

## ZXTBM322

### MPPS™ Miniature Package Power Solutions 20V NPN LOW SATURATION TRANSISTOR

#### SUMMARY

$V_{CE0} = 20V$ ;  $R_{SAT} = 47m\Omega$ ;  $I_C = 4.5A$

#### DESCRIPTION

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

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

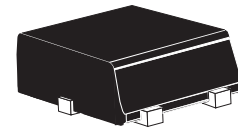
**Performance capability equivalent to much larger packages**

**Improved circuit efficiency & power levels**

**Lower package height (nom 0.9mm)**

**PCB area and device placement savings**

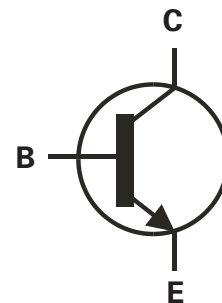
**Reduced component count**



2mm x 2mm MLP  
(single die)

#### FEATURES

- Low Equivalent On Resistance
- Extremely Low Saturation Voltage (**150mV @1A**)
- $h_{FE}$  specified up to 6A
- $I_C = 4.5A$  Continuous Collector Current
- 2mm x 2mm MLP



#### APPLICATIONS

- DC - DC Converters (FET Drivers)
- Power switches
- Motor control
- LED backlighting

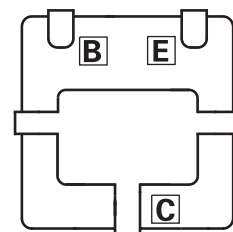
#### ORDERING INFORMATION

DEVICE	REEL	TAPE WIDTH	QUANTITY PER REEL
ZXTBM322TA	7"	8mm	3000 units
ZXTBM322TC	13"	8mm	10000 units

#### DEVICE MARKING

SB

#### PINOUT



2mm x 2mm Single MLP  
underside view

## ZXTBM322

### ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	LIMIT	UNIT
Collector-Base Voltage	$V_{CBO}$	40	V
Collector-Emitter Voltage	$V_{CEO}$	20	V
Emitter-Base Voltage	$V_{EBO}$	7.5	V
Peak Pulse Current (c)	$I_{CM}$	12	A
Continuous Collector Current (a)	$I_C$	4.5	A
Continuous Collector Current (b)	$I_C$	5	A
Base Current	$I_B$	1000	mA
Power Dissipation at $T_A=25^{\circ}\text{C}$ (a)	$P_D$	1.5	W
Linear Derating Factor		12	mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ (b)	$P_D$	2.45	W
Linear Derating Factor		19.6	mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ (d)	$P_D$	1	W
Linear Derating Factor		8	mW/ $^{\circ}\text{C}$
Power Dissipation at $T_A=25^{\circ}\text{C}$ (e)	$P_D$	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

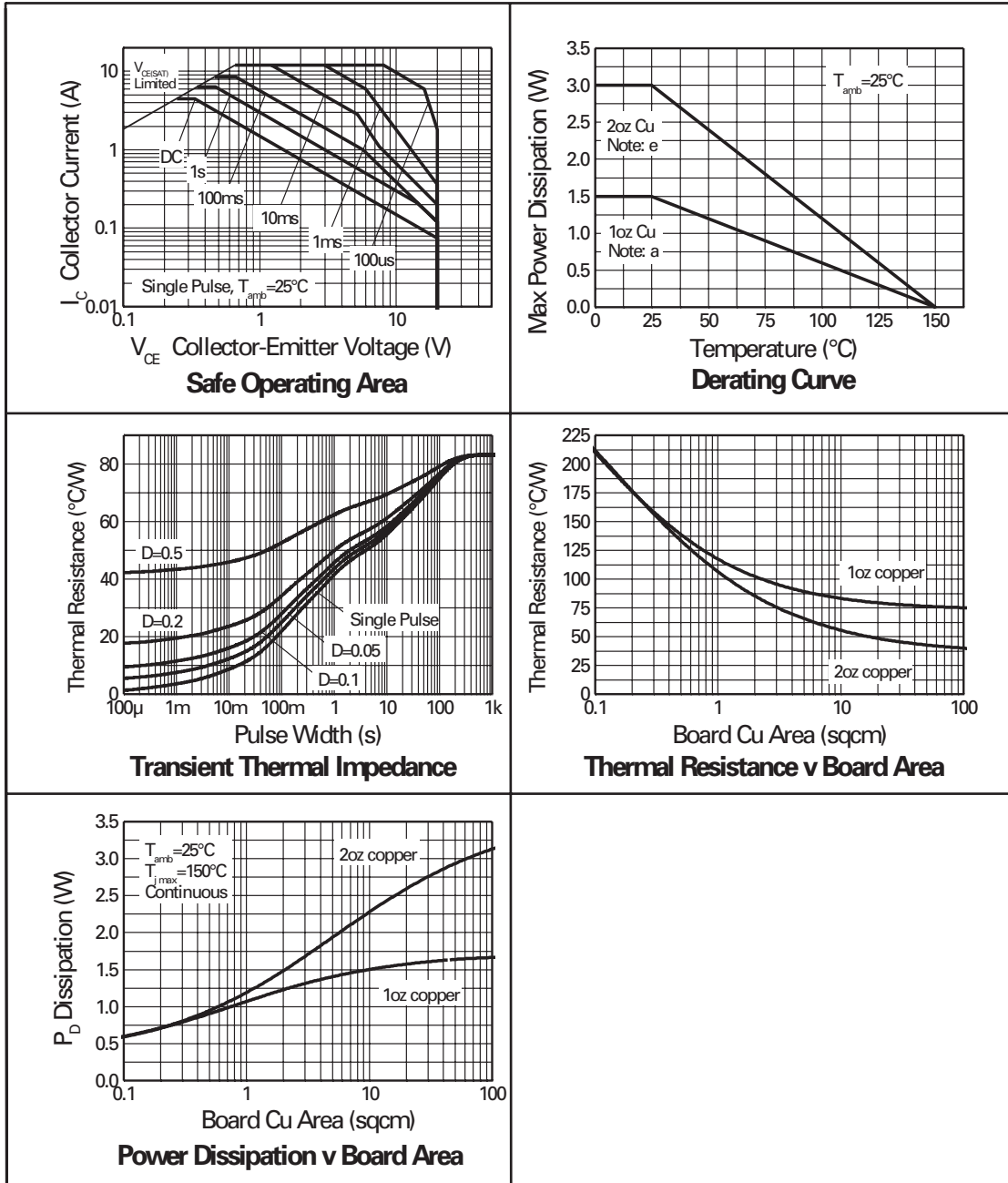
PARAMETER	SYMBOL	VALUE	UNIT
Junction to Ambient (a)	$R_{\theta JA}$	83	$^{\circ}\text{C}/\text{W}$
Junction to Ambient (b)	$R_{\theta JA}$	51	$^{\circ}\text{C}/\text{W}$
Junction to Ambient (d)	$R_{\theta JA}$	125	$^{\circ}\text{C}/\text{W}$
Junction to Ambient (e)	$R_{\theta JA}$	42	$^{\circ}\text{C}/\text{W}$

#### NOTES

- (a) For a single device surface mounted on 10sq cm1oz copper on FR4 PCB in still air conditions **with all exposed pads attached**.
- (b) For a single device surface mounted on 10sq cm1oz 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 10sq cm1oz copper on FR4 PCB in still air conditions **with minimal lead connections only**.
- (e) For a single device surface mounted on 65sq cm2oz copper on 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 is  $R_{th}=300^{\circ}\text{C}/\text{W}$  giving a power rating of  $P_{tot}=420\text{mW}$ .

ZXTBM322

TYPICAL CHARACTERISTICS



## ZXTBM322

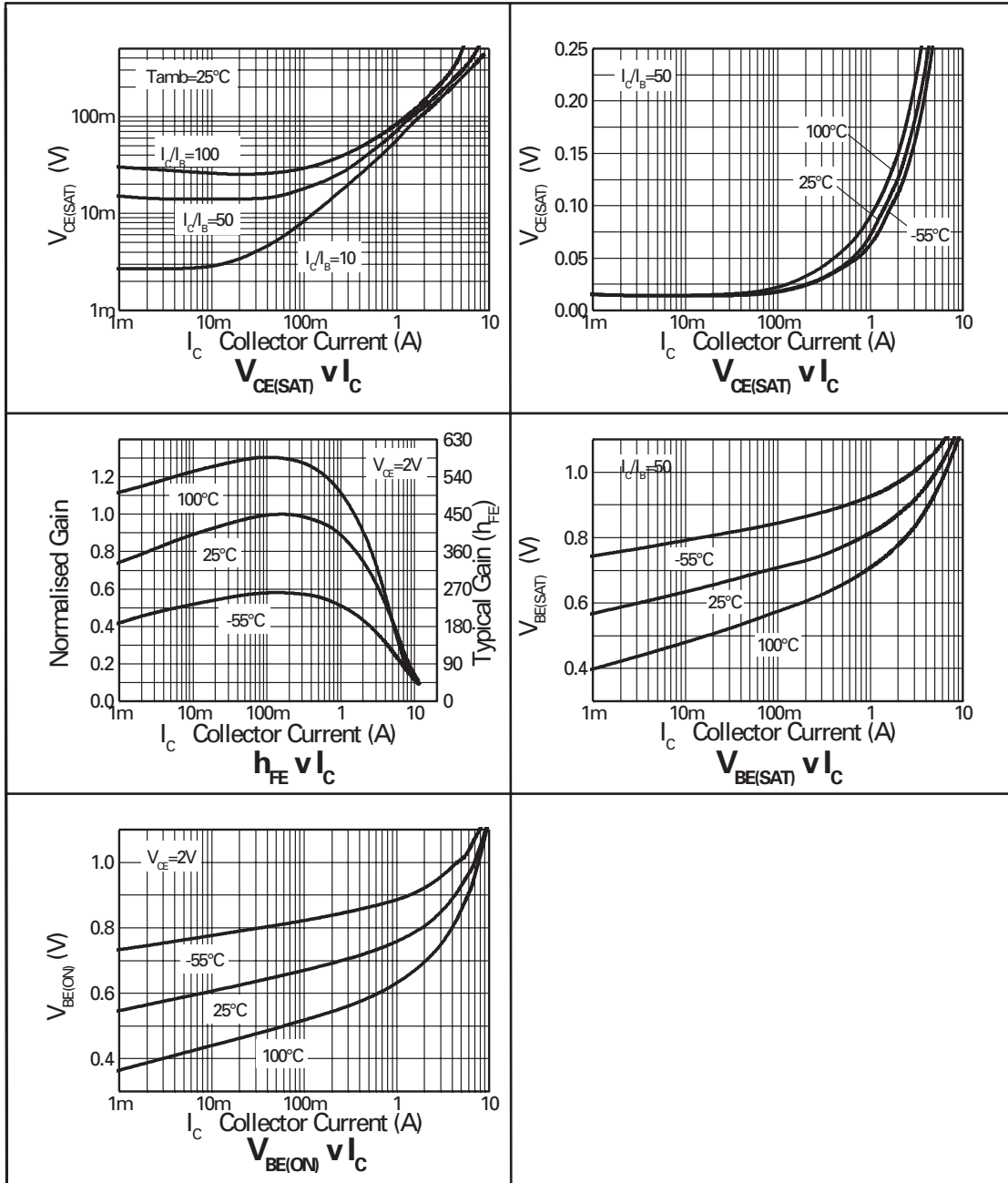
**ELECTRICAL CHARACTERISTICS** (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	40	100		V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	20	27		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	$V_{CB}=32\text{V}$
Emitter Cut-Off Current	$I_{EBO}$			25	nA	$V_{EB}=6\text{V}$
Collector Emitter Cut-Off Current	$I_{CES}$			25	nA	$V_{CES}=16\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		8	15	mV	$I_C=0.1\text{A}, I_B=10\text{mA}^*$
			90	150	mV	$I_C=1\text{A}, I_B=10\text{mA}^*$
			115	135	mV	$I_C=2\text{A}, I_B=50\text{mA}^*$
			190	250	mV	$I_C=3\text{A}, I_B=100\text{mA}^*$
			210	270	mV	$I_C=4.5\text{A}, I_B=125\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.98	1.05	V	$I_C=4.5\text{A}, I_B=125\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.88	0.95	V	$I_C=4.5\text{A}, V_{CE}=2\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	200	400			$I_C=10\text{mA}, V_{CE}=2\text{V}^*$
		300	450			$I_C=0.2\text{A}, V_{CE}=2\text{V}^*$
		200	360			$I_C=2\text{A}, V_{CE}=2\text{V}^*$
		100	180			$I_C=6\text{A}, V_{CE}=2\text{V}^*$
Transition Frequency	$f_T$	100	140		MHz	$I_C=50\text{mA}, V_{CE}=10\text{V}$ $f=100\text{MHz}$
Output Capacitance	$C_{obo}$		23	30	pF	$V_{CB}=10\text{V}, f=1\text{MHz}$
Turn-On Time	$t_{(on)}$		170		ns	$V_{CC}=10\text{V}, I_C=3\text{A}$ $I_{B1}=I_{B2}=10\text{mA}$
Turn-Off Time	$t_{(off)}$		400		ns	

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

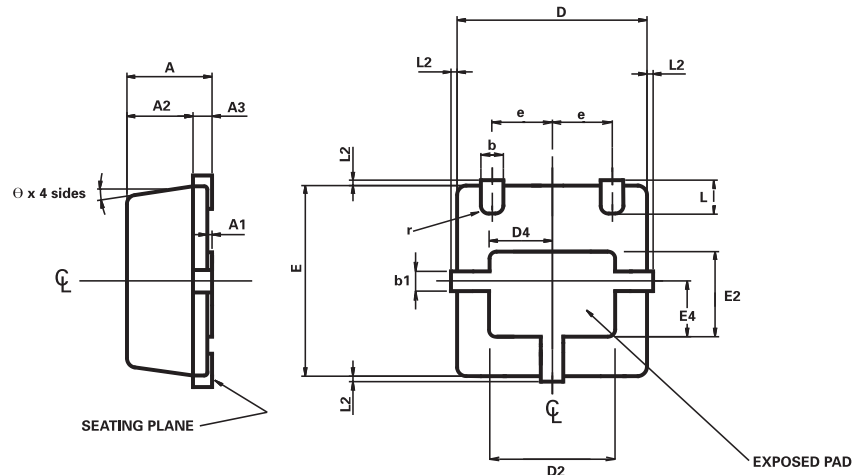
ZXTBM322

TYPICAL CHARACTERISTICS



## ZXTBM322

### MLP322 PACKAGE OUTLINE (2mm x 2mm Micro Leaded Package)



CONTROLLING DIMENSIONS IN MILLIMETRES  
APPROX. CONVERTED DIMENSIONS 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	Ø	0°	12°	0°	12°
D4	0.56	0.76	0.0220	0.0299					

© Zetex plc 2002

#### Europe

Zetex plc  
Fields New Road  
Chadderton  
Oldham, OL9 8NP  
United Kingdom  
Telephone: (44) 161 622 4422  
Fax: (44) 161 622 4420  
uksales@zetex.com

Zetex GmbH  
Streitfeldstraße 19  
D-81673 München  
Germany  
Telefon: (49) 89 45 49 49 0  
Fax: (49) 89 45 49 49 49  
europe.sales@zetex.com

#### Americas

Zetex Inc  
700 Veterans Memorial Hwy  
Hauppauge, NY11788  
USA  
Telephone: (631) 360 2222  
Fax: (631) 360 8222  
usa.sales@zetex.com

#### Asia Pacific

Zetex (Asia) Ltd  
3701-04 Metroplaza, Tower 1  
Hing Fong Road  
Kwai Fong  
Hong Kong  
Telephone: (852) 26100 611  
Fax: (852) 24250 494  
asia.sales@zetex.com

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 2 - JUNE 2002