

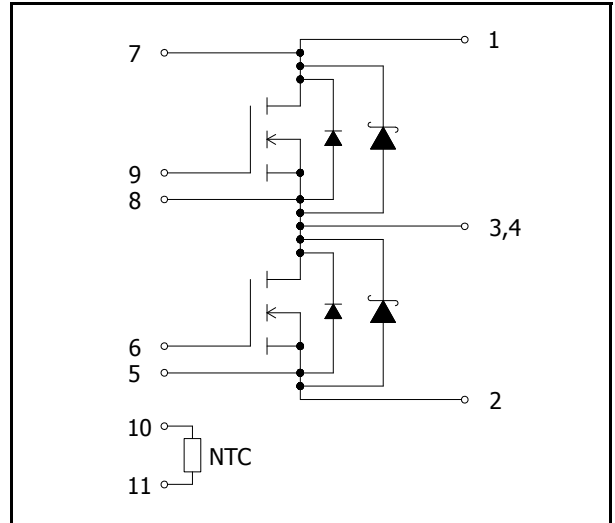
●Application

- 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.

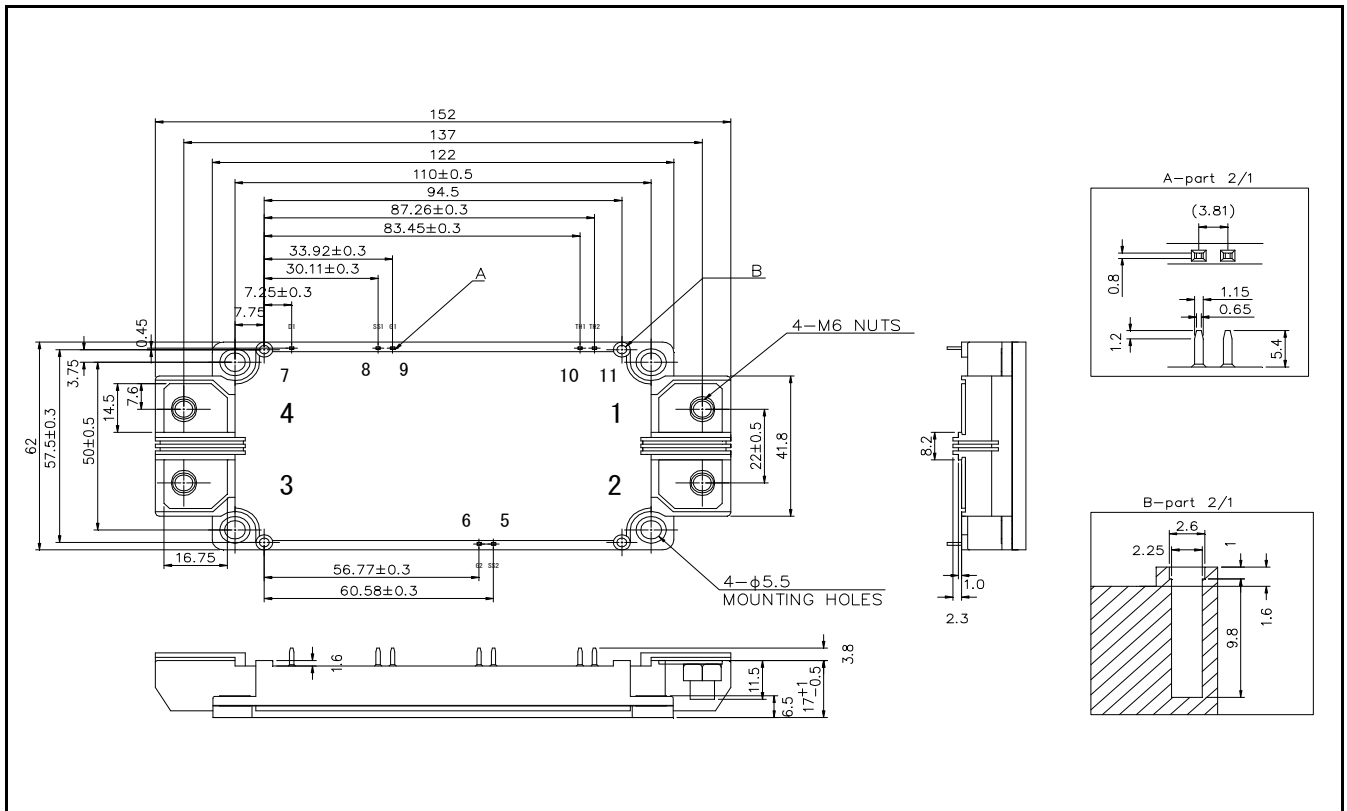
●Circuit diagram



●Construction

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

●Dimensions & Pin layout (Unit : mm)



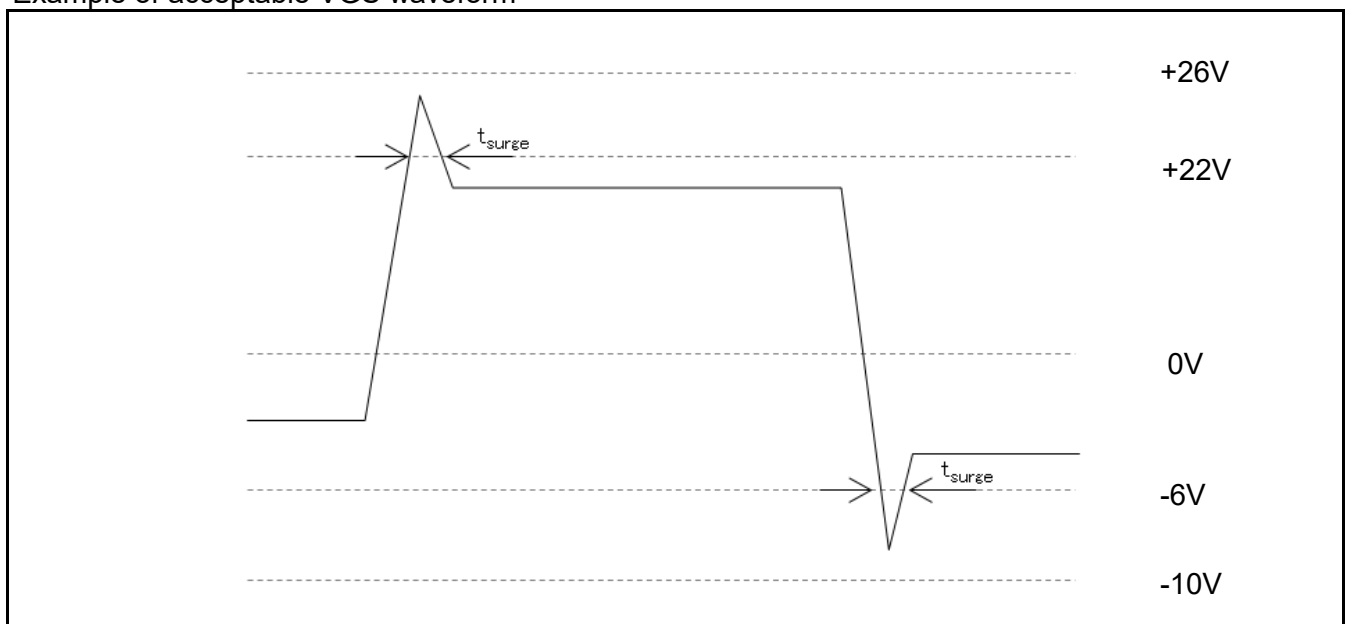
●Absolute maximum ratings ($T_j = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Ratings	Unit
Drain - Source Voltage	V_{DSS}	G-S short	1200	V
Gate - Source Voltage (+)	V_{GSS}	D-S short	22	
Gate - Source Voltage (-)	V_{GSS}	D-S short	-6	
G - S Voltage ($t_{\text{surge}} < 300\text{nsec}$)	V_{GSSsurge}	D-S short	-10 to 26	
Drain Current Note 1)	I_{D}	DC($T_c=60^\circ\text{C}$) $V_{\text{GS}}=18\text{V}$	397	A
	I_{D}	DC($T_c=59^\circ\text{C}$) $V_{\text{GS}}=18\text{V}$	400	
	I_{DRM}	Pulse ($T_c = 60^\circ\text{C}$) 1ms $V_{\text{GS}}=18\text{V}$ Note 2)	800	
Source Current Note 1)	I_{S}	DC($T_c=60^\circ\text{C}$) $V_{\text{GS}}=18\text{V}$	418	
	I_{S}	DC($T_c=60^\circ\text{C}$) $V_{\text{GS}}=0\text{V}$	418	
	I_{SRM}	Pulse ($T_c = 60^\circ\text{C}$) 1ms $V_{\text{GS}}=18\text{V}$ Note 2)	800	
	I_{SRM}	Pulse ($T_c = 60^\circ\text{C}$) 1ms $V_{\text{GS}}=0\text{V}$ Note 2)	800	
Total Power Dissipation Note 3)	P_{tot}	$T_c = 25^\circ\text{C}$	2450	W
Max Junction Temperature	T_{jmax}		175	$^\circ\text{C}$
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 1 min.	2500	Vrms
Mounting Torque	-	Main Terminals : M6 screw	4.5	N · m
		Mounting to heat sink M5 screw	3.5	

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

Note 2) Repetition rate should be kept within the range where temperature rise if die should not exceed T_{jmax} .

Note 3) T_j is less than 175°C .

Example of acceptable VGS waveform


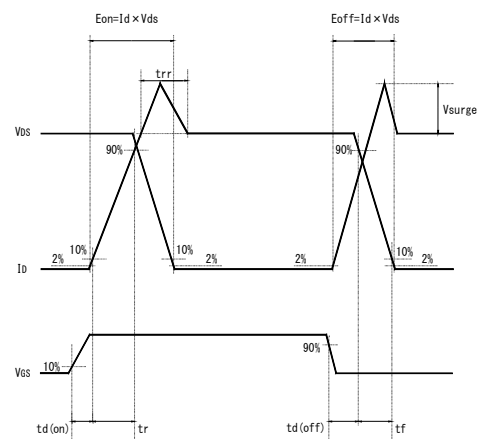
●Electrical characteristics (T_j=25°C)

Parameter	Symbol	Conditions		Ratings			Unit
				Min.	Typ.	Max.	
On-state static Drain-Source Voltage	V _{DS(on)}	ID=400A,VGS=18V	Tj=25°C	—	2.3	3.2	V
			Tj=125°C	—	3.3	—	
			Tj=150°C	—	3.8	4.6	
Drain Cutoff Current	IDSS	VDS=1200V,VGS=0V		—	—	4	mA
Souce-Drain Voltage	VSD	VGS=0V,IS=400A	Tj=25°C	—	1.8	2.1	V
			Tj=125°C	—	2.3	—	
			Tj=150°C	—	2.4	3.4	
		VGS=18V,IS=400A	Tj=25°C	—	1.4	—	
			Tj=125°C	—	1.7	—	
			Tj=150°C	—	1.8	—	
Gate-Source Threshold Voltage	VGS(th)	VDS=10V,ID=85mA		1.6	—	4	V
Gate-Source Leak Current	IGSS	VGS=22V,VDS=0V		—	—	0.5	μA
		VGS=-6V,VDS=0V		-0.5	—	—	
Switching Characteristics	td(on)	VGS(on)=18V、VGS(off)=0V VDS=600V ID=400A RG(on)=0.2 ohm, RG(off)=0.2 ohm Inductive load		—	60	—	ns
	tr			—	50	—	
	trr			—	70	—	
	td (off)			—	240	—	
	tf			—	75	—	
Input Capacitance	Ciss	Vds=10V,VGS=0V,200kHz		—	38	—	nF
Gate Resistance	RGint	Tj=25°C		—	1.4	—	Ω
NTC Rated Resistance	R25			—	5.0	—	kΩ
NTC B Value	B50/25			—	3370	—	K
Stray Inductance	Ls			—	10.0	—	nH
Creepage Distance	-	Terminal to heat sink		—	16.7	—	mm
		Terminal to terminal		—	16.7	—	mm
Clearance Distance	-	Terminal to heat sink		—	12.0	—	mm
		Terminal to terminal		—	11.0	—	mm
Junction-to -Case Thermal Resistance	Rth(j-c)	DMOSFET (1/2 module) Note 4)		—	—	61	°C/kW
		SBD (1/2 module) Note 4)		—	—	80	
Case-to -heat sink Thermal Resistance	Rth(c-f)	Case to heat sink, per 1 module. Thermal grease applied. Note 5)		—	15	—	

Note 4) Measurement of T_c is to be done at the point just under the chip.

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

Note 6) If the Product is used beyond absolute maximum ratings defined in the Specifications, as its internal structure may be damaged, please replace such Product with a new one.

<Wavelength for Switching Test>


●Electrical characteristic curves (Typical)

Fig.1 Output characteristic 25°C (TYP)

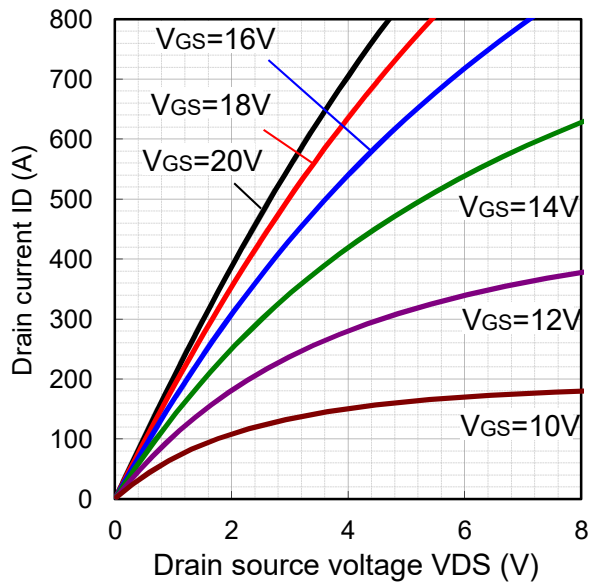


Fig.2 Drain source voltage characteristic (TYP)

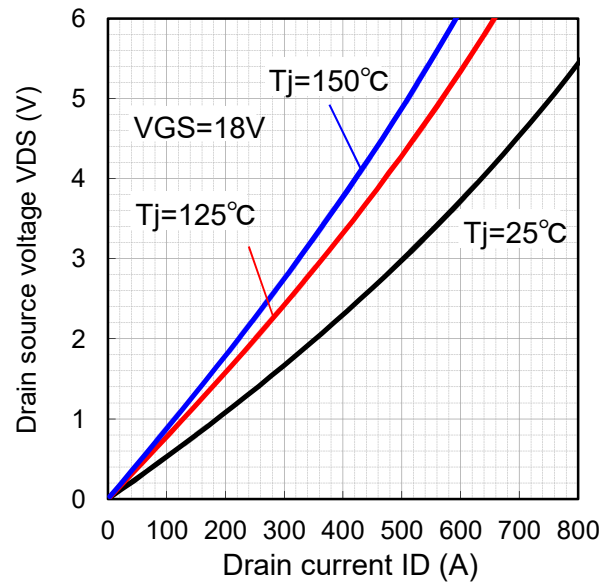
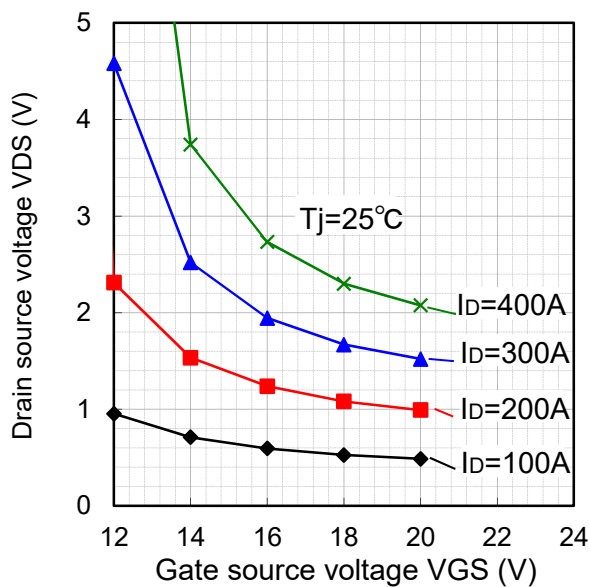
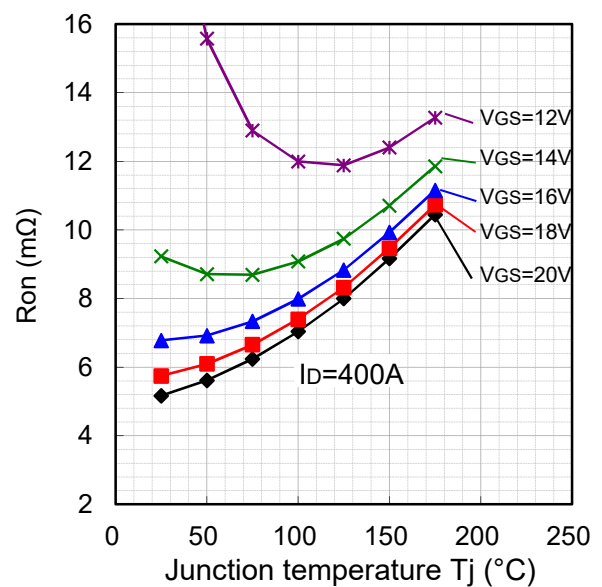


Fig.3 Drain source voltage characteristic 25°C (TYP)

Fig.4 R_{on} vs T_j characteristic (TYP)

●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode (TYP)

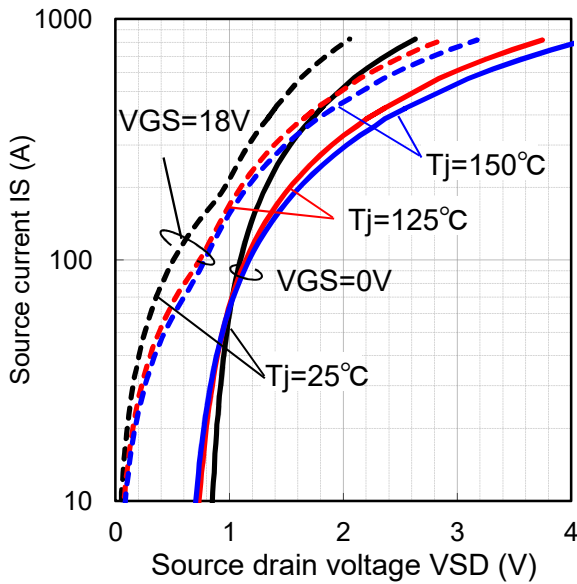


Fig.6 Forward characteristic of Diode (TYP)

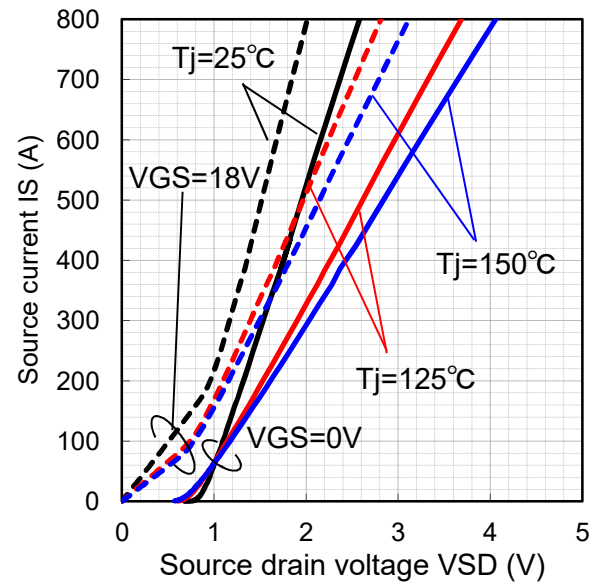


Fig.7 Drain Current vs Gate Voltage (TYP)

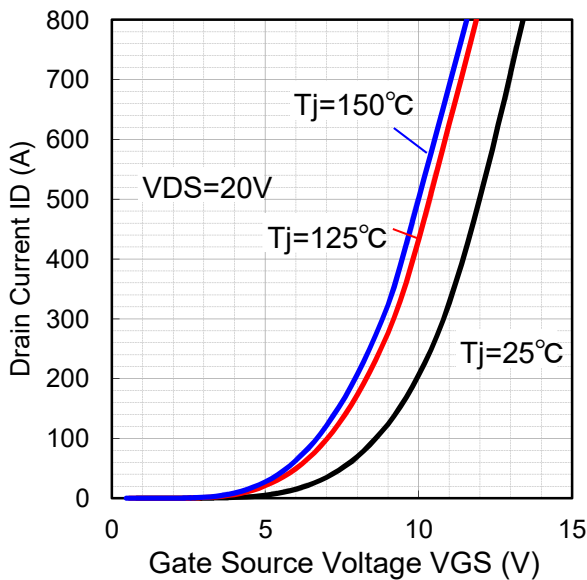
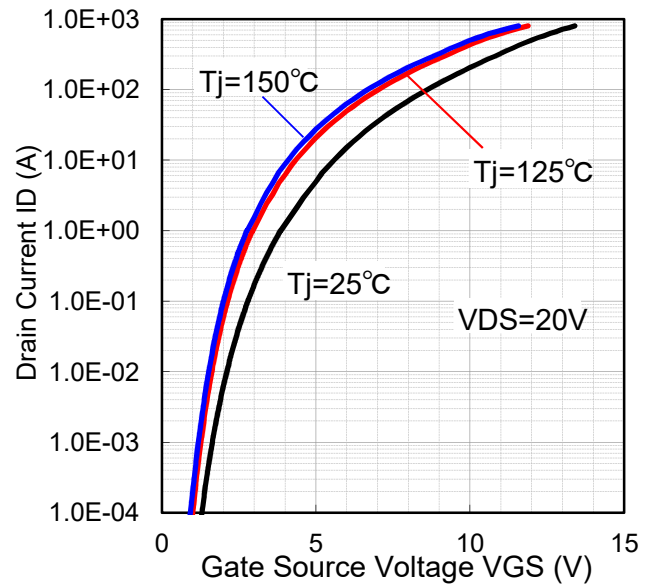


Fig.8 Drain Current vs Gate Voltage (TYP)



●Electrical characteristic curves (Typical)

Fig.9 Switching time vs drain current at 25°C (TYP)

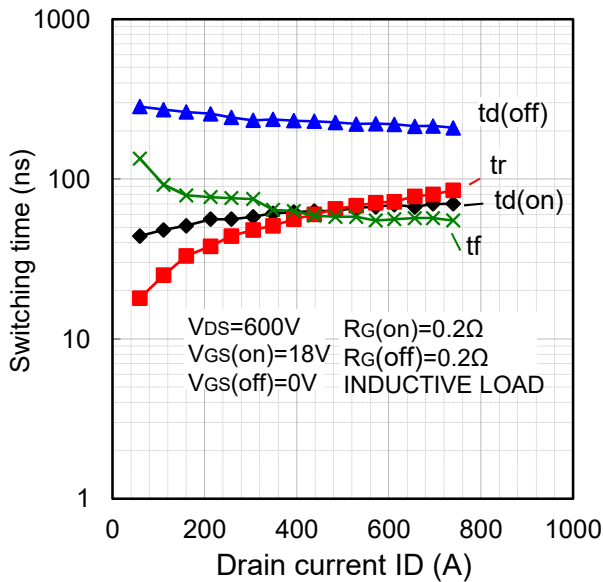


Fig.10 Switching time vs drain current at 125°C (TYP)

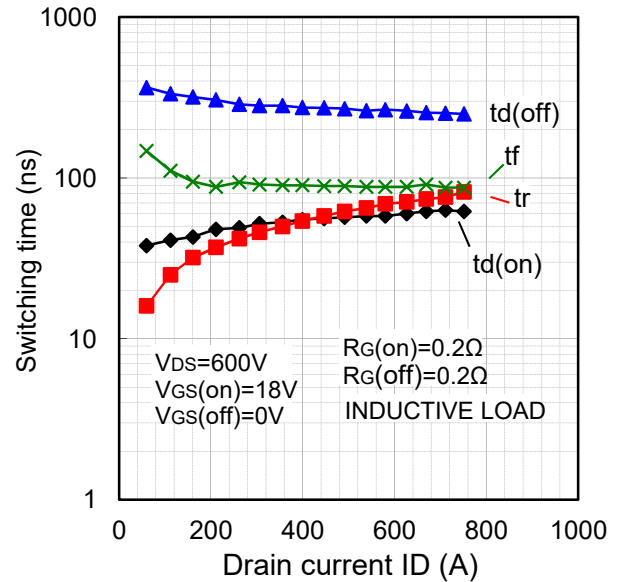


Fig.11 Switching time vs drain current at 150°C (TYP)

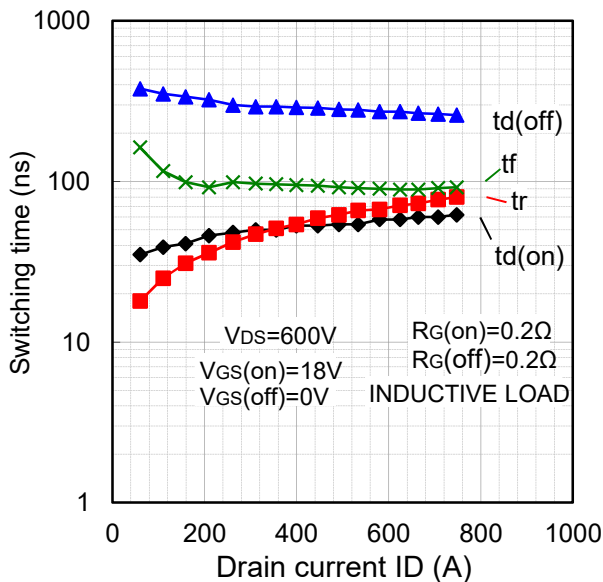
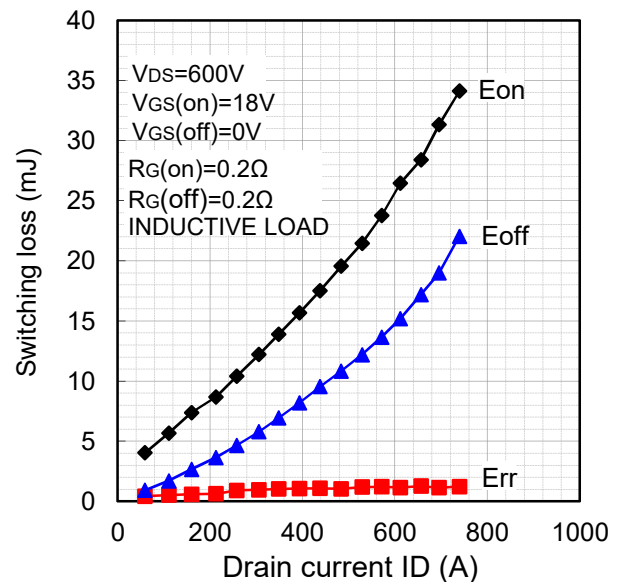


Fig.12 Switching loss vs drain current at 25°C (TYP)



●Electrical characteristic curves (Typical)

Fig.13 Switching loss vs drain current at 125°C (TYP)

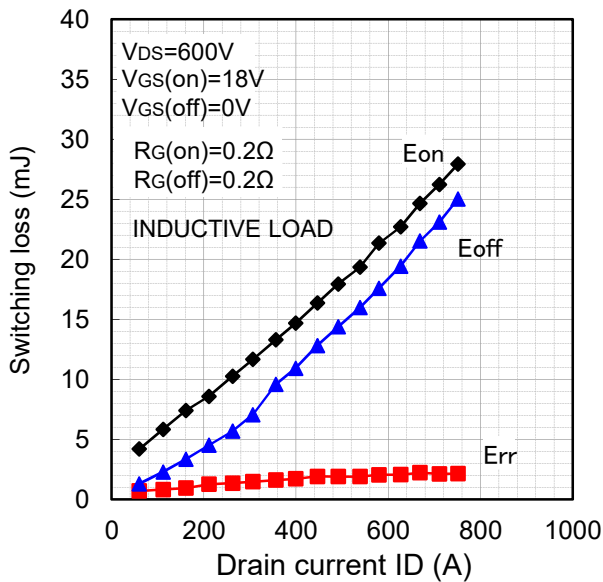


Fig.14 Switching loss vs drain current at 150°C (TYP)

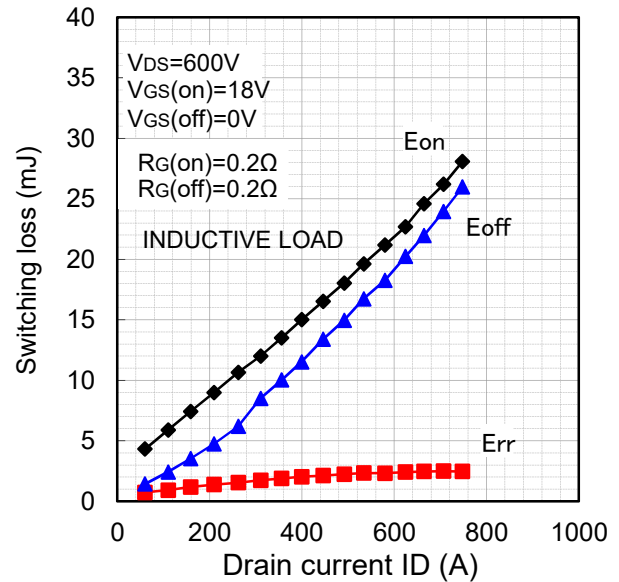


Fig.15 Recovery characteristic vs drain current at 25°C (TYP)

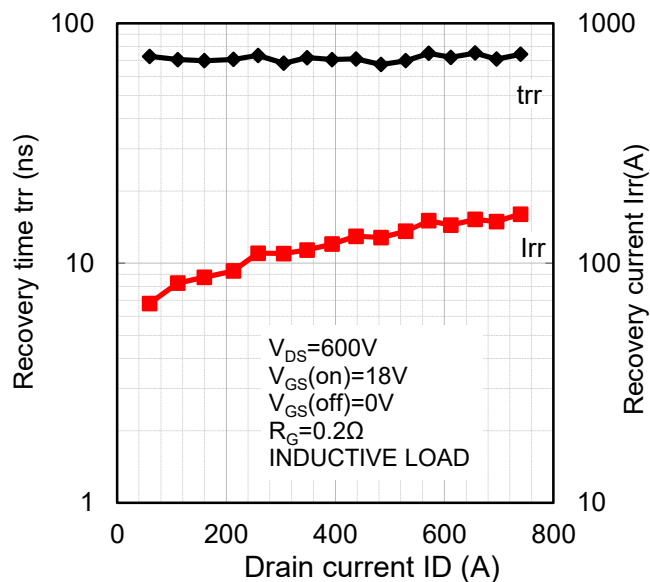
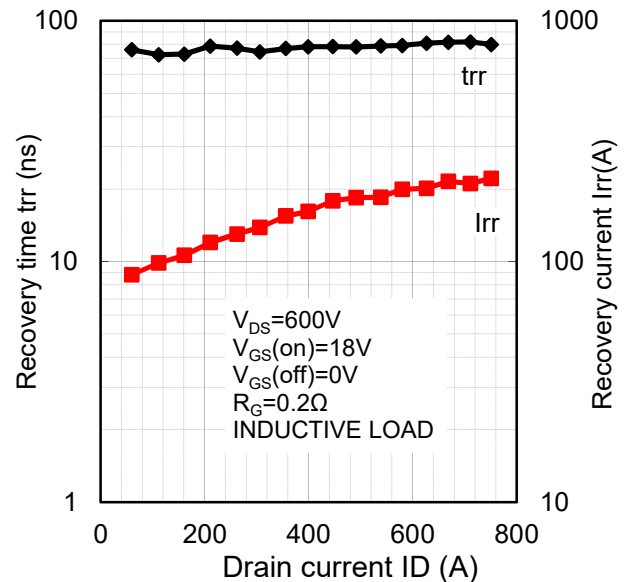


Fig.16 Recovery characteristic vs drain current at 125°C (TYP)



●Electrical characteristic curves (Typical)

Fig.17 Recovery characteristic vs drain current at 150°C (TYP)

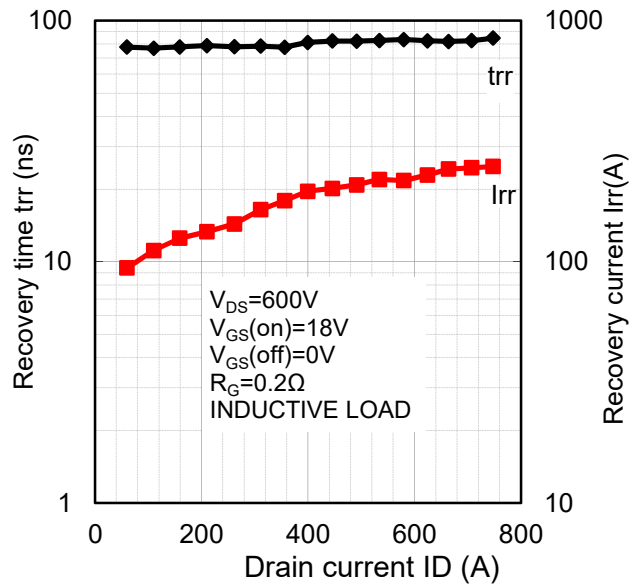


Fig.18 Switching time vs gate resistance at 25°C (TYP)

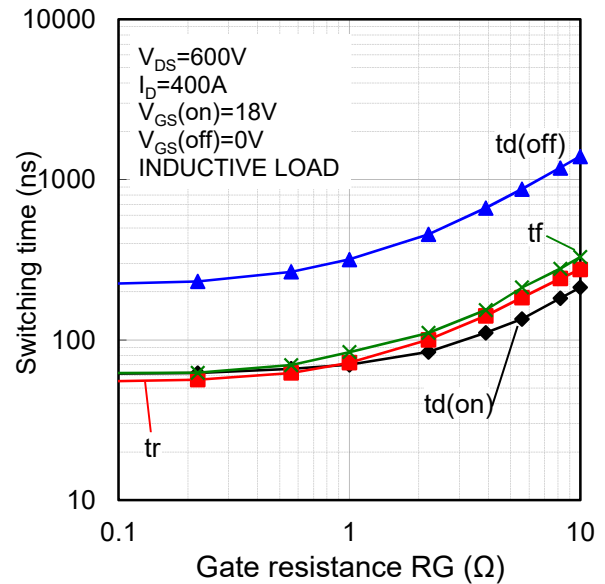


Fig.19 Switching time vs gate resistance at 125°C (TYP)

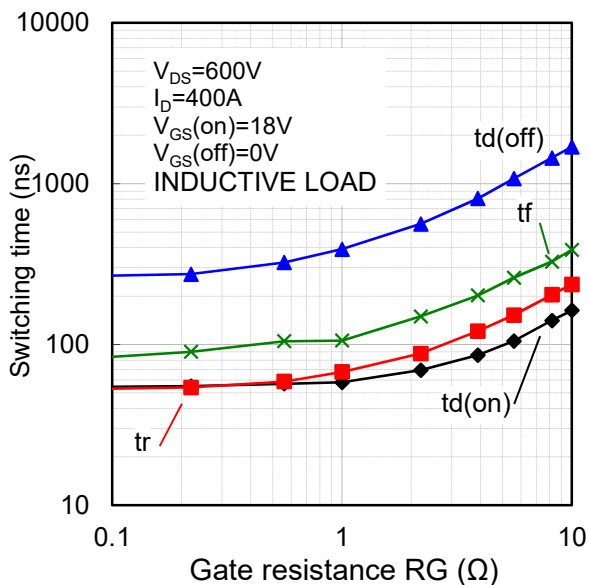
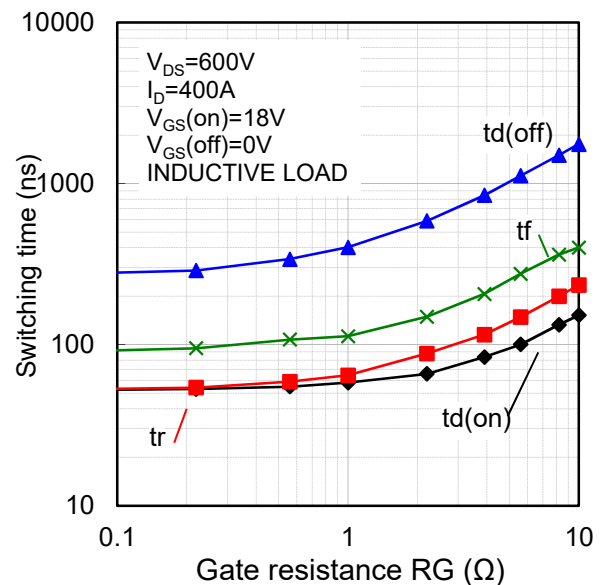


Fig.20 Switching time vs gate resistance at 150°C (TYP)



●Electrical characteristic curves (Typical)

Fig.21 Switching loss vs gate resistance at 25°C (TYP)

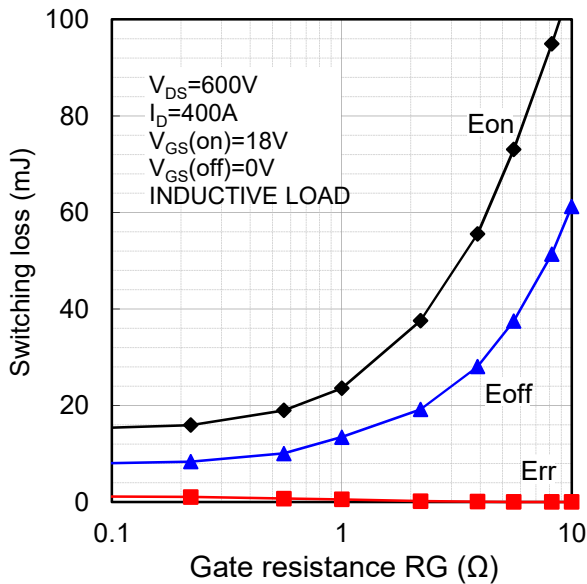


Fig.22 Switching loss vs gate resistance at 125°C (TYP)

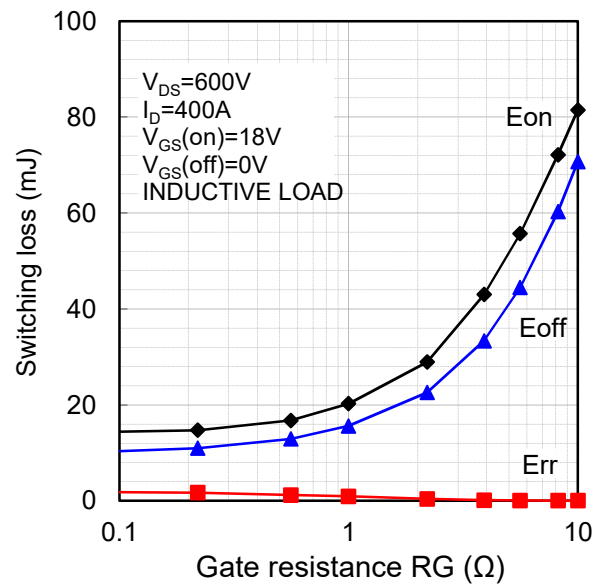
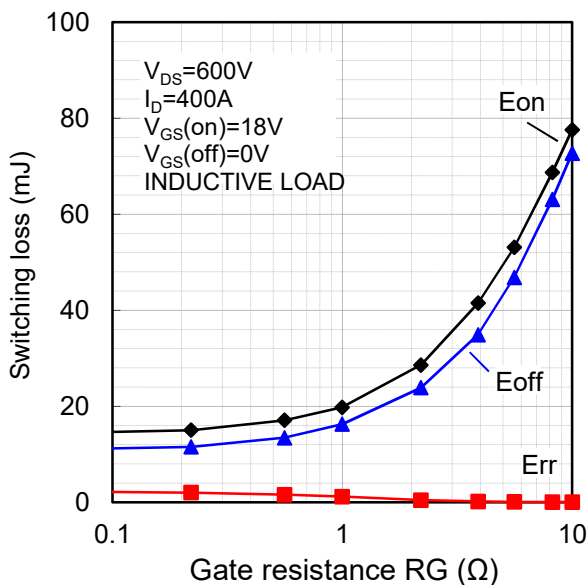


Fig.23 Switching loss vs gate resistance at 150°C (TYP)



●Electrical characteristic curves (Typical)

Fig.24 Capacitance vs Drain source voltage (TYP)

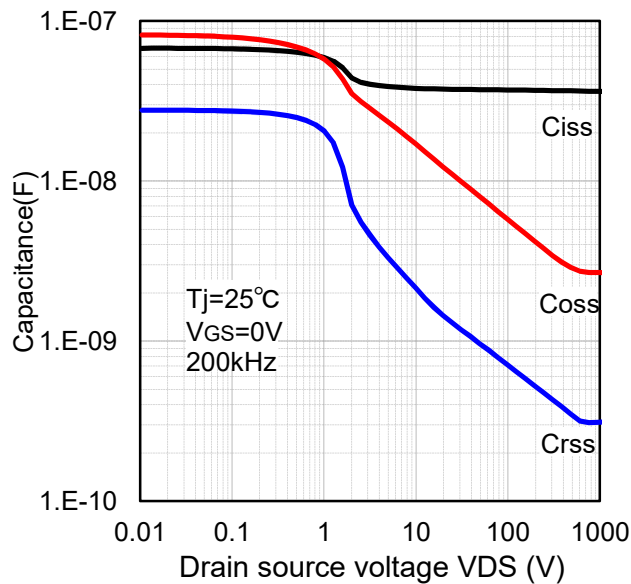


Fig.25 Gate charge characteristic (TYP)

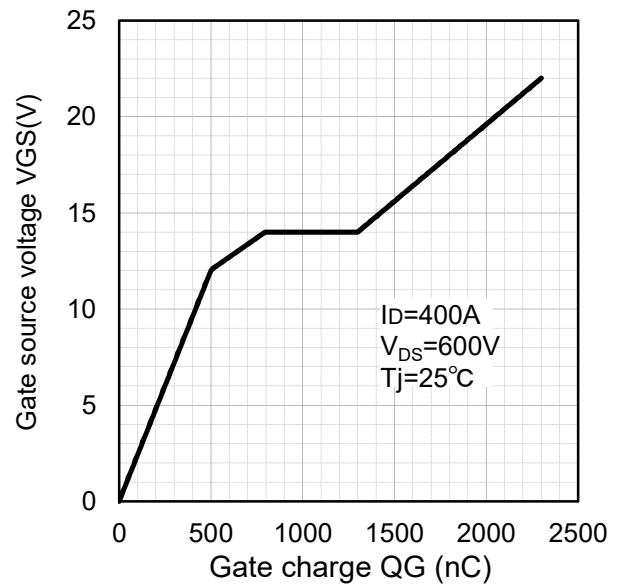
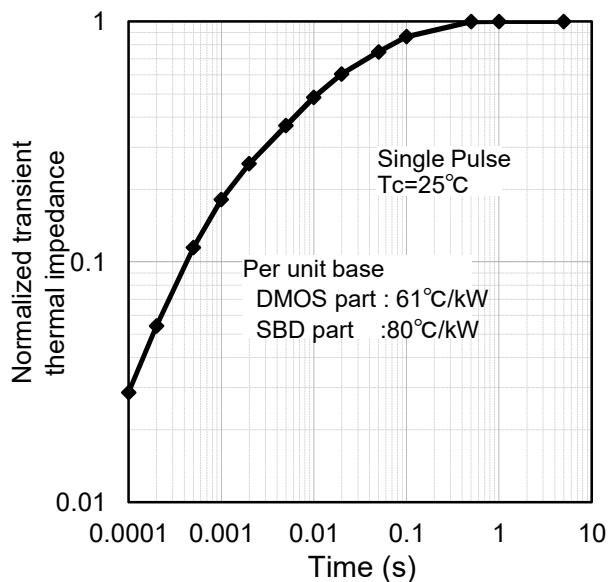


Fig.26 Transient thermal impedance (TYP)



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