CM1442-06LP

LCD and Camera EMI Filter Array with ESD Protection

ON Semiconductor®

http://onsemi.com



WLCSP15
LP SUFFIX
CASE 567CM

Functional Description

The CM1442-06LP is part of a family of pi-style EMI filter arrays with ESD protection, which integrates six filters (C-R-C) in a Chip Scale Package (CSP) form factor with 0.40 mm pitch. The CM1442-06LP (low profile) has component values of 15 pF – 100 Ω – 15 pF per channel. The CM1442-06LP has a cut-off frequency of 120 MHz and can be used in applications where the data rates are as high as 48 Mbps. The parts include avalanche-type ESD diodes on every pin, which provide a very high level of protection for sensitive electronic components against potential electrostatic discharge (ESD). The ESD protection diodes safely dissipate ESD strikes of ±15 kV, well 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 ±30 kV.

The CM1442-06LP is available in a space-saving, low-profile CSP with RoHS-compliant, lead-free finishing. It is manufactured with a 0.40 mm pitch and 0.15 mm CSP solder ball to provide up to 28% board space saving versus competing CSP devices with 0.50 mm pitch and 0.30 mm CSP solder ball.

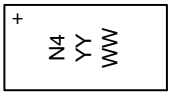
Features

- Six Channels of EMI Filtering with Integrated ESD Protection
- 0.4 mm Pitch, 15−Bump, 2.360 mm x 1.053 mm Footprint Chip Scale Package (CSP)
- Pi−Style EMI Filters in a Capacitor−Resistor−Capacitor (C−R−C) Network
- ±15 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Greater than 30 dB Attenuation (Typical) at 1 GHz
- These Devices are Pb−Free and are 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

MARKING DIAGRAM



CM1442−06LP
15−Bump CSP Package

N4 = CM1442−06LP
YYWW = Datecode

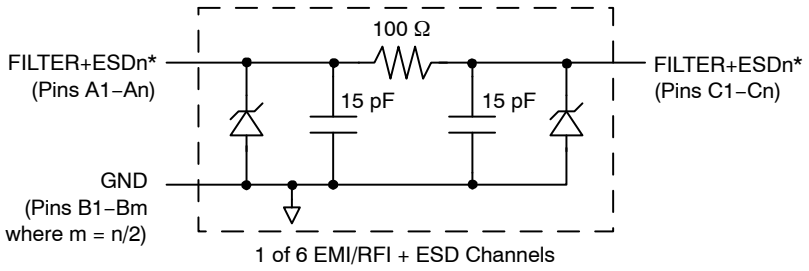
ORDERING INFORMATION

Device	Package	Shipping†
CM1442−06LP	CSP−15 (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.

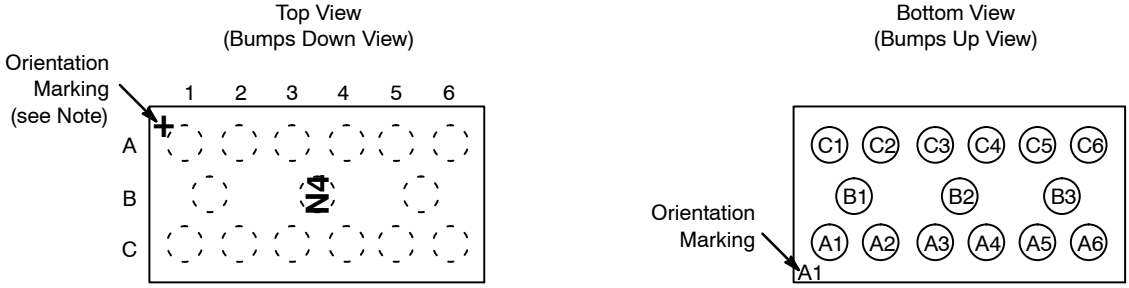
© Semiconductor Components Industries, LLC, 2011

BLOCK DIAGRAM



*See Package/Pinout Diagrams for expanded pin information.

