

4 Channel EMI Filter Array with ESD Protection

Features

- Four channels of EMI filtering with ESD protection
- Greater than 25dB of attenuation from 800MHz to 3GHz
- ±15kV ESD protection (IEC 61000-4-2, contact discharge)
- ±30kV ESD protection (MIL-STD-883, Method 3015, HBM)
- 8-lead TDFN package (2mm x 2mm), 0.5mm pitch
- Lead-free version available

Applications

- 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

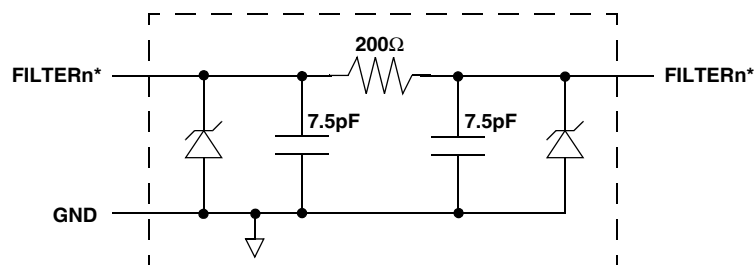
Product Description

California Micro Devices's CM1407 is an EMI filter array with ESD protection, which integrates 4 pi filters (C-R-C). The CM1407 has component values of 7.5pF-200Ω-7.5pF. 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 are designed and characterized to safely dissipate ESD strikes of ±15kV contact discharge, twice the specification requirement of the IEC 61000-4-2, Level 4 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 ±30kV.

This device is particularly well-suited for portable electronics (e.g. mobile handsets, PDAs, notebook computers) because of its small package format and easy-to-use pin assignments. In particular, the CM1407 is ideal for EMI filtering and protecting data lines from ESD in wireless handsets.

The CM1407 is available in a space-saving, low-profile, 8-lead, 2mm x 2mm TDFN package. It is fabricated with California Micro Devices' Centurion™ process and available with optional lead-free finishing.

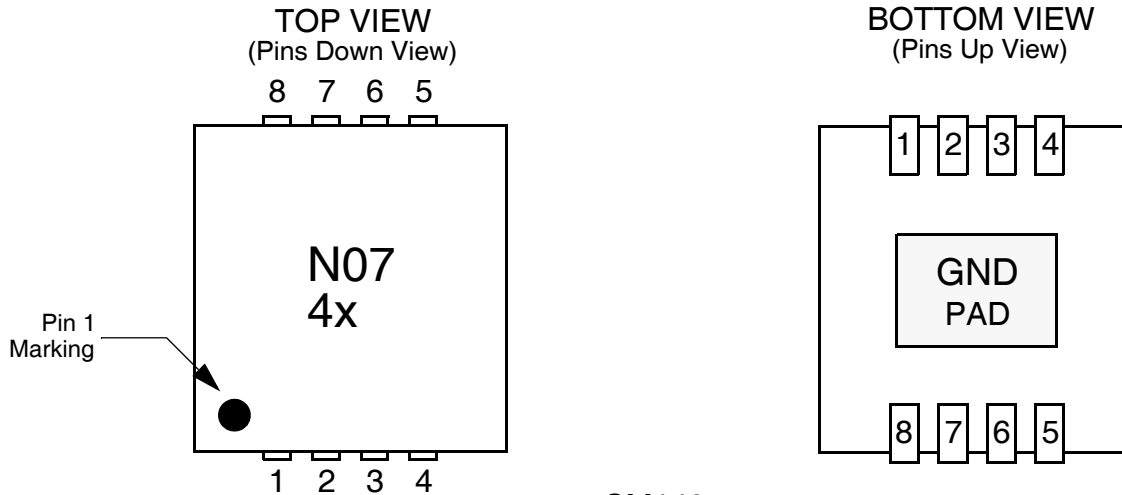
Electrical Schematic



1 of 4 EMI Filtering + ESD Channels

* See Package/Pinout Diagram for expanded pin information.

PACKAGE / PINOUT DIAGRAMS



**CM1407
8-Lead TDFN Package**

- Notes:
- 1) This drawing is not to scale.
 - 2) See Ordering Information section below for device specific marking.

