

Praetorian™ 4-Channel LCD Camera EMI Filter Array with ESD Protection

Features

- 4 channels of EMI filtering
- ±15kV ESD protection (IEC 61000-4-2, contact discharge)
- Greater than -40dB of attenuation at 1GHz
- 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

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

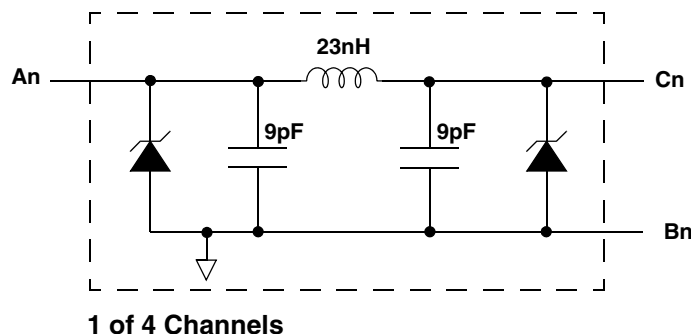
The CM1456-04 is a pi-style EMI filter array with ESD protection, which integrates four filters (C-L-C) in CSP

form factor with 0.40mm pitch. Each EMI filter channel of the CM1456-04 is implemented as a 3-pole L-C filter where the component values are 9pF-23nH-9pF. The roll-off frequency at -6dB attenuation is 380MHz and can be used in applications where the data rates are as high as 160Mbps while providing greater than -35dB over the 800MHz to 2.7GHz frequency range. The parts include ESD diodes on every I/O pin, that provide a high level of protection against electrostatic discharge (ESD). 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.

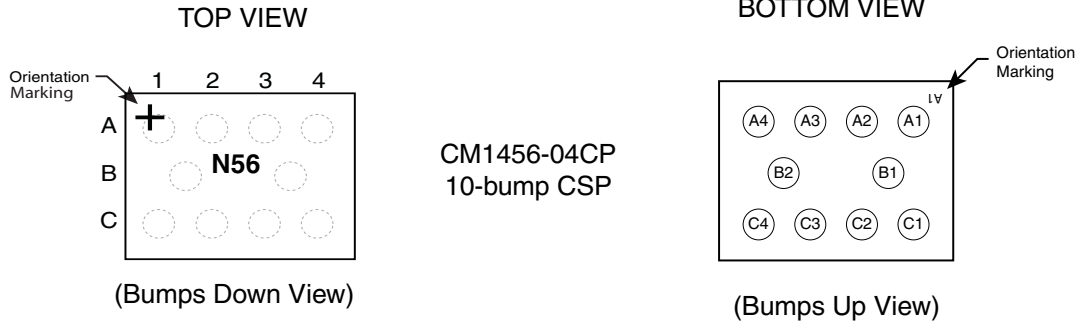
This device is particularly well suited for wireless handsets, mobile LCD modules and PDAs because of its small package format and easy-to-use pin assignments. In particular, the CM1456-04 is ideal for EMI filtering and protecting data and control lines for the LCD display and camera interface in mobile handsets.

The CM1456-04 incorporates *OptiGuard*™ which results in improved reliability at assembly. It 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



PACKAGE / PINOUT DIAGRAMS



Notes:
 1) These drawings are not to scale.

PIN DESCRIPTIONS

PIN NUMBER	PIN DESCRIPTION	PIN NUMBER	PIN DESCRIPTION
A1	Filter #1	C1	Filter #1
A2	Filter #2	C2	Filter #2
A3	Filter #3	C3	Filter #3
A4	Filter #4	C4	Filter #4
B1	GND	–	
B2	GND	–	

Ordering Information

PART NUMBERING INFORMATION

Bumps	Package	Lead-free Finish	
		Ordering Part Number ¹	Part Marking
10	CSP	CM1456-04CP	N56

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 current per Inductor	20	mA
DC Package Power Rating	0.5	W

STANDARD OPERATING CONDITIONS

PARAMETER	RATING	UNITS
Operating Temperature Range	-40 to +85	°C

ELECTRICAL OPERATING CHARACTERISTICS (NOTE 1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
L_{TOT}	Total Channel Inductance			23		nH
C_{TOT_0V}	Total Channel Capacitance, 0V bias	0V dc; 1MHz, 30mV rms	23.5	29	35	pF
$C_{TOT_2.5V}$	Total Channel Capacitance, 2.5V bias	2.5V dc; 1MHz, 30mV rms; Note 4		18		pF
C_1	Capacitance	2.5V dc; 1MHz, 30mV rms; Note 4		9		pF
V_{ST}	Stand-off Voltage	$I = 10\mu A$	5.5			V
I_{LEAK}	Diode Leakage Current	$V_{IN} = +3.3V$		0.1	0.5	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) Contact discharge per IEC 61000-4-2 standard, Level 4 b) Air discharge per IEC 61000-4-2 standard, Level 4	Notes 2, 3, and 4	± 15 ± 15			kV kV
f_C	Cut-off frequency $Z_{SOURCE} = 50\Omega$, $Z_{LOAD} = 50\Omega$			300		MHz
f_R	Roll-off frequency at -6dB Attenuation $Z_{SOURCE} = 50\Omega$, $Z_{LOAD} = 50\Omega$			380		MHz

Note 1: $T_A = 25^\circ C$ unless otherwise specified.

