

COMPLEMENTARY SILICON PLASTIC POWER TRANSISTORS

... designed for use in power amplifier and switching circuit applications.

FEATURES:

* Collector-Emitter Sustaining Voltage-

$V_{CEO(sus)} = 30\text{ V (Min) - 2N6111, 2N6288}$
 $= 50\text{ V (Min) - 2N6109, 2N6290}$
 $= 70\text{ V (Min) - 2N6107, 2N6292}$

* DC Current Gain Specified to 7.0 Amperes

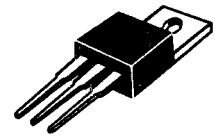
$h_{FE} = 30-150 @ I_C = 3.0\text{ A - 2N6111, 2N6292}$
 $= 2.3(\text{Min}) @ I_C = 7.0\text{ A - All Devices}$

| PNP | NPN |
|--------|--------|
| 2N6107 | 2N6288 |
| 2N6109 | 2N6290 |
| 2N6111 | 2N6292 |

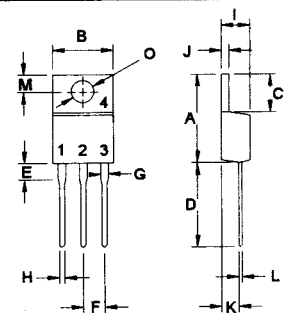
7 AMPERE
COMPLEMENTARY SILICON
POWER TRANSISTORS
30-70 Volts
40 Watts

MAXIMUM RATINGS

| Characteristic | Symbol | 2N6111 2N6288 | 2N6109 2N6290 | 2N6107 2N6292 | Unit |
|---|----------------|------------------|------------------|------------------|--------------------------|
| Collector-Emitter Voltage | V_{CEO} | 30 | 50 | 70 | V |
| Collector-Base Voltage | V_{CBO} | 40 | 60 | 80 | V |
| Emitter-Base Voltage | V_{EBO} | 5.0 | | | V |
| Collector Current - Continuous - Peak | I_C | 7.0 10 | | | A |
| Base Current | I_B | 3.0 | | | A |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 40 0.32 | | | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{STG} | -65 to +150 | | | $^\circ\text{C}$ |



TO-220



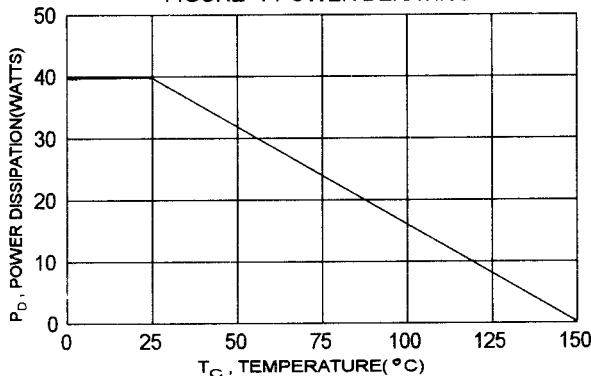
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR (CASE)

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|-------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 3.125 | $^\circ\text{C/W}$ |

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 14.68 | 15.31 |
| B | 9.78 | 10.42 |
| C | 5.01 | 6.52 |
| D | 13.06 | 14.62 |
| E | 3.57 | 4.07 |
| F | 2.42 | 3.66 |
| G | 1.12 | 1.36 |
| H | 0.72 | 0.96 |
| I | 4.22 | 4.98 |
| J | 1.14 | 1.38 |
| K | 2.20 | 2.97 |
| L | 0.33 | 0.55 |
| M | 2.48 | 2.98 |
| O | 3.70 | 3.90 |

FIGURE -1 POWER DERATING



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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|--|--|---------------|--|----|
| Collector - Emitter Sustaining Voltage (1) ($I_c = 100 \text{ mA}$, $I_B = 0$) | 2N6111, 2N6288 2N6109, 2N6290 2N6107, 2N6292 | $V_{CE(sus)}$ | 30 50 70 | V |
| Collector Cutoff Current ($V_{CE} = 20 \text{ V}$, $I_B = 0$) ($V_{CE} = 40 \text{ V}$, $I_B = 0$) ($V_{CE} = 60 \text{ V}$, $I_B = 0$) | 2N6111, 2N6288 2N6109, 2N6290 2N6107, 2N6292 | I_{CEO} | 1.0 1.0 1.0 | mA |
| Collector Cutoff Current ($V_{CE} = 40 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 60 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 80 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 30 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$, $T_c = 125^\circ\text{C}$) ($V_{CE} = 50 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$, $T_c = 125^\circ\text{C}$) ($V_{CE} = 70 \text{ V}$, $V_{BE(off)} = 1.5 \text{ V}$, $T_c = 125^\circ\text{C}$) | 2N6111, 2N6288 2N6109, 2N6290 2N6107, 2N6292 2N6111, 2N6288 2N6109, 2N6290 2N6107, 2N6292 | I_{CEX} | 0.1 0.1 0.1 2.0 2.0 2.0 | mA |
| Emitter Cutoff Current ($V_{EB} = 5.0 \text{ V}$, $I_C = 0$) | | I_{EBO} | 1.0 | mA |

ON CHARACTERISTICS (1)

| | | | | |
|---|---|---------------|-----------------------|-------------------|
| DC Current Gain ($I_c = 2.0 \text{ A}$, $V_{CE} = 4.0 \text{ V}$) ($I_c = 2.5 \text{ A}$, $V_{CE} = 4.0 \text{ V}$) ($I_c = 3.0 \text{ A}$, $V_{CE} = 4.0 \text{ V}$) ($I_c = 7.0 \text{ A}$, $V_{CE} = 4.0 \text{ V}$) | 2N6107, 2N6292 2N6109, 2N6290 2N6111, 2N6288 All Devices | hFE | 30 30 30 2.3 | 150 150 150 |
| Collector-Emitter Saturation Voltage ($I_c = 7.0 \text{ A}$, $I_B = 3.0 \text{ A}$) | | $V_{CE(sat)}$ | | 3.5 |
| Base-Emitter On Voltage ($I_c = 7.0 \text{ A}$, $V_{CE} = 4.0 \text{ V}$) | | $V_{BE(on)}$ | | 3.0 |

DYNAMIC CHARACTERISTICS

| | | | | |
|--|------------------------------|----------|-----------|-----|
| Current-Gain-Bandwidth Product (2) ($I_c = 0.5 \text{ A}$, $V_{CE} = 4.0 \text{ V}$, $f = 1.0 \text{ MHz}$) | 2N6288,90,92 2N6107,09,11 | f_T | 2.5 10 | MHz |
| Small-Signal Current Gain ($I_c = 0.5 \text{ A}$, $V_{CE} = 4.0 \text{ V}$, $f = 50 \text{ KHz}$) | | h_{fe} | 20 | |

(1) Pulse Test: Pulse width = 300 us , Duty Cycle $\leq 2.0\%$ (2) $f_T = |h_{fe}| \cdot f_{test}$

FIGURE 2 - SWITCHING TIME TEST CIRCUIT

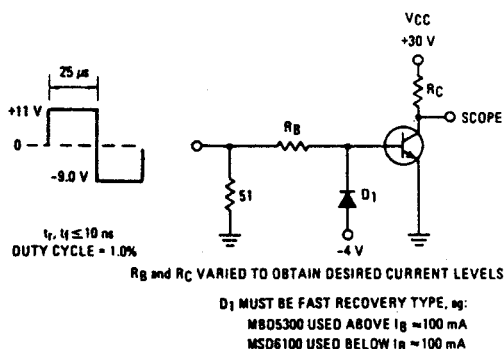


FIG-3 TURN-OFF TIME

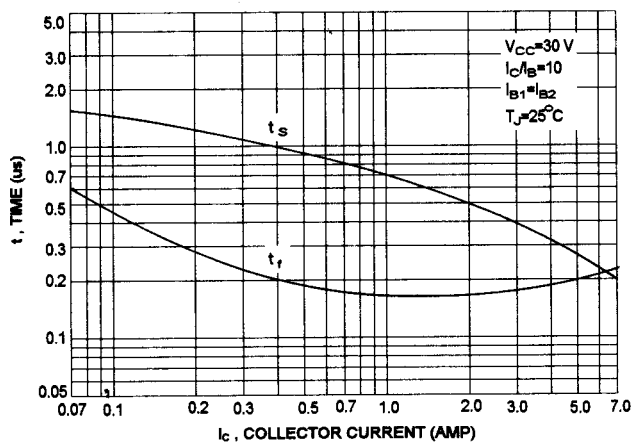


FIG-4 DC CURRENT GAIN

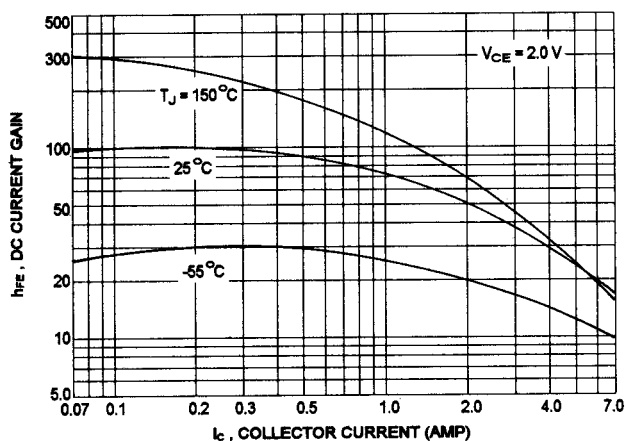


FIG-5 TURN-ON TIME

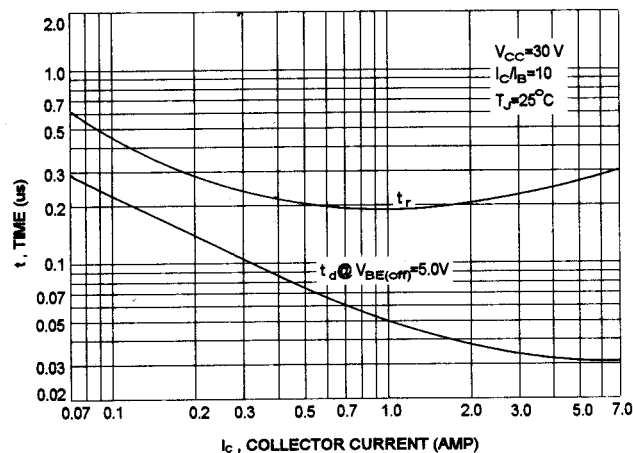
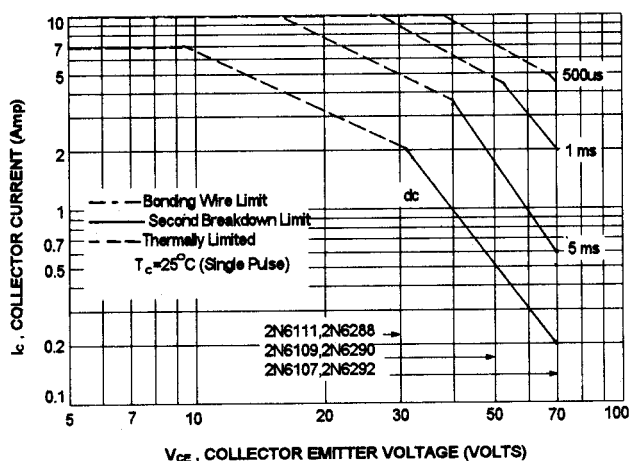


FIG-6 ACTIVE REGION SAFE OPERATING AREA



There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data of FIG-6 is base on $T_{J(PK)}=150^\circ \text{ C}$; T_C is variable depending on power level. second breakdown pulselimits are valid for duty cycles to 10% provided $T_{J(PK)} \leq 150^\circ \text{ C}$. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

FIG-7 COLLECTOR SATURATION REGION

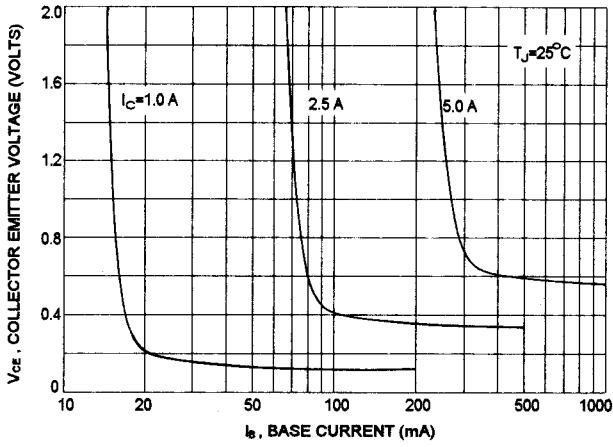


FIG-8 CAPACITANCES

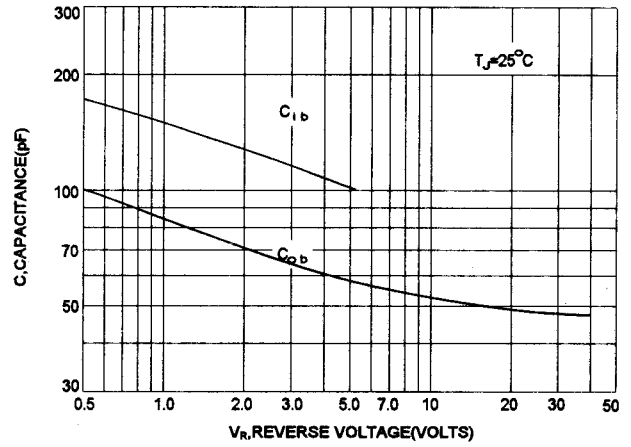


FIG-9 "ON" VOLTAGE

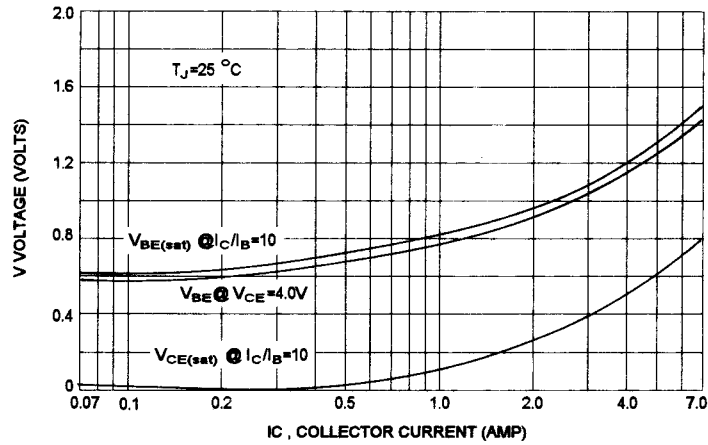


FIG-10 COLLECTOR CUT-OFF REGION

