

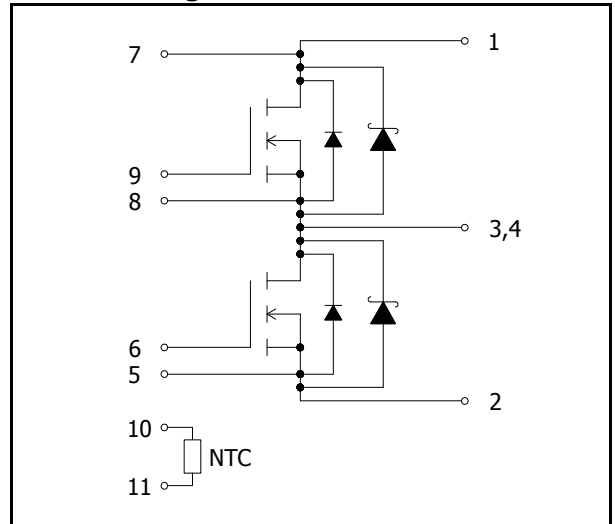
### ●Application

- 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.

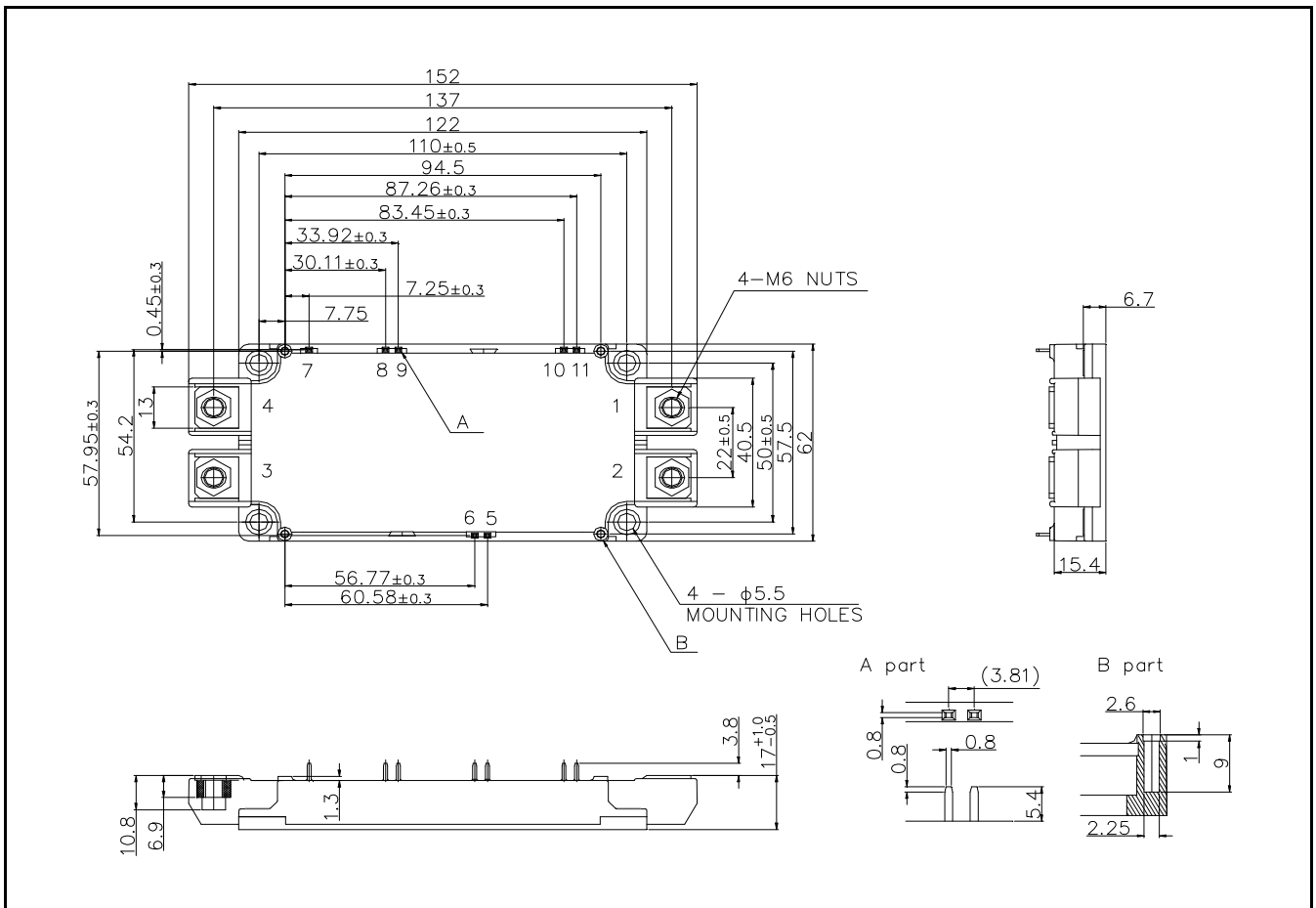
### ●Circuit diagram



### ●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** ( $T_j = 25^\circ\text{C}$ )

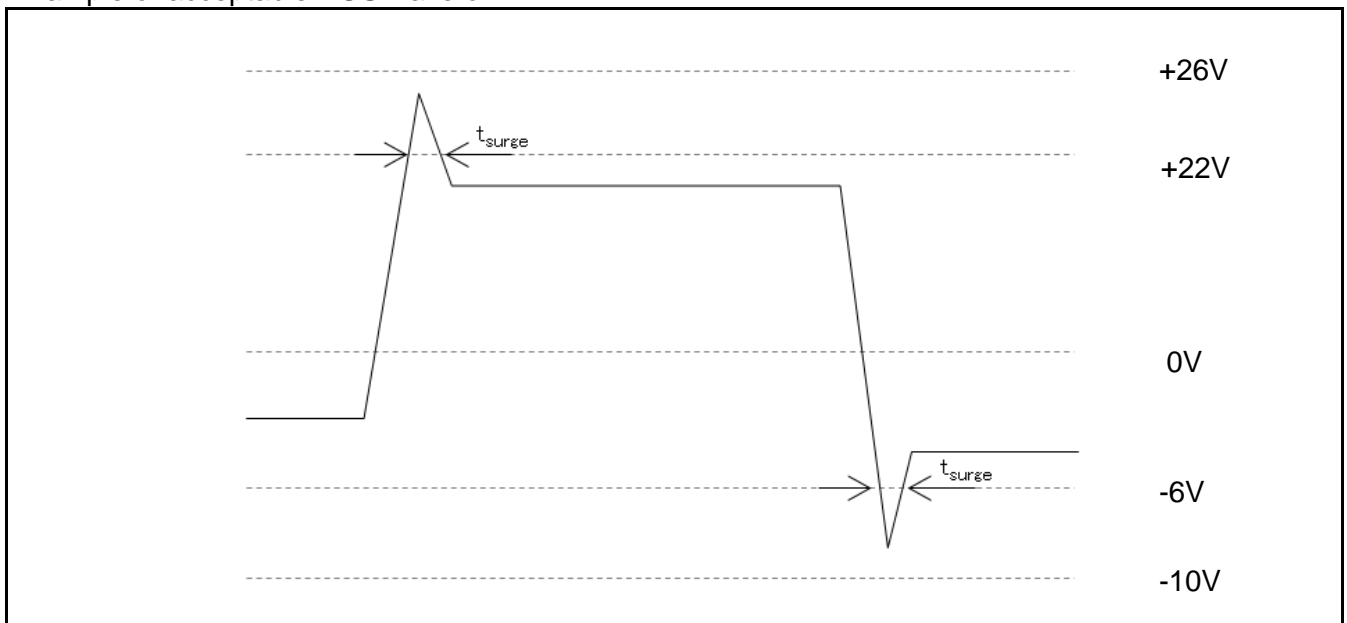
Parameter	Symbol	Conditions	Ratings	Unit
Drain - Source Voltage	$V_{DSS}$	G-S short	1700	V
Gate - Source Voltage (+)	$V_{GSS}$	D-S short	22	
Gate - Source Voltage (-)	$V_{GSS}$	D-S short	-6	
G - S Voltage ( $t_{surge} < 300\text{nsec}$ )	$V_{GSSsurge}$	D-S short	-10 to 26	
Drain Current <small>Note 1)</small>	$I_D$	DC( $T_c=60^\circ\text{C}$ ) $V_{GS}=18\text{V}$	250	A
	$I_{DRM}$	Pulse ( $T_c = 60^\circ\text{C}$ ) 1ms $V_{GS}=18\text{V}$ <small>Note 2)</small>	500	
