2SK3778-01

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N-CHANNEL SILICON POWER MOSFET

FUJI POWER MOSFET

Super FAP-G Series

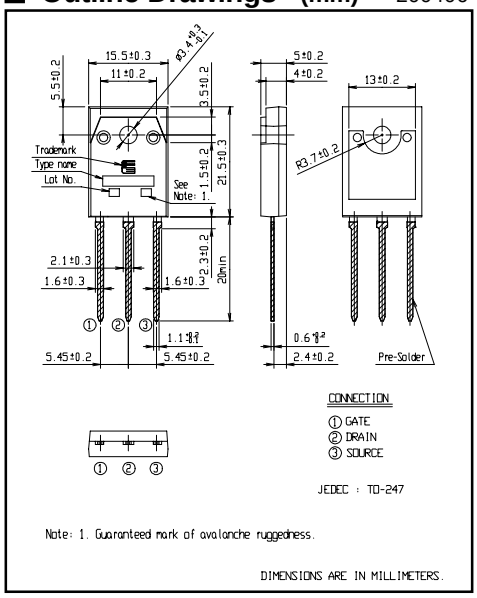
■ Features

High speed switching, Low on-resistance
Low driving power, Avalanche-proof
No secondary breadown

■ Applications

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

■ Outline Drawings (mm) 200406

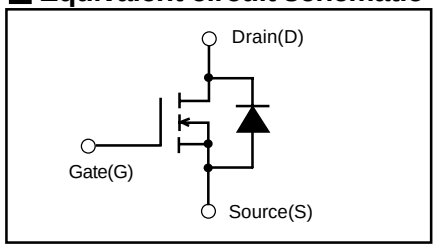


■ Maximum ratings and characteristic

● **Absolute maximum ratings**
(Tc=25°C unless otherwise specified)

Item	Symbol	Ratings	Unit	Remarks
Drain-source voltage	V_{DS}	250	V	
	V_{DSX}	250	V	V_{GS}=-30V
Continuous Drain Current	I_D	59	A	
Pulsed Drain Current	$I_{D(puls)}$	±236	A	
Gate-Source Voltage	V_{GS}	±30	V	
Maximum Avalanche current	I_{AR}	59	A	Note *1
Non-Repetitive Maximum Avalanche Energy	E_{AS}	1115.2	mJ	Note *2
Repetitive Maximum Avalanche Energy	E_{AR}	41	mJ	Note *3
Maximum Drain-Source dV/dt	dV_{DS}/dt	20	kV/µs	V_{DS}≦250V
Peak Diode Recovery dV/dt	dV/dt	5	kV/µs	Note *4
Max. Power Dissipation	P_D	410	W	Tc=25°C
		2.50		Ta=25°C
Operating and Storage Temperature range	T_{ch}	+150	°C	
	T_{stg}	-55 to +150	°C	

■ Equivalent circuit schematic



Note *1:Tch≦150°C,Repetitive and Non-repetitive
Note *2:StartingTch=25°C,I_{AS}=24A,L=3.25mH,
V_{CC}=48V,R_G=50Ω
EAS limited by maximum channel temperature and avalanch current.
See to the 'Avalanche Energy' graph
Note *3:Repetitive rating:Pulse width limited by maximum channel temperature.
See to the 'Transient Theemal impedance' graph
Note *4:I_F≦-I_D, -di/dt=50A/µs,V_{CC}≦BV_{DSS}, Tch≦150°C

● **Electrical characteristics (T_c =25°C unless otherwise specified)**

Item	Symbol	Test Conditions		Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltaget	BV_{DSS}	I_D= 250µA V_{GS}=0V		250			V
Gate Threshold Voltage	$V_{GS(th)}$	I_D= 250µA V_{DS}=V_{GS}		3.0		5.0	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=250V V_{GS}=0V	Tch=25°C			25	µA
		V_{DS}=200V V_{GS}=0V	Tch=125°C			250	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V V_{DS}=0V				100	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	I_D=29.5A V_{GS}=10V			43	53	mΩ
Forward Transcondutance	g_{fs}	I_D=29.5A V_{DS}=25V		12	24		S
Input Capacitance	C_{iss}	V_{DS}=75V			3800	5400	pF
Output Capacitance	C_{oss}	V_{GS}=0V			530	795	
Reverse Transfer Capacitance	C_{rss}	f=1MHz			35	52.5	
Turn-On Time t_{on}	td(on)	V_{CC}=72V I_D=29.5A			40	60	ns
	tr	V_{GS}=10V			62	93	
Turn-Off Time t_{off}	td(off)	R_{GS}=10Ω			70	105	
	tf				20	30	
Total Gate Charge	Q_G	V_{CC}=150V			80	120	nC
Gate-Source Charge	Q_{GS}	I_D=59A			30	45	
Gate-Drain Charge	Q_{GD}	V_{GS}=10V			25	38	
Diode forward on-voltage	V_{SD}	I_F=59A V_{GS}=0V Tch=25°C			1.20	1.50	V
Reverse recovery time	t_{rr}	I_F=59A V_{GS}=0V			370		ns
Reverse recovery charge	Q_{rr}	-di/dt=100A/µs Tch=25°C			4.5		µC

● **Thermalcharacteristics**

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal resistance	$R_{th(ch-c)}$	channel to case			0.305	°C/W
	$R_{th(ch-a)}$	channel to ambient			50.0	°C/W

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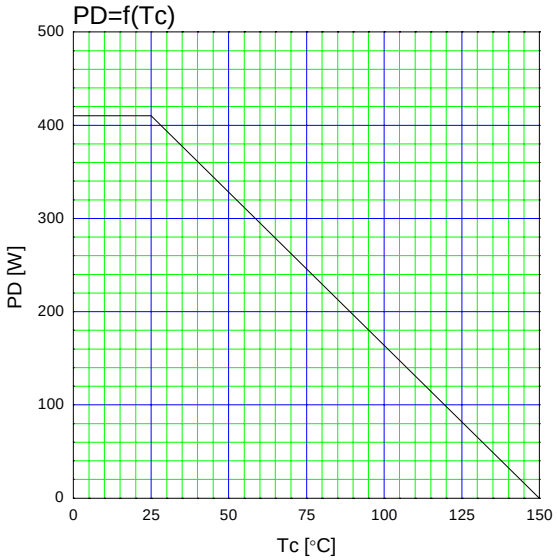
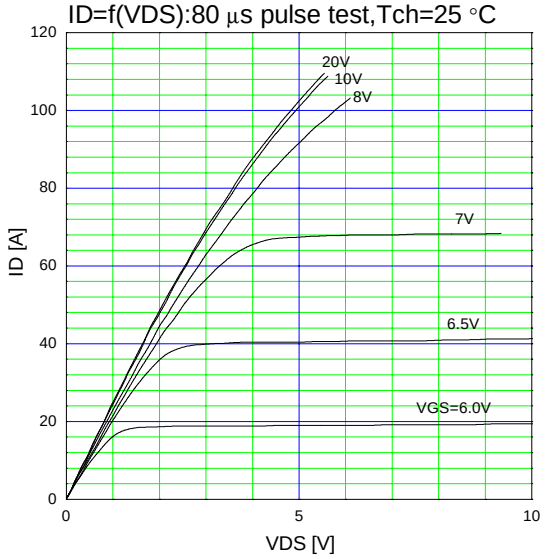
Characteristics

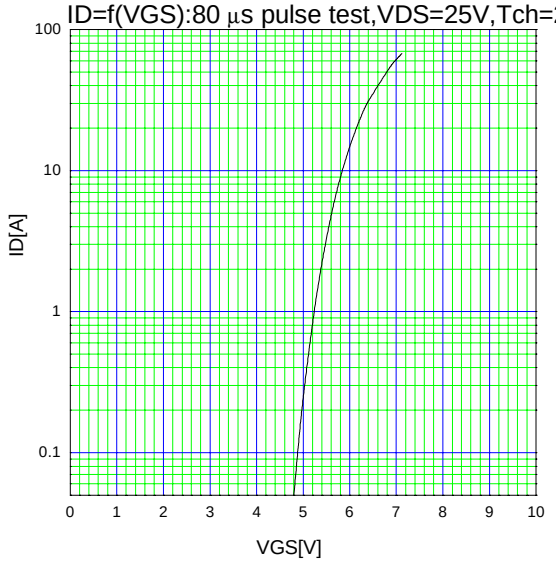
Allowable Power Dissipation
PD=f(Tc)



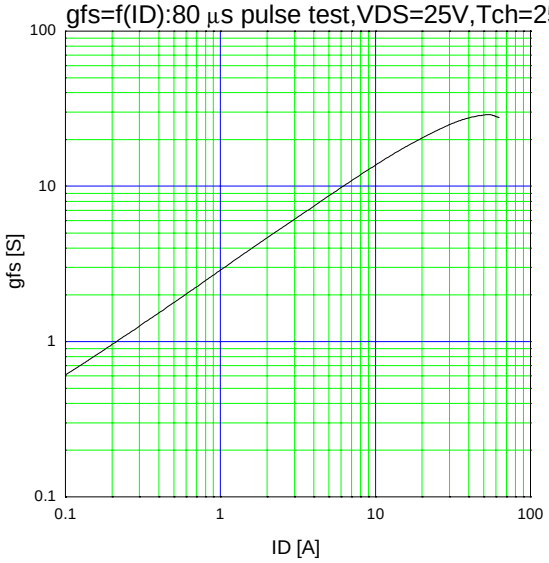
Typical Output Characteristics
ID=f(VDS):80 μs pulse test,Tch=25 °C



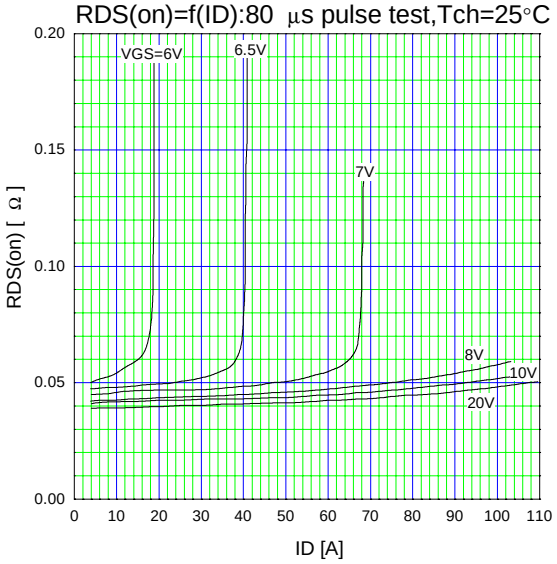
Typical Transfer Characteristic
ID=f(VGS):80 μs pulse test,VDS=25V,Tch=25°C



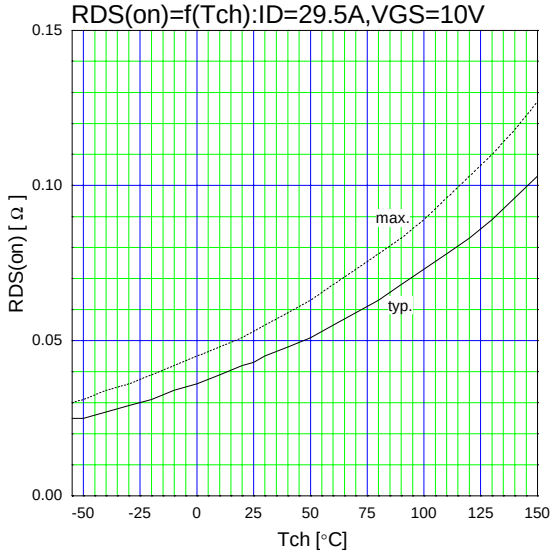
Typical Transconductance
gfs=f(ID):80 μs pulse test,VDS=25V,Tch=25°C



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=29.5A,VGS=10V



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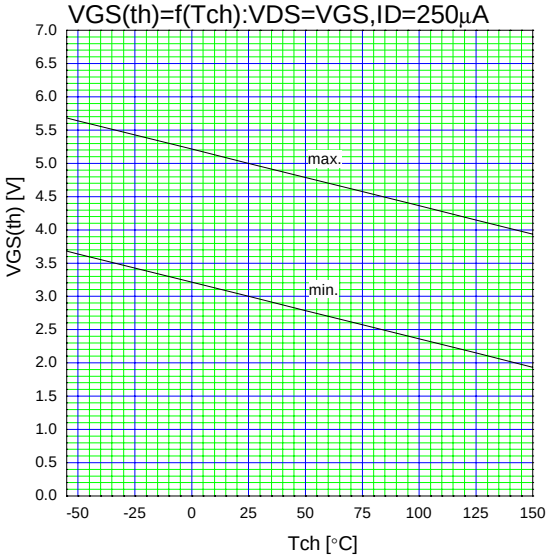
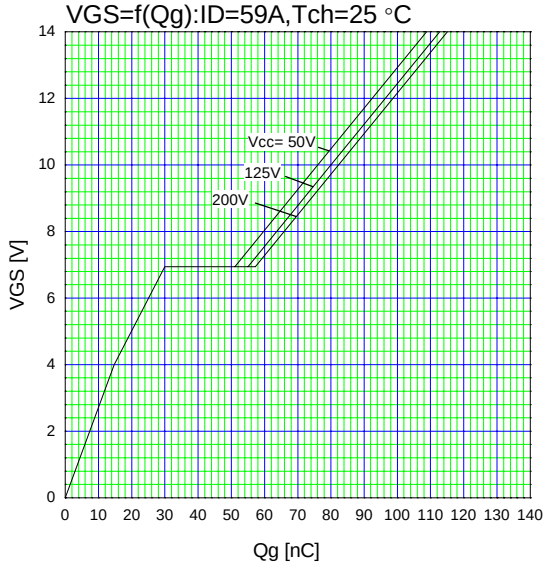
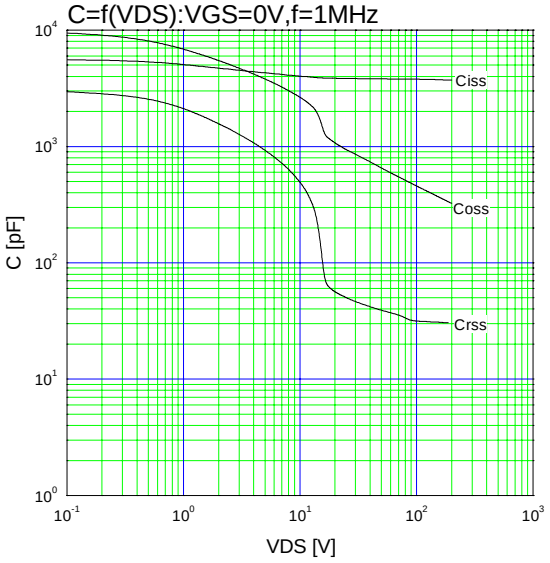
Gate Threshold Voltage vs. Tch
VGS(th)=f(Tch):VDS=VGS,ID=250μA



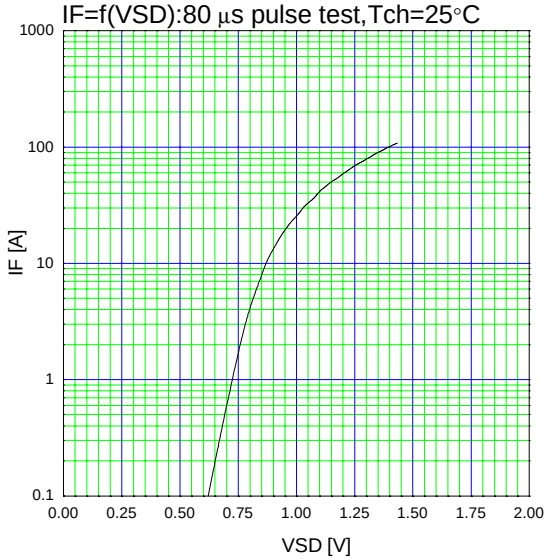
Typical Gate Charge Characteristics
VGS=f(Qg):ID=59A,Tch=25 °C



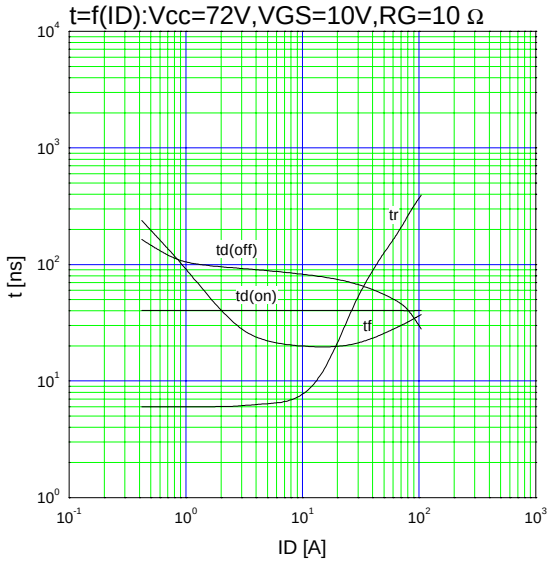
Typical Capacitance
C=f(VDS):VGS=0V,f=1MHz



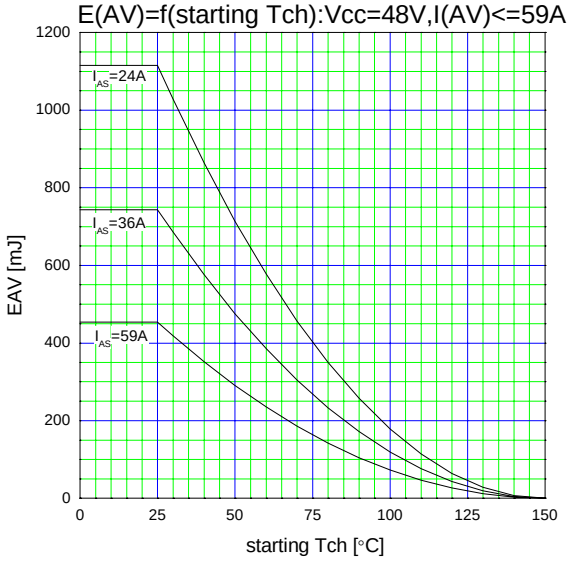
Typical Forward Characteristics of Reverse Diode
IF=f(VSD):80 μs pulse test,Tch=25°C



Typical Switching Characteristics vs. ID
t=f(ID):Vcc=72V,VGS=10V,RG=10 Ω



Maximum Avalanche Energy vs. starting Tch
E(AV)=f(starting Tch):Vcc=48V,I(AV)<=59A



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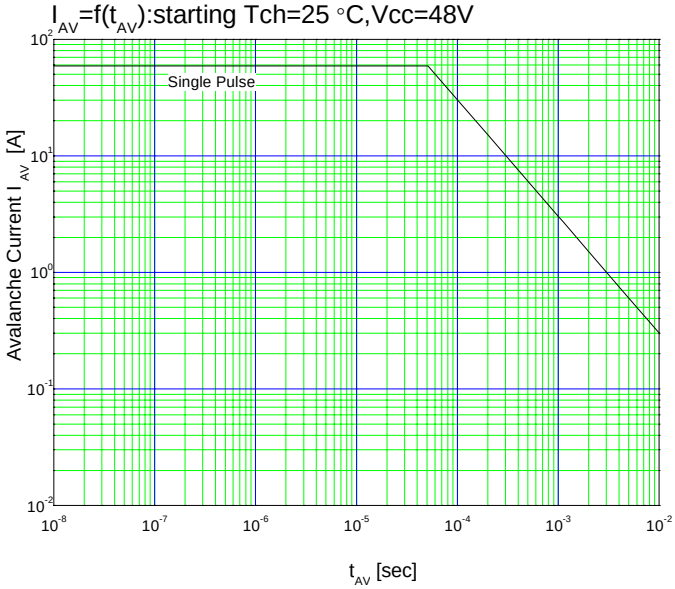
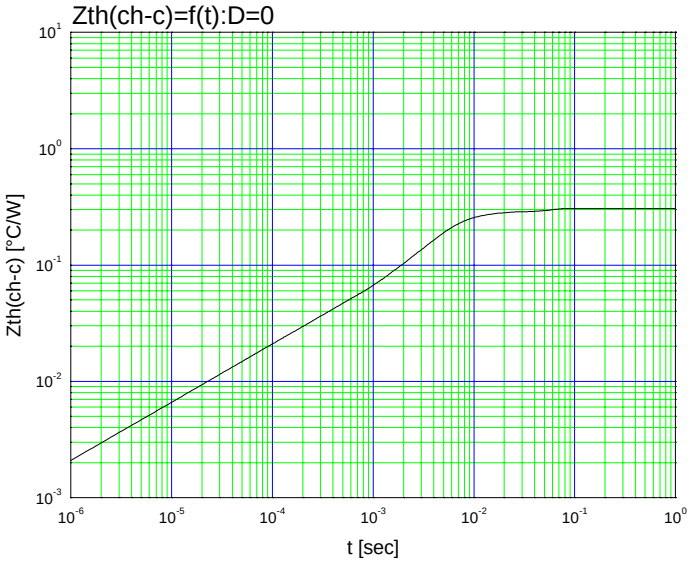
Maximum Avalanche Current Pulsewidth
I_{AV}=f(t_{AV}):starting Tch=25 °C,Vcc=48V



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