FMV30N60S1

FUJI POWER MOSFET

Super J-MOS series

N-Channel enhancement mode power MOSFET

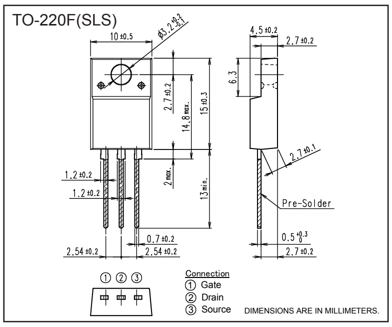
Features

Low on-state resistance
Low switching loss
easy to use (more controllabe switching dV/dt by R_g)

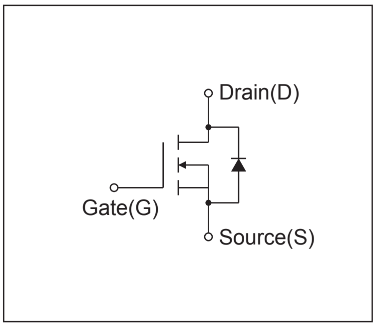
Applications

UPS
Server
Telecom
Power conditioner system
Power supply

Outline Drawings [mm]



Equivalent circuit schematic



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

Description	Symbol	Characteristics	Unit	Remarks
Drain-Source Voltage	V_{DS}	600	V	
	V_{DSX}	600	V	V_{GS}=-30V
Continuous Drain Current	I_D	±30	A	Tc=25°C Note*1
		±19	A	Tc=100°C Note*1
Pulsed Drain Current	I_{DP}	±90	A	
Gate-Source Voltage	V_{GS}	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	I_{AR}	6.6	A	Note *2
Non-Repetitive Maximum Avalanche Energy	E_{AS}	849.2	mJ	Note *3
Maximum Drain-Source dV/dt	dV_{DS}/dt	50	kV/μs	V_{DS}≤ 600V
Peak Diode Recovery dV/dt	dV/dt	12	kV/μs	Note *4
Peak Diode Recovery -di/dt	-di/dt	100	A/μs	Note *5
Maximum Power Dissipation	P_D	2.16	W	T_a=25°C
		90		Tc=25°C
Operating and Storage Temperature range	T_{ch}	150	°C	
	T_{stg}	-55 to +150	°C	
Isolation Voltage	V_{iso}	2	kVrms	t=60sec,f=60Hz

Note *1 : Limited by maximum channel temperature.
Note *2 : T_{ch}≤150°C, See Fig.1 and Fig.2
Note *3 : Starting T_{ch}=25°C, I_{AS}=4A, L=97.3mH, V_{DD}=60V, R_G=50Ω, See Fig.1 and Fig.2
E_{AS} limited by maximum channel temperature and avalanche current.
Note *4 : I_F≤-I_D, -di/dt=100A/μs, V_{DD}≤400V, T_{ch}≤150°C.
Note *5 : I_F≤-I_D, dV/dt=12kV/μs, V_{DD}≤400V, T_{ch}≤150°C.

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

• Static Ratings

Description	Symbol	Conditions		min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA V_{GS}=0V		600	-	-	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}=600V V_{GS}=0V	T_{ch}=25°C	-	-	25	μA
		V_{DS}=480V 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=15A V_{GS}=10V		-	0.106	0.125	Ω
Gate resistance	R_G	f=1MHz, open drain		-	3.2	-	Ω

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May 2012

• Dynamic Ratings

Description	Symbol	Conditions	min.	typ.	max.	Unit
Forward Transconductance	g_{fs}	I_D=15A V_{DS}=25V	13	26	-	S
Input Capacitance	C_{iss}	V_{DS}=10V V_{GS}=0V f=1MHz	-	2200	-	pF
Output Capacitance	C_{oss}		-	4670	-	
Reverse Transfer Capacitance	C_{rss}		-	430	-	
Effective output capacitance, energy related (Note *6)	$C_{o(er)}$	V_{GS}=0V V_{DS}=0…480V	-	127	-	
Effective output capacitance, time related (Note *7)	$C_{o(tr)}$	V_{GS}=0V V_{DS}=0…480V ID=constant	-	450	-	
Turn-On Time	$t_{d(on)}$	V_{DD}=400V, V_{GS}=10V I_D=15A, R_G=13Ω See Fig.3 and Fig.4	-	31	-	ns
	t_r		-	57	-	
Turn-Off Time	$t_{d(off)}$		-	136	-	
	t_f		-	17	-	
Total Gate Charge	Q_G	V_{DD}=480V, I_D=30A V_{GS}=10V See Fig.5	-	73	-	nC
Gate-Source Charge	Q_{GS}		-	18	-	
Gate-Drain Charge	Q_{GD}		-	25	-	
Drain-Source crossover Charge	Q_{SW}		-	11.5	-	

Note *6 : $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% BV_{DSS}.
Note *7 : $C_{o(tr)}$ is a fixed capacitance that gives the same charging times as C_{oss} while V_{DS} is rising from 0 to 80% BV_{DSS}.

