

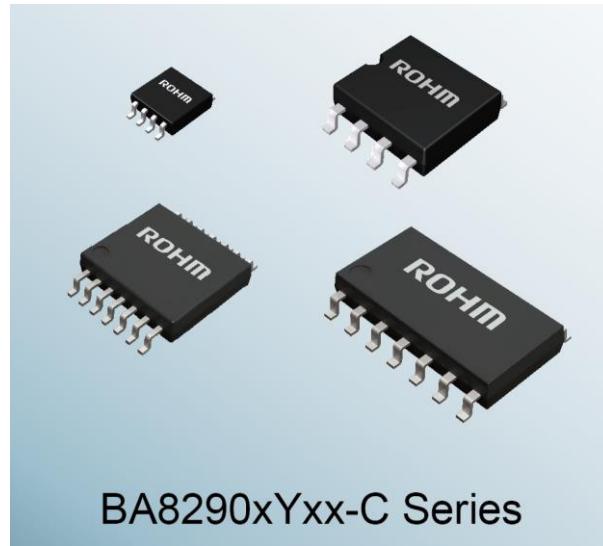


Noise-Tolerant Automotive OpAmps: BA8290xYxx-C Series

Showing how noise tolerance contributes to improved reliability and simpler designs in automotive sensor applications

Product Overview

- Superior noise tolerance suppresses output voltage variance to $\pm 1\%$ or less
- AEC-Q100 qualified guarantees automotive-grade reliability
- Stable long-term supply possible
- Pin-compatible with industry-standard products (package and pin layout)



Basic Specifications

Ground Sense OpAmps

- Supply voltage : 3.0V to 36V
- Input offset voltage : $\pm 2\text{mV}$ (typ.)
 $\pm 6\text{mV (max.)}$
- Input voltage : 0 to $V_{cc}-1.5\text{V}$
- Operating temp : -40°C to 125°C

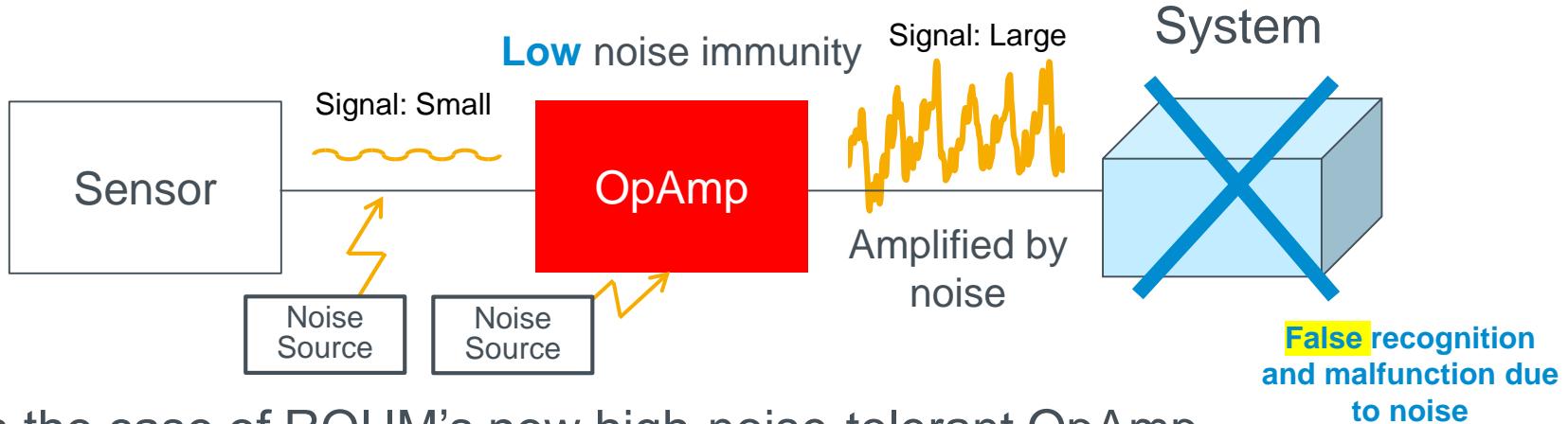
Lineup

Part No.	Ch	Package	Current Consumption (typ.)
BA82904YF-C	2ch	SOP8	0.5mA
BA82904YFVM-C		MSOP8	
BA82902YF-C	4ch	SOP14	0.7mA
BA82902YFV-C		SSOP-B14	

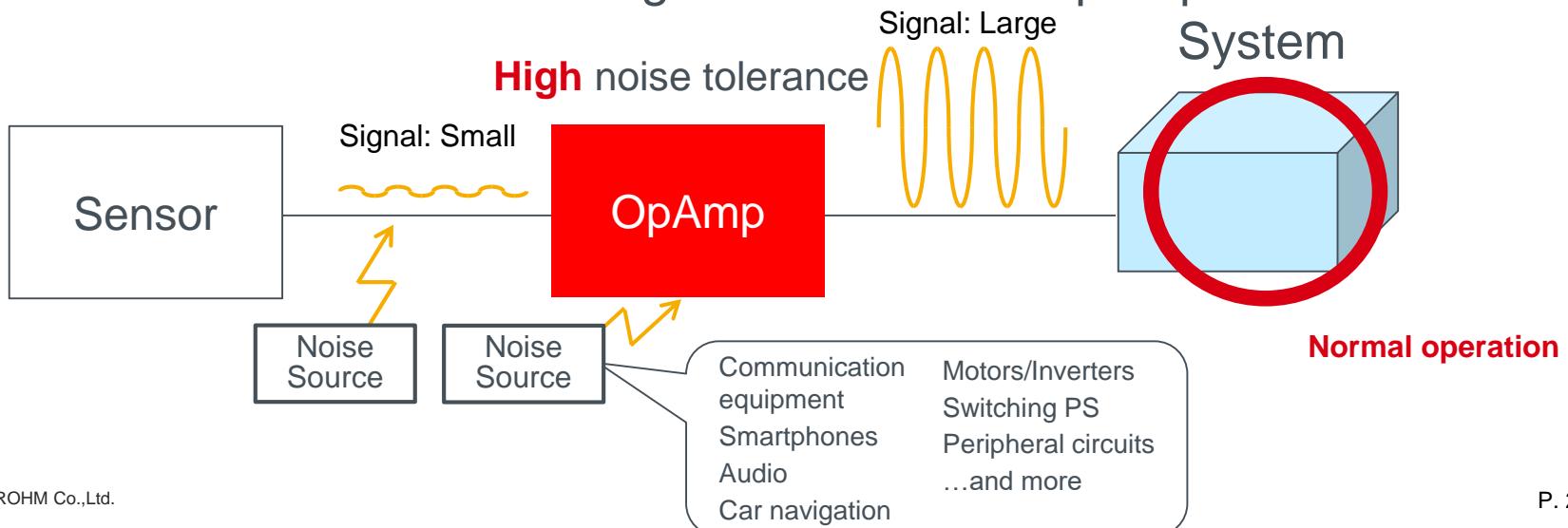
Market Background

There is a **growing demand for improved anti-noise performance** following the digitization and increasing density of automotive electrical systems

- In the case of a conventional low-noise-tolerant OpAmp



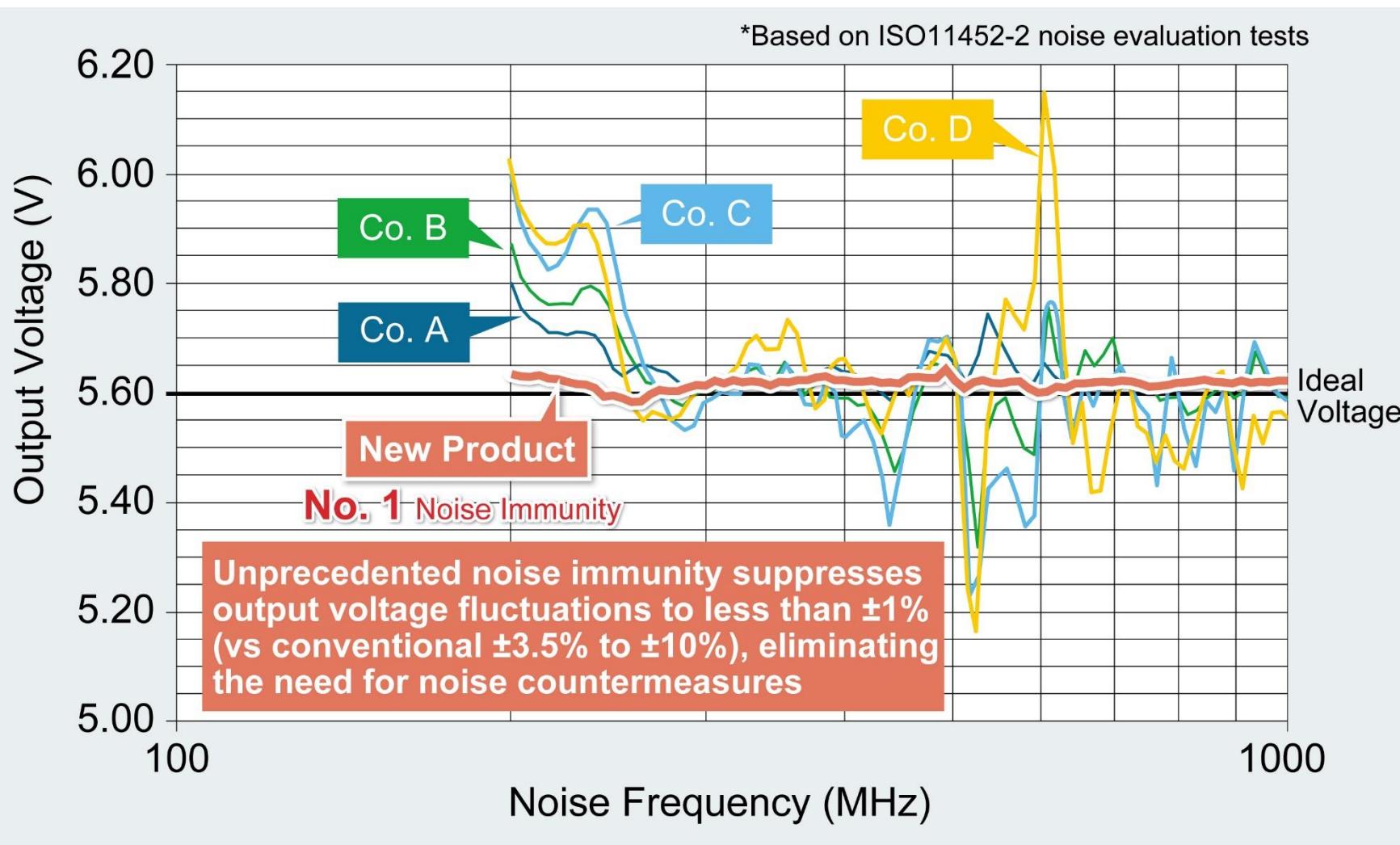
- In the case of ROHM's new high-noise-tolerant OpAmp



