

ROHM
SEMICONDUCTOR

INDUSTRIAL

PRODUCT CATALOG **Ver. 2.0**





ROHM supports further innovations in industrial equipment through high quality, high reliability and stable long-term supply

Based on our objective of 'Quality First' established since our founding, ROHM provides ICs, discretes, and modules featuring superior quality and reliability in a wide range of fields, from industrial equipment and automotive systems to commercial and IT devices.

At ROHM we are strengthening our approach for the industrial market by focusing on developing new, innovative products that contribute to greater power conservation, safety, security, and miniaturization in areas ranging from factory automation and energy to infrastructure (base stations, servers, etc.).

Supporting product development is our 'vertically integrated production system', in which all processes, from development to production, are carried out within the ROHM Group. This symbolizes ROHM's commitment to prioritize quality over everything, which has been a part of our DNA since the beginning. High quality manufacturing throughout all processes makes it possible to achieve long-term supply and reliability required in the industrial equipment sector by providing reliable traceability and optimizing the entire supply chain.

The ROHM Group is committed to providing greater reliability and peace of mind by advancing technological innovation in the industrial equipment sector through increased quality and implementing product development that meets customer and market needs.

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Technology

High-reliability production and proven technologies support the rapidly evolving industrial equipment market



ROHM promotes the development of innovative products that achieve higher speed, increased miniaturization, greater energy savings, and improved efficiency in the industrial equipment sector by combining technologies cultivated in the consumer and automotive markets.

In addition, a highly integrated production system makes it possible to provide a stable supply of high quality products that meet the rapidly evolving needs of the industrial equipment market.

High Quality

- Vertically integrated production system
- Traceability

Stable Supply [Over 10 years]

- Reliable BCM (Business Continuity Management) system
- On-time delivery
- Long-term supply
- Sales system that provides optimized support

Technological Capability

- High efficiency high reliability ICs leveraging analog power technology
- Cutting-edge power devices
- Broad lineup ranging from ICs to modules

Lineup

Providing total solutions through a wide portfolio of products including ICs and modules

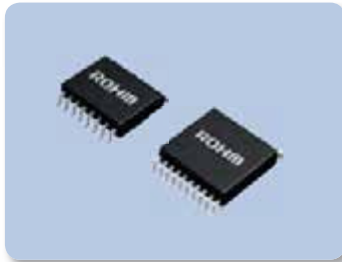


ROHM offers a wide lineup, from passive devices and discretes to ICs and modules, making it possible to propose solutions at the system level.

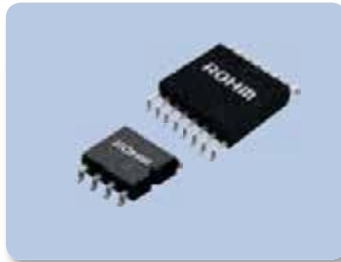
And the ROHM Group will continue to leverage its strengths to provide optimized solutions tailored to customer sets.

ICs

Power Management ICs



Driver ICs



- Memory
- Amplifiers & Linear
- Power Management/Power Supply ICs
- Clocks & Timers
- Switch & Multiplexer & Logic
- Data Converter
- Sensors & MEMS
- Display Driver
- Motor/Actuator Driver
- Interface
- Communication LSI (LAPIS)

- Audio & Video
- Speech Synthesis LSI (LAPIS)
- Microcontroller (LAPIS)



Power Devices/Discrete Semiconductors/Passive Devices/Opto Devices/Modules

SiC Power Devices

- SiC Schottky Barrier Diodes
- SiC MOSFETs
- SiC Power Modules



Discrete Semiconductors

Transistors



Diodes



Opto Devices

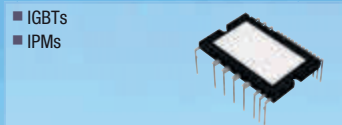
LEDs



- LED Displays
- Laser Diodes
- Optical Sensors

Power Devices

- IGBTs
- IPMs



Passive Devices

Resistors



Tantalum Capacitors



Power Modules

- Power Supply Modules
- Wireless Modules
- Contact Image Sensor Heads

Thermal Printheads



- Battery-Free Wireless Communication Modules (EnOcean)

Quality

Ensuring high quality and stable supply through a vertically integrated production system

High Quality Raw Materials

Complete wafer production, from silicon ingot pulling



Silicon ore

Silicon Ingot



Si
Silicon

SiC
Silicon
carbide

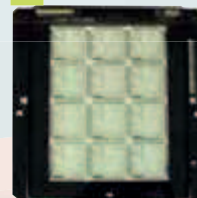
In-house photomask

Pursuing high quality through integrated quality control, from IC chip design layout to photomask production

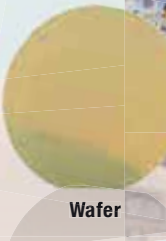
CAD



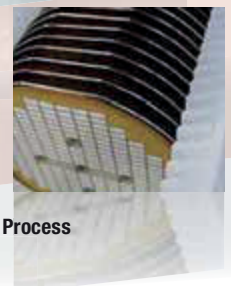
Photo Mask



Wafer



Wafer Process



SiCrystal

A ROHM Group Company

SiCrystal, a German-based SiC single crystal wafer manufacturer, became a member of the ROHM Group in 2009

High Quality

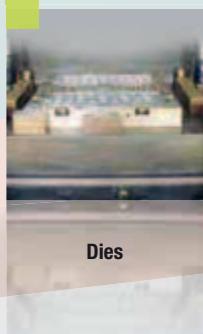
Achieving high quality in all processes

ROHM considers "quality first" as its company objective and unwaveringly pursues this goal. Through our vertically integrated production system the Group implements production, sales, and service - including design, development, and wafer fabrication - and are working on initiatives to improve quality in all processes. This also results in excellent traceability and establishes a system that ensures worry-free use of our products.

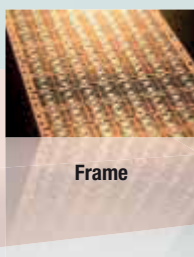


In-house dies and lead frames

To ensure quality, all dies for lead frame punching, lead frames, and even molds are produced in-house



Dies



Frame



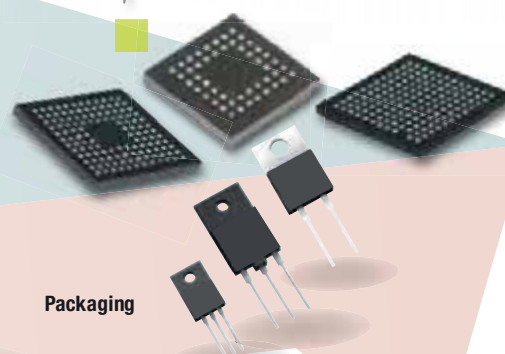
Assembly Line



All production equipment is developed in-house

State-of-the-art packages

Utilizing the latest assembly technology for CSP, BGA, COC, COF and stacked packages



Packaging

Stable Supply

Meeting supplier requirements through the collective efforts of the entire group

The ROHM Group meets supplier responsibilities for requested products by leveraging its strengths and thoroughly understanding market conditions.

By managing the manufacturing process in-house using our vertically integrated production system, we are able to create a system that is less susceptible to external factors compared with general fabless and foundry manufacturers. We have established a BCM (Business Continuity Management) system that involves securing appropriate inventory and carrying out multi-site production, and endeavor to ensure a stable supply to customers.

Stable Supply

Ensuring stable supply for the industrial equipment market

Stable long-term supply

ROHM offers stable, long-term product supply for the industrial equipment market.

Long-term supply required for industrial equipment over 10 years is provided.

Note: Supply will be ensured unless an unforeseen event or natural disaster occurs, at which time ROHM will consult with the customer to determine the best course of action.

Fulfilling supplier responsibilities through risk management

We conduct thorough BIA (Business Impact Analysis) at all our sites and hedge risks based on production stoppages and number of shutdown days.

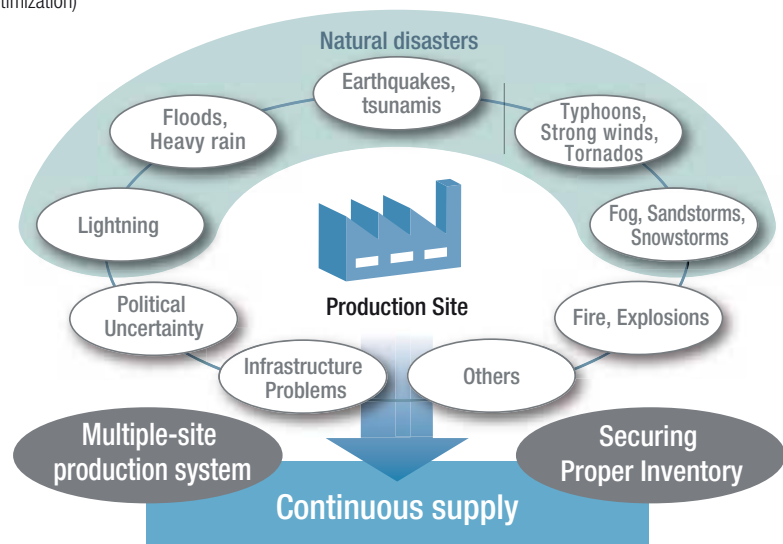
Multi-Site Production System

(Production performed at multiple locations will make it impossible to be affected by external factors at the same time)

Emergency safety stock

(Inventory Optimization)

The ROHM Group manages all production processes based on a comprehensive, vertically-integrated in-house production system that, unlike fabless and foundry manufacturers, is not easily affected by external factors in order to guarantee stable supply.



Risk Verification at Each Facility

ROHM Integrated Systems (Thailand) Co., Ltd. (Post-processing) Example

	Risks	Past Shutdown Cases	Occurrence Frequency (A)					Stoppage Period (B)					Overall Determination (A) X (B)	Basis for Countermeasures/ No Countermeasure
			Past Occurrence/ Future Forecast/ 3 Points	No Past Occurrence/ Future Forecast/ 2 Points	Priority 1 Point	None 0 Points	1 to 14 Days 5 Points	15 to 30 Days 2 Points	31 to 60 Days 1 Point	61 to 90 Days 0 Points	91 to 120 Days 0 Points	121 to 150 Days 0 Points		
Natural Disaster	Earthquake	Risk in the vicinity of Bangkok is small			•					•			0 Points	No earthquakes have occurred near Bangkok
	Typhoon/Tornado	Averages 4 typhoons per year, followed by significant damage due to subsequent flooding	•							•			0 Points	Although typhoons occur, there is no direct impact to the factory from wind and rain; the employee dormitory is close, and production is unlikely to be affected
	Lightning		•							•			0 Points	Power outage for a few minutes due to lightning in the vicinity while switching power supply
	Flood	Flood damage 43 days since 10/15/2011	•						• (7 days)				3 Points	Construction of the embankment at Nava Nakorn has started. Raising auxiliary facilities and installing production equipment on the 2nd floor are being performed.
	Heavy Rain		•							•			0 Points	Although there was flooding of Building A due to torrential rain, there was no flooding at the factory.
	Mist/Yellow Dust/ Heavy Snow	None		•						•			0 Points	There is no danger at RIST
	Tsunami	None				•				•			0 Points	The plant is more than 80km from the sea, and there are few earthquakes that will cause a tsunami

Risk check at all factories

Plant	Products	Greatest Stoppage Risk	No. of Stoppage Days
RIST (Thailand)	LSI/TR/D/PM/IGBT/R/TC/SiC/S	Flooding	7
REP (Thailand)	LSI/TR/D/R	Earthquake	7

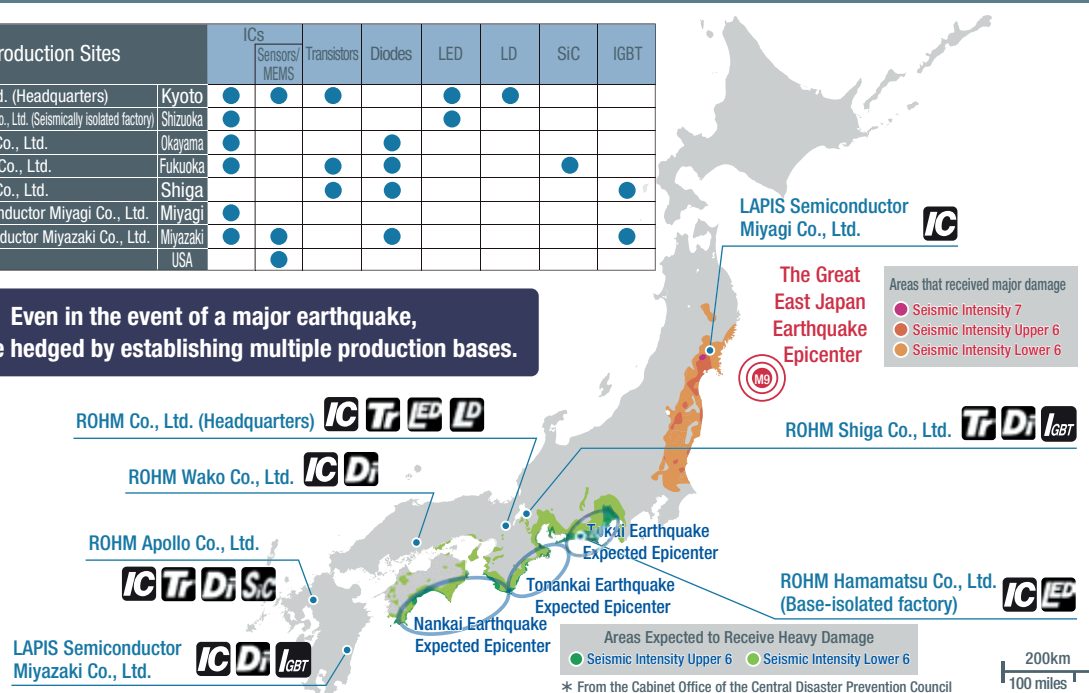


Multi-Site Production

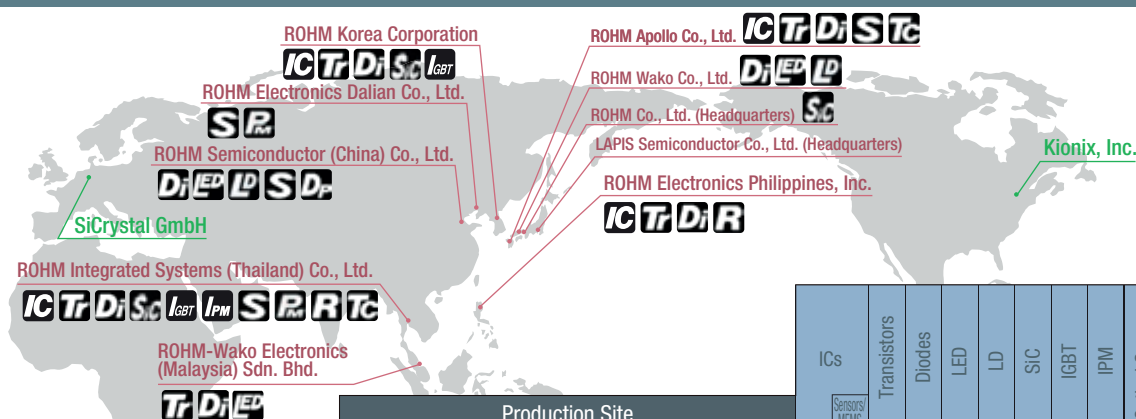
Pre-processing (wafer)

Production Sites		ICs						
		Sensors/ MEMS	Transistors	Diodes	LED	LD	SiC	IGBT
ROHM Co., Ltd. (Headquarters)	Kyoto	●	●		●	●		
ROHM Hamamatsu Co., Ltd. (Seismically isolated factory)	Shizuoka	●			●			
ROHM Wako Co., Ltd.	Okayama	●		●				
ROHM Apollo Co., Ltd.	Fukuoka	●	●	●			●	
ROHM Shiga Co., Ltd.	Shiga		●	●				●
LAPIS Semiconductor Miyagi Co., Ltd.	Miyagi	●						
LAPIS Semiconductor Miyazaki Co., Ltd.	Miyazaki	●		●				●
Kionix	USA		●					

Even in the event of a major earthquake, risks are hedged by establishing multiple production bases.



Post-processing (assembly)



Production Site		ICs											
		Sensors/ MEMS	Transistors	Diodes	LED	LD	SiC	IGBT	IPM	Optical Sensors	LED Displays	Modules	Resistors
ROHM Co., Ltd. (Headquarters)	Kyoto												
ROHM Wako Co., Ltd.	Okayama												
ROHM Apollo Co., Ltd.	Fukuoka	●	●	●	●	●				●			●
LAPIS Semiconductor Miyazaki Co., Ltd.	Miyazaki	●											
ROHM Integrated Systems (Thailand) Co., Ltd.	Thailand	●	●	●	●	●	●	●	●	●	●	●	●
ROHM Electronics Philippines, Inc.	Philippines	●	●	●	●	●	●	●					●
ROHM-Wako Electronics (Malaysia) Sdn. Bhd.	Malaysia		●	●	●	●							
ROHM Korea Corporation	Korea	●	●	●	●	●	●	●					
ROHM Semiconductor (China) Co., Ltd.	China Tianjin			●	●	●				●	●		
ROHM Electronics Dalian Co., Ltd.	China Dalian									●		●	

As of October 2018



Factory Automation

ROHM supports device requirements in the FA market with a variety of new technologies centered on greater energy savings, improved speed and performance, and increased miniaturization

P.11



Energy

ROHM offers optimized system-level devices for EMS, including HEMS, BEMS, and FEMS.

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Infrastructure

ROHM power devices contribute to increased energy efficiency, greater compactness, and reduced noise.

P.19



Block Diagrams

FACTORY AUTOMATION

PLC (Programmable Logic Controller)	P.11
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HMI (Human Machine Interface)	P.14
Machine Health Monitoring	P.15

ENERGY

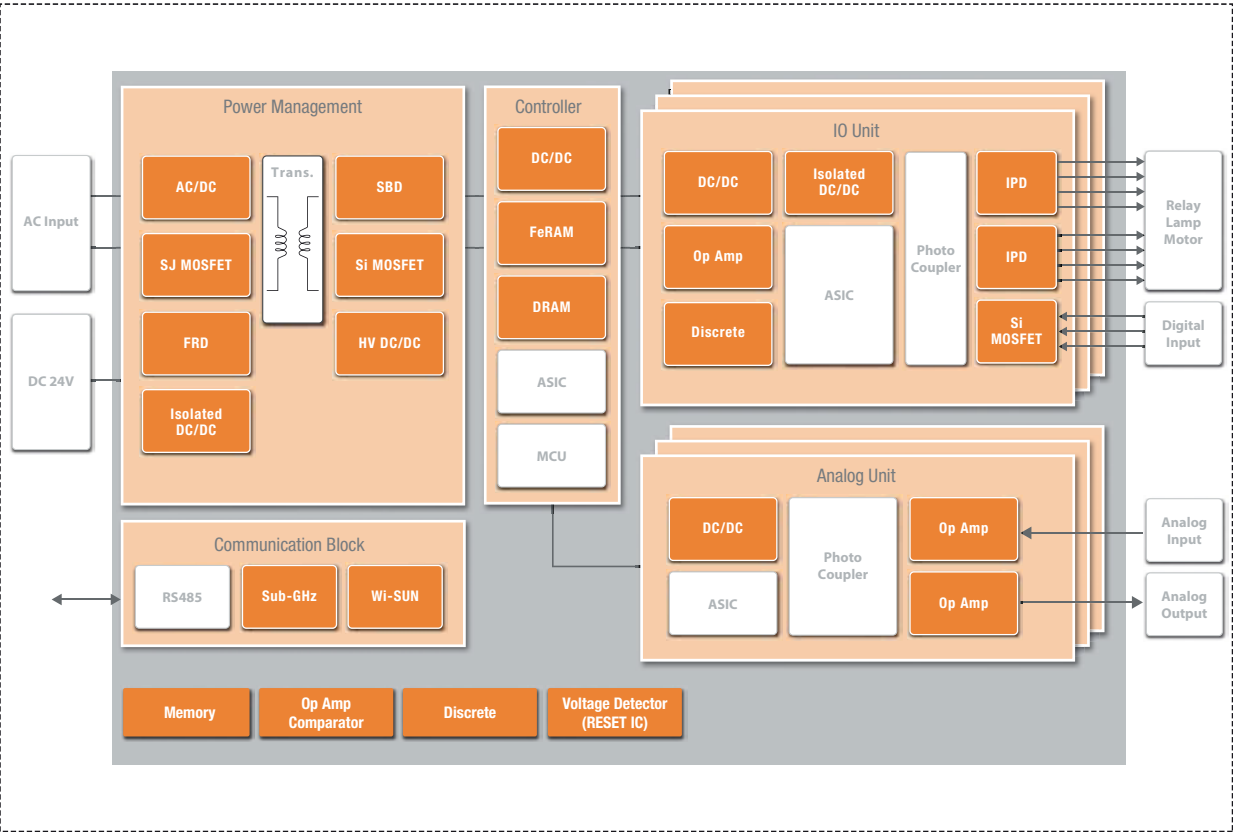
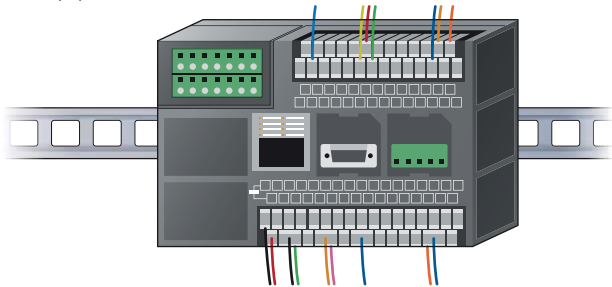
Solar Inverter	P.16
BMS (Battery Management System)	P.17
Electricity Smart Meter	P.18

INFRASTRUCTURE

Base Station	P.19
Server.....	P.20
EV Charger	P.21
PSU (Power Supply Unit)	P.22
UPS (Uninterruptible Power Supply)	P.23

PLC (Programmable Logic Controller)

A PLC is a computerized device that utilizes programs to give commands to input/output equipment, control sequences, etc. It is used to control automated control equipment in factories and for various machine controls. ROHM offers a lineup of power ICs for power supply systems for industrial equipment, IPDs (Intelligent Power Devices) with multiple protection circuits, and isolated ICs that contribute to improved miniaturization, power conservation, and safety.



Featured Products

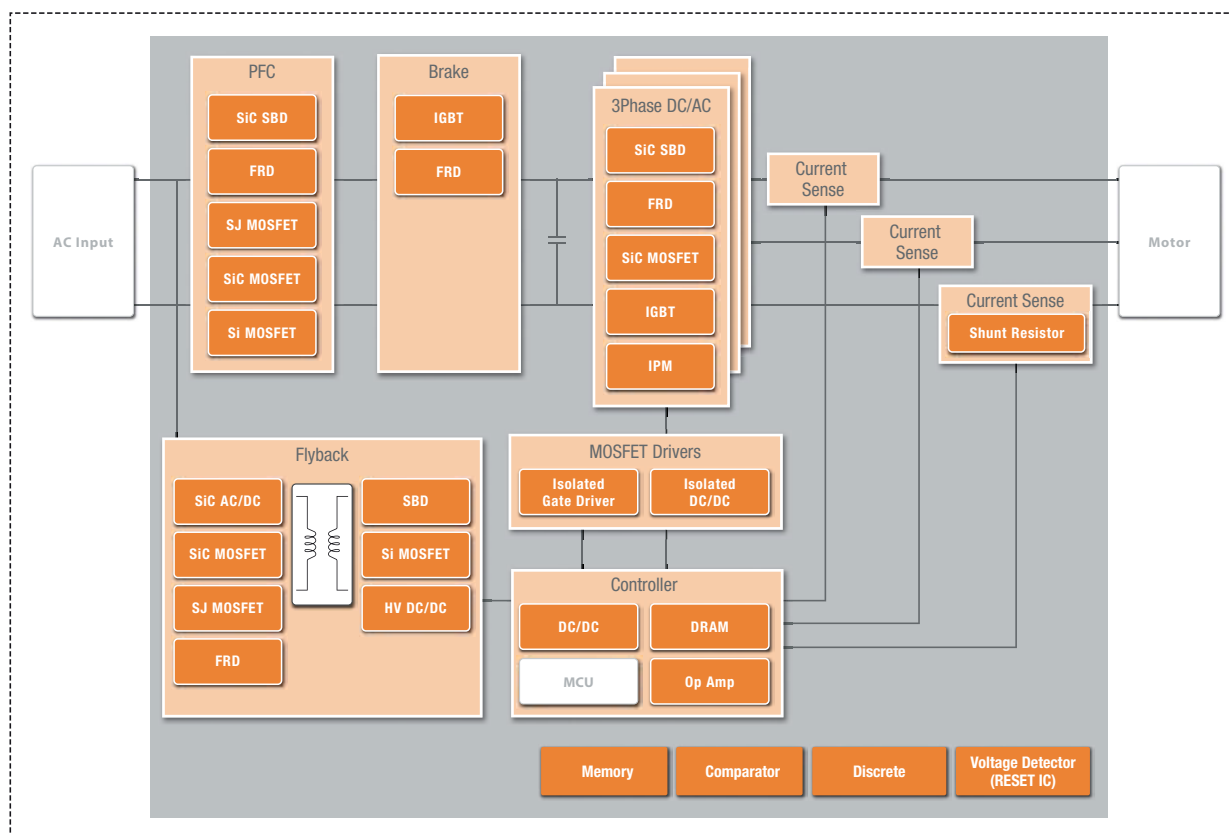
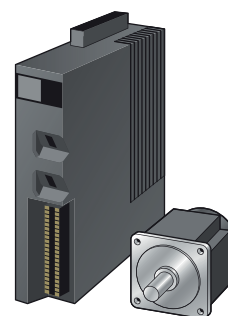
IPD	P.26	AC/DC	P.27	SJ MOSFET	P.31	Si MOSFET	…P.32
						SBD	…P.32
						Sub-GHz	…P.42
						Wi-SUN	…P.43
FRD	P.33	Isolated DC/DC	P.37	HV DC/DC	P.38		
DC/DC	P.39	FeRAM	P.41	DRAM	P.41		

Inverter/AC Servo

An inverter/AC servo is a device for rotating and controlling motors,

and is often adopted for FAN control as well as in various other industrial equipment, such as machine tools.

In addition to power supply ICs optimized for the power supply systems of industrial equipment, ROHM offers power devices and isolated ICs that contribute to greater miniaturization, energy savings, and safety.



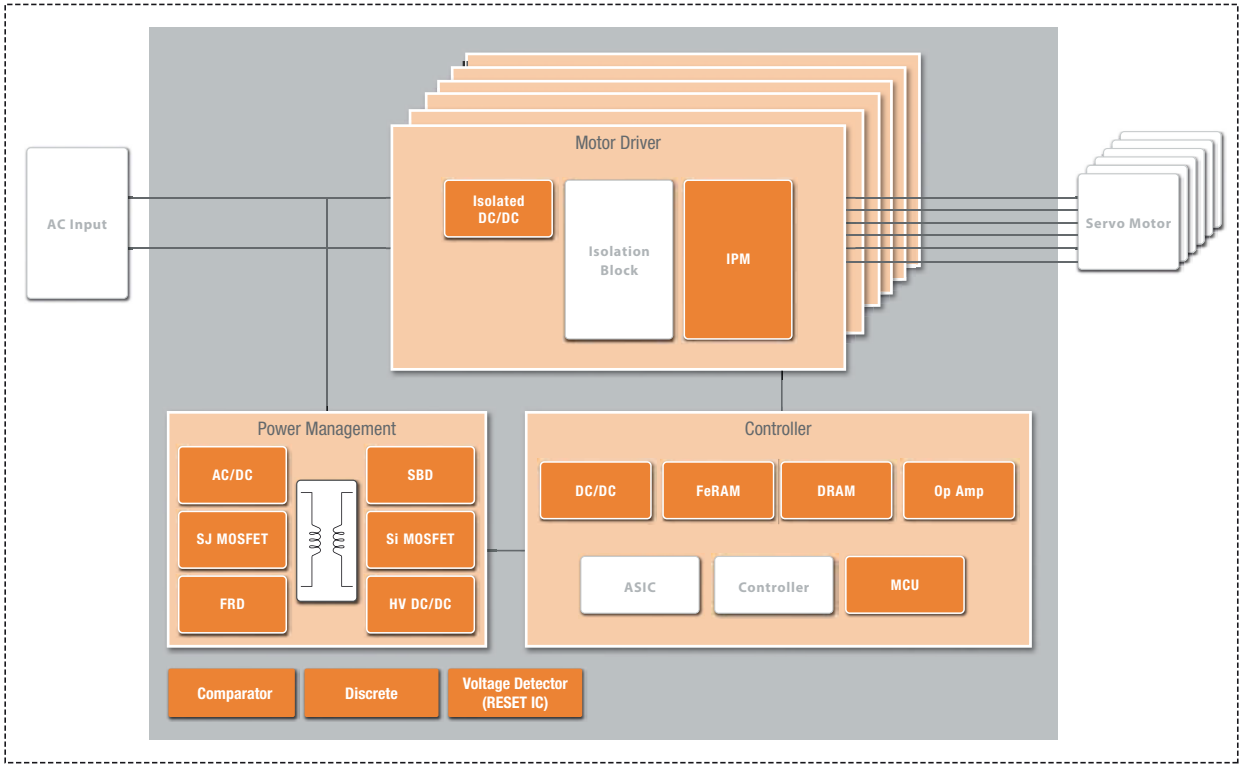
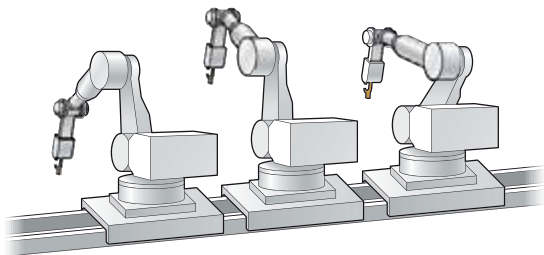
Featured Products

IPM..... P.25	SiC AC/DC..... P.28	SiC MOSFET P.29
SiC SBD..... P.30	SJ MOSFET..... P.31	FRD P.33
Isolated Gate Driver P.36	Isolated DC/DC P.37	HV DC/DC P.38

IGBT	...P.26
Si MOSFET	...P.32
SBD	...P.32
Shunt Resistor	...P.34
DC/DC	...P.39
DRAM	...P.41

Robot

Industrial robots are devices that help improve productivity and safety, and are essential for factory automation. ROHM offers a lineup of power ICs for power supply systems for industrial equipment as well as single-chip IPMs (Intelligent Power Modules) that contribute to greater miniaturization, energy efficiency, and safety in power devices and drive circuits.



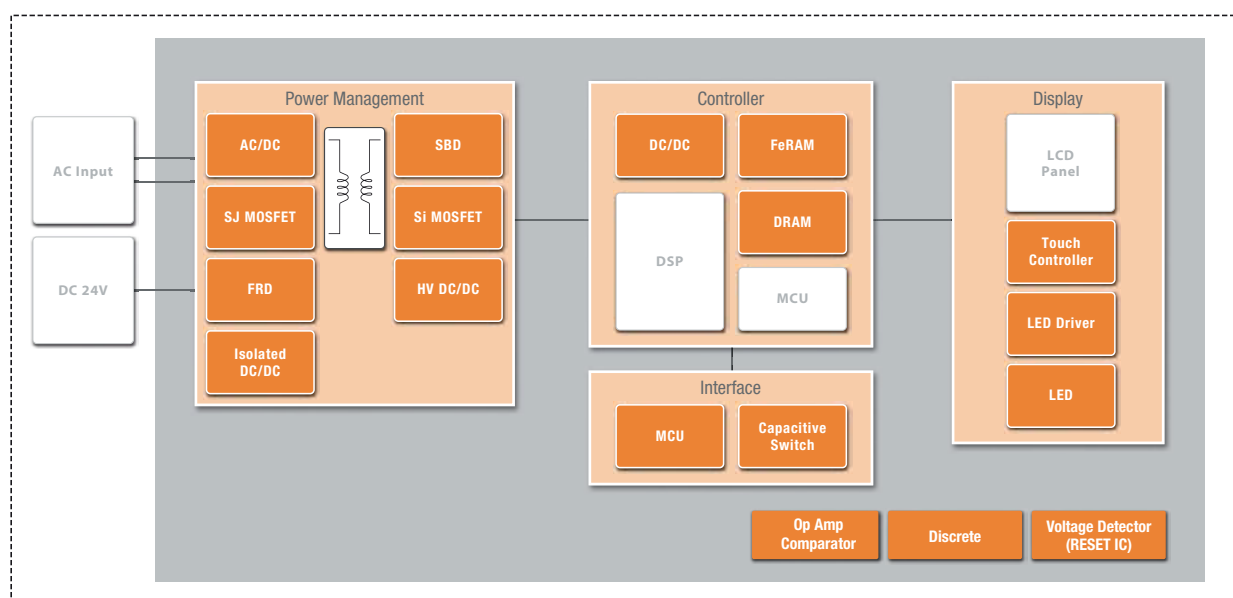
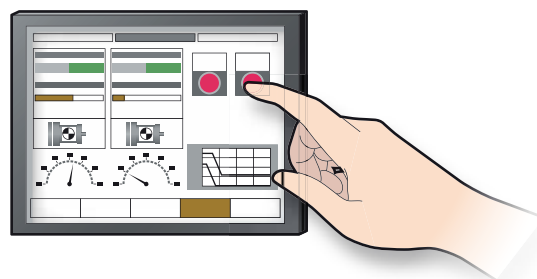
Featured Products

IPM..... P.26	AC/DC..... P.27	SJ MOSFET..... P.31	FeRAM.....P.41
			DRAM.....P.41
FRD..... P.33	Isolated DC/DC P.37	HV DC/DC P.38	
DC/DC P.39	MCU..... P.41	Op Amp P.44	

HMI (Human Machine Interface)

A HMI (Human Machine Interface) is a device that links humans with industrial equipment, and consists of display functions and input functions using a touch panel.

ROHM provides touchscreen controller ICs, power supply ICs, and small signal devices that ensure a smooth interface between humans and industrial equipment.



Featured Products

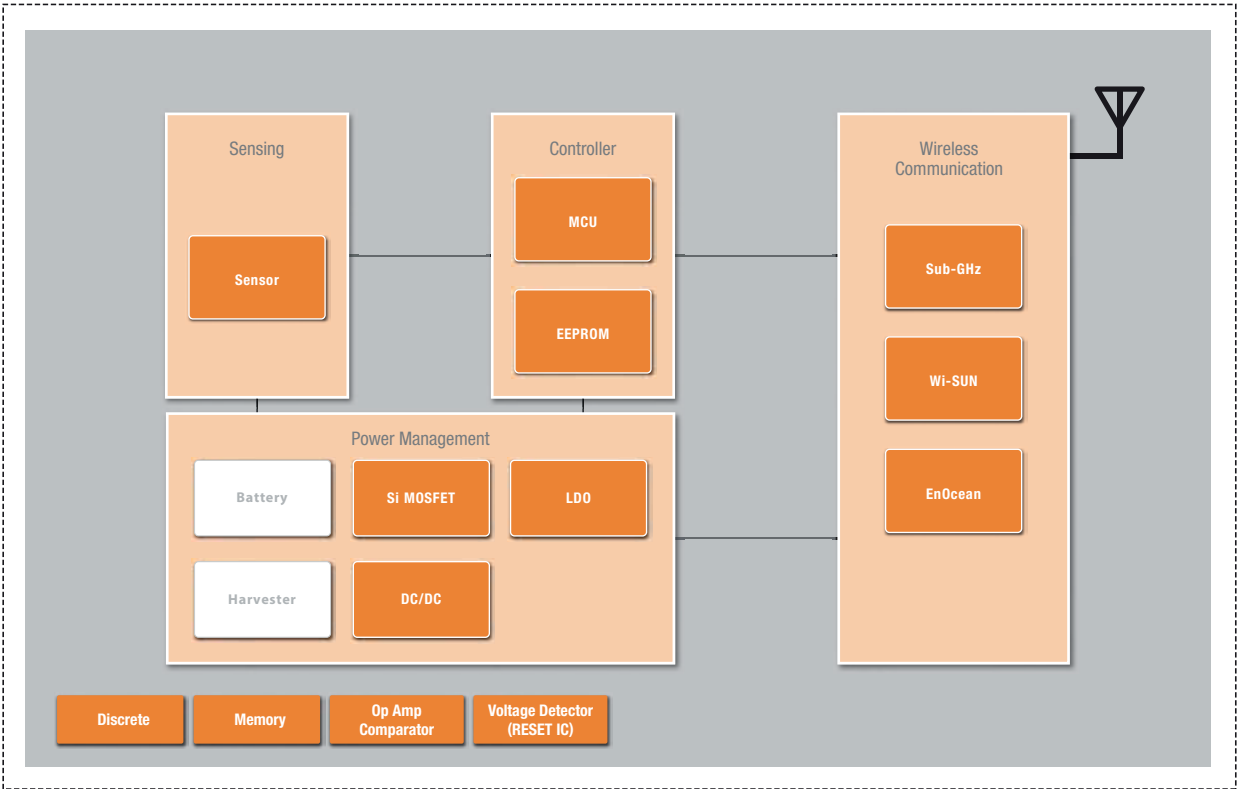
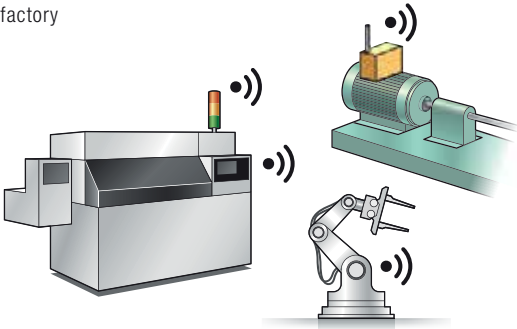
AC/DC..... P.27	SJ MOSFET..... P.31	FRD P.33
Isolated DC/DC P.37	HV DC/DC P.38	DC/DC P.39
Touch Controller..... P.46	Capacitive Switch..... P.46	LED P.103

Si MOSFET	...P.32
SBD	...P.32
MCU	...P.41
FeRAM	...P.41
DRAM	...P.41

Machine Health Monitoring

Under the header of Industry 4.0, moves to innovate the manufacturing industry by leveraging advanced technologies such as AI (Artificial Intelligence) and IoT (Internet of Things) are trending on a global scale. As such, Machine Health Monitoring solutions that prevent equipment failures by monitoring environmental conditions and equipment status within the factory are becoming increasingly important.

The ROHM Group has developed a broad lineup of sensors, wireless devices/modules compatible with a variety of wireless standards, and low-power MCUs that provide added value in terms of wireless capability and low power consumption for sensor-equipped terminals used in smart factories.



Featured Products

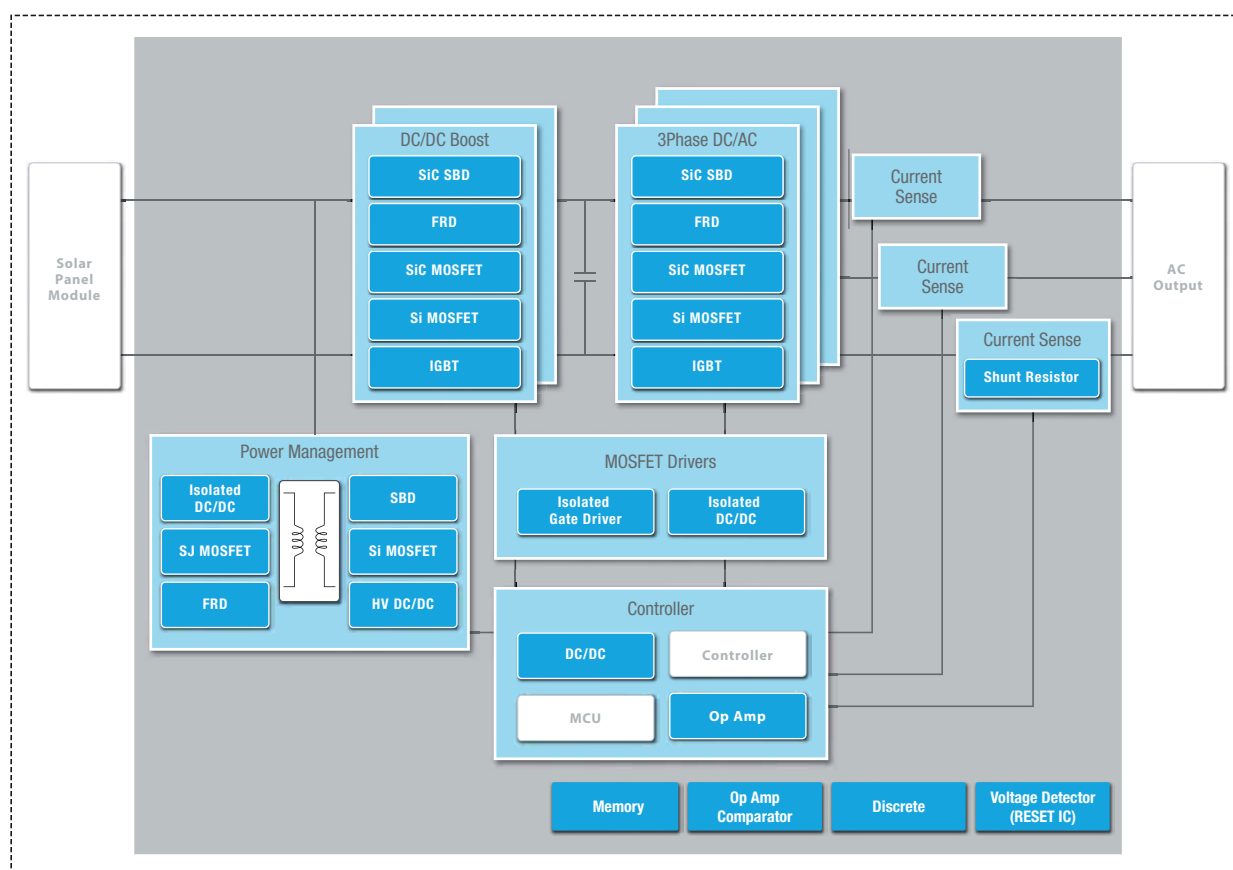
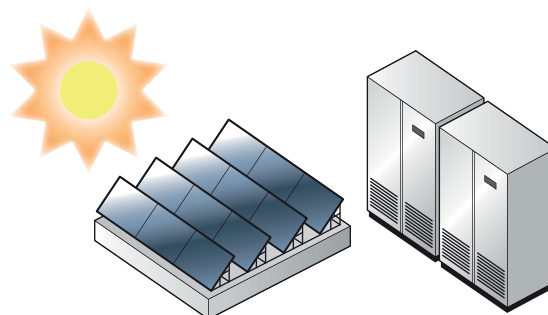
Si MOSFET.....	P.32	DC/DC	P.39	MCU	P.41
EEPROM	P.41	Sub-GHz	P.42	Wi-SUN	P.43
EnOcean.....	P.43	Sensor.....	P.44		45

Solar Inverter

A solar inverter is a device that converts DC energy generated by solar panels into AC energy.

It consists of a converter block that boosts the voltage of each string connecting the solar panels in series and an inverter block for converting to AC.

ROHM proposes power device solutions including IGBTs and SiC along with gate drivers for inverter and converter configurations that contribute to greater miniaturization and higher efficiency.



Featured Products

SiC MOSFET P.29	SiC SBD P.30	SJ MOSFET..... P.31
SBD P.32	FRD P.33	Isolated Gate Driver P.36
Isolated DC/DC P.37	HV DC/DC P.38	DC/DC P.39

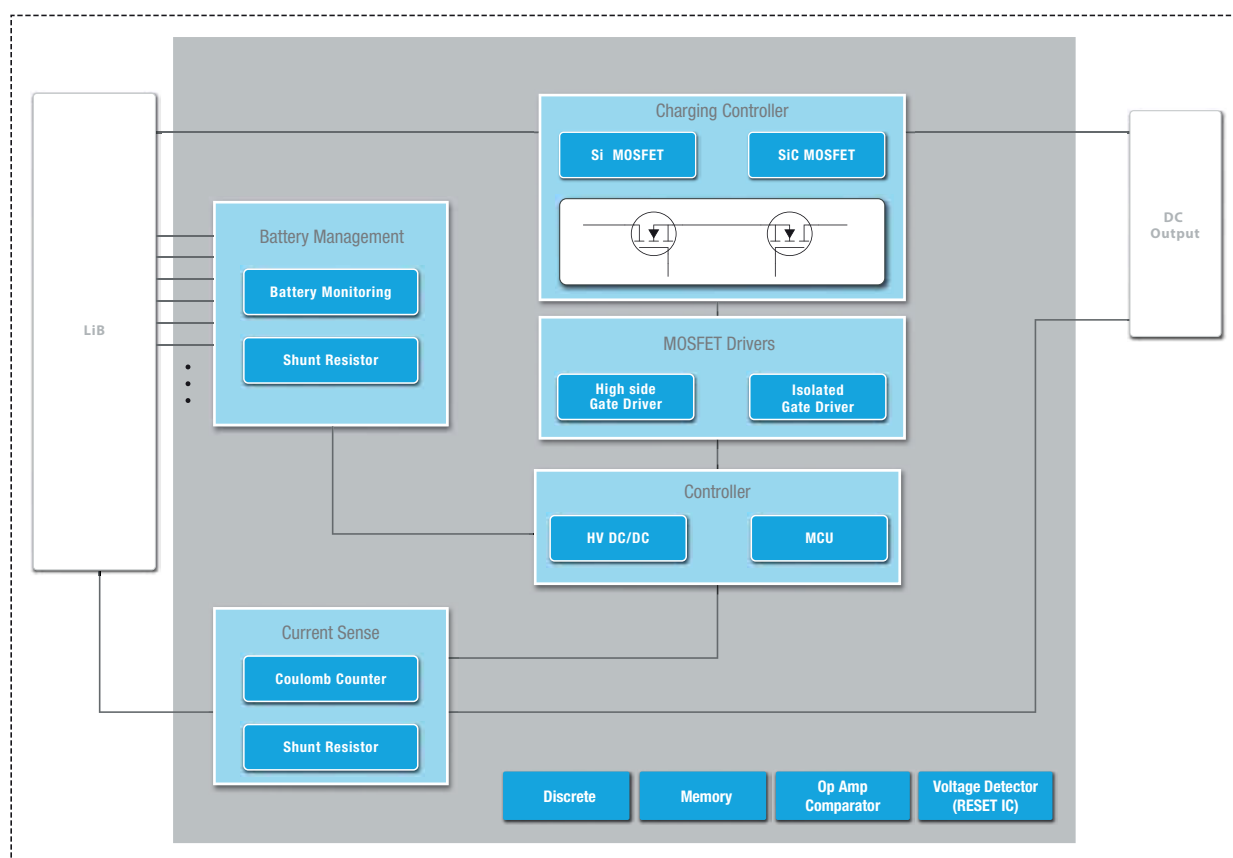
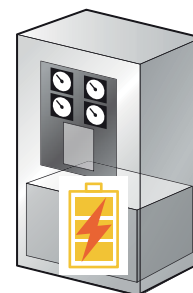
IGBT	...P.30
Si MOSFET	...P.32
Shunt Resistor	...P.34
MCU	...P.41

BMS (Battery Management System)

Power storage systems that utilize large capacity li-ion batteries are spreading in popularity along with renewable energy.

Compatibility with high-voltage systems is required in order to increase power storage capacities by connecting multiple battery cells in series.

A broad lineup is available that includes battery monitoring ICs that incorporates cell voltage and current monitoring functions for up to 16 cells in series, large current high accuracy Coulomb counters, high voltage gate drivers, and power supply ICs that enable configuration of high performance, high precision battery management systems.



Featured Products

SiC MOSFET..... P.29 Si MOSFET..... P.32 Shunt Resistor..... P.34

High Side Gate Driver P.35 Isolated Gate Driver..... P.35 HV DC/DC..... P.38

MCUP.41 Battery MonitoringP.47 Coulomb Counter P.48

Electricity Smart Meter

Smart meters are next-generation power meters with built-in communications functions.

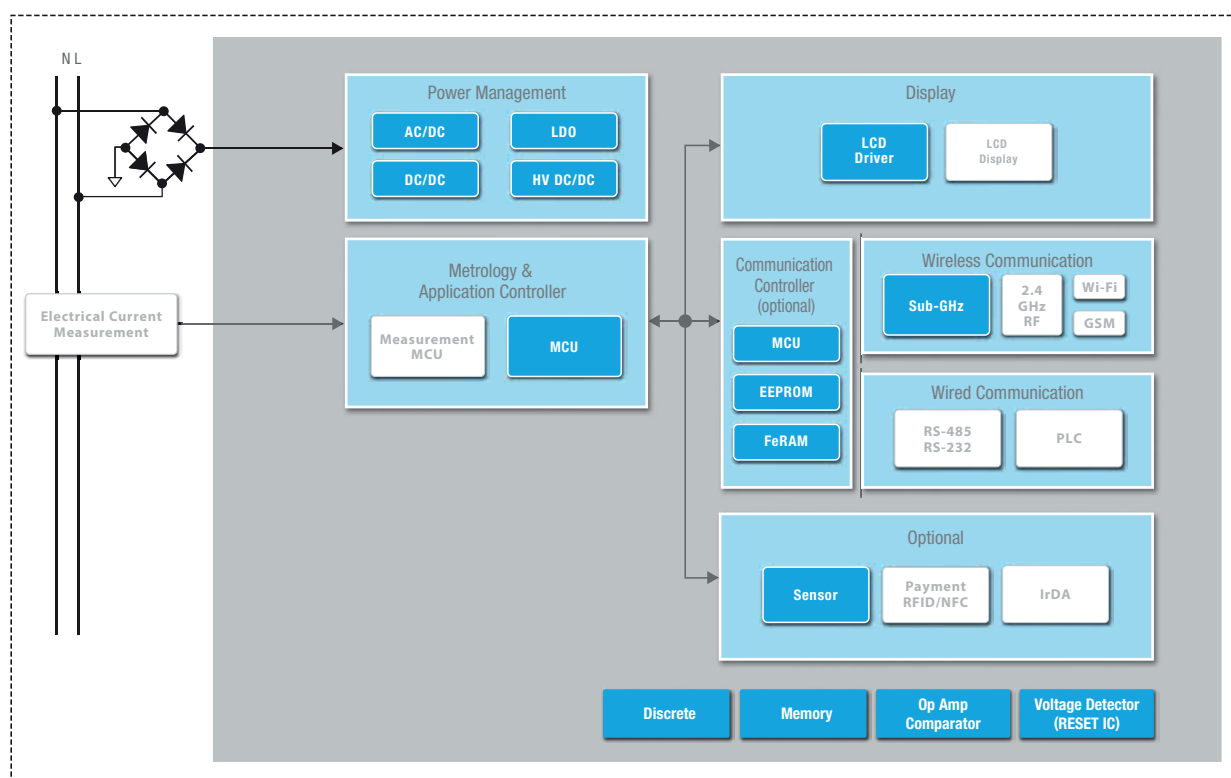
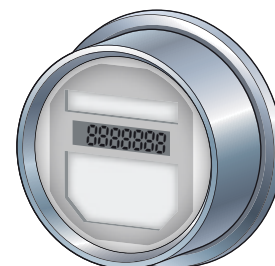
Unlike conventional analog induction type power meters, they can measure power consumption digitally and send data to remote locations.

The ROHM Group offers a wide product lineup, including specified low-power wireless communication

ICs compatible with various wireless communication protocols,

MCUs necessary for system configuration, power ICs, memory, and more,

making it possible to propose solutions for the entire system.



Featured Products

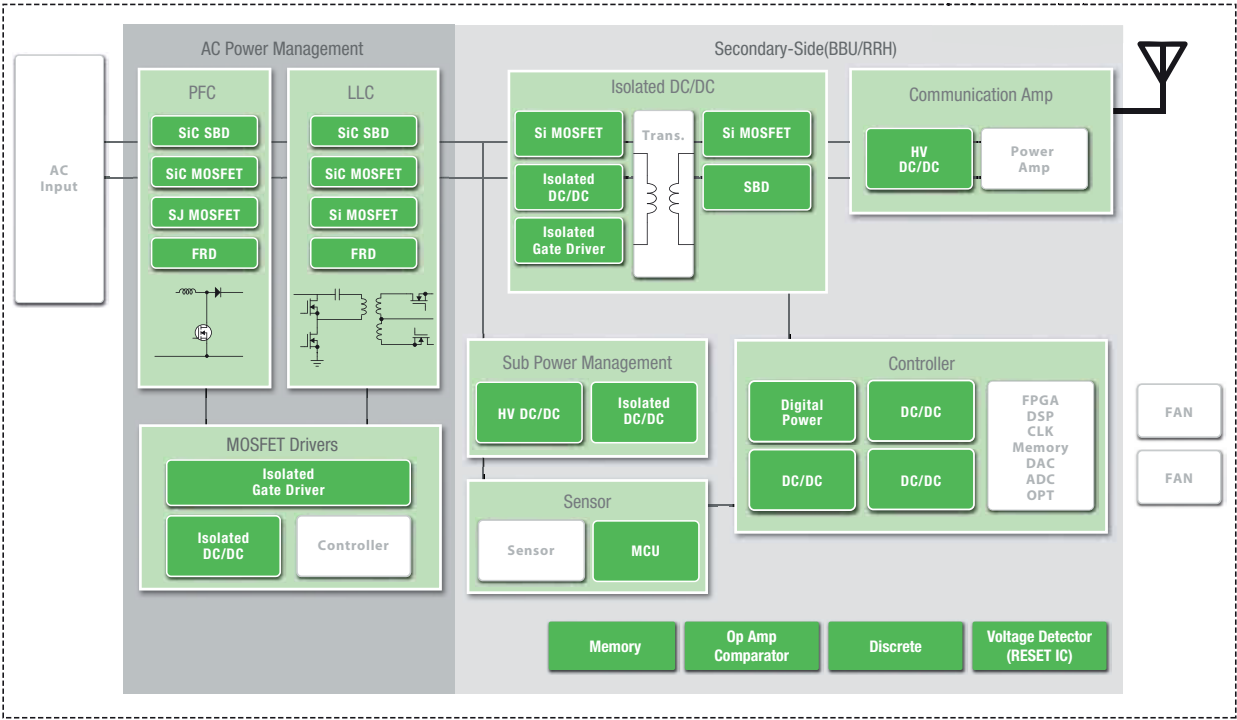
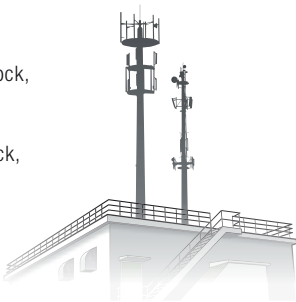
AC/DC..... P.27 HV DC/DC P.39 DC/DC P.39

MCU P.41 FeRAM..... P.41 EEPROM P.41

Sub-GHz P.42 Sensor..... P.44 · 45

Base Station

Base stations are infrastructure equipment that are used to construct wireless communication networks, such as those for mobile phones. They perform wireless recovery modulation, packet processing, and other large-capacity signal processing operations. Divided into units called cells, they are classified over coverable ranges from macro cells to femto cells. The number of simultaneously processable terminals differs for each class. They consist of a power device block for supplying power to the base station, a wireless communication block, and a signal processing block. ROHM offers a lineup of high voltage MOSFETs and high efficiency DC/DC converter ICs usable in each block, providing solutions that contribute to reduced consumption.



Featured Products

SiC MOSFET..... P.29	SiC SBD..... P.30	SJ MOSFET..... P.31	Si MOSFET.....P.32
SBD..... P.32	FRD P.33	Isolated Gate Driver..... P.36	DC/DCP.39
Isolated DC/DC..... P.37	HV DC/DC..... P.38	Digital Power..... P.40	MCUP.41

Server

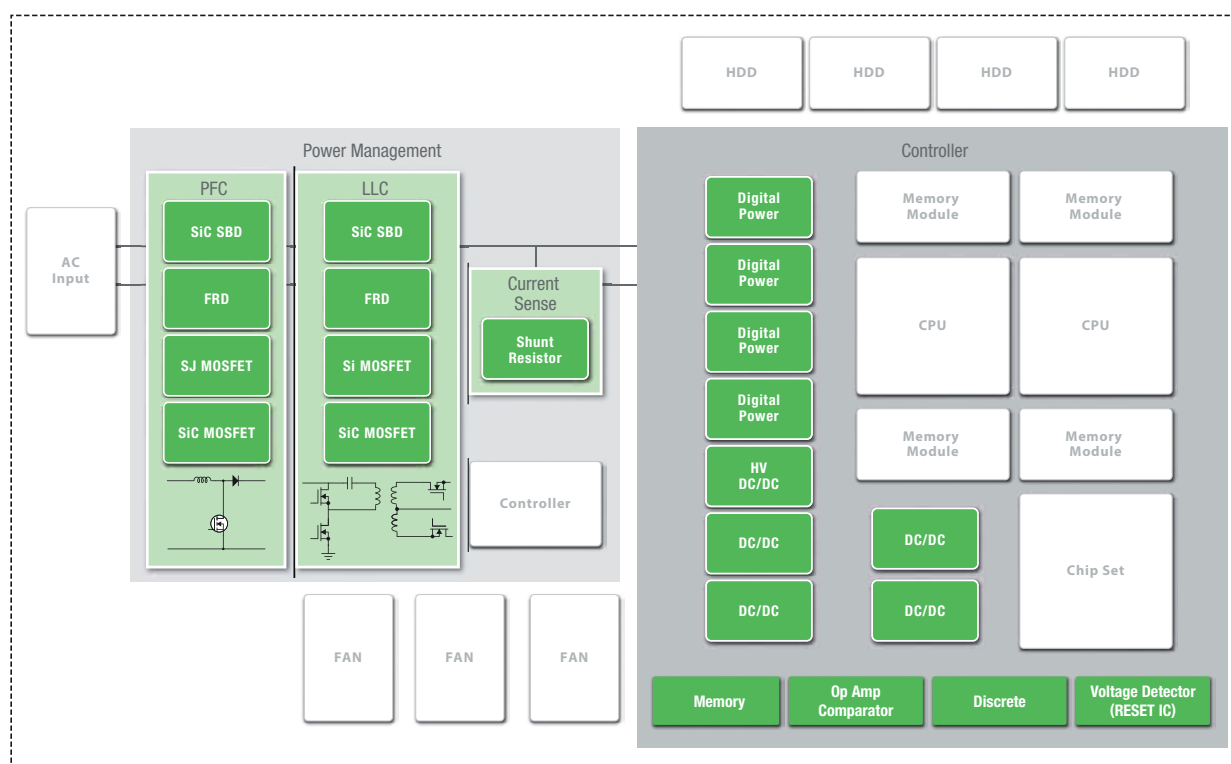
Servers are high-performance computers used for high-speed arithmetic processing in data centers.

