

# 4-, 6-, 8-Channel EMI Filter Array with ESD Protection

## CM1457

### Description

The CM1457 is an inductor-based (L-C) EMI filter array with ESD protection, which integrates four, six, or eight filters in a CSP form factor with 0.40 mm pitch. Each EMI filter channel of the CM1457 is implemented with the component value of 6 pF – 35 nH – 4.7 pF – 35 nH – 1.8 pF. The cut-off frequency at –3 dB attenuation is 300 MHz and can be used in applications where the data rates are as high as 160 Mbps, while providing greater than –35 dB attenuation over the 800 MHz to 2.7 GHz 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 external filter ports are designed and characterized to safely dissipate ESD strikes of ±15 kV, which is beyond the maximum requirement of the IEC61000-4-2 international standard.

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 CM1457 is ideal for EMI filtering and protecting data and control lines for the LCD display and camera interface in mobile handsets.

The CM1457 incorporates *OptiGuard* which results in improved reliability at assembly. It is manufactured with a 0.40 mm pitch and 0.25 mm CSP solder ball to provide up to 28% board space savings vs. competing CSP devices with 0.50 mm pitch and 0.30 mm CSP solder ball.

### Features

- Four, Six or Eight Channels of EMI Filtering
- ±15 kV ESD Protection (IEC 61000-4-2, Contact Discharge) at External Pins
- Greater than –40 dB of Attenuation at 1 GHz MIL-STD-883 International ESD Standard
- Chip Scale Package (CSP) with 0.40 mm Pitch and 0.25 mm CSP Solder Ball which Features Extremely Low Parasitic Inductance for Optimum Filter and ESD Performance
- *OptiGuard* Coating for Improved Reliability at Assembly
- These Devices are Pb-Free and are 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



