

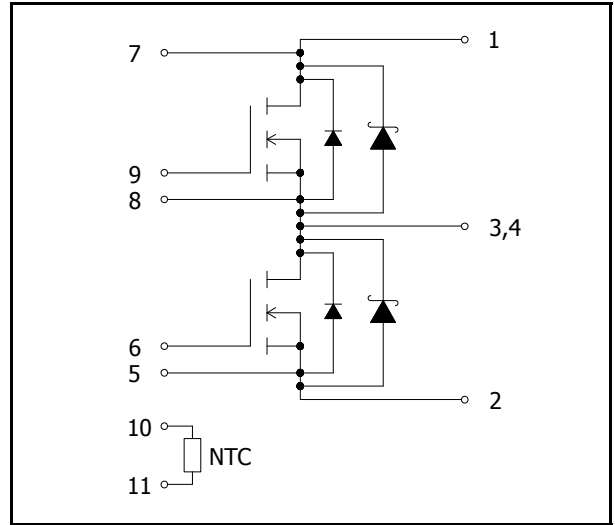
●Application

- 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.

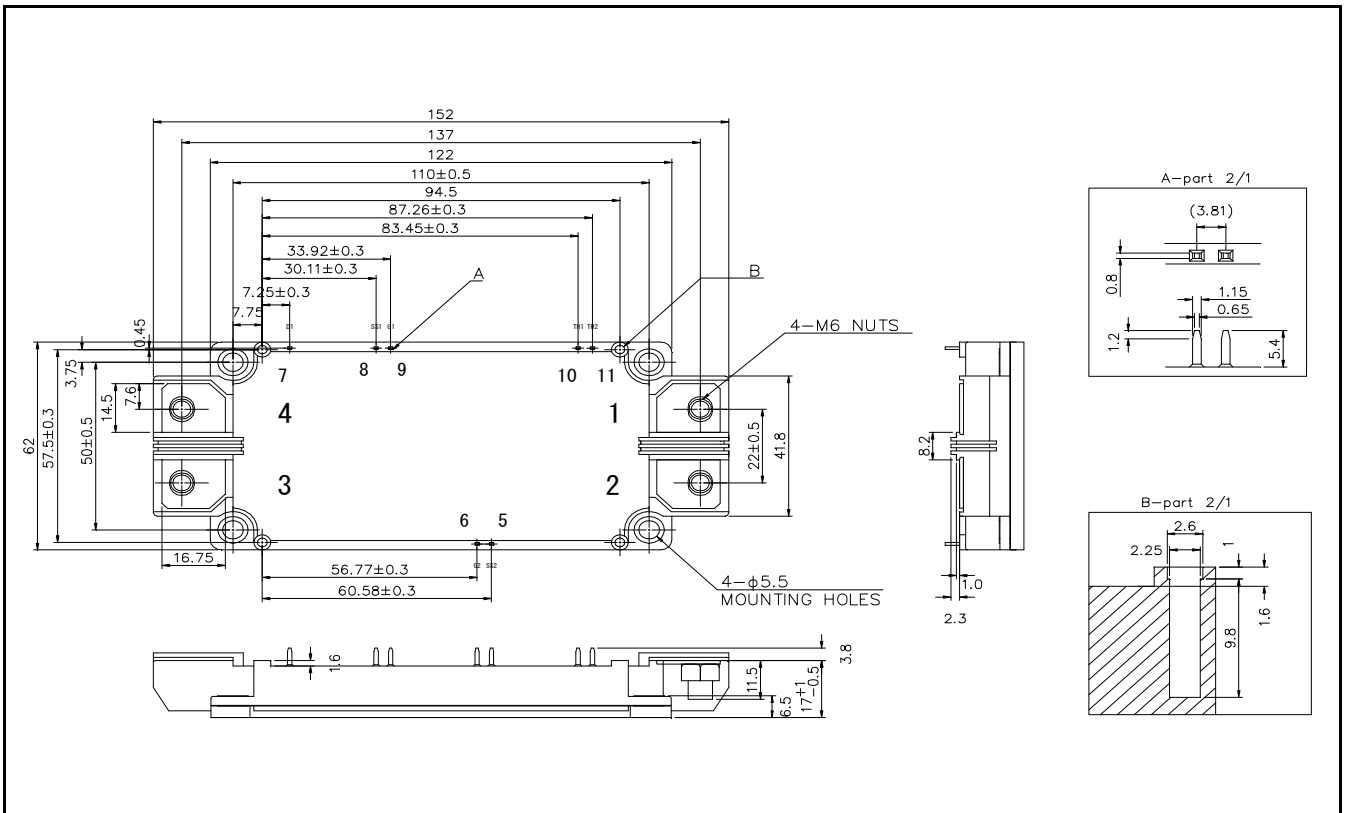
●Circuit diagram



●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** ($T_j = 25^\circ\text{C}$)

