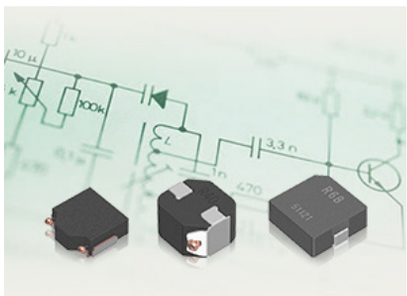
Product Overview

Power Inductor SPM Series

Inductor (coil)



The SPM series power inductors are the metal composite type wire-wound inductors that have the coils integrally molded with metallic magnetic powder. Compared to ferrite-base wire-wound inductors, the SPM series inductors realize larger current, lower Rdc, smaller size and superior DC bias characteristic. In addition, they ensure low magnetic flux leakage and are effective as a means to suppress acoustic noise of the coil. This article introduces the structure, features, and application of these products, and other information that helps you in an easy-to-understand way.

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Product summary

The SPM series are the inductors that have the coils integrally molded with metallic magnetic powder. TDK offers a large selection of the SPM series inductors, including the lowprofile SPMLR series, the SPMHZ series for automotive applications, etc.

Figure 1: Product summary

Series	SPM series 	SPM-LR series 	SPM-XT series 	SPM-CT series 	SPM-HZ series 	SPM-VT series 
Product summary	**Metal composite type inductor** The inductors that have the coils integrally molded with magnetic powder. These inductors use Fe-base alloy powder to have high saturation characteristics, i.e. allowing for large current. The inductors of this series are offered in large selection of product sizes.	**Metal composite type low-profile inductor** The inductors that have the coils integrally molded with magnetic powder. These inductors use Fe-base alloy powder to have high saturation characteristics, i.e. allowing for large current. The low-profile (H = 1.0 to 2.0 mm) is achieved by employing the terminal of proprietary shape.	**Metal composite type large inductor** The inductors that have the coils integrally molded with magnetic powder. These inductors use Fe-base alloy powder to have high saturation characteristics, i.e. allowing for large current. A simple structure without exterior terminals is achieved by employing the wire collinear electrode structure.	**Metal composite type inductor for high frequency applications** The inductors that have the coils integrally molded with magnetic powder. By using the proprietary alloy powder, low loss in the high frequency region is achieved, in addition to having high saturation characteristics.	**Metal composite type inductor for automotive applications** The inductors that have the coils integrally molded with magnetic powder. These inductors use Fe-base alloy powder to have high saturation characteristics, i.e. allowing for large current. The inductors of this series are designed for automotive applications.	**Metal composite type inductor for automotive applications** The inductors that have the coils integrally molded with magnetic powder. These inductors use Fe-base alloy powder to have high saturation characteristics, i.e. allowing for large current. Compared to the SPM-HZ series, this series inductors have wider operating temperature range in automotive environments.

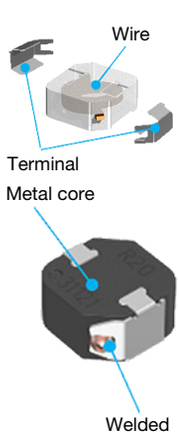
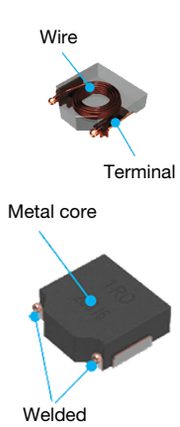
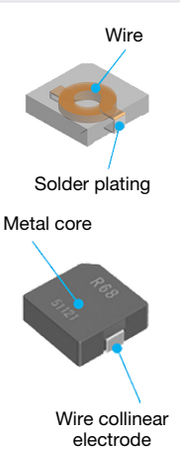
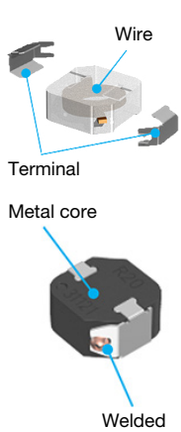
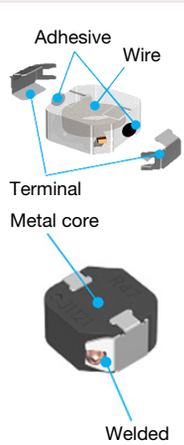
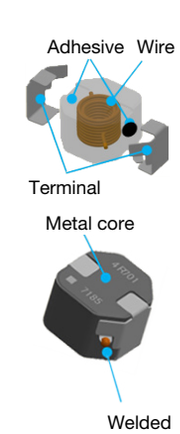
Figure 1: Product summary

