

V_{DSS}	650V
$R_{DS(on)}$ (Typ.)	22mΩ
I_D	93A
P_D	339W

●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

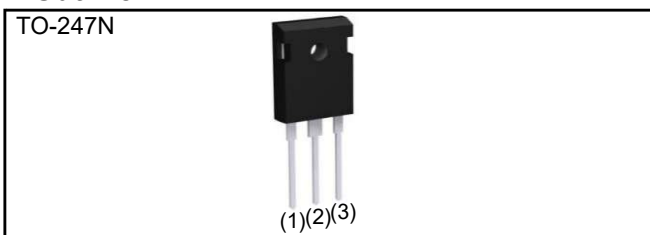
●Application

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

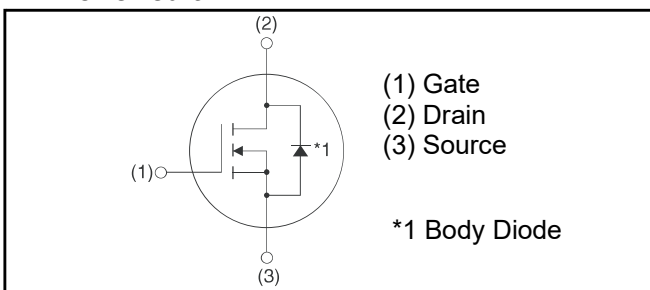
●Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit	
Drain - Source voltage	V_{DSS}	650	V	
Continuous drain current	$T_c = 25^\circ\text{C}$	I_D^{*1}	93	A
	$T_c = 100^\circ\text{C}$	I_D^{*1}	65	A
Pulsed drain current	$I_{D,pulse}^{*2}$	232	A	
Gate - Source voltage	V_{GSS}	-4 to 22	V	
Gate-Source Surge Voltage	$V_{GSS,surge}$	-4 to 22	V	
Recommended Drive Voltage	$V_{GS,op}$	0 / 18	V	
Junction temperature	T_j	175	$^\circ\text{C}$	
Range of storage temperature	T_{stg}	-55 to +175	$^\circ\text{C}$	

●Outline



●Inner circuit



●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Taping code	C11
	Marking	SCT3022AL

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}	-	0.34	0.44	°C/W

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$	650	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 650\text{V}, V_{GS} = 0\text{V}$ $T_j = 25^\circ\text{C}$	-	1	10	μA
		$T_j = 150^\circ\text{C}$	-	2	-	
Gate - Source leakage current	I_{GSS+}	$V_{GS} = +22\text{V}, V_{DS} = 0\text{V}$	-	-	100	nA
Gate - Source leakage current	I_{GSS-}	$V_{GS} = -4\text{V}, V_{DS} = 0\text{V}$	-	-	-100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10\text{V}, I_D = 18.2\text{mA}$	2.7	-	5.6	V
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = 18\text{V}, I_D = 36\text{A}$ $T_j = 25^\circ\text{C}$	-	22	28.6	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$	-	29	-	
Gate input resistance	R_G	$f = 1\text{MHz}, \text{open drain}$	-	5	-	Ω

●Example of acceptable Vgs waveform



●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs}^{*3}	$V_{DS} = 10V, I_D = 36A$	-	12.2	-	S
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	2208	-	pF
Output capacitance	C_{oss}	$V_{DS} = 500V$	-	118	-	
Reverse transfer capacitance	C_{rss}	$f = 1MHz$	-	52	-	
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS} = 0V$ $V_{DS} = 0V \text{ to } 300V$	-	303	-	pF
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} = 300V, I_D = 18A$	-	25	-	ns
Rise time	t_r^{*3}	$V_{GS} = 18V/0V$	-	53	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L = 17\Omega$	-	61	-	
Fall time	t_f^{*3}	$R_G = 0\Omega$	-	35	-	
Turn - on switching loss	E_{on}^{*3}	$V_{DD} = 300V, I_D = 36A$ $V_{GS} = 18V/0V$	-	252	-	μJ
Turn - off switching loss	E_{off}^{*3}	$R_G = 0\Omega, L = 100\mu H$ * E_{on} includes diode reverse recovery	-	201	-	

●Gate Charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*3}	$V_{DD} = 300V$	-	133	-	nC
Gate - Source charge	Q_{gs}^{*3}	$I_D = 36A$	-	31	-	
Gate - Drain charge	Q_{gd}^{*3}	$V_{GS} = 18V$	-	53	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 300V, I_D = 36A$	-	9.6	-	V

*1 Limited only by maximum temperature allowed.

