

# ZXTN2010A

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## 60V NPN LOW SATURATION MEDIUM POWER TRANSISTOR IN E-LINE

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### SUMMARY

$BV_{CEO} = 60V$  ;  $R_{SAT} = 34m\Omega$  ;  $I_C = 4.5A$

### DESCRIPTION

Packaged in the E-line outline this new low saturation 60V 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

- Extremely low equivalent on-resistance;  $R_{SAT} = 34m\Omega$  at 5A
- 4.5 amps continuous current
- Up to 15 amps peak current
- Very low saturation voltages

### APPLICATIONS

- Emergency lighting circuits
- Motor driving (including DC fans)
- Solenoid, relay and actuator drivers
- DC modules
- Backlight inverters

### ORDERING INFORMATION

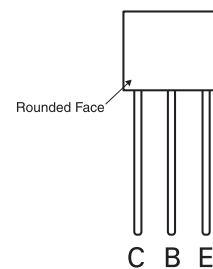
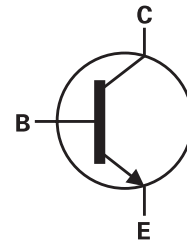
| DEVICE        | QUANTITY            |
|---------------|---------------------|
| ZXTN2010ASTOA | 2000 units / reel   |
| ZXTN2010ASTZ  | 2000 units / carton |

### DEVICE MARKING

ZXT  
N20  
10



E-LINE



PINOUT

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## ABSOLUTE MAXIMUM RATINGS

| PARAMETER  | SYMBOL         | LIMIT       | UNIT  |
|--|----------------|-------------|-------|
| Collector-base voltage                                       | $BV_{CBO}$     | 150         | V     |
| Collector-emitter voltage                                    | $BV_{CEO}$     | 60          | V     |
| Emitter-base voltage   | $BV_{EBO}$     | 7           | V     |
| Continuous collector current <sup>(a)</sup>                  | $I_C$          | 4.5         | A     |
| Peak pulse current   | $I_{CM}$       | 15          | A     |
| Practical power dissipation <sup>(a)</sup>                   | $P_D$          | 1.0         | W     |
| Linear derating factor                                       |                | 8           | mW/°C |
| Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(b)</sup> | $P_D$          | 0.71        | W     |
| Linear derating factor                                       |                | 5.7         | mW/°C |
| Operating and storage temperature range                      | $T_j, T_{stg}$ | -55 to +150 | °C    |

## THERMAL RESISTANCE

| PARAMETER                          | SYMBOL          | VALUE | UNIT |
|------------------------------------|-----------------|-------|------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 125   | °C/W |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 175   | °C/W |

