

ZXTDC3M832

MPPS™ Miniature Package Power Solutions DUAL 50V NPN & 40V PNP LOW SATURATION TRANSISTOR COMBINATION

SUMMARY

NPN — $V_{CE0} = 50V$; $R_{SAT} = 68m\Omega$; $I_C = 4A$

PNP — $V_{CE0} = -40V$; $R_{SAT} = 104m\Omega$; $I_C = -3A$

DESCRIPTION

Packaged in the innovative 3mm x 2mm MLP (Micro Leaded Package) outline, these new 4th generation low saturation dual 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**:

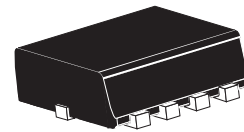
Performance capability equivalent to much larger packages

Improved circuit efficiency & power levels

PCB area and device placement savings

Lower package height (nom 0.9mm)

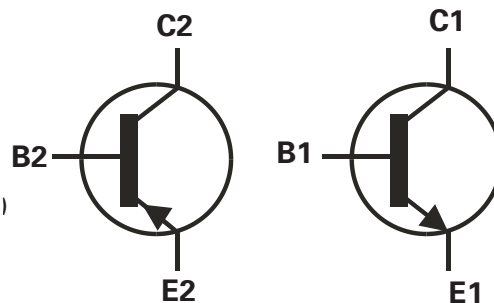
Reduced component count



3mm x 2mm (Dual die) MLP

FEATURES

- Low Equivalent On Resistance
- Extremely Low Saturation Voltage (100mV @1A--NPN)
- h_{FE} characterised up to 6A
- $I_C=4A$ Continuous Collector Current
- 3mm x 2mm MLP



APPLICATIONS

- DC - DC Converters
- Charging circuits
- Power switches
- Motor control
- CCFL Backlighting

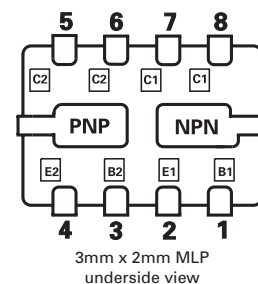
ORDERING INFORMATION

DEVICE	REEL	TAPE WIDTH	QUANTITY PER REEL
ZXTDC3M832TA	7''	8mm	3000
ZXTDC3M832TC	13''	8mm	10000

DEVICE MARKING

DC3

PINOUT



3mm x 2mm MLP
underside view

ISSUE 1 - JUNE 2002



ZXTDC3M832

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	NPN	PNP	UNIT
Collector-Base Voltage	V _{CB0}	100	-50	V
Collector-Emitter Voltage	V _{CEO}	50	-40	V
Emitter-Base Voltage	V _{EBO}	7.5	-7.5	V
Peak Pulse Current	I _{CM}	6	-4	A
Continuous Collector Current (a)(f)	I _C	4	-3	A
Base Current	I _B	1000		mA
Power Dissipation at TA=25°C (a)(f) Linear Derating Factor	P _D	1.5 12		W mW/°C
Power Dissipation at TA=25°C (b)(f) Linear Derating Factor	P _D	2.45 19.6		W mW/°C
Power Dissipation at TA=25°C (c)(f) Linear Derating Factor	P _D	1 8		W mW/°C
Power Dissipation at TA=25°C (d)(f) Linear Derating Factor	P _D	1.13 9		W mW/°C
Power Dissipation at TA=25°C (d)(g) Linear Derating Factor	P _D	1.7 13.6		W mW/°C
Power Dissipation at TA=25°C (e)(g) Linear Derating Factor	P _D	3 24		W mW/°C
Operating and Storage Temperature Range	T _j :T _{stg}	-55 to +150		°C

THERMAL RESISTANCE

PARAMETER	SYMBOL	VALUE	UNIT
Junction to Ambient (a)(f)	R _{θJA}	83.3	°C/W
Junction to Ambient (b)(f)	R _{θJA}	51	°C/W
Junction to Ambient (c)(f)	R _{θJA}	125	°C/W
Junction to Ambient (d)(f)	R _{θJA}	111	°C/W
Junction to Ambient (d)(g)	R _{θJA}	73.5	°C/W
Junction to Ambient (e)(g)	R _{θJA}	41.7	°C/W

Notes

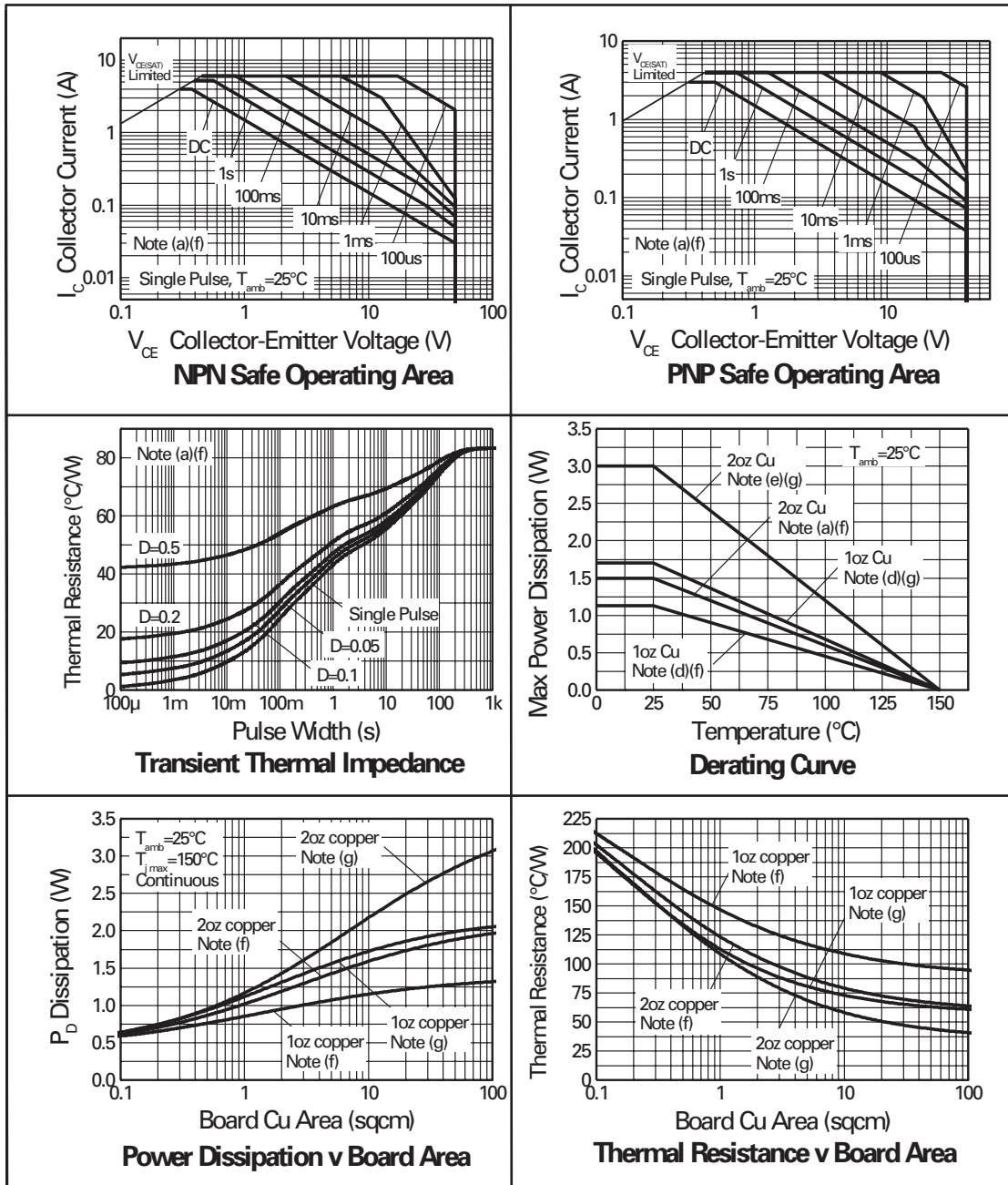
- (a) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
- (b) Measured at t<5 secs for a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
- (c) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.
- (d) For a dual device surface mounted on 10 sq cm single sided 1oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
- (e) For a dual device surface mounted on 85 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
- (f) For a dual device with one active die.
- (g) For dual device with 2 active die running at equal power.
- (h) Repetitive rating - pulse width limited by max junction temperature. Refer to Transient Thermal Impedance graph.
- (i) 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 dual device mounted on 1.5mm thick FR4 board using minimum copper 1 oz weight, 1mm wide tracks and one half of the device active is R_{th} = 250°C/W giving a power rating of P_{tot} = 500mW.



ISSUE 1 - JUNE 2002

ZXTDC3M832

TYPICAL CHARACTERISTICS



ISSUE 1 - JUNE 2002



ZXTDC3M832

NPN TRANSISTOR 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	190		V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	50	65		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	$V_{CES}=40\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		10 70 145 115 225 270	20 100 200 220 300 320	mV mV mV mV mV mV	$I_C=0.1\text{A}, I_B=10\text{mA}^*$ $I_C=1\text{A}, I_B=50\text{mA}^*$ $I_C=1\text{A}, I_B=10\text{mA}^*$ $I_C=2\text{A}, I_B=50\text{mA}^*$ $I_C=3\text{A}, I_B=100\text{mA}^*$ $I_C=4\text{A}, I_B=200\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		1.00	1.05	V	$I_C=4\text{A}, I_B=200\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.94	1.00	V	$I_C=4\text{A}, V_{CE}=2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	200 300 200 100	400 450 400 225 40			$I_C=10\text{mA}, V_{CE}=2\text{V}^*$ $I_C=0.2\text{A}, V_{CE}=2\text{V}^*$ $I_C=1\text{A}, V_{CE}=2\text{V}^*$ $I_C=2\text{A}, V_{CE}=2\text{V}^*$ $I_C=6\text{A}, V_{CE}=2\text{V}^*$
Transition Frequency	f_T	100	165		MHz	$I_C=50\text{mA}, V_{CE}=10\text{V}$ $f=100\text{MHz}$
Output Capacitance	C_{obo}		12	20	pF	$V_{CB}=10\text{V}, f=1\text{MHz}$
Turn-On Time	$t_{(on)}$		170		ns	$V_{CC}=10\text{V}, I_C=1\text{A}$
Turn-Off Time	$t_{(off)}$		750		ns	$I_{B1}=I_{B2}=10\text{mA}$

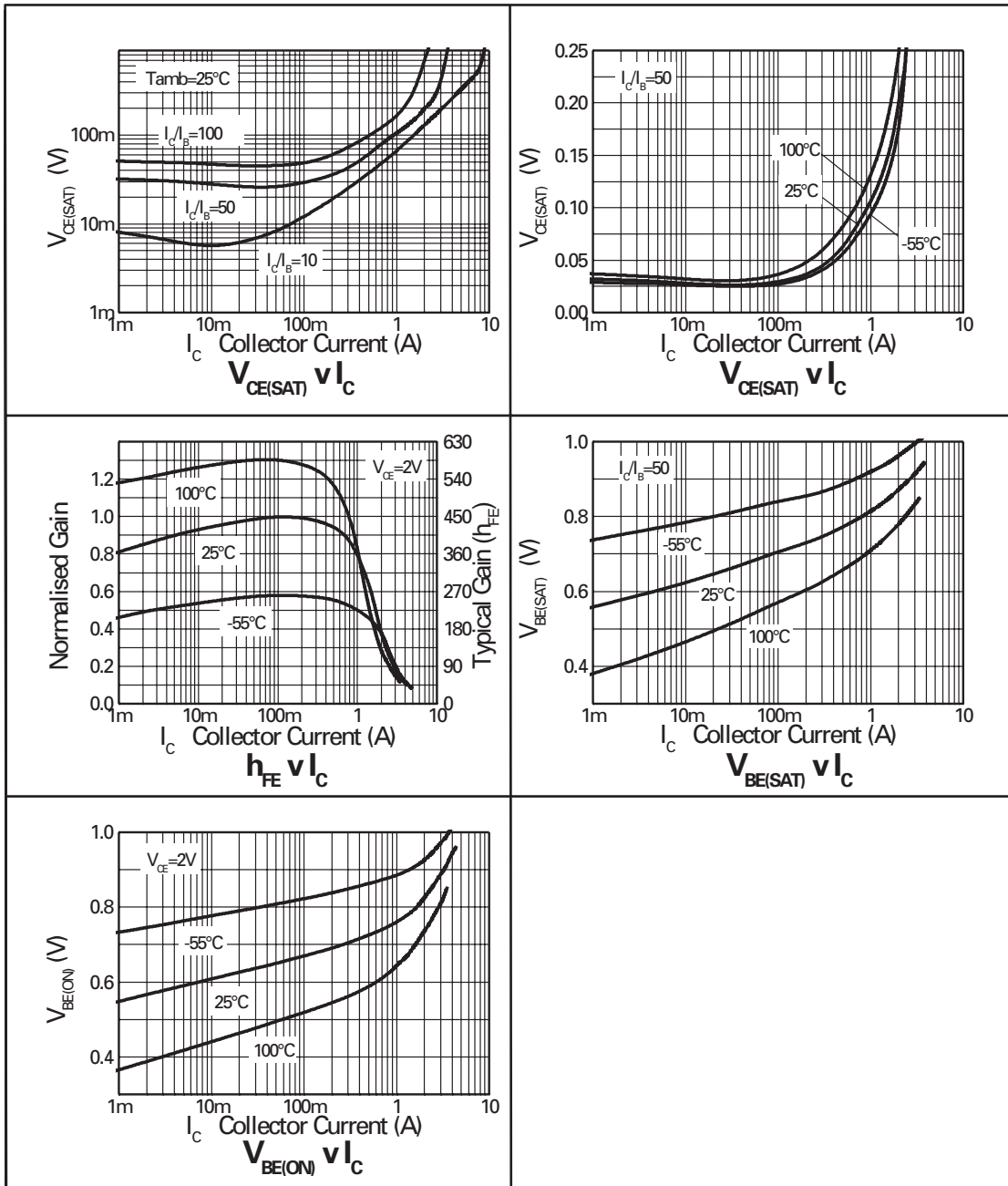
*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$