PACKAGE / PINOUT DIAGRAMS



CM1442−06LP
15−Bump CSP Package

Table 1. PIN DESCRIPTIONS

Pins	Name	Description	Pins	Name	Description
A1	FILTER1	Filter + ESD Channel 1	C1	FILTER1	Filter + ESD Channel 1
A2	FILTER2	Filter + ESD Channel 2	C2	FILTER2	Filter + ESD Channel 2
A3	FILTER3	Filter + ESD Channel 3	C3	FILTER3	Filter + ESD Channel 3
A4	FILTER4	Filter + ESD Channel 4	C4	FILTER4	Filter + ESD Channel 4
A5	FILTER5	Filter + ESD Channel 5	C5	FILTER5	Filter + ESD Channel 5
A6	FILTER6	Filter + ESD Channel 6	C6	FILTER6	Filter + ESD Channel 6
B1−B3	GND	Device Ground			

SPECIFICATIONS

Table 2. 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

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_{TOTAL}	Total Channel Capacitance	At 2.5 VDC Reverse Bias, 1 MHz, 30 mVAC	24	30	36	pF
C	Capacitance C1	At 2.5 VDC Reverse Bias, 1 MHz, 30 mVAC	12	15	18	pF
V_{DIODE}	Standoff Voltage	I_{DIODE} = 10 μA		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE} = +3.3 V		0.1	1	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
f_C	Cut−off Frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω	R = 100 Ω, C = 15 pF		 115		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. Unused pins are left open.

PERFORMANCE INFORMATION

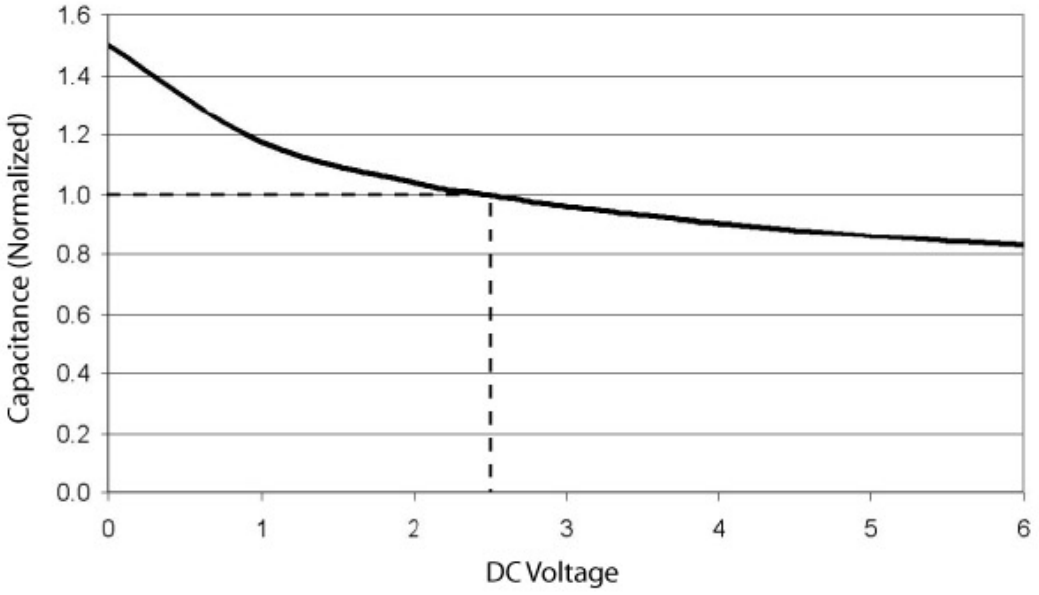


Figure 1. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5 VDC and 25°C)

PERFORMANCE INFORMATION (Cont'd)

