

# FMMT413

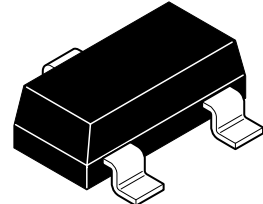
## SOT23 NPN silicon planar avalanche transistor

### 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.

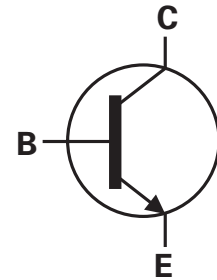


### Features

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

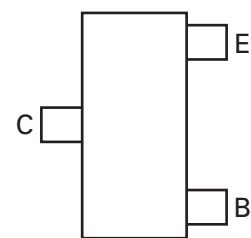
### Applications

- 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 $T_{amb} = 25^{\circ}C$<br>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   | $^{\circ}C/W$ |

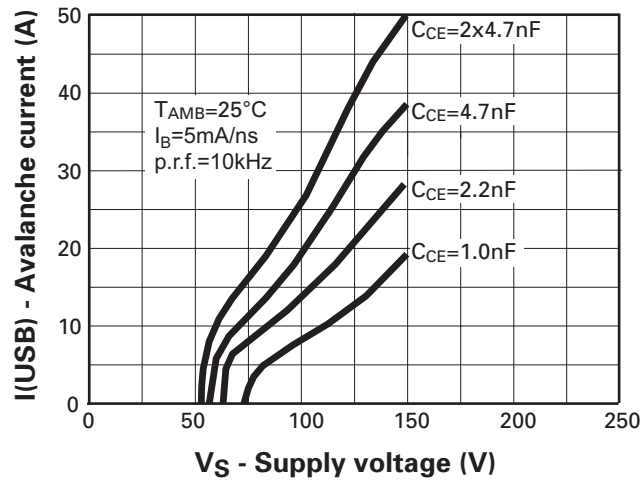
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| 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   | $I_C = 10\text{mA}$ ,<br>$I_B = 1\text{mA}$                        |
| Base-emitter saturation voltage       | $V_{BE(sat)}$ |      |      | 800  | mV   | $I_C = 10\text{mA}$ ,<br>$I_B = 1\text{mA}$                        |
| 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   |      |      |      | $I_C = 10\text{mA}$ ,<br>$V_{CE} = 10\text{V}$                     |
| Collector-emitter inductance          | $L_{ce}$      |      | 2.5  |      | nH   | Standard SOT23 leads   |
| Transition frequency                  | $f_T$         |      | 150  |      | MHz  | $I_C = 10\text{mA}$ , $V_{CE} = 5\text{V}$ ,<br>$f = 20\text{MHz}$ |
| Output capacitance                    | $C_{OBO}$     |      | 2    |      | pF   | $V_{CB} = 10\text{V}$ , $I_E = 0$ ,<br>$f = 1\text{MHz}$           |

### NOTES:

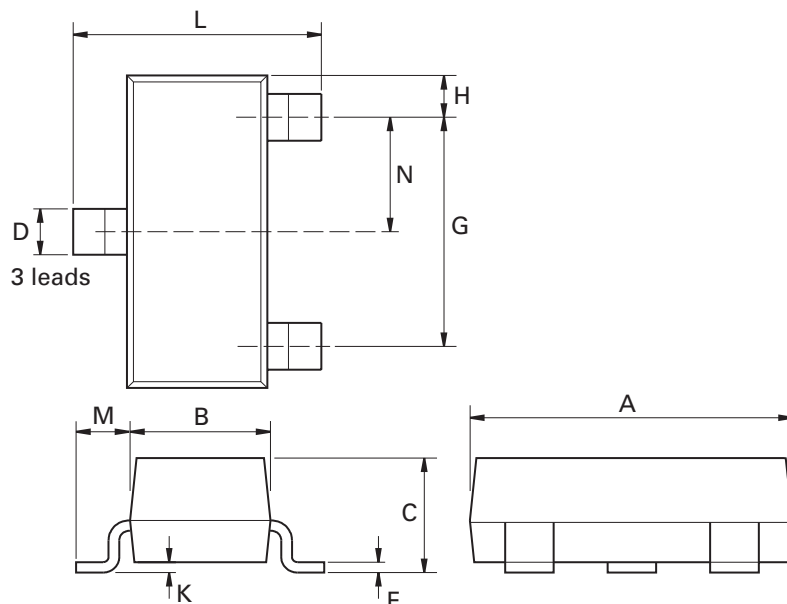
(\*) Measured with a circuit possessing an approximate loop inductance of 12nH.

## Typical characteristics



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## 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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