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# ZXTP2009Z

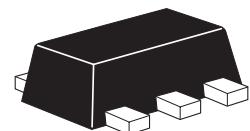
## 40V PNP HIGH GAIN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89

### SUMMARY

$BV_{CEO} = -40V$  :  $R_{SAT} = 29m\Omega$ ;  $I_C = -5.5A$

### DESCRIPTION

Packaged in the SOT89 outline this new low saturation 40V PNP transistor offers low on state losses making it ideal for use in DC-DC circuits, line switching and various driving and power management functions.



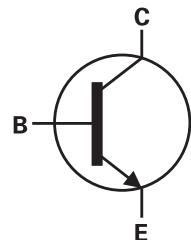
### FEATURES

- Extremely low equivalent on-resistance
- 5.5 amps continuous current
- Up to 15 amps peak current
- Very low saturation voltages < -60mV @ -1A

SOT89

### APPLICATIONS

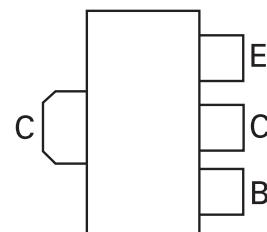
- DC - DC converters
- MOSFET gate drivers
- Charging circuits
- Power switches
- Motor control



### ORDERING INFORMATION

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXTP2009ZTA	7"	12mm	1,000 units

### PINOUT



TOP VIEW

### DEVICE MARKING

53Z

# ZXTP2009Z

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Collector-base voltage	$BV_{CBO}$	-50	V
Collector-base voltage	$BV_{CBS}$	-50	V
Collector-emitter voltage	$BV_{CEO}$	-40	V
Emitter-base voltage	$BV_{EBO}$	-7.5	V
Continuous collector current <sup>(b)</sup>	$I_C$	-5.5	A
Peak pulse current	$I_{CM}$	-15	A
Power dissipation at $T_A = 25^\circ C$ <sup>(a)</sup>	$P_D$	0.9	W
Linear derating factor		7.2	$mW/^\circ C$
Power dissipation at $T_A = 25^\circ C$ <sup>(b)</sup>	$P_D$	1.5	W
Linear derating factor		12	$mW/^\circ C$
Power dissipation at $T_A = 25^\circ C$ <sup>(c)</sup>	$P_D$	2.1	W
Linear derating factor		16.8	$mW/^\circ C$
Power dissipation at $T_A = 25^\circ C$ <sup>(d)</sup>	$P_D$	3	W
Linear derating factor		24	$mW/^\circ C$
Operating and storage temperature range	$T_j, T_{stg}$	-55 to 150	°C

## THERMAL RESISTANCE

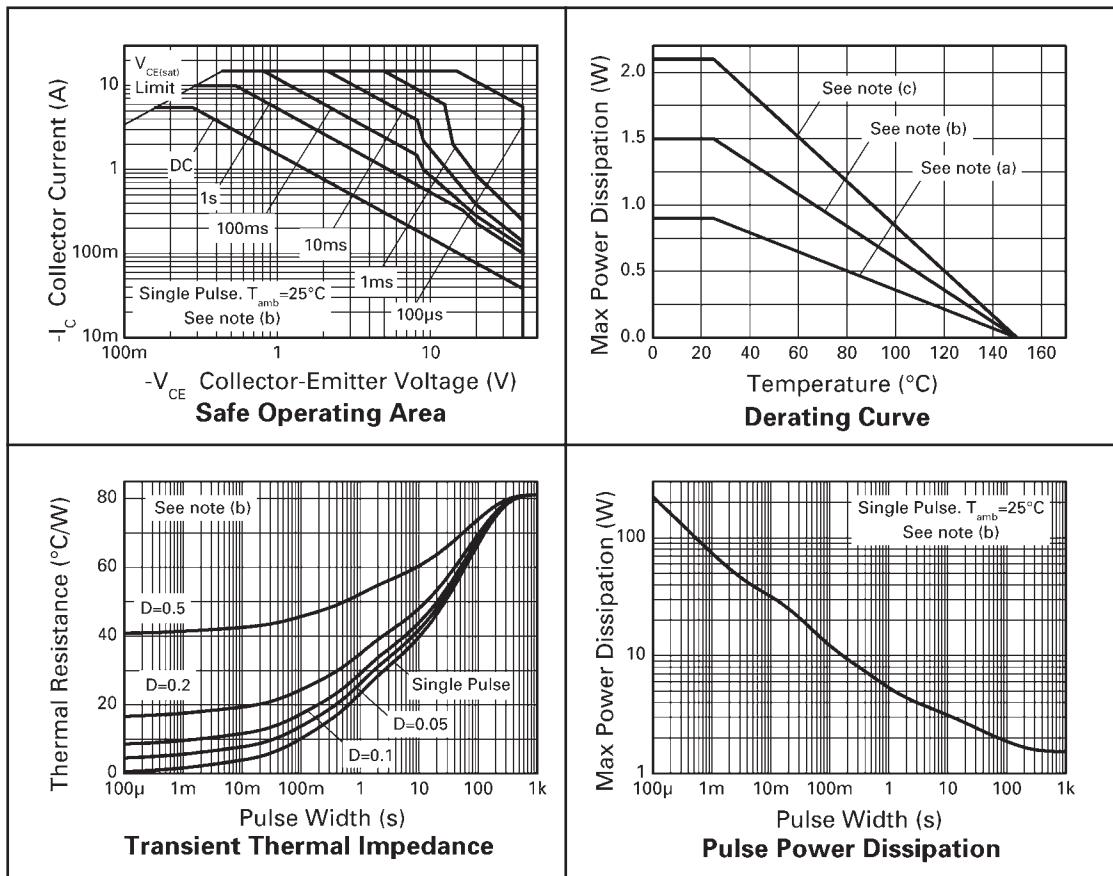
PARAMETER	SYMBOL	VALUE	UNIT
Junction to ambient <sup>(a)</sup>	$R_{\Theta JA}$	139	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\Theta JA}$	83	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\Theta JA}$	60	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\Theta JA}$	42	°C/W

### 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) For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (c) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (d) For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB measured at  $t < 5$  secs.

# ZXTP2009Z

## CHARACTERISTICS



# ZXTP2009Z

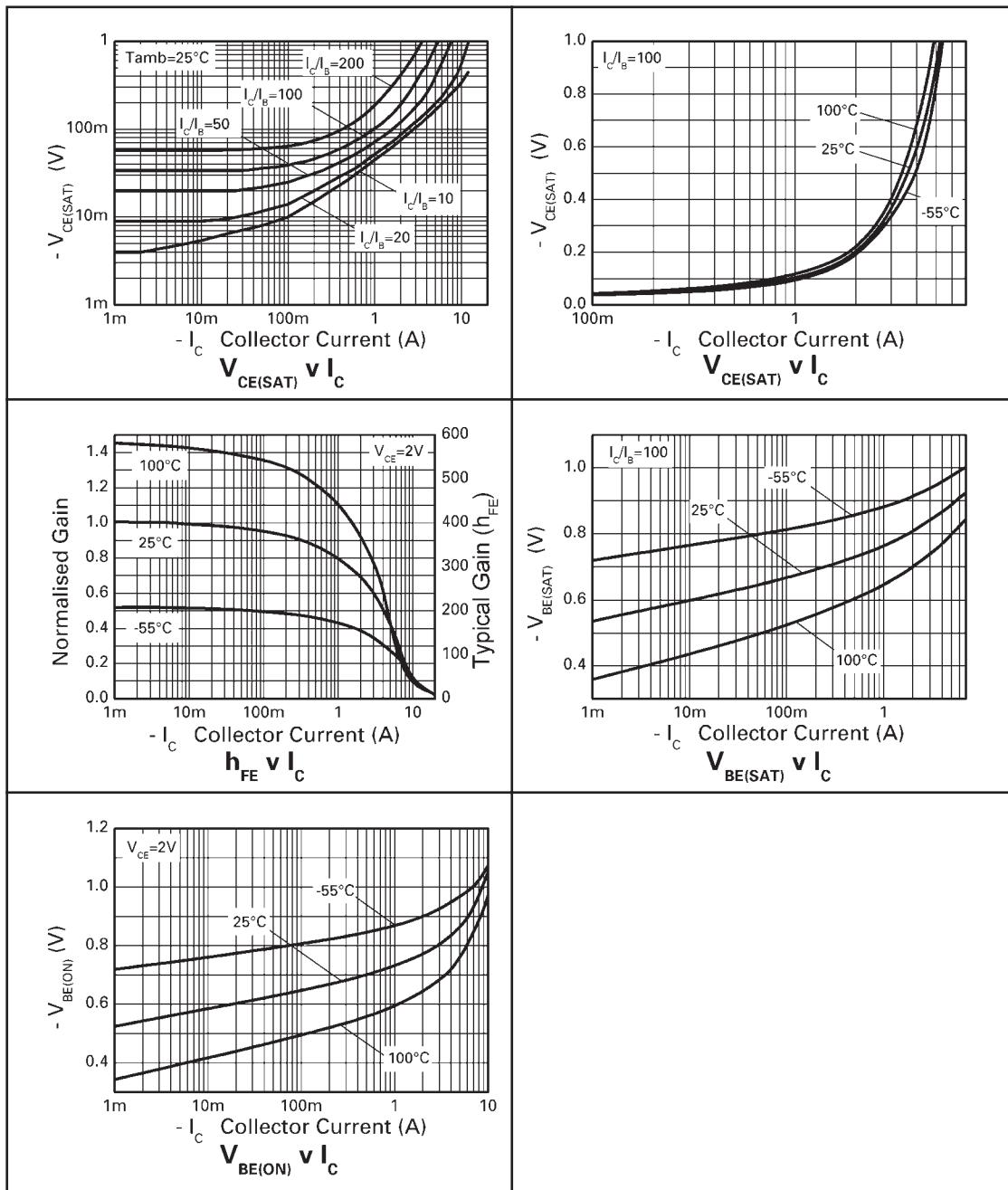
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^\circ\text{C}$ unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Collector-base breakdown voltage	$\text{BV}_{\text{CBO}}$	-50	-90		V	$I_C=-100\mu\text{A}$
Collector-emitter breakdown voltage	$\text{BV}_{\text{CES}}$	-50	-90		V	$I_C=-100\mu\text{A}$
Collector-emitter breakdown voltage	$\text{BV}_{\text{CEO}}$	-40	-58		V	$I_C=-10\text{mA}^*$
Emitter-base breakdown voltage	$\text{BV}_{\text{EBO}}$	-7.5	-8.3		V	$I_E=-100\mu\text{A}$
Collector cut-off current	$I_{\text{CBO}}$		<1	-20	nA	$V_{\text{CB}}=-40\text{V}$
Collector cut-off current	$I_{\text{CES}}$		<1	-20	nA	$V_{\text{CB}}=-32\text{V}$
Emitter cut-off current	$I_{\text{EBO}}$		<1	-20	nA	$V_{\text{EB}}=-6\text{V}$
Collector-emitter saturation voltage	$V_{\text{CE}(\text{SAT})}$		-15 -44 -50 -120 -70 -125 -130 -162	-30 -60 -70 -165 -80 -175 -175 -185	mV	$I_C=-0.1\text{A}, I_B=-10\text{mA}^*$ $I_C=-1\text{A}, I_B=-100\text{mA}^*$ $I_C=-1\text{A}, I_B=-50\text{mA}^*$ $I_C=-1\text{A}, I_B=-10\text{mA}^*$ $I_C=-2\text{A}, I_B=-200\text{mA}^*$ $I_C=-2\text{A}, I_B=-40\text{mA}^*$ $I_C=-3.5\text{A}, I_B=-175\text{mA}^*$ $I_C=-5.5\text{A}, I_B=-550\text{mA}^*$
Base-emitter saturation voltage	$V_{\text{BE}(\text{SAT})}$		-820 -1000	-900 -1075	mV	$I_C=-2\text{A}, I_B=-40\text{mA}^*$ $I_C=-5.5\text{A}, I_B=-550\text{mA}^*$
Base-emitter turn-on voltage	$V_{\text{BE}(\text{ON})}$		-778 -869	-850 -950	mV	$I_C=-2\text{A}, V_{\text{CE}}=-2\text{V}^*$ $I_C=-5.5\text{A}, V_{\text{CE}}=-2\text{V}^*$
Static forward current transfer ratio	$H_{\text{FE}}$	200 200 170 110	390 350 290 175	550		$I_C=-10\text{mA}, V_{\text{CE}}=-2\text{V}^*$ $I_C=-0.5\text{A}, V_{\text{CE}}=-2\text{V}^*$ $I_C=-2\text{A}, V_{\text{CE}}=-2\text{V}^*$ $I_C=-5.5\text{A}, V_{\text{CE}}=-2\text{V}^*$
Transition frequency	$f_T$		152		MHz	$I_C=-50\text{mA}, V_{\text{CE}}=-10\text{V}$ $f=100\text{MHz}$
Output capacitance	$C_{\text{OBO}}$		53		pF	$V_{\text{CB}}=-10\text{V}, f=1\text{MHz}^*$
Switching times	$t_d$ $t_r$ $t_s$ $t_r$		18 17 325 60		ns	$I_C=-1\text{A}, V_{\text{CC}}=-10\text{V},$ $I_{B1}=I_{B2}=-100\text{mA}$
Switching times	$t_d$ $t_r$ $t_s$ $t_r$		55 107 264 103		ns	$I_C=-2\text{A}, V_{\text{CC}}=-30\text{V},$ $I_{B1}=I_{B2}=-20\text{mA}$

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

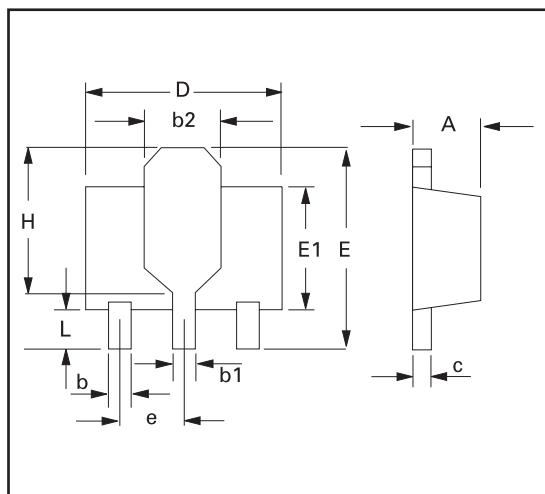
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## TYPICAL CHARACTERISTICS

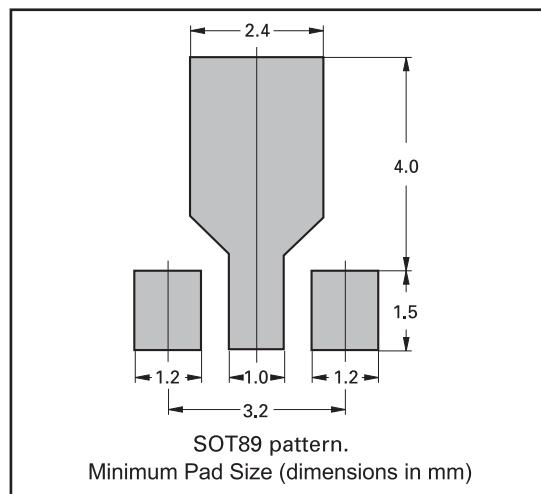


# ZXTP2009Z

## PACKAGE OUTLINE



## PAD LAYOUT DETAILS



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

## PACKAGE DIMENSIONS

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.40	1.60	0.550	0.630	e	1.40	1.50	0.055	0.059
b	0.38	0.48	0.015	0.019	E	3.75	4.25	0.150	0.167
b1	-	0.53	-	0.021	E1	-	2.60	-	0.102
b2	1.50	1.80	0.060	0.071	G	2.90	3.00	0.114	0.118
c	0.28	0.44	0.011	0.017	H	2.60	2.85	0.102	0.112
D	4.40	4.60	0.173	0.181	-	-	-	-	-

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