

SILICON EPITAXIAL POWER TRANSISTORS

NPN silicon epitaxial power transistors, each in a SOT186 envelope with an electrically insulated mounting base.

PNP complements are BD944F, BD946F and BD948F.

QUICK REFERENCE DATA

| | | | | BD943F | 945F | 947F | |
|---------------------------------------------------------|------------------|------|--|--------|------|------|---|
| Collector-base voltage (open emitter) | V _{CB0} | max. | | 22 | 32 | 45 | V |
| Collector-emitter voltage (open base) | V _{CE0} | max. | | 22 | 32 | 45 | V |
| Emitter-base voltage (open collector) | V _{EB0} | max. | | | 5 | | V |
| DC collector current | I _C | max. | | | 5 | | A |
| Total power dissipation up to T _h = 25 °C | P _{tot} | max. | | | 22 | | W |

MECHANICAL DATA

Pinning

- 1 = base
- 2 = collector
- 3 = emitter

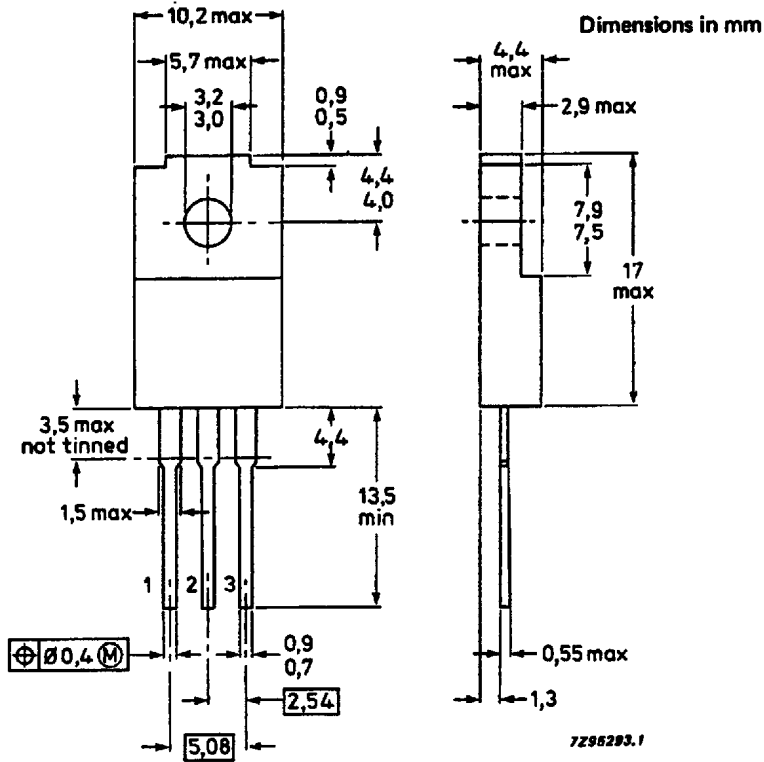
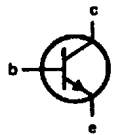


Fig.1 SOT186.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| | | BD943F | 945F | 947F | |
|------------------------------------------------------------------|-----------------------|--------------|------|------|----|
| Collector-base voltage (open emitter) | V _{CBO} max. | 22 | 32 | 45 | V |
| Collector-emitter voltage (open base) | V _{CEO} max. | 22 | 32 | 45 | V |
| Emitter-base voltage (open collector) | V _{EBO} max. | | 5 | | V |
| DC collector current | I _C max. | | 5 | | A |
| Peak collector current | I _{CM} max. | | 8 | | A |
| Base current | I _B max. | | 1 | | A |
| Total power dissipation up to T _h = 25 °C (note 1) | P _{tot} max. | | 15 | | W |
| up to T _h = 25 °C (note 2) | P _{tot} max. | | 22 | | W |
| Storage temperature range | T _{stg} | -65 to + 150 | | | °C |
| Junction temperature | T _j max. | | 150 | | °C |

THERMAL RESISTANCE

| | | | | | |
|---------------------------------------------|------------------------|--|------|--|-----|
| From junction to internal heatsink | R _{th j-mb} = | | 2.93 | | K/W |
| From junction to external heatsink (note 1) | R _{th j-h} = | | 7.93 | | K/W |
| From junction to external heatsink (note 2) | R _{th j-h} = | | 5.43 | | K/W |

INSULATION

| | | | | | |
|-------------------------------------------------------------------------|-------------------------|--|------|--|---|
| Voltage allowed between all terminals and external heatsink, peak value | V _{insul} max. | | 1000 | | V |
|-------------------------------------------------------------------------|-------------------------|--|------|--|---|

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

| | | | | | |
|----------------------------------------------------------------------------------------|-----------------------|--------|-----|--|----|
| Collector cut-off current I _E = 0; V _{CB} = V _{CBOmax} | I _{CBO} max. | | 50 | | μA |
| I _E = 0; V _{CB} = V _{CBOmax} ; T _j = 150 °C | I _{CBO} max. | | 1 | | mA |
| I _B = 0; V _{CE} = 15 V | I _{CEO} max. | BD943F | 0.1 | | mA |
| I _B = 0; V _{CE} = 20 V | I _{CEO} max. | BD945F | 0.1 | | mA |
| I _B = 0; V _{CE} = 25 V | I _{CEO} max. | BD947F | 0.1 | | mA |
| Emitter cut-off current I _C = 0; V _{EB} = 5 V | I _{EBO} max. | | 0.2 | | mA |

Notes

1. Mounted without heatsink compound and 30 ± 5 newton pressure on centre of envelope.
2. Mounted with heatsink compound and 30 ± 5 newton pressure on centre of envelope.

| | | | BD943F | 945F | 947F | |
|---------------------------------------------------------------------------------------------------------------------------------------|-------------|------|--------|------|------|-----|
| DC current gain (note 1) $I_C = 10 \text{ mA}; V_{CE} = 5 \text{ V}$ $I_C = 500 \text{ mA}; V_{CE} = 1 \text{ V}$ | h_{FE} | min. | 25 | 25 | 25 | |
| | h_{FE} | min. | 85 | 85 | 85 | |
| | h_{FE} | max. | 475 | 475 | 475 | |
| | h_{FE} | min. | 50 | 50 | 40 | |
| Base-emitter voltage (notes 1 and 2) $I_C = 2 \text{ A}; V_{CE} = 1 \text{ V}$ $I_C = 3 \text{ A}; V_{CE} = 1 \text{ V}$ | V_{BE} | max. | 1.1 | 1.1 | — | V |
| | V_{BE} | max. | — | — | 1.3 | V |
| Collector-emitter saturation voltage (note 1) $I_C = 2 \text{ A}; I_B = 0.2 \text{ A}$ $I_C = 3 \text{ A}; I_B = 0.3 \text{ A}$ | V_{CEsat} | max. | 0.5 | 0.5 | — | V |
| | V_{CEsat} | max. | — | — | 0.7 | V |
| Knee voltage (note 1) $I_C = 2 \text{ A}; I_B = 20 \text{ mA}$ | V_{CEK} | max. | | 0.8 | | V |
| | | | | | | |
| Transition frequency at $f = 1 \text{ MHz}$ $I_C = 250 \text{ mA}; V_{CE} = 1 \text{ V}$ | f_T | min. | | 3 | | MHz |
| | | | | | | |

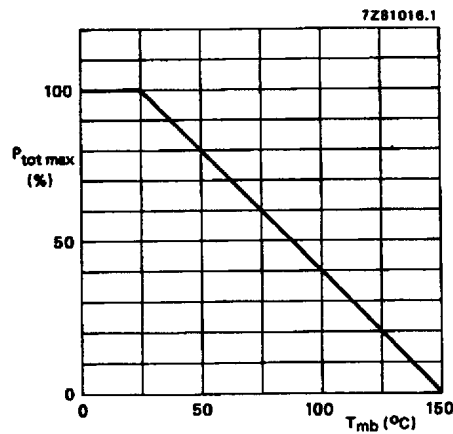
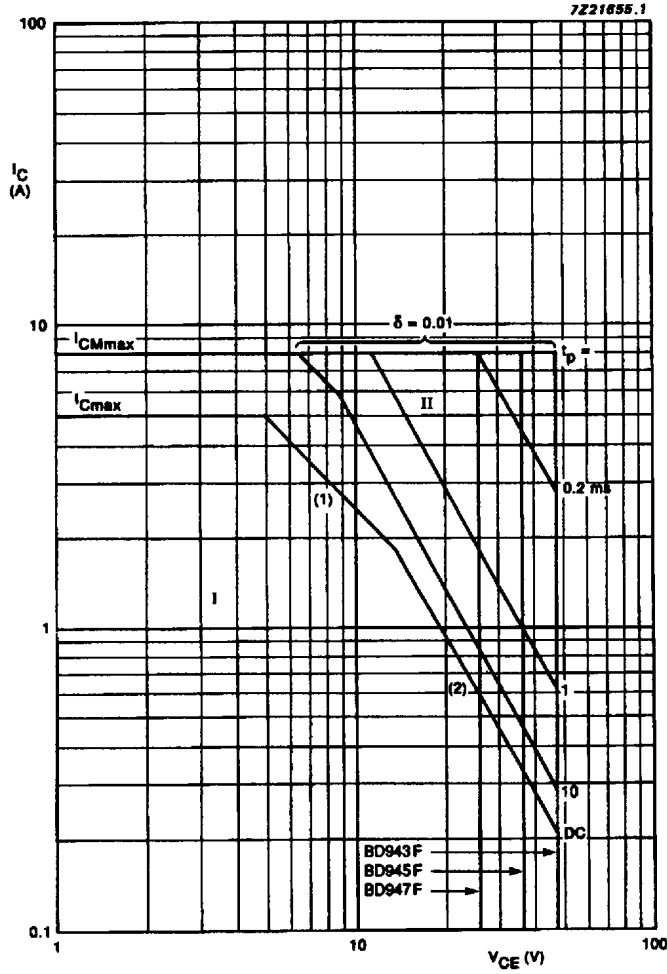


Fig. 2 Power derating curve.

Notes

1. Measured under pulse conditions; $t_p < 300 \mu\text{s}$; $\delta < 2\%$.
2. V_{BE} decreases by about 2.3 mV/K with increasing temperature.



- I Region of permissible DC operation.
- II Permissible extension for repetitive pulse operation.
- (1) $P_{tot\ max}$ and $P_{peak\ max}$ lines.
- (2) Second-breakdown limits.

Fig. 3 Safe Operating Area, $T_{mb} = 25\ ^\circ\text{C}$.

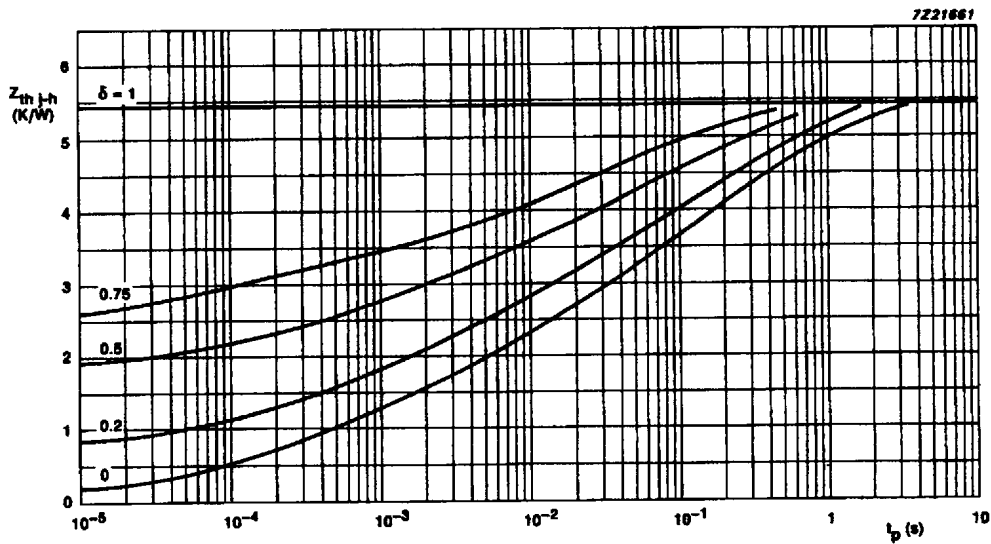


Fig. 4 Pulse power rating chart.

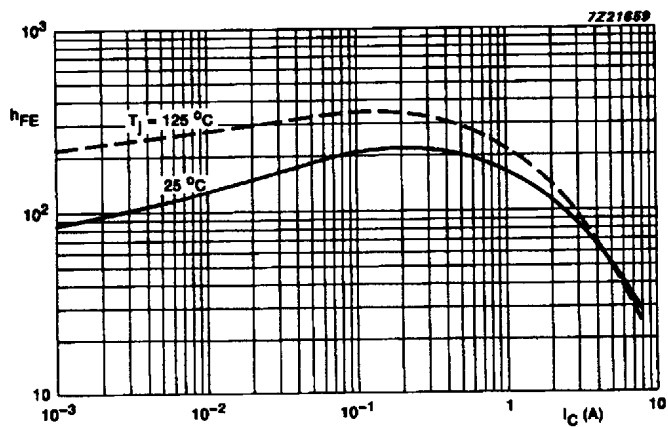


Fig. 5 DC current gain; $V_{CE} = 1$ V; typical values.

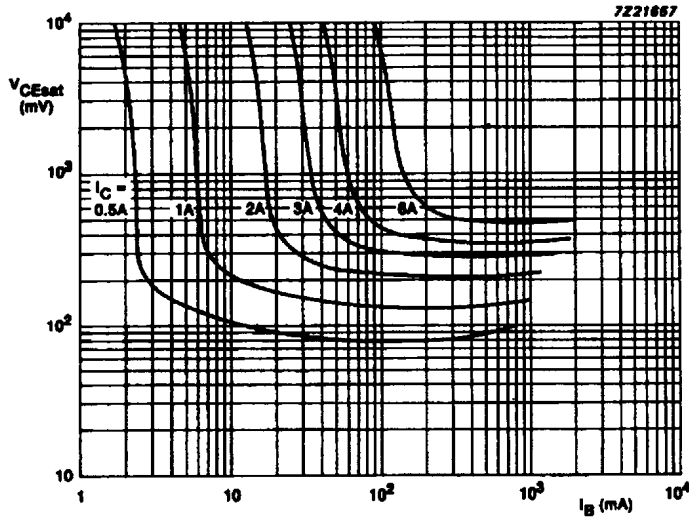


Fig.6 Collector-emitter saturation voltage as a function of base current $T_h = 25^\circ\text{C}$.