e-Front runners

FMH09N90E

FUJI POWER MOSFET

Super FAP-E^3 series

N-CHANNEL SILICON POWER MOSFET

■ Features

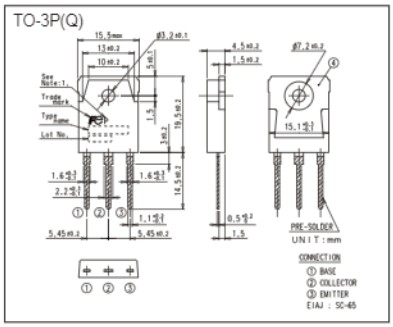
Maintains both low power loss and low noise
Lower R_{DS}(on) characteristic
More controllable switching dv/dt by gate resistance
Smaller V_{GS} ringing waveform during switching
Narrow band of the gate threshold voltage (4.0±0.5V)
High avalanche durability

■ Applications

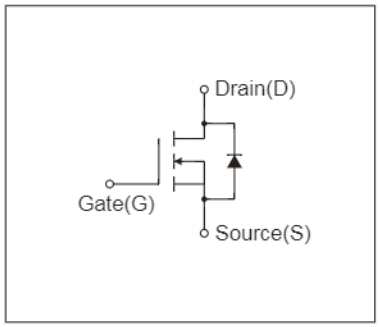
Switching regulators
UPS (Uninterruptible Power Supply)
DC-DC converters

■ Outline Drawings [mm]

TO-3P(Q)



■ 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}	900	V	
	V_{DSX}	900	V	V_{GS} = -30V
Continuous Drain Current	I_D	±9	A	
Pulsed Drain Current	I_{DP}	±36	A	
Gate-Source Voltage	V_{GS}	±30	V	
Repetitive and Non-Repetitive Maximum AvalancheCurrent	I_{AR}	9	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E_{AS}	565.3	mJ	Note*2
Repetitive Maximum Avalanche Energy	E_{AR}	20.5	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	P_D	2.5	W	Ta=25°C
		205		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)

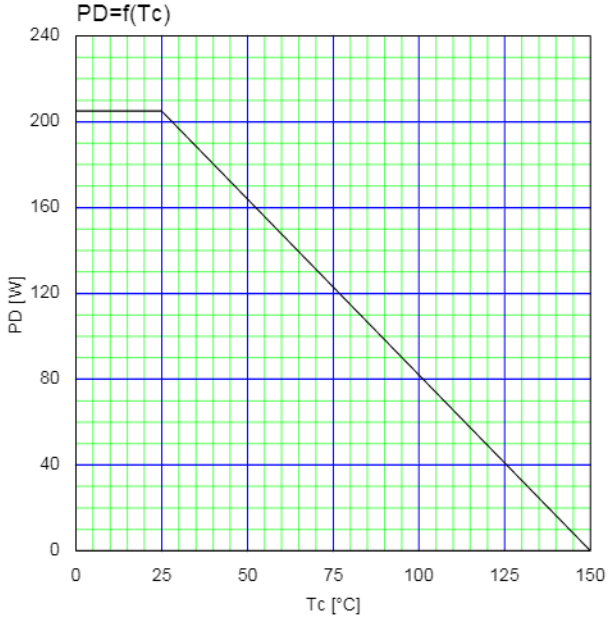
Description	Symbol	Conditions		min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V		900	-	-	V
Gate Threshold Voltage	V_{GS} (th)	I_D=250μA, V_{DS}=V_{GS}		3.5	4.0	4.5	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=900V, V_{GS}=0V	T_{ch}=25°C	-	-	25	μA
		V_{DS}=720V, V_{GS}=0V	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=4.5A, V_{GS}=10V		-	1.16	1.4	Ω
Forward Transconductance	g_{fs}	I_D=4.5A, V_{DS}=25V		5.0	10	-	S
Input Capacitance	Ciss	V_{DS}=25V		-	1700	2550	pF
Output Capacitance	Coss	V_{GS}=0V		-	150	225	
Reverse Transfer Capacitance	Crss	f=1MHz		-	11	17	
Turn-On Time	td(on)	V_{cc}=600V		-	35	53	ns
	tr	V_{GS}=10V		-	30	45	
Turn-Off Time	td(off)	I_D=4.5A		-	110	165	
	tf	R_G=24Ω		-	30	45	
Total Gate Charge	Q_G	V_{cc}=450V		-	50	75	nC
Gate-Source Charge	Q_{GS}	I_D=9A		-	15	23	
Gate-Drain Charge	Q_{GD}	V_{GS}=10V		-	16	24	
Gate-Drain Crossover Charge	Q_{SW}			-	6	9	
Avalanche Capability	I_{AV}	L=5.12mH, T_{ch}=25°C		9	-	-	A
Diode Forward On-Voltage	V_{SD}	I_F=9A, V_{GS}=0V, T_{ch}=25°C		-	0.90	1.35	V
Reverse Recovery Time	trr	I_F=9A, V_{GS}=0V		-	1.8	-	μS
Reverse Recovery Charge	Qrr	-di/dt=100A/μs, Tch=25°C		-	15	-	μC

● Thermal Characteristics

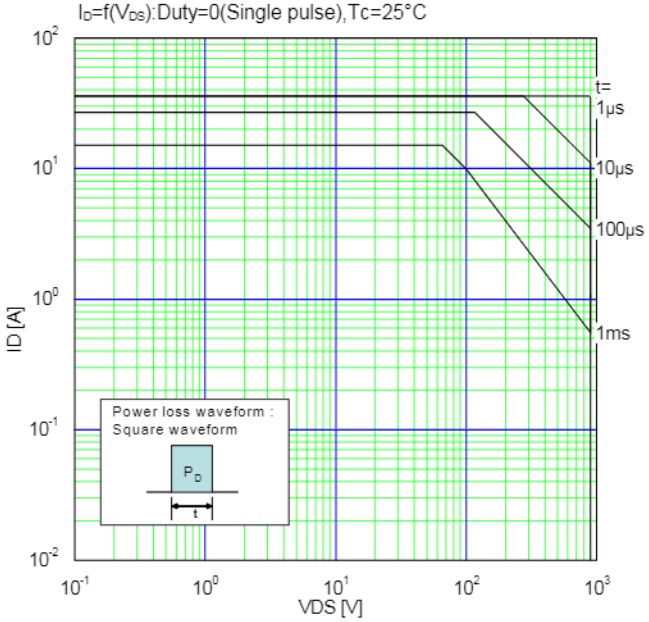
Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to case			0.610	°C/W
	Rth (ch-a)	Channel to ambient			50.0	°C/W

Note *1 : Tch≤150°C
Note *2 : Stating Tch=25°C, I_{AS}=3.6A, L=80.0mH, V_{cc}=90V, R_G=10Ω
E_{AS} 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 : I_F≤-I_D, -di/dt=100A/μs, V_{cc}≤BV_{DSS}, Tch≤150°C.
Note *5 : I_F≤-I_D, dv/dt=2.1kV/μs, V_{cc}≤BV_{DSS}, Tch≤150°C.

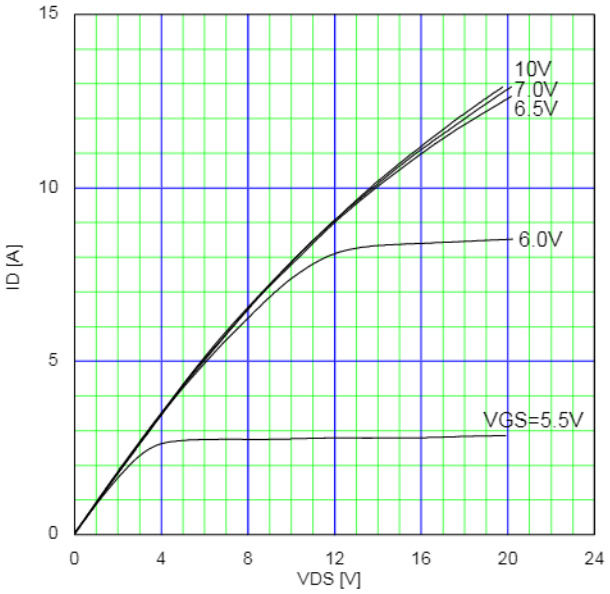
Allowable Power Dissipation
PD=f(Tc)



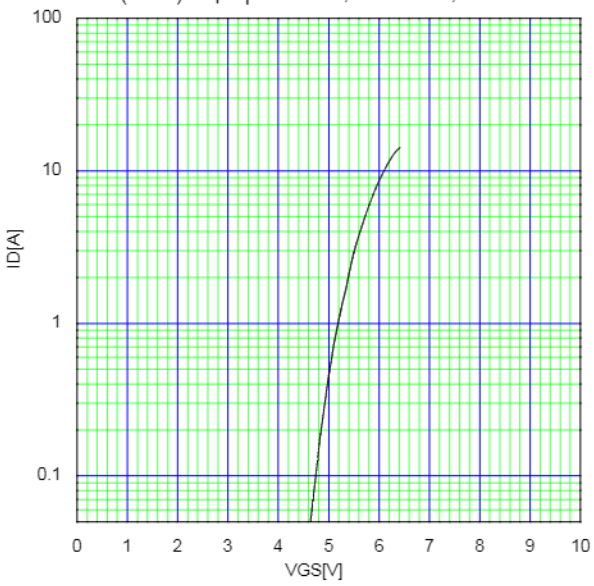
Safe Operating Area
I_D=f(V_{DS}):Duty=0(Single pulse),Tc=25°C



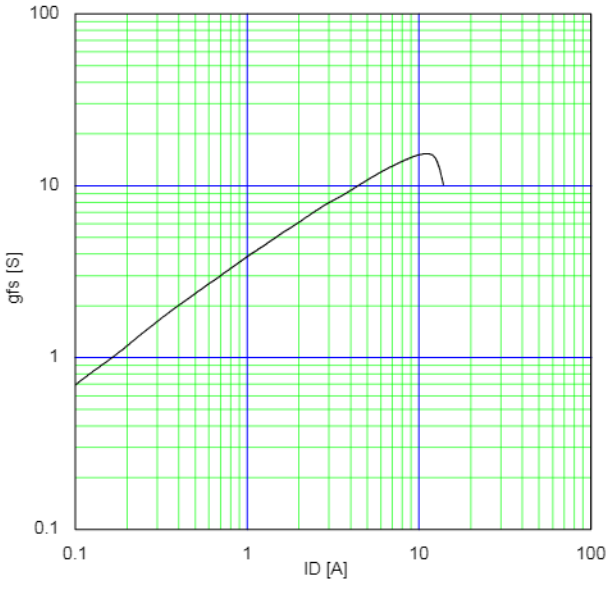
Typical Output Characteristics
ID=f(VDS):80 µs pulse test,Tch=25°C



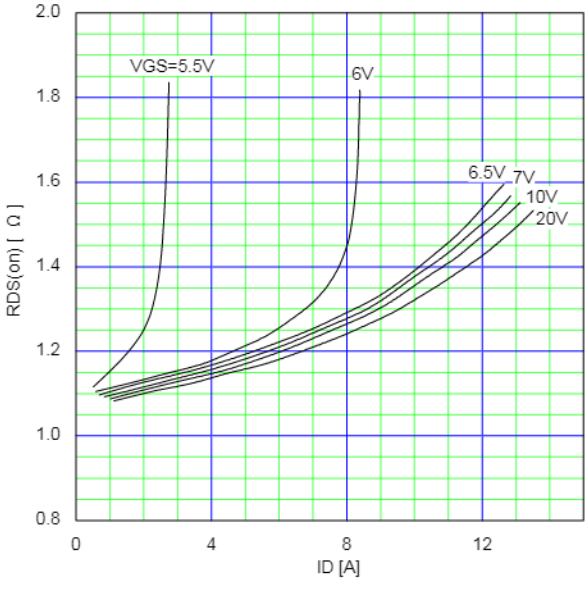
Typical Transfer Characteristic
ID=f(VGS):80µs pulse test,VDS=25V,Tch=25˚C



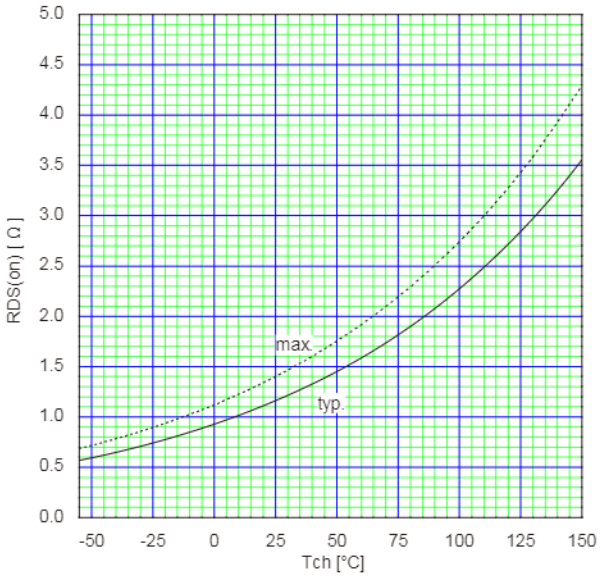
Typical Transconductance
gfs=f(ID):80µs pulse test,VDS=25V,Tch=25°C



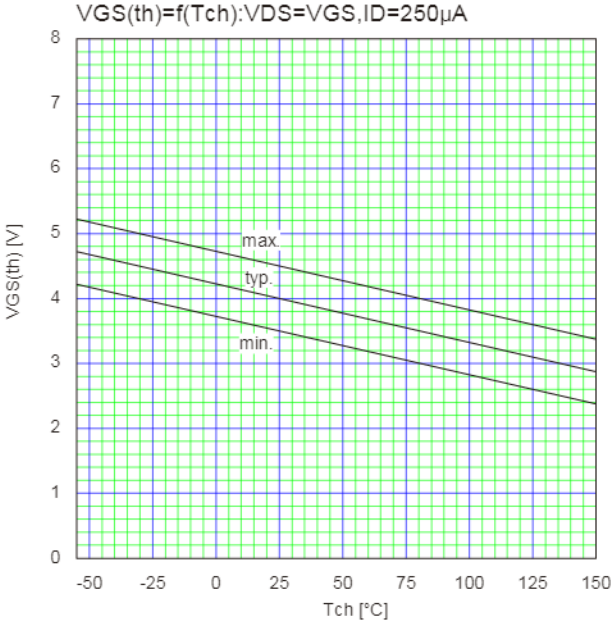
Typical Drain-Source on-state Resistance
RDS(on)=f(ID):80 µs pulse test,Tch=25°C



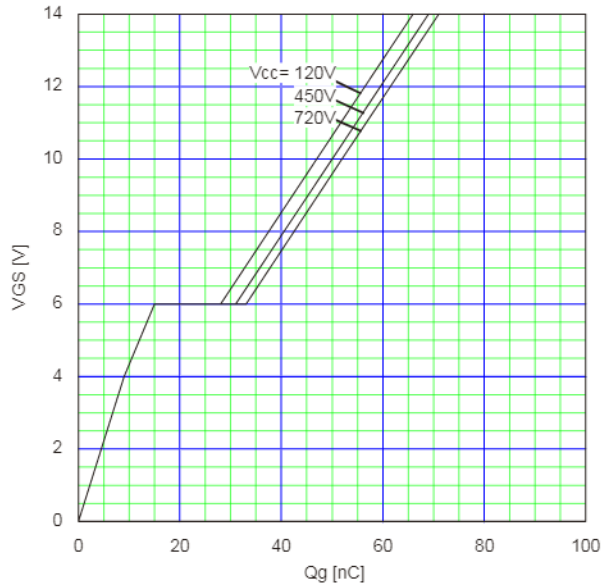
Drain-Source On-state Resistance
RDS(on)=f(Tch):ID=4.5A,VGS=10V



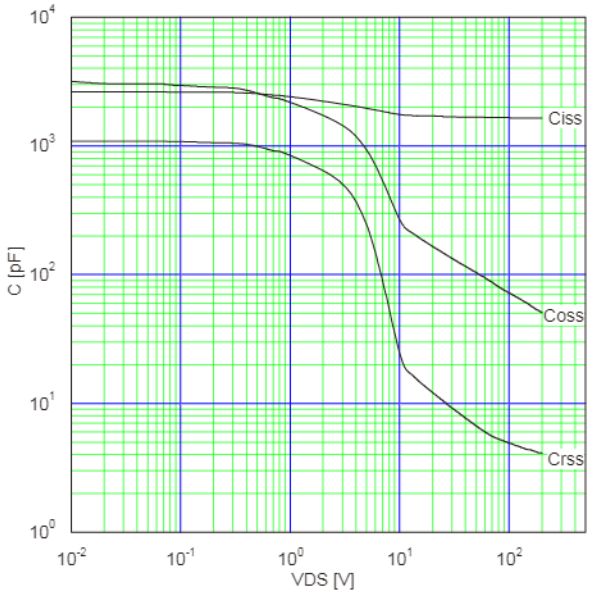
Gate Threshold Voltage vs. Tch
VGS(th)=f(Tch):VDS=VGS,ID=250μA



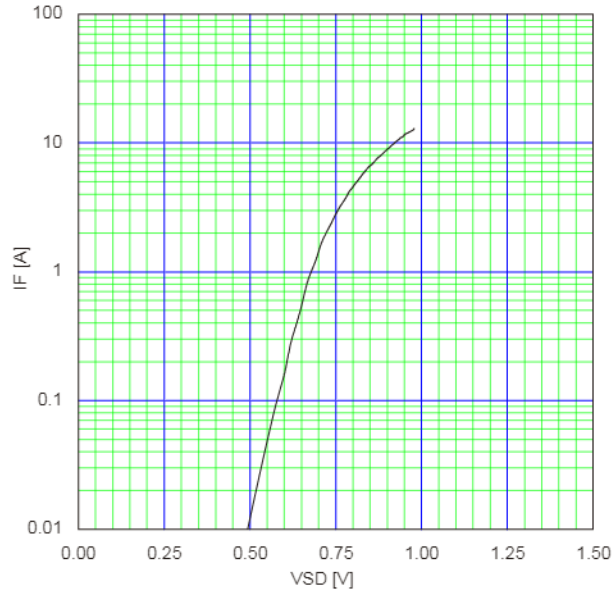
Typical Gate Charge Characteristics
VGS=f(Qg):ID=9A,Tch=25°C



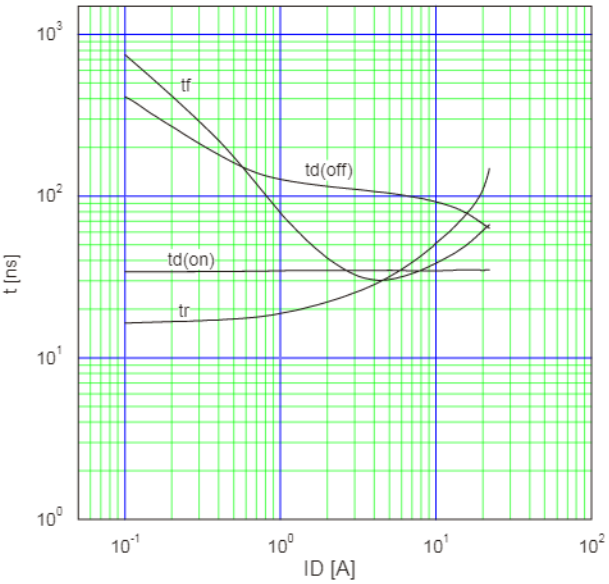
Typical Capacitance
C=f(VDS):VGS=0V,f=1MHz



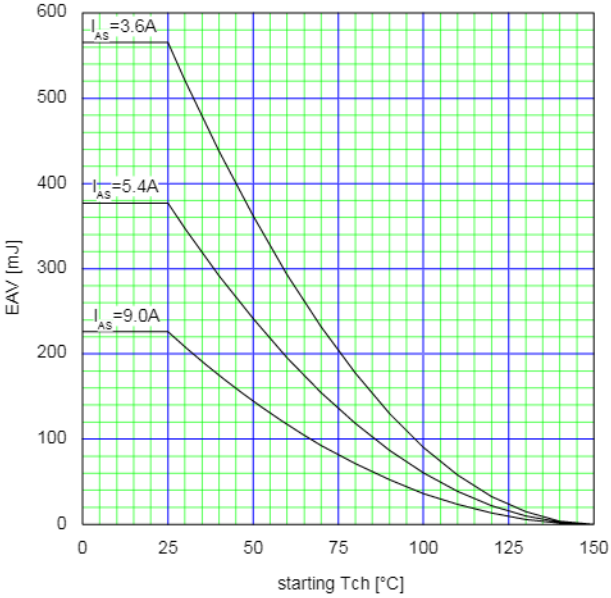
Typical Forward Characteristics of Reverse Diode
IF=f(VSD):80 μs pulse test,Tch=25°C



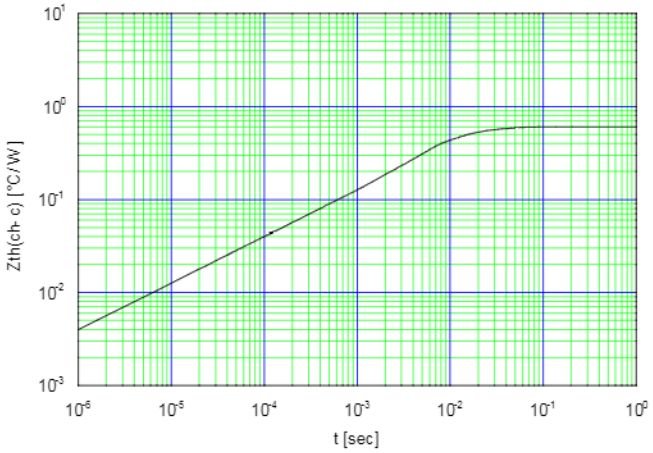
Typical Switching Characteristics vs. ID
t=f(ID):Vcc=600V,VGS=10V,RG=24Ω



Maximum Avalanche Energy vs. starting Tch
E(AV)=f(starting Tch):Vcc=90V,I(AV)<=9A



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



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