



# 8-Channel LCD and Camera EMI Filter Array with ESD Protection

## CM1408-08DE

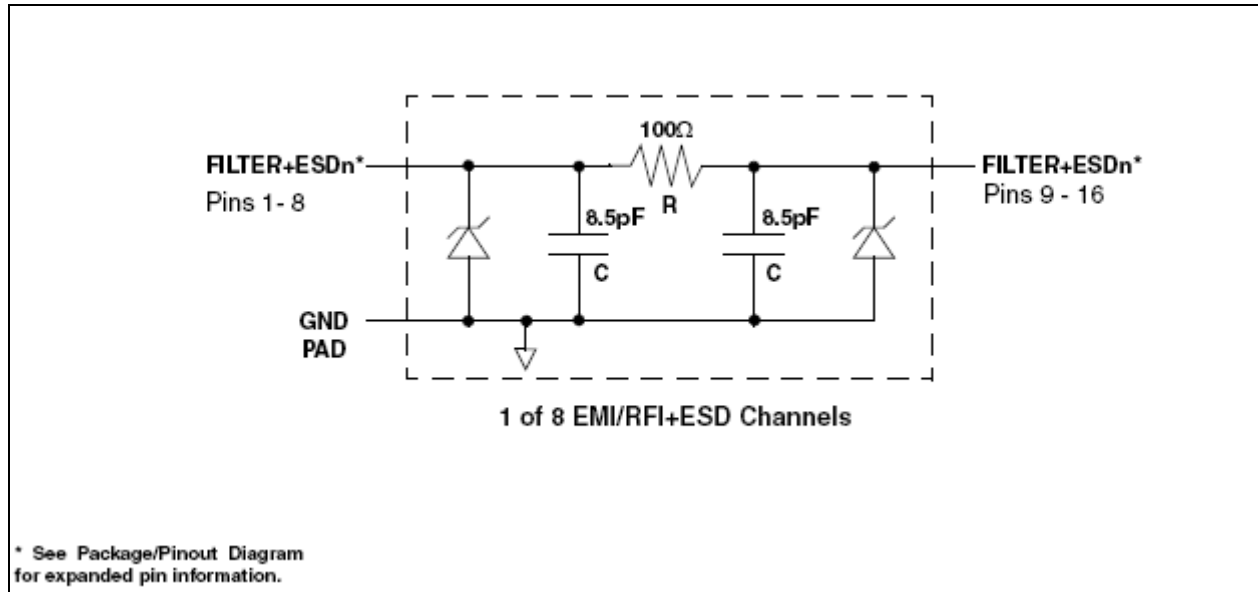
### Features

- Eight channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- $\pm 15\text{kV}$  ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- $\pm 30\text{kV}$  ESD protection on each channel (HBM)
- Greater than  $-35\text{dB}$  attenuation (typical) at  $1\text{GHz}$
- TDFN packaging with  $0.5\text{mm}$  lead pitch:
  - 16-lead TDFN,  $4.0\text{mm} \times 1.60\text{mm}$
- Increased robustness against vertical impacts during manufacturing process
- Lead-free finishing

