LCD EMI Filter Array with ESD Protection

CM1420, CM1422

WLCSP15
CP SUFFIX
CASE 567BS

WLCSP20
CP SUFFIX
CASE 567BZ

Description

The CM1420 and CM1422 are EMI filter arrays with ESD protection, which integrate six and eight Pi−filters (C−R−C), respectively. The CM1420/22 has component values of 15 pF − 100 Ω − 15 pF. These devices include ESD protection diodes on every pin, which provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The ESD diodes connected to the filter ports safely dissipate ESD strikes of ±15 kV, well beyond the maximum requirement of the IEC 61000−4−2 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 ±30 kV.

This device is particularly well suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of its small package format and easy−to−use pin assignments. In particular, the CM1420/22 is ideal for EMI filtering and protecting data lines from ESD for the LCD display in clamshell handsets.

The CM1420 and CM1422 incorporate OptiGuard coating which results in improved reliability at assembly. The CM1420 and CM1422 are available in space−saving, low−profile chip scale packages with RoHS compliant lead−free finishing.

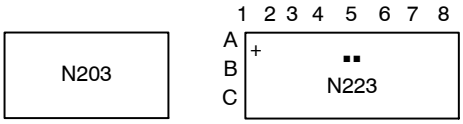
Features

- Functionally and Pin Compatible with CSPEMI606 (CM1420) and CSPEMI608 (CM1422) Devices
- OptiGuard Coated for Improved Reliability at Assembly
- Six and Eight Channels of EMI Filtering
- ±15 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Better than 30 dB of Attenuation at 1 GHz to 3 GHz
- Chip Scale Package Features Extremely Low Lead Inductance for Optimum Filter and ESD Performance
- 15−Bump, 2.960 mm x 1.330 mm Footprint Chip Scale Package (CM1420)
- 20−Bump, 4.000 mm x 1.458 mm Footprint Chip Scale Package (CM1422)
- These Devices are Pb−Free and are RoHS Compliant

Applications

- LCD Data Lines in Clamshell Wireless Handsets
- EMI Filtering & ESD Protection for High−Speed I/O Data Ports
- Wireless Handsets / Cell Phones
- Notebook Computers
- PDAs / Handheld PCs
- EMI Filtering for High−Speed Data Lines

MARKING DIAGRAM



CM1420
15−Bump CSP Package

CM1422
20−Bump CSP Package

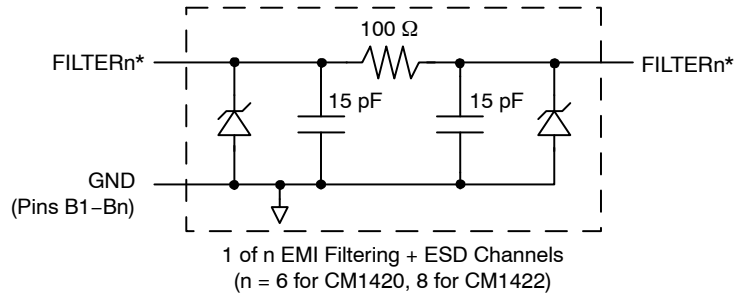
N203 = CM1420−03CP
N223 = CM1422−03CP

ORDERING INFORMATION

Device	Package	Shipping†
CM1420−03CP	CSP−15 (Pb−Free)	3500/Tape & Reel
CM1422−03CP	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.

BLOCK DIAGRAM



1 of n EMI Filtering + ESD Channels
(n = 6 for CM1420, 8 for CM1422)

*See Package/Pinout Diagrams for expanded pin information.

PACKAGE / PINOUT DIAGRAMS

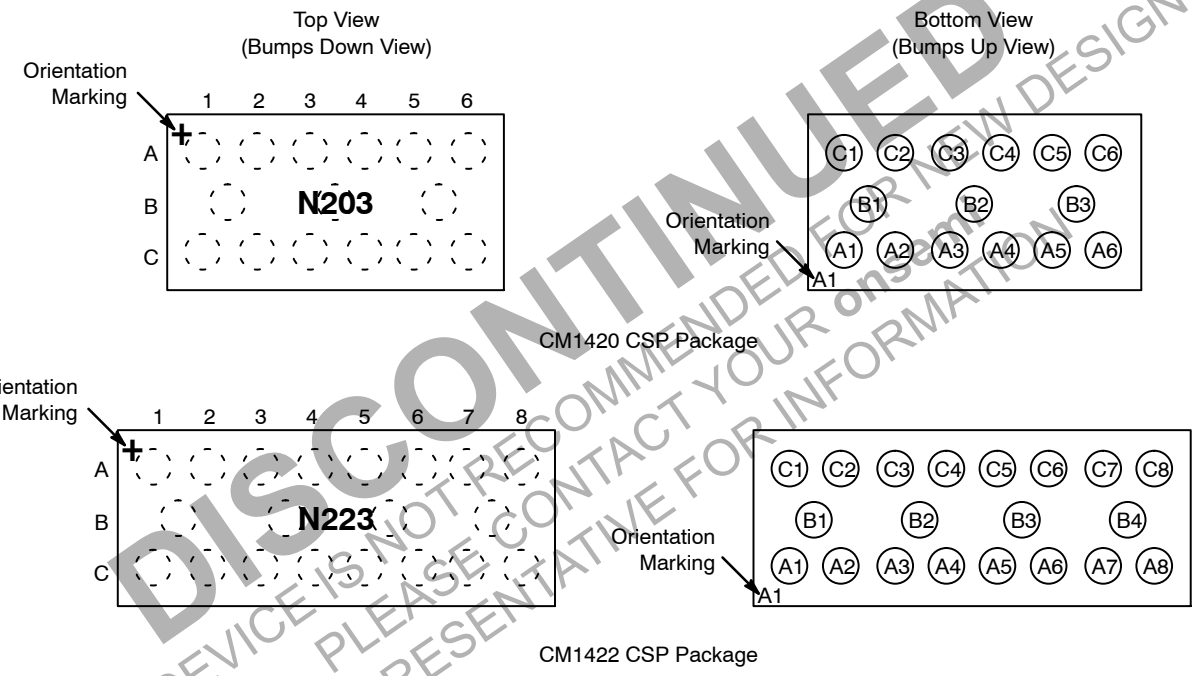


Table 1. PIN DESCRIPTIONS

CM1420 Pin(s)	CM1422 Pin(s)	Name	Description	CM1420 Pin(s)	CM1422 Pin(s)	Name	Description
A1	A1	FILTER1	Filter Channel 1	C1	C1	FILTER1	Filter Channel 1
A2	A2	FILTER2	Filter Channel 2	C2	C2	FILTER2	Filter Channel 2
A3	A3	FILTER3	Filter Channel 3	C3	C3	FILTER3	Filter Channel 3
A4	A4	FILTER4	Filter Channel 4	C4	C4	FILTER4	Filter Channel 4
A5	A5	FILTER5	Filter Channel 5	C5	C5	FILTER5	Filter Channel 5
A6	A6	FILTER6	Filter Channel 6	C6	C6	FILTER6	Filter Channel 6
–	A7	FILTER7	Filter Channel 7	–	C7	FILTER7	Filter Channel 7
–	A8	FILTER8	Filter Channel 8	–	C8	FILTER8	Filter Channel 8
B1−B3	B1−B4	GND	Device Ground				

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Unit
Storage Temperature Range	−65 to +150	°C
DC Power per Resistor	100	mW
DC Package Power Rating	500	mW

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 3. STANDARD OPERATING CONDITIONS

Parameter	Rating	Unit
Operating Temperature Range	−40 to +85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R	Resistance		80	100	120	Ω
C	Capacitance	At 2.5 V DC, 1 MHz, 30 mV AC	12	15	18	pF
V_{DIODE}	Diode Standoff Voltage	I_{DIODE} = 10 μA		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE} = 3.3 V		100	200	nA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	I_{LOAD} = 10 mA (Note 3)	 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	(Note 2)	 ±30 ±15			kV
R_{DYN}	Dynamic Resistance Positive Negative			 2.30 0.90		Ω
f_C	Cut−off Frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω	R = 100 Ω, C = 15 pF		 120		MHz

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. Clamping voltage is measured at the opposite side of the EMI filter to the ESD pin. For example, if ESD is applied to Pin A1, then clamping voltage is measured at Pin C1.

PERFORMANCE INFORMATION

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

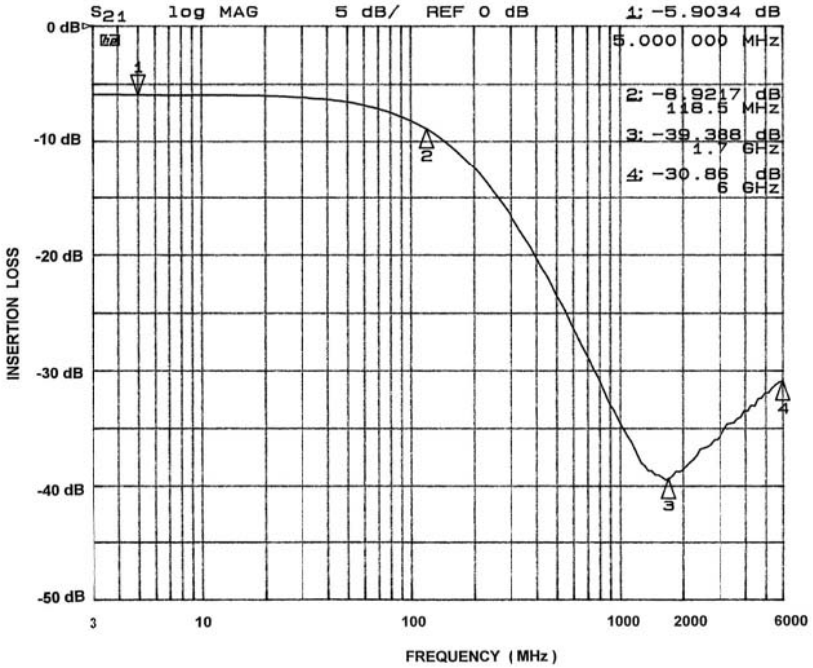


Figure 1. Insertion Loss vs. Frequency (A1−C1 to GND B1)

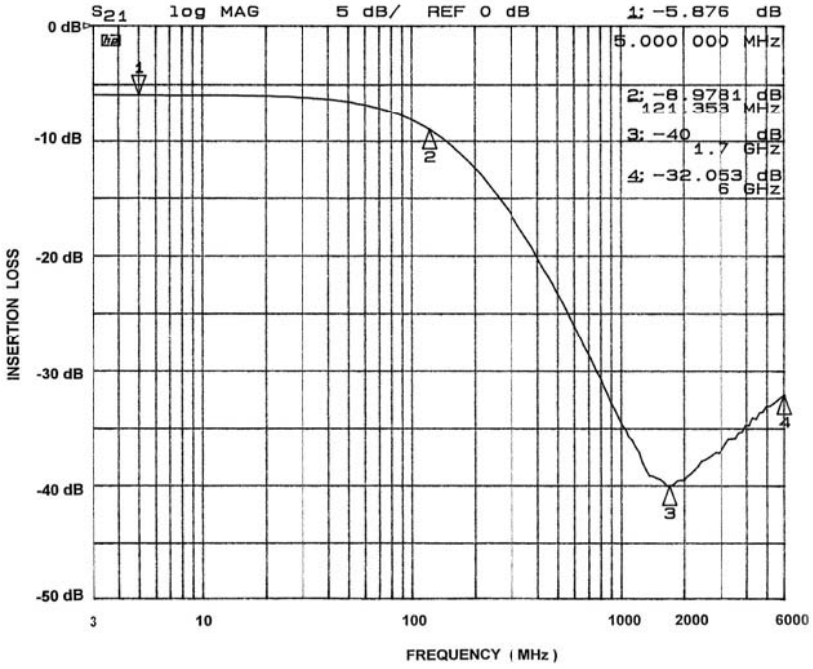


Figure 2. Insertion Loss vs. Frequency (A2−C2 to GND B1)

PERFORMANCE INFORMATION (continued)

