

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-020 (latest revision) 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 | 3.9 |
| CMS1-12-R | 131 | 1.15 | 0.100 | 0.100 | 1.45 | 3.0 |
| CMS1-13-R | 166 | 1.00 | 0.138 | 0.138 | 1.83 | 3.1 |
| CMS1-14-R | 205 | 0.85 | 0.186 | 0.186 | 2.25 | 3.2 |
| 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 | 2.0 |
| CMS2-2-R | 40 | 4.40 | 0.008 | 0.008 | 0.34 | 2.3 |
| CMS2-3-R | 57 | 3.60 | 0.012 | 0.012 | 0.47 | 2.5 |
| CMS2-4-R | 102 | 2.80 | 0.019 | 0.019 | 0.80 | 2.8 |
| CMS2-5-R | 160 | 2.30 | 0.029 | 0.029 | 1.25 | 3.1 |
| CMS2-6-R | 230 | 1.85 | 0.044 | 0.044 | 1.75 | 3.4 |
| CMS2-7-R | 270 | 1.60 | 0.060 | 0.060 | 2.00 | 3.6 |
| CMS2-8-R | 360 | 1.35 | 0.084 | 0.084 | 2.60 | 3.9 |
| CMS2-9-R | 460 | 1.10 | 0.120 | 0.120 | 3.30 | 4.3 |
| CMS2-10-R | 575 | 0.94 | 0.170 | 0.170 | 4.00 | 4.3 |
| CMS2-11-R | 700 | 0.80 | 0.230 | 0.230 | 5.00 | 4.6 |
| CMS2-12-R | 915 | 0.67 | 0.330 | 0.330 | 6.30 | 4.9 |
| CMS2-13-R | 1070 | 0.58 | 0.440 | 0.440 | 7.30 | 5.1 |
| CMS2-14-R | 1340 | 0.50 | 0.620 | 0.620 | 9.00 | 5.4 |
| CMS3-1-R | 28 | 5.70 | 0.005 | 0.005 | 0.31 | 2.80 |
| CMS3-2-R | 45 | 5.10 | 0.006 | 0.006 | 0.46 | 3.05 |
| CMS3-3-R | 64 | 4.75 | 0.007 | 0.007 | 0.64 | 3.30 |
| 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) 0.10Vrms, 100kHz, 0.0A_{dc}: (See Chart)

OCL (4-3) 0.10Vrms, 100kHz, 0.0A_{dc}: (See Chart)

DCR (1-2) typ @ 20°C: (See Chart)

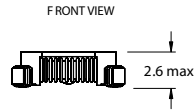
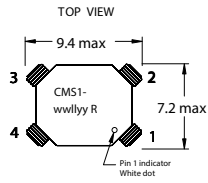
DCR (4-3) typ @ 20°C: (See Chart)

Hipot rating: winding to winding: 300V_{dc} min. for 1 second.

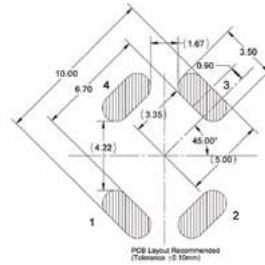
Turns Ratio: (1-2):(4-3) 1:1

Dimensions—mm

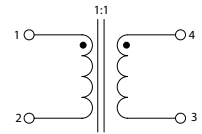
CMS1



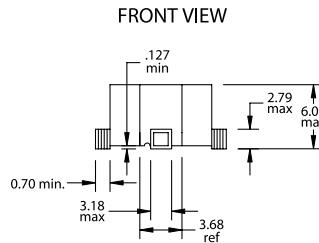
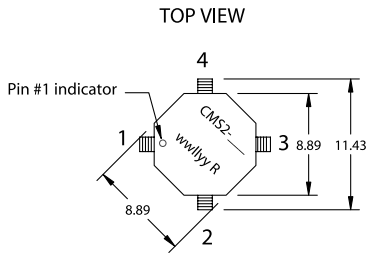
RECOMMENDED PCB LAYOUT



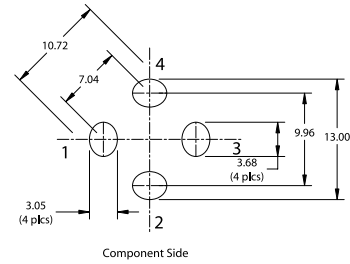
SCHEMATIC



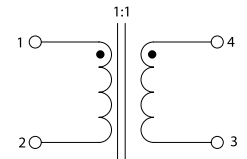
CMS2



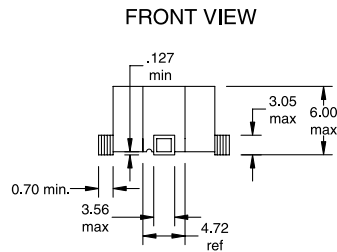
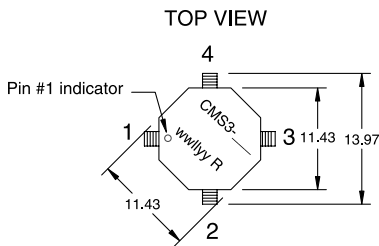
RECOMMENDED PCB LAYOUT



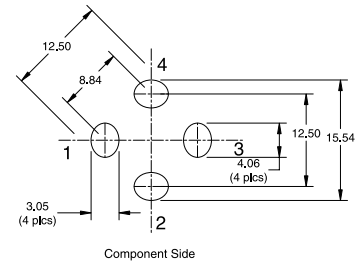
SCHEMATIC



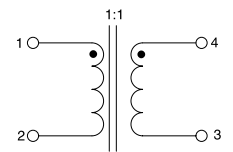
CMS3



RECOMMENDED PCB LAYOUT



SCHEMATIC

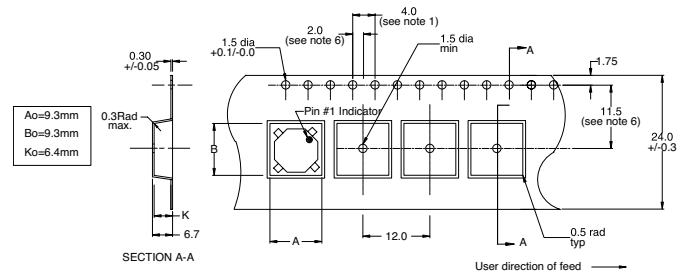
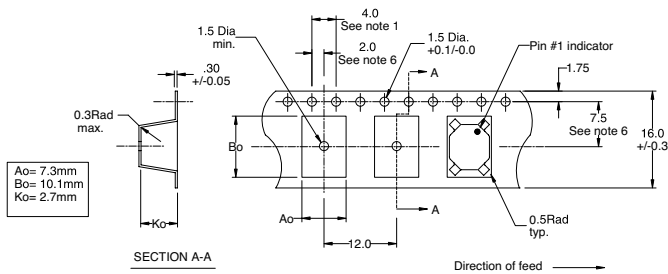


