

# UP5

## High power, drum inductors



### Description

- 18.54 x 15.24 x 7.11mm maximum surface mount package
- Ferrite core material
- Inductance range from 1.0 $\mu$ H to 1000 $\mu$ H
- Current range from 0.56 to 20 Amps
- Frequency range up to 1MHz
- RoHS compliant

### Applications

- Buck or boost inductor
- Desktop computer
- Workstations/servers
- DVD Players
- Portable power devices
- Base stations
- Industrial power supplies
- Output filter chokes
- Test equipment instrumentation

### Environmental Data

- Storage temperature range: -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>5</sup> | OCL <sup>1</sup> $\mu\text{H} \pm 20\%$ | I <sub>rms</sub> <sup>2</sup> (amps) | sat <sup>3</sup> (amps)<br>@25°C | SRF MHz typical | DCR m $\Omega$ @ 20°C<br>Maximum | K-factor <sup>4</sup> |
|--------------------------|-----------------------------------------|--------------------------------------|----------------------------------|-----------------|----------------------------------|-----------------------|
| UP5-1R0-R                | 1.0                                     | 8.6                                  | 20.0                             | 140             | 9.0                              | 73.61                 |
| UP5-1R5-R                | 1.5                                     | 7.5                                  | 18.0                             | 110             | 12.0                             | 60.22                 |
| UP5-2R2-R                | 2.2                                     | 7.1                                  | 16.0                             | 75.0            | 14.0                             | 50.96                 |
| UP5-3R3-R                | 3.3                                     | 6.2                                  | 14.0                             | 70.0            | 18.0                             | 44.16                 |
| UP5-5R6-R                | 5.6                                     | 5.3                                  | 12.0                             | 45.0            | 20.0                             | 31.55                 |
| UP5-100-R                | 10.0                                    | 4.3                                  | 10.0                             | 21.0            | 31.0                             | 24.54                 |
| UP5-150-R                | 15.0                                    | 4.0                                  | 8.0                              | 16.0            | 36.0                             | 20.07                 |
| UP5-220-R                | 22.0                                    | 3.5                                  | 7.0                              | 13.0            | 47.0                             | 16.99                 |
| UP5-330-R                | 33.0                                    | 3.0                                  | 5.5                              | 11.0            | 66.0                             | 14.09                 |
| UP5-470-R                | 47.0                                    | 2.6                                  | 4.5                              | 9.0             | 86.0                             | 11.62                 |
| UP5-680-R                | 68.0                                    | 2.3                                  | 3.5                              | 6.5             | 130                              | 9.60                  |
| UP5-101-R                | 100                                     | 1.8                                  | 3.0                              | 5.7             | 190                              | 7.98                  |
| UP5-151-R                | 150                                     | 1.5                                  | 2.6                              | 4.5             | 250                              | 6.56                  |
| UP5-221-R                | 220                                     | 1.2                                  | 2.4                              | 3.7             | 380                              | 5.39                  |
| UP5-331-R                | 330                                     | 1.0                                  | 1.9                              | 3.0             | 560                              | 4.39                  |
| UP5-471-R                | 470                                     | 0.82                                 | 1.4                              | 2.7             | 850                              | 3.70                  |
| UP5-681-R                | 680                                     | 0.72                                 | 1.2                              | 2.2             | 1100                             | 3.08                  |
| UP5-102-R                | 1000                                    | 0.56                                 | 1.0                              | 2.0             | 1800                             | 2.54                  |

1. OpenCircuitInductance(OCL)TestParameters:100kHz,0.25Vrms,0.0Adc

2. I<sub>rms</sub>: DC current for an approximate  $\Delta T$  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 the part temperature not exceed 125°C under worst case operating conditions verified in the end application.

3. Isat: Peak current for approximately 10% rolloff at 25°C.

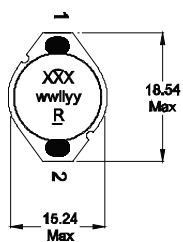
4. K-factor:UsedtodetermineBp-pforcoreloss(see graph).  $B_p-p = K \cdot L \cdot \Delta I$ , Bp-p:(Gauss), K: (K-factor from table), L: (inductance in  $\mu\text{H}$ ),  $\Delta I$  (peak-to-peak ripple current in amps).

