

## ZXTEM322

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**MPPS™ Miniature Package Power Solutions**  
**80V NPN LOW SATURATION TRANSISTOR**


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**SUMMARY**

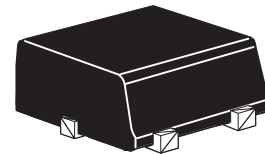
**NPN —  $V_{CE0} = 80V$ ;  $R_{SAT} = 68m\Omega$ ;  $I_C = 3.5A$**

**DESCRIPTION**

Packaged in the new innovative 2mm x 2mm MLP (Micro Leaded Package) outline, these new 4<sup>th</sup> generation low saturation dual PNP transistors offer extremely low on state losses making them ideal for use in DC-DC circuits and various driving and power management functions.

Additionally users gain several other **key benefits:**

**Performance capability equivalent to much larger packages**  
**Improved circuit efficiency & power levels**  
**PCB area and device placement savings**  
**Lower Package Height (0.9mm nom)**  
**Reduced component count**



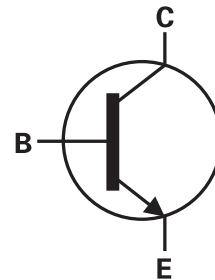
MLP322

**FEATURES**

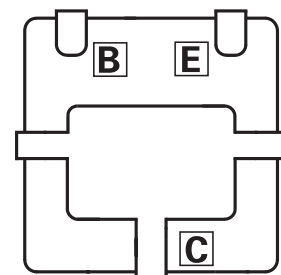
- Low Equivalent On Resistance
- Extremely Low Saturation Voltage (**185mV max @1A**)
- $h_{FE}$  specified up to 5A
- $I_C = 3.5A$  Continuous Collector Current
- 2mm x 2mm MLP

**APPLICATIONS**

- DC - DC Converters
- DC - DC Modules
- Power switches
- Motor control

**ORDERING INFORMATION**

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXTEM322TA	7"	8mm	3000
ZXTEM322TC	13"	8mm	10000



Underside View

**DEVICE MARKING**

- SE

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ISSUE 2 - JUNE 2006



## ZXTEM322

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Collector-Base Voltage	$V_{CBO}$	100	V
Collector-Emitter Voltage	$V_{CEO}$	80	V
Emitter-Base Voltage	$V_{EBO}$	7.5	V
Peak Pulse Current	$I_{CM}$	5	A
Continuous Collector Current <sup>(a)</sup>	$I_C$	3.5	A
Base Current	$I_B$	1000	mA
Power Dissipation at $T_A=25^{\circ}\text{C}$ <sup>(a)</sup> Linear Derating Factor	$P_D$	1.5 12	W mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ <sup>(b)</sup> Linear Derating Factor	$P_D$	2.45 19.6	W mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ <sup>(d)</sup> Linear Derating Factor	$P_D$	1 8	W mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ <sup>(e)</sup> Linear Derating Factor	$P_D$	3 24	W mW/ $^{\circ}\text{C}$
Operating & Storage Temperature Range	$T_j:T_{stg}$	-55 to +150	$^{\circ}\text{C}$
Junction Temperature	$T_j$	150	$^{\circ}\text{C}$

### THERMAL RESISTANCE

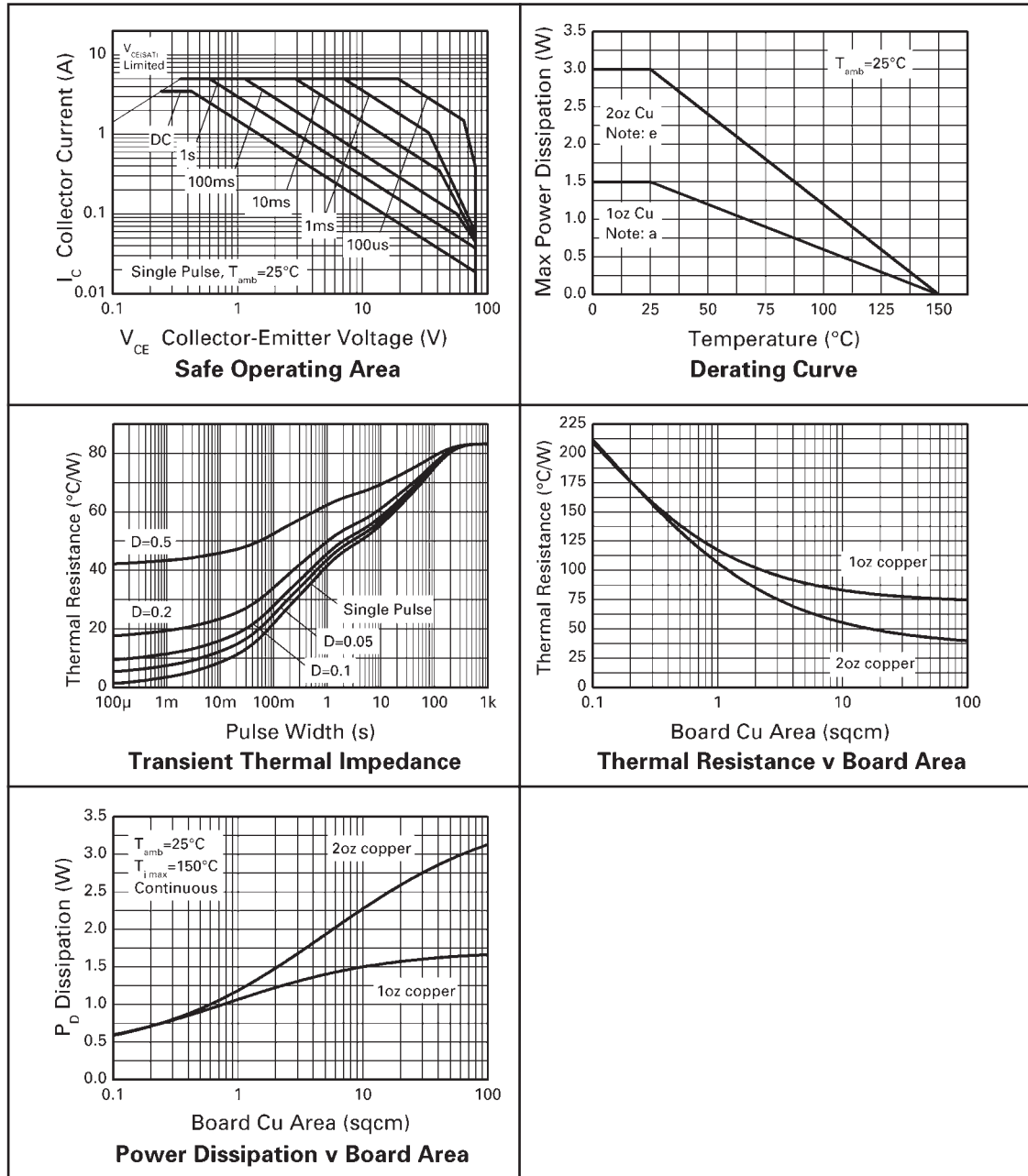
PARAMETER	SYMBOL	VALUE	UNIT
Junction to Ambient <sup>(a)</sup>	$R_{\theta JA}$	83	$^{\circ}\text{C/W}$
Junction to Ambient <sup>(b)</sup>	$R_{\theta JA}$	51	$^{\circ}\text{C/W}$
Junction to Ambient <sup>(d)</sup>	$R_{\theta JA}$	125	$^{\circ}\text{C/W}$
Junction to Ambient <sup>(e)</sup>	$R_{\theta JA}$	42	$^{\circ}\text{C/W}$

#### NOTES

- (a) For a single device surface mounted on 10 sq cm 1oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**.
- (b) For a single device surface mounted on 10 sq cm 1oz copper on FR4 PCB, in still air conditions measured at  $t \leq 5$  secs **with all exposed pads attached**.
- (c) Repetitive rating - pulse width limited by max junction temperature. Refer to Transient Thermal Impedance graph.
- (d) For a single device surface mounted on 10 sq cm 1oz copper FR4 PCB, in still air conditions **with minimal lead connections only**.
- (e) For a single device surface mounted on 65 sq cm 2oz copper FR4 PCB, in still air conditions **with all exposed pads attached**.
- (f) The minimum copper dimensions required for mounting are no smaller than the exposed metal pads on the base of the device, as shown in the package dimensions data. The thermal resistance for a device mounted on 1.5mm thick FR4 board using minimum copper of 1oz weight and 1mm wide tracks is  $R_{th} = 300^{\circ}\text{C/W}$  giving a power rating of  $P_{tot} = 420\text{mW}$ .

## ZXTEM322

## TYPICAL CHARACTERISTICS



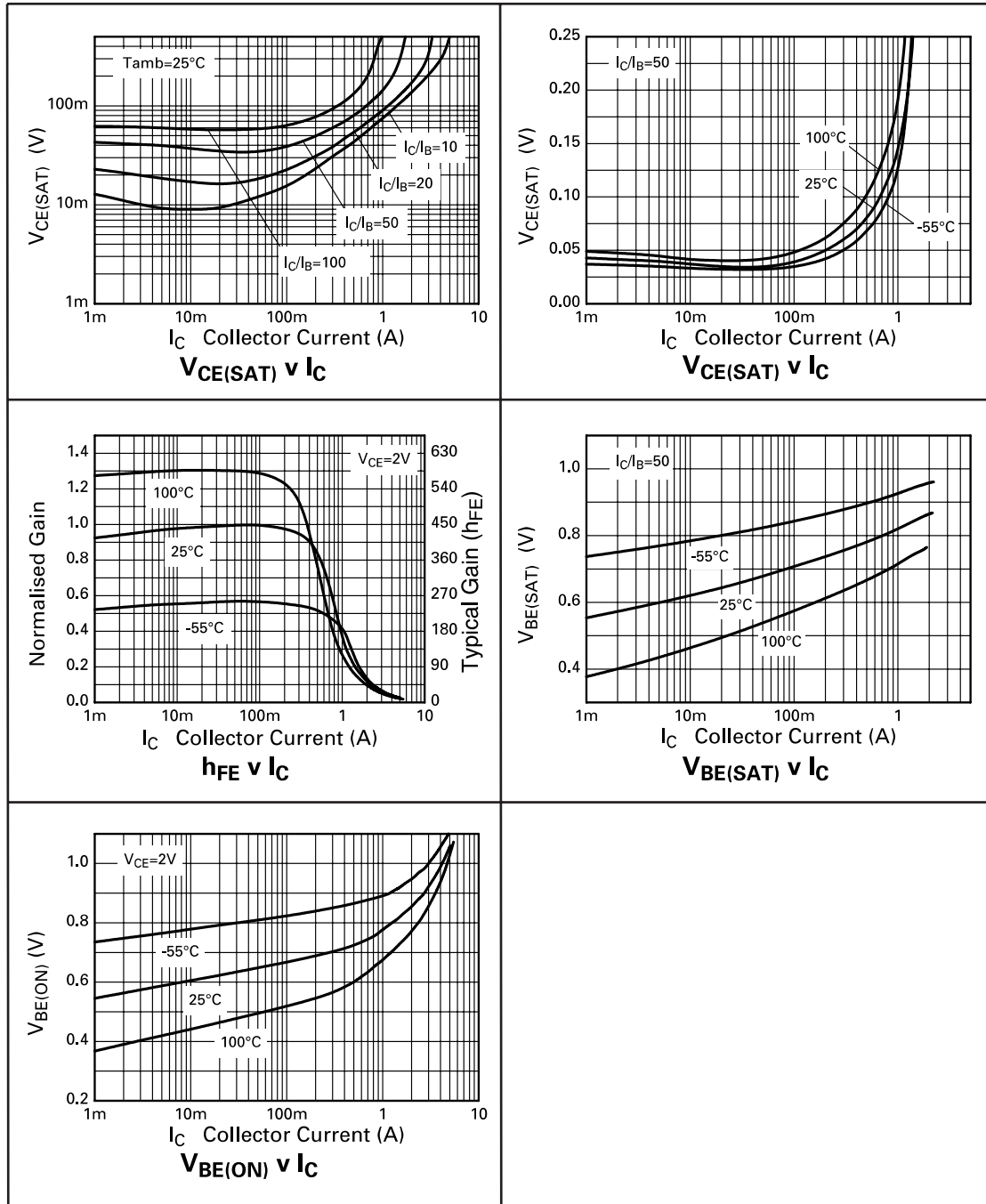
**ZXTEM322****ELECTRICAL CHARACTERISTICS** (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	100	180		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	80	110		V	$I_C = 10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7.5	8.2		V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			25	nA	$V_{CB} = 80\text{V}$
Emitter Cut-Off Current	$I_{EBO}$			25	nA	$V_{EB} = 6\text{V}$
Collector Emitter Cut-Off Current	$I_{CES}$			25	nA	$V_{CE} = 65\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		15	20	mV	$I_C = 0.1\text{A}, I_B = 10\text{mA}^*$
			45	60	mV	$I_C = 0.5\text{A}, I_B = 50\text{mA}^*$
			145	185	mV	$I_C = 1\text{A}, I_B = 20\text{mA}^*$
			160	200	mV	$I_C = 1.5\text{A}, I_B = 50\text{mA}^*$
			240	325	mV	$I_C = 3.5\text{A}, I_B = 300\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		1.09	1.175	V	$I_C = 3.5\text{A}, I_B = 300\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.96	1.05	V	$I_C = 3.5\text{A}, V_{CE} = 2\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	200	450			$I_C = 10\text{mA}, V_{CE} = 2\text{V}^*$
		300	450			$I_C = 200\text{mA}, V_{CE} = 2\text{V}^*$
		110	170	900		$I_C = 1\text{A}, V_{CE} = 2\text{V}^*$
		60	90			$I_C = 1.5\text{A}, V_{CE} = 2\text{V}^*$
		20	30			$I_C = 3\text{A}, V_{CE} = 2\text{V}^*$
			10			$I_C = 5\text{A}, V_{CE} = 2\text{V}^*$
Transition Frequency	$f_T$	100	160		MHz	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	$C_{obo}$		11.5	18	pF	$V_{CB} = 10\text{A}, f = 1\text{MHz}$
Turn-On Time	$t_{(on)}$		86		ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$
Turn-Off Time	$t_{(off)}$		1128		ns	$I_{B1} = I_{B2} = 25\text{mA}$

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

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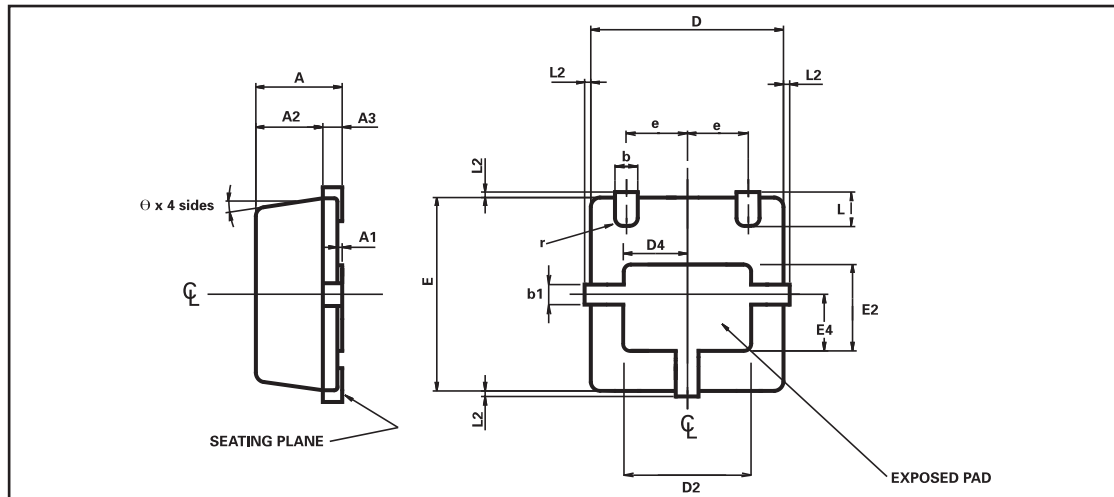
## TYPICAL CHARACTERISTICS



ISSUE 2 - JUNE 2006

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### PACKAGE OUTLINE



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

### PACKAGE DIMENSIONS

DIM	Millimetres		Inches		DIM	Millimetres		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	0.80	1.00	0.0315	0.0393	e	0.65 REF		0.0255 REF	
A1	0.00	0.05	0.00	0.002	E	2.00 BSC		0.0787 BSC	
A2	0.65	0.75	0.0255	0.0295	E2	0.79	0.99	0.031	0.039
A3	0.15	0.25	0.0059	0.0098	E4	0.48	0.68	0.0188	0.0267
b	0.18	0.28	0.0070	0.0110	L	0.20	0.45	0.0078	0.0177
b1	0.17	0.30	0.0066	0.0118	L2	0.125 MAX.		0.005 REF	
D	2.00 BSC		0.0787 BSC		r	0.075 BSC		0.0029 BSC	
D2	1.22	1.42	0.0480	0.0559	Θ	0°	12°	0°	12°
D4	0.56	0.76	0.0220	0.0299					

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ISSUE 2 - JUNE 2006