

# FP0705

## High frequency, high current power inductors



### Applications

- Multi-phase and Vcore regulators
- Voltage Regulator Modules (VRMs)
  - Server and desktop
  - Central processing unit (CPU)
  - Graphics processing unit (GPU)
  - Application specific integrated circuit (ASIC)
  - High power density
- Data networking and storage systems
- Graphics cards and battery power systems
- Portable electronics
- Point-of-Load modules

### Product description

- High current carrying capacity
- Low core loss
- Inductance Range from 72 nH to 220 nH
- Current range from 20 A to 65 A
- 7.0 mm x 7.0 mm footprint surface mount package in a 4.95 mm height
- Ferrite core material
- Halogen free, lead free, RoHS compliant

### Environmental data

- Storage temperature range (Component): -40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020D compliant



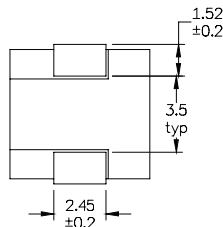
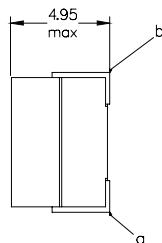
Product specifications

Part Number <sup>7</sup>	OCL <sup>1</sup> (nH) ±10%	FLL <sup>2</sup> (nH) minimum	I <sub>rms</sub> <sup>3</sup> (A)	I <sub>sat</sub> 1 <sup>4</sup> (A)	I <sub>sat</sub> 2 <sup>5</sup> (A)	DCR (mΩ) @ 20°C	K-factor <sup>6</sup>
<b>R1 version</b>							
FP0705R1-R07-R	72	51	43	65	50	0.25 ± 10%	826
FP0705R1-R10-R	105	78	43	44	34	0.25 ± 10%	826
FP0705R1-R12-R	120	86	43	37	30	0.25 ± 10%	826
FP0705R1-R15-R	150	108	43	30	24	0.25 ± 10%	826
FP0705R1-R18-R	180	130	43	25	20	0.25 ± 10%	826
FP0705R1-R22-R	226	159	43	20	16	0.25 ± 10%	826
<b>R2 version</b>							
FP0705R2-R07-R	72	51	38	65	50	0.32 ± 9.4%	826
FP0705R2-R10-R	105	78	38	44	34	0.32 ± 9.4%	826
FP0705R2-R12-R	120	86	38	37	30	0.32 ± 9.4%	826
FP0705R2-R15-R	150	108	38	30	24	0.32 ± 9.4%	826
FP0705R2-R18-R	180	130	38	25	20	0.32 ± 9.4%	826
FP0705R2-R22-R	226	159	38	20	16	0.32 ± 9.4%	826
<b>R3 version</b>							
FP0705R3-R07-R	72	51	32	65	50	0.46 ± 6.5%	826
FP0705R3-R10-R	105	78	32	44	34	0.46 ± 6.5%	826
FP0705R3-R12-R	120	86	32	37	30	0.46 ± 6.5%	826
FP0705R3-R15-R	150	108	32	30	24	0.46 ± 6.5%	826
FP0705R3-R18-R	180	130	32	25	20	0.46 ± 6.5%	826
FP0705R3-R22-R	226	159	32	20	16	0.46 ± 6.5%	826

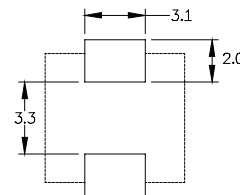
- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.1 Vrms, I<sub>sat</sub>1, +25 °C
- I<sub>rms</sub>: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB layout, trace thickness and width, air-flow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed 125 °C under worst case operating conditions verified in the end application.
- I<sub>sat</sub>1: Peak current for approximately 20% rolloff @ +25 °C
- I<sub>sat</sub>2: Peak current for approximately 20% rolloff @ +125 °C

- K-factor: Used to determine B<sub>pp</sub> for core loss (see graph).  
B<sub>pp</sub> = K \* L \* ΔI \* 10<sup>-3</sup>. B<sub>pp</sub> (Gauss), K: (K-factor from table),  
L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).
- Part Number Definition: FP0705Rx-Rxx-R  
FP0705= Product code and size  
Rx= Version indicator  
-Rxx= Inductance value in μH, R= decimal point  
-R suffix = RoHS compliant

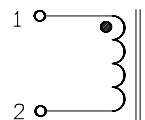
Dimensions (mm)



Recommended Pad Layout



Schematic



Part marking: 0705Rx (Rx = version indicator), Rxx = Inductance value in μH, R = decimal point, wwllly = date code, R = revision level

Tolerances are ±0.25 millimeters unless stated otherwise

PCB tolerances are ±0.1 millimeters unless stated otherwise

All soldering surface to be coplanar within 0.1016 millimeters

DCR measured between point "a" and point "b"

