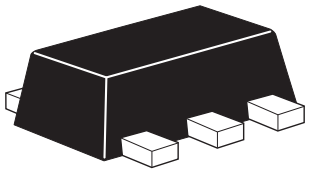
# ZXTP25012EZ
# 20V PNP high gain transistor in SOT89

## Summary



**$BV_{CEO}$ > -12V**

**$h_{FE}$ > 500**

**$I_{C(cont)}$ = 4.5A**

**$V_{CE(sat)}$ < -70mV @ 1A**

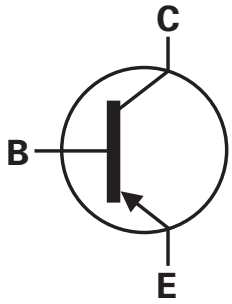
**$R_{CE(sat)}$ = 45mΩ**

**$P_D$ = 2.4W**

**Complementary part number ZXTN25012EZ**

## Description

Packaged in the SOT89 outline this new low saturation 12V PNP transistor offers extremely low on state losses making it ideal for use in DC-DC circuits and various driving and power management functions.

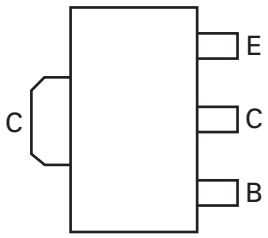



## Features

- 4.5A continuous current
- Up to 10A peak current
- Very low saturation voltages
- High gain

## Applications

- High side switch
- Battery charging
- Regulator circuits
- Buck converters
- MOSFET gate drivers



Pinout - top view

## Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|
| ZXTP25012EZTA | 7 | 12 | 1000 |

## Device marking

- 1L4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## Absolute maximum ratings

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Collector-Base voltage | $V_{CBO}$ | -20 | V |
| Collector-Emitter voltage | $V_{CEO}$ | -12 | V |
| Emitter-Base voltage | $V_{EBO}$ | -7 | V |
| Continuous Collector current[c] | $I_C$ | -4.5 | A |
| Base current | $I_B$ | -1 | A |
| Peak pulse current | $I_{CM}$ | -10 | 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 $T_A$ =25°C[d]<br>Linear derating factor | $P_D$ | 19.2<br>153 | 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] | $R_{\Theta JC}$ | 7.95 | °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


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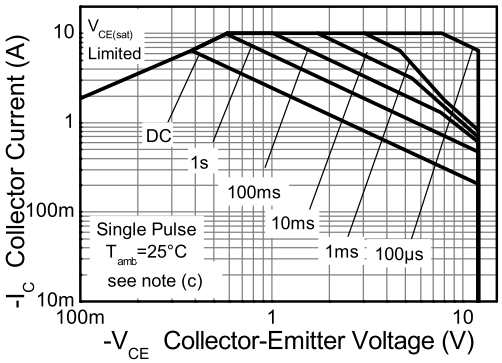
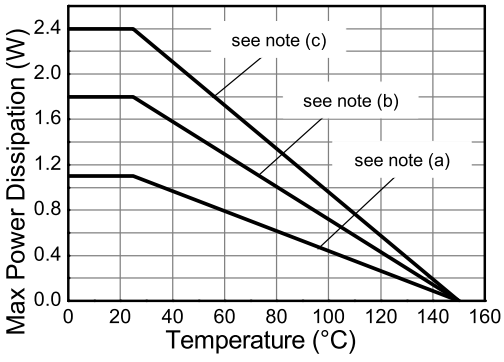
## Thermal characteristics




**Safe Operating Area**




**Derating Curve**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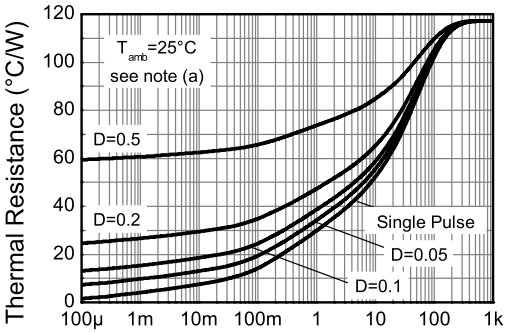
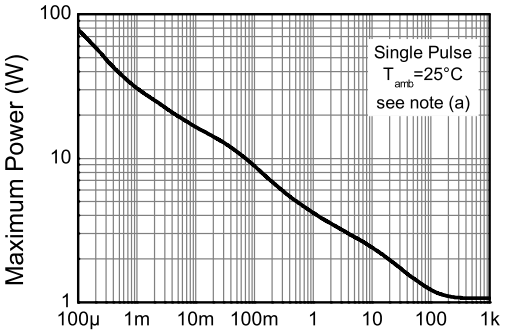
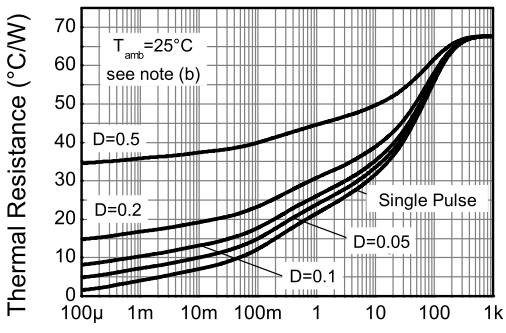
## Thermal characteristics



