Complementary Bias Resistor Transistors R1 = 10 k\Omega, R2 = 10 k\Omega NPN and 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 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

 $(T_A = 25^{\circ}C \text{ both polarities } Q_1 (PNP) \& Q_2 (NPN), unless otherwise noted)$

Rating	Symbol	Max	Unit
Collector-Base Voltage	V _{CBO}	50	Vdc
Collector-Emitter Voltage	V _{CEO}	50	Vdc
Collector Current – Continuous	Ι _C	100	mAdc
Input Forward Voltage	V _{IN(fwd)}	40	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.

ORDERING INFORMATION

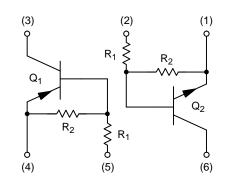
Device	Package	Shipping [†]
MUN5311DW1T1G, SMUN5311DW1T1G*	SOT-363	3,000/Tape & Reel
MUN5311DW1T2G, SMUN5311DW1T2G*	SOT-363	3,000/Tape & Reel
SMUN5311DW1T3G	SOT-363	10,000/Tape & Reel
NSBC114EPDXV6T1G, NSVBC114EPDXV6T1G*	SOT-563	4,000/Tape & Reel



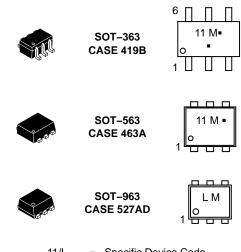
ON Semiconductor®

www.onsemi.com

PIN CONNECTIONS



MARKING DIAGRAMS





(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

Semiconductor Components Industries, LLC, 2014 July, 2018 – Rev. 4

ORDERING INFORMATION

Device	Package	Shipping [†]
NSBC114EPDXV6T5G	SOT-563	8,000/Tape & Reel
NSBC114EPDP6T5G	SOT-963	8,000/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.

THERMAL CHARACTERISTICS

	Characteristic	Symbol	Max	Unit
MUN5311DW1 (SOT-363) ON	E JUNCTION HEATED			
Total Device Dissipation $T_A = 25^{\circ}C$ (Note 1) (Note 2) Derate above 25^{C} (Note 2)	(Note 1)	PD	187 256 1.5 2.0	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	R _{θJA}	670 490	°C/W
MUN5311DW1 (SOT-363) BC	TH JUNCTION HEATED (Note 3)			
Total Device Dissipation $T_A = 25^{\circ}C$ (Note 1) (Note 2) Derate above 25^{C} (Note 2)	(Note 1)	PD	250 385 2.0 3.0	mW mW/°C
Thermal Resistance, Junction to Ambient (Note 2)	(Note 1)	R _{0JA}	493 325	°C/W
Thermal Resistance, Junction to Lead (Note 1) (Note 2)		R _{θJL}	188 208	°C/W
Junction and Storage Temper	ature Range	T _J , T _{stg}	-55 to +150	°C
NSBC114EPDXV6 (SOT-563)	ONE JUNCTION HEATED		· · · · ·	
$\begin{array}{l} \mbox{Total Device Dissipation} \\ T_A = 25^\circ C \qquad (Note 1) \\ \mbox{Derate above } 25^\circ C \end{array}$	(Note 1)	PD	357 2.9	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1)	R _{0JA}	350	°C/W
NSBC114EPDXV6 (SOT-563)	BOTH JUNCTION HEATED (Note 3)			
$\begin{array}{l} \mbox{Total Device Dissipation} \\ T_A = 25^\circ C \qquad (Note 1) \\ \mbox{Derate above } 25^\circ C \end{array}$	(Note 1)	PD	500 4.0	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1)	R _{θJA}	250	°C/W
Junction and Storage Temper	ature Range	T _J , T _{stg}	-55 to +150	°C
NSBC114EPDP6 (SOT-963)	ONE JUNCTION HEATED			
Total Device Dissipation $T_A = 25^{\circ}C$ (Note 4) (Note 5) Derate above 25^{\circ}C (Note 5)	(Note 4)	PD	231 269 1.9 2.2	MW mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	(Note 4)	R _{θJA}	540 464	°C/W
NSBC114EPDP6 (SOT-963)	BOTH JUNCTION HEATED (Note 3)			
$\begin{array}{l} \mbox{Total Device Dissipation} \\ T_A = 25^\circ C \qquad (Note 4) \\ (Note 5) \\ \mbox{Derate above } 25^\circ C \\ (Note 5) \end{array}$	(Note 4)	PD	339 408 2.7 3.3	MW mW/°C

