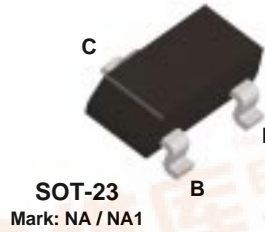




Discrete POWER & Signal Technologies

PN100  
PN100A

MMBT100  
MMBT100A



### NPN General Purpose Amplifier

This device is designed for general purpose amplifier applications at collector currents to 300 mA. Sourced from Process 10.

#### Absolute Maximum Ratings\* TA=25°C unless otherwise noted

| Symbol                            | Parameter  | Value       | Units |
|-----------------------------------|--|-------------|-------|
| V <sub>CEO</sub>                  | Collector-Emitter Voltage                        | 45          | V     |
| V <sub>CBO</sub>                  | Collector-Base Voltage                           | 75          | V     |
| V <sub>EBO</sub>                  | Emitter-Base Voltage                             | 6.0         | V     |
| I <sub>C</sub>                    | Collector Current - Continuous                   | 500         | 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.

#### Thermal Characteristics TA= 25°C unless otherwise noted

| Symbol           | Characteristic                          | Max    |           | Units |
|------------------|---|--------|-----------|-------|
|                  |   | PN100A | *MMBT100A |       |
| P <sub>D</sub>   | Total Device Dissipation                | 625    | 350       | mW    |
|                  | Derate above 25°C                       | 5.0    | 2.8       | 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    | 357       | °C/W  |

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

PN100 / MMBT100 / PN100A / MMBT100A

## NPN General Purpose Amplifier

(continued)

### Electrical Characteristics

TA= 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|--------|-----------|-----------------|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-------|

#### OFF CHARACTERISTICS

|                   |                                      |  |     |    |    |
|-------------------|--------------------------------------|--|-----|----|----|
| BV <sub>CBO</sub> | Collector-Base Breakdown Voltage     | I <sub>C</sub> = 10 μA, I <sub>B</sub> = 0 | 75  |    | V  |
| BV <sub>CEO</sub> | Collector-Emitter Breakdown Voltage* | I <sub>C</sub> = 1 mA, I <sub>E</sub> = 0  | 45  |    | V  |
| BV <sub>EBO</sub> | Emitter-Base Breakdown Voltage       | I <sub>E</sub> = 10 μA, I <sub>C</sub> = 0 | 6.0 |    | V  |
| I <sub>CBO</sub>  | Collector Cutoff Current             | V <sub>CB</sub> = 60 V                     |     | 50 | nA |
| I <sub>CES</sub>  | Collector Cutoff Current             | V <sub>CE</sub> = 40 V                     |     | 50 | nA |
| I <sub>EBO</sub>  | Emitter Cutoff Current               | V <sub>EB</sub> = 4 V                      |     | 50 | nA |

#### ON CHARACTERISTICS

|                      |                                      |   |             |     |        |
|----------------------|--------------------------------------|---|-------------|-----|--------|
| h <sub>FE</sub>      | DC Current Gain                      | I <sub>C</sub> = 100 μA, V <sub>CE</sub> = 1.0 V  | <b>100</b>  | 80  |        |
|                      |                                      | I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 1.0 V   | <b>100A</b> | 240 |        |
|                      |                                      | I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 1.0 V* | <b>100</b>  | 100 | 450    |
|                      |                                      | I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 5.0 V* | <b>100A</b> | 300 | 600    |
| V <sub>CE(sat)</sub> | Collector-Emitter Saturation Voltage | I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA   |             |     | 0.2 V  |
|                      |                                      | I <sub>C</sub> = 200 mA, I <sub>B</sub> = 20 mA*  |             |     | 0.4 V  |
| V <sub>BE(sat)</sub> | Base-Emitter Saturation Voltage      | I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA   |             |     | 0.85 V |
|                      |                                      | I <sub>C</sub> = 200 mA, I <sub>B</sub> = 20 mA*  |             |     | 1.0 V  |

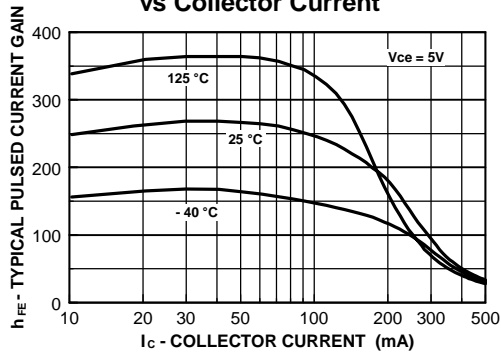
#### SMALL SIGNAL CHARACTERISTICS

|                  |                                  |   |             |     |        |
|------------------|----------------------------------|---|-------------|-----|--------|
| f <sub>T</sub>   | Current Gain - Bandwidth Product | V <sub>CE</sub> = 20 V, I <sub>C</sub> = 20 mA  | 250         |     | MHz    |
| C <sub>obo</sub> | Output Capacitance               | V <sub>CB</sub> = 5.0 V, f = 1.0 MHz  |             | 4.5 | pF     |
| NF               | Noise Figure                     | I <sub>C</sub> = 100 μA, V <sub>CE</sub> = 5.0 V,<br>R <sub>G</sub> = 2.0 kΩ, f = 1.0 kHz | <b>100</b>  |     | 5.0 dB |
|                  |                                  |   | <b>100A</b> |     | 4.0 dB |

