ON Semiconductor®

LCD and Camera EMI Filter Array with ESD Protection

CM1452

Features

- Four, six and eight channels of EMI filtering with integrated ESD protection
- ±15kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±30kV ESD protection on each channel (HBM)
- Greater than 30dB attenuation (typical) at 1 GHz
- Chip Scale Package (CSP) with 0.40mm pitch and 0.25mm CSP solder ball which features extremely low parasitic inductance for optimum filter and ESD performance
- *OptiGuard*™ Coating for improved reliability at assembly
- RoHS-compliant, lead-free finishing

Applications

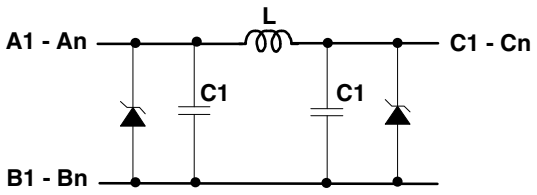
- LCD and Camera data lines in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

Product Description

The CM1452 family of pi-style EMI filter arrays with ESD protection, integrates four, six and eight filters (C-L-C) in CSP form factor with 0.40mm pitch. Each EMI filter channel of the CM1452 is implemented as a 3-pole L-C filter where the component values are 20pF-17nH-20pF. The CM1452 roll-off frequency at -6dB attenuation is 330MHz and can be used in applications where the data rates are as high as 132Mbps and provide greater than 30dB over the 800MHz to 2.7GHz frequency range. The ESD diodes on every I/O pin provide a very high level of ESD protection for sensitive electronic components. The ESD protection diodes connected to the filter ports are designed and characterized to safely dissipate ESD strikes of ±15kV, 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 ±30kV.

The CM1452 incorporates *OptiGuard*™ which results in improved reliability at assembly. The CM1452 is manufactured with a 0.40mm pitch and 0.25mm CSP solder ball to provide up to 28% board space savings vs. competing CSP devices with 0.50mm pitch and 0.30mm CSP solder ball.

Electrical Schematic



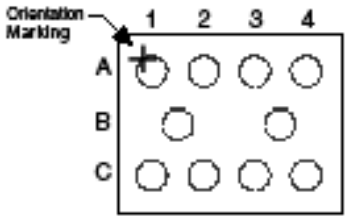
CM1452 schematic diagram of 3-pole L-C filter array with ESD.

April 2010 Rev. 2

Publication Order Number:
CM1452/D

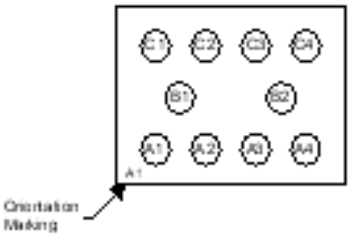
PACKAGE / PINOUT DIAGRAMS

TOP VIEW
(Bumps Down View)

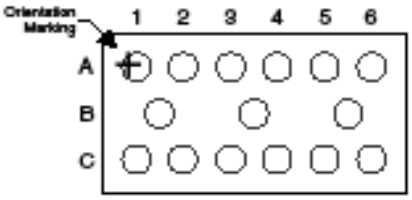


CM1452-04CP
10-bump CSP

BOTTOM VIEW
(Bumps Up View)



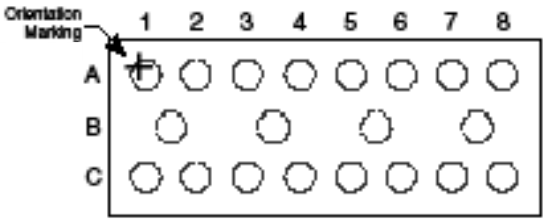
TOP VIEW
(Bumps Down View)



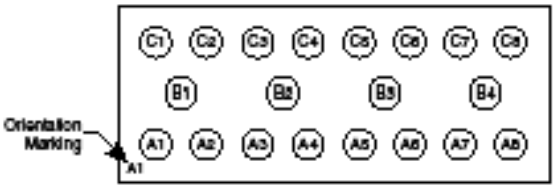
BOTTOM VIEW
(Bumps Up View)

CM1452-06CP
15-bump CSP

TOP VIEW
(Bumps Down View)



BOTTOM VIEW
(Bumps Up View)



CM1452-08CP
20-bump CSP

Notes:
1) These drawings are not to scale.

Pin Descriptions

PIN DESCRIPTIONS							
PIN NUMBER			PIN DESCRIPTION	PIN NUMBER			PIN DESCRIPTION
-04	-06	-08		-04	-06	-08	
A1	A1	A1	Filter #1	C1	C1	C1	Filter #1
A2	A2	A2	Filter #2	C2	C2	C2	Filter #2
A3	A3	A3	Filter #3	C3	C3	C3	Filter #3
A4	A4	A4	Filter #4	C4	C4	C4	Filter #4
	A5	A5	Filter #5		C5	C5	Filter #5
	A6	A6	Filter #6		C6	C6	Filter #6
		A7	Filter #7			C7	Filter #7
		A8	Filter #8			C8	Filter #8
B1	B1	B1	GND				
B2	B2	B2	GND				
	B3	B3	GND				
		B4	GND				

Ordering Information

PART NUMBERING INFORMATION				
# of Channels	Leads	Package	Lead-free Finish	
			Ordering Part Number[1]	Part Marking
4	10	CSP	CM1452-04CP	52
6	15	CSP	CM1452-06CP	L526
8	20	CSP	CM1452-08CP	L528

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

Specifications

ABSOLUTE MAXIMUM RATINGS		
PARAMETER	**RATING**	**UNITS**
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–65 to +150	°C

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_{CHAN}	Channel Inductance			17		nH
C_{TOT}	Total Channel Capacitance at 2.5Vdc; 1MHz, 30mVac	2.5V dc; 1MHz, 30mV ac	24	30	36	pF
C_1	Capacitance C1 at 2.5V dc; 1MHz, 30mV ac	2.5V dc; 1MHz, 30mV ac		15		pF
f_C	Cut-off Frequency, ZSOURCE = 50Ω, ZLOAD = 50Ω			148		MHz
f_R	Roll-off Frequency at -6dB Attenuation, ZSOURCE = 50Ω, ZLOAD = 50Ω			330		MHz
V_{ST}	Stand-off Voltage, I = 10mA		5.5			V
I_{LEAK}	Diode Leakage at 3.3V reverse bias voltage			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*: a) Human Body Model, MIL-STD-883, Method 3015 b) Contact Discharge per IEC 61000-4-2 Level 4	Notes 2 and 3	 ±30 ±15			 kV kV
R_{DYN}	Dynamic Resistance Channel Positive Transients Channel Negative Transients			 2.3 0.9		 Ω Ω
A_L	Current per Inductor:				30	mA
DC	DC Package Power Rating:				30	W

Note 1: All parameters specified at T_A = –40°C to +85°C unless otherwise noted.
Note 2: ESD applied to input/output pins with respect to GND, one at a time. 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).
Note 3: Unused pins are left open.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 50Ω environment)

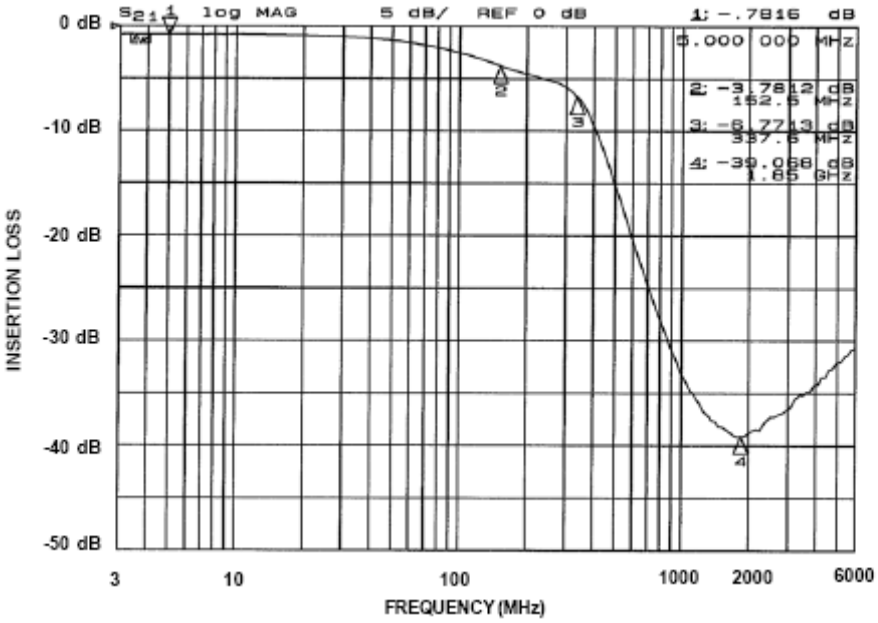


Figure 1. Insertional Loss vs. Frequency (Filter 1: CM1452-04, -06, -08)

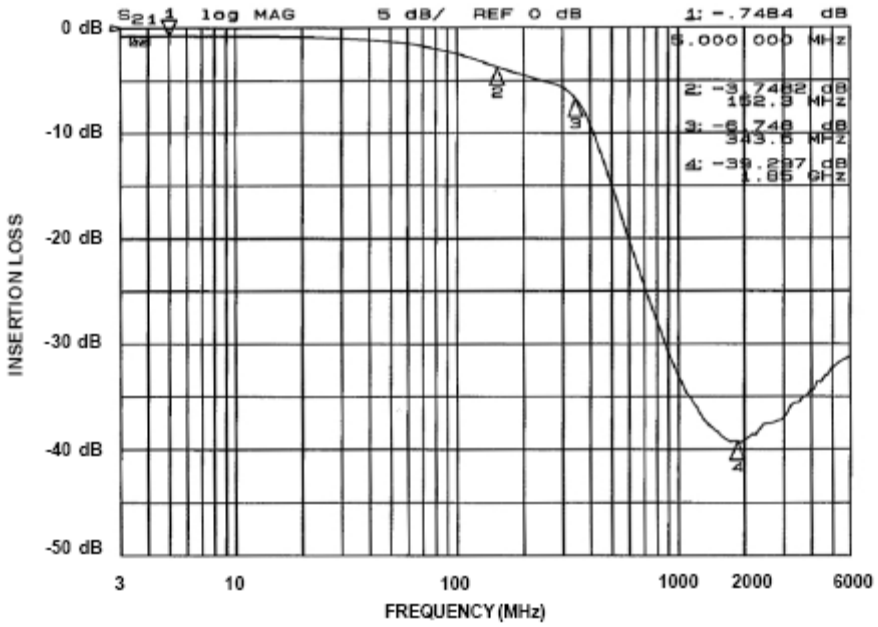


Figure 2. Insertional Loss vs. Frequency (Filter 2: CM1452-04, -06, -08)

Performance Information (Con'td)

Typical Filter Performance (nominal conditions unless specified otherwise, 50Ω environment)

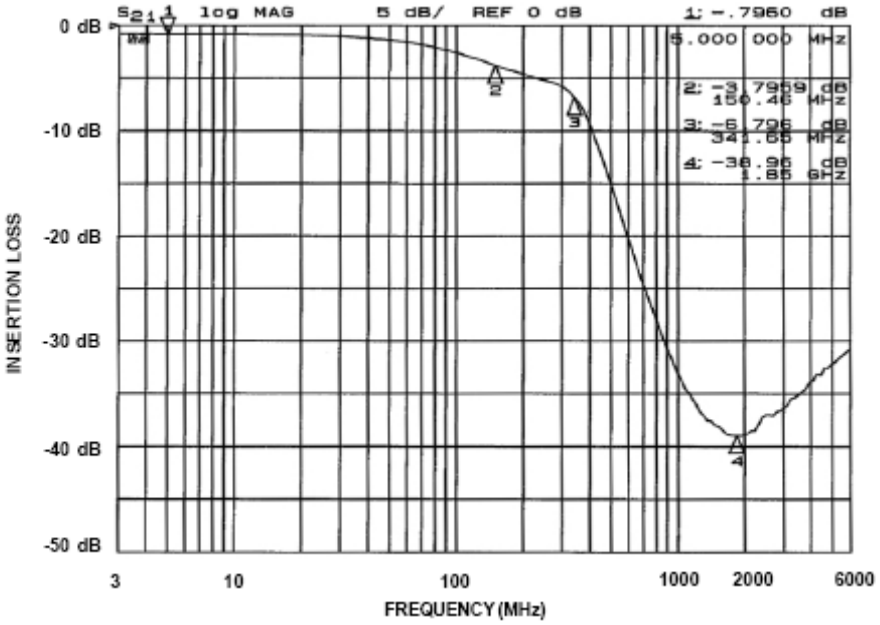


Figure 3. Insertional Loss vs. Frequency (Filter 3: CM1452-04, -06, -08)

