4 and 8 Channel EMI Filter Arrays with ESD Protection

Features

- Four and eight 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)
- Fabricated with *Centurion*™ advanced low capacitance zener process technology
- Space saving, low profile 8 and 16-lead TDFN packages
- 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, camera and chip-to-chip data lines

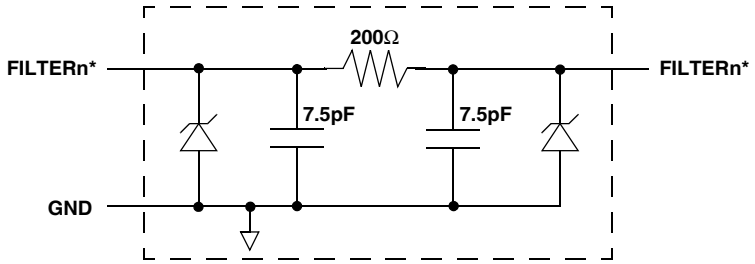
Product Description

California Micro Devices's CM1407 is an EMI filter array with ESD protection, which integrates either four or eight 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, providing 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 ±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 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 space-saving, low-profile, 8 and 16-lead TDFN packages. It is fabricated with California Micro Devices' *Centurion*™ process and available with optional lead-free finishing.

Electrical Schematic

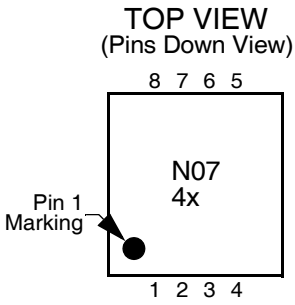


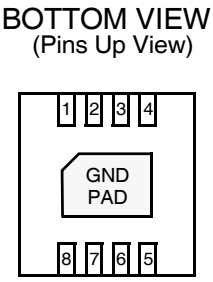
1 of 4/8 EMI Filtering + ESD Channels

*** See Package/Pinout Diagram for expanded pin information.**

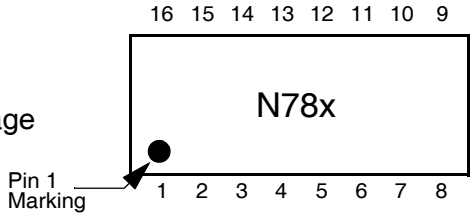
PACKAGE / PINOUT DIAGRAMS

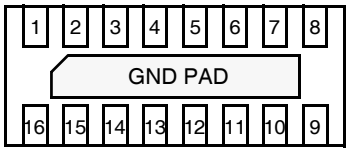
CM1407-04DE/DF
8-Lead TDFN Package





CM1407-08DE/DF
16-Lead TDFN Package





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

PIN DESCRIPTIONS

Pins					Pins			
CM1407 -04Dx	CM1407 -08Dx	NAME	DESCRIPTION		CM1407 -04Dx	CM1407 -08Dx	NAME	DESCRIPTION
1	1	FILTER1	Filter Channel 1		8	16	FILTER1	Filter Channel 1
2	2	FILTER2	Filter Channel 2		7	15	FILTER2	Filter Channel 2
3	3	FILTER3	Filter Channel 3		6	14	FILTER3	Filter Channel 3
4	4	FILTER4	Filter Channel 4		5	13	FILTER4	Filter Channel 4
	5	FILTER5	Filter Channel 5			12	FILTER5	Filter Channel 5
	6	FILTER6	Filter Channel 6			11	FILTER6	Filter Channel 6
	7	FILTER7	Filter Channel 7			10	FILTER7	Filter Channel 7
	8	FILTER8	Filter Channel 8			9	FILTER8	Filter Channel 8
GND Pad		GND	Device Ground					

Ordering Information

PART NUMBERING INFORMATION

		Standard Finish		Lead-free Finish	
Leads/Pins	Package	Ordering Part Number[1]	Part Marking	Ordering Part Number[1]	Part Marking
8	TDFN-08	CM1407-04DF	N07 4F	CM1407-04DE	N07 4E
16	TDFN-16	CM1407-08DF	N78F	CM1407-08DE	N78E

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 Rating per Resistor	100	mW
Package DC 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		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE} = 3.3V		0.1	1	μA
V_{SIG}	Signal 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
f_C	Cut-off Frequency Z_{SOURCE}=50Ω, Z_{LOAD}=50Ω	R = 200Ω, C = 15pF; Note 3		 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: These parameters are guaranteed by design and characterization.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

