

NPN Silicon Planar Medium Power Transistor

DESCRIPTION

The ZTX449 is a high current transistor encapsulated in the popular E-line package. The device is intended for low voltage, high current L.F. applications and features high power dissipation, 1W at 25°C ambient temperature, and excellent gain characteristics up to 2 amps.

The E-line package is formed by transfer moulding a SILICONE plastic specially selected to provide a rugged one-piece encapsulation resistant to severe environments and allow the high junction temperature operation normally associated with metal can devices.

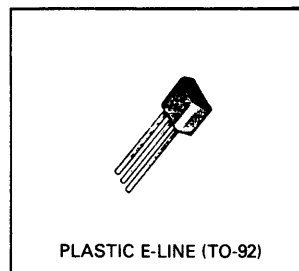
E-line encapsulated devices are approved for use in military, industrial and professional equipments.

Alternative lead configurations are available as plug-in replacements of TO-5/39 and TO-18 metal can types, and for flat mounting.

Complementary to the ZTX549

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Max.	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	30	V
Emitter-Base Voltage	V_{EBO}	5	V
Peak Pulse Current (see note below)	I_{CM}	2	amps
Continuous Collector Current	I_C	1	amp
Base Current	I_B	200	mA
Power Dissipation at $T_{amb} = 25^\circ\text{C}$ at $T_{case} = 25^\circ\text{C}$	P_{tot}	1 2	W W
Operating and Storage Temperature Range		- 55 to + 200	°C



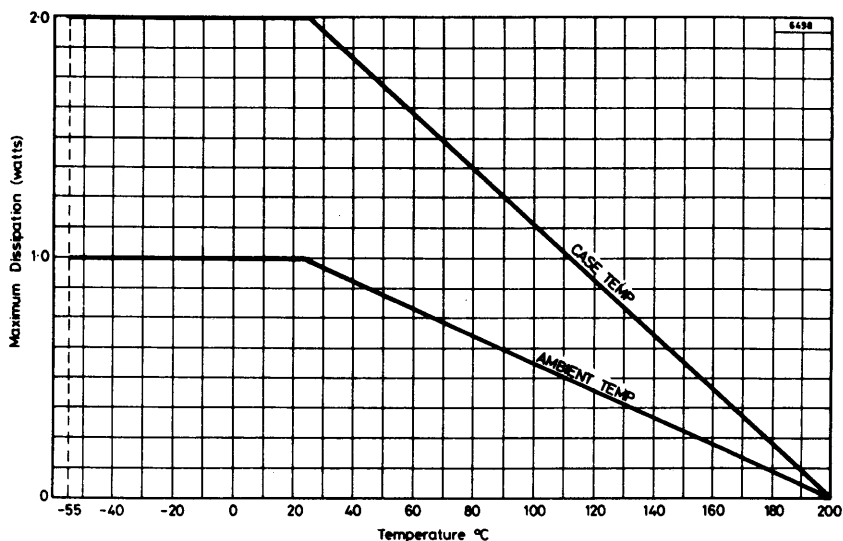
Note: Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

ZTX449

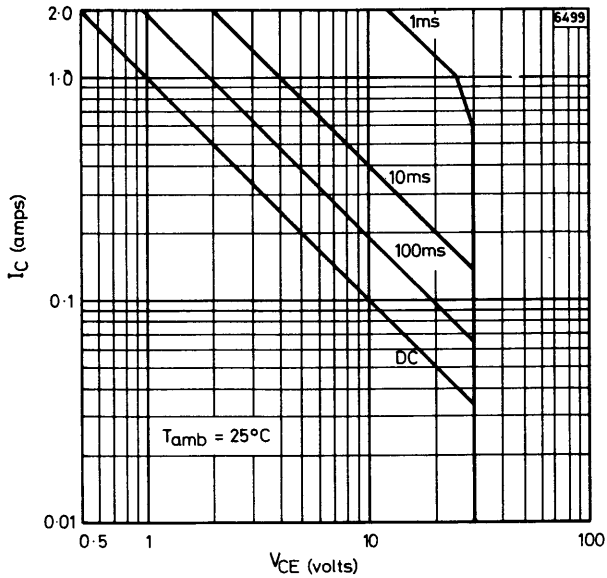
CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

