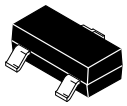
CM1214

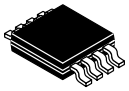
1 and 2-Channel AC Signal ESD Protector

ON Semiconductor®

http://onsemi.com



SOT−23
SO SUFFIX
CASE 419AH



MSOP−8
MR SUFFIX
CASE 846AD

Product Description

The CM1214 ESD protector guards bipolar signal lines against electrostatic discharge (ESD). The CM1214 allows operation in high−speed environments with signals levels up to ±5 V. The low sub−1 pF loading capacitance makes the CM1214−01SO ideal for protecting high−speed interfaces including RF switches and amplifiers. The CM1214−02MR is ideal for dual high−speed signal pairs used in Gigabit Ethernet, ADSL, etc. The CM1214−02MR can also be used for higher transmit voltage applications by connecting the two channels in series.

The CM1214−01SO is a single channel ESD protector available in a 3−lead SOT23−3 package. The CM1214−02MR is a dual channel ESD protector and is available in an 8−lead MSOP−8 package.

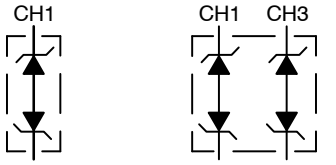
Features

- Single Channel ESD Protection for an AC Signal Up to ±5 V for 0.25 W Transmit Power
- Connects Two Channels in Series for Signals Up to ±10 V (1 W Transmit Power)
- ±8 kV ESD Protection Per IEC 61000−4−2 Contact Discharge
- Sub−1 pF Loading Capacitance
- Minimal Variation with Voltage and Temperature
- Can Withstand Over 1000 ESD Strikes at 8 kV
- SOT23−3 and MSOP−8 Package Options
- These Devices are Pb−Free and are RoHS Compliant

Applications

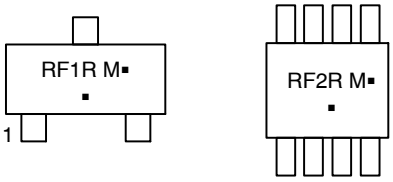
- RF Switch and Amplifier Protection
- RF Modules and RF IC Protection
- Wireless Handsets and WLAN
- High−Speed AC Signals for Gbit Ethernet, etc.

ELECTRICAL SCHEMATICS



CM1214−01SO CM1214−02MR

MARKING DIAGRAM



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
CM1214−01SO	SOT23 (Pb−Free)	3000/Tape & Reel
CM1214−02MR	MSOP (Pb−Free)	4000/Tape & Reel

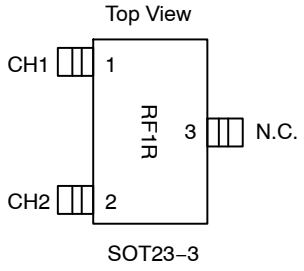
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

Table 1. PIN DESCRIPTIONS

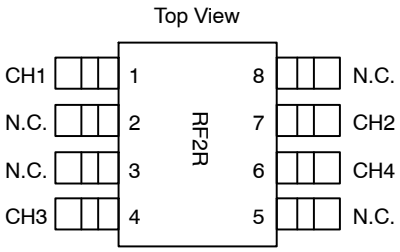
SOT23−3 Package		
Pin	**Name**	**Description**
1	CH1	ESD Channel
2	CH2	ESD Channel
3	N.C.	No connect

MSOP−8 Package		
Pin	**Name**	**Description**
1	CH1	ESD Channel
2	N.C.	No connect
3	N.C.	No connect
4	CH3	ESD Channel
5	N.C.	No connect
6	CH4	ESD Channel
7	CH2	ESD Channel
8	N.C.	No connect