THERMAL CHARACTERISTICS

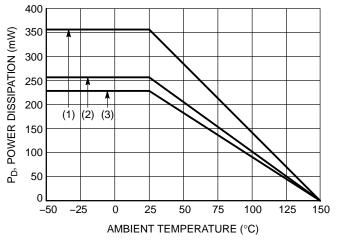
Characteristic	Symbol	Max	Unit
NSBC114EPDP6 (SOT-963) BOTH JUNCTION HEATED (Note 3)			
Thermal Resistance, Junction to Ambient (Note 4) (Note 5)	$R_{ heta JA}$	369 306	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C

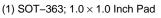
FR-4 @ Minimum Pad.
 FR-4 @ 1.0 × 1.0 Inch Pad.
 Both junction heated values assume total power is sum of two equally powered channels.
 FR-4 @ 100 mm², 1 oz. copper traces, still air.
 FR-4 @ 500 mm², 1 oz. copper traces, still air.

ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}C$ both polarities Q_1 (PNP) & Q_2 (NPN), 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}	-	-	0.5	mAdc
Collector-Base Breakdown Voltage $(I_C = 10 \ \mu A, I_E = 0)$	V _{(BR)CBO}	50	-	-	Vdc
Collector-Emitter Breakdown Voltage (Note 6) $(I_C = 2.0 \text{ mA}, I_B = 0)$	V _{(BR)CEO}	50	_	_	Vdc
ON CHARACTERISTICS					
DC Current Gain (Note 6) ($I_C = 5.0 \text{ mA}, V_{CE} = 10 \text{ V}$)	h _{FE}	35	60	_	
Collector-Emitter Saturation Voltage (Note 6) ($I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA}$)	V _{CE(sat)}	_	_	0.25	V
Input Voltage (Off) ($V_{CE} = 5.0 \text{ V}, I_C = 100 \mu\text{A}$) (NPN) ($V_{CE} = 5.0 \text{ V}, I_C = 100 \mu\text{A}$) (PNP)	V _{i(off)}	-	1.2 1.2		Vdc
Input Voltage (On) ($V_{CE} = 0.2 \text{ V}, I_C = 10 \text{ mA}$) (NPN) ($V_{CE} = 0.2 \text{ V}, I_C = 10 \text{ mA}$) (PNP)	V _{i(on)}	-	2.0 2.2		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	0.8	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. 6. Pulsed Condition: Pulse Width = 300 ms, Duty Cycle $\leq 2\%$.

