

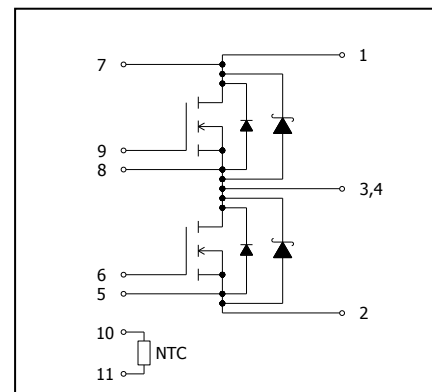
●Application

- 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.

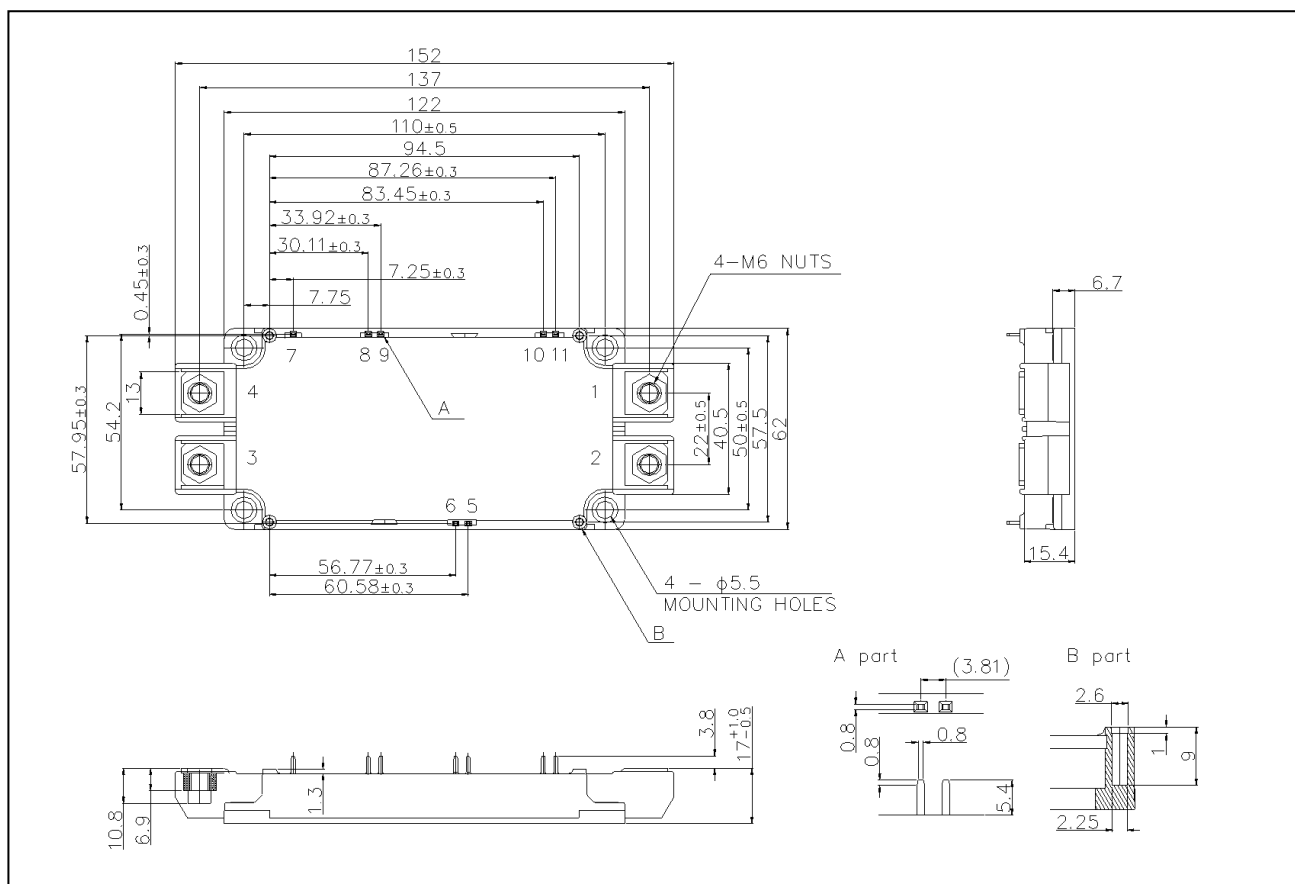
●Circuit diagram



●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 ($T_j = 25^\circ\text{C}$)