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

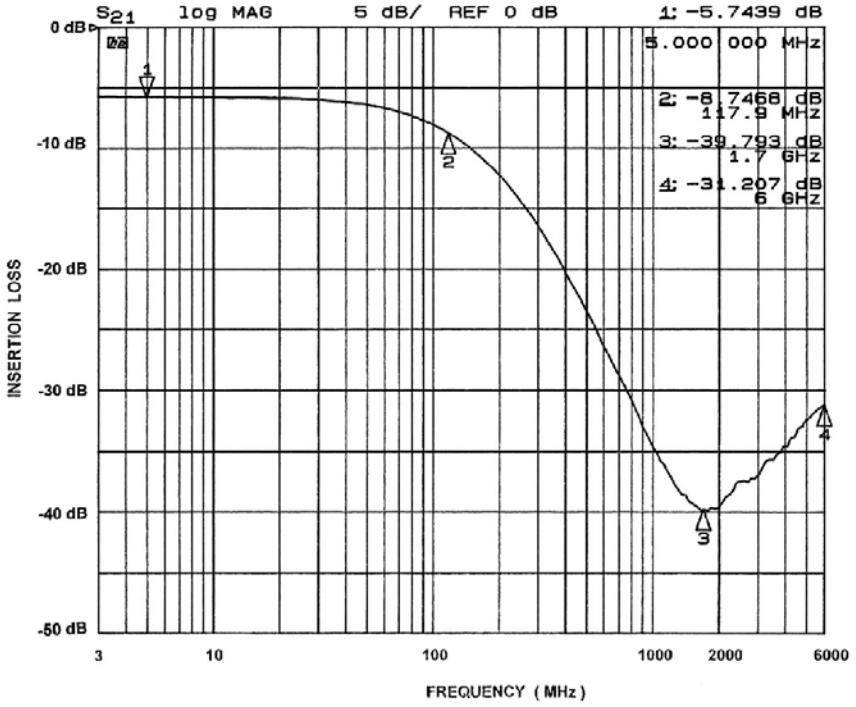


Figure 2. Insertion Loss vs. Frequency (A1−C1 to GND B1)

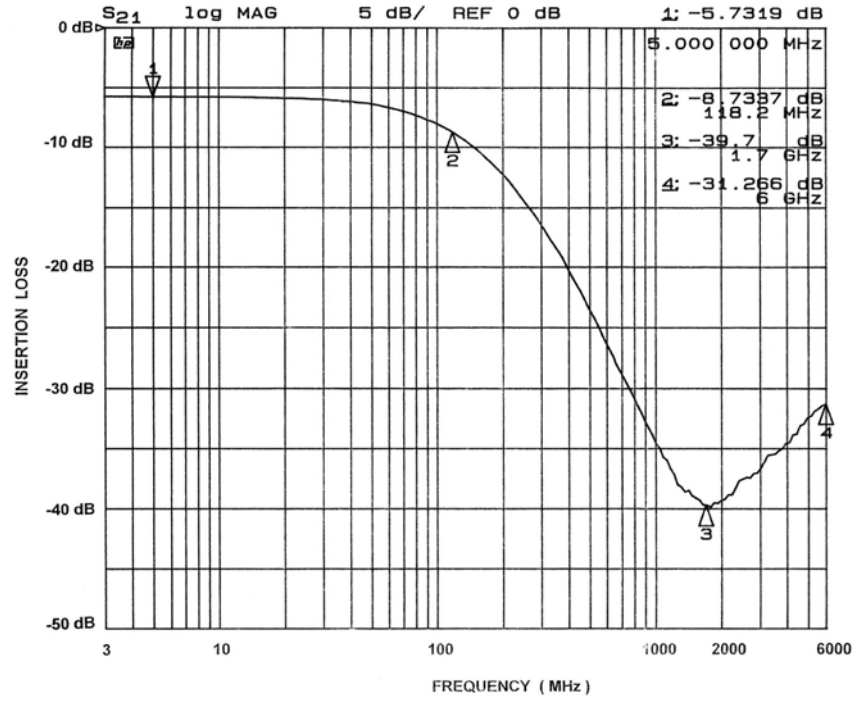


Figure 3. Insertion Loss vs. Frequency (A2−C2 to GND B1)

