

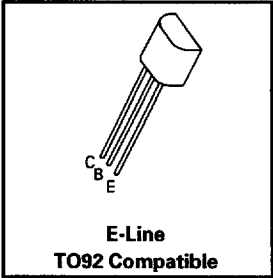
NPN SILICON PLANAR
MEDIUM POWER TRANSISTORS

ZTX652
ZTX653

ISSUE 2 – JULY 94

FEATURES

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



ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	ZTX652	ZTX653	UNIT
Collector-Base Voltage	V_{CBO}	100	120	V
Collector-Emitter Voltage	V_{CEO}	80	100	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/ $^{\circ}C$
Operating and Storage Temperature Range	$T_j:T_{stg}$	-55 to +200		$^{\circ}C$

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

PARAMETER	SYMBOL	ZTX652			ZTX653			UNIT	CONDITIONS.
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	100			120			V	$I_C=100\mu A$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	80			100			V	$I_C=10mA^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			5			V	$I_E=100\mu A$
Collector Cut-Off Current	I_{CBO}			0.1 10			0.1 10	μA μA μA μA	$V_{CB}=80V$ $V_{CB}=100V$ $V_{CB}=80V, T_{amb}=100^{\circ}C$ $V_{CB}=100V, T_{amb}=100^{\circ}C$
Emitter Cut-Off Current	I_{EBO}			0.1			0.1	μA	$V_{EB}=4V$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		0.13 0.23	0.3 0.5		0.13 0.23	0.3 0.5	V V	$I_C=1A, I_B=100mA^*$ $I_C=2A, I_B=200mA^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.9	1.25		0.9	1.25	V	$I_C=1A, I_B=100mA^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.8	1		0.8	1	V	$I_C=1A, V_{CE}=2V^*$
Static Forward Current Transfer Ratio	h_{FE}	70 100 55 25	200 200 110 55	300	70 100 55 25	200 200 110 55	300		$I_C=50mA, V_{CE}=2V^*$ $I_C=500mA, V_{CE}=2V^*$ $I_C=1A, V_{CE}=2V^*$ $I_C=2A, V_{CE}=2V^*$

ZTX652 ZTX653

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

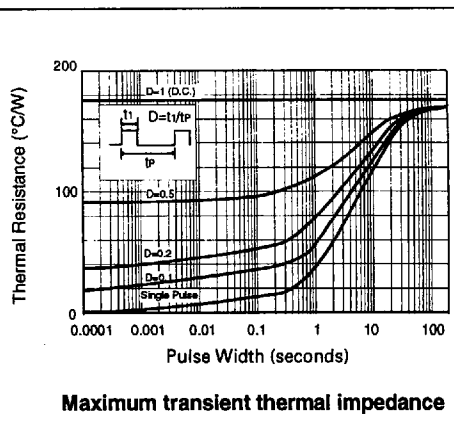
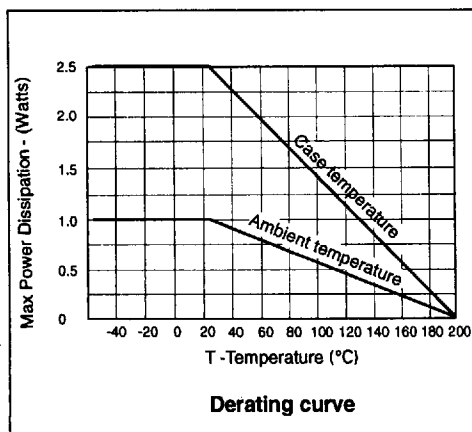
PARAMETER	SYMBOL	ZTX652			ZTX653			UNIT	CONDITIONS.
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Transition Frequency	f_T	140	175		140	175		MHz	$I_C=100\text{mA}$, $V_{CE}=5\text{V}$ $f=100\text{MHz}$
Switching Times	t_{on}		80			80		ns	$I_C=500\text{mA}$, $V_{CC}=10\text{V}$ $I_{B1}=I_{B2}=50\text{mA}$
	t_{off}		1200			1200		ns	
Output Capacitance	C_{obo}			30			30	pF	$V_{CB}=10\text{V}$ $f=1\text{MHz}$

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

THERMAL CHARACTERISTICS

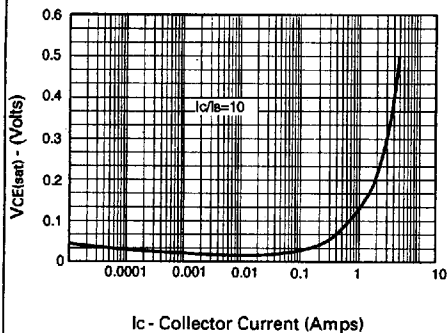
PARAMETER	SYMBOL	MAX.	UNIT
Thermal Resistance: Junction to Ambient ₁	$R_{th(j-amb)1}$	175	$^{\circ}\text{C/W}$
Junction to Ambient ₂	$R_{th(j-amb)2}^{\dagger}$	116	$^{\circ}\text{C/W}$
Junction to Case	$R_{th(j-case)}$	70	$^{\circ}\text{C/W}$

$\dagger$ Device mounted on P.C.B. with copper equal to 1 sq. Inch minimum.

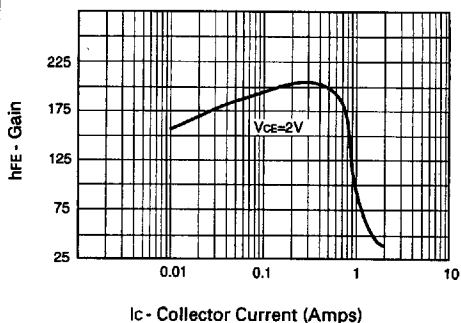


ZTX652 ZTX653

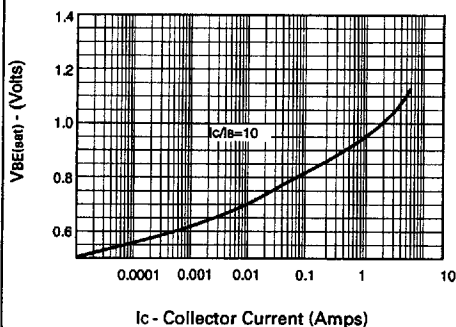
TYPICAL CHARACTERISTICS



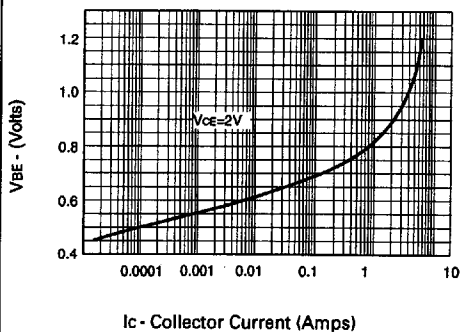
$V_{CE(sat)}$ v I_C



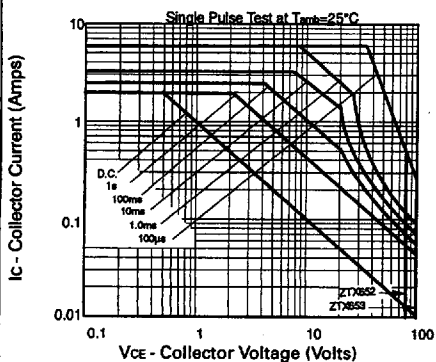
hFE v I_C



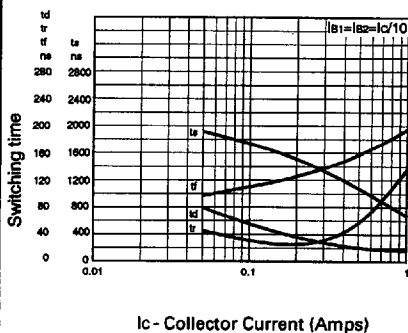
$V_{BE(sat)}$ v I_C



$V_{BE(on)}$ v I_C



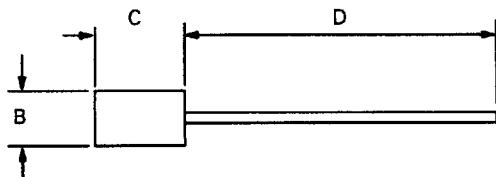
Safe Operating Area



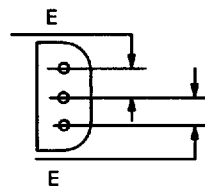
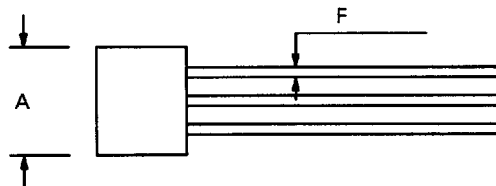
Switching Speeds

E-Line Package Dimensions

3 Pin Device



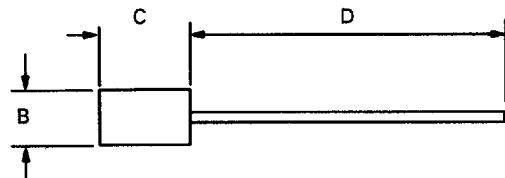
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.37	4.77	0.172	0.188
B	2.16	2.41	0.085	0.095
C	3.61	4.01	0.142	0.158
D	13.00	13.97	0.512	0.550
E	NOM 1.27		NOM 0.05	
F	0.37	0.495	0.016	0.0195



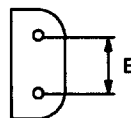
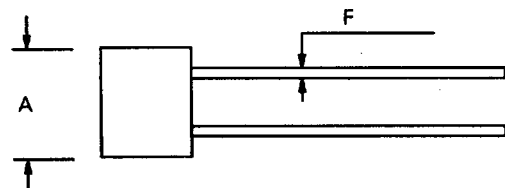
Leads to pass through a hole 0.7mm dia.

Various lead forms are offered, details of which are available on request.

2 Pin Device

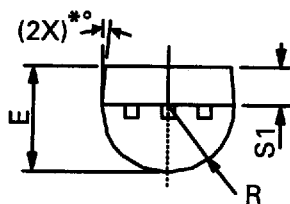
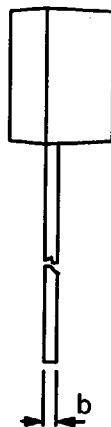
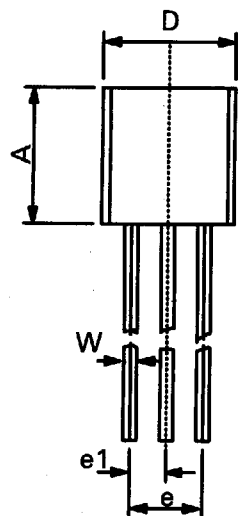


DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.37	4.77	0.172	0.188
B	2.16	2.41	0.085	0.095
C	3.61	4.01	0.142	0.158
D	13.00	13.97	0.512	0.550
E	NOM 2.54		NOM 0.10	
F	0.37	0.495	0.016	0.0195



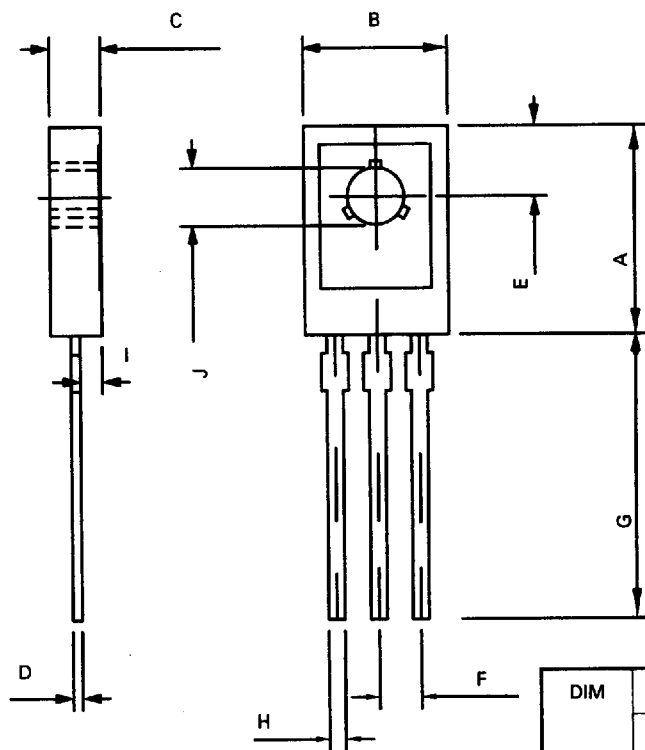
Leads to pass through a hole 0.7mm dia.

T092 Package Dimensions



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.32	4.95	0.170	0.195
b	0.36	0.51	0.014	0.020
E	3.30	3.94	0.130	0.155
e	2.41	2.67	0.095	0.105
e1	1.14	1.40	0.045	0.055
L	12.70	15.49	0.500	0.610
R	2.16	2.41	0.085	0.095
S1	1.14	1.52	0.045	0.060
W	0.41	0.56	0.016	0.022
D	4.45	4.95	0.175	0.195
°	4°	6°	4°	6°

TO126 Package Dimensions



DIM	Millimeters	
	Min	Max
A		11.1
B		7.80
C		2.80
D	0.50 typical	
E	3.75 typical	
F	2.29 typical	
G	15.3	
H		0.88
I	1.2 typical	
J	3.00	3.20