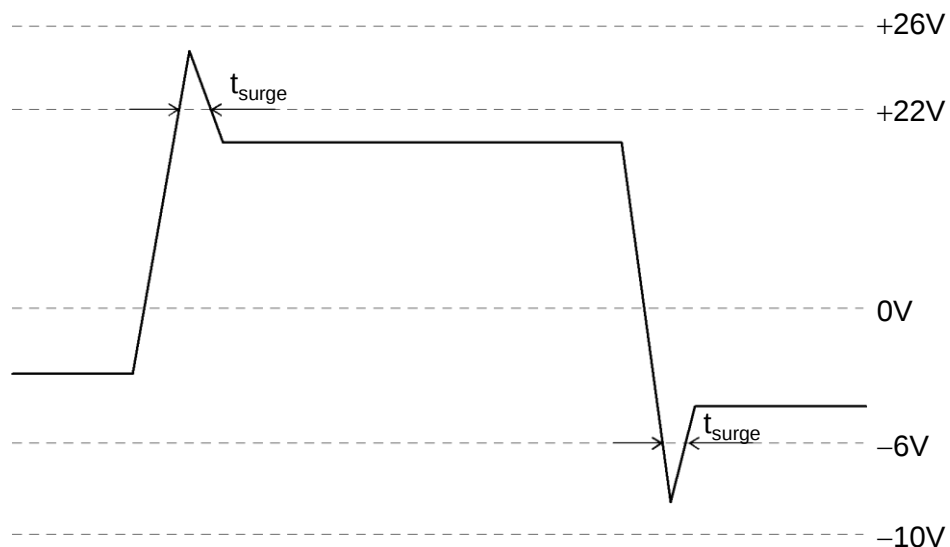
Parameter	Symbol	Conditions	Limit	Unit
Drain-source voltage	V_{DSS}	G-S short	1200	V
Gate-source voltage(+)	V_{GSS}	D-S short	22	
Gate-source voltage(-)			-6	
G - S Voltage ($t_{\text{surge}} < 300\text{nsec}$)	$V_{\text{GSS_surge}}$	D-S short	-10 to 26	
Drain current ^{*1}	I_{D}	DC ($T_c=60^\circ\text{C}$)	300	A
	I_{DRM}	Pulse ($T_c=60^\circ\text{C}$) 1ms ^{*2}	600	
Source current ^{*1}	I_{S}	DC ($T_c=60^\circ\text{C}$)	300	
	I_{SRM}	Pulse ($T_c=60^\circ\text{C}$) 1ms ^{*2}	600	
Total power dissipation ^{*3}	P_{tot}	$T_c=25^\circ\text{C}$	1875	W
Max Junction Temperature	T_{jmax}		175	$^\circ\text{C}$
Operating junction temperature	T_{jop}		-40 to 150	
Storage temperature	T_{stg}		-40 to 125	
Isolation voltage	V_{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 shink : 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_{jmax} .

(*3) T_j is less than 175°C

Example of acceptable V_{GS} waveform



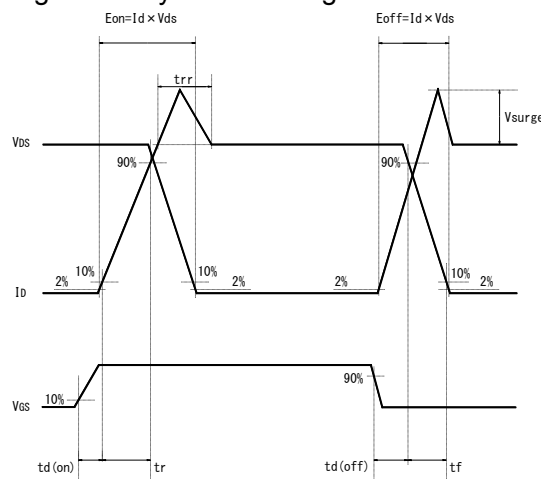
●Electrical characteristics (T_j=25°C)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Static drain-source on-state voltage	V _{DS(on)}	I _D =300A, V _{GS} =18V	T _J =25°C	-	2.2	2.9	V
			T _J =125°C	-	3.0	-	
			T _J =150°C	-	3.4	4.5	
Drain cutoff current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V		-	-	3.2	mA
Source-drain voltage	V _{SD}	V _{GS} =0V, I _S =300A	T _J =25°C	-	1.6	2.1	V
			T _J =125°C		2.2	-	
			T _J =150°C	-	2.4	3.2	
		V _{GS} =18V, I _S =300A	T _J =25°C	-	1.4	-	
			T _J =125°C		1.6	-	
			T _J =150°C	-	1.7	-	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} =10V, I _D =68mA		1.6	2.7	4.0	V
Gate-source leakage current	I _{GSS}	V _{GS} =22V, V _{DS} =0V		-	-	0.5	μA
		V _{GS} = -6V, V _{DS} =0V		-0.5	-	-	
Switching characteristics	t _{d(on)}	V _{GS(on)} =18V, V _{GS(off)} =0V V _{DS} =600V I _D =300A R _G =0.2Ω inductive load		-	80	-	ns
	t _r			-	70	-	
	t _{rr}			-	50	-	
	t _{d(off)}			-	250	-	
	t _f			-	65	-	
Input capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V,100kHz		-	35	-	nF
Gate Registance	R _{Gint}	T _J =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 _{th(j-c)}	DMOS (1/2 module) * ⁴		-	-	0.08	K/W
		SBD (1/2 module) * ⁴		-	-	0.11	
Case-to-heat sink Thermal resistance	R _{th(c-f)}	Case to heat sink, per 1 module, Thermal grease applied * ⁵		-	0.035	-	

