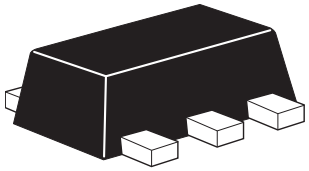
# ZXTN19020DZ
## 20V NPN high gain transistor in SOT89

### Summary

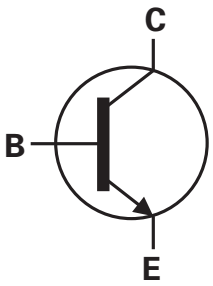


**$BV_{CEX}$ > 70V**
**$BV_{CEO}$ > 20V**
**$BV_{ECO}$ > 4.5V**
**$I_{C(cont)}$ = 7.5A**
**$V_{CE(sat)}$ < 35mV @ 1A**
**$R_{CE(sat)}$ = 21mΩ**
**$P_D$ = 2.4W**

**Complementary part number ZXTP19020DZ**

### Description

Packaged in the SOT89 outline this new low saturation NPN transistor offers extremely low on state losses making it ideal for use in DC-DC circuits and various driving and power management functions.

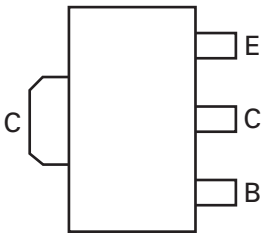



### Features

- 7.5A continuous current
- Up to 20A peak current
- Very low saturation voltage
- 70V forward blocking voltage
- 4.5V reverse blocking voltage

### Applications

- Emergency lighting circuits
- Motor driving
- Camera strobe
- Boost converter
- CCFL backlight inverters
- MOSFET gate drivers
- LED Driving



Pinout - top view

### Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|
| ZXTN19020DZTA | 7 | 12 | 1000 |

### Device marking

1L8

## Absolute maximum ratings

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Collector-Base voltage | $V_{CBO}$ | 70 | V |
| Collector-Emitter voltage (forward blocking) | $V_{CEX}$ | 70 | V |
| Collector-Emitter voltage | $V_{CEO}$ | 20 | V |
| Emitter-Collector voltage (reverse blocking) | $V_{ECX}$ | 6 | V |
| Emitter-Base voltage | $V_{EBO}$ | 7 | V |
| Continuous Collector current[c] | $I_C$ | 7.5 | A |
| Base current | $I_B$ | 1 | A |
| Peak pulse current | $I_{CM}$ | 20 | A |
| Power dissipation at $T_A$ =25°C[a]<br>Linear derating factor | $P_D$ | 1.1<br>8.8 | W<br>mW/°C |
| Power dissipation at $T_A$ =25°C[b]<br>Linear derating factor | $P_D$ | 1.8<br>14.4 | W<br>mW/°C |
| Power dissipation at $T_A$ =25°C[c]<br>Linear derating factor | $P_D$ | 2.4<br>19.2 | W<br>mW/°C |
| Power dissipation at $T_A$ =25°C[d]<br>Linear derating factor | $P_D$ | 4.46<br>35.7 | W<br>mW/°C |
| Power dissipation at $T_C$ =25°C[e]<br>Linear derating factor | $P_D$ | 27.8<br>222 | W<br>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] | $R_{\Theta JA}$ | 117 | °C/W |
| Junction to ambient[b] | $R_{\Theta JA}$ | 68 | °C/W |
| Junction to ambient[c] | $R_{\Theta JA}$ | 51 | °C/W |
| Junction to ambient[d] | $R_{\Theta JA}$ | 28 | °C/W |
| Junction to case[e] | $R_{\Theta JC}$ | 4.69 | °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.

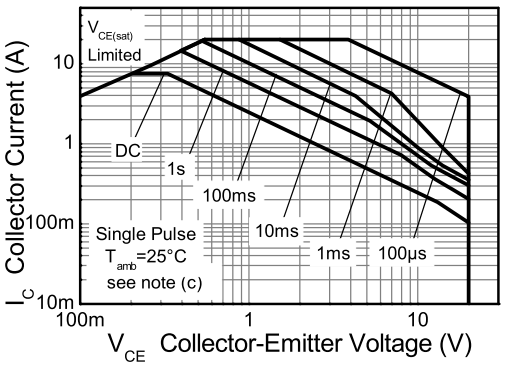
(b) Mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(c) Mounted on 50mm x 50mm x 0.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.

