

## NPN LOW POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/225

### Devices

2N1711

2N1890

### Qualified Level

JAN  
JANTX

### MAXIMUM RATINGS

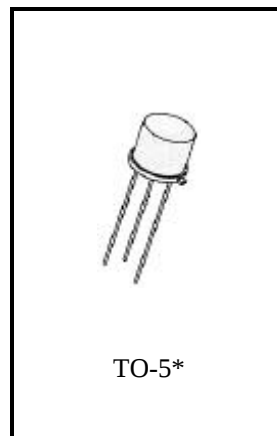
| Ratings                                                                                                                 | Symbol         | 2N1711      | 2N1890 | Unit               |
|-------------------------------------------------------------------------------------------------------------------------|----------------|-------------|--------|--------------------|
| Collector-Base Voltage                                                                                                  | $V_{CBO}$      | 75          | 100    | Vdc                |
| Emitter-Base Voltage                                                                                                    | $V_{EBO}$      | 7.0         |        | Vdc                |
| Collector Current                                                                                                       | $I_C$          | 500         |        | mAdc               |
| Total Power Dissipation<br>@ $T_A = +25^{\circ}\text{C}$ <sup>(1)</sup><br>@ $T_C = +25^{\circ}\text{C}$ <sup>(2)</sup> | $P_T$          | 0.8<br>3.0  |        | W<br>W             |
| Operating & Storage Junction Temperature Range                                                                          | $T_J, T_{stg}$ | -65 to +200 |        | $^{\circ}\text{C}$ |

### THERMAL CHARACTERISTICS

| Characteristics   | Symbol          | Max. | Unit                 |
|-------------------|-----------------|------|----------------------|
| Thermal Impedance | $Z_{\theta JX}$ | 58   | $^{\circ}\text{C/W}$ |

1) Derate linearly 4.57 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$

2) Derate linearly 17.2 mW/ $^{\circ}\text{C}$  for  $T_C > 25^{\circ}\text{C}$



\*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-Base Breakdown Voltage<br>$I_C = 100 \mu\text{Adc}$                           | 2N1711, S<br>2N1890, S | $V_{(BR)CBO}$ | 75<br>100 | Vdc              |
| Collector-Emitter Breakdown Voltage<br>$R_{BE} = 10 \Omega, I_C = 100 \text{ mAdc}$     | 2N1711, S<br>2N1890, S | $V_{(BR)CER}$ | 50<br>80  | Vdc              |
| Collector-Emitter Breakdown Voltage<br>$I_C = 30 \text{ mAdc}$                          | 2N1711, S<br>2N1890, S | $V_{(BR)CEO}$ | 30<br>60  | Vdc              |
| Emitter-Base Breakdown Voltage<br>$I_E = 100 \mu\text{Adc}$                             |                        | $V_{(BR)EBO}$ | 7.0       | Vdc              |
| Collector-Base Cutoff Current<br>$V_{CB} = 60 \text{ Vdc}$<br>$V_{CB} = 80 \text{ Vdc}$ | 2N1711<br>2N1890       | $I_{CBO}$     | 10<br>10  | $\eta\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 5.0 \text{ Vdc}$                               |                        | $I_{EBO}$     | 5.0       | $\eta\text{Adc}$ |

**2N1711, 2N1890 JAN SERIES**

| Characteristics                                                                                                                                                                                         | Symbol             | Min.            | Max.              | Unit           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|-------------------|----------------|
| <b>ON CHARACTERISTICS <sup>(3)</sup></b>                                                                                                                                                                |                    |                 |                   |                |
| Forward-Current Transfer Ratio<br>$I_C = 10 \mu\text{Adc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ 2N1711, S | $h_{FE}$           | 20<br>100<br>50 | 300               |                |
| Collector-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$ 2N1711, S<br>2N1890, S<br>$I_C = 50 \text{ mAdc}, I_B = 5.0 \text{ mAdc}$ 2N1890, S                             | $V_{CE(sat)}$      |                 | 1.5<br>5.0<br>1.2 | Vdc            |
| Base-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$<br>$I_C = 50 \text{ mAdc}, I_B = 5.0 \text{ mVdc}$ 2N1890, S                                                         | $V_{BE(sat)}$      |                 | 1.3<br>0.9        | Vdc            |
| <b>DYNAMIC CHARACTERISTICS</b>                                                                                                                                                                          |                    |                 |                   |                |
| Small-Signal Short-Circuit Forward-Current Transfer Ratio<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$<br>$I_C = 5.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$                                    | $h_{fe}$           | 80<br>90        | 200<br>270        |                |
| Magnitude of Common Emitter Small-Signal Short-Circuit Forward-Current Transfer Ratio<br>$I_C = 50 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}; f = 20 \text{ MHz}$                                           | $ h_{fe} $         | 3.5             | 12                |                |
| Small-Signal Short-Circuit Input Impedance<br>$I_C = 5.0 \text{ mAdc}, V_{CB} = 10 \text{ Vdc}$                                                                                                         | $h_{ib}$           | 4.0             | 8.0               | $\Omega$       |
| Small-Signal Short-Circuit Output Admittance<br>$I_C = 5.0 \text{ mAdc}, V_{CB} = 10 \text{ Vdc}$ 2N1711, S<br>2N1890, S                                                                                | $h_{ob}$           |                 | 1.0<br>.03        | $\mu\Omega$    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$ 2N1711, S<br>2N1890, S                                                                            | $C_{obo}$          | 8.0<br>5.0      | 25<br>15          | pF             |
| <b>SWITCHING CHARACTERISTICS</b>                                                                                                                                                                        |                    |                 |                   |                |
| Turn-On Time + Turn-Off Time<br>(See figure 1 of MIL-PRF-19500/225)                                                                                                                                     | $t_{on} + t_{off}$ |                 | 30                | $\eta\text{s}$ |

(3) Pulse Test: Pulse Width 250 to 350 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

