

**300V NPN HIGH VOLTAGE TRANSISTOR IN SOT23**

**Features**

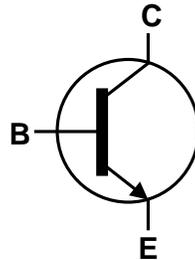
- $BV_{CEO} > 300V$
- $I_C = 200mA$  high Collector Current
- 350mW Power dissipation
- Excellent  $h_{FE}$  Characteristics Up To 30mA
- Complementary part number FMMA92
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**Mechanical Data**

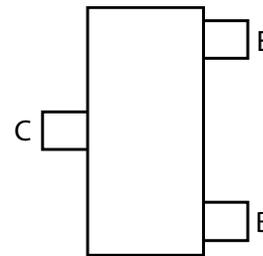
- Case: SOT23
- Case material: molded Plastic. "Green" molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol



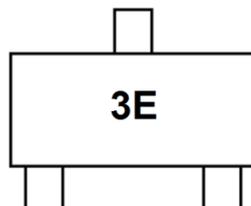
Top View  
Pin-Out

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

| Product    | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------|------------|---------|--------------------|-----------------|-------------------|
| FMMTA42TA  | AEC-Q101   | 3E      | 7                  | 8               | 3,000             |
| FMMTA42TC  | AEC-Q101   | 3E      | 13                 | 8               | 10,000            |
| FMMTA42QTA | Automotive | 3E      | 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](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.
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



3E = Product Type Marking Code

### Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic            | Symbol           | Value | Unit |
|---------------------------|------------------|-------|------|
| Collector-Base Voltage    | V <sub>CBO</sub> | 300   | V    |
| Collector-Emitter Voltage | V <sub>CEO</sub> | 300   | V    |
| Emitter-Base Voltage      | V <sub>EBO</sub> | 7     | V    |
| Collector Current         | I <sub>C</sub>   | 200   | mA   |

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

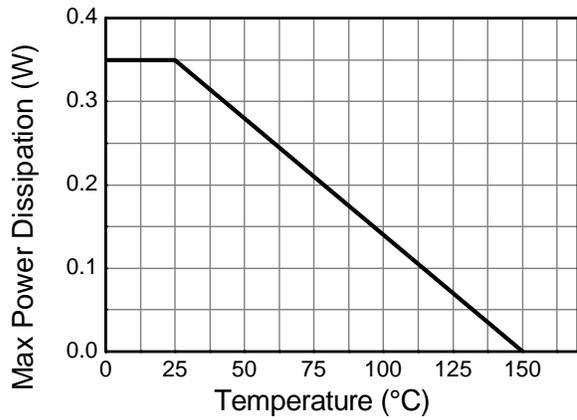
| Characteristic                          | Symbol                            | Value           | Unit |
|---|-----------------------------------|-----------------|------|
| Power Dissipation                       | P <sub>D</sub>                    | (Note 6)<br>310 | mW   |
|   |                                   | (Note 7)<br>350 |      |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | (Note 6)<br>403 | °C/W |
|   |                                   | (Note 7)<br>357 |      |
| Thermal Resistance, Junction to Leads   | R <sub>θJL</sub>                  | 350             | °C/W |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150     | °C   |

### ESD Ratings (Note 9)

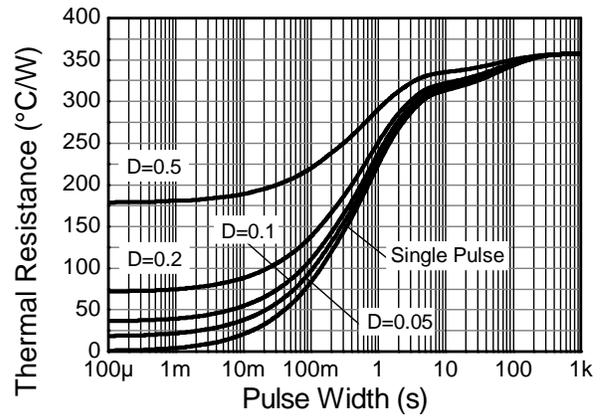
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
6. For the device mounted on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady state condition.
  7. Same as note (6), except the device is mounted on 15mm X 15mm 1oz copper.
  8. Thermal resistance from junction to solder-point (at the end of the leads).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

