

# NJT4031N, NJV4031NT1G, NJV4031NT3G

## Bipolar Power Transistors

### NPN Silicon

#### 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 Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

#### 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.

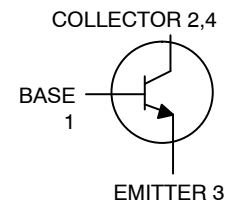
2. Mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material.



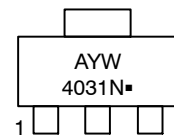
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### NPN TRANSISTOR 3.0 AMPERES 40 VOLTS, 2.0 WATTS



#### 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
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### OFF CHARACTERISTICS

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)

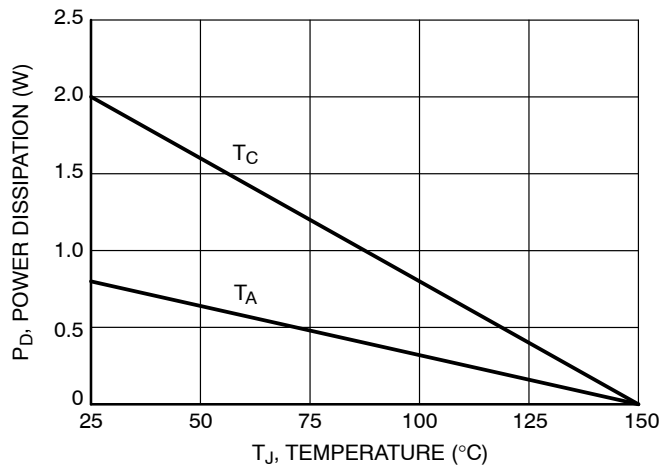
Collector–Emitter Saturation Voltage ( $I_C = 0.5\text{ Adc}$ , $I_B = 5.0\text{ mAdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $I_B = 10\text{ mAdc}$ ) ( $I_C = 3.0\text{ Adc}$ , $I_B = 0.3\text{ Adc}$ )	$V_{CE(sat)}$	–	–	0.100 0.150 0.300	Vdc
Base–Emitter Saturation Voltage ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{BE(sat)}$	–	–	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

