# CM1204

# 4-Channel ESD Array in CSP

### Product Description

The CM1204 is a quad ESD transient voltage suppression diode array. Each diode provides a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). These diodes safely dissipate ESD strikes of ±15 kV, exceeding 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 device provides protection for contact discharges to greater than ±30 kV.

The CM1204 is particularly well suited for portable electronics (e.g., cellular telephones, PDAs, notebook computers) because of its small package format and low weight.

The CM1204 features *Optiguard™* coating which results in improved reliability at assembly. It is available in a space-saving, low-profile chip scale package with RoHS-compliant lead-free finishing.

### Features

- Functionally and Pin Compatible with ON Semiconductor's CSPESD304
- Optiguard™ Coated for Improved Reliability
- Four Channels of ESD Protection
- ±15 kV ESD Protection on Each Channel (IEC 61000-4-2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Chip Scale Package Features Extremely Low Lead Inductance for Optimum ESD Protection
- 5-bump, 0.960 mm X 1.330 mm Footprint Chip Scale Package (CSP)
- These Devices are Pb−Free and are RoHS Compliant

### Applications

- ESD Protection for Sensitive Electronic Equipment
- I/O Port and Keypad and Button Circuitry Protection for Portable Devices
- Wireless Handsets
- Handheld PCs / PDAs
- MP3 Players
- Digital Camcorders
- Notebooks
- Desktop PCs

**ON Semiconductor®**

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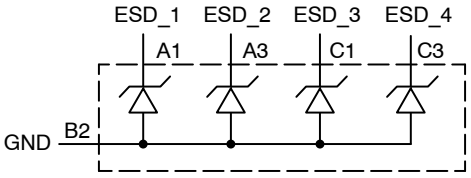
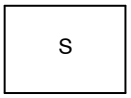
**CSP−5**
**CP SUFFIX**
**CASE 567AY**

### BLOCK DIAGRAM




### MARKING DIAGRAM




S = Specific Device Code

### ORDERING INFORMATION

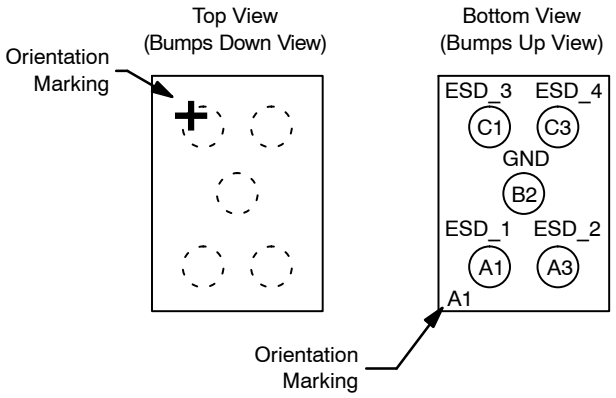
| Device | Package | Shipping† |
|---|---|---|
| CM1204−03CP | CSP (Pb−Free) | 3500/Tape & Reel |

†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.

**Table 1. PIN DESCRIPTIONS**

| Pin | Name | Description |
|---|---|---|
| A1 | ESD_1 | ESD Channel 1 |
| A3 | ESD_2 | ESD Channel 2 |
| B2 | GND | Device Ground |
| C1 | ESD_3 | ESD Channel 3 |
| C3 | ESD_4 | ESD Channel 4 |

**PACKAGE / PINOUT DIAGRAMS**




CM1204
CSP Package with OptiGuard™

## SPECIFICATIONS

**Table 2. ABSOLUTE MAXIMUM RATINGS**

| Parameter | Rating | Units |
|---|---|---|
| Storage Temperature Range | −65 to +150 | °C |
| DC Package Power Rating | 200 | 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 |
|---|---|---|---|---|---|---|
| $V_{DIODE}$ | Diode Reverse Breakdown Voltage | $I_{DIODE}$ = 10 μA | | 6.0 | | V |
| $I_{LEAK}$ | Diode Leakage Current | $V_{IN}$ = 3.3 V, $T_A$ = 25°C | | | 100 | nA |
| $V_{SIG}$ | Signal Voltage<br>Positive Clamp<br>Negative Clamp | $I_{DIODE}$ = 10 mA | <br>5.6<br>−1.5 | <br>6.8<br>−0.8 | <br>9.0<br>−0.4 | V |
| $V_{ESD}$ | In-system ESD Withstand Voltage<br>a) Human Body Model, MIL-STD-883, Method 3015<br>b) Contact Discharge per IEC 61000-4-2 | (Note 2) | <br>±30<br>±15 | | | kV |
| $V_{CL}$ | Clamping Voltage during ESD Discharge<br>MIL-STD-883 (Method 3015), 8 kV<br>Positive Transients<br>Negative Transients | (Note 2) | | <br><br>+15<br>−8 | | V |
| $C_{DIODE}$ | Diode Capacitance | At 2.5 VDC Reverse Bias, 1 MHz, 30 mVAC | 22 | 27 | 32 | pF |

1. $T_A$ = −40 to +85°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.