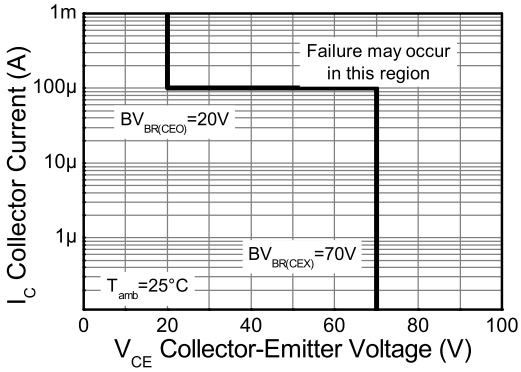
(d) As (c) above measured at t<5 seconds.

(e) Junction to case (collector tab). Typical

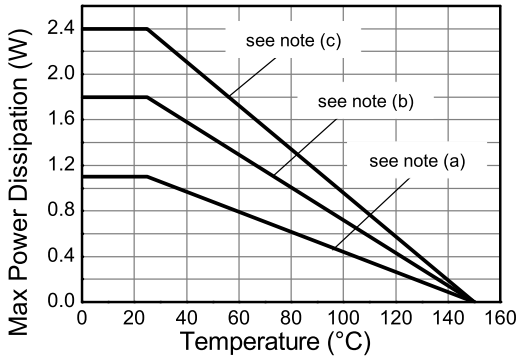
## Thermal characteristics




**Safe Operating Area**

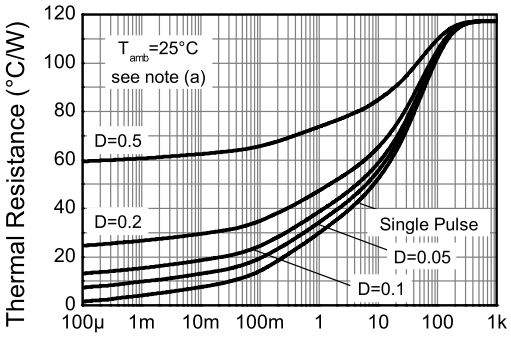



**Safe Operating Area**

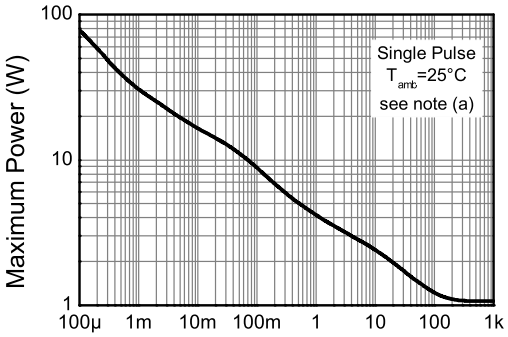



**Derating Curve**

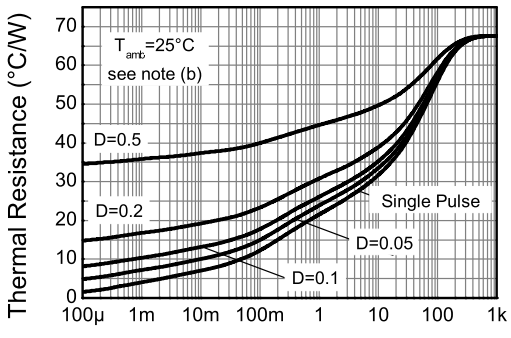
## Thermal characteristics



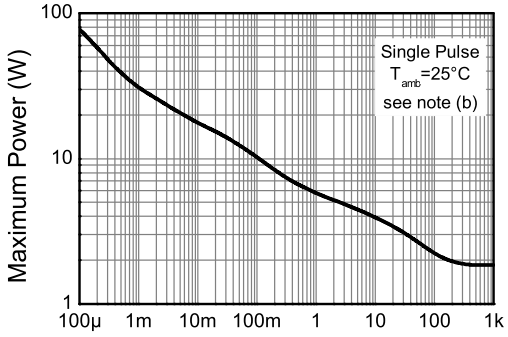

**Transient Thermal Impedance**



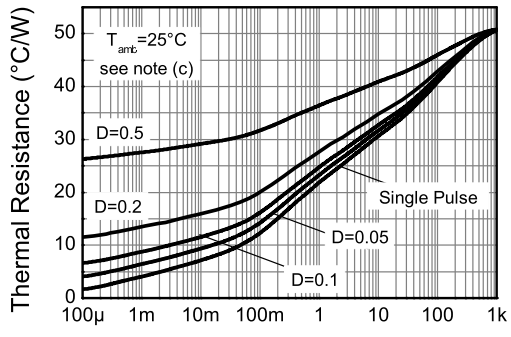

**Pulse Power Dissipation**



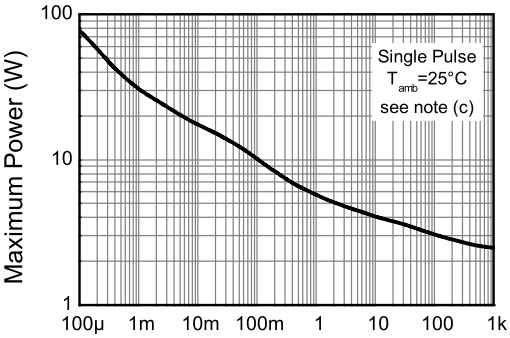

**Transient Thermal Impedance**




**Pulse Power Dissipation**




**Transient Thermal Impedance**



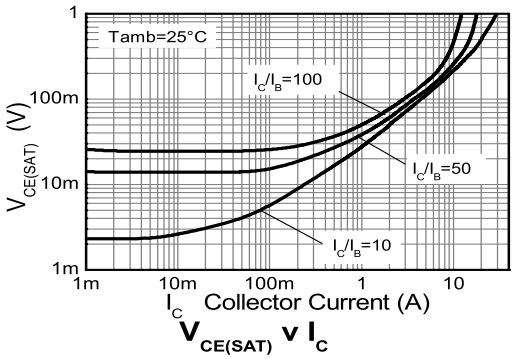

**Pulse Power Dissipation**

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

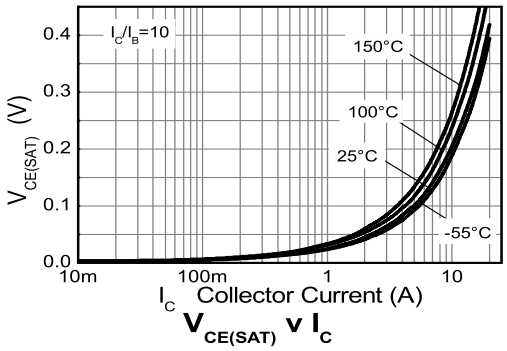
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-Base breakdown voltage | $BV_{CBO}$ | 70 | 100 | | V | $I_C$ = 100μA |