PACKAGE / PINOUT DIAGRAMS



SOT23−3



MSOP−8

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
DC Voltage between CH pins	7	V
Operating Temperature Range	−40 to +85	°C
Storage Temperature Range	−65 to +150	°C
Package Power Rating SOT23−3 Package (CM1214−01SO) MSOP8 Package (CM1214−02MR)	 225 400	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	Units
Operating Temperature Range	−40 to +85	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{ST}	Standoff Voltage	I = 10 μA	−	±7	−	V
V_{ESD}	ESD Voltage Protection Peak discharge voltage between CH pins a) Contact discharge per IEC 61000−4−2 standard	(Notes 2 and 3)	 ±8	 −	 −	kV
I_{LEAK}	Channel Leakage Current	T_A = 25°C, 5.5 V between CH pins	−	±0.1	±1.0	μA
R_{DYN}	Dynamic Resistance	T_A = 25°C, I_{PP} = 1 A, t_P = 8/20 μS Any I/O pin to Ground (Note 4)	−	0.9	−	Ω

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{CL}	Channel Clamp Voltage	T_A = 25°C, I_{PP} = 1 A, t_P = 8/20 μS (Note 4)	–	10.0	–	V
C_{IN}	Channel Input Capacitance Voltage between CH pins = 0 V Voltage between CH pins = 5 V	Measured at 1 MHz between CH pins	 0.5 0.5	 0.8 0.8	 1.2 1.2	pF

1. All parameters specified at T_A = −40°C to +85°C unless otherwise noted.
2. Standard IEC 61000−4−2 with $C_{Discharge}$ = 150 pF, $R_{Discharge}$ = 330 Ω.
3. From CH pin with other CH pin grounded.
4. No Connect pins are left open for all tests.

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

PERFORMANCE INFORMATION

Typical Capacitance Characteristics vs. Voltage

CM1214 illustrates how the loading capacitance remains mainly flat across the voltage range form 0 V to 5 V, the voltage between CH pins.

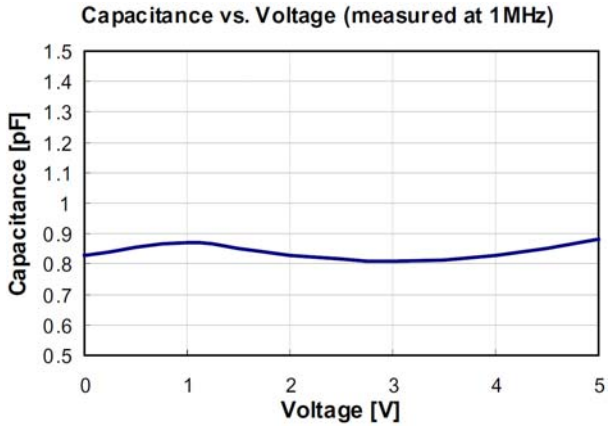


Figure 1. CM1214 Capacitance vs. Voltage

Typical Voltage Current (VI) Characteristics (low current)

CM1214 shows how the CM1214 experiences a symmetrical I/V curve, without any snapback or trigger voltage. It gradually starts to turn on at about 6 v and clamps above 7 V.

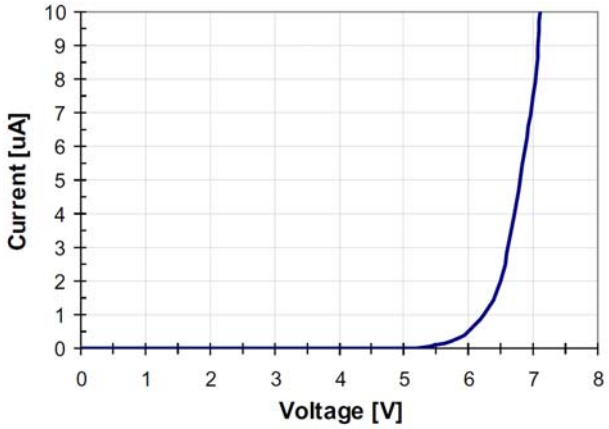


Figure 2. CM1214 VI Characteristics, Low Current

PERFORMANCE INFORMATION (Cont'd)

Typical Voltage−Current (VI) Characteristics (high current, pulse condition)

CM1214 shows how the CM1214 experiences a symmetrical I/V curve, without any snapback or trigger voltage. The curve shows only one polarity.

