

## NPN MEDIUM POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/581

### Devices

2N4237

2N4238

2N4239

### Qualified Level

JANTX  
JANTXV

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless Otherwise noted)

| Ratings                                                                                        | Symbol            | 2N4237      | 2N4238 | 2N4239 | Units            |
|------------------------------------------------------------------------------------------------|-------------------|-------------|--------|--------|------------------|
| Collector-Emitter Voltage                                                                      | $V_{CEO}$         | 40          | 60     | 80     | Vdc              |
| Collector-Base Voltage                                                                         | $V_{CBO}$         | 50          | 80     | 100    | Vdc              |
| Emitter-Base Voltage                                                                           | $V_{EBO}$         | 6.0         |        |        | Vdc              |
| Collector Current                                                                              | $I_C$             | 1.0         |        |        | Adc              |
| Base Current                                                                                   | $I_B$             | 0.5         |        |        | Adc              |
| Total Power Dissipation @ $T_A = +25^\circ\text{C}^{(1)}$<br>@ $T_C = +25^\circ\text{C}^{(2)}$ | $P_T$             | 1.0         |        |        | W                |
|                                                                                                |                   | 6.0         |        |        | W                |
| Operating & Storage Temperature Range                                                          | $T_{op}, T_{stg}$ | -65 to +200 |        |        | $^\circ\text{C}$ |

### THERMAL CHARACTERISTICS

| Characteristics                      | Symbol          | Max. | Unit               |
|--------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 29   | $^\circ\text{C/W}$ |

1) Derate linearly 5.7 mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$

2) Derate linearly 34 mW/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$



TO-39\*

\*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>$I_C = 100 \text{ mAdc}$                         | $V_{(BR)CEO}$ |  | 50  | Vdc  |
| 2N4237                                                                                  |               |  | 80  |      |
| 2N4239                                                                                  |               |  | 100 |      |
| Emitter-Base Cutoff Current<br>$V_{EB} = 6.0 \text{ Vdc}$                               | $I_{EBO}$     |  | 0.5 | mAdc |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 90 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ | $I_{CEX}$     |  |     | nAdc |
| $V_{CE} = 50 \text{ Vdc}$ 2N4237                                                        |               |  | 100 |      |
| $V_{CE} = 80 \text{ Vdc}$ 2N4238                                                        |               |  | 100 |      |
| $V_{CE} = 10 \text{ Vdc}$ 2N4239                                                        |               |  | 100 |      |
| Collector-Base Cutoff Current<br>$V_{CE} = 50 \text{ Vdc}$ 2N4237                       | $I_{CBO}$     |  | 100 | nAdc |
| $V_{CE} = 80 \text{ Vdc}$ 2N4238                                                        |               |  | 100 |      |
| $V_{CE} = 10 \text{ Vdc}$ 2N4239                                                        |               |  | 100 |      |

**ELECTRICAL CHARACTERISTICS (con't)**

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

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

|                                                                                                                                            |               |          |            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------|------------|-----|
| Forward Current Transfer Ratio<br>$I_C = 250 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$ | $h_{FE}$      | 30<br>30 | 150        |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 500 \text{ Adc}, I_B = 50 \text{ Adc}$<br>$I_C = 1.0 \text{ Adc}, I_B = 0.1 \text{ Adc}$    | $V_{CE(sat)}$ |          | 0.3<br>0.6 | Vdc |
| Base-Emitter Saturation Voltage<br>$I_C = 500 \text{ Adc}, I_B = 50 \text{ Adc}$<br>$I_C = 1.0 \text{ Adc}, I_B = 0.1 \text{ Adc}$         | $V_{BE(sat)}$ |          | 1.0<br>1.5 | Vdc |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                                                   |            |     |     |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|----|
| Magnitude of Common Emitter Small-Signal<br>Short Circuit Forward-Current Transfer Ratio<br>$I_C = 100 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 10 \text{ MHz}$ | $ h_{fe} $ | 3.0 |     |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 100 \text{ kHz}$                                                                                     | $C_{obo}$  |     | 100 | pF |

**SAFE OPERATING AREA****DC Tests** $T_C = +25^{\circ}\text{C}$ , 1 Cycle,  $t \geq 0.5 \text{ s}$ **Test 1** $V_{CE} = 6.0 \text{ Vdc}, I_C = 1.0 \text{ Adc}$ **Test 2** $V_{CE} = 12 \text{ Vdc}, I_C = 500 \text{ mAdc}$ **Test 3** $V_{CE} = 30 \text{ Vdc}, I_C = 166 \text{ mAdc}$  2N4237 $V_{CE} = 50 \text{ Vdc}, I_C = 100 \text{ mAdc}$  2N4238 $V_{CE} = 70 \text{ Vdc}, I_C = 71 \text{ mAdc}$  2N4239

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