ON Semiconductor®

LCD and Camera EMI Filter Array with ESD Protection

CM1630

Features

- Four, six and eight channels of EMI filtering with integrated ESD protection
- 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 25dB attenuation (typical) at 1 GHz
- UDFN package with 0.40mm lead pitch:
  - 4-ch. = 8-lead UDFN
  - 6-ch. = 12-lead UDFN
  - 8-ch. = 16-lead UDFN
- Tiny UDFN package size:
  - 8-lead: 1.7mm x 1.35mm x 0.5mm
  - 12-lead: 2.5mm x 1.35mm x 0.5mm
  - 16-lead: 3.3mm x 1.35mm x 0.5mm
- Increased robustness against vertical impacts during manufacturing process
- Lead-free version available

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

Product Description

The CM1630 is a family of pi-style EMI filter arrays with ESD protection, which integrates four, six and eight filters (C-R-C) in small form factor UDFN 0.40mm pitch packages. The CM1630 has component values of 8.5pF-100Ω-8.5pF per channel. The CM1630 has a cut-off frequency of 200MHz and can be used in applications with data rates up to 80Mbps. The parts include 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 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.

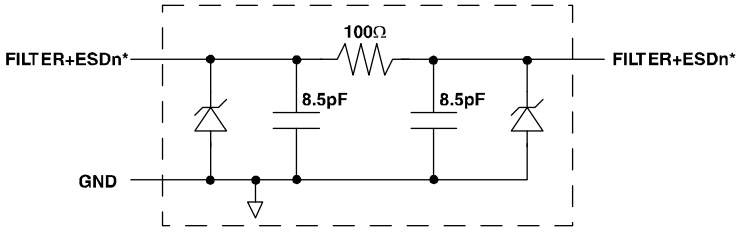
These devices are particularly well-suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of their small package and easy-to-use pin assignments. In particular, the CM1630 is ideal for EMI filtering and protecting data and control lines for the I/O data ports, LCD display and camera interface in mobile handsets.

The CM1630 is housed in space-saving, low-profile 8-, 12- and 16-lead UDFN packages with a 0.4mm pitch and is available with lead-free finishing. This new small UDFN package provides up to 42% board space savings vs. the 0.50mm pitch UDFN packages.

May 2010 – Rev. 2

Publication Order Number:
CM1630/D

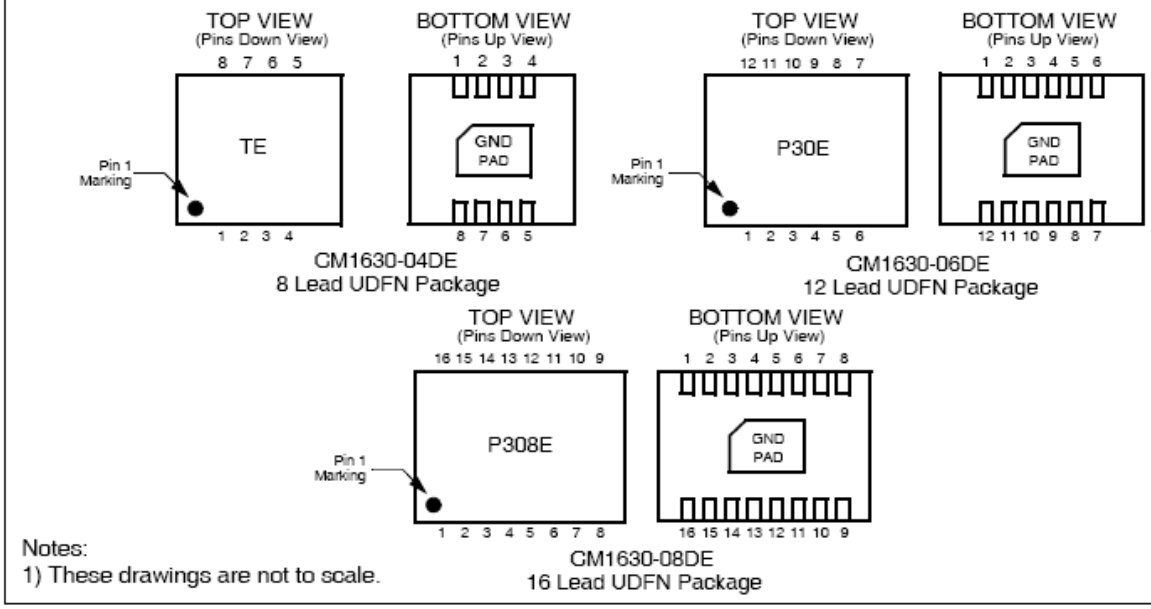
Electrical Schematic



1 of 4, 6 or 8 EMI/RFI Filter Channels with Integrated ESD Protection

*** See Package/Pinout Diagram for expanded pin information.**

PACKAGE / PINOUT DIAGRAMS



Notes:
1) These drawings are not to scale.

PIN DESCRIPTIONS										
DEVICE PIN(s)			NAME	DESCRIPTION		DEVICE PIN(s)			NAME	DESCRIPTION
-04	-06	-08				-04	-06	-08		
1	1	1	FILTER1	Filter + ESD Channel 1		8	12	16	FILTER1	Filter + ESD Channel 1
2	2	2	FILTER2	Filter + ESD Channel 2		7	11	15	FILTER2	Filter + ESD Channel 2
3	3	3	FILTER3	Filter + ESD Channel 3		6	10	14	FILTER3	Filter + ESD Channel 3
4	4	4	FILTER4	Filter + ESD Channel 4		5	9	13	FILTER4	Filter + ESD Channel 4
	5	5	FILTER5	Filter + ESD Channel 5			8	12	FILTER5	Filter + ESD Channel 5
	6	6	FILTER6	Filter + ESD Channel 6			7	11	FILTER6	Filter + ESD Channel 6
		7	FILTER7	Filter + ESD Channel 7				10	FILTER7	Filter + ESD Channel 7
		8	FILTER8	Filter + ESD Channel 8				9	FILTER8	Filter + ESD Channel 8
GND PAD			GND	Device Ground						

Ordering Information

PART NUMBERING INFORMATION			
		Lead-free Finish	
Pins	Package	Ordering Part Number[1]	Part Marking
8	UDFN-8	CM1630-04DE	TE
12	UDFN-12	CM1630-06DE	P30E
16	UDFN-16	CM1630-08DE	P308E

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

Specifications

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

STANDARD OPERATING CONDITIONS

PARAMETER	RATING	UNITS
Operating Temperature Range	-40 to +85	°C

ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE1)

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	14	17	22	pF
C	Capacitance C1	At 2.5VDC Reverse Bias, 1MHz, 30mVAC	7	8.5	11	pF
V_{DIODE}	Standoff Voltage	I_{DIODE}=10μA		6.0		V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE}=+3.3V		0.1	1.0	μA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10mA I_{LOAD} = -10mA	 5.6 -0.4	 6.8 -0.8		 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	Note 2	 ±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	Channel R = 100Ω, Channel C = 8.5pF		 200		 MHz
A_{1GHz}	Absolute Attenuation @ 1GHz from 0dB Level	Z_{SOURCE} = 50Ω, Z_{LOAD} = 50Ω, DC Bias = 0V; Notes 1 and 3		30		dB
$A_{800MHz - 6GHz}$	Absolute Attenuation @ 800MHz to 6GHz from 0dB Level	Z_{SOURCE} = 50Ω, Z_{LOAD} = 50Ω, DC Bias = 0V; Notes 1 and 3		25		dB

Note 1: T_A=25°C unless otherwise specified.
Note 2: ESD applied to input and output pins with respect to GND, one at a time.
Note 3: Attenuation / RF curves characterized by a network analyzer using microprobes.

Performance Information

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

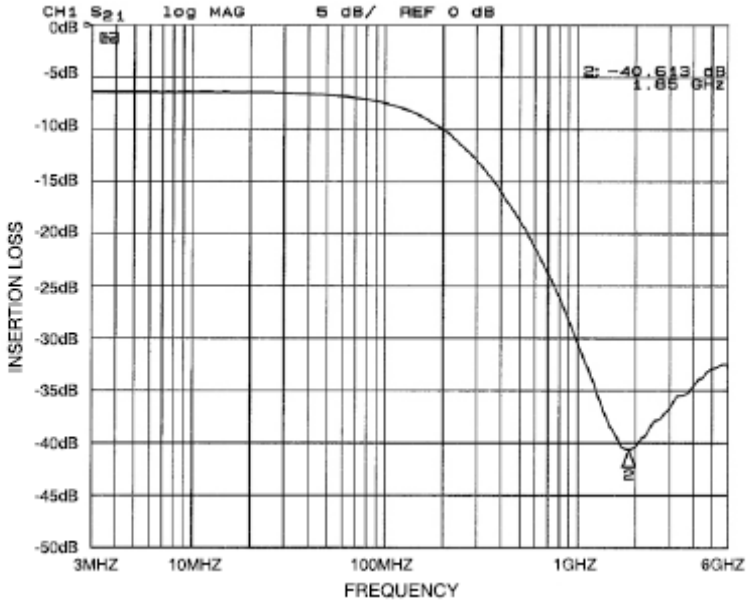


Figure 1. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1436-04DE)

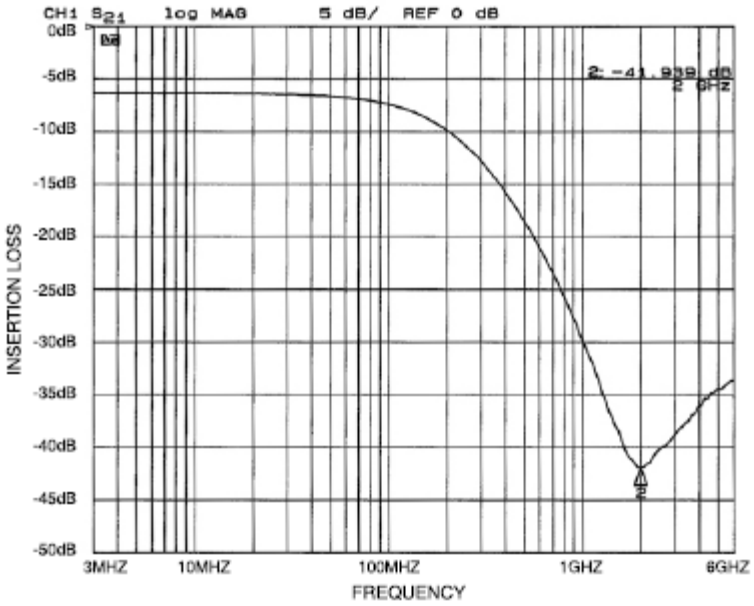


Figure 2. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1436-04DE)

Performance Information (cont'd)

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

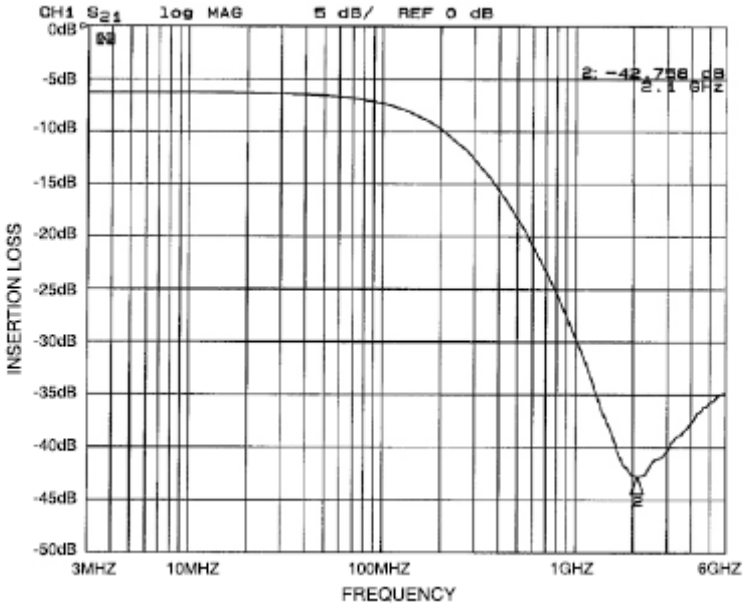


Figure 3. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1436-04DE)

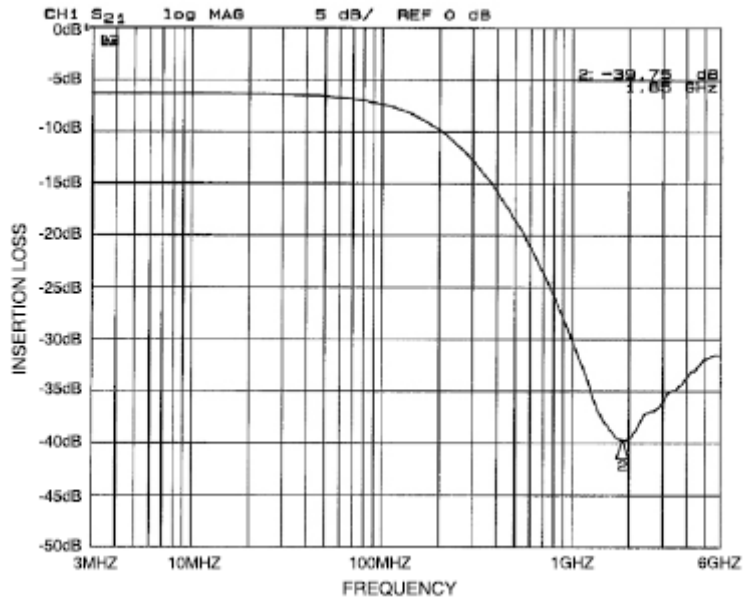


Figure 4. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1436-04DE)

Performance Information (cont'd)

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

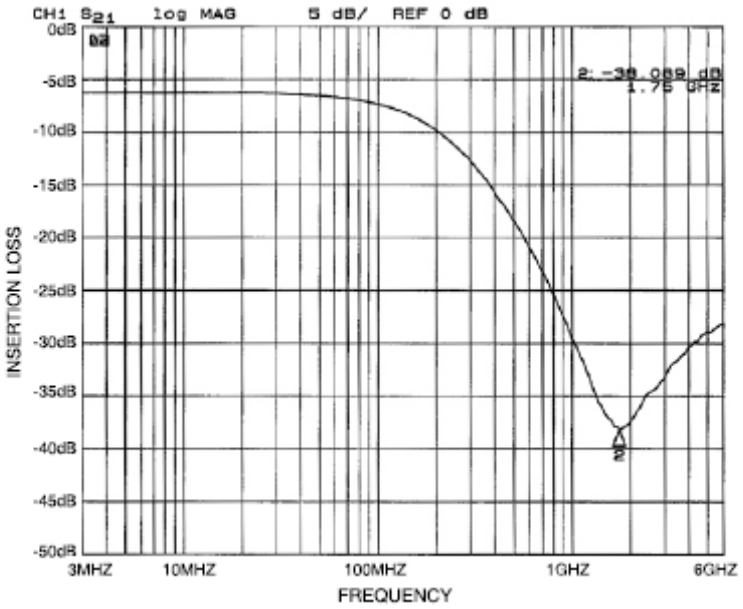


Figure 5. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1436-06DE)

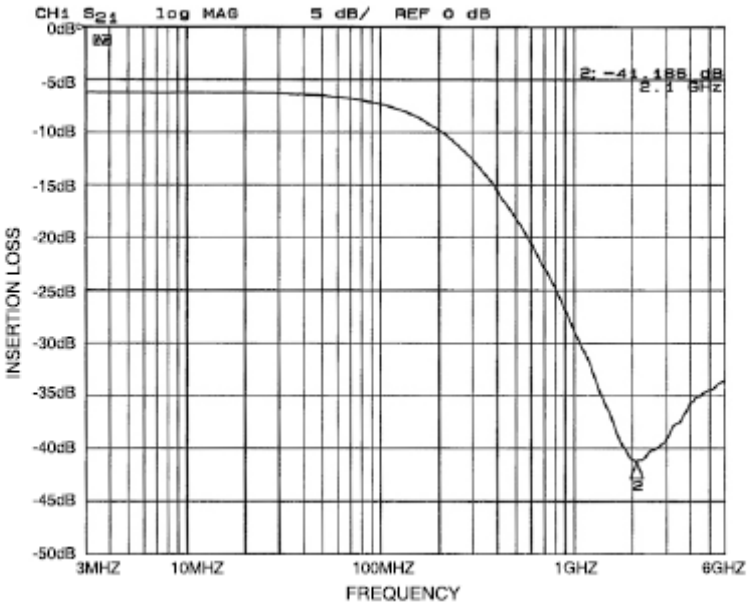


Figure 6. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1436-06DE)