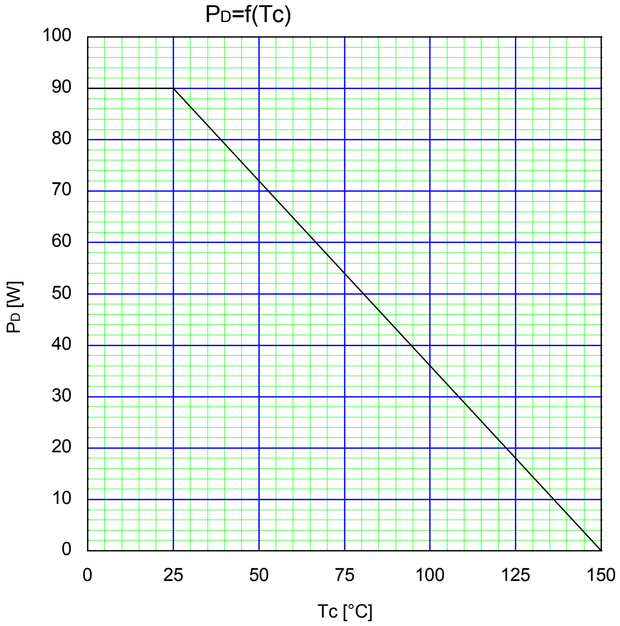
• Reverse Diode

Description	Symbol	Conditions	min.	typ.	max.	Unit
Avalanche Capability	I_{AV}	L=21.7mH, T_{ch}=25°C See Fig.1 and Fig.2	6.6	-	-	A
Diode Forward On-Voltage	V_{SD}	I_F=30A, V_{GS}=0V T_{ch}=25°C	-	0.9	1.35	V
Reverse Recovery Time	t_{rr}	I_F=30A, V_{GS}=0V V_{DD}=400V -di/dt=100A/μs T_{ch}=25°C See Fig.6	-	430	-	ns
Reverse Recovery Charge	Q_{rr}		-	8.6	-	μC
Peak Reverse Recovery Current	I_{rp}		-	38	-	A

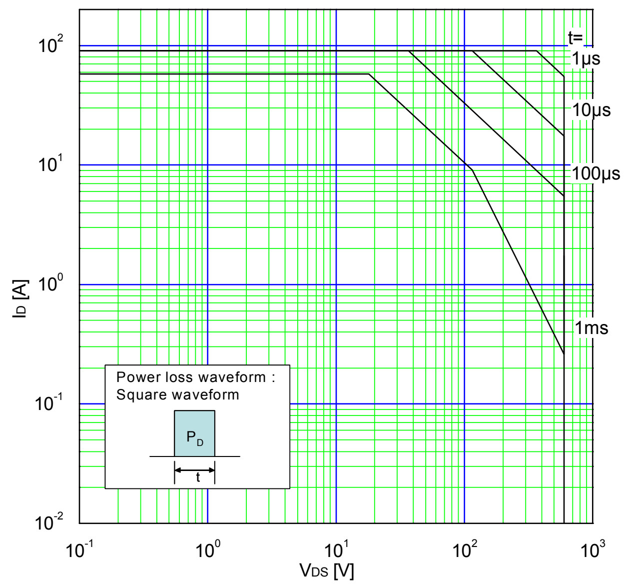
Thermal Characteristics

Description	Symbol	min.	typ.	max.	Unit
Channel to Case	$R_{th(ch-c)}$	-	-	1.39	°C/W
Channel to Ambient	$R_{th(ch-a)}$	-	-	58	°C/W