WLCSP10  
CP SUFFIX  
CASE 567BJ

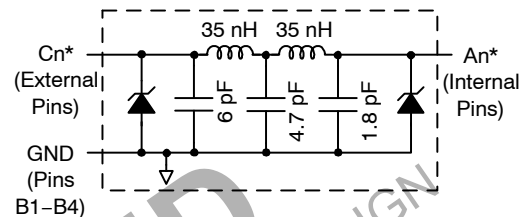


WLCSP15  
CP SUFFIX  
CASE 567BR

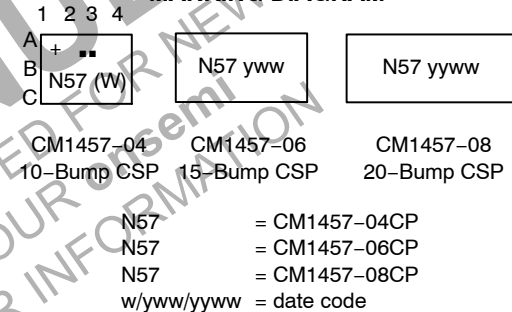


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### BLOCK DIAGRAM



### MARKING DIAGRAM



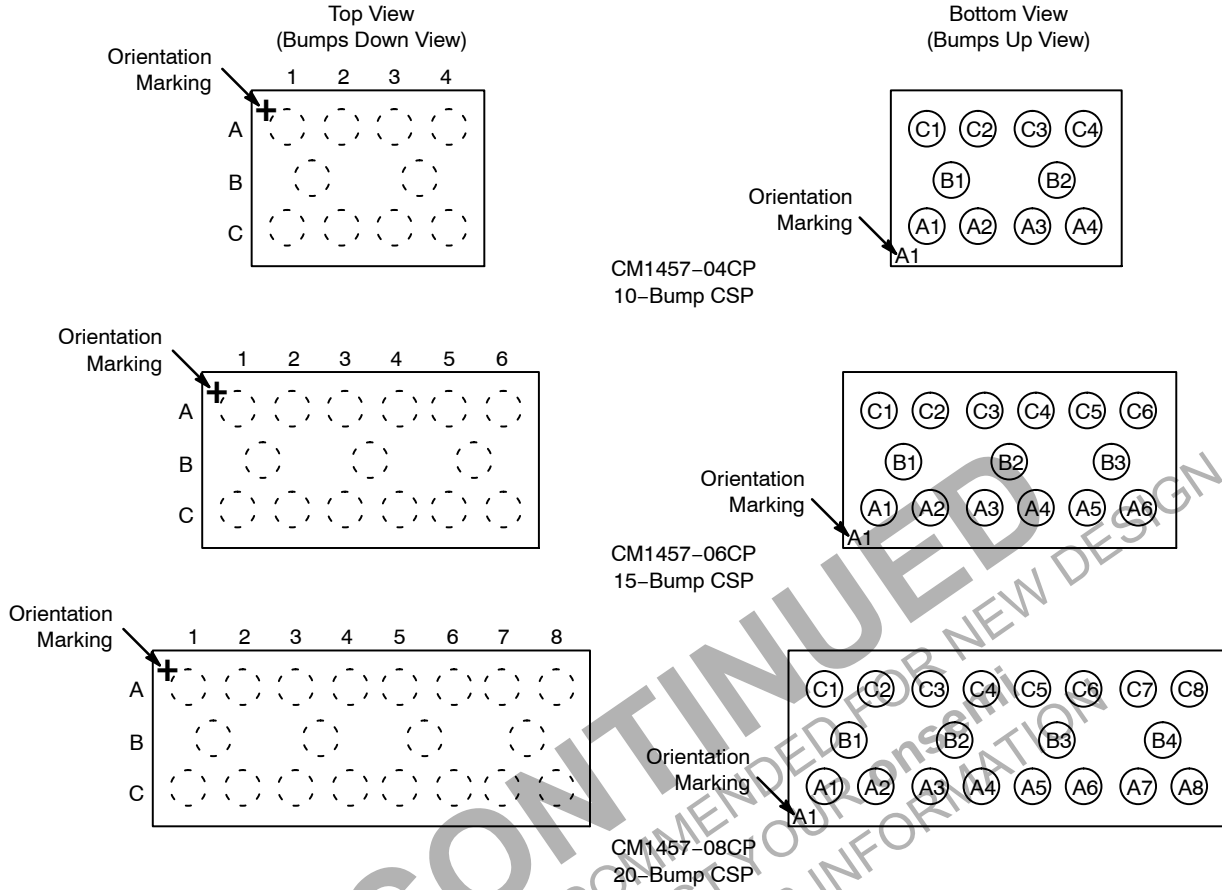
### ORDERING INFORMATION

| Device      | Package          | Shipping <sup>†</sup> |
|-------------|------------------|-----------------------|
| CM1457-04CP | CSP-10 (Pb-Free) | 3500/Tape & Reel      |
| CM1457-06CP | CSP-15 (Pb-Free) | 3500/Tape & Reel      |
| CM1457-08CP | CSP-20 (Pb-Free) | 3500/Tape & Reel      |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# CM1457

## PACKAGE / PINOUT DIAGRAMS



**Table 1. PIN DESCRIPTIONS**

| Pin Number |       |       | Pin Description      | Pin Number |     |     | Pin Description      |
|------------|-------|-------|----------------------|------------|-----|-----|----------------------|
| -04        | -06   | -08   |                      | -04        | -06 | -08 |                      |
| A1         | A1    | A1    | Filter #1 (Internal) | C1         | C1  | C1  | Filter #1 (External) |
| A2         | A2    | A2    | Filter #2 (Internal) | C2         | C2  | C2  | Filter #2 (External) |
| A3         | A3    | A3    | Filter #3 (Internal) | C3         | C3  | C3  | Filter #3 (External) |
| A4         | A4    | A4    | Filter #4 (Internal) | C4         | C4  | C4  | Filter #4 (External) |
| -          | A5    | A5    | Filter #5 (Internal) | -          | C5  | C5  | Filter #5 (External) |
| -          | A6    | A6    | Filter #6 (Internal) | -          | C6  | C6  | Filter #6 (External) |
| -          | -     | A7    | Filter #7 (Internal) | -          | -   | C7  | Filter #7 (External) |
| -          | -     | A8    | Filter #8 (Internal) | -          | -   | C8  | Filter #8 (External) |
| B1, B2     | B1-B3 | B1-B4 | GND                  |            |     |     |                      |

## SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

| Parameter                 | Rating      | Units |
|---------------------------|-------------|-------|
| Storage Temperature Range | -65 to +150 | °C    |
| DC current per Inductor   | 15          | mA    |
| DC Package Power Rating   | 0.5         | W     |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 3. STANDARD OPERATING CONDITIONS

| Parameter                   | Rating     | Units |
|-----------------------------|------------|-------|
| Operating Temperature Range | -40 to +85 | °C    |

