FMMT416

NPN HIGH VOLTAGE AVALANCHE TRANSISTOR IN SOT23

Features

- 60A Peak Avalanche Current
- BV_{CBO} > 315V
- BV_{CEO} > 100V
- Specifically Designed for Avalanche Mode Operation
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

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)

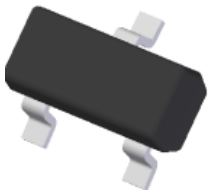
Description

The FMMT416 is a silicon planar bipolar transistor designed for operating in avalanche mode. Tight process control and low inductance packaging combine to produce high-current pulses with fast edges.

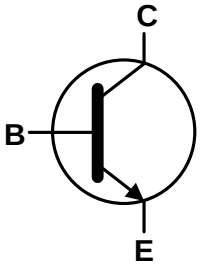
Applications

- Laser Diode Drivers for Ranging and Measurement (LIDAR)
- Radar Systems
- Fast Edge Switch Generator
- High-Speed Pulse Generators

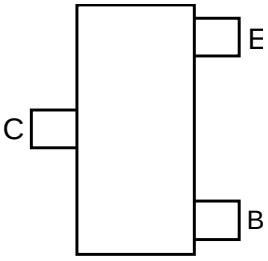
SOT23 (Type DN)



Top View



Device Symbol



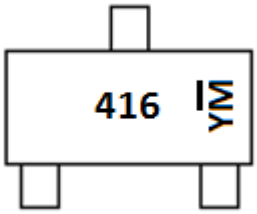
Top View
Pin-Out

Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
FMMT416TD	416	7	8	500
FMMT416TA	416	7	8	3000

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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



416 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: G = 2019)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	G	H	I	J	K	L	M	N	O	P	Q

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	315	V
Collector-Emitter Voltage	V_{CEO}	100	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	500	mA
Peak Collector Current (Pulse Width = 20ns)	I_{CM}	60	A

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

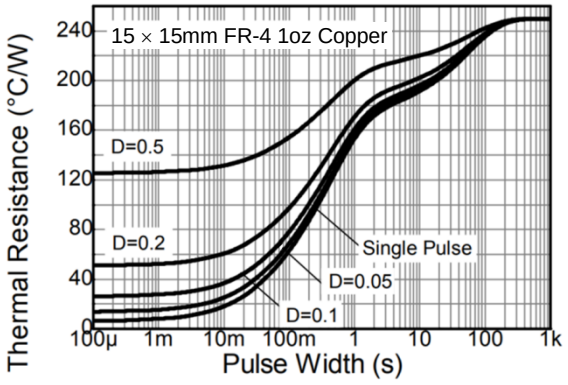
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	500	mW
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	250	°C/W
Thermal Resistance, Junction to Leads	(Note 6)	$R_{\theta JL}$	197	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 7)

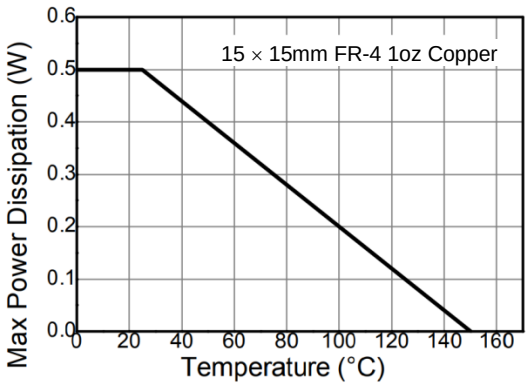
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with the collector lead on 15mm × 15mm 1oz copper that is on a single-sided 1.6mm FR-4 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.

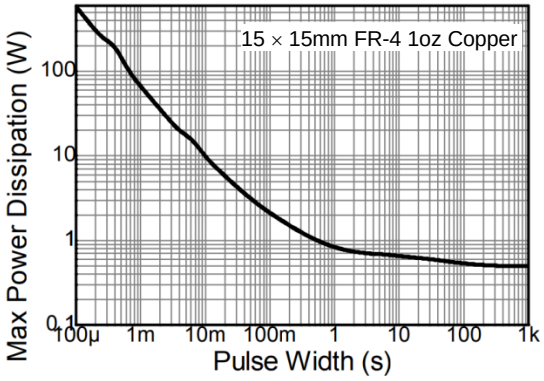
Thermal Characteristics and Derating information



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

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

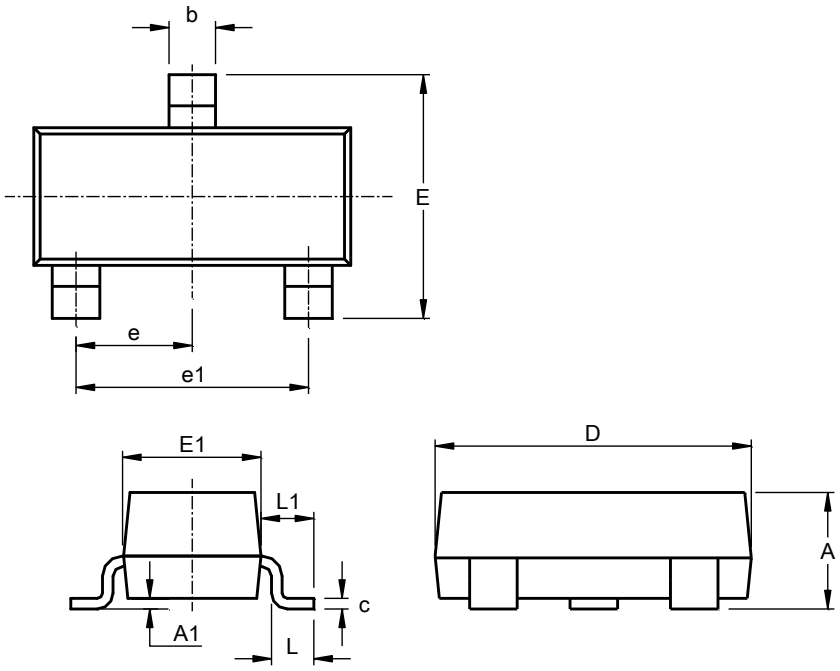
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	315	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage	BV_{CEO}	100	—	—	V	I_C = 100µA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	—	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	—	100 10	nA µA	V_{CB} = 310V V_{CB} = 310V, T_J = +100°C
Emitter Cutoff Current	I_{EBO}	—	—	20	nA	V_{EB} = 6V
Static Forward Current Transfer Ratio (Note 8)	h_{FE}	100	—	—	—	I_C = 10mA, V_{CE} = 10V
Collector-Emitter Saturation Voltage (Note 8)	$V_{CE(sat)}$	—	—	100	mV	I_C = 10mA, I_B = 1mA
Base-Emitter Saturation Voltage (Note 8)	$V_{BE(sat)}$	—	—	800	mV	I_C = 10mA, I_B = 1mA
Current in Second Breakdown (Pulsed)	I_{USB}	— —	25 35	— —	A A	V_C = 200V, C_{CE} = 620pF V_C = 250V, C_{CE} = 620pF
Collector-Emitter Inductance	L_{ce}	—	2.5	—	nH	Standard SOT23 leads
Output Capacitance	C_{cbo}	—	—	8	pF	V_{CB} = 20V, I_E = 0 f = 100MHz
Transition Frequency	f_T	40	—	—	MHz	V_{CE} = 20V, I_C = 10mA, f = 20MHz

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

Package Outline Dimensions

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

SOT23 (Type DN)

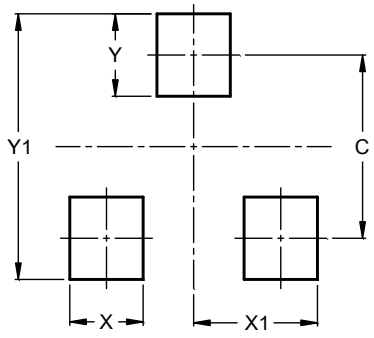


SOT23 Type DN			
Dim	**Min**	**Max**	**Typ**
A	0.89	1.12	1.00
A1	0.01	0.10	0.05
b	0.30	0.51	0.45
c	0.08	0.20	0.10
D	2.80	3.04	3.00
E	2.10	2.64	2.42
E1	1.20	1.40	1.37
e	0.95 REF		
e1	1.90 REF		
L	0.25	0.60	0.30
L1	0.45	0.62	0.54
All Dimensions in mm			

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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