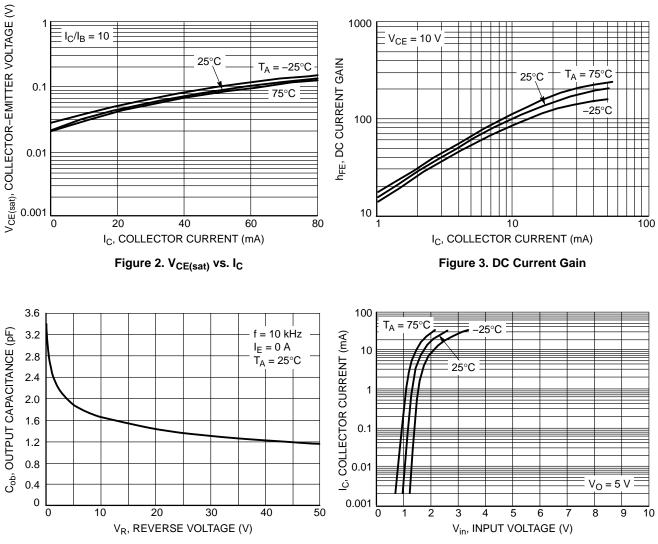




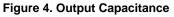
(2) SOT-563; Minimum Pad

(3) SOT-963; 100 mm², 1 oz. Copper Trace

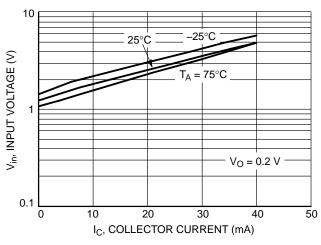
Figure 1. Derating Curve



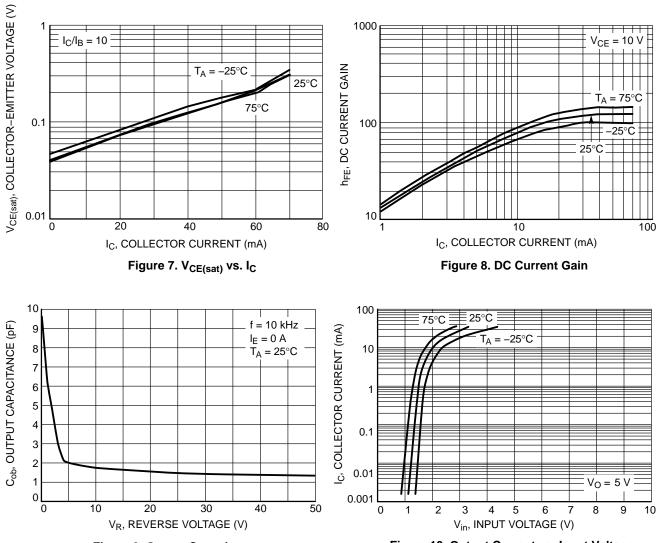
TYPICAL CHARACTERISTICS – NPN TRANSISTOR MUN5311DW1, NSBC114EPDXV6



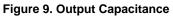




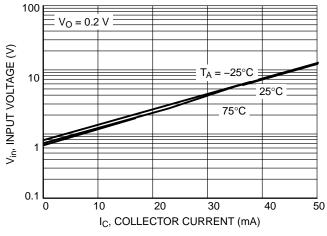




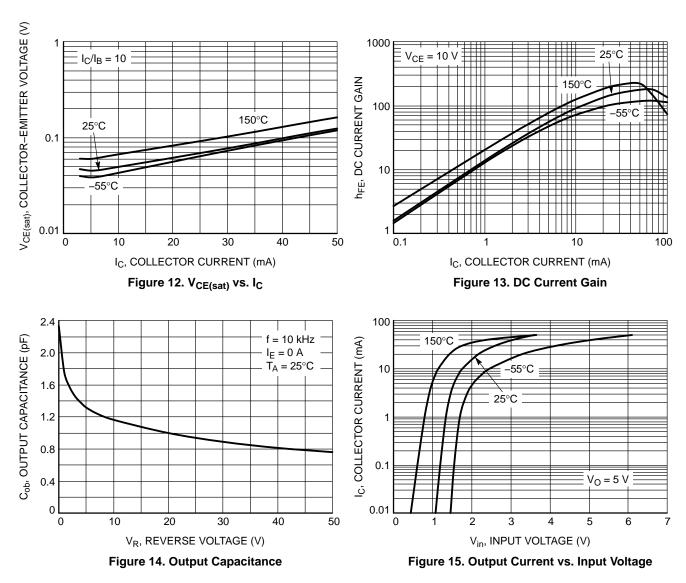
TYPICAL CHARACTERISTICS – PNP TRANSISTOR MUN5311DW1, NSBC114EPDXV6



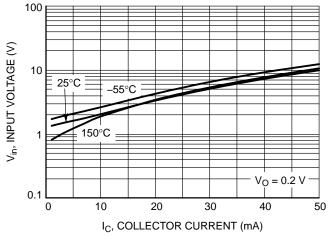




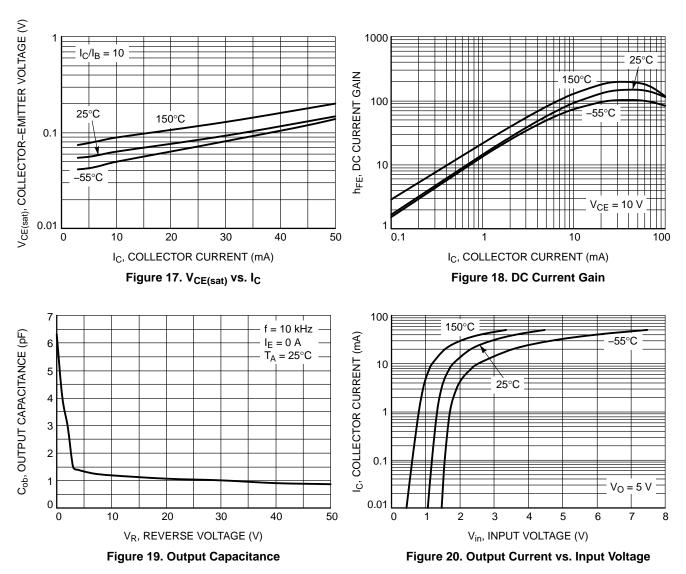




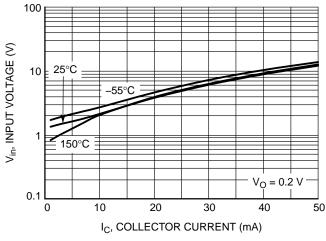
TYPICAL CHARACTERISTICS – NPN TRANSISTOR NSBC114EPDP6





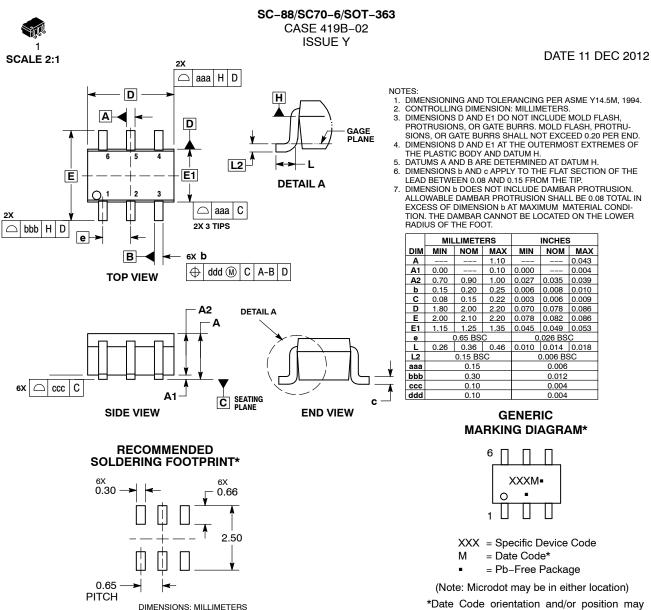


TYPICAL CHARACTERISTICS – PNP TRANSISTOR NSBC114EPDP6









- *Date Code orientation and/or position may vary depending upon manufacturing 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.

STYLES ON PAGE 2

DOCUMENT NUMBER:	98ASB42985B Electronic versions are uncontrolled except when accessed directly from the Document Report Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
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*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-88/SC70-6/SOT-363 CASE 419B-02 ISSUE Y

DATE 11 DEC 2012

STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
