

ZXTDBM832

MPPS™ Miniature Package Power Solutions DUAL 20V NPN SILICON LOW SATURATION SWITCHING TRANSISTOR

SUMMARY

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

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**:

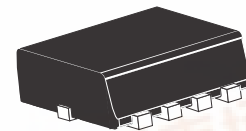
Performance capability equivalent to much larger packages

Improved circuit efficiency & power levels

PCB area and device placement savings

Lower package height (nom 0.9mm)

Reduced component count



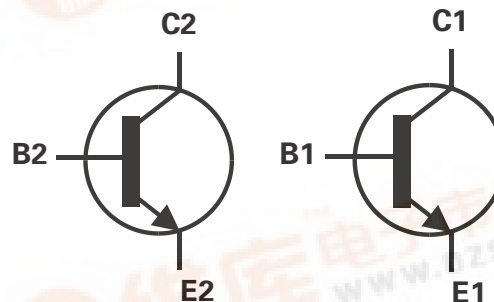
3mm x 2mm (Dual die) MLP

FEATURES

- Low Equivalent On Resistance
- Extremely Low Saturation Voltage (150mV @1A)
- h_{FE} characterised up to 6A
- $I_C=4.5A$ Continuous Collector Current
- 3mm x 2mm MLP

APPLICATIONS

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



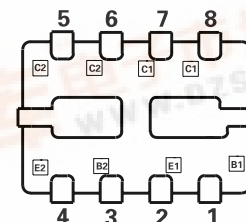
ORDERING INFORMATION

| DEVICE | REEL | TAPE WIDTH | QUANTITY PER REEL |
|-------------|------|------------|-------------------|
| ZXTDCM832TA | 7" | 8mm | 3000 |
| ZXTDCM832TC | 13" | 8mm | 10000 |

DEVICE MARKING

DBB

PINOUT



3mm x 2mm MLP
underside view

ZXTDBM832

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 | I_{CM} | 12 | A |
| Continuous Collector Current (a)(f) | I_C | 4.5 | A |
| Continuous Collector Current (b)(f) | I_C | 5 | A |
| Base Current | I_B | 1000 | mA |
| Power Dissipation at $T_A=25^\circ\text{C}$ (a)(f) | P_D | 1.5 | W |
| Linear Derating Factor | | 12 | mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_A=25^\circ\text{C}$ (b)(f) | P_D | 2.45 | W |
| Linear Derating Factor | | 19.6 | mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_A=25^\circ\text{C}$ (c)(f) | P_D | 1 | W |
| Linear Derating Factor | | 8 | mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_A=25^\circ\text{C}$ (d)(f) | P_D | 1.13 | W |
| Linear Derating Factor | | 9 | mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_A=25^\circ\text{C}$ (d)(g) | P_D | 1.7 | W |
| Linear Derating Factor | | 13.6 | mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_A=25^\circ\text{C}$ (e)(g) | 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

