

# ZXTP25020DFH

## 20V, SOT23, PNP medium power transistor

### Summary

$BV_{CEO} > -20V$

$BV_{ECO} > -4V$

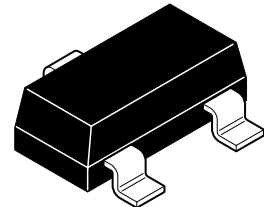
$I_{C(cont)} = 4A$

$V_{CE(sat)} < 60\text{ mV @ } 1A$

$R_{CE(sat)} = 39\text{ m}\Omega$

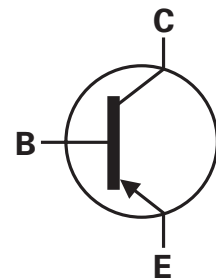
$P_D = 1.25W$

Complementary part number ZXTN25020DFH



### 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.

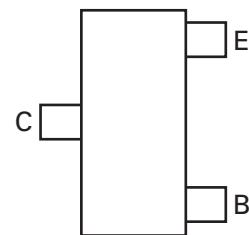


### Features

- High power dissipation SOT23 package
- High peak current
- High gain
- Low saturation voltage

### Applications

- MOSFET gate drivers
- Power switches
- Motor control



Pinout - top view

### Ordering information

| Device         | Reel size (inches) | Tape width (mm) | Quantity per reel |
|----------------|--------------------|-----------------|-------------------|
| ZXTP25020DFHTA | 7                  | 8               | 3000              |

### Device marking

1A3

# ZXTP25020DFH

## Absolute maximum ratings

| Parameter  | Symbol         | Limit      | Unit  |
|--|----------------|------------|-------|
| Collector-base voltage                             | $V_{CBO}$      | -25        | V     |
| Collector-emitter voltage (forward blocking)       | $V_{CEO}$      | -20        | V     |
| Emitter-collector voltage (reverse blocking)       | $V_{ECO}$      | -4         | V     |
| Emitter-base voltage                               | $V_{EBO}$      | -7         | V     |
| Continuous collector current <sup>(c)</sup>        | $I_C$          | -4         | A     |
| Base current                                       | $I_B$          | -1         | A     |
| Peak pulse current                                 | $I_{CM}$       | -10        | A     |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$ | $P_D$          | 0.73       | W     |
| Linear derating factor                             |                | 5.84       | mW/°C |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$ | $P_D$          | 1.05       | W     |
| Linear derating factor                             |                | 8.4        | mW/°C |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(c)}$ | $P_D$          | 1.25       | W     |
| Linear derating factor                             |                | 9.6        | mW/°C |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(d)}$ | $P_D$          | 1.81       | W     |
| Linear derating factor                             |                | 14.5       | mW/°C |
| Operating and storage temperature range            | $T_j, T_{stg}$ | -55 to 150 | °C    |

