



Praetorian® 6-Channel EMI Filter Array with ESD Protection

CM1453-06CP

Features

- Six channels of EMI filtering
- $\pm 15\text{kV}$ ESD protection (IEC 61000-4-2, contact discharge)
- $\pm 30\text{kV}$ ESD protection (HBM)
- Greater than -40dB of attenuation at 1GHz
- Chip Scale Package (CSP) with 0.40mm pitch and 0.25mm CSP solder ball which features extremely low parasitic inductance for optimum filter and ESD performance
- *OptiGuard*™ Coating for improved reliability at assembly
- RoHS compliant

Applications

- LCD and Camera data lines in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

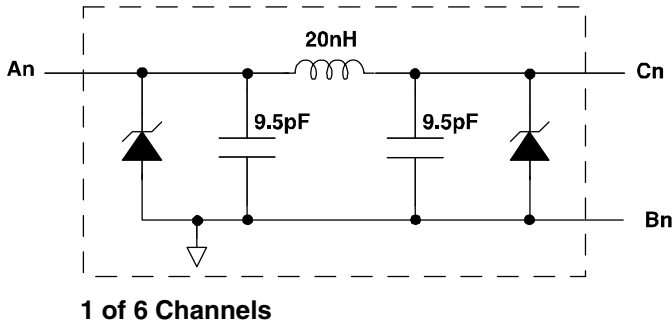
Product Description

The CM1453-06CP is a pi-style EMI filter array with ESD protection, which integrates filters (C-L-C) in CSP form factor with 0.40mm pitch. Each EMI filter channel of the CM1453-06CP is implemented as a 3-pole L-C filter where the component values are 9.5pF-20nH-9.5pF. The roll-off frequency at -6dB attenuation is 380MHz and can be used in applications where the data rates are as high as 160Mbps while providing greater than -35dB over the 800MHz to 2.7GHz frequency range. The parts include ESD diodes on every I/O pin, and provide a high level of protection against electrostatic discharge (ESD). The ESD protection diodes connected to the filter ports are designed and characterized to safely dissipate ESD strikes of $\pm 15\text{kV}$, beyond the maximum requirement of the IEC61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the pins are protected for contact discharges at greater than $\pm 30\text{kV}$.

This device is particularly well suited for wireless handsets, mobile LCD modules and PDAs because of its small package format and easy-to-use pin assignments. In particular, the CM1453-06CP is ideal for EMI filtering and protecting data and control lines for the LCD display and camera interface in mobile handsets.

The CM1453-06CP incorporates *OptiGuard*™ which results in improved reliability at assembly. It is manufactured with a 0.40mm pitch and 0.25mm CSP solder ball to provide up to 28% board space savings vs. competing CSP devices with 0.50mm pitch and 0.30mm CSP solder ball.

Electrical Schematic



PACKAGE / PINOUT DIAGRAMS

TOP VIEW
(Bumps Down View)

BOTTOM VIEW
(Bumps Up View)

CM1453-06CP
15-bump CSP

Notes:
1) These drawings are not to scale.

PIN DESCRIPTIONS

| PIN NUMBER | PIN DESCRIPTION | PIN NUMBER | PIN DESCRIPTION |
|------------|-----------------|------------|-----------------|
| A1 | Filter #1 | C1 | Filter #1 |
| A2 | Filter #2 | C2 | Filter #2 |
| A3 | Filter #3 | C3 | Filter #3 |
| A4 | Filter #4 | C4 | Filter #4 |
| A5 | Filter #5 | C5 | Filter #5 |
| A6 | Filter #6 | C6 | Filter #6 |
| B1 | GND | - | |
| B2 | GND | - | |
| B3 | GND | - | |

CM1453-06CP

Ordering Information

| PART NUMBERING INFORMATION | | | |
|----------------------------|---------|-----------------------------------|--------------|
| Bumps | Package | Lead-free Finish | |
| | | Ordering Part Number ¹ | Part Marking |
| 15 | CSP | CM1453-06CP | N536 |

