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SiC Power Module

BSM300D12P2E001

Data Sheet

●Application

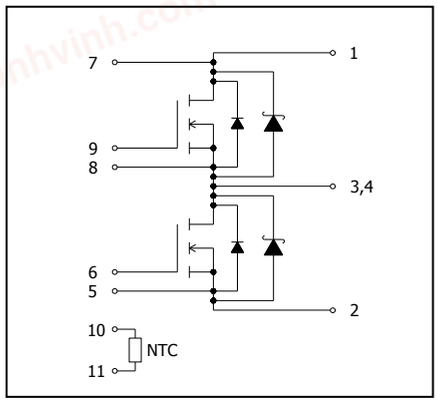
· Motor drive

· Inverter, Converter

· Photovoltaics, wind power generation.

· Induction heating equipment.

●Circuit diagram



●Features

1) Low surge, low switching loss.

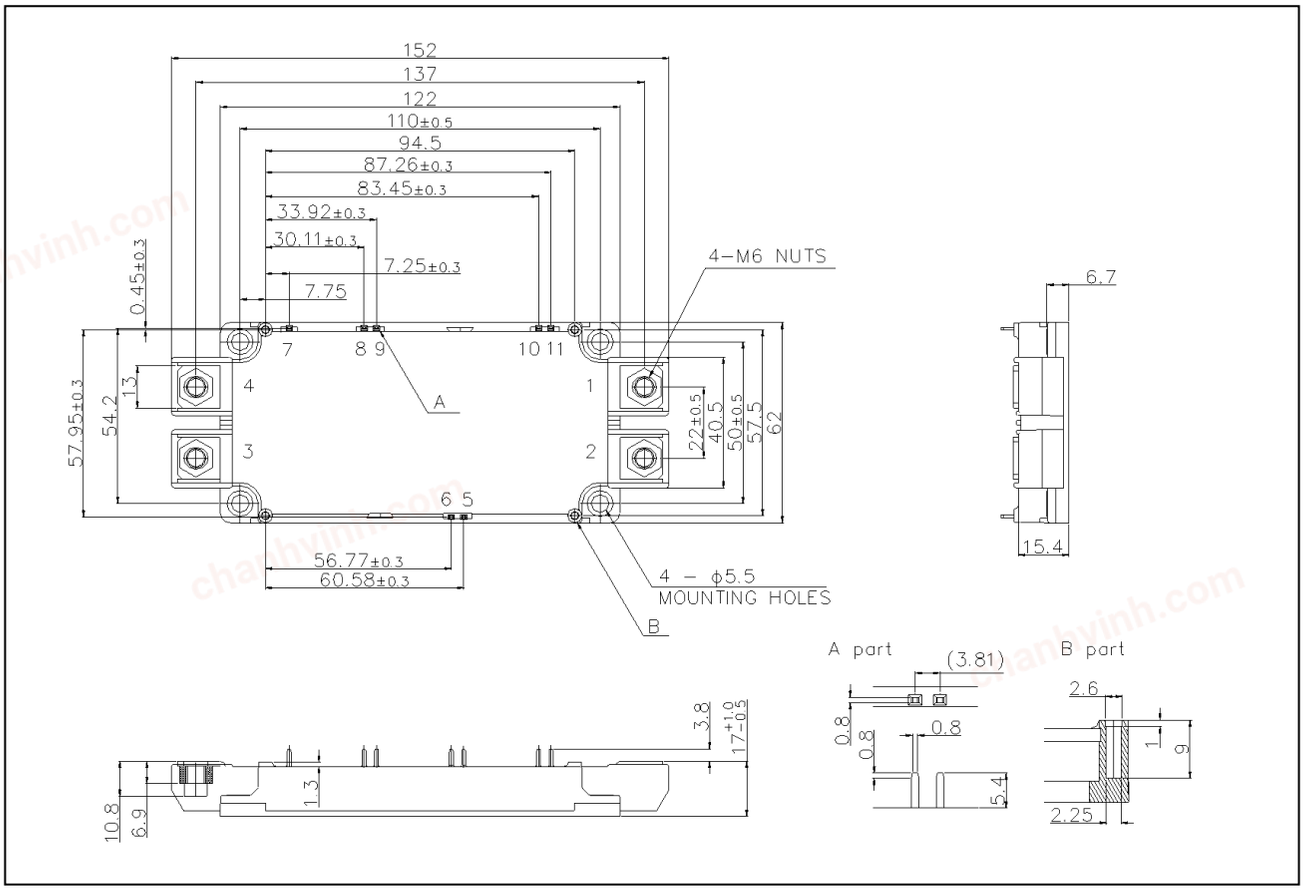
2) High-speed switching possible.

3) Reduced temperature dependence.

