

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.

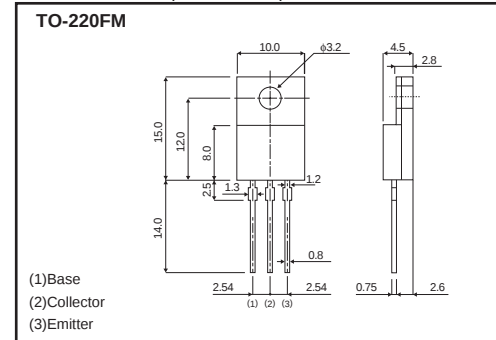
●Applications

Switching

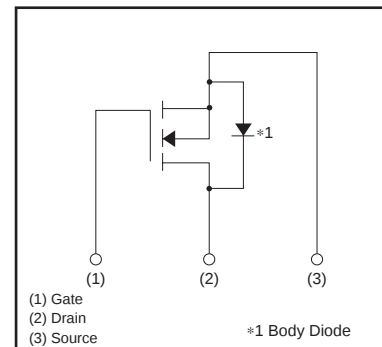
●Packaging specifications

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	A
	Pulsed	I_{DP} *1	A
Source current (Body Diode)	Continuous	I_S *3	A
	Pulsed	I_{SP} *1	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	T_{ch}	150	°C
Range of storage temperature	T_{stg}	-55 to +150	°C

*1 $P_w \leq 10W$, Duty cycle $\leq 1\%$
 *2 $L \approx 500\mu H$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting, $T_{ch} = 25^\circ C$
 *3 Limited only by maximum temperature allowed

●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to case	$R_{th(ch-c)}$	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	$I_D=4.5A$, $V_{DD}\approx 250V$
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	$V_{DD}\approx 250V$
Gate-source charge	Q_{gs}^*	—	5	—	nC	$I_D=9A$
Gate-drain charge	Q_{gd}^*	—	9	—	nC	$V_{GS}=10V$ $R_L=27.8\Omega$ / $R_G=10\Omega$

* 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

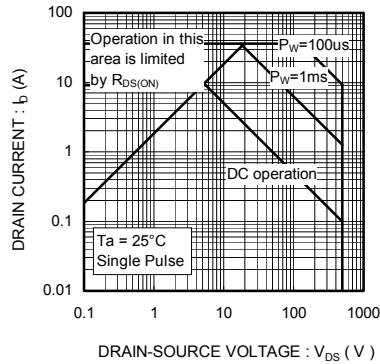


Fig.1 Maximum Safe Operating Area

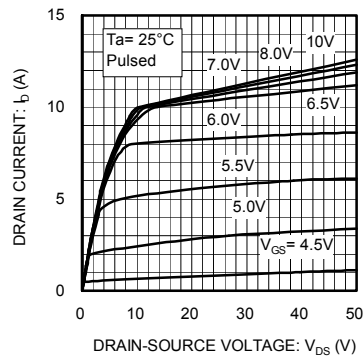


Fig.2 Typical Output Characteristics(I)

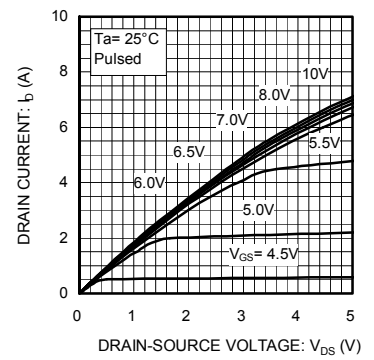


Fig.3 Typical Output Characteristics(II)

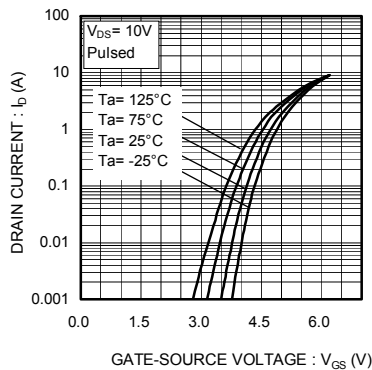


Fig.4 Typical Transfer Characteristics

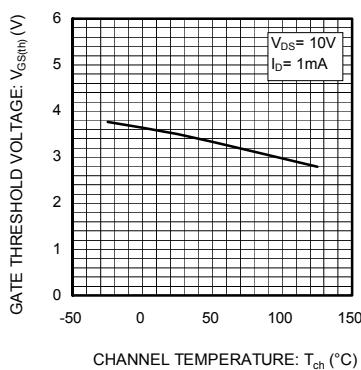


Fig.5 Gate Threshold Voltage vs. Channel Temperature

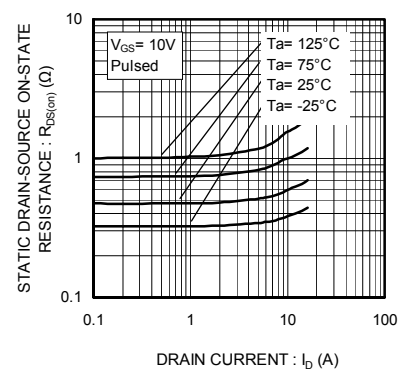


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

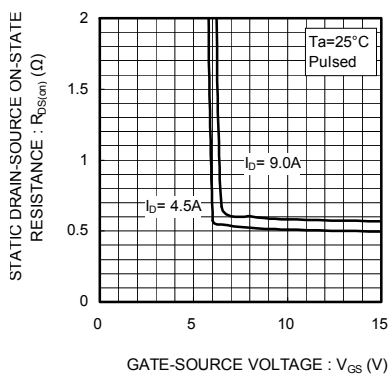


Fig.7 Static Drain-Source On-State Resistance vs. Gate Source Voltage

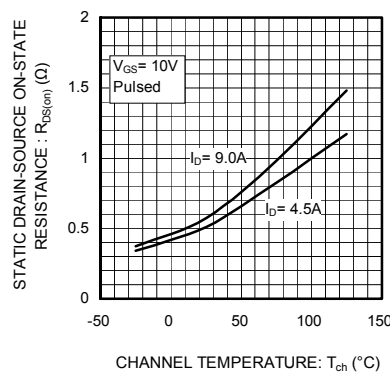


Fig.8 Static Drain-Source On-State Resistance vs. Channel Temperature

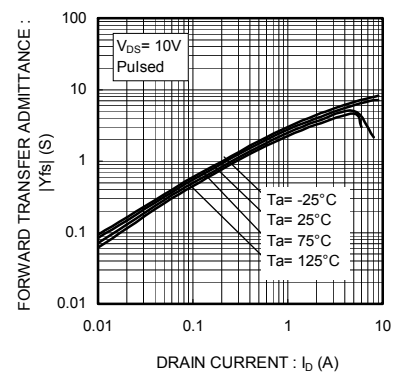


Fig.9 Forward Transfer Admittance vs. Drain Current

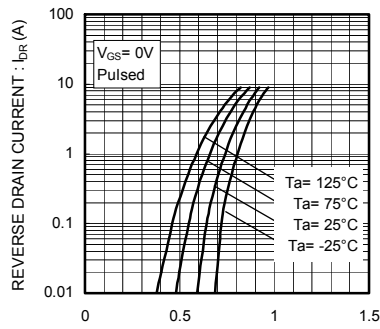
SOURCE-DRAIN VOLTAGE : V_{SD} (V)

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

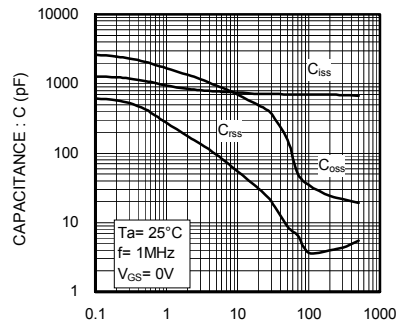
DRAIN-SOURCE VOLTAGE : V_{DS} (V)

Fig.11 Typical Capacitance vs. Drain-Source Voltage

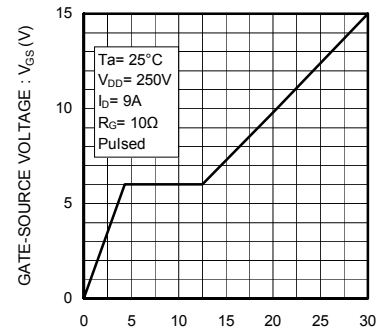
TOTAL GATE CHARGE : Q_g (nC)

Fig.12 Dynamic Input Characteristics

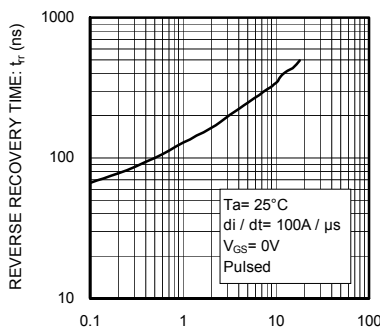
REVERSE DRAIN CURRENT : I_{DR} (A)

Fig.13 Reverse Recovery Time vs. Reverse Drain Current

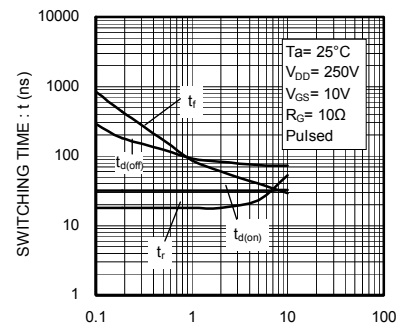
DRAIN CURRENT : I_D (A)

Fig.14 Switching Characteristics

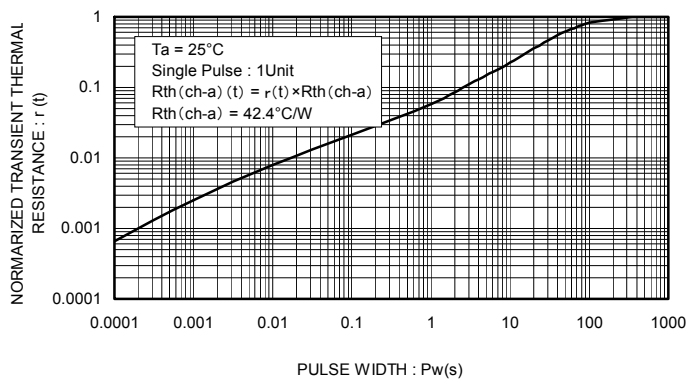
PULSE WIDTH : Pw (s)

Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width

●Switching characteristics measurement circuit

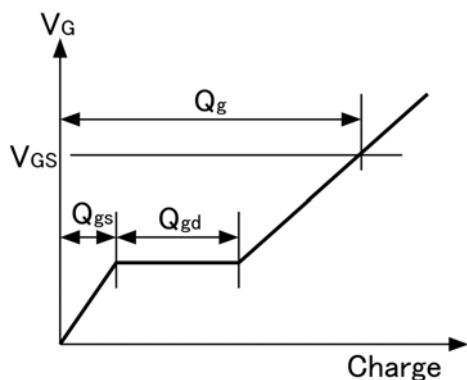


Fig.1 Switching time measurement circuit

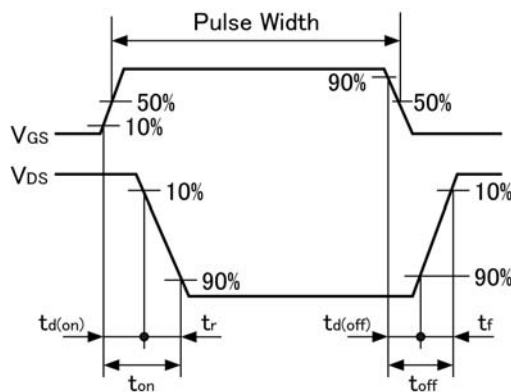


Fig.2 Switching waveforms

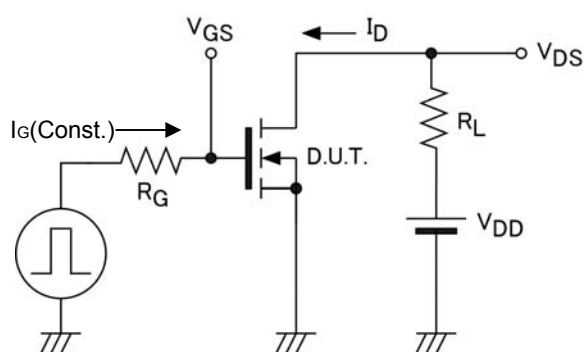


Fig.3 Gate charge measurement circuit

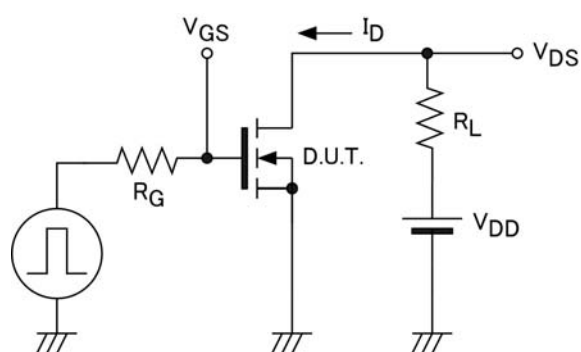


Fig.4 Gate charge waveform

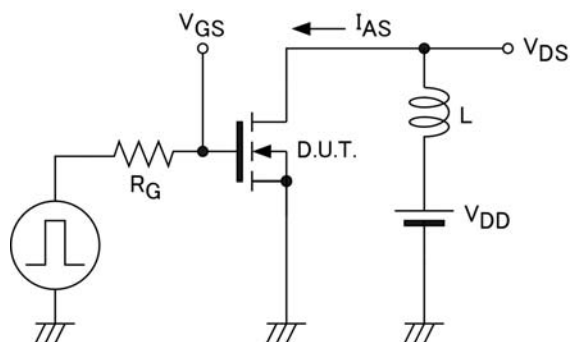


Fig.5 Avalanche measurement circuit

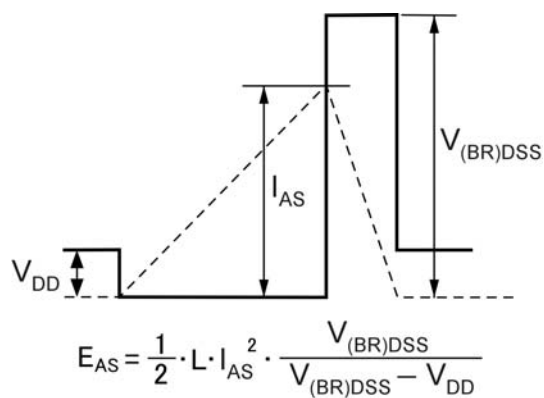


Fig.6 Avalanche waveform

Notes

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