


**60V NPN MEDIUM POWER TRANSISTOR IN SOT23**

**Features**

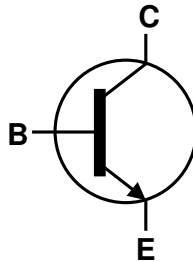
- $BV_{CEO} > 60V$
- $I_C = 1A$  Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- 500mW Power Dissipation
- Complementary PNP Type: FMMT551
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

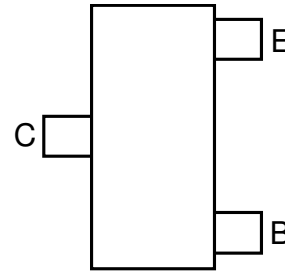
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 
- Weight 0.008 grams (approximate)



Top View



Device Symbol



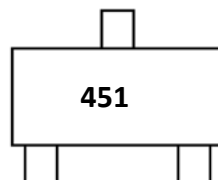
Top View  
Pin-Out

**Ordering Information** (Note 4)

Part Number	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMT451TA	AEC-Q101	451	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**



451 = 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>	80	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	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.)

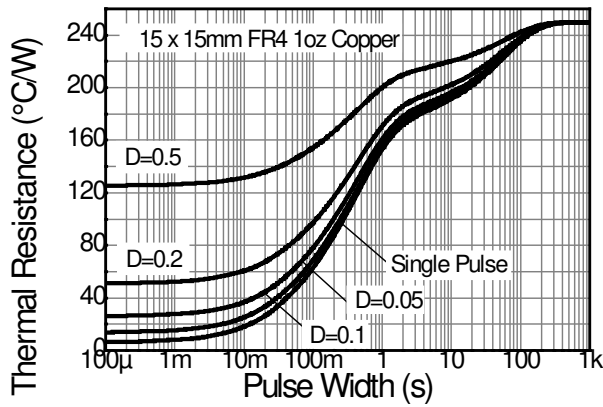
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	500	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	250	°C/W
Thermal Resistance, Junction to Lead (Note 6)	R <sub>θJL</sub>	197	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 7)

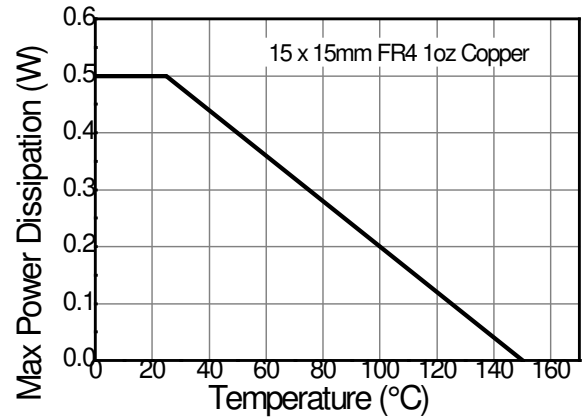
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm 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.

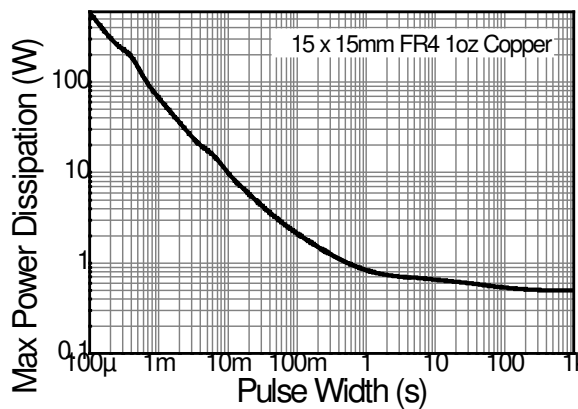
**Thermal Characteristics and Derating Information**



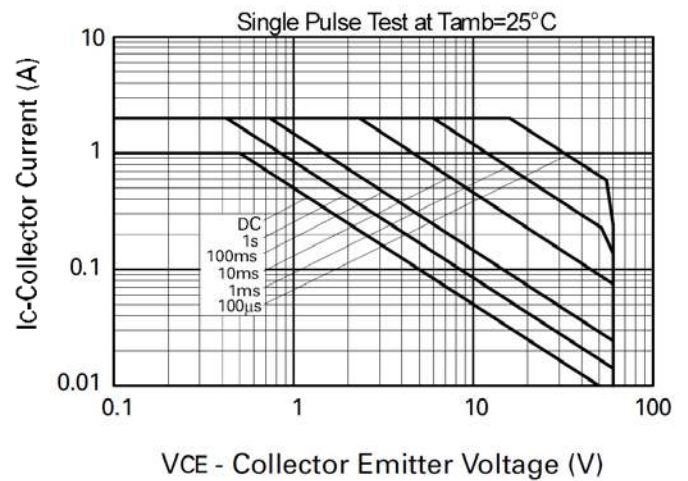
**Transient Thermal Impedance**



**Derating Curve**



**Pulse Power Dissipation**



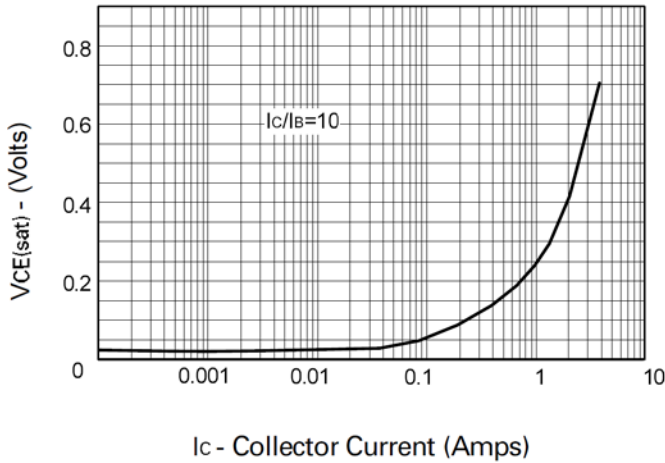
**Safe Operating Area**

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

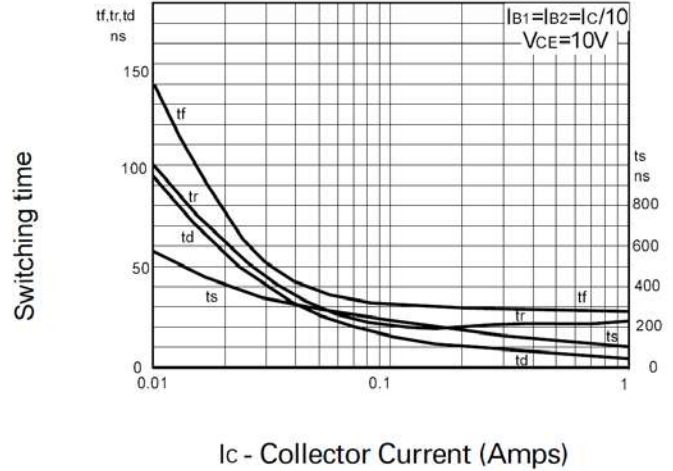
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	80	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 8)	$BV_{CEO}$	60	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	—	—	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$	—	—	100	nA	$V_{CB} = 60\text{V}$
Emitter Cutoff Current	$I_{EBO}$	—	—	100	nA	$V_{EB} = 4\text{V}$
Static Forward Current Transfer Ratio (Note 8)	$h_{FE}$	50 10	— —	150 —	—	$I_C = 150\text{mA}, V_{CE} = 10\text{V}$ $I_C = 1\text{A}, V_{CE} = 10\text{V}$
Collector-Emitter Saturation Voltage (Note 8)	$V_{CE(sat)}$	—	—	0.35	V	$I_C = 150\text{mA}, I_B = 15\text{mA}$
Base-Emitter Saturation Voltage (Note 8)	$V_{BE(sat)}$	—	—	1.1	V	$I_C = 150\text{mA}, I_B = 15\text{mA}$
Output Capacitance	$C_{obo}$	—	—	15	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Transition Frequency	$f_T$	150	—	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$

Note: 8. Measured under pulsed conditions. Pulse width  $\leq 300 \mu\text{s}$ . Duty cycle  $\leq 2\%$ .

