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6-Channel LCD and Camera EMI Filter Array with ESD Protection

CM1499-E6DE

Features

- Six channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- ±15kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±30kV ESD protection on each channel (HBM)
- Greater than -35dB attenuation (typical) at 1GHz
- 12-lead DFN package with 0.50mm lead pitch
- Tiny 3.0mm x 1.35mm DFN package size
- 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 computers.
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

Product Description

The CM1499-E6DE is a 6-channel pi-style EMI filter array with ESD protection that integrates six filters (C-R-C) into a small form factor 0.50mm pitch, DFN package. The CM1499-E6DE has component values of 15pF-100Ω-15pF per channel. The CM1499-E6DE provides a cut-off frequency of 110MHz and can be used in applications with data rates of up to 44Mbps. The parts include ESD diodes on every pin that provide a very high level of protection for sensitive electronic components against possible electrostatic discharge (ESD). The ESD protection diodes safely dissipate ESD strikes of ±15kV, which well beyond the maximum requirement of the IEC61000-4-2 international standard. In accordance with MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the pins are protected for contact discharges at greater than ±30kV.

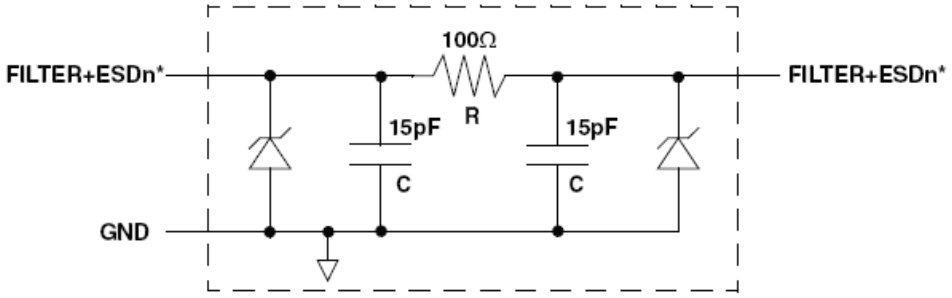
These devices are particularly well-suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of their small package and easy-to-use pin assignments. In particular, the CM1499-E6DE is ideal for EMI filtering and protecting data and control lines for the I/O data ports, LCD display and camera interface in mobile handsets.

The CM1499-E6DE is housed in a space-saving, low-profile 12-lead DFN package with a 0.50mm pitch with RoHS compliant lead-free finishing.

May 2010 – Rev. 2

Publication Order Number:
CM1499-E6DE/D

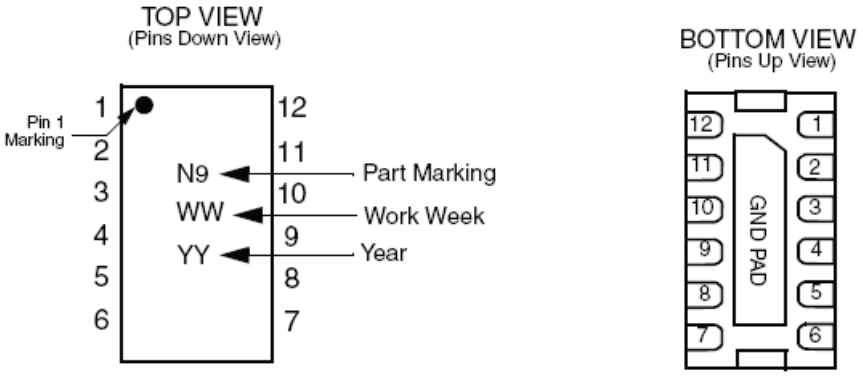
Electrical Schematic



1 of 6 EMI/RFI + ESD Channels

* See Package/Pinout Diagram for expanded pin information.

PACKAGE / PINOUT DIAGRAMS



CM1499-E6DE
12 Lead DFN Package

Note:
1) These drawings are not to scale.

