

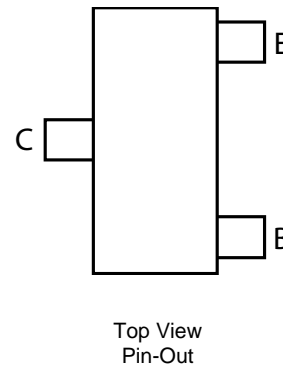
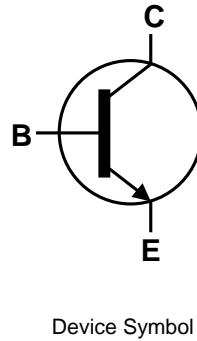
**30V NPN MEDIUM POWER TRANSISTOR IN SOT23**

**Features**

- $BV_{CEO} > 30V$
- $I_C = 1A$  high Continuous Collector Current
- $I_{CM}$  Up to 4A Peak Pulse Current
- Excellent  $h_{FE}$  Characteristics Up To 4A
- $R_{SAT} = 175m\Omega @ 1A$  for a Low Equivalent On-Resistance
- Low Saturation Voltage  $< 300mV @ 1A$
- 500mW Power Dissipation
- Complementary PNP Type: FMMT589
- **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**

**Mechanical Data**

- Case: SOT-23
- 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 <sup>Ⓔ</sup>
- Weight: 0.008 grams (Approximate)

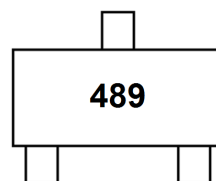


**Ordering Information** (Note 4)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FMMT489TA	489	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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



489 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	50	V
Collector-Emitter Voltage	$V_{CEO}$	30	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	1	A
Peak Pulse Current	$I_{CM}$	4	A
Base Current	$I_B$	200	mA

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

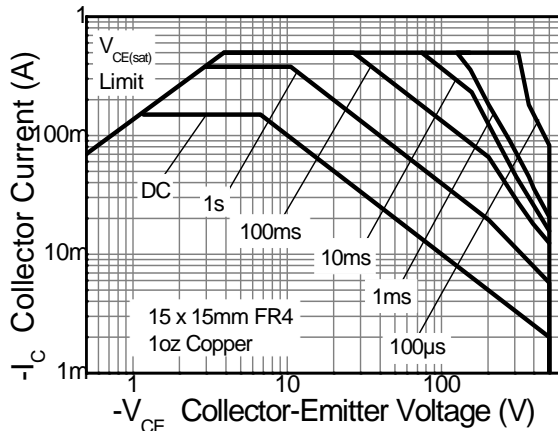
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	$P_D$	500	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	250	$^\circ\text{C/W}$
Thermal Resistance, Junction to Lead (Note 6)	$R_{\theta JL}$	197	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

### ESD Ratings (Note 7)

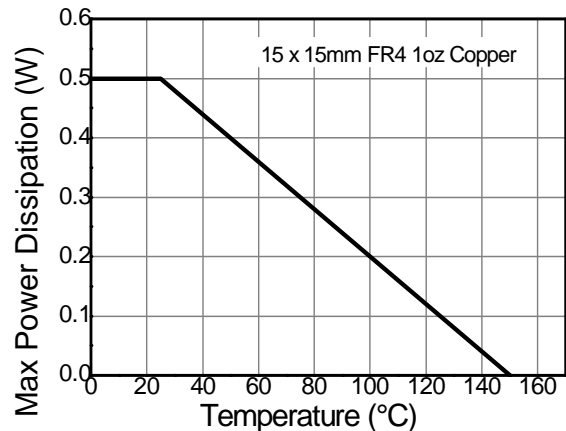
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	$\geq 4,000$	V	3A
Electrostatic Discharge - Machine Model	ESD MM	$\geq 400$	V	C

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

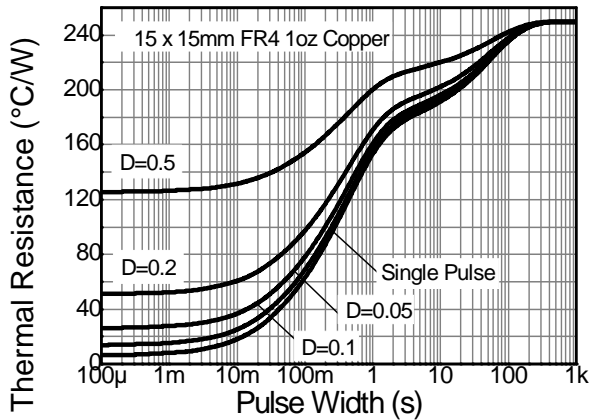
**Thermal Characteristics and Derating Information**



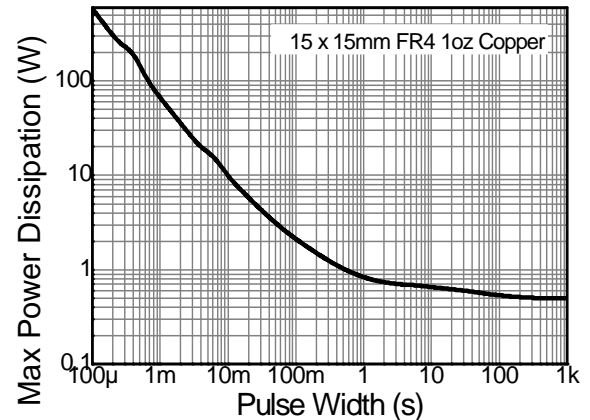
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



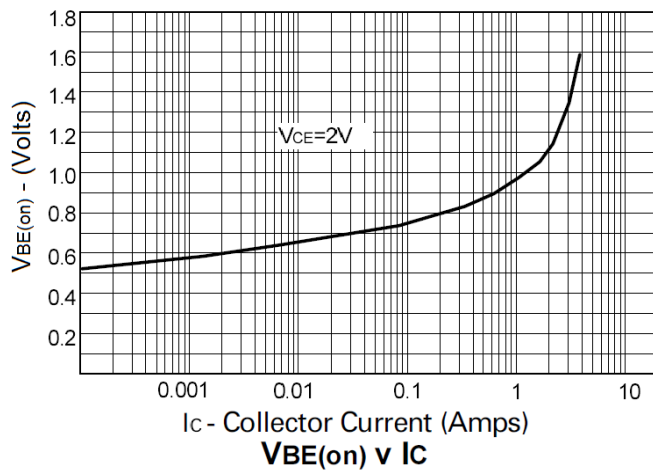
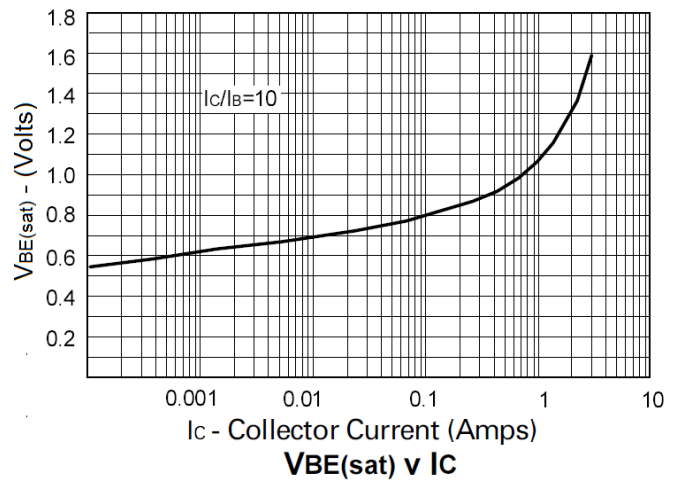
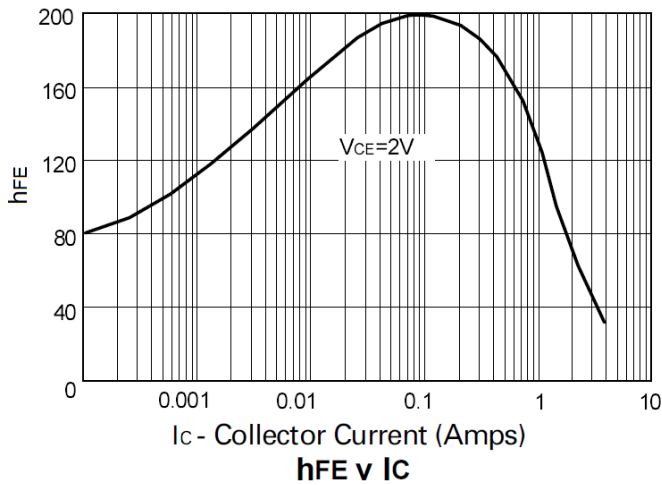
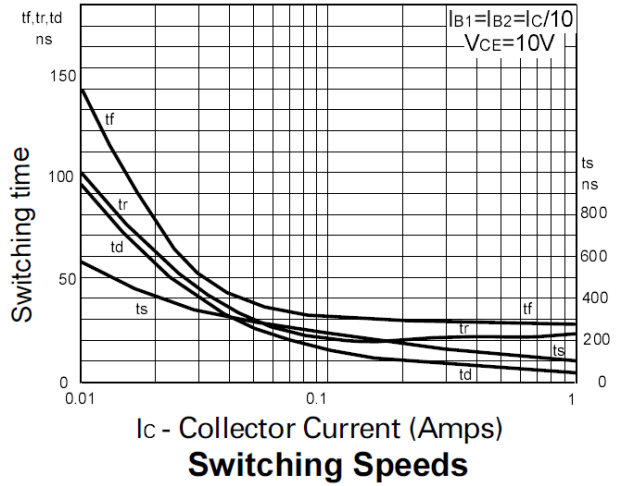
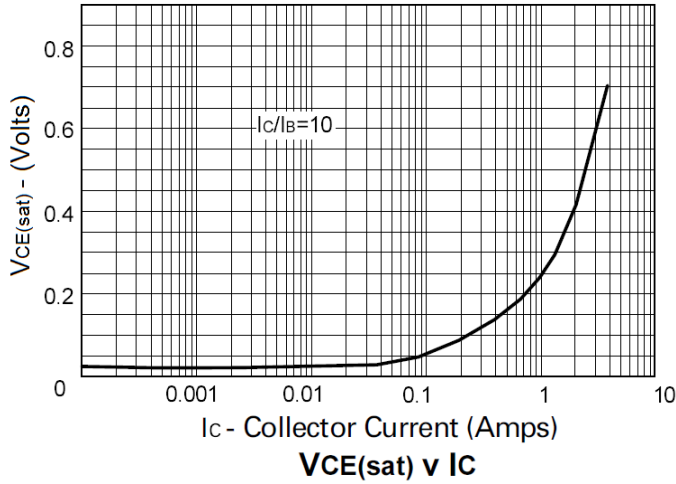
**Pulse Power Dissipation**

