

# 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	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:**

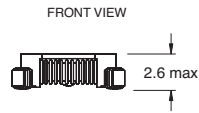
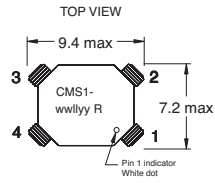
OCL = Open Circuit Inductance  
DCR = Direct Current Resistance  
I<sub>rms</sub> = rms current for approx. a 40°C temperature rise at an ambient temperature of 85°C.  
\*Operating Temperature: 160°C Max. Inductance values are sustained up to 160°C.

**Electrical Characteristics:**

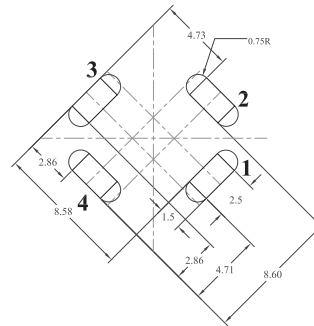
OCL (1-2) 0.10V<sub>rms</sub>, 100kHz, 0.0Adc: (See Chart)  
OCL (4-3) 0.10V<sub>rms</sub>, 100kHz, 0.0Adc: (See Chart)  
DCR (1-2) typ @ 20°C: (See Chart)  
DCR (4-3) typ @ 20°C: (See Chart)  
Hipot rating: winding to winding: 300Vdc min. for 1 second.  
Turns Ratio: (1-2):(4-3) 1:1

Dimensions—mm

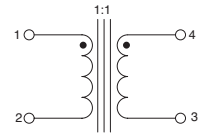
CMS1



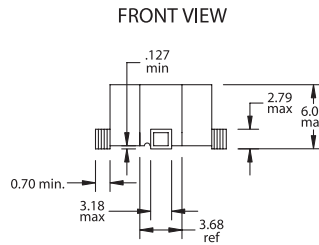
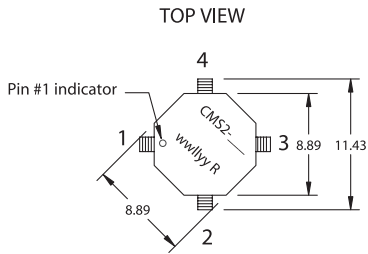
RECOMMENDED PCB LAYOUT



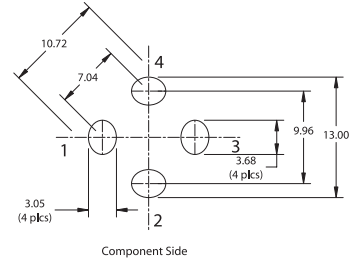
SCHEMATIC



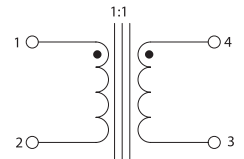
CMS2



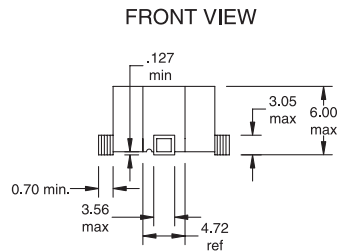
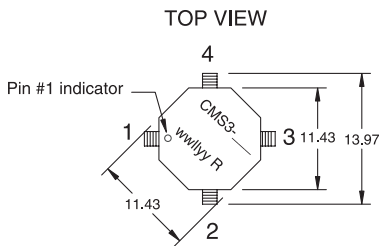
RECOMMENDED PCB LAYOUT



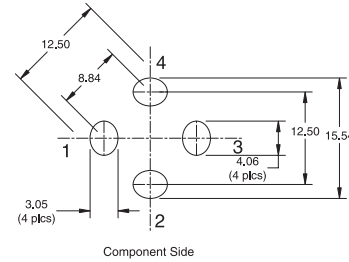
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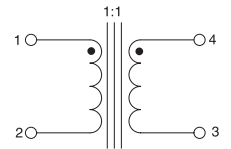
CMS3