PIN DESCRIPTIONS

PINS	NAME	DESCRIPTION		PINS	NAME	DESCRIPTION
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

PART NUMBERING INFORMATION			
		Lead-free Finish	
Pins	Package	Ordering Part Number[1]	Part Marking
12	DFN-12	CM1499 -E6DE	N9

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 NOTE1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
R	Resistance		85	100	115	Ω
C_{TOTAL}	Total Channel Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	24	30	36	pF
C	Capacitance C_1	At 2.5VDC Reverse Bias, 1MHz, 30mVAC		15		pF
V_{DIODE}	Standoff Voltage	I_{DIODE}=1mA	6.0	7.0	8.0	V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE} = +3.0V		0.1	1.0	mA
V_{ESD}	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	 ±30 ±15			 kV kV
R_{DYN}	Dynamic Resistance Positive Negative			 2.3 0.9		 W W
f_C	Cut-off Frequency Z_{SOURCE}=50Ω, Z_{LOAD}=50Ω	Channel R = 100Ω, Channel C = 15pF		 110		 MHz
A_{1GHz}	Absolute Attenuation @ 1GHz from 0dB Level	Z_{SOURCE} = 50Ω, Z_{LOAD} = 50Ω, DC Bias = 0V; Notes 1 and 3		35		dB
$A_{800MHz - 6GHz}$	Absolute Attenuation @ 800MHz to 6GHz from 0dB Level	Z_{SOURCE} = 50Ω, Z_{LOAD} = 50Ω, DC Bias = 0V; Notes 1 and 3		30		dB

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: Attenuation / RF curves characterized by a network analyzer using microprobes.

Performance Information

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

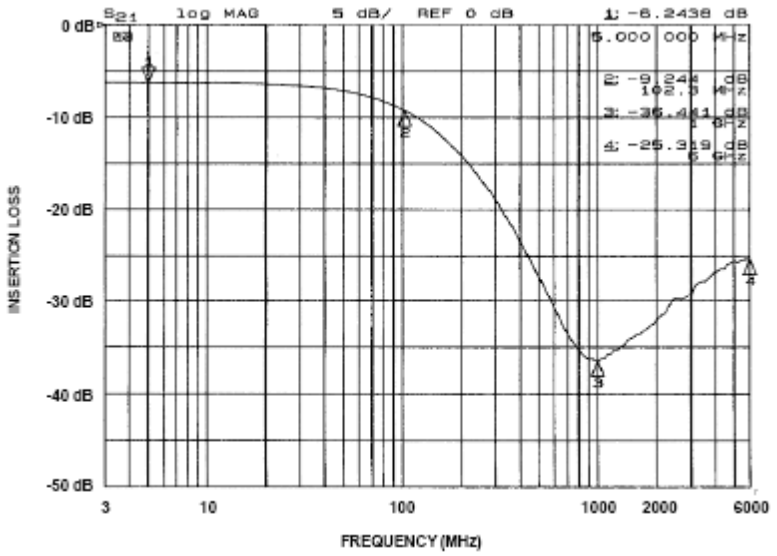


Figure 1. Insertion Loss vs. Frequency (Filter 1 Input to GND)

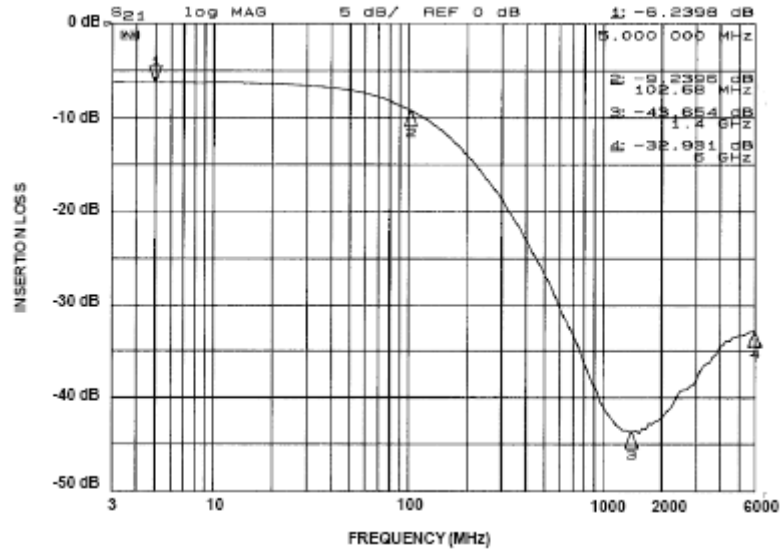


Figure 2. Insertion Loss vs. Frequency (Filter 2 Input to GND)

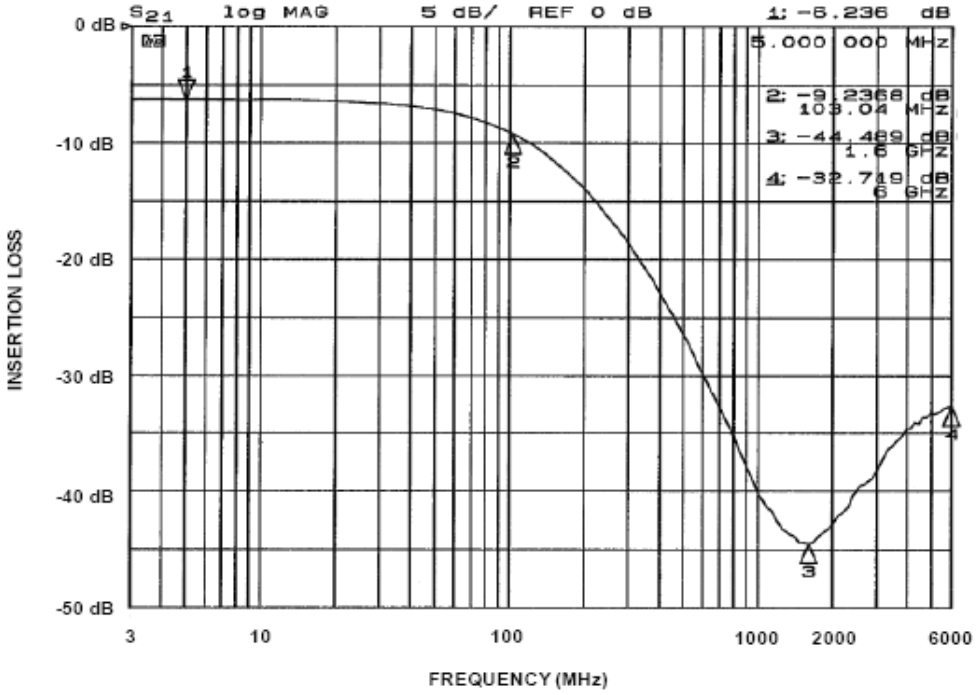


Figure 3. Insertion Loss vs. Frequency (Filter 3 Input to GND)

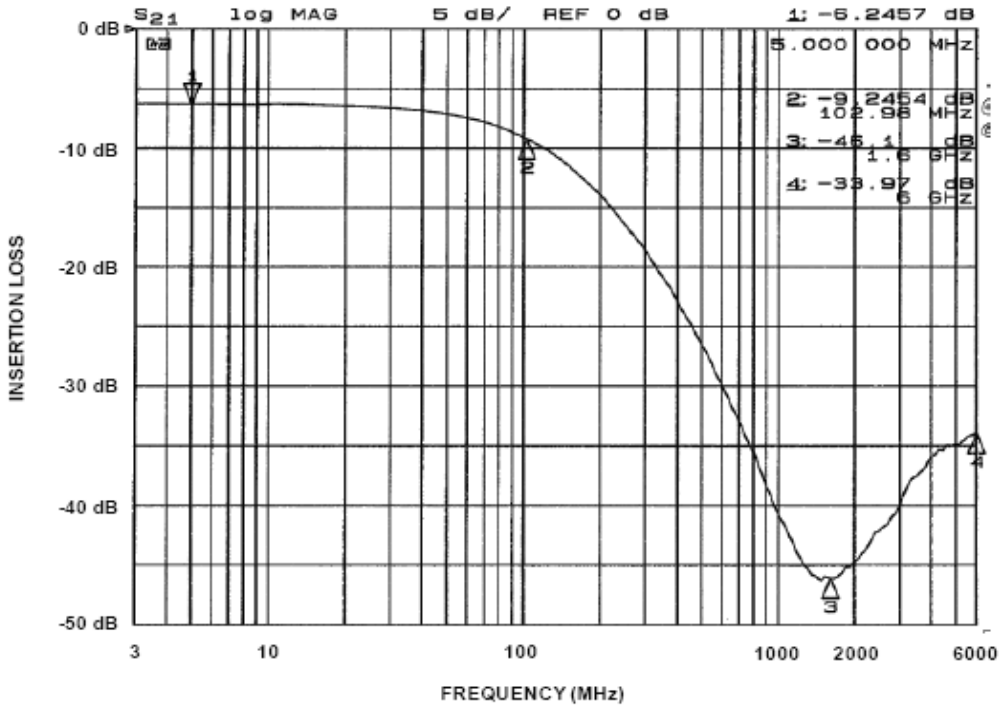


Figure 4. Insertion Loss vs. Frequency (Filter 4 Input to GND)