Performance Information (cont'd)

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

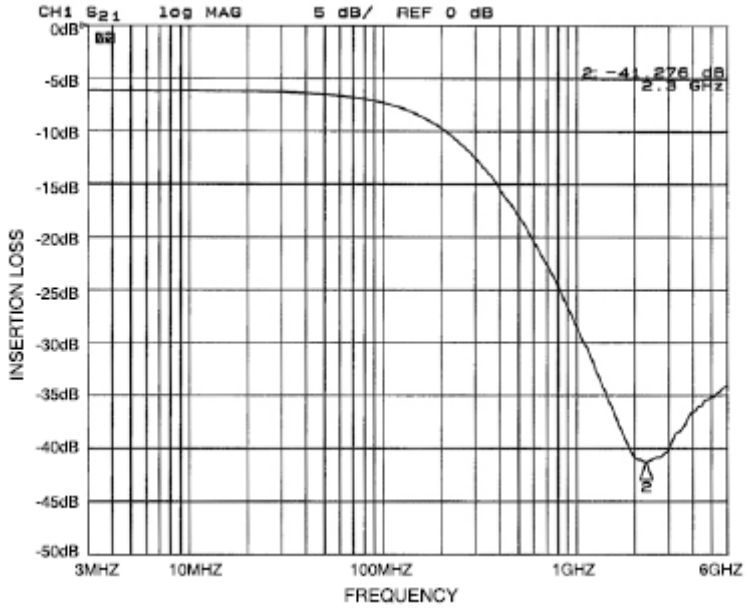


Figure 7. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1436-06DE)

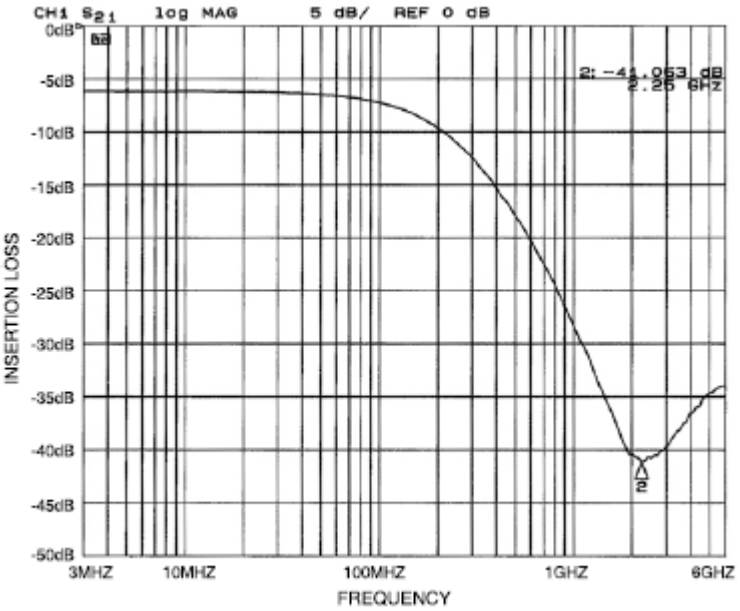


Figure 8. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1436-06DE)

Performance Information (cont'd)

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

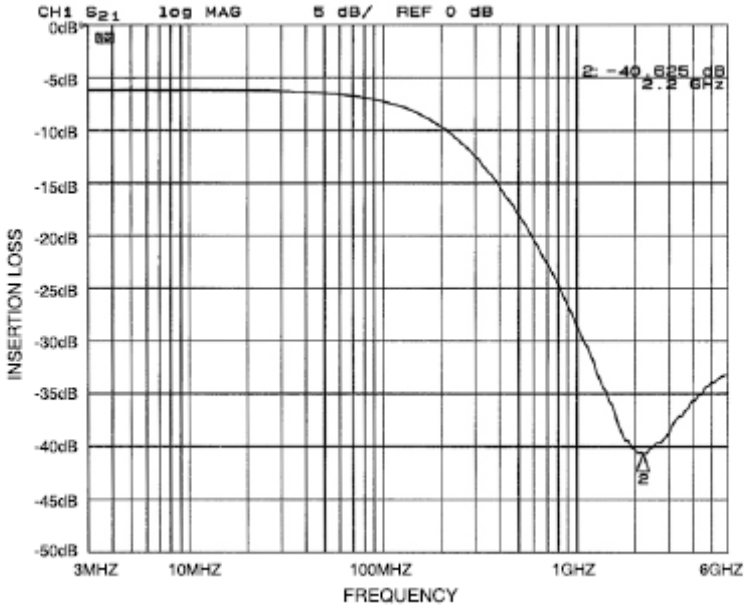


Figure 9. Insertion Loss vs. Frequency (FILTER5 Input to GND, CM1436-06DE)