Series	SPM series	SPM-LR series	SPM-XT series	SPM-CT series	SPM-HZ series	SPM-VT series
Features	• Large selection of products, ranging from 4 to 10 mm. • Low inductance variance in high-temperature environments. • With the use of a coil integrally molded with metallic magnetic material, hum noise and magnetic flux leakage are reduced. • High quality and high productivity, and therefore stable supply is possible.	• The low-profile is achieved with the use of L-shaped terminals. • Low inductance variance in high-temperature environments. • With the use of a coil integrally molded with metallic magnetic material, hum noise and magnetic flux leakage are reduced.	• Compatible with low inductance region. • Low inductance variance in high-temperature environments. • With the use of a coil integrally molded with metallic magnetic material, hum noise and magnetic flux leakage are reduced. • High quality and high productivity, and therefore stable supply is possible.	• By employing proprietary alloy powder, low loss = high Q characteristics are achieved. • Low inductance variance in high-temperature environments. • With the use of a coil integrally molded with metallic magnetic material, hum noise and magnetic flux leakage are reduced.	• AEC-Q200 complied. • Large selection of products, ranging from 4 to 10 mm. • Low inductance variance in high-temperature environments. • With the use of a coil integrally molded with metallic magnetic material, hum noise and magnetic flux leakage are reduced. • High quality and high productivity, and therefore stable supply is possible.	• AEC-Q200 complied. • Large selection of products is offered, ranging from 1 to 100 uH. • Low inductance variance in high-temperature environments. • Vibration resistance to 30G is featured with vibration resistance structure. • With the use of a coil integrally molded with metallic magnetic material, hum noise and magnetic flux leakage are reduced.
Applications	• LCD-TV,HDD • Amusement equipment • Other AV equipment	• Notebook computers • Tablet terminals • Gaming equipment	• Base stations, servers • Amusement equipment • Industrial equipment	• Wireless chargers • IJP head drive	• Car accessories • Electronic power steering • Headlights, etc.	• LED • ADAS • Engine ECUs, etc.

Product structures

Figure 2 shows the structure of each SPM series. The integral mold structure and the welding method for connecting the wire and terminals achieves high reliability.

Figure 2: Product structures

Series	SPM series	SPM-LR series	SPM-XT series	SPM-CT series	SPM-HZ series	SPM-VT series
Product structures						

Product features

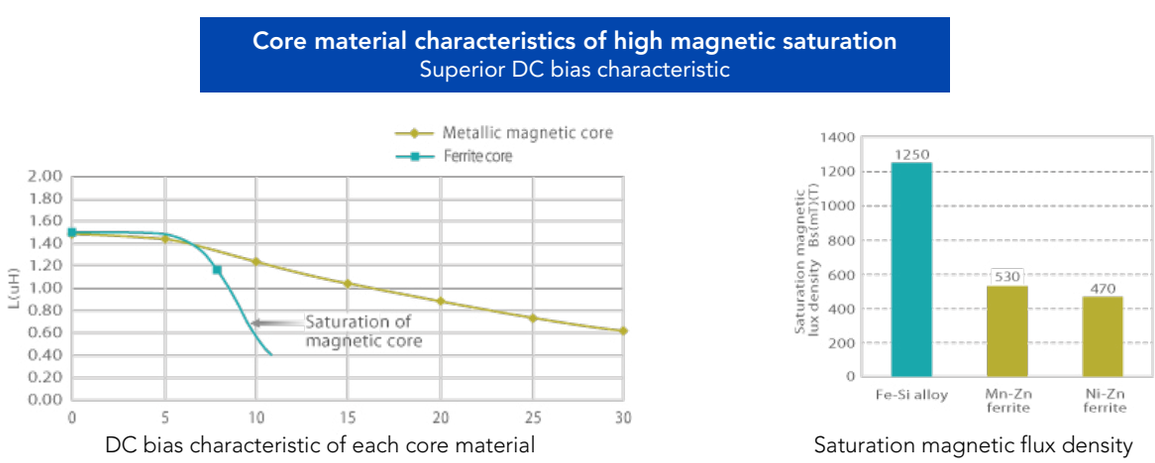
Figure 3 shows the features of each SPM series.

