



SANYO SEMICONDUCTOR

DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS

| | |
|------------|------------|
| NPN | PNP |
| TIP110 | TIP115 |
| TIP111 | TIP116 |
| TIP112 | TIP117 |

60-80-100 VOLTS, 2 AMPERE

HIGH CURRENT GAIN $h_{FE} = 4000$ typ. @ 3V, 1.5A
 LOW SATURATION VOLTAGE $V_{CE(SAT)} = 1.0V$ typ. @ 1.5A
 MONOLITHIC CONSTRUCTION WITH BUILT-IN
 (1) BASE-EMITTER RESISTORS AND
 (2) COLLECTOR-EMITTER DIODE

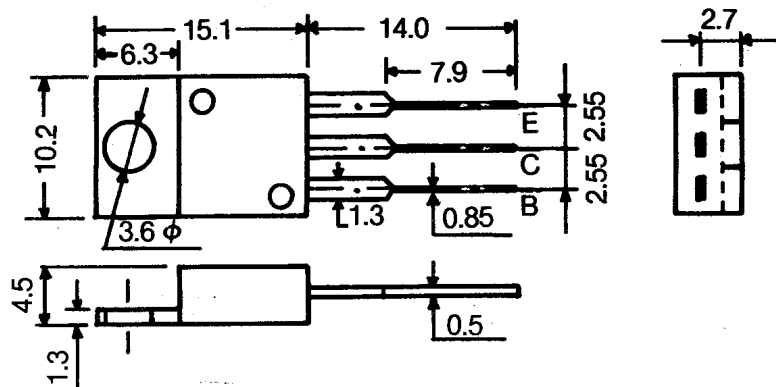
ABSOLUTE MAXIMUM RATINGS @ $T_a = 25^\circ C$

| RATING | SYMBOL | TIP110, TIP115 | TIP111, TIP116 | TIP112, TIP117 | UNIT |
|--|----------------|-------------------|-------------------|-------------------|-----------------|
| COLLECTOR-EMITTER VOLTAGE | V_{CEO} | 60 | 80 | 100 | Vdc |
| COLLECTOR-BASE VOLTAGE | V_{CB} | 60 | 80 | 100 | Vdc |
| EMITTER-BASE VOLTAGE | V_{EB} | 5.0 | | | Vdc |
| COLLECTOR CURRENT-CONTINUOUS PEAK | I_C | 2.0 5.0 | | | A _{dc} |
| TOTAL POWER DISSIPATION @ $T_C = 25^\circ C$ | P_D | 50 | | | W |
| TOTAL POWER DISSIPATION @ $T_A = 25^\circ C$ | P_D | 2.0 | | | W |
| OPERATING AND STORAGE JUNCTION TEMPERATURE RANGE | T_J, T_{stg} | - 55 to + 150 | | | $^\circ C$ |

OUTLINE DIMENSION

JEDEC: TO-220

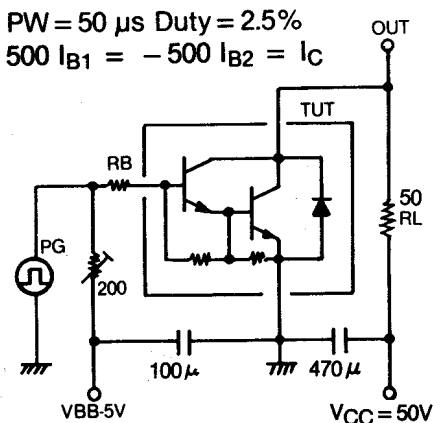
UNIT: MM



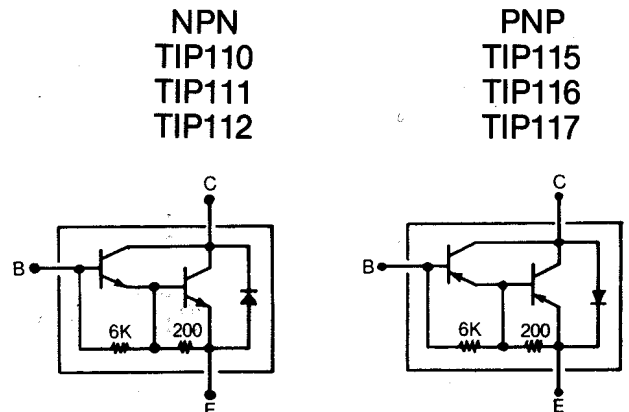
ELECTRICAL CHARACTERISTICS @ Ta = 25°C

| CHARACTERISTIC | SYMBOL | MIN | MAX | UNIT |
|---|-----------------------|--------------------|-------------------|------------------|
| COLLECTOR-EMITTER SUSTAINING VOLTAGE (1) (I _C = 30 mA, I _B = 0) TIP110, TIP115 TIP111, TIP116 TIP112, TIP117 | V _{CEO(SUS)} | 60 80 100 | — | Vdc |
| COLLECTOR CUTOFF CURRENT (V _{CE} = 30 Vdc, I _B = 0) (V _{CE} = 40 Vdc, I _B = 0) (V _{CE} = 50 Vdc, I _B = 0) TIP110, TIP115 TIP111, TIP116 TIP112, TIP117 | I _{CEO} | — — — | 0.5 0.5 0.5 | A _{dc} |
| COLLECTOR CUTOFF CURRENT (V _{CB} = 60 Vdc, I _E = 0) (V _{CB} = 80 Vdc, I _E = 0) (V _{CB} = 100 Vdc, I _E = 0) TIP110, TIP115 TIP111, TIP116 TIP112, TIP117 | I _{CBO} | — — — | 0.2 0.2 0.2 | A _{dc} |
| EMITTER CUTOFF CURRENT (V _{BE} = 5.0 Vdc, I _C = 0) | I _{EBO} | — | 2.0 | mA _{dc} |
| DC CURRENT GAIN (I _C = 1.0 A _{dc} , V _{CE} = 4.0 Vdc) (I _C = 2.0 A _{dc} , V _{CE} = 4.0 Vdc) | h _{FE} | 1000 500 | — — | — |
| COLLECTOR-EMITTER SATURATION VOLTAGE (I _C = 2.0 A _{dc} , I _B = 8.0 mA _{dc}) | V _{CE(SAT)} | — | 2.5 | Vdc |
| BASE-EMITTER ON VOLTAGE (I _C = 2.0 A _{dc} , V _{CE} = 4.0 Vdc) | V _{BE(ON)} | — | 2.8 | Vdc |
| GAIN BANDWIDTH PRODUCT (I _C = 1.5 A, V _{CE} = 5.0V) | f _T | 20 typ. | — | mHz |
| OUTPUT CAPACITANCE (V _{CB} = 10 V, I _E = 0, f = 0.1 mHz) TIP 110, 111, 112 TIP 115, 116, 117 | | 35 typ. 40 typ. | — — | pF pF |
| SWITCHING TIME (RESISTIVE LOAD) | | (NPN) | (PNP) | |
| Turn-on Time (Test Circuit) | t _{on} | 0.7 typ. | 0.8 typ. | uS |
| Storage Time | t _s | 5.0 typ. | 2.4 typ. | uS |
| Fall Time | t _f | 1.2 typ. | 1.2 typ. | uS |

