

## Praetorian™ L-C LCD and Camera EMI Filter Array with ESD Protection in Ultra-Thin uDFN Packages

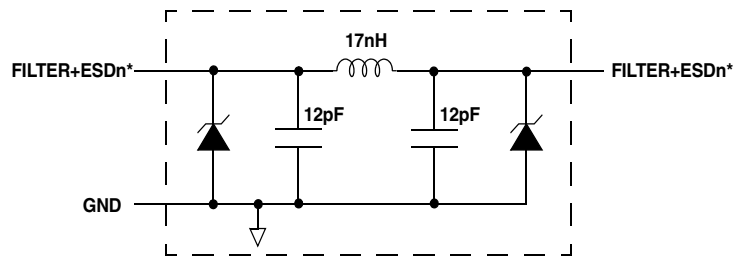
### Features

- Four, six, and eight channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-inductor-capacitor (C-L-C) network
- $\pm 15\text{kV}$  ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- Greater than 30dB attenuation (typical) at 1GHz
- 0.5mm thick uDFN package with 0.40mm lead pitch:
  - 4-channel = 8-lead uDFN
  - 6-channel = 12-lead uDFN
  - 8-channel = 16-lead uDFN
- Tiny uDFN package size:
  - 8-lead: 1.70mm x 1.35mm
  - 12-lead: 2.50mm x 1.35mm
  - 16-lead: 3.30mm x 1.35mm
- RoHS-compliant, Lead-free packaging

### Applications

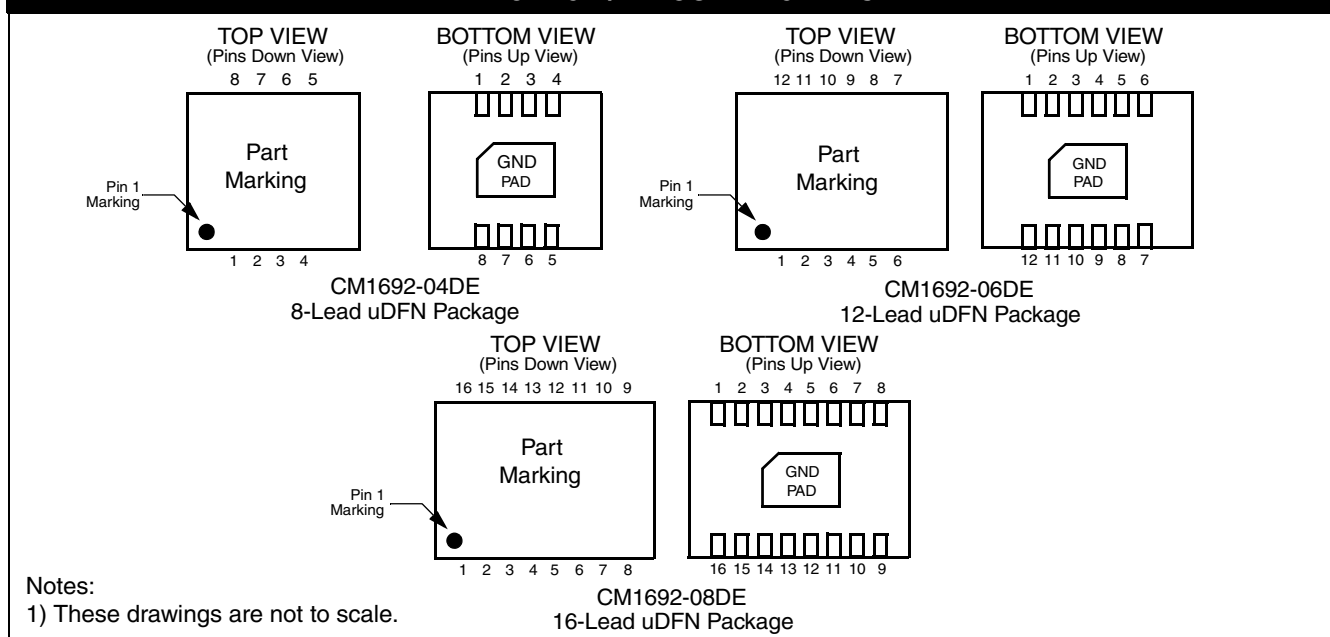
- LCD and camera data lines in mobile handsets
- Wireless handsets
- LCD and camera modules

### Electrical Schematic



\* See Package/Pinout Diagrams for expanded pin information.