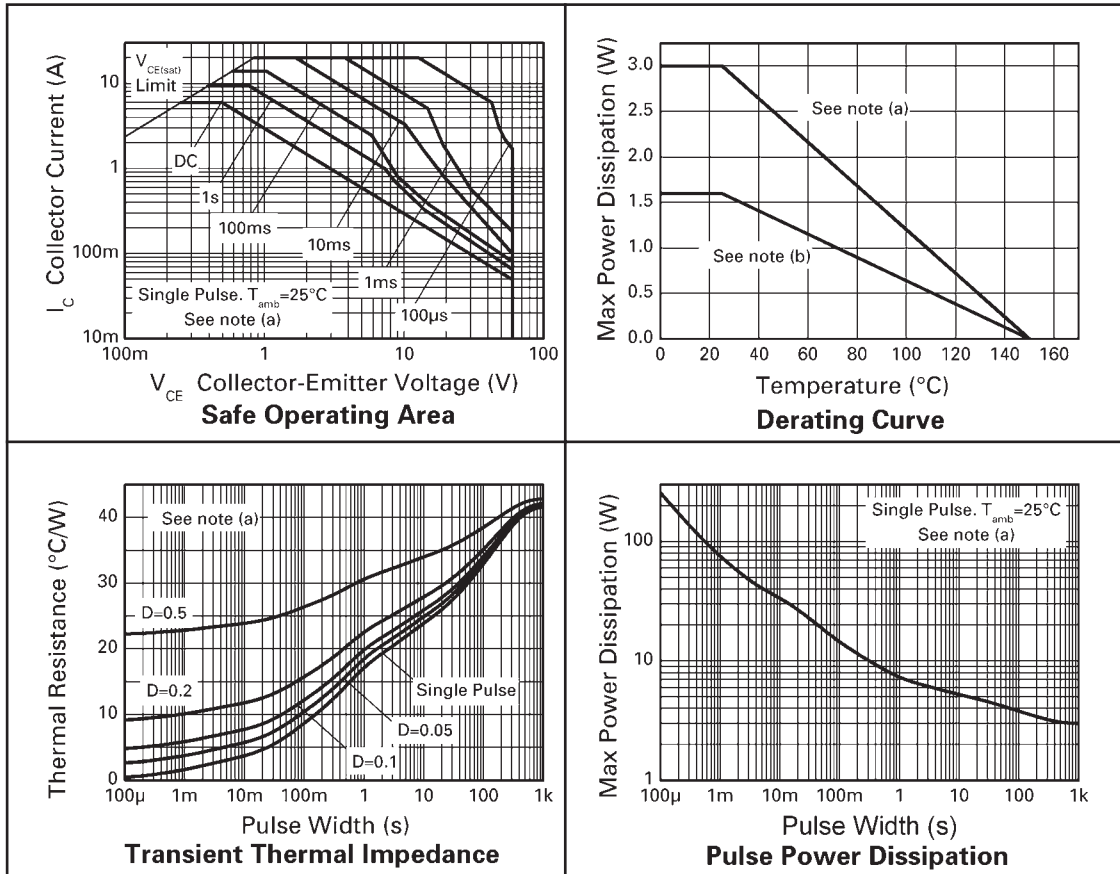
### NOTES

(a) For a device through hole mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions. Collector lead length to solder point 4mm.

(b) For a device mounted in a socket in still air conditions. Collector lead length 10mm.

