



4-Channel LCD and Camera EMI Filter Array with ESD Protection

CM1408-04DE

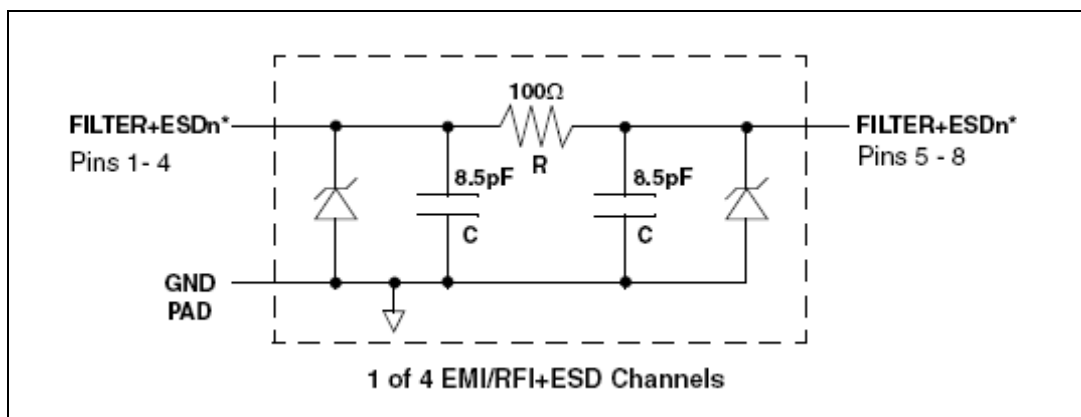
Features

- channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- 15kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- 30kV ESD protection on each channel (HBM)
- Greater than -35dB attenuation (typical) at 1GHz
- TDFN packaging with 0.5mm lead pitch:
- Increased robustness against vertical impacts during manufacturing process
- Lead-free finishing

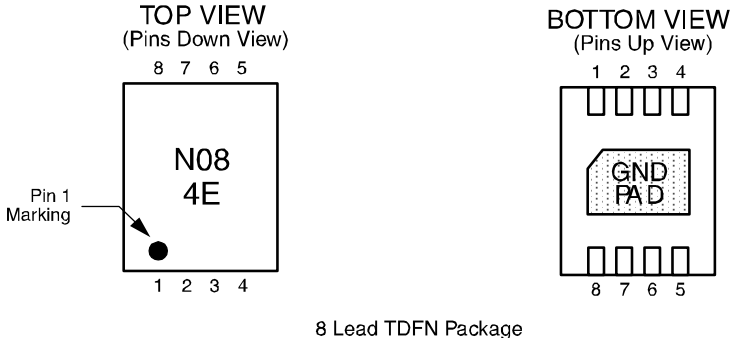
Applications

- 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

Block Diagram



PACKAGE / PINOUT DIAGRAMS



Note:
1) These drawings are not to scale.

PIN DESCRIPTIONS

| DEVICE PIN(s) | NAME | DESCRIPTION | DEVICE PIN(s) | NAME | DESCRIPTION |
|---------------|---------|------------------------|---------------|---------|------------------------|
| 1 | FILTER1 | Filter + ESD Channel 1 | 8 | FILTER1 | Filter + ESD Channel 1 |
| 2 | FILTER2 | Filter + ESD Channel 2 | 7 | FILTER2 | Filter + ESD Channel 2 |
| 3 | FILTER3 | Filter + ESD Channel 3 | 6 | FILTER3 | Filter + ESD Channel 3 |
| 4 | FILTER4 | Filter + ESD Channel 4 | 5 | FILTER4 | Filter + ESD Channel 4 |
| GND PAD | GND | Device Ground | - | - | - |

CM1408-04DE

Ordering Information

| PART NUMBERING INFORMATION | | | |
|-----------------------------------|----------------|---|---------------------|
| Pins | Package | Lead-free Finish | |
| | | Ordering Part Number¹ | Part Marking |
| 8 | TDFN-8 | CM1408-04DE | N08 4E |

Note 1: Parts are shipped in Tape and Reel form.

Specifications

| ABSOLUTE MAXIMUM RATINGS | | |
|---------------------------------|---------------|--------------|
| PARAMETER | RATING | UNITS |
| Storage Temperature Range | -65 to +150 | °C |
| DC Power per Resistor | 100 | mW |
| DC Package Power Rating | 500 | mW |

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

ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE 1)

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--------------------|--|---|-------------|-------------|-------------|----------------------|
| R | Resistance | | 80 | 100 | 120 | Ω |
| C _{TOTAL} | Total Channel Capacitance | At 2.5VDC Reverse Bias, 1MHz, 30mVAC | 14 | 17 | 22 | pF |
| C | Capacitance C | At 2.5VDC Reverse Bias, 1MHz, 30mVAC | | 8.5 | | pF |
| V _{DIODE} | Standoff Voltage | I _{DIODE} =10 μ A | | 6.0 | | V |
| I _{LEAK} | Diode Leakage Current (reverse bias) | V _{DIODE} = 3.3V | | 0.1 | 1.0 | μ A |
| 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 |
| R _{DYN} | Dynamic Resistance Positive Negative | | | 2.3 0.9 | | Ω Ω |
| f _C | Cut-off Frequency Z _{SOURCE} =50 Ω , Z _{LOAD} =50 Ω | Channel R = 100 Ω , Channel C _{SINGLE} = 8.5pF | | 200 | | MHz |

Note 1: T_A=25°C unless otherwise specified.