## Thermal resistance

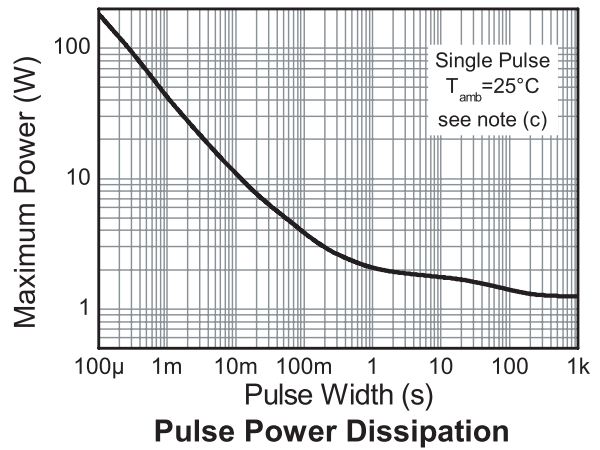
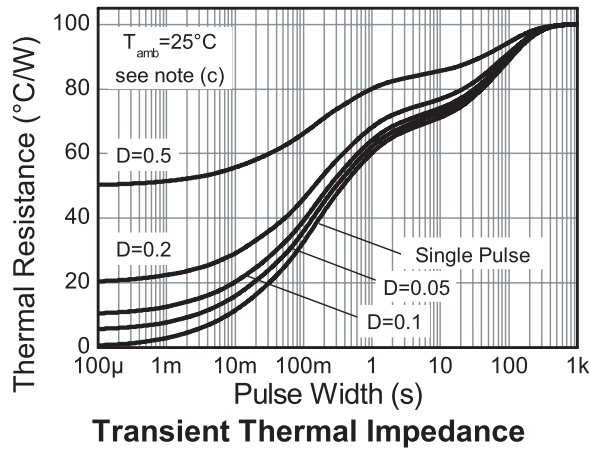
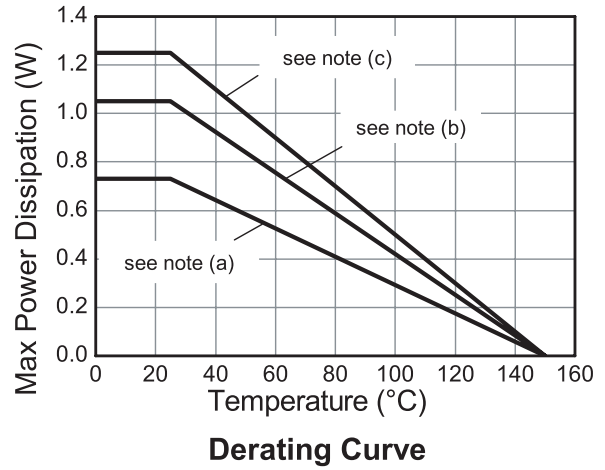
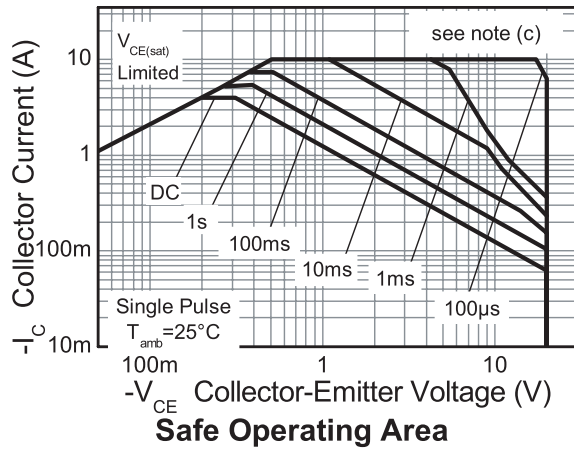
| Parameter                          | Symbol          | Limit | Unit |
|------------------------------------|-----------------|-------|------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 171   | °C/W |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 119   | °C/W |
| Junction to ambient <sup>(c)</sup> | $R_{\theta JA}$ | 100   | °C/W |
| Junction to ambient <sup>(d)</sup> | $R_{\theta JA}$ | 69    | °C/W |

### NOTES:

- (a) For a device surface mounted on 15mm x 15mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (b) For a device surface mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (c) For a device surface mounted on 50mm x 50mm x 0.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
- (d) As (c) above measured at  $t < 5$  seconds.