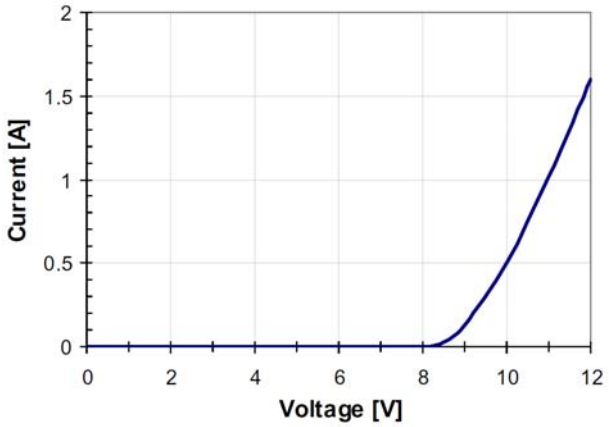


Figure 3. CM1214 VI Characteristics, High Current, Pulse (clamping) Condition

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ohm Environment)

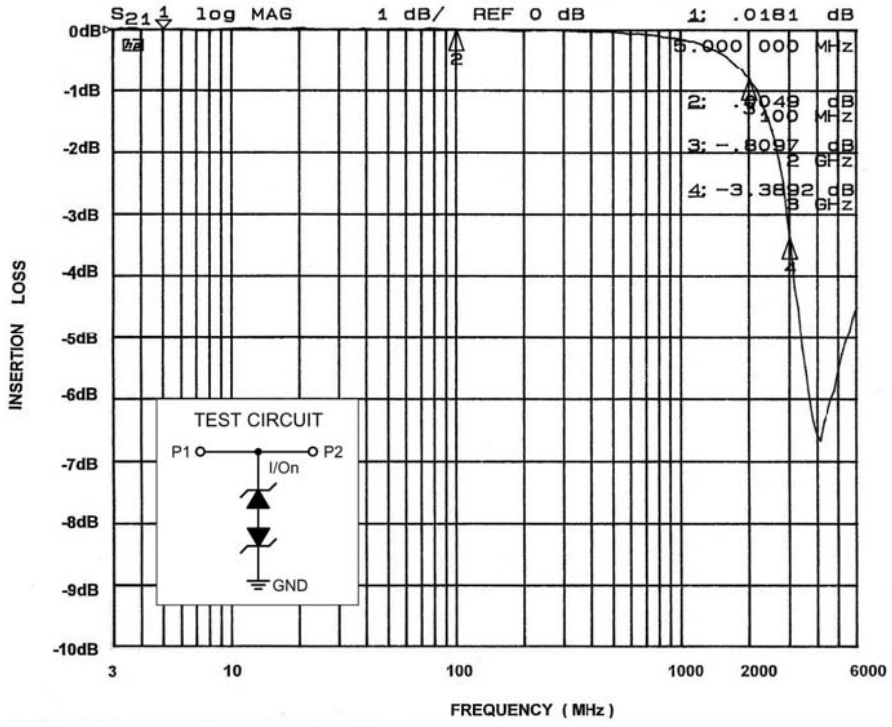


Figure 4. Insertion Loss vs. Frequency (0 V DC Bias)

PERFORMANCE INFORMATION (Cont'd)