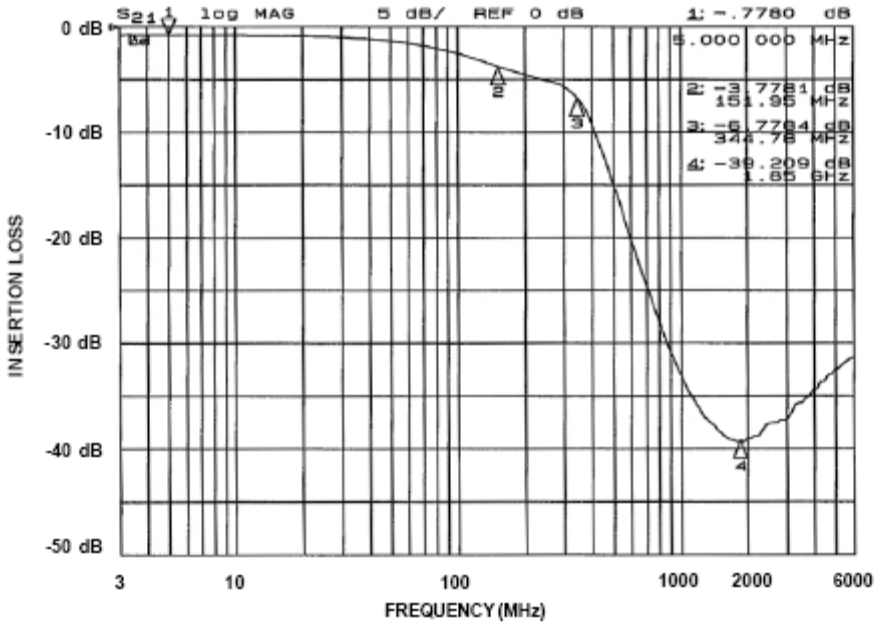


Figure 4. Insertional Loss vs. Frequency (Filter 4: CM1452-04, -06, -08)

Performance Information (Con'td)

Typical Filter Performance (nominal conditions unless specified otherwise, 50Ω environment)

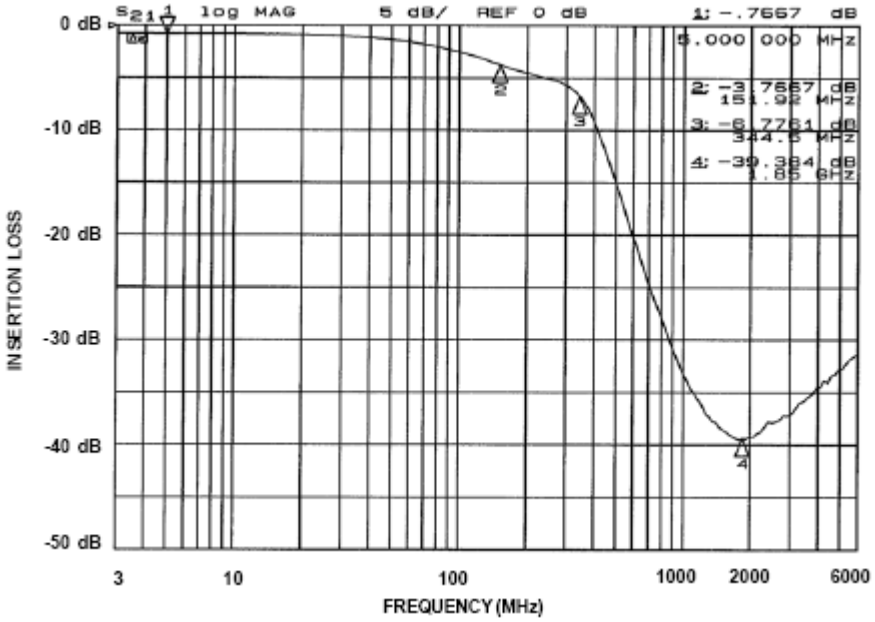


Figure 5. Insertional Loss vs. Frequency (Filter 5: CM1452-06, -08)

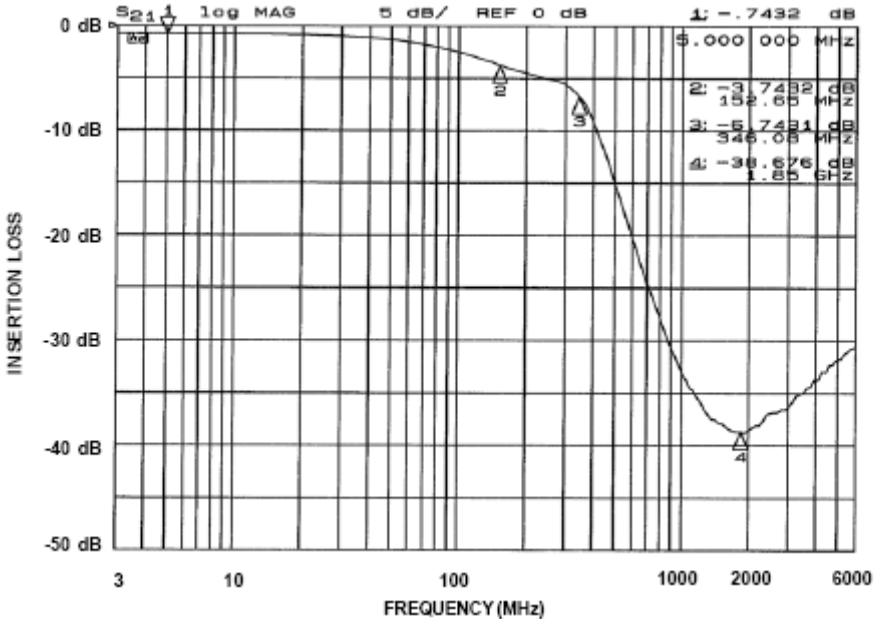


Figure 6. Insertional Loss vs. Frequency (Filter 6: CM1452-06, -08)

Performance Information (Con'td)

Typical Filter Performance (nominal conditions unless specified otherwise, 50Ω environment)

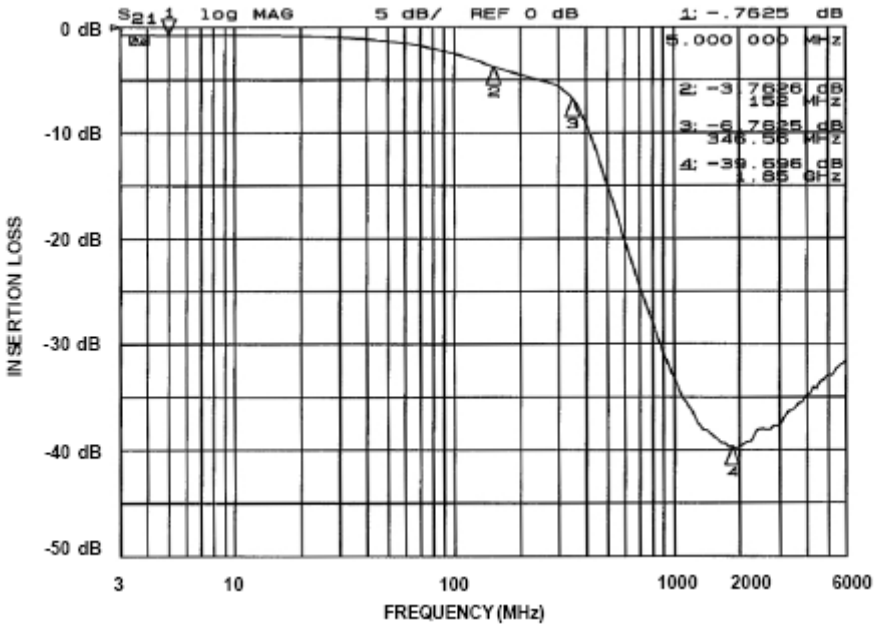


Figure 7. Insertional Loss vs. Frequency (Filter 7: CM1452-08)

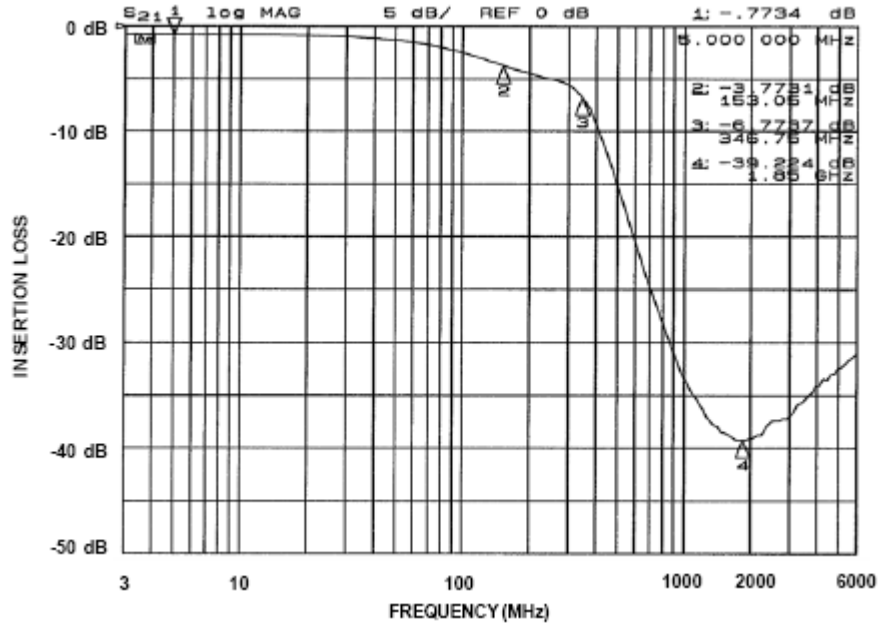


Figure 8. Insertional Loss vs. Frequency (Filter 8: CM1452-08)

Performance Information (Con'td)

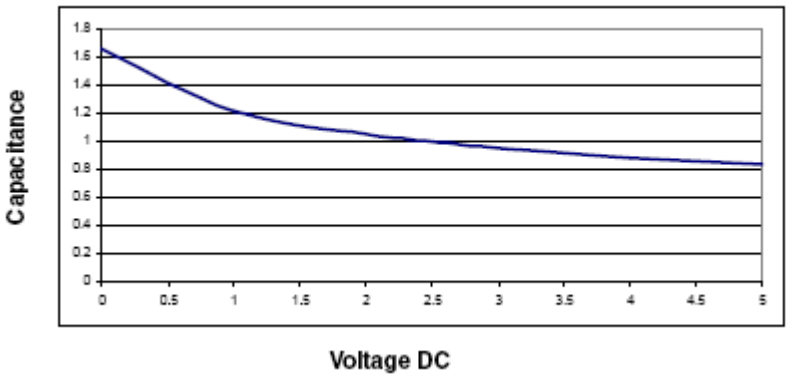


Figure 9. CM1452 Typical Diode Capacitance vs. Input Voltage (Normalized to 2.5Vdc)

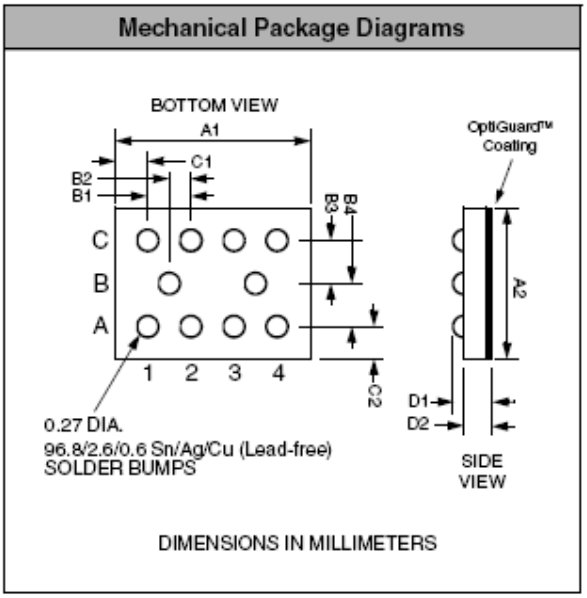
Application Information

Refer to Application Note AP-217, "The Chip Scale Package", for a detailed description of Chip Scale Packages offered by California Micro Devices. See http://www.wlcspforum.org/documents/pdf/ap-217.pdf for download.