ISSUE 1 - JUNE 2002

ZXTDC3M832

NPN CHARACTERISTICS



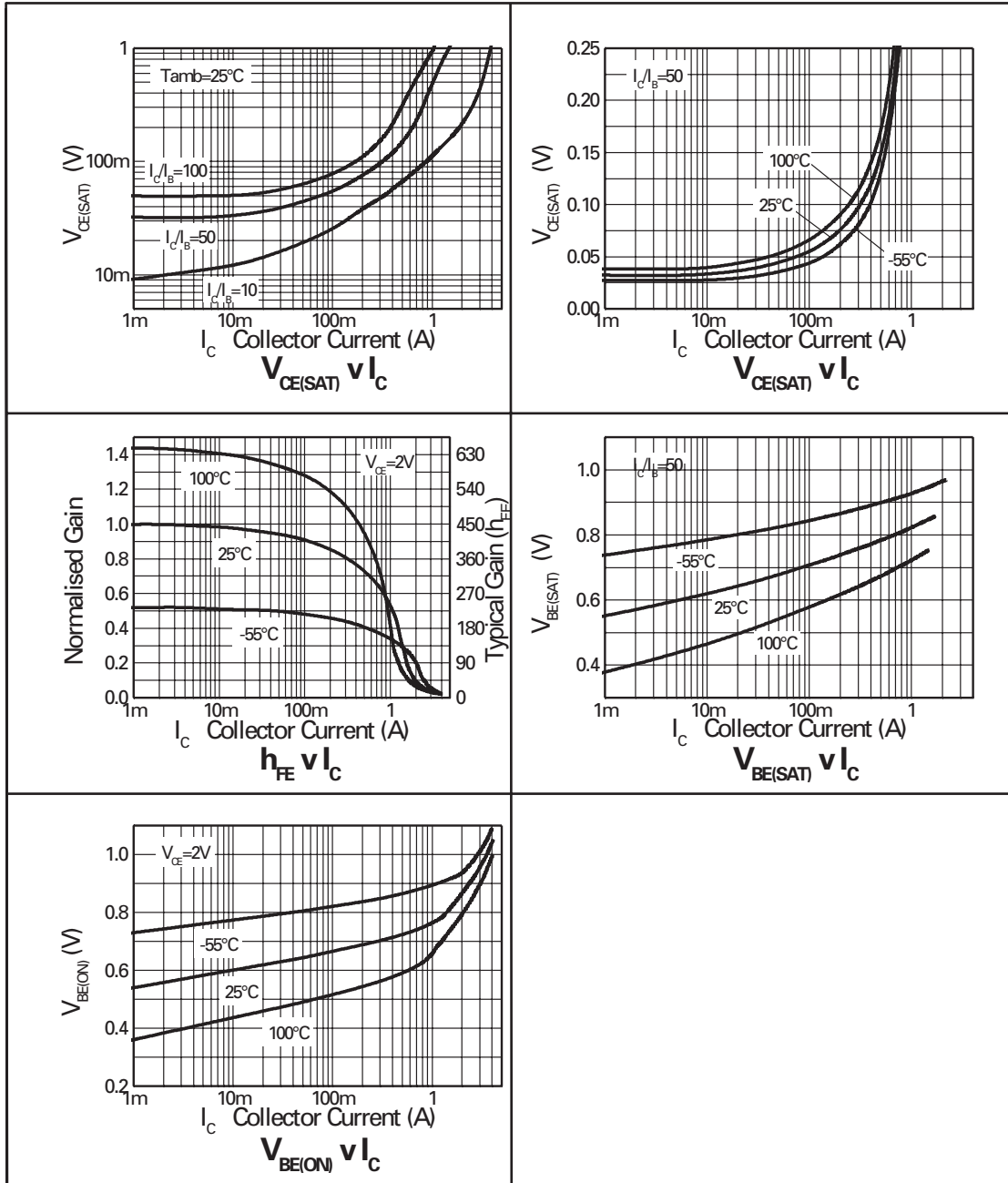
ZXTDC3M832**PNP TRANSISTOR ELECTRICAL CHARACTERISTICS** (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-50	-80		V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-40	-70		V	$I_C = -10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-7.5	-8.5		V	$I_E = -100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}			-25	nA	$V_{CB} = -40\text{V}$
Emitter Cut-Off Current	I_{EBO}			-25	nA	$V_{EB} = -6\text{V}$
Collector Emitter Cut-Off Current	I_{CES}			-25	nA	$V_{CES} = -32\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		-25 -150 -195 -210 -260	-40 -220 -300 -300 -370	mV mV mV mV mV	$I_C = -0.1\text{A}, I_B = -10\text{mA}^*$ $I_C = -1\text{A}, I_B = -50\text{mA}^*$ $I_C = -1.5\text{A}, I_B = -100\text{mA}^*$ $I_C = -2\text{A}, I_B = -200\text{mA}^*$ $I_C = -2.5\text{A}, I_B = -250\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		-0.97	-1.05	V	$I_C = -2.5\text{A}, I_B = -250\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		-0.89	-0.95	V	$I_C = -2.5\text{A}, V_{CE} = -2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	300 300 180 60 12	480 450 290 130 22			$I_C = -10\text{mA}, V_{CE} = -2\text{V}^*$ $I_C = -0.1\text{A}, V_{CE} = -2\text{V}^*$ $I_C = -1\text{A}, V_{CE} = -2\text{V}^*$ $I_C = -1.5\text{A}, V_{CE} = -2\text{V}^*$ $I_C = -3\text{A}, V_{CE} = -2\text{V}^*$
Transition Frequency	f_T	150	190		MHz	$I_C = -50\text{mA}, V_{CE} = -10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	C_{obo}		19	25	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$
Turn-On Time	$t_{(on)}$		40		ns	$V_{CC} = -15\text{V}, I_C = -0.75\text{A}$
Turn-Off Time	$t_{(off)}$		435		ns	$I_{B1} = I_{B2} = 10\text{mA}$

