

Features

- $BV_{CEO} > -100V$
- $I_C = -1A$ High Continuous Collector Current
- $I_{CM} = -2A$ Peak Pulse Current
- Low Saturation Voltage
- Excellent h_{FE} Characteristics up to $I_C = -1A$
- Complementary NPN Type: FMMT493
- **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

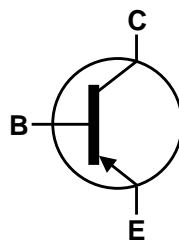
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 [Ⓔ]
- Weight 0.008 grams (Approximate)

Applications

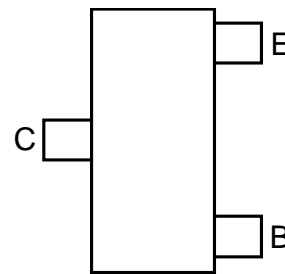
- High-Side Driver
- Load Disconnect Switch
- Motor Drive



Top View



Device Symbol



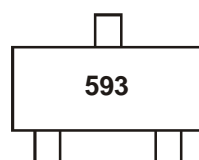
Top View
Pin-Out

Ordering Information (Notes 4 & 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FMMT593TA	AEC-Q101	593	7	8	3000
FMMT593QTA	Automotive	593	7	8	3000
FMMT593TC	AEC-Q101	593	13	8	10,000
FMMT593QTC	Automotive	593	13	8	10,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



593 = Product Type Marking Code

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

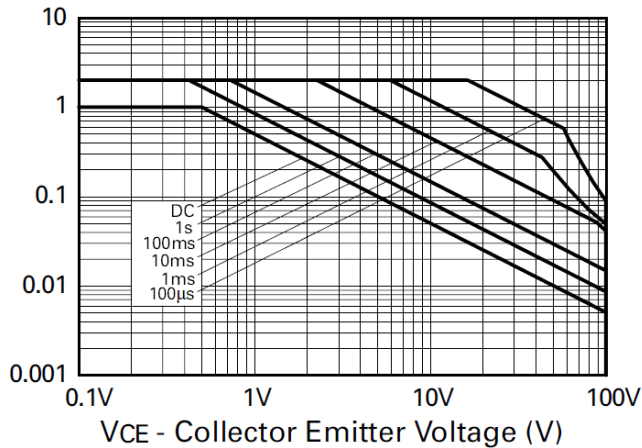
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-120	V
Collector-Emitter Voltage	V _{CEO}	-100	V
Emitter-Base Voltage	V _{EBO}	-7	V
Continuous Collector Current	I _C	-1	A
Peak Pulse Current	I _{CM}	-2	A
Continuous Base Current	I _B	-200	mA

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

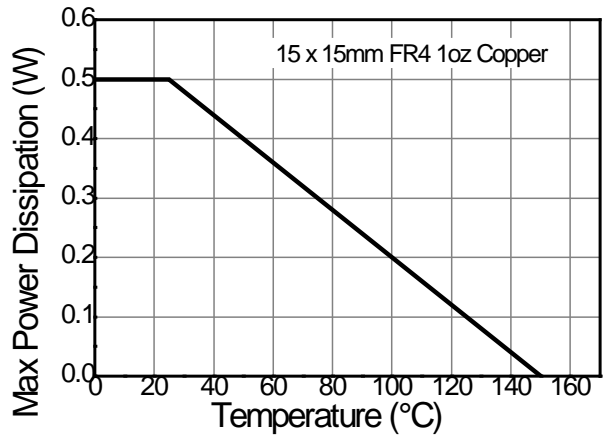
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P _D	500	mW
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	250	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R _{θJL}	197	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

- Notes:
6. For a device surface mounted on 15mm × 15mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 7. Thermal resistance from junction to solder-point (at the end of the collector lead).

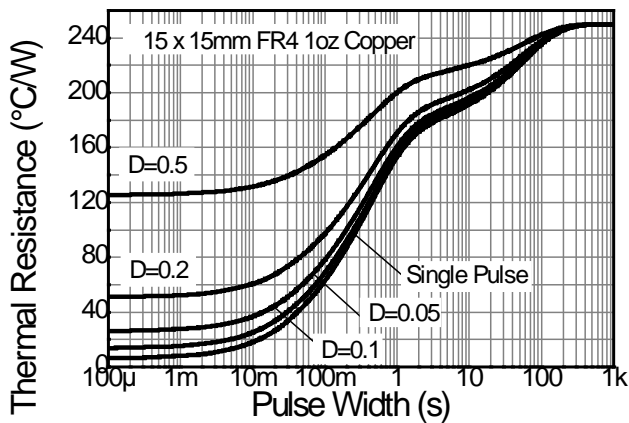
Thermal Characteristics and Derating Information



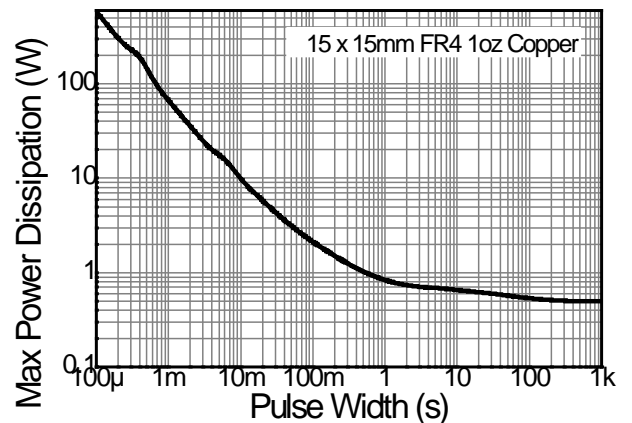
Safe Operating Area



Derating Curve



Transient Thermal Impedance



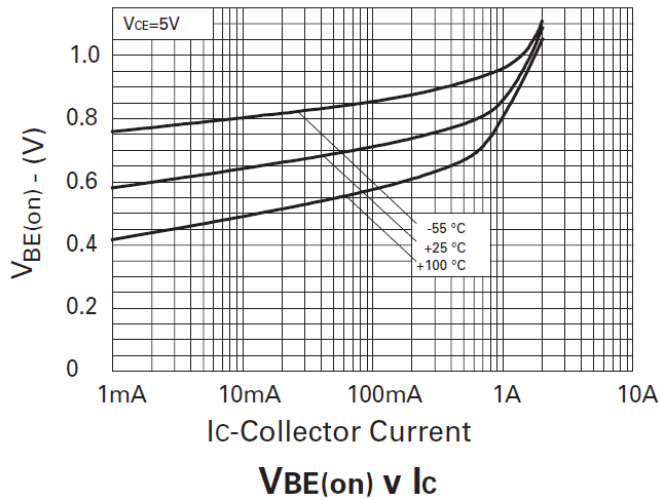
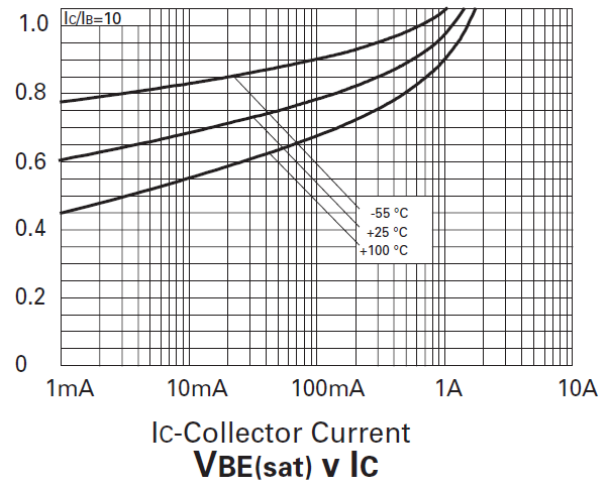
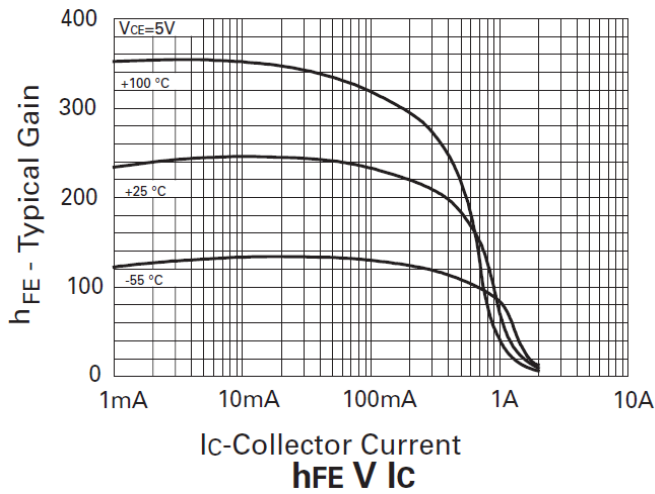
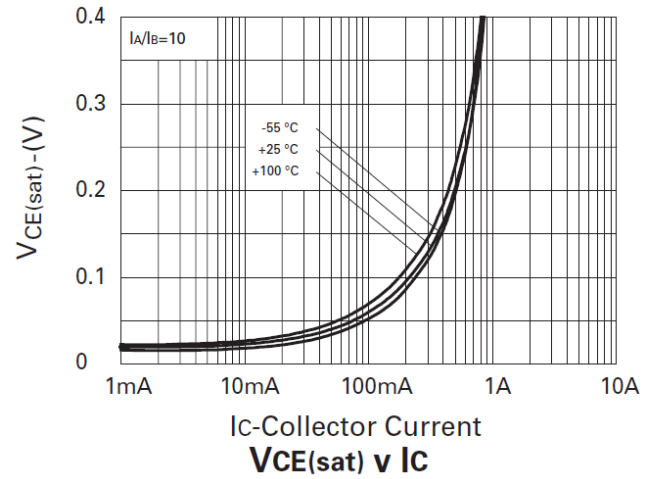
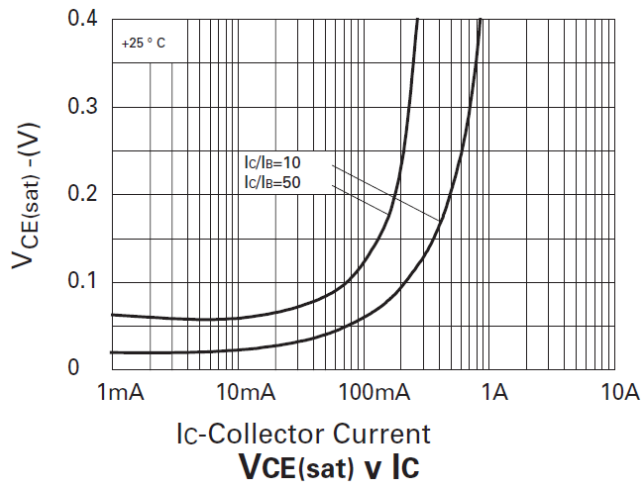
Pulse Power Dissipation

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CBO}	-120	—	—	V	I _C = -100μA
Collector-Emitter Breakdown Voltage (Note 8)	BV _{CEO}	-100	—	—	V	I _C = -1mA
Emitter-Base Breakdown Voltage	BV _{EBO}	-7	—	—	V	I _E = -100μA
Collector Cutoff Current	I _{CBO}	—	—	-100	nA	V _{CB} = -100V
Emitter Cutoff Current	I _{EBO}	—	—	-100	nA	V _{EB} = -5.6V
Collector-Emitter Cut-Off Current	I _{CES}	—	—	-100	nA	V _{CES} = -100V
Static Forward Current Transfer Ratio (Note 8)	h _{FE}	100	—	—	—	I _C = -1mA, V _{CE} = -5V
		100		—		I _C = -250mA, V _{CE} = -5V
		100		300		I _C = -500mA, V _{CE} = -5V
		50		—		I _C = -1A, V _{CE} = -5V
Collector-Emitter Saturation Voltage (Note 8)	V _{CE(sat)}	—	—	-200 -300	mV	I _C = -250mA, I _B = -25mA I _C = -500mA, I _B = -50mA
Base-Emitter Saturation Voltage (Note 8)	V _{BE(sat)}	—	—	-1.1	V	I _C = -500mA, I _B = -50mA
Base-Emitter Turn-On Voltage (Note 8)	V _{BE(on)}	—	—	-1.0	V	I _C = -1mA, V _{CE} = -5V
Transition Frequency	f _T	50	—	—	MHz	V _{CE} = -10V, I _C = -50mA, f = 100MHz
Output Capacitance	C _{obo}	—	—	5	pF	V _{CB} = -10V, f = 1MHz

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

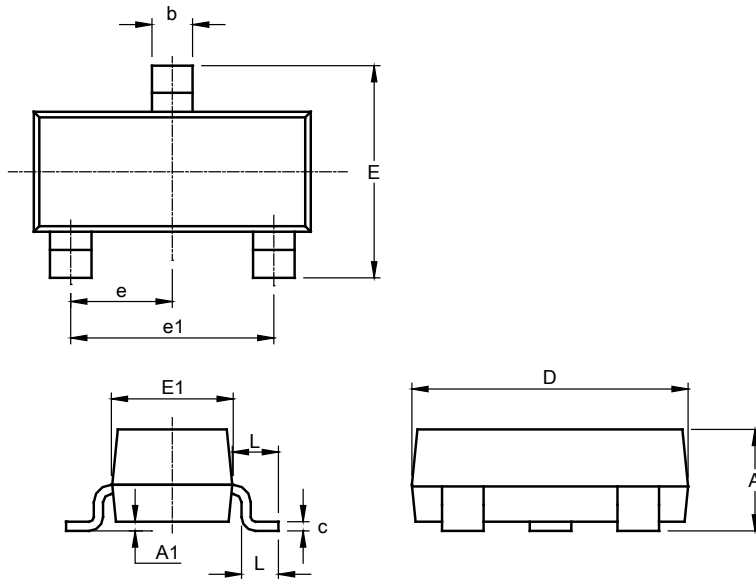
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT23 (Type DN)

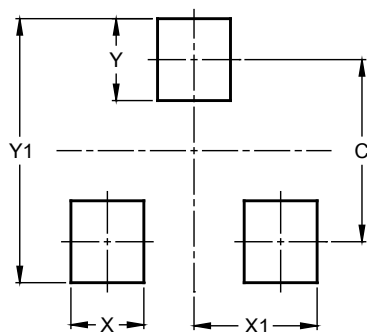


SOT23 (Type DN)			
Dim	Min	Max	Typ
A	0.89	1.12	1.00
A1	0.01	0.10	0.05
b	0.30	0.51	0.45
c	0.08	0.20	0.10
D	2.80	3.04	3.00
E	2.10	2.64	2.42
E1	1.20	1.40	1.37
e	0.95 REF		
e1	1.90 REF		
L	0.25	0.60	0.30
L1	0.45	0.62	0.54
All Dimensions in mm			

Suggested Pad Layout

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

SOT23 (Type DN)



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

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