

# **FMP13N60E**

**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

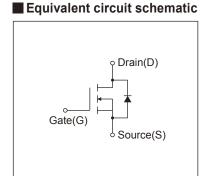
Switching regulators UPS (Uninterruptible Power Supply) DC-DC converters

# Maximum Ratings and Characteristics

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

TO-220AB 10 %	7.40.1		4.5±0.2	
\$1.642	7.7	1	1.3±0.2	
See Note:1.	6.4 ±0.2	1.4	_	
Trademark	7 5 3			
<b>*</b>	15 #2			
Type name	1			
Lot No.		닠		
1201	<b></b>			
1.2 M-2 - 18 B	3,6 sb.2 13,5min.			
000	~ 12	N	PRE-SOLDI	R
0.00		8		
2.54 ±0.2	0.8111 2.54±0.2	4-1	2.7±0.2	
2.34 10.2		ONS ARE IN	_	rne
	_	UNS ARE IN	MILLIMEI	CONNECTION
+++				① GATE
000	_			② DRAIN
				③ SOURCE

■ Outline Drawings [mm]



Description	Symbol	Characteristics	Unit	Remarks
Duain Course Voltage	V <sub>DS</sub>	600	V	
Drain-Source Voltage	V <sub>DSX</sub>	600	V	V <sub>GS</sub> = -30V
Continuous Drain Current	ID	±13	Α	
Pulsed Drain Current	IDP	±52	Α	
Gate-Source Voltage	V <sub>GS</sub>	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	IAR	13	Α	Note*1
Non-Repetitive Maximum Avalanche Energy	Eas	471.5	mJ	Note*2
Repetitive Maximum Avalanche Energy	Ear	22.5	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	5.2	kV/μs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/µs	Note*5
Martin and Branch and an	Po	2.02	W	Ta=25°C
Maximum Power Dissipation		225	VV	Tc=25°C
Oneveting and Stavene Temperature venue	Tch	150	°C	
Operating and Storage 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	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V		600	-	-	V	
Gate Threshold Voltage	V <sub>GS</sub> (th)	In=250µA, Vns=Vgs	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>		3.0	3.5	V	
Zero Gate Voltage Drain Current		V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	T <sub>ch</sub> =25°C	-	-	25		
	IDSS	V <sub>DS</sub> =480V, 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		-	10	100	nA	
Drain-Source On-State Resistance	R <sub>DS</sub> (on)	I <sub>D</sub> =6.5A, V <sub>GS</sub> =10V		-	0.50	0.58	Ω	
Forward Transconductance	<b>g</b> fs	I <sub>D</sub> =6.5A, V <sub>DS</sub> =25V		7.5	15	-	S	
Input Capacitance	Ciss	V <sub>DS</sub> =25V		-	2150	3225		
Output Capacitance	Coss	V <sub>GS</sub> =0V		-	190	285	pF	
Reverse Transfer Capacitance	Crss	f=1MHz		-	14	21		
Turn-On Time Turn-Off Time	td(on)	V <sub>cc</sub> =300V V <sub>GS</sub> =10V I <sub>D</sub> =6.5A R <sub>GS</sub> =10Ω		-	21	31.5	ns	
	tr			-	8	12		
	td(off)			-	100	150		
	tf			-	15	22.5		
Total Gate Charge	Q <sub>G</sub>	V <sub>cc</sub> =300V I <sub>D</sub> =13A V <sub>GS</sub> =10V		-	60	90	nC	
Gate-Source Charge	Qgs			-	17	25.5		
Gate-Drain Charge	Q <sub>GD</sub>			-	18	27		
Avalanche Capability	lav	L=2.36mH, Tch=25°C		13	-	-	А	
Diode Forward On-Voltage	V <sub>SD</sub>	I <sub>F</sub> =13A, V <sub>GS</sub> =0V, T <sub>ch</sub> =25°	I <sub>F</sub> =13A, V <sub>GS</sub> =0V, T <sub>ch</sub> =25°C		0.90	1.35	V	
Reverse Recovery Time	trr	I <sub>F</sub> =13A, V <sub>GS</sub> =0V	I <sub>F</sub> =13A, V <sub>GS</sub> =0V		0.7	-	μs	
Reverse Recovery Charge	Qrr	-di/dt=100A/µs, Tch=25	-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			0.560	°C/W
	Rth (ch-a)	Channel to ambient			62.0	°C/W

Note \*1 : Tch≤150°C

Note 12: Stating Tch=25°C, Ias=6A, L=24.0mH, Vcc=60V, R<sub>G</sub>=50Ω

Eas limited by maximum channel temperature and avalanche current.

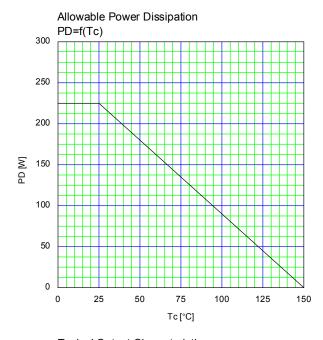
See to 'Avalanche Energy' graph.

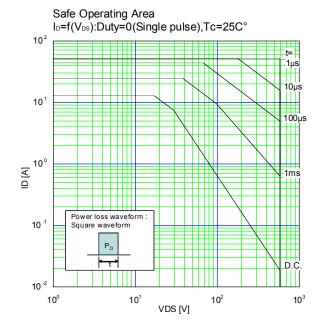
Note  $^{\star}3$  : Repetitive rating : Pulse width limited by maximum channel temperature

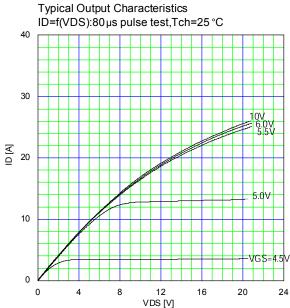
See to the 'Transient Themal impeadance' graph.

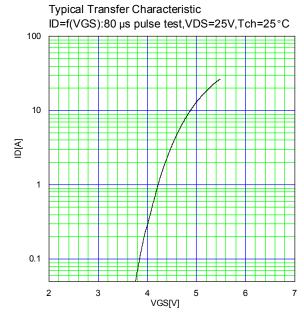
Note \*4 : I₅≤-I₀, -di/dt=100A/μ₅, Vcc≤BVbss, Tch≤150°C.

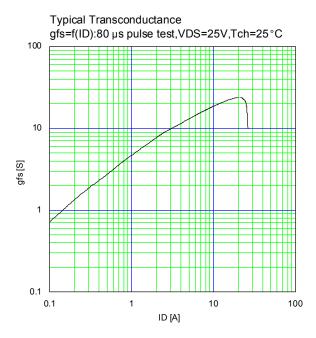
Note \*5 : I₅≤-I₀, dv/dt=5.2kV/μ₅, Vcc≤BVbss, Tch≤150°C.

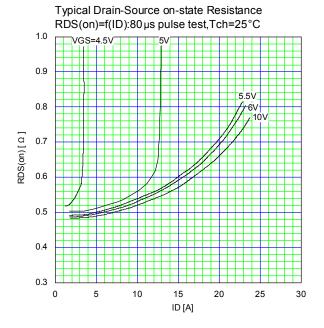


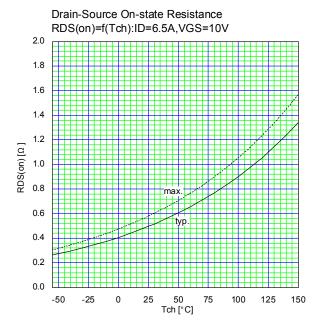


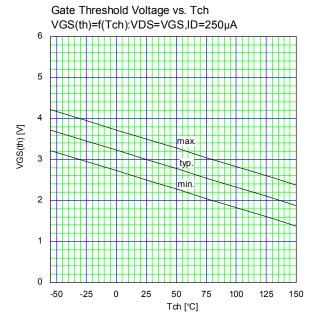


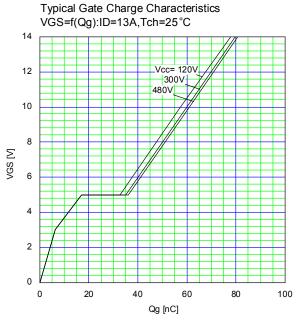


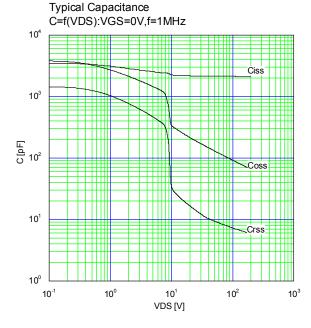


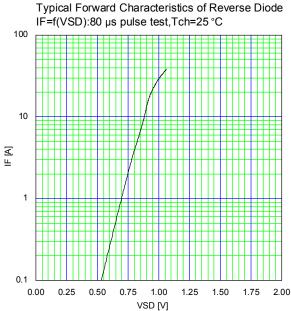


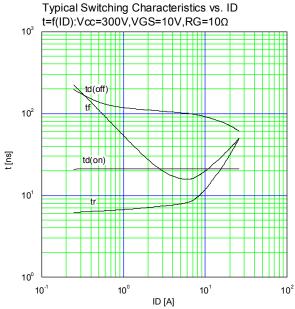


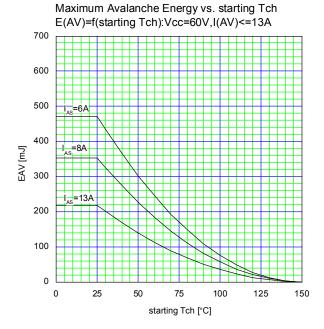


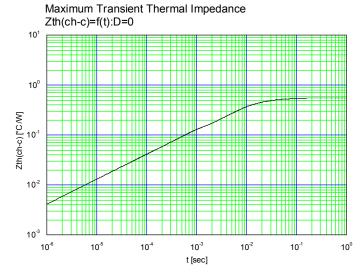












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