STYLE 7: PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	STYLE 8: CANCELLED	STYLE 9: PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	STYLE 10: PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	STYLE 11: PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	STYLE 12: PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
STYLE 13:	STYLE 14:	STYLE 15:	STYLE 16:	STYLE 17:	STYLE 18:
PIN 1. ANODE	PIN 1. VREF	PIN 1. ANODE 1	PIN 1. BASE 1	PIN 1. BASE 1	PIN 1. VIN1
2. N/C	2. GND	2. ANODE 2	2. EMITTER 2	2. EMITTER 1	2. VCC
3. COLLECTOR	3. GND	3. ANODE 3	3. COLLECTOR 2	3. COLLECTOR 2	3. VOUT2
4. EMITTER	4. IOUT	4. CATHODE 3	4. BASE 2	4. BASE 2	4. VIN2
5. BASE	5. VEN	5. CATHODE 2	5. EMITTER 1	5. EMITTER 2	5. GND
6. CATHODE	6. VCC	6. CATHODE 1	6. COLLECTOR 1	6. COLLECTOR 1	6. VOUT1
STYLE 19:	STYLE 20:	STYLE 21:	STYLE 22:	STYLE 23:	STYLE 24:
PIN 1. I OUT	PIN 1. COLLECTOR	PIN 1. ANODE 1	PIN 1. D1 (i)	PIN 1. Vn	PIN 1. CATHODE
2. GND	2. COLLECTOR	2. N/C	2. GND	2. CH1	2. ANODE
3. GND	3. BASE	3. ANODE 2	3. D2 (i)	3. Vp	3. CATHODE
4. V CC	4. EMITTER	4. CATHODE 2	4. D2 (c)	4. N/C	4. CATHODE
5. V EN	5. COLLECTOR	5. N/C	5. VBUS	5. CH2	5. CATHODE
6. V REF	6. COLLECTOR	6. CATHODE 1	6. D1 (c)	6. N/C	6. CATHODE
STYLE 25:	STYLE 26:	STYLE 27:	STYLE 28:	STYLE 29:	STYLE 30:
PIN 1. BASE 1	PIN 1. SOURCE 1	PIN 1. BASE 2	PIN 1. DRAIN	PIN 1. ANODE	PIN 1. SOURCE 1
2. CATHODE	2. GATE 1	2. BASE 1	2. DRAIN	2. ANODE	2. DRAIN 2
3. COLLECTOR 2	3. DRAIN 2	3. COLLECTOR 1	3. GATE	3. COLLECTOR	3. DRAIN 2
4. BASE 2	4. SOURCE 2	4. EMITTER 1	4. SOURCE	4. EMITTER	4. SOURCE 2
5. EMITTER	5. GATE 2	5. EMITTER 2	5. DRAIN	5. BASE/ANODE	5. GATE 1
6. COLLECTOR 1	6. DRAIN 1	6. COLLECTOR 2	6. DRAIN	6. CATHODE	6. DRAIN 1

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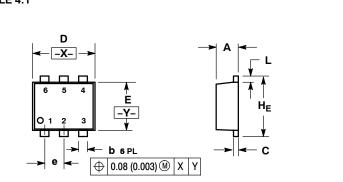




STYL PIN

STYL PIN

STYL PIN



 I. EMITTER 1 BASE 1 COLLECTOR 2 EMITTER 2 BASE 2 	
LE 4: 11. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	2. CATHODE 3. ANODE 4. ANODE 5. CATHODE
LE 7: I 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. ANODE	STYLE 8: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN

PIN	1.	DRAIN
	2.	DRAIN
	З.	GATE
	4.	SOUR
	5.	DRAIN
	6.	DRAIN

STYLE	10:
	CATL

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

6. CATHODE

- 6. ANODE 1

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

ST

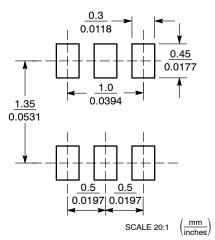
CATHODE	
 CATHODE 	
5. CATHODE	
6. CATHODE	
YLE 9:	
IN 1. SOURCE 1	

SOT-563, 6 LEAD CASE 463A

ISSUE G

SOURCE 1
GATE 1
DRAIN 2
SOURCE 2
GATE 2
DRAIN 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.

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NOTES

2.

1. DIMENSIONING AND TOLERANCING PER ANSI

Y14.5M, 1982. CONTROLLING DIMENSION: MILLIMETERS

MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS 3. IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	0.50	0.55	0.60	0.020	0.021	0.023
b	0.17	0.22	0.27	0.007	0.009	0.011
С	0.08	0.12	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.062	0.066
Е	1.10	1.20	1.30	0.043	0.047	0.051
е	0.5 BSC		0.02 BSC			
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	1.50	1.60	1.70	0.059	0.062	0.066

GENERIC **MARKING DIAGRAM***

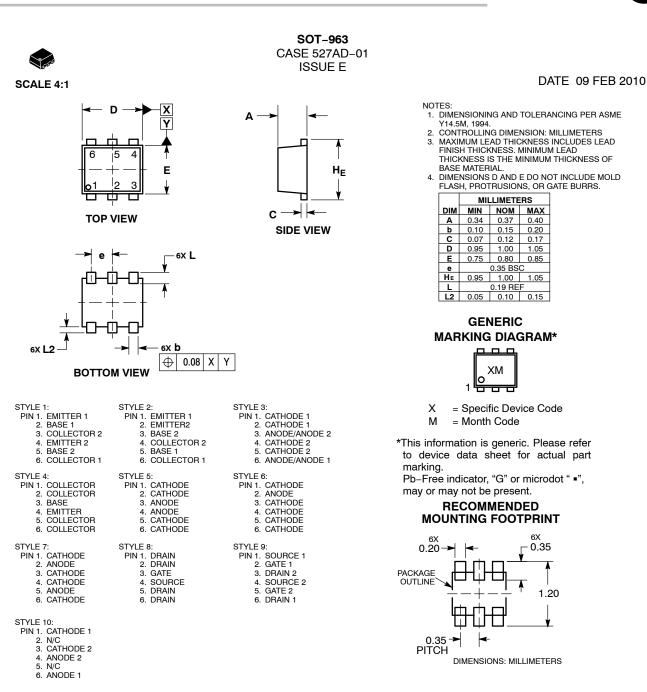


XX = Specific Device Code

- M = Month 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.





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