Ideal for sensing in battery-power devices
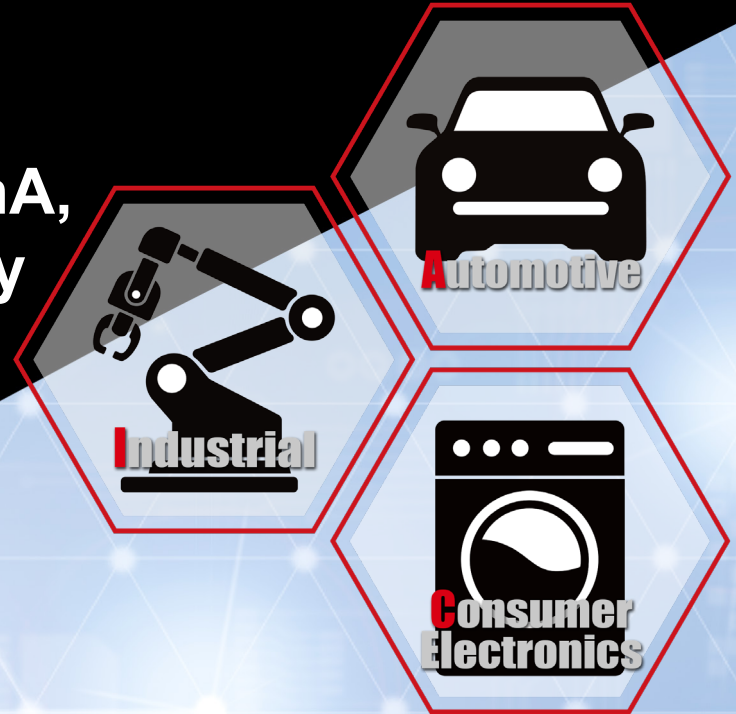
Ultra-Low Operating Current 160nA, Low Offset Voltage High Accuracy Op Amp

LMR1901YG-M

Automotive

Industrial

Consumer **E**lectronics

The LMR1901YG-M is an ultra-low current Op Amp ideal for battery operated equipment. Features include minimal variations in operating current due to changes in power supply voltage and temperature along with superior input offset voltage characteristics - despite being an ultra-low current product - making it suitable for a wide range of applications beyond sensing.

Features

- **Ultra-low current operation contributes to longer operation of battery-powered devices**
  Nano Energy™ technology provides unmatched low current operation: 160nA (Typ) at 3.0V supply voltage

- **Stable current characteristics support a wide range of applications**
  Minimal variation in operating current due to changes in power supply voltage and temperature supports rail-to-rail input/output

- **Excellent input offset voltage characteristics facilitate compensation design**
  Guarantees a max. input offset voltage and temperature drift of 0.55mV and 7.0μV/°C, respectively, while achieving ultra-low current consumption

Nano Energy
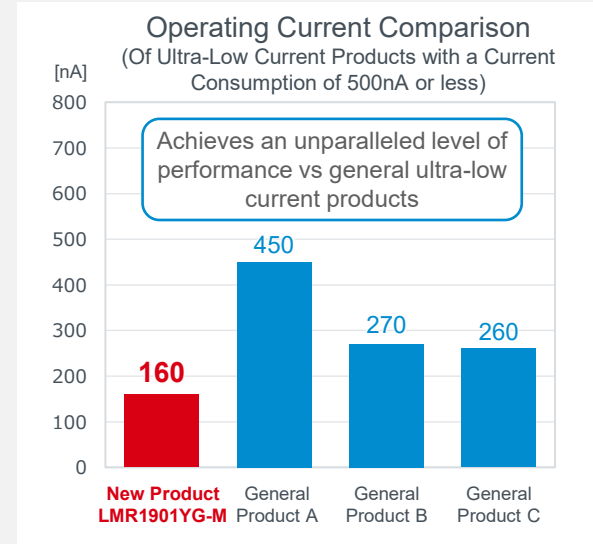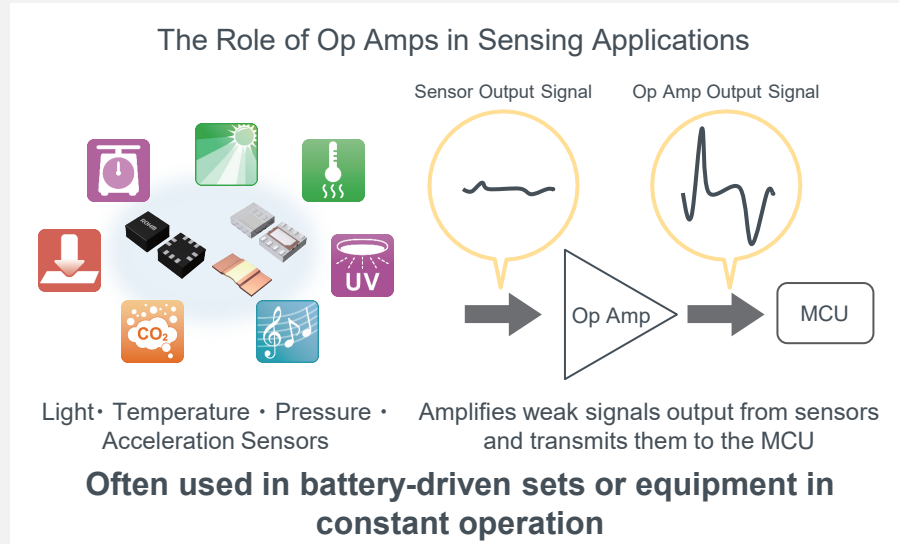
ComfySIL Functional Safety

SSOP5
2.90×2.80×1.25mm

"Nano Energy™" and "ComfySIL™" are trademarks or registered trademarks of ROHM Co., Ltd.

Mechanism and Characteristics Required for Low Current Operation

The Role of Op Amps in Sensing Applications

Sensor Output Signal   Op Amp Output Signal

Op Amp → MCU

Light・Temperature・Pressure・Acceleration Sensors

Amplifies weak signals output from sensors and transmits them to the MCU

Often used in battery-driven sets or equipment in constant operation

Operating Current Comparison
(Of Ultra-Low Current Products with a Current Consumption of 500nA or less)

[nA]

Achieves an unparalleled level of performance vs general ultra-low current products

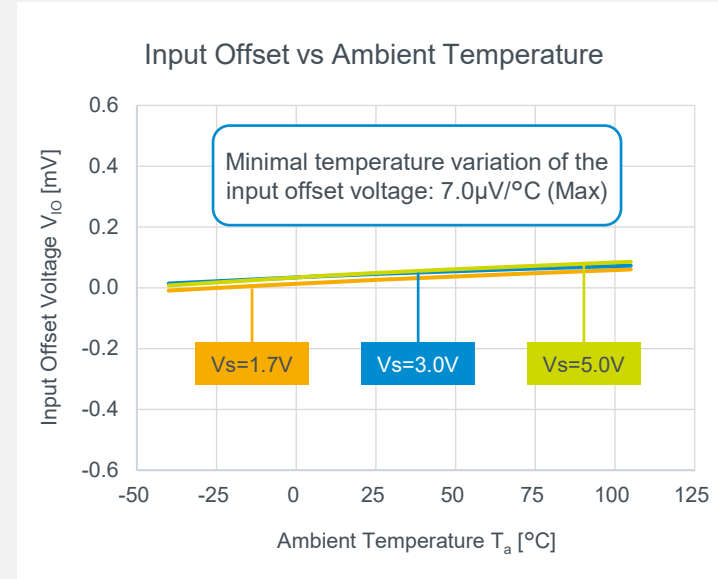| Product	Value [nA]
New Product LMR1901YG-M	160
General Product A	450
General Product B	270
General Product C	260

Low current Op Amp enables long-term sensing operation

The operating environment has little effect on battery life

Operating Current vs Supply Voltage

Minimal change in operating current with changes in supply voltage

$T_a = -40°C$

$T_a = +25°C$

$T_a = +105°C$

Supply Current I_{DD} [nA]

Supply Voltage V_S [V]

Operating Current vs Ambient Temperature

Small change in operating current with respect to temperature change

$V_S = 5.0V$

$V_S = 1.7V$

$V_S = 3.0V$

Supply Current I_{DD} [nA]

