

CMS

Common mode inductors, surface mount



Product description

- Three sizes of surface mount toroidal common mode inductors that provide 300Vdc isolation
- Inductance range from 5.5uH to 1600uH
- Current range up to 7.0 Amps
- Noise attenuation up to 44 dB
- Frequency range up to 100 MHz
- Meets UL94V-0 flammability standard
- Ferrite core material



Applications

- EMI filters
- DC-DC brick power supplies
- Discrete output supplies
- Discrete and point-of-use power supplies (PUPS)

Environmental data

- Storage temperature range: -40°C to +160°C
- Operating ambient temperature range: -40°C to +160°C (range is application specific)
- Solder reflow temperature: J-STD-020D compliant

Product specifications

| Part number | OCL (uH) minimum (1-2) & (4-3) | I rms. Amperes Max* | DCR (Ω) typ @ 20°C (1-2) | DCR (Ω) typ @ 20°C (4-3) | Leakage Inductance (uH) typ | Interwinding Capacitance (pF) typ |
|-------------|--------------------------------|---------------------|--------------------------|--------------------------|-----------------------------|-----------------------------------|
| CMS1-1-R | 4.5 | 7.00 | 0.0027 | 0.0027 | 0.05 | 2.0 |
| CMS1-2-R | 8 | 5.70 | 0.0040 | 0.0040 | 0.09 | 2.1 |
| CMS1-3-R | 12.6 | 4.10 | 0.077 | 0.077 | 0.14 | 2.2 |
| CMS1-4-R | 18 | 3.80 | 0.0089 | 0.0089 | 0.20 | 2.3 |
| CMS1-5-R | 25 | 3.60 | 0.0100 | 0.0100 | 0.28 | 2.4 |
| CMS1-6-R | 32.8 | 3.10 | 0.0138 | 0.0138 | 0.36 | 2.5 |
| CMS1-7-R | 41.5 | 2.60 | 0.019 | 0.019 | 0.45 | 2.6 |
| CMS1-8-R | 51.2 | 2.20 | 0.026 | 0.026 | 0.056 | 2.7 |
| CMS1-9-R | 62 | 1.90 | 0.035 | 0.035 | 0.68 | 2.7 |
| CMS1-10-R | 73.7 | 1.65 | 0.048 | 0.048 | 0.81 | 2.8 |
| CMS1-11-R | 100 | 1.35 | 0.070 | 0.070 | 1.10 | 2.8 |
| CMS1-12-R | 131 | 1.15 | 0.100 | 0.100 | 1.45 | 2.9 |
| CMS1-13-R | 166 | 1.00 | 0.138 | 0.138 | 1.83 | 3.0 |
| CMS1-14-R | 205 | 0.85 | 0.186 | 0.186 | 2.25 | 3.1 |
| CMS2-0-R | 14 | 6.00 | 0.004 | 0.004 | 0.13 | 1.7 |
| CMS2-1-R | 25 | 5.35 | 0.005 | 0.005 | 0.22 | 3.2 |
| CMS2-2-R | 40 | 4.40 | 0.008 | 0.008 | 0.34 | 2.0 |
| CMS2-3-R | 57 | 3.60 | 0.012 | 0.012 | 0.47 | 2.3 |
| CMS2-4-R | 102 | 2.80 | 0.019 | 0.019 | 0.80 | 2.5 |
| CMS2-5-R | 160 | 2.30 | 0.029 | 0.029 | 1.25 | 2.8 |
| CMS2-6-R | 230 | 1.85 | 0.044 | 0.044 | 1.75 | 3.1 |
| CMS2-7-R | 270 | 1.60 | 0.060 | 0.060 | 2.00 | 3.4 |
| CMS2-8-R | 360 | 1.35 | 0.084 | 0.084 | 2.60 | 3.6 |
| CMS2-9-R | 460 | 1.10 | 0.120 | 0.120 | 3.30 | 3.9 |
| CMS2-10-R | 575 | 0.94 | 0.170 | 0.170 | 4.00 | 4.1 |
| CMS2-11-R | 700 | 0.80 | 0.230 | 0.230 | 5.00 | 4.3 |
| CMS2-12-R | 915 | 0.67 | 0.330 | 0.330 | 6.30 | 4.6 |
| CMS2-13-R | 1070 | 0.58 | 0.440 | 0.440 | 7.30 | 4.9 |
| CMS2-14-R | 1340 | 0.50 | 0.620 | 0.620 | 9.00 | 5.1 |
| CMS3-1-R | 28 | 5.70 | 0.005 | 0.005 | 0.31 | 5.4 |
| CMS3-2-R | 45 | 5.10 | 0.006 | 0.006 | 0.46 | 2.80 |
| CMS3-3-R | 64 | 4.75 | 0.007 | 0.007 | 0.64 | 3.05 |
| CMS3-4-R | 88 | 3.95 | 0.010 | 0.010 | 0.85 | 3.50 |
| CMS3-5-R | 146 | 3.10 | 0.017 | 0.017 | 1.30 | 3.70 |
| CMS3-6-R | 217 | 2.85 | 0.020 | 0.020 | 1.90 | 3.90 |
| CMS3-7-R | 258 | 2.45 | 0.027 | 0.027 | 2.20 | 4.15 |
| CMS3-8-R | 350 | 2.00 | 0.040 | 0.040 | 3.00 | 4.40 |
| CMS3-9-R | 400 | 1.70 | 0.053 | 0.053 | 3.30 | 4.65 |
| CMS3-10-R | 518 | 1.45 | 0.076 | 0.076 | 4.20 | 4.85 |
| CMS3-11-R | 648 | 1.20 | 0.107 | 0.107 | 5.10 | 5.10 |
| CMS3-12-R | 790 | 1.05 | 0.145 | 0.145 | 6.10 | 5.35 |
| CMS3-13-R | 1030 | 0.88 | 0.210 | 0.210 | 7.80 | 5.55 |
| CMS3-14-R | 1310 | 0.75 | 0.300 | 0.300 | 9.60 | 5.80 |

Definitions:

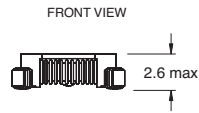
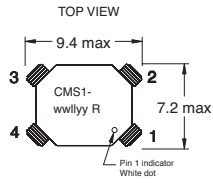
OCL = Open Circuit Inductance
DCR = Direct Current Resistance
I_{rms} = rms current for approx. a 40°C temperature rise at an ambient temperature of 85°C.
*Operating Temperature: 160°C Max. Inductance values are sustained up to 160°C.

Electrical Characteristics:

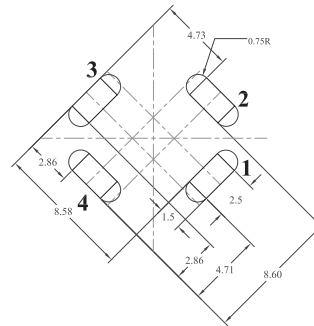
OCL (1-2) 0.10V_{rms}, 100kHz, 0.0Adc: (See Chart)
OCL (4-3) 0.10V_{rms}, 100kHz, 0.0Adc: (See Chart)
DCR (1-2) typ @ 20°C: (See Chart)
DCR (4-3) typ @ 20°C: (See Chart)
Hipot rating: winding to winding: 300Vdc min. for 1 second.
Turns Ratio: (1-2):(4-3) 1:1

Dimensions—mm

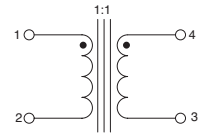
CMS1



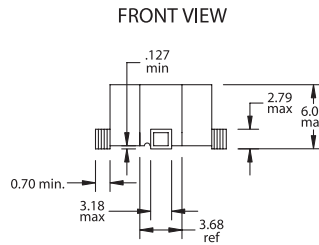
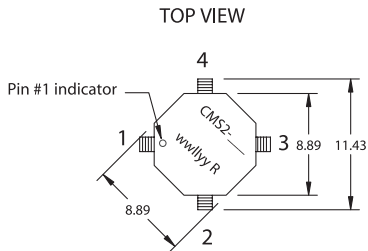
RECOMMENDED PCB LAYOUT



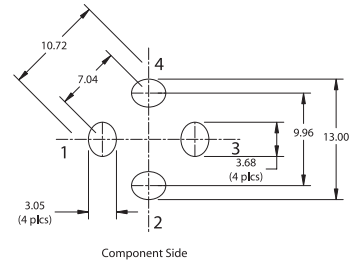
SCHEMATIC



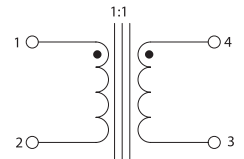
CMS2



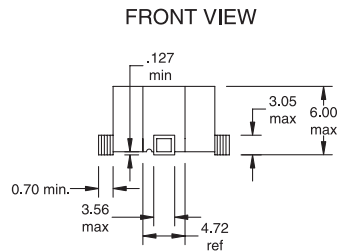
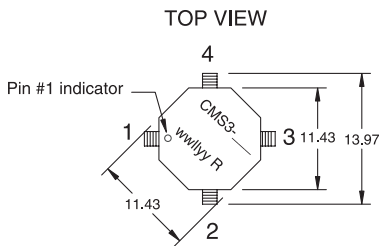
RECOMMENDED PCB LAYOUT



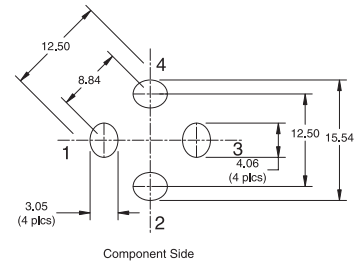
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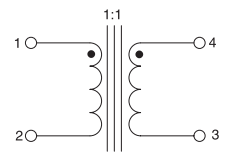
CMS3



RECOMMENDED PCB LAYOUT



SCHEMATIC



willyy = Date code R = Revision level

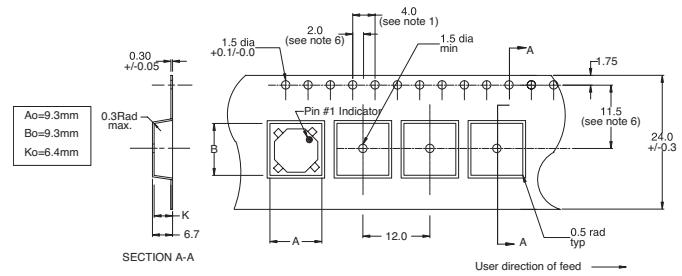
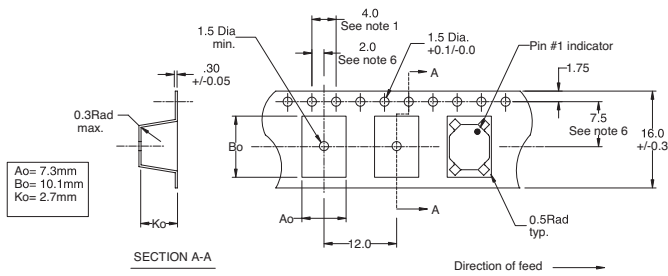
Packaging Information

