

# ZXTN04120HFF

## 120V, SOT23F, NPN medium power Darlington transistor

### Summary

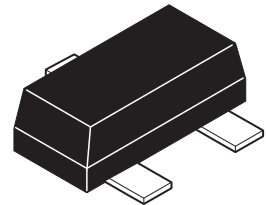
$BV_{CEO} > 120V$

$I_{C(cont)} = 1A$

$V_{CE(sat)} < 1.5V @ 1A$

$P_D = 1.5W$

Complementary part number ZXTP05120HFF

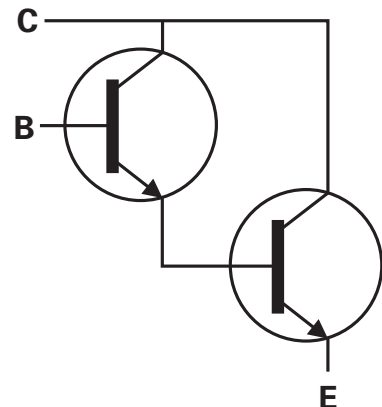


### Description

This high performance NPN Darlington transistor is housed in the small outline SOT23 flat package for applications where space is at a premium.

### Features

- Darlington transistor
- 120 volt
- 1 amp continuous rating
- Small outline surface mount SOT23 flat package

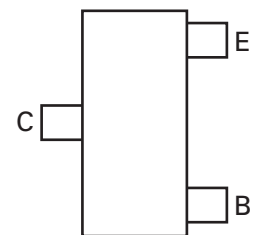


### Applications

- Lamp, relay and solenoid drive
- Lighting

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN04120HFFTA	7	8	3000



Pinout - top view

### Device marking

1F6

# ZXTN04120HFF

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	$V_{CBO}$	140	V
Collector-emitter voltage	$V_{CEO}$	120	V
Emitter-base voltage	$V_{EBO}$	10	V
Continuous collector current (c)	$I_C$	1	A
Peak pulse current	$I_{CM}$	4	A
Base current	$I_B$	0.5	A
Power dissipation @ $T_{amb} = 25^\circ\text{C}^{(a)}$	$P_D$	0.84	W
Linear derating factor		6.72	mW/°C
Power dissipation @ $T_{amb} = 25^\circ\text{C}^{(b)}$	$P_D$	1.34	W
Linear derating factor		10.72	mW/°C
Power dissipation @ $T_{amb} = 25^\circ\text{C}^{(c)}$	$P_D$	1.5	W
Linear derating factor		12.0	mW/°C
Power dissipation @ $T_{amb} = 25^\circ\text{C}^{(d)}$	$P_D$	2.0	W
Linear derating factor		16.0	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>	$R_{\theta JA}$	149	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	93	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	83	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	60	°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.

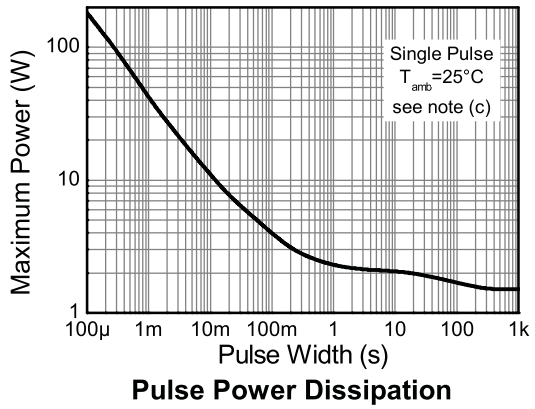
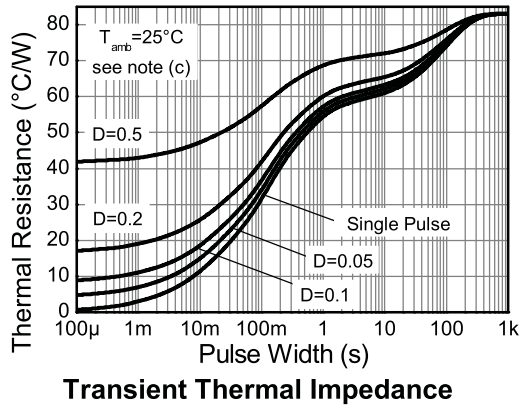
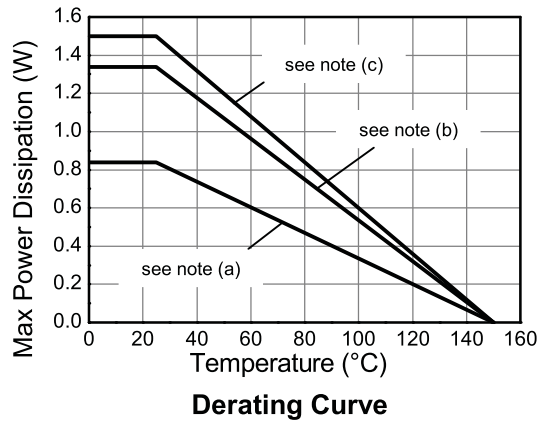
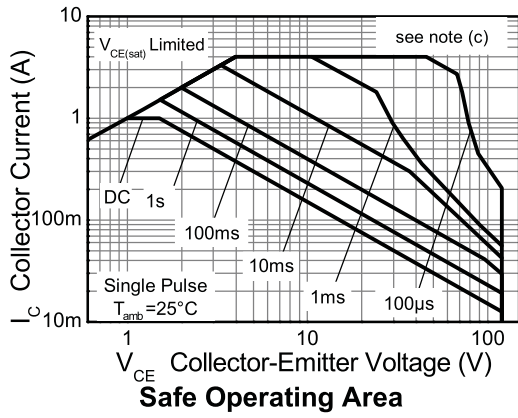
(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2oz copper in still air conditions.

