10V Drive Nch MOSFET

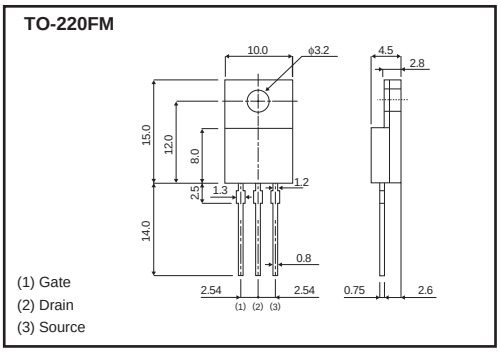
R5011FNX

●Structure
Silicon N-channel MOSFET

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

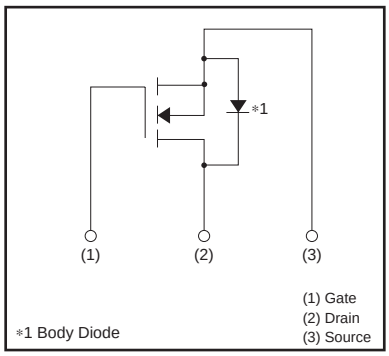
●Dimensions (Unit : mm)

TO-220FM



●Applications
Switching

●Inner circuit



●Packaging specifications

Type	Package	Bulk
	Basic ordering unit (pieces)	500
R5011FNX		○

●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	±11	A
	Pulsed	I_{DP} ∗1	±44	A
Source current (Body Diode)	Continuous	I_S ∗3	11	A
	Pulsed	I_{SP} ∗1	44	A
Avalanche current		I_{AS} ∗2	5.5	A
Avalanche energy		E_{AS} ∗2	8.1	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 Pw≤10μs, Duty cycle≤1%
∗2 L≒500μH, V_{DD}=50V, R_G=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

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●**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	μA	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	$R_{DS(on)}$ *	–	0.40	0.52	Ω	I_D=5.5A, V_{GS}=10V
Forward transfer admittance	$\|Y_{fs}\|$ *	4.5	–	–	S	V_{DS}=10V, I_D=5.5A
Input capacitance	C_{iss}	–	950	–	pF	V_{DS}=25V
Output capacitance	C_{oss}	–	580	–	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	–	30	–	pF	f=1MHz
Turn-on delay time	$t_{d(on)}$ *	–	26	–	ns	V_{DD}≒250V, I_D=5.5A
Rise time	t_r *	–	28	–	ns	V_{GS}=10V
Turn-off delay time	$t_{d(off)}$ *	–	75	–	ns	R_L=45.5Ω
Fall time	t_f *	–	30	–	ns	R_G=10Ω
Total gate charge	Q_g *	–	30	–	nC	V_{DD}≒250V
Gate-source charge	Q_{gs} *	–	7	–	nC	I_D=11A V_{GS}=10V
Gate-drain charge	Q_{gd} *	–	12	–	nC	R_L=22.7Ω / R_G=10Ω

* 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= 11A, V_{GS}=0V
Forward recovery time	t_{rr} *	55	85	115	ns	I_F= 11A, di/dt=100A/μs

* Pulsed

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●Electrical characteristic curves

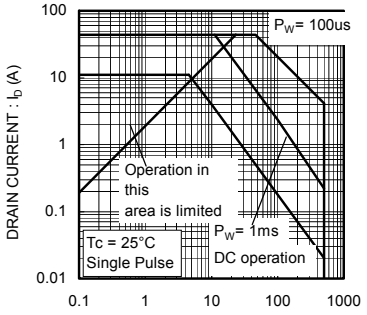


Fig.1 Maximum Safe Operating Aera

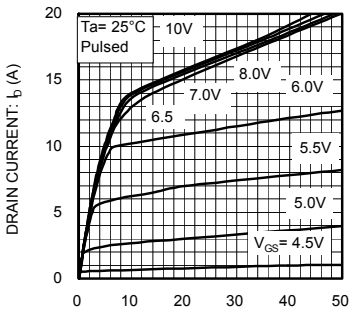


Fig.2: Typical output characteristics(Ⅰ)

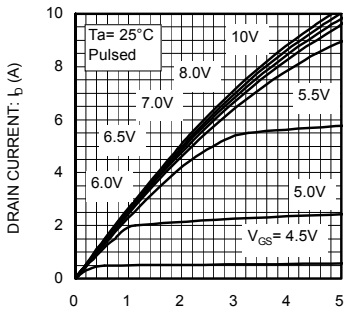


Fig.3: Typical output

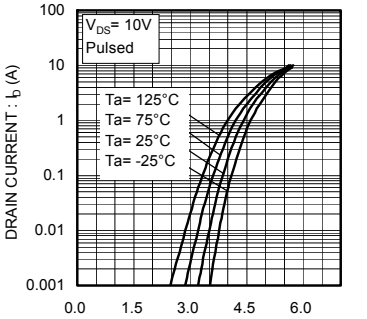


Fig.4 Typical Transfer Characteristics

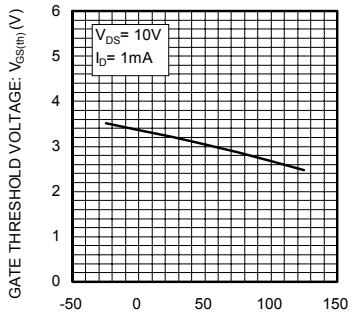


Fig.5 Gate Threshold Voltage vs. Channel Temperature

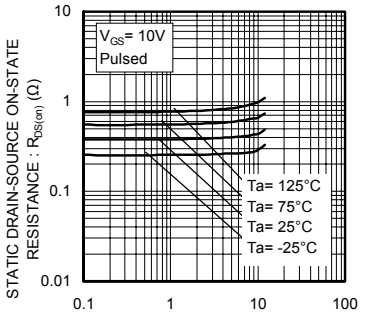


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

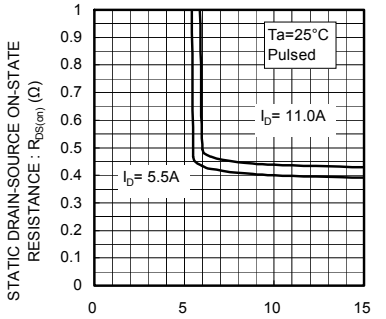


Fig.7 Static Drain-Source On-State Resistance vs. Gate Source

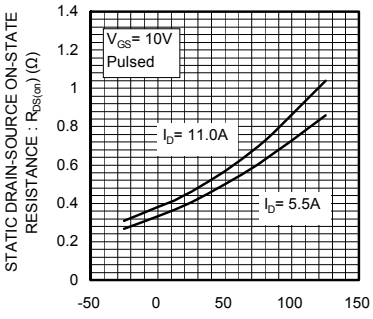


Fig.8 Static Drain-Source On-State Resistance vs. Channel Temperature

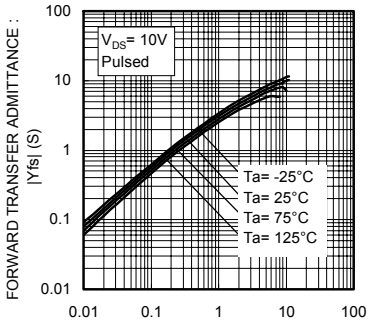


Fig.9 Forward Transfer Admittance vs. Drain Current

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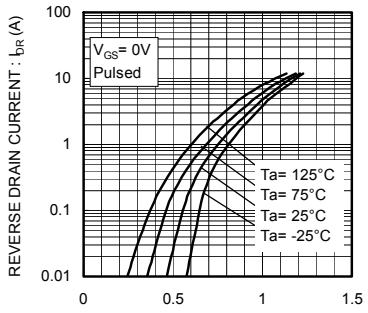


