CM1440

6-Channel EMI Filter Array with ESD Protection

ON Semiconductor®

http://onsemi.com

WLCSP15
CP SUFFIX
CASE 567BP

Product Description

The CM1440 is a six channel low−pass EMI filter array with ESD protection that reduces EMI/RFI emissions while providing robust protection from ESD strikes. Each EMI filter channel integrates a high quality pi−style filter (30 pF − 100 Ω − 30 pF) which provides greater than 30 dB of attenuation in the 800 MHz to 2.7 GHz frequency range. The parts include avalanche−type ESD 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 protection diodes connected to the filter ports safely dissipate ESD strikes of ±30 kV, 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.

This device is particularly well−suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of its small package and easy−to−use pin assignments. In particular, the CM1440 is ideal for EMI filtering and protecting data and control lines for the I/O data ports, LCD display and camera interface in mobile handsets.

The CM1440 incorporates *OptiGuard™* which results in improved reliability at assembly. The CM1440 is available in a space saving, low profile Chip Scale Package with RoHS−compliant lead−free finishing. It is manufactured with a 0.40 mm pitch and 0.25 mm CSP solder ball to provide up to 28% board space savings versus competing CSP devices with 0.50 mm pitch and 0.30 mm CSP solder ball.

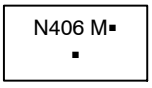
Features

- Six Channels of EMI Filtering for Data Ports
- Pi−Style EMI Filters in a Capacitor−Resistor−Capacitor (C−R−C) Network
- ±30 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Greater than 35 dB Attenuation (Typical) at 1 GHz
- 15−Bump, 0.4 mm pitch, 2.360 mm X 1.053 mm Footprint Chip Scale Package (CSP)
- Chip Scale Package Features Extremely Low Lead Inductance for Optimum Filter and ESD Performance
- *OptiGuard™* Coated for Improved Reliability at Assembly
- 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



N406 = CM1440−06CP
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
CM1440−06CP	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.

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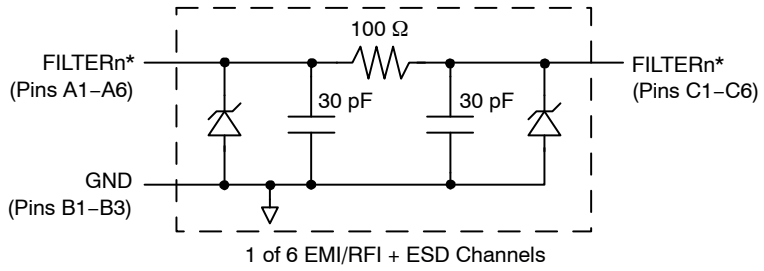
BLOCK DIAGRAM

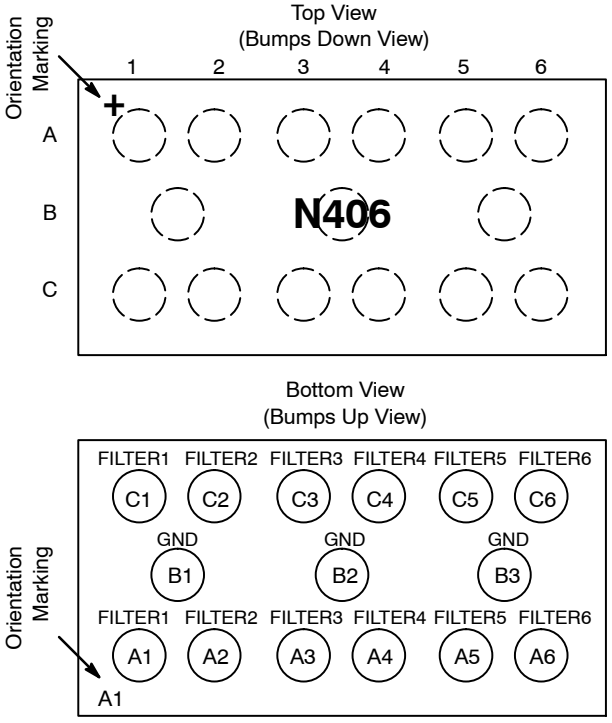


*See Package/Pinout Diagrams for expanded pin information.

