

# High Current Power Inductors

## FLAT-PAC™ FP0708 Series



SMD Device

### Description

- Halogen free
- 125°C maximum total temperature operation
- 8.5 x 7.0 x 7.2mm surface mount package
- Ferrite core material
- High current carrying capacity
- Low core losses
- Controlled DCR tolerance for sensing circuits
- Inductance range from 72nH to 190nH
- Current range from 37 to 90 amps
- Frequency range up to 2MHz
- RoHS compliant

### Applications

- Multi-phase regulators
- Voltage Regulator Module (VRM)
- Point of load modules
- Servers and workstations
- Data networking and storage systems
- Notebook and desktop computers
- Graphics cards and battery power systems
- DCR sensing

### Environmental Data

- Storage temperature range: -40°C to +125 °C
- Operating temperature range: -40°C to +125°C (Range is application specific)
- Solder reflow temperature: J-STD-020D compliant

### Packaging

- Supplied in tape and reel packaging, 640 parts per reel, 13" diameter reel

### Product Specifications

| Part Number    | OCL <sup>1</sup> ± 10% (nH) | FLL <sup>2</sup> Min. (nH) | I <sub>rms</sub> <sup>3</sup> (Amps) | I <sub>sat</sub> <sup>1,4</sup> @ 25°C (Amps) | I <sub>sat</sub> <sup>2,5</sup> @ 125°C (Amps) | DCR (mΩ) @ 20°C | K-factor <sup>6</sup> |
|----------------|-----------------------------|----------------------------|--------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------|-----------------------|
| FP0708R1-R07-R | 72                          | 52                         | 44                                   | 90                                            | 72                                             | 0.35 ± 8.6%     | 557                   |
| FP0708R1-R09-R | 90                          | 64                         |                                      | 75                                            | 60                                             |                 | 557                   |
| FP0708R1-R10-R | 105                         | 75                         |                                      | 68                                            | 54                                             |                 | 557                   |
| FP0708R1-R12-R | 120                         | 86                         |                                      | 59                                            | 47                                             |                 | 557                   |
| FP0708R1-R15-R | 150                         | 108                        |                                      | 47                                            | 37                                             |                 | 557                   |
| FP0708R1-R19-R | 190                         | 135                        |                                      | 37                                            | 29                                             |                 | 557                   |

1 Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.10V<sub>rms</sub>, 0.0Adc

2 Full Load Inductance (FLL) Test Parameters: 100kHz, 0.1V<sub>rms</sub>, I<sub>sat</sub><sup>1</sup>

3 I<sub>rms</sub>: DC current for an approximate temperature rise of 40°C without core loss. Derating is necessary for AC currents. PCB pad layout, trace thickness and width, air-flow and proximity of other heat generating components will affect the temperature rise. It is recommended the part temperature not exceed 125°C under worst case operating conditions verified in the end application.

4 I<sub>sat</sub><sup>1</sup>: Peak current for approximately 20% rolloff at +25°C.

5 I<sub>sat</sub><sup>2</sup>: Peak current for approximately 20% rolloff at +125°C.

6 K-factor: Used to determine B<sub>p-p</sub> for core loss (see graph). B<sub>p-p</sub> = K • L • ΔI • 10<sup>-3</sup>, B<sub>p-p</sub>: (Gauss), K: (K-factor from table), L: (inductance in nH), ΔI (peak-to-peak ripple current in amps).

7 Part Number Definition: FP0708Rx-Rxx-R

• FP0708 = Product code and size

• Rxx= Inductance value in μH, R = decimal point

• Rx is the DCR indicator

• "-R" suffix = RoHS compliant

Dimensions - mm

A = 7.0 Max.

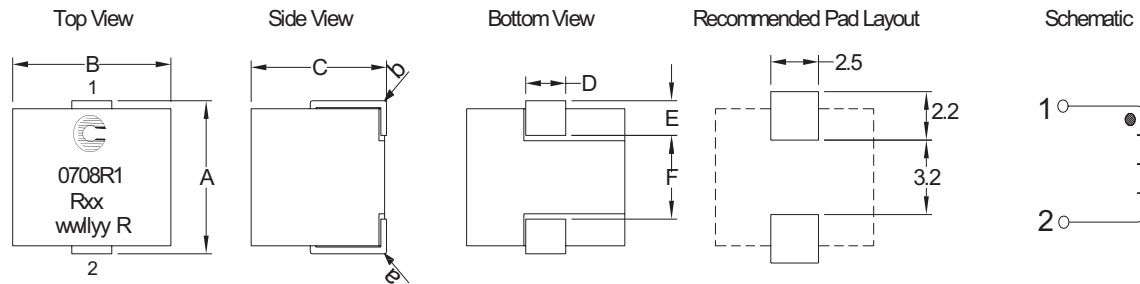
B = 8.5 Max.

C = 7.2 Max.

D =  $2.1 \pm 0.15$

E =  $1.52 \pm 0.2$

F = 3.6 Typ.



Nominal DCR is measured from point "a" to point "b."

Part Marking: Coiltronics Logo

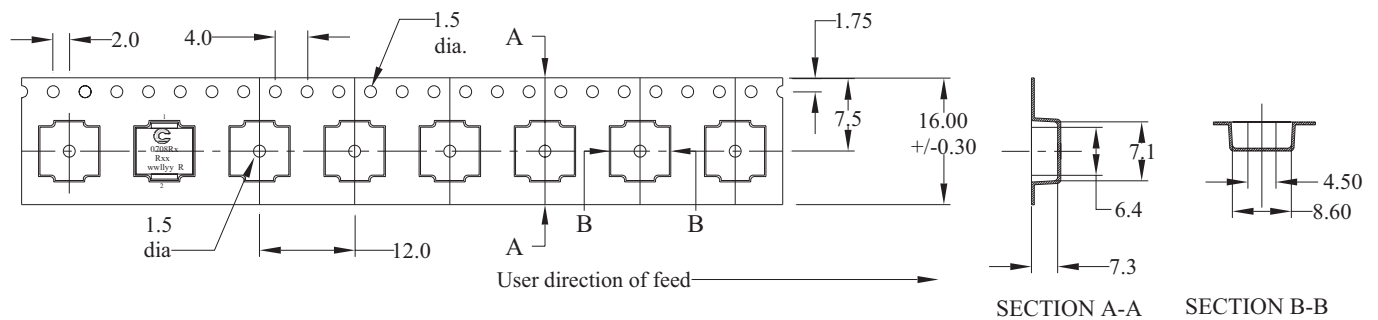
0708Rx (Rx = DCR indicator)

Rxx = inductance value in  $\mu\text{H}$  (R = decimal point)