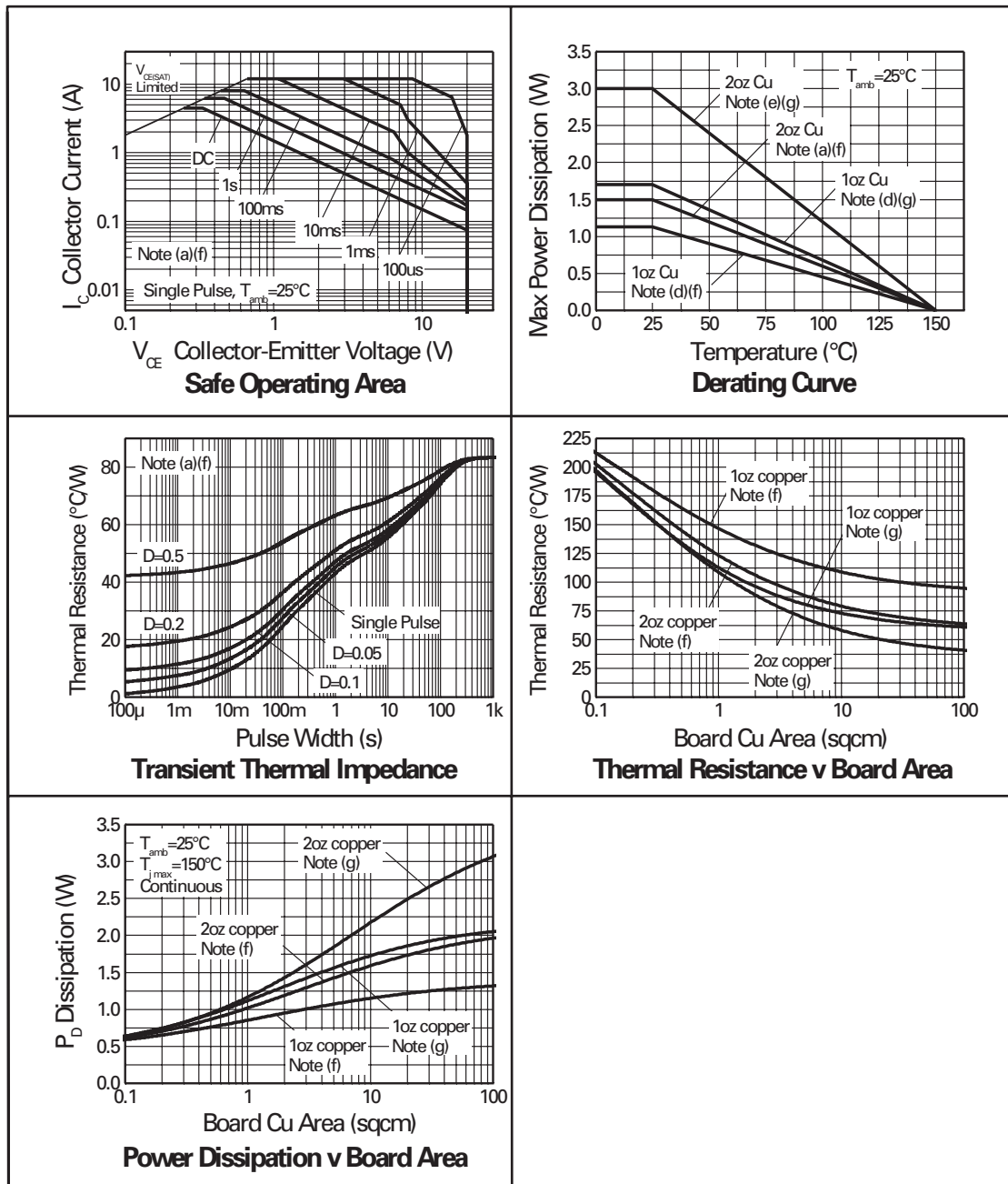
| PARAMETER | SYMBOL | VALUE | UNIT |
|----------------------------|-----------------|-------|---------------------------|
| Junction to Ambient (a)(f) | $R_{\theta JA}$ | 83.3 | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient (b)(f) | $R_{\theta JA}$ | 51 | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient (c)(f) | $R_{\theta JA}$ | 125 | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient (d)(f) | $R_{\theta JA}$ | 111 | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient (d)(g) | $R_{\theta JA}$ | 73.5 | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient (e)(g) | $R_{\theta JA}$ | 41.7 | $^\circ\text{C}/\text{W}$ |

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 $R_{th} = 250^\circ\text{C}/\text{W}$ giving a power rating of $P_{tot} = 500\text{mW}$.

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TYPICAL CHARACTERISTICS



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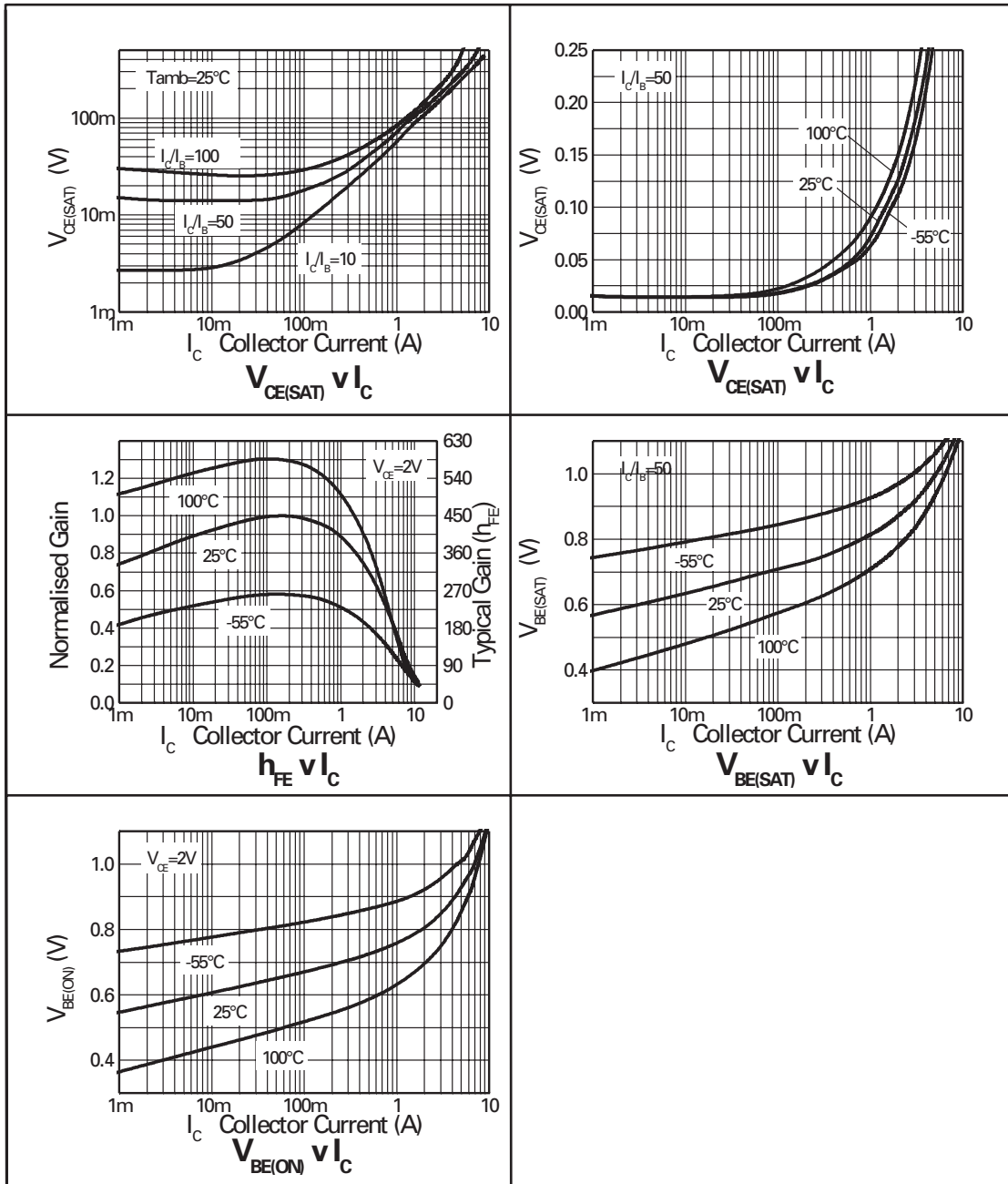
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| 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 | $V_{CC}=10\text{V}, I_C=3\text{A}$ |
| Turn-Off Time | $t_{(off)}$ | | 400 | | ns | $I_{B1}=I_{B2}=10\text{mA}$ |

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

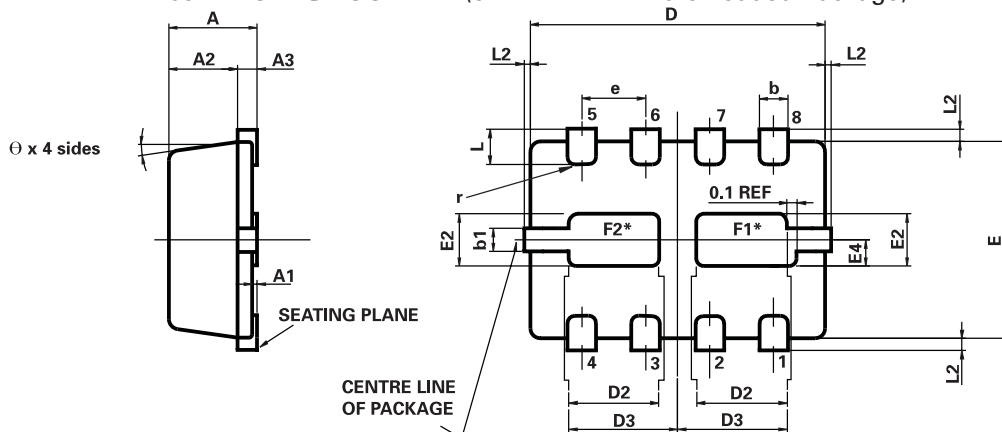
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TYPICAL CHARACTERISTICS



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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 | Ø | 0° | 12° | 0° | 12° |
| D3 | 1.01 | 1.21 | 0.0397 | 0.0476 | | | | | |

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