# ZXTP25020DFH

## Characteristics



# ZXTP25020DFH

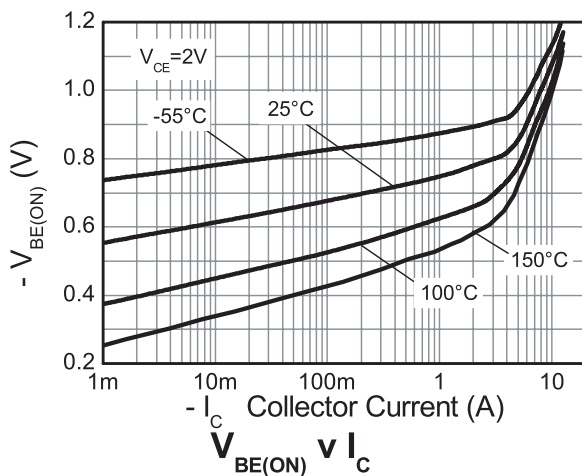
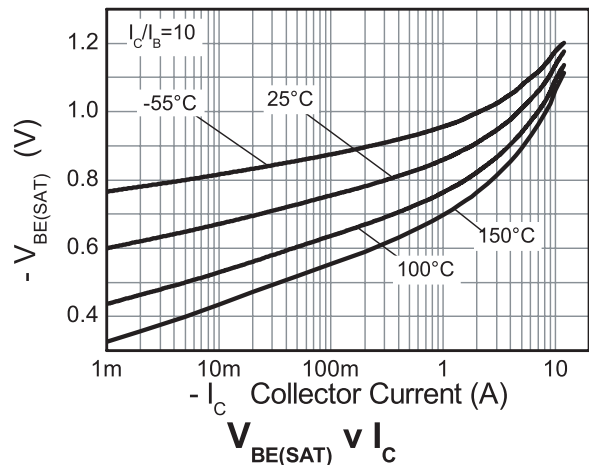
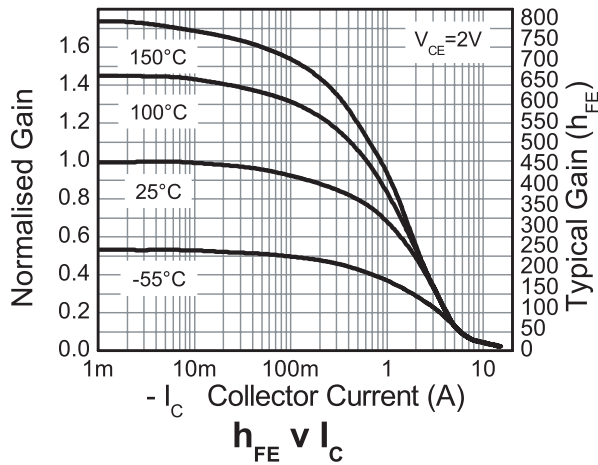
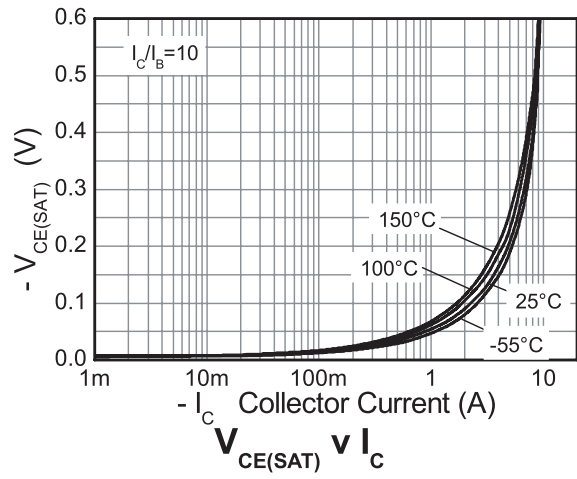
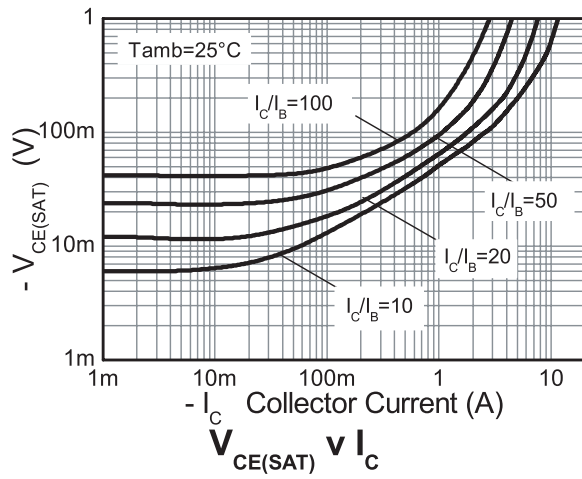
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter  | Symbol        | Min. | Typ. | Max.  | Unit          | Conditions  |
|--|---------------|------|------|-------|---------------|---|
| Collector-base breakdown voltage                       | $BV_{CBO}$    | -25  | -55  |       | V             | $I_C = -100\mu\text{A}$   |
| Collector-emitter breakdown voltage (base open)        | $BV_{CEO}$    | -20  | -45  |       | V             | $I_C = -10\text{mA}^{(*)}$  |
| Emitter-base breakdown voltage                         | $BV_{EBO}$    | -7   | -8.3 |       | V             | $I_E = -100\mu\text{A}$   |
| Emitter-collector breakdown voltage (reverse blocking) | $BV_{ECO}$    | -4   | -8.5 |       | V             | $I_C = -100\mu\text{A}^{(*)}$   |
| Collector cut-off current                              | $I_{CBO}$     |      | <-1  | -50   | nA            | $V_{CB} = -20\text{V}$  |
|  |               |      |      | -20   | $\mu\text{A}$ | $V_{CB} = -20\text{V}, T_{amb} = 100^{\circ}\text{C}$                     |
| Emitter cut-off current                                | $I_{EBO}$     |      | <-1  | -50   | nA            | $V_{EB} = -5.6\text{V}$   |
| Collector-emitter saturation voltage                   | $V_{CE(sat)}$ |      | -50  | -60   | mV            | $I_C = -1\text{A}, I_B = -100\text{mA}^{(*)}$                             |
|  |               |      | -150 | -210  | mV            | $I_C = -1\text{A}, I_B = -10\text{mA}^{(*)}$                              |
|  |               |      | -180 | -240  | mV            | $I_C = -2\text{A}, I_B = -40\text{mA}^{(*)}$                              |
|  |               |      | -155 | -180  | mV            | $I_C = -4\text{A}, I_B = -400\text{mA}^{(*)}$                             |
| Base-emitter saturation voltage                        | $V_{BE(sat)}$ |      | -960 | -1050 | mV            | $I_C = -4\text{A}, I_B = -400\text{mA}^{(*)}$                             |
| Base-emitter turn-on voltage                           | $V_{BE(on)}$  |      | -815 | -900  | mV            | $I_C = -4\text{A}, V_{CE} = -2\text{V}^{(*)}$                             |
| Static forward current transfer ratio                  | $h_{FE}$      | 300  | 450  | 900   |               | $I_C = -10\text{mA}, V_{CE} = -2\text{V}^{(*)}$                           |
|  |               | 200  | 310  |       |               | $I_C = -1\text{A}, V_{CE} = -2\text{V}^{(*)}$                             |
|  |               | 70   | 100  |       |               | $I_C = -4\text{A}, V_{CE} = -2\text{V}^{(*)}$                             |
|  |               |      | 20   |       |               | $I_C = -10\text{A}, V_{CE} = -2\text{V}^{(*)}$                            |
| Transition frequency                                   | $f_T$         |      | 290  |       | MHz           | $I_C = -50\text{mA}, V_{CE} = -10\text{V}$<br>$f = 50\text{MHz}$          |
| Output capacitance                                     | $C_{OBO}$     |      | 21   | 30    | pF            | $V_{CB} = -10\text{V}, f = 1\text{MHz}^{(*)}$                             |
| Delay time   | $t_{(d)}$     |      | 14.2 |       |               | $V_{CC} = -10\text{V}, I_C = -1\text{A}, I_{B1} = I_{B2} = -50\text{mA}.$ |
| Rise time  | $t_{(r)}$     |      | 16.3 |       |               |   |
| Storage time   | $t_{(s)}$     |      | 186  |       |               |   |
| Fall time  | $t_{(f)}$     |      | 32.7 |       |               |   |

