

# 2N6383, 2N6384, & 2N6385



## NPN High Power Silicon Transistors

Rev. V1

### Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/523
- TO-3 (TO-204AA) Package



### Electrical Characteristics

| Parameter                              | Test Conditions  | Symbol        | Units | Min.           | Max.       |
|--|--|---------------|-------|----------------|------------|
| <b>Off Characteristics</b>             |  |               |       |                |            |
| Collector - Emitter Breakdown Voltage  | $I_C = 20 \text{ mAdc}$ , $L = 42 \text{ mH}$ , 30 - 60 GHz<br>(see figure 10 of MIL-PRF-19500/510) 2N6383<br>2N6384<br>2N6385   | $V_{(BR)CEO}$ | Vdc   | 40<br>60<br>80 | —          |
| Collector - Emitter Breakdown Voltage  | $I_C = 200 \text{ mAdc}$ , $L = 14 \text{ mH}$ , 30 - 60 GHz<br>(see figure 10 of MIL-PRF-19500/510) 2N6383<br>2N6384<br>2N6385  | $V_{(BR)CER}$ | Vdc   | 40<br>60<br>80 | —          |
| Collector - Base Cutoff Current        | $V_{CE} = 40 \text{ Vdc}$ , 2N6383<br>$V_{CE} = 60 \text{ Vdc}$ , 2N6384<br>$V_{CE} = 80 \text{ Vdc}$ , 2N6385   | $I_{EBO}$     | mAdc  | —              | 1          |
| Emitter - Base Cutoff Current          | $V_{EB} = 6 \text{ Vdc}$   | $I_{EBO}$     | mAdc  | —              | 5          |
| Collector - Emitter Cutoff Current     | $V_{CE} = 40 \text{ Vdc}$ , 2N6383<br>$V_{CE} = 60 \text{ Vdc}$ , 2N6384<br>$V_{CE} = 80 \text{ Vdc}$ , 2N6385   | $I_{CEO}$     | mAdc  | —              | 1          |
| Collector - Emitter Cutoff Current     | $V_{CE} = 40 \text{ Vdc}$ , $V_{BE} = -1.5 \text{ Vdc}$ , 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 | $I_{EBO}$     | mAdc  | —              | 0.3        |
| <b>On Characteristics<sup>1</sup></b>  |  |               |       |                |            |
| Forward Current Transfer Ratio         | $I_C = 5 \text{ Adc}$ , $V_{CE} = 3 \text{ Vdc}$<br>$I_C = 10 \text{ Adc}$ , $V_{CE} = 3 \text{ Vdc}$  | $H_{FE}$      | -     | 1000<br>100    | 20000      |
| Collector - Emitter Sustaining Voltage | $I_C = 5 \text{ Adc}$ , $I_B = 10 \text{ mAdc}$<br>$I_C = 10 \text{ Adc}$ , $I_B = 0.1 \text{ mAdc}$   | $V_{CE(SAT)}$ | Vdc   | —              | 2<br>3     |
| Base - Emitter Saturation Voltage      | $I_C = 5 \text{ Adc}$ , $I_B = 3 \text{ Adc}$<br>$I_C = 10 \text{ Adc}$ , $I_B = 3 \text{ Adc}$  | $V_{BE(SAT)}$ | Vdc   | —              | 2.8<br>4.5 |

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

### Electrical Characteristics

| Parameter   | Test Conditions  | Symbol     | Units         | Min. | Max. |
|---|--|------------|---------------|------|------|
| <b>Dynamic Characteristics</b>                            |  |            |               |      |      |
| Small-Signal Short-Circuit Forward Current Transfer Ratio | $I_C = 1 \text{ Adc}, V_{CE} = 5 \text{ Vdc}, f = 1 \text{ MHz}$                   | $ h_{FE} $ | -             | 20   | 300  |
| Output Capacitance  | $V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1 \text{ MHz}$      | $C_{OBO}$  | pF            | —    | 200  |
| <b>Switching Characteristics</b>                          |  |            |               |      |      |
| Turn-On Time  | $V_{CC} = 200 \text{ Vdc}; I_C = 1 \text{ Adc}, I_{B1} = 20 \text{ mAdc}$          | $T_{ON}$   | $\mu\text{s}$ | —    | 2.5  |
| Turn-Off Time   | $V_{CC} = 200 \text{ Vdc}; I_C = 1 \text{ Adc}, I_{B1} = I_{B2} = 20 \text{ mAdc}$ | $T_{OFF}$  | $\mu\text{s}$ | —    | 10   |
| <b>Safe Operating Area</b>                                |  |            |               |      |      |
| DC Tests:   | $T_C = +25^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$                      |            |               |      |      |
| Test 1:   | $V_{CE} = 10 \text{ Vdc}, I_C = 10 \text{ Adc}, \text{ All Types}$                 |            |               |      |      |
| Test 2:   | $V_{CE} = 30 \text{ Vdc}, I_C = 3.33 \text{ Adc}, \text{ All Types}$               |            |               |      |      |
| Test 3:   | $V_{CE} = 40 \text{ Vdc}, I_C = 1.5 \text{ Adc}, 2\text{N}6383$                    |            |               |      |      |
|   | $V_{CE} = 60 \text{ Vdc}, I_C = 0.4 \text{ Adc}, 2\text{N}6384$                    |            |               |      |      |
|   | $V_{CE} = 80 \text{ Vdc}, I_C = 0.16 \text{ Adc}, 2\text{N}6385$                   |            |               |      |      |

