Digital Transistors (BRT) $R1 = 1 k\Omega$, $R2 = 1 k\Omega$

PNP Transistors with Monolithic Bias Resistor Network

This series of digital transistors is designed to replace a single device and its external resistor bias network. The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a baseemitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space.

Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS $(T_A = 25^{\circ}C)$

Rating	Symbol	Max	Unit
Collector-Base Voltage	V_{CBO}	50	Vdc
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector Current – Continuous	I _C	100	mAdc
Input Forward Voltage	$V_{IN(fwd)}$	10	Vdc
Input Reverse Voltage	V _{IN(rev)}	10	Vdc

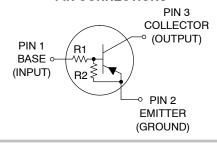
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



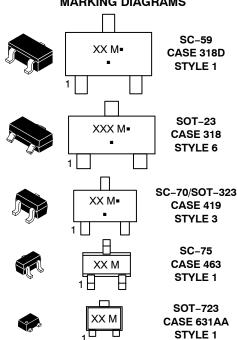
ON Semiconductor®

www.onsemi.com

PIN CONNECTIONS



MARKING DIAGRAMS



XXX = Specific Device Code Μ = Date Code* = Pb-Free Package

IX ML₁

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering, marking, and shipping information on page 2 of this data sheet.

SOT-1123

CASE 524AA STYLE 1

Table 1. ORDERING INFORMATION

Device	Part Marking	Package	Shipping [†]
MUN2130T1G	6G	SC-59 (Pb-Free)	3000 / Tape & Reel
MMUN2130LT1G	A6G	SOT-23 (Pb-Free)	3000 / Tape & Reel
MUN5130T1G	6G	SC-70/SOT-323 (Pb-Free)	3000 / Tape & Reel
DTA113EET1G	6G	SC-75 (Pb-Free)	3000 / Tape & Reel
DTA113EM3T5G, NSVDTA113EM3T5G*	7E	SOT-723 (Pb-Free)	8000 / Tape & Reel
NSBA113EF3T5G	L (180°)**	SOT-1123 (Pb-Free)	8000 / Tape & Reel

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

^{**} (xx°) = Degree rotation in the clockwise direction.

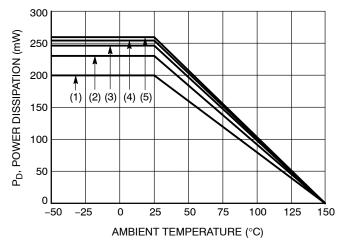


Figure 1. Derating Curve

- (1) SC-75 and SC-70/SOT323; Minimum Pad
- (2) SC-59; Minimum Pad
- (3) SOT-23; Minimum Pad
- (4) SOT-1123; 100 mm², 1 oz. copper trace
- (5) SOT-723; Minimum Pad