Feature: The World's First Automotive OpAmps Designed to Eliminate the Effects of Noise



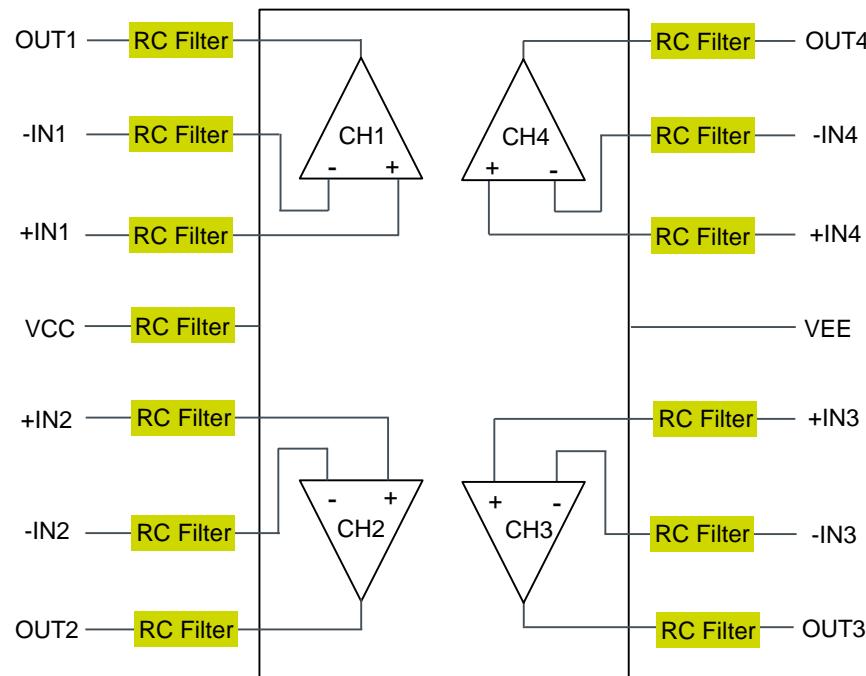
Noise Frequency vs Output Voltage



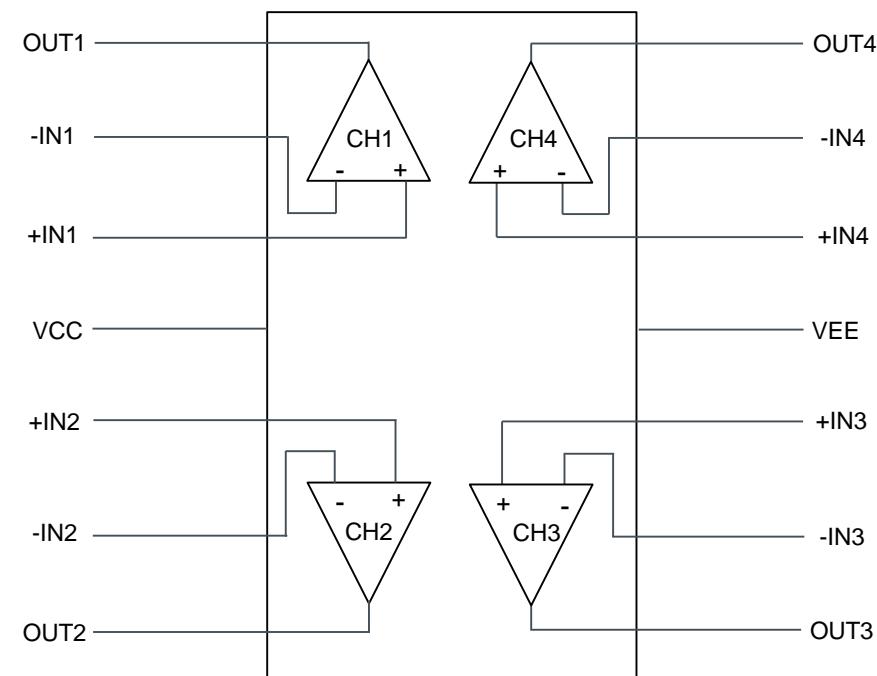
Differences in Layout Due to Noise Tolerance



Conventional OpAmp



ROHM's New OpAmp



Requires RC filters to supplement noise immunity

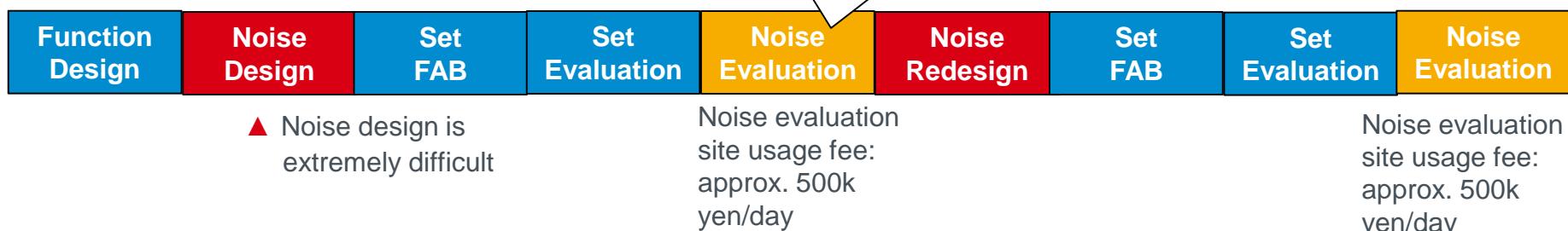
Noise-tolerant design eliminates the need for countermeasures

※Depend on applications so customers need to evaluate noise-tolerant.

Process flow (each time) when designing a new model (board)

