

# ZXTP2009Z

---

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

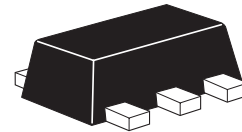
---

### 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.



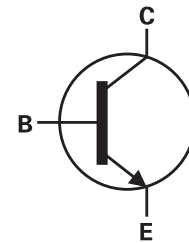
SOT89

### 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



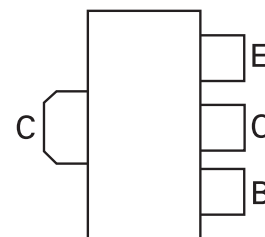
### ORDERING INFORMATION

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

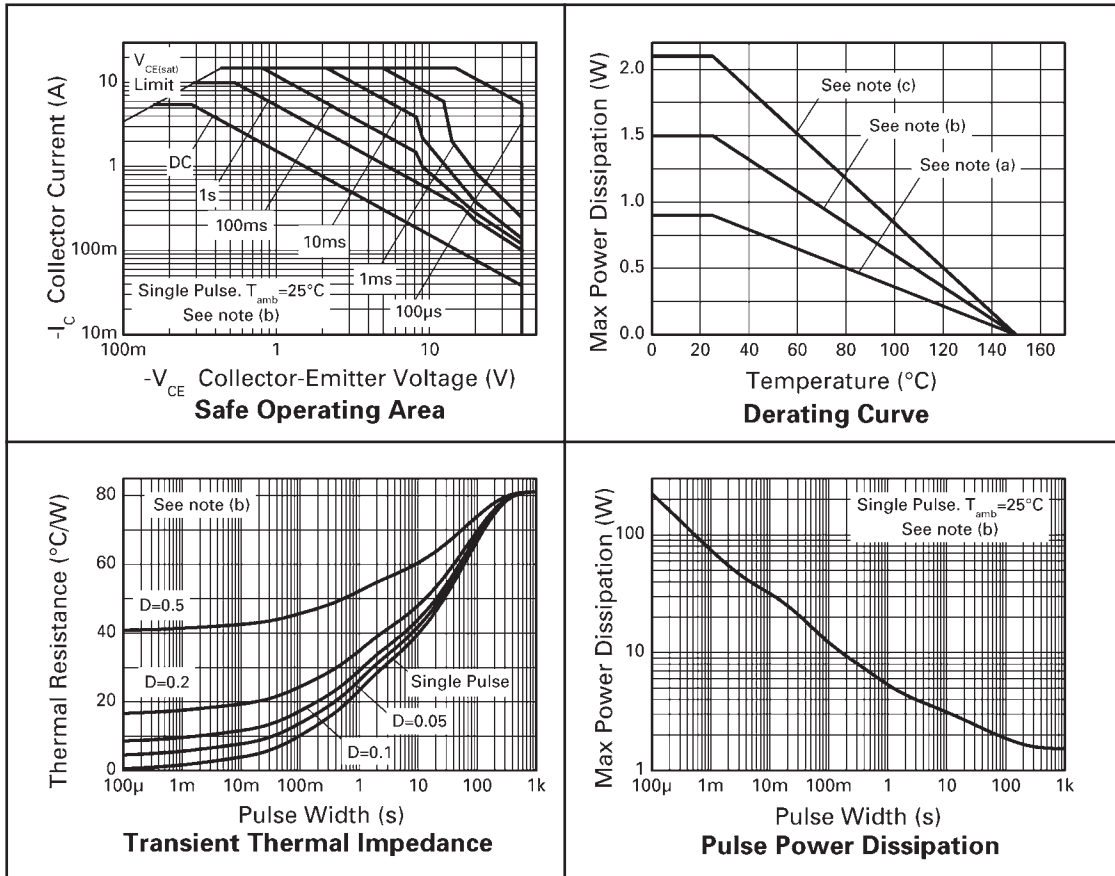
## THERMAL RESISTANCE

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.

## CHARACTERISTICS



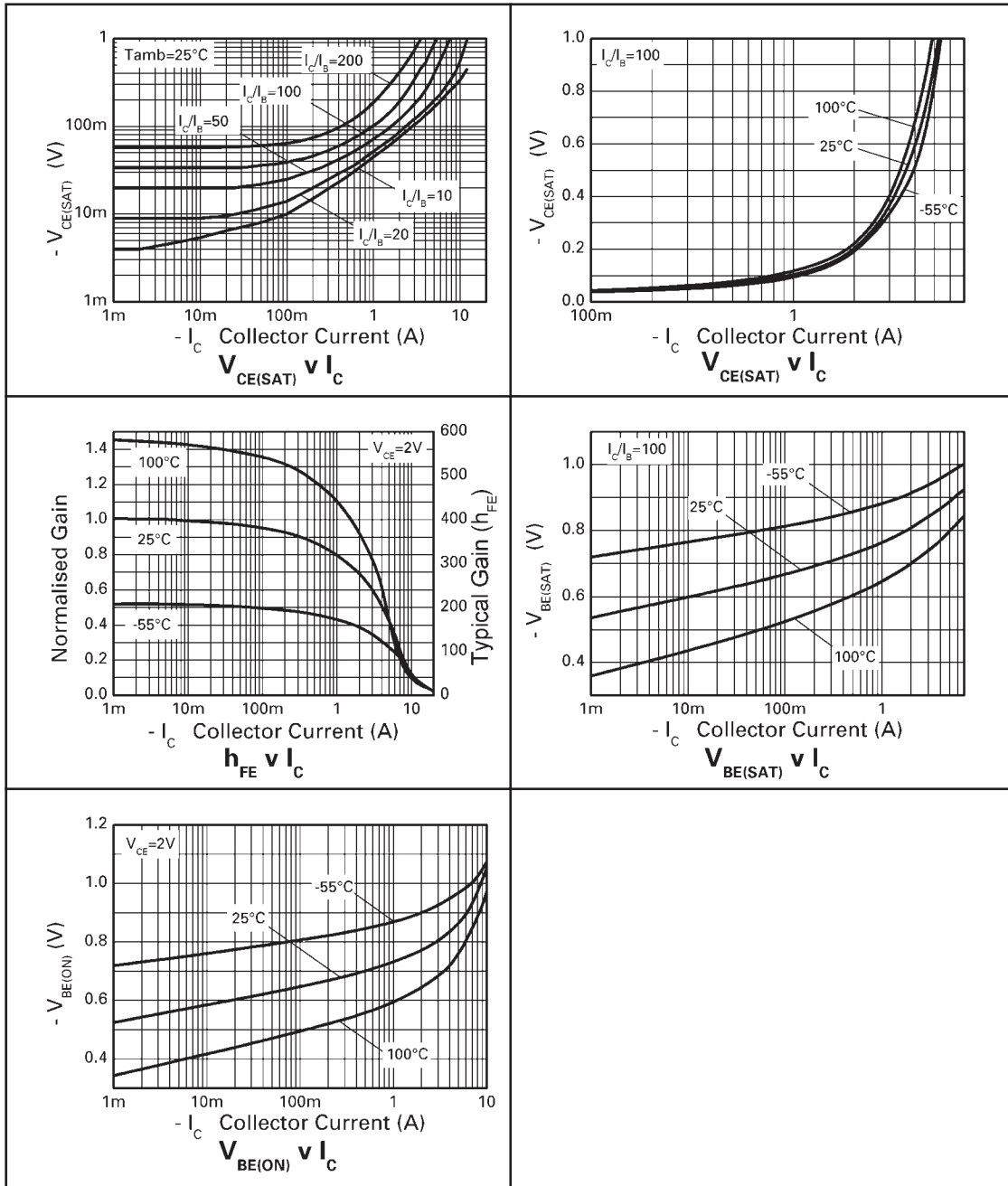
# ZXTP2009Z

## 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			

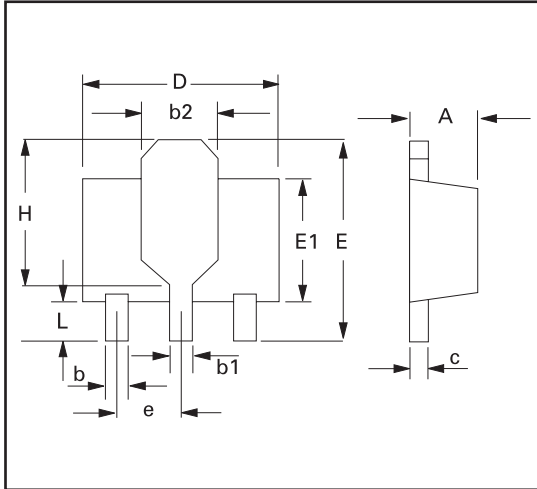
\* Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## TYPICAL CHARACTERISTICS

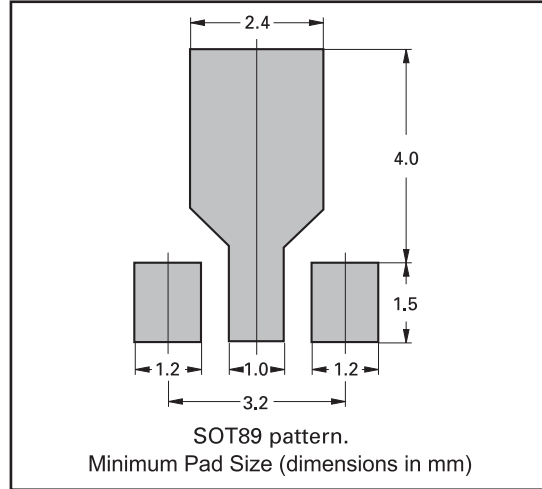


# ZXTP2009Z

## 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	-	-	-	-	-

© Zetex Semiconductors plc 2005

Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Streitfeldstraße 19 D-81673 München Germany	Zetex Inc 700 Veterans Memorial Hwy Hauppauge, NY 11788 USA	Zetex (Asia) Ltd 3701-04 Metroplaza Tower 1 Hing Fong Road, Kwai Fong Hong Kong	Zetex Semiconductors plc Zetex Technology Park Chadderton, Oldham, OL9 9LL United Kingdom
Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 <a href="mailto:europa.sales@zetex.com">europa.sales@zetex.com</a>	Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 <a href="mailto:usa.sales@zetex.com">usa.sales@zetex.com</a>	Telephone: (852) 26100 611 Fax: (852) 24250 494 <a href="mailto:asia.sales@zetex.com">asia.sales@zetex.com</a>	Telephone (44) 161 622 4444 Fax: (44) 161 622 4446 <a href="mailto:hq@zetex.com">hq@zetex.com</a>

These offices are supported by agents and distributors in major countries world-wide.

This publication is issued to provide outline information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose or form part of any order or contract or be regarded as a representation relating to the products or services concerned. The Company reserves the right to alter without notice the specification, design, price or conditions of supply of any product or service.

For the latest product information, log on to [www.zetex.com](http://www.zetex.com)



ISSUE 1 - JUNE 2005