

High Current, High Frequency, Low-Profile Power Inductors

FLAT-PAC™ FP1005 Series



Description

- Halogen free
- 125°C maximum total temperature operation
- 10.2 x 7.0 x 4.95mm surface mount package
- Ferrite core material
- High current carrying capacity, Low core losses
- Controlled DCR tolerance for sensing circuits
- Inductance range from 85nH to 220nH

- Current range from 33 to 90 amps
- Frequency range up to 2MHz
- RoHS compliant



Applications

- Multi-phase regulators
- Voltage Regulator Module (VRM)
- Point-of-load modules
- Desktop and server VRMs and EVRDs
- Data networking and storage systems
- Notebook regulators
- 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, 950 parts per reel, 13" dia. reel

Product Specifications

| Part Number ⁷ | OCL ¹ ± 10% (nH) | FLL ² Min. (nH) | I _{rms} ³ (Amps) | I _{sat} ^{1,4} @ 25°C (Amps) | I _{sat} ^{2,5} @ 125°C (Amps) | DCR (mΩ) @ 20°C | K-factor ⁶ |
|--------------------------|-----------------------------|----------------------------|--------------------------------------|---|--|-----------------|-----------------------|
| R1 Version | | | | | | | |
| FP1005R1-R08-R | 85 | 61 | 53 | 90 | 64 | 0.39 ± 7.7% | 536 |
| FP1005R1-R10-R | 100 | 72 | | 73 | 57 | | 536 |
| FP1005R1-R12-R | 120 | 86 | | 60 | 48 | | 536 |
| FP1005R1-R15-R | 150 | 108 | | 47 | 37 | | 536 |
| FP1005R1-R22-R | 220 | 158 | | 33 | 26 | | 536 |
| R2 Version | | | | | | | |
| FP1005R2-R08-R | 85 | 61 | 50 | 90 | 64 | 0.47 ± 6.7% | 536 |
| FP1005R2-R10-R | 100 | 72 | | 73 | 57 | | 536 |
| FP1005R2-R12-R | 120 | 86 | | 60 | 48 | | 536 |
| FP1005R2-R15-R | 150 | 108 | | 47 | 37 | | 536 |
| FP1005R2-R22-R | 220 | 158 | | 33 | 26 | | 536 |
| R3 Version | | | | | | | |
| FP1005R3-R08-R | 85 | 61 | 45 | 90 | 64 | 0.55 ± 5.4% | 536 |
| FP1005R3-R10-R | 100 | 72 | | 73 | 57 | | 536 |
| FP1005R3-R12-R | 120 | 86 | | 60 | 48 | | 536 |
| FP1005R3-R15-R | 150 | 108 | | 47 | 37 | | 536 |
| FP1005R3-R22-R | 220 | 158 | | 33 | 26 | | 536 |

1 Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.10V_{rms}, 0.0Adc

2 Full Load Inductance (FLL) Test Parameters: 100kHz, 0.1V_{rms}, I_{sat}¹

3 I_{rms}: 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_{sat}¹: Peak current for approximately 20% rolloff at +25°C.

5 I_{sat}²: Peak current for approximately 20% rolloff at +125°C.

6 K-factor: Used to determine B_{p-p} for core loss (see graph). B_{p-p} = K · L · ΔI · 10⁻³, B_{p-p}: (Gauss), K: (K-factor from table), L: (inductance in nH), ΔI (peak-to-peak ripple current in amps).

