

COMPLEMENTARY SILICON HIGH-POWER TRANSISTORS

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

FEATURES:

* Collector-Emitter Sustaining Voltage -

$V_{CEO(sus)} = 40V(\text{Min})$ - TIP35, TIP36
 $60V(\text{Min})$ - TIP35A, TIP36A
 $80V(\text{Min})$ - TIP35B, TIP36B
 $100V(\text{Min})$ - TIP35C, TIP36C

* DC Current Gain $hFE=25(\text{Min})@I_C = 1.5A$

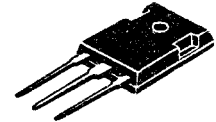
* Current Gain-Bandwidth Product $f_T=3.0 \text{ MHz}(\text{Min})@I_C=1.0A$

| NPN | PNP |
|--------|--------|
| TIP35 | TIP36 |
| TIP35A | TIP36A |
| TIP35B | TIP36B |
| TIP35C | TIP36C |

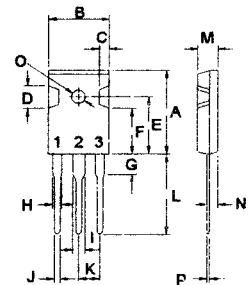
25 AMPERE
COMPLEMENTARY SILICON
POWER TRANSISTORS
40 -100 VOLTS
125 WATTS

MAXIMUM RATINGS

| Characteristic | Symbol | TIP35 TIP36 | TIP35A TIP36A | TIP35B TIP36B | TIP35C TIP36C | Unit |
|--|----------------|----------------|------------------|------------------|------------------|--------------------------|
| Collector-Emitter Voltage | V_{CEO} | 40 | 60 | 80 | 100 | V |
| Collector-Base Voltage | V_{CBO} | 40 | 60 | 80 | 100 | V |
| Emitter-Base Voltage | V_{EBO} | 5.0 | | | | V |
| Collector Current - Continuous - Peak | I_C | 25 40 | | | | A |
| Base Current | I_B | 5.0 | | | | A |
| Total Power Dissipation@ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 125 1.0 | | | | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{STG} | -65 to +150 | | | | $^\circ\text{C}$ |



TO-247(3P)



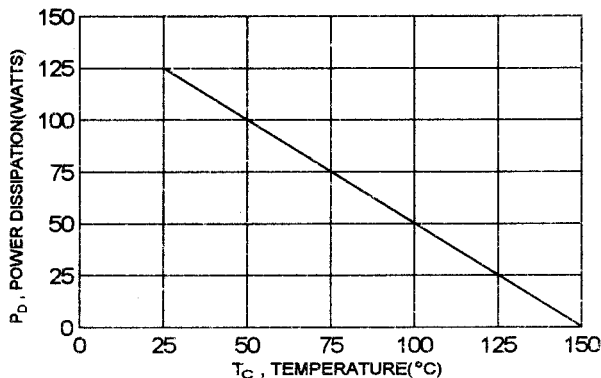
PIN 1.BASE
2.COLLECTOR
3.EMITTER

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|-------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 1.0 | $^\circ\text{C/W}$ |

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 20.63 | 22.38 |
| B | 15.38 | 16.20 |
| C | 1.90 | 2.70 |
| D | 5.10 | 6.10 |
| E | 14.81 | 15.22 |
| F | 11.72 | 12.84 |
| G | 4.20 | 4.50 |
| H | 1.82 | 2.46 |
| I | 2.92 | 3.23 |
| J | 0.89 | 1.53 |
| K | 5.26 | 5.66 |
| L | 18.50 | 21.50 |
| M | 4.68 | 5.36 |
| N | 2.40 | 2.80 |
| O | 3.25 | 3.65 |
| P | 0.55 | 0.70 |

