Ferrite cores are familiar as brittle, rigid and bulky components for high-inductance coils and transformers. The performance of such ferrites depends very much on external influences such as temperature, pressure, electromagnetic fields and frequency.

FPC is a homogeneous mixture of ferrite powder and plastic with outstanding mechanical and magnetic properties. This rugged material can be processed into injection-molded parts or thin, flexible film to open up innovative applications.

The new C351 film is suitable for high-temperature applications up to 200 °C and is UL 94-V0-listed. It is also available with copper coatings of 35 to 75 µm and in various thicknesses from 0,2 to 0,4 mm. FPC film of materials C350 and C351 can also be supplied in self-adhesive versions.

FPC film is ideal for EMC applications, e.g. to shield coils against metals or absorb interference at frequencies of 500 MHz and higher. It opens up many other applications, such as implementation of low-profile coils for identification systems and electronic article surveillance in retailing and logistics, for sensors or contactless smart cards. FPC can also be used for compensation of deflection yoke coils in TV picture tubes and computer monitors. This innovative material is also suitable as spacing between ferrite cores – instead of air gaps or non-magnetic films – to suppress leakage fields, for instance, or to adjust the biasing curve.

EPCOS

FPC

C302

Basic features

- Composite material of polymer and ferrite for injection molded parts
- Minor influence of temperature
- High dc magnetic bias capability
- Suitable for a wide frequency range
- High electrical resistance

Technical benefits

- High mechanical stability
- Excellent dimensional stability
- Manufacturing technique: injection molding
  → production of any core shape possible
- Distributed air gap → low winding losses

Applications

- Inductive proximity switches
- Identification systems, e.g. immobilizer in automobiles
- Non-contact power transmission
- Resonance inductors for DC/DC converters

Core shapes on request

Physical properties

Material	Symbol	Unit	C302
Initial permeability; f = 1 MHz	μ_i		17 ± 20 %
Flux density (near saturation) H = 25 kA/m; f = 10 kHz	B_S (25 °C)	mT	330
Remanent flux density H = 25 kA/m; f = 10 kHz	B_r (25 °C)	mT	15
Coercive field strength H = 25 kA/m; f = 10 kHz	H_C (25 °C)	A/m	770
Relative loss factor f = 1 MHz f = 100 MHz	$\tan\delta/\mu_i$		 < 0,0004 < 0,03
Hysteresis material constant	η_B	10^{-3}/mT	< 0,25
Temperature coefficient	$\alpha = \Delta\mu/\mu\Delta T$	1/K	< 0,0002
Density		kg/m^3	3500
Resistivity f = 10 kHz f = 10 MHz	ρ	Ωm	 21 13
Dielectric constant f = 10 kHz f = 10 MHz	ε_r		 280 100
Max. operating temperature	T_{max}	°C	180

EPCOS

FPC Film

C 350, C 351 **B68450 … B68452**

Basic features

- FPC is a composite material of polymer and ferrite
- FPC film is a thin, mechanically flexible film

Technical benefits

- Stable magnetic characteristics
- Low weight: FPC film is 40% lower in density than ferrite
- High mechanical strength
- Shaping as required: customer-specific solutions possible
- Economy: easy transport and storage,
  simple, rationalized processing, low mounting volume
- C351 film suitable for high-temperature applications (up to 200 °C)
- Material C351 approved to UL 94-V0 (E 140 693)
- Various film thickness (from 0,2 to 0,4 mm)
- Self-adhesive versions
- C351 film with optional copper coatings 35 to 75 µm thick

Applications

- Implementation of low-profile coils, e.g. for
  – identification systems
  – security tags for electronic article surveillance
  – sensors
  – inductive reading of smart cards
- Electromagnetic shielding of coils from metals to prevent interference
- EMC: absorption of radiated emissions at frequencies ≥ 500 MHz
- Compensation of deflection yokes to correct distortion at the corners of TV screens and monitors
- Spacing between ferrite cores (as a substitute for air gaps or non-magnetic films) for
  – suppression of the leakage field
  – adjustment of the biasing curve

Ordering details

The ordering codes are structured as follows:

1st group Design	2nd group Film thickness/width		3rd group Copper coating[1]/material	
B68450: Film on reel	A: 0,2 mm B: 0,3 mm C: 0,4 mm	0080: 80 mm	X: Default letter	350 351
B68451: Film on reel, self-adhesive				
B68452: Film on reel, copper-coated (only in combination with C351!)			A: 35 µm B: 50 µm C: 75 µm	351

Material	Thickness (mm)	Extra features	Ordering code
C350	0,2		B68450-A0080-X350
C351	0,2		B68450-A0080-X351
C350 C350	0,2 0,2	self-adhesive	B68451-A0080-X350 B68451-A0080-X350
C351 C351	0,3 0,3	self-adhesive	B68451-B0080-X351 B68451-B0080-X351
C351 C351	0,2 0,2	copper-coated	B68452-A0080-X351 B68452-A0080-X351

FPC film is supplied in units of 50 m length.

1) Copper coating only in combination with C351.

Physical properties (material values defined on 0,2 mm thick film)

Material	Symbol	Unit	C350	C351 3)
Initial permeability 1) f = 1 MHz	μ_i		9 ± 20 %	9 ± 20 %
Flux density (near saturation) 1) H = 25 kA/m f = 10 kHz	B_S	mT	255	255
Remanent flux density 1) H = 25 kA/m f = 10 kHz	B_r	mT	9	9
Coercive field strength 1) H = 25 kA/m f = 10 kHz	H_C	A/m	600	600
Relative loss factor 1) f = 10 MHz f = 1 GHz	$\tan\delta/\mu_i$		 < 0,005 < 0,400	 < 0,005 < 0,400
Hysteresis material constant	η_B	10^{-3}/mT	< 2	< 2
Temperature coefficient 1)	$\alpha = \Delta\mu/\mu\Delta T$	1/K	$< 5 \cdot 10^{-5}$	$< 5 \cdot 10^{-5}$
Density		kg/m^3	2930	2930
Resistivity 1) f = 1 kHz f = 10 MHz	ρ	Ωm	 500 100	 500 100
Dielectric constant 1) f = 1 kHz f = 10 MHz	ε_r		 700 21	 700 21
Dielectric strength		kV/mm	1	0,8
Max. operating temperature	T_{max}	°C	120	200
Tensile strength 2)	σ_Z	N/mm^2	1,5	2,5
Tearing resistance 2)		%	25	25
Compressibility 2)	κ	N/mm^2	70	70

1) T = 25 °C in accordance with IEC 51 (CO) 282
2) T = 23 °C and 50 % r.h.
3) UL 94, flame class V0 (listed E 140 693)

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