Digital Transistors (BRT) R1 = 10 k Ω , R2 = 47 k Ω

NPN 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 base–emitter 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	۱ _C	100	mAdc
Input Forward Voltage	V _{IN(fwd)}	40	Vdc
Input Reverse Voltage	V _{IN(rev)}	6	Vdc

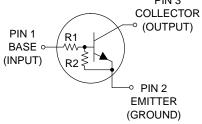
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

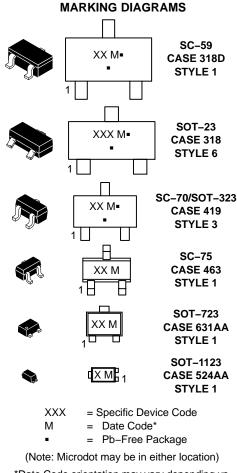


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*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering, marking, and shipping information in the package dimensions section on page 2 of this data sheet.

Table 1. ORDERING INFORMATION

Device	Part Marking	Package	Shipping [†]
MUN2214T1G, SMUN2214T1G*	8D	SC-59 (Pb-Free)	3000 / Tape & Reel
MUN2214T3G, SMUN2214T3G*	8D	SC–59 (Pb–Free)	10000 / Tape & Reel
MMUN2214LT1G, SMMUN2214LT1G*	A8D	SOT-23 (Pb-Free)	3000 / Tape & Reel
MUN5214T1G, SMUN5214T1G*	8D	SC-70/SOT-323 (Pb-Free)	3000 / Tape & Reel
DTC114YET1G, SDTC114YET1G	8D	SC-75 (Pb-Free)	3000 / Tape & Reel
DTC114YM3T5G, NSVDTC114YM3T5G*	8D	SOT-723 (Pb-Free)	8000 / Tape & Reel
NSBC114YF3T5G	J	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.

*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q101 Qualified and PPAP Capable.

(1) SC-75 and SC-70/SOT-323; Minimum Pad

(4) SOT-1123; 100 mm², 1 oz. copper trace

(2) SC-59; Minimum Pad

(3) SOT-23; Minimum Pad

(5) SOT-723; Minimum Pad

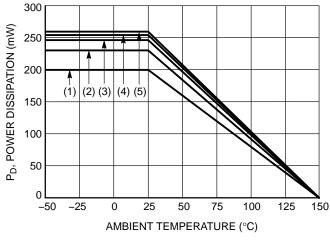


Figure 1. Derating Curve

Table 2. THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
THERMAL CHARACTERISTICS (SC-59) (MUN2214)				
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_{\thetaJA}	540 370	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{\theta JL}$	264 287	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SOT-23) (MMUN2214L)				
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)	$R_{ hetaJA}$	508 311	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{ heta JL}$	174 208	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SC-70/SOT-323) (MUN5214)				
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)	$R_{ hetaJA}$	618 403	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{ hetaJL}$	280 332	°C/W
Junction and Storage Temperature Range		TJ, T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SC-75) (DTC114YE)			-	
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above $25^{\circ}C$	(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_{\thetaJA}	600 400	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
THERMAL CHARACTERISTICS (SOT-723) (DTC114YM3)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	260 600 2.0 4.8	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{ hetaJA}$	480 205	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C

FR-4 @ Minimum Pad.
 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.

Table 2. THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
THERMAL CHARACTERISTICS (SOT-1123) (NSBC114YF3)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above $25^{\circ}C$	(Note 3) (Note 4) (Note 3) (Note 4)	PD	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)	$R_{ extsf{ heta}JL}$	193	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C

1. FR-4 @ Minimum Pad.

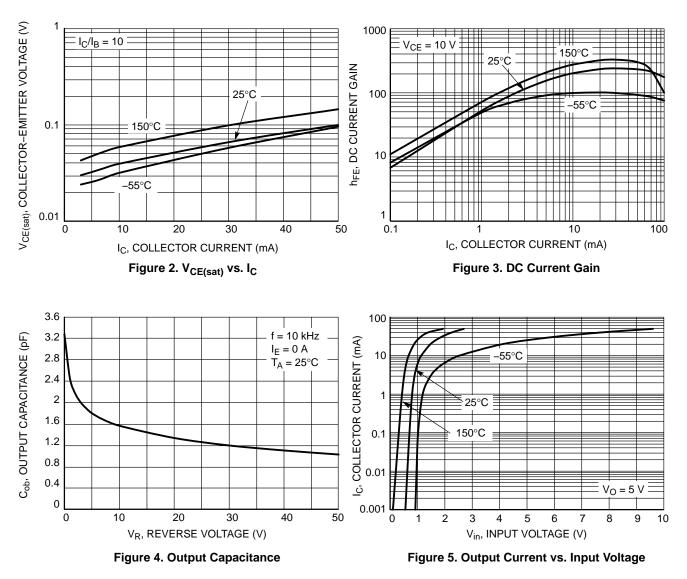
2. FR-4 @ 1.0 x 1.0 Inch Pad.