FIGURE -1 POWER DERATING



TIP35, TIP35A, TIP35B, TIP35C NPN / TIP36, TIP36A, TIP36B, TIP36C PNP

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

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

OFF CHARACTERISTICS

| | | | | |
|---|--|----------------|--------------------------|----|
| Collector-Emitter Sustaining Voltage(1) ($I_C = 30\text{ mA}$, $I_B = 0$) | TIP35,TIP36 TIP35A,TIP36A TIP35B,TIP36B TIP35C,TIP36C | $V_{CEO(sus)}$ | 40 60 80 100 | V |
| Collector Cutoff Current ($V_{CE} = 30\text{ V}$, $I_B = 0$) ($V_{CE} = 60\text{ V}$, $I_B = 0$) | TIP35,TIP36,TIP35A,TIP36A TIP35B,TIP36B,TIP35C,TIP36C | I_{CEO} | 1.0 1.0 | mA |
| Collector Cutoff Current ($V_{CE} = 40\text{ V}$, $V_{EB} = 0$) ($V_{CE} = 60\text{ V}$, $V_{EB} = 0$) ($V_{CE} = 80\text{ V}$, $V_{EB} = 0$) ($V_{CE} = 100\text{ V}$, $V_{EB} = 0$) | TIP35,TIP36 TIP35A,TIP36A TIP35B,TIP36B TIP35C,TIP36C | I_{CES} | 0.7 0.7 0.7 0.7 | mA |
| Emitter Cutoff Current ($V_{EB} = 5.0\text{ V}$, $I_C = 0$) | | I_{EBO} | 1.0 | mA |

ON CHARACTERISTICS (1)

| | | | | |
|--|---------------|----------|------------|---|
| DC Current Gain ($I_C = 1.5\text{ A}$, $V_{CE} = 4.0\text{ V}$,) ($I_C = 15\text{ A}$, $V_{CE} = 4.0\text{ V}$,) | h_{FE} | 25 15 | 75 | |
| Collector-Emitter Saturation Voltage ($I_C = 15\text{ A}$, $I_B = 1.5\text{ A}$) ($I_C = 25\text{ A}$, $I_B = 5.0\text{ A}$) | $V_{CE(sat)}$ | | 1.8 4.0 | V |
| Base-Emitter On Voltage ($I_C = 15\text{ A}$, $V_{CE} = 4.0\text{ V}$) ($I_C = 25\text{ A}$, $V_{CE} = 4.0\text{ V}$) | $V_{BE(on)}$ | | 2.0 4.0 | V |

DYNAMIC CHARACTERISTICS

| | | | | |
|---|----------|-----|--|-----|
| Current Gain - Bandwidth Product (2) ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ V}$, $f_{TEST} = 1\text{ MHz}$) | f_T | 3.0 | | MHz |
| Small Signal Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$) | h_{fe} | 25 | | |