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

Note 3: These parameters are guaranteed by design and characterization.

Performance Information

Typical Filter Performance ($T_A=25^\circ\text{C}$, DC Bias=0V, 50 Ohm Environment)

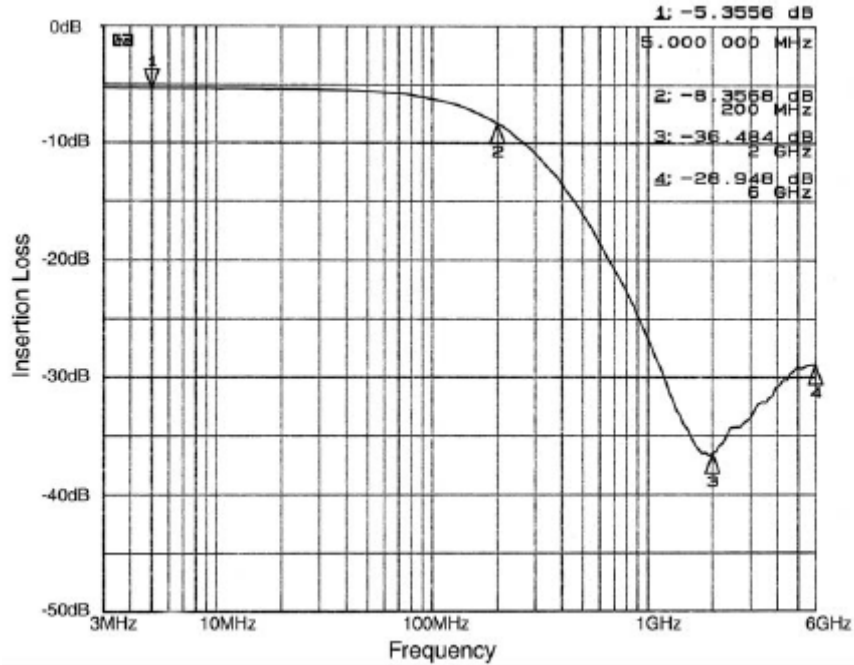


Figure 1. Insertion Loss vs. Frequency (FILTER1 Input to GND)

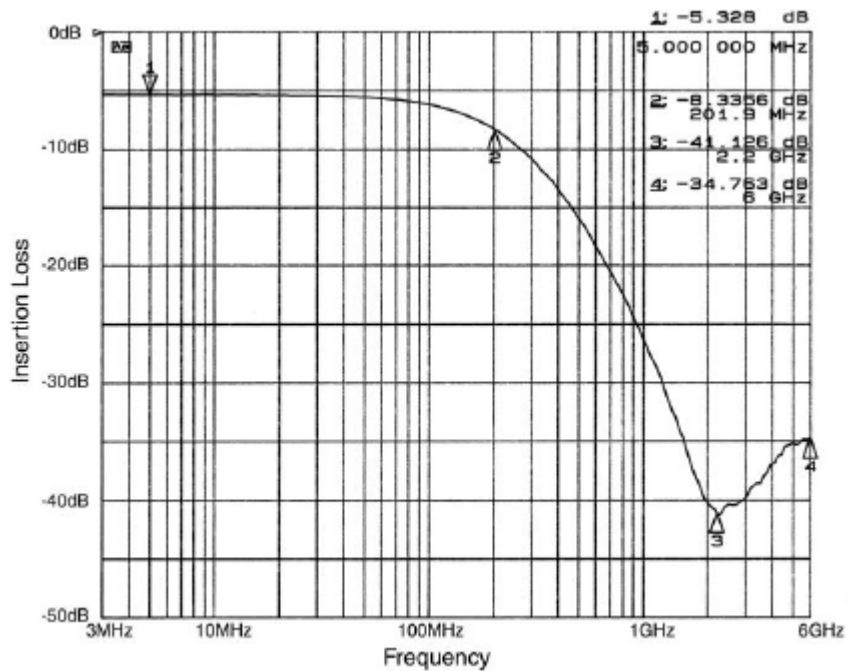


Figure 2. Insertion Loss vs. Frequency (FILTER2 Input to GND)

Performance Information (cont'd)