●Construction

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

●Dimensions & Pin layout (Unit : mm)



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

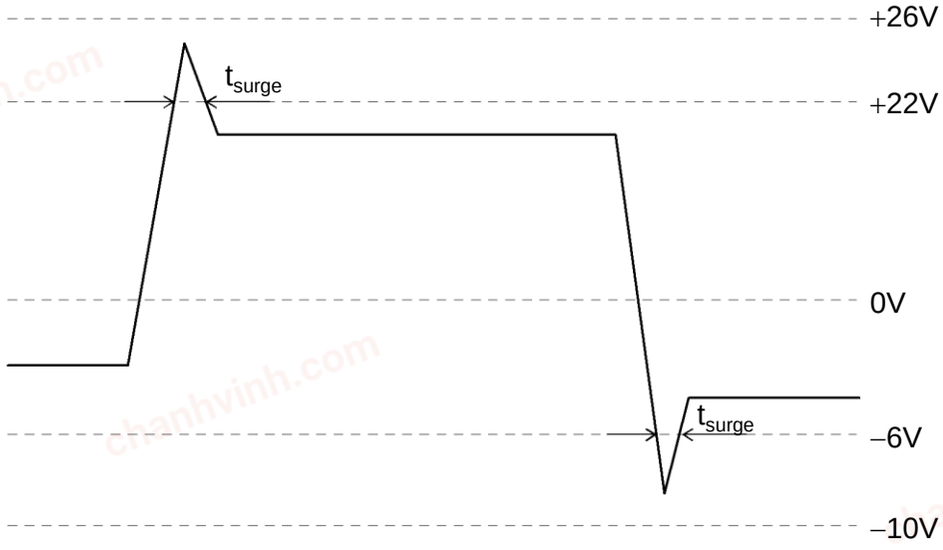
Parameter	Symbol	Conditions	Limit	Unit
Drain-source voltage	V_{DSS}	G-S short	1200	V
Gate-source voltage(+)	V_{GSS}	D-S short	22	
Gate-source voltage(–)			–6	
G - S Voltage (t_{surge}<300nsec)	V_{GSS_surge}	D-S short	–10 to 26	
Drain current *1	I_D	DC (T_c=60°C)	300	A
	I_{DRM}	Pulse (T_c=60°C) 1ms *2	600	
Source current *1	I_S	DC (T_c=60°C)	300	
	I_{SRM}	Pulse (Tc=60°C) 1ms *2	600	
Total power disspation *3	Ptot	T_c=25°C	1875	W
Max Junction Temperature	T_{jmax}		175	°C
Operating junction temperature	T_{jop}		–40 to150	
Storage temperature	T_{stg}		–40 to125	
Isolation voltage	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 $T_{j\,max.}$

(*3) T_j is less than 175°C

Example of acceptable V_{GS} waveform



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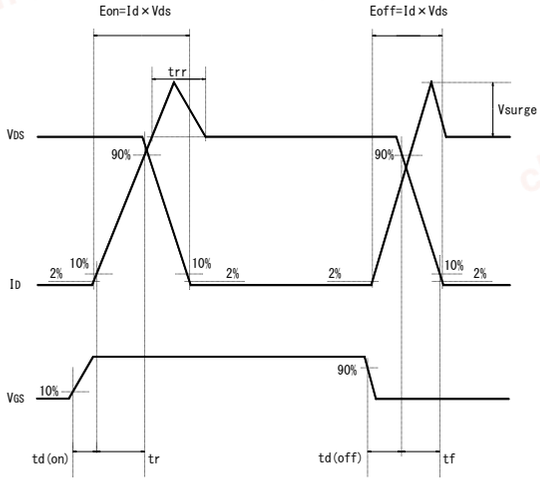
●Electrical characteristics (T_j=25°C)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Static drain-source on-state voltage	$V_{DS(on)}$	I_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		-	80	-	ns
	t_r	V_{DS}=600V		-	70	-	
	t_{rr}	I_D=300A		-	50	-	
	$t_{d(off)}$	R_G=0.2Ω		-	250	-	
	t_f	inductive load		-	65	-	
Input capacitance	Ciss	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 appied *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



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●Electrical characteristic curves (Typical)

Fig.1 Typical Output Characteristics [T_j=25ºC]

