

Super J-MOS series

N-Channel enhancement mode power MOSFET

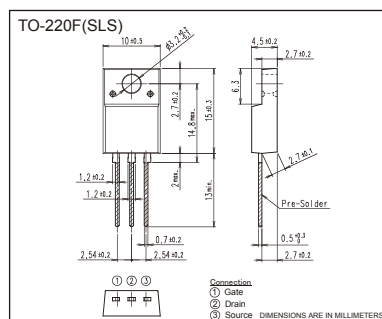
■ Features

Pb-free lead terminal
RoHS compliant

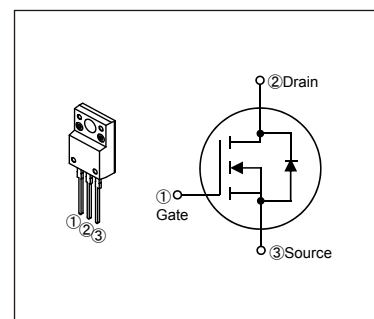
■ Applications

For switching

■ Outline Drawings [mm]



■ Equivalent circuit schematic



■ Maximum Ratings and Characteristics

● 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	± 20	A	$T_c=25^{\circ}C$ Note*1
		± 12.6	A	$T_c=100^{\circ}C$ Note*1
Pulsed Drain Current	I_{DP}	± 60	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}	472.2	mJ	Note *3
Maximum Drain-Source dV/dt	d V_{DS} /dt	50	kV/ μs	$V_{DS} \leq 600V$
Peak Diode Recovery dV/dt	dV/dt	15	kV/ μs	Note *4
Peak Diode Recovery -di/dt	-di/dt	100	A/ μs	Note *5
Maximum Power Dissipation	P_D	2.16	W	$T_a=25^{\circ}C$
		53		$T_c=25^{\circ}C$
Operating and Storage Temperature range	T_{ch}	150	$^{\circ}C$	
	T_{stg}	-55 to +150	$^{\circ}C$	
Isolation Voltage	V_{iso}	2	kVrms	t=60sec,f=60Hz

Note *1 : Limited by maximum channel temperature.

Note *2 : $T_{ch} \leq 150^{\circ}\text{C}$, See Fig.1 and Fig.2

Note *3 : Starting $T_{ch}=25^{\circ}C$, $I_{AS}=2A$, $L=216mH$, $V_{DD}=60V$, $R_G=50\Omega$, See Fig.1 and Fig.2

EAS limited by maximum channel temperature and avalanche current.

Note *4 : $I_F \leq -I_D$, $-di/dt = 100A/\mu s$, $V_{DD} \leq 400V$, $T_{ch} \leq 150^\circ C$.

Note *5: $I_F \leq -I_D$, $dV/dt = 15 \text{ kV}/\mu\text{s}$, $V_{DD} \leq 400 \text{ V}$, $T_{ch} \leq 150^\circ\text{C}$.

● Electrical Characteristics at T_c=25°C (unless otherwise specified)
Static Ratings