▲ With a conventional OpAmp

Possible failure



○ With ROHM's new OpAmp

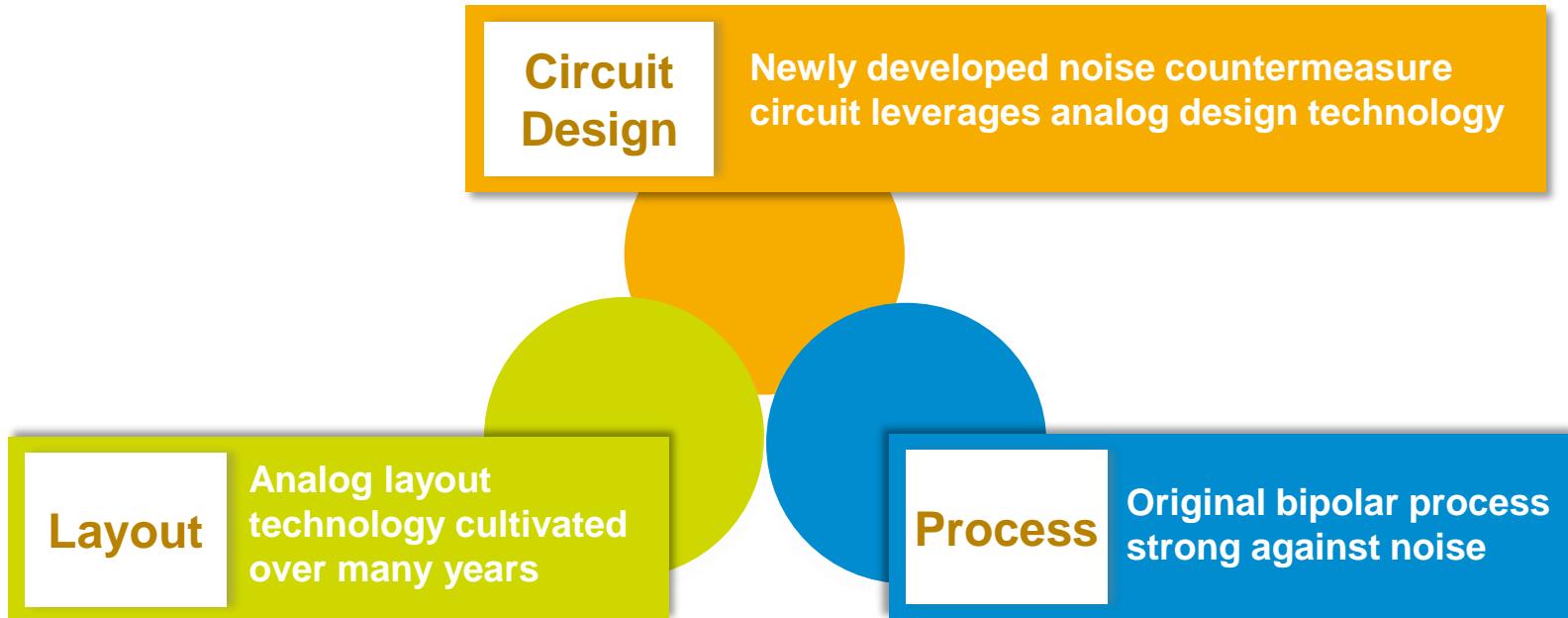
One time OK



○ Noise-tolerant design