*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$

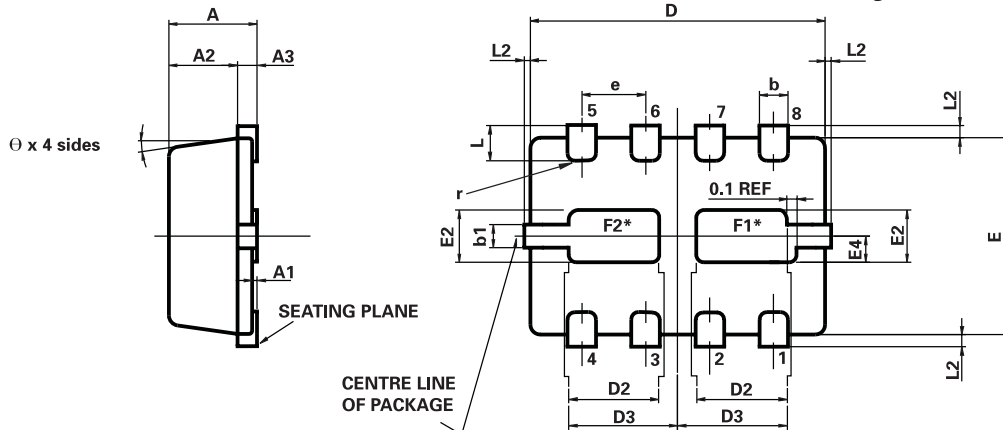
ZXTDC3M832

PNP CHARACTERISTICS



ZXTDC3M832

MLP832 PACKAGE OUTLINE (3mm x 2mm Micro Leaded Package)



*Exposed Flags. Solder connection to improve thermal dissipation is optional.
 F1 at collector 1 potential
 F2 at collector 2 potential

CONTROLLING DIMENSIONS IN MILLIMETRES
 APPROX. CONVERTED DIMENSIONS IN INCHES

MLP832 PACKAGE DIMENSIONS

DIM	MILLIMETRES		INCHES		DIM	MILLIMETRES		INCHES	
	MIN.	MAX.	MIN.	MAX.		MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039	e	0.65 REF		0.0256 BSC	
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	0.43	0.63	0.017	0.0249
A3	0.15	0.25	0.006	0.0098	E4	0.16	0.36	0.006	0.014
b	0.24	0.34	0.009	0.013	L	0.20	0.45	0.0078	0.0157
b1	0.17	0.30	0.0066	0.0118	L2	—	0.125	0.00	0.005
D	3.00 BSC		0.118 BSC		r	0.075 BSC		0.0029 BSC	
D2	0.82	1.02	0.032	0.040	θ	0°	12°	0°	12°
D3	1.01	1.21	0.0397	0.0476					

© 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



ISSUE 1 - JUNE 2002