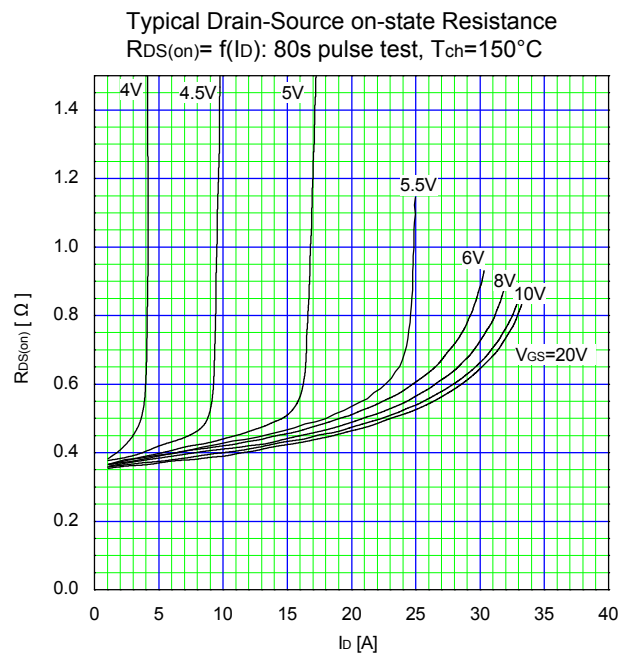
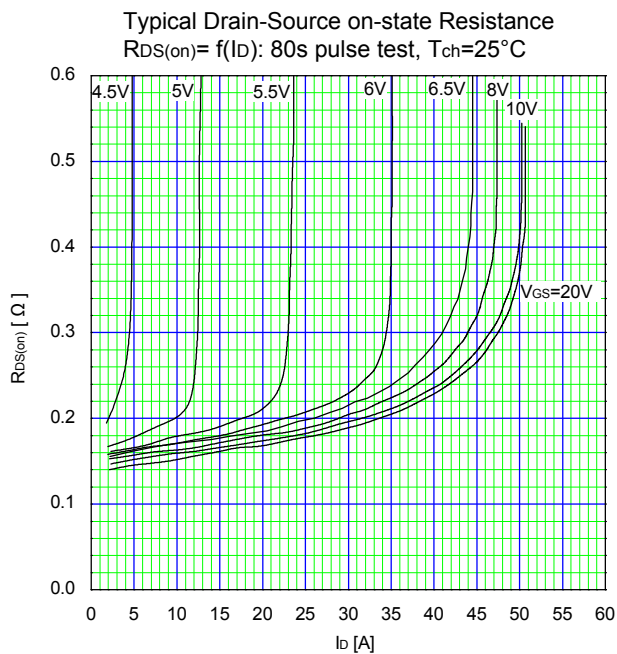
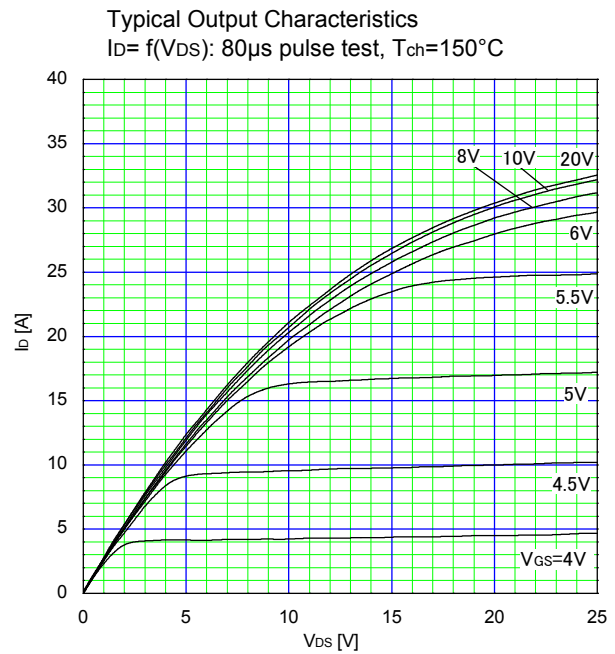
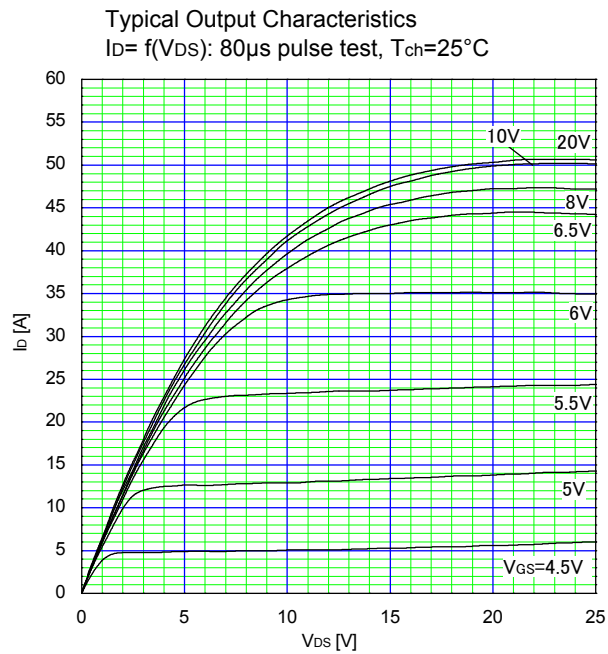
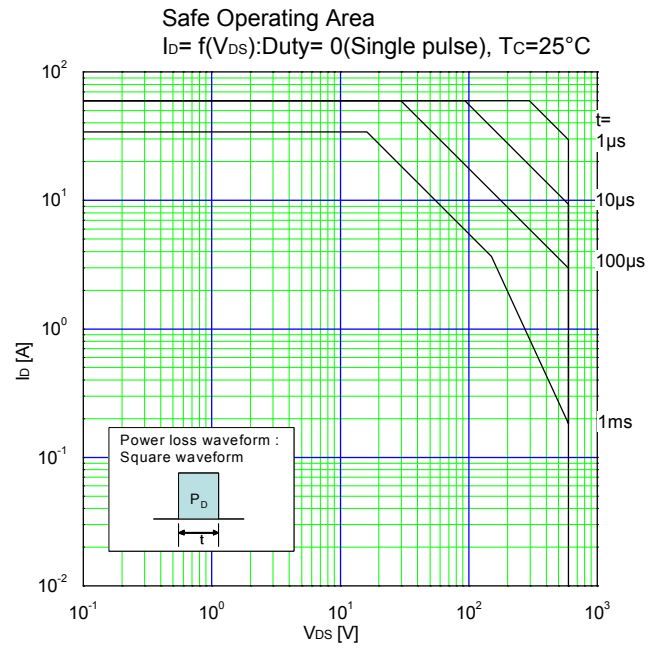
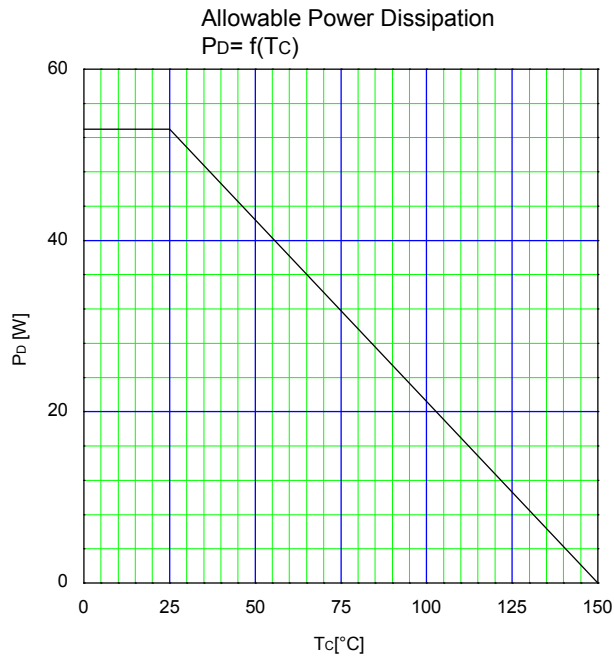
Description	Symbol	Conditions	min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA V _{GS} =0V	600	-	-	V
Gate Threshold Voltage	V _{GS(th)}	I _D =250μA V _{DS} =V _{GS}	2.5	3	3.5	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V V _{GS} =0V T _{ch} =25°C	-	-	25	μA
		V _{DS} =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 =10A V _{GS} =10V	-	0.161	0.19	Ω
Gate resistance	R _G	f=1MHz, open drain	-	3.7	-	Ω
Forward Transconductance	g _{fs}	I _D =10A V _{DS} =25V	8.5	17.5	-	S
Input Capacitance	C _{iss}	V _{DS} =10V	-	1470	-	pF
Output Capacitance	C _{oss}	V _{GS} =0V	-	3120	-	
Reverse Transfer Capacitance	C _{rss}	f=1MHz	-	280	-	