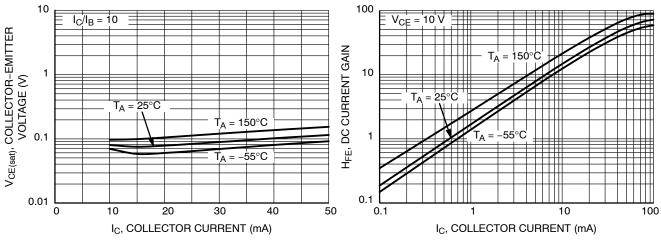


Figure 2. V_{CE(sat)} vs. I_C

Figure 3. DC Current Gain

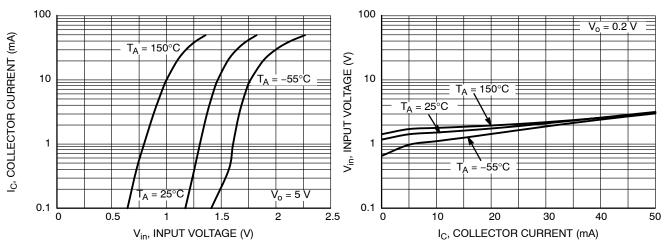


Figure 4. Output Current vs. Input Voltage

Figure 5. Input Voltage vs. Output Current

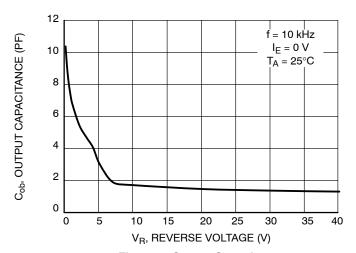


Figure 6. Output Capacitance

Table 2. THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
THERMAL CHARACTERISTICS (SC-59) (MUN2130)			•	
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	230 338 1.8 2.7	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{ heta JA}$	540 370	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{ hetaJL}$	264 287	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SOT-23) (MMUN2130L)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	246 400 2.0 3.2	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{\theta JA}$	508 311	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{ hetaJL}$	174 208	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SC-70/SOT-323) (MUN5130)				
Total Device Dissipation $T_{A} = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	202 310 1.6 2.5	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{\theta JA}$	618 403	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{ hetaJL}$	280 332	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SC-75) (DTA113EE)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	200 300 1.6 2.4	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{ heta JA}$	600 400	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SOT-723) (DTA113EM3)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1)	P _D	260 600 2.0	mW mW/°C
Thermal Resistance,	(Note 2) (Note 1)	$R_{ heta JA}$	4.8 480	°C/W
Junction to Ambient	(Note 2)		205	

- 1. FR-4 @ Minimum Pad.

- FR-4 @ 1.0 x 1.0 lnch Pad.
 FR-4 @ 100 mm², 1 oz. copper traces, still air.
 FR-4 @ 500 mm², 1 oz. copper traces, still air.

Table 2. THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
THERMAL CHARACTERISTICS (SOT-1123) (NSBA113EF3)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above $25^{\circ}C$	(Note 3) (Note 4) (Note 3) (Note 4)	P _D	254 297 2.0 2.4	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 3) (Note 4)	$R_{ hetaJA}$	493 421	°C/W
Thermal Resistance, Junction to Lead	(Note 3)	$R_{ hetaJL}$	193	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C

^{1.} FR-4 @ Minimum Pad.

Table 3. ELECTRICAL CHARACTERISTICS ($T_A = 25$ °C, unless otherwise noted)

Characteristic	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Cutoff Current $(V_{CB} = 50 \text{ V, } I_E = 0)$	I _{CBO}	_	_	100	nAdc
Collector-Emitter Cutoff Current (V _{CE} = 50 V, I _B = 0)	I _{CEO}	-	-	500	nAdc
Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	_	-	4.3	mAdc
Collector-Base Breakdown Voltage $(I_C = 10 \mu A, I_E = 0)$	V _(BR) CBO	50	-	-	Vdc
Collector-Emitter Breakdown Voltage (Note 5) (I _C = 2.0 mA, I _B = 0)	V _(BR) CEO	50	-	-	Vdc
ON CHARACTERISTICS	•		-		
DC Current Gain (Note 5) (I _C = 5.0 mA, V _{CE} = 10 V)	h _{FE}	3.0	5.0	-	
Collector–Emitter Saturation Voltage (Note 5) $(I_C = 10 \text{ mA}, I_B = 5.0 \text{ mA})$	V _{CE(sat)}	-	-	0.25	Vdc
Input Voltage (off) $(V_{CE} = 5.0 \text{ V}, I_{C} = 100 \mu\text{A})$	V _{i(off)}	-	1.2	0.5	Vdc
Input Voltage (on) $(V_{CE} = 0.3 \text{ V}, I_{C} = 20 \text{ mA})$	V _{i(on)}	2.0	1.6	-	Vdc
Output Voltage (on) $(V_{CC} = 5.0 \text{ V}, V_B = 2.5 \text{ V}, R_L = 1.0 \text{ k}\Omega)$	V _{OL}	_	_	0.2	Vdc
Output Voltage (off) $(V_{CC} = 5.0 \text{ V}, V_B = 0.05 \text{ V}, R_L = 1.0 \text{ k}\Omega)$	V _{OH}	4.9	-	_	Vdc
Input Resistor	R1	0.7	1.0	1.3	kΩ
Resistor Ratio	R_1/R_2	0.8	1.0	1.2	

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.

5. Pulsed Condition: Pulse Width = 300 msec, Duty Cycle ≤ 2%.

FR-4 @ 1.0 x 1.0 Inch Pad.
 FR-4 @ 100 mm², 1 oz. copper traces, still air.
 FR-4 @ 500 mm², 1 oz. copper traces, still air.

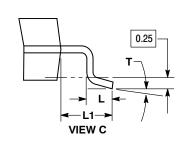


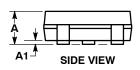
SOT-23 (TO-236) CASE 318-08 **ISSUE AS**

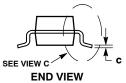
DATE 30 JAN 2018

SCALE 4:1 D - 3X b

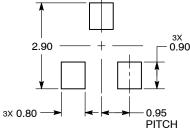
TOP VIEW







RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

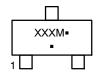
3. ANODE

NOTES:

- 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
Α	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
С	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
е	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
HE	2.10	2.40	2.64	0.083	0.094	0.104
Т	O٥		100	O٥		10°

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code

= Date Code

= Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

STYLE 1 THRU 5: CANCELLED	STYLE 6: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 7: PIN 1. EMITTER 2. BASE 3. COLLECTOR	STYLE 8: PIN 1. ANODE 2. NO CONNECTION 3. CATHODE	ı	
STYLE 9:	STYLE 10:	STYLE 11:	STYLE 12: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 13:	STYLE 14:
PIN 1. ANODE	PIN 1. DRAIN	PIN 1. ANODE		PIN 1. SOURCE	PIN 1. CATHODE
2. ANODE	2. SOURCE	2. CATHODE		2. DRAIN	2. GATE
3. CATHODE	3. GATE	3. CATHODE-ANODE		3. GATE	3. ANODE
STYLE 15:	STYLE 16:	STYLE 17:	STYLE 18:	STYLE 19:	STYLE 20:
PIN 1. GATE	PIN 1. ANODE	PIN 1. NO CONNECTION	PIN 1. NO CONNECTION	I PIN 1. CATHODE	PIN 1. CATHODE
2. CATHODE	2. CATHODE	2. ANODE	2. CATHODE	2. ANODE	2. ANODE
3. ANODE	3. CATHODE	3. CATHODE	3. ANODE	3. CATHODE-ANODE	3. GATE
STYLE 21:	STYLE 22:	STYLE 23:	STYLE 24:	STYLE 25:	STYLE 26:
PIN 1. GATE	PIN 1. RETURN	PIN 1. ANODE	PIN 1. GATE	PIN 1. ANODE	PIN 1. CATHODE
2. SOURCE	2. OUTPUT	2. ANODE	2. DRAIN	2. CATHODE	2. ANODE
3. DRAIN	3. INPUT	3. CATHODE	3. SOURCE	3. GATE	3. NO CONNECTION
STYLE 27: PIN 1. CATHODE 2. CATHODE	STYLE 28: PIN 1. ANODE 2. ANODE				

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DESCRIPTION:	SOT-23 (TO-236)		PAGE 1 OF 1	

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3. CATHODE



SCALE 2:1

SC-59 CASE 318D-04 ISSUE H

DATE 28 JUN 2012

NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	MOM	MAX
Α	1.00	1.15	1.30	0.039	0.045	0.051
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.35	0.43	0.50	0.014	0.017	0.020
С	0.09	0.14	0.18	0.003	0.005	0.007
D	2.70	2.90	3.10	0.106	0.114	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
е	1.70	1.90	2.10	0.067	0.075	0.083
L	0.20	0.40	0.60	0.008	0.016	0.024
HE	2.50	2.80	3.00	0.099	0.110	0.118

GENERIC MARKING DIAGRAM

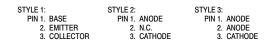


XXX = Specific Device Code

Μ = Date Code = Pb-Free Package*

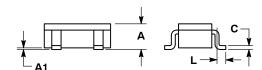
(*Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

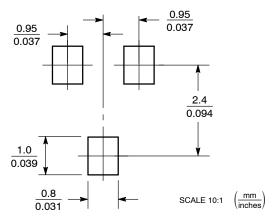


STYLE 4:	STYLE 5:	STYLE 6:
PIN 1. CATHODE	PIN 1. CATHODE	PIN 1. ANODE
2. N.C.	2. CATHODE	2. CATHODE
ANODE	3. ANODE	ANODE/CATHODE

Ε H_{E}



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.

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DESCRIPTION:	SC-59	•	PAGE 1 OF 1	

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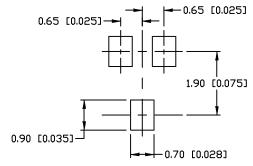
SC-70 (SOT-323) **CASE 419 ISSUE P**

DATE 07 OCT 2021

NOTES:

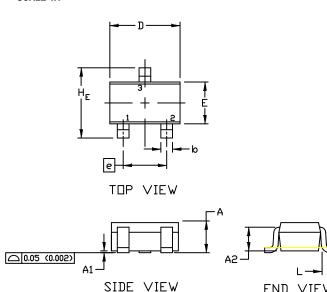
- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
- 2. CONTROLLING DIMENSION: INCH

	MILLIMETERS				INCHES	
DIM	MIN.	N□M.	MAX.	MIN.	N□M.	MAX.
Α	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF				0.028 BS	C
b	0.30	0.35	0.40	0.012	0.014	0.016
С	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
Ε	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC		0.026 BSC			
L	0.20	0.38	0.56	0.008	0.015	0.022
HE	2.00	2.10	2.40	0.079	0.083	0.095



For additional information on our Pb-Free strategy and soldering details, please download the DN Semiconductor Soldering and Mounting Techniques Reference Manual, SDLDERRM/D.

SOLDERING FOOTPRINT



GENERIC MARKING DIAGRAM



XX = Specific Device Code

= Date Code М

= Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

STYLE 1: CANCELLED	STYLE 2: PIN 1. ANODE 2. N.C. 3. CATHODE	STYLE 3: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. CATHODE	
STYLE 6:	STYLE 7:	STYLE 8:	STYLE 9:	STYLE 10:	STYLE 11:
PIN 1. EMITTER	PIN 1. BASE	PIN 1. GATE	PIN 1. ANODE	PIN 1. CATHODE	PIN 1. CATHODE
2. BASE	2. EMITTER	2. SOURCE	2. CATHODE	2. ANODE	2. CATHODE
3. COLLECTOR	3. COLLECTOR	3. DRAIN	3. CATHODE-ANODE	3. ANODE-CATHODE	3. CATHODE

END VIEW

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DESCRIPTION:	SC-70 (SOT-323)		PAGE 1 OF 1

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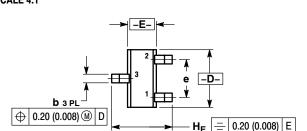
MECHANICAL CASE OUTLINE

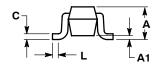




SC-75/SOT-416 CASE 463-01 ISSUE G

DATE 07 AUG 2015





STYLE 1: PIN 1. BASE 2. EMITTER 3. COLLECTOR

PIN 1. CATHODE 2. CATHODE 3. ANODE

STYLE 4:

STYLE 5:

