



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

CM1693-06DE

Features

- Six channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-inductor-capacitor (C-L-C) network
- $\pm 18\text{kV}$ ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- Greater than -35dB attenuation (typical) at 1GHz
- uDFN lead-free package with 0.40mm lead pitch:
 - 6-ch. = 12-lead uDFN
- uDFN lead-free package with 0.40mm lead pitch:
 - 12-lead: 2.50mm x 1.35mm
- Increased robustness against vertical impacts during manufacturing process
- RoHS-compliant, 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 computer
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

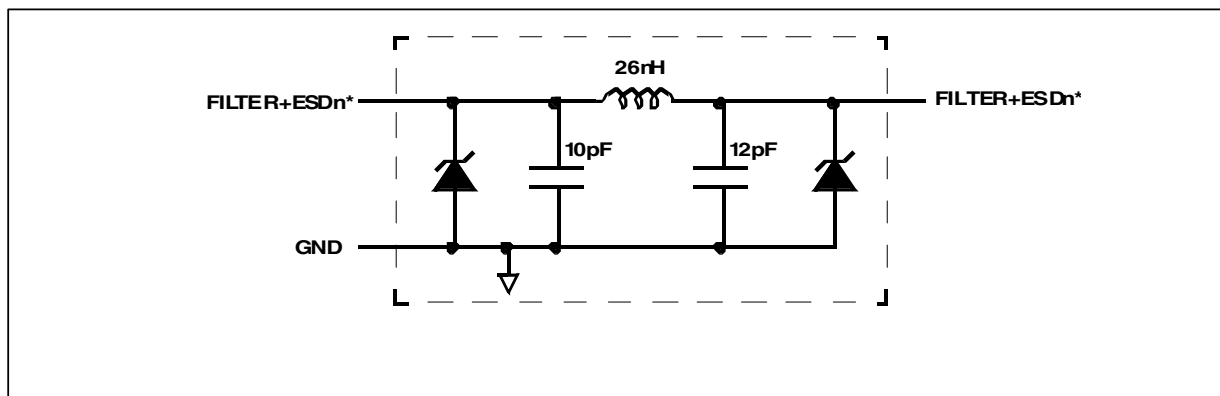
Functional Description

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 0.40mm pitch package. Each EMI filter channel is implemented as a 3-pole L-C filter, where the component values are 10pF-26nH-12pF. The CM1693-06DE's roll-off frequency at -6dB attenuation is 300MHz and can be used in applications where the data rates are as high as 140Mbps.

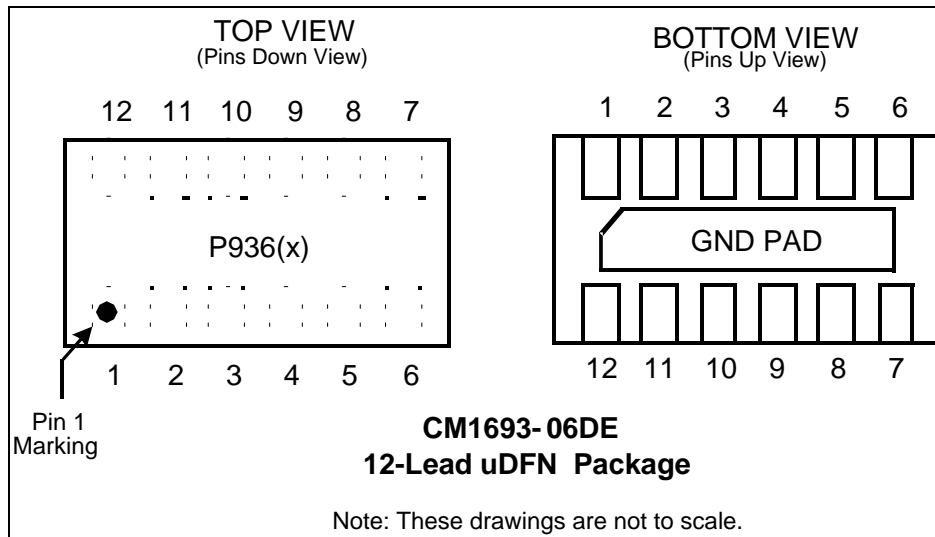
The CM1693-06DE also provides greater than -30dB attenuation over the 800MHz to 6GHz frequency range. The device includes ESD diodes on every pin which provides a very high level of protection for sensitive electronic components against possible electrostatic discharge (ESD). The ESD protection diodes connected to the filter ports are designed and characterized to safely dissipate ESD strikes of $\pm 18\text{kV}$, 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.

