Microsemi LAWRENCE

**TECHNICAL DATA**

# NPN POWER SILICON SWITCHING TRANSISTOR

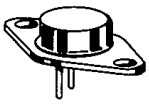
***Qualified per MIL-PRF-19500/455***

| *Devices* | *Qualified Level* | *Devices* | *Qualified Level* |
|---|---|---|---|
| **2N5664 2N5665** | **JAN<br>JANTX<br>JANTXV** | **2N5666 2N5667<br>2N5666S 2N5667S** | **JAN<br>JANTX<br>JANTXV<br>JANS** |

**MAXIMUM RATINGS**

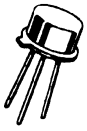
| Ratings | Symbol | 2N5664<br>2N5666, S | 2N5665<br>2N5667, S | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 200 | 300 | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 250 | 400 | Vdc |
| Emitter-Base Voltage | $V_{EBO}$ | 6.0 | | Vdc |
| Base Current | $I_B$ | 1.0 | | Adc |
| Collector Current | $I_C$ | 5.0 | | Adc |
| | | **2N5664<br>2N5665** | **2N5666, S<br>2N5667, S** | |
| Total Power Dissipation @ $T_A = +25^0C$<br>@ $T_C = +100^0C$ | $P_T$ | 2.5 (1)<br>30 (3) | 1.2 (2)<br>15 (4) | W<br>W |
| Operating & Storage Junction Temperature Range | $T_J$, $T_{stg}$ | -65 to +200 | | $^0C$ |

1) Derate linearly 14.3 mW/$^0$C for $T_A > +25^0C$
2) Derate linearly 6.9 mW/$^0$C for $T_A > +25^0C$
3) Derate linearly 300 mW/$^0$C for $T_C > +100^0C$
4) Derate linearly 150 mW/$^0$C for $T_C > +100^0C$



TO-66* (TO-213AA)
2N5664, 2N5665

TO-5*
2N5666, 2N5667



TO-39* (TO-205AD)
2N5666S, 2N5667S

*See appendix A for package outline

**ELECTRICAL CHARACTERISTICS ($T_C = 25^0C$ unless otherwise noted)**

| Characteristics | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector-Emitter Breakdown Voltage<br>$I_C$ = 10 mAdc | 2N5664, 2N5666, S<br>2N5665, 2N5667, S | $V_{(BR)CER}$ | 250<br>400 | | Vdc |
| Emitter-Base Breakdown Voltage<br>$I_E$ = 10 µAdc | | $V_{(BR)EBO}$ | 6.0 | | Vdc |
| Collector-Emitter Cutoff Current<br>$V_{CE}$ = 200 Vdc<br>$V_{CE}$ = 300 Vdc | 2N5664, 2N5666, S<br>2N5665, 2N5667, S | $I_{CES}$ | | 0.2<br>0.2 | µAdc |