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

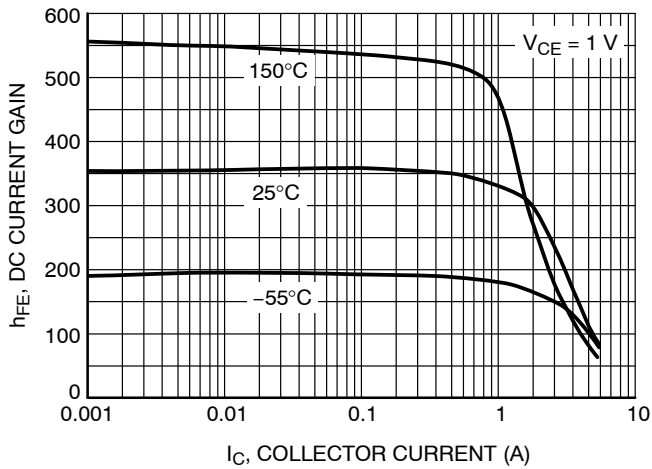


Figure 2. DC Current Gain

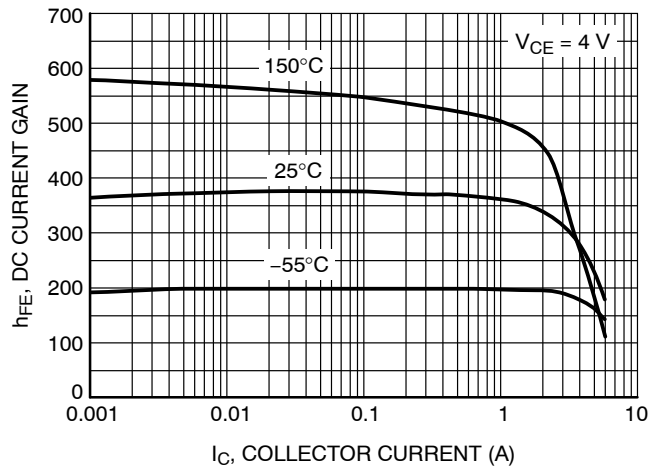


Figure 3. DC Current Gain

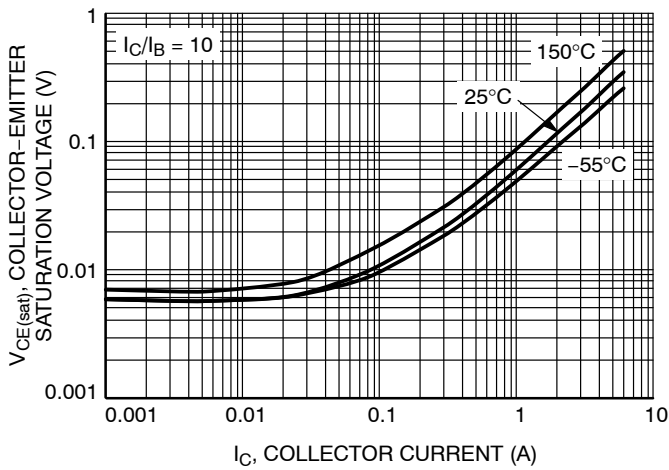


Figure 4. Collector-Emitter Saturation Voltage

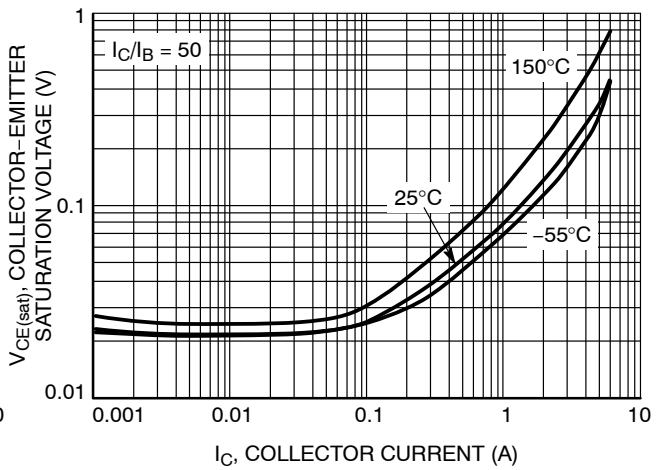


Figure 5. Collector-Emitter Saturation Voltage

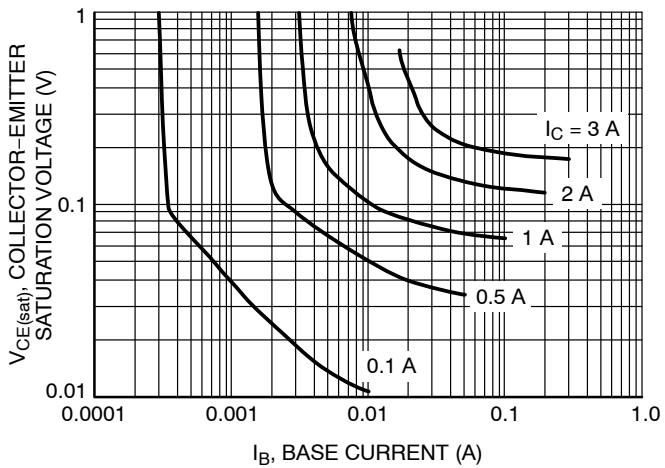


Figure 6. Collector Saturation Region

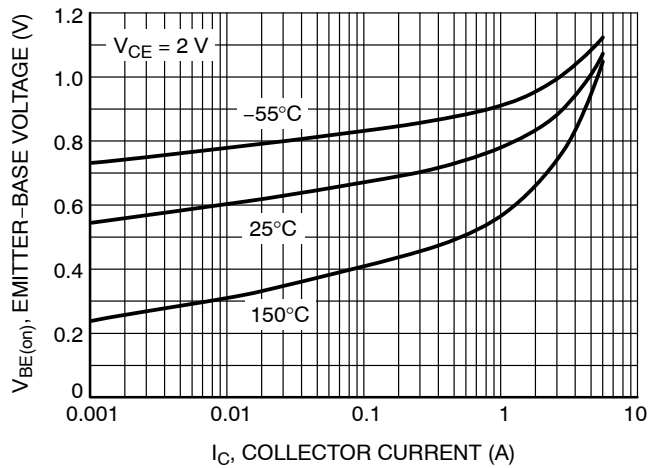


Figure 7.  $V_{BE(on)}$  Voltage

TYPICAL CHARACTERISTICS

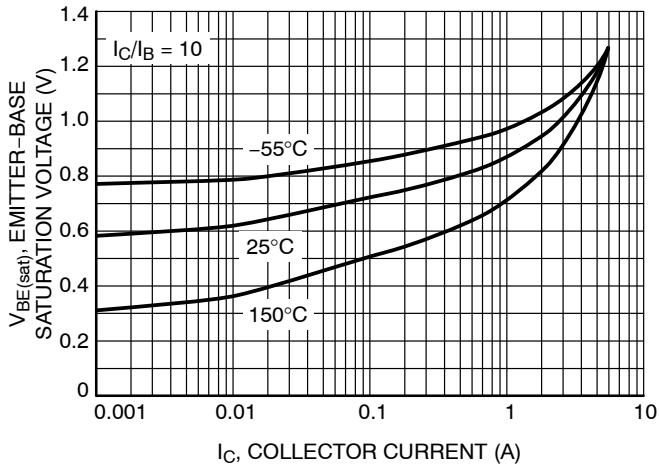


Figure 8. Base-Emitter Saturation Voltage

