

# Bipolar Power Transistors

## NPN Silicon

### NJT4031N, NJV4031NT1G, NJV4031NT3G

#### Features

- Epoxy Meets UL 94, V-0 @ 0.125 in
- NJV 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<sub>C</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	40	Vdc
Collector-Base Voltage	V <sub>CB</sub>	40	Vdc
Emitter-Base Voltage	V <sub>EB</sub>	6.0	Vdc
Base Current - Continuous	I <sub>B</sub>	1.0	Adc
Collector Current - Continuous	I <sub>C</sub>	3.0	Adc
Collector Current - Peak	I <sub>CM</sub>	5.0	Adc
ESD - Human Body Model	HBM	3B	V
ESD - Machine Model	MM	C	V

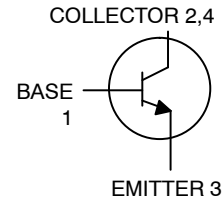
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

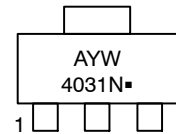
Characteristic	Symbol	Max	Unit
Total Power Dissipation Total P <sub>D</sub> @ T <sub>A</sub> = 25°C (Note 1) Total P <sub>D</sub> @ T <sub>A</sub> = 25°C (Note 2)	P <sub>D</sub>	2.0 0.80	W
Thermal Resistance, Junction-to-Case Junction-to-Ambient (Note 1) Junction-to-Ambient (Note 2)	R <sub>θJA</sub> R <sub>θJA</sub>	64 155	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T <sub>L</sub>	260	°C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

1. Mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material.
2. Mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material.

## NPN TRANSISTOR 3.0 AMPERES 40 VOLTS, 2.0 WATTS



#### MARKING DIAGRAM



- A = Assembly Location
- Y = Year
- W = Work Week
- 4031N = Specific Device Code
- = Pb-Free Package

#### ORDERING INFORMATION

Device	Package	Shipping†
NJT4031NT1G	SOT-223 (Pb-Free)	1000 / Tape & Reel
NJV4031NT1G		
NJT4031NT3G	SOT-223 (Pb-Free)	4000 / Tape & Reel
NJV4031NT3G		

†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.

# NJT4031N, NJV4031NT1G, NJV4031NT3G

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Sustaining Voltage ( $I_C = 10\text{ mAdc}$ , $I_B = 0\text{ Adc}$ )	$V_{CEO(sus)}$	40	-	-	Vdc
Emitter-Base Voltage ( $I_E = 50\text{ }\mu\text{Adc}$ , $I_C = 0\text{ Adc}$ )	$V_{EBO}$	6.0	-	-	Vdc
Collector Cutoff Current ( $V_{CB} = 40\text{ Vdc}$ )	$I_{CBO}$	-	-	100	nAdc
Emitter Cutoff Current ( $V_{BE} = 6.0\text{ Vdc}$ )	$I_{EBO}$	-	-	100	nAdc

## ON CHARACTERISTICS (Note 3)

Collector-Emitter Saturation Voltage ( $I_C = 0.5\text{ Adc}$ , $I_B = 5.0\text{ mAdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $I_B = 10\text{ mAdc}$ ) ( $I_C = 3.0\text{ Adc}$ , $I_B = 0.3\text{ Adc}$ )	$V_{CE(sat)}$	-	-	0.100 0.150 0.300	Vdc
Base-Emitter Saturation Voltage ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{BE(sat)}$	-	-	1.0	Vdc
Base-Emitter On Voltage ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 2.0\text{ Vdc}$ )	$V_{BE(on)}$	-	-	1.0	Vdc
DC Current Gain ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	220 200 100	- - -	500	

## DYNAMIC CHARACTERISTICS

Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	-	25	-	pF
Input Capacitance ( $V_{EB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ MHz}$ )	$C_{ib}$	-	170	-	pF
Current-Gain - Bandwidth Product (Note 4) ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $F_{test} = 1.0\text{ MHz}$ )	$f_T$	-	215	-	MHz

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.

3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

4.  $f_T = |h_{FE}| \cdot f_{test}$

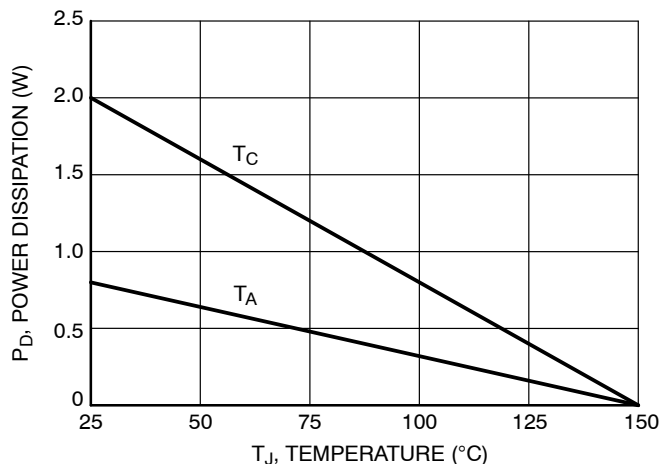


Figure 1. Power Derating

TYPICAL CHARACTERISTICS

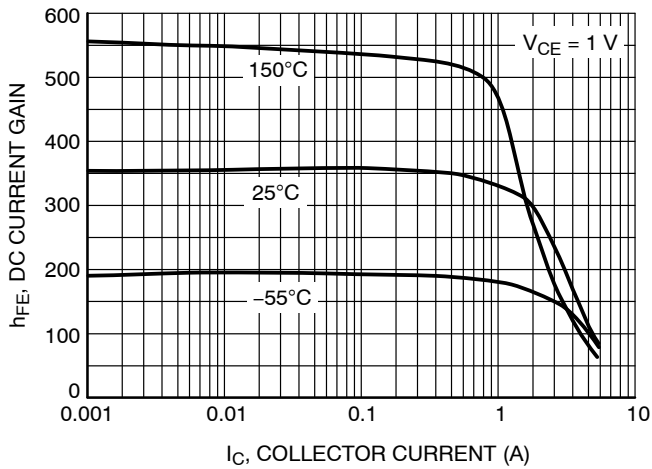


Figure 2. DC Current Gain

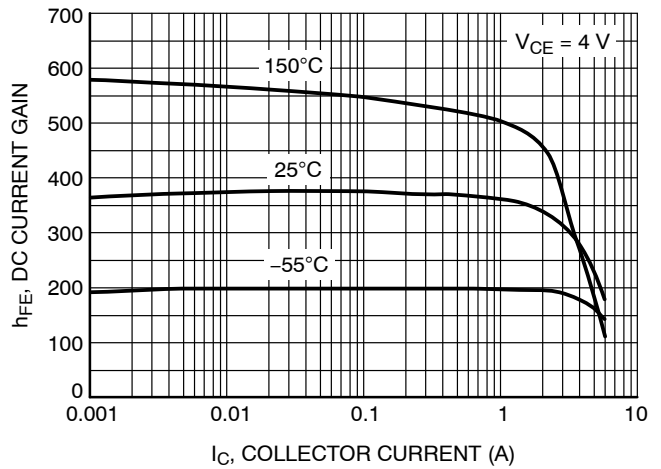


Figure 3. DC Current Gain

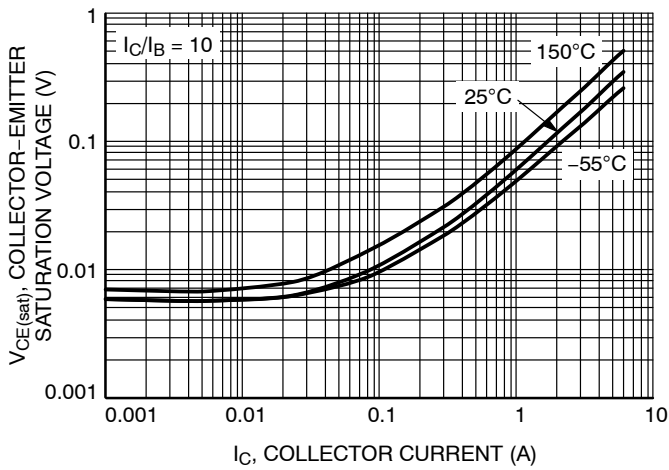


Figure 4. Collector-Emitter Saturation Voltage

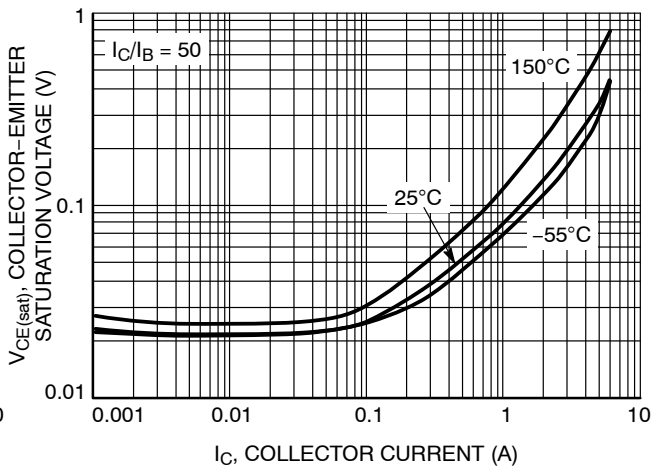


Figure 5. Collector-Emitter Saturation Voltage

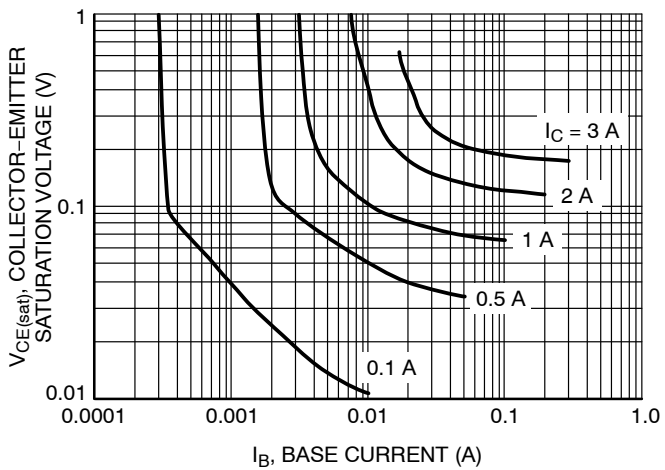


Figure 6. Collector Saturation Region

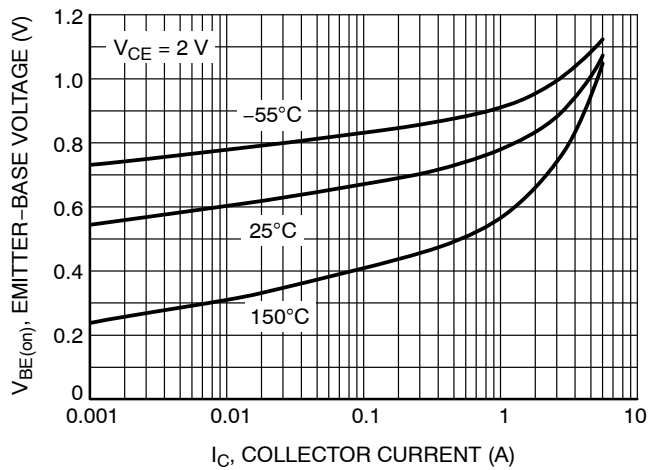


Figure 7.  $V_{BE(on)}$  Voltage

TYPICAL CHARACTERISTICS

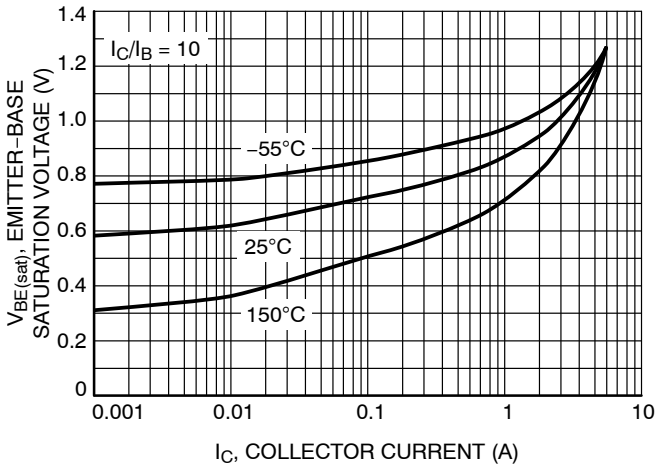