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

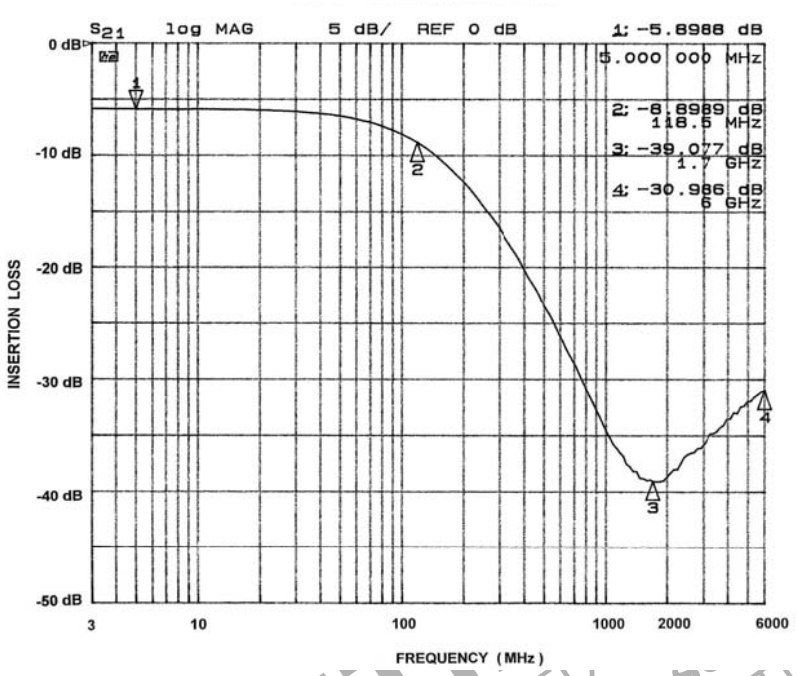


Figure 3. Insertion Loss vs. Frequency (A3−C3 to GND B2)

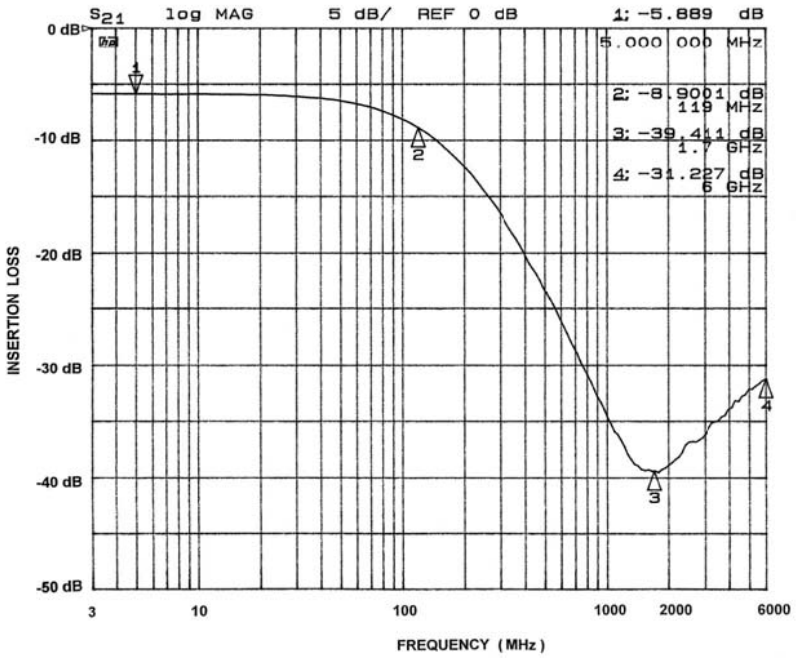


Figure 4. Insertion Loss vs. Frequency (A4−C4 to GND B2)

PERFORMANCE INFORMATION (continued)

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

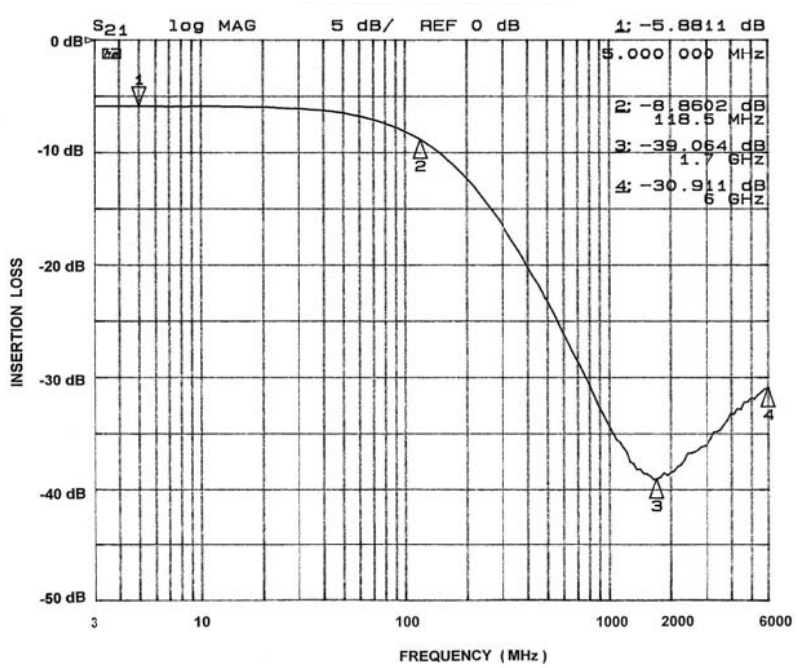


Figure 5. Insertion Loss vs. Frequency (A5−C5 to GND B3)

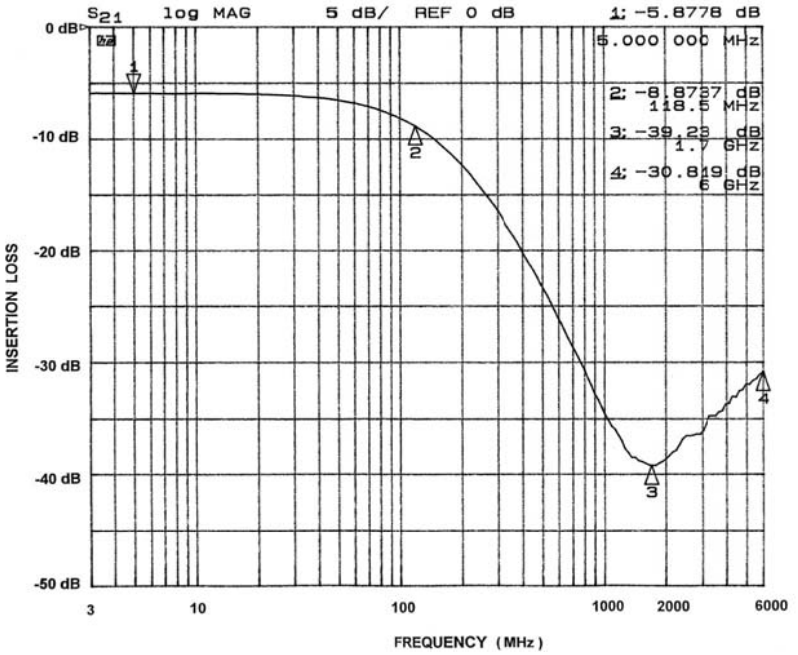


Figure 6. Insertion Loss vs. Frequency (A6−C6 to GND B3)

PERFORMANCE INFORMATION (continued)