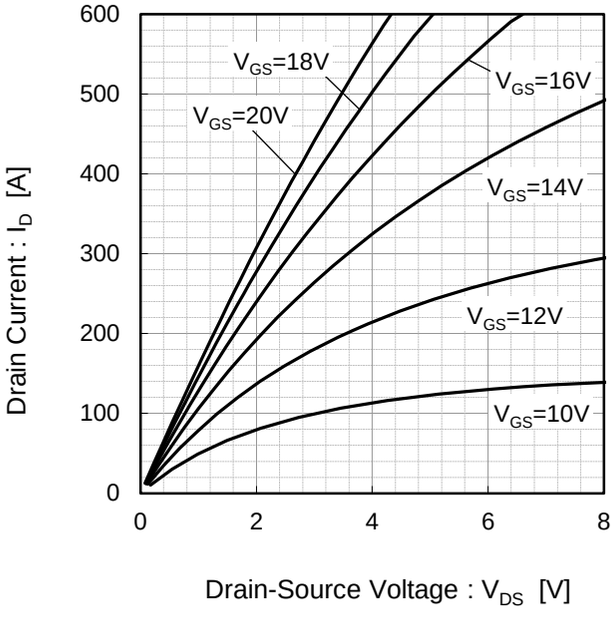


Fig.2 Drain-Source Voltage vs. Drain Current

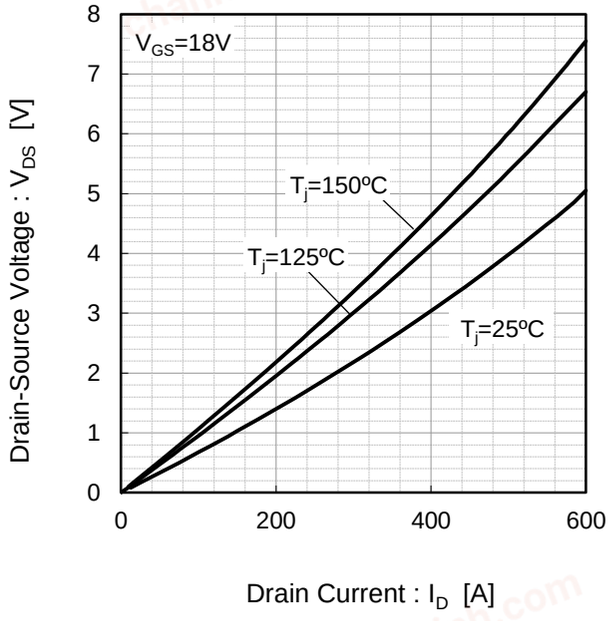


Fig.3 Drain-Source Voltage vs. Gate-Source Voltage [T_j=25ºC]

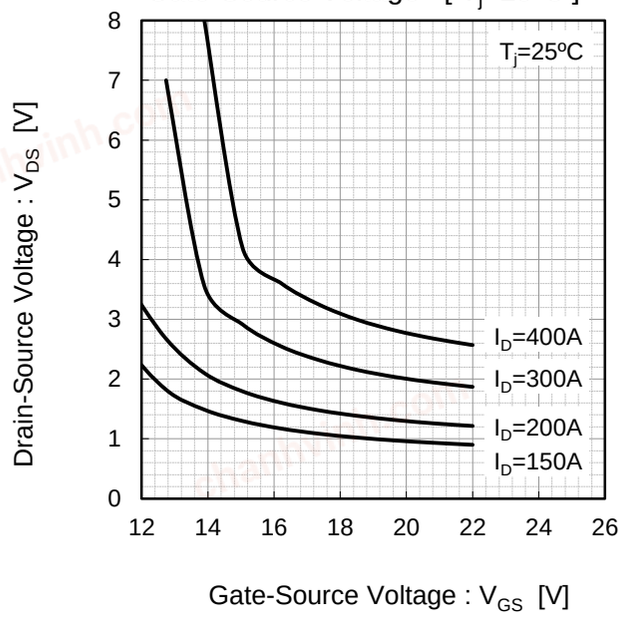
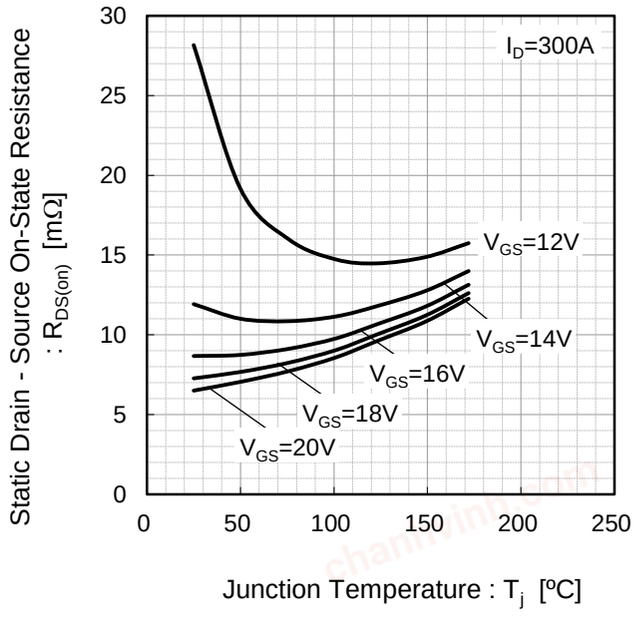


