

NPN SILICON PLANAR MEDIUM POWER TRANSISTOR

ZTX649

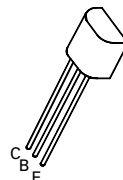
ISSUE 2 – APRIL 94

FEATURES

- * 25 Volt V_{CEO}
- * 2 Amp continuous current
- * Low saturation voltage
- * $P_{tot}=1$ Watt

APPLICATIONS

- * Motor driver
- * DC-DC converters



E-Line
T092 Compatible

ABSOLUTE MAXIMUM RATINGS.

| PARAMETER | SYMBOL | VALUE | UNIT |
|--|----------------|-------------|------------|
| Collector-Base Voltage | V_{CBO} | 35 | V |
| Collector-Emitter Voltage | V_{CEO} | 25 | V |
| Emitter-Base Voltage | V_{EBO} | 5 | V |
| Peak Pulse Current | I_{CM} | 6 | A |
| Continuous Collector Current | I_C | 2 | A |
| Power Dissipation at $T_{amb}=25^{\circ}C$ derate above $25^{\circ}C$ | P_{tot} | 1 5.7 | W mW/°C |
| Operating and Storage Temperature Range | $T_j; T_{stg}$ | -55 to +200 | °C |

ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}C$ unless otherwise stated).

| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS. |
|---------------------------------------|---------------|-----------------------|-------------------------|------------|---------|--|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 35 | | | V | $I_C=100\mu A$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 25 | | | V | $I_C=10mA^*$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 5 | | | V | $I_E=100\mu A$ |
| Collector Cut-Off Current | I_{CBO} | | | 0.1 10 | μA | $V_{CB}=30V$ $V_{CB}=30V, T_{amb}=100^{\circ}C$ |
| Emitter Cut-Off Current | I_{EBO} | | | 0.1 | μA | $V_{EB}=4V$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | | 0.12 0.23 | 0.3 0.5 | V | $I_C=1A, I_B=100mA^*$ $I_C=2A, I_B=200mA^*$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | | 0.9 | 1.25 | V | $I_C=1A, I_B=100mA^*$ |
| Base-Emitter Turn-On Voltage | $V_{BE(on)}$ | | 0.8 | 1 | V | $I_C=1A, V_{CE}=2V^*$ |
| Static Forward Current Transfer Ratio | h_{FE} | 70 100 75 15 | 200 200 150 50 | 300 | | $I_C=50mA, V_{CE}=2V^*$ $I_C=1A, V_{CE}=2V^*$ $I_C=2A, V_{CE}=2V^*$ $I_C=6A, V_{CE}=2V^*$ |
| Transition Frequency | f_T | 150 | 240 | | MHz | $I_C=100mA, V_{CE}=5V$ $f=100MHz$ |

ZTX649

ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

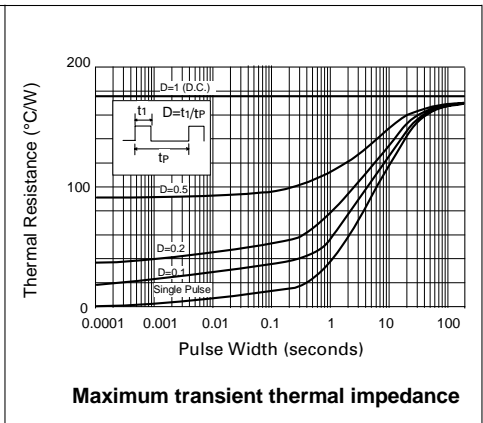
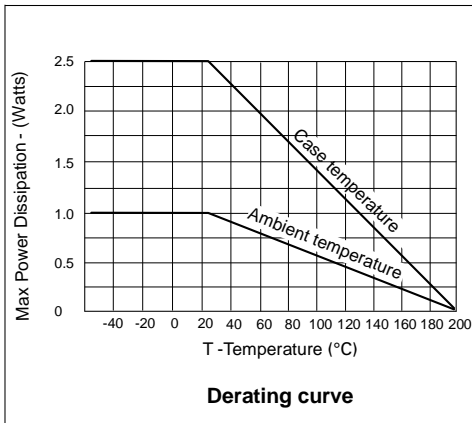
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS. |
|--------------------|-----------|------|------|------|------|---|
| Output Capacitance | C_{obo} | | 25 | 50 | pF | $V_{CB}=10\text{V}$ $f=1\text{MHz}$ |
| Switching Times | t_{on} | | 55 | | ns | $I_C=500\text{mA}$, $V_{CC}=10\text{V}$ $I_{B1}=I_{B2}=50\text{mA}$ |
| | t_{off} | | 300 | | ns | |

*Measured under pulsed conditions. Pulse Width=300 μs . Duty cycle $\leq 2\%$

THERMAL CHARACTERISTICS

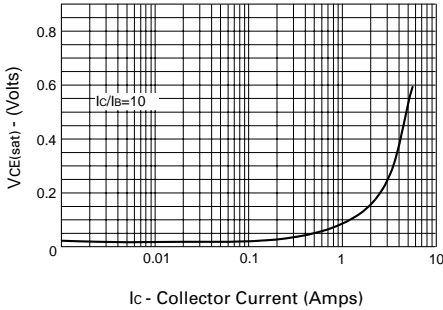
| PARAMETER | SYMBOL | MAX. | UNIT |
|--|--------------------|------|----------------------|
| Thermal Resistance: Junction to Ambient ₁ | $R_{th(j-amb)1}$ | 175 | $^{\circ}\text{C/W}$ |
| Junction to Ambient ₂ | $R_{th(j-amb)2}$ † | 116 | $^{\circ}\text{C/W}$ |
| Junction to Case | $R_{th(j-case)}$ | 70 | $^{\circ}\text{C/W}$ |

† Device mounted on P.C.B. with copper equal to 1 sq. Inch minimum.

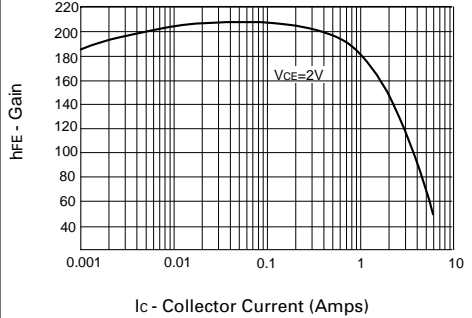


ZTX649

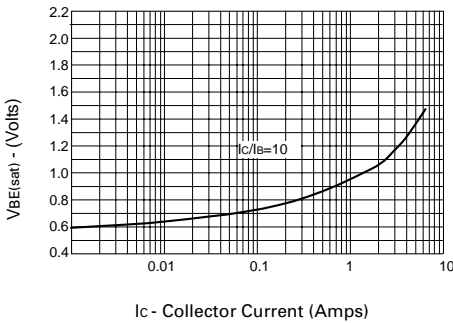
TYPICAL CHARACTERISTICS



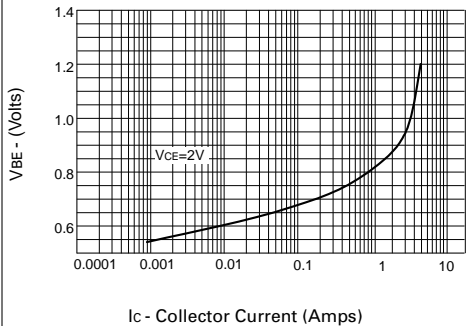
$V_{CE(sat)}$ v I_C



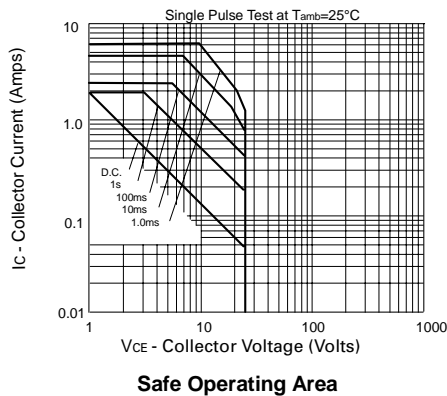
h_{FE} v I_C



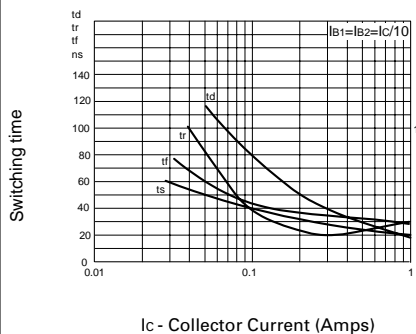
$V_{BE(sat)}$ v I_C



$V_{BE(on)}$ v I_C



Safe Operating Area



Switching Speeds