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PACDN042

ESD Protection Diode
Low Clamping Voltage

ON Semiconductor®

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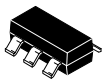
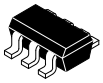
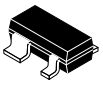
SOT−23−3
CASE 318



SOT−23−5
CASE 527AH

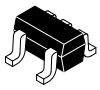


SOT−23−6
CASE 527AJ



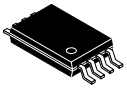
SOT−143
CASE 527AF

SC70−3
CASE 419AB

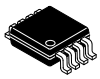


CS70−5
CASE 419AC

SC70−6
CASE 419AD



TSSOP8
CASE 948AL



MSOP8
CASE 846AB

Product Description

The PACDN042/43/44/45/46 family of surge protection arrays provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The PACDN042/43/44/45/46 devices safely dissipate ESD strikes, exceeding the IEC 61000−4−2 International Standard, Level 4 (±8 kV contact discharge). All pins are rated to withstand ±20 kV ESD pulses using the IEC 61000−4−2 contact discharge method. Using the MIL−STD−883D (Method 3015) specification for Human Body Model (HBM) ESD, all pins are protected from contact discharges of greater than ±30 kV.

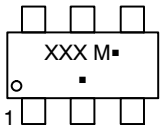
Features

- Two, Three, Four, Five, or Six surge protection
- Compact SMT Package Saves Board Space and Facilitates Layout in Space−Critical Applications
- In−System ESD Protection to ±20 kV Contact Discharge, per the IEC 61000−4−2 International Standard
- These Devices are Pb−Free and are RoHS Compliant

Applications

- ESD Protection of PC Ports, Including USB Ports, Serial Ports, Parallel Ports, IEEE1394 Ports, Docking Ports, Proprietary Ports, etc.
- Protection of Interface Ports or IC Pins which are Exposed to High ESD Levels

MARKING DIAGRAM



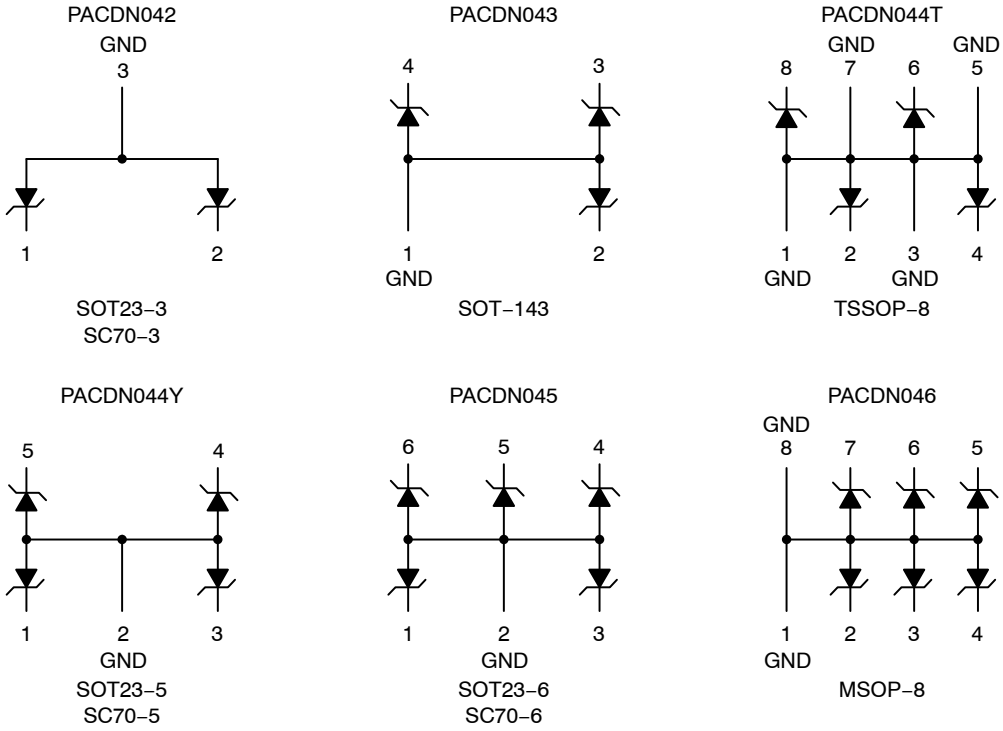
XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

