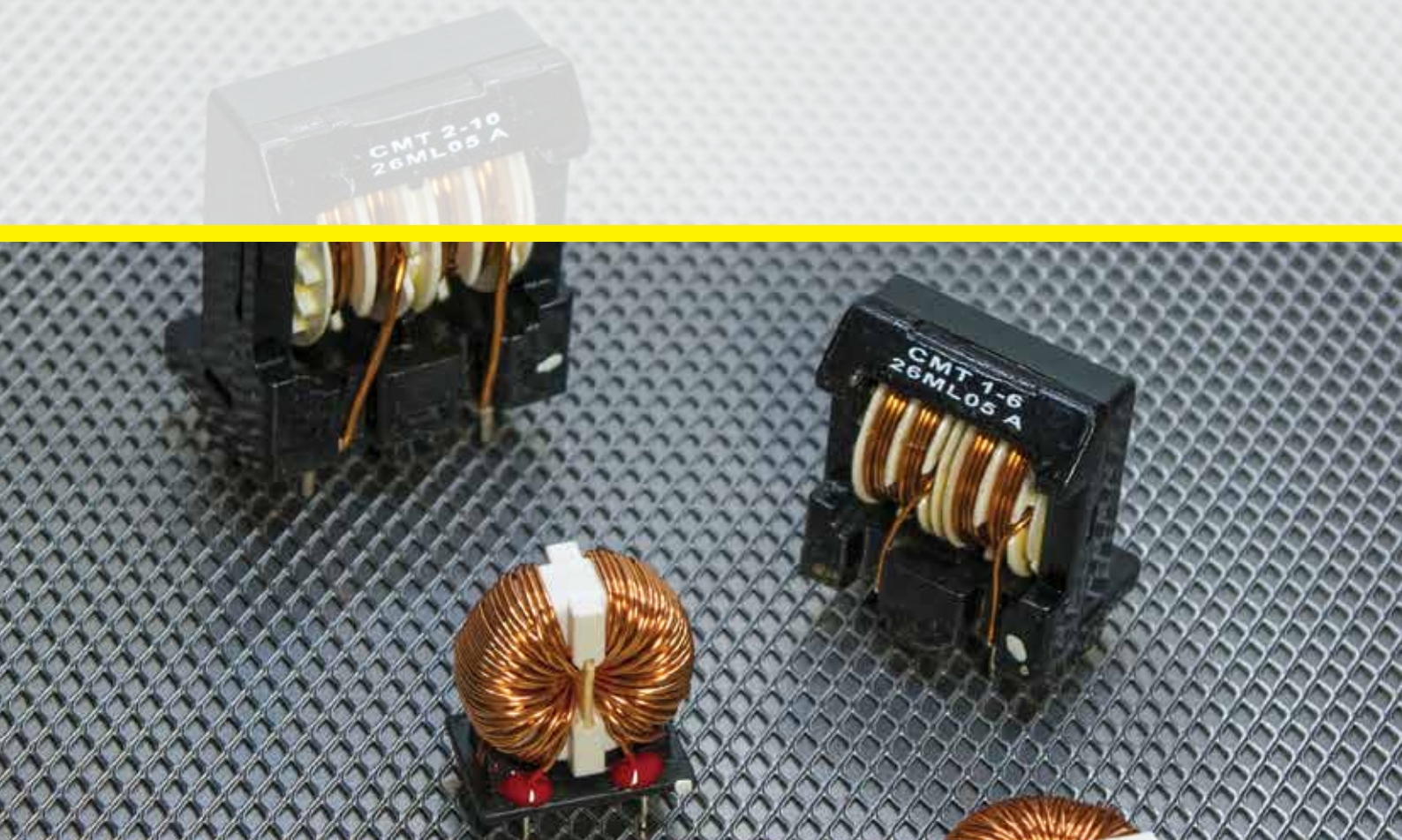




COMMON MODE

COMMON MODE | MODE COMMUN



PARTNERS



INDICE Index Index

FILTRI DA CIRCUITO STAMPATO

Through hall filters | *Filtres pour circuit imprimé*

FILTRI TOROIDALI

Toroidal filters | *Filtres toriques*

FILTRI SMD

SMD filters | *Filtres SMD*



INFORMAZIONI GENERALI General Information | Informations Générales

Il Filtro EMI, Common mode, è un filtro passivo presente nella gran parte delle apparecchiature elettroniche, per permettere a tali dispositivi di rispondere alle normative della compatibilità elettromagnetica, in particolare a quelle riguardanti le emissioni condotte.