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

*3 Pulsed

●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}	$T_c = 25^\circ\text{C}$	-	-	93	A
Inverse diode direct current, pulsed	I_{SM}^{*2}		-	-	232	A
Forward voltage	V_{SD}^{*3}	$V_{GS} = 0\text{V}, I_S = 36\text{A}$	-	3.2	-	V
Reverse recovery time	t_{rr}^{*3}	$I_F = 36\text{A}, V_R = 300\text{V}$ $di/dt = 1100\text{A}/\mu\text{s}$	-	27	-	ns
Reverse recovery charge	Q_{rr}^{*3}		-	146	-	nC
Peak reverse recovery current	I_{rrm}^{*3}		-	10	-	A

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

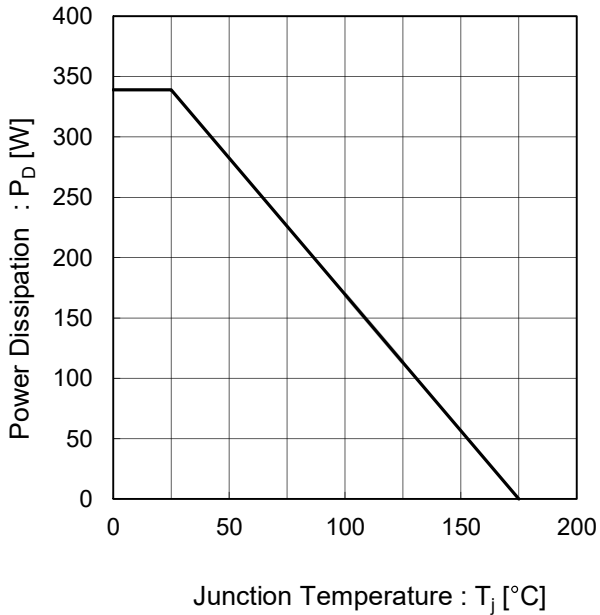


Fig.2 Maximum Safe Operating Area

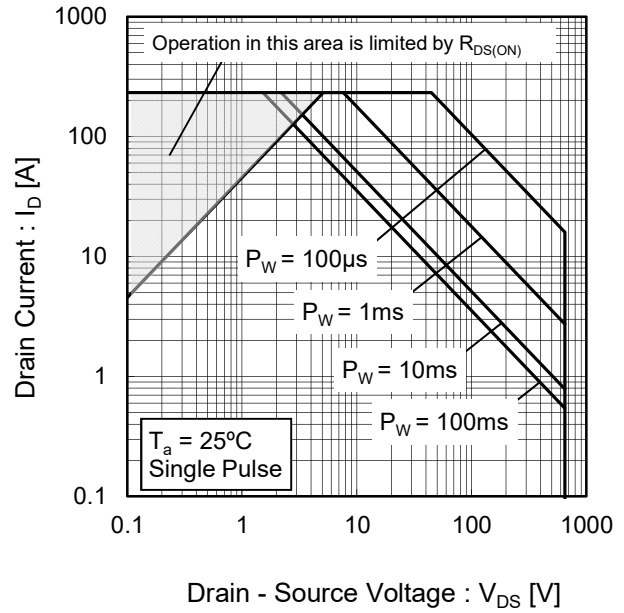
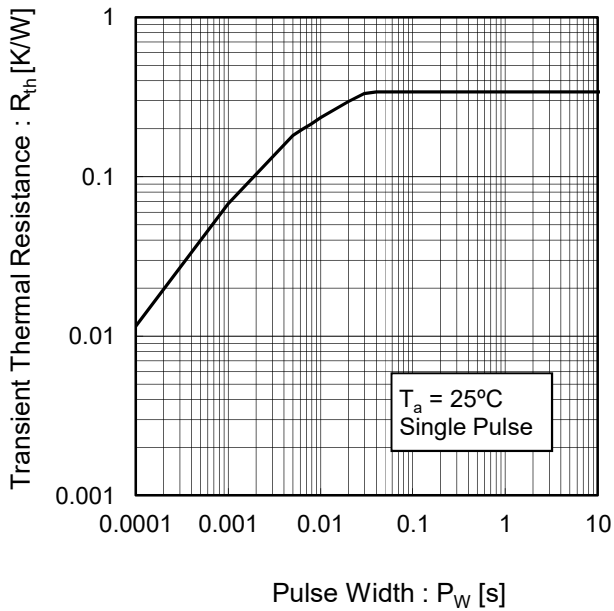


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

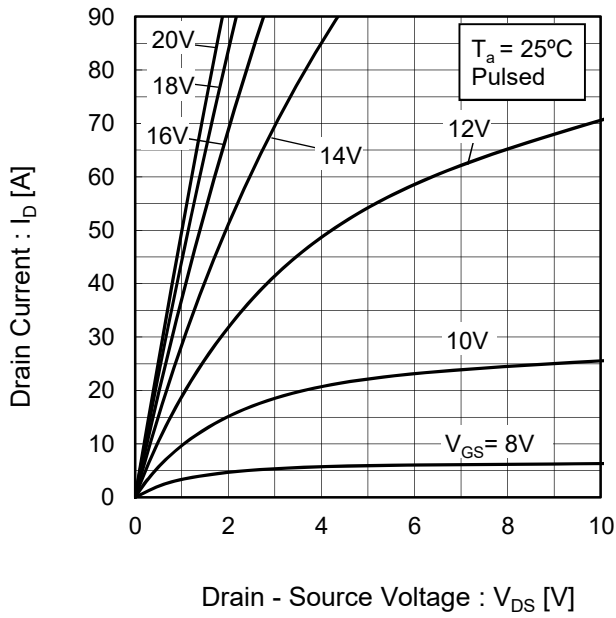


Fig.5 Typical Output Characteristics(II)