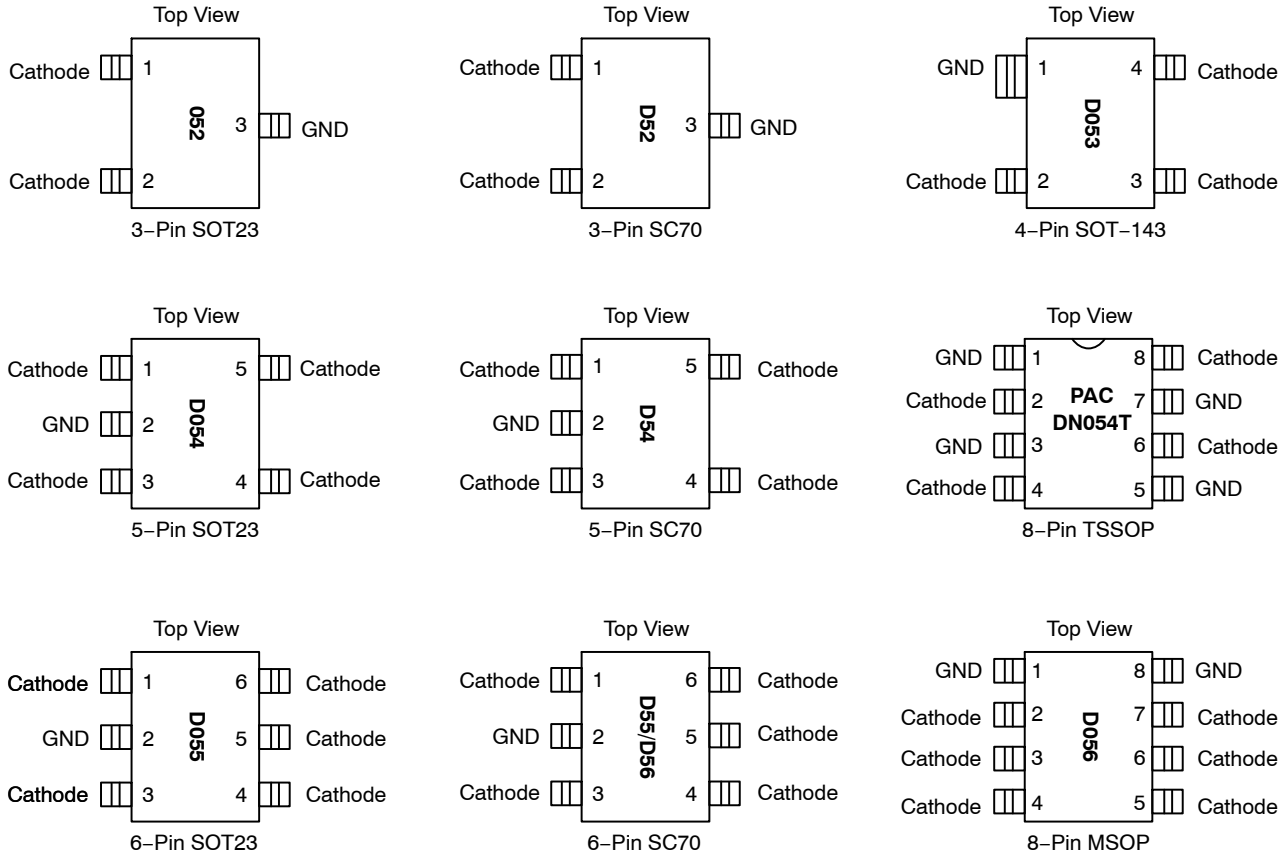
ORDERING INFORMATION

(see the last page of this document)

ELECTRICAL SCHEMATIC



PACKAGE / PINOUT DIAGRAMS



Note: SOT23, SC70, SOT−143, TSSOP, and MSOP Packages may differ in size. These drawings are not to scale.

Table 1. PIN DESCRIPTIONS

Pins	Name	Description
(Refer to Package Outline Drawings)	Cathode	The cathode of the respective surge protection diode, which should be connected to the node requiring transient voltage protection.
(Refer to Package Outline Drawings)	GND	The anode of the surge protection diodes.

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Storage Temperature Range	−65 to +150	°C
Package Power Dissipation SC70 SOT23−3, SOT23−5, SOT23−6, SOT−143 TSSOP, MSOP	 0.2 0.225 0.5	W

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	−40 to +85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
C	Capacitance	T_A = 25°C, 2.5 VDC, 1 MHz		30		pF
V_{RSO}	Reverse Stand−off Voltage	I_R = 10 μA, T_A = 25°C	5.5			V
		I_R = 1 mA, T_A = 25°C	6.1			V
I_{LEAK}	Leakage Current	V_{IN} = 5.0 VDC, T_A = 25°C		1	100	nA
V_{SIG}	Small Signal Clamp Voltage Positive Clamp Negative Clamp	 I = 10 mA, T_A = 25°C I = −10 mA, T_A = 25°C	 6.2 −0.4	 6.8 −0.8	 8 −1.2	V
V_{ESD}	ESD Withstand Voltage Human Body Model, MIL−STD−883, Method 3015 Contact Discharge per IEC 61000−4−2 Standard	 (Note 1) (Note 1)	 ±30 ±20			kV
R_D	Diode Dynamic Resistance Forward Conduction Reverse Conduction			 1.0 1.4		Ω

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.

1. ESD voltage applied between channel pins & ground, one pin at a time; all other channel pins open; all GND pins grounded.

PERFORMANCE INFORMATION

Diode Capacitance

Typical diode capacitance with respect to positive cathode voltage (reverse voltage across the diode) is given in Diode Capacitance vs. Reverse Voltage.

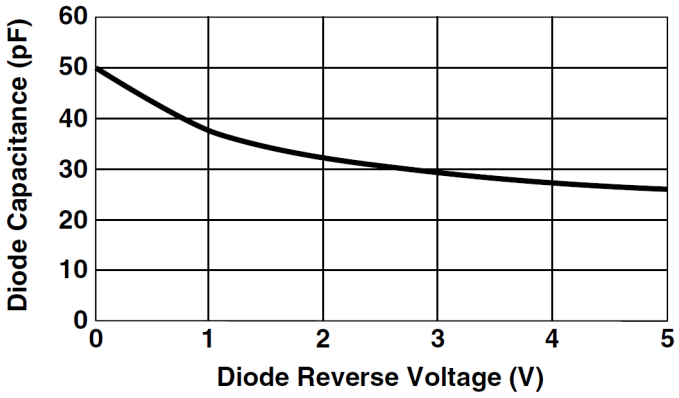


Figure 1. Diode Capacitance vs. Reverse Voltage

Typical High Current Diode Characteristics

Measurements are made in pulse mode with a nominal pulse width of 0.7 mS.

