

10V Drive Nch MOSFET

R4008AND

● **Structure**

Silicon N-channel MOSFET

● **Features**

- 1) Low on-resistance.
- 2) High-speed switching.
- 3) Wide SOA.
- 4) Drive circuits can be simple.
- 5) Parallel use is easy.

● **Application**

Switching

● **Packaging specifications**

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	2500
R4008AND		○

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

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V_{DSS}	400	V	
Gate-source voltage	V_{GSS}	±30	V	
Drain current	Continuous	I_D *4	±8	A
	Pulsed	I_{DP}	±32 *1 ±48 *2	A
Source current (Body Diode)	Continuous	I_S *4	8	A
	Pulsed	I_{SP}	32 *1 48 *2	A
Avalanche current	I_{AS} *3	4	A	
Avalanche energy	E_{AS} *3	4.3	mJ	
Power dissipation	P_D *5	20	W	
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 $P_w \leq 1 \mu s$, Duty cycle $\leq 1\%$ Limited by Safe Operating Area. ($V_{DS} \leq 30V$)

*3 $L = 500 \mu H$, $V_{DD} = 50V$, $R_G = 25 \Omega$, $T_{ch} = 25^\circ C$

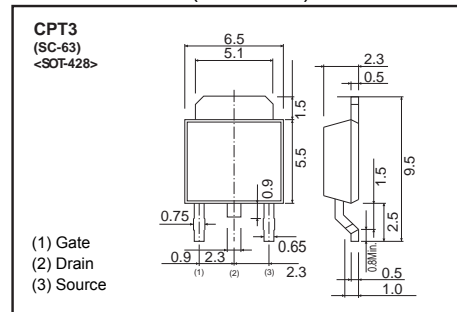
*4 Limited only by maximum temperature allowed.

*5 $T_C = 25^\circ C$

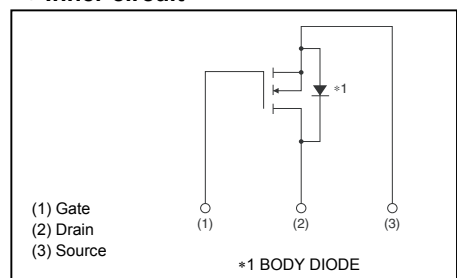
● **Thermal resistance**

Parameter	Symbol	Limits	Unit
Channel to Case	$R_{th(ch-c)}$	6.25	°C / W

● **Dimensions (Unit : mm)**



● **Inner circuit**



● Electrical characteristics (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	±100	nA	$V_{GS}=\pm 30V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	400	-	-	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	-	-	100	μA	$V_{DS}=400V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	2.5	-	4.5	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	-	0.73	0.95	Ω	$I_D=4A, V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} ^*$	2	-	-	S	$V_{DS}=10V, I_D=4A$
Input capacitance	C_{iss}	-	500	-	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	-	280	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	25	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	20	-	ns	$V_{DD}\approx 200V, I_D=4A$
Rise time	t_r^*	-	20	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	-	48	-	ns	$R_L=50\Omega$
Fall time	t_f^*	-	16	-	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	-	15	-	nC	$V_{DD}\approx 200V$
Gate-source charge	Q_{gs}^*	-	3.5	-	nC	$I_D=8A$
Gate-drain charge	Q_{gd}^*	-	7	-	nC	$V_{GS}=10V$

*Pulsed

● Body diode characteristics (Source-Drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD}^*	-	-	1.5	V	$I_S=8A, V_{GS}=0V$

*Pulsed

●Electrical characteristic curves

Fig.1 Maximum Safe Operating Area

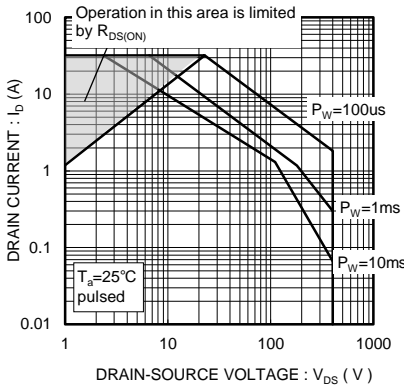


Fig.2 Typical Output Characteristics (I)

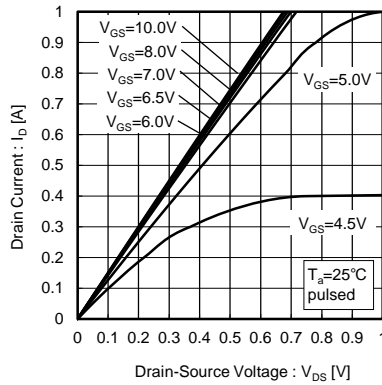


Fig.3 Typical Output Characteristics (II)

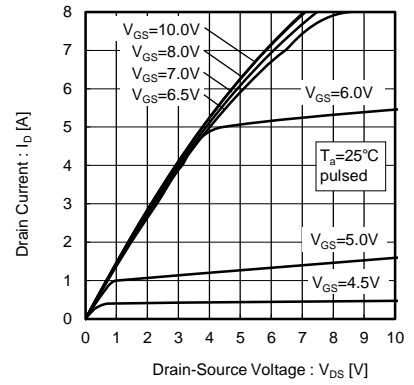


Fig.4 Typical Transfer Characteristics

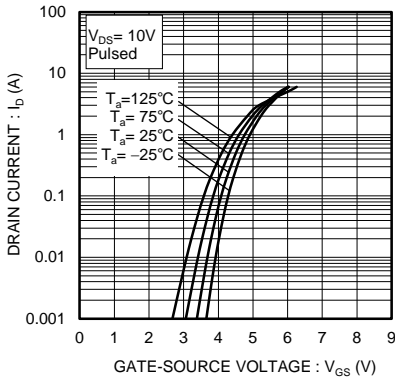


Fig.5 Gate Threshold Voltage vs. Channel Temperature

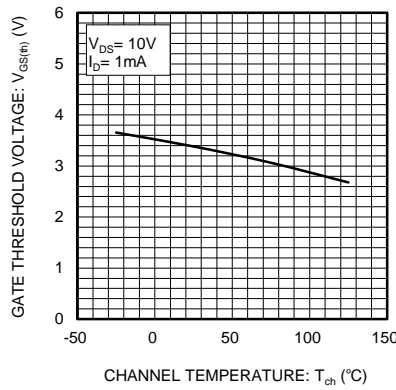


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

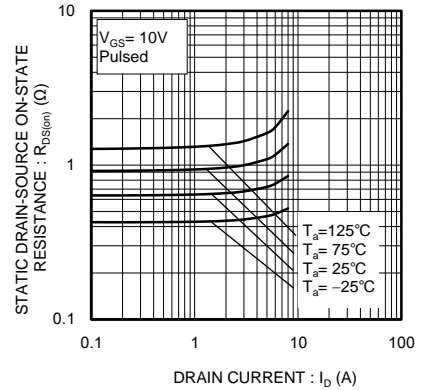


Fig.7 Static Drain-Source On-State Resistance vs. Gate Source Voltage

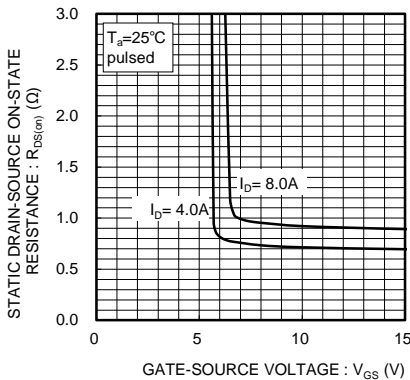


Fig.8 Static Drain-Source On-State Resistance vs. Channel Temperature

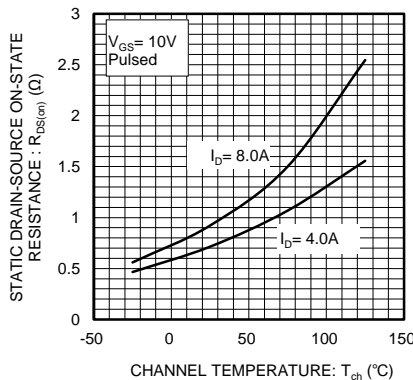


Fig.9 Forward Transfer Admittance vs. Drain Current

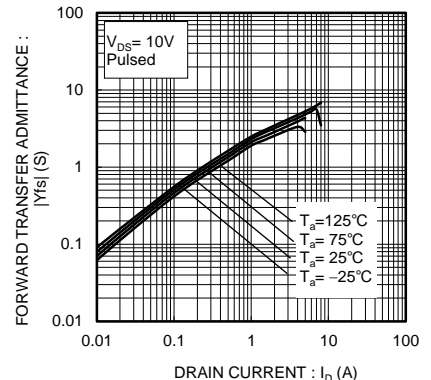


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

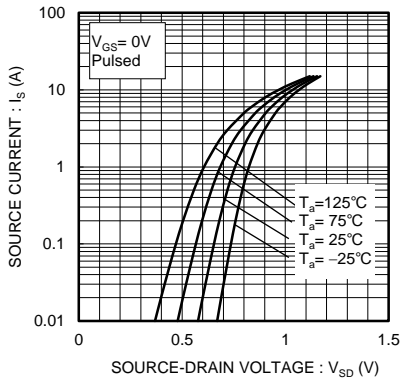


Fig.11 Typical Capacitance vs. Drain-Source Voltage

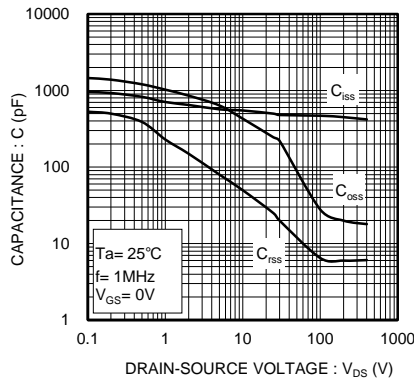


Fig.12 Dynamic Input Characteristics

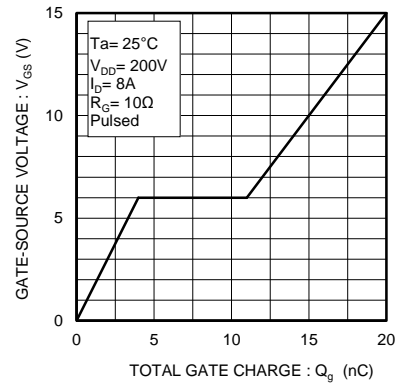


Fig.13 Reverse Recovery Time vs. Source Current

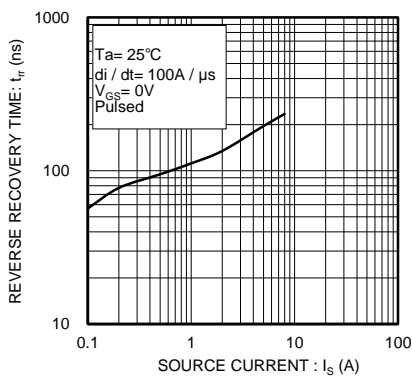


Fig.14 Switching Characteristics

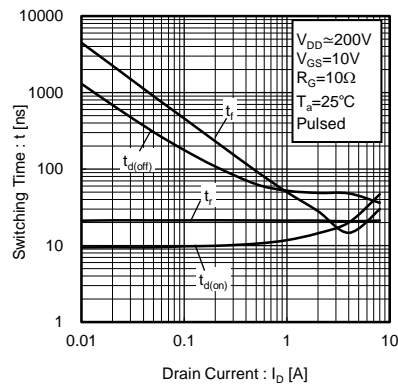
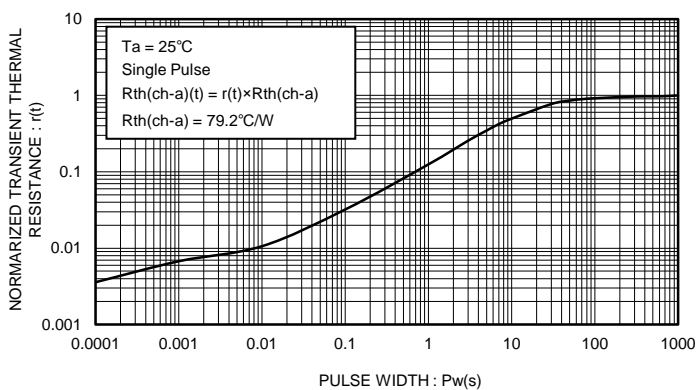


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



● Measurement circuits

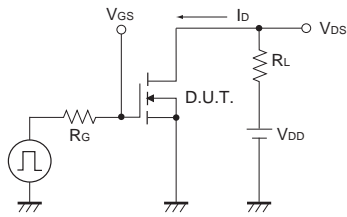


Fig.1-1 Switching Time Measurement Circuit

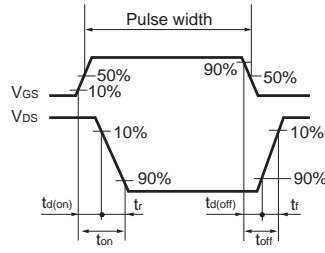


Fig.1-2 Switching Waveforms

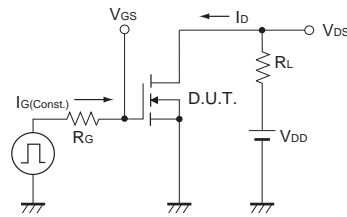


Fig.2-1 Gate Charge Measurement Circuit

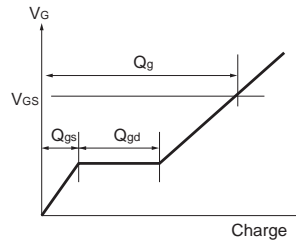


Fig.2-2 Gate Charge Waveform

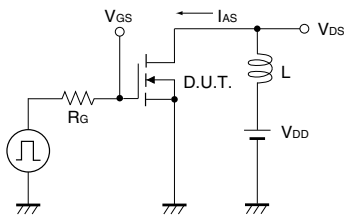


Fig.3-1 Avalanche Measurement Circuit

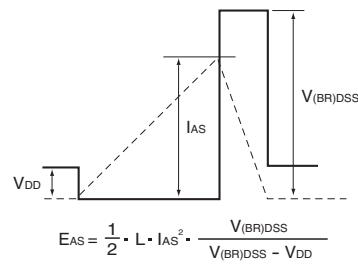


Fig.3-2 Avalanche Waveform

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