Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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ROHM SEMICONDUCTOR

Data Sheet

4V Drive Nch + Pch MOSFET

MP6M12

● Structure

Silicon N-channel MOSFET/
Silicon P-channel MOSFET

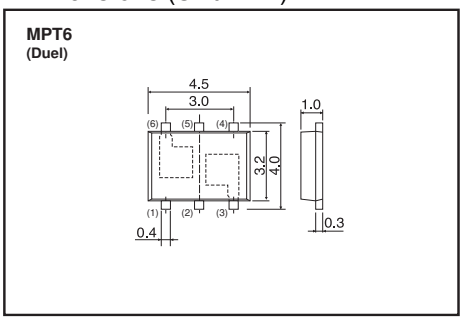
●Features

1) Low on-resistance.
2) Built-in G-S Protection Diode.
3) Small Surface Mount Package (MPT6).

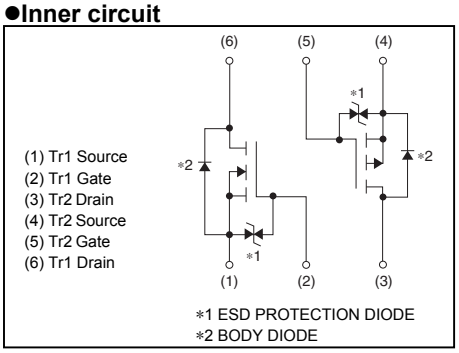
● Application

Switching

●Dimensions (Unit : mm)



●Inner circuit



● Packaging specifications

Type	Package	Taping
	Code	TCR
	Basic ordering unit (pieces)	1000
MP6M12		O

● 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	±5.0	±5.0	A
	Pulsed	I_{DP} *1	±12	±12	A
Source current (Body Diode)	Continuous	I_s	1.6	−1.6	A
	Pulsed	I_{sp} *1	12	−12	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.

● **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	$R_{DS(on)}$*	-	30	42	mΩ	I_D=5.0A, V_{GS}=10V
		-	40	56		I_D=5.0A, V_{GS}=4.5V
		-	45	63		I_D=5.0A, V_{GS}=4.0V
Forward transfer admittance	$\|Y_{fs}\|$*	2.5	-	-	S	V_{DS}=10V, I_D=5.0A
Input capacitance	C_{iss}	-	250	-	pF	V_{DS}=10V
Output capacitance	C_{oss}	-	90	-	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	-	45	-	pF	f=1MHz
Turn-on delay time	$t_{d(on)}$*	-	6	-	ns	I_D=2.5A, V_{DD}≒15V
Rise time	t_r *	-	27	-	ns	V_{GS}=10V
Turn-off delay time	$t_{d(off)}$*	-	26	-	ns	R_L=6Ω
Fall time	t_f *	-	5	-	ns	R_G=10Ω
Total gate charge	Q_g *	-	4.0	-	nC	I_D=5.0A
Gate-source charge	Q_{gs}*	-	1.2	-	nC	V_{DD} ≒15V
Gate-drain charge	Q_{gd}*	-	1.2	-	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=5.0A, 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}=±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	$R_{DS\ (on)}$*	-	40	56	mΩ	I_D=−4.5A, V_{GS}=−10V
		-	55	77		I_D=−2.5A, V_{GS}=−4.5V
		-	60	84		I_D=−2.5A, V_{GS}=−4.0V
Forward transfer admittance	$\|Y_{fs}\|$*	2.5	-	-	S	I_D=−4.5A, V_{DS}=−10V
Input capacitance	C_{iss}	-	800	-	pF	V_{DS}=−10V
Output capacitance	C_{oss}	-	120	-	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	-	110	-	pF	f=1MHz
Turn-on delay time	$t_{d(on)}$*	-	10	-	ns	I_D=−2.5A, V_{DD}≒−15V
Rise time	t_r *	-	25	-	ns	V_{GS}=−10V
Turn-off delay time	$t_{d(off)}$*	-	80	-	ns	R_L=6.0Ω
Fall time	t_f *	-	65	-	ns	R_G=10Ω
Total gate charge	Q_g *	-	8.4		nC	I_D=−4.5A
Gate-source charge	Q_{gs}*	-	3.0	-	nC	V_{DD}≒−15V
Gate-drain charge	Q_{gd}*	-	3.5	-	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=−4.5A, V_{GS}=0V

