FP1010V
High frequency, high current power inductors

Product features
- Vertical design utilizes less board space
- Tight tolerance DCR for sensing circuits
- High current carrying capacity
- Low core loss
- Magnetically shielded
- Inductance Range from 100 nH to 330 nH
- Current range from 35 A to 117 A
- 9.6 mm x 6.4 mm and 10 mm x 7.0 mm footprint surface mount package in a 10 mm height
- Moisture Sensitivity Level: 1
- Ferrite core material

Applications
- Multi-phase and Vcore regulators
- Voltage Regulator Modules (VRMs) and high-power density VRMs
  - Server and desktop
  - Central processing unit (CPU)
  - Graphics processing unit (GPU)
  - Application specific integrated circuit (ASIC)
- Data networking and storage systems
- Graphics cards and battery power systems
- Point-of-Load modules (POL)
- DCR sensing circuits

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-020 (latest revision) compliant
- Halogen free, lead free, RoHS compliant
Product Specifications

<table>
<thead>
<tr>
<th>Part Number*</th>
<th>OCL1 (nH) ±10%</th>
<th>FLL2 (nH) minimum</th>
<th>Ims1 (A)</th>
<th>Isat1 (A)</th>
<th>Isat2 (A)</th>
<th>Isat3 (A)</th>
<th>DCR (mΩ) @ +20 °C</th>
<th>K-factor*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V1 Version</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP1010V1-R100-R</td>
<td>100</td>
<td>72</td>
<td>68</td>
<td>97</td>
<td>88</td>
<td>85</td>
<td>0.145 ±5%</td>
<td>352</td>
</tr>
<tr>
<td>FP1010V1-R120-R</td>
<td>120</td>
<td>86</td>
<td>68</td>
<td>80</td>
<td>73</td>
<td>71</td>
<td>0.145 ±5%</td>
<td>352</td>
</tr>
<tr>
<td>FP1010V1-R150-R</td>
<td>150</td>
<td>108</td>
<td>68</td>
<td>65</td>
<td>59</td>
<td>57</td>
<td>0.145 ±5%</td>
<td>352</td>
</tr>
<tr>
<td>FP1010V1-R180-R</td>
<td>180</td>
<td>130</td>
<td>68</td>
<td>53</td>
<td>48</td>
<td>46</td>
<td>0.145 ±5%</td>
<td>352</td>
</tr>
<tr>
<td><strong>V5 Version</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP1010V5-R100-R</td>
<td>100</td>
<td>72</td>
<td>68</td>
<td>117</td>
<td>97</td>
<td>94</td>
<td>0.185 ±10%</td>
<td>308</td>
</tr>
<tr>
<td>FP1010V5-R120-R</td>
<td>120</td>
<td>86</td>
<td>68</td>
<td>98</td>
<td>82</td>
<td>79</td>
<td>0.185 ±10%</td>
<td>308</td>
</tr>
<tr>
<td>FP1010V5-R150-R</td>
<td>150</td>
<td>108</td>
<td>68</td>
<td>85</td>
<td>75</td>
<td>73</td>
<td>0.185 ±10%</td>
<td>308</td>
</tr>
<tr>
<td>FP1010V5-R330-R</td>
<td>330</td>
<td>237</td>
<td>68</td>
<td>35</td>
<td>29</td>
<td>27</td>
<td>0.185 ±10%</td>
<td>308</td>
</tr>
</tbody>
</table>

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.1 Vrms, Isat1, +25 °C
3. Ims1 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.
4. Isat1: Peak current for approximately 20% rolloff @ +25 °C
5. Isat2: Peak current for approximately 20% rolloff @ +75 °C (FP1010V1), @ +100 °C (FP1010V5)
6. Isat3: Peak current for approximately 20% rolloff @ +100 °C (FP1010V1), @ +125 °C (FP1010V5)
   Bp-p = K * L * ΔI * 10^-3  Bp-p: (Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).
8. Part Number Definition: FP1010Vx-Rxxx-R
   FP1010V= Product code and size
   x= Version indicator
   Rxxx= Inductance value in μH, R= decimal point
   -R suffix = RoHS compliant