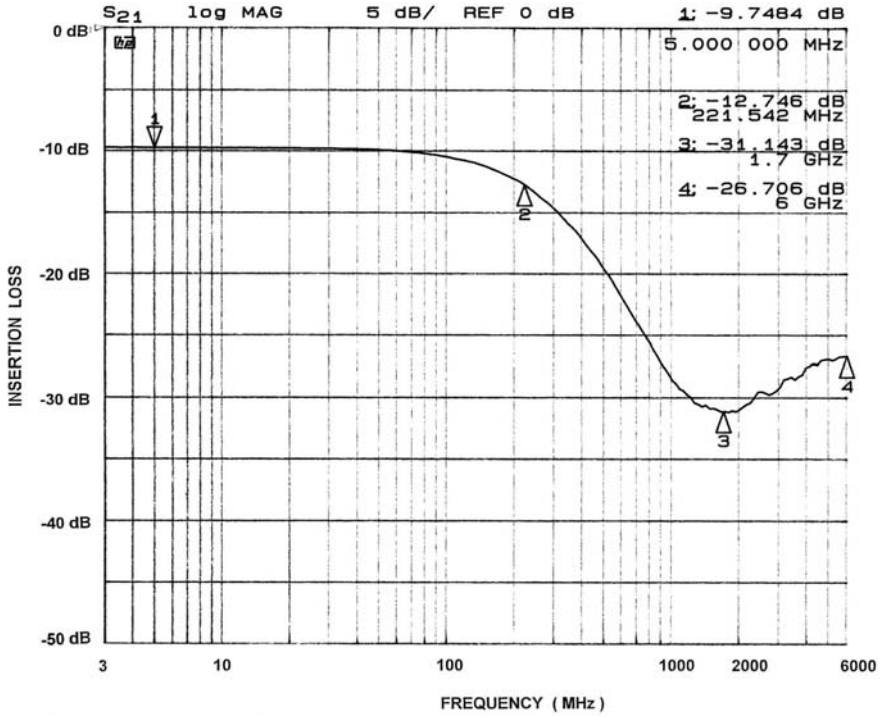


Figure 1. Channel 1 EMI Filter Performance (CM1407-04)

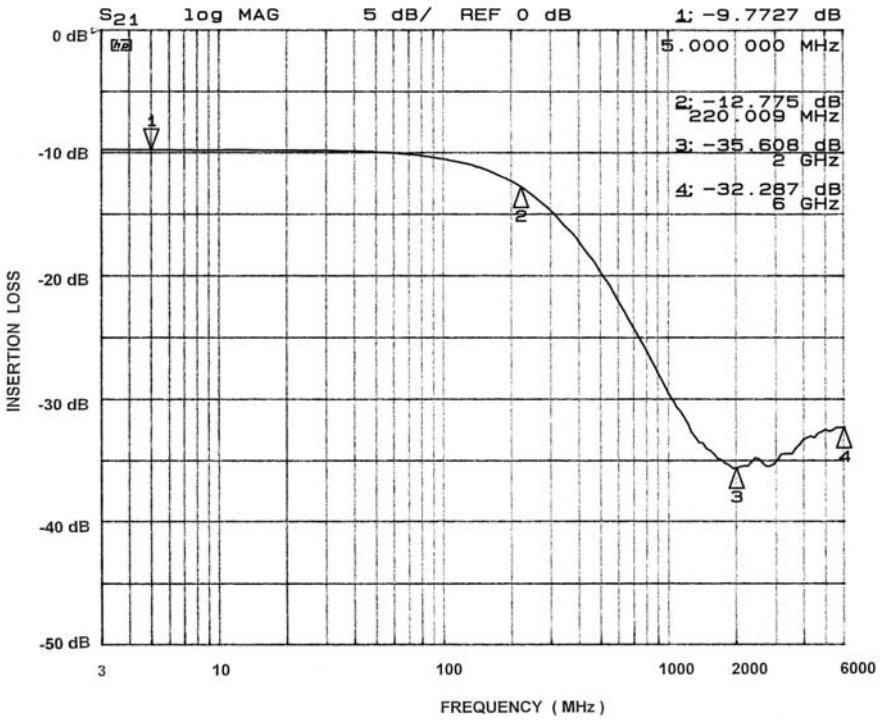


Figure 2. Channel 2 EMI Filter Performance (CM1407-04)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

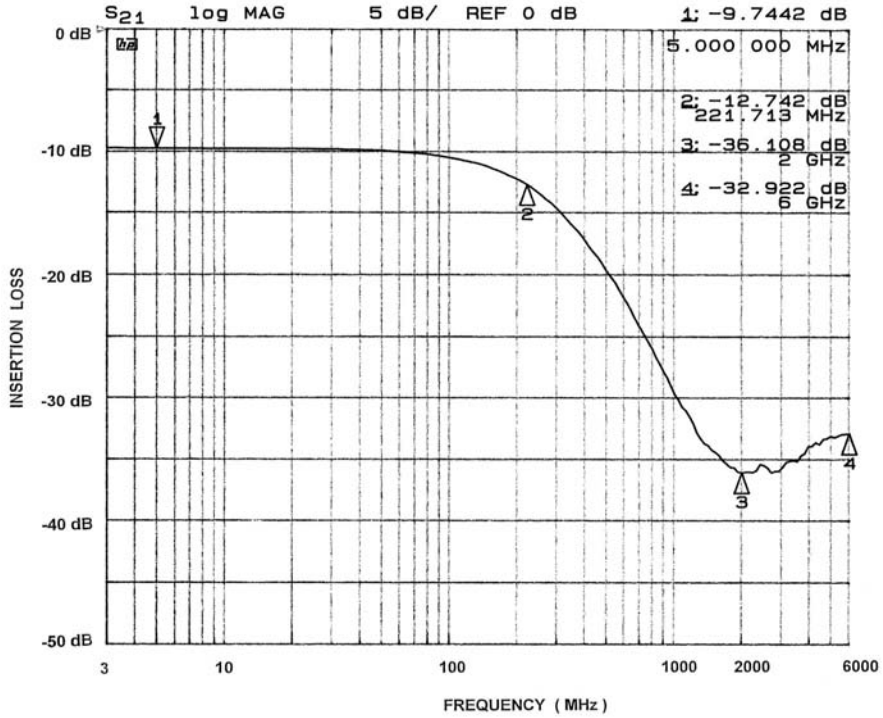


Figure 3. Channel 3 EMI Filter Performance (CM1407-04)

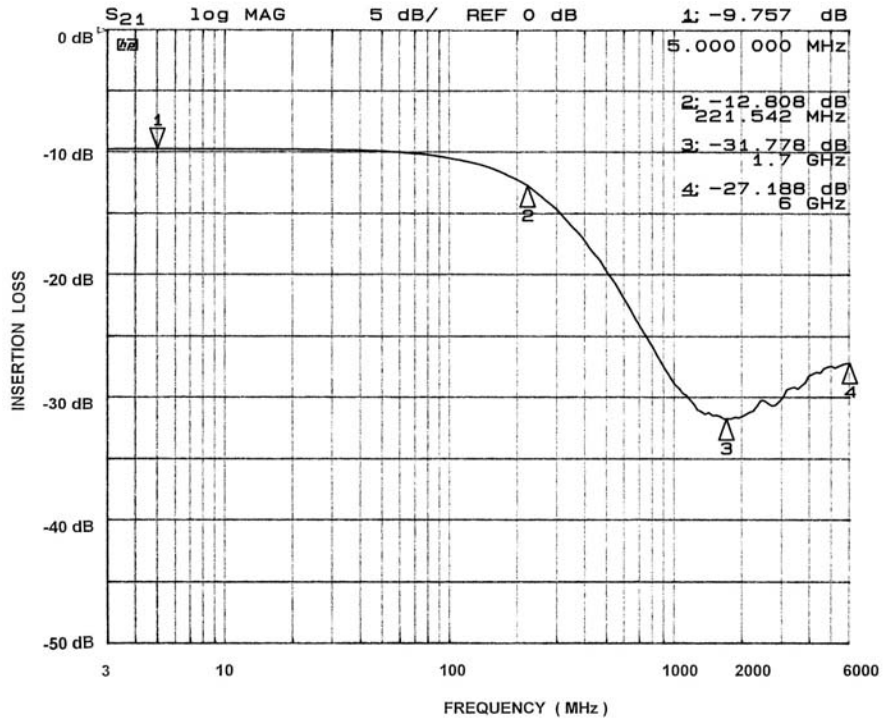


Figure 4. Channel 4 EMI Filter Performance (CM1407-04)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

