

# ZXTN08400BFF

## 400V, SOT23F, NPN medium power high voltage transistor

### Summary

$BV_{CEX} > 450V$

$BV_{CEO} > 400V$

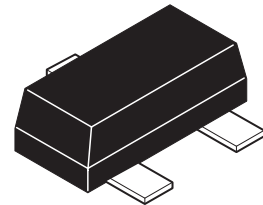
$BV_{ECO} > 6V$

$I_{C(cont)} = 0.5A$

$V_{CE(sat)} < 175mV @ 500mA$

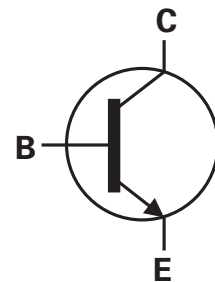
$P_D = 1.5W$

Complementary part number ZXTP08400BFF



### Description

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

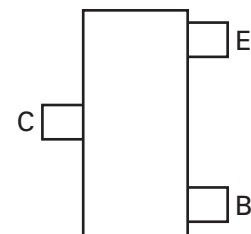


### Features

- High voltage
- Low saturation voltage
- Low profile small outline package

### Applications

- Modems
- Telecoms line switching



Pinout - top view

### Ordering information

| Device         | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|--------------------|-----------------|-------------------|
| ZXTN08400BFFTA | 7                  | 8               | 3000              |

### Device marking

1D5

# ZXTN08400BFF

## Absolute maximum ratings

| Parameter   | Symbol         | Limit       | Unit  |
|---|----------------|-------------|-------|
| Collector-base voltage                                  | $V_{CBO}$      | 450         | V     |
| Collector-emitter voltage (forward blocking)            | $V_{CEX}$      | 450         | V     |
| Collector-emitter voltage                               | $V_{CEO}$      | 400         | V     |
| Emitter-collector voltage (reverse blocking)            | $V_{ECO}$      | 6           | V     |
| Emitter-base voltage                                    | $V_{EBO}$      | 7           | V     |
| Continuous collector current <sup>(c)</sup>             | $I_C$          | 0.5         | A     |
| Peak pulse current                                      | $I_{CM}$       | 1           | A     |
| Base current  | $I_B$          | 0.2         | A     |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(a)}$ | $P_D$          | 0.84        | W     |
| Linear derating factor                                  |                | 6.72        | mW/°C |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(b)}$ | $P_D$          | 1.34        | W     |
| Linear derating factor                                  |                | 10.72       | mW/°C |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(c)}$ | $P_D$          | 1.5         | W     |
| Linear derating factor                                  |                | 12.0        | mW/°C |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(d)}$ | $P_D$          | 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