CMS1

Supplied in tape and reel packaging, 2,000 parts per 13" diameter reel

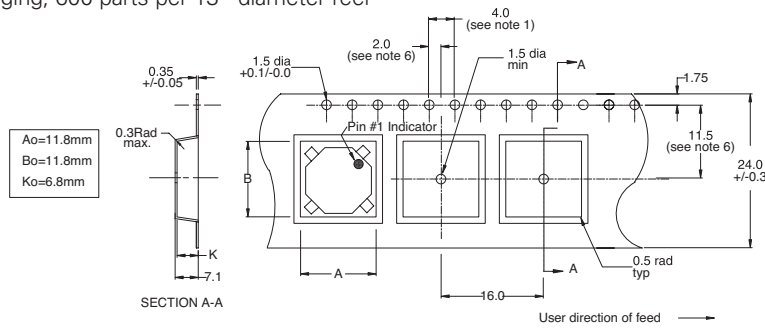
CMS2

Supplied in tape and reel packaging, 800 parts per 13" diameter reel

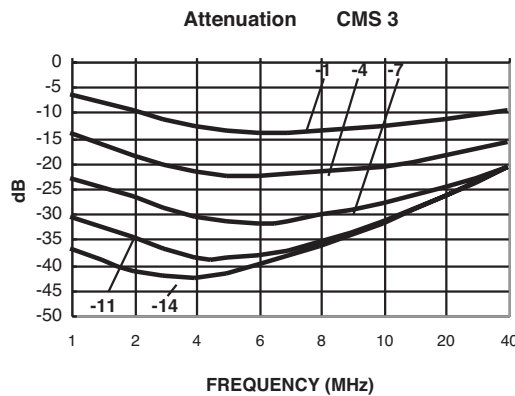
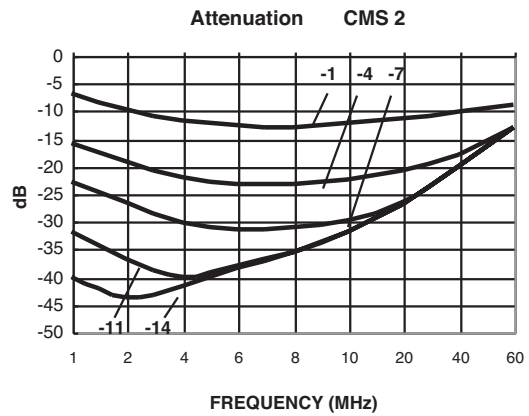
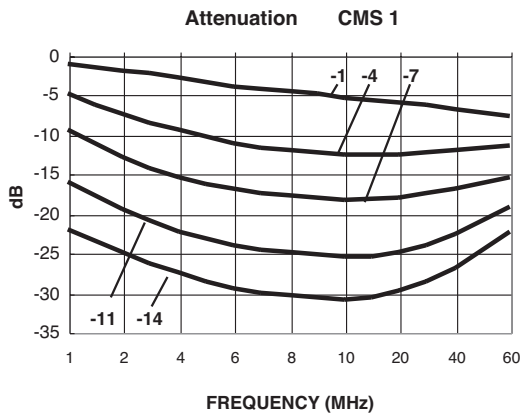