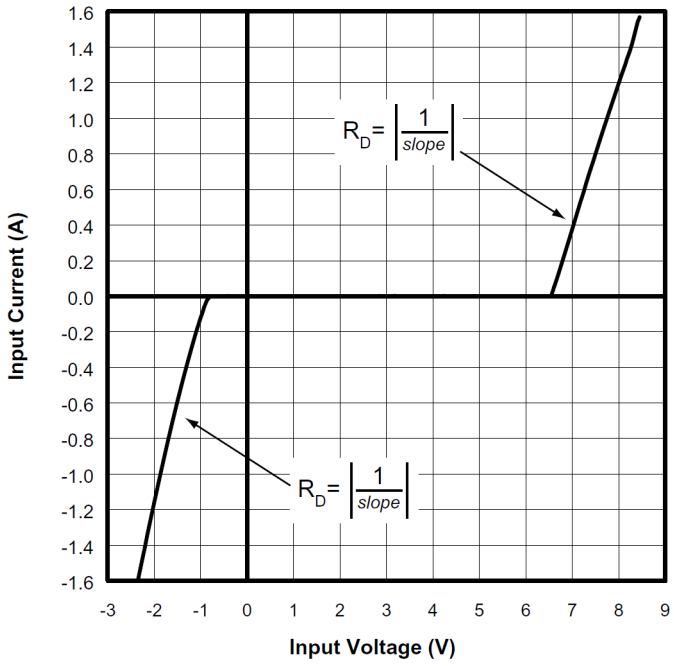
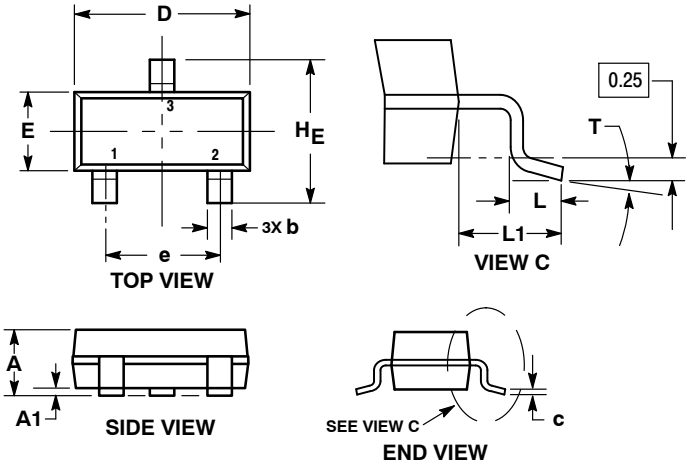


Figure 2. Typical Input VI Characteristics
(Pulse−mode measurements, pulse width = 0.7 mS nominal)

PACKAGE DIMENSIONS

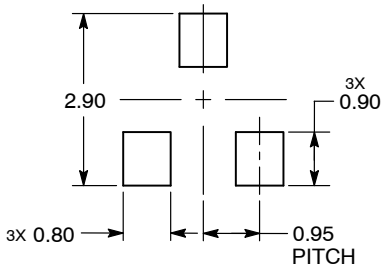
SOT−23 (TO−236)
CASE 318−08
ISSUE AR



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	–––	10°	0°	–––	10°

RECOMMENDED SOLDERING FOOTPRINT*

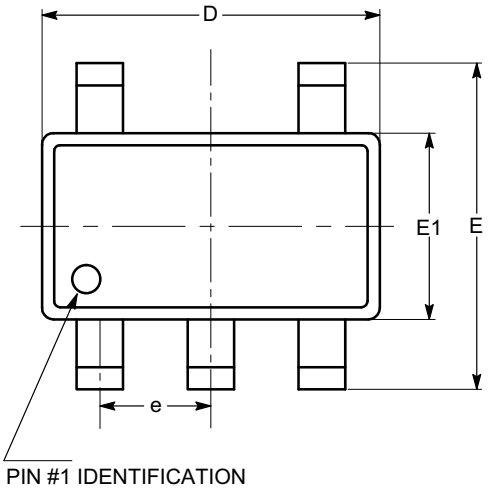


DIMENSIONS: MILLIMETERS

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

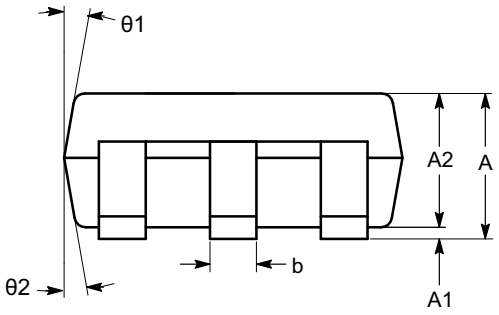
PACKAGE DIMENSIONS

SOT−23, 5 Lead
CASE 527AH
ISSUE O

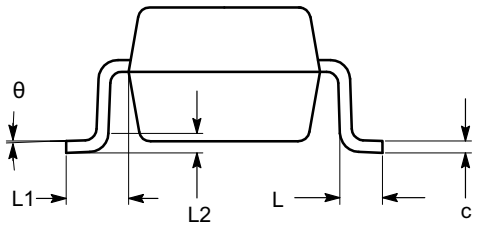


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.90		1.45
A1	0.00		0.15
A2	0.90	1.15	1.30
b	0.30		0.50
c	0.08		0.22
D		2.90 BSC	
E		2.80 BSC	
E1		1.60 BSC	
e		0.95 BSC	
L	0.30	0.45	0.60
L1		0.60 REF	
L2		0.25 REF	
θ	0°	4°	8°
θ1	5°	10°	15°
θ2	5°	10°	15°



