

2N6057 thru 2N6059
(See 2N6050)

Complementary Silicon Plastic Power Transistors

... designed for use in general-purpose amplifier and switching applications.

- DC Current Gain Specified to 7.0 Amperes
 $h_{FE} = 30-150 @ I_C = 3.0 \text{ Adc} - 2N6111, 2N6288$
 $= 2.3 (\text{Min}) @ I_C = 7.0 \text{ Adc} - \text{All Devices}$
- Collector-Emitter Sustaining Voltage —
 $V_{CEO(sus)} = 30 \text{ Vdc (Min)} - 2N6111, 2N6288$
 $= 50 \text{ Vdc (Min)} - 2N6109$
 $= 70 \text{ Vdc (Min)} - 2N6107, 2N6292$
- High Current Gain — Bandwidth Product
 $f_T = 4.0 \text{ MHz (Min)} @ I_C = 500 \text{ mAdc} - 2N6288, 90, 92$
 $= 10 \text{ MHz (Min)} @ I_C = 500 \text{ mAdc} - 2N6107, 09, 11$
- TO-220AB Compact Package

*MAXIMUM RATINGS

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

THERMAL CHARACTERISTICS

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

* Indicates JEDEC Registered Data.

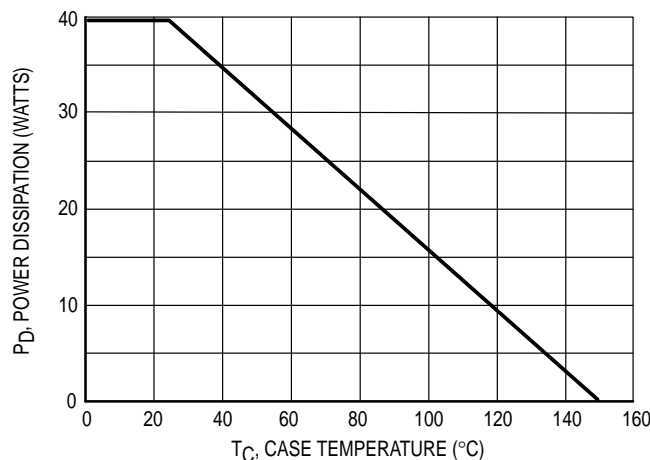


Figure 1. Power Derating

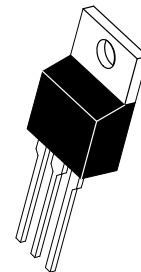
Preferred devices are Motorola recommended choices for future use and best overall value.

REV 2

PNP
2N6107
2N6109*
2N6111
NPN
2N6288
2N6292*

*Motorola Preferred Device

7 AMPERE
POWER TRANSISTORS
COMPLEMENTARY
SILICON
30-50-70 VOLTS
40 WATTS



CASE 221A-06
TO-220AB

2N6107 2N6109 2N6111 2N6288 2N6292

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

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------|----------------------------|--|---------------------------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (1) ($I_C = 100\text{ mAdc}$, $I_B = 0$) | $V_{CEO(sus)}$ | 30 50 70 | — | Vdc |
| Collector Cutoff Current ($V_{CE} = 20\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 40\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 60\text{ Vdc}$, $I_B = 0$) | I_{CEO} | — — — | 1.0 1.0 1.0 | mAdc |
| Collector Cutoff Current ($V_{CE} = 40\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 80\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 30\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 50\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 70\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) | I_{CEX} | — — — — — — | 100 100 100 2.0 2.0 2.0 | μAdc mAdc |
| Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | — | 1.0 | mAdc |
| ON CHARACTERISTICS (1) | | | | |
| DC Current Gain ($I_C = 2.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 2.5\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 3.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 7.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) | h_{FE} | 30 30 30 2.3 | 150 150 150 — | — |
| Collector–Emitter Saturation Voltage ($I_C = 7.0\text{ Adc}$, $I_B = 3.0\text{ Adc}$) | $V_{CE(sat)}$ | — | 3.5 | Vdc |
| Base–Emitter On Voltage ($I_C = 7.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) | $V_{BE(on)}$ | — | 3.0 | Vdc |
| DYNAMIC CHARACTERISTICS | | | | |
| Current Gain — Bandwidth Product (2) ($I_C = 500\text{ mAdc}$, $V_{CE} = 4.0\text{ Vdc}$, $f_{test} = 1.0\text{ MHz}$) | f_T | 4.0 10 | — | MHz |
| Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | C_{ob} | — | 250 | pF |
| Small–Signal Current Gain ($I_C = 0.5\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$, $f = 50\text{ kHz}$) | h_{fe} | 20 | — | — |

* Indicates JEDEC Registered Data.

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

(2) $f_T = |h_{fe}| \cdot f_{test}$.

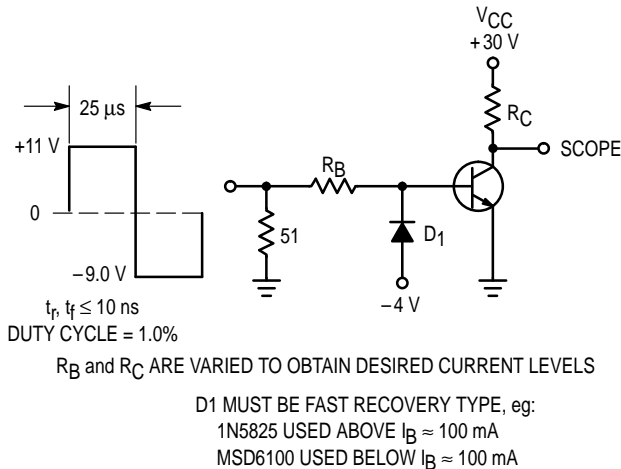


Figure 2. Switching Time Test Circuit

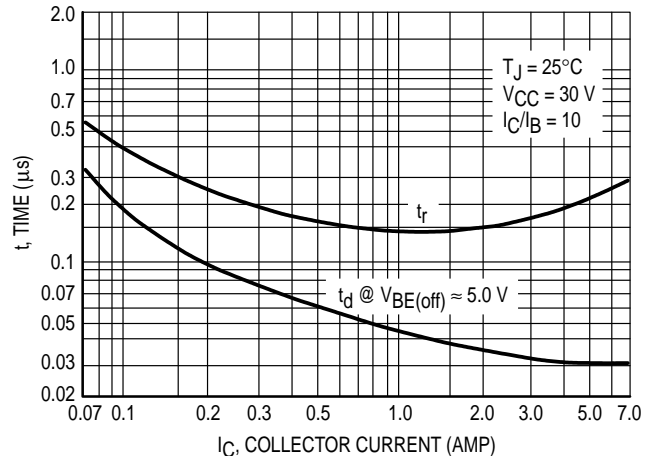


Figure 3. Turn–On Time

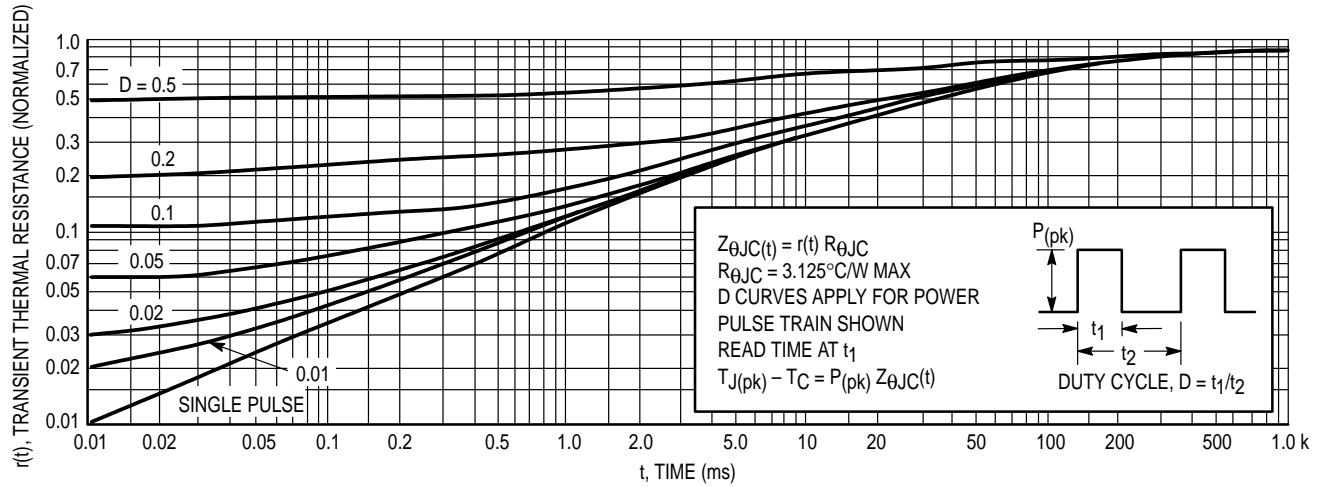


Figure 4. Thermal Response

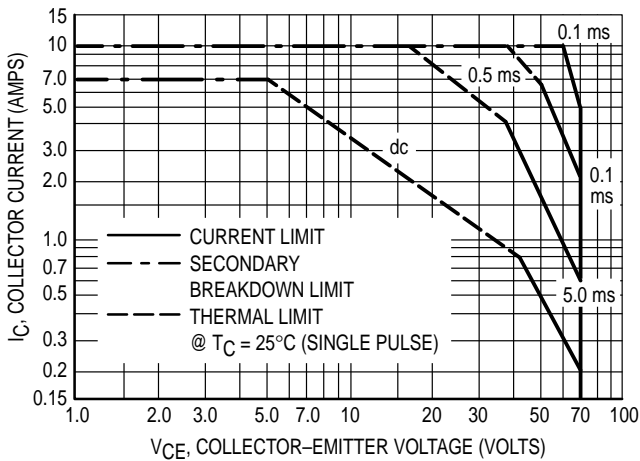


Figure 5. Active-Region Safe Operating Area

There are two limitations 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 the curves indicate.

The data of Figure 5 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

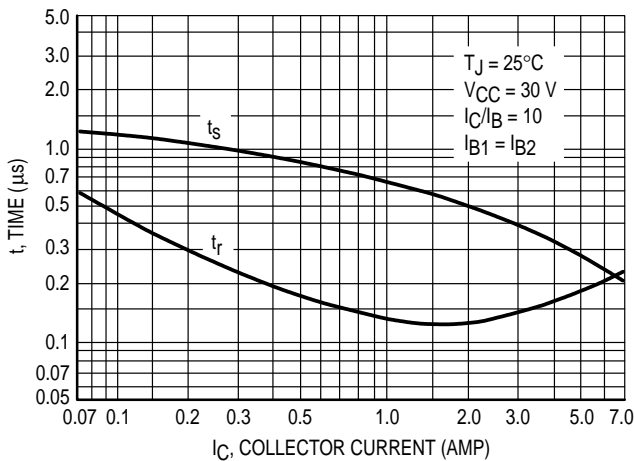


Figure 6. Turn-Off Time

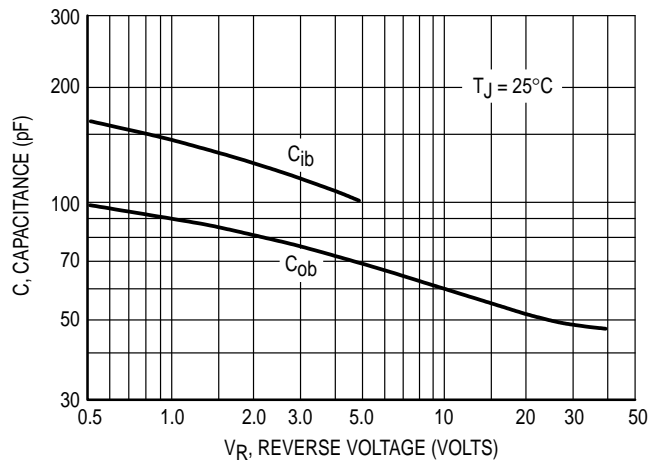
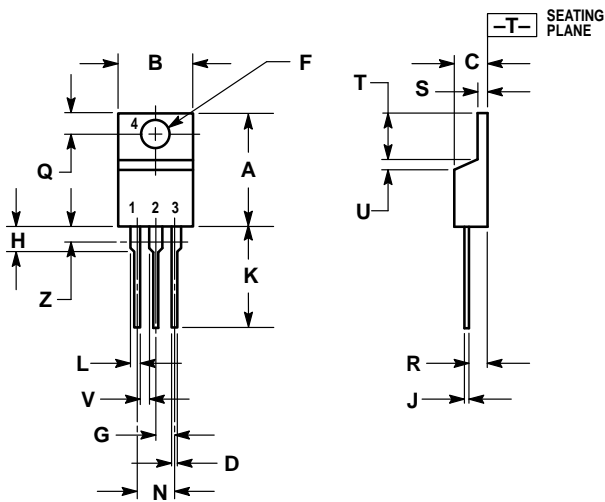


Figure 7. Capacitance

PACKAGE DIMENSIONS




- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.147 | 3.61 | 3.73 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | — | 1.15 | — |
| Z | — | 0.080 | — | 2.04 |

- STYLE 1:
- PIN 1. BASE
 - 2. COLLECTOR
 - 3. EMITTER
 - 4. COLLECTOR

CASE 221A-06
TO-220AB
ISSUE Y

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