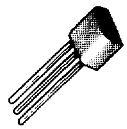
NPN Silicon Medium Power Darlington Transistors

ZTX600
ZTX601



Plastic E-Line
(TO-92 Compatible)

FEATURES

- 1.5W power dissipation at $T_{amb}=25°C$
- 1A continuous collector current
- High V_{CEO} up to 160V
- Guaranteed h_{FE} specified up to 1A
- Fast switching

DESCRIPTION

The ZTX600 and ZTX601 are high performance medium power Darlington amplified transistors encapsulated in the popular E-line (TO-92) plastic package.

The 1A performance permits use in a wide variety of industrial consumer applications.

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 surface mounting.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX600	ZTX601	Unit
Collector-base voltage	V_{CBO}	160	180	V
Collector-emitter voltage (note 1)	V_{CEO}	140	160	V
Emitter-base voltage	V_{EBO}	10		V
Peak pulse current (note 2)	I_{CM}	4		A
Continuous collector current	I_C	1		A
Practical power dissipation (note 3)	P_{totp}	1.5		W
Power dissipation at $T_{amb}=25°C$ (note 1) at $T_{case}=25°C$	P_{tot}	1 2.5		W W
Operating & storage temp. range (note 1)		−55 to +200		°C

Note 1: The maximum values of V_{CEO} and power dissipation are dependent on operating temperature. See Voltage derating graph for maximum power dissipation and operating temperature in a given application.

Note 2: Consult Safe Operating Area graph for conditions.

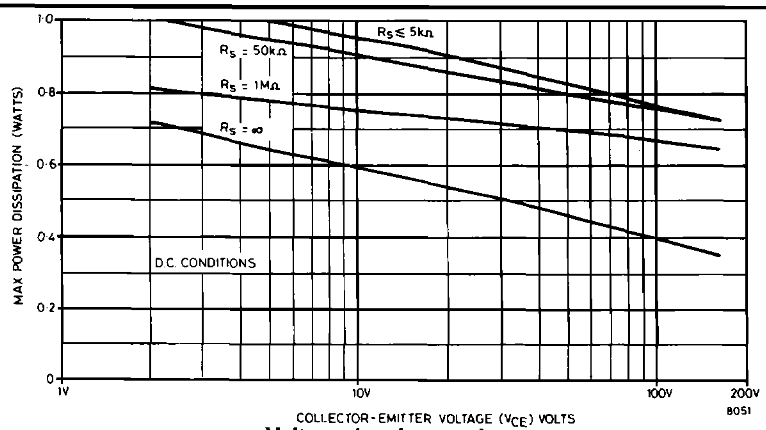
Note 3: The power which can be dissipated assuming that the device is mounted in a typical manner on a PCB with copper equal to 1sq.inch minimum.

ZTX600 ZTX601

CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

Parameter	Symbol	ZTX600 Min.	ZTX600 Typ.	ZTX600 Max.	ZTX601 Min.	ZTX601 Typ.	ZTX601 Max.	Unit	Conditions
Collector-base breakdown voltage	$V_{(BR)CBO}$	160	–	–	180	–	–	V	I_C = 100μA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	140	–	–	160	–	–	V	I_C = 10mA*
Emitter-base breakdown voltage	$V_{(BR)EBO}$	10	–	–	10	–	–	V	I_E = 100μA
Collector cut-off current	I_{CBO}	–	–	0.01	–	–	–	μA	V_{CB} = 140V
		–	–	10	–	–	–	μA	V_{CB} = 140V, T_{amb} = 100°C
		–	–	–	–	–	0.01	μA	V_{CB} = 160V
		–	–	–	–	–	10	μA	V_{CB} = 160V, T_{amb} = 100°C
Collector-emitter cut-off current	I_{CES}	–	–	10	–	–	–	μA	V_{CES} = 140V
		–	–	–	–	–	10	μA	V_{CES} = 160V
Emitter cut-off current	I_{EBO}	–	–	0.1	–	–	0.1	μA	V_{EB} = 8V
Collector-emitter saturation voltage	$V_{CE(sat)}$	–	0.75	1.1	–	0.75	1.1	V	I_C = 0.5A, I_B = 5mA*
		–	0.85	1.2	–	0.85	1.2	V	I_C = 1A, I_B = 10mA*
Base-emitter saturation voltage	$V_{BE(sat)}$	–	1.7	1.9	–	1.7	1.9	V	I_C = 1A, I_B = 10mA*
Base-emitter turn-on voltage	$V_{BE(on)}$	–	1.5	1.7	–	1.5	1.7	V	I_C = 1A, V_{CE} = 5V*
Static forward current transfer ratio	h_{FE}	1K	–	–	1K	–	–		I_C = 50mA, V_{CE} = 10V*
		2K	–	100K	2K	–	100K		I_C = 0.5A, V_{CE} = 10V*
		1K	–	–	1K	–	–		I_C = 1A, V_{CE} = 10V*
		1K	2K	–	1K	2K	–		I_C = 50mA, V_{CE} = 10V*
Group A		2K	5K	20K	2K	5K	20K		I_C = 0.5A, V_{CE} = 10V*
		1K	3K	–	1K	3K	–		I_C = 1A, V_{CE} = 10V*
		5K	10K	–	5K	10K	–		I_C = 50mA, V_{CE} = 10V*
Group B		10K	20K	100K	10K	20K	100K		I_C = 0.5A, V_{CE} = 10V*
		5K	10K	–	5K	10K	–		I_C = 1A, V_{CE} = 10V*
Transition frequency	f_T	150	250	–	150	250	–	MHz	I_C = 100mA, V_{CE} = 10V f = 20MHz
Switching times	t_{on}	–	0.75	–	–	0.75	–	μs	I_C = 0.5A, V_{CE} = 10V
	t_{off}	–	2.2	–	–	2.2	–	μs	I_{B1} = I_{B2} = 0.5mA
Input capacitance	C_{ibo}	–	60	90	–	60	90	pF	V_{EB} = 0.5V, f = 1MHz
Output capacitance	C_{obo}	–	10	15	–	10	15	pF	V_{CE} = 10V, f = 1MHz