SIDE VIEW

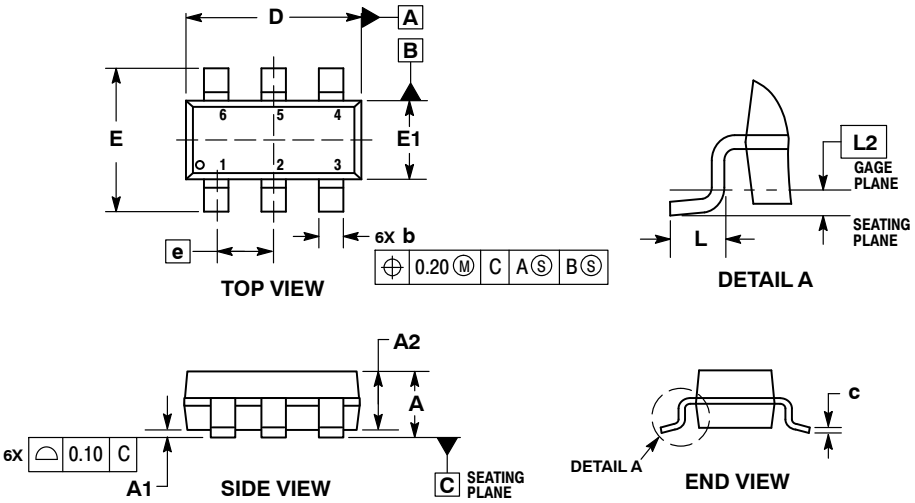


END VIEW

Notes:
(1) All dimensions in millimeters. Angles in degrees.
(2) Complies with JEDEC standard MO-178.

PACKAGE DIMENSIONS

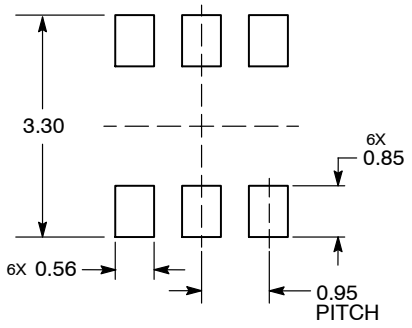
SOT−23, 6 Lead
CASE 527AJ
ISSUE B



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DATUM C IS THE SEATING PLANE.

	MILLIMETERS	
DIM	MIN	MAX
A	---	1.45
A1	0.00	0.15
A2	0.90	1.30
b	0.20	0.50
c	0.08	0.26
D	2.70	3.00
E	2.50	3.10
E1	1.30	1.80
e	0.95 BSC	
L	0.20	0.60
L2	0.25 BSC	

