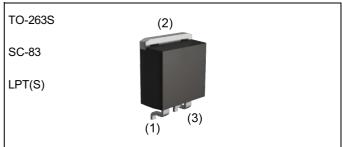
Nch 600V 7A Power MOSFET

V _{DSS}	600V
R _{DS(on)} (Max.)	0.62Ω
I _D	±7A
P _D	78W

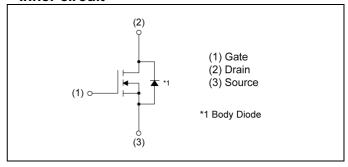
Outline



Features

- 1) Low on-resistance.
- 2) Ultra fast switching speed.
- 3) Parallel use is easy.
- 4) Pb-free lead plating; RoHS compliant

•Inner circuit



Packaging specifications

• i ackaç	Jing specifications	
	Packing	Embossed Tape
	Reel size (mm)	330
Type	Tape width (mm)	24
,	Quantity (pcs)	1000
	Taping code	TL
	Marking	R6007KNJ

Application

Switching

● **Absolute maximum ratings** (T_a = 25°C ,unless otherwise specified)

Parameter	Symbol	Value	Unit	
Drain - Source voltage		V_{DSS}	600	V
Continuous drain current (T _c = 25	I _D *1	±7	Α	
Pulsed drain current	l _{DP} *2	±21	Α	
O-t- O	static	V _{GSS}	±20	V
Gate - Source voltage	AC(f>1Hz)		±30	V
Avalanche current, single pulse	·	I _{AS}	1.3	Α
Avalanche energy, single pulse		E _{AS} *3	133	mJ
Power dissipation (T _c = 25°C)	P _D	78	W	
Junction temperature	T _j	150	°C	
Operating junction and storage te	emperature range	T _{stg}	-55 to +150	°C

●Thermal resistance

Downwortow	Cymah al	Values			l lmit
Parameter	Symbol	Min.	Тур.	Max.	Unit
Thermal resistance, junction - case	R _{thJC} *4	-	-	1.6	°C/W
Thermal resistance, junction - ambient	R _{thJA} *5	-	-	80	°C/W
Soldering temperature, wavesoldering for 10s	T _{sold}	-	-	265	°C

●Electrical characteristics (T_a = 25°C)

Parameter	Cumb al	Conditions	Values			Unit
- Farameter	Symbol	Conditions	Min.	Тур.	Max.	Offic
Drain - Source breakdown voltage	V _{(BR)DSS}	$V_{GS} = 0V$, $I_D = 1mA$	600	-	-	V
		V _{DS} = 600V, V _{GS} = 0V				
Zero gate voltage drain current	I _{DSS}	$T_j = 25^{\circ}C$	-	-	100	μΑ
aram canoni		$T_j = 125^{\circ}C$	-	-	1000	
Gate - Source leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V _{DS} = 10V, I _D = 1mA	3	-	5	V
		V _{GS} = 10V, I _D = 2.4A				
Static drain - source on - state resistance	R _{DS(on)} *6	$T_j = 25^{\circ}C$	-	0.57	0.62	Ω
		$T_j = 125^{\circ}C$	-	1.20	-	
Gate resistance	R_{G}	f = 1MHz, open drain	-	3.2	-	Ω

● Electrical characteristics (T_a = 25°C)

Darramatar	Cymah al	Conditions	Values			Linit
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Forward Transfer Admittance	Y _{fs} *6	V _{DS} = 10V, I _D = 3.5A	1.9	3.8	-	S
Input capacitance	C _{iss}	V _{GS} = 0V	-	470	-	
Output capacitance	C _{oss}	V _{DS} = 25V	-	440	-	pF
Reverse transfer capacitance	C _{rss}	f = 1MHz	-	20	-	
Turn - on delay time	t _{d(on)} *6	$V_{DD} \simeq 300V$, $V_{GS} = 10V$	-	18	-	
Rise time	t _r *6	I _D = 3.5A	-	22	-	20
Turn - off delay time	t _{d(off)} *6	$R_L \simeq 86.6\Omega$	-	35	-	ns
Fall time	t _f *6	$R_G = 10\Omega$	-	25	-	

● Gate charge characteristics (T_a = 25°C)

Davamatar	Cymah al	Conditions	Values			1.1:4
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Total gate charge	Q_g^{*6}	V _{DD} ≈ 300V	-	14.5	-	
Gate - Source charge	Q _{gs} *6	I _D = 7A	-	4.2	-	nC
Gate - Drain charge	Q _{gd} *6	V _{GS} = 10V	-	5.8	-	
Gate plateau voltage	V _(plateau)	V _{DD} ≈ 300V, I _D = 7A	-	6.8	-	V

^{*1} Limited only by maximum channel temperature allowed.

^{*2} Pw ≤ 10µs, Duty cycle ≤ 1%

^{*3} L \doteqdot 100mH, V_{DD}=50V, R_G=25 Ω , STARTING T_i=25 $^{\circ}$ C

^{*4} T_C=25°C

^{*5} Mounted on a epoxy PCB FR4 (25mm x 27mm x 0.8mm)

^{*6} Pulsed

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Daramatar	Symbol	Canditions	Values			Unit
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit
Continuous forward current	I _S *1	T - 25°C	1	1	7	А
Pulse forward current	I _{SP} *2	T _C = 25°C	-	-	21	А
Forward voltage	V _{SD} *6	$V_{GS} = 0V, I_{S} = 7.0A$	-	-	1.5	V
Reverse recovery time	t _{rr} *6		1	302	-	ns
Reverse recovery charge	Q _{rr} *6	I _S = 7A di/dt = 100A/µs		2.8	-	μC
Peak reverse recovery current	I _{rrm} *6	- α, ατ 100/ γμο	-	18	-	Α

Typical transient thermal characteristics

Symbol	Value	Unit
R _{th1}	0.172	
R _{th2}	0.694	K/W
R _{th3}	0.640	

Symbol	Value	Unit
C _{th1}	0.00102	
C _{th2}	0.00288	Ws/K
C _{th3}	0.153	

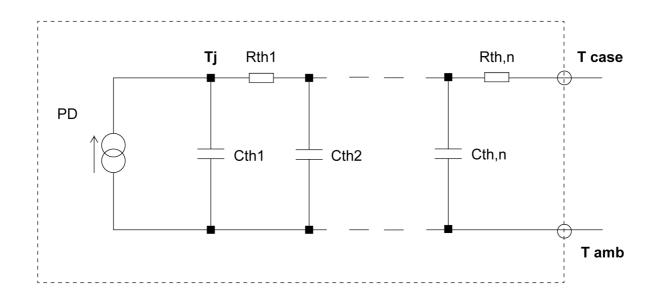


Fig.1 Power Dissipation Derating Curve

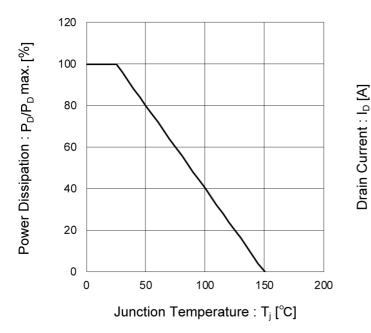


Fig.2 Maximum Safe Operating Area

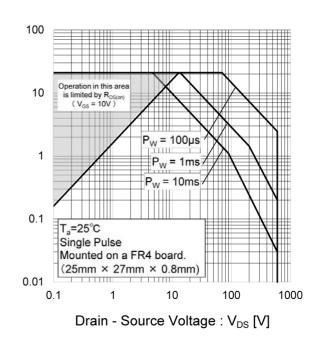


Fig.3 Avalanche Energy Derating Curve vs. Junction Temprature

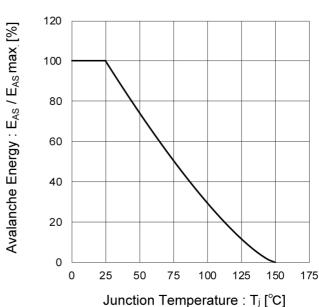




Fig.4 Typical Output Characteristics(I)

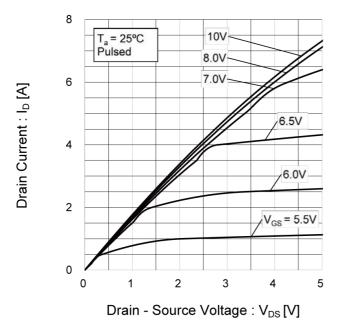
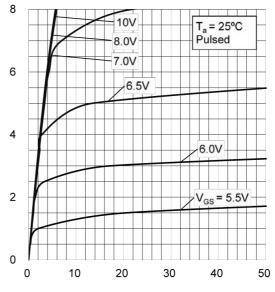


Fig.5 Typical Output Characteristics(II)



Drain Current : I_D [A]

Fig.6 Breakdown Voltage vs.

Junction Temperature

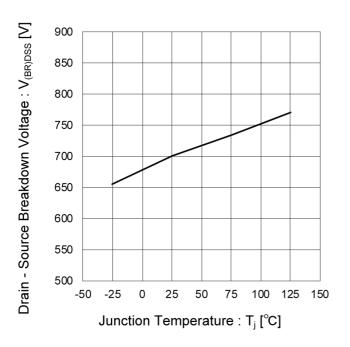


Fig.7 Typical Transfer Characteristics

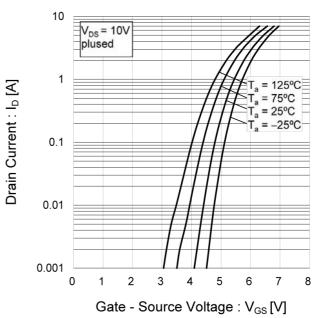


Fig.8 Gate Threshold Voltage vs.
Junction Temperature

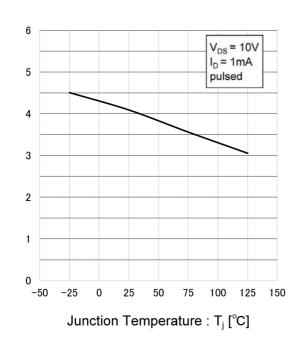
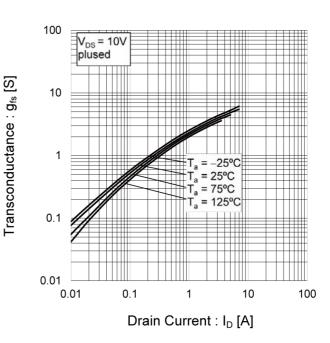


Fig.9 Forward Transfer Admittance vs.

Drain Current



Gate Threshold Voltage: VGS(th) [V]

Fig.10 Static Drain - Source On - State
Resistance vs. Gate Source Voltage

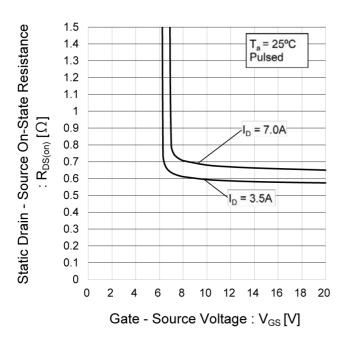


Fig.11 Static Drain - Source On - State Resistance vs. Junction Temperature

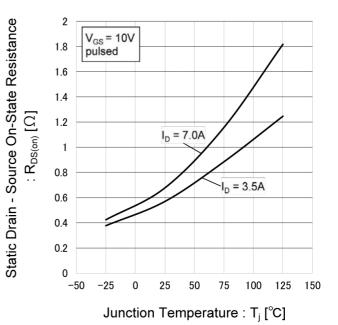
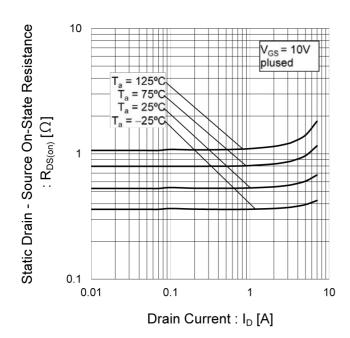


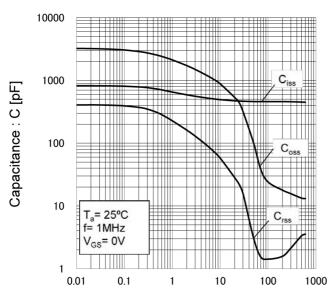
Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)



8/12

Fig.13 Typical Capacitance vs.

Drain - Source Voltage



Drain - Source Voltage : V_{DS} [V]

Fig.14 Switching Characteristics

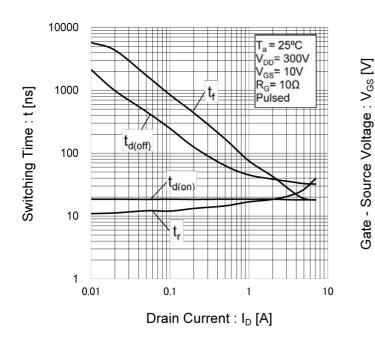


Fig.15 Dynamic Input Characteristics

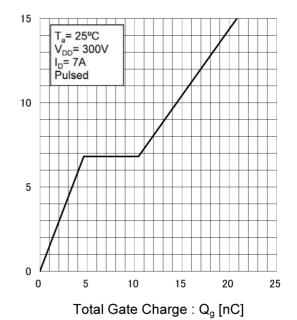


Fig.16 Inverse Diode Forward Current vs. Source - Drain Voltage

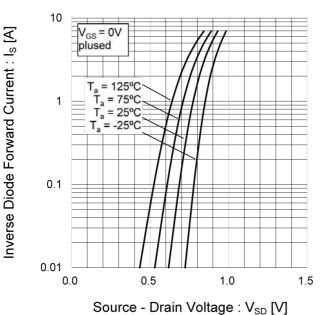
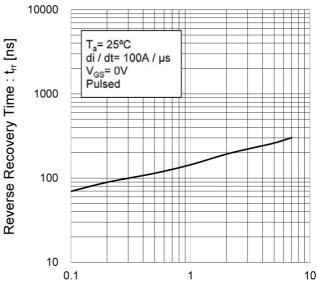


Fig.17 Reverse Recovery Time vs. Inverse Diode Forward Current



Inverse Diode Forward Current: I_S [A]

Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

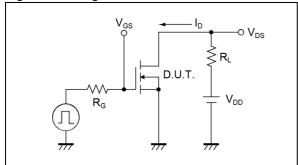


Fig.2-1 Gate Charge Measurement Circuit

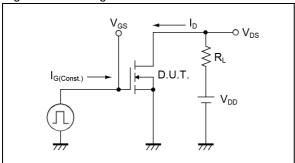


Fig.3-1 Avalanche Measurement Circuit

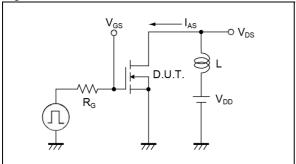


Fig.4-1 dv/dt Measurement Circuit

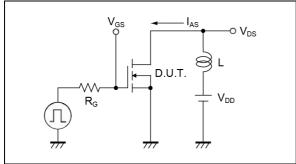


Fig.5-1 di/dt Measurement Circuit

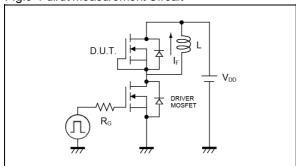


Fig.1-2 Switching Waveforms

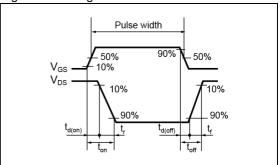


Fig.2-2 Gate Charge Waveform

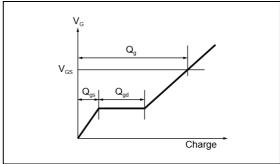


Fig.3-2 Avalanche Waveform

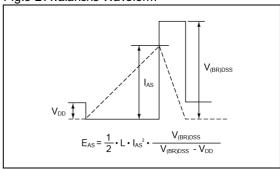


Fig.4-2 dv/dt Waveform

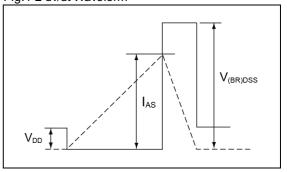
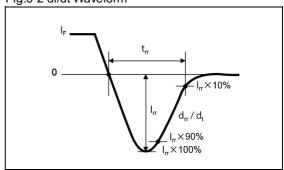
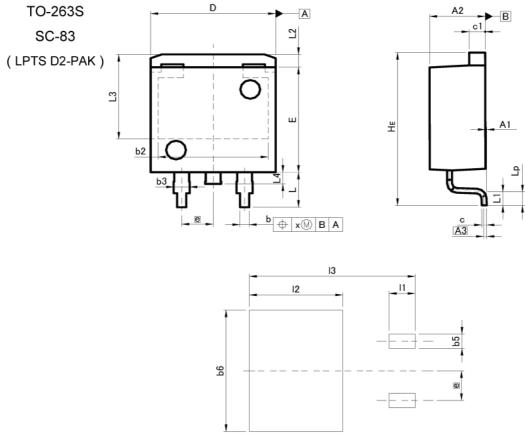


Fig.5-2 di/dt Waveform



Dimensions



Pattern of terminal position areas [Not a pattern of soldering pads]

DIM	MILIM	ETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
A1	0.00	0.30	0.000	0.012
A2	4.30	4.70	0.169	0.185
A3	0.:	25	0.0	10
b	0.68	0.98	0.027	0.039
b2	8.9	90	0.3	50
b3	1.14	1.44	0.045	0.057
С	0.30	0.60	0.012	0.024
c1	1.10	1.50	0.043	0.059
D	9.80	10.40	0.386	0.409
E	8.80	9.20	0.346	0.362
е	2.	54	0.1	00
HE	12.80	13.40	0.504	0.528
L	2.70	3.30	0.106	0.130
LI	1.	20	0.0	47
L2	1.	10	0.043	
L3	7.:	25	0.285	
L4	1.00		0.039	
Lp	0.90	1.50	0.035	0.059
Х	,=3;	0.25		0.010
	NATI TNA	TEDO	INIO	UEC
DIM L	MILIM	EIERO	INC	пео

DIM	MILIMETERS		INCHES		
DIM L	DIM MIN	MAX	MIN	MAX	
bb	=:	1.23	-	0.049	
b6	4 0	10.40	3=4	0.409	
11	23	2.10		0.083	
12	70 8	7.55	1.75	0.297	
13		13.40	-	0.528	

Dimension in mm/inches



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1. Our Products are designed and manufactured for application in ordinary electronic equipment (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment (Note 1), transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

JÁPAN	USA	EU	CHINA
CLASSⅢ	CLASSII	CLASS II b	CLASSIII
CLASSIV		CLASSⅢ	

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 - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - [f] Sealing or coating our Products with resin or other coating materials
 - [g] Use of our Products without cleaning residue of flux (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - [h] Use of the Products in places subject to dew condensation
- 4. The Products are not subject to radiation-proof design.
- 5. Please verify and confirm characteristics of the final or mounted products in using the Products.
- 6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse, is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- 7. De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.
- 8. Confirm that operation temperature is within the specified range described in the product specification.
- ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

- 1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- 2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

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- 1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
- 2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of lonizer, friction prevention and temperature / humidity control).

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- 1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
 - [a] the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] the temperature or humidity exceeds those recommended by ROHM
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic
- Even under ROHM recommended storage condition, solderability of products out of recommended storage time period
 may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is
 exceeding the recommended storage time period.
- 3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
- 4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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