



**General  
Semiconductor  
Industries, Inc.**

**2N4002  
2N4003**

### DIFFUSED SILICON EPITAXIAL PASSIVATED TRANSISTORS

These NPN devices are designed for use in high power switching and untuned amplifier applications. The latest technologies are used to offer the highest degree of reliability.

#### FEATURES

- Fast Switching
- High Power Dissipation
- Low Leakage Current
- Low Saturation Voltage

#### APPLICATIONS

- Switching Regulators
- Inverters
- Converters
- Power Amplifiers

#### ABSOLUTE MAXIMUM RATINGS

##### Maximum Temperatures

Storage Temperature	-65°C to +200°C
Operating Junction Temperature	+200°C
Lead Temperature (1/16 inch from case for 10 seconds)	+230°C

##### Maximum Power Dissipation

Total Dissipation at 100°C Case Temperature	100 Watts
Linear Derating Factor	1.0 W/°C

##### Maximum Voltages and Current


	2N4002	2N4003
V <sub>CEO</sub> Collector to Emitter Voltage	80 Volts	100 Volts
V <sub>CBO</sub> Collector to Base Voltage	100 Volts	120 Volts
V <sub>EBO</sub> Emitter to Base Voltage	8 Volts	8 Volts
I <sub>C</sub> Continuous Collector Current	30 Amps	30 Amps

#### MECHANICAL CHARACTERISTICS

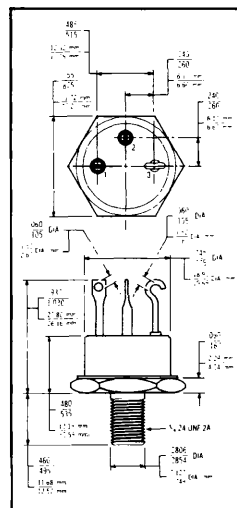
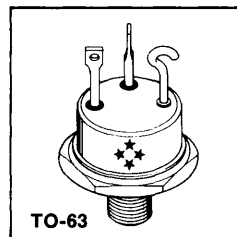
Case: TO-63 Package

Weight: 24 grams (Approximate)

1. Emitter 2. Base 3. Collector

Body marked with Logo  and type number

### NPN SILICON POWER TRANSISTORS



#### \*ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	2N4002		2N4003		UNITS
			MIN	MAX	MIN	MAX	
† Collector to Emitter Breakdown Voltage	V <sub>CEO</sub>	I <sub>C</sub> = 30mA, I <sub>B</sub> = 0	80		100		Volts
Collector Cutoff Current	I <sub>CBO</sub>	V <sub>CE</sub> = 40V, I <sub>B</sub> = 0 V <sub>CE</sub> = 50V, I <sub>B</sub> = 0		2		2	mAmps
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> = 5V, I <sub>C</sub> = 0 V <sub>EB</sub> = 8V, I <sub>C</sub> = 0		100 50		100 50	μAmps mAmps
† DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 4V, I <sub>C</sub> = 30A V <sub>CE</sub> = 4V, I <sub>C</sub> = 15A	10 20	80	10 20	80	
† Collector Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>B</sub> = 4A, I <sub>C</sub> = 30A		1.2		1.2	Volts
† Base - Emitter Voltage	V <sub>BE(on)</sub>	V <sub>CE</sub> = 4V, I <sub>C</sub> = 30A		1.8		1.8	Volts

\*JEDEC registered data. † Pulse Conditions. Width = 300μs; Duty Cycle ≤ 2% (measured using Kelvin connections).

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## \* DYNAMIC CHARACTERISTICS

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN	MAX	UNITS
Turn-on Time	$t_{on}$	See Figure 2		1.0	$\mu$ SEC
Turn-off Time	$t_{off}$	See Figure 2		3.0	$\mu$ SEC
High Frequency Small Signal	$h_{fe1}$	$V_{CE} = 10V, I_C = 1A, f = 10$ MHz	3		
Common Emitter Small Signal	$h_{fe1}$	$V_{CE} = 4V, I_C = 1A, f = 1$ KHz	30		

\*JEDEC registered data.

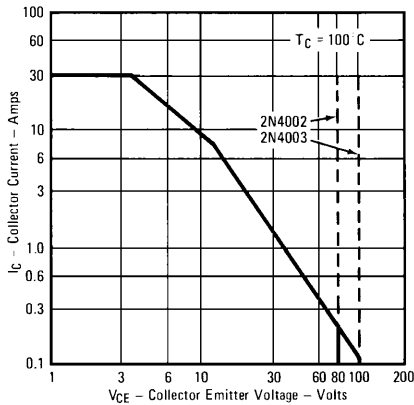


Figure 1 - MAXIMUM SAFE OPERATING REGION

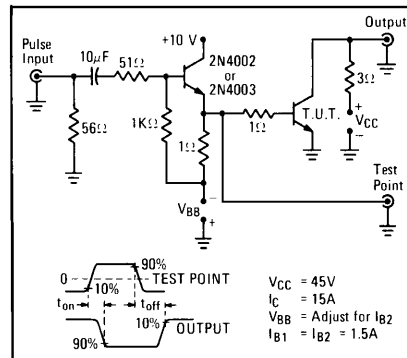


Figure 2 - SWITCHING CIRCUIT

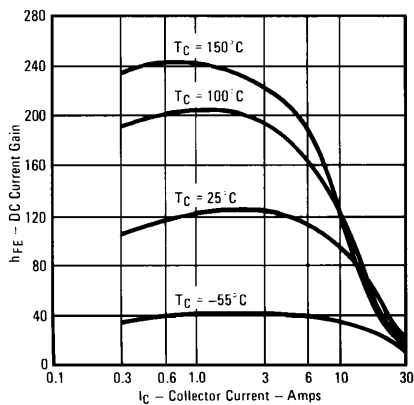


Figure 3 - TYPICAL DC CURRENT GAIN

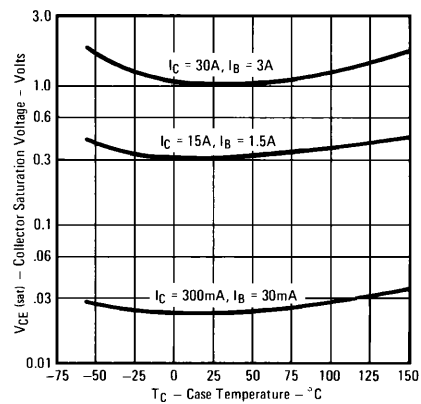


Figure 4 - SATURATION VOLTAGE VS. TEMPERATURE

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NPN SWITCHING TRANSISTORS