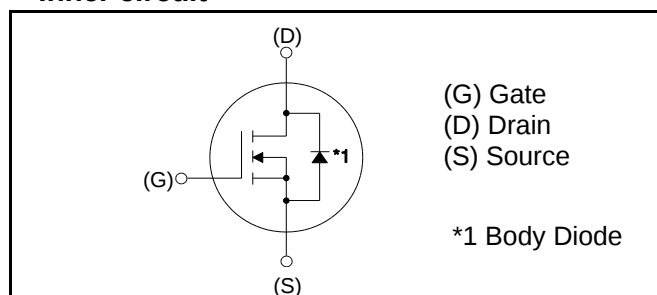


V_{DSS}	1200V
$R_{DS(on)}$ (Typ.)	450m Ω
I_D	10A ^{*1}

●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 $T_c = 25^\circ\text{C}$	I_D ^{*1}	10	A
Pulsed drain current	$I_{D,pulse}$ ^{*2}	25	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	$^\circ\text{C}$
Range of storage temperature	T_{stg}	-55 to +175	$^\circ\text{C}$

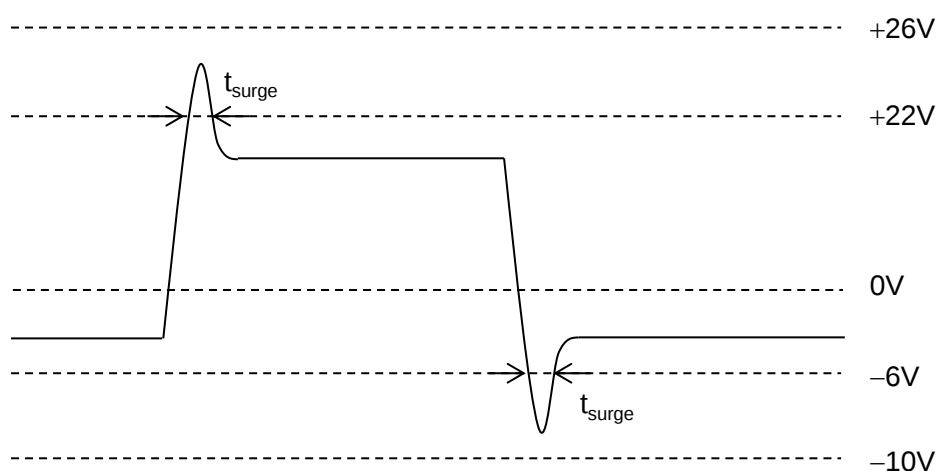
●Electrical characteristics ($T_a = 25^\circ\text{C}$)

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}	$V_{DS} = 1200V, V_{GS} = 0V$ $T_j = 25^\circ\text{C}$	-	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	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 0.9mA$	1.6	2.8	4.0	V
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 18V, I_D = 3A$ $T_j = 25^\circ\text{C}$	-	450	556	$m\Omega$
		$T_j = 125^\circ\text{C}$	-	610	-	
Gate input resistance	R_G	$f = 1MHz, \text{open drain}$	-	25	-	Ω

*1 Limited only by maximum temperature allowed.

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

*3 Example of acceptable Vgs waveform



*4 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs}^{*4}	$V_{DS} = 10\text{V}, I_D = 3\text{A}$	-	1.0	-	S
Input capacitance	C_{iss}	$V_{GS} = 0\text{V}$	-	463	-	pF
Output capacitance	C_{oss}	$V_{DS} = 800\text{V}$	-	21	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	4	-	
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS} = 0\text{V}$ $V_{DS} = 0\text{V to } 500\text{V}$	-	31	-	pF
Turn - on delay time	$t_{d(on)}^{*4}$	$V_{DD} = 400\text{V}, V_{GS} = 18\text{V}$	-	19	-	ns
Rise time	t_r^{*4}	$I_D = 3\text{A}$	-	17	-	
Turn - off delay time	$t_{d(off)}^{*4}$	$R_L = 133\Omega$	-	38	-	
Fall time	t_f^{*4}	$R_G = 0\Omega$	-	34	-	
Turn - on switching loss	E_{on}^{*4}	$V_{DD} = 600\text{V}, I_D = 3\text{A}$ $V_{GS} = 18\text{V}/0\text{V}$	-	47	-	μJ
Turn - off switching loss	E_{off}^{*4}	$R_G = 0\Omega, L = 500\mu\text{H}$ * E_{on} includes diode reverse recovery	-	17	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*4}	$V_{DD} = 400\text{V}$	-	27	-	nC
Gate - Source charge	Q_{gs}^{*4}	$I_D = 3\text{A}$	-	7	-	
Gate - Drain charge	Q_{gd}^{*4}	$V_{GS} = 18\text{V}$	-	9	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 400\text{V}, I_D = 3\text{A}$	-	10.5	-	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}	$T_c = 25^\circ\text{C}$	-	-	10	A
Inverse diode direct current, pulsed	I_{SM}^{*2}		-	-	25	A
Forward voltage	V_{SD}^{*4}	$V_{GS} = 0\text{V}, I_S = 3\text{A}$	-	4.3	-	V
Reverse recovery time	t_{rr}^{*4}	$I_F = 3\text{A}, V_R = 400\text{V}$ $di/dt = 110\text{A}/\mu\text{s}$	-	19	-	ns
Reverse recovery charge	Q_{rr}^{*4}		-	13	-	nC
Peak reverse recovery current	I_{rrm}^{*4}		-	1.4	-	A