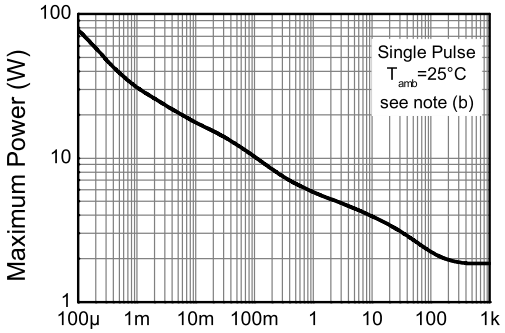

**Transient Thermal Impedance**



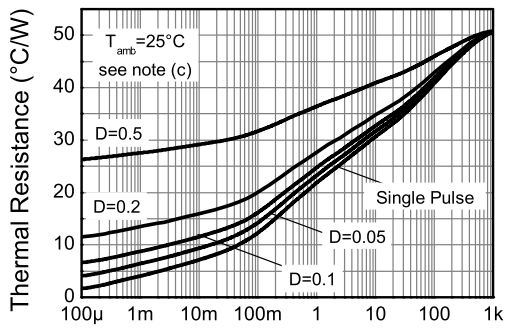

**Pulse Power Dissipation**



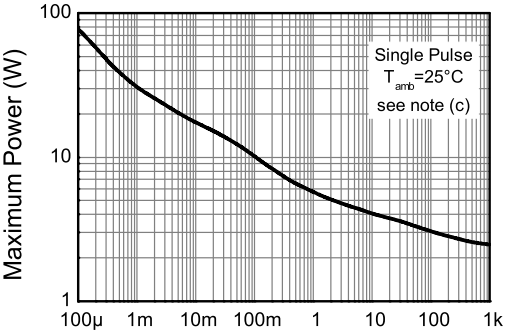

**Transient Thermal Impedance**




**Pulse Power Dissipation**




**Transient Thermal Impedance**




**Pulse Power Dissipation**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## Electrical characteristics (at $T_{amb}$ = 25°C unless otherwise stated)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-Base breakdown voltage | $BV_{CBO}$ | -12 | -35 | | V | $I_C$ = -100μA |
| Collector-Emitter breakdown voltage | $BV_{CEO}$ | -12 | -25 | | V | $I_C$= -10mA (*) |
| Emitter-Base breakdown voltage | $BV_{EBO}$ | -7 | -8.5 | | V | $I_E$ = -100μA |
| Collector-Base cut-off current | $I_{CBO}$ | | <-1 | -50<br>-0.5 | nA<br>μA | $V_{CB}$ = -12V<br>$V_{CB}$ = -12V, $T_{amb}$=100°C |
| Emitter Base cut-off current | $I_{EBO}$ | | <-1 | -50 | nA | $V_{EB}$ = -5.6V |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ | | -55<br>-155<br>-185<br>-200 | -70<br>-265<br>-355<br>-285 | mV<br>mV<br>mV<br>mV | $I_C$ = -1A, $I_B$ = -100mA(*)<br>$I_C$ = -1A, $I_B$ = -10mA(*)<br>$I_C$ = -2A, $I_B$ = -40mA(*)<br>$I_C$ = -4.5A, $I_B$ = -450mA(*) |
| Base-Emitter saturation voltage | $V_{BE(sat)}$ | | -990 | -1100 | mV | $I_C$ = -4.5A, $I_B$ = -450mA(*) |
| Base-Emitter turn-on voltage | $V_{BE(on)}$ | | -865 | -975 | mV | $I_C$ = -4.5A, $V_{CE}$ = -2V(*) |
| Static forward current transfer ratio | $h_{FE}$ | 500<br>300<br>40 | 800<br>450<br>85<br>15 | 1500 | | $I_C$ = -10mA, $V_{CE}$ = -2V(*)<br>$I_C$ = -1A, $V_{CE}$ = -2V(*)<br>$I_C$ = -4.5A, $V_{CE}$ = -2V(*)<br>$I_C$ = -10A, $V_{CE}$ = -2V(*) |
| Transition frequency | $f_T$ | | 310 | | MHz | $I_C$ = -50mA, $V_{CE}$ = -10V<br>f = 100MHz |
| Input capacitance | $C_{ibo}$ | | 127 | 250 | pF | $V_{EB}$ = -0.5V, f = 1MHz(*) |
| Output capacitance | $C_{obo}$ | | 16.9 | 30 | pF | $V_{CB}$ = -10V, f = 1MHz(*) |
| Delay time | $t_d$ | | 41 | | ns | $V_{CC}$ = -10V, $I_C$ = -1A,<br>$I_{B1}$ = -$I_{B2}$ = -10mA |
| Rise time | $t_r$ | | 62 | | ns | |
| Storage time | $t_s$ | | 179 | | ns | |
| Fall time | $t_f$ | | 65 | | ns | |

