

10V Drive Nch MOSFET

R5009ANX

●Structure

Silicon N-channel MOSFET

●Features

- 1) Low on-resistance.
- 2) Fast switching speed.
- 3) Wide SOA (safe operating area).
- 4) Gate-source voltage (V_{GS}) guaranteed to be $\pm 30V$.
- 5) Drive circuits can be simple.
- 6) Parallel use is easy.

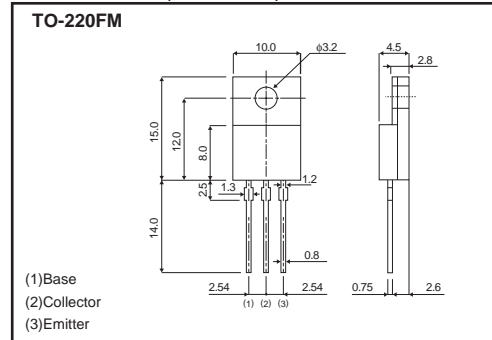
●Applications

Switching

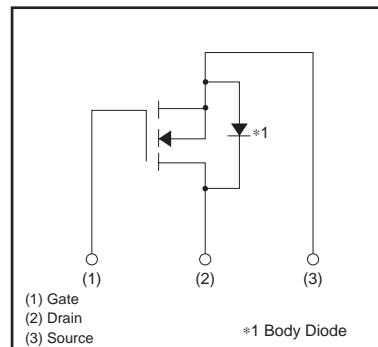
●Packaging specifications

Type	Package	Bulk
		Code
	Basic ordering unit (pieces)	500
R5009ANX		○

●Dimensions (Unit : mm)



●Inner circuit



●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V_{DS}	500	V	
Gate-source voltage	V_{GS}	± 30	V	
Drain current	Continuous	I_D *3	± 9	A
	Pulsed	I_{DP} *1	± 36	A
Source current (Body Diode)	Continuous	I_S *3	9	A
	Pulsed	I_{SP} *1	36	A
Avalanche Current	I_{AS} *2	4.5	A	
Avalanche Energy	E_{AS} *2	5.4	mJ	
Total power dissipation (Tc=25°C)	P_D	50	W	
Channel temperature	Tch	150	°C	
Range of storage temperature	Tstg	-55 to +150	°C	

*1 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$
 *2 $L = 500\mu H$, $V_{DS} = 50V$, $R_G = 25\Omega$, Starting, Tch = 25°C
 *3 Limited only by maximum temperature allowed

●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to case	Rth(ch-c)	2.5	°C/W

●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	$V_{(BR)DSS}$	500	–	–	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	–	–	100	μA	$V_{DS}=500V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	2.5	–	4.5	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	–	0.55	0.72	Ω	$I_D=4.5A, V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} ^*$	2.5	–	–	S	$I_D=4.5A, V_{DS}=10V$
Input capacitance	C_{iss}	–	650	–	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	–	400	–	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	–	30	–	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	–	30	–	ns	$I_D=4.5A, V_{DD}=250V$
Rise time	t_r^*	–	20	–	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	–	62	–	ns	$R_L=55.6\Omega$
Fall time	t_f^*	–	28	–	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	–	21	–	nC	$V_{DD}=250V$
Gate-source charge	Q_{gs}^*	–	5	–	nC	$I_D=9A$ $V_{GS}=10V$
Gate-drain charge	Q_{gd}^*	–	9	–	nC	$R_L=27.8\Omega / R_G=10\Omega$

* Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}^*	–	–	1.5	V	$I_S=9A, V_{GS}=0V$