They are comprised of high-performance processors, high-speed memory, and chipsets.

CPUs and FPGAs have low-voltage cores that consume large currents, and because of their high-density structure, they require high efficiency power supply control and power devices.

For the peripheral circuitry, we provide digital power supplies and low voltage DC/DC converters.

In addition, we offer power devices such as SiC, shunt resistors, and a wide range of power supply IC solutions geared for AC/DC power supply systems, contributing to lower consumption in server applications.



Featured Products

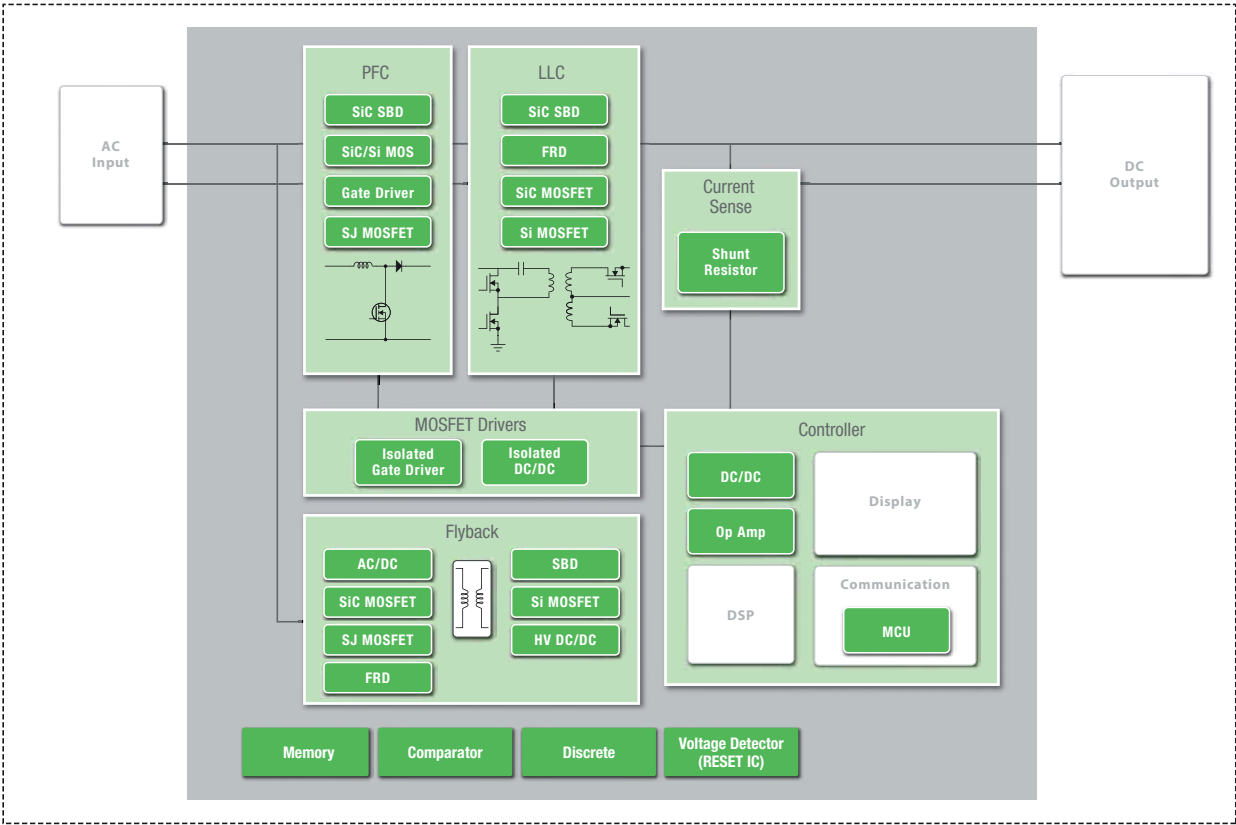
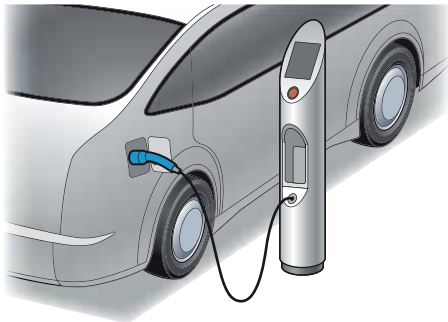
SiC MOSFET P.29 SiC SBD P.30 SJ MOSFET..... P.31

Si MOSFET..... P.32 FRD P.33 Shunt Resistor..... P.34

HV DC/DC P.38 DC/DC P.39 Digital Power P.40

EV Charger

EV Chargers are facilities and equipment (plug-in outlets, etc.) used to charge electric vehicles (EV) and plug-in hybrid vehicles (PHV). Charging equipment can be divided into ordinary chargers that take 5 to 24 hours for charging (home-use charging equipment via AC outlets, charging facilities at shopping centers, etc.) and rapid chargers that can charge in dozens of minutes (i.e. expressway PA areas). For rapid charging facilities, high frequency switching is required to minimize equipment size and weight while ensuring high efficiency. ROHM meets these needs with high-power devices and driver ICs.



Featured Products

AC/DC..... P.27	SiC MOSFET P.29	SiC SBD P.30	Si MOSFETP.32
			SBDP.32
			Shunt ResistorP.34
			DC/DCP.39
			MCUP.41
SJ MOSFET..... P.31	FRD P.33	Isolated Gate Driver P.36	
Isolated DC/DC P.37	HV DC/DC P.38	Op Amp P.44	

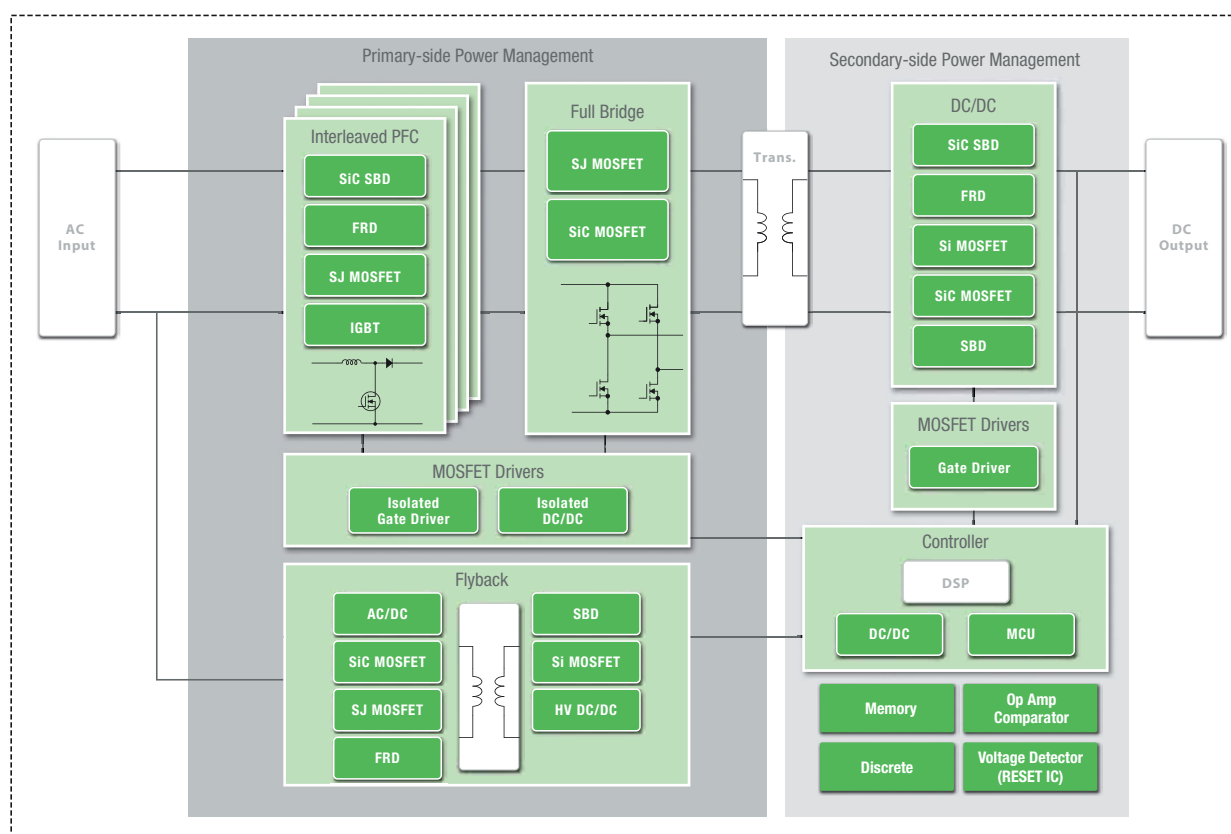
PSU (Power Supply Unit)

Power supply units produce anywhere from several hundred to several kW, such as those used in commercial AC power supplies.

The main block is divided into four parts: a power efficiency improvement block, main power supply block, auxiliary power supply block, and secondary side control.

The power efficiency improvement and main power supply blocks in particular require high efficiency to provide high power output.

ROHM offers a broad lineup centered on cutting-edge SiC power devices, including high voltage MOSFETs low ON-resistance MOSFETs, driver ICs, and controllers that allow users to achieve smaller, more efficient power supply solutions.



Featured Products

AC/DC P.27

SiC MOSFET..... P.29

SiC SBD..... P.30

IGBTP.30

Si MOSFETP.32

SJ MOSFET..... P.31

FRD P.33

High Side Gate Driver..... P.35

SBDP.32

DC/DCP.39

MCUP.41

Isolated Gate Driver..... P.36

Isolated DC/DC..... P.37

HV DC/DC..... P.38

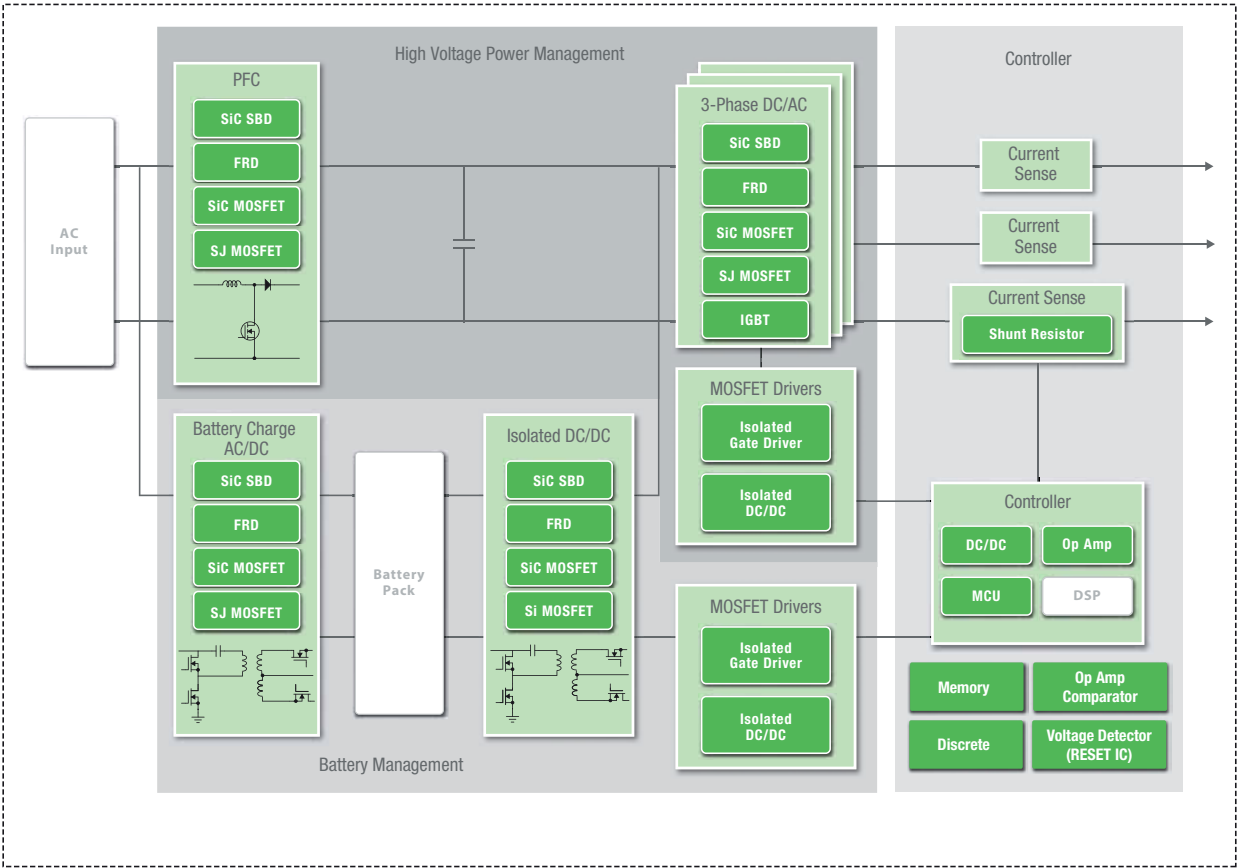
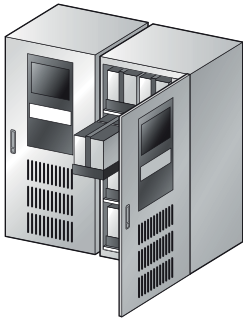
UPS (Uninterruptible Power Supply)

UPS (Uninterruptible Power Supply) are devices used to prevent entire systems from shutting down when instantaneous power failures occur due to lightning strikes or other unexpected events.

Even if the main power supply is cut off, power can be supplied from the UPS, enabling stable processing without stopping system operations.

Inside the UPS is a storage battery block, charge control block, and inverter circuit for supplying power from the UPS.

ROHM's broad lineup includes IGBTs optimized for increasing the efficiency of inverter circuits, high voltage MOSFETs, and AC/DC controllers that contribute to greater miniaturization and higher efficiency.



Featured Products

SiC MOSFET..... P.29	SiC SBD..... P.30	SJ MOSFET..... P.31	IGBT.....P.30
			Si MOSFET.....P.32
FRD..... P.33	Shunt Resistor..... P.34	Isolated Gate Driver..... P.36	
Isolated DC/DC..... P.37	DC/DC..... P.39	MCUP.41	

Featured Products

Power Modules

600V 2nd Generation IGBT IPM P.25

IPDs (Intelligent Power Devices)

IPDs (Intelligent Power Devices) P.26

AC/DC

AC/DC Converter IC Series P.27

AC/DC Secondary Side Synchronous Rectification Control ICs P.27

AC/DC Converter Control ICs for SiC Drive P.28

Power Devices

SiC Power Devices P.29

SiC MOSFETs P.29

SiC Schottky Barrier Diodes (SBD) P.30

3rd Generation Field Stop Trench IGBTs P.30

600/650V 2nd Generation

Super Junction MOSFETs P.31

800V 2nd Generation

Super Junction MOSFETs P.31

Discretes

Low Voltage MOSFETs P.32

High-Power Dual MOSFETs P.32

Low V_f High Reliability Schottky Barrier Diodes P.32

4th Generation Fast Recovery Diodes P.33

TVS (Protection Diodes) P.33

Shunt Resistors P.34

Anti-Sulfuration Chip Resistors P.34

Gate Drivers

High-Side/Low-Side Gate Drivers P.35

Non-Isolated Gate Drivers for BMS P.35

Isolated Gate Drivers P.36

Isolated DC/DC

Isolated Flyback DC/DC Converters P.37

Active Clamp Isolated DC/DC Controller P.37

DC/DC

High Voltage DC/DC Converter P.38

High Voltage Synchronous Buck Converter P.38

60V Boost DC/DC Controller P.39

Step-Down DC/DC Converter Series P.39

Digital Power Supply

Digital Power Supply Step-Down DC/DC Converters P.40

Microcontrollers/Memory

Microcontrollers P.41

Memory Series P.41

Wireless Communications LSIs/Modules

Specified Low Power Wireless Communication LSIs P.42

Wi-SUN Communication Modules P.43

EnOcean® Communication Modules P.43

Operational Amplifiers

High EMI Tolerance Ground Sense Operational Amplifiers P.44

Sensors

Higher-g range(±32g) 3-Axis Accelerometer P.44

Contactless Current Sensor P.45

2-point Touchscreen Controller IC P.46

Capacitive Switch Controller ICs P.46

Battery Monitoring/Charge Monitoring

Lithium-Ion Battery Monitoring LSI Series P.47

Energy Storage Element (EDLC) Cell Balancing IC P.47

Coulomb Counter IC for Energy Storage Systems P.48



AC100 to 240Vrms motor control from a single package (Intelligent Power Module)

600V 2nd Generation IGBT IPM P.91

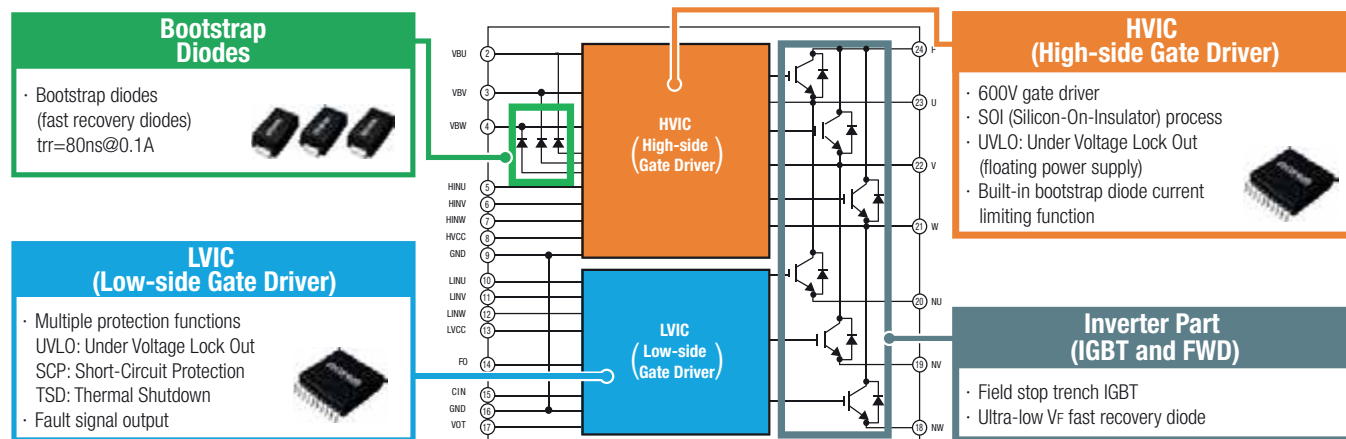


HSDIP25

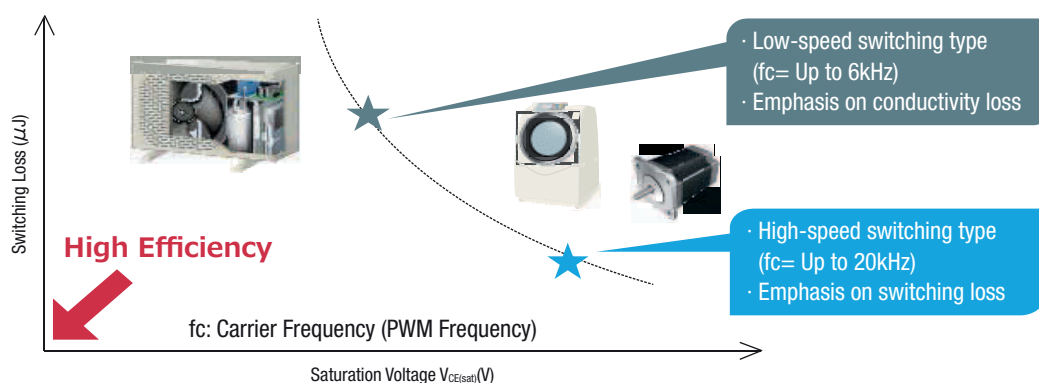
A market-proven high voltage, low-loss power device (IGBT) with high-efficiency control circuit is integrated into a single package. The optimized design maximizes device performance and simplifies motor application while improving efficiency.

Features

- 2 series offered for both low-speed and high-speed IGBT switching based on application requirements
- IGBT, FWD (Free Wheeling Diode), Bootstrap Diodes, and Gate Driver IC are integrated into a single package
- Multiple protection functions (short-circuit, under voltage lockout, thermal shutdown) are built-in - along with fault signal output during protection operation



Select the IGBT that meets application needs to achieve high efficiency drive

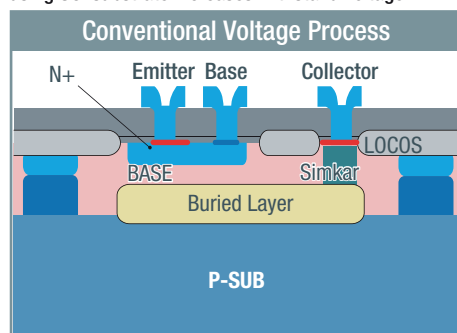


HVIC adopts new high voltage process

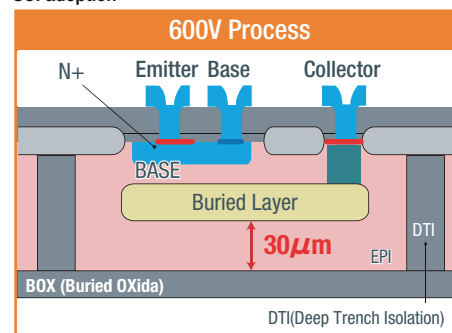
SOI process structure prevents latch-up problems

SOI ··· Silicon On Insulator

Complete dielectric isolation method using SOI substrate increases withstand voltage



SOI adoption





8ch low-side switch, 1ch/2ch low-side switch, 1ch high-side switch

IPDs (Intelligent Power Devices)

P.61

Features

8ch low-side switch

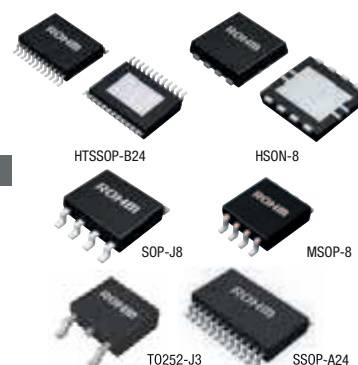
- Diagnostics function
- Active clamp circuit
- SPI control enabled
- Protection functions
- Compact package

1ch/2ch low-side switch

- Active clamp circuit
- Guaranteed low ON resistance ($I_N=3V$)
- Protection functions

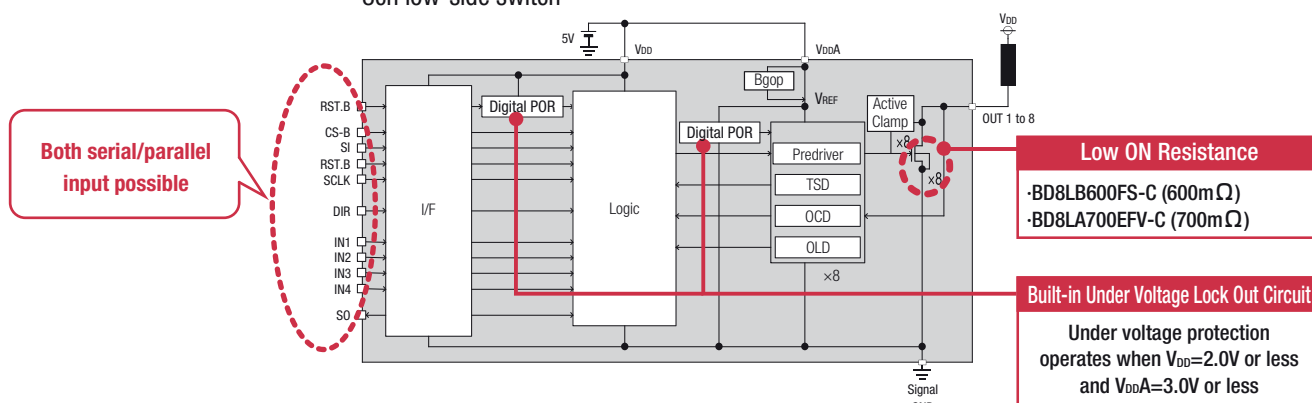
1ch high-side switch

- Active clamp circuit
- Low ON resistance
- Protection functions

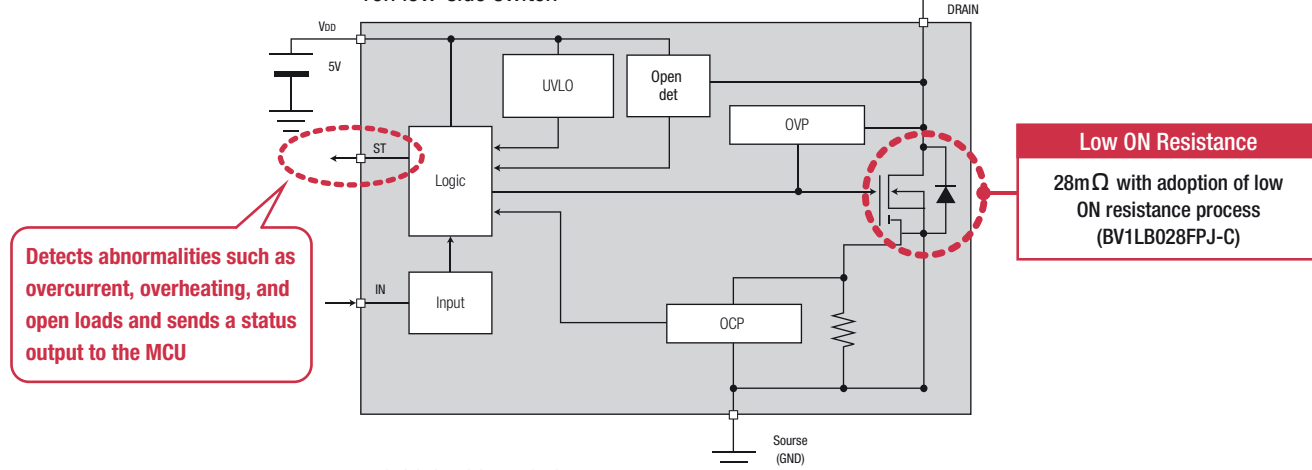


Block Diagram

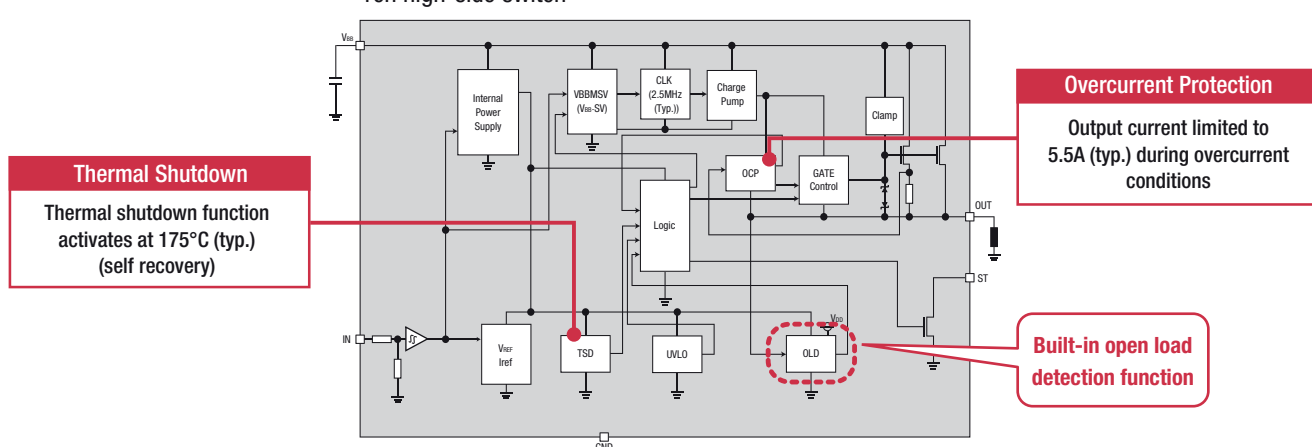
8ch low-side switch



1ch low-side switch



1ch high-side switch



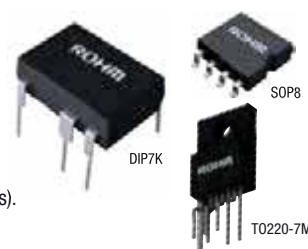


Built-in 650V super junction MOSFETs

AC/DC Converter IC Series P.58

ROHM's proprietary super junction MOSFETs feature class-leading efficiency and miniaturization.

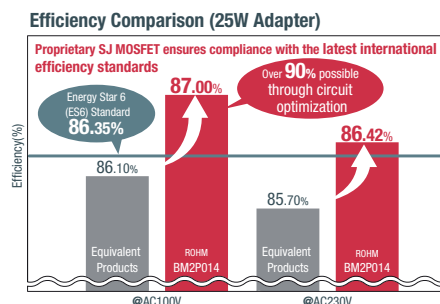
ROHM's broad lineup enables customers to select the ideal solution based on application requirements (i.e. current, protection circuits).



High Efficiency (>90%)

High efficiency contributes to greater energy savings

To improve efficiency, ROHM's super junction MOSFET is utilized, along with circuits that maximize MOSFET performance.



Compact Package

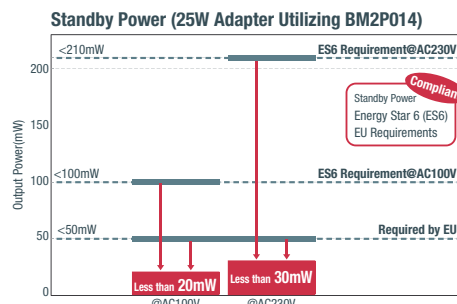
Compact package achieved through low heat generation

We succeeded in achieving greater miniaturization by adopting ROHM's super junction MOSFET that generates less heat compared to conventional planar types.

Standby Power Significantly Reduced

Improved efficiency minimizes standby power

ROHM 650V low ON resistance, low gate charge, high-speed switching Super Junction MOSFETs contribute to lower standby power consumption.



High-Power Insertion type

Compact Surface Mount type



Ideal for embedded power supplies and adapters

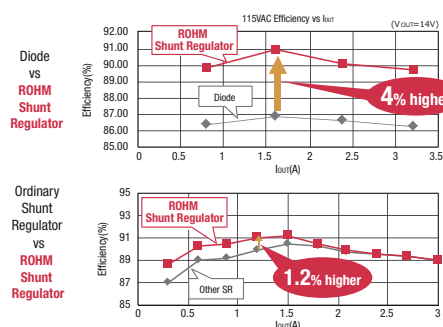
Optimized for compact devices



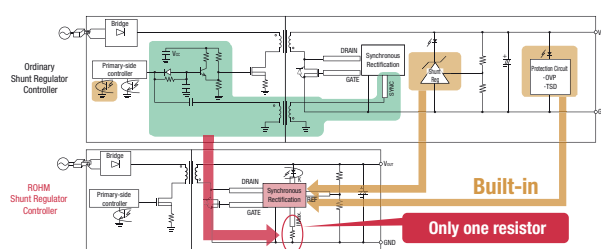
AC/DC Secondary Side Synchronous Rectification Control ICs P.59

ROHM ICs integrate an ultra-low consumption high accuracy shunt regulator that significantly reduces standby power. The shunt regulator is comprised entirely of independent chips, enabling operation as a ground reference even when used at the high side. Also, operation in continuous mode is possible without requiring primary switching synchronous signal input, achieving even greater space savings. The operating supply voltage range is 2.7V to 32V, ensuring compatibility with a variety of applications. And adopting a 120V high voltage makes it possible to directly monitor the drain voltage.

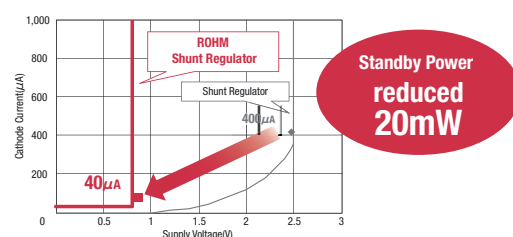
Significantly Improved Efficiency



Supports Continuous Mode with Just One Resistor. Compatible with PWM



Built-in Low Power Shunt REG Significantly Reduces Standby Power Consumption





Maximizing the performance of SiC contributes to dramatically improved power savings and miniaturization

AC/DC Converter Control ICs for SiC Drive

P.59



SOP-J8

ROHM fuses analog design and SiC device technologies to maximize SiC performance and significantly reduce power consumption.

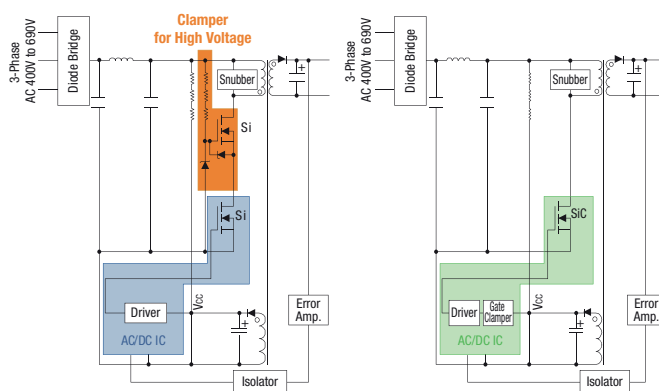
Features

- Internal driver circuit maximizes SiC MOSFET performance
- Low-noise, high efficiency quasi-resonant system supports up to 150W power supplies
- Multiple protection circuits enable high voltage operation even at 690V AC

Achieves Greater Miniaturization

Conventional Product

BM2SCQ121NT (Under Development)



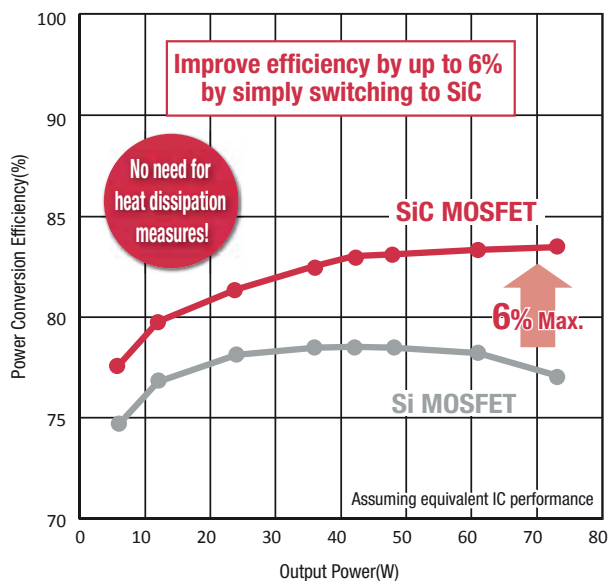
Power Supply Board for Evaluation



BD7682FJ-LB-EVK-402

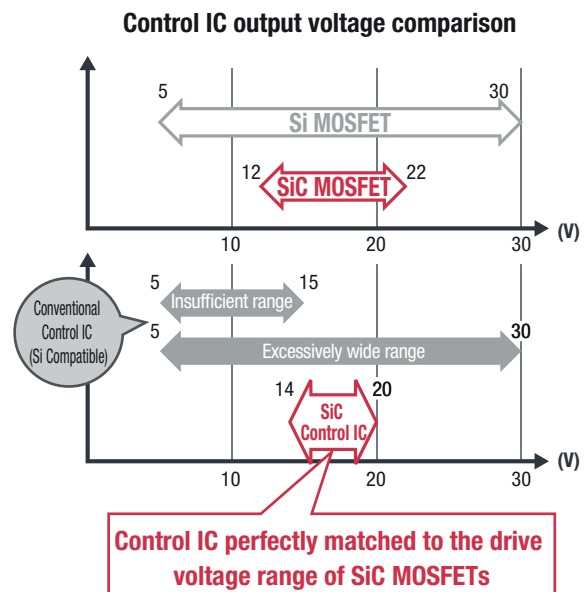


AC/DC Converter Comparison: Si vs SiC



Contributes to dramatically higher power savings and miniaturization

MOSFET Drive Voltage Comparison



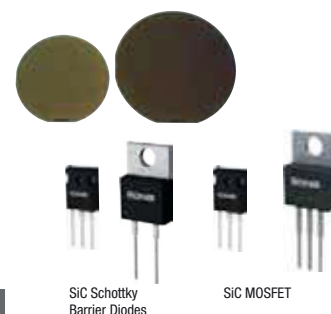
Control IC perfectly matched to the drive voltage range of SiC MOSFETs



Providing unmatched energy savings and miniaturization

SiC Power Devices P.87

SiC Power Devices provide a number of advantages, including higher voltage capability and lower loss, making them ideal for high power applications such as power conditioners and power supplies that cannot be achieved using conventional silicon-based solutions. ROHM is actively engaged in the development of SiC power devices that contribute to society with lower power consumption and compactness, for example by producing industry-leading SiC MOSFETs featuring a double trench structure that achieves lower losses in power devices.



Features

Significantly reduced power loss with increased thermal resistance in a smaller form factor

Power devices are often used for power conversion or control in a variety of applications. SiC is garnering increased attention as a next-generation semiconductor material for power devices due to its superior characteristics compared with silicon, including lower ON resistance, faster switching speeds, and higher temperature operation.

SiC power devices play an active role in a variety of areas, such as power supplies, automotive, railway, industrial equipment, and consumer devices

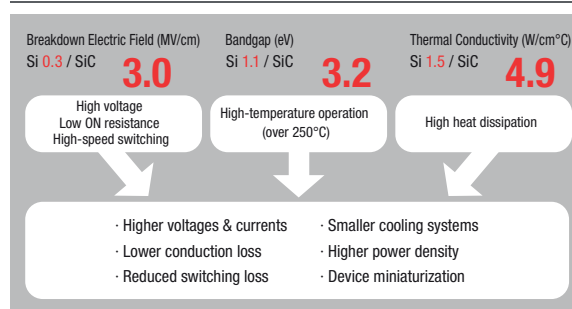
SiC power devices allow for smaller products with lower power consumption that make mounting possible even in tight spaces. Additional advantages include high voltage and high temperature operation, enabling stable operation under harsh conditions that are impossible to achieve with silicon-based products. For example, when applied to solar power generation, it is possible to improve power loss by approx. 47%, and as such is expected to make a significant contribution to environmental issues on a global scale.

Vertically Integrated Production System for SiC

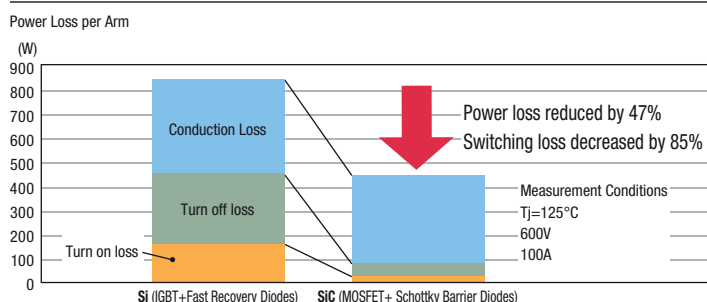
ROHM utilizes a vertically integrated production system for manufacturing SiC as well.

In 2009 German SiC wafer manufacturer SiCrystal was added to the ROHM Group, making it possible to carry out all processes, from wafers to packaging and module products, in-house.

Performance Comparison: SiC vs. Si



Power Loss Comparison



SiCrystal
A ROHM Group Company

Note: Package is JEDEC code.



Promoting further evolution by developing high voltage, high speed, low ON resistance devices and next-generation solutions

SiC MOSFETs P.88

In addition to achieving both low ON resistance and high-speed switching that cannot be realized with silicon-based devices, ROHM SiC MOSFETs feature superior electrical characteristics even in the high temperature region. This results in significantly reduced switching loss while enabling support for smaller peripheral components.

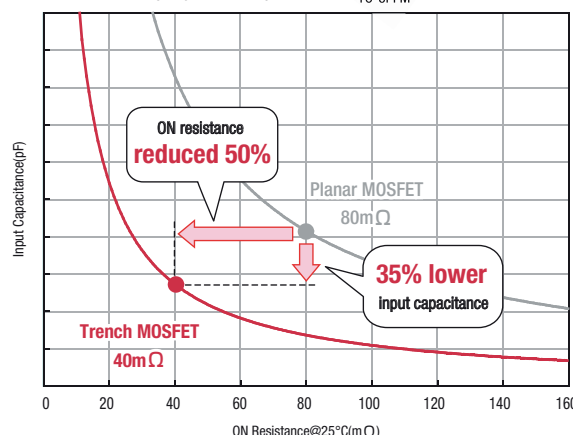
Features

- 650V / 1,200V / 1,700V product lineup
- Low ON resistance and high-speed switching
- Minimal reverse recovery operation of the parasitic diode

Evolution to Next-generation Devices

ROHM developed the world's first* trench-type SiC MOSFETs, utilizing a proprietary structure to achieve long-term reliability and successfully enable mass production. In addition, lower power loss in a variety of devices is made possible through further reductions in ON resistance. And going forward, ROHM will continue to develop full SiC modules along with 650V/1,200V class discrete products.

* : ROHM October 2018 study



Achieves class-leading low V_F

SiC Schottky Barrier Diodes (SBD)

P.87

Dramatically lower switching and conduction losses reduce power loss.

Features

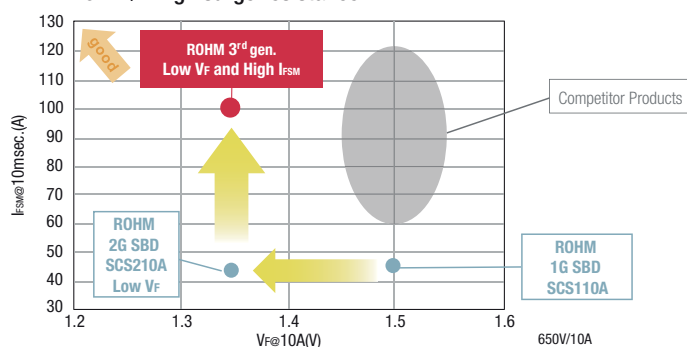
- Industry's lowest V_F
- High-speed recovery characteristics
- Considerably lower switching loss

Breakthrough Low V_F : 1.35V

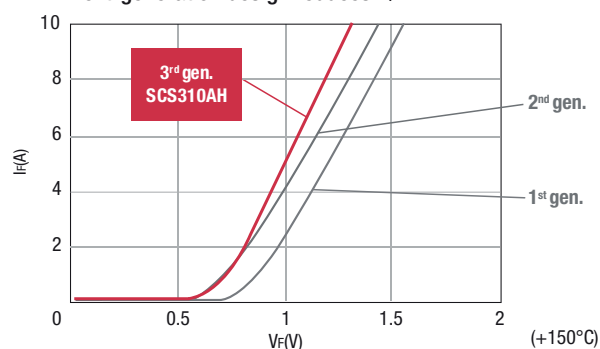
Improved processes and device structure makes it possible to reduce V_F while maintaining low current leakage.

The rise voltage in particular is low, ensuring high efficiency during low load conditions regardless of operating temperature or current level.

Low V_F · High surge resistance



Next-generation design reduces V_F



Contributes to higher efficiency and energy savings in high voltage, large current applications



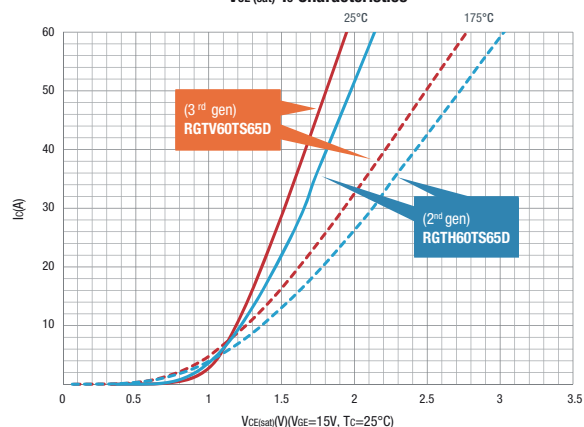
3rd Generation Field Stop Trench IGBTs

P.89

High-speed switching characteristics and short-circuit protection ideal for solar inverter applications.

RGTV series

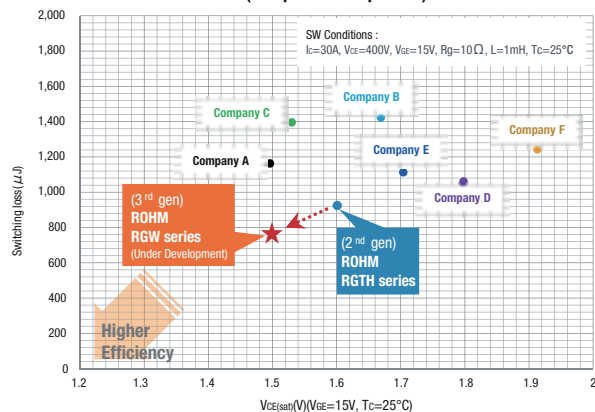
$V_{CE(sat)}$ - I_C Characteristics



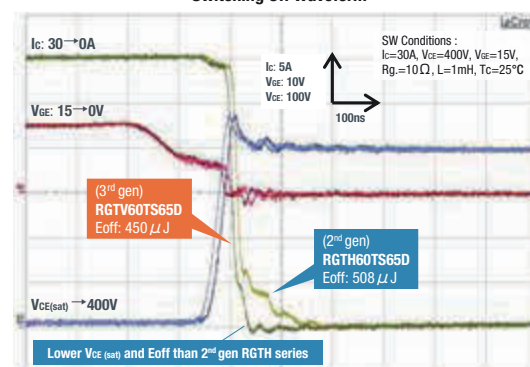
Improved performance optimized for converters.

RGW series

$V_{CE(sat)}$ vs. Switching Loss (Competitor Comparison)



Switching Off Waveform



Note : Package is JEDEC code. () : ROHM Package, [] : JEITA Code, [] : GENERAL Code.

Supports a wide range of power circuits.



600/650V*1 2nd Generation

Super Junction MOSFETs P.94 >

Adopting the latest high-voltage processes makes it possible to achieve the industry's*2 lowest ON resistance. Compared to conventional planar MOSFETs, ON resistance is reduced by 80% and QG (gate charge capacity) by 40%.

The lineup includes low-noise types (R6xxxENx series), high-speed switching models (R6xxxKNx series), and high-speed trr products (R6xxxJNx series).



SOT-428
(CPT3)
[SC-63]
[DPAK]

TO-252

TO-263S
(LPTS)
[SC-83]
[D2PAK]

TO-220FM

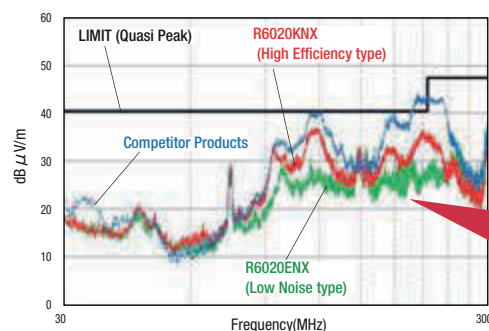
TO-247

*1 : Under Development

Features

Low Noise (R6xxxENx/R6xxxKNx series)

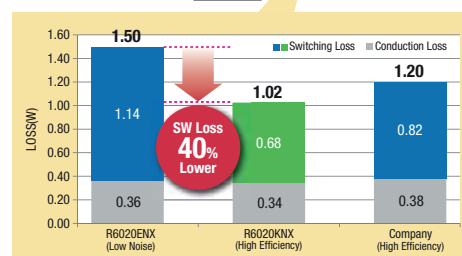
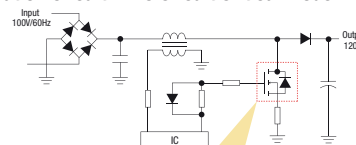
RADIATED EMISSION H (dB μ V/m) 100V/60Hz Input Power 146W



The low-noise R6xxxENx series is recommended for power supply circuits requiring noise countermeasures

High-Speed Switching High Efficiency (R6xxxKNx series)

Evaluation Circuit : PFC Circuit Critical Mode

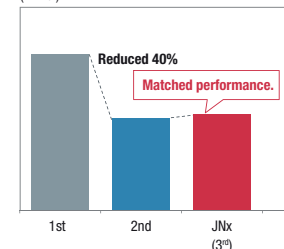


The R6xxxKNx series featuring high-speed switching is ideal for power supply circuits demanding high efficiency and low loss

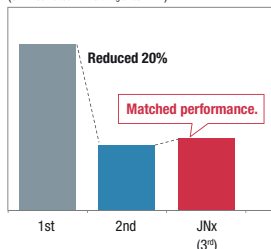
High Speed Recovery (R6xxxJNx series)

Comparison of key characteristics vs conventional products

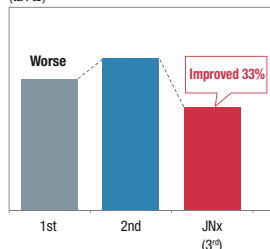
Low ON resistance performance index (A $\times$ R_{on})



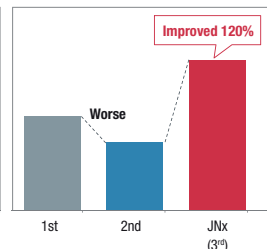
High-speed trr performance index (trr *Converted with valid region as 1mm²)



Hardware recovery performance index (ta₊-tb)



Self turn-on margin



Achieves improved usability while maintaining industry-leading*2 high-speed recovery performance.

*2 : ROHM October 2018 study

Note : Package is JEDEC code.

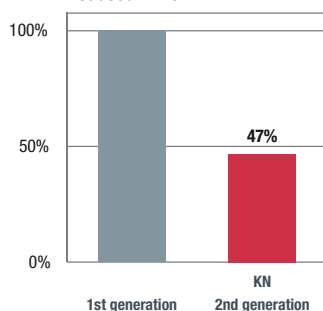


High-speed trr

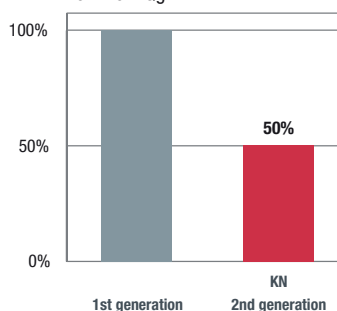
800V 2nd Generation Super Junction MOSFETs

Lineup includes high-efficiency, high-power MOSFETs that reduce A $\times$ R_{on} and Ron $\times$ Qg by half vs conventional products.

Reduced A $\times$ R_{on}



Low Ron $\times$ Qg



TO-252

TO-220FM

TO-220AB

TO-247



Optimized for 24V input DC/DC power supply circuits

Low Voltage MOSFETs P.92 >

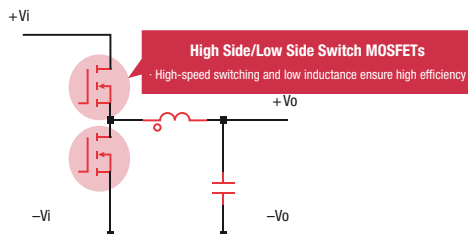
New processes are utilized to reduce ON resistance and Qg by 40% over conventional products.

Class-leading efficiency, along with significantly reduced noise, make them ideal for 24V DC input power supply circuits widely adopted in industrial equipment.

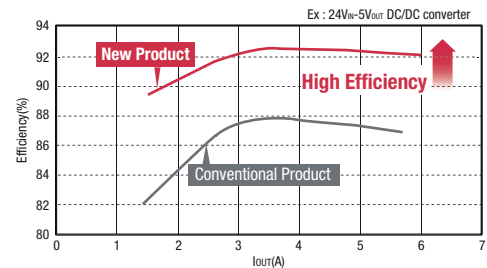
Features

- Performance index (Ron-Qg) improved 40% (industry best)
- Optimized for 24V DC input circuits in industrial and automotive applications

DC/DC Converter Circuits



The Latest Wafer Processes Utilized to Improve Efficiency



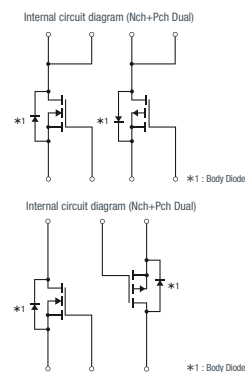
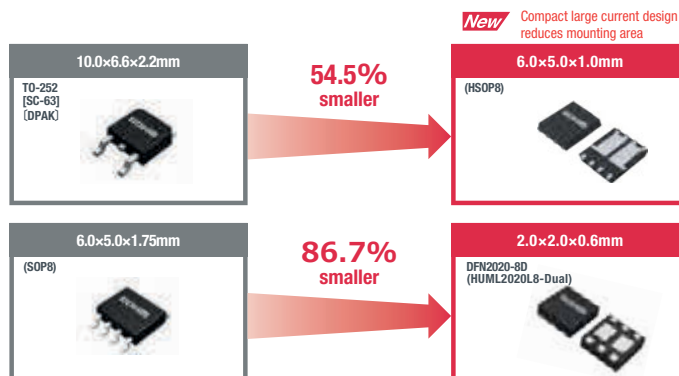
Note : Package is JEDEC code. () : ROHM Package, [] : JEITA Code, { } : GENERAL Code.



Achieves even greater miniaturization

High-Power Dual MOSFETs P.92 >

Reduced size and thickness. Integrating 2 elements into one package minimizes space.



Note: Package is JEDEC code. () : ROHM package.



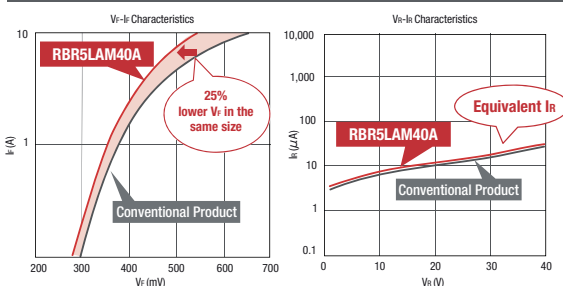
Higher efficiency chips achieve lower V_F

Low V_F High Reliability Schottky Barrier Diodes P.95 >

Features

- New lineup achieves higher chip efficiency
- Lower V_F reduces package size
- Medium power packages added to lineup
- AEC-Q101 (Automotive Grade)

SOD-128 (PMDTM) Package Comparison ($T_j=25^\circ\text{C}$)

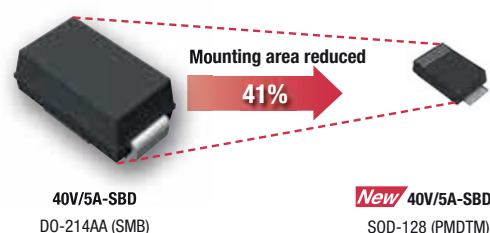


Higher efficiency for lower V_F

Applications

- General automotive
- Power supplies (secondary rectification circuits)
- DC/DC converters

Compact



Lower V_F makes it possible to reduce package size.



Low-noise design provides even higher efficiency

4th Generation Fast Recovery Diodes

P.97

Samples available
Mass production planned for Spring 2019*

ROHM's 4th generation Fast Recovery Diodes (FRD) evolved from previous series.
Ultra-soft recovery (low noise design) and high-speed improve efficiency.
Ideal for noise sensitive sets.

*Automotive grade planned for Winter 2019 or later

Features

- Ultra-soft recovery (low noise design)
- Low V_F
- Low I_R
- Ultra high-speed switching (RFS series)
- High-speed switching (RFL series)



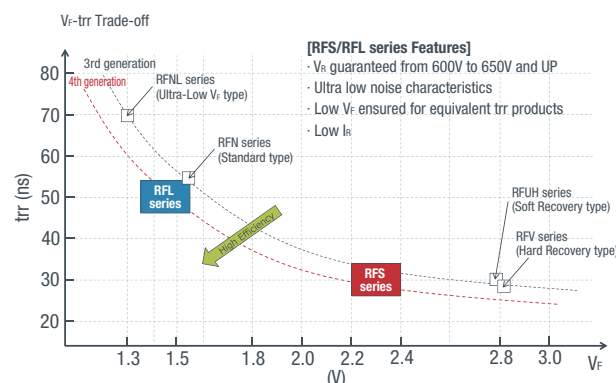
TO-220AC
 $I_o=5$ to 30A
28.56×10.2×4.5mm



TO-247N
 $I_o=30A$ and up
41.0×16.0×5.0mm



TO-247N <2pin>
 $I_o=30A$ and up
41.0×16.0×5.0mm



RFS series

4th generation FRDs evolved from the RFUH series
● Ultra high-speed switching

Consumer/Industrial Equipment

CCM PFC (Ex : Air conditioners)
Secondary side rectification circuits

Automotive

OBC (Onboard chargers)
Charging stations
(PFC, secondary side rectification), etc.

RFL series

4th generation FRD evolved from RFN series
● High-speed switching

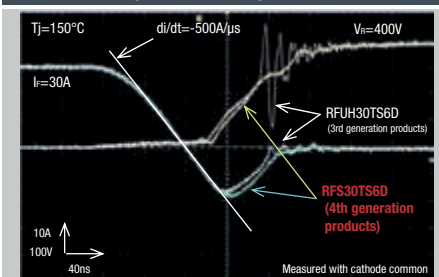
Consumer

DCM PFC (Ex : Air conditioners)
Inverter reflux diodes
(AC, washing machines, refrigerators)

Automotive

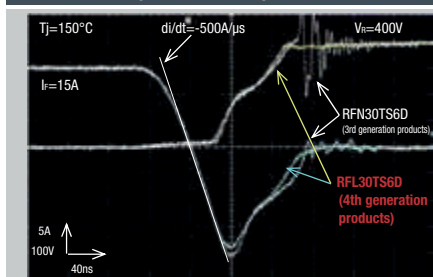
OBC (Onboard chargers)
(secondary side rectification), etc.

G4 vs G3 recovery waveform comparison



The RFS series features significantly lower noise compared to the RFUH series.
As a result, the effects on EMC are expected to improve.