Figure 3: List of product features

Series	SPM series	SPM-LR series	SPM-XT series	SPM-CT series	SPM-HZ series	SPM-VT series
Appearance						
Operating temperature range	-40 to 125°C (including self-temperature rise)					-55 to 125°C (including self-temperature rise)
Magnetic material	Metallic magnetic material					
Terminal electrode specifications	Metal terminal + plating		Wire collinear electrode + plating	Metal terminal + plating		
Features	Standard specifications	Low-profile specifications	Large current specifications	High frequency & High Q specifications	Automotive application specifications	

One of the remarkable features of the SPM series is that they are made with metallic magnetic core. Compared to ferrite cores, metallic magnetic cores have higher magnetic saturation density and better DC bias characteristic. In addition, since their Curie temperature is high, they show only a small change in characteristics with ambient temperature.

Figure 4: Comparison of DC bias characteristic (Metallic magnetic core vs. ferrite core)

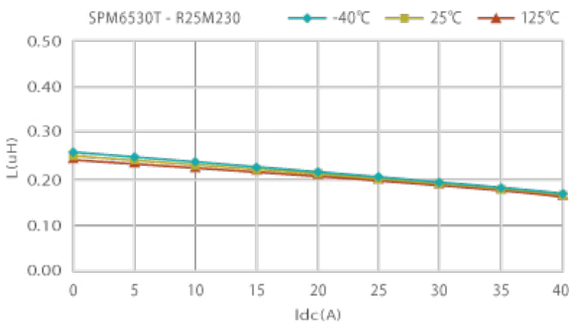


DC bias characteristic of each core material

Saturation magnetic flux density

Figure 5: Change in DC bias characteristic with ambient temperature

Core material characteristics of high Curie temperature
Change in characteristics with ambient temperature is small.



DC bias characteristic under different temperatures

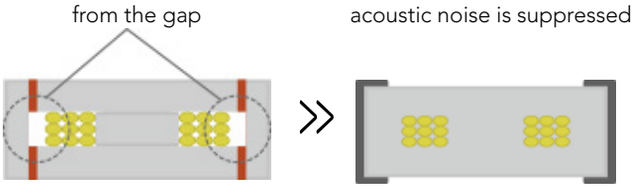
Since the SPM series inductors are made with wire-wound cores integrally molded with metallic magnetic powder, they do not have a core gap and the acoustic noise is reduced. Also, they have good shielding qualities and the magnetic flux leakage is small.

Figure 6: Integral molding for suppressing acoustic noise

Core gapless (integral molding) for suppressing acoustic noise
Contributes to improve the set quality

Acoustic noise generates from the gap

With the gapless structure, acoustic noise is suppressed



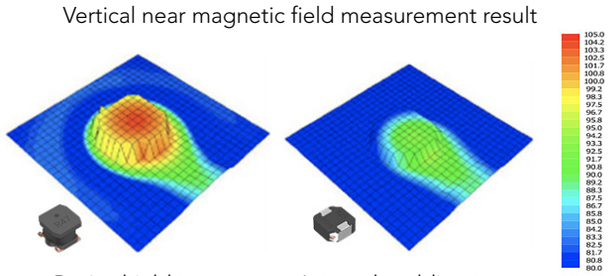
Combination core type

Integral molding type (SPM)

Figure 7: Comparison of magnetic flux leakage

Shielding structure for low magnetic flux leakage
Effective for reducing EMI

Vertical near magnetic field measurement result



Resin shield type

Integral molding type (SPM)

List of products

Figure 8 shows the list of products by series and by shape. You can view the detailed information of the product or purchase a sample by clicking the type name.