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

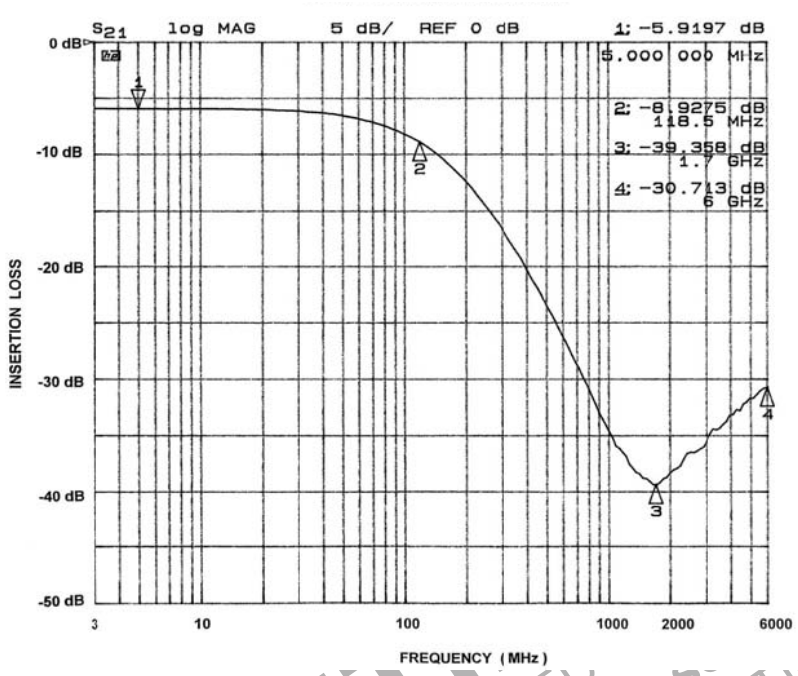


Figure 7. Insertion Loss vs. Frequency (A7−C7 to GND B4, CM1422 Only)

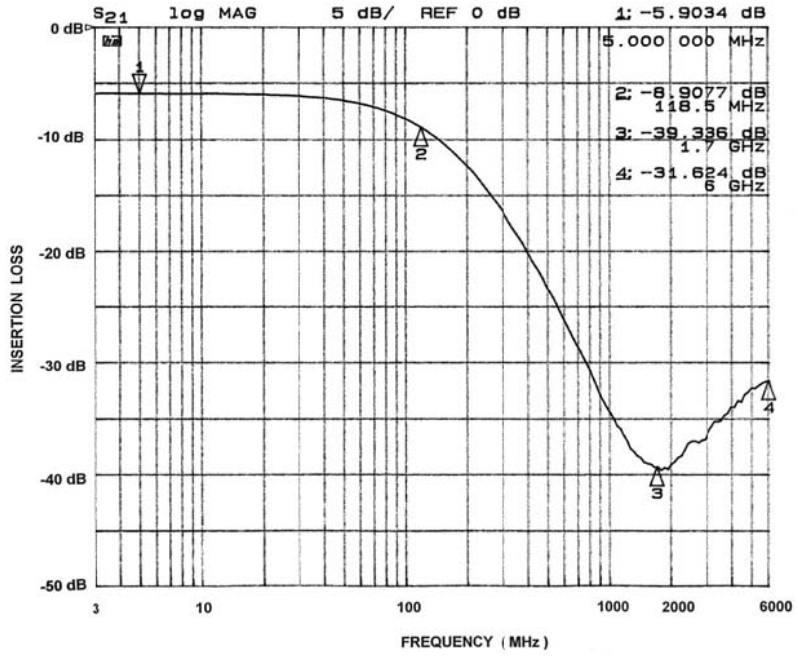


Figure 8. Insertion Loss vs. Frequency (A8−C8 to GND B4, CM1422 Only)

PERFORMANCE INFORMATION (continued)

