FERRANTI semiconductors®

ZTX549

PNP Silicon Planar Medium Power Transistor

FEATURES

- 1.0W power dissipation at $T_{amb} = 25°C$
- 2A peak pulse current
- Excellent gain characteristics up to 2A (pulsed)
- Low saturation voltages
- Fast switching
- NPN complementary type available

PLASTIC E-LINE (TO-92)

DESCRIPTION

A high performance transistor encapsulated in the popular E-line (TO-92) plastic package.
The 2 amp, 1 watt performance and excellent gain characteristics up to 2 amps permit use in a wide range of industrial and consumer applications.
The specially selected SILICONE encapsulation provides resistance to severe environments comparable with metal can devices. In addition the small size of the E-line package assists where space is at a premium.
Complementary to the ZTX449

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX549	Unit
Collector-Base Voltage	V_{CBO}	−35	volts
Collector-Emitter Voltage	V_{CEO}	−25	volts
Emitter-Base Voltage	V_{EBO}	−5	volts
Peak Pulse Current*	I_{CM}	−2	amps
Continuous Collector Current	I_C	−1	amps
Power Dissipation: at $T_{amb} = 25°C$ derate above 25°C	P_{tot}	1 5.7	watts mW/°C
Operating & Storage Temperature Range		−55 to +200	°C

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

ZTX549

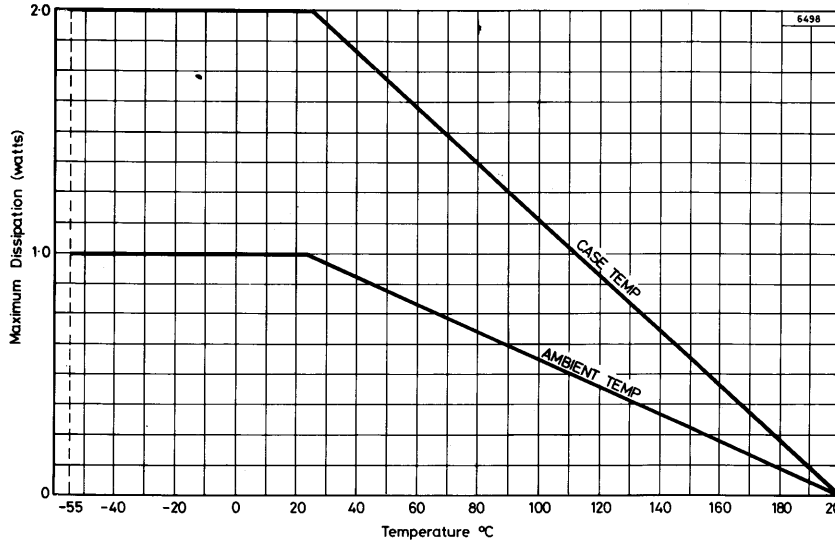
CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

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 μA	$V_{CB} = -30V$ $V_{CB} = -30V$, $T_{amb} = 100°C$
Emitter cut-off current	I_{EBO}			−0.1	μA	$V_{EB} = -4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$		−0.25 −0.50	−0.5 −0.75	V V	$I_C = -1A$, $I_B = -100mA$* $I_C = -2A$, $I_B = -200mA$*
Base-emitter saturation voltage	$V_{BE(sat)}$		−0.90	−1.25	V	$I_C = -1A$, $I_B = -100mA$*
Base-emitter turn on voltage	$V_{BE(ON)}$		−0.85	−1.0	V	$I_C = -1A$, $V_{CE} = -2V$*
Static forward current transfer ratio	h_{FE}	70 100 80 40	200 160 130 80	– 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	100			MHz	$I_C = -100mA$, $V_{CE} = -5V$ f = 100MHz
Output capacitance	C_{obo}			25	pF	$V_{CB} = -10V$, f = 1MHz
Switching times	T_{on} T_{off}	–	300 50		nS nS	$I_C = -500mA$, $I_{B1} = I_{B2} = -50mA$, $V_{CC} = -10V$

