

## DUAL 60V NPN/PNP SILICON MEDIUM POWER TRANSISTORS

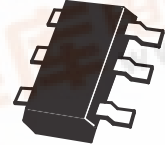
### SUMMARY

**NPN:**  $V_{CE0}=60V$ ;  $I_C=1A$ ;  $h_{FE}=100-300$

**PNP:**  $V_{CE0}=-60V$ ;  $I_C=-1A$ ;  $h_{FE}=100-300$

### DESCRIPTION

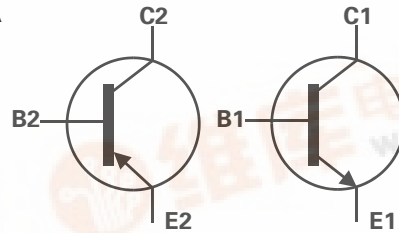
Complementary NPN and PNP medium power transistors packaged in the 6 lead SOT23 package.



**SOT23-6**

### FEATURES

- Low Equivalent On Resistance
  - NPN  $R_{CE(sat)} 210m\Omega$  at 1A
  - PNP  $R_{CE(sat)} 355m\Omega$  at -1A
- Low Saturation Voltage
- $h_{FE}$  characterised up to 2A
- $I_C=1A$  Continuous Collector Current
- SOT23-6 package

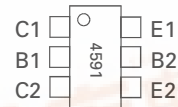


### APPLICATIONS

- MOSFET gate driver
- Low Power Motor Drive
- Low Power DC-DC Converters

### ORDERING INFORMATION

DEVICE	REEL SIZE (inches)	TAPE WIDTH (mm)	QUANTITY PER REEL
ZXTD4591E6TA	7	8mm embossed	3000 units
ZXTD4591E6TC	13	8mm embossed	10000 units



Top View

### DEVICE MARKING

4591

# ZXTD4591E6

## ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	LIMIT NPN	LIMIT PNP	UNIT
Collector-Base Voltage	$V_{CBO}$	80	-80	V
Collector-Emitter Voltage	$V_{CEO}$	60	-60	V
Emitter-Base Voltage	$V_{EBO}$	5	-5	V
Peak Pulse Current	$I_{CM}$	2	-2	A
Continuous Collector Current	$I_C$	1	-1	A
Base Current	$I_B$	500	-500	mA
Power Dissipation at $T_A=25^{\circ}\text{C}$ (a) Linear Derating Factor	$P_D$	1.1 8.8	1.1 8.8	W mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ (b) Linear Derating Factor	$P_D$	1.7 13.6	1.7 13.6	W mW/ $^{\circ}\text{C}$
Operating and Storage Temperature Range	$T_j:T_{stg}$	-55 to +150	-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.

# ZXTD4591E6

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-80			V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-60			V	$I_C = -10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5			V	$I_E = -100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			-100	nA	$V_{CB} = -60\text{V}$
Emitter Cut-Off Current	$I_{EBO}$			-100	nA	$V_{EB} = -4\text{V}$
Collector Emitter Cut-Off Current	$I_{CES}$			-100	nA	$V_{CES} = -60\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			-0.3 -0.6	V V	$I_C = -500\text{mA}$ , $I_B = -50\text{mA}^*$ $I_C = -1\text{A}$ , $I_B = -100\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			-1.2	V	$I_C = -1\text{A}$ , $I_B = -100\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			-1.0	V	$I_C = -1\text{A}$ , $V_{CE} = -5\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	100 100 80 15		300		$I_C = -1\text{mA}$ , $V_{CE} = -5\text{V}^*$ $I_C = -500\text{mA}$ , $V_{CE} = -5\text{V}^*$ $I_C = -1\text{A}$ , $V_{CE} = -5\text{V}^*$ $I_C = -2\text{A}$ , $V_{CE} = -5\text{V}^*$
Transition Frequency	$f_T$	150			MHz	$I_C = -50\text{mA}$ , $V_{CE} = -10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	$C_{obo}$			10	pF	$V_{CB} = -10\text{V}$ , $f = 1\text{MHz}$