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

Specifications

| ABSOLUTE MAXIMUM RATINGS | | |
|---------------------------|-------------|-------|
| PARAMETER | RATING | UNITS |
| Storage Temperature Range | -65 to +150 | °C |
| DC current per Inductor | 30 | mA |
| DC Package Power Rating | 0.5 | W |

| STANDARD OPERATING CONDITIONS | | |
|-------------------------------|------------|-------|
| PARAMETER | RATING | UNITS |
| Operating Temperature Range | -40 to +85 | °C |

ELECTRICAL OPERATING CHARACTERISTICS (NOTE 1)

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|------------|--|---|----------------------|-------------|-------------|----------------------|
| L_{TOT} | Total Channel Inductance | | | 20 | | nH |
| C_{TOT} | Total Channel Capacitance ($C_1 \times 2$) | 2.5V dc; 1MHz, 30mV ac | 15.2 | 19 | 22.8 | pF |
| C_1 | Capacitance | 2.5V dc; 1MHz, 30mV ac | | 9.5 | | pF |
| V_{ST} | Stand-off Voltage | $I = 10\mu A$ | 5.5 | | | V |
| I_{LEAK} | Diode Leakage Current | $V_{IN} = 3.3V$ | | 0.1 | 1.0 | μA |
| V_{SIG} | Signal Clamp Voltage Positive Clamp Negative Clamp | $I_{LOAD} = 10mA$ $I_{LOAD} = -10mA$ | 5.6 -1.5 | 6.8 -0.8 | 9.0 -0.4 | V V |
| V_{ESD} | In-system ESD Withstand Voltage a) Human Body Model, MIL-STD-883, Method 3015 b) Contact Discharge per IEC 61000-4-2 Level 4 | Notes 2 and 3 | ± 30 ± 15 | | | kV kV |
| f_C | Cut-off frequency $Z_{SOURCE} = 50\Omega$, $Z_{LOAD} = 50\Omega$ | | | 300 | | MHz |
| f_C | Roll-off frequency at -6dB Attenuation $Z_{SOURCE} = 50\Omega$, $Z_{LOAD} = 50\Omega$ | | | 380 | | MHz |
| R_{DYN} | Dynamic Resistance Positive Negative | | | 2.3 0.9 | | Ω Ω |

Note 1: $T_A = 25^\circ C$ unless otherwise specified.

Note 2: ESD applied to input and output pins with respect to GND, one at a time.

Note 3: Unused pins are left open.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

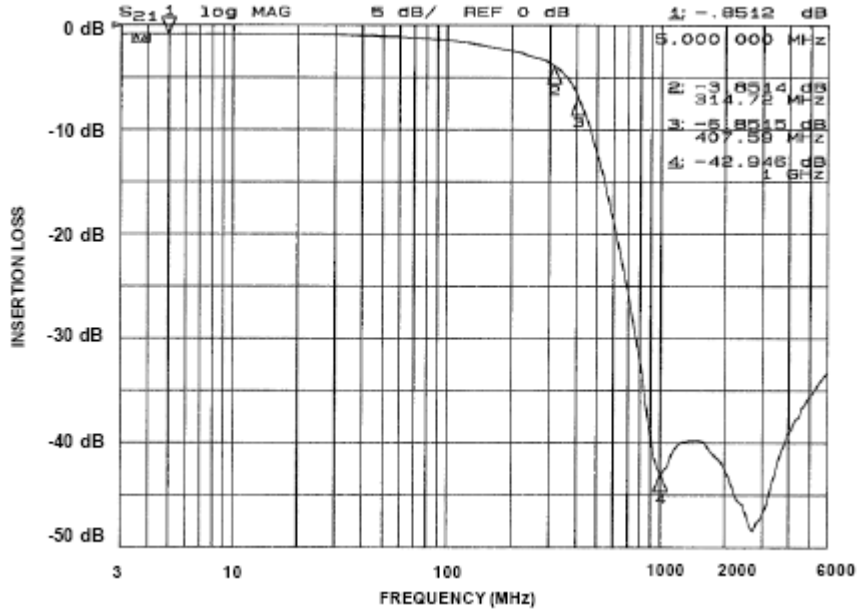


Figure 1. Insertion Loss VS. Frequency (CM1453-06: Filter 1)

