4V Drive Nch + Pch MOSFET

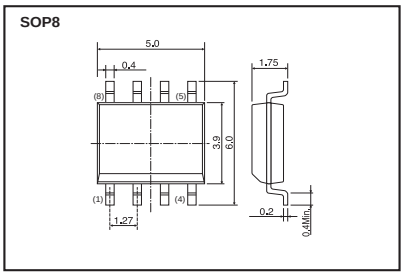
SH8M13

● Structure
Silicon N-channel MOSFET/
Silicon P-channel MOSFET

● Features
1) Low on-resistance.
2) Built-in G-S Protection Diode.
3) Small Surface Mount Package (SOP8).

● Application
Switching

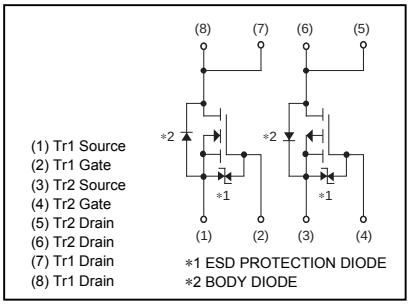
● Dimensions (Unit : mm)



● Packaging specifications

Type	Package	Taping
	Code	TB
	Basic ordering unit (pieces)	2500
SH8M13		○

● Inner circuit



● Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits		Unit
			Tr1 : N-ch	Tr2 : P-ch	
Drain-source voltage		V_{DSS}	30	−30	V
Gate-source voltage		V_{GSS}	±20	±20	V
Drain current	Continuous	I_D	±6.0	±7.0	A
	Pulsed	I_{DP} *1	±24	±28	A
Source current (Body Diode)	Continuous	I_s	1.6	−1.6	A
	Pulsed	I_{sp} *1	24	−28	A
Total power dissipation		P_D *2	2.0		W / TOTAL
			1.4		W / ELEMENT
Channel temperature		Tch	150		°C
Range of storage temperature		Tstg	−55 to +150		°C

*1 Pw≤10μs, Duty cycle≤1%

*2 Mounted on a ceramic board.

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

<Tr1(Nch)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	±10	μA	V_{GS}=±20V, V_{DS}=0V
Drain-source breakdown voltage	$V_{(BR)DSS}$	30	-	-	V	I_D=1mA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=30V, V_{GS}=0V
Gate threshold voltage	$V_{GS\ (th)}$	1.0	-	2.5	V	V_{DS}=10V, I_D=1mA
Static drain-source on-state resistance	$R_{DS\ (on)}$*	-	22	31	mΩ	I_D=6.0A, V_{GS}=10V
		-	30	42		I_D=6.0A, V_{GS}=4.5V
		-	35	49		I_D=6.0A, V_{GS}=4.0V
Forward transfer admittance	$\|Y_{fs}\|$*	2.5	-	-	S	V_{DS}=10V, I_D=6.0A
Input capacitance	C_{iss}	-	350	-	pF	V_{DS}=10V
Output capacitance	C_{oss}	-	160	-	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	-	65	-	pF	f=1MHz
Turn-on delay time	$t_{d(on)}$*	-	8	-	ns	I_D=3.0A, V_{DD}≒ 15V
Rise time	t_r *	-	16	-	ns	V_{GS}=10V
Turn-off delay time	$t_{d(off)}$*	-	30	-	ns	R_L=5Ω
Fall time	t_f *	-	7	-	ns	R_G=10Ω
Total gate charge	Q_g *	-	5.0	-	nC	I_D=6.0A
Gate-source charge	Q_{gs} *	-	1.4	-	nC	V_{DD} ≒15V
Gate-drain charge	Q_{gd} *	-	1.9	-	nC	V_{GS}=5V

*Pulsed

●**Body diode characteristics** (Source-Drain) (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD} *	-	-	1.2	V	I_s=6.0A, V_{GS}=0V

*Pulsed

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

<Tr2(Pch)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	±10	μA	V_{GS}=±20V, V_{DS}=0V
Drain-source breakdown voltage	$V_{(BR)DSS}$	−30	-	-	V	I_D=−1mA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}		-	−1	μA	V_{DS}=−30V, V_{GS}=0V
Gate threshold voltage	$V_{GS\ (th)}$	−1.0	-	−2.5	V	V_{DS}=−10V, I_D=−1mA
Static drain-source on-state resistance	$R_{DS\ (on)}$*	-	21.5	29.0	mΩ	I_D=−7.0A, V_{GS}=−10V
		-	29.0	39.0		I_D=−3.5A, V_{GS}=−4.5V
		-	31.0	40.8		I_D=−3.5A, V_{GS}=−4.0V
Forward transfer admittance	$\|Y_{fs}\|$*	6.0	-	-	S	I_D=−7.0A, V_{DS}=−10V
Input capacitance	C_{iss}	-	1200	-	pF	V_{DS}=−10V
Output capacitance	C_{oss}	-	170	-	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	-	170	-	pF	f=1MHz
Turn-on delay time	$t_{d(on)}$*	-	12	-	ns	I_D=−3.5A, V_{DD}≒ −15V
Rise time	t_r *	-	40	-	ns	V_{GS}=−10V
Turn-off delay time	$t_{d(off)}$*	-	80	-	ns	R_L=4.29Ω
Fall time	t_f *	-	65	-	ns	R_G=10Ω
Total gate charge	Q_g *	-	18		nC	I_D=−7.0A
Gate-source charge	Q_{gs} *	-	3.5	-	nC	V_{DD} ≒−15V
Gate-drain charge	Q_{gd} *	-	6.5	-	nC	V_{GS}=−5V

*Pulsed

●**Body diode characteristics** (Source-Drain) (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD} *	-	-	−1.2	V	I_s=−7.0A, V_{GS}=0V

*Pulsed

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●Electrical characteristic curves (Ta=25°C)

〈Tr.1(Nch)〉

Fig.1 Typical Output Characteristics(Ⅰ)

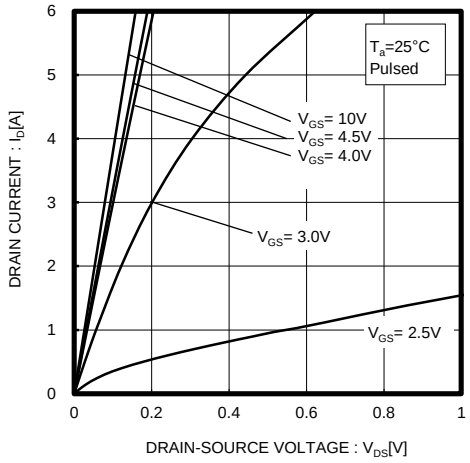

Fig.2 Typical Output Characteristics(Ⅱ)

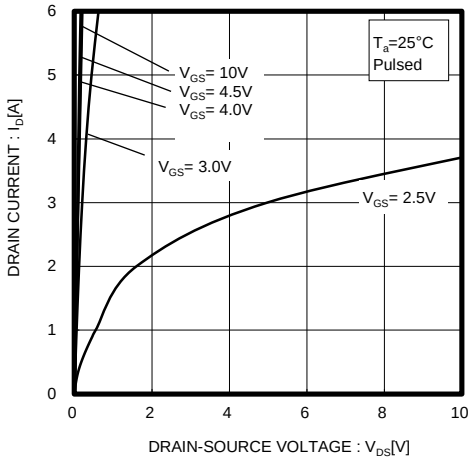

Fig.3 Typical Transfer Characteristics

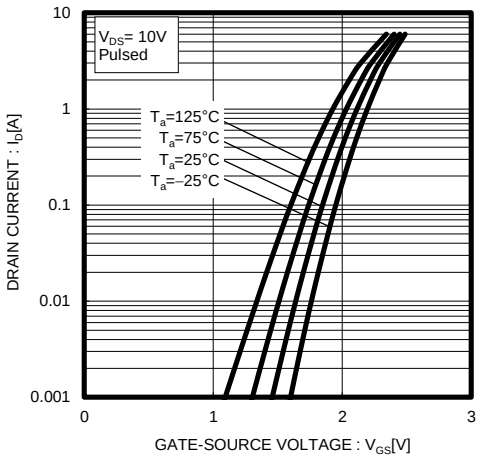

Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

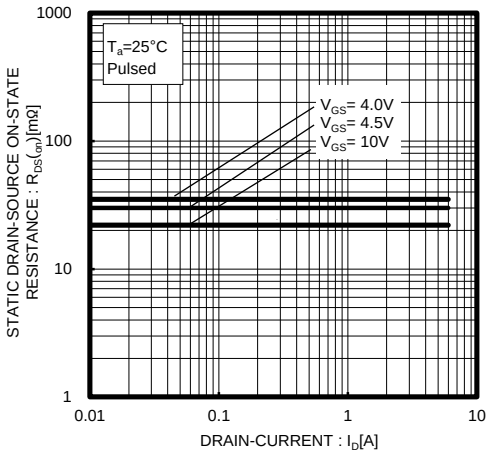

Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

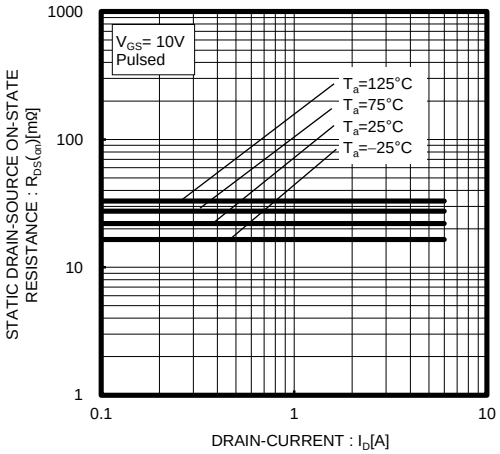

Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

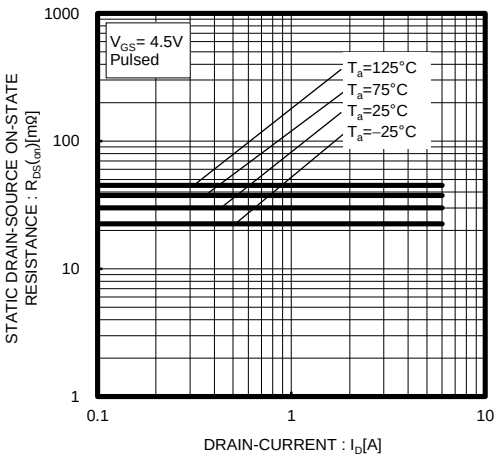

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Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

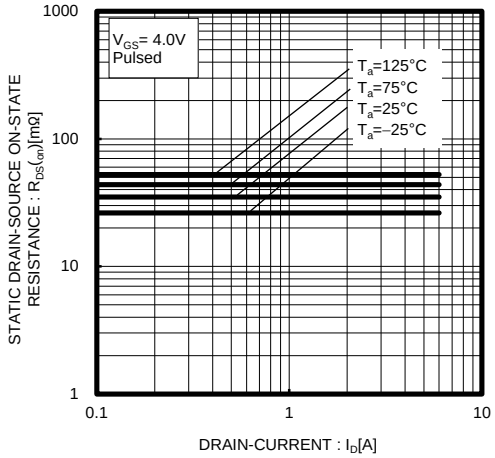

Fig.8 Forward Transfer Admittance vs. Drain Current

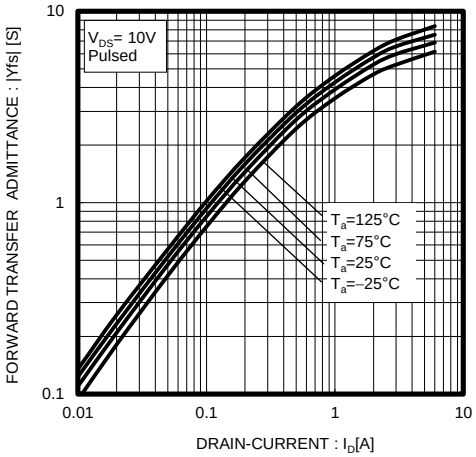

Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

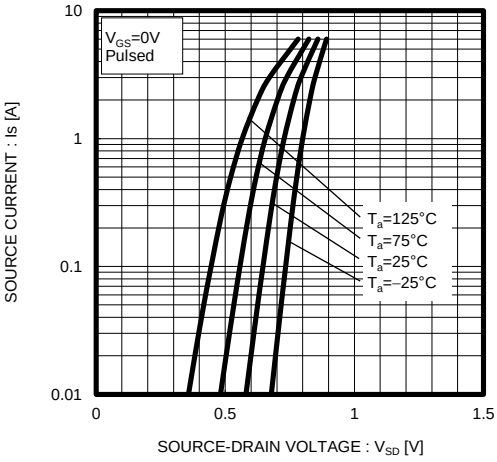

Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

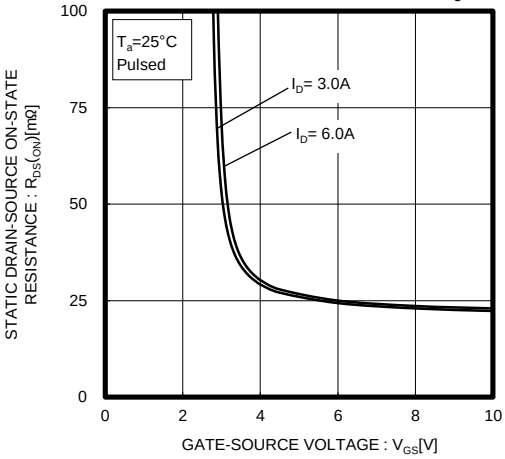

Fig.11 Switching Characteristics

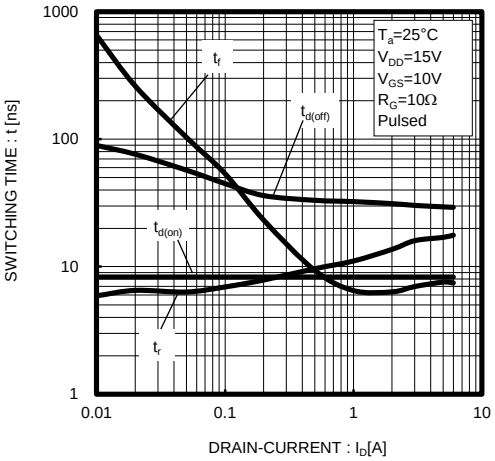

Fig.12 Dynamic Input Characteristics

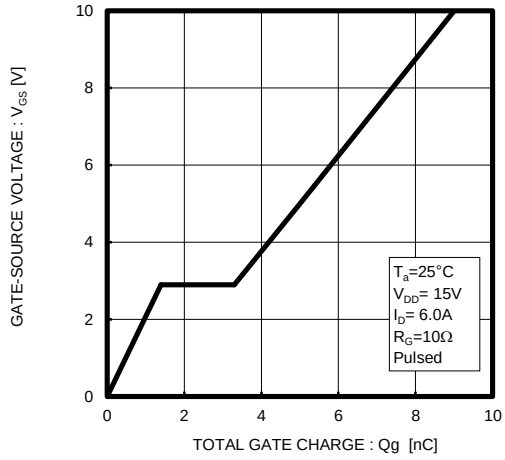

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Fig.13 Typical Capacitance vs. Drain-Source Voltage

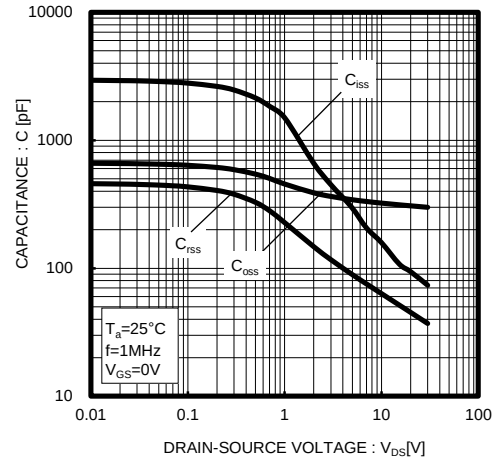


Fig.14 Maximum Safe Operating Aera

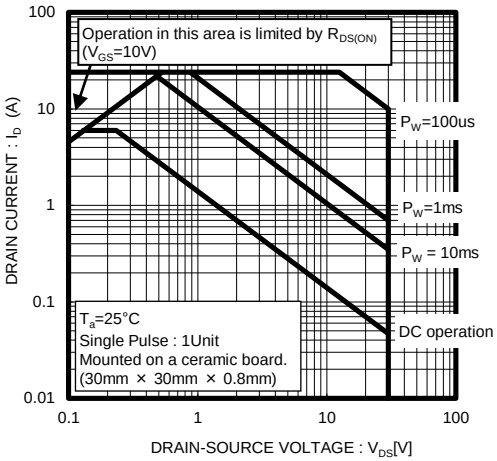
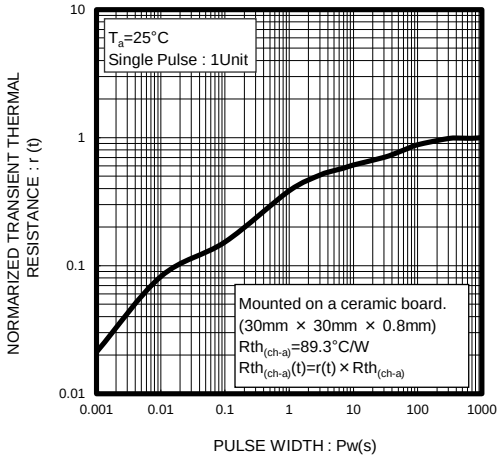


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



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〈Tr.2(Pch)〉

Fig.1 Typical Output Characteristics(Ⅰ)

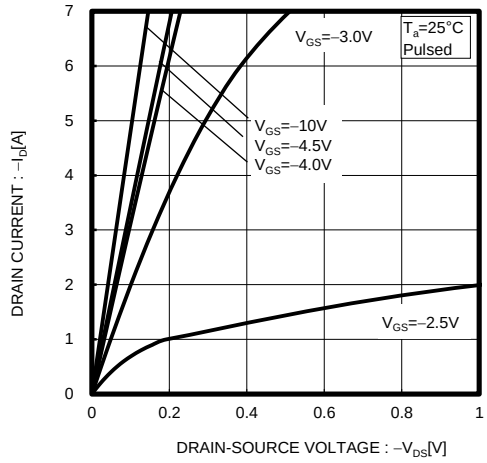

Fig.2 Typical Output Characteristics(Ⅱ)

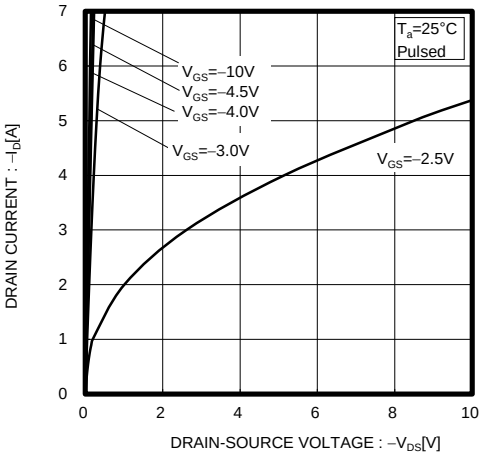

Fig.3 Typical Transfer Characteristics

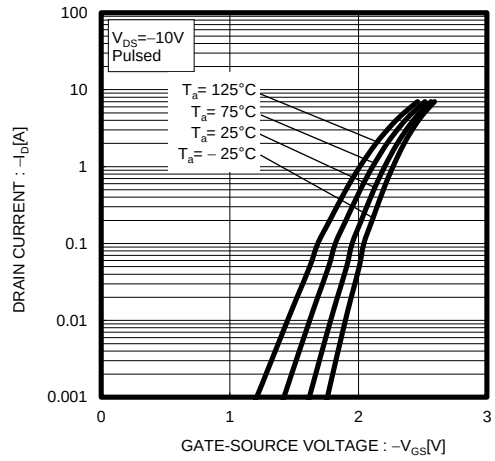

Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

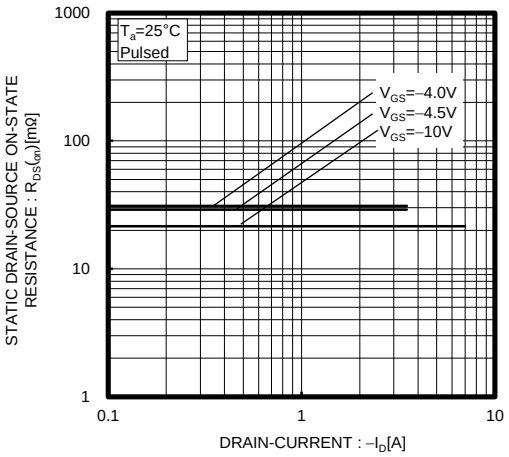

Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

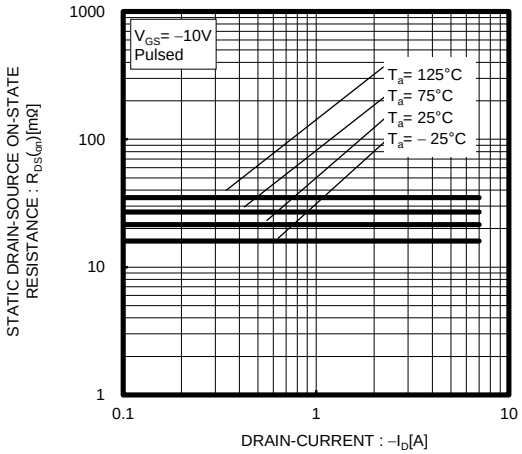

Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

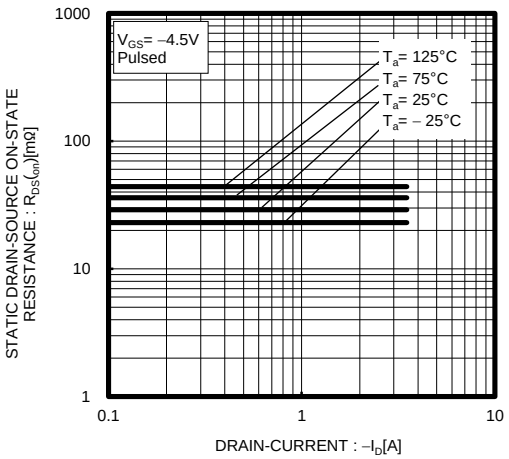

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Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

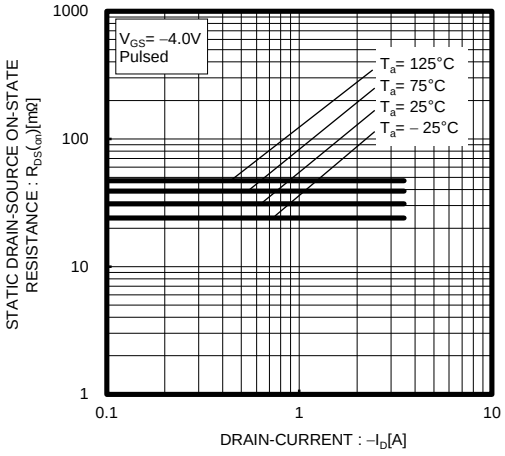

Fig.8 Forward Transfer Admittance vs. Drain Current

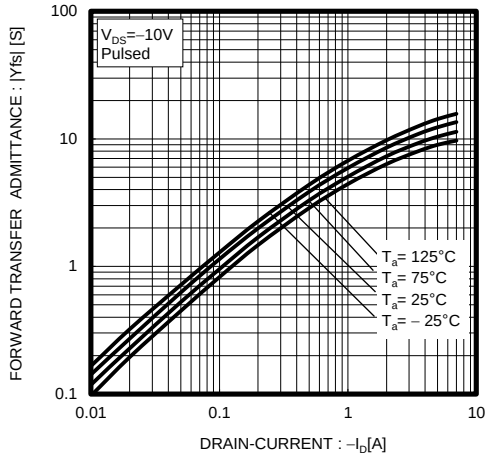

Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

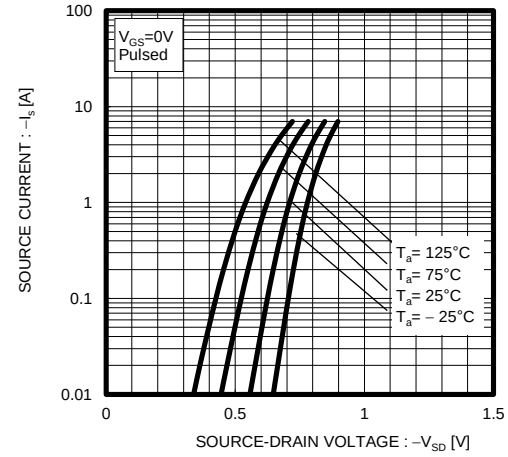

Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

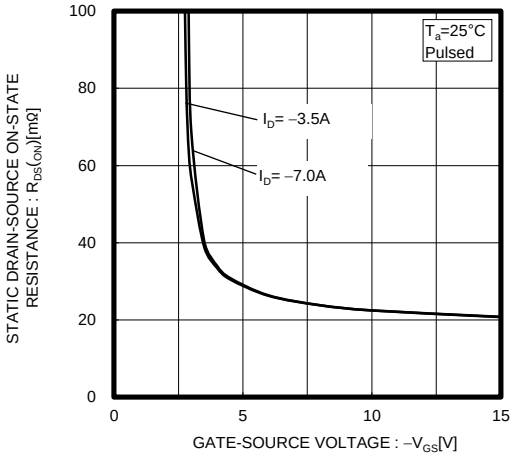

Fig.11 Switching Characteristics

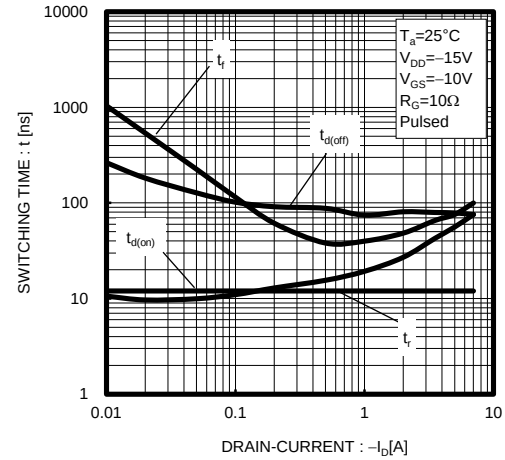

Fig.12 Dynamic Input Characteristics

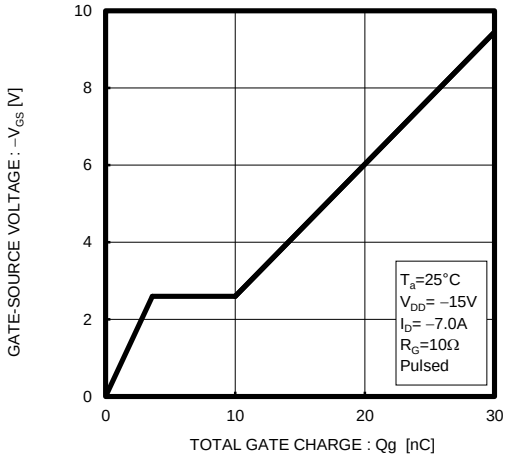

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Fig.13 Typical Capacitance vs. Drain-Source Voltage

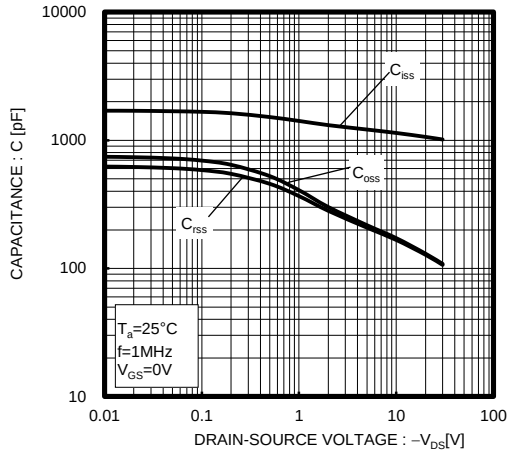


Fig.14 Maximum Safe Operating Aera

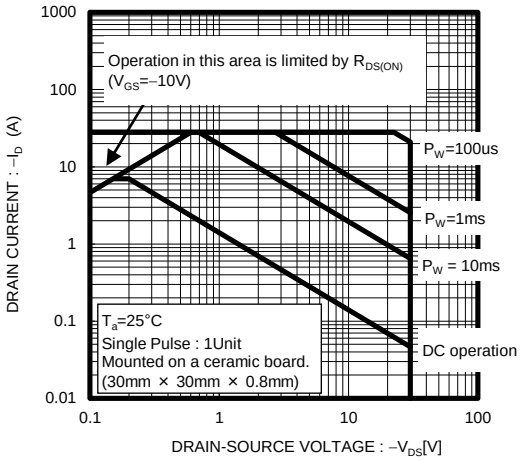
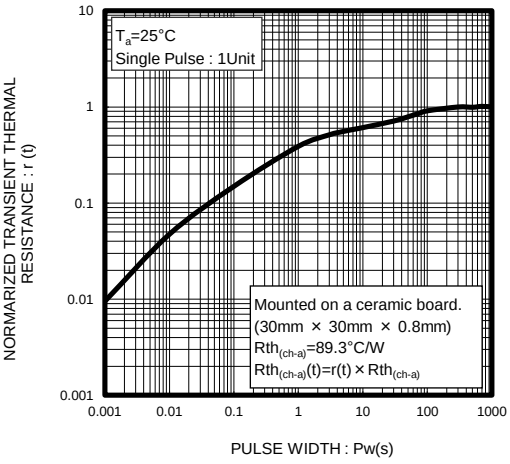


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



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● **Measurement circuits**

<Tr1(Nch)>

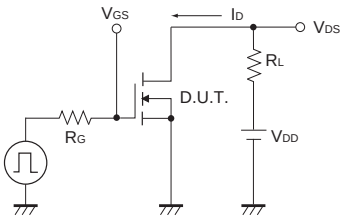

Fig.1-1 Switching Time Measurement Circuit

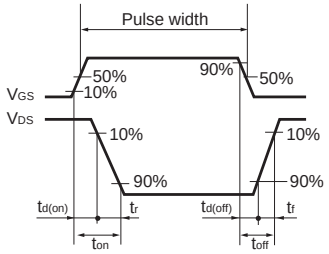

Fig.1-2 Switching Waveforms

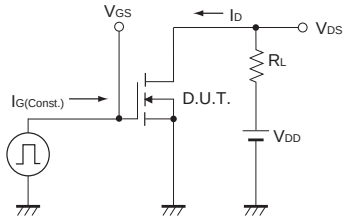

Fig.2-1 Gate Charge Measurement Circuit

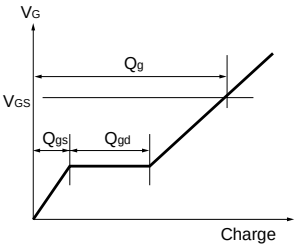

Fig.2-2 Gate Charge Waveform

<Tr2(Pch)>

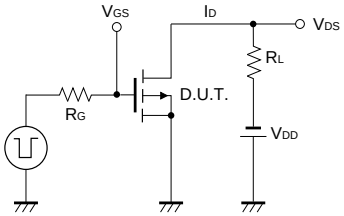

Fig.3-1 Switching Time Measurement Circuit

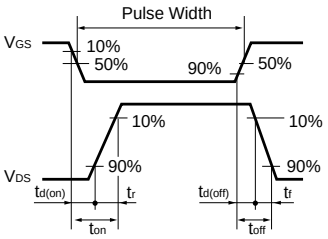

Fig.3-2 Switching Waveforms

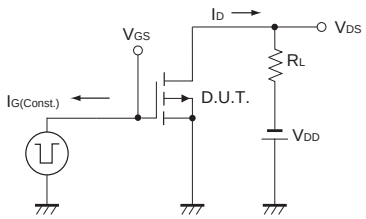

Fig.4-1 Gate Charge Measurement Circuit

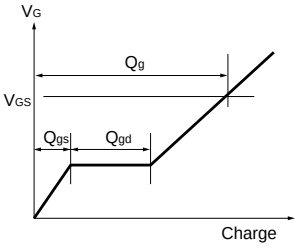

Fig.4-2 Gate Charge Waveform

● **Notice**

This product might cause chip aging and breakdown under the large electrified environment. Please consider to design ESD protection circuit.

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Notes

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SH8M13 - Web Page

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Distribution Inventory

Part Number	SH8M13
Package	SOP8
Unit Quantity	2500
Minimum Package Quantity	2500
Packing Type	Taping
Constitution Materials List	inquiry
RoHS	Yes

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