7 Part Number Definition: FP1005Rx-Rxx-R

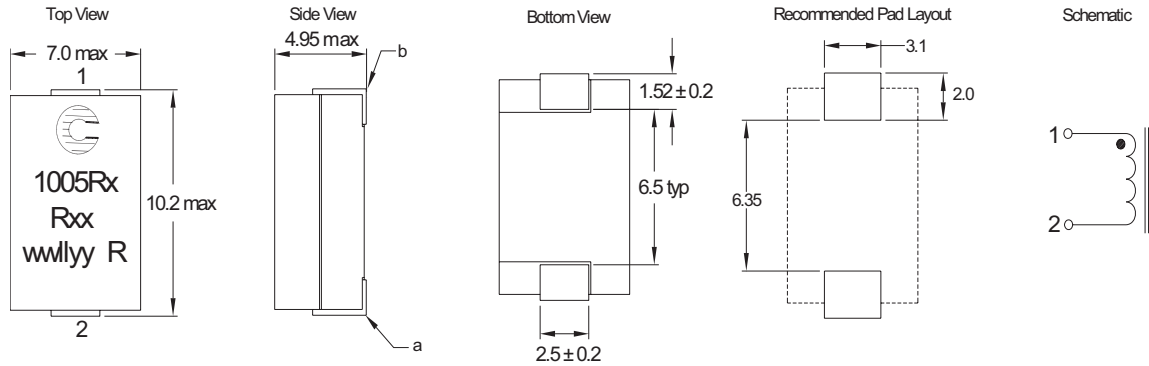
• FP1005 = Product code and size

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

• Rx is the DCR indicator

• "-R" suffix = RoHS compliant

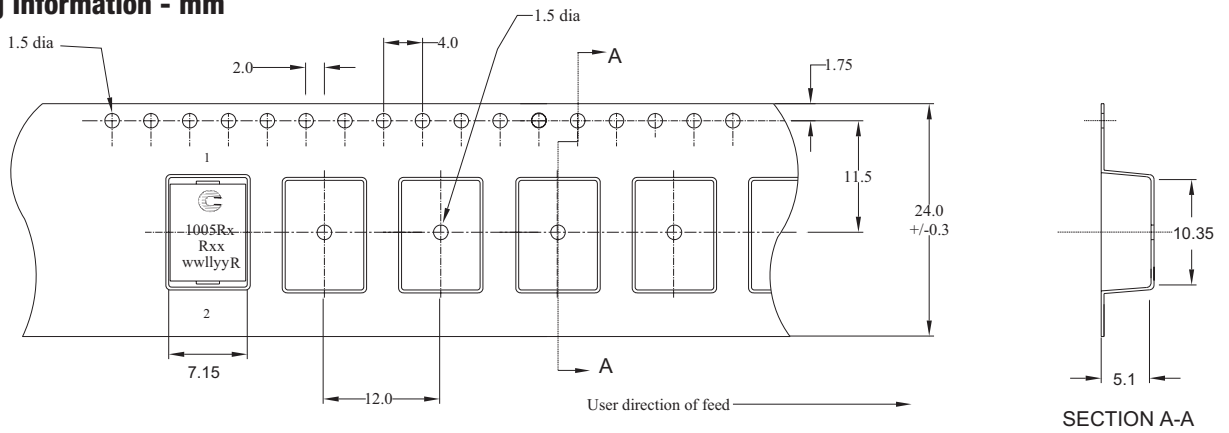
Dimensions - mm



The nominal DCR is measured from point "a" to point "b."

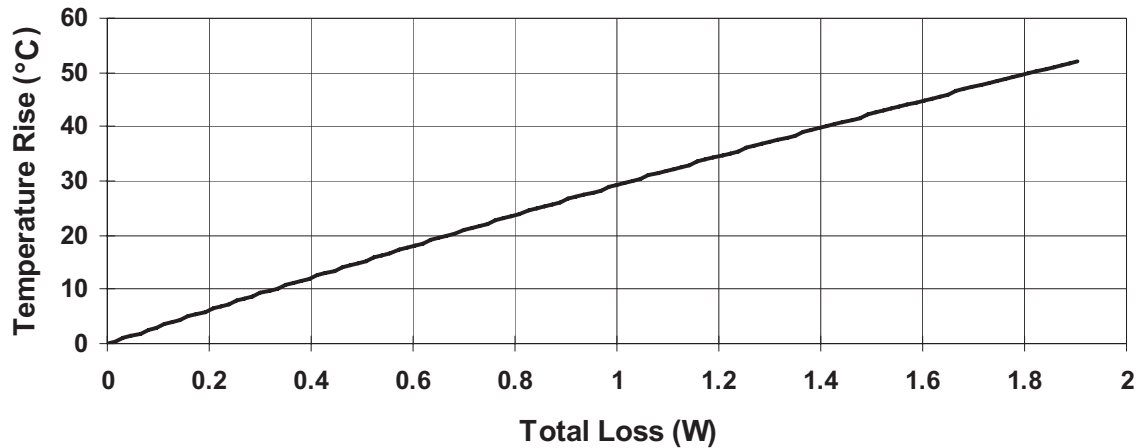
Part Marking: Coiltronics Logo 1005Rx (Rx = DCR indicator) Rxx = Inductance value in μH (R = Decimal point) wwllyy = Date code R = Revision level