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

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

TIP35, TIP35A, TIP35B, TIP35C NPN / TIP36, TIP36A, TIP36B, TIP36C PNP

FIG-2 DC CURRENT GAIN

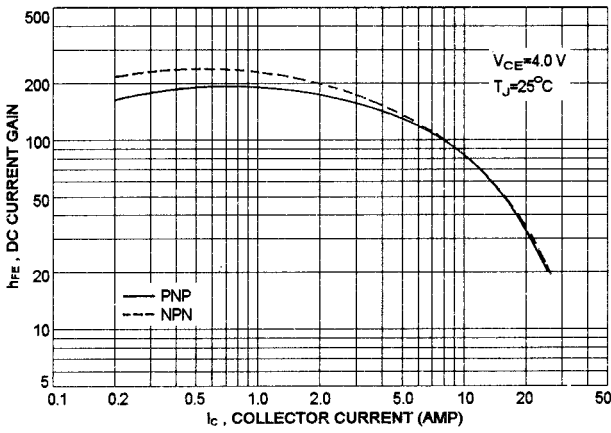


FIG-3 TURN-OFF TIME

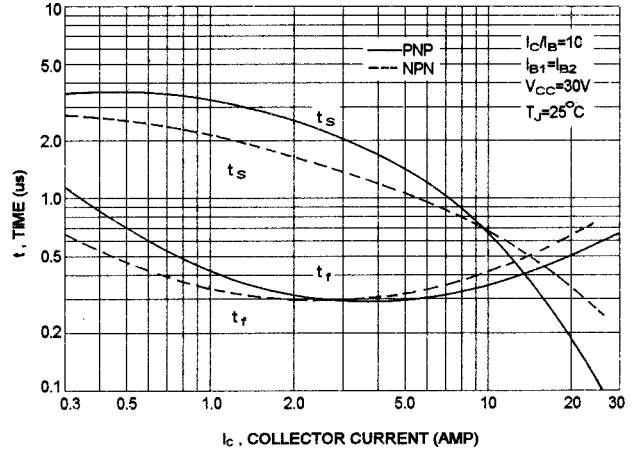


FIG-4 TURN-ON TIME

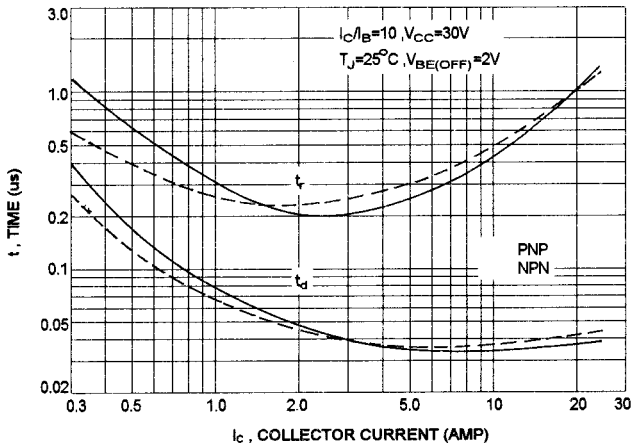


FIG-5 REVERSE BIASE SAFE OPERATING AREA

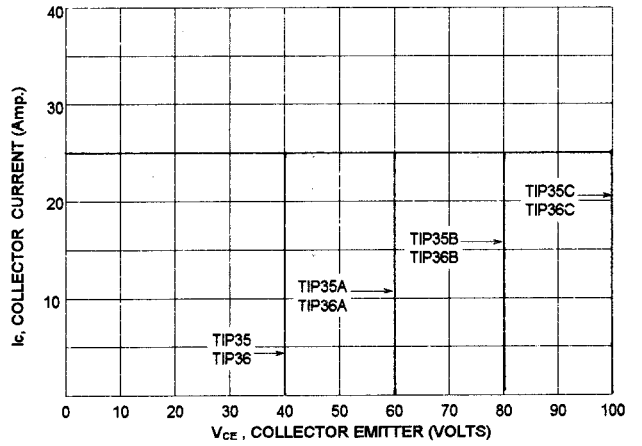
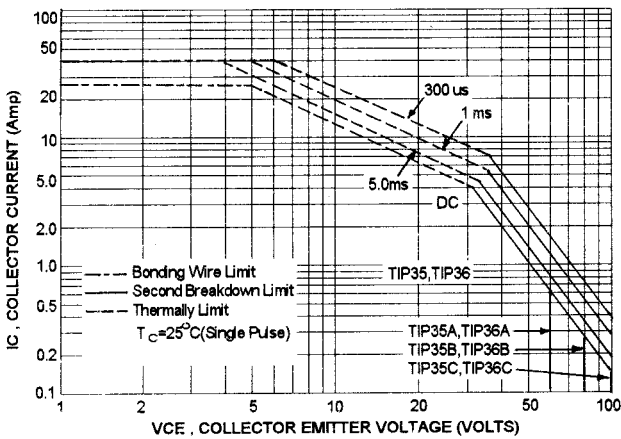


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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 $T_C = 25^\circ C$; $T_{J(PK)}$ is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% but must be derated when $T_C \geq 25^\circ C$, second breakdown limitations do not derate the same as thermal limitation.