●Electrical characteristic curves

Fig.1 Typical Output Characteristics(I)

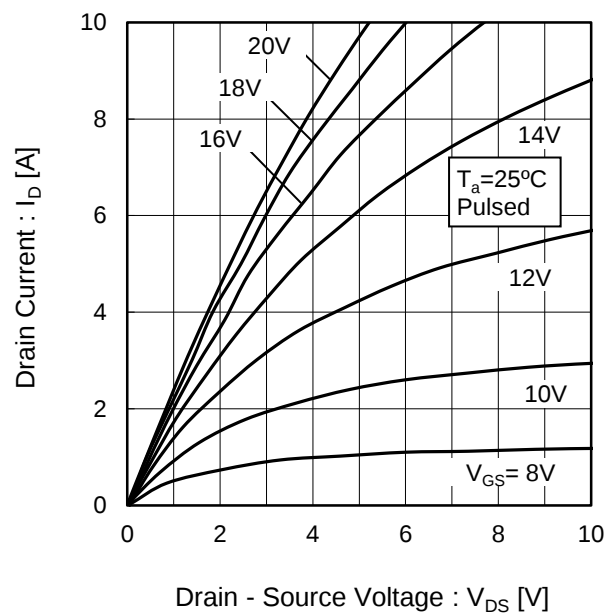


Fig.2 Typical Output Characteristics(II)

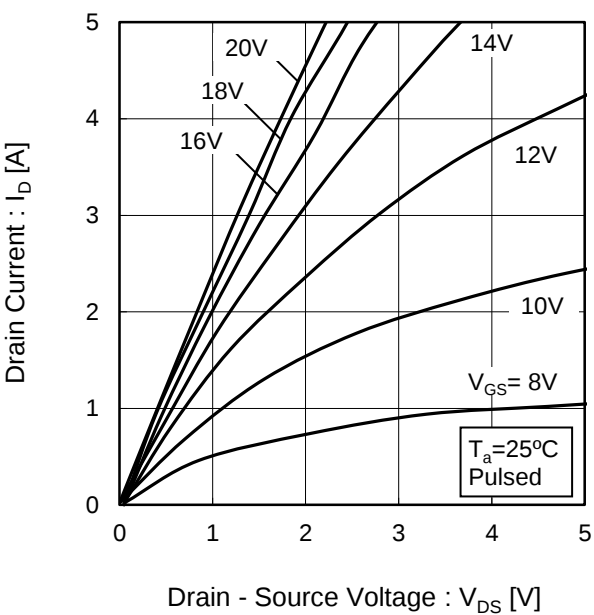


Fig.3 $T_j = 150^\circ\text{C}$ Typical Output Characteristics(I)