5. Part Number Definition: UP5-xxx-R

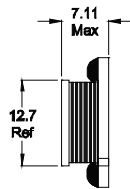
- UP5 = Product code and size
- xxx= Inductance value in  $\mu\text{H}$ , R = decimal point. If no R is present, then third digit equals the number of zeros.
- "-R" suffix = RoHS compliant

## Dimensions (mm)

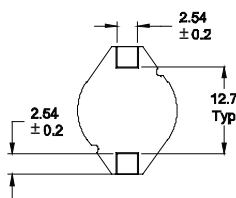
Top View



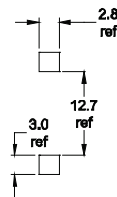
Side View



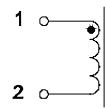
Bottom View



Recommended Pad Layout



Schematic



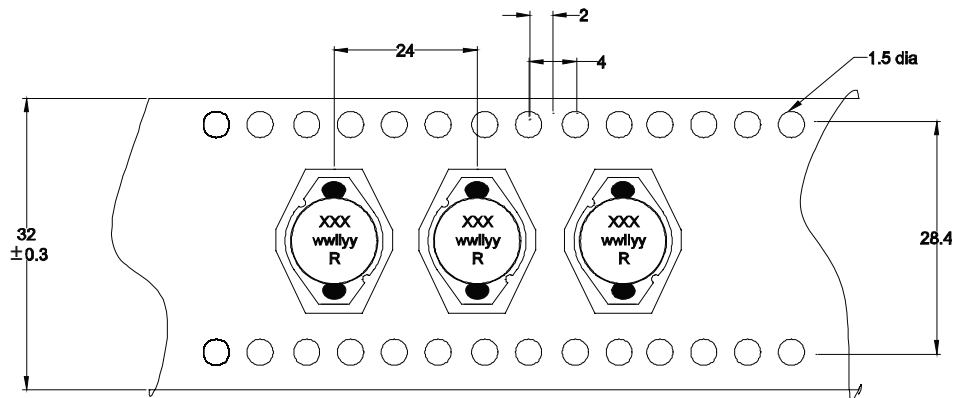
xxx = Inductance value in  $\mu\text{H}$  (R = Decimal point).

If no "R" is present, then the third digit equals the number of zeros.

wwlllyy = Date code R = Revision level

Packaging information

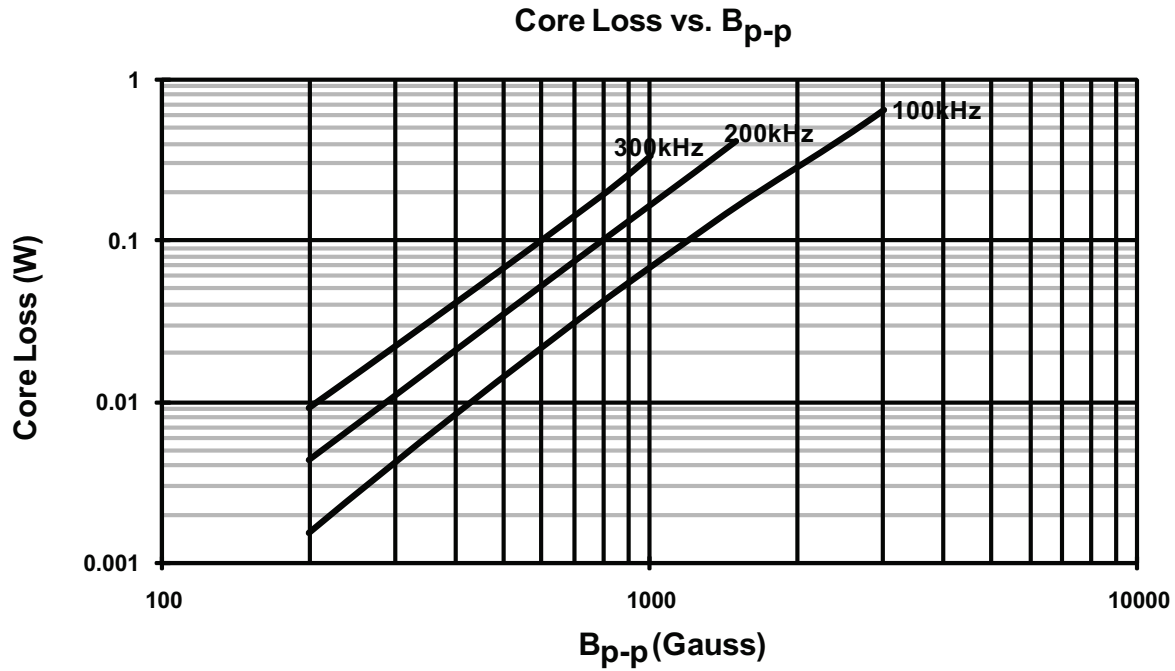
Supplied in tape-and-reel packaging, 250 parts per reel, 13" diameter reel.



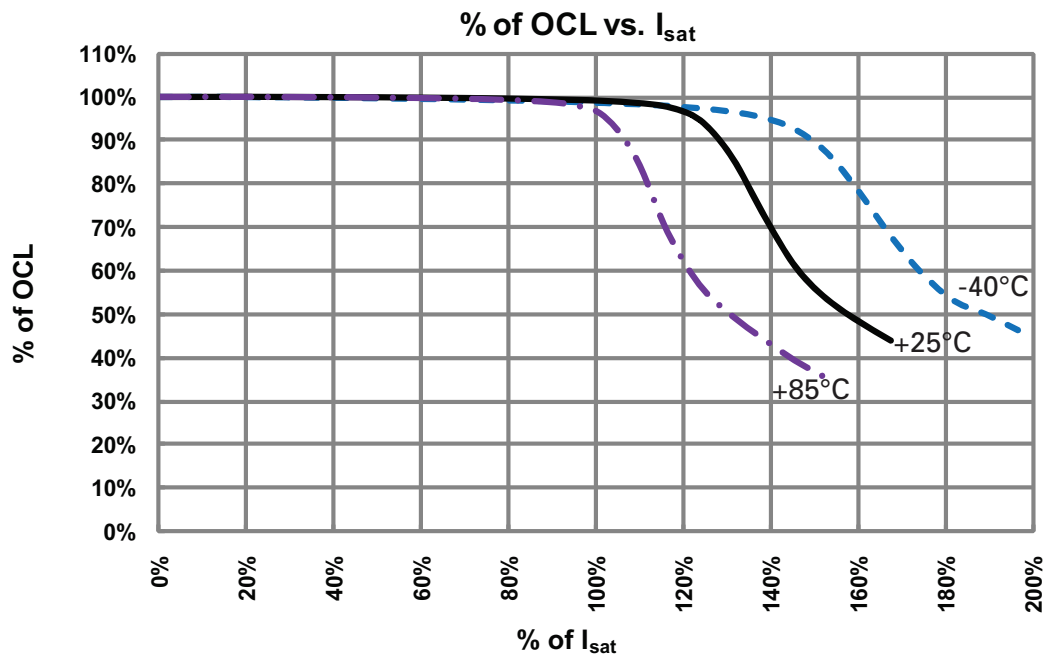
Temperature rise vs. total loss



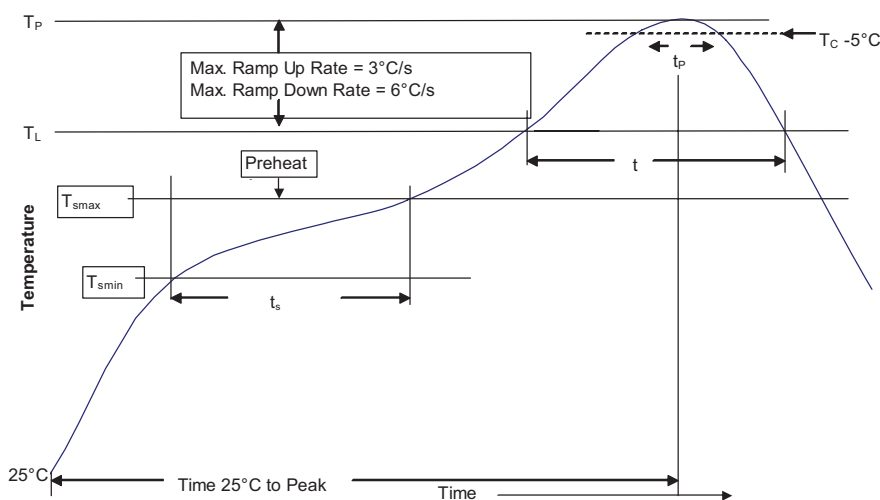
Core loss



Inductance characteristics



## Solder reflow profile



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

| Package Thickness | Volume mm <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 JEDEC 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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