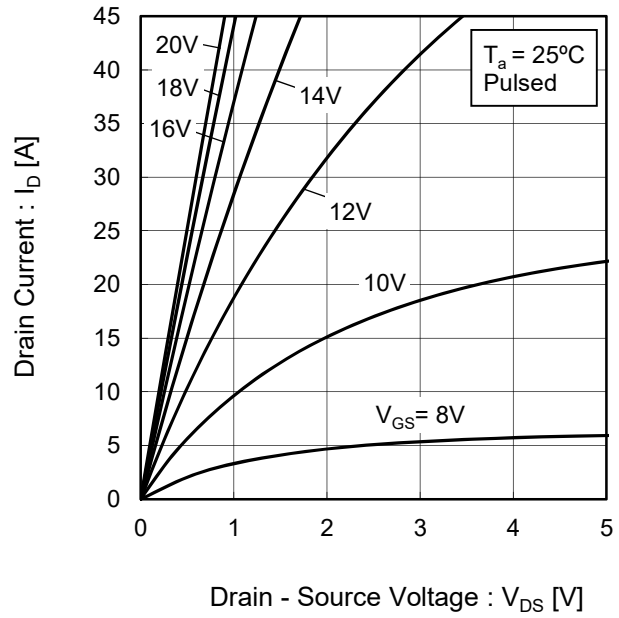


Fig.6 $T_j = 150^\circ\text{C}$ Typical Output Characteristics(I)

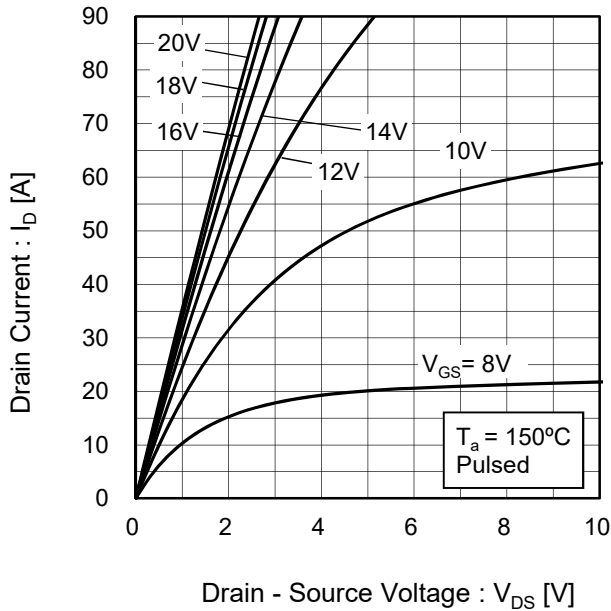
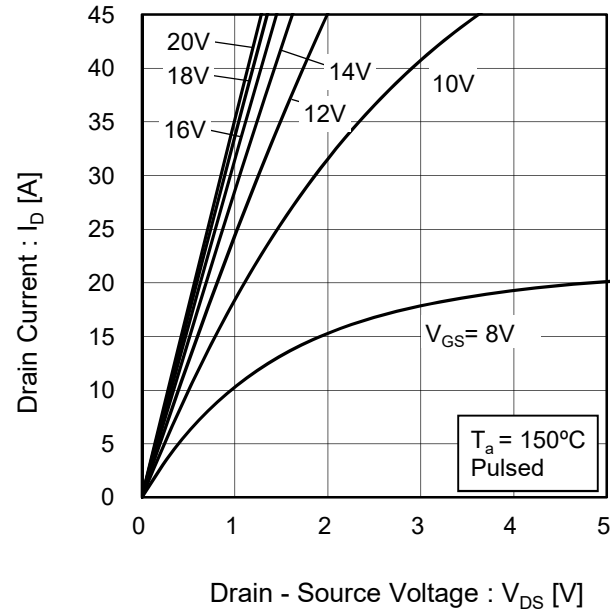


Fig.7 $T_j = 150^\circ\text{C}$ Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics (I)

