CM1454

Data Port EMI Filter Array with ESD Protection

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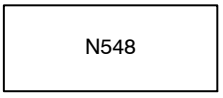
WLCSP20
CP SUFFIX
CASE 567BY

MARKING DIAGRAM



CM1454−08
20−Bump CSP Package

N548 = CM1454−08CP

ORDERING INFORMATION

Device	Package	Shipping†
CM1454−08CP	CSP−20 (Pb−Free)	3500/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.

Description

The CM1454 is an EMI filter array with ESD protection in a CSP form factor for the data port of a mobile handset. The CM1454−08 is configured in an 8 channel format and combines both resistor−capacitor (R−C) and inductor−capacitor (L−C) filters in the chip. There are five C−R−C filters with component values of 30 pF − 100 Ω − 30 pF which are used for the microphone and data ports. There are also three C−L−C filters with values of 80 pF − 3 nH − 80 pF which are designed for the stereo speaker port.

The CM1454's C−RC filters have a cut−off frequency of 60 MHz and an attenuation of better than 35 dB over the 800 MHz to 2.7 GHz frequency range. The C−L−C filters have a cut−off frequency of 21 MHz with an attenuation of 40 dB at 1 GHz. The parts integrate ESD protection 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 connected to the filter ports are designed and characterized to safely dissipate ESD strikes of ±15 kV, which is beyond the Level 4 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 also protected for contact discharges at greater than ±30 kV.

The CM1454 incorporates *OptiGuard*™ which results in improved reliability at assembly. The CM1454 is available in a space saving, low profile Chip Scale Package with RoHS compliant lead−free finishing.

Features

- *OptiGuard*™ Coated for Improved Reliability
- Eight Channels of EMI Filtering
- Three C−L−C Filters with ESD Protection for Stereo Speaker Port
- Five C−R−C Filters with ESD Protection for Microphone and Data Ports
- ±15 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Chip Scale Package (CSP) Features Extremely Low Parasitic Inductance for Optimum Filter and ESD Performance
- 20−Bump, 3.960 mm x 1.586 mm Footprint CSP
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Combination I/O Data Port that has I/Os for Data, Microphone and Speaker
- 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

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ELECTRICAL SCHEMATIC

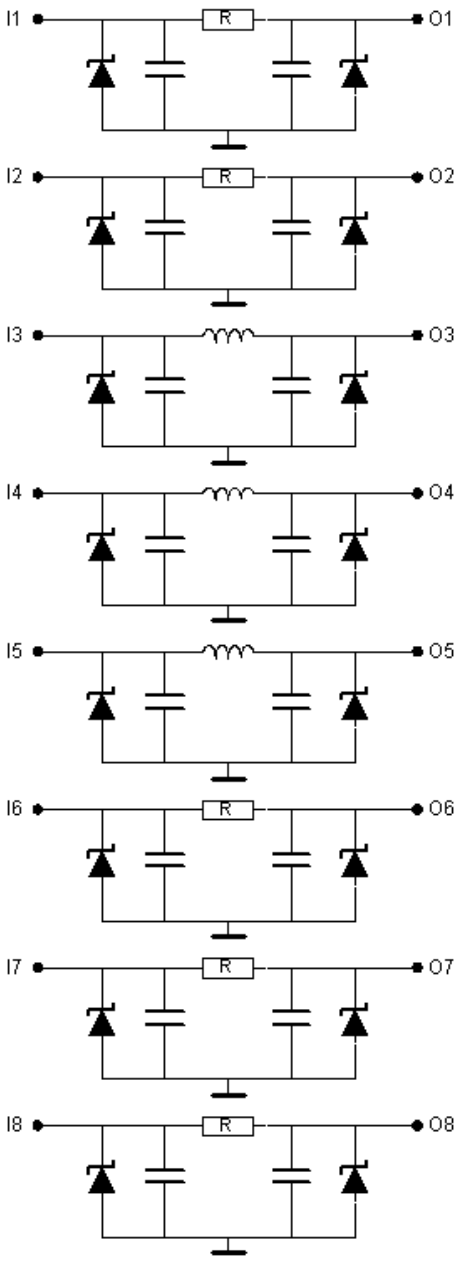
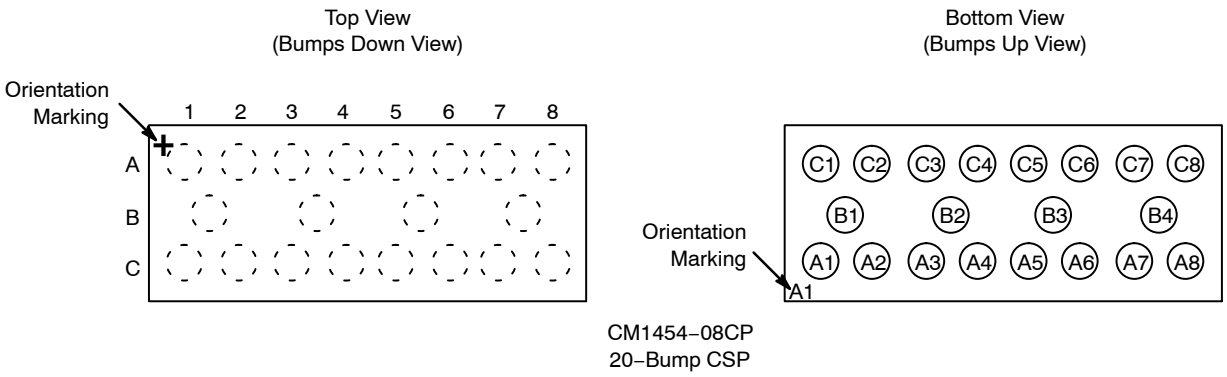


