

# CM1425

## 4-Channel EMI Filter Array with ESD Protection

### Product Description

The CM1425 is an EMI filter array with ESD protection, which integrates 4 pi filters (C–R–C). The CM1425 has component values of 20 pF – 100  $\Omega$  – 20 pF. The parts include ESD protection diodes on every pin, which provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The ESD diodes connected to the filter ports safely dissipate ESD strikes of  $\pm 15$  kV, well beyond the maximum requirement of the IEC 61000–4–2 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  $\pm 30$  kV.

This device is particularly well-suited for portable electronics (e.g. mobile handsets, PDAs, notebook computers) because of its small package and easy-to-use pin assignments. In particular, the CM1425 is ideal for EMI filtering and protecting data lines from ESD in wireless handsets.

All CM1425 devices are optionally available with *OptiGuard™* coating which results in improved reliability at assembly. These devices are also available with standard lead-free finishing. The CM1425 is housed in a space-saving, low-profile, chip-scale package and is fabricated with the Centurion™ processes.

### Features

- Four Channels of EMI Filtering with ESD Protection
- Pin Compatible with the CSPRC032A
- Greater than 30 dB Attenuation Over the 800 MHz to 3 GHz Frequency Range
- $\pm 15$  kV ESD Protection (IEC 61000–4–2, Contact Discharge)
- $\pm 30$  kV ESD Protection (HBM)
- 9–Bump, 2.470 mm x 0.970 mm Footprint Chip Scale Package (CSP)
- Available with *OptiGuard™* Coating for Improved Reliability
- These Devices are Pb–Free and are RoHS Compliant

### Applications

- Filtering for Antenna and Keypad Data Lines
- I/O Port Protection for Mobile Handsets, Notebook Computers, PDAs, etc.
- EMI Filtering for Data Ports in Cell Phones, PDAs or Notebook Computers
- EMI Filtering for LCD and Chip-to–Chip Data Lines in Mobile Electronic Devices that Use Flexible PCB Interconnections



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**WLCSP9  
CP SUFFIX  
CASE 567BF**

### MARKING DIAGRAM

|                                 |                                 |
|---------------------------------|---------------------------------|
| N251                            | N253                            |
| CM1425–01<br>9–Bump CSP Package | CM1425–03<br>9–Bump CSP Package |
| N251 = CM1425–01CP              |                                 |
| N253 = CM1425–03CP              |                                 |

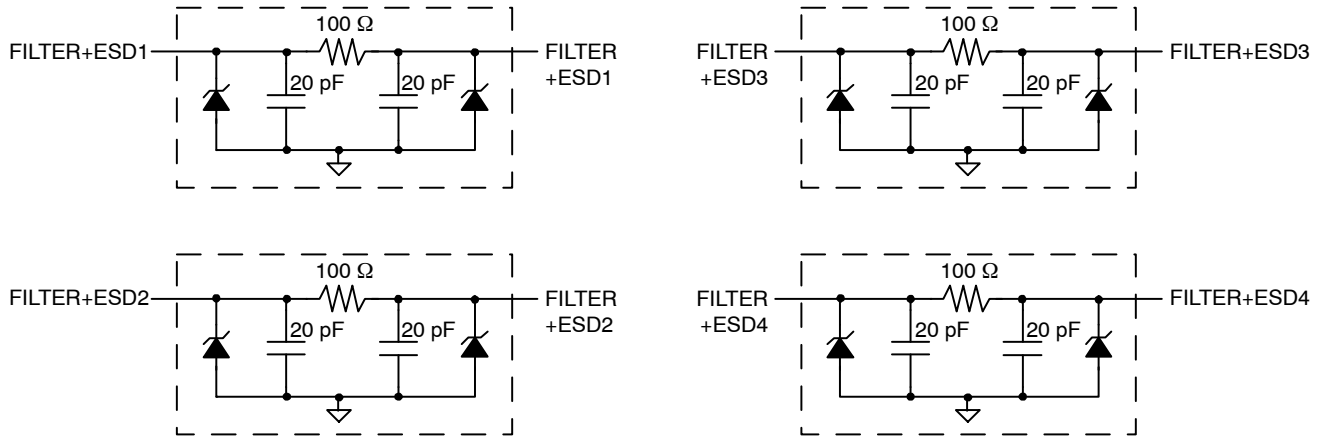
### ORDERING INFORMATION

| Device      | Package            | Shipping†        |
|-------------|--------------------|------------------|
| CM1425–01CP | CSP–9<br>(Pb–Free) | 3500/Tape & Reel |
| CM1425–03CP | CSP–9<br>(Pb–Free) | 3500/Tape & Reel |