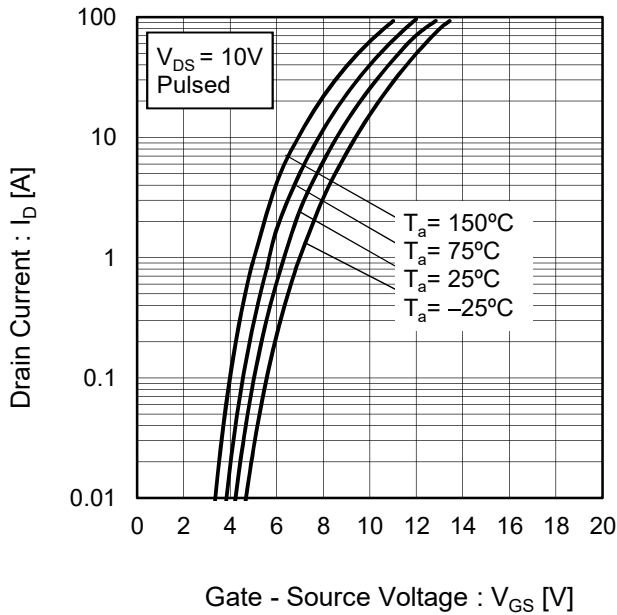


Fig.9 Typical Transfer Characteristics (II)

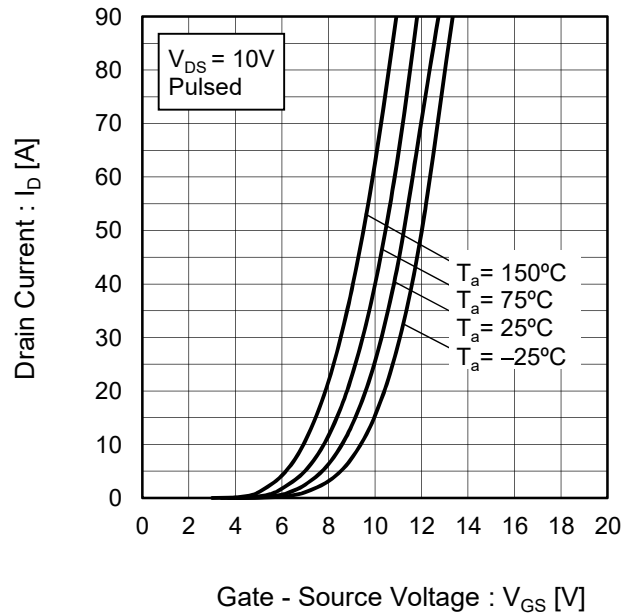


Fig.10 Gate Threshold Voltage vs. Junction Temperature

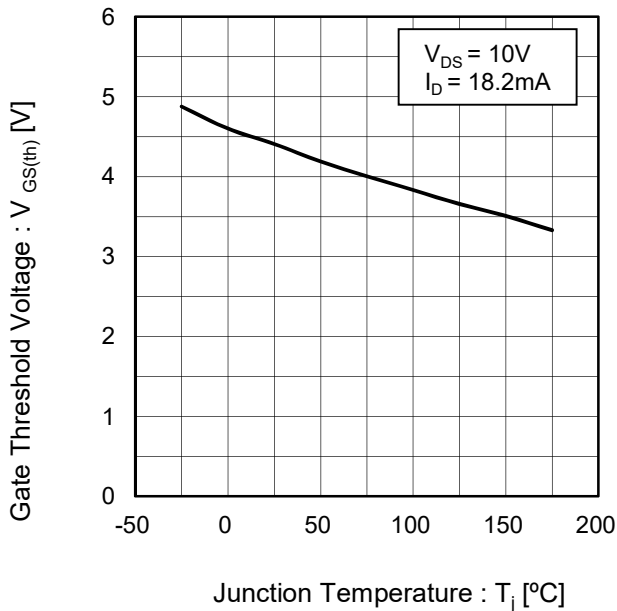
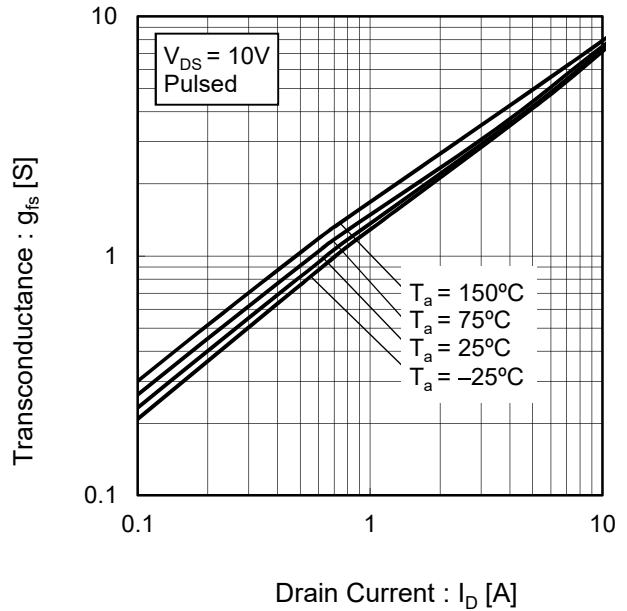


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.12 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

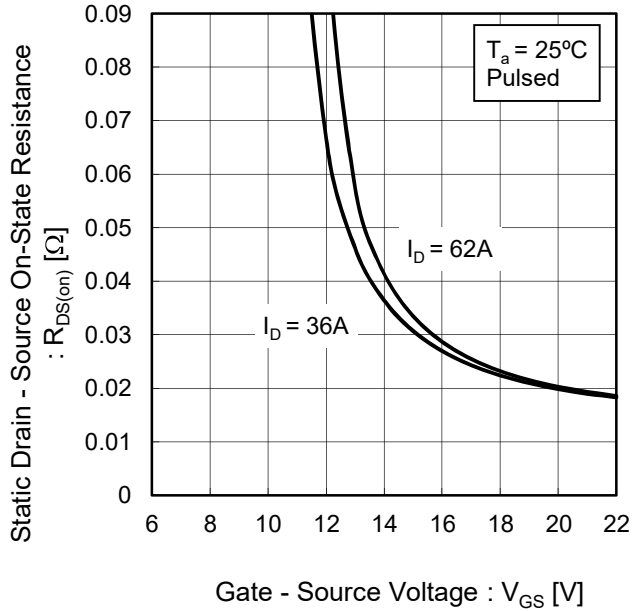


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

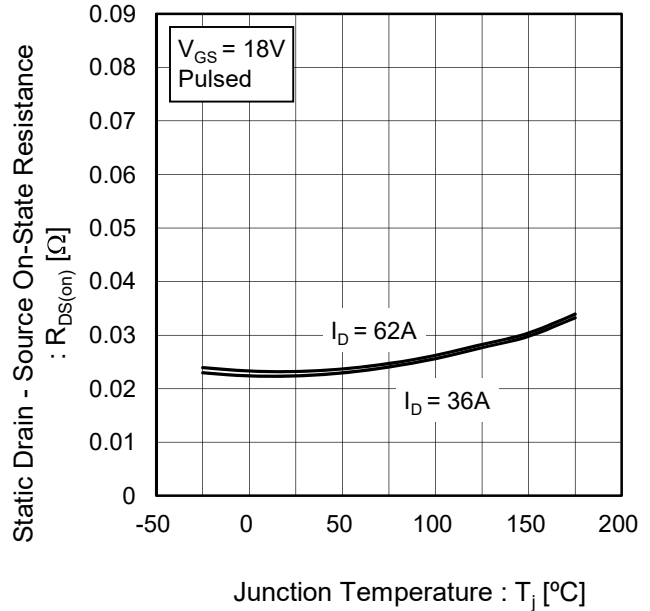
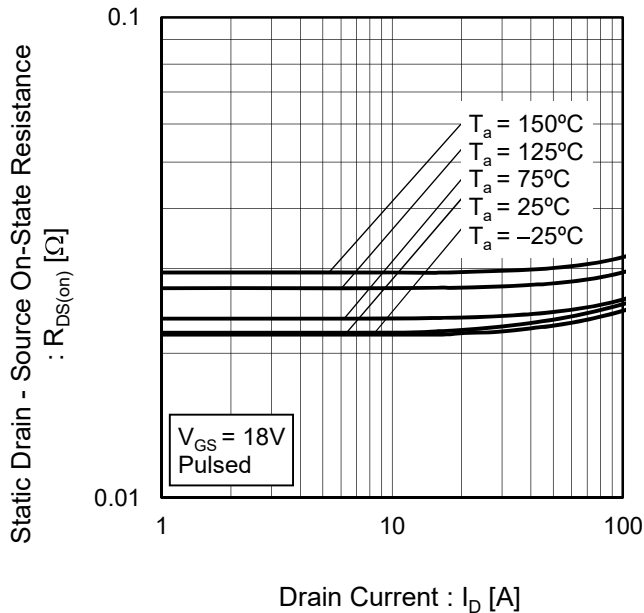


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.15 Typical Capacitance vs. Drain - Source Voltage

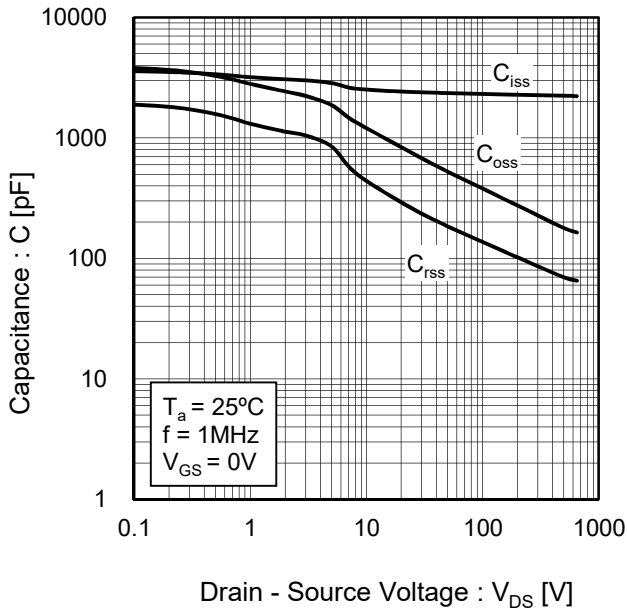


Fig.16 Coss Stored Energy

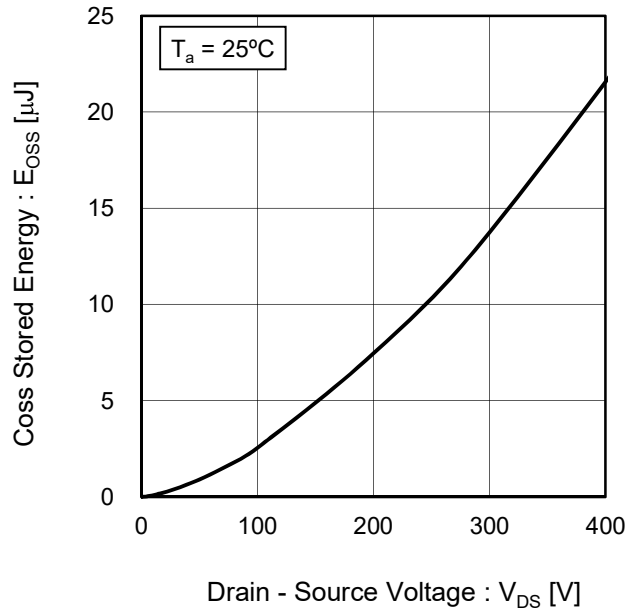


Fig.17 Switching Characteristics

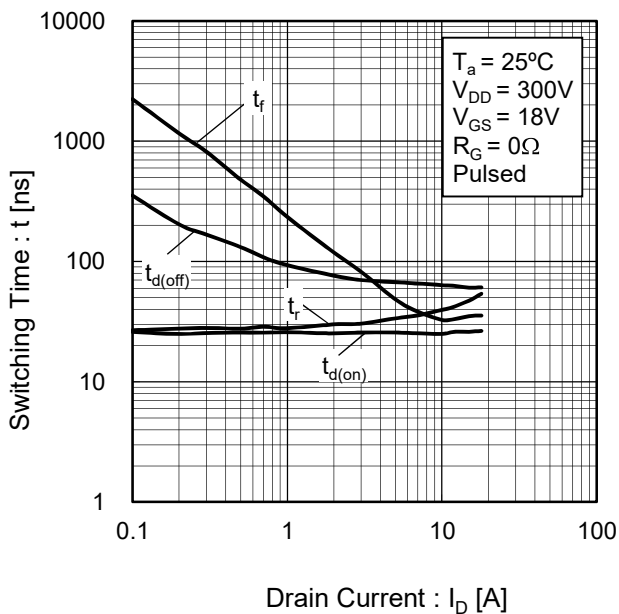
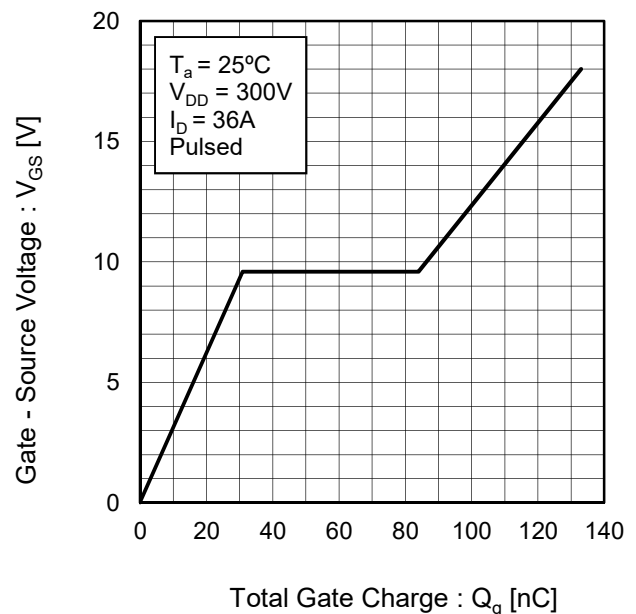


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.19 Typical Switching Loss vs. Drain - Source Voltage

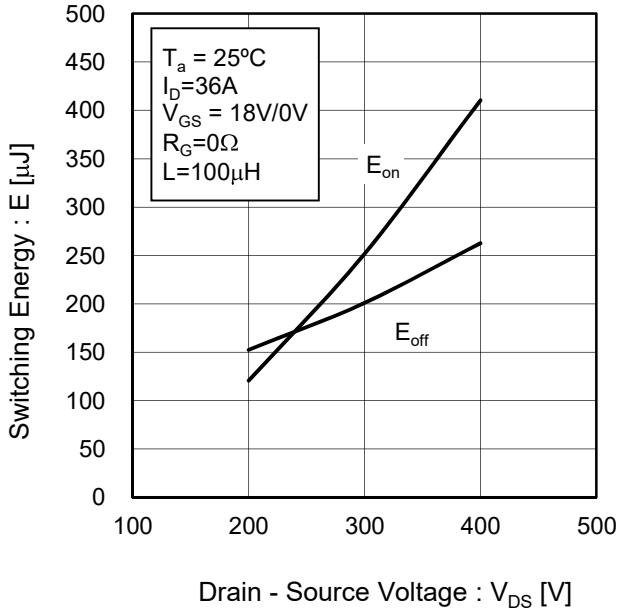


Fig.20 Typical Switching Loss vs. Drain Current

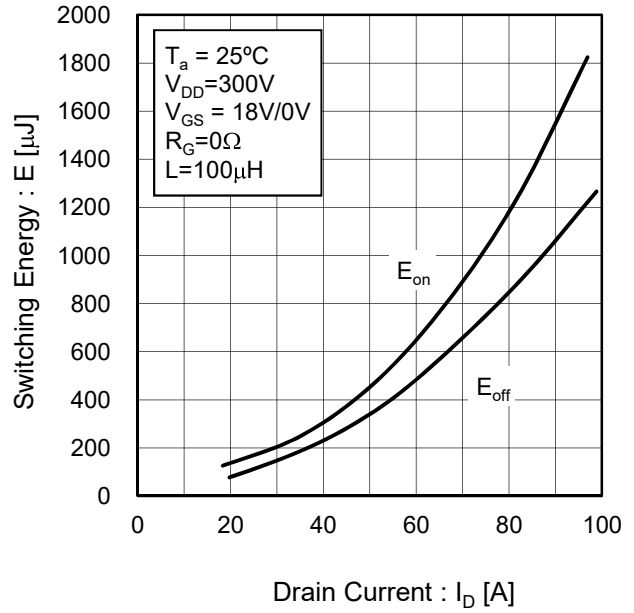
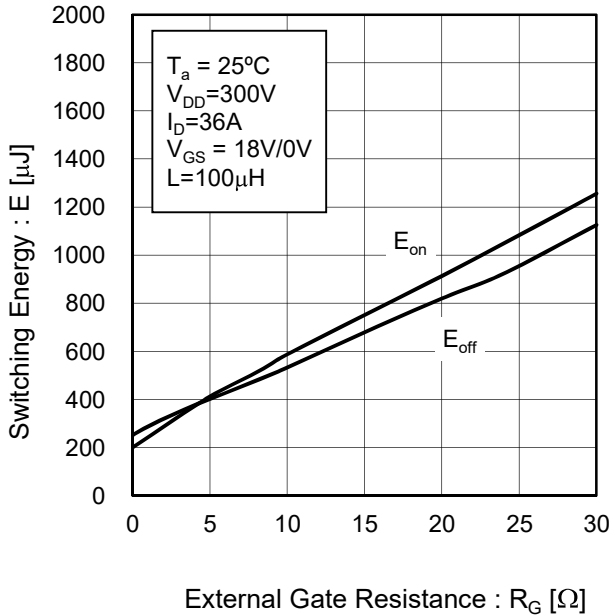


Fig.21 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

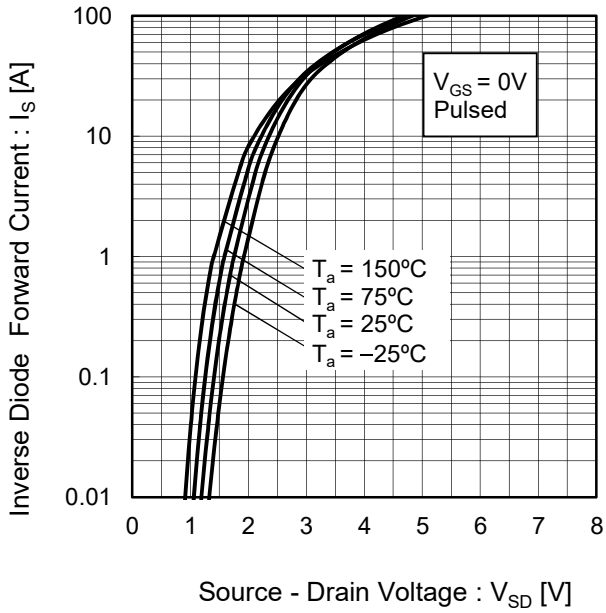
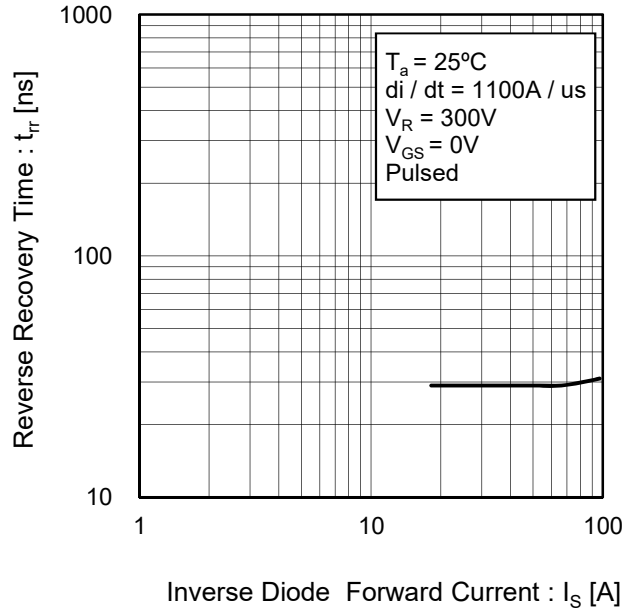


Fig.23 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

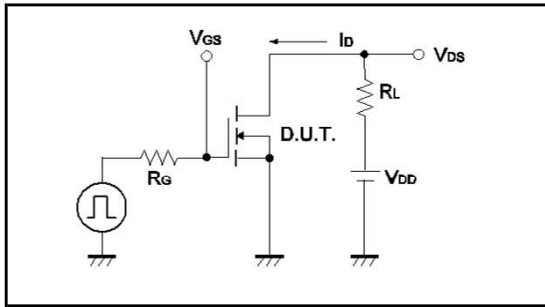


Fig.1-2 Switching Waveforms

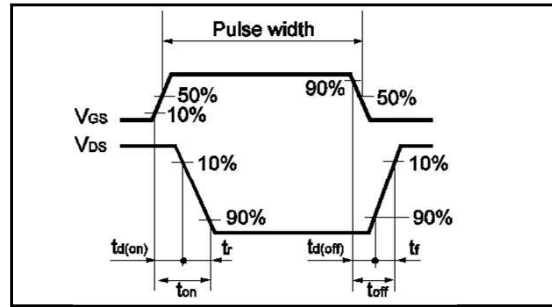


Fig.2-1 Gate Charge Measurement Circuit

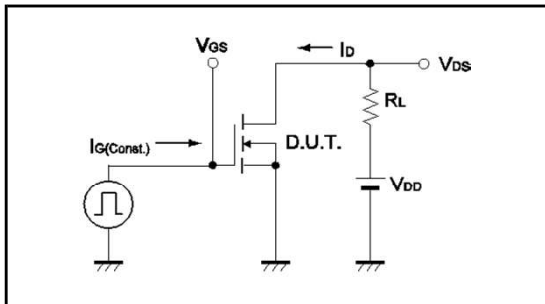


Fig.2-2 Gate Charge Waveform

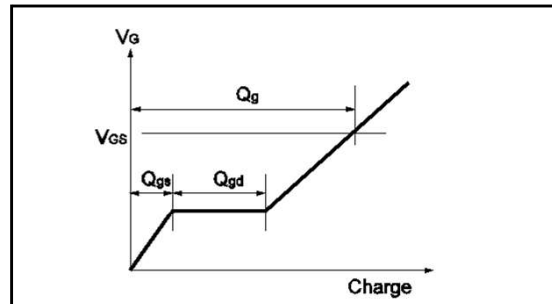


Fig.3-1 Switching Energy Measurement Circuit

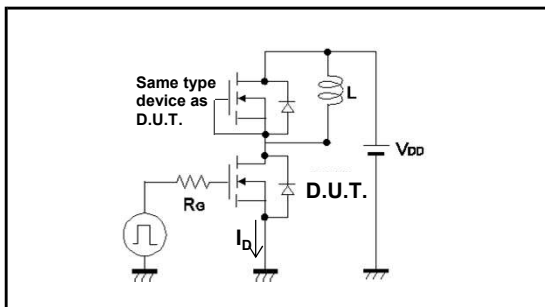


Fig.3-2 Switching Waveforms

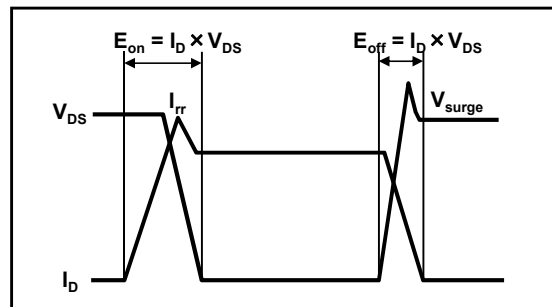


Fig.4-1 Reverse Recovery Time Measurement Circuit

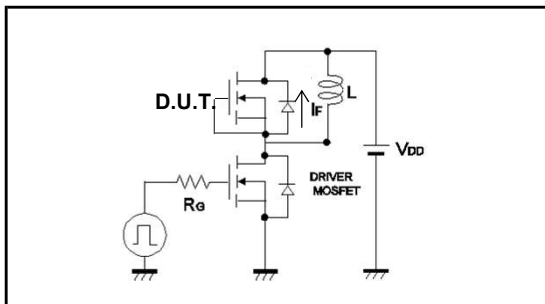


Fig.4-2 Reverse Recovery Waveform