PERFORMANCE INFORMATION (Cont'd)

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

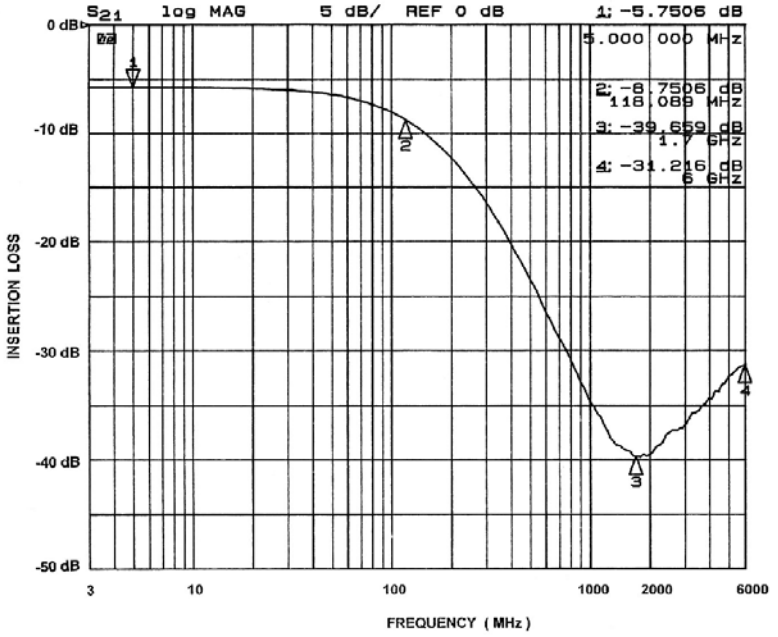


Figure 4. Insertion Loss vs. Frequency (A3−C3 to GND B2)

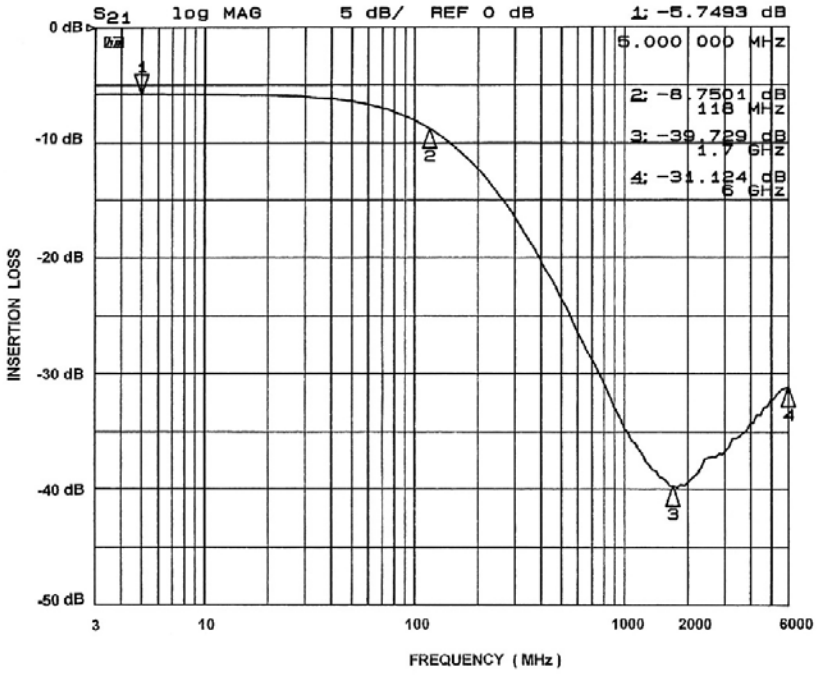


Figure 5. Insertion Loss vs. Frequency (A4−C4 to GND B2)

PERFORMANCE INFORMATION (Cont'd)

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

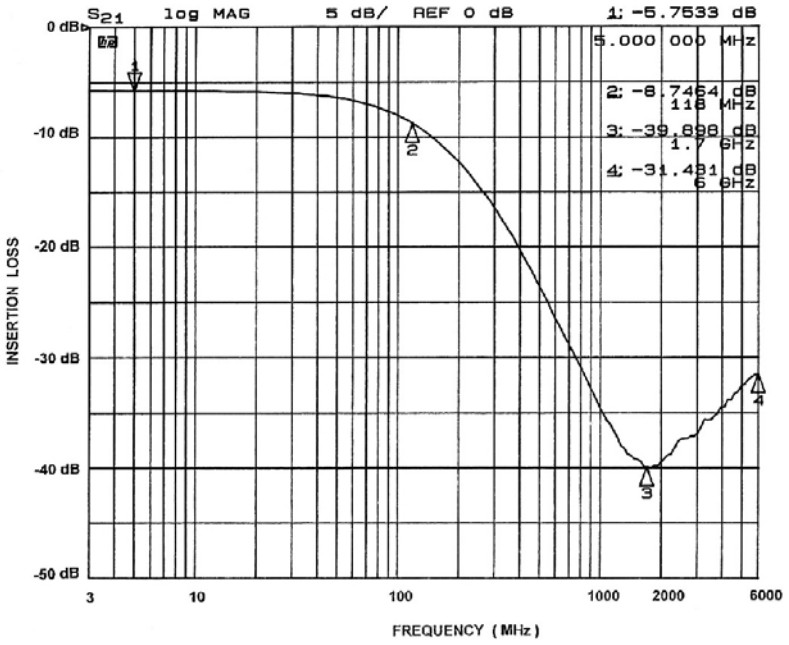


Figure 6. Insertion Loss vs. Frequency (A5−C5 to GND B3)

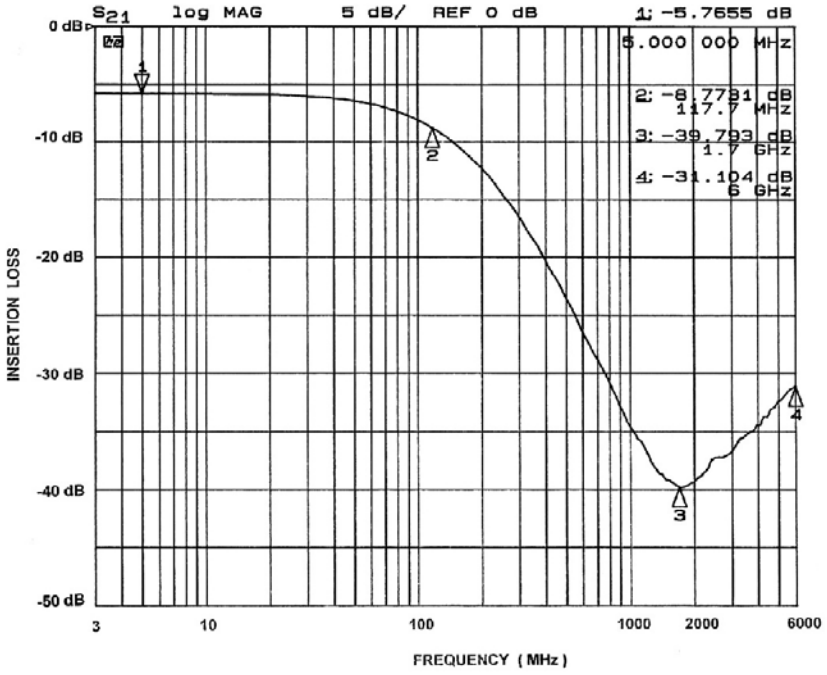


Figure 7. Insertion Loss vs. Frequency (A6−C6 to GND B3)