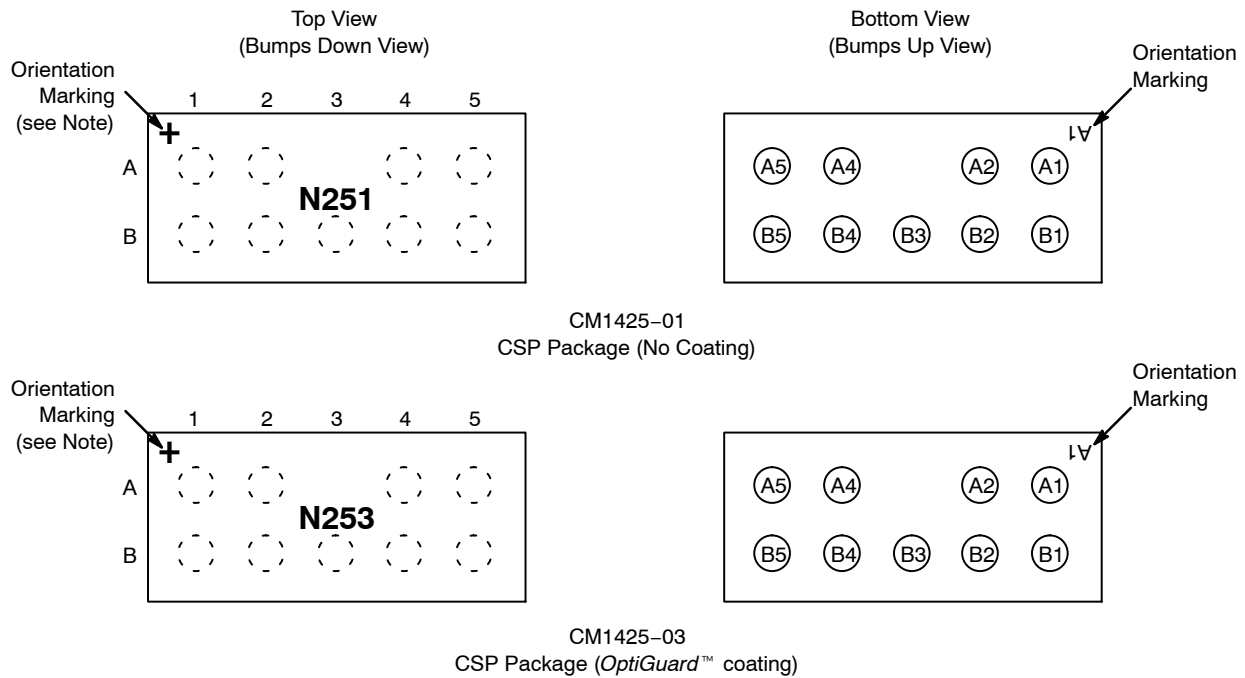
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# CM1425

## BLOCK DIAGRAM



## PACKAGE / PINOUT DIAGRAMS



Note: Lead-free devices are specified by using a "+" character for the top side orientation mark.