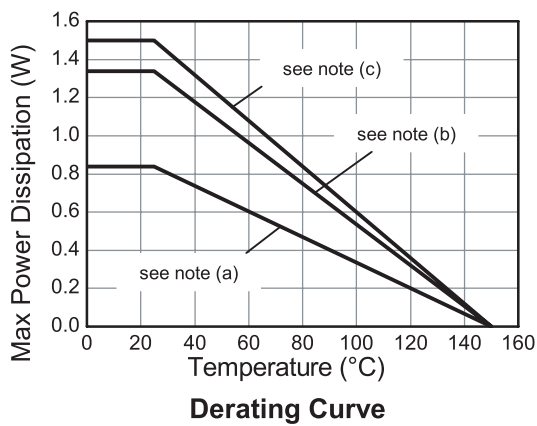
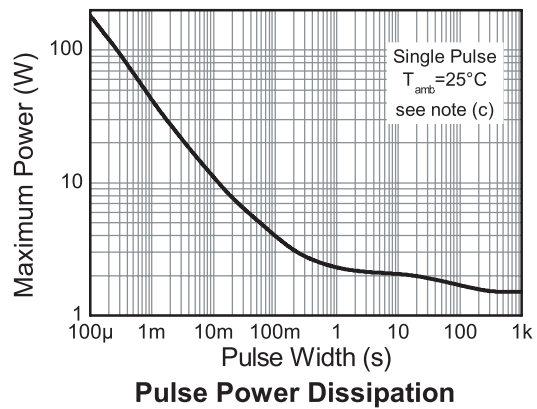
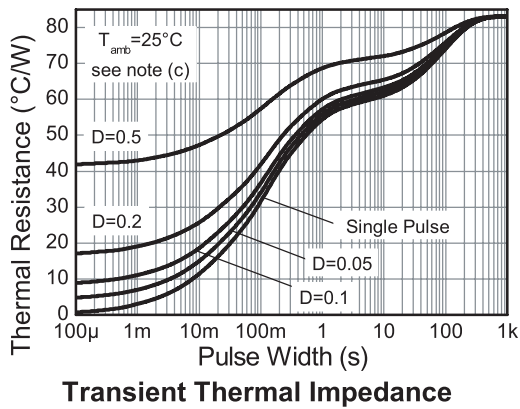
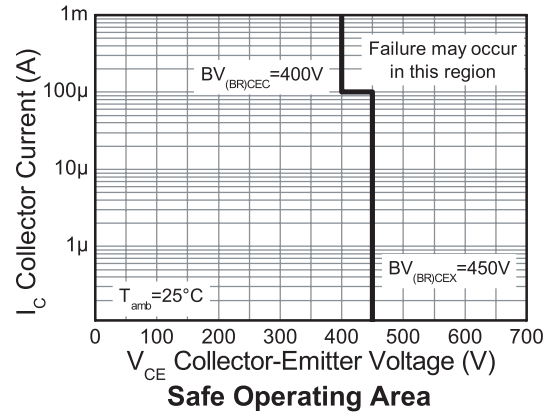
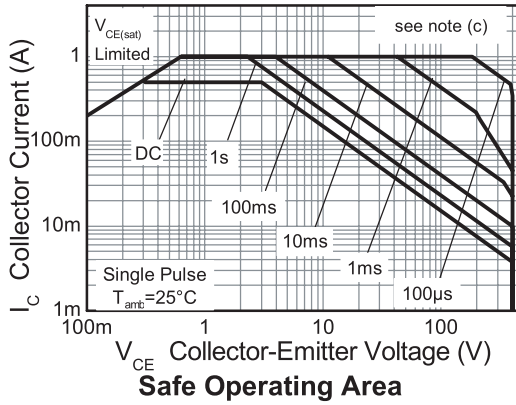
| Parameter                          | Symbol          | Limit | Unit |
|------------------------------------|-----------------|-------|------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 149   | °C/W |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 93    | °C/W |
| Junction to 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 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.

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## Typical characteristics



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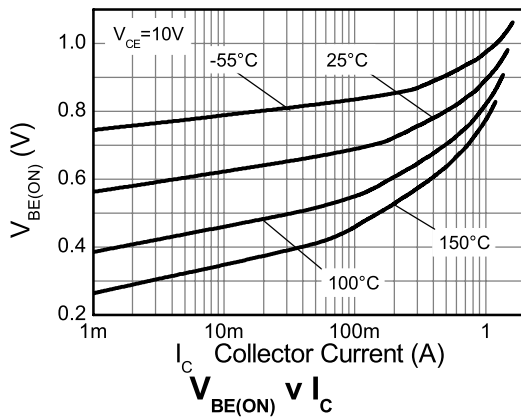
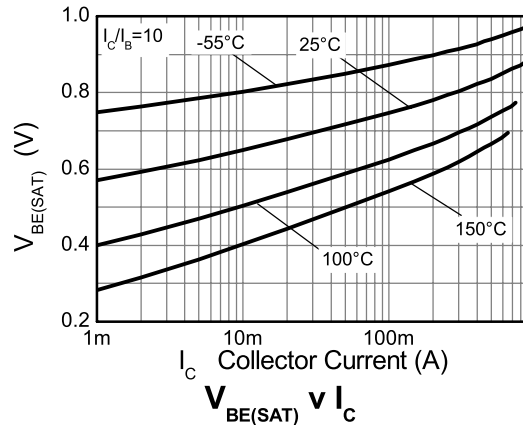
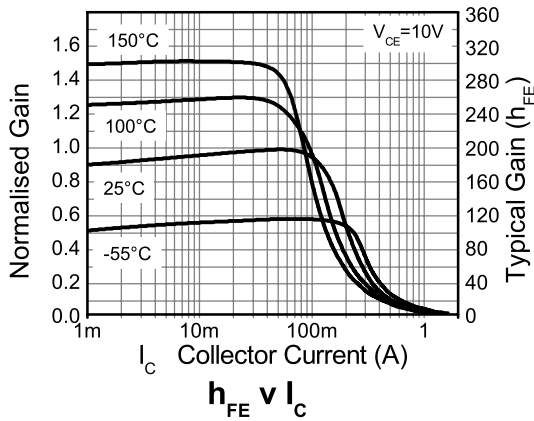
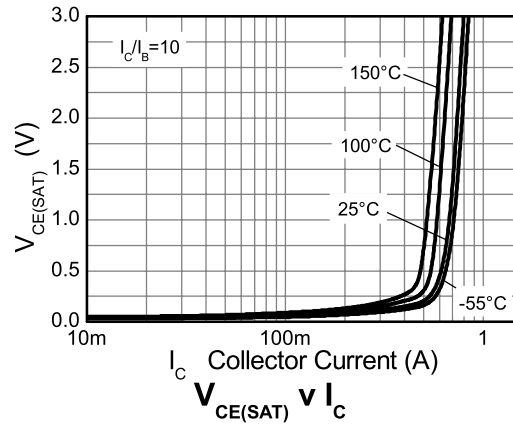
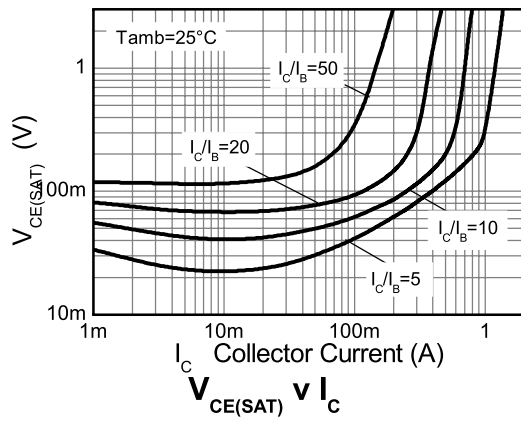
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter  | Symbol        | Min. | Typ. | Max.     | Unit                | Conditions  |
|--|---------------|------|------|----------|---------------------|---|
| Collector-base breakdown voltage                       | $BV_{CBO}$    | 450  | 550  |          | V                   | $I_C = 100\mu\text{A}$  |
| Collector-emitter breakdown voltage (forward blocking) | $BV_{CEX}$    | 450  | 550  |          | V                   | $I_C = 100\mu\text{A}$ , $R_{BE} < 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$             |
| Collector-emitter breakdown voltage (base open)        | $BV_{CEO}$    | 400  | 500  |          | V                   | $I_C = 10\text{mA}^{(*)}$   |
| 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)        | $BV_{ECO}$    | 6    | 8.5  |          | V                   | $I_E = 100\mu\text{A}$ ,  |
| Emitter-base breakdown voltage                         | $BV_{EBO}$    | 7    | 8.1  |          | V                   | $I_E = 100\mu\text{A}$  |
| Collector-base cut-off current                         | $I_{CBO}$     |      | <1   | 50<br>20 | nA<br>$\mu\text{A}$ | $V_{CB} = 360\text{V}$<br>$V_{CB} = 360\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$                      |
| Collector-emitter cut-off current                      | $I_{CEX}$     |      | <1   | 100      | nA                  | $V_{CE} = 360\text{V}$ , $R_{BE} < 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$             |
| Emitter-base cut-off current                           | $I_{EBO}$     |      | <1   | 50       | nA                  | $V_{EB} = 5.6\text{V}$  |
| Collector-emitter saturation voltage                   | $V_{CE(sat)}$ |      | 70   | 85       | mV                  | $I_C = 20\text{mA}$ , $I_B = 1\text{mA}^{(*)}$  |
|  |               |      | 50   | 70       | mV                  | $I_C = 50\text{mA}$ , $I_B = 5\text{mA}^{(*)}$  |
|  |               |      | 120  | 170      | mV                  | $I_C = 300\text{mA}$ , $I_B = 30\text{mA}^{(*)}$  |
|  |               |      | 125  | 175      | mV                  | $I_C = 500\text{mA}$ , $I_B = 100\text{mA}^{(*)}$   |
| Base-emitter saturation voltage                        | $V_{BE(sat)}$ |      | 865  | 950      | mV                  | $I_C = 500\text{mA}$ , $I_B = 100\text{mA}^{(*)}$   |
| Base-emitter turn-on voltage                           | $V_{BE(on)}$  |      | 800  | 900      | mV                  | $I_C = 500\text{mA}$ , $V_{CE} = 10\text{V}^{(*)}$  |
| Static forward current transfer ratio                  | $h_{FE}$      | 90   | 165  |          |                     | $I_C = 1\text{mA}$ , $V_{CE} = 5\text{V}^{(*)}$   |
|  |               | 100  | 180  | 300      |                     | $I_C = 50\text{mA}$ , $V_{CE} = 5\text{V}^{(*)}$  |
|  |               | 10   | 20   |          |                     | $I_C = 500\text{mA}$ , $V_{CE} = 10\text{V}^{(*)}$  |
| Transition frequency                                   | $f_T$         |      | 40   |          | MHz                 | $I_C = 10\text{mA}$ , $V_{CE} = 20\text{V}$<br>$f = 20\text{MHz}$                                       |
| Output capacitance                                     | $C_{OBO}$     |      | 8    | 10       | pF                  | $V_{CB} = 20\text{V}$ , $f = 1\text{MHz}^{(*)}$   |
| Delay time   | $t_d$         |      | 100  |          | ns                  | $V_{CC} = 100\text{V}$ .<br>$I_C = 100\text{mA}$ ,<br>$I_{B1} = 10\text{mA}$ , $I_{B2} = 20\text{mA}$ . |
| Rise time  | $t_r$         |      | 52   |          | ns                  |   |
| Storage time   | $t_s$         |      | 3122 |          | ns                  |   |
| Fall time  | $t_f$         |      | 240  |          | ns                  |   |

### NOTES:

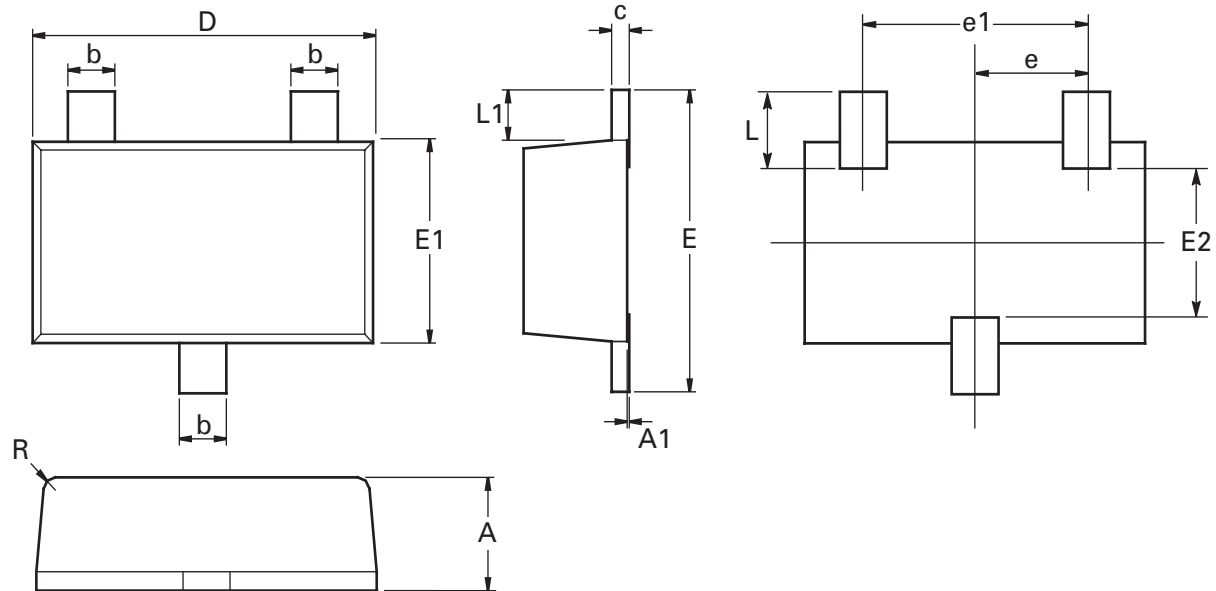
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTN08400BFF

## 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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