RECOMMENDED SOLDERING FOOTPRINT*

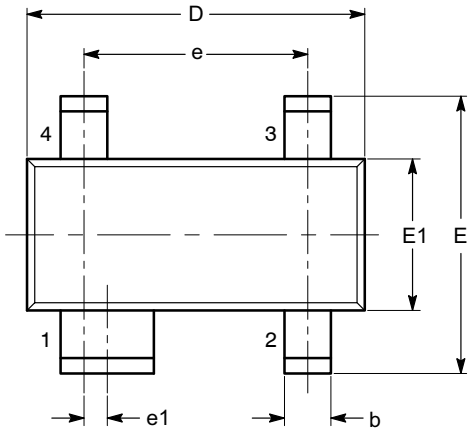


DIMENSIONS: MILLIMETERS

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

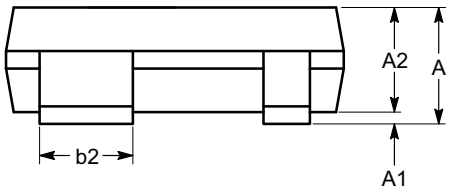
PACKAGE DIMENSIONS

SOT−143, 4 Lead
CASE 527AF
ISSUE A

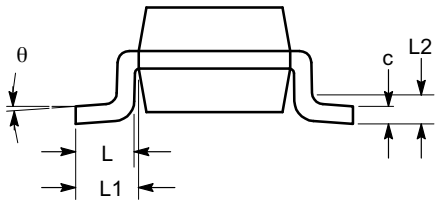


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.22
A1	0.05		0.15
A2	0.75	0.90	1.07
b	0.30		0.50
b2	0.76		0.89
c	0.08		0.20
D	2.80	2.90	3.04
E	2.10		2.64
E1	1.20	1.30	1.40
e	1.92 BSC		
e1	0.20 BSC		
L	0.40	0.50	0.60
L1	0.54 REF		
L2		0.25	
θ	0°		8°



SIDE VIEW

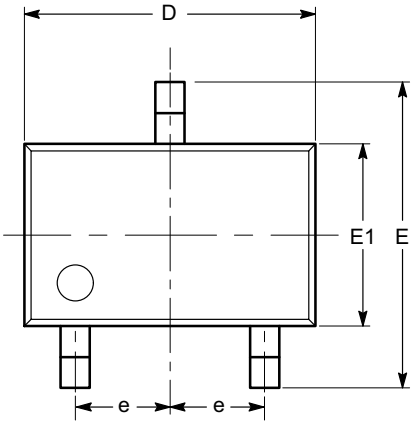


END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC TO-253.

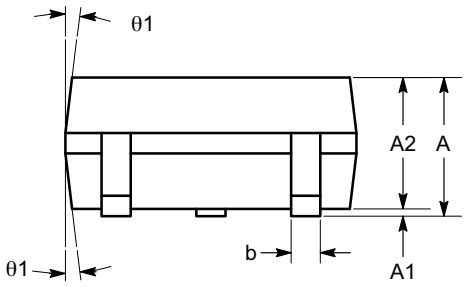
PACKAGE DIMENSIONS

SC−70, 3 Lead, 1.25x2
CASE 419AB
ISSUE O

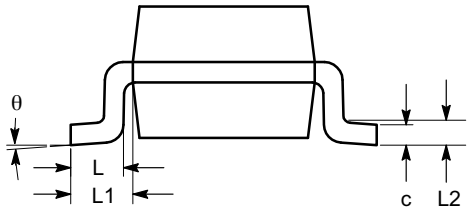


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80	0.90	1.00
b	0.15		0.30
c	0.08		0.22
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e		0.65 BSC	
L	0.26	0.36	0.46
L1		0.42 REF	
L2		0.15 BSC	
θ	0°		8°
θ1	4°		10°



SIDE VIEW

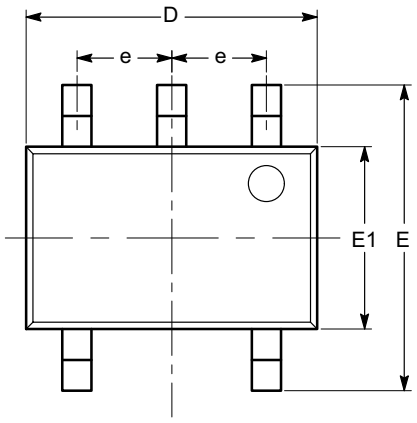


END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-203.

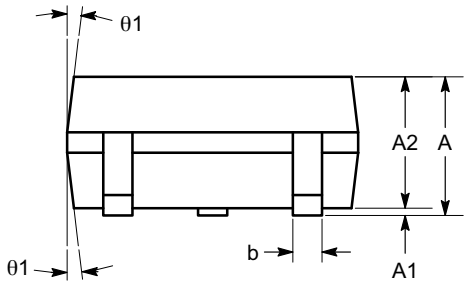
PACKAGE DIMENSIONS

SC−88A (SC−70 5 Lead), 1.25x2
CASE 419AC
ISSUE A

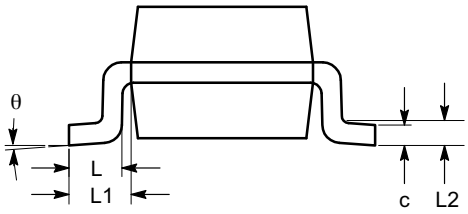


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80		1.00
b	0.15		0.30
c	0.10		0.18
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e		0.65 BSC	
L	0.26	0.36	0.46
L1		0.42 REF	
L2		0.15 BSC	
θ	0°		8°
θ1	4°		10°



