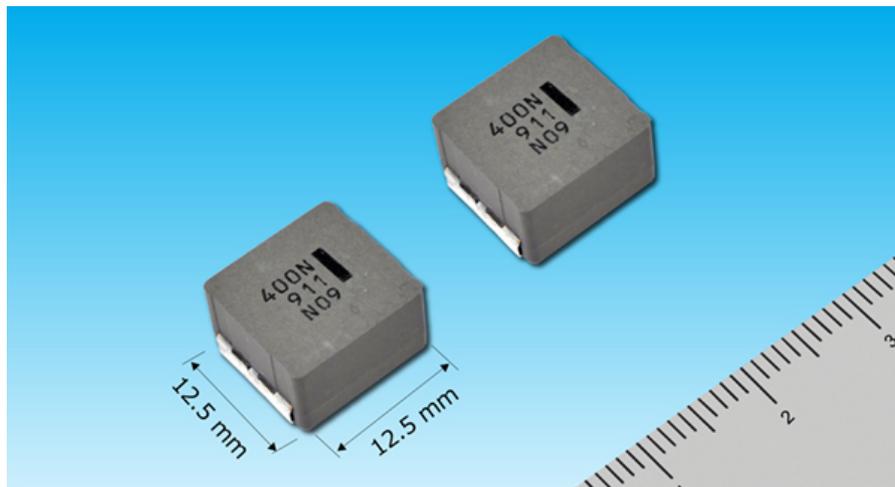


Dec 21, 2020

Panasonic Commercializes a Power Choke Coil Using Low-loss Magnetic Materials for Automotive Use

- Industry-leading*1 low-loss materials contribute to the improved performance and downsizing of automotive ECUs



Power Choke Coil for Automotive Use
(December 2020, Panasonic)

Osaka, Japan – Panasonic Corporation announced today that it has commercialized a surface mounted automotive power choke coil [1] suitable for power circuits in electronic control units (ECUs) installed in vehicles such as gasoline, diesel, and hybrid cars equipped with internal combustion engines, which are under pressure to meet the growing demand for improved fuel efficiency. The product features low loss, high withstand voltage, and high vibration acceleration-resistant characteristics, and will be mass-produced starting in February 2021.

With ever-tightening environmental regulations around the world, emission regulations for cars with internal combustion engines are becoming more stringent. In order to improve emissions performance, it is necessary for such cars to efficiently burn fuel to achieve complete combustion as much as possible. Accordingly, the direct fuel injection method [2] that directly injects fuel at high pressure into the cylinder has been adopted to facilitate highly efficient fuel combustion. Complete combustion requires fuel to be atomized and finely injected. For that purpose, it is indispensable for the coil used to boost the voltage of the injector drive unit of a direct injection engine to have the low loss and high withstand voltage characteristics in order to shorten its boost voltage recovery time. In addition, more automotive ECUs are being placed in the engine compartment, increasing the integration of mechanical and electronic in-vehicle components [3]. Moreover, this trend has created a need for automotive ECUs that can be installed in high-temperature environments under more severe vibration conditions and support larger currents. Panasonic has independently developed industry-leading low-loss magnetic materials with high withstand voltage to commercialize a surface-mounted automotive power choke coil that achieves the higher performance and downsizing of automotive ECUs.

Panasonic's new automotive power choke coil has the following features:

1. Halved power loss and doubled high withstand voltage performance*2 compared to conventional products through the use of industry-leading low-loss magnetic materials with high withstand voltage.

- Power loss: 1.5 W (Panasonic's conventional product*3: 3 W)
- High withstand voltage: up to 125 V (Panasonic's conventional product*4: up to 60 V)

2. The downsizing and the reduced number of coils required to be incorporated into ECUs due to the improved performance contribute to ECU space saving.

- Size: 12.5 mm² (Panasonic's conventional product*3: 14 mm²)

3. The product eliminates the need for anti-vibration reinforcement as part of the mounting process, reducing the use of reinforcing measures with bonding agents (adhesives).

- High resistance to vibration: up to 30 G

*1: As a surface-mounted power choke coil for automotive use (with a size of 10 to 12.5 mm²) as of Dec. 21, 2020 (Panasonic data).

*2: When the coil is driven by a triangular wave current with a peak value of 13 A_{o-p}, a frequency of 75 kHz, and a duty cycle of 35%.

*3: Panasonic's conventional product: 14-mm² dust core power choke coil for automotive use (PCC-D1413H series).

*4: Panasonic's conventional product: 10-mm² power choke coil for automotive use (PCC-M1054M series).

Suitable applications:

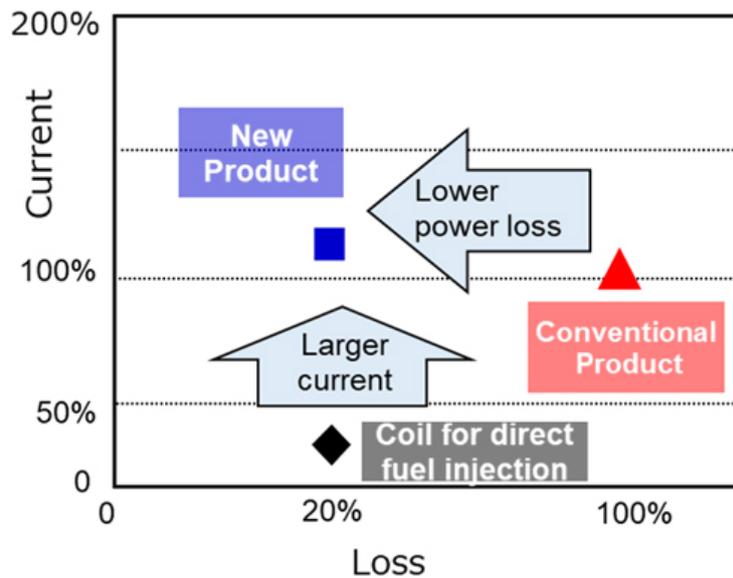
Boosting DC/DC converter circuits [4] for gasoline, diesel, and hybrid cars, power circuits in highly functional automotive ECUs, and automotive ECU circuits integrated with mechanical drive components.

[Product Features]

1. Halved power loss and doubled high withstand voltage performance compared to conventional products through the use of industry-leading low-loss magnetic materials with high withstand voltage

In accordance with environmental regulations, the internal combustion engines of cars are required to conform to further CO₂ reduction requirements and emission controls, which has led to the introduction of fuel injection based on the direct injection method and the lean burn control [5] of fuel.

Power choke coils incorporated into automotive ECUs are used in boosting circuits; therefore, high withstand voltage characteristics are required in addition to lower power loss and greater downsizing features. Conventional products faced issues of unsatisfactory power loss and withstand voltage characteristics and were unable to allow large currents to flow. Panasonic has developed new low-loss magnetic materials capable of handling large currents with a high withstand voltage based on metal composite materials [6] using its in-house-developed metallic magnetic materials to commercialize a power choke coil with halved power loss and doubled high withstand voltage performance compared to conventional products. These features will contribute to the improved performance and downsizing of automotive ECUs.



2. Downsizing and reduced number of coils required to be incorporated into ECUs contribute to ECU space saving

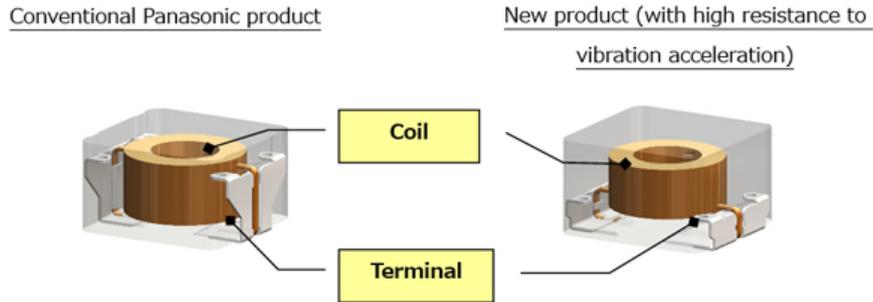
With the rapidly expanding computerization of cars, ECUs are being incorporated more frequently in the engine compartment and the engine itself, which requires the downsizing of ECUs. Accordingly, Panasonic has developed a high performance power choke coil using its in-house-developed magnetic materials and winding technology for forming coils with high accuracy. The size of the coil was reduced to 12.5 mm², smaller than a comparable conventional product (14 mm²), and the volume was reduced by 40% compared to the company's conventional power choke coil used for direct fuel injection. Additionally, the reduced number of coils required to be incorporated into ECUs due to the improved performance contributes to ECU space saving.



