CM1690

Praetorian® L-C LCD and Camera EMI Filter Array with ESD Protection

Product Description

The CM1690 is a family of pi−style EMI filter arrays with ESD protection, which integrates four, six and eight filters (C−L−C) in small form factor µDFN 0.40 mm pitch packages. Each EMI filter channel of the CM1690 is implemented as a 3−pole L−C filter where the component values are 16 pF – 12 nH – 16 pF. The CM1690’s roll−off frequency at –6 dB attenuation is 330 MHz and can be used in applications where the data rates are as high as 140 Mbps while providing greater than −35 dB attenuation over the 1.0 GHz to 3.0 GHz frequency range. The parts include ESD 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 protection diodes connected to the filter ports are designed and characterized to safely dissipate ESD strikes of ±15 kV, beyond the maximum requirement of the IEC61000−4−2 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 ±30 kV.

This device is particularly well suited for wireless handsets, mobile LCD modules and PDAs because of its small package format and easy−to−use pin assignments. In particular, the CM1690 is ideal for EMI filtering and protecting data and control lines for the LCD display and camera interface in mobile handsets.

The CM1690 is available in space saving, ultra low profile 8−, 12−, and 16−lead 0.40 mm µDFN packages with lead−free finishing.

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
- ±15 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Greater than −35 dB Attenuation (Typical) at 1 GHz
- 0.50 mm Thick µDFN Package with 0.40 mm Lead Pitch:
  - 4−ch. = 8−lead µDFN
  - 6−ch. = 12−lead µDFN
  - 8−ch. = 16−lead µDFN
- Tiny µDFN Package Size:
  - 8−lead: 1.70 mm x 1.35 mm
  - 12−lead: 2.50 mm x 1.35 mm
  - 16−lead: 3.30 mm x 1.35 mm
- These Devices are Pb−Free and are RoHS Compliant

Applications

- LCD and Camera Data Lines in Mobile Handsets
- Wireless Handsets
- LCD and Camera Modules

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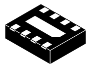
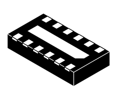
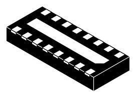


UDFN8
DE SUFFIX
CASE 517BC

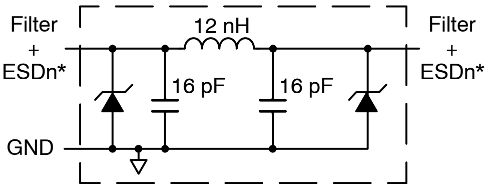


UDFN12
DE SUFFIX
CASE 517BD



UDFN16
DE SUFFIX
CASE 517BE

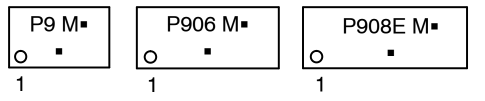
ELECTRICAL SCHEMATIC



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

* See Package/Pinout Diagrams for expanded pin information.

MARKING DIAGRAM



P9 = CM1690−04DE
P906 = CM1690−06DE
P908E = CM1690−08DE
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

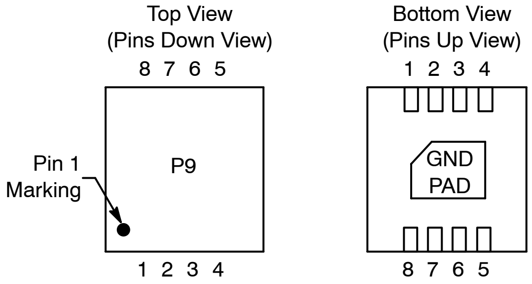
Device	Package	Shipping†
CM1690−04DE	µDFN−8 (Pb−Free)	3000/Tape & Reel
CM1690−06DE	µDFN−12 (Pb−Free)	3000/Tape & Reel
CM1690−08DE	µDFN−16 (Pb−Free)	3000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

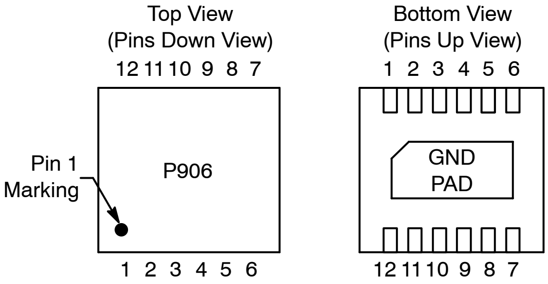
April, 2011 − Rev. 3

Publication Order Number:
CM1690/D

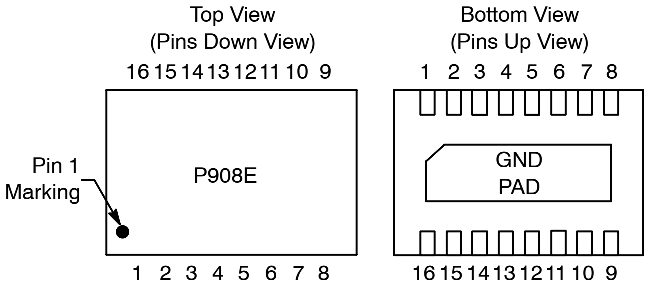
PACKAGE / PINOUT DIAGRAMS



CM1690−04DE
8 Lead µDFN Package



CM1690−06DE
12 Lead µDFN Package



CM1690−08DE
16 Lead µDFN Package

Table 1. 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	–	–	–	–	

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Storage Temperature Range	−65 to +150	°C
Current per Inductor	30	mA
DC Package Power Rating	500	mW

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. STANDARD OPERATING CONDITIONS

Parameter	Rating	Units
Operating Temperature Range	−40 to +85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
L	Channel Inductance			12		nH
C_{TOTAL}	Total Channel Capacitance	At 2.5 V DC Reverse Bias, 1 MHz, 30 mV AC	25	33	40	pF
C	Capacitance C1	At 2.5 V DC Reverse Bias, 1 MHz, 30 mV AC		16.5		pF
V_{DIODE}	Stand−off Voltage	I_{DIODE} = 10 μA		6.0		V
I_{LEAK}	Diode Leakage Current (Reverse Bias)	V_{DIODE} = 3.3 V		0.1	0.3	μA
V_{SIG}	Signal Clamp Voltage					V
	Positive Clamp	I_{LOAD} = 10 mA	5.6	6.8	9.0	
	Negative Clamp	I_{LOAD} = −10 mA (Note 3)	−1.5	−0.8	−0.4	
V_{ESD}	In−system ESD Withstand Voltage	(Notes 2 and 4)				kV
	a) Human Body Model, MIL−STD−883, Method 3015		±30			
	b) Contact Discharge per IEC 61000−4−2 Level 4		±15			
R_{DYN}	Dynamic Resistance					Ω
	Positive			2.3		
	Negative			0.9		
f_C	Roll−off Frequency at −6 dB Attenuation Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω			330		MHz
$R_{INSULATION}$	Insulation Resistance	V_{DIODE} = 3.3 V (Note 4)	10			MΩ
$R_{CHANNEL}$	Channel Resistance			8		Ω

1. T_A = 25°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.
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).
4. Unused pins are left open.

PERFORMANCE INFORMATION

Typical Diode Capacitance vs. Input Voltage

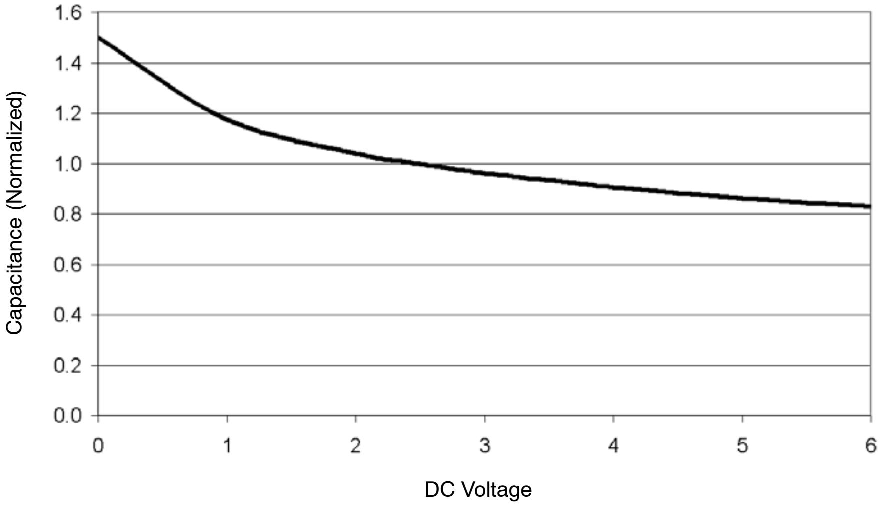


Figure 1. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5 V DC and 25°C)

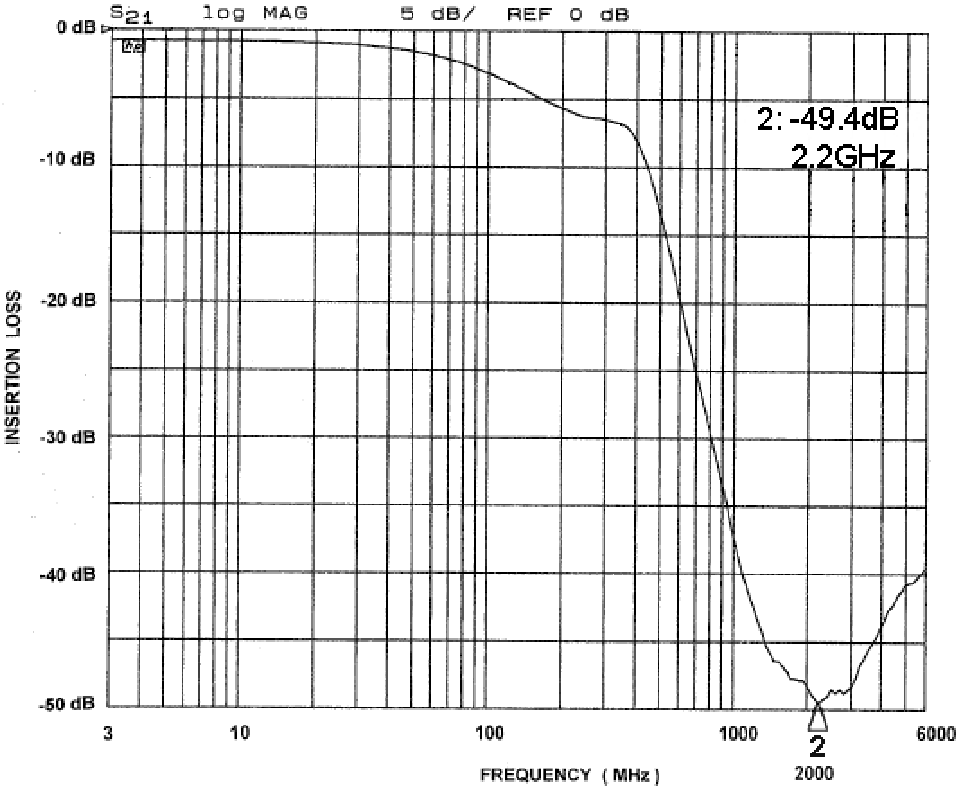


Figure 2. Typical Performance Curve

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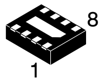
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