Fig.4 Static Drain - Source On-State Resistance vs. Junction Temperature



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●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode

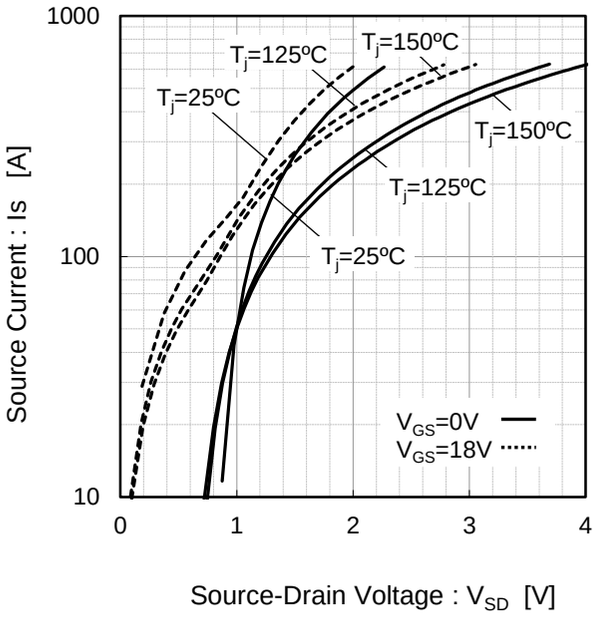


Fig.6 Forward characteristic of Diode

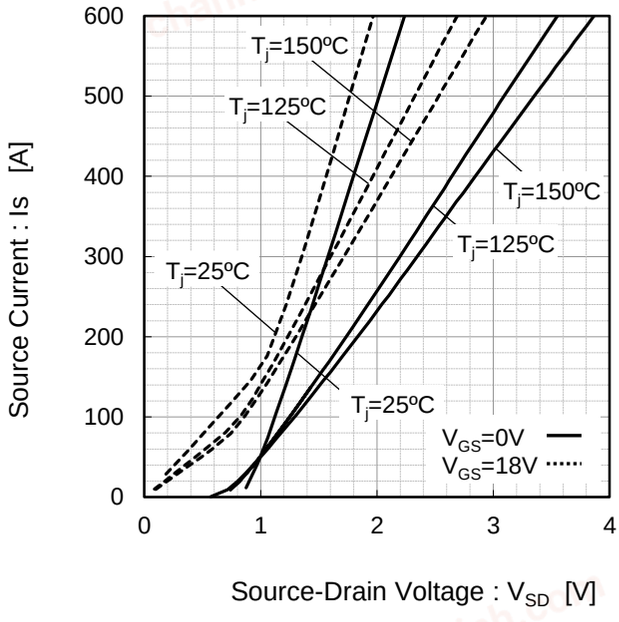


Fig.7 Drain Current vs. Gate-Source Voltage

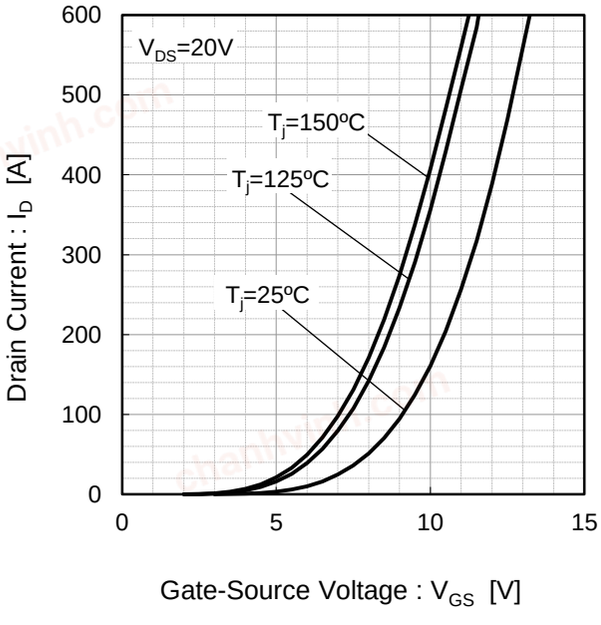
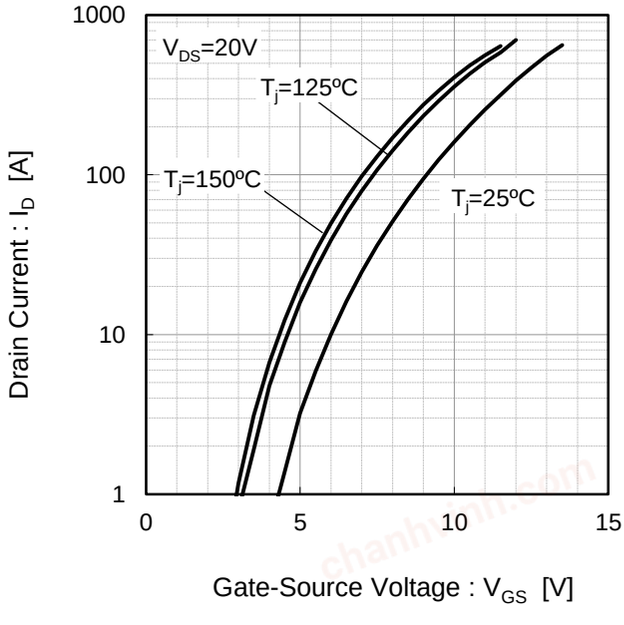