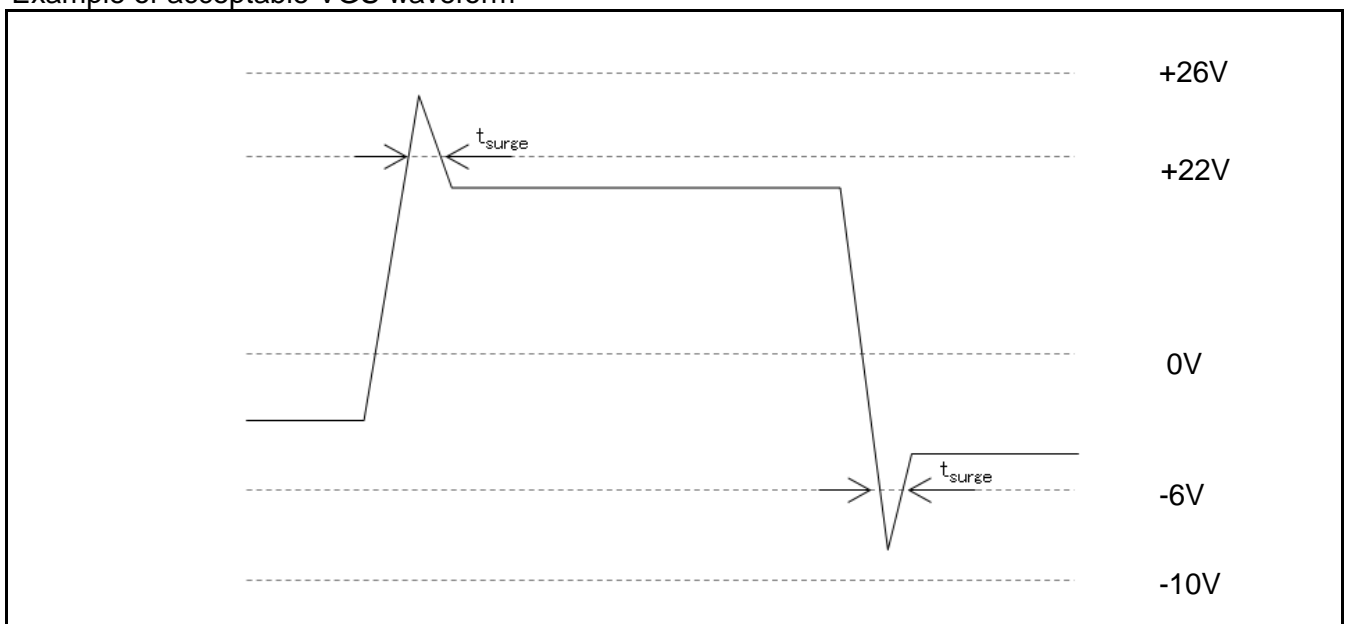
Parameter	Symbol	Conditions	Ratings	Unit
Drain - Source Voltage	V_{DSS}	G-S short	1200	V
Gate - Source Voltage (+)	V_{GSS}	D-S short	22	
Gate - Source Voltage (-)	V_{GSS}	D-S short	-6	
G - S Voltage ($t_{surge} < 300\text{nsec}$)	$V_{GSSsurge}$	D-S short	-10 to 26	
Drain Current <small>Note 1)</small>	I_D	DC($T_c=60^\circ\text{C}$) $V_{GS}=18\text{V}$	397	A
	I_D	DC($T_c=59^\circ\text{C}$) $V_{GS}=18\text{V}$	400	
	I_{DRM}	Pulse ($T_c = 60^\circ\text{C}$) 1ms $V_{GS}=18\text{V}$ <small>Note 2)</small>	800	
Source Current <small>Note 1)</small>	I_S	DC($T_c=60^\circ\text{C}$) $V_{GS}=18\text{V}$	418	
	I_S	DC($T_c=60^\circ\text{C}$) $V_{GS}=0\text{V}$	418	
	I_{SRM}	Pulse ($T_c = 60^\circ\text{C}$) 1ms $V_{GS}=18\text{V}$ <small>Note 2)</small>	800	
	I_{SRM}	Pulse ($T_c = 60^\circ\text{C}$) 1ms $V_{GS}=0\text{V}$ <small>Note 2)</small>	800	
Total Power Dissipation <small>Note 3)</small>	P_{tot}	$T_c = 25^\circ\text{C}$	2450	
Max Junction Temperature	T_{jmax}		175	°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



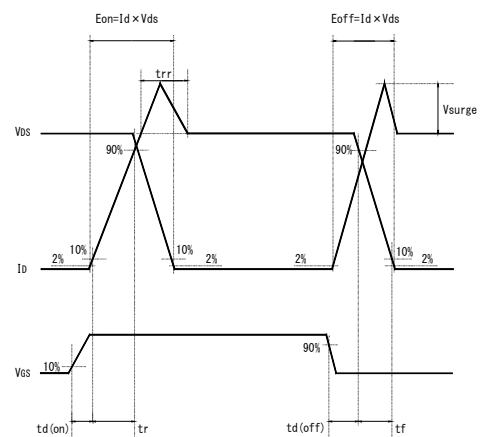
●Electrical characteristics (T_j=25°C)