Parameter	Symbol	Min.	Max.	Unit	Test Conditions
Collector-base cut-off current	I_{CBO}	—	0.1 10	μA μA	$V_{CB} = 40V$ $V_{CB} = 40V, T_{amb} = 100^{\circ}C$
Emitter-base cut-off current	I_{EBO}	—	0.1	μA	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	0.5 1.0	V V	$I_C = 1A, I_B = 0.1A^*$ $I_C = 2A, I_B = 0.2A^*$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	1.25	V	$I_C = 1A, I_B = 0.1A^*$
Base-emitter turn-on time	$V_{BE(on)}$	—	1.0	V	$I_C = 1A, V_{CE} = 2V^*$
Static forward current transfer ratio	h_{FE}	70 100 80 40	— 300 — —		$I_C = 50mA, V_{CE} = 2V^*$ $I_C = 500mA, V_{CE} = 2V^*$ $I_C = 1A, V_{CE} = 2V^*$ $I_C = 2A, V_{CE} = 2V^*$
Transition frequency	f_T	150	—	MHz	$I_C = 50mA, V_{CE} = 10V$ $f = 100MHz$
Output capacitance	C_{obo}	—	15	pF	$V_{CB} = 10V, f = 1MHz$

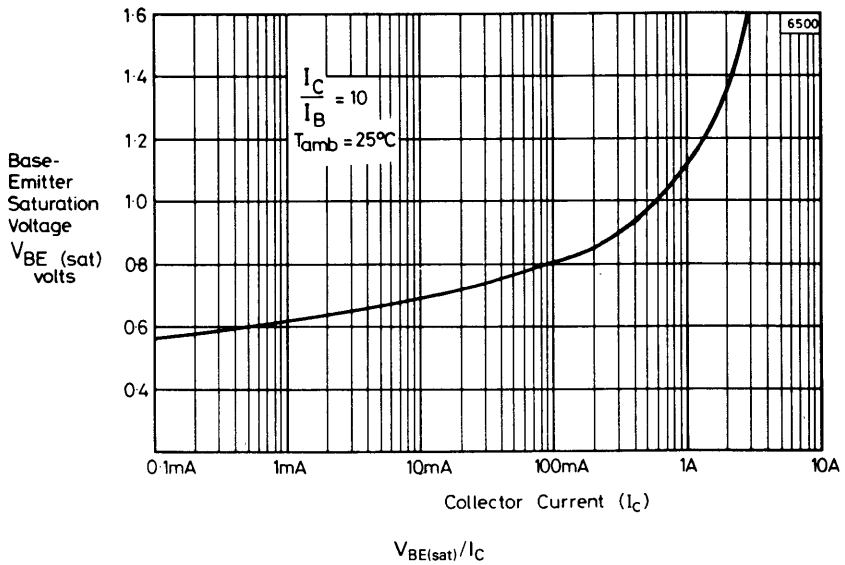
*Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.



