

# ZXTP25012EFH

## 12V, SOT23, PNP medium power transistor

### Summary

$BV_{CEO} > -12V$

$h_{FE} > 500$

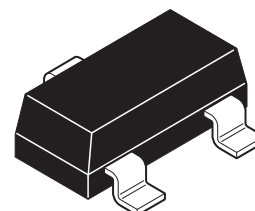
$I_{C(cont)} = 4A$

$R_{CE(sat)} = 40m\Omega$

$V_{CE(sat)} < -65mV @ 1A$

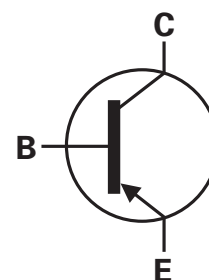
$P_D = 1.25W$

Complementary part number ZXTN25012EFH



### Description

Advanced process capability and package design have been used to maximise 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.

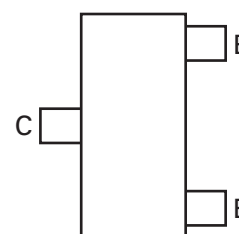


### Features

- High power dissipation SOT23 package
- High peak current
- Very high gain, 500 minimum
- Low saturation voltage

### Applications

- MOSFET and IGBT gate driving
- DC - DC converters
- Motor drive
- High side driver
- Line disconnect switch



Pinout - top view

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTP25012EFHTA	7	8	3000

### Device marking

1E8

# ZXTP25012EFH

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	$V_{CBO}$	-12	V
Collector-emitter voltage	$V_{CEO}$	-12	V
Emitter-base voltage	$V_{EBO}$	-7	V
Continuous collector current <sup>(b)</sup>	$I_C$	-4	A
Base current	$I_B$	-1	A
Peak pulse current	$I_{CM}$	-10	A
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(a)}$	$P_D$	0.73	W
Linear derating factor		5.84	mW/ $^{\circ}\text{C}$
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(b)}$	$P_D$	1.05	W
Linear derating factor		8.4	mW/ $^{\circ}\text{C}$
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(c)}$	$P_D$	1.25	W
Linear derating factor		9.6	mW/ $^{\circ}\text{C}$
Power dissipation at $T_{amb} = 25^{\circ}\text{C}^{(d)}$	$P_D$	1.81	W
Linear derating factor		14.5	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 <sup>(a)</sup>	$R_{\theta JA}$	171	$^{\circ}\text{C}/\text{W}$
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	119	$^{\circ}\text{C}/\text{W}$
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	100	$^{\circ}\text{C}/\text{W}$
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	69	$^{\circ}\text{C}/\text{W}$

### 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.

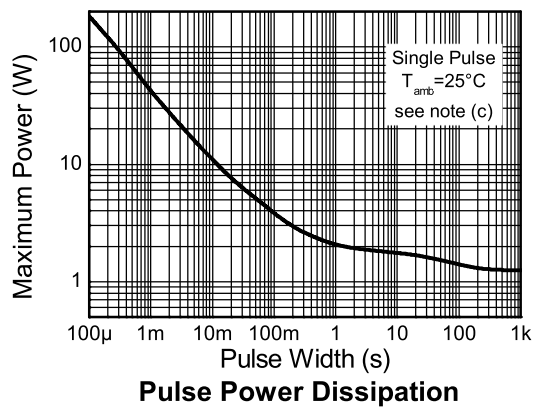
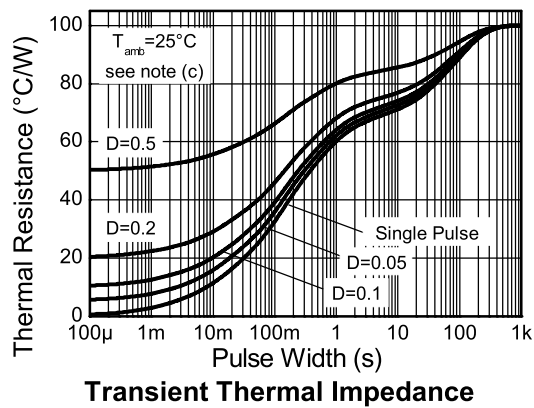
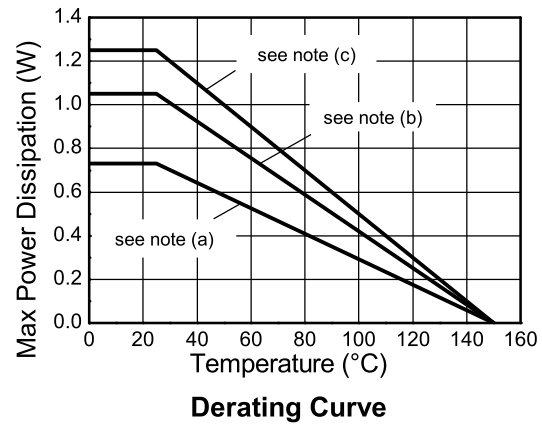
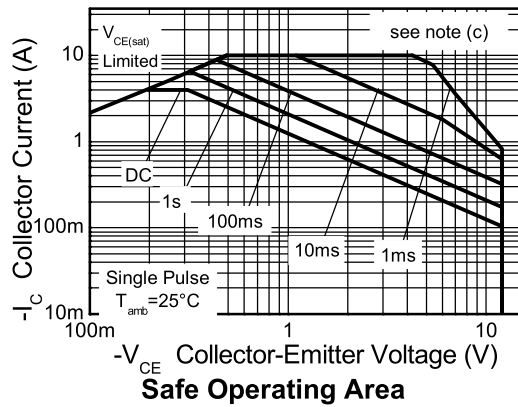
(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(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  $t < 5\text{secs}$

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## Characteristics



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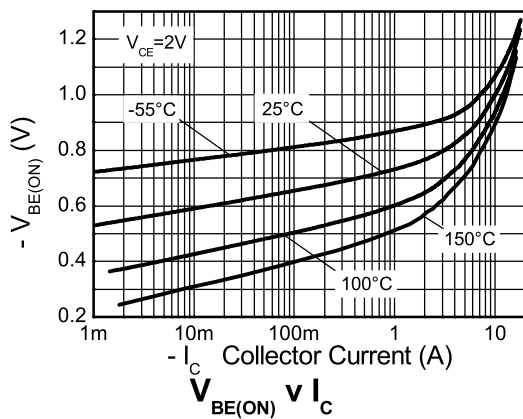
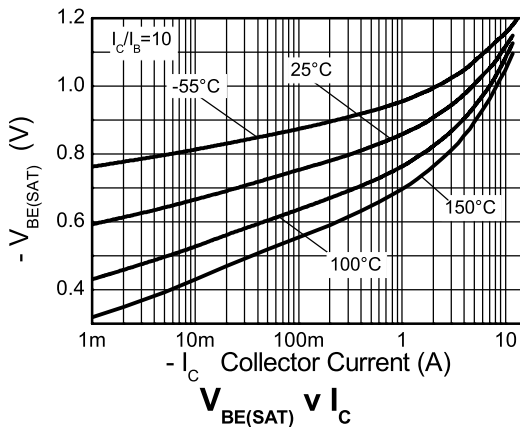
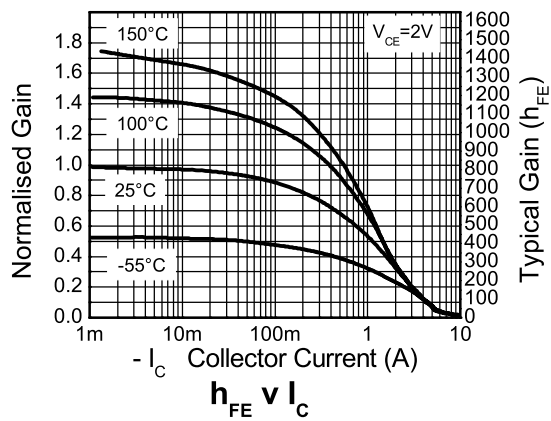
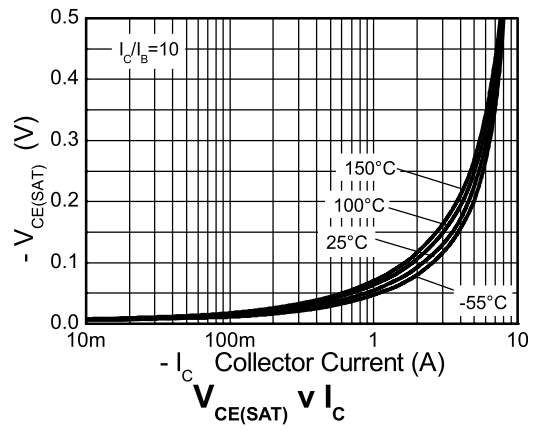
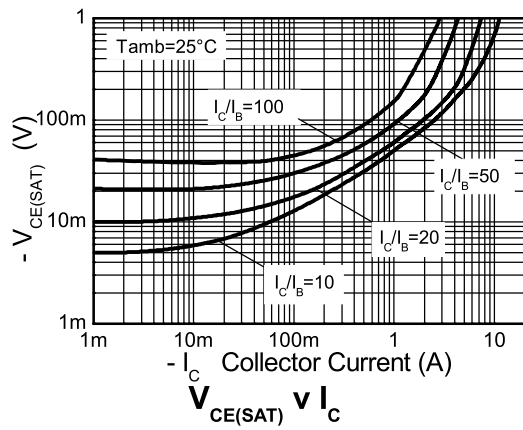
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	-12	-35		V	$I_C = -100\mu\text{A}$
Collector-emitter breakdown voltage (base open)	$BV_{CEO}$	-12	-25		V	$I_C = -10\text{mA}^{(*)}$
Emitter-base breakdown voltage	$BV_{EBO}$	-7	-8.5		V	$I_E = -100\mu\text{A}$
Collector-base cut-off current	$I_{CBO}$		<-1	-50 -0.5	nA $\mu\text{A}$	$V_{CB} = -12\text{V}$ $V_{CB} = -12\text{V}, T_{amb} = 100^{\circ}\text{C}$
Emitter-base cut-off current	$I_{EBO}$		<-1	-50	nA	$V_{EB} = -5.6\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		-50	-65	mV	$I_C = -1\text{A}, I_B = -100\text{mA}^{(*)}$
			-150	-260	mV	$I_C = -1\text{A}, I_B = -10\text{mA}^{(*)}$
			-175	-350	mV	$I_C = -2\text{A}, I_B = -40\text{mA}^{(*)}$
			-160	-210	mV	$I_C = -4\text{A}, I_B = -400\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		-970	-1050	mV	$I_C = -4\text{A}, I_B = -400\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		-825	-950	mV	$I_C = -4\text{A}, V_{CE} = -2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	500	800	1500		$I_C = -10\text{mA}, V_{CE} = -2\text{V}^{(*)}$
		300	450			$I_C = -1\text{A}, V_{CE} = -2\text{V}^{(*)}$
		50	100			$I_C = -4\text{A}, V_{CE} = -2\text{V}^{(*)}$
Transition frequency	$f_T$		310		MHz	$I_C = -50\text{mA}, V_{CE} = -10\text{V}$ $f = 100\text{MHz}$
Output capacitance	$C_{obo}$		16.9		pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}^{(*)}$
Delay time	$t_d$		41		ns	$V_{CC} = -10\text{V}$ $I_C = -1\text{A},$ $I_{B1} = I_{B2} = -10\text{mA}$
Rise time	$t_r$		62		ns	
Storage time	$t_s$		179		ns	
Fall time	$t_f$		65		ns	

