

Description

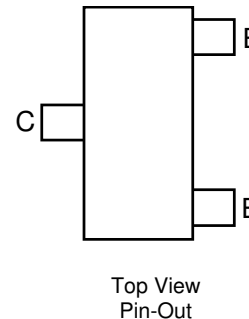
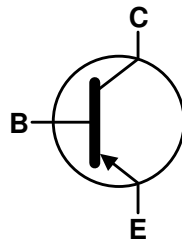
This Bipolar Junction Transistor (BJT) has been designed to meet the stringent requirements of Automotive Applications.

Features

- $BV_{CEO} > -60V$
- $I_C = -1A$ High Continuous Collector Current
- $I_{CM} = -2A$ Peak Pulse Current
- $R_{SAT} = 295m\Omega$ for a Low Equivalent On-Resistance
- h_{FE} Characterized up to $-2A$ for High Current Gain Hold Up
- Complementary NPN Type: FMMT491Q
- **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)

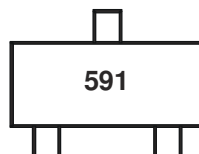


Ordering Information (Notes 4 & 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
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. Refer to http://www.diodes.com/product_compliance_definitions.html.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



591 = Product Type Marking Code

Absolute 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.)

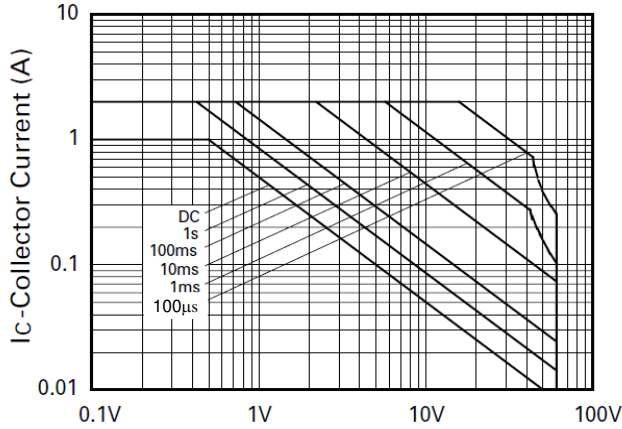
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P _D	500	mW
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	250	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R _{θJL}	197	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 8)

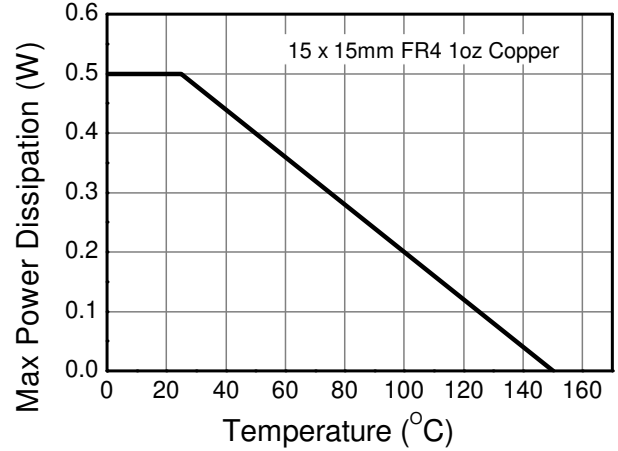
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted with the collector lead on 15mm x 15mm 1oz copper that is on a single-sided FR-4 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.

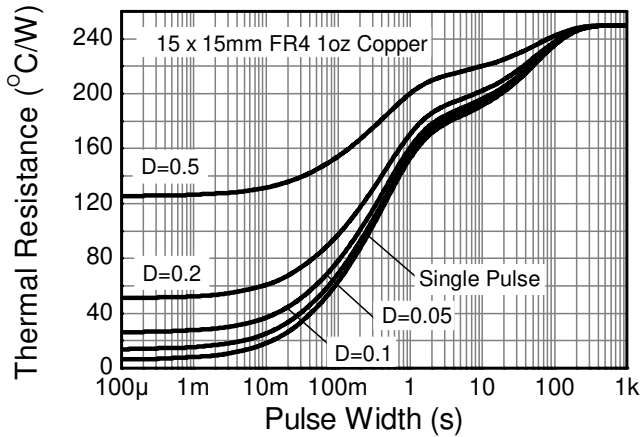
Thermal Characteristics and Derating Information



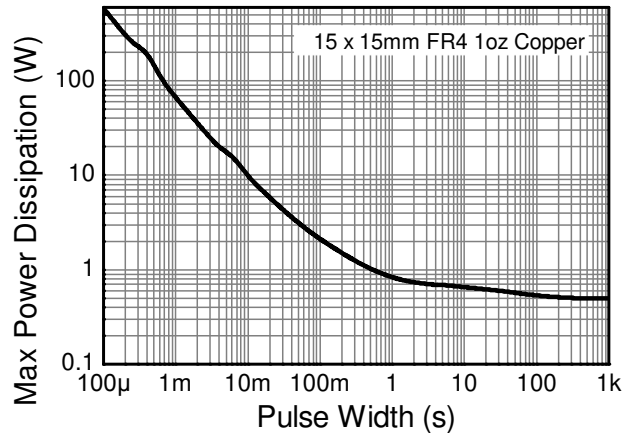
VCE - Collector Emitter Voltage (V)
Safe Operating Area