SIDE VIEW

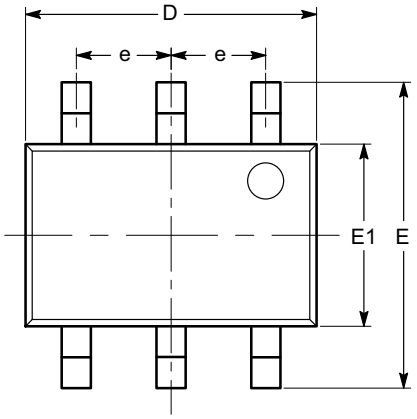


END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-203.

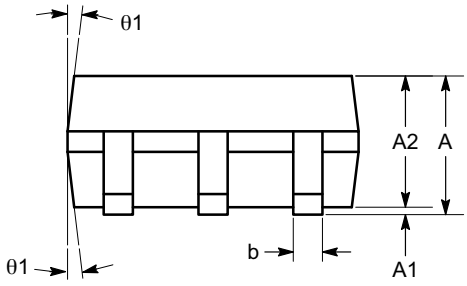
PACKAGE DIMENSIONS

SC−88 (SC−70 6 Lead), 1.25x2
CASE 419AD
ISSUE A

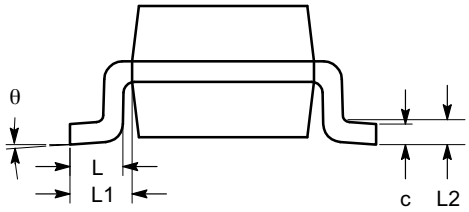


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80		1.00
b	0.15		0.30
c	0.10		0.18
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e		0.65 BSC	
L	0.26	0.36	0.46
L1		0.42 REF	
L2		0.15 BSC	
θ	0°		8°
θ1	4°		10°



SIDE VIEW

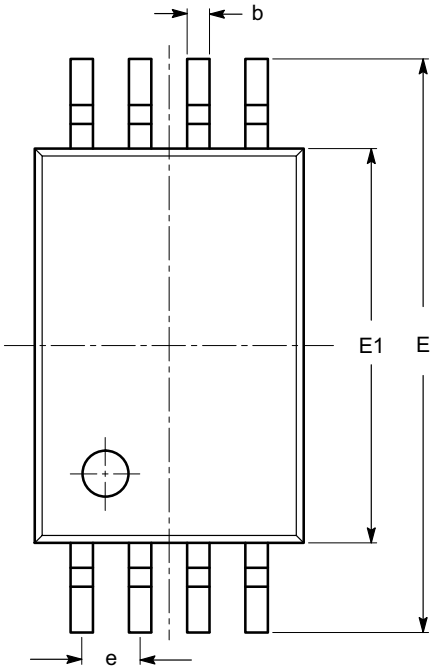


END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-203.

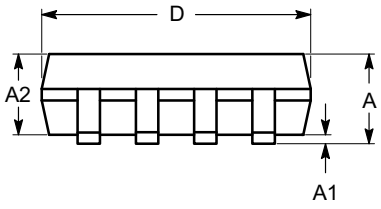
PACKAGE DIMENSIONS

TSSOP8, 4.4x3
CASE 948AL
ISSUE O

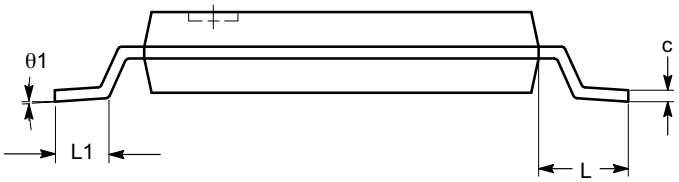


TOP VIEW

SYMBOL	MIN	NOM	MAX
A			1.20
A1	0.05		0.15
A2	0.80	0.90	1.05
b	0.19		0.30
c	0.09		0.20
D	2.90	3.00	3.10
E	6.30	6.40	6.50
E1	4.30	4.40	4.50
e	0.65 BSC		
L	1.00 REF		
L1	0.50	0.60	0.75
θ	0°		8°



