

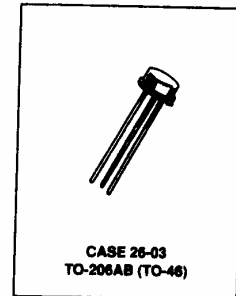
# SEMICONDUCTOR TECHNICAL DATA

**2N5581  
2N5582**

**NPN Silicon  
Small-Signal Transistors**

**CRYSTALONCS**  
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Suite 14  
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| MAXIMUM RATINGS           |                  |            |                 |
|---------------------------|------------------|------------|-----------------|
| Rating                    | Symbol           | Value      | Unit            |
| Collector-Emitter Voltage | V <sub>CEO</sub> | 50         | V <sub>dc</sub> |
| Collector-Base Voltage    | V <sub>CBO</sub> | 75         | V <sub>dc</sub> |
| Collector Current         | I <sub>C</sub>   | 800        | mAdc            |
| Device Dissipation        | P <sub>T</sub>   |            |                 |
| @ T <sub>A</sub> = 25°C   |                  | 500        | mW              |
| Derate above 25°C         |                  | 2.28       | mW/°C           |
| @ T <sub>C</sub> = 25°C   |                  | 2.0        | Watts           |
| Derate above 25°C         |                  | 11.43      | mW/°C           |
| Storage Temperature       | T <sub>stg</sub> | -65 to 200 | °C              |



| ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25°C unless otherwise noted.)       |                      |     |     |                 |
|--|----------------------|-----|-----|-----------------|
| Characteristic   | Symbol               | Min | Max | Unit            |
| <b>OFF CHARACTERISTICS</b>   |                      |     |     |                 |
| Collector-Emitter Breakdown Voltage <sup>(1)</sup><br>(I <sub>C</sub> = 10 mAdc) | V <sub>(BR)CEO</sub> | 50  | —   | V <sub>dc</sub> |
| Collector-Base Breakdown Voltage<br>(I <sub>C</sub> = 10 μAdc)                   | V <sub>(BR)CBO</sub> | 75  | —   | V <sub>dc</sub> |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 60 Vdc)                           | I <sub>CBO</sub>     | —   | 10  | nAdc            |
| (V <sub>CB</sub> = 60 Vdc, T <sub>A</sub> = 150°C)                               |                      | —   | 10  | μAdc            |
| Emitter Cutoff Current<br>(V <sub>EB</sub> = 4.0 Vdc)                            | I <sub>EBO</sub>     | —   | 10  | nAdc            |
| (V <sub>EB</sub> = 6.0 Vdc)  |                      | —   | 10  | μAdc            |

<sup>1)</sup> Pulsed. Pulse Width 250 to 350 μs. Duty Cycle 1.0 to 2.0%.

(continued)

### 2N5581JAN, 2N5582JAN SERIES

| ELECTRICAL CHARACTERISTICS — continued (T <sub>A</sub> = 25 °C unless otherwise noted.)  |                  |                                    |  |                                   |     |
|--|------------------|------------------------------------|--|-----------------------------------|-----|
| Characteristic   | Symbol           | Min                                | Max                                      | Unit                              |     |
| <b>ON CHARACTERISTICS</b>  |                  |                                    |  |                                   |     |
| DC Current Gain<br>(I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 10 Vdc)(1)<br>(I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 10 Vdc)(1)  | 2N5581           | h <sub>FE</sub>                    | 30<br>35<br>40<br>40<br>20               | —<br>—<br>—<br>120<br>—           | —   |
| (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 Vdc, T <sub>A</sub> = -55 °C)<br>(I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 10 Vdc)(1)<br>(I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 10 Vdc)(1)<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 Vdc, T <sub>A</sub> = -55 °C) | 2N5582           | h <sub>FE</sub>                    | 15<br>50<br>75<br>100<br>100<br>30<br>35 | —<br>—<br>—<br>—<br>300<br>—<br>— | —   |
| Collector-Emitter Saturation Voltage<br>(I <sub>C</sub> = 150 mA, I <sub>B</sub> = 15 mA)<br>(I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA)   |                  | V <sub>CE(sat)</sub>               | —<br>—                                   | 0.3<br>1.0                        | Vdc |
| Base-Emitter Saturation Voltage(1)<br>(I <sub>C</sub> = 150 mA, I <sub>B</sub> = 15 mA)<br>(I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA)   |                  | V <sub>BE(sat)</sub>               | 0.6<br>—                                 | 1.2<br>2.0                        | Vdc |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>  |                  |                                    |  |                                   |     |
| Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 0.1 to 1.0 MHz)  |                  | C <sub>obo</sub>                   | —  | 8.0                               | pF  |
| Input Capacitance (V <sub>EB</sub> = 0.5 Vdc, I <sub>C</sub> = 0, f = 0.1 to 1.0 MHz)  |                  | C <sub>ibo</sub>                   | —  | 25                                | pF  |
| Small-Signal Current Gain<br>(V <sub>CE</sub> = 10 Vdc, I <sub>C</sub> = 1.0 mA, f = 1.0 kHz)  | 2N5581<br>2N5582 | h <sub>ie</sub>                    | 30<br>50                                 | —<br>—                            | —   |
| Small-Signal Current Transfer Ratio, Magnitude<br>(V <sub>CE</sub> = 20 Vdc, I <sub>C</sub> = 50 mA, f = 100 MHz)  |                  | h <sub>te</sub>                    | 2.5                                      | —                                 | —   |
| <b>SWITCHING CHARACTERISTICS (See Figure 21)</b>   |                  |                                    |  |                                   |     |
| Saturated Turn-On Time   |                  | t <sub>on</sub>                    | —  | 35                                | ns  |
| Saturated Turn-Off Time  |                  | t <sub>off</sub>                   | —  | 300                               | ns  |
| Nonsaturated Pulse Response Time   |                  | t <sub>on</sub> + t <sub>off</sub> | —  | 18                                | ns  |

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**ASSURANCE TESTING (Pre/Post Burn-In)**  
**Burn-In Conditions: T<sub>A</sub> = 25, ±3 °C, V<sub>CB</sub> = 30 Vdc**  
**P<sub>T</sub> = 400 mW**

| Characteristics Tested  | Symbol            | Initial and End Point Limits |  | Unit                     |
|---|-------------------|------------------------------|--|--------------------------|
|   |                   | Min                          | Max                                    |                          |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 60 Vdc)                    | I <sub>CBO</sub>  | —                            | 10                                     | mA                       |
| DC Current Gain(1)<br>(I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 10 Vdc) | 2N5581            | h <sub>FE</sub>              | 40                                     | 120                      |
|   | 2N5582            | h <sub>FE</sub>              | 100                                    | 300                      |
| <b>Delta from Pre-Burn-In Measured Values</b>                             |                   | <b>Min</b>                   | <b>Max</b>                             |                          |
| Delta Collector Cutoff Current  | ΔI <sub>CBO</sub> | —                            | ±100<br>or ±50<br>whichever is greater | % of Initial Value<br>mA |
| Delta DC Current Gain(1)  | Δh <sub>FE</sub>  | —                            | -15                                    | % of Initial Value       |

(1) Pulsed Pulse Width 25 to 35% Duty Cycle 10 to 200 μs