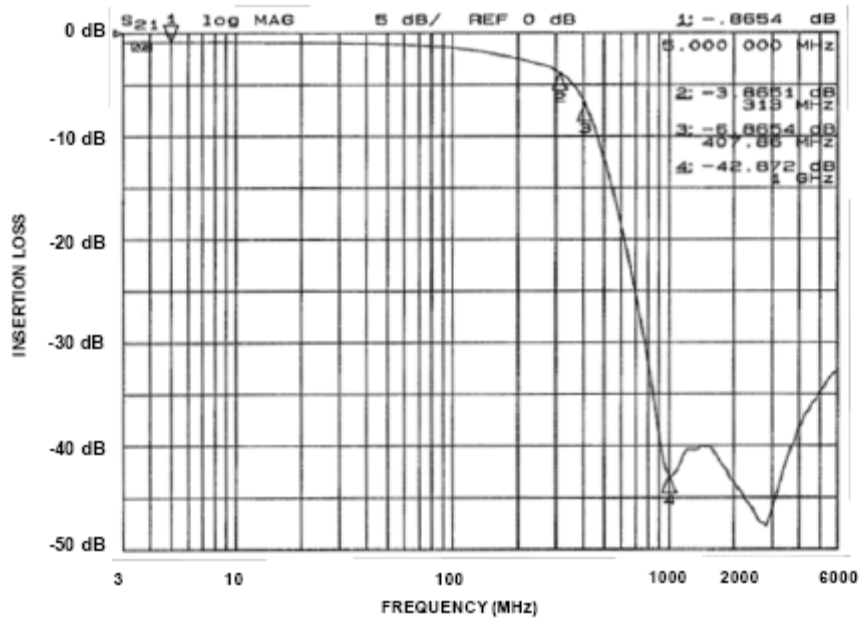


Figure 2. Insertion Loss VS. Frequency (CM1453-06: Filter 2)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

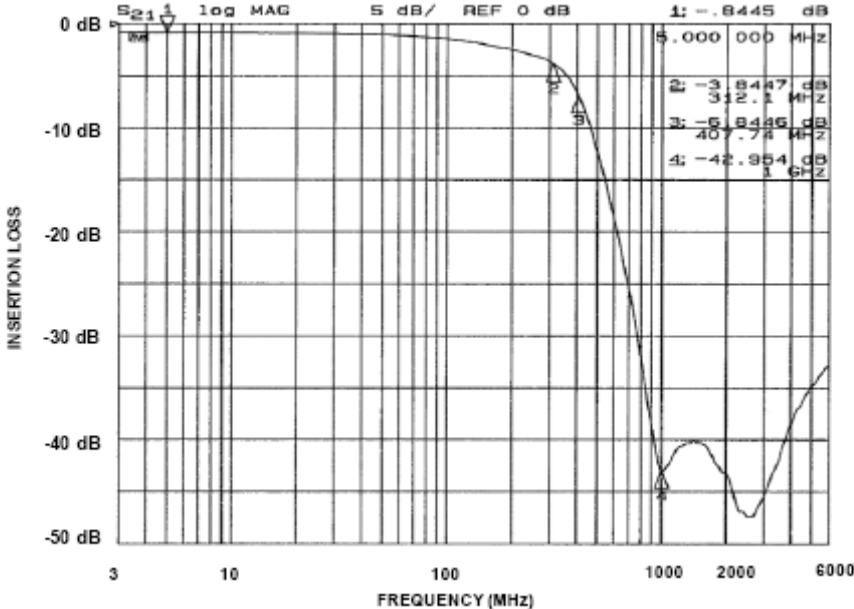


Figure 3. Insertion Loss VS. Frequency (CM1453-06: Filter 3)

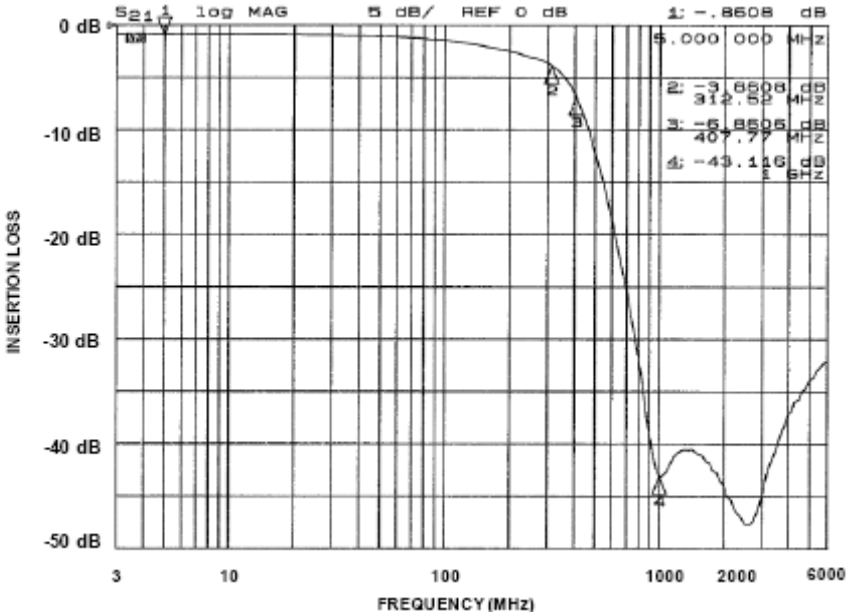


Figure 4. Insertion Loss VS. Frequency (CM1453-06: Filter 4)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

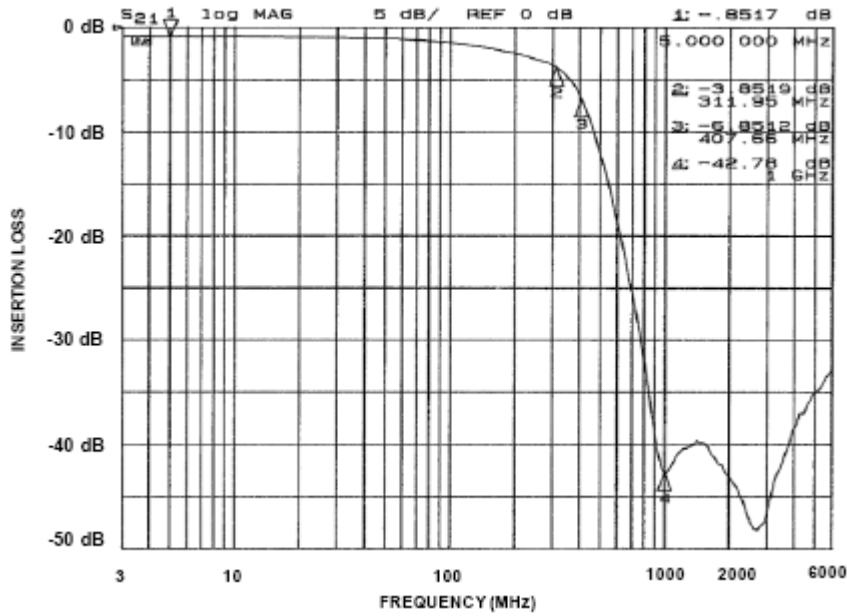


Figure 5. Insertion Loss VS. Frequency (CM1453-06: CSP1 – Filter 5)

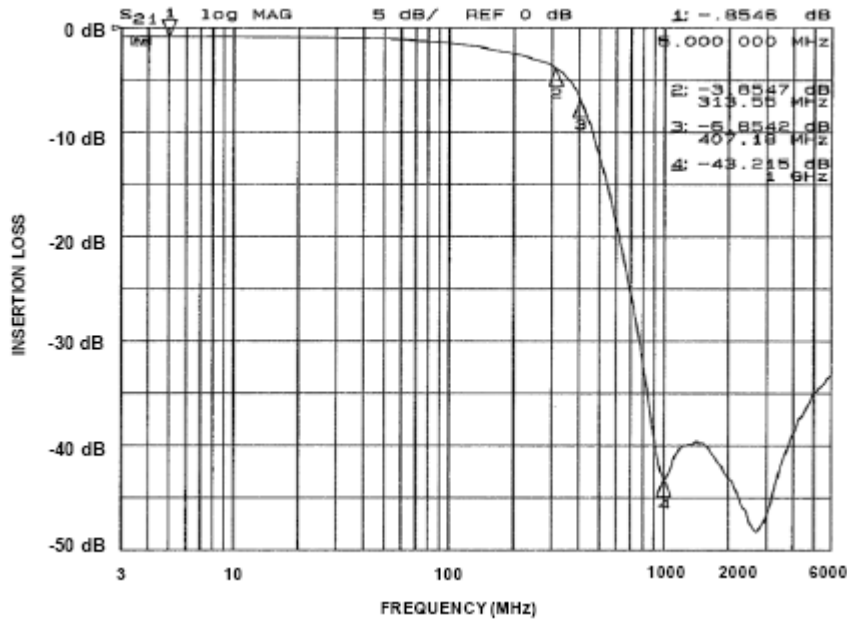


Figure 6. Insertion Loss VS. Frequency (CM1453-06: CSP1 – Filter 6)

Performance Information (cont'd)

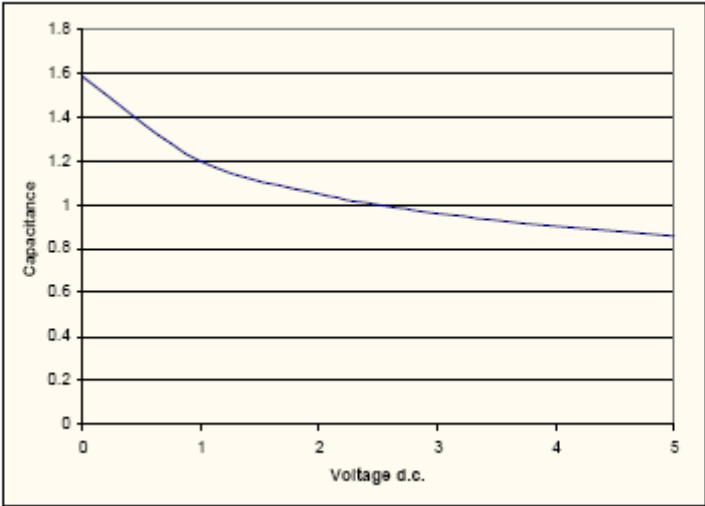


Figure 7. Typical Diode Capacitance vs. Input Voltage (normalized to 2.5V d.c)

Application Information

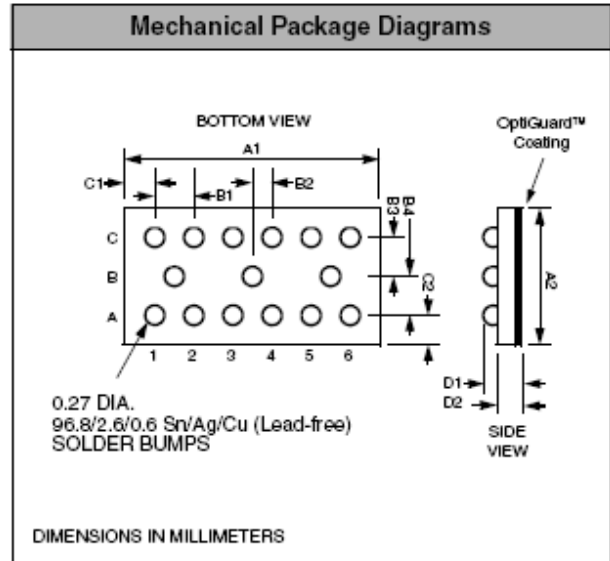
Refer to Application Note AP-217, "The Chip Scale Package", for a detailed description of Chip Scale Packages offered by California Micro Devices. See <http://www.wlcsforum.org/documents/pdf/ap-217.pdf> for download.

CM1453-06CP

Mechanical Specifications

CM1453 devices are packaged in custom Chip Scale Packages (CSP). See Application Note AP-217 for more information at: <http://www.wlcsforum.org/documents/pdf/ap-217.pdf>.

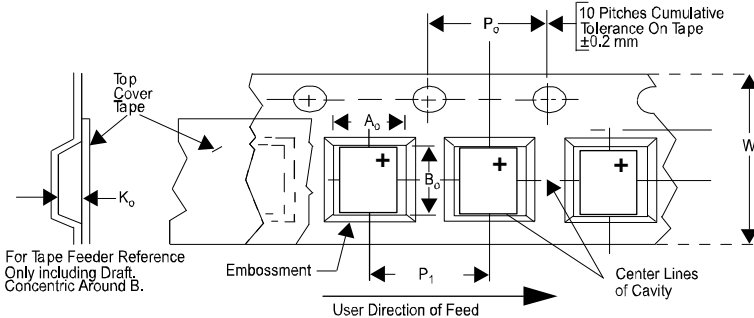
| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|-------|-------|--------|--------|--------|
| Package | Custom CSP | | | | | |
| Bumps | 15 | | | | | |
| Dim | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A1 | 2.429 | 2.474 | 2.519 | 0.0956 | 0.0974 | 0.0992 |
| A2 | 1.099 | 1.144 | 1.189 | 0.0433 | 0.0450 | 0.0468 |
| B1 | 0.395 | 0.400 | 0.405 | 0.0156 | 0.0157 | 0.0159 |
| B2 | 0.195 | 0.200 | 0.205 | 0.0077 | 0.0079 | 0.0081 |
| B3 | 0.342 | 0.347 | 0.352 | 0.0135 | 0.0137 | 0.0139 |
| B4 | 0.342 | 0.347 | 0.352 | 0.0135 | 0.0137 | 0.0139 |
| C1 | 0.187 | 0.237 | 0.287 | 0.0074 | 0.0093 | 0.0113 |
| C2 | 0.175 | 0.225 | 0.275 | 0.0069 | 0.0089 | 0.0108 |
| D1 | 0.545 | 0.615 | 0.685 | 0.0215 | 0.0242 | 0.0270 |
| D2 | 0.368 | 0.419 | 0.470 | 0.0145 | 0.0165 | 0.0185 |
| # per tape and reel | 3500 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |



**Package Dimensions for
CM1453-06CP Chip Scale Package**

CSP Tape and Reel Specifications

| PART NUMBER | CHIP SIZE (mm) | POCKET SIZE (mm) $B_0 \times A_0 \times K_0$ | TAPE WIDTH W | REEL DIAMETER | QTY PER REEL | P_0 | P_1 |
|-------------|---------------------|---|-----------------|---------------|--------------|-------|-------|
| CM1453-06CP | 2.47 X 1.14 X 0.615 | 2.59 X 1.27 X 0.73 | 8mm | 178mm (7") | 3500 | 4mm | 4mm |



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