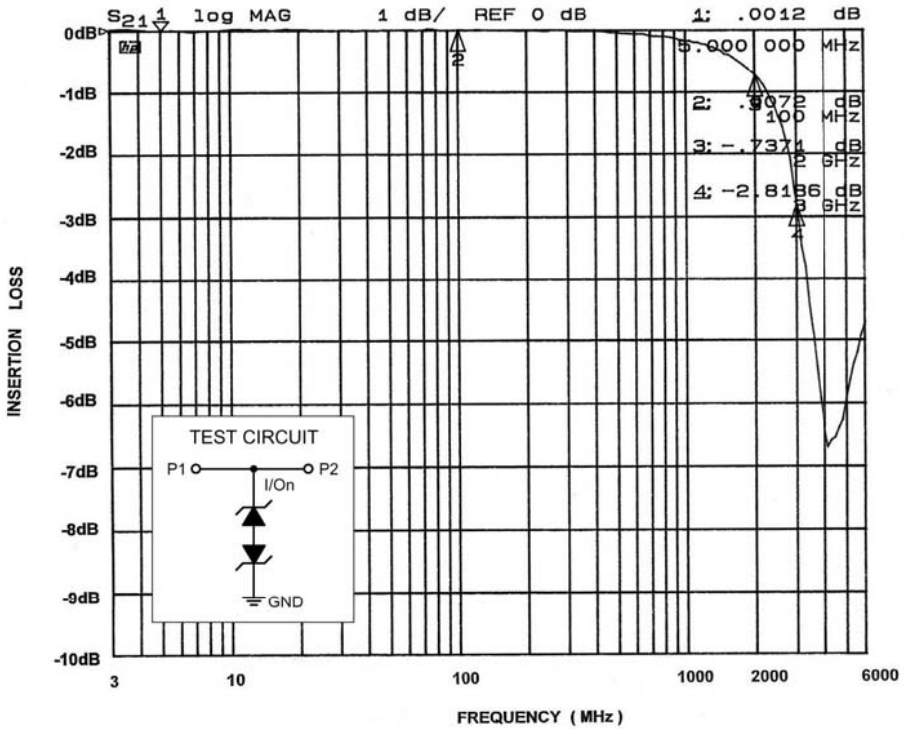


Figure 5. Insertion Loss vs. Frequency (2.5 V DC Bias)

APPLICATION INFORMATION

The CM1214−01SO protects a single bipolar signal line, such as is found in RF circuits. One I/O pin (pin 1 for example) is connected to the signal line to be protected, and the other I/O pin is tied to GND. It is important to have a solid ground connection in order to reduce the clamping voltage. Pin 3 of the 3−lead SOT23 must be left open (not connected on the PCB).

The CM1214−02MR protects two bipolar lines, such as for Gbit Ethernet. The PCB traces underneath the package connect across to the corresponding pins, i.e., pin 1 to pin 8 etc.

Any disturbance on the line above or below the standoff voltage is clamped.

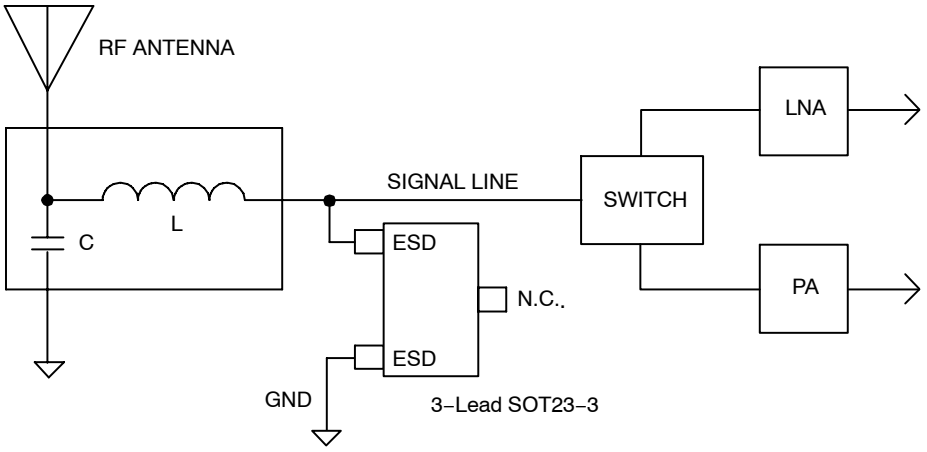


Figure 6. Typical Application − RF Switch and Amplifier Protection, CM1214−01SO−01SO/in 3−lead SOT23

APPLICATION INFORMATION (Cont'd)

