

# SD53

## Low profile shielded power inductors



### Product description

- Octagonal shape utilizes board space
- Shielded drum core
- Inductance range from 1.1 uH to 100 uH
- Current range from 0.44 A to 4.8 A
- 5.7 mm x 5.2 mm footprint surface mount package in a 3.0 mm height
- Ferrite core material
- Halogen free, lead free, RoHS compliant

### Applications

- Desktop computers
- Notebook and laptop regulators
- LED and White LED drivers
- Digital cameras, media devices
- Battery power systems

### 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> | OCL1 (μH) ±20% | Part marking | $I_{rms}^2$<br>(A) | $I_{sat}^3$<br>(A) | DCR (Ω) typical<br>@ 20 °C | DCR (Ω) maximum @<br>20 °C | K-factor <sup>4</sup> |
|--------------------------|----------------|--------------|--------------------|--------------------|----------------------------|----------------------------|-----------------------|
| SD53-1R1-R               | 1.10           | A            | 3.25               | 4.80               | 0.017                      | 0.020                      | 48                    |
| SD53-2R0-R               | 2.00           | B            | 2.64               | 3.30               | 0.023                      | 0.027                      | 35                    |
| SD53-3R3-R               | 3.30           | C            | 2.26               | 2.60               | 0.029                      | 0.034                      | 28                    |
| SD53-4R7-R               | 4.70           | D            | 2.01               | 2.10               | 0.039                      | 0.045                      | 21                    |
| SD53-6R8-R               | 6.80           | E            | 1.65               | 1.85               | 0.059                      | 0.068                      | 20                    |
| SD53-100-R               | 10.0           | F            | 1.41               | 1.40               | 0.077                      | 0.090                      | 15                    |
| SD53-150-R               | 15.0           | G            | 1.10               | 1.10               | 0.122                      | 0.142                      | 12                    |
| SD53-220-R               | 22.0           | H            | 0.81               | 0.94               | 0.179                      | 0.208                      | 10                    |
| SD53-330-R               | 33.0           | I            | 0.75               | 0.76               | 0.221                      | 0.257                      | 8                     |
| SD53-470-R               | 47.0           | J            | 0.64               | 0.64               | 0.303                      | 0.352                      | 7                     |
| SD53-680-R               | 68.0           | K            | 0.52               | 0.58               | 0.452                      | 0.525                      | 6                     |
| SD53-101-R               | 100            | L            | 0.44               | 0.45               | 0.689                      | 0.801                      | 5                     |

1. 1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.1 Vrms, 0.0 Adc.

2. Irms: DC current for an approximate ΔT 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. Isat: Peak current for approximately 30% rolloff @ 25 °C.

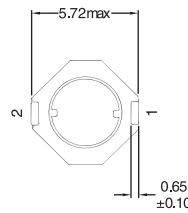
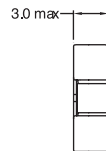
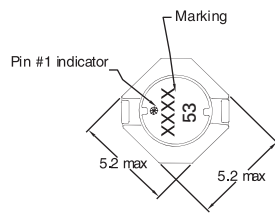
4. K-factor: Used to determine B p-p for core loss (see graph). B p-p = K\*L\*ΔI, B p-p(mT), K: (K factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in Amps).

5. Part Number Definition: SD53-xxx-R

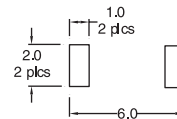
SD53 = Product code and size; -xxx = Inductance value in μH; R = decimal point; If no R is present then third character equals the number of zeros.

-R suffix = RoHS compliant.

## Dimensions (mm)



### RECOMMENDED PCB LAYOUT

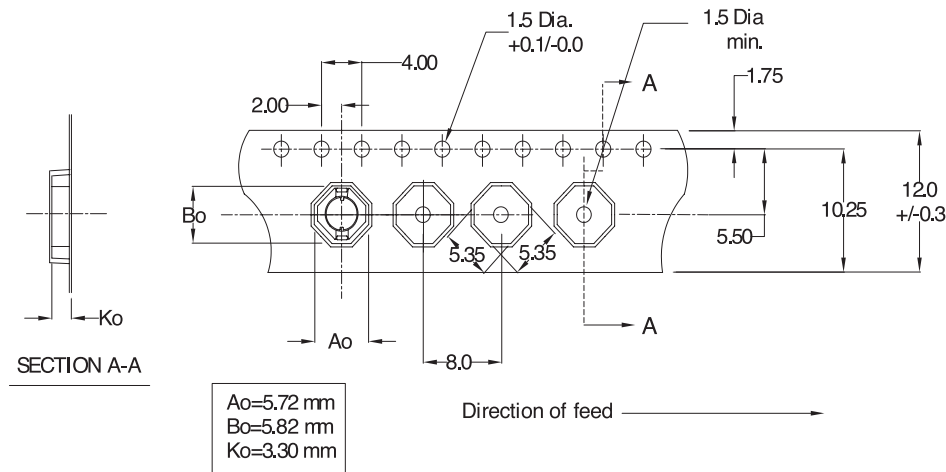


Part Marking: Line 1: (1st digit= inductance value per Part Marking Designator); (2nd digit= Bi-weekly production date code); (3rd digit= Last digit of the year produced), (4th digit= Internal manufacturing code). Line 2: 53=product size code)

