Lead-free Green

FMMT591

60V PNP MEDIUM POWER TRANSISTOR IN SOT23

Features

- BV_{CEO} > -60V
- I_C = -1A High Continuous Collector Current
- I_{CM} = -2A Peak Pulse Current
- R_{SAT} = 295mΩ for a Low Equivalent On-Resistance
- Excellent h_{FE} Characteristics up to -2A
- Complementary NPN Type: FMMT491
- **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

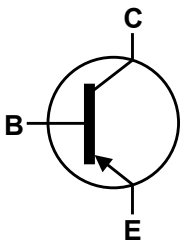
- Case: SOT23
- Case Material: molded plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight 0.008 grams (approximate)

Applications

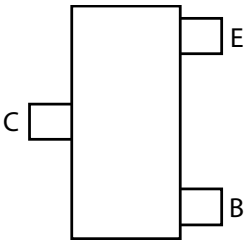
- MOSFET Gate Driving
- Power Switches
- Motor Control

SOT23

Top View



Device Symbol



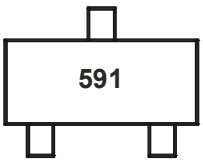
Top View
Pin-Out

Ordering Information (Notes 4 & 5)

Part Number	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMT591TA	AEC-Q101	591	7	8	3,000
FMMT591QTA	Automotive	591	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 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/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



591 = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-80	V
Collector-Emitter Voltage	V_{CEO}	-60	V
Emitter-Base Voltage	V_{EBO}	-7	V
Continuous Collector Current	I_C	-1	A
Peak Pulse Current	I_{CM}	-2	A
Base Current	I_B	-200	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

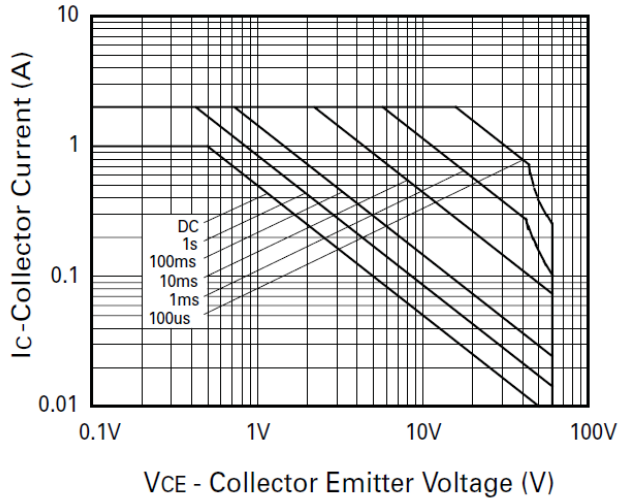
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	500	mW
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	250	°C/W
Thermal Resistance, Junction to Lead	(Note 7)	$R_{\theta JL}$	197	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 8)

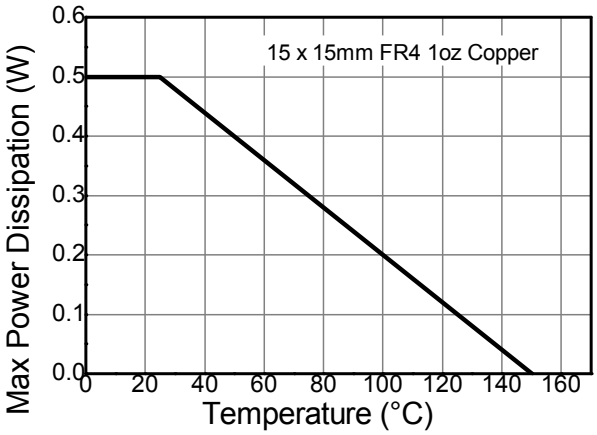
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	≥ 400	V	C

Notes:
6. For a device mounted with the collector lead on 15mm x 15mm 1oz 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.

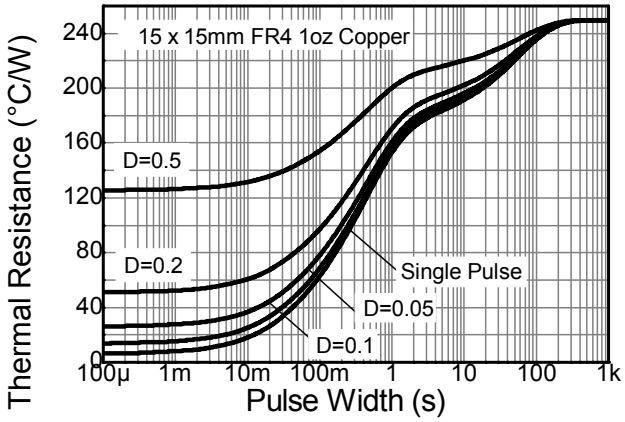
Thermal Characteristics and Derating Information



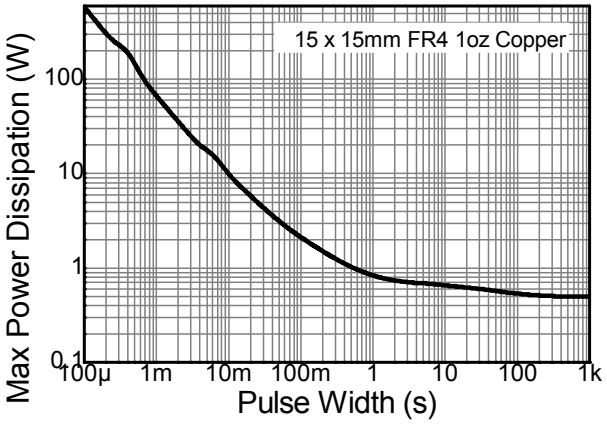
Safe Operating Area



Derating Curve



Transient Thermal Impedance



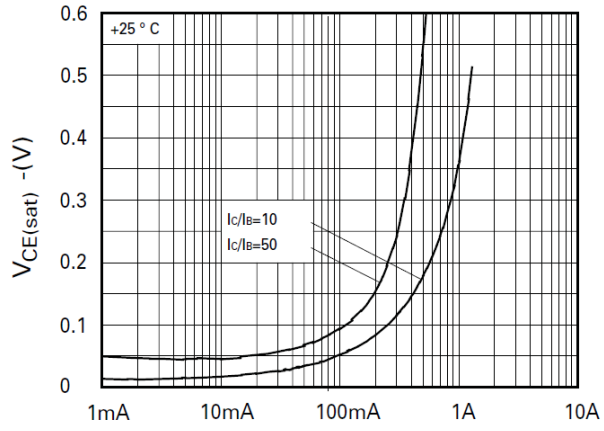
Pulse Power Dissipation

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

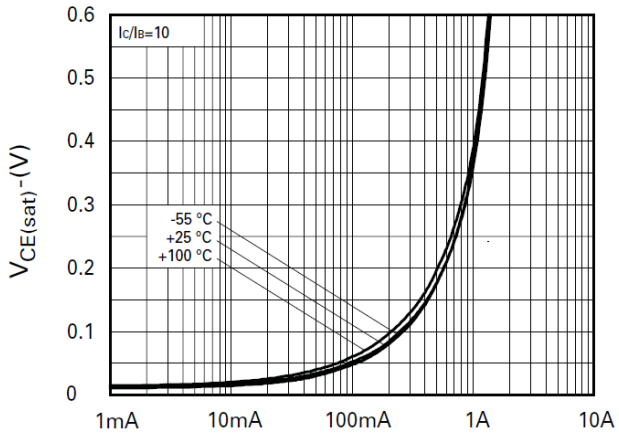
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-80	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	-60	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.1	—	V	I_E = -100µA
Collector-Base Cutoff Current	I_{CBO}	—	<1	-100	nA	V_{CB} = -60V
Emitter-Base Cutoff Current	I_{EBO}	—	<1	-100	nA	V_{EB} = -5.6V
Collector-Emitter Cut-Off Current	I_{CES}	—	<1	-100	nA	V_{CE} = -50V
Static Forward Current Transfer Ratio (Note 9)	h_{FE}	100 100 80 15	220 175 155 40	— 300 — —	—	I_C = -1mA, V_{CE} = -5V I_C = -500mA, V_{CE} = -5V I_C = -1A, V_{CE} = -5V I_C = -2A, V_{CE} = -5V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(SAT)}$	—	-155 -295	-180 -350	mV	I_C = - 500mA, I_B = -50mA I_C = - 1A, I_B = -100mA
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(SAT)}$	—	965	-1200	mV	I_C = -1A, I_B = -100mA
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(ON)}$	—	830	-1000	mV	I_C = -1A, V_{CE} = -5V
Transition Frequency	f_T	150	—	—	MHz	V_{CE} = -10V, I_C = -50mA, f = 100MHz
Output Capacitance	C_{obo}	—	—	10	pF	V_{CB} = -10V, f = 1MHz

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

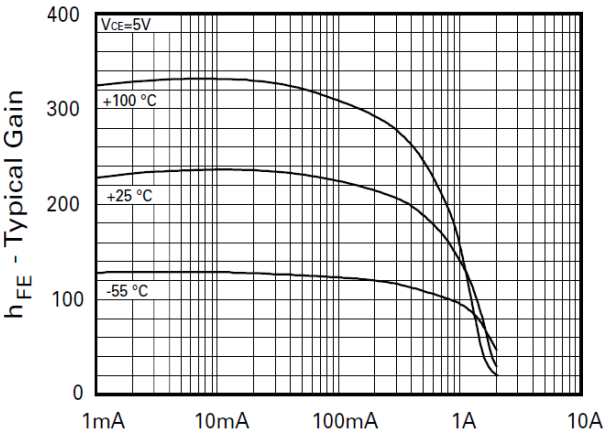
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



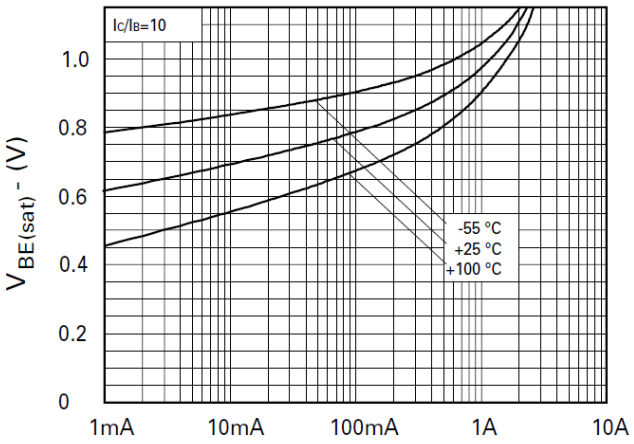
VCE(sat) v IC



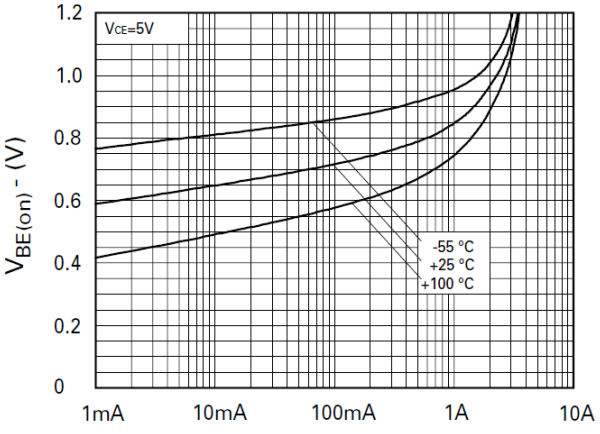
VCE(sat) v IC



hFE V IC



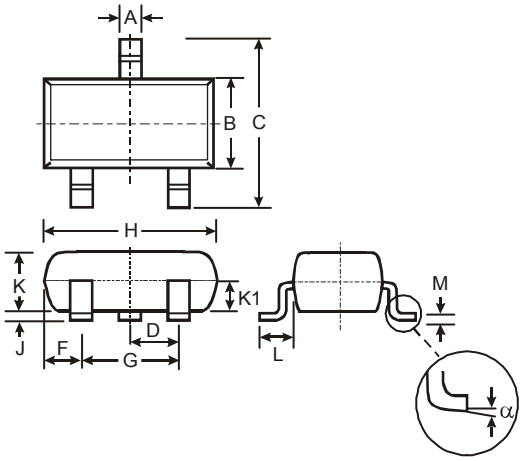
VBE(sat) v IC



VBE(on) v IC

Package Outline Dimensions

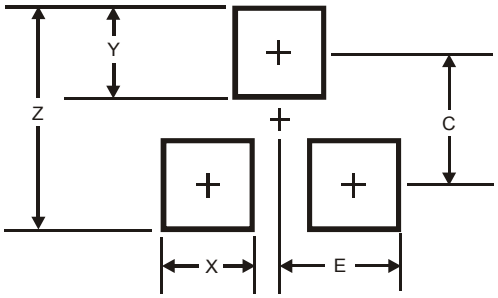
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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	0.903	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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