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

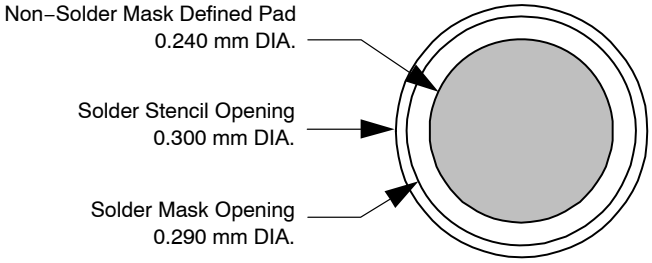


Figure 8. Recommended Non−Solder Mask Defined Pad Illustration

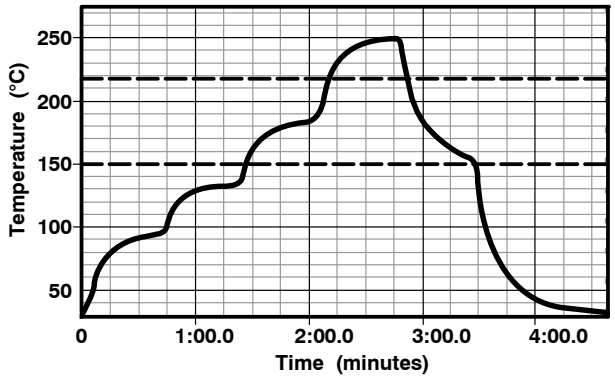


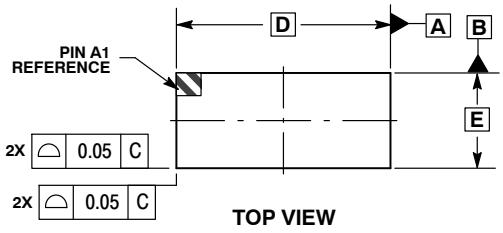
Figure 9. Lead−free (SnAgCu) Solder Ball Reflow Profile



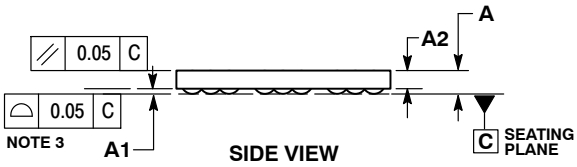
SCALE 4:1

WLCSP15, 2.36x1.05
CASE 567CM
ISSUE O

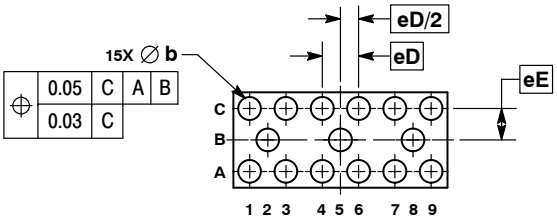
DATE 26 JUL 2010



TOP VIEW



SIDE VIEW

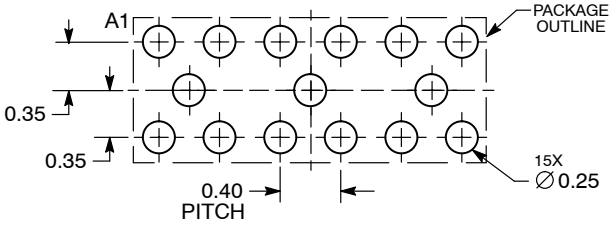


BOTTOM VIEW

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	0.22	0.30
A1	0.04	0.12
A2	0.20 REF	
b	0.23	0.28
D	2.36 BSC	
E	1.05 BSC	
eD	0.400 BSC	
eE	0.347 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.

DOCUMENT NUMBER:	**98AON50485E**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**WLCSP15, 2.36X1.05**		**PAGE 1 OF 1**

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales