

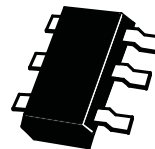
## SuperSOT4™ 40V PNP SILICON LOW SATURATION SWITCHING TRANSISTOR

### SUMMARY

$V_{CE0} = -40V$ ;  $R_{SAT} = 58m\Omega$ ;  $I_C = -3A$

### DESCRIPTION

This new 4th generation ultra low saturation transistor utilises the Zetex matrix structure combined with advanced assembly techniques to give extremely low on state losses. This makes it ideal for high efficiency, low voltage switching applications.



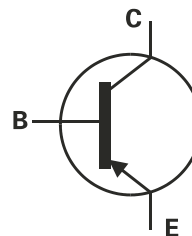
SOT23-6

### FEATURES

- Extremely Low Equivalent On Resistance
- Extremely Low Saturation Voltage
- $h_{FE}$  characterised up to 5A
- $I_C = 3A$  Continuous Collector Current
- SOT23-6 package

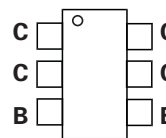
### APPLICATIONS

- DC - DC Converters
- Power Management Functions
- Power switches
- Motor control



### ORDERING INFORMATION

| DEVICE        | REEL SIZE (inches) | TAPE WIDTH (mm) | QUANTITY PER REEL |
|---------------|--------------------|-----------------|-------------------|
| ZXT13P40DE6TA | 7                  | 8mm embossed    | 3000 units        |
| ZXT13P40DE6TC | 13                 | 8mm embossed    | 10000 units       |



Top View

### DEVICE MARKING

P40D

# ZXT13P40DE6

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER   | SYMBOL         | LIMIT       | UNIT                      |
|---|----------------|-------------|---------------------------|
| Collector-Base Voltage  | $V_{CBO}$      | -40         | V                         |
| Collector-Emitter Voltage   | $V_{CEO}$      | -40         | V                         |
| Emitter-Base Voltage  | $V_{EBO}$      | -7.5        | V                         |
| Peak Pulse Current  | $I_{CM}$       | -10         | A                         |
| Continuous Collector Current  | $I_C$          | -3          | A                         |
| Base Current  | $I_B$          | -500        | mA                        |
| Power Dissipation at $T_A=25^\circ\text{C}$ (a)<br>Linear Derating Factor | $P_D$          | 1.1<br>8.8  | W<br>mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_A=25^\circ\text{C}$ (b)<br>Linear Derating Factor | $P_D$          | 1.7<br>13.6 | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range                                   | $T_j; T_{stg}$ | -55 to +150 | $^\circ\text{C}$          |

## THERMAL RESISTANCE

| PARAMETER               | SYMBOL          | VALUE | UNIT               |
|-------------------------|-----------------|-------|--------------------|
| Junction to Ambient (a) | $R_{\theta JA}$ | 113   | $^\circ\text{C/W}$ |
| Junction to Ambient (b) | $R_{\theta JA}$ | 73    | $^\circ\text{C/W}$ |