In sostanza, il filtro EMI Common mode è un filtro passa basso che viene collegato come ultimo stadio tra l'apparecchiatura e la rete di alimentazione, in modo da attenuare le componenti di disturbo che ogni dispositivo elettronico tende ad emettere. Ovviamente, il filtro deve risultare trasparente alla frequenza di alimentazione (50-60 Hz) per permettere il corretto funzionamento del dispositivo, mentre deve agire nel campo di frequenze stabilite dalla normativa (150kHz-30MHz).

La principale limitazione al valore dell'induttanza L è data dalla massima caduta che è tollerabile su tali componenti alla frequenza di alimentazione. Tipicamente si usano componenti di centinaia di µhenry. Fondamentale è inoltre la scelta del nucleo ferromagnetico su cui sono avvolti i conduttori. Esso deve presentare un alto valore di permeabilità, che deve rimanere più possibile costante nell'intervallo di interesse (150kHz-30MHz). Tale valore elevato di permeabilità permette di ottenere un coefficiente di mutua induzione M il più simile possibile a L. Ciò è molto importante per il corretto funzionamento del filtro.

The EMI filter, Common mode, is a passive filter present in a large part of the electronic equipment, to allow these devices to respond to the laws of electromagnetic compatibility, in particular to those concerning the conducted emissions.

In essence, the EMI filter Common mode is a low pass filter which is connected as the last stage between the equipment and the power network, so as to attenuate the noise components that each electronic device tends to emit. Obviously, the filter needs to be transparent to the power frequency (50-60 Hz) to allow proper operation of the device, and must act in the frequency range of said regulations (150kHz-30MHz).

The main limitation to the value of the inductance L is given by the maximum allowable voltage drop that is tolerable on such components to the power supply frequency. Typically components are hundreds of µhenry. Fundamental is also the choice of the ferromagnetic core on which are wound the conductors. It must present a high permeability value, which must remain as constant as possible in the range of interest (150kHz-30MHz). Such a high value of permeability allows to obtain a coefficient of mutual inductance M as similar as possible to L. This is very important for the proper functioning of the filter.

Le filtre EMI, en mode commun, est un filtre passif présent dans la plupart des équipements électroniques. Il permet à ces appareils de répondre aux lois de la compatibilité électromagnétique, en particulier celles concernant les émissions conduites.

En substance, le filtre EMI en mode commun est un filtre passe-bas connecté à la fin du circuit, entre l'équipement et le réseau d'alimentation, de façon à atténuer les parasites que chaque dispositif électronique à tendance à émettre. De toute évidence, le filtre doit laisser passer la fréquence d'alimentation (50-60 Hz) afin de permettre un fonctionnement correct du dispositif et bloquer les parasites. Il doit également agir dans la gamme de fréquences de ladite réglementation (150kHz à 30MHz).

La principale limitation de la valeur de l'inductance L est donnée par la chute de tension maximale admissible qui est tolérable sur ces composants à la fréquence d'alimentation. Typiquement, on utilise des composants de quelques centaines de µhenry. Le choix du noyau ferromagnétique sur lequel sont enroulés les conducteurs est également fondamental. Il doit présenter une valeur de haute perméabilité, qui doit rester aussi constante que possible dans la plage de fréquences (150kHz-30MHz). Une telle valeur élevée de la perméabilité permet d'obtenir un coefficient d'induction mutuelle M aussi semblable que possible à la valeur L. Ceci est très important pour le bon fonctionnement du filtre.

VANTAGGI Advantages | Avantages

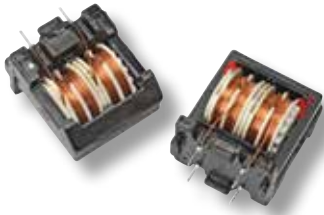
- **Disponibili in diversi formati**
Available in different size | *Disponibles en différents formats*
- **Possibilità di customizzazioni**
Available for customization | *Possibilité de personnalisation*

APPLICAZIONI Applications | Applications

- **Filtri EMI**
EMI filters | *Filtres EMI*
- **DC-DC converter**
DC-DC converter | *Convertisseurs DC-DC*
- **Alimentatori**
Power supply | *Alimentateurs*
- **Elettronica di consumo**
Consumer electronics | *Electronique de consommation*
- **Apparecchiature ufficio**
Office equipment | *Appareils de bureau*

COMMON MODE

Common Mode | Mode Commune

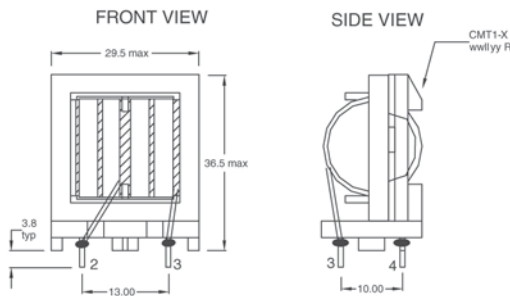


SERIE CMT1 CMT1 Series | Série CMT1

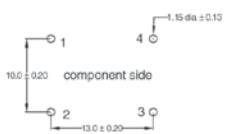
| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| 36,5x29,5x10 mm | 36,5x29,5x10 mm | 36,5x29,5x10 mm |
| Induttanza | Inductance | Inductance |
| 0,94µH ~ 66µH | 0,94µH ~ 66µH | 0,94µH ~ 66µH |
| Corrente | Current | Courant |
| 0,74A ~ 6,05A | 0,74A ~ 6,05A | 0,74A ~ 6,05A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +130°C | -40°C ~ +130°C | -40°C ~ +130°C |



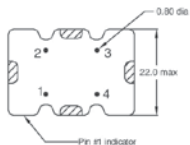
| Codice Code Code | OCL min (1-2) OCL min (1-2) OCL min (1-2) | OCL min (3-4) OCL min (3-4) OCL min (3-4) | Corrente Irms Irms Current Courant Irms | DCR (1-2) DCR (1-2) DCR (1-2) | DCR (3-4) DCR (3-4) DCR (3-4) |
|------------------------|---|---|---|-------------------------------------|-------------------------------------|
| | µH | µH | A | Ω | Ω |
| ZICMT1-1-R | 66 | 66 | 0,74 | 1,20 | 1,20 |
| ZICMT1-2-R | 49 | 49 | 0,88 | 0,85 | 0,85 |
| ZICMT1-3-R | 28 | 28 | 1,13 | 0,50 | 0,50 |
| ZICMT1-4-R | 21 | 21 | 1,37 | 0,35 | 0,35 |
| ZICMT1-5-R | 13 | 13 | 1,76 | 0,20 | 0,20 |
| ZICMT1-6-R | 7,5 | 7,5 | 2,27 | 0,13 | 0,13 |
| ZICMT1-7-R | 4,2 | 4,2 | 2,89 | 0,08 | 0,08 |
| ZICMT1-8-R | 2,4 | 2,4 | 3,85 | 0,045 | 0,045 |
| ZICMT1-9-R | 1,85 | 1,85 | 4,53 | 0,033 | 0,033 |
| ZICMT1-10-R | 0,94 | 0,94 | 6,05 | 0,018 | 0,018 |