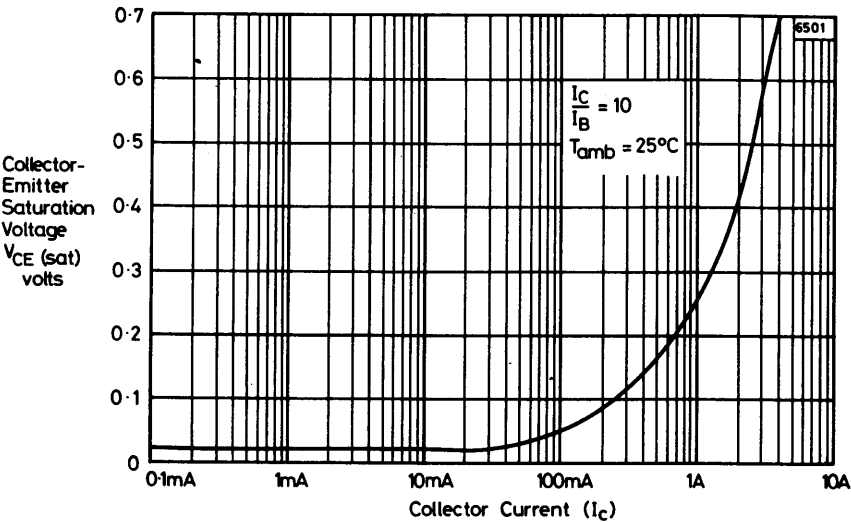
DERATING CURVE



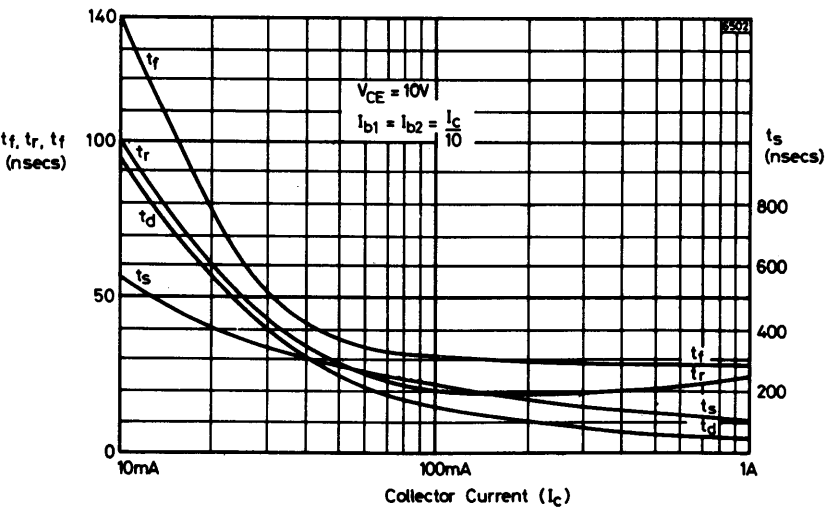
OPERATING AREA AT $T_{amb} = 25^\circ\text{C}$



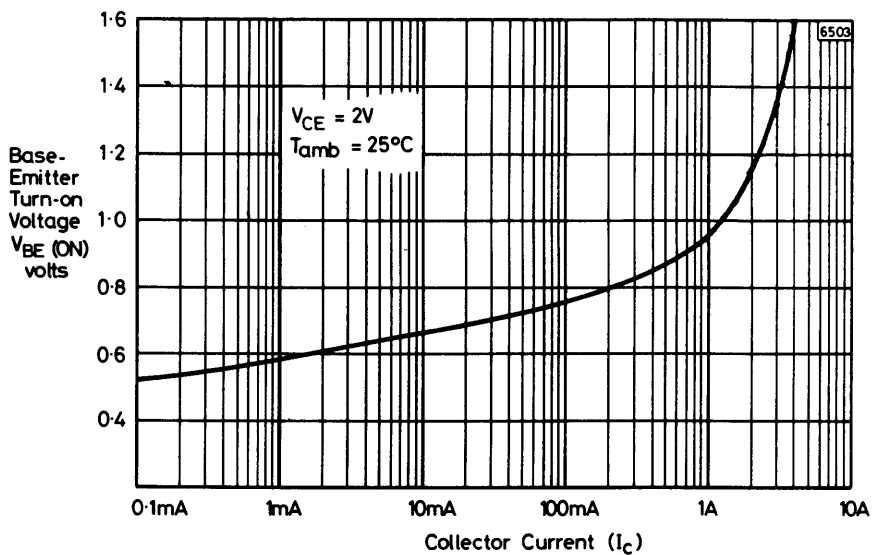
ZTX449



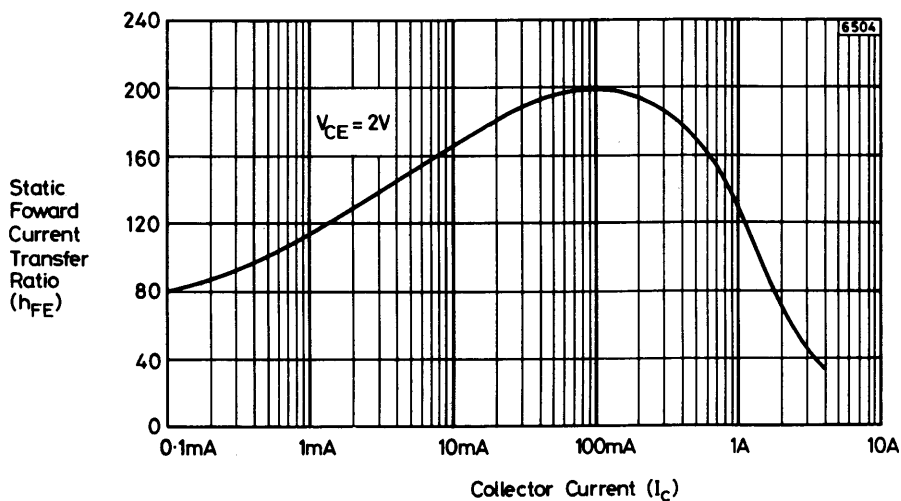
$V_{CE(sat)}/I_C$



SWITCHING TIMES

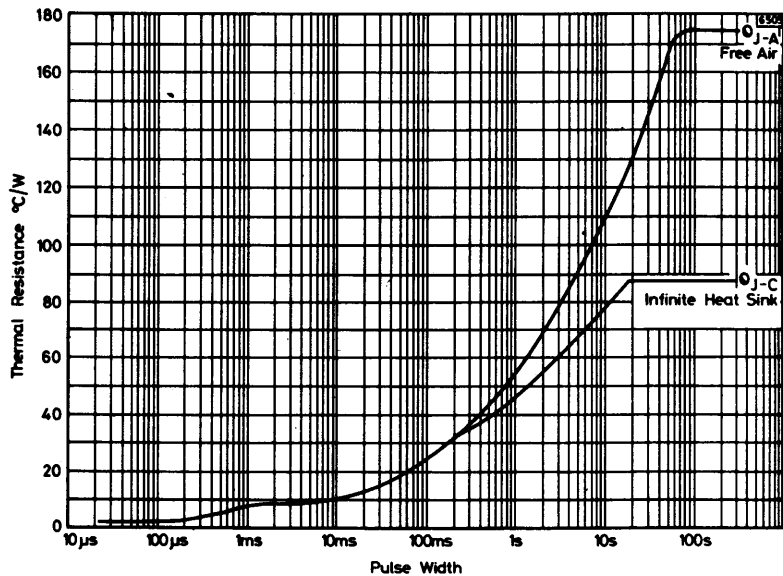


$V_{BE(on)}/I_C$



h_{FE}/I_C

ZTX449



TRANSIENT THERMAL RESISTANCE

NPN Silicon Planar Medium Power Transistors

FEATURES

- High power dissipation: 1W at $T_{amb} = 25^{\circ}\text{C}$.
- h_{FE} specified up to 1 amp.
- High F_T : 200MHz typical

DESCRIPTION

These are plastic encapsulated, general purpose transistors designed for small and medium signal amplification from d.c. to radio frequencies.

Application areas include: Audio Frequency Amplifiers, Driver and Output Stages, Oscillators and General Purpose Switching.

The E-line package is formed by transfer moulding a SILICONE plastic specially selected to provide a rugged one-piece encapsulation resistant to severe environments and allow the high junction temperature operation normally associated with metal can devices.

E-line encapsulated devices are approved for use in military, industrial and professional equipments.

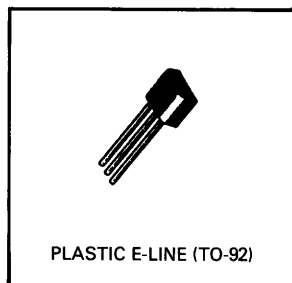
Alternative lead configurations are available as plug-in replacements of TO-5/39 and TO-18 metal can types, and for flat mounting.

Complementary to the ZTX550 and ZTX 551 PNP transistors.

The ZTX450 and ZTX451 transistors **APPROVED FOR USE IN MILITARY EQUIPMENT** are identified by the following numbers:

BS9365 F137 & F138 – Category P.

BS9365 F139 & F140 – Category Q.



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX450	ZTX451	Unit
Collector-Base Voltage	V_{CBO}	60	80	Volts
Collector-Emitter Voltage	V_{CEO}	45	60	Volts
Emitter-Base Voltage	V_{EBO}	5	5	Volts
Peak Pulse Current (see note below)	I_{CM}	2	2	A
Continuous Collector Current	I_C	1	1	A
Base Current	I_B	200	200	mA
Power Dissipation at $T_{amb} = 25^{\circ}\text{C}$ at $T_{case} = 25^{\circ}\text{C}$	P_{tot}	1 2	1 2	W W
Operating and Storage Temp. Range		- 55 to + 200		$^{\circ}\text{C}$

Note: Pulse width = 300 μs . Duty cycle $\leq 2\%$.

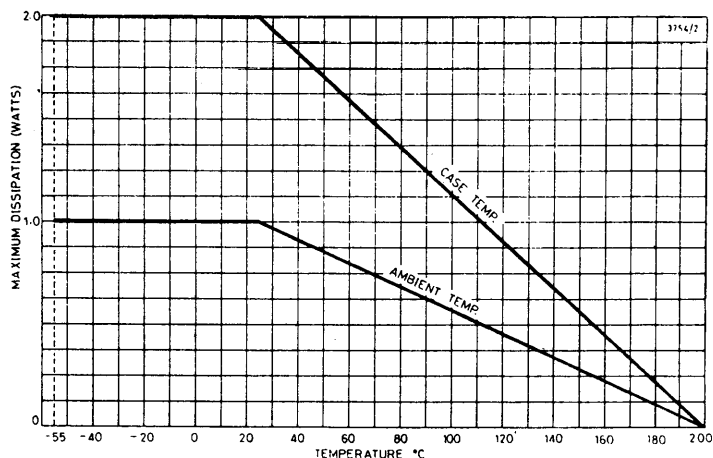
ZTX450/451

CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

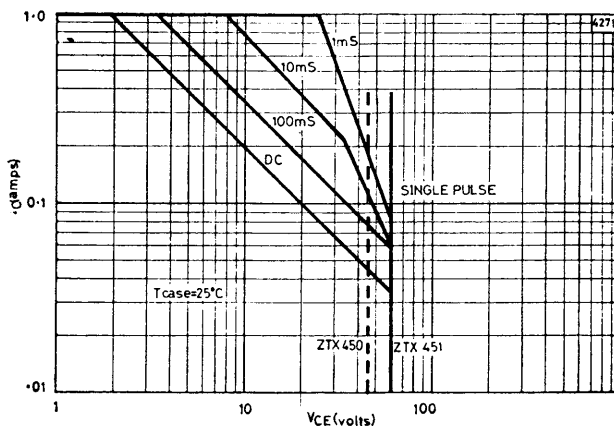
Parameter	Symbol	ZTX450		ZTX451		Unit	Conditions
		Min.	Max.	Min.	Max.		
Collector-base cut-off current	I_{CBO}	—	0.1	—	0.1	μA	$V_{CB} = 45V$ $V_{CB} = 60V$
Emitter-base cut-off current	I_{EBO}	—	0.1	—	0.1	μA	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	0.25	—	0.35	V	$I_C = 150 mA$ $I_B = 15 mA^*$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	1.1	—	1.1	V	$I_C = 150 mA$ $I_B = 15 mA^*$
Collector-emitter sustaining voltage	$V_{CEO(sus)}$	45	—	60	—	V	$I_C = 10 mA^*$
Static forward current transfer ratio	h_{FE}	100 15	300 —	50 10	150 —		$I_C = 150 mA$ $V_{CE} = 10V^*$ $I_C = 1 A$ $V_{CE} = 10V^*$
Transition frequency	f_T	150	—	150	—	MHz	$I_C = 50 mA$ $V_{CE} = 10V$ $f = 100 MHz$
Output capacitance	C_{obo}	—	15	—	15	pF	$V_{CB} = 10V$ $f = 1 MHz$

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

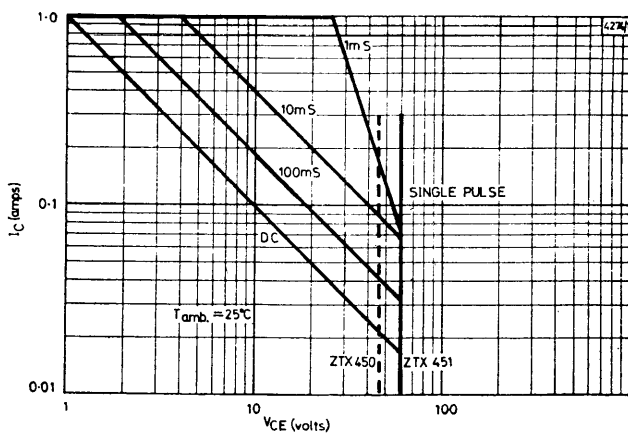
DERATING CURVE



TYPICAL CHARACTERISTICS

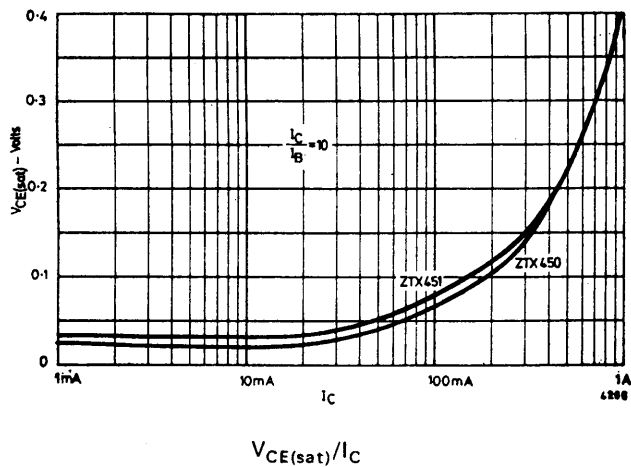
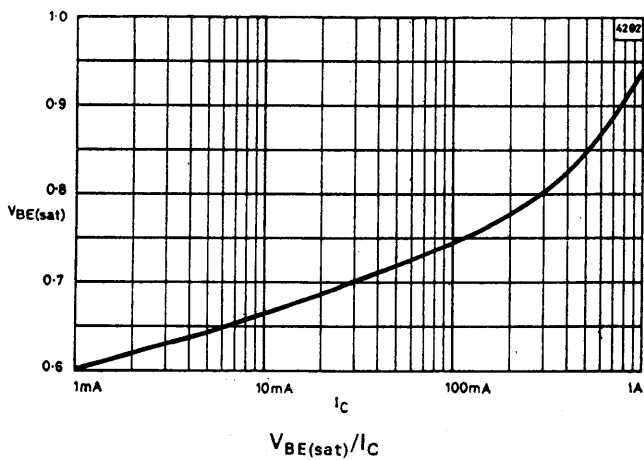


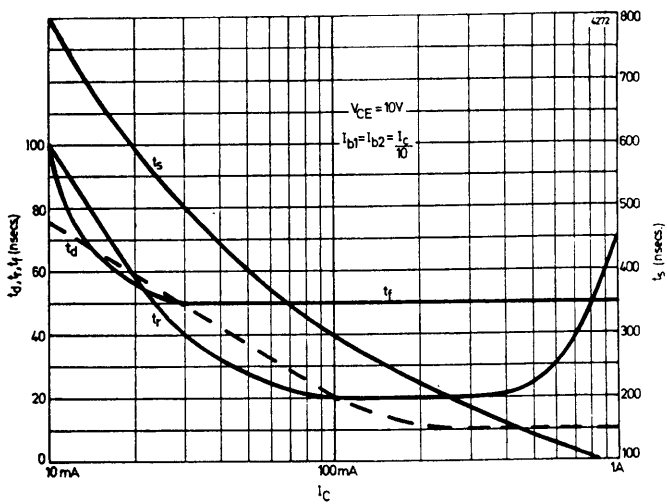
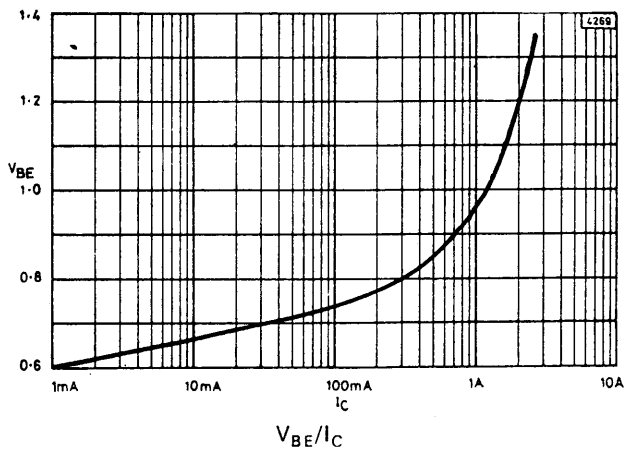
Operating Area at $T_{case} = 25^\circ C$



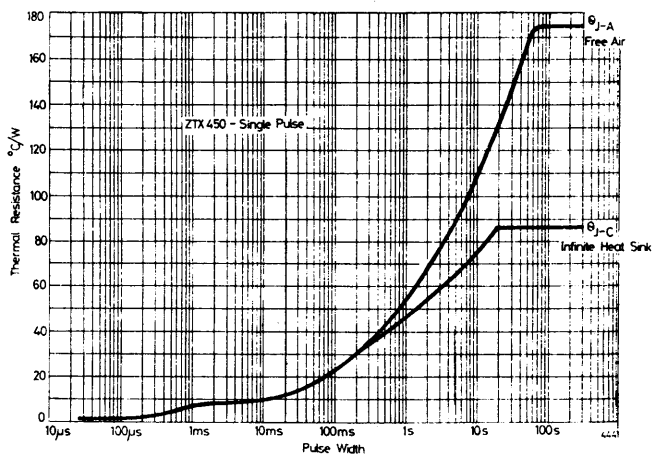
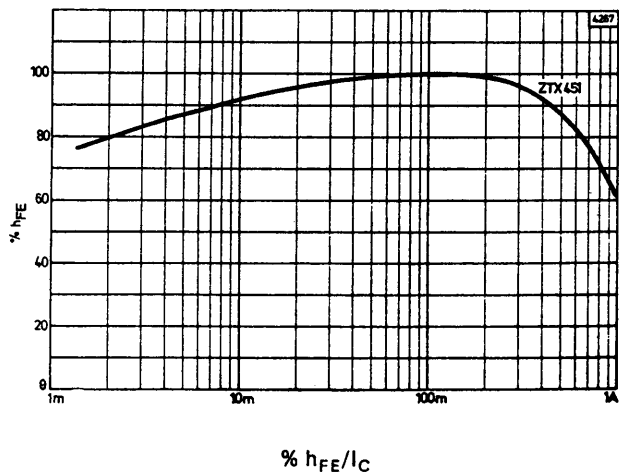
Operating Area at $T_{amb} = 25^\circ C$

ZTX450/451





ZTX450/451



TRANSIENT THERMAL RESISTANCE

NPN Silicon Planar Medium Power Transistors

FEATURES

- High power dissipation: 1W at $T_{amb} = 25^{\circ}\text{C}$.
- h_{FE} specified up to 1 amp.
- High V_{CEO} up to 100 volts.
- ZTX452 complementary to ZTX552.

DESCRIPTION

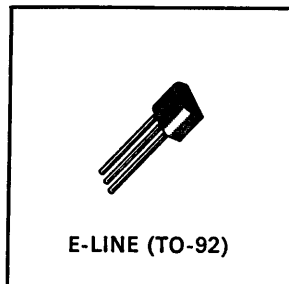
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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX452	ZTX453	Units
Collector-Base Voltage	V_{CBO}	100	120	Volts
Collector-Emitter Voltage	V_{CEO}	80	100	Volts
Emitter-Base Voltage	V_{EB}	5	5	Volts
Peak Pulse Current (See note overleaf)	I_{CM}	2	2	Amps
Continuous D.C. Current	I_C	1	1	Amp
Base Current	I_B	200	200	mA
Power Dissipation at $T_{amb} = 25^{\circ}\text{C}$ at $T_{case} = 25^{\circ}\text{C}$	P_{tot}	1 2	1 2	Watt Watts
Operating and Storage Temp. Range		-55 to +200		$^{\circ}\text{C}$

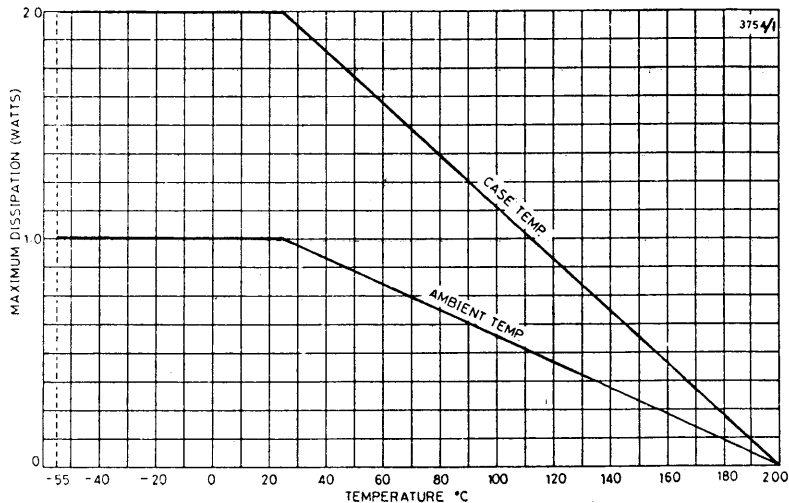
ZTX452/453

CHARACTERISTICS (at 25°C ambient temperature unless otherwise specified)

Parameter	Symbol	ZTX452		ZTX453		Unit	Test Conditions
		Min.	Max.	Min.	Max.		
Collector-base cut-off current	I_{CBO}	—	0.1	—	0.1	μA	$V_{CB} = 80V$ $V_{CB} = 100V$
Emitter-base cut-off current	I_{EBO}	—	0.1	—	0.1	μA	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	0.7	—	0.7	V	$I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	1.3	—	1.3	V	$I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$
Collector-emitter sustaining voltage	$V_{CEO(sus)}$	80	—	100	—	V	$I_C = 10\text{ mA}$
Static forward current transfer ratio	h_{FE}	40 10	150 —	40 10	200 —		$\left\{ \begin{array}{l} I_C = 150\text{ mA} \\ V_{CE} = 10V^* \\ I_C = 1\text{ Amp} \\ V_{CE} = 10V^* \end{array} \right.$
Transition frequency	f_T	150	—	150	—	MHz	$I_C = 50\text{ mA}$, $V_{CE} = 10V$, $f = 100\text{ MHz}$
Output capacitance	C_{obo}	—	15	—	15	pF	$V_{CB} = 10V$, $f = 1\text{ MHz}$

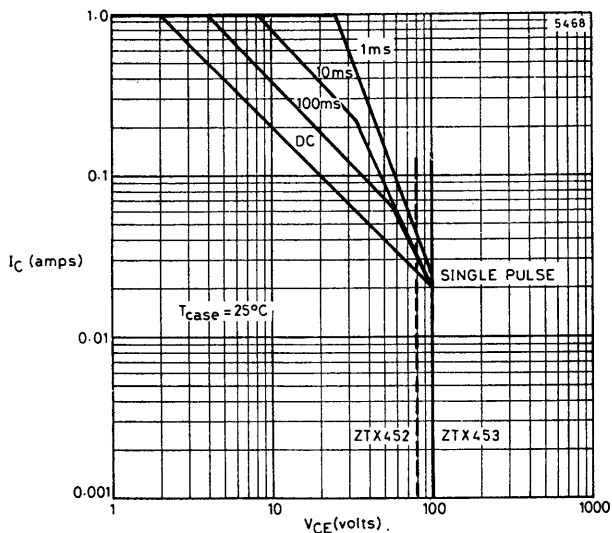
* Pulsed : Pulse width = 300 μs , duty cycle $\leq 2\%$.

DERATING CURVE

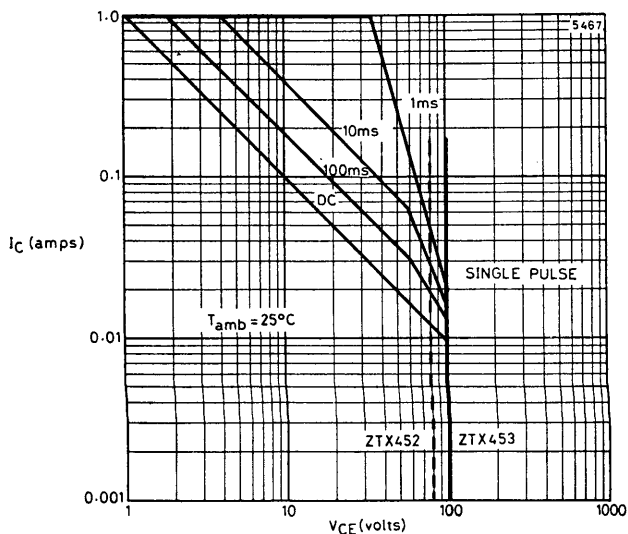


TYPICAL CHARACTERISTICS

Operating Area at $T_{case} = 25^{\circ}C$



Operating Area at $T_{amb} = 25^{\circ}C$



NPN Silicon Planar Medium Power Transistors

DESCRIPTION

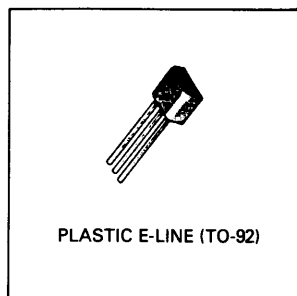
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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX454	ZTX455	Unit
Collector-Base Voltage	V_{CBO}	140	160	V
Collector-Emitter Voltage	V_{CEO}	120	140	V
Emitter-Base Voltage	V_{EBO}	5	5	V
Peak Pulse Current*	I_{CM}	2	2	A
Continuous Direct Current	I_C	1	1	A
Base Current	I_B	200	200	mA
Power Dissipation at $T_{amb} = 25^\circ\text{C}$ at $T_{case} = 25^\circ\text{C}$	P_{tot}	1 2	1 2	W W
Operating and Storage Temp. Range	T_j, T_{stg}	- 55 to + 200		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Parameter	Symbol	Maximum	Unit
Thermal Resistance Junction to Ambient	$R_{th(j-amb)}$	175	$^\circ\text{C/W}$
Junction to Case	$R_{th(j-case)}$	87.5	$^\circ\text{C/W}$

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

ZTX454/455

CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

Parameter	Symbol	ZTX454		ZTX455		Unit	Conditions
		Min.	Max.	Min.	Max.		
Collector-base cut-off current	I_{CBO}	—	0.1	—	—	μA	$V_{CB} = 120V$
		—	—	—	0.1	μA	$V_{CB} = 140V$
Emitter-base cut-off current	I_{EBO}	—	0.1	—	0.1	μA	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	0.7	—	0.7	V	$I_C = 150mA$ $I_B = 15mA$
		—	1.0	—	—	V	$I_C = 200mA$ $I_B = 20mA$
Collector-emitter sustaining voltage	$V_{CEO(sus)}$	120	—	140	—	V	$I_C = 10mA$
Static forward current transfer ratio	h_{FE}	100	300	100	300		$I_C = 150mA$ $V_{CE} = 10V^*$
		30	—	—	—		$I_C = 200mA$ $V_{CE} = 1V^*$
		10 typ.		10 typ.			$I_C = 1A$ $V_{CE} = 10V^*$
Transition frequency	f_T	100	—	100	—	MHz	$I_C = 50mA$ $V_{CE} = 10V$ $f = 100MHz$
Output capacitance	C_{obo}	—	15	—	15	pF	$V_{CB} = 10V$ $f = 1MHz$

*Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle = 2%.