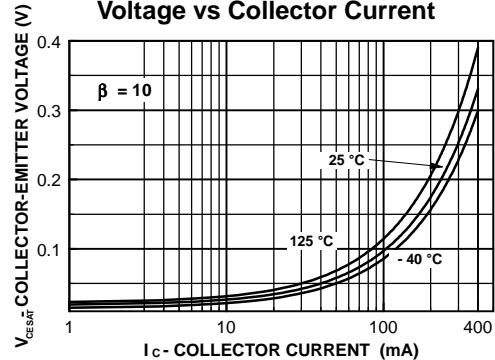
\*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

### Typical Characteristics

**Typical Pulsed Current Gain vs Collector Current**



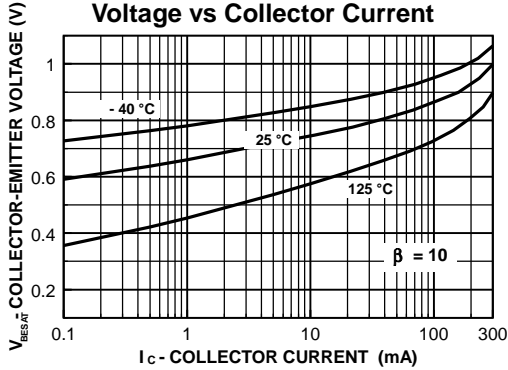
**Collector-Emitter Saturation Voltage vs Collector Current**



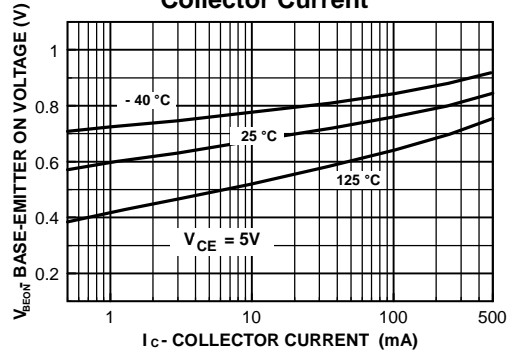
**NPN General Purpose Amplifier**  
(continued)

**Typical Characteristics** (continued)

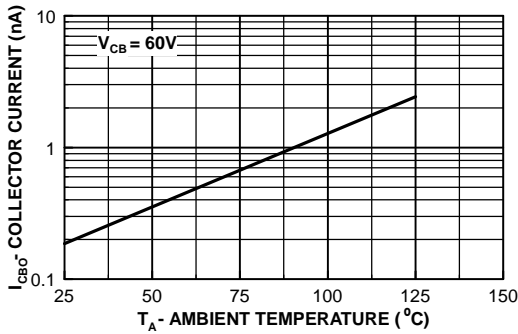
**Base-Emitter Saturation Voltage vs Collector Current**



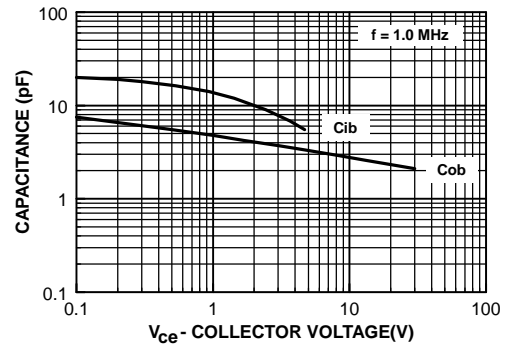
**Base-Emitter ON Voltage vs Collector Current**



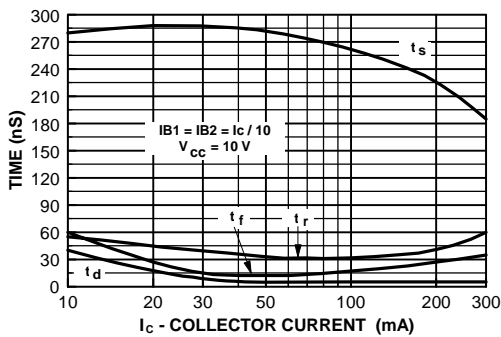
**Collector-Cutoff Current vs Ambient Temperature**



**Input and Output Capacitance vs Reverse Voltage**



**Switching Times vs Collector Current**



**Power Dissipation vs Ambient Temperature**

