

FMH20N50ES

FUJI POWER MOSFET

Super FAP-E^{3S} series

N-CHANNEL SILICON POWER MOSFET

■ Features

Maintains both low power loss and low noise Lower $R_{DS}(on)$ characteristic More controllable switching dv/dt by gate resistance Smaller V_{GS} ringing waveform during switching Narrow band of the gate threshold voltage (4.2±0.5V) High avalanche durability

Applications

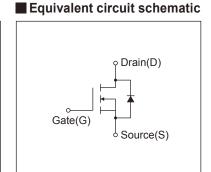
Switching regulators UPS (Uninterruptible Power Supply) DC-DC converters

■ Maximum Ratings and Characteristics

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

TO-3P (Q) 15.5mm (3).2ml (4.5m2) (9).2m2 (9).2

■ Outline Drawings [mm]



Description	Symbol	Characteristics	Unit	Remarks	
Dunin Course Voltage	V _{DS}	500	V		
Drain-Source Voltage	V _{DSX}	500	V	V _{GS} = -30V	
Continuous Drain Current	ID	±20	A		
Pulsed Drain Current	IDP	±80	A		
Gate-Source Voltage	V _G s	±30	V		
Repetitive and Non-Repetitive Maximum Avalanche Current	Iar	20	A	Note*1	
Non-Repetitive Maximum Avalanche Energy	Eas	582.5	mJ	Note*2	
Repetitive Maximum Avalanche Energy	Ear	23.5	mJ	Note*3	
Peak Diode Recovery dV/dt	dV/dt	4.6	kV/μs	Note*4	
Peak Diode Recovery -di/dt	-di/dt	100	A/µs	Note*5	
Maximum Power Dissipation	Po	2.50	W	Ta=25°C	
		235	VV	Tc=25°C	
Operating and Storage Temperature range	Tch	150	°C		
	Tstg	-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 _D =250µA, V _{GS} =0V		500	-	-	V	
Gate Threshold Voltage	V _{GS} (th)	I _D =250µA, V _{DS} =V _{GS}		3.7	4.2	4.7	V	
Zero Gate Voltage Drain Current		V _{DS} =500V, V _{GS} =0V	T _{ch} =25°C	-	-	25		
	Ipss	V _{DS} =400V, V _{GS} =0V	T _{ch} =125°C	-	-	250	μA	
Gate-Source Leakage Current	Igss	V _{GS} =±30V, V _{DS} =0V		-	10	100	nA	
Drain-Source On-State Resistance	R _{DS} (on)	I _D =10A, V _{GS} =10V		-	0.27	0.31	Ω	
Forward Transconductance	g _{fs}	I _D =10A, V _{DS} =25V		5	10	-	S	
Input Capacitance	Ciss	V _{DS} =25V V _{GS} =0V f=1MHz		-	2100	3150	pF	
Output Capacitance	Coss			-	250	375		
Reverse Transfer Capacitance	Crss			-	15	22.5		
Turn-On Time	td(on)	V _{cc} =300V V _{GS} =10V I _D =10A R _{GS} =15Ω		-	40	60	ns	
	tr			-	38	57		
Turn-Off Time	td(off)			-	85	127.5		
	tf			-	17	25.5		
Total Gate Charge	Q _G	V _{cc} =250V I _D =20A V _{GS} =10V		-	57	85.5	nC	
Gate-Source Charge	Q _{GS}			-	21	31.5		
Gate-Drain Charge	Q _{GD}			-	21	31.5		
Gate-Drain Crossover Charge	Qsw			-	10	15		
Avalanche Capability	lav	L=1.07mH, T _{ch} =25°C		20	-	-	Α	
Diode Forward On-Voltage	V _{SD}	I _F =20A, V _{GS} =0V, T _{ch} =25°C		-	0.90	1.35	V	
Reverse Recovery Time	trr	I _F =20A, V _{GS} =0V		-	0.5	-	μs	
Reverse Recovery Charge	Qrr	-di/dt=100A/µs, Tch=25°C		-	7.0	-	μC	

Thermal Characteristics

Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to Case			0.530	°C/W
	Rth (ch-a)	Channel to Ambient			50.0	°C/W

Note *1 : Tch≤150°C.