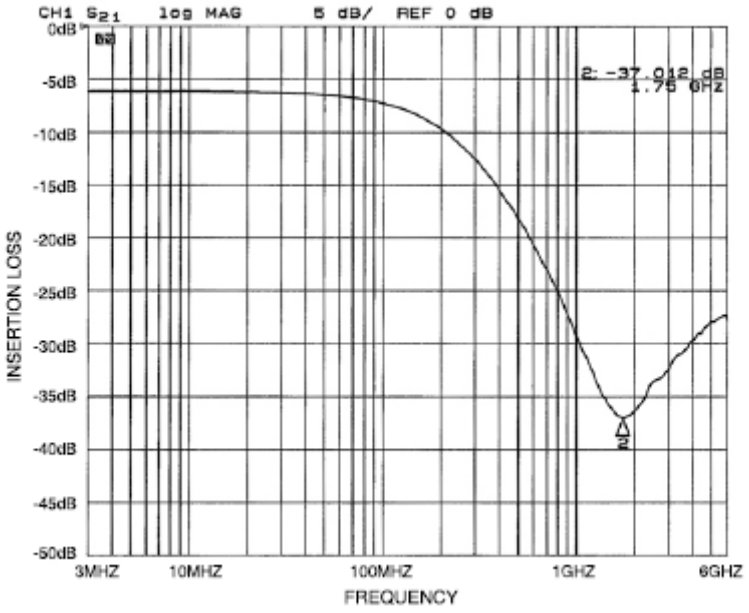


Figure 10. Insertion Loss vs. Frequency (FILTER6 Input to GND, CM1436-06DE)

Performance Information (cont'd)

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

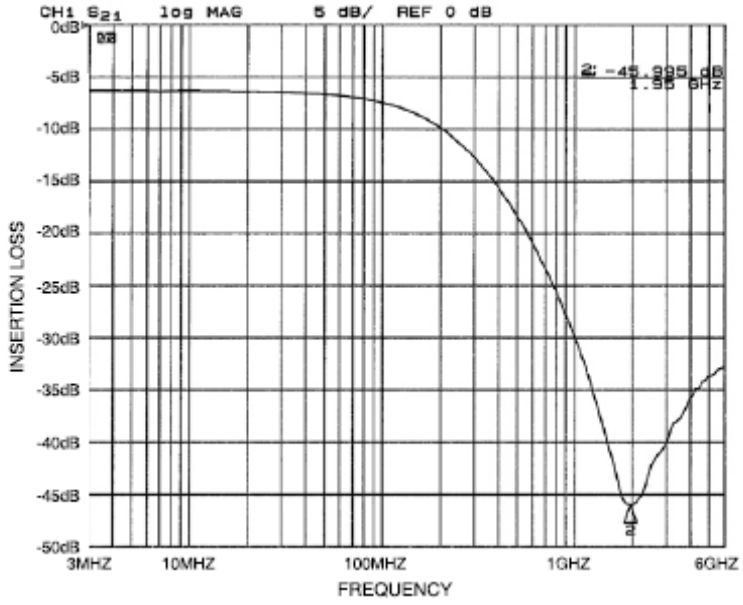


Figure 11. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1436-08DE)

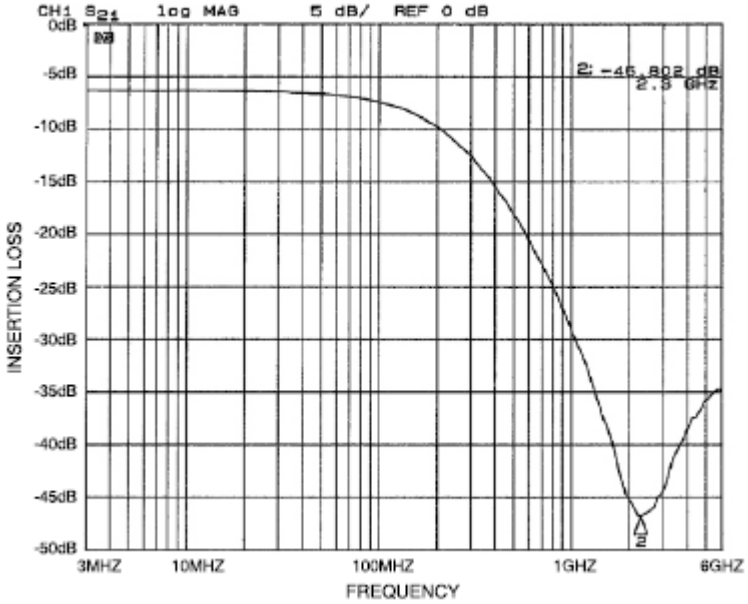


Figure 12. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1436-08DE)

Performance Information (cont'd)

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

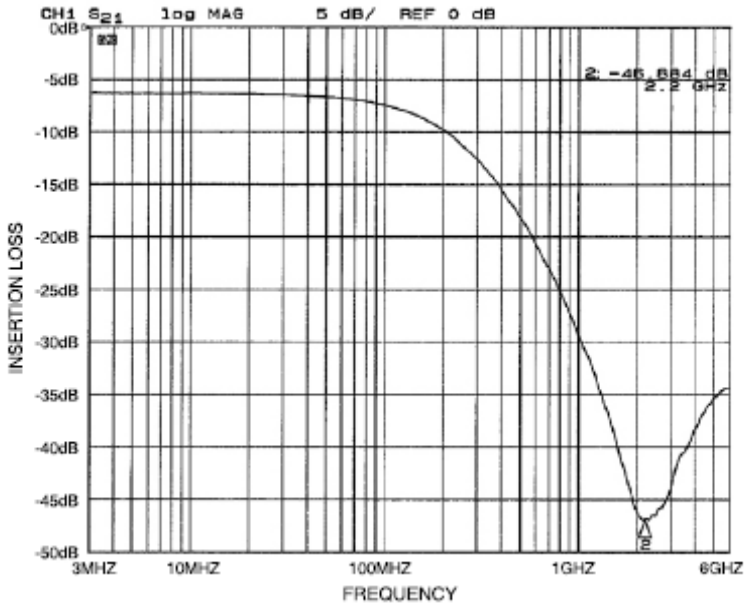


Figure 13. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1436-08DE)

