

ZXT4M322

MPPS™ Miniature Package Power Solutions

70V PNP LOW SATURATION TRANSISTOR

SUMMARY

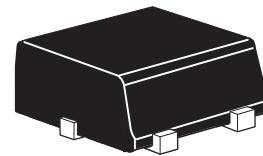
PNP— $V_{CE0} = -70V$; $R_{SAT} = 117m\Omega$; $I_C = -2.5A$

DESCRIPTION

Packaged in the new innovative 2mm x 2mm MLP (Micro Leaded Package) outline, this new 4th generation low saturation PNP 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 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



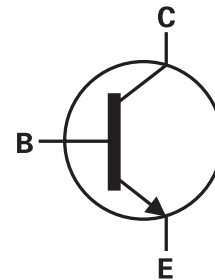
MLP322

FEATURES

- Low Equivalent On Resistance
- Extremely Low Saturation Voltage ($-220mV$ max @1A)
- h_{FE} specified up to 3A
- $I_C = 2.5A$ Continuous Collector Current
- 2mm x 2mm MLP

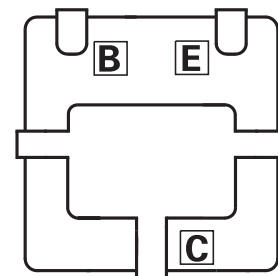
APPLICATIONS

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



ORDERING INFORMATION

| DEVICE | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|-------------|-----------|------------|-------------------|
| ZXTD4M322TA | 7" | 8mm | 3000 |
| ZXTD4M322TC | 13" | 8mm | 10000 |



Underside View

DEVICE MARKING

- S4

ZXT4M322

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--|---------------|-------------|----------------------|
| Collector-Base Voltage | V_{CB0} | -70 | V |
| Collector-Emitter Voltage | V_{CEO} | -70 | V |
| Emitter-Base Voltage | V_{EBO} | -7.5 | V |
| Peak Pulse Current | I_{CM} | -3 | A |
| Continuous Collector Current ^(a) | I_C | -2.5 | 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 & Storage Temperature Range | $T_j:T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |
| Junction Temperature | T_j | 150 | $^\circ\text{C}$ |

THERMAL RESISTANCE

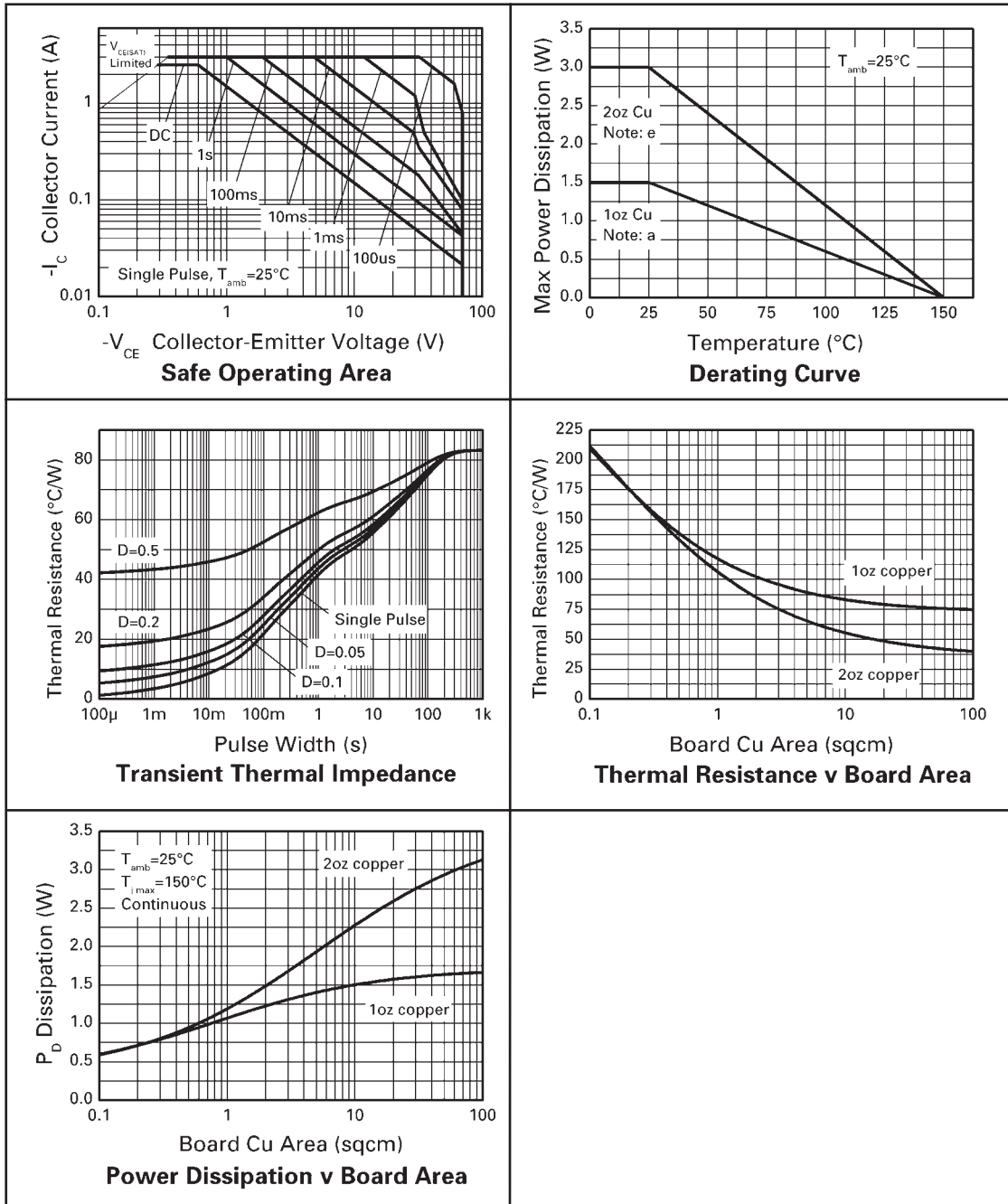
| PARAMETER | SYMBOL | VALUE | UNIT |
|------------------------------------|-----------------|-------|---------------------------|
| Junction to Ambient ^(a) | $R_{\theta JA}$ | 83 | $^\circ\text{C}/\text{W}$ |
| Junction to Ambient ^(b) | $R_{\theta JA}$ | 51 | $^\circ\text{C}/\text{W}$ |
| Junction 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 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 $R_{th} = 300^\circ\text{C}/\text{W}$ giving a power rating of $P_{tot} = 420\text{mW}$

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TYPICAL CHARACTERISTICS



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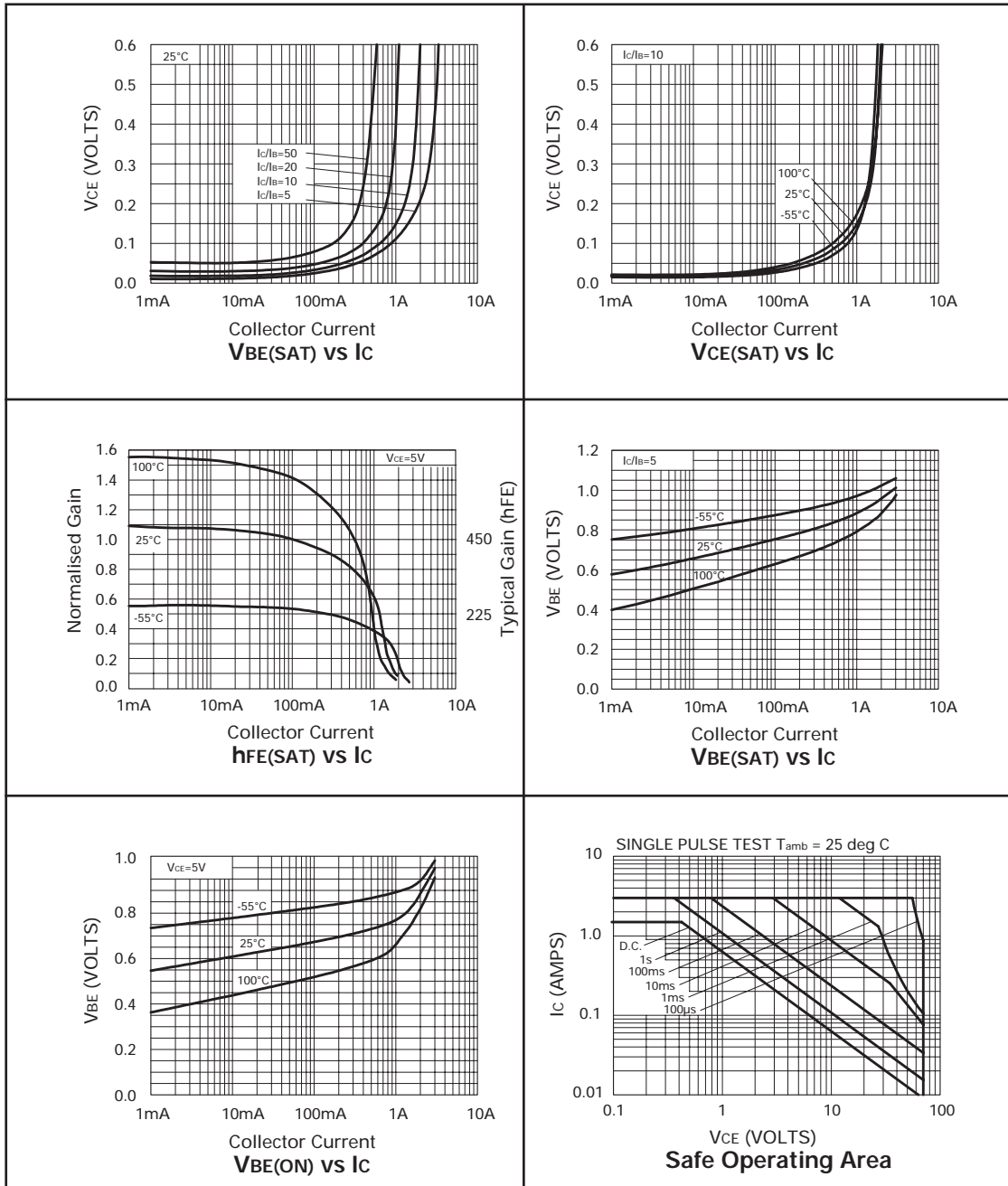
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---------------------------------------|---------------|-------------------------|-------------------------------|-----------------------------|------|--|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -70 | -150 | | V | $I_C = -100\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | -70 | -125 | | 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 | $V_{CB} = -55\text{V}$ |
| Emitter Cut-Off Current | I_{EBO} | | | -25 | nA | $V_{EB} = -6\text{V}$ |
| Collector Emitter Cut-Off Current | I_{CES} | | | -25 | nA | $V_{CE} = -55\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | | -35 -135 -140 -175 | -50 -200 -220 -260 | mV | $I_C = -0.1\text{A}, I_B = -10\text{mA}^*$ $I_C = -0.5\text{A}, I_B = -20\text{mA}^*$ $I_C = -1\text{A}, I_B = -100\text{mA}^*$ $I_C = -1.5\text{A}, I_B = -200\text{mA}^*$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | | -0.94 | -1.05 | V | $I_C = -1.5\text{A}, I_B = -200\text{mA}^*$ |
| Base-Emitter Turn-On Voltage | $V_{BE(on)}$ | | -0.78 | -1.00 | V | $I_C = -1.5\text{A}, V_{CE} = -5\text{V}^*$ |
| Static Forward Current Transfer Ratio | h_{FE} | 300 300 175 40 | 470 450 275 60 10 | | | $I_C = -10\text{mA}, V_{CE} = -5\text{V}^*$ $I_C = -100\text{mA}, V_{CE} = -5\text{V}^*$ $I_C = -1\text{A}, V_{CE} = -5\text{V}^*$ $I_C = -1.5\text{A}, V_{CE} = -5\text{V}^*$ $I_C = -3\text{A}, V_{CE} = -5\text{V}^*$ |
| Transition Frequency | f_T | 150 | 180 | | MHz | $I_C = -50\text{mA}, V_{CE} = -10\text{V}$ $f = 100\text{MHz}$ |
| Output Capacitance | C_{obo} | | 14 | 20 | pF | $V_{CB} = -10\text{A}, f = 1\text{MHz}$ |
| Turn-On Time | $t_{(on)}$ | | 40 | | ns | $V_{CC} = -50\text{V}, I_C = -1\text{A}$ |
| Turn-Off Time | $t_{(off)}$ | | 700 | | ns | $I_{B1} = I_{B2} = -50\text{mA}$ |

