

## **FMH07N90E**

**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 (4.0±0.5V) High avalanche durability

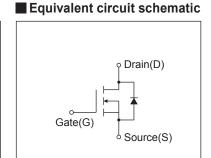
#### Applications

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

#### Maximum Ratings and Characteristics

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

# ■ Outline Drawings [mm] TO-3P(Q)



## Deceription

Description	Symbol	Characteristics	Unit	Remarks
Duain Course Voltage	V <sub>DS</sub>	900	V	
Drain-Source Voltage	V <sub>DSX</sub>	900	V	V <sub>GS</sub> = -30V
Continuous Drain Current	I <sub>D</sub>	±7	Α	
Pulsed Drain Current	IDP	±28	A	
Gate-Source Voltage	V <sub>GS</sub>	±30	V	
Repetitive and Non-Repetitive Maximum AvalancheCurrent	IAR	7	A	Note*1
Non-Repetitive Maximum Avalanche Energy	Eas	396.3	mJ	Note*2
Repetitive Maximum Avalanche Energy	Ear	14.5	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	2.1	kV/μs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/µs	Note*5
Maximum Power Dissipation	PD	2.5	10/	Ta=25°C
		145	W	Tc=25°C
O	Tch	150	°C	
Operating and Storage Temperature range	T <sub>stg</sub>	-55 to + 150	°C	

#### ■ Flectrical Characteristics at Tc=25°C (unless otherwise specified).

Description	Symbol	Conditions	Conditions		typ.	max.	Unit
Drain-Source Breakdown Voltage	BVDSS	In=250µA, Vgs=0V	I <sub>D</sub> =250µA, V <sub>GS</sub> =0V		-	-	V
Gate Threshold Voltage	V <sub>GS</sub> (th)	In=250µA, Vos=Vgs	I <sub>D</sub> =250µA, V <sub>DS</sub> =V <sub>GS</sub>		4.0	4.5	V
Zero Gate Voltage Drain Current	Ipss	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V	Tch=25°C	-	-	25	μA
	IDSS	V <sub>DS</sub> =720V, V <sub>GS</sub> =0V	T <sub>ch</sub> =125°C	-	-	250	
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	R <sub>DS</sub> (on)	I <sub>D</sub> =3.5A, V <sub>GS</sub> =10V	I <sub>D</sub> =3.5A, V <sub>GS</sub> =10V		1.65	2.0	Ω
Forward Transconductance	g <sub>fs</sub>	I <sub>D</sub> =3.5A, V <sub>DS</sub> =25V	I <sub>D</sub> =3.5A, V <sub>DS</sub> =25V		8.4	-	S
Input Capacitance	Ciss	V <sub>DS</sub> =25V		-	1200	1800	pF
Output Capacitance	Coss	V <sub>GS</sub> =0V	V <sub>GS</sub> =0V		115	175	
Reverse Transfer Capacitance	Crss	f=1MHz		-	8.5	13	
IIIrn-On Time	td(on)	V <sub>cc</sub> =600V V <sub>cS</sub> =10V I <sub>D</sub> =3.5A R <sub>c</sub> =36Ω		-	33	53	ns
	tr			-	32	45	
Turn-Off Time	td(off)			-	110	165	
	tf			-	32	45	
Total Gate Charge	QG	1/ 4501/	Vcc=450V		39	59	nC
Gate-Source Charge	Qgs	1			10	15	
Drain-Source Crossover Charge	Qsw	I <sub>D</sub> =7A - V <sub>GS</sub> =10V		-	3.6	5.5	
Gate-Drain Charge	Q <sub>GD</sub>			-	15	23	
Avalanche Capability	lav	L=5.93mH, Tch=25°C		7	-	-	Α
Diode Forward On-Voltage	V <sub>SD</sub>	I <sub>F</sub> =7A, V <sub>GS</sub> =0V, T <sub>ch</sub> =25°C		-	0.90	1.35	V
Reverse Recovery Time	trr	I <sub>F</sub> =7A, V <sub>GS</sub> =0V		-	1.65	-	μS
Reverse Recovery Charge	Qrr	-di/dt=100A/µs, Tch=25	-di/dt=100A/µs, Tch=25°C		11	-	μC

#### Thermal Characteristics

Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to case			0.862	°C/W
	Rth (ch-a)	Channel to ambient			50.0	°C/W

Note \*1 : Tch≤150°C

Note \*2 : Stating Tch=25°C, Ias=2.8A, L=92.7mH, Vcc=90V, Rg=10 $\Omega$ Eas limited by maximum channel temperature and avalanche current. See to 'Avalanche current' graph.

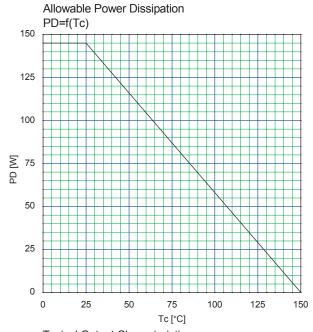
Note \*3: Repetitive rating: Pulse width limited by maximum channel temperature.

See to the 'Transient Themal impeadance' graph.

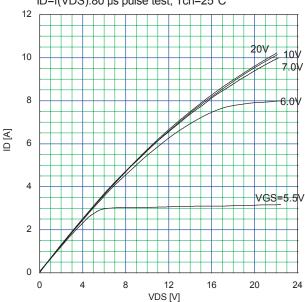
Note \*4 : Ir≤-Ip, -di/dt=100A/µs, Vcc≤BVbss, Tch≤150°C.

Note \*5 : Ir≤-Ip, dv/dt=2.1kV/µs, Vcc≤BVbss, Tch≤150°C.

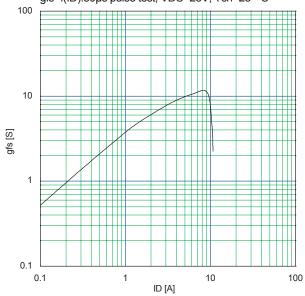
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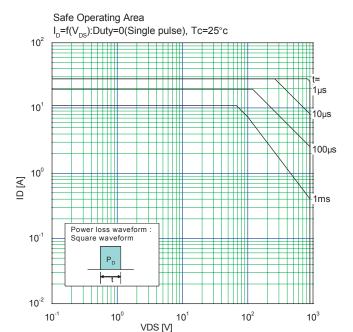


Typical Output Characteristics ID=f(VDS):80 µs pulse test, Tch=25°C

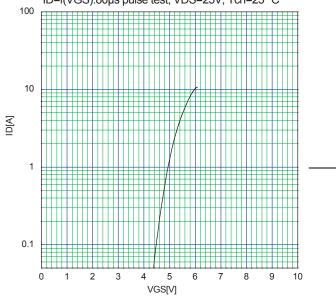


Typical Transconductance gfs=f(ID):80 $\mu$ s pulse test, VDS=25V, Tch=25 °C

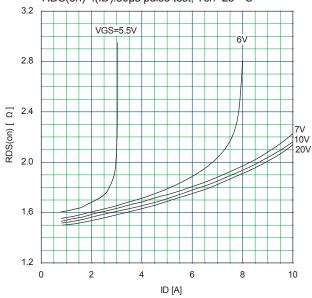


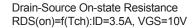


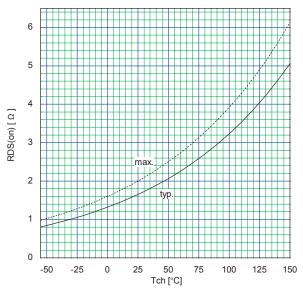
Typical Transfer Characteristic ID=f(VGS):80µs pulse test, VDS=25V, Tch=25 °C



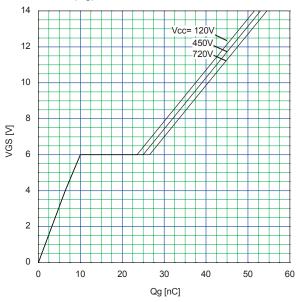
Typical Drain-Source on-state Resistance RDS(on)=f(ID):80µs pulse test, Tch=25 °C



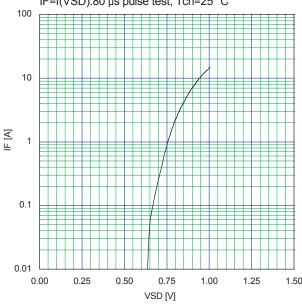




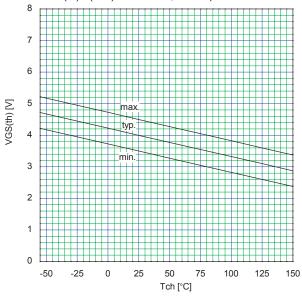
Typical Gate Charge Characteristics VGS=f(Qg):ID=7A, Tch=25°C



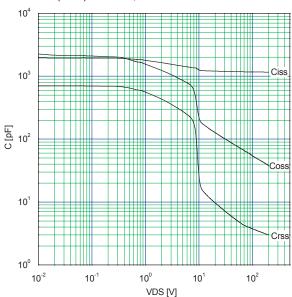
Typical Forward Characteristics of Reverse Diode IF=f(VSD):80  $\mu$ s pulse test, Tch=25 °C



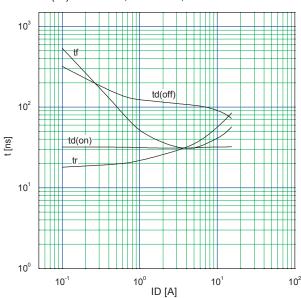
Gate Threshold Voltage vs. Tch VGS(th)=f(Tch):VDS=VGS, ID=25@A



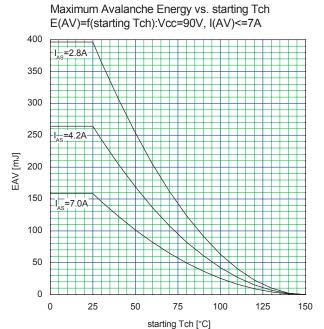
Typical Capacitance C=f(VDS):VGS=0V, f=1MHz

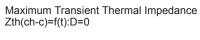


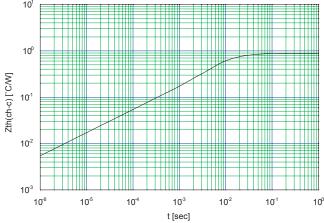
Typical Switching Characteristics vs. ID t=f(ID):Vcc=600V, VGS=10V, RG=3€Ω



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