STYLE 2: PIN 1. ANODE 2. N/C 3. CATHODE

PIN 1. GATE 2. SOURCE 3. DRAIN

STYLE 3: PIN 1. ANODE 2. ANODE

3. CATHODE

NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS		INCHES		;	
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	0.70	0.80	0.90	0.027	0.031	0.035
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.15	0.20	0.30	0.006	0.008	0.012
С	0.10	0.15	0.25	0.004	0.006	0.010
D	1.55	1.60	1.65	0.061	0.063	0.065
E	0.70	0.80	0.90	0.027	0.031	0.035
е	1.00 BSC			.04 BS0		
Ĺ	0.10	0.15	0.20	0.004	0.006	0.008
HE	1.50	1.60	1.70	0.060	0.063	0.067

GENERIC MARKING DIAGRAM*



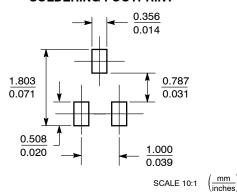
XX= Specific Device Code

Μ = Date Code

= Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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.

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DESCRIPTION:	SC-75/SOT-416		PAGE 1 OF 1	

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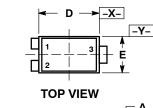


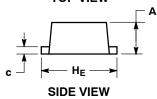


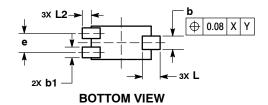
SOT-1123 CASE 524AA ISSUE C

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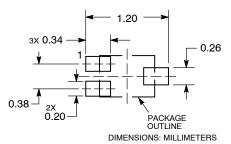
SCALE 8:1







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.

NOTES:

- 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 BASE MATERIAL.
 DIMENSIONS D AND E DO NOT INCLUDE MOLD
 FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS		
DIM	MIN	MAX	
Α	0.34	0.40	
b	0.15	0.28	
b1	0.10	0.20	
С	0.07	0.17	
D	0.75	0.85	
E	0.55	0.65	
е	0.35	0.40	
HE	0.95	1.05	
Ĺ	0.185 REF		
L2	0.05	0.15	

GENERIC MARKING DIAGRAM*



= Specific Device Code Μ = Date Code

*This information is generic. Please refer to device data sheet for actual part marking.

Pb-Free indicator, "G" or microdot " ■", may or may not be present.

STYLE 1:	STYLE 2:	STYLE 3:	STYLE 4:	STYLE 5:
PIN 1. BASE	PIN 1. ANODE	PIN 1. ANODE	PIN 1. CATHODE	PIN 1. GATE
EMITTER	2. N/C	2. ANODE	2. CATHODE	SOURCE
3. COLLECTOR	CATHODE	CATHODE	ANODE	3. DRAIN

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SOT-723 CASE 631AA-01 ISSUE D

- C

SIDE VIEW

DATE 10 AUG 2009

NOTES:

- 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 BASE MATERIAL.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			
DIM	MIN	NOM	MAX	
Α	0.45	0.50	0.55	
b	0.15	0.21	0.27	
b1	0.25	0.31	0.37	
С	0.07	0.12	0.17	
D	1.15	1.20	1.25	
E	0.75	0.80	0.85	
е	0.40 BSC			
ΗE	1.15	1.20	1.25	
L	0.29 REF			
12	0.15	0.20	0.25	

L2 0.15 0.20 0.25

GENERIC MARKING DIAGRAM*



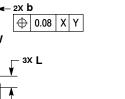
= Specific Device Code XX

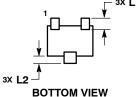
or not be present.

Μ = Date Code *This information is generic. Please refer to device data sheet for actual part

marking. Pb-Free indicator, "G", may

-X-2X b ⊕ 0.08 X Y **TOP VIEW** 3X L





STYLE 1: PIN 1. BASE 2. EMITTER 3. COLLECTOR STYLE 2: PIN 1. ANODE 2. N/C 3. CATHODE STYLE 3: PIN 1. ANODE 2. ANODE 3. CATHODE

STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE STYLE 5: PIN 1. GATE 2. SOURCE 3. DRAIN

RECOMMENDED

0.40 2X 0.27 PACKAGE OUTLINE 1.50 3X 0.52 0.36

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.

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