G4 vs G3 recovery waveform comparison



The RFL series features ultra-low noise compared to the RFN series.
As a result, the effects on EMC are expected to improve.

Note : Package indicate JEDEC code. () : ROHM package.



Expanded lineup of compact, low capacitance types for general use

TVS (Protection Diodes)

P.97

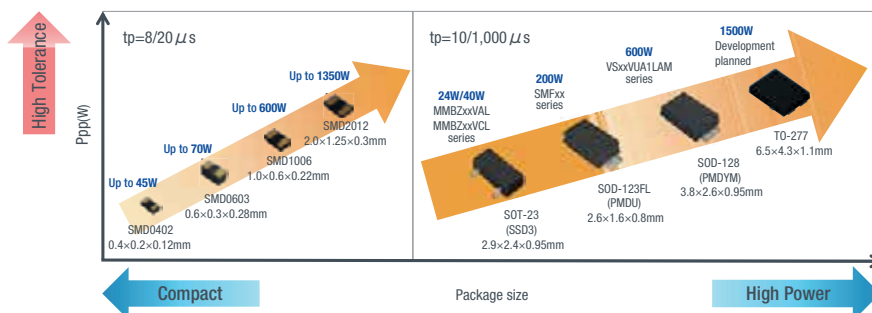
We introduce new TVS models, including compact and high power types.

The expanded lineup in a variety of packages makes it possible to support a wider range of applications.

And in addition to the industry-standard MMBZxx and SMF series, compatibility with models of the same part number from other companies has been improved.

Features

1. Adopts three key features of the RASPID series
 - Unprecedented miniaturization achieved using new construction methods
 - Remarkable dimensional precision: ±10μm
 - High reliability structure
2. 3.3V V_{RWM} (standoff voltage) meets low voltage circuit demands
3. High ESD resistance equivalent to conventional 5.0V products





Ideal for current detection in large-current applications

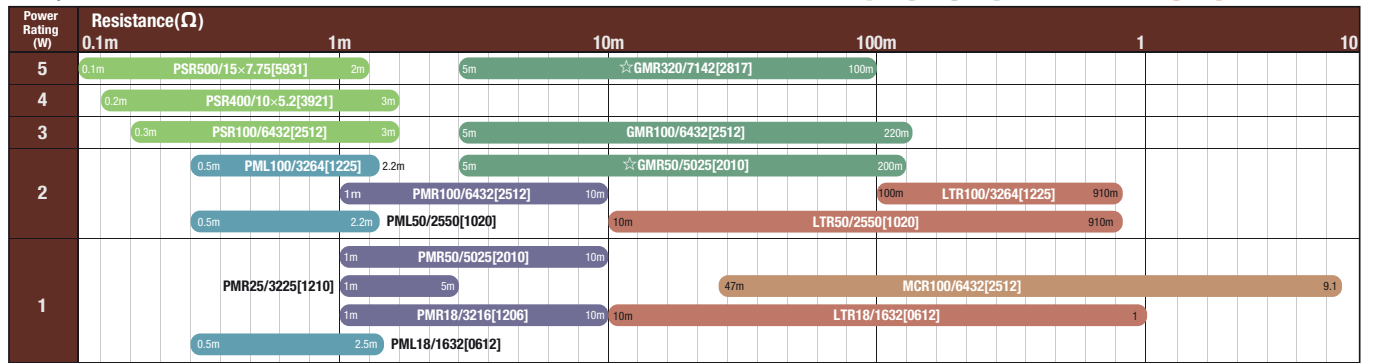
Shunt Resistors P.101

This series features high rated power and ultra-low resistances ideal for current detection in high power sets.

Adopting a high performance alloy material as the resistive element ensures superior temperature coefficient of resistance (TCR), even in the ultra-low-ohmic region.

Features

Simplified Resistance Chart

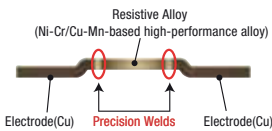


Ultra-Low-Ohmic High Power Metal Plate type (PSR series)

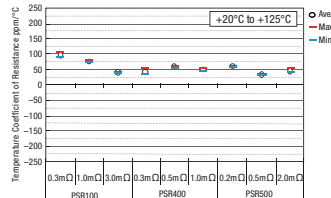


- High power (3W to 5W class)
- Ultra-low resistance from 0.2mΩ
- Convex structure
- Special alloy used for low TCR

High rated power achieved through precision welding technology and high-performance resistive alloy



Superior temperature coefficient of resistance ensured even in the ultra-low-ohmic region

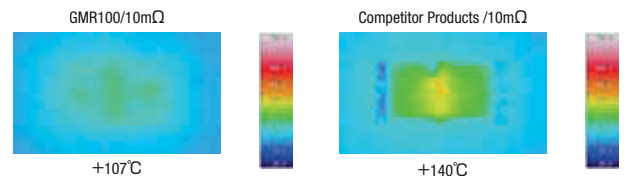


Low Ohmic High Power Metal Plate type (GMR series)

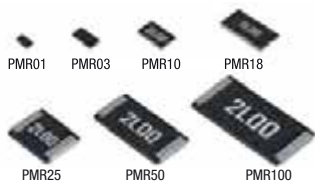


- High Power: 5W Max.
 - Original construction enables high heat dissipation and excellent temperature cycling characteristics
 - Special alloy used for low TCR
- ☆ : Under Development

Surface Temperature Comparison

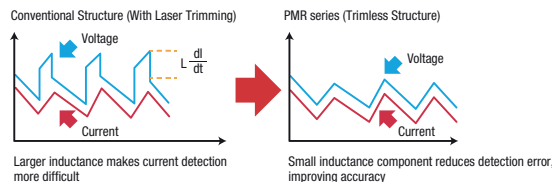


Ultra-Low-Ohmic Metal Plate type (PMR series)

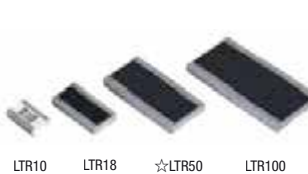


- High power (2W class)
- Original trimless structure
- Multiple package types

<Trimless Structure Improves Current Detection Accuracy>



Low Ohmic Wide Terminal / Thick Film type (LTR series)



- Wide terminal configuration improves rated power and temperature cycling strength over conventional resistors
- ☆ : Under Development

<Wide Terminal type>

Size mm(inch)	MCR Low-Ohmic series	LTR Low-Ohmic series
1220 (0506)	0.25W	0.5W
1632 (0612)	0.25W	1W

Configuring the terminal at the long sides improves solder joint reliability

x 2 to 4 times



Ideal for applications requiring high reliability

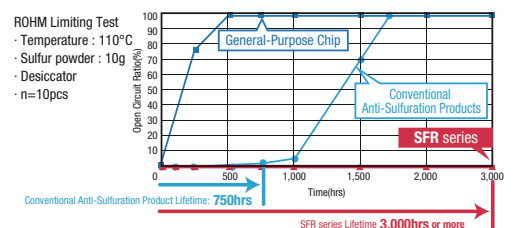
Anti-Sulfuration Chip Resistors P.99

Original structure improves sulfuration resistance.

Lineup offered in 1005, 1608, and 1212 sizes.

Models in the 3216 and 3225 sizes planned. (expanding the selectable range)

Anti-Sulfuration Characteristics (Open Circuit Ratio)





High 600V voltage

High-Side/Low-Side Gate Drivers P.60

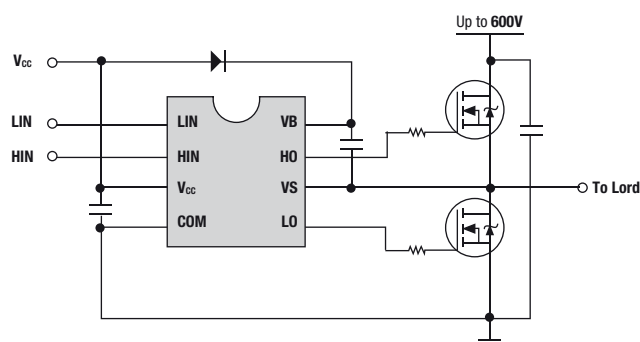


These 600V high-side/low-side gate drivers utilize the bootstrap method to drive an external Nch FET or IGBT. Input logic power voltages of 3.3V and 5.0V are supported. As a protection function, a malfunction prevention circuit (UVLO) that detects low input between V_{CC} -GND and V_B -VS is built-in. In addition, adopting an SOI process structure makes it possible to prevent latch-up problems.

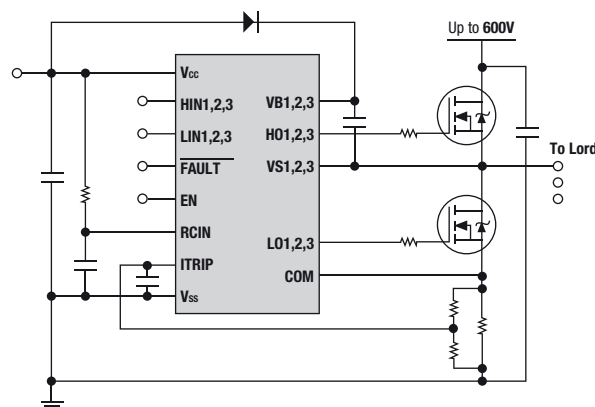
Features

- Floating terminal voltage : +600V
- Gate driver voltage range : 10 to 18V (BS2103F, BS2101F)
10 to 20V (BS2114F)
11.5 to 20V (BS2130F)
- Undervoltage lockout (UVLO) circuits built into each channels
- Supports 3.3V and 5.0V logic input
- Common-mode output applications relative to the input signal

Circuit Diagram



Circuit Diagram



Battery pack charge and discharge control

Under Development

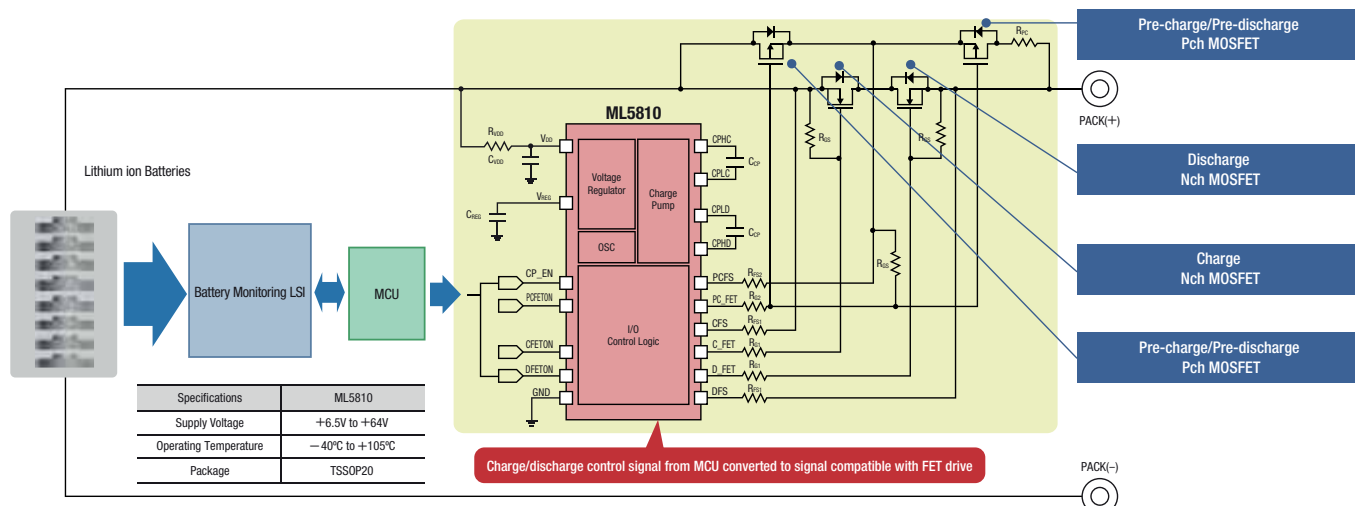
Non-Isolated Gate Drivers for BMS P.60

High-side Nch MOSFET gate driver LSI for battery pack charge/discharge.
Ideal replacement for mechanical relays.

Features

- High side Nch power MOSFET gate driver
- Low current pre-charge/pre-discharge Pch MOSFET gate driver
- 80V rating voltage supports 48V batteries (supply voltage: 6.5V to 64V)
- Built-in charge pump
- 20-pin TSSOP

Block Diagram





Built-in 2,500Vrms isolated element

Isolated Gate Drivers P.60

ROHM gate drivers integrate an isolation element that fuses advanced process BiC-DMOS processes with on-chip-transformer technology. Our integrated insulated element type features the smallest* package in the industry, contributing to system compactness. In addition, our gate drivers provide protection elements, meet quality requirements, and feature higher noise immunity, lower current consumption, and superior temperature characteristics compared to conventional photocoupler types.

*ROHM October 2018 study



Industry's smallest*

More than 50% smaller
than conventional designs

High speed

150ns
delay time

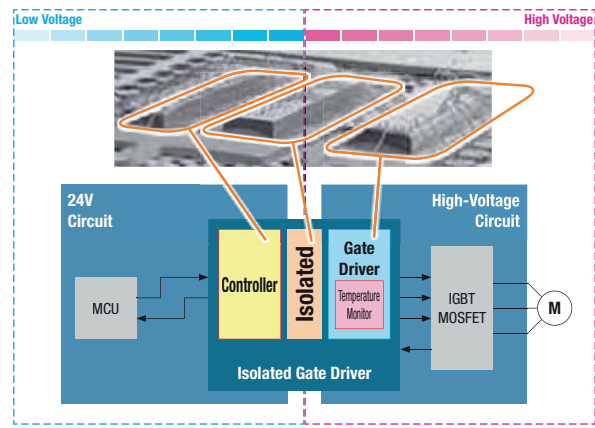
Low current consumption

10× lower
than the photocoupler method ($I_{cc1}=0.9mA$)

Features

- ROHM All-In-One Isolated Gate Drivers
- Optimized for IGBT/MOSFET gate drive
- Built-in IGBT/MOSFET temperature margin monitoring function
- All-in-one IC with flyback power supply

High Voltage Safety Measures



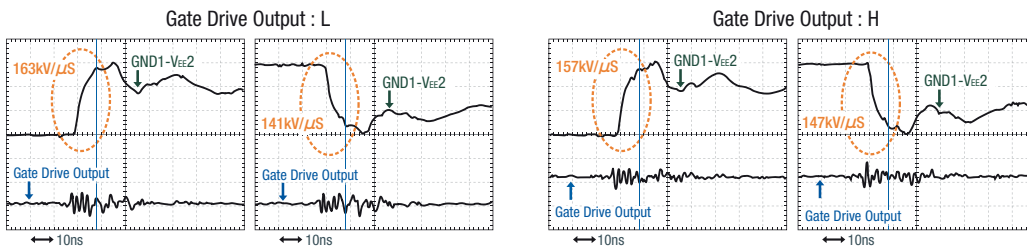
Industry-leading* Noise Immunity Strong Against Malfunctions

Industry-leading* noise resistance prevents malfunctions

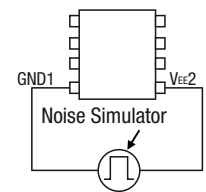
An optimized circuit design has been created to overcome challenges associated with noise immunity during power semiconductor switching operation. An industry-best* 100kV/μs is achieved - twice that of conventional products - preventing noise-induced malfunctions and increasing application reliability considerably.

High Noise Application Test Examples BM6108FV-LB

Noise Measurement Circuit



No malfunctions at both low and high gate drive output



[Conditions]
 $T_a = +25^{\circ}C$
 $V_{cc1} = 5V$, $V_{cc2} = 15V$, $V_{EE} = -8V$
 $OUT1_H/L = \text{No Load}$, $V_{CM} = 1,500V$

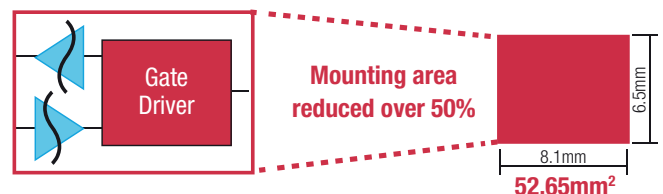
Integrated Isolation Element Achieves the Industry's Smallest* size

High performance in the industry's smallest* size

In addition to the high performance characteristics mentioned above, ROHM incorporates an insulated gate driver developed using advanced element formation and microfabrication technologies to achieve the smallest* form factor in the industry ($W \times D \times H = 6.5mm \times 8.1mm \times 2.01mm$). Integrating an insulated element reduces mounting area by more than 50% compared with solutions that combine a photocoupler for insulation with conventional gate driver.

Conventional Product
Photocoupler+Gate Driver

ROHM
Isolated Gate Driver





Incorporating a photocoupler and eliminating auxiliary winding contribute to greater miniaturization

Isolated Flyback DC/DC Converters

P.59

Isolated flyback DC/DC converters can stabilize secondary output by controlling the primary flyback voltage, contributing to improved reliability in DC/DC and AC/DC converters while eliminating parts such as optocouplers that cross the isolation boundary and the need to consider product lifetime.

Features

- High-speed load response achieved through adaptive on-time control; automatic light-load mode improves efficiency across the entire load range
- Eliminates the need for parts that cross the isolation boundary, improving functional safety
- Long-term operation achieved by eliminating the need for limited-life components
- Supports multi-output configuration with excellent cross-regulation



HS0N8

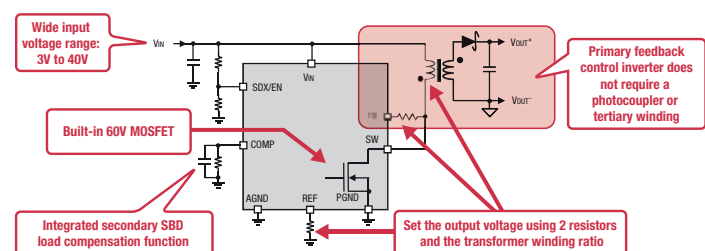


HTSOP-J8

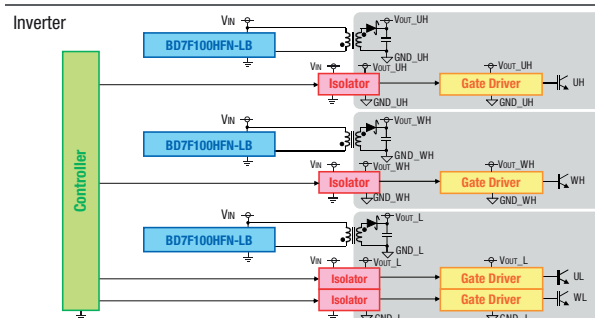


BD7F100HFN-EVK-001

Block Diagram



Application Example



Integrates a high efficiency driver for secondary synchronous rectification FETs

Active Clamp Isolated DC/DC Controller

P.59



TSSOP-B30

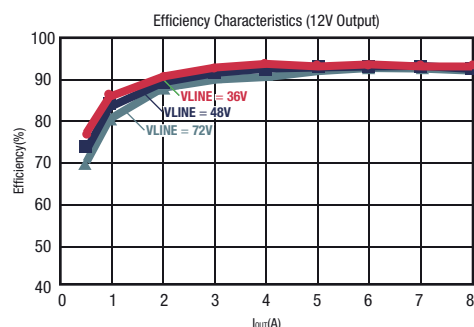
These PWM controllers are designed for active clamp type, current mode isolated switching regulators.

A primary MOSFET control signal and secondary synchronous rectification MOSFET control signal output with adjustable timing are built-in.

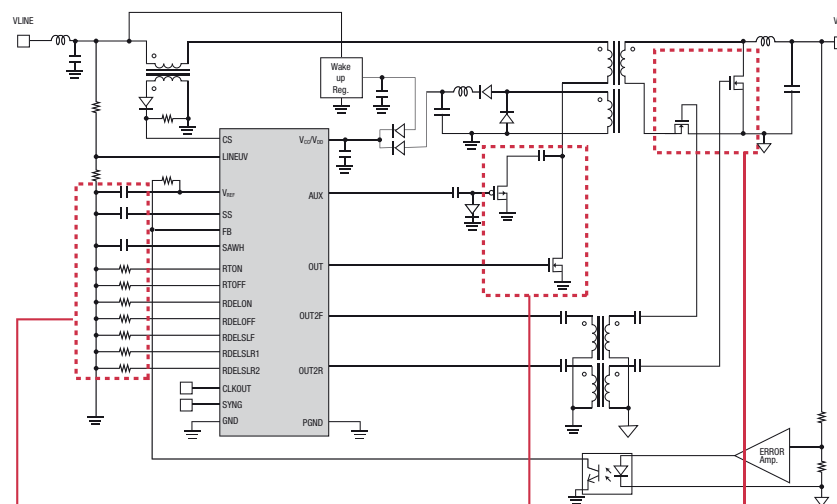
20V Max. rated input voltage makes it possible to set a large voltage at the external regulator for startup.

Features

- Conditions can be set via the pull-down resistors
- 4 drivers built-in
- Supports a wide input voltage range (20V Max. at V_{OS}/V_{DD} pins)
- Current mode PWM control
- Compatible with 2 types of overcurrent protection systems (pulse-by-pulse and hiccup)
- Soft OFF function prevents abnormal voltages and currents in the secondary switching and main switching during abnormalities such as thermal shutdown or reduced voltage protection (LINEUV)
- Higher efficiency is achieved through a synchronization function for parallel operation



Block Diagram



The following conditions can be set using the pull-down resistors

- Dead Time on the primary side (Main ON)
- Delay from the primary side to the secondary side
- Dead Time on the secondary side (QR/QF ON)
- PWM Max. ON interval
- PWM Min. OFF interval
- Current mode slope feedback amount

4 drivers are built-in

- Main output on the primary side (OUT)
- Active Clamp/Reset output (AUX)
- Synchronous rectification on the secondary side (OUT2F, OUT2R)



80V and 3A support a wide range of industrial applications

High Voltage DC/DC Converter P.57

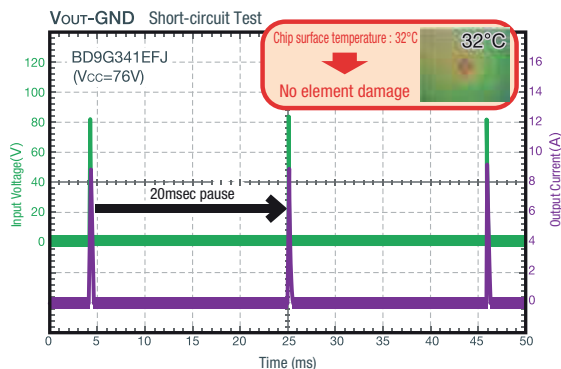
The BD9G341AEFJ-LB is a buck DC/DC converter with built-in 80V MOSFET compatible with a wide range of input voltages.

Features

- Input Voltage Range : 12V to 76V
- Maximum Output Current : 3A
- Frequency Variability : 50kHz to 750kHz
- Soft start function
- Standby function
- Multiple protection circuits (OVP, UVLO, TSD, OCP)

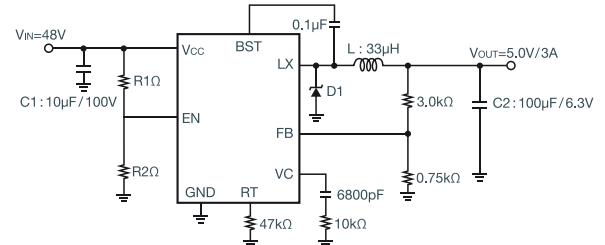
Achieves Stable Protection

Hiccup mode* overcurrent protection suppresses damage due to chip overheating, ensuring stable protection. This also eliminates the need for restart.



* Hiccup Mode : Periodically attempts auto recovery even if the IC operation stops due to overcurrent conditions.

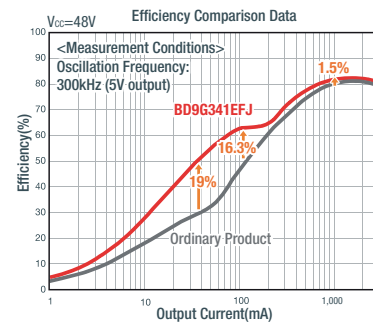
Block Diagram



High Efficiency Design Improves Energy Savings

High efficiency (as much as 19%) ensured throughout the entire load range, contributing to significant energy savings. (Achieve the industry's highest* efficiency at 80V class.)

* : ROHM October 2018 study



Adopts ROHM's proprietary ultra-high-speed control technology - Nano Pulse Control®

High Voltage Synchronous Buck Converter P.57

The BD9V101MUF-LB is a synchronous buck DC/DC converter that leverages original Nano Pulse Control® to achieve the industry's smallest* switching ON time.

This makes it possible to convert 48V to 3.3V at 2.1MHz using a single IC.

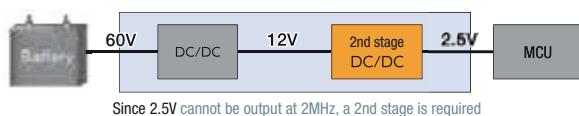
* : ROHM October 2018 study

Features

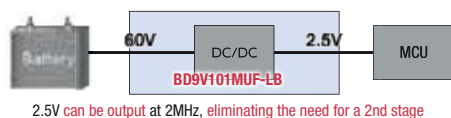
- Input Voltage Range : 16V to 60V
- Output Voltage Range : 0.8 to 5.5V
- Maximum Output Current : 1A
- Switching Frequency : 1.9MHz to 2.3MHz
- Soft Start
- Multiple Protection Circuits (UVLO, OVP, etc.)

Significance of Achieving High Step Down Ratio in Power Supply Systems

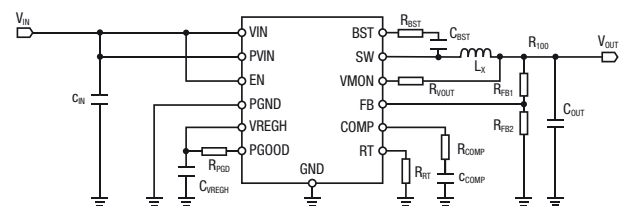
Standard Configuration



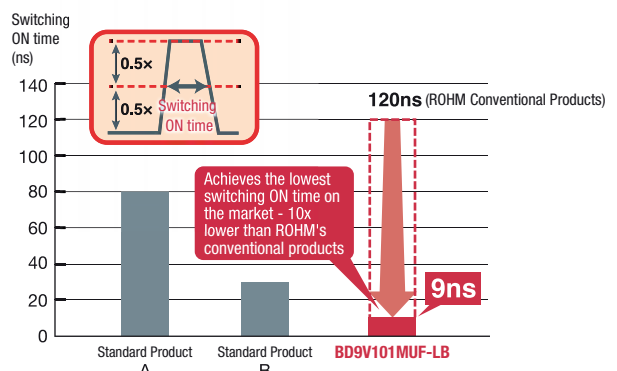
New Configuration



Block Diagram



Advantage of Nano Pulse Control®

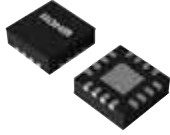




Integrates a variety of functions and supports a broad range of input voltages

60V Boost DC/DC Controller

P.57 >



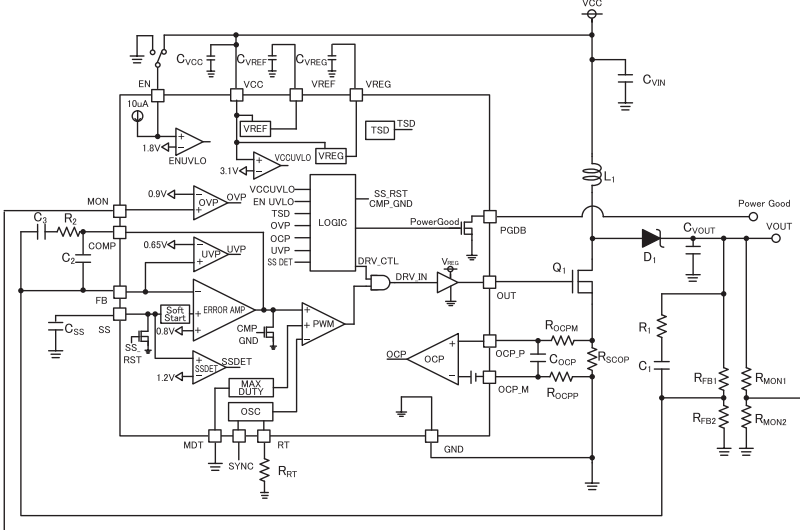
VQFN16SV3030
3.00×3.00×1.00(mm)

The BD9615MUV-LB is a boost DC/DC controller that supports a wide range of input voltages.

Features

- Input voltage range : 3.5V to 60V
- Compatible with a wide range of oscillation frequencies: 100kHz to 2.5MHz
- Variable load current (via external FET)
- Adjustable soft start time
- ON/OFF control (via EN pin)
- Configurable UVLO value
- Over voltage protection function
- Power Good output
- Max. duty switching function (90%/50%)
- Compatible with isolated flyback converter control
- QFN package contributes to set miniaturization

Block Diagram





Broad lineup optimized for industrial equipment

Step-Down DC/DC Converter Series

P.57 >



MSOP8 VQFN16V3030

ROHM's wide portfolio of step-down (buck) DC/DC converters make it possible to select the ideal power supply solution based on a product matrix of input voltage and output current.

In addition, stable, long-term supply and 250-piece reels* are provided to support smaller production lots in industrial equipment applications.

* : Supports part of the products

Features

- High efficiency lineup compatible with a wide range of input voltages
- External diode for synchronous rectification not needed
- High voltage handling capability makes it possible to achieve smaller, more energy-efficient power supplies

Compact 1MHz synchronous rectification design

Conventional Product

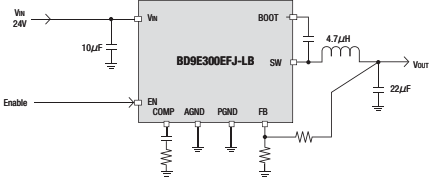
Asynchronous Rectification
Switching Frequency: 300kHz

New

Synchronous Rectification
Switching Frequency: 1MHz

Mounting area 50% smaller

Circuit Diagram



Product Family

Output Current(A)	BD9611MUV					Controller
	3.3	5.0	12	24	48	
4.0			BD95602MUV-LB			4.0
			BD95601MUV-LB			
3.0			BD9327EFJ-LB			
			BD9326EFJ-LB			
			BD9C301FJ-LB			
	BD9A301MUV-LB, BD9B301MUV-LB		BD9E303EFJ-LB			3.0
			BD9G341AEFJ-LB			
2.5			BD9E300EFJ-LB, BD9E301EFJ-LB			2.5
2.0			BD9325FJ-LB			2.0
1.5			BD9G201EFJ-LB			1.5
1.0			BD9V101MUF-LB			1.0
	BD9A101MUV-LB		BD9E100FJ-LB, BD9E101FJ-LB			
0.8		BD9106FVM-LB, BD9109FVM-LB				0.8
0.5	BD9161FVM-LB		BD9G102G-LB			0.5



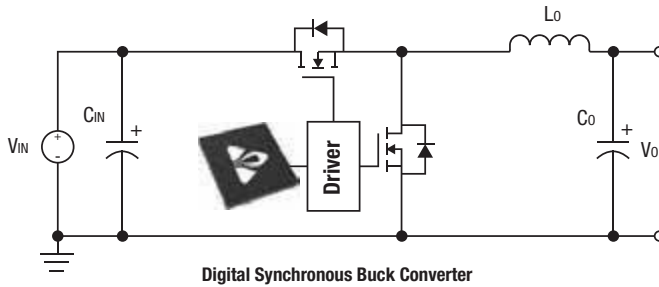
Provides smart, simple power management

Digital Power Supply Step-Down DC/DC Converters P.58



ROHM POWERVATION digital power supplies integrate two engines specially developed for DSP and RISC and utilize advanced real-time auto-tuning technology to not only improve load fluctuation follow performance, but compensate for characteristics degradation due to parts aging in order to improve reliability.

Block Diagram

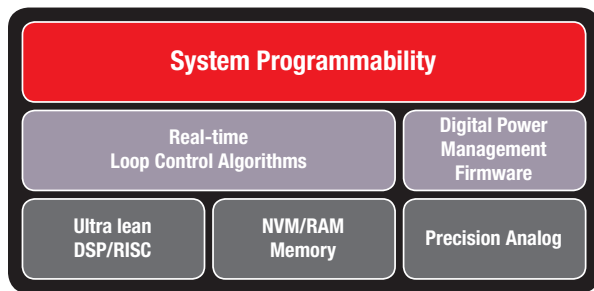


Single/Multi-phase Compatible Step-down DC/DC Converters

Input	12V(Typically)
Output	0.6V to 5V
	15A to 30A $\phi 1$ controller
	30A to 60A $\phi 2$ controller
	>60A multiple controllers (in parallel)

Intelligent Controller Engine

Original DSP and RISC design that supports a wide range of applications is included, along with advanced control algorithms, making it possible to achieve performance superior to other analog and digital systems.



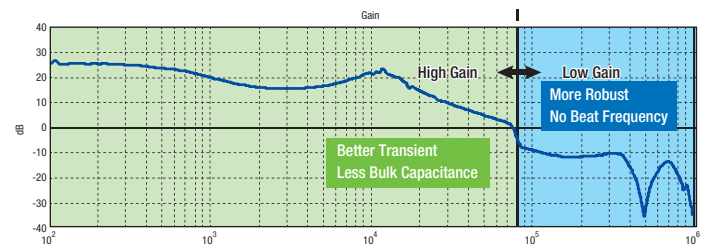
Power Smart Design Tool

Eliminates the need for complex calculations and troublesome coding. The PowerSMART GUI tool, intuitive enough for anyone to use, allows the customer to set a variety of parameters and quickly perform debugging and verify operation, accelerating time-to-market.



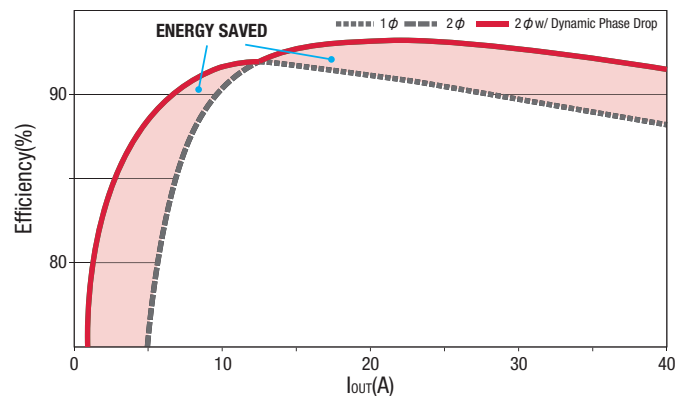
Auto-Control Advanced Auto-Tuning

Continuous monitoring and correcting for characteristics changes in real time due to transient fluctuations in output voltage and component aging are performed, contributing to exceptional output stability and improved reliability.



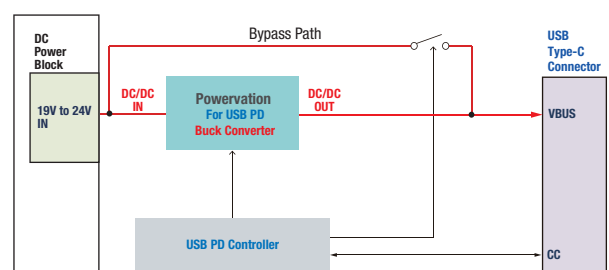
Intelligent Efficiency Management

The phase is automatically switched based on load conditions to achieve maximum efficiency under both light and heavy loads, reducing power consumption considerably.



Power Management for USB Power Delivery

- Output voltage switching performed by PD controller
- Compatible with a variety of protection circuits; easy setup
- High accuracy output current monitoring possible
- Auto tuning function supports high-speed load response

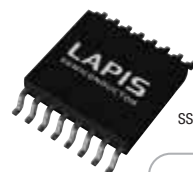




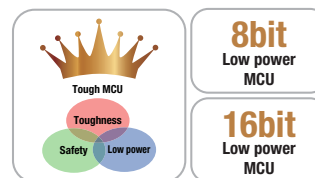
The wide ranging lineup includes models optimized for mobile applications to products that provide high noise immunity

Microcontrollers P.80

Taking advantage of market-proven ultra-low-power technology has allowed LAPIS Semiconductor to provide 8bit low-power MCUs that enable long-term operation using just a single button battery along with 16bit types featuring both ultra-low-power consumption and high performance designed to meet the need for increased processing power required by industrial equipment. LAPIS Semiconductor has also developed a 'tough' low-power MCU featuring strong resistance to heat and noise ideal for applications and devices where noise is a concern such as motors, compressors, and heaters. In addition, these MCUs have cleared the highest level of noise testing under the international IEC 61000-4-2 standard, eliminating the need for additional noise countermeasures.



SSOP16



Features

1. 'Tough' MCUs deliver high noise resistance and support high temperature operation

- High noise immunity : Double measure against power supply and signal line noise

Radiation Noise Test Results

Applied Voltage	Comparison Results	
	Co. A	LAPIS
1.0kV	○	○
1.2kV	○	○
1.4kV	○	○
1.6kV	×	○
1.8kV	×	○
2.0kV	×	○

*Distance from antenna to tested parts: 0cm ○: Normal operation ×: Reset

- Operating temperature : -40°C to +105°C

3. In-house fab system ensures stable, long-term supply

LAPIS Semiconductor Miyagi



- Wafer process

LAPIS Semiconductor Miyazaki



- Wafer process
- Assembly/Testing process

2. Multiple safety functions (ML62Q1000 series)

Self-diagnostic functions : 8	Error detection functions : 3	Memory protection functions : 2
- Register test - Oscillation frequency test - UART/SSIO/I²C test - WDT test - GPIO test - A/D converter test - D/A converter test - Analog multi plexer test	- Flash Memory CRC calculation - RAM parity error - ROM unused domain access	- RAM guard - SFR guard (Special Function Register)
Peripheral circuit diagnosis detects faults	Detects malfunctions due to memory data error and ROM invalid access	SFR/RAM erroneous write prevention



High reliability, long-term stable supply, rapid delivery, quick support

Memory Series P.66

ROHM supports product development, from legacy DRAM that meets long-term needs for stable supply to non-volatile FeRAM memory capable of fast write speed (150ns) and up to 10 trillion rewrites.



SOP8



TSOP(II)54



TQFP100

Volatile Memory

- **SDRAM**
16MB to 256MB
- **DDR3 (Under Development)**
1GB
- **FIFO memory**
26MB

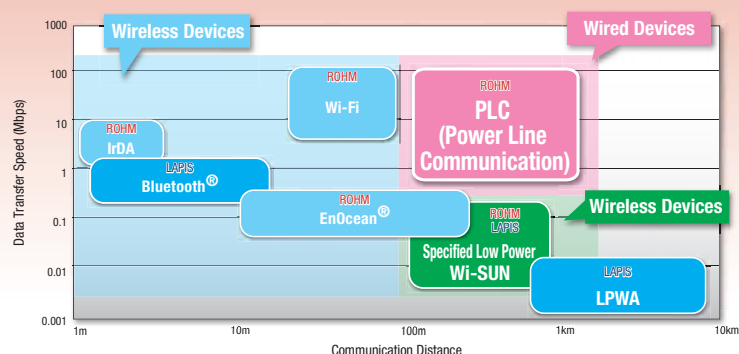
Non-volatile Memory

- **EEPROM**
I²C/Microwire/SPI, ultra-compact WL-CSP, Plug & Play, 1KB to 1MB
- **FeRAM**
Parallel/SPI/I²C, 32KB to 2MB

Multiple communication solutions that meet various needs for communication distance and data rate

Communication technologies are indispensable for achieving Smart Communities that efficiently manage and control various infrastructures. The ROHM Group offers a variety of wireless communication technologies, ranging from wireless LAN and Bluetooth to sub-GHz (specified low power radio) protocols such as Wi-SN and EnOcean, as well as the newly added LPWA standard. In addition, HD-PLC compliant communication IC technology is available that is widely expected to be adopted for power line communication, making it possible to supply optimized solutions tailored to meet the varying demands for data rate and communication distance.

■ ROHM Communication Solutions



Class-leading low power consumption, receiving sensitivity, and stable transmission power contribute to improved communication reliability

Specified Low Power Wireless Communication LSIs P.65

LAPIS Semiconductor's broad lineup includes LSIs for wireless stations (429MHz, 920MHz) for telemetry, tele-controls, and data transfer, as well as for specified low-power wireless stations (426MHz) in security systems. And in addition to compliance with various specifications such as Japan's Radio Law, superior transmission/reception characteristics make it possible to configure stable, high reliability wireless networks.

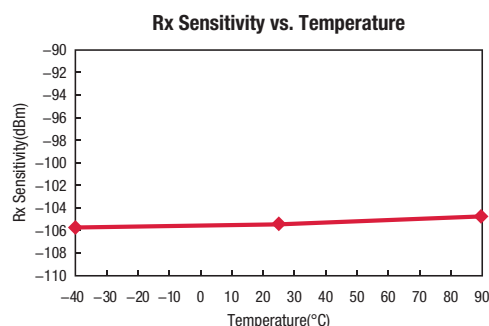
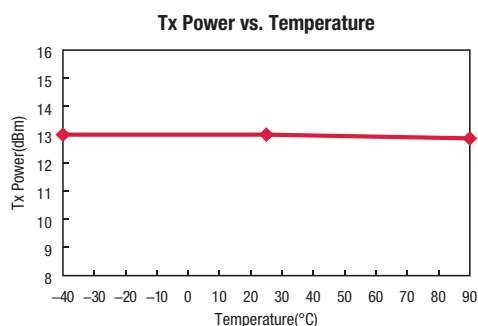


WQFN40

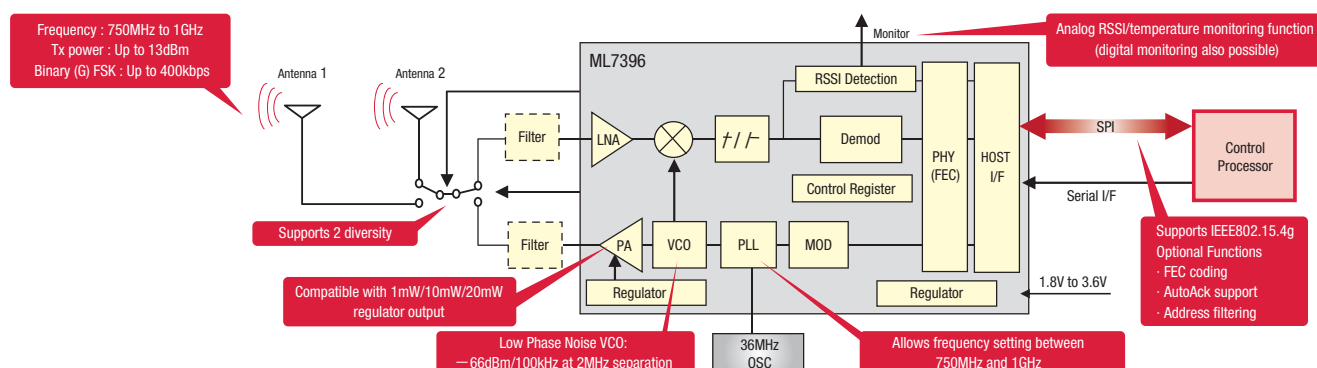
Features

- High reliability communication range with minimal temperature dependence, reception sensitivity voltage, and transmission power
- The ML7396 family utilizes an FEC function that further improves on its already excellent sensitivity characteristics
- Adopting a high-efficiency PA enables output up to 13dBm and reduce current consumption during transmission

Minimal Temperature Dependence Ensures Stable Communication Year-round



Block Diagram

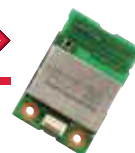




Middle range communication · Low power consumption

Wi-SUN Communication Modules P.106 >

International wireless communication standard Wi-SUN (Wireless Smart Utility Network), which has attracted significant attention in recent years among the 920MHz specified low power wireless band, features advantages such as low power consumption and long communication range, making it ideal for smart communities (i.e. smart meters, transportation infrastructure) as well as the M2M and IoT markets.



BP35A1



BP35C0

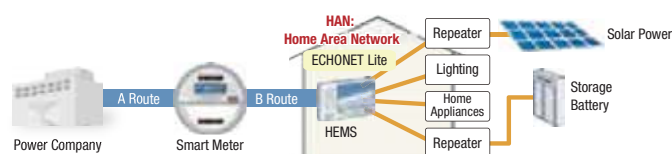


BP35C2

Features

- LAPIS Semiconductor LSIs deliver class-leading reception sensitivity
- ARIB STD-T108 compliant, Radio Law certified
- Compatible with international wireless communication standard Wi-SUN (Wireless Smart Utility Network)
- Pre-adjusted transmission power
- Middle range (under 1km) communication enabled using the 920MHz band

Application Example



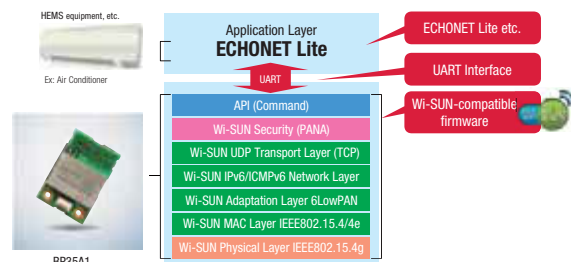
	B Route		HAN/E-HAN			
	Master	Slave	Master	End device	Relay device	Sleeping device
BP35A1 (B Route Stack)	○	○				
BP35C0/C2 (HAN Dual Stack)	*	○	○ HAN			
BP 35C0-EHAN (Enhanced HAN Stack)		*	○ E-HAN	○ HAN	○ E-HAN	○ E-HAN

*Separate verification required

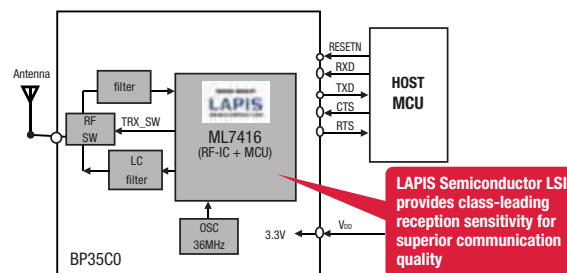
Coming Soon!

Built-in MCU Enables Support for Various HEMS Devices

Software Stack Structure Block



Class-leading Reception Sensitivity



LAPIS Semiconductor LSI provides class-leading reception sensitivity for superior communication quality



Battery-free wireless communication technology

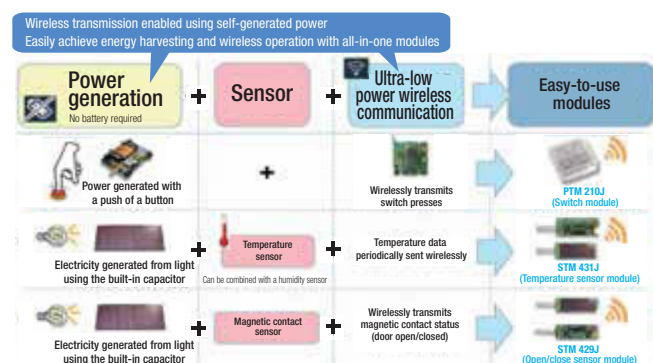
EnOcean® Communication Modules P.106 >

These wireless communication modules combine energy harvesting (environmental power generation) with ultra-low-power communication technology, making it possible to configure IoT solutions without batteries or wires. Since wiring is not needed, sensors to detect equipment status and other important factors can be introduced without major modifications.

Features

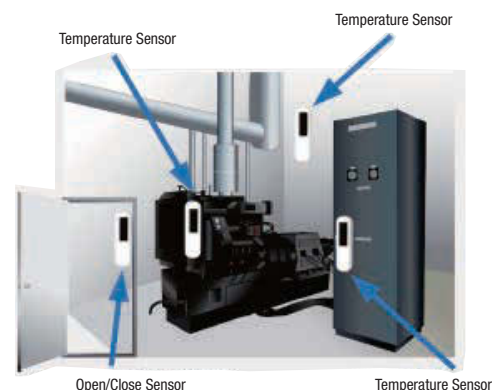
- Built-in antenna; Japan Radio Law certified
- Maintenance-free (no power supply required)
- Compliant with international standards (ISO/IEC 14543-3-11)
- Modular configuration eliminates the need for high frequency design

Broad Lineup Ranges from Energy Harvester to Receiver Dongles



Application Example

Machine Room





Eliminates the need for noise designs

High EMI Tolerance Ground Sense Operational Amplifiers

P.70

ROHM developed the BA8290xYxx-C series by leveraging original analog technologies covering circuit design, layout and processes. The result is breakthrough noise tolerance that limits output voltage fluctuations across all frequency bands to less than $\pm 1\%$ (vs $\pm 3.5\%$ to $\pm 10\%$ with conventional products). They can be installed at the rear stage of devices such as sensors that output minute signals to minimize the effects of noise during signal amplification. This eliminates the need for noise designs (i.e. using filters), contributing to greater reliability while reducing development load.

Features

Industry-leading* EMI Tolerance

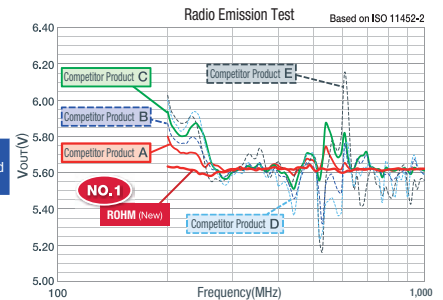
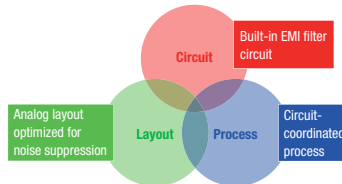
High EMC immunity is achieved by implementing a thorough review of all circuits, layouts, and processes. As a result, filters and shields used for EMI countermeasures are no longer required, reducing design load considerably.

Maintains the Same Overall Performance

The same performance as conventional op amps is ensured, allowing for easy, worry-free replacement.

Conforms to Global Reliability Standards

AEC-Q100 qualified



* : ROHM October 2018 study



Optimized for oscillation/shock detection

Higher-g range($\pm 32g$) 3-Axis Accelerometer

P.64

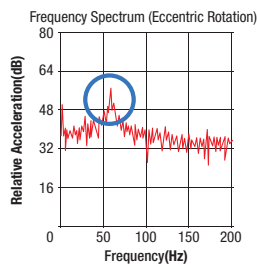
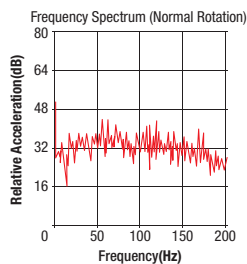
g : gravitational acceleration(m/s²)

Features

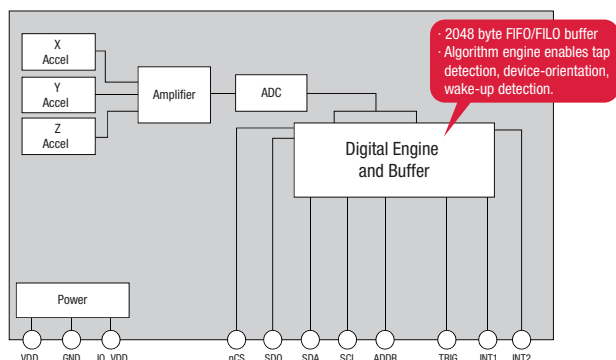
- Compact accelerometer supports up to 32g
- Signal bandwidth for X and Y axes is 8kHz, 5.1kHz for Z axis (both -3dB)
- Output data rate : 25.6kHz (Max.)

Applications

- Vibration monitoring for motors, frequency analysis, abnormality detection



Block Diagram



· 2048 byte FIFO/FILO buffer
· Algorithm engine enables tap detection, device-orientation, wake-up detection.

Compact Package



Specifications

Parameter	Unit	KX222-1054/KX224-1053	Conditions
Range	g	$\pm 8, \pm 16, \pm 32$	User-selectable full-scale output range
Sensitivity	counts/g	4096, 2048, 1024	16bit
0g Offset vs. Temp.	mg/°C	0.5	-40°C to +85°C
Sensitivity vs. Temp.	%/°C	0.01	-40°C to +85°C
Signal Bandwidth	Hz	8000(xy), 5100(z)	-3dB
Output Data Rate (ODR)	Hz	0.781 to 25600 (Default: 50)	
Non-Linearity	% of FS	0.6	% of full scale output
Cross-Axis Sensitivity	%	2.0	
Noise	$\mu g/\sqrt{Hz}$	630	ODR=50Hz, LPF=ODR/2
I ² C Communication Rate	MHz	3.4 Max.	
SPI Communication Rate	MHz	10 Max.	
Power Supply	V	1.71 to 3.60	
Current Consumption	μA	145	High resolution(RES = 1)
		10	Low power(RES = 0)
		0.9	Standby

* Unless otherwise specified, the above values are typical.

New

Enables Contactless monitoring of high-side current in high voltage applications

Contactless Current Sensor P.64

ROHM's current sensor utilizes MI technology to provide 100x the sensitivity of conventional Hall sensors, making it possible to directly detect the magnetic field generated from current flowing through the substrate wiring. This eliminates the need to draw current within the IC package, enabling completely non-contact measurement that significantly reduces power loss. In addition, the IC itself can be operated with low power consumption, making it ideal for battery-driven applications.



VQFN20QV3535
(3.5×3.5, H=Max.1.0)

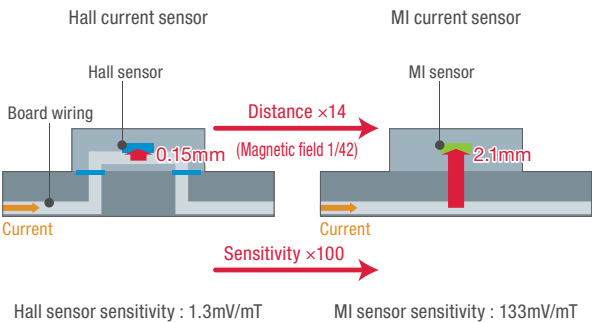
Features

- Ultra-high sensitivity MI sensor technology
- Non-contact design significantly reduces power loss
- Contactless current sensing minimizes power loss
- Cancels random disturbance magnetic fields, eliminating the need for shields
- Current measurement range: ±50A (evaluated with ROHM substrate)

Applications

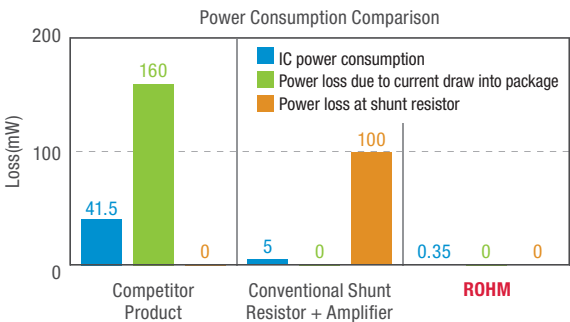
- Power meters, solar power systems, power storage equipment

Ultra-high Sensitivity MI Sensor Technology and Current Sensor Structure



MI sensing technology enables current detection without drawing current into the package

High Sensitivity MI Sensor Achieves Minimal Power Loss and Power Consumption



Contactless minimizes power loss
Achieves breakthrough low power consumption

Conditions : Conduction Current=10A, Shunt Resistance=1mΩ

Part No.	Supply Voltage (V)	Input Magnetic Field (μT)	Magnetic Field Sensitivity (μT/LSB)	Current Consumption (μA)	I/F	Operating Temperature (°C)	Package (mm)
BM14270MUV-LB	2.7 to 5.5	±280	0.045	70	I ² C	−40 to +125	VQFN20QV3535 3.5×3.5, H=Max.1.0



For 4-wire analog resistive film type touchscreens

2-point Touchscreen Controller IC P.64

This controller enables 1- or 2-point touch detection while maintaining the advantages of resistive touchscreens (i.e. water resistance, allows the use of gloves).

Features

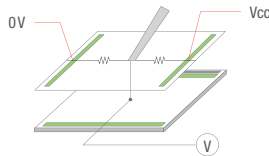
- Enables 2-point touch and gesture recognition in existing 4-wire analog resistive touchscreen systems
- The expanded lineup includes models with built-in CPU, an AFE type, and a 1-point controller IC

Conversion System

1-point (button input)
menu operation



Existing controllers can
only detect a single point



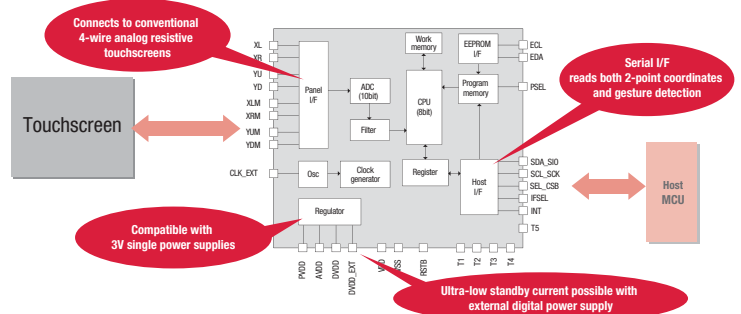
In existing 4-wire analog resistive touchscreens, voltage is supplied in the X direction to measure the Y coordinate and supplied voltage in the Y direction to measure X, providing one-point touch detection for each set of measured values.

ROHM's 2-Point Touchscreen Controller System

ROHM ICs enable intuitive
gesture input (2-point) even with
resistive panels



Block Diagram

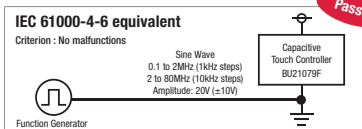


Configure touch switches featuring high sensitivity and noise resistance

Capacitive Switch Controller ICs P.64

Original user interface control technology is utilized to develop electrostatic switch controller ICs that deliver high sensitivity and class-leading noise resistance. Also, incorporating intermittent operation helps to reduce power consumption. Replacing mechanical switches in industrial equipment with ROHM's electrostatic switches makes it possible to increase resistance to wear and dust while improving design flexibility.

