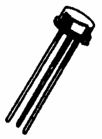
# SEMICONDUCTOR
TECHNICAL DATA

# 2N5581
# 2N5582

## NPN Silicon
## Small-Signal Transistors

CRYSTALONCS
2805 Veterans Highway
Suite 14
Ronkonkoma, N.Y. 11779

| MAXIMUM RATINGS | | | |
|---|---|---|---|
| **Rating** | **Symbol** | **Value** | **Unit** |
| Collector-Emitter Voltage | $V_{CEO}$ | 50 | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 75 | Vdc |
| Collector Current | $I_C$ | 800 | mAdc |
| Device Dissipation | $P_T$ | | |
| @ $T_A = 25°C$ | | 500 | mW |
| Derate above 25°C | | 2.28 | mW/°C |
| @ $T_C = 25°C$ | | 2.0 | Watts |
| Derate above 25°C | | 11.43 | mW/°C |
| Storage Temperature | $T_{stg}$ | –65 to 200 | °C |



CASE 26-03
TO-206AB (TO-46)

| ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted.) | | | | |
|---|---|---|---|---|
| **Characteristic** | **Symbol** | **Min** | **Max** | **Unit** |
| **OFF CHARACTERISTICS** | | | | |
| Collector-Emitter Breakdown Voltage[1] ($I_C$ = 10 mAdc) | $V_{(BR)CEO}$ | 50 | — | Vdc |
| Collector-Base Breakdown Voltage ($I_C$ = 10 μAdc) | $V_{(BR)CBO}$ | 75 | — | Vdc |
| Collector Cutoff Current | $I_{CBO}$ | | | |
| ($V_{CB}$ = 60 Vdc) | | — | 10 | nAdc |
| ($V_{CB}$ = 60 Vdc, $T_A$ = 150°C) | | — | 10 | μAdc |
| Emitter Cutoff Current | $I_{EBO}$ | | | |
| ($V_{EB}$ = 4.0 Vdc) | | — | 10 | nAdc |
| ($V_{EB}$ = 6.0 Vdc) | | — | 10 | μAdc |

[1] Pulsed: Pulse Width 250 to 350 μs, Duty Cycle 1.0 to 2.0%.

(continued)

**ELECTRICAL CHARACTERISTICS — continued** (T$_A$ = 25°C unless otherwise noted.)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain | | $h_{FE}$ | | | — |
| ($I_C$ = 0.1 mAdc, $V_{CE}$ = 10 Vdc) | 2N5581 | | 30 | — | |
| ($I_C$ = 1.0 mAdc, $V_{CE}$ = 10 Vdc) | | | 35 | — | |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 10 Vdc) | | | 40 | — | |
| ($I_C$ = 150 mAdc, $V_{CE}$ = 10 Vdc)(1) | | | 40 | 120 | |
| ($I_C$ = 500 mAdc, $V_{CE}$ = 10 Vdc)(1) | | | 20 | — | |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 10 Vdc, $T_A$ = −55°C) | | | 15 | — | |
| ($I_C$ = 0.1 mAdc, $V_{CE}$ = 10 Vdc) | 2N5582 | | 50 | — | |
| ($I_C$ = 1.0 mAdc, $V_{CE}$ = 10 Vdc) | | | 75 | — | |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 10 Vdc) | | | 100 | — | |
| ($I_C$ = 150 mAdc, $V_{CE}$ = 10 Vdc)(1) | | | 100 | 300 | |
| ($I_C$ = 500 mAdc, $V_{CE}$ = 10 Vdc)(1) | | | 30 | — | |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 10 Vdc, $T_A$ = −55°C) | | | 35 | — | |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | | | Vdc |
| ($I_C$ = 150 mAdc, $I_B$ = 15 mAdc) | | | — | 0.3 | |
| ($I_C$ = 500 mAdc, $I_B$ = 50 mAdc) | | | — | 1.0 | |
| Base-Emitter Saturation Voltage(1) | | $V_{BE(sat)}$ | | | Vdc |
| ($I_C$ = 150 mAdc, $I_B$ = 15 mAdc) | | | 0.6 | 1.2 | |
| ($I_C$ = 500 mAdc, $I_B$ = 50 mAdc) | | | — | 2.0 | |
| **SMALL-SIGNAL CHARACTERISTICS** | | | | | |
| Output Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 0.1 to 1.0 MHz) | | $C_{obo}$ | — | 8.0 | pF |
| Input Capacitance ($V_{EB}$ = 0.5 Vdc, $I_C$ = 0, f = 0.1 to 1.0 MHz) | | $C_{ibo}$ | — | 25 | pF |
| Small-Signal Current Gain | 2N5581 | $h_{fe}$ | 30 | — | — |
| ($V_{CE}$ = 10 Vdc, $I_C$ = 1.0 mAdc, f = 1.0 kHz) | 2N5582 | | 50 | — | |
| Small-Signal Current Transfer Ratio, Magnitude ($V_{CE}$ = 20 Vdc, $I_C$ = 50 mAdc, f = 100 MHz) | | $\|h_{fe}\|$ | 2.5 | — | — |
| **SWITCHING CHARACTERISTICS** (See Figure 21) | | | | | |
| Saturated Turn-On Time | | $t_{on}$ | — | 35 | ns |
| Saturated Turn-Off Time | | $t_{off}$ | — | 300 | ns |
| Nonsaturated Pulse Response Time | | $t_{on} + t_{off}$ | — | 18 | ns |

**ASSURANCE TESTING (Pre/Post Burn-In)**
**Burn-In Conditions: $T_A$ = 25, ±3°C, $V_{CB}$ = 30 Vdc**
**$P_T$ = 400 mW**

| Characteristics Tested | | Symbol | Initial and End Point Limits | | Unit |
|---|---|---|---|---|---|
| | | | Min | Max | |
| Collector Cutoff Current ($V_{CB}$ = 60 Vdc) | | $I_{CBO}$ | — | 10 | nAdc |
| DC Current Gain(1) | 2N5581 | $h_{FE}$ | 40 | 120 | — |
| ($I_C$ = 150 mAdc, $V_{CE}$ = 10 Vdc) | 2N5582 | | 100 | 300 | |

| Delta from Pre-Burn-In Measured Values | | Min | Max | |
|---|---|---|---|---|
| Delta Collector Cutoff Current | $\Delta I_{CBO}$ | — | ±100<br>or ±5.0<br>whichever is greater | % of Initial Value<br>nAdc |
| Delta DC Current Gain(1) | $\Delta h_{FE}$ | — | ±15 | % of Initial Value |

(1) Pulsed: Pulse Width 250 to 350 µs, Duty Cycle 1.0 to 2.0%.