

# ZXTP23015CFH

## 15V, SOT23, PNP medium power transistor

### Summary

$V_{(BR)CES} > -15V, V_{(BR)CEO} > -15V$

$V_{(BR)ECO} > -6V$

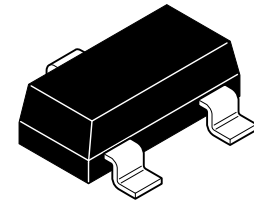
$I_{C(CONT)} = -6A$

$R_{CE(SAT)} = 20m\Omega$  typical

$V_{CE(SAT)} < -36mV @ -1A$

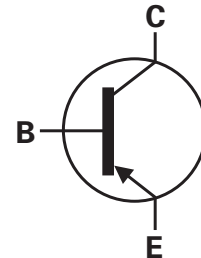
$P_D = 1.25W$

Complementary part number ZXTN23015CFH



### 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.

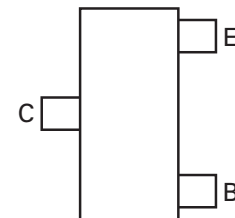


### Feature

- Higher power dissipation SOT23 package
- High peak current
- Low saturation voltage
- 15V forward blocking voltage
- 6V reverse blocking voltage

### Applications

- High side disconnect switches
- DC - DC converters
- MOSFET and IGBT gate driving
- Motor drive
- Relay, lamp, and solenoid drive



Pinout - top view

### Ordering information

| Device         | Reel size (inches) | Tape width | Quantity per reel |
|----------------|--------------------|------------|-------------------|
| ZXTP23015CFHTA | 7                  | 8mm        | 3000              |

### Device marking

317

# ZXTP23015CFH

## Absolute maximum ratings

| Parameter   | Symbol        | Limit          | Unit       |
|---|---------------|----------------|------------|
| Collector-base voltage  | $V_{CBO}$     | -15            | V          |
| Collector-emitter voltage   | $V_{(BR)CES}$ | -15            | V          |
| Collector-emitter voltage   | $V_{CEO}$     | -15            | V          |
| Emitter-base voltage  | $V_{EBO}$     | -7.0           | V          |
| Emitter-collector voltage   | $V_{ECO}$     | -6.0           | V          |
| Peak pulse current  | $I_{CM}$      | -10            | A          |
| Continuous collector current <sup>(c)</sup>   | $I_C$         | -5             | A          |
| Continuous collector current <sup>(d)</sup>   | $I_C$         | -6             | A          |
| Base current  | $I_B$         | -1.2           | A          |
| Power dissipation @ $T_A=25^{\circ}C$ <sup>(a)</sup><br>Linear derating factor <sup>(a)</sup> | $P_D$         | 0.73<br>5.84   | W<br>mW/°C |
| Power dissipation @ $T_A=25^{\circ}C$ <sup>(b)</sup><br>Linear derating factor <sup>(b)</sup> | $P_D$         | 1.05<br>8.4    | W<br>mW/°C |
| Power dissipation @ $T_A=25^{\circ}C$ <sup>(c)</sup><br>Linear derating factor <sup>(c)</sup> | $P_D$         | 1.25<br>9.6    | W<br>mW/°C |
| Power dissipation @ $T_A=25^{\circ}C$ <sup>(d)</sup><br>Linear derating factor <sup>(d)</sup> | $P_D$         | 1.81<br>14.5   | W<br>mW/°C |
| Operating and storage temperature   | $T_j:T_{stg}$ | -55 to<br>+150 | °C         |

## Thermal resistance

| Parameter                          | Symbol          | Value | 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 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