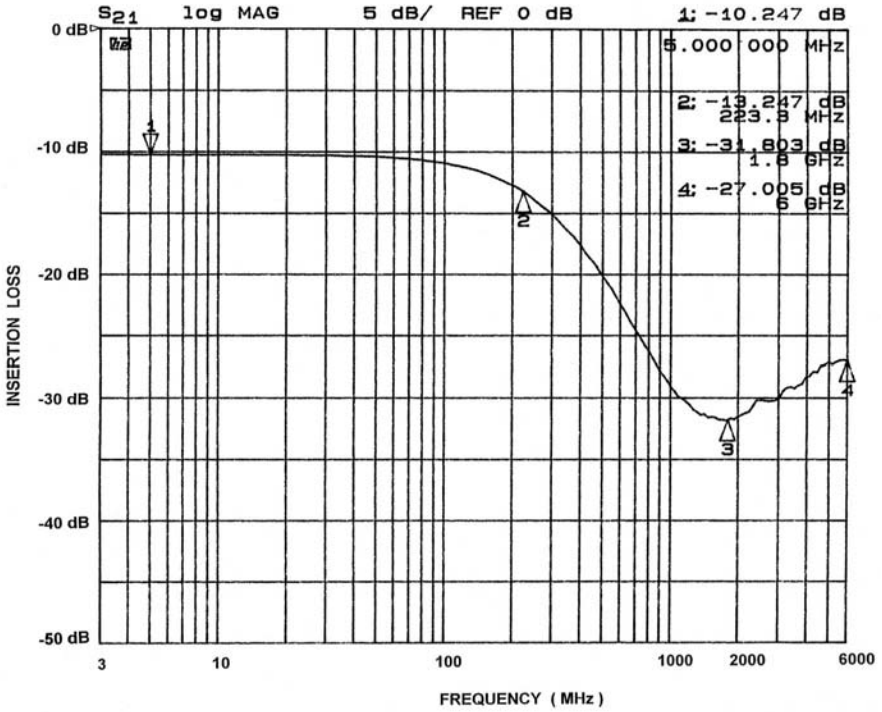


Figure 5. Channel 1 EMI Filter Performance (CM1407-08)

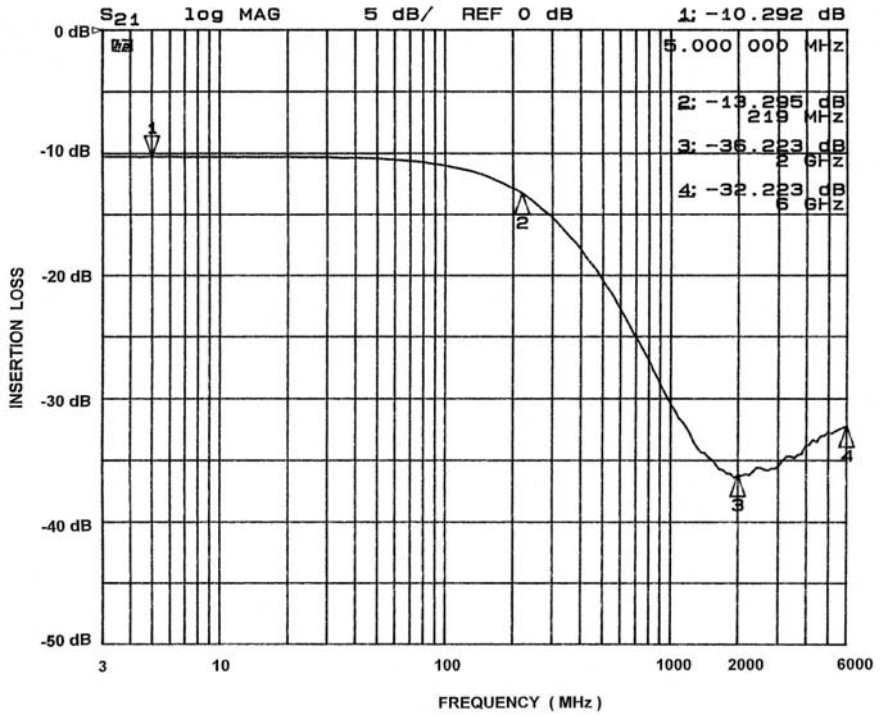


Figure 6. Channel 2 EMI Filter Performance (CM1407-08)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

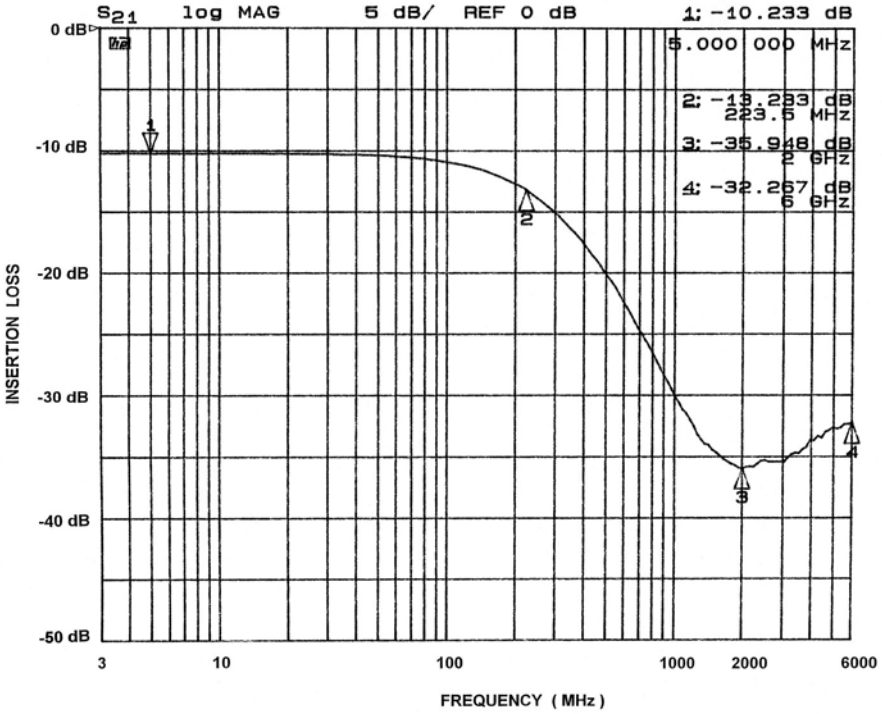


Figure 7. Channel 3 EMI Filter Performance (CM1407-08)

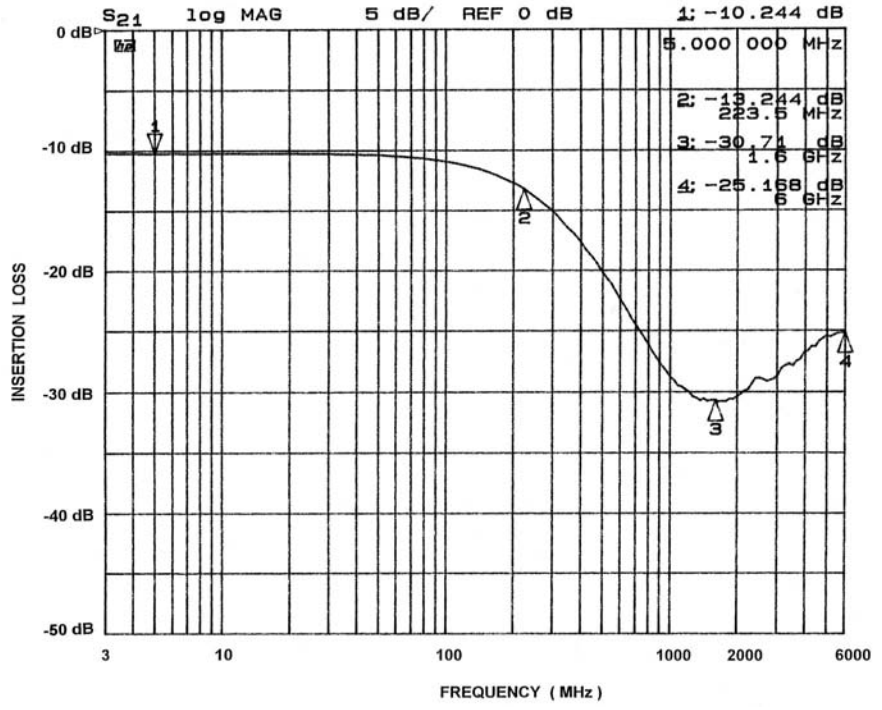


Figure 8. Channel 4 EMI Filter Performance (CM1407-08)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

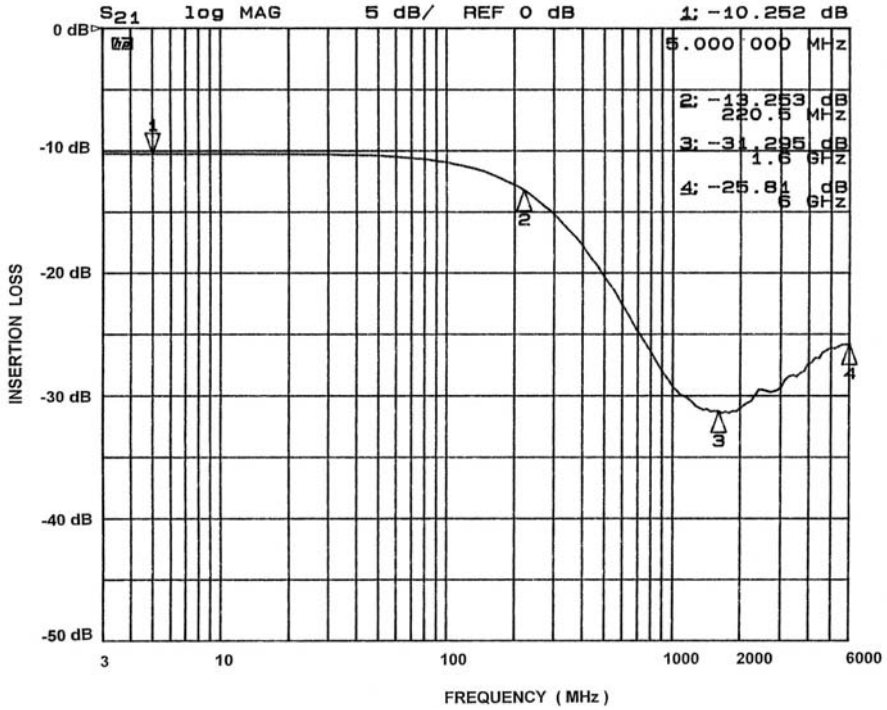


Figure 9. Channel 5 EMI Filter Performance (CM1407-08)

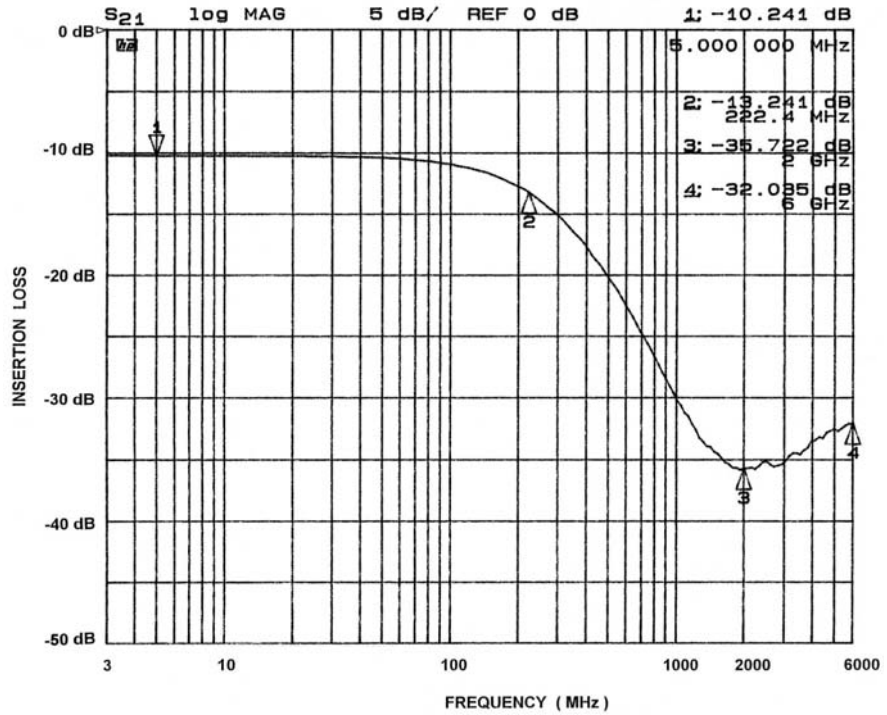


Figure 10. Channel 6 EMI Filter Performance (CM1407-08)

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

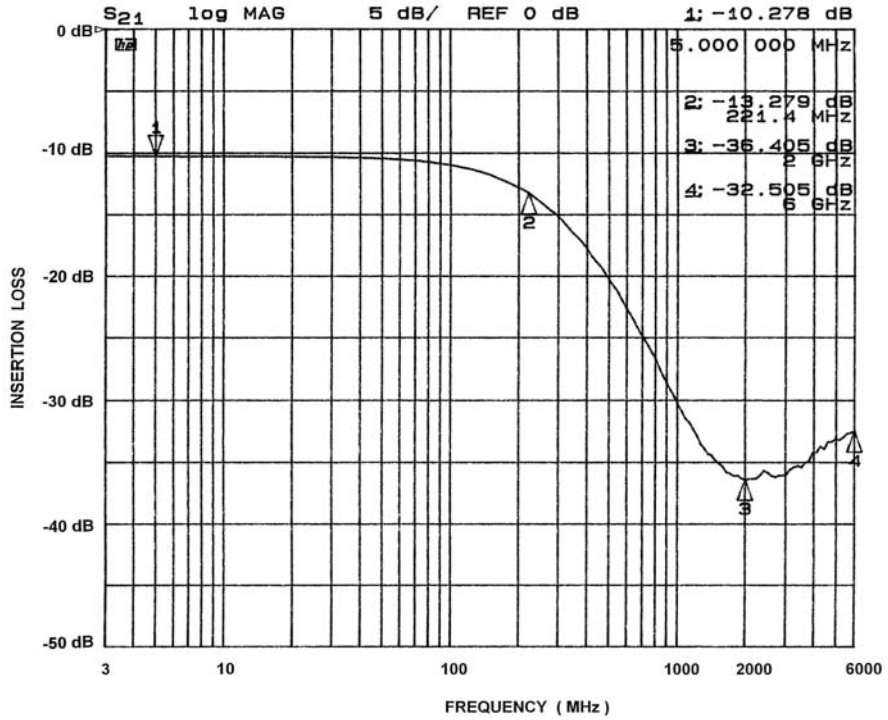


Figure 11. Channel 7 EMI Filter Performance (CM1407-08)

