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SiC Power Module

BSM120D12P2C005 Datasheet

●Application

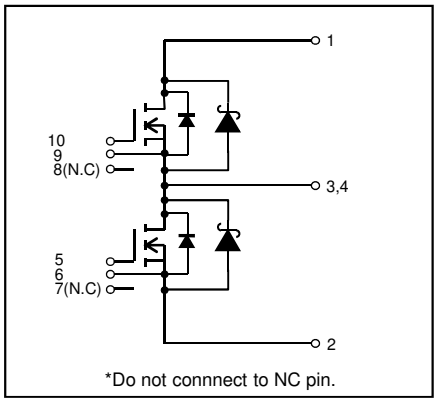
· Motor drive

· Inverter, Converter

· Photovoltaics, wind power generation.

· Induction heating equipment.

●Circuit diagram



●Features

1) Low surge, low switching loss.

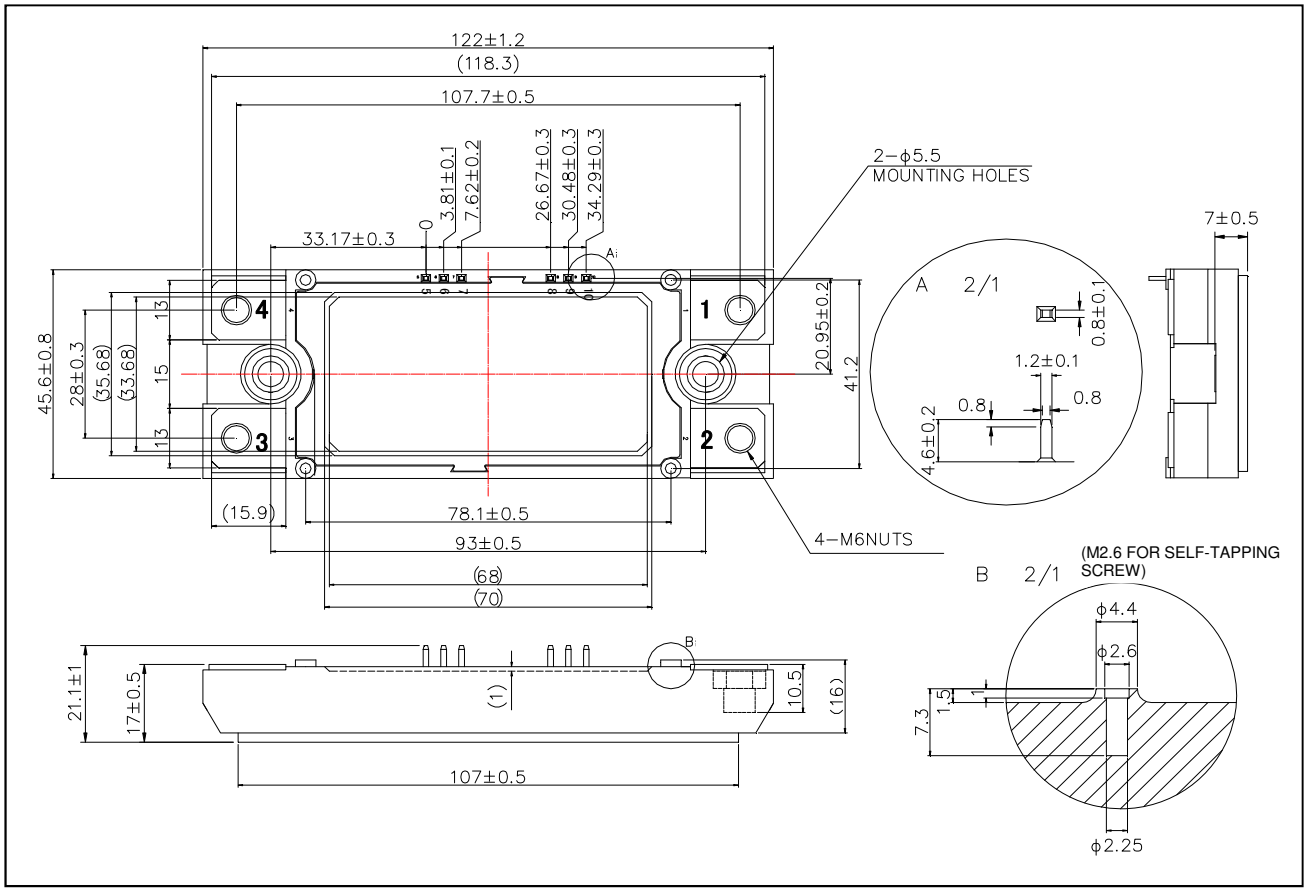
2) High-speed switching possible.

3) Reduced temperature dependence.

●Construction

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

●Dimensions & Pin layout (Unit : mm)



●Absolute maximum ratings (Tj = 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	V
Gate-source voltage(−)			−6	V
Drain current *1	I_D	DC(Tc=60°C)	120	A
	I_{DRM}	Pulse (Tc=60°C) 1ms *2	240	A
Source current *1	I_S	Tc=60°C	120	A
	I_{SRM}	Pulse (Tc=60°C) 1ms *2	240	A
Total power disspation *3	Ptot	Tc=25°C	780	W
Junction temperature	Tj		−40 to150	°C
Storage temperature	Tstg		−40 to125	°C
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	N · m

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

(*2) Repetition rate should be kept within the range where temperature rise of die should not exceed Tj max.

(*3) Tj is less than 150°C (*4) Actual measurement is 3000V/1sec . in accordance with UL1557.

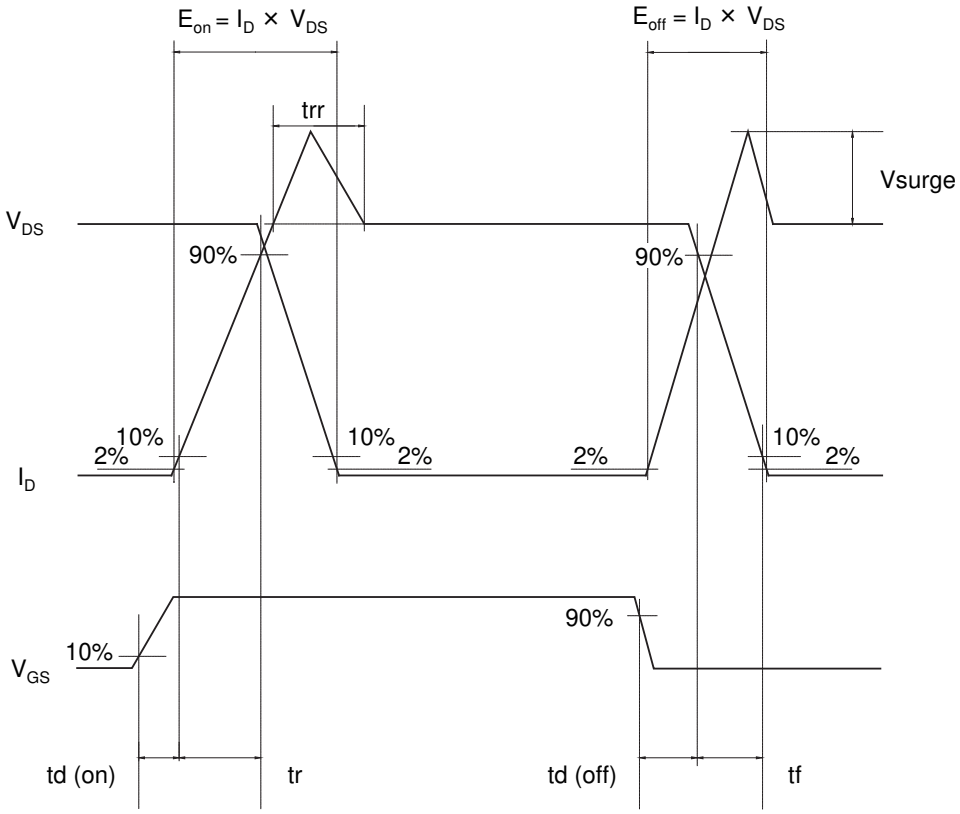
●Electrical characteristics (Tj=25°C)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Static drain-source on-state voltage	$V_{DS(on)}$	I_D=120A, V_{GS}=18V	Tj=25°C	−	2.4	3.2	V
			Tj=125°C	−	3.5	4.6	V
Drain cutoff current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V		−	−	2	mA
Source-drain voltage	V_{SD}	V_{GS}=0V, I_S=120A	Tj=25°C	−	1.7	2.1	V
			Tj=125°C	−	2.2	2.7	V
Gate-source threshold voltag	$V_{GS(th)}$	V_{DS}=10V, I_D=22mA		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	−	−	μA
Switching characteristics	td(on)	$V_{GS(on)}$=18V, $V_{GS(off)}$=0V		−	45	−	ns
	tr	V_{DS}=600V		−	50	−	ns
	trr	I_D=120A		−	30	−	ns
	td(off)	R_G=3.9Ω		−	170	−	ns
	tr	inductive load		−	60	−	ns
Input capacitance	Ciss	V_{DS}=10V, V_{GS}=0V, f=1MHz		−	14	−	nF
Junction-to-case thermal resistance	Rth(j-c)	DMOS (1/2 module) *5		−	−	0.16	°C/W
		SBD (1/2 module) *5		−	−	0.21	°C/W
Case-to-heat sink Thermal resistance	Rth(c-f)	Case to heat sink, per 1 module, Thermal grease appied *6		−	0.04	−	°C/W

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

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

●Waveform for switching test



●**Electrical characteristic curves** (Typical)

Fig.1 Typical Output Characteristics

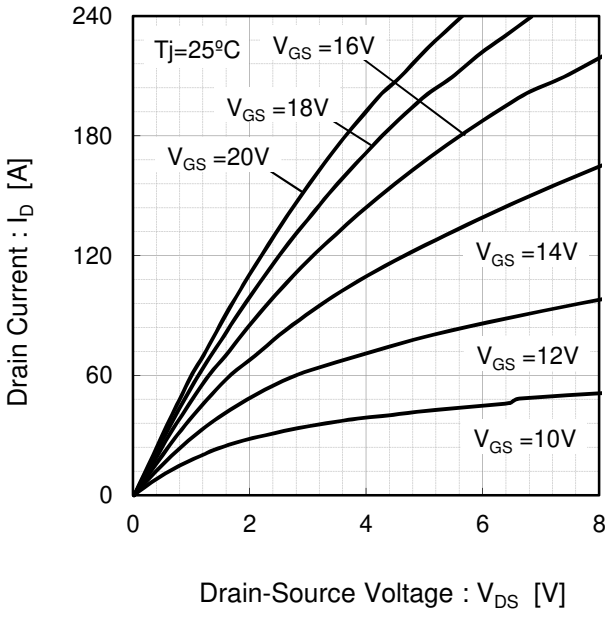


Fig.2 Drain-Source Voltage vs. Drain Current

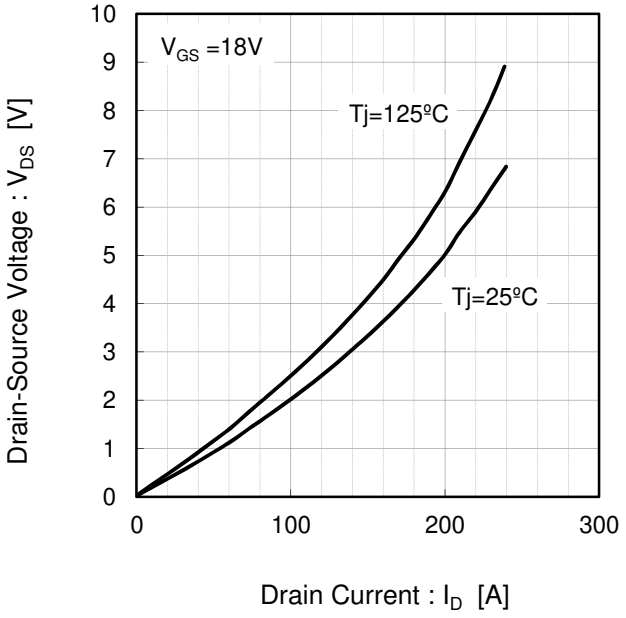


Fig.3 Drain-Source Voltage vs. Gate-Source Voltage

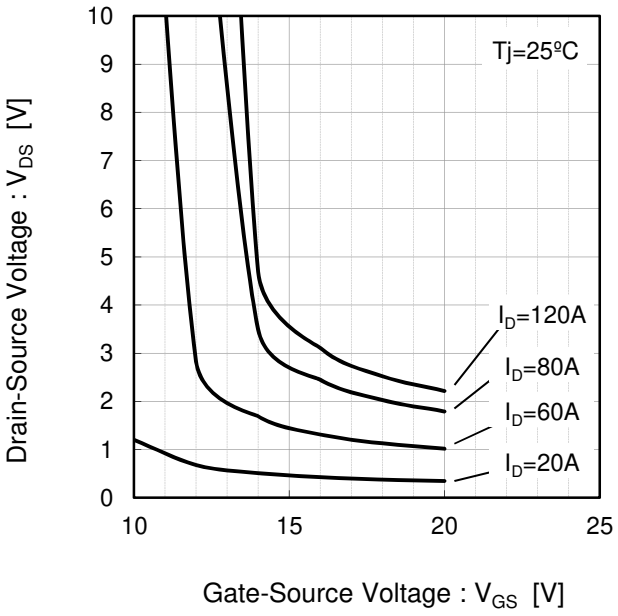
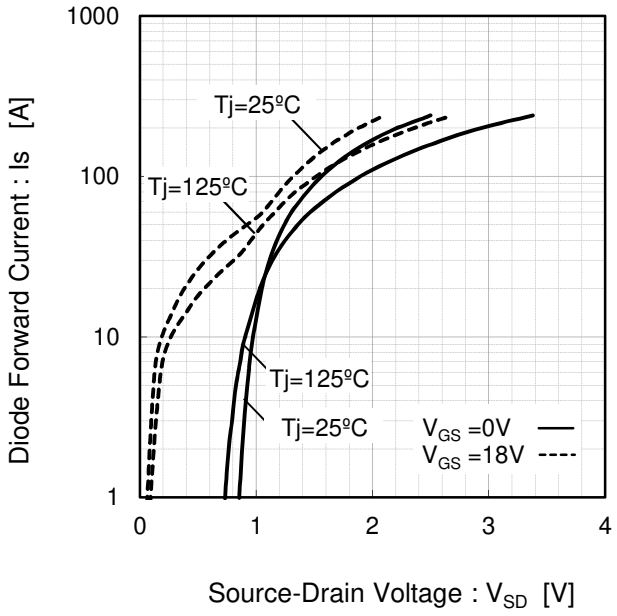


Fig.4 Forward characteristic of Diode-inverter



●Electrical characteristic curves (Typical)

Fig.5 Drain Current vs. Gate-Source Voltage

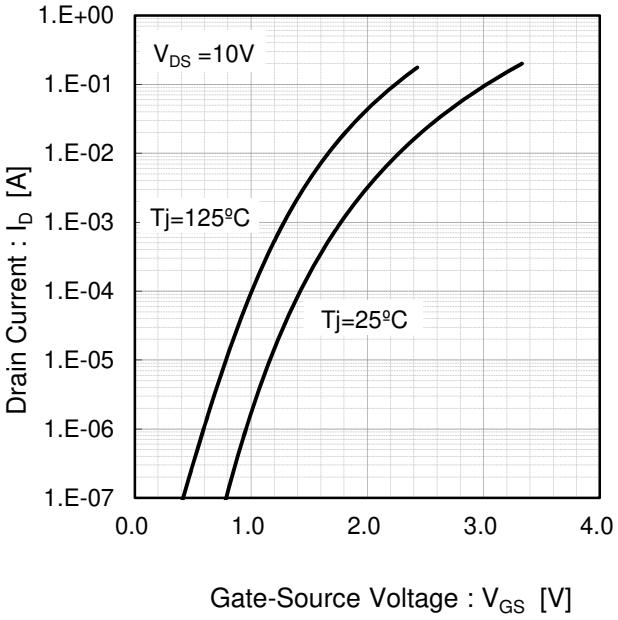


Fig.6 Drain Current vs. Gate-Source Voltage

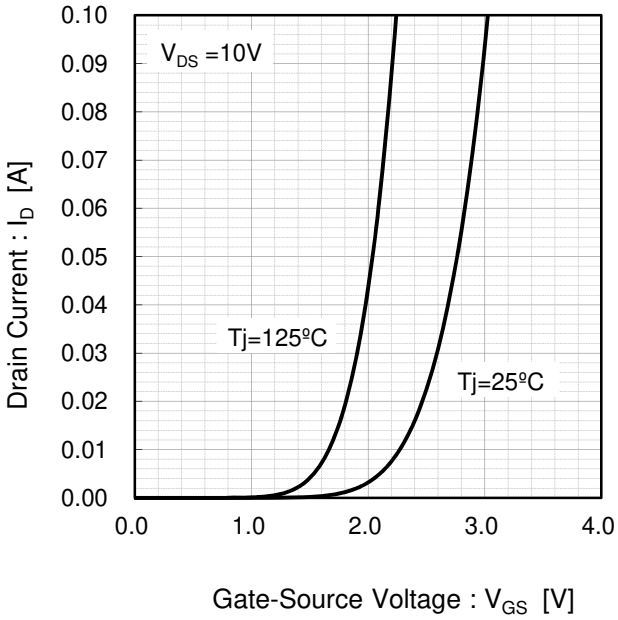


Fig.7 Switching Characteristics [Tj=25ºC]

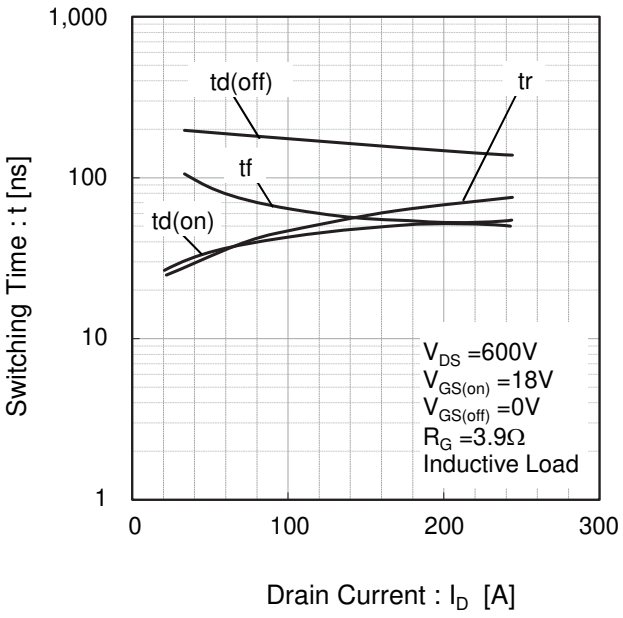
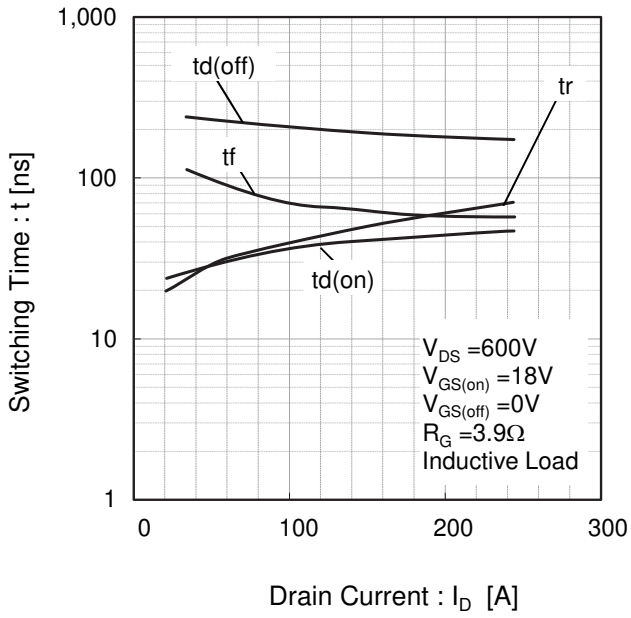


Fig.8 Switching Characteristics [Tj=125ºC]



●**Electrical characteristic curves** (Typical)

Fig.9 Switching Loss vs. Drain current [Tj=25ºC]

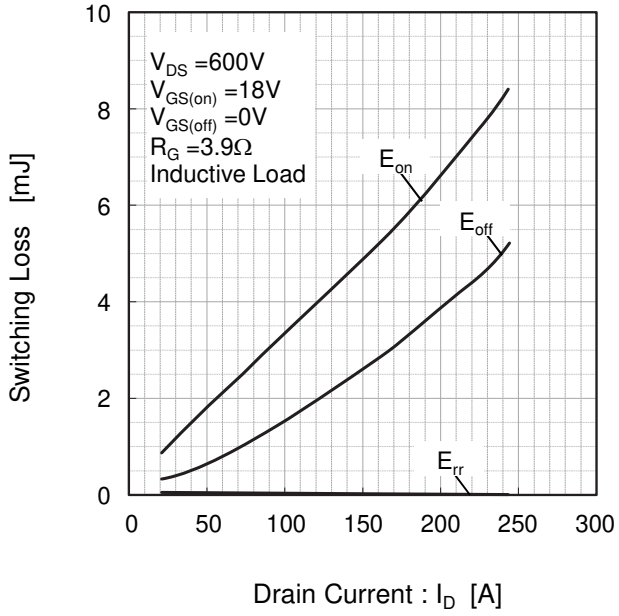


Fig.10 Switching Loss vs. Drain current [Tj=125ºC]

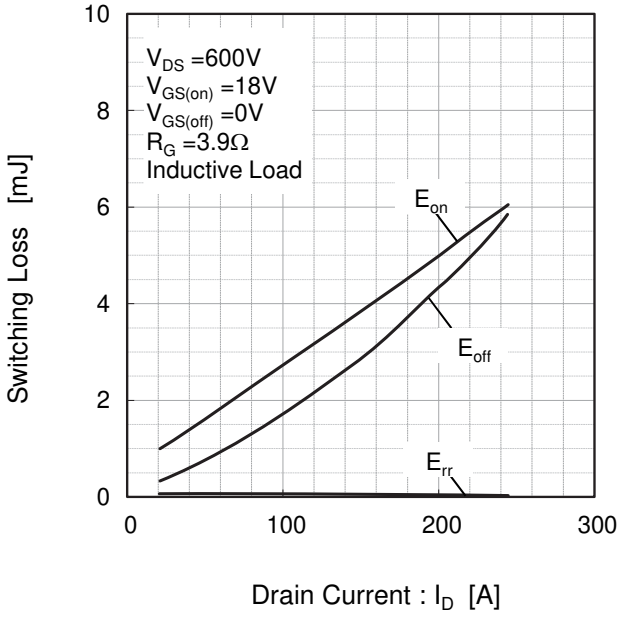


Fig.11 Reverse Recovery Characteristics vs. Drain Current [Tj=25ºC]

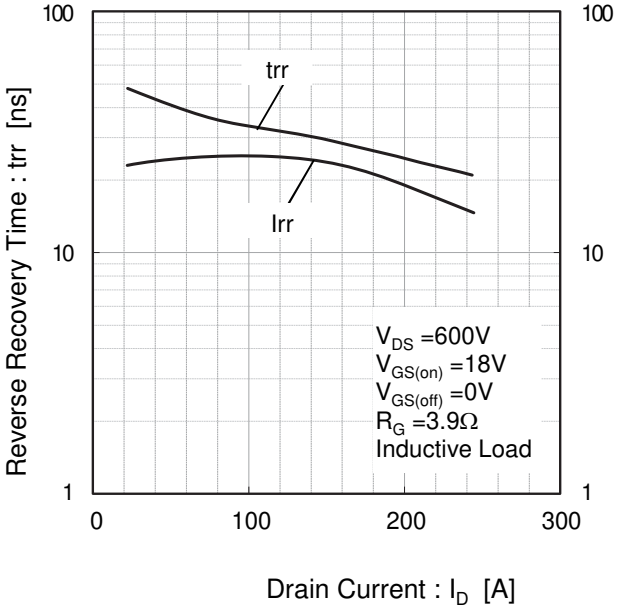
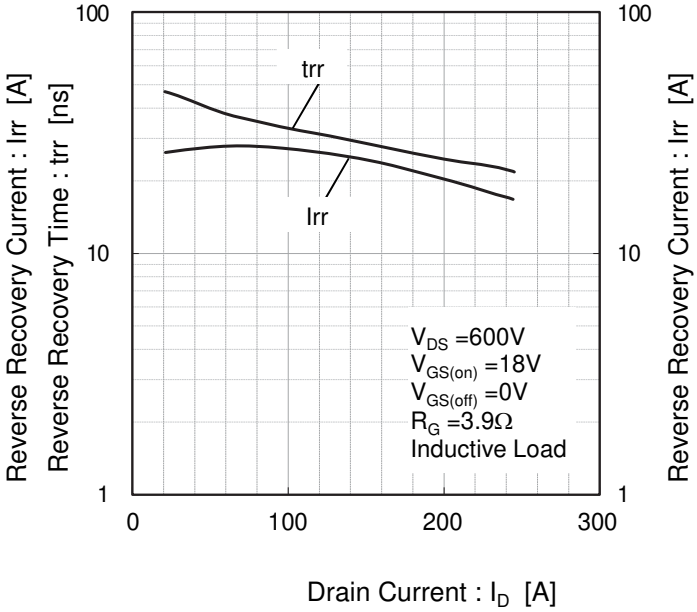


Fig.12 Reverse Recovery Characteristics vs. Drain Current [Tj=125ºC]



●Electrical characteristic curves (Typical)

Fig.13 Switching Characteristics vs. Gate Resistance [Tj=25ºC]

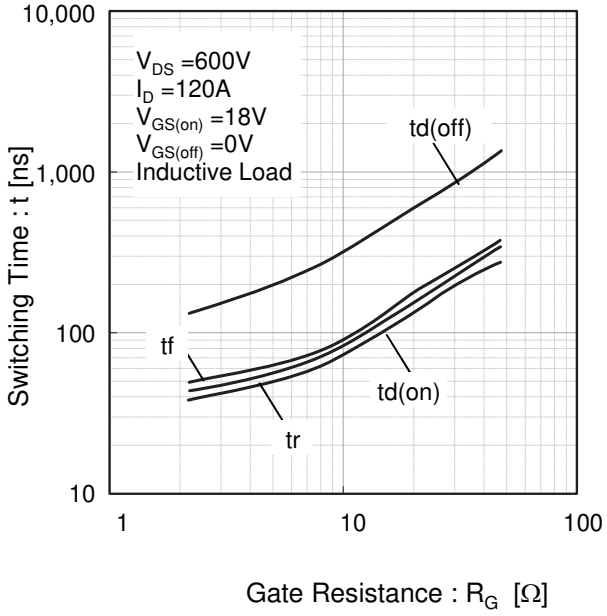


Fig.14 Switching Characteristics vs. Gate Resistance [Tj=125ºC]

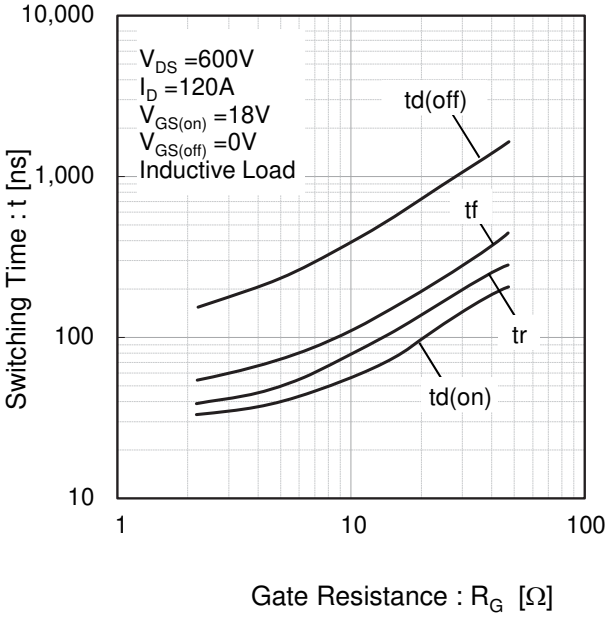


Fig.15 Switching Loss vs. Gate Resistance [Tj=25ºC]

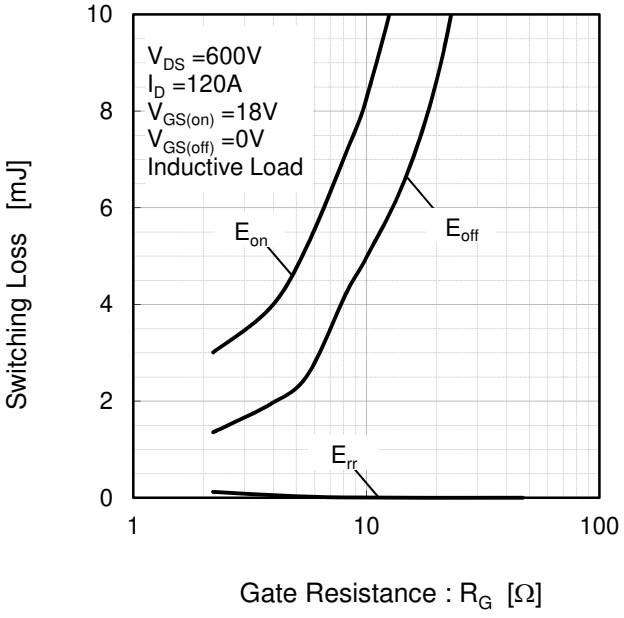
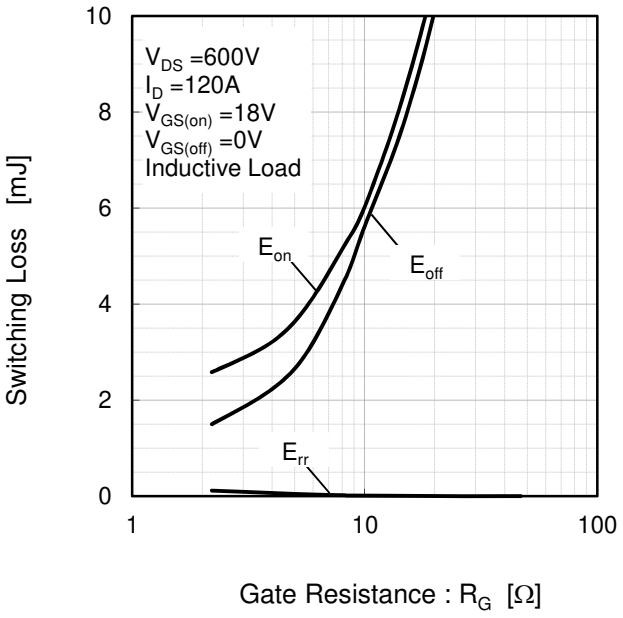


Fig.16 Switching Loss vs. Gate Resistance [Tj=125ºC]



●Electrical characteristic curves (Typical)

Fig.17 Typical Capacitance vs. Drain-Source Voltage

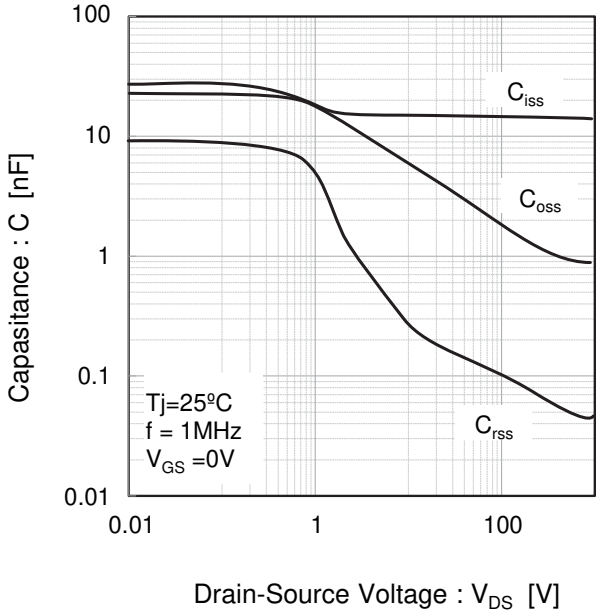


Fig.18 Gate Charge Characteristics [Tj=25ºC]

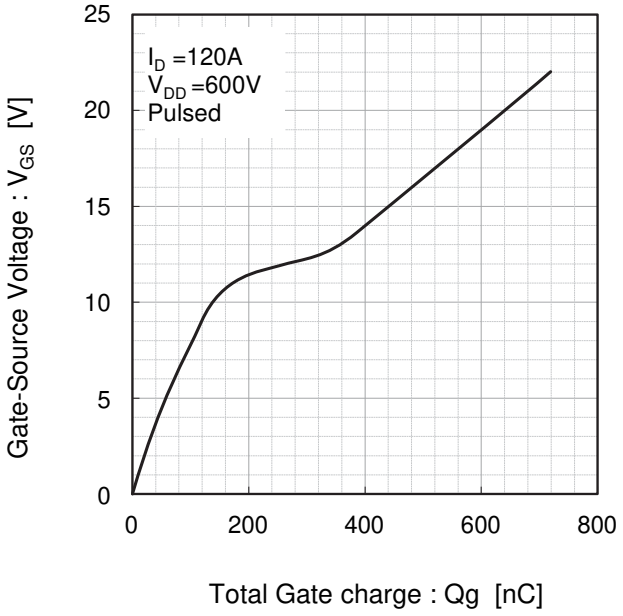


Fig.19 Normalized Transient Thermal Impedance vs. Pulse Width

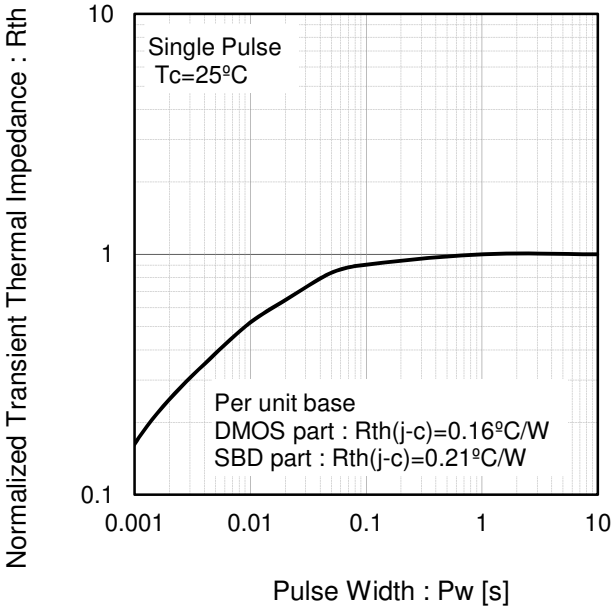
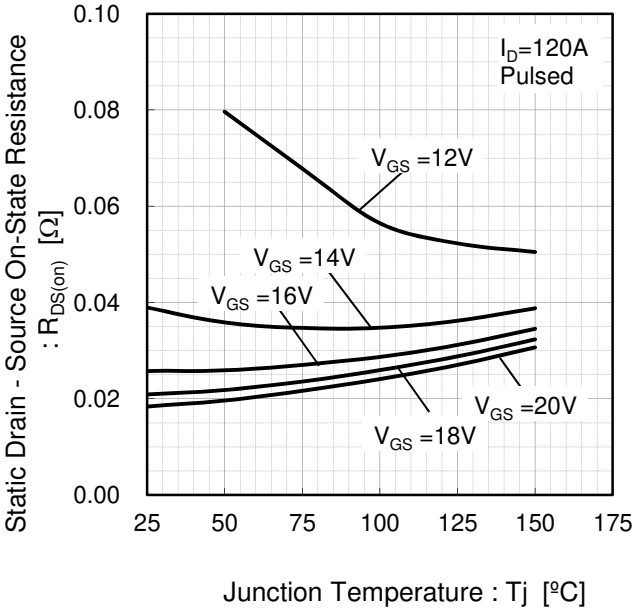


Fig.20 Static Drain - Source On-State Resistance vs. Junction Temperature



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