

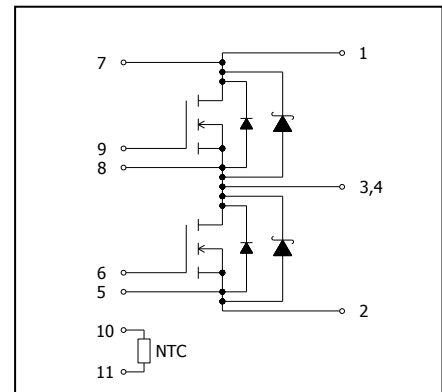
### ●Application

- Motor drive
- Inverter, Converter
- Photovoltaics, wind power generation.
- Induction heating equipment.

### ●Features

- 1) Low surge, low switching loss.
- 2) High-speed switching possible.
- 3) Reduced temperature dependence.

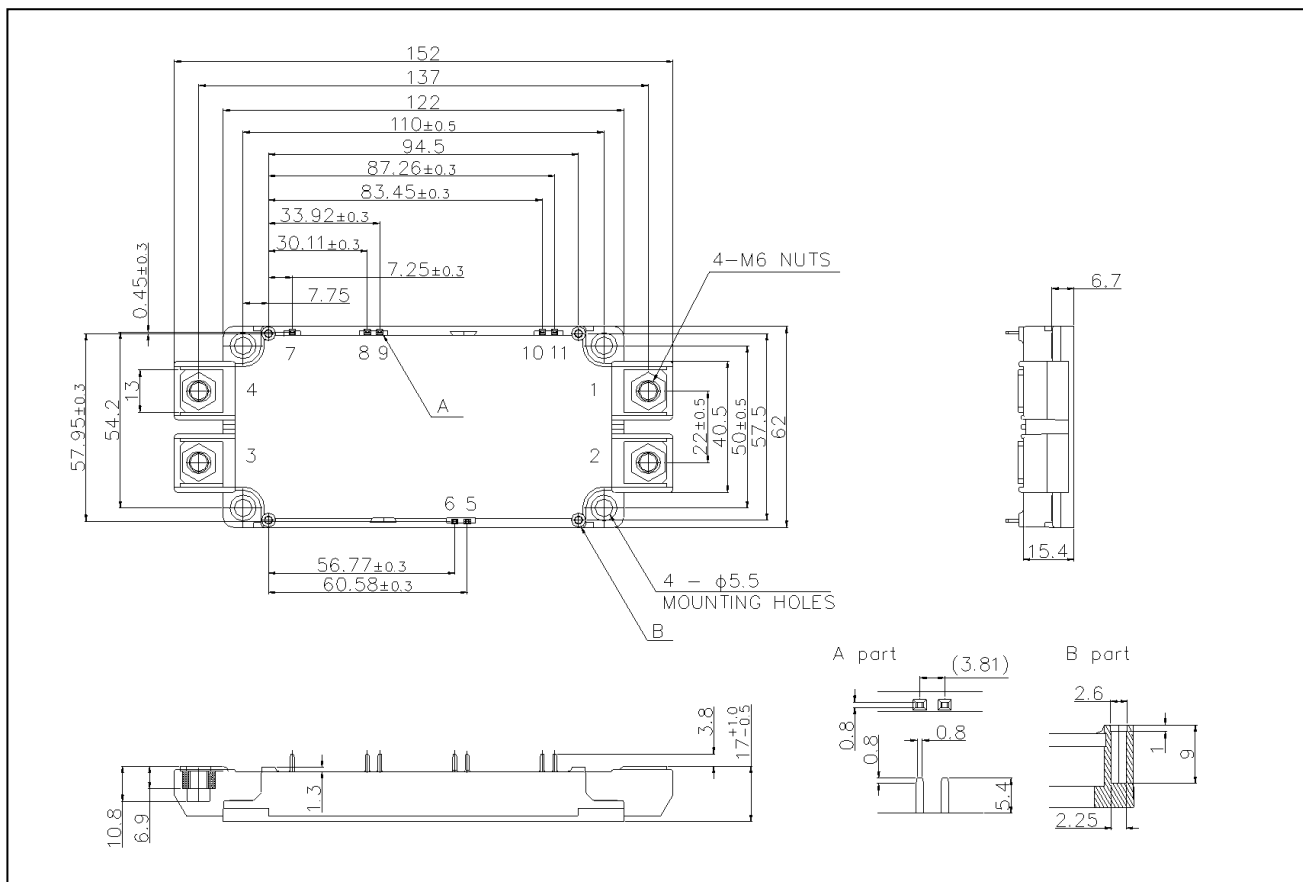
### ●Circuit diagram



### ●Construction

This product is a half bridge module consisting of SiC-DMOSFET and SiC-SBD from ROHM.

### ●Dimensions & Pin layout (Unit : mm)



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

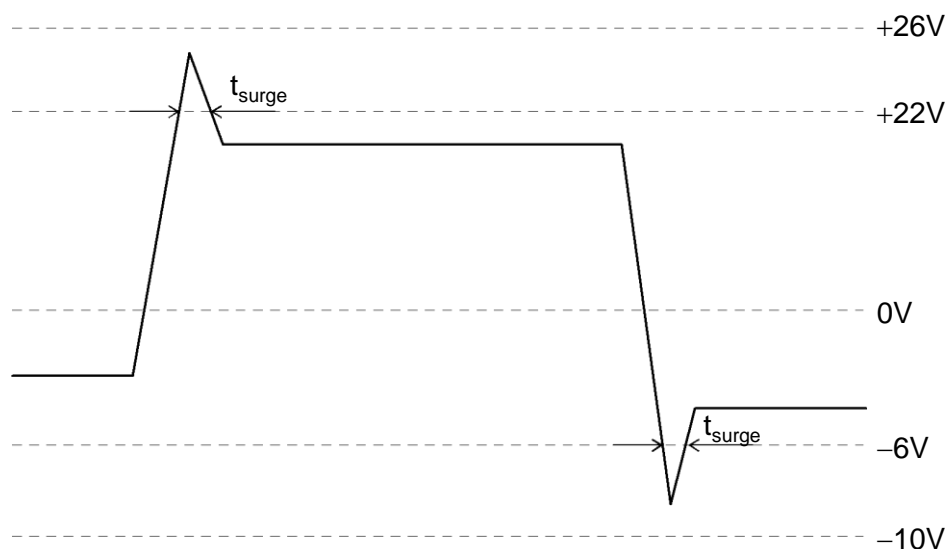
Parameter	Symbol	Conditions	Limit	Unit
Drain-source voltage	$V_{\text{DSS}}$	G-S short	1200	V
Gate-source voltage(+)	$V_{\text{GSS}}$	D-S short	22	
Gate-source voltage(-)			-6	
G - S Voltage ( $t_{\text{surge}} < 300\text{nsec}$ )	$V_{\text{GSS\_surge}}$	D-S short	-10 to 26	
Drain current <sup>*1</sup>	$I_{\text{D}}$	DC ( $T_c = 60^\circ\text{C}$ )	300	A
	$I_{\text{DRM}}$	Pulse ( $T_c = 60^\circ\text{C}$ ) 1ms <sup>*2</sup>	600	
Source current <sup>*1</sup>	$I_{\text{S}}$	DC ( $T_c = 60^\circ\text{C}$ )	300	
	$I_{\text{SRM}}$	Pulse ( $T_c = 60^\circ\text{C}$ ) 1ms <sup>*2</sup>	600	
Total power dissipation <sup>*3</sup>	$P_{\text{tot}}$	$T_c = 25^\circ\text{C}$	1875	W
Max Junction Temperature	$T_{\text{jmax}}$		175	$^\circ\text{C}$
Operating junction temperature	$T_{\text{jop}}$		-40 to 150	
Storage temperature	$T_{\text{stg}}$		-40 to 125	
Isolation voltage	$V_{\text{isol}}$	Terminals to baseplate, $f = 60\text{Hz}$ AC 1min.	2500	Vrms
Mounting torque	-	Main Terminals : M6 screw	4.5	N · m
		Mounting to heat sink : M5 screw	3.5	

(\*1) Case temperature ( $T_c$ ) is defined on the surface of base plate just under the chips.

(\*2) Repetition rate should be kept within the range where temperature rise if die should not exceed  $T_{\text{jmax}}$ .