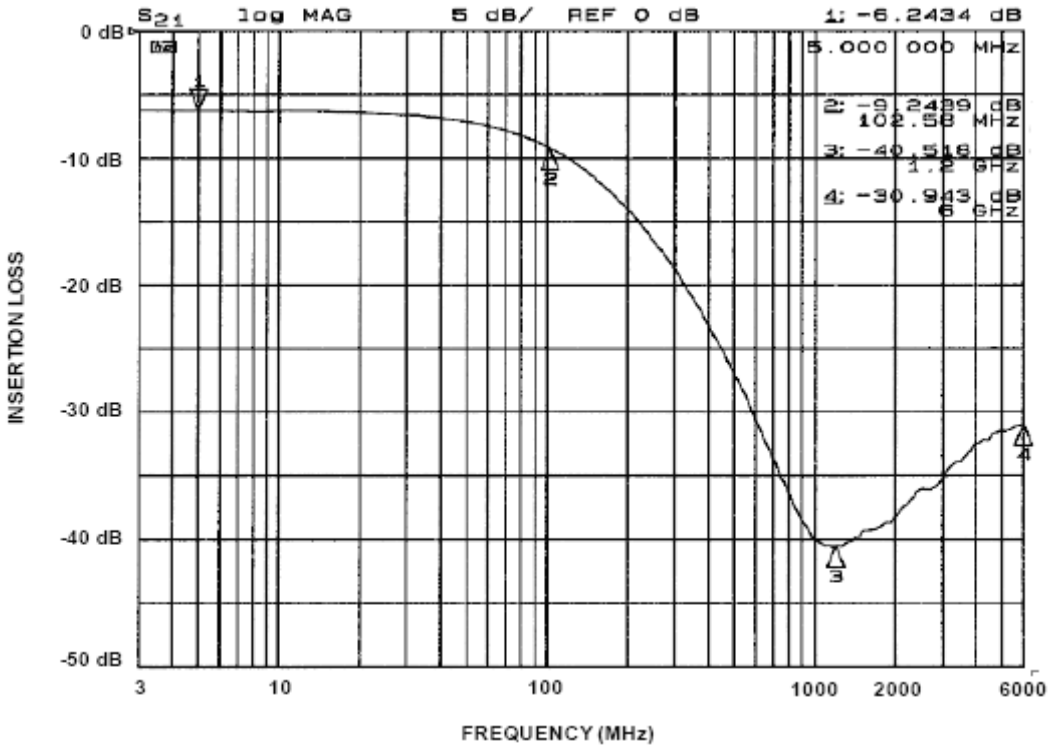


Figure 5. Insertion Loss vs. Frequency (Filter 5 Input to GND)