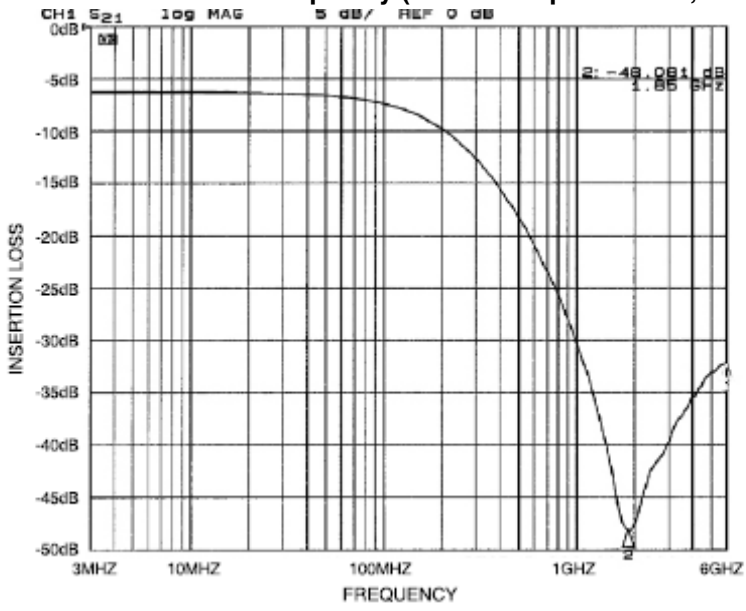


Figure 14. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1436-08DE)

Performance Information (cont'd)

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

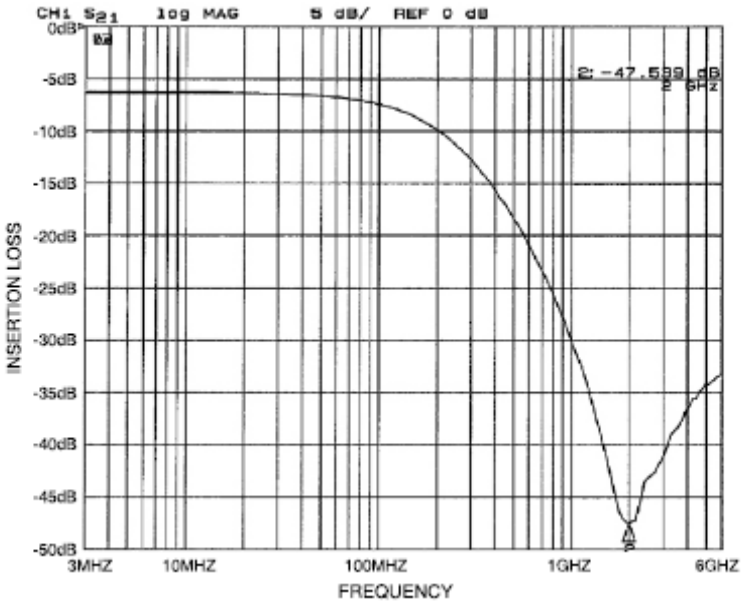


Figure 15. Insertion Loss vs. Frequency (FILTER5 Input to GND, CM1436-08DE)

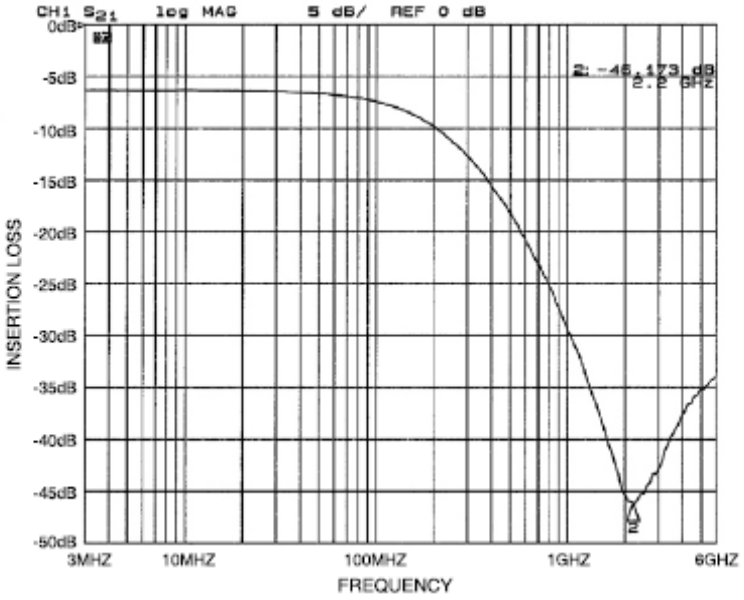


Figure 16. Insertion Loss vs. Frequency (FILTER6 Input to GND, CM1436-08DE)

Performance Information (cont'd)

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

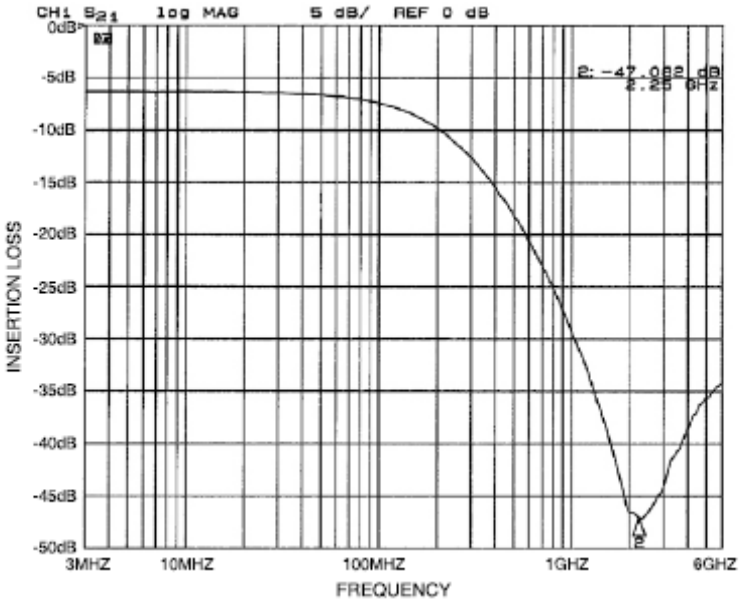


Figure 17. Insertion Loss vs. Frequency (FILTER7 Input to GND, CM1436-08DE)

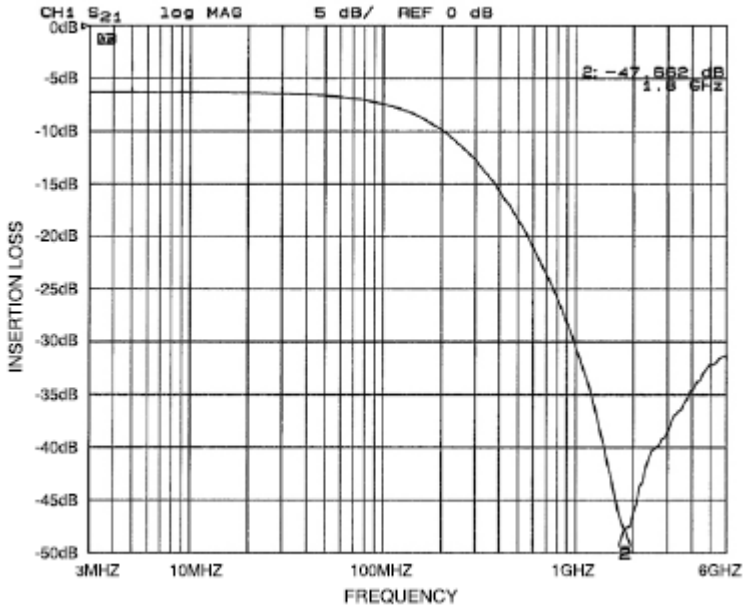


Figure 18. Insertion Loss vs. Frequency (FILTER8 Input to GND, CM1436-08DE)

Performance Information (cont'd)

Typical Diode Capacitance vs. Input Voltage

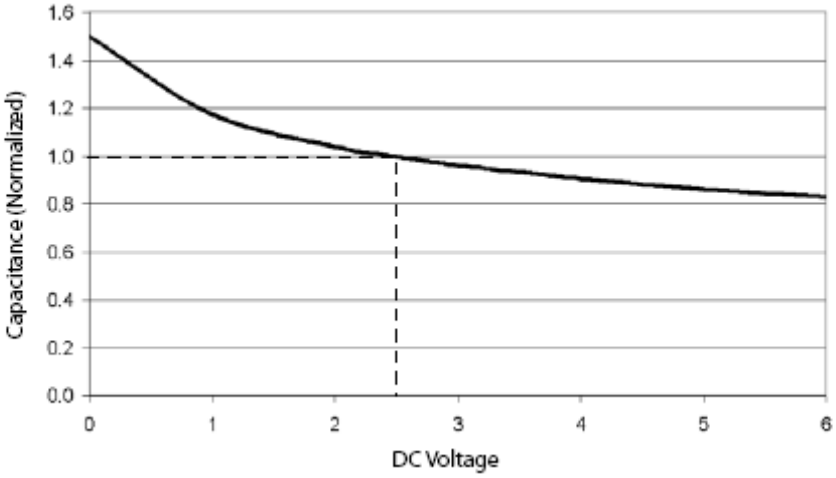


Figure 19. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5VDC and 25°C)

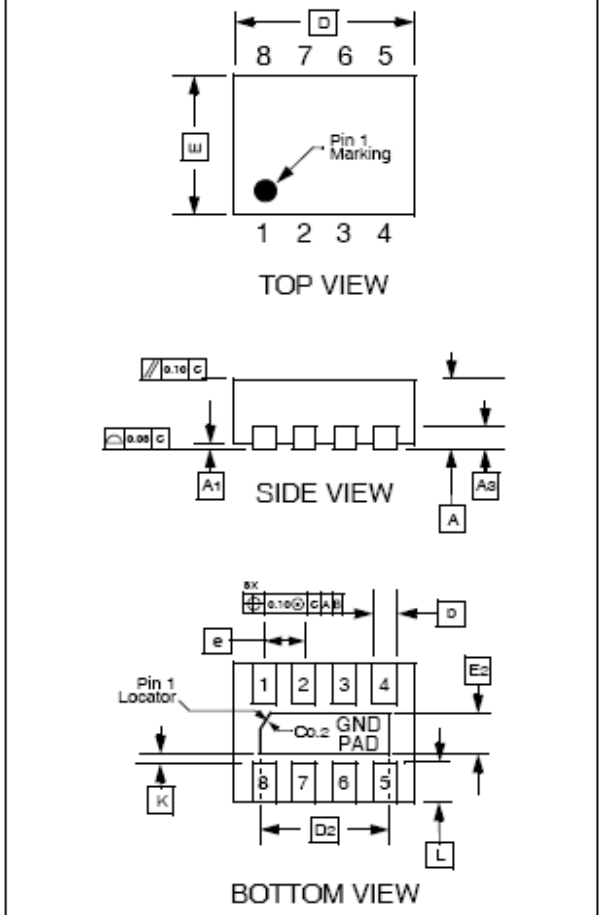
Mechanical Details

UDFN-08 Mechanical Specifications

Dimensions for the CM1630 supplied in a 8-lead, 0.4mm pitch UDFN package are presented below.

PACKAGE DIMENSIONS						
Package	UDFN					
JEDEC No.	MO-229C[†]					
Leads	8					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.60	1.70	1.80	0.063	0.067	0.071
D2	1.10	1.20	1.30	0.043	0.047	0.051
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



Dimensions for 8-Lead, 0.4mm pitch UDFN package

[=] This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.

Mechanical Details (cont'd)

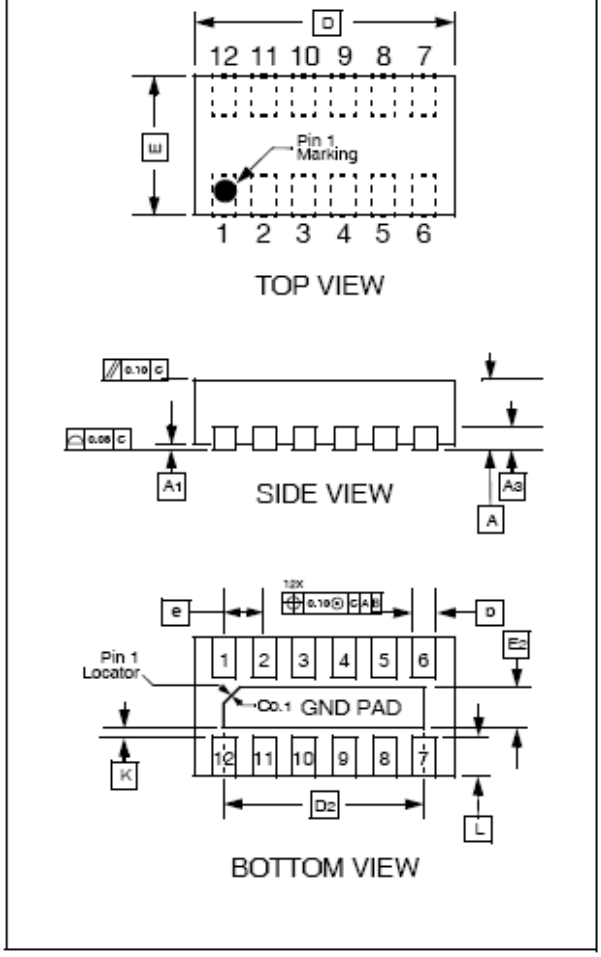
UDFN-12 Mechanical Specifications

Dimensions for the CM1630 suplied in a 12-lead, 0.4mm pitch UDFN package are presented below.

PACKAGE DIMENSIONS						
Package	UDFN					
JEDEC No.	MO-229C[†]					
Leads	12					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	2.40	2.50	2.60	0.094	0.098	0.102
D2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

[†]This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.

Mechanical Package Diagrams



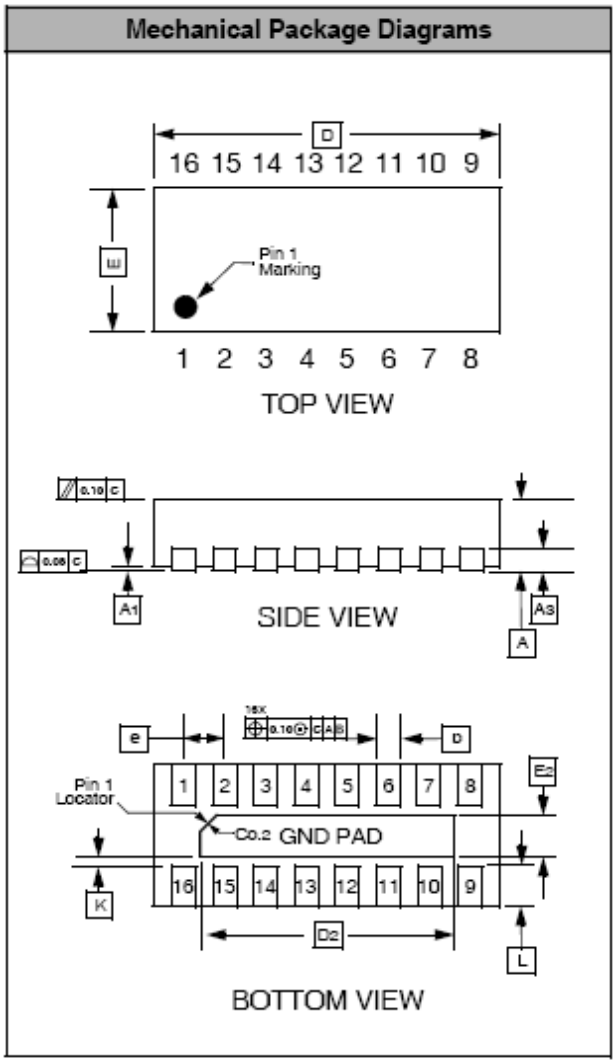
Dimensions for 12-Lead, 0.4mm pitch UDFN package

Mechanical Details (cont'd)

UDFN-16 Mechanical Specifications

Dimensions for the CM1630 supplied in a 16-lead, 0.4mm pitch UDFN package are presented below.

PACKAGE DIMENSIONS						
Package	UDFN					
JEDEC No.	MO-229C†					
Leads	16					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	3.20	3.30	3.40	0.126	0.130	0.134
D2	2.70	2.80	2.90	0.106	0.110	0.114
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						



Dimensions for 16-Lead, 0.4mm pitch UDFN package

†This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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P.O. Box 5163, Denver, Colorado 80217 USA
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Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

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