

FMY52N60S1FDA

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Automotive FUJI POWER MOSFET

Super J MOS[®] S1 series FRED type N-Channel enhancement mode power MOSFET

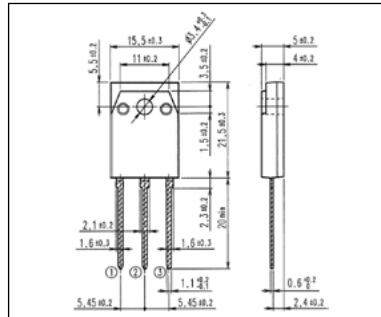
Features

- Low on-state resistance
- Low switching loss
- Easy to use
(more controllable switching dV/dt by Rg)
- Reliability assurance in accordance with AEC Q101
- 100% avalanche tested
- Built in fast recovery diode

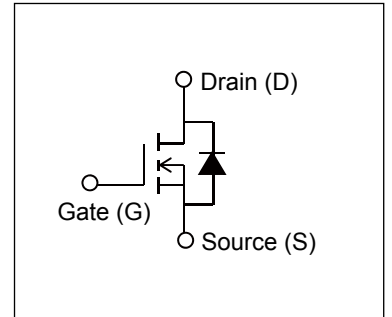
Applications

- Automotive switching applications

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	±52	A	T _c =25°C Note*1
		±33	A	T _c =100°C Note*1
Pulsed Drain Current	I _{DP}	±156	A	
Gate-Source Voltage	V _{GS}	±30	V	
Non-Repetitive Maximum Avalanche current	I _{AS}	16	A	Note *2
Non-Repetitive Maximum Avalanche Energy	E _{AS}	1120	mJ	Note *3
Maximum Drain-Source dV/dt	dV _{DS} /dt	50	kV/μs	V _{DS} =600V
Peak Diode Recovery dV/dt	dV/dt	40	kV/μs	Note *4
Peak Diode Recovery di/dt	-di/dt	100	A/μs	Note *5
Maximum Power Dissipation	P _D	2.5	W	T _s =25°C
		480		T _c =25°C
Operating and Storage Temperature range	T _{ch}	150	°C	
	T _{stg}	-55 to +150	°C	

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}=16A, L=8.0mH, 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}≤300V, T_{ch}≤150°C

Note *5 : I_F≤-I_D, dV/dt=40kV/μs, V_{DD}≤300V, 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 =1mA V _{GS} =0V	600	-	-	V
Gate Threshold Voltage	V _{GS(th)}	I _D =2.9mA V _{DS} =V _{GS}	3.0	4.0	5.0	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V V _{GS} =0V	-	-	3	μA
		V _{DS} =480V V _{GS} =0V	-	-	2	mA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V V _{DS} =0V	-	-	100	nA
Drain-Source On-State Resistance	R _{DS(on)}	I _D =26A V _{GS} =10V	-	53	71	mΩ
Gate- Resistance	R _G	f=1MHz, Open drain	-	1.3	-	Ω

• Dynamic Ratings

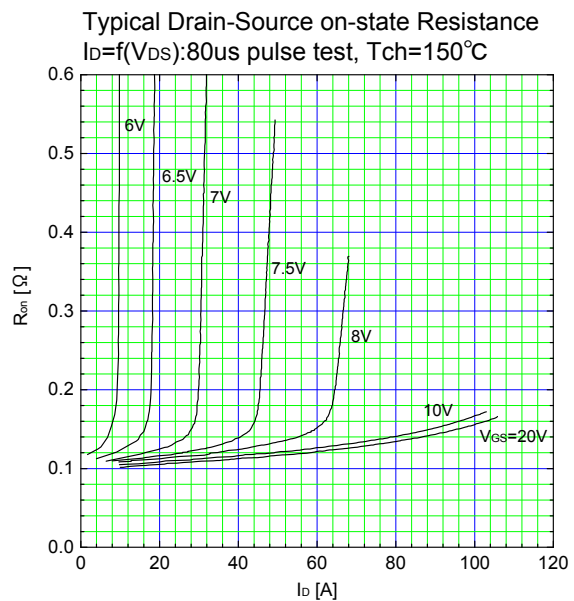
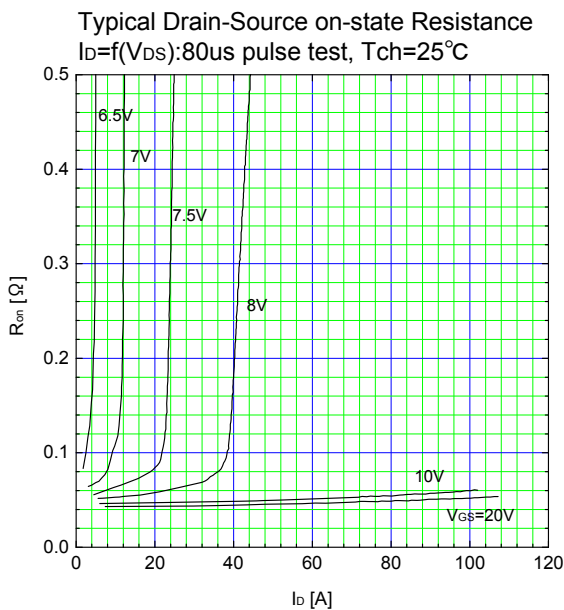
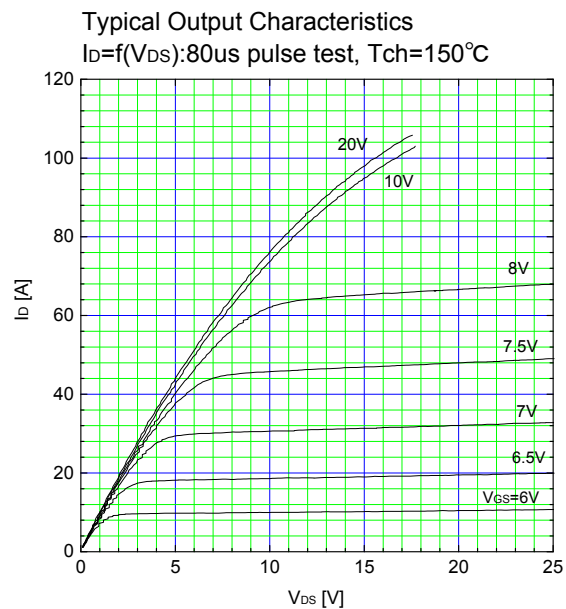
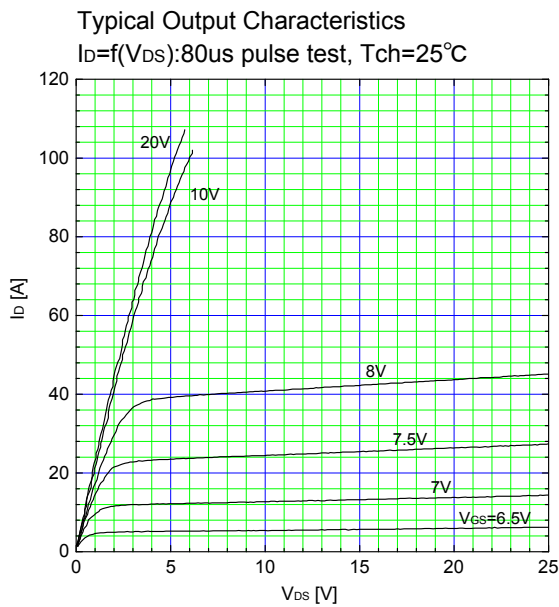
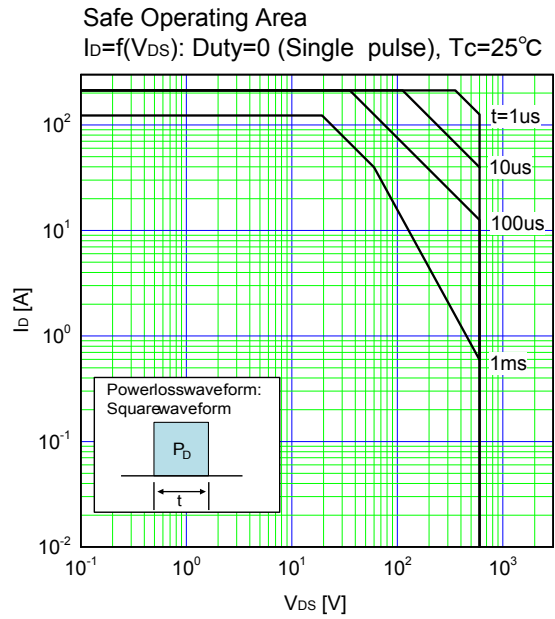
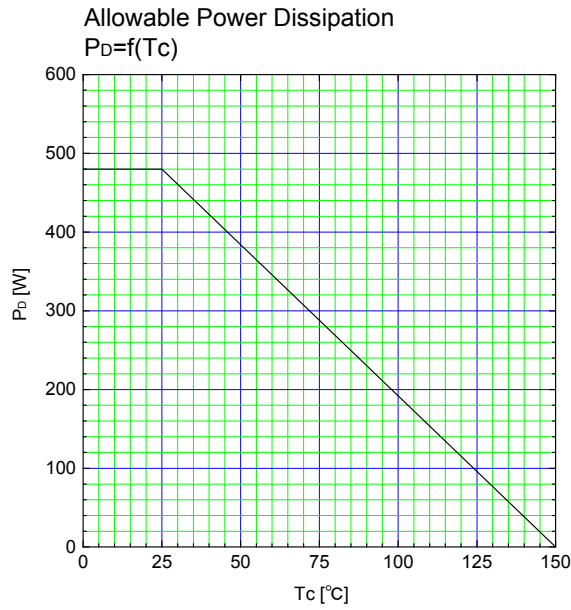
Description	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Transconductance	g _{fs}	I _D =26A V _{DS} =10V	12	-	-	S
Input Capacitance	C _{iss}	V _{DS} =400V V _{GS} =0V	-	4000	-	pF
Output Capacitance	C _{oss}	f=250kHz	-	150	-	
Reverse Transfer Capacitance	C _{rss}		-	10	-	
Turn-On Time	t _{d(on)}	V _{DD} =400V, V _{GS} =10V I _D =26A, R _G =15Ω See Fig.3 and Fig.4	-	190	-	ns
	t _r		-	60	-	
Turn-Off Time	t _{d(off)}		-	250	-	
	t _f		-	25	-	
Total Gate Charge	Q _G	V _{DD} =480V, I _D =52A	-	165	-	nC
Gate-Source Charge	Q _{GS}	V _{GS} =10V	-	35	-	
Gate-Drain Charge	Q _{GD}	See Fig.5	-	110	-	

• Reverse Ratings

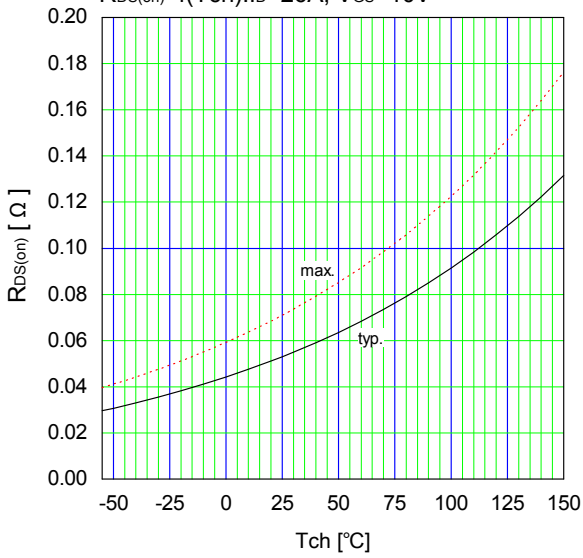
Description	Symbol	Conditions	Min.	Typ.	Max.	Unit
Avalanche Capability	I _{AV}	L=8.0mH, T _{ch} =25°C See Fig.1 and Fig.2	16	-	-	A
Diode Forward On-Voltage	V _{SD}	I _F =52A, V _{GS} =0V T _{ch} =25°C	-	-	1.35	V
Reverse Recovery Time	t _{rr}	I _F =33A, V _{GS} =0V V _{DD} =300V	-	270	-	ns
Reverse Recovery Charge	Q _{rr}	-di/dt=100A/μs See Fig.6	-	2.5	-	μC

■ Thermal Characteristics

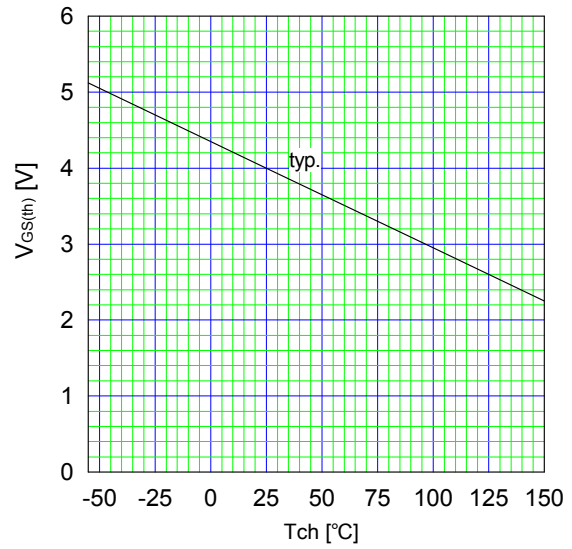
Description	Symbol	Min.	Typ.	Max.	Unit
Channel to Case	R _{th(ch-c)}	-	-	0.26	°C/W
Channel to Ambient	R _{th(ch-a)}	-	-	50	°C/W



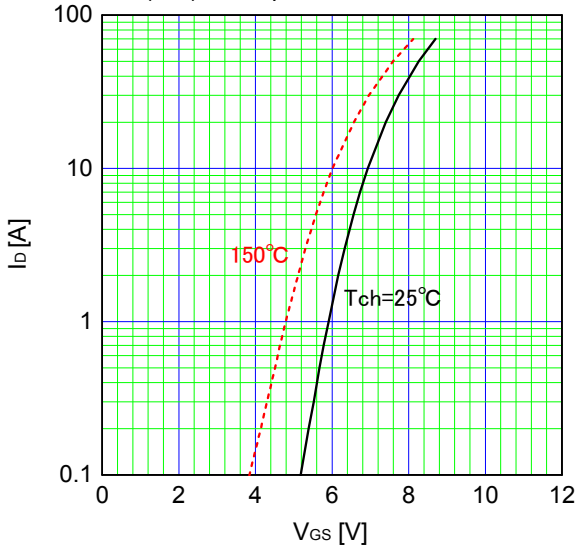
Drain-Source On-state Resistance
 $R_{DS(on)}=f(T_{ch}):I_D=26A, V_{GS}=10V$



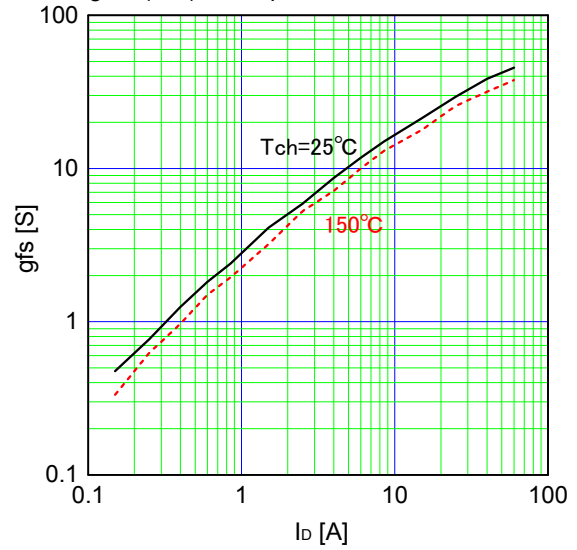
Gate Threshold Voltage vs. T_{ch}
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=2.9mA$



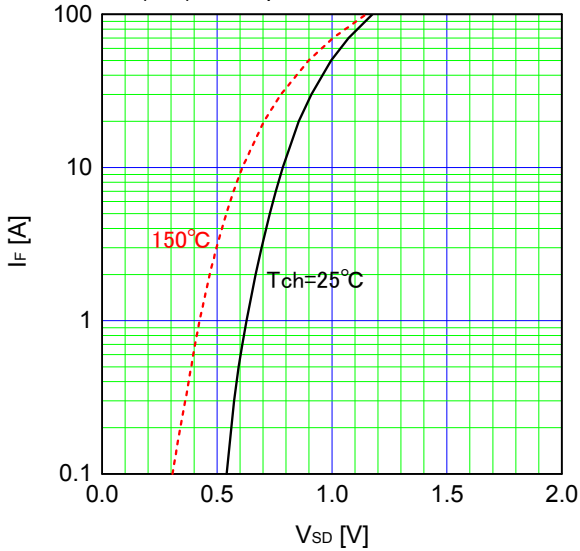
Typical Transfer Characteristics
 $I_D=f(V_{GS}):80 \mu s \text{ pulse test}, V_{DS}=25V$



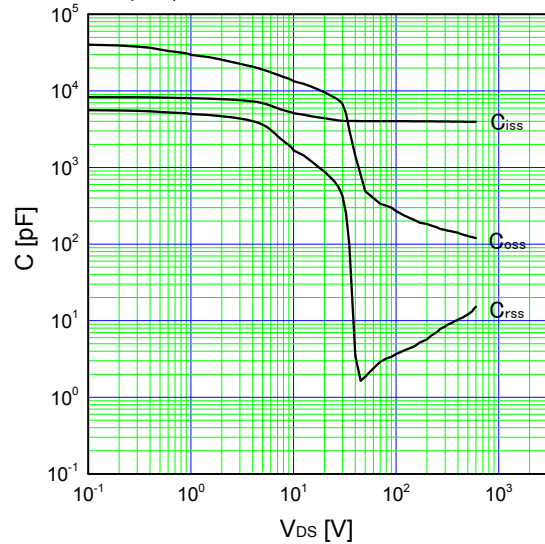
Typical Trans conductance
 $g_{fs}=f(V_{GS}):80 \mu s \text{ pulse test}, V_{DS}=25V$



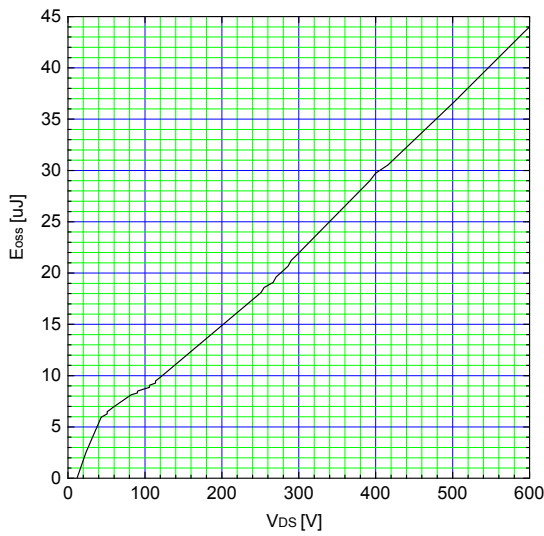
Typical Forward Characteristics of Reverse Diode
 $I_F=f(V_{SD}):80 \mu s \text{ pulse test}$



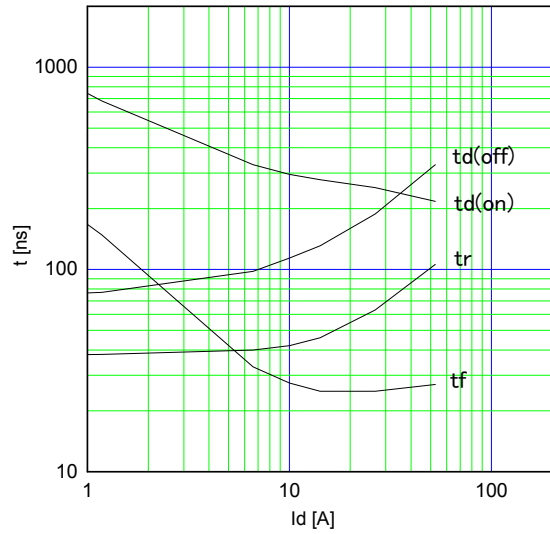
Typical Capacitance
 $C=f(V_{DS}):V_{GS}=0V, f=250kHz$



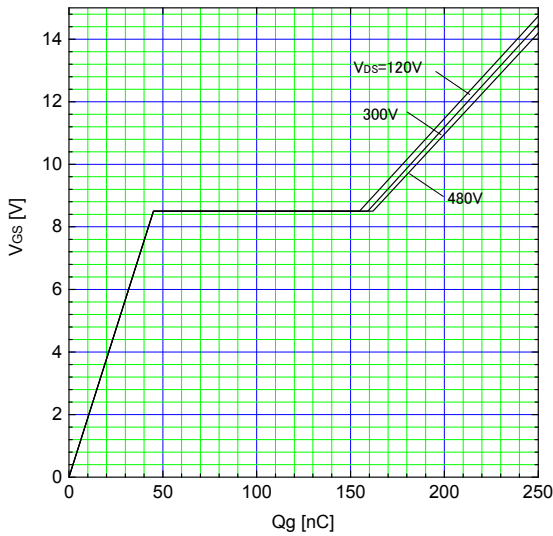
Typical Cross stored energy



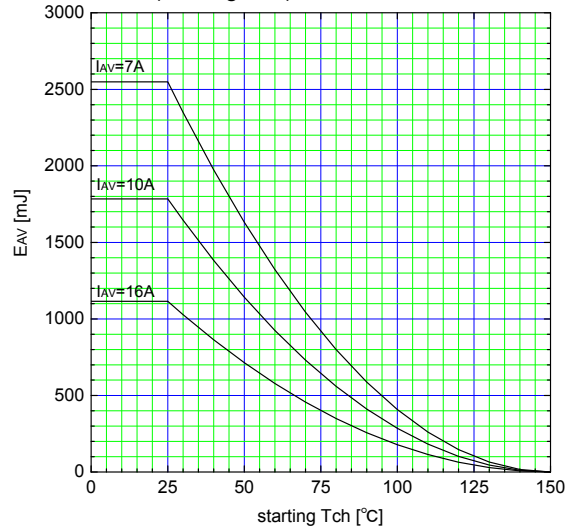
Typical Switching Characteristics vs. Id T_{ch}=25 °C
t_f(I_D): V_{DD}=400V, V_{GS}=10V/0V, R_G=15 Ω



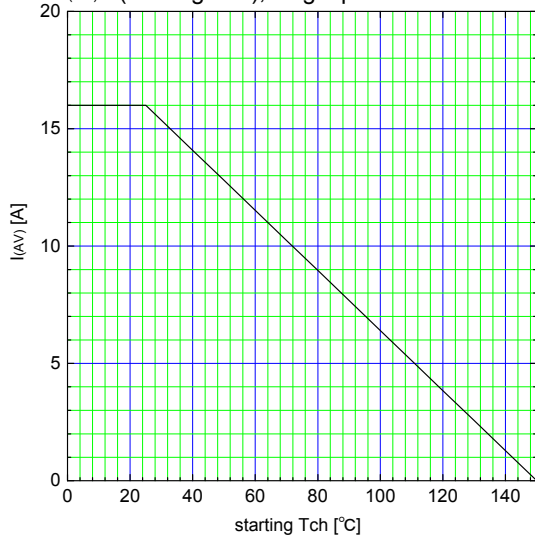
Typical Gate Characteristics
V_{GS}=f(Q_g): I_D=52A, T_{ch}=25 °C



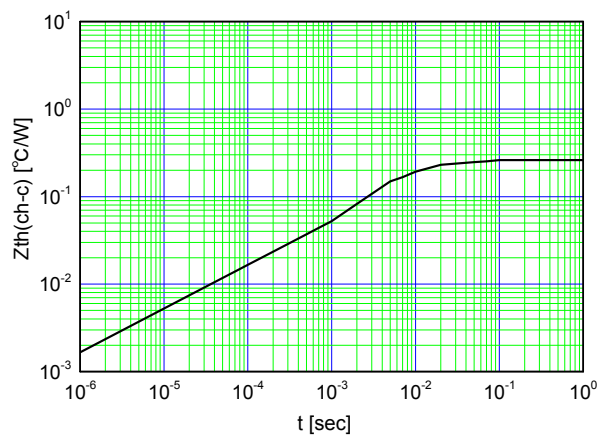
Maximum Avalanche Energy vs. starting T_{ch}
E_(AV)=f(starting T_{ch}), V_{CC}=60V, I_(AV) ≤ 16A



Maximum Avalanche Current vs. starting T_{ch}
I_(AV)=f(starting T_{ch}), single pulse



Transient Thermal Impedance
Z_{th(ch-c)}=f(t): D=0



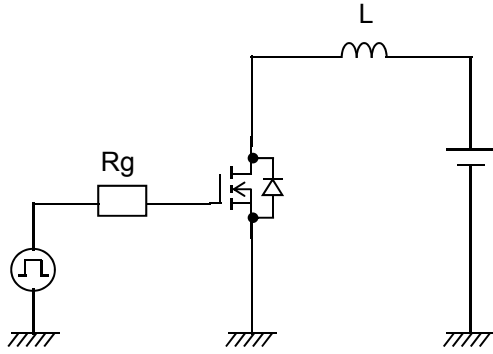


Fig.1 Avalanche Test circuit

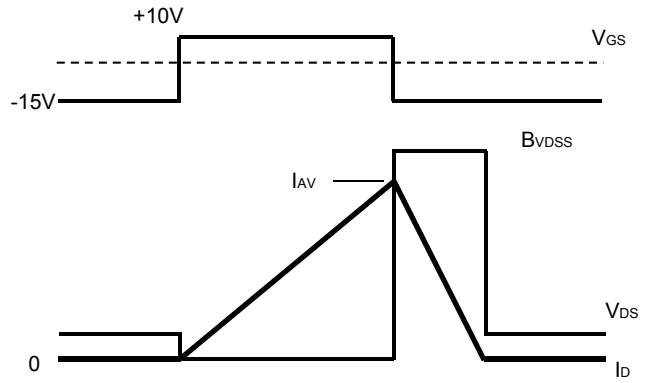


Fig.2 Operating waveforms of Avalanche Test

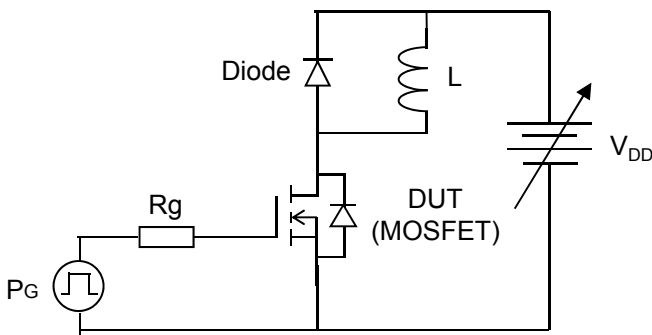


Fig.3 Switching Test circuit

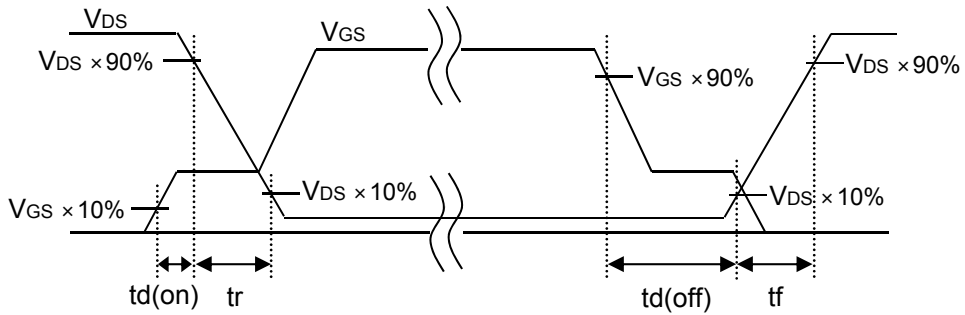


Fig.4 Operating waveform of Switching Test

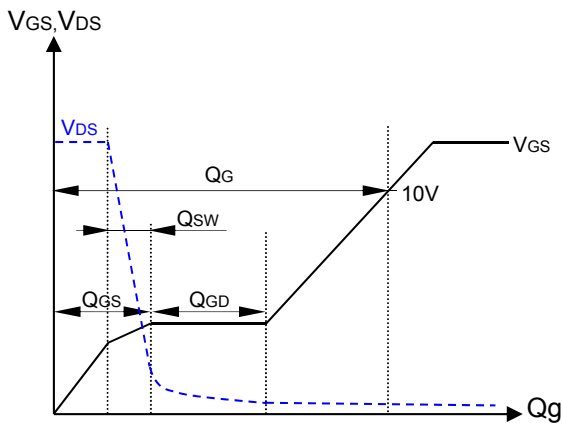


Fig.5 Operating waveform of Gate charge Test

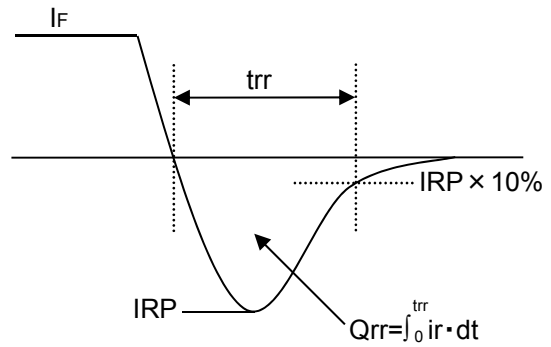
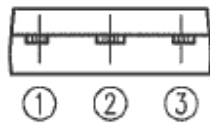
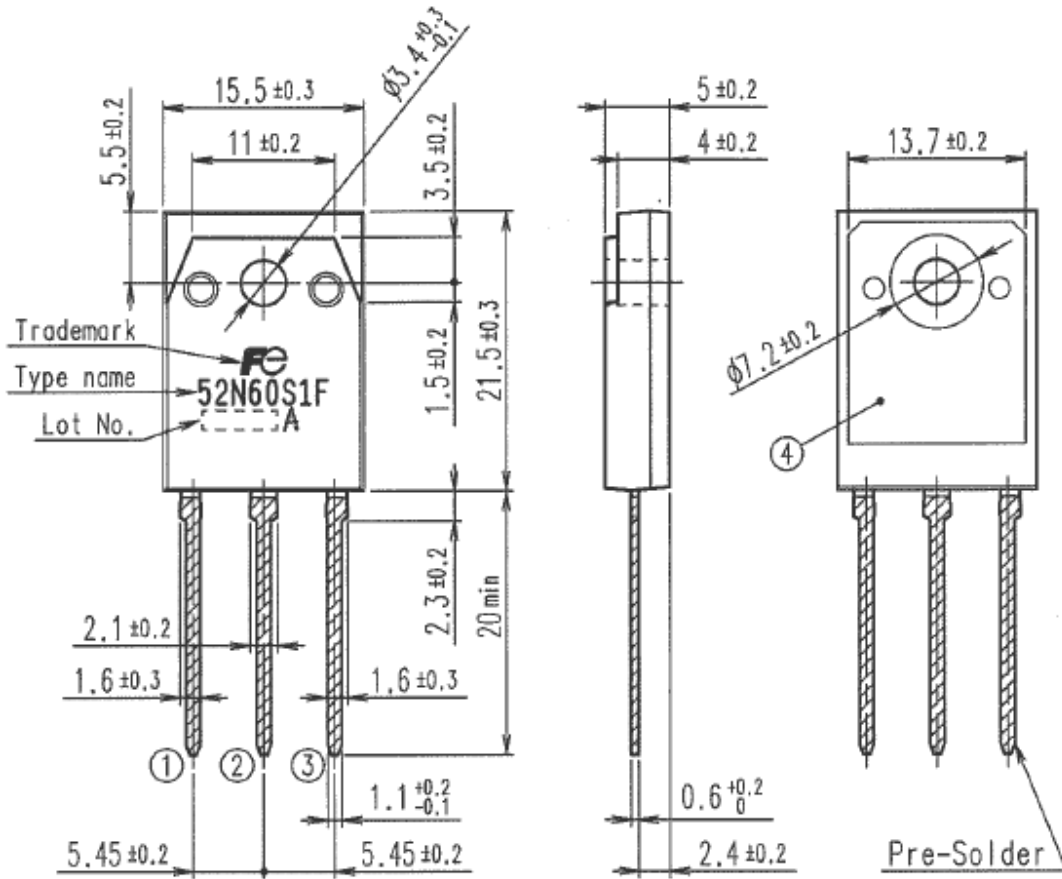


Fig.6 Operating waveform of Body diode Recovery Test

■ Outview



CONNECTION

- ① GATE
- ② ④ DRAIN
- ③ SOURCE

JEDEC: TO-247

DIMENSIONS ARE IN MILLIMETERS.

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