

# FMMT413TC Datasheet



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DiGi Electronics Part Number	FMMT413TC-DG
Manufacturer	<a href="#">Diodes Incorporated</a>
Manufacturer Product Number	FMMT413TC
Description	TRANS NPN 50V 0.1A SOT23-3
Detailed Description	Bipolar (BJT) Transistor NPN - Avalanche Mode 50 V 100 mA 150MHz 330 mW Surface Mount SOT-23-3



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## Purchase and inquiry

Manufacturer Product Number:

FMMT413TC

Series:

-

Transistor Type:

NPN - Avalanche Mode

Voltage - Collector Emitter Breakdown (Max):

50 V

Current - Collector Cutoff (Max):

100nA (ICBO)

Power - Max:

330 mW

Operating Temperature:

-55°C ~ 150°C (TJ)

Package / Case:

TO-236-3, SC-59, SOT-23-3

Base Product Number:

FMMT413

Manufacturer:

Diodes Incorporated

Product Status:

Obsolete

Current - Collector (Ic) (Max):

100 mA

Vce Saturation (Max) @ Ib, Ic:

150mV @ 1mA, 10mA

DC Current Gain (hFE) (Min) @ Ic, Vce:

50 @ 10mA, 10V

Frequency - Transition:

150MHz

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-23-3

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0075

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



# FMMT413

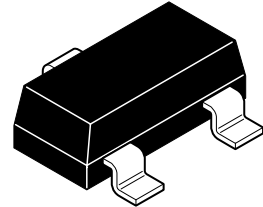
## SOT23 NPN silicon planar avalanche transistor

### Summary

$V_{(BR)CES} = 150V$ ,  $V_{(BR)CEO} = 50V$ ,  $I_{USB} = 25A$

### Description

The FMMT413 is a NPN silicon planar bipolar transistor optimized for avalanche mode operation. Tight process control and low inductance packaging combine to produce high current pulses with fast edges, ideal for laser diode driving.

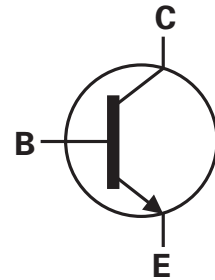


### Features

- Avalanche mode operation
- 50A peak avalanche current
- Low inductance packaging

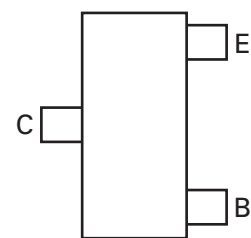
### Applications

- Laser LED drivers
- Fast edge generation
- High speed pulse generators



### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMT413TD	7	8	500
FMMT413TA	7	8	3,000



Pinout - top view

### Device marking

413

**FMMT413****Absolute maximum ratings**

Parameter	Symbol	Limit	Unit
Collector-base voltage	$BV_{CBO}$	150	V
Collector-emitter voltage	$BV_{CEO}$	50	V
Emitter-base voltage	$BV_{EBO}$	6	V
Peak pulse current (25ns Pulse Width)	$I_{CM}$	50	A
Continuous collector current	$I_C$	100	mA
Power dissipation at $T_{amb} = 25^{\circ}C$ Linear derating factor	$P_D$	330	mW
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150	$^{\circ}C$

**Thermal resistance**

Parameter	Symbol	Limit	Unit
Junction to ambient	$R_{\theta JA}$	378	$^{\circ}C/W$

**FMMT413****Electrical characteristics (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)**

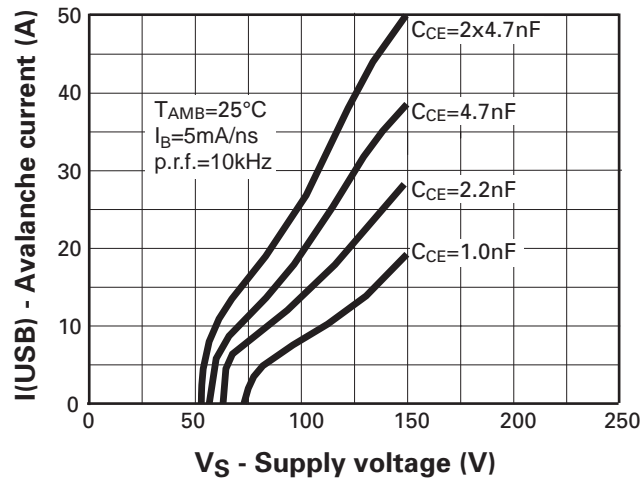
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	150			V	
Collector-emitter breakdown voltage	$BV_{CES}$	150			V	$I_C = 100\mu\text{A}$
Collector-emitter breakdown voltage	$BV_{CEO}$	50			V	$I_C = 10\text{mA}$
Emitter-base breakdown voltage	$BV_{EBO}$	6			V	$I_E = 100\mu\text{A}$
Collector cut-off current	$I_{CBO}$			100	nA	$V_{CB} = 120\text{V}$
Emitter cut-off current	$I_{EBO}$			100	nA	$V_{EB} = 4\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$			150	mV	$I_C = 10\text{mA}$ , $I_B = 1\text{mA}$
Base-emitter saturation voltage	$V_{BE(sat)}$			800	mV	$I_C = 10\text{mA}$ , $I_B = 1\text{mA}$
Current in second breakdown (pulsed)	$I_{USB}$	22			A	$V_C = 110\text{V}$ , $C_{CE} = 4.7\text{nF}^{(*)}$
		25			A	$V_C = 130\text{V}$ , $C_{CE} = 4.7\text{nF}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	50				$I_C = 10\text{mA}$ , $V_{CE} = 10\text{V}$
Collector-emitter inductance	$L_{ce}$		2.5		nH	Standard SOT23 leads
Transition frequency	$f_T$		150		MHz	$I_C = 10\text{mA}$ , $V_{CE} = 5\text{V}$ , $f = 20\text{MHz}$
Output capacitance	$C_{OBO}$		2		pF	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$

**NOTES:**

(\*) Measured with a circuit possessing an approximate loop inductance of 12nH.

# FMMT413

## Typical characteristics

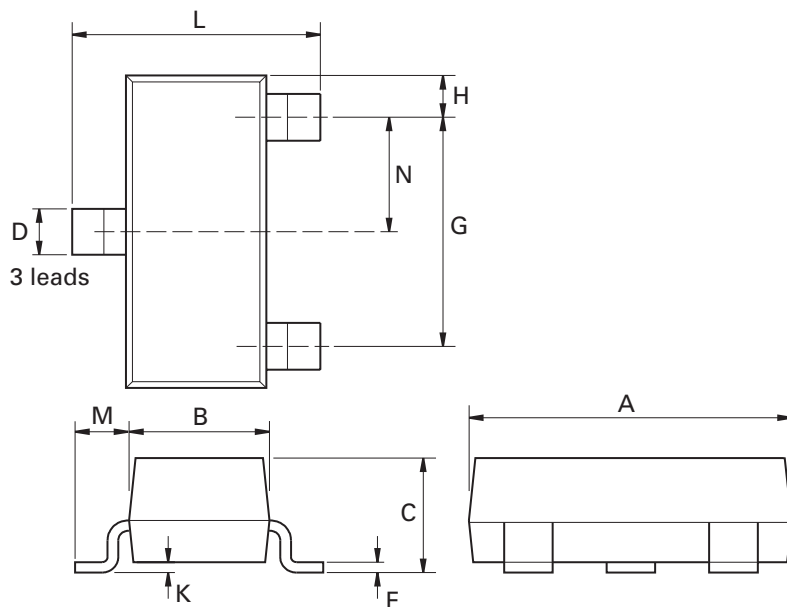


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# FMMT413

## Package outline - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	2.67	3.05	0.105	0.120	H	0.33	0.51	0.013	0.020
B	1.20	1.40	0.047	0.055	K	0.01	0.10	0.0004	0.004
C	-	1.10	-	0.043	L	2.10	2.50	0.083	0.0985
D	0.37	0.53	0.015	0.021	M	0.45	0.64	0.018	0.025
F	0.085	0.15	0.0034	0.0059	N	0.95 NOM		0.0375 NOM	
G	1.90 NOM		0.075 NOM		-	-	-	-	-

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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