Temperature (°C)
Derating Curve



Transient Thermal Impedance



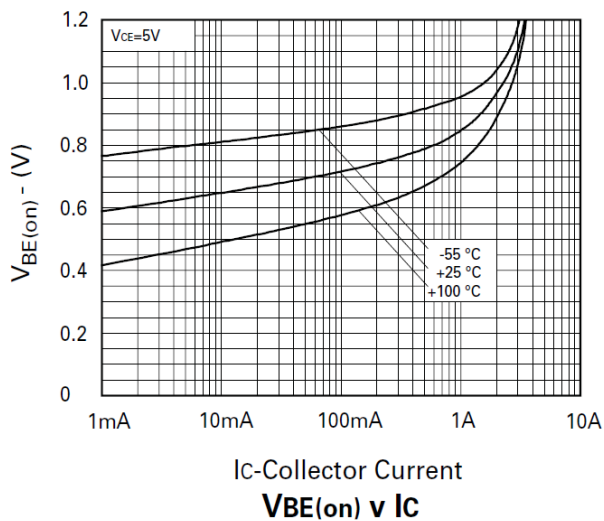
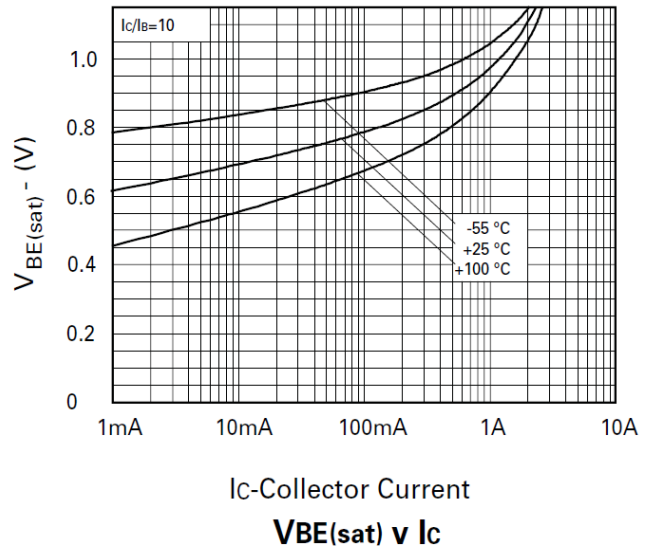
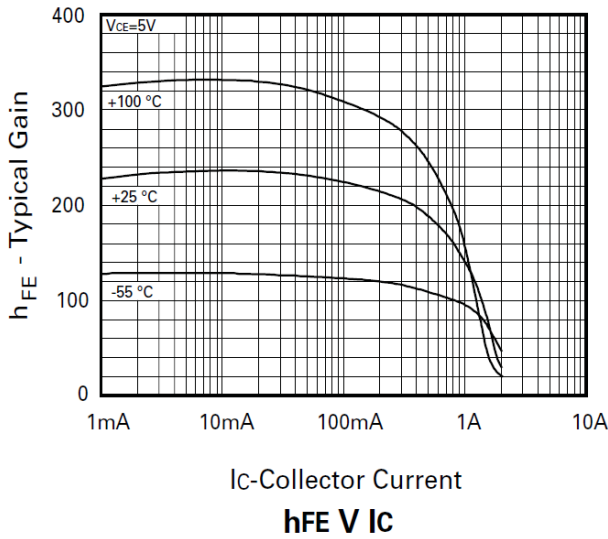
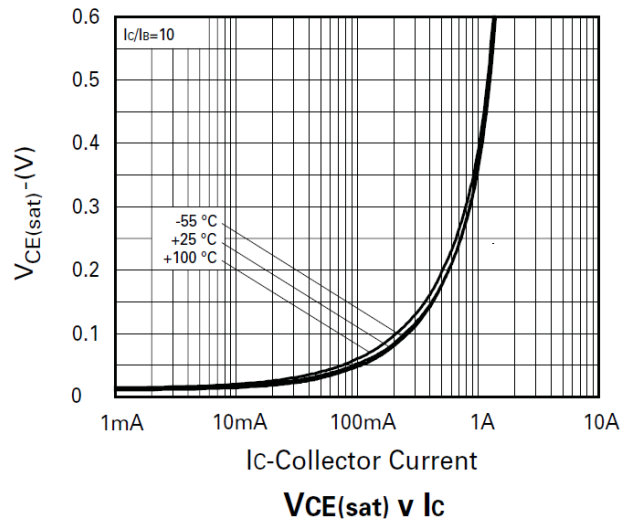
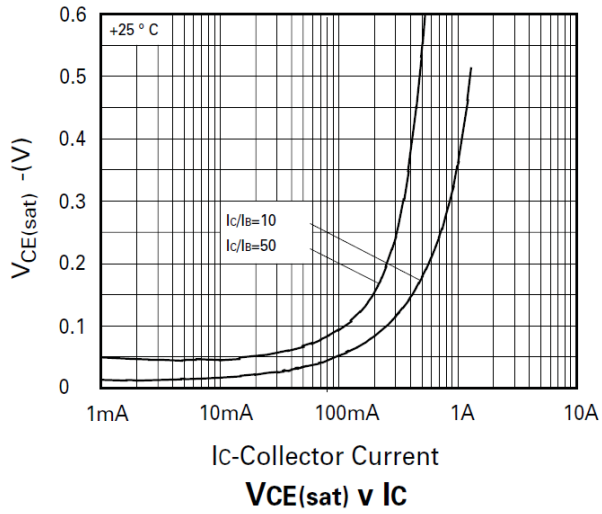
Pulse Power Dissipation

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 9)	BV_{CEO}	-60	—	—	V	$I_C = -10\text{mA}$	
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.1	—	V	$I_E = -100\mu\text{A}$	
Collector-Base Cutoff Current	I_{CBO}	—	<1	-100	nA	$V_{CB} = -60\text{V}$	
Emitter-Base Cutoff Current	I_{EBO}	—	<1	-100	nA	$V_{EB} = -5.6\text{V}$	
Collector-Emitter Cut-Off Current	I_{CES}	—	<1	-100	nA	$V_{CE} = -50\text{V}$	
Static Forward Current Transfer Ratio (Note 9)	h_{FE}	100	220	—	—	$I_C = -1\text{mA}, V_{CE} = -5\text{V}$	
		100	175	300		$I_C = -500\text{mA}, V_{CE} = -5\text{V}$	
		80	155	—		$I_C = -1\text{A}, V_{CE} = -5\text{V}$	
		15	40	—		$I_C = -2\text{A}, V_{CE} = -5\text{V}$	
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(SAT)}$	—	-155 -295	-180 -350	mV	$I_C = -500\text{mA}, I_B = -50\text{mA}$ $I_C = -1\text{A}, I_B = -100\text{mA}$	
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(SAT)}$	—	965	-1200	mV	$I_C = -1\text{A}, I_B = -100\text{mA}$	
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(ON)}$	—	830	-1000	mV	$I_C = -1\text{A}, V_{CE} = -5\text{V}$	
Transition Frequency	f_T	150	—	—	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA},$ $f = 100\text{MHz}$	
Output Capacitance	C_{obo}	—	—	10	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$	
Switching Time	Delay Time	t_d	—	29.1	—	ns	$V_{CC} = -10\text{V}, I_C = -500\text{mA},$ $I_{B1} = -I_{B2} = -25\text{mA}$
	Rise Time	t_r	—	26.5	—		
	Storage Time	t_s	—	99.3	—		
	Fall Time	t_f	—	18.9	—		

Note: 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

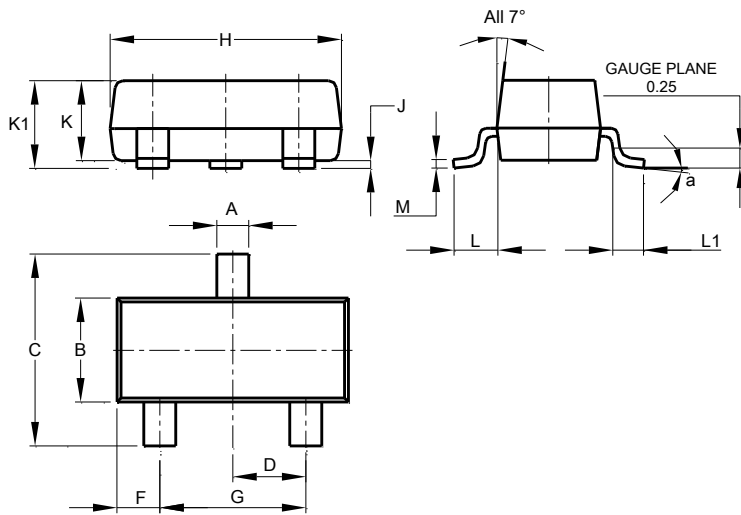
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

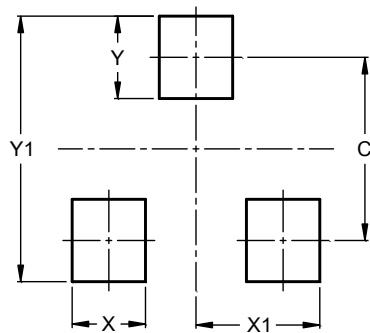


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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