ON Semiconductor®

LCD and Camera EMI Filter Array with ESD Protection

CM1442-06LP

Features

- Six channels of EMI filtering with integrated ESD protection
- 0.4mm pitch, 15-bump, 2.360mm x 1.053mm footprint Chip Scale Package (CSP)
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- ±15kV ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- ±30kV ESD protection on each channel (HBM)
- Greater than 30dB attenuation (typical) at 1 GHz
- RoHS-compliant, lead-free packaging

Applications

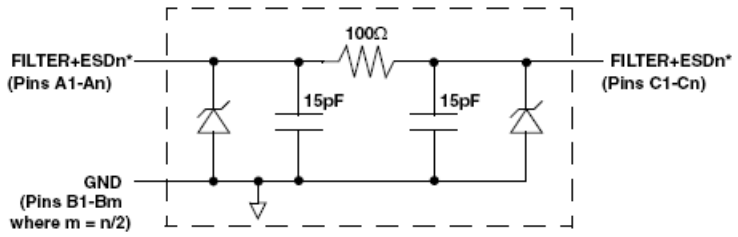
- LCD and camera data lines in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

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 0.40mm pitch. The CM1442-06LP (low profile) has component values of 15pF-100Ω-15pF per channel. The CM1442-06LP has a cut-off frequency of 120MHz and can be used in applications where the data rates are as high as 48Mbps. 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 ±15kV, 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 ±30kV.

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

Electrical Schematic



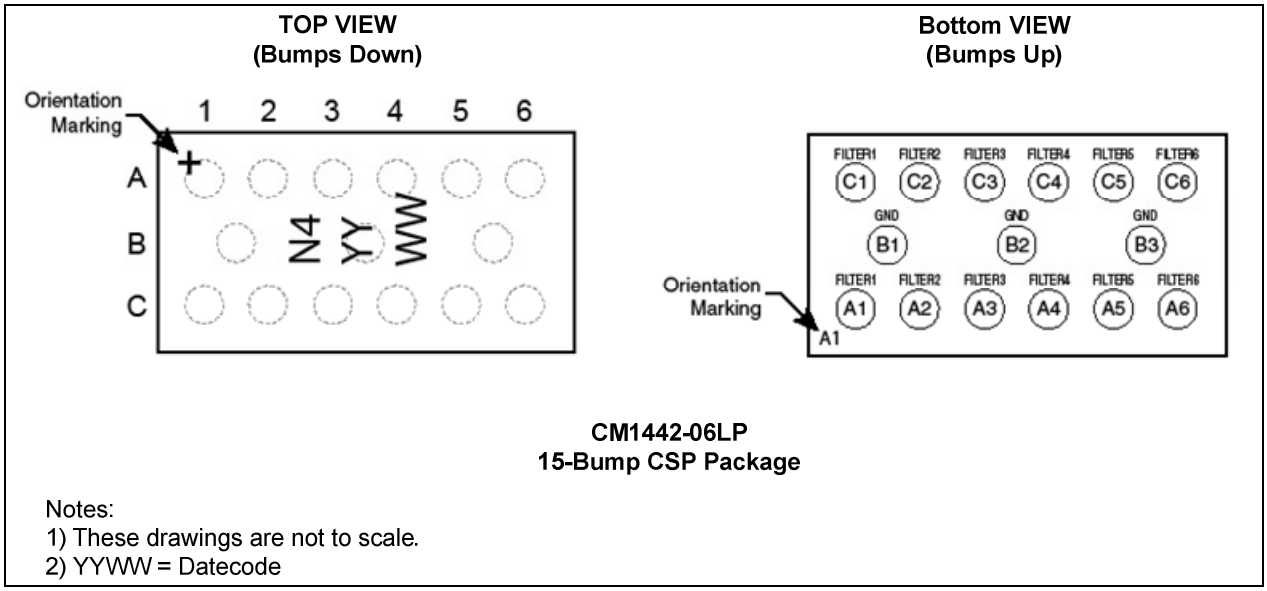
* See Package/Pinout Diagram for expanded pin information.

1 of 6 EMI/RFI + ESD Channels

Package/Pinout Diagrams

March 2010 Rev. 3

Publication Order Number:
CM1442-06LP/D



CM1442-06LP
15-Bump CSP Package

Notes:
1) These drawings are not to scale.
2) YYWW = Datecode

Pin Descriptions

PIN(s)	NAME	DESCRIPTION		PIN(s)	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				

Ordering Information

Bumps	Package	Order Part Number[1]	Part Marking
15	CSP	CM1442-06LP	N4

Note 1: Parts are shipped in tape and reel form unless otherwise specified.

Absolute Maximum Ratings

PARAMETER	RATING	UNITS
Storage Temperature Range	-65 to +150	℃
DC Power per Resistor	100	mW
DC Package Power Rating	500	mW

Standard Operating Conditions

PARAMETER	RATING	UNITS
Operating Temperature Range	-40 to +85	℃

Electrical Specifications

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
R	Resistance		80	100	120	Ω
C_{TOTAL}	Total Channel Capacitance	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	24	30	36	pF
C	Capacitance C1	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	12	15	18	pF
V_{DIODE}	Standoff Voltage	I_{DIODE}=10μA		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE}= +3.3V		0.1	1	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) 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 kV
R_{DYN}	Dynamic Resistance Positive Negative			 2.3 0.9		 Ω Ω
f_C	Cut-off Frequency Z_{SOURCE}=50Ω, Z_{LOAD}=50Ω	R=100Ω, C=15pF		 115		 MHz

Note 1: T_A=25℃ 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.

Performance Information

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

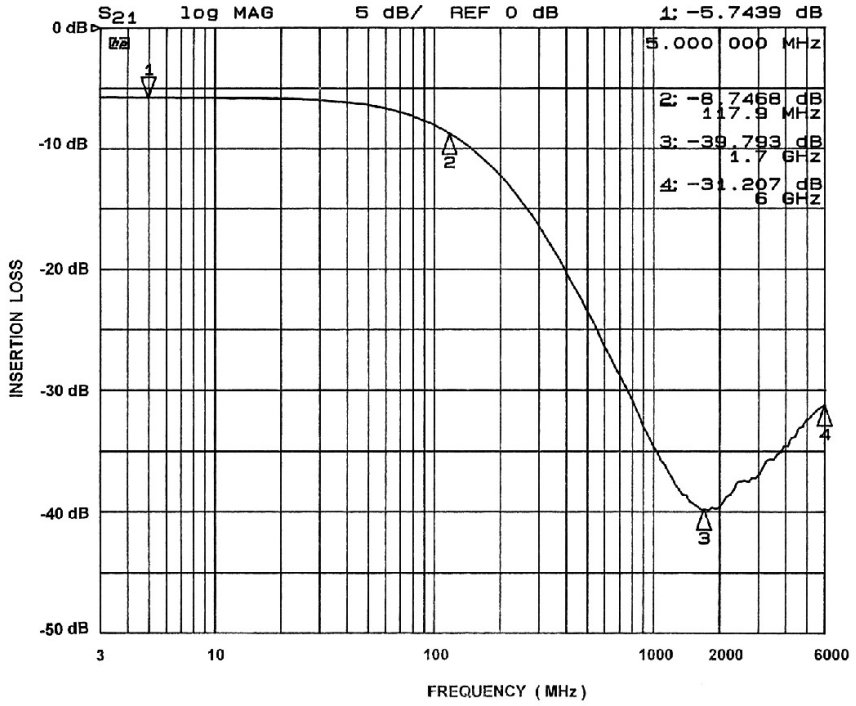


Figure 1. Insertion Loss vs. Frequency (A1-C1 to GND B1)