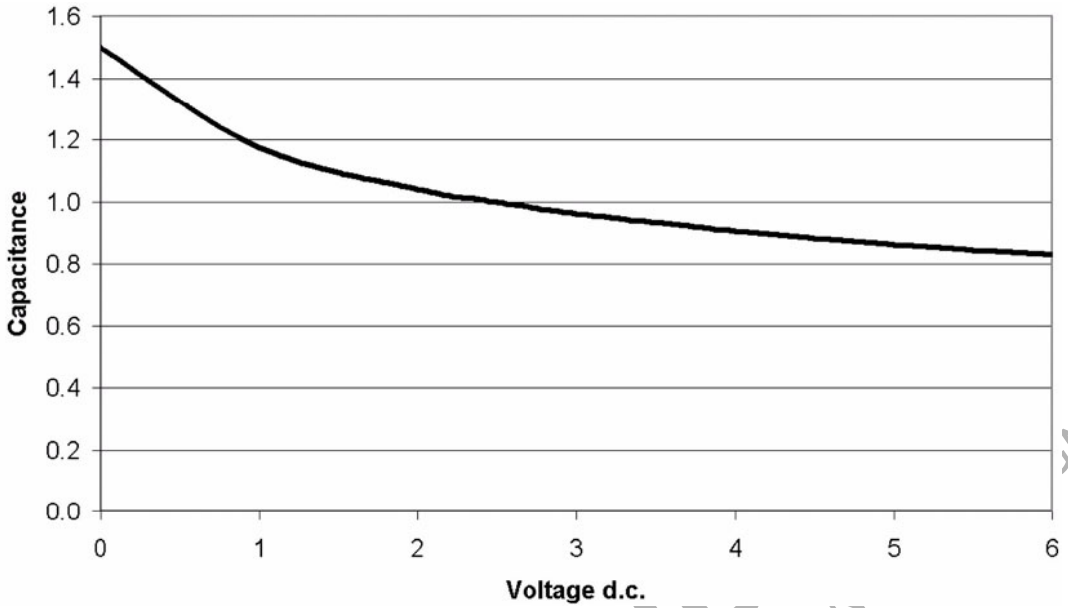


Figure 9. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5 VDC and 25°C)

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

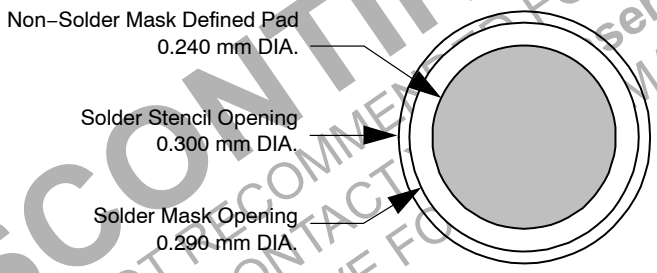


Figure 10. Recommended Non−Solder Mask Defined Pad Illustration

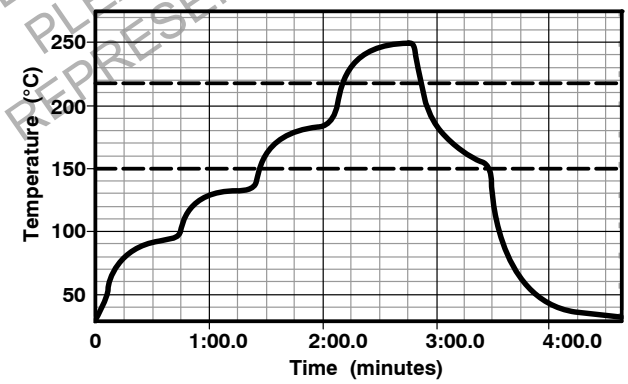
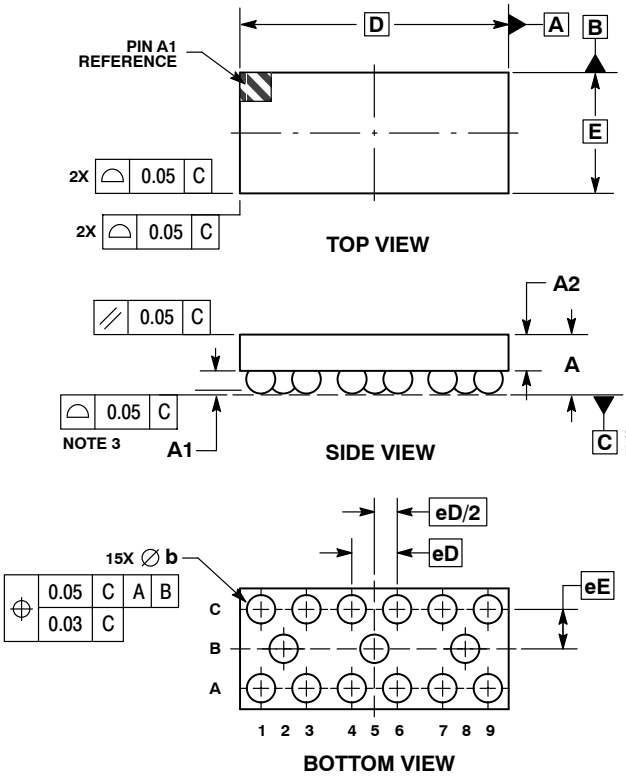


