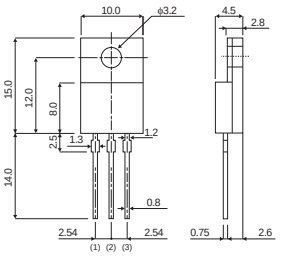
10V Drive Nch MOSFET

R5009FNX

● Structure
Silicon N-channel MOSFET

● Dimensions (Unit : mm)

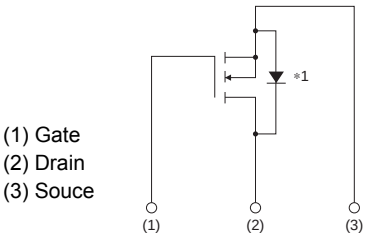
TO-220FM



●Features
1)Fast reverse recovery time (t_{rr})
2) Low on-resistance.
3) Fast switching speed.
4) Gate-source voltage
V_{GSS} garanteed to be ±30V .
5) Drive circuits can be simple.
6) Parallel use is easy.

● Application
Switching

●Inner circuit



*1 Body Diode

● Packaging specifications

Type	Package	Bulk
	Basic ordering unit (pieces)	500
R5009FNX		○

● Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DSS}	500	V
Gate-source voltage		V_{GSS}	±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
Power dissipation (Tc=25℃)		P_D	50	W
Channel temperature		Tch	150	°C
Range of storage temperature		Tstg	−55 to +150	°C

*1 Pw≤10μs, Duty cycle≤1%

*2 L≒500μH, V_{DD}=50V, Rg=25Ω,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}=±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	uA	V_{DS}=500V, V_{GS}=0V
Gate threshold voltage	$V_{GS\ (th)}$	2.0	-	4.0	V	V_{DS}=10V, I_D=1mA
Static drain-source on-state resistance	$R_{DS\ (on)}$*	-	0.65	0.84	Ω	I_D=4.5A, V_{GS}=10V
Forward transfer admittance	$\|Y_{fs}\|$*	4.0	5.7	-	S	I_D=4.5A, V_{DS}=10V
Input capacitance	C_{iss}	-	630	-	pF	V_{DS}=25V
Output capacitance	C_{oss}	-	400	-	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	-	25	-	pF	f=1MHz
Turn-on delay time	$t_{d(on)}$ *	-	24	-	ns	I_D=4.5A, V_{DD}≒ 250V
Rise time	t_r *	-	20	-	ns	V_{GS}=10V
Turn-off delay time	$t_{d(off)}$ *	-	50	-	ns	R_L=55.6Ω
Fall time	t_f *	-	40	-	ns	R_G=10Ω
Total gate charge	Q_g *	-	18	-	nC	I_D=9.0A, V_{DD}≒ 250V
Gate-source charge	Q_{gs} *	-	3.5	-	nC	V_{GS}=10V
Gate-drain charge	Q_{gd} *	-	5.5	-	nC	

*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=9.0A, V_{GS}=0V
Reverse Recovery Time	t_{rr} *	48	78	108	ns	I_s=9.0A, di/dt=100A/μs

*Pulsed

●Electrical characteristics curves

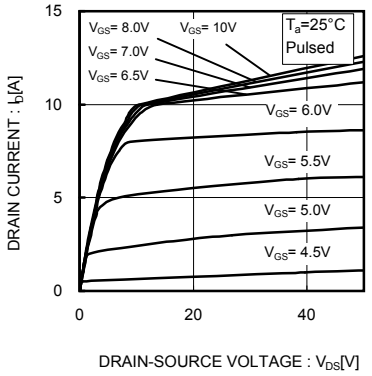


Fig.1 Typical Output Characteristics(Ⅰ)

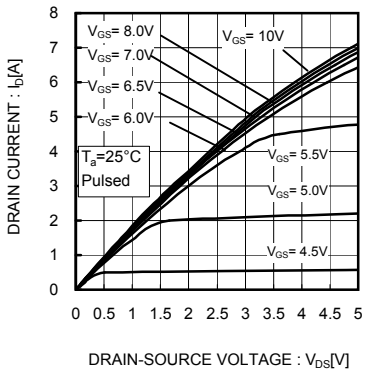


Fig.2 Typical Output Characteristics(Ⅱ)

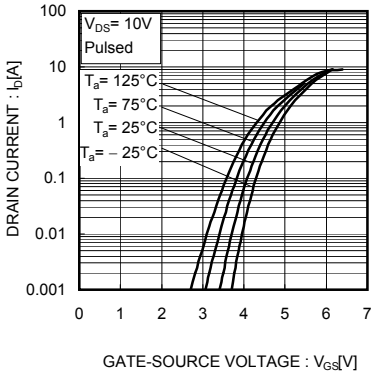


Fig.3 Typical Transfer Characteristics

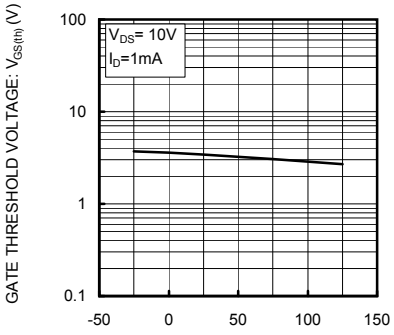


Fig.4 Gate Threshold Voltage vs. Channel Temperature

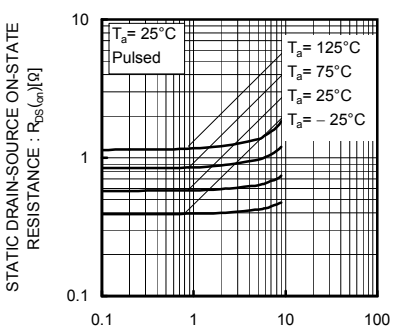


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

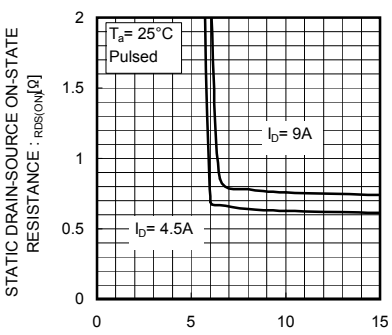


Fig.6 Static Drain-Source On-State Resistance vs. Gate Source Voltage

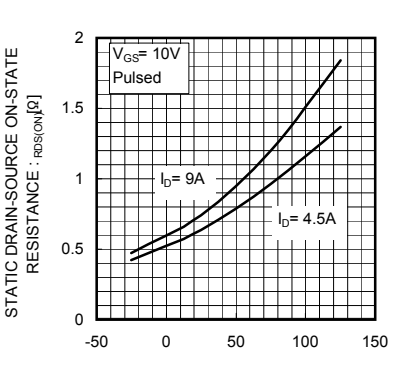


Fig.7 Static Drain-Source On-State Resistance vs. Channel Temperature

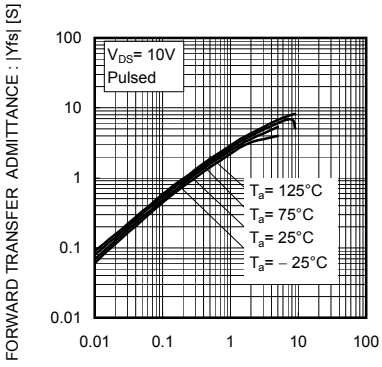


Fig.8 Forward Transfer Admittance vs. Drain Current

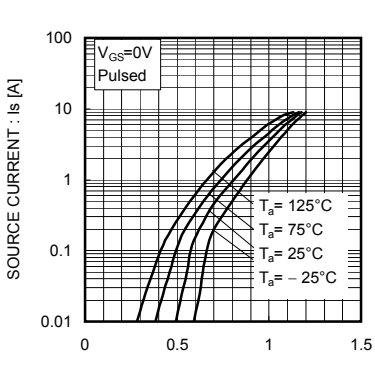


Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

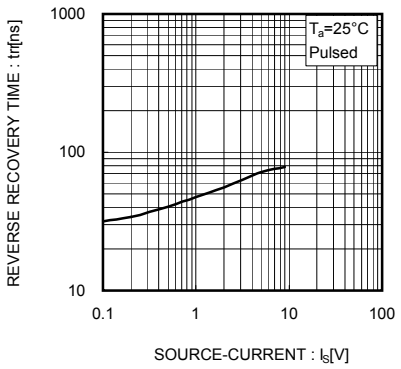


Fig.10 Reverse Recovery Time vs. Source Current

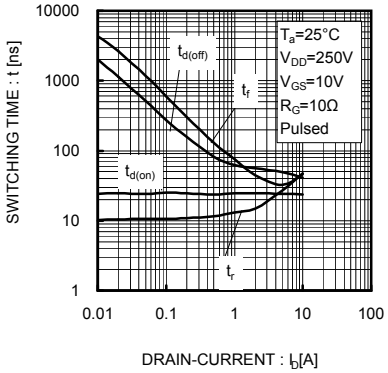


Fig.11 Switching Characteristics

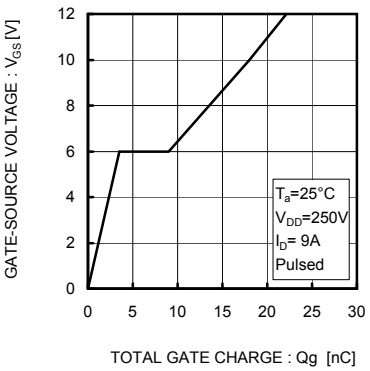


Fig.12 Dynamic Input Characteristics

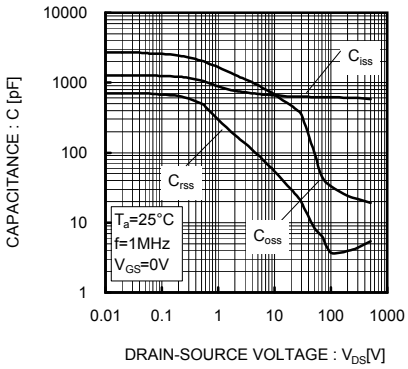


Fig.13 Typical Capacitance vs. Drain-Source Voltage

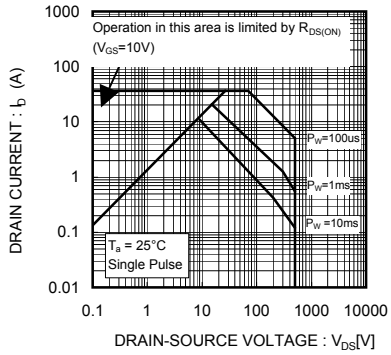


Fig.14 Maximum Safe Operating Aera

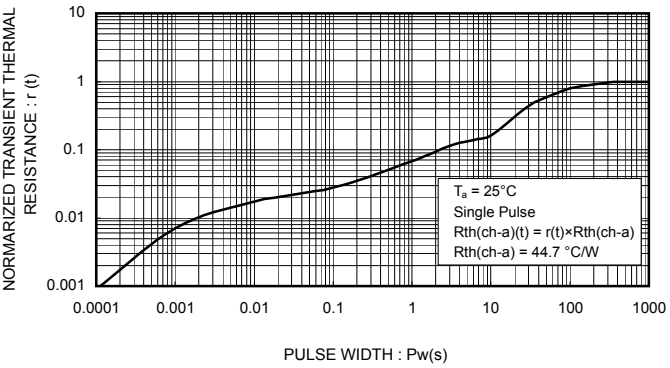


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width

● **Measurement circuits**

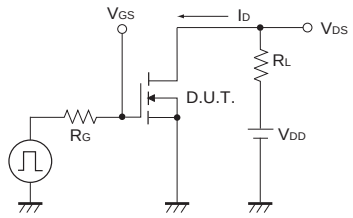


Fig.1-1 Switching Time Measurement Circuit

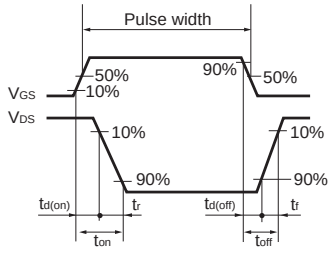


Fig.1-2 Switching Waveforms

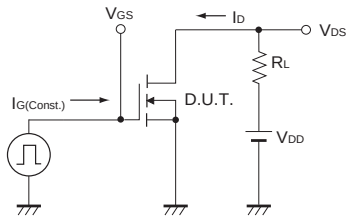


Fig.2-1 Gate Charge Measurement Circuit

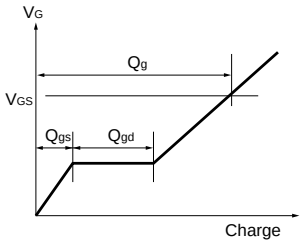


Fig.2-2 Gate Charge Waveform

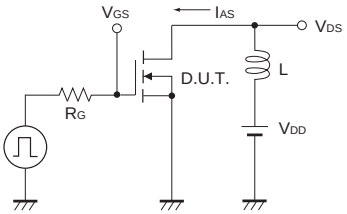


Fig.3-1 Avalanche Measurement Circuit

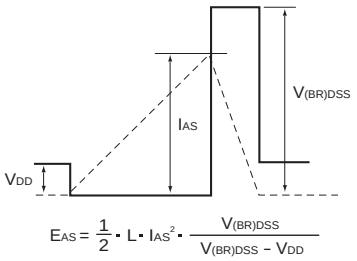


Fig.3-2 Avalanche Waveform

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