3. The product removes the need for the anti-vibration reinforcement as part of the mounting process, allowing streamlining of the process

In conventional automotive ECU board mounting processes, reinforcement measures to fix components with bonding agents (adhesives) were necessary for ensuring the high vibration acceleration-resistant performance. This product employs Panasonic's original coil winding and forming technologies, which reduce the height of the terminal's pull-out position down to half compared to the company's conventional products. Positioning closer to the mounting circuit board have achieved excellent vibration resistant performance. This removes the need for anti-vibration reinforcement and contributes to the streamlining of the mounting process.

< Structure comparison >



Basic specifications:

Series	Shape W × D × H (mm)	Inductance [7]*1	DC resistance [8] 20°C	Rated current*2	Rated voltage
PCC-M1280MS	14.0 × 12.5 × 8.0	40 μH	41.0 mΩ	5.9 A	125 V

*1: Measured at 100 kHz

*2: Current value that causes a temperature rise of 40°C

Panasonic will expand the inductance range of the product and add smaller models to enhance the product lineup to respond to market needs in the future.

[Term Descriptions]

[1] Power choke coil

This is an electronic component used in DC/DC converter circuits, etc., that serves as a filter for accumulating energy and removing noise.

[2] Direct fuel injection method

Method of directly injecting gasoline into cylinders at high pressure.

[3] Integration of mechanical and electronic in-vehicle components

This refers to the integration of mechanical drive components and automotive ECUs. Mechanical drive components and automotive ECUs used to be installed separately, but were interconnected via cables. Demand for high-precision control, higher degree of freedom in component layout, reduction in the number of cables, etc. has led to the adoption of an integrated configuration of mechanical and electrical components.

[4] DC/DC converter circuit

This is a circuit that converts direct current from one voltage to another.

[5] Lean burn control

Combustion of fuel with a smaller injected amount than the theoretical air fuel ratio.

[6] Metal composite material

This refers to a magnetic material made by the compression molding of metallic magnetic material-based (iron group) powder insulated with resin.

[7] Inductance

This is an indicator of coil performance. Passing a changing current through a coil will generate a voltage that passes current in a direction that hinders the current change.

The rate of the generated voltage is referred to as inductance.

[8] DC resistance

DC resistance is a resistance component of a winding (copper wire). The lower the DC resistance, the smaller the power loss, thereby improving the power supply efficiency.

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<https://industrial.panasonic.com/cuif/ww/contact-us?>

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Detailed product information:

Low-loss Power Choke Coil for Automotive (Metal core type) MC

https://industrial.panasonic.com/ww/products-inductors/automotive-inductors/automotive-inductors/low-loss_pcc?

[ad=press20201221](https://industrial.panasonic.com/ww/products-inductors/automotive-inductors/automotive-inductors/low-loss_pcc?ad=press20201221)

About Panasonic

Panasonic Corporation is a worldwide leader in the development of diverse electronics technologies and solutions for customers in the consumer electronics, housing, automotive, and B2B businesses. The company, which celebrated its 100th anniversary in 2018, has expanded globally and now operates 528 subsidiaries and 72 associated companies worldwide, recording consolidated net sales of 7.49 trillion yen for the year ended March 31, 2020. Committed to pursuing new value through innovation across divisional lines, the company uses its technologies to create a better life and a better world for its customers. To learn more about Panasonic:

<https://www.panasonic.com/global>.

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