(*4) Measurement of T_c 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 [$T_J=25^{\circ}\text{C}$]

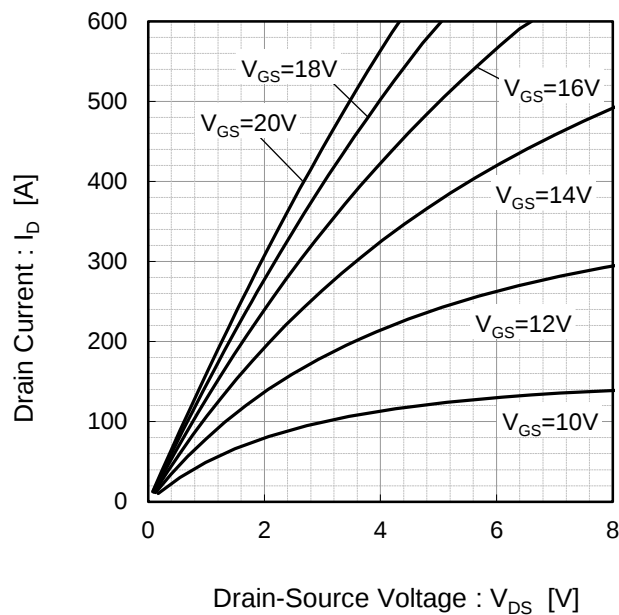


Fig.2 Drain-Source Voltage vs. Drain Current

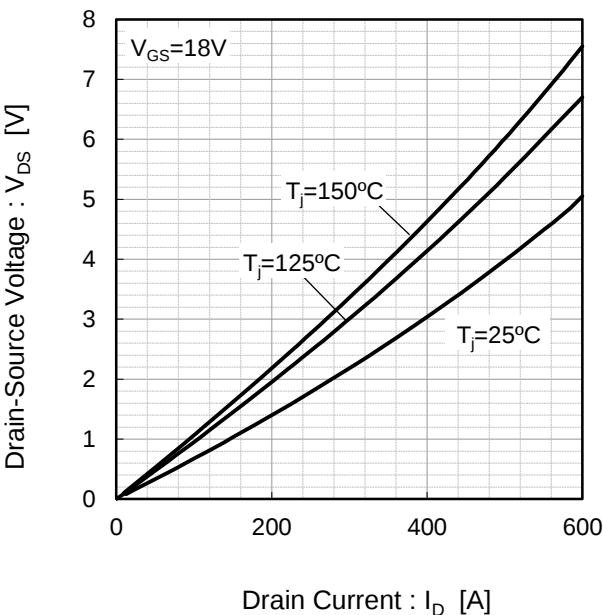


Fig.3 Drain-Source Voltage vs. Gate-Source Voltage [$T_J=25^{\circ}\text{C}$]

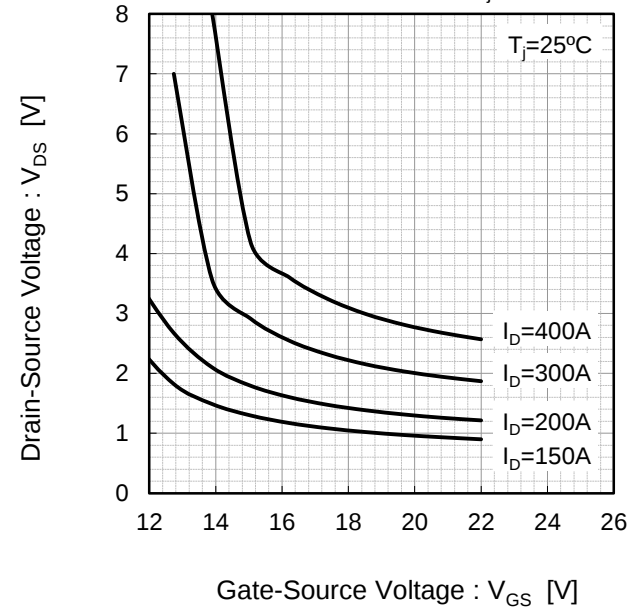
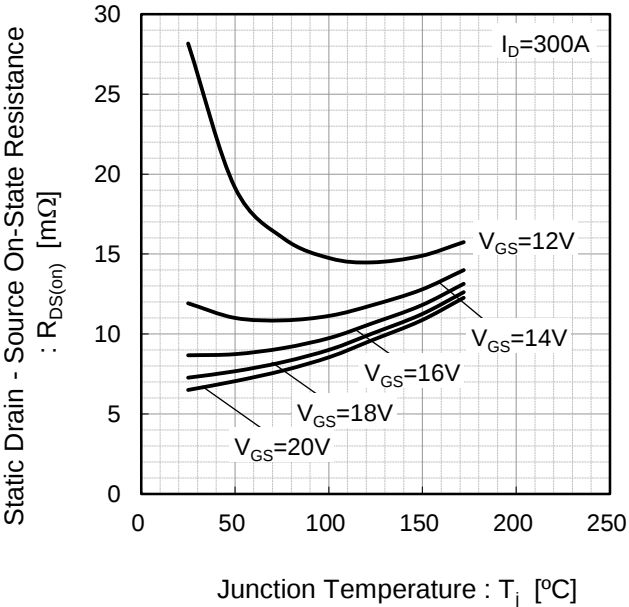


Fig.4 Static Drain - Source On-State Resistance vs. Junction Temperature



●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode

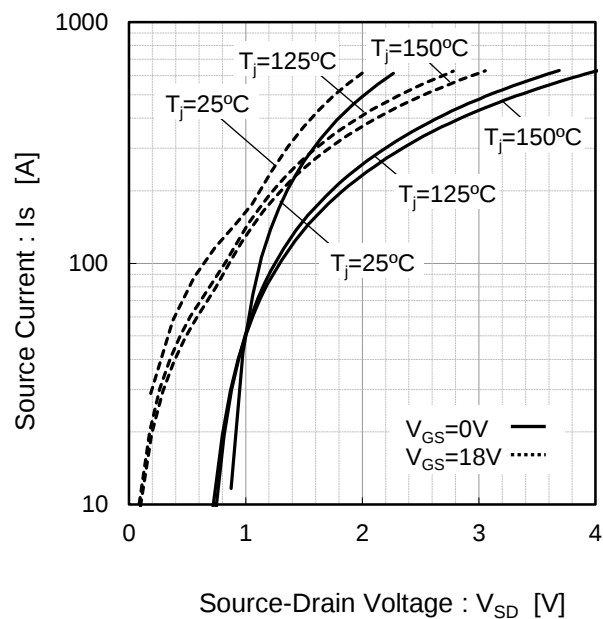


Fig.6 Forward characteristic of Diode

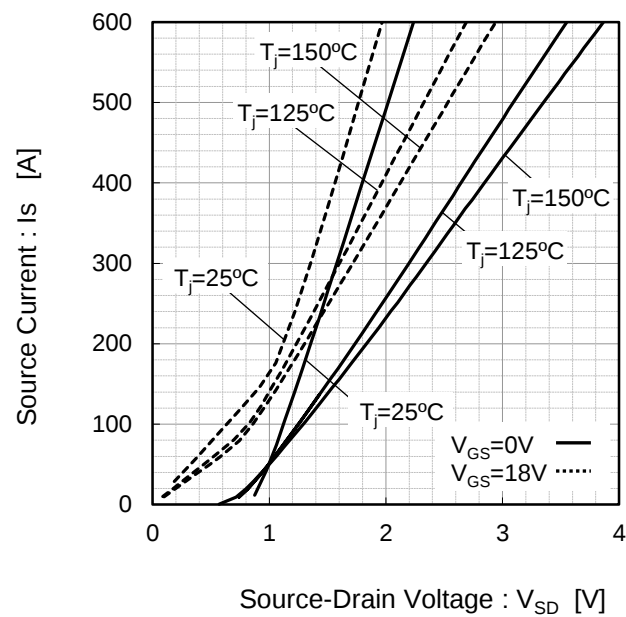


Fig.7 Drain Current vs. Gate-Source Voltage

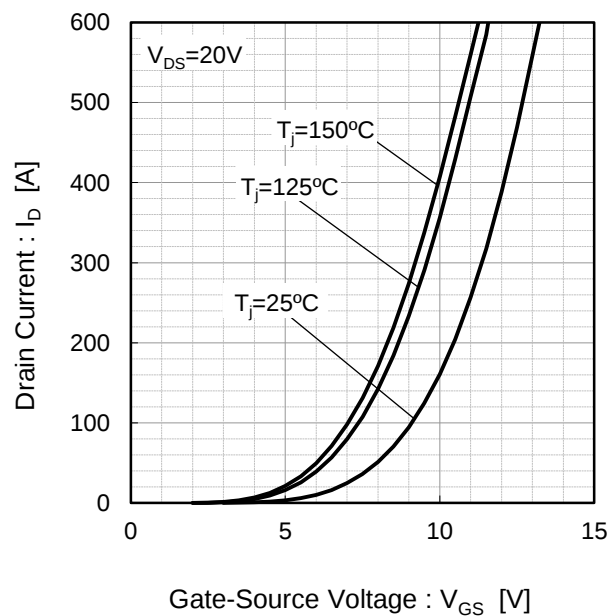
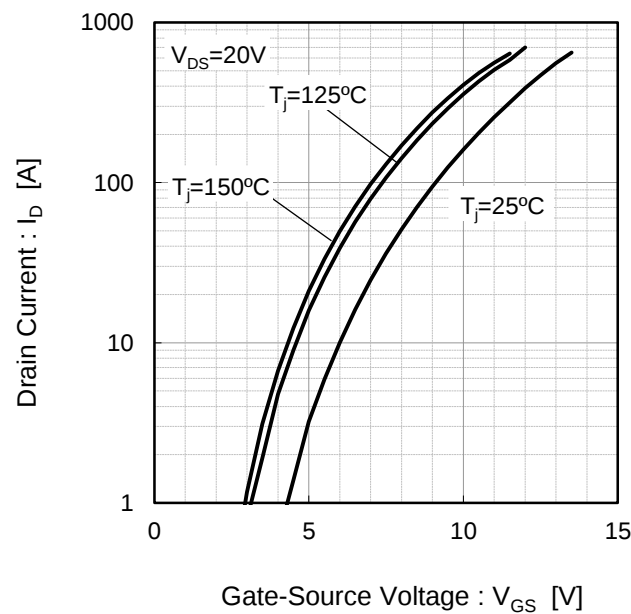


