



## TECHNICAL DATA

### NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/537

#### Devices

2N6674      2N6675      2N6689      2N6690

#### Qualified Level

JAN  
JANTX  
JANTXV

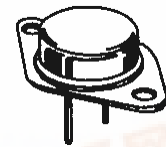
#### MAXIMUM RATINGS

| Ratings                                                                                         | Symbol            | 2N6674<br>2N6689   | 2N6675<br>2N6690   | Unit               |
|-------------------------------------------------------------------------------------------------|-------------------|--------------------|--------------------|--------------------|
| Collector-Emitter Voltage                                                                       | $V_{CEO}$         | 300                | 400                | Vdc                |
| Collector-Base Voltage                                                                          | $V_{CBO}$         | 450                | 650                | Vdc                |
| Collector-Base Voltage                                                                          | $V_{CEX}$         | 450                | 650                | Vdc                |
| Emitter-Base Voltage                                                                            | $V_{EBO}$         | 7.0                |                    | Vdc                |
| Base Current                                                                                    | $I_B$             | 5.0                |                    | Adc                |
| Collector Current                                                                               | $I_C$             | 15                 |                    | Adc                |
|                                                                                                 |                   | 2N6674<br>2N6675   | 2N6689<br>2N6690   |                    |
| Total Power Dissipation<br>@ $T_A = +25^{\circ}\text{C}$<br>@ $T_C = +25^{\circ}\text{C}^{(1)}$ | $P_T$             | 6.0 <sup>(2)</sup> | 3.0 <sup>(3)</sup> | W                  |
|                                                                                                 |                   | 175                | 175                | W                  |
| Operating & Storage Temperature Range                                                           | $T_{op}; T_{stg}$ | -65 to +200        |                    | $^{\circ}\text{C}$ |

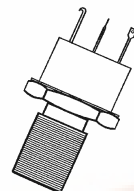
#### THERMAL CHARACTERISTICS

| Characteristics                      | Symbol          | Max. | Unit                 |
|--------------------------------------|-----------------|------|----------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.0  | $^{\circ}\text{C/W}$ |

- 1) Derate linearly 1.0 W/ $^{\circ}\text{C}$  for  $T_C > 25^{\circ}\text{C}$
- 2) Derate linearly 34.2 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$
- 3) Derate linearly 17.1 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$



2N6674, 2N6675  
TO-3 (TO-204AA)\*



2N6689, 2N6690  
TO-61\*

\* See Appendix A for Package Outline

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

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

#### OFF CHARACTERISTICS

|                                                                                                                                                    |                                  |               |            |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------|------------|------|
| Collector-Emitter Breakdown Voltage<br>$I_C = 200 \text{ mAdc}$                                                                                    | 2N6674, 2N6689<br>2N6675, 2N6690 | $V_{(BR)CEO}$ | 300<br>400 | Vdc  |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 450 \text{ Vdc}, V_{BE} = -1.5 \text{ Vdc}$<br>$V_{CE} = 650 \text{ Vdc}, V_{BE} = -1.5 \text{ Vdc}$ | 2N6674, 2N6689<br>2N6675, 2N6690 | $I_{CEX}$     | 0.1<br>0.1 | mAdc |



**2N6674, 2N6675, 2N6689, 2N6690 JAN SERIES**

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics                                                                                                         | Symbol    | Min. | Max.       | Unit |
|-------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|------|
| Emitter-Base Cutoff Current<br>$V_{EB} = 7.0 \text{ Vdc}$                                                               | $I_{EBO}$ |      | 2.0        | mAdc |
| Collector-Base Cutoff Current<br>$V_{CB} = 450 \text{ Vdc}$ 2N6674, 2N6689<br>$V_{CB} = 650 \text{ Vdc}$ 2N6675, 2N6690 | $I_{CBO}$ |      | 1.0<br>1.0 | mAdc |

**ON CHARACTERISTICS <sup>(4)</sup>**

|                                                                                                                                       |               |         |            |     |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------|---------|------------|-----|
| Forward-Current Transfer Ratio<br>$I_C = 1 \text{ Adc}; V_{CE} = 3.0 \text{ Vdc}$<br>$I_C = 10 \text{ Adc}; V_{CE} = 2.0 \text{ Vdc}$ | $h_{FE}$      | 15<br>8 | 40<br>20   |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 10 \text{ Adc}; I_B = 2 \text{ Adc}$<br>$I_C = 15 \text{ Adc}; I_B = 5 \text{ Adc}$    | $V_{CE(sat)}$ |         | 1.0<br>5.0 | Vdc |
| Base-Emitter Saturation Voltage<br>$I_C = 10 \text{ Adc}; I_B = 2 \text{ Adc}$                                                        | $V_{BE(sat)}$ |         | 1.5        | Vdc |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                  |            |     |     |    |
|----------------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|----|
| Small-Signal Short-Circuit Forward Current Transfer Ratio<br>$I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 5 \text{ MHz}$ | $ h_{fe} $ | 3.0 | 10  |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                            | $C_{obo}$  | 150 | 500 | pF |

**SWITCHING CHARACTERISTICS**

|                 |                                   |       |  |     |               |
|-----------------|-----------------------------------|-------|--|-----|---------------|
| Delay Time      | See Figure 3 of MIL-PRF-19500/537 | $t_d$ |  | 0.1 | $\mu\text{s}$ |
| Rise Time       |                                   | $t_r$ |  | 0.6 | $\mu\text{s}$ |
| Storage Time    |                                   | $t_s$ |  | 2.5 | $\mu\text{s}$ |
| Fall Time       |                                   | $t_f$ |  | 0.5 | $\mu\text{s}$ |
| Cross-Over Time |                                   | $t_c$ |  | 0.5 | $\mu\text{s}$ |

**SAFE OPERATING AREA**

**DC Tests (continuous dc)**

$T_C = +25^\circ\text{C}$ , power application time = 1.0 s; 1 Cycle, (See Figure 4 of MIL-PRF-19500/537)

**Test 1**

$V_{CE} = 11.7 \text{ Vdc}, I_C = 15 \text{ Adc}$  All Types

**Test 2**

$V_{CE} = 30 \text{ Vdc}, I_C = 5.9 \text{ Adc}$  2N6674, 2N6675

**Test 3**

$V_{CE} = 100 \text{ Vdc}, I_C = 0.25 \text{ Adc}$  All Types

**Test 4**

$V_{CE} = 25 \text{ Vdc}, I_C = 7.0 \text{ Adc}$  2N6689, 2N6690

**Test 5**

$V_{CE} = 300 \text{ Vdc}, I_C = 20 \text{ mAdc}$  2N6674, 2N6689

$V_{CE} = 400 \text{ Vdc}, I_C = 10 \text{ mAdc}$  2N6675, 2N6690

**Clamped Switching**

$T_A = 25^\circ\text{C}; V_{CC} = 15 \text{ Vdc}$ ; Load condition B;  $R_{BB1} = 5 \Omega; R_{BB2} = 1.5 \Omega$ ;

$V_{BB2} = 5 \text{ Vdc}; L = 50 \mu\text{H}; R \text{ of inductor} = .05\Omega; R_L = R \text{ of inductor.}$

(See Figure 6 of MIL-PRF-19500/537)

Clamp Voltage = 350;  $I_C = 10 \text{ Adc}$  2N6674, 2N6689

Clamp Voltage = 450;  $I_C = 10 \text{ Adc}$  2N6675, 2N6690

(4) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .