

# DR1050

## Shielded power inductors



### Description

- Shielded drum core
- Inductance range from 0.7  $\mu$ H to 1000  $\mu$ H
- Current range from 0.43 A to 13.5 A
- 10.5 mm x 10.3 mm footprint surface mount package in a 5.0 mm height
- Ferrite core material
- Halogen free, lead free, RoHS compliant

### Applications

- LED/LCD backlighting
- High definition televisions (HDTV)
- Server and desktop power supplies
- Graphics cards and battery powered systems
- Point-of-load (POL) modules
- Printers and peripherals
- Portable electronics

### 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



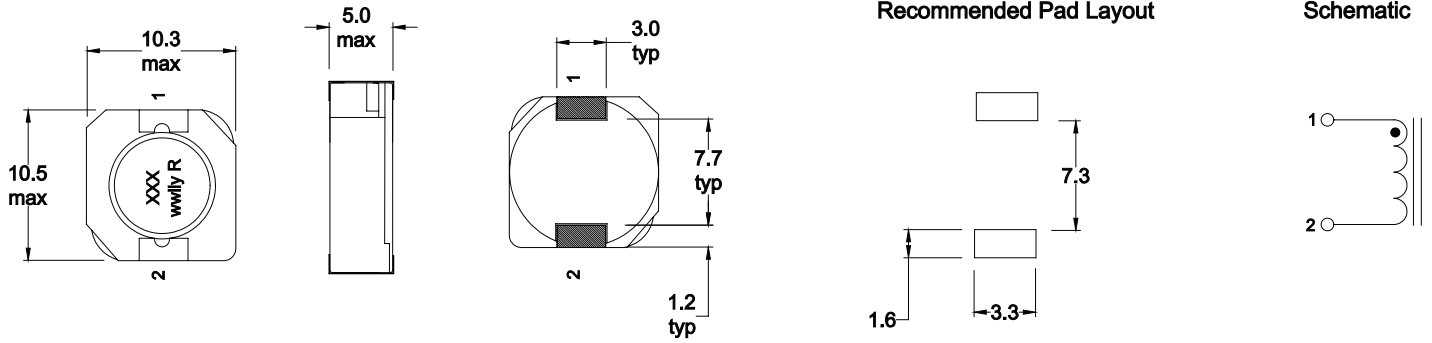
Product Specifications

| Part Number <sup>5</sup> | OCL <sup>1</sup><br>( $\mu$ H) $\pm$ 30% | I <sub>rms</sub> <sup>2</sup><br>(A) | I <sub>sat</sub> <sup>3</sup><br>(A) | DCR (m $\Omega$ )<br>typical<br>@ 20°C | DCR (m $\Omega$ )<br>maximum<br>@ 20°C | K-factor <sup>4</sup> |
|--------------------------|--|--------------------------------------|--------------------------------------|--|--|-----------------------|
| DR1050-R80-R             | 0.70                                     | 9.70                                 | 13.5                                 | 3.2                                    | 4.0                                    | 20.47                 |
| DR1050-1R5-R             | 1.37                                     | 8.60                                 | 10.5                                 | 4.0                                    | 5.0                                    | 14.62                 |
| DR1050-2R2-R             | 2.27                                     | 7.52                                 | 9.3                                  | 5.6                                    | 6.8                                    | 11.37                 |
| DR1050-3R3-R             | 3.21                                     | 6.50                                 | 8.2                                  | 8.0                                    | 10                                     | 9.30                  |
| DR1050-4R7-R             | 4.43                                     | 6.13                                 | 6.7                                  | 10                                     | 12                                     | 7.87                  |
| DR1050-6R8-R             | 6.30                                     | 5.45                                 | 5.8                                  | 13                                     | 17                                     | 6.82                  |
| DR1050-8R2-R             | 8.09                                     | 5.24                                 | 5.0                                  | 15                                     | 19                                     | 6.02                  |
| DR1050-100-R             | 10.1                                     | 4.80                                 | 4.6                                  | 18                                     | 23                                     | 5.39                  |
| DR1050-120-R             | 11.6                                     | 3.94                                 | 4.1                                  | 24                                     | 30                                     | 4.87                  |
| DR1050-150-R             | 14.8                                     | 3.80                                 | 3.7                                  | 26                                     | 33                                     | 4.45                  |
| DR1050-180-R             | 17.5                                     | 3.39                                 | 3.3                                  | 33                                     | 41                                     | 4.09                  |
| DR1050-220-R             | 23.5                                     | 3.12                                 | 3.0                                  | 39                                     | 48                                     | 3.53                  |
| DR1050-270-R             | 26.9                                     | 2.82                                 | 2.8                                  | 43                                     | 53                                     | 3.30                  |
| DR1050-330-R             | 34.3                                     | 2.56                                 | 2.5                                  | 58                                     | 72                                     | 2.92                  |
| DR1050-390-R             | 38.3                                     | 2.35                                 | 2.35                                 | 61                                     | 76                                     | 2.77                  |
| DR1050-470-R             | 47.1                                     | 2.06                                 | 2.10                                 | 89                                     | 111                                    | 2.50                  |
| DR1050-560-R             | 56.7                                     | 1.96                                 | 1.94                                 | 98                                     | 123                                    | 2.27                  |
| DR1050-680-R             | 67.2                                     | 1.84                                 | 1.70                                 | 111                                    | 139                                    | 2.09                  |
| DR1050-820-R             | 84.4                                     | 1.60                                 | 1.58                                 | 147                                    | 184                                    | 1.86                  |
| DR1050-101-R             | 97.5                                     | 1.52                                 | 1.45                                 | 164                                    | 205                                    | 1.73                  |
| DR1050-121-R             | 118                                      | 1.30                                 | 1.30                                 | 223                                    | 279                                    | 1.57                  |
| DR1050-151-R             | 149                                      | 1.26                                 | 1.15                                 | 238                                    | 298                                    | 1.40                  |
| DR1050-181-R             | 184                                      | 1.18                                 | 1.08                                 | 273                                    | 341                                    | 1.26                  |
| DR1050-221-R             | 222                                      | 1.00                                 | 0.98                                 | 377                                    | 472                                    | 1.15                  |
| DR1050-271-R             | 264                                      | 0.96                                 | 0.90                                 | 410                                    | 513                                    | 1.06                  |
| DR1050-331-R             | 321                                      | 0.83                                 | 0.80                                 | 554                                    | 693                                    | 0.96                  |
| DR1050-391-R             | 397                                      | 0.76                                 | 0.72                                 | 648                                    | 810                                    | 0.86                  |
| DR1050-471-R             | 481                                      | 0.64                                 | 0.62                                 | 855                                    | 1069                                   | 0.78                  |
| DR1050-561-R             | 573                                      | 0.62                                 | 0.60                                 | 970                                    | 1213                                   | 0.72                  |
| DR1050-681-R             | 708                                      | 0.56                                 | 0.55                                 | 1095                                   | 1369                                   | 0.64                  |
| DR1050-821-R             | 819                                      | 0.54                                 | 0.50                                 | 1185                                   | 1481                                   | 0.60                  |
| DR1050-102-R             | 1000                                     | 0.43                                 | 0.48                                 | 1528                                   | 1950                                   | 0.54                  |

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C  
 2. 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.  
 3. I<sub>sat</sub>: Peak current for approximately 35% rolloff @ +25 °C

4. K-factor: K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K \* L \*  $\Delta$ I. Bp-p: (mT), K: (K-factor from table), L: (Inductance in  $\mu$ H),  $\Delta$ I (Peak to peak ripple current in Amps).  
 5. Part Number Definition: DR1050-xxx-R  
 DR1050 = Product code and size  
 -xxx= inductance value in  $\mu$ H, R= decimal point,  
 If no R is present then last character equals number of zeros  
 -R suffix = RoHS compliant

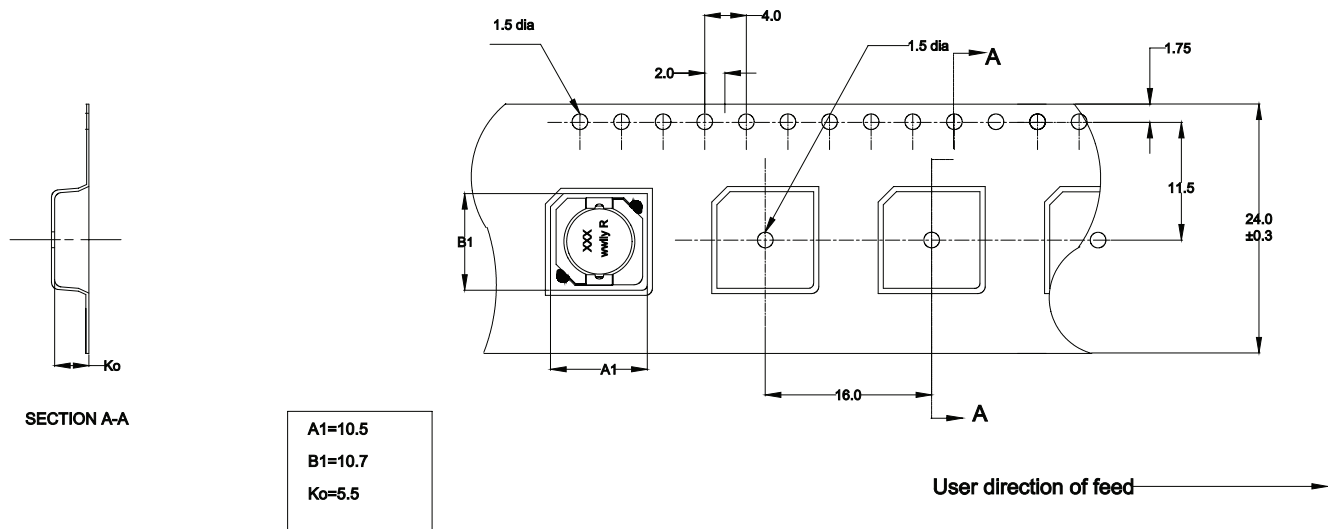
Dimensions (mm)



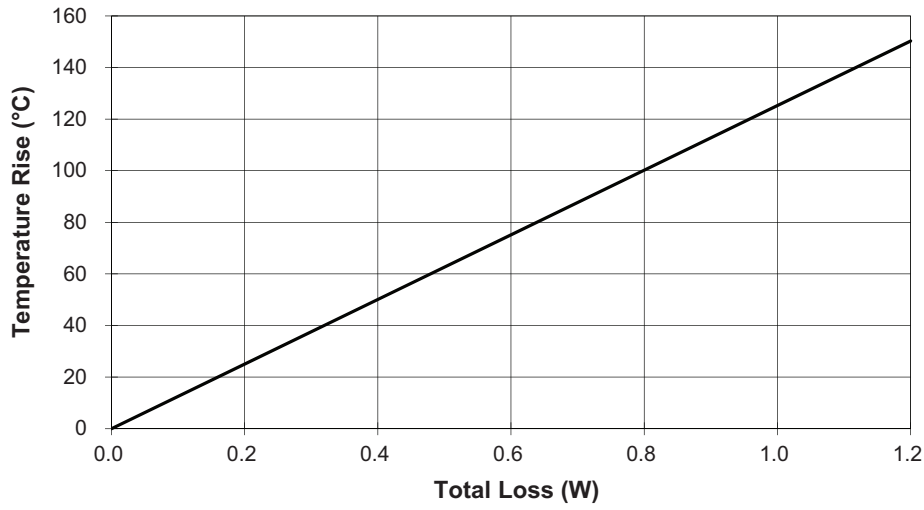
Part marking: inductance value in uH. R = decimal point. If no R is present then last character equals number of zeroes.  
wwly = date code, R = revision level  
Do not route traces or vias underneath the inductor

Packaging information (mm)

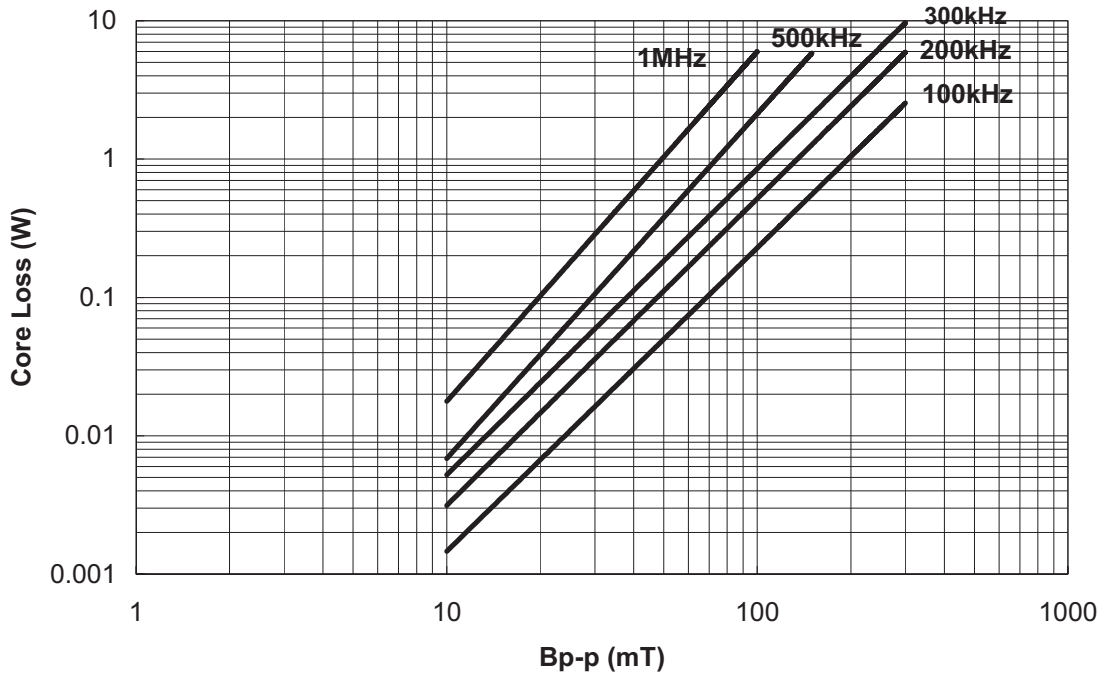
Supplied in tape and reel packaging , 500 parts per 13" diameter reel



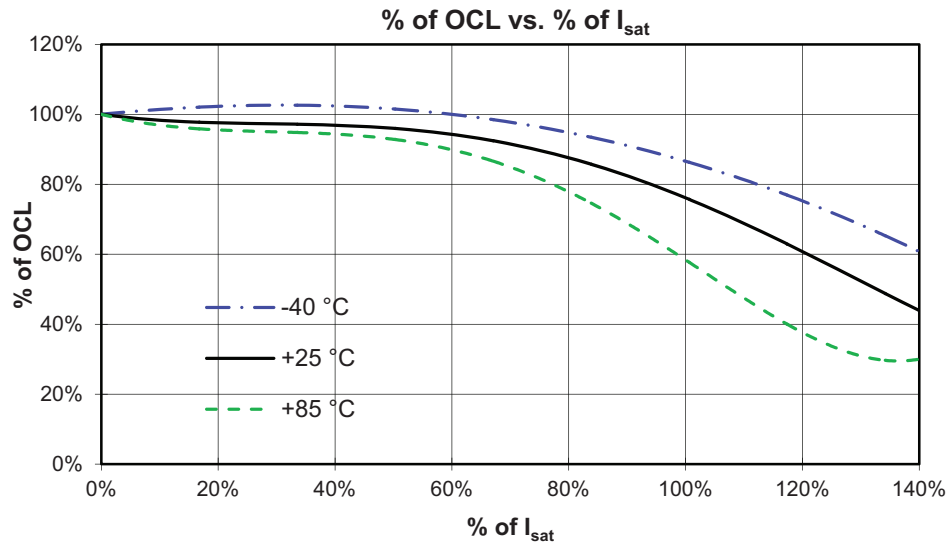
Temperature rise vs. total loss



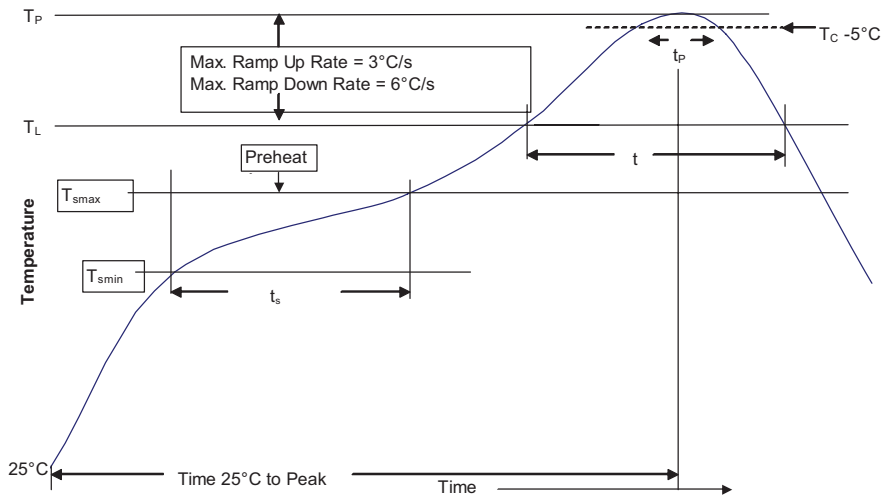
Core loss vs.  $B_{p-p}$



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.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Eaton reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Eaton also reserves the right to change or update, without notice, any technical information contained in this bulletin.

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

© 2016 Eaton  
All Rights Reserved  
Printed in USA  
Publication No. 4139  
April 2016

Eaton is a registered trademark.

All other trademarks are property of their respective owners.