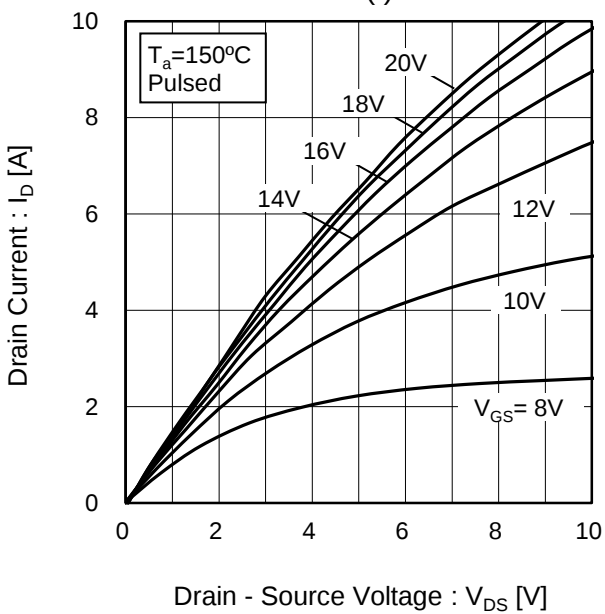
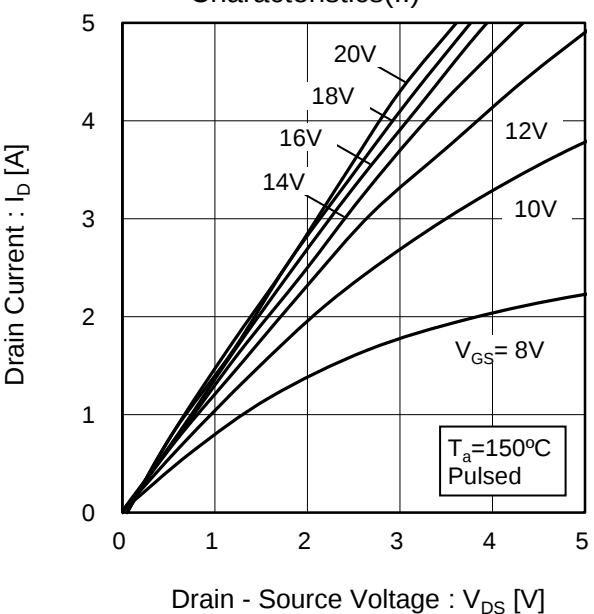


Fig.4 $T_j = 150^\circ\text{C}$ Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.5 Typical Transfer Characteristics (I)

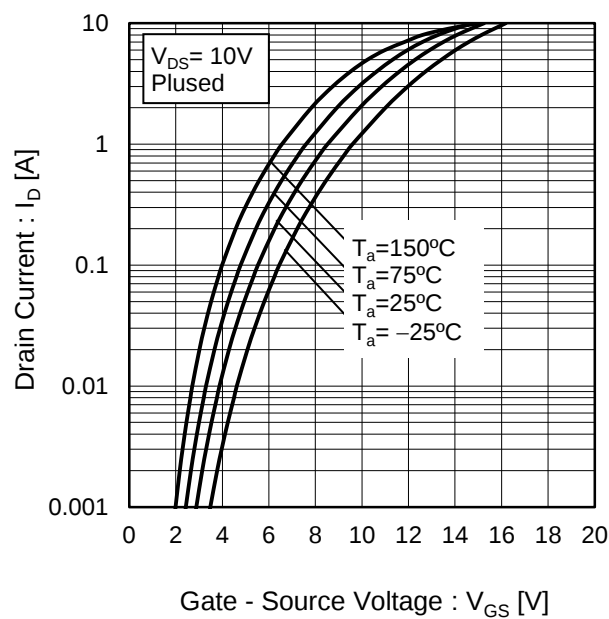


Fig.6 Typical Transfer Characteristics (II)