Effective output capacitance, energy related (Note *6)	C _{o(er)}	V _{GS} =0V V _{DS} =0...480V	-	90	-	
Effective output capacitance, time related (Note *7)	C _{o(tr)}	V _{GS} =0V V _{DS} =0...480V ID=constant	-	305	-	
Turn-On Time	t _{d(on)}	V _{DD} =400V, V _{GS} =10V I _D =10A, R _G =27Ω See Fig.3 and Fig.4	-	22	-	ns
	t _r		-	40	-	
Turn-Off Time	t _{d(off)}		-	162	-	
	t _f		-	22	-	
Total Gate Charge	Q _G	V _{DD} =480V, I _D =20A V _{GS} =10V See Fig.5	-	48	-	nC
Gate-Source Charge	Q _{GS}		-	12.5	-	
Gate-Drain Charge	Q _{GD}		-	15	-	
Drain-Source crossover Charge	Q _{SW}		-	8	-	
Avalanche Capability	I _{AV}	L=6.02mH, T _{ch} =25°C See Fig.1 and Fig.2	6.6	-	-	A
Diode Forward On-Voltage	V _{SD}	I _F =20A, V _{GS} =0V T _{ch} =25°C	-	0.9	1.35	V
Reverse Recovery Time	t _{rr}	I _F =20A, V _{GS} =0V V _{DD} =400V -di/dt=100A/μs T _{ch} =25°C See Fig.6	-	370	-	ns
Reverse Recovery Charge	Q _{rr}		-	6.2	-	μC
Peak Reverse Recovery Current	I _{rp}		-	32	-	A