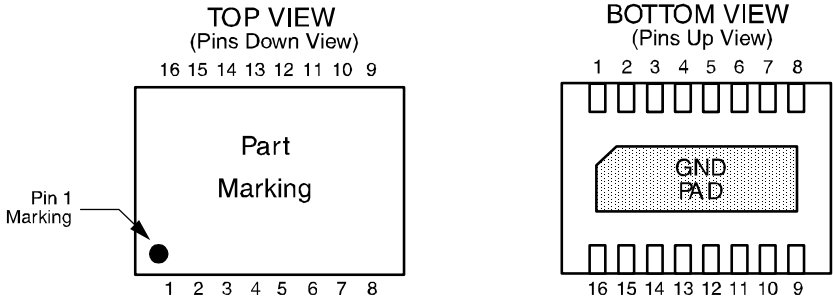
### Applications

- 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**



16 Lead TDFN Package

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	16	FILTER1	Filter + ESD Channel 1
2	FILTER2	Filter + ESD Channel 2	15	FILTER2	Filter + ESD Channel 2
3	FILTER3	Filter + ESD Channel 3	14	FILTER3	Filter + ESD Channel 3
4	FILTER4	Filter + ESD Channel 4	13	FILTER4	Filter + ESD Channel 4
5	FILTER5	Filter + ESD Channel 5	12	FILTER5	Filter + ESD Channel 5
6	FILTER6	Filter + ESD Channel 6	11	FILTER6	Filter + ESD Channel 6
7	FILTER7	Filter + ESD Channel 7	10	FILTER7	Filter + ESD Channel 7
8	FILTER8	Filter + ESD Channel 8	9	FILTER8	Filter + ESD Channel 8
GND PAD	GND	Device Ground	-	-	-

# CM1408-08DE

## Ordering Information

PART NUMBERING INFORMATION			
Pins	Package	Lead-free Finish	
		Ordering Part Number <sup>1</sup>	Part Marking
16	TDFN-16	CM1408-08DE	N088E

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	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	$\Omega$
C <sub>TOTAL</sub>	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 <sub>DIODE</sub>	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> = 3.3V		0.1	1.0	$\mu$ A
V <sub>SIG</sub>	Signal Clamp Voltage Positive Clamp Negative Clamp	I <sub>LOAD</sub> = 10mA I <sub>LOAD</sub> = -10mA	5.6 -1.5	6.8 -0.8	9.0 -0.4	V V
V <sub>ESD</sub>	In-system ESD Withstand Voltage a) Human Body Model, MIL-STD-883, Method 3015 b) Contact Discharge per IEC 61000-4-2 Level 4	Note 2	$\pm$ 30 $\pm$ 15			kV kV
R <sub>DYN</sub>	Dynamic Resistance Positive Negative			2.3 0.9		$\Omega$ $\Omega$
f <sub>C</sub>	Cut-off Frequency Z <sub>SOURCE</sub> =50 $\Omega$ , Z <sub>LOAD</sub> =50 $\Omega$	Channel R = 100 $\Omega$ , Channel C <sub>SINGLE</sub> = 8.5pF		200		MHz

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

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

## Performance Information

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

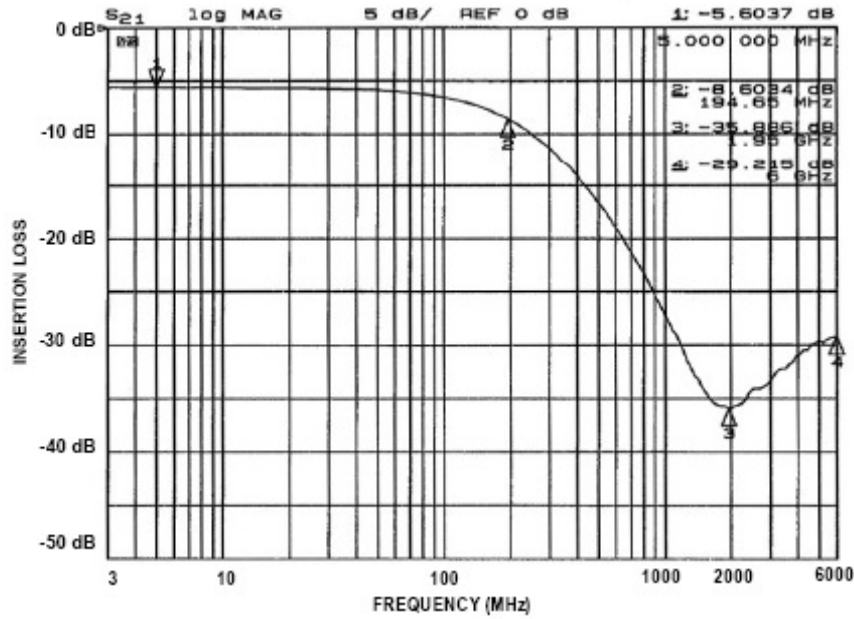


Figure 1. Insertion Loss vs. Frequency (Filter 1 Input – Pin 1 to Pin 16)

