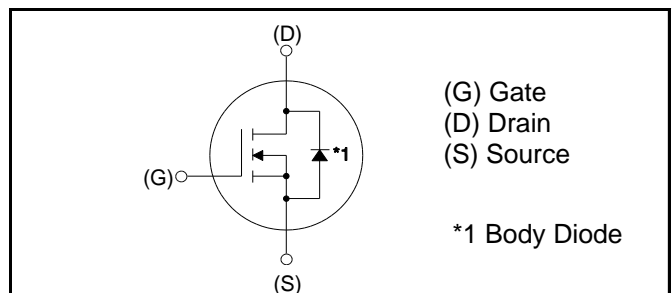


V_{DSS}	1200V
$R_{DS(on)}$ (Typ.)	80mΩ
I_D	40A ^{*1}

●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive

●Inner circuit



●Application

- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating
- Motor drives

●Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	1200	V
Continuous drain current	I_D ^{*1}	40	A
Pulsed drain current	$I_{D,pulse}$ ^{*2}	80	A
Gate - Source voltage (DC)	V_{GSS}	-6 to 22	V
Gate - Source surge voltage ($T_{surge} < 300\text{nsec}$)	$V_{GSS-surge}$ ^{*3}	-10 to 26	V
Junction temperature	T_j	175	°C
Range of storage temperature	T_{stg}	-55 to +175	°C

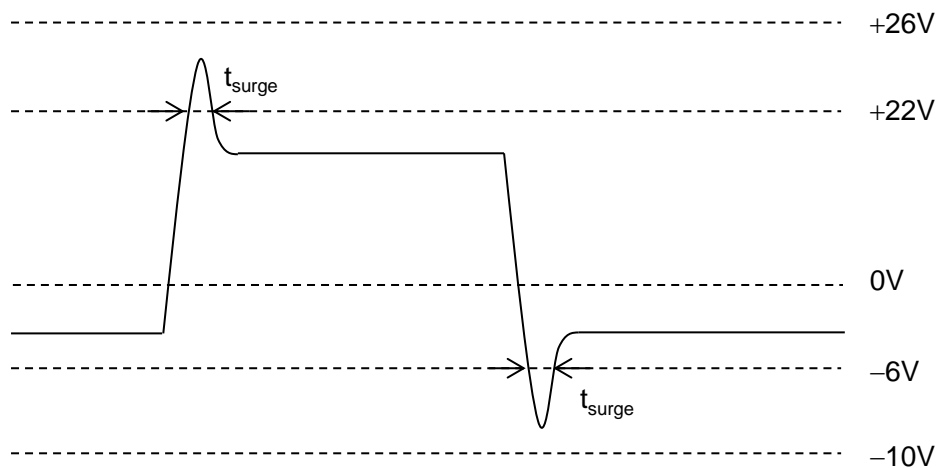
●Electrical characteristics ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	1200	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 1200V, V_{GS} = 0V$	-	1	10	μA
		$T_j = 150^\circ\text{C}$	-	2	-	
Gate - Source leakage current	I_{GSS+}	$V_{GS} = +22V, V_{DS} = 0V$	-	-	100	nA
Gate - Source leakage current	I_{GSS-}	$V_{GS} = -6V, V_{DS} = 0V$	-	-	-100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 4.4mA$	1.6	2.8	4.0	V
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 18V, I_D = 10A$	-	80	111	$m\Omega$
		$T_j = 125^\circ\text{C}$	-	125	-	
Gate input resistance	R_G	$f = 1MHz, \text{open drain}$	-	6.3	-	Ω

*1 Limited only by maximum temperature allowed.

*2 $PW \leq 10\mu s$, Duty cycle $\leq 1\%$

*3 Example of acceptable Vgs waveform



*4 Pulsed

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs}^{*4}	V _{DS} = 10V, I _D = 10A	-	3.7	-	S
Input capacitance	C _{iss}	V _{GS} = 0V	-	2080	-	pF
Output capacitance	C _{oss}	V _{DS} = 800V	-	77	-	
Reverse transfer capacitance	C _{rss}	f = 1MHz	-	16	-	
Effective output capacitance, energy related	C _{o(er)}	V _{GS} = 0V V _{DS} = 0V to 500V	-	116	-	pF
Turn - on delay time	$t_{d(on)}^{*4}$	V _{DD} = 400V, I _D = 10A	-	35	-	ns
Rise time	t_r^{*4}	V _{GS} = 18V/0V	-	36	-	
Turn - off delay time	$t_{d(off)}^{*4}$	R _L = 40Ω	-	76	-	
Fall time	t_f^{*4}	R _G = 0Ω	-	22	-	
Turn - on switching loss	E _{on} ^{*4}	V _{DD} = 600V, I _D =10A V _{GS} = 18V/0V	-	174	-	μJ
Turn - off switching loss	E _{off} ^{*4}	R _G = 0Ω, L=500μH *E _{on} includes diode reverse recovery	-	51	-	

●Gate Charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q _g ^{*4}	V _{DD} = 400V	-	106	-	nC
Gate - Source charge	Q _{gs} ^{*4}	I _D = 10A	-	27	-	
Gate - Drain charge	Q _{gd} ^{*4}	V _{GS} = 18V	-	31	-	
Gate plateau voltage	V _(plateau)	V _{DD} = 400V, I _D = 10A	-	9.7	-	V

●Body diode electrical characteristics (Source-Drain) ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S^{*1}	$T_c = 25^\circ\text{C}$	-	-	40	A
Inverse diode direct current, pulsed	I_{SM}^{*2}		-	-	80	A
Forward voltage	V_{SD}^{*4}	$V_{GS} = 0\text{V}, I_S = 10\text{A}$	-	4.6	-	V
Reverse recovery time	t_{rr}^{*4}	$I_F = 10\text{A}, V_R = 400\text{V}$ $di/dt = 150\text{A}/\mu\text{s}$	-	31	-	ns
Reverse recovery charge	Q_{rr}^{*4}		-	44	-	nC
Peak reverse recovery current	I_{rrm}^{*4}		-	2.3	-	A

●Electrical characteristic curves

Fig.1 Typical Output Characteristics(I)

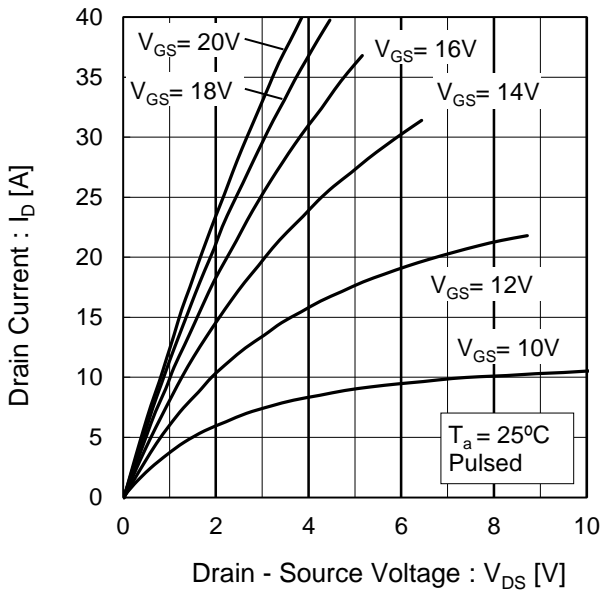


Fig.2 Typical Output Characteristics(II)

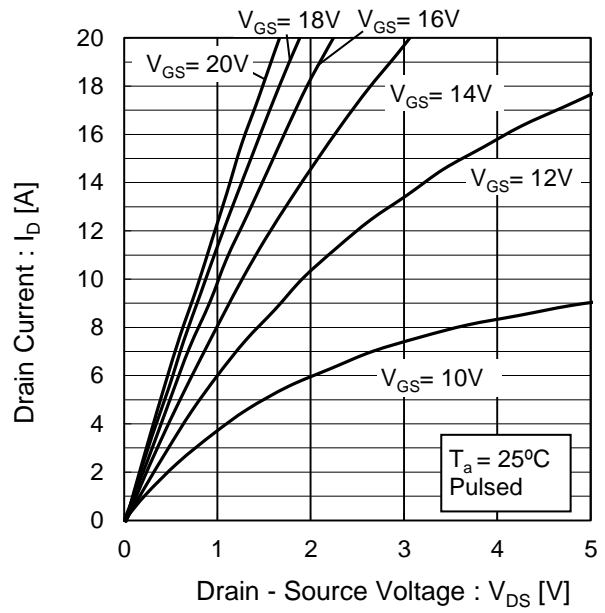


Fig.3 Typical Output Characteristics(I)

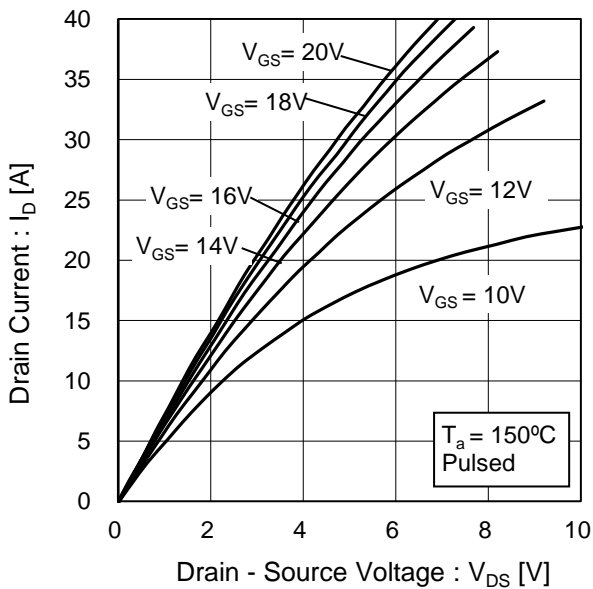
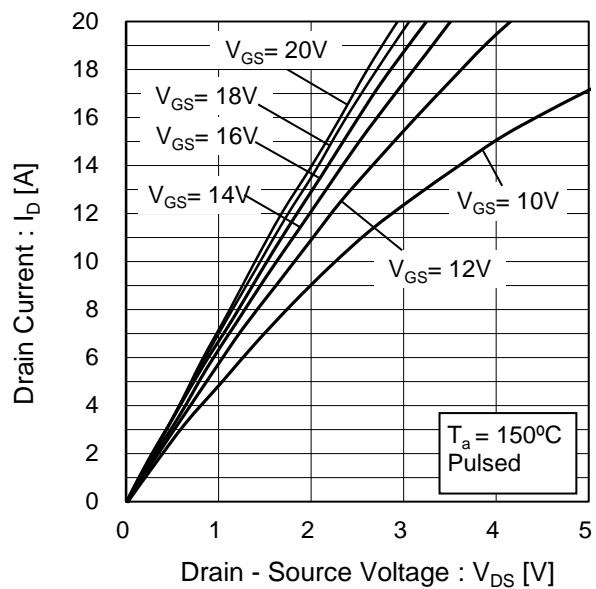


Fig.4 Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.5 Typical Transfer Characteristics

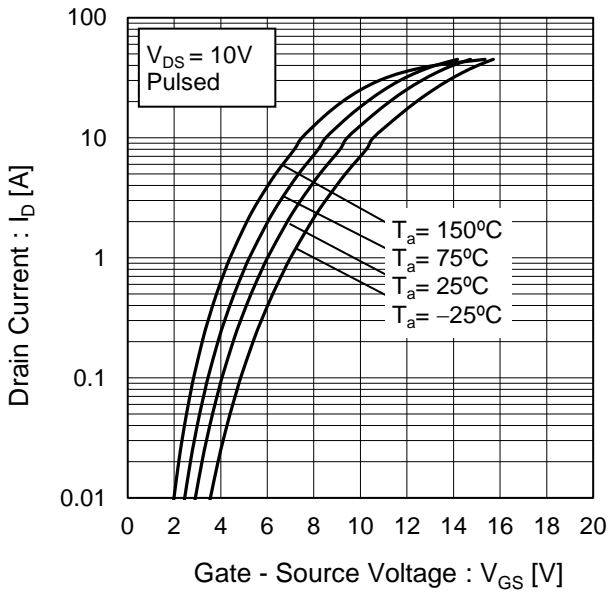


Fig.6 Typical Transfer Characteristics (II)

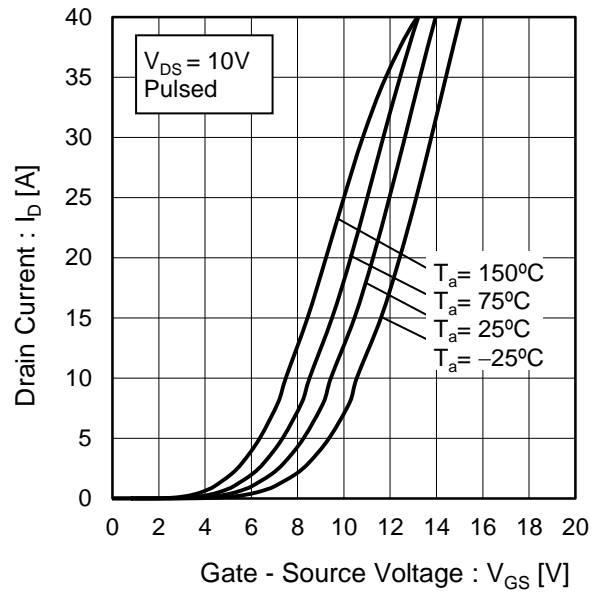


Fig.7 Gate Threshold Voltage vs. Junction Temperature

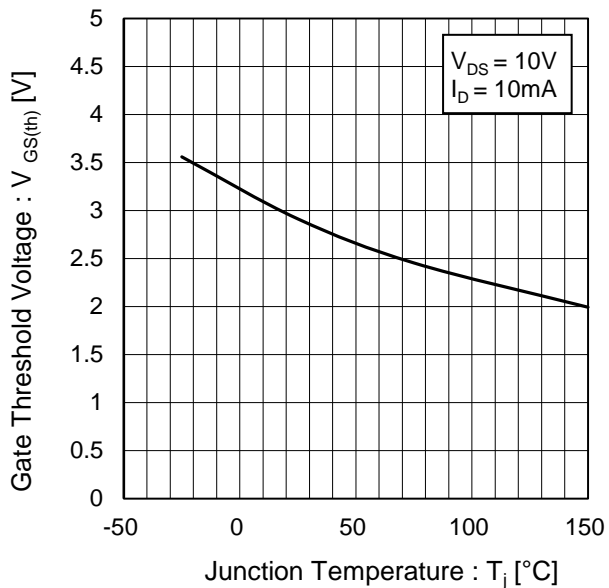
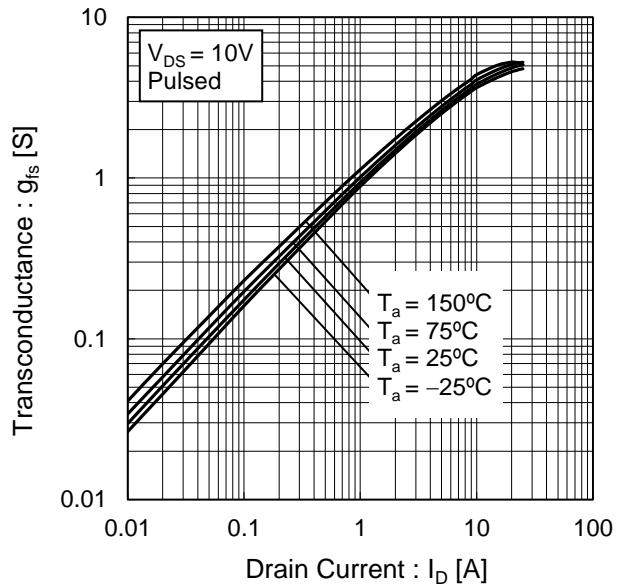


Fig.8 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.9 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

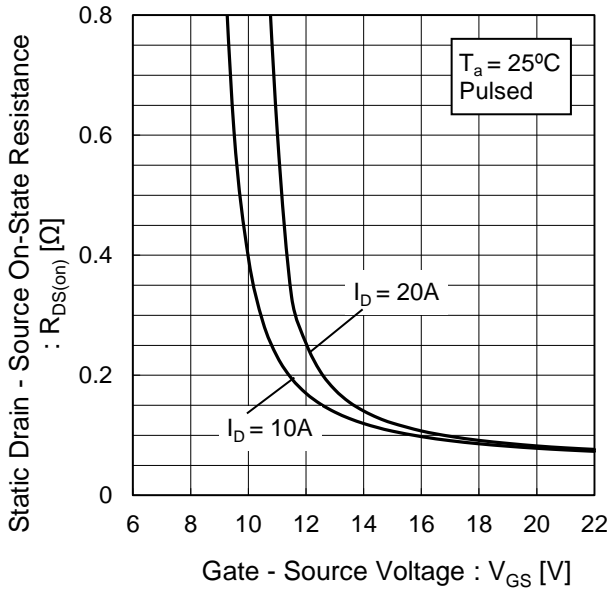


Fig.10 Static Drain - Source On - State Resistance vs. Junction Temperature

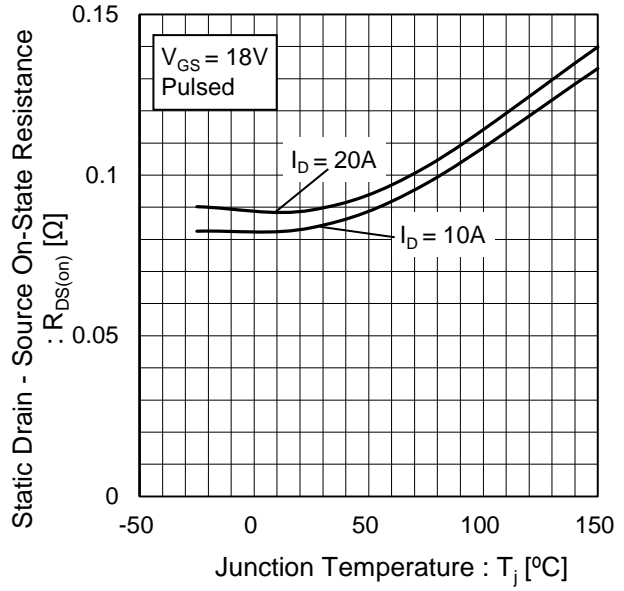
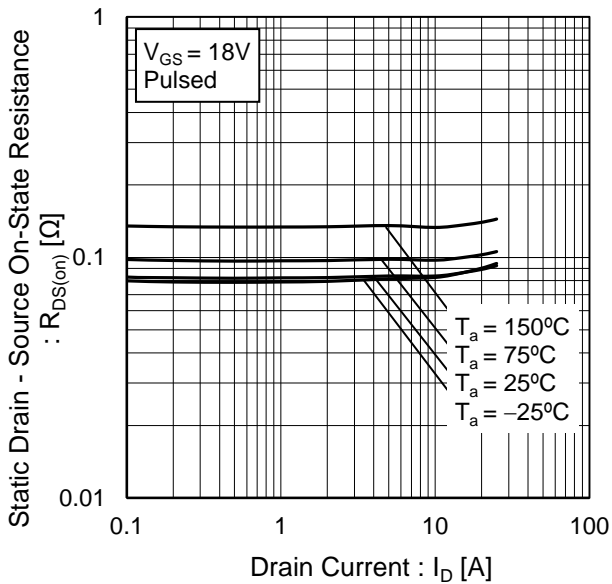


Fig.11 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.12 Typical Capacitance vs. Drain - Source Voltage