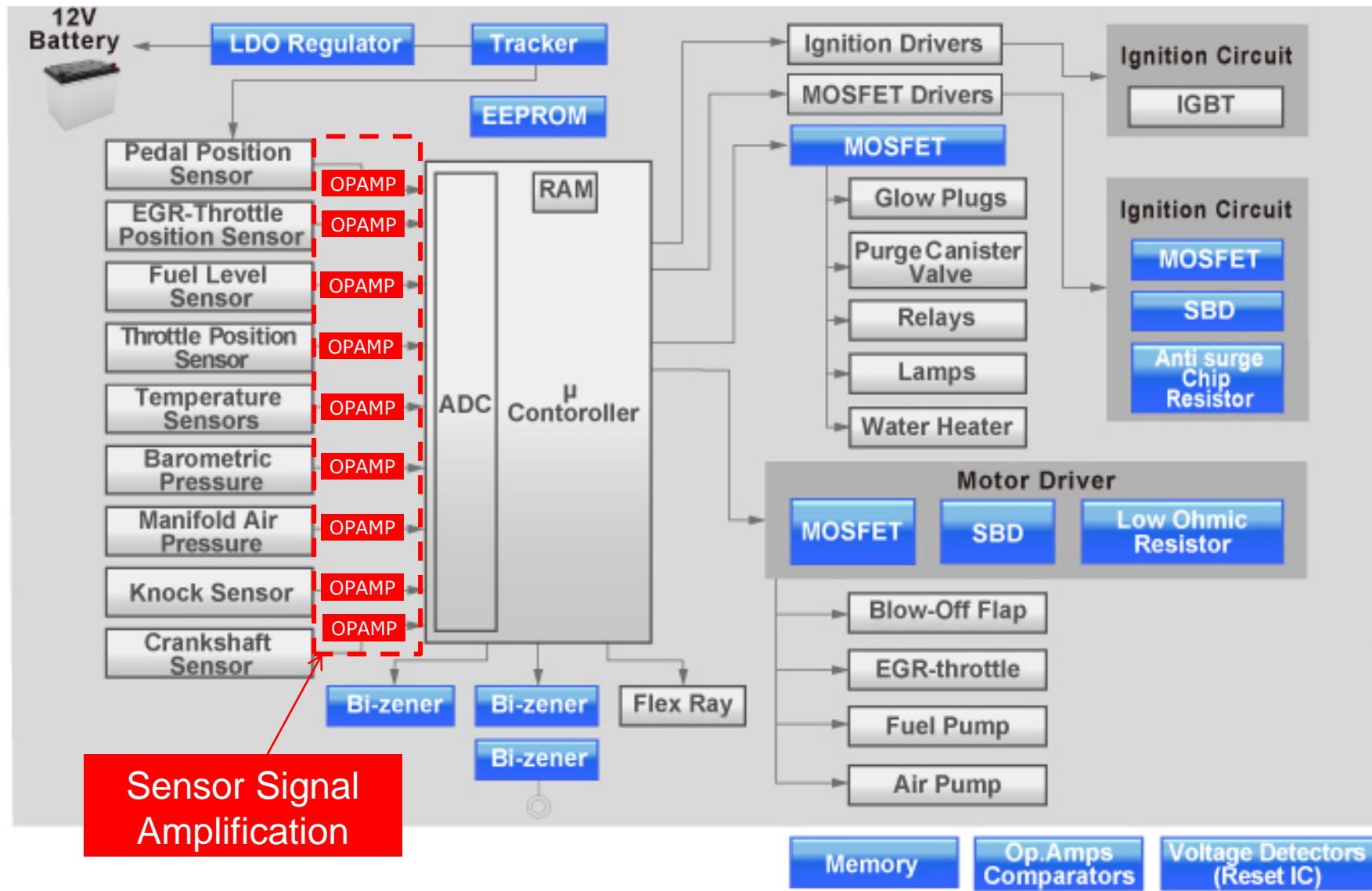
Noise-tolerant design reduces design load and cost
⇒ Enables quick response to meet short delivery times

