

50V NPN LOW SATURATION TRANSISTOR

Features and Benefits

- $BV_{CEO} > 50V$
- $I_C = 4A$ Continuous Collector Current
- Low Saturation Voltage (100mV max @ 1A)
- $R_{SAT} = 68 m\Omega$ for a low equivalent On-Resistance
- h_{FE} specified up to 6A for high current gain hold up
- Low profile 0.6mm high package for thin applications
- $R_{\theta JA}$ efficient, 60% lower than SOT23
- 4mm² 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**

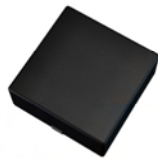
Mechanical Data

- 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)

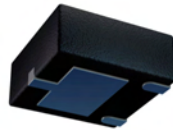
Applications

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

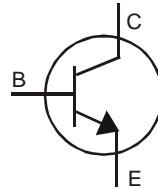
DFN2020B-3



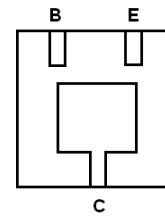
Top View



Bottom View



Device Symbol



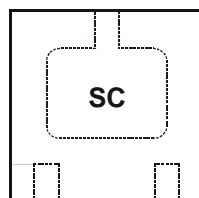
Bottom View
Pin-Out

Ordering Information

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| ZXTN619MATA | SC | 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>

Marking Information



Top View

SC = Product Type Marking code

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

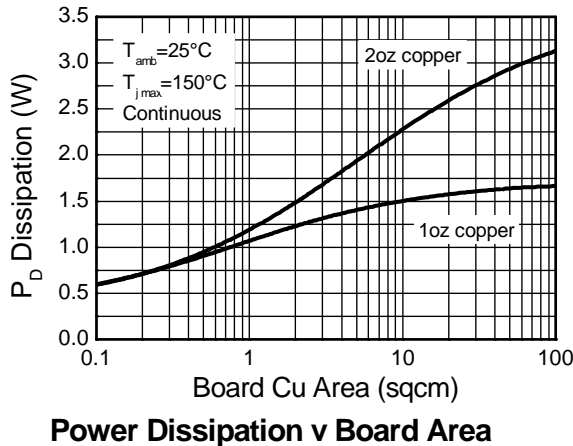
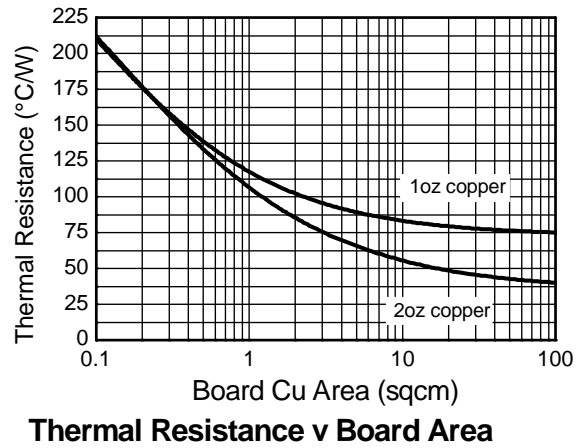
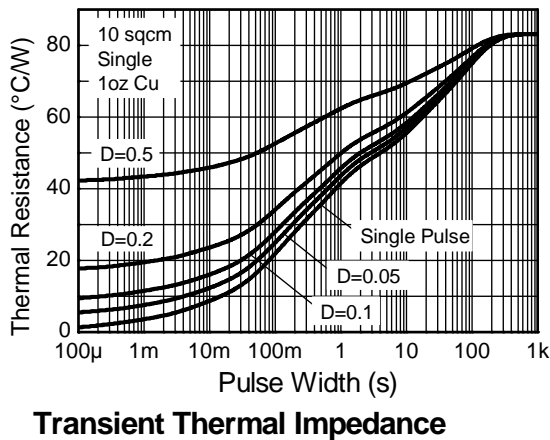
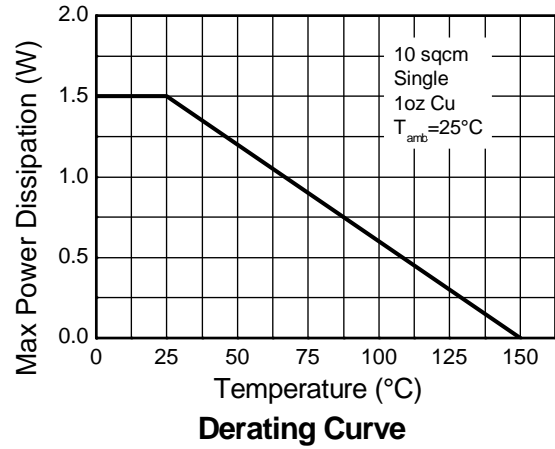
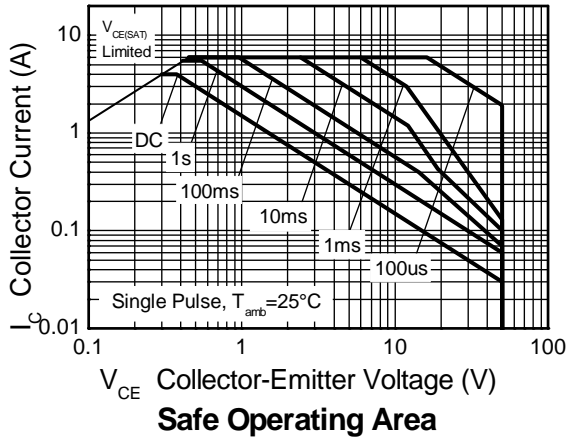
| Parameter | Symbol | Limit | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 100 | V |
| Collector-Emitter Voltage | V_{CEO} | 50 | |
| Emitter-Base Voltage | V_{EBO} | 7 | |
| Peak Pulse Current | I_{CM} | 6 | A |
| Continuous Collector Current | (Note 3) | 4 | |
| | (Note 4) | 4.3 | |
| Base Current | I_B | 1 | |

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|---------------------------|
| Power Dissipation | P_D | 1.5 | W |
| | | 12 | |
| Linear Derating Factor | | 2.45 | mW/ $^\circ\text{C}$ |
| | | 19.6 | |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 83 | $^\circ\text{C}/\text{W}$ |
| | | 51 | |
| Thermal Resistance, Junction to Lead | $R_{\theta JL}$ | 16.8 | |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Notes:
3. For a device surface mounted on 31mm x 31mm (10cm²) 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.
 4. Same as note (3), except the device is measured at $t \leq 5$ sec.
 5. For a single device, thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

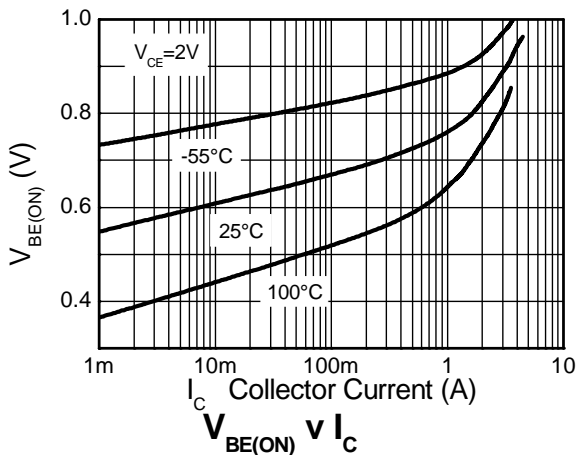
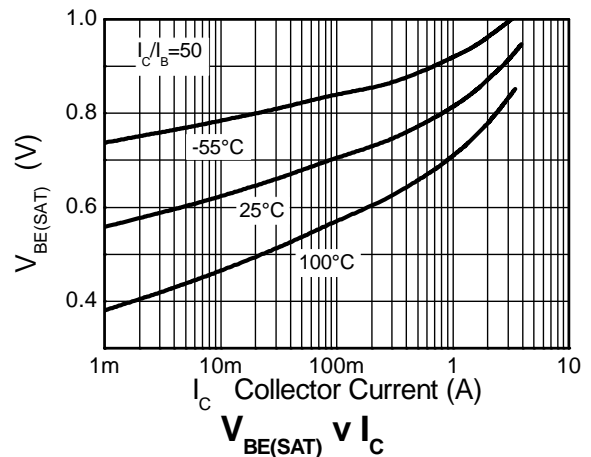
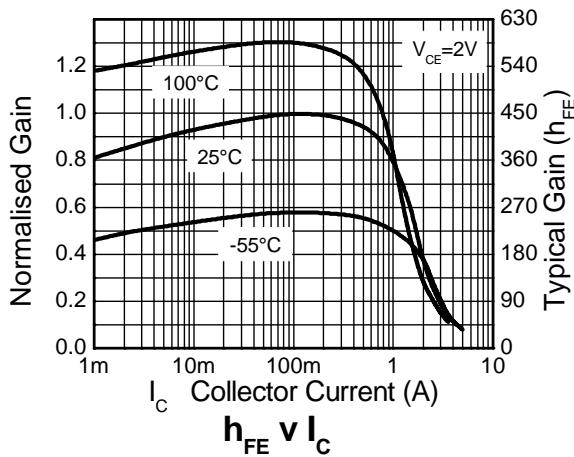
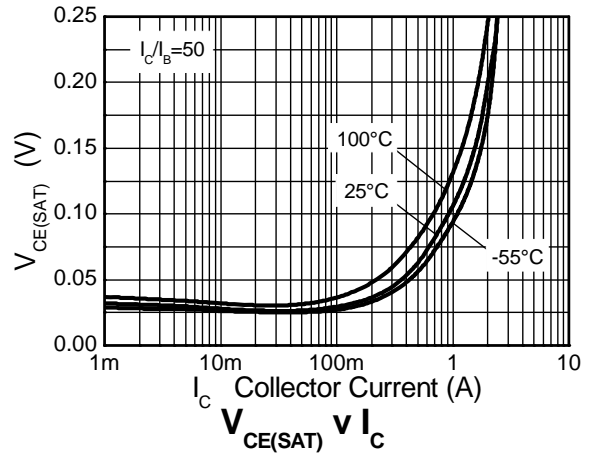
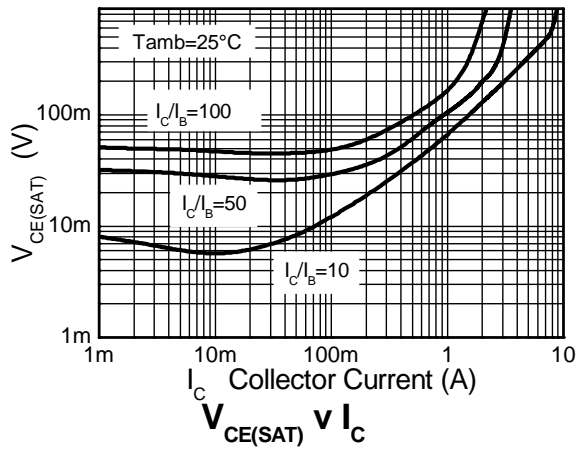


Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

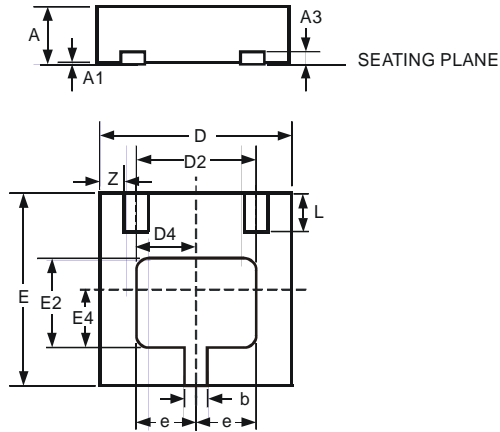
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------|-----|------|------|------|---|
| Collector-Base Breakdown Voltage | BV_{CBO} | 100 | 190 | - | V | $I_C = 100 \mu\text{A}$ |
| Collector-Emitter Breakdown Voltage (Note 6) | BV_{CEO} | 50 | 65 | - | V | $I_C = 10 \text{mA}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 7 | 8.2 | - | V | $I_E = 100 \mu\text{A}$ |
| Collector Cutoff Current | I_{CBO} | - | - | 100 | nA | $V_{CB} = 80\text{V}$ |
| Emitter Cutoff Current | I_{EBO} | - | - | 100 | nA | $V_{EB} = 6\text{V}$ |
| Collector Emitter Cutoff Current | I_{CES} | - | - | 100 | nA | $V_{CES} = 40\text{V}$ |
| Static Forward Current Transfer Ratio (Note 6) | h_{FE} | 200 | 400 | - | - | $I_C = 10\text{mA}, V_{CE} = 2\text{V}$ |
| | | 300 | 450 | - | | $I_C = 200\text{mA}, V_{CE} = 2\text{V}$ |
| | | 200 | 400 | - | | $I_C = 1\text{A}, V_{CE} = 2\text{V}$ |
| | | 100 | 225 | - | | $I_C = 2\text{A}, V_{CE} = 2\text{V}$ |
| | | - | 40 | - | | $I_C = 6\text{A}, V_{CE} = 2\text{V}$ |
| Collector-Emitter Saturation Voltage (Note 6) | $V_{CE(sat)}$ | - | 10 | 20 | mV | $I_C = 0.1\text{A}, I_B = 10\text{mA}$ |
| | | - | 70 | 100 | | $I_C = 1\text{A}, I_B = 5\text{mA}$ |
| | | - | 145 | 200 | | $I_C = 1\text{A}, I_B = 10\text{mA}$ |
| | | - | 115 | 220 | | $I_C = 2\text{A}, I_B = 50\text{mA}$ |
| | | - | 225 | 300 | | $I_C = 3\text{A}, I_B = 100\text{mA}$ |
| | | - | 270 | 320 | | $I_C = 4\text{A}, I_B = 200\text{mA}$ |
| Base-Emitter Turn-On Voltage (Note 6) | $V_{BE(on)}$ | - | 0.94 | 1.00 | V | $I_C = 4\text{A}, V_{CE} = 2\text{V}$ |
| Base-Emitter Saturation Voltage (Note 6) | $V_{BE(sat)}$ | - | 1.00 | 1.07 | V | $I_C = 4\text{A}, I_B = 200\text{mA}$ |
| Output Capacitance | C_{obo} | - | 12 | 20 | pF | $V_{CB} = 10\text{V}, f = 1\text{MHz}$ |
| Transition Frequency | f_T | 100 | 165 | - | MHz | $V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$ |
| Turn-On Time | t_{on} | - | 170 | - | ns | $V_{CC} = 10\text{V}, I_C = 1\text{A}$ |
| Turn-Off Time | t_{off} | - | 750 | - | ns | $I_{B1} = I_{B2} = 10\text{mA}$ |

Notes: 6. Measured under pulsed conditions. Pulse width $\leq 300 \mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics

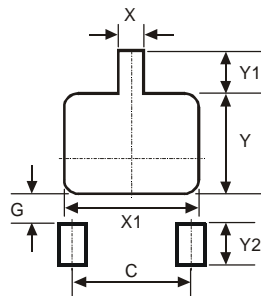


Package Outline Dimensions



| 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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