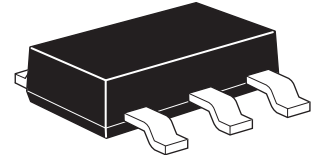


ZXTN19020DG

20V NPN high gain transistor in SOT223

Summary

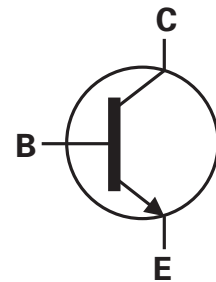
$BV_{CEX} > 70V$
 $BV_{CEO} > 20V$
 $BV_{ECO} > 4.5V$
 $I_{C(cont)} = 9A$
 $V_{CE(sat)} < 35mV @ 1A$
 $R_{CE(sat)} = 20m\Omega$
 $P_D = 3.0W$



Complementary part number ZXTP19020DG

Description

Packaged in the SOT223 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

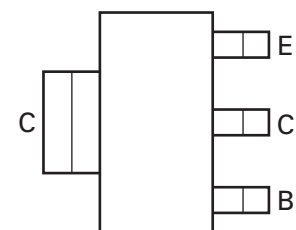
- Higher power dissipation SOT223 package
- High gain
- High peak current
- Low saturation voltage
- 70V forward blocking voltage
- 4.5V reverse blocking voltage

Applications

- DC - DC converters
- Motor drive
- Relay, lamp and solenoid drive
- Regulator circuits

Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|--------------------|-----------------|-------------------|
| ZXTN19020DGTA | 7 | 12 | 1000 |



Pinout - top view

Device marking

ZXTN19020D

ZXTN19020DG

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 | 9 | A |
| Base current | I_B | 1 | A |
| Peak pulse current | I_{CM} | 20 | A |
| Power dissipation at $T_A = 25^\circ\text{C}^{(a)}$ | P_D | 1.2 | W |
| Linear derating factor | | 9.6 | mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}^{(b)}$ | P_D | 1.6 | W |
| Linear derating factor | | 12.8 | mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}^{(c)}$ | P_D | 3.0 | W |
| Linear derating factor | | 24 | mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}^{(d)}$ | P_D | 5.3 | W |
| Linear derating factor | | 42 | mW/°C |
| Power dissipation at $T_C = 25^\circ\text{C}^{(e)}$ | P_D | 9.4 | W |
| Linear derating factor | | 75 | 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) | $R_{\theta JA}$ | 104 | °C/W |
| Junction to ambient ^(b) | $R_{\theta JA}$ | 78 | °C/W |
| Junction to ambient ^(c) | $R_{\theta JA}$ | 42 | °C/W |
| Junction to ambient ^(d) | $R_{\theta JA}$ | 23.5 | °C/W |
| Junction to case ^(e) | $R_{\theta JC}$ | 12.3 | °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.

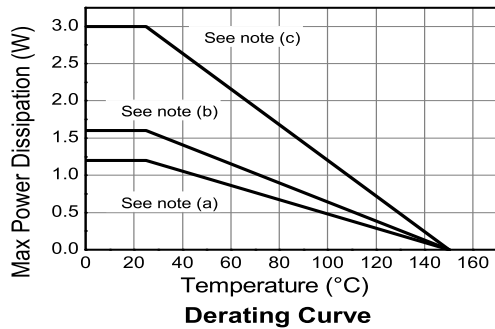
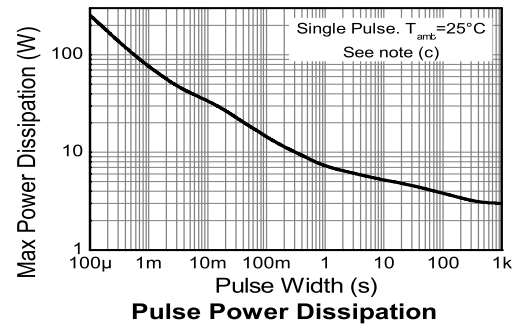
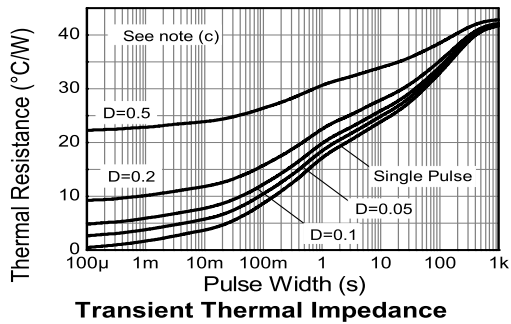
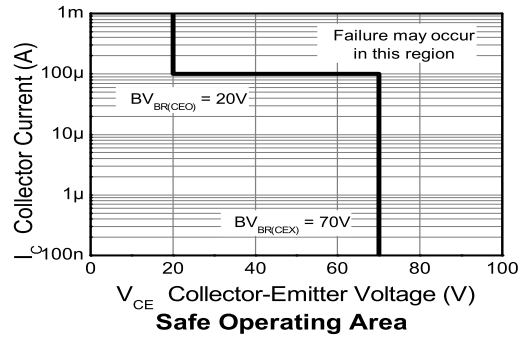
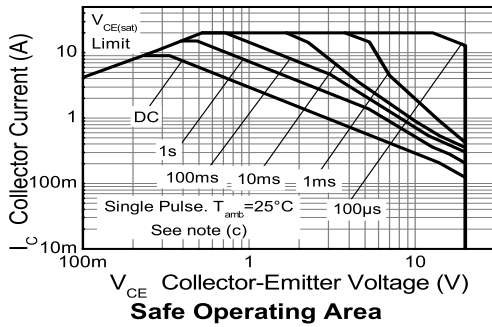
(b) Mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(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