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

| Symbol          | Parameter                                                                                                                                                                                                 | Conditions                                | Min                 | Typ         | Max         | Units    |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------|-------------|-------------|----------|
| $L_{TOT}$       | Total Channel Inductance                                                                                                                                                                                  |                                           |                     | 70          |             | nH       |
| $R_{TOT}$       | Total Channel DC Resistance                                                                                                                                                                               |                                           |                     | 45          |             | $\Omega$ |
| $C_{TOT\_0V}$   | Total Channel Capacitance, 0 V bias                                                                                                                                                                       | 0 V dc; 1 MHz, 30 mV rms                  |                     | 20          | 24          | pF       |
| $C_{TOT\_2.5V}$ | Total Channel Capacitance, 2.5 V bias                                                                                                                                                                     | 2.5 V dc; 1 MHz, 30 mV rms                |                     | 12.5        |             | pF       |
| $V_{ST}$        | Stand-off Voltage                                                                                                                                                                                         | $I = 10 \mu A$                            | 5.5                 |             |             | V        |
| $I_{LEAK}$      | Diode Leakage Current                                                                                                                                                                                     | $V_{IN} = +3.3 V$                         |                     | 0.1         | 0.5         | $\mu A$  |
| $V_{SIG}$       | Signal Clamp Voltage<br>Positive Clamp<br>Negative Clamp                                                                                                                                                  | $I_{LOAD} = 10 mA$<br>$I_{LOAD} = -10 mA$ | 5.6<br>-1.5         | 6.8<br>-0.8 | 9.0<br>-0.4 | V        |
| $V_{ESD}$       | In-system ESD Withstand Voltage<br>a) Contact Discharge per IEC 61000-4-2 standard, Level 4 ( <b>External Pins</b> )<br>b) Contact Discharge per IEC 61000-4-2 standard, Level 4 ( <b>Internal Pins</b> ) | (Notes 2 and 3)                           | $\pm 15$<br>$\pm 2$ |             |             | kV       |
| $f_C$           | Cut-off Frequency<br>$Z_{SOURCE} = 50 \Omega$ , $Z_{LOAD} = 50 \Omega$                                                                                                                                    |                                           |                     | 300         |             | MHz      |

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

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

3. Unused pins are left open.

## APPLICATION INFORMATION

Refer to Application Note “The Chip Scale Package”, for a detailed description of Chip Scale Packages offered by onsemi.

PERFORMANCE INFORMATION

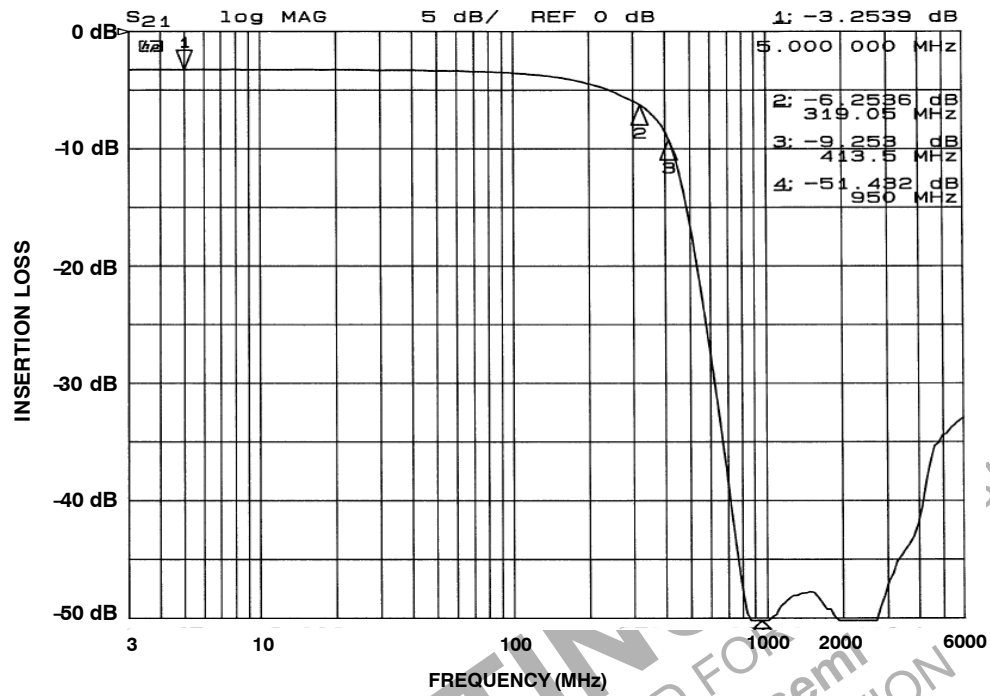


Figure 1. Insertion Loss vs. Frequency (0 V Bias)