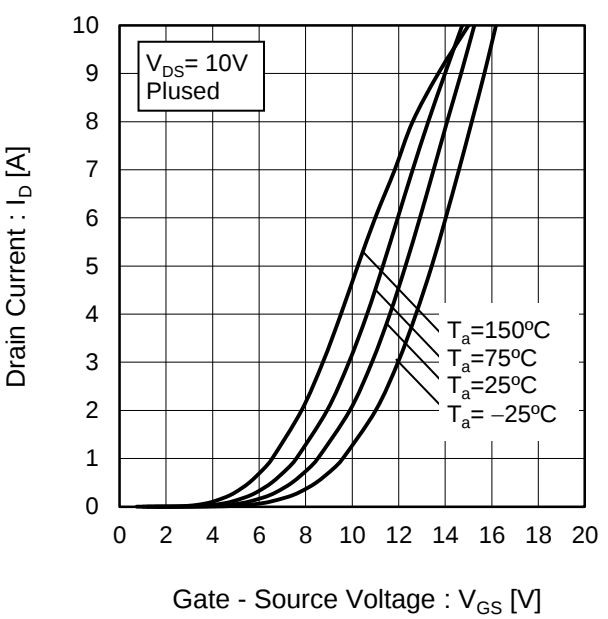


Fig.7 Gate Threshold Voltage vs. Junction Temperature

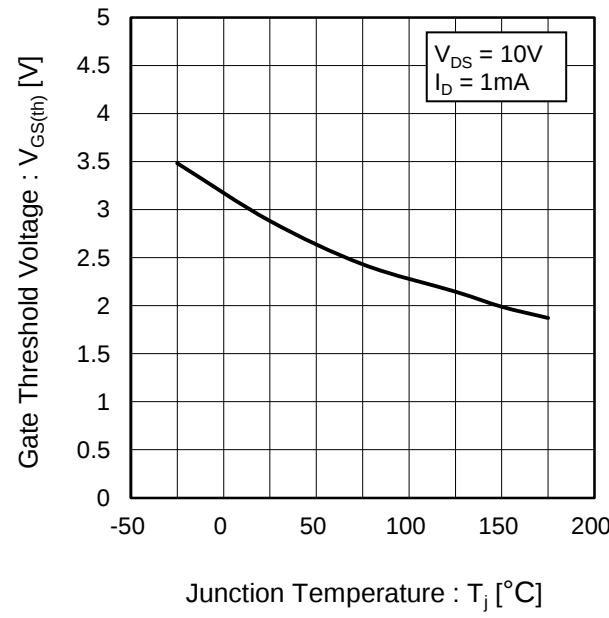
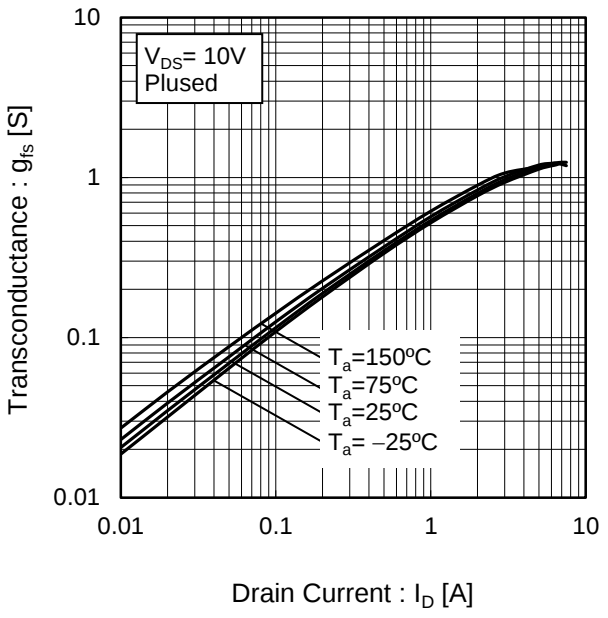


Fig.8 Transconductance vs. Drain Current



●Electrical characteristic curves

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

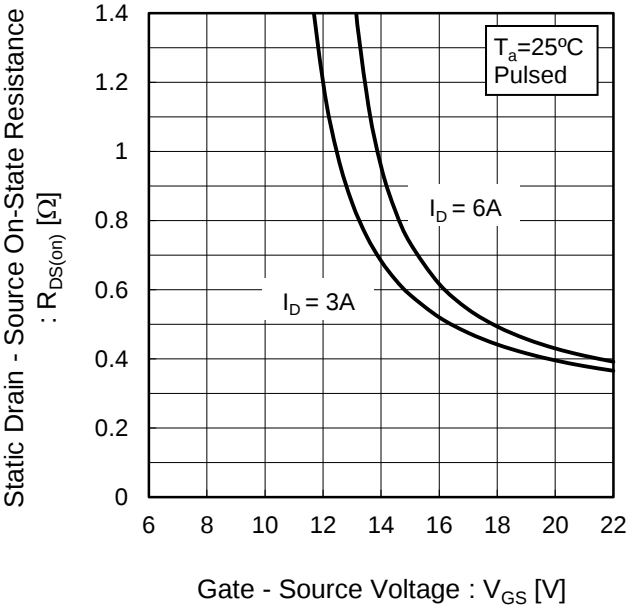


Fig.10 Static Drain - Source On - State Resistance vs. Junction Temperature

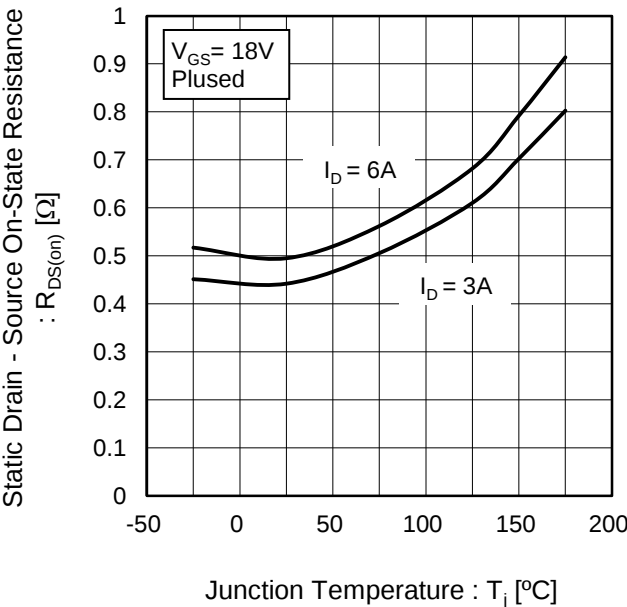
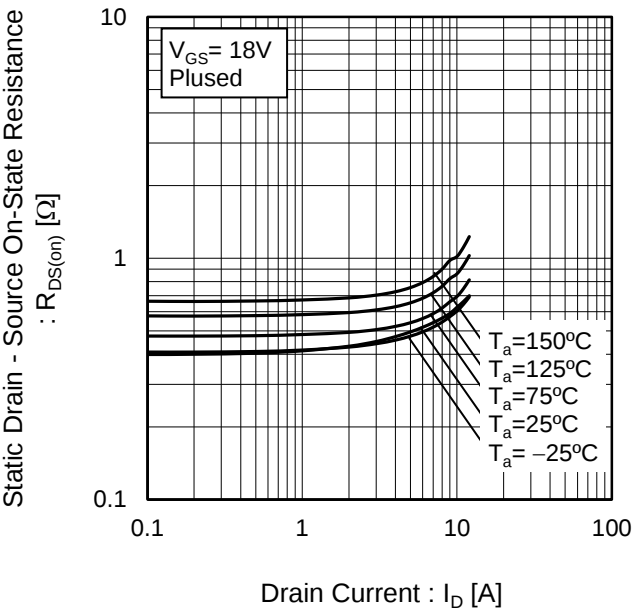


Fig.11 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.12 Typical Capacitance vs. Drain - Source Voltage

