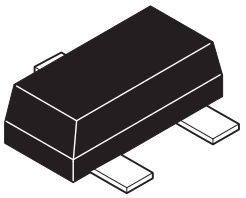
# ZXTP05120HFF
# 120V, SOT23F, PNP medium power Darlington transistor

## Summary



**$BV_{CEO}$ > -120V**

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

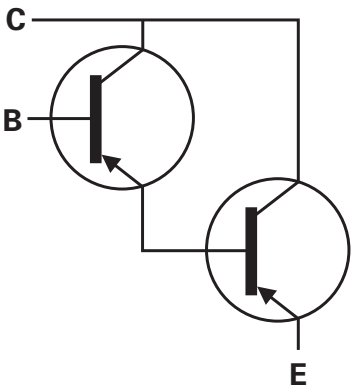
**$V_{CE(sat)}$ < 1.1V @ 1A**

**$P_D$ = 1.5W**

**Complementary part number ZXTN04120HFF**

## Description

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

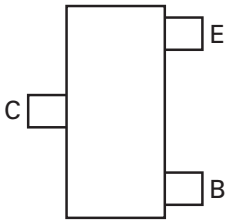



## Features

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

## Applications

- High side drivers



Pinout - top view

## Ordering information

| DEVICE | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|
| ZXTP05120HFFTA | 7 | 8 | 3000 |

## Device marking

1F7

## 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°C[a] | $P_D$ | 0.84 | W |
| Linear derating factor | | 6.72 | mW/°C |
| Power dissipation @ $T_{amb}$ =25°C[b] | $P_D$ | 1.34 | W |
| Linear derating factor | | 10.72 | mW/°C |
| Power dissipation @ $T_{amb}$ =25°C[c] | $P_D$ | 1.50 | W |
| Linear derating factor | | 12.0 | mW/°C |
| Power dissipation @ $T_{amb}$ =25°C[d] | $P_D$ | 2.0 | W |
| Linear derating factor | $P_D$ | 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[a] | $R_{\Theta JA}$ | 149 | °C/W |
| Junction to ambient[b] | $R_{\Theta JA}$ | 93 | °C/W |
| Junction to ambient[c] | $R_{\Theta JA}$ | 83 | °C/W |
| Junction to ambient[d] | $R_{\Theta JA}$ | 60 | °C/W |

**NOTES:**

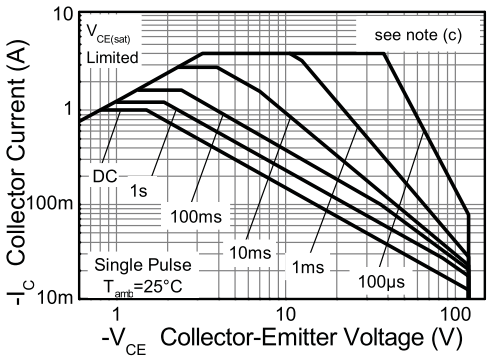
(a) For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

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

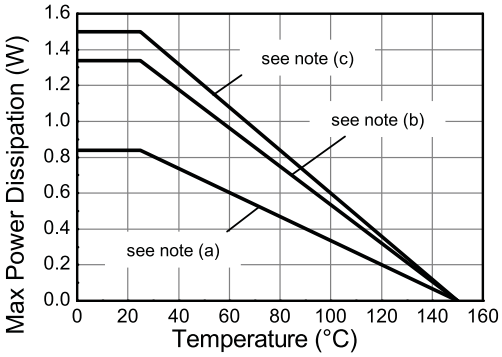
(c) Mounted on 50mm x 50mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