PIN DESCRIPTIONS

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

Ordering Information

PART NUMBERING INFORMATION

| Leads/Pins | Package | Standard Finish | | Lead-free Finish | |
|------------|---------|-----------------------------------|--------------|-----------------------------------|--------------|
| | | Ordering Part Number ¹ | Part Marking | Ordering Part Number ¹ | Part Marking |
| 8 | TDFN-08 | CM1407-04DF | N07 4F | CM1407-04DE | N07 4E |

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 Power per Resistor | 100 | mW |
| DC Package Power Rating | 300 | 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 | | 160 | 200 | 240 | Ω |
| C | Capacitance | At 2.5V DC, 1MHz, 30mV AC | 6 | 7.5 | 9 | pF |
| V _{DIODE} | Diode Standoff Voltage | I _{DIODE} = 10μA | 5.5 | | | V |
| I _{LEAK} | Diode Leakage Current (reverse bias) | V _{DIODE} = 3.3V | | 100 | | nA |
| V _{SIG} | Signal Voltage | | | | | |
| | Positive Clamp | I _{LOAD} = 10mA | 5.6 | 6.8 | 9.0 | V |
| | Negative Clamp | I _{LOAD} = -10mA | -0.4 | -0.8 | -1.5 | V |
| V _{ESD} | In-system ESD Withstand Voltage | Notes 2,4 and 5 | | | | |
| | a) Human Body Model, MIL-STD-883, Method 3015 | | ±30 | | | kV |
| | b) Contact Discharge per IEC 61000-4-2 Level 4 | | ±15 | | | kV |
| V _{CL} | Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8kV | Notes 2,3,4 and 5 | | | | |
| | Positive Transients | | | +12 | | V |
| | Negative Transients | | | -7 | | V |
| f _C | Cut-off Frequency | R = 200Ω, C = 15pF | | | | |
| | Z _{SOURCE} =50Ω, Z _{LOAD} =50Ω | | | 210 | | 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: Clamping voltage is measured at the opposite side of the EMI filter to the ESD pin. For example, if ESD is applied to Pin 1, then clamping voltage is measured at Pin 8.

Note 4: Unused pins are left open

Note 5: These parameters are guaranteed by design and characterization.

Performance Information (cont'd)