Source Current <small>Note 1)</small>	$I_S$	DC( $T_c=60^\circ\text{C}$ ) $V_{GS}=18\text{V}$	250	
	$I_S$	DC( $T_c=60^\circ\text{C}$ ) $V_{GS}=0\text{V}$	200	
	$I_{SRM}$	Pulse ( $T_c = 60^\circ\text{C}$ ) 1ms $V_{GS}=18\text{V}$ <small>Note 2)</small>	500	
Total Power Dissipation <small>Note 3)</small>	$P_{tot}$	$T_c = 25^\circ\text{C}$	1800	W
Max Junction Temperature	$T_{jmax}$		175	°C
Junction Temperature	$T_{jop}$		-40 to 150	
Storage Temperature	$T_{stg}$		-40 to 125	
Isolation Voltage	$Visol$	Terminals to baseplate $f = 60\text{Hz AC}$ 1 min.	3400	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  $175^\circ\text{C}$ .

Example of acceptable VGS waveform



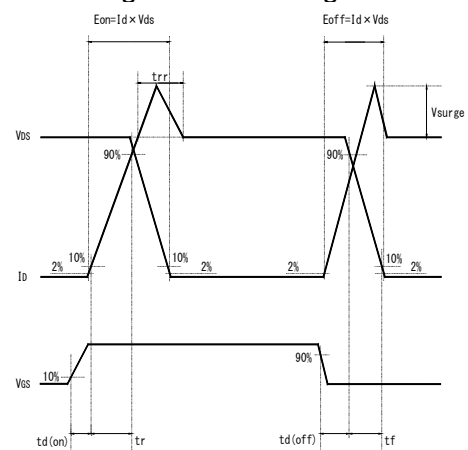
**●Electrical characteristics (T<sub>j</sub>=25°C)**

Parameter	Symbol	Conditions	Ratings			Unit	
			Min.	Typ.	Max.		
On-state static Drain-Source Voltage	V <sub>DS(on)</sub>	I <sub>D</sub> =250A, V <sub>GS</sub> =18V	T <sub>j</sub> =25°C	—	2.0	2.8	V
			T <sub>j</sub> =125°C	—	3.2	—	
			T <sub>j</sub> =150°C	—	3.7	5.1	
Drain Cutoff Current	I <sub>DSS</sub>	V <sub>DS</sub> =1200V, V <sub>GS</sub> =0V	—	—	1.0	mA	
Source-Drain Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =250A	T <sub>j</sub> =25°C	—	2.3	2.7	V
			T <sub>j</sub> =125°C	—	3.2	—	
			T <sub>j</sub> =150°C	—	3.5	4.8	
		V <sub>GS</sub> =18V, I <sub>S</sub> =250A	T <sub>j</sub> =25°C	—	1.5	—	
			T <sub>j</sub> =125°C	—	2.0	—	
			T <sub>j</sub> =150°C	—	2.2	—	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =66mA	1.6	—	4	V	
Gate-Source Leak 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	td(on)	V <sub>GS(on)</sub> =18V, V <sub>GS(off)</sub> =0V V <sub>DS</sub> =1000V I <sub>D</sub> =250A R <sub>G(on)</sub> =1.0 ohm, R <sub>G(off)</sub> =0.2 ohm Inductive load	—	55	—	ns	
	tr		—	55	—		
	trr		—	50	—		
	td(off)		—	195	—		
	tf		—	70	—		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, 200kHz	—	30	—	nF	
Gate Resistance	R <sub>Gint</sub>	T <sub>j</sub> =25°C	—	1.4	—	Ω	
NTC Rated Resistance	R <sub>25</sub>		—	5.0	—	kΩ	
NTC B Value	B <sub>50/25</sub>		—	3370	—	K	
Stray Inductance	L <sub>s</sub>		—	13.3	—	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>	DMOSFET (1/2 module) Note 4)	—	—	83	°C/kW	
		SBD (1/2 module) Note 4)	—	—	115		
Case-to -heat sink Thermal Resistance	R <sub>th(c-f)</sub>	Case to heat sink, per 1 module. Thermal grease applied. Note 5)	—	35	—		

Note 4) Measurement of T<sub>c</sub> 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)

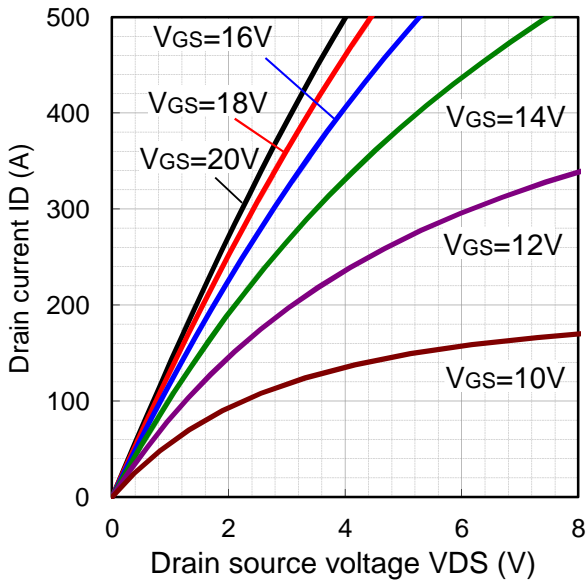


Fig.2 Drain source voltage characteristic (TYP)

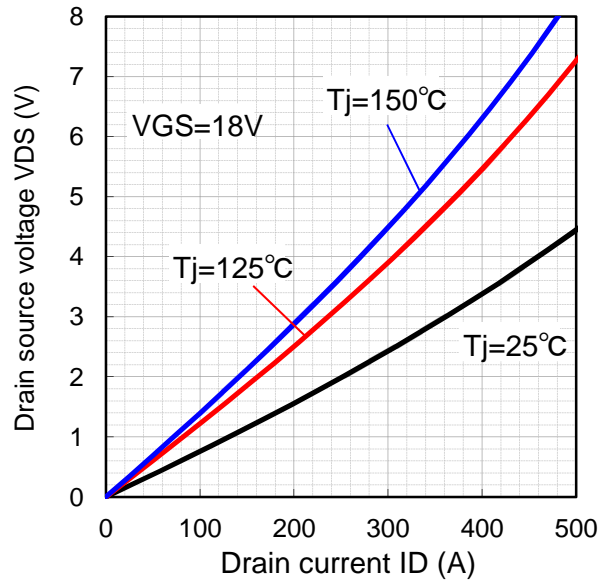


Fig.3 Drain source voltage characteristic 25°C (TYP)

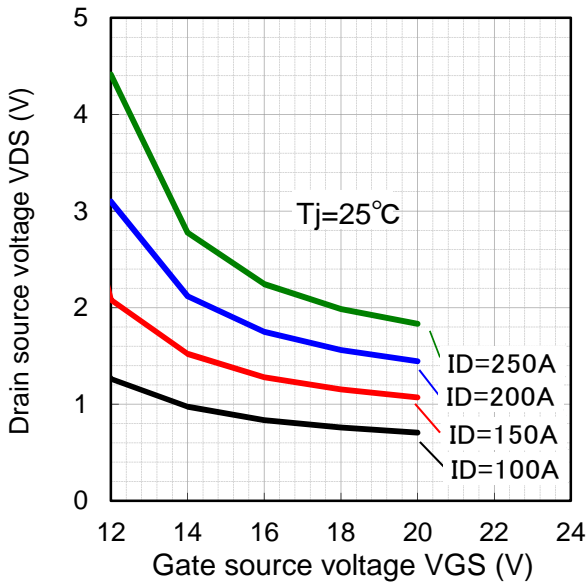
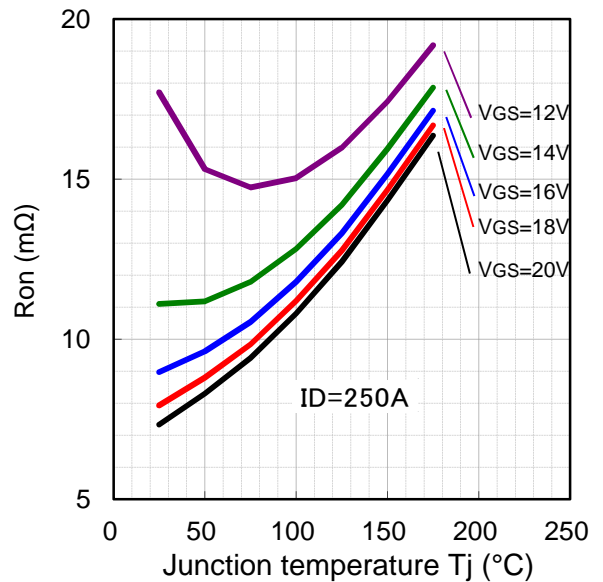


Fig.4 Ron vs Tj characteristic (TYP)



●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode (TYP)

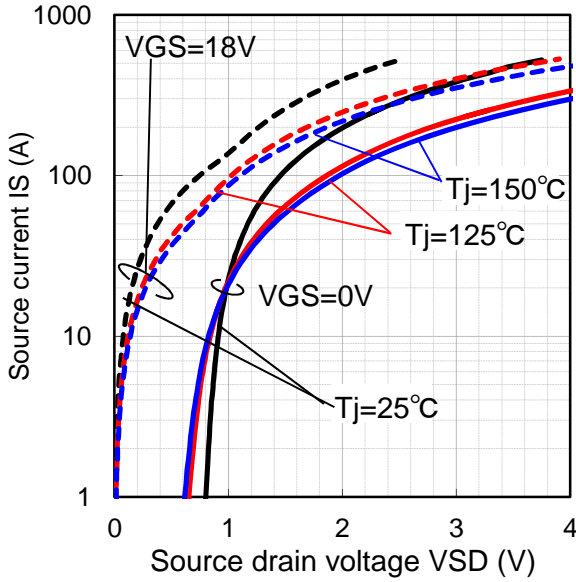


Fig.6 Forward characteristic of Diode (TYP)

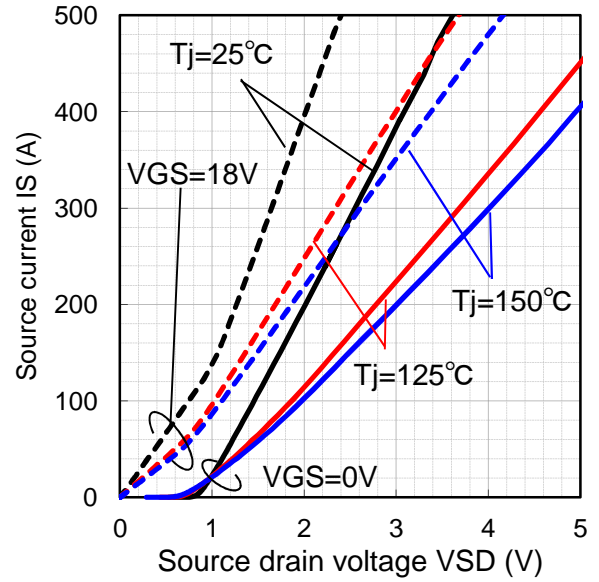


Fig.7 Drain Current vs Gate Voltage (TYP)

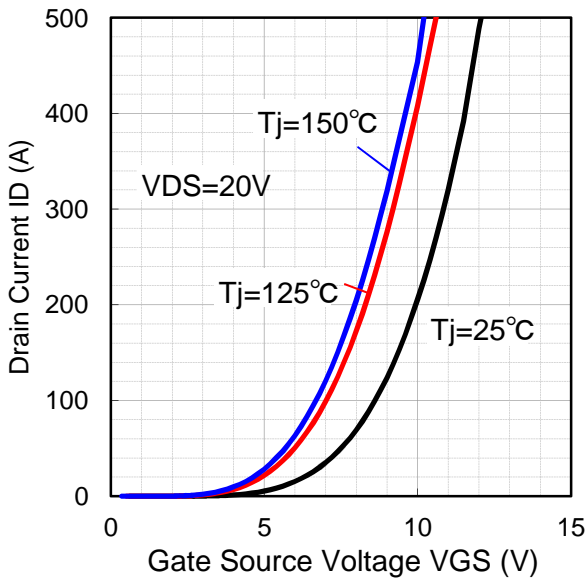
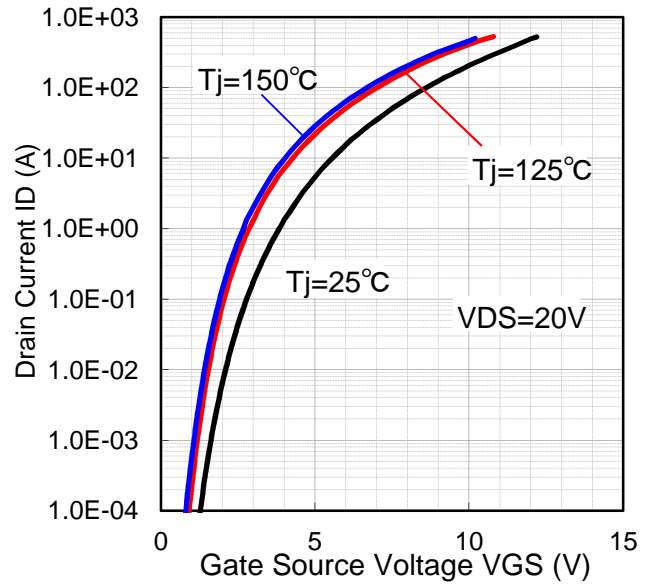


Fig.8 Drain Current vs Gate Voltage (TYP)



●Electrical characteristic curves (Typical)

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

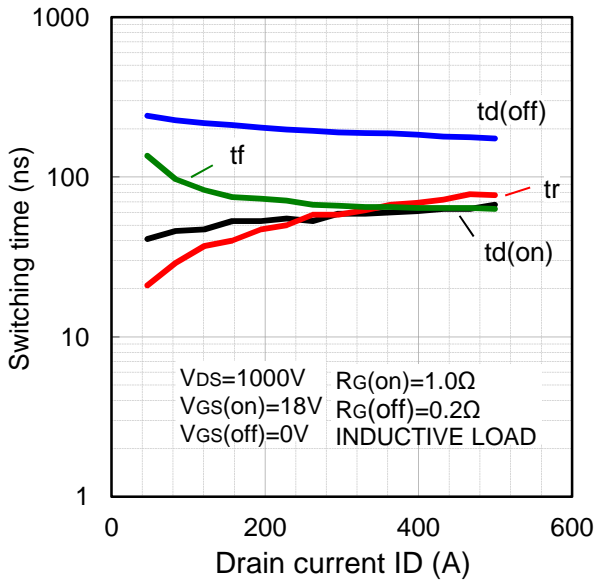


Fig.10 Switching time vs drain current at 125°C (TYP)

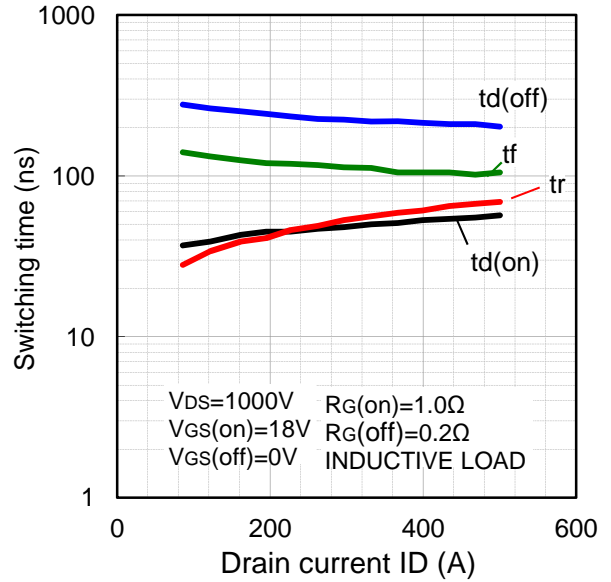


Fig.11 Switching time vs drain current at 150°C (TYP)

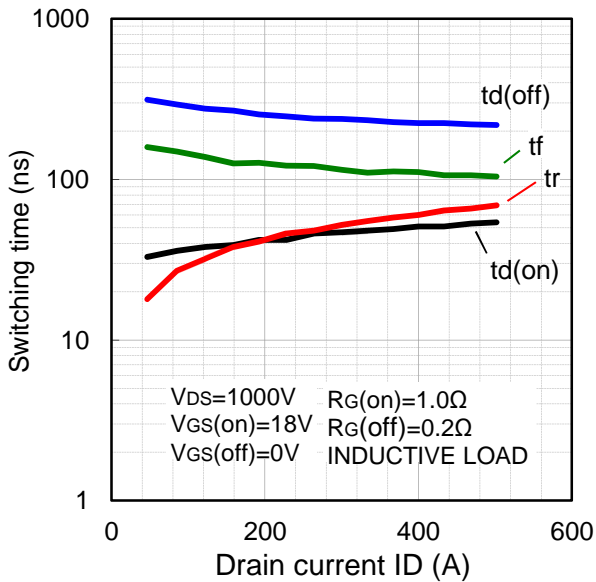
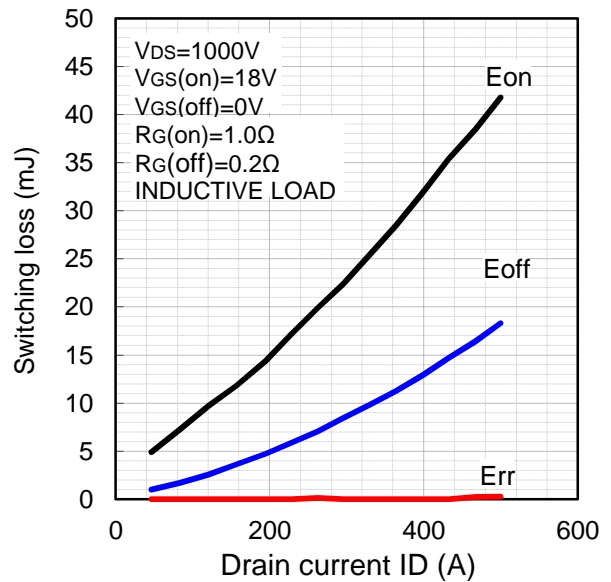


Fig.12 Switching loss vs drain current at 25°C (TYP)



●Electrical characteristic curves (Typical)

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

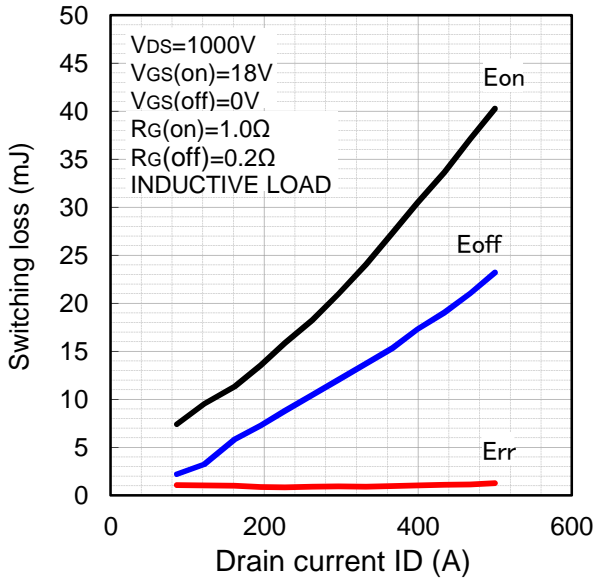


Fig.14 Switching loss vs drain current at 150°C (TYP)

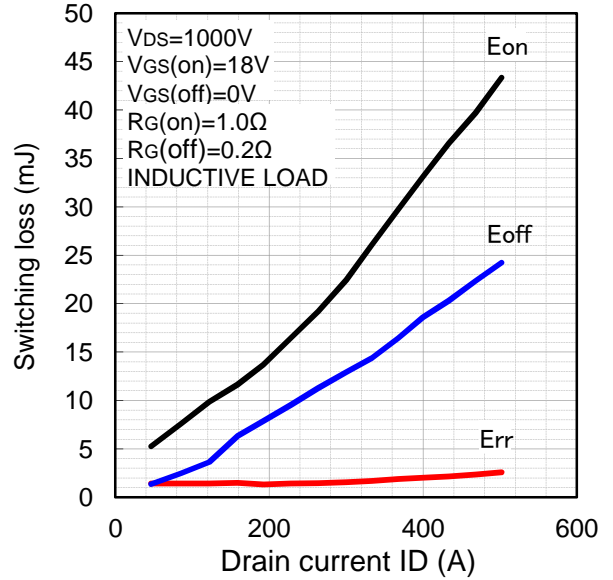


Fig.15 Recovery characteristic vs drain current at 25°C (TYP)

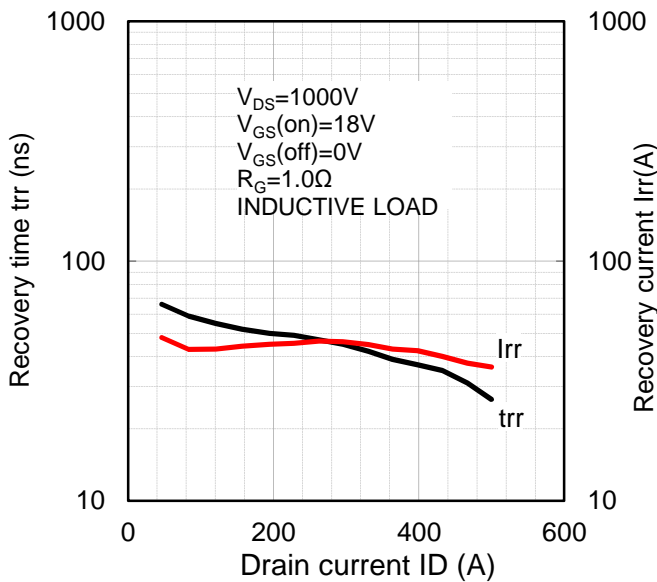
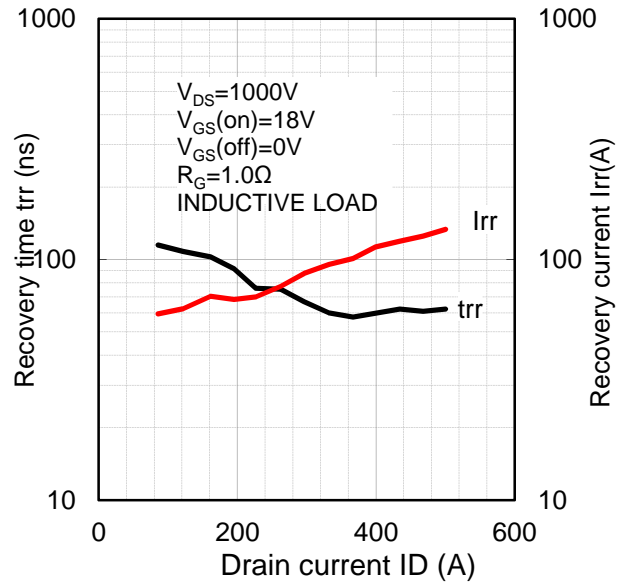


Fig.16 Recovery characteristic vs drain current at 125°C (TYP)



●Electrical characteristic curves (Typical)

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

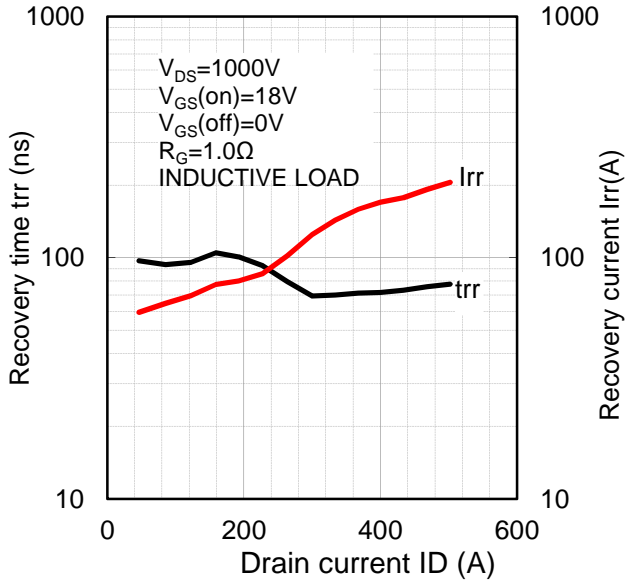


Fig.18 Switching time vs gate resistance at 25°C (TYP)

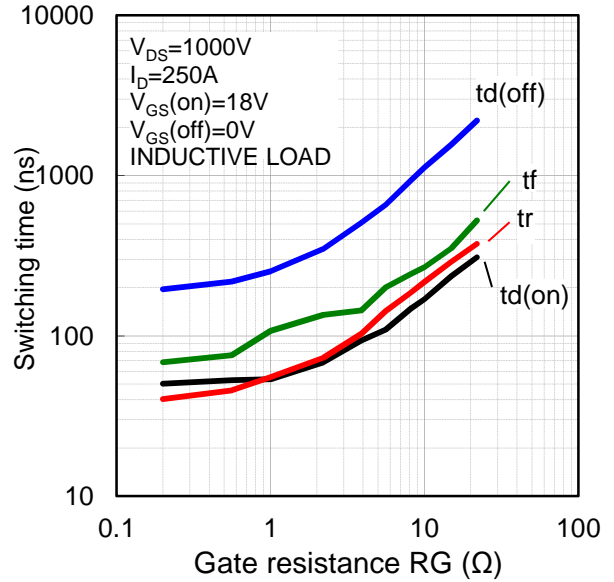


Fig.19 Switching time vs gate resistance at 125°C (TYP)

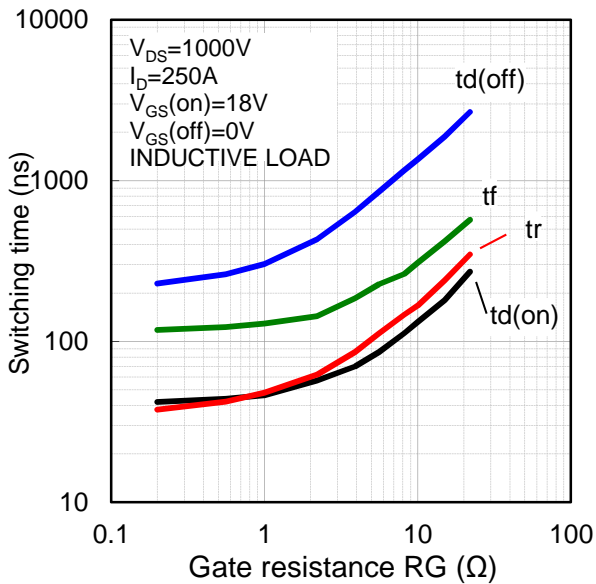
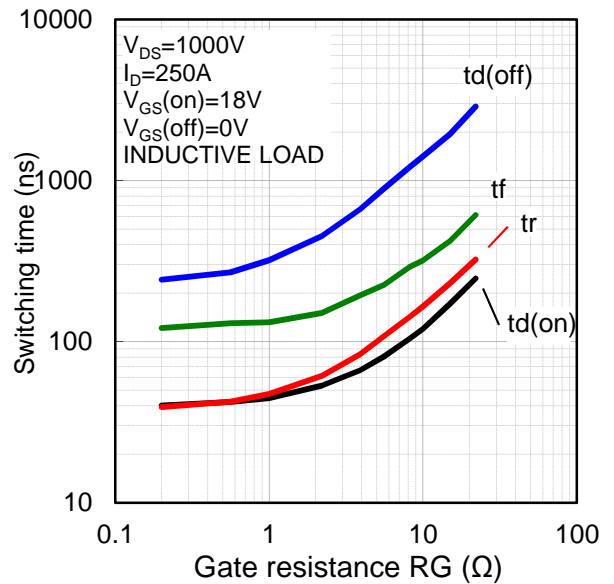


Fig.20 Switching time vs gate resistance at 150°C (TYP)





●Electrical characteristic curves (Typical)

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

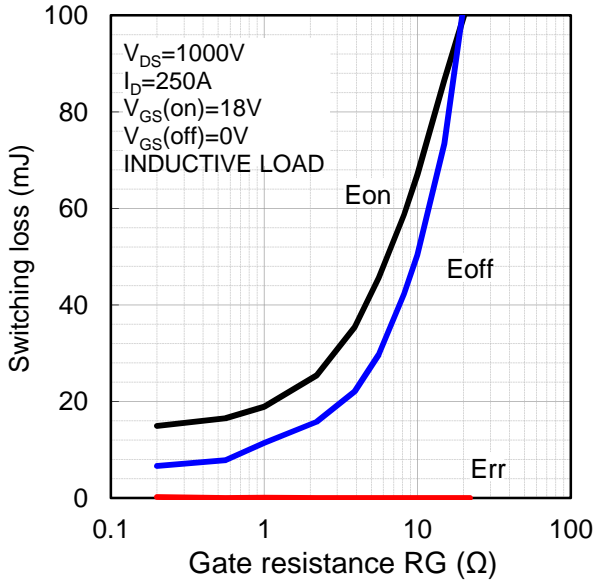


Fig.22 Switching loss vs gate resistance at 125°C (TYP)

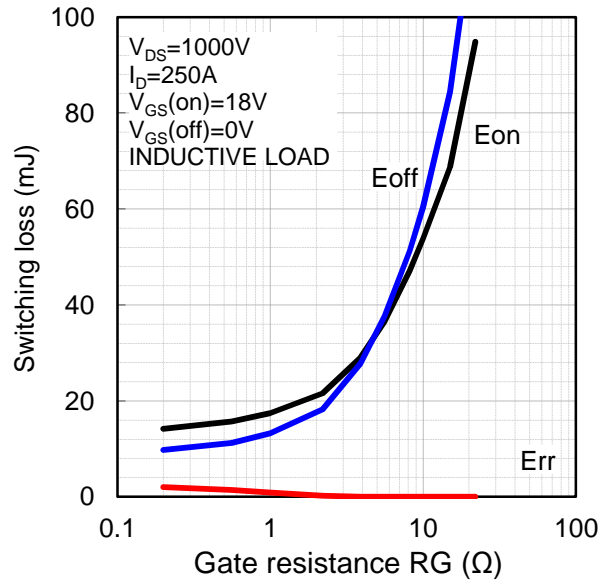
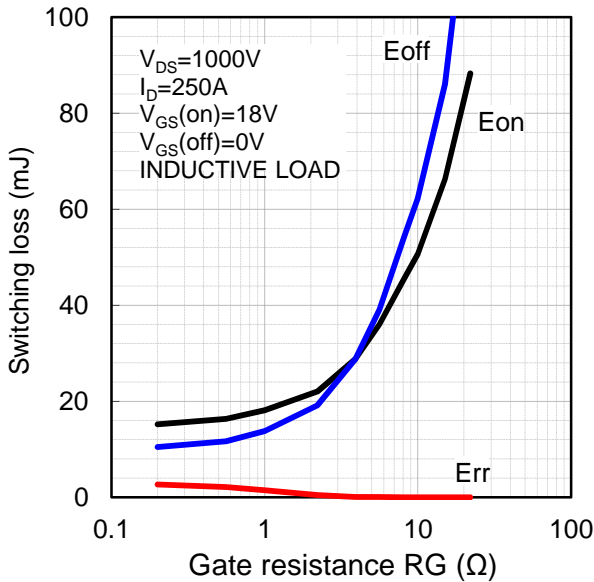


Fig.23 Switching loss vs gate resistance at 150°C (TYP)



●Electrical characteristic curves (Typical)

Fig.24 Capacitance vs Drain source voltage (TYP)

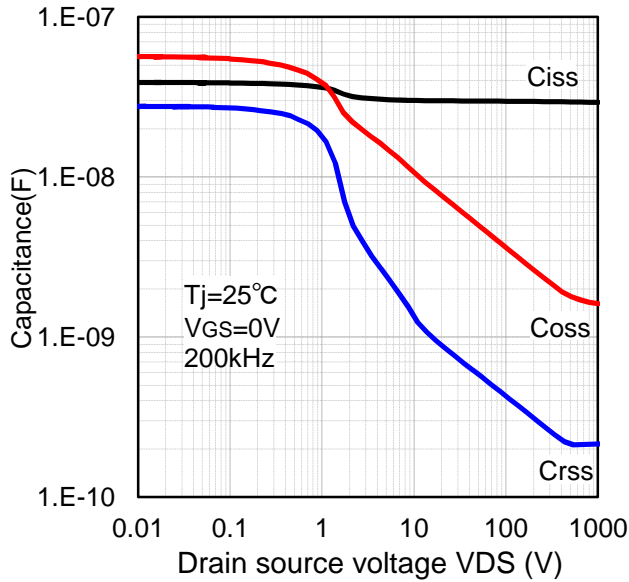


Fig.25 Gate charge characteristic (TYP)

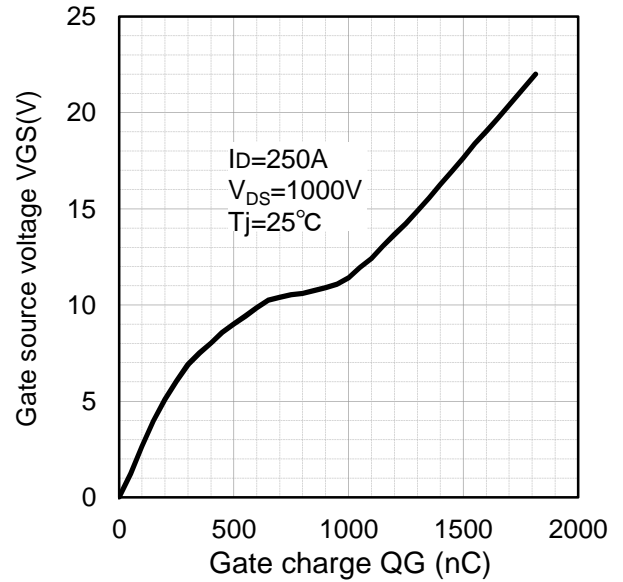
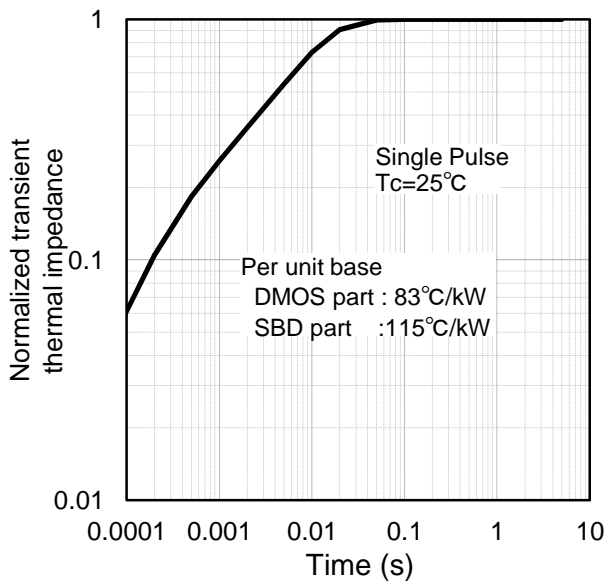


Fig.26 Transient thermal impedance (TYP)



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Part Number	BSM250D17P2E004
Package	E
Unit Quantity	4
Minimum Package Quantity	4
Packing Type	Corrugated Cardboard
Constitution Materials List	inquiry
RoHS	Yes

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