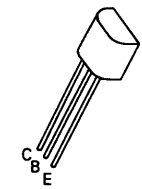
NPN SILICON PLANAR SMALL SIGNAL TRANSISTOR

ZTX341

ISSUE 2 – MARCH 94

FEATURES

* High voltage
* Low current



E-Line
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

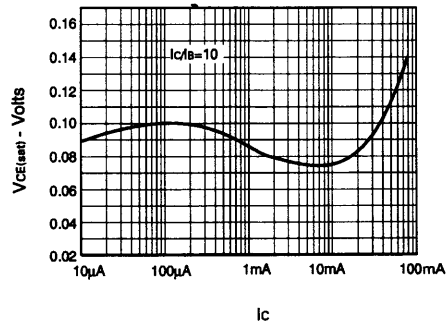
PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	100	V
Collector-Emitter Voltage	V_{CEO}	100	V
Emitter-Base Voltage	V_{EBO}	5	V
Continuous Collector Current	I_C	100	mA
Base Current	I_B	20	mA
Power Dissipation at T_{amb}=25°C	P_{tot}	300	mW
Operating and Storage Temperature Range	T_j:T_{stg}	-55 to +175	°C

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

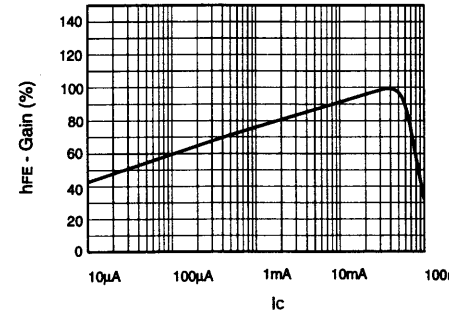
PARAMETER	SYMBOL	MIN.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	100		V	I_C=10μA, I_E=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	100		V	I_C=10mA, I_B=0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5		V	I_E=10μA, I_C=0
Collector Cut-Off Current	I_{CBO}		0.5	μA	V_{CB}=80V, I_E=0
Collecor-Emitter Cut-Off Current	I_{CER}		0.5 10	μA μA	V_{CE}=80V, R_{BE}=50KΩ V_{CE}=80V, R_{BE}=50KΩ†
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		0.5	V	I_C=2mA, I_B=0.1mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		1.0	V	I_C=2mA, I_B=0.1mA
Static Forward Current Transfer Ratio	h_{FE}	30			I_C=2mA, V_{CE}=1V
Transition Frequency	f_T	80		MHz	I_C=5mA, V_{CE}=5V f=60MHz
Output Capacitance	C_{obo}		10	pF	V_{CB}=6V, f=1MHz

*Measured under pulsed conditions. Pulse width=300μs. Duty cycle ≤ 2%
†T_{amb}=100°C

TYPICAL CHARACTERISTICS



$V_{CE(sat)}$ v Ic



h_{FE} v Ic

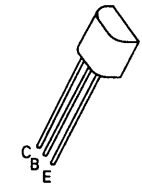
NPN SILICON PLANAR HIGH SPEED SWITCHING TRANSISTOR

ZTX360

ISSUE 2 – MARCH 94

FEATURES

* 40 Volt V_{CEO}
* 1 Amp continuous current
* Fast switching



E-Line
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	5	V
Continuous Collector Current	I_C	1	A
Power Dissipation at T_{amb}=25°C	P_{tot}	500	W
Operating and Storage Temperature Range	T_j:T_{stg}	-55 to +175	°C

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Emitter Sustaining Voltage	$V_{CEO(SUS)}$	40			V	I_C=10mA, I_B=0*
Collector Cut-Off Current	I_{CBO}			500 300	nA µA	V_{CB}=40V, I_E=0 V_{CB}=40V, I_E=0, T_{amb}=150°C
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.6	V	I_C=500mA, I_B=50mA*
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	0.7		1.2	V	I_C=500mA, I_B=50mA*
Static Forward Current Transfer Ratio	h_{FE}	25		150		I_C=500mA, V_{CE}=1V*
Transition Frequency	f_T	200			MHz	I_C=50mA, V_{CE}=10V, f=100MHz
Input Capacitance	C_{ib}		36	50	pF	V_{EB}=0.5V, I_C=0, f=1MHz
Output Capacitance	C_{ob}		5.75	10	pF	V_{CB}=10V, I_E=0, f=1MHz
Turn-On Time	t_{on}			40	ns	V_{CC}=30V, I_C=500mA, $I_{B(on)}$=50mA, -$V_{BE(off)}$=2V
Turn-Off Time	t_{off}			75	ns	V_{CC}=30V, I_C=500mA, $I_{B(on)}$=-$I_{B(off)}$=50mA

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

NPN SILICON PLANAR LOW NOISE TRANSISTOR

ZTX384C

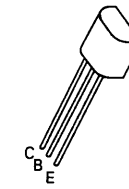
ISSUE 2 – MARCH 94

FEATURES

* 30 Volt V_{CEO}
* High Gain
* Low Noise

APPLICATIONS

* Audio circuits



E-Line
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	45	V
Collector-Emitter Voltage	V_{CEO}	30	V
Emitter-Base Voltage	V_{EBO}	6	V
Continuous Collector Current	I_C	200	mA
Power Dissipation	P_{tot}	350	mW
Operating and Storage Temperature Range	T_j:T_{stg}	-55 to +175	°C