Mechanical Specifications

CM1452-04CP devices are packaged in custom Chip Scale Packages (CSP).

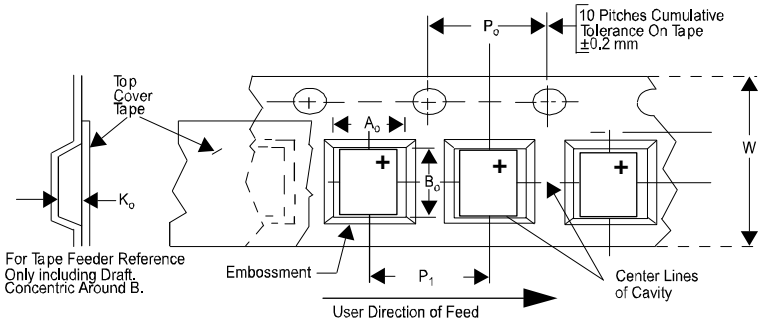
PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	10					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	1.627	1.672	1.717	0.0641	0.0658	0.0676
A2	1.068	1.113	1.158	0.0420	0.0438	0.0456
B1	0.395	0.400	0.405	0.0156	0.0157	0.0159
B2	0.195	0.200	0.205	0.0077	0.0079	0.0081
B3	0.342	0.347	0.352	0.0135	0.0137	0.0139
B4	0.342	0.347	0.352	0.0135	0.0137	0.0139
C1	0.186	0.236	0.286	0.0073	0.0093	0.0113
C2	0.160	0.210	0.260	0.0063	0.0082	0.0102
D1	0.545	0.615	0.685	0.0215	0.0242	0.0270
D2	0.378	0.419	0.460	0.0149	0.0165	0.0181
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						



Package Dimensions for
CM1452-04CP Chip Scale Package

CSP Tape and Reel Specifications

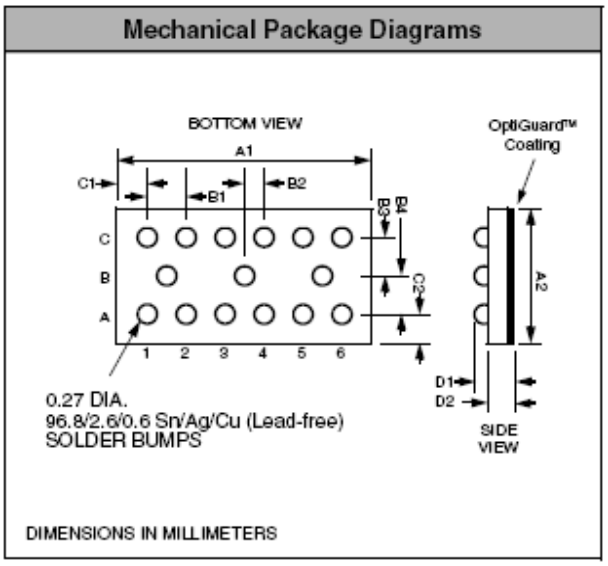
PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B_0 X A_0 X K_0	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P_0	P_1
CM1452-04CP	1.67 X 1.11 X 0.615	1.73 X 1.23 X 0.83	8mm	178mm (7")	3500	4mm	4mm



Mechanical Specifications

CM1452-06CP devices are packaged in custom Chip Scale Packages (CSP).

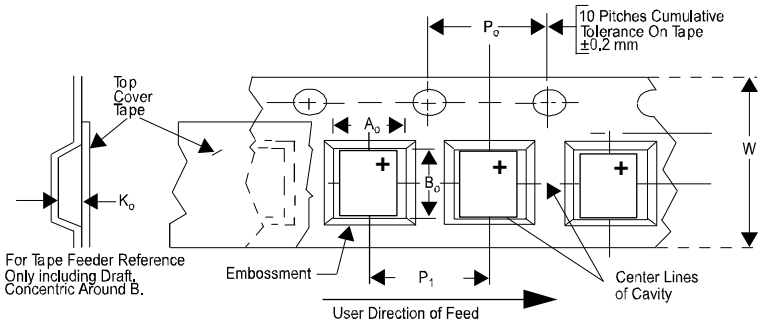
PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	15					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	2.427	2.472	2.517	0.0956	0.0973	0.0991
A2	1.068	1.113	1.158	0.0420	0.0438	0.0456
B1	0.395	0.400	0.405	0.0156	0.0157	0.0159
B2	0.195	0.200	0.205	0.0077	0.0079	0.0081
B3	0.342	0.347	0.352	0.0135	0.0137	0.0139
B4	0.342	0.347	0.352	0.0135	0.0137	0.0139
C1	0.186	0.236	0.286	0.0073	0.0093	0.0113
C2	0.160	0.210	0.260	0.0063	0.0082	0.0102
D1	0.545	0.615	0.685	0.0215	0.0242	0.0270
D2	0.368	0.419	0.470	0.0145	0.0165	0.0185
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						