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


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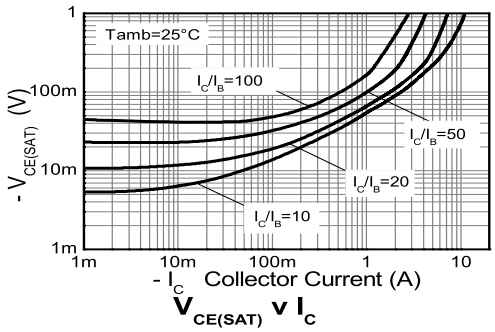
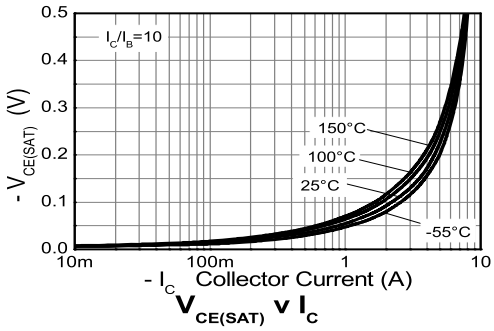
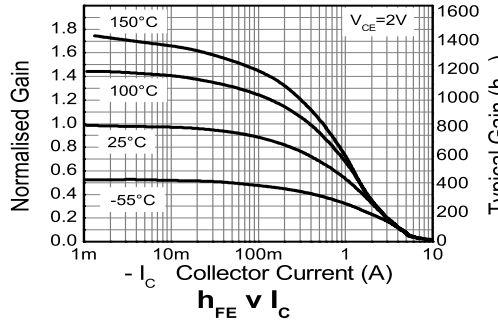
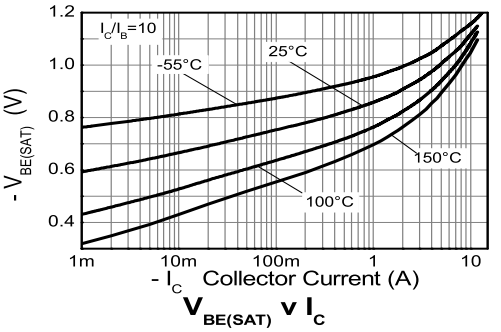
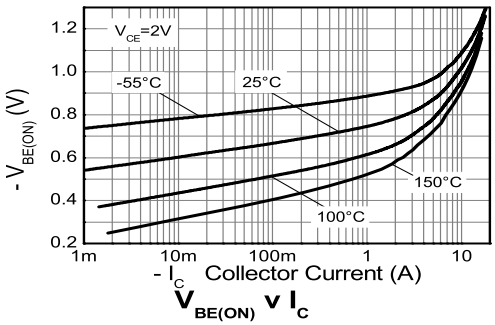
## Typical characteristics





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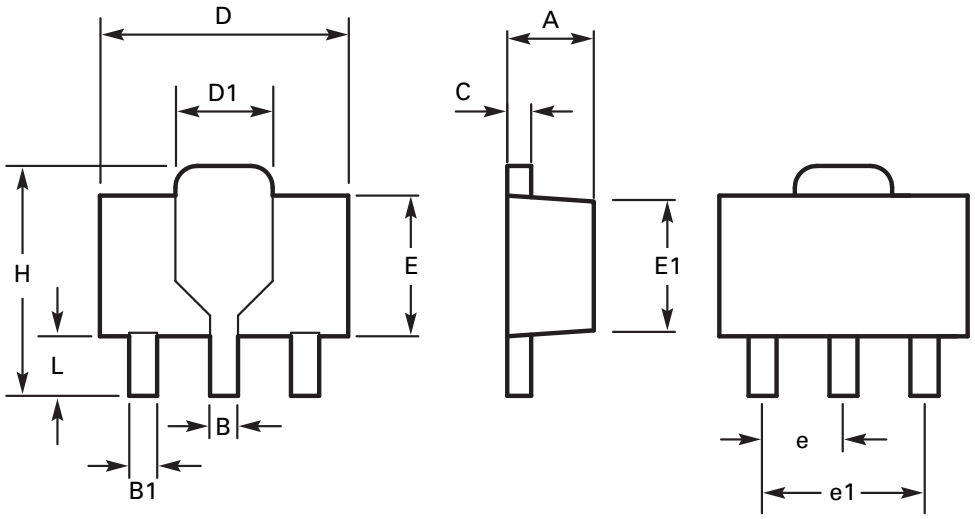
## Package outline




| 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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