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



Voltage derating graph

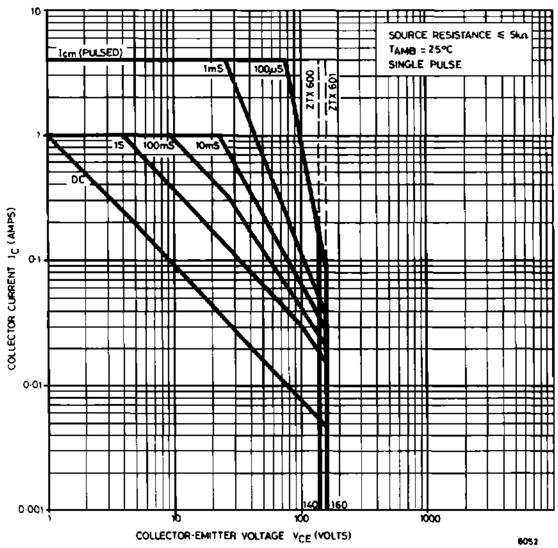
The maximum permissible operating temperature can be obtained from this graph using the equation

$$T_{amb(max)} = \frac{\text{Power (max)} - \text{Power (actual)}}{0.0057} + 25°C$$

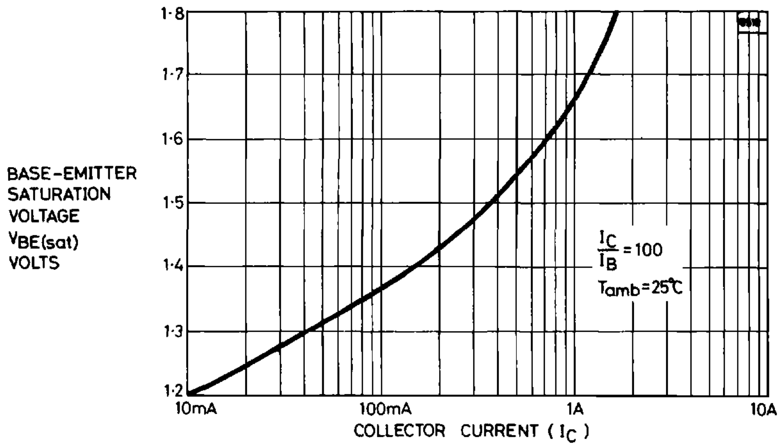
$T_{amb(max)}$ = Maximum operating ambient temperature.

Power (max) = Maximum power dissipation figure, obtained from the above graph for a given V_{CE} and source resistance (R_S).

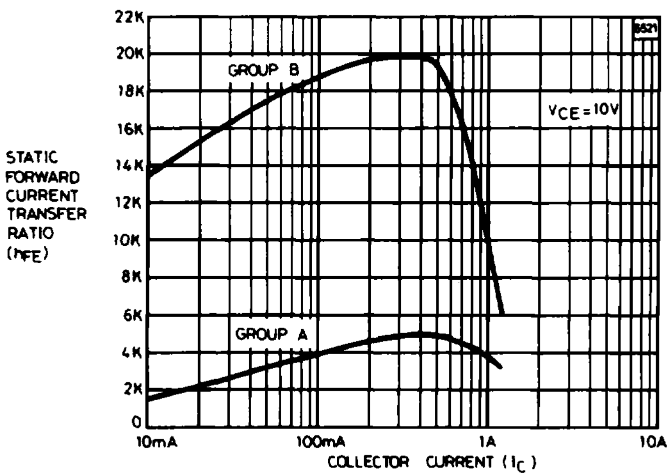
Power (actual) = Actual power dissipation in users circuit.



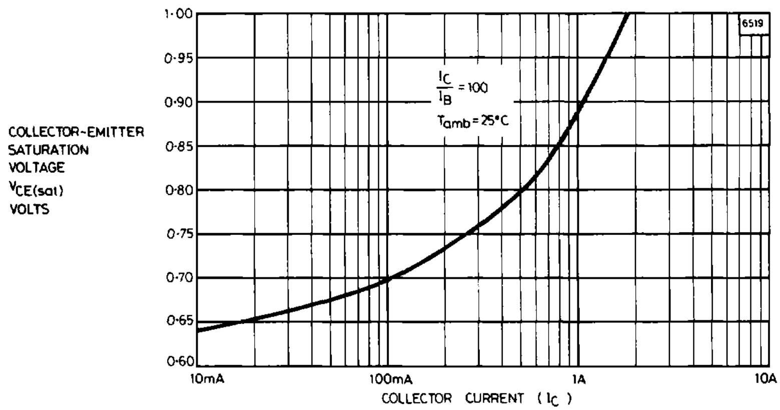
Safe operating area at $T_{amb} = 25°C$ (single pulse)



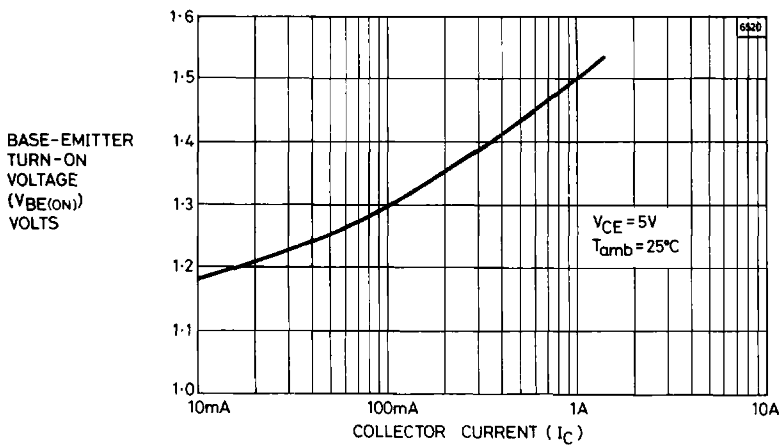
Typical base-emitter saturation voltages plotted against collector current



Typical static forward current transfer ratio plotted against collector current

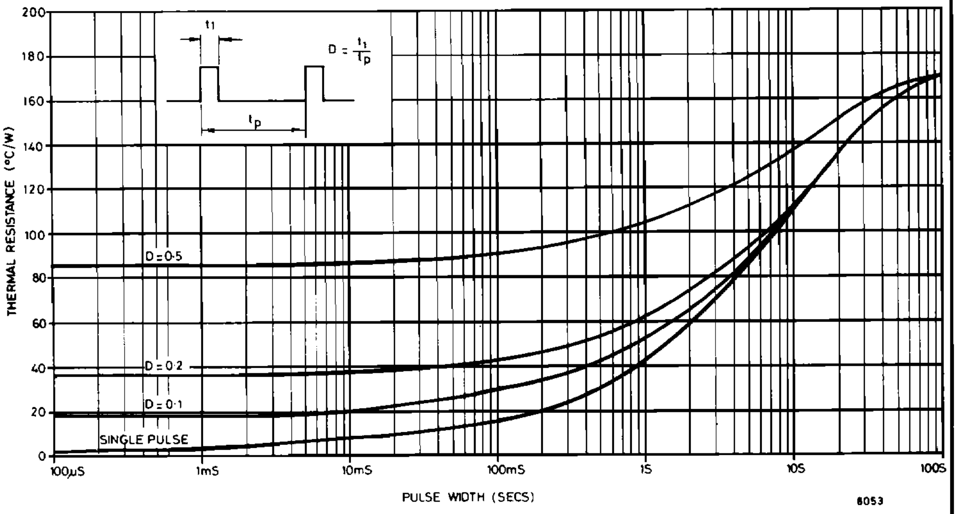


Typical collector-emitter saturation voltages plotted against collector current



Typical base-emitter turn-on voltages plotted against collector current

ZTX600 ZTX601



Maximum transient thermal impedance curves