*Pulsed

●Electrical characteristic curves (Ta=25°C)

〈Tr.1(Nch)〉

Fig.1 Typical Output Characteristics (I)

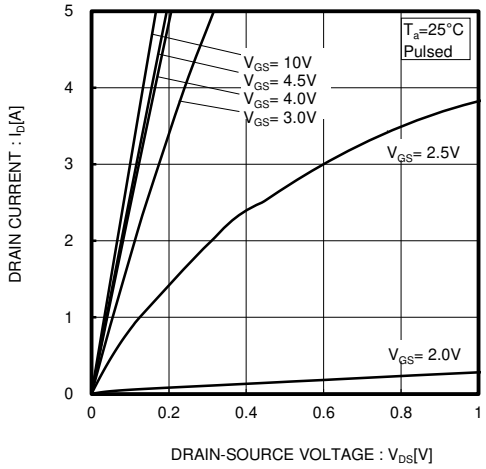


Fig.2 Typical Output Characteristics (II)

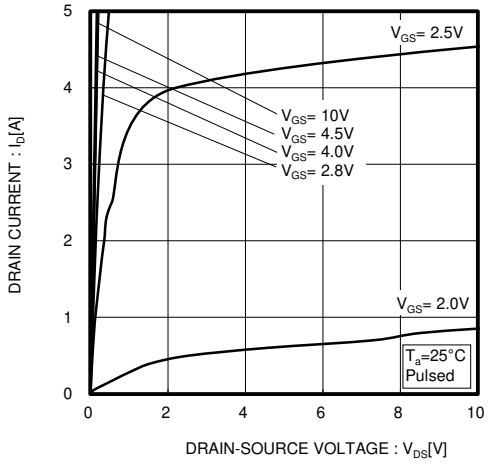


Fig.3 Typical Transfer Characteristics

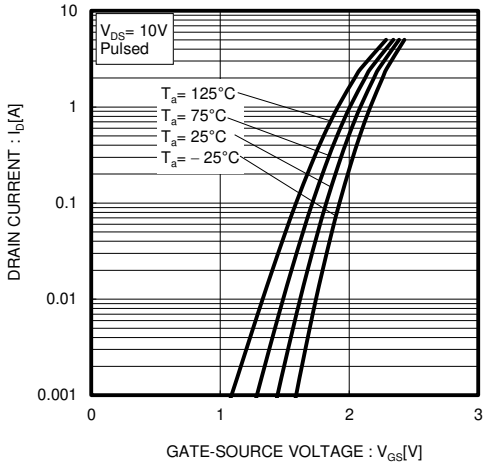


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (I)

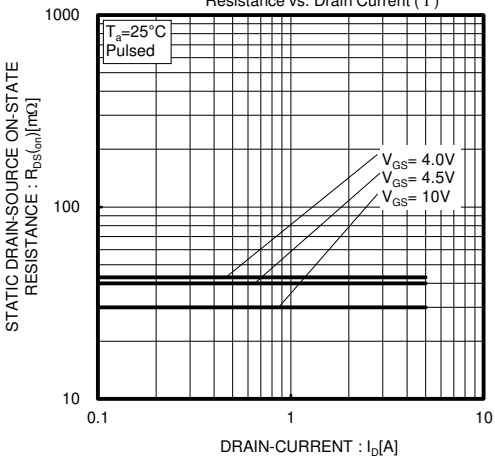


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (II)

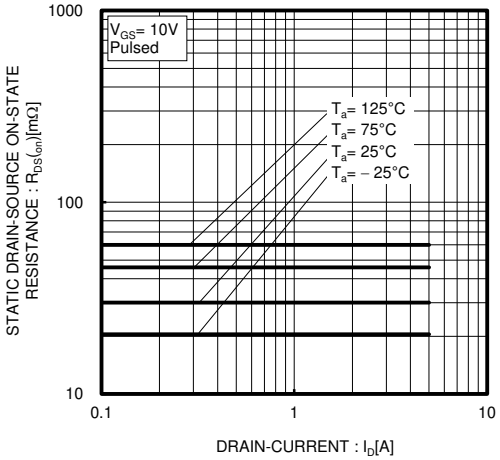


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (III)

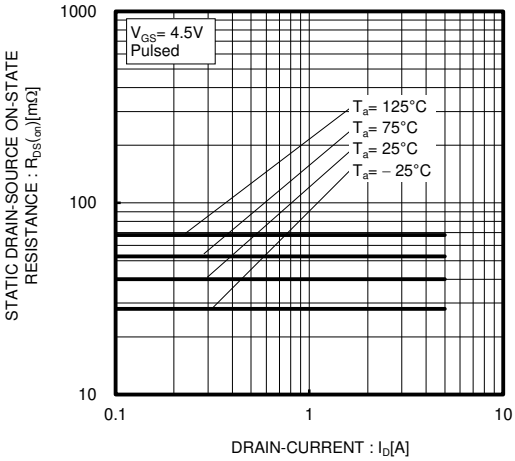


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (Ⅳ)

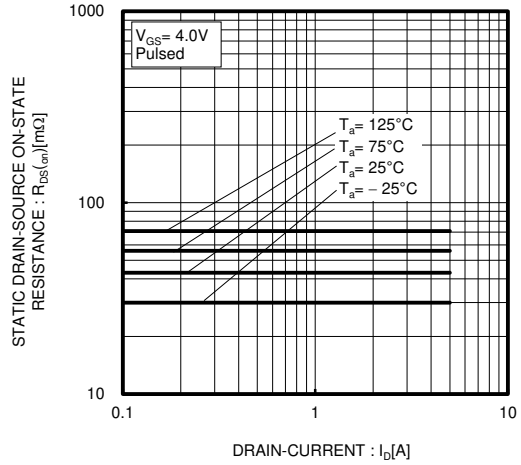


Fig.8 Forward Transfer Admittance vs. Drain Current

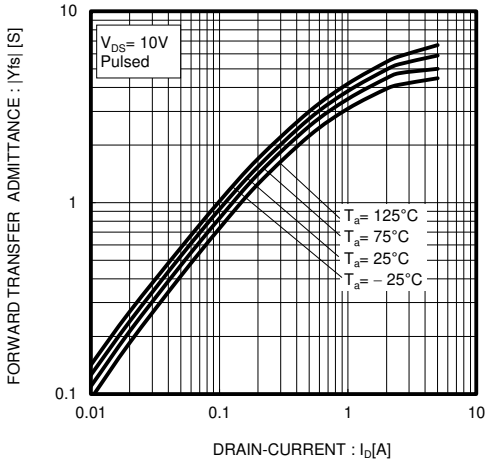


Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

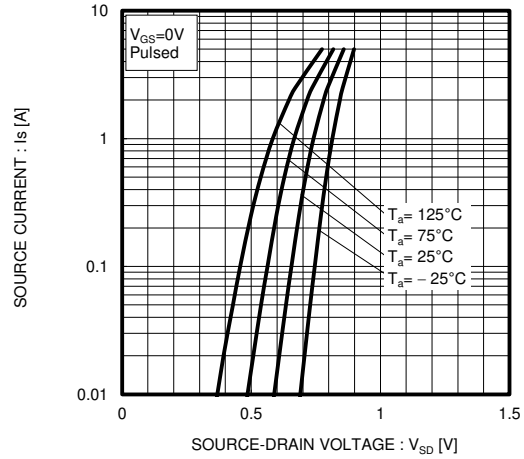


Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

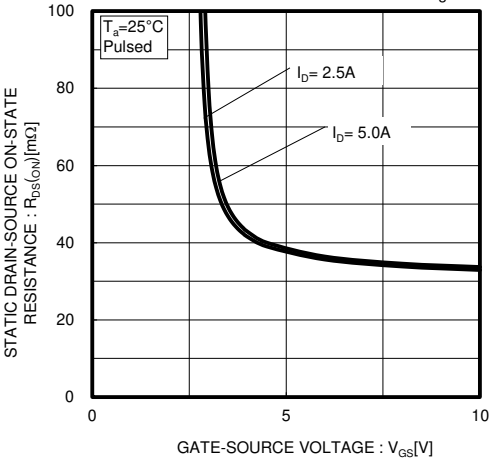


Fig.11 Switching Characteristics

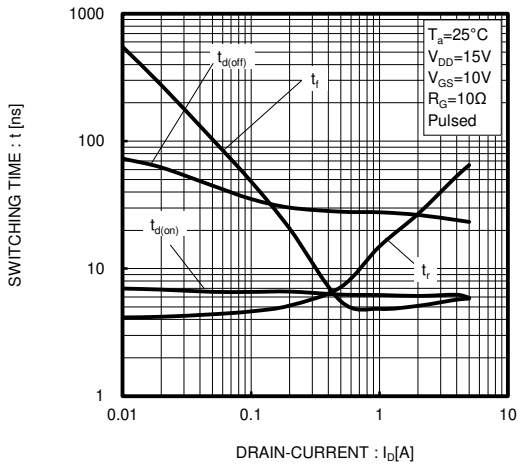


Fig.12 Dynamic Input Characteristics

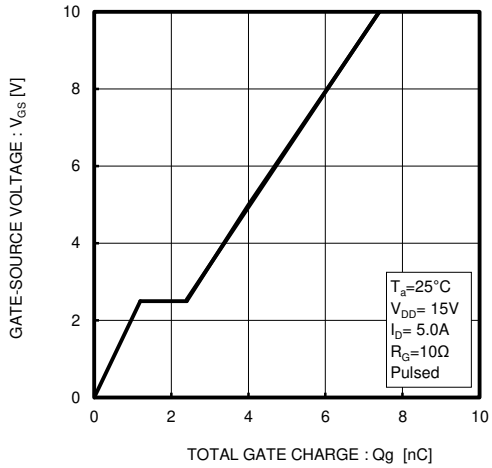


Fig.13 Typical Capacitance vs. Drain-Source Voltage

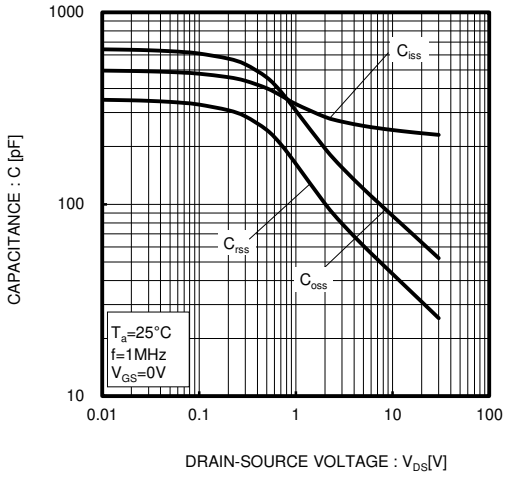


Fig.14 Maximum Safe Operating Area

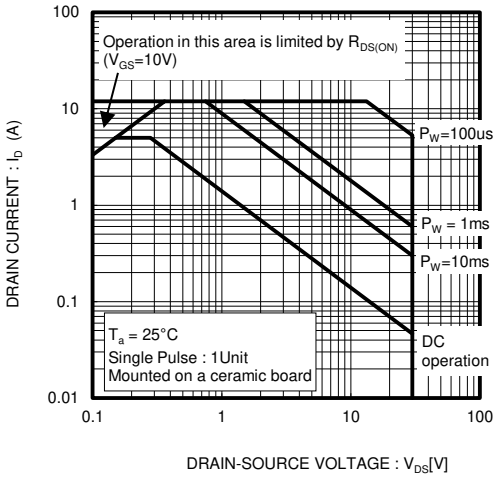
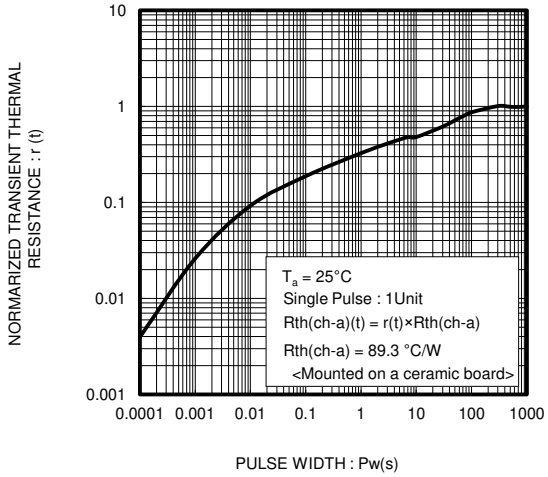


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



〈Tr.2(Pch)〉

Fig.1 Typical Output Characteristics(Ⅰ)

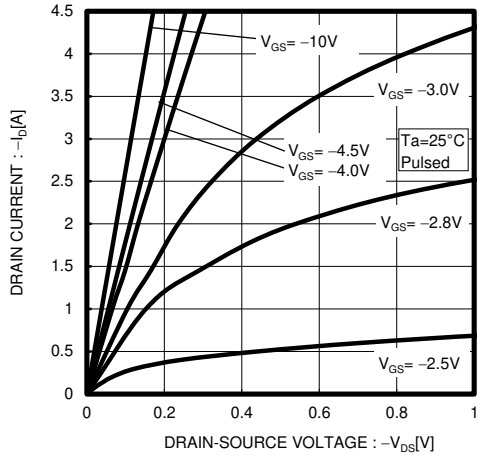


Fig.2 Typical Output Characteristics(Ⅱ)