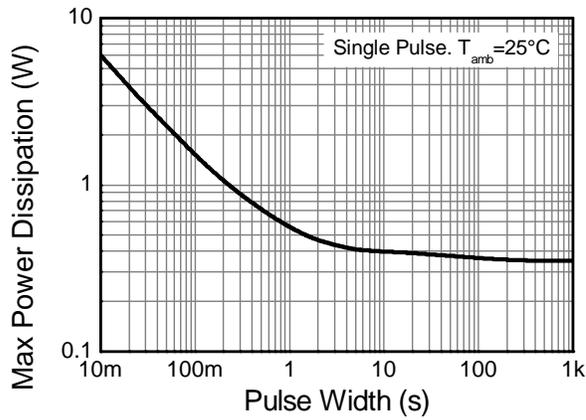
**Thermal Characteristics and Derating information**



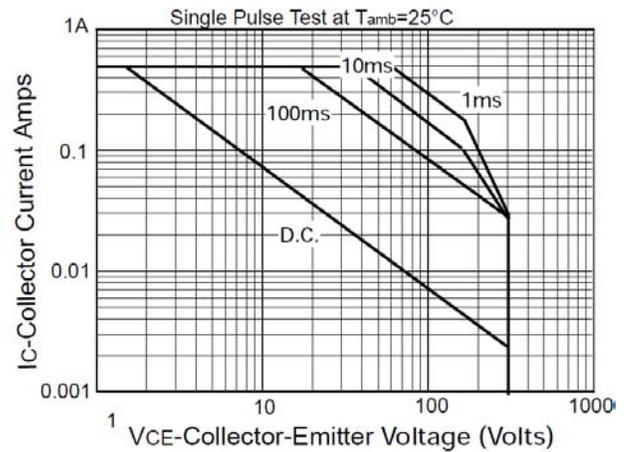
**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



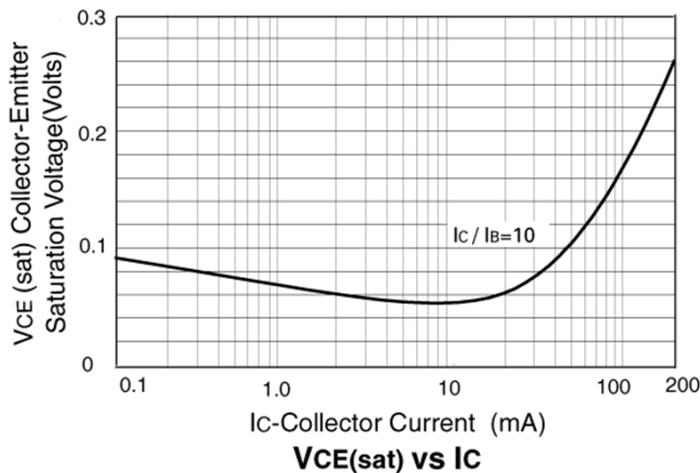
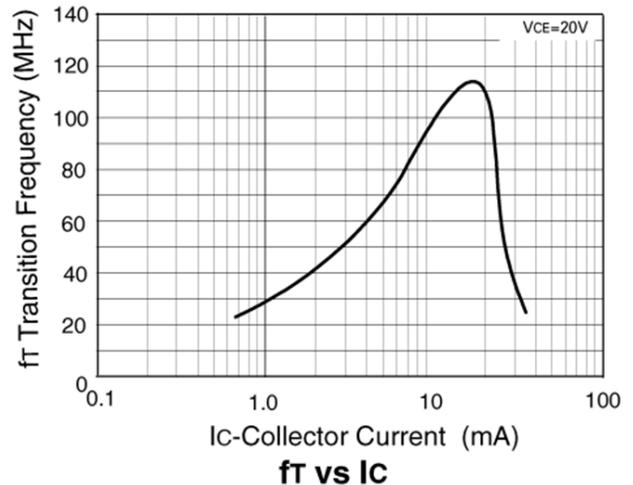
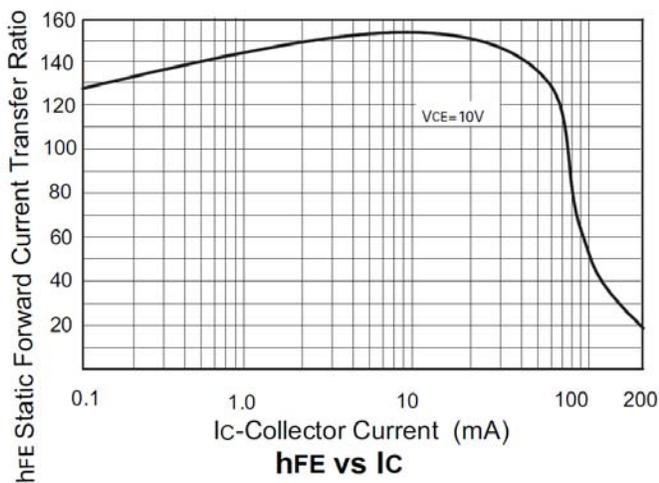
**Safe operating area**

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

| Characteristic                                  | Symbol        | Min            | Typ | Max | Unit | Test Condition  |
|---|---------------|----------------|-----|-----|------|---|
| Collector-Base Breakdown Voltage                | $V_{CB0}$     | 300            | —   | —   | V    | $I_C = 100\mu\text{A}$  |
| Collector-Emitter Breakdown Voltage (Note 10)   | $V_{CEO}$     | 300            | —   | —   | V    | $I_C = 1\text{mA}$  |
| Emitter-Base Breakdown Voltage                  | $V_{EBO}$     | 7              | —   | —   | V    | $I_E = 100\mu\text{A}$  |
| Collector Cutoff Current                        | $I_{CBO}$     | —              | —   | 100 | nA   | $V_{CB} = 200\text{V}$  |
| Emitter Cutoff Current                          | $I_{EBO}$     | —              | —   | 100 | nA   | $V_{EB} = 6\text{V}$  |
| Static Forward Current Transfer Ratio (Note 10) | $h_{FE}$      | 25<br>40<br>40 | —   | —   | —    | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 10\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 30\text{mA}, V_{CE} = 10\text{V}$ |
| Collector-Emitter Saturation Voltage (Note 10)  | $V_{CE(sat)}$ | —              | —   | 500 | mV   | $I_C = 20\text{mA}, I_B = 2\text{mA}$   |
| Base-Emitter Saturation Voltage (Note 10)       | $V_{BE(sat)}$ | —              | —   | 900 | mV   | $I_C = 20\text{mA}, I_B = 2\text{mA}$   |
| Output Capacitance                              | $C_{obo}$     | —              | —   | 6   | pF   | $V_{CB} = 20\text{V}, f = 1\text{MHz}$  |
| Transition Frequency                            | $f_T$         | 50             | —   | —   | MHz  | $V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 20\text{MHz}$  |

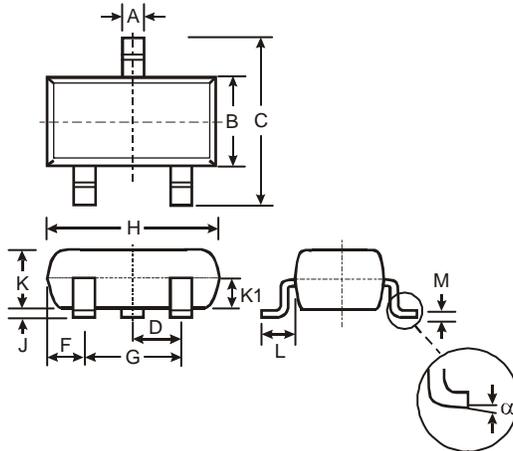
Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



## Package Outline Dimensions

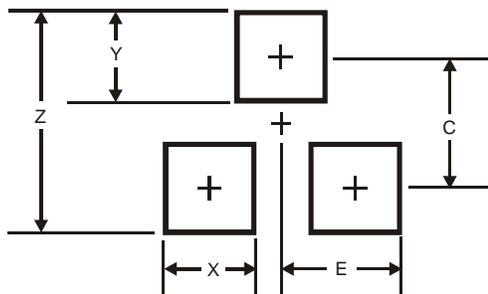
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| α                    | 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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