## PERFORMANCE INFORMATION

**Diode Characteristics (nominal conditions unless specified otherwise)**

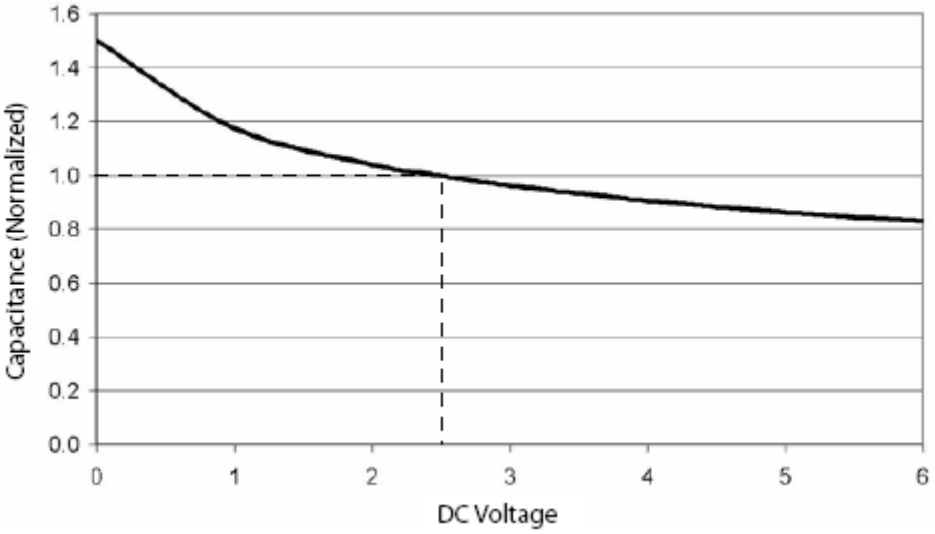



**Figure 1. Typical Diode Capacitance vs. Input Voltage (Normalized to 2.5 VDC)**

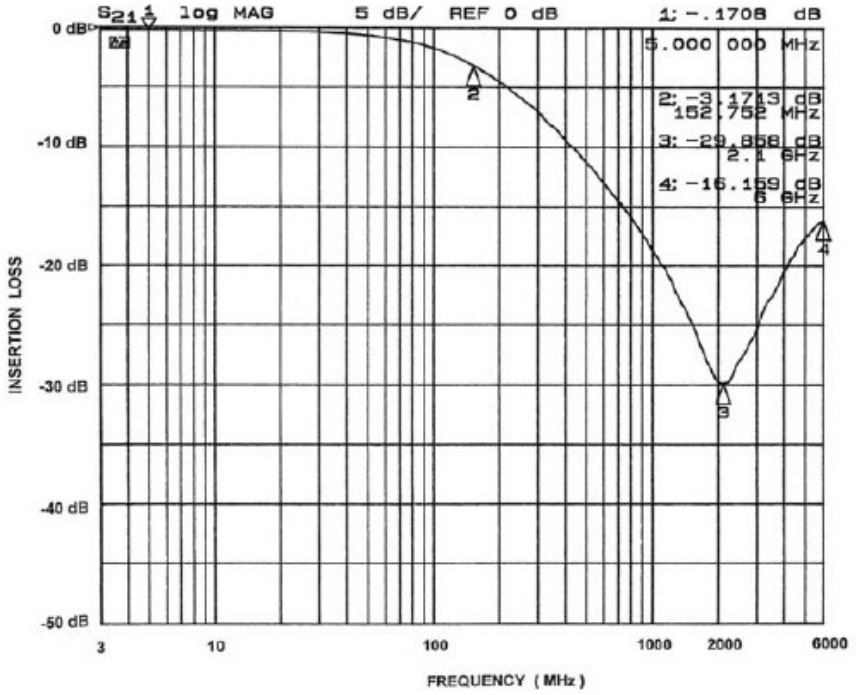



**Figure 2. Frequency Response (Single Channel vs. GND, in 50 Ω System)**

## APPLICATION INFORMATION

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

**Table 5. PRINTED CIRCUIT BOARD RECOMMENDATIONS**

| Parameter | Value |
|---|---|
| Pad Size on PCB | 0.275 mm |
| Pad Shape | Round |
| Pad Definition | Non−Solder Mask defined pads |
| Solder Mask Opening | 0.325 mm Round |
| Solder Stencil Thickness | 0.125 mm – 0.150 mm |
| Solder Stencil Aperture Opening (laser cut, 5% tapered walls) | 0.330 mm Round |
| Solder Flux Ratio | 50/50 by volume |
| Solder Paste Type | No Clean |
| Pad Protective Finish | OSP (Entek Cu Plus 106 A) |
| Tolerance — Edge To Corner Ball | ±50 μm |
| Solder Ball Side Coplanarity | ±20 μm |
| Maximum Dwell Time Above Liquidous | 60 seconds |
| Maximum Soldering Temperature | 260°C |