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

(d) As (c) above measured at  $t < 5$ secs.

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## Characteristics



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

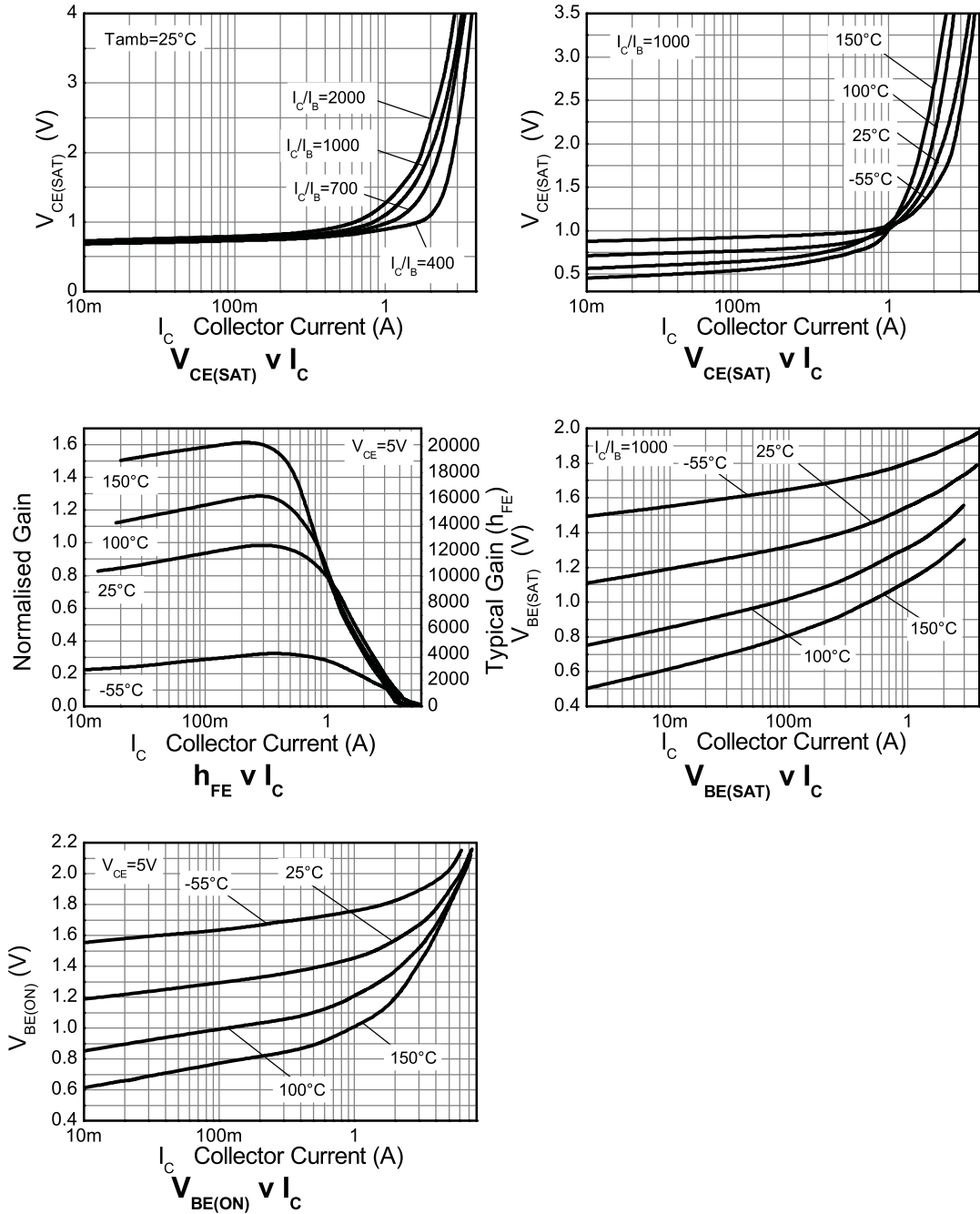
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	140	300		V	$I_C = 100\mu\text{A}$
Collector-emitter breakdown voltage (base open)	$BV_{CEO}$	120	140		V	$I_C = 10\text{mA}^{(*)}$
Emitter-base breakdown voltage	$BV_{EBO}$	10	16		V	$I_E = 100\mu\text{A}$
Collector-base cut-off current	$I_{CBO}$		<1	100 10	nA $\mu\text{A}$	$V_{CB} = 120\text{V}$ $V_{CB} = 120\text{V}, T_{amb} = 100^{\circ}\text{C}$
Collector-emitter cut-off current	$I_{CES}$		<0.1	10	$\mu\text{A}$	$V_{CE} = 120\text{V}$
Emitter-base cut-off current	$I_{EBO}$		<1	100	nA	$V_{EB} = 8\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		0.8 1.1 1.1	0.9 1.5 1.5	V V V	$I_C = 250\text{mA}, I_B = 0.25\text{mA}^{(*)}$ $I_C = 1\text{A}, I_B = 1\text{mA}^{(*)}$ $I_C = 2\text{A}, I_B = 5\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		1.55	1.70	V	$I_C = 1\text{A}, I_B = 1\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		1.45	1.70	V	$I_C = 1\text{A}, V_{CE} = 5\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	3K 3K 3K 1K	11k 12k 10k 5k	30K		$I_C = 50\text{mA}, V_{CE} = 5\text{V}^{(*)}$ $I_C = 500\text{mA}, V_{CE} = 5\text{V}^{(*)}$ $I_C = 1\text{A}, V_{CE} = 5\text{V}^{(*)}$ $I_C = 2\text{A}, V_{CE} = 5\text{V}^{(*)}$
Transition frequency	$f_T$		120		MHz	$I_C = 100\text{mA}, V_{CE} = 10\text{V}$ $f = 20\text{MHz}$
Input capacitance	$C_{ibo}$		68	90	pF	$V_{EB} = 500\text{mV}, f = 1\text{MHz}^{(*)}$
Output capacitance	$C_{obo}$		12.8	25	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}^{(*)}$
Delay time	$t_d$		507		ns	$V_{CC} = 10\text{V}$
Rise time	$t_r$		136		ns	$I_C = 500\text{mA},$
Storage time	$t_s$		910		ns	$I_{B1} = I_{B2} = 0.5\text{mA}$
Fall time	$t_f$		369		ns	