Figure 8: List of products

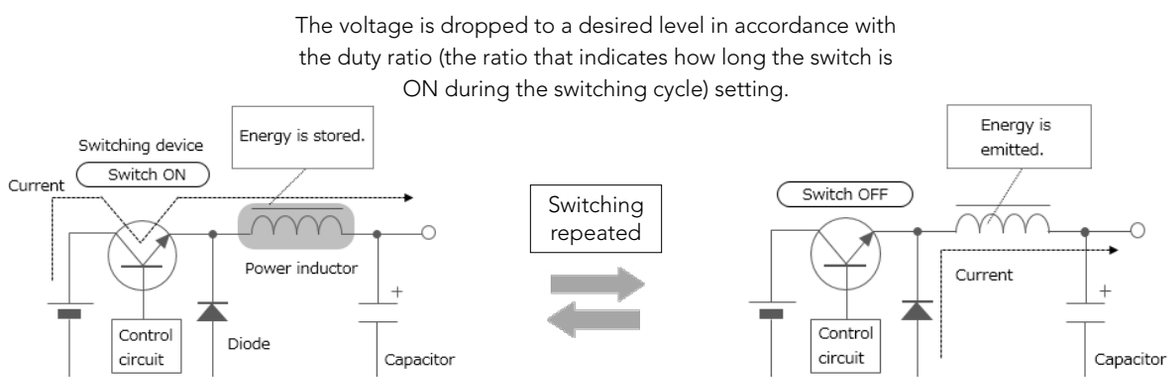
Commercial grade Automotive grade

Size (mm)	SPM series	SPM-LR series	SPM-XT series	SPM-CT series	SPM-HZ series	SPM-VT series
3mm sqr.		 **3.2x3.0mm** SPM3010-LR SPM3012-LR SPM3015-LR SPM3020-LR				
4mm sqr.	 **4.2x4.0mm** SPM4030	 **4.4x4.1mm** SPM4010-LR SPM4012-LR SPM4015-LR SPM4020-LR			 **4.2x4.0mm** SPM4030-HZ	
5mm sqr.	 **5.2x5.0mm** SPM5030	 **5.4x5.1mm** SPM5010-LR SPM5012-LR SPM5015-LR SPM5020-LR			 **5.2x5.0mm** SPM5030-HZ	
6mm sqr.	 **7.1x6.5mm** SPM6530 SPM6550			 **7.1x6.5mm** SPM6550-CT	 **7.1x6.5mm** SPM6530-HZ SPM6550-HZ	
7mm sqr.						 **7.5x7.0mm** SPM7054-VT
10mm sqr.	 **10.7x10.0mm** SPM10040		 **11.5x10.0mm** SPM10040XT		 **10.7x10.0mm** SPM10040-HZ SPM10054-HZ	
12mm sqr.			 **12.6x13.0mm** SPM12565XT			

What are power inductors?

Power inductors are inductors used for power supply circuit such as DC-DC converters. They are also called power coils or power chalks. One of the inductors' characteristics is that they store energy by self-induction function. Chopper type DC-DC converters use inductors having such characteristics with switching devices for voltage conversion (see Figure 9).
Depending on the processing method, inductors can be classified into multilayer type, thin-film type, and wire-wound type. Since wire-wound type permits large current to flow, most of the power inductors are wire-wound type. Various wound-type power inductor products with ferrite or soft magnetic metal core are offered. Recently, the multilayer type and thin-film type, with which reduction of size and thickness can be achieved, are being improved to allow for larger current.

Figure 9: DC-DC converter (chopper type / step-down type) and inductor



Contact Information

Inquiries on products, sales, or technical matters

Related Links

Inductor (coil) product information

Various information on TDK Group's inductors (coils) are comprehensively provided on this page.

- Lineup
- Inductors for high frequency applications Selection Guide
- Inductors for Power Circuits Selection Guide (Commercial Grade)
- Inductors for Power Circuits Selection Guide (Automotive Grade)
- Inductors for standard circuits/decoupling circuits Selection Guide
- Application Note “Selection Guide for Power Inductors in Consideration of Leakage Flux”
- Solution Guide “Solutions for silencing DC-DC converters - Measures Against Acoustic Noise in Power Inductors”