Block Diagram



Pin Configurations



Pin Descriptions

DEVICE PIN(s)	NAME	DESCRIPTON	DEVICE PIN(s)	NAME	DESCRIPTON
1	FILTER1	Filter + ESD Channel 1	12	FILTER1	Filter + ESD Channel 1
2	FILTER2	Filter + ESD Channel 2	11	FILTER2	Filter + ESD Channel 2
3	FILTER3	Filter + ESD Channel 3	10	FILTER3	Filter + ESD Channel 3
4	FILTER4	Filter + ESD Channel 4	9	FILTER4	Filter + ESD Channel 4
5	FILTER5	Filter + ESD Channel 5	8	FILTER5	Filter + ESD Channel 5
6	FILTER6	Filter + ESD Channel 6	7	FILTER6	Filter + ESD Channel 6
GND PAD	GND	Device Ground			

Ordering Information

Pins	Package	Ordering Part Number ¹	Part Marking
12	uDFN-12	CM1693-06DE	P936(x) ²

Note 1: Parts are shipped in Tape and Reel form unless otherwise specified.

Note 2: (x) = date code

CM1693-06DE

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

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
L	Channel Inductance			26		nH
C _{TOTAL}	Total Channel Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	17.6	22	26.4	pF
V _{DIODE}	Standoff Voltage	I _{DIODE} = 10μA	5.5			V
I _{LEAK}	Diode Leakage Current (reverse bias)	V _{DIODE} = +3.3V		0.1	1.0	μA
V _{SIG}	Signal Clamp 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 Contact Discharge per IEC 61000-4-2 Level 4	Notes 2 and 3	±18			kV
R _{DYN}	Dynamic Resistance Positive Negative			2.3 0.9		Ω Ω
f _R	Roll-off Frequency at -6dB Attenuation Z _{SOURCE} = 50Ω, Z _{LOAD} = 50Ω			300		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: 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.

Performance Information

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

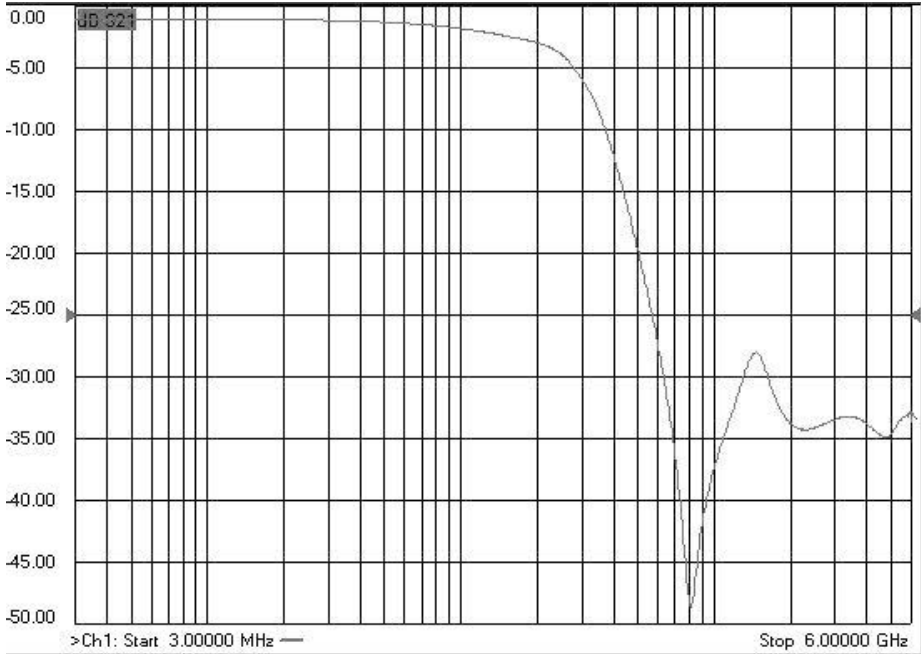


Figure 1. Typical Insertion Loss

Typical Diode Capacitance vs. Input Voltage

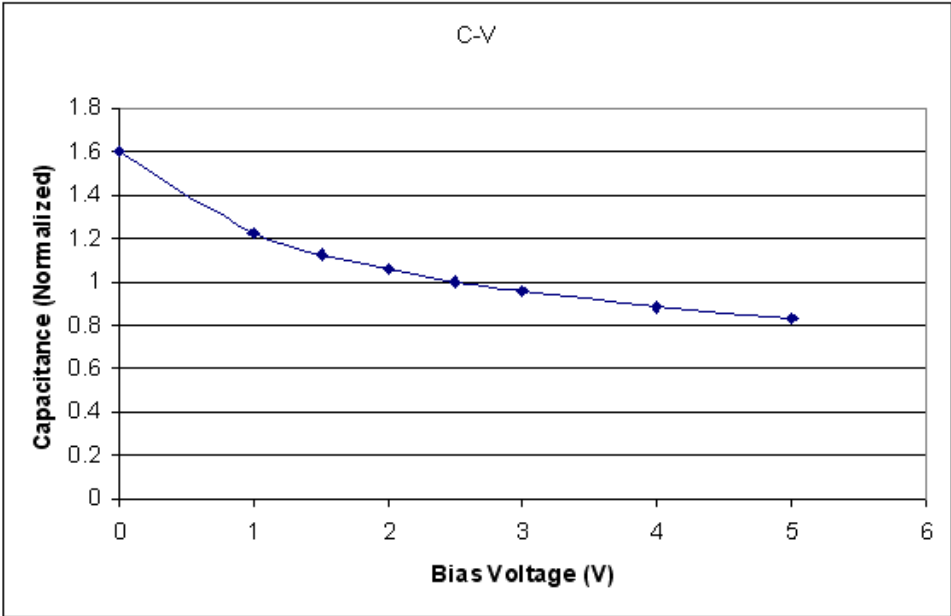


Figure 2. Filter Capacitance vs. Input Voltage (normalized to capacitance at 0VDC and 25°C)