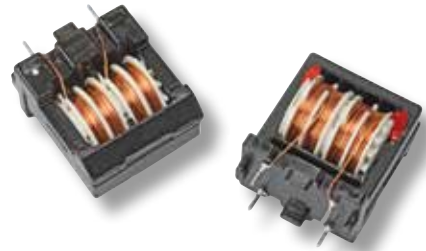
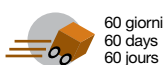
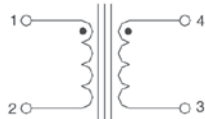
RECOMMENDED PCB LAYOUT



BOTTOM VIEW



SCHEMATIC

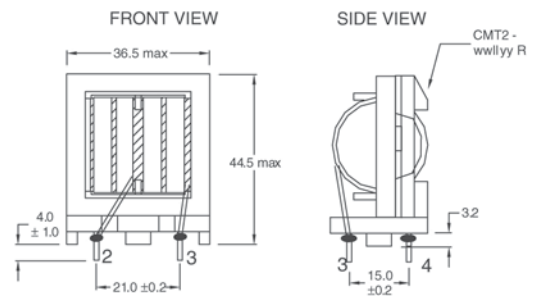


SERIE CMT2 CMT2 Series | Série CMT2

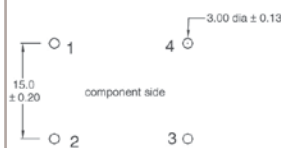
| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| 44,5x36,5x15 mm | 44,5x36,5x15 mm | 44,5x36,5x15 mm |
| Induttanza | Inductance | Inductance |
| 1,6µH ~ 30µH | 1,6µH ~ 30µH | 1,6µH ~ 30µH |
| Corrente | Current | Courant |
| 1,5A ~ 5,75A | 1,5A ~ 5,75A | 1,5A ~ 5,75A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +130°C | -40°C ~ +130°C | -40°C ~ +130°C |



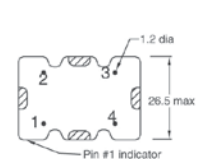
| Codice Code Code | OCL min (1-2) OCL min (1-2) OCL min (1-2) | OCL min (3-4) OCL min (3-4) OCL min (3-4) | Corrente Irms Irms Current Courant Irms | DCR (1-2) DCR (1-2) DCR (1-2) | DCR (3-4) DCR (3-4) DCR (3-4) |
|------------------------|---|---|---|-------------------------------------|-------------------------------------|
| | µH | µH | A | Ω | Ω |
| ZICMT2-1-R | 30 | 30 | 1,50 | 0,350 | 0,350 |
| ZICMT2-2-R | 20 | 20 | 1,95 | 0,220 | 0,220 |
| ZICMT2-3-R | 12 | 12 | 2,45 | 0,135 | 0,135 |
| ZICMT2-4-R | 8 | 8 | 2,80 | 0,100 | 0,100 |
| ZICMT2-5-R | 6 | 6 | 3,40 | 0,070 | 0,070 |
| ZICMT2-6-R | 4,8 | 4,8 | 3,95 | 0,053 | 0,053 |
| ZICMT2-7-R | 3,2 | 3,2 | 4,40 | 0,042 | 0,042 |
| ZICMT2-8-R | 2,4 | 2,4 | 4,75 | 0,037 | 0,037 |
| ZICMT2-9-R | 2,0 | 2,0 | 5,45 | 0,028 | 0,028 |
| ZICMT2-10-R | 1,6 | 1,6 | 5,75 | 0,026 | 0,026 |



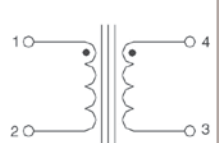
RECOMMENDED PCB LAYOUT



BOTTOM VIEW



SCHEMATIC



COMMON MODE

Common Mode | Mode Commune

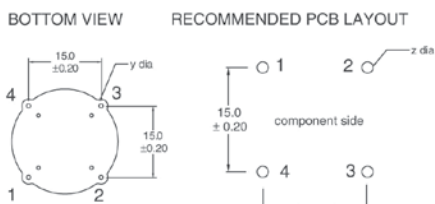
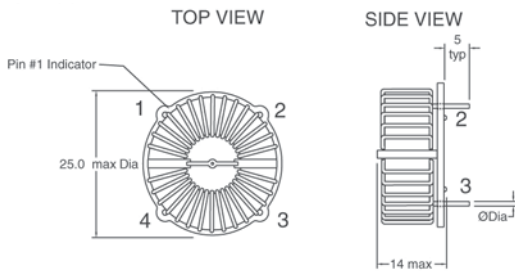