RECOMMENDED PCB LAYOUT



SCHEMATIC



willyy = Date code R = Revision level

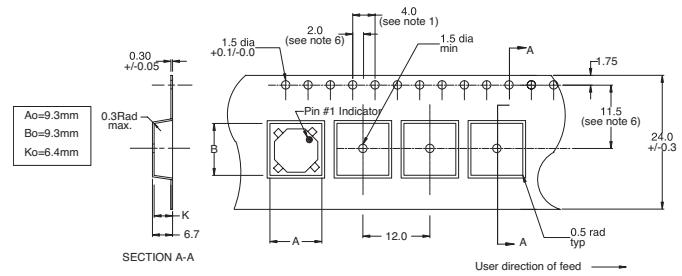
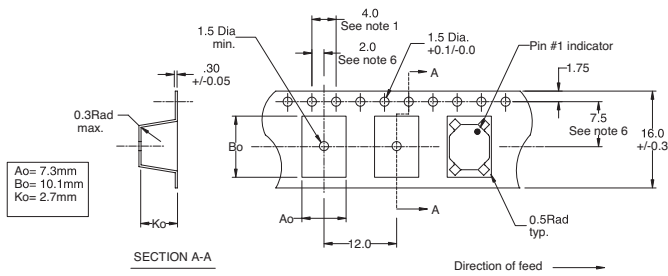
**Packaging Information**

**CMS1**

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

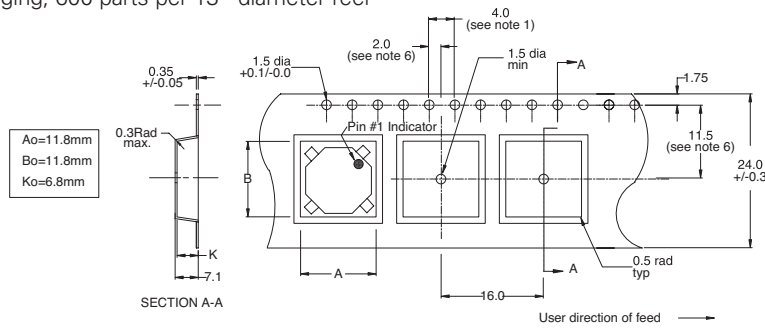
**CMS2**

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



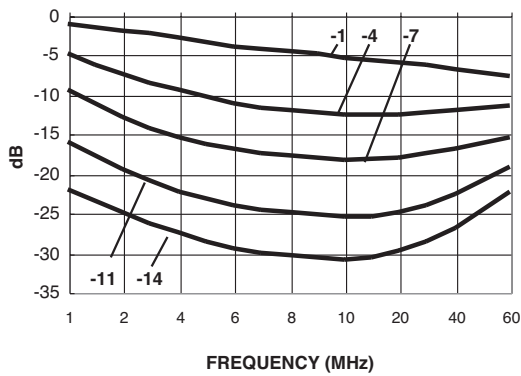
**CMS3**

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

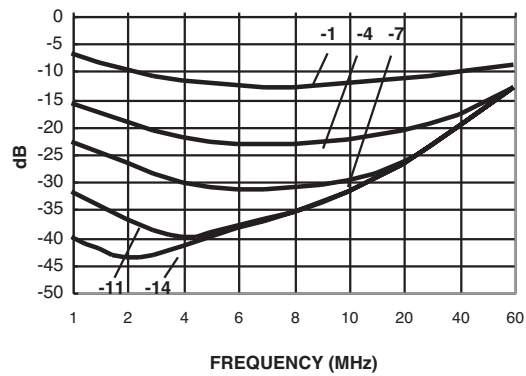


**Attenuation Curves**

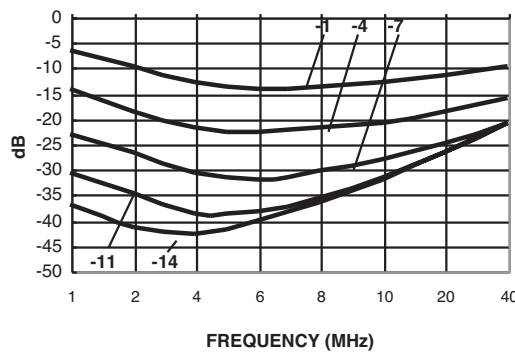
**Attenuation CMS 1**



**Attenuation CMS 2**

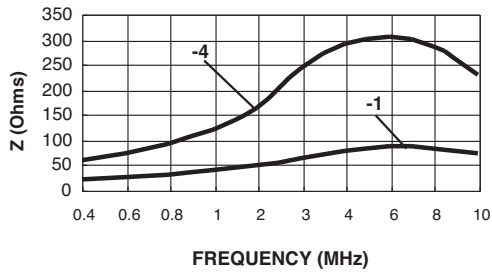


**Attenuation CMS 3**

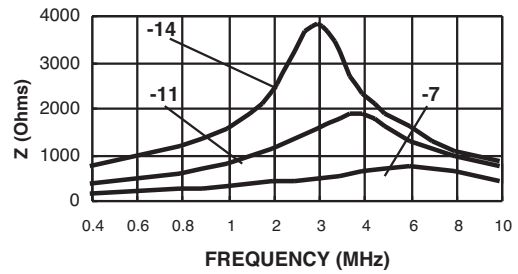


Impedance Curves

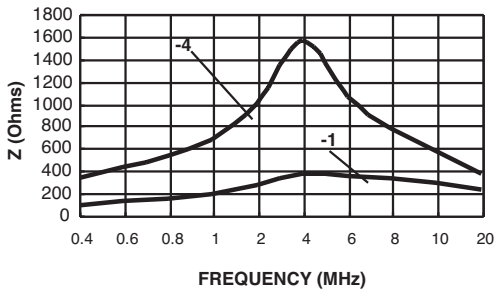
Impedance CMS1-1 & 4



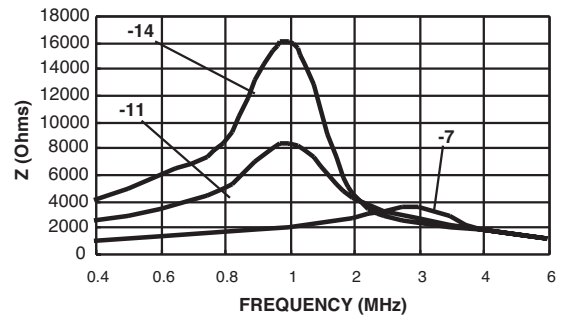
Impedance CMS1 - 7,11, & 14



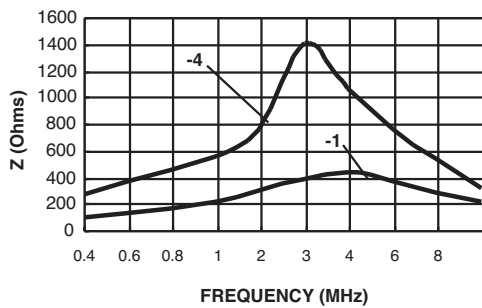
Impedance CMS2 - 1 & 4



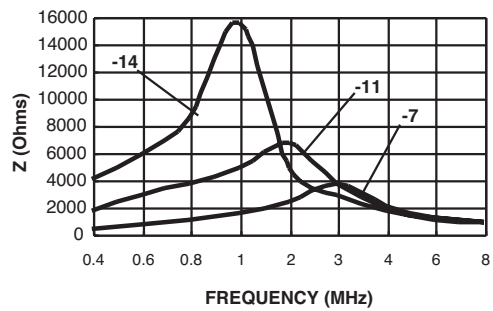
Impedance CMS2 - 7,11, & 14



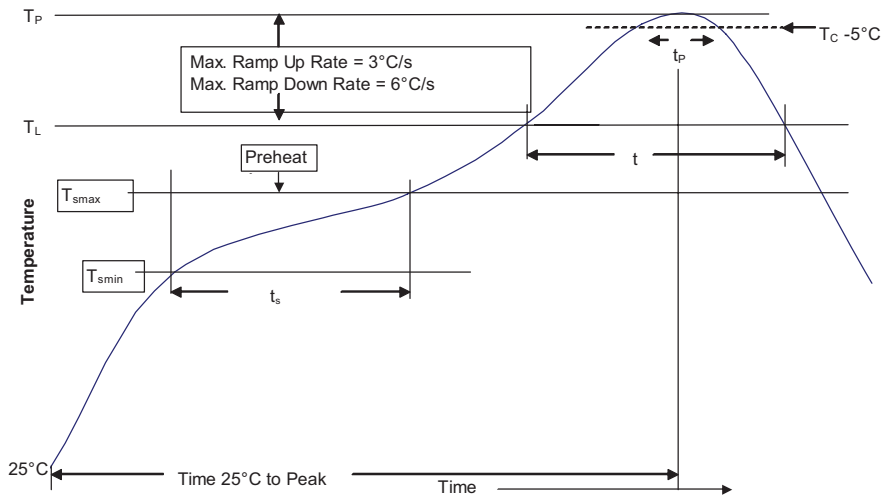
Impedance CMS3 - 1 & 4



Impedance CMS3 - 7,11, & 14



**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_C$ )**

Package Thickness	Volume mm <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.

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