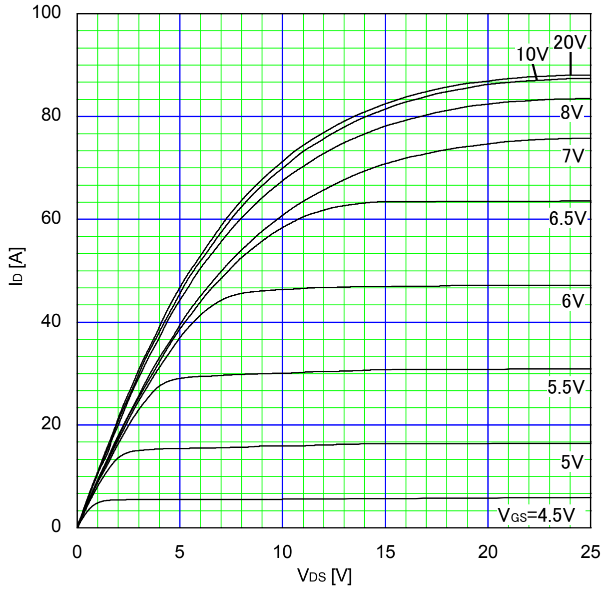
Allowable Power Dissipation
P_D=f(Tc)



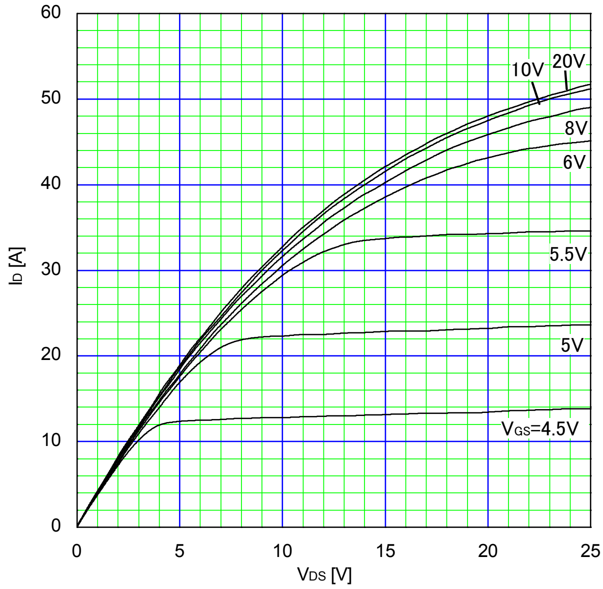
Safe Operating Area
I_D=f(V_{DS}):Duty=0(Single pulse),Tc=25°C



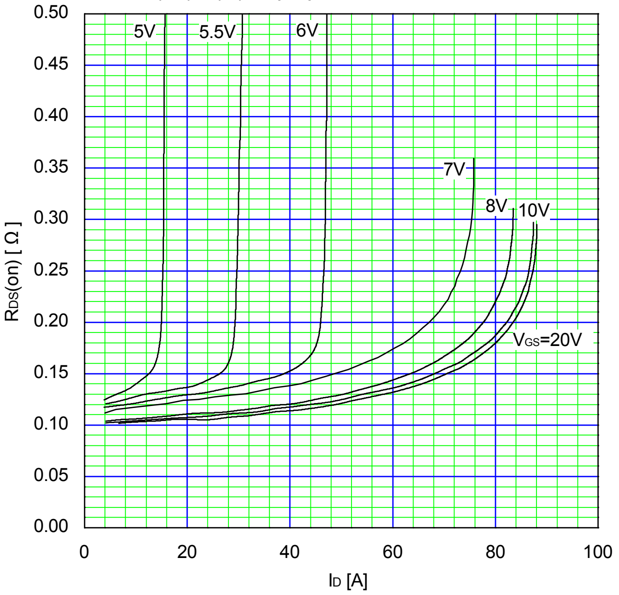
Typical Output Characteristics
I_D=f(V_{DS}):80μs pulse test,Tch=25°C



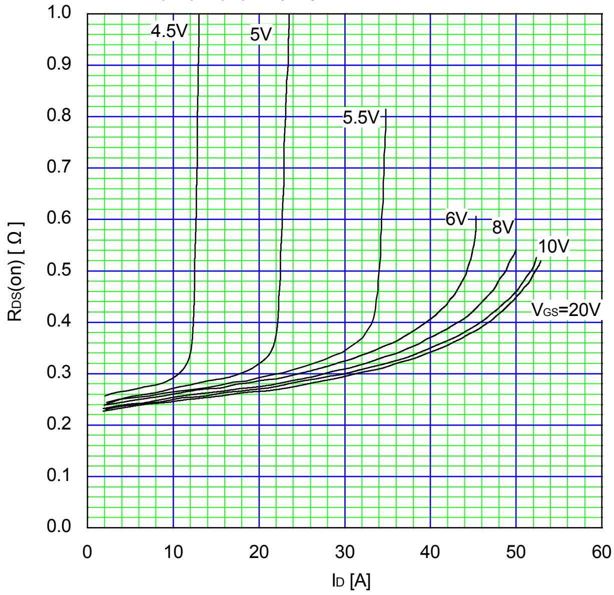
Typical Output Characteristics
I_D=f(V_{DS}):80μs pulse test,Tch=150°C



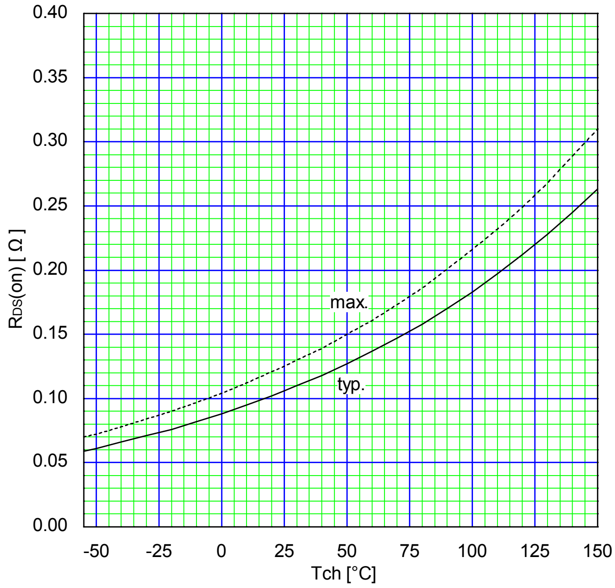
Typical Drain-Source on-state Resistance
R_{DS}(on)=f(I_D):80μs pulse test,Tch=25°C



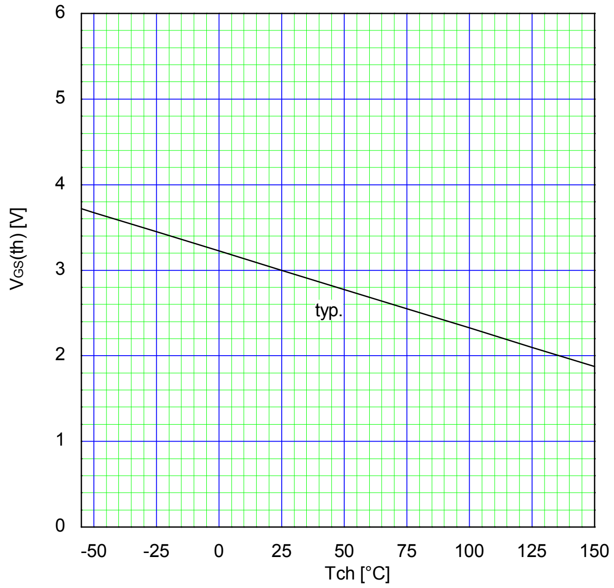
Typical Drain-Source on-state Resistance
R_{DS}(on)=f(I_D):80μs pulse test,Tch=150°C



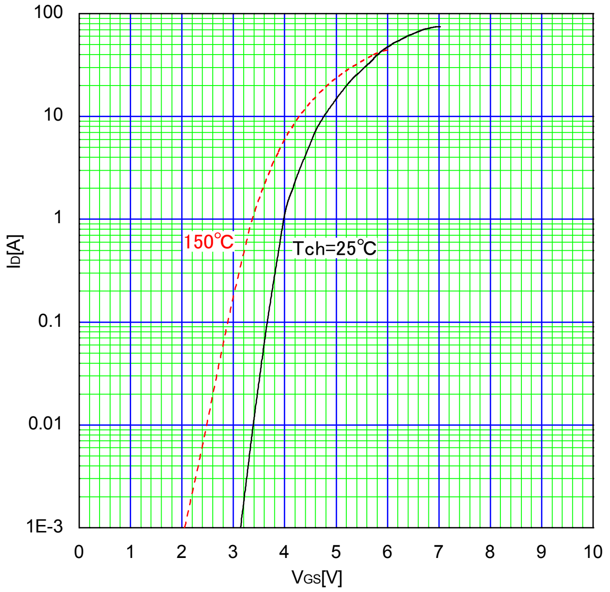
Drain-Source On-state Resistance
RDS(on)=f(Tch):ID=15A,VGS=10V