SERIE CMT3 CMT3 Series | Séries CMT3

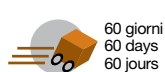
| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| Ø25x14 mm | Ø25x14 mm | Ø25x14 mm |
| Induttanza | Inductance | Inductance |
| 0,53µH ~ 5,4µH | 0,53µH ~ 5,4µH | 0,53µH ~ 5,4µH |
| Corrente | Current | Courant |
| 2A ~ 6,5A | 2A ~ 6,5A | 2A ~ 6,5A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +130°C | -40°C ~ +130°C | -40°C ~ +130°C |



| Codice | OCL min (1-2) | OCL min (3-4) | Corrente Irms | DCR (1-2) | DCR (3-4) |
|------------|---------------|---------------|---------------|-----------|-----------|
| Code | OCL min (1-2) | OCL min (3-4) | Irms Current | DCR (1-2) | DCR (3-4) |
| Code | µH | µH | A | Ω | Ω |
| ZICMT3-1-R | 5,4 | 5,4 | 2,00 | 0,120 | 0,120 |
| ZICMT3-2-R | 3,5 | 3,5 | 2,60 | 0,080 | 0,080 |
| ZICMT3-3-R | 2,7 | 2,7 | 3,00 | 0,055 | 0,055 |
| ZICMT3-4-R | 1,3 | 1,3 | 4,00 | 0,032 | 0,032 |
| ZICMT3-5-R | 0,92 | 0,92 | 5,00 | 0,021 | 0,021 |
| ZICMT3-6-R | 0,53 | 0,53 | 6,50 | 0,013 | 0,013 |



| | *Y* Dia ref | *Z* Dia ref |
|--------|-------------|-------------|
| CMT3-1 | 0.58 | 0.83 |
| CMT3-2 | 0.64 | 0.90 |
| CMT3-3 | 0.71 | 0.97 |
| CMT3-4 | 0.80 | 1.06 |
| CMT3-5 | 0.89 | 1.15 |
| CMT3-6 | 0.99 | 1.25 |

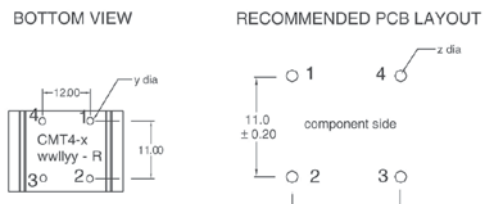
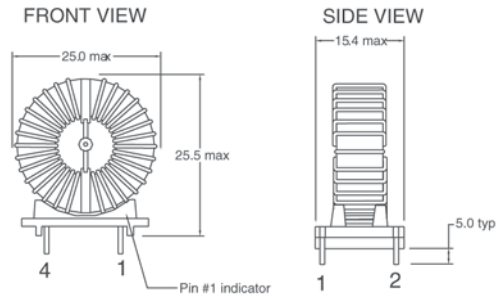


SERIE CMT4 CMT4 Series | Séries CMT4

| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| Ø25,5xØ25x15,4 mm | Ø25,5xØ25x15,4 mm | Ø25,5xØ25x15,4 mm |
| Induttanza | Inductance | Inductance |
| 0,53µH ~ 5,4µH | 0,53µH ~ 5,4µH | 0,53µH ~ 5,4µH |
| Corrente | Current | Courant |
| 2A ~ 6,5A | 2A ~ 6,5A | 2A ~ 6,5A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +130°C | -40°C ~ +130°C | -40°C ~ +130°C |