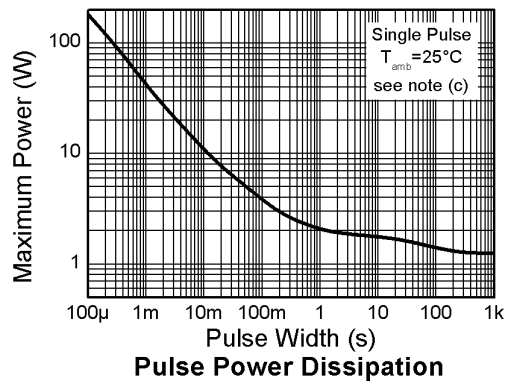
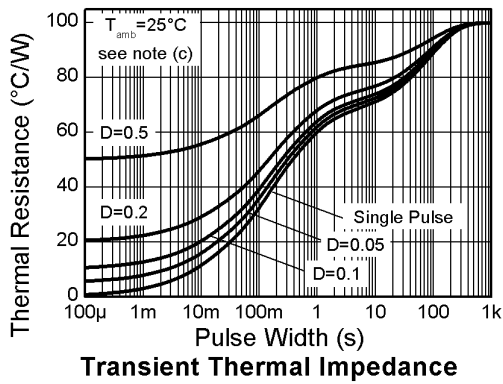
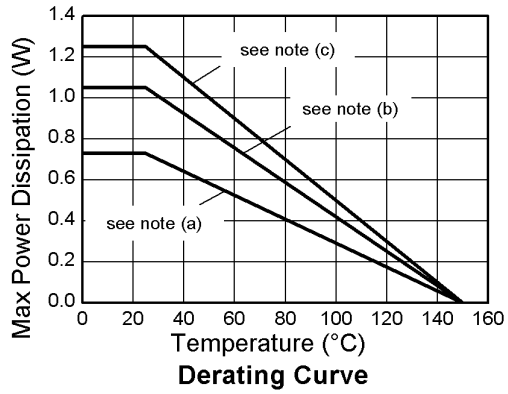
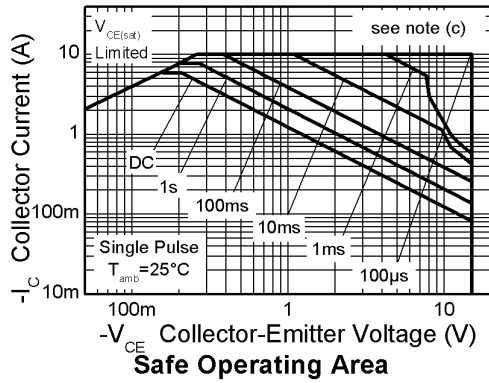
(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(c) Mounted on 50mm x 50mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

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

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## Characteristics



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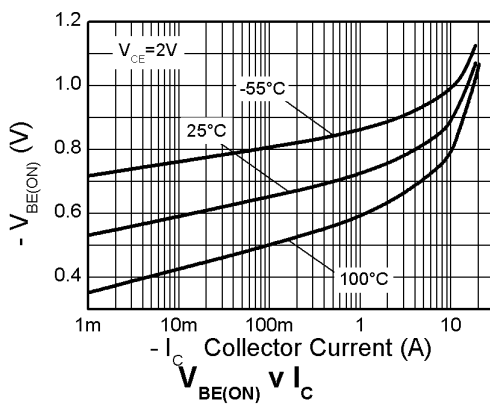
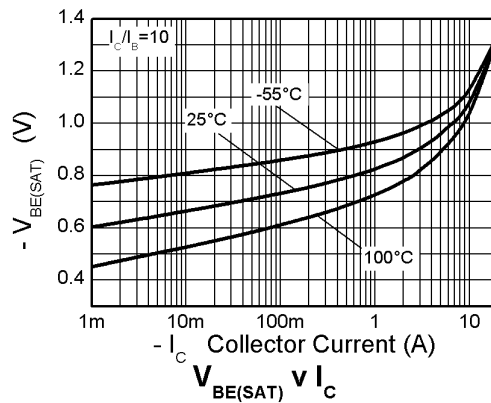
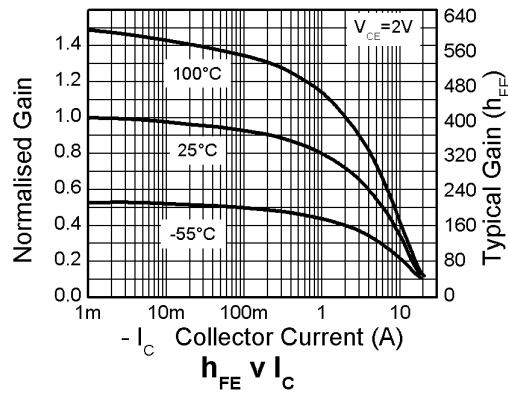
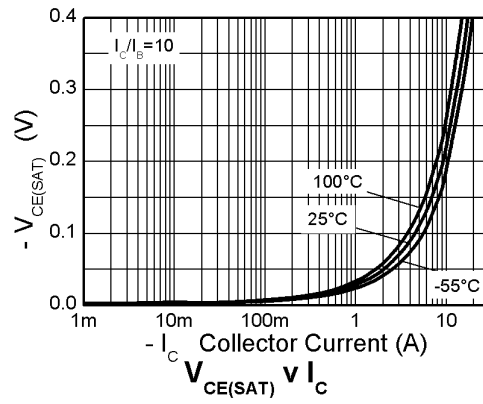
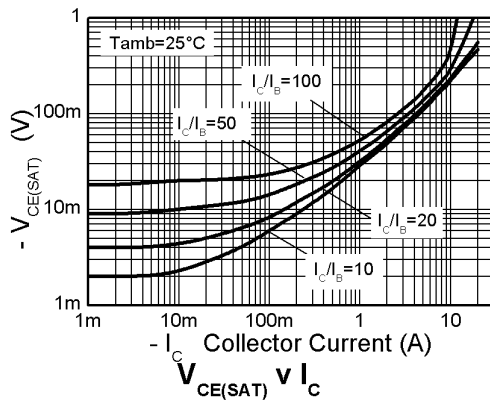
## ELECTRICAL CHARACTERISTICS (at $T_{AMB} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter                             | Symbol        | Min.              | Typ.                     | Max.                       | Unit | Conditions  |
|---------------------------------------|---------------|-------------------|--------------------------|----------------------------|------|---|
| Collector-base breakdown voltage      | $V_{(BR)CBO}$ | -15               | -40                      |                            | V    | $I_C = -100\mu\text{A}$   |
| Collector-emitter breakdown voltage   | $V_{(BR)CES}$ | -15               | -40                      |                            | V    | $I_C = -100\mu\text{A}$   |
| Collector-emitter breakdown voltage   | $V_{(BR)CEO}$ | -15               | -25                      |                            | V    | $I_C = -10\text{mA}^{(*)}$  |
| Emitter-base breakdown voltage        | $V_{(BR)EBO}$ | -7.0              | -8.2                     |                            | V    | $I_E = -100\mu\text{A}$   |
| Emitter-collector breakdown voltage   | $V_{(BR)ECO}$ | -6.0              | -8.5                     |                            | V    | $I_E = -100\mu\text{A}$   |
| Collector-emitter cut-off current     | $I_{CES}$     |                   |                          | -20                        | nA   | $V_{CE} = -12\text{V}$  |
| Collector-base cut-off current        | $I_{CBO}$     |                   |                          | -20                        | nA   | $V_{CB} = -12\text{V}$  |
| Emitter-base cut-off current          | $I_{EBO}$     |                   |                          | -10                        | nA   | $V_{EB} = -6\text{V}$   |
| Static forward current transfer ratio | $H_{FE}$      | 200<br>200<br>140 | 380<br>350<br>220        | 560                        |      | $I_C = -10\text{mA}, V_{CE} = -2\text{V}^{(*)}$<br>$I_C = -500\text{mA}, V_{CE} = -2\text{V}$<br>$I_C = -6\text{A}, V_{CE} = -2\text{V}$  |
| Collector-emitter saturation voltage  | $V_{CE(sat)}$ |                   | -6<br>-27<br>-90<br>-140 | -10<br>-36<br>-120<br>-190 | mV   | $I_C = -100\text{mA}, I_B = -10\text{mA}^{(*)}$<br>$I_C = -1\text{A}, I_B = -100\text{mA}^{(*)}$<br>$I_C = -3\text{A}, I_B = -60\text{mA}^{(*)}$<br>$I_C = -6\text{A}, I_B = -240\text{mA}^{(*)}$ |
| Base-emitter saturation voltage       | $V_{BE(sat)}$ |                   | -0.83<br>-0.93           | -0.93<br>-1.03             | V    | $I_C = -3\text{A}, I_B = -60\text{mA}^{(*)}$<br>$I_C = -6\text{A}, I_B = -240\text{mA}^{(*)}$   |
| Base-emitter turn-on voltage          | $V_{BE(on)}$  |                   | -0.83                    | -0.93                      | V    | $I_C = -6\text{A}, V_{CE} = -2\text{V}^{(*)}$   |
| Transition frequency                  | $f_T$         |                   | 270                      |                            | MHz  | $I_C = -500\text{mA}, V_{CE} = -2\text{V}, f = 50\text{MHz}$  |
| Output capacitance                    | $C_{obo}$     |                   | 78.4                     |                            | pF   | $V_{CB} = -10\text{V}, f = 1\text{MHz}$   |
| Delay time                            | $t_{(d)}$     |                   | 16                       |                            | ns   | $V_{CC} = -5\text{V}, I_C = -3\text{A}, I_{B1} = I_{B2} = -150\text{mA}$  |
| Rise time                             | $t_{(r)}$     |                   | 13                       |                            | ns   |   |
| Storage time                          | $t_{(stg)}$   |                   | 123                      |                            | ns   |   |
| Fall time                             | $t_{(f)}$     |                   | 9                        |                            | ns   |   |