**Table 1. PIN DESCRIPTIONS**

| Pins | Name        | Description      | Pins | Name        | Description      |
|------|-------------|------------------|------|-------------|------------------|
| A1   | FILTER+ESD1 | Filter Channel 1 | B1   | FILTER+ESD1 | Filter Channel 1 |
| A2   | FILTER+ESD2 | Filter Channel 2 | B2   | FILTER+ESD2 | Filter Channel 2 |
| A4   | FILTER+ESD3 | Filter Channel 3 | B4   | FILTER+ESD3 | Filter Channel 3 |
| A5   | FILTER+ESD4 | Filter Channel 4 | B5   | FILTER+ESD4 | Filter Channel 4 |
| B3   | GND         | Device Ground    |      |             |                  |

## SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

| Parameter                 | Rating      | Units |
|---------------------------|-------------|-------|
| Storage Temperature Range | -65 to +150 | °C    |
| DC Power per Resistor     | 100         | mW    |
| DC Package Power Rating   | 300         | mW    |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------|-------------|-------------|----------|
| R                  | Resistance                                                                                                                         |                                                         | 80                   | 100         | 120         | $\Omega$ |
| C                  | Capacitance                                                                                                                        | At 2.5 V DC, 1 MHz,<br>30 mV AC                         | 16                   | 20          | 24          | pF       |
| V <sub>DIODE</sub> | Diode Standoff Voltage                                                                                                             | I <sub>DIODE</sub> = 10 $\mu$ A                         |                      | 6.0         |             | V        |
| I <sub>LEAK</sub>  | Diode Leakage Current (reverse bias)                                                                                               | V <sub>DIODE</sub> = +3.3 V                             |                      | 100         | 300         | nA       |
| V <sub>SIG</sub>   | Signal Clamp Voltage<br>Positive Clamp<br>Negative Clamp                                                                           | I <sub>LOAD</sub> = 10 mA<br>I <sub>LOAD</sub> = -10 mA | 5.6<br>-1.5          | 6.8<br>-0.8 | 9.0<br>-0.4 | V        |
| V <sub>ESD</sub>   | In-system ESD Withstand Voltage<br>a) Human Body Model, MIL-STD-883, Method 3015<br>b) Contact Discharge per IEC 61000-4-2 Level 4 | (Note 2)                                                | $\pm 30$<br>$\pm 15$ |             |             | kV       |
| R <sub>DYN</sub>   | Dynamic Resistance<br>Positive<br>Negative                                                                                         |                                                         |                      | 1.5<br>0.9  |             | $\Omega$ |
| f <sub>C</sub>     | Cut-off Frequency<br>Z <sub>SOURCE</sub> = 50 $\Omega$ , Z <sub>LOAD</sub> = 50 $\Omega$                                           | R = 100 $\Omega$ , C = 20 pF                            |                      | 86          |             | MHz      |

1. T<sub>A</sub> = 25°C unless otherwise specified.

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

# CM1425

## PERFORMANCE INFORMATION

Typical Filter Performance (nominal conditions unless specified otherwise, 50  $\Omega$  Environment)