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	45			V	I_C=10μA, I_E=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=2mA, I_B=0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6			V	I_E=10μA, I_C=0
Collector Cut-Off Current	I_{CBO}			15	nA	V_{CB}=30V, I_E=0
Emitter Cut-Off Current	I_{EBO}			15	nA	V_{EB}=4V, I_C=0
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.25 0.6	V V	I_C=10mA, I_B=0.5mA* I_C=100mA, I_B=5mA*
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1.2	V	I_C=100mA, I_B=5mA*
Base-Emitter Turn On Voltage	$V_{BE(on)}$	0.55		0.7	V	I_C=2mA, V_{CE}=5V
Static Forward Current Transfer Ratio	h_{FE}	100 250 130	400			I_C=10μA, V_{CE}=5V I_C=2mA, V_{CE}=5V I_C=100mA, V_{CE}=5V*
Transition Frequency	f_T	150			MHz	I_C=10mA, V_{CE}=5V f=100MHz

ZTX384C

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Output Capacitance	C_{obo}		2.5	5	pF	V_{CB}=10V, f=1MHz
Input Capacitance	C_{ibo}		11		pF	V_{EB}=0.5V, f=1MHz
Noise Figure (Wide Band)	N			4	dB	I_C=200μA, V_{CE}=5V f=30Hz to 15KHz at -3dB points, R_S=2KΩ
Flicker Noise	N_f			0.135	μV	I_C=200μA, V_{CE}=5V f=10Hz to 50Hz at -3dB points, R_S=2KΩ
Small Signal Static Forward Current Transfer Ratio	h_{fe}	450		900		I_C=2mA, V_{CE}=5V, f=1kHz

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

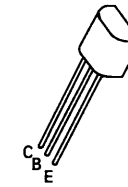
NPN SILICON PLANAR AVALANCHE TRANSISTOR

ZTX413

PROVISIONAL DATASHEET ISSUE 2 – MARCH 94

FEATURES

* Avalanche mode operation
* 50A Peak avalanche current
* Low inductance packaging



E-Line
TO92 Compatible

APPLICATIONS

* Laser LED drivers
* Fast edge generation
* High speed pulse generators

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EBO}	6	V
Continuous Collector Current	I_C	200	mA
Peak Collector Current (25ns Pulse Width)	I_{CM}	50	A
Power Dissipation	P_{tot}	500	mW
Operating and Storage Temperature Range	T_j:T_{stg}	-55 to +200	°C

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	150			V	I_C=100µA
Collector-Emitter Breakdown Voltage	$V_{CEO(sus)}$	50			V	I_C=10mA
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6			V	I_E=100µA
Collector Cut-Off Current	I_{CBO}			0.1	µA	V_{CB}=120V
Emitter Cut-Off Current	I_{EBO}			0.1	µA	V_{EB}=4V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.15	V	I_C=10mA, I_B=1mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			0.8	V	I_C=10mA, I_B=1mA
Current in Second Breakdown (Pulsed)	I_{USB}	22 31			A A	V_C=110V, C_{CE}=4.7nF* V_C=130V, C_{CE}=4.7nF*
Static Forward Current Transfer Ratio	h_{FE}	50				I_C=10mA, V_{CE}=10V

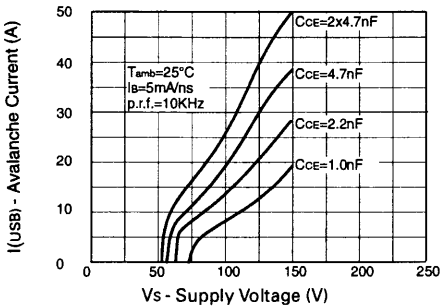
*Measured within a circuit possessing an approximate loop inductance of 12nH. The $I_{(USB)}$ monitor circuitry reflects 0.15 Ohm into the Collector-Emitter Discharge Loop

ZTX413

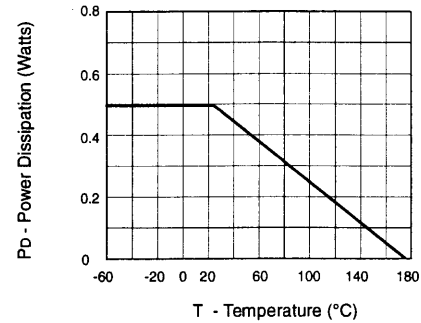
ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Emitter Inductance	L_e		6		nH	With 3mm leads
Transition Frequency	f_T		150		MHz	I_C=10mA, V_{CE}=5V f=20MHz
Collector-Base Capacitance	C_{cb}		2		pF	V_{CB}=10V, I_E=0 f=1MHz