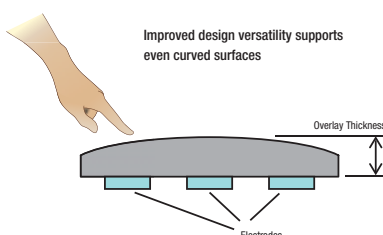
Class-Leading Noise Immunity



Easy noise compliance

Noise Immunity	Conventional Product	ROHM
	±3V	±10V

Strong Noise Immunity Makes High-Sensitivity Detection Possible

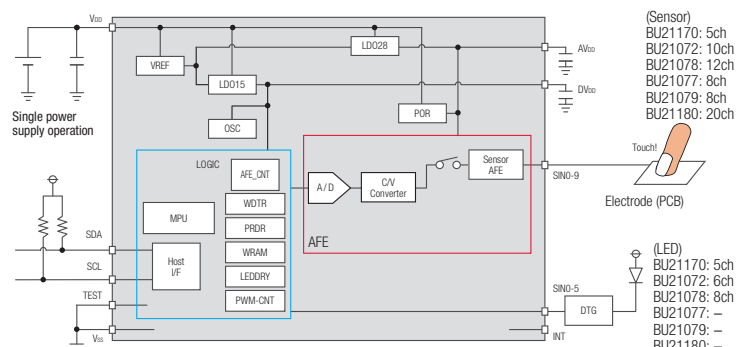


Overlay Thickness (Acrylic Plate)	Conventional Product	ROHM
	10mm	15mm

High Sensitivity



Block Diagram





80V voltage process supports up to 16 cells in series

Lithium-Ion Battery Monitoring LSI Series P.63

High-density li-ion batteries are expected to be adopted in electric bicycles, power storage devices, and the like, making it necessary to meet the demands of high voltage systems in order to increase battery capacity and achieve a common platform. LAPIS Semiconductor battery monitoring LSIs utilize market-proven mixed signal circuit technology and high voltage processes to achieve class-leading cell voltage measurement accuracy and low current consumption in multicell industrial applications, contributing to greater miniaturization and reliability.



LQFP32



TOFP44

Features

Class-leading low current consumption

During Operation

Battery monitoring LSIs for electric tools and bicycles contribute to greater system energy savings by reducing operating current consumption to a class-leading 25 μ A (typ.).

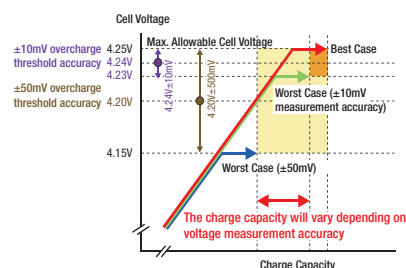
In Power Down Mode

Achieves a current consumption of 0.1 μ A (typ.), the lowest in its class. This minimizes the impact on battery capacity and prevents unnecessary drain, even during long-term storage.

Class-leading voltage measurement accuracy maximizes usable charge capacity

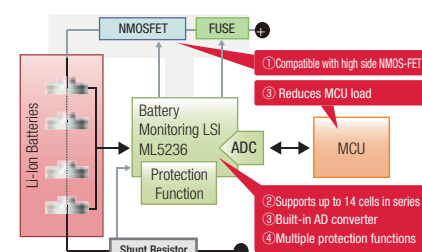
ROHM LSIs for electrical storage systems feature a class-leading cell voltage measurement accuracy of ± 10 mV. This makes it possible to measure the voltage of each cell in a battery pack with high precision, maximizing battery capacity.

CC-CV Charge Characteristics (ML5239 Voltage Measurement Accuracy: ± 10 mV)



Equipped with high-side NMOSFET drive, cell balancing, and other functions

Multiple functions, including cell voltage/current/temperature measurement and detection, cell balancing, and high-side NMOSFET drive, are built into a single LSI. This reduces the number of external parts, contributing to increased system miniaturization and development efficiency.

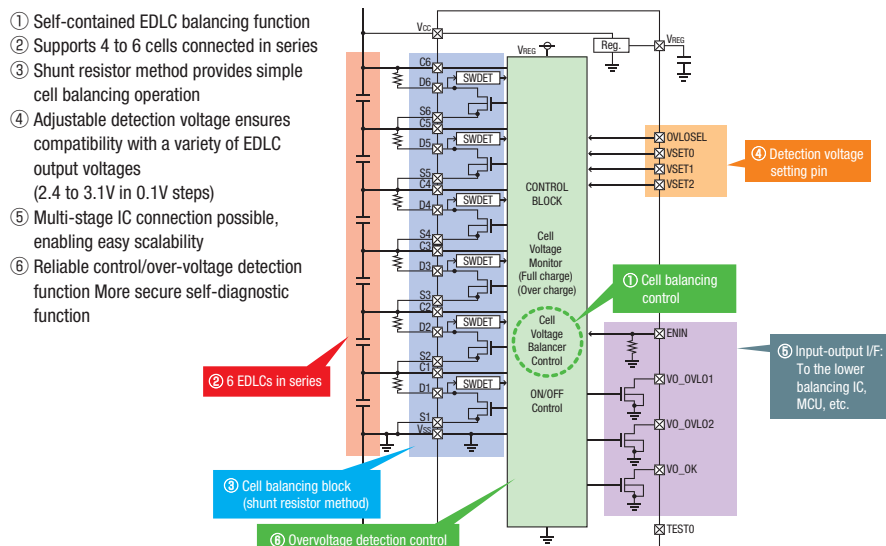


Supports 4 to 6 cells in series

Energy Storage Element (EDLC) Cell Balancing IC P.63

This monolithic IC with cell balancing functionality improves the stability and life of EDLCs (Electric Double Layer Capacitors), which are expected to expand the market for energy regeneration and instantaneous countermeasures. This makes it easy to configure a simple, compact, high reliability EDLC system without the need to worry about variations in individual components that make up conventional discrete solutions. And besides cell balancing functionality for up to 6 cells, multiple ICs can be connected in series to support additional cells in larger voltage applications. Multiple protection functions are built in, including short-circuit detection, Miller clamp, and gate monitoring.

Block Diagram



HTSSOP-B30

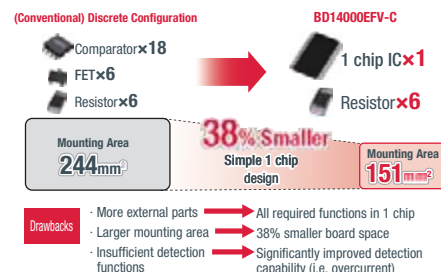
Power Supply Board for Evaluation



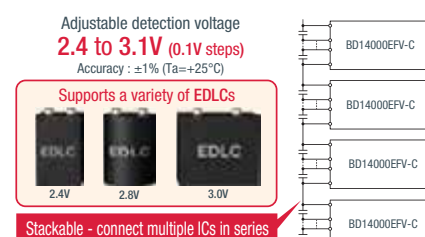
BD14000EFV-EVK-001

Features

Simple single-chip design



Easy scalability



Under Development

Optimized for predicting the remaining charge of large capacity li-ion batteries

Coulomb Counter IC for Energy Storage Systems

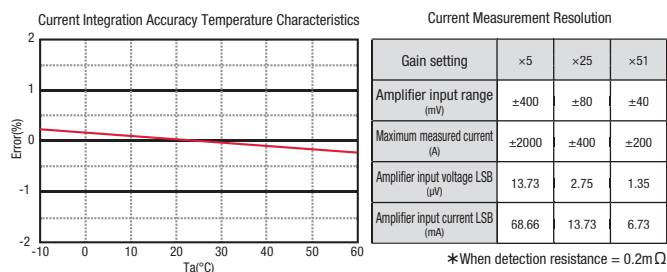
P.63



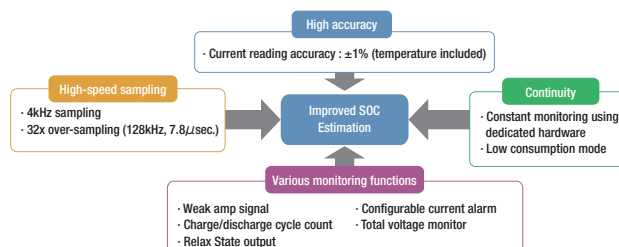
SSOP-B20

Features include a 16bit $\Delta\Sigma$ ADC, high accuracy op amp, and current integration logic circuit, making it possible to integrate the charge/discharge current in $\pm 2000V$ class applications with high accuracy.

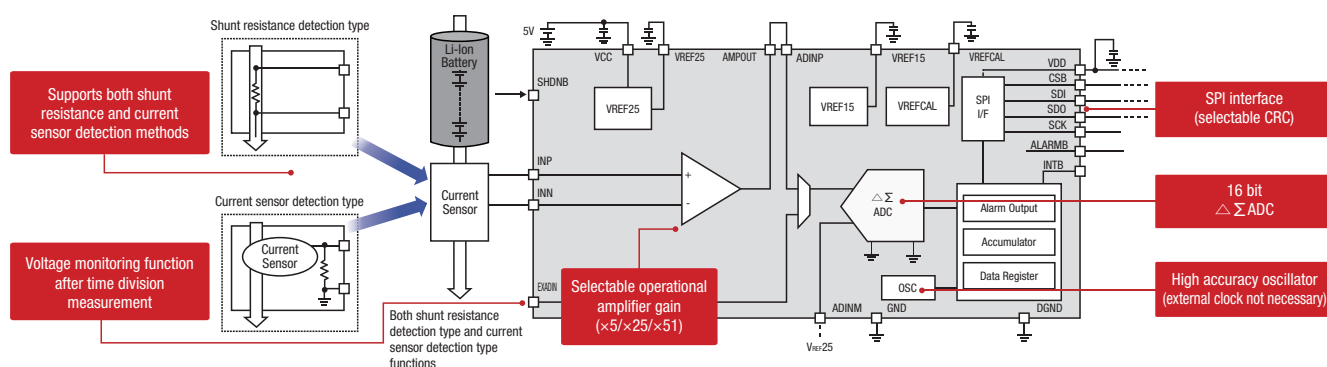
Broad Current Measurement Accuracy



Four Advantages



Block Diagram



Applications

- Power storage systems
- Backup battery systems
- Uninterruptible Power Supplies (UPS)
- Automated guided vehicles (AGV), robots, drones



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Linear Regulators

Standard Regulators (3-Terminal Regulators)

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

35V Rating, 1A Output 3-Terminal Regulators									
Type	Maximum Rating (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Circuit Current (mA)	Temperature Protection Circuit	Safety Operation Region Restriction Circuit	Over-Current Protection Circuit	Package
BA178xx type	35	5/6/7/8/9/10/12/15/18/20/24	±4	1	4.5	✓	✓	✓	TO220CP-3/TO252-3
35V Rating, 500mA Output 3-Terminal Regulators									
Type	Maximum Rating (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Circuit Current (mA)	Temperature Protection Circuit	Safety Operation Region Restriction Circuit	Over-Current Protection Circuit	Package
BA178Mxx type	35	5/6/7/8/9/10/12/15/18/20/24	±4	0.5	4.5	✓	✓	✓	TO220CP-3/TO252-3
15V Rating, 1A Output LDO Regulator									
Part No.	Maximum Rating (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Adjust Pin Current (μA)	Saturation Voltage (V)	Protection Circuit	Package	
BA1117FP	15	Variable	±1	1	60	1.2(Io=1A)	Over-Current/ Temperature	TO252-3	

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

50V Rating, 500mA Output, LDO Regulators										
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage : Io=200mA (V)	Circuit Current (μA)	Operating Temperature (°C)	Protection Circuit	Package	
BD357xYxxx-M series	4.5 to 36.0(3.3) (Variable)/ 5.5 to 36.0(5.0)	3.3/5.0/ Variable 2.8 to 12.0	±2 (Ta=−40 to +125°C)	0.5	−(3.3)/ 0.25(5.0)(Variable)	30	−40 to +125	Over-Current/ Temperature	TO252-3/ TO252-5/ HRP5	
50V Rating, Low Quiescent, 200mA Output, LDO Regulators										
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage : Io=200mA (V)	Circuit Current (μA)	Operating Temperature (°C)	Protection Circuit	Package	Automotive Grade AEC-Q100
BD7xxL2EFJ-C series/ BD7xxL2FP-C series/ BD7xxL2FP3-C series	4.37 to 45.0(3.3)/ 5.8 to 45.0(5.0)	3.3/5.0	±2 (Ta=−40 to +125°C)	0.2	0.4(5.0)/ 0.6(3.3)	6.0	−40 to +125	Over-Current/ Temperature	HTSOP-J8/ TO252-3/ SOT223-4	YES
50V Rating, Low Quiescent, 500mA Output, LDO Regulators										
BD7xxL5FP-C series	4.17 to 45.0(3.3)/ 5.6 to 45.0(5.0)	3.3/5.0	±2 (Ta=−40 to +125°C)	0.5	0.4(3.3)/ 0.25(5.0)	6.0	−40 to +125	Over-Current/ Temperature	TO252-3	YES
45V Rating, Low Quiescent, 500mA Output, LDO Regulators										
Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (V)	Circuit Current (μA)	Operating Temperature (°C)	Protection Circuit	Package	Automotive Grade AEC-Q100
BD4xxM5 type/ BD4xxM5W type	4.0 to 42.0(3.3)/ 5.5 to 42.0(5.0)	3.3/5.0	±2 (Tj=−40 to +150°C)	0.5	0.25(Io=300mA)(3.3)/ 0.2(Io=300mA)(5.0)	38	−40 to +150	Over-Current/ Temperature	TO252-3/ TO263-3/ TO263-5/ TO252-J5	YES
45V Rating, Low Quiescent, 200mA Output, LDO Regulators										
BD4xxM2 type/ BD4xxM2W type	3.9 to 42.0(3.3)/ 5.5 to 42.0(5.0)	3.3/5.0	±2 (Tj=−40 to +150°C)	0.2	0.2(Io=100mA)(3.3)/ 0.16(Io=100mA)(5.0)	40	Tj=−40 to +150	Over-Current/ Temperature	HTSOP-J8/ SOT223-4	YES
36V Rating, 300mA Output, LDO Regulator										
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (V)	Circuit Current (mA)	Operating Temperature (°C)	Protection Circuit	Package	Automotive Grade AEC-Q100
BD3650FP-M	5.6 to 30.0	5.0	±2 (Ta=−40 to +125°C)	0.3	0.2 (Io=200mA)	0.5	−40 to +125	Over-Current/ Temperature	TO252-3	YES
35V Rating, 2A Output, LDO Regulators										
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BAxxDD0T series	3 to 25	1.5/1.8/2.5/3.0/3.3/5.0/9.0/12.0/16.0	±1.0	2.0	0.9	0.45 (Io=2A)	Overvoltage/ Over-Current/Temperature	TO220FP-3		
35V Rating, 2A Output, LDO Regulators with Shutdown Switch										
BAxxDD0W series	3 to 25	Variable 1.5 to 16.0/ 1.5/1.8/2.5/3.0/3.3/5.0/9.0/12.0/16.0	±1.0	2.0	0.9	0.45 (Io=2A)	Overvoltage/ Over-Current/Temperature	TO220FP-5/ HRP5		
BDxxFD0WHFP series	4.0 to 32.0 (Variable 1.5 to 16.0/ 1.5 to 3.0)/Vo+1 to 32.0(3.3 to 16.0)	Variable 1.5 to 16.0/ 1.5/1.8/2.5/3.0/3.3/5.0/8.0/ 9.0/12.0/15.0/16.0	±1.0	2.0	0.5	0.4(Io=1A)	Over-Current/ Temperature	HRP5/ TO263-5		
35V Rating, 1A Output, LDO Regulators										
BAxxCC0 series	4 to 25	3.0/3.3/5.0/6.0/7.0/8.0/9.0/ 10.0/12.0/15.0	±2.0	1.0	2.5	0.30 (Io=0.5A)	Overvoltage/ Over-Current/Temperature	TO220FP-3/ TO252-3		
BDxxC0AFPS series	9.0 to 26.5(8)/ 10.0 to 26.5(9)	8/9	±1.0	1.0	0.6	0.30 (Io=0.5A)	Over-Current/ Temperature	TO252S-3		
BDxxFC0FP series	4.3 to 26.5(3.3)/ 6.0 to 26.5(5.0)	3.3/5.0	±1.0	1.0	0.6	−(3.3)/ 0.30 (Io=0.5A)	Over-Current/ Temperature	TO252-3		

Linear Regulators

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

35V Rating, 1A Output, LDO Regulators with Shutdown Switch										
Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BDxxFC0W type	4.0 to 26.5(Variable/3)/ 4.3 to 26.5(3.3)/ 6.0 to 26.5(5)/ 7.0 to 26.5(6)/ 8.0 to 26.5(7)/ 9.0 to 26.5(8)/ 10.0 to 26.5(9)/ 11.0 to 26.5(10)/ 13.0 to 26.5(12)/ 16.0 to 26.5(15)	Variable/ 3.0/3.3/5.0/6.0/7.0/8.0/ 9.0/10.0/12.0/15.0	±1	1.0	0.5	—(3.3)/ 0.3 (I _o =0.5A)	Over-Current/ Temperature	TO252-5/ HTSOP-J8		
BAxxCC0W type	4 to 25	Variable 3.0 to 15.0/ 3.0/3.3/5.0/6.0/7.0/8.0/9.0/ 10.0/12.0	±2	1.0	2.5	0.3 (I _o =0.5A)	Overvoltage/ Over-Current/ Temperature	TO220FP-5/ TO252-5		
BDxxC0AW type	4.0 to 26.5(Variable)/ 4.3 to 26.5(3.3)/ 6.0 to 26.5(5.0)	Variable 3.0 to 15.0/ 3.3/5.0	±1	1.0	0.5	—(3.3)/ 0.3 (I _o =0.5A)	Over-Current/ Temperature	TO252-5/ TO220CP-V5		
35V Rating, 1A Output, LDO Regulators										
Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
BDxxC0A type	4.3 to 26.5(3.3)/ 6.0 to 26.5(5.0)/ 9.0 to 26.5(8.0)/ 10.0 to 26.5(9.0)	3.3/5.0/8.0/9.0	±3 (Ta=−40 to +125°C)	1.0	0.5	—(3.3)/ 0.3 (I _o =500mA)	Over-Current/ Temperature	TO252-3/ HRP5/ TO263-3	YES	
35V Rating, 1A Output, LDO Regulators with Shutdown Switch										
BD00C0AWFPS-M	4.0 to 26.5	Variable 3.0 to 15.0	±3 (Ta=−40 to +105°C)	1.0	0.5	0.3 (I _o =500mA)	Over-Current/ Temperature	TO252S-55	YES	
BDxxC0AW type	4.0 to 26.5(Variable 1.0 to 15.0)/ 4.3 to 26.5(3.3)/ 6.0 to 26.5(5.0)/ 9.0 to 26.5(8.0)/ 10.0 to 26.5(9.0)	Variable 1.0 to 15.0/ 3.3/5.0/8.0/9.0	±3 (Ta=−40 to +125°C)	1.0	0.5	—(3.3)/ 0.3 (I _o =500mA)	Over-Current/ Temperature	TO252-5/ HRP5/ TO263-5	YES	
35V Rating, 300mA Output, LDO Regulator with Shutdown Switch										
Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BA3662CP-V5	4 to 25	Variable 3.0 to 15.0	±2	0.3	2.5	0.3 (I _o =0.2A)	Overvoltage/ Over-Current/Temperature	TO220CP-V5		
30V Rating, 100mA Output, LDO Regulators * Vo is Output Voltage/Unit : V										
BDxxFA1FP3 type	Vo+3 to 25	3.3/5.0/5.4/12.0	±1	0.1	0.3(V _{out} <5.4V)/ 0.4(V _{out} ≥5.4V)	1 (I _o =100mA)	Over-Current/ Temperature	SOT89-3		
30V Rating, 100mA Output, LDO Regulators with Shutdown Switch * Vo is Output Voltage/Unit : V										
Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
BD50FA1MG-M	Vo+3 to 25	5	±1	0.1	0.5	2 (I _o =100mA)	Over-Current/ Temperature	SSOP5	YES	
Type	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BD00FA1WEFJ	Vo+3 to 25	Variable 3.0 to 12.0	±1	0.1	0.3	2 (I _o =100mA)	Over-Current/ Temperature	HTSOP-J8		
18V Rating, 1.5A Output, LDO Regulators										
BAxxJC5T type	3 to 16	1.5/1.8/2.5/3.0/3.3/5.0/6.0/ 8.0/9.0	±1	1.5	0.5	0.3 (I _o =500mA)	Over-Current/ Temperature	TO220FP-3		
18V Rating, 1.5A Output, LDO Regulator with Shutdown Switch										
BA00JC5WT	3 to 16	Variable 1.5 to 12.0	±1	1.5	0.5	0.3 (I _o =500mA)	Over-Current/ Temperature	TO220FP-5		
18V Rating, 1A Output, LDO Regulators										
BAxxBC0 type	3 to 16	1.5/1.8/2.5/3.0/3.3/5.0/6.0/ 7.0/8.0/9.0/10.0	±2	1.0	0.5(V _{out} ≤6.0V)/ 0.6(V _{out} >6.0V)	0.3 (I _o =200mA)	Over-Current/ Temperature	TO252-3/ TO220FP-3		
18V Rating, 1A Output, LDO Regulators with Shutdown Switch										
BAxxBC0W type	3 to 16	Variable 1.5 to 12.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0	±2	1.0	0.5(V _i ≤6.0V)/ 0.5(V _{out} <7.0V)/ 0.6(V _{out} ≥7.0V)	0.3 (I _o =200mA)	Over-Current/ Temperature	TO252-5/ TO220FP-5		
15V Rating, 1A Output, LDO Regulators with Shutdown Switch										
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100
Consumer	Automotive Grade Products									
BDxxGC0WEFJ series	BDxxGC0MEFJ-M series	4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±1/±3 (Ta=−40 to +105°C) <Automotive Grade Products>	1.0	0.6	0.6 (I _o =1A)	Over-Current/ Temperature	HTSOP-J8	—/YES
15V Rating, 1A Output, Variable Output/Fixed Output LDO Regulators										
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	
BDxxGC0MEFJ-LB series		4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±1/±3 (Ta=−40 to +105°C)	1.0	0.6	0.6 (I _o =1A)	Over-Current/ Temperature	HTSOP-J8	

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

15V Rating, 500mA Output, LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxGA5WEFJ series	BDxxGA5MEFJ-M series	4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±1(Ta=25°C)/±3 (Ta=-40 to +105°C) <Automotive Grade Products>	0.5	0.6	0.6 (Io=500mA)	Over-Current/ Temperature	HTSOP-J8	—/YES	
15V Rating, 300mA Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxGA5MEFJ-LB series		4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±1/±3 (Ta=-40 to +105°C)	0.5	0.6	0.6 (Io=500mA)	Over-Current/ Temperature	HTSOP-J8		
15V Rating, 300mA Output, LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxGA3W series		4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±1	0.3	0.6	0.6 (Io=300mA)	Over-Current/ Temperature	HTSOP-J8/ VSON008X2030		
BDxxGA3MEFJ-M series		4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±3 (Ta=-40 to +105°C)	0.3	0.6	0.6 (Io=300mA)	Over-Current/ Temperature	HTSOP-J8	YES	
15V Rating, 300mA Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxGA3MEFJ-LB series		4.5 to 14.0	Variable 1.5 to 13.0/ 1.5/1.8/2.5/3.0/3.3/5.0/ 6.0/7.0/8.0/9.0/10.0/12.0	±3 (Ta=-40 to +105°C)	0.3	0.6	0.6 (Io=300mA)	Over-Current/ Temperature	HTSOP-J8		
10V Rating, 1.5A Output, LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHC5WEFJ series	BDxxHC5MEFJ-M series	4.5 to 8.0	Variable 1.5 to 7.0/ 1.5/1.8/2.5/3.0/ 3.3/5.0/6.0/7.0	±1(Ta=25°C)/±3 (Ta=-40 to +105°C) <Automotive Grade Products>	1.5	0.6	0.6 (Io=1.5A)	Over-Current/ Temperature	HTSOP-J8	—/YES	
10V Rating, 1.5A Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHC5MEFJ-LB series		4.5 to 8.0	(Variable 1.5 to 7.0)/ 1.5/1.8/2.5/3.0/ 3.3/5.0/6.0/7.0	±1/±3 (Ta=-40 to +105°C)	1.5	0.6	0.6 (Io=1.5A)	Over-Current/ Temperature	HTSOP-J8		
10V Rating, 1A Output, LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHC0WEFJ series	BDxxHC0MEFJ-M series	4.5 to 8.0	Variable 0.8 to 7.0(Automotive Grade Products Variable 1.5 to 7.0)/ 1.5/1.8/2.5/3.0/3.3/ 5.0/6.0/7.0	±1(Ta=25°C)/±3 (Ta=-40 to +105°C) <Automotive Grade Products>	1.0	0.6	0.6 (Io=1A)	Over-Current/ Temperature	HTSOP-J8	—/YES	
10V Rating, 1A Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHC0MEFJ-LB series		4.5 to 8.0	Variable 0.8 to 7.0 (Variable 1.5 to 7.0)/ 1.5/1.8/2.5/3.0/3.3/5.0/6.0/7.0	±1/±3 (Ta=-40 to +105°C)	1.0	0.6	0.6 (Io=1A)	Over-Current/ Temperature	HTSOP-J8		
10V Rating, 500mA Output, LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHA5WEFJ series	BDxxHA5MEFJ-M series	4.5 to 8.0	Variable 1.5 to 7.0/ 1.5/1.8/2.5/3.0/3.3/ 5.0/6.0/7.0	±1(Ta=25°C)/±3 (Ta=-40 to +105°C) <Automotive Grade Products>	0.5	0.6	0.6 (Io=500mA)	Over-Current/ Temperature	HTSOP-J8	—/YES	
10V Rating, 500mA Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHA5MEFJ-LB series		4.5 to 8.0	Variable 1.5 to 7.0/ 1.5/1.8/2.5/3.0/3.3/5.0/6.0/7.0	±1/±3 (Ta=-40 to +105°C)	0.5	0.6	0.6 (Io=500mA)	Over-Current/ Temperature	HTSOP-J8		
10V Rating, 300mA Output, LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHA3WEFJ series	BDxxHA3MEFJ-M series	4.5 to 8.0	Variable 1.5 to 7.0/ 1.5/1.8/2.5/3.0/3.3/ 5.0/6.0/7.0	±1(Ta=25°C)/±3 (Ta=-40 to +105°C) <Automotive Grade Products>	0.3	0.6	0.6 (Io=300mA)	Over-Current/ Temperature	HTSOP-J8	—/YES	
10V Rating, 300mA Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxHA3MEFJ-LB series		4.5 to 8.0	Variable 1.5 to 7.0/ 1.5/1.8/2.5/3.0/3.3/5.0/6.0/7.0	±1/±3 (Ta=-40 to +105°C)	0.3	0.6	0.6 (Io=300mA)	Over-Current/ Temperature	HTSOP-J8		

Linear Regulators

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

7V Rating, 1A Output, LDO Regulators with Shutdown Switch											
Type		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)		Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	
BDxxIC0W type		2.4 to 5.5	Variable 0.8 to 4.5/ 1.0/1.2/1.25/1.5/1.8/ 2.5/2.6/3.0/3.3	±1	1.0		0.3	0.4 (I _O =1A)	Over-Current/ Temperature	HTSOP-J8/ HVSOF6	
Type		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
BD00IC0MEFJ-M type		2.4 to 5.5	Variable 0.8 to 4.5/ 1.0/1.2/1.5/1.8/2.5/3.0/3.3	±3 (Ta=−40 to +105°C)	1.0	0.3	0.4 (I _O =1A)	Over-Current/ Temperature	HTSOP-J8	YES	
7V Rating, 1A Output, Variable Output/Fixed Output LDO Regulators											
Type		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BDxxIC0MEFJ-LB type		2.3 to 5.5/ 2.4 to 5.5	Variable 0.8 to 4.5/ 1.0/1.2/1.5/1.8/2.5/3.0/3.3	±3 (Ta=−40 to +105°C)	1.0	0.3	0.4 (I _O =1A)	Over-Current/ Temperature	HTSOP-J8		
7V Rating, 500mA Output, LDO Regulators											
BDxxKA5FP type		2.3 to 5.5	1.0/1.2/1.5/1.8/2.5/3.0/3.3	±1	0.5	0.35	0.12 (I _O =200mA)	Over-Current/ Temperature	TO252-3		
7V Rating, 500mA Output, LDO Regulators with Shutdown Switch											
BDxxKA5W type		2.3 to 5.5	Variable 1.0 to 4.0/ 1.0/1.2/1.5/1.8/2.5/3.0/3.3	±1	0.5	0.35	0.12 (I _O =200mA)	Over-Current/ Temperature	TO252-5/ SOP8		
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
BD00IA5MHFV-M		2.4 to 5.5	Variable 0.8 to 4.5	±1(Ta=25°C)/±3 (Ta=−40 to +105°C) <Automotive Grade Products>	0.5	0.25	0.4 (I _O =500mA)	Over-Current/ Temperature	HVSOF6	YES	
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package	Automotive Grade AEC-Q100	
Consumer	Automotive Grade Products										
BDxxIA5WEFJ series	BDxxIA5MEFJ-M series	2.4 to 5.5	Variable 0.8 to 4.5/ 1.0/1.2/1.5/1.8/2.5/3.0/3.3	±1(Ta=25°C)/±3 (Ta=−40 to +105°C) <Automotive Grade Products>	0.5	0.25	0.4 (I _O =500mA)	Over-Current/ Temperature	HTSOP-J8	—/YES	
7V Rating, 500mA Output, Variable Output/Fixed Output LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BDxxIA5MEFJ-LB series		2.4 to 5.5	Variable 0.8 to 4.5/ 1.0/1.2/1.5/1.8/2.5/3.0/3.3	±1/±3 (Ta=−40 to +105°C)	0.5	0.25	0.4 (I _O =500mA)	Over-Current/ Temperature	HTSOP-J8		
6.5V Rating, 500mA Output, Full CMOS LDO Regulators											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Protection Circuit	Package		
BUxxSD5WG series		1.7 to 6.0	1.8/3.3	±1	0.5	33.0	150 (I _O =100mA)/ 85 (I _O =100mA)	Over-Current/ Temperature	SSOP5		
6.5V Rating, 500mA Output, Full CMOS LDO Regulators with Shutdown Switch WL-CSP type											
BUxxSA5WGWZ series		1.8 to 5.0	3/3.3	±1	0.5	0.033	0.08 (I _O =100mA)	Over-Current/ Temperature	UCSP30L1		
6.5V Rating, 300mA Output, CMOS LDO Regulators with Shutdown Switch											
Part No.		Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)		Protection Circuit	Package		
BHxxM0AWHFV series		2.5 to 5.5	1.5/1.8/2.0/2.1/2.5/2.6/2.7/ 2.8/2.9/3.0/3.1/3.2/3.3/3.4	±25mV(V _{OUT} <2.5V)/ ±1(V _{OUT} ≥2.5V)	0.3	60 (I _O =100mA)(V _{OUT} ≥2.5V)		Over-Current/ Temperature	HVSOF6		

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

6.5V Rating, 200mA Output, CMOS LDO Regulators with Shutdown Switch																		
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)	Protection Circuit	Package											
BUxxTD2WNVX series/ BUxxTD3WG series	1.7 to 5.5	1.0/1.05/1.1/1.15/1.2/ 1.25/1.3/1.5/1.8/1.85/1.9/ 2.0/2.05/2.1/2.3/2.5/2.6/ 2.7/2.75/2.8/2.85/2.9/3.0/ 3.1/3.2/3.3/3.4	±25mV(V _{OUT} <2.5V)/ ±1(V _{OUT} ≥2.5V)	0.2	—(1.0 to 2.3)/ 280 (I _O =200mA)(2.5/2.6)/ 260 (I _O =200mA)(2.7 to 2.85)/ 240 (I _O =200mA)(2.9 to 3.1)/ 220 (I _O =200mA)(3.2 to 3.4)	Over-Current/ Temperature	SSON004X1010/ SSOP5											
BUxxTA2W series	2.5 to 5.5	1.5/1.8/2.5/2.6/2.7/2.8/ 2.85/2.9/3.0/3.1/3.2/3.3/3.4	±25mV(V _{OUT} <2.5V)/ ±1(V _{OUT} ≥2.5V)	0.2	—(1.5/1.8)/ 400 (I _O =200mA)(2.5/2.6)/ 360 (I _O =200mA)(2.7 to 2.85)/ 330 (I _O =200mA)(2.9 to 3.1)/ 300 (I _O =200mA)(3.2 to 3.4)	Over-Current/ Temperature	SSON004X1216/ HVSOF5											
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)	Protection Circuit	Package	Automotive Grade AEC-Q100										
BUxxSD2MG-M series	1.7 to 6.0	1.2/1.5/1.8/2.5/ 2.8/3.0/3.3	±2 (T _a =−40°C to +105°C)	0.2	400 (I _O =100mA)(1.20)/ 280 (I _O =100mA)(1.50)/ 150 (I _O =100mA)(1.80)/ 100 (I _O =100mA)(2.50)/ 85 (I _O =100mA) (2.80 to 3.30)	Over-Current/ Temperature	SSOP5	YES										
BUxxJA2MNVX-C series	1.7 to 6.0	1.0/1.1/1.2/1.25/ 1.5/1.8/2.5/2.8/ 2.85/2.9/3/3.3	±36mV (V _{OUT} <1.8V) ±2 (V _{OUT} ≥1.8V)	0.2	800(1.0/1.1)/ 600(1.2/1.25)/ 440(1.5/380(1.8)/ 280(2.5)/260(2.8/2.85)/ 240(2.9/3.0)/220(3.3)	Over-Current/ Temperature	SSON004R1010	YES										
BUxxJA2VG-C series	1.7 to 6.0	1.0/1.2/1.25/1.5/ 1.8/2.5/2.8/2.85/ 3.0/3.3	±2	0.2	—(1.0 to 1.5)/ 160(1.8)/100(2.5)/ 85(2.8 to 3.3)	Over-Current/ Temperature	SSOP5	YES										
BUxxJA2DG-C series	1.7 to 6.0	1.0/1.2/1.25/1.5/ 1.8/2.5/2.8/2.85/ 3.0/3.3	±2	0.2	—(1.0 to 1.5)/ 160(1.8)/100(2.5)/ 85(2.8 to 3.3)	Over-Current/ Temperature	SSOP5	YES										
6.5V Rating, 200mA Output, CMOS LDO Regulators with Shutdown Switch WL-CSP type																		
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)	Protection Circuit	Package (mm)											
BUxxSA4WGWL series	1.7 to 5.5	1.8/2.5/2.55/2.8/3.0/3.3	±2	0.2	100(I _O =150mA)(V _{OUT} <2.5V)/ 80(I _O =150mA)(V _{OUT} ≥2.5V)	Over-Current/ Temperature	UCSP50L1 0.8×0.8, H=Max. 0.55											
6.5V Rating, 150mA Output, CMOS LDO Regulators with Shutdown Switch																		
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)	Circuit Current (μA)	Protection Circuit	Package (mm)										
BHxxNB1WHFV series	2.5 to 5.5	2.5/2.8/2.85/2.9/3.0/3.1/3.3	±1	0.15	250 (I _O =100mA)	60	Over-Current/ Temperature	HVSOF5										
BHxxRB1WGUT series	2.5 to 5.5	1.5/1.8/2.5/2.8/2.9/ 3.0/3.1/3.3	±25mV(V _{OUT} <2.5V)/ ±1(V _{OUT} ≥2.5V)	0.15	100 V _{OUT} ≥2.5V (I _O =100mA)	34	Over-Current/ Temperature	VCSP60N1 1.04×1.0, H=Max. 0.675										
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%) (High Speed Mode)	Output Voltage Precision (%) (Low Icc Mode)	Output Current (A)	Saturation Voltage (mV)	Circuit Current High Speed Mode (μA)	Circuit Current Low Icc Mode (μA)	Protection Circuit	Package								
BHxxPB1WHFV series	1.7 to 5.5	1.2/1.5/1.8/2.5/2.8/2.9/ 3.0/3.1/3.3	±25mV(V _{OUT} <2.5V)/ ±1(V _{OUT} ≥2.5V)	−3.3 to +4.3(V _{OUT} <2.5V)/ −3.0 to +3.8(V _{OUT} ≥2.5V)	0.15	210 V _{OUT} ≥2.5V (I _O =100mA)	20	2	Over-Current/ Temperature	HVSO5								
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)	Circuit Current (μA)	Protection Circuit	Package										
BHxxSA3WGUT series	2.2 to 5.5	1.8/2.8/3.0	±25mV(V _{OUT} <2.8V)/ ±1(V _{OUT} ≥2.8V)	0.15	100 V _{OUT} ≥2.8V (I _O =100mA)	40	Over-Current/ Temperature	VCSP60N1										
Ultra Low Dropout type, Fast Transient Response																		
Part No.	Output Current (A)	Input Voltage(V)		Output Voltage (V)	Voltage Precision (%)	Power Good	Variable Soft Start	UVLO	OCP	TSD	Package							
		V _{CC}	V _{IN}															
BD3550HFN	0.5	4.3 to 5.5	0.95 to (V _{CC} −1)	0.65 to 2.70	±1	—	✓	✓	Recovery	Recovery	HSON8							
BD3507HFV	0.55	4.5 to 5.5	1.2 to (V _{CC} −1)								HVSOF6							
BD3551HFN	1.0	4.3 to 5.5	0.95 to (V _{CC} −1)	0.65 to 2.50							HSON8							
BD3506F	2.5		1.2 to (V _{CC} −1)								SOP8							
BD3552HFN	2.0		0.95 to (V _{CC} −1)	0.65 to 2.70							HSON8							
BD3508MUV	3.0		0.75 to (V _{CC} −1)								VQFN020V4040							
BD3540NUV	0.5	3.0 to 5.5	0.95 to (V _{CC} −1)	0.65 to 2.70	±1	✓	✓	✓	Recovery	Recovery	VSON010V3030							
BD3541NUV	1.0		0.7 to (V _{CC} −1)								VSON010V3030							
BD3512MUV	3.0										VQFN020V4040							
BD3509MUV	4.0										VQFN020V4040							
BD3504FVM	External FET	4.5 to 5.5	V _O +(I _{OX} R _{ON}) to (V _{CC} −1)	0.65 to 2.50	±1	—	✓	✓	Latch	Latch	MSOP8							
BD3521FVM	External FET			1.5							MSOP8							

Linear Regulators

Single-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

Power Supply for High Fidelity Audio										
Part No.	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Reference Voltage Accuracy (%)	Saturation Voltage (mV)	Noise Level (μVrms)	PSRR (dB)	Over-Current Protection	Thermal Protection	Package
BD37201NUX	0.5	2.7 to 5.5	Variable 1.0 to 4.5	±1	200	4.72	90(f=1kHz) 55(f=1MHz)	✓	✓	VSON008X2030
☆BD37210AMUV	1.0	3.0 to 16.0	Variable 1.0 to 15.0	±1	300	4.6	78(f=1kHz) 53(f=1MHz)	✓	✓	VQFN020V4040
☆BD37215AMUV	1.0	−16.0 to −3.0	Variable −15.0 to −1.0	±1	300	5.1	90(f=1kHz) 55(f=1MHz)	✓	✓	VQFN020V4040

UVLO : Undervoltage lockout, OCP : Overcurrent protection, TSD : Thermal shutdown

☆ : Under Development

LDO Regulators with Voltage Detector and Watchdog Timer

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

550mA Output, LDO Regulators with Voltage Detector and Watchdog Timer												
Part No.	Input Voltage (V)	LDO				Reset			Circuit Current (μA)	Operating Temperature (°C)	Package	Automotive Grade AEC-Q100
		Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (V)	Detection Voltage (V)	Voltage Detection Precision (%)	Function				
BD4271HFP-C	5.5 to 45.0	5	±2 (Tj=−40 to +150°C)	0.55	0.2 (Io=300mA)	4.65	±2.6	4.65V Voltage Detector+WDT	75	Tj=−40 to +150	HRP7	YES
BD4271FP2-C											TO263-7	YES
500mA Output, LDO Regulators with Voltage Detector and Watchdog Timer												
BD3021HFP	5.6 to 36.0	5	±2 (Ta=−40 to +125°C)	0.5	0.3 (Io=200mA)	4.5	±2	4.5V Voltage Detector+WDT (Switchable)	80	Ta=−40 to +125	HRP7	Preparing
BD3020HFP						Variable (at Vs open: 4.1V)		Adjustable Voltage Detector +WDT			HRP7	Preparing

LDO Regulators with Voltage Detector

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

500mA Output, LDO Regulators with Voltage Detector												
Part No.	Input Voltage (V)	LDO				Reset		Shutdown Switch	Circuit Current (μA)	Operating Temperature (°C)	Package	Automotive Grade AEC-Q100
		Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (V)	Detection Voltage (V)	Voltage Detection Precision (%)					
BD42754FPJ-C	5.5 to 45.0	5	±2 (Tj=−40 to +150°C, Vcc=6.0 to 28V, Io=5 to 400mA)	0.5	0.25 (Io=300mA)	4.62	±2.8	—	75	Tj=−40 to +150	TO252-J5	YES
BD42754FP2-C											TO263-5	YES
200mA/300mA Output, LDO Regulators with Voltage Detector												
BD4269FJ-C	5.5 to 45.0	5	±2 (Tj=−40 to +150°C, Vcc=6.0 to 16V, Io=1 to 100mA)	0.2	0.25 (Io=100mA)	Variable (with RADJ not used: 4.62V)	±2.6	—	70	Tj=−40 to +150	SOP-J8	YES
BD4269EFJ-C				0.3							HTSOP-J8	YES

Voltage Tracker

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

500mA Voltage Trackers							
Part No.	Input Voltage (V)	Output Current (A)	Offset Voltage (mV)	Circuit Current (μA)	Operating Temperature (°C)	Package	
BD3925FP-C	4.5 to 36.0	0.5	±10(Ta=−40 to +125°C, Vcc=6 to 36V, Io=5 to 200mA)	45	Ta=−40 to +125	TO252-5	
BD3925HFP-C						HRP5	
50mA/70mA Voltage Trackers							
Part No.	Input Voltage (V)	Output Current (A)	Offset Voltage (mV)	Circuit Current (μA)	Operating Temperature (°C)	Package	Automotive Grade AEC-Q100
BD42500G-C	5.3* to 42.0	0.05	±15(Tj=−40 to +150°C, Vcc=6 to 40V, Io=1 to 50mA)	40	Tj=−40 to +150	SSOP5	YES
BD42540FJ-C	5.4* to 42.0	0.07	±10(Tj=−40 to +150°C, Vcc=5.5 to 26V, Io=0.1 to 60mA)	40	Tj=−40 to +150	SOP-J8	YES
250mA Voltage Trackers							
BD42530EFJ-C	5.6* to 42.0	0.25	±10(Tj=−40 to +150°C, Vcc=6 to 32V, Io=0.1 to 250mA)	40	Tj=−40 to +150	HTSOP-J8	YES
BD42530FP2-C	5.6* to 42.0	0.25	±10(Tj=−40 to +150°C, Vcc=6 to 32V, Io=0.1 to 250mA)	40	Tj=−40 to +150	TO263-5	YES
BD42530FPJ-C	5.6* to 42.0	0.25	±10(Tj=−40 to +150°C, Vcc=6 to 32V, Io=0.1 to 250mA)	40	Tj=−40 to +150	TO252-J5	YES

*5V setting

Multi-Output LDO Regulators

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

2ch LDO Regulators																								
Part No.	Input Voltage (V)	Output Voltage 1 (V)	Output Voltage 2 (V)	Output Voltage Precision (%)	Output Current (A)	Bias Current (mA)	Saturation Voltage (V)	Ripple Rejection (dB)	Load Regulation (mV)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Protection Circuit	Package										
BA30E00WHFP	4.1 to 16.0	3.3	Variable 0.8 to 3.3	±2	0.6/0.6	0.7	0.3 (Io=300mA)	68 (3.3V Output)	30 (Io=0 to 0.6A)	1.0	47	✓	Over-Current/ Temperature	HRP7										
BA3259HFP	4.75 to 14.00				1.0/1.0	3.0	1.1 (Io=1A)	52	5 (Io=5mA to 1A)	3.3	1.0	—		HRP5										
BA33D15HFP	4.1 to 16.0		1.5		0.5/0.5	0.7	0.25 (Io=250mA)	58 (1.5V Output)	30 (Io=0 to 500mA)	1.0				HRP5										
BA33D18HFP			1.8											HRP5										
2ch High Efficiency CMOS Regulator																								
Part No.	Output Voltage (V)		Output Voltage Precision (%)	Output Current (A)	Ripple Rejection (dB)	Load Regulation (%)	Output Short Current (mA)	Output Capacitor (μF)	Shutdown Switch	Over-Current Protection	Thermal Protection	Discharge Function												
BD70511GWL	LDO1	1.2	1.5	0.15	60	10	30	1.0	✓	✓	✓	✓												
	LDO2			0.3			65																	
2ch Variable Output, CMOS LDO Regulators																								
Part No.	Input Voltage (V)	V _{OUT}	Selection Output Voltage (V)								Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)(Io=100mA)	Ripple Rejection (dB)	Load Regulation (%)	Circuit Current (μA)	Output Short Current (mA)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Over-Current Protection	Thermal Protection	Under Voltage Protection	
BD7003NUX	2.5 to 5.5	1ch	1.5	1.8	1.8	1.8	1.8	2.6	2.8	2.9	2.8	1.8	0.3	90	66	0.2 (Io=1 to 300mA)	55	150	1.0	1.0	✓	✓	✓	✓
BD7004NUX		2ch	2.8	2.6	2.7	2.8	2.9	2.8	2.8	2.9	3.3													
BD7004NUX	2.5 to 5.5	1ch	1.2	1.2	1.8	1.8	1.8	1.8	2.8	3.0	3.3	1.8	0.3	90	66	0.2 (Io=1 to 300mA)	55	150	1.0	1.0	✓	✓	✓	✓
		2ch	1.5	1.8	1.5	1.8	3.0	3.3	3.0	3.0	3.3													
BD7602GUL	2.7 to 5.5	1ch	3.0								2	0.1	—	45	0.7	10	—	4.7	—	—	—	—		
		2ch	2.8	2.9	2.95	3.0	3.05	3.1	3.2	3.3		—											0.15	
3ch CMOS LDO Regulators																								
Part No.	Input Voltage (V)	Output Voltage (V)	Output Voltage Precision (%)	Output Current (A)	Saturation Voltage (mV)(Io=200mA)	Ripple Rejection (dB)	Load Regulation (mV)	ch	Circuit Current (μA)	Output Short Current (mA)	Input Capacitor (μF)	Output Capacitor (μF)	Shutdown Switch	Over-Current Protection	Thermal Protection	Discharge Function	Package							
BU6650NUX	2.5 to 5.5	2.8	±1%	0.2	360	65	10 (Io=1 to 100mA)	1	120	70	2.2	1.0	✓	✓	✓	✓	VSON008X2030							
		2.8	±1%		360	65		2																
		1.8	±25mV		—	70		3																
BU6651NUX		2.8	±1%		360	65		1									VSON008X2030							
		1.8	±25mV		—	70		2																
		1.5	±25mV		—	70		3																
BU6652NUX		2.8	±1%		360	65		1									VSON008X2030							
		2.8	±1%		360	65		2																
		1.5	±25mV		—	70		3																
BU6653NUX		2.8	±1%		360	65		1									VSON008X2030							
		1.8	±25mV		—	70		2																
		1.8	±25mV		—	70		3																
BU6654NUX		3.3	±1%		300	65		1									VSON008X2030							
		1.8	±25mV		—	70		2																
		1.5	±25mV		—	70		3																
BU6655NUX		3.3	±1%		300	65		1									VSON008X2030							
		2.8	±1%		360	65		2																
		1.8	±25mV		—	70		3																

Linear Regulators for DDR SDRAM

Please ensure that minimum input voltage always exceeds the sum of output voltage and drop out voltage for the device.

Termination Regulators for DDR SDRAM																						
Part No.	V _{CC} Termination Input Voltage (V)	V _{TT,N} Termination Input Voltage (V)	V _{DDQ} Reference Input Voltage (V)	V _{TT} Output Voltage (V)	V _{TT} Voltage Precision (mV)	V _{TT} Output Current (A)	V _{REF} Output Current (mA)	Function												Package		
								Enable	Soft Start	Power Good	UVLO	Output Ceramic Capacitors Compatibility	Thermal Protection	DDR(VDDQ)								
														DDR1 (2.5V/2.6V)	DDR2 (1.8V)	DDR2L (1.5V)	LPDDR2 (1.2V)	DDR3 (1.5V)	DDR3L (1.35V)		DDR3U (1.25V)	LPDDR3 (1.2V)
BD3533F	2.7 to 5.5	1.0 to 5.5	1.00 to 2.75	0.75 to 1.25	±30	±1.0	±20	✓	✓	—	✓	—	Recovery	✓	✓	—	—	—	—	—	SOP8	
BD3533FVM								✓	✓	—	—	—	—	—	—	MSOP8						
BD3533HFN								✓	✓	—	—	—	—	—	—	HSOP8						
BD3539FVM	2.7 to 5.5	1.0 to 5.5	1.00 to 2.75	0.75 to 1.25	±15	±1.0	±25	✓	✓	—	✓	✓	Recovery	✓	✓	✓	—	—	—	—	MSOP8	
BD3539NUX								✓	✓	—	—	—	—	—	—	VSON008X2030						
BD35390FJ	2.7 to 5.5	1.0 to 5.5	1.00 to 2.75	0.75 to 1.25	±15	±1.0	—	✓	✓	✓	✓	✓	Recovery	✓	✓	✓	—	✓	—	—	SOP-J8	
Part No.	V _{CC} Termination Input Voltage (V)	V _{TT,N} Termination Input Voltage (V)	V _{DDQ} Reference Input Voltage (V)	V _{TT} Output Voltage (V)	V _{TT} Voltage Precision (mV)	V _{TT} Output Current (A)	V _{REF} Output Current (mA)	Function												Package	Automotive Grade AEC-Q100	
								Enable	Soft Start	Power Good	UVLO	Output Ceramic Capacitors Compatibility	Thermal Protection	DDR(VDDQ)								
BD35395FJ-M	2.7 to 5.5	1.0 to 5.5	1.00 to 2.75	0.500 to 1.375	±13.5	±1.0	—	✓	✓	✓	✓	✓	Recovery	✓	✓	✓	—	✓	✓	—	SOP-J8	YES

Switching Regulators

Integrated MOSFET Switching Regulators

Single Output Buck Converters $V_{IN} \leq 6V$														
Part No.	Input Rating (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Function						Package	
							Power Good	Variable Soft Start	Synchronous Rectification	Light-Load Efficiency	Over-Current Protection	Thermal Protection		
BD9161FVM-LB	7	0.6	2.5 to 4.5	1.0 to 3.3	1	Current	—	—	✓	✓	Latch	Latch	MSOP8	
BD9109FVM-LB	7	0.8	4.5 to 5.5	3.3	1	Current	—	—	✓	✓	Latch	Latch	MSOP8	
BD9106FVM-LB	7	0.8	4.0 to 5.5	1.0 to 2.5	1	Current	—	—	✓	✓	Latch	Latch	MSOP8	
BD9A101MUV-LB	7	1	2.7 to 5.5	0.8 to $(V_{IN} \times 0.7)$	1	Current	✓	✓	✓	✓	Recovery	Recovery	VQFN016V3030	
BD9A301MUV-LB	7	3	2.7 to 5.5	0.8 to $(V_{IN} \times 0.7)$	1	Current	✓	✓	✓	✓	Recovery	Recovery	VQFN016V3030	
BD9B301MUV-LB	7	3	2.7 to 5.5	0.8 to $(V_{IN} \times 0.8)$	2/1	On-Time	✓	✓	✓	Deep	Recovery	Recovery	VQFN016V3030	
Single Output Buck Converters $V_{IN} \leq 20V$														
Part No.	Input Rating (V)	Output Current (A)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Function							Package
							Power Good	Variable Soft Start	Synchronous Rectification	Light-Load Efficiency	Over-Current Protection	Thermal Protection	Overvoltage Protection	
BD9325FJ-LB	20	2	4.75 to 18.0	0.9 to $(V_{IN} \times 0.9)$	0.38	Current	—	✓	—	—	Recovery	Recovery	—	SOP-J8
BD9C301FJ-LB	20	3	4.5 to 18.0	$(V_{IN} \times 0.125)$ to $(V_{IN} \times 0.7)$	0.5	Current	—	—	✓	—	Latch	Recovery	—	SOP-J8
BD9326EFJ-LB	20	3	4.75 to 18.0	0.9 to $(V_{IN} \times 0.9)$	0.38	Current	—	✓	—	—	Recovery	Recovery	—	HTSOP-J8
BD9327EFJ-LB	20	4	4.75 to 18.0	0.9 to $(V_{IN} \times 0.9)$	0.38	Current	—	✓	—	—	Recovery	Recovery	—	HTSOP-J8
Single Output Buck Converters $V_{IN} \geq 20V$														
BD9G201EFJ-LB	45	1.5	4.5 to 42.0	0.8 to V_{IN}^*	0.3	Current	—	—	—	—	Recovery	Recovery	—	HTSOP-J8ES
BD9G102G-LB	45	0.5	6 to 42	$(V_{IN} \times 0.08)$ to $(V_{IN} \times 0.8)$ $(V_{IN} \times 0.08) \geq 0.75$	1	Current	—	—	—	—	Recovery	Recovery	✓	SSOP6
BD9E100FJ-LB	40	1	7 to 36	$(V_{IN} \times 0.15)$ to $(V_{IN} \times 0.7)$ $(V_{IN} \times 0.15) \geq 1.0$	1	Current	—	—	✓	—	Recovery	Recovery	✓	SOP-J8
BD9E101FJ-LB	40	1	7 to 36	$(V_{IN} \times 0.0855)$ to $(V_{IN} \times 0.7)$ $(V_{IN} \times 0.0855) \geq 1.0$	0.57	Current	—	—	✓	—	Recovery	Recovery	✓	SOP-J8
BD9E300EFJ-LB	40	2.5	7 to 36	$(V_{IN} \times 0.15)$ to $(V_{IN} \times 0.7)$ $(V_{IN} \times 0.15) \geq 1.0$	1	Current	—	—	✓	—	Recovery	Recovery	✓	HTSOP-J8
BD9E301EFJ-LB	40	2.5	7 to 36	$(V_{IN} \times 0.0855)$ to $(V_{IN} \times 0.7)$ $(V_{IN} \times 0.0855) \geq 1.0$	0.57	Current	—	—	✓	—	Recovery	Recovery	✓	HTSOP-J8
BD9E303EFJ-LB	40	3	7 to 36	$(V_{IN} \times 0.06)$ to $(V_{IN} \times 0.8)$ $(V_{IN} \times 0.06) \geq 1.0$	0.3	Current	—	—	✓	—	Recovery	Recovery	✓	HTSOP-J8
BD9G341AEFJ-LB	80	3	12 to 76	1.0 to $(V_{IN} \times 0.7)^*$	0.05 to 0.75	Current	—	—	—	—	Recovery	Recovery	✓	HTSOP-J8
BD9V101MUF-LB	70	1	16 to 60	0.8 to 5.5	1.9 to 2.3	Current	✓	—	✓	—	Recovery	Recovery	✓	VQFN24FV4040

* Restrictions depend on input/output voltage conditions.

External MOSFET Switching Regulators

Buck Controllers																	
Part No.	No. of Outputs	Input Rating (V)	Input Voltage (V)	Supply Voltage (V)	Output Voltage (V)	Switching Frequency (MHz)	Control Method	Function								Package	
								Power Good	Enable	External Synchronization	Variable Soft Start	Synchronous Rectification	Light-Load Efficiency	Over-Current Protection	Thermal Protection		
BD95601MUV-LB	1	28	4.5 to 25.0	—	0.75 to 2.0	0.2 to 0.5	H ³ Reg	✓	✓	—	✓	✓	✓	Latch	Recovery	VQFN020V4040	
BD95602MUV-LB	2	30	5.5 to 28.0	—	1.0 to 5.5	0.15 to 0.50	H ³ Reg	✓	✓	—	✓	✓	✓	Latch	Recovery	VQFN032V5050	
Boost Controller																	
Part No.	No. of Outputs	Input Rating (V)	Input Voltage (V)	Output Voltage (V)	Switching Frequency (kHz)	Control Method	Function									Package	
							Boost	Buck Boost	Return	Buck	Enable	External Synchronization	Variable Soft Start	Synchronous Rectification	Short-Circuit Protection		Thermal Protection
BD9615MUV-LB	1	62	3.5 to 60.0	V _{IN} to (V _{IN} /0.2)	100 to 2,500	Voltage	✓	—	—	—	✓	✓	✓	—	Recovery	Recovery	VQFN16KV3030

Digital Controllers (Powervation) series

Digital Controllers for Servers/Base Stations (Powervation)

Single-Phase Controllers																					
Part No.	Phase number	Supply Voltage (V)	Interface				Features										Protection Functions				Package (mm)
			SMBus	VR12/ 12.5 SVID	VR13 SVID	3-Bit Parallel VID	Auto-Tuning	Programmable f _{sw}	Phase Add/ Drop	DSS*	Sensors & Precision Telemetry	Programmable Load-Line	Single Pin CONFIG™	ADDR	VSET/ VTRAC K/System Good	TSense Supported	OVP/ OCP	SCP/ OTP	LOS	Phase Loss	
 PV2105	1	0.6 to 21.0	PMBUS™ Compliant	—	—	—	Auto-Control®: Real-Time Adaptive Auto-Tuning	375kHz to 1.25MHz	—	—	V _{out} , I _{out} , V _{in} , E _{out} , Temperature, Duty Cycle, f _{sw}	—	8 Tables	✓	—	Internal Die Sense & External	Restart/ Latching	Restart/ Latching	Retry	Restart	QFN28 4x4
PV3114		0.6 to 5.5		—	—	✓		375kHz to 1MHz	—	—		—		✓	—		Restart/ Latching	Restart/ Latching	Retry or Disable	—	QFN28 4x4
PV3101		0.6 to 5.5		—	—	—		375kHz to 1MHz	—	✓		—		✓	✓		Restart/ Latching	Retry	Retry	—	QFN32 5x5
PV3102		0.6 to 5.5		—	—	—		375kHz to 1MHz	—	✓		—		✓	✓		Restart/ Latching	Retry	Retry	—	QFN28 4x4
PV3104		0.60 to 1.52		✓	—	—		375kHz to 1MHz	—	—		—		—	—		Latch	Latch	—	—	QFN32 5x5
PV3103		0.60 to 1.52		✓	—	—		375kHz to 1MHz	—	—		—		—	—		Latch	Latch	—	—	QFN28 4x4
PV3105		0.6 to 5.5		—	—	—		375kHz to 1.25MHz	—	✓		✓		✓	✓		Restart/ Latching	Restart/ Latching	—	—	QFN28 4x4
Dual-Phase Controllers																					
 PV2205	2	0.6 to 16.0	PMBUS™ Compliant	—	—	—	Auto-Control®: Real-Time Adaptive Auto-Tuning	375kHz to 1.25MHz	Automatic	—	V _{out} , I _{out} , V _{in} , E _{out} , Temperature, Duty Cycle, f _{sw}	—	8 Tables	✓	✓	Internal Die Sense & External	Restart/ Latching	Restart/ Latching	Retry	Restart	QFN32 5x5
PV3204		0.6 to 5.5		—	—	✓		375kHz to 1MHz	Automatic	—		—		✓	—		Restart/ Latching	Restart/ Latching	Retry or Disable	Restart	QFN32 5x5
PV3012		0.6 to 5.5		—	—	—		375kHz to 1MHz	Automatic	✓		—		✓	✓		Restart/ Latching	Retry	Retry	—	QFN32 5x5
PV3201		0.60 to 1.52		✓	—	—		375kHz to 1MHz	SVID	—		—		—	—		Latch	Latch	—	—	QFN32 5x5
PV3203		0.6 to 5.5		—	—	—		375kHz to 1.25MHz	Automatic	✓		—		✓	✓		Restart/ Latching	Restart/ Latching	Retry	Restart	QFN32 5x5
PV3205		0.6 to 5.5		—	—	—		375kHz to 1.25MHz	Automatic	✓		—		✓	✓		Restart/ Latching	Restart/ Latching	Retry	Restart	QFN32 5x5
PV3202		0.60 to 1.52		✓	—	—		375kHz to 1MHz	Automatic/ SVID	—		—		—	—		Latch	Latch	—	—	QFN32 5x5
PV3207		0.6 to 5.5		—	—	—		375kHz to 1MHz	Automatic	✓		—		✓	✓		Restart/ Latching	Latch	Retry	—	QFN32 5x5
PV4210		0.25 to 3.04		✓	✓	—		375kHz to 1MHz	Automatic	—		✓	23 Tables	—	—		Restart/ Latching	Restart/ Latching	—	—	QFN32 5x5
 PV4220		0.6 to 5.5		—	—	—		375kHz to 1MHz	Automatic	✓		—	23 Tables	✓	✓		Restart/ Latching	Restart/ Latching	Retry	Restart	QFN32 5x5

Isolated/Non-Isolated Converters, Controllers

AC/DC Converter ICs

Isolated/Non-Isolated AC/DC Converter ICs (Built-in MOSFET, External Sensing Resistor type)										
Part No.	Supply Voltage (V)	MOSFET V _{DS} (Max.)(V)	Control Method	Switching Frequency (kHz)	ON Resistance (Ω)	Peak Current (A)	Brown-Out	V _{CC} OVP Protection	Package	
New BM2P0391	8.9 to 26.0	650	PWM	100	4.0	5.2	✓(Adjustable)	Self Recovery	DIP7K	
New BM2P095F	8.9 to 26.0	650	PWM	65	8.5	1.3	—	Latch	SOP8	
New BM2PA96F	8.9 to 26.0	650	PWM	65	8.5	1.3	—	Self Recovery	SOP8	
New BM2P015	8.9 to 26.0	650	PWM	65	1.4	10.4	—	Latch	DIP7K	
New BM2P016	8.9 to 26.0	650	PWM	65	1.4	10.4	—	Self Recovery	DIP7K	
New BM2P016T	8.9 to 26.0	650	PWM	65	1.4	10.4	—	Self Recovery	TO220	
BM2P011	8.9 to 26.0	650	PWM	65	1.4	10.4	✓(Adjustable)	Latch	DIP7K	
BM2P012	8.9 to 26.0	650	PWM	65	1.4	10.4	✓(Adjustable)	Self Recovery	DIP7K	
BM2P013	8.9 to 26.0	650	PWM	65	1.4	10.4	—	Latch	DIP7K	
BM2P014	8.9 to 26.0	650	PWM	65	1.4	10.4	—	Self Recovery	DIP7K	
BM2P031	8.9 to 26.0	650	PWM	65	2.4	5.2	✓(Adjustable)	Latch	DIP7K	
BM2P032	8.9 to 26.0	650	PWM	65	2.4	5.2	✓(Adjustable)	Self Recovery	DIP7K	
BM2P033	8.9 to 26.0	650	PWM	65	2.4	5.2	—	Latch	DIP7K	
BM2P034	8.9 to 26.0	650	PWM	65	2.4	5.2	—	Self Recovery	DIP7K	
BM2P051	8.9 to 26.0	650	PWM	65	4.0	2.6	✓(Adjustable)	Latch	DIP7K	
BM2P051F	8.9 to 26.0	650	PWM	65	4.0	2.6	✓(Adjustable)	Latch	SOP8	
BM2P052	8.9 to 26.0	650	PWM	65	4.0	2.6	✓(Adjustable)	Self Recovery	DIP7K	
BM2P052F	8.9 to 26.0	650	PWM	65	4.0	2.6	✓(Adjustable)	Self Recovery	SOP8	
BM2P053	8.9 to 26.0	650	PWM	65	4.0	2.6	—	Latch	DIP7K	
BM2P053F	8.9 to 26.0	650	PWM	65	4.0	2.6	—	Latch	SOP8	
BM2P054	8.9 to 26.0	650	PWM	65	4.0	2.6	—	Self Recovery	DIP7K	
BM2P054F	8.9 to 26.0	650	PWM	65	4.0	2.6	—	Self Recovery	SOP8	
BM2P091	8.9 to 26.0	650	PWM	65	8.5	1.3	✓(Adjustable)	Latch	DIP7K	
BM2P091F	8.9 to 26.0	650	PWM	65	8.5	1.3	✓(Adjustable)	Latch	SOP8	
BM2P092	8.9 to 26.0	650	PWM	65	8.5	1.3	✓(Adjustable)	Self Recovery	DIP7K	
BM2P092F	8.9 to 26.0	650	PWM	65	8.5	1.3	✓(Adjustable)	Self Recovery	SOP8	
BM2P093	8.9 to 26.0	650	PWM	65	8.5	1.3	—	Latch	DIP7K	
BM2P093F	8.9 to 26.0	650	PWM	65	8.5	1.3	—	Latch	SOP8	
BM2P094	8.9 to 26.0	650	PWM	65	8.5	1.3	—	Self Recovery	DIP7K	
BM2P094F	8.9 to 26.0	650	PWM	65	8.5	1.3	—	Self Recovery	SOP8	
BM2P074KF	10.2 to 26.0	800	PWM	65	6.7	2.0	—	Self Recovery	SOP8	
New BM2P061EK-LB	10.9 to 30.0	800	PWM	65	1.6	5.0	✓(Adjustable)	Self Recovery	DIP7AK	
New BM2P101EK-LB	10.9 to 30.0	800	PWM	100	1.6	5.0	✓(Adjustable)	Self Recovery	DIP7AK	
BM2P0161	8.9 to 26.0	650	PWM	65	1.0	12.0	—	Self Recovery	DIP7K	
BM2P0361	8.9 to 26.0	650	PWM	65	3.0	4.0	—	Self Recovery	DIP7K	



Isolated/Non-Isolated Converters, Controllers

AC/DC Converter ICs

AC/DC Converter ICs (PWM Driver, Built-in MOSFET)									
Part No.	Supply Voltage (V)	Control Method	START-UP Circuit	Switching Frequency (kHz)	AC Voltage Calibration	V _{CC} Recharge Function	Brown-Out	V _{CC} OVP Protection	Package
BM1P061FJ	8.9 to 26.0	PWM	✓	65	✓	✓	✓(Adjustable)	Self Recovery	SOP-J8
BM1P062FJ	8.9 to 26.0	PWM	✓	65	✓	✓	✓(Adjustable)	Latch	SOP-J8
BM1P065FJ	8.9 to 26.0	PWM	✓	65	✓	—	✓(Adjustable)	Self Recovery	SOP-J8
BM1P066FJ	8.9 to 26.0	PWM	✓	65	✓	—	✓(Adjustable)	Latch	SOP-J8
BM1P067FJ	8.9 to 26.0	PWM	✓	65	✓	—	—	Self Recovery	SOP-J8
BM1P068FJ	8.9 to 26.0	PWM	✓	65	✓	—	—	Latch	SOP-J8
BM1P101FJ	8.9 to 26.0	PWM	✓	100	✓	✓	✓(Adjustable)	Self Recovery	SOP-J8
BM1P102FJ	8.9 to 26.0	PWM	✓	100	✓	✓	✓(Adjustable)	Latch	SOP-J8
BM1P105FJ	8.9 to 26.0	PWM	✓	100	✓	—	✓(Adjustable)	Self Recovery	SOP-J8
BM1P107FJ	8.9 to 26.0	PWM	✓	100	✓	—	—	Self Recovery	SOP-J8
BD7672BG	8.5 to 25.0	PWM	—	65	—	—	—	Latch	SSOP6
BD7673AG	8.5 to 25.0	PWM	—	65	—	—	—	Latch	SSOP6
BD7679G	8.5 to 25.0	PWM	—	65	—	—	—	Self Recovery	SSOP6
BD7678FJ	8.5 to 25.5	PWM	—	65	✓	—	✓(Adjustable)	Latch	SOP-J8
AC/DC Converter ICs (Quasi-Resonant Controller, External MOSFET)									
Part No.	Supply Voltage (V)	Control Method	START-UP Circuit	Maximum Frequency (kHz)	AC Voltage Calibration	FBOLP Protection	V _{CC} OVP Protection	ZT OVP Protection	Package
BM1Q002FJ	8.9 to 26.0	QR	✓	120	✓	Self Recovery	Latch	Latch	SOP-J8
BM1Q021FJ	8.9 to 26.0	QR	✓	120	✓	Self Recovery	Automatic Recovery	Automatic Recovery	SOP-J8
BM1Q041FJ	8.9 to 26.0	QR	✓	120	✓	Self Recovery	Automatic Recovery	None	SOP-J8
New BM1Q011FJ	8.9 to 26.0	QR	✓	120	✓	Self Recovery	Automatic Recovery	None	SOP-J7
New BM1Q104FJ	14.0 to 30.0	QR	✓	111	—	Self Recovery	—	Latch	SOP-J8
AC/DC Converter ICs (PFC, PFC + Quasi-Resonant Controller)									
Part No.	Supply Voltage (V)	Control Method	START-UP Circuit	X-cap Discharge	QR Maximum Frequency(kHz)	PFC Maximum Frequency(kHz)	PFC Output Voltage Switching Function	V _{CC} OVP Protection ZT OVP Protection	Package
BD7690FJ	10.0 to 26.0	PFC	—	—	—	220	—	—	SOP-J8
BD7691FJ	10.0 to 26.0	PFC	—	—	—	220	—	—	SOP-J8
BM1050AF	8.9 to 26.0	PFC+QR	✓	—	120	65	—	Selectable Externally	SOP24
BM1051F	8.9 to 26.0	PFC+QR	✓	—	120	65	—	Selectable Externally	SOP24
BM1C101F	8.9 to 26.0	PFC+QR	✓	✓	120	400	✓	✓	SOP18
BM1C102F	8.9 to 26.0	PFC+QR	✓	✓	120	400	—	✓	SOP18
AC/DC Converter ICs (For SiC MOSFET Driving)									
Part No.	Supply Voltage (V)	Control Method	MOSFET	MOSFET Performance	Maximum Frequency(kHz)	FBOLP Protection	Brown-Out	V _{CC} OVP Protection	Package
BD7682FJ-LB	15.0 to 27.5	QR	External	—	120	Automatic Recovery	✓(Adjustable)	Latch	SOP-J8
BD7683FJ-LB	15.0 to 27.5	QR	External	—	120	Latch	✓(Adjustable)	Latch	SOP-J8
BD7684FJ-LB	15.0 to 27.5	QR	External	—	120	Automatic Recovery	✓(Adjustable)	Automatic Recovery	SOP-J8
BD7685FJ-LB	15.0 to 27.5	QR	External	—	120	Latch	✓(Adjustable)	Automatic Recovery	SOP-J8
AC/DC Converter ICs (Secondary Side Synchronous Rectification)									
Part No.	Supply Voltage (V)	Control Method	Shunt Regulator Precision(%)	Drain Terminal Resistance(V)	Compulsion OFF Time(μs)	V _{CC} OVP Protection	Automatic Sleep Function	Continuous Mode Support	Package
BM1R00146F	2.7 to 32.0	SR	±0.5	120	1.3	Automatic Recovery	✓	✓	SOP8
BM1R00147F	2.7 to 32.0	SR	±0.5	120	2.0	Automatic Recovery	✓	✓	SOP8
BM1R00148F	2.7 to 32.0	SR	±0.5	120	3.0	Automatic Recovery	✓	✓	SOP8
BM1R00149F	2.7 to 32.0	SR	±0.5	120	3.6	Automatic Recovery	✓	✓	SOP8
BM1R00150F	2.7 to 32.0	SR	±0.5	120	4.6	Automatic Recovery	✓	✓	SOP8
New BM1R00178F	2.7 to 32.0	SR	±0.5	120	3.0	Automatic Recovery	—	✓	SOP8

Isolated DC/DC Converter ICs

Isolated DC/DC Converter ICs													
Part No.	Output Power (W)	Input Resistance (V)	Switch Allowable Current (A)	Input Voltage (V)	Switching Frequency (kHz)	Control Method	Function						Package
							Enable	Soft Start	Light-Load Efficiency	UVLO	Over-Current Protection	Thermal Protection	
BD7F100EFJ-LB	1W(At V _{IN} 5.0V)	45	1.25	3.0 to 40.0	400	Adaptive on-time	✓	✓	✓	✓	Recovery	Recovery	HTSOP-J8
BD7F100HFN-LB	5W(At V _{IN} 24V)						✓	✓	✓	✓	Recovery	Recovery	HSO8
BD7F200EFJ-LB	5W(At V _{IN} 12V)	45	2.75	8.0 to 40.0	400	Adaptive on-time	✓	✓	✓	✓	Recovery	Recovery	HTSOP-J8
BD7F200HFN-LB	10W(At V _{IN} 24V)						✓	✓	✓	✓	Recovery	Recovery	HSO8
☆BD7J200EFJ-LA	10W(At V _{IN} 48V)	80	2.13	8.0 to 80.0	400	Adaptive on-time	✓	✓	✓	✓	Recovery	Recovery	HTSOP-J8
☆BD7J200HFN-LA							✓	✓	✓	✓	Recovery	Recovery	HSO8

☆ : Under Development

Isolated DC/DC Controller

Isolated DC/DC Controller									
Part No.	Topology	Primary/Secondary	Supply Voltage (V)	Switching Frequency (kHz)	Frequency Synchronization	I/F	Package	Automotive Grade AEC-Q100	
BD8325FVT-M	Active Clamp Forward	Primary IC	9 to 18	50 to 500	✓	—	TSSOP-B30	YES	

Gate Drivers

Isolated Gate Drivers

Isolated Gate Drivers (AEC-Q100)											
Part No.	Input-side Supply Voltage (V)	Output-side Positive Supply Voltage (V)	Output-side Negative Supply Voltage (V)	Isolation Voltage (Vrms)	I/O Delay Time (ns)	Minimum Input Pulse Width (ns)	Maximum Output Current (A)	Operating Temperature (°C)	Function	Package	Automotive Grade AEC-Q100
BM6101FV-C	4.5 to 5.5	14 to 24	-12 to 0	2,500	350	180	3	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/ Thermal protection/Short-circuit protection/DESAT/Soft turn-off function for short-circuit protection	SSOP-B20W	YES
BM6102FV-C	4.5 to 5.5	14 to 20	—	2,500	200	100	3	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/ Thermal protection/Short-circuit protection/DESAT/Soft turn-off function for short-circuit protection	SSOP-B20W	YES
BM6104FV-C	4.5 to 5.5	10 to 24	-12 to 0	2,500	150	90	3	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/ Short-circuit protection/DESAT/Soft turn-off function for short-circuit protection	SSOP-B20W	YES
BM60014FV-C	4.5 to 5.5	10 to 24	—	2,500	120	70	3	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit	SSOP-B20W	YES
New BM61S40RFV-C	4.5 to 5.5	16 to 20	—	3,750	65	60	4	-40 to +125	Miller Clamp/Built-In under voltage lock out circuit/ Overvoltage protection	SSOP-B10W	YES

Isolated Gate Drivers											
Part No.	Input-side Supply Voltage (V)	Output-side Positive Supply Voltage (V)	Output-side Negative Supply Voltage (V)	Isolation Voltage (Vrms)	I/O Delay Time (ns)	Minimum Input Pulse Width (ns)	Maximum Output Current (A)	Operating Temperature (°C)	Function	Package	
BM6108FV-LB	4.5 to 5.5	10 to 24	-12 to 0	2,500	150	90	3	-40 to +105	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/Short-circuit protection/DESAT/Soft turn-off function for short-circuit protection	SSOP-B20W	
New BM6105AFW-LBZ	4.5 to 5.5	13.3 to 20.0	-12 to 0	2,500	120	60	3	-40 to +105	Miller Clamp/Fail Output/Ready Output/Built-in under voltage lock out circuit/DESAT	SOP16WM	

Isolated Gate Drivers (For Flyback Controller)											
Part No.	Input-side Supply Voltage (V)	Output-side Positive Supply Voltage (V)	Output-side Negative Supply Voltage (V)	Isolation Voltage (Vrms)	I/O Delay Time (ns)	Minimum Input Pulse Width (ns)	Maximum Output Current (A)	Operating Temperature (°C)	Function	Package	Automotive Grade AEC-Q100
BM60051FV-C	4.5 to 24.0/ 4.5 to 5.5	9 to 24	—	2,500	260	180	5	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/Short-circuit protection/Soft turn-off function for short-circuit protection	SSOP-B28W	YES
BM60055FV-C	4.5 to 30.0	9 to 24	—	2,500	250	170	5	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/Thermal protection/Short-circuit protection/Soft turn-off function for short-circuit protection/Over current protection/2 Level Turn Off	SSOP-B28W	YES
New BM60052AFV-C	4 to 32	10 to 20	-12 to 0	2,500	120	90	3	-40 to +125	Miller Clamp/Fail Output/Ready Output/ Built-in under voltage lock out circuit/ Thermal protection/DESAT/Soft turn-off function for DESAT	SSOP-B28W	YES
New BM60054AFV-C	4 to 32	10 to 20	-12 to 0	2,500	120	90	3	-40 to +125	Miller Clamp/Fail Output/Ready Output/ Built-in under voltage lock out circuit/Thermal protection/Short-circuit protection/Soft turn-off function for short-circuit protection	SSOP-B28W	YES
New BM60056FV-C	6 to 30	14 to 24	—	2,500	3,000	3,000	1.5	-40 to +125	Miller Clamp/Fail Output/Built-in under voltage lock out circuit/Short-circuit protection/Soft turn-off function for short-circuit protection	SSOP-B28W	YES

Others

IGBT/MOSFET High Side/Low Side Gate Drivers								
Part No.	Input-side Supply Voltage (V)	Floating Voltage (V)	I/O Delay Time (ns)	Minimum Output Current (A)	Dead Time (ns)	ch	Operating Temperature (°C)	Package
BS2101F	10 to 18	600	220	0.06/-0.13	—	2	-40 to +125	SOP8
BS2103F	10 to 18	600	220	0.06/-0.13	160	2	-40 to +125	SOP8
BS2114F	10 to 20	600	250	0.5/-0.5	160	2	-40 to +125	SOP8
New BM60212FV-C	10 to 24	1,200	75	3/-3	—	2	-40 to +125	SSOP-B20W

IGBT/MOSFET High Side/Low Side 3-Phase Bridge Drivers								
Part No.	Input-side Supply Voltage (V)	Floating Voltage (V)	I/O Delay Time (ns)	Minimum Output Current (A)	Dead Time (ns)	ch	Operating Temperature (°C)	Package
BS2130F-G	11.5 to 20.0	600	630/580	0.2/-0.35	300	6	-40 to +125	SOP28
New BS2132F	11.5 to 20.0	600	630/580	0.2/-0.35	300	6	-40 to +125	SOP28

(LAPIS Semiconductor Products)

Non-Isolated Gate Driver for Battery Monitoring System (BMS)							
Part No.	Supply Voltage (V)	Gate Driving Supply Voltage (Min.)(V)	Start-Up Time (Max.)(μs)	Stand-Down Time (Max.)(μs)	Operating Temperature (°C)	Package	Halogen Free Support
☆ ML5810	6.5 to 64	10	350	70	-40 to +105	P-TSSOP20-0225-0.65	✓

☆ : Under Development

IPDs (Intelligent Power Devices)

High Side Switches

Smart High Side Switches								
Part No.	Power Supply (V)	VDS (Max.)(V)	ch	I _{ocp} (Min.)(A)	ON Resistance (Typ.)(mΩ)	TSD	Package	Automotive Grade AEC-Q100
BV1HD090FJ-C	4.5 to 36.0	45.0	1	2.7	90	Self Recovery	SOP-J8	YES
BD1HC500EFJ-C	4.0 to 18.0	44.5	1	0.8	500	Off Latch	HTSOP-J8	YES
BD1HC500FVM-C	4.0 to 18.0	44.5	1	0.8	500	Off Latch	MSOP-8	YES
BD1HC500HFN-C	4.0 to 18.0	44.5	1	0.8	500	Off Latch	HSOP-8	YES
BD1HD500EFJ-C	4.0 to 18.0	44.5	1	0.8	500	Self Recovery	HTSOP-J8	YES
BD1HD500FVM-C	4.0 to 18.0	44.5	1	0.8	500	Self Recovery	MSOP-8	YES
BD1HD500HFN-C	4.0 to 18.0	44.5	1	0.8	500	Self Recovery	HSOP-8	YES

Low Side Switches

Smart Low Side Switches								
Part No.	Power Supply (V)	VDS (Max.)(V)	ch	I _{ocp} (Min.)(A)	ON Resistance (Typ.)(mΩ)	TSD	Package	Automotive Grade AEC-Q100
New BM2LC120FJ-C	3.0 to 5.5	42	2	3	120	Self Recovery	SOP-J8	YES
New BM2LC300FJ-C	3.0 to 5.5	42	2	1.7	350	Self Recovery	SOP-J8	YES
New BV1LC300FJ-C	3.0 to 5.5	42	1	1.7	350	Self Recovery	SOP-J8	YES
BV1LB028FPJ-C	3.0 to 5.5	42	1	30	28	Self Recovery	TO252-J3	YES
BV1LB045FPJ-C	3.0 to 5.5	42	1	18	45	Self Recovery	TO252-J3	YES
BV1LB085FJ-C	3.0 to 5.5	42	1	13	85	Self Recovery	SOP-J8	YES
BV1LC105FJ-C	3.0 to 5.5	42	1	3	105	Self Recovery	SOP-J8	YES
BV1LB150FJ-C	3.0 to 5.5	42	1	6.5	150	Self Recovery	SOP-J8	YES
BV1LB300FJ-C	3.0 to 5.5	42	1	1.7	300	Self Recovery	SOP-J8	YES
BV1LB300HFS-C	3.0 to 5.5	42	1	1.7	300	Self Recovery	HSOP-A8	YES
BD1LB500EFJ-C	3.5 to 5.5	42	1	0.8	350	Self Recovery	HTSOP-J8	YES
BD1LB500FVM-C	3.5 to 5.5	42	1	0.8	350	Self Recovery	MSOP8	YES
BM2LC105FJ-C	3.0 to 5.5	42	2	3	105	Self Recovery	SOP-J8	YES
BM2LB110FJ-C	3.0 to 5.5	42	2	2.5	120	Self Recovery	SOP-J8	YES
BM2LB150FJ-C	3.0 to 5.5	42	2	6.5	150	Self Recovery	SOP-J8	YES
BM2LB300FJ-C	3.0 to 5.5	42	2	1.7	300	Self Recovery	SOP-J8	YES
BD8LB600FS-C	3.0 to 5.5(Digital)/ 4.0 to 5.5(Analog)	45	8	1	600	Self Recovery	SSOP-A24	YES
BD8LA700EFV-C	3.0 to 5.5(Digital)/ 4.0 to 5.5(Analog)	45	8	0.5	700	Off Latch	HTSSOP-B24	YES

Power Management Switch ICs

1ch Small Size High Side Switch ICs											
Part No.	Supply Voltage (V)	ON Resistance (mΩ)	Control Input Logic	Output Current (A)	Over-Current Detection(A) Min./Typ./Max.	Output Startup Time (ms)	OCF	Thermal Protection	Flag Output Delay at Over-Current (ms)	Discharge Resistance (Ω)	Package
BD6538G-LB	2.7 to 5.5	150	H Active	0.5	0.5/—/1.0	1.0	Latch	Recovery	15	—	SSOP5
BD2220G-LB	2.7 to 5.5	160	H Active	0.5	0.5/—/1.0	1.0	Latch	Recovery	15	—	SSOP5
BD2221G-LB	2.7 to 5.5	160	L Active	0.5	0.5/—/1.0	1.0	Latch	Recovery	15	—	SSOP5
BD2224G-LB	2.7 to 5.5	150	H Active	0.5	0.55/0.78/1.0	1.0	Recovery	Recovery	15	—	SSOP5
BD2225G-LB	2.7 to 5.5	150	L Active	0.5	0.55/0.78/1.0	1.0	Recovery	Recovery	15	—	SSOP5
BD2226G-LB	2.7 to 5.5	150	H Active	0.65	0.75/1.0/1.35	1.0	Recovery	Recovery	15	—	SSOP5
BD2227G-LB	2.7 to 5.5	150	L Active	0.65	0.75/1.0/1.35	1.0	Recovery	Recovery	15	—	SSOP5
1ch High Side Switch ICs											
BD82001FVJ-LB	2.7 to 5.5	70	H Active	0.9	1.0/1.5/2.0	0.8	Recovery	Recovery	15	—	TSSOP-B8J
BD82000FVJ-LB	2.7 to 5.5	70	L Active	0.9	1.0/1.5/2.0	0.8	Recovery	Recovery	15	—	TSSOP-B8J
BD82065FVJ-LB	2.7 to 5.5	70	H Active	1.1	1.5/2.4/3.0	0.8	Recovery	Recovery	15	—	TSSOP-B8J
BD82061FVJ-LB	2.7 to 5.5	70	L Active	1.1	1.5/2.4/3.0	0.8	Recovery	Recovery	15	—	TSSOP-B8J
2ch High Side Switch ICs											
BD2066FJ-LB*	2.7 to 5.5	80	H Active	1.0	1.5/2.4/3.0	0.8	Recovery	Recovery	15	—	SOP-J8
BD2062FJ-LB*	2.7 to 5.5	80	L Active	1.0	1.5/2.4/3.0	0.8	Recovery	Recovery	15	—	SOP-J8
Load Switch ICs											
Part No.	Input Voltage (V)	Current Consumption (μA)	ON Resistance (mΩ)	Number of Output Channels (ch)	Control Input Logic	Output Current (A)	Over-Current Detection(A) Min./Typ./Max.	Output Startup Time (ms)	Thermal Protection	Discharge Resistance (Ω)	Package
BD2202G-LB	2.7 to 3.6	70	150	1	H Active	0.2	0.25/—/1.0	1.2	Recovery	—	SSOP5
BD2206G-LB	2.7 to 3.6	70	150	1	H Active	0.5	0.8/—/1.6	1.2	Recovery	—	SSOP5
High Side N-channel FET Controller IC											
Part No.	Supply Voltage (V)	Current Consumption (μA)	Output Voltage(V)		Number of Output Channels (ch)	Control Input Logic	Output Startup Time (ms)	Discharge Resistance (Ω)			Package
			V _{CC} =3.3V	V _{CC} =5.0V							
BD2270HFV-LB	2.7 to 5.5	50	9.5	13.5	1	H Active	0.13	200			HVSOF5

* : UL Approved File No. E243261

Battery Management

Cell Balance IC of Energy Storage Element Cells

EDLC Cell Balance IC (4 to 6 series)									
Part No.	Maximum Rating (V)	Cell Voltage Detection Range VCB(V)	Overvoltage Detection Level 1 (V)	Overvoltage Detection Level 2 (V)	Shunt SW Ron (Ω)	Function			Package (mm)
						EN	OVLO	Stack IC	
BD14000EFV-C	+28	2.4 to 3.1V±(1%) (0.1V/step usable)	VCB+0.15 or 0.25 (OVLOSEL=L or H)	VCB+0.3 or 0.5 (OVLOSEL=L or H)	1(Typ.)	✓	✓	✓	HTSSOP-B30 10.0×7.6, H=Max.1.0

Li-ion Battery Monitoring LSIs

(LAPIS Semiconductor Products)

Stand-alone type																
Part No.	Features	Supply Voltage (V)	Overcharge Voltage Detection Accuracy (Typ.)(mV)	Charge/ Discharge Control FET Driver	Cell Balance Switch	Current Consumption (Typ.)(μA)		Overvoltage/ Undervoltage Detection	Charge / Discharge Over-Current Detection	Temperature Detection	Short-Circuit Detection	Open-wire Detection	Threshold Change	Operating Temperature (°C)	Package	Halogen Free Support
						Operating	Power-down									
ML5203	7 cell, cell voltage/current protection, cell voltage/ current monitoring	+ 5 to +42	±25	NMOS	Internal (MCU control)	30	0.1	✓	✓	—	—	—	Mask Option	−40 to +85	P-SSOP30-56-0.65	—
ML5232	14 cell, secondary protection	+ 7 to +80	±20	—	—	2.5	—	Overvoltage detection	—	—	—	—	Mask Option	−40 to +105	P-TSSOP20-0225-0.65	✓
ML5233	10 cell, cell voltage/current/ temperature protection, multistage connection	+ 5 to +60	±15	NMOS	—	25	0.1	✓	✓	✓	✓	—	Mask Option	−40 to +85	P-LQFP32-0707-0.80	✓
ML5235	13 cell, cell voltage/ current protection, cell voltage monitoring	+ 7 to +80	±25	NMOS	—	25	0.1	✓	✓	—	—	—	Mask Option	−40 to +85	P-SSOP30-56-0.65	—
NEW ML5241	5 cell, secondary protection	+ 5 to +25	±25	—	—	1	0.1	Overvoltage detection	—	—	—	✓	Mask Option	−40 to +85	P-WSON10-0303-0.50	✓
NEW ML5243	5 cell, cell voltage/ current/temperature protection	+ 5 to +25	±25	NMOS	—	6.5	0.1	✓	✓	✓	✓	✓	Mask Option	−40 to +85	P-TSSOP20-0225-0.65	✓
NEW ML5245	13 cell, cell voltage/current/ temperature protection, cell voltage monitoring	+ 7 to +80	±15	NMOS	—	25	0.1	✓	✓	✓	✓	—	Mask Option	−40 to +85	P-SSOP30-56-0.65	—

Analog Front End type															
Part No.	Features	Supply Voltage (V)	Cell Voltage Measurement (Typ.)(mV)	Monitor	Charge/Discharge Control FET Driver	Cell Balance Switch	Current Consumption (Typ.)(μA)		Overvoltage/Undervoltage Detection	Charge/Discharge Over-Current Detection	Short-Circuit Detection	Threshold Change	Operating Temperature (°C)	Package	Halogen Free Support
							Operating	Power-down							
New ML5204	5 cell, analog monitoring output	+3.3 to +42	±25	Cell Voltage/Current	—	Integrated	14μA	—	✓	✓	✓	Mask Option	−40 to +85	P-TSSOP20-0225-0.65	✓
ML5238	16 cell, analog monitoring output	+7 to +80	±20	Cell Voltage/Current	NMOS	Integrated	50μA	0.1μA	—	—	✓	MCU Control	−40 to +85	P-QFP44-910-0.80	—
ML5236	14 cell, built-in ADC, digital monitoring output	+8 to +64	±15	Cell Voltage/Current/Temperature	High Side NMOS	Integrated	330μA	0.1μA	Overvoltage Detection	—	✓	MCU Control	−40 to +85	P-TQFP44-1010-0.80	✓
ML5239	16 cell, built-in ADC, multistage connection, digital monitoring output	+10 to +72	±10	Cell Voltage/Current/Temperature	—	External	1.2mA	0.1μA	—	—	—	MCU Control	−40 to +85	P-TQFP64-1010-0.50	✓
New ML5248	7 cell, analog monitoring output	+5 to +31.5	±20	Cell Voltage/Current	High Side NMOS	Integrated	32μA	0.1μA	✓	—	✓	MCU Control	−40 to +85	P-SSOP30-56-0.65	—

Dedicated Controllers									
Part No.	Features	Supply Voltage(V)		AD Converter	Current Consumption(μA)(Typ.)			Package	Halogen Free Support
		V _{DD}	AV _{DD}		Operating	HALT Mode	STOP Mode		
ML610Q486P	nX-U8/100, 32KB Flash, 1KB RAM, master clock 500kHz	1.6 to 3.6	2.2 to 3.6	12bit, 4ch	400	15	0.2	TQFP48	✓
ML610Q488P	nX-U8/100, 48KB Flash with ECC, 2KB RAM, master clock 1MHz	1.8 to 3.6	2.2 to 3.6	10bit, 3ch	175	1.4	0.2	TQFP48	✓

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

Coulomb Counter IC for Energy Storage Systems

For Large Currents								
Part No.	Supply Voltage (V)	Operational Amplifiers	Delta Sigma AD Converter	Sampling Frequency	Coulomb Count	Communication I/F	Operating Temperature (°C)	Package
☆ BD7220FV-LA	5	Gain Switching (×5/×25/×51)	16bit	4kHz	Automatic Integration	SPI	−40 to 105	SSOP-B20

☆ : Under Development

Capacitive Switch Control ICs

Capacitive Switch Control ICs										
Part No.	Supply Voltage (V)	Capacitive Switch (ch)	LED Drive Terminal (ch)	LED_PWM Control	Matrix Control	I/F	MCU Built-In (bit)	Program Memory	Intermittent Operation	Package
BU21170MUV	3.0 to 5.5	5	5	✓	—	I ² C	32	ROM	—	VQFN020V4040
BU21079F	3.0 to 5.5	8	—	—	4×4	I ² C	32	ROM	✓	SOP16
BU21077MUV	2.7 to 5.5	8	—	—	4×4	I ² C	32	RAM	✓	VQFN020V4040
BU21072MUV	3.0 to 5.5	10	6	✓	4×4	I ² C	32	ROM	—	VQFN024V4040
BU21078MUV	3.0 to 5.5	12	8	✓	6×6	I ² C	32	ROM	—	VQFN028V5050
BU21078FV	3.0 to 5.5	12	8	✓	6×6	I ² C	32	ROM	—	SSOP-B28
☆BU21181FS	3.0 to 5.5	18	—	—	—	I ² C	32	ROM	✓	SSOP-A32
BU21180FS	3.0 to 5.5	20	—	—	—	I ² C	32	ROM	—	SSOP-A32

☆ : Under Development

Touch Screen Controller ICs

Resistive type										
Part No.	Supply Voltage (V)	MCU (bit)	Resolution	Touch Detection	Stand-by Current (μA)	Active Current (mA)	Host I/F	Operating Temperature (°C)	Package (mm)	Automotive Grade AEC-Q100
BU21029MUV	1.65 to 3.6	—	4096×4096	2 point/1 point	100	0.8	I ² C	−20 to +85	VQFN020V4040	—
BU21029GUL	1.65 to 3.6	—	4096×4096	2 point/1 point	100	0.8	I ² C	−20 to +85	VCSP50L2 2.0×2.0, t=0.55	—
BU21028FV-M	2.7 to 3.6	—	4096×4096	2 point/1 point	100	0.8	I ² C	−40 to +85	SSOP-B20	YES
BU21023MUV	2.7 to 3.6	8	1024×1024	2 point/1 point	60	4.0	I ² C/SPI	−20 to +85	VQFN028V5050	—
BU21023GUL	2.7 to 3.6	8	1024×1024	2 point/1 point	60	4.0	I ² C/SPI	−20 to +85	VCSP50L2 2.6×2.6, t=0.55	—
BU21024FV-M	2.7 to 3.6	8	1024×1024	2 point/1 point	60	4.0	I ² C/SPI	−40 to +85	SSOP-B28	YES
BU21027MUV	2.7 to 3.6	32	4096×4096	2 point/1 point	70	8.0	I ² C	−20 to +85	VQFN020V4040	—
BU21025GUL	1.65 to 3.6	—	4096×4096	1 point	0.8	0.12	I ² C	−30 to +85	VCSP50L2 2.0×1.5, t=0.55	—
BU21026MUV	1.65 to 3.6	—	4096×4096	1 point	0.8	0.12	I ² C	−30 to +85	VQFN020V4040	—

Accelerometers

(Kionix Products)

3-Axis Accelerometers						
Part No.	Axis	Full Scale Range	I/F Output	Current Consumption (μA) (Typ.)	Size, No. of Pins, Package type	Features
New KX224-1053	3	User Selectable 8g, 16g, 32g	Digital SPI/I ² C	1.8 to 145.0	3×3×0.9mm, 16pin, LGA	2KB FIFO/FILO, ODR Setting 0.781Hz to 25.6kHz, Signal Bandwidth (−3dB)8kHz(XY), 5.1kHz(Z)
New KX222-1054	3	User Selectable 8g, 16g, 32g	Digital SPI/I ² C	1.8 to 145.0	2×2×0.9mm, 12pin, LGA	2KB FIFO/FILO, ODR Setting 0.781Hz to 25.6kHz, Signal Bandwidth (−3dB)8kHz(XY), 5.1kHz(Z)
New KX220 series	3	Up to 40g	Analog	240 to 310	3×3×0.9mm, 10pin, LGA	Factory Programmable Internal Low Pass Filter

Current Sensor IC

Contactless Current Sensor IC							
Part No.	Supply Voltage (V)	Input Magnetic Field (μT)	Magnetic Field Sensitivity (μT/LSB)	Current Consumption (μA)	I/F	Operating Temperature (°C)	Package (mm)
New BM14270MUV-LB	2.7 to 5.5	±280	0.045	70	I ² C	−40 to +125	VQFN20QV3535 3.5×3.5, H=Max.1.0

Wireless Communication LSIs

Specified Low Power Radio (Sub-GHz Band Radio)

(LAPIS Semiconductor Products)

UHF Transmitter LSIs												
Part No.	Supported Standards	Frequency Band	Supply Voltage (V)	Modulation Method	FEC Mode	Control I/F	Transmission Rate (kbps)	Transmission Output (mW)	Reception Sensitivity	Operating Temperature (°C)	Package	Halogen Free Supported*
ML7386	ARIB STD-T67 RCR STD-30	426MHz Band	1.8 to 3.6	2-FSK MSK	—	Synchronous Serial (Control) DIO(DATA)	2.4/ 4.8/ 7.2	10	—	−25 to +85	P-WQFN28-0404-0.40	✓
ML7386B								1/10				
Data Transceiver LSIs												
ML7066	ARIB STD-T67 RCR STD-30	426MHz Band 429MHz Band	2.1 to 3.6	2-FSK	—	Synchronous Serial (Control) DIO(DATA)	1.2/2.4/4.8[NRZ] (3-step setting function)	1/10	−116dBm [BER<1%]*1	−25 to +65	P-WQFN48-0707-0.50	✓
ML7396D	ARIB STD-T108 EN300-220	750 to 960MHz	1.8 to 3.6	2-(G)FSK (G)MSK	IEEE 802.15.4g Compliant	Synchronous Serial (Control/ DATA) DIO(DATA)	Up to 50/ 100/ 150/ 200/ 400	1/ 10/ 20	−107dBm [100kbps BER=0.1%]*1	−40 to +85	P-WQFN40-0606-0.50	✓
ML7396A	FCC part15.247/249								−106dBm [100kbps BER=0.1%]*1			
ML7344J	ARIB STD-T67 RCR STD-30	160 to 510MHz	1.8 to 3.6	2-(G)FSK (G)MSK	—	Synchronous Serial (Control) DIO(DATA)	Up to 15	1/ 10/ 20	−117dBm [4.8kbps BER=0.1%]*1	−40 to +85	P-WQFN32-0505-0.50	✓
ML7344C	Q/GDW374.3		3.3 to 3.6 (100mW)					20/ 100				
ML7406	EN300-220 EN1357-4 : 2011	750 to 960MHz	1.8 to 3.6	2-(G)FSK (G)MSK	—	Synchronous Serial (Control) DIO(DATA)	Up to 500	1/ 10/ 20	−106dBm [100kbps BER=0.1%]*1	−40 to +85	P-WQFN32-0505-0.50	✓
ML7345	ARIB STD-T67 ARIB STD-T108 RCR STD-30 EN300-220 EN13757-4 : 2013	160 to 960MHz	1.8 to 3.6	2-(G)FSK (G)MSK 4-(G)FSK	—	Synchronous Serial (Control) DIO(DATA)	Up to 100	1/ 10/ 20	−123dBm [2.4kbps BER=1%]*1	−40 to +85	P-WQFN32-0505-0.50	✓
ML7345D	ARIB STD-T67 ARIB STD-T108 RCR STD-30 EN300-220 EN13757-4 : 2013	315 to 960MHz	1.8 to 3.6	2-(G)FSK (G)MSK 4-(G)FSK	—	Synchronous Serial (Control) DIO(DATA)	Up to 100	1/ 10/ 20	−119.5dBm [2.4kbps BER=1%]*1	−40 to +85	P-WQFN32-0505-0.50	✓
ML7345C	Q/GDW374.3	470 to 510MHz	3.3 to 3.6 (100mW)	2-(G)FSK (G)MSK 4-(G)FSK	—	Synchronous Serial (Control) DIO(DATA)	Up to 100	20/ 100	−123dBm [2.4kbps BER=1%]*1	−40 to +85	P-WQFN32-0505-0.50	✓
ML7414	ARIB STD-T67 ARIB STD-T108 Sigfox®(Rev 2.E) RCR STD-30 EN300-220 EN13757-4 : 2013	315 to 960MHz	1.8 to 3.6	2-(G)FSK (G)MSK 4-(G)FSK BPSK (Send only)	IEEE 802.15.4g Compliant	Synchronous Serial (Control) DIO(DATA)	Up to 100	1/ 10/ 20	−106dBm [100kbps BER=1%]*1	−40 to +85	P-WQFN32-0505-0.50	✓

Sigfox® is the registered trademark of SIGFOX S.A.

*1 : BER means Bit Error Rate.

*2 : Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

LPWA

(LAPIS Semiconductor Products)

UHF Transceiver LSI												
Part No.	Supported Standards	Frequency Band (MHz)	Supply Voltage (V)	Modulation Method	FEC Mode	Control Interface	Transmission Rate	Transmission Output (mW)	Reception Sensitivity	Operating Temperature (°C)	Package	Halogen Free Supported*3
ML7404	ARIB STD-T67 ARIB STD-T108 RCR STD-30 EN300-220 EN13757-4 : 2013 Sigfox®(Rev 2.E) IEEE802.15.4k	315 to 960	1.8 to 3.6	2-(G)FSK (G)MSK 4-(G)FSK BPSK DSSS	IEEE 802.15.4k Compliant	Synchronous Serial (Control) DIO (DATA)	Up to 100kbps (xFSK) 80k to 200kcpss (DSSS)	1/ 10/ 20	−119.5dBm [2.4kbps BER=1%]*1 (xFSK) −121dBm [200kpcss, SF=64, PER=1%]*1 (DSSS)	−40 to +85	P-WQFN32-0505-0.50	✓

Sigfox® is the registered trademark of SIGFOX S.A.

*1 : BER is an abbreviation for Bit Error Rate. *2 : PER is an abbreviation for Packet Error Rate.

*3 : Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

Multiband Wireless (Sub-GHz Band & 2.4GHz Band)

(LAPIS Semiconductor Products)

Data Transceiver LSI												
Part No.	Supported Standards	Frequency Band	Supply Voltage (V)	Modulation Method	FEC Mode	Control Interface	Transmission Rate (kbps)	Transmission Output (mW)	Reception Sensitivity	Operating Temperature (°C)	Package	Halogen Free Supported*2
New ML7411	ARIB STD-T66 ARIB STD-T67 ARIB STD-T108 RCR STD-30 EN300-220 EN13757-4 : 2013 FCC part15	169MHz Band 433MHz Band 860MHz Band 915MHz Band 920MHz Band 2.4GHz Band	1.8 to 3.6	2-(G)FSK (G)MSK 4-(G)FSK	IEEE 802.15.4g Compliant	Synchronous Serial (Control) DIO (DATA)	1.2 to 300	1/ 10/ 20	−108dBm [100kbps BER=1%]*1 (860/920MHz Band) −95dBm [100kpcss BER=1%]*1 (2.4GHz Band)	−40 to +85	P-WQFN36-0606-0.50	✓

*1 : BER is an abbreviation for Bit Error Rate.

*2 : Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

MCU Included Specified Low Power Radio (Sub-GHz Band Radio) System LSI

(LAPIS Semiconductor Products)

Data Transceiver LSI												
Part No.	Supported Standard	Frequency Band (MHz)	Supply Voltage (V)	Modulation Method	CPU Core	Memory Resource	Transmission Rate (kbps)	Transmission Output (mW)	Reception Sensitivity	Operating Temperature (°C)	Package	Halogen Free Supported*2
ML7416N	ARIB STD-T108	750 to 960	1.8 to 3.6	2-(G)FSK (G)MSK	Cortex®-M0+	FLASH 512KB, RAM 64KB	Up to 50/ 100/ 150/ 200/ 400	1/ 10/ 20	−106dBm [100kbps BER=0.1%]*1	−40 to +85	P-LFBGA81-1010-1.00	✓

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*1 : BER means Bit Error Rate.

*2 : Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

Serial EEPROM

Standard EEPROM

I ² C BUS EEPROM (2-Wire) BR24Gxxx-3 series (SCL Frequency=400kHz)																		
Part No.	Package and Suffix								Capacity (bit)	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	SCL Frequency (Hz)	Operating Temperature (°C)	Endurance (times)	Data Retention (years)
	SOP8	SOP-J8	SSOP-B8	TSSOP-B8	MSOP8	TSSOP-B8J	VSON008 X2030	VMMP008 Z1830				Operating (mA)	Standby (μA)					
BR24G01	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	1K	128×8	1.6 to 5.5	2	2	5	400k	-40 to +85	10 ⁶	40
BR24G02	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	2K	256×8	1.6 to 5.5	2	2	5	400k			
BR24G04	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	4K	512×8	1.6 to 5.5	2	2	5	400k			
BR24G08	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	8K	1K×8	1.6 to 5.5	2	2	5	400k			
BR24G16	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	QUZ-3	16K	2K×8	1.6 to 5.5	2	2	5	400k			
BR24G32	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	32K	4K×8	1.6 to 5.5	2	2	5	400k			
BR24G64	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	64K	8K×8	1.6 to 5.5	2	2	5	400k			
BR24G128	F-3	FJ-3	FV-3	FVT-3	FVM-3	FVJ-3	NUX-3	—	128K	16K×8	1.6 to 5.5	2.5	2	5	400k			
BR24G256	F-3	FJ-3	FV-3	FVT-3	—	—	—	—	256K	32K×8	1.6 to 5.5	2.5	2	5	400k			
I ² C BUS EEPROM (2-Wire) BR24Gxxx-3A series (SCL Frequency=1MHz)																		
BR24G01	F-3A	FJ-3A	—	FVT-3A	FVM-3A	FVJ-3A	NUX-3A	—	1K	128×8	1.7 to 5.5	2	2	5	1M	-40 to +85	10 ⁶	40
BR24G02	F-3A	FJ-3A	—	FVT-3A	FVM-3A	FVJ-3A	NUX-3A	—	2K	256×8	1.7 to 5.5	2	2	5	1M			
BR24G04	F-3A	FJ-3A	—	FVT-3A	FVM-3A	FVJ-3A	NUX-3A	—	4K	512×8	1.7 to 5.5	2	2	5	1M			
BR24G08	F-3A	FJ-3A	—	FVT-3A	FVM-3A	FVJ-3A	NUX-3A	—	8K	1K×8	1.7 to 5.5	2	2	5	1M			
BR24G16	F-3A	FJ-3A	—	FVT-3A	FVM-3A	FVJ-3A	NUX-3A	—	16K	2K×8	1.7 to 5.5	2	2	5	1M			
BR24G512	F-3A	FJ-3A	—	FVT-3A	—	—	—	—	512K	64K×8	1.7 to 5.5	4.5	3	5	1M			
BR24G1M	F-3A	FJ-3A	—	—	—	—	—	—	1M	128K×8	1.7 to 5.5	4.5	3	5	1M			
I ² C BUS EEPROM (2-Wire) BR24Gxxx-5 series (SCL Frequency=1MHz)																		
BR24G32	F-5	FJ-5	—	FVT-5	FVM-5	—	NUX-5	—	32K	4K×8	1.6 to 5.5	2	2.5	5	1M	-40 to +85	4×10 ⁶	200
BR24G64	F-5	FJ-5	—	FVT-5	FVM-5	—	NUX-5	—	64K	8K×8	1.6 to 5.5	2	2.5	5	1M			
BR24G128	F-5	FJ-5	—	FVT-5	FVM-5	—	NUX-5	—	128K	16K×8	1.6 to 5.5	2	2.5	5	1M			
BR24G256	F-5	FJ-5	—	FVT-5	FVM-5	—	NUX-5	—	256K	32K×8	1.6 to 5.5	2	2.5	5	1M			
SPI BUS EEPROM BR25Gxxx-3 series																		
Part No.	Package and Suffix					Capacity (bit)	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	Operating Temperature (°C)	Endurance (times)	Data Retention (years)				
	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030				Operating (mA)	Standby (μA)								
BR25G320	F-3	FJ-3	FVT-3	FVM-3	NUX-3	32K	4K×8	1.6 to 5.5	8	2	5	-40 to +85	10 ⁶	100				
BR25G640	F-3	FJ-3	FVT-3	FVM-3	NUX-3	64K	8K×8	1.6 to 5.5	8	2	5							
BR25G128	F-3	FJ-3	FVT-3	FVM-3	NUX-3	128K	16K×8	1.6 to 5.5	8	2	5							
BR25G256	F-3	FJ-3	FVT-3	—	—	256K	32K×8	1.6 to 5.5	8	2	5							
BR25G512	F-3	FJ-3	FVT-3	—	—	512K	64K×8	1.8 to 5.5	4	1	5							
BR25G1M	F-3	FJ-3	—	—	—	1M	128K×8	1.8 to 5.5	4	1	5							

Serial EEPROM

Standard EEPROM

WL-CSP EEPROM															
Part No.	I/F	Capacity (bit)	Package					Pull-Up Resistance	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	Operating Temperature (°C)	Data Retention (years)
			Package Name	Size (mm)	Thickness (mm) (Max.)	Ball Pitch (mm)	RESIN COATING				Operating (mA)	Standby (μA)			
BU9833GUL-W	I²C	2K	VCSP50L1	x : 1.27 y : 1.50	0.55	0.5	✓	—	256×8	1.7 to 5.5	2	2	5	−40 to +85	40
BU9847GUL-W	I²C	4K	VCSP50L1	x : 1.95 y : 1.06	0.55	0.5	✓	—	512×8	1.7 to 5.5	2	2	5	−40 to +85	40
BU9889GUL-W	I²C	8K	VCSP50L1	x : 1.60 y : 1.00	0.55	0.5	✓	—	1K×8	1.7 to 5.5	2	2	5	−40 to +85	40
BRCB008GWZ-3	I²C	8K	UCSP30L1	x : 0.94 y : 0.94	0.33	0.4	—	—	1K×8	1.7 to 3.6	2	2	5	−40 to +85	40
BRCB016GWL-3	I²C	16K	UCSP50L1	x : 1.10 y : 1.15	0.55	0.4	✓	—	2K×8	1.7 to 3.6	2	2	5	−40 to +85	40
BRCD016GWZ-3	I²C	16K	UCSP35L1	x : 1.30 y : 0.77	0.40	0.4	✓	—	2K×8	1.7 to 3.6	2	2	5	−40 to +85	40
BRCG016GWZ-3	I²C	16K	UCSP30L1A	x : 0.82 y : 0.82	0.33	0.4	✓	—	2K×8	1.7 to 5.5	2	2	5	−40 to +85	40
BRCF016GWZ-3	I²C	16K	UCSP30L1	x : 0.86 y : 0.84	0.35	0.4	—	—	2K×8	1.7 to 5.5	2	2	5	−40 to +85	40
BRCA016GWZ-W	I²C	16K	UCSP30L1	x : 1.30 y : 0.77	0.35	0.4	—	—	2K×8	1.7 to 3.6	2	2	5	−40 to +85	40
BRCB032GWZ-3	I²C	32K	UCSP30L1	x : 1.45 y : 0.77	0.33	0.4	—	—	4K×8	1.7 to 5.5	2	2	5	−40 to +85	40
BRCH064GWZ-3	I²C	64K	UCSP35L1A	x : 1.50 y : 1.00	0.33	0.4	✓	—	8K×8	1.6 to 5.5	2	2	5	−40 to +85	40
BRCB064GWZ-3	I²C	64K	UCSP30L1	x : 1.50 y : 1.00	0.35	0.4	—	WP	8K×8	1.6 to 5.5	3.9	2	5	−40 to +85	40
BRCE064GWZ-3	I²C	64K	UCSP25L1	x : 1.50 y : 1.00	0.30	0.4	—	—	8K×8	1.6 to 5.5	2	2	5	−40 to +85	40
BU9897GUL-W	I²C	128K	VCSP50L2	x : 2.44 y : 1.99	0.55	0.5	✓	—	16K×8	1.7 to 5.5	2.5	2	5	−40 to +85	40
BU9832GUL-W	SPI	8K	VCSP50L2	x : 2.09 y : 1.85	0.55	0.5	✓	—	1K×8	1.8 to 5.5	3	2	5	−40 to +85	40
BU9829GUL-W	SPI	16K	VCSP50L1	x : 1.74 y : 1.65	0.55	0.5	✓	—	2K×8	1.6 to 3.6	2	1	5	−30 to +85	10
BR25S128GUZ-W	SPI	128K	VCSP35L2	x : 2.00 y : 2.63	0.40	0.5	✓	—	16K×8	1.7 to 5.5	2*	2	5	−40 to +85	40
BU9891GUL-W	MW	4K	VCSP50L1	x : 1.60 y : 1.00	0.55	0.5	✓	—	256×16	1.7 to 5.5	3	2	5	−40 to +85	40

WL-CSP EEPROM : * V_{CC}=2.5V

Plug & Play EEPROM for Memory Modules										
Part No.	Package and Suffix		Bit Format (word×bit)	Supply Voltage (V)	Clock Frequency (kHz)	Write Cycle Time (ms)	Endurance (times)	Data Retention (years)	Write Protect	
	TSSOP-B8	VSON008X2030								
BR34L02	FVT-W	—	256×8	1.7 to 5.5	100*/400*2	5	10 ⁶	40	One-Time ROM Write Protect Function	
BR34E02	FVT-3	NUX-3	256×8	1.7 to 5.5	400	5	10 ⁶	40	Setting/Release-Capable Write Protect Function, One-Time ROM Write Protect Function	

Plug & Play EEPROM For Memory Modules : *1 : V_{CC}=1.7 to 5.5V *2 : V_{CC}=2.5 to 5.5V

Plug & Play EEPROM for Display												
Part No.	Package and Suffix							Function Explanation	Bit Format (word×bit)	Supply Voltage (V)	Clock Frequency (kHz)	Write Cycle Time (ms)
	SOP8	SOP-J8	SSOP-B8	SOP14	SSOP-B14	SSOP-B16	VSON008X2030					
BR24C21	F	FJ	FV	—	—	—	—	Supports DDC1TM/ DDC2 for displays	128×8	2.5 to 5.5	100/400	10
BU9882	—	—	—	F-W	FV-W	—	—	Dual-port type compatible with DDC2 for displays	128×8×2ch	2.5 to 5.5	100/400	10
BU9883	—	—	—	—	—	FV-W	—	2kbit×3ch EEPROM for HDMI ports	256×8×3ch	3.0 to 5.5	400	5
BU99022	—	—	—	—	—	—	NUX-3	2Kbit×2ch EEPROM	256×8×2ch	1.7 to 5.5	400	5

Automotive EEPROM

105°C Operation I ² C BUS EEPROM (2-Wire) BR24Axx-WM series													
Part No.	Package and Suffix			Capacity (bit)	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	Operating Temperature (°C)	Endurance (times)	Data Retention (years)	Automotive Grade AEC-Q100
	SOP8	SOP-J8	MSOP8				Operating (mA)	Standby (μA)					
BR24A01A	F-WM	FJ-WM	—	1K	128×8	2.5 to 5.5	2	2	5	−40 to +105	10 ⁶	40	YES
BR24A02	F-WM	FJ-WM	FVM-WM	2K	256×8	2.5 to 5.5	2	2	5				
BR24A04	F-WM	FJ-WM	—	4K	512×8	2.5 to 5.5	2	2	5				
BR24A08	F-WM	FJ-WM	—	8K	1K×8	2.5 to 5.5	2	2	5				
BR24A16	F-WM	FJ-WM	—	16K	2K×8	2.5 to 5.5	2	2	5				
BR24A32	F-WM	—	—	32K	4K×8	2.5 to 5.5	3	2	5				
BR24A64	F-WM	—	—	64K	8K×8	2.5 to 5.5	3	2	5				
85°C Operation I ² C BUS EEPROM (2-Wire) BR24Txx-3AM series													
Part No.	Package and Suffix			Capacity (bit)	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	Operating Temperature (°C)	Endurance (times)	Data Retention (years)	Automotive Grade AEC-Q100
	SOP8	SOP-J8	TSSOP-B8				Operating (mA)	Standby (μA)					
BR24T512	F-3AM	FJ-3AM	FVT-3AM	512K	64K×8	1.7 to 5.5	4.5	3	5	−40 to +85	10 ⁶	40	YES
BR24T1M	F-3AM	FJ-3AM	—	1M	128K×8	1.7 to 5.5	4.5	3	5	−40 to +85	10 ⁶	40	YES

Automotive EEPROM

125°C Operation Microwire BUS EEPROM (3-Wire) BR93Hxx-2C series														
Part No.	Package and Suffix				Capacity (bit)	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	Operating Temperature (°C)	Endurance (times)	Data Retention (years)	Automotive Grade AEC-Q100
	SOP8	SOP-J8	TSSOP-B8	MSOP8				Operating (mA)	Standby (μA)					
BR93H46	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	1K	64×16	2.5 to 5.5	3	10	4	−40 to +125	10 ⁶	100	YES
BR93H56	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	2K	128×16	2.5 to 5.5	3	10	4				
BR93H66	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	4K	256×16	2.5 to 5.5	3	10	4				
BR93H76	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	8K	512×16	2.5 to 5.5	3	10	4				
BR93H86	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C	16K	1K×16	2.5 to 5.5	3	10	4				
105°C Operation Microwire BUS EEPROM (3-Wire) BR93Axx-WM series														
BR93A46	RF-WM	RFJ-WM	RFVT-WM	RFVM-WM	1K	64×16	2.5 to 5.5	3	2	5	−40 to +105	10 ⁶	40	YES
BR93A56	RF-WM	RFJ-WM	RFVT-WM	RFVM-WM	2K	128×16	2.5 to 5.5	3	2	5				
BR93A66	RF-WM	RFJ-WM	RFVT-WM	RFVM-WM	4K	256×16	2.5 to 5.5	3	2	5				
BR93A76	RF-WM	RFJ-WM	RFVT-WM	RFVM-WM	8K	512×16	2.5 to 5.5	3	2	5				
BR93A86	RF-WM	RFJ-WM	RFVT-WM	RFVM-WM	16K	1K×16	2.5 to 5.5	3	2	5				
125°C Operation SPI BUS EEPROM BR25Hxxx-2C series														
Part No.	Package and Suffix				Capacity (bit)	Bit Format (word×bit)	Supply Voltage (V)	Current Consumption (Max.)		Write Cycle Time (Max.)(ms)	Operating Temperature (°C)	Endurance (times)	Data Retention (years)	Automotive Grade AEC-Q100
	SOP8	SOP-J8	TSSOP-B8	MSOP8				Operating (mA)	Standby (μA)					
BR25H010	F-2C	FJ-2C	FVT-2C	FVM-2C	1K	128×8	2.5 to 5.5	4	10	4	−40 to +125	10 ⁶	100	YES
BR25H020	F-2C	FJ-2C	FVT-2C	FVM-2C	2K	256×8	2.5 to 5.5	4	10	4				
BR25H040	F-2C	FJ-2C	FVT-2C	FVM-2C	4K	512×8	2.5 to 5.5	4	10	4				
BR25H080	F-2C	FJ-2C	FVT-2C	FVM-2C	8K	1K×8	2.5 to 5.5	4	10	4				
BR25H160	F-2C	FJ-2C	FVT-2C	FVM-2C	16K	2K×8	2.5 to 5.5	4	10	4				
BR25H320	F-2C	FJ-2C	FVT-2C	FVM-2C	32K	4K×8	2.5 to 5.5	4	10	4				
BR25H640	F-2C	FJ-2C	FVT-2C	—	64K	8K×8	2.5 to 5.5	5.5	10	4				
BR25H128	F-2C	FJ-2C	—	—	128K	16K×8	2.5 to 5.5	5.5	10	4				
125°C Operation SPI BUS EEPROM with ECC Function BR25Hxxx-2AC series														
BR25H640	F-2AC	FJ-2AC	FVT-2AC	FVM-2AC	64K	8K×8	2.5 to 5.5	5.5	10	4	−40 to +125	10 ⁶	100	YES
BR25H128	F-2AC	FJ-2AC	FVT-2AC	—	128K	16K×8	2.5 to 5.5	5.5	10	4				
BR25H256	F-2AC	FJ-2AC	—	—	256K	32K×8	2.5 to 5.5	5.5	10	4				
105°C Operation SPI BUS EEPROM BR25Axxx-3M series														
BR25A256	F-3M	FJ-3M	FVT-3M	—	256K	32K×8	2.5 to 5.5	4	10	5	−40 to +105	10 ⁶	100	YES
BR25A512	F-3M	FJ-3M	FVT-3M	—	512K	64K×8	2.5 to 5.5	4	10	5				
BR25A1M	F-3M	FJ-3M	—	—	1M	128K×8	2.5 to 5.5	4	10	5				

FeRAM

Ferroelectric Memory

(LAPIS Semiconductor Products)

Parallel BUS FeRAM										
Part No.	Memory Capacity (bit)	Configuration (word×bit)	Supply Voltage (V)	Operating Speed	Read/Write Endurance (times)	Data Retention (years)	Operating Temperature Ta(°C)	Package	Halogen Free Supported*1	Automotive Grade*2
MR48V256C	256K	32K×8	2.7 to 3.6	t _{nc} =150ns	10 ¹³	10	−40 to +85	TSOP(I) 28-08134-0.55	—	YES
I ² C BUS FeRAM MR44Vxxxx series										
MR44V064B	64K	8K×8	1.8 to 3.6	f _{clk} ≧3.4MHz	10 ¹³	10	−40 to +85	SOP8-200-1.27	✓	YES
MR44V100A	1M	128K×8	1.8 to 3.6	f _{clk} ≧3.4MHz					✓	
SPI BUS FeRAM MR45Vxxxx series										
MR45V032A	32K	4K×8	2.7 to 3.6	f _{clk} ≧15MHz	10 ¹³	10	−40 to +85	SOP8-200-1.27	✓	YES
MR45V064B	64K	8K×8	1.8 to 3.6	f _{clk} ≧40MHz						
MR45V256A	256K	32K×8	3.0 to 3.6	f _{clk} ≧15MHz						
MR45V100A	1M	128K×8	1.8 to 3.6	f _{clk} ≧40MHz				SOP8-200-1.27	✓	YES
								DIP8-300-2.54	✓	—
MR45V200B	2M	256K×8	2.7 to 3.6	f _{clk} ≧34MHz	DIP8-300-2.54	✓	—			

*1 : Halogen-free models are available for products with the halogen free compatible mark "✓".
Please contact a sales representative for further details.

*2 : Please contact a sales representative for details regarding AEC-Q100.

SDRAM

General Purpose Legacy DRAM SDRAM

(LAPIS Semiconductor Products)

Standard												
Part No.	Data Rate type	Supply Voltage (V)	Memory Capacity (bit)	Number of Data bits	Configuration (bank×word×bit)	Max. Operating Frequency (MHz)	Refresh Cycle (cycles/ms)	Cycle Time (ns)	Features	Operating Temperature Ta(°C)	Package	Halogen Free Supported*1
MSM56V16161N	SDR	3.3±0.3	16M	×16	2×512K×16	143	4096/64	7/7.5/10	Drivability Control	0 to +70	TSOP(2)50-400-0.80	✓
MD56V62161M			64M		4×1M×16	143		7/7.5/10			TSOP(2)54-400-0.80	✓
MD56V72161C			128M		4×2M×16	166		6/7/7.5/10				✓
MD56V82161A			256M		4×4M×16	166		6/7/7.5/10				✓

*1 : Halogen-free models are available for products with the halogen free compatible mark "✓".
Please contact a sales representative for further details.

Industrial Legacy DRAM SDRAM

(LAPIS Semiconductor Products)

Industrial												
Part No.	Data Rate type	Supply Voltage (V)	Memory Capacity (bit)	Number of Data bits	Configuration (bank×word×bit)	Max. Operating Frequency (MHz)	Refresh Cycle (cycles/ms)	Cycle Time (ns)	Features	Operating Temperature Ta(°C)	Package	Halogen Free Supported*1
MSM56V16161NP	SDR	3.3±0.3	16M	×16	2×512K×16	143	4096/64	7/7.5/10	Drivability Control	−40 to +85	TSOP(2)50-400-0.80	✓
MD56V62161M-xxTAP			64M		4×1M×16	143		7/7.5/10			TSOP(2)54-400-0.80	✓
MD56V72161C-xxTAP			128M		4×2M×16	166		6/7/7.5/10				✓
MD56V82161A-xxTAP			256M		4×4M×16	166		6/7/7.5/10				✓
☆ MD60Y1G160A-xxLAP7AL	DDR3	1.5±0.075	1G	×16	8×8M×16	800 (1600Mbps)	Average Refresh Period: 7.8μs(Tc≤85°C), 3.9μs(Tc>85°C)	1.25/1.5	—	−40 to +95	TFBGA96-9.0×13.0-0.80	✓
☆ MD60S1G160A-xxLAP7AL	DDR3L	1.35+0.1, −0.067	1G	×16	8×8M×16	800 (1600Mbps)	Average Refresh Period: 7.8μs(Tc≤85°C), 3.9μs(Tc>85°C)	1.25/1.5	—	−40 to +95	TFBGA96-9.0×13.0-0.80	✓

*1 : Halogen-free models are available for products with the halogen free compatible mark "✓".
Please contact a sales representative for further details.

☆: Under Development

Automotive Legacy DRAM SDRAM

(LAPIS Semiconductor Products)

Automotive (85°C/95°C)													
Part No.	Data Rate type	Supply Voltage (V)	Memory Capacity (bit)	Number of Data bits	Configuration (bank×word×bit)	Max. Operating Frequency (MHz)	Refresh Cycle (cycles/ms)	Cycle Time (ns)	Features	Operating Temperature Ta(°C)	Package	Halogen Free Supported*1	Automotive Grade AEC-Q100
MSM56V16161NP-xxTFEX	SDR	3.3±0.3	16M	×16	2×512K×16	143	4096/64	7/7.5/10	Drivability Control	−40 to +85	TSOP(2)50-400-0.80	✓	YES
MD56V62161M-xxTAL42X			64M		4×1M×16	143		7/7.5/10			TSOP(2)54-400-0.80	✓	YES
MD56V72161C-xxTAL42X			128M		4×2M×16	166		6/7/7.5/10					
MD56V82161A-xxTAL42X			256M		4×4M×16	166		6/7/7.5/10					
☆ MD60Y1G160A-xxLAL43L	DDR3	1.5±0.075	1G	×16	8×8M×16	800 (1600Mbps)	Average Refresh Period: 7.8μs(Tc≤85°C), 3.9μs(Tc>85°C)	1.25/1.5	—	−40 to +95	TFBGA96-9.0×13.0-0.80	✓	YES
☆ MD60S1G160A-xxLAL43L	DDR3L	1.35+0.1, −0.067	1G	×16	8×8M×16	800 (1600Mbps)	Average Refresh Period: 7.8μs(Tc≤85°C), 3.9μs(Tc>85°C)	1.25/1.5	—	−40 to +95	TFBGA96-9.0×13.0-0.80	✓	YES

DDR3 : Double Data Rate 3 Synchronous DRAM, SDR: Single Data Rate Synchronous DRAM

*1 : Halogen-free models are available for products with the halogen free compatible mark "✓".
Please contact a sales representative for further details.

☆: Under Development

SiP SDRAM

(LAPIS Semiconductor Products)

Standard										
Part No.	Supply Voltage (V)	Memory Capacity (bit)	Number of Data bits	Configuration (bank×word×bit)	Max. Operating Frequency (MHz)	Refresh Cycle (cycles/ms)	Cycle Time (ns)	Operating Temperature Tj(°C)	Features	
MSM56V16160N-xxWBP	3.3±0.3	16M	×16	2×512K×16	143	4096/16	7/7.5/10	−40 to +125	KGD	
MD56V62160M-xxWBP		64M		4×1M×16	143		7/7.5/8/10			
MD56V72160C-xxWBP		128M		4×2M×16	166		6/7/7.5/10			

Automotive										
Part No.	Supply Voltage (V)	Memory Capacity (bit)	Number of Data bits	Configuration (bank×word×bit)	Max. Operating Frequency (MHz)	Refresh Cycle (cycles/ms)	Cycle Time (ns)	Operating Temperature Tj(°C)	Features	Automotive Grade*1
MSM56V16160NP	3.3±0.3	16M	×16	2×512K×16	143	4096/16	7/7.5/10	−40 to +125	KGD	YES
MD56V62160M		64M		4×1M×16	143		7/7.5/8/10			
MD56V72160C		128M		4×2M×16	166		6/7/7.5/10			

*1 : Please contact a sales representative for details regarding AEC-Q100.

Operational Amplifiers

Standard

Ground Sense Operational Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Source Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA2904F/FV/FVM	2	3 to 36	0.5	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP8/SSOP-B8/MSOP8
BA2904SF/SFV/SFVM							V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$				-40 to +105	SOP8/SSOP-B8/MSOP8
BA2904YF-LB	2	3 to 36	0.5	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP8
BA2902F/FV	4	3 to 36	0.7	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP14/SSOP-B14
BA2902SF/SFV							V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$				-40 to +105	SOP14/SSOP-B14
BA2902YF-LB	4	3 to 36	0.7	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP14
BA3404F/4FJ/FVM	2	4 to 36	2.0	2.0	70	30	V_{EE} to $V_{CC}-2.0$	V_{EE} to $V_{CC}-2.0$	100	1.2	1.2	-40 to +85	SOP8/SOP-J8/MSOP8
LM2902F/FJ/FV/FVJ	4	3 to 32	1.0	1.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.3	0.8	-40 to +125	SOP14/SOP-J14/SSOP-B14/TSSOP-B14J
LM2904F/FJ/FV/FVJ/FVM/FVT	2	3 to 32	0.6	1.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.3	0.8	-40 to +125	SOP8/SOP-J8/SSOP-B8/TSSOP-B8J/MSOP8/TSSOP-B8
LM324F/FJ/FV/FVJ	4	3.0 to 32.0	1,000	1.0	20	30	V_{EE} to $V_{CC}-1.5$	$V_{EE}+0.01$ to $V_{CC}-1.5$	100	0.3	0.8	-40 to +85	SOP14/SOP-J14/SSOP-B14/TSSOP-B14J
LM358F/FJ/FV/FVJ/FVM/FVT	2	3.0 to 32.0	600	1.0	20	30	V_{EE} to $V_{CC}-1.5$	$V_{EE}+0.01$ to $V_{CC}-1.5$	100	0.3	0.8	-40 to +85	SOP8/SOP-J8/SSOP-B8/TSSOP-B8J/MSOP8/TSSOP-B8
Automotive Ground Sense Operational Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Source Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA2904YF-C/YFV-C/YFVM-C	2	3 to 36	0.5	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP8/SSOP-B8/MSOP8
BA2902YF-C/YFV-C	4	3 to 36	0.7	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP14/SSOP-B14
BA2904YF-M/YFV-M/YFVM-M	2	3 to 36	0.5	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP8/SSOP-B8/MSOP8
BA2902YF-M/YFV-M	4	3 to 36	0.7	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP14/SSOP-B14
Excellent EMI Characteristics Ground Sense Operational Amplifiers													
New BA82904YF-C/YFVM-C	2	3 to 36	0.5	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP8/MSOP8
New BA82902YF-C/YFJ-C/YFV-C/YFVJ-C	4	3 to 36	0.7	2.0	20	30	V_{EE} to $V_{CC}-1.5$	V_{EE} to $V_{CC}-1.5$	100	0.2	0.5	-40 to +125	SOP14/SOP-J14/SSOP-B14/TSSOP-B14J

Operational Amplifiers

High Speed

Input-Output Full Swing Operational Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BU7261G	1	1.8 to 5.5	250	1.0	0.001	10	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	95	1.1	2.0	-40 to +85	SSOP5
BU7261SG								-40 to +105				SSOP5	
BU7262F/FVM/NUX	2	1.8 to 5.5	550	1.0	0.001	10	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	95	1.1	2.0	-40 to +85	SOP8/MSOP8/ VSON008X2030
BU7262SF/SFVM/SNUX								-40 to +105				SOP8/MSOP8/ VSON008X2030	
BU7264F/FV/SF/SFV	4	1.8 to 5.5	1,100	1.0	0.001	10	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	95	1.1	2.0	-40 to +85	SOP14/SSOP-B14
												-40 to +105	SOP14/SSOP-B14
BU7291G	1	2.4 to 5.5	470	1.0	0.001	8	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	105	3.0	2.8	-40 to +85	SSOP5
												-40 to +105	SSOP5
BU7294F/FV/SF/SFV	4	2.4 to 5.5	2,000	1.0	0.001	8	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	105	3.0	2.8	-40 to +85	SOP14/SSOP-B14
												-40 to +105	SOP14/SSOP-B14
BU7295HFV	1	1.8 to 5.5	150	1.0	0.001	8	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	95	1.0	1.0	-40 to +85	HVSOF5
BU7295SHFV								-40 to +105				HVSOF5	
BU7255HFV	1	2.4 to 5.5	540	1.0	0.001	4	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	105	3.4	4.0	-40 to +85	HVSOF5
BU7255SHFV								-40 to +105				HVSOF5	
BD7561G	1	5.0 to 14.5	440	1.0	0.001	8	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	95	0.9	1.0	-40 to +85	SSOP5
BD7561SG								-40 to +105				SSOP5	
BD7562F/FVM	2	5.0 to 14.5	900	1.0	0.001	8	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	95	0.9	1.0	-40 to +85	SOP8/MSOP8
BD7562SF/SFVM								-40 to +105				SOP8/MSOP8	
Ground Sense Operational Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA3472F/FV/FJ/FVM/ FVT	2	3 to 36	4.0	1.0	100	30	V _{EE} to V _{CC} -2.0	V _{EE} +0.3 to V _{CC} -1.0	100	10.0	4.0	-40 to +85	SOP8/SSOP-B8/SOP-J8/ MSOP8/TSSOP-B8
BA3472YF-LB								-40 to +125				SOP8	
BA3472RFVM								-40 to +105				MSOP8	
BA3474F	4	3 to 36	8.0	1.0	100	30	V _{EE} to V _{CC} -2.0	V _{EE} +0.3 to V _{CC} -1.0	100	10.0	4.0	-40 to +75	SOP14
BA3474FV/FVJ								-40 to +85				SSOP-B14/TSSOP-B14J	
BA3474RFV								-40 to +105				SSOP-B14	
BU7461G	1	1.7 to 5.5	0.15	1.0	0.001	8	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	95	1.0	1.0	-40 to +85	SSOP5
BU7461SG								-40 to +105				SSOP5	
BU7462F/FVM/NUX	2	1.7 to 5.5	0.3	1.0	0.001	8	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	95	1.0	1.0	-40 to +85	SOP8/MSOP8/ VSON008X2030
BU7462SF/SFVM/SNUX	2	1.7 to 5.5	0.3	1.0	0.001	8	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	95	1.0	1.0	-40 to +105	SOP8/MSOP8/ VSON008X2030
BU7464F	4	1.7 to 5.5	0.6	1.0	0.001	8	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	95	1.0	1.0	-40 to +85	SOP14
BU7464SF								-40 to +105				SOP14	
BU7465HFV	1	1.7 to 5.5	0.12	1.0	0.001	8	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	100	1.0	1.2	-40 to +85	HVSOF5
BU7465SHFV								-40 to +105				HVSOF5	
BU7481G	1	1.8 to 5.5	0.42	1.0	0.001	8	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	105	3.2	2.8	-40 to +85	SSOP5
BU7481SG								-40 to +105				SSOP5	
BU7485G	1	3.0 to 5.5	1.5	1.0	0.001	8	V _{SS} to V _{DD} -1.4	V _{SS} +0.1 to V _{DD} -0.1	105	10.0	10.0	-40 to +85	SSOP5
BU7485SG								-40 to +105				SSOP5	
BU7486F/FV/FVM	2	3.0 to 5.5	3.0	1.0	0.001	8	V _{SS} to V _{DD} -1.4	V _{SS} +0.1 to V _{DD} -0.1	105	10.0	10.0	-40 to +85	SOP8/SSOP-B8/MSOP8
BU7486SF/SFV/SFVM								-40 to +105				SOP8/SSOP-B8/MSOP8	
BU7487F/FV	4	3.0 to 5.5	6.0	1.0	0.001	8	V _{SS} to V _{DD} -1.4	V _{SS} +0.1 to V _{DD} -0.1	105	10.0	10.0	-40 to +85	SOP14/SSOP-B14
BU7487SF/SFV								-40 to +105				SOP14/SSOP-B14	
BU7495HFV	1	1.8 to 5.5	0.65	1.0	0.001	7	V _{SS} to V _{DD} -1.2	V _{SS} +0.1 to V _{DD} -0.1	100	5.0	4.0	-40 to +85	HVSOF5
BU7495SHFV								-40 to +105				HVSOF5	
Automotive Ground Sense Operation Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA3472YF-C/YFV-C/ YFVM-C/WFV-C	2	3 to 36	4.0	1.0	100	30	V _{EE} to V _{CC} -2.0	V _{EE} +0.3 to V _{CC} -1.0	100	10	4.0	-40 to +125	SOP8/SSOP-B8/MSOP8/ SSOP-B8
BA3474WFV-C/YFV-C	4	3 to 36	8.0	1.0	100	30	V _{EE} to V _{CC} -2.0	V _{EE} +0.3 to V _{CC} -1.0	100	10	4.0	-40 to +125	SSOP-B14/SSOP-B14

Low Power

Input-Output Full Swing Operational Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BU7205HFV	1	1.8 to 5.5	0.4	1.0	0.001	1.2	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.0025	0.0025	−40 to +85	HVSOF5
BU7205SHFV												−40 to +105	HVSOF5
BU7241G	1	1.8 to 5.5	70	1.0	0.001	10	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.4	0.9	−40 to +85	SSOP5
BU7241SG												−40 to +105	SSOP5
BU7242F/FVM/NUX	2	1.8 to 5.5	180	1.0	0.001	10	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.4	0.9	−40 to +85	SOP8/MSOP8/ VSON008X2030
BU7242SF/SFVM/SNUX												−40 to +105	SOP8/MSOP8/ VSON008X2030
BU7244F/FV	4	1.8 to 5.5	360	1.0	0.001	10	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.4	0.9	−40 to +85	SOP14/SSOP-B14
BU7244SF/SFV												−40 to +105	SOP14/SSOP-B14
BU7245HFV	1	1.8 to 5.5	5	1.0	0.001	4	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.035	0.09	−40 to +85	HVSOF5
BU7245SHFV												−40 to +105	HVSOF5
BU7265G	1	1.8 to 5.5	0.35	1.0	0.001	2.4	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.0024	0.004	−40 to +85	SSOP5
BU7265SG												−40 to +105	SSOP5
BU7266F/FV/FVM	2	1.8 to 5.5	0.7	1.0	0.001	2.4	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.0024	0.004	−40 to +85	SOP8/SSOP-B8/MSOP8
BU7266SF/SFV/SFVM												−40 to +105	SOP8/SSOP-B8/MSOP8
BU7271G	1	1.8 to 5.5	8.6	1.0	0.001	4	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	100	0.05	0.09	−40 to +85	SSOP5
BU7271SG												−40 to +105	SSOP5
BU7275HFV	1	1.8 to 5.5	40	1.0	0.001	8	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.3	0.6	−40 to +85	HVSOF5
BU7275SHFV												−40 to +105	HVSOF5
BD12730G	1	1.8 to 5.5	320	1.0	50	5	GND to V_{+}	0.1 to $V_{+} - 0.1$	85	0.4	1.0	−40 to +85	SSOP5
BD12732F/FJ/FV/FVJ/ FVM/FVT	2	1.8 to 5.5	580	1.0	50	5	GND to V_{+}	0.1 to $V_{+} - 0.1$	85	0.4	1.0	−40 to +85	SOP8/SOP-J8/ SSOP-B8/TSSOP-B8J/ MSOP8/TSSOP-B8
BD12734F/FJ/FV/FVJ	4	1.8 to 5.5	1,200	1.0	50	5	GND to V_{+}	0.1 to $V_{+} - 0.1$	85	0.4	1.0	−40 to +85	SOP14/SOP-J14/ SSOP-B14/TSSOP-B14J
BD7541G	1	5.0 to 14.5	180	1.0	0.001	4	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.3	0.6	−40 to +85	SSOP5
BD7541SG												−40 to +105	SSOP5
BD7542F/FVM	2	5.0 to 14.5	400	1.0	0.001	4	V_{SS} to V_{DD}	$V_{SS} + 0.1$ to $V_{DD} - 0.1$	95	0.3	0.6	−40 to +85	SOP8/MSOP8
BD7542SF/SFVM												−40 to +105	SOP8/MSOP8
LMR931G	1	1.8 to 5.0	80	1.0	5	28	V_{SS} to V_{DD}	$V_{SS} + 0.04$ to $V_{DD} - 0.05$	100	0.4	1.4	−40 to +85	SSOP5
LMR932F/FJ/FV/FVJ/ FVM/FVT	2	1.8 to 5.0	135	1.0	5	28	V_{SS} to V_{DD}	$V_{SS} + 0.04$ to $V_{DD} - 0.05$	100	0.4	1.4	−40 to +85	SOP8/SOP-J8/ SSOP-B8/TSSOP-B8J/ MSOP8/TSSOP-B8
LMR934F/FJ/FV/FVJ	4	1.8 to 5.0	250	1.0	5	28	V_{SS} to V_{DD}	$V_{SS} + 0.04$ to $V_{DD} - 0.05$	100	0.4	1.4	−40 to +85	SOP14/SOP-J14/ SSOP-B14/TSSOP-B14J
LMR981G	1	1.8 to 5.0	80	1.0	5	28	V_{SS} to V_{DD}	$V_{SS} + 0.04$ to $V_{DD} - 0.05$	100	0.4	1.4	−40 to +85	SSOP6
LMR982FVM	2	1.8 to 5.0	135	1.0	5	28	V_{SS} to V_{DD}	$V_{SS} + 0.04$ to $V_{DD} - 0.05$	100	0.4	1.4	−40 to +85	MSOP8

Operational Amplifiers

Low Power

Ground Sense Operational Amplifiers													
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BU7411G	1	1.6 to 5.5	0.35	1.0	0.001	2.4	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.1$ to $V_{DD}-0.1$	95	0.0024	0.004	-40 to +85	SSOP5
BU7411SG												-40 to +105	SSOP5
BU7421G	1	1.7 to 5.5	8.5	1.0	0.001	4	V_{SS} to $V_{DD}-1.2$	$V_{SS}+0.1$ to $V_{DD}-0.1$	100	0.05	0.09	-40 to +85	SSOP5
BU7421SG												-40 to +105	SSOP5
BU7441G	1	1.7 to 5.5	50	1.0	0.001	6	V_{SS} to $V_{DD}-1.2$	$V_{SS}+0.1$ to $V_{DD}-0.1$	95	0.3	0.6	-40 to +85	SSOP5
BU7441SG												-40 to +105	SSOP5
BU7442F/FVM/NUX	2	1.7 to 5.5	100	1.0	0.001	6	V_{SS} to $V_{DD}-1.2$	$V_{SS}+0.1$ to $V_{DD}-0.1$	95	0.3	0.6	-40 to +85	SOP8/MSOP8/ VSON008X2030
BU7442SF/SFVM/SNUX												-40 to +105	SOP8/MSOP8/ VSON008X2030
BU7444F	4	1.7 to 5.5	200	1.0	0.001	6	V_{SS} to $V_{DD}-1.2$	$V_{SS}+0.1$ to $V_{DD}-0.1$	95	0.3	0.6	-40 to +85	SOP14
BU7444SF												-40 to +105	SOP14
BU7445HFV	1	1.7 to 5.5	40	1.0	0.001	8	V_{SS} to $V_{DD}-1.2$	$V_{SS}+0.1$ to $V_{DD}-0.1$	100	0.25	0.4	-40 to +85	HVSOF5
BU7445SHFV												-40 to +105	HVSOF5
BU7475HFV	1	1.7 to 5.5	9	1.0	0.001	7	V_{SS} to $V_{DD}-1.2$	$V_{SS}+0.1$ to $V_{DD}-0.1$	100	0.05	0.1	-40 to +85	HVSOF5
BU7475SHFV												-40 to +105	HVSOF5
BD1321G	1	2.7 to 5.5	130	0.1	15	70	V_{EE} to $V_{CC}-0.8$	$V_{EE}+0.08$ to $V_{CC}-0.04$	110	1.0	3.0	-40 to +85	SSOP5
LMR321G	1	2.7 to 5.5	130	0.1	15	70	V_{EE} to $V_{CC}-0.8$	$V_{EE}+0.08$ to $V_{CC}-0.04$	110	1.0	3.0	-40 to +85	SSOP5
LMR324F/FJ/FV/FVJ	4	2.7 to 5.5	410	1.0	15	70	V_{EE} to $V_{CC}-0.8$	$V_{EE}+0.08$ to $V_{CC}-0.04$	110	1.0	3.0	-40 to +85	SOP14/SOP-J14/ SSOP-B14/ TSSOP-B14J/MSOP8
LMR341G	1	2.7 to 5.5	100	0.25	0.001	24	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.06$ to $V_{DD}-0.06$	103	1.0	2.0	-40 to +85	SSOP6
LMR342F/FJ/FV/FVJ/ FVM/FVT	2	2.7 to 5.5	200	0.25	0.001	24	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.06$ to $V_{DD}-0.06$	103	1.0	2.0	-40 to +85	SOP8/SOP-J8/ SSOP-B8/TSSOP- B8J/TSSOP-B8
LMR344F/FJ/FVJ	4	2.7 to 5.5	400	0.25	0.001	24	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.06$ to $V_{DD}-0.06$	103	1.0	2.0	-40 to +85	SOP14/SOP-J14/ TSSOP-B14J
LMR358F/FJ/FV/FVJ/ FVM/FVT	2	2.7 to 5.5	210	0.1	15	70	V_{EE} to $V_{CC}-0.8$	$V_{EE}+0.08$ to $V_{CC}-0.04$	110	1.0	3.0	-40 to +85	SOP8/SOP-J8/ SSOP-B8/TSSOP- B8J/MSOP8/ TSSOP-B8
LMR821G	1	2.5 to 5.5	280	1.0	30	16	V_{SS} to $V_{DD}-0.9$	$V_{SS}+0.12$ to $V_{DD}-0.1$	100	2.0	5.0	-40 to +85	SSOP5
LMR822F/FJ/FV/FVJ/ FVM/FVT	2	2.5 to 5.5	560	1.0	30	16	V_{SS} to $V_{DD}-0.9$	$V_{SS}+0.12$ to $V_{DD}-0.1$	100	2.0	5.0	-40 to +85	SOP8/SOP-J8/ SSOP-B8/TSSOP- B8J/MSOP8/ TSSOP-B8
LMR824F/FJ/FVJ	4	2.5 to 5.5	1,120	1.0	30	16	V_{SS} to $V_{DD}-0.9$	$V_{SS}+0.12$ to $V_{DD}-0.1$	100	2.0	5.0	-40 to +85	SOP14/SOP-J14/ TSSOP-B14J
TLR341G	1	1.8 to 5.5	70	0.3	0.001	8	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.055$ to $V_{DD}-0.05$	100	1.2	2.2	-40 to +85	SSOP6
TLR342F/FJ/FVJ/FVT	2	1.8 to 5.5	150	0.3	0.001	8	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.055$ to $V_{DD}-0.05$	100	1.0	1.2	-40 to +85	SOP8/SOP-J8/ TSSOP-B8J/ TSSOP-B8
TLR344F/FJ/FVJ	4	1.8 to 5.5	300	0.3	0.001	8	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.055$ to $V_{DD}-0.05$	100	1.2	2.2	-40 to +85	SOP14/SOP-J14/ TSSOP-B14J
Automotive Input-Output Full Swing Operational Amplifiers													
BU7241YG-C	1	1.8 to 5.5	70	1.0	0.001	10	V_{SS} to V_{DD}	$V_{SS}+0.05$ to $V_{DD}-0.05$	100	0.4	1.0	-40 to +125	SSOP5
BU7242YFVM-C	2	1.8 to 5.5	180	1.0	0.001	10	V_{SS} to V_{DD}	$V_{SS}+0.05$ to $V_{DD}-0.05$	100	0.4	1.0	-40 to +125	MSOP8
BU7244YFV-C	4	1.8 to 5.5	360	1.0	0.001	10	V_{SS} to V_{DD}	$V_{SS}+0.05$ to $V_{DD}-0.05$	100	0.4	1.0	-40 to +125	SSOP-B14

New

Low Noise

Output Full Swing Operational Amplifiers														
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Input Referred Noise Voltage (μVrms)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package	
BA4510F/FV	2	±1 to ±3.5	5.0	1.0	80	0.7	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +0.1 to V _{CC} -0.1	90	5.0	10.0	-20 to +75	SOP8/SSOP-B8	
BA4510FVM/FVT												-40 to +75	MSOP8/TSSOP-B8	
BA2107G	1	±1 to ±7	1.8	1.0	150	0.9	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +0.1 to V _{CC} -0.1	80	4.0	12.0	-40 to +85	SSOP5	
BA2115F/FJ/FVM	2	±1 to ±7	3.5	1.0	150	0.9	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +0.1 to V _{CC} -0.1	80	4.0	12.0	-40 to +85	SOP8/SOP-J8/MSOP8	
Automotive Operational Amplifiers														
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Input Referred Noise Voltage (μVrms)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package	
BA4558YF-M/YFV-M/YFVM-M	2	±4 to ±15	3.0	0.5	60	1.8	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	1.0	2.0	-40 to +105	SOP8/SSOP-B8/MSOP8	
BA4560YF-M/YFV-M/YFVM-M	2	±4 to ±15	3.0	0.5	50	1.0	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	4.0	4.0	-40 to +105	SOP8/SSOP-B8/MSOP8	
BA4580YF-M/YFVM-M	2	±2 to ±16	6.0	0.3	100	0.8	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +1.5 to V _{CC} -1.5	110	5.0	10.0	-40 to +105	SOP8/MSOP8	
BA4584YFV-M	4	±2 to ±16	11.0	0.3	100	0.8	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +1.5 to V _{CC} -1.5	110	5.0	10.0	-40 to +105	SSOP-B14	
Dual Supply Voltage Operational Amplifiers														
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Input Referred Noise Voltage (μVrms)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package	
BA4558F/FJ/FV/FVM/FVT	2	±4 to ±15	3.0	0.5	60	1.8	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	1.0	2.0	-40 to +85	SOP8/SOP-J8/SSOP-B8/MSOP8/TSSOP-B8	
BA4558RF/RFJ/RFV/RFVM/RFVT												-40 to +105	SOP8/SOP-J8/SSOP-B8/MSOP8/TSSOP-B8	
BA4560F/FJ/FV/FVM/FVT	2	±4 to ±15	4.0	0.5	50	1.0	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	4.0	10.0	-40 to +85	SOP8/SOP-J8/SSOP-B8/MSOP8/TSSOP-B8	
BA4560RF/RFJ/RFV/RFVM/RFVT			3.0								4.0	-40 to +105	SOP8/SOP-J8/SSOP-B8/MSOP8/TSSOP-B8	
BA4564RFV	4	±4 to ±15	6.0	0.5	50	1.0	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	4.0	4.0	-40 to +105	SSOP-B14	
BA15218F	2	±2 to ±16	5.0	0.5	50	1.0	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +2.0 to V _{CC} -2.0	110	3.0	10.0	-40 to +85	SOP8	
BA14741F/FJ	4	±2 to ±18	3.0	1.0	60	2.0	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +2.5 to V _{CC} -2.5	100	1.0	2.0	-40 to +85	SOP14/SOP-J14	
BA15532F	2	±3 to ±20	8.0	0.5	200	1.5	V _{EE} +2.0 to V _{CC} -2.0	V _{EE} +2.0 to V _{CC} -2.0	94	8.0	20.0	-20 to +75	SOP8	
BA4580RF/RFJ/RFVM/RFVT	2	±2 to ±16	6.0	0.3	100	0.8	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +1.5 to V _{CC} -1.5	110	5.0	5.0	-40 to +105	SOP8/SOP-J8/MSOP8/TSSOP-B8	
BA4584FV	4	±2 to ±16	12.0	0.3	100	0.8	V _{EE} +1.5 to V _{CC} -1.5	V _{EE} +1.5 to V _{CC} -1.5	110	5.0	5.0	-40 to +85	SSOP-B14	
BA4584RF/RFV		±2 to ±9.5	11.0									-40 to +105	SOP14/SSOP-B14	
LM4559F/FJ/FV/FVT/FVM/FVJ	2	±4 to ±18	3.3	0.5	40	0.7	V _{EE} +2.0 to V _{CC} -2.0	V _{EE} +1.5 to V _{CC} -1.5	110	3.5	4.0	-40 to +85	SOP8/SOP-J8/SSOP-B8/TSSOP-B8/MSOP8/TSSOP-B8J	
LM4565F/FJ/FV/FVT/FVM/FVJ	2	±4 to ±18	4.5	0.5	70	0.6	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	5.0	10.0	-40 to +85	SOP8/SOP-J8/SSOP-B8/TSSOP-B8/MSOP8/TSSOP-B8J	

Low Offset Voltage

Dual Power Supply Operational Amplifier															
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Source Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	CMRR (dB)	PSRR (dB)	Slew Rate (V/μs)	Gain Bandwidth Product (MHz)	Operating Temperature (°C)	Package
BA4564WV	4	±4 to ±15	6.0	0.5	50	25	V _{EE} +1.0 to V _{CC} -1.0	V _{EE} +1.0 to V _{CC} -1.0	100	90	90	4.0	4.0	-40 to +105	SSOP-B14
Input-Output Full Swing Operational Amplifier															
BD5291G	1	1.7 to 5.5	0.65	0.1	0.001	6	V _{SS} to V _{DD}	V _{SS} +0.1 to V _{DD} -0.1	110	90	90	2.5	3.2	-40 to +85	SSOP5

High Performance

Ground Sense Operational Amplifier															
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (μ V)	Input Bias Current (nA)	Output Source Current (mA)	Input Voltage (V)	Output Voltage (V)	Voltage Gain (dB)	CMRR (dB)	PSRR (dB)	Slew Rate (V/ μ s)	Gain Bandwidth Product (MHz)	Operating Temperature ($^{\circ}$ C)	Package
 LMR1802G-LB	1	2.5 to 5.5	1.1	5	0.0005	3.5	V_{SS} to $V_{DD}-1.0$	$V_{SS}+0.05$ to $V_{DD}-0.05$	140	105	125	1.1	3.0	-40 to +125	SSOP5

Comparators

Standard

Open-Collector Comparators												
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Voltage Gain (dB)	Response Time (μs)	Operating Temperature (°C)	Package	
BA2901F/FV	4	2 to 36	0.8	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP14/SSOP-B14	
BA2901SF/SFV	4	2 to 36	0.8	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +105	SOP14/SSOP-B14	
BA2901YF-LB	4	2 to 36	0.8	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP14	
BA2903F/FV/FVM	2	2 to 36	0.6	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP8/SSOP-B8/MSOP8	
BA2903SF/SFV/SFVM	2	2 to 36	0.6	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +105	SOP8/SSOP-B8/MSOP8	
BA2903YF-LB	2	2 to 36	0.6	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP8	
BA8391G	1	2 to 36	0.3	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +85	SSOP5	
LM2901F/FJ/FV/FVJ	4	3 to 32	1.2	1	50	16	V _{EE} to V _{CC} −1.5	120	1.0	−40 to +125	SOP14/SOP-J14/SSOP-B14/ TSSOP-B14J	
LM2903F/FJ/FV/FVJ/ FVM/FVT	2	3 to 32	0.6	1	50	16	V _{EE} to V _{CC} −1.5	120	1.0	−40 to +125	SOP8/SOP-J8/SSOP-B8/ TSSOP-B8J/MSOP8/ TSSOP-B8	
LM339F/FJ/FV/FVJ	4	3 to 32	1.2	1	50	16	V _{EE} to V _{CC} −1.5	120	1.0	−40 to +85	SOP14/SOP-J14/SSOP-B14/ TSSOP-B14J	
LM393F/FJ/FV/FVJ/ FVM/FVT	2	3 to 32	0.6	1	50	16	V _{EE} to V _{CC} −1.5	120	1.0	−40 to +85	SOP8/SOP-J8/SSOP-B8/ TSSOP-B8J/MSOP8/ TSSOP-B8	
Automotive Open-Collector Comparators												
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Voltage Gain (dB)	Response Time (μs)	Operating Temperature (°C)	Package	
BA2903YF-C/YFV-C/ YFVM-C	2	2 to 36	0.6	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP8/SSOP-B8/MSOP8	
BA2901YF-C/YFV-C	4	2 to 36	0.8	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP14/SSOP-B14	
BA2903YF-M/YFV-M/ YFVM-M	2	2 to 36	0.6	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP8/SSOP-B8/MSOP8	
BA2901YF-M/YFV-M	4	2 to 36	0.8	2	50	16	V _{EE} to V _{CC} −1.5	100	1.3	−40 to +125	SOP14/SSOP-B14	
Automotive High EMI Tolerance Open-Collector Comparators												
Part No.	ch	Supply Voltage (V)	Circuit Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Voltage Gain (dB)	Response Time (μs)	Operating Temperature (°C)	Package	Automotive Grade AEC-Q100
BA82903YF-C	2	2 to 36	0.6	2	50	16	V _{EE} −0.3 to V _{CC} −1.5	100	1.3	−40 to +125	SOP8	YES
BA82903YFVM-C			0.6								MSOP8	YES
BA82901YF-C	4	2 to 36	0.8								SOP14	YES
BA82901YFV-C			0.8								SSOP-B14	YES

High Speed

Push Pull Comparators											
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Voltage Gain (dB)	Response Time (μs)	Operating Temperature (°C)	Package
BU7251G	1	1.8 to 5.5	15	1	0.001	6	V _{SS} to V _{DD}	90	0.55	-40 to +85	SSOP5
BU7251SG										-40 to +105	SSOP5
BU7252F/FVM	2	1.8 to 5.5	35	1	0.001	6	V _{SS} to V _{DD}	90	0.55	-40 to +85	SOP8/MSOP8
BU7252SF/SFVM										-40 to +105	SOP8/MSOP8
BU5265HFV	1	1.8 to 5.5	22	1	0.001	3.5	V _{SS} to V _{DD}	90	0.5	-40 to +85	HVSOF5
BU5265SHFV										-40 to +105	HVSOF5
Open-Drain Comparators											
BU7250G	1	1.8 to 5.5	15	1	0.001	6	V _{SS} to V _{DD}	90	0.75	-40 to +85	SSOP5
BU7250SG										-40 to +105	SSOP5
BU7253F	2	1.8 to 5.5	35	1	0.001	6	V _{SS} to V _{DD}	90	0.75	-40 to +85	SOP8
BU7253SF										-40 to +105	SOP8

Low Power Comparaors

Low Power Comparators											
Part No.	ch	Supply Voltage (V)	Circuit Current (μA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Output Current (mA)	Input Voltage (V)	Voltage Gain (dB)	Response Time (μs)	Operating Temperature (°C)	Package
BU7231G	1	1.8 to 5.5	5	1	0.001	6	V _{SS} to V _{DD}	90	1.7	−40 to +85	SSOP5
BU7231SG										−40 to +105	SSOP5
BU7232F/FVM	2	1.8 to 5.5	10	1	0.001	6	V _{SS} to V _{DD}	90	1.7	−40 to +85	SOP8/MSOP8
BU7232SF/SFVM										−40 to +105	SOP8/MSOP8
BU5255HFV	1	1.8 to 5.5	6.5	1	0.001	3.5	V _{SS} to V _{DD}	90	1.6	−40 to +85	HVSOF5
BU5255SHFV										−40 to +105	HVSOF5
Automotive Push Pull Comparator											
☆BU7232YFVM-C	2	1.8 to 5.5	10	1	0.001	7	V _{SS} to V _{DD}	100	1.7	−40 to +125	MSOP8
Open-Drain Comparators											
BU7230G	1	1.8 to 5.5	5	1	0.001	6	V _{SS} to V _{DD}	90	1.8	−40 to +85	SSOP5
BU7230SG										−40 to +105	SSOP5
BU7233F	2	1.8 to 5.5	10	1	0.001	6	V _{SS} to V _{DD}	90	1.8	−40 to +85	SOP8
BU7233SF										−40 to +105	SOP8
Automotive Open Drain Comparator											
BU7233YF-C	2	1.8 to 5.5	10	1	0.001	7	V _{SS} to V _{DD}	100	1.8	−40 to +125	SOP8

☆:Under Development

Transistor Arrays

Darlington Transistor Arrays

Open Collectors											
Part No.	Number of bits	Output Resistance (V)	Output Saturation Voltage(V)	Output Current (mA)	Input Resistance (kΩ)	Input/Output Relation	Input Active Level	Output Current Relation	Circuit Construction	Features	Package
BA12003DF-Z	7	60	1.46*	500	2.7	Inverting type	H	Sink	Darlington	Built-in surge absorbing diode	SOP-J16A
BA12004DF-Z	7	60	1.46*	500	10.5	Inverting type	H	Sink	Darlington	Built-in surge absorbing diode	SOP-J16A

* Output Current=350mA

Voltage Detectors (Reset ICs)

Voltage Detectors (Reset ICs)

General Purpose CMOS Voltage Detector ICs																	
Part No.	Types	Voltage Detection Precision (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (V)	*L*Output Current (mA)		Package					
							ON	OFF		V _{DD} =1.2V	V _{DD} =2.4V						
BD48ExxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1	Open Drain	0.60 (V _S =4.8V)	0.85 (V _S =4.8V)	V _S ×0.05	1	4	SSOP5					
BD48xxFVE series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1							VSO5					
BD48KxxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1							SSOP3(GND 1pin)					
BD48LxxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1							SSOP3(GND 3pin)					
BD49ExxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1	CMOS						0.60 (V _S =4.8V)	0.85 (V _S =4.8V)	V _S ×0.05	1	4	SSOP5
BD49xxFVE series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1												VSO5
BD49KxxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1												SSOP3(GND 1pin)
BD49LxxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.0	0.1												SSOP3(GND 3pin)

Detection voltage (from 2.3V to 6.0V as 0.1V step) is applied in the xx of part No. Ex. : For 2.3V detection voltage in BD48ExxG series, Part No. is BD48E23G.

Voltage Detector ICs (Low Voltage Detection type)																	
Part No.	Types	Voltage Detection Precision Ta=+25°C (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (V)	*L*Output Current (mA)		Package					
							ON	OFF		VDD=1.2V	VDD=2.4V						
BU48xxG series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1	Open Drain	0.40 (VDET= 4.8V)	0.55 (VDET= 4.8V)	VDET×0.05	3.3	6.5	SSOP5					
BU48xxFVE series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							VSO5					
BU48xxF series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1	CMOS						SOP4					
BU49xxG series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							SSOP5					
BU49xxFVE series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							VSO5					
BU49xxF series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							SOP4					

Bipolar Voltage Detector ICs											
Part No.	Types	Voltage Detection Precision Ta=+25°C (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (mV)	*L*Output Current (mA)	Package
							I _{COL}	I _{CH}			
BD47xxG series	0.1V step 28 types	±1	1.9 to 4.6	0.85 to 10.00	0.1	Open Collector	1.5	1.6	50	15	SSOP5

Voltage Detector ICs (Low Voltage Detection type): Detection voltage (from 0.9V to 4.8V as 0.1V step) is applied in the xx of part No. Ex. : For 2.3V detection voltage in BU48xxG series, Part No. is BU4823G.

Bipolar Voltage Detector ICs Detection voltage (from 1.9V to 4.6V as 0.1V step) is applied in the xx of part No. Ex. : For 2.3V detection voltage in BD47xxG series, Part No. is BD4723G.

Overvoltage Detection type (Reset ICs)

Over Voltage Detector ICs										
Part No.	Voltage Detection Precision Ta=+25°C (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (mV)	"L" Output Current (mA)	Package
						IcCL	IcCH			
BD71L4LG-1	±0.8	4.05	1.2 to 7.0	—	Open Drain	0.6	0.7	30	4 (VDD=4.25V)	SSOP5
BD71L4LHFV-1	±0.8	4.05	1.2 to 7.0	—					4 (VDD=4.25V)	HVSOF5
 BD71L3SHFV	±1.0	3.83	1.2 to 7.0	—					4 (VDD=4.03V)	HVSOF5

Voltage Detectors with Adjustable Delay Time

Variable Delay Time Voltage Detectors																			
Part No.	Types	Voltage Detection Precision Ta=+25°C (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (V)	*L*Output Current (mA)		Reset Active Timeout Period (ms)	Delay Circuit Resistance (MΩ)	Package					
							ON	OFF		V _{DD} =1.2V	V _{DD} =2.4V								
BD52ExxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.00	0.1	Open Drain	0.90 (V _{DET} =4.8V)	0.85 (V _{DET} =4.8V)	V _{DET} ×0.05	1.2	5.0	Variable	9	SSOP5					
BD52xxFVE series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.00	0.1							Variable	9	VSO5					
BD53ExxG series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.00	0.1	CMOS						Variable	9	SSOP5					
BD53xxFVE series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.00	0.1							Variable	9	VSO5					
Variable Delay Time Voltage Detectors (Low Voltage Detection type)																			
BU42xxG series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1	Open Drain	0.40 (V _{DET} =4.8V)	0.55 (V _{DET} =4.8V)	V _{DET} ×0.05	3.3	6.5	Variable	10	SSOP5					
BU42xxFVE series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							Variable	10	VSO5					
BU42xxF series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1	CMOS						Variable	10	SOP4					
BU43xxG series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							Variable	10	SSOP5					
BU43xxFVE series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							Variable	10	VSO5					
BU43xxF series	0.1V step 40 types	±1	0.9 to 4.8	0.7 to 7.0	0.1							Variable	10	SOP4					

Variable Delay Time Voltage Detector: Detection voltage is inserted in the "xx" of the part No. (in 0.1V steps from 2.3V to 6.0V). Ex. : For 2.3V detection voltage in BD52ExxG series, Part No. is BD52E23G.

Variable Delay Time Voltage Detector (Low Voltage Detection type): Detection voltage is inserted in the "xx" of the part No. (in 0.1V steps from 0.9V to 4.8V). Ex. : For 2.3V detection voltage in BU42xxG series, Part No. is BU4223G.

Fixed Delay Time Voltage Detectors

Fixed Delay Time Voltage Detectors (Open Drain Output type)														
Part No.	Types	Voltage Detection Precision (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (V)	*L*Output Current (mA)		Delay Time (ms)	Manual Reset PIN	Package
							ON	OFF		V _{DD} =1.2V	V _{DD} =2.4V			
BD45xx5G series	0.1V step 26 types	±1	2.3 to 4.8	0.95 to 10.00	0.1	Open Drain	0.80 (V _{DET} =4.8V)	0.85 (V _{DET} =4.8V)	V _{DET} ×0.05	1.2	5.0	50	Available	SSOP5
BD45xx1G series	0.1V step 26 types	±1	2.3 to 4.8	0.95 to 10.00	0.1							100	Available	SSOP5
BD45xx2G series	0.1V step 26 types	±1	2.3 to 4.8	0.95 to 10.00	0.1							200	Available	SSOP5
BU45Kxx2G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1		2.3 (V _{DET} =4.8V)	2.8 (V _{DET} =4.8V)				200	Unavailable	SSOP3(GND 1pin)
BU45Lxx2G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1							200	Unavailable	SSOP3(GND 3pin)
BU45Kxx4G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1							400	Unavailable	SSOP3(GND 1pin)
BU45Lxx4G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1							400	Unavailable	SSOP3(GND 3pin)

Detection voltage is inserted in the "xx" of the part No. (in 0.1V steps from 2.3V to 4.8V). Ex. : For 2.3V detection voltage in BD45xx5G series, Part No. is BD45235G.

Fixed Delay Time Voltage Detectors (CMOS Output type)														
Part No.	Types	Voltage Detection Precision (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current(μA)		Hysteresis Voltage (V)	*L*Output Current (mA)		Delay Time (ms)	Manual Reset PIN	Package
							ON	OFF		V _{DD} =1.2V	V _{DD} =2.4V			
BD46xx5G series	0.1V step 26 types	±1	2.3 to 4.8	0.95 to 10.00	0.1	CMOS	0.80 (V _{DET} =4.8V)	0.85 (V _{DET} =4.8V)	V _{DET} ×0.05	1.2	5.0	50	Available	SSOP5
BD46xx1G series	0.1V step 26 types	±1	2.3 to 4.8	0.95 to 10.00	0.1							100	Available	SSOP5
BD46xx2G series	0.1V step 26 types	±1	2.3 to 4.8	0.95 to 10.00	0.1							200	Available	SSOP5
BU46Kxx2G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1		2.3 (V _{DET} =4.8V)	2.8 (V _{DET} =4.8V)				200	Unavailable	SSOP3(GND 1pin)
BU46Lxx2G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1							200	Unavailable	SSOP3(GND 3pin)
BU46Kxx4G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1							400	Unavailable	SSOP3(GND 1pin)
BU46Lxx4G series	0.1V step 26 types	±1	2.3 to 4.8	0.6 to 10.0	0.1							400	Unavailable	SSOP3(GND 3pin)

Detection voltage is inserted in the "xx" of the part No. (in 0.1V steps from 2.3V to 4.8V). Ex. : For 2.3V detection voltage in BD46xx5G series, Part No. is BD46235G.

Automotive Voltage Detectors

105°C Operation																
Part No.	Types	Voltage Detection Precision Ta= +25°C (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current (μA)		Hysteresis Voltage (V)	*L*Output Current (mA)		Reset Active Timeout Period (ms)	Delay Circuit Resistance (MΩ)	Manual Reset PIN	Package	Automotive Grade AEC-Q100
							ON	OFF		V _{DD} =1.2V	V _{DD} =2.4V					
BD48ExxG-M series	0.1V step 38 types	±1	2.3 to 6.0	0.95 to 10.00	0.1	Open Drain	0.60 (V _S = 4.8V)	0.85 (V _S = 4.8V)	V _S ×0.05	1.0	4	—	—	Unavailable	SSOP5	YES
BD49ExxG-M series	0.1V step 38 types		2.3 to 6.0	0.95 to 10.00	0.1	CMOS				1.0	4	—	—	Unavailable	SSOP5	YES
BD45Exx5G-M series	0.1V step 26 types		2.3 to 4.8	0.95 to 10.00	0.1	Open Drain	0.80 (V _{DET} = 4.8V)	0.85 (V _{DET} = 4.8V)	V _{DET} ×0.05	1.2	5	50	—	Available	SSOP5	YES
BD45Exx1G-M series	0.1V step 26 types		2.3 to 4.8	0.95 to 10.00	0.1							100	—	Available	SSOP5	YES
BD45Exx2G-M series	0.1V step 26 types		2.3 to 4.8	0.95 to 10.00	0.1							200	—	Available	SSOP5	YES
BD46Exx5G-M series	0.1V step 26 types		2.3 to 4.8	0.95 to 10.00	0.1	CMOS						50	—	Available	SSOP5	YES
BD46Exx1G-M series	0.1V step 26 types		2.3 to 4.8	0.95 to 10.00	0.1							100	—	Available	SSOP5	YES
BD46Exx2G-M series	0.1V step 26 types		2.3 to 4.8	0.95 to 10.00	0.1							200	—	Available	SSOP5	YES
BD52xxG-2M series	0.1V step 42 types	±2.5 (Full Temperature Range)	0.9 to 5.0	0.8 to 6.0	0.1	Open Drain	0.23	0.27	V _{DET} ×0.05	1.0mA or more	2.0mA or more	Variable	±30% (Full Temperature Range)	Unavailable	SSOP5	YES
BD53xxG-2M series	0.1V step 42 types		0.9 to 5.0	0.8 to 6.0	0.1	CMOS						Variable	Unavailable	SSOP5	YES	
125°C Operation																
Part No.	Types	Voltage Detection Precision Within The Full Temperature Range (%)	Detection Voltage (V)	Reset Active Voltage (V)	Detection Step (V)	Output Method	Circuit Current (μA)		Hysteresis Voltage (V)	*L*Output Current		Reset Active Timeout Period (ms)	Delay Time Precision (%)	Manual Reset PIN	Package	Automotive Grade AEC-Q100
							ON	OFF		V _{DD} =1.2V	V _{DD} =2.4V					
BD52xxG-2C series	0.1V step 42 types	±3	0.9 to 5.0	0.8 to 6.0	0.1	Open Drain	0.23	0.27	V _{DET} ×0.05	1.0mA or more	2.0mA or more	Variable	±50 (Full Temperature Range)	Unavailable	SSOP5	YES
BD53xxG-2C series	0.1V step 42 types		0.9 to 5.0	0.8 to 6.0	0.1	CMOS						Variable		Unavailable	SSOP5	YES
BD52xxNVX-2C series	0.1V step 6 types	±2.5	2.6 to 3.1	0.8 to 6.0	0.1	Open Drain	0.27	0.3	—	1.0mA or more	2.0mA or more	Variable	—	Unavailable	SSON004R1010	YES
BD70HxxG-2C series	0.1V step 4 types	±1.4	3.46 to 3.76	0.8 to 6.0	0.1							—		Unavailable	SSOP5	YES
BD73HxxG-2C series	0.1V step 4 types		3.46 to 3.76	0.8 to 6.0	0.1							CMOS		—	Unavailable	SSOP5

Voltage Detectors: Detection voltage is inserted in the "xx" of the part No. Ex. : For 2.3V detection voltage in BD48ExxG-M series, Part No. is BD48E23G-M.