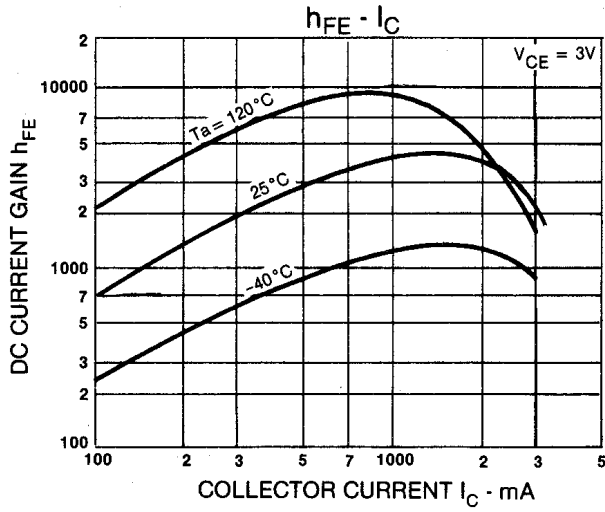
SWITCHING TIME TEST CIRCUIT



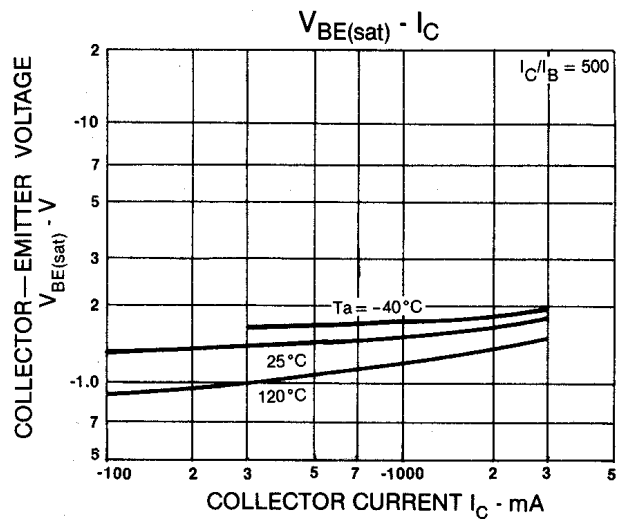
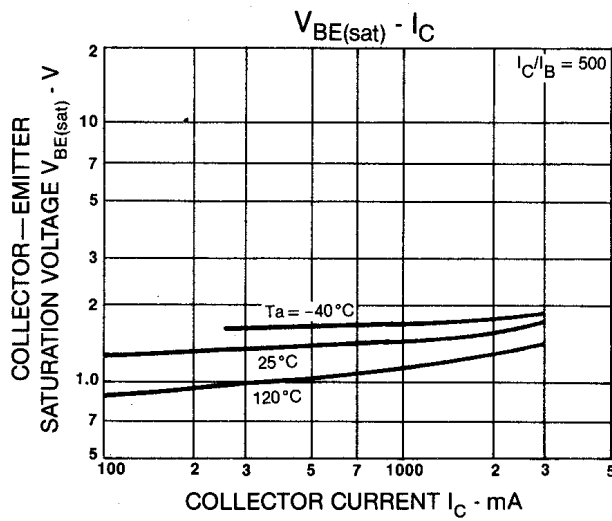
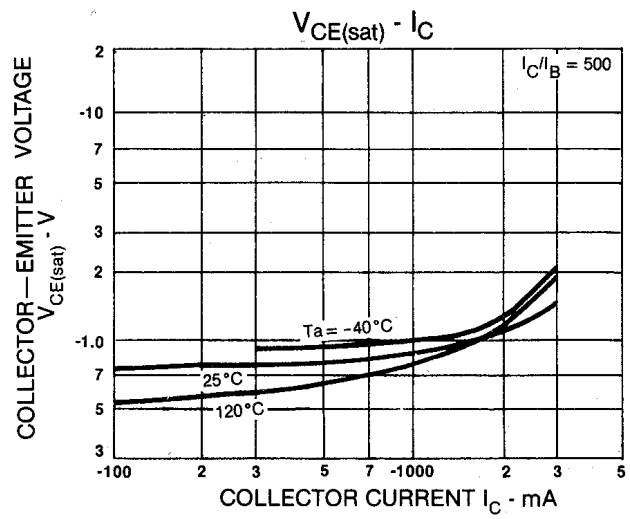
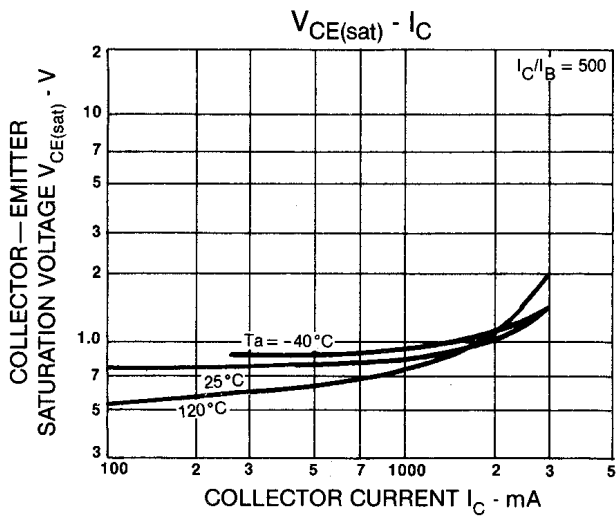
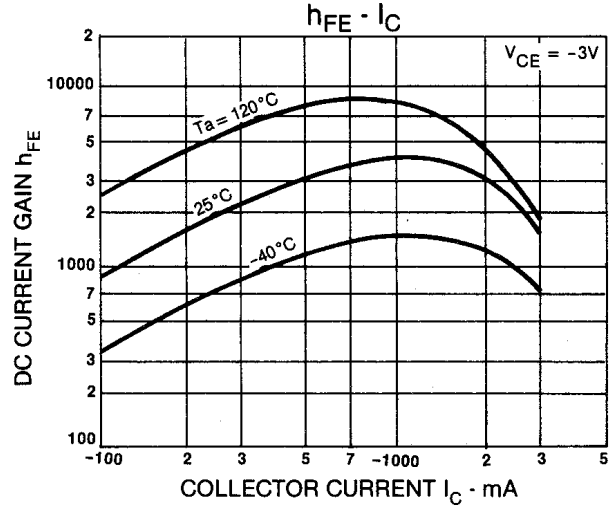
DARLINGTON SCHEMATIC



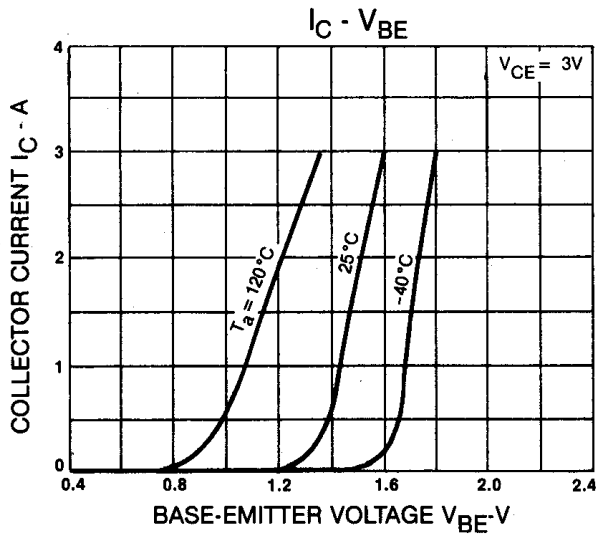
NPN TIP 110, TIP 111, TIP 112



PNP TIP 115, TIP 116, TIP 117



NPN TIP 110, TIP 111, TIP 112



PNP TIP 115, TIP 116, TIP 117