Figure 1. CM1454 Schematic Diagram of R−C and L−C Filter Arrays with ESD

PACKAGE / PINOUT DIAGRAMS



CM1454−08CP
20−Bump CSP

Table 1. PIN DESCRIPTIONS

Pin Number	Pin Description		Pin Number	Pin Description
A1	Filter #1 (Microphone)		C1	Filter #1
A2	Filter #2 (Microphone)		C2	Filter #2
A3	Filter #3 (Stereo Headphone)		C3	Filter #3
A4	Filter #4 (Left Speaker)		C4	Filter #4
A5	Filter #5 (Right Speaker)		C5	Filter #5
A6	Filter #6 (Accessory ID)		C6	Filter #6
A7	Filter #7 (Data)		C7	Filter #7
A8	Filter #8 (Data)		C8	Filter #8
B1−B4	GND			

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	0.5	W

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
R	Resistance		80	100	120	Ω
C_1	Capacitance	2.5 V dc; 1 MHz, 30 mV ac	24	30	36	pF
L	Inductance			3.0		nH
R_E	Equivalent Series Resistance of Inductor			0.25		Ω
C_2	Capacitance	0 V dc, 1 MHz, 30 mV ac;	100	125	150	pF
		2.5 V dc, 1 MHz, 30 mV ac;	64	80	96	pF
f_{RC}	Cut−off Frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω			60		MHz
f_{LC}	Cut−off Frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω			21		MHz
V_{ST}	Stand−off Voltage	I = 10 μA		6.0		V
I_{LEAK}	Diode Leakage Current	V_{IN} = 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 −0.4	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
R_{DYN}	Dynamic Resistance Positive Negative			 2.3 0.9		Ω

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. Unused pins are left open.

PERFORMANCE INFORMATION

Diode Characteristics (nominal conditions unless specified otherwise)

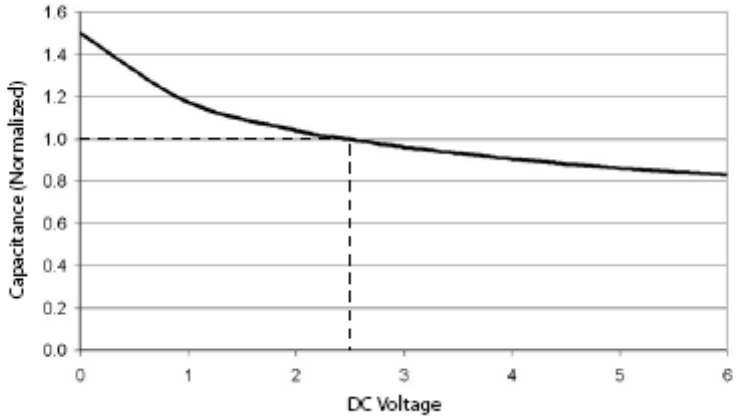


Figure 2. Typical Diode Capacitance vs. Input Voltage (normalized to 2.5 VDC)

PERFORMANCE INFORMATION (Cont'd)

