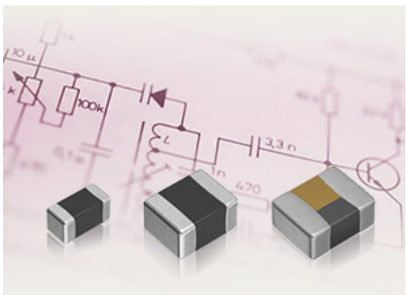
Product Overview

Power Inductor TFM Series

Inductors (Coils)



The TFM series of power inductors consists of compact, thin inductors developed with the skillful application of the thin-film processing techniques acquired by TDK throughout its past. By using metallic magnetic materials with high saturation magnetic flux densities, these products have furthermore achieved the outstanding DC superimposition characteristics required of power inductors. This article clearly describes and explains valuable information for our customers related to the products in the TFM series, including their structures, features, and uses.

Table of contents

Product summary

A summary of the TFM series is shown in Figure 1. Starting with the TFM-GHM series, various lines of products are available, each with further improved characteristics.

Figure 1: Product summary

Series	TFM-GHM series	TFM-ALM series	TFM-ALC series	TFM-ALMA series	TFM-ALVA series (in development)
	Thin-film type inductors which use metallic magnetic materials			Automotive thin-film type inductors which use metallic magnetic materials	
Product Summary	Inductors which are produced using thin-film processing. By employing our original pattern forming technology as well as metallic magnetic materials with improved saturation magnetic flux densities, these products have achieved rated currents on the order of several A despite being compact and low-profile. The risk of short-circuits is prevented by a structure which includes insulation between the coil conductors, for greater reliability.	Inductors which are produced using thin-film processing. Their characteristics have been enhanced even further over the GHM series, by optimizing their internal patterns.	Inductors which are produced using thin-film processing. Their characteristics have been enhanced even further over the ALM series, by changing their metal materials and optimizing their internal patterns.	Inductors which are produced using thin-film processing. These products are compatible with quality requirements for in-vehicle mounting, and are guaranteed to support temperatures of 150°C.	Inductors which are produced using thin-film processing. The characteristics of their metal materials have been improved over the ALMA series for enhanced withstand voltage performance.

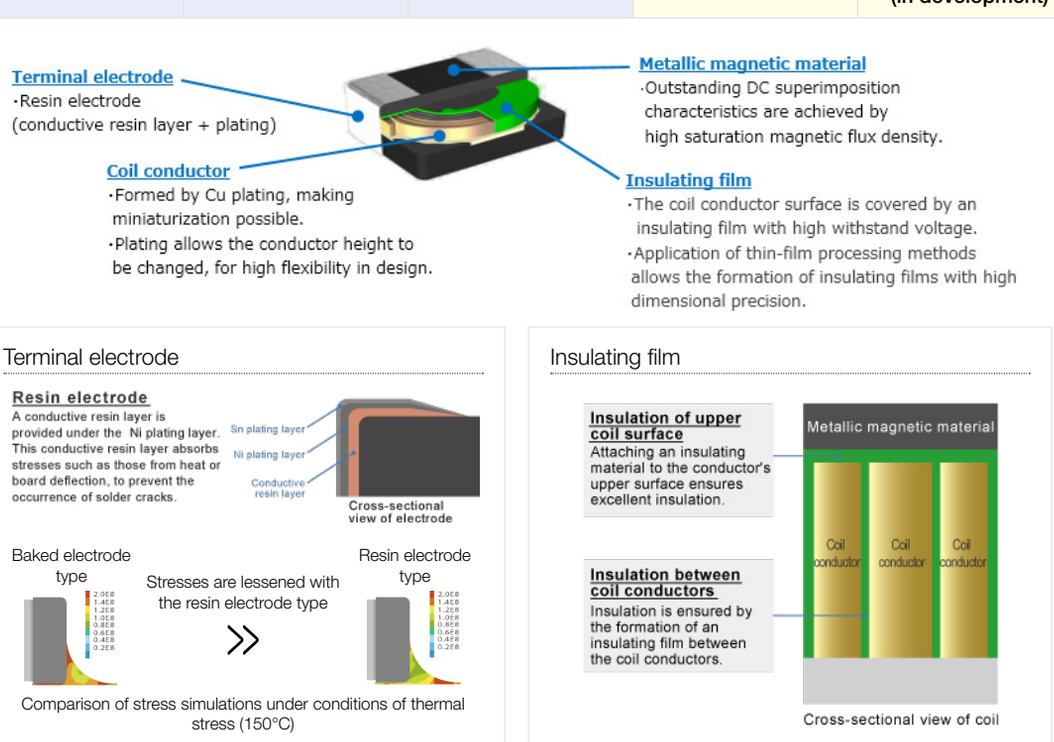
Figure 1: Product summary

Series	TFM-GHM series	TFM-ALM series	TFM-ALC series	TFM-ALMA series	TFM-ALVA series (in development)
Features	• Compact, support large currents	• Optimization of internal patterns has improved DC resistance and DC superimposition characteristics	• More compact than GHM and ALM • Use of low-loss materials has successfully reduced coil losses	• Compliant with AEC-Q200 • Low magnetic leakage flux	• Compliant with AEC-Q200 • Enhancements to the insulating performance of their magnetic materials have made it possible to ensure a withstand voltage of 40V, allowing usage even in battery lines • Low magnetic leakage flux
Applications	• Smartphones • Tablet devices • Other mobile devices			• ADAS • ECU • In-vehicle cameras • Radar • Automotive communication modules	