Note 2: ESD applied to input and output pins with respect to GND, one at a time.

Note 3: Unused pins are left open.

Note 4: These parameters are guaranteed by design and characterization.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

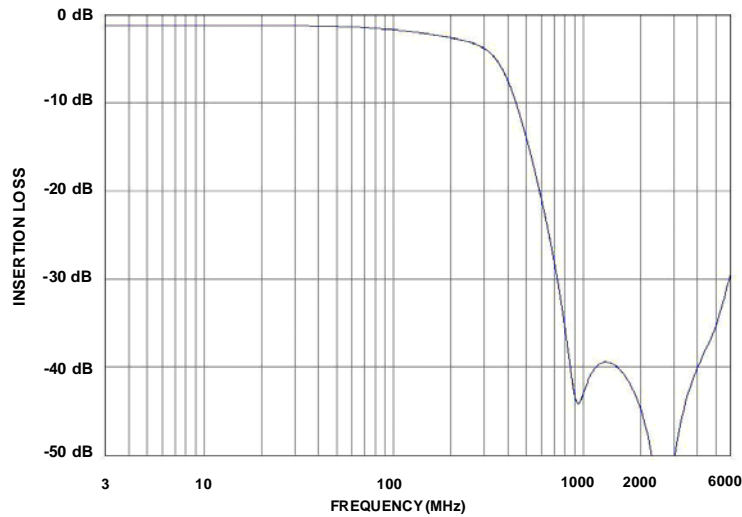


Figure 1. Insertion Loss VS. Frequency (CM1456-04: Filter 1)

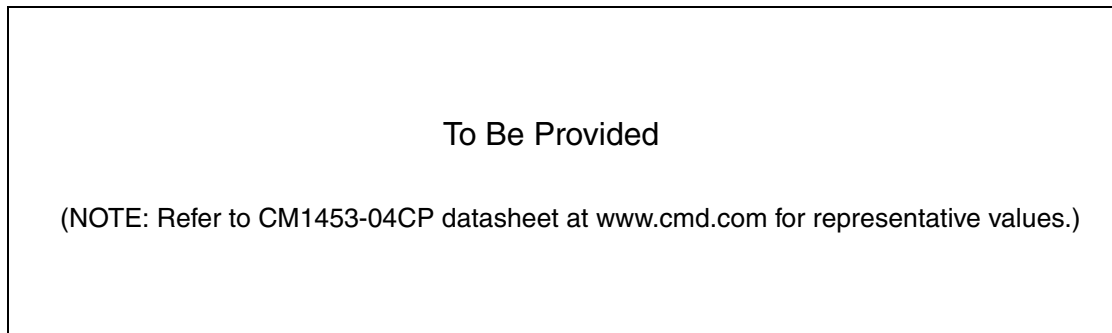


Figure 2. Typical Diode Capacitance vs. Input Voltage (normalized to 2.5V d.c)

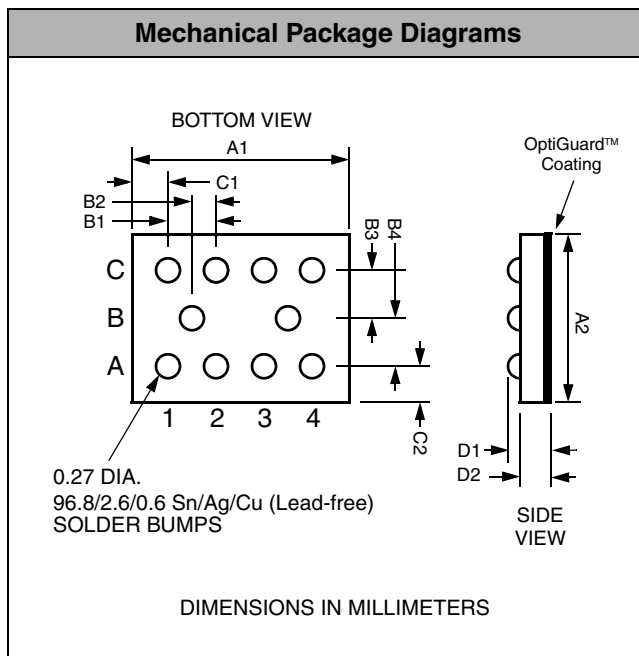
Application Information

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.wlcsforum.org/documents/pdf/ap-217.pdf> for download.

Mechanical Specifications

CM1456 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 CM1456-04CP 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
CM1456-04CP	1.67 X 1.11 X 0.615	1.80 X 1.27 X 0.73	8mm	178mm (7")	3500	4mm	4mm

