

4V Drive Nch + Pch MOSFET

QS8M51

● Structure

Silicon N-channel MOSFET/
Silicon P-channel MOSFET

● Features

- 1) Low on-resistance.
- 2) Low voltage drive (4V drive).
- 3) Small surface mount package (TSMT8).

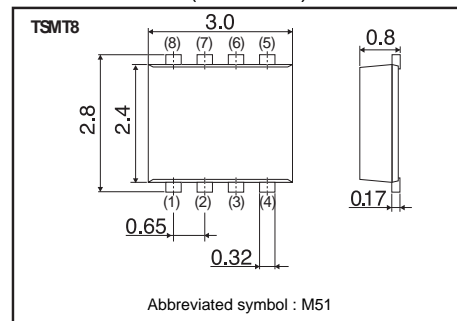
● Application

Switching

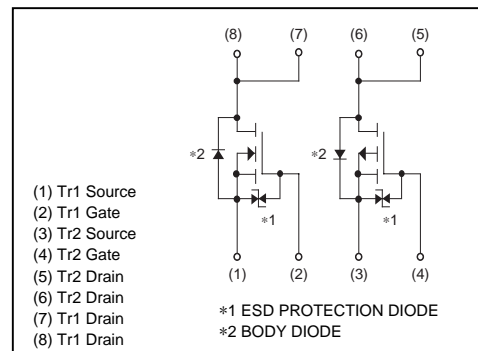
● Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS8M51		○

● Dimensions (Unit : mm)



● Inner circuit



● Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits		Unit	
		Tr1 : N-ch	Tr2 : P-ch		
Drain-source voltage	V_{DSS}	100	-100	V	
Gate-source voltage	V_{GSS}	±20	±20	V	
Drain current	Continuous	I_D	±2	±1.5	A
	Pulsed	I_{DP} *1	±6	±6	A
Source current (Body Diode)	Continuous	I_s	1.0	-1.0	A
	Pulsed	I_{sp} *1	6	-6	A
Power dissipation	P_D *2	1.5		W / TOTAL	
		1.25		W / ELEMENT	
Channel temperature	T_{ch}	150		°C	
Range of storage temperature	T_{stg}	-55 to +150		°C	

*1 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

*2 Mounted on a ceramic board.

● Electrical characteristics (Ta = 25°C)

<Tr1(Nch)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	±10	μA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=100V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	1	-	2.5	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	-	240	325	mΩ	$I_D=2A, V_{GS}=10V$
		-	250	340		$I_D=2A, V_{GS}=4.5V$
		-	260	355		$I_D=2A, V_{GS}=4V$
Forward transfer admittance	$ Y_{fs} ^*$	1.9	-	-	S	$V_{DS}=10V, I_D=2A$
Input capacitance	C_{iss}	-	290	-	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	-	30	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	20	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	10	-	ns	$V_{DD}=50V, I_D=1A$
Rise time	t_r^*	-	10	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	-	30	-	ns	$R_L=50\Omega, R_G=10\Omega$
Fall time	t_f^*	-	15	-	ns	
Total gate charge	Q_g^*	-	4.7	-	nC	$V_{DD}=50V, I_D=2A$
Gate-source charge	Q_{gs}^*	-	1.2	-	nC	$V_{GS}=5V$
Gate-drain charge	Q_{gd}^*	-	1.8	-	nC	

*Pulsed

● Body diode characteristics (Source-Drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD}^*	-	-	1.2	V	$I_s=2A, V_{GS}=0V$

*Pulsed

● Electrical characteristics (Ta = 25°C)

<Tr2(Pch)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	±10	μA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	-100	-	-	V	$I_D=-1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	-	-	-1	μA	$V_{DS}=-100V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	-1	-	-2.5	V	$V_{DS}=-10V, I_D=-1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	-	350	470	mΩ	$I_D=-1.5A, V_{GS}=-10V$
		-	380	510		$I_D=-0.75A, V_{GS}=-4.5V$
		-	400	540		$I_D=-0.75A, V_{GS}=-4V$
Forward transfer admittance	$ Y_{fs} ^*$	1.5	-	-	S	$V_{DS}=-10V, I_D=-1.5A$
Input capacitance	C_{iss}	-	950	-	pF	$V_{DS}=-25V$
Output capacitance	C_{oss}	-	45	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	20	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	10	-	ns	$V_{DD}=-50V, I_D=-0.75A$
Rise time	t_r^*	-	15	-	ns	$V_{GS}=-10V$
Turn-off delay time	$t_{d(off)}^*$	-	60	-	ns	$R_L=66\Omega, R_G=10\Omega$
Fall time	t_f^*	-	10	-	ns	
Total gate charge	Q_g^*	-	17	-	nC	$V_{DD}=-50V, I_D=-1.5A$
Gate-source charge	Q_{gs}^*	-	4.5	-	nC	$V_{GS}=-5V$
Gate-drain charge	Q_{gd}^*	-	5	-	nC	

*Pulsed

● Body diode characteristics (Source-Drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD}^*	-	-	-1.2	V	$I_S=-0.75A, V_{GS}=0V$

*Pulsed

●Electrical characteristic curves (Ta=25°C)

<Tr.1(Nch)>

Fig.1 Typical Output Characteristics (I)

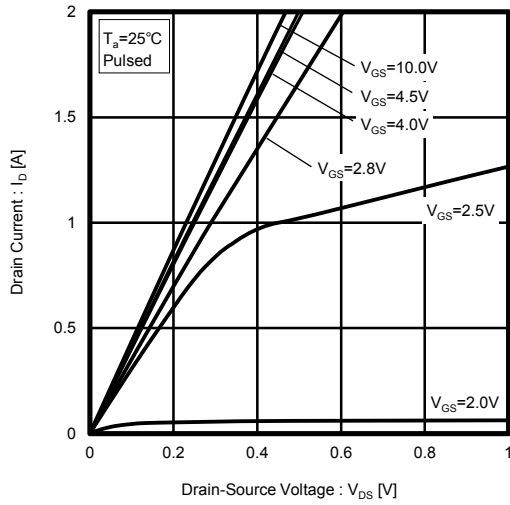


Fig.2 Typical Output Characteristics (II)

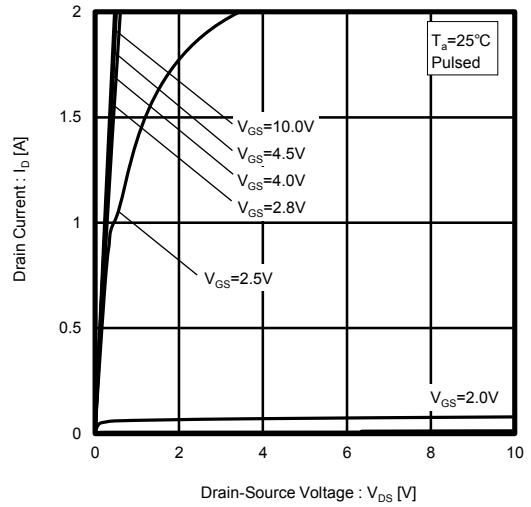


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

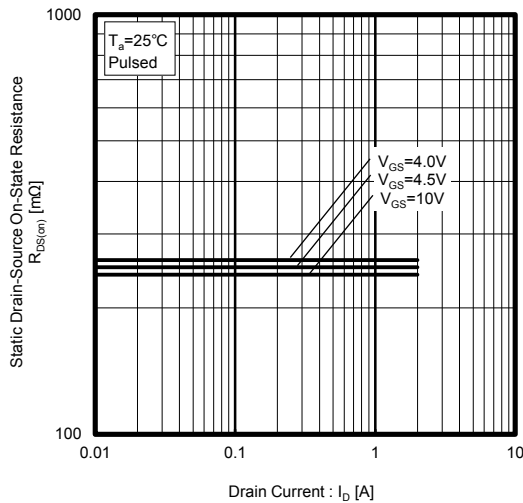


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

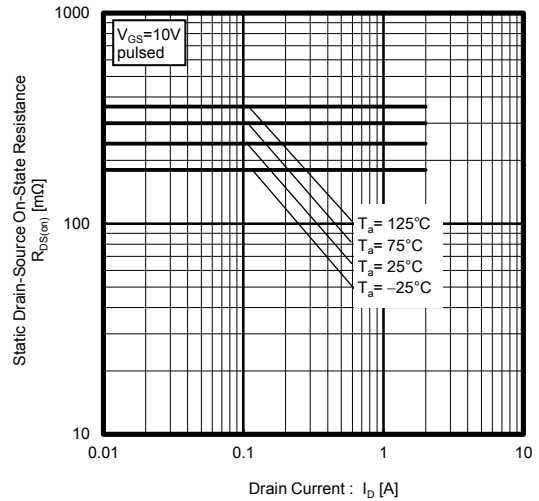


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

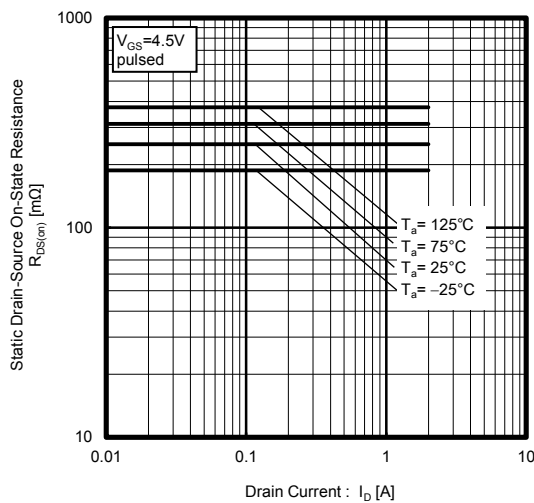


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

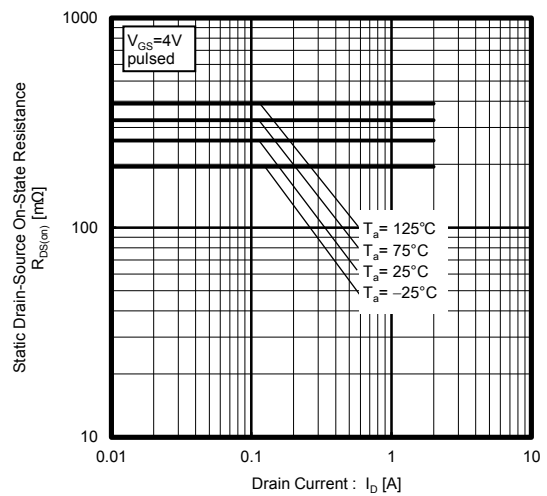


Fig.7 Forward Transfer Admittance vs. Drain Current

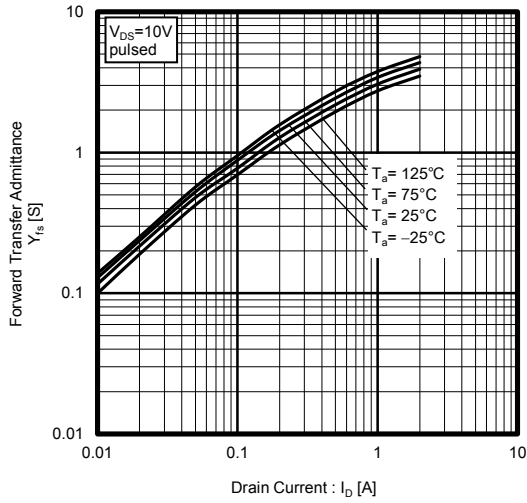


Fig.8 Typical Transfer Characteristics

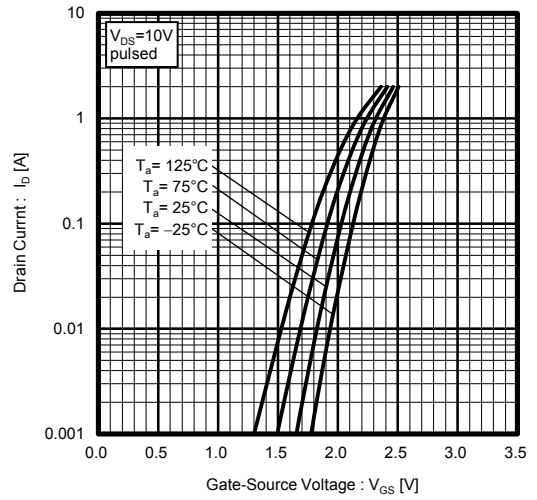


Fig.9 Source Current vs. Source-Drain Voltage

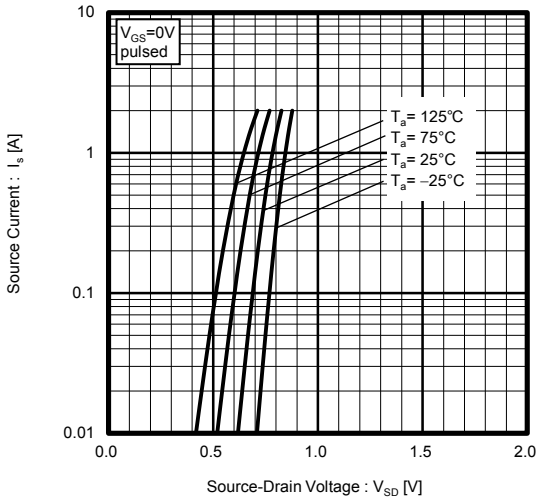


Fig.10 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

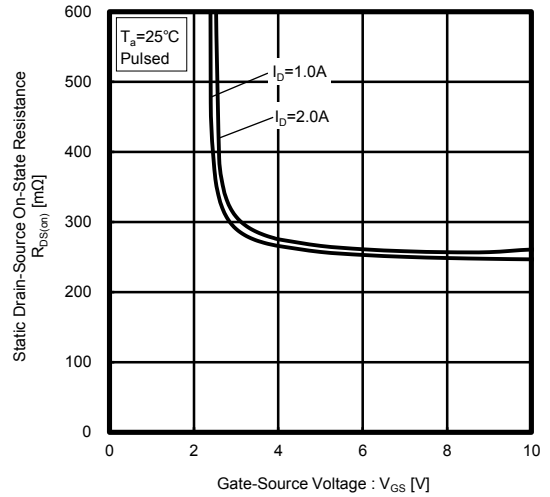


Fig.11 Switching Characteristics

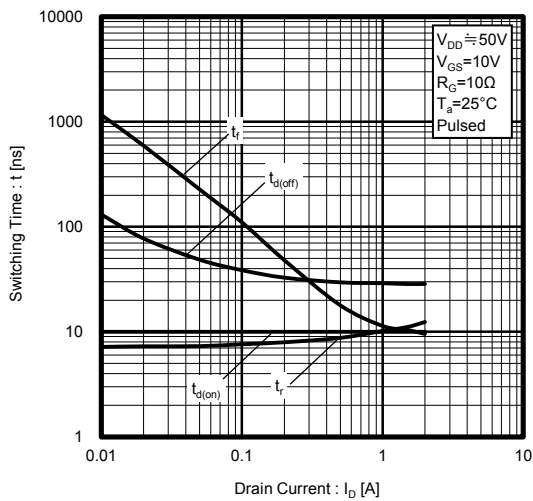


Fig.12 Dynamic Input Characteristics

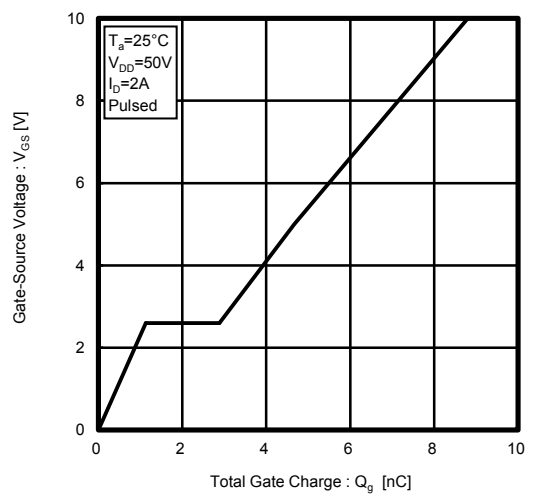


Fig.13 Typical Capacitance vs. Drain-Source Voltage

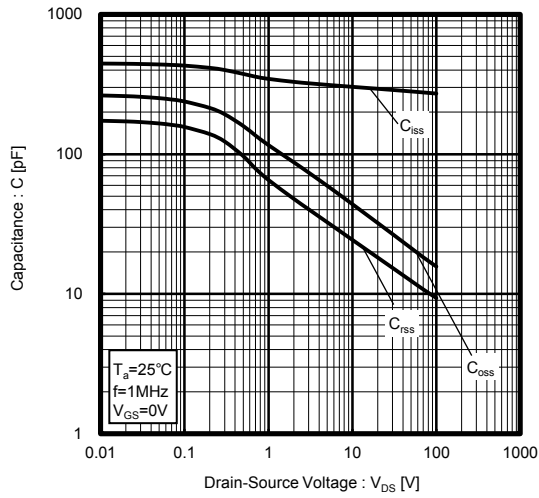


Fig.14 Normalized Transient Thermal Resistance v.s. Pulse Width

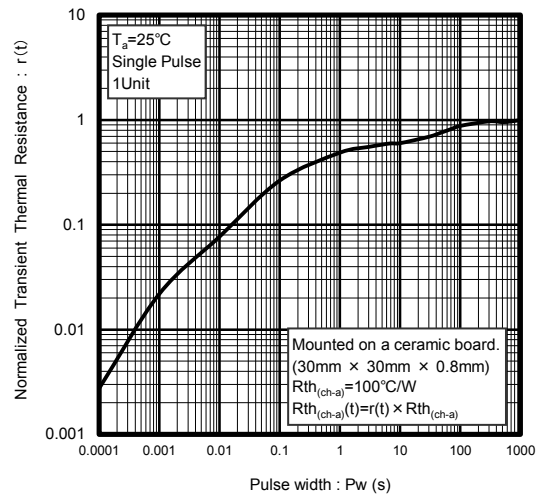
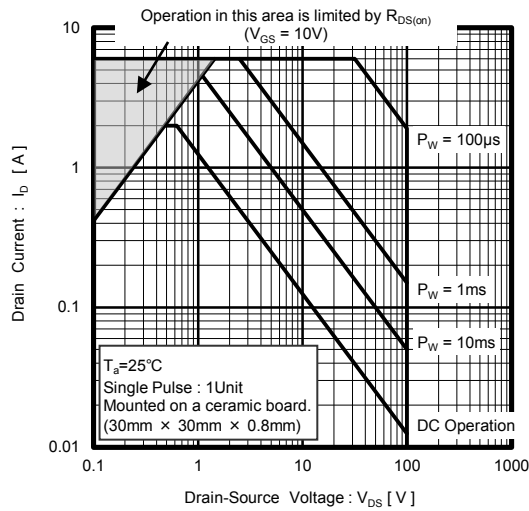


Fig.15 Maximum Safe Operating Area



<Tr.2(Pch)>

Fig.1 Typical Output Characteristics (I)

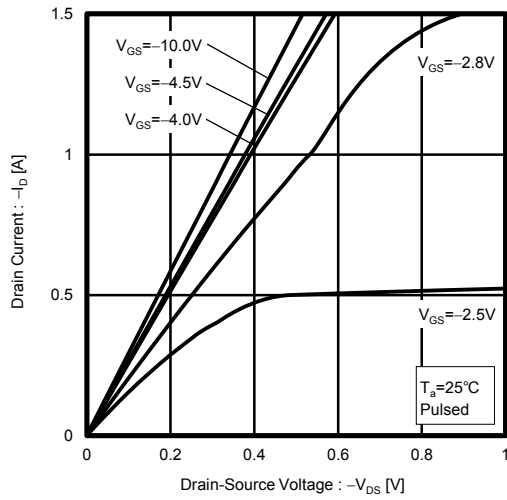


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

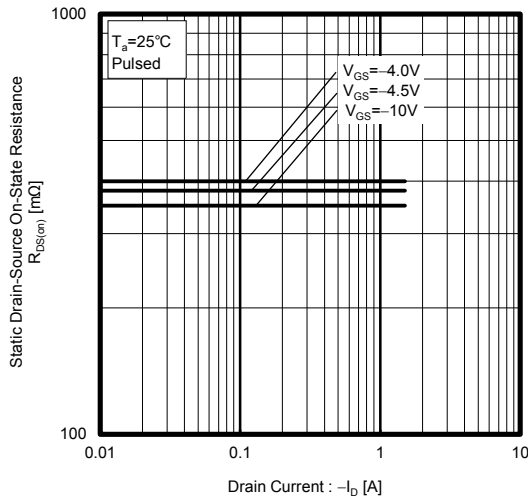


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

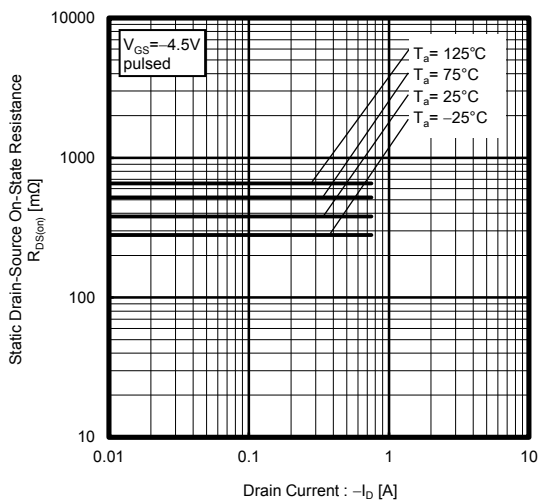


Fig.2 Typical Output Characteristics (II)

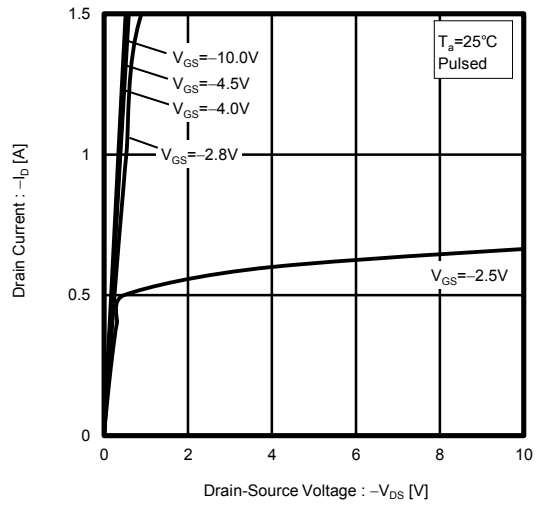


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

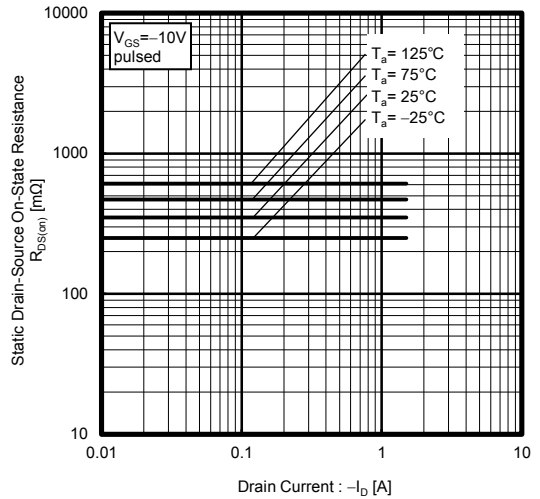


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

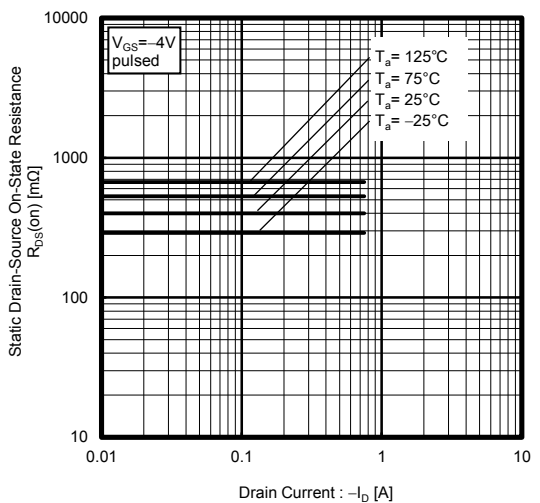


Fig.7 Forward Transfer Admittance vs. Drain Current

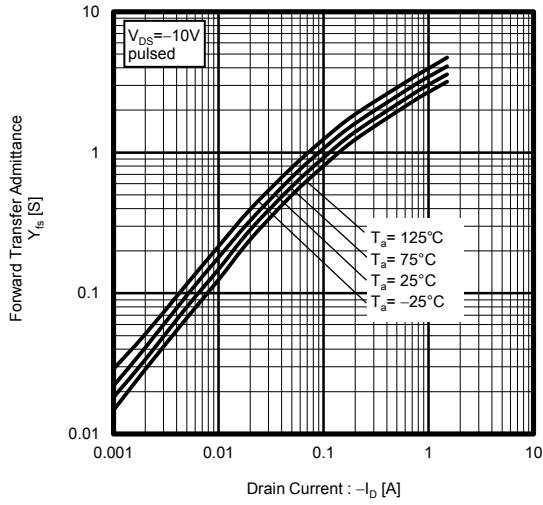


Fig.8 Typical Transfer Characteristics

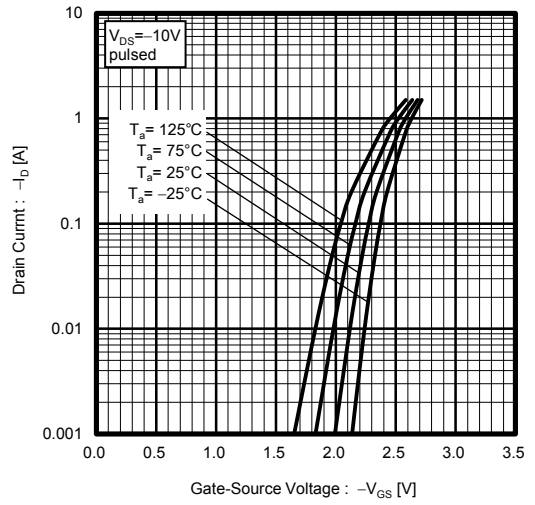


Fig.9 Source Current vs. Source-Drain Voltage

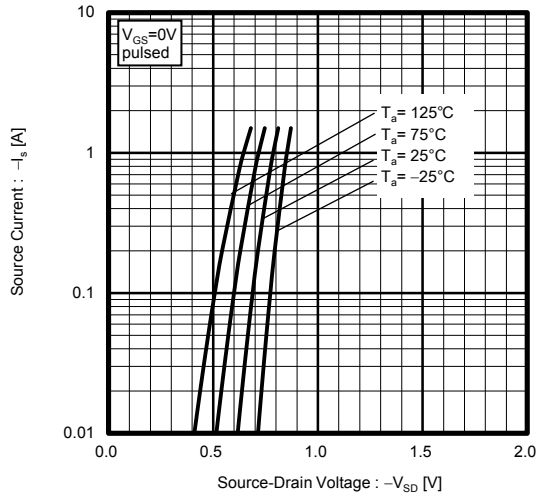


Fig.10 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

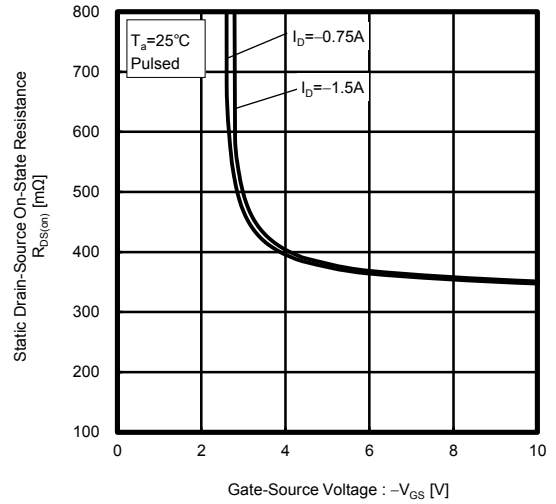


Fig.11 Switching Characteristics

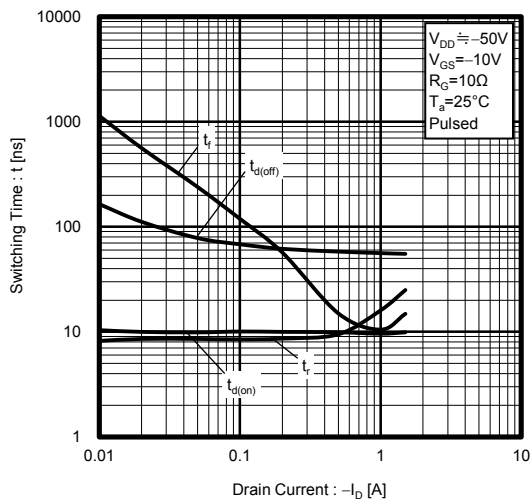


Fig.12 Dynamic Input Characteristics

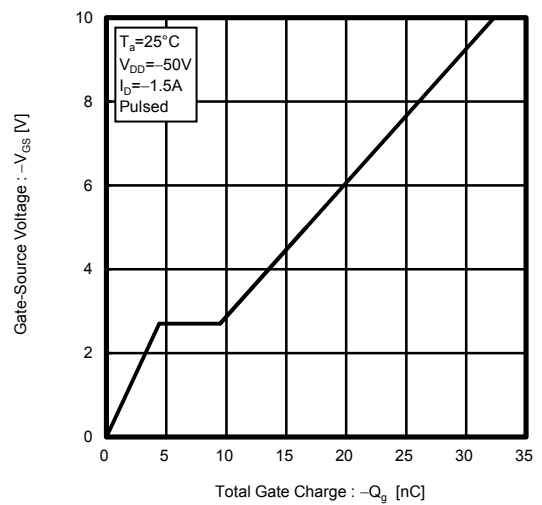


Fig.13 Typical Capacitance vs. Drain-Source Voltage

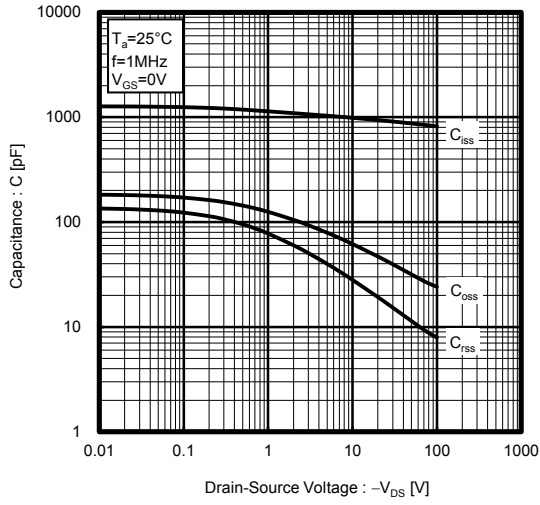


Fig.14 Normalized Transient Thermal Resistance v.s. Pulse Width

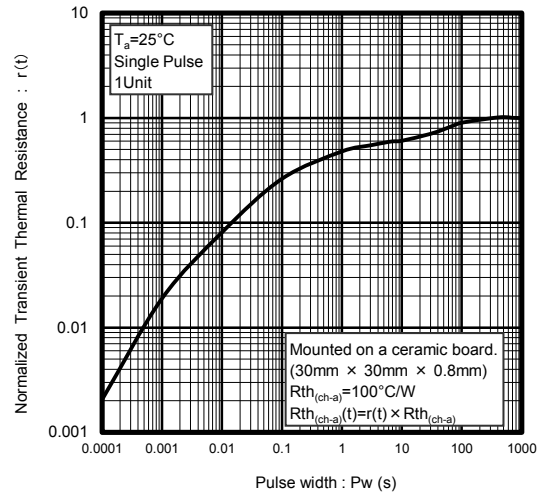
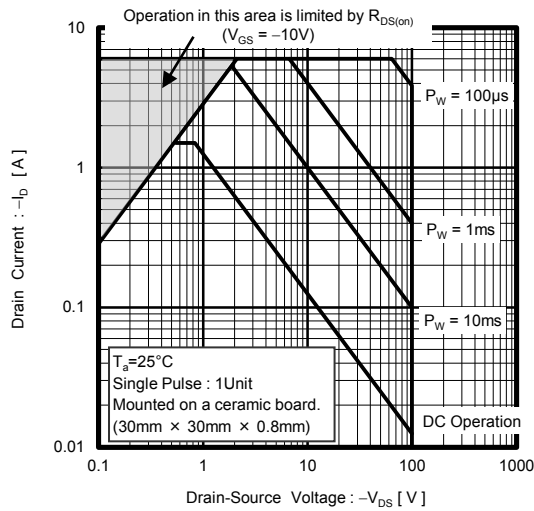


Fig.15 Maximum Safe Operating Area



● Measurement circuits

<Tr1(Nch)>

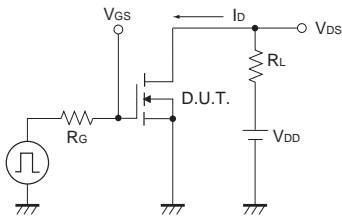


Fig.1-1 Switching Time Measurement Circuit

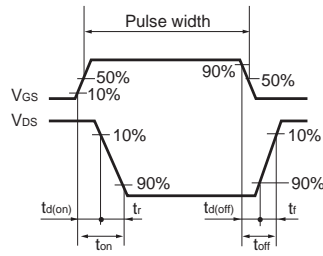


Fig.1-2 Switching Waveforms

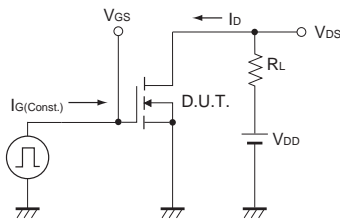


Fig.2-1 Gate Charge Measurement Circuit

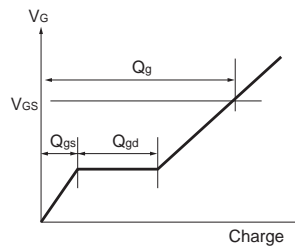


Fig.2-2 Gate Charge Waveform

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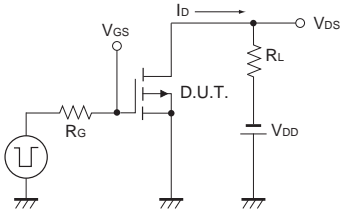


Fig.1-1 Switching Time Measurement Circuit

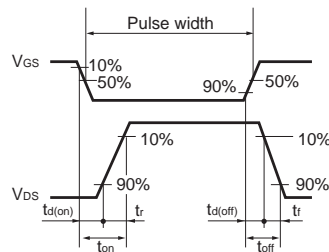


Fig.1-2 Switching Waveforms

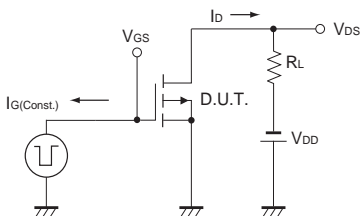


Fig.2-1 Gate Charge Measurement Circuit

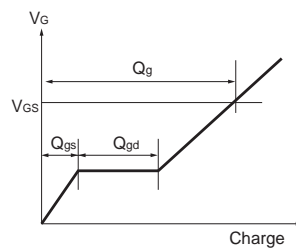


Fig.2-2 Gate Charge Waveform

Notes

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