FR-4 @ 100 mm², 1 oz. copper traces, still air.
 FR-4 @ 500 mm², 1 oz. copper traces, still air.

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 ($V_{CE} = 50 \text{ V}, I_B = 0$)	I _{CEO}	_	-	500	nAdc
Emitter–Base Cutoff Current ($V_{EB} = 6.0 \text{ V}, I_C = 0$)	I _{EBO}	_	-	0.2	mAdc
Collector–Base Breakdown Voltage $(I_C = 10 \ \mu\text{A}, I_E = 0)$	V _{(BR)CBO}	50	-	-	Vdc
Collector–Emitter Breakdown Voltage (Note 5) $(I_C = 2.0 \text{ mA}, I_B = 0)$	V _{(BR)CEO}	50	-	-	Vdc
ON CHARACTERISTICS					
DC Current Gain (Note 5) ($I_C = 5.0 \text{ mA}, V_{CE} = 10 \text{ V}$)	h _{FE}	80	140	-	
Collector – Emitter Saturation Voltage (Note 5) $(I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA})$	V _{CE(sat)}	_	-	0.25	Vdc
Input Voltage (off) ($V_{CE} = 5.0 \text{ V}, I_C = 100 \mu\text{A}$)	V _{i(off)}	_	0.7	0.5	Vdc
Input Voltage (on) ($V_{CE} = 0.3 \text{ V}, I_C = 1.0 \text{ mA}$)	V _{i(on)}	1.4	0.8	-	Vdc
Output Voltage (on) $(V_{CC} = 5.0 \text{ V}, \text{ V}_{B} = 2.5 \text{ V}, \text{ R}_{L} = 1.0 \text{ k}\Omega)$	V _{OL}	_	_	0.2	Vdc
Output Voltage (off) $(V_{CC} = 5.0 \text{ V}, \text{ V}_{B} = 0.5 \text{ V}, \text{ R}_{L} = 1.0 \text{ k}\Omega)$	V _{OH}	4.9	-	-	Vdc
Input Resistor	R1	7.0	10	13	kΩ
Resistor Ratio	R ₁ /R ₂	0.17	0.21	0.25	

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 $\leq 2\%$.



TYPICAL CHARACTERISTICS MUN2214, MMUN2214L, MUN5214, DTC114YE, DTC114YM3

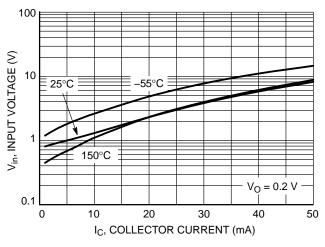
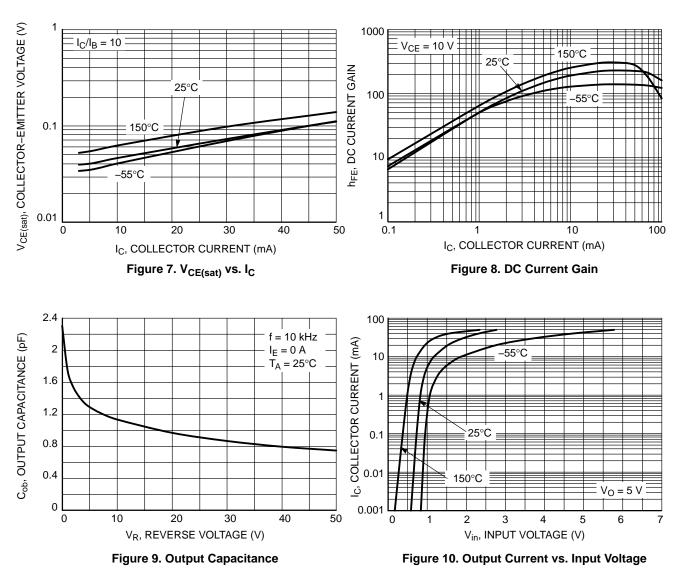


Figure 6. Input Voltage vs. Output Current



TYPICAL CHARACTERISTICS NSBC114YF3

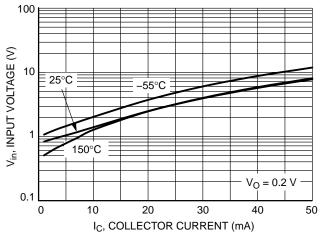
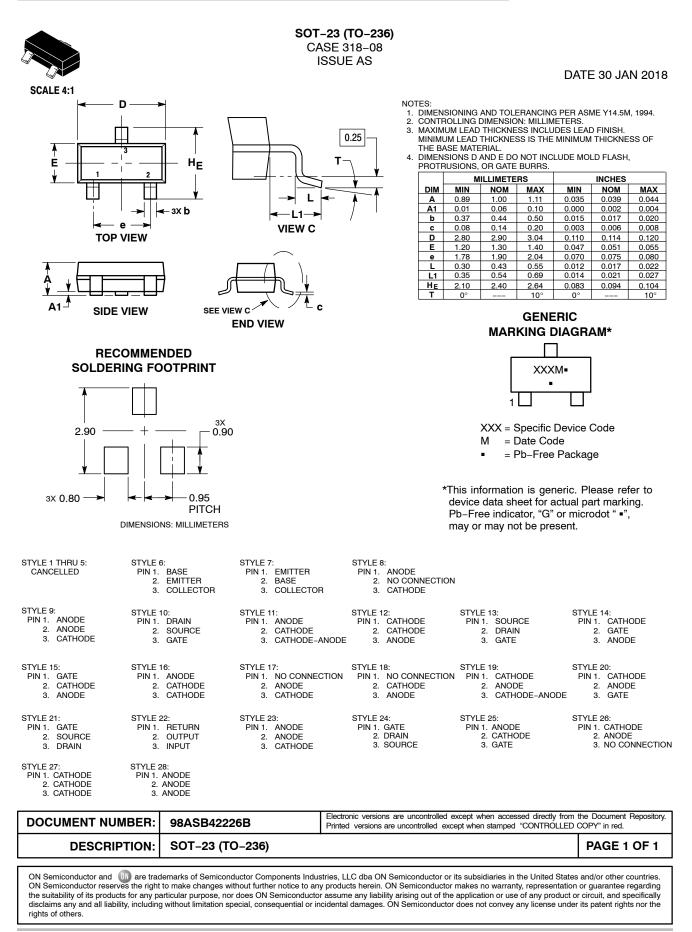


Figure 11. Input Voltage vs. Output Current





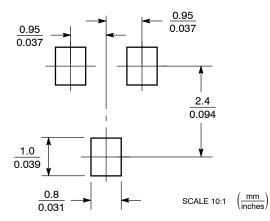




SCALE 2:1



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.

SC-59 CASE 318D-04 ISSUE H

DATE 28 JUN 2012

NOTES:

DIES:
 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 CONTROLLING DIMENSION: MILLIMETER.

	м	ILLIMETE	RS		INCHES	
DIM	MIN	NOM	MAX	MIN	NOM	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**



= Specific Device Code XXX Μ = Date Code

= Pb-Free Package*

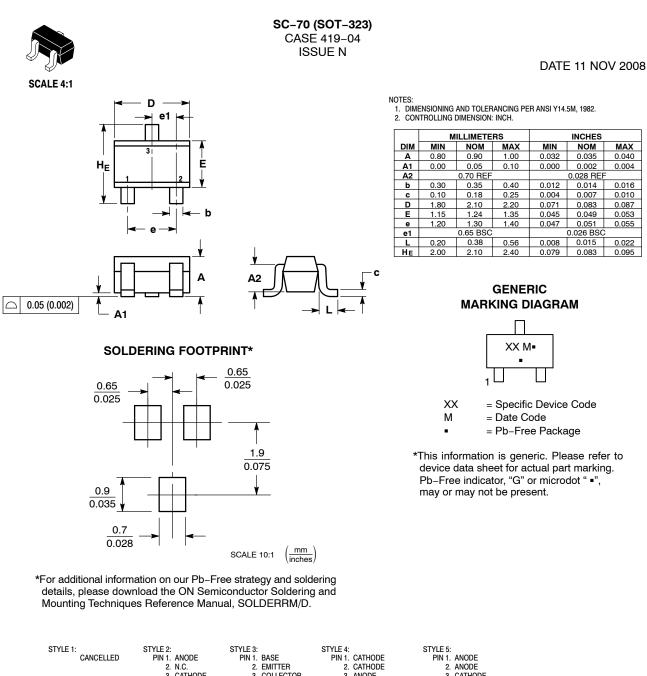
(*Note: Microdot may be in either location)

*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 1:	STYLE 2:	STYLE 3:
PIN 1. BASE	PIN 1. ANODE	PIN 1. ANODE
2. EMITTER	2. N.C.	2. ANODE
3. COLLECTOR	3. CATHODE	3. CATHODE
Style 4:	Style 5:	STYLE 6:
Pin 1. Cathode	Pin 1. Cathode	PIN 1. ANODE
2. n.c.	2. Cathode	2. CATHODE
3. Anode	3. Anode	3. ANODE/CATHODE

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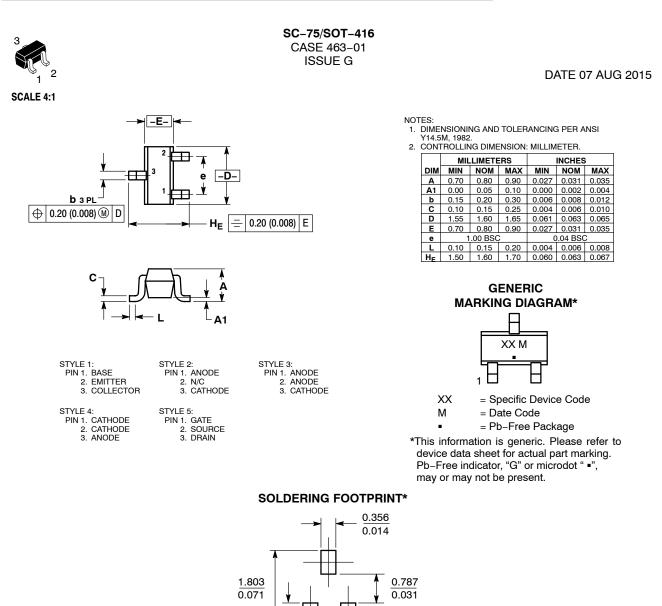
		3. CATHODE	3. COLLECTOR	3. ANODE	3. CATHODE	
3. COLLECTOR 3. COLLECTOR 3. DRAIN 3. CATHODE-ANODE 3. ANODE-CATHODE 3. CATHOD	PIN 1. EMITTER 2. BASE	PIN 1. BASE 2. EMITTER	PIN 1. GATE 2. SOURCE	PIN 1. ANODE 2. CATHODE	PIN 1. CATHODE 2. ANODE	STYLE 11: PIN 1. CATHODE 2. CATHODE 3. CATHODE

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1.000

0.039

SCALE 10:1

mm

inches

0.508

0.020

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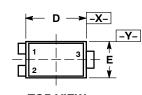
 DESCRIPTION:
 SC-75/SOT-416
 PAGE 1 OF 1

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SCALE 8:1

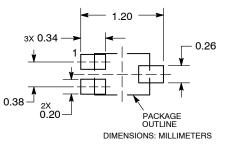


SOT-1123 CASE 524AA **ISSUE C**





SOLDERING FOOTPRINT*



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

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DATE 29 NOV 2011

- 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 DIMENSION OF DEPENDENT
- MINIMUM THICKNESS OF BASE MATERIAL. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. 4.

	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	
Е	0.55	0.65	
е	0.35	0.40	
HE	0.95	1.05	
L	0.185 REF		
L2	0.05	0.15	

GENERIC **MARKING DIAGRAM***

ď	ХМ	P

= Specific Device Code Х Μ = Date Code

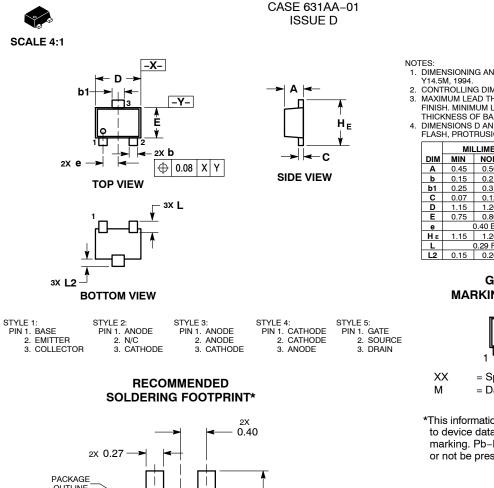
*This information is generic. Please refer to device data sheet for actual part marking.

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

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SOT-723

DATE 10 AUG 2009

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

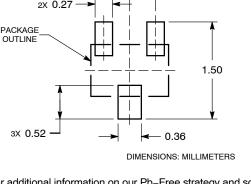
DIM	MIN	NOM	MAX
Α	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
С	0.07	0.12	0.17
D	1.15	1.20	1.25
Е	0.75	0.80	0.85
е	0.40 BSC		
ΗE	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

GENERIC **MARKING DIAGRAM***

	ХХ М	
1		

= Specific Device Code = Date Code

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



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