CMS3

Supplied in tape and reel packaging, 600 parts per 13" diameter reel

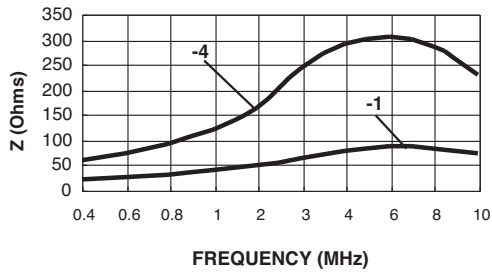


Attenuation Curves

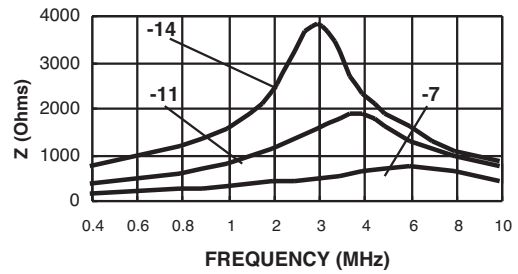


Impedance Curves

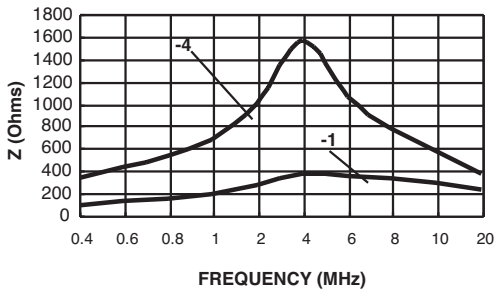
Impedance CMS1-1 & 4



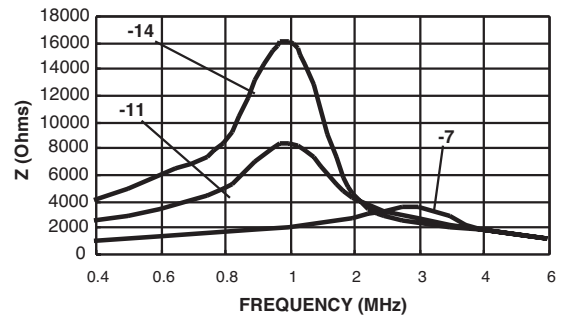
Impedance CMS1 - 7,11, & 14



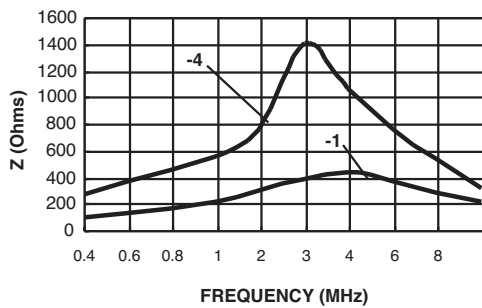
Impedance CMS2 - 1 & 4



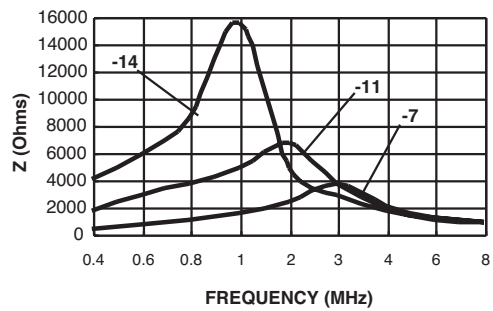
Impedance CMS2 - 7,11, & 14



Impedance CMS3 - 1 & 4



Impedance CMS3 - 7,11, & 14



Solder reflow profile

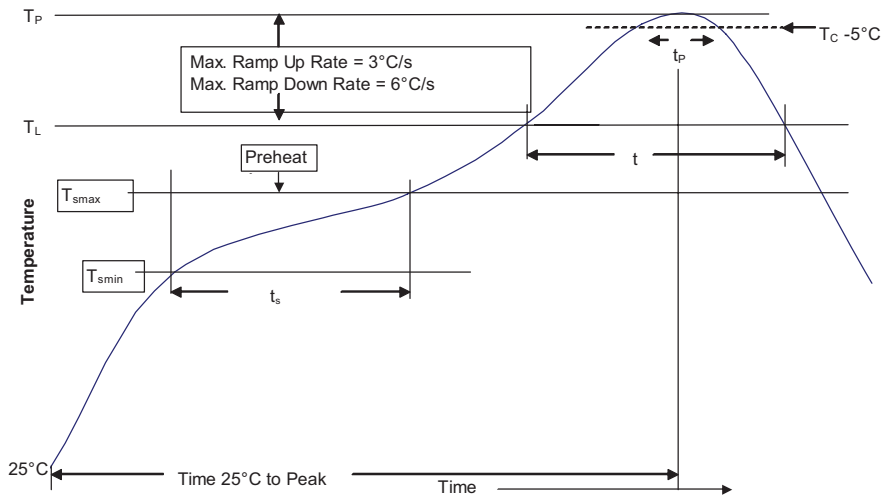


Table 1 - Standard SnPb Solder (T_c)

| Package Thickness | Volume mm ³ <350 | Volume mm ³ ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5mm) | 235°C | 220°C |
| ≥2.5mm | 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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