

## PNP SILICON POWER TRANSISTOR 2SA1396

**DESCRIPTION** The 2SA1396 is PNP silicon epitaxial transistor designed for switching regulator, DC-DC converter and high frequency power amplifier application.

- FEATURES**
- Easy mount by eliminating Insulation Sheet and Bushing.
  - Low Collector Saturation Voltage.
  - High Switching Speed.
  - Complementary to 2SC3568.

**ABSOLUTE MAXIMUM RATINGS**

Maximum Temperatures

Storage Temperature . . . . . -55 to + 150 °C

Junction Temperature . . . . . 150 °C Maximum

Maximum Power Dissipation ( $T_c = 25\text{ °C}$ )

Total Power Dissipation . . . . . 30 W

Maximum Voltages and Currents ( $T_a = 25\text{ °C}$ )

$V_{CBO}$  Collector to Base Voltage . . . . . -100 V

$V_{CEO}$  Collector to Emitter Voltage . . . . . -100 V

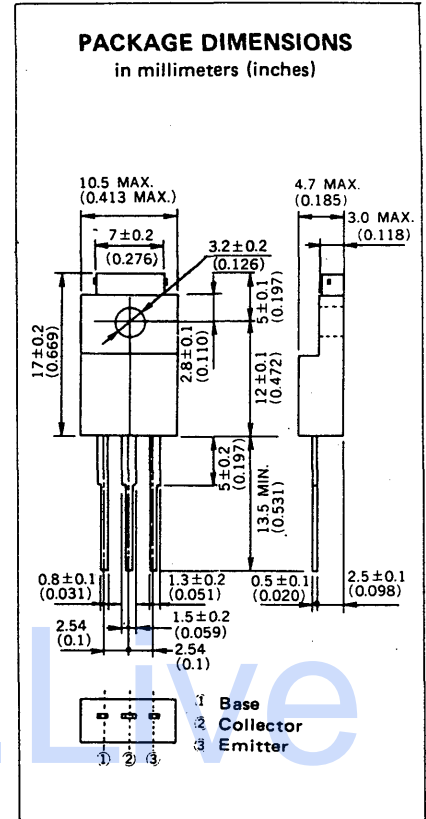
$V_{EBO}$  Emitter to Base Voltage . . . . . -7.0 V

$I_C(DC)$  Collector Current (DC) . . . . . -10 A

$I_C(pulse)$  Collector Current (pulse)\* . . . . . -20 A

$I_B(DC)$  Base Current (DC) . . . . . -5.0 A

\*  $PW \leq 300\ \mu s$ , Duty Cycle  $\leq 10\%$



**ELECTRICAL CHARACTERISTICS ( $T_a = 25\text{ °C}$ )**

| SYMBOL          | CHARACTERISTIC                          | MIN. | TYP. | MAX. | UNIT.   | TEST CONDITIONS   |
|-----------------|---|------|------|------|---------|---|
| $t_{on}$        | Turn-on Time                            |      |      | 0.5  | $\mu s$ | $I_C = -5.0\text{ A}$ , $I_{B1} = -I_{B2} = -0.5\text{ A}$<br>$R_L = 10\ \Omega$ , $V_{CC} = 50\text{ V}$       |
| $t_{stg}$       | Storage Time                            |      |      | 1.5  | $\mu s$ |   |
| $t_f$           | Fall Time                               |      |      | 0.5  | $\mu s$ |   |
| $h_{FE1}$       | DC Current Gain**                       | 40   |      | 200  | -       | $V_{CE} = -5.0\text{ V}$ , $I_C = -0.5\text{ A}$  |
| $h_{FE2}$       | DC Current Gain**                       | 40   |      | 200  | -       | $V_{CE} = -5.0\text{ V}$ , $I_C = -3.0\text{ A}$  |
| $h_{FE3}$       | DC Current Gain**                       | 20   |      |      | -       | $V_{CE} = -5.0\text{ V}$ , $I_C = -5.0\text{ A}$  |
| $V_{CE(sat)}$   | Collector Saturation Voltage**          |      |      | -0.6 | V       | $I_C = -5.0\text{ A}$ , $I_B = -0.5\text{ A}$   |
| $V_{BE(sat)}$   | Base Saturation Voltage**               |      |      | -1.5 | V       | $I_C = -5.0\text{ A}$ , $I_B = -0.5\text{ A}$   |
| $V_{CEO(SUS)}$  | Collector to Emitter Sustaining Voltage | -100 |      |      | V       | $I_C = -5.0\text{ A}$ , $I_B = -0.5\text{ A}$ , $L = 1\text{ mH}$   |
| $V_{CEX(SUS)1}$ | Collector to Emitter Sustaining Voltage | -100 |      |      | V       | $I_C = -5.0\text{ A}$ , $I_{B1} = -I_{B2} = -0.5\text{ A}$ , $T_a = 125\text{ °C}$ , $L = 180\ \mu H$ , Clamped |
| $V_{CEX(SUS)2}$ | Collector to Emitter Sustaining Voltage | -100 |      |      | V       | $I_C = -10\text{ A}$ , $I_{B1} = -1.0\text{ A}$ , $-I_{B2} = 0.5\text{ A}$ , $L = 180\ \mu H$ , Clamped         |
| $I_{CBO}$       | Collector Cutoff Current                |      |      | -10  | $\mu A$ | $V_{CB} = -100\text{ V}$ , $I_E = 0$  |
| $I_{CER}$       | Collector Cutoff Current                |      |      | -1.0 | $m A$   | $V_{CE} = -100\text{ V}$ , $R_{BE} = 51\ \Omega$ , $T_a = 125\text{ °C}$  |
| $I_{CEX1}$      | Collector Cutoff Current                |      |      | -10  | $\mu A$ | $V_{CE} = -100\text{ V}$ , $V_{BE(OFF)} = 1.5\text{ V}$   |
| $I_{CEX2}$      | Collector Cutoff Current                |      |      | -1.0 | $m A$   | $V_{CE} = -100\text{ V}$ , $V_{BE(OFF)} = 1.5\text{ V}$ , $T_a = 125\text{ °C}$                                 |
| $I_{EBO}$       | Emitter Cutoff Current                  |      |      | -10  | $\mu A$ | $V_{EB} = -5.0\text{ V}$ , $I_C = 0$  |

