

## NPN POWER SILICON SWITCHING TRANSISTOR

Qualified per MIL-PRF-19500/560

### Devices

2N5339

### Qualified Level

JANTX  
JANTXV

### MAXIMUM RATINGS

| Ratings                                                                                      | Symbol            | Value       | Units              |
|----------------------------------------------------------------------------------------------|-------------------|-------------|--------------------|
| Collector-Emitter Voltage                                                                    | $V_{CEO}$         | 100         | Vdc                |
| Collector-Base Voltage                                                                       | $V_{CBO}$         | 100         | Vdc                |
| Emitter-Base Voltage                                                                         | $V_{EBO}$         | 6.0         | Vdc                |
| Base Current                                                                                 | $I_B$             | 1.0         | Adc                |
| Collector Current                                                                            | $I_C$             | 5.0         | Adc                |
| Total Power Dissipation                                                                      | $P_T$             | 1.0         | W                  |
| @ $T_A = +25^{\circ}\text{C}$ <sup>(1)</sup><br>@ $T_C = +25^{\circ}\text{C}$ <sup>(2)</sup> |                   | 10          | W                  |
| Operating & Storage Junction Temperature Range                                               | $T_{op}, T_{stg}$ | -55 to +200 | $^{\circ}\text{C}$ |

### THERMAL CHARACTERISTICS

| Characteristics                      | Symbol          | Max. | Unit                 |
|--------------------------------------|-----------------|------|----------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 17.5 | $^{\circ}\text{C/W}$ |

1) Derate linearly 5.71 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$

2) Derate linearly 57.1 mW/ $^{\circ}\text{C}$  for  $T_C > 25^{\circ}\text{C}$



TO-39\*  
(TO-205AD)

\*See appendix A for  
package outline

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^{\circ}\text{C}$ unless otherwise noted)

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

### OFF CHARACTERISTICS

|                                                                                         |               |     |     |                 |
|-----------------------------------------------------------------------------------------|---------------|-----|-----|-----------------|
| Collector-Emitter Breakdown Voltage<br>$I_C = 50 \text{ mAdc}$                          | $V_{(BR)CEO}$ | 100 |     | Vdc             |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 100 \text{ Vdc}$                          | $I_{CEO}$     |     | 100 | $\mu\text{Adc}$ |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 90 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ | $I_{CEX}$     |     | 10  | $\mu\text{Adc}$ |
| Collector-Base Cutoff Current<br>$V_{CB} = 100 \text{ Vdc}$                             | $I_{CBO}$     |     | 10  | $\mu\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 6.0 \text{ Vdc}$                               | $I_{EBO}$     |     | 100 | $\mu\text{Adc}$ |

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

**ON CHARACTERISTICS <sup>(3)</sup>**

|                                                                                                                                                                                               |               |                |            |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|------------|-----|
| Forward-Current Transfer Ratio<br>$I_C = 0.5 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 2.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 5.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ | $h_{FE}$      | 60<br>60<br>40 | 240        |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 2.0 \text{ Adc}, I_B = 0.2 \text{ Adc}$<br>$I_C = 5.0 \text{ Adc}, I_B = 0.5 \text{ Adc}$                                                      | $V_{CE(sat)}$ |                | 0.7<br>1.2 | Vdc |
| Base-Emitter Saturation Voltage<br>$I_C = 2.0 \text{ Adc}, I_B = 0.2 \text{ Adc}$<br>$I_C = 5.0 \text{ Adc}, I_B = 0.5 \text{ Adc}$                                                           | $V_{BE(sat)}$ |                | 1.2<br>1.8 | Vdc |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                                                  |            |     |       |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|-------|----|
| Magnitude of Common Emitter Small-Signal Short-Circuit<br>Forward Current Transfer Ratio<br>$I_C = 0.5 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 10 \text{ MHz}$ | $ h_{fe} $ | 3.0 | 15    |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                                                            | $C_{obo}$  |     | 250   | pF |
| Input Capacitance<br>$V_{BE} = 2.0 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                                                            | $C_{ibo}$  |     | 1,000 | pF |

**SAFE OPERATING AREA****DC Tests**

$T_C = +25^\circ\text{C}$ , 1 Cycle,  $t \geq 0.5 \text{ s}$

**Test 1**

$V_{CE} = 2.0 \text{ Vdc}, I_C = 5.0 \text{ Adc}$

**Test 2**

$V_{CE} = 5.0 \text{ Vdc}, I_C = 2.0 \text{ Adc}$

**Test 3**

$V_{CE} = 90 \text{ Vdc}, I_C = 55 \text{ mAdc}$

(3) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .