

# ZXTN19060CG

## 60V NPN low sat medium power transistor in SOT223

### Summary

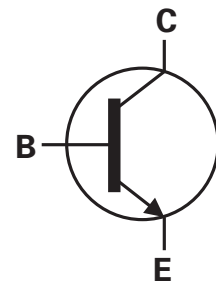
$BV_{CEO} > 60V$   
 $BV_{CEX} > 160V$   
 $BV_{ECO} > 6V$   
 $I_{C(cont)} = 7A$   
 $V_{CE(sat)} < 50mV @ 1A$   
 $R_{CE(sat)} = 30m\Omega$   
 $P_D = 3.0W$



Complementary part number ZXTP19060CG

### 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

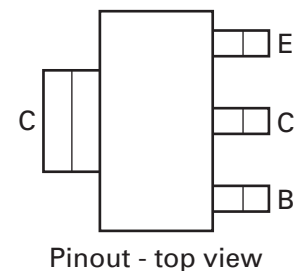
- Higher power dissipation SOT223 package
- High peak current
- Low saturation voltage
- 160V forward blocking voltage
- 6V reverse blocking voltage

### Applications

- Motor drive
- Lamp, relay and solenoid drive

### Ordering information

| Device        | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|--------------------|-----------------|-------------------|
| ZXTN19060CGTA | 7                  | 12              | 1000              |



### Device marking

ZXTN19  
060C

# ZXTN19060CG

## Absolute maximum ratings

| Parameter   | Symbol         | Limit       | Unit       |
|---|----------------|-------------|------------|
| Collector-Base voltage  | $V_{CBO}$      | 160         | V          |
| Collector-Emitter voltage (forward blocking)                                  | $V_{CEX}$      | 160         | V          |
| Collector-Emitter voltage   | $V_{CEO}$      | 60          | V          |
| Emitter-Collector voltage (reverse blocking)                                  | $V_{ECX}$      | 6           | V          |
| Emitter-Base voltage  | $V_{EBO}$      | 7           | V          |
| Continuous Collector current <sup>(c)</sup>                                   | $I_C$          | 7           | A          |
| Base current  | $I_B$          | 1           | A          |
| Peak pulse current  | $I_{CM}$       | 12          | A          |
| Power dissipation at $T_A = 25^\circ\text{C}^{(a)}$<br>Linear derating factor | $P_D$          | 1.2<br>9.6  | W<br>mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}^{(b)}$<br>Linear derating factor | $P_D$          | 1.6<br>12.8 | W<br>mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}^{(c)}$<br>Linear derating factor | $P_D$          | 3.0<br>24   | W<br>mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}^{(d)}$<br>Linear derating factor | $P_D$          | 5.3<br>42   | W<br>mW/°C |
| Power dissipation at $T_C = 25^\circ\text{C}^{(e)}$<br>Linear derating factor | $P_D$          | 10.2<br>81  | W<br>mW/°C |
| Operating and storage temperature range                                       | $T_j, T_{stg}$ | -55 to 150  | °C         |

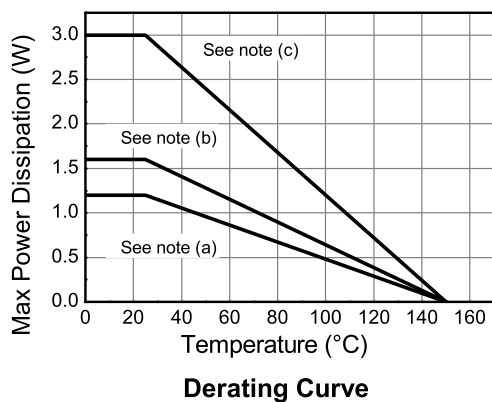
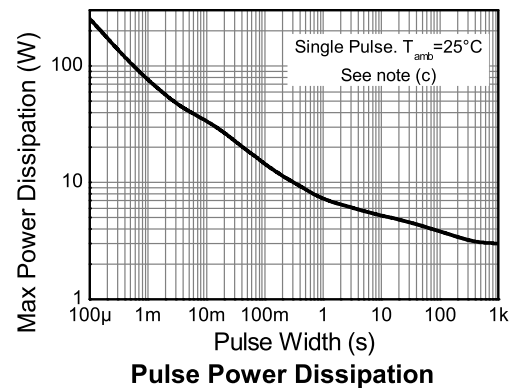
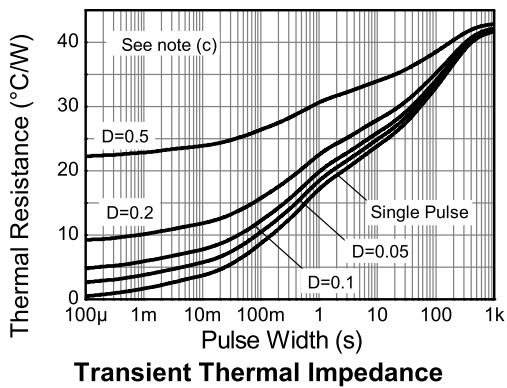
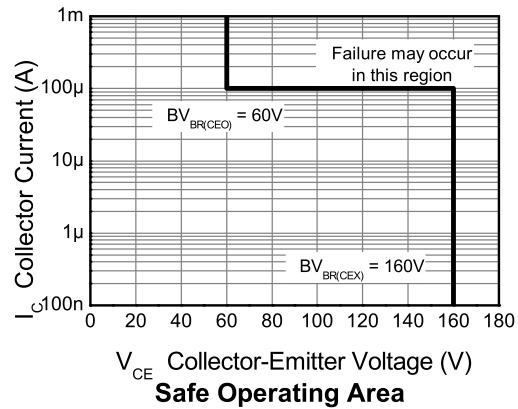
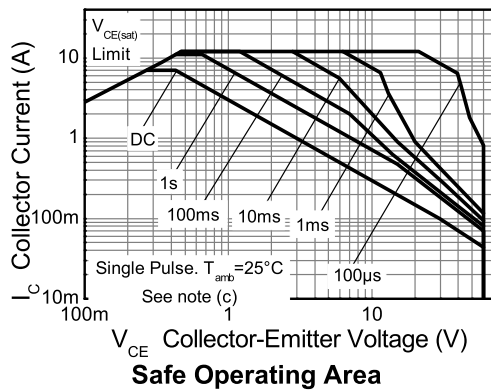
## Thermal resistance

| Parameter                          | Symbol          | Limit | Unit |
|------------------------------------|-----------------|-------|------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 104   | °C/W |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 78    | °C/W |
| Junction to ambient <sup>(c)</sup> | $R_{\theta JA}$ | 42    | °C/W |
| Junction to ambient <sup>(d)</sup> | $R_{\theta JA}$ | 23.5  | °C/W |
| Junction to case <sup>(e)</sup>    | $R_{\theta JC}$ | 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



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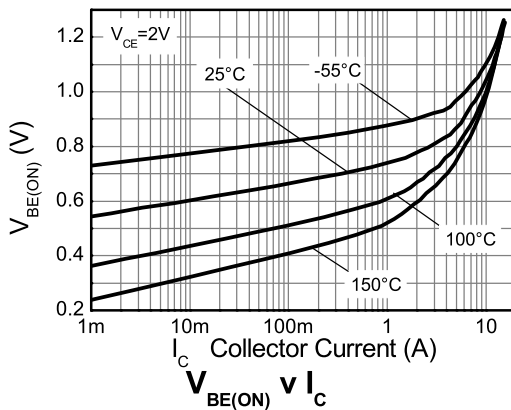
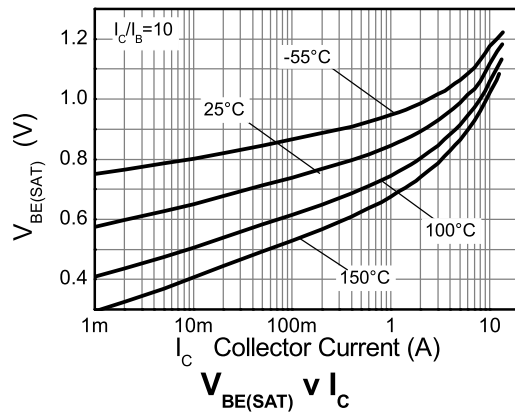
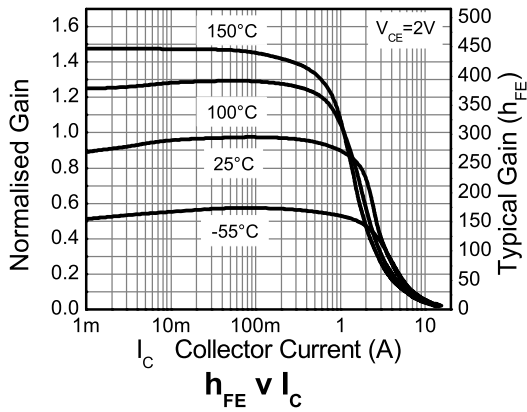
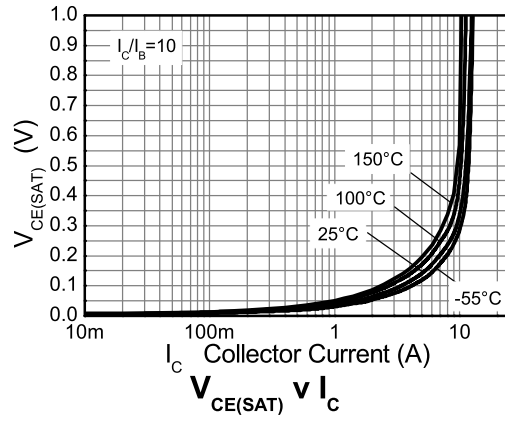
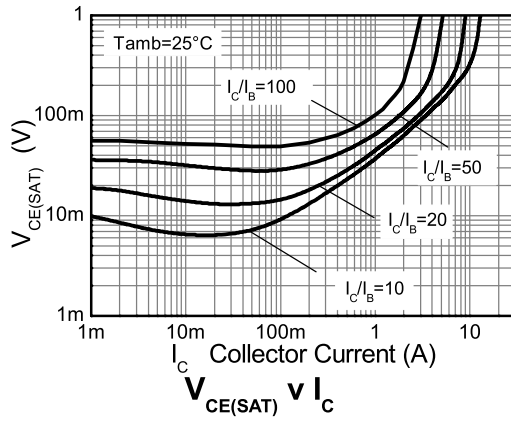
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| Parameter  | Symbol        | Min.             | Typ.                    | Max.                    | Unit                 | Conditions   |
|--|---------------|------------------|-------------------------|-------------------------|----------------------|--|
| Collector-Base breakdown voltage                       | $BV_{CBO}$    | 160              | 200                     |                         | V                    | $I_C = 100\mu\text{A}$   |
| Collector-Emitter breakdown voltage (forward blocking) | $BV_{CEX}$    | 160              | 200                     |                         | V                    | $I_C = 100\mu\text{A}$ , $R_{BE} < 1\text{k}\Omega$<br>or<br>$-1\text{V} < V_{BE} < 0.25\text{V}$  |
| Collector-Emitter breakdown voltage                    | $BV_{CEO}$    | 60               | 75                      |                         | V                    | $I_C = 10\text{mA}^{(*)}$  |
| Emitter-Collector Breakdown Voltage (Reverse Blocking) | $BV_{ECX}$    | 6                | 7                       |                         | V                    | $I_E = 100\mu\text{A}$ , $R_{BC} < 1\text{k}\Omega$<br>or<br>$0.25\text{V} > V_{BC} > -0.25\text{V}$   |
| Emitter-Collector breakdown voltage (reverse blocking) | $BV_{ECO}$    | 6                | 7                       |                         | V                    | $I_E = 100\mu\text{A}$   |
| Emitter-Base breakdown voltage                         | $BV_{EBO}$    | 7                | 8.3                     |                         | V                    | $I_E = 100\mu\text{A}$   |
| Collector-Base cut-off current                         | $I_{CBO}$     |                  | <1                      | 50<br>0.5               | nA<br>$\mu\text{A}$  | $V_{CB} = 160\text{V}$<br>$V_{CB} = 160\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$   |
| Collector-Emitter cut-off current                      | $I_{CEX}$     |                  |                         | 100                     | nA                   | $V_{CE} = 160\text{V}$ , $R_{BE} < 1\text{k}\Omega$<br>or<br>$-1\text{V} < V_{BE} < 0.25\text{V}$  |
| Emitter cut-off current                                | $I_{EBO}$     |                  | <1                      | 50                      | nA                   | $V_{EB} = 5.6\text{V}$   |
| Collector-Emitter saturation voltage                   | $V_{CE(sat)}$ |                  | 37<br>105<br>110<br>200 | 50<br>155<br>150<br>300 | mV<br>mV<br>mV<br>mV | $I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$<br>$I_C = 1\text{A}$ , $I_B = 10\text{mA}^{(*)}$<br>$I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$<br>$I_C = 7\text{A}$ , $I_B = 700\text{mA}^{(*)}$ |
| Base-Emitter saturation voltage                        | $V_{BE(sat)}$ |                  | 1050                    | 1150                    | mV                   | $I_C = 7\text{A}$ , $I_B = 700\text{mA}^{(*)}$   |
| Base-Emitter turn-on voltage                           | $V_{BE(on)}$  |                  | 960                     | 1050                    | mV                   | $I_C = 7\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$   |
| Static forward current transfer ratio                  | $h_{FE}$      | 200<br>160<br>25 | 300<br>220<br>40        | 500                     |                      | $I_C = 100\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$<br>$I_C = 2\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$<br>$I_C = 7\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$  |
| Transition frequency                                   | $f_T$         |                  | 130                     |                         | MHz                  | $I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$<br>$f = 100\text{MHz}$   |
| Input capacitance                                      | $C_{ibo}$     |                  | 310                     | 400                     | pF                   | $V_{EB} = 0.5\text{V}$ , $f = 1\text{MHz}^{(*)}$   |
| Output capacitance                                     | $C_{obo}$     |                  | 19.7                    | 25                      | pF                   | $V_{CB} = 10\text{V}$ , $f = 1\text{MHz}^{(*)}$  |
| Delay time   | $t_d$         |                  | 27.3                    |                         | ns                   | $I_C = 500\text{mA}$ , $V_{CC} = 10\text{V}$ ,<br>$I_{B1} = -I_{B2} = 50\text{mA}$   |
| Rise time  | $t_r$         |                  | 13.2                    |                         | ns                   |  |
| Storage time   | $t_s$         |                  | 682                     |                         | ns                   |  |
| Fall time  | $t_f$         |                  | 90.3                    |                         | ns                   |  |

### NOTES:

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

## Typical characteristics



**ZXTN19060CG**

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# ZXTN19060CG

## 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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|                                   |  |
|-----------------------------------|--|
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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   |

### Datasheet status key:

|                       |   |
|-----------------------|---|
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