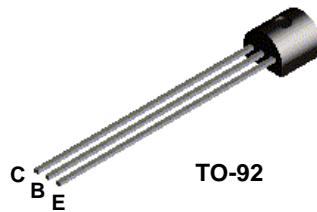
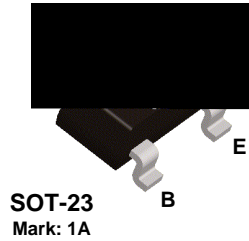


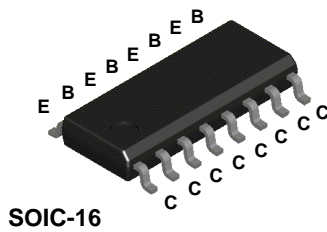
### 2N3904



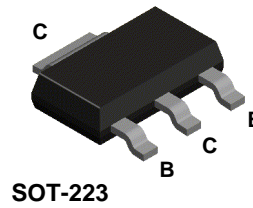
### MMBT3904



### MMPQ3904



### PZT3904



## NPN General Purpose Amplifier

This device is designed as a general purpose amplifier and switch. The useful dynamic range extends to 100 mA as a switch and to 100 MHz as an amplifier. Sourced from Process 23.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	40	V
V <sub>CBO</sub>	Collector-Base Voltage	60	V
V <sub>EBO</sub>	Emitter-Base Voltage	6.0	V
I <sub>C</sub>	Collector Current - Continuous	200	mA
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°C

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

# NPN General Purpose Amplifier

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10 \text{ mA}, I_B = 0$	40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10 \text{ } \mu\text{A}, I_E = 0$	60		V
V					

## NPN General Purpose Amplifier

(continued)

### Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		2N3904	*PZT3904	
P <sub>D</sub>	Total Device Dissipation	625	1,000	mW
	Derate above 25°C	5.0	8.0	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3		°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	125	°C/W

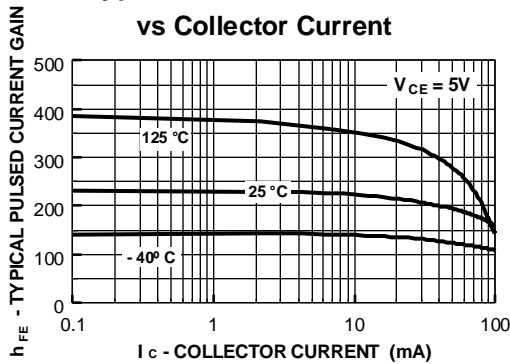
Symbol	Characteristic	Max		Units
		**MMBT3904	MMPQ3904	
P <sub>D</sub>	Total Device Dissipation	350	1,000	mW
	Derate above 25°C	2.8	8.0	mW/°C
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357		°C/W
	Effective 4 Die		125	°C/W
	Each Die		240	°C/W

\* Device mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 cm<sup>2</sup>.

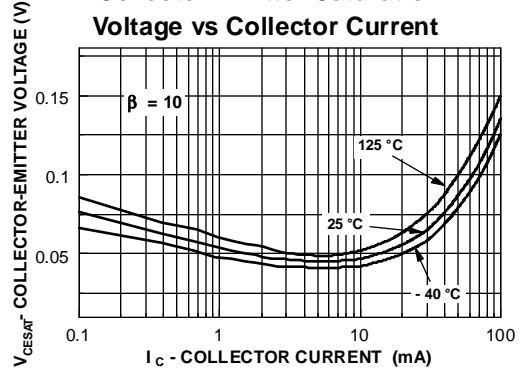
\*\* Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

### Typical Characteristics

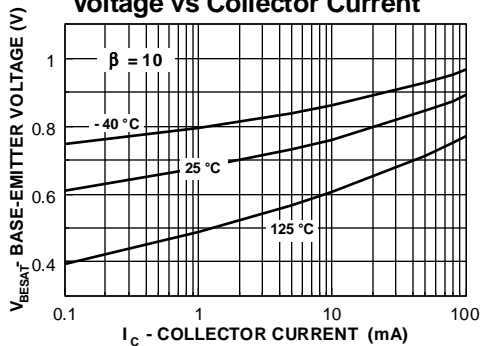
Typical Pulsed Current Gain vs Collector Current