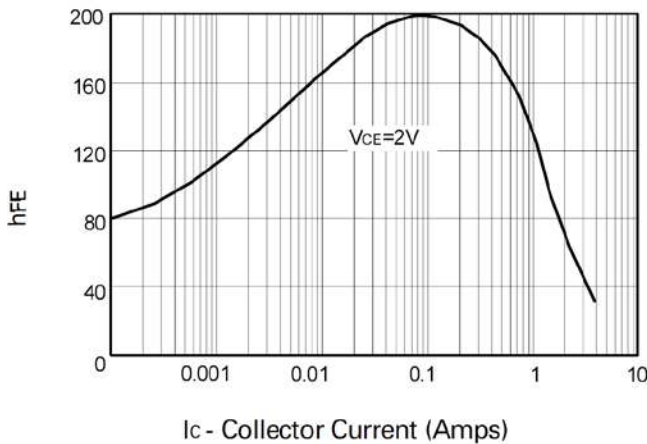
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



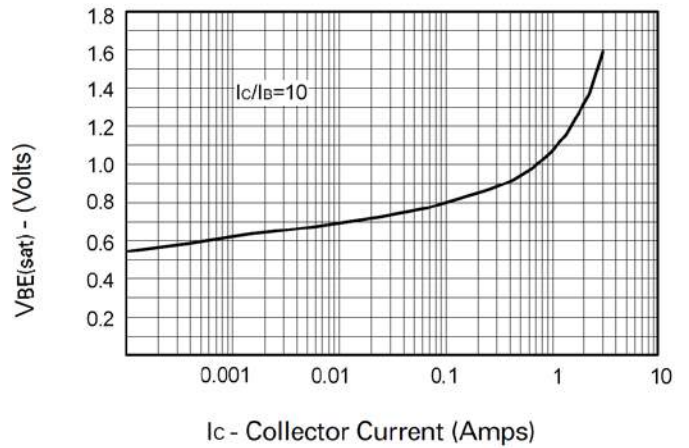
**VCE(sat) v IC**



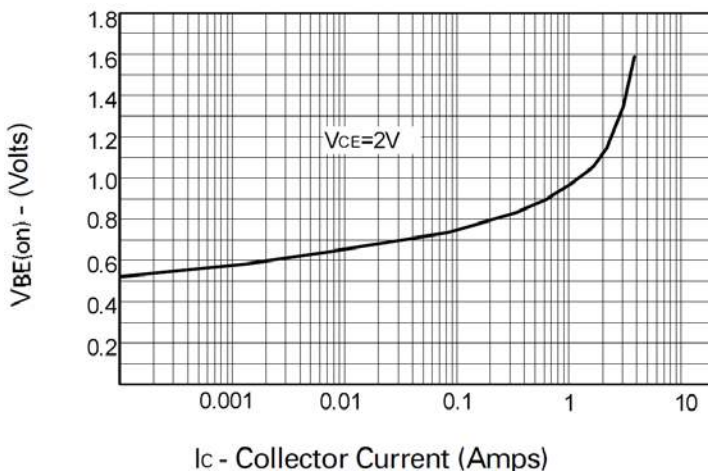
**Switching Speeds**



**hFE v IC**



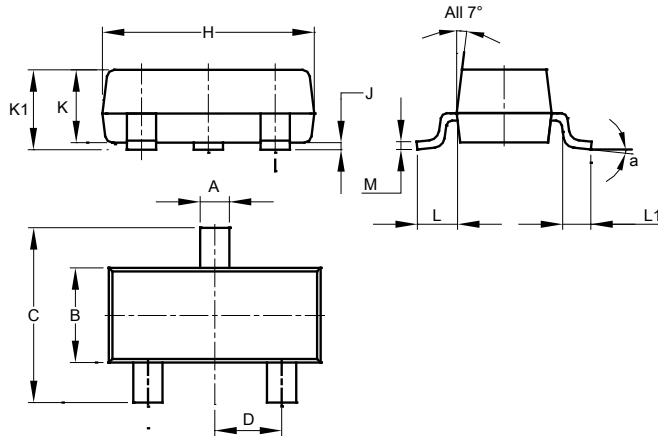
**VBE(sat) v IC**



**VBE(on) v IC**

## Package Outline Dimensions

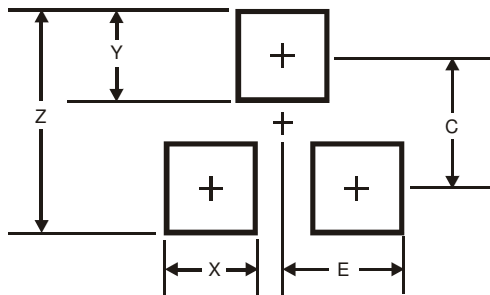
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	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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