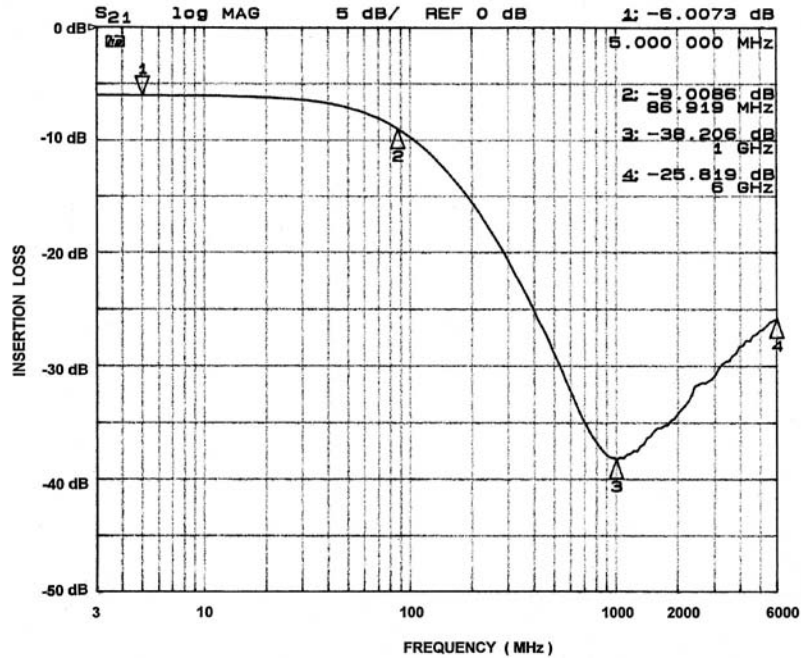


Figure 1. CM1425 Filter Typical Measured Frequency Response

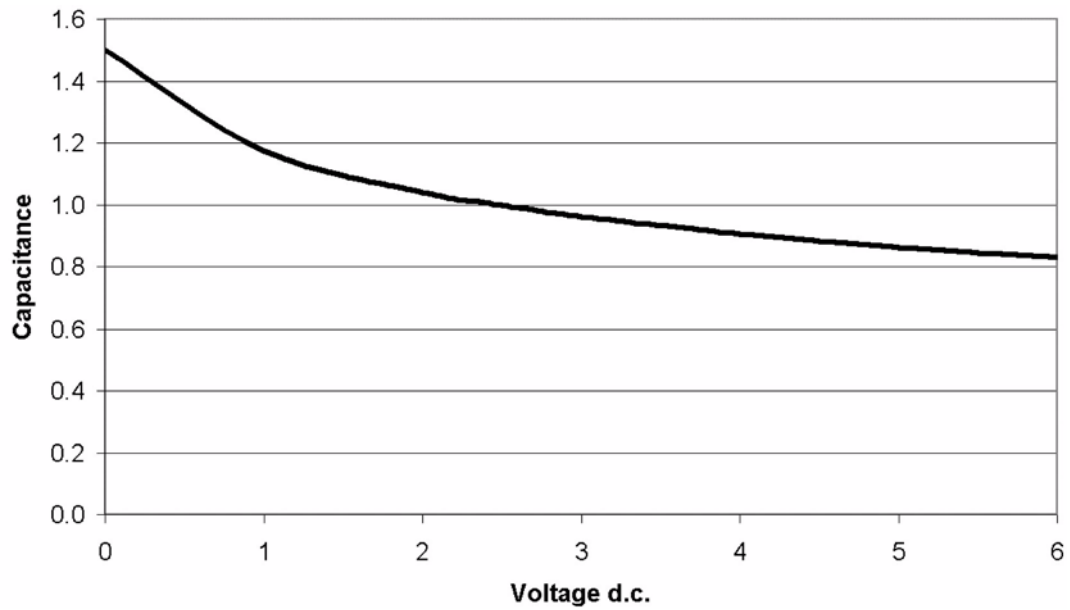


Figure 2. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5 VDC and 25°C)

APPLICATION INFORMATION

Table 5. PRINTED CIRCUIT BOARD RECOMMENDATIONS

| Parameter                                                                          | Value                        |
|------------------------------------------------------------------------------------|------------------------------|
| Pad Size on PCB                                                                    | 0.240 mm                     |
| Pad Shape                                                                          | Round                        |
| Pad Definition                                                                     | Non-Solder Mask defined pads |
| Solder Mask Opening                                                                | 0.290 mm Round               |
| Solder Stencil Thickness                                                           | 0.125 – 0.150 mm             |
| Solder Stencil Aperture Opening (laser cut, 5% tapered walls)                      | 0.300 mm Round               |
| Solder Flux Ratio                                                                  | 50/50 by volume              |
| Solder Paste Type                                                                  | No Clean                     |
| Pad Protective Finish                                                              | OSP (Entek Cu Plus 106A)     |
| Tolerance – Edge To Corner Ball                                                    | $\pm 50 \mu\text{m}$         |
| Solder Ball Side Coplanarity                                                       | $\pm 20 \mu\text{m}$         |
| Maximum Dwell Time Above Liquidous                                                 | 60 seconds                   |
| Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste | 260°C                        |

