

## NPN MEDIUM POWER SILICON SWITCHING TRANSISTOR

Qualified per MIL-PRF-19500/99

### Devices

2N696  
2N696S

2N697  
2N697S

### Qualified Level

JAN

### MAXIMUM RATINGS

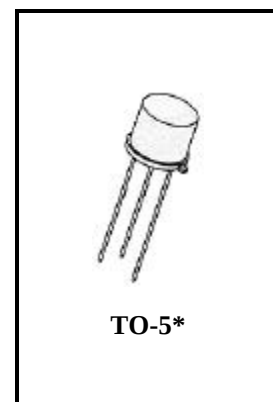
| Ratings                                                                                                            | Symbol         | Value       | Units              |
|--------------------------------------------------------------------------------------------------------------------|----------------|-------------|--------------------|
| Collector-Base Voltage                                                                                             | $V_{CBO}$      | 60          | Vdc                |
| Emitter-Base Voltage                                                                                               | $V_{EBO}$      | 5.0         | Vdc                |
| Total Power Dissipation @ $T_A = 25^{\circ}\text{C}$ <sup>(1)</sup><br>@ $T_C = 25^{\circ}\text{C}$ <sup>(2)</sup> | $P_T$          | 0.6<br>2.0  | 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 Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.075 | $^{\circ}\text{C}/\text{mW}$ |

1) Derate linearly 4.0 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$

2) Derate linearly 13.3 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-Emitter Breakdown Voltage<br>$R_{BE} = 10 \Omega, I_C = 100 \text{ mAdc}$      | $V_{(BR)CER}$ | 40 |           | Vdc             |
| Collector-Base Cutoff Current<br>$V_{CB} = 100 \text{ Vdc}$<br>$V_{CB} = 30 \text{ Vdc}$ | $I_{CBO}$     |    | 10<br>0.1 | $\mu\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 7.0 \text{ Vdc}$                                | $I_{EBO}$     |    | 10        | $\mu\text{Adc}$ |

#### ON CHARACTERISTICS <sup>(3)</sup>

|                                                                                                                                          |                                          |               |                          |           |     |
|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------|--------------------------|-----------|-----|
| Forward-Current Transfer Ratio<br>$I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ | 2N696,s<br>2N697,s<br>2N696,s<br>2N697,s | $h_{FE}$      | 20<br>40<br>12.5<br>20.0 | 60<br>120 |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$                                                  |                                          | $V_{CE(sat)}$ | 0.3                      | 1.5       | Vdc |
| Base-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$                                                       |                                          | $V_{BE(sat)}$ |                          | 1.3       | Vdc |

**2N696, 2N696s, 2N697, 2N697s SERIES**

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                                                        |            |            |          |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|----------|----|
| Magnitude of Common Emitter Small-Signal Short-Circuit<br>Forward-Current Transfer Ratio<br>$I_C = 50 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ ; $f = 20 \text{ MHz}$ | $ h_{fe} $ | 2.5<br>3.0 | 10<br>12 |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                                                            | $C_{obo}$  | 2.0        | 25       | pF |

**SWITCHING CHARACTERISTICS**

|                                                     |           |  |       |          |
|-----------------------------------------------------|-----------|--|-------|----------|
| Turn-On Time<br>(See Figure 3 of MIL-PRF-19500/ 99) | $t_{on}$  |  | 200   | $\eta s$ |
| Turn-Off Time<br>(See Figure 4 of MIL-PRF-19500/99) | $t_{off}$ |  | 1,000 | $\eta s$ |

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