Packaging Information - mm

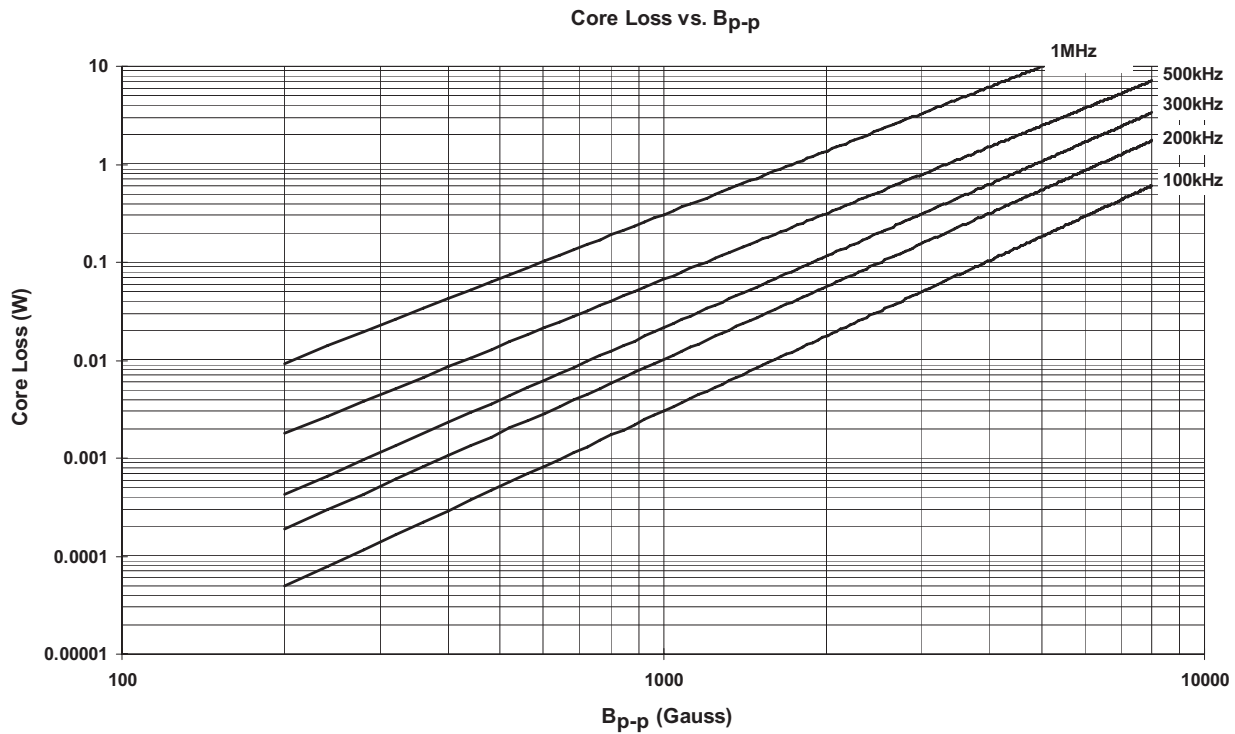


Supplied in tape-and-reel packaging, 950 parts per reel, 13" diameter reel.

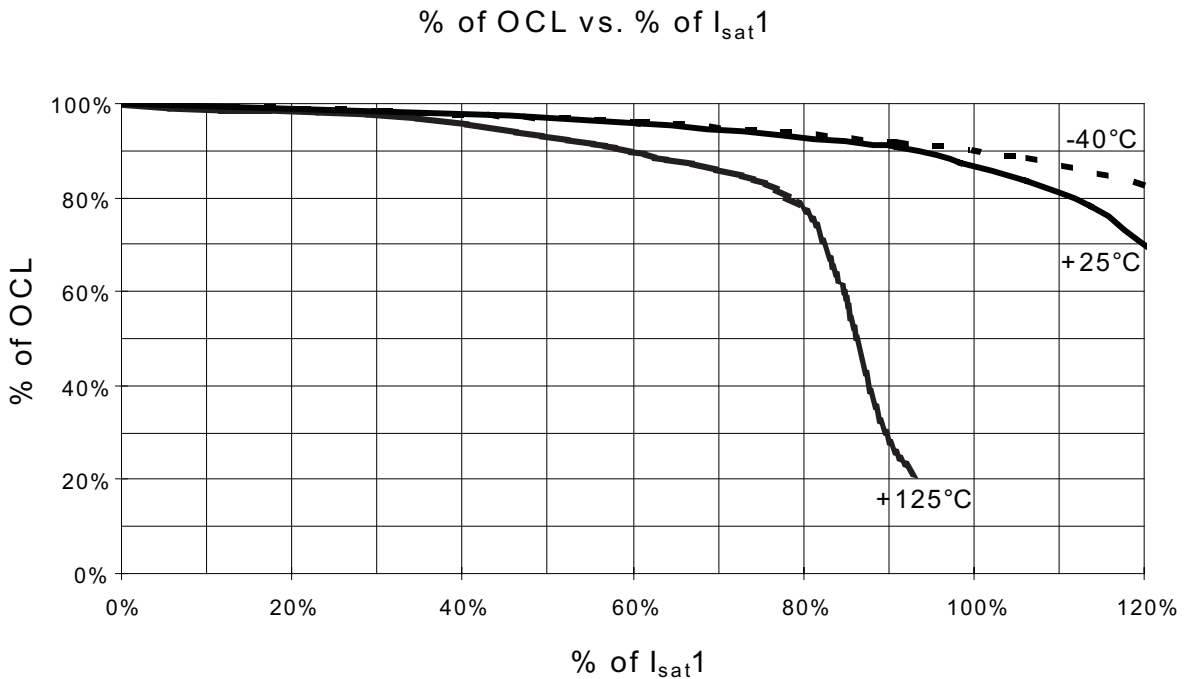
Temperature Rise vs. Total Loss



Core Loss



Inductance Characteristics



Solder Reflow Profile

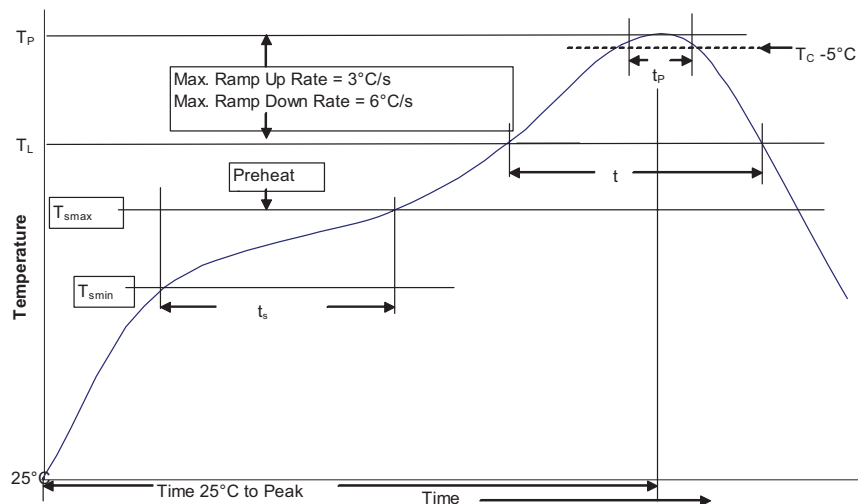


Table 1 - Standard SnPb Solder (T_c)

| Package Thickness | Volume mm^3 <350 | Volume mm^3 ≥ 350 |
|---------------------|---------------------------|---------------------------------|
| <2.5mm | 235°C | 220°C |
| $\geq 2.5\text{mm}$ | 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.

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