wwlyy = date code

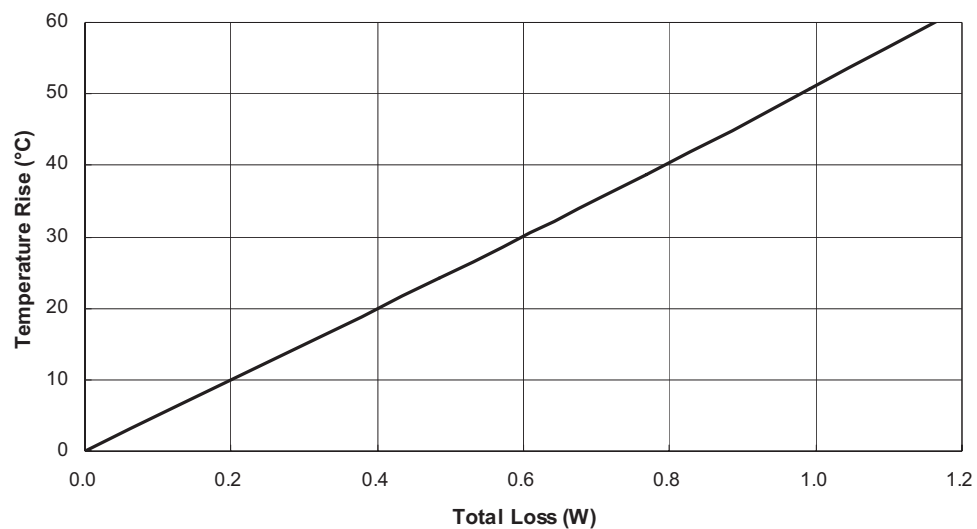
R = revision level

## Packaging Information - mm

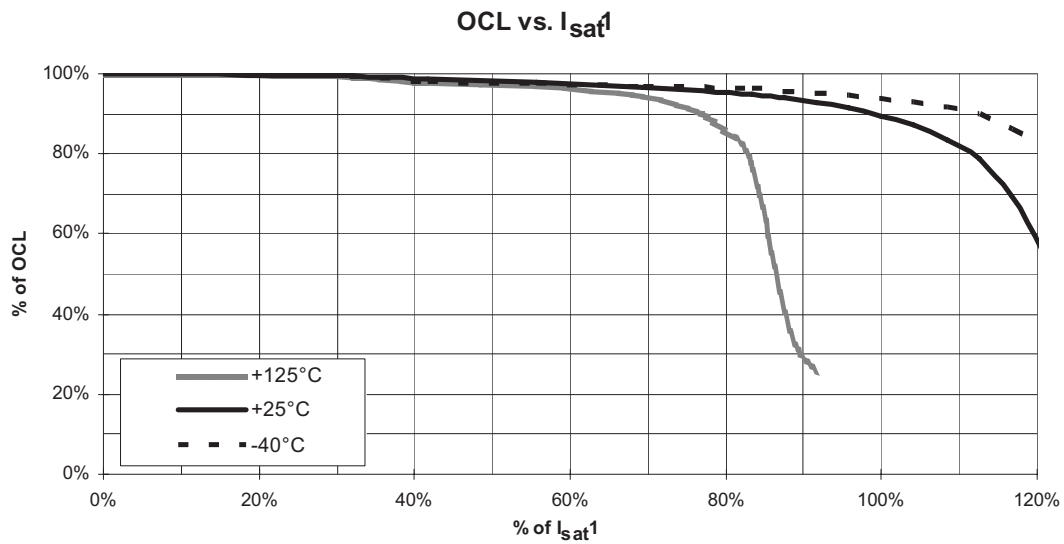


Supplied in tape-and-reel packaging, 640 parts per reel, 13" diameter reel.

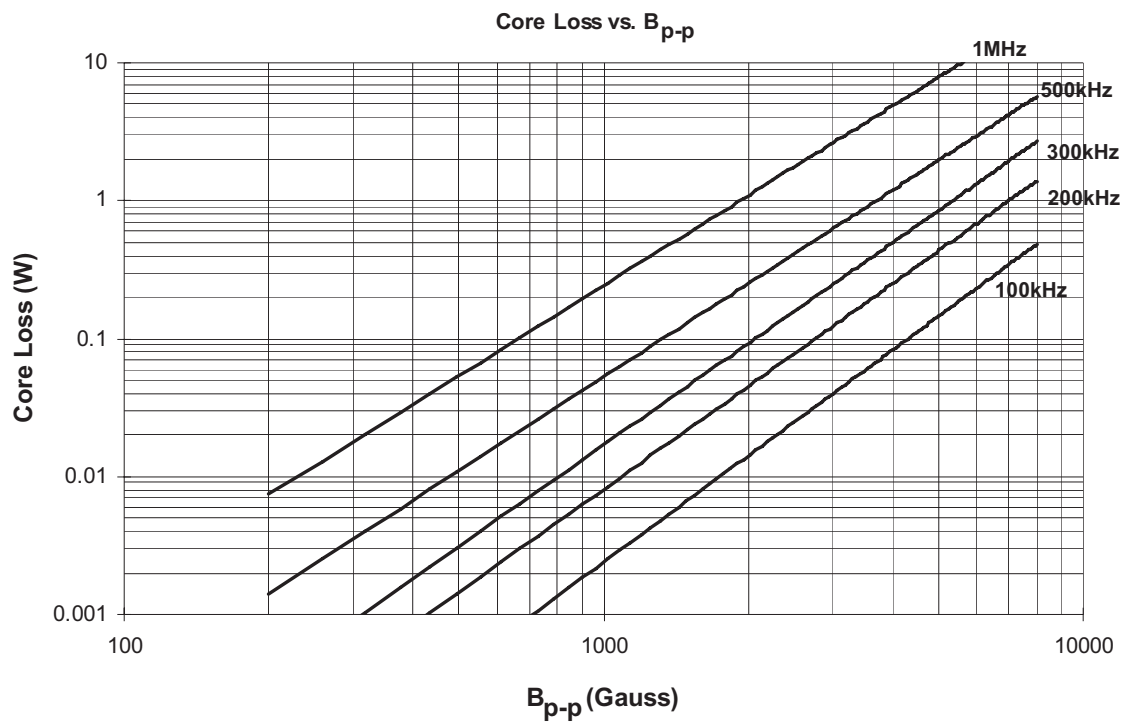
## Temperature Rise vs.Total Loss



## Inductance Characteristics



## Core Loss



## Solder Reflow Profile

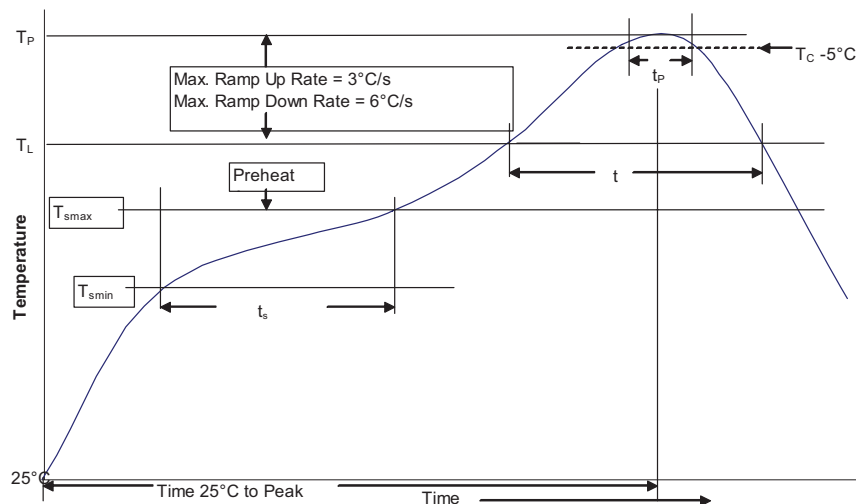


Table 1 - Standard SnPb Solder ( $T_c$ )

| Package Thickness | Volume $mm^3$ <350 | Volume $mm^3$ >350 |
|-------------------|--------------------|--------------------|
| <2.5mm            | 235°C              | 220°C              |
| ≥2.5mm            | 220°C              | 220°C              |

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

| Package Thickness | Volume $mm^3$ <350 | Volume $mm^3$ 350 - 2000 | Volume $mm^3$ >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.

### North America

Cooper Electronic Technologies  
1225 Broken Sound Parkway NW  
Suite F  
Boca Raton, FL 33487-3533  
Tel: 1-561-998-4100  
Fax: 1-561-241-6640  
Toll Free: 1-888-414-2645

Cooper Bussmann  
P.O. Box 14460  
St. Louis, MO 63178-4460  
Tel: 1-636-394-2877  
Fax: 1-636-527-1607

### Europe

Cooper Electronic Technologies  
Cooper (UK) Limited  
Burton-on-the-Wolds  
Leicestershire • LE12 5TH UK  
Tel: +44 (0) 1509 882 737  
Fax: +44 (0) 1509 882 786

Cooper Electronic Technologies  
Avda. Santa Eulalia, 290  
08223  
Terrassa, (Barcelona), Spain  
Tel: +34 937 362 812  
+34 937 362 813  
Fax: +34 937 362 719

### Asia Pacific

Cooper Electronic Technologies  
1 Jalan Kilang Timor  
#06-01 Pacific Tech Centre  
Singapore 159303  
Tel: +65 278 6151  
Fax: +65 270 4160

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