SEMICOA SEMICONDUCTORS

Data Sheet No. 2N4033

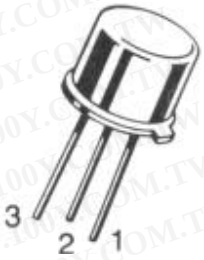
# Type 2N4033
**Geometry 6700**
**Polarity PNP**
**Qual Level: JAN - JANTXV**

**Generic Part Number: 2N4033**

**REF: MIL-PRF-19500/512**

## Features:

- General-purpose transistor for high speed switching and driver applicatons.
- Housed in a TO-39 case.
- Also available in chip form using the 6700 chip geometry.
- The Min and Max limits shown are per MIL-PRF-19500/512 which Semicoa meets in all cases.



TO-39

## Maximum Ratings

$T_C$ = 25°C unless otherwise specified

| Rating | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 80 | V |
| Collector-Base Voltage | $V_{CBO}$ | 80 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5.0 | V |
| Collector Current, Continuous | $I_C$ | 1.0 | mA |
| Power Dissipation at 25°C ambient<br>Derate above 25°C | $P_T$ | 0.8<br>4.56 | Watt<br>mW/°C |
| Operating Junction Temperature | $T_J$ | -55 to +200 | °C |
| Storage Temperature | $T_{STG}$ | -55 to +200 | °C |

## Electrical Characteristics

$T_C$ = 25°C unless otherwise specified

| OFF Characteristics | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Collector-Base Breakdown Voltage<br>$I_C$ = 10 µA, pulsed | $V_{(BR)CBO}$ | 80 | --- | V |
| Collector-Emitter Breakdown Voltage<br>$I_C$ = 10 mA, pulsed | $V_{(BR)CEO}$ | 80 | --- | V |
| Emitter-Base Breakdown Voltage<br>$I_C$ = 10 µA, pulsed | $V_{(BR)EBO}$ | 5.0 | --- | V |
| Collector-Base Cutoff Current<br>$V_{CB}$ = 60 V<br>$V_{CB}$ = 60 V, $T_A$ = +150°C | $I_{CBO1}$<br>$I_{CBO2}$ | ---<br>--- | 10<br>25 | nA<br>µA |
| Collector-Emitter Cutoff Current<br>$V_{CE}$ = 60 V, $V_{BE}$ = 2.0 V | $I_{CEX1}$ | --- | 25 | nA |
| Base-Emitter Cutoff Current<br>$V_{BE}$ = 3 V | $I_{EBO}$ | --- | 25 | nA |

| ON Characteristics | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| ***Forward current Transfer Ratio*** | | | | |
| $I_C$ = 100 µA, $V_{CE}$ = 5 V | $h_{FE1}$ | 50 | --- | --- |
| $I_C$ = 100 mA, $V_{CE}$ = 5.0 V (pulse test) | $h_{FE2}$ | 100 | 300 | --- |
| $I_C$ = 500 mA, $V_{CE}$ = 5 V (pulse test) | $h_{FE3}$ | 70 | --- | --- |
| $I_C$ = 1.0 A, $V_{CE}$ = 5 V (pulse test) | $h_{FE4}$ | 25 | --- | --- |
| $I_C$ = 500 mA, $V_{CE}$ = 5.0 V (pulse test), $T_A$ = -55°C | $h_{FE5}$ | 30 | --- | --- |
| ***Collector-Emitter Saturation Voltage*** | | | | |
| $I_C$ = 150 mA, $I_B$ = 15 mA (pulse test) | $V_{CE(sat)1}$ | --- | 0.15 | V dc |
| $I_C$ = 500 mA, $I_B$ = 50 mA (pulse test) | $V_{CE(sat)2}$ | --- | 0.5 | V dc |
| $I_C$ = 1.0 A, $I_B$ = 100 mA (pulse test) | $V_{CE(sat)3}$ | --- | 1.0 | V dc |
| ***Base-Emitter Saturation Voltage*** | | | | |
| $I_C$ = 150 mA, $I_B$ = 15 mA (pulse test) | $V_{BE(sat)1}$ | --- | 0.9 | V dc |
| $I_C$ = 500 mA, $I_B$ = 50 mA (pulse test) | $V_{BE(sat)2}$ | --- | 1.2 | V dc |

| Small Signal Characteristics | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| *Magnitude of Common Emitter Small Signal Short Circuit Forward Current Transfer Ratio*<br>$V_{CE}$ = 10 V, $I_C$ = 50 mA, f = 100 MHz | $\|h_{fe}\|$ | 1.5 | 6.0 | --- |
| *Open Circuit Output Capacitance*<br>$V_{CB}$ = 10 V, $I_E$ = 0, 100 kHz < f < 1 MHz | $C_{OBO}$ | --- | 20 | pF |
| *Input Capacitance, Output Open Circuited*<br>$V_{EB}$ = 0.5 V, $I_C$ = 0, 100 kHz < f < 1 MHz | $C_{IBO}$ | --- | 80 | pF |

| Switching Characteristics | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| *Delay Time*<br>$I_C$ = 500 mA, $I_{B1}$ = 50 mA | $t_d$ | --- | 15 | ns |
| *Rise Time*<br>$I_C$ = 500 mA, $I_{B1}$ = 50 mA | $t_r$ | --- | 25 | ns |
| *Storage Time*<br>$I_C$ = 500 mA, $I_{B1}$ = $I_{B2}$ = 50 mA | $t_s$ | --- | 175 | ns |
| *Fall Time*<br>$I_C$ = 500 mA, $I_{B1}$ = $I_{B2}$ = 50 mA | $t_f$ | --- | 35 | ns |