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## CHARACTERISTICS



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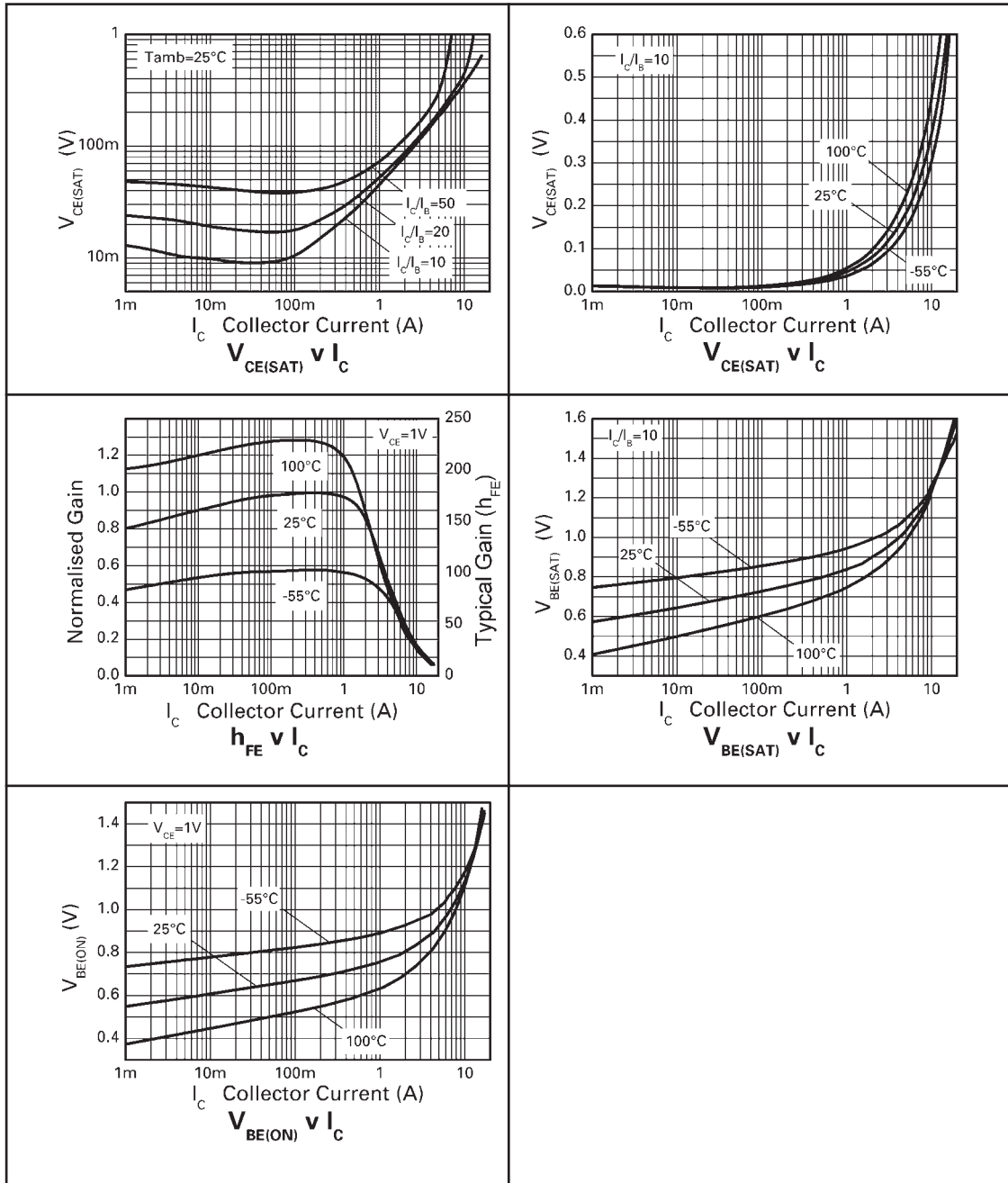
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| PARAMETER                             | SYMBOL                                | MIN.                   | TYP.                        | MAX.                         | UNIT                | CONDITIONS  |
|---------------------------------------|---------------------------------------|------------------------|-----------------------------|------------------------------|---------------------|---|
| Collector-base breakdown voltage      | $BV_{CBO}$                            | 150                    | 190                         |                              | V                   | $I_C=100\mu\text{A}$  |
| Collector-emitter breakdown voltage   | $BV_{CER}$                            | 150                    | 190                         |                              | V                   | $I_C=1\mu\text{A}$ , $R_B \leq 1\text{k}\Omega$   |
| Collector-emitter breakdown voltage   | $BV_{CEO}$                            | 60                     | 80                          |                              | V                   | $I_C=10\text{mA}^*$   |
| Emitter-base breakdown voltage        | $BV_{EBO}$                            | 7                      | 8.1                         |                              | V                   | $I_E=100\mu\text{A}$  |
| Collector cut-off current             | $I_{CBO}$                             |                        |                             | 50<br>0.5                    | nA<br>$\mu\text{A}$ | $V_{CB}=120\text{V}$<br>$V_{CB}=120\text{V}$ , $T_{amb}=100^{\circ}\text{C}$  |
| Collector cut-off current             | $I_{CER}$<br>$R \leq 1\text{k}\Omega$ |                        |                             | 100<br>0.5                   | nA<br>$\mu\text{A}$ | $V_{CB}=120\text{V}$<br>$V_{CB}=120\text{V}$ , $T_{amb}=100^{\circ}\text{C}$  |
| Emitter cut-off current               | $I_{EBO}$                             |                        |                             | 10                           | nA                  | $V_{EB}=6\text{V}$  |
| Collector-emitter saturation voltage  | $V_{CE(SAT)}$                         |                        | 18<br>40<br>45<br>95<br>170 | 30<br>55<br>65<br>130<br>210 | mV                  | $I_C=100\text{mA}$ , $I_B=5\text{mA}^*$<br>$I_C=1\text{A}$ , $I_B=100\text{mA}^*$<br>$I_C=1\text{A}$ , $I_B=50\text{mA}^*$<br>$I_C=2\text{A}$ , $I_B=50\text{mA}^*$<br>$I_C=5\text{A}$ , $I_B=200\text{mA}^*$ |
| Base-emitter saturation voltage       | $V_{BE(SAT)}$                         |                        | 950                         | 1050                         | mV                  | $I_C=4\text{A}$ , $I_B=200\text{mA}^*$  |
| Base-emitter turn-on voltage          | $V_{BE(ON)}$                          |                        | 840                         | 950                          | mV                  | $I_C=4\text{A}$ , $V_{CE}=1\text{V}^*$  |
| Static forward current transfer ratio | $h_{FE}$                              | 100<br>100<br>55<br>20 | 200<br>200<br>105<br>40     | 300                          |                     | $I_C=10\text{mA}$ , $V_{CE}=1\text{V}^*$<br>$I_C=2\text{A}$ , $V_{CE}=1\text{V}^*$<br>$I_C=5\text{A}$ , $V_{CE}=1\text{V}^*$<br>$I_C=10\text{A}$ , $V_{CE}=1\text{V}^*$                                       |
| Transition frequency                  | $f_T$                                 |                        | 130                         |                              | MHz                 | $I_C=100\text{mA}$ , $V_{CE}=10\text{V}$<br>$f=50\text{MHz}$  |
| Output capacitance                    | $C_{OBO}$                             |                        | 31                          |                              | pF                  | $V_{CB}=10\text{V}$ , $f=1\text{MHz}^*$   |
| Switching times                       | $t_{ON}$<br>$t_{OFF}$                 |                        | 42<br>760                   |                              | ns<br>ns            | $I_C=1\text{A}$ , $V_{CC}=10\text{V}$ ,<br>$I_{B1}=I_{B2}=100\text{mA}$   |