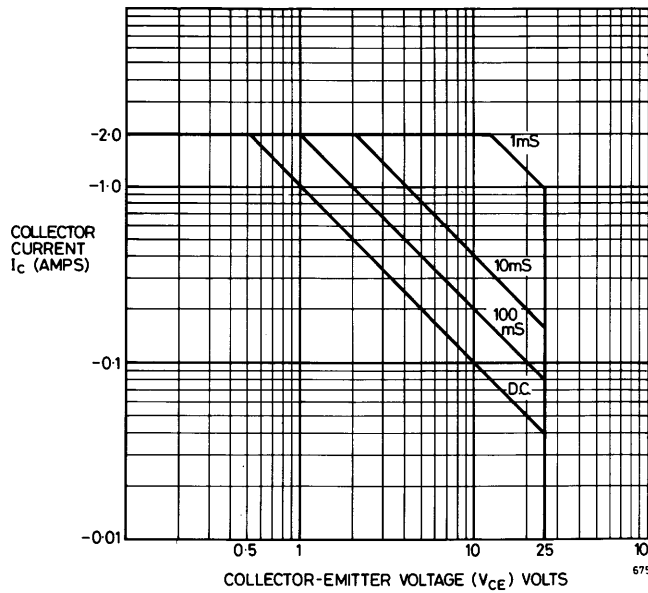
* Measured under pulsed conditions. Pulse width = 300μS. Duty cycle ⩽2%.

THERMAL CHARACTERISTICS

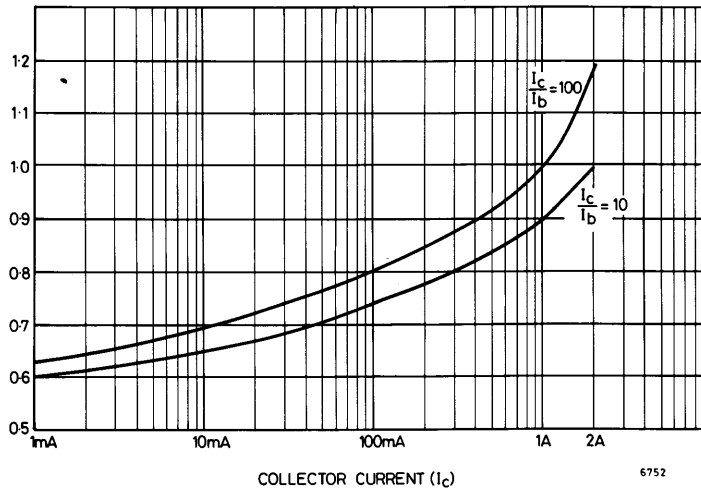
Parameter		Symbol	Maximum	Unit
Thermal Resistance:	Junction to Ambient	$R_{th(j\text{-}amb)}$	175	°C/W
	Junction to Case	$R_{th(j\text{-}case)}$	87.5	°C/W



DISSIPATION DERATING CURVE

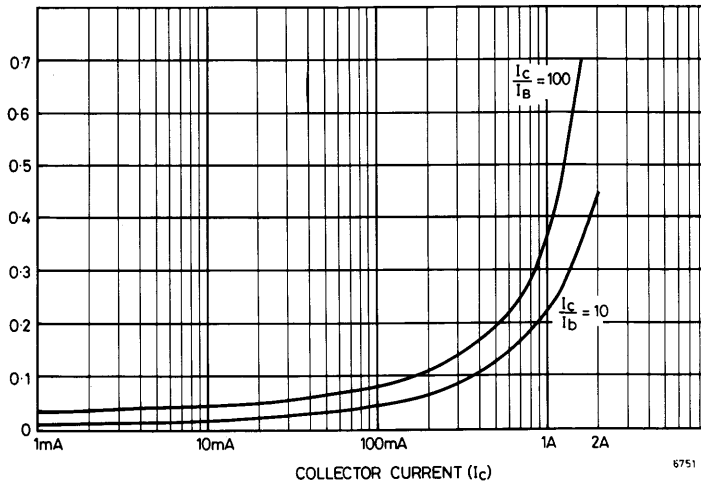


SAFE OPERATING AREA
at T_{amb} = 25°C (SINGLE PULSE)