(\*3)  $T_j$  is less than  $175^\circ\text{C}$

Example of acceptable  $V_{\text{GS}}$  waveform

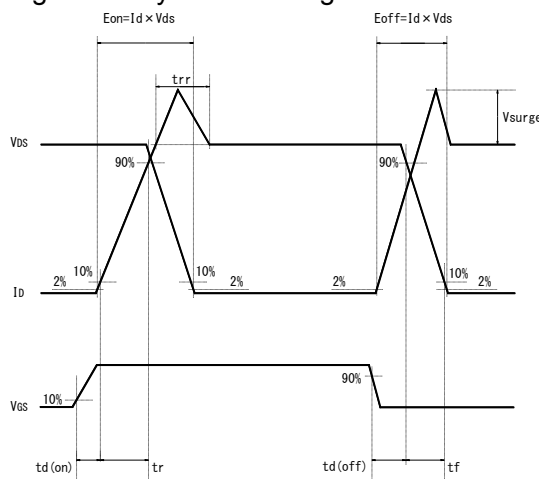


**●Electrical characteristics (T<sub>j</sub>=25°C)**

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Static drain-source on-state voltage	V <sub>DS(on)</sub>	I <sub>D</sub> =300A, V <sub>GS</sub> =18V	T <sub>J</sub> =25°C	-	2.2	2.9	V
			T <sub>J</sub> =125°C	-	3.0	-	
			T <sub>J</sub> =150°C	-	3.4	4.5	
Drain cutoff current	I <sub>DSS</sub>	V <sub>DS</sub> =1200V, V <sub>GS</sub> =0V		-	-	3.2	mA
Source-drain voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =300A	T <sub>J</sub> =25°C	-	1.6	2.1	V
			T <sub>J</sub> =125°C		2.2	-	
			T <sub>J</sub> =150°C	-	2.4	3.2	
		V <sub>GS</sub> =18V, I <sub>S</sub> =300A	T <sub>J</sub> =25°C	-	1.4	-	
			T <sub>J</sub> =125°C		1.6	-	
			T <sub>J</sub> =150°C	-	1.7	-	
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =68mA		1.6	2.7	4.0	V
Gate-source leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =22V, V <sub>DS</sub> =0V		-	-	0.5	μA
		V <sub>GS</sub> = -6V, V <sub>DS</sub> =0V		-0.5	-	-	
Switching characteristics	t <sub>d(on)</sub>	V <sub>GS(on)</sub> =18V, V <sub>GS(off)</sub> =0V V <sub>DS</sub> =600V I <sub>D</sub> =300A R <sub>G</sub> =0.2Ω inductive load		-	80	-	ns
	t <sub>r</sub>			-	70	-	
	t <sub>rr</sub>			-	50	-	
	t <sub>d(off)</sub>			-	250	-	
	t <sub>f</sub>			-	65	-	
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,100kHz		-	35	-	nF
Gate Registance	R <sub>Gint</sub>	T <sub>J</sub> =25°C		-	1.6	-	Ω
NTC Rated Resistance	R25				5.0		kΩ
NTC B Value	B50/25				3370		K
Stray Inductance	Ls				13	-	nH
Creepage Distance	-	Terminal to heat sink			14.5	-	mm
		Terminal to terminal			15.0	-	mm
Clearance Distance	-	Terminal to heat sink			12.0	-	mm
		Terminal to terminal			9.0	-	mm
Junction-to-case thermal resistance	R <sub>th(j-c)</sub>	DMOS (1/2 module) * <sup>4</sup>		-	-	0.08	K/W
		SBD (1/2 module) * <sup>4</sup>		-	-	0.11	
Case-to-heat sink Thermal resistance	R <sub>th(c-f)</sub>	Case to heat sink, per 1 module, Thermal grease applied * <sup>5</sup>		-	0.035	-	

(\*4) Measurement of T<sub>c</sub> is to be done at the point just beneath the chip.

(\*5) Typical value is measured by using thermally conductive grease of λ=0.9W/(m·K).

**●Waveform for switching test**


●Electrical characteristic curves (Typical)

Fig.1 Typical Output Characteristics [  $T_j=25^{\circ}\text{C}$  ]

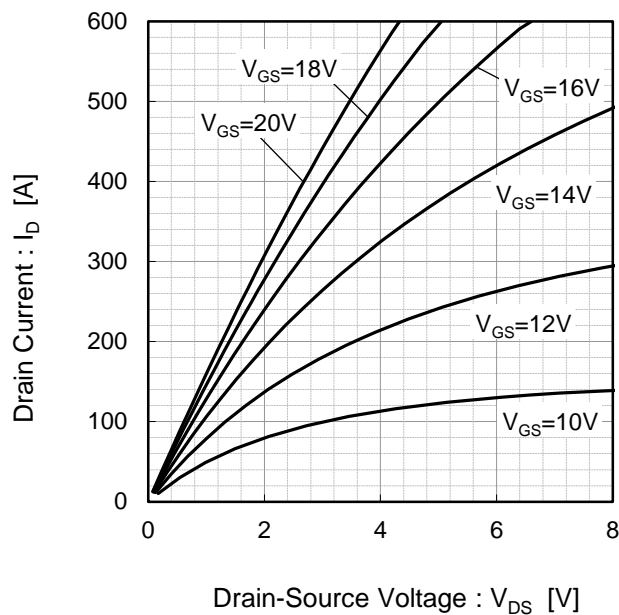


Fig.2 Drain-Source Voltage vs. Drain Current

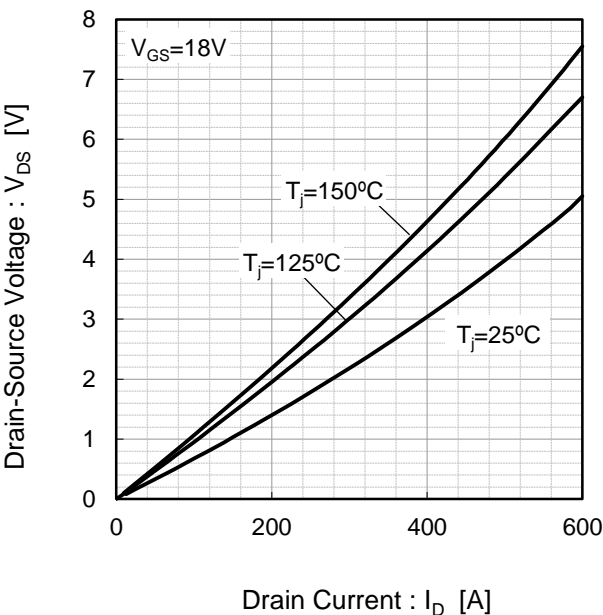


Fig.3 Drain-Source Voltage vs. Gate-Source Voltage [  $T_j=25^{\circ}\text{C}$  ]

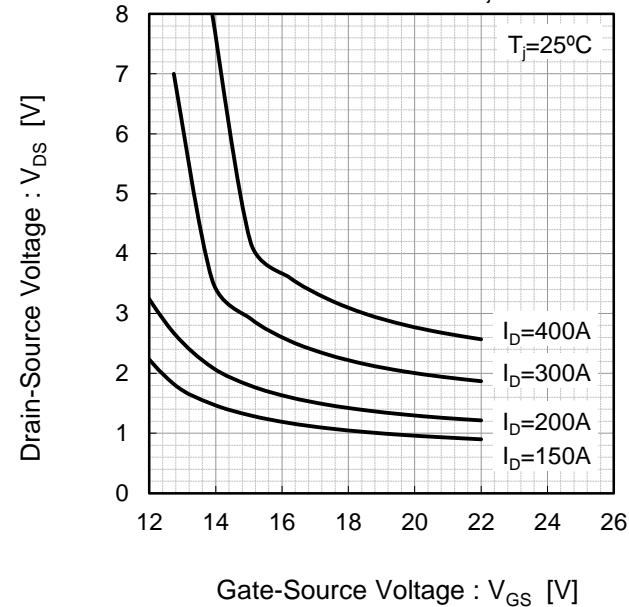
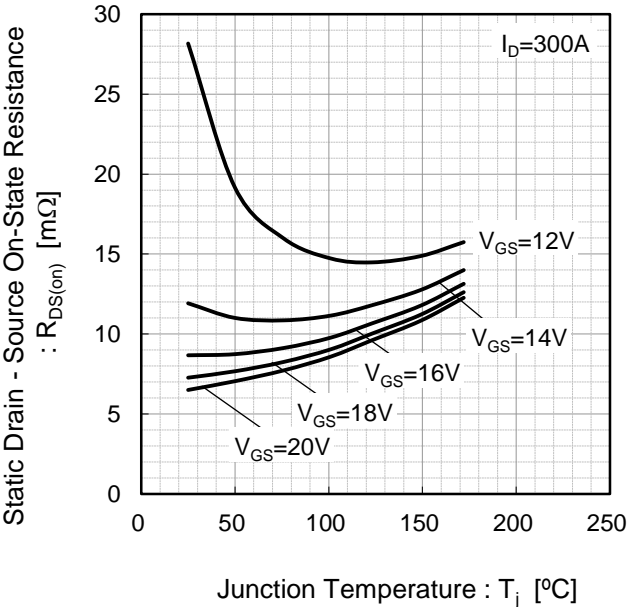


Fig.4 Static Drain - Source On-State Resistance vs. Junction Temperature



●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode

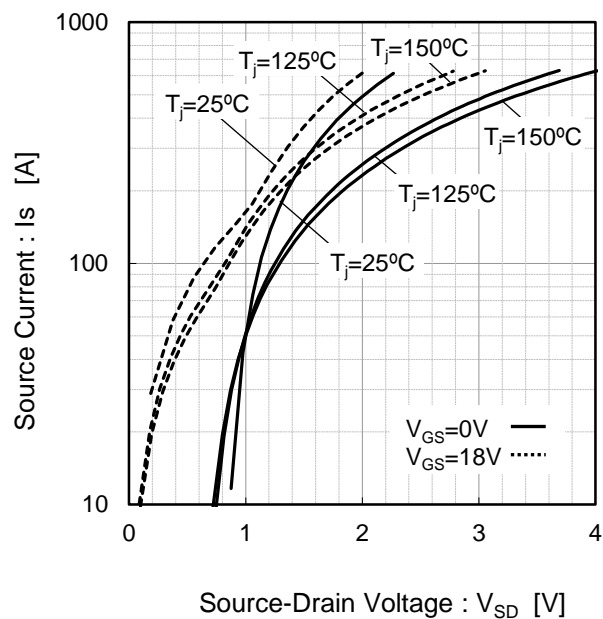


Fig.6 Forward characteristic of Diode

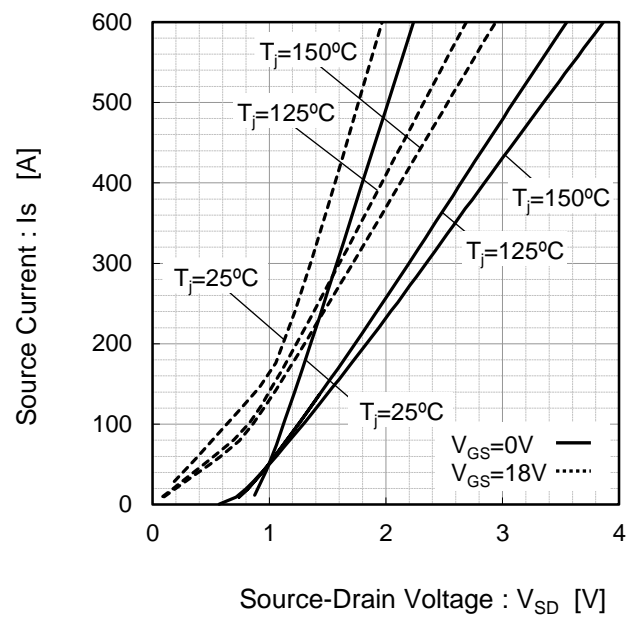


Fig.7 Drain Current vs. Gate-Source Voltage

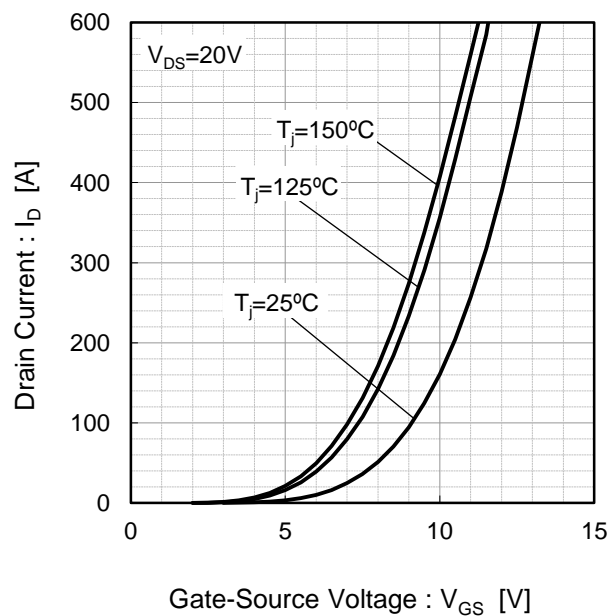
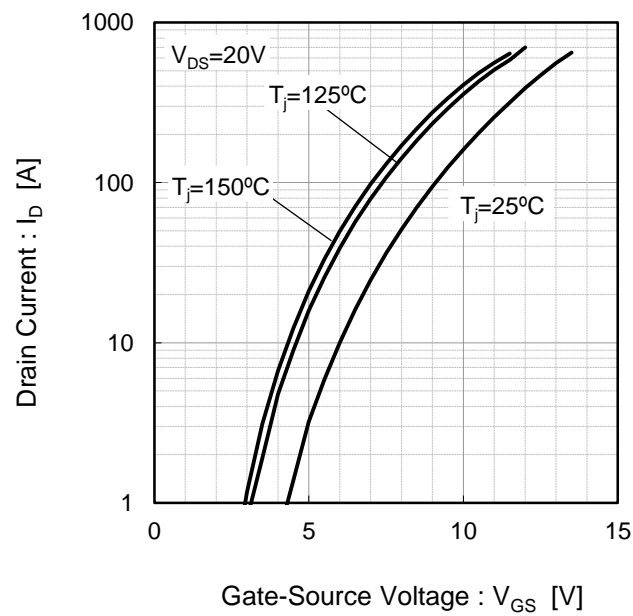


Fig.8 Drain Current vs. Gate-Source Voltage



●Electrical characteristic curves (Typical)

Fig.9 Switching Characteristics [  $T_j=25^{\circ}\text{C}$  ]

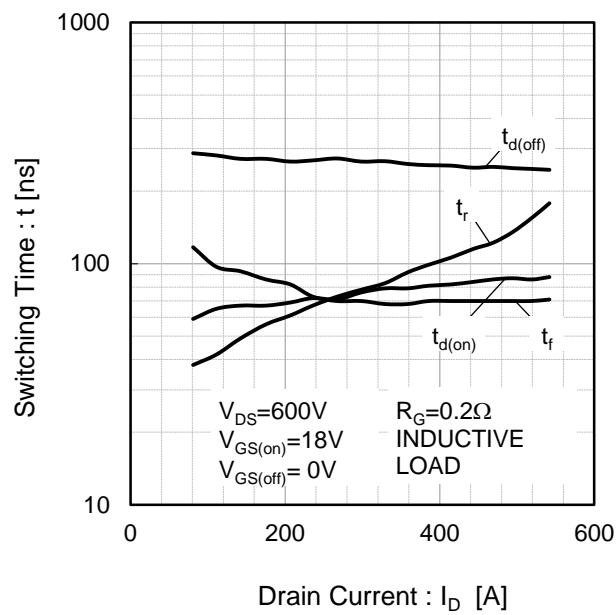


Fig.10 Switching Characteristics [  $T_j=150^{\circ}\text{C}$  ]

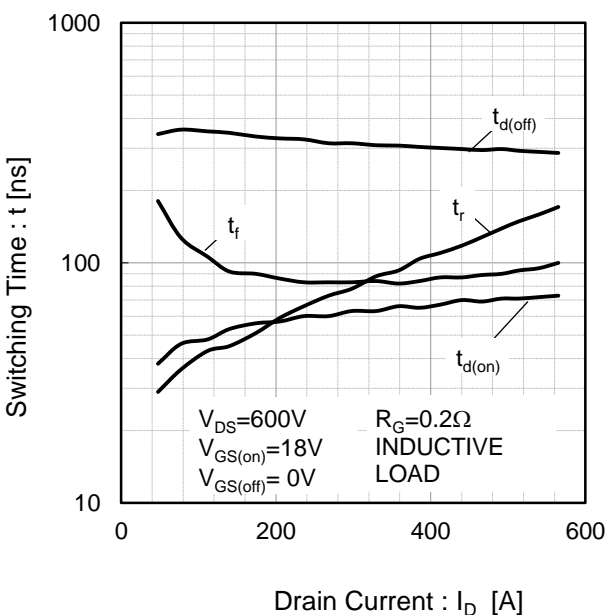


Fig.11 Switching Loss vs. Drain Current [  $T_j=25^{\circ}\text{C}$  ]