Dimensions (mm)

Part marking: FP1010Vx (x = Version indicator), Rxxx = Inductance value in uH, R= decimal point, xxxx=Lot code
Tolerances are ±0.15 unless stated otherwise
Pad layout tolerances are ±0.1 unless stated otherwise
Soldering surfaces to be coplanar within 0.1 millimeters
DCR measured from point “a” to point “b”
Weight: (FP1010V1) 2.5 g reference, (FP1010V5) 3.0 g reference
Termination finish: matte tin (Sn) over nickel (Ni)
Do not route traces or vias underneath the inductor
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Packaging information (mm)
Supplied in tape and reel packaging, 300 parts per 13” diameter reel

FP1010V1

User direction of feed

FP1010V5

User direction of feed
Temperature rise vs. total loss

Core loss vs. Bp-p

Inductance characteristics
FP1010V
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Inductance characteristics

FP1010V1-R150-R

FP1010V1-R180-R

FP1010V5-R100-R

FP1010V5-R120-R

FP1010V5-R150-R

FP1010V5-R330-R
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Solder reflow profile

Temperature

Time 25°C to Peak

Time 25°C to Peak Temperature

Table 1 - Standard SnPb Solder (Tc)

<table>
<thead>
<tr>
<th>Package Thickness</th>
<th>Volume mm³</th>
<th>Volume mm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.5mm</td>
<td>235 °C</td>
<td>220 °C</td>
</tr>
<tr>
<td>≥2.5mm</td>
<td>220 °C</td>
<td>220 °C</td>
</tr>
</tbody>
</table>

Table 2 - Lead (Pb) Free Solder (Tc)

<table>
<thead>
<tr>
<th>Package Thickness</th>
<th>Volume mm³</th>
<th>Volume mm³</th>
<th>Volume mm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.6mm</td>
<td>260 °C</td>
<td>260 °C</td>
<td>260 °C</td>
</tr>
<tr>
<td>1.6 – 2.5mm</td>
<td>260 °C</td>
<td>250 °C</td>
<td>245 °C</td>
</tr>
<tr>
<td>≥2.5mm</td>
<td>250 °C</td>
<td>245 °C</td>
<td>245 °C</td>
</tr>
</tbody>
</table>

Reference JDEC J-STD-020

<table>
<thead>
<tr>
<th>Profile Feature</th>
<th>Standard SnPb Solder</th>
<th>Lead (Pb) Free Solder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat and Soak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Temperature min. (Tmin)</td>
<td>100 °C</td>
<td>150 °C</td>
</tr>
<tr>
<td>• Temperature max. (Tmax)</td>
<td>150 °C</td>
<td>200 °C</td>
</tr>
<tr>
<td>• Time (Tmin to Tmax)</td>
<td>60-120 Seconds</td>
<td>60-120 Seconds</td>
</tr>
<tr>
<td>Average ramp up rate Tmax to Tp</td>
<td>3 °C/ Second Max.</td>
<td>3 °C/ Second Max.</td>
</tr>
<tr>
<td>Liquidous temperature (Tl)</td>
<td>183 °C</td>
<td>217 °C</td>
</tr>
<tr>
<td>Time at liquidus (tl)</td>
<td>60-150 Seconds</td>
<td>60-150 Seconds</td>
</tr>
<tr>
<td>Peak package body temperature (Tp)*</td>
<td>Table 1</td>
<td>Table 2</td>
</tr>
<tr>
<td>Time (tp)** within 5 °C of the specified classification temperature (Tc)</td>
<td>20 Seconds**</td>
<td>30 Seconds**</td>
</tr>
<tr>
<td>Average ramp-down rate (Tp to Tmax)</td>
<td>6 °C/ Second Max.</td>
<td>6 °C/ Second Max.</td>
</tr>
<tr>
<td>Time 25 °C to Peak Temperature</td>
<td>6 Minutes Max.</td>
<td>8 Minutes Max.</td>
</tr>
</tbody>
</table>

* Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum.
** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum.

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