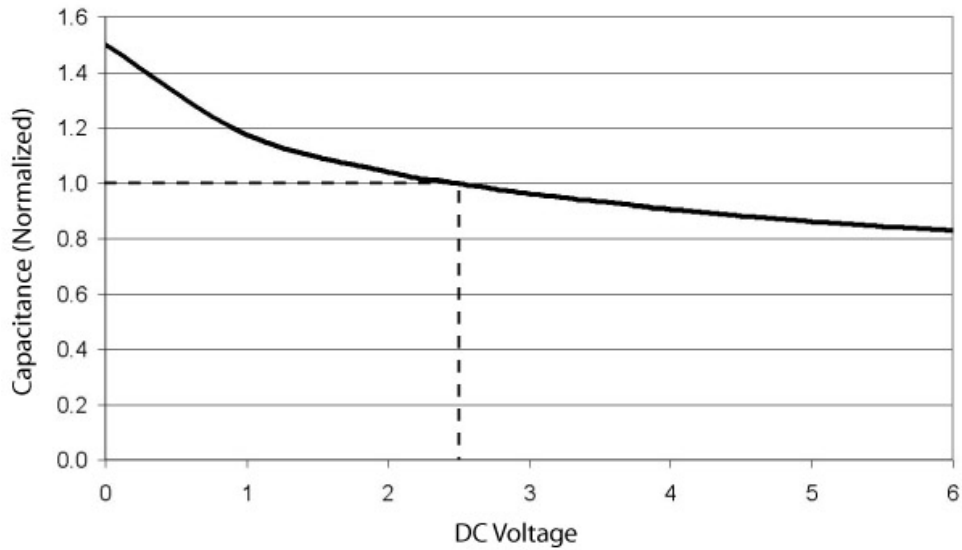


Figure 1. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

Mechanical Details

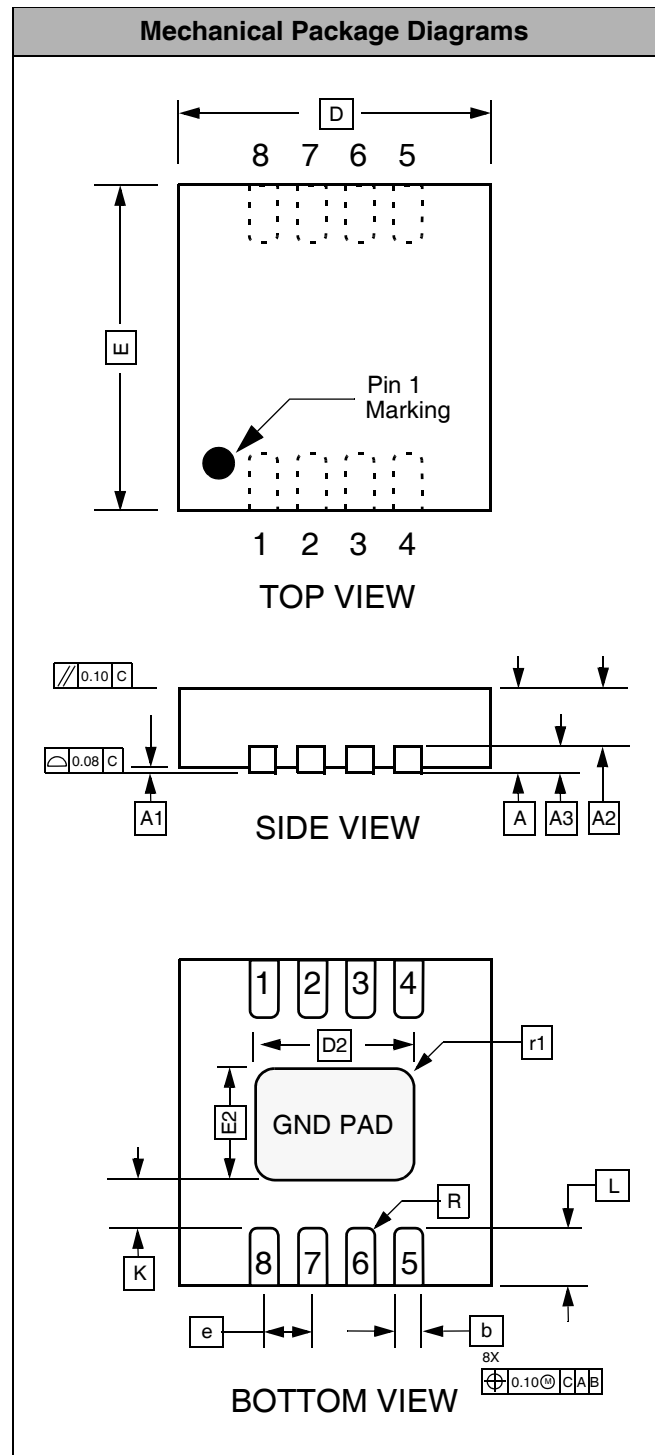
TDFN-08 Mechanical Specifications

Dimensions for the CM1407 device in an 8-lead TDFN package are presented below.

For complete information on the TDFN-08, see the California Micro Devices TDFN Package Information document.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-----------------------------------|-------|------|--------|-------|-------|
| Package | TDFN | | | | | |
| JEDEC No. | MO-229 (Var. VCCD-3) [†] | | | | | |
| Leads | 8 | | | | | |
| Dim. | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.80 | 0.90 | 1.00 | 0.031 | 0.035 | 0.039 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| A2 | 0.55 | 0.65 | 0.80 | 0.022 | 0.026 | 0.031 |
| A3 | | 0.20 | | | 0.008 | |
| b | 0.18 | 0.25 | 0.30 | 0.007 | 0.010 | 0.012 |
| D | | 2.00 | | | 0.079 | |
| D2 | 0.88 | 0.98 | 1.08 | 0.035 | 0.039 | 0.043 |
| E | | 2.00 | | | 0.079 | |
| E2 | 0.46 | 0.56 | 0.66 | 0.018 | 0.022 | 0.026 |
| e | | 0.50 | | | 0.020 | |
| K | 0.20 | | | 0.008 | | |
| L | 0.20 | 0.30 | 0.45 | 0.008 | 0.012 | 0.018 |
| R | | 0.075 | | | 0.003 | |
| r1 | | 0.075 | | | 0.003 | |
| # per tube | NA | | | | | |
| # 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 and the "r1" dimension which is not specified in the MO-229 standard.



Package Dimensions for 8-Lead TDFN