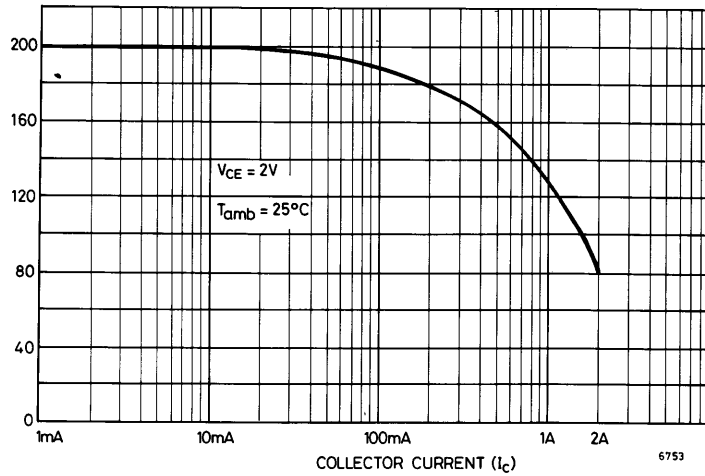
$V_{BE(sat)}/I_C$

TYPICAL BASE-EMITTER SATURATION VOLTAGE PLOTTED AGAINST COLLECTOR CURRENT



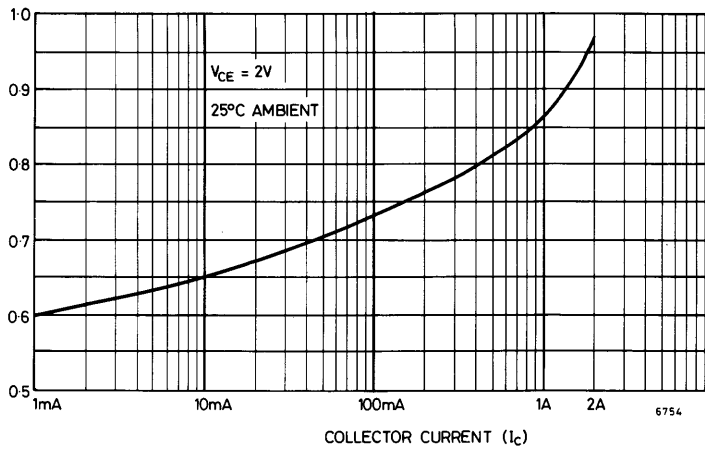
$V_{CE(sat)}/I_C$

TYPICAL COLLECTOR-EMITTER SATURATION VOLTAGE PLOTTED AGAINST COLLECTOR CURRENT



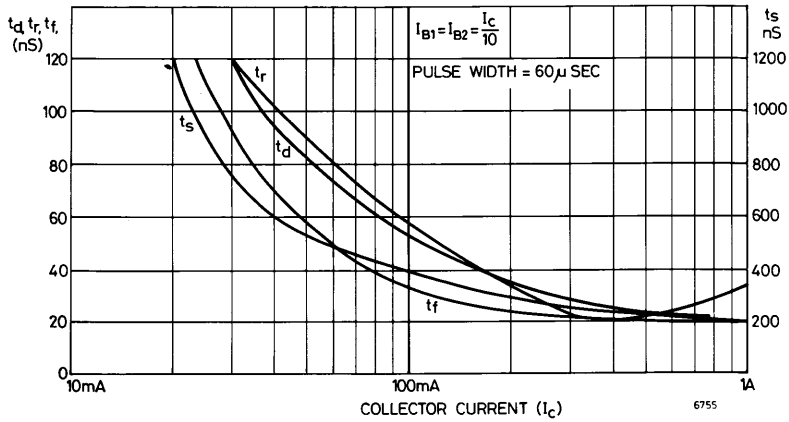
h_{FE}/I_C

TYPICAL STATIC FORWARD CURRENT TRANSFER RATIO PLOTTED AGAINST COLLECTOR CURRENT

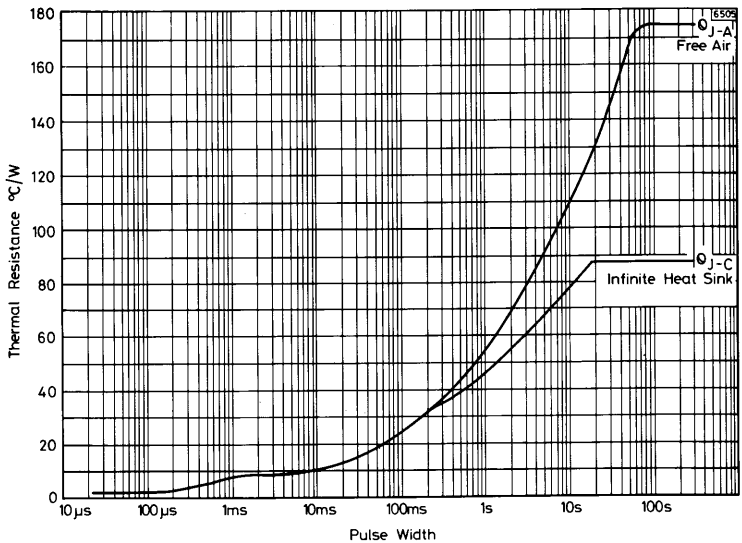


$V_{BE(ON)}/I_C$

TYPICAL BASE-EMITTER TURN-ON VOLTAGE PLOTTED AGAINST COLLECTOR CURRENT



TYPICAL SWITCHING SPEEDS



TYPICAL TRANSIENT THERMAL IMPEDANCE CURVES

FERRANTI semiconductors®

ZTX550
ZTX551

PNP Silicon Planar Medium Power Transistors

FEATURES

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

PLASTIC E-LINE (TO-92)

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 ZTX450 and ZTX 451 NPN transistors.

The ZTX550 and ZTX551 transistors APPROVAL PENDING FOR USE IN MILITARY EQUIPMENT will be identified by the following numbers:

BS9365 F143 & F144 – Category P.

BS9365 F145 & F146 – Category Q.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX550	ZTX551	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 $T_{amb} = 25°C$ at $T_{case} = 25°C$	P_{tot}	1 2	1 2	W W
Operating and Storage Temp. Range		−55 to +200		°C

Note: Pulse width = 300μs. Duty cycle ≤2%.

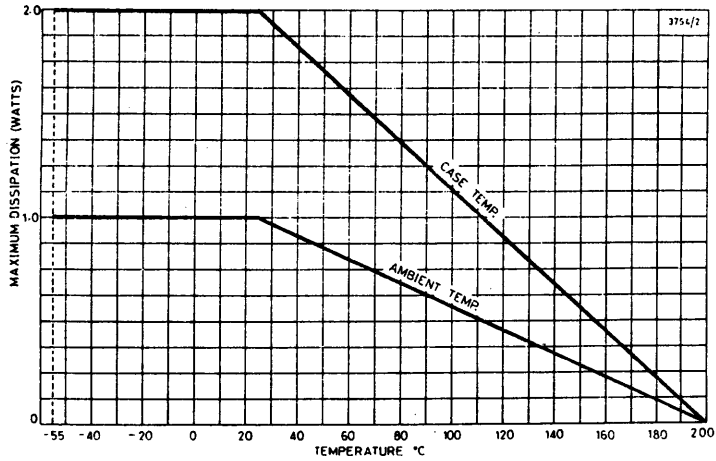
ZTX550/551

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

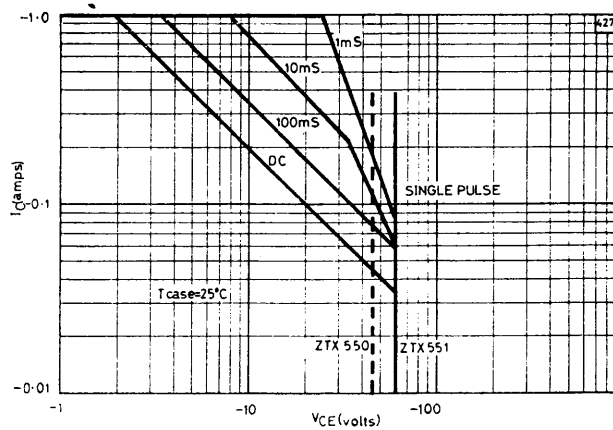
Parameter	Symbol	ZTX550		ZTX551		Unit	Conditions
		Min.	Max.	Min.	Max.		
Collector-base cut-off current	I_{CBO}	— —	–0.1 —	— —	— –0.1	µA µA	V_{CB} = –45V V_{CB} = –60V
Emitter-base cut-off current	I_{EBO}	—	–0.1	—	–0.1	µA	V_{EB} = –4V
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	–0.25	—	–0.35	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}	—	25	—	25	pF	V_{CB} = –10V f = 1 MHz