* Pulsed

●Electrical characteristic curves

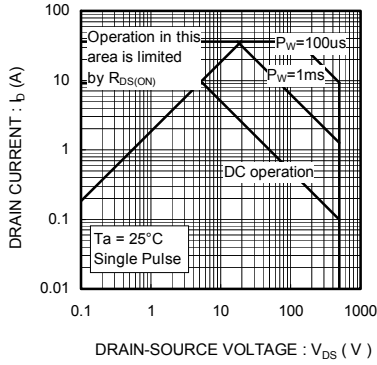


Fig.1 Maximum Safe Operating Area

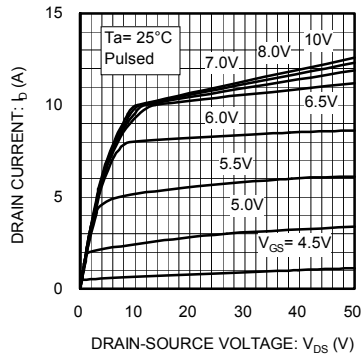


Fig.2 Typical Output Characteristics (I)

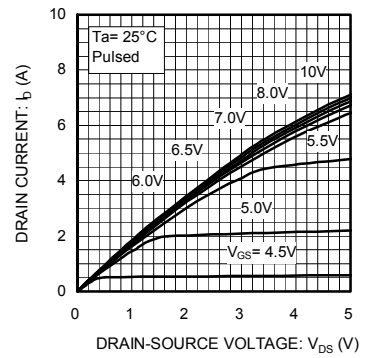


Fig.3 Typical Output Characteristics (II)

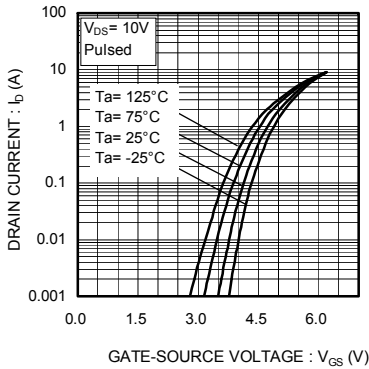


Fig.4 Typical Transfer Characteristics

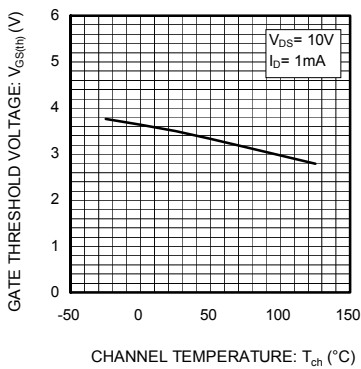


Fig.5 Gate Threshold Voltage vs. Channel Temperature

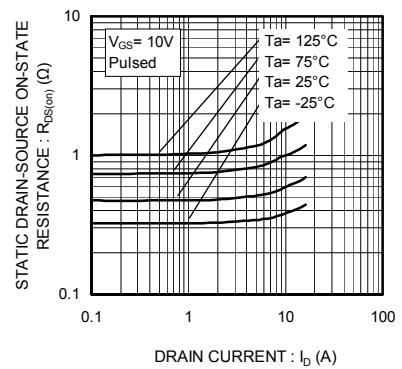


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

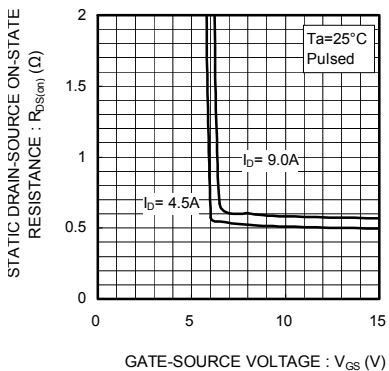


Fig.7 Static Drain-Source On-State Resistance vs. Gate Source Voltage

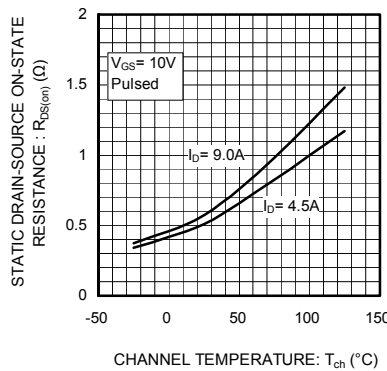


Fig.8 Static Drain-Source On-State Resistance vs. Channel Temperature

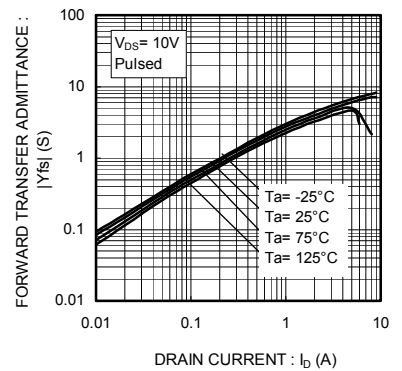


Fig.9 Forward Transfer Admittance vs. Drain Current

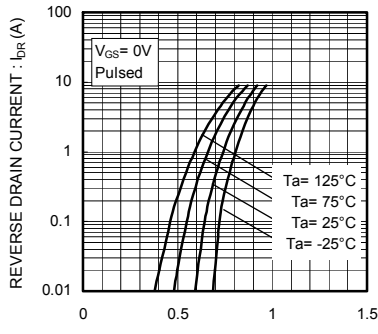


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

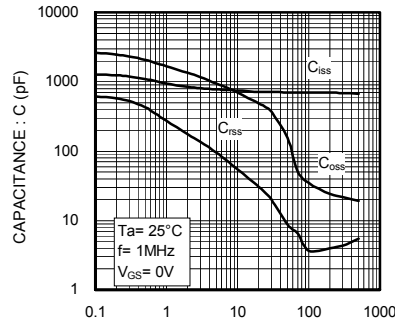


Fig.11 Typical Capacitance vs. Drain-Source Voltage

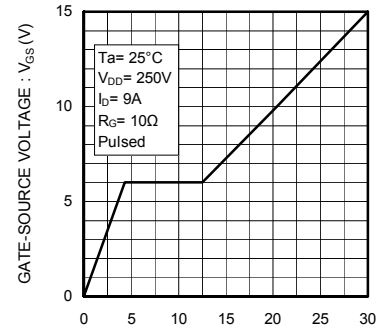


Fig.12 Dynamic Input Characteristics

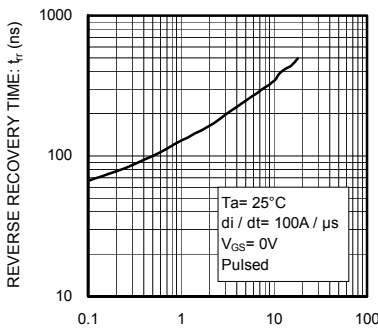


Fig.13 Reverse Recovery Time vs. Reverse Drain Current

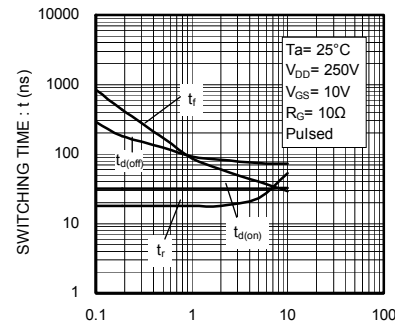


Fig.14 Switching Characteristics

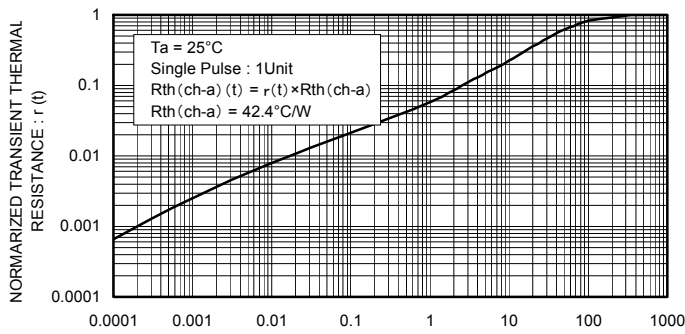


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width

●Switching characteristics measurement circuit

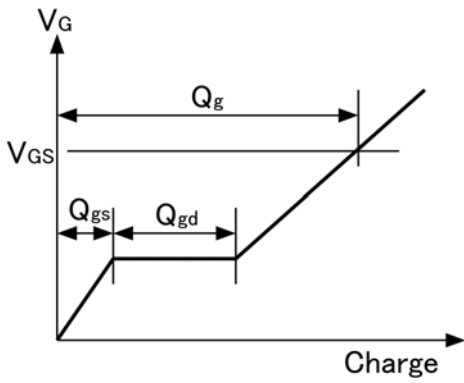


Fig.1 Switching time measurement circuit

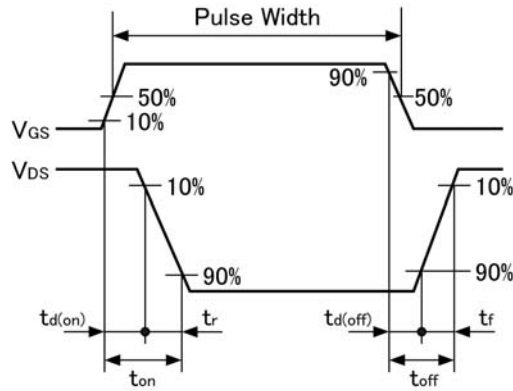


Fig.2 Switching waveforms

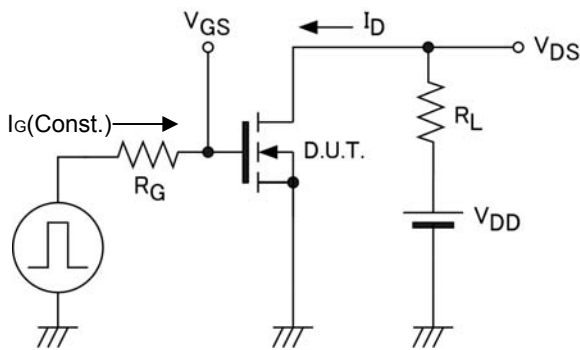


Fig.3 Gate charge measurement circuit

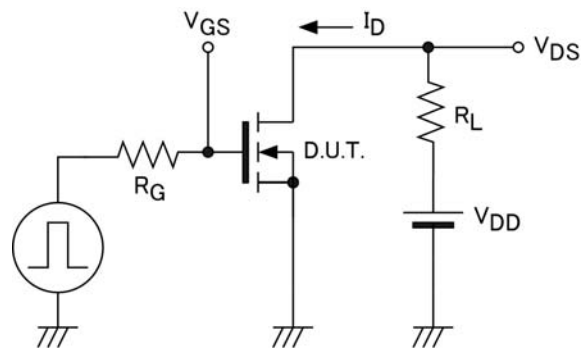


Fig.4 Gate charge waveform

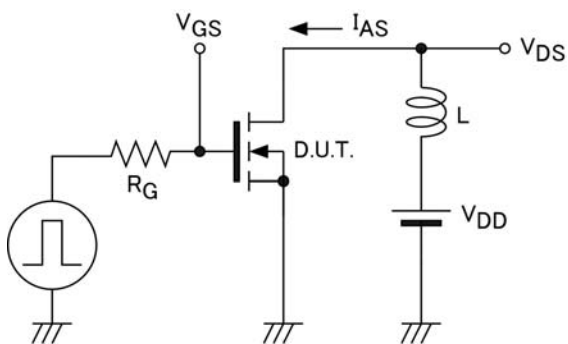


Fig.5 Avalanche measurement circuit

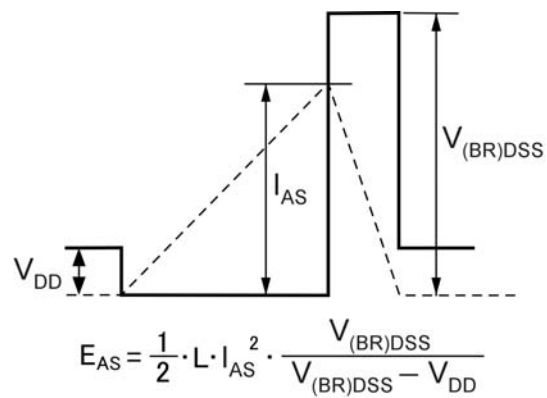


Fig.6 Avalanche waveform

Notes

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