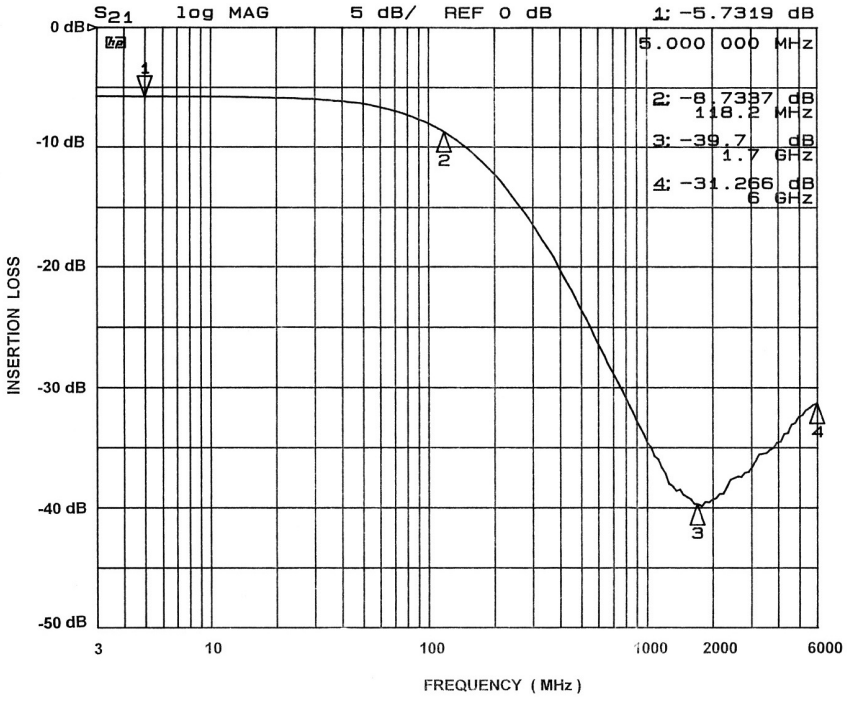


Figure 2. Insertion Loss vs. Frequency (A2-C2 to GND B1)

Performance Information (cont'd)

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

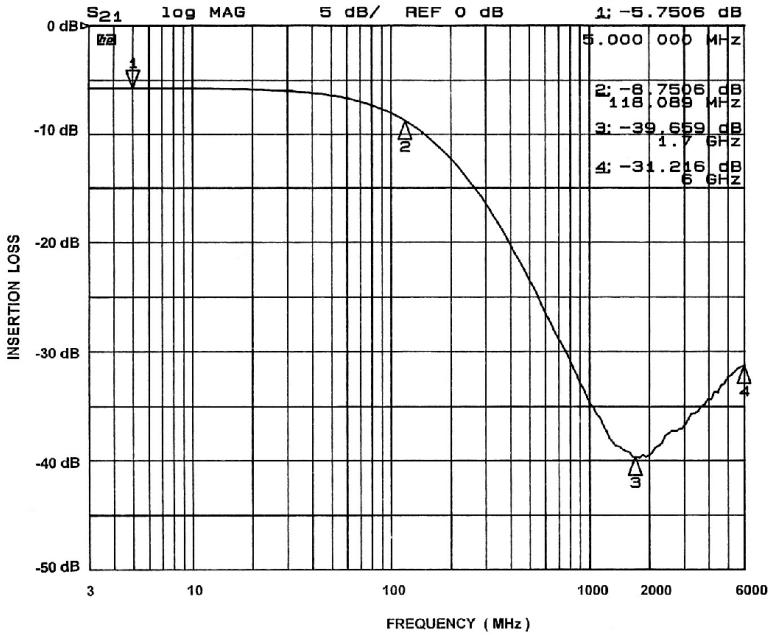


Figure 3. Insertion Loss vs. Frequency (A3-C3 to GND B2)