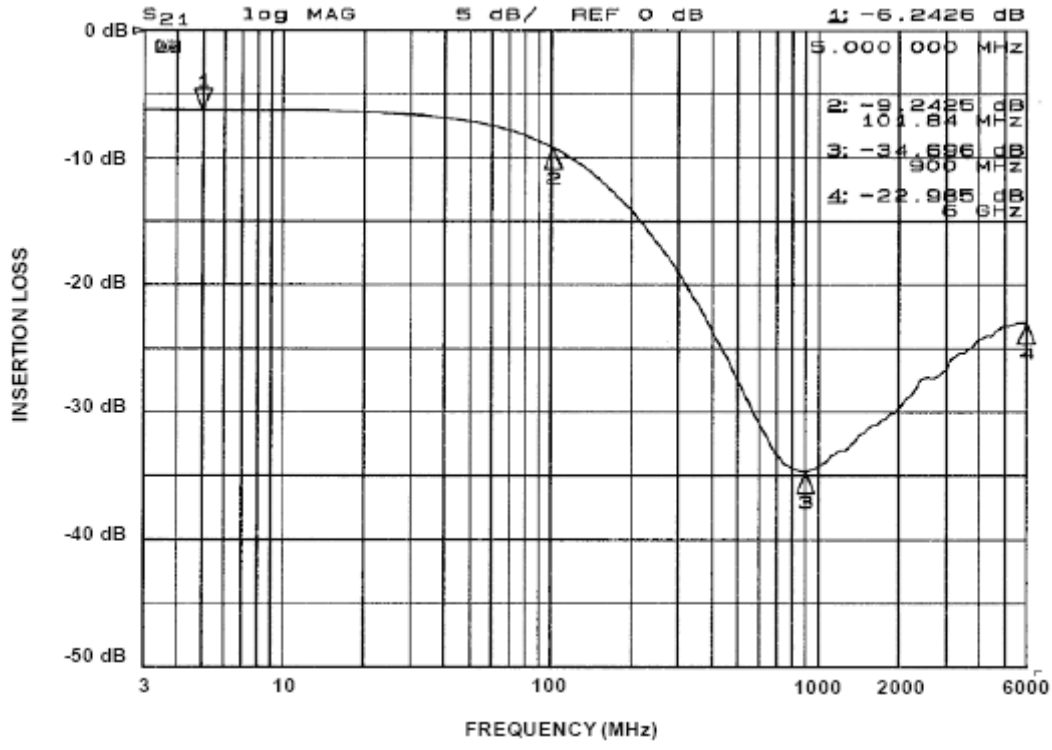


Figure 6. Insertion Loss vs. Frequency (Filter 6 Input to GND)

Performance Information (cont'd)

Typical Diode Capacitance vs. Input Voltage

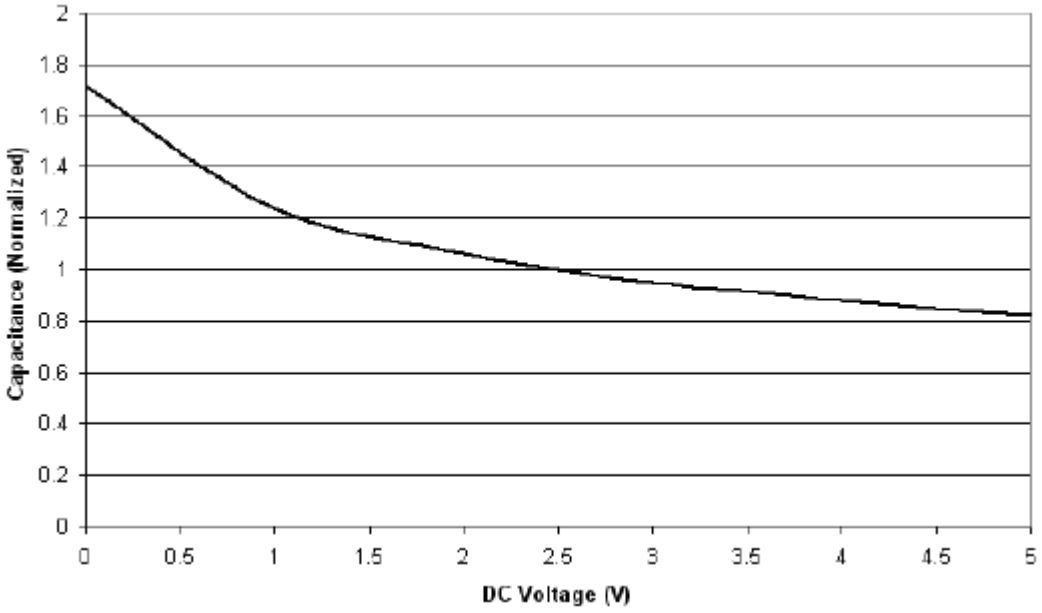


Figure 7. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5VDC and 25°C)

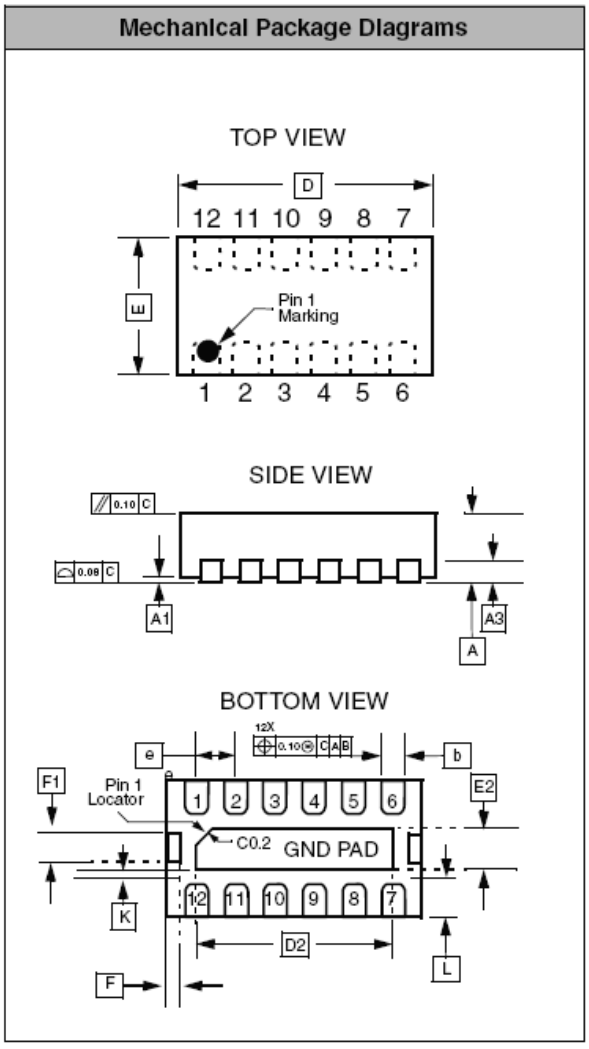
Mechanical Details

DFN-12 EEP Mechanical Specifications, 0.5mm

The 12-lead, 0.5mm pitch DFN package dimensions with Exposed End Pads (EEP) are presented below.

PACKAGE DIMENSIONS						
Package	DFN					
JEDEC No.	MO-229C*					
Leads	12					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.80	0.90	1.00	0.031	0.035	0.039
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.20 REF			0.008 REF		
b	0.20	0.25	0.30	0.008	0.010	0.012
D	2.90	3.00	3.10	0.114	0.118	0.122
D2	2.10	2.20	2.30	0.083	0.087	0.091
E	1.30	1.35	1.40	0.051	0.053	0.055
E2	0.25	0.30	0.35	0.010	0.012	0.014
e	0.50 BSC			0.020 BSC		
F	0.20 REF			0.008 REF		
F1	0.25 REF			0.010 REF		
K	0.28 REF			0.011 REF		
L	0.20	0.25	0.30	0.008	0.010	0.012
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

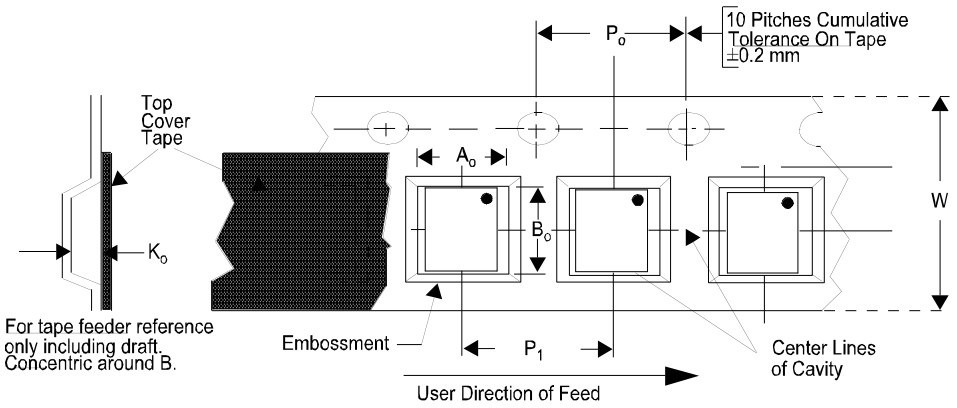
*This package is compliant with JEDEC standard MO-229C with the exception of the D, D2, E, E2, K and L dimensions as called out in the table above.



Dimensions for 12-Lead, 0.5mm pitch DFN package with Exposed End Pads (EEP)

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
CM1499 -E6DE	1.35 X 3.00 X 0.90	1.60 X 3.35 X 1.10	8mm	178mm (7")	3000	4mm	4mm



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