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

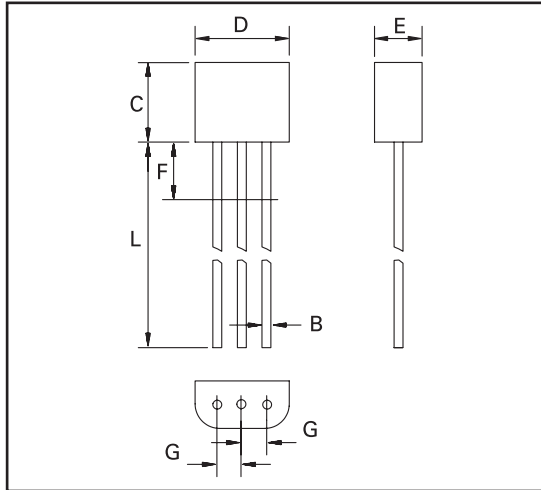
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## TYPICAL CHARACTERISTICS



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## PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

## PACKAGE DIMENSIONS

| DIM | Millimeters |       | Inches    |        |
|-----|-------------|-------|-----------|--------|
|     | Min         | Max   | Min       | Max    |
| A   | 0.41        | 0.495 | 0.016     | 0.0195 |
| B   | 0.41        | 0.495 | 0.016     | 0.0195 |
| C   | 3.61        | 4.01  | 0.142     | 0.158  |
| D   | 4.37        | 4.77  | 0.172     | 0.188  |
| E   | 2.16        | 2.41  | 0.085     | 0.095  |
| F   | —           | 2.50  | —         | 0.098  |
| G   | 1.27 NOM    |       | 0.050 NOM |        |
| L   | 13.00       | 13.97 | 0.512     | 0.550  |

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