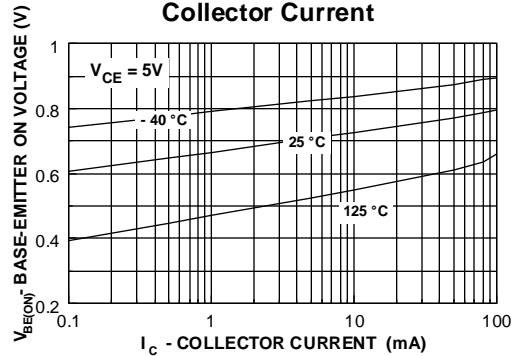
Collector-Emitter Saturation Voltage vs Collector Current



Base-Emitter Saturation Voltage vs Collector Current



Base-Emitter ON Voltage vs Collector Current

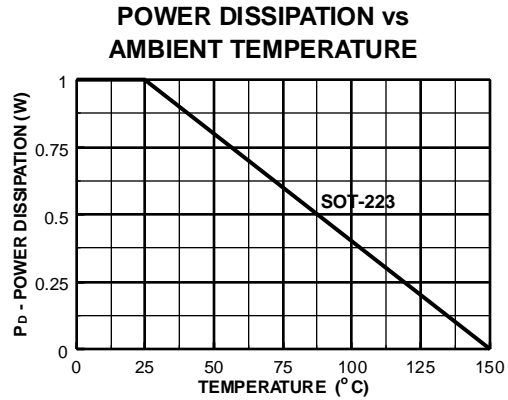
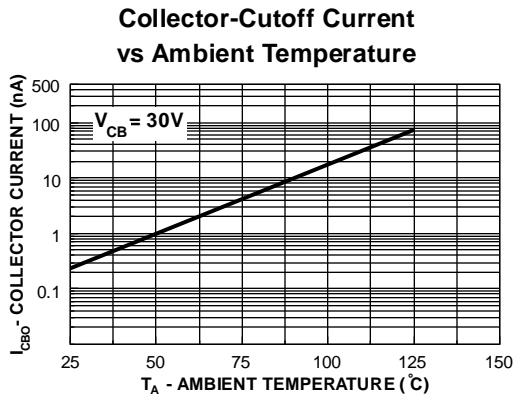


# NPN General Purpose Amplifier

(continued)

2N3904 / MMBT3904 / MMMPQ3904 / PZT3904

## Typical Characteristics (continued)



## Test Circuits

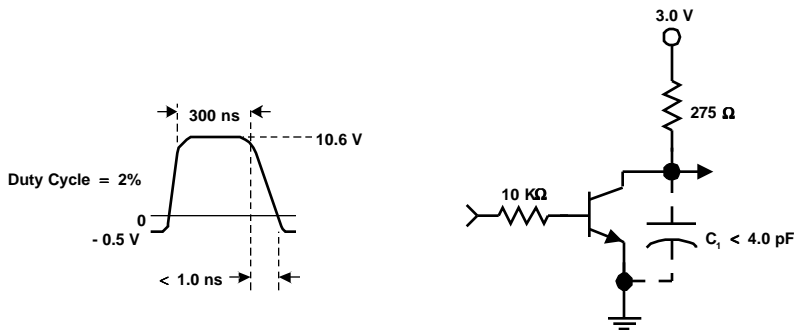


FIGURE 1: Delay and Rise Time Equivalent Test Circuit

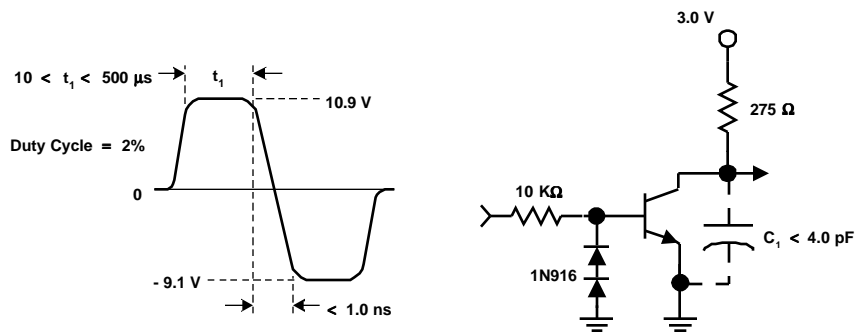


FIGURE 2: Storage and Fall Time Equivalent Test Circuit