### Absolute Maximum Ratings

| Ratings   | Symbol            | 2N6383      | 2N6384 | 2N6385 | Units            |
|---|-------------------|-------------|--------|--------|------------------|
| Collector - Emitter Voltage   | $V_{CEO}$         | 40          | 60     | 80     | Vdc              |
| Collector - Base Voltage  | $V_{CBO}$         | 40          | 60     | 80     | Vdc              |
| Emitter - Base Voltage  | $V_{EBO}$         | 5           |        |        | Vdc              |
| Collector Current   | $I_C$             | 10          |        |        | Adc              |
| Base Current  | $I_B$             | 0.25        |        |        | Adc              |
| Total Power Dissipation<br>@ $T_A = +25^\circ\text{C}^2$<br>@ $T_C = +25^\circ\text{C}^3$ | $P_T$             | 6<br>100    |        |        | W                |
| Operating & Storage Temperature Range   | $T_{OP}, T_{STG}$ | -55 to +175 |        |        | $^\circ\text{C}$ |

2. Derate linearly @ 34.2 mW /  $^\circ\text{C}$  for  $T_A > 25^\circ\text{C}$ .  
 3. Derate linearly @ 571 mW /  $^\circ\text{C}$  for  $T_C > 75^\circ\text{C}$ .

### Thermal Characteristics

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

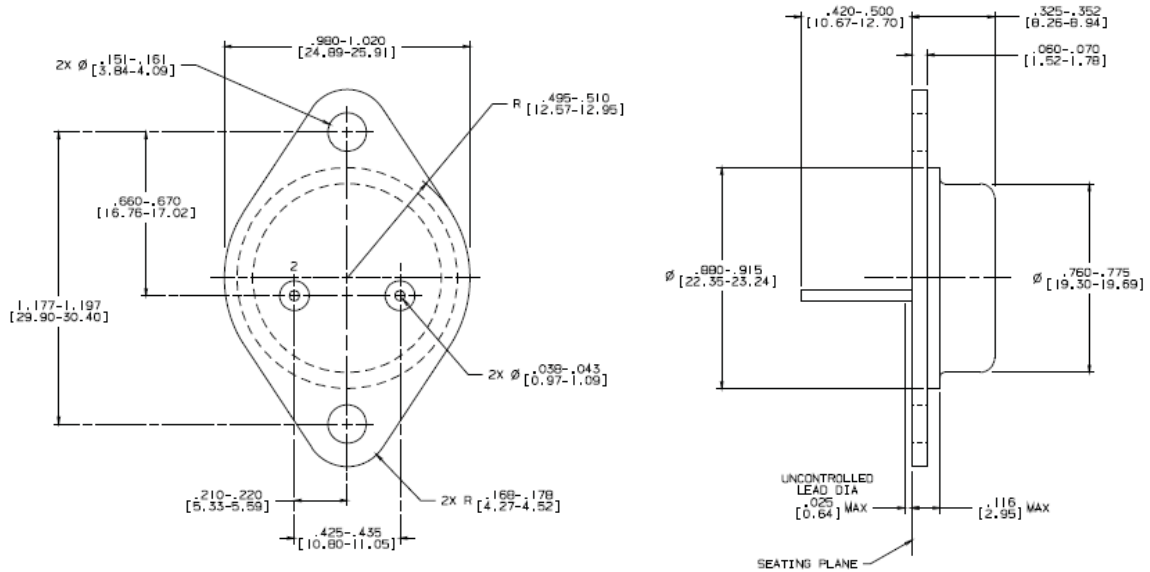
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### Outline Drawing



#### NOTES:

1. STANDARD HEADER TYPE SOLID BASE.
2. STANDARD LEAD FINISH PER MIL-M-39510 TYPE X OR EQUIVALENT.
3. LEAD NOT BENT GREATER THAN 15°.
4. DIMENSIONS BASED ON JEDEC STANDARD TO-3 PUBLICATION 95, PA

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