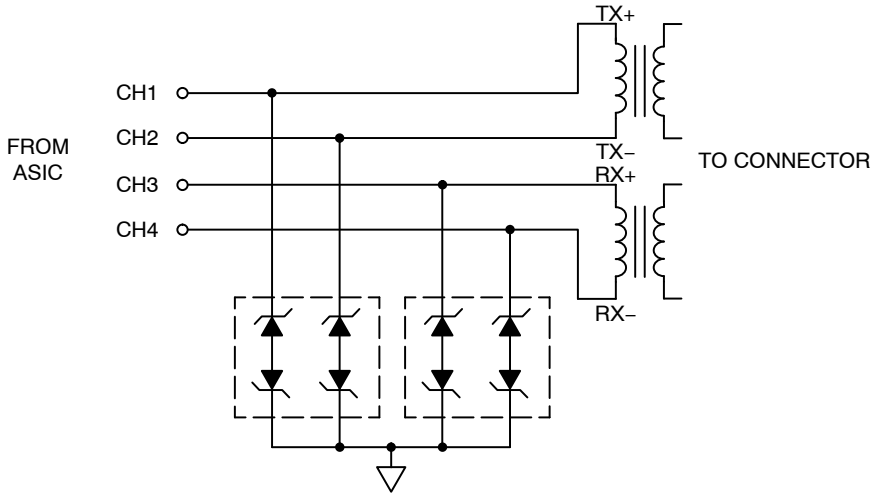
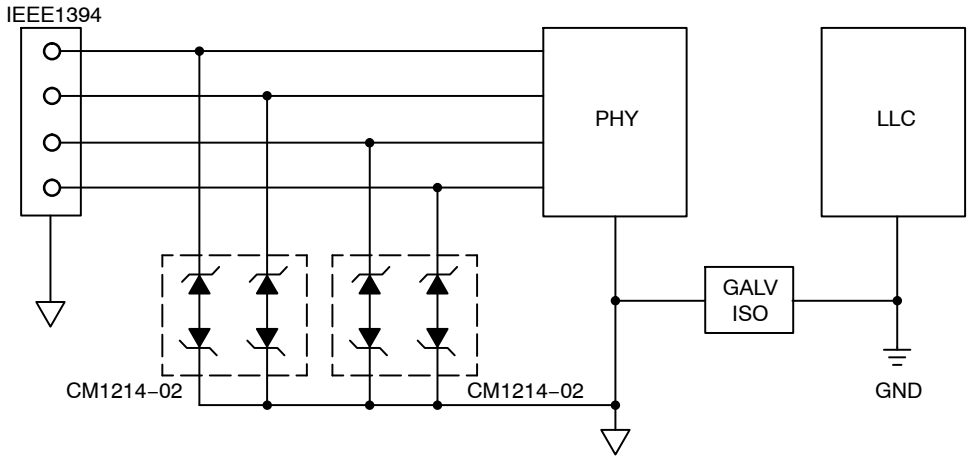


Figure 7. Typical Application – Ethernet Protection, CM1214–02MR in 8–lead MSOP

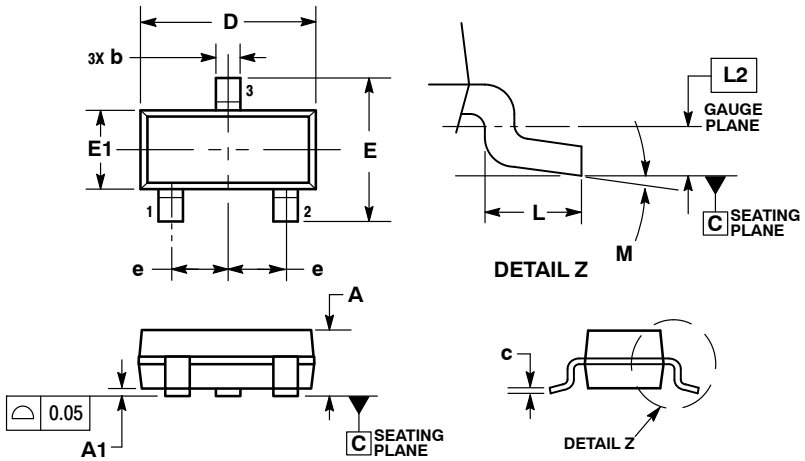


Keep the ESD devices on the PHY side of the galvanic isolation and inside the V_{CC} domain of the PHY controller

