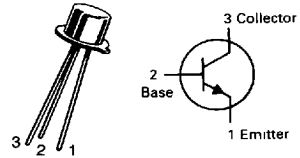


BSX20

CASE 22-03, STYLE 1
TO-18 (TO-206AA)



TRANSISTOR

NPN SILICON

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------------|-------------|-------------------------------|
| Collector-Emitter Voltage | V_{CE0} | 15 | Vdc |
| Collector-Emitter Voltage ($R_{BE} = 10$ Ohms) | V_{CER} | 20 | Vdc |
| Collector-Base Voltage | V_{CBO} | 40 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 4.5 | Vdc |
| Collector Current - Continuous | I_C | 500 | mAmp |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | PD | 360 2.06 | mWatt mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$ Derate above 25°C | PD | 1.2 6.85 | Watt mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|-----|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 146 | $^\circ\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Max | Unit |
|---|--------------------------------|----------------|----------------------|---------------------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Breakdown Voltage(1) ($I_C = 10$ mA, $I_B = 0$) ($I_C = 10$ mA, $R_{BE} = 10 \Omega$) | $V_{(BR)CEO}$ $V_{(BR)CER}$ | 15 20 | | Vdc |
| Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | 4.5 | | Vdc |
| Collector Cutoff Current ($V_{CB} = 20$ Vdc, $I_E = 0$) ($V_{CB} = 20$ Vdc, $I_E = 0$, $T_J = 150^\circ\text{C}$) | I_{CBO} | | 400 30 | nA μA |
| Collector Cutoff Current ($V_{CE} = 15$ Vdc, $V_{BE} = 0$, $T_J = 55^\circ\text{C}$) ($V_{CE} = 40$ Vdc, $V_{BE} = 0$) | I_{CES} | | 0.4 1.0 | μA |
| Cutoff Current ($V_{CE} = 15$ Vdc, $V_{EB} = 3.0$ V, $T_J = 55^\circ\text{C}$) | I_{CEX} I_{BEX} | | 0.6 0.6 | μA |
| ON CHARACTERISTICS | | | | |
| DC Current Gain(1) ($I_C = 10$ mA, $V_{CE} = 1.0$ Vdc) ($I_C = 10$ mA, $V_{CE} = 1.0$ Vdc, $T_J = -55^\circ\text{C}$) ($I_C = 100$ mA, $V_{CE} = 2.0$ Vdc) | h_{FE} | 40 20 10 | 120 | |
| Base-Emitter On Voltage ($I_C = 30 \mu\text{A}$, $V_{CE} = 20$ Vdc, $T_J = 100^\circ\text{C}$) | $V_{BE(on)}$ | | 0.35 | Vdc |
| Emitter-Collector Saturation Voltage(1) ($I_C = 10$ mA, $I_B = 0.3$ mA) ($I_C = 10$ mA, $I_B = 1.0$ mA) ($I_C = 100$ mA, $I_B = 10$ mA) | $V_{CE(sat)}$ | | 0.30 0.25 0.60 | Vdc |
| Emitter-Base Saturation Voltage(1) ($I_C = 10$ mA, $I_B = 1.0$ mA) ($I_C = 100$ mA, $I_B = 10$ mA) | $V_{BE(sat)}$ | 0.70 | 0.85 1.50 | Vdc |

6367254 0103904 59T

ELECTRICAL CHARACTERISTICS (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Max | Unit |
|--|-----------|-----|-----------|------|
| SMALL-SIGNAL CHARACTERISTICS | | | | |
| Current Gain-Bandwidth Product ($I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 100\text{ MHz}$) | f_T | 500 | | MHz |
| Output Capacitance ($V_{CB} = 5.0\text{ V}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | C_{obo} | | 4.0 | pF |
| Input Capacitance ($V_{EB} = 1.0\text{ V}$, $I_C = 0$, $f = 1.0\text{ MHz}$) | C_{ibo} | | 4.5 | pF |
| Time ($I_C = 10\text{ mA}$, $I_{B1} = I_{B2} = 10\text{ mA}$) | t_s | | 1.3 | ns |
| Turn-On Time ($I_C = 10\text{ mA}$, $I_{B1} = 3.0\text{ mA}$) ($I_C = 100\text{ mA}$, $I_{B1} = 40\text{ mA}$) | t_{on} | | 12 7.0 | ns |
| Turn-Off Time ($I_C = 10\text{ mA}$, $I_{B1} = 3.0\text{ mA}$, $I_{B2} = -1.5\text{ mA}$) ($I_C = 100\text{ mA}$, $I_{B1} = 40\text{ mA}$, $I_{B2} = -20\text{ mA}$) | t_{off} | | 18 21 | ns |

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

6367254 0103905 426