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

Characteristic	Symbol	Min	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	50		V	I <sub>C</sub> = 100 μA
Collector-Emitter Breakdown Voltage (Note 8)	BV <sub>CEO</sub>	30		V	I <sub>C</sub> = 10 mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7		V	I <sub>E</sub> = 100 μA
Collector-Base Cutoff Current	I <sub>CBO</sub>		100	nA	V <sub>CB</sub> = 30V
Emitter-Base Cutoff Current	I <sub>EBO</sub>		100	nA	V <sub>EB</sub> = 6V
Collector-Emitter Cutoff Current	I <sub>CES</sub>		100	nA	V <sub>CES</sub> = 30V
Static Forward Current Transfer Ratio (Note 8)	h <sub>FE</sub>	100	-		I <sub>C</sub> = 1mA, V <sub>CE</sub> = 2V
		100	300		I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
		60	-		I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V
		20	-		I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 8)	V <sub>CE(sat)</sub>		300	mV	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
			600	mV	I <sub>C</sub> = 2A, I <sub>B</sub> = 200mA
Base-Emitter Turn-On Voltage (Note 8)	V <sub>BE(on)</sub>		1.0	V	I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
Base-Emitter Saturation Voltage (Note 8)	V <sub>BE(sat)</sub>		1.1	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, f = 100MHz

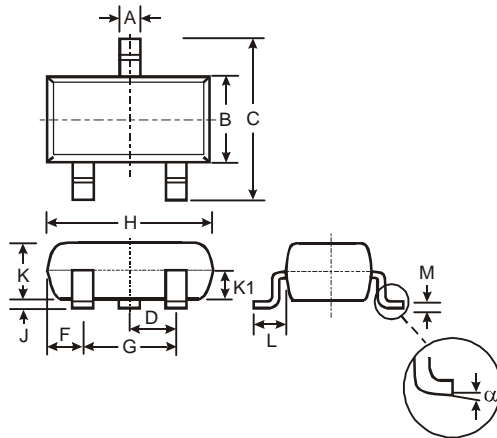
Note: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

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



### Package Outline Dimensions

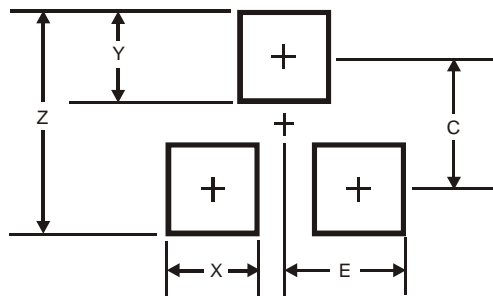
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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
α	0°	8°	-
<b>All Dimensions in mm</b>			

### 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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