

**12V PNP LOW SATURATION SWITCHING TRANSISTOR**
**Features and Benefits**

- $BV_{CEO} > -12V$
- $I_C = -4A$  Continuous Collector Current
- Low Saturation Voltage ( $-140mV$  max @  $-1A$ )
- $R_{SAT} = 60 m\Omega$  for a low equivalent On-Resistance
- $h_{FE}$  specified up to  $-10A$  for a high current gain hold up
- Low profile  $0.6mm$  high package for thin applications
- $R_{\theta JA}$  efficient, 60% lower than SOT23
- $4mm^2$  footprint, 50% smaller than SOT23
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

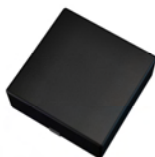
**Mechanical Data**

- Case: DFN2020B-3
- Case Material: Molded Plastic. "Green" Molding Compound.
- Terminals: Pre-Plated NiPdAu leadframe.
- Nominal Package Height:  $0.6mm$
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight:  $0.01$  grams (approximate)

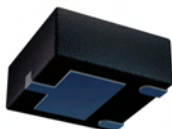
**Applications**

- MOSFET Gate Driving
- DC-DC Converters
- Charging Circuits
- Power switches
- Motor Control

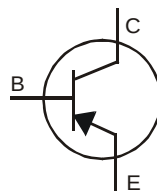
DFN2020B-3



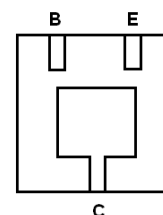
Top View



Bottom View



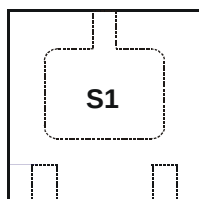
Device Symbol


 Bottom View  
Pin-Out

**Ordering Information** (Note 3)

| Product     | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| ZXTP717MATA | S1      | 7                  | 8               | 3000              |

- Notes:
1. No purposefully added lead.
  2. Diodes Inc's "Green" policy can be found on our website at <http://www.diodes.com>
  3. For Packaging Details, go to our website at <http://www.diodes.com>.

**Marking Information**


Top View

S1 = Product Type Marking code

**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

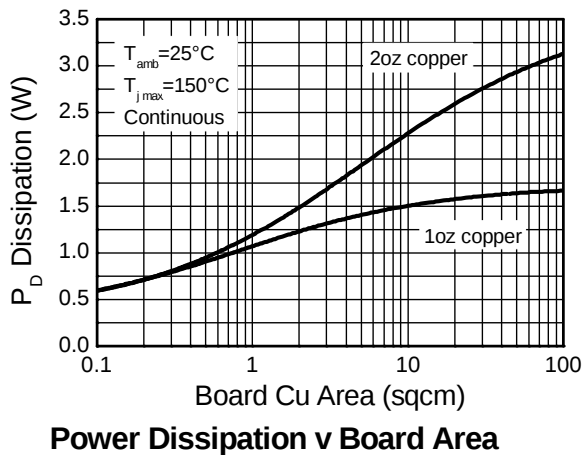
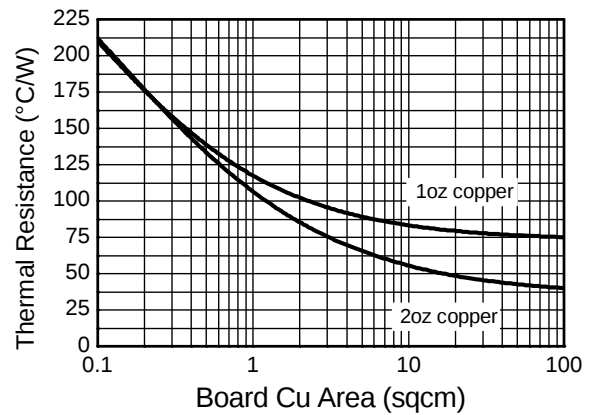
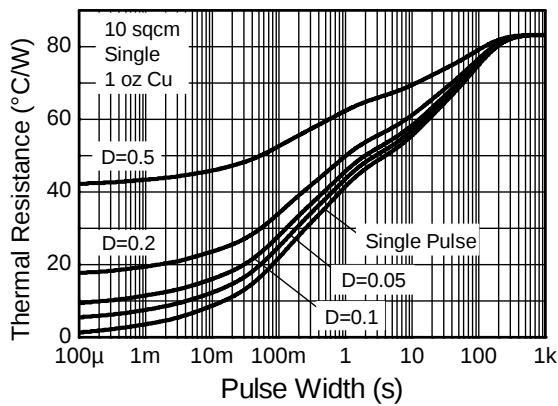
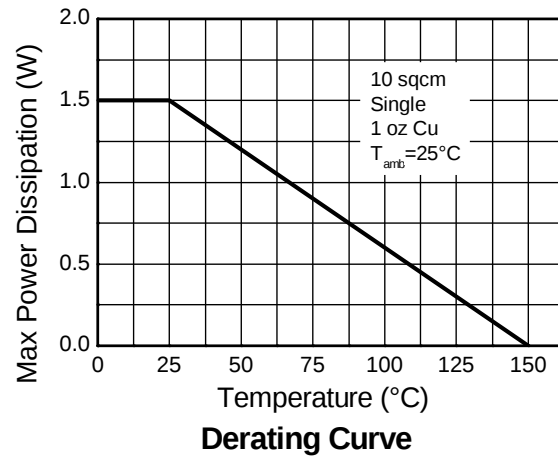
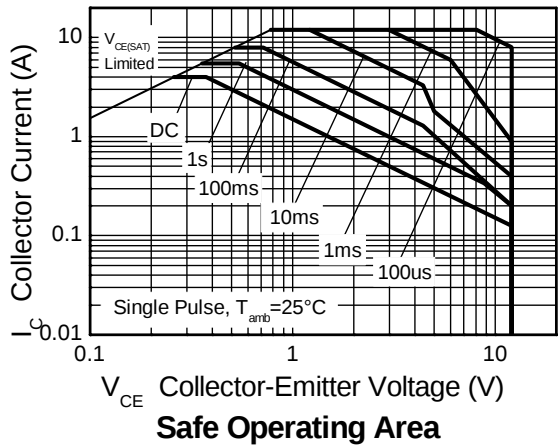
| Characteristic               |          | Symbol           | Value | Unit |
|------------------------------|----------|------------------|-------|------|
| Collector-Base Voltage       |          | V <sub>CBO</sub> | -20   | V    |
| Collector-Emitter Voltage    |          | V <sub>CEO</sub> | -12   |      |
| Emitter-Base Voltage         |          | V <sub>EBO</sub> | -7    |      |
| Peak Pulse Current           |          | I <sub>CM</sub>  | -12   | A    |
| Continuous Collector Current | (Note 4) | I <sub>C</sub>   | -4    |      |
|                              | (Note 5) |                  | -4.5  |      |
| Base Current                 |          | I <sub>B</sub>   | -1    |      |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                          |          | Symbol                            | Value       | Unit  |
|-----------------------------------------|----------|-----------------------------------|-------------|-------|
| Power Dissipation                       | (Note 4) | P <sub>D</sub>                    | 1.5         | W     |
|                                         | (Note 5) |                                   | 12          |       |
| Linear Derating Factor                  |          |                                   | 2.45        | mW/°C |
|                                         |          |                                   | 19.6        |       |
| Thermal Resistance, Junction to Ambient | (Note 4) | R <sub>θJA</sub>                  | 83          | °C/W  |
|                                         | (Note 5) |                                   | 51          |       |
| Thermal Resistance, Junction to Lead    | (Note 6) | R <sub>θJL</sub>                  | 16.8        |       |
| Operating and Storage Temperature Range |          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

- Notes:
4. For a device surface mounted on 31mm x 31mm (10cm<sup>2</sup>) FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The entire exposed collector pad is attached to the heatsink.
  5. Same as note (4), except the device is measured at t ≤ 5 sec.
  6. For a single device, thermal resistance from junction to solder-point (at the end of the drain lead).

## Thermal Characteristics

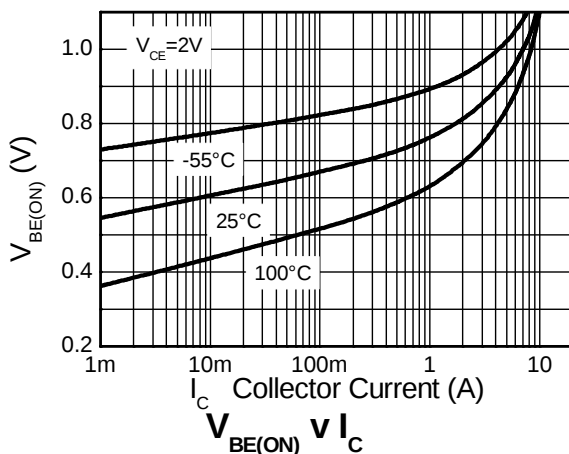
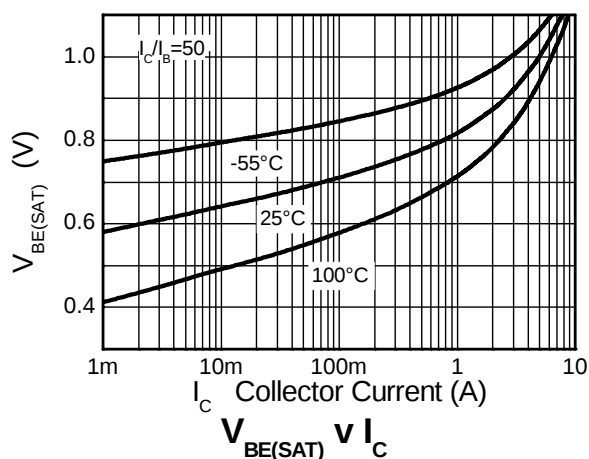
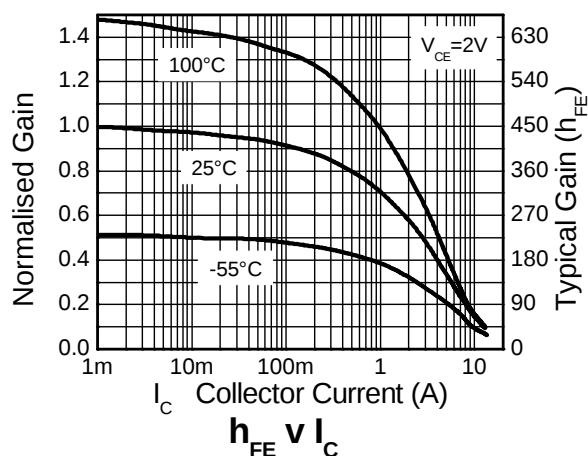
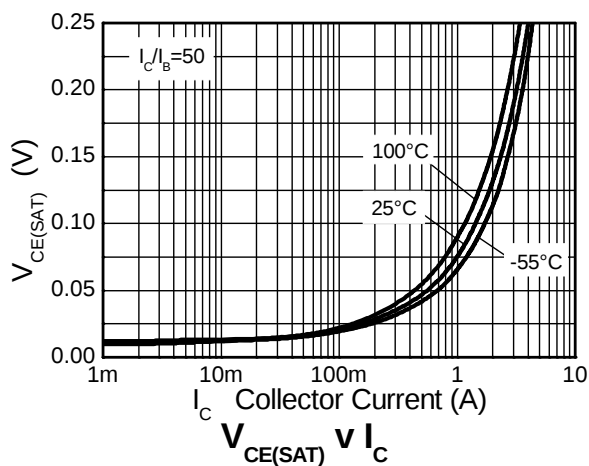
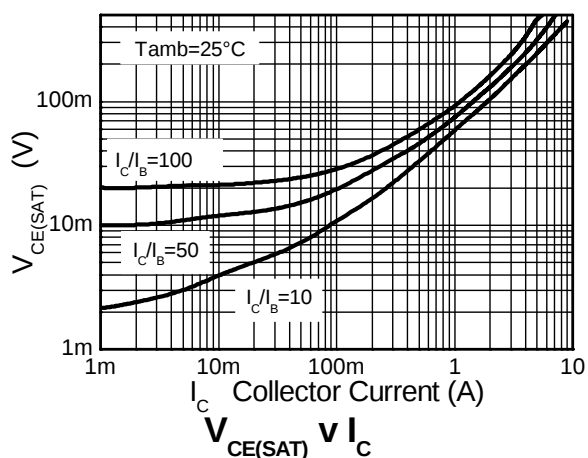