Voltage Detectors (Reset ICs)

Others

Voltage Detectors with Watchdog Timer													
Part No.	Voltage Detection Precision (%)	Detection Voltage (V)	Reset Active Voltage (V)	Output Method	Circuit Current(μA)	Hysteresis Voltage (V)	*L*Output Current (mA)		Reset Active Timeout Period (ms)	Delay Circuit Resistance (MΩ)	WDT Operating Voltage (V)	INH Mode (Allowed)	Package
					ON		V _{DD} =1.2V	V _{DS} =0.5V					
BD37A19FVM	±1.5	1.9	1.0 to 10.0	Open Drain	5	V _{DET} ×0.13	0.7	Variable	10	2.5 to 10.0		H	MSOP8
BD37A41FVM	±1.5	4.1	1.0 to 10.0			V _{DET} ×0.035						H	MSOP8
BD87A28FVM	±1.5	2.8	1.0 to 10.0			V _{DET} ×0.045						L	MSOP8
BD87A29FVM	±1.5	2.9	1.0 to 10.0			V _{DET} ×0.05						L	MSOP8
BD87A34FVM	±1.5	3.4	1.0 to 10.0									L	MSOP8
BD87A41FVM	±1.5	4.1	1.0 to 10.0									L	MSOP8
BD99A41F	±1.5	4.1	1.0 to 10.0			V _{DET} ×0.035						H	SOP8
Complex type (2ch Reset+Comparator) Voltage Detector													
Part No.	Voltage Detection Precision (%)	Detection Voltage (V)	Output Method	Circuit Current (μA) At V _{SB} =5V	Hysteresis Voltage (mV)	Reset Active Timeout Period (ms)	Input Voltage (V)		Package				
BD3775AF	±1.5	1.23	Open Collector + Rated Current Pull-Up	350	28	Variable	3.5 to 18.0		SOP8				

A/D Converter

12bit

12bit								
Part No.	Supply Voltage (V)	ch	Analog Input type	Sampling Frequency (SPS)	Interface	Differential Nonlinear Error (LSB)	Integrated Nonlinear Error (LSB)	Package
BU1S12S1AG-LB	2.70 to 5.25	1	Single End	0.5M to 1.0M	SPI	−0.9Min./+1.0Max.	−1.1Min./+1.0Max.	SSOP6

TN/STN LCD Driver series

LCD Segment Drivers

Low Duty LCD Segment Drivers																
Part No.	Display (dots)	Outputs		Operating Voltage (V)		Operating Temperature (°C)	Duty	Bias	I/F	EVR	GPO	Independent Blink	LED Drivers (port)	PWM Gen.	Keyscan	Package
		seg.	com.	I/F(V _{cc})	LCD(VLCD)											
BU97941FV-LB	104	26	4	1.8 to 3.6	2.7 to 5.5	−40 to +85	1/4,1/3, Static	1/3	3wire	—	—	—	4	—	—	SSOP-B40
BU9795AFV-LB	108	27	4	2.5 to 5.5		−40 to +85	1/4	1/3,1/2	3wire	—	—	—	—	—	—	SSOP-B40
BU97931FV-LB	112	28	4	1.8 to 3.6	2.7 to 5.5	−40 to +85	1/4,1/3, Static	1/3	3wire	✓	5port	✓	1	1ch 8bit	—	SSOP-B40

ML62Q1000 series

(LAPIS Semiconductor Products)

Standard type 1300 Group 16bit Microcontrollers															
Part No.	Operating Voltage (V)	Operating Conditions				Current Consumption (Typ. @HALT)	Operating Temperature (C)	ROM/RAM				LCD Drivers	Package	Chip Support	Halogen Free Support
		Operating Frequency(Max.)		Minimum Instruction Execution Time	ROM type			ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)					
		Low Speed Clock	High Speed Clock												
☆ML62Q1323	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓	
☆ML62Q1324	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓	
☆ML62Q1325	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓	
☆ML62Q1333	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓	
☆ML62Q1334	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓	
☆ML62Q1335	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓	
W ML62Q1345	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	4K	—	P-WQFN24-0404-0.50	—	✓	
W ML62Q1346	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	48K	2K	4K	—	P-WQFN24-0404-0.50	—	✓	
W ML62Q1347	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	64K	2K	4K	—	P-WQFN24-0404-0.50	—	✓	
W ML62Q1365	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	4K	—	P-TQFP32-0707-0.80 P-WQFN32-0505-0.50	—	✓	
W ML62Q1366	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	48K	2K	4K	—	P-TQFP32-0707-0.80 P-WQFN32-0505-0.50	—	✓	
W ML62Q1367	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD)µA (Internal RC Oscillation)	-40 to +105	Flash	64K	2K	4K	—	P-TQFP32-0707-0.80 P-WQFN32-0505-0.50	—	✓	
Standard type 1500 Group 16bit Microcontrollers															
Part No.	Operating Voltage (V)	Operating Conditions				Current Consumption (Typ. @HALT)	Operating Temperature (C)	ROM/RAM				LCD Drivers	Package	Chip Support	Halogen Free Support
		Operating Frequency(Max.)		Minimum Instruction Execution Time	ROM type			ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)					
		Low Speed Clock	High Speed Clock												
W ML62Q1530	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	4K	8K	—	P-TQFP48-0707-0.50	—	✓	
W ML62Q1531	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	4K	8K	—	P-TQFP48-0707-0.50	—	✓	
W ML62Q1532	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	4K	8K	—	P-TQFP48-0707-0.50	—	✓	
W ML62Q1533	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	96K	4K	8K	—	P-TQFP48-0707-0.50	—	✓	
W ML62Q1534	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	128K	4K	8K	—	P-TQFP48-0707-0.50	—	✓	
W ML62Q1540	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	4K	8K	—	P-TQFP52-1010-0.65	—	✓	
W ML62Q1541	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	4K	8K	—	P-TQFP52-1010-0.65	—	✓	
W ML62Q1542	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	4K	8K	—	P-TQFP52-1010-0.65	—	✓	
W ML62Q1543	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	96K	4K	8K	—	P-TQFP52-1010-0.65	—	✓	
W ML62Q1544	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	128K	4K	8K	—	P-TQFP52-1010-0.65	—	✓	
W ML62Q1550	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	4K	8K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1551	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	4K	8K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1552	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	4K	8K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1553	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	96K	4K	8K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1554	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	128K	4K	8K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1555	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	160K	4K	16K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1556	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	192K	4K	16K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1557	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	256K	4K	16K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
☆ML62Q1558	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	384K	8K	32K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
☆ML62Q1559	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	512K	8K	32K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓	
W ML62Q1563	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	96K	4K	16K	—	P-QFP80-1414-0.65	—	✓	
W ML62Q1564	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	128K	4K	16K	—	P-QFP80-1414-0.65	—	✓	
W ML62Q1565	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	160K	4K	16K	—	P-QFP80-1414-0.65	—	✓	
W ML62Q1566	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	192K	4K	16K	—	P-QFP80-1414-0.65	—	✓	
W ML62Q1567	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	256K	4K	16K	—	P-QFP80-1414-0.65	—	✓	
☆ML62Q1568	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	384K	8K	32K	—	P-QFP80-1414-0.65	—	✓	
☆ML62Q1569	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	512K	8K	32K	—	P-QFP80-1414-0.65	—	✓	
W ML62Q1573	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	96K	4K	16K	—	P-QFP100-1420-0.65 P-TQFP100-1414-0.50	—	✓	
W ML62Q1574	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	128K	4K	16K	—	P-QFP100-1420-0.65 P-TQFP100-1414-0.50	—	✓	
W ML62Q1575	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	(TBD/TBD) (Internal RC/Crystal Oscillation)	-40 to +105	Flash	160K	4K	16K	—	P-QFP100-1420-0.65 P-TQFP100-1414-0.50	—	✓	

☆ : Under Development

ML62Q1000 series

(LAPIS Semiconductor Products)

Standard type 1200 Group 16bit Microcontrollers													
Part No.	Operating Voltage (V)	Operating Conditions			Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM/RAM			Functions/Features	Package	Chip Support	Halogen Free Support
		Operating Frequency(Max.)		Minimum Instruction Execution Time			ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)			
		Low Speed Clock	High Speed Clock										
ML62Q1223A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML62Q1224A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML62Q1225A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	2K	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML62Q1233A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	P-TSSOP20-0225-0.65	—	✓
ML62Q1234A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	P-TSSOP20-0225-0.65	—	✓
ML62Q1235A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	2K	P-TSSOP20-0225-0.65	—	✓
ML62Q1245A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	4K	P-WQFN24-0404-0.50	—	✓
ML62Q1246A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	48K	2K	4K	P-WQFN24-0404-0.50	—	✓
ML62Q1247A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	64K	2K	4K	P-WQFN24-0404-0.50	—	✓
ML62Q1265A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	4K	P-TQFP32-0707-0.80	—	✓
ML62Q1266A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	48K	2K	4K	P-TQFP32-0707-0.80	—	✓
ML62Q1267A*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	64K	2K	4K	P-TQFP32-0707-0.80	—	✓
ML62Q1223E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML62Q1224E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML62Q1225E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	2K	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML62Q1233E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	P-TSSOP20-0225-0.65	—	✓
ML62Q1234E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	P-TSSOP20-0225-0.65	—	✓
ML62Q1235E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	2K	P-TSSOP20-0225-0.65	—	✓
ML62Q1245E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	4K	P-WQFN24-0404-0.50	—	✓
ML62Q1246E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	48K	2K	4K	P-WQFN24-0404-0.50	—	✓
ML62Q1247E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	64K	2K	4K	P-WQFN24-0404-0.50	—	✓
ML62Q1265E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	32K	2K	4K	P-TQFP32-0707-0.80	—	✓
ML62Q1266E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	48K	2K	4K	P-TQFP32-0707-0.80	—	✓
ML62Q1267E*1	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	2.8µA (Internal RC Oscillation)	-40 to +105	Flash	64K	2K	4K	P-TQFP32-0707-0.80	—	✓
Standard type 1400 Group 16bit Microcontrollers													
Part No.	Operating Voltage (V)	Operating Conditions			Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM/RAM			Functions/Features	Package	Chip Support	Halogen Free Support
		Operating Frequency(Max.)		Minimum Instruction Execution Time			ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)			
		Low Speed Clock	High Speed Clock										
ML62Q1430*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	2K	4K	P-TQFP48-0707-0.50	—	✓
ML62Q1431*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	2K	4K	P-TQFP48-0707-0.50	—	✓
ML62Q1432*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	2K	4K	P-TQFP48-0707-0.50	—	✓
ML62Q1440*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	2K	4K	P-TQFP52-1010-0.65	—	✓
ML62Q1441*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	2K	4K	P-TQFP52-1010-0.65	—	✓
ML62Q1442*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	2K	4K	P-TQFP52-1010-0.65	—	✓
ML62Q1450*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	2K	4K	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML62Q1451*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	2K	4K	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML62Q1452*2	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	2K	4K	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓

*1 : For new development, use the ML62Q1300 Group.

*2 : For new development, use the ML62Q1500 Group.

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.



General Purpose 16bit Microcontrollers

ML62Q1000 series

(LAPIS Semiconductor Products)

Built-in LCD Driver Segment type 1600 Group 16bit Microcontrollers														
Part No.	Operating Voltage (V)	Operating Conditions				ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support	
		Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)				LCD Drivers
		Low Speed Clock	High Speed Clock											
ML62Q1600*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	2K	4K	Max. 192dot 24seg.x8com.	P-TQFP48-0707-0.50	—	✓
ML62Q1601*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	2K	4K	Max. 192dot 24seg.x8com.	P-TQFP48-0707-0.50	—	✓
ML62Q1602*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	2K	4K	Max. 192dot 24seg.x8com.	P-TQFP48-0707-0.50	—	✓
ML62Q1610*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	2K	4K	Max. 216dot 27seg.x8com.	P-TQFP52-1010-0.65	—	✓
ML62Q1611*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	2K	4K	Max. 216dot 27seg.x8com.	P-TQFP52-1010-0.65	—	✓
ML62Q1612*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	2K	4K	Max. 216dot 27seg.x8com.	P-TQFP52-1010-0.65	—	✓
ML62Q1620*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	32K	2K	4K	Max. 288dot 35seg.x8com.	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML62Q1621*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	48K	2K	4K	Max. 288dot 35seg.x8com.	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML62Q1622*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	24MHz (PLL Oscillation)	41ns 30.5µs	3.4/2.2µA (Internal RC/Crystal Oscillation)	-40 to +105	Flash	64K	2K	4K	Max. 288dot 35seg.x8com.	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓

* : For new development, use the ML62Q1700 Group.

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

High Temperature (85°C/105°C) Operation 8bit/16bit Microcontrollers

ML610Q100

(LAPIS Semiconductor Products)

Standard type 8bit Microcontrollers														
Part No.	Operating Conditions						ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock											
ML610Q101	2.7 to 5.5	32.768kHz (Built-In RC Oscillation)	8.192MHz	0.122µs/ 30.5µs	—	−40 to +85	Flash	4K	—	256	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML610Q102	2.7 to 5.5	32.768kHz (Built-In RC Oscillation)	8.192MHz	0.122µs/ 30.5µs	—	−40 to +85	Flash	6K	—	256	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML610Q111	2.7 to 5.5	32.768kHz (Built-In RC Oscillation)	8.192MHz	0.122µs/ 30.5µs	—	−40 to +105	Flash	24K	4K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML610Q112	2.7 to 5.5	32.768kHz (Built-In RC Oscillation)	8.192MHz	0.122µs/ 30.5µs	—	−40 to +105	Flash	32K	4K	4K	—	P-LQFP32-0707-0.80	—	✓

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

ML620Q100

(LAPIS Semiconductor Products)

Standard type 16bit Microcontrollers														
Part No.	Operating Conditions					ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support	
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)				LCD Drivers
		Low Speed Clock	High Speed Clock											
ML620Q131*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	8K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML620Q132*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML620Q133*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML620Q134*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	8K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML620Q135*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML620Q136*	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML620Q131B	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	8K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML620Q132B	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML620Q133B	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	—	P-SSOP16-0225-0.65 P-WQFN16-0404-0.50	—	✓
ML620Q134B	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	8K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML620Q135B	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	16K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML620Q136B	1.6 to 5.5	32.768kHz (Built-In RC Oscillation)	16MHz	62.5ns 30.5µs	3.5µA (Internal RC Oscillation)	-40 to +105	Flash	24K	2K	2K	—	P-TSSOP20-0225-0.65	—	✓
ML620Q151A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	8.192MHz	0.122µs/ 30.5µs	2.5µA (During Crystal Oscillation) 3.5µA (During Built-In RC Oscillation)	-40 to +105	Flash	32K	2K	2K	—	P-TQFP48-0707-0.50	—	✓
ML620Q152A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	8.192MHz	0.122µs/ 30.5µs	2.5µA (During Crystal Oscillation) 3.5µA (During Built-In RC Oscillation)	-40 to +105	Flash	48K	2K	2K	—	P-TQFP48-0707-0.50	—	✓
ML620Q153A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	8.192MHz	0.122µs/ 30.5µs	2.5µA (During Crystal Oscillation) 3.5µA (During Built-In RC Oscillation)	-40 to +105	Flash	64K	2K	2K	—	P-TQFP48-0707-0.50	—	✓
ML620Q154A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	8.192MHz	0.122µs/ 30.5µs	2.5µA (During Crystal Oscillation) 3.5µA (During Built-In RC Oscillation)	-40 to +105	Flash	32K	2K	2K	—	P-TQFP52-1010-0.65	—	✓
ML620Q155A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	8.192MHz	0.122µs/ 30.5µs	2.5µA (During Crystal Oscillation) 3.5µA (During Built-In RC Oscillation)	-40 to +105	Flash	48K	2K	2K	—	P-TQFP52-1010-0.65	—	✓
ML620Q156A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/Crystal Oscillation)	8.192MHz	0.122µs/ 30.5µs	2.5µA (During Crystal Oscillation) 3.5µA (During Built-In RC Oscillation)	-40 to +105	Flash	64K	2K	2K	—	P-TQFP52-1010-0.65	—	✓

* : For new development, see the B Version.

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

ML620Q100

(LAPIS Semiconductor Products)

Standard type 16bit Microcontrollers														
Part No.	Operating Conditions						ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock											
ML620Q157A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA (During Crystal Oscillation) 3.5μA (During Built-In RC Oscillation)	−40 to +105	Flash	32K	2K	2K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML620Q158A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA (During Crystal Oscillation) 3.5μA (During Built-In RC Oscillation)	−40 to +105	Flash	48K	2K	2K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML620Q159A*	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA (During Crystal Oscillation) 3.5μA (During Built-In RC Oscillation)	−40 to +105	Flash	64K	2K	2K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML620Q151B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	32K	2K	2K	—	P-TQFP48-0707-0.50	—	✓
ML620Q152B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	48K	2K	2K	—	P-TQFP48-0707-0.50	—	✓
ML620Q153B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	64K	2K	2K	—	P-TQFP48-0707-0.50	—	✓
ML620Q154B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	32K	2K	2K	—	P-TQFP52-1010-0.65	—	✓
ML620Q155B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	48K	2K	2K	—	P-TQFP52-1010-0.65	—	✓
ML620Q156B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	64K	2K	2K	—	P-TQFP52-1010-0.65	—	✓
ML620Q157B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	32K	2K	2K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML620Q158B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	48K	2K	2K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓
ML620Q159B	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.5μA(Crystal Oscillation) 3.5μA(Built-In RC Oscillation)	−40 to +105	Flash	64K	2K	2K	—	P-QFP64-1414-0.80 P-TQFP64-1010-0.50	—	✓

* : For new development, see the B Version.

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

Low Power Consumption 16bit Microcontrollers

ML620Q500

(LAPIS Semiconductor Products)

Standard type 16bit Microcontrollers														
Part No.	Operating Conditions						ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock											
ML620Q503H	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation/ External Input)	16MHz (Built-In RC Oscillation/ Crystal Oscillation/ External Input)	62.5ns 30.5μs	0.45μA (Crystal Oscillation)	−40 to +85	Flash	32K	2K	2K	—	P-TQFP48-0707-0.50	✓	✓
ML620Q504H	1.8 to 5.5	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation/ External Input)	16MHz (Built-In RC Oscillation/ Crystal Oscillation/ External Input)	62.5ns 30.5μs	0.45μA (Crystal Oscillation)	−40 to +85	Flash	64K	2K	6K	—	P-TQFP48-0707-0.50	✓	✓

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

USB/Security 32bit Microcontrollers

ML630Q400(ARM® Cortex-M0+)

(LAPIS Semiconductor Products)

Built-in LCD Driver Dot Matrix type 32bit Microcontrollers														
Part No.	Operating Conditions						ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock											
ML630Q464	1.8 to 3.6	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	16MHz (Built-In RC Oscillation) 24MHz(PLL)	41.7ns 30.5μs	0.8μA (Crystal Oscillation)	−40 to +85	Flash	64K	2K	8K	Max. 400dot 50seg.x8com.	P-TQFP100-1414-0.50	—	✓
ML630Q466	1.8 to 3.6	32.768kHz (Built-In RC Oscillation/ Crystal Oscillation)	16MHz (Built-In RC Oscillation) 24MHz(PLL)	41.7ns 30.5μs	0.8μA (Crystal Oscillation)	−40 to +85	Flash	128K	2K	16K	Max. 400dot 50seg.x8com.	P-TQFP100-1414-0.50	—	✓

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

Low Voltage Operation 8bit Microcontrollers

ML610400/ML610Q400

(LAPIS Semiconductor Products)

Standard type 8bit Microcontrollers														
Part No.	Operating Conditions						ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock											
ML610482P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	4.096MHz (Crystal Oscillation)	0.244μs/2μs/30.5μs	0.5μA	−40 to +85	Mask	64K	—	4K	—	—	✓	✓
ML610Q482P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	4.096MHz (Crystal Oscillation)	0.244μs/2μs/30.5μs	0.5μA	−40 to +85	Flash	64K	—	4K	—	P-TQFP48-0707-0.50	✓	✓
Built-in LCD Driver Dot Matrix type 8bit Microcontrollers														
ML610Q421P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	4.096MHz (Crystal Oscillation)	0.244μs/2μs/30.5μs	0.5μA	−40 to +85	Flash	32K	—	2K	Max. 400dot 50seg.x8com.	P-TQFP120-1414-0.40	✓	✓
ML610Q422P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	4.096MHz (Crystal Oscillation)	0.244μs/2μs/30.5μs	0.5μA	−40 to +85	Flash	32K	—	2K	Max. 800dot 50seg.x16com.	P-TQFP120-1414-0.40	✓	✓
ML610Q439P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	4.096MHz (Crystal Oscillation)	0.244μs/0.5μs/30.5μs	0.5μA	−40 to +85	Flash	128K	—	7K	Max. 1024dot 64seg.x16com.	P-LQFP144-2020-0.50	—	✓
Built-in LCD Driver Segment type 8bit Microcontrollers														
Part No.	Operating Conditions						ROM/RAM				Functions/Features	Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock											
ML610401P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	500kHz	2μs/30.5μs	0.9μA	−40 to +85	Mask	6K	—	192	Max. 55dot 11seg.x5com.	—	✓	✓
ML610402P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	500kHz	2μs/30.5μs	0.9μA	−40 to +85	Mask	6K	—	192	Max. 75dot 15seg.x5com.	—	✓	✓
ML610403P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	500kHz	2μs/30.5μs	0.9μA	−40 to +85	Mask	6K	—	192	Max. 95dot 19seg.x5com.	—	✓	✓
ML610404P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Mask	8K	—	256	Max. 105dot 21seg.x5com.	—	✓	✓
ML610405P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Mask	8K	—	256	Max. 125dot 25seg.x5com.	—	✓	✓
ML610406P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Mask	8K	—	256	Max. 145dot 29seg.x5com.	—	✓	✓
ML610407P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Mask	16K	—	1K	Max. 145dot 29seg.x5com.	—	✓	✓
ML610Q407P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Flash	16K	—	1K	Max. 145dot 29seg.x5com.	P-TQFP100-1414-0.50	✓	✓
ML610Q407PA	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Flash	16K	—	1K	Max. 145dot 29seg.x5com.	—	✓	✓
ML610408P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Mask	16K	—	1K	Max. 165dot 33seg.x5com.	—	✓	✓
ML610Q408P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Flash	16K	—	1K	Max. 165dot 33seg.x5com.	P-TQFP100-1414-0.50	✓	✓
ML610409P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Mask	16K	—	1K	Max. 185dot 37seg.x5com.	—	✓	✓
ML610Q409P	1.25 to 3.6	32.768kHz (Crystal Oscillation)	2MHz	0.5μs/30.5μs	0.9μA	−40 to +85	Flash	16K	—	1K	Max. 185dot 37seg.x5com.	P-TQFP100-1414-0.50	✓	✓
ML610Q411P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	500kHz	2μs/30.5μs	0.5μA	−40 to +85	Flash	16K	—	1K	Max. 144dot 36seg.x4com.	P-TQFP120-1414-0.40	✓	✓
ML610Q411PA	1.1 to 3.6	32.768kHz (Crystal Oscillation)	500kHz	2μs/30.5μs	0.5μA	−40 to +85	Flash	16K	—	1K	Max. 144dot 36seg.x4com.	P-TQFP120-1414-0.40	✓	✓
ML610Q412P	1.1 to 3.6	32.768kHz (Crystal Oscillation)	500kHz	2μs/30.5μs	0.5μA	−40 to +85	Flash	16K	—	1K	Max. 176dot 44seg.x4com.	P-TQFP120-1414-0.40	✓	✓

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.

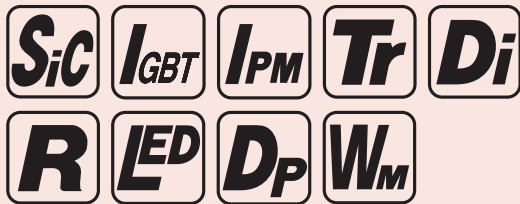
Voice Playback 8bit Microcontrollers

ML610Q300

(LAPIS Semiconductor Products)

Standard type 8bit Microcontrollers															
Part No.	Operating Conditions						ROM/RAM				Functions/Features		Package	Chip Support	Halogen Free Support
	Operating Voltage (V)	Operating Frequency(Max.)		Minimum Instruction Execution Time	Current Consumption (Typ.@HALT)	Operating Temperature (°C)	ROM type	ROM Capacity (Byte)	Data Flash Capacity (Byte)	Memory for Sound	RAM Capacity (Byte)	LCD Drivers			
		Low Speed Clock	High Speed Clock												
ML610Q304	2.0 to 5.5	32.768kHz (Built-in RC Oscillation)	8.192MHz	0.122μs/ 30.5μs	2.7μA	−40 to +85	Flash	96K	2K	Flash ROM	1K	—	P-VQFN28-0505-0.50 P-WQFN32-0505-0.50	—	✓
ML610Q359	2.2 to 3.6	32.768kHz (Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	1.7μA	−40 to +85	Flash	160K	3K	Flash ROM	2K	—	P-TQFP64-1010-0.50	—	✓
ML610Q360	2.2 to 3.6	32.768kHz (Crystal Oscillation)	8.192MHz	0.122μs/ 30.5μs	1.7μA	−40 to +85	Flash P2ROM	160K	3K	P2ROM: 16M bit	2K	—	P-TQFP64-1010-0.50	—	—

Halogen-free models are available for products with the halogen free compatible mark "✓". Please contact a sales representative for further details.



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SiC Schottky Barrier Diodes

SiC Schottky Barrier Diodes											
Part No.	Absolute Maximum Ratings (Ta=25°C)				Electrical Characteristics (Ta=25°C)				Package	Equivalent Circuit Diagram	Automotive Grade AEC-Q101
	V _{RM} (V)	V _R (V)	I _F (A)	I _{FSM} (A) 50Hz, 1ms	V _F (V) Typ.	I _F (A)	I _R (μA) Max.	V _R (V)			
SCS206AJ	650	650	6	22	1.35	6	120	600	TO-263AB (LPTL)		—
SCS208AJ	650	650	8	29	1.35	8	160	600			—
SCS210AJ	650	650	10	38	1.35	10	200	600			—
SCS212AJ	650	650	12	42	1.35	12	240	600			—
SCS215AJ	650	650	15	52	1.35	15	300	600			—
SCS220AJ	650	650	20	67	1.35	20	400	600			—
SCS206AJHR	650	650	6	22	1.35	6	120	600			YES
SCS208AJHR	650	650	8	29	1.35	8	160	600			YES
SCS210AJHR	650	650	10	38	1.35	10	200	600			YES
SCS212AJHR	650	650	12	42	1.35	12	240	600			YES
SCS215AJHR	650	650	15	52	1.35	15	300	600			YES
SCS220AJHR	650	650	20	67	1.35	20	400	600			YES
New SCS302AJ	650	650	2	19	1.35	2	10	650	TO-220AC		—
New SCS304AJ	650	650	4	27	1.35	4	20	650			—
New SCS306AJ	650	650	6	47	1.35	6	30	650			—
New SCS308AJ	650	650	8	67	1.35	8	40	650			—
New SCS310AJ	650	650	10	82	1.35	10	50	650			—
New SCS312AJ	650	650	12	96	1.35	12	60	650			—
New SCS315AJ	650	650	15	112	1.35	15	75	650			—
New SCS320AJ	650	650	20	123	1.35	20	100	650			—
SCS206AG	650	650	6	22	1.35	6	120	600			—
SCS208AG	650	650	8	29	1.35	8	160	600			—
SCS210AG	650	650	10	38	1.35	10	200	600			—
SCS212AG	650	650	12	42	1.35	12	240	600			—
SCS215AG	650	650	15	52	1.35	15	300	600			—
SCS220AG	650	650	20	67	1.35	20	400	600			—
SCS206AGHR	650	650	6	22	1.35	6	120	600			YES
SCS208AGHR	650	650	8	29	1.35	8	160	600			YES
SCS210AGHR	650	650	10	38	1.35	10	200	600			YES
SCS212AGHR	650	650	12	42	1.35	12	240	600			YES
SCS215AGHR	650	650	15	52	1.35	15	300	600			YES
SCS220AGHR	650	650	20	67	1.35	20	400	600			YES
New SCS302AHG	650	650	2	19	1	2	10	650	TO-220AC (TO-220ACP)		—
New SCS304AHG	650	650	4	27	1	4	20	650			—
New SCS306AHG	650	650	6	47	1	6	30	650			—
New SCS308AHG	650	650	8	67	1	8	40	650			—
New SCS310AHG	650	650	10	82	1	10	50	650			—
New SCS312AHG	650	650	12	96	1	12	60	650			—
New SCS315AHG	650	650	15	112	1	15	75	650			—
New SCS320AHG	650	650	20	123	1	20	100	650			—
SCS206AM	650	650	6	22	1.35	6	120	600	TO-220FM		—
SCS208AM	650	650	8	29	1.35	8	160	600			—
SCS210AM	650	650	10	38	1.35	10	200	600			—
SCS212AM	650	650	12	42	1.35	12	240	600			—
SCS215AM	650	650	15	52	1.35	15	300	600			—
SCS220AM	650	650	20	67	1.35	20	400	600			—
New SCS304AM	650	650	4	27	1	4	20	650			—
New SCS306AM	650	650	6	47	1	6	30	650			—
New SCS308AM	650	650	8	67	1	8	40	650			—
New SCS310AM	650	650	10	82	1	10	50	650			—
New SCS312AM	650	650	12	96	1	12	60	650			—
New SCS315AM	650	650	15	112	1	15	75	650			—
New SCS320AM	650	650	20	123	1	20	100	650			—

Note : Package is JEDEC code. () : ROHM Package.

SiC Schottky Barrier Diodes											
Part No.	Absolute Maximum Ratings (Ta=25°C)				Electrical Characteristics (Ta=25°C)				Package	Equivalent Circuit Diagram	Automotive Grade AEC-Q101
	V _{RM} (V)	V _R (V)	I _F (A)	I _{FSM} (A) 50Hz,1~	V _F (V) Typ.	I _R (μA) Max.					
						I _F (A)					
SCS215AE	650	650	15	52	1.35	15	300	600	TO-247		—
SCS220AE	650	650	20	67	1.35	20	400	600			—
SCS220AE2	650	650	10/20*1	38/76*1	1.35	10	200	600			—
SCS230AE2	650	650	15/30*1	52/104*1	1.35	15	300	600			—
SCS240AE2	650	650	20/40*1	67/135*1	1.35	20	400	600			—
SCS220AE2HR	650	650	10/20*1	38/76*1	1.35	10	200	600			YES
SCS230AE2HR	650	650	15/30*1	52/104*1	1.35	15	300	600			YES
SCS240AE2HR	650	650	20/40*1	67/135*1	1.35	20	400	600			YES
SCS205KG	1,200	1,200	5	22	1.4	5	100	1,200	TO-220AC		—
SCS210KG	1,200	1,200	10	42	1.4	10	200	1,200			—
SCS215KG	1,200	1,200	15	62	1.4	15	300	1,200			—
SCS220KG	1,200	1,200	20	78	1.4	20	400	1,200			—
SCS205KGHR	1,200	1,200	5	22	1.4	5	100	1,200			YES
SCS210KGHR	1,200	1,200	10	42	1.4	10	200	1,200			YES
SCS215KGHR	1,200	1,200	15	62	1.4	15	300	1,200			YES
SCS220KGHR	1,200	1,200	20	78	1.4	20	400	1,200			YES
SCS210KE2	1,200	1,200	5/10*1	22/45*1	1.4	5	100	1,200	TO-247		—
SCS220KE2	1,200	1,200	10/20*1	42/84*1	1.4	10	200	1,200			—
SCS230KE2	1,200	1,200	15/30*1	62/124*1	1.4	15	300	1,200			—
SCS240KE2	1,200	1,200	20/40*1	78/157*1	1.4	20	400	1,200			—
SCS210KE2HR	1,200	1,200	5/10*1	22/45*1	1.4	5	100	1,200			YES
SCS220KE2HR	1,200	1,200	10/20*1	42/84*1	1.4	10	200	1,200			YES

Note : Package is JEDEC code.

* 1 : (Per Leg/Package)

SiC MOSFETs

2nd Generation (Planar Structure)									
Part No.	Polarity (ch)	V _{DS} (V)	I _D (A)	P _D (W) (Tc=25°C)	R _{DS(on)} Typ.(mΩ)	Q _g Typ.(nC)		Package	Automotive Grade AEC-Q101
					V _{GS} =18V	V _{GS} =18V	Driving Voltage (V)		
SCT2120AF	N	650	29	165	120	61	18	TO-220AB	—
SCH2080KE	N	1,200	40	262	80	106	18	TO-247	—
SCT2080KE	N	1,200	40	262	80	106	18		—
SCT2160KE	N	1,200	22	165	160	62	18		—
SCT2280KE	N	1,200	14	108	280	35	18		—
SCT2450KE	N	1,200	10	85	450	27	18		—
SCT2750NY	N	1,700	5.9	57	750	17	18	TO-268-2L	—
SCT2H12NY	N	1,700	4	44	1,150	14	18		—
SCT2H12NZ	N	1,700	3.7	35	1,150	14	18	TO-3PFM	—
3rd Generation (Trench Structure)									
SCT3017AL	N	650	118	427	17	172	18	TO-247 (TO-247N)	—
SCT3022AL	N	650	93	339	22	133	18		—
SCT3030AL	N	650	70	262	30	104	18		—
SCT3060AL	N	650	39	165	60	58	18		—
SCT3080AL	N	650	30	134	80	48	18		—
SCT3120AL	N	650	21	103	120	38	18		—
SCT3022KL	N	1,200	95	427	22	178	18		—
SCT3030KL	N	1,200	72	339	30	131	18		—
SCT3040KL	N	1,200	55	262	40	107	18		—
SCT3080KL	N	1,200	31	165	80	60	18		—
New SCT3105KL	N	1,200	24	134	105	51	18		—
SCT3160KL	N	1,200	17	103	160	42	18		—

Note : Package is JEDEC code. () : ROHM Package.

Field Stop Trench IGBTs

Field Stop Trench IGBTs														
Part No.	V _{CES} (V)	I _C (A)		P _D (W)	V _{CE(sat)} Typ. (V)	I _C (A)	t _{sc} Min. (μsec.)	I _F (Diode)(A)		V _F (Diode) Typ. (V)	I _F (A)	Package	Internal Circuit Diagram	Automotive Grade AEC-Q101
		Tc=25°C	Tc=100°C					Tc=25°C	Tc=100°C					
RGTH40TS65	650	40	20	144	1.6	20	—	—	—	—	—	TO-247N		—
RGTH50TS65	650	50	25	174	1.6	25	—	—	—	—	—			—
RGTH60TS65	650	58	30	194	1.6	30	—	—	—	—	—			—
RGTH80TS65	650	70	40	234	1.6	40	—	—	—	—	—			—
RGTH00TS65	650	85	50	277	1.6	50	—	—	—	—	—			—
RGTH40TS65D	650	40	20	144	1.6	20	—	35	20	1.45	20			—
RGTH50TS65D	650	50	25	174	1.6	25	—	35	20	1.45	20			—
RGTH60TS65D	650	58	30	194	1.6	30	—	40	20	1.35	20			—
RGTH80TS65D	650	70	40	234	1.6	40	—	40	20	1.35	20			—
RGTH00TS65D	650	85	50	277	1.6	50	—	50	30	1.45	30			—
RGTH40TK65	650	23	14	56	1.6	20	—	—	—	—	—	TO-3PFM		—
RGTH50TK65	650	26	16	59	1.6	25	—	—	—	—	—			—
RGTH60TK65	650	28	17	61	1.6	30	—	—	—	—	—			—
RGTH80TK65	650	31	19	66	1.6	40	—	—	—	—	—			—
RGTH00TK65	650	35	21	72	1.6	50	—	—	—	—	—			—
RGTH40TK65D	650	23	14	56	1.6	20	—	26	15	1.45	20			—
RGTH50TK65D	650	26	16	59	1.6	25	—	26	15	1.45	20			—
RGTH60TK65D	650	28	17	61	1.6	30	—	28	16	1.35	20			—
RGTH80TK65D	650	31	19	66	1.6	40	—	28	16	1.35	20			—
RGTH00TK65D	650	35	21	72	1.6	50	—	34	19	1.45	30			—
New RGW60TS65	650	60	30	178	1.5	30	—	—	—	—	—	TO-247N		—
New RGW80TS65	650	78	40	214	1.5	40	—	—	—	—	—			—
New RGW00TS65	650	96	50	254	1.5	50	—	—	—	—	—			—
New RGW60TS65D	650	60	30	178	1.5	30	—	40	20	1.45	20			—
New RGW80TS65D	650	78	40	214	1.5	40	—	40	20	1.45	20			—
New RGW00TS65D	650	96	50	254	1.5	50	—	56	30	1.45	30			—
New RGW60TK65	650	33	20	72	1.5	30	—	—	—	—	—	TO-3PFM		—
New RGW80TK65	650	39	23	81	1.5	40	—	—	—	—	—			—
New RGW00TK65	650	45	26	89	1.5	50	—	—	—	—	—			—
New RGW60TK65D	650	33	20	72	1.5	30	—	27	16	1.45	20			—
New RGW80TK65D	650	39	23	81	1.5	40	—	27	16	1.45	20			—
New RGW80TK65E	650	39	23	81	1.5	40	—	46	26	1.45	50			—
New RGW00TK65D	650	45	26	89	1.5	50	—	34	19	1.45	30			—
RGCL60TS60	600	48	30	111	1.4	30	—	—	—	—	—	TO-247N		—
RGCL80TS60	600	65	40	148	1.4	40	—	—	—	—	—			—
RGCL60TS60D	600	48	30	111	1.4	30	—	35	20	1.45	20			—
RGCL80TS60D	600	65	40	148	1.4	40	—	35	20	1.45	20			—
RGCL60TK60	600	30	18	54	1.4	30	—	—	—	—	—	TO-3PFM		—
RGCL80TK60	600	35	21	57	1.4	40	—	—	—	—	—			—
RGCL60TK60D	600	30	18	54	1.4	30	—	26	15	1.45	20			—
RGCL80TK60D	600	35	21	57	1.4	40	—	26	15	1.45	20			—
New RGC80TSX8R	1,800	80	40	535	2.2	40	—	80	40	1.8	40	TO-247N		—

Note : Package is JEDEC code.

* : Built in Fast Recovery Diodes

Field Stop Trench IGBTs															
Part No.	V _{CES} (V)	I _C (A)		P _D (W)	V _{CE(sat)} Typ. (V)	I _C (A)	t _{sc} Min. (μsec.)	I _F (Diode)(A)		V _F (Diode) Typ. (V)		Package	Internal Circuit Diagram	Automotive Grade AEC-Q101	
		Tc=25°C	Tc=100°C					Tc=25°C	Tc=100°C	V _F (Diode) Typ. (V)	I _F (A)				
RGT8BM65D	650	8	4	62	1.65	4	5	7	4	1.45	4	TO-252		—	
RGT16BM65D	650	16	8	94	1.65	8	5	16	8	1.4	8			—	
RGT8NS65D	650	8	4	65	1.65	4	5	7	4	1.45	4	TO-263S (LPDS)/ TO-262		—	
RGT16NS65D	650	16	8	94	1.65	8	5	16	8	1.4	8			—	
RGT30NS65D	650	30	15	133	1.65	15	5	26	15	1.5	15			—	
RGT40NS65D	650	40	20	161	1.65	20	5	35	20	1.45	20			—	
RGT50NS65D	650	48	25	194	1.65	25	5	35	20	1.45	20			—	
RGT8NL65D	650	8	4	65	1.65	4	5	7	4	1.45	4	TO-263L (LPDL)		—	
RGT16NL65D	650	16	8	94	1.65	8	5	16	8	1.4	8			—	
RGT30NL65D	650	30	15	133	1.65	15	5	26	15	1.5	15			—	
RGT40NL65D	650	40	20	161	1.65	20	5	35	20	1.45	20			—	
RGT50NL65D	650	48	25	194	1.65	25	5	35	20	1.45	20			—	
RGT8TM65D	650	5	3	16	1.65	4	5	5	3	1.45	4	TO-220NFM		—	
RGT16TM65D	650	9	5	22	1.65	8	5	13	7	1.4	8			—	
RGT30TM65D	650	14	8	32	1.65	15	5	17	9	1.5	15			—	
RGT40TM65D	650	17	10	39	1.65	20	5	22	13	1.45	20			—	
RGT50TM65D	650	21	13	47	1.65	25	5	22	13	1.45	20			—	
RGT40TS65D	650	40	20	144	1.65	20	5	35	20	1.45	20	TO-247N		—	
RGT50TS65D	650	48	25	174	1.65	25	5	35	20	1.45	20			—	
RGT60TS65D	650	55	30	194	1.65	30	5	40	20	1.35	20			—	
RGT80TS65D	650	70	40	234	1.65	40	5	40	20	1.35	20			—	
RGT00TS65D	650	85	50	277	1.65	50	5	50	30	1.45	30			—	
 RGTV60TS65	650	60	30	194	1.5	30	2	—	—	—	—	TO-247N		—	
 RGTV00TS65	650	95	50	276	1.5	50	2	—	—	—	—			—	
 RGTVX6TS65	650	144	80	404	1.5	80	2	—	—	—	—			—	
 RGTV60TS65D	650	60	30	194	1.5	30	2	56	30	1.45	30			—	
 RGTV00TS65D	650	95	50	276	1.5	50	2	84	50	1.45	50			—	
 RGTV60TK65	650	33	20	76	1.5	30	2	—	—	—	—	TO-3PFM		—	
 RGTV00TK65	650	45	26	94	1.5	50	2	—	—	—	—			—	
 RGTV60TK65D	650	33	20	76	1.5	30	2	34	19	1.45	30		TO-247N		—
 RGTV00TK65D	650	45	26	94	1.5	50	2	46	26	1.45	50				—
RGS60TS65DHR	650	56	30	223	1.65	30	8	56	30	1.45	30	YES			
RGS80TS65DHR	650	73	40	272	1.65	40	8	56	30	1.45	30	YES			
RGS00TS65DHR	650	88	50	326	1.65	50	8	56	30	1.45	30	YES			
RGS00TS65EHR	650	88	50	326	1.65	50	8	84	50	1.45	50	YES			
☆ RGS50TSX2DHR	1,200	50	25	395	1.7	25	10	50	25	1.65	25			YES	
☆ RGS80TSX2DHR	1,200	80	40	535	1.75	40	10	80	40	1.75	40			YES	

Note : Package is JEDEC code. () : ROHM Package.

* Built-in Fast Recovery Diodes ☆ : Under Development

Ignition IGBTs

Ignition IGBTs									
Part No.	V _{CEs} (V)	V _{GES} (V)	I _c (A)	P _D (W)	E _{as} (mJ)	V _{CE(sat)} Typ. (V)	Package	Internal Circuit Diagram	Automotive Grade AEC-Q101
RGPZ10BM40FH	430±30	±10	20	107	250	1.6	TO-252		YES
☆ RGPZ30BM56HR	560±30	±10	30	166	300	1.4	TO-252		YES
RGPR10BM40FH	430±30	±10	20	107	250	1.6	TO-252		YES
☆ RGPR20BM36HR	360±30	±10	20	107	250	1.6	TO-252		YES
RGPR20NS43HR	430±30	±10	20	107	250	1.6	TO-263S(LPDS)		YES
☆ RGPR30BM56HR	560±30	±10	30	166	300	1.4	TO-252		YES
RGPR30BM40HR	400±30	±10	30	125	300	1.6	TO-252		YES
RGPR30NS40HR	400±30	±10	30	125	300	1.6	TO-263S(LPDS)		YES
☆ RGPR50NS45HR	450±30	±10	50	187	500	1.6	TO-263S(LPDS)		YES

Note : Package is JEDEC code. () : ROHM Package.

☆ : Under Development

Intelligent Power Modules

IGBT-IPMs								
Part No.	Power Devices	V _{CEs} (V)	I _c (A)	V _{CE(sat)} (V)	PWM Input Frequency (kHz)	Isolation Resistance*1 (Vrms)	Thermal Protection Function*2	Package
BM63363S-VA	IGBT	600	10	1.5	Up to 6	1,500	TSD	HSDIP25
BM63363S-VC	IGBT	600	10	1.5	Up to 6	1,500	TSD	HSDIP25VC
BM63563S-VA	IGBT	600	10	1.5	Up to 6	1,500	VOT	HSDIP25
BM63563S-VC	IGBT	600	10	1.5	Up to 6	1,500	VOT	HSDIP25VC
BM63763S-VA	IGBT	600	10	1.7	Up to 20	1,500	TSD	HSDIP25
BM63763S-VC	IGBT	600	10	1.7	Up to 20	1,500	TSD	HSDIP25VC
BM63963S-VA	IGBT	600	10	1.7	Up to 20	1,500	VOT	HSDIP25
BM63963S-VC	IGBT	600	10	1.7	Up to 20	1,500	VOT	HSDIP25VC
BM63364S-VA	IGBT	600	15	1.5	Up to 6	1,500	TSD	HSDIP25
BM63364S-VC	IGBT	600	15	1.5	Up to 6	1,500	TSD	HSDIP25VC
BM63564S-VA	IGBT	600	15	1.5	Up to 6	1,500	VOT	HSDIP25
BM63564S-VC	IGBT	600	15	1.5	Up to 6	1,500	VOT	HSDIP25VC
BM63764S-VA	IGBT	600	15	1.7	Up to 20	1,500	TSD	HSDIP25
BM63764S-VC	IGBT	600	15	1.7	Up to 20	1,500	TSD	HSDIP25VC
BM63964S-VA	IGBT	600	15	1.7	Up to 20	1,500	VOT	HSDIP25
BM63964S-VC	IGBT	600	15	1.7	Up to 20	1,500	VOT	HSDIP25VC
BM63767S-VA	IGBT	600	30	1.7	Up to 20	1,500	TSD	HSDIP25
BM63767S-VC	IGBT	600	30	1.7	Up to 20	1,500	TSD	HSDIP25VC
BM63967S-VA	IGBT	600	30	1.7	Up to 20	1,500	VOT	HSDIP25
BM63967S-VC	IGBT	600	30	1.7	Up to 20	1,500	VOT	HSDIP25VC
MOS-IPMs								
Part No.	Power Devices	V _{DSS} (V)	I _c (A)	R _{on} (mΩ)	Recommended Switching Frequency (kHz)	Isolation Resistance*1 (Vrms)	Thermal Protection Function*2	Package
BM65364S-VA	MOSFET	600	15	120	Up to 20	1,500	TSD	HSDIP25
BM65364S-VC	MOSFET	600	15	120	Up to 20	1,500	TSD	HSDIP25VC

*1 AC60Hz, 1min., convex heat sink use enables 2,500Vrms compatibility

*2 TSD : Thermal Shut Down, VOT : Analog Temperature Output



Power MOSFETs

● Quick Reference for Power MOSFETs series

Single type <Nch>



V_{DS} (V)	1	2	3	4	5	6	7	8	9	10	20	30	40	50
30			(3A) SOT-89(MPT3)[SC-62]				(6A) DFN2020-8S(HUML2020L8)Single					(15A) (HSMT8)	(39A)	
40							DFN2020-8S(HUML2020L8)Single		(9A)			(HSMT8) (27A)	(39A)	
60		(2A) SOT-89(MPT3)[SC-62]					(5.5A) DFN2020-8S(HUML2020L8)Single					(13A) (HSMT8)	(30A)	
100												(HSMT8) (36A)		

Dual type <Nch+Nch>

V_{DS} (V)	1	2	3	4	5	6	7	8	9	10	20	30	40	50
30/30						(5.5A) DFN2020-8D(HUML2020L8)Dual								
60/60			(3A) DFN2020-8D(HUML2020L8)Dual											

Single type <Pch>

V_{DS} (V)	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-20	-30	-40	-50
-20										(-10A) DFN2020-8S(HUML2020L8)Single		(-30A) (HSMT8)		
-30							(-7.5A) DFN2020-8S(HUML2020L8)Single					(-18A) (HSMT8)	(-39A)	

Dual type <Pch+Pch>

V_{DS} (V)	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
-20/-20					(-5A) DFN2020-8D(HUML2020L8)Dual					
-30/-30				(-4A) DFN2020-8D(HUML2020L8)Dual						

Dual type <Nch+Pch>

V_{DS} (V)	1	2	3	4	5	6	7	8	9	10	20	30	40	50
20/-20					(5A 5.5A) DFN2020-8D(HUML2020L8)Dual									
30/-30				(4A) DFN2020-8D(HUML2020L8)Dual										

Note : Package is JEDEC code. () : ROHM Package, [] : JEITA Code.



Power MOSFETs

●(SOP8) Single/Dual type Quick Reference

Single type <Nch>

(SOP8)
Single

(SOP8)
Dual

V _{DSS} (V)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
30							7A			(SOP8)Single			13.5A					
45							7A		(SOP8)Single									
60					4.5A					(SOP8)Single				14A				

Dual type <Nch+Nch>

V _{DSS} (V)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
30/30				3.5A						(SOP8)Dual					15A			
40/40						5.2A, 6A				(SOP8)Dual								
60/60					4.5A					(SOP8)Dual				13A				
80/80				3.4A						(SOP8)Dual								
100/100				3A						(SOP8)Dual								

Single type <Pch>

V _{DSS} (V)	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18
-30				4A						(SOP8)Single								18A
-45								7A		(SOP8)Single								

Dual type <Pch+Pch>

V _{DSS} (V)	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18
-30/-30					-4.5A					(SOP8)Dual					-9A			
-60/-60					-4.5A					(SOP8)Dual								

Dual type <Nch+Pch>

V _{DSS} (V)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
30/-30					4.5A					(SOP8)Dual					9A			
45/-45				3.5A, 4.5A						(SOP8)Dual								
60/-60					4.5A					(SOP8)Dual								
80/-80				2.6A, 3.4A						(SOP8)Dual								
100/-100				2.5A, 3A						(SOP8)Dual								

Note : () : ROHM Package.

●(HSOP8) Single type

Single type <Nch>

(HSOP8)
Single

V _{DSS} (V)	Features	10	20	30	40	50	60	70	80
30	Switching				35A		(HSOP8)Single		80A
40					34A		(HSOP8)Single		80A
60					36A		(HSOP8)Single	68A	
100							60A	(HSOP8)Single	

Single type <Pch>

V _{DSS} (V)	Features	-10	-20	-30	-40	-50	-60	-70	-80
-30	Switching							(HSOP8)Single	76A, 80A

Note : () : ROHM Package.

●(HSOP8) Dual type

Dual type <Nch+Nch>

(HSOP8)
Dual

V _{DSS} (V)	Features	10	20	30	40	50	60	70	80
30/30	Switching	14A							80A
				27A					80A

Dual type <Nch+Pch>

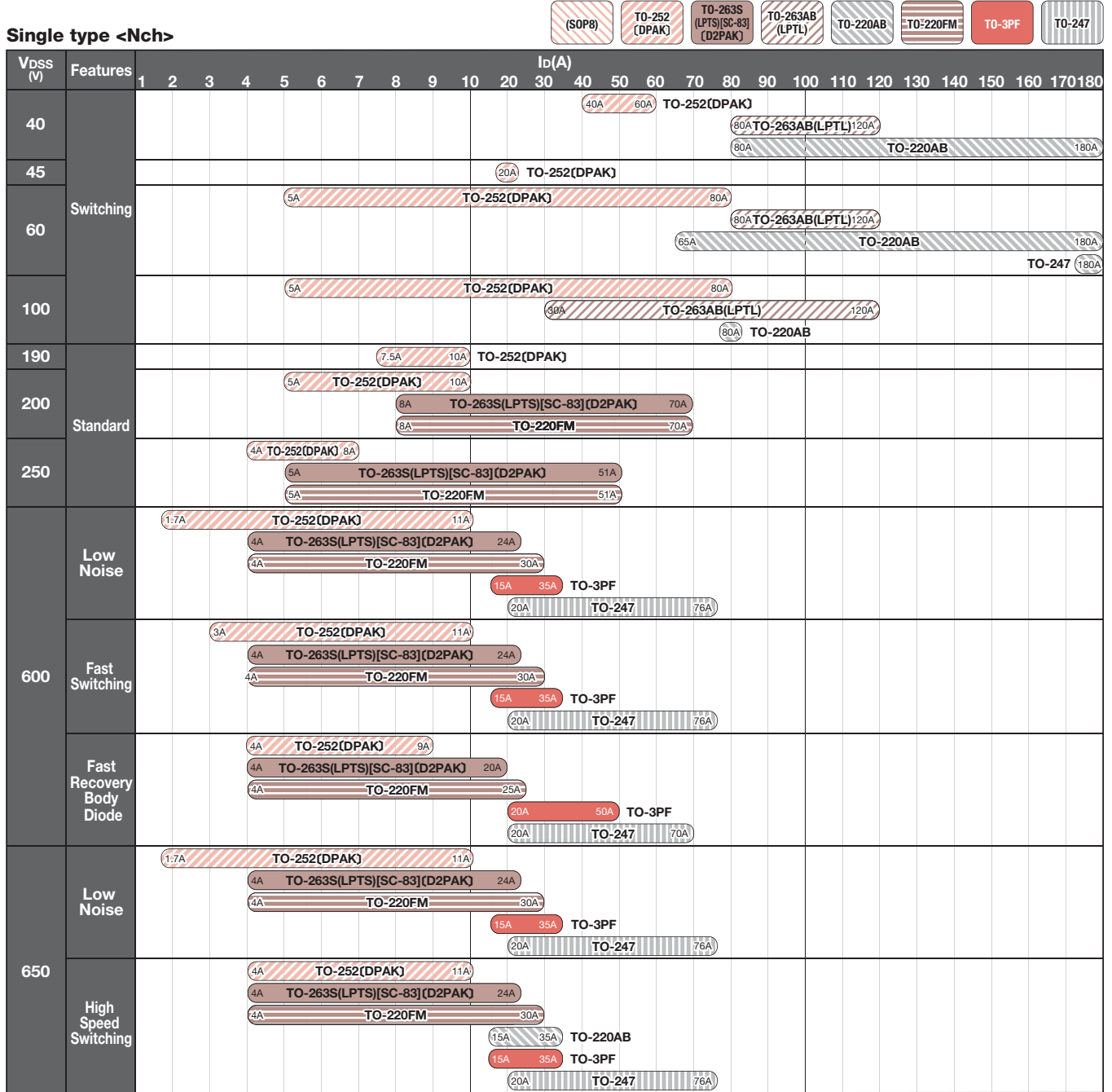
V _{DSS} (V)	Features	1	5	10	15	20	25
30/-30	Motor				15A, 18A	(HSOP8)Dual	
60/-60				8.5A	(HSOP8)Dual		
100/-100			4.5A	(HSOP8)Dual			

Note : () : ROHM Package.



Power MOSFETs

● Quick Reference for Power MOSFETs series



Dual type <Nch+Nch>

V _{DSS} (V)	Features	I _D (A)
500/500	Standard	0.5 (SOP8)

Single type <Pch>

V _{DSS} (V)	Features	I _D (A)
-45	Switching	-4.5A TO-252(DPAK) -16A TO-252(DPAK)
-60		-14A TO-252(DPAK)
-100		-13A TO-252(DPAK)
-100		-15A TO-263S(LPTS)[SC-83](D2PAK) -25A TO-263S(LPTS)[SC-83](D2PAK)

Note : Package is JEDEC code, () : ROHM Package, [] : JEITA Code, { } : GENERAL Code.



Schottky Barrier Diodes

●Quick Reference for Middle Power Schottky Barrier Diodes (High Efficiency type)

V _R (V)	I _O (A)	Surface Mount type					
		2513 Size	3516 Size		4725 Size		5026 Size
		(PMDE)	SOD-123FL (PMDU)		SOD-128 (PMDTM)		DO-214AC (SMA) (PMDS)
		Low V _F type	Super-Low V _F type	Low V _F type	Super-Low V _F type	Low V _F type	Low V _F type
20	1		RBS1MM40A		RBS1LAM40A		
	2		RBS2MM40A RBS2MM40B RBS2MM40C		RBS2LAM40A RBS2LAM40B RBS2LAM40C		
	3		RBS3MM40A RBS3MM40B		RBS3LAM40A RBS3LAM40B RBS3LAM40C		
	5				RBS5LAM40A		
30	1	☆RBR1VWM30A		RBR1MM30A		RBR1LAM30A	RBR1L30A
	2	☆RBR2VWM30A		RBR2MM30A RBR2MM30B		RBR2LAM30A	RBR2L30A
	3			RBR3MM30A		RBR3LAM30A RBR3LAM30B	RBR3L30A RBR3L30B
	5					RBR5LAM30A RBR5LAM30B	RBR5L30A RBR5L30B
40	1	☆RBR1VWM40A ☆RBR2VWM40A		RBR1MM40A RBR2MM40A RBR2MM40B RBR2MM40C		RBR1LAM40A RBR2LAM40A	RBR1L40A RBR2L40A
	2			RBR3MM40A RBR3MM40B		RBR3LAM40A RBR3LAM40B RBR3LAM40C	RBR3L40A RBR3L40B RBR3L40C
	3					RBR5LAM40A	RBR5L40A
	5						
60	1	☆RBR1VWM60A		RBR1MM60A		RBR1LAM60A	RBR1L60A
	2	☆RBR2VWM60A		RBR2MM60A RBR2MM60B RBR2MM60C		RBR2LAM60A RBR2LAM60B	RBR2L60A RBR2L60B
	3			RBR3MM60B RBR3MM60A		RBR3LAM60A RBR3LAM60B	RBR3L60A RBR3L60B
	5					RBR5LAM60A	RBR5L60A

Note : Package is JEDEC code. () : ROHM Package, [] : GENERAL Code.

☆ : Under Development

●Quick Reference for Middle Power Schottky Barrier Diodes (Standard Parts)

V _R (V)	I _O (A)	Surface Mount type									
		2513 Size	3516 Size			4725 Size			5026 Size		
											
		(PMDE)	SOD-123FL (PMDU)			SOD-128 (PMDTM)			DO-214AC [SMA] (PMDS)		
		Super-Low I _n type	Super-Low V _F type	Low V _F type	Super-Low I _n type	Super-Low V _F type	Low V _F type	Super-Low I _n type	Super-Low V _F type	Low V _F type	Super-Low I _n type
20	5					RSX501LAM20					
30	1	☆RB168VWM-30	RSX101MM-30		RB168MM-30			RB168LAM-30			RB168L-30
	2				RB068MM-30	RSX201LAM30 RSX205LAM30		RB068LAM-30	RSX201L-30 RSX205L-30		RB068L-30
	3					RSX301LAM30		RB058LAM-30	RSX301L-30		RB058L-30
	5							RB088LAM-30			
40	1	☆RB168VWM-40			RB168MM-40			RB168LAM-40			RB168L-40
	2				RB068MM-40			RB068LAM-40			RB068L-40
	3							RB058LAM-40			RB058L-40
	5						New	RB088LAM-40			
60	1	☆RB168VWM-60			RB168MM-60			RB168LAM-60			RB168L-60
	2				RB068MM-60			RB068LAM-60			RB068L-60
	3							RB058LAM-60			RB058L-60
	5							RB088LAM-60			
90	1			RB160MM-90			RB160LAM-90			RB160L-90	
100	1	☆RB168VWM100			RB168MM100			RB168LAM100			RB168L100
	2				RB068MM100			RB068LAM100			RB068L100
	3							RB058LAM100			
	5							RB088LAM100			
150	1	☆RB168VWM150			RB168MM150			RB168LAM150			RB168L150
	2							RB068LAM150			RB068L150
	3							RB058LAM150			RB058L150
	5							RB088LAM150			

Note : Package is JEDEC code. () : ROHM Package, [] : GENERAL Code.

