Chipsmall

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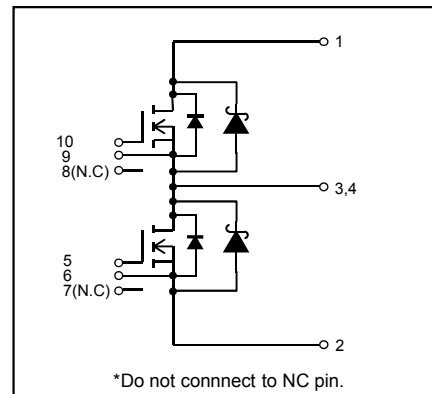● **Application**

· Motor drive

· Inverter, Converter

· Photovoltaics, wind power generation.

· Induction heating equipment.

● **Circuit diagram**

*Do not connnect to NC pin.

● **Features**

1) Low surge, low switching loss.

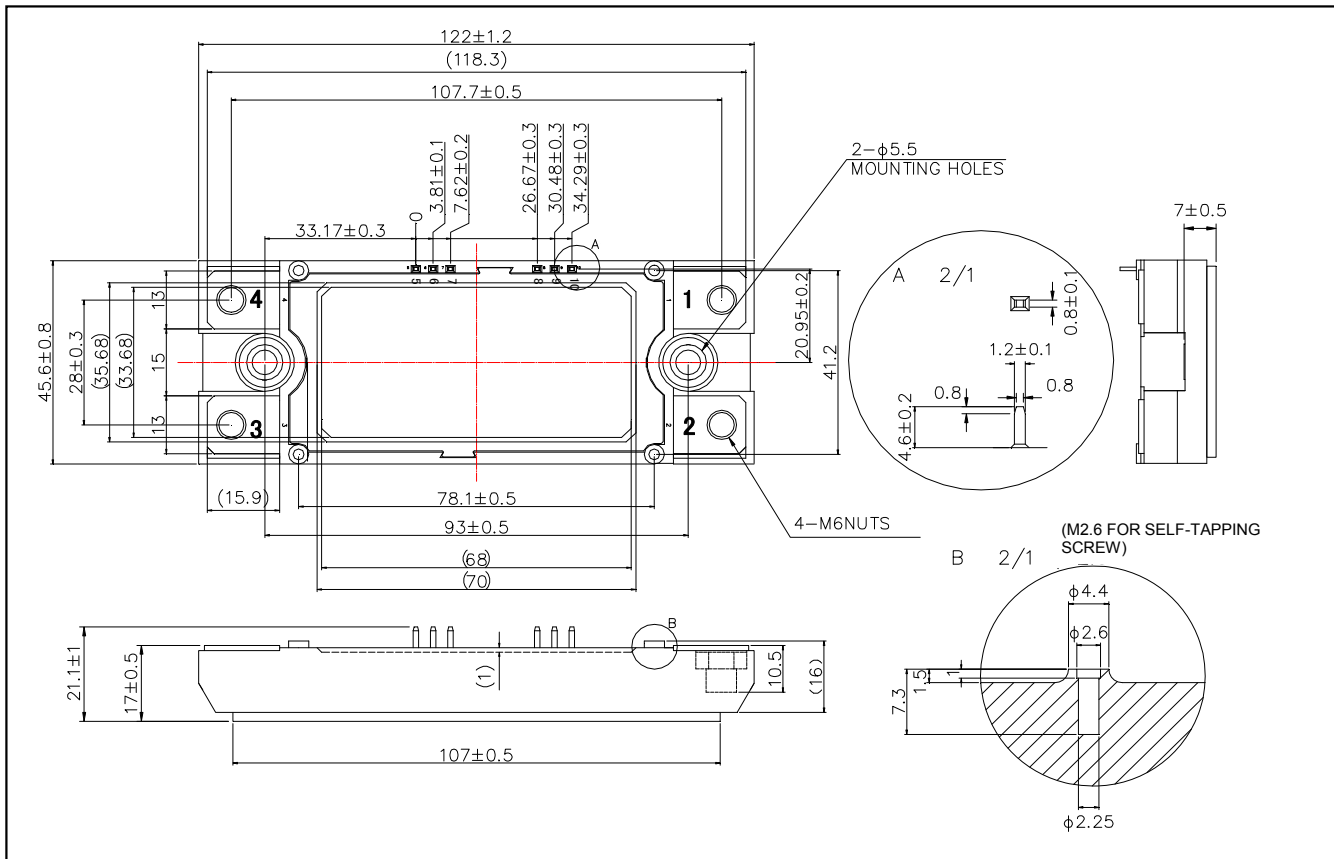2) High-speed switching possible.

3) Reduced temperature dependence.

● **Construction**

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

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

● **Absolute maximum ratings** (T_j = 25°C)

Parameter	Symbol	Conditions	Limit	Unit
Drain-source voltage	V_{DSS}	G-S short	1200	
Gate-source voltage(+)	V_{GSS}	D-S short	22	V
Gate-source voltage(−)			−4	
Drain current [*1]	I_D	DC (T_c=60°C)	180	
	I_{DRM}	Pulse (T_c=60°C) 1ms [*2]	360	
Source current [*1]	I_S	DC (T_c=60°C) V_{GS}=18V	180	A
	I_{SRM}	Pulse (T_c=60°C) 1ms V_{GS}=18V [*2]	360	
		Pulse (T_c=60°C) 10μs V_{GS}=0V [*2]	360	
Total power disspation [*3]	Ptot	T_c=25°C	880	W
Max Junction Temperature	T_{jmax}		175	
Junction temperature	T_{jop}		−40 to150	°C
Storage temperature	T_{stg}		−40 to125	
Isolation voltage [*4]	Visol	Terminals to baseplate, f=60Hz 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