| Collector-Emitter breakdown voltage (forward blocking) | $BV_{CEX}$ | 70 | 100 | | V | $I_C$ = 100μA, $R_{BE} \leq 1k\Omega$ or $-1V < V_{BE} < 0.25V$ |
| Collector-Emitter breakdown voltage | $BV_{CEO}$ | 20 | 30 | | V | $I_C$= 10mA (*) |
| Emitter-Collector breakdown voltage (reverse blocking) | $BV_{ECX}$ | 6 | 8.4 | | V | $I_E$ = 100μA, $R_{BC} \leq 1k\Omega$ or $0.25V > V_{BC} > -0.25V$ |
| Emitter-Collector breakdown voltage (reverse blocking) | $BV_{ECO}$ | 4.5 | 5.7 | | V | $I_E$ = 100μA |
| Emitter-Base breakdown voltage | $BV_{EBO}$ | 7.0 | 8.4 | | V | $I_E$ = 100μA |
| Collector-Base cut-off current | $I_{CBO}$ | | <1 | 50<br>0.5 | nA<br>μA | $V_{CB}$ = 70V<br>$V_{CB}$ = 70V, $T_{amb}$=100°C |
| Collector-Emitter cut-off current | $I_{CEX}$ | | | 100 | nA | $V_{CE}$ = 70V, $R_{BE} \leq 1k\Omega$ or $-1V < V_{BE} < 0.25V$ |
| Emitter cut-off current | $I_{EBO}$ | | <1 | 50 | nA | $V_{EB}$ = 5.6V |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ | | 26<br>50<br>75<br>60<br>83<br>155 | 32<br>70<br>100<br>80<br>105<br>200 | mV<br>mV<br>mV<br>mV<br>mV<br>mV | $I_C$ = 1A, $I_B$ = 100mA(*)<br>$I_C$ = 1A, $I_B$ = 10mA(*)<br>$I_C$ = 2A, $I_B$ = 20mA(*)<br>$I_C$ = 2A, $I_B$ = 40mA(*)<br>$I_C$ = 4A, $I_B$ = 400mA(*)<br>$I_C$ = 7.5A, $I_B$ = 375mA(*) |
| Base-Emitter saturation voltage | $V_{BE(sat)}$ | | 1000 | 1100 | mV | $I_C$ = 7.5A, $I_B$ = 375mA(*) |
| Base-Emitter turn-on voltage | $V_{BE(on)}$ | | 870 | 1000 | mV | $I_C$ = 7.5A, $V_{CE}$ = 2V(*) |
| Static forward current transfer ratio | $h_{FE}$ | 300<br>260<br>150<br>50 | 450<br>390<br>210<br>75<br>35 | 900 | | $I_C$ = 100mA, $V_{CE}$ = 2V(*)<br>$I_C$ = 2A, $V_{CE}$ = 2V(*)<br>$I_C$ = 7.5A, $V_{CE}$ = 2V(*)<br>$I_C$ = 15A, $V_{CE}$ = 2V(*)<br>$I_C$ = 20A, $V_{CE}$ = 2V(*) |
| Transition frequency | $f_T$ | | 160 | | MHz | $I_C$ = 50mA, $V_{CE}$ = 10V<br>f = 100MHz |
| Input capacitance | $C_{ibo}$ | | 297 | 400 | pF | $V_{EB}$ = 0.5V, f = 1MHz(*) |
| Output capacitance | $C_{obo}$ | | 32.6 | 40 | pF | $V_{CB}$ = 10V, f = 1MHz(*) |
| Delay time | $t_d$ | | 129 | | ns | $I_C$ = 1A, $V_{CC}$ = 10V,<br>$I_{B1}$ =-$I_{B2}$ = 10mA |
| Rise time | $t_r$ | | 96 | | ns | |
| Storage time | $t_s$ | | 398 | | ns | |
| Fall time | $t_f$ | | 90 | | ns | |