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

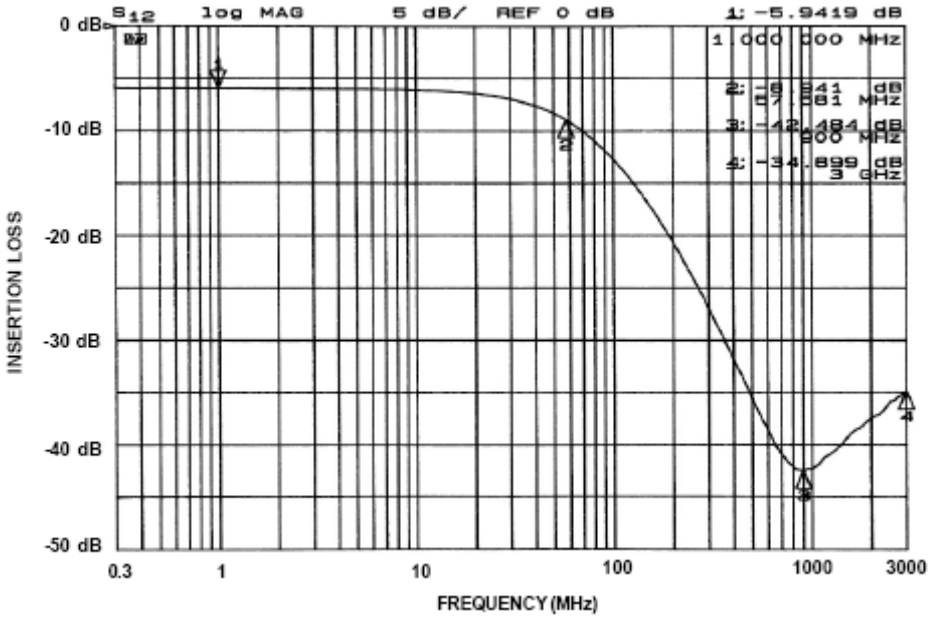


Figure 3. Attenuation Curve for CM1454 RC Filters: 1, 2, 6, 7, and 8

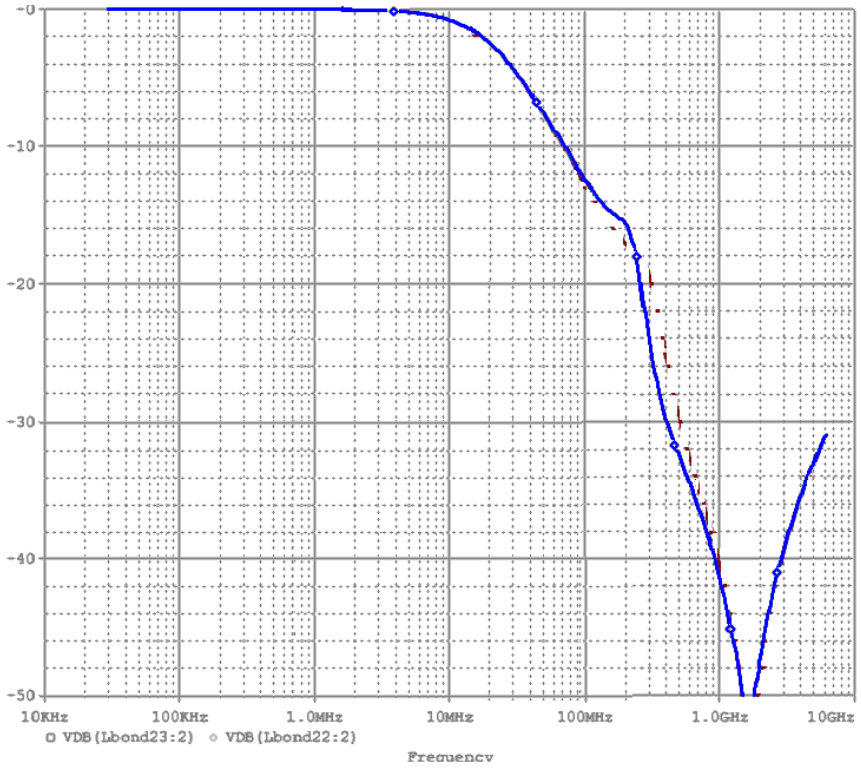


Figure 4. Attenuation Curve for CM1454 RC Filters: 3, 4, and 5

APPLICATION INFORMATION

Table 5. PRINTED CIRCUIT BOARD RECOMMENDATIONS

Parameter	Value
Pad Size on PCB	0.240 mm
Pad Shape	Round
Pad Definition	Non−Solder Mask defined pads
Solder Mask Opening	0.290 mm Round
Solder Stencil Thickness	0.125 − 0.150 mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300 mm Round
Solder Flux Ratio	50/50 by volume
Solder Paste Type	No Clean
Pad Protective Finish	OSP (Entek Cu Plus 106A)
Tolerance − Edge To Corner Ball	±50 μm
Solder Ball Side Coplanarity	±20 μm
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead−free Devices using a Lead−free Solder Paste	260°C