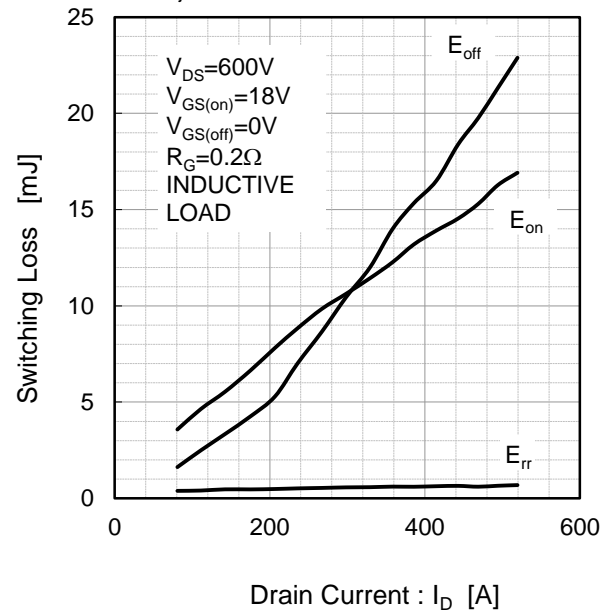
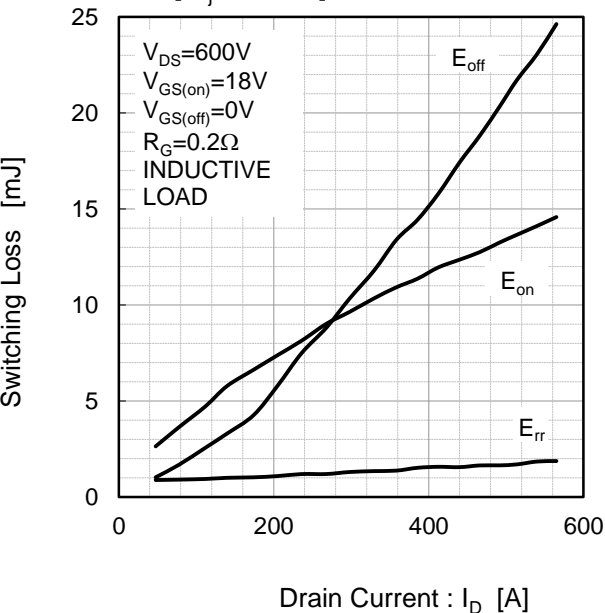


Fig.12 Switching Loss vs. Drain Current [  $T_j=150^{\circ}\text{C}$  ]



●Electrical characteristic curves (Typical)

Fig.13 Recovery Characteristics vs. Drain Current [  $T_j=25^{\circ}\text{C}$  ]

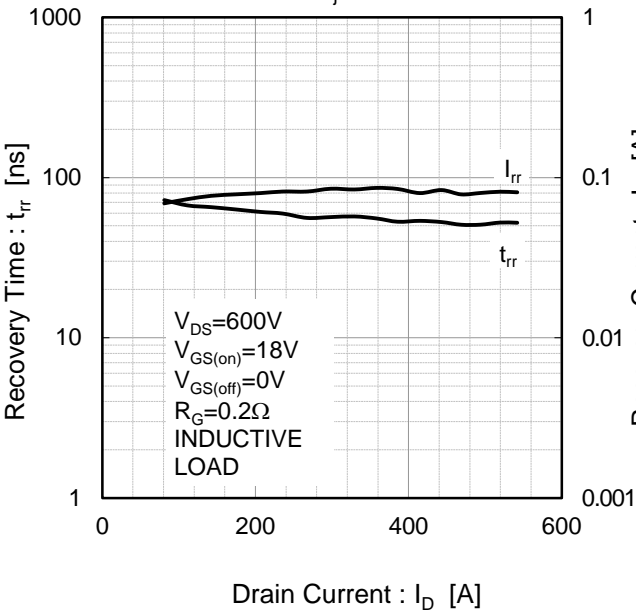


Fig.14 Recovery Characteristics vs. Drain Current [  $T_j=150^{\circ}\text{C}$  ]

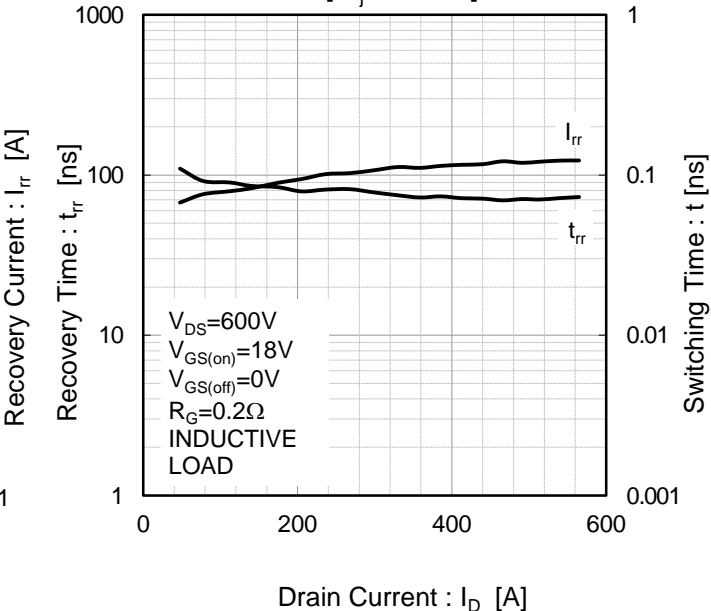


Fig.15 Switching Characteristics vs. Gate Resistance [  $T_j=25^{\circ}\text{C}$  ]

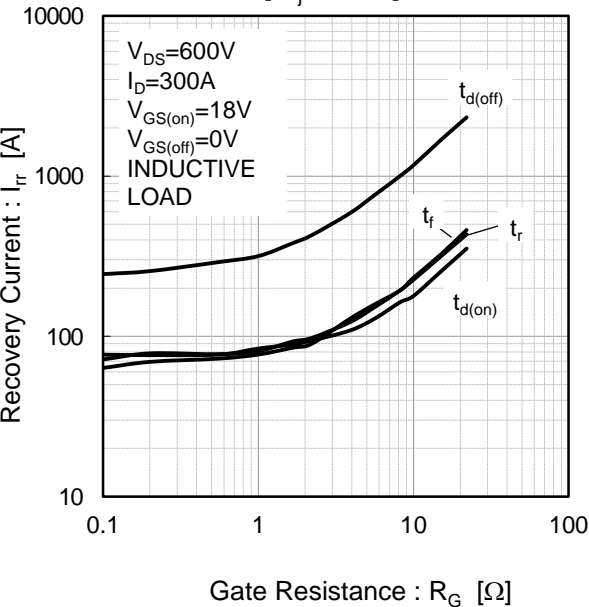
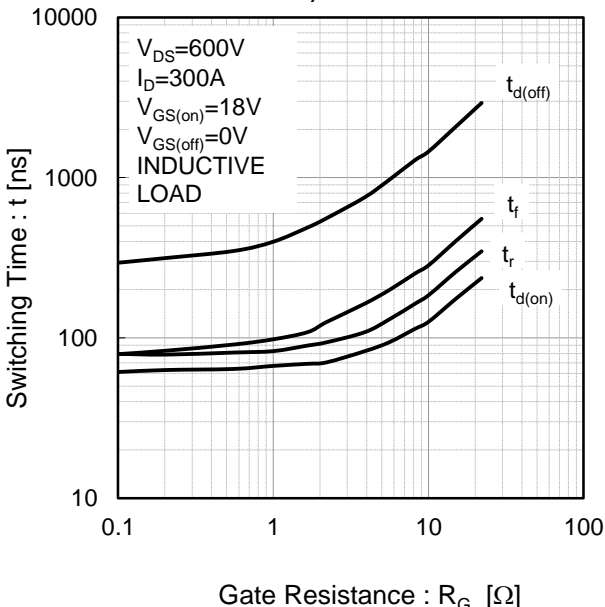


Fig.16 Switching Characteristics vs. Gate Resistance [  $T_j=150^{\circ}\text{C}$  ]



●Electrical characteristic curves (Typical)

Fig.17 Switching Loss vs. Gate Resistance  
[  $T_j=25^{\circ}\text{C}$  ]

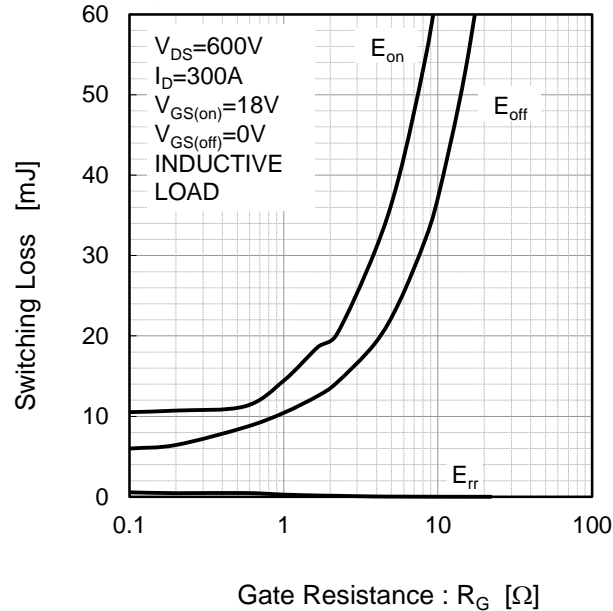


Fig.18 Switching Loss vs. Gate Resistance  
[  $T_j=150^{\circ}\text{C}$  ]

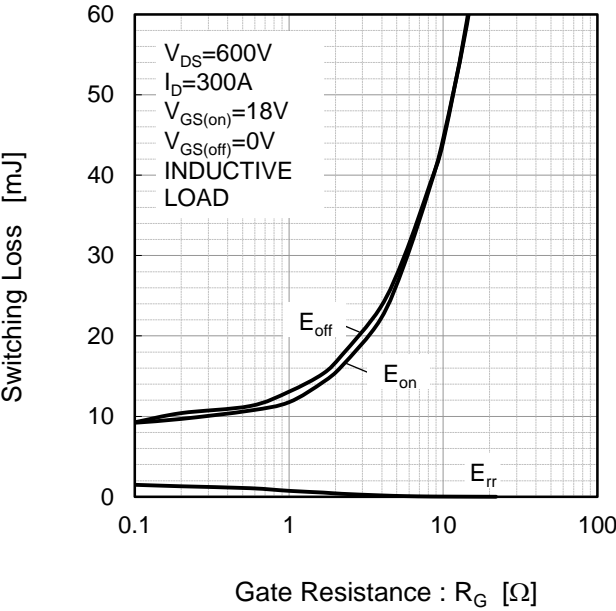


Fig.19 Typical Capacitance vs. Drain-Source Voltage

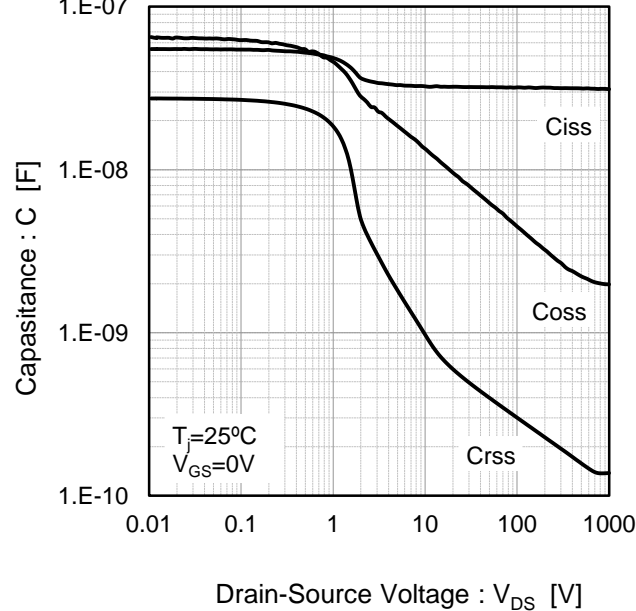
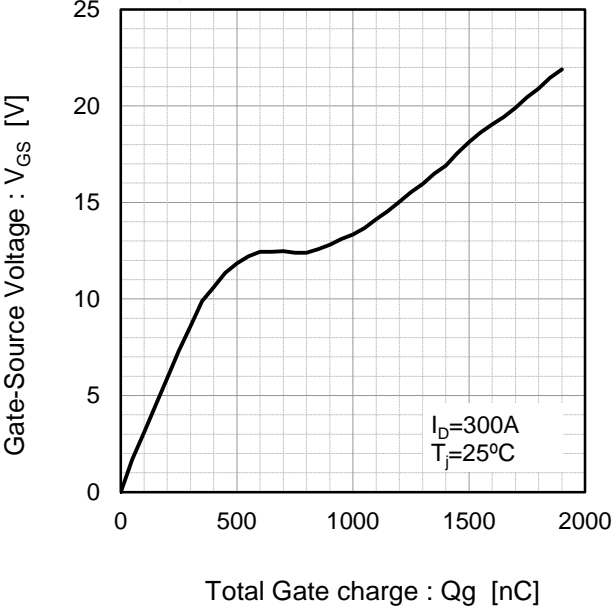
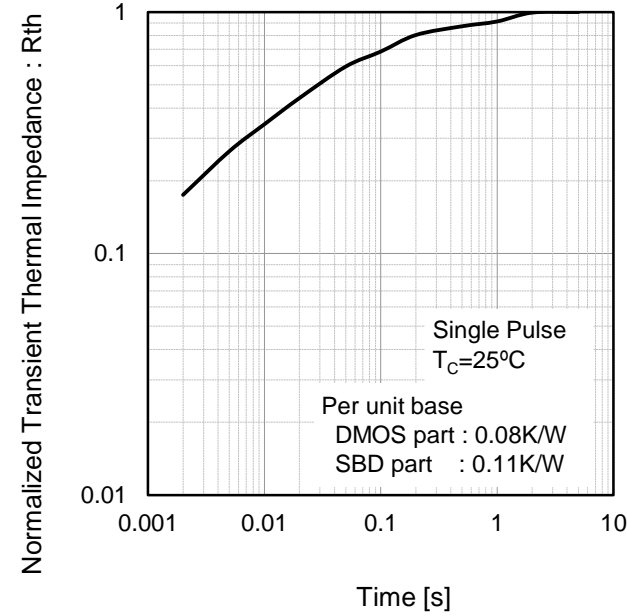


Fig.20 Gate Charge Characteristics  
[  $T_j=25^{\circ}\text{C}$  ]



●Electrical characteristic curves (Typical)

Fig.21 Normalized Transient Thermal Impedance



## Notes

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