Note *2 : Stating Tch=25°C, I_{AS}=8A, L=16.7mH, Vcc=50V, R_G=50Ω.

EAS limited by maximum channel temperature and avalanche current.

See to 'Avalanche Energy' graph.

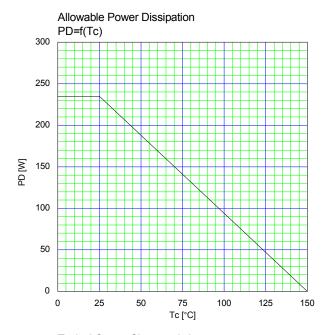
Note *3 : Repetitive rating : Pulse width limited by maximum channel temperature

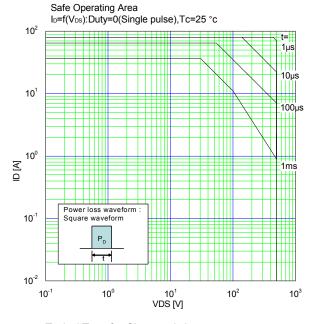
See to the 'Transient Themal impeadance' graph.

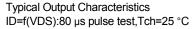
Note *4 : Ir≤-Iɒ, -di/dt=100A/µs, Vcc≤BVɒss, Tch≤150°C.

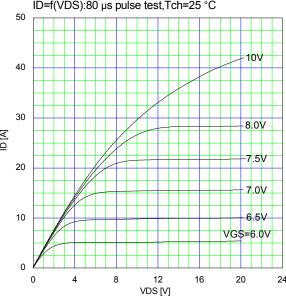
Note *5 : Ir≤-Iɒ, dv/dt=4.6kV/µs, Vcc≤BVɒss, Tch≤150°C.

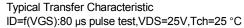
FMH20N50ES **FUJI POWER MOSFET**

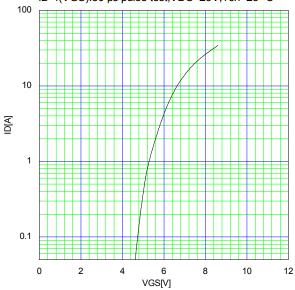




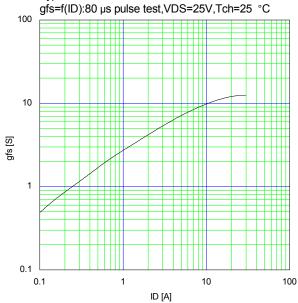


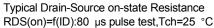


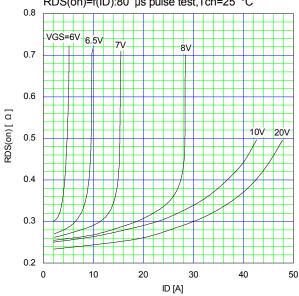




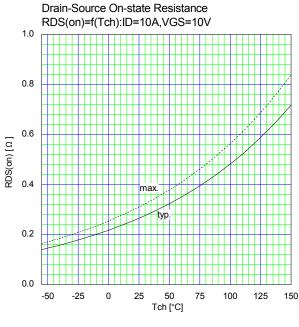
Typical Transconductance

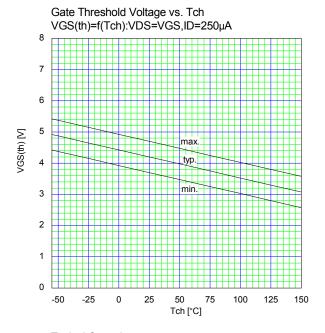


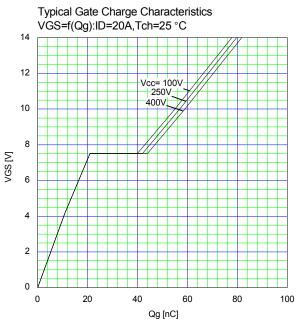


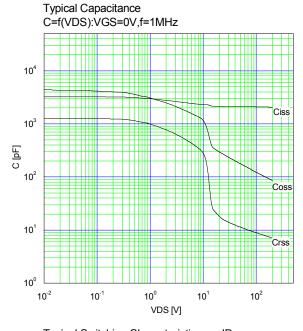


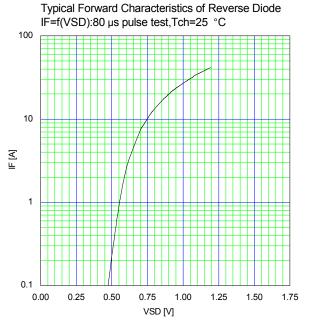
FMH20N50ES FUJI POWER MOSFET

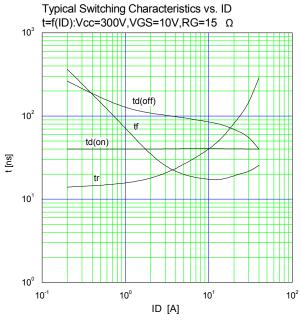


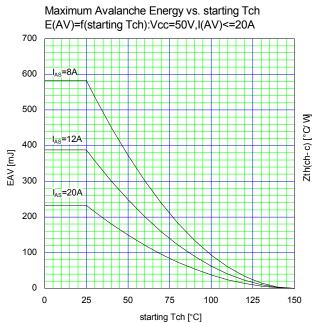


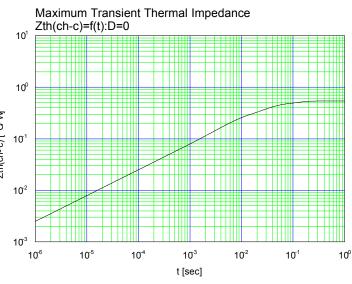












WARNING

- 1. This Catalog contains the product specifications, characteristics, data, materials, and structures as of October 2008.

 The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this Catalog, be sure to obtain the latest specifications.
- 2. All applications described in this Catalog exemplify the use of Fuji's products for your reference only. No right or license, either express or implied, under any patent, copyright, trade secret or other intellectual property right owned by Fuji Electric Device Technology Co., Ltd. is (or shall be deemed) granted. Fuji Electric Device Technology Co., Ltd. makes no representation or warranty, whether express or implied, relating to the infringement or alleged infringement of other's intellectual property rights which may arise from the use of the applications described herein.
- 3. Although Fuji Electric Device Technology Co., Ltd. is enhancing product quality and reliability, a small percentage of semiconductor products may become faulty. When using Fuji Electric semiconductor products in your equipment, you are requested to take adequate safety measures to prevent the equipment from causing a physical injury, fire, or other problem if any of the products become faulty. It is recommended to make your design fail-safe, flame retardant, and free of malfunction.
- 4. The products introduced in this Catalog are intended for use in the following electronic and electrical equipment which has normal reliability requirements.
 - Computers
- OA equipment
- Communications equipment (terminal devices)
- Measurement equipment

- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
- Industrial robots etc.
- 5. If you need to use a product in this Catalog for equipment requiring higher reliability than normal, such as for the equipment listed below, it is imperative to contact Fuji Electric Device Technology Co., Ltd. to obtain prior approval. When using these products for such equipment, take adequate measures such as a backup system to prevent the equipment from malfunctioning even if a Fuji's product incorporated in the equipment becomes faulty.
 - Transportation equipment (mounted on cars and ships)
 - Traffic-signal control equipment

- Trunk communications equipment
- Gas leakage detectors with an auto-shut-off feature
- Emergency equipment for responding to disasters and anti-burglary devices

· Aeronautic equipment

Safety devices

- Medical equipment
- 6. Do not use products in this Catalog for the equipment requiring strict reliability such as the following and equivalents to strategic equipment (without limitation).
 - equipment (without limital)
 Space equipment

- Nuclear control equipment
- Submarine repeater equipment
- 7. Copyright ©1996-2008 by Fuji Electric Device Technology Co., Ltd. All rights reserved.

 No part of this Catalog may be reproduced in any form or by any means without the express permission of Fuji Electric Device Technology Co., Ltd.
- 8. If you have any question about any portion in this Catalog, ask Fuji Electric Device Technology Co., Ltd. or its sales agents before using the product.
 - Neither Fuji Electric Device Technology Co., Ltd. nor its agents shall be liable for any injury caused by any use of the products not in accordance with instructions set forth herein.