

ZXTN2031F

50V NPN MEDIUM POWER TRANSISTOR IN SOT23

Features

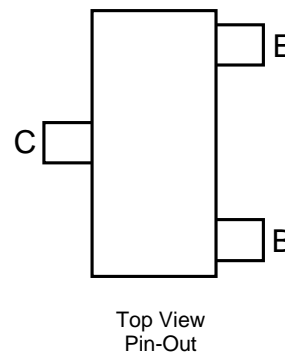
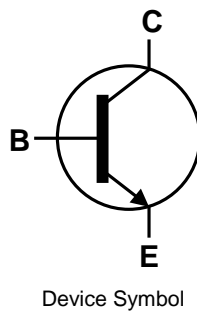
- $BV_{CEO} > 50V$
- $BV_{CEV} > 80V$ Forward Blocking Voltage
- $I_C = 5A$ high Continuous Collector Current
- $I_{CM} = 12A$ Peak Collector Current
- Low Saturation Voltage, $V_{CE(SAT)} < 40mV @ 1A$
- $R_{CE(SAT)} = 24m\Omega$ for a Low Equivalent On-Resistance
- Complementary PNP Type: ZXTP2025F
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per
MIL-STD-202, Method 208 @3
- Weight 0.008 grams (Approximate)

Applications

- MOSFET and IGBT Gate Driving
- Motor Drive
- Relay Lamp and Solenoid Drive
- DC-DC Converters

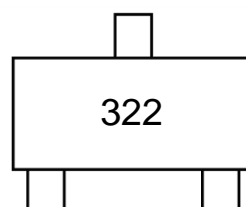


Ordering Information (Note 4)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| ZXTN2031FTA | AEC-Q101 | 322 | 7 | 8 | 3,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



322 = Product Type Marking Code

ZXTN2031F

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | 80 | V |
| Collector-Emitter Voltage | V _{CEV} | 80 | V |
| Collector-Emitter Voltage | V _{CEO} | 50 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Continuous Collector Current | I _C | 5 | A |
| Peak Pulse Current | I _{CM} | 12 | A |
| Base Current | I _B | 1.2 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

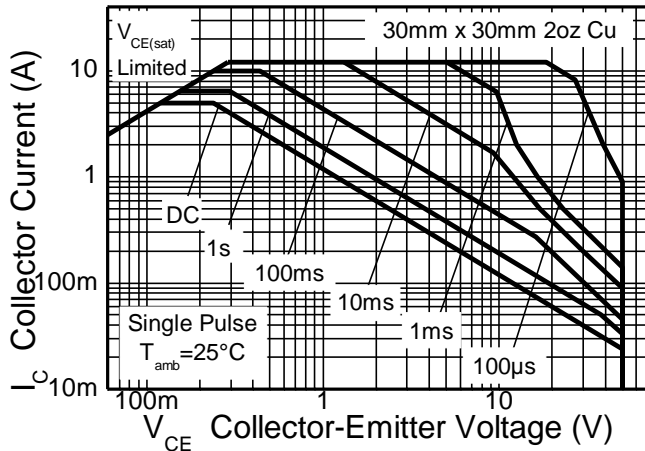
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation Linear Derating Factor | P _D | 1.0 | W |
| | | 8.0 | |
| | | 1.2 | |
| | | 9.6 | |
| Thermal Resistance, Junction to Ambient | R _{θJA} | 1.56 | °C/W |
| | | 12.5 | |
| | | 125 | |
| | | 104 | |
| Thermal Resistance, Junction to Lead | R _{θJL} | 80 | °C/W |
| | | 57 | |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

ESD Ratings (Note 9)

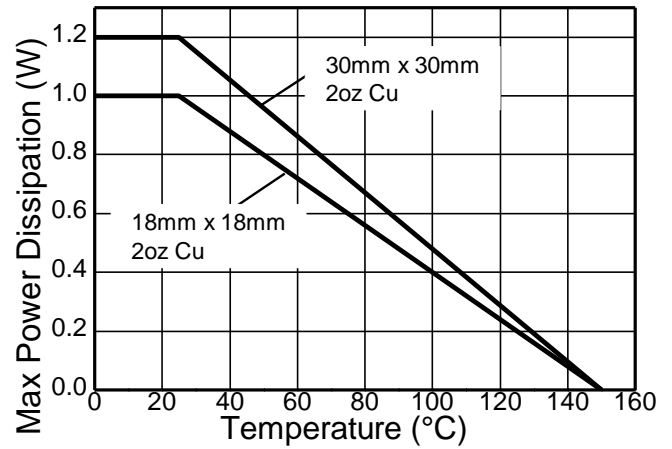
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
5. For a device mounted with the collector lead on 18mm x 18mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
 6. Same as note (5), except the device is mounted on 30mm x 30mm 2oz copper.
 7. Same as note (6), except measured at t < 5 seconds.
 8. Thermal resistance from junction to solder-point (at the end of the collector lead).
 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

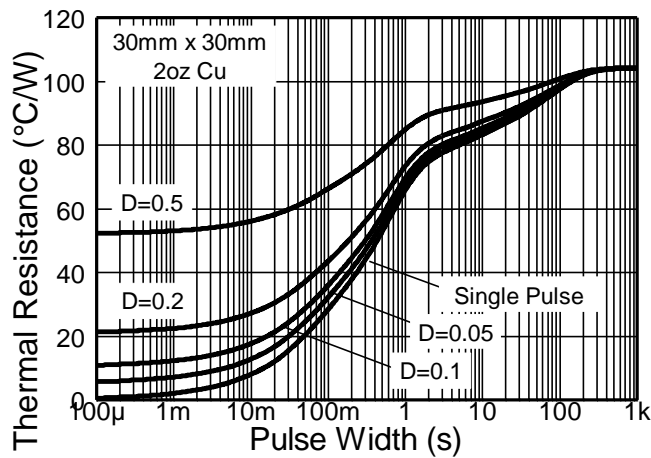
Thermal Characteristics and Derating information



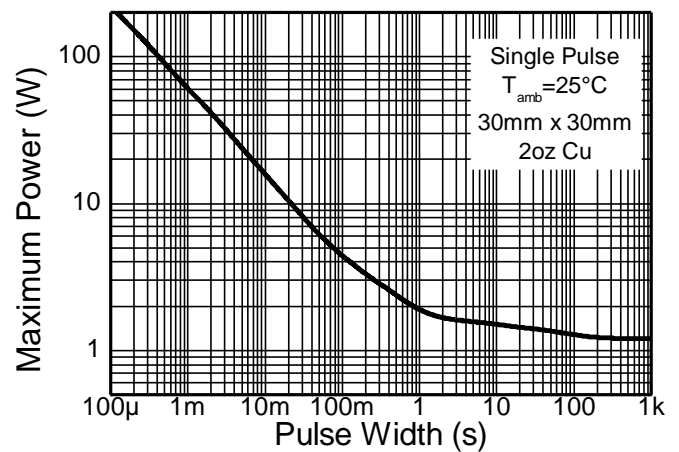
Safe Operating Area



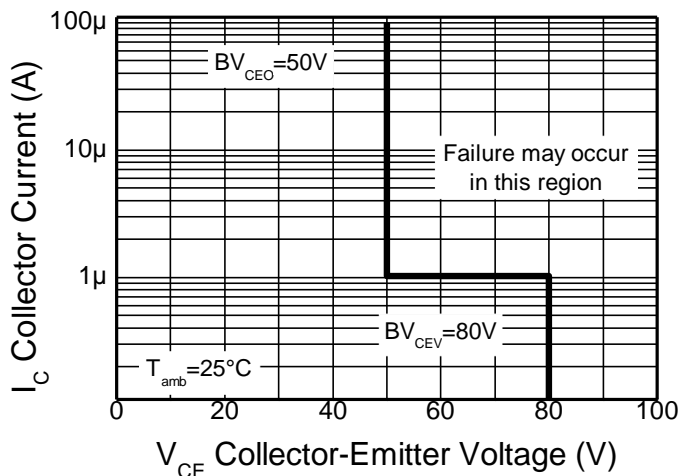
Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation



Safe Operating Area

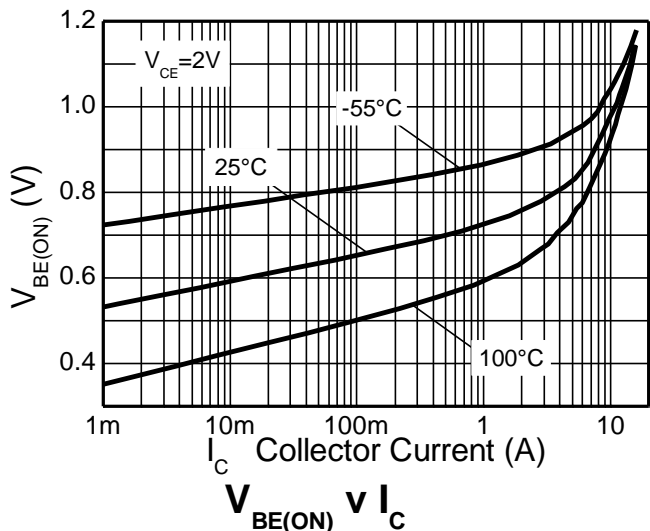
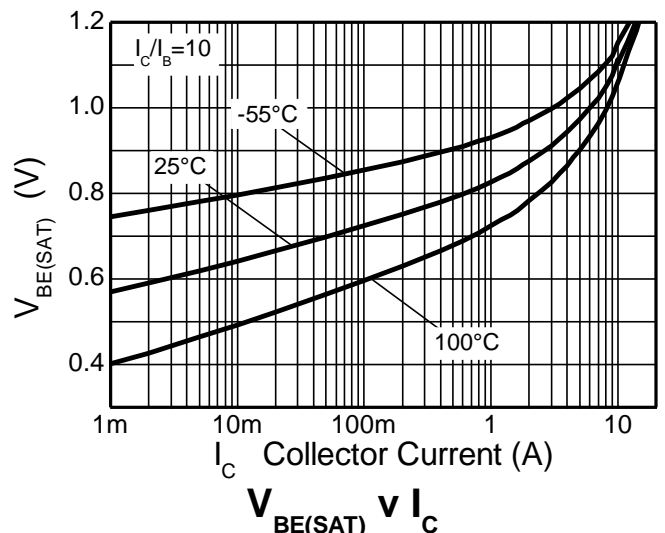
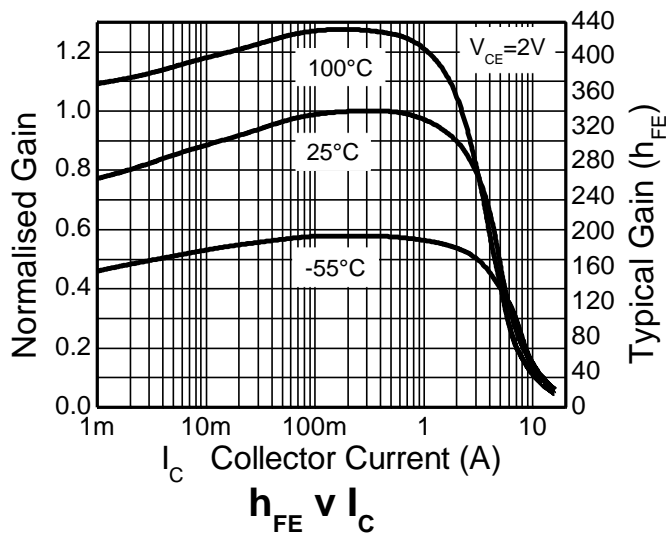
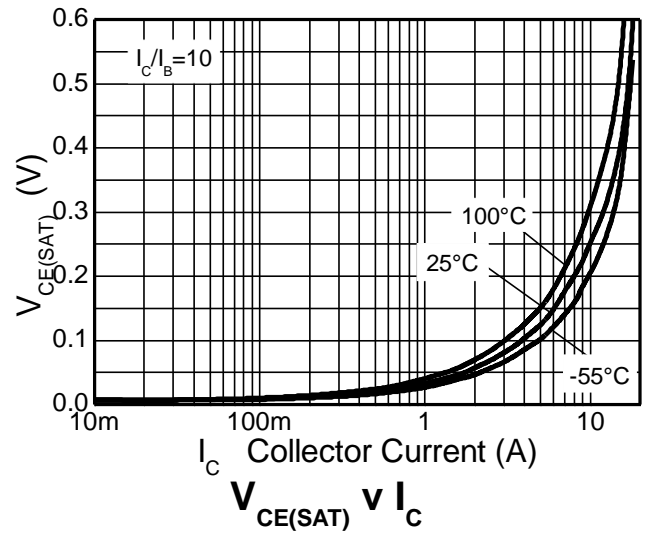
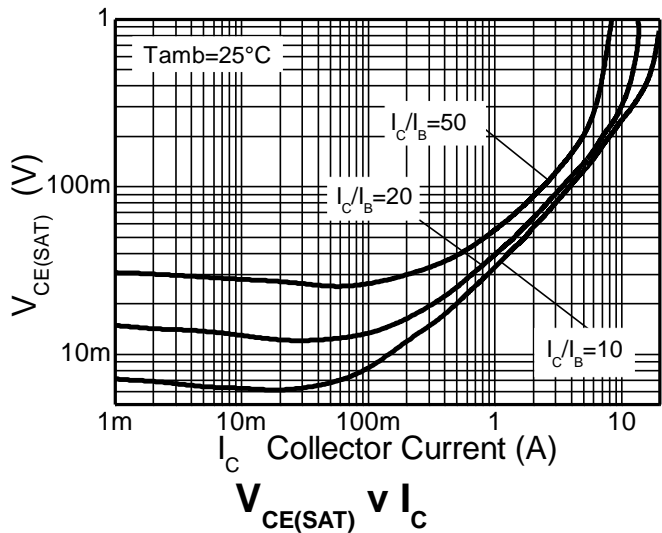
ZXTN2031F

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|----------------------|-------------------------|--------------------------|------------------------|------|--|
| Collector-Base Breakdown Voltage | BV _{CBO} | 80 | 175 | - | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage | BV _{CEV} | 80 | 175 | - | V | I _C = 1μA, -1V < V _{BE} < +0.3V |
| Collector-Emitter Breakdown Voltage (Note 10) | BV _{CEO} | 50 | 75 | - | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 7 | 8.3 | - | V | I _E = 100μA |
| Collector – Emitter Cut-Off Current | I _{CEV} | - | <1 | 20 | nA | V _{CE} = 60V, V _{BE} = -1V |
| Collector - Base Cut-Off Current | I _{CBO} | - | <1 | 20 | nA | V _{CB} = 60V |
| Emitter Cut-off Current | I _{EBO} | - | <1 | 10 | nA | V _{EB} = 6V |
| Static Forward Current Transfer Ratio (Note 10) | h _{FE} | 190 200 200 80 | 300 350 340 125 | - 560 - - | - | I _C = 10mA, V _{CE} = 2V I _C = 500mA, V _{CE} = 2V I _C = 2A, V _{CE} = 2V I _C = 5A, V _{CE} = 2V |
| Collector-Emitter Saturation Voltage (Note 10) | V _{CE(sat)} | - - - - | 13 30 80 135 | 18 40 110 170 | mV | I _C = 100mA, I _B = 5mA I _C = 1A, I _B = 100mA I _C = 2A, I _B = 40mA I _C = 5A, I _B = 250mA |
| Base-Emitter Saturation Voltage (Note 10) | V _{BE(sat)} | - - | 800 920 | 900 1000 | mV | I _C = 2A, I _B = 40mA I _C = 5A, I _B = 250mA |
| Base-Emitter Turn-On Voltage (Note 10) | V _{BE(on)} | - | 830 | 930 | mV | I _C = 5A, V _{CE} = 2V |
| Transition Frequency | F _T | - | 125 | - | MHz | I _C = 500mA, V _{CE} = 10V, f=50MHz |
| Output Capacitance | C _{obo} | - | 29 | - | pF | V _{CB} = 10V, f=1MHz |
| Delay Time | t _(d) | - | 16 | - | ns | V _{CC} = 12V, I _C = 2.5A, I _{B1} = - I _{B1} = 125mA |
| Rise Time | t _(r) | - | 27 | - | ns | |
| Storage Time | t _(stg) | - | 468 | - | ns | |
| Fall Time | t _(f) | - | 44 | - | ns | |

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

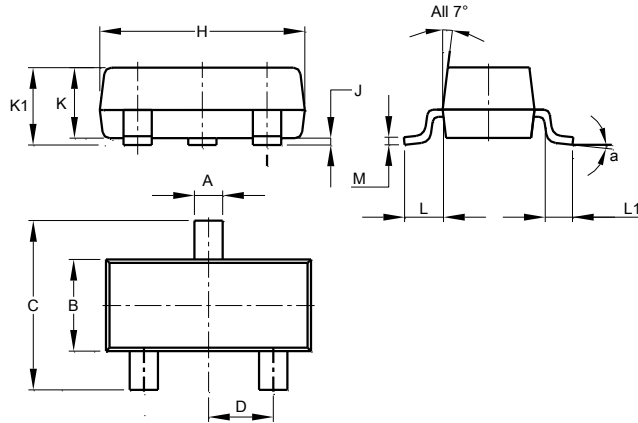
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



ZXTN2031F

Package Outline Dimensions

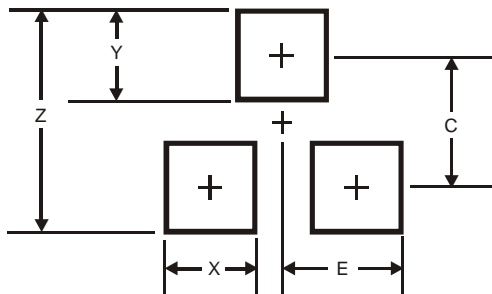
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 8° | | |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

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