How we were able to improve noise tolerance



Combining the above 3 technologies allowed ROHM to significantly improve EMI tolerance

Automotive OpAmp Application Example (ECU)

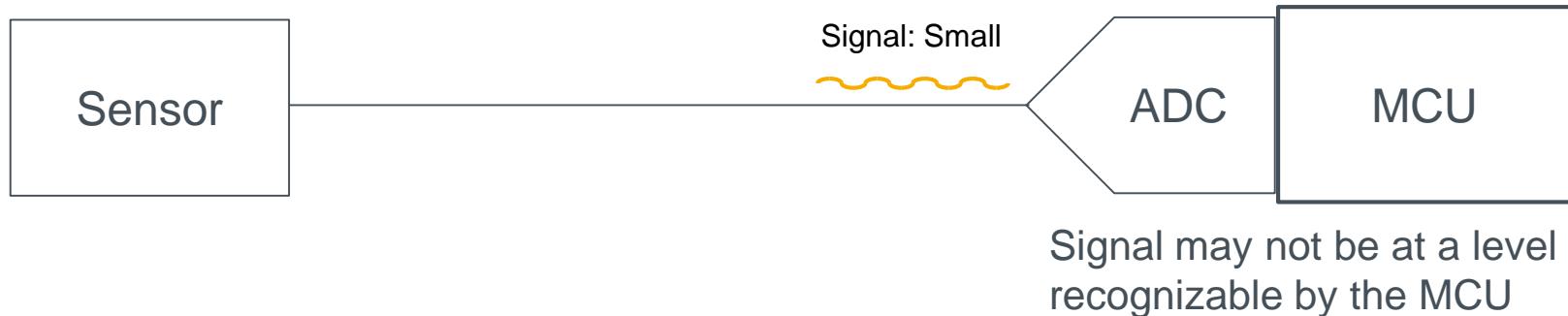


OpAmp Usage (Sensor Signal Amplification)

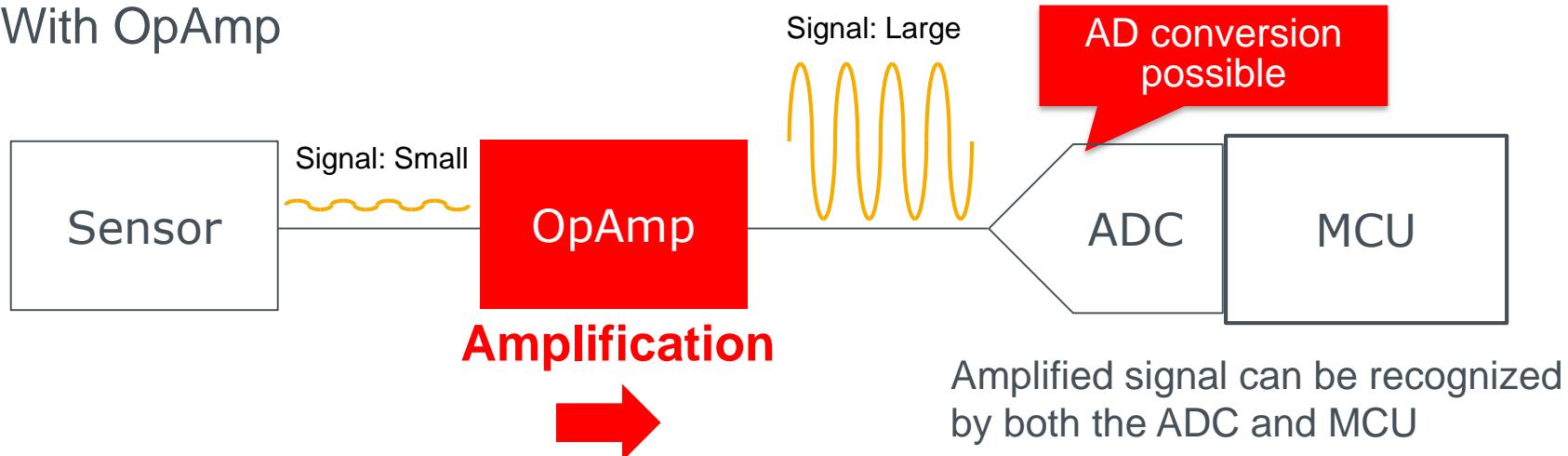
Sensors used to monitor ambient conditions emit ultra-small signals ⇒
Connect an OpAmp to amplify the voltage for processing by the MCU

