

400V NPN MEDIUM POWER HIGH VOLTAGE TRANSISTOR IN SOT23F
Features

- $BV_{CEX} > 450V$
- $BV_{CEO} > 400V$
- $BV_{ECO} > 6V$
- $I_C = 0.5A$ Continuous Collector Current
- Low Saturation Voltage $V_{CE(SAT)} < 175mV @ 500mA$
- 1.5W Power Dissipation
- Complementary PNP Type: ZXP08400BFF
- **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**

Description

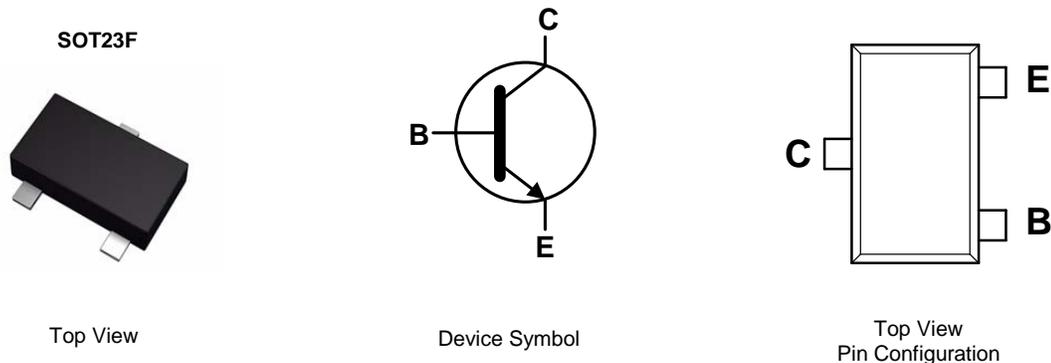
This NPN transistor has been designed for applications requiring high voltage blocking. The SOT23F package is pin compatible with the industry standard SOT23 foot print but offers lower profile and higher power dissipation for applications where power density is of utmost importance.

Mechanical Data

- Case: SOT23F
- 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 (E3)
- Weight: 0.012 grams (Approximate)

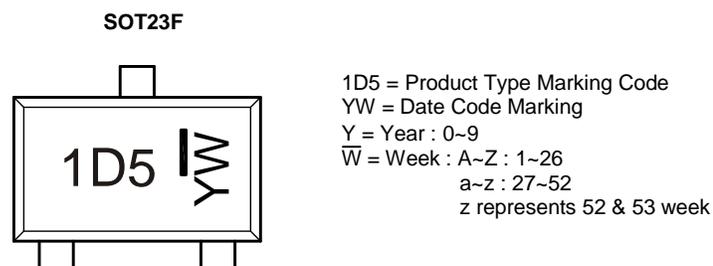
Applications

- High Voltage
- Low Saturation Voltage
- Low Profile Small Package Outline


Ordering Information (Note 4)

| Product | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|----------------|------------|---------|--------------------|-----------------|-------------------|
| ZXTN08400BFFTA | AEC-Q101 | 1D5 | 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


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

| Characteristic | Symbol | Value | Unit |
|--|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | 450 | V |
| Collector-Emitter Voltage (Forward Blocking) | V _{CEx} | 450 | V |
| Collector-Emitter Voltage | V _{CEO} | 400 | V |
| Emitter-Collector Voltage (Reverse Blocking) | V _{ECO} | 6 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Continuous Collector Current | I _C | 0.5 | A |
| Peak Pulse Current | I _{CM} | 1 | A |
| Base Current | I _B | 0.2 | A |

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

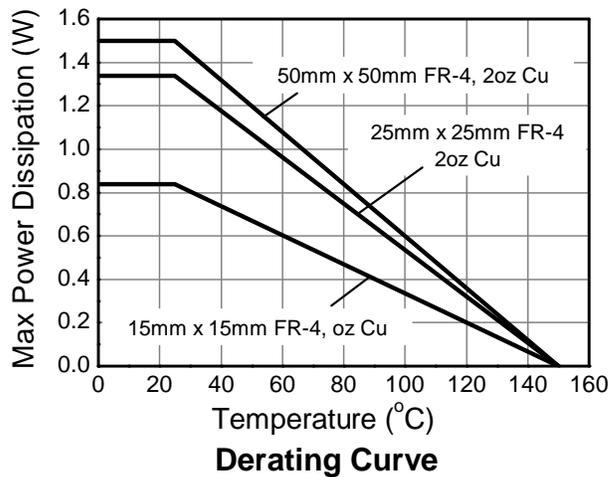
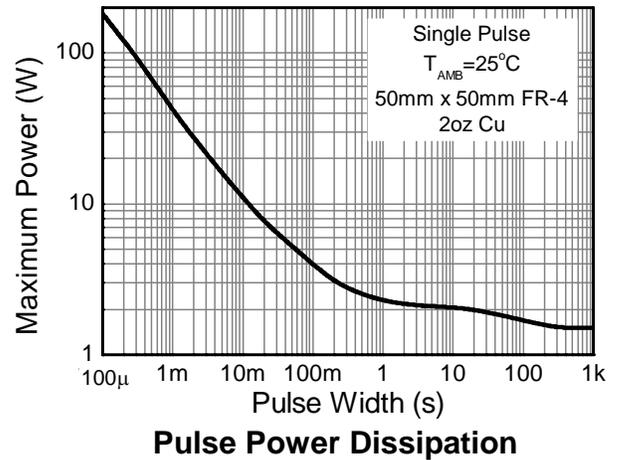
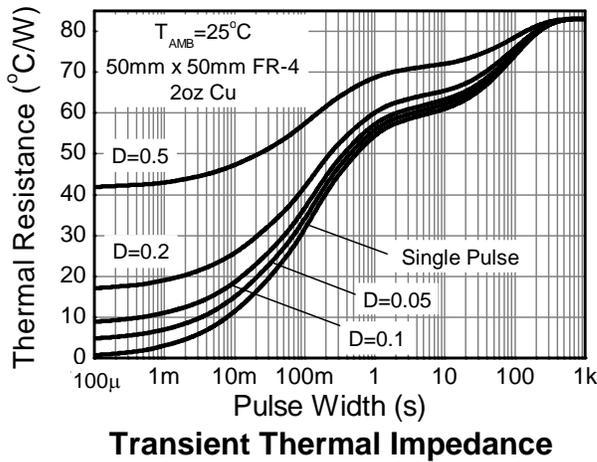
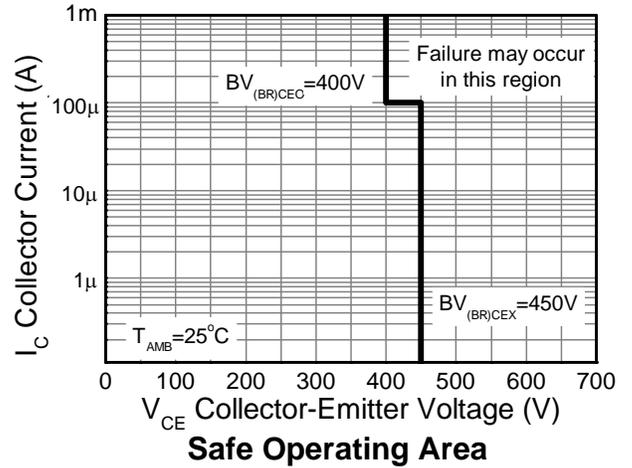
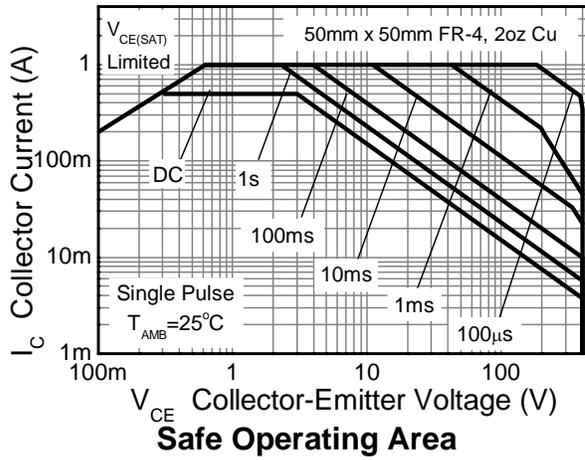
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------------|
| Power Dissipation Linear Derating Factor | P _D | 0.84 | W mW/°C |
| | | (Note 5) | |
| | | 6.72 | |
| | | (Note 6) | |
| | | 1.34 | |
| Thermal Resistance, Junction to Ambient | R _{θJA} | 10.72 | °C/W |
| | | (Note 7) | |
| | | 1.5 | |
| | | 12 | |
| Thermal Resistance, Junction to Lead | R _{θJL} | 2 | °C/W |
| | | (Note 8) | |
| | | 16 | |
| Operating and Storage Temperature Range | T _J , T _{STG} | 149 | °C |
| | | (Note 5) | |
| | | 93.4 | |
| | | (Note 6) | |
| Thermal Resistance, Junction to Ambient | R _{θJA} | 83.3 | °C/W |
| | | (Note 7) | |
| Thermal Resistance, Junction to Lead | R _{θJL} | 60 | °C/W |
| | | (Note 8) | |
| Operating and Storage Temperature Range | T _J , T _{STG} | 43.8 | °C |
| | | (Note 9) | |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |
| | | (Note 9) | |

ESD Ratings (Note 10)

| 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:
- For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
 - Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
 - Same as Note 7, whilst measured at t < 5 seconds.
 - Thermal resistance from junction to solder-point (at the end of the collector lead).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

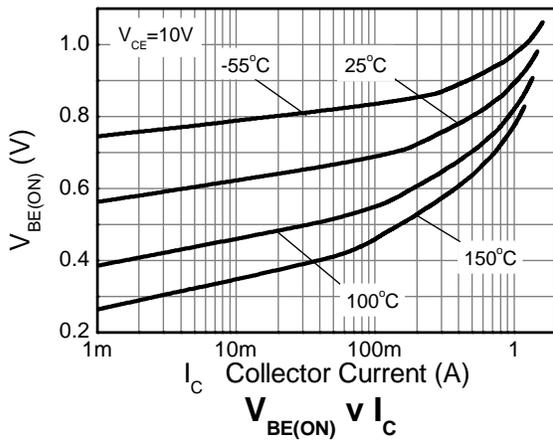
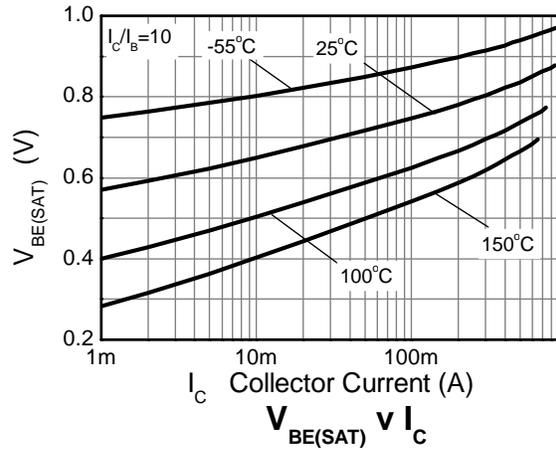
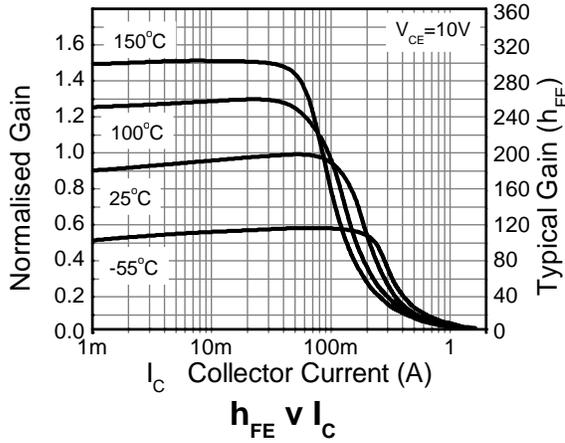
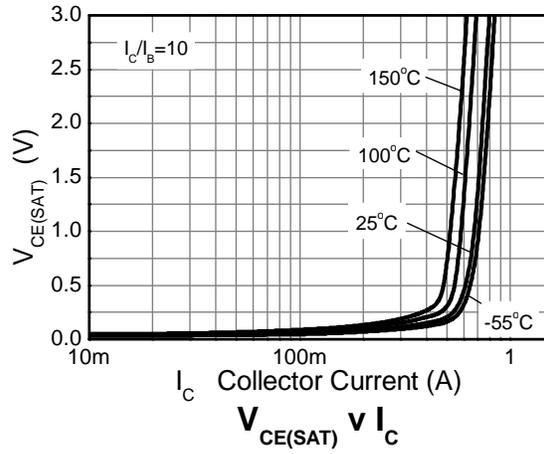
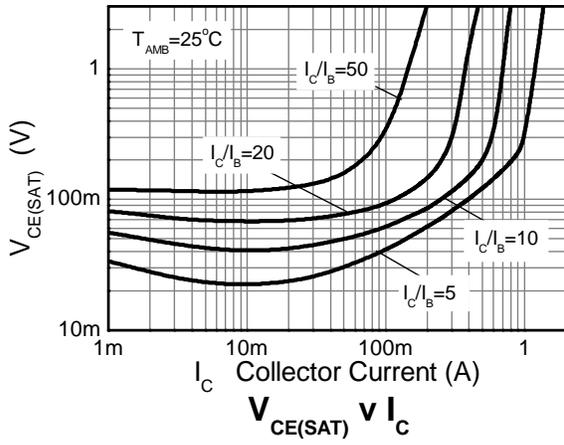


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------|-----------------|------------------------|------------------------|------|---|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | BV_{CBO} | 450 | 550 | — | V | $I_C = 100\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage (Forward Blocking) | BV_{CEX} | 450 | 550 | — | V | $I_C = 100\mu\text{A}$, $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$ |
| Collector-Emitter Breakdown Voltage (Base Open) (Note 11) | BV_{CEO} | 400 | 500 | — | V | $I_C = 10\text{mA}$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 7 | 8.1 | — | V | $I_E = 100\mu\text{A}$ |
| Emitter-Collector Breakdown Voltage (Reverse Blocking) | BV_{ECX} | 6 | 8 | — | V | $I_E = 100\mu\text{A}$, $R_{BC} \leq 1\text{k}\Omega$ or $-0.25\text{V} < V_{BC} < 0.25\text{V}$ |
| Emitter-Collector Breakdown Voltage (Base Open) | BV_{ECO} | 6 | 8.5 | — | V | $I_E = 100\mu\text{A}$ |
| Collector-Base Cutoff Current | I_{CBO} | — | <1 | 50 | nA | $V_{CB} = 360\text{V}$ |
| Collector-Emitter Cutoff Current | I_{CEX} | — | <1 | 100 | nA | $V_{CE} = 360\text{V}$, $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$ |
| Emitter-Base Cutoff Current | I_{EBO} | — | <1 | 50 | nA | $V_{EB} = 5.6\text{V}$ |
| ON CHARACTERISTICS (Note 11) | | | | | | |
| Static Forward Current Transfer Ratio | h_{FE} | 90 100 10 | 165 180 20 | 300 | — | $I_C = 1\text{mA}$, $V_{CE} = 5\text{V}$ $I_C = 50\text{mA}$, $V_{CE} = 5\text{V}$ $I_C = 500\text{mA}$, $V_{CE} = 5\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | 70 50 120 125 | 85 70 170 175 | mV | $I_C = 20\text{mA}$, $I_B = 1\text{mA}$ $I_C = 50\text{mA}$, $I_B = 5\text{mA}$ $I_C = 300\text{mA}$, $I_B = 30\text{mA}$ $I_C = 500\text{mA}$, $I_B = 100\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | — | 865 | 950 | mV | $I_C = 500\text{mA}$, $I_B = 100\text{mA}$ |
| Base-Emitter On Voltage | $V_{BE(ON)}$ | — | 800 | 900 | mV | $I_C = 500\text{mA}$, $V_{CE} = 10\text{V}$ |
| SMALL SIGNAL CHARACTERISTICS (Note 11) | | | | | | |
| Transition Frequency | f_T | — | 40 | — | MHz | $I_C = 10\text{mA}$, $V_{CE} = 20\text{V}$, $f = 20\text{MHz}$ |
| Output Capacitance | C_{OBO} | — | 8 | 10 | pF | $V_{CB} = 20\text{V}$, $f = 1\text{MHz}$ |
| Delay Time | t_D | — | 100 | — | ns | $V_{CC} = 100\text{V}$, $I_C = 100\text{mA}$, $I_{B1} = 10\text{mA}$, $I_{B2} = -20\text{mA}$ |
| Rise Time | t_R | — | 52 | — | ns | |
| Storage Time | t_S | — | 3122 | — | ns | |
| Fall Time | t_F | — | 240 | — | ns | |

Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

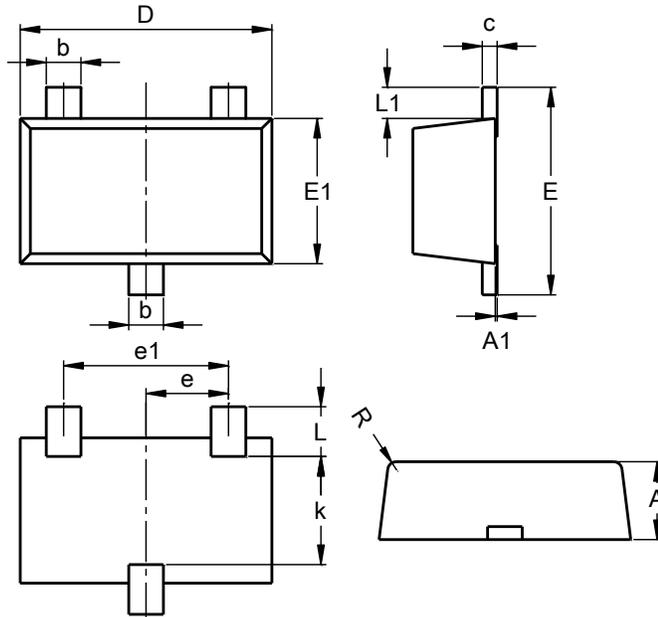
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23F

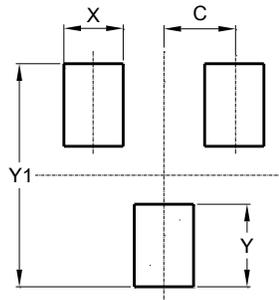


| SOT23F | | | |
|----------------------|----------|------|------|
| Dim | Min | Max | Typ |
| A | 0.80 | 1.00 | 0.90 |
| A1 | 0.00 | 0.10 | 0.01 |
| b | 0.35 | 0.50 | 0.44 |
| c | 0.10 | 0.20 | 0.16 |
| D | 2.80 | 3.00 | 2.90 |
| e | 0.95 REF | | |
| e1 | 1.90 REF | | |
| E | 2.30 | 2.50 | 2.40 |
| E1 | 1.50 | 1.70 | 1.65 |
| k | 1.20 | - | - |
| L | 0.30 | 0.65 | 0.50 |
| L1 | 0.30 | 0.50 | 0.40 |
| R | 0.05 | 0.15 | - |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23F



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.95 |
| X | 0.80 |
| Y | 1.110 |
| Y1 | 3.000 |

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