

ZXTN25020BFH

20V, SOT23, NPN medium power transistor

Summary

$BV_{CEX} > 50V$

$BV_{CEO} > 20V$

$BV_{ECO} > 3V$

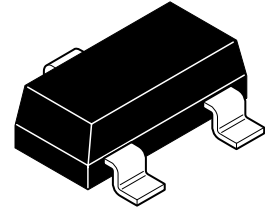
$I_{C(cont)} = 4.5A$

$V_{CE(sat)} < 45\text{ mV @ } 1A$

$R_{CE(sat)} = 27\text{ m}\Omega$

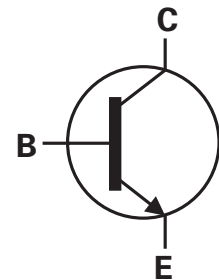
$P_D = 1.25W$

Complementary part number ZXTP25020BFH



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.

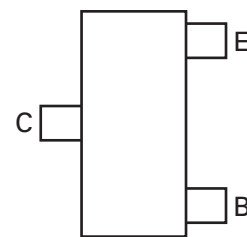


Features

- High power dissipation SOT23 package
- High peak current
- Low saturation voltage
- 50V forward blocking voltage
- 3V reverse blocking voltage

Applications

- MOSFET gate drivers
- Motor control
- DC-DC converters



Pinout - top view

Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|--------------------|-----------------|-------------------|
| ZXTN25020BFHTA | 7 | 8 | 3,000 |

Device marking

1B1

ZXTN25020BFH

Absolute maximum ratings

| Parameter | Symbol | Limit | Unit |
|---|----------------|-------------|-------|
| Collector-base voltage | V_{CBO} | 50 | V |
| Collector-emitter voltage (forward blocking) | V_{CEX} | 50 | V |
| Collector-emitter voltage | V_{CEO} | 20 | V |
| Emitter-collector voltage (reverse blocking) | V_{ECO} | 3 | V |
| Emitter-base voltage | V_{EBO} | 7 | V |
| Continuous collector current ^(c) | I_C | 4.5 | 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/°C |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(b)}$ | P_D | 1.05 | W |
| Linear derating factor | | 8.4 | mW/°C |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(c)}$ | P_D | 1.25 | W |
| Linear derating factor | | 9.6 | mW/°C |
| Power dissipation at $T_{amb} = 25^\circ\text{C}^{(d)}$ | P_D | 1.81 | W |
| Linear derating factor | | 14.5 | mW/°C |
| Operating and storage temperature range | T_j, T_{stg} | - 55 to 150 | °C |

Thermal graphs

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

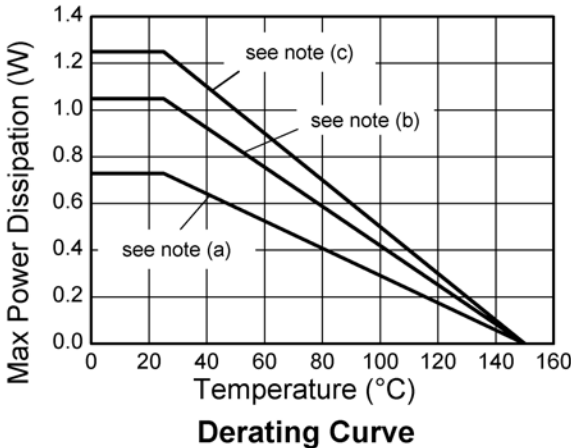
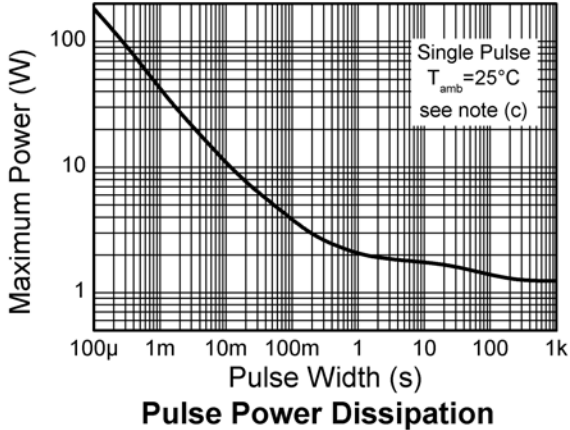
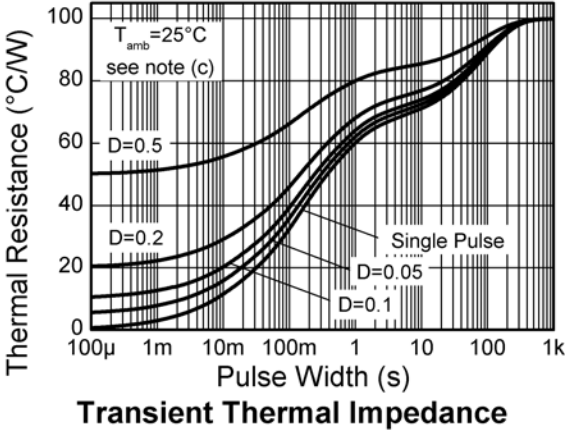
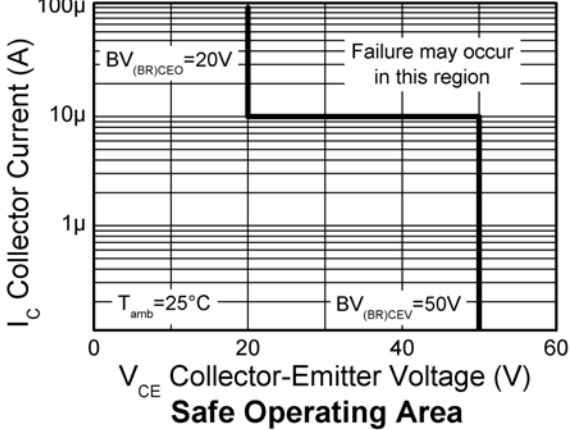
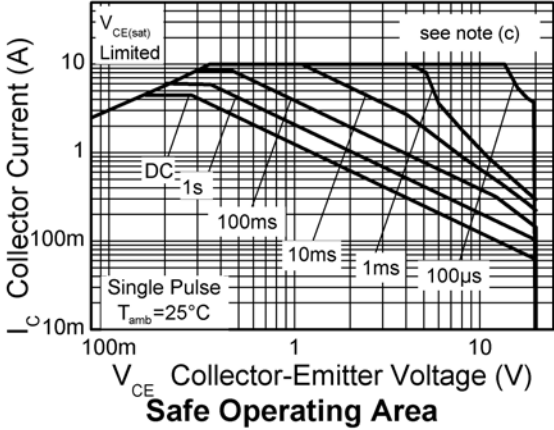
(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(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.

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Characteristics



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

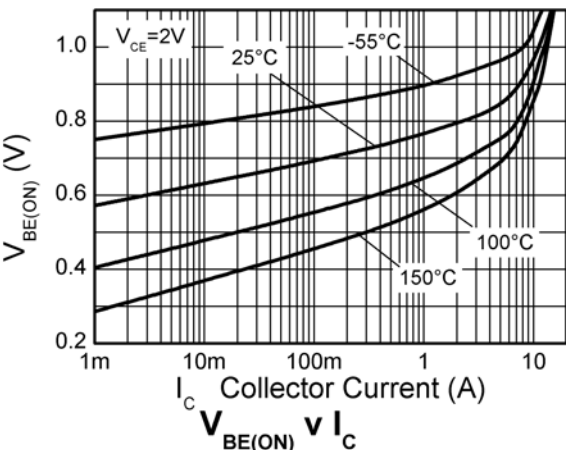
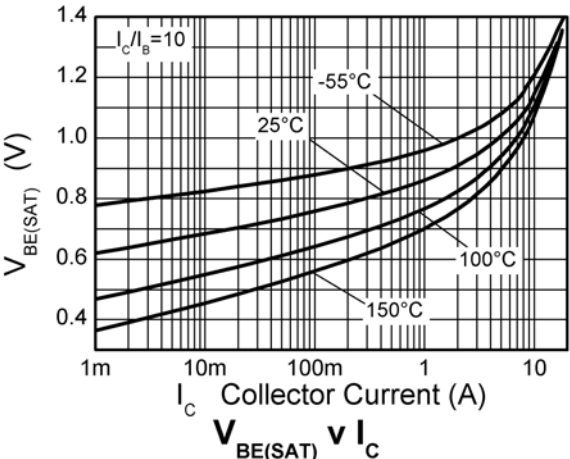
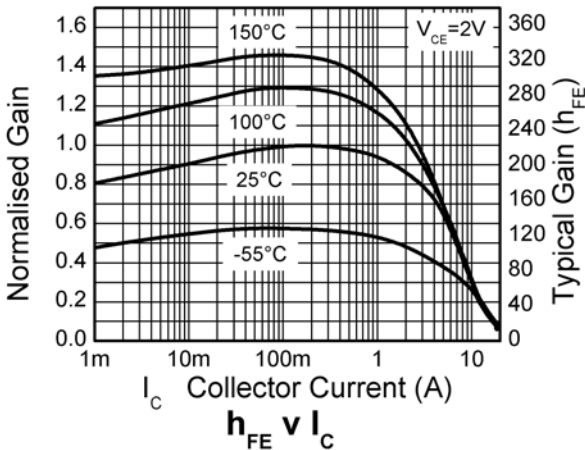
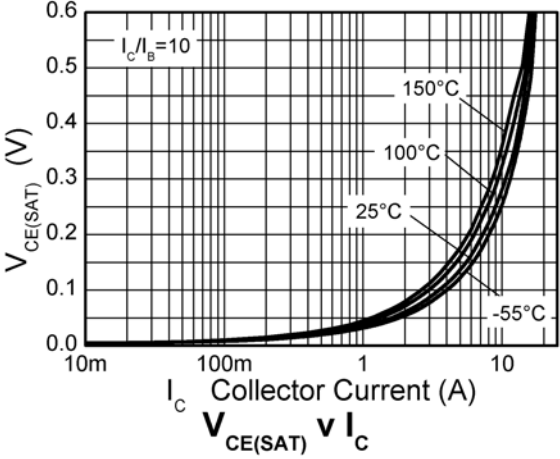
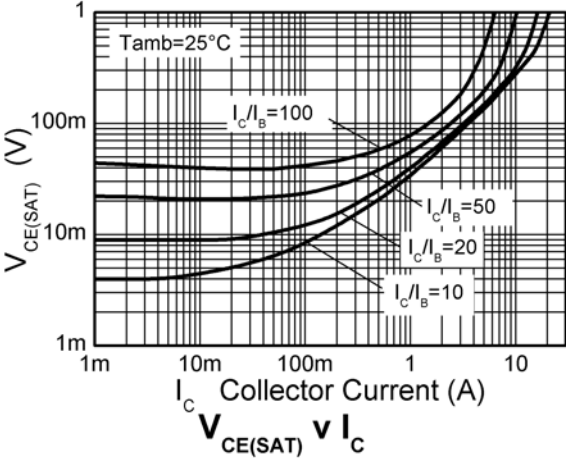
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--|---------------|------------------------|------------------------------|-------------------------------|----------------------------|---|
| Collector-base breakdown voltage | BV_{CBO} | 50 | 90 | | V | $I_C = 100\mu\text{A}$ |
| Collector-emitter breakdown voltage (forward blocking) | BV_{CEX} | 50 | 90 | | | $I_C = 100\mu\text{A}$, $R_{BE} < 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$ |
| Collector-emitter breakdown voltage (base open) | BV_{CEO} | 20 | 27 | | V | $I_C = 10\text{mA}^{(*)}$ |
| Emitter-base breakdown voltage | BV_{EBO} | 7 | 8 | | V | $I_E = 100\mu\text{A}$ |
| Emitter-collector breakdown voltage (reverse blocking) | BV_{ECX} | 6 | 7 | | 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} | 3 | 4.7 | | V | $I_E = 100\mu\text{A}$, |
| Collector-base cut-off current | I_{CBO} | | <1 | 50 20 | nA μA | $V_{CB} = 40\text{V}$ $V_{CB} = 40\text{V}$, $T_{amb} = 100^{\circ}\text{C}$ |
| Collector-emitter cut-off current | I_{CEX} | | - | 100 | nA | $V_{CE} = 40\text{V}$; $R_{BE} < 1\text{k}\Omega$ 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 | $V_{CE(sat)}$ | | 35 55 90 175 120 | 45 80 115 240 145 | mV mV mV mV mV | $I_C = 1\text{A}$, $I_B = 100\text{mA}^{(*)}$ $I_C = 1\text{A}$, $I_B = 20\text{mA}^{(*)}$ $I_C = 2\text{A}$, $I_B = 40\text{mA}^{(*)}$ $I_C = 4.5\text{A}$, $I_B = 90\text{mA}^{(*)}$ $I_C = 4.5\text{A}$, $I_B = 450\text{mA}^{(*)}$ |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | | 910 | 1000 | mV | $I_C = 4.5\text{A}$, $I_B = 90\text{mA}^{(*)}$ |
| Base-emitter turn-on voltage | $V_{BE(on)}$ | | 825 | 900 | mV | $I_C = 4.5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ |
| Static forward current transfer ratio | h_{FE} | 100 100 75 30 | 200 210 160 70 | 300 | | $I_C = 10\text{mA}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 1\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 4.5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 10\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ |
| Transition frequency | f_T | | 185 | | MHz | $I_C = 50\text{mA}$, $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$ |
| Output capacitance | C_{OBO} | | 22.7 | 30 | pF | $V_{CB} = 10\text{V}$, $f = 1\text{MHz}^{(*)}$ |
| Delay time | t_d | | 87 | | ns | $V_{CC} = 10\text{V}$. |
| Rise time | t_r | | 119 | | ns | $I_C = 1\text{A}$, |
| Storage time | t_s | | 146 | | ns | $I_{B1} = I_{B2} = 10\text{mA}$. |
| Fall time | t_f | | 61 | | ns | |

NOTES:

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

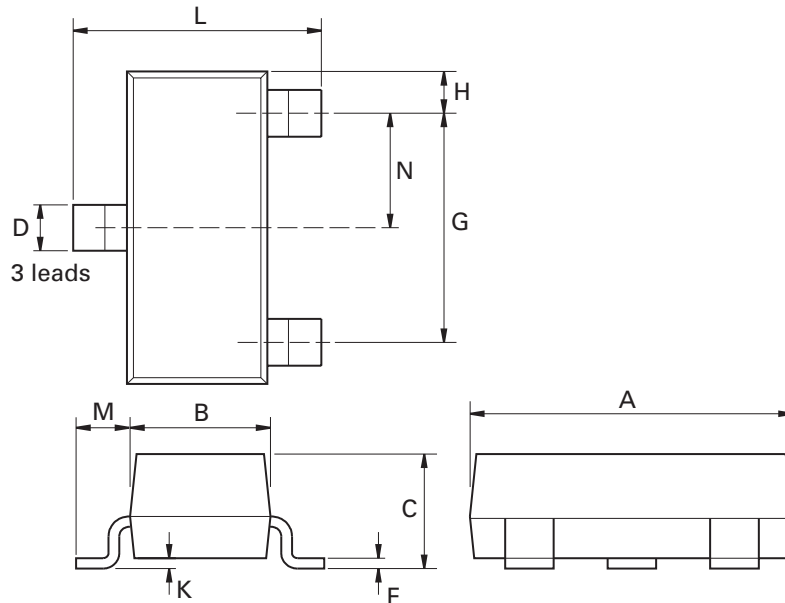
ZXTN25020BFH

Typical characteristics



ZXTN25020BFH

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 |

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9