Figure 11. Lead−free (SnAgCu) Solder Ball Reflow Profile

SCALE 4:1

WLCSP15, 2.96x1.33
CASE 567BS
ISSUE O

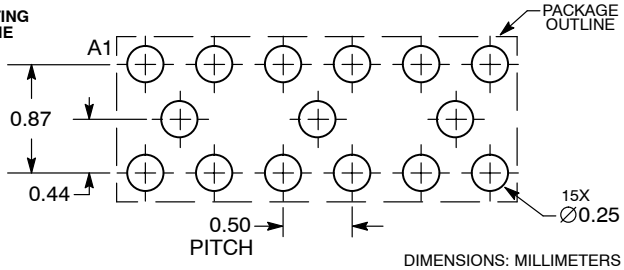
DATE 26 JUL 2010



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

	MILLIMETERS	
DIM	MIN	MAX
A	0.56	0.65
A1	0.21	0.27
A2	0.40 REF	
b	0.29	0.35
D	2.96 BSC	
E	1.33 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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WLCSP20, 4.00x1.46
CASE 567BZ
ISSUE O

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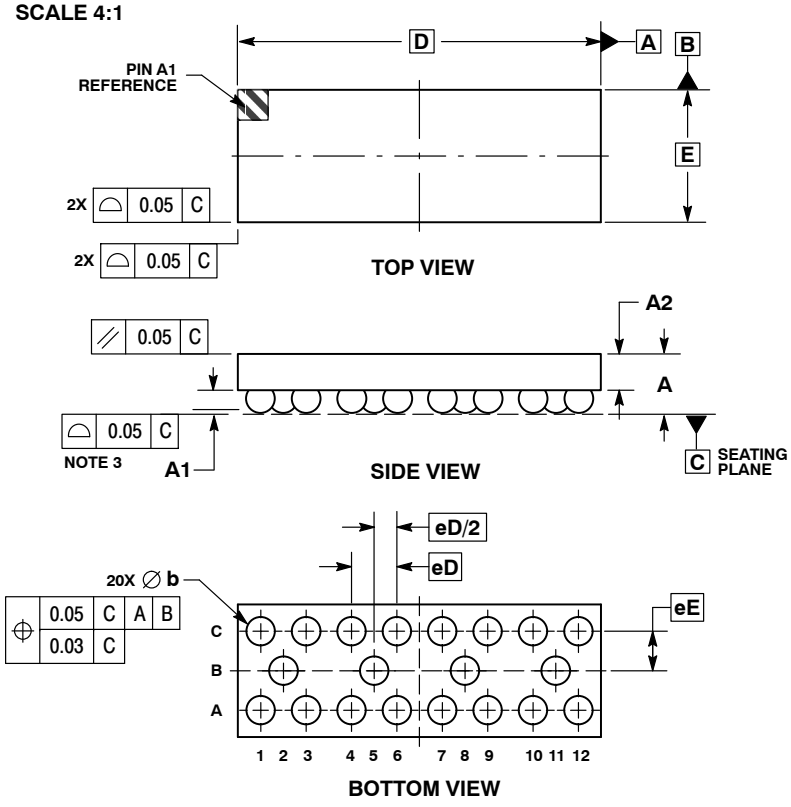
SCALE 4:1



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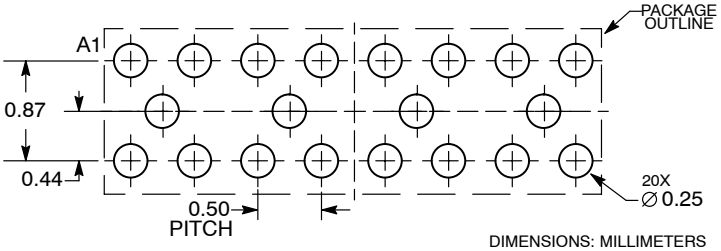
	MILLIMETERS	
DIM	MIN	MAX
A	0.56	0.65
A1	0.21	0.27
A2	0.40 REF	
b	0.29	0.35
D	4.00 BSC	
E	1.46 BSC	
eD	0.50 BSC	
eE	0.435 BSC	

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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