Package Dimensions for
CM1452-06CP Chip Scale Package

CSP Tape and Reel Specifications

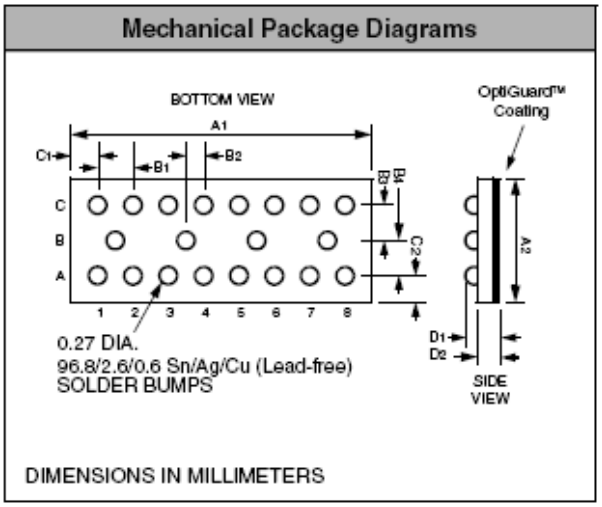
PART NUMBER	CHIP SIZE (mm)	POCKET SIZE (mm) B_0 X A_0 X K_0	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P_0	P_1
CM1452-06	2.47 X 1.11X 0.615	2.59 X 1.27 X 0.73	8mm	178mm (7")	3500	4mm	4mm



Mechanical Specifications

CM1452-08CP devices are packaged in custom Chip Scale Packages (CSP).

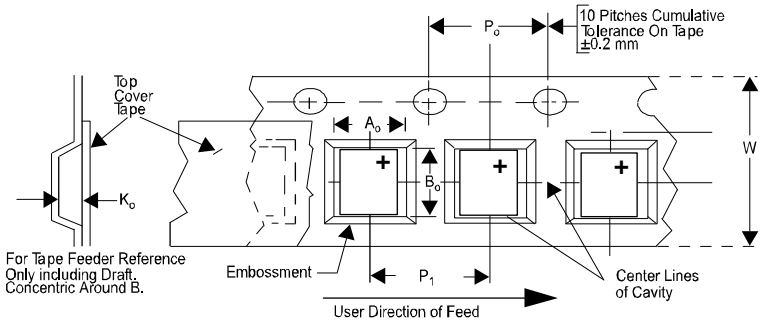
PACKAGE DIMENSIONS						
Package	Custom CSP					
Bumps	20					
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	3.227	3.272	3.317	0.1270	0.1288	0.1306
A2	1.068	1.113	1.158	0.0420	0.0438	0.0456
B1	0.395	0.400	0.405	0.0156	0.0157	0.0159
B2	0.195	0.200	0.205	0.0077	0.0079	0.0081
B3	0.342	0.347	0.352	0.0135	0.0137	0.0139
B4	0.342	0.347	0.352	0.0135	0.0137	0.0139
C1	0.186	0.236	0.286	0.0073	0.0093	0.0113
C2	0.160	0.210	0.260	0.0063	0.0082	0.0102
D1	0.545	0.615	0.685	0.0215	0.0242	0.0270
D2	0.368	0.419	0.470	0.0145	0.0165	0.0185
# per tape and reel	3500 pieces					
Controlling dimension: millimeters						



Package Dimensions for
CM1452-08CP Chip Scale Package

CSP Tape and Reel Specifications

PART NUMBER	CHIP 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
CM1452-08CP	3.27 X 1.11X 0.615	3.40 X 1.19 X 0.74	12mm	330mm (13")	3500	4mm	4mm



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