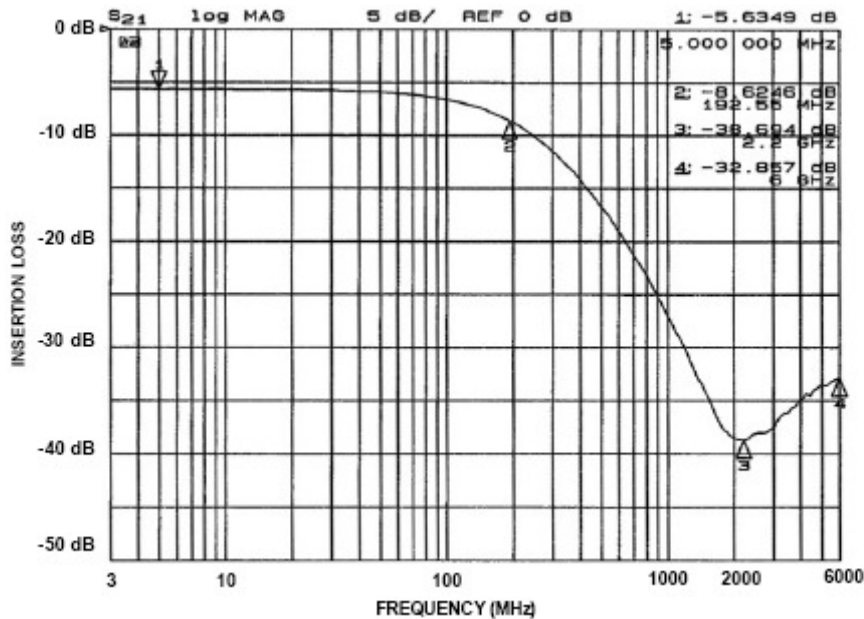


Figure 2. Insertion Loss vs. Frequency (Filter 2 Input – Pin 2 to Pin 15)

### Performance Information (cont'd)

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

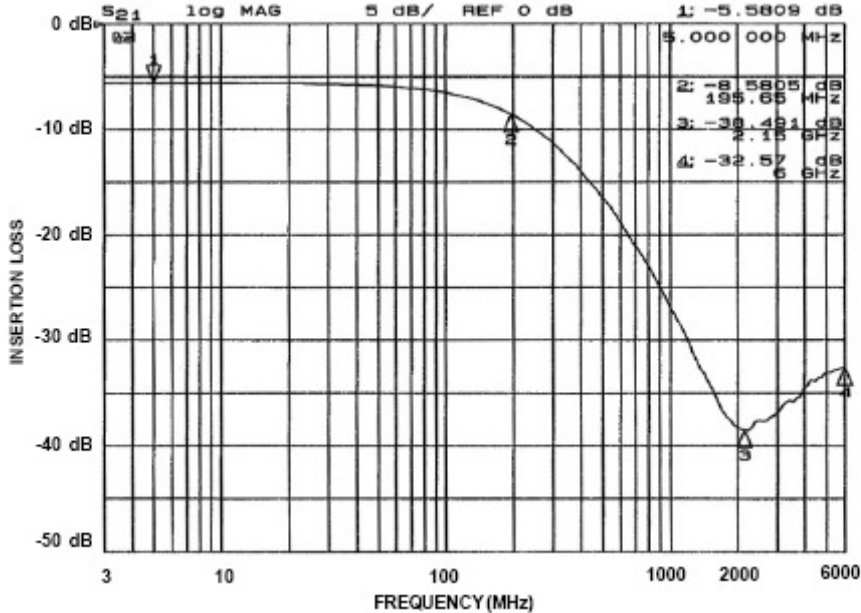


Figure 3. Insertion Loss vs. Frequency (Filter 3 Input – Pin 3 to Pin 14)