Figure 8. Base-Emitter Saturation Voltage

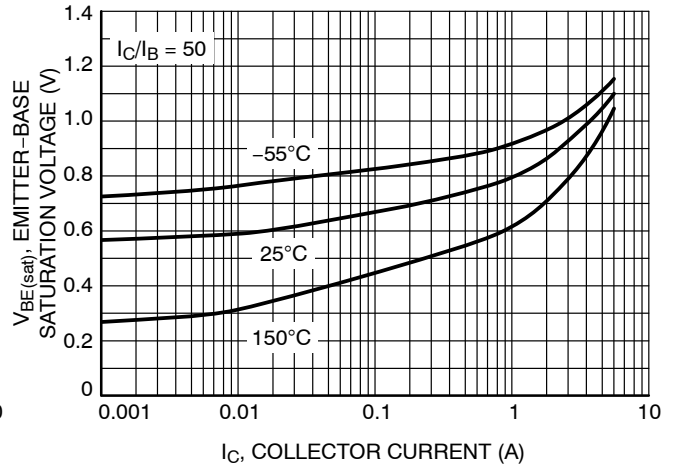


Figure 9. Base-Emitter Saturation Voltage

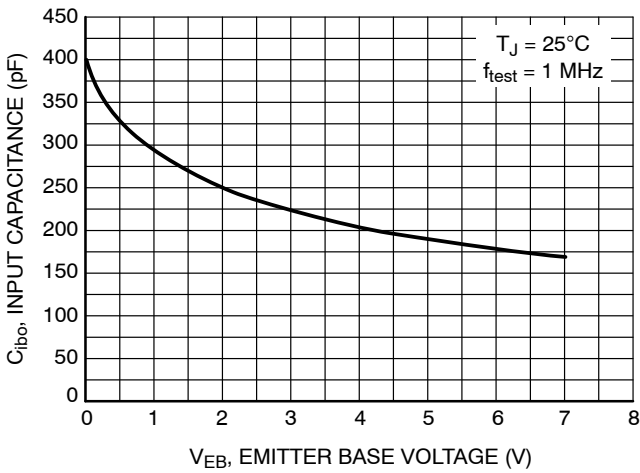


Figure 10. Input Capacitance

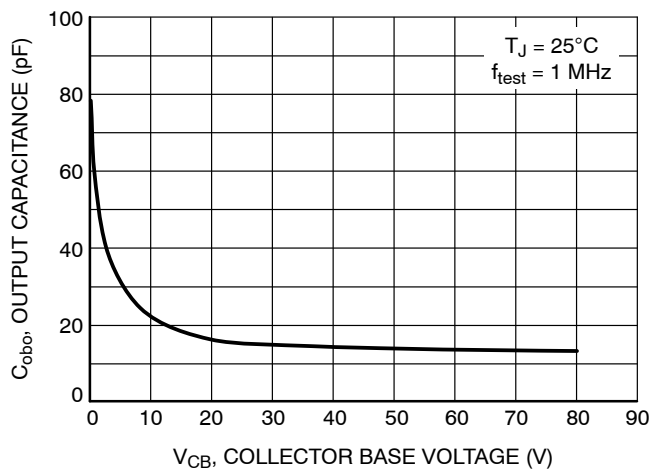


Figure 11. Output Capacitance

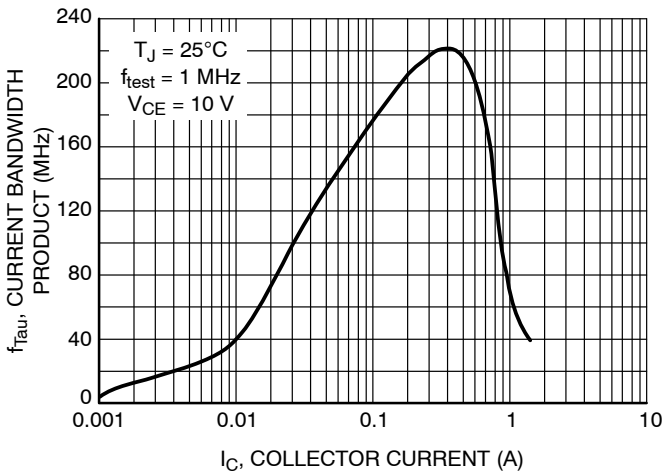


Figure 12. Current-Gain Bandwidth Product

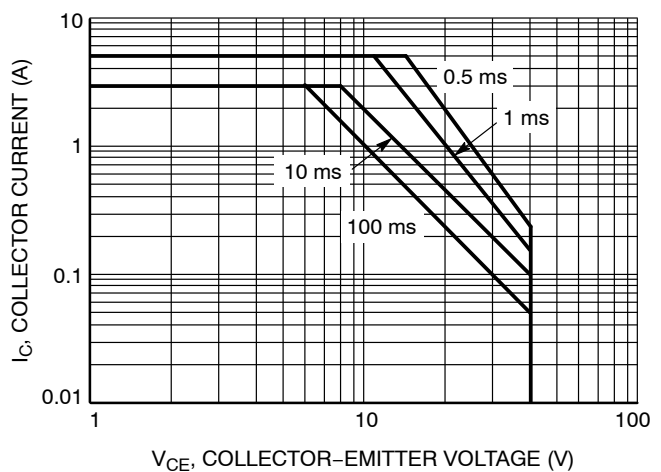


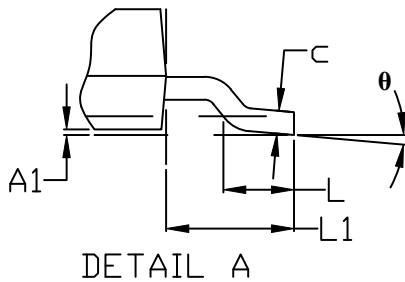
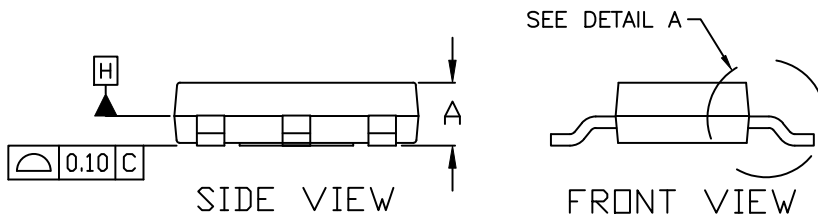
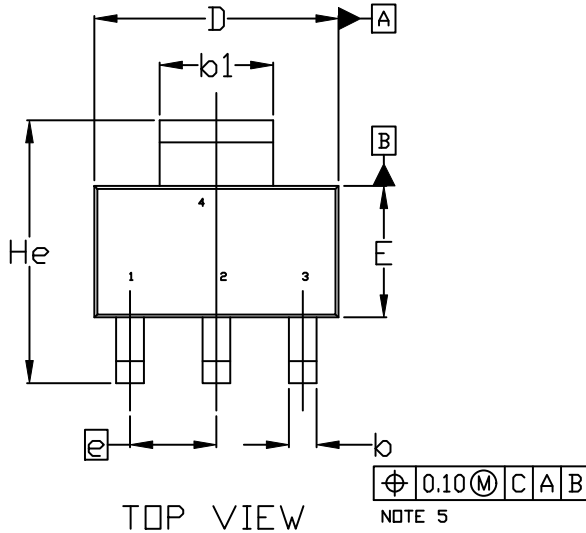
Figure 13. Safe Operating Area



SCALE 1:1

SOT-223 (TO-261)  
CASE 318E-04  
ISSUE R

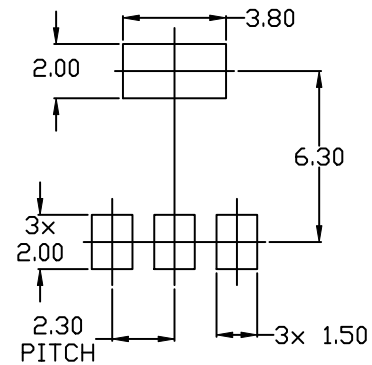
DATE 02 OCT 2018



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
$\theta$	0°	---	10°