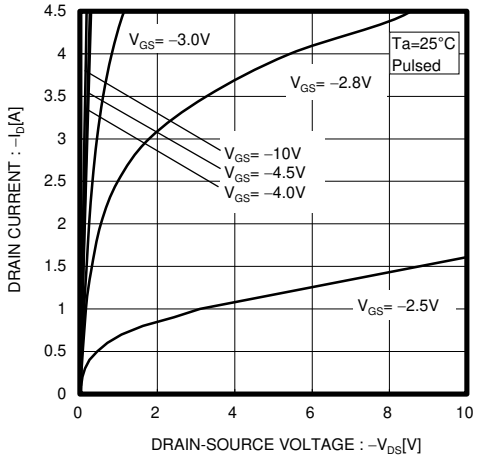


Fig.3 Typical Transfer Characteristics

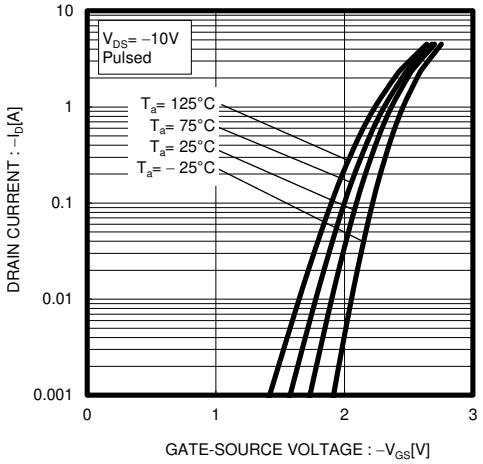


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

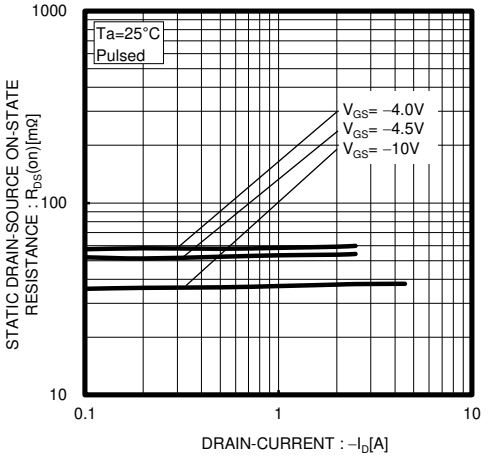


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

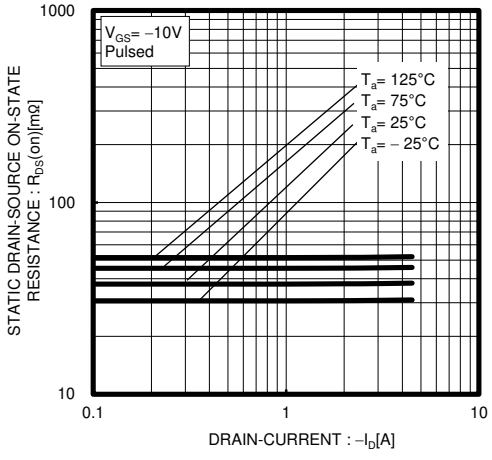


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

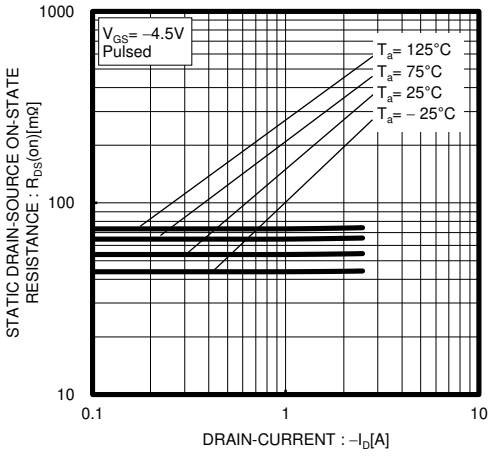


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

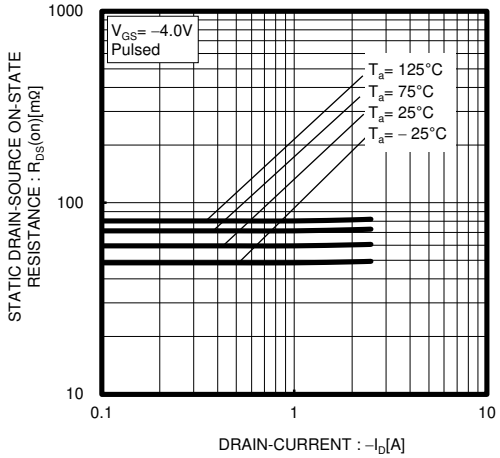


Fig.8 Forward Transfer Admittance vs. Drain Current

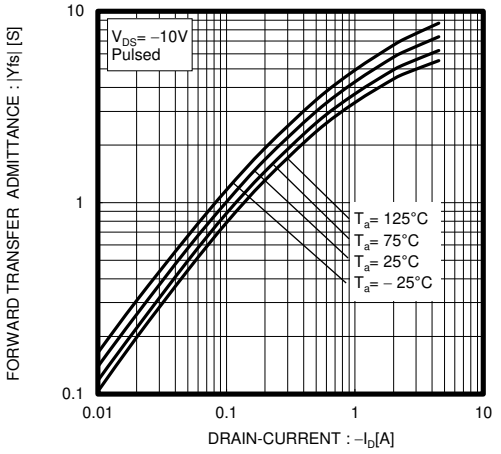


Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

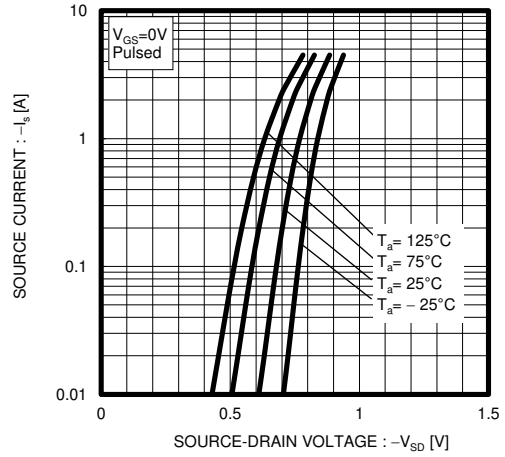


Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

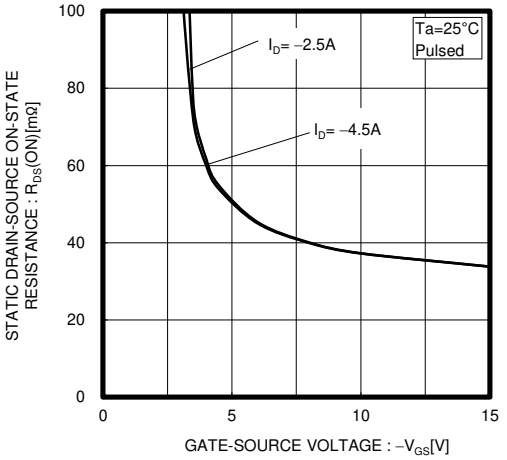


Fig.11 Switching Characteristics

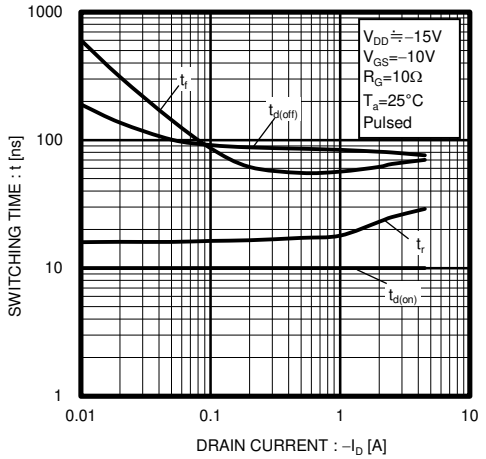


Fig.12 Dynamic Input Characteristics

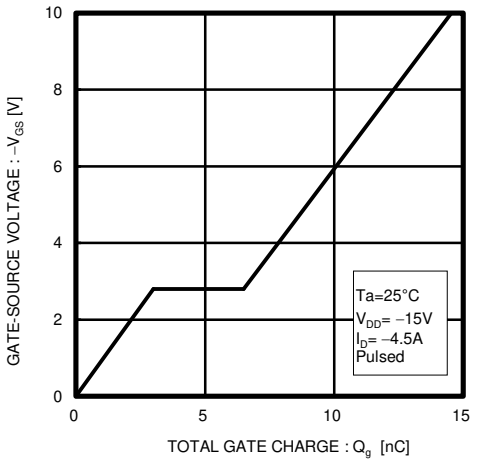


Fig.13 Typical Capacitance vs. Drain-Source Voltage

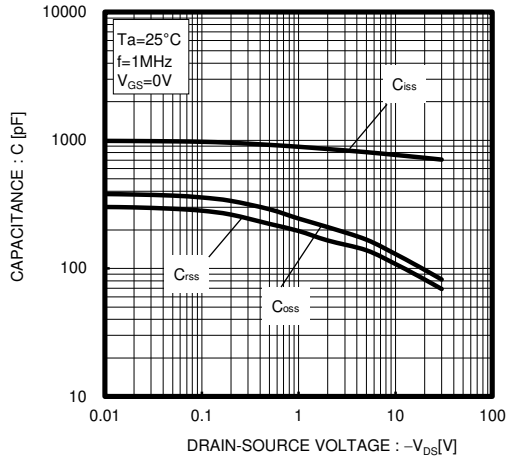


Fig.14 Maximum Safe Operating Area

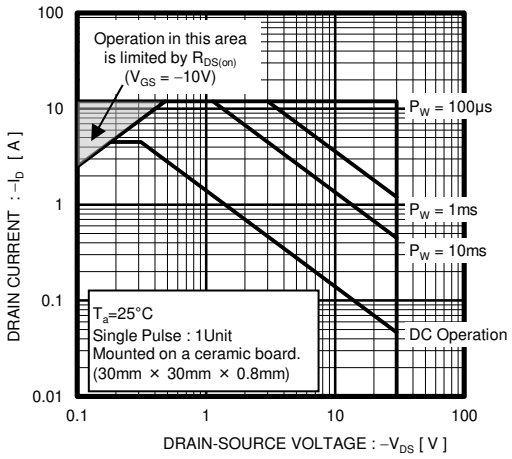
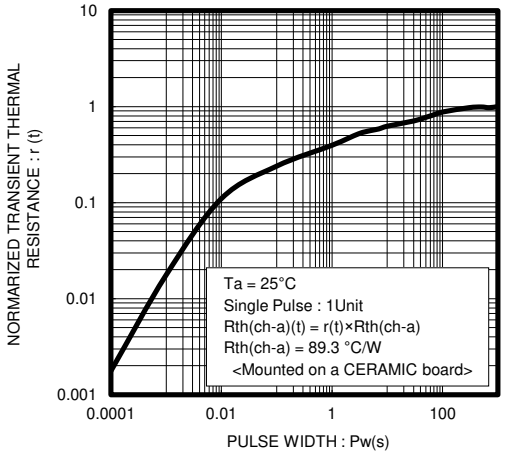


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



● Measurement circuits

<Tr1(Nch)>

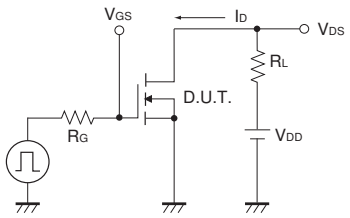


Fig.1-1 Switching Time Measurement Circuit

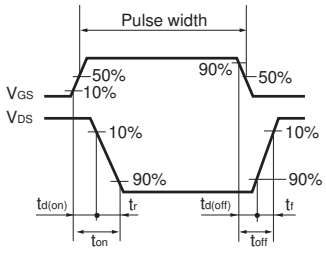


Fig.1-2 Switching Waveforms

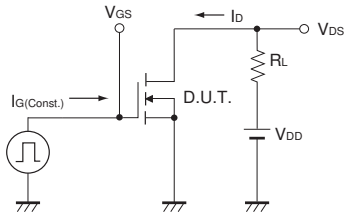


Fig.2-1 Gate Charge Measurement Circuit

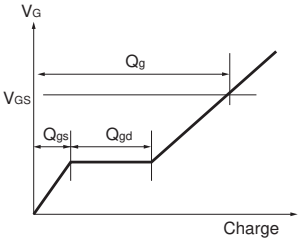


Fig.2-2 Gate Charge Waveform

<Tr2(Pch)>

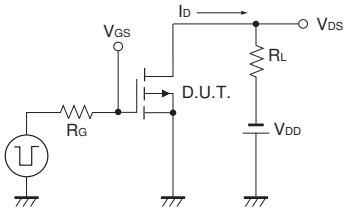


Fig.1-1 Switching Time Measurement Circuit

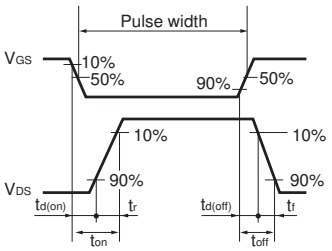


Fig.1-2 Switching Waveforms

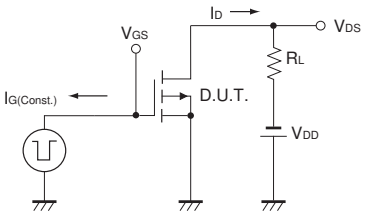


Fig.2-1 Gate Charge Measurement Circuit

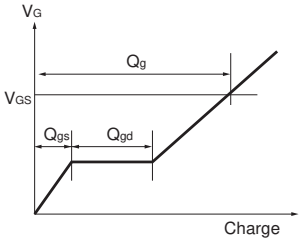


Fig.2-2 Gate Charge Waveform

● Notice

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

Notes

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