Product structures

The TFM series consists of inductors which are produced using thin-film processing. Since their coils are formed by Cu plating, they support highly flexible designs, and their use of resin electrodes also allows them to lessen stresses such as those from heat and board deflection.

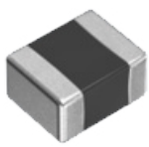
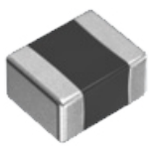
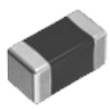
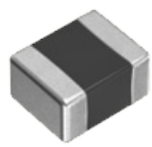
Figure 2: Product structure

Series	TFM-GHM series	TFM-ALM series	TFM-ALC series	TFM-ALMA series	TFM-ALVA series (in development)
Product Structure					

Product features

The features of each TFM series are shown in Figure 3. The TFM-ALMA and TFM-ALVA series consist of products with automotive specifications, which support temperatures of 150°C.

Figure 3: List of product features

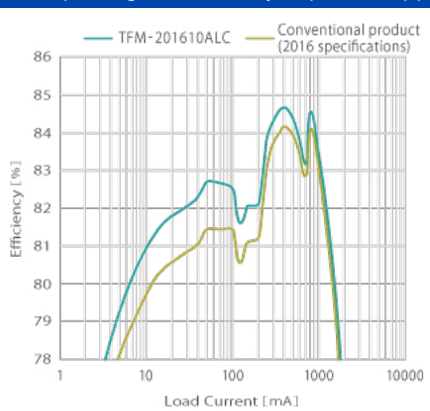
Series	TFM-GHM series	TFM-ALM series	TFM-ALC series	TFM-ALMA series	TFM-ALVA series (in development)
Appearance					
Size	2.0x1.6mm	2.0x1.6mm	1.6x0.8mm 2.0x1.6mm	2.0x1.6mm 2.5x2.0mm	2.0x1.6mm 2.5x2.0mm 3.2x3.5mm
Operating temperature range	-40 to 125°C (including self-heating)			-40 to 155°C (including self-heating)	
Magnetic material	Metallic magnetic material			Metallic magnetic material	
Terminal electrode specifications	Resin electrode (conductive resin layer + plating)			Resin electrode (conductive resin layer + plating)	
Features	Standard specification	Excellent DC superimposition characteristics	Reduced losses achieved by revision of core material	Automotive specifications	Automotive specifications with assurance of 40V

The TFM series employs a newly-developed metallic magnetic material, to reduce coil losses and achieve excellent DC superimposition characteristics.

Figure 4: Improvement of power-supply circuit efficiency characteristics

Reduced coil losses achieved by magnetic material characteristics

Effective at improving the efficiency of power-supply circuits

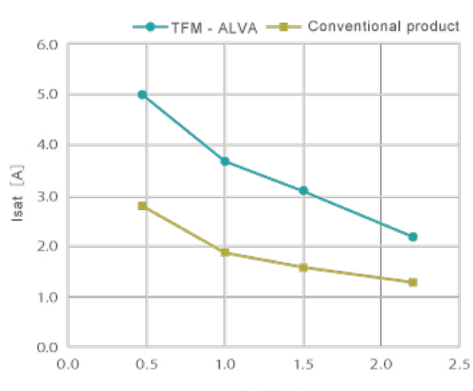


DC-DC converter efficiency characteristics

Figure 5: Improvement of DC Superimposition Characteristics

High magnetic saturation achieved by magnetic material characteristics

Excellent DC superimposition characteristics

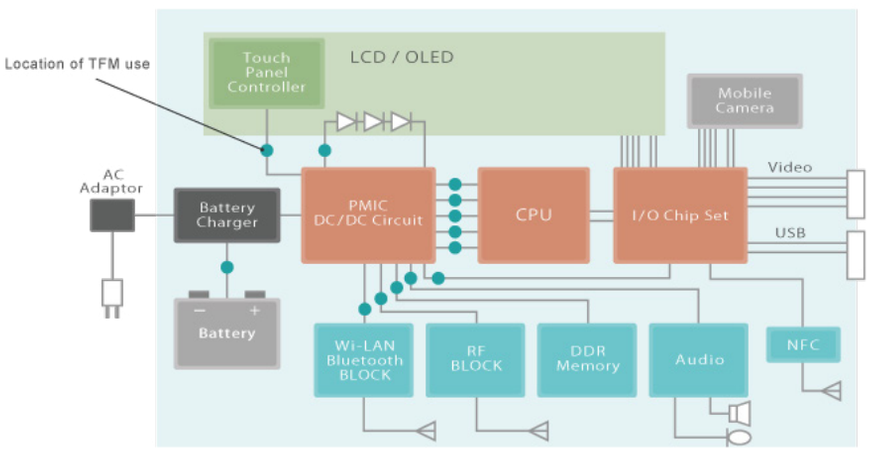
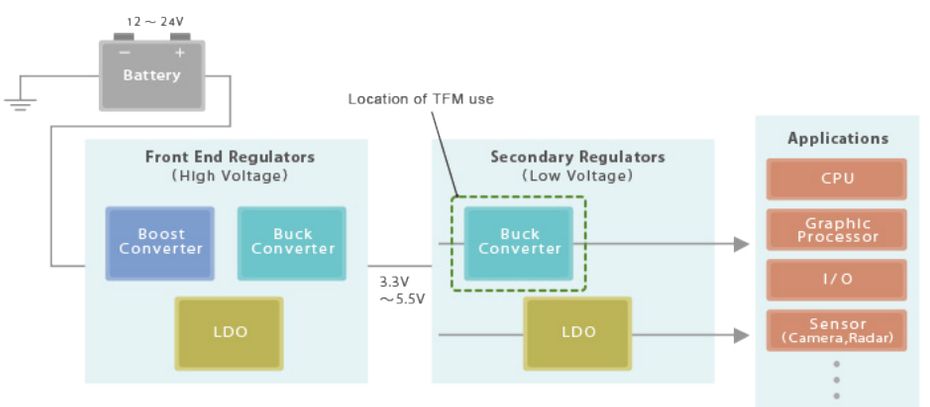


Rated current according to inductance value
(Isat: Current at which the initial value of L decreases by 30%)

Applications

Example applications which use the TFM series are shown in Figure 6. Since the inductors in the TFM series are compact and can support large currents, they are ideal for applications requiring high-density mounting such as smartphones and automotive ECUs.

Figure 6: Applications

Application	Block diagram
Smartphone	
Automotive ECU	

List of products

A list of products by series and shape is shown in Figure 7. Detailed information can be viewed and samples can be purchased by clicking on the product type name.

Figure 7: List of products

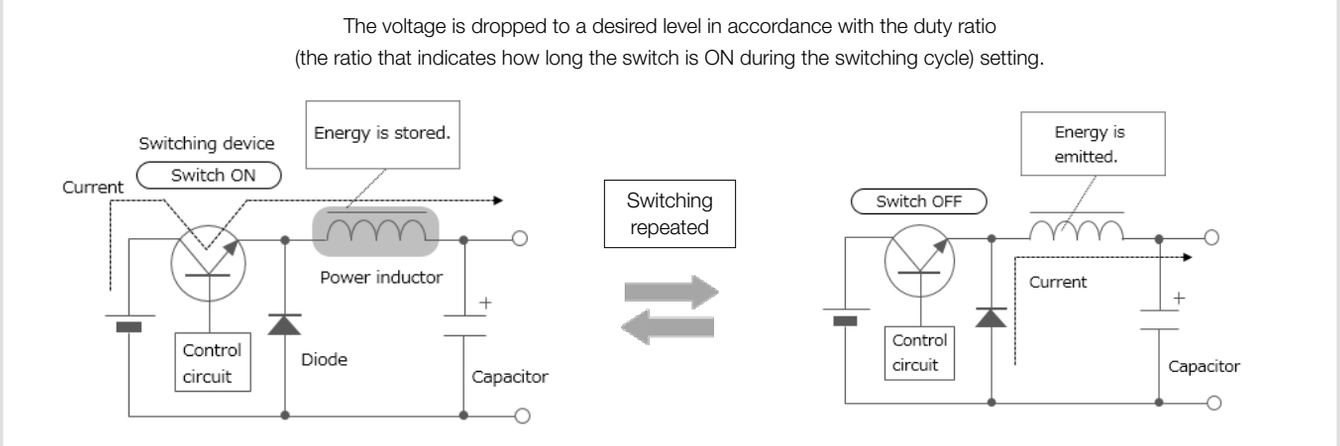
Commercial grade Automotive grade

Size (mm)	Height (mm)	TFM-GHM series	TFM-ALM series	TFM-ALC series	TFM-ALMA series	TFM-ALVA series (in development)
1.6x0.8	0.8 Max.			 TFM160808ALC		
2.0x1.6	0.8 Max.			 TFM201608ALC		
	1.0 Max.	 TFM201610GHM	 TFM201610ALM	 TFM201610ALC	 TFM201610ALMA	 TFM201610ALVA
2.5x2.0	1.2 Max.				 TFM252012ALMA	 TFM252012ALVA
3.2x2.5	1.2 Max.					 TFM322512ALVA

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 characteristic with switching devices for voltage conversion (see Figure 8).
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 8: 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”