ZXTN19020DG

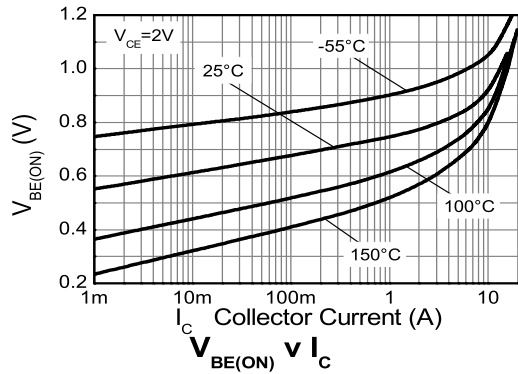
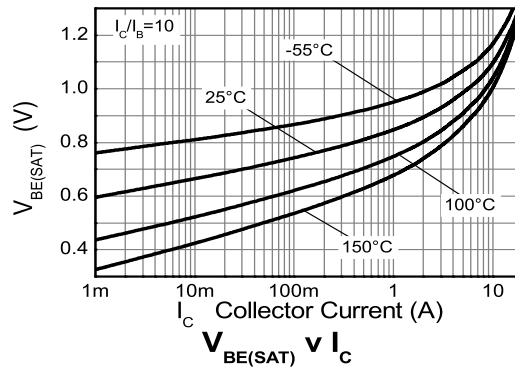
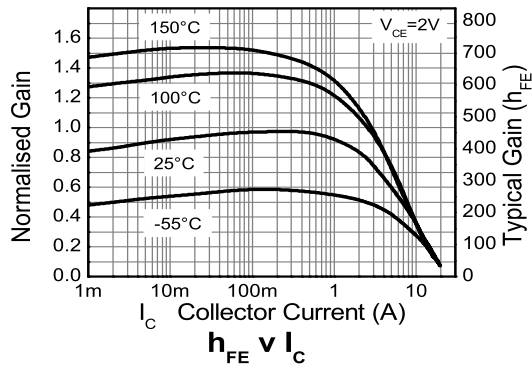
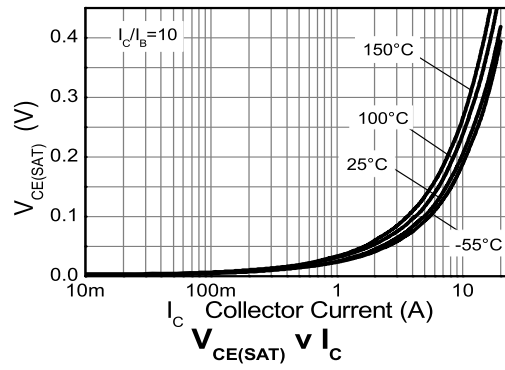
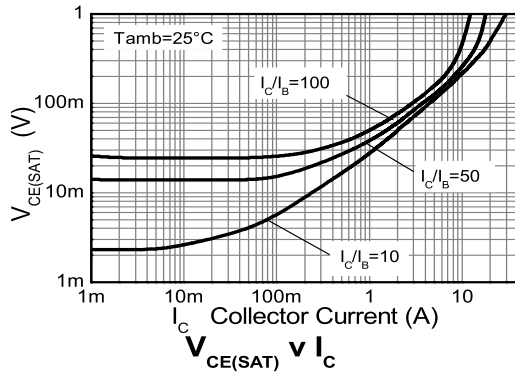
Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--|---------------|-------------------------|-----------------------------------|-------------------------------------|----------------------------------|---|
| Collector-Base breakdown voltage | BV_{CBO} | 70 | 100 | | V | $I_C = 100\mu\text{A}$ |
| Collector-Emitter breakdown voltage (forward blocking) | BV_{CEX} | 70 | 100 | | 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 | BV_{CEO} | 20 | 30 | | V | $I_C = 10\text{mA}^{(*)}$ |
| Emitter-Collector breakdown voltage (reverse blocking) | BV_{ECX} | 6 | 8.4 | | 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 (reverse blocking) | BV_{ECO} | 4.5 | 5.7 | | V | $I_E = 100\mu\text{A}$ |
| Emitter-Base breakdown voltage | BV_{EBO} | 7 | 8.4 | | V | $I_E = 100\mu\text{A}$ |
| Collector-Base cut-off current | I_{CBO} | | <1 | 50 0.5 | nA μA | $V_{CB} = 70\text{V}$ $V_{CB} = 70\text{V}$, $T_{amb} = 100^{\circ}\text{C}$ |
| Collector-Emitter cut-off current | I_{CEX} | | | 100 | nA | $V_{CE} = 70\text{V}$, $R_{BE} < 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$ |
| Emitter cut-off current | I_{EBO} | | <1 | 50 | nA | $V_{EB} = 5.6\text{V}$ |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ | | 27 50 80 63 85 200 | 35 70 100 80 110 250 | mV mV mV mV mV mV | $I_C = 1\text{A}$, $I_B = 100\text{mA}^{(*)}$ $I_C = 1\text{A}$, $I_B = 10\text{mA}^{(*)}$ $I_C = 2\text{A}$, $I_B = 20\text{mA}^{(*)}$ $I_C = 2\text{A}$, $I_B = 40\text{mA}^{(*)}$ $I_C = 4\text{A}$, $I_B = 400\text{mA}^{(*)}$ $I_C = 9\text{A}$, $I_B = 450\text{mA}^{(*)}$ |
| Base-Emitter saturation voltage | $V_{BE(sat)}$ | | 1040 | 1150 | mV | $I_C = 9\text{A}$, $I_B = 450\text{mA}^{(*)}$ |
| Base-Emitter turn-on voltage | $V_{BE(on)}$ | | 910 | 1050 | mV | $I_C = 9\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ |
| Static forward current transfer ratio | h_{FE} | 300 260 130 50 | 450 390 175 75 30 | 900 | | $I_C = 100\text{mA}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 2\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 9\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 15\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 20\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ |
| Transition frequency | f_T | | 160 | | MHz | $I_C = 50\text{mA}$, $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$ |
| Input capacitance | C_{ibo} | | 297 | 400 | pF | $V_{EB} = 0.5\text{V}$, $f = 1\text{MHz}^{(*)}$ |
| Output capacitance | C_{obo} | | 32.6 | 40 | pF | $V_{CB} = 10\text{V}$, $f = 1\text{MHz}^{(*)}$ |
| Delay time | t_d | | 129 | | ns | $I_C = 1\text{A}$, $V_{CC} = 10\text{V}$, $I_{B1} = -I_{B2} = 10\text{mA}$ |
| 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 $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

Typical characteristics



ZXTN19020DG

Intentionally left blank

ZXTN19020DG

Package outline - SOT223



Conforms to JEDEC TO-261 AA Issue B

| Dim. | Millimeters | | Inches | | Dim. | Millimeters | | Inches | |
|------|-------------|------|--------|--------|------|-------------|------|------------|-------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | - | 1.80 | - | 0.071 | D | 6.30 | 6.70 | 0.248 | 0.264 |
| A1 | 0.02 | 0.10 | 0.0008 | 0.004 | e | 2.30 BSC | | 0.0905 BSC | |
| A2 | 1.55 | 1.65 | 0.0610 | 0.0649 | e1 | 4.60 BSC | | 0.181 BSC | |
| b | 0.66 | 0.84 | 0.026 | 0.033 | E | 6.70 | 7.30 | 0.264 | 0.287 |
| b2 | 2.90 | 3.10 | 0.114 | 0.122 | E1 | 3.30 | 3.70 | 0.130 | 0.146 |
| C | 0.23 | 0.33 | 0.009 | 0.013 | L | 0.90 | - | 0.355 | - |

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

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| "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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