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

# ZXTD4591E6

## NPN

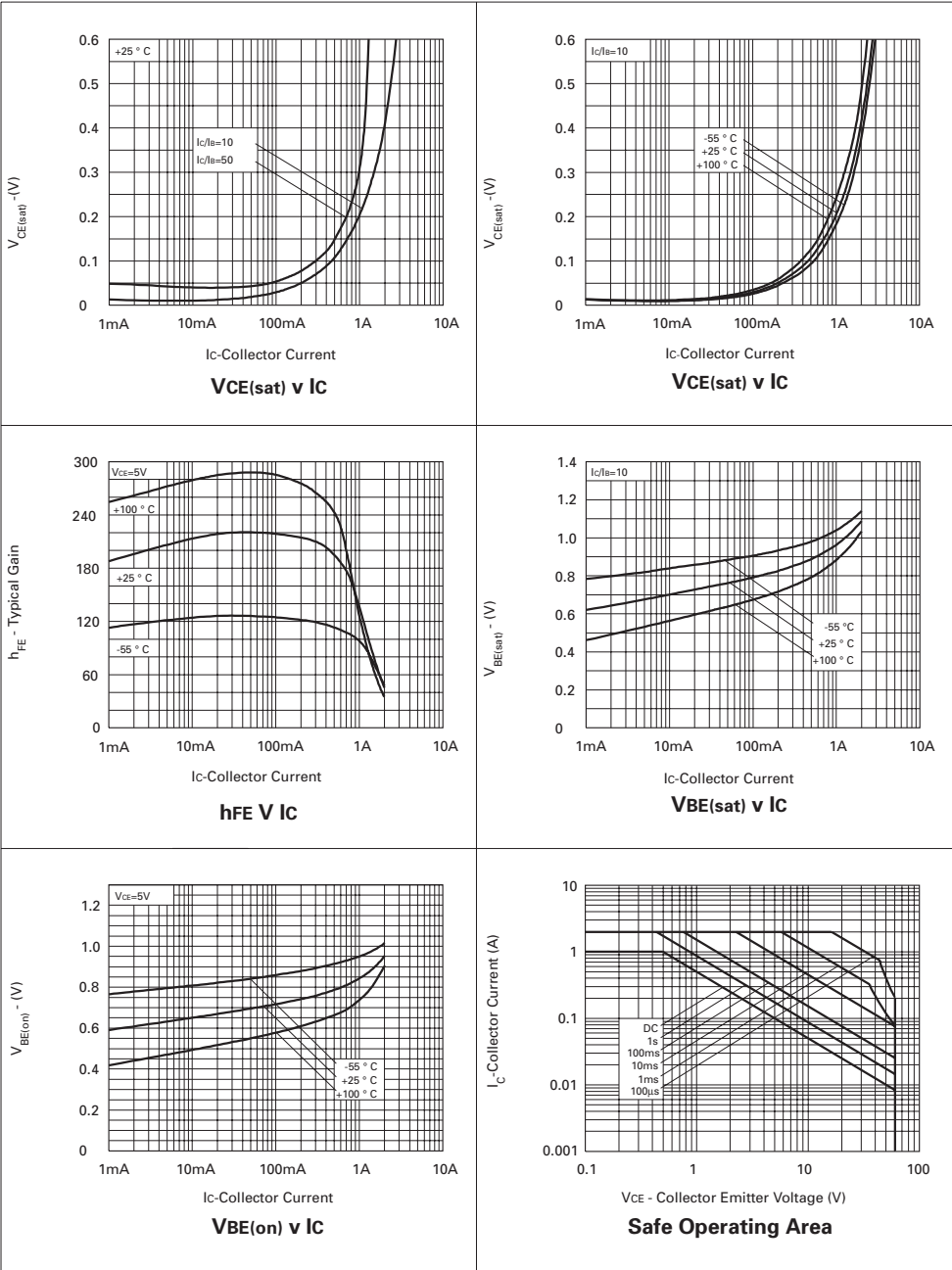
### ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	80			V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	60			V	$I_C=10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	$I_E=100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			100	nA	$V_{CB}=60\text{V}$
Emitter Cut-Off Current	$I_{EBO}$			100	nA	$V_{EB}=4\text{V}$
Collector Emitter Cut-Off Current	$I_{CES}$			100	nA	$V_{CES}=60\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.25 0.5	V V	$I_C=500\text{mA}, I_B=50\text{mA}^*$ $I_C=1\text{A}, I_B=100\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1.1	V	$I_C=1\text{A}, I_B=100\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			1.0	V	$I_C=1\text{A}, V_{CE}=5\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	100 100 80 30		300		$I_C=1\text{mA}, V_{CE}=5\text{V}^*$ $I_C=500\text{mA}, V_{CE}=5\text{V}^*$ $I_C=1\text{A}, V_{CE}=5\text{V}^*$ $I_C=2\text{A}, V_{CE}=5\text{V}^*$
Transition Frequency	$f_T$	150			MHz	$I_C=50\text{mA}, V_{CE}=10\text{V}$ $f=100\text{MHz}$
Output Capacitance	$C_{obo}$			10	pF	$V_{CB}=10\text{V}, f=1\text{MHz}$

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

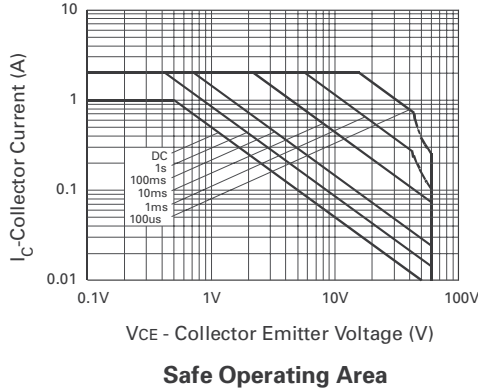
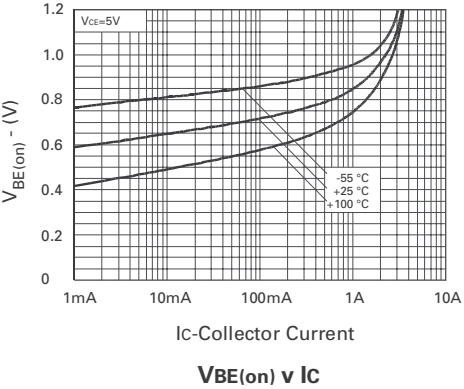
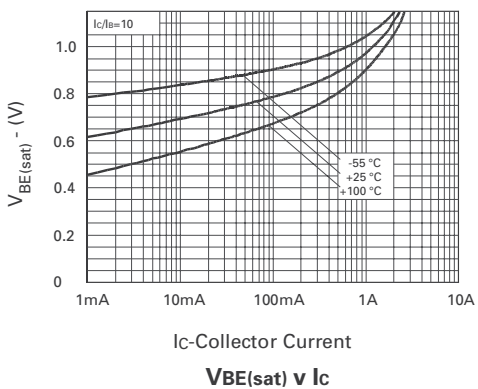
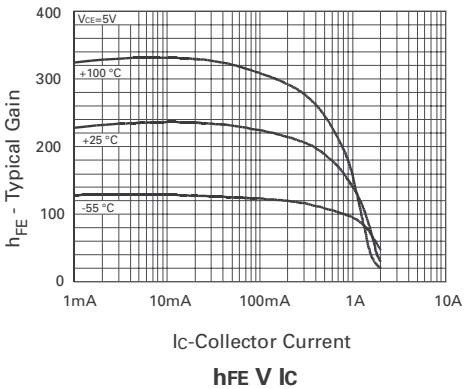
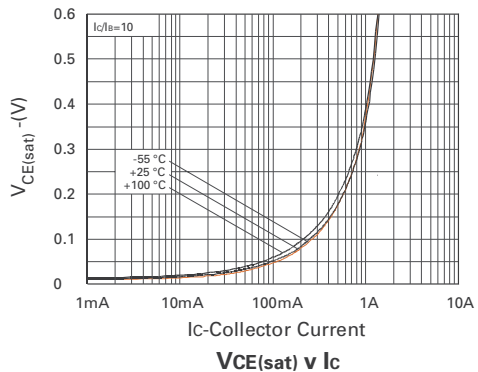
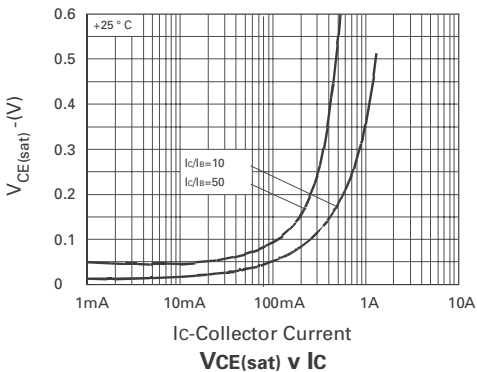
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## NPN TYPICAL CHARACTERISTICS



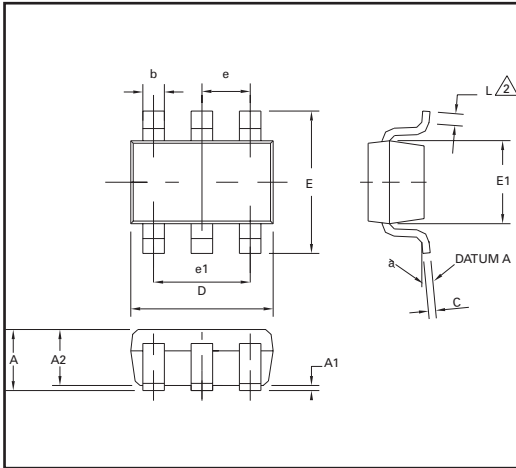
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## PNP TYPICAL CHARACTERISTICS

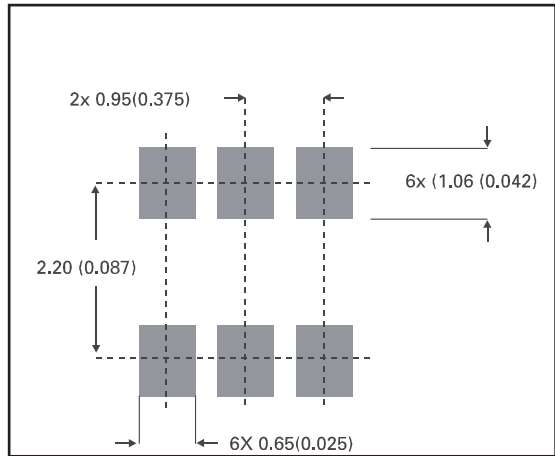


# ZXTD4591E6

## 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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