| Codice | OCL min (1-2) | OCL min (3-4) | Corrente Irms | DCR (1-2) | DCR (3-4) |
|------------|---------------|---------------|---------------|-----------|-----------|
| Code | OCL min (1-2) | OCL min (3-4) | Irms Current | DCR (1-2) | DCR (3-4) |
| Code | µH | µH | A | Ω | Ω |
| ZICMT4-1-R | 5,4 | 5,4 | 2,0 | 0,120 | 0,012 |
| ZICMT4-2-R | 3,5 | 3,5 | 2,6 | 0,080 | 0,080 |
| ZICMT4-3-R | 2,7 | 2,7 | 3,0 | 0,055 | 0,055 |
| ZICMT4-4-R | 1,3 | 1,3 | 4,0 | 0,032 | 0,032 |
| ZICMT4-5-R | 0,92 | 0,92 | 5,0 | 0,021 | 0,021 |
| ZICMT4-6-R | 0,53 | 0,53 | 6,5 | 0,013 | 0,013 |



| | *Y* Dia ref | *Z* Dia ref |
|--------|-------------|-------------|
| CMT4-1 | 0.58 | 0.83 |
| CMT4-2 | 0.64 | 0.90 |
| CMT4-3 | 0.71 | 0.97 |
| CMT4-4 | 0.80 | 1.06 |
| CMT4-5 | 0.89 | 1.15 |
| CMT4-6 | 0.99 | 1.25 |



COMMON MODE

Common Mode | Mode Commun



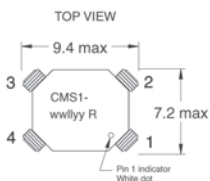
SERIE CMS1 CMS1 Series | Série CMS1

| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| 9,4x7,2x2,6 | 9,4x7,2x2,6 | 9,4x7,2x2,6 |
| Induttanza | Inductance | Inductance |
| 4,5µH ~ 205µH | 4,5µH ~ 205µH | 4,5µH ~ 205µH |
| Corrente | Current | Courant |
| 0,85A ~ 7A | 0,85A ~ 7A | 0,85A ~ 7A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +160°C | -40°C ~ +160°C | -40°C ~ +160°C |

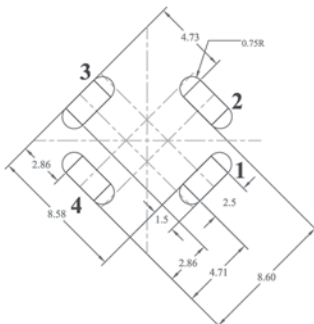


| Codice Code | OCL min (1-2) OCL min (1-2) | Corrente Irms Irms Current Courant Irms | DCR (1-2) DCR (1-2) | DCR (3-4) DCR (3-4) | Induttanza dispersa Leakage Inductance Inductance de fuite |
|----------------|--------------------------------|---|------------------------|------------------------|--|
| | µH | µH | Ω | Ω | TYP |
| ZICMS1-1-R | 4,5 | 7,00 | 0,0027 | 0,0027 | 0,05 |
| ZICMS1-2-R | 8,0 | 5,70 | 0,0040 | 0,0040 | 0,09 |
| ZICMS1-3-R | 12,6 | 4,10 | 0,0077 | 0,0077 | 0,14 |
| ZICMS1-4-R | 18,0 | 3,80 | 0,0081 | 0,0089 | 0,20 |
| ZICMS1-5-R | 25,0 | 3,60 | 0,0100 | 0,0100 | 0,28 |
| ZICMS1-6-R | 32,8 | 3,10 | 0,0138 | 0,0138 | 0,36 |
| ZICMS1-7-R | 41,5 | 2,60 | 0,019 | 0,0190 | 0,45 |
| ZICMS1-8-R | 51,2 | 2,20 | 0,026 | 0,0260 | 0,566 |
| ZICMS1-9-R | 62,0 | 1,90 | 0,035 | 0,0350 | 0,68 |
| ZICMS1-10-R | 73,7 | 1,65 | 0,048 | 0,0480 | 0,81 |
| ZICMS1-11-R | 100 | 1,35 | 0,070 | 0,0700 | 1,10 |
| ZICMS1-12-R | 131 | 1,15 | 0,100 | 0,1000 | 1,45 |
| ZICMS1-13-R | 166 | 1,00 | 0,138 | 0,1380 | 1,83 |
| ZICMS1-14-R | 205 | 0,85 | 0,186 | 0,1860 | 2,25 |