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● **Electrical characteristics** (T_j=25°C)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Static drain-source on-state voltage	$V_{DS(on)}$	I_C=180A, V_{GS}=18V	T_j=25°C	-	1.8	2.6	V
			T_j=125°C	-	2.7	-	
			T_j=150°C	-	3.1	4	
Drain cutoff current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V		-	-	2	mA
Source-drain voltage	V_{SD}	V_{GS}=0V, I_S=180A	T_j=25°C	-	2.1	2.6	V
			T_j=125°C		2.6	-	
			T_j=150°C	-	2.8	4.3	
		V_{GS}=18V, I_S=180A	T_j=25°C	-	1.4	-	
			T_j=125°C		1.9		
			T_j=150°C	-	2	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS}=10V, I_D=50mA		2.7	-	5.6	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, $V_{GS(off)}$= −2V *4		-	50	-	ns
	t_r	V_{DS}=600V		-	70	-	
	t_{rr}	I_D=180A		-	35	-	
	$t_{d(off)}$	$R_{G(on)}$=8.2Ω, $R_{G(off)}$=4.7Ω		-	165	-	
	t_f	inductive load		-	50	-	
Input capacitance	Ciss	V_{DS}=10V, V_{GS}=0V,200kHz		-	9	-	nF
Gate Registance	R_{Gint}	T_j=25°C		-	1.4	-	Ω
Stray Inductance	Ls				25.0	-	nH
Creepage Distance	-	Terminal to heat sink			11.5	-	mm
		Terminal to terminal			19.0	-	mm
Clearance Distance	-	Terminal to heat sink			9.5	-	mm
		Terminal to terminal			13.0	-	mm
Junction-to-case thermal resistance	$R_{th(j-c)}$	UMOSFET (1/2 module) *5		-	-	0.17	°C/W
		SBD (1/2 module) *5		-	-	0.21	
Case-to-heat sink Thermal resistance	$R_{th(c-f)}$	Case to heat sink, per 1 module, Thermal grease applied *6		-	0.035	-	°C/W

(*4) In order to prevent self turn-on, it is recommended to apply negative gate bias.

(*5) Measurement of Tc is to be done at the point just under the chip.

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

(*7) SiC devices have lower short cuicuit withstand capability due to high current density. Please be advised to pay careful attention to short cuicuit accident and try to adjust protection time to shutdown them as short as possible.

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

＜Wavelength for Switching Test＞
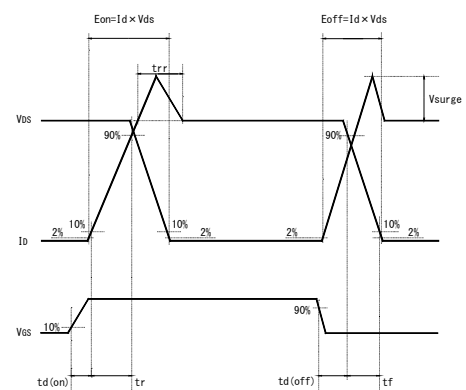
● **Electrical characteristic curves** (Typical)
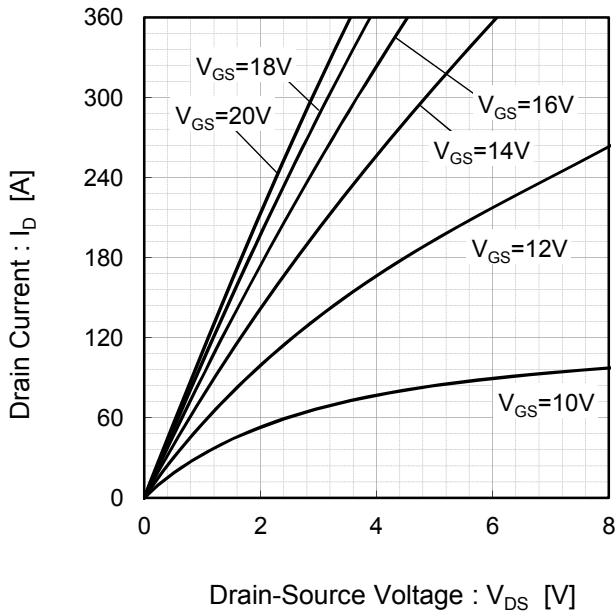
Fig.1 Typical Output Characteristics [T_j=25ºC]

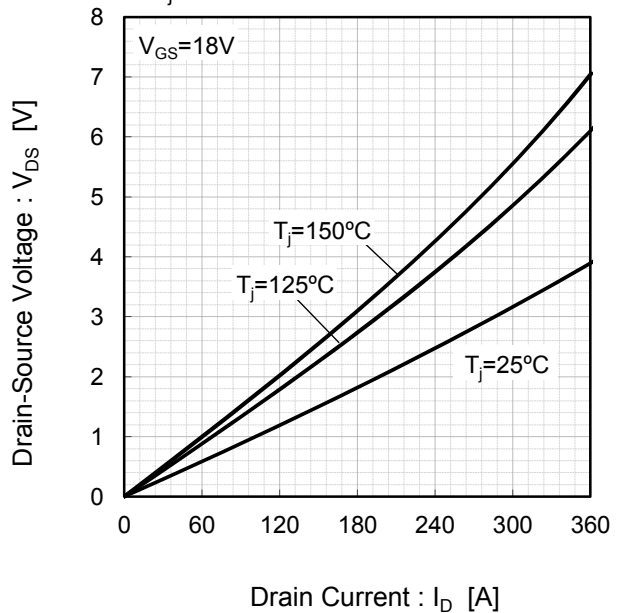Fig.2 Drain-Source Voltage vs. Drain Current [T_j=25ºC]

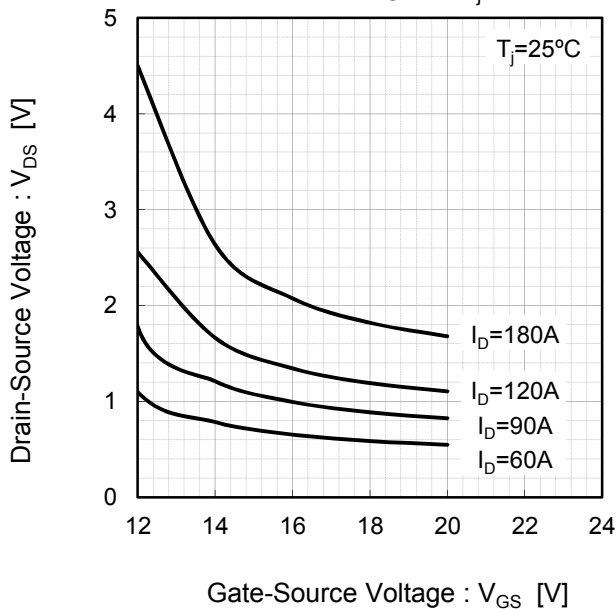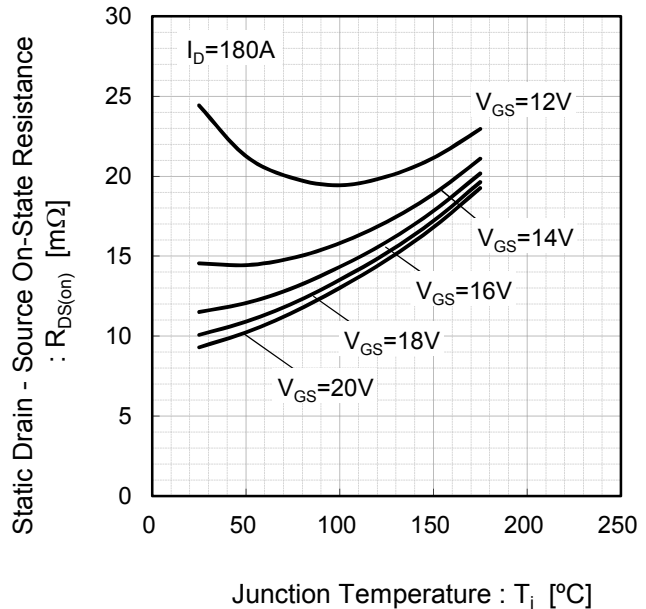Fig.3 Drain-Source Voltage vs. Gate-Source Voltage [T_j=25ºC]

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

● **Electrical characteristic curves** (Typical)

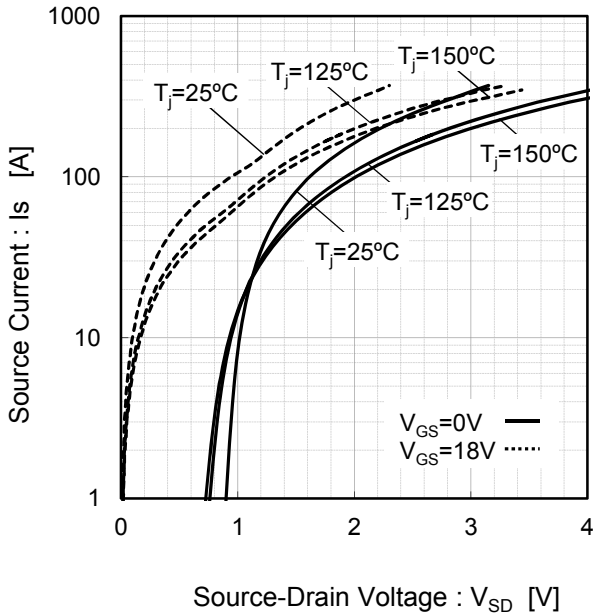Fig.5 Forward characteristic of Diode
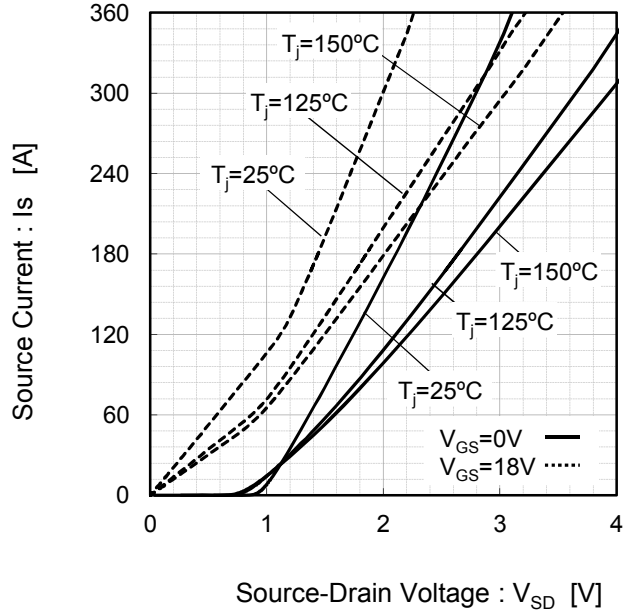

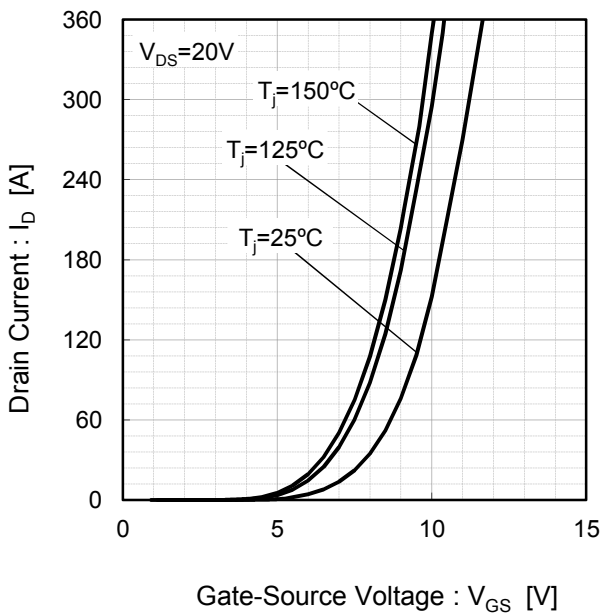Fig.6 Forward characteristic of Diode
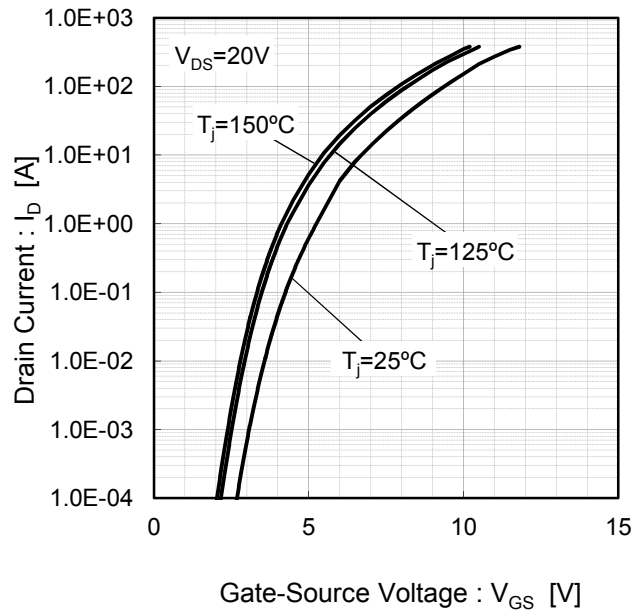

Fig.7 Drain Current vs. Gate-Source Voltage

Fig.8 Drain Current vs. Gate-Source Voltage

● **Electrical characteristic curves** (Typical)
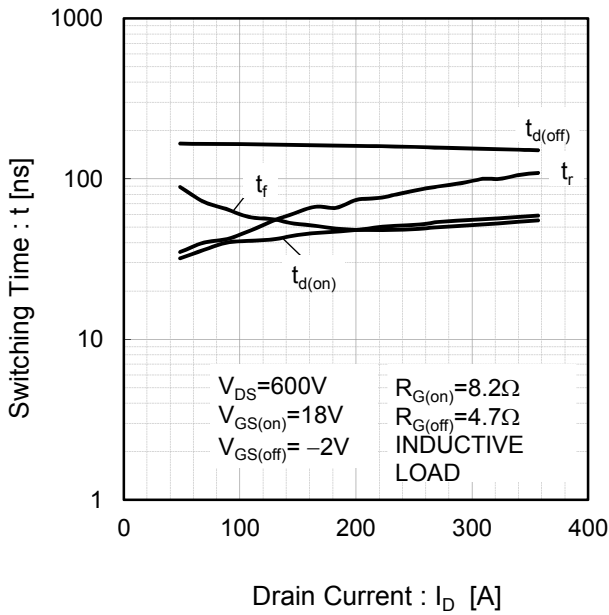
Fig.9 Switching Characteristics [T_j=25ºC]

Fig.10 Switching Characteristics [T_j=125ºC]
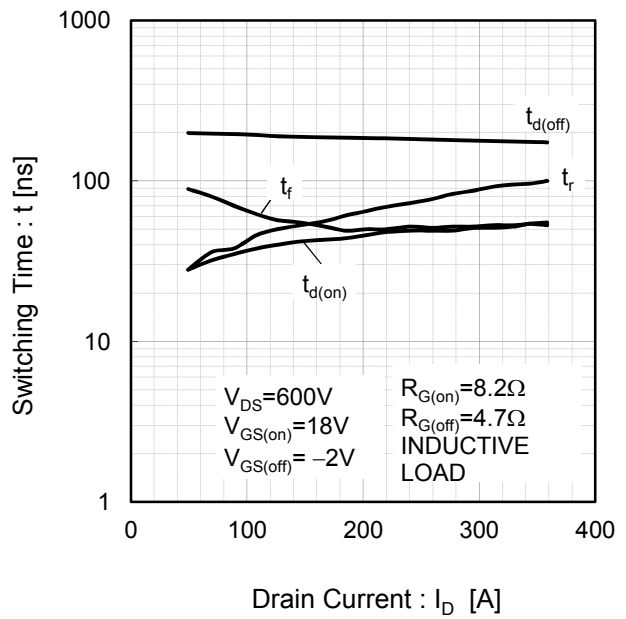
Fig.11 Switching Characteristics [T_j=150ºC]
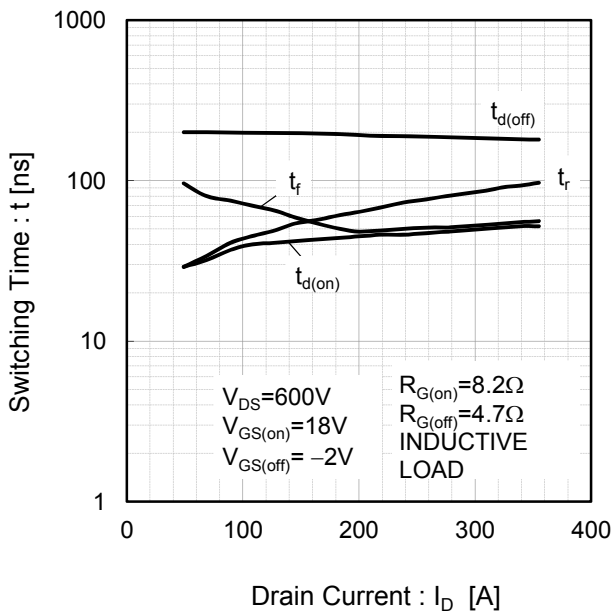
Fig.12 Switching Loss vs. Drain Current [T_j=25ºC]

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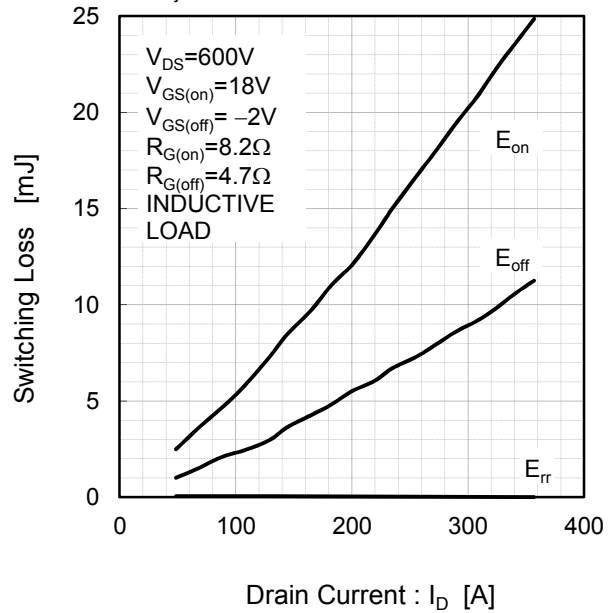
● **Electrical characteristic curves** (Typical)

Fig.13 Switching Loss vs. Drain Current
[T_j=125°C]

V_{DS}=600V
$V_{GS(on)}$=18V
$V_{GS(off)}$= −2V
$R_{G(on)}$=8.2Ω
$R_{G(off)}$=4.7Ω
INDUCTIVE LOAD

E_{on}
E_{off}
E_{rr}

Switching Loss [mJ]
Drain Current : I_D [A]
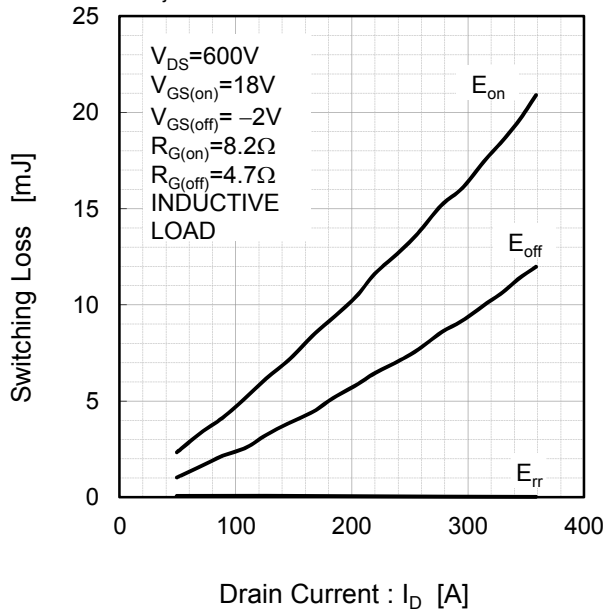
Fig.14 Switching Loss vs. Drain Current
[T_j=150°C]

V_{DS}=600V
$V_{GS(on)}$=18V
$V_{GS(off)}$= −2V
$R_{G(on)}$=8.2Ω
$R_{G(off)}$=4.7Ω
INDUCTIVE LOAD

E_{on}
E_{off}
E_{rr}

Switching Loss [mJ]
Drain Current : I_D [A]
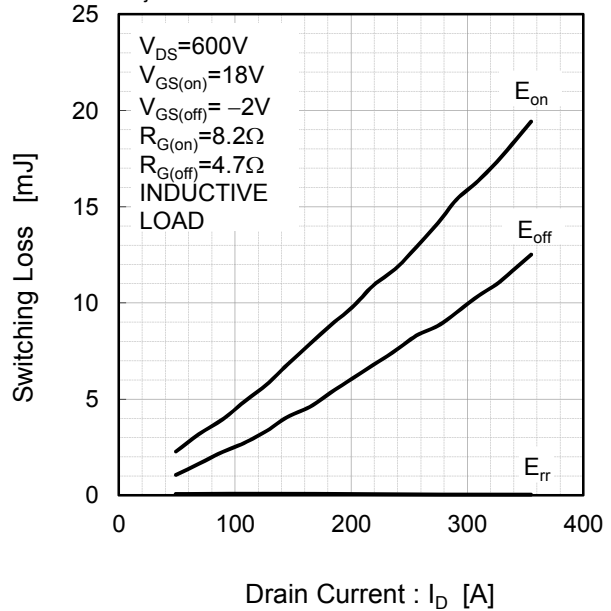
Fig.15 Recovery Characteristics vs.
Drain Current [T_j=25°C]
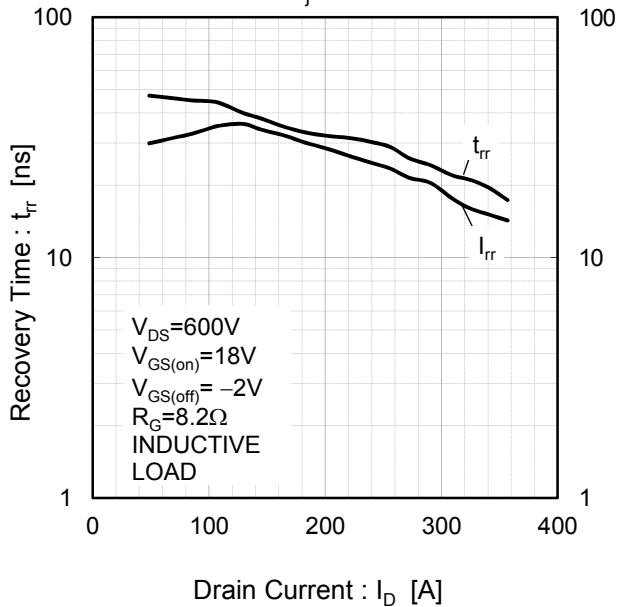
t_{rr}
I_{rr}

V_{DS}=600V
$V_{GS(on)}$=18V
$V_{GS(off)}$= −2V
R_G=8.2Ω
INDUCTIVE LOAD

Recovery Time : t_{rr} [ns]
Recovery Current : I_{rr} [A]
Drain Current : I_D [A]

Fig.16 Recovery Characteristics vs.
Drain Current [T_j=125°C]

t_{rr}
I_{rr}

V_{DS}=600V
$V_{GS(on)}$=18V
$V_{GS(off)}$= −2V
R_G=8.2Ω
INDUCTIVE LOAD

Recovery Time : t_{rr} [ns]
Recovery Current : I_{rr} [A]
Drain Current : I_D [A]
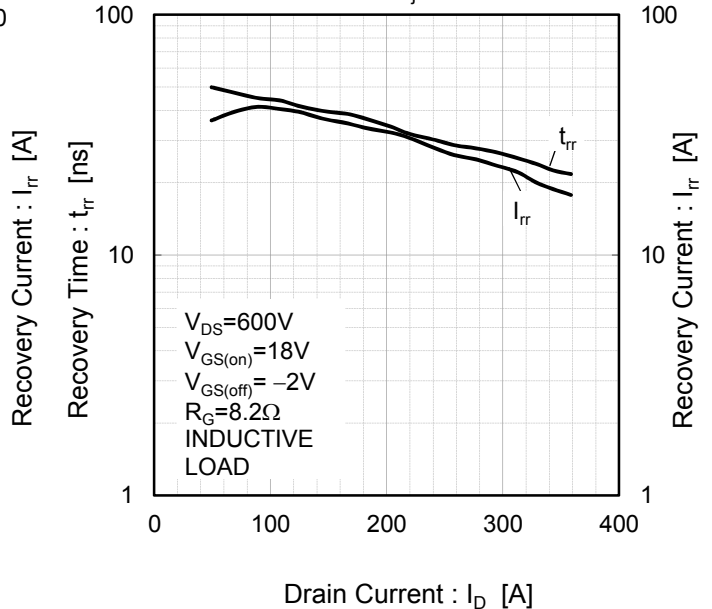
● **Electrical characteristic curves** (Typical)
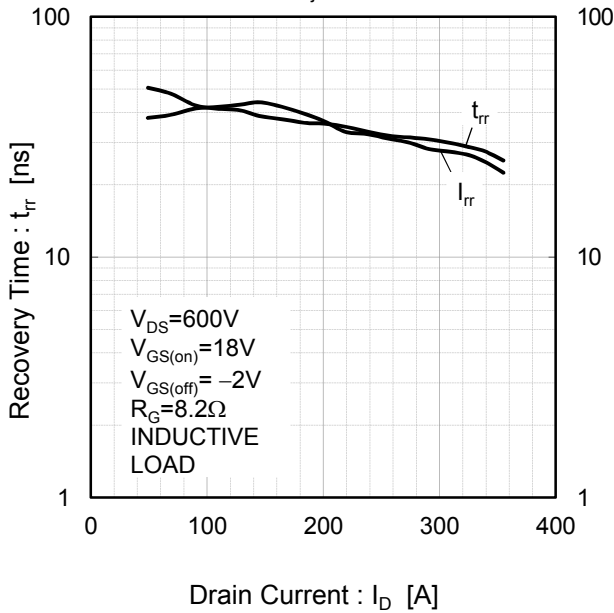
Fig.17 Recovery Characteristics vs.
Drain Current [T_j=150ºC]

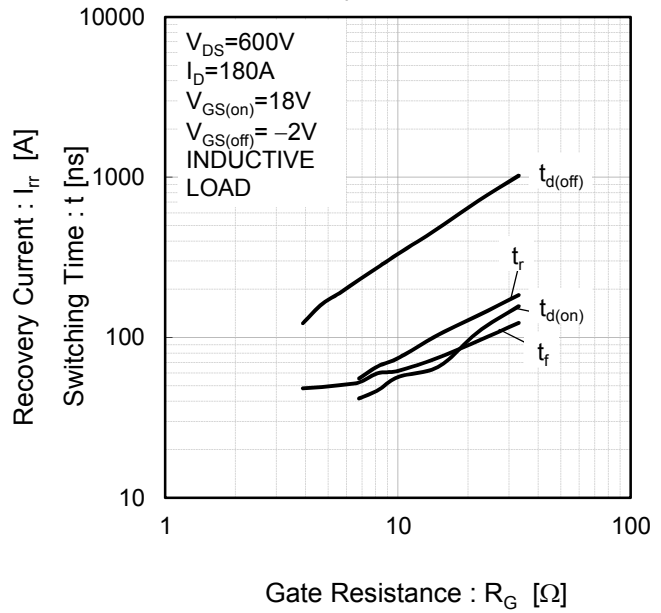Fig.18 Switching Characteristics vs. Gate
Resistance [T_j=25ºC]

Fig.19 Switching Characteristics vs. Gate
Resistance [T_j=125ºC]

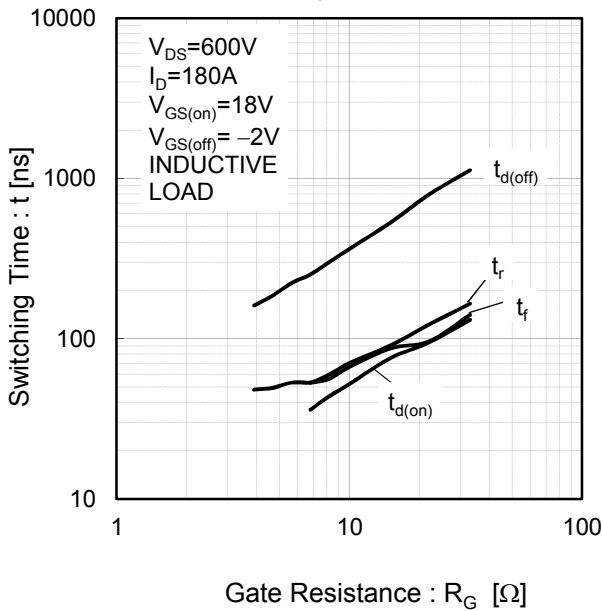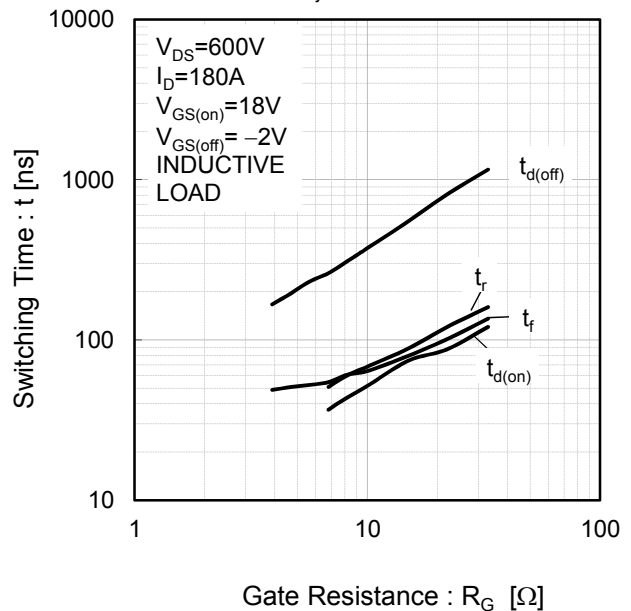Fig.20 Switching Characteristics vs. Gate
Resistance [T_j=150ºC]

●**Electrical characteristic curves** (Typical)

Fig.21 Switching Loss vs. Gate Resistance
[T_j=25ºC]
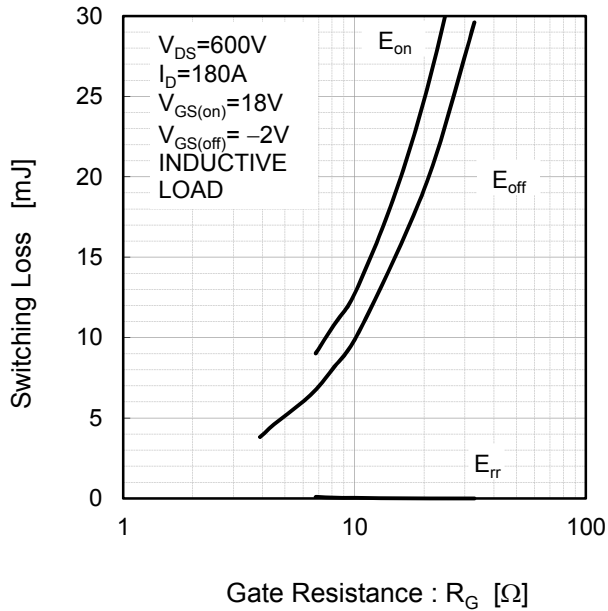
Fig.22 Switching Loss vs. Gate Resistance
[T_j=125ºC]
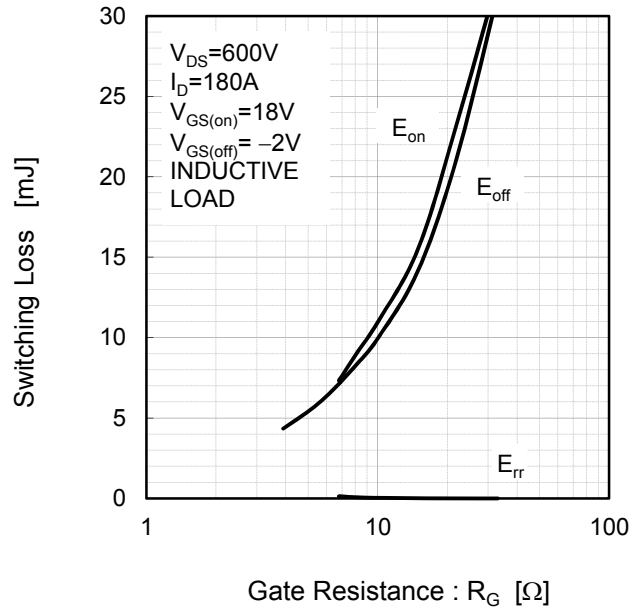
Fig.23 Switching Loss vs. Gate Resistance
[T_j=150ºC]
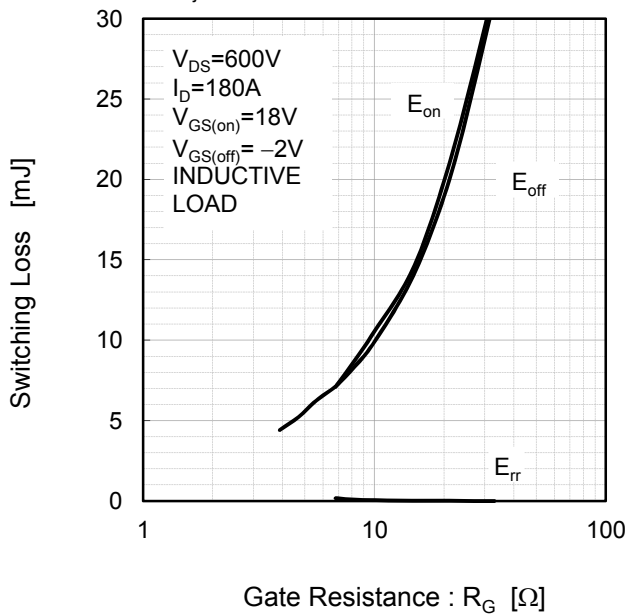
Fig.24 Typical Capacitance vs. Drain-Source
Voltage

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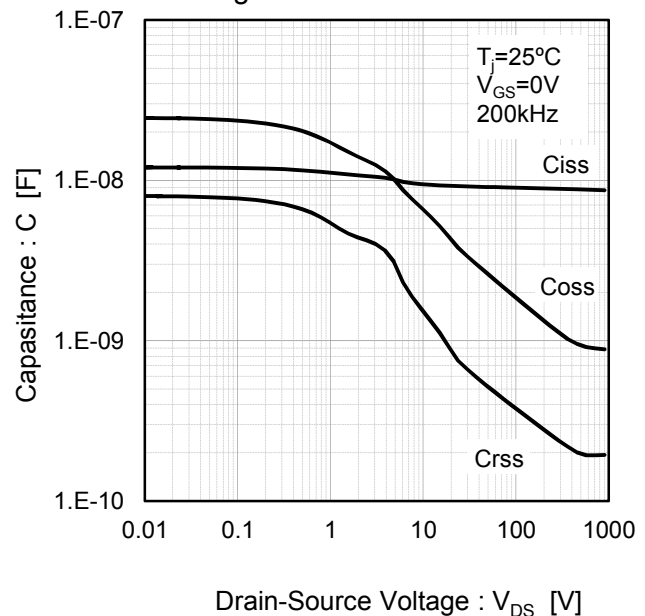
●**Electrical characteristic curves** (Typical)

Fig.25 Gate Charge Characteristics
[T_j=25°C]

Gate-Source Voltage : V_{GS} [V]

Total Gate charge : Qg [nC]

V_D=180A
V_{DS}=600V
T_j=25°C
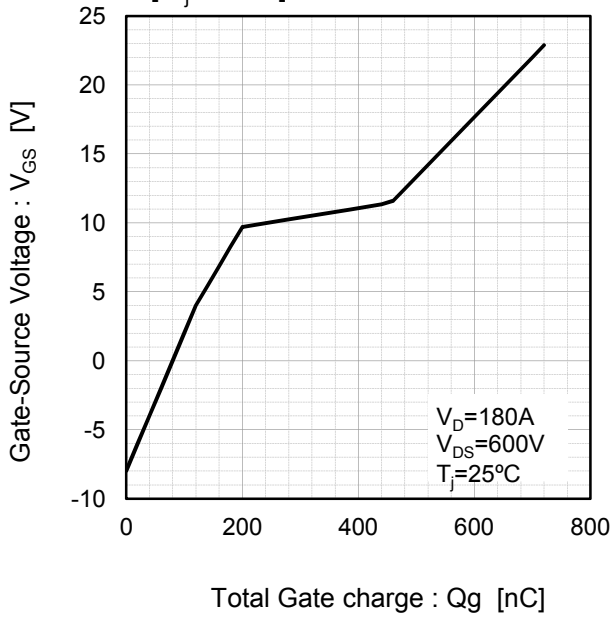
Fig.26 Normalized Transient Thermal
Impedance

Normalized Transient Thermal Impedance : Zth

Time [s]

Single Pulse
T_C=25°C

Per unit base
UMOS part : 0.17K/W
SBD part : 0.21K/W

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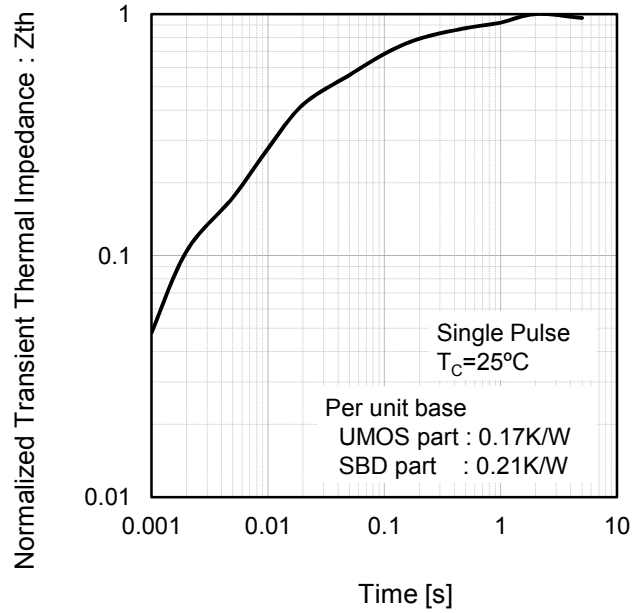
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Part Number	BSM180D12P3C007
Package	C
Unit Quantity	12
Minimum Package Quantity	12
Packing Type	Tray
Constitution Materials List	inquiry
RoHS	Yes