# FMMT589

## 30V PNP SILICON PLANAR MEDIUM POWER HIGH PERFORMANCE TRANSISTOR

## Features and Benefits

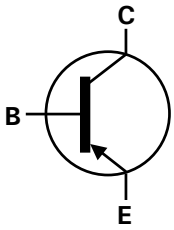
- $BV_{CEO}$ > -30V
- $I_C$ = -1A Continuous Collector Current
- Low saturation voltage $V_{CE(sat)}$ < -350mV @ -1A
- $R_{SAT}$ = 250mΩ for a low equivalent on-resistance
- Complementary NPN type: FMMT489
- Low equivalent on-resistance; $R_{CE(sat)}$ = 250mW @ 1A
- **Lead Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

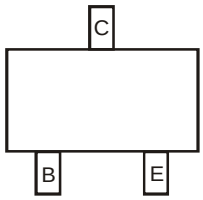
- Case: SOT23
- Case Material: Molded Plastic, “Green” Molding Compound (Note 2). UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper Plated Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

SOT23

Top View




Device Circuit



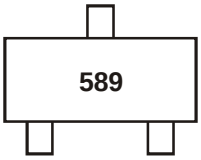

Top View
Pin-Out

## Ordering Information (Note 3)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| FMMT589TA | 589 | 7 | 8 | 3,000 |

Notes: 1. No purposefully added lead.
2. Diodes Inc.`s “Green” Policy can be found on our website at http://www.diodes.com
3. For Packaging Details, go to our website at http://www.diodes.com.

## Marking Information




589 = Product Type Marking Code

## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | -50 | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | -30 | V |
| Emitter-Base Voltage | | $V_{EBO}$ | -5 | V |
| Continuous Collector Current | (Note 4) | $I_C$ | -1 | A |
| Peak Pulse Current | | $I_{CM}$ | -2 | A |
| Base Current | | $I_B$ | -200 | mA |

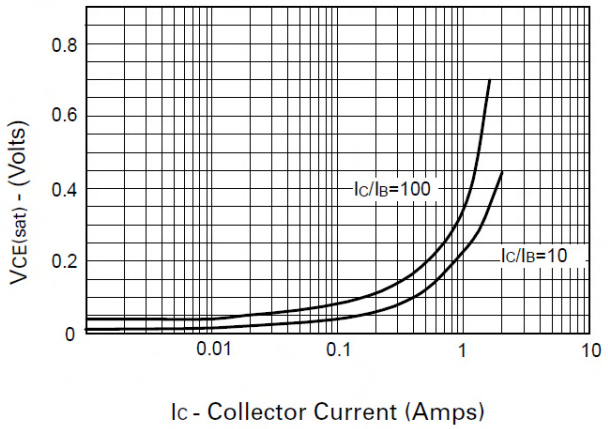
## Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation<br>Linear Derating Factor | (Note 4) | $P_D$ | 500<br>4 | mW<br>mW/°C |
| Thermal Resistance, Junction to Ambient | (Note 4) | $R_{\theta JA}$ | 250 | °C/W |
| Thermal Resistance, Junction to Lead | (Note 5) | $R_{\theta JL}$ | 197 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

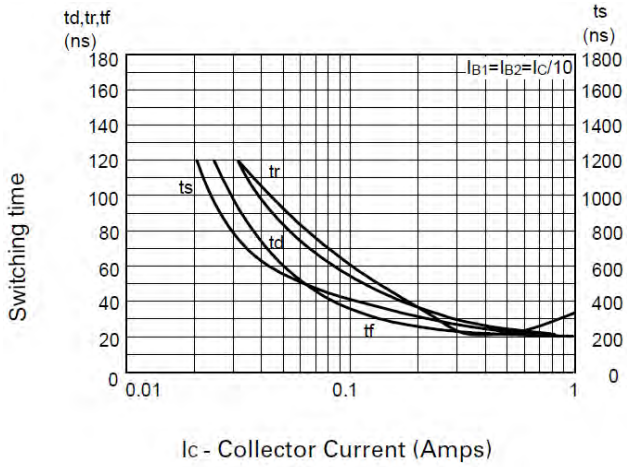
## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -50 | — | — | V | $I_C$ = -100μA |
| Collector-Emitter Breakdown Voltage (Note 6) | $BV_{CEO}$ | -30 | — | — | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -5 | — | — | V | $I_E$ = -100μA |
| Collector Cutoff Current | $I_{CBO}$ | — | — | -100 | nA | $V_{CB}$ = -30V |
| Collector-Emitter Cutoff Current | $I_{CES}$ | — | — | -100 | nA | $V_{CES}$ = -30V |
| Emitter Cutoff Current | $I_{EBO}$ | — | — | -100 | nA | $V_{EB}$ = -4V |
| **ON CHARACTERISTICS (Note 6)** | | | | | | |
| DC Current Gain | $h_{FE}$ | 100<br>100<br>80<br>40 | —<br>—<br>—<br>— | —<br>300<br>—<br>— | — | $I_C$ = -1mA, $V_{CE}$ = -2V<br>$I_C$ = -500mA, $V_{CE}$ = -2V<br>$I_C$ = -1A, $V_{CE}$ = -2V<br>$I_C$ = -2A, $V_{CE}$ = -2V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —<br>—<br>— | —<br>—<br>— | -0.25<br>-0.35<br>-0.65 | V | $I_C$ = -0.5A, $I_B$ = -50mA<br>$I_C$ = -1A, $I_B$ = -100mA<br>$I_C$ = -2A, $I_B$ = -200mA |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | — | — | -1.2 | V | $I_C$ = -1A, $I_B$ = -100mA |
| Base-Emitter Turn-On Voltage | $V_{BE(on)}$ | — | — | -1.1 | V | $I_C$ = -1A, $V_{CE}$ = -2V |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | | |
| Output Capacitance | $C_{obo}$ | — | — | 15 | pF | $V_{CB}$ = -10V, f = 1MHz |
| Current Gain-Bandwidth Product | $f_T$ | 100 | — | — | MHz | $V_{CE}$ = -5V, $I_C$ = -100mA, f = 100MHz |

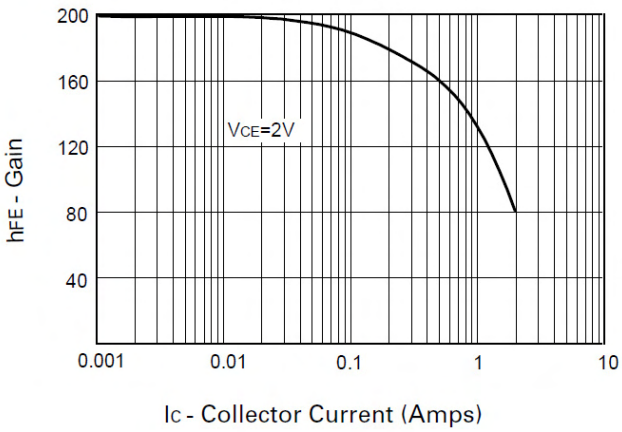
Notes:
4. For a device surface mounted on a 15mm x 15mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
5. Thermal resistance from junction to solder-point (at the end of the collector lead).
6. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤2%



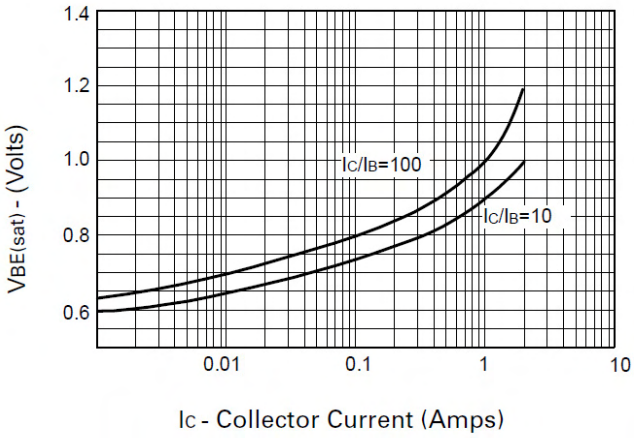

**VCE(sat) v IC**



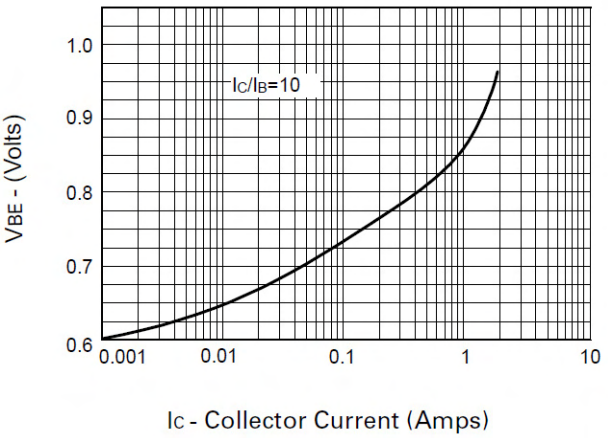

**Switching Speeds**




**hFE v IC**

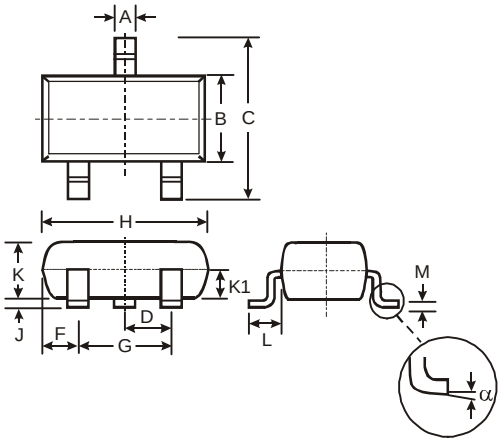



**VBE(sat) v IC**



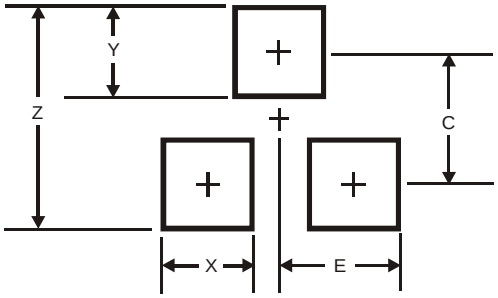

**VBE(on) v IC**

## Package Outline Dimensions




| 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




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

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