**1 of 4, 6 or 8 EMI/RFI Filter Channels  
with Integrated ESD Protection**

**PACKAGE / PINOUT DIAGRAMS**

**PIN DESCRIPTIONS**

DEVICE PIN(s)			NAME	DESCRIPTION	DEVICE PIN(s)			NAME	DESCRIPTION
-04	-06	-08			-04	-06	-08		
1	1	1	FILTER1	Filter + ESD Channel 1	8	12	16	FILTER1	Filter + ESD Channel 1
2	2	2	FILTER2	Filter + ESD Channel 2	7	11	15	FILTER2	Filter + ESD Channel 2
3	3	3	FILTER3	Filter + ESD Channel 3	6	10	14	FILTER3	Filter + ESD Channel 3
4	4	4	FILTER4	Filter + ESD Channel 4	5	9	13	FILTER4	Filter + ESD Channel 4
	5	5	FILTER5	Filter + ESD Channel 5		8	12	FILTER5	Filter + ESD Channel 5
	6	6	FILTER6	Filter + ESD Channel 6		7	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					

**Ordering Information**
**PART NUMBERING INFORMATION**

Pins	Package	Lead-free Finish	
		Ordering Part Number <sup>1</sup>	Part Marking
8	uDFN-8	CM1692-04DE	P92
12	uDFN-12	CM1692-06DE	P926
16	uDFN-16	CM1692-08DE	P928

Note 1: Parts are shipped in Tape &amp; Reel form unless otherwise specified.

## Specifications

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNITS
Storage Temperature Range	-65 to +150	°C
Current per Inductor	30	mA
DC Package Power Rating	500	mW

### STANDARD OPERATING CONDITIONS

PARAMETER	RATING	UNITS
Operating Temperature Range	-40 to +85	°C

### ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
L	Channel Inductance			17		nH
C <sub>TOTAL</sub>	Total Channel Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	18.8	23.5	28.2	pF
C	Capacitance C1	At 2.5VDC Reverse Bias, 1MHz, 30mVAC		11.8		pF
V <sub>DIODE</sub>	Standoff Voltage	I <sub>DIODE</sub> = 10μA		6.0		V
I <sub>LEAK</sub>	Diode Leakage Current (reverse bias)	V <sub>DIODE</sub> = +3.3V		0.1	1.0	μA
V <sub>SIG</sub>	Signal Clamp Voltage Positive Clamp Negative Clamp	Note 3 I <sub>LOAD</sub> = 10mA I <sub>LOAD</sub> = -10mA	5.6 -1.5	6.8 -0.8	9 -0.4	V V
V <sub>ESD</sub>	In-system ESD Withstand Voltage: Contact Discharge per IEC 61000-4-2 standard, Level 4	Notes 2, 3 and 4	±15			kV
R <sub>DYN</sub>	Dynamic Resistance Positive Negative	Note 4		2.3 0.9		Ω Ω
f <sub>C</sub>	Roll-off Frequency at -6dB Attenuation Z <sub>SOURCE</sub> = 50Ω, Z <sub>LOAD</sub> = 50Ω	Note 4		400		MHz

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

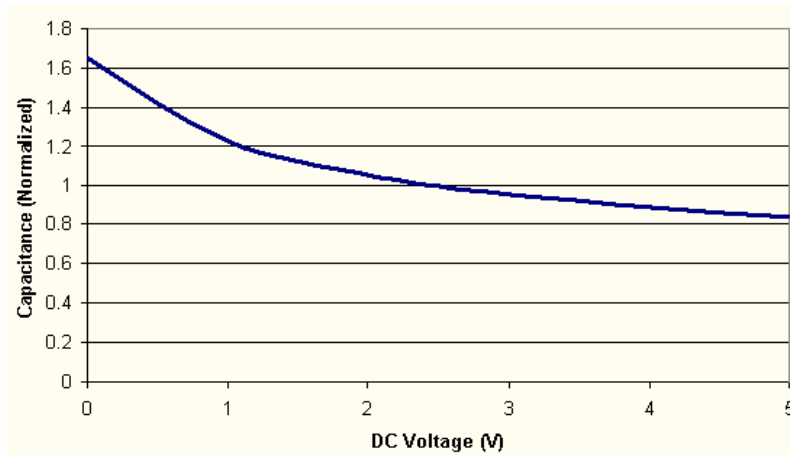
Note 2: ESD applied to input and output pins with respect to GND, one at a time.

Note 3: Clamping voltage is measured at the opposite side of the EMI filter to the ESD pin (i.e. if ESD is applied to pin A1 then clamping voltage is measured at pin C1). Unused pins are left open.

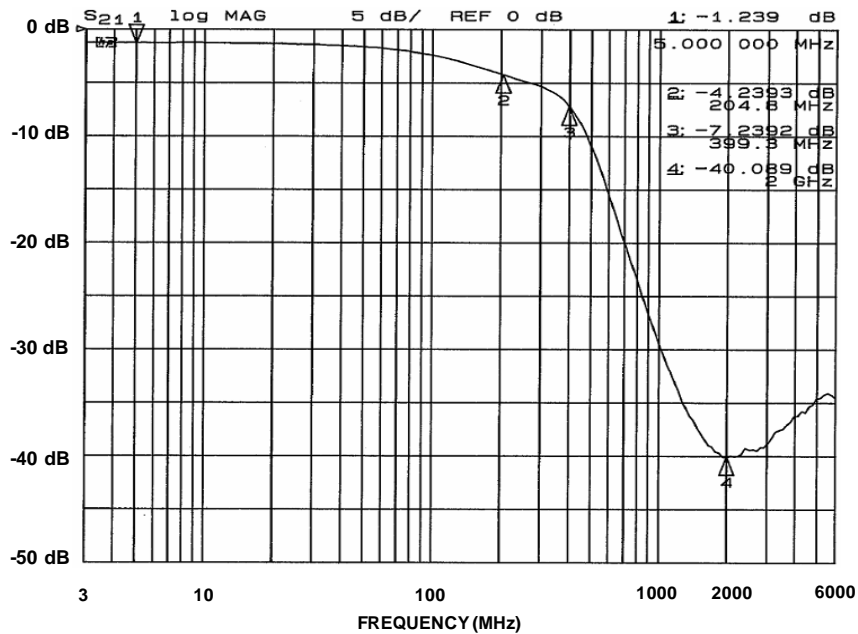
Note 4: These parameters are guaranteed by design and characterization.

