

**NPN SILICON SWITCHING TRANSISTOR**
**Qualified per MIL-PRF-19500/423**
**Devices**
**2N5581**
**2N5582**
**Qualified Level**
**JAN  
JANTX  
JANTXV**
**MAXIMUM RATINGS**

| Ratings                                                             | Symbol            | Value       | Unit               |
|---------------------------------------------------------------------|-------------------|-------------|--------------------|
| Collector-Emitter Voltage                                           | $V_{CEO}$         | 50          | Vdc                |
| Collector-Base Voltage                                              | $V_{CBO}$         | 75          | Vdc                |
| Emitter-Base Voltage                                                | $V_{EBO}$         | 6.0         | Vdc                |
| Collector Current                                                   | $I_C$             | 800         | mAdc               |
| Total Power Dissipation @ $T_A = 25^{\circ}\text{C}$ <sup>(1)</sup> | $P_T$             | 0.5         | W                  |
| @ $T_C = 25^{\circ}\text{C}$ <sup>(2)</sup>                         |                   | 2.0         | W                  |
| Operating & Storage Junction Temperature Range                      | $T_{op}, T_{stg}$ | -55 to +200 | $^{\circ}\text{C}$ |

1) Derate linearly 2.86 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$ 

2) Derate linearly 11.43 mW/ $^{\circ}\text{C}$  for  $T_C > 25^{\circ}\text{C}$ 

**TO-46\*  
(TO-206AB)**

\*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>$I_C = 10 \text{ mAdc}$                          | $V_{(BR)CEO}$ | 50 |          | Vdc                                 |
| Collector-Base Cutoff Current<br>$V_{CB} = 60 \text{ Vdc}$<br>$V_{CB} = 75 \text{ Vdc}$ | $I_{CBO}$     |    | 10<br>10 | $\eta\text{Adc}$<br>$\mu\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 4.0 \text{ Vdc}$<br>$V_{EB} = 6.0 \text{ Vdc}$ | $I_{EBO}$     |    | 10<br>10 | $\eta\text{Adc}$<br>$\mu\text{Adc}$ |

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Symbol                                       | Min.                                             | Max.                                                           | Unit                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------------------|--------------------------------|
| <b>ON CHARACTERISTICS <sup>(3)</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                              |                                                  |                                                                |                                |
| Forward-Current Transfer Ratio<br>$I_C = 0.1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br><br>$I_C = 0.1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ | 2N5581<br><br><br><br><br><br><br><br>2N5582 | $h_{FE}$<br><br><br><br><br><br><br><br>$h_{FE}$ | 30<br>35<br>40<br>40<br>20<br><br>50<br>75<br>100<br>100<br>30 | 120<br><br><br><br><br><br>300 |
| Collector-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$<br>$I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$                                                                                                                                                                                                                                                                                                                                                                                                                                         | $V_{CE(sat)}$                                |                                                  | 0.3<br>1.0                                                     | Vdc                            |
| Base-Emitter Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$<br>$I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$                                                                                                                                                                                                                                                                                                                                                                                                                                                         | $V_{BE(sat)}$                                | 0.6                                              | 1.2<br>2.0                                                     | Vdc                            |

**DYNAMIC CHARACTERISTICS**

|                                                                                                         |                  |            |          |    |
|---------------------------------------------------------------------------------------------------------|------------------|------------|----------|----|
| Forward Current Transfer Ratio<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$                     | 2N5581<br>2N5582 | $h_{fe}$   | 30<br>50 |    |
| Forward Current Transfer Ratio<br>$I_C = 50 \text{ mAdc}, V_{CE} = 20 \text{ Vdc}, f = 100 \text{ MHz}$ |                  | $ h_{fe} $ | 2.5      |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$   |                  | $C_{obo}$  | 8.0      | pF |
| Input Capacitance<br>$V_{EB} = 0.5 \text{ Vdc}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$   |                  | $C_{ibo}$  | 25       | pF |

**SWITCHING CHARACTERISTICS**

|                                                                                                       |           |  |     |    |
|-------------------------------------------------------------------------------------------------------|-----------|--|-----|----|
| Turn-On Time<br>$V_{CC} = 30 \text{ Vdc}; I_C = 150 \text{ mAdc}; I_{B1} = 15 \text{ mAdc}$           | $t_{on}$  |  | 35  | ns |
| Turn-Off Time<br>$V_{CC} = 30 \text{ Vdc}; I_C = 150 \text{ mAdc}; I_{B1} = I_{B2} = 15 \text{ mAdc}$ | $t_{off}$ |  | 300 | ns |

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