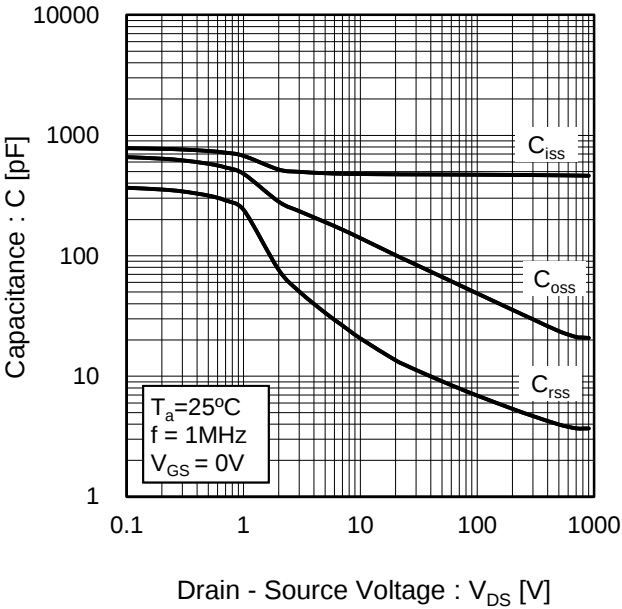


Fig.13 Coss Stored Energy

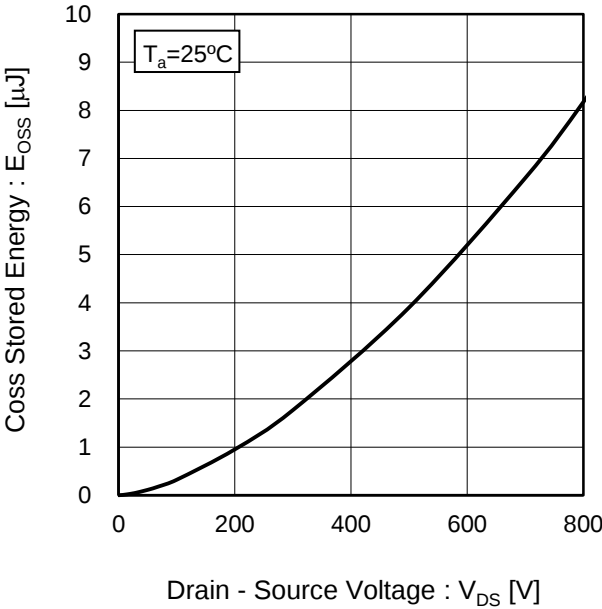


Fig.14 Switching Characteristics

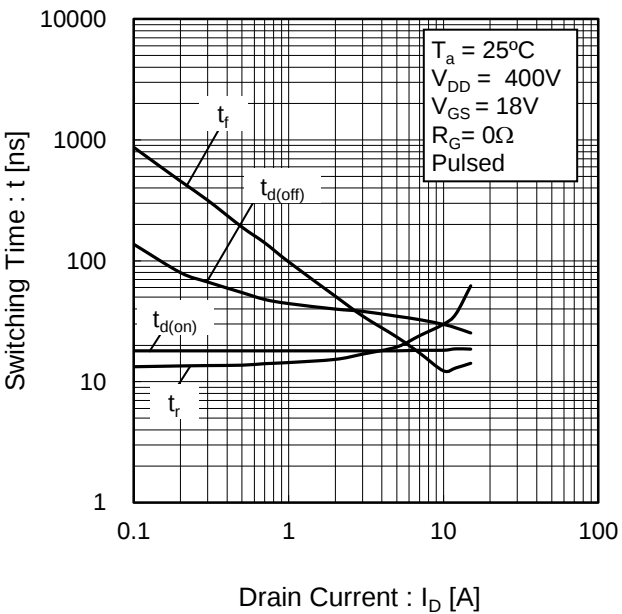
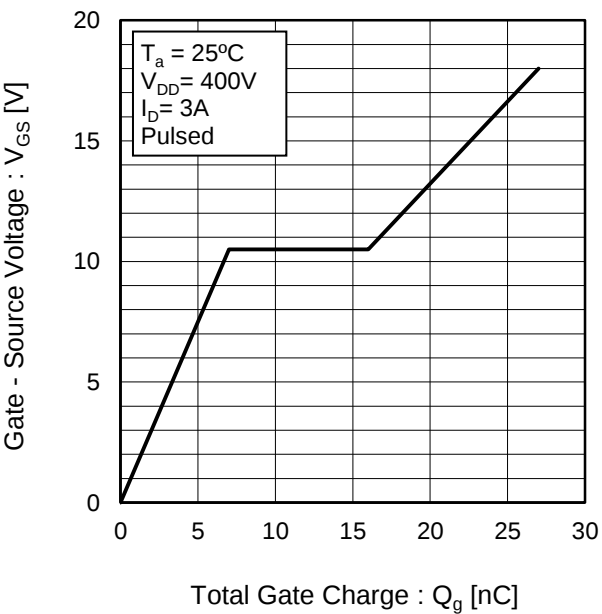


Fig.15 Dynamic Input Characteristics



●Electrical characteristic curves

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

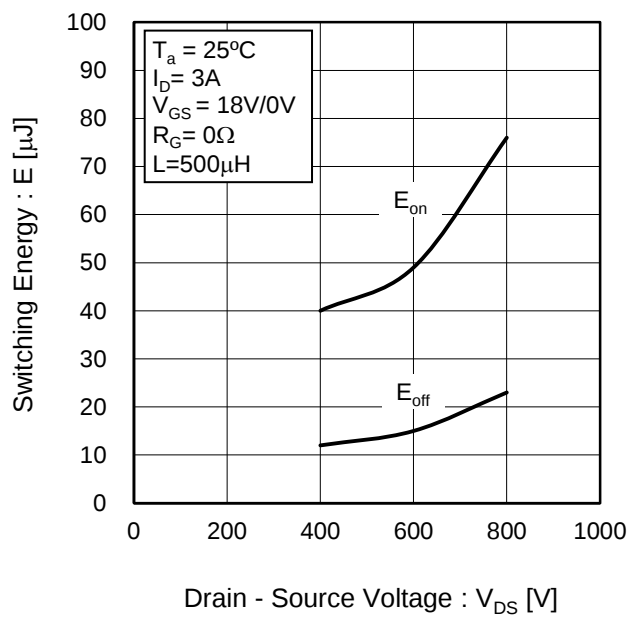


Fig.17 Typical Switching Loss
vs. Drain Current

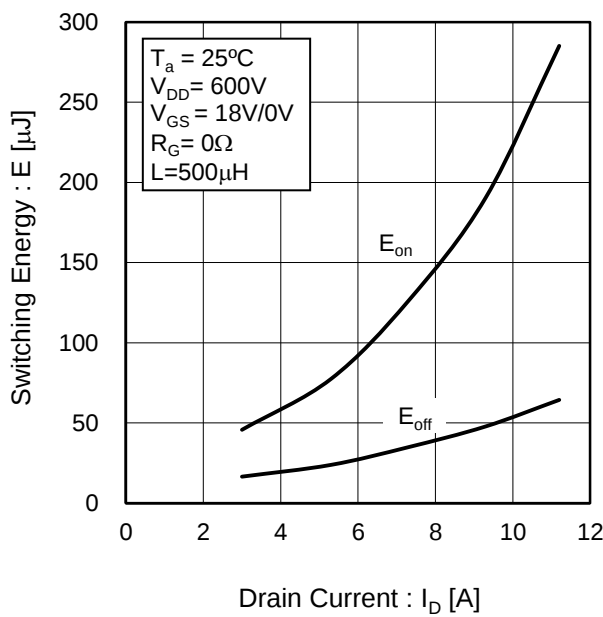
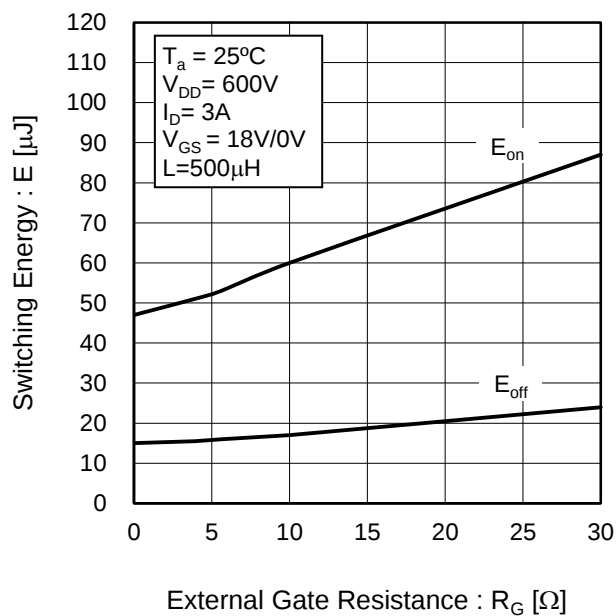


Fig.18 Typical Switching Loss
vs. External Gate Resistance



●Electrical characteristic curves

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

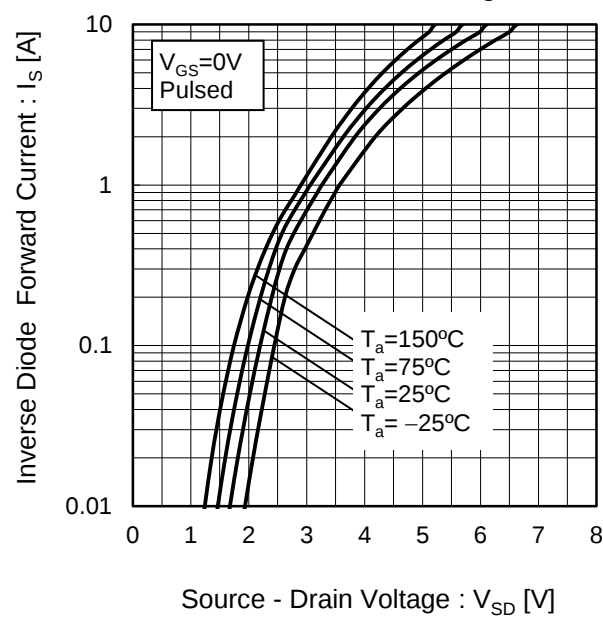
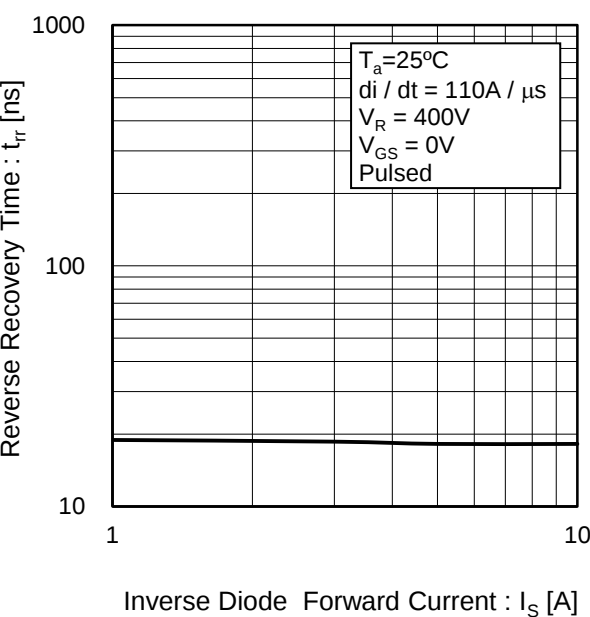


Fig.20 Reverse Recovery Time vs. Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

