

10V Drive Nch MOSFET

R6020FNX

● Structure

Silicon N-channel MOSFET

● Features

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

● Application

Switching

● Packaging specifications

Type	Package	Bulk
		Basic ordering unit (pieces)
R6020FNX		○

● Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V_{DSS}	600	V	
Gate-source voltage	V_{GSS}	± 30	V	
Drain current	Continuous	I_D *3	± 20	A
	Pulsed	I_{DP} *1	± 80	A
Source current (Body Diode)	Continuous	I_S *3	20	A
	Pulsed	I_{SP} *1	80	A
Avalanche Current	I_{AS} *2	10	A	
Avalanche Energy	E_{AS} *2	26.7	mJ	
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 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

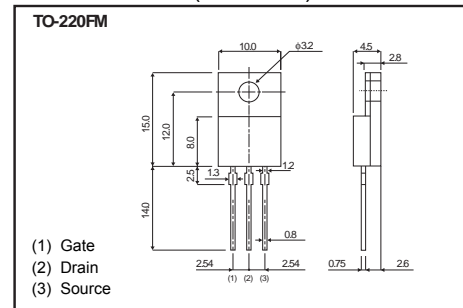
*2 $L = 500\mu H$, $V_{DD} = 50V$, $R_G = 25\Omega$, starting $T_{ch} = 25^\circ C$

*3 Limited only by maximum temperature allowed.

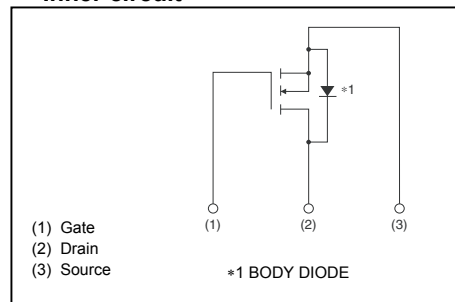
● Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to Case	$R_{th(ch-c)}$	2.5	°C / W

● 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	$V_{(BR)DSS}$	600	-	-	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	-	-	100	uA	$V_{DS}=600V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	3.0	-	5.0	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	-	0.19	0.25	Ω	$I_D=10A, V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} $ *	7.0	-	-	S	$I_D=10A, V_{DS}=10V$
Input capacitance	C_{iss}	-	2040	-	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	-	1660	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	70	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	-	50	-	ns	$I_D=10A, V_{DD}\approx 300V$
Rise time	t_r *	-	70	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}$ *	-	170	-	ns	$R_L=30\Omega$
Fall time	t_f *	-	40	-	ns	$R_G=10\Omega$
Total gate charge	Q_g *	-	65	-	nC	$I_D=20A$
Gate-source charge	Q_{gs} *	-	15	-	nC	$V_{DD}\approx 300V$
Gate-drain charge	Q_{gd} *	-	25	-	nC	$V_{GS}=10V$

*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD} *	-	-	1.5	V	$I_S=20A, V_{GS}=0V$
Reverse Recovery Time	t_{rr} *	75	105	135	ns	$I_S=20A, di/dt=100A/\mu s$

*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics (I)

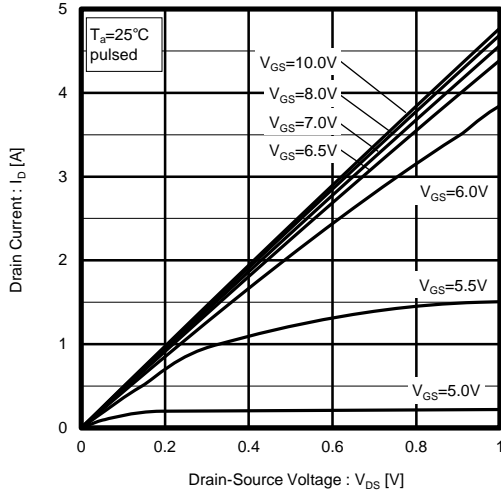


Fig.2 Typical Output Characteristics (II)

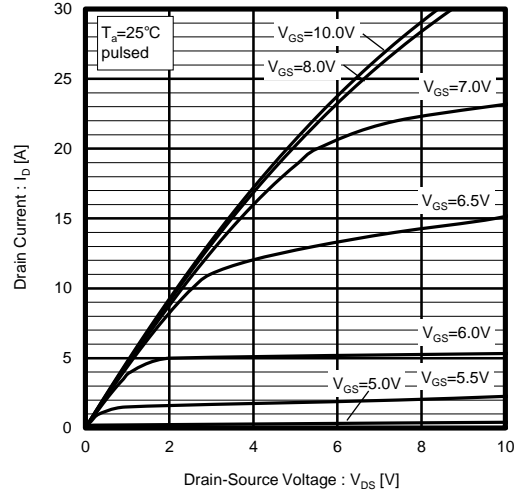


Fig.3 Typical Transfer Characteristics

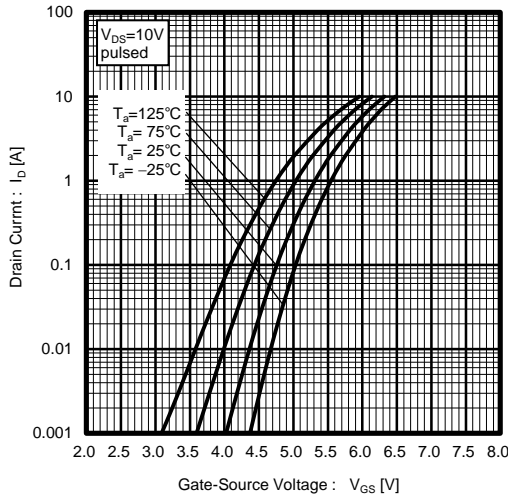


Fig.4 Gate Threshold Voltage vs. Channel Temperature

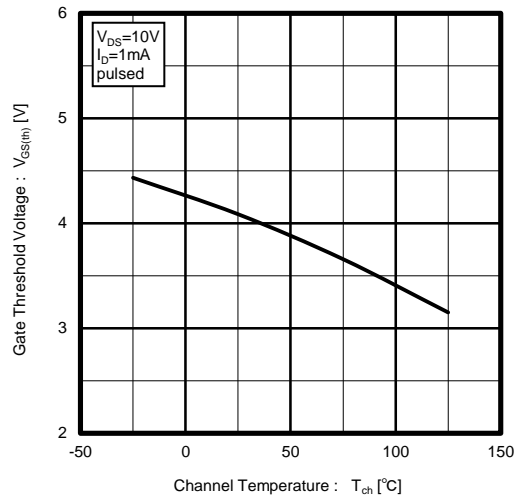


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

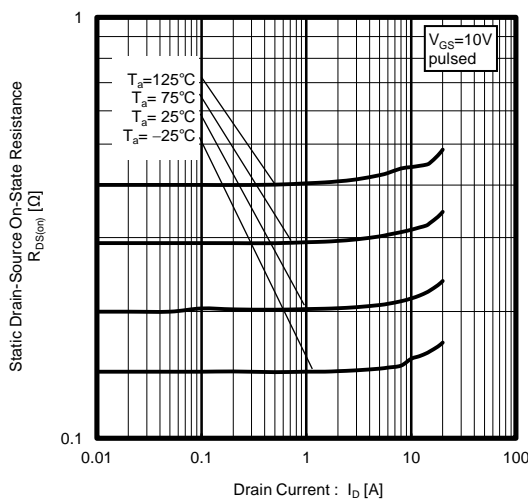


Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

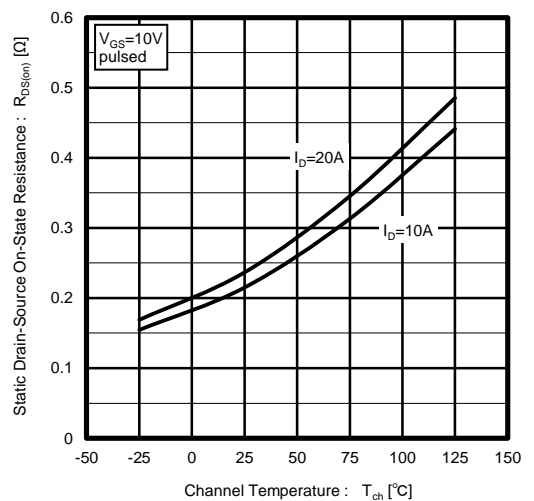


Fig.7 Forward Transfer Admittance vs. Drain Current

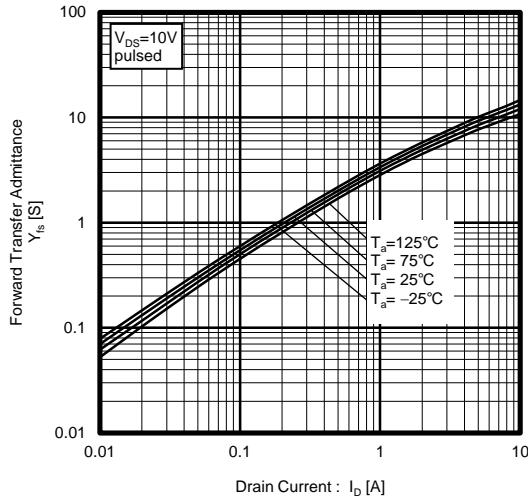


Fig.8 Source Current vs. Source-Drain Voltage

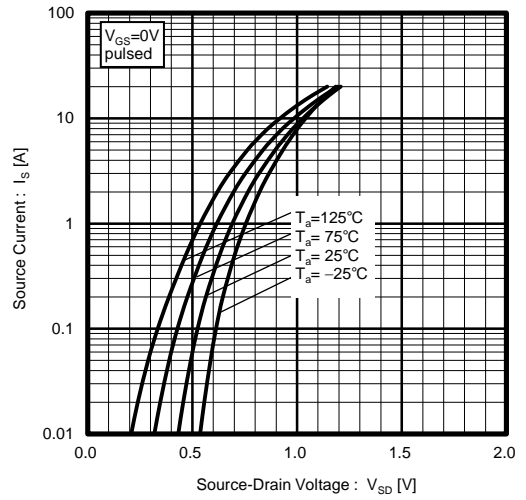


Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

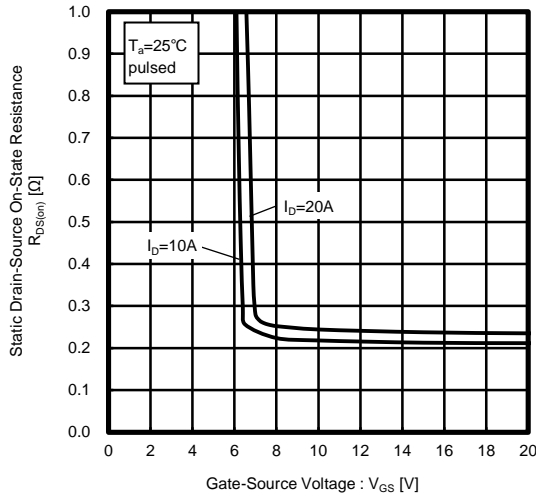


Fig.10 Switching Characteristics

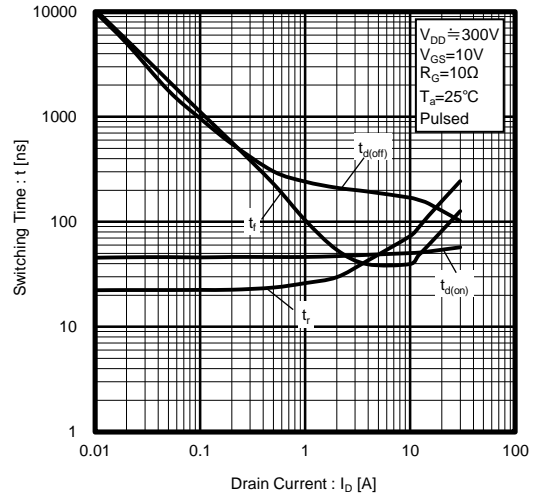


Fig.11 Dynamic Input Characteristics

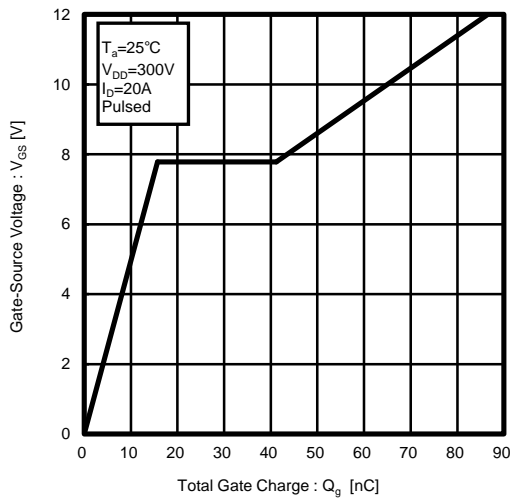


Fig.12 Typical Capacitance vs. Drain-Source Voltage

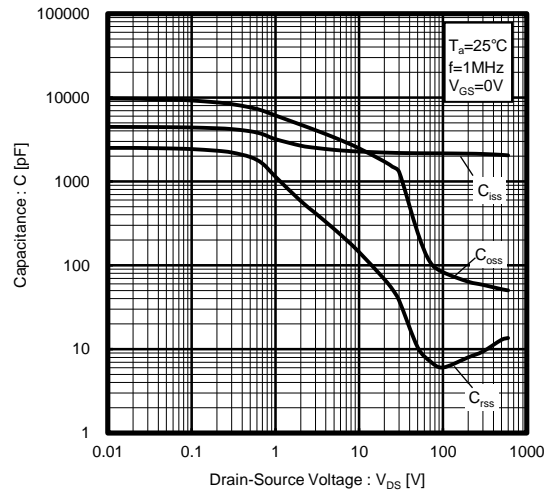


Fig.13 Normalized Transient Thermal Resistance v.s. Pulse Width

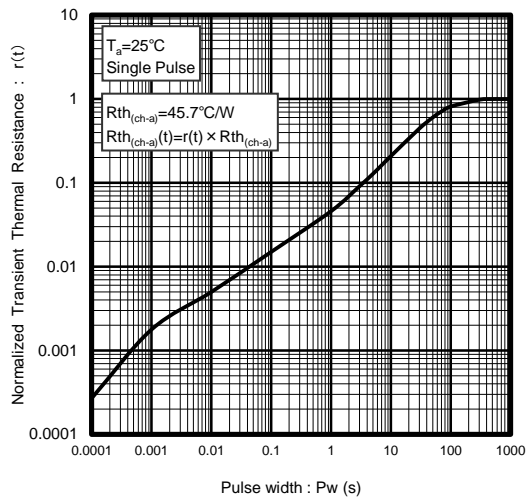


Fig.14 Maximum Safe Operating Area

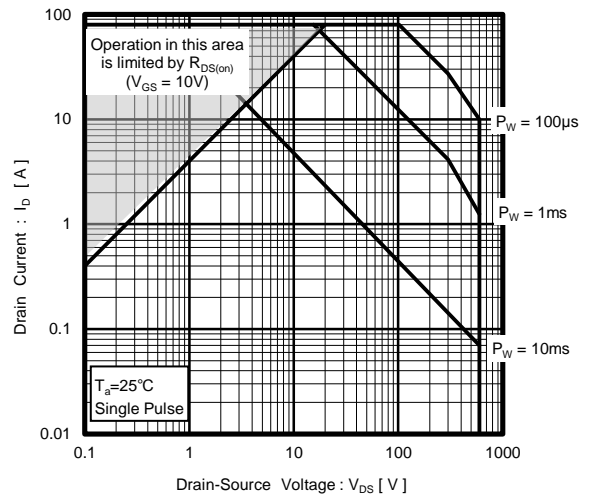