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

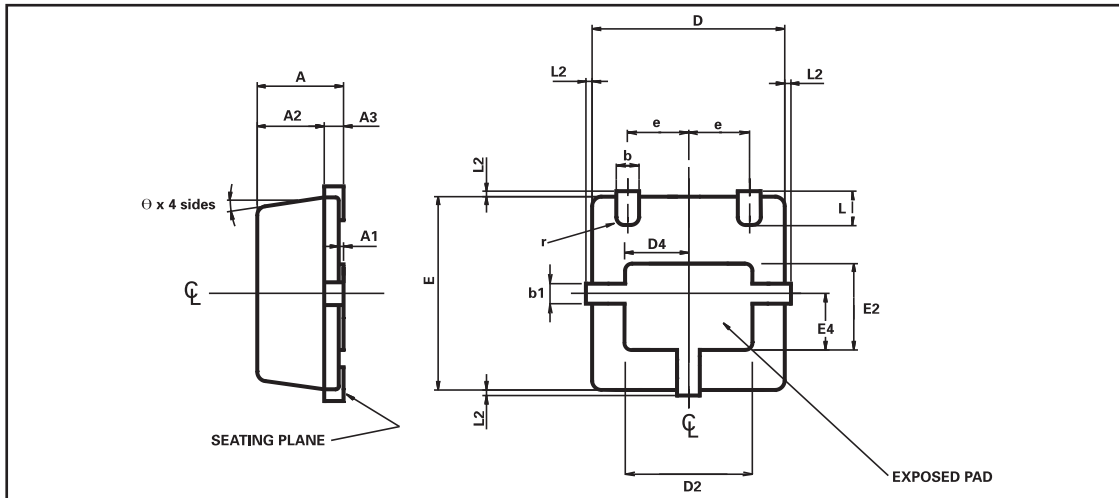
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TYPICAL CHARACTERISTICS



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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 | |
| 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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