☆ : Under Development



Schottky Barrier Diodes

●Quick Reference for Power Schottky Barrier Diodes (High Efficiency type)

V _R (V)	I _O (A)	Surface Mount type					Lead type		
									
		TO-252GE [DPAK]	TO-252 [DPAK]		TO-263S [D2PAK]		TO-220FN <3pin>		TO-220FN <2pin>
		Low I _R type	Low V _F type	Low I _R type	Low V _F type	Low I _R type	Low V _F type	Low I _R type	Low I _R type
30	10		RBR10BM30A		RBR10NS30A		RBR10T30A		
	15		RBR15BM30A						
	20		RBR20BM30A		RBR20NS30A		RBR20T30A		
	30				RBR30NS30A		RBR30T30A		
	40				RBR40NS30A				
40/45	10		RBR10BM40A	RBQ10BM45A	RBR10NS40A	RBQ10NS45A	RBR10T40A	RBQ10T45A	
	15		RBR15BM40A	RBQ15BM45A					
	20		RBR20BM40A	RBQ20BM45A	RBR20NS40A	RBQ20NS45A	RBR20T40A	RBQ20T45A	
	30				RBR30NS40A	RBQ30NS45A RBQ30NS45B	RBR30T40A	RBQ30T45A	RBQ30TB45B
	40				RBR40NS40A				
60/65	10		RBR10BM60A	RBQ10BM65A	RBR10NS60A	RBQ10NS65A	RBR10T60A	RBQ10T65A	
	15		RBR15BM60A	RBQ15BM65A					
	20		RBR20BM60A	RBQ20BM65A	RBR20NS60A	RBQ20NS65A	RBR20T60A	RBQ20T65A	
	30				RBR30NS60A	RBQ30NS65A	RBR30T60A	RBQ30T65A	
	40				RBR40NS60A				
100	10	☆RBQ10BGE100A	New RBQ10BM100A		New RBQ10NS100A		New RBQ10T100A		
	15	☆RBQ15BGE100A	New RBQ15BM100A						
	20	☆RBQ20BGE100A	New RBQ20BM100A		New RBQ20NS100A		New RBQ20T100A		
	30				New RBQ30NS100A		New RBQ30T100A		

Note : Package is JEDEC code. [] : GENERAL Code.

☆ : Under Development

●Quick Reference for Power Schottky Barrier Diodes (Standard Parts)

V _R (V)	I _O (A)	Surface Mount type			Lead type
					
		TO-252GE [DPAK]	TO-252 [DPAK]	TO-263S [D2PAK]	TO-220FN <3pin>
		Super-Low I _R type	Super-Low I _R type	Super-Low I _R type	Super-Low I _R type
30	5		RB078BM30S		
	6		RB098BM-30		
	10		RB088BM-30	RB088NS-30	RB088T-30
	20			RB218NS-30	RB218T-30
	30			RB228NS-30	RB228T-30
	40			RB238NS-30	RB238T-30
40	5		RB075BM40S		
	6		RB098BM-40		
	10		RB088BM-40	RB088NS-40	RB088T-40
	20			RB218NS-40	RB218T-40
	30			RB228NS-40	RB228T-40
	40			RB238NS-40	RB238T-40
60	6		RB098BM-60		
	10		RB088BM-60	RB088NS-60	RB088T-60
	20			RB218NS-60	RB218T-60
	30			RB228NS-60	RB228T-60
	40			RB238NS-60	RB238T-60
100	6		RB098BM100		
	10		RB088BM100	RB088NS100	RB088T100
	20			RB218NS100	RB218T100
	30			RB228NS100	RB228T100
	40			RB238NS100	RB238T100
150	6		RB098BM150		
	10	New RB088BGE150	RB088BM150	RB088NS150	RB088T150
	20			RB218NS150	RB218T150
	30			RB228NS150	RB228T150
	40			RB238NS150	RB238T150

Note : Package is JEDEC code. [] : GENERAL Code.



Fast Recovery Diodes

●Quick Reference for Power Fast Recovery Diodes

V_R (V)	I_O (A)	Surface Mount type			Lead type					
		TO-252GE (DPAK)	TO-252 (DPAK)	TO-263S (D2PAK)	TO-220FN <2pin>	TO-220FN <3pin>	TO-220NFM <2pin>	TO-220AC	TO-220ACFP	TO-247
200	3	RF301BGE2S	RF301BM2S RFN3BM2S RF501BM2S							
	5		RFN5BM2S							
	6		RF601BM2D RFN6BM2D			RFN6T2D RF601T2D RF1001T2D RFN10T2D				
	10			RF1001NS2D		RF1601T2D RFN16T2D				
	16			RF1601NS2D		RF2001T2D RFN20T2D				
	20			RF2001NS2D						
300	20			RF2001NS3D		RF2001T3D	RF1501TF3S			
350	5	RFN5BGE3S	RFN5BM3S							
	10		RFN10BM3S	RFN10NS3S						
	20			RFN20NS3S RFUH25NS3S RFUH20NS3S	RFUH25TB3S RFUH20TB3S					
430	10			RFN10NS4S RFUH10NS4S RFN20NS4S	RFN10TB4S RFUH10TB4S RFN20TB4S					
	20			RFUH20NS4S	RFUH20TB4S					
600	3	RFN3BGE6S	RFN3BM6S RF305BM6S							
	5	RFN5BGE6S	RFN5BM6S RFN15BM6S RF505BM6S RFV5BM6S RFV8BM6S				RFN5TF6S RFUH5TF6S RF505TF6S		RFN15TJ6S	
	8							RFV8TG6S RFV8TG6S	RFV8TJ6S RFV8TJ6S	
	10		RFN10BM6S	RFUH10NS6S RFN10NS6S			RFUH10TF6S RFN10TF6S RF1005TF6S		RFN10TJ6S	
	12							RFV12TG6S RFV15TG6S	RFV12TJ6S RFN15TJ6S RFV15TJ6S	
	15									
	20			RFN20NS6S RFUH20NS6S			RFN20TF6S RFUH20TF6S		RFUH20TJ6S RFN20TJ6S RFN120TJ6S	
	30							RFV30TG6S		RFUH30TS6D RFN30TS6D RFUH30TS6S RFN30TS6S RFUH60TS6D RFN60TS6D
	60									
800	5						RFN5TF8S			
	10			RFN10NS8D						

Note : Package is JEDEC code. () : GENERAL Code.

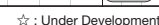
TVS Diodes

●Quick Reference for TVS Diodes

V_{RWM} (V)	Surface Mount type		
	2924 size 	3516 size 	4725 size
	SOT-23 (SSD3)	SOD-123FL (PMDU)	SOD-128 (PMDTM)
3.0	MMBZ5V6AL MMBZ6V2AL MMBZ6V8AL		
4.5			
5.0		SMF5V0	VS5V0UA1LAM
6.0	MMBZ9V1AL	SMF6V0	VS6V0UA1LAM
6.5	MMBZ10VAL	SMF6V5	
7.0		SMF7V0	VS7V0UA1LAM
7.5		SMF7V5	
8.0		SMF8V0	VS8V0UA1LAM
8.5	MMBZ12VAL		
9.0		SMF9V0	VS9V0UA1LAM
10.0		SMF10V	VS10VUA1LAM
11.0		SMF11V	VS11VUA1LAM
12.0	MMBZ15VAL	SMF12V	VS12VUA1LAM
13.0	MMBZ16VAL	SMF13V	VS13VUA1LAM
14.0		SMF14V	VS14VUA1LAM
14.5	MMBZ18VAL		
15.0		SMF15V	VS15VUA1LAM
16.0		SMF16V	VS16VUA1LAM
17.0	MMBZ20VAL	SMF17V	VS17VUA1LAM
18.0		SMF18V	VS18VUA1LAM
20.0	MMBZ24VAL	SMF20V	VS20VUA1LAM
22.0	MMBZ27VAL MMBZ27VCL	SMF22V	VS22VUA1LAM
24.0	RES1CAN MMBZ30VAL	SMF24V	VS24VUA1LAM
26.0	MMBZ33VAL	SMF26V	VS26VUA1LAM
28.0		SMF28V	VS28VUA1LAM
30.0		SMF30V	VS30VUA1LAM
33.0		SMF33V	

Note : Package is JEDEC code. () : ROHM Package.

PSR GMR PML PMR **Metal Strip**
UCR LHR LTR MCR **Thick Film**



ESR SDR KTR LTR MCR SFR SMR Thick Film



Thick Film Chip Resistors (High Reliability series) Tolerance for Sulfurization Chip Resistor (SFR series)

- Improved anti-sulfur performance with ROHM original structure



SFR series								
Part No.	Size Code mm(inch)	Rated Power (70°C)	Limiting Element Voltage (V)	Tolerance	Temperature Coefficient (ppm/°C)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
SFR01	1005 (0402)	0.063W (1/16W)	50	J(±5%)	+500/−250 ±200	1Ω to 9.1Ω (E24 series) 10Ω to 10MΩ (E24 series)	−55 to +155	YES
				F(±1%)	±100	10Ω to 2.2MΩ (E24, E96 series)		
SFR03	1608 (0603)	0.1W	50	J(±5%)	±400 ±200	1Ω to 9.1Ω (E24 series) 10Ω to 10MΩ (E24 series)		YES
				F(±1%)	±100	10Ω to 10MΩ (E24, E96 series)		
SFR10	2012 (0805)	0.125W	150	J(±5%)	±400 ±200	1Ω to 9.1Ω (E24 series) 10Ω to 10MΩ (E24 series)		YES
				F(±1%)	±100	10Ω to 2.2MΩ (E24, E96 series)		
New SFR18	3216 (1206)	0.25W	200	J(±5%)	±400 ±200	1Ω to 9.1Ω (E24 series) 10Ω to 10MΩ (E24 series)		YES
New SFR25	3225 (1210)	0.5W	200	F(±1%)	±100	10Ω to 2.2MΩ (E24, E96 series)		
				J(±5%)	±200	1Ω to 1MΩ (E24 series)		YES
New SFR25	3225 (1210)	0.5W	200	F(±1%)	±100	10Ω to 1MΩ (E24, E96 series)		YES
				J(±5%)	±200	1Ω to 1MΩ (E24 series)		YES

*E24 : Standard products/E96 : Custom products

Jumper type					
Part No.	Size Code mm(inch)	Rated Current (A)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
SFR01	1005(0402)	1	50mΩ Max.	−55 to +155	YES
SFR03	1608(0603)	1			YES
SFR10	2012(0805)	2			YES
New SFR18	3216(1206)	2			YES
New SFR25	3225(1210)	2			YES

Chip Resistors for Current Detection (Thick Film type) Chip Resistors (Low Ohmic MCR series)

- Very-low ohmic resistance from 47mΩ is in lineup by thick-film resistive element
- High-reliability chip resistor employing metal glaze as resistive element



Low Ohmic MCR series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient (ppm/°C)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
MCR006	0603 (0201)	0.05W	F(±1%)	+600/−200	1Ω to 9.1Ω (E24 series)	−55 to +155	YES
MCR01	1005 (0402)	0.063W (1/16W)	F(±1%)	±400	1Ω to 9.1Ω (E24 series)		YES
MCR03	1608 (0603)	0.1W	F(±1%)	±400	1Ω to 9.1Ω (E24 series)		YES
MCR10	2012 (0805)	0.25W	J(±5%)	*Table 1	0.047Ω to 0.91Ω (E24 series)		YES
			F(±1%)	*Table 1	0.047Ω to 9.1Ω (E24 series)		
MCR18	3216 (1206)	0.25W	J(±5%)	*Table 1	0.047Ω to 0.91Ω (E24 series)		YES
			F(±1%)	*Table 1	0.047Ω to 9.1Ω (E24 series)		
MCR25	3225 (1210)	0.5W	J(±5%)	300±300	0.047Ω to 0.091Ω (E24 series)		YES
				±200	0.1Ω to 0.91Ω (E24 series)		
			F(±1%)	300±300	0.047Ω to 0.091Ω (E24 series)		
MCR50	5025 (2010)	0.5W	J(±5%)	±200	0.1Ω to 9.1Ω (E24 series)		YES
				300±300	0.047Ω to 0.091Ω (E24 series)		
			F(±1%)	±200	0.1Ω to 9.1Ω (E24 series)		
MCR100	6432 (2512)	1W	J(±5%)	*Table 1	0.047Ω to 0.91Ω (E24 series)	−55 to +125	YES
			F(±1%)	*Table 1	0.047Ω to 9.1Ω (E24 series)		

*Table 1

Tolerance	Temperature Coefficient (ppm/°C)	Resistance
J(±5%) F(±1%)	500±300	0.047Ω to 0.091Ω (E24 series)
	400±200	0.1Ω to 0.13Ω (E24 series)
	±250	0.15Ω to 9.1Ω (E24 series)

Chip Resistors for Current Detection (Thick Film type) Face down Low Ohmic Chip Resistors (UCR series)

- Chip resistors for current detection (11mΩ or more)
- Resistive element is located at bottom side, which reduces the resistance shift during mounting process
- ROHM's heat dissipation design achieves excellent rated power



UCR series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient (ppm/°C)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
UCR006	0603 (0201)	0.1W	J(±5%) F(±1%)	0 to 300	100mΩ to 910mΩ (E24 series)	-55 to +155	YES
UCR01	1005 (0402)	0.125W	J(±5%) F(±1%)	0 to 300 0 to 250 0 to 200	68mΩ to 91mΩ (E24 series) 100mΩ to 200mΩ (E24 series) 220mΩ to 910mΩ (E24 series)		YES
UCR03	1608 (0603)	0.25W	J(±5%) F(±1%)	0 to 250 0 to 200 0 to 150	20mΩ to 47mΩ (E24 series) 51mΩ to 91mΩ (E24 series) 100mΩ to 200mΩ (E24 series)		YES*
		0.2W	J(±5%) F(±1%)	0 to 150	220mΩ to 910mΩ (E24 series)		
UCR10	2012 (0805)	0.33W (1/3W)	J(±5%) F(±1%)	250±200 0 to 250 0 to 150	11mΩ to 18mΩ (E24 series) 20mΩ to 47mΩ (E24 series) 51mΩ to 100mΩ (E24 series)		YES
			J(±5%) F(±1%)	0 to 250 0 to 150	11mΩ to 47mΩ (E24 series) 51mΩ to 100mΩ (E24 series)		
UCR18	3216 (1206)	0.5W	J(±5%) F(±1%)	0 to 350 0 to 200 0 to 150	11mΩ to 18mΩ (E24 series) 20mΩ to 39mΩ (E24 series) 43mΩ to 100mΩ (E24 series)		YES
		New 1W	J(±5%) F(±1%)	0 to 350 0 to 200	11mΩ to 18mΩ (E24 series) 20mΩ to 39mΩ (E24 series)		YES

* Limited to 100mΩ and higher.

Chip Resistors for Current Detection (Thick Film type) High Power Chip Resistors <Wide Terminal type (Low TCR)> (LHR series) High Power Chip Resistors <Wide Terminal type> (Low Ohmic LTR series)

- Chip resistors for current detection (10mΩ or more)
- High joint reliability with long side terminations
- Improvement of rated power enables replacement with smaller size resistors, conserving space



LHR series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient (ppm/°C)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
New LHR18	1632 (0612)	1.25W	J(±5%) F(±1%)	0 to 125 0 to 100 0 to 75	33mΩ to 39mΩ (E24 series) 43mΩ to 270mΩ (E24 series) 300mΩ to 1Ω (E24 series)	-55 to +155	YES
Low Ohmic LTR series							
LTR10	1220 (0508)	0.5W	J(±5%) F(±1%)	±150	47mΩ to 9.1Ω (E24 series)	-55 to +155	YES
LTR18	1632 (0612)	1W	J(±5%) F(±1%)	0 to 300 0 to 200 0 to 150 ±100	10mΩ to 18mΩ (E24 series) 20mΩ to 47mΩ (E24 series) 51mΩ to 470mΩ (E24 series) 510mΩ to 1Ω (E24 series)		YES
			J(±5%) F(±1%)	0 to 300 0 to 200 0 to 150 ±100	10mΩ to 18mΩ (E24 series) 20mΩ to 47mΩ (E24 series) 51mΩ to 91mΩ (E24 series) 100mΩ to 910mΩ (E24 series)		
New LTR50	2550 (1020)	2W	J(±5%) F(±1%)	0 to 300 0 to 200 0 to 150 ±100	10mΩ to 18mΩ (E24 series) 20mΩ to 47mΩ (E24 series) 51mΩ to 91mΩ (E24 series) 100mΩ to 910mΩ (E24 series)		YES
LTR100	3264 (1225)	2W	J(±5%) F(±1%)	±200 0 to 150	100mΩ to 910mΩ (E24 series)		YES
			J(±5%) F(±1%)	0 to 300 0 to 200 0 to 150	10mΩ to 18mΩ (E24 series) 20mΩ to 47mΩ (E24 series) 51mΩ to 91mΩ (E24 series)		
		☆3W	J(±5%) F(±1%)	0 to 300 0 to 200 0 to 150	10mΩ to 18mΩ (E24 series) 20mΩ to 47mΩ (E24 series) 51mΩ to 91mΩ (E24 series)		

☆ : Under Development

Chip Resistors for Current Detection (Metal Plate type) Ultra Low Ohmic Chip Shunt Resistors (PMR series)

- Chip resistors for current detection ($1\text{m}\Omega$ or more)
- Trimming-less structure helps avoid concentration of heat, reducing rises in surface temperature
- Special low resistance temperature coefficient (TCR) alloy utilized for the resistive element



PMR series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient (ppm/°C)	Resistance (mΩ)	Operating Temperature (°C)	Automotive Grade AEC-Q200
PMR01	1005(0402)	0.2W	J($\pm 5\%$)	0 to 200	10	-55 to +155	YES
PMR03	1608(0603)	0.25W	J($\pm 5\%$) F($\pm 1\%$)	0 to 150	10(☆5)		YES
PMR10	2012(0805)	0.5W	J($\pm 5\%$) F($\pm 1\%$)	± 150	2, 3, 4, 5, 6, 7, 8, 9, 10		YES
PMR18	3216(1206)	1W	J($\pm 5\%$) F($\pm 1\%$)	± 100	1, 2, 3, 4, 5, 6, 7, 8, 9, 10		YES
PMR25	3225(1210)	1W	J($\pm 5\%$) F($\pm 1\%$)	± 100	1, 2, 3, 4, 5		YES
PMR50	5025(2010)	1W	J($\pm 5\%$) F($\pm 1\%$)	± 100	1, 2, 3, 4, 5, 6, 7, 8, 9, 10		YES
PMR100	6432(2512)	2W	J($\pm 5\%$) F($\pm 1\%$)	± 150	1, 2		YES
		☆3W	J($\pm 5\%$) F($\pm 1\%$)	± 150	3, 4, 5, 6, 7, 8, 9, 10		

☆ : Under Development

Large current jumper type					
Part No.	Size Code mm(inch)	Rated Current (A)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
PMR01	1005(0402)	20.0	0.5mΩ Max.	-55 to +155	YES
PMR03	1608(0603)	22.4			YES
PMR10	2012(0805)	31.6			YES
PMR18	3216(1206)	38.7			YES
PMR25	3225(1210)	44.7			YES
PMR50	5025(2010)	50.0			YES
PMR100	6432(2512)	63.2			YES

Chip Resistors for Current Detection (Metal Plate type) Ultra Low Ohmic Chip Shunt Resistors <Wide Terminal type> (PML series)

- Ultra-low resistance range ($0.5\text{m}\Omega$ up)
- Wide terminal configuration for high joint reliability and heat dissipation
- Trimming-less structure helps avoid concentration of heat, reducing rises in surface temperature



PML series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient (ppm/°C)	Resistance (mΩ)	Operating Temperature (°C)	Automotive Grade AEC-Q200
PML10	1220 (0508)	0.66W	J($\pm 5\%$) G($\pm 2\%$)	± 200	1.0, 1.5, 2.0, 2.5	-55 to +155	YES
PML18	1632 (0612)	1W	J($\pm 5\%$) G($\pm 2\%$)	± 150	0.5, 1.0, 1.5, 2.0, 2.5		YES
PML50	2550 (1020)	2W	J($\pm 5\%$)	± 200	0.5, 2.2		YES
PML100	3264 (1225)	2W (3W at 25°C)	J($\pm 5\%$)	± 100	1.0, 1.5, 2.0, 2.2		YES
		2W		± 150	0.5		

Chip Resistors for Current Detection (Metal Plate type) High Power Ultra Low Ohmic Chip Shunt Resistors (PSR series)

- High power 3W to 5W
- Ultra low resistance range(0.1mΩ or more)
- Excellent TCR characteristics
- Convex structure

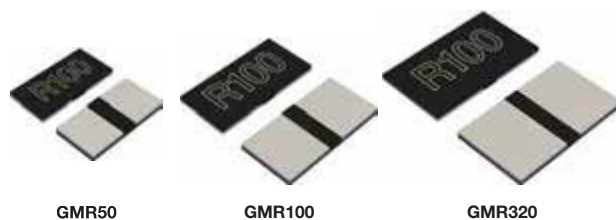


PSR series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient* (ppm/°C)	Resistance (mΩ)	Operating Temperature (°C)	Automotive Grade AEC-Q200
New PSR100	6432 (2512)	3W	F(±1%)	±150	0.3	-55 to +170	YES
				±115	0.5		
				±100	1.0		
				±50	2.0, 3.0		
PSR400	10×5.2 (3921)	4W	F(±1%)	125±50	☆0.2		YES
				±175	0.3, 0.5		
				±75	1.0, 2.0, 3.0		
				200±50	☆0.1		
PSR500	15×7.75 (5931)	5W	F(±1%)	±225	0.2		YES
				±150	0.3, 0.4, 0.5		
				±75	1.0, 2.0		

☆ : Under Development * (+20°C to +125°C)

Chip Resistors for Current Detection (Metal Plate type) High Power Low Ohmic Chip Shunt Resistors (GMR series)

- 2W to 5W Class High Power
- High heat dissipation
- Excellent TCR characteristics
- 5mΩ to 220mΩ Range Lineup



GMR series							
Part No.	Size Code mm(inch)	Rated Power (70°C)	Tolerance	Temperature Coefficient*1 (ppm/°C)	Resistance	Operating Temperature (°C)	Automotive Grade AEC-Q200
☆GMR50	5025 (2010)	2W	F(±1%)	0 to +50	5mΩ	-55 to +170	Preparing
				±25	10mΩ to 200mΩ (E6 series *2*3)		
New GMR100	6432 (2512)	3W	F(±1%)	0 to +50	☆5mΩ		YES
				±20	10mΩ to 220mΩ (E6 series *2)		
☆GMR320	7142 (2817)	5W	F(±1%)	0 to +100	5mΩ		Preparing
				±25	10mΩ to 200mΩ (E6 series *2*3)		

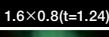
☆ : Under Development (Development schedule will vary depending on resistance value. Please contact us.)
*1 (+20°C to +60°C)

*2 Please contact us for other standard nominal resistance values.

*3 The development schedule varies for each resistance value. Please contact us.

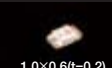
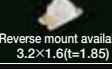
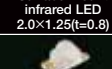
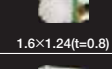
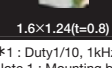
SMD LEDs

<PICOLED™>																														
Package (mm)	Part No.	Emitting Color	Absolute Maximum Ratings(Ta=25°C)						Electrical and Optical Characteristics(Ta=25°C)								Automotive Grade AEC-Q101													
			Power Dissipation Pd (mW)	Forward Current If (mA)	Peak Forward Current Ifp (mA)	Reverse Voltage Vr (V)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)	Forward Voltage Vf		Reverse Current Ir		Dominant Wavelength λo / Chromaticity(x, y)		Luminous Intensity Iv															
									Typ. (V)	Ir (mA)	Max. (μA)	Vr (V)	Typ.* (nm)	Ir (mA)	Min. (mcd)	Typ. (mcd)	Max. (mcd)	Ir (mA)												
	SML-P11VT(R)	Red	50	20	100*2	5	-40 to +85	-40 to +100	1.8	1	10	5	626	1	2	4	6	1	—											
	SML-P11UT(R)	Orange	52						621				1		3															
	SML-P11DT(R)	Yellow	52						605				4		7	16														
	SML-P11YT(R)	Yellow Green	54						586				1		8															
	SML-P11MT(R)	Yellow Green	54						569				1		2	4														
	SML-P12VT(R)	Red	50	20	100*2	5	-40 to +85	-40 to +100	2.0	20	10	5	630	20	25	60	100	20	—											
	SML-P12UT(R)	Orange	52						620				40		85	160														
	SML-P12U2T(R)	Orange	52						615				25		70															
	SML-P12DT(R)	Yellow	54						605				63		100	250														
	SML-P12Y3T(R)	Yellow	54						596				40		90															
	SML-P12YT(R)	Yellow	54						590				40		100	160														
	SML-P12WT(R)	Yellow	54						585				25		70															
	SML-P12Y2T(R)	Yellow	54						580				16		50	100														
	SML-P12M2T(R)	Yellow Green	54						576				10		25	63														
	SML-P12MT(R)	Yellow Green	54						572				6		18	40														
	SML-P13FT(R)	Green	52						566				4		10	16														
	SML-P13PT(R)	Green	34						560				4		10	16														
	SMLP13EC8T	Blue	33						527				56		110	220														
	SMLP13BC8T	Blue	33						470				9		25	56														
	SCMP13WBC8W	White	33						(x, y)(0.30, 0.30)				90		150	360														
	SMLP13WBC9W	White	33						(x, y)(0.29, 0.28)				56		105	180														
	☆SML-P15UT(A)	Red	36						15				100*2		5	-40 to +85	-40 to +100			1.9	5	10	5	620	5	(45)	(80)	(112)	5	—
	☆SML-P15DT(A)	Orange	36						15				100*2		5	-40 to +85	-40 to +100			2.0	5	10	5	604	5	(56)	(105)	(180)	5	—
	<Mold type(1608)>																													
	SML-E12UW	Red	62	25	60*1	5	-30 to +85	-40 to +85	2.0	20	10	5	624	20	36	85	280	20	—											
	SML-E12DW	Orange	62	25	60*1	5	-30 to +85	-40 to +85	2.0				607		56	150	450													
	SML-E12V8W	Red	62	25	60*1	5	-30 to +85	-40 to +85	2.0				630		16	40	100													
	SML-E12U8W	Orange	62	25	60*1	5	-30 to +85	-40 to +85	2.0				620		25	63	160													
	SML-E12D8W	Orange	62	25	60*1	5	-30 to +85	-40 to +85	2.0				605		40	100	250													
	SML-E12Y8W	Yellow	54	20	100*2	5	-40 to +85	-40 to +100	2.2				590		25	63	160													
	SML-E12M8W	Yellow Green	54	20	100*2	5	-40 to +85	-40 to +100	2.2				572		10	25	63													
	SML-E12P8W	Yellow Green	54	20	100*2	5	-40 to +85	-40 to +100	2.2				560		3	6	16													
	SML-E12EC8T	Green	68	25	60*1	5	-30 to +85	-40 to +85	3.0				527		56	120	360													
	SML-E12BC8T	Blue	66	25	60*1	5	-30 to +85	-40 to +85	3.0				470		14	40	90													
SML-E12V8W(A)	Yellow	52	20	100*2	5	-40 to +100	-40 to +100	1.9	2	10	5	588	2	2	4	6	2	—												
SML-D12W8W(A)	Yellow	52	20	100*2	12	-40 to +100	-40 to +100	2.0	2	10	12	588	2	5	7	9	2	YES												
	SML-D12V1W	Red	72	30	100*2	5	-40 to +85	-40 to +100	2.2	20	10	5	630	20	25	40	63	20	—											
	SML-D12U1W	Orange	72						620				40		63	100														
	SML-D12D1W	Orange	72						605				63		100	160														
	SML-D12Y1W	Yellow	72						590				63		100	160														
	SML-D12M1W	Yellow Green	72						572				16		30	63														
	SML-D12V8W	Red	72						630				16		40	100														
	SML-D12U8W	Orange	72						620				25		63	160														
	SML-D12D8W	Orange	72						605				40		100	250														
	SML-D12Y8W	Yellow	72						590				25		63	160														
	SML-D12Y3W	Yellow	72						581				16		160	100														
	SML-D12M8W	Yellow Green	72						572				10		25	63														
	SML-D12P8W	Yellow Green	72						560				3		6	16														
	SML-D12FW	Green	72						565				14		18	28														
	SMLD12EN1W	Blue	70						527				140		220															
	SMLD12E2N1W	Blue	70						505				120		140															
	SMLD12E3N1W	Green	66						496				85		140															
	SMLD12BN1W	Blue	66						470				14		40	56														
	SMLD12WBN1W	White	66						(x, y)(0.295, 0.280)				56		120	220														
	SML-D13VW(A)	Red	72						630				36		55	90														
	SML-D13UW(A)	Orange	72						620				56		85	140														
	SML-D13DW(A)	Orange	72						605				71		120	180														
	SML-D13WW(A)	Yellow	75						581				71		110	180														
	SML-D13MW(A)	Yellow Green	75						571				28		45	71														
	SML-D13U8W	Red	52						620				40		70															
	SML-D13Y8W	Yellow	54						590				63		100	160														
	SML-D13Y2W	Yellow	78						581				40		80															
	SML-D13M8W	Yellow Green	54						572				16		30	63														
	SML-D13FW	Green	81						565				18		22	36														
SML-D14VW(A)	Red	72	630	71	90	112																								
SML-D14U2W(A)	Orange	72	615	90	160	224																								
SML-D14DW(A)	Orange	75	605	112	200	280																								
SML-D14YW(A)	Yellow	75	590	180	280																									
SML-D14WW(A)	Yellow	75	587	180	280																									
SML-D14MW(A)	Yellow Green	75	571	36	60	90																								
SML-D15VW	Red	84	630	71	90	112																								
SML-D15UW	Orange	84	620	90	112	140																								
SML-D15U2W	Orange	84	615	112	140	180																								
SML-D15DW	Yellow	87	605	180	224	280																								
SML-D15YW	Yellow	87	590	56	71	90																								
SML-D15MW	Yellow Green	87	571	56	71	90																								

<Mold type(1608)>																			
Package (mm)	Part No.	Emitting Color	Absolute Maximum Ratings(Ta=25°C)						Electrical and Optical Characteristics(Ta=25°C)										Automotive Grade AEC-Q101
			Power Dissipation P _D (mW)	Forward Current I _F (mA)	Peak Forward Current I _{FP} (mA)	Reverse Voltage V _R (V)	Operating Temperature T _{opr} (°C)	Storage Temperature T _{stg} (°C)	Forward Voltage V _F		Reverse Current I _R		Dominant Wavelength λ _D		Luminous Intensity I _V				
								Typ. (V)	I _R (mA)	Max. (μA)	V _R (V)	Typ.* (nm)	I _R (mA)	Min. (mcd)	Typ. (mcd)	Max. (mcd)	I _R (mA)		
	New CSL0901VT	Red	62.5	25	100*2	12	-40 to +100	-40 to +100	2.1	20	10	12	630	20	112	180	355	20	YES
	New CSL0901UT	Orange											620		140	280	450		
	New CSL0901DT	Yellow											605		224	400	710		
	New CSL0901YT	Yellow											590		180	320	560		
	New CSL0901WT	Yellow Green					587		280										
	New CSL0901MT	Yellow Green					571		56	100	180								
	New CSL0901PT	Green					560		14	30	45								
	☆ CSL0901ET	Green	70	20	5		3.0	5		5	527	5	(220)	(360)	(560)	5	(YES)		
	☆ CSL0901BT	Blue	68				(470)				(36)		(56)	(90)					
		☆ CSL0902VT	Red	87	35	100*2	12	-40 to +100	-40 to +100	2.1	20	10	12	(630)	20	(140)	(250)	(450)	20
☆ CSL0902UT		Orange	(620)											(180)		(350)	(560)		
☆ CSL0902DT		Yellow	(605)											(355)		(560)	(1,120)		
☆ CSL0902YT		Yellow	(590)											(280)		(500)	(900)		
☆ CSL0902WT		Yellow Green					(587)		(224)	(400)	(710)								
☆ CSL0902MT		Yellow Green					(571)		(71)	(140)	(280)								
☆ CSL0902PT		Green					(560)		(28)	(45)	(90)								
New CSL0902ET		Green	95	25		5		3.4			5	527		710	1,100	1,800		YES	
New CSL0902BT		Blue	33					470				220		360	560				
		☆ CSL1001VT	Red	72	30	100*2	12	-40 to +100	-40 to +100	2.0	20		12	630	20	(71)	(112)	(180)	20
	☆ CSL1001YT	Yellow	590							(112)				(180)		(280)			
	☆ CSL1001MT	Yellow Green	571							(36)				(56)		(90)			
	New CSL1001ET	Green	35							5				90		140	224	5	
	New CSL1001BT	Blue	33	10	50*2	5	-40 to +100		2.8	1		5	470	1	4	6	9	1	

<Mold type(20125)>																			
Package (mm)	Part No.	Emitting Color	Absolute Maximum Ratings(Ta=25°C)						Electrical and Optical Characteristics(Ta=25°C)										Automotive Grade AEC-Q101
			Power Dissipation P _D (mW)	Forward Current I _F (mA)	Peak Forward Current I _{FP} (mA)	Reverse Voltage V _R (V)	Operating Temperature T _{opr} (°C)	Storage Temperature T _{stg} (°C)	Forward Voltage V _F		Reverse Current I _R		Dominant Wavelength λ _D		Luminous Intensity I _v				
								Typ. (V)	I _F (mA)	Max. (μA)	V _R (V)	Typ. (nm)	I _F (mA)	Min. (mcd)	Typ. (mcd)	Max. (mcd)	I _F (mA)		
 2.0×1.25(t=0.8)	SML-H12V8T	Red	54	20	100*2	5	-40 to +85	-40 to +100	2.2	20	10	5	630	20	16	25	63	20	YES
	SML-H12U8T	Orange											620		25	40	100		
	SML-H12D8T	Yellow											605						
	SML-H12Y8T	Yellow											590		40	63	160		
	SML-H12M8T	Yellow Green											572		10	25	40		
	SML-H12P8T	Green											560		3	4	10		

*1 : Duty 1/5, 200Hz *2 : Duty 1/10, 1kHz *3 : Duty 1/20, 1ms *4 : Duty 1/5, 1kHz *5 : Duty 1/10, Pulse Width : 10ms or less
 * : Brightness for white color is noted with chromaticity coordinate (x, y). (YES): Preparing () : Reference Value ☆ : Under Development

<Surface mount infrared LEDs>																		
Package (mm)	Part No.	Element Material	Emitting Color	Absolute Maximum Ratings (Ta=25°C)						Electrical and Optical Characteristics(Ta=25°C)								
				Power Dissipation P _D (mW)	Forward Current I _F (mA)	Peak Forward Current I _{FP} (mA)	Reverse Voltage V _R (V)	Operating Temperature T _{opr} (°C)	Storage Temperature T _{stg} (°C)	Forward Voltage V _F (V)	Reverse Current I _R (μA)	Dominant Wavelength λ _D (nm)	Radiation Intensity				Automotive Grade AEC-Q101	
	☆ SML-P15R2T	AlGaAs	Infrared	(40)	(20)	(100)*1	(5)	(-40 to +85)	(-40 to +100)	(1.6)		(100)			(0.6)	(1.1)	(2.2)	
	☆ SML-S15R2T			(100)	(50)	(300)*1	(5)	(-40 to +85)	(-40 to +100)	(1.4)		(10)			(5.6)	(12)	(22)	
	SML-M13RT			60	30	100*1	5	(-40 to +85)	(-40 to +100)	1.4		10			0.5	1.7	3.5	
	☆ SML-M15R2T			(60)	(30)	(100)*1	(5)	(-40 to +85)	(-40 to +100)	(1.4)		(10)			(1.5)	(2.5)	(3.5)	
	SML-S13RT			60								850			1.5	2.5	3.6	
	SCM-013RT			57	30	300*1	5	(-40 to +85)	(-40 to +100)	1.4	20	10	5	20	0.5	2.0	5.0	20
	☆ CSL0901R2T														(2.5)	(3.5)	(6.3)	
	☆ CSL1001R2T														(1.0)	(1.6)	(2.5)	
	☆ CSL1201R2T			(60)	(30)	(100)*1	(5)	(-40 to +85)	(-40 to +100)	(1.4)		(10)			(2.5)	(3.5)	(6.3)	
	☆ CSL1301R2T														(1.0)	(1.6)	(2.5)	

*1 : Duty 1/10, 1kHz
 Note 1 : Mounting board may be required () : Reference Value ☆ : Under Development

SMD LEDs

Surface mount phototransistors																		
Package (mm)	Part No.	Element Material	Absolute Maximum Ratings (Ta=25°C)						Electrical and Optical Characteristics(Ta=25°C)									
			Collector to-Emitter Voltage (V)	Emitter to-Collector Voltage (V)	Collector Current (mA)	Collector Loss (mW)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)	Photocurrent			Quiescent Current		Sensitivity Wavelength	Collector-to-Emitter Saturation Voltage			
									Min. (mA)	Max. (mA)	VCE(V) /ε(Lx)	Max. (μA)	VCE (V)	λP Typ. (nm)	Min. (V)	Typ. (V)	Max. (V)	Ic(mA) /ε(Lx)
 2.0×1.25(t=0.8)	SML-H10TB	Si	32	5	30	80	−30 to +85	−30 to +100	2.0	4.0	5/500	0.5	10	800	—	—	0.4	0.1/500
 Reverse mount type 3.4×1.25(t=1.1)	SML-810TB								2.3	3.8								
 3.0×1.5(t=2.2)	SCM-014TB				100				0.3									
 1.6×0.8(t=1.24)	☆CSL1001TB		(30)	(75)					(1.0)	(4.0)		(0.5)	(800)	—	—	(0.4)		
 1.6×1.24(t=0.8)	☆CSL1301TB																(5)	

*1 : Duty 1/10, 1kHz * Mounting board may be required

() : Reference Value ☆ : Under Development

High Brightness LED Numeric Displays

A type that provides high brightness, low power consumption and high reliability.

High Brightness LED Numeric Displays																		
Shape	Part No.	Emitting Color	Absolute Maximum Ratings (Ta=25°C)					Input Voltage Maximum Rating		Electrical and Optical Characteristics (Ta=25°C)								
			Power Dissipation P _D (mW)	Forward Current I _F (mA)	Peak Forward Current I _{FP} * (mA)	Reverse Voltage V _R (V)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)		Forward Voltage V _F	Reverse Current I _R	Dominant Wavelength	Luminosity/Digit I _V					
 Letter Height : 8 mm (Outline) : (7×11)	LAP-301VB/VL	Red										650	14	36				
	LAP-301MB/ML	Green	448	20	60	5	−25 to +75	−30 to +85	1.9	10	100	3	572	20	10	36	100	10
	LAP-301DB/DL	Orange										605			56	250		
 Letter Height : 10.16 mm (Outline) : (9.6×13)	LAP-401VD/VN	Red										650	14	36				
	LAP-401MD/MN	Green	448	20	60	5	−25 to +75	−30 to +85	1.9	10	100	3	572	20	10	36	100	10
	LAP-401DD/DN	Orange										605			56	250		
 Letter Height : 14.6 mm (Outline) : (12.5×19)	LAP-601VB/VL	Red										650	14	36				
	LAP-601MB/ML	Green	448	20	60	5	−25 to +75	−30 to +85	1.9	10	100	3	572	20	10	36	100	10
	LAP-601DB/DL	Orange										605			56	250		
 Letter Height : 14.3 mm (Outline) : (25×19)	LBP-602VA2/VK2	Red										650	14	36				
	LBP-602MA2/MK2	Green	896	20	60	5	−25 to +75	−30 to +85	1.9	10	100	3	572	20	10	36	100	10
	LBP-602DA2/DK2	Orange										605			56	250		

* The conditions for I_{FP} are Duty≤1/5 and Pulse width≤1ms

LED Numeric Displays

A reflow-capable LED numeric indicator that can be automatically mounted.

1-digit LED Numeric Displays (Surface Mount type)																		
Shape	Part No.	Emitting Color	Absolute Maximum Ratings (Ta=25°C)					Input Voltage Maximum Rating		Electrical and Optical Characteristics (Ta=25°C)								
			Power Dissipation P _D (mW)	Forward Current I _F (mA)	Peak Forward Current I _{FP} * (mA)	Reverse Voltage V _R (V)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)		Forward Voltage V _F	Reverse Current I _R	Dominant Wavelength	Luminosity/Digit I _V					
 Letter Height : 8 mm (Outline) : (6.8×11)	LF-3011VA/VK	Red	320	15	60	5	−25 to +75	−30 to +85	2.0	10	100	3	650	40	10	3.6	10	10
	LF-3011MA/MK	Green	480	20					2.1				563					

* The conditions for I_{FP} are Duty≤1/5 and Pulse width≤1ms

Wi-SUN Communication Modules (Specified Low Power Communication Modules)

- 920MHz specified low-power wireless module
- Class-leading receiver sensitivity
- Built-in antenna eliminates the need for Radio-frequency designs
- Transmitting power pre-adjusted
- MAC address included
- Japan Radio Law certified



BP35A1



BP35C0



BP35C2

Wi-SUN Communication Modules (Specified Low Power Communication Modules)							
Part No.	Supply Voltage (V)	Operating Temperature (°C)	Host CPU I/F	Supported Standards	On-board System LSI	Dimensions (mm)	Package
BP35A1	2.7 to 3.6 (Single power)	−20 to +80	UART	Wi-SUN 	ML7396B (LAPIS Semiconductor)	22.0×33.5×4.0	Connector mount type 0.5mm pitch, 20pin
BP35C0	2.6 to 3.6 (Single power)	−30 to +85	UART	Wi-SUN 	ML7416N (LAPIS Semiconductor)	15.0×19.0×3.0	SMD 1.27mm Pitch, 28pin
BP35C2	5.0 (Single power)	−20 to +50	USB	Wi-SUN 	ML7416N (LAPIS Semiconductor)	21.4×49.7×8.5	USB Dongle

EnOcean® Communication Modules

The EnOcean® communication modules are based on energy harvesting battery-less/wireless telecommunication technology. ROHM has been a member of the EnOcean alliance that promotes next generation radio telecommunication standards since 2012, and is contributing to the expansion of the EnOcean® communication method.

■ Features

- Compliant with EnOcean® communication standards (ISO/IEC 14543-3-10/11)
- Built-in antenna eliminates the need for Radio-frequency designs
- Japan Radio Law certified (928MHz) / EU Radio certified (868MHz)

EnOcean® Communication Modules/Devices											
Frequency Band	Usage Target Area	Products									
											
		Electromagnetic Induction Power Generation Element for Switch Module	Electronic Circuit Board For Switch Module	Switch Module	Energy Harvesting Wireless Module	Programmable Wireless Module for Communication Reception	Magnet Contact Module	Temperature Sensor Module	Humidity Sensor Module	USB Module for Reception	Evaluation Kit
928MHz	Japan	ECO 200	PTM 430J	PTM 210J	STM 400J	TCM 410J	STM 429J	STM 431J	HSM 100	USB 400J	EDK 400J*
868MHz	Europe/China	ECO 200	PTM 330	PTM 210	STM 300	TCM 310	STM 320	STM 331	HSM 100	USB 300	EDK 350

* Contents of EDK 400J : PTM 210J (switch module) / USB 400J (USB module for reception) / PTM 430J (electronic circuit board for switch module) / ECO 200 (electromagnetic induction power generation element for switch module) / STM 431J (temperature sensor module) / STM 400J (energy harvesting wireless module) / EOP 350 (Programming board: used to replace the firmware of STM 431J and STM 400J) / USB cable (cable for connecting EOP 350 and a PC)

● STM 400J inside EDK 400J is mounted on a dedicated board for connecting to EOP 350.

- Please choose the product with the frequency band suitable for your region.
- Please contact a ROHM sales representative for purchase or inquiries.
- For details on this product, please refer to ROHM's EnOcean® product introduction page (<https://www.rohm.com/enocan>).

Included Products

Part No.	Page	Part No.	Page	Part No.	Page	Part No.	Page
BA00JC5WT	51	BD3509MUV	54	BD7J200HFN-LA	59	BM2LC105FJ-C	61
BA1117FP	50	BD3512MUV	54	BD7xxL2EFJ-C series	50	BM2LC120FJ-C	61
BA12003DF-Z	76	BD3521FVM	54	BD7xxL2FP3-C series	50	BM2LC300FJ-C	61
BA12004DF-Z	76	BD3533F	56	BD7xxL2FP-C series	50	BM2P011	58
BA14741F/FJ	74	BD3533FVM	56	BD7xxL5FP-C series	50	BM2P012	58
BA15218F	74	BD3533HFN	56	BD82000FVJ-LB	62	BM2P013	58
BA15532F	74	BD35390FJ	56	BD82001FVJ-LB	62	BM2P014	58
BA178Mxx type	50	BD35395FJ-M	56	BD82061FVJ-LB	62	BM2P015	58
BA178xx type	50	BD3539FVM	56	BD82065FVJ-LB	62	BM2P016	58
BA2107G	74	BD3539NUX	56	BD8325FVT-M	59	BM2P0161	58
BA2115F/FJ/FVM	74	BD3540NUV	54	BD87A28FVM	79	BM2P016T	58
BA2901F/FV	75	BD3541NUV	54	BD87A29FVM	79	BM2P031	58
BA2901SF/SFV	75	BD3550HFN	54	BD87A34FVM	79	BM2P032	58
BA2901YF-C/YFV-C	75	BD3551HFN	54	BD87A41FVM	79	BM2P033	58
BA2901YF-LB	75	BD3552HFN	54	BD8LA700EFV-C	61	BM2P034	58
BA2901YF-M/YFV-M	75	BD357xYxxx-M series	50	BD8LB600FS-C	61	BM2P0361	58
BA2902F/FV	70	BD3650FP-M	50	BD9106FVM-LB	57	BM2P0391	58
BA2902SF/SFV	70	BD37201NUX	55	BD9109FVM-LB	57	BM2P051	58
BA2902YF-C/YFV-C	70	BD37210AMUV	55	BD9161FVM-LB	57	BM2P051F	58
BA2902YF-LB	70	BD37215AMUV	55	BD9325FJ-LB	57	BM2P052	58
BA2902YF-M/YFV-M	70	BD3775AF	79	BD9326EFJ-LB	57	BM2P052F	58
BA2903F/FV/FVM	75	BD37A19FVM	79	BD9327EFJ-LB	57	BM2P053	58
BA2903SF/SFV/SFVM	75	BD37A41FVM	79	BD95601MUV-LB	57	BM2P053F	58
BA2903YF-C/YFV-C/YFVM-C	75	BD3925FP-C	55	BD95602MUV-LB	57	BM2P054	58
BA2903YF-LB	75	BD3925HFP-C	55	BD9615MUV-LB	57	BM2P054F	58
BA2903YF-M/YFV-M/YFVM-M	75	BD42500G-C	55	BD99A41F	79	BM2P061EK-LB	58
BA2904F/FV/FVM	70	BD42530EFJ-C	55	BD9A101MUV-LB	57	BM2P074KF	58
BA2904SF/SFV/SFVM	70	BD42530FP2-C	55	BD9A301MUV-LB	57	BM2P091	58
BA2904YF-C/YFV-C/YFVM-C	70	BD42530FPJ-C	55	BD9B301MUV-LB	57	BM2P091F	58
BA2904YF-LB	70	BD42540FJ-C	55	BD9C301FJ-LB	57	BM2P092	58
BA2904YF-M/YFV-M/YFVM-M	70	BD4269EFJ-C	55	BD9E100FJ-LB	57	BM2P092F	58
BA30E00WHFP	56	BD4269FJ-C	55	BD9E101FJ-LB	57	BM2P093	58
BA3259HFP	56	BD4271FP2-C	55	BD9E300EFJ-LB	57	BM2P093F	58
BA33D15HFP	56	BD4271HFP-C	55	BD9E301EFJ-LB	57	BM2P094	58
BA33D18HFP	56	BD42754FP2-C	55	BD9E303EFJ-LB	57	BM2P094F	58
BA3404F/4FJ/FVM	70	BD42754FPJ-C	55	BD9G102G-LB	57	BM2P095F	58
BA3472F/FV/FJ/FVM/FVT	71	BD45Exx1G-M series	78	BD9G201EFJ-LB	57	BM2P101EK-LB	58
BA3472RFVM	71	BD45Exx2G-M series	78	BD9G341AEFJ-LB	57	BM2PA96F	58
BA3472YF-C/YFV-C/YFVM-C/WFV-C	71	BD45Exx5G-M series	78	BD9V101MUF-LB	57	BM60014FV-C	60
BA3472YF-LB	71	BD45xx1G series	78	BDxxC0A type	51	BM60051FV-C	60
BA3474F	71	BD45xx2G series	78	BDxxC0AFPS series	50	BM60052AFV-C	60
BA3474FV/FVJ	71	BD45xx5G series	78	BDxxC0AW type	51	BM60054AFV-C	60
BA3474RFV	71	BD46Exx1G-M series	78	BDxxFA1FP3 type	51	BM60055FV-C	60
BA3474WV-C/YFV-C	71	BD46Exx2G-M series	78	BDxxFC0FP series	50	BM60056FV-C	60
BA3662CP-V5	51	BD46Exx5G-M series	78	BDxxFC0W type	51	BM60212FV-C	60
BA4510F/FV	74	BD46xx1G series	78	BDxxFD0WHFP series	50	BM6101FV-C	60
BA4510FVM/FVT	74	BD46xx2G series	78	BDxxGA3MEFJ-LB series	52	BM6102FV-C	60
BA4558F/FJ/FV/FVM/FVT	74	BD46xx5G series	78	BDxxGA3MEFJ-M series	52	BM6104FV-C	60
BA4558RF/RFJ/RFV/RFVM/RFVT	74	BD47xxG series	77	BDxxGA3W series	52	BM6105AFW-LBZ	60
BA4558YF-M/YFV-M/YFVM-M	74	BD48ExxG series	77	BDxxGA5MEFJ-LB series	52	BM6108FV-LB	60
BA4560F/FJ/FV/FVM/FVT	74	BD48ExxG-M series	78	BDxxGA5MEFJ-M series	52	BM61S40RFV-C	60
BA4560RF/RFJ/RFV/RFVM/RFVT	74	BD48KxxG series	77	BDxxGA5WEFJ series	52	BM63363S-VA	91
BA4560YF-M/YFV-M/YFVM-M	74	BD48LxxG series	77	BDxxGC0MEFJ-LB series	51	BM63363S-VC	91
BA4564RFV	74	BD48xxFVE series	77	BDxxGC0MEFJ-M series	51	BM63364S-VA	91
BA4564WV	74	BD49ExxG series	77	BDxxGC0WEFJ series	51	BM63364S-VC	91
BA4580RF/RFJ/RFVM/RFVT	74	BD49ExxG-M series	78	BDxxHA3MEFJ-LB series	52	BM63363S-VA	91
BA4580YF-M/YFVM-M	74	BD49KxxG series	77	BDxxHA3MEFJ-M series	52	BM63563S-VC	91
BA4584FV	74	BD49LxxG series	77	BDxxHA3WEFJ series	52	BM63564S-VA	91
BA4584RF/RFV	74	BD49xxFVE series	77	BDxxHA5MEFJ-LB series	52	BM63564S-VC	91
BA4584YFV-M	74	BD4xxM2 type	50	BDxxHA5MEFJ-M series	52	BM63763S-VA	91
BA82901YF-C	75	BD4xxM2W type	50	BDxxHA5WEFJ series	52	BM63763S-VC	91
BA82901YFV-C	75	BD4xxM5 type	50	BDxxHC0MEFJ-LB series	52	BM63764S-VA	91
BA82902YF-C/YFJ-C/YFV-C/YFVJ-C	75	BD4xxM5W type	50	BDxxHC0MEFJ-M series	52	BM63764S-VC	91
BA82903YF-C	70	BD50FA1MG-M	51	BDxxHC0WEFJ series	52	BM63767S-VA	91
BA82903YFVM-C	75	BD5291G	74	BDxxHC5MEFJ-LB series	52	BM63767S-VC	91
BA82904YF-C/YFVM-C	70	BD52ExxG series	77	BDxxHC5MEFJ-M series	52	BM63963S-VA	91
BA8391G	75	BD52xxFVE series	77	BDxxHC5WEFJ series	52	BM63963S-VC	91
BAxxBC0 type	51	BD52xxG-2C series	78	BDxxIA5MEFJ-LB series	53	BM63964S-VA	91
BAxxCC0 series	50	BD52xxG-2M series	78	BDxxIA5MEFJ-M series	53	BM63964S-VC	91
BAxxCC0W type	51	BD52xxNVX-2C series	78	BDxxIA5WEFJ series	53	BM63967S-VA	91
BAxxDD0T series	50	BD53ExxG series	77	BDxxIC0MEFJ-LB type	53	BM63967S-VC	91
BAxxDD0W series	50	BD53xxFVE series	77	BDxxIC0W type	53	BM63968S-VA	91
BAxxJC5T type	51	BD53xxG-2C series	78	BDxxKA5FP type	53	BM63968S-VC	91
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BD00FA1WEFJ	51	BD6538G-LB	62	BHxxM0AWHFV series	53	BP35C0	106
BD00IA5MEFV-M	53	BD7003NUX	56	BHxxNB1WHFV series	54	BP35C2	106
BD00IC0MEFJ-M type	53	BD7004NUX	56	BHxxPB1WHFV series	54	BR24A01A	67
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BD12732F/FJ/FV/FVJ/FVM/FVT	72	BD70HxxG-2C series	78	BHxxSA3WGUT series	54	BR24A04	67
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BD1HC500EFJ-C	61	BD7220FV-LA	63	BM1C101F	59	BR24A64	67
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ML7414	65	RB098BM150	96	RBR1LAM60A	95	RFN10NS6S	97
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RGPR30BM40HR	91	SCS210KGHR	88	SMLD12E2N1W	103	VS70VUA1LAM	97
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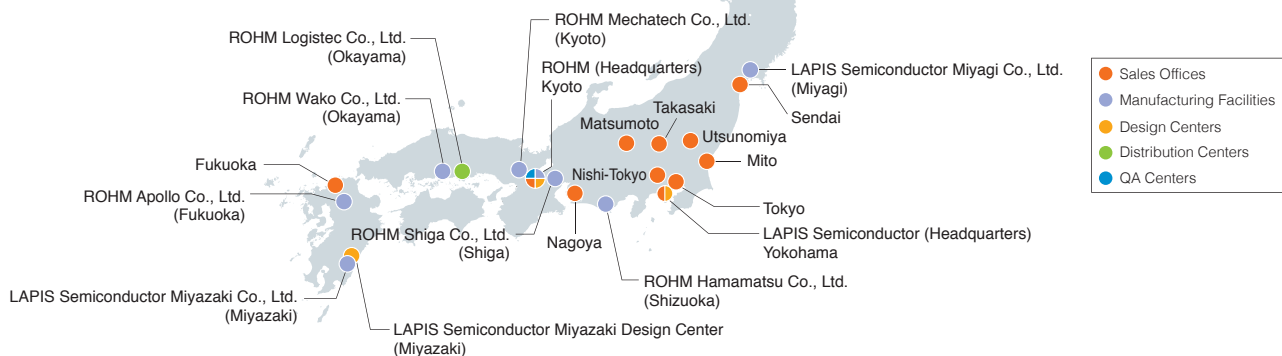
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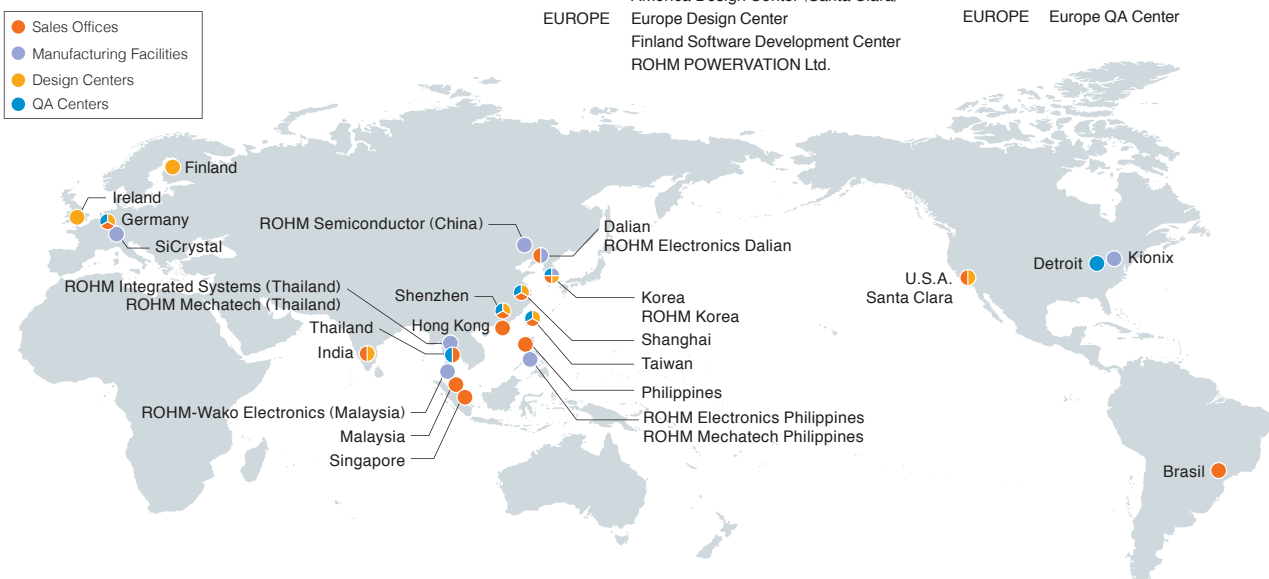
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ROHM Co., Ltd.

21 Saini Mizosaki-cho, Ukyo-ku,
Kyoto 615-8585 Japan
TEL : +81-75-311-2121 FAX : +81-75-315-0172

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