Typical Filter Performance ($T_A=25^\circ\text{C}$, DC Bias=0V, 50 Ohm Environment)

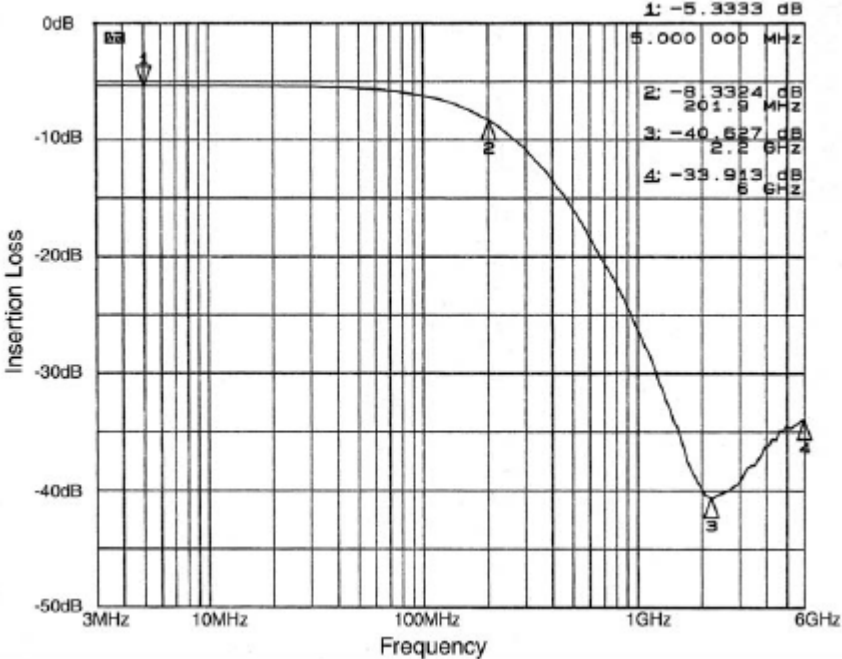


Figure 3. Insertion Loss vs. Frequency (FILTER3 Input to GND)

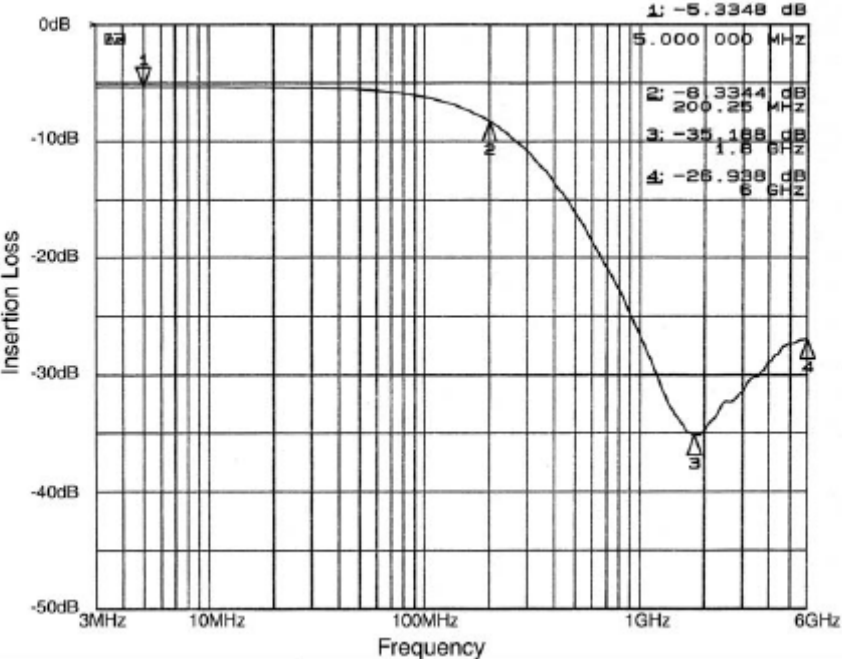


Figure 4. Insertion Loss vs. Frequency (FILTER4 Input to GND)

Performance Information (cont'd)

