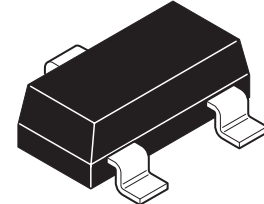


# FMMT459

## 500V Silicon NPN high voltage switching transistor

### Summary

$V_{(BR)CEV} > 500V$   
 $V_{(BR)ECV} > 6V$   
 $I_{c(cont)} = 150\text{ mA}$   
 $V_{ce(sat)} = 70\text{ mV @ } 50\text{ mA}$



### Description

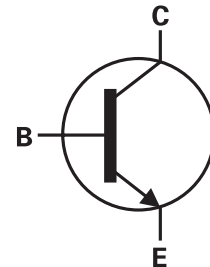
This new high voltage transistor provides users with very efficient performance, combining low  $V_{CE(SAT)}$  high  $H_{fe}$  to give extremely low on state losses at 500V operation, making it ideal for use in high efficiency Telecom and protected line switching applications.

### Features

- 6V reverse blocking capability
- Low saturation voltage - 90mV @ 50mA
- $H_{fe} > 50 @ 30\text{ mA}$
- $I_C=150\text{mA}$  continuous
- SOT23 package with  $P_{tot} 625\text{mW}$
- Specification can be supplied in other package outlines

### Applications

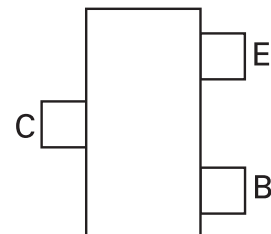
- Electronic test equipment
- Offline switching circuits
- Piezo actuators
- RCD circuits



### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMT459TA	7	8	3,000
FMMT459TC	13	8	10,000

### Pin out - top view



### Device marking

459

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	$V_{CBO}$	500	V
Collector-emitter voltage	$V_{CEV}$	500	V
Collector-emitter voltage	$V_{CEO}$	450	V
Emitter-base voltage	$V_{EBO}$	6	V
Emitter-collector voltage	$V_{ECV}$	6	V
Peak pulse current	$I_{CM}$	0.5	A
Continuous collector current*	$I_C$	0.15	A
Base current	$I_B$	0.2	A
Power dissipation @ $T_A=25^{\circ}\text{C}^*$ Linear derating factor	$P_D$	625 5	mW mW/ $^{\circ}\text{C}$
Power dissipation @ $T_A=25^{\circ}\text{C}^{\dagger}$ Linear derating factor	$P_D$	806 6.4	mW mW/ $^{\circ}\text{C}$
Operating and storage temperature range	$T_j:T_{stg}$	-55 to +150	$^{\circ}\text{C}$

## Thermal resistance

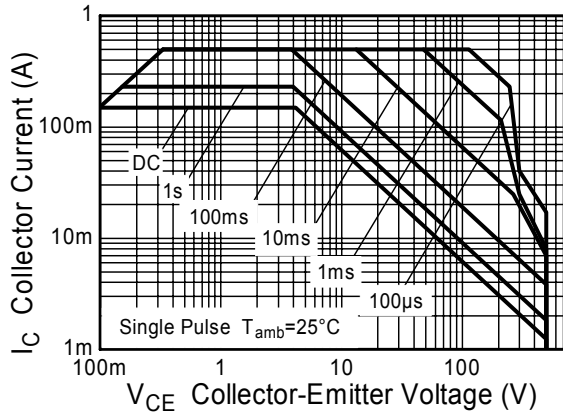
Parameter	Symbol	Value	Unit
Junction to ambient*	$R_{\theta JA}$	200	$^{\circ}\text{C}/\text{W}$
Junction to ambient <sup>†</sup>	$R_{\theta JA}$	155	$^{\circ}\text{C}/\text{W}$

### NOTES:

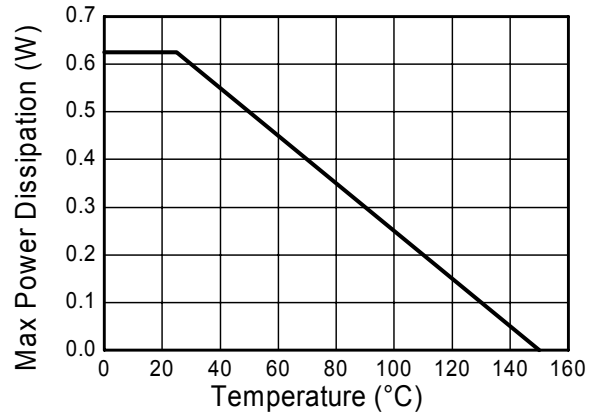
\* For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of 1oz copper, in still air conditions

† as above measured at  $t < 5\text{secs}$ .

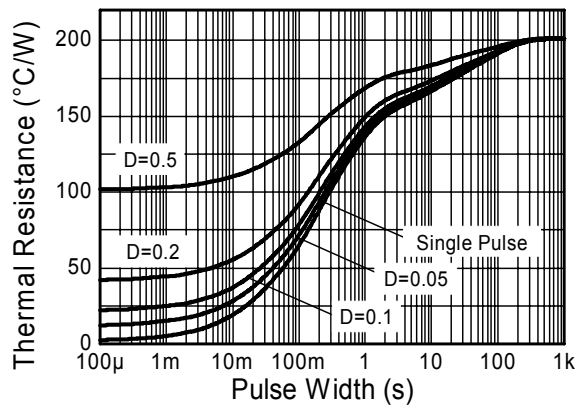
## Thermal characteristics



**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**

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

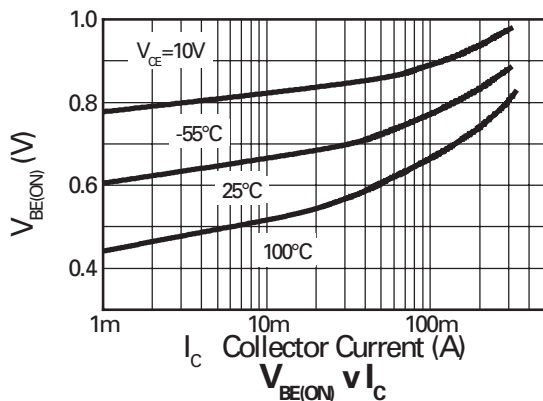
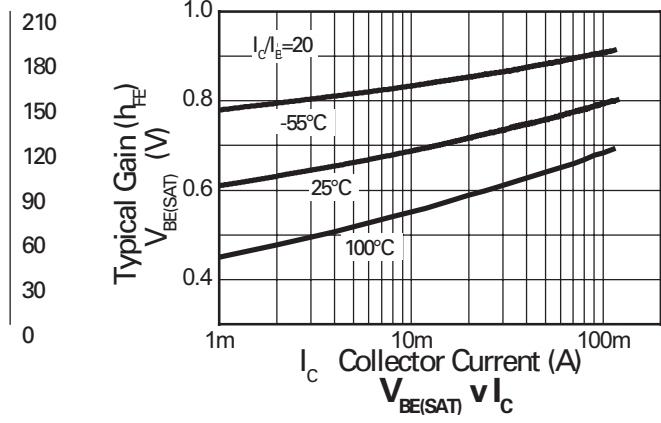
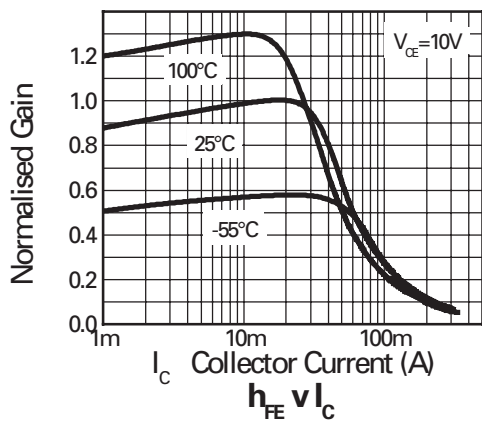
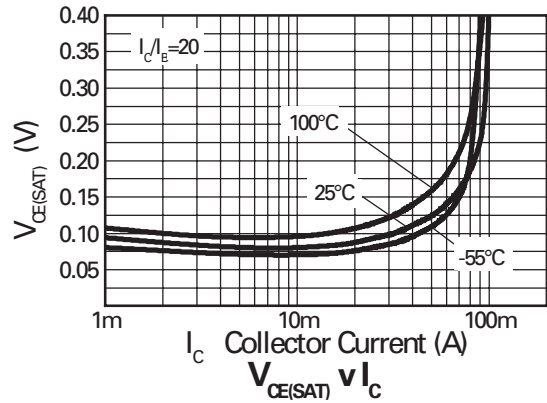
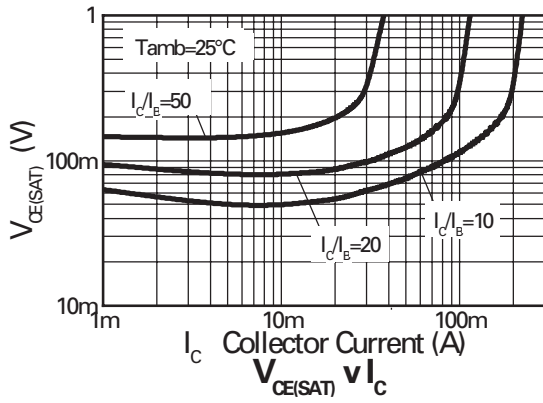
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	500	700		V	$I_C = 100\mu\text{A}$
Collector-emitter breakdown voltage	$BV_{CEV}$	500	700		V	$I_C = 10\mu\text{A}$ , $0.3\text{V} > V_{BE} > -1\text{V}$
Collector-emitter breakdown voltage	$BV_{CEO}$	450	500		V	$I_C = 10\text{mA}^*$
Emitter-base breakdown voltage	$BV_{EBO}$	6	8.1		V	$I_E = 100\mu\text{A}$
Emitter-base breakdown voltage (reverse blocking)	$BV_{ECV}$	6	8.1		V	$I_C = 1\mu\text{A}$ , $0.3\text{V} > V_{BC} > -6\text{V}$
Collector-emitter cut-off current	$I_{CES}$			100	nA	$V_{CE}=450\text{V}$
Collector-base cut-off current	$I_{CBO}$			100	nA	$V_{CB}=450\text{V}$
Emitter-base cut-off current	$I_{EBO}$			100	nA	$V_{EB}=5\text{V}$
Static forward current transfer ratio	$H_{FE}$	50	120 70			$I_C = 30\text{mA}$ , $V_{CE} = 10\text{V}$ $I_C = 50\text{mA}^*$ , $V_{CE} = 10\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		60 70	75 90	mV mV	$I_C = 20\text{mA}$ , $I_B = 2\text{mA}^*$ $I_C = 50\text{mA}$ , $I_B = 6\text{mA}^*$
Base-emitter saturation voltage	$V_{BE(sat)}$		0.76	0.9	V	$I_C = 50\text{mA}$ , $I_B = 5\text{mA}^*$
Base-emitter turn-on voltage	$V_{BE(on)}$		0.71	0.9	V	$I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}^*$
Transition frequency	$f_T$	50			MHz	$I_C = 10\text{mA}$ , $V_{CE} = 20\text{V}$ $f = 20\text{MHz}$
Output capacitance	$C_{obo}$			5	pF	$V_{CB} = 20\text{V}$ , $f = 1\text{MHz}$
Turn-on time	$t_{(ON)}$		113		ns	$I_C = 50\text{mA}$ , $V_C = 100\text{V}$ $I_{B1} = 5\text{mA}$ , $I_{B2} = 10\text{mA}$
Turn-off time	$t_{(OFF)}$		3450		ns	$I_C = 50\text{mA}$ , $V_C = 100\text{V}$ $I_{B1} = 5\text{mA}$ , $I_{B2} = 10\text{mA}$

### NOTES:

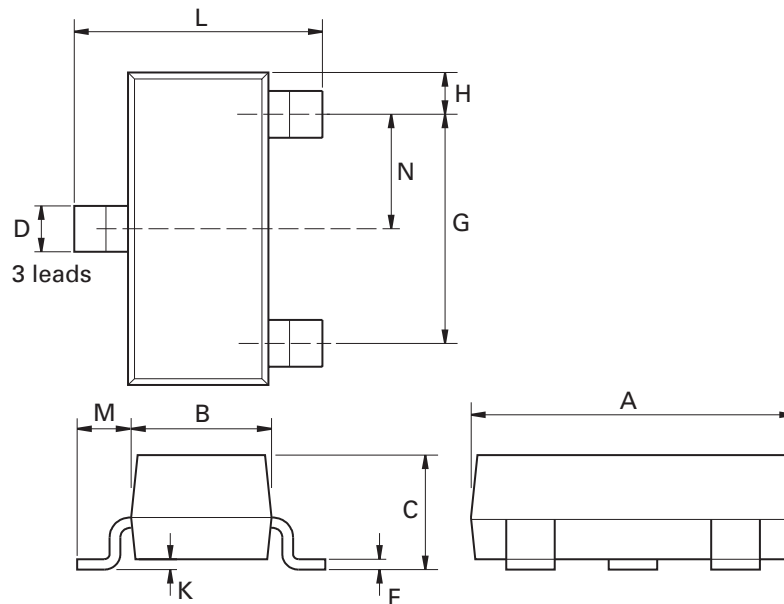
\* Measured under pulsed conditions. Pulse width =  $300\mu\text{s}$ ; duty cycle  $<2\%$

**Note:** For high voltage applications, the appropriate industry sector guidelines should be considered with regards to voltage spacing between Terminals.

Electrical characteristics



## Packaging details - SOT23



## Package dimensions

Dimensions in inches are control dimensions, dimensions in millimeters are approximate.

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.		-	-	-	-	-

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