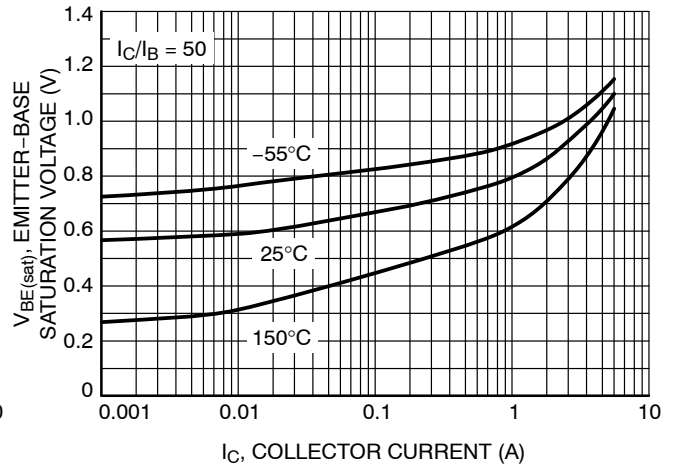


Figure 9. Base-Emitter Saturation Voltage

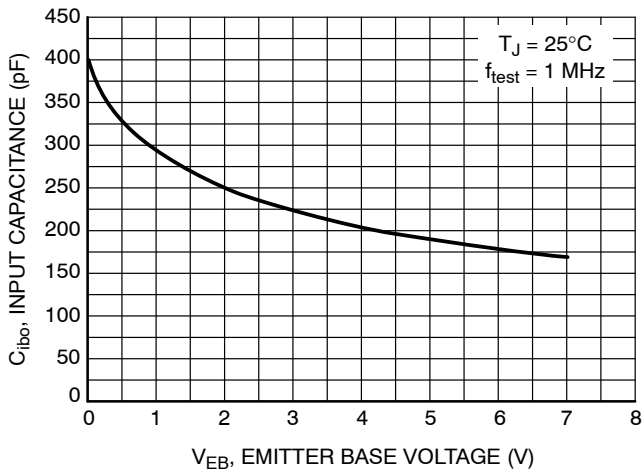


Figure 10. Input Capacitance

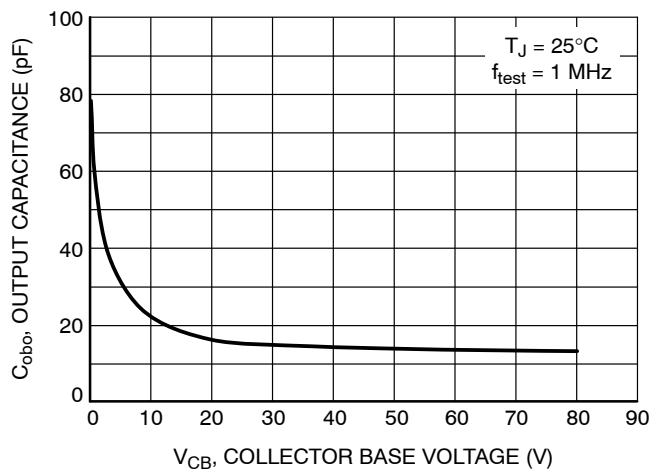


Figure 11. Output Capacitance

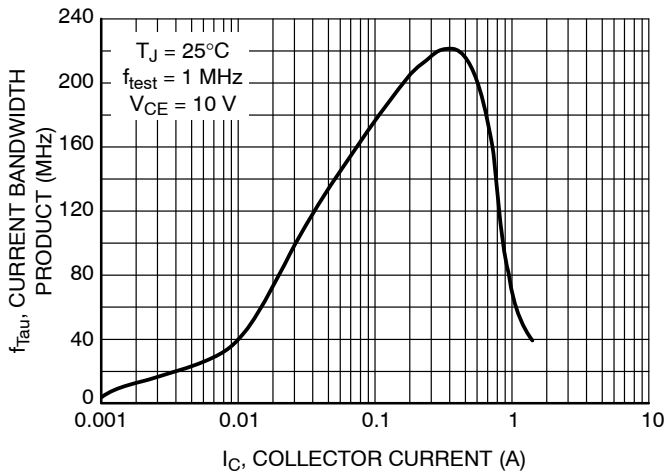


Figure 12. Current-Gain Bandwidth Product

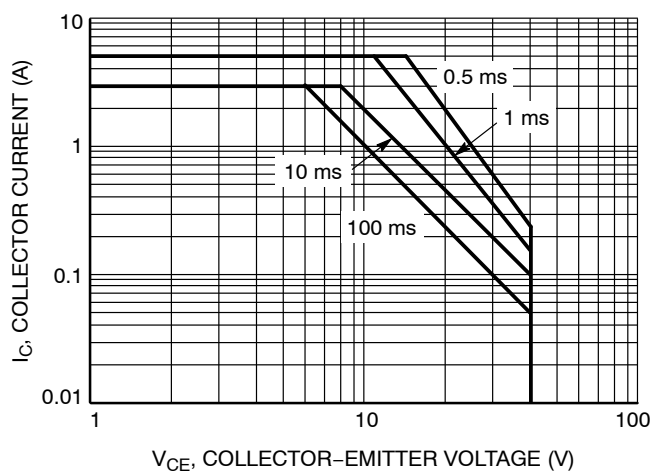
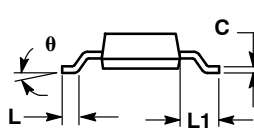
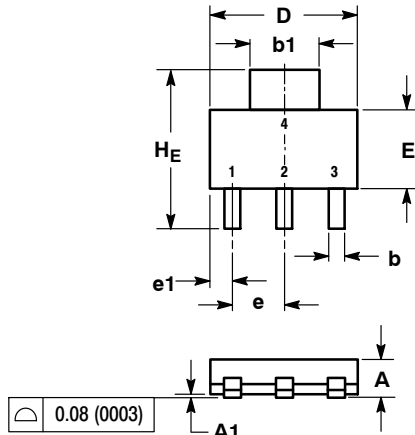


Figure 13. Safe Operating Area

# NJT4031N, NJV4031NT1G, NJV4031NT3G

## PACKAGE DIMENSIONS

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



NOTES:

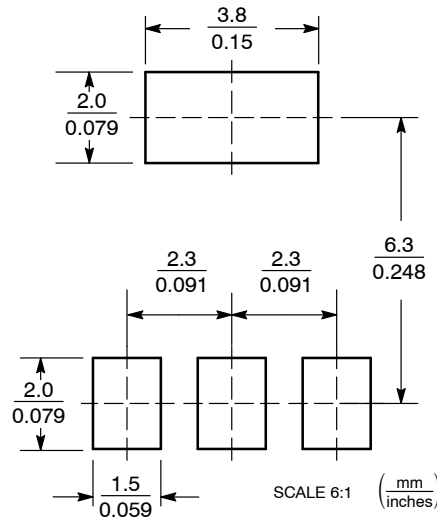
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.63	1.75	0.060	0.064	0.068
A1	0.02	0.06	0.10	0.001	0.002	0.004
b	0.60	0.75	0.89	0.024	0.030	0.035
b1	2.90	3.06	3.20	0.115	0.121	0.126
c	0.24	0.29	0.35	0.009	0.012	0.014
D	6.30	6.50	6.70	0.249	0.256	0.263
E	3.30	3.50	3.70	0.130	0.138	0.145
e	2.20	2.30	2.40	0.087	0.091	0.094
e1	0.85	0.94	1.05	0.033	0.037	0.041
L	0.20	---	---	0.008	---	---
L1	1.50	1.75	2.00	0.060	0.069	0.078
HE	6.70	7.00	7.30	0.264	0.276	0.287
θ	0°	-	10°	0°	-	10°

STYLE 1:

- PIN 1. BASE
- COLLECTOR
- EMITTER
- COLLECTOR

### 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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