## ELECTRICAL CHARACTERISTICS (con't)

| Characteristics | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Collector-Base Cutoff Current | | | | | |
| $V_{CB}$ = 200 Vdc | 2N5664, 2N5666, S | $I_{CBO}$ | | 0.1 | µAdc |
| $V_{CB}$ = 250 Vdc | | | | 1.0 | mAdc |
| $V_{CB}$ = 300 Vdc | 2N5665, 2N5667, S | | | 0.1 | µAdc |
| $V_{CB}$ = 400 Vdc | | | | 1.0 | mAdc |
| **ON CHARACTERISTICS** (5) | | | | | |
| Forward-Current Transfer Ratio | | | | | |
| $I_C$ = 0.5 Adc, $V_{CE}$ = 2.0 Vdc | 2N5664, 2N5666, S | $h_{FE}$ | 40 | | |
| | 2N5665, 2N5667, S | | 25 | | |
| $I_C$ = 1.0 Adc, $V_{CE}$ = 5.0 Vdc | 2N5664, 2N5666, S | | 40 | 120 | |
| | 2N5665, 2N5667, S | | 25 | 75 | |
| $I_C$ = 3.0 Adc, $V_{CE}$ = 5.0 Vdc | 2N5664, 2N5666, S | | 15 | | |
| | 2N5665, 2N5667, S | | 10 | | |
| $I_C$ = 5.0 Adc, $V_{CE}$ = 5.0 Vdc | All Types | | 5.0 | | |
| Collector-Emitter Saturation Voltage | | | | | |
| $I_C$ = 3.0 Adc, $I_B$ = 0.3 Adc | 2N5664, 2N5666, S | $V_{CE(sat)}$ | | 0.4 | |
| $I_C$ = 3.0 Adc, $I_B$ = 0.6 Adc | 2N5665, 2N5667, S | | | 0.4 | Vdc |
| $I_C$ = 5.0 Adc, $I_B$ = 1.0 Adc | All Types | | | 1.0 | |
| Base-Emitter Saturation Voltage | | | | | |
| $I_C$ = 3.0 Adc, $I_B$ = 0.3 Adc | 2N5664, 2N5666, S | $V_{BE(sat)}$ | | 1.2 | |
| $I_C$ = 3.0 Adc, $I_B$ = 0.6 Adc | 2N5665, 2N5667, S | | | 1.2 | Vdc |
| $I_C$ = 5.0 Adc, $I_B$ = 1.0 Adc | All Types | | | 1.5 | |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Forward Current Transfer Ratio | | | | | |
| $I_C$ = 0.5 Adc, $V_{CE}$ = 5.0 Vdc, f = 10 MHz | | $\lvert h_{fe} \rvert$ | 2.0 | 7.0 | |
| Output Capacitance | | | | | |
| $V_{CB}$ = 10 Vdc, $I_E$ = 0, 100 kHz ≤ f ≤ 1.0 MHz | | $C_{obo}$ | | 120 | pF |
| **SWITCHING CHARACTERISTICS** | | | | | |
| Turn-On Time | | | | | |
| $V_{CC}$ = 100 Vdc; $I_C$ = 1.0 Adc; $I_{B1}$ = 30 mAdc | | $t_{on}$ | | 0.25 | µs |
| Turn-Off Time | | | | | |
| $V_{CC}$ = 30 Vdc; $I_C$ = 1.0 Adc; $I_{B1}$ = $-I_{B2}$ = 50 mAdc | | $t_{off}$ | | | µs |
| | 2N5664, 2N5666, S | | | 1.5 | |
| | 2N5665, 2N5667, S | | | 2.0 | |

## SAFE OPERATING AREA

**DC Tests** (2N5664 and 2N5665 only)

$T_C$ = 100$^0$C, 1 Cycle, t ≥ 1.0 s, $t_r + t_f$ = 10 µs

| | |
|---|---|
| **Test 1** | |
| $V_{CE}$ = 6.0 Vdc, $I_C$ = 5.0 Adc | 2N5664 and 2N5665 |
| $V_{CE}$ = 3.0 Vdc, $I_C$ = 5.0 Adc | 2N5666 and 2N5667 |
| **Test 2** | |
| $V_{CE}$ = 40 Vdc, $I_C$ = 0.75 Adc | 2N5664 and 2N5665 |
| $V_{CE}$ = 37.5 Vdc, $I_C$ = 0.4 Adc | 2N5666 and 2N5667 |
| **Test 3** | |
| $V_{CE}$ = 200 Vdc, $I_C$ = 43 mAdc | 2N5664 |
| $V_{CE}$ = 200 Vdc, $I_C$ = 27 mAdc | 2N5666 |
| **Test 4** | |
| $V_{CE}$ = 300 Vdc, $I_C$ = 21 mAdc | 2N5665 |
| $V_{CE}$ = 300 Vdc, $I_C$ = 14 mAdc | 2N5667 |

(5) Pulse Test: Pulse Width = 300µs, Duty Cycle ≤ 2.0%.