

Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive applications.

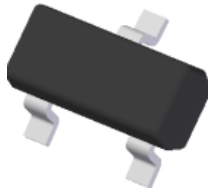
Feature

- $BV_{CEO} > 60V$
- $I_C = 1A$ Continuous Collector Current
- $I_{CM} = 2A$ Peak Pulse Current
- $R_{CE(SAT)} = 195m\Omega$ for a Low Equivalent On-Resistance
- 500mW Power Dissipation
- h_{FE} Characterized up to 2A for High Current Gain Hold Up
- Complementary PNP Type: FMMT591Q
- **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**
- **PPAP Capable (Note 4)**

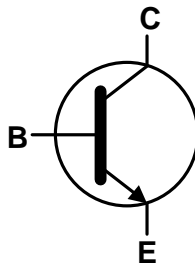
Mechanical Data

- 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
- Weight 0.008 grams (Approximate)

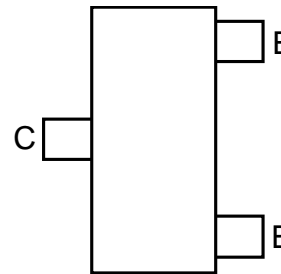
SOT23 (Type DN)



Top View



Device Symbol



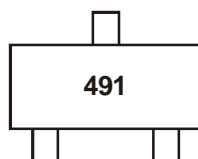
Top View
Pin-Out

Ordering Information (Note 5)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| FMMT491QTA | Automotive | 491 | 7 | 8 | 3,000 |
| FMMT491QTC | Automotive | 491 | 13 | 8 | 10,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



491 = Product Type Marking Code

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

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 80 | V |
| Collector-Emitter Voltage | V _{CEO} | 60 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Continuous Collector Current | I _C | 1 | A |
| Peak Pulse Current | I _{CM} | 2 | A |
| Base Current | I _B | 200 | mA |

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

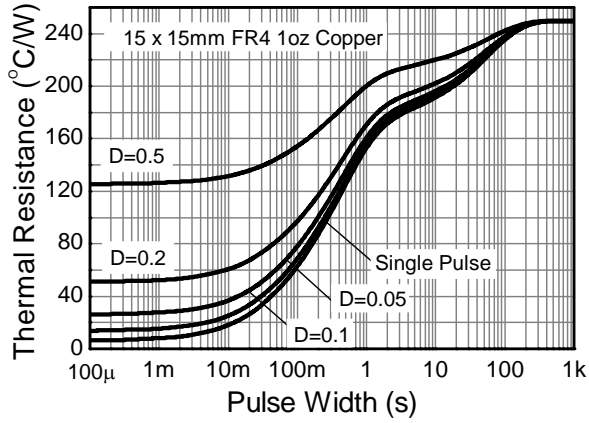
| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6) | P _D | 500 | mW |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 250 | °C/W |
| Thermal Resistance, Junction to Lead (Note 7) | R _{θJL} | 197 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

ESD Ratings (Note 8)

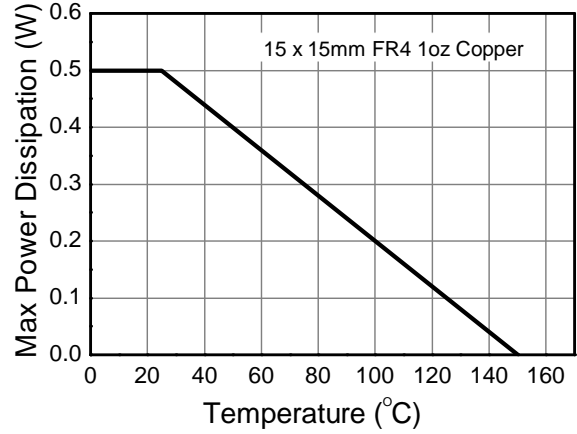
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge – Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge – Machine Model | ESD MM | 400 | V | C |

- Notes:
6. For a device mounted with the collector lead 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.
 7. Thermal resistance from junction to solder-point (at the end of the collector lead).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

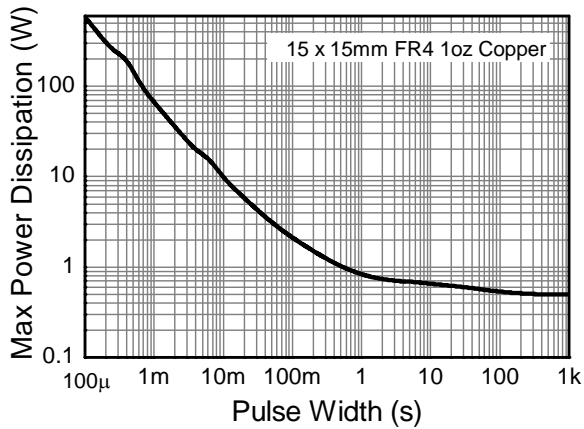
Thermal Characteristics and Derating Information



Transient Thermal Impedance



Derating Curve



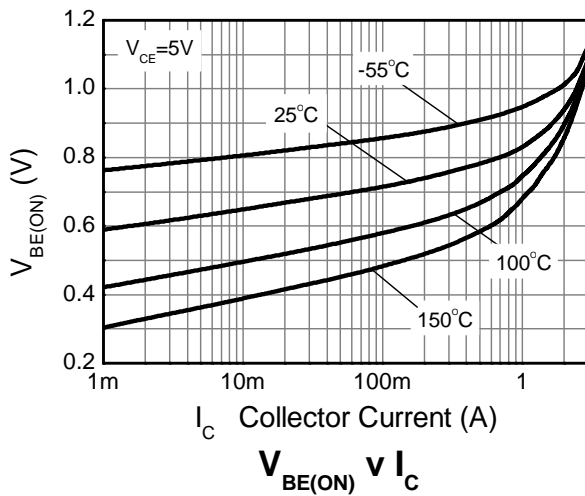
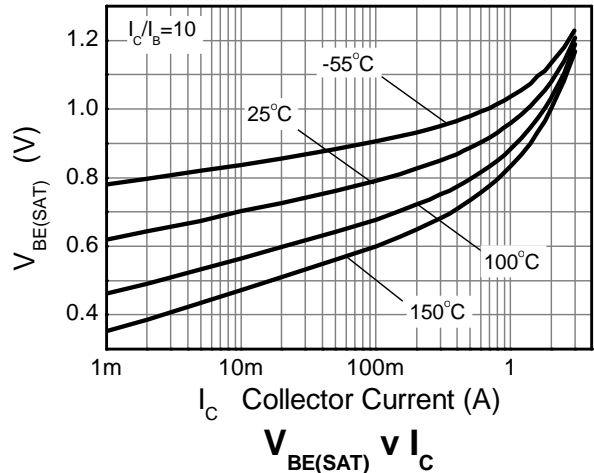
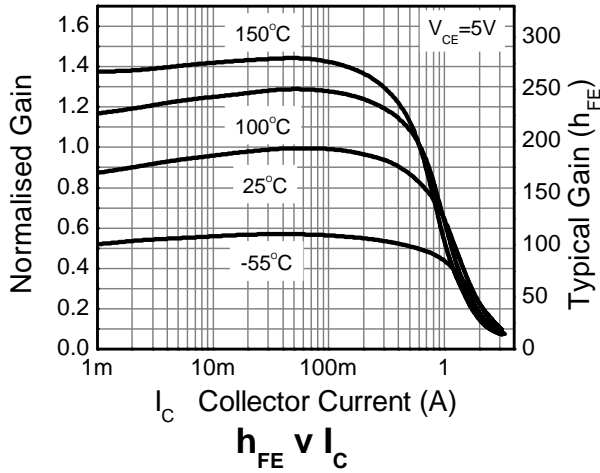
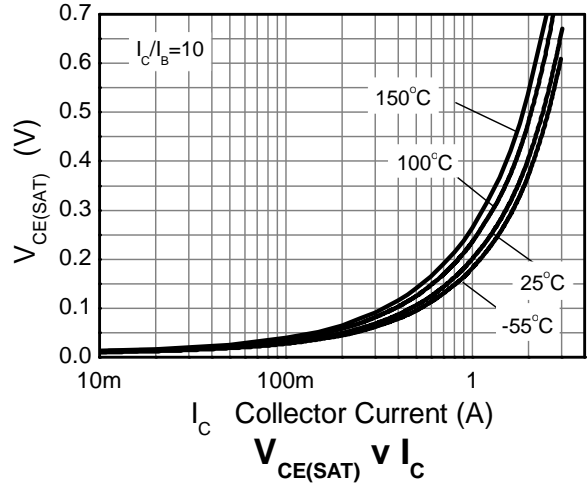
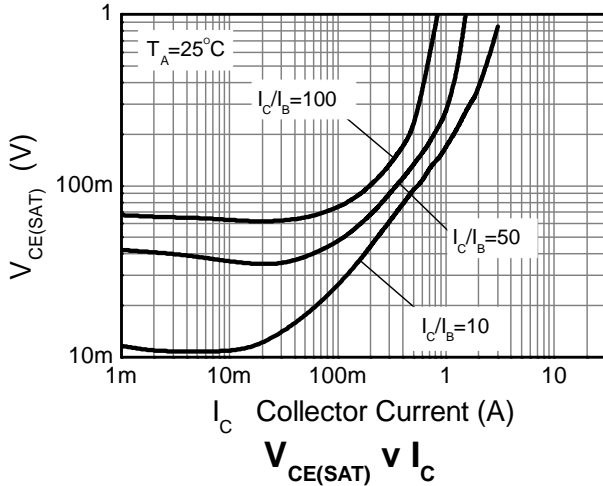
Pulse Power Dissipation

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|-----|-----|-------|------|--|
| Collector-Base Breakdown Voltage | BV _{CB0} | 80 | — | — | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage (Note 9) | BV _{CEO} | 60 | — | — | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 7 | 8.1 | — | V | I _E = 100μA |
| Collector Cutoff Current | I _{CB0} | — | <1 | 100 | nA | V _{CB} = 60V |
| Emitter Cutoff Current | I _{EBO} | — | <1 | 100 | nA | V _{EB} = 5.6V |
| Collector Emitter Cutoff Current | I _{CES} | — | <1 | 100 | nA | V _{CE} = 60V, V _{CES} = 60V |
| Static Forward Current Transfer Ratio (Note 9) | h _{FE} | 100 | 140 | — | — | I _C = 1mA, V _{CE} = 5V |
| | | 100 | 150 | 300 | | I _C = 500mA, V _{CE} = 5V |
| | | 80 | 120 | — | | I _C = 1A, V _{CE} = 5V |
| | | 30 | 40 | — | | I _C = 2A, V _{CE} = 5V |
| Collector-Emitter Saturation Voltage (Note 9) | V _{CE(SAT)} | — | 100 | 150 | mV | I _C = 500mA, I _B = 50mA |
| | | — | 160 | 250 | | I _C = 1A, I _B = 100mA |
| Base-Emitter Turn-On Voltage (Note 9) | V _{BE(ON)} | — | 830 | 1,000 | mV | I _C = 1A, V _{CE} = 5V |
| Base-Emitter Saturation Voltage (Note 9) | V _{BE(SAT)} | — | 965 | 1,100 | mV | I _C = 1A, I _B = 100mA |
| Output Capacitance | C _{OBO} | — | — | 10 | pF | V _{CB} = 10V, f = 1MHz |
| Transition Frequency | f _T | 150 | — | — | MHz | V _{CE} = 10V, I _C = 50mA, f = 100MHz |

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

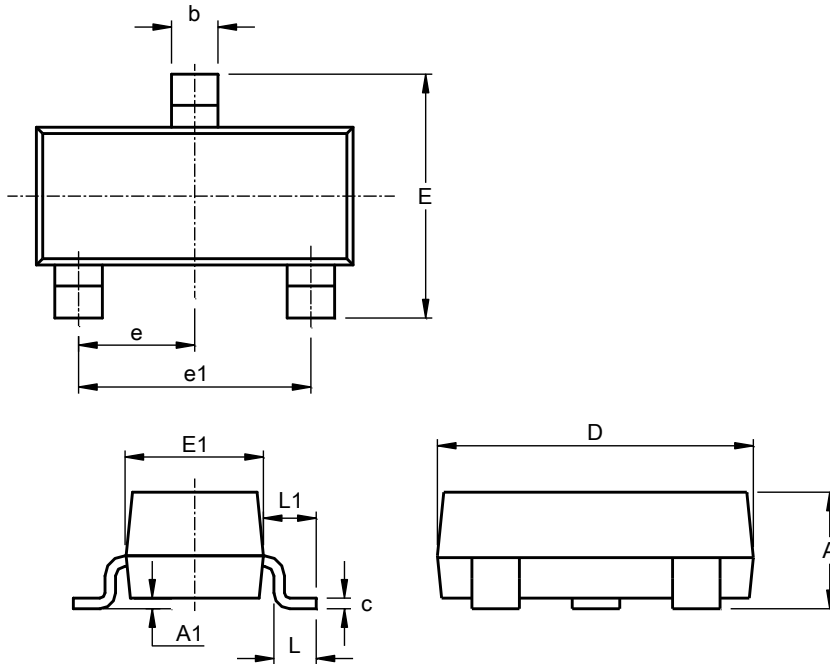
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT23 (Type DN)

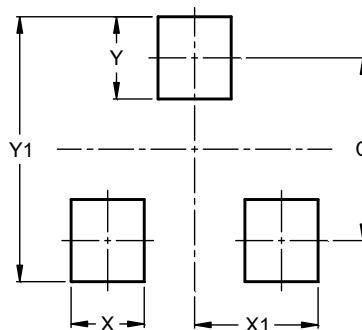


| SOT23 (Type DN) | | | |
|----------------------|----------|------|------|
| Dim | Min | Max | Typ |
| A | 0.89 | 1.12 | 1.00 |
| A1 | 0.01 | 0.10 | 0.05 |
| b | 0.30 | 0.51 | 0.45 |
| c | 0.08 | 0.20 | 0.10 |
| D | 2.80 | 3.04 | 3.00 |
| E | 2.10 | 2.64 | 2.42 |
| E1 | 1.20 | 1.40 | 1.37 |
| e | 0.95 REF | | |
| e1 | 1.90 REF | | |
| L | 0.25 | 0.60 | 0.30 |
| L1 | 0.45 | 0.62 | 0.54 |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT23 (Type DN)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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