

ZXTN07012EFF

12V, SOT23F, NPN high gain power transistor

Summary

$BV_{CEO} > 12V$

$BV_{ECO} > 3V$

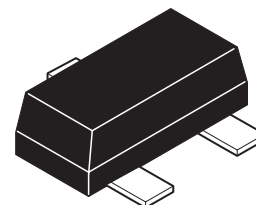
$I_{C(cont)} = 4.5A$

$V_{CE(sat)} < 70mV @ 1A$

$R_{CE(sat)} = 43m\Omega$

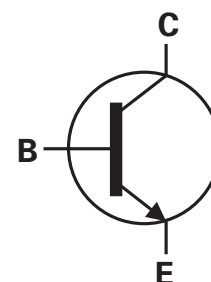
$P_D = 1.5W$

Complementary part number ZXTP07012EFF



Description

This low voltage NPN transistor has been designed for applications requiring high gain and very low saturation voltage. The SOT23F package is pin compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

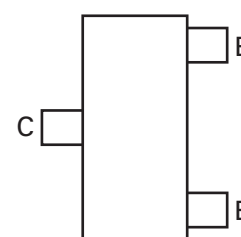


Features

- Low profile SOT23F package
- Low saturation voltage
- High gain
- High power dissipation

Applications

- LED driver
- Boost converter
- Logic interface
- Motor drive



Pinout - top view

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN07012EFFTA	7	8	3000

Device marking

1D3

Absolute maximum 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_{ECO}	3	V
Emitter-base voltage	V_{EBO}	7	V
Continuous collector current ^(c)	I_C	4.5	A
Base current	I_B	1	A
Peak pulse current	I_{CM}	10	A
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(a)}$	P_D	0.84	W
Linear derating factor		6.72	mW/ $^{\circ}\text{C}$
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(b)}$	P_D	1.34	W
Linear derating factor		10.72	mW/ $^{\circ}\text{C}$
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(c)}$	P_D	1.50	W
Linear derating factor		12.0	mW/ $^{\circ}\text{C}$
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(d)}$	P_D	2.0	W
Linear derating factor		16.0	mW/ $^{\circ}\text{C}$
Operating and storage temperature range	T_j, T_{stg}	- 55 to 150	$^{\circ}\text{C}$

Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	149	$^{\circ}\text{C/W}$
Junction to ambient ^(b)	$R_{\theta JA}$	93	$^{\circ}\text{C/W}$
Junction to ambient ^(c)	$R_{\theta JA}$	83	$^{\circ}\text{C/W}$
Junction to ambient ^(d)	$R_{\theta JA}$	60	$^{\circ}\text{C/W}$

NOTES:

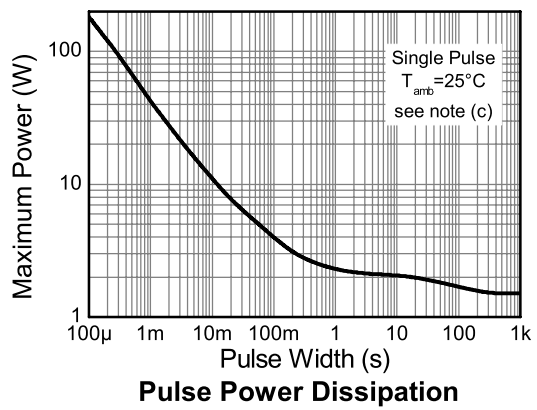
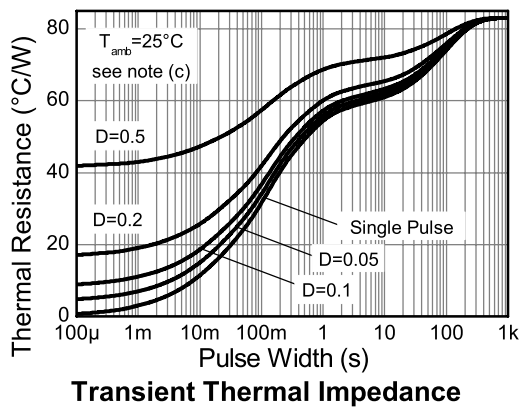
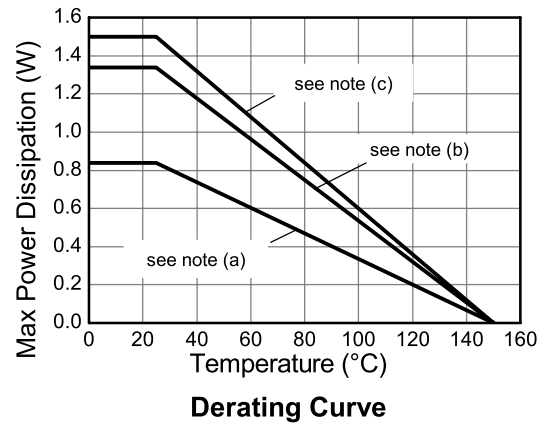
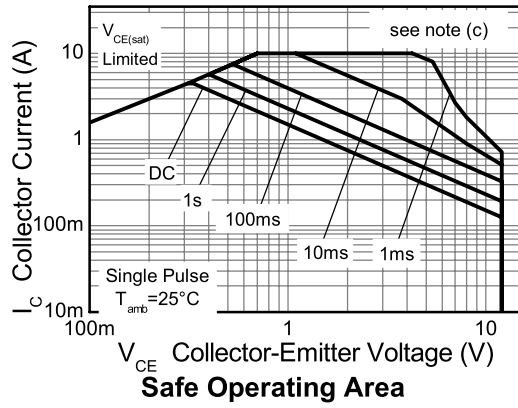
(a) For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(c) Mounted on 50mm x 50mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(d) As (c) above measured at $t < 5\text{secs}$.

Characteristics



ZXTN07012EFF

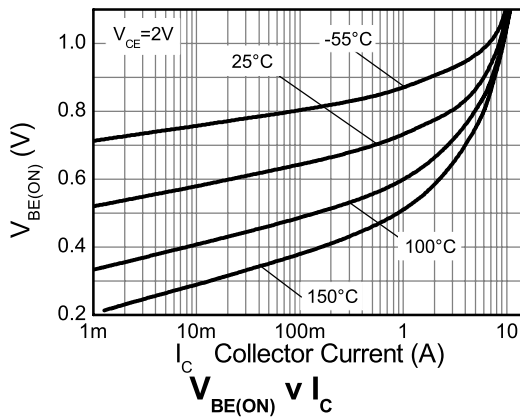
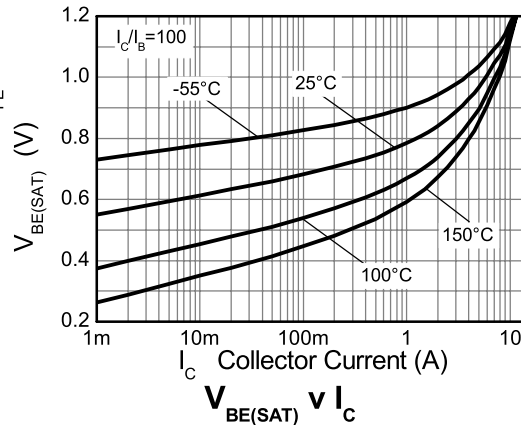
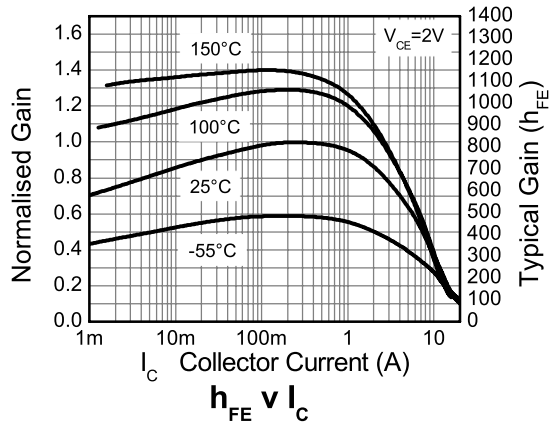
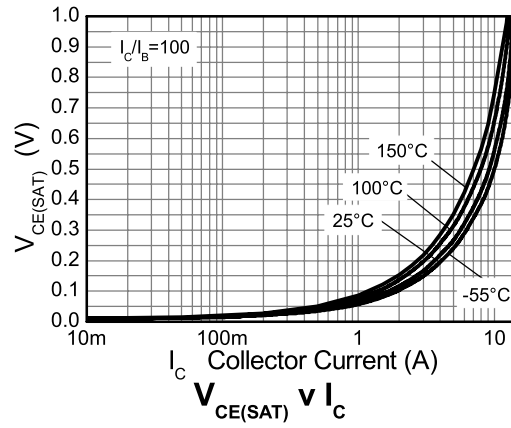
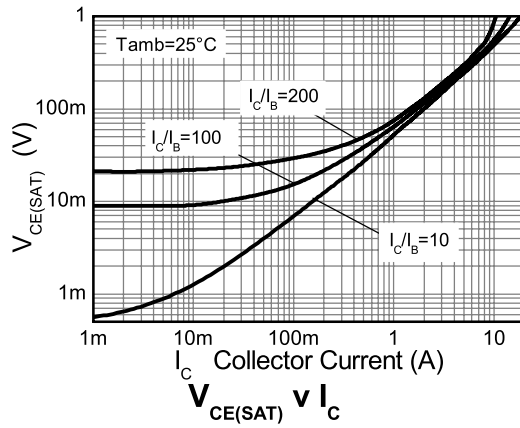
Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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 (base open)	BV_{CEO}	12	17		V	$I_C = 10\text{mA}^{(*)}$
Emitter-base breakdown voltage	BV_{EBO}	7	8.3		V	$I_E = 100\mu\text{A}$
Emitter-collector breakdown voltage (reverse blocking)	BV_{ECX}	6	8.2		V	$I_E = 100\mu\text{A}$, $R_{BC} < 1\text{k}\Omega$ or $0.25\text{V} > V_{BC} > -0.25\text{V}$
Emitter-collector breakdown voltage (base open)	BV_{ECO}	3.0	5.3		V	$I_E = 100\mu\text{A}$,
Collector-base cut-off current	I_{CBO}		<1	50 20	nA μA	$V_{CB} = 16\text{V}$ $V_{CB} = 16\text{V}$, $T_{amb} = 100^{\circ}\text{C}$
Emitter-base cut-off current	I_{EBO}		<1	50	nA	$V_{EB} = 5.6\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		25	40	mV	$I_C = 100\text{mA}$, $I_B = 0.5\text{mA}^{(*)}$
			60	85	mV	$I_C = 1\text{A}$, $I_B = 10\text{mA}^{(*)}$
			50	70	mV	$I_C = 1\text{A}$, $I_B = 100\text{mA}^{(*)}$
			105	150	mV	$I_C = 2\text{A}$, $I_B = 20\text{mA}^{(*)}$
			215	320	mV	$I_C = 4.5\text{A}$, $I_B = 45\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		945	1050	mV	$I_C = 4.5\text{A}$, $I_B = 45\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		850	950	mV	$I_C = 4.5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	h_{FE}	500	800	1500		$I_C = 0.1\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
		400	650			$I_C = 2\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
		330	530			$I_C = 4.5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
		140	230			$I_C = 10\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	f_T	150	220		MHz	$I_C = 50\text{mA}$, $V_{CE} = 5\text{V}$ $f = 50\text{MHz}$
Input capacitance	C_{ibo}		229		pF	$V_{EB} = 0.5\text{V}$, $f = 1\text{MHz}^{(*)}$
Output capacitance	C_{Obo}		40	50	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}^{(*)}$
Delay time	t_d		26.8		ns	$V_{CC} = 10\text{V}$. $I_C = 500\text{mA}$, $I_{B1} = I_{B2} = 50\text{mA}$.
Rise time	t_r		14.2		ns	
Storage time	t_s		250		ns	
Fall time	t_f		67.7		ns	

NOTES:

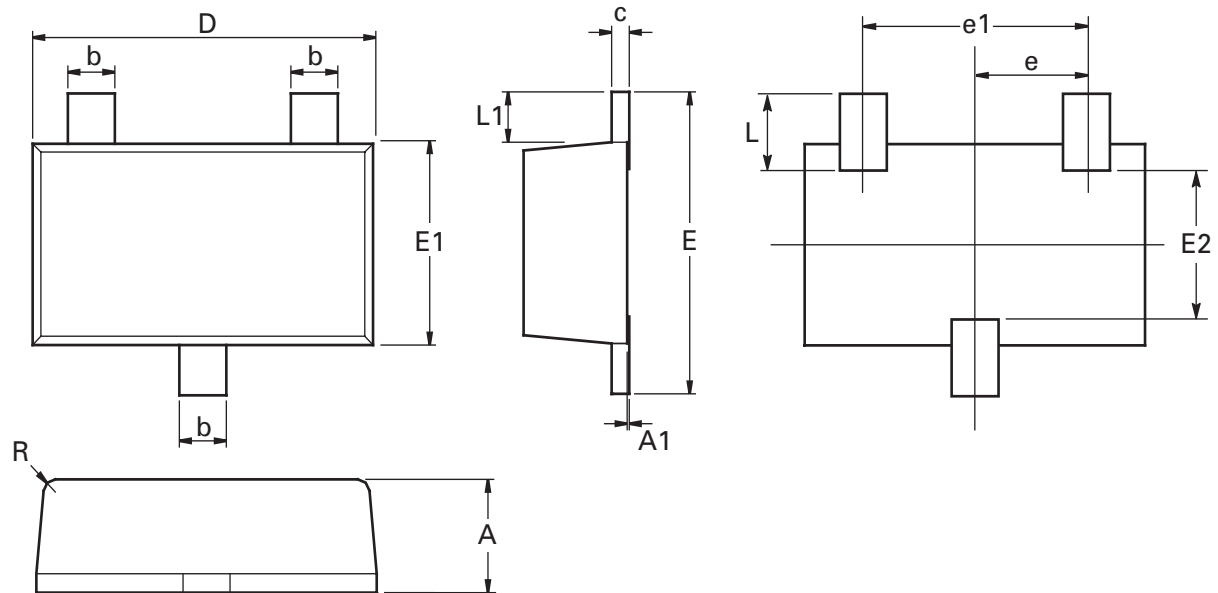
(*) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

Typical characteristics



ZXTN07012EFF

Package outline - SOT23F



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	0.80	1.00	0.0315	0.0394	E	2.30	2.50	0.0906	0.0984
A1	0.00	0.10	0.00	0.0043	E1	1.50	1.70	0.0590	0.0669
b	0.35	0.45	0.0153	0.0161	E2	1.10	1.26	0.0433	0.0496
c	0.10	0.20	0.0043	0.0079	L	0.48	0.68	0.0189	0.0268
D	2.80	3.00	0.1102	0.1181	L1	0.30	0.50	0.0153	0.0161
e	0.95 ref		0.0374 ref		R	0.05	0.15	0.0019	0.0059
e1	1.80	2.00	0.0709	0.0787	O	0°	12°	0°	12°

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

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