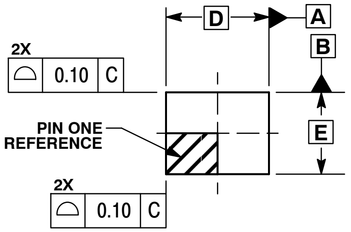
ON Semiconductor®



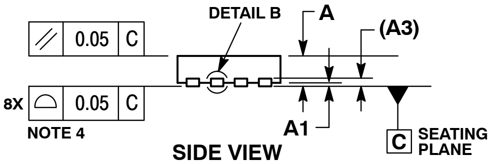
SCALE 4:1

UDFN8, 1.7x1.35, 0.4P
CASE 517BC−01
ISSUE O

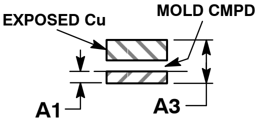
DATE 17 NOV 2009



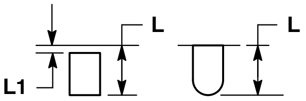
TOP VIEW



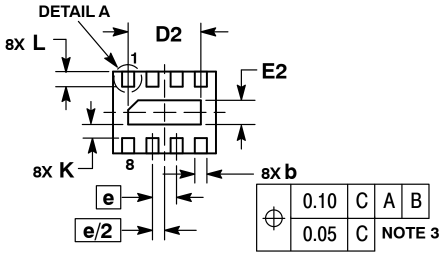
SIDE VIEW



DETAIL B
ALTERNATE CONSTRUCTIONS



DETAIL A
ALTERNATE TERMINAL CONSTRUCTIONS

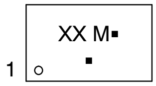


BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.70 BSC	
D2	1.10	1.30
E	1.35 BSC	
E2	0.30	0.50
e	0.40 BSC	
K	0.15	---
L	0.20	0.30
L1	---	0.05

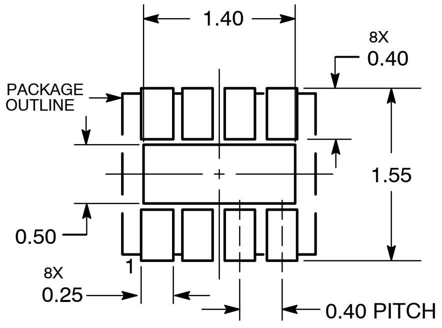
GENERIC MARKING DIAGRAM*



XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G”, may or not be present.

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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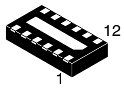
DESCRIPTION:	**8 PIN UDFN, 1.7X1.35, 0.4P**	**PAGE 1 OF 1**

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

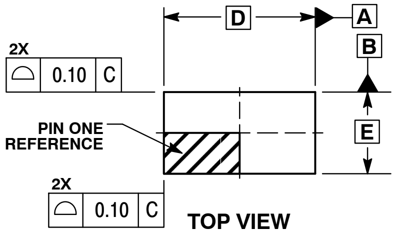
ON Semiconductor®



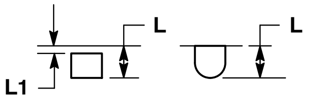
SCALE 4:1

UDFN12, 2.5x1.35, 0.4P
CASE 517BD−01
ISSUE O

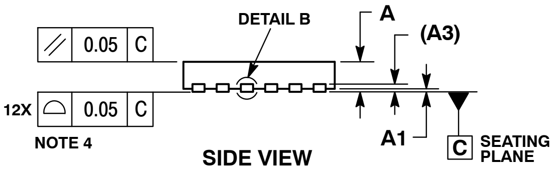
DATE 18 NOV 2009



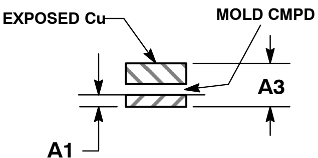
TOP VIEW



DETAIL A
OPTIONAL CONSTRUCTIONS



SIDE VIEW



DETAIL B
OPTIONAL CONSTRUCTION

NOTES:
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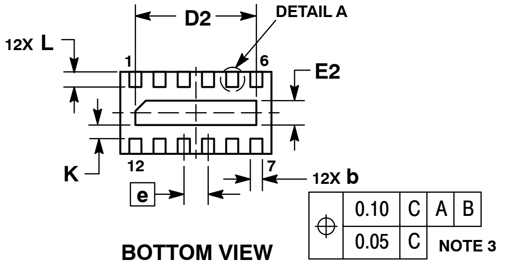
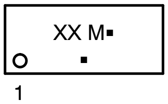
	MILLIMETERS	
DIM	**MIN**	**MAX**
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	2.50 BSC	
D2	1.90	2.10
E	1.35 BSC	
E2	0.30	0.50
e	0.40 BSC	
K	0.15	---
L	0.20	0.30
L1	---	0.05



BOTTOM VIEW

GENERIC MARKING DIAGRAM*



XX = Specific Device Code
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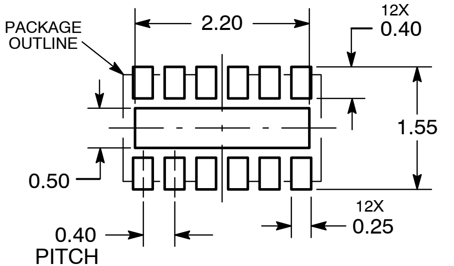
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking.
Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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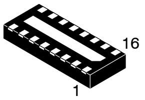
DESCRIPTION:	**UDFN12, 2.5X1.35, 0.4P**	**PAGE 1 OF 1**

UDFN16, 3.3x1.35, 0.4P
CASE 517BE−01
ISSUE O

DATE 18 NOV 2009



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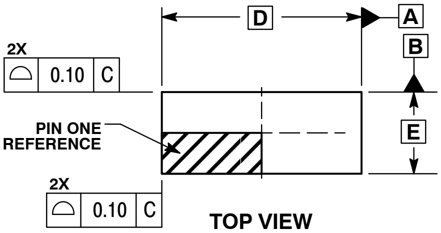
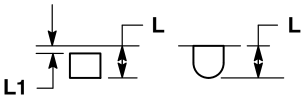


TOP VIEW



DETAIL A
OPTIONAL CONSTRUCTIONS

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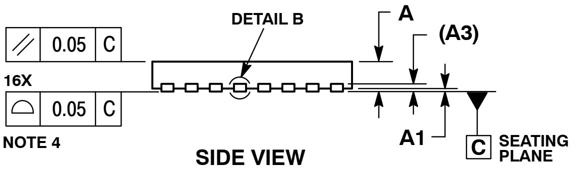
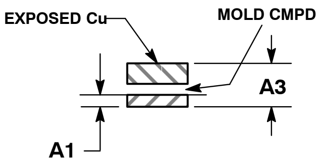
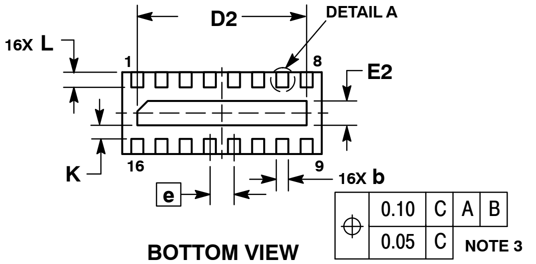


SIDE VIEW

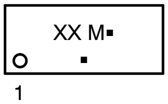


DETAIL B
OPTIONAL CONSTRUCTION



BOTTOM VIEW

GENERIC MARKING DIAGRAM*



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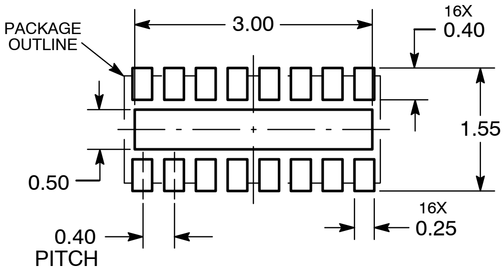
RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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