### NOTES:

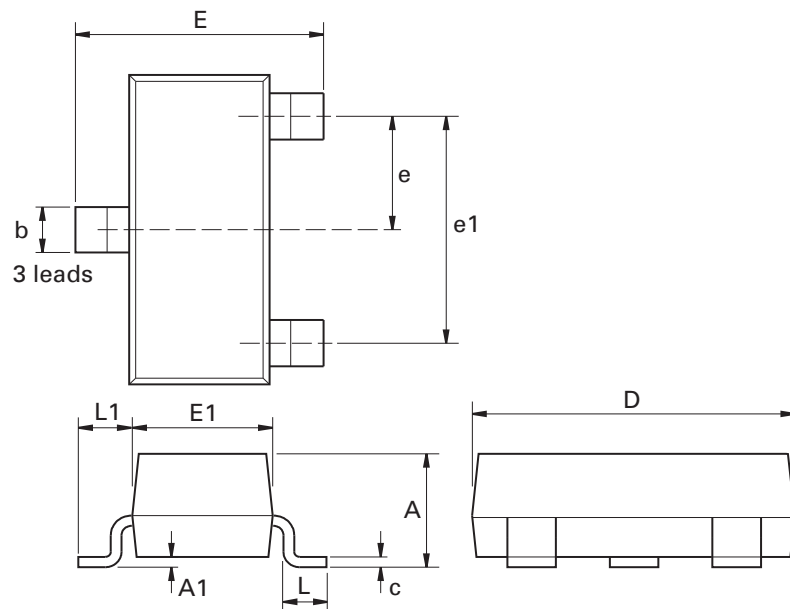
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



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## Package outline - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
C	0.085	0.120	0.003	0.008	L	0.25	0.62	0.018	0.024
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.0375 NOM		-	-	-	-	-

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

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