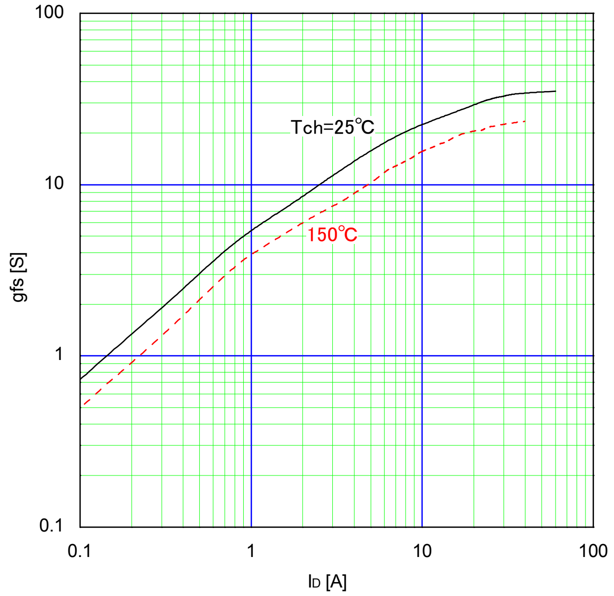
Gate Threshold Voltage vs. Tch
VGS(th)=f(Tch):VDS=VGS,ID=250μA



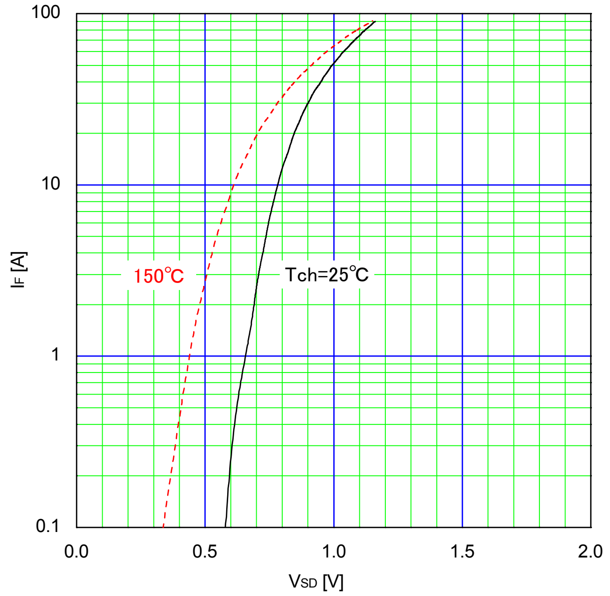
Typical Transfer Characteristic
ID=f(VGS):80μs pulse test,VDS=25V



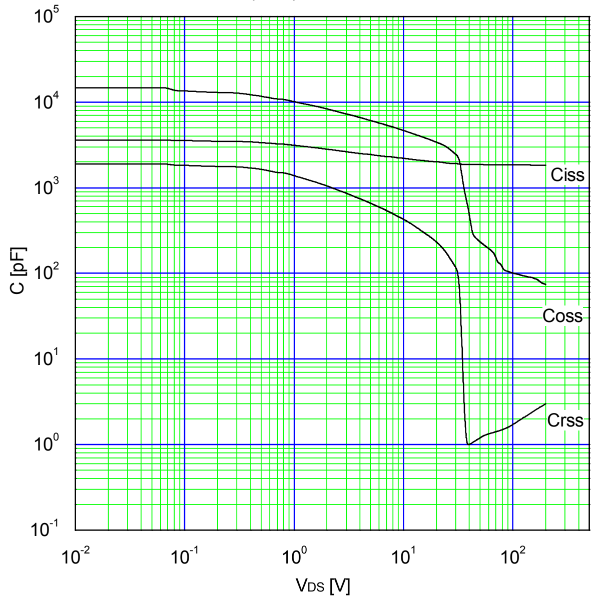
Typical Transconductance
gfs=f(ID):80μs pulse test,VDS=25V



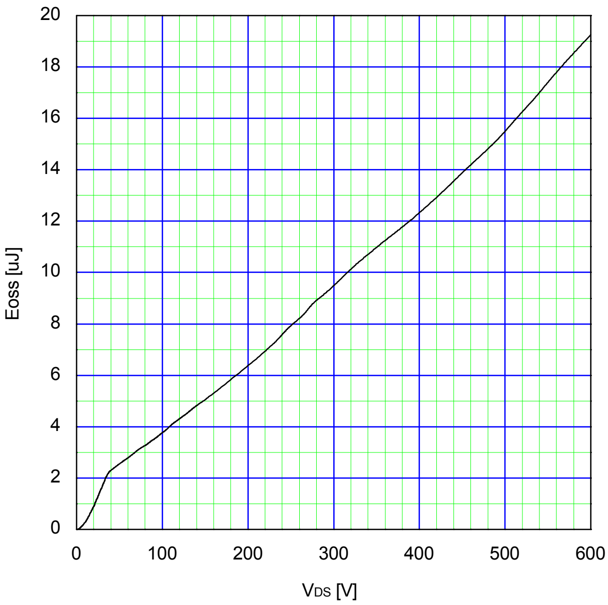
Typical Forward Characteristics of Reverse Diode
IF=f(VSD):80μs pulse test