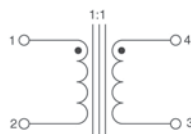
CMS1 Series



RECOMMENDED PCB LAYOUT



SCHEMATIC



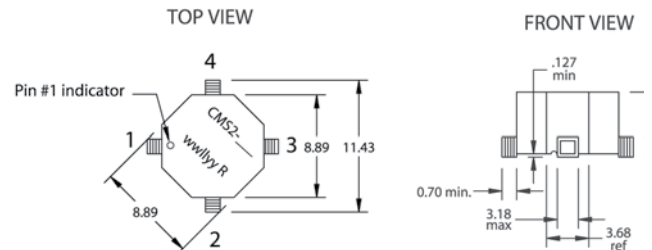
SERIE CMS2 CMS2 Series | Série CMS2

| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| 11,43x8,89x6 | 11,43x8,89x6 | 11,43x8,89x6 |
| Induttanza | Inductance | Inductance |
| 25µH ~ 1340µH | 25µH ~ 1340µH | 25µH ~ 1340µH |
| Corrente | Current | Courant |
| 0,50A ~ 5,35A | 0,50A ~ 5,35A | 0,50A ~ 5,35A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +160°C | -40°C ~ +160°C | -40°C ~ +160°C |

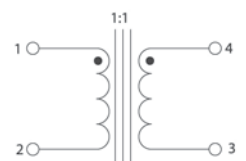


| Codice Code | OCL min (1-2) OCL min (1-2) | Corrente Irms Irms Current Courant Irms | DCR (1-2) DCR (1-2) | DCR (3-4) DCR (3-4) | Induttanza dispersa Leakage Inductance Inductance de fuite |
|----------------|--------------------------------|---|------------------------|------------------------|--|
| | µH | µH | Ω | Ω | TYP |
| ZICMS2-1-R | 25 | 5,35 | 0,005 | 0,005 | 0,22 |
| ZICMS2-2-R | 40 | 4,40 | 0,008 | 0,008 | 0,34 |
| ZICMS2-3-R | 57 | 3,60 | 0,012 | 0,012 | 0,47 |
| ZICMS2-4-R | 102 | 2,80 | 0,019 | 0,019 | 0,80 |
| ZICMS2-5-R | 160 | 2,30 | 0,029 | 0,029 | 1,25 |
| ZICMS2-6-R | 230 | 1,85 | 0,044 | 0,044 | 1,75 |
| ZICMS2-7-R | 270 | 1,60 | 0,060 | 0,060 | 2,00 |
| ZICMS2-8-R | 360 | 1,35 | 0,084 | 0,084 | 2,60 |
| ZICMS2-9-R | 460 | 1,10 | 0,120 | 0,120 | 3,30 |
| ZICMS2-10-R | 575 | 0,94 | 0,170 | 0,170 | 4,00 |
| ZICMS2-11-R | 700 | 0,80 | 0,230 | 0,230 | 5,00 |
| ZICMS2-12-R | 915 | 0,67 | 0,330 | 0,330 | 6,30 |
| ZICMS2-13-R | 1070 | 0,58 | 0,440 | 0,440 | 7,30 |
| ZICMS2-14-R | 1340 | 0,50 | 0,620 | 0,620 | 9,00 |

CMS2 Series

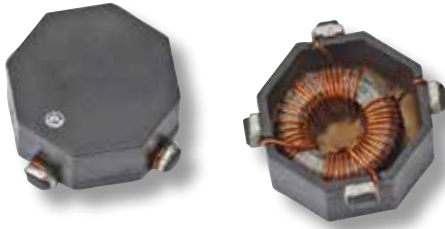


SCHEMATIC



COMMON MODE

Common Mode | Mode Commun

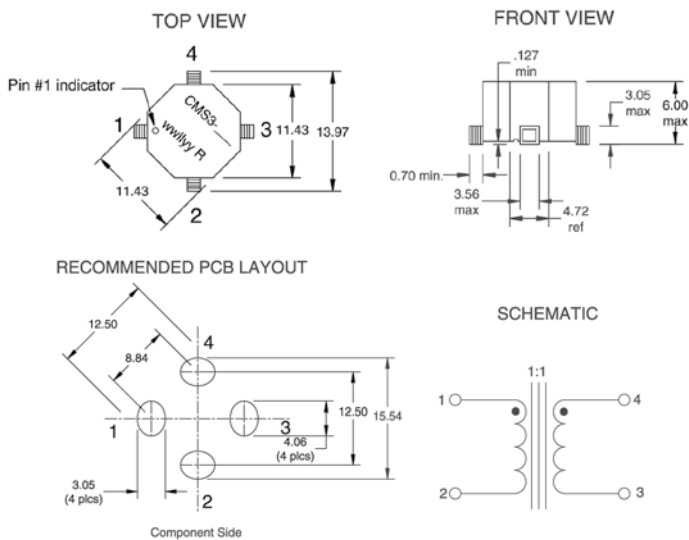

SERIE CMS3
 CMS3 Series | Série CMS3

| Dimensioni | Dimensions | Dimensions |
|--------------------------|-----------------------|------------------------|
| 13,97x11,43x6 | 13,97x11,43x6 | 13,97x11,43x6 |
| Induttanza | Inductance | Inductance |
| 28μH ~ 1310μH | 28μH ~ 1310μH | 28μH ~ 1310μH |
| Corrente | Current | Courant |
| 0,75A ~ 5,70A | 0,50A ~ 5,35A | 0,75A ~ 5,70A |
| Temperatura di esercizio | Operating Temperature | Température de travail |
| -40°C ~ +160°C | -40°C ~ +160°C | -40°C ~ +160°C |



| Codice Code Code | OCL min (1-2) OCL min (1-2) OCL min (1-2) | Corrente Irms Irms Current Courant Irms | DCR (1-2) DCR (1-2) DCR (1-2) | DCR (3-4) DCR (3-4) DCR (3-4) | Induttanza dispersa Leakage Inductance Inductance de fuite |
|------------------------|---|---|-------------------------------------|-------------------------------------|--|
| | μH | μH | Ω | Ω | TYP |
| ZICMS3-1-R | 28 | 5,70 | 0,005 | 0,005 | 0,31 |
| ZICMS3-2-R | 45 | 5,10 | 0,006 | 0,006 | 0,46 |
| ZICMS3-3-R | 64 | 4,75 | 0,007 | 0,007 | 0,64 |
| ZICMS3-4-R | 88 | 3,95 | 0,010 | 0,010 | 0,85 |
| ZICMS3-5-R | 146 | 3,10 | 0,017 | 0,017 | 1,30 |
| ZICMS3-6-R | 217 | 2,85 | 0,020 | 0,020 | 1,90 |
| ZICMS3-7-R | 258 | 2,45 | 0,027 | 0,027 | 2,20 |
| ZICMS3-8-R | 350 | 2,00 | 0,040 | 0,040 | 3,00 |
| ZICMS3-9-R | 400 | 1,70 | 0,053 | 0,053 | 3,30 |
| ZICMS3-10-R | 518 | 1,45 | 0,076 | 0,076 | 4,20 |
| ZICMS3-11-R | 648 | 1,20 | 0,107 | 0,107 | 5,10 |
| ZICMS3-12-R | 790 | 1,05 | 0,145 | 0,145 | 6,10 |
| ZICMS3-13-R | 1030 | 0,88 | 0,210 | 0,210 | 7,80 |
| ZICMS3-14-R | 1310 | 0,75 | 0,300 | 0,300 | 9,60 |

CMS3 Series


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