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

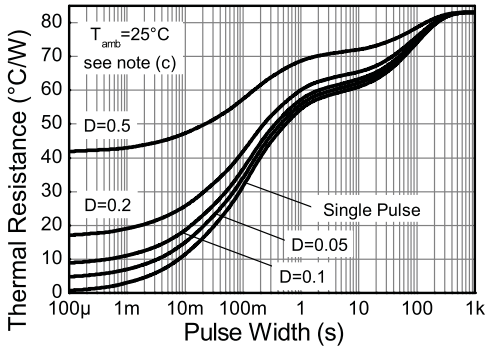
## Characteristics



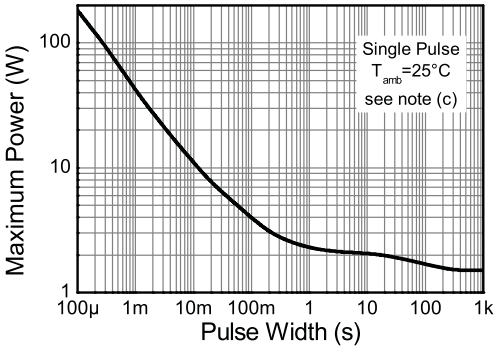

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**



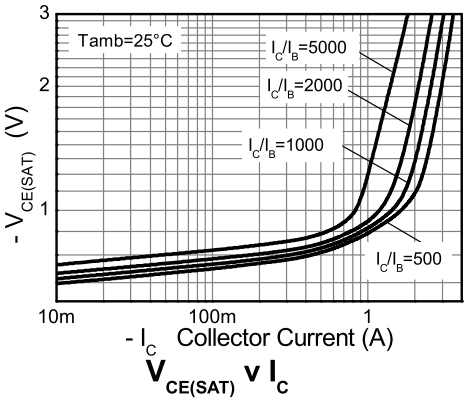

**Pulse Power Dissipation**

## Electrical characteristics (at $T_{amb}$ = 25°C unless otherwise stated)

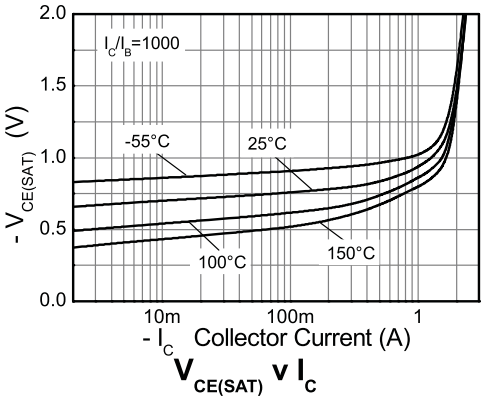
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $BV_{CBO}$ | -140 | -170 | | V | $I_C$ = -100μA |
| Collector-emitter breakdown voltage (base open) | $BV_{CEO}$ | -120 | -140 | | V | $I_C$ = -10mA (*) |
| Emitter-base breakdown voltage | $BV_{EBO}$ | -10 | -16 | | V | $I_E$ = -100μA |
| Collector-base cut-off current | $I_{CBO}$ | | <-1 | -100 | nA | $V_{CB}$ = -120V |
| | | | | -10 | μA | $V_{CB}$ = -120V, $T_{amb}$= 100°C |
| Collector-emitter cut-off current | $I_{CES}$ | | <-0.1 | -10 | μA | $V_{CB}$ = -120V |
| Emitter-base cut-off current | $I_{EBO}$ | | <-1 | -100 | nA | $V_{EB}$ = -8V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | | -0.77 | -0.9 | V | $I_C$ = 250mA, $I_B$ = 0.25mA(*) |
| | | | -0.9 | -1.1 | V | $I_C$ = -1A, $I_B$ = -1mA(*) |
| | | | -1.3 | -2.0 | V | $I_C$ = -2A, $I_B$ = -2mA(*) |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | | -1.5 | -1.7 | V | $I_C$ = -1A, $I_B$ = -1mA(*) |
| Base-emitter turn-on voltage | $V_{BE(on)}$ | | -1.4 | -1.7 | V | $I_C$ = -1A, $V_{CE}$ = -5V(*) |
| Static forward current transfer ratio | $h_{FE}$ | 3K | 14k | | | $I_C$ = -50mA, $V_{CE}$ = -5V(*) |
| | | 3K | 11k | | | $I_C$ = -500mA, $V_{CE}$ = -5V(*) |
| | | 3K | 10k | 30K | | $I_C$ = -1A, $V_{CE}$ = -5V(*) |
| | | 2K | 8k | | | $I_C$ = -2A, $V_{CE}$ = -5V(*) |
| Transition frequency | $f_T$ | | 150 | | MHz | $I_C$ = -100mA, $V_{CE}$ = -10V f = 20MHz |
| Output capacitance | $C_{ibo}$ | | 67 | 90 | pF | $V_{EB}$ = -0.5V, f = 1MHz(*) |
| Output capacitance | $C_{obo}$ | | 22 | 40 | pF | $V_{CB}$ = -10V, f = 1MHz(*) |
| Delay time | $t_d$ | | 556 | | ns | $V_{CC}$ = -10V. $I_C$ = -0.5A, $I_{B1}$ = $I_{B2}$= -0.5mA. |
| Rise time | $t_r$ | | 212 | | ns | |
| Storage time | $t_s$ | | 681 | | ns | |
| Fall time | $t_f$ | | 304 | | ns | |

**NOTES**:
(*) Measured under pulsed conditions. Pulse width ≤300μs; duty cycle ≤2%.

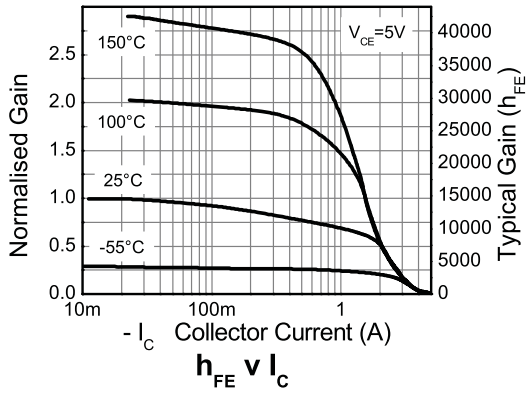
## Typical characteristics



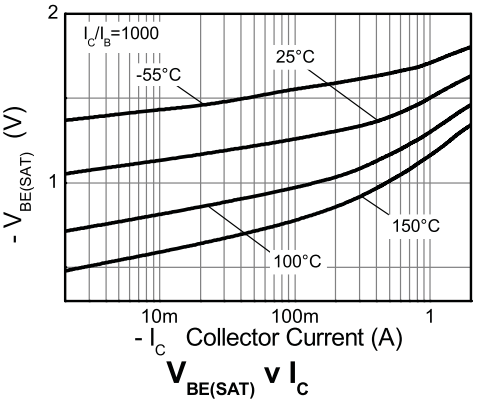

$V_{CE(SAT)}$ v $I_C$



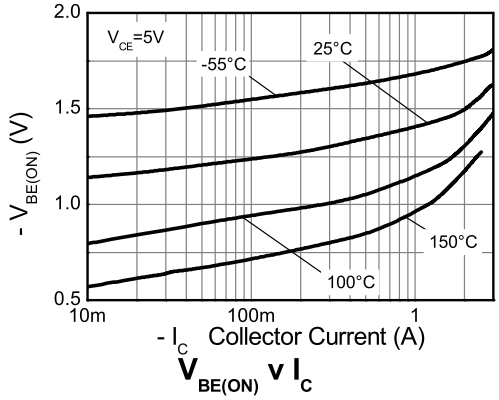

$V_{CE(SAT)}$ v $I_C$




$h_{FE}$ v $I_C$




$V_{BE(SAT)}$ v $I_C$




$V_{BE(ON)}$ v $I_C$

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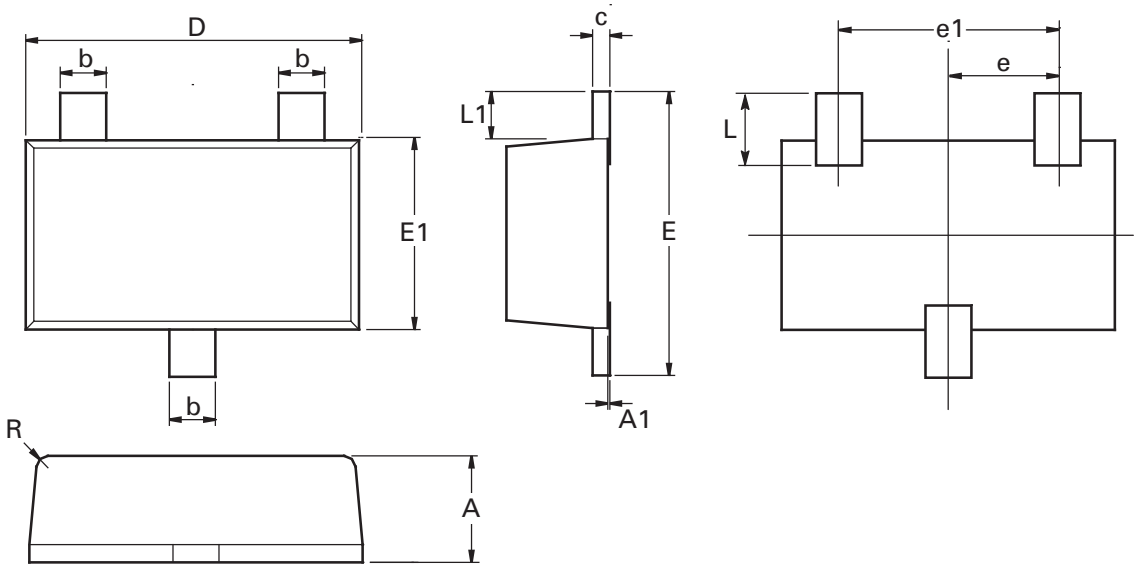
## Package outline - SOT23F




| 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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