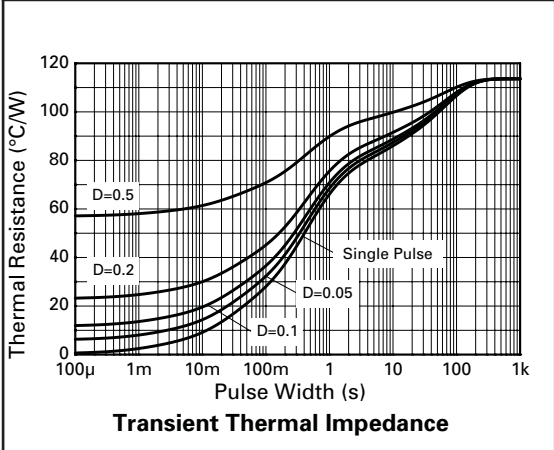
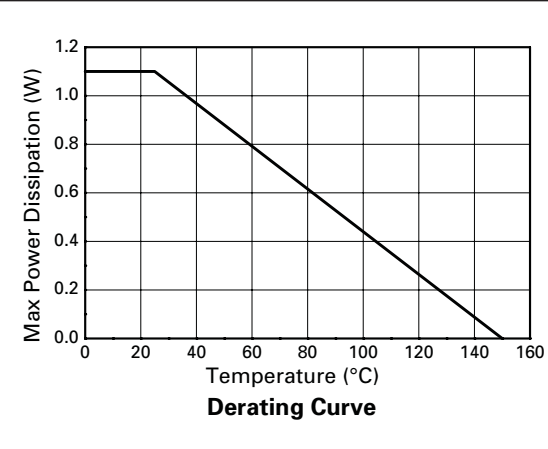
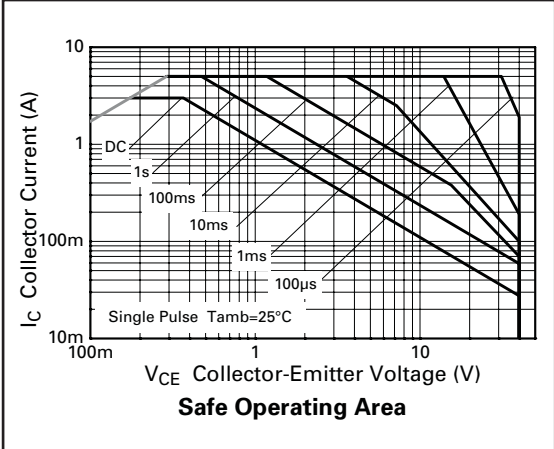
### NOTES

(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at  $t \leq 5$  secs.

# ZXT13P40DE6

## TYPICAL CHARACTERISTICS



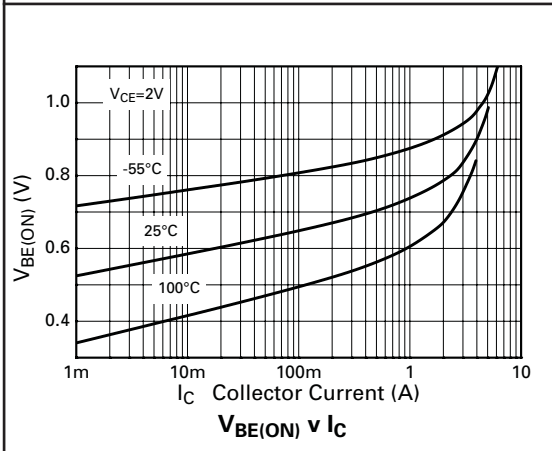
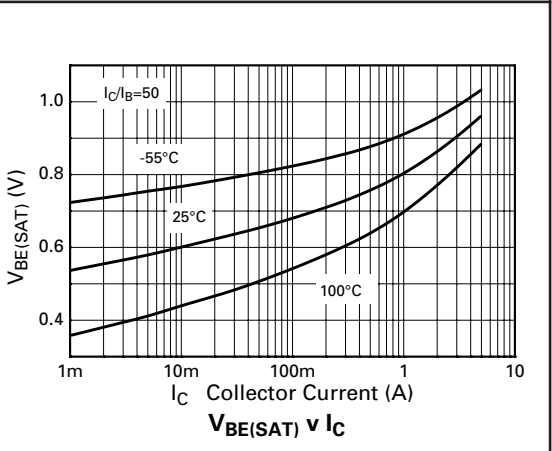
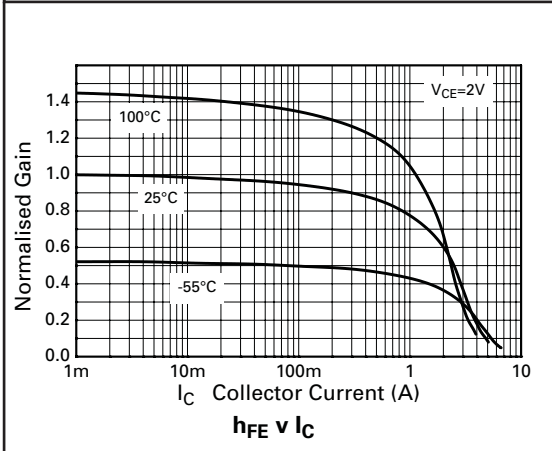
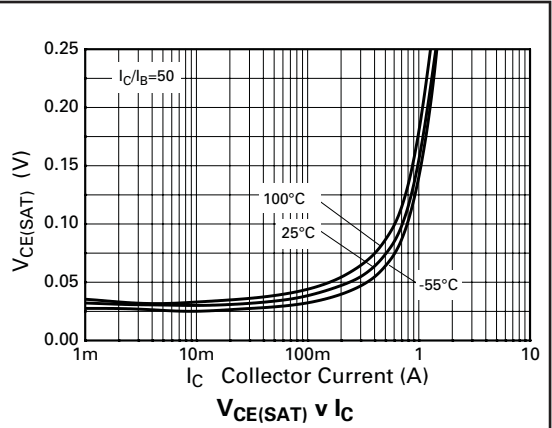
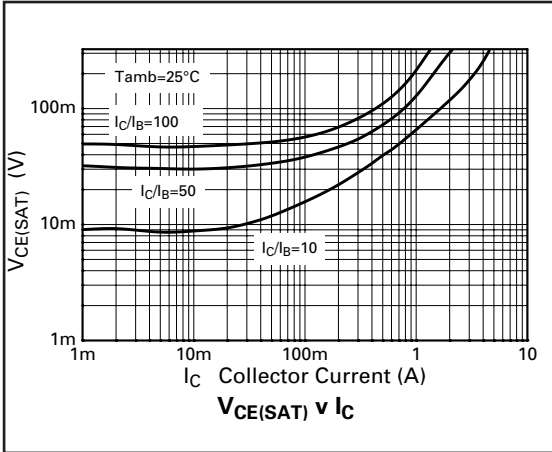
# ZXT13P40DE6

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

| PARAMETER                             | SYMBOL        | MIN.                    | TYP.                        | MAX.                        | UNIT                 | CONDITIONS.  |
|---------------------------------------|---------------|-------------------------|-----------------------------|-----------------------------|----------------------|--|
| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$ | -50                     | -80                         |                             | V                    | $I_C = -100\mu\text{A}$  |
| Collector-Emitter Breakdown Voltage   | $V_{(BR)CEO}$ | -40                     | -70                         |                             | V                    | $I_C = -10\text{mA}^*$   |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$ | -7.5                    | -8.5                        |                             | V                    | $I_E = -100\mu\text{A}$  |
| Collector Cut-Off Current             | $I_{CBO}$     |                         |                             | -100                        | nA                   | $V_{CB} = -40\text{V}$   |
| Emitter Cut-Off Current               | $I_{EBO}$     |                         |                             | -100                        | nA                   | $V_{EB} = -6\text{V}$  |
| Collector Emitter Cut-Off Current     | $I_{CES}$     |                         |                             | -100                        | nA                   | $V_{CES} = -40\text{V}$  |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ |                         | -16<br>-110<br>-145<br>-175 | -25<br>-200<br>-190<br>-240 | mV<br>mV<br>mV<br>mV | $I_C = -0.1\text{A}, I_B = -10\text{mA}^*$<br>$I_C = -1\text{A}, I_B = -20\text{mA}^*$<br>$I_C = -2\text{A}, I_B = -100\text{mA}^*$<br>$I_C = -3\text{A}, I_B = -300\text{mA}^*$   |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$ |                         |                             | -1.1                        | V                    | $I_C = -3\text{A}, I_B = -300\text{mA}^*$  |
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$  |                         |                             | -0.9                        | V                    | $I_C = -3\text{A}, V_{CE} = -2\text{V}^*$  |
| Static Forward Current Transfer Ratio | $h_{FE}$      | 300<br>300<br>100<br>15 | 500<br>450<br>250<br>50     | 900                         |                      | $I_C = -10\text{mA}, V_{CE} = -2\text{V}^*$<br>$I_C = -1\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -3\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -5\text{A}, V_{CE} = -2\text{V}^*$ |
| Transition Frequency                  | $f_T$         |                         | 115                         |                             | MHz                  | $I_C = -50\text{mA}, V_{CE} = -10\text{V}$<br>$f = 50\text{MHz}$   |
| Output Capacitance                    | $C_{obo}$     |                         | 42                          |                             | pF                   | $V_{CB} = -10\text{V}, f = 1\text{MHz}$  |
| Turn-On Time                          | $t_{(on)}$    |                         | 185                         |                             | ns                   | $V_{CC} = -10\text{V}, I_C = -1\text{A}$<br>$I_{B1} = I_{B2} = -20\text{mA}$   |
| Turn-Off Time                         | $t_{(off)}$   |                         | 400                         |                             | ns                   |  |

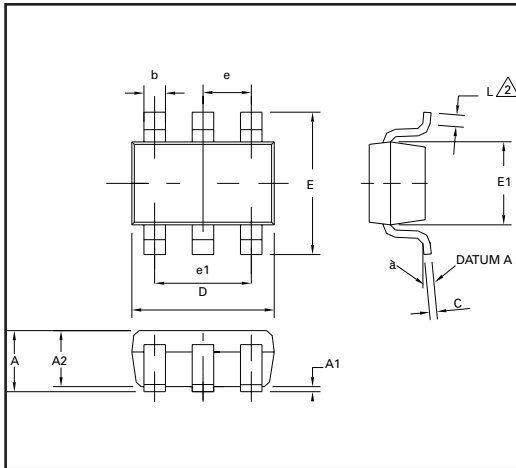
\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

## TYPICAL CHARACTERISTICS

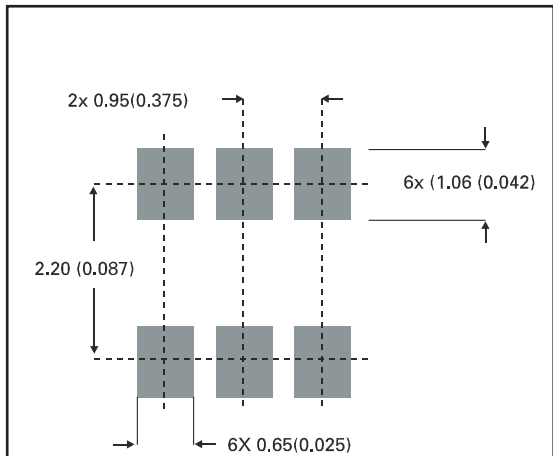


# ZXT13P40DE6

## PACKAGE DIMENSIONS



## PAD LAYOUT DETAILS



| DIM | Millimetres |      | Inches    |       |
|-----|-------------|------|-----------|-------|
|     | Min         | Max  | Min       | Max   |
| A   | 0.90        | 1.45 | 0.35      | 0.057 |
| A1  | 0.00        | 0.15 | 0         | 0.006 |
| A2  | 0.90        | 1.30 | 0.035     | 0.051 |
| b   | 0.35        | 0.50 | 0.014     | 0.019 |
| C   | 0.09        | 0.20 | 0.0035    | 0.008 |
| D   | 2.80        | 3.00 | 0.110     | 0.118 |
| E   | 2.60        | 3.00 | 0.102     | 0.118 |
| E1  | 1.50        | 1.75 | 0.059     | 0.069 |
| L   | 0.10        | 0.60 | 0.004     | 0.002 |
| e   | 0.95 REF    |      | 0.037 REF |       |
| e1  | 1.90 REF    |      | 0.074 REF |       |
| L   | 0°          | 10°  | 0°        | 10°   |

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