### NOTES:

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

## Typical characteristics

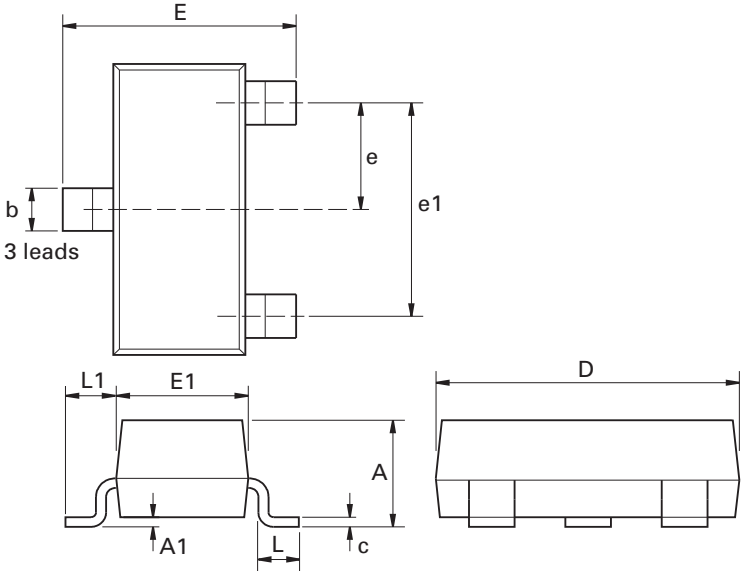


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## Package outline - SOT23



| Dim. | Millimeters |      | Inches    |       | Dim. | Millimeters |      | Inches    |        |
|------|-------------|------|-----------|-------|------|-------------|------|-----------|--------|
|      | Min.        | Max. | Min.      | Max.  |      | Min.        | Max. | Min.      | Max.   |
| A    | -           | 1.12 | -         | 0.044 | e1   | 1.90 NOM    |      | 0.075 NOM |        |
| A1   | 0.01        | 0.10 | 0.0004    | 0.004 | E    | 2.10        | 2.64 | 0.083     | 0.104  |
| b    | 0.30        | 0.50 | 0.012     | 0.020 | E1   | 1.20        | 1.40 | 0.047     | 0.055  |
| c    | 0.085       | 0.20 | 0.003     | 0.008 | L    | 0.25        | 0.60 | 0.0098    | 0.0236 |
| D    | 2.80        | 3.04 | 0.110     | 0.120 | L1   | 0.45        | 0.62 | 0.018     | 0.024  |
| e    | 0.95 NOM    |      | 0.037 NOM |       | -    | -           | -    | -         | -      |

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

# ZXTP23015CFH

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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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