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DESCRIPTION:	SOT-223 (TO-261)	PAGE 1 OF 2

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**SOT-223 (TO-261)**  
**CASE 318E-04**  
**ISSUE R**

DATE 02 OCT 2018

- |  |   |   |   |   |
|--|---|---|---|---|
| <b>STYLE 1:</b><br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | <b>STYLE 2:</b><br>PIN 1. ANODE<br>2. CATHODE<br>3. NC<br>4. CATHODE        | <b>STYLE 3:</b><br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN           | <b>STYLE 4:</b><br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE<br>4. DRAIN   | <b>STYLE 5:</b><br>PIN 1. DRAIN<br>2. GATE<br>3. SOURCE<br>4. GATE    |
| <b>STYLE 6:</b><br>PIN 1. RETURN<br>2. INPUT<br>3. OUTPUT<br>4. INPUT        | <b>STYLE 7:</b><br>PIN 1. ANODE 1<br>2. CATHODE<br>3. ANODE 2<br>4. CATHODE | <b>STYLE 8:</b><br>CANCELLED  | <b>STYLE 9:</b><br>PIN 1. INPUT<br>2. GROUND<br>3. LOGIC<br>4. GROUND | <b>STYLE 10:</b><br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE<br>4. ANODE |
| <b>STYLE 11:</b><br>PIN 1. MT 1<br>2. MT 2<br>3. GATE<br>4. MT 2             | <b>STYLE 12:</b><br>PIN 1. INPUT<br>2. OUTPUT<br>3. NC<br>4. OUTPUT         | <b>STYLE 13:</b><br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR |   |   |

**GENERIC  
 MARKING DIAGRAM\***



- A = Assembly Location
- Y = Year
- W = Work Week
- XXXXX = Specific Device 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. Some products may not follow the Generic Marking.

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