Fig.10 Reverse Drain Current vs. Sourse-Drain Voltage

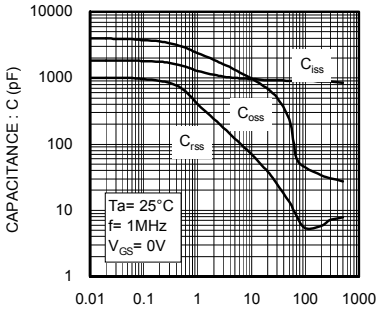


Fig.11 Typical Capacitance vs. Drain-Source Voltage

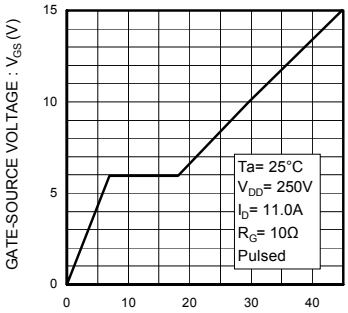


Fig.12 Dynamic Input Characteristics

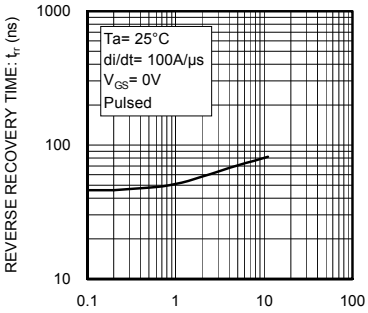


Fig.13 Reverse Recovery Time vs.Reverse Drain Current

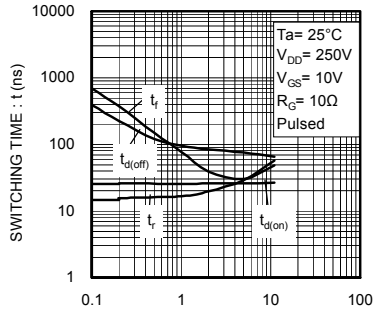


Fig.14 Switching Characteristics

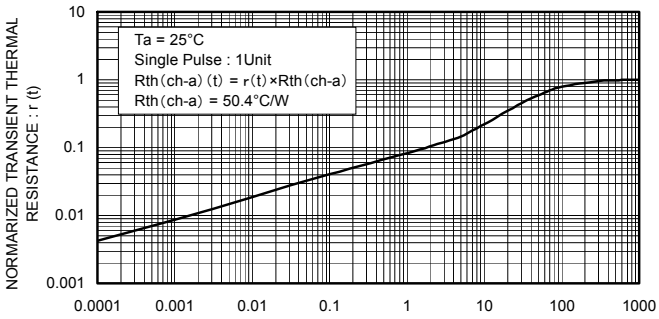


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width

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●Switching characteristics measurement circuit

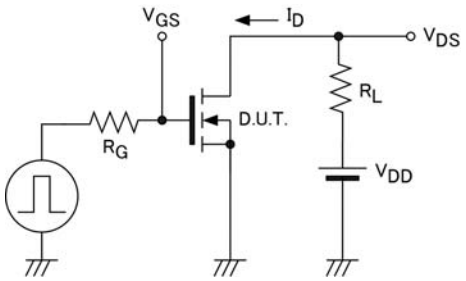


Fig.1-1 Switching time measurement circuit

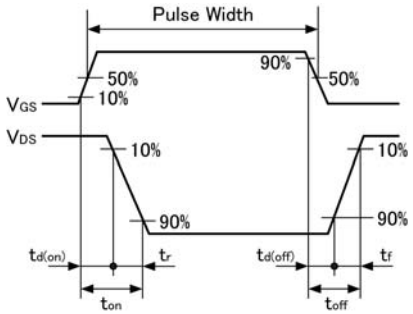


Fig.1-2 Switching waveforms

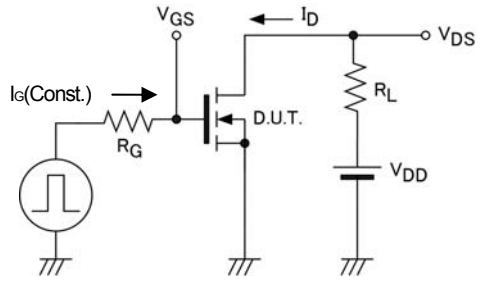


Fig.2-1 Gate charge measurement circuit

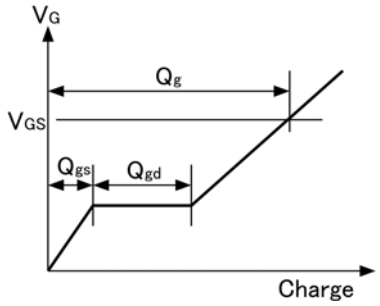


Fig.2-2 Gate charge waveform

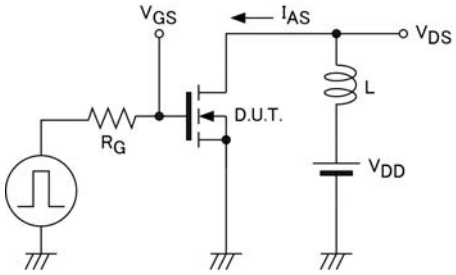


Fig.3-1 Avalanche measurement circuit

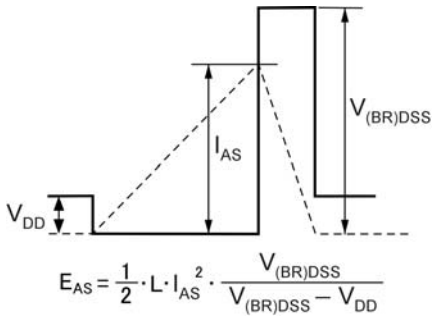


Fig.3-2 Avalanche waveform

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