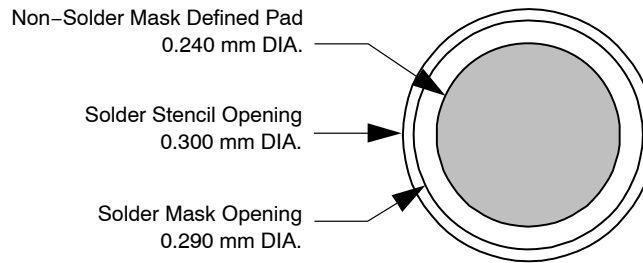


Figure 3. Recommended Non-Solder Mask Defined Pad Illustration

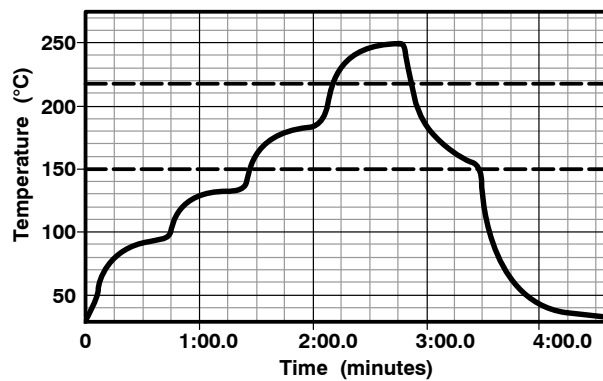


Figure 4. Lead-free (SnAgCu) Solder Ball Reflow Profile

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

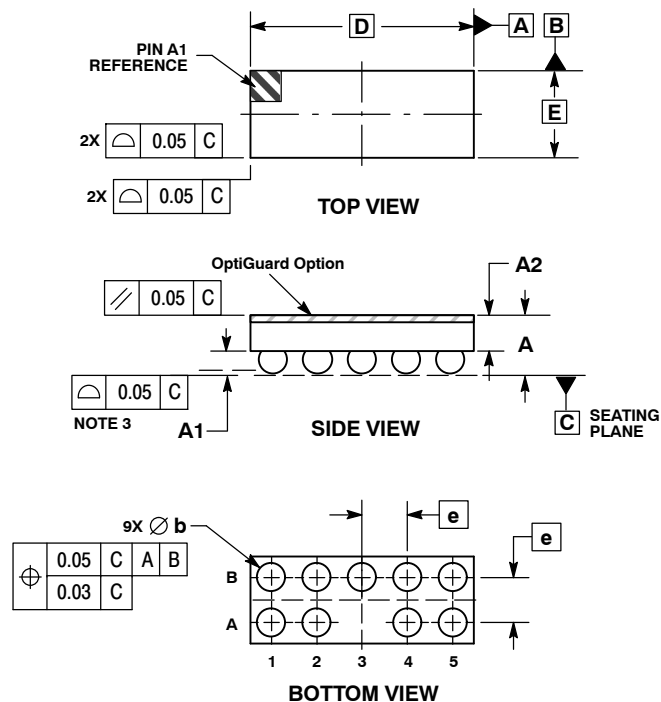
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SCALE 4:1

WLCSP9, 2.47x0.97  
CASE 567BF-01  
ISSUE O

DATE 26 JUL 2010

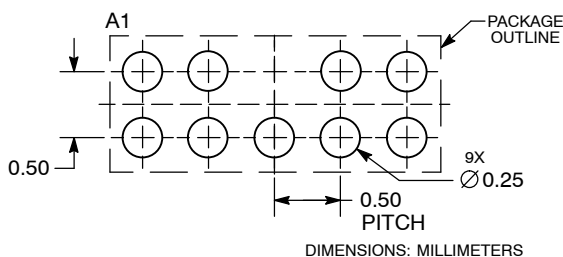


### NOTES:

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   | 0.56        | 0.72 |
| A1  | 0.21        | 0.27 |
| A2  | 0.42        | REF  |
| b   | 0.29        | 0.35 |
| D   | 2.47        | BSC  |
| E   | 0.97        | BSC  |
| e   | 0.50        | BSC  |

### RECOMMENDED SOLDERING FOOTPRINT\*



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

|                  |                           |                                                                                                                                                                                  |
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|                  |                           | PAGE 1 OF 2                                                                                                                                                                      |

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