Parameter	Symbol	Conditions	Ratings			Unit	
			Min.	Typ.	Max.		
On-state static Drain-Source Voltage	V _{DS(on)}	I _D =400A, V _{GS} =18V	T _j =25°C	—	2.3	3.2	V
			T _j =125°C	—	3.3	—	
			T _j =150°C	—	3.8	4.6	
Drain Cutoff Current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V	—	—	4	mA	
Source-Drain Voltage	V _{SD}	V _{GS} =0V, I _S =400A	T _j =25°C	—	1.8	2.1	V
			T _j =125°C	—	2.3	—	
			T _j =150°C	—	2.4	3.4	
		V _{GS} =18V, I _S =400A	T _j =25°C	—	1.4	—	
			T _j =125°C	—	1.7	—	
			T _j =150°C	—	1.8	—	
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =10V, I _D =85mA	1.6	—	4	V	
Gate-Source Leak Current	I _{GSS}	V _{GS} =22V, V _{DS} =0V	—	—	0.5	μA	
		V _{GS} =-6V, V _{DS} =0V	-0.5	—	—		
Switching Characteristics	td(on)	V _{GS(on)} =18V, V _{GS(off)} =0V V _{DS} =600V I _D =400A R _{G(on)} =0.2 ohm, R _{G(off)} =0.2 ohm Inductive load	—	60	—	ns	
	tr		—	50	—		
	trr		—	70	—		
	td(off)		—	240	—		
	tf		—	75	—		
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, 200kHz	—	38	—	nF	
Gate Resistance	R _{Gint}	T _j =25°C	—	1.4	—	Ω	
NTC Rated Resistance	R ₂₅		—	5.0	—	kΩ	
NTC B Value	B _{50/25}		—	3370	—	K	
Stray Inductance	L _s		—	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	R _{th(j-c)}	DMOSFET (1/2 module) Note 4)	—	—	61	°C/kW	
		SBD (1/2 module) Note 4)	—	—	80		
Case-to -heat sink Thermal Resistance	R _{th(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)

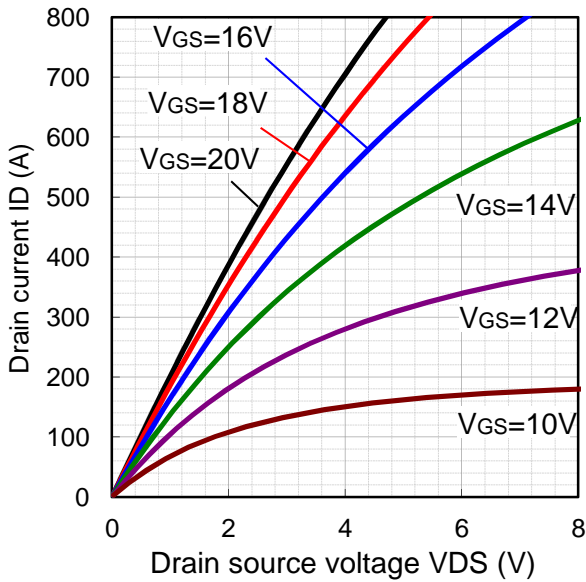


Fig.2 Drain source voltage characteristic (TYP)

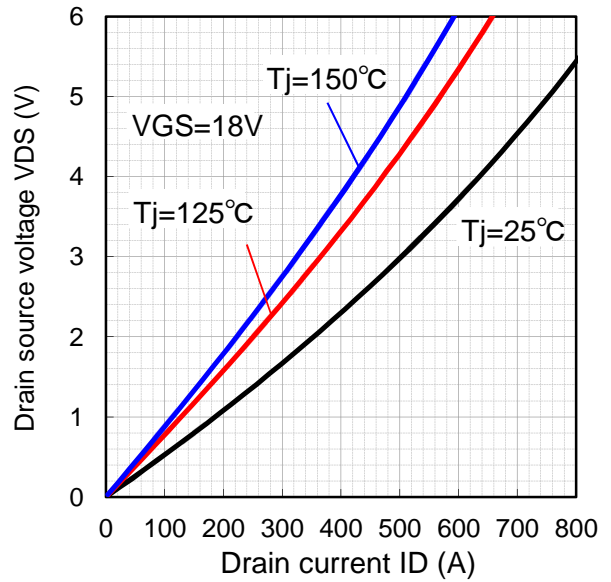


Fig.3 Drain source voltage characteristic 25°C (TYP)

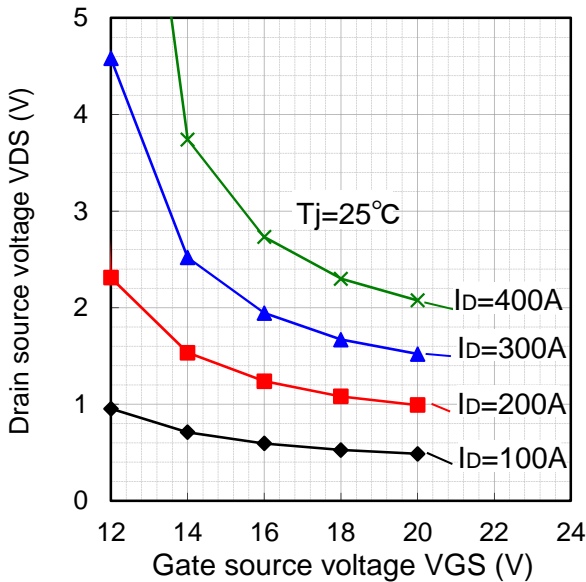
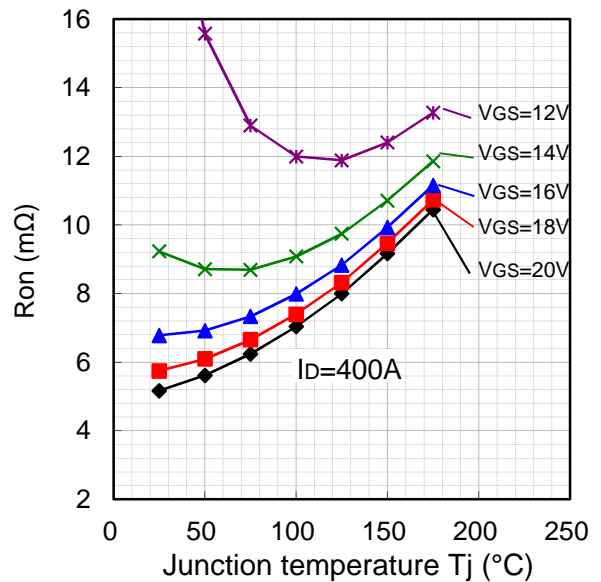


Fig.4 Ron vs Tj characteristic (TYP)



●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode (TYP)

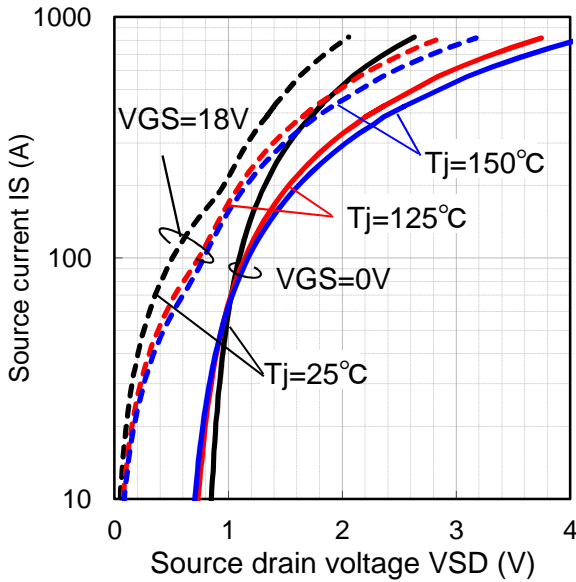


Fig.6 Forward characteristic of Diode (TYP)

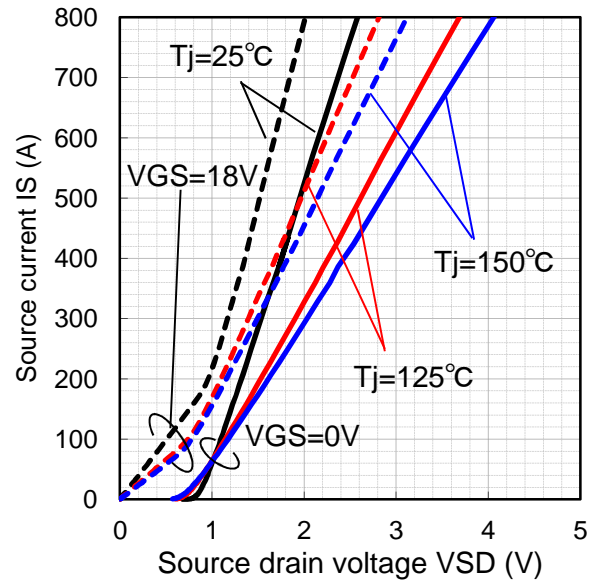


Fig.7 Drain Current vs Gate Voltage (TYP)

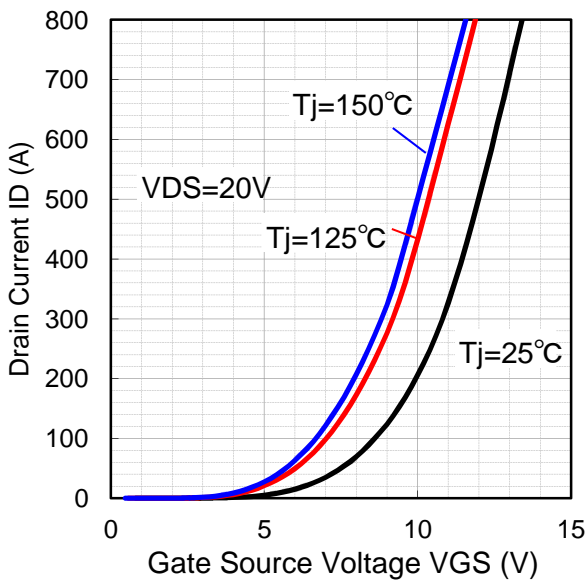
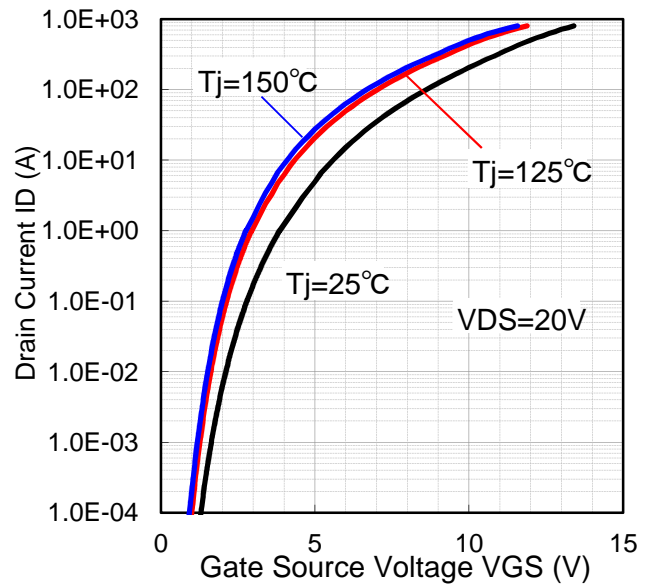


Fig.8 Drain Current vs Gate Voltage (TYP)



●Electrical characteristic curves (Typical)

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

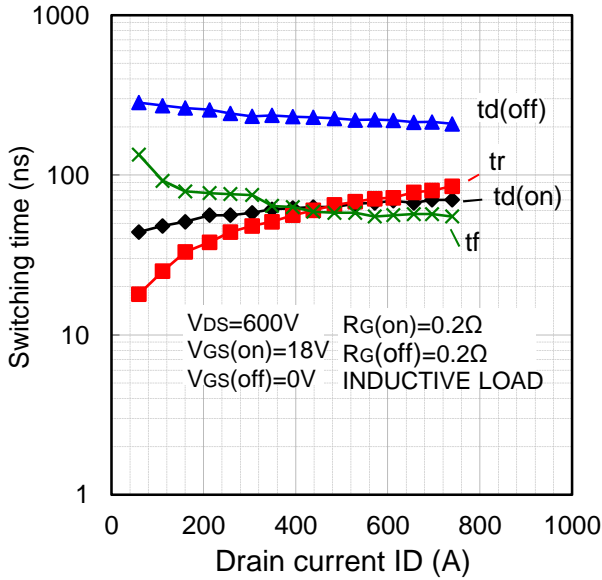


Fig.10 Switching time vs drain current at 125°C (TYP)

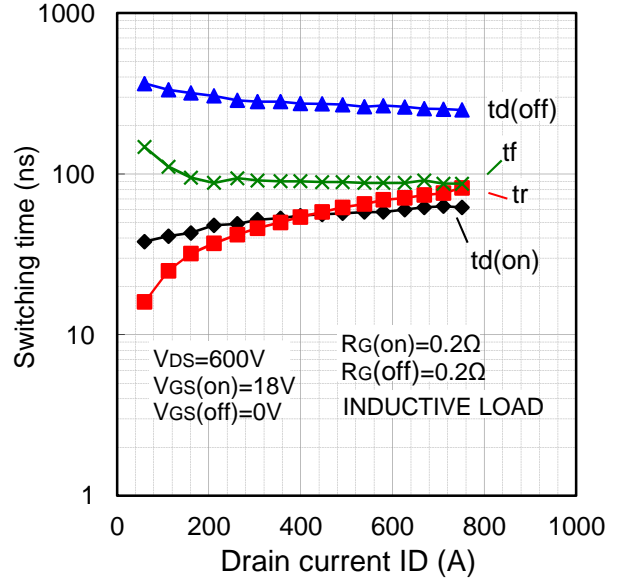


Fig.11 Switching time vs drain current at 150°C (TYP)

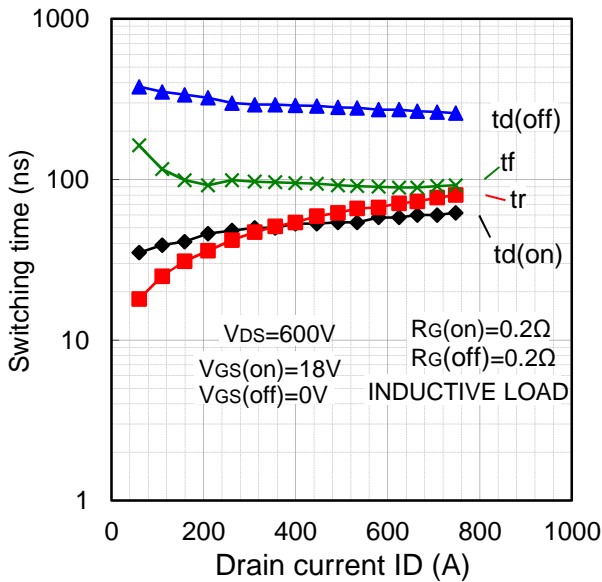
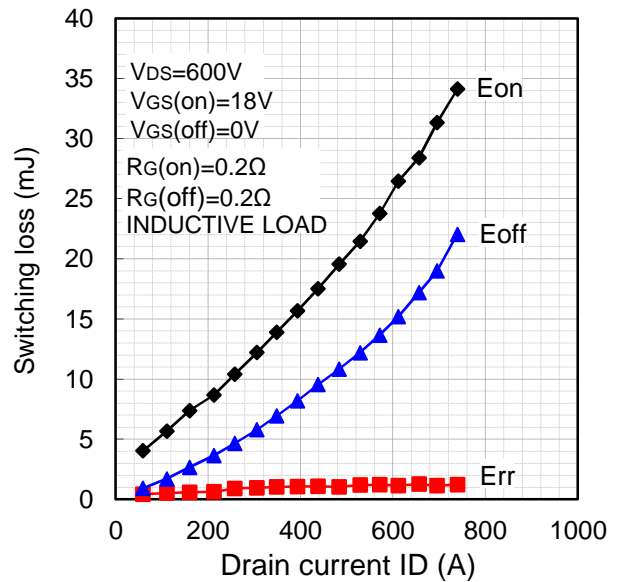


Fig.12 Switching loss vs drain current at 25°C (TYP)



●Electrical characteristic curves (Typical)

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

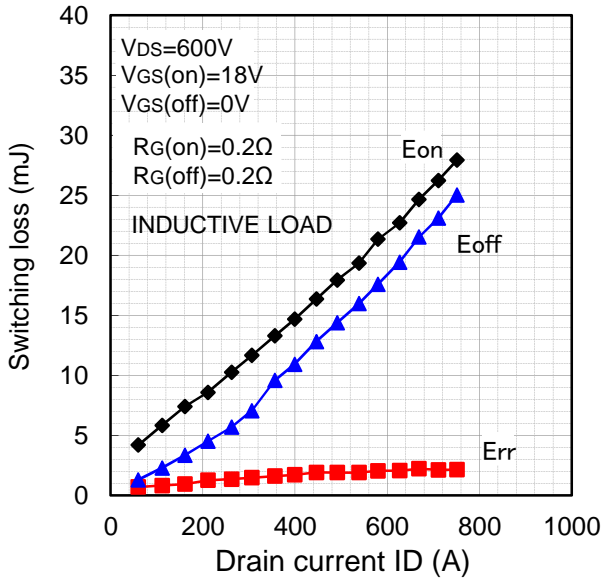


Fig.14 Switching loss vs drain current at 150°C (TYP)

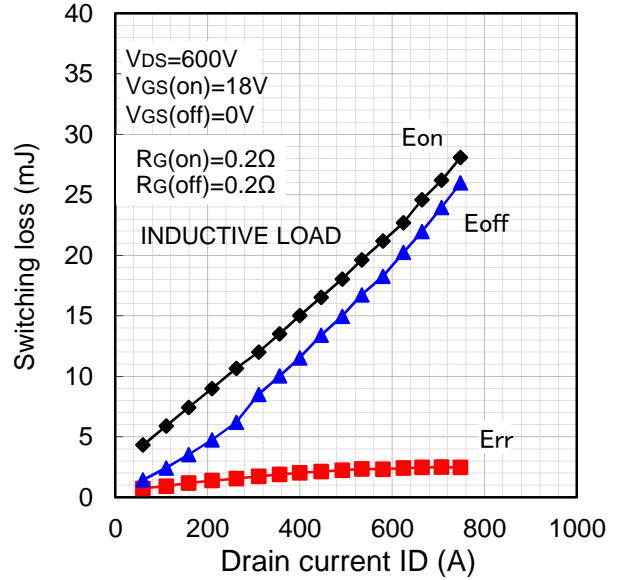


Fig.15 Recovery characteristic vs drain current at 25°C (TYP)

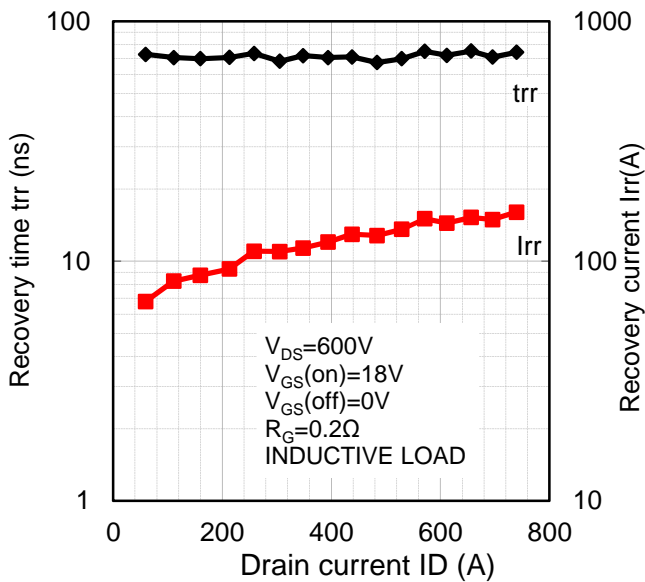
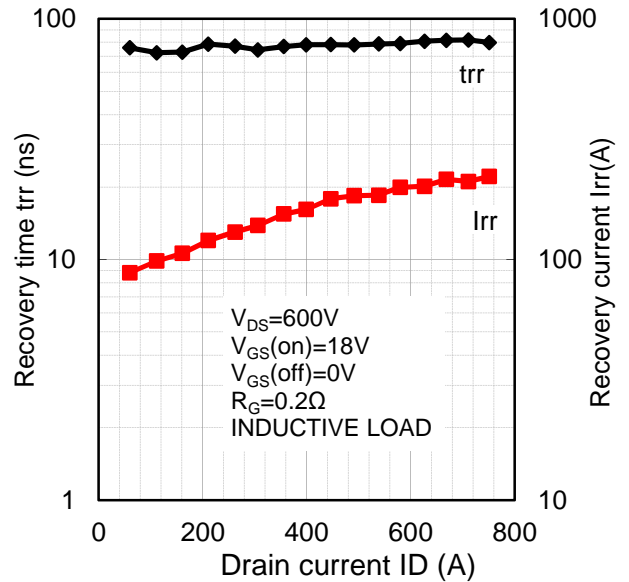


Fig.16 Recovery characteristic vs drain current at 125°C (TYP)



●Electrical characteristic curves (Typical)

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

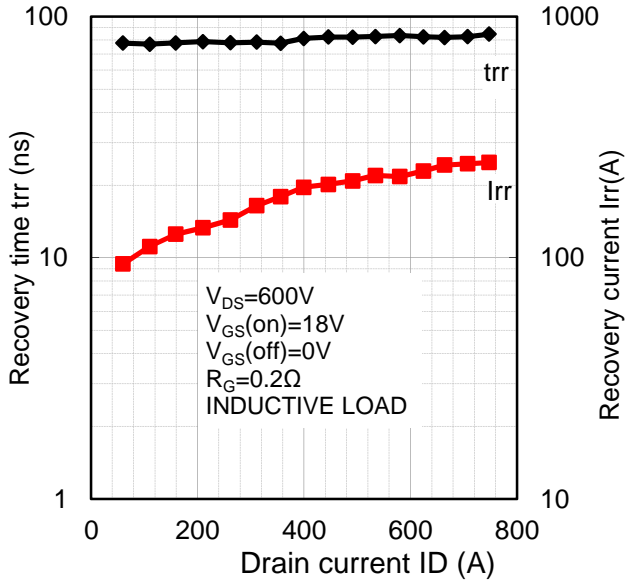


Fig.18 Switching time vs gate resistance at 25°C (TYP)

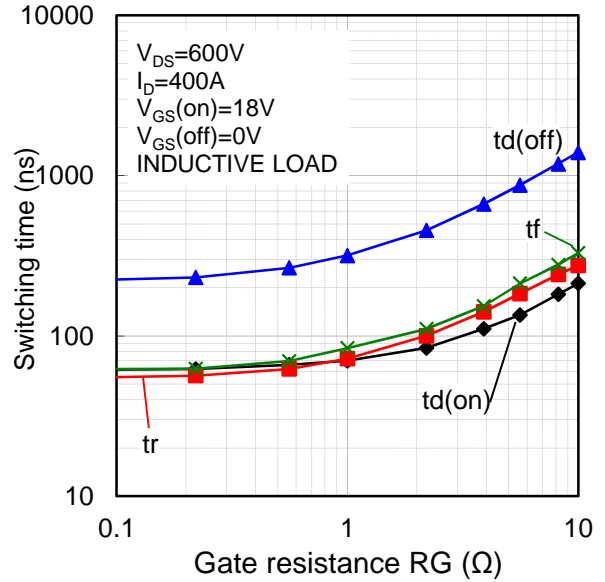


Fig.19 Switching time vs gate resistance at 125°C (TYP)

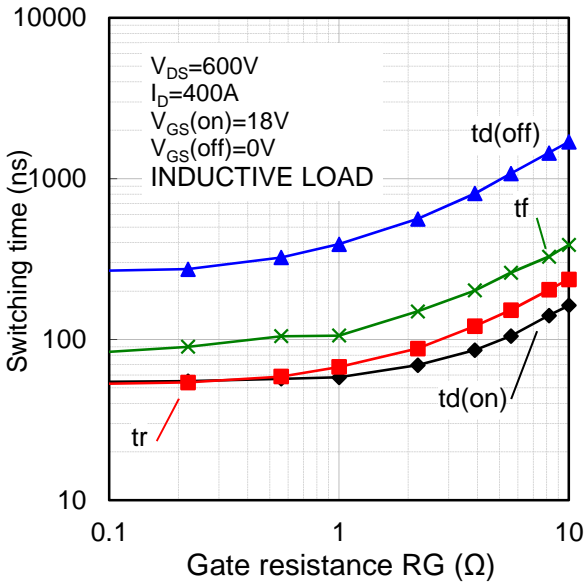
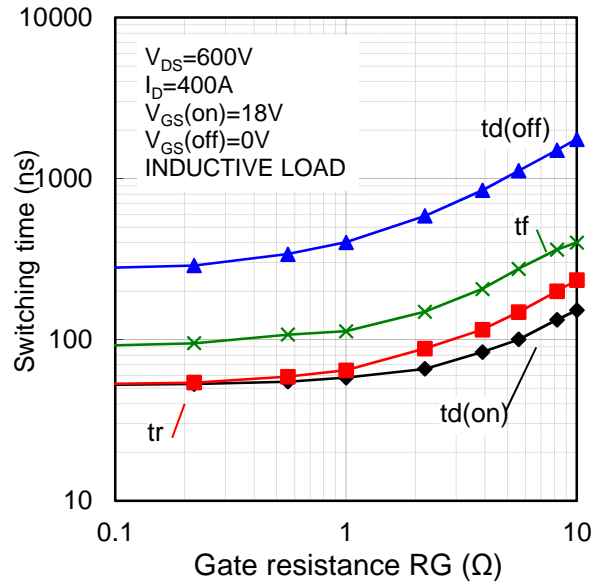


Fig.20 Switching time vs gate resistance at 150°C (TYP)



●Electrical characteristic curves (Typical)

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

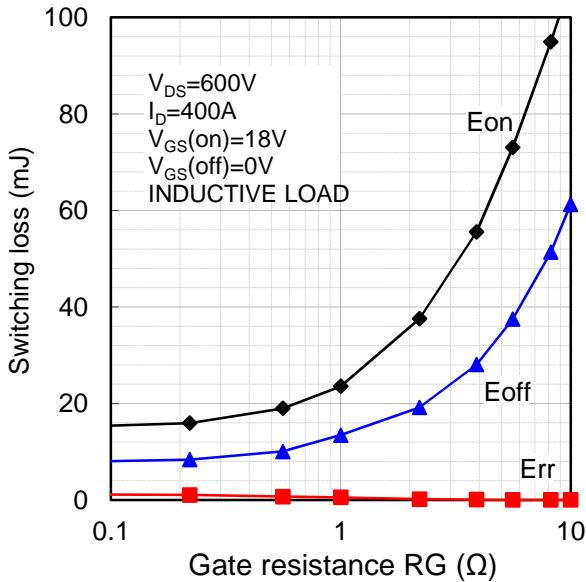


Fig.22 Switching loss vs gate resistance at 125°C (TYP)

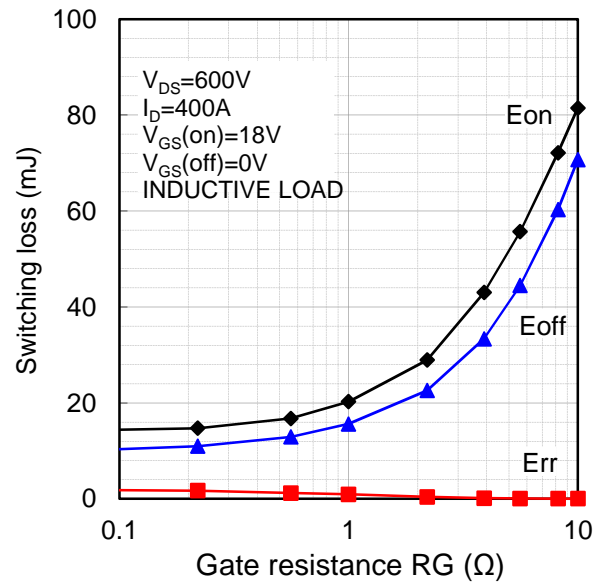
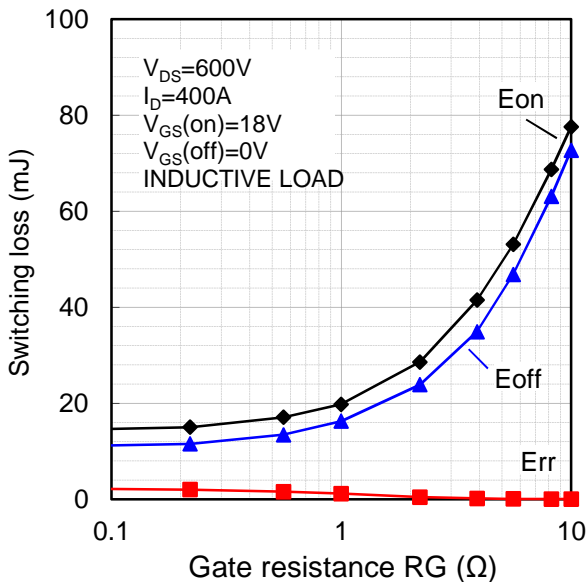


Fig.23 Switching loss vs gate resistance at 150°C (TYP)



●Electrical characteristic curves (Typical)

Fig.24 Capacitance vs Drain source voltage (TYP)

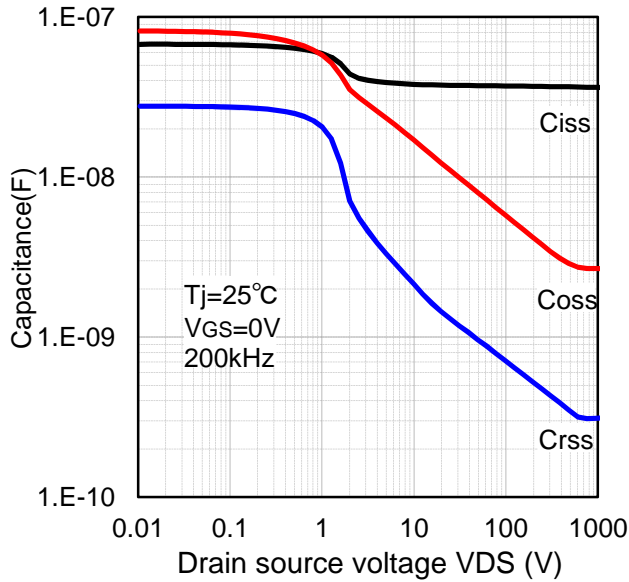


Fig.25 Gate charge characteristic (TYP)

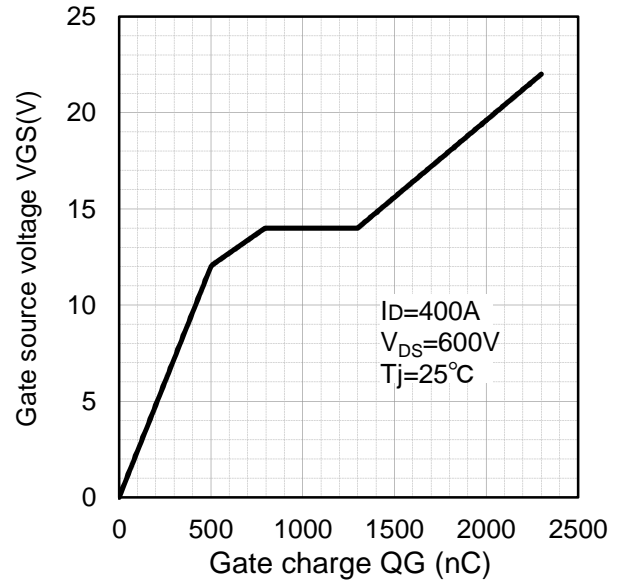
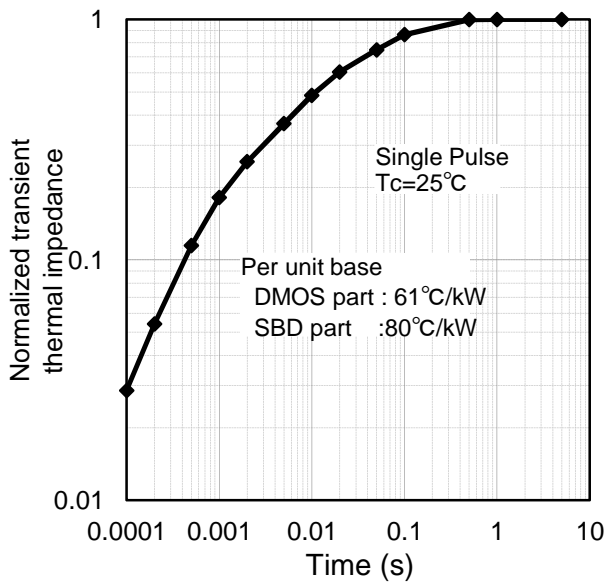


Fig.26 Transient thermal impedance (TYP)



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