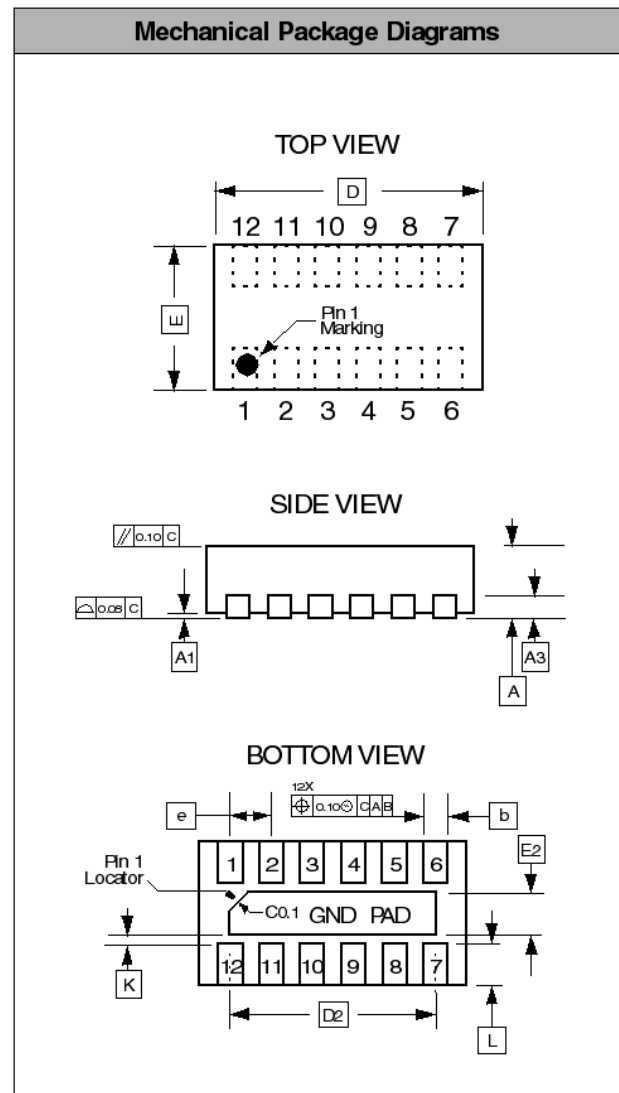
CM1693-06DE

Package Dimensions

The 12-lead, 0.4mm pitch uDFN package dimensions are presented below.

Package	TDFN					
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	0.22 REF			0.009 REF		
L	0.15	0.30	0.35	0.006	0.010	0.014
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

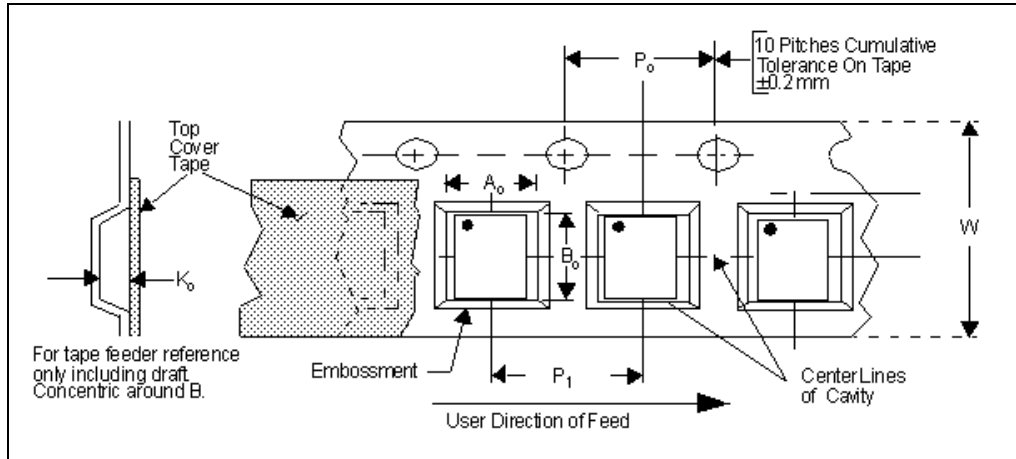
*This package is compliant with JEDEC standard MO-229C with the exception of the D, D2, E, E2, K and L dimensions as called out in the table above.




Dimensions for 12-Lead, 0.4mm pitch uDFN package

Tape and Reel Specifications

PART NUMBER	PACKAGE SIZE (mm)	POCKET SIZE (mm) $B_0 \times A_0 \times K_0$	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	8mm	178mm (7")	3000	4mm	4mm



ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855
Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative