

# ZXTN25012EFH

## 12V, SOT23, NPN medium power transistor

### Summary

$BV_{CEO} > 12V$

$BV_{ECO} > 4.5V$

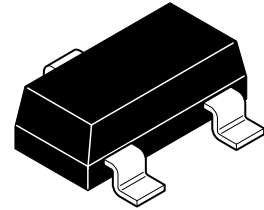
$h_{FE} > 500$

$I_{C(cont)} = 6A$

$V_{CE(sat)} < 32mV @ 1A$

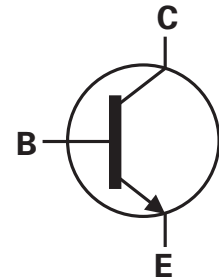
$R_{CE(sat)} = 23m\Omega$

$P_D = 1.25W$



### Description

Advanced process capability and package design have been used to maximize the power handling and performance of this small outline transistor. The compact size and ratings of this device make it ideally suited to applications where space is at a premium.

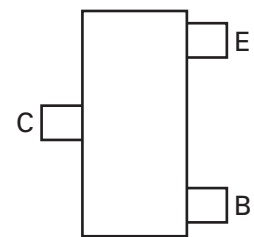


### Features

- High power dissipation SOT23 package
- High peak current
- Very high gain
- Low saturation voltage
- 6V reverse blocking voltage

### Applications

- MOSFET gate drivers
- Power switches
- Motor control
- DC fans
- DC-DC converters



Pinout - top view

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN25012EFHTA	7	8	3,000

### Device marking

1C3

# ZXTN25012EFH

## 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)	$V_{ECO}$	4.5	V
Emitter-base voltage	$V_{EBO}$	7	V
Continuous collector current <sup>(c)</sup>	$I_C$	6	A
Base current	$I_B$	1	A
Peak pulse current	$I_{CM}$	15	A
Power dissipation at $T_{amb} = 25^\circ\text{C}^{(a)}$ Linear derating factor	$P_D$	0.73 5.84	W mW/°C
Power dissipation at $T_{amb} = 25^\circ\text{C}^{(b)}$ Linear derating factor	$P_D$	1.05 8.4	W mW/°C
Power dissipation at $T_{amb} = 25^\circ\text{C}^{(c)}$ Linear derating factor	$P_D$	1.25 9.6	W mW/°C
Power dissipation at $T_{amb} = 25^\circ\text{C}^{(d)}$ Linear derating factor	$P_D$	1.81 14.5	W mW/°C
Operating and storage temperature range	$T_j, T_{stg}$	- 55 to 150	°C

## Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	171	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	119	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	100	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	69	°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.

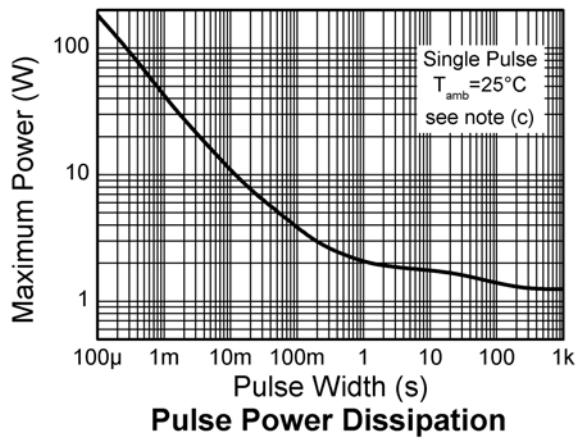
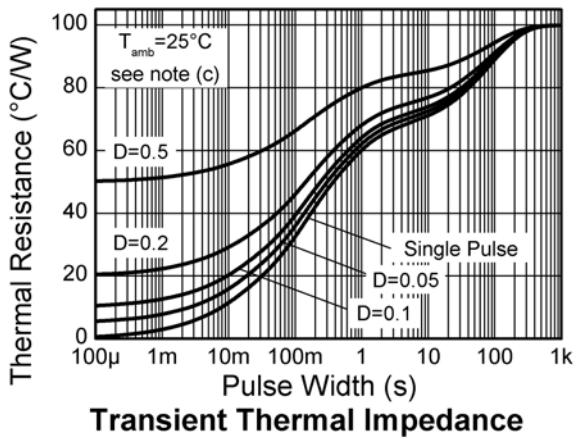
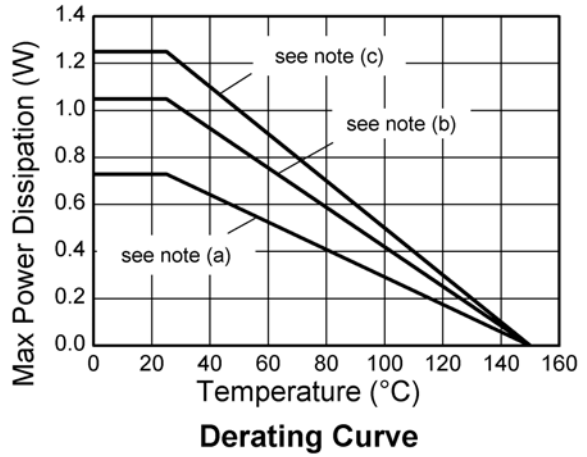
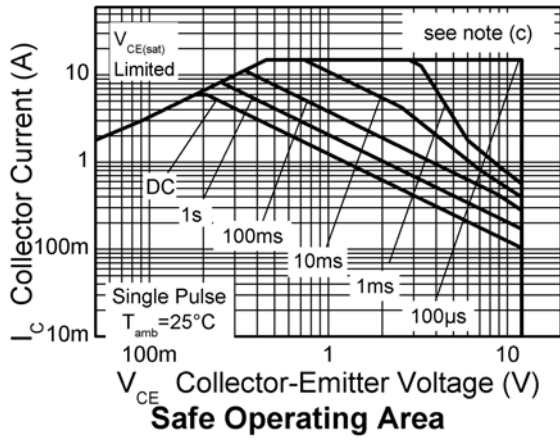
(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(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  $t < 5$ secs.

# ZXTN25012EFH

## Characteristics



# ZXTN25012EFH

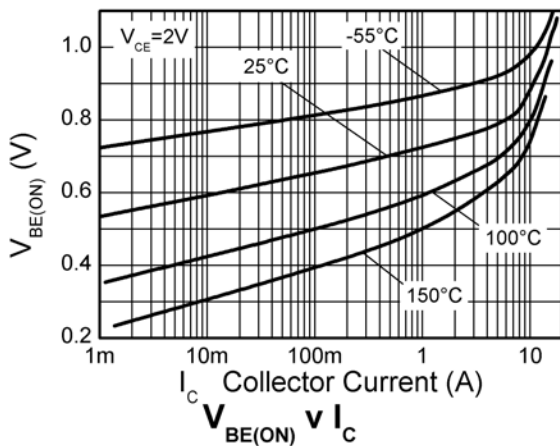
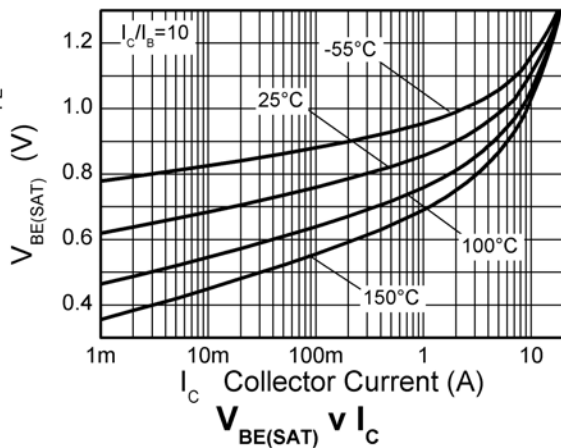
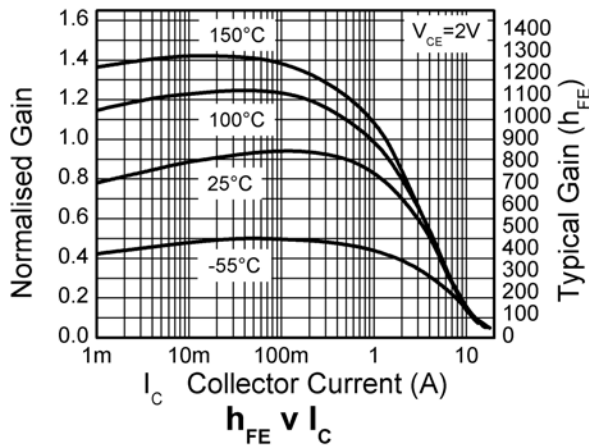
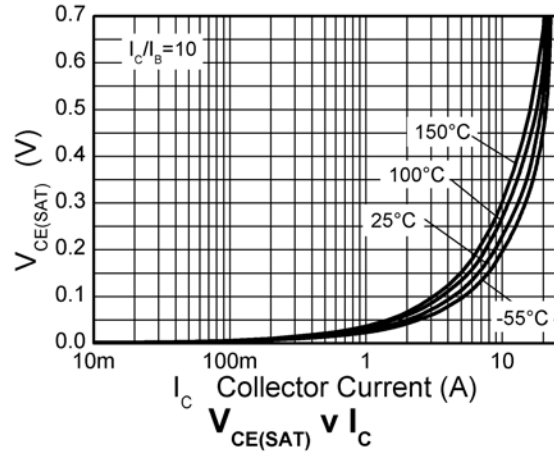
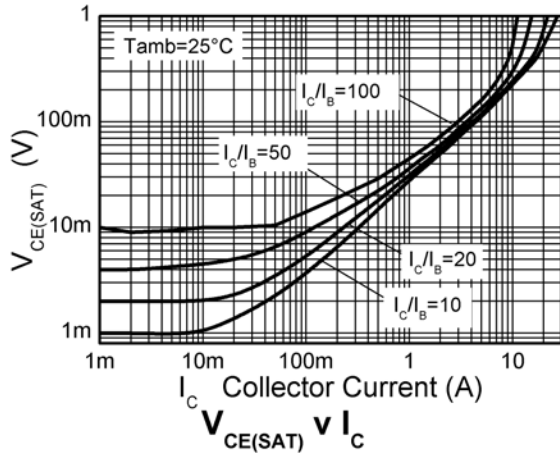
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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	8.0		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)	$BV_{ECO}$	4.5	5.5		V	$I_E = 100\mu\text{A}$ ,
Collector-base cut-off current	$I_{CBO}$		<1	50 20	nA $\mu\text{A}$	$V_{CB} = 16\text{V}$ $V_{CB} = 16\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$
Emitter-base cut-off current	$I_{EBO}$		<1	50	nA	$V_{EB} = 5.6\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		28 45 60 160	32 55 75 190	mV mV mV mV	$I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$ $I_C = 1\text{A}$ , $I_B = 10\text{mA}^{(*)}$ $I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$ $I_C = 6\text{A}$ , $I_B = 120\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		920	1000	mV	$I_C = 6\text{A}$ , $I_B = 120\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		800	900	mV	$I_C = 6\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	500 500 300 40	800 750 460 55	1500		$I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 1\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 4\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 15\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	$f_T$		260		MHz	$I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output capacitance	$C_{OBO}$		25.6	35	pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}^{(*)}$
Delay time	$t_d$		70.9		ns	$V_{CC} = 10\text{V}$ .
Rise time	$t_r$		69.8		ns	$I_C = 1\text{A}$ ,
Storage time	$t_s$		233		ns	$I_{B1} = I_{B2} = 10\text{mA}$ .
Fall time	$t_f$		71.6		ns	

### NOTES:

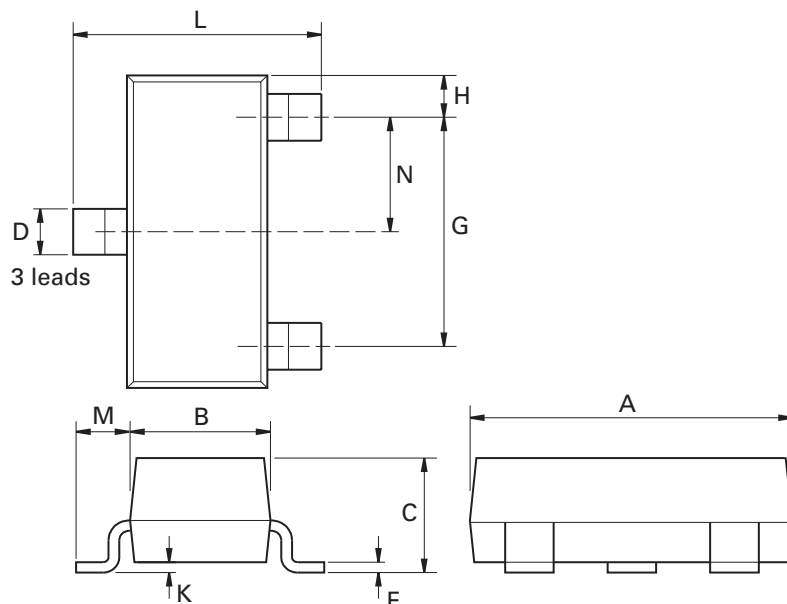
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTN25012EFH

## Package outline - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	2.67	3.05	0.105	0.120	H	0.33	0.51	0.013	0.020
B	1.20	1.40	0.047	0.055	K	0.01	0.10	0.0004	0.004
C	-	1.10	-	0.043	L	2.10	2.50	0.083	0.0985
D	0.37	0.53	0.015	0.021	M	0.45	0.64	0.018	0.025
F	0.085	0.15	0.0034	0.0059	N	0.95 NOM		0.0375 NOM	
G	1.90 NOM		0.075 NOM		-	-	-	-	-

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

Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Streitfeldstraße 19 D-81673 München Germany	Zetex Inc 700 Veterans Memorial Highway Hauppauge, NY 11788 USA	Zetex (Asia Ltd) 3701-04 Metroplaza Tower 1 Hing Fong Road, Kwai Fong Hong Kong	Zetex Semiconductors plc Zetex Technology Park, Chadderton Oldham, OL9 9LL United Kingdom
Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com	Telephone: (852) 26100 611 Fax: (852) 24250 494 asia.sales@zetex.com	Telephone: (44) 161 622 4444 Fax: (44) 161 622 4446 hq@zetex.com

For international sales offices visit [www.zetex.com/offices](http://www.zetex.com/offices)

Zetex products are distributed worldwide. For details, see [www.zetex.com/salesnetwork](http://www.zetex.com/salesnetwork)

This publication is issued to provide outline information only which (unless agreed by the company in writing) may not be used, applied or reproduced for any purpose or form part of any order or contact or be regarded as a representation relating to the products or services concerned. The company reserves the right to alter without notice the specification, design, price or conditions of supply of any product or service.