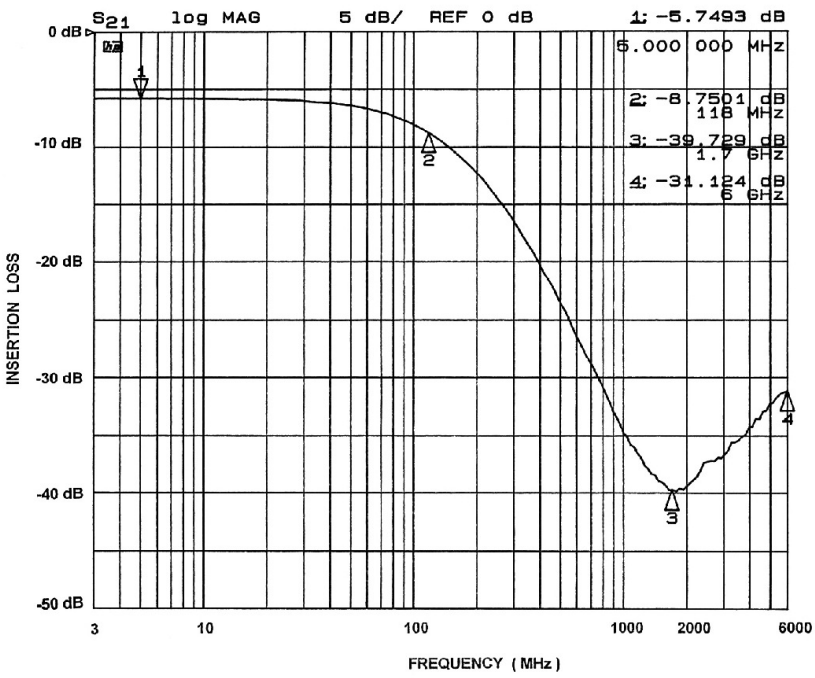


Figure 4. Insertion Loss vs. Frequency (A4-C4 to GND B2)

Performance Information (cont'd)

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

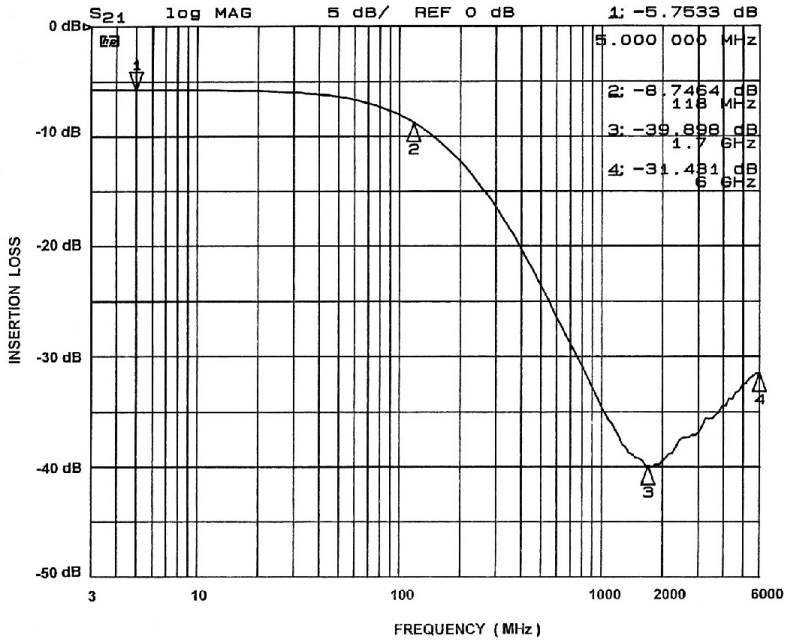


Figure 5. Insertion Loss vs. Frequency (A5-C5 to GND B3)

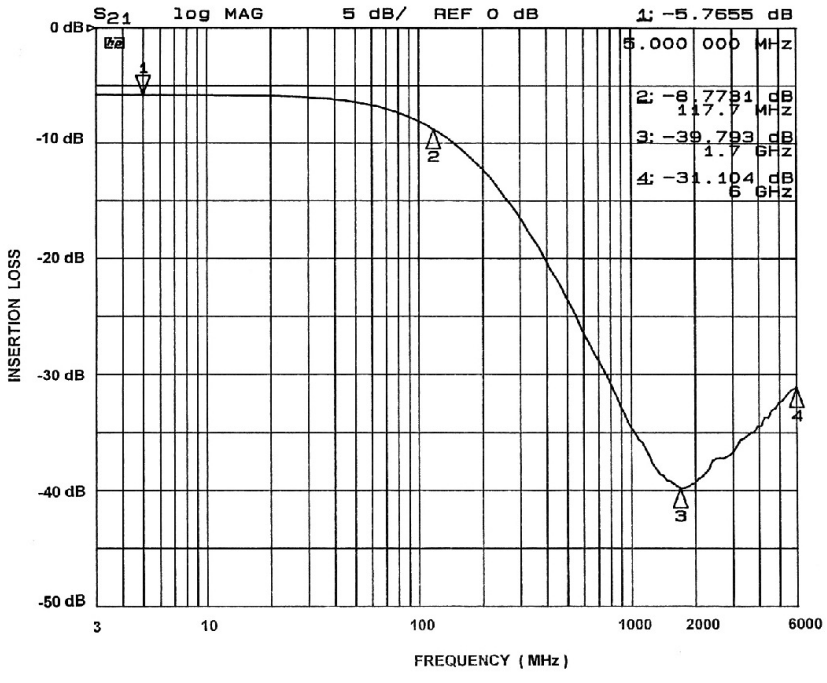


Figure 6. Insertion Loss vs. Frequency (A6-C6 to GND B3)

Performance Information (cont'd)

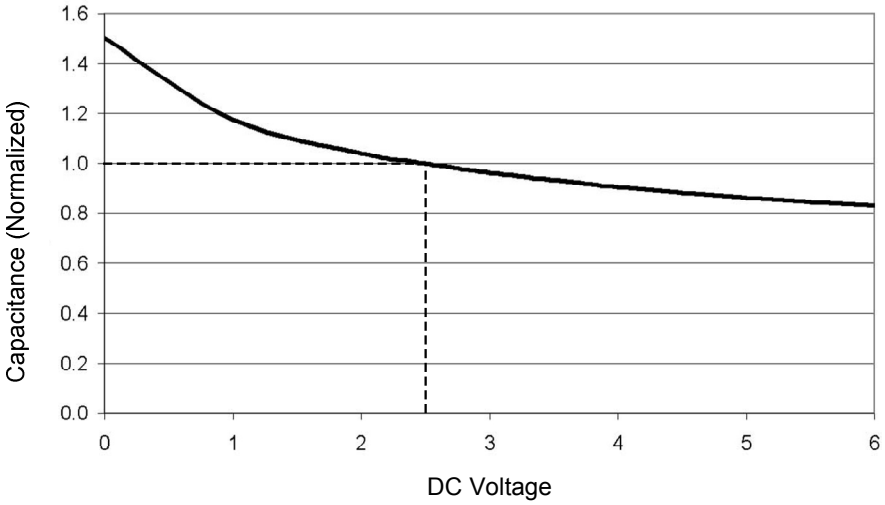


Figure 7. Filter Capacitance vs. Input Voltage (Normalized to capacitance at 2.5VDC and 25°C)

Application Information

PARAMETER	VALUE
Pad Size on PCB	0.240mm
Pad Shape	Round
Pad Definition	Non-Solder Mask defined pads
Solder Mask Opening	0.290mm Round
Solder Stencil Thickness	0.125mm - 0.150mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300mm 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	±50µm
Solder Ball Side Coplanarity	±20µm
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead-free Devices using a Lead-free Solder Paste	260°C

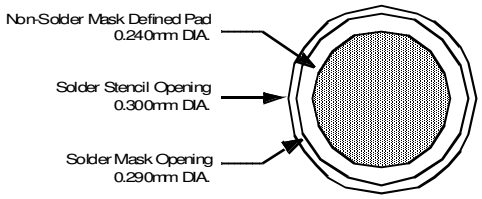


Figure 8. Recommended Non-Solder Mask Defined Pad Illustration

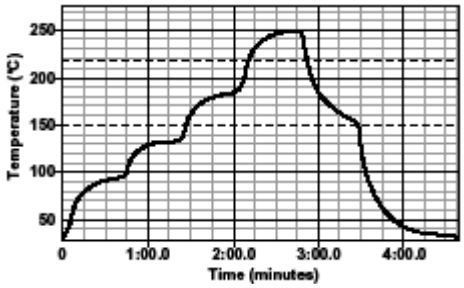
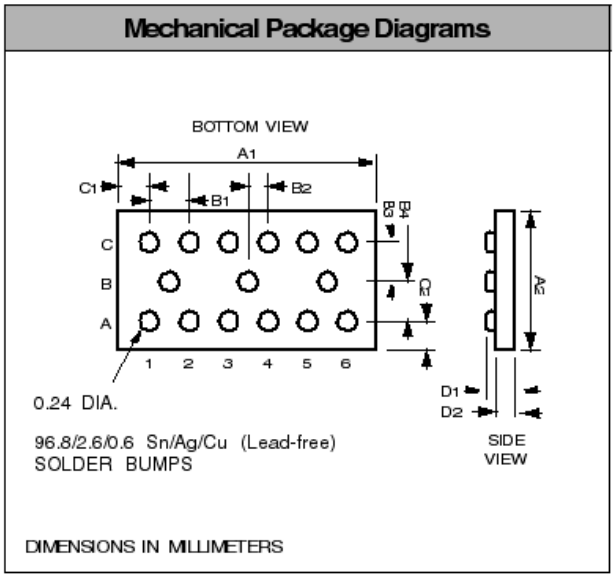


Figure 9. Lead-free (SnAgCu) Solder Ball Reflow Profile

Package Dimensions

The CM1442-06LP is supplied in custom Chip Scale Packages (CSP). Dimensions are presented below.

Package		Custom CSP				
Bumps		15				
Dim	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A1	2.315	2.360	2.405	0.911	0.0929	0.0947
A2	1.008	1.053	1.098	0.0397	0.0415	0.0432
B1	0.395	0.4000	0.405	0.0156	0.0157	0.0159
B2	0.195	0.2000	0.205	0.0076	0.0078	0.0080
B3	0.3415	0.3465	0.3515	0.0134	0.0136	0.0138
B4	0.3415	0.3465	0.3515	0.0134	0.0136	0.0138
C1	0.130	0.1800	0.230	0.0051	0.0071	0.0091
C2	0.130	0.1800	0.230	0.0051	0.0071	0.0091
D1	0.224	0.262	0.300	0.088	0.0103	0.0118
D2	0.191	0.203	0.216	0.0075	0.0080	0.0085
# per tape and reel		3500 pieces				
Controlling dimension: millimeters						



Package Dimensions for CM1442-06LP Chip Scale Package

Tape and Reel Specifications

PART NUMBER	PACKAGE 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
CM1442-06LP	2.36 X 1.053 X 0.262	2.59 X 1.15 X 0.40	8mm	178mm (7")	3500	4mm	4mm

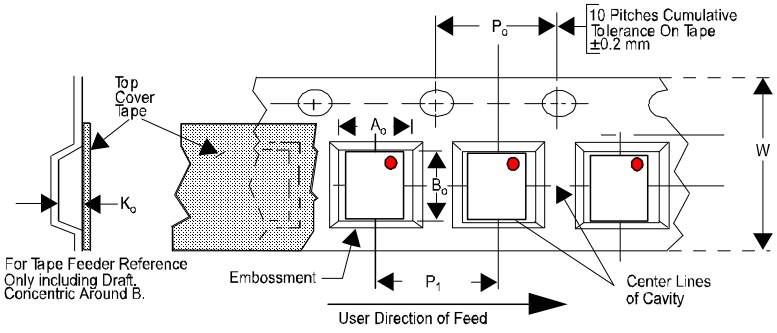


Figure 10. Tape and Reel Mechanical Data

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
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