TYPICAL CHARACTERISTICS



Avalanche Current v Supply Voltage



Derating Curve

NPN SILICON PLANAR AVALANCHE TRANSISTOR

ZTX415

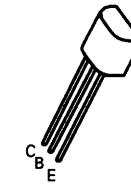
ISSUE 4 - NOVEMBER 1995

FEATURES

* Specifically designed for Avalanche mode operation
* 60A Peak Avalanche Current (Pulse width=20ns)
* Low inductance package

APPLICATIONS

* Laser LED drivers
* Fast edge generation
* High speed pulse generators
* Suitable for single, series and parallel operation



E-Line
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	260	V
Collector-Emitter Voltage	V_{CEO}	100	V
Emitter-Base Voltage	V_{EBO}	6	V
Continuous Collector Current	I_C	500	mA
Peak Collector Current (Pulse Width=20ns)	I_{CM}	60	A
Power Dissipation	P_{tot}	680	mW
Operating and Storage Temperature Range	T_j:T_{stg}	-55 to +175	°C

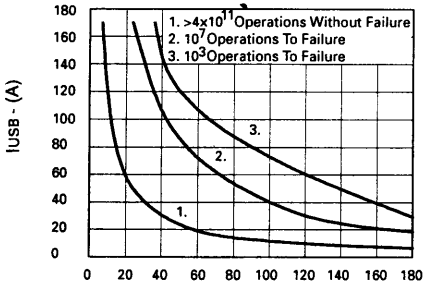
ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CES}$	260			V	I_C=1mA T_{amb}= -55 to +175°C
Collector-Emitter Breakdown Voltage	$V_{CEO(sus)}$	100			V	I_C=100μA
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6			V	I_E=10μA
Collector Cut-Off Current	I_{CBO}			0.1 10	μA μA	V_{CB}=180V V_{CB}=180V, T_{amb}=100°C
Emitter Cut-Off Current	I_{EBO}			0.1	μA	V_{EB}=4V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.5	V	I_C=10mA, I_B=1mA*
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			0.9	V	I_C=10mA, I_B=1mA*
Current in Second Breakdown (Pulsed)	I_{SB}	15 25			A A	V_C=200V, C_{CE}=620pF V_C=250V, C_{CE}=620pF
Static Forward Current Transfer Ratio	h_{FE}	25				I_C=10mA, V_{CE}=10V*
Transition Frequency	f_T	40			MHz	I_C=10mA, V_{CE}=20V f=20MHz
Collector-Base Capacitance	C_{cb}			8	pF	V_{CB}=20V, I_E=0 f=100MHz

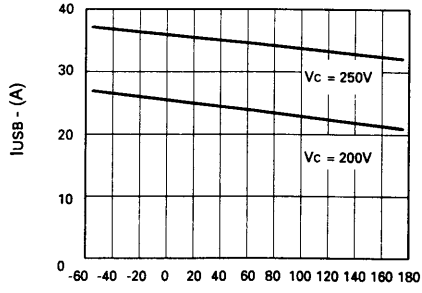
*Measured under pulsed conditions. Pulse width=300μs. Duty cycle ≤ 2%

ZTX415

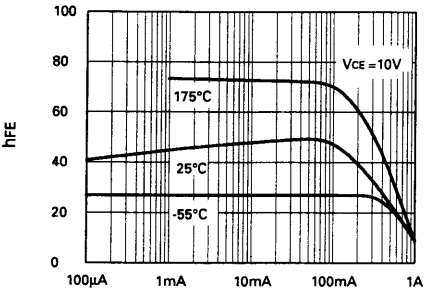
TYPICAL CHARACTERISTICS



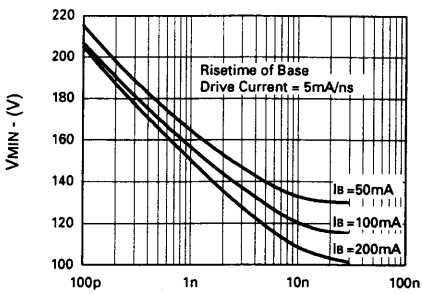
Maximum Avalanche Current v Pulse Width



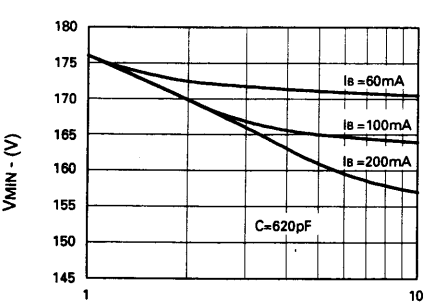
IUSB v Temperature for the specified conditions



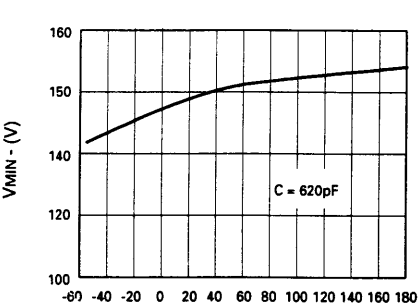
hFE v IC



Minimum starting voltage as a function of capacitance



Minimum starting voltage as a function of drive current



Minimum starting voltage as a function of temperature