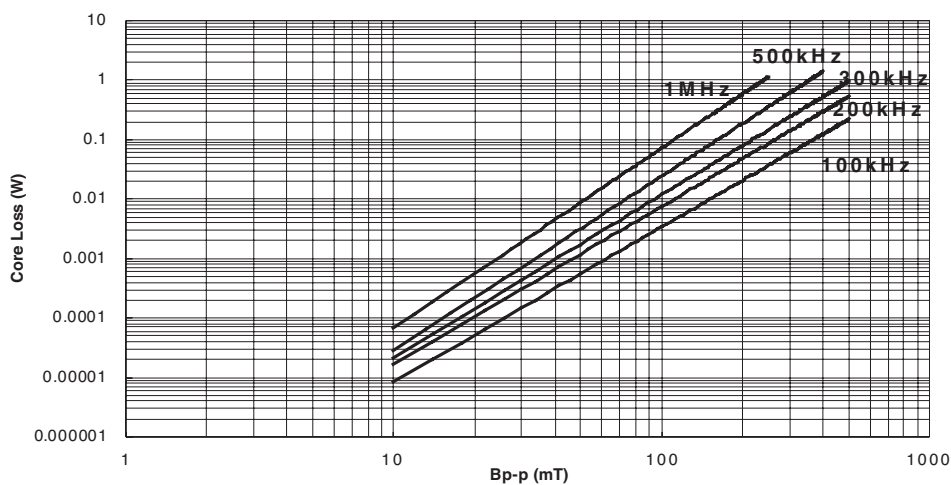
Do not route traces or vias underneath the inductor

## Packaging information (mm)

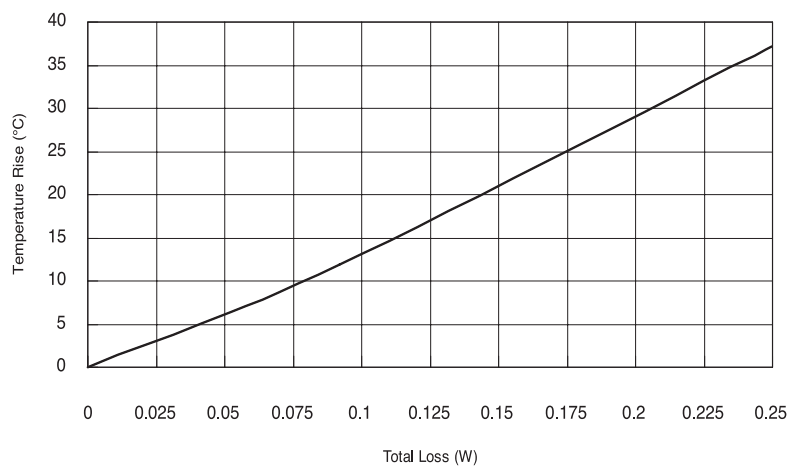
Parts packaged on 13" diameter reel, 2,600 parts per reel.



### Core loss vs. Bp-p

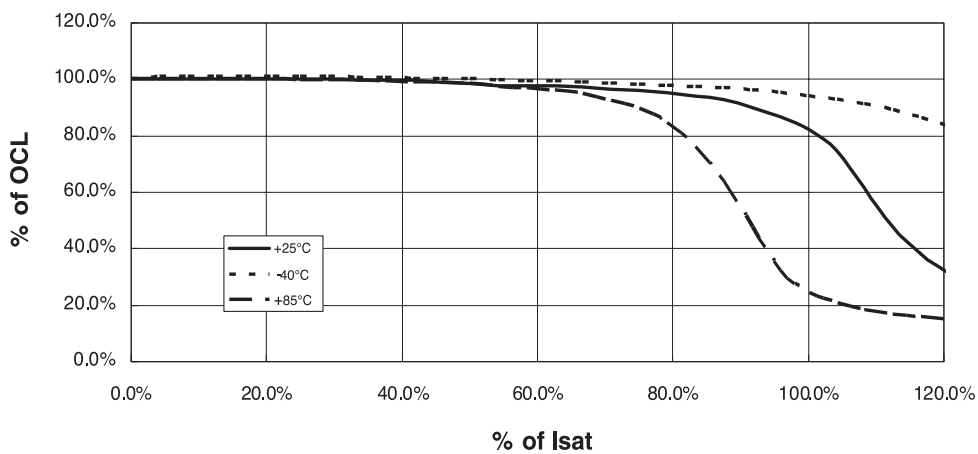


### Temperature rise vs. total loss



### Inductance characteristics

#### OCL vs. Isat



## 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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