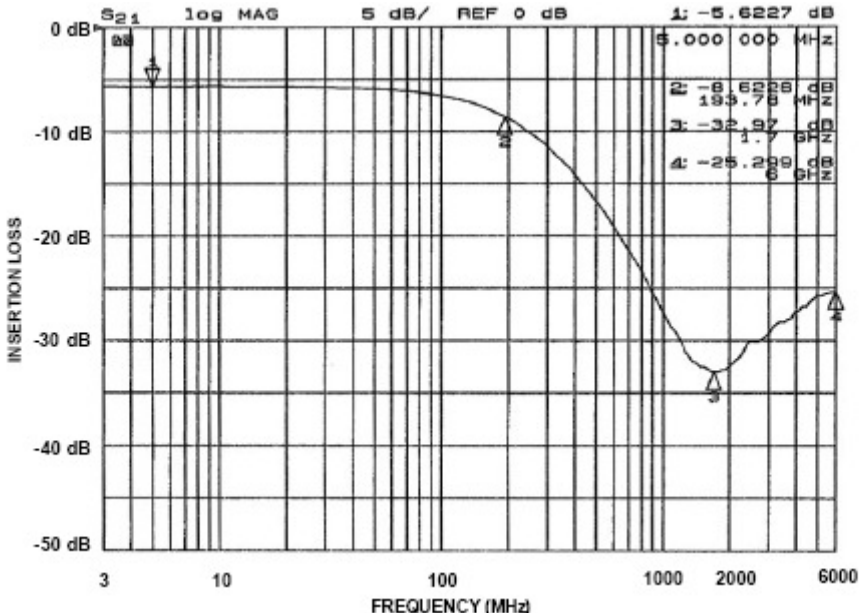


Figure 4. Insertion Loss vs. Frequency (Filter 4 Input – Pin 4 to Pin 13)

Performance Information (cont'd)

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

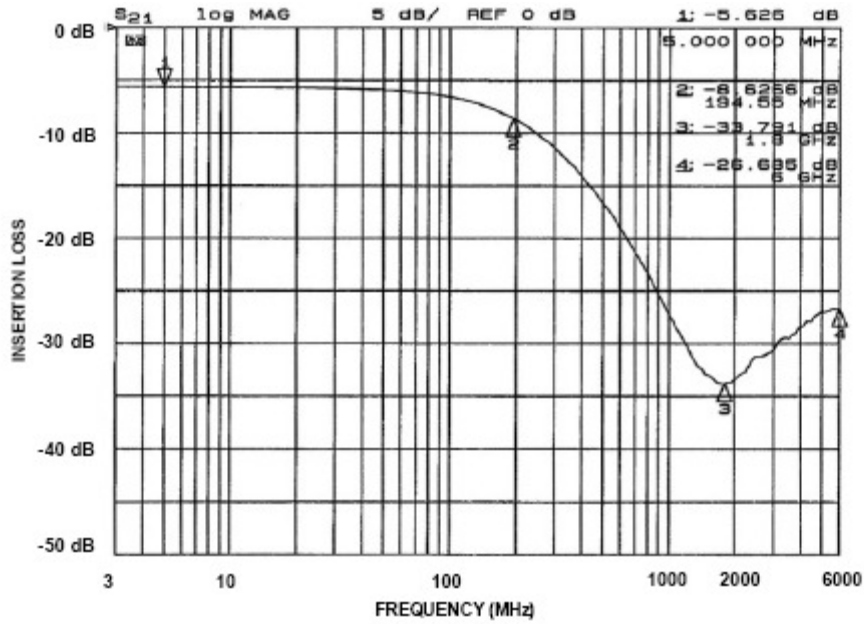


Figure 5. Insertion Loss vs. Frequency (Filter 5 Input – Pin 5 to Pin 12)

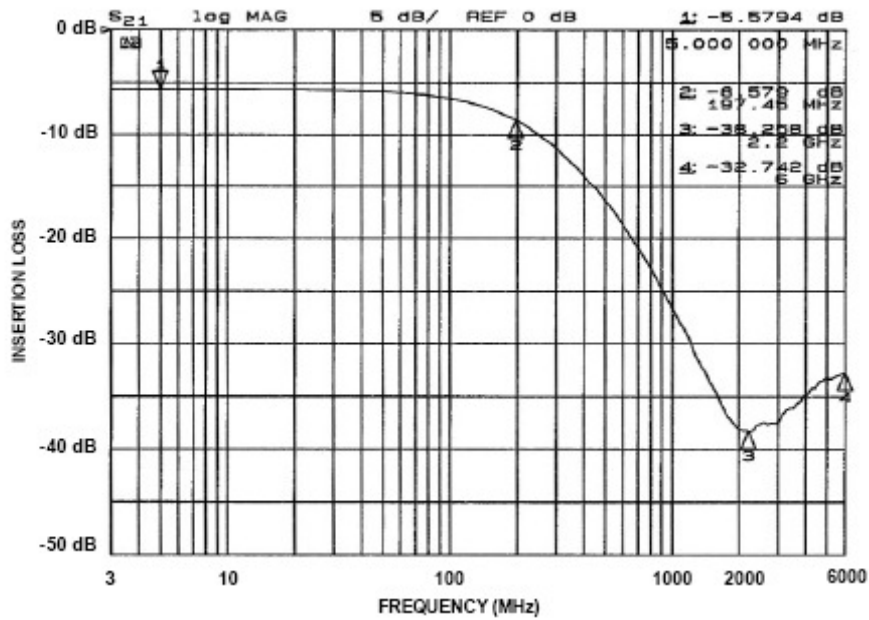


Figure 6. Insertion Loss vs. Frequency (Filter 6 Input – Pin 6 to Pin 11)

Performance Information (cont'd)

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

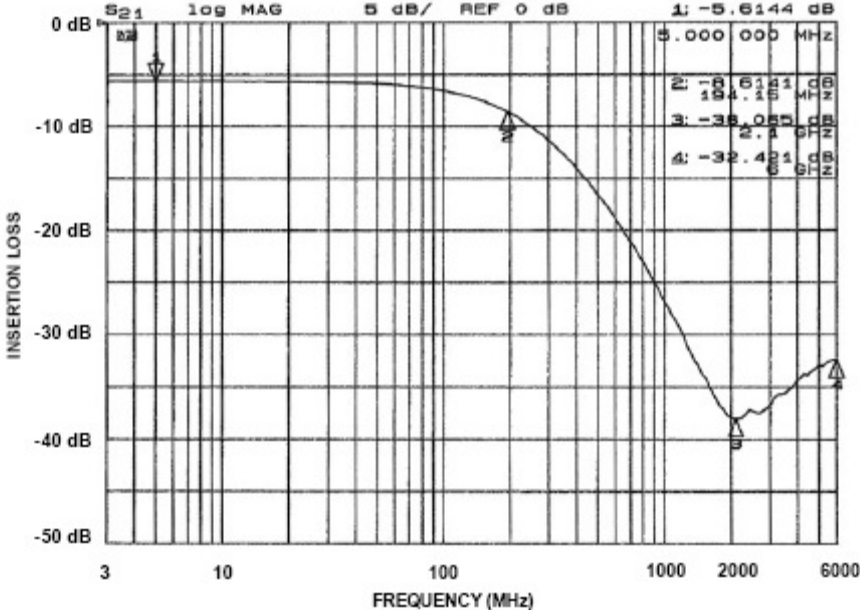


Figure 7. Insertion Loss vs. Frequency (Filter 7 Input – Pin 7 to Pin 10)

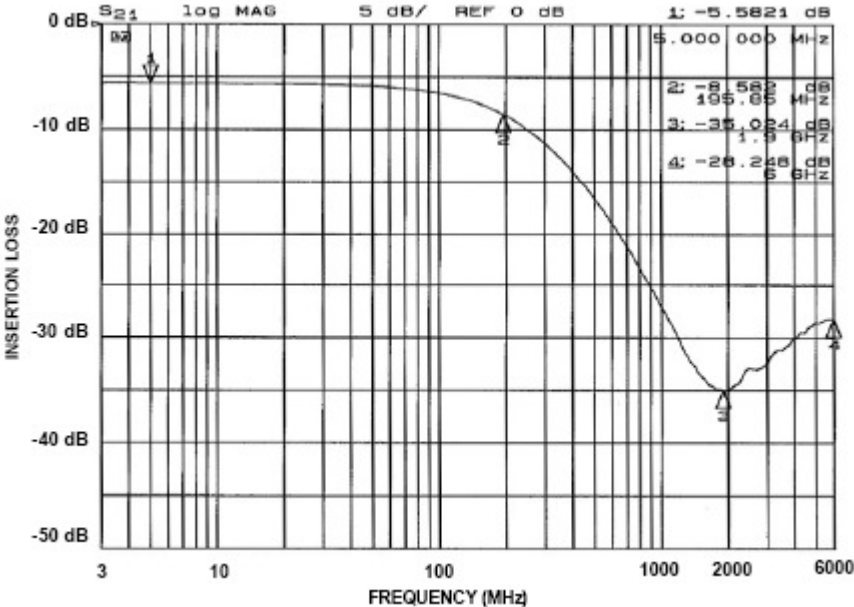
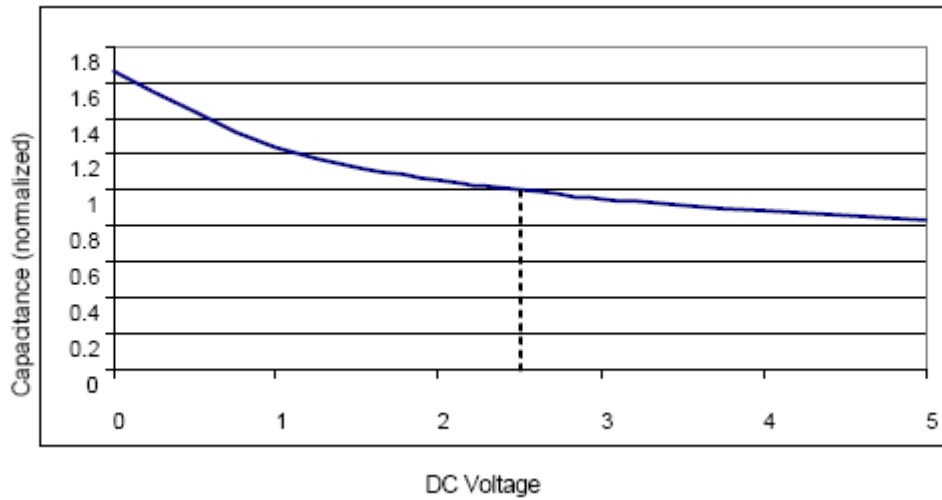


Figure 8. Insertion Loss vs. Frequency (Filter 8 Input – Pin 8 to Pin 9)



## Performance Information (cont'd)

### Typical Diode Capacitance vs. Input Voltage



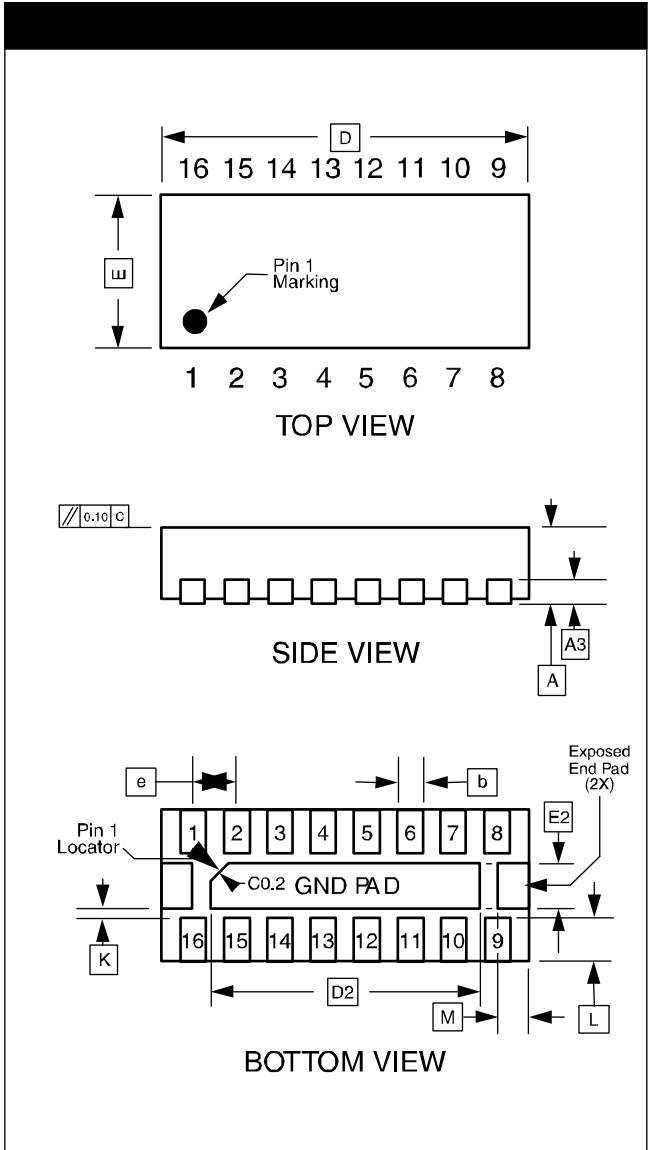
**Figure 9. Filter Capacitance vs. Input Voltage  
(normalized to capacitance at 2.5VDC and 25°C)**

**Mechanical Details**

**TDFN-16EEP Mechanical Specifications**

The CM1408-08DE is supplied in a 16-lead, 0.5mm pitch TDFN package with Exposed End Pads (EEP). Dimensions are presented below.

PACKAGE DIMENSIONS						
Package	TDFN					
JEDEC No.	MO-229C <sup>†</sup>					
Leads	16					
Dim.	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.70	0.75	0.80	0.028	0.030	0.031
A3	0.20 REF			0.008 REF		
b	0.20	0.25	0.30	0.008	0.010	0.012
D	3.90	4.00	4.10	0.153	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 BSC			0.020 BSC		
K	0.20			0.008		
L	0.20	0.30	0.40	0.008	0.010	0.012
M	0.25 REF			0.010 REF		
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						



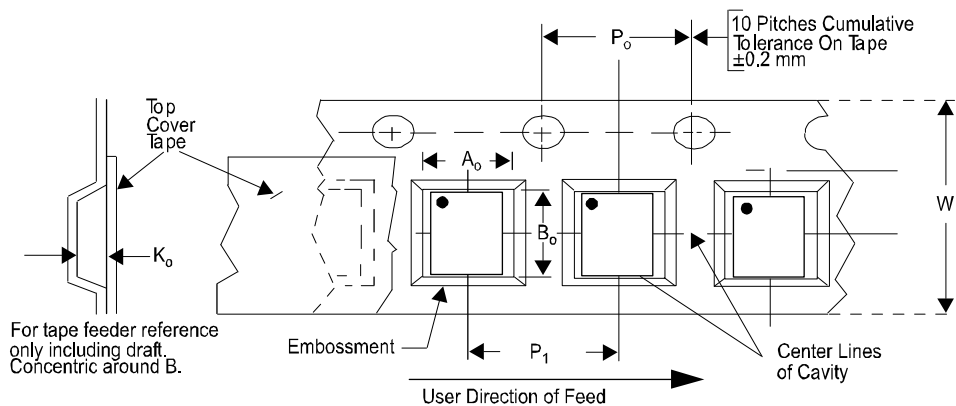
**Dimensions for 16-Lead, 0.5mm pitch TDFN package with Exposed End Pads (EEP)**


<sup>†</sup> 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.

# CM1408-08DE

## Tape and Reel Specifications

PART NUMBER	PACKAGE SIZE (mm)	POCKET SIZE (mm) $B_o \times A_o \times K_o$	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	$P_o$	$P_1$
CM1408-08DE	4.00 X 1.60 X 0.75	4.30 X 1.90 X 1.20	12mm	178mm (7")	3000	4mm	4mm



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