### NOTES:

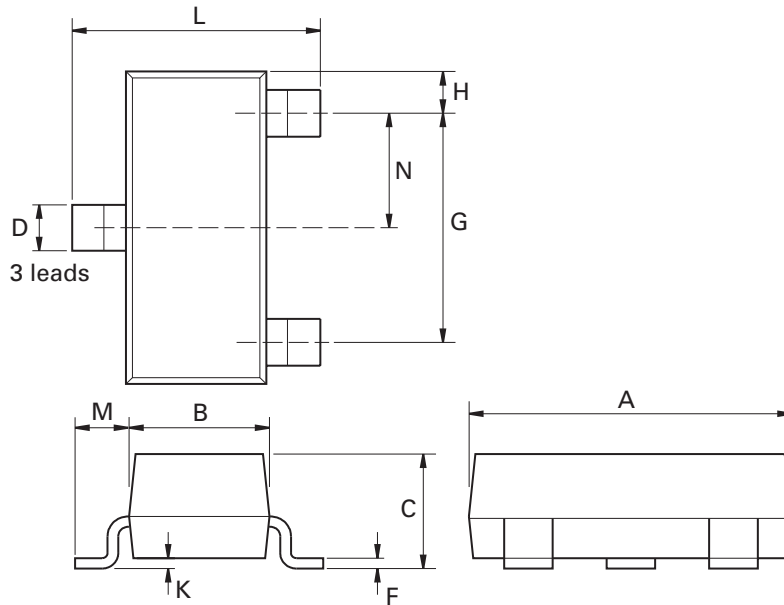
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTP25020DFH

## 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

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