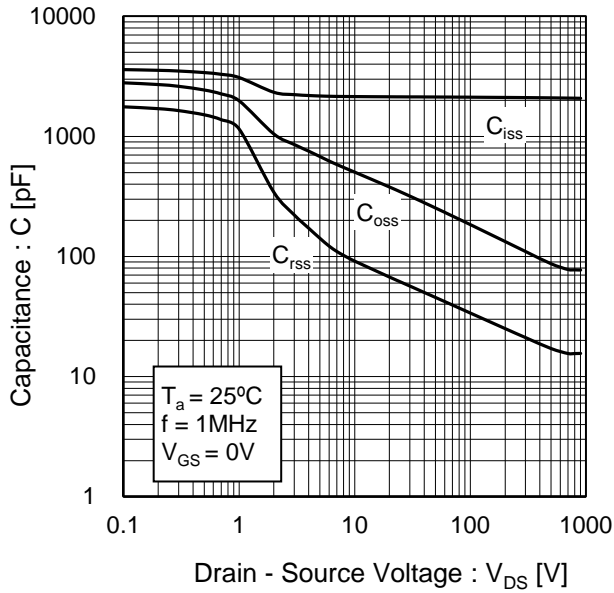


Fig.13 Coss Stored Energy

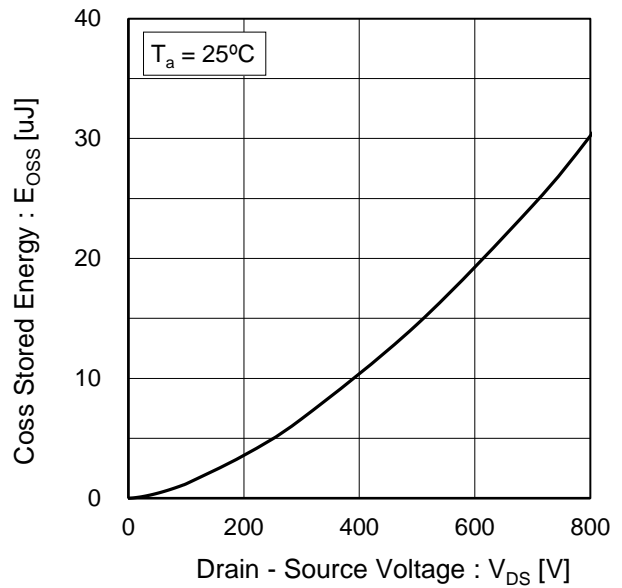


Fig.14 Switching Characteristics

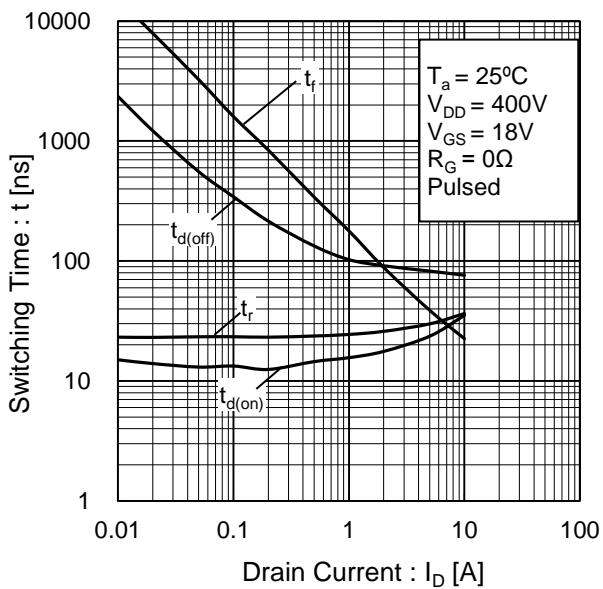
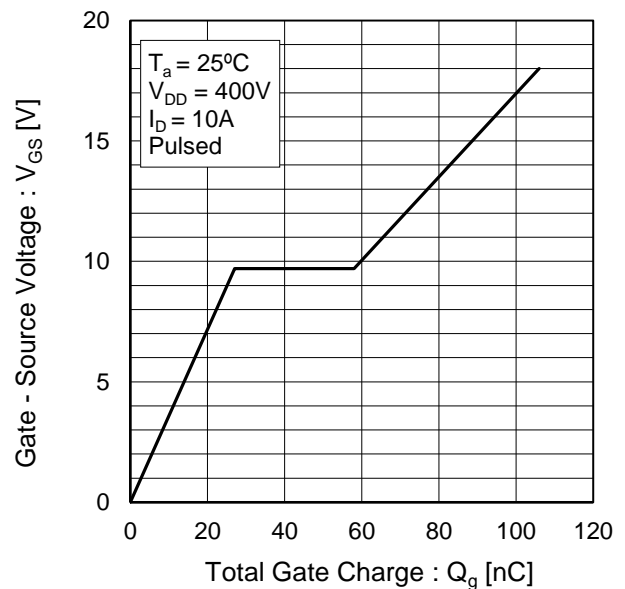


Fig.15 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.16 Typical Switching Loss vs. Drain - Source Voltage

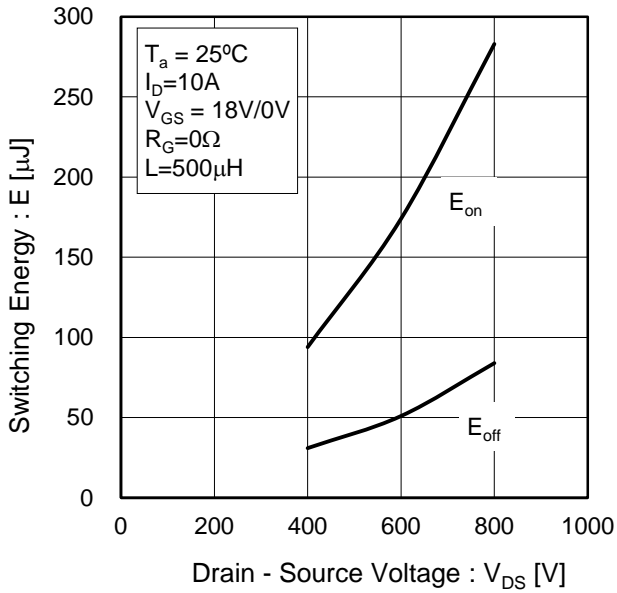


Fig.17 Typical Switching Loss vs. Drain Current

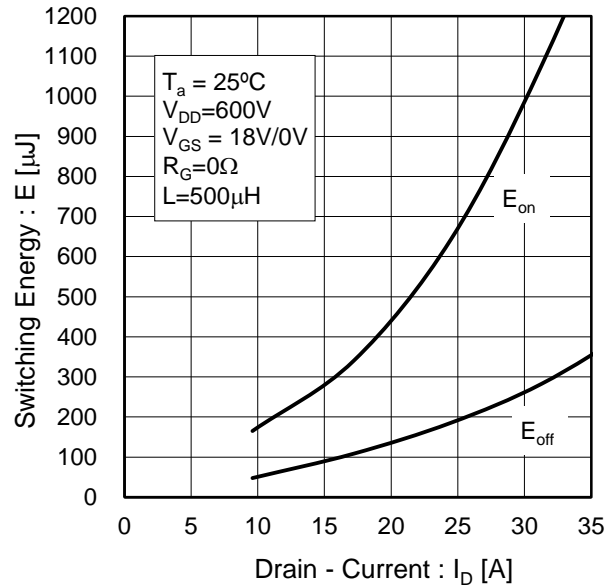
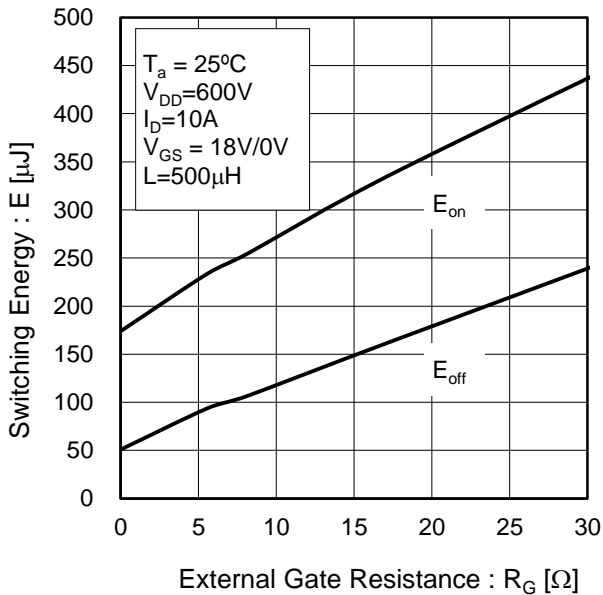


Fig.18 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

Fig.19 Inverse Diode Forward Current vs. Source - Drain Voltage

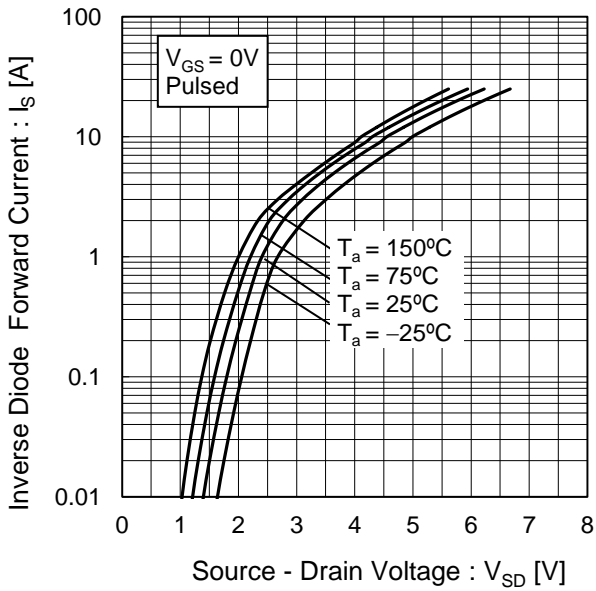
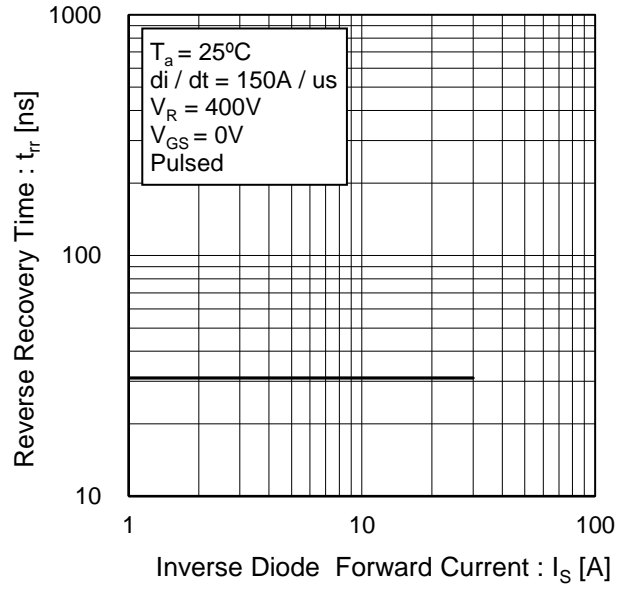


Fig.20 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

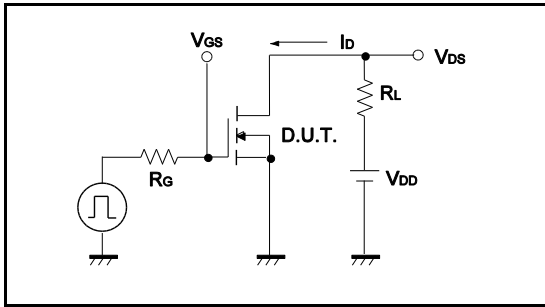


Fig.1-2 Switching Waveforms

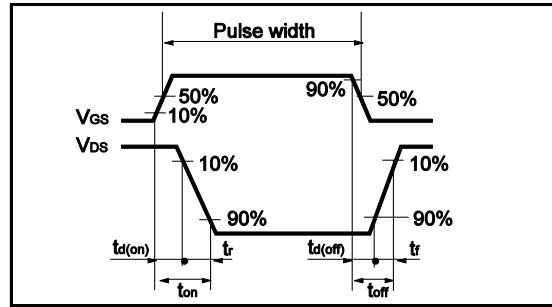


Fig.2-1 Gate Charge Measurement Circuit

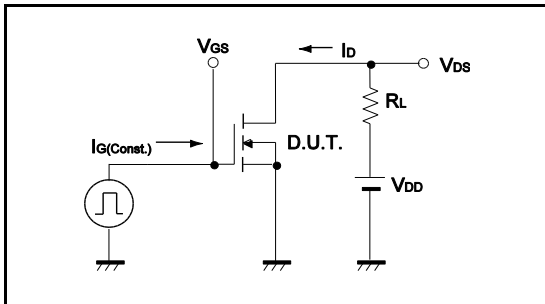


Fig.2-2 Gate Charge Waveform

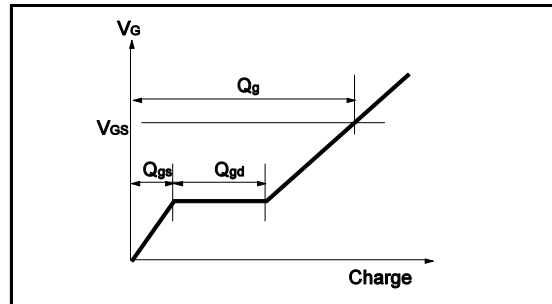


Fig.3-1 Switching Energy Measurement Circuit

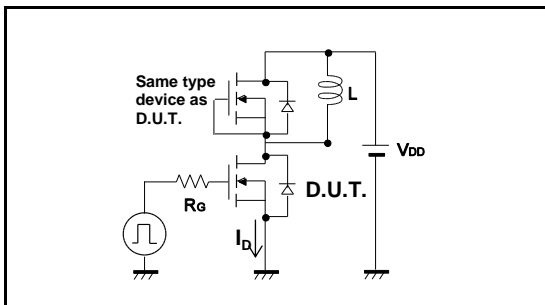


Fig.3-2 Switching Waveforms

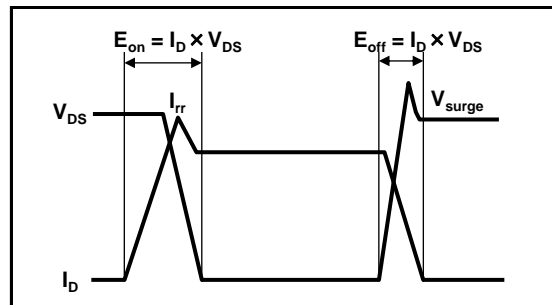


Fig.4-1 Reverse Recovery Time Measurement Circuit

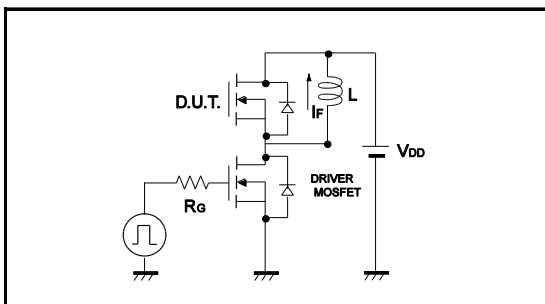
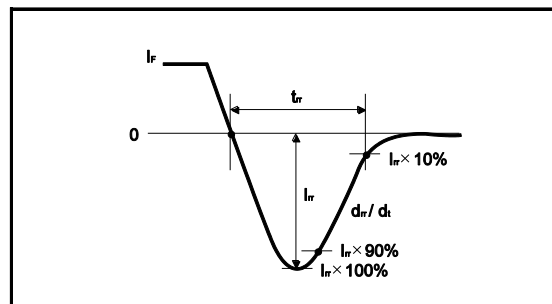


Fig.4-2 Reverse Recovery Waveform



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