Fuji Electric

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FMH28N50E

FUJI POWER MOSFET

Super FAP-E^3 series

N-CHANNEL SILICON POWER MOSFET

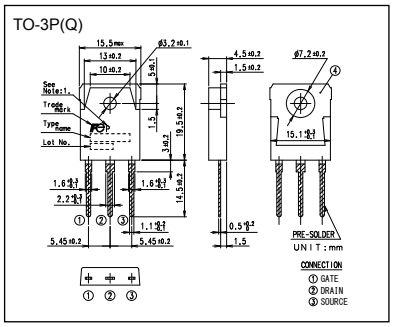
■ Features

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 (3.0±0.5V)
High avalanche durability

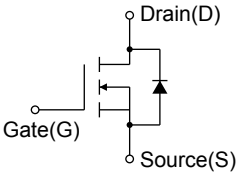
■ Applications

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

■ Outline Drawings [mm]



■ Equivalent circuit schematic



■ Maximum Ratings and Characteristics

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

Description	Symbol	Characteristics	Unit	Remarks
Drain-Source Voltage	V_{DS}	500	V	
	V_{DSX}	500	V	V_{GS} = -30V
Continuous Drain Current	I_D	±28	A	
Pulsed Drain Current	I_{DP}	±112	A	
Gate-Source Voltage	V_{GS}	±30	V	
Repetitive and Non-Repetitive Maximum AvalancheCurrent	I_{AR}	28	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E_{AS}	1033.1	mJ	Note*2
Repetitive Maximum Avalanche Energy	E_{AR}	40	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	10.9	kV/μs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/μs	Note*5
Maximum Power Dissipation	P_D	2.50	W	Ta=25°C
		400		Tc=25°C
Operating and Storage Temperature range	T_{ch}	150	°C	
	T_{stg}	-55 to + 150	°C	

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

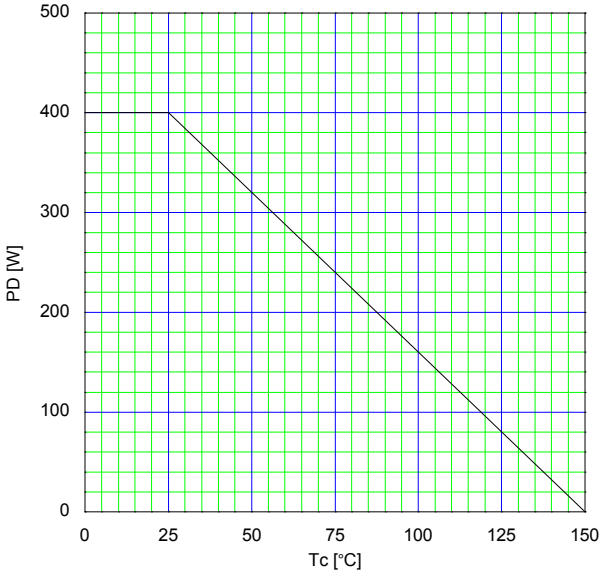
Description	Symbol	Conditions		min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V		500	-	-	V
Gate Threshold Voltage	V_{GS} (th)	I_D=250μA, V_{DS}=V_{GS}		2.5	3.0	3.5	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=500V, V_{GS}=0V	T_{ch}=25°C	-	-	25	μA
		V_{DS}=400V, V_{GS}=0V	T_{ch}=125°C	-	-	250	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V		-	10	100	nA
Drain-Source On-State Resistance	R_{DS} (on)	I_D=14A, V_{GS}=10V		-	0.16	0.19	Ω
Forward Transconductance	g_{fs}	I_D=14A, V_{DS}=25V		16	32	-	S
Input Capacitance	Ciss	V_{DS}=25V		-	4400	6600	pF
Output Capacitance	Coss	V_{GS}=0V		-	420	630	
Reverse Transfer Capacitance	Crss	f=1MHz		-	32	48	
Turn-On Time	td(on)	V_{cc}=300V		-	26	39	ns
	tr	V_{GS}=10V		-	14	21	
Turn-Off Time	td(off)	I_D=14A		-	144	216	
	tf	R_{GS}=5.1Ω		-	24	36	
Total Gate Charge	Q_G	V_{cc}=250V		-	130	195	nC
Gate-Source Charge	Q_{GS}	I_D=28A		-	30	45	
Gate-Drain Charge	Q_{GD}	V_{GS}=10V		-	40	60	
Avalanche Capability	I_{AV}	L=1.04mH, T_{ch}=25°C		28	-	-	A
Diode Forward On-Voltage	V_{SD}	I_F=28A, V_{GS}=0V, T_{ch}=25°C		-	0.90	1.35	V
Reverse Recovery Time	trr	I_F=28A, V_{GS}=0V		-	0.72	-	μS
Reverse Recovery Charge	Qrr	-di/dt=100A/μs, Tch=25°C		-	11.2	-	μC

● Thermal Characteristics

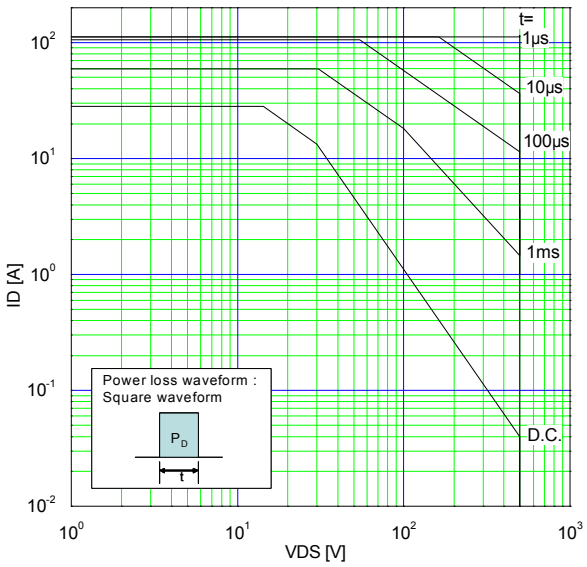
Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to Case			0.313	°C/W
	Rth (ch-a)	Channel to Ambient			50.0	°C/W

Note *1 : Tch≤150°C
Note *2 : Stating Tch=25°C, I_{AS}=12A, L=13.2mH, Vcc=50V, R_G=50Ω
E_{AS} 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 : I_F≤-I_D, -di/dt=100A/μs, Vcc≤BV_{DSS}, Tch≤150°C.
Note *5 : I_F≤-I_D, dv/dt=10.9kV/μs, Vcc≤BV_{DSS}, Tch≤150°C.

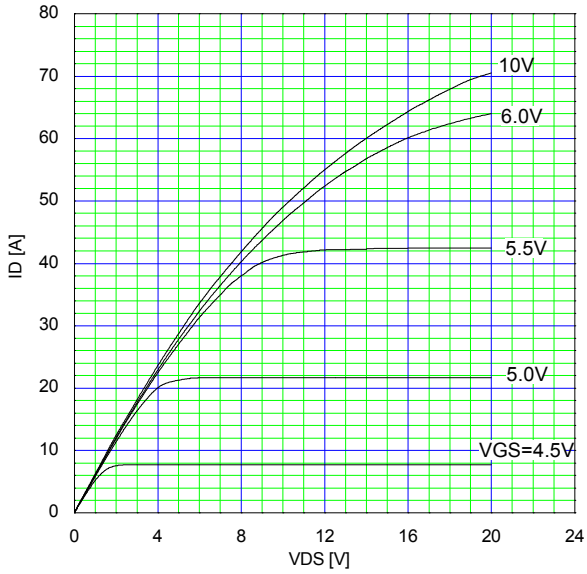
Allowable Power Dissipation
PD=f(Tc)



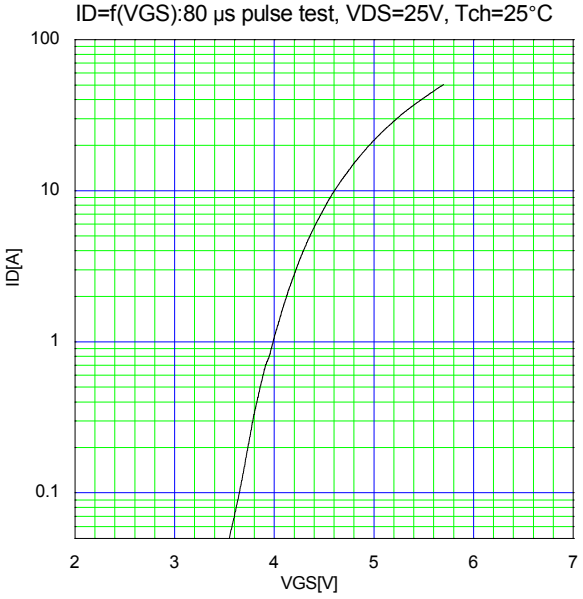
SafeOperatingArea
I_D=f(V_{DS}):Duty=0(Single pulse), Tc=25°c



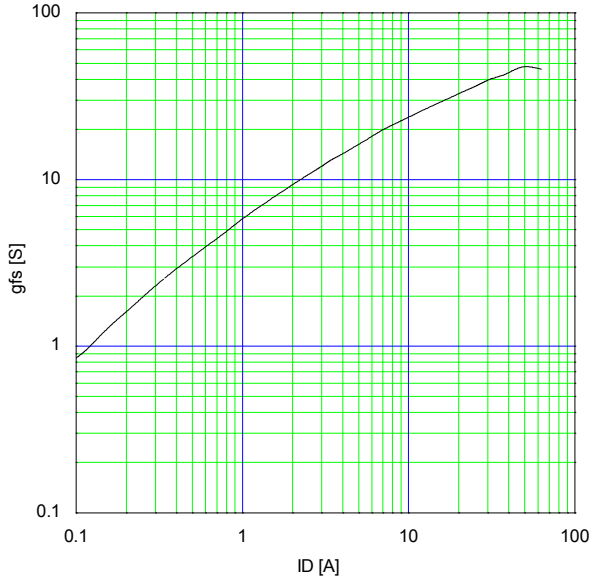
Typical Output Characteristics
ID=f(VDS):80 µs pulse test, Tch=25°C



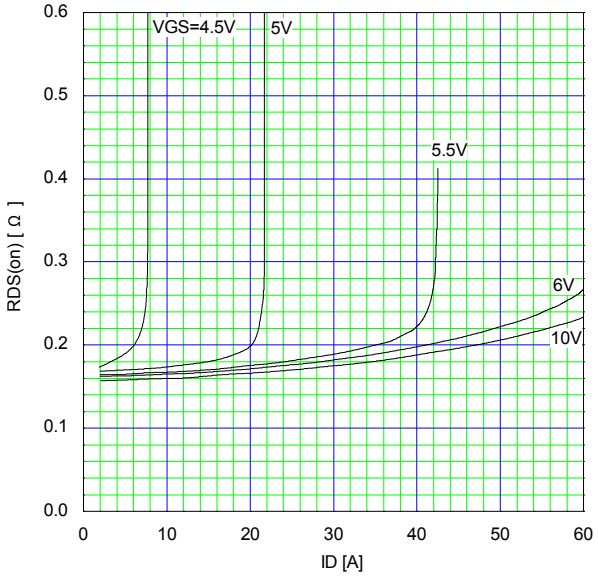
Typical Transfer Characteristic
ID=f(VGS):80 µs pulse test, VDS=25V, Tch=25°C



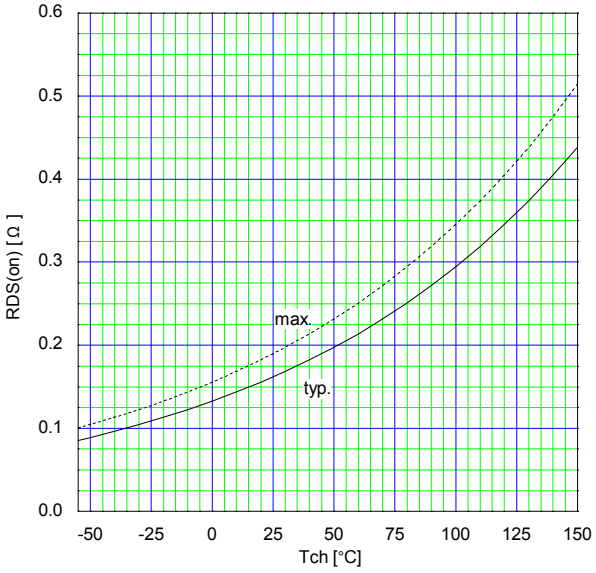
Typical Transconductance
gfs=f(ID):80 µs pulse test, VDS=25V, Tch=25°C



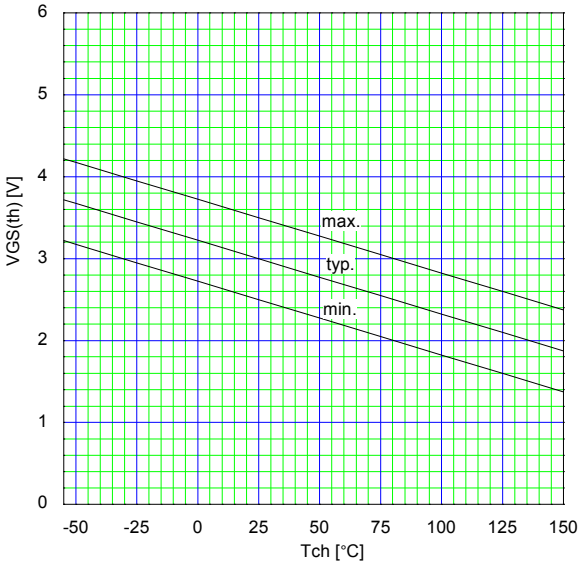
Typical Drain-Source on-state Resistance
RDS(on)=f(ID):80 µs pulse test, Tch=25°C



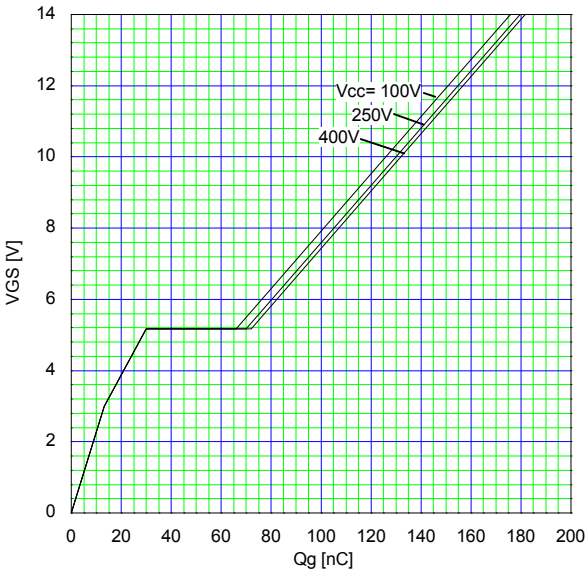
Drain-Source On-state Resistance
RDS(on)=f(Tch):ID=14A, VGS=10V



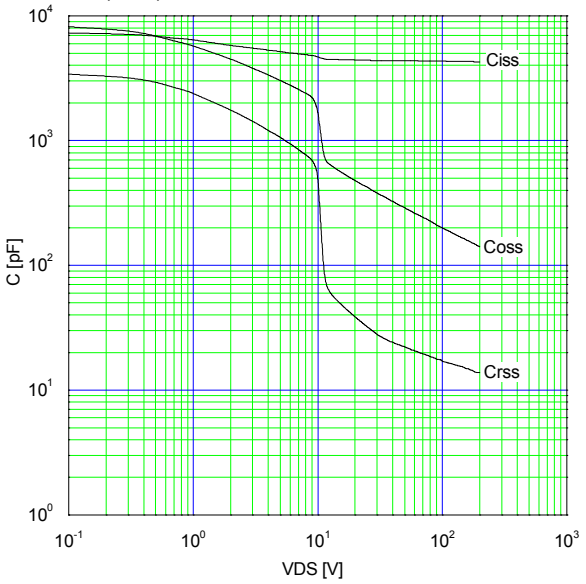
Gate Threshold Voltage vs. Tch
VGS(th)=f(Tch):VDS=VGS, ID=250μA



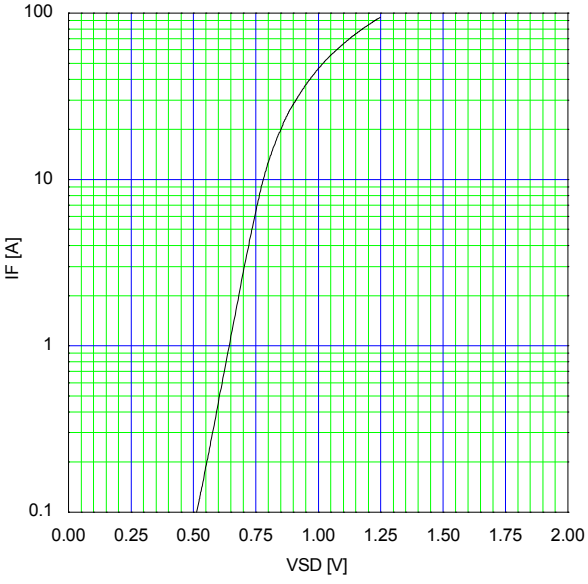
Typical Gate Charge Characteristics
VGS=f(Qg):ID=28A, Tch=25°C



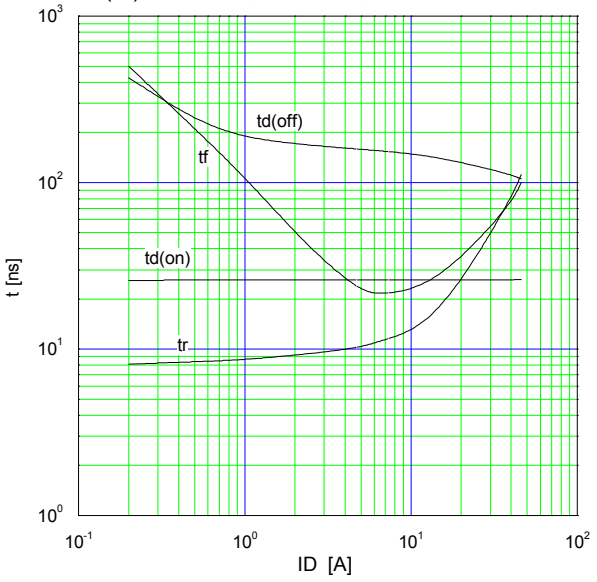
Typical Capacitance
C=f(VDS):VGS=0V, f=1MHz



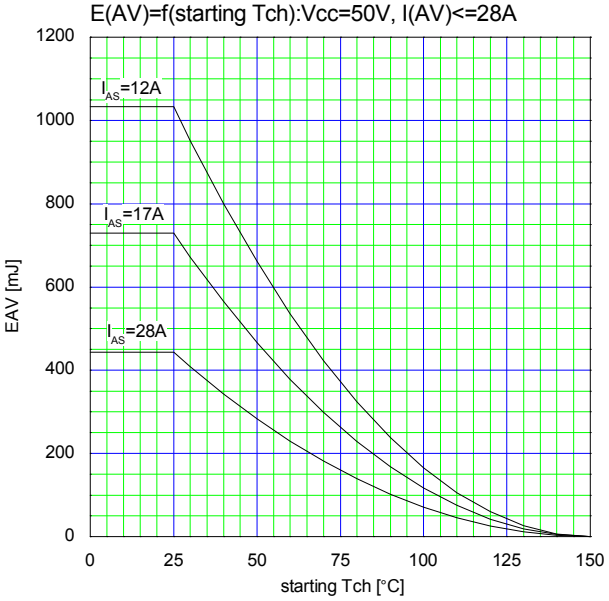
Typical Forward Characteristics of Reverse Diode
IF=f(VSD):80 μs pulse test, Tch=25°C



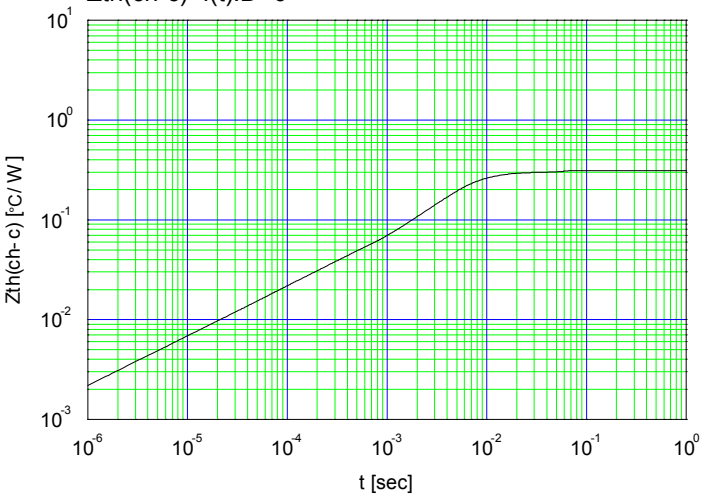
Typical Switching Characteristics vs. ID
t=f(ID):Vcc=300V, VGS=10V, RG=5.1Ω



Maximum Avalanche Energy vs. starting Tch
E(AV)=f(starting Tch):Vcc=50V, I(AV)<=28A



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



WARNING

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- Measurement equipment
- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
- Industrial robots etc.

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

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- Aeronautic equipment
- Nuclear control equipment
- Submarine repeater equipment

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