

# **FMH23N50E**

**FUJI POWER MOSFET** 

## Super FAP-E<sup>3</sup> series

#### **N-CHANNEL SILICON POWER MOSFET**

#### ■ Features

Maintains both low power loss and low noise Lower R<sub>DS</sub>(on) characteristic More controllable switching dv/dt by gate resistance Smaller V<sub>GS</sub> ringing waveform during switching Narrow band of the gate threshold voltage (3.0±0.5V) High avalanche durability

#### Applications

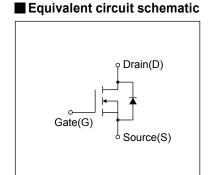
Switching regulators UPS (Uninterruptible Power Supply) DC-DC converters

#### Maximum Ratings and Characteristics

### ● Absolute Maximum Ratings at Tc=25°C (unless otherwise specified)

TO-3P(Q)  15.5m  15.2m  10.2.2 9  10.2 9  10	4.3 to.2 67.2 to.2 15.12d
① ② ③ 1.1%; 5.45 so.2 5.45 so.2	0.5 %2 PRE-SOLDER UNIT:mm
(+ + + (1) (2) (3)	CONNECTION ① GATE ② DRAIN ③ SOURCE

■ Outline Drawings [mm]



Description	Symbol	Characteristics	Unit	Remarks
Drain Sauras Valtara	V <sub>DS</sub>	500	V	
Drain-Source Voltage	V <sub>DSX</sub>	500	V	V <sub>GS</sub> = -30V
Continuous Drain Current	ID	±23	Α	
Pulsed Drain Current	IDP	±92	Α	
Gate-Source Voltage	V <sub>GS</sub>	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	lar	23	Α	Note*1
Non-Repetitive Maximum Avalanche Energy	Eas	767.3	mJ	Note*2
Repetitive Maximum Avalanche Energy	Ear	31.5	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	9.3	kV/µs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/µs	Note*5
Maximum Power Dissipation	PD	2.50	W	Ta=25°C
		315	VV	Tc=25°C
Operating and Storage	Tch	150	°C	
Temperature range	T <sub>stg</sub>	-55 to + 150	°C	

#### ● Electrical Characteristics at Tc=25°C (unless otherwise specified)

Description	Symbol	Conditions		min.	typ.	max.	Unit	
Drain-Source Breakdown Voltage	BVDSS	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V		500	-	-	V	
Gate Threshold Voltage	V <sub>GS</sub> (th)	I <sub>D</sub> =250µA, V <sub>DS</sub> =V <sub>GS</sub>		2.5	3.0	3.5	V	
Zero Gate Voltage Drain Current		V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	T <sub>ch</sub> =25°C	-	-	25		
	IDSS	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V	T <sub>ch</sub> =125°C	-	-	250	μA	
Gate-Source Leakage Current	Igss	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V		10	100	nA	
Drain-Source On-State Resistance	Ros (on)	I <sub>D</sub> =11.5A, V <sub>GS</sub> =10V		-	0.21	0.245	Ω	
Forward Transconductance	g <sub>fs</sub>	I <sub>D</sub> =11.5A, V <sub>DS</sub> =25V		14	28	-	S	
Input Capacitance	Ciss	V <sub>DS</sub> =25V V <sub>GS</sub> =0V		-	3500	5250	pF	
Output Capacitance	Coss			-	330	495		
Reverse Transfer Capacitance	Crss	f=1MHz	-	24	36			
Turn-On Time	td(on)	V <sub>cc</sub> =300V V <sub>ss</sub> =10V I <sub>D</sub> =11.5A		-	24	36	ns	
Turn-On Time	tr			-	13	19.5		
Turn-Off Time	td(off)			-	150	225		
	tf	R <sub>GS</sub> =5.6Ω	-	20	30			
	Qth	\(\(\sigma_0=0\)\(\sigma_0\)			11	16.5		
Total Gate Charge	Q <sub>G</sub>	V₀=250V I₀=23A V₀s=10V		-	93	139.5		
Gate-Source Charge	Q <sub>GS</sub>			-	24	36	nC	
Gate-Drain Charge	Q <sub>GD</sub>			-	30	45		
Avalanche Capability	lav	L=1.16mH, Tch=25°C		23	-	-	Α	
Diode Forward On-Voltage	V <sub>SD</sub>	I <sub>F</sub> =23A, V <sub>GS</sub> =0V, T <sub>ch</sub> =25°C		-	0.90	1.35	V	
Reverse Recovery Time	trr	I <sub>F</sub> =23A, V <sub>GS</sub> =0V	I <sub>F</sub> =23A, V <sub>GS</sub> =0V		0.5	-	μs	
Reverse Recovery Charge	Qrr	-di/dt=100A/µs, Tch=25°C		-	8	-	μC	

#### Thermal Characteristics

Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to case			0.40	°C/W
	Rth (ch-a)	Channel to ambient			50.0	°C/W

Note \*1 : Tch≤150°C

Note 12: Stating Tch=25°C, Ias=10A, L=14.1mH, Vcc=50V, R<sub>G</sub>=50Ω

Eas limited by maximum channel temperature and avalanche current.

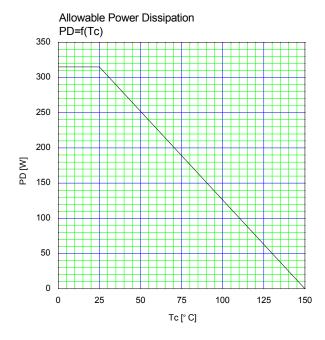
See to 'Avalanche Energy' graph.

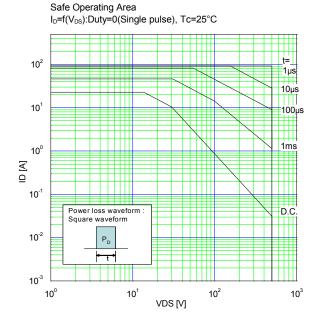
Note  $^{\star}3$  : Repetitive rating : Pulse width limited by maximum channel temperature.

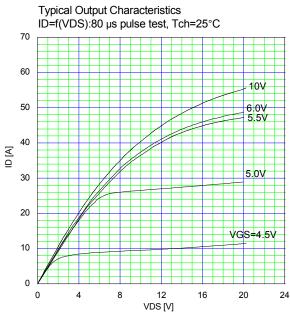
See to the 'Transient Themal impeadance' graph. Note \*4 : I₅≤-I₀, -di/dt=100A/μs, Vcc≤BV₀ss, Tch≤150°C.

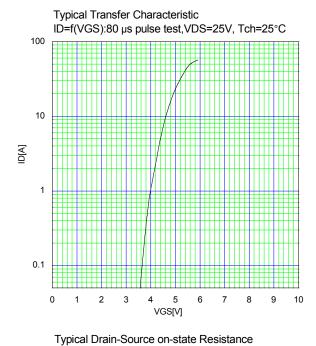
Note \*5 : IF≤-ID, dv/dt=5.0kV/µs, Vcc≤BVDss, Tch≤150°C

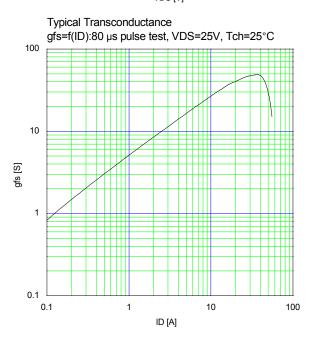
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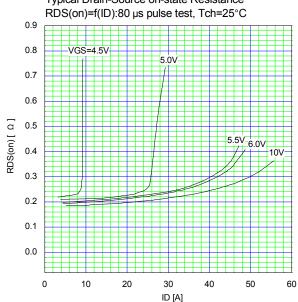


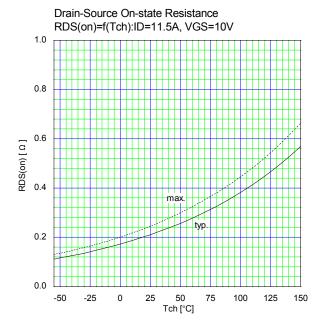


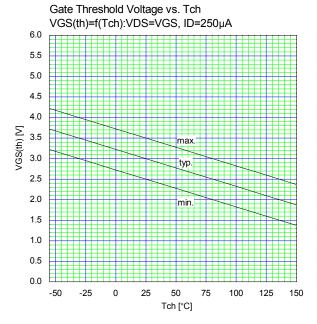


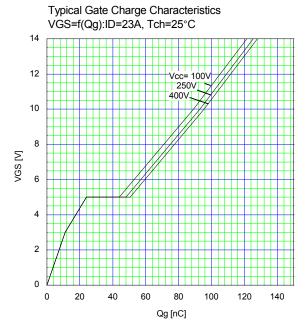


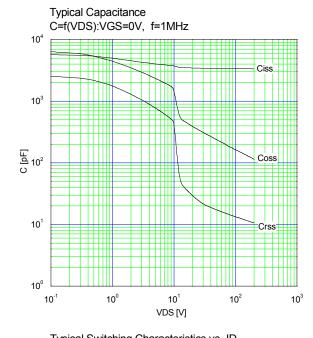


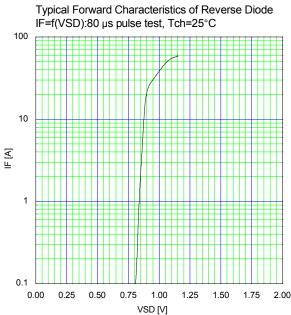


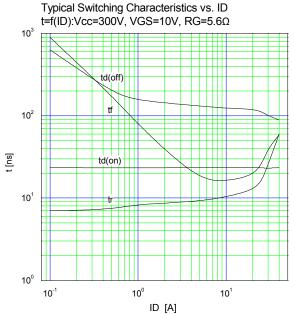




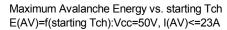


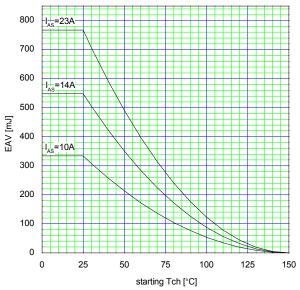




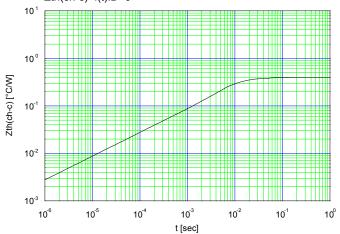


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### Maximum Transient Thermal Impedance Zth(ch-c)=f(t):D=0



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