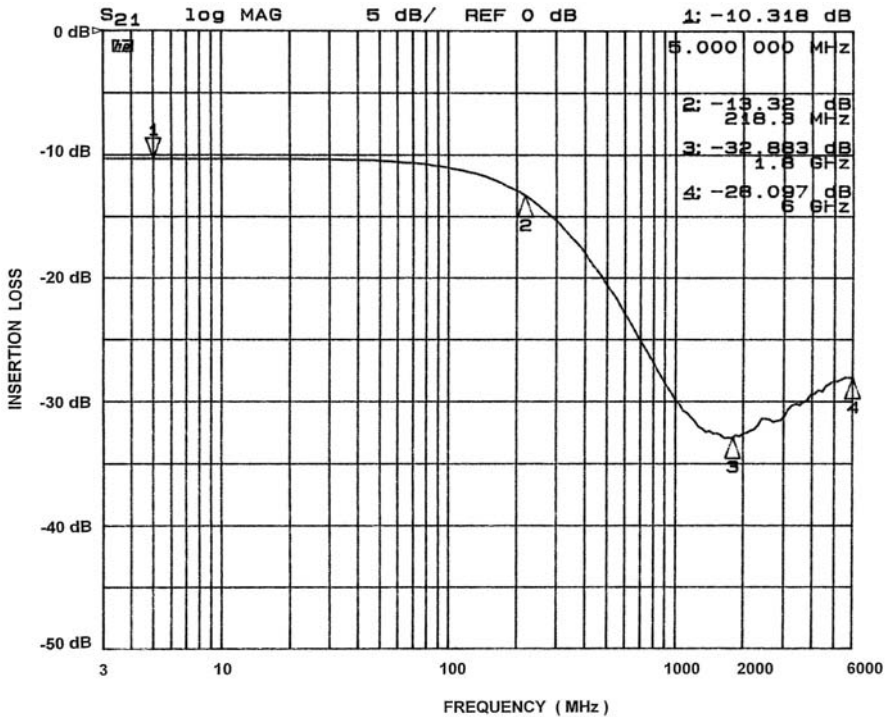


Figure 12. Channel 8 EMI Filter Performance (CM1407-08)

Performance Information (cont'd)

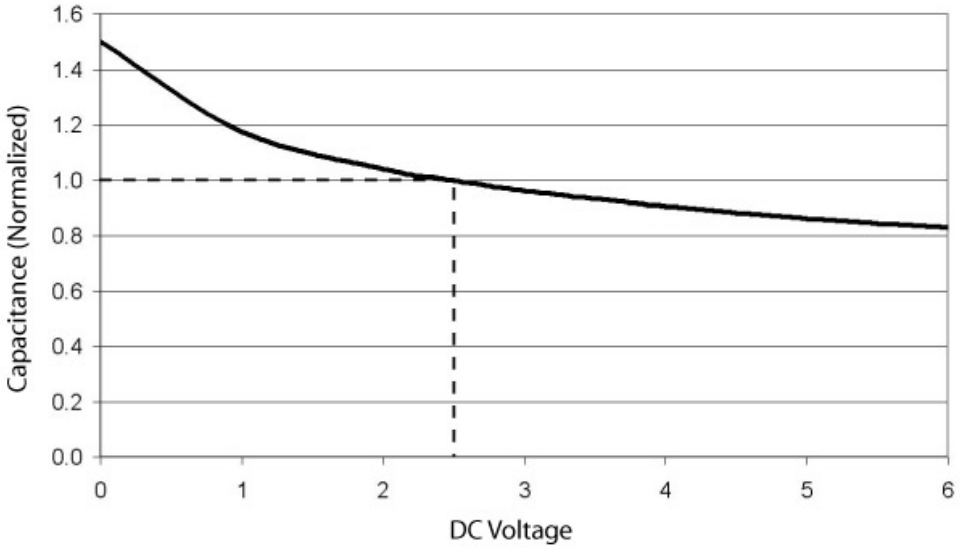


Figure 13. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

Mechanical Details

TDFN-08 Mechanical Specifications

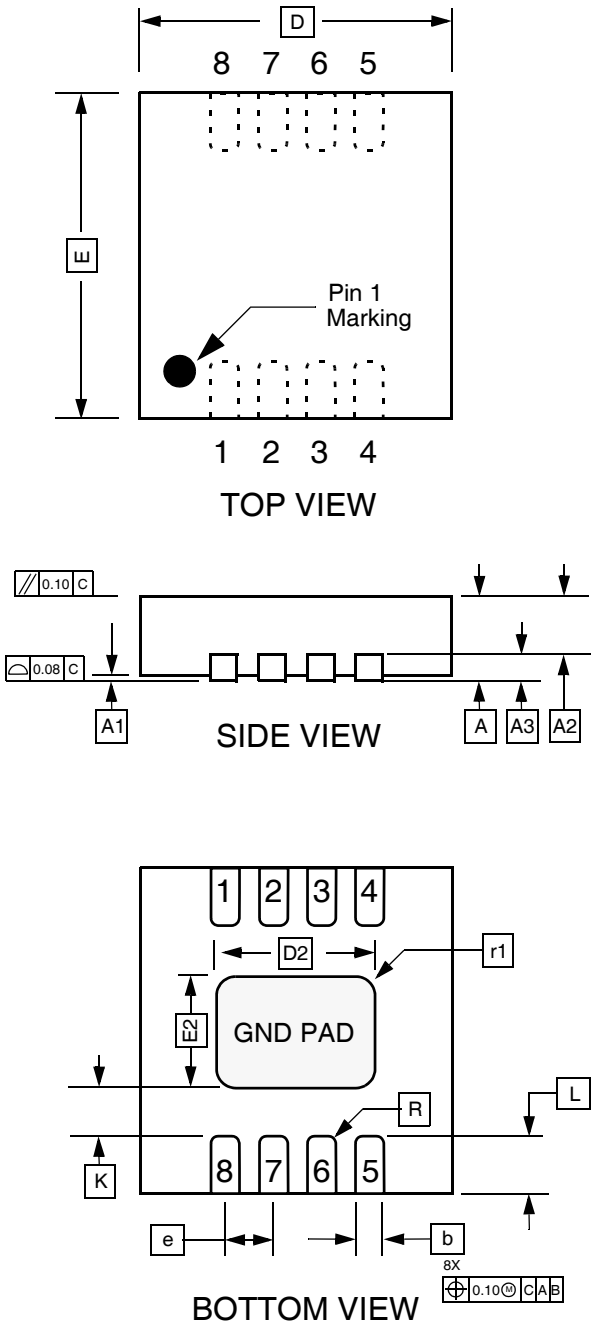
Dimensions for the CM1407 device packaged in an 8-lead TDFN package are presented below.

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.

Mechanical Package Diagrams



Package Dimensions for 8-Lead TDFN

Mechanical Details (cont'd)

TDFN-16 Mechanical Specifications

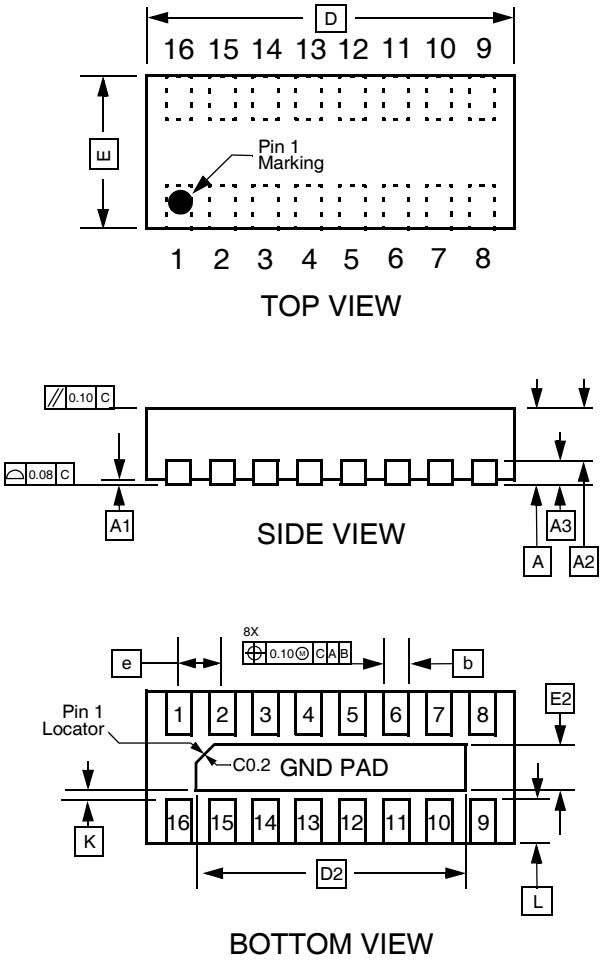
Dimensions for the CM1407 supplied in a 16-lead TDFN package are presented below.

For complete information on the TDFN-16, see the California Micro Devices TDFN Package Information document.

PACKAGE DIMENSIONS						
Package	TDFN					
JEDEC No.	MO-229C†					
Leads	16					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	0.02	0.05	0.000	0.001	0.002
A2	0.45	0.55	0.65	0.018	0.022	0.026
A3		0.20			0.008	
b	0.20	0.25	0.30	0.008	0.010	0.012
D	3.90	4.00	4.10	0.154	0.157	0.161
D2	3.10	3.20	3.30	0.122	0.126	0.130
E	1.50	1.60	1.70	0.059	0.063	0.067
E2	0.30	0.40	0.50	0.012	0.016	0.020
e		0.50			0.020	
K	0.10	0.30	0.50	0.004	0.012	0.020
L	0.20	0.30	0.40	0.008	0.012	0.016
# per tube	NA					
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

†This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.

Mechanical Package Diagrams



Package Dimensions for 16-Lead TDFN