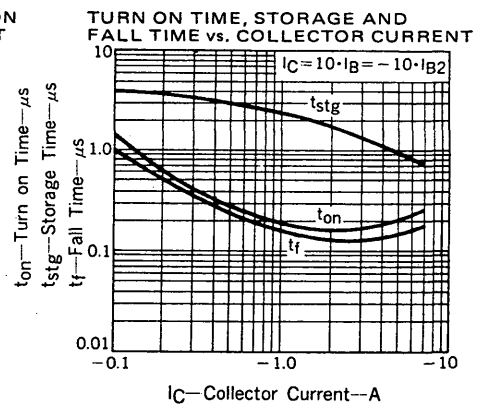
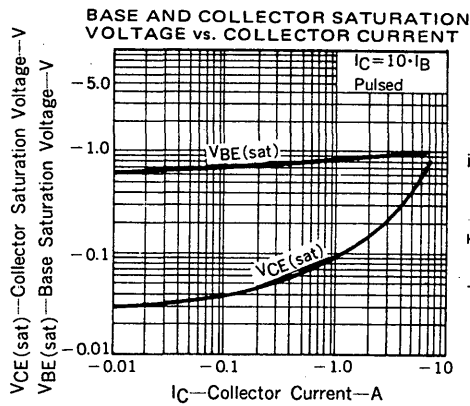
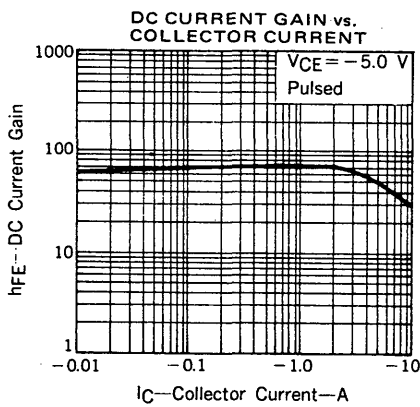
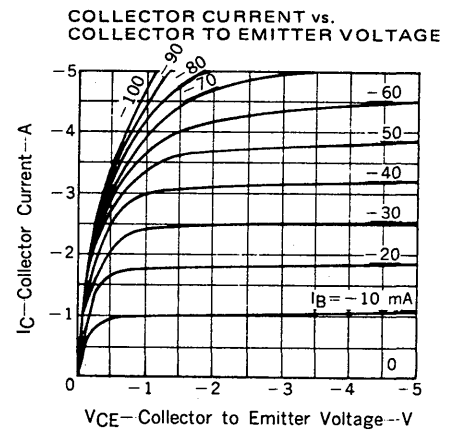
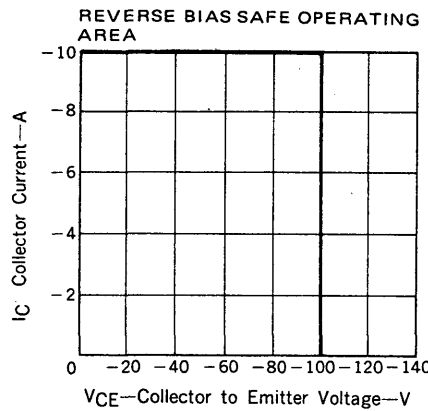
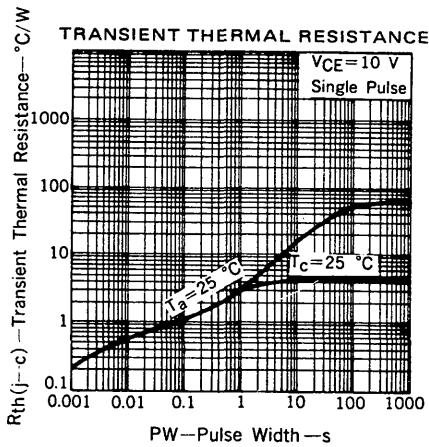
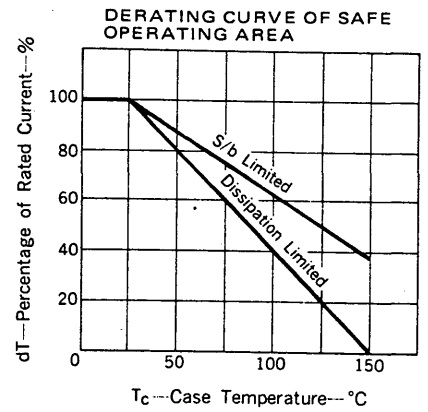
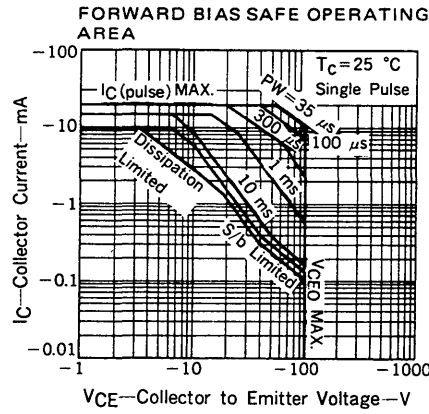
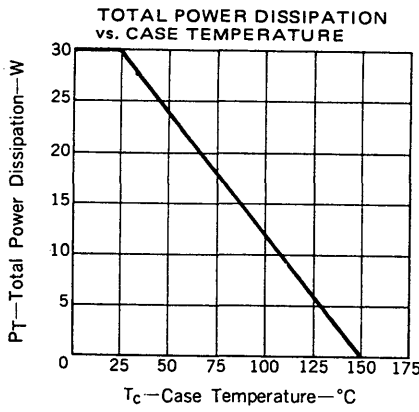
\*\* $PW \leq 350\ \mu s$ , Duty Cycle  $\leq 2\%$

**Classification of  $h_{FE2}$**

| Rank  | M        | L         | K          |
|-------|----------|-----------|------------|
| Range | 40 to 80 | 60 to 120 | 100 to 200 |

Test Conditions:  $V_{CE} = -5.0\text{ V}$ ,  $I_C = -3.0\text{ A}$

TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



SWITCHING TIME ( $t_{on}$ ,  $t_{stg}$ ,  $t_f$ ) TEST CIRCUIT