Table 1. PIN DESCRIPTIONS

15−bump CSP Package		
Pin	**Name**	**Description**
A1	FILTER1	Filter Channel 1
A2	FILTER2	Filter Channel 2
A3	FILTER3	Filter Channel 3
A4	FILTER4	Filter Channel 4
A5	FILTER5	Filter Channel 5
A6	FILTER6	Filter Channel 6
B1−B3	GND	Device Ground
C1	FILTER1	Filter Channel 1
C2	FILTER2	Filter Channel 2
C3	FILTER3	Filter Channel 3
C4	FILTER4	Filter Channel 4
C5	FILTER5	Filter Channel 5
C6	FILTER6	Filter Channel 6

PACKAGE / PINOUT DIAGRAMS



CM1440−06CP
15 Bump CSP Package

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	48	60	72	pF
C	Capacitance	At 2.5 VDC Reverse Bias, 1 MHz, 30 mVAC	24	30	36	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	1.0	μA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	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	(Note 2)	 ±30 ±30			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 = 30 pF		 60		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.

PERFORMANCE INFORMATION

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

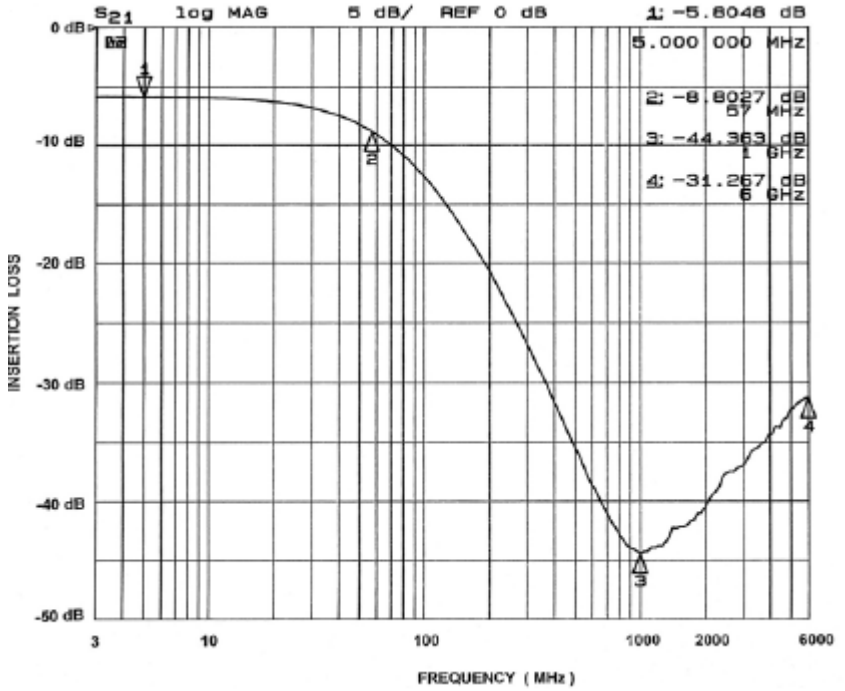


Figure 1. Insertion Loss vs. Frequency (A1−C1 to GND B1)

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

PERFORMANCE INFORMATION (Cont'd)

