



ZXTN25012EZ

12V NPN high gain transistor in SOT89

Summary

$BV_{CEO} > 12V$

$BV_{ECX} > 6V$

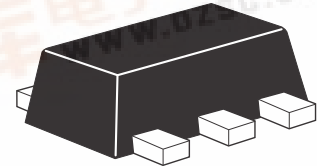
$h_{FE} > 500$

$I_{C(cont)} = 6.5A$

$V_{CE(sat)} < 38mV @ 1A$

$R_{CE(sat)} = 25m\Omega$

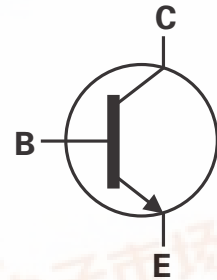
$P_D = 2.4W$



Complementary part number ZXTP25012EZ

Description

Packaged in the SOT89 outline this new ultra high gain, low saturation 12V NPN transistor offers extremely low on state losses making it ideal for use in DC-DC circuits and various driving and power management functions

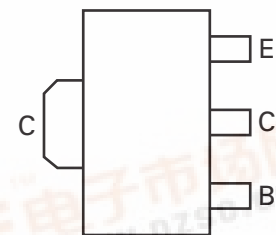


Features

- 6.5A continuous current
- Up to 15A peak current
- Very low saturation voltages
- 6V reverse blocking voltage

Applications

- LED driving
- Motor driving
- Boost converters
- Royer converters
- Camera strobe
- MOSFET gate drivers



Pinout - top view

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN25012EZTA	7	12	1000

Device marking

1K7



ZXTN25012EZ

Absolute maximum and thermal ratings

Parameter	Symbol	Limit	Unit
Collector-Base voltage	V_{CBO}	20	V
Collector-Emitter voltage	V_{CEO}	12	V
Emitter-Collector voltage (reverse blocking)	V_{ECX}	6	V
Emitter-Base voltage	V_{EBO}	7	V
Continuous Collector current ^(c)	I_C	6.5	A
Base current	I_B	1	A
Peak pulse current	I_{CM}	15	A
Power dissipation at $T_A = 25^\circ\text{C}^{(a)}$	P_D	1.1	W
Linear derating factor		8.8	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(b)}$	P_D	1.8	W
Linear derating factor		14.4	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(c)}$	P_D	2.4	W
Linear derating factor		19.2	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(d)}$	P_D	4.46	W
Linear derating factor		35.7	mW/°C
Power dissipation at $T_C = 25^\circ\text{C}^{(e)}$	P_D	19.2	W
Linear derating factor		153	mW/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	°C

Thermal resistance

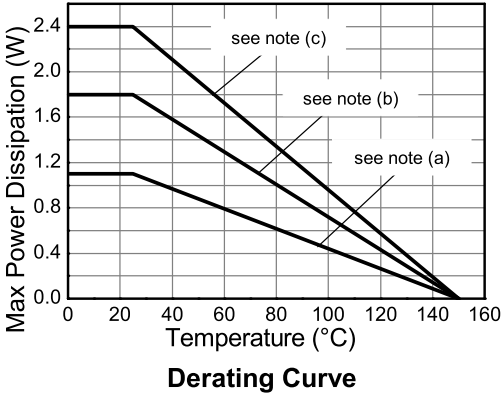
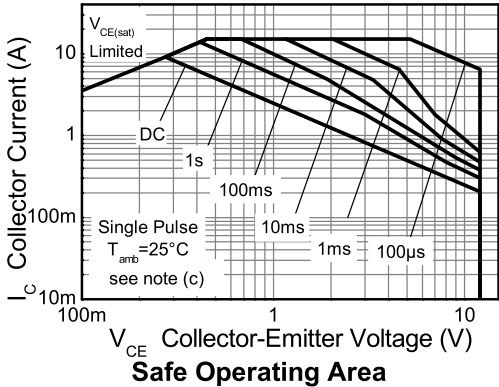
Parameter	Symbol	Limit	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	117	°C/W
Junction to ambient ^(b)	$R_{\theta JA}$	68	°C/W
Junction to ambient ^(c)	$R_{\theta JA}$	51	°C/W
Junction to ambient ^(d)	$R_{\theta JA}$	28	°C/W
Junction to case ^(e)	$R_{\theta JC}$	7.95	°C/W

NOTES:

- (a) For a device surface mounted on 15mm x 15mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (b) Mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (c) Mounted on 50mm x 50mm x 0.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
- (d) As (c) above measured at $t < 5$ seconds.
- (e) Junction to case (collector tab). Typical

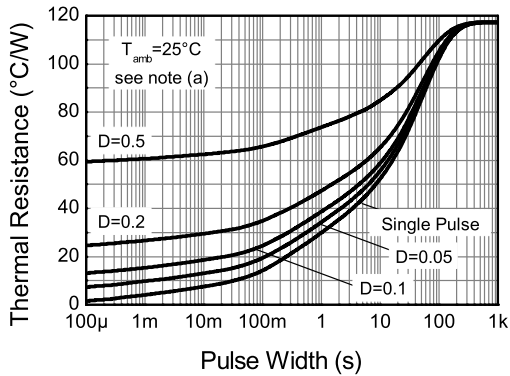
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Thermal characteristics

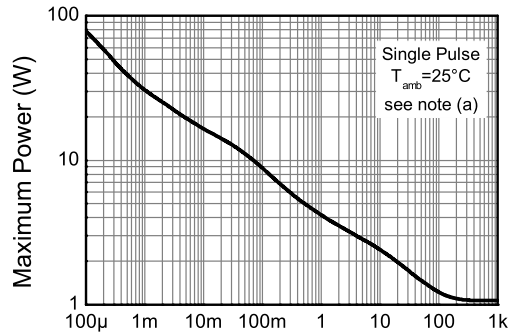


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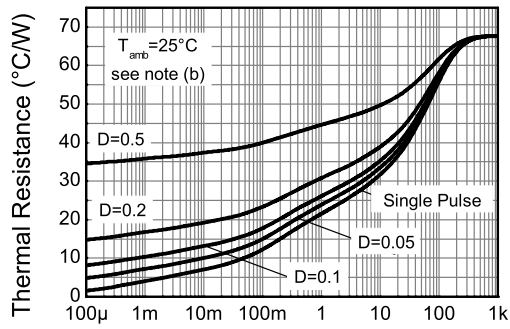
Thermal characteristics



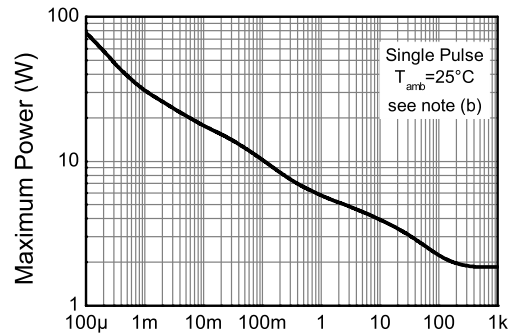
Transient Thermal Impedance



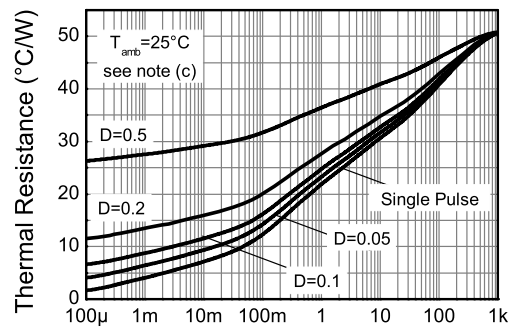
Pulse Power Dissipation



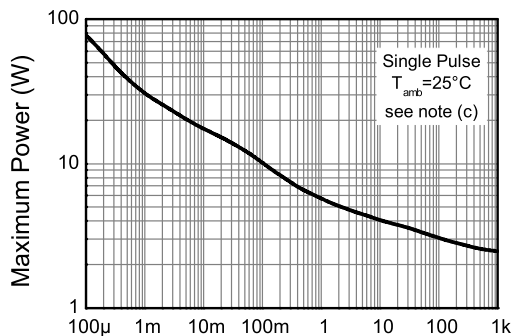
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



Pulse Power Dissipation

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Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

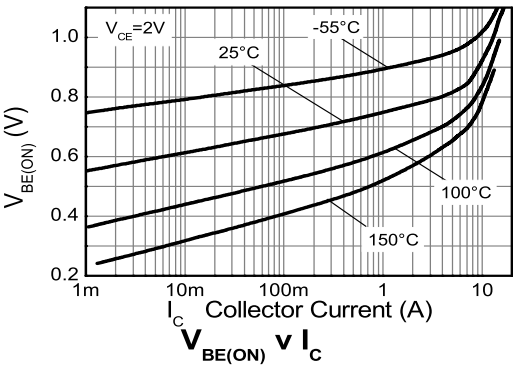
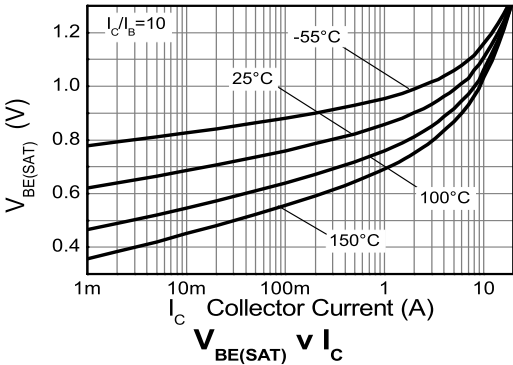
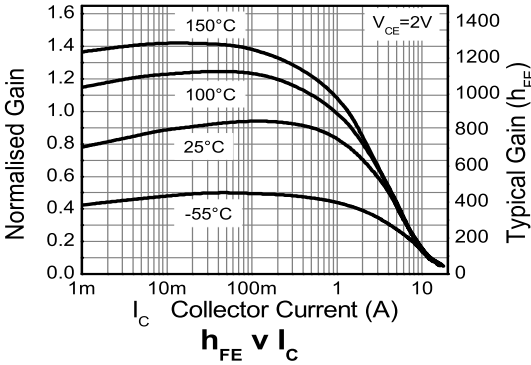
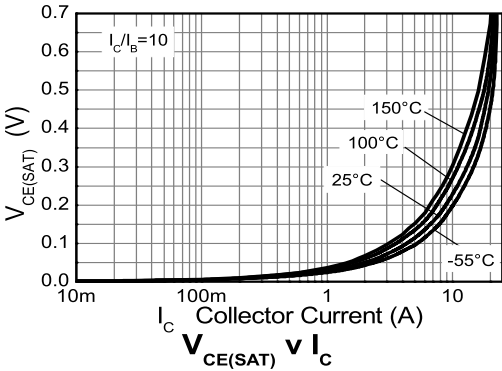
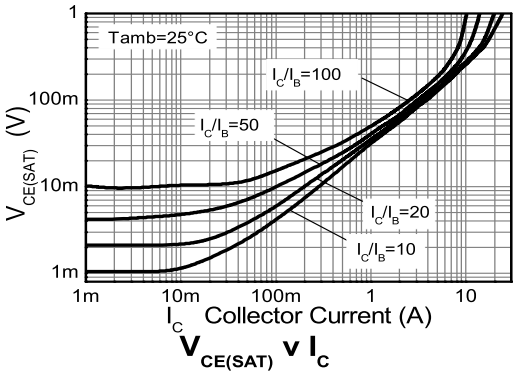
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-Base breakdown voltage	BV_{CBO}	20	40		V	$I_C = 100\mu\text{A}$
Collector-Emitter breakdown voltage	BV_{CEO}	12	17		V	$I_C = 10\text{mA}^{(*)}$
Emitter-Collector breakdown voltage (reverse blocking)	BV_{ECX}	6	8		V	$I_E = 100\text{mA}$, $R_{BC} < 1\text{k}\Omega$ or $0.25\text{V} > V_{BC} > -0.25\text{V}$
Emitter-Collector breakdown voltage (reverse blocking)	BV_{ECO}	4.5	5.5		V	$I_E = 100\mu\text{A}$
Emitter-Base breakdown voltage	BV_{EBO}	7	8.3		V	$I_E = 100\mu\text{A}$
Collector-Base cut-off current	I_{CBO}		<1	50 0.5	nA μA	$V_{CB} = 20\text{V}$ $V_{CB} = 20\text{V}$, $T_{amb} = 100^{\circ}\text{C}$
Collector-Emitter cut-off current	I_{CEX}			100	nA	$V_{CE} = 20\text{V}$, $R_{BE} < 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Emitter cut-off current	I_{EBO}		<1	50	nA	$V_{EB} = 5.6\text{V}$
Collector-Emitter saturation voltage	$V_{CE(sat)}$		31 50 70 90 200	38 60 85 130 270	mV mV mV mV mV	$I_C = 1\text{A}$, $I_B = 100\text{mA}^{(*)}$ $I_C = 1\text{A}$, $I_B = 10\text{mA}^{(*)}$ $I_C = 2\text{A}$, $I_B = 40\text{mA}^{(*)}$ $I_C = 2\text{A}$, $I_B = 20\text{mA}^{(*)}$ $I_C = 6.5\text{A}$, $I_B = 130\text{mA}^{(*)}$
Base-Emitter saturation voltage	$V_{BE(sat)}$		950	1050	mV	$I_C = 6.5\text{A}$, $I_B = 130\text{mA}^{(*)}$
Base-Emitter turn-on voltage	$V_{BE(on)}$		840	950	mV	$I_C = 6.5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	h_{FE}	500 500 185 30	800 750 250 50	1500		$I_C = 10\text{mA}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 1\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 6.5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 15\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	f_T		260		MHz	$I_C = 50\text{mA}$, $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Input capacitance	C_{ibo}		137	250	pF	$V_{EB} = 0.5\text{V}$, $f = 1\text{MHz}^{(*)}$
Output capacitance	C_{obo}		25	35	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}^{(*)}$
Delay time	t_d		71		ns	$I_C = 1\text{A}$, $V_{CC} = 10\text{V}$, $I_{B1} = -I_{B2} = 10\text{mA}$
Rise time	t_r		70		ns	
Storage time	t_s		233		ns	
Fall time	t_f		72		ns	

