

ZXTN25012EZ 12V NPN high gain transistor in SOT89

Summary

$$\begin{split} & {\sf BV}_{{\sf CEO}} > 12{\sf V} \\ & {\sf BV}_{{\sf ECX}} > 6{\sf V} \\ & {\sf h}_{{\sf FE}} > 500 \\ & {\sf I}_{{\sf C}({\sf cont})} = 6.5{\sf A} \\ & {\sf V}_{{\sf CE}({\sf sat})} < 38{\sf mV} @ 1{\sf A} \\ & {\sf R}_{{\sf CE}({\sf sat})} = 25{\sf m}\Omega \\ & {\sf P}_{{\sf D}} = 2.4{\sf W} \end{split}$$



С

B

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

Ordering information

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

Device marking

1K7



Pinout - top view

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)	Ι _C	6.5	А
Base current	Ι _Β	1	А
Peak pulse current	I _{CM}	15	А
Power dissipation at $T_A = 25^{\circ}C^{(a)}$	PD	1.1	W
Linear derating factor		8.8	mW/°C
Power dissipation at $T_A = 25^{\circ}C^{(b)}$	PD	1.8	W
Linear derating factor		14.4	mW/°C
Power dissipation at $T_A = 25^{\circ}C^{(c)}$	PD	2.4	W
Linear derating factor		19.2	mW/°C
Power dissipation at $T_A = 25^{\circ}C^{(d)}$	PD	4.46	W
Linear derating factor		35.7	mW/°C
Power dissipation at $T_{C} = 25^{\circ}C^{(e)}$	PD	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 _{OJA}	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 _{OJC}	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

Thermal characteristics



Thermal characteristics



Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Collector-Base breakdown voltage	BV _{CBO}	20	40		V	I _C = 100μA
Collector-Emitter breakdown voltage	BV _{CEO}	12	17		V	I _C = 10mA ^(*)
Emitter-Collector breakdown voltage (reverse blocking)	BV _{ECX}	6	8		V	$I_{E} = 100 \text{mA}, R_{BC} < 1 \text{k}\Omega$ or $0.25 \text{V} > \text{V}_{BC} > -0.25 \text{V}$
Emitter-Collector breakdown voltage (reverse blocking)	BV _{ECO}	4.5	5.5		V	I _E = 100μA
Emitter-Base breakdown voltage	BV _{EBO}	7	8.3		V	I _E = 100μA
Collector-Base cut-off	I _{CBO}		<1	50	nA	V _{CB} = 20V
current				0.5	μA	$V_{CB} = 20V, T_{amb} = 100^{\circ}C$
Collector-Emitter cut-off current	I _{CEX}			100	nA	$V_{CE} = 20V, R_{BE} < 1k\Omega \text{ or} \\ -1V < V_{BE} < 0.25V$
Emitter cut-off current	I _{EBO}		<1	50	nA	V _{EB} = 5.6V
Collector-Emitter	V _{CE(sat)}		31	38	mV	$I_{C} = 1A, I_{B} = 100 \text{mA}^{(*)}$
saturation voltage			50	60	mV	$I_{C} = 1A, I_{B} = 10mA^{(*)}$
			70	85	mV	$I_{C} = 2A, I_{B} = 40mA^{(*)}$
			90	130	mV	$I_{\rm C} = 2A, I_{\rm B} = 20 {\rm m} {\rm A}^{(*)}$
			200	270	mV	I _C = 6.5A, I _B = 130mA ^(*)
Base-Emitter saturation voltage	V _{BE(sat)}		950	1050	mV	I _C = 6.5A, I _B = 130mA ^(*)
Base-Emitter turn-on voltage	V _{BE(on)}		840	950	mV	$I_{C} = 6.5A, V_{CE} = 2V^{(*)}$
Static forward current transfer ratio	h _{FE}	500 500 185 30	800 750 250 50	1500		$\begin{split} &I_{C} = 10 \text{mA}, V_{CE} = 2 \text{V}^{(*)} \\ &I_{C} = 1 \text{A}, V_{CE} = 2 \text{V}^{(*)} \\ &I_{C} = 6.5 \text{A}, V_{CE} = 2 \text{V}^{(*)} \\ &I_{C} = 15 \text{A}, V_{CE} = 2 \text{V}^{(*)} \end{split}$
Transition frequency	f _T		260		MHz	I _C = 50mA, V _{CE} = 10V f = 100MHz
Input capacitance	C _{ibo}		137	250	pF	V _{EB} = 0.5V, f = 1MHz ^(*)
Output capacitance	C _{obo}		25	35	pF	V _{CB} = 10V, f = 1MHz ^(*)
Delay time	t _d		71		ns	
Rise time	t _r		70		ns	$I_{\rm C} = 1$ A, $V_{\rm CC} = 10$ V,
Storage time	t _s		233		ns	I _{B1} =-I _{B2} = 10mA
Fall time	t _f		72		ns	

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

NOTES:

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

Typical characteristics



Package outline - SOT89



DIM	Millin	neters	Inc	hes	DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
Α	1.40	1.60	0.550	0.630	E	2.29	2.60	0.090	0.102
В	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	е	1.50 BSC		0.059 BSC	
С	0.35	0.44	0.014	0.017	e1	3.00 BSC		0.118 BSC	
D	4.40	4.60	0.173	0.181	Н	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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