wwllyy = Date code R = Revision level

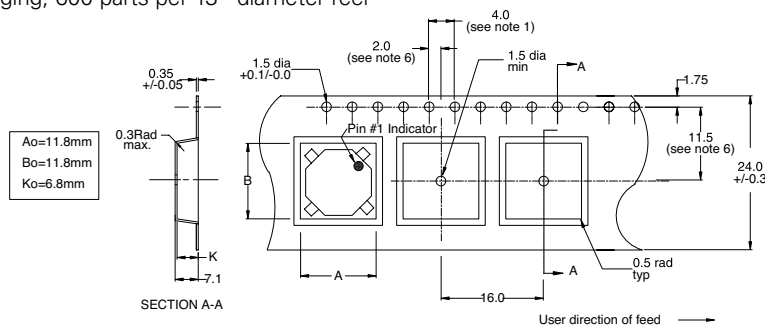
Packaging Information

CMS1
Supplied in tape and reel packaging, 2,000 parts per 13" diameter reel

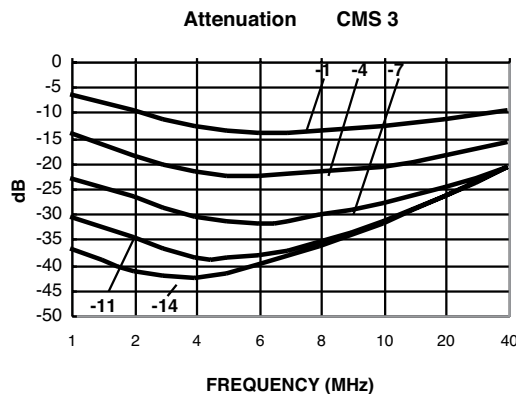
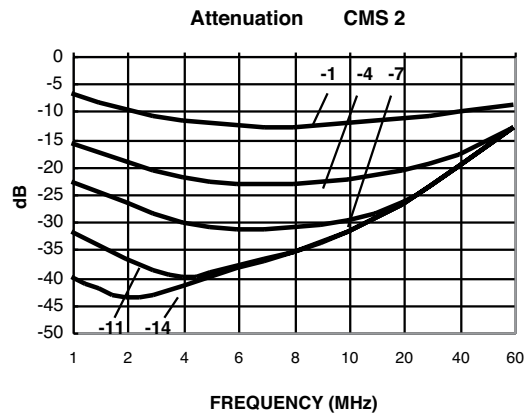
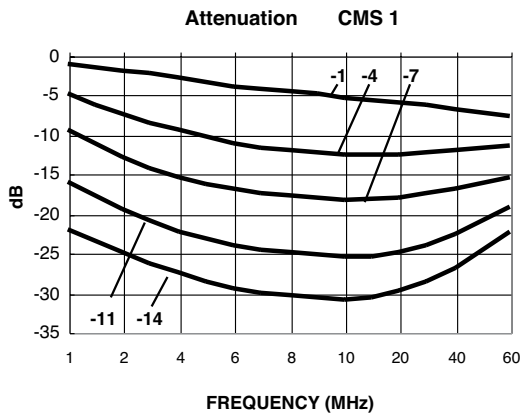
CMS2
Supplied in tape and reel packaging, 800 parts per 13" diameter reel