Figure 8. Typical Application – IEEE1394 Protection, CM1214–02MR in 8–lead MSOP

PACKAGE DIMENSIONS

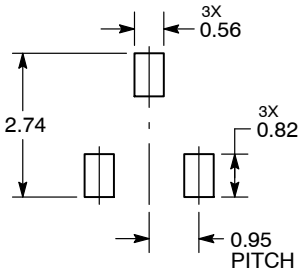
SOT−23 3−Lead (TO−236AA)
CASE 419AH−01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

	MILLIMETERS	
DIM	MIN	MAX
A	0.75	1.17
A1	0.05	0.15
b	0.30	0.50
c	0.08	0.20
D	2.80	3.05
E	2.10	2.64
E1	1.20	1.40
e	0.95 BSC	
L	0.40	0.60
L2	0.25 BSC	
M	0°	8°

RECOMMENDED SOLDERING FOOTPRINT*

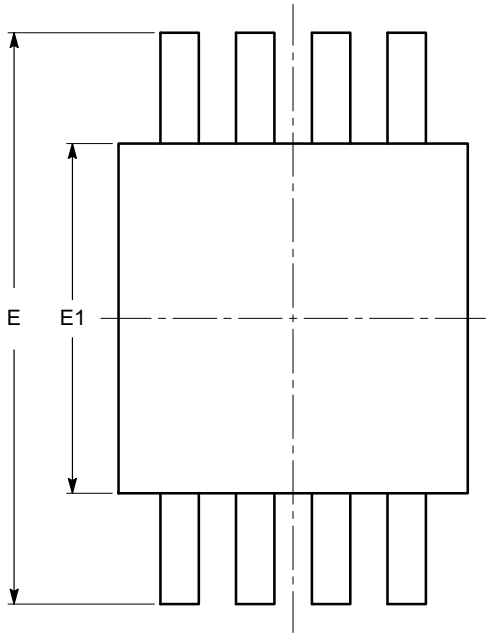


DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

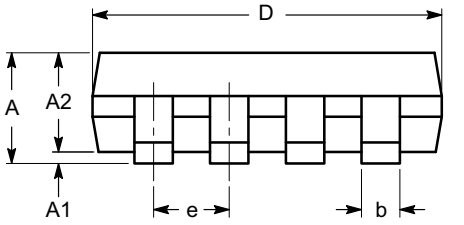
PACKAGE DIMENSIONS

MSOP 8, 3x3
CASE 846AD−01
ISSUE O

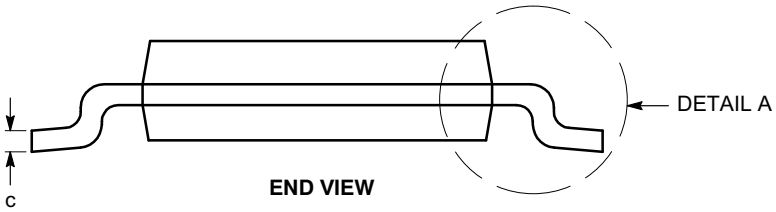


TOP VIEW

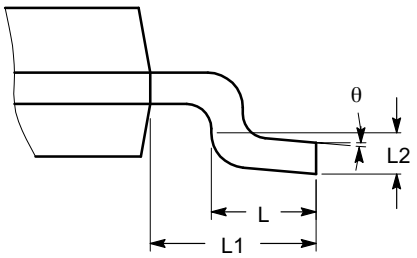
SYMBOL	MIN	NOM	MAX
A			1.10
A1	0.05	0.10	0.15
A2	0.75	0.85	0.95
b	0.22		0.38
c	0.13		0.23
D	2.90	3.00	3.10
E	4.80	4.90	5.00
E1	2.90	3.00	3.10
e		0.65 BSC	
L	0.40	0.60	0.80
L1		0.95 REF	
L2		0.25 BSC	
θ	0°		6°



SIDE VIEW



END VIEW



DETAIL A

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-187.

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
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

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

For additional information, please contact your local Sales Representative