Ambient Temperature T_a [°C]
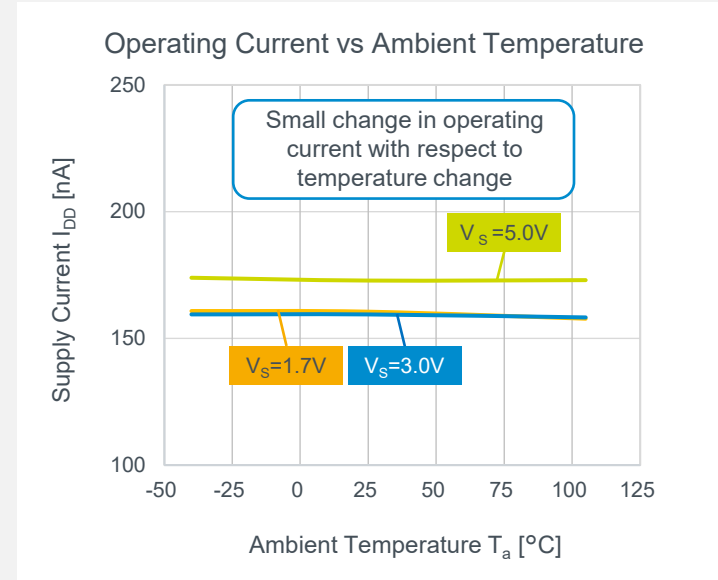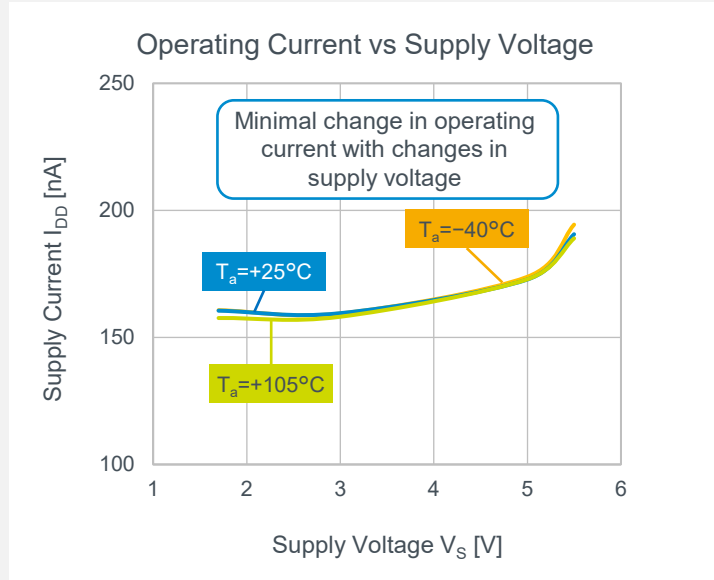
Stable, low-current operation reduces battery drain in automotive systems* and other applications exposed to harsh environments

*AEC-Q100 (Grade 2) Qualified

Excellent Input Offset Voltage Characteristics Facilitate Compensation Design

Achieves outstanding 0.55mV (Max) for ultra-low current products of 500nA or less

Input Offset Voltage Comparison
(Of ultra-Low Current Products with a Current Consumption of 500nA or less)

Provides superior offset voltage characteristics vs general ultra-low current types

Input Offset Voltage V_{IO} [mV]

- New Product LMR1901YG-M: **0.55**
- General Product A: 4.5
- General Product B: 1.3
- General Product C: 1.0

Input Offset vs Ambient Temperature

Minimal temperature variation of the input offset voltage: 7.0µV/°C (Max)

Input Offset Voltage V_{IO} [mV]

Ambient Temperature T_a [°C]

- Vs=1.7V
- Vs=3.0V
- Vs=5.0V

Excellent input offset voltage characteristics facilitate compensation design, even with ultra-low current products

Part No.	ch	Supply Voltage [V]	Circuit Current (Typ) [nA]	Input Offset Voltage (Max) [mV]	Input Offset Voltage Temperature Drift (Max) [μV/°C]	Input Equivalent Noise Voltage Density (Typ) [nV/√Hz]	Operating Temperature [°C]	Package	ComfySIL™ Functional safety Category	Automotive Grade (AEC-Q100)
New LMR1901YG-M 🌐 📄	1	1.7 to 5.5	160	0.55	7.0	740	−40 to +105	SSOP5	FS supportive*	Grade 2

* FS supportive: ICs developed for automotive use that can support safety analysis related to functional safety.

Click on the 🌐 icon to access the product page and 📄 to view the datasheet on ROHM's website.

Application Examples

Various sensing applications such as drive recorders and anti-theft devices that operate even when parked

AEC-Q100 (Grade 2) qualified

Optimized for battery-operated sensing applications such as monitoring equipment and portable devices

The Effects of Nano Energy™ Technology on ROHM's New Products

Nano
Nano Energy

Nano Energy™ Technology Overview

Circuit Design — High performance reference voltage circuit achieves both ultra-low current consumption and superior response

Processes — Low current consumption through the development of high-density, high-resistance elements

Layout — Promotes low noise with high accuracy by coordinating circuits and elements
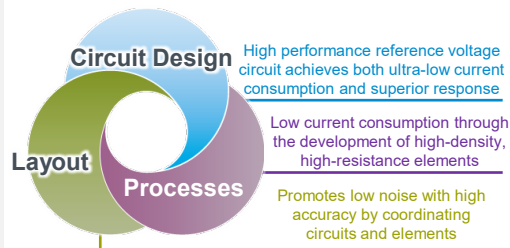
Nano Energy™ refers to ultra-low current consumption technology achieved by combining analog circuit design, layout, and processes leveraging ROHM's vertically integrated production system.
The LMR1901YG-M utilizes a newly developed reference current source based on this technology to achieve an operating current of just 160nA by thoroughly suppressing current increase due to temperature.

"Nano Energy™" and "ComfySIL™" are trademarks or registered trademarks of ROHM Co., Ltd.

Notice

ROHM Co.,Ltd.
21 Saiin Mizosaki-cho, Ukyo-ku,
Kyoto 615-8585 Japan

www.rohm.com

【O_187】 Catalog No.66OP7378E 02.2024 PDF   © 2024 ROHM Co., Ltd.