SIDE VIEW

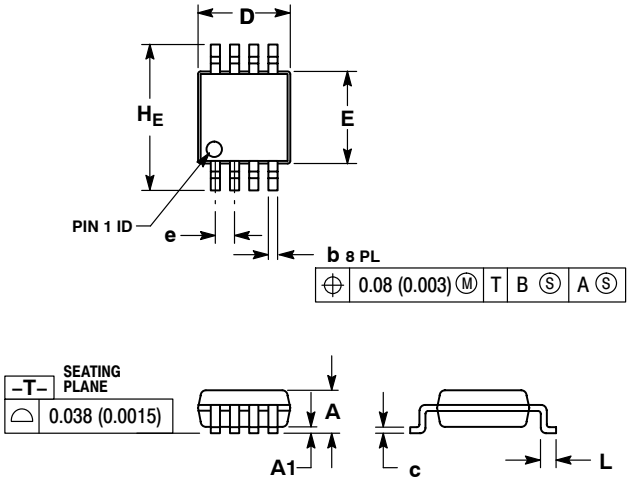


END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-153.

PACKAGE DIMENSIONS

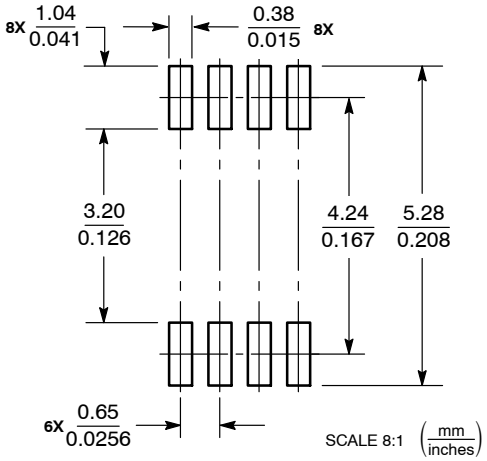
MSOP8
CASE 846AB
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. 846A–01 OBSOLETE, NEW STANDARD 846A–02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	––	––	1.10	––	––	0.043
A1	0.05	0.08	0.15	0.002	0.003	0.006
b	0.25	0.33	0.40	0.010	0.013	0.016
c	0.13	0.18	0.23	0.005	0.007	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
E	2.90	3.00	3.10	0.114	0.118	0.122
e	0.65 BSC			0.026 BSC		
L	0.40	0.55	0.70	0.016	0.021	0.028
H_E	4.75	4.90	5.05	0.187	0.193	0.199

SOLDERING FOOTPRINT*



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

ORDERING INFORMATION

Device	Package	Shipping
PACDN042Y3R	SOT23−3 (Pb−Free)	3000/Tape & Reel
PACDN044Y5R	SOT23−5 (Pb−Free)	3000/Tape & Reel
PACDN045Y6R	SOT23−6 (Pb−Free)	3000/Tape & Reel
PACDN043Y4R	SOT−143 (Pb−Free)	3000/Tape & Reel
PACDN042YB3R	SC70−3 (Pb−Free)	3000/Tape & Reel

ORDERING INFORMATION (cont'd)

Device	Package	Shipping
PACDN044YB5R	SC70−5 (Pb−Free)	3000/Tape & Reel
PACDN045YB6R	SC70−6 (Pb−Free)	3000/Tape & Reel
PACDN045YB6R−R	SC70−6 (Pb−Free)	3000/Tape & Reel
PACDN044TR	TSSOP8 (Pb−Free)	2500/Tape & Reel
PACDN046MR	MSOP8 (Pb−Free)	4000/Tape & Reel

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