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

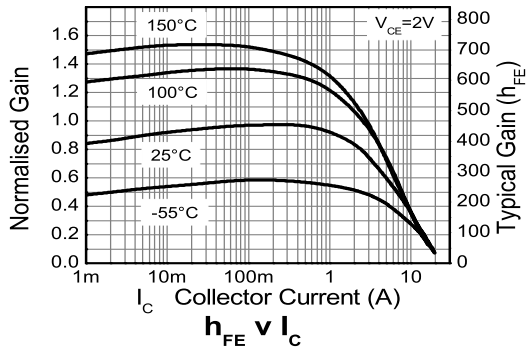
## Typical characteristics



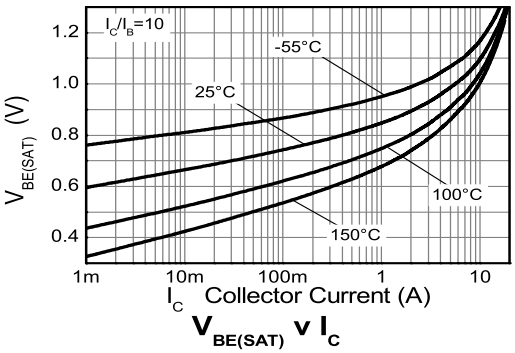

$V_{CE(SAT)}$ v $I_C$



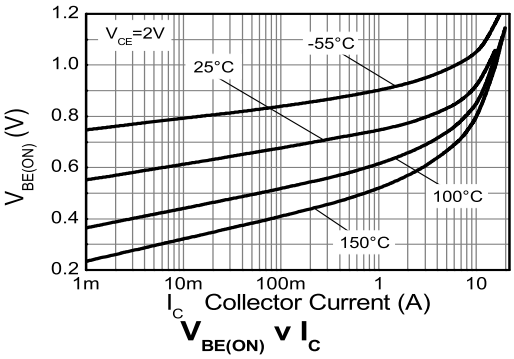

$V_{CE(SAT)}$ v $I_C$




$h_{FE}$ v $I_C$

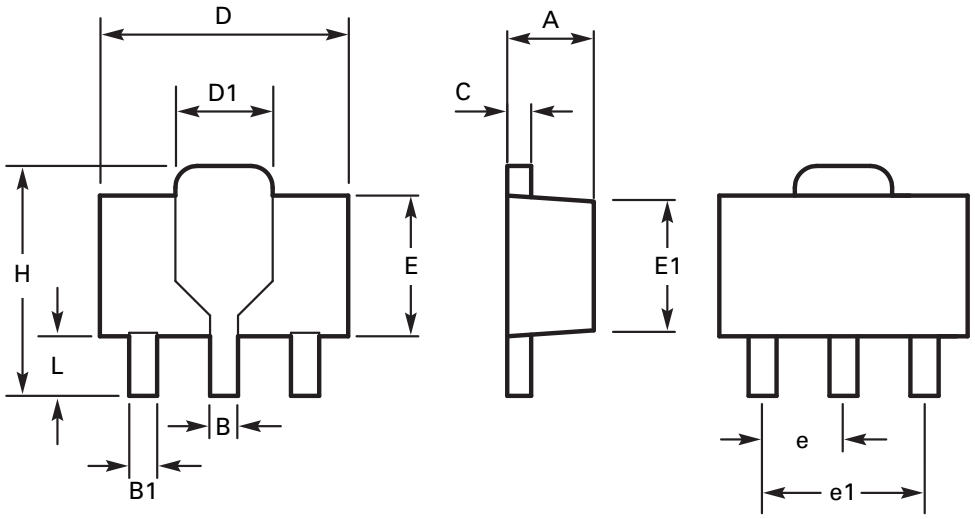



$V_{BE(SAT)}$ v $I_C$




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

## Package outline - SOT89




| DIM | Millimeters | | Inches | | DIM | Millimeters | | Inches | |
|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | | Min | Max | Min | Max |
| A | 1.40 | 1.60 | 0.550 | 0.630 | E | 2.29 | 2.60 | 0.090 | 0.102 |
| B | 0.44 | 0.56 | 0.017 | 0.022 | E1 | 2.13 | 2.29 | 0.084 | 0.090 |
| B1 | 0.36 | 0.48 | 0.014 | 0.019 | e | 1.50 BSC | | 0.059 BSC | |
| C | 0.35 | 0.44 | 0.014 | 0.017 | e1 | 3.00 BSC | | 0.118 BSC | |
| D | 4.40 | 4.60 | 0.173 | 0.181 | H | 3.94 | 4.25 | 0.155 | 0.167 |
| D1 | 1.52 | 1.83 | 0.064 | 0.072 | L | 0.89 | 1.20 | 0.035 | 0.047 |

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

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| | |
|---|---|
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| "Active" | Product status recommended for new designs |
| "Last time buy (LTB)" | Device will be discontinued and last time buy period and delivery is in effect |
| "Not recommended for new designs" | Device is still in production to support existing designs and production |
| "Obsolete" | Production has been discontinued |

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| | |
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