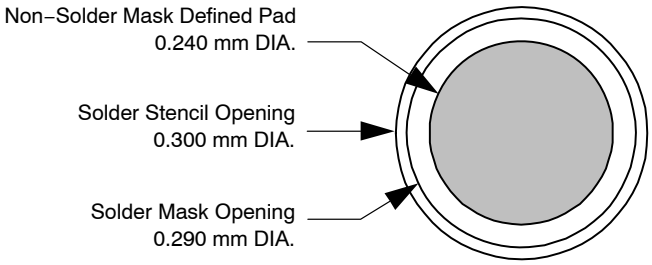


Figure 5. Recommended Non−Solder Mask Defined Pad Illustration

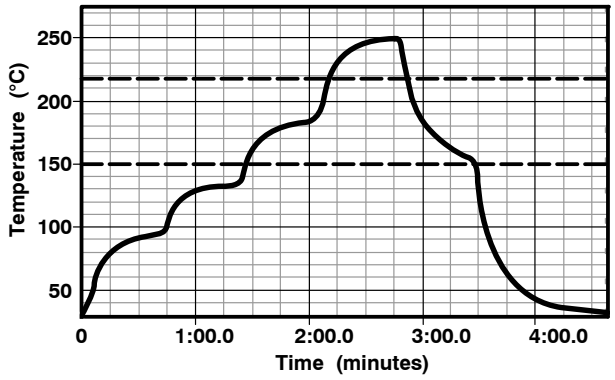


Figure 6. Lead−free (SnAgCu) Solder Ball Reflow Profile

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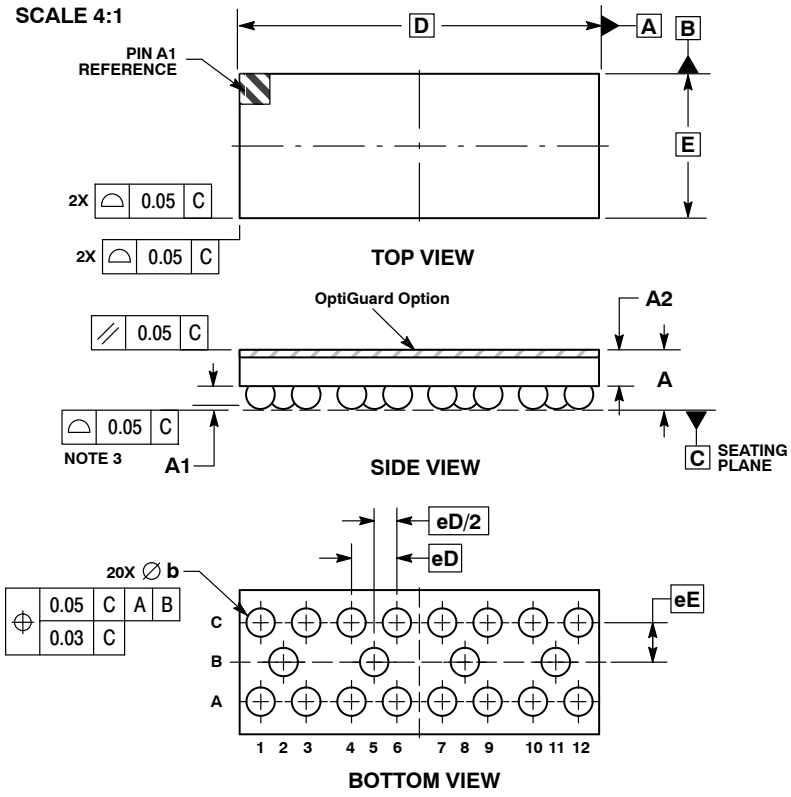
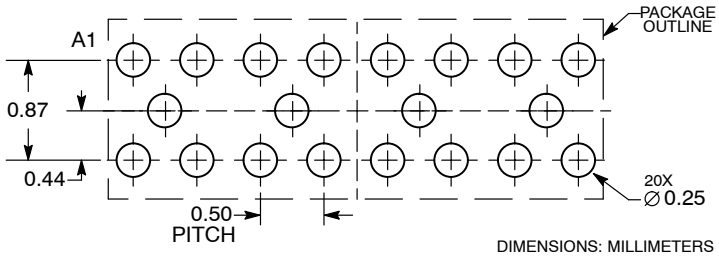


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

DIM	MILLIMETERS MIN	MAX
A	0.56	0.72
A1	0.21	0.27
A2	0.42 REF	
b	0.29	0.35
D	3.96 BSC	
E	1.59 BSC	
eD	0.50 BSC	
eE	0.435 BSC	

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.

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