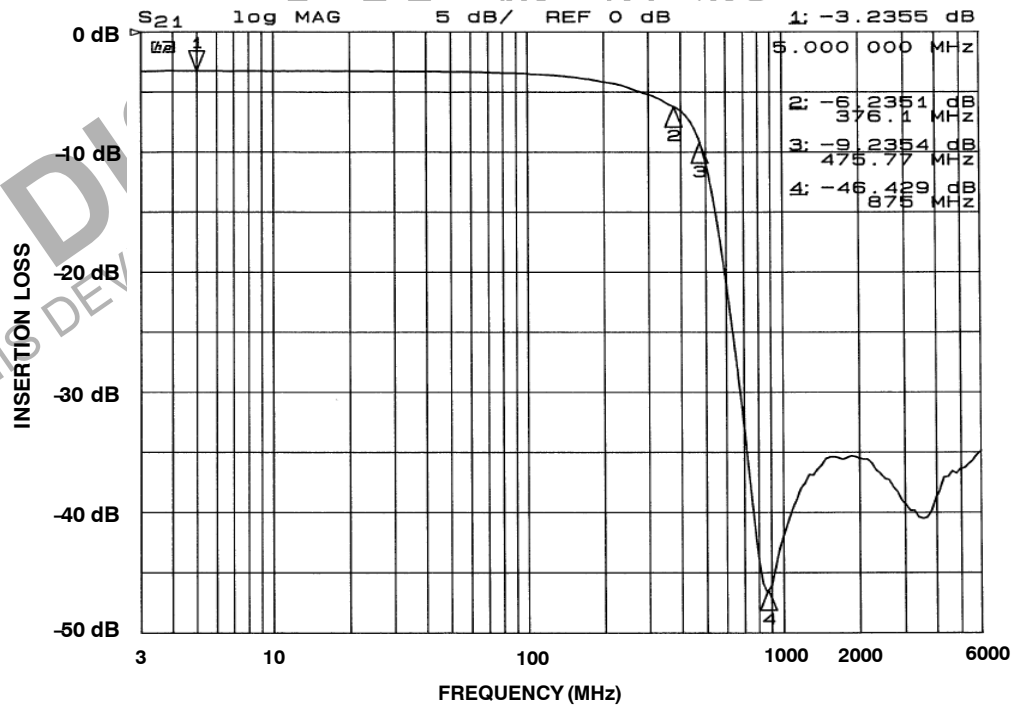


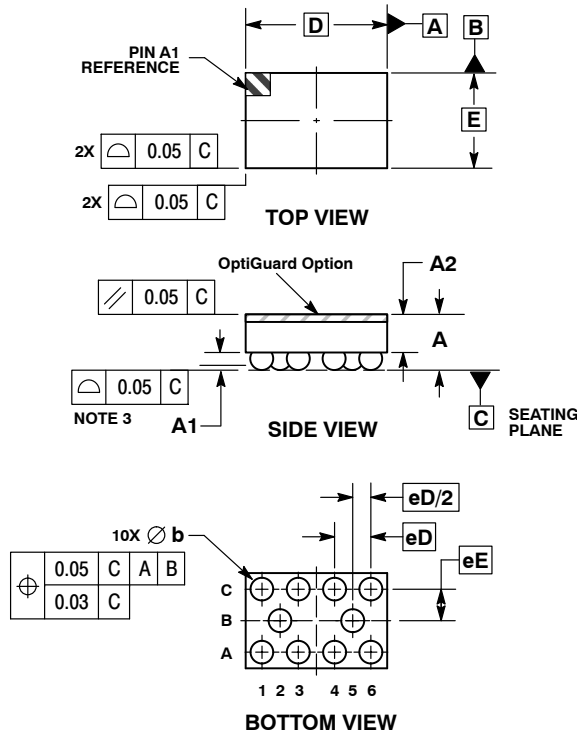
Figure 2. Insertion Loss vs. Frequency (2.5 V Bias)



SCALE 4:1

**WLCSP10, 1.67x1.05**  
CASE 567BJ  
ISSUE O

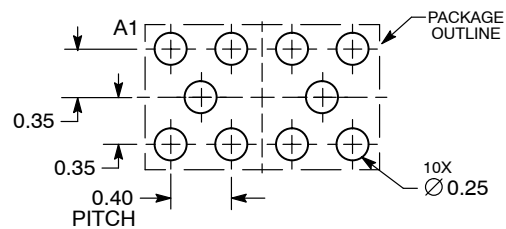
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## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 0.54        | 0.69 |
| A1  | 0.17        | 0.24 |
| A2  | 0.42        | REF  |
| b   | 0.24        | 0.29 |
| D   | 1.67        | BSC  |
| E   | 1.05        | BSC  |
| eD  | 0.400       | BSC  |
| eE  | 0.347       | BSC  |

**RECOMMENDED  
SOLDERING FOOTPRINT\***


DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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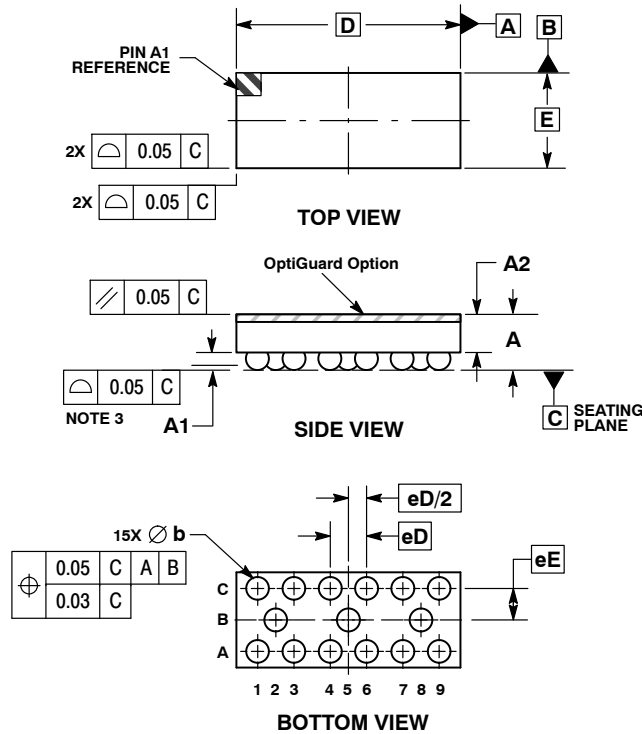
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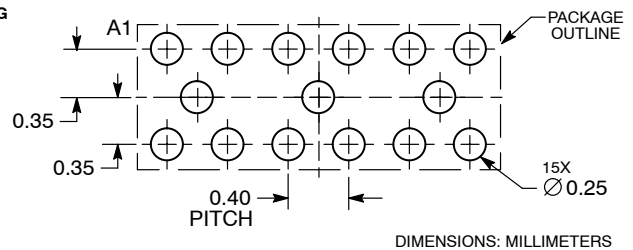


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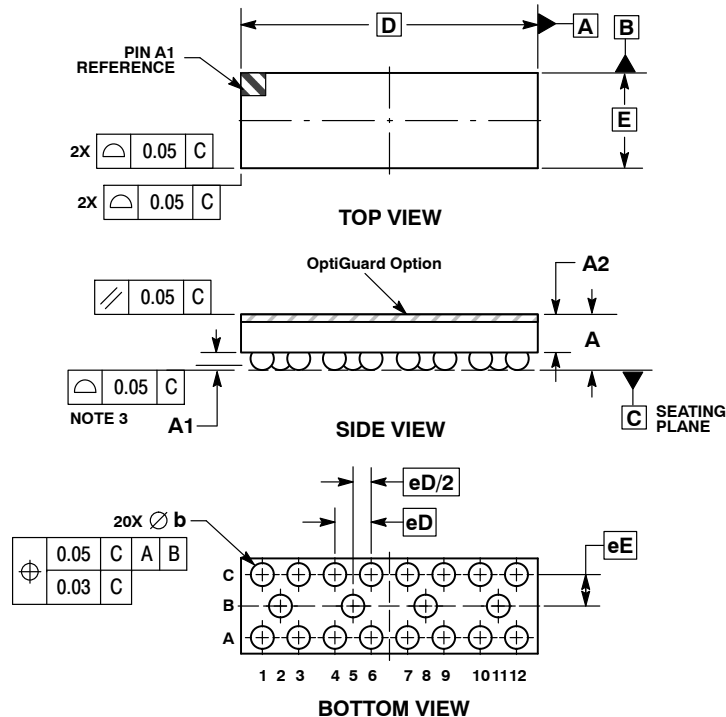
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SCALE 4:1

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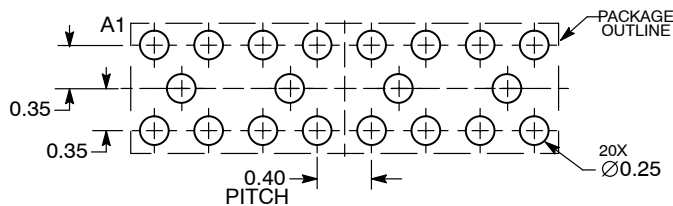


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