Fig.8 Drain Current vs. Gate-Source Voltage



●Electrical characteristic curves (Typical)

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

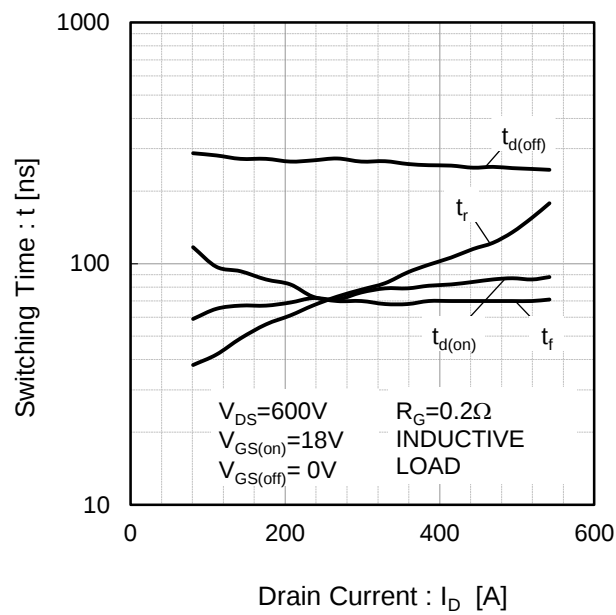


Fig.10 Switching Characteristics [$T_j=150^{\circ}\text{C}$]

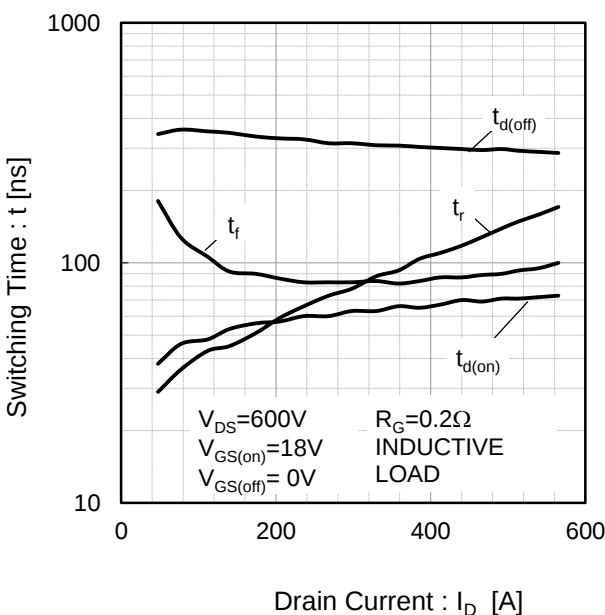


Fig.11 Switching Loss vs. Drain Current [$T_j=25^{\circ}\text{C}$]

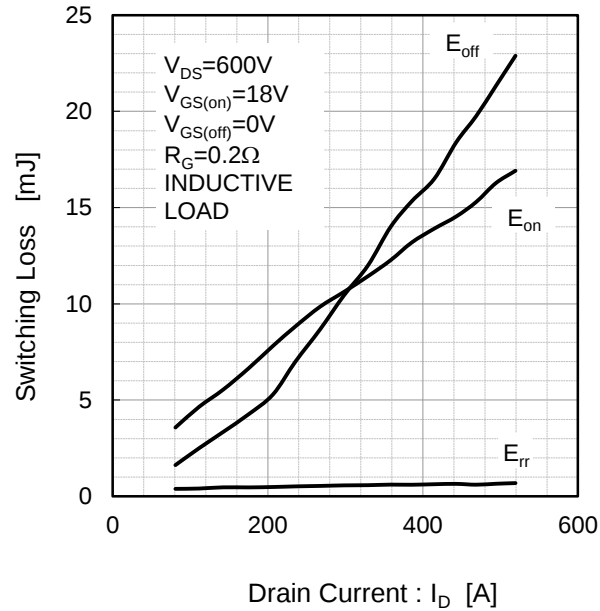
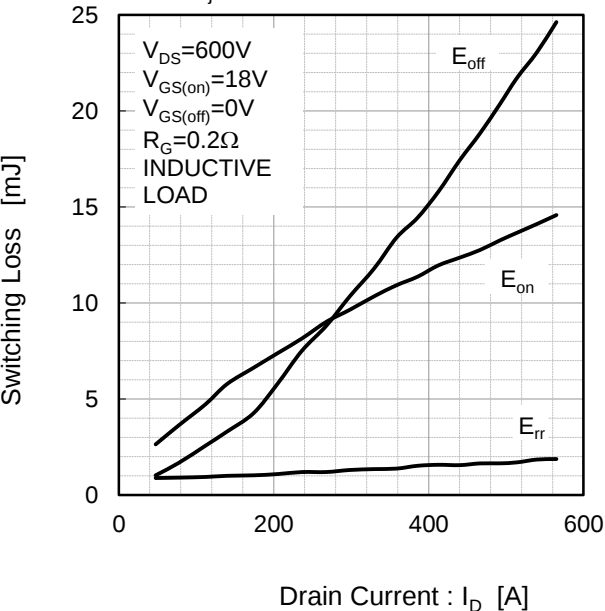


Fig.12 Switching Loss vs. Drain Current [$T_j=150^{\circ}\text{C}$]



●Electrical characteristic curves (Typical)

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

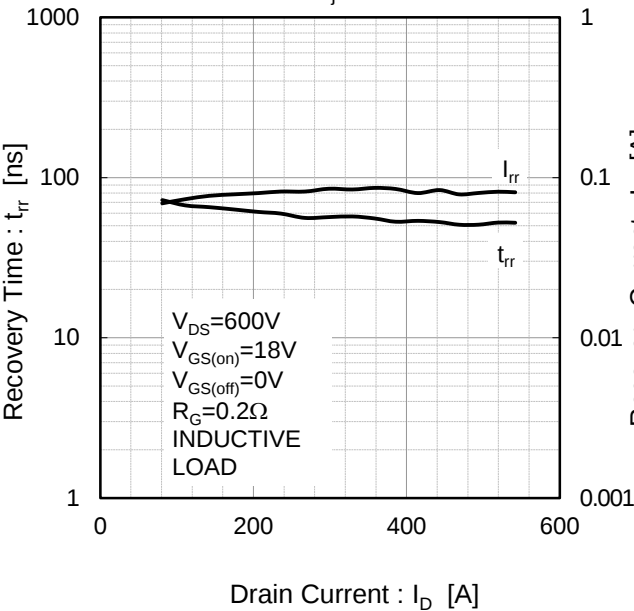


Fig.14 Recovery Characteristics vs. Drain Current [$T_j=150^{\circ}\text{C}$]

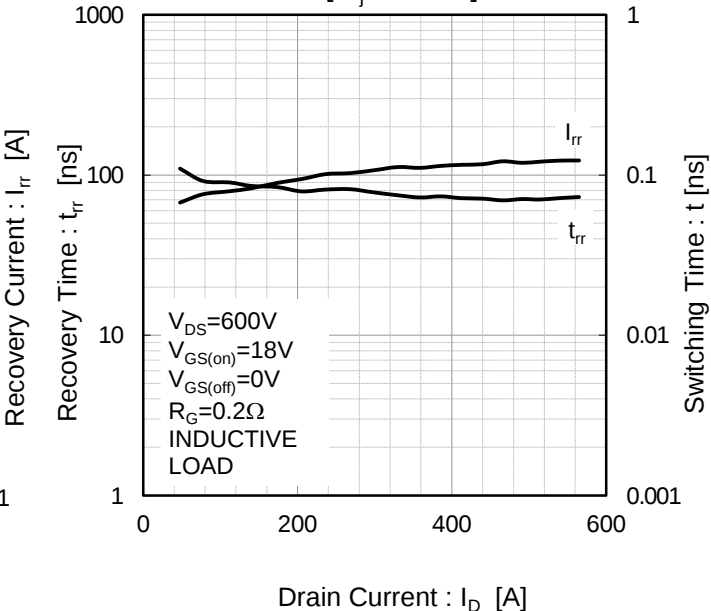


Fig.15 Switching Characteristics vs. Gate Resistance [$T_j=25^{\circ}\text{C}$]

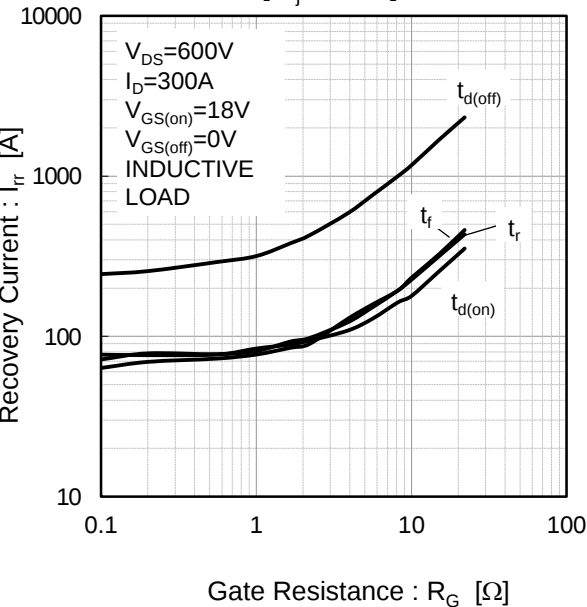
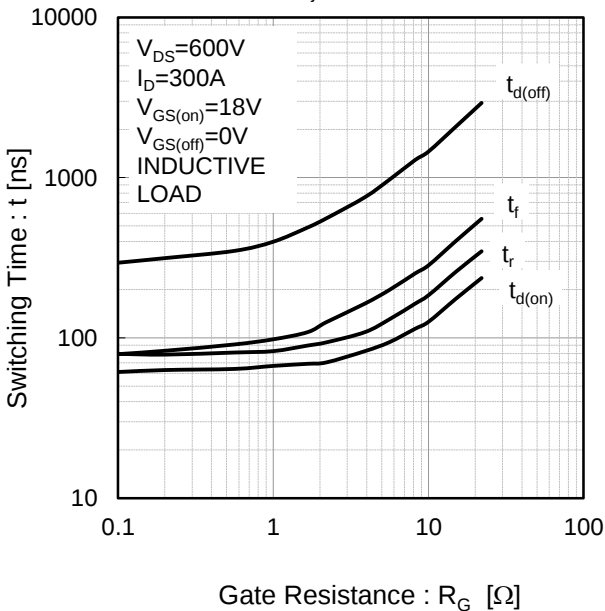


Fig.16 Switching Characteristics vs. Gate Resistance [$T_j=150^{\circ}\text{C}$]



●Electrical characteristic curves (Typical)

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

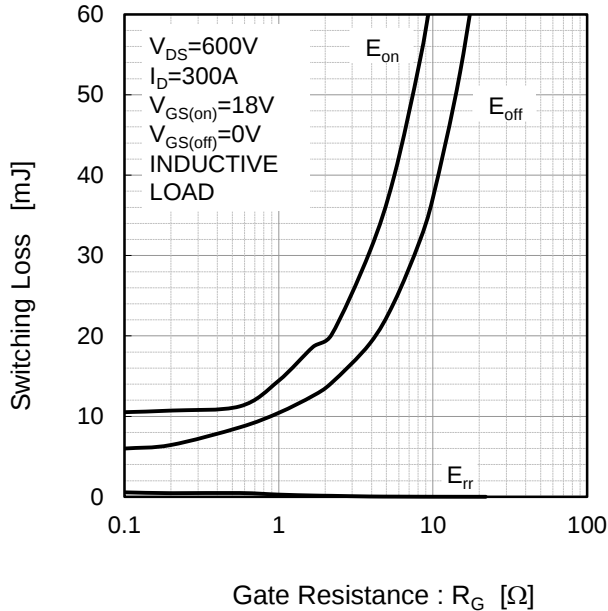


Fig.18 Switching Loss vs. Gate Resistance
[$T_j=150^{\circ}\text{C}$]

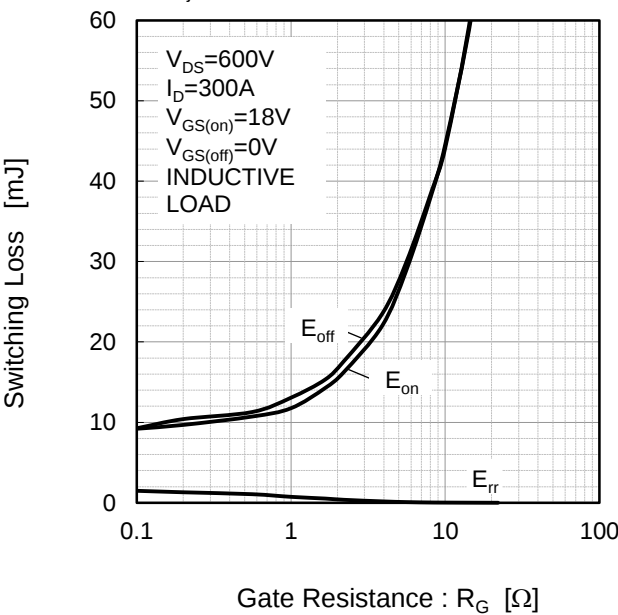


Fig.19 Typical Capacitance vs. Drain-Source Voltage

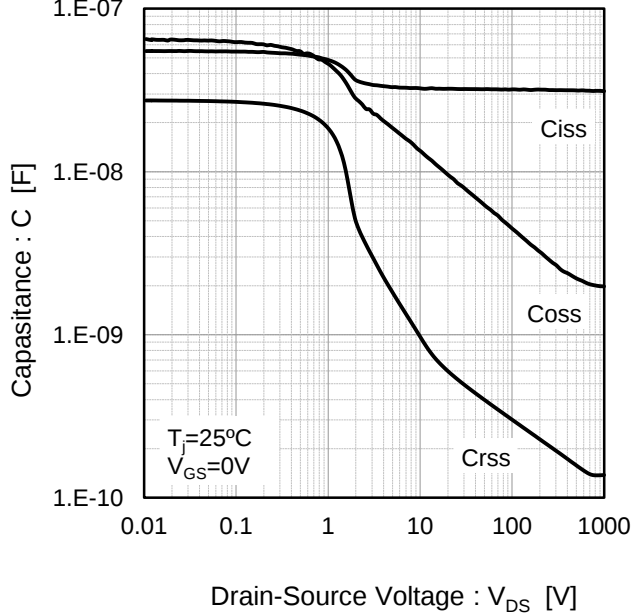
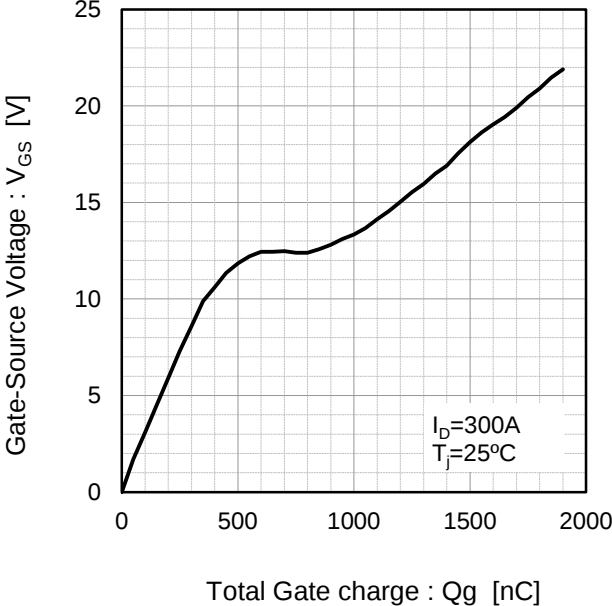
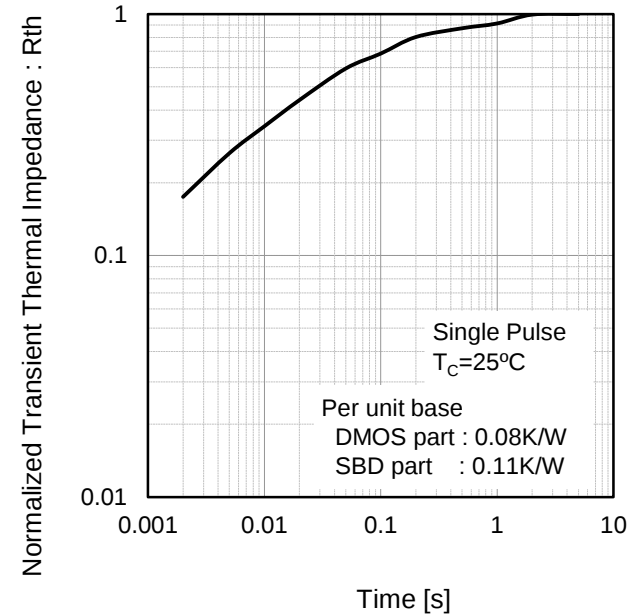


Fig.20 Gate Charge Characteristics
[$T_j=25^{\circ}\text{C}$]



●Electrical characteristic curves (Typical)

Fig.21 Normalized Transient Thermal Impedance



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