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

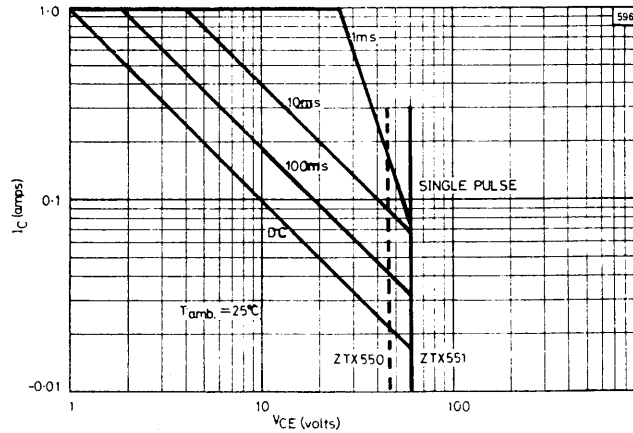
DERATING CURVE



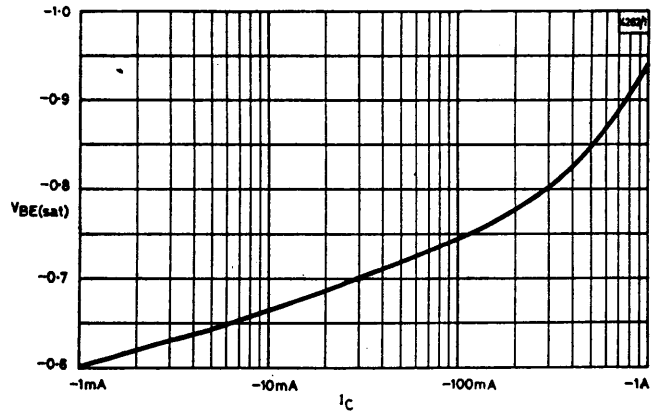
TYPICAL CHARACTERISTICS



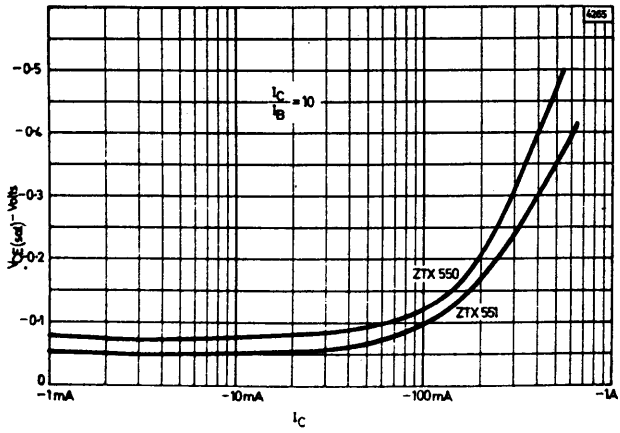
Operating Area at T_{case} = 25°C



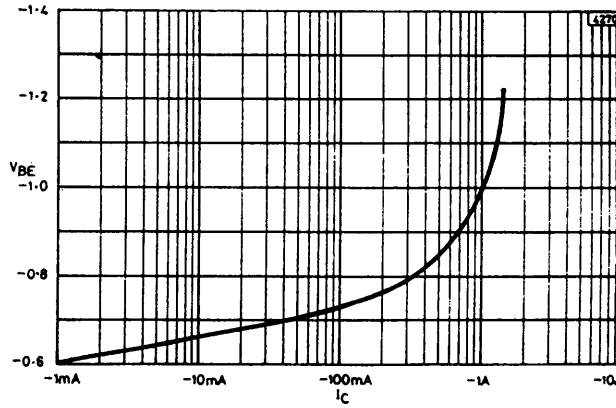
Operating Area at T_{amb} = 25°C



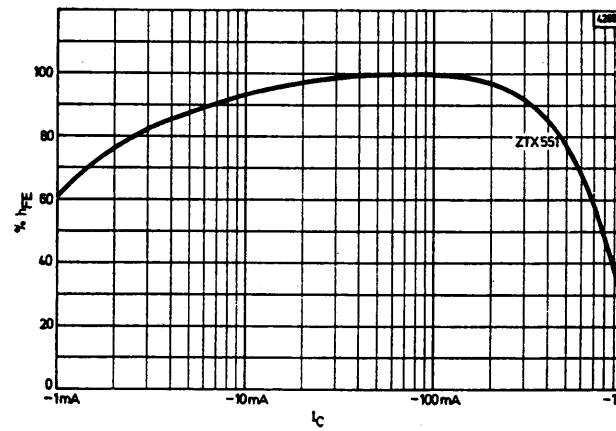
$V_{BE(sat)}/I_C$



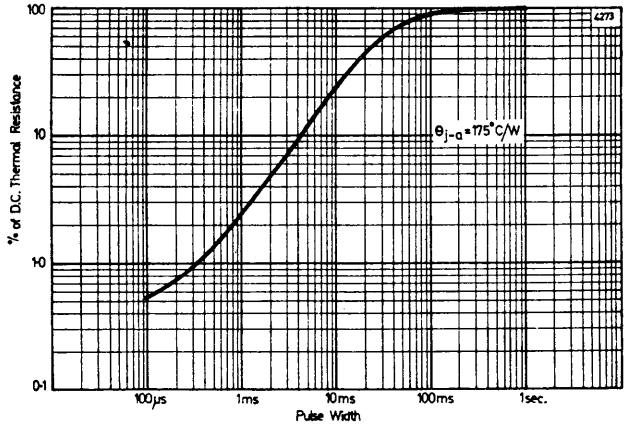
$V_{CE(sat)}/I_C$


-1·4
-1·2
V_{BE}
-1·0
-0·8
-0·6
-1mA
-10mA
-100mA
-1A
-10A
I_C

V_{BE}/I_C


100
80
% h_{FE}
60
40
20
0
-1mA
-10mA
-100mA
-1A
I_C
ZTX551

% h_{FE}/I_C



TRANSIENT THERMAL RESISTANCE

FERRANTI semiconductors®

ZTX552

PNP Silicon Planar Medium Power Transistors

PLASTIC E-LINE (TO-92)

FEATURES

- **High power dissipation: 1W at $T_{amb} = 25°C$.**
- **h_{FE} specified up to 1 amp.**
- **High V_{CEO} up to 80 volts.**
- **Complementary to ZTX452.**

DESCRIPTION

This plastic encapsulated, general purpose transistor is designed for small and medium signal amplification from d.c. to radio frequencies.

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

The E-line package is transfer moulded with 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.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX552	Unit
Collector-Base Voltage	V_{CBO}	−100	Volts
Collector-Emitter Voltage	V_{CEO}	−80	Volts
Emitter-Base Voltage	V_{EB}	−5	Volts
Peak Pulse Current (*See note overleaf)	I_{CM}	−2	Amps
Continuous Direct Current	I_C	−1	Amps
Base Current	I_B	−200	mA
Power Dissipation at $T_{amb} = 25°C$ at $T_{case} = 25°C$	P_{tot}	1 2	Watt Watts
Operating and Storage Temperature Range		−55 to +200	°C

THERMAL CHARACTERISTICS

Parameter	Symbol	Maximum	Unit
Thermal Resistance (junction to ambient) (junction to case)	$R_{th(j\text{-}amb)}$ $R_{th(j\text{-}case)}$	175 87.5	°C/W °C/W

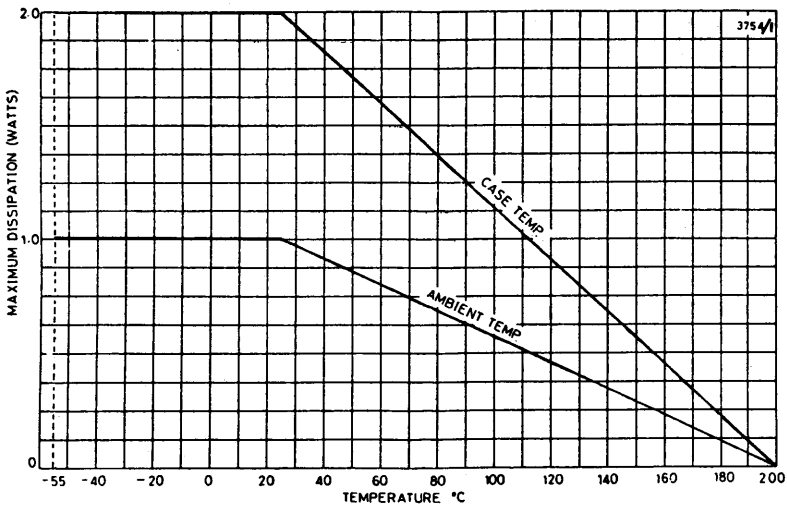
ZTX552

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

Parameter	Symbol	ZTX552		Unit	Test Conditions
		Min.	Max.		
Collector-base cut-off current	I_{CBO}	— —	–0.1 —	μA μA	$V_{CB} = -80V$ $V_{CB} = -100V$
Emitter-base cut-off current	I_{EBO}	—	–0.1	μA	$V_{EB} = -4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	–0.7	V	$I_C = -150$ mA, $I_B = -15$ mA
Base-emitter saturation voltage	$V_{BE(sat)}$	—	–1.3	V	$I_C = -150$ mA, $I_B = -15$ mA
Collector-emitter sustaining voltage	$V_{CEO(sus)}$	–80	—	V	$I_C = -10$ mA
Static forward current transfer ratio	h_{FE}	40 10	150 —		$I_C = -150$ mA $V_{CE} = -10V$* $I_C = -1$ Amp $V_{CE} = -10V$*
Transition frequency	f_T	150	—	MHz	$I_C = -50$ mA, $V_{CE} = -10V$, f = 100 MHz
Output capacitance	C_{obo}	—	25	pF	$V_{CB} = -10V$, f = 1 MHz

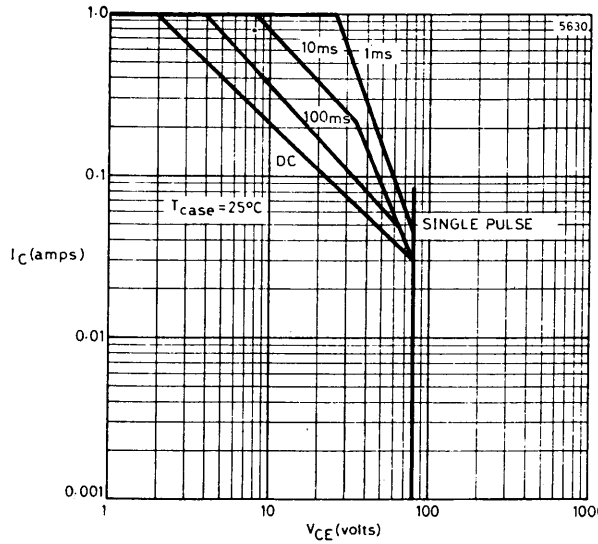
* Pulsed: Pulse width = 300 μs, duty cycle ≤2%.

DERATING CURVE



TYPICAL CHARACTERISTICS

Operating Area at T_{case} = 25°C



Operating Area at T_{amb} = 25°C