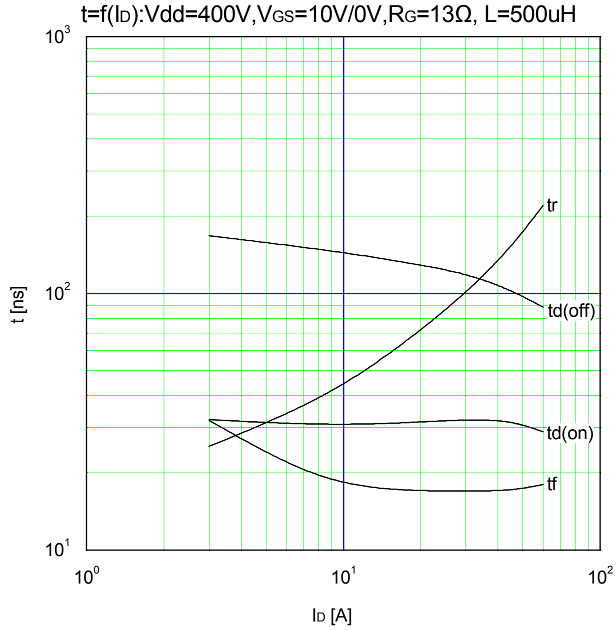
Typical Capacitance
C=f(VDS):VGS=0V,f=1MHz



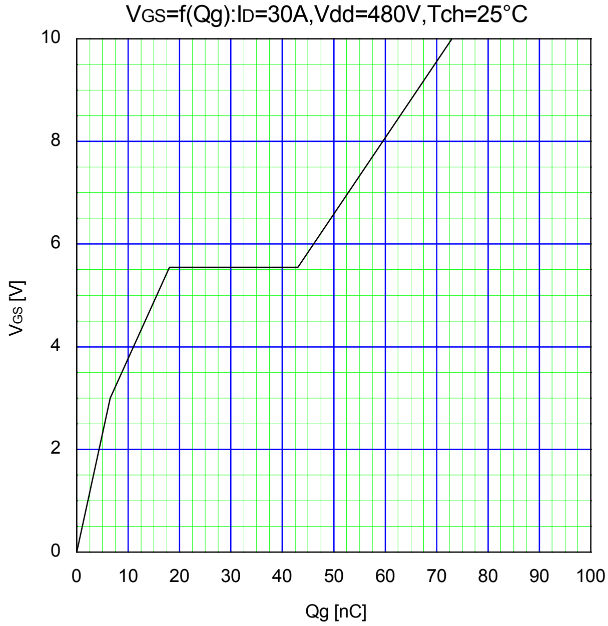
Typical Coss stored energy



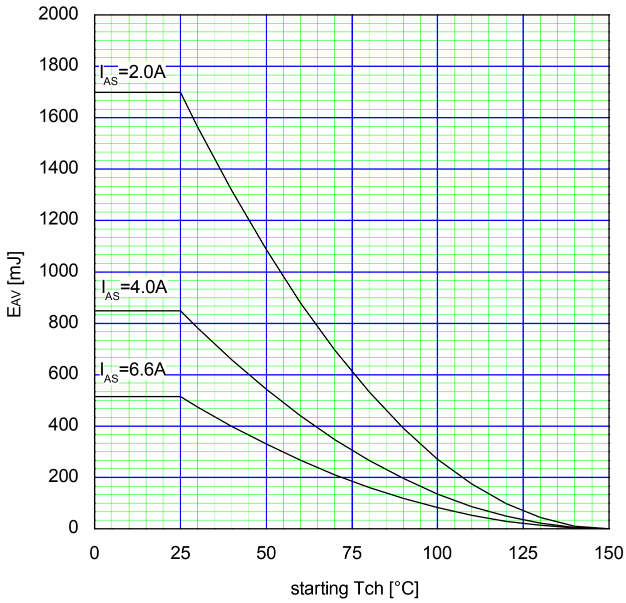
Typical Switching Characteristics vs. ID Tch=25°C
t=f(ID):Vdd=400V,VGS=10V/0V,RG=13Ω, L=500uH



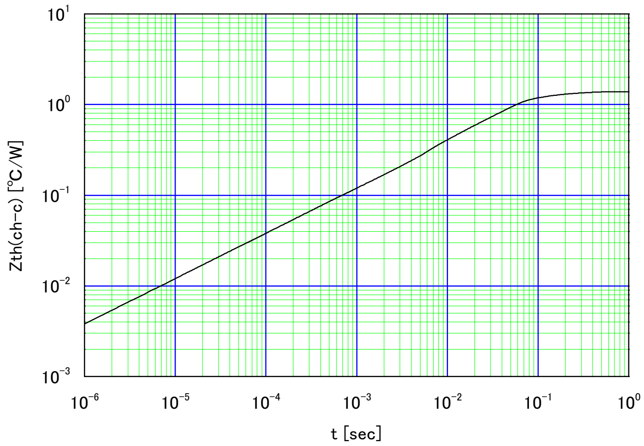
Typical Gate Charge Characteristics
VGS=f(Qg):ID=30A,Vdd=480V,Tch=25°C



Maximum Avalanche Energy vs. startingTch
E(AV)=f(starting Tch):Vcc=60V,I(AV)<=6.6A



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



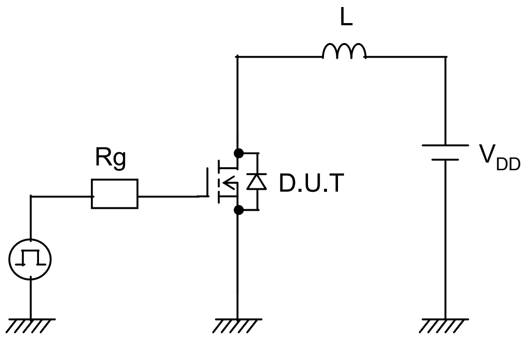


Fig.1 Avalanche Test circuit

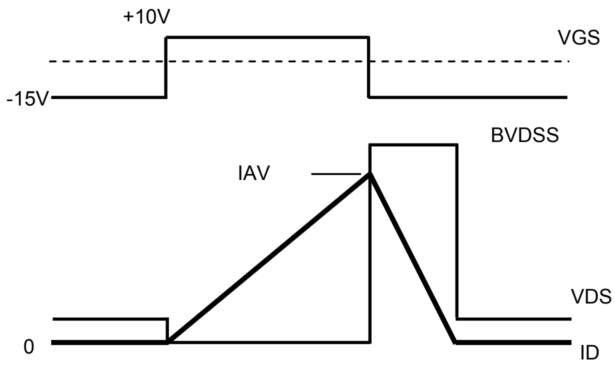


Fig.2 Operating waveforms of Avalanche Test

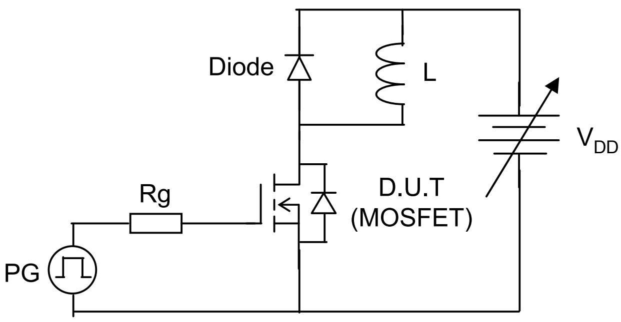


Fig.3 Switching Test circuit

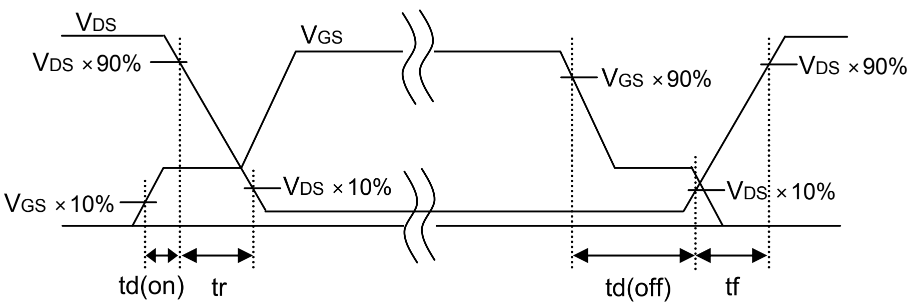


Fig.4 Operating waveform of Switching Test

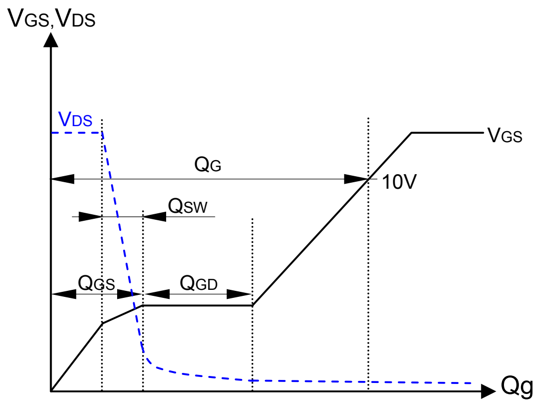


Fig.5 Operating waveform of Gate charge Test

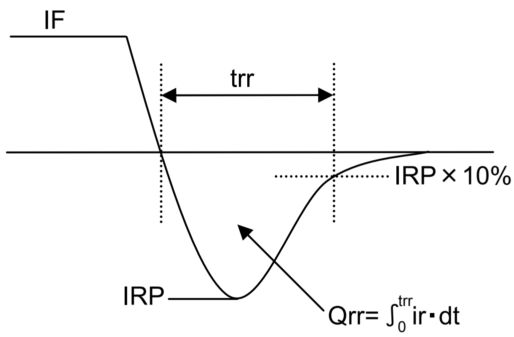
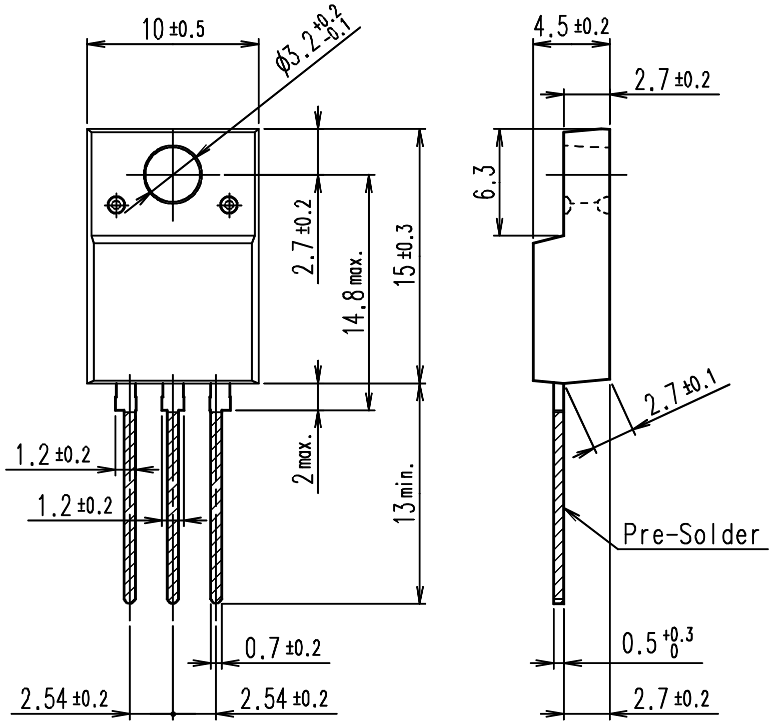
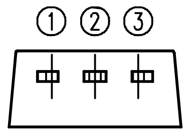


Fig.6 Operating waveform of Body diode Recovery Test

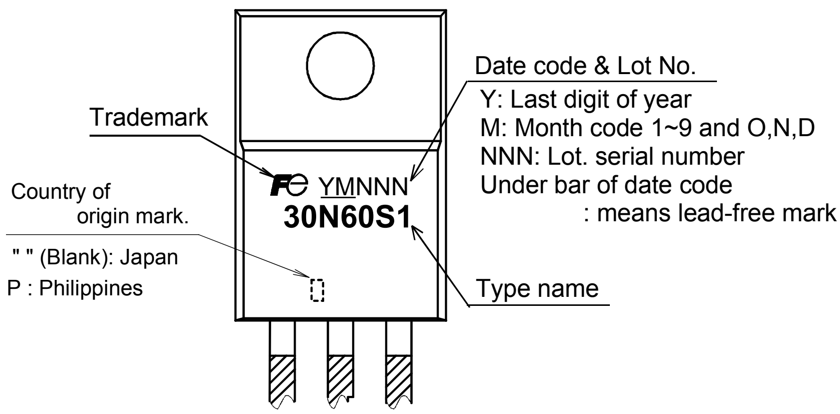
■ Outview: TO-220F(SLS) Package





Connection
① Gate
② Drain
③ Source
DIMENSIONS ARE IN MILLIMETERS.

■ Marking



* The font (font type,size) and the trademark-size might be actually different.

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