### NOTES:

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

# ZXTN04120HFF

## Typical characteristics

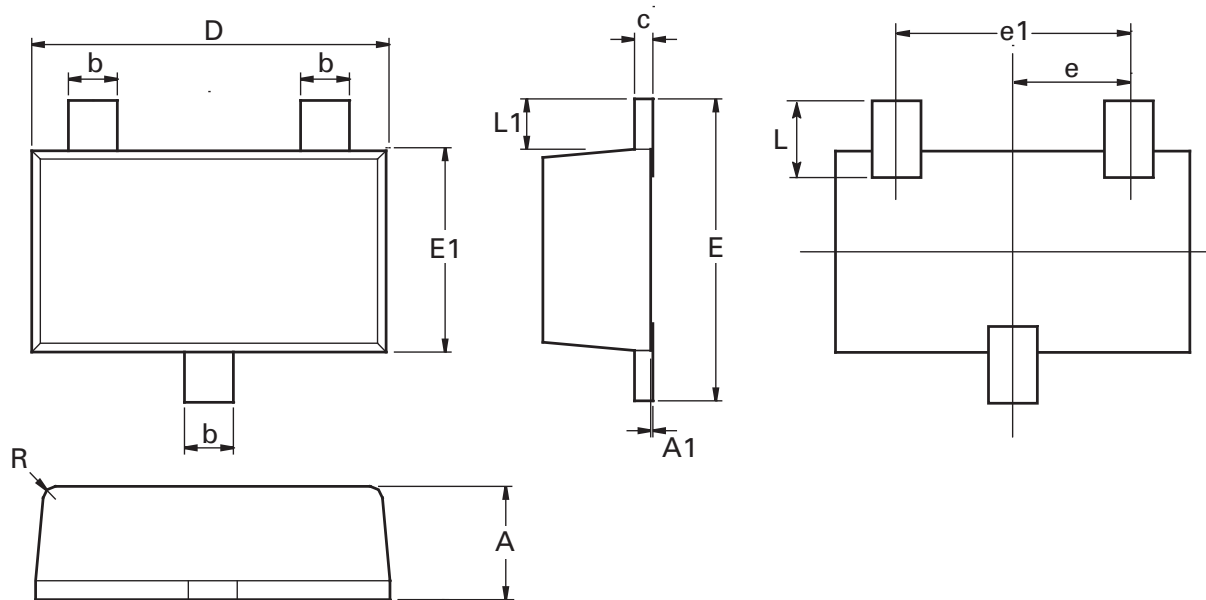


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## Package outline - SOT23F



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	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	L	0.48	0.68	0.0189	0.0268
c	0.10	0.20	0.0043	0.0079	L1	0.30	0.50	0.0153	0.0161
D	2.80	3.00	0.1102	0.1181	R	0.05	0.15	0.0019	0.0059
e	0.95 ref		0.0374 ref		O	0°	12°	0°	12°
e1	1.80	2.00	0.0709	0.0787	-	-	-	-	-

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

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