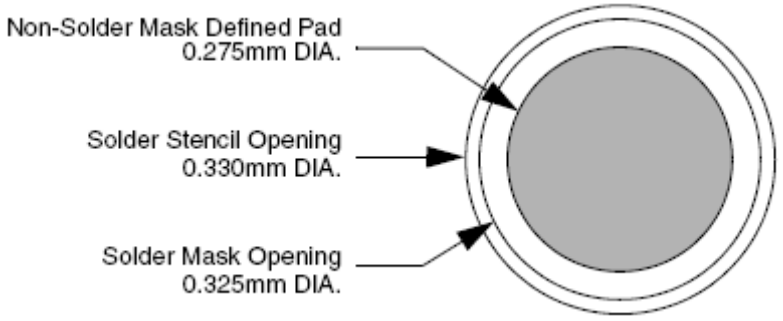



**Figure 3. Recommended Non−Solder Mask Defined Pad Illustration**

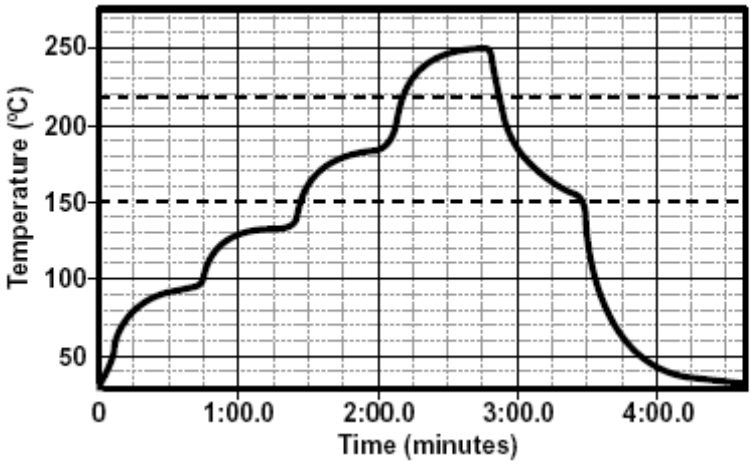
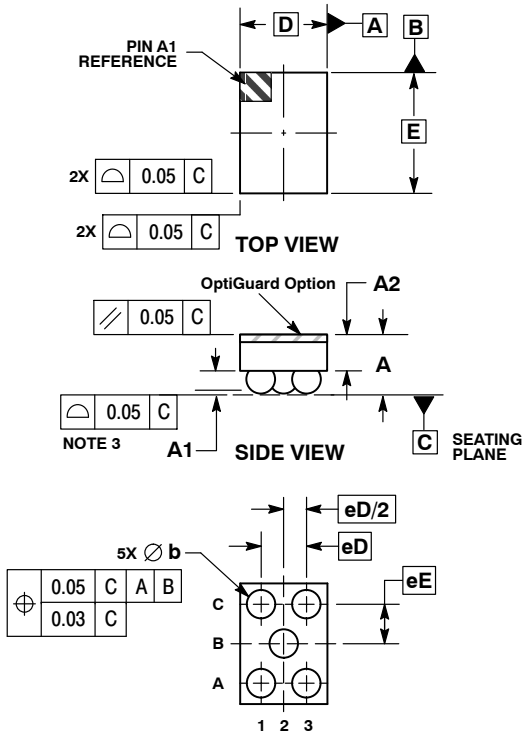



**Figure 4. Lead−free (SnAgCu) Solder Ball Reflow Profile**

**WLCSP5, 0.96x1.33**
CASE 567AY−01
ISSUE O

**SCALE 4:1**

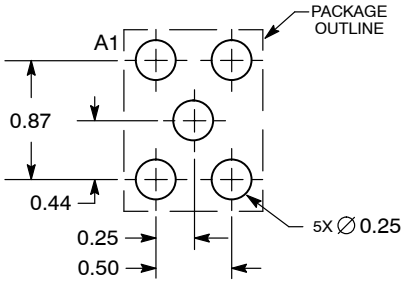
DATE 26 JUL 2010




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

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 0.56 | 0.72 |
| A1 | 0.21 | 0.27 |
| A2 | 0.40 REF | |
| b | 0.29 | 0.35 |
| D | 0.96 BSC | |
| E | 1.33 BSC | |
| eD | 0.50 BSC | |
| eE | 0.435 BSC | |

**RECOMMENDED SOLDERING FOOTPRINT***




DIMENSIONS: MILLIMETERS

*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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|---|---|---|---|
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| **DESCRIPTION:** | **WLCSP5, 0.96X1.33** | | **PAGE 1 OF 1** |

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