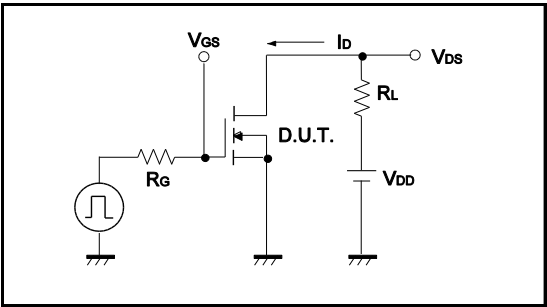


Fig.1-2 Switching Waveforms

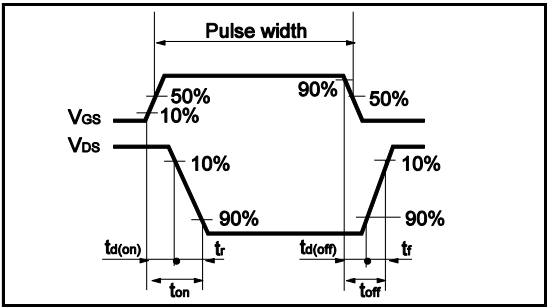


Fig.2-1 Gate Charge Measurement Circuit

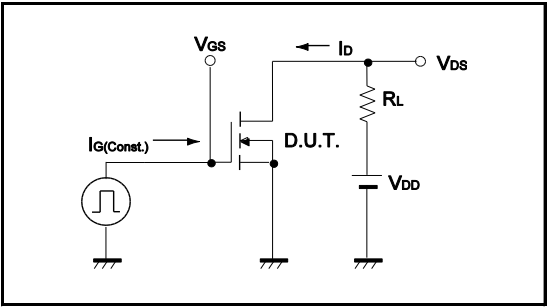


Fig.2-2 Gate Charge Waveform

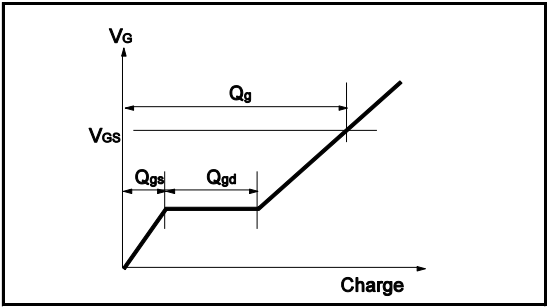


Fig.3-1 Switching Energy Measurement Circuit

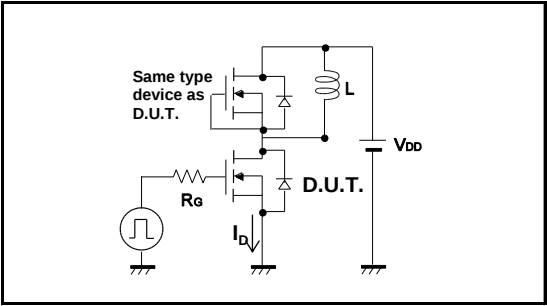


Fig.3-2 Switching Waveforms

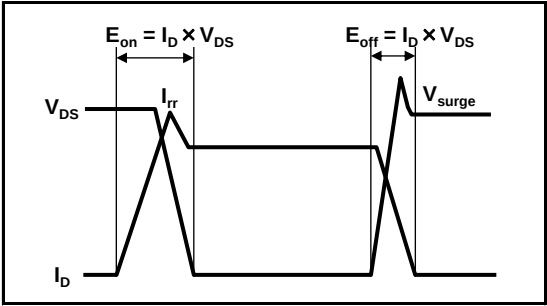


Fig.4-1 Reverse Recovery Time Measurement Circuit

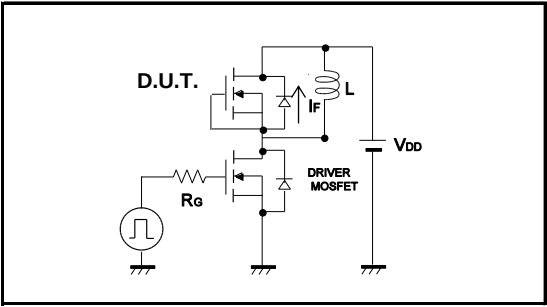
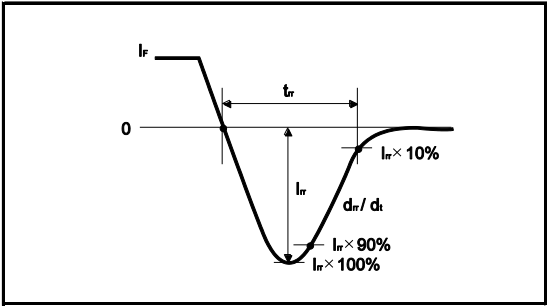


Fig.4-2 Reverse Recovery Waveform



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