Preferred Device

Bipolar Power Transistors

NPN Silicon

Features

• Collector -Emitter Sustaining Voltage -

$$V_{CEO(sus)} = 40 \text{ Vdc (Min)} @ I_C = 10 \text{ mAdc}$$

• High DC Current Gain -

$$h_{FE}$$
 = 200 (Min) @ I_C = 1.0 Adc
= 100 (Min) @ I_C = 3.0 Adc

• Low Collector -Emitter Saturation Voltage -

$$V_{CE(sat)} = 0.150 \text{ Vdc (Max)} @ I_C = 1.0 \text{ Adc}$$

= 0.300 Vdc (Max) @ $I_C = 3.0 \text{ Adc}$

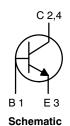
- SOT-223 Surface Mount Packaging
- Epoxy Meets UL 94, V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B; > 8000 V Machine Model, C; > 400 V
- These are Pb-Free Devices



ON Semiconductor®

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NPN TRANSISTOR 3.0 AMPERES 40 VOLTS, 2.0 WATTS



MARKING DIAGRAM



W

SOT-223 CASE 318E STYLE 1



A = Assembly Location

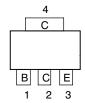
Yea

= Work Week

4031N = Specific Device Code

= Pb-Free Package

PIN ASSIGNMENT



Top View Pinout

ORDERING INFORMATION

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

Preferred devices are recommended choices for future use and best overall value.

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit	
Collector-Emitter Voltage	V _{CEO}	40	Vdc	
Collector-Base Voltage	V _{CB}	40	Vdc	
Emitter-Base Voltage	V _{EB}	6.0	Vdc	
Base Current - Continuous	I _B	1.0	Adc	
Collector Current - Continuous - Peak	Ic	3.0 5.0	Adc	
Total Power Dissipation Total $P_D @ T_A = 25^{\circ}C$ mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material Total $P_D @ T_A = 25^{\circ}C$ mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material	P _D	2.0 0.80	W	
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to +150	°C	

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
Thermal Resistance, Junction-to-Case - Junction-to-Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material - Junction-to-Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material		64 155	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	TL	260	°C

ORDERING INFORMATION

Device	Device Package	
NJT4031NT1G	SOT-223 (Pb-Free)	1000 / Tape & Reel
NJT4031NT3G	SOT-223 (Pb-Free)	4000 / 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.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS	<u> </u>	•			
Collector-Emitter Sustaining Voltage (I _C = 10 mAdc, I _B = 0 Adc)	V _{CEO(sus)}	40			Vdc
Emitter-Base Voltage ($I_E = 50 \mu Adc$, $I_C = 0 Adc$)	V _{EBO}	6.0			Vdc
Collector Cutoff Current (V _{CB} = 40 Vdc)	I _{CBO}			100	nAdc
Emitter Cutoff Current (V _{BE} = 6.0 Vdc)	I _{EBO}			100	nAdc
ON CHARACTERISTICS (Note 1)		•			
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 Adc, I _B = 0.1 Adc)	V _{BE(sat)}			1.0	Vdc
Base-Emitter On Voltage (I _C = 1.0 Adc, V _{CE} = 2.0 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 Vdc, f = 1.0 MHz)	C _{ob}		25		pF
Input Capacitance (V _{EB} = 5.0 Vdc, f = 1.0 MHz)	C _{ib}		170		pF
Current-Gain - Bandwidth Product (Note 2) (I _C = 500 mA, V _{CE} = 10 V, F _{test} = 1.0 MHz)	f _T		215		MHz

^{1.} Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2%. 2. $f_T = |h_{FE}| \bullet f_{test}$

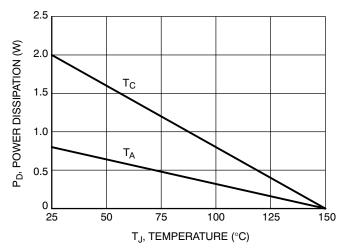
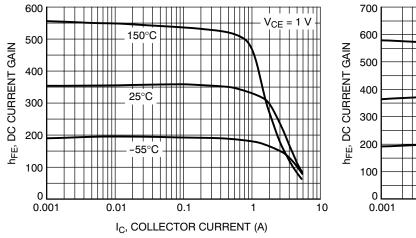


Figure 1. Power Derating

TYPICAL CHARACTERISTICS





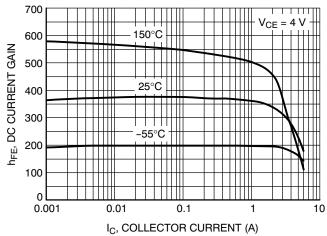


Figure 3. DC Current Gain

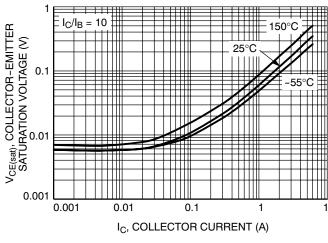


Figure 4. Collector-Emitter Saturation Voltage

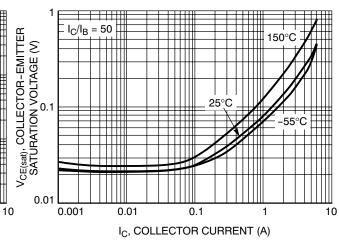


Figure 5. Collector-Emitter Saturation Voltage

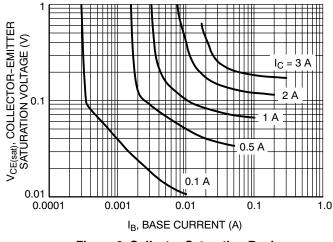


Figure 6. Collector Saturation Region

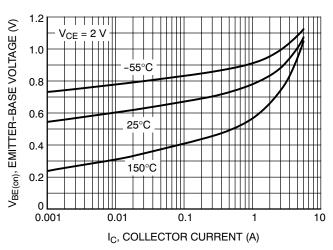


Figure 7. V_{BE(on)} Voltage

TYPICAL CHARACTERISTICS

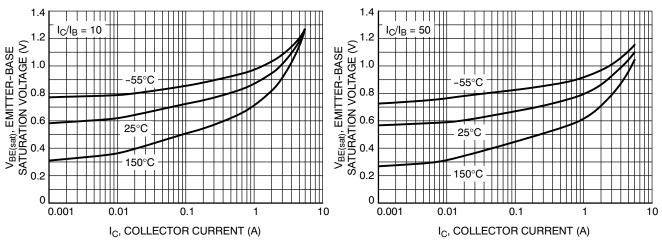


Figure 8. Base-Emitter Saturation Voltage

Figure 9. Base-Emitter Saturation Voltage

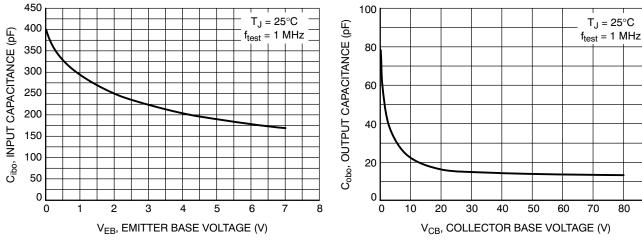


Figure 10. Input Capacitance

Figure 11. Output Capacitance

90

100

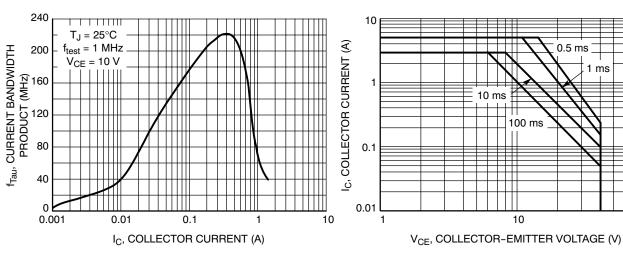
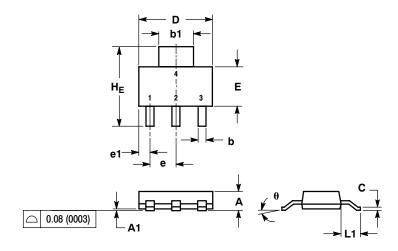


Figure 12. Current-Gain Bandwidth Product

Figure 13. Safe Operating Area

PACKAGE DIMENSIONS

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

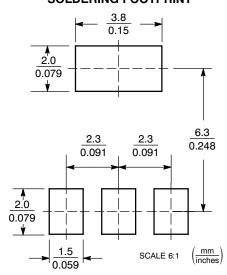


NOTES

- DIMENSIONING AND TOLERANCING PER ANSI
 Y14.5M. 1982.
- 2. CONTROLLING DIMENSION: INCH.

	М	MILLIMETERS INCHES				
DIM	MIN	NOM	MAX	MIN	MAX	
Α	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
С	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
е	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
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°

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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