

**FMMT493**
**100V NPN MEDIUM POWER TRANSISTOR IN SOT23**
**Features**

- $BV_{CEO} > 100V$
- $I_C = 1A$  High Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- 500mW Power Dissipation
- $h_{FE}$  Characterised Up to 2A for High Current Gain Hold Up
- Complementary PNP Type: FMMT593
- **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)**

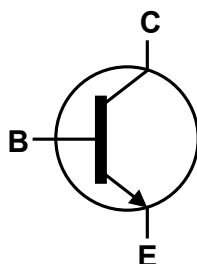
**Mechanical Data**

- Case: SOT23
- Case material: Molded Plastic. "Green" Molding Compound.
- UL Flammability 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)

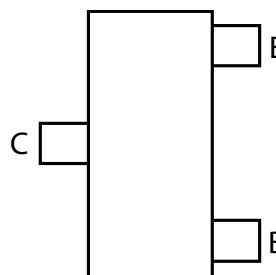
SOT23



Top View



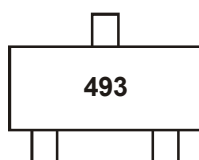
Device Symbol


 Top View  
Pin-Out

**Ordering Information** (Notes 4 & 5)

| Part Number | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| FMMT493TA   | AEC-Q101   | 493     | 7                  | 8               | 3,000             |
| FMMT493QTA  | Automotive | 493     | 7                  | 8               | 3,000             |
| FMMT493TC   | AEC-Q101   | 493     | 13                 | 8               | 10,000            |

- 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](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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


493 = 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> | 120   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 100   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | I <sub>C</sub>   | 1     | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | 2     | A    |
| Base Current                 | I <sub>B</sub>   | 200   | mA   |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

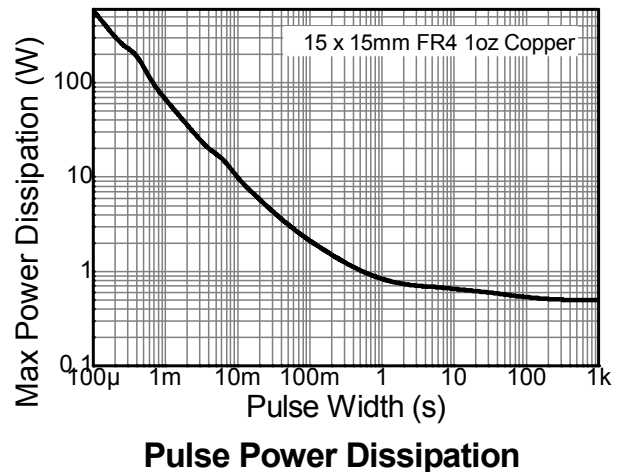
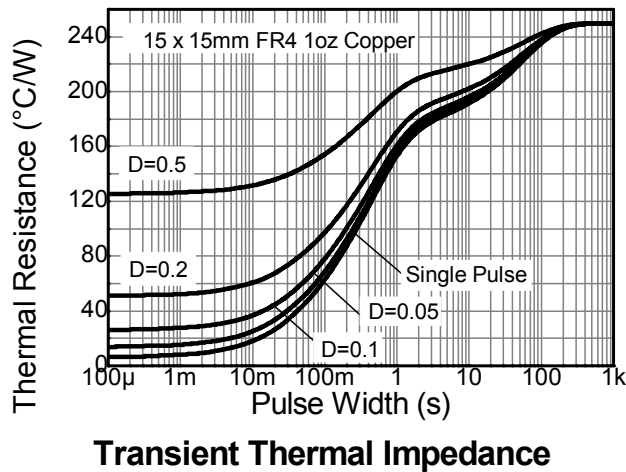
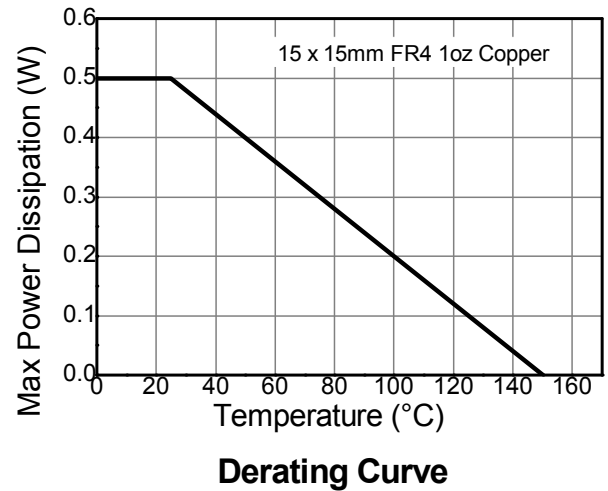
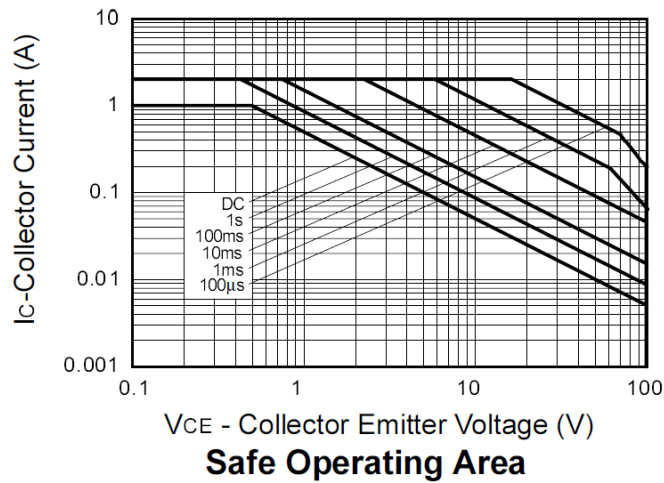
| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)                       | P <sub>D</sub>                    | 500         | mW   |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 250         | °C/W |
| Thermal Resistance, Junction to Lead (Note 7)    | R <sub>θJL</sub>                  | 197         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -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 on 15mm X 15mm 1oz weight copper that is on a single-sided FR4 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

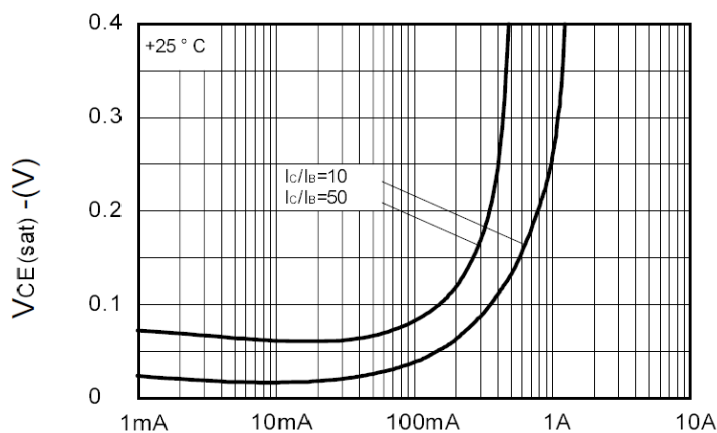


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

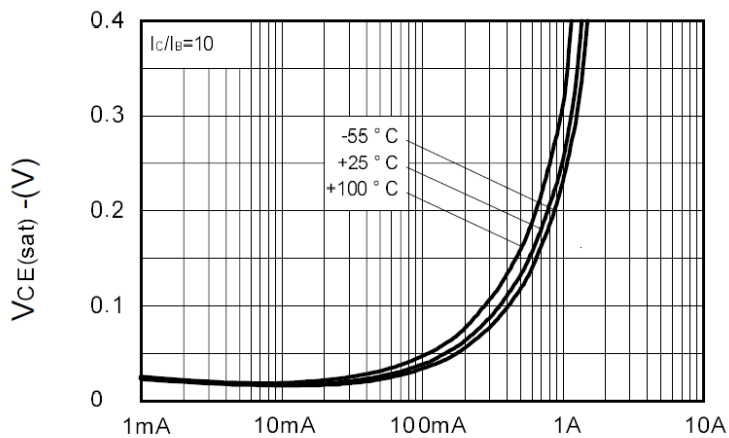
| Characteristic                                 | Symbol               | Min                    | Typ              | Max                | Unit     | Test Condition  |
|--|----------------------|------------------------|------------------|--------------------|----------|---|
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>    | 120                    | —                | —                  | V        | I <sub>C</sub> = 100μA  |
| Collector-Emitter Breakdown Voltage (Note 9)   | BV <sub>CEO</sub>    | 100                    | —                | —                  | V        | I <sub>C</sub> = 1mA  |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>    | 7                      | —                | —                  | V        | I <sub>E</sub> = 100μA  |
| Collector Cutoff Current                       | I <sub>CBO</sub>     | —                      | —                | 100                | nA       | V <sub>CB</sub> = 100V  |
| Emitter Cutoff Current                         | I <sub>EBO</sub>     | —                      | —                | 50                 | nA       | V <sub>EB</sub> = 5.6V  |
| Collector Emitter Cutoff Current               | I <sub>CES</sub>     | —                      | —                | 100                | nA       | V <sub>CE</sub> = 100V  |
| Static Forward Current Transfer Ratio (Note 9) | h <sub>FE</sub>      | 100<br>100<br>60<br>20 | —<br>—<br>—<br>— | —<br>300<br>—<br>— | —        | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 10V<br>I <sub>C</sub> = 250mA, V <sub>CE</sub> = 10V<br>I <sub>C</sub> = 500mA, V <sub>CE</sub> = 10V<br>I <sub>C</sub> = 1A, V <sub>CE</sub> = 10V |
| Collector-Emitter Saturation Voltage (Note 9)  | V <sub>CE(sat)</sub> | —                      | —                | 300<br>600         | mV<br>mV | I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA<br>I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA  |
| Base-Emitter Turn-On Voltage(Note 9)           | V <sub>BE(on)</sub>  | —                      | —                | 1.0                | V        | I <sub>C</sub> = 1A, V <sub>CE</sub> = 10V  |
| Base-Emitter Saturation Voltage(Note 9)        | V <sub>BE(sat)</sub> | —                      | —                | 1.15               | V        | I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA   |
| Output Capacitance                             | C <sub>obo</sub>     | —                      | —                | 10                 | pF       | V <sub>CB</sub> = 10V, f = 1MHz   |
| Transition Frequency                           | f <sub>T</sub>       | 150                    | —                | —                  | MHz      | V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA,<br>f = 100MHz   |

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

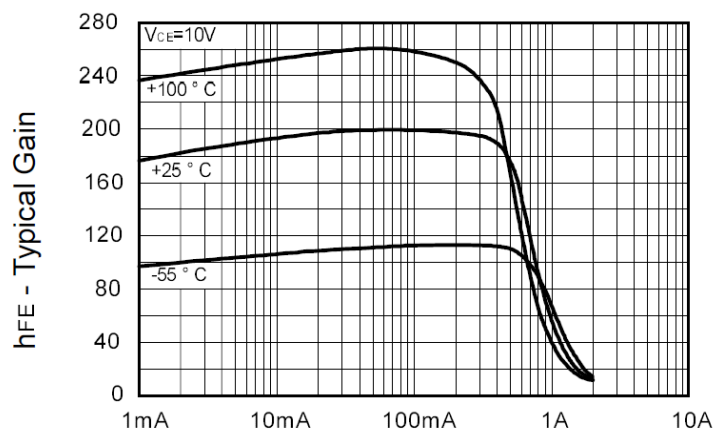
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



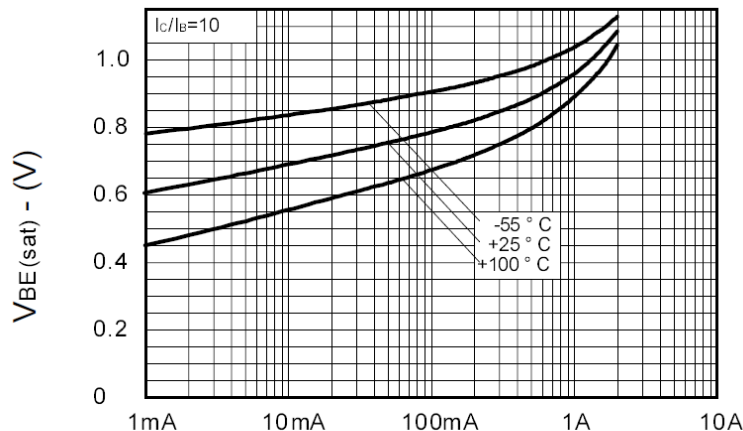
**V<sub>CE(sat)</sub> v I<sub>C</sub>**



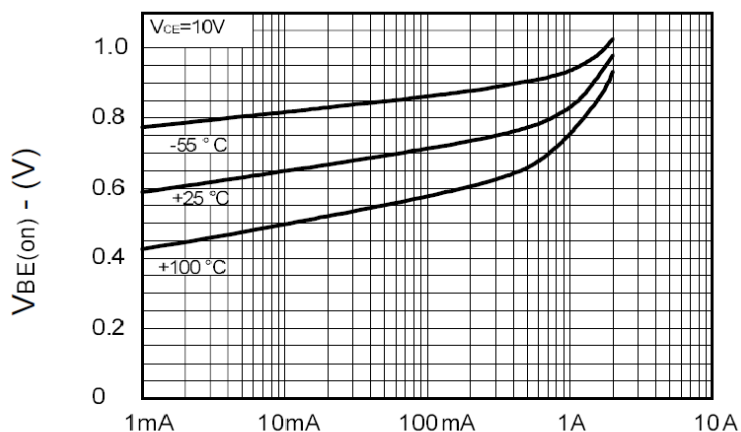
**V<sub>CE(sat)</sub> v I<sub>C</sub>**



**h<sub>FE</sub> v I<sub>C</sub>**



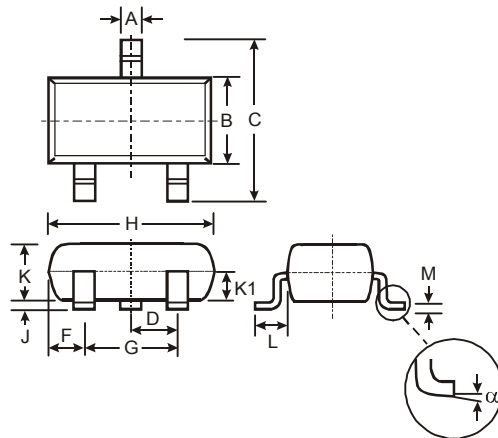
**V<sub>BE(sat)</sub> v I<sub>C</sub>**



**V<sub>BE(on)</sub> v I<sub>C</sub>**

## Package Outline Dimensions

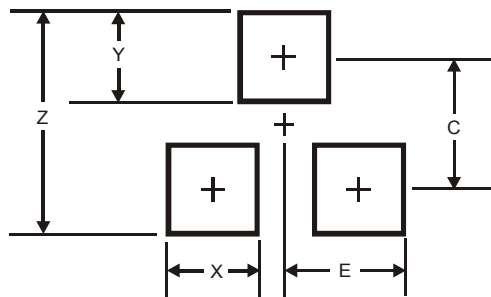
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| $\alpha$             | 0°    | 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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