CMS3
Supplied in tape and reel packaging, 600 parts per 13" diameter reel

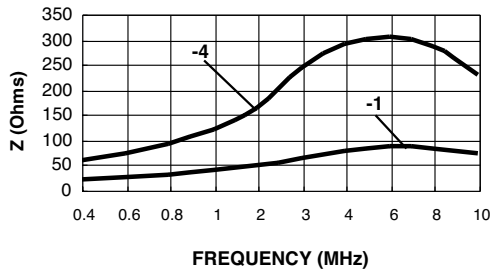


Attenuation Curves

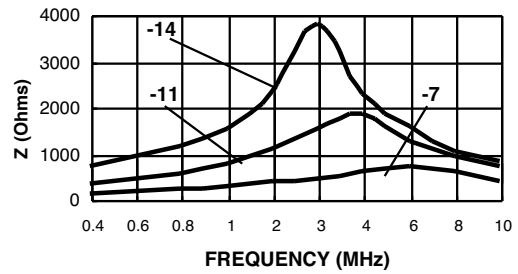


Impedance Curves

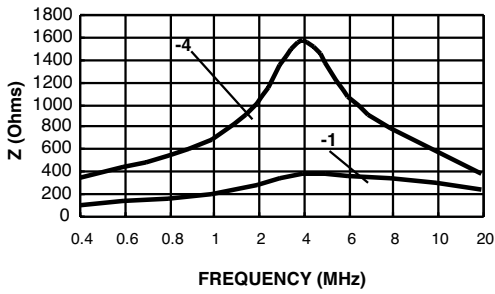
Impedance CMS1-1 & 4



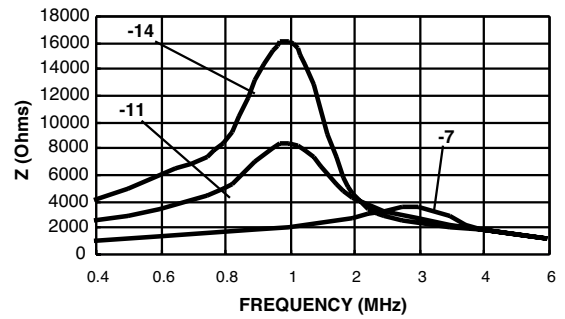
Impedance CMS1 - 7,11, & 14



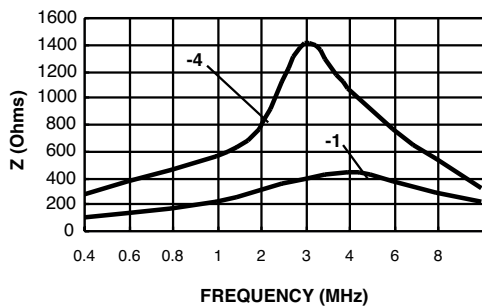
Impedance CMS2 - 1 & 4



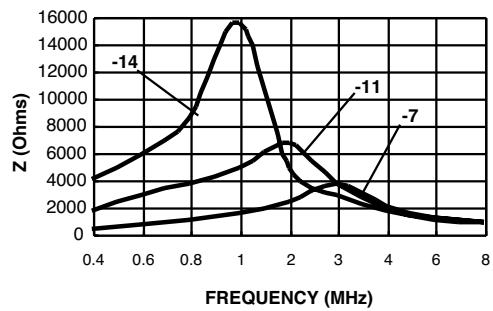
Impedance CMS2 - 7,11, & 14



Impedance CMS3 - 1 & 4



Impedance CMS3 - 7,11, & 14



Solder reflow profile

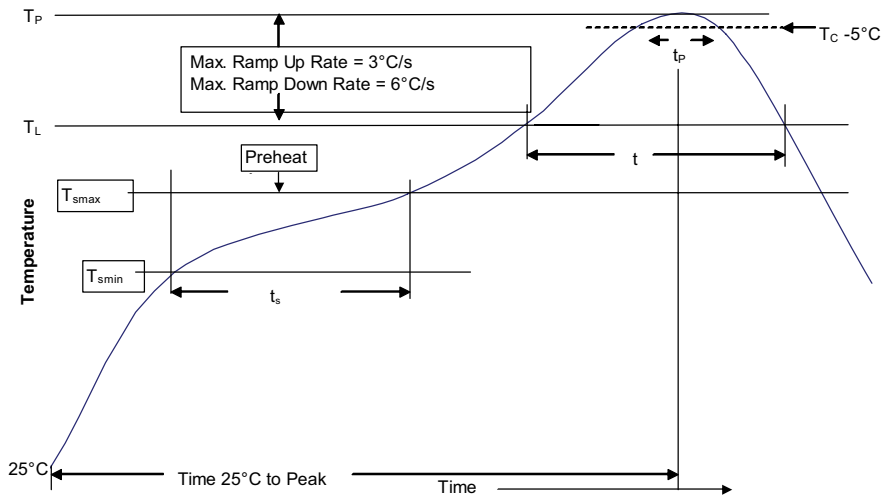


Table 1 - Standard SnPb solder (T_c)

| 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 J-STD-020

| Profile feature | Standard SnPb solder | Lead (Pb) free solder |
|--|--|--|
| Preheat and soak | <ul style="list-style-type: none"> Temperature min. (T_{smin}) Temperature max. (T_{smax}) Time (T_{smin} to T_{smax}) (t_s) | <ul style="list-style-type: none"> 100 °C 150 °C 60-120 seconds |
| Average ramp up rate T_{smax} to T_p | 3 °C/ second Max. | 3 °C/ second Max. |
| Liquidous temperature (T_L) Time at liquidous (t_L) | <ul style="list-style-type: none"> 183 °C 60-150 seconds | <ul style="list-style-type: none"> 217 °C 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/electronics

© 2018 Eaton
All Rights Reserved
Printed in USA
Publication No. 4313 PCN18009
September 2018

Eaton is a registered trademark.

All other trademarks are property of their respective owners.