

# ZXTP2009Z

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

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### 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.



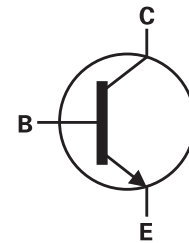
SOT89

### FEATURES

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

### APPLICATIONS

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



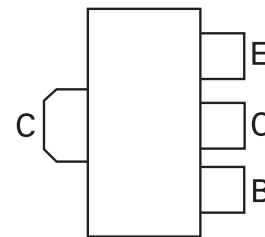
### ORDERING INFORMATION

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

### DEVICE MARKING

53Z

### PINOUT



TOP VIEW

# 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 $T_A = 25^\circ\text{C}$ <sup>(a)</sup>	$P_D$	0.9	W
Linear derating factor		7.2	mW/ $^\circ\text{C}$
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(b)</sup>	$P_D$	1.5	W
Linear derating factor		12	mW/ $^\circ\text{C}$
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(c)</sup>	$P_D$	2.1	W
Linear derating factor		16.8	mW/ $^\circ\text{C}$
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(d)</sup>	$P_D$	3	W
Linear derating factor		24	mW/ $^\circ\text{C}$
Operating and storage temperature range	$T_j, T_{stg}$	-55 to 150	$^\circ\text{C}$

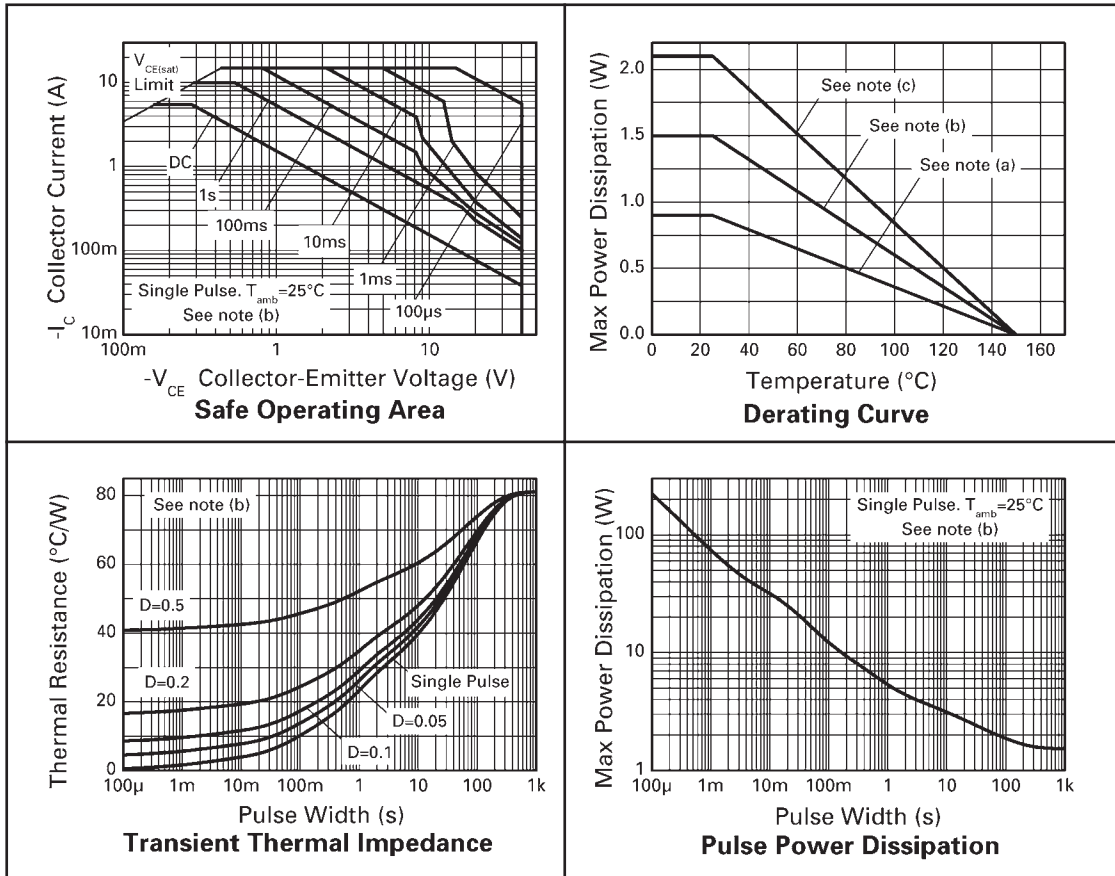
## THERMAL RESISTANCE

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

### 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.

## CHARACTERISTICS



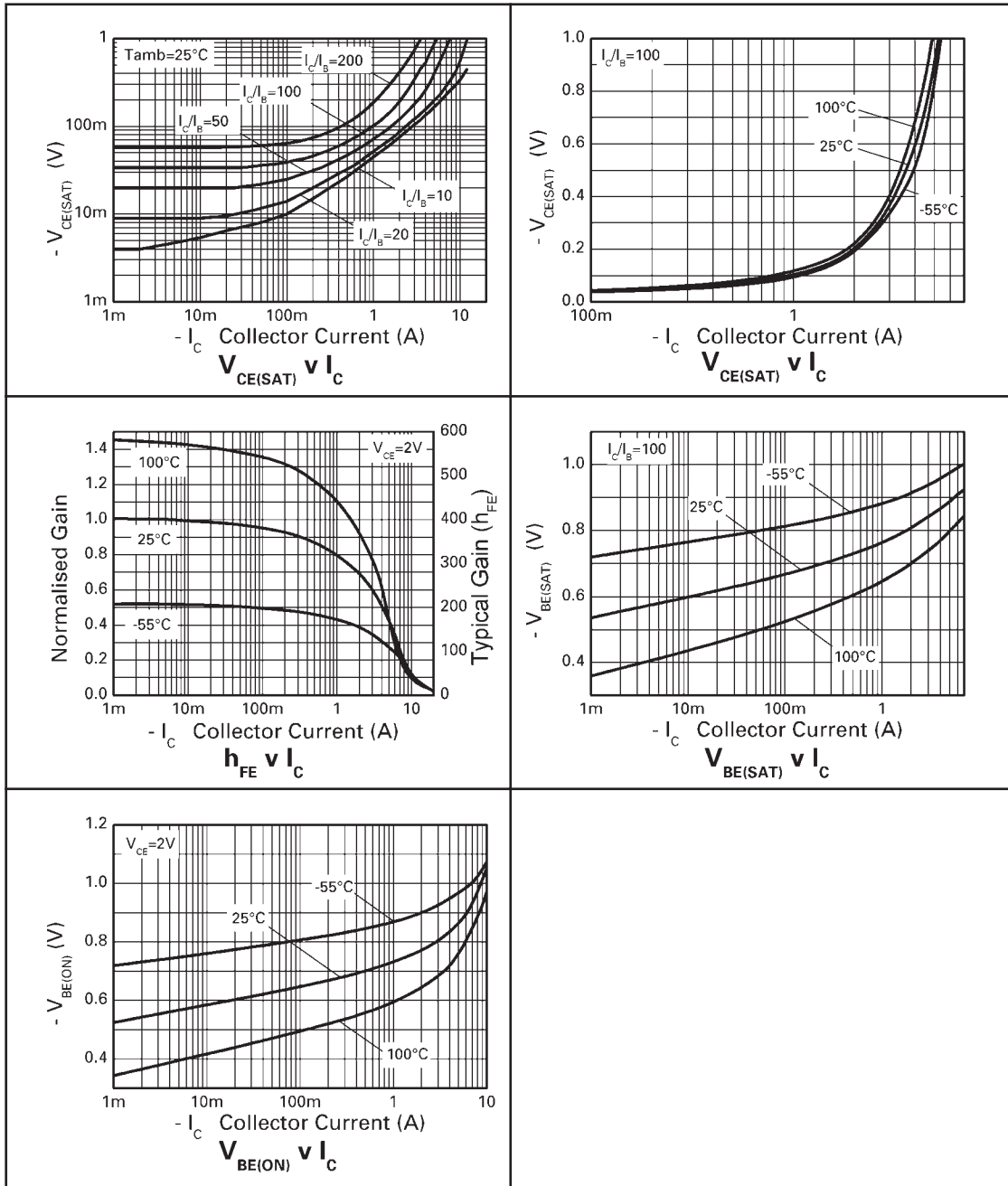
# ZXTP2009Z

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

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

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

## TYPICAL CHARACTERISTICS

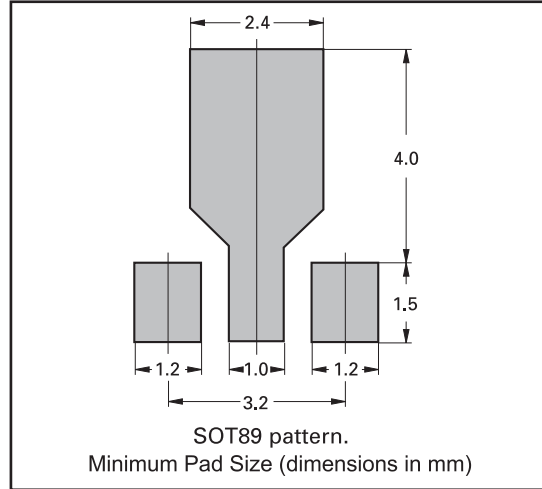


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## PACKAGE OUTLINE



## 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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