NOTES:

(*) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

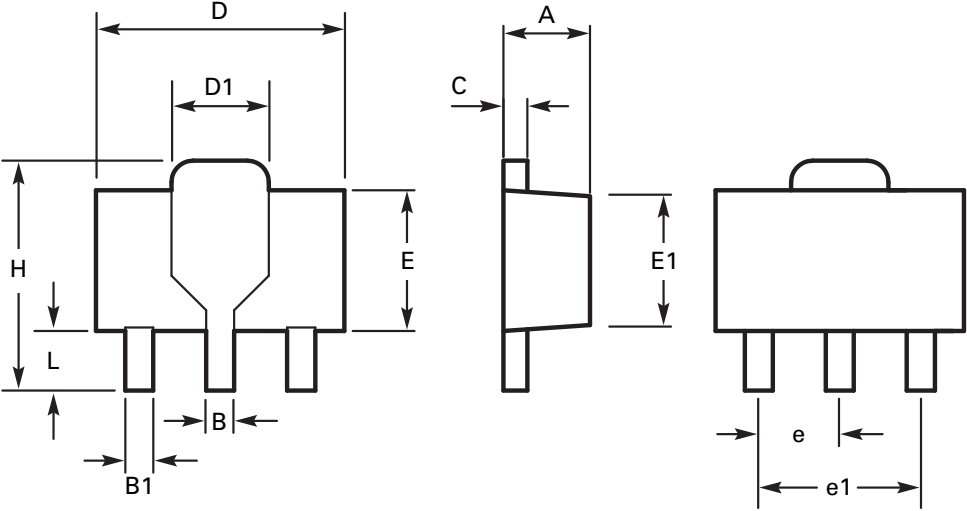
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Typical characteristics



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Package outline - SOT89



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.40	1.60	0.550	0.630	E	2.29	2.60	0.090	0.102
B	0.44	0.56	0.017	0.022	E1	2.13	2.29	0.084	0.090
B1	0.36	0.48	0.014	0.019	e	1.50 BSC		0.059 BSC	
C	0.35	0.44	0.014	0.017	e1	3.00 BSC		0.118 BSC	
D	4.40	4.60	0.173	0.181	H	3.94	4.25	0.155	0.167
D1	1.52	1.83	0.064	0.072	L	0.89	1.20	0.035	0.047

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Kustermann-park Balanstraße 59 D-81541 München Germany Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Zetex Inc 700 Veterans Memorial Highway Hauppauge, NY 11788 USA Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com	Zetex (Asia Ltd) 3701-04 Metroplaza Tower 1 Hing Fong Road, Kwai Fong Hong Kong Telephone: (852) 26100 611 Fax: (852) 24250 494 asia.sales@zetex.com	Zetex Semiconductors plc Zetex Technology Park, Chadderton Oldham, OL9 9LL United Kingdom Telephone: (44) 161 622 4444 Fax: (44) 161 622 4446 hq@zetex.com

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