Typical Diode Capacitance vs. Input Voltage

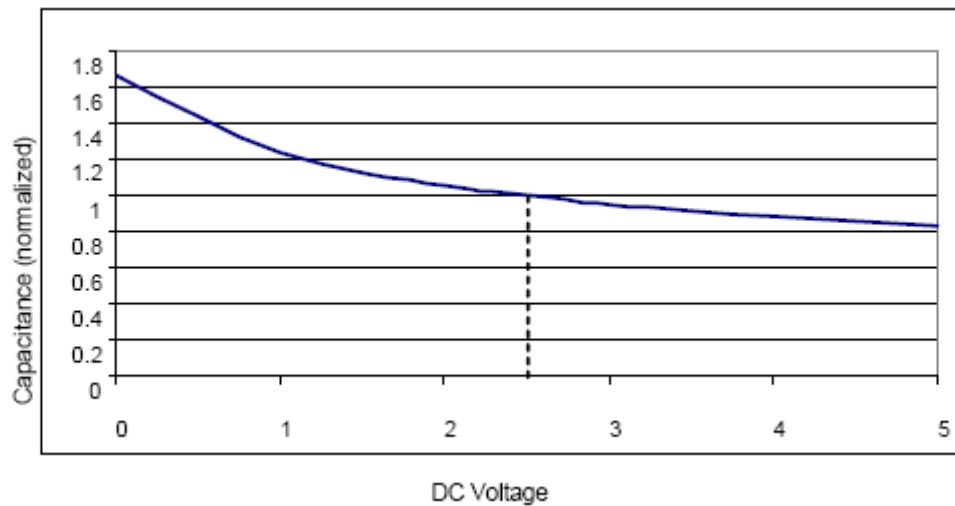


Figure 5. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5VDC and 25°C)

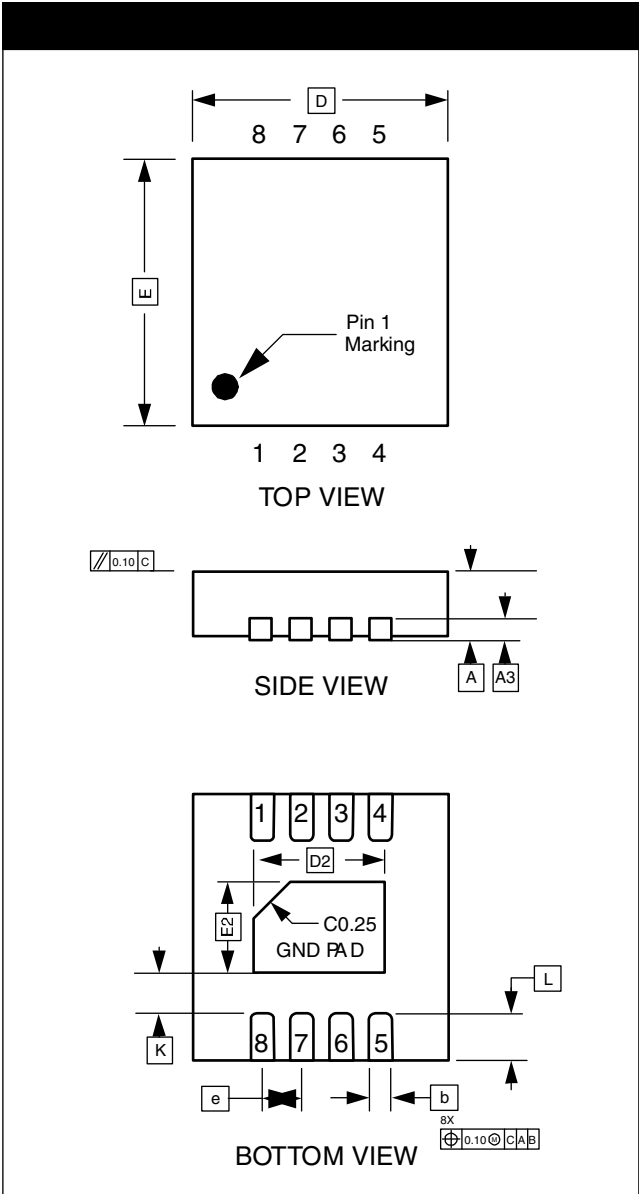
Mechanical Details

TDFN-08 Mechanical Specifications


Dimensions for CM1408-04DE device packaged in an 8-lead TDFN package are presented below.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-----------------------------------|------|------|-----------|-------|-------|
| Package | TDFN | | | | | |
| JEDEC No. | MO-229 (Var. VCCD-3) [†] | | | | | |
| Leads | 8 | | | | | |
| Dim. | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.032 |
| A3 | 0.20 REF | | | 0.008 REF | | |
| b | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| D | 1.95 | 2.00 | 2.05 | 0.077 | 0.079 | 0.081 |
| D2 | 1.55 | 1.60 | 1.65 | 0.061 | 0.063 | 0.065 |
| E | 1.95 | 2.00 | 2.05 | 0.077 | 0.079 | 0.081 |
| E2 | 0.85 | 0.90 | 0.95 | 0.033 | 0.035 | 0.037 |
| e | 0.50 BSC | | | 0.020 BSC | | |
| K | 0.20 | | | 0.008 | | |
| L | 0.25 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| # per tape and reel | 3000 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |

[†] This package is compliant with JEDEC standard MO-229, variation VCCD-3 with exception of the "D2" and "E2" dimensions as called out in the table above.



Dimensions for 8-Lead, 0.5mm pitch TDFN package

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