*Sensor output impedance and disturbance noise are assumed to be equal

- Without OpAmp

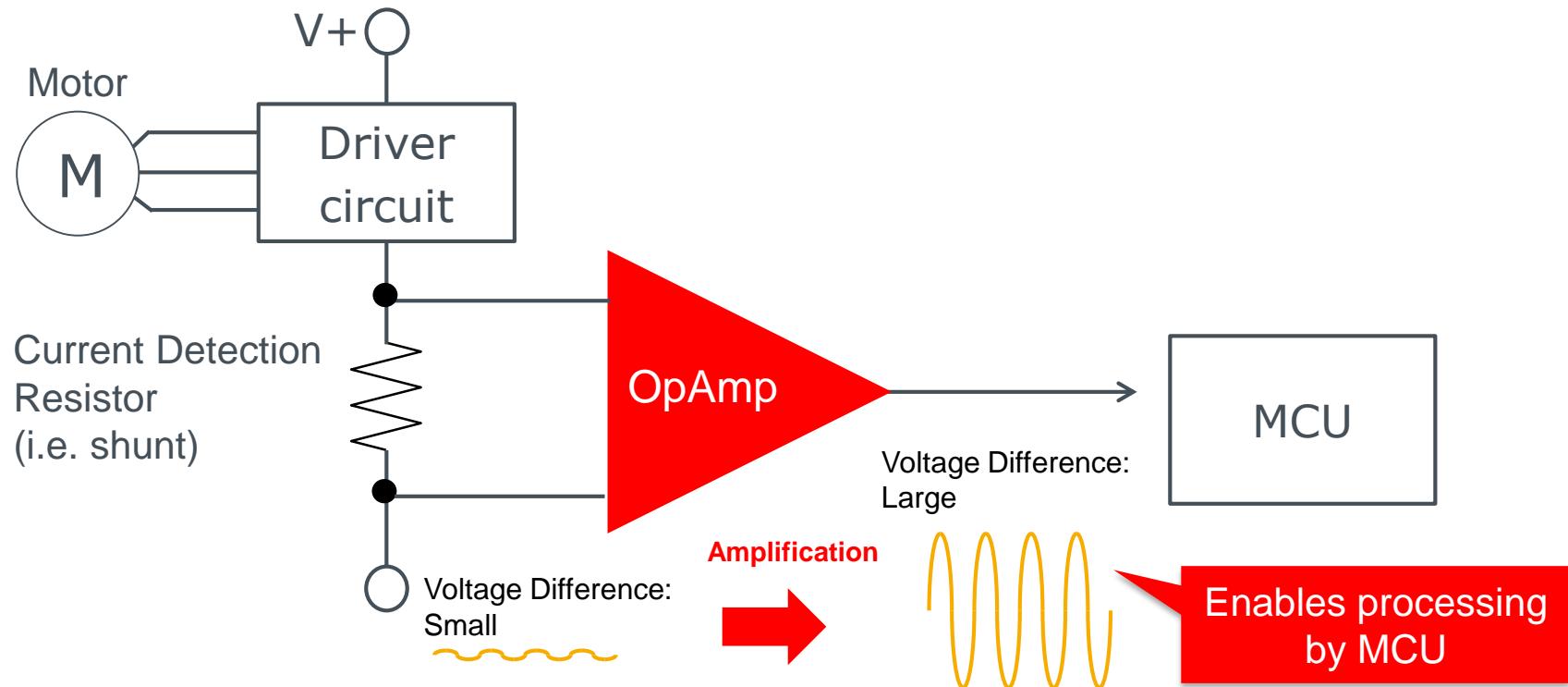


- With OpAmp



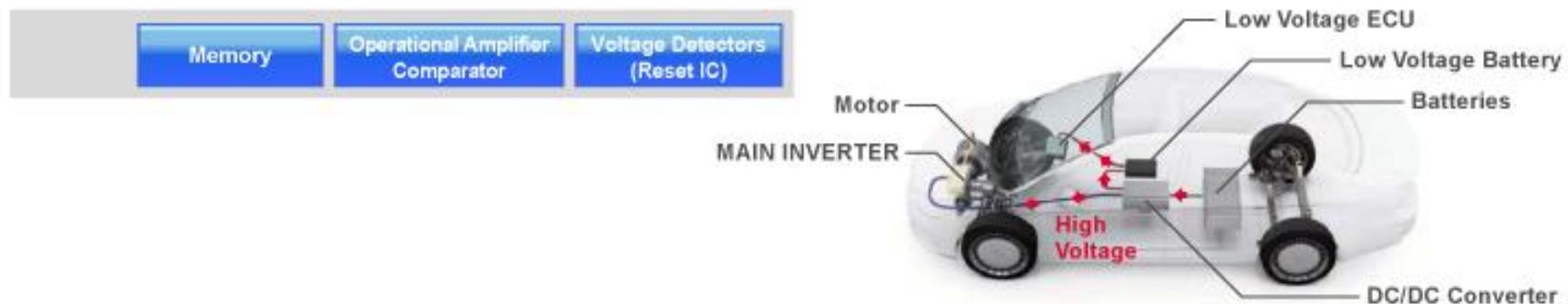
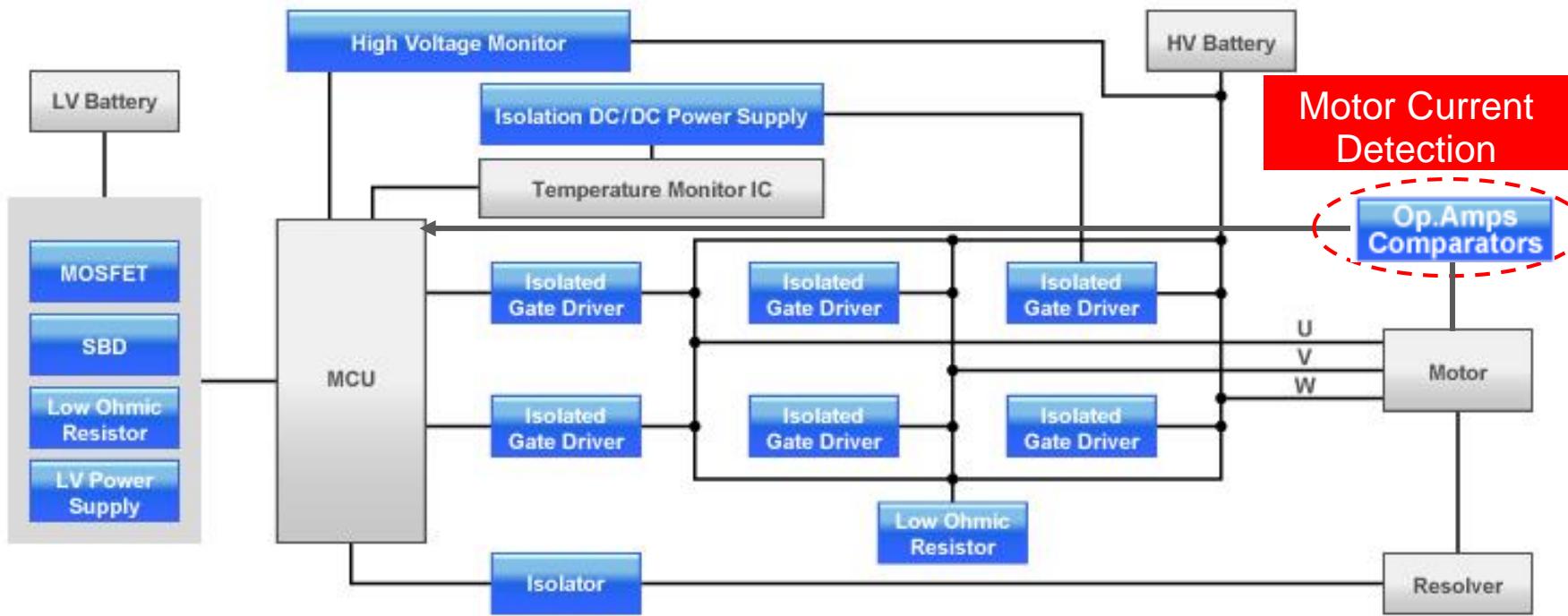
OpAmp Usage (Motor Current Detection)

A detection resistor is connected to the motor to monitor current, but the voltage difference at both ends is very small ⇒ **Use an OpAmp to amplify the small voltage at both ends of the detection resistor**



A current detection resistor is used to convert the current into voltage, then the OpAmp amplifies the weak converted signal to a level that can be processed by the MCU

OpAmp Usage (Main Inverter)





ROHM Co.,Ltd.

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