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}.

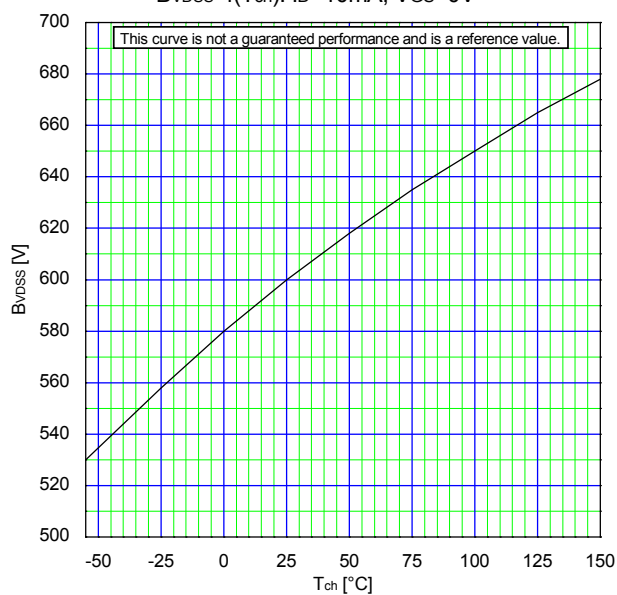
Note *7 : C_{o(tr)} is a fixed capacitance that gives the same charging times as C_{oss} while V_{DS} is rising from 0 to 80% BV_{DSS}.

● Thermal Characteristics

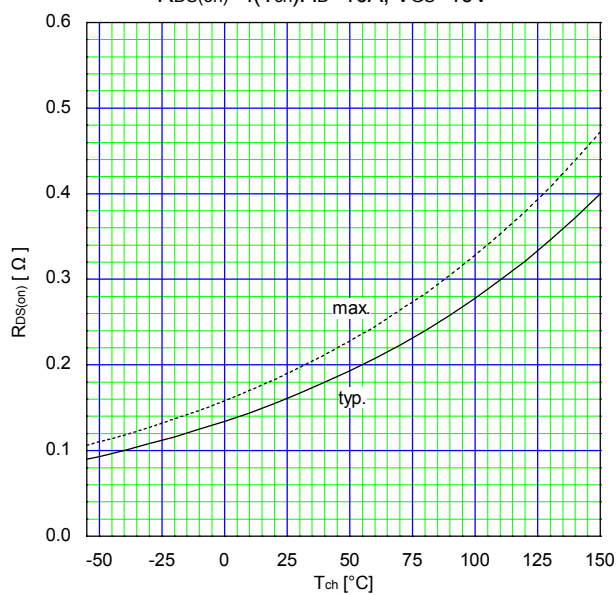
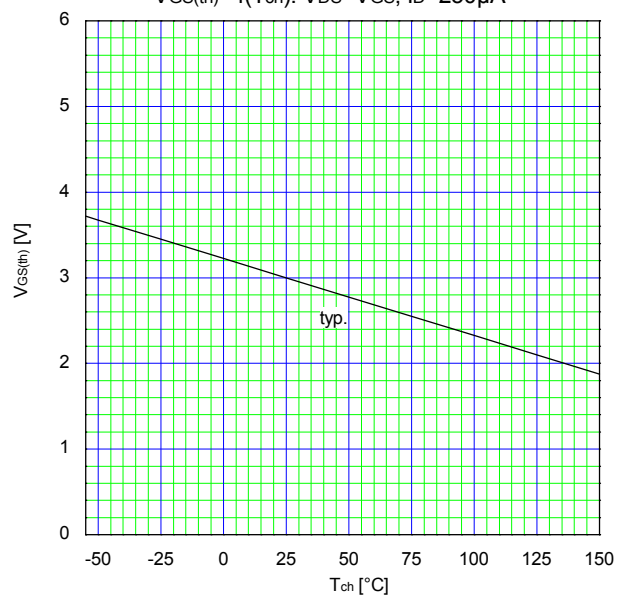
Description	Symbol	min.	typ.	max.	Unit
Channel to Case	R _{th(ch-c)}			2.36	°C/W
Channel to Ambient	R _{th(ch-a)}			58	°C/W



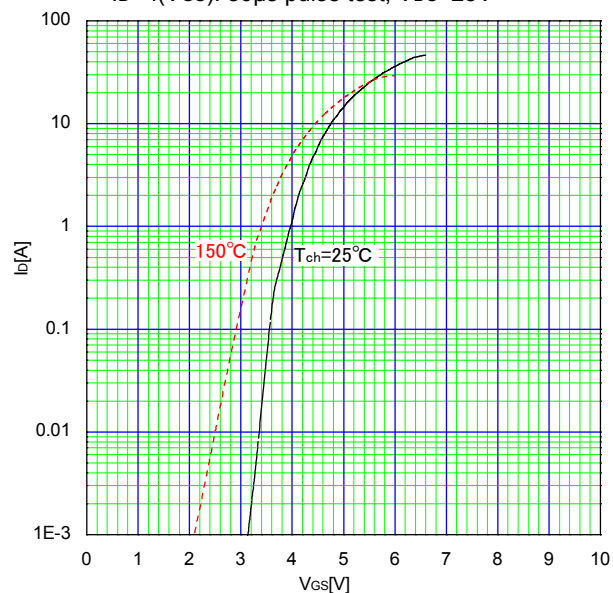
Drain-Source Breakdown Voltage

 $B_{VDS} = f(T_{ch})$: $I_D = 10\text{mA}$, $V_{GS} = 0\text{V}$ 

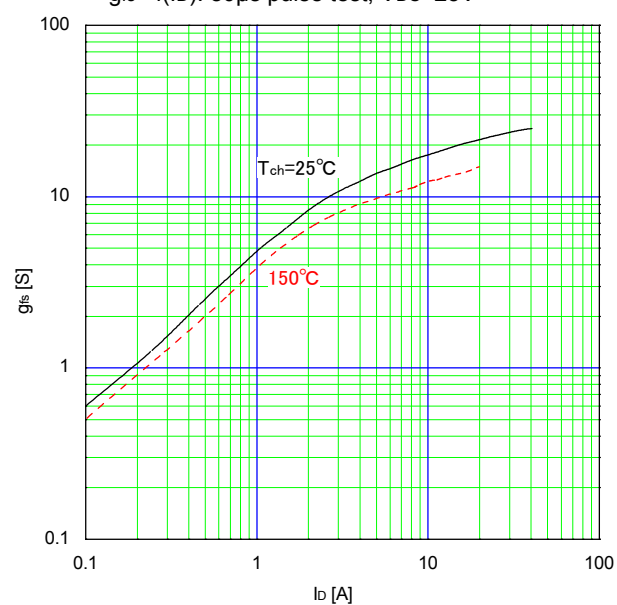
Drain-Source On-state Resistance

 $R_{DS(on)} = f(T_{ch})$: $I_D = 10\text{A}$, $V_{GS} = 10\text{V}$ Gate Threshold Voltage vs. T_{ch} $V_{GS(th)} = f(T_{ch})$: $V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$ 

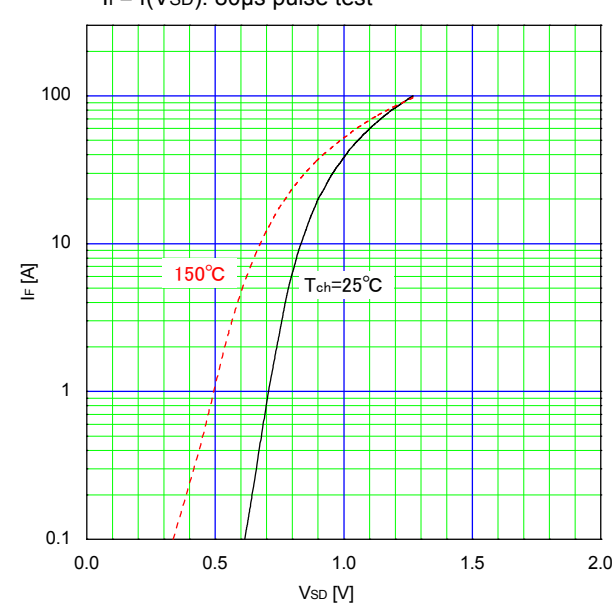
Typical Transfer Characteristic

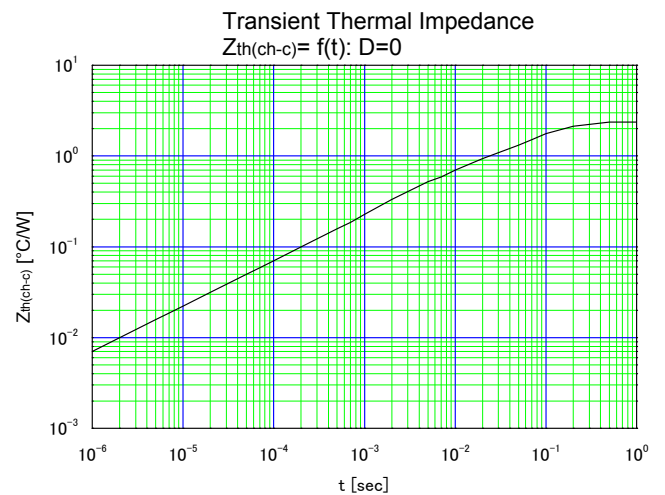
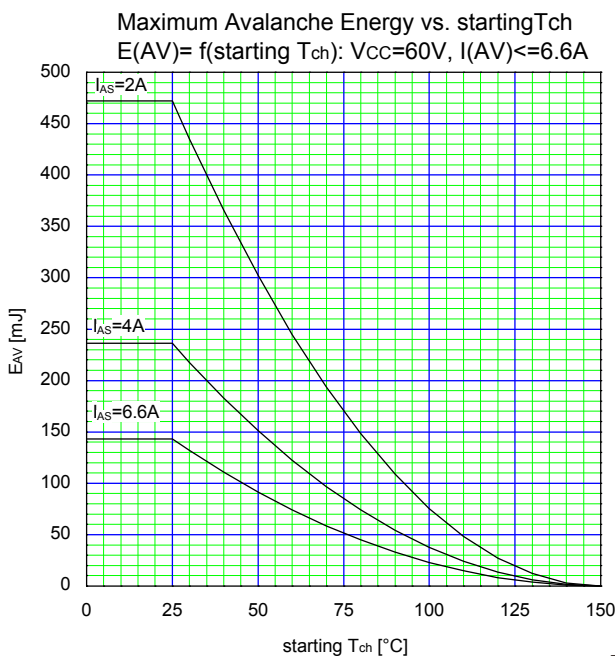
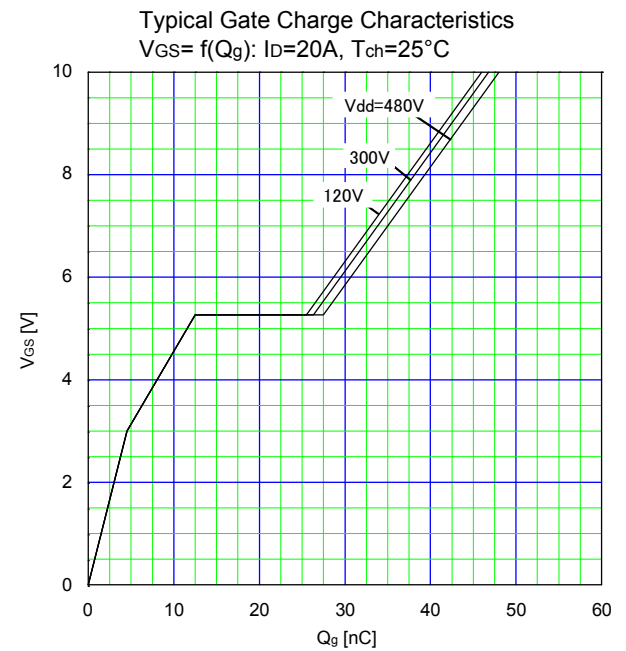
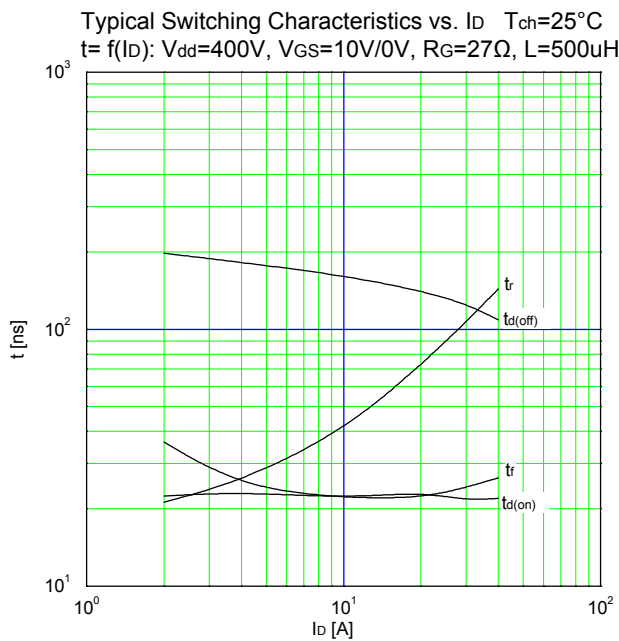
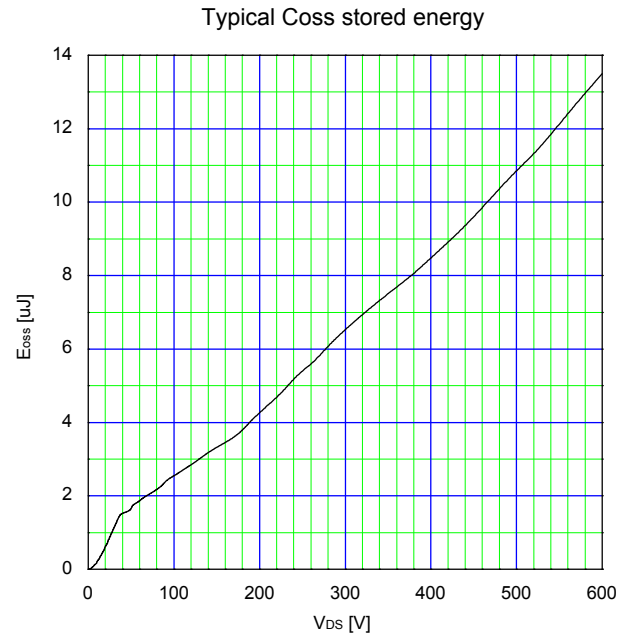
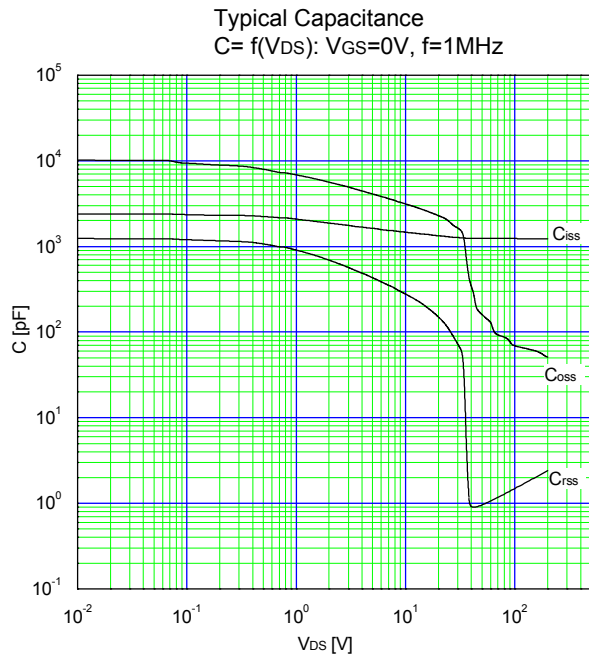
 $I_D = f(V_{GS})$: 80μs pulse test, $V_{DS} = 25\text{V}$ 

Typical Transconductance

 $g_{fs} = f(I_D)$: 80μs pulse test, $V_{DS} = 25\text{V}$ 

Typical Forward Characteristics of Reverse Diode

 $I_F = f(V_{SD})$: 80μs pulse test



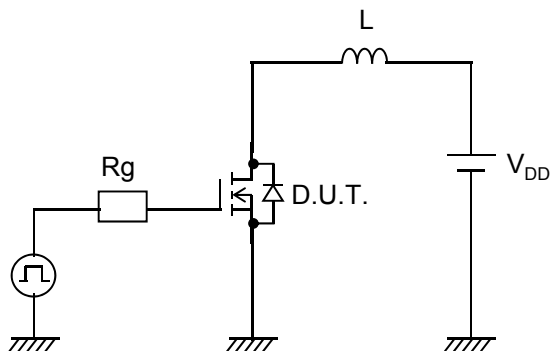


Fig.1 Avalanche Test circuit

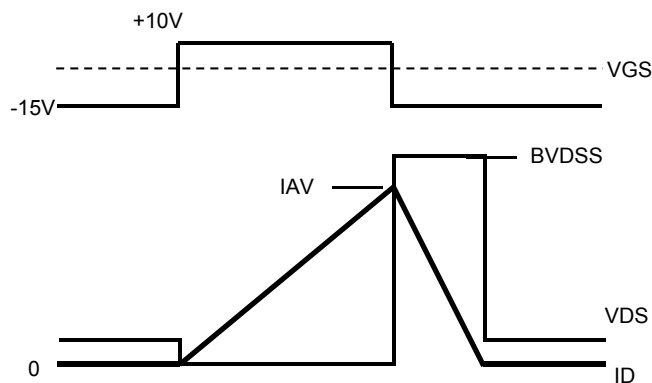


Fig.2 Operating waveforms of Avalanche Test

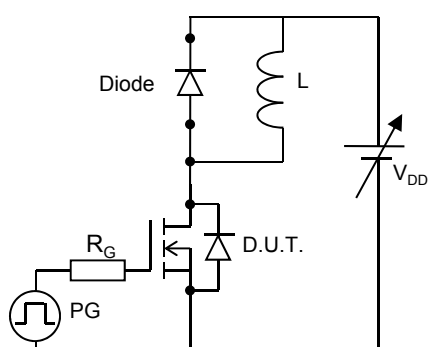


Fig.3 Switching Test circuit

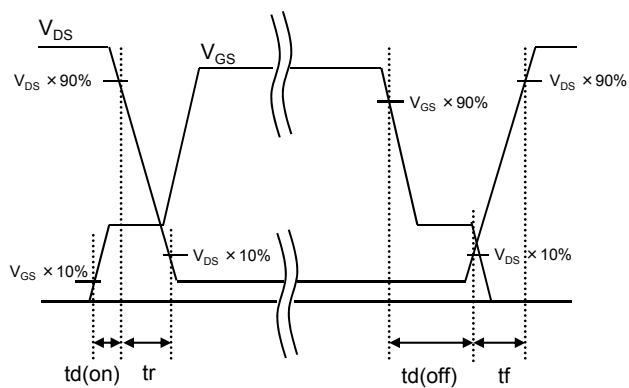


Fig.4 Operating waveform of Switching Test

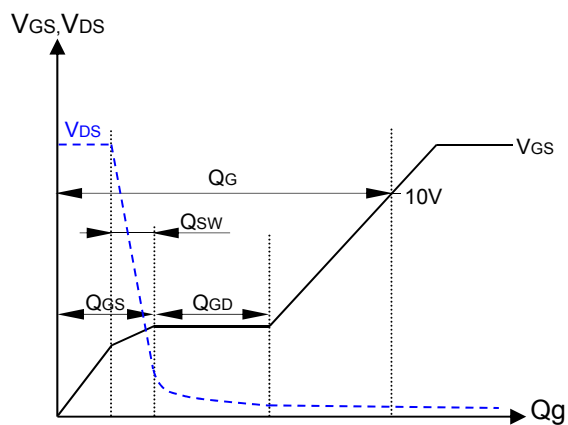


Fig.5 Operating waveform of Gate charge Test

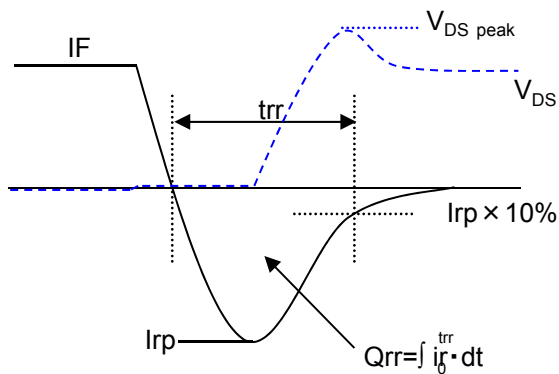
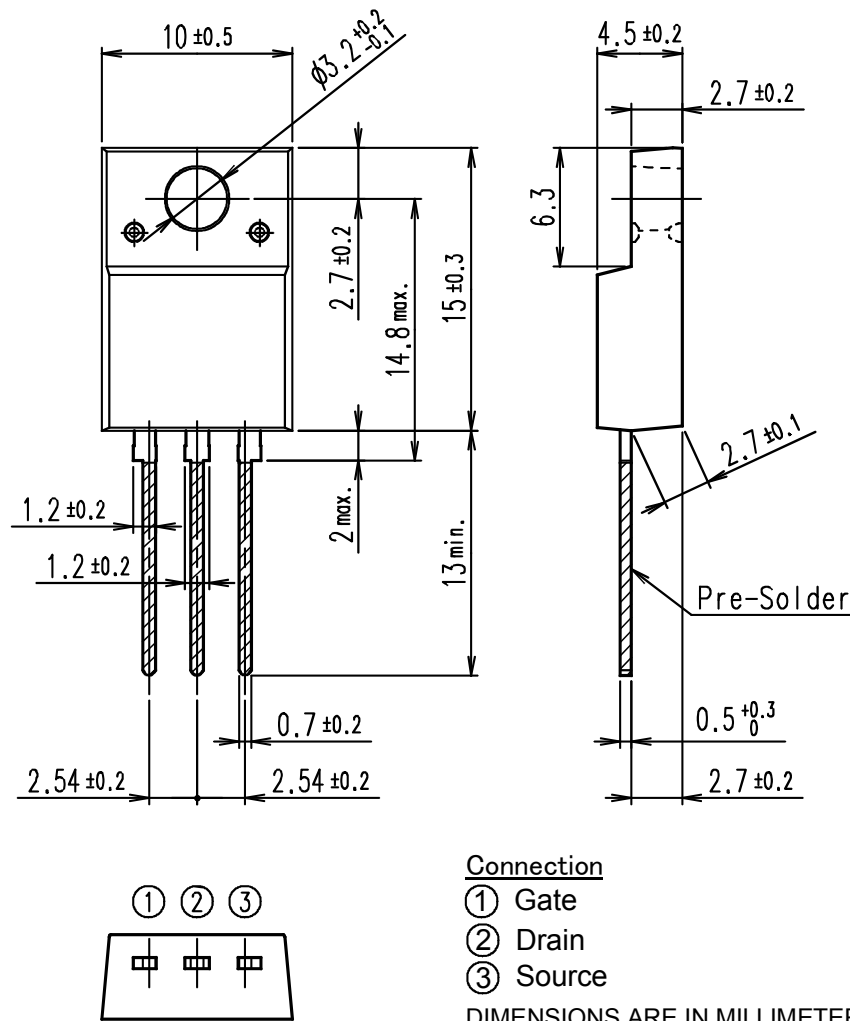
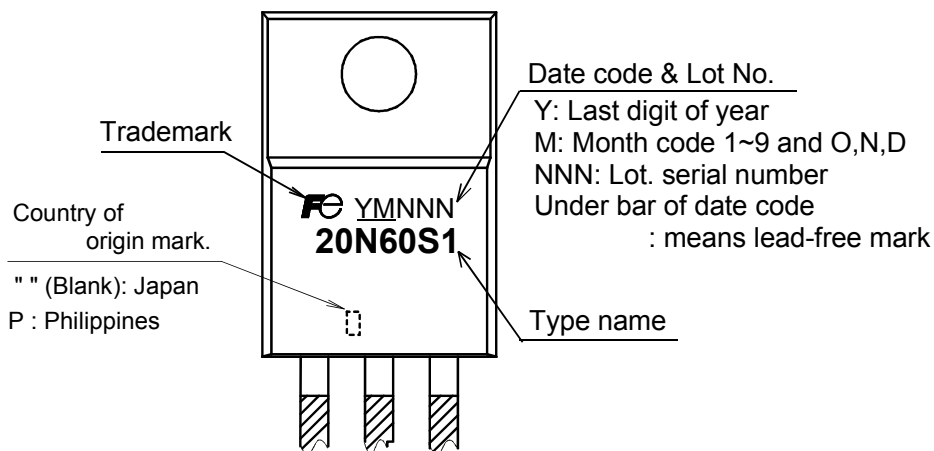


Fig.6 Operating waveform of Reverse recovery Test

■ Outview: TO-220F(SLS) Package



■ Marking



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