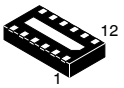
CM1693-06DE

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

ON Semiconductor®

http://onsemi.com



uDFN12
DE SUFFIX
CASE 517BD

Product Description

The CM1693-06DE is a pi-style EMI filter array with ESD protection that integrates six filters (C-L-C) into a small-form factor, uDFN 0.40 mm pitch package. Each EMI filter channel is implemented as a 3-pole L-C filter, where the component values are 10 pF - 26 nH - 12 pF. The CM1693-06DE's roll-off frequency at -6 dB attenuation is 300 MHz and can be used in applications where the data rates are as high as 140 Mbps.

The CM1693-06DE also provides greater than -30 dB attenuation over the 800 MHz to 6 GHz frequency range. The device includes ESD diodes on every pin which provides a very high level of protection for sensitive electronic components against possible electrostatic discharge (ESD). The ESD protection diodes connected to the filter ports are designed and characterized to safely dissipate ESD strikes of ±18 kV, which is beyond the maximum requirement of the IEC61000-4-2 international standard.

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 CM1693-06DE is ideal for EMI filtering and protecting data and control lines for the LCD display and camera interface in mobile handsets.

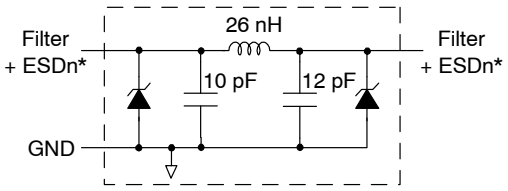
Features

- Six Channels of EMI Filtering with Integrated ESD Protection
- Pi−Style EMI Filters in a Capacitor−Inductor−Capacitor (C−L−C) Network
- ±18 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- Greater than −35 dB Attenuation (Typical) at 1 GHz
- uDFN Lead-free Package with 0.40 mm Lead Pitch:
  - 6-ch. = 12-lead uDFN
- uDFN Lead-free Package with 0.40 mm Lead Pitch:
  - 12-lead: 2.50 mm x 1.35 mm
- Increased robustness against vertical impacts during manufacturing process
- These Devices are Pb−Free and are RoHS Compliant

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 Computer
- Wireless Handsets
- Handheld PCs/PDAs
- LCD and Camera Modules

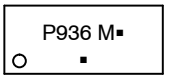
BLOCK DIAGRAM



6 EMI/RFI Filter Channels
with Integrated ESD protection

(* See Package/Pinout Diagram for expanded pin information)

MARKING DIAGRAM



XXXX = Specific Device Code
M = Month Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

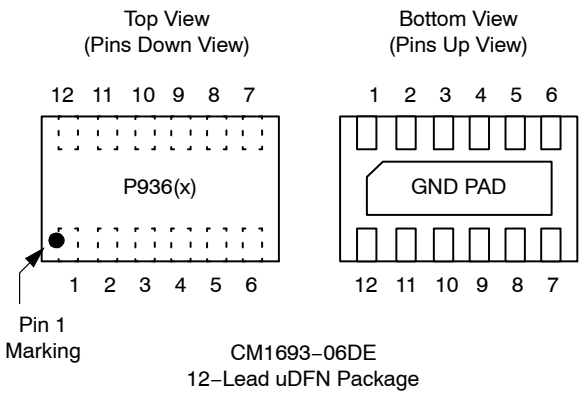
Device	Package	Shipping†
CM1693−06DE	uDFN−12 (Pb−Free)	3000/Tape & Reel

†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.

Table 1. PIN DESCRIPTIONS

Device Pins	Name	Description
1; 12	FILTER1	Filter + ESD Channel 1
2; 11	FILTER2	Filter + ESD Channel 2
3; 10	FILTER3	Filter + ESD Channel 3
4; 9	FILTER4	Filter + ESD Channel 4
5; 8	FILTER3	Filter + ESD Channel 3
6; 7	FILTER4	Filter + ESD Channel 4
GND PAD	GND	Device Ground

PACKAGE / PINOUT DIAGRAMS



CM1693−06DE
12−Lead uDFN Package

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Storage Temperature Range	−65 to +150	°C
DC 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			26		nH
C_{TOTAL}	Total Channel Capacitance	At 2.5 VDC Reverse Bias, 1 MHz, 30 mVAC	17.6	22	26.4	pF
V_{DIODE}	Standoff Voltage	I_{DIODE} = 10 μA	5.5			V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE} = +3.3 V		0.1	1.0	μA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10 mA I_{LOAD} = −10 mA	 5.6 −1.5	 6.8 −0.8	 9 −0.4	V
V_{ESD}	In−system ESD Withstand Voltage Contact Discharge per IEC 61000−4−2 Level 4	(Notes 2, 3 and 4)	 ±18			kV
R_{DYN}	Dynamic Resistance Positive Negative			 2.3 0.9		Ω
f_C	Roll−off Frequency at −6 dB Attenuation Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω			300		MHz

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). Unused pins are left open.
4. These parameters are guaranteed by design and characterization.

PERFORMANCE INFORMATION

Typical Filter Performance (T_A = 25°C, DC Bias = 0 V, 50 Ohm Environment)

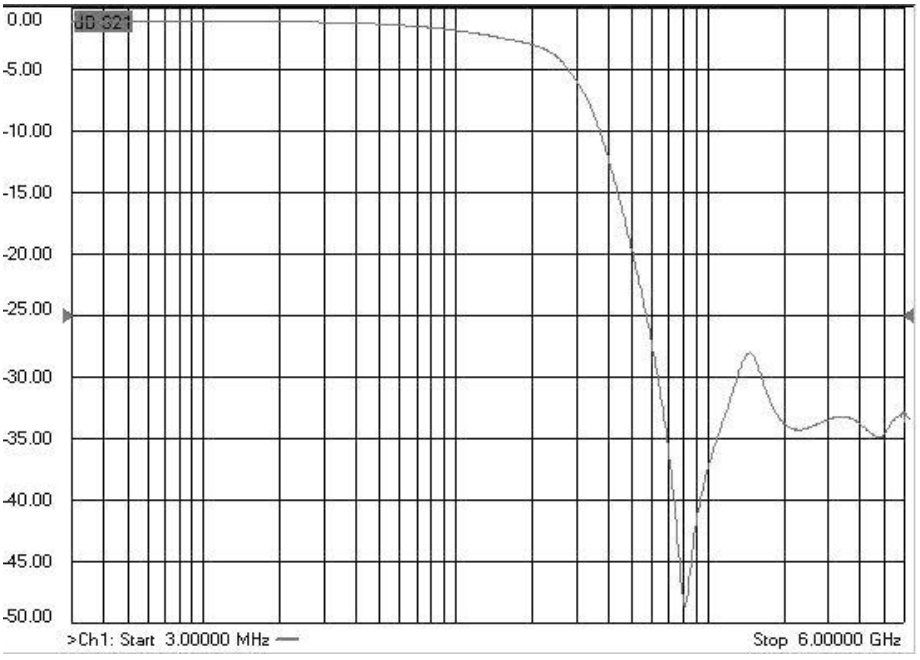


Figure 1. Typical Insertion Loss

Typical Diode Capacitance vs. Input Voltage

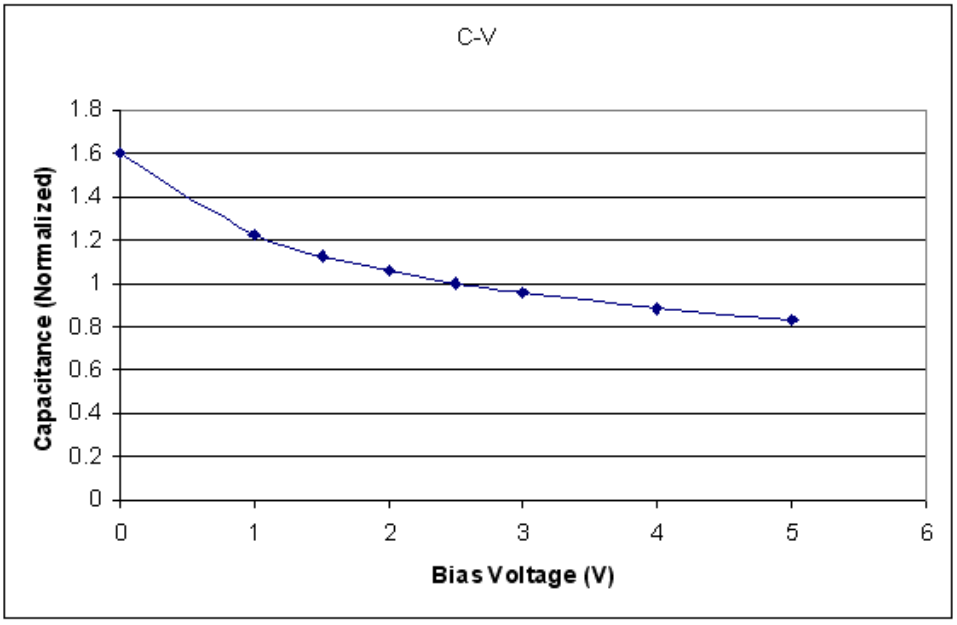
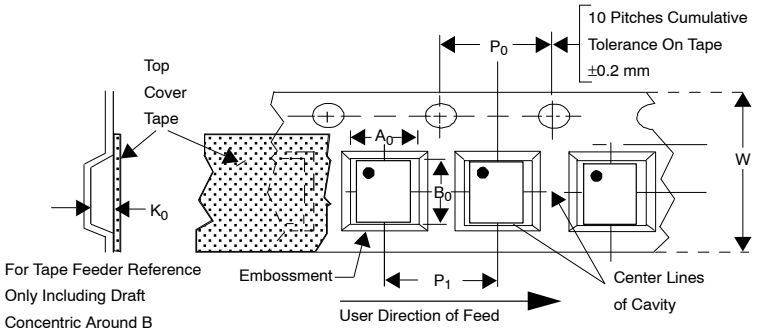


Figure 2. Filter Capacitance vs. Input Voltage (Normalized to Capacitance at 0 VDC and 25°C)

MECHANICAL DETAILS

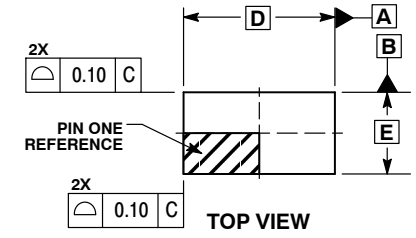
Table 5. TAPE AND REEL SPECIFICATIONS

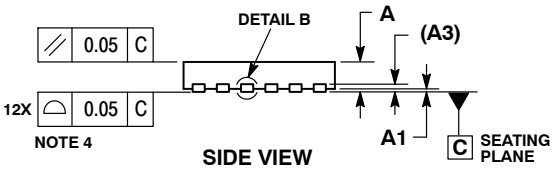
Part Number	Package Size (mm)	Pocket Size (mm) B_0 x A_0 x K_0	Tape Width W	Reel Diameter	Qty per Reel	P_0	P_1
CM1693−06DE	2.50 x 1.35 x 0.50	2.75 x 1.60 x 0.60	8 mm	178 mm (7″)	3000	4 mm	4 mm

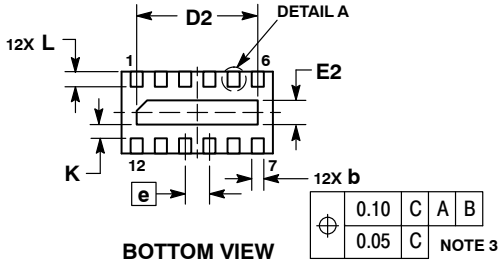


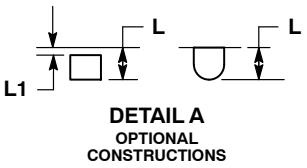
PACKAGE DIMENSIONS

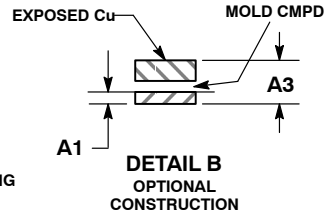
UDFN12, 2.5x1.35, 0.4P
CASE 517BD−01
ISSUE O







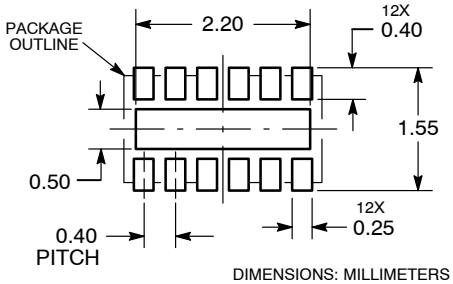




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	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

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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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