

## NPN DARLINGTON POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/523

### Devices

2N6383

2N6384

2N6385

### Qualified Level

JAN, JANTX  
JANTXV

### MAXIMUM RATINGS

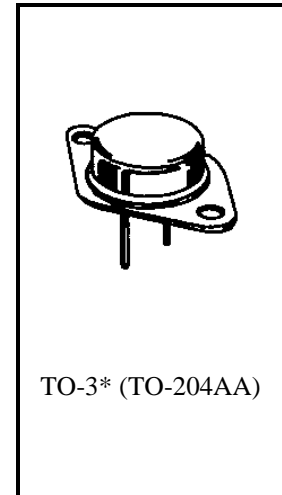
| Ratings                         | Symbol            | 2N6383                     | 2N6384 | 2N6385 | Unit        |
|---------------------------------|-------------------|----------------------------|--------|--------|-------------|
| Collector-Emitter Voltage       | $V_{CEO}$         | 40                         | 60     | 80     | Vdc         |
| Collector-Base Voltage          | $V_{CBO}$         | 40                         | 60     | 80     | Vdc         |
| Emitter-Base Voltage            | $V_{EBO}$         | 5.0                        |        |        | Vdc         |
| Base Current                    | $I_B$             | 0.25                       |        |        | Adc         |
| Collector Current               | $I_C$             | 10                         |        |        | Adc         |
| Total Power Dissipation         | $P_T$             | @ $T_A = +25^{\circ}C$ (1) | 6.0    |        | W           |
|                                 |                   | @ $T_C = +25^{\circ}C$ (2) | 100    |        | W           |
| Operating & Storage Temperature | $T_{op}, T_{stg}$ | -55 to +175                |        |        | $^{\circ}C$ |

### THERMAL CHARACTERISTICS

| Characteristics                     | Symbol          | Max. | Unit          |
|-------------------------------------|-----------------|------|---------------|
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | 1.75 | $^{\circ}C/W$ |

1) Derate linearly 34.2 mW/ $^{\circ}C$  above  $T_A > +25^{\circ}C$

2) Derate linearly 571 mW/ $^{\circ}C$  above  $T_C > +25^{\circ}C$



\*See Appendix A for package outline

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

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

### OFF CHARACTERISTICS

|  |                            |               |                   |      |
|--|----------------------------|---------------|-------------------|------|
| Collector-Emitter Breakdown Voltage<br>$I_C = 200$ mAdc                                      | 2N6383<br>2N6384<br>2N6385 | $V_{(BR)CEO}$ | 40<br>60<br>80    | Vdc  |
| Collector-Emitter Breakdown Voltage<br>$I_C = 200$ mAdc, $R_{BB} = 100 \Omega$               | 2N6383<br>2N6384<br>2N6385 | $V_{(BR)CER}$ | 40<br>60<br>80    | Vdc  |
| Collector-Base Cutoff Current<br>$V_{CE} = 40$ Vdc<br>$V_{CE} = 60$ Vdc<br>$V_{CE} = 80$ Vdc | 2N6383<br>2N6384<br>2N6385 | $I_{CBO}$     | 1.0<br>1.0<br>1.0 | mAdc |

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics  | Symbol    | Min. | Max.              | Unit |
|--|-----------|------|-------------------|------|
| Emitter-Base Cutoff Current<br>$V_{EB} = 5.0 \text{ Vdc}$  | $I_{EBO}$ |      | 5.0               | mAdc |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 40 \text{ Vdc}$ 2N6383<br>$V_{CE} = 60 \text{ Vdc}$ 2N6384<br>$V_{CE} = 80 \text{ Vdc}$ 2N6385   | $I_{CEO}$ |      | 1.0<br>1.0<br>1.0 | mAdc |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 40 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ 2N6383<br>$V_{CE} = 60 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ 2N6384<br>$V_{CE} = 80 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ 2N6385 | $I_{CEX}$ |      | 0.3<br>0.3<br>0.3 | mAdc |

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

|   |               |              |            |     |
|---|---------------|--------------|------------|-----|
| Forward-Current Transfer Ratio<br>$I_C = 5.0 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$<br>$I_C = 10 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$ | $h_{FE}$      | 1,000<br>100 | 20,000     |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 5.0 \text{ Adc}, I_B = 10 \text{ mAdc}$<br>$I_C = 10 \text{ Adc}, I_B = 0.1 \text{ Adc}$ | $V_{CE(sat)}$ |              | 2.0<br>3.0 | Vdc |
| Base-Emitter Voltage<br>$I_C = 5.0 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$<br>$I_C = 10 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$           | $V_{BE(on)}$  |              | 2.8<br>4.5 | Vdc |

**DYNAMIC CHARACTERISTICS**

|   |            |    |     |    |
|---|------------|----|-----|----|
| Small-Signal Short-Circuit Forward Current Transfer Ratio<br>$I_C = 1.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}, f = 1.0 \text{ MHz}$ | $ h_{fe} $ | 20 | 300 |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                               | $C_{obo}$  |    | 200 | pF |

**SWITCHING CHARACTERISTICS**

|   |           |  |     |               |
|---|-----------|--|-----|---------------|
| Turn-On Time<br>$V_{CC} = 30 \text{ Vdc}; I_C = 5.0 \text{ Adc}; I_{B1} = 20 \text{ mAdc}$            | $t_{on}$  |  | 2.5 | $\mu\text{s}$ |
| Turn-Off Time<br>$V_{CC} = 30 \text{ Vdc}; I_C = 5.0 \text{ Adc}; I_{B1} = -I_{B2} = 20 \text{ mAdc}$ | $t_{off}$ |  | 10  | $\mu\text{s}$ |

**SAFE OPERATING AREA**

|   |           |  |  |  |
|---|-----------|--|--|--|
| <b>DC Tests</b>   |           |  |  |  |
| $T_C = +25^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$ |           |  |  |  |
| <b>Test 1</b>   |           |  |  |  |
| $V_{CE} = 10 \text{ Vdc}, I_C = 10 \text{ Adc}$               | All Types |  |  |  |
| <b>Test 2</b>   |           |  |  |  |
| $V_{CE} = 30 \text{ Vdc}, I_C = 3.33 \text{ Adc}$             | All Types |  |  |  |
| <b>Test 3</b>   |           |  |  |  |
| $V_{CE} = 40 \text{ Vdc}, I_C = 1.5 \text{ Adc}$              | 2N6383    |  |  |  |
| $V_{CE} = 60 \text{ Vdc}, I_C = 0.4 \text{ Adc}$              | 2N6384    |  |  |  |
| $V_{CE} = 80 \text{ Vdc}, I_C = 0.16 \text{ Adc}$             | 2N6385    |  |  |  |

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