**Performance Information**

**Typical Diode Capacitance vs. Input Voltage**



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



**Figure 2. Typical Performance Curve**

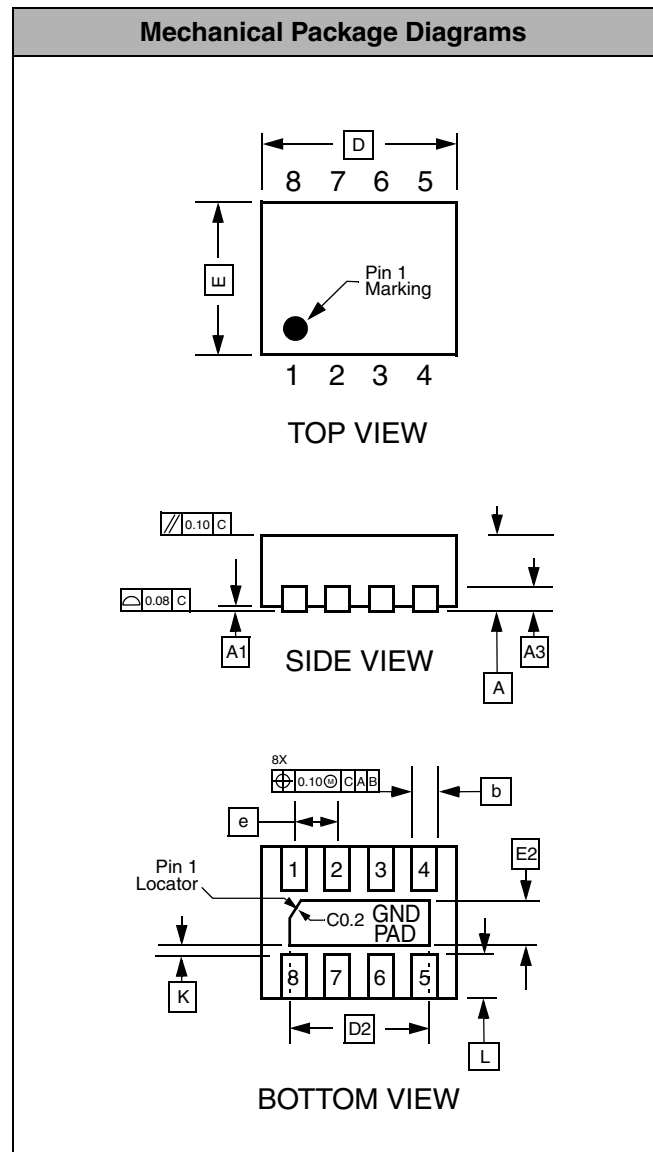
## Mechanical Details

### uDFN-08 Mechanical Specifications

Dimensions for the CM1692 supplied in an 8-lead, 0.4mm pitch uDFN package are presented below.

PACKAGE DIMENSIONS						
Package	uDFN					
JEDEC No.	MO-229C*					
Leads	8					
Dim.	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.60	1.70	1.80	0.063	0.067	0.071
D2	1.10	1.20	1.30	0.043	0.047	0.051
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000					
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.



**Dimensions for 8-Lead, 0.4mm pitch uDFN package**

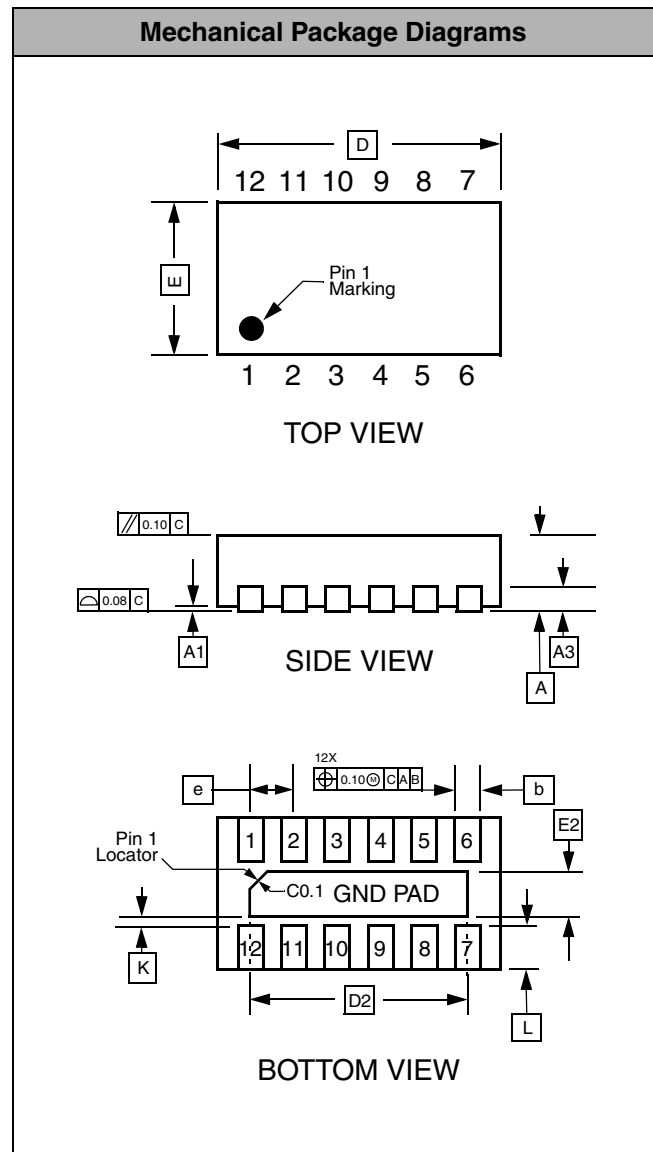
## Mechanical Details (cont'd)

### uDFN-12 Mechanical Specifications

Dimensions for the CM1692 supplied in a 12-lead, 0.4mm pitch uDFN package are presented below.

PACKAGE DIMENSIONS						
Package	uDFN					
JEDEC No.	MO-229C*					
Leads	12					
Dim.	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	2.40	2.50	2.60	0.094	0.098	0.102
D2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000					
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.



**Dimensions for 12-Lead, 0.4mm pitch uDFN package**

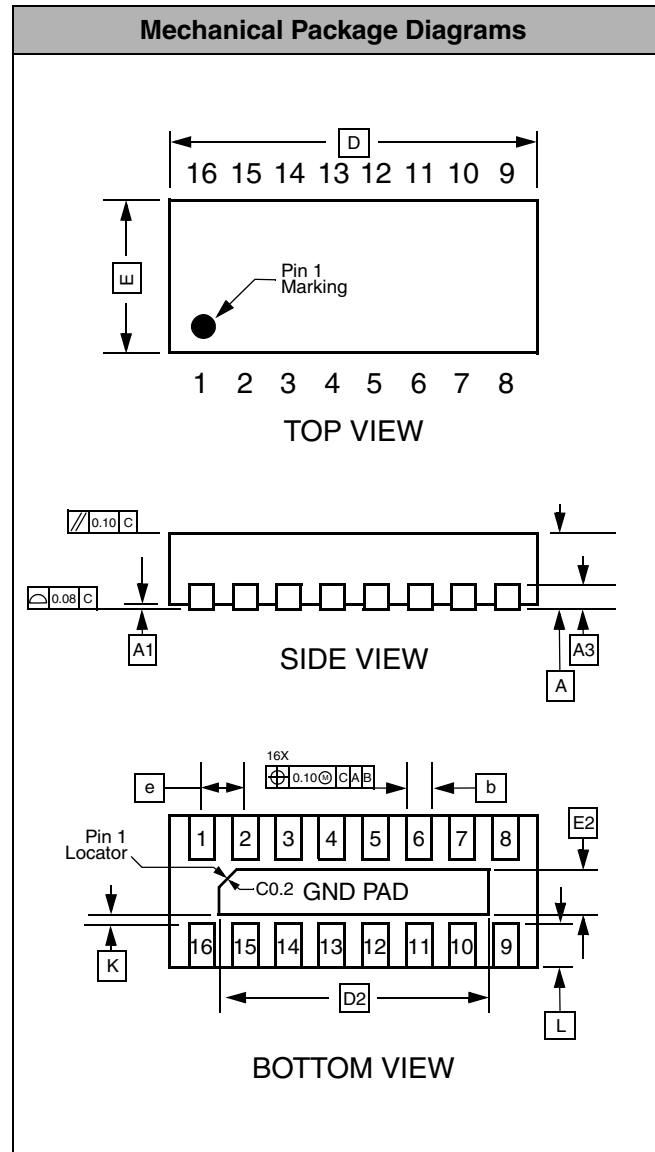
## Mechanical Details (cont'd)

### uDFN-16 Mechanical Specifications

Dimensions for the CM1692 supplied in a 16-lead, 0.4mm pitch uDFN package are presented below.

PACKAGE DIMENSIONS						
Package	uDFN					
JEDEC No.	MO-229C*					
Leads	16					
Dim.	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	3.20	3.30	3.40	0.126	0.130	0.134
D2	2.70	2.80	2.90	0.106	0.110	0.114
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000					
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.



**Dimensions for 16-Lead, 0.4mm pitch uDFN package**