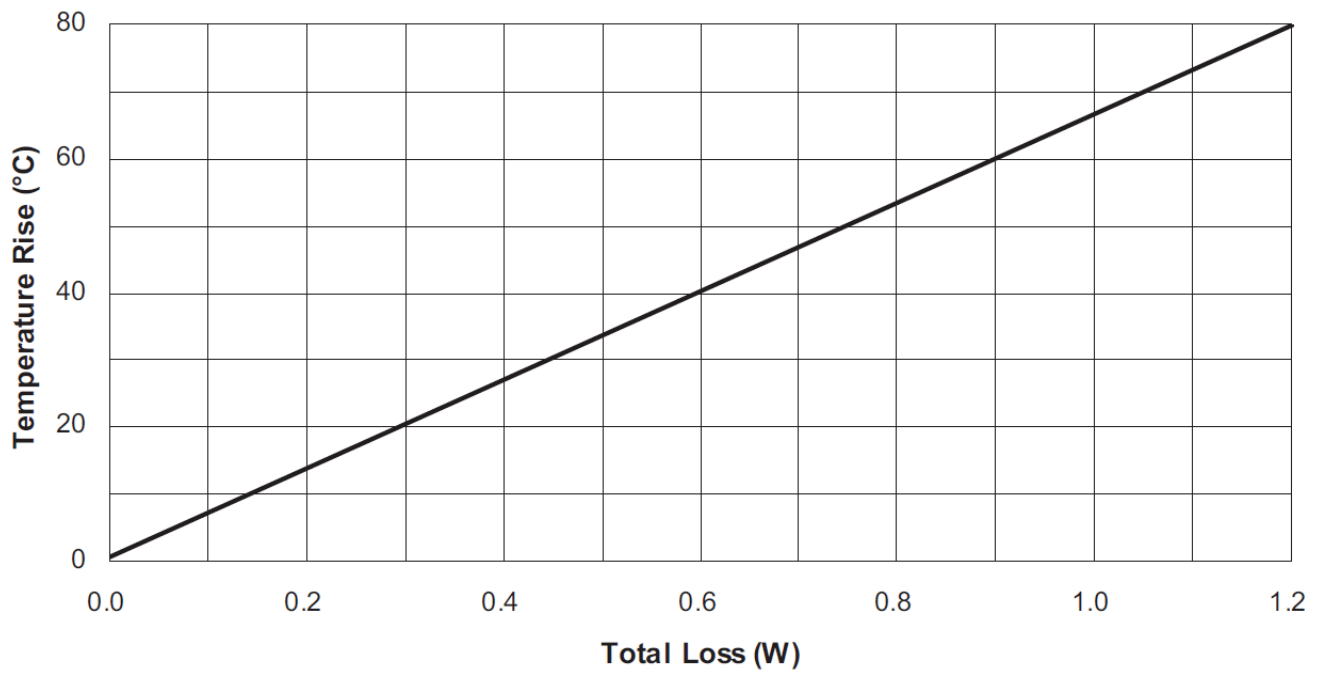
Do not route traces or vias underneath the inductor

**Packaging information (mm)**

Supplied in tape and reel packaging , 950 parts per 13" diameter reel



**Temperature rise vs. total loss**



Core loss vs.  $B_{p-p}$



Inductance characteristics



**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_c$ )**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5mm)	235°C	220°C
≥2.5mm	220°C	220°C

**Table 2 - Lead (Pb) Free Solder ( $T_c$ )**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >2000
<1.6mm	260°C	260°C	260°C
1.6 – 2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

**Reference JDEC J-STD-020D**

Profile Feature	Standard SnPb Solder	Lead (Pb) Free Solder
Preheat and Soak		
• Temperature min. ( $T_{smin}$ )	100°C	150°C
• Temperature max. ( $T_{smax}$ )	150°C	200°C
• Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 Seconds	60-120 Seconds
Average ramp up rate $T_{smax}$ to $T_p$	3°C/ Second Max.	3°C/ Second Max.
Liquidous temperature ( $T_L$ )	183°C	217°C
Time at liquidous ( $t_L$ )	60-150 Seconds	60-150 Seconds
Peak package body temperature ( $T_p$ )*	Table 1	Table 2
Time ( $t_p$ )** within 5 °C of the specified classification temperature ( $T_c$ )	20 Seconds**	30 Seconds**
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6°C/ Second Max.	6°C/ Second Max.
Time 25°C to Peak Temperature	6 Minutes Max.	8 Minutes Max.

\* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.  
 \*\* Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

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**Eaton**  
**Electronics Division**  
 1000 Eaton Boulevard  
 Cleveland, OH 44122  
 United States  
 www.eaton.com/elx

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.