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

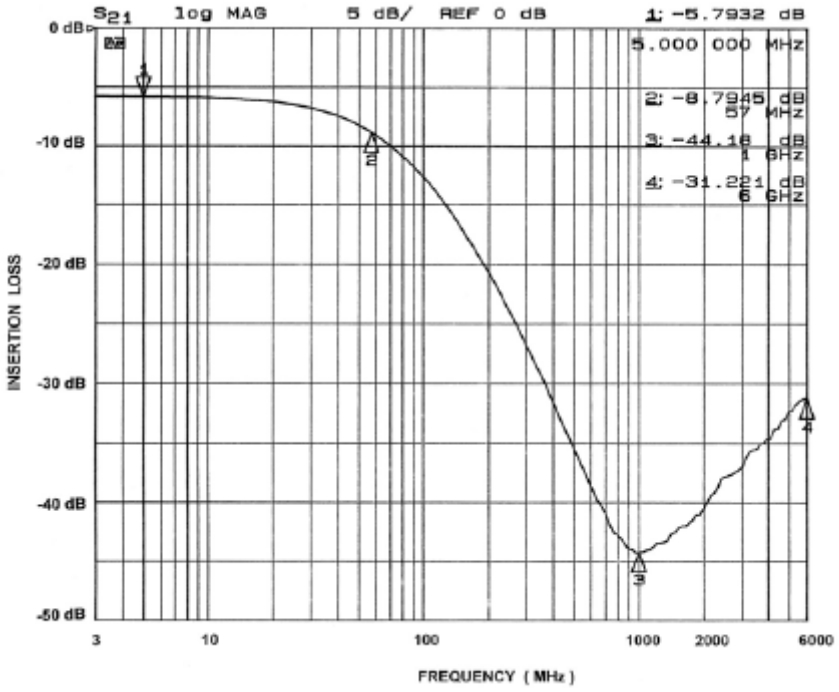


Figure 3. Insertion Loss vs. Frequency (A3−C3 to GND B2)

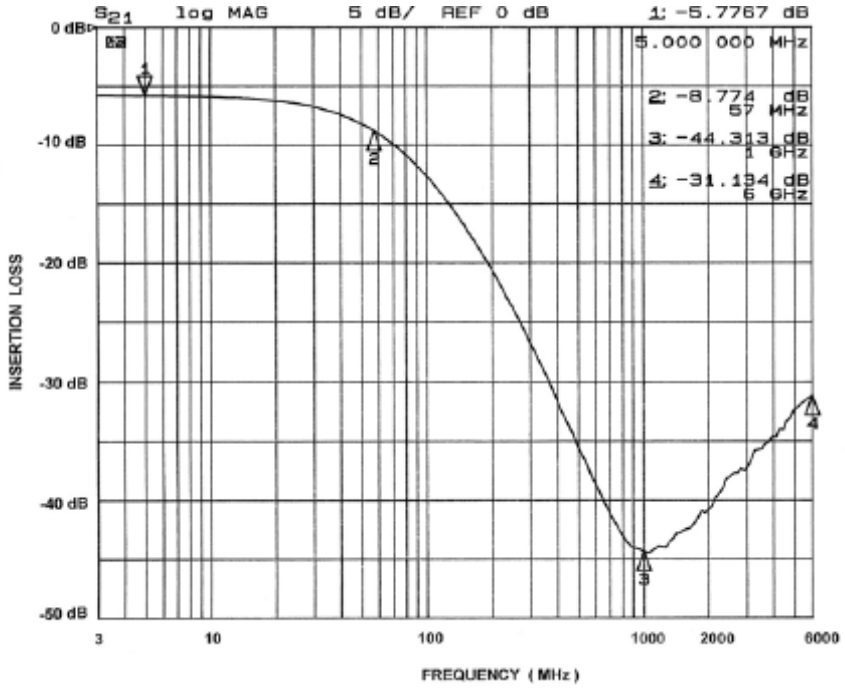


Figure 4. Insertion Loss vs. Frequency (A4−C4 to GND B2)

PERFORMANCE INFORMATION (Cont'd)

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

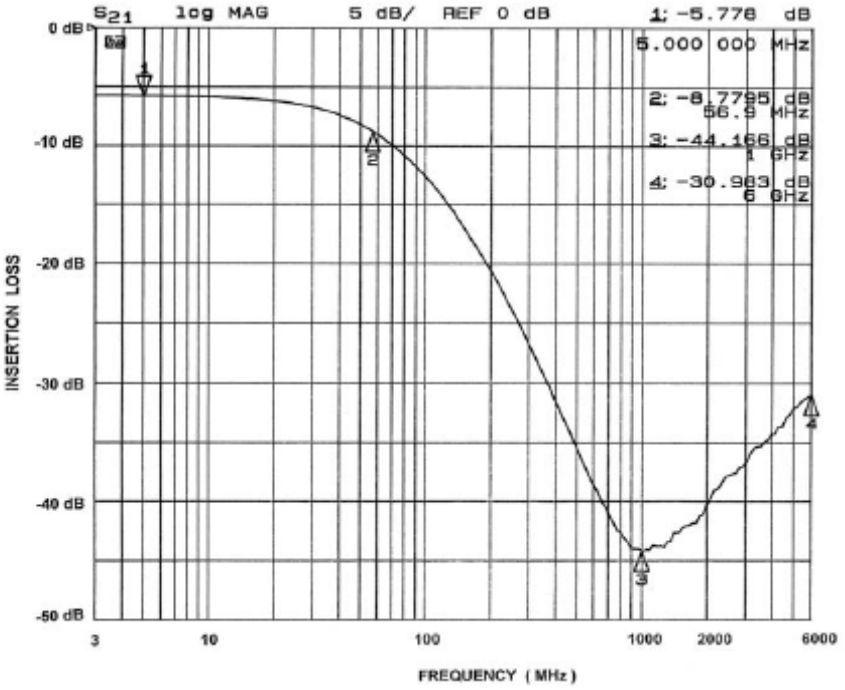


Figure 5. Insertion Loss vs. Frequency (A5−C5 to GND B3)

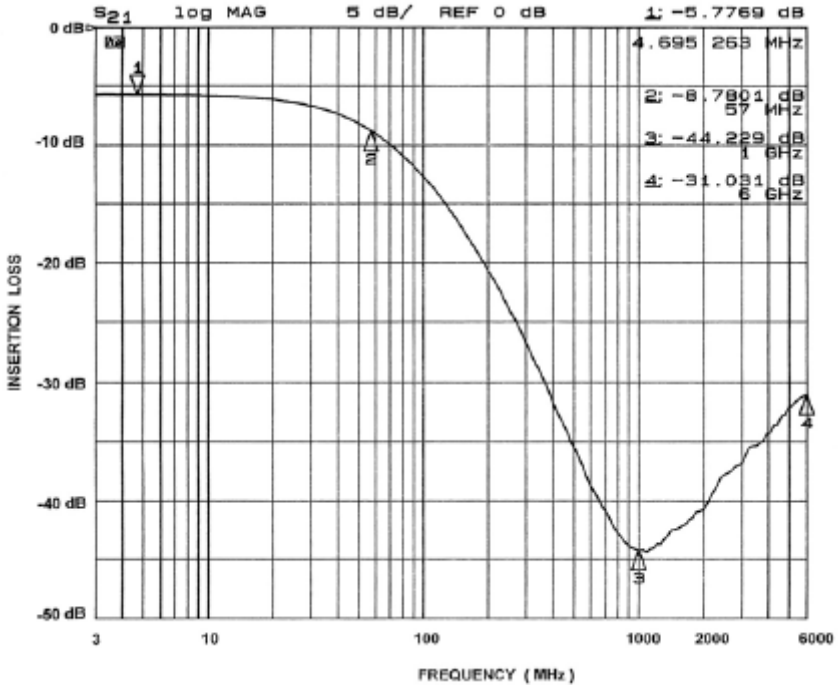


Figure 6. Insertion Loss vs. Frequency (A6−C6 to GND B3)

PERFORMANCE INFORMATION (Cont'd)

Typical Diode Capacitance vs. Input Voltage

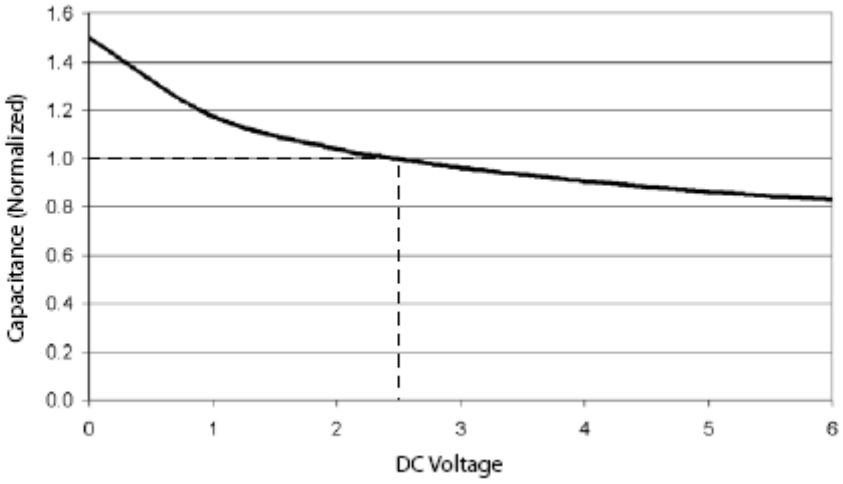


Figure 7. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5 VDC and 25°C)

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

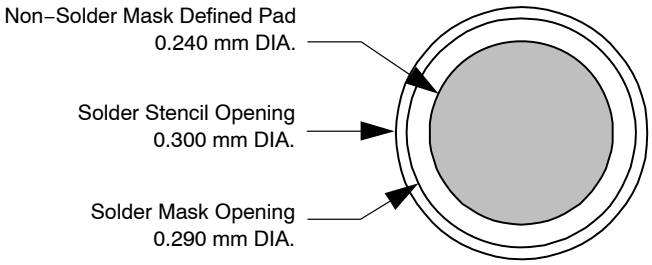


Figure 8. Recommended Non−Solder Mask Defined Pad Illustration

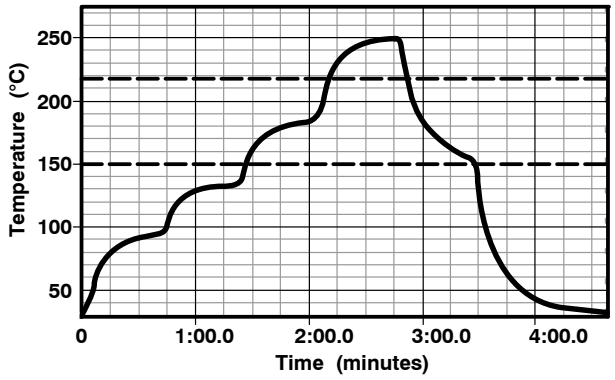


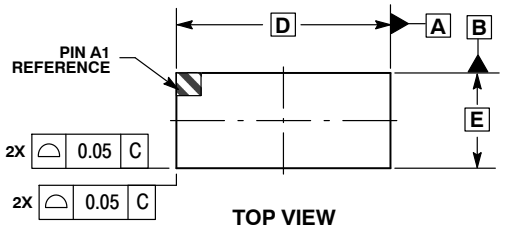
Figure 9. Lead−free (SnAgCu) Solder Ball Reflow Profile

OptiGuard™ is a trademark of Semiconductor Components Industries, LLC (SCILLC).

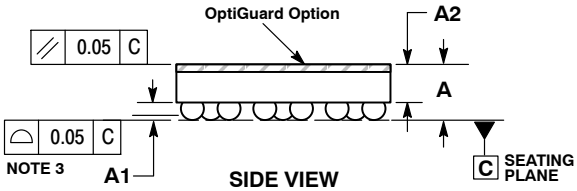
SCALE 4:1

WLCSP15, 2.36x1.05
CASE 567BP
ISSUE O

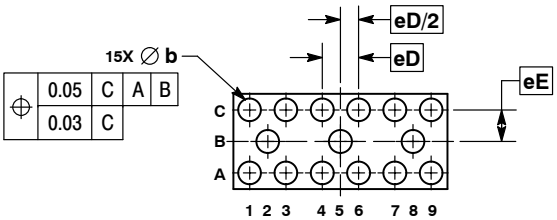
DATE 26 JUL 2010



TOP VIEW



SIDE VIEW

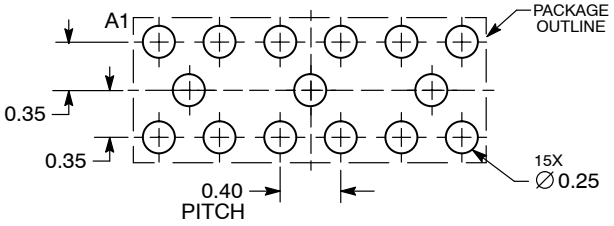


BOTTOM VIEW

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	0.57	0.72
A1	0.17	0.24
A2	0.42 REF	
b	0.24	0.29
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 **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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