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

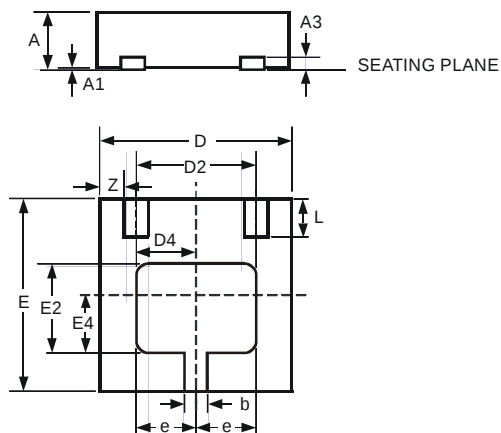
| Characteristic                                 | Symbol               | Min | Typ   | Max   | Unit | Test Condition                                                |
|------------------------------------------------|----------------------|-----|-------|-------|------|---------------------------------------------------------------|
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>    | -20 | -35   | -     | V    | I <sub>C</sub> = -100 $\mu$ A                                 |
| Collector-Emitter Breakdown Voltage (Note 7)   | BV <sub>CEO</sub>    | -12 | -25   | -     | V    | I <sub>C</sub> = -10 mA                                       |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>    | -7  | -8.5  | -     | V    | I <sub>E</sub> = -100 $\mu$ A                                 |
| Collector Cutoff Current                       | I <sub>CBO</sub>     | -   | -     | -100  | nA   | V <sub>CB</sub> = -16V                                        |
| Emitter Cutoff Current                         | I <sub>EBO</sub>     | -   | -     | -100  | nA   | V <sub>EB</sub> = -6V                                         |
| Collector Emitter Cutoff Current               | I <sub>CES</sub>     | -   | -     | -100  | nA   | V <sub>CES</sub> = -10V                                       |
| Static Forward Current Transfer Ratio (Note 7) | h <sub>FE</sub>      | 300 | 475   | -     | -    | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V                 |
|                                                |                      | 300 | 450   | -     |      | I <sub>C</sub> = -100mA, V <sub>CE</sub> = -2V                |
|                                                |                      | 180 | 275   | -     |      | I <sub>C</sub> = -2.5A, V <sub>CE</sub> = -2V                 |
|                                                |                      | 60  | 100   | -     |      | I <sub>C</sub> = -8A, V <sub>CE</sub> = -2V                   |
|                                                |                      | 45  | 70    | -     |      | I <sub>C</sub> = -10A, V <sub>CE</sub> = -2V                  |
| Collector-Emitter Saturation Voltage (Note 7)  | V <sub>CE(sat)</sub> | -   | -10   | -17   | mV   | I <sub>C</sub> = -0.1A, I <sub>B</sub> = -10mA                |
|                                                |                      | -   | -100  | -140  |      | I <sub>C</sub> = -1A, I <sub>B</sub> = -10mA                  |
|                                                |                      | -   | -100  | -150  |      | I <sub>C</sub> = -1.5A, I <sub>B</sub> = -50mA                |
|                                                |                      | -   | -195  | -300  |      | I <sub>C</sub> = -3A, I <sub>B</sub> = -50mA                  |
|                                                |                      | -   | -240  | -310  |      | I <sub>C</sub> = -4A, I <sub>B</sub> = -150mA                 |
| Base-Emitter Turn-On Voltage (Note 7)          | V <sub>BE(on)</sub>  | -   | -0.87 | -0.96 | V    | I <sub>C</sub> = -4A, V <sub>CE</sub> = -2V                   |
| Base-Emitter Saturation Voltage (Note 7)       | V <sub>BE(sat)</sub> | -   | -0.97 | -1.07 | V    | I <sub>C</sub> = -4A, I <sub>B</sub> = -150mA                 |
| Output Capacitance                             | C <sub>obo</sub>     | -   | 21    | 30    | pF   | V <sub>CB</sub> = -10V, f = 1MHz                              |
| Transition Frequency                           | f <sub>T</sub>       | 100 | 110   | -     | MHz  | V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA,<br>f = 100MHz |
| Turn-On Time                                   | t <sub>on</sub>      | -   | 70    | -     | ns   | V <sub>CC</sub> = -6V, I <sub>C</sub> = -2A                   |
| Turn-Off Time                                  | t <sub>off</sub>     | -   | 130   | -     | ns   | I <sub>B1</sub> = I <sub>B2</sub> = -50mA                     |

Notes: 7. Measured under pulsed conditions. Pulse width  $\leq$  300  $\mu$ s. Duty cycle  $\leq$  2%.

## Typical Electrical Characteristics

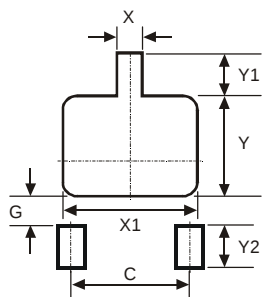


## Package Outline Dimensions



| DFN2020B-3           |      |       |       |
|----------------------|------|-------|-------|
| Dim                  | Min  | Max   | Typ   |
| A                    | 0.57 | 0.63  | 0.60  |
| A1                   | 0    | 0.05  | 0.02  |
| A3                   | —    | —     | 0.152 |
| b                    | 0.20 | 0.30  | 0.25  |
| D                    | 1.95 | 2.075 | 2.00  |
| D2                   | 1.22 | 1.42  | 1.32  |
| D4                   | 0.56 | 0.76  | 0.66  |
| e                    | —    | —     | 0.65  |
| E                    | 1.95 | 2.075 | 2.00  |
| E2                   | 0.79 | 0.99  | 0.89  |
| E4                   | 0.48 | 0.68  | 0.58  |
| L                    | 0.25 | 0.35  | 0.30  |
| Z                    | —    | —     | 0.225 |
| All Dimensions in mm |      |       |       |

## Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.30          |
| G          | 0.24          |
| X          | 0.35          |
| X1         | 1.52          |
| Y          | 1.09          |
| Y1         | 0.47          |
| Y2         | 0.50          |

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