Fig.8 Drain Current vs. Gate-Source Voltage



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●Electrical characteristic curves (Typical)

Fig.9 Switching Characteristics [T_j=25ºC]

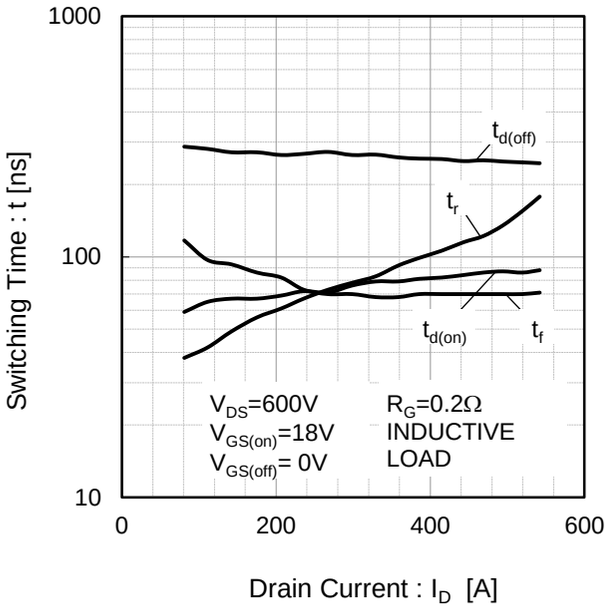


Fig.10 Switching Characteristics [T_j=150ºC]

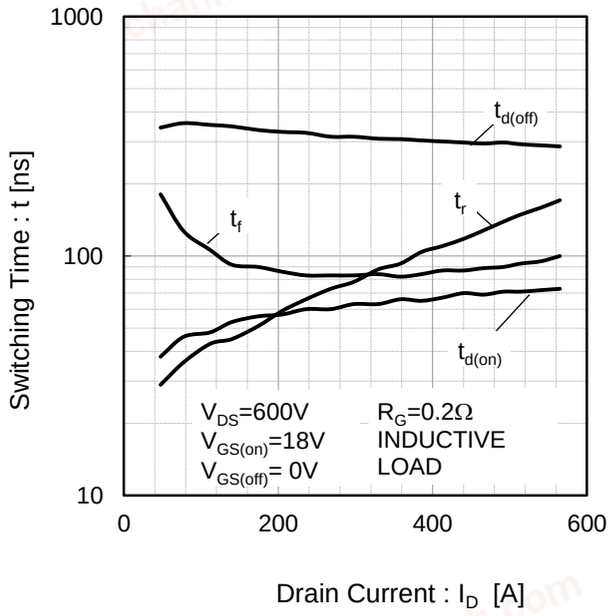


Fig.11 Switching Loss vs. Drain Current [T_j=25ºC]

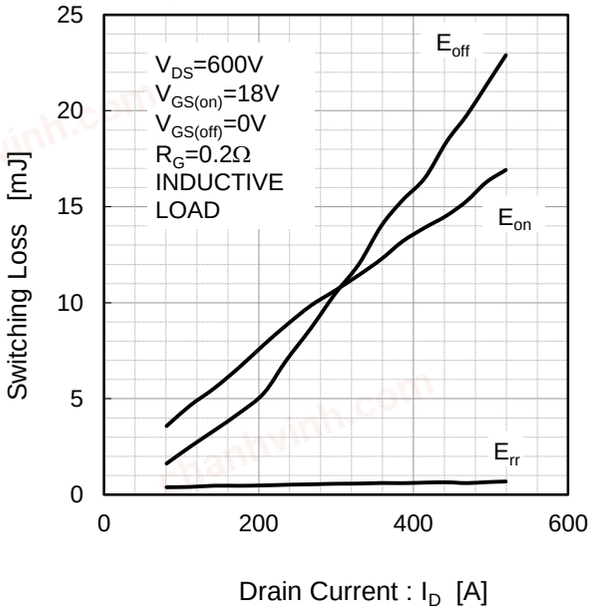
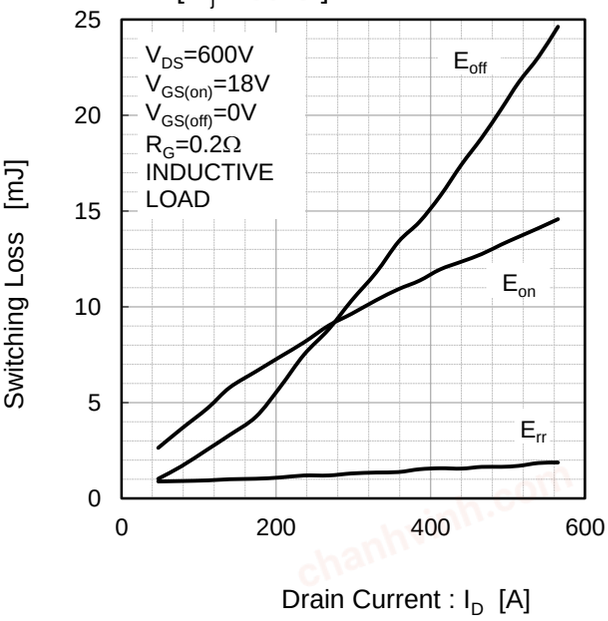


Fig.12 Switching Loss vs. Drain Current [T_j=150ºC]



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●Electrical characteristic curves (Typical)

Fig.13 Recovery Characteristics vs. Drain Current [T_j=25ºC]

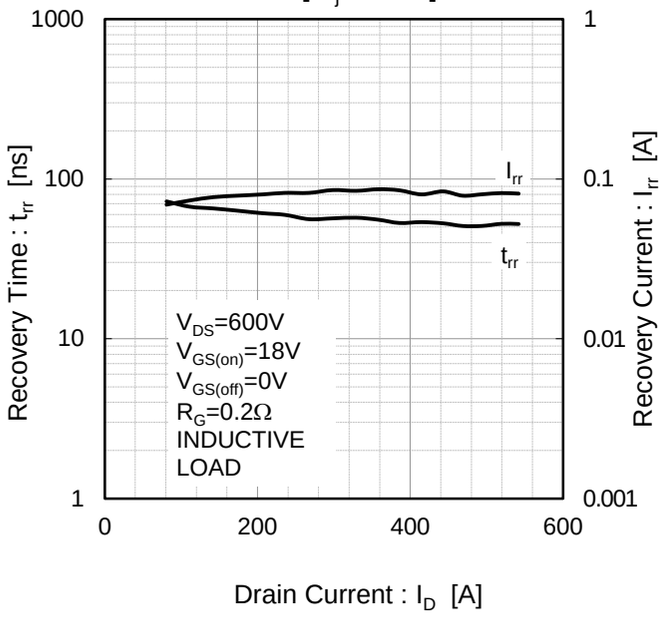


Fig.14 Recovery Characteristics vs. Drain Current [T_j=150ºC]

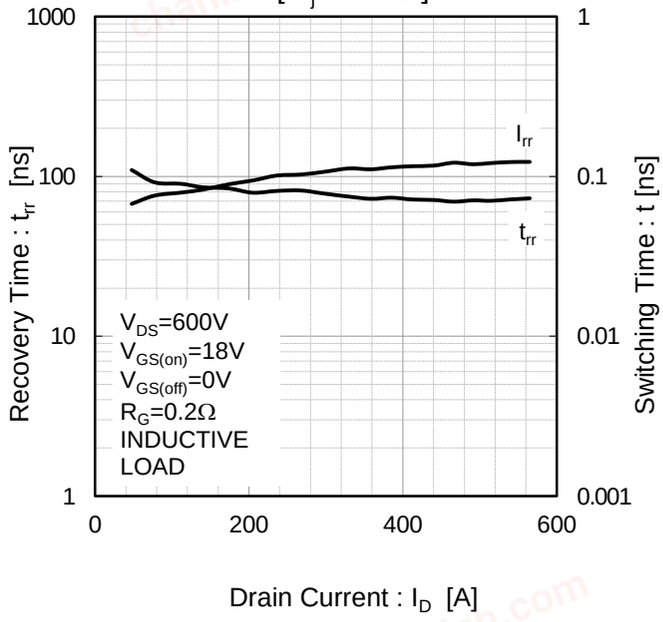


Fig.15 Switching Characteristics vs. Gate Resistance [T_j=25ºC]

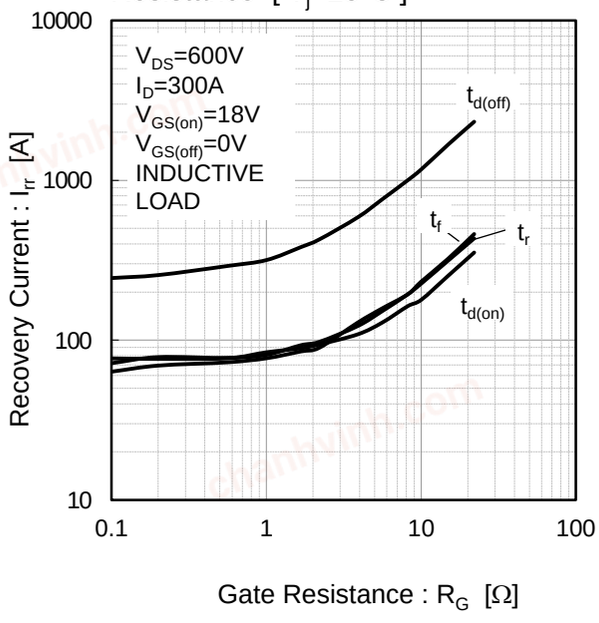
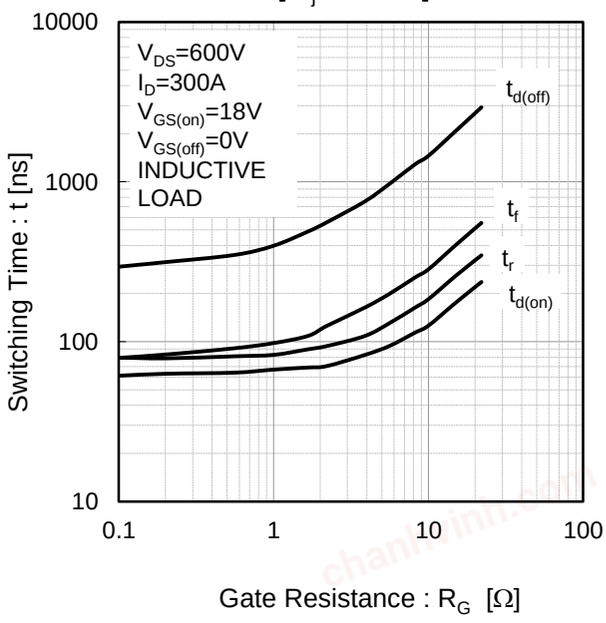


Fig.16 Switching Characteristics vs. Gate Resistance [T_j=150ºC]



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●Electrical characteristic curves (Typical)

Fig.17 Switching Loss vs. Gate Resistance
[T_j=25ºC]

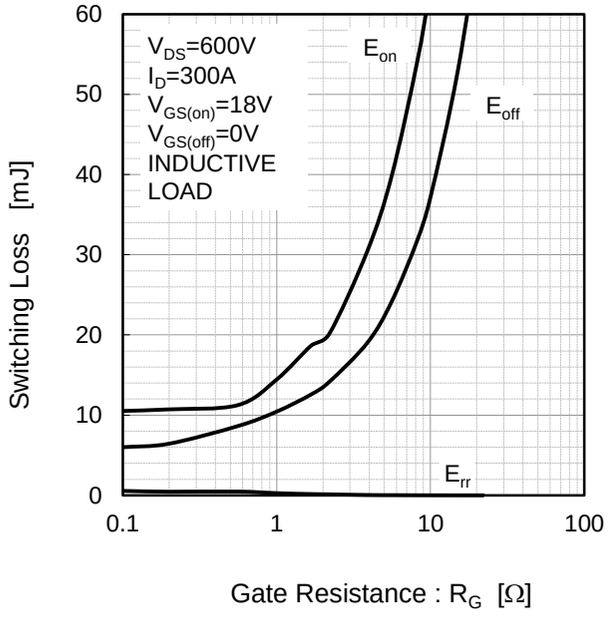


Fig.18 Switching Loss vs. Gate Resistance
[T_j=150ºC]

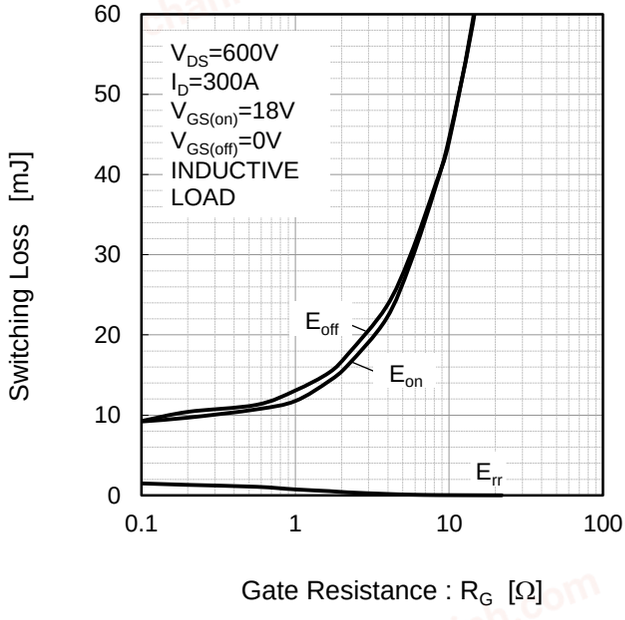


Fig.19 Typical Capacitance vs. Drain-Source Voltage

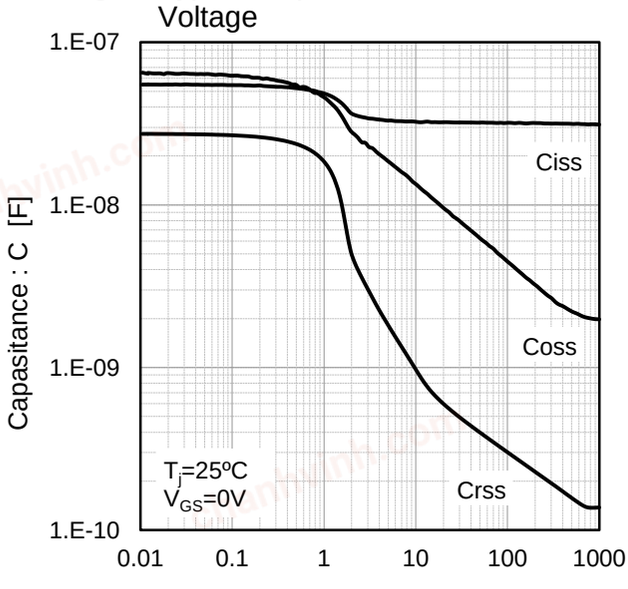
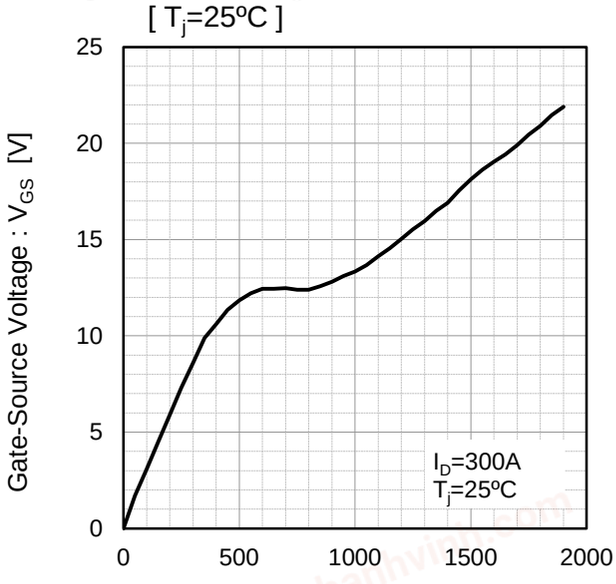


Fig.20 Gate Charge Characteristics
[T_j=25ºC]



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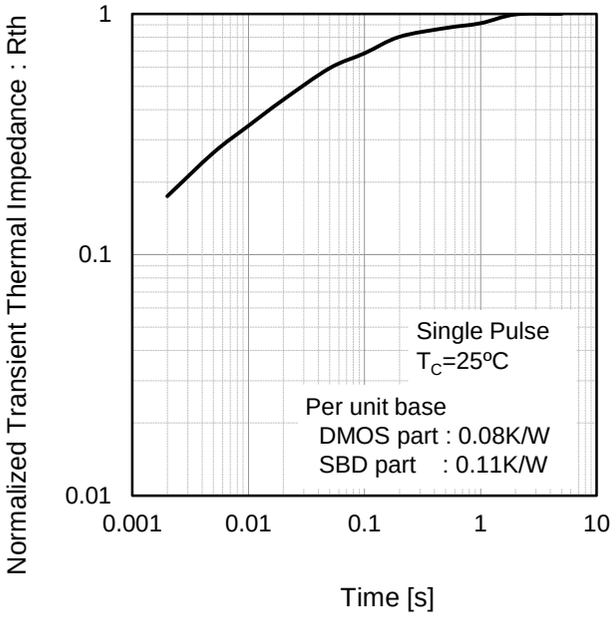
●Electrical characteristic curves (Typical)

Fig.21 Normalized Transient Thermal Impedance



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Datasheet

BSM300D12P2E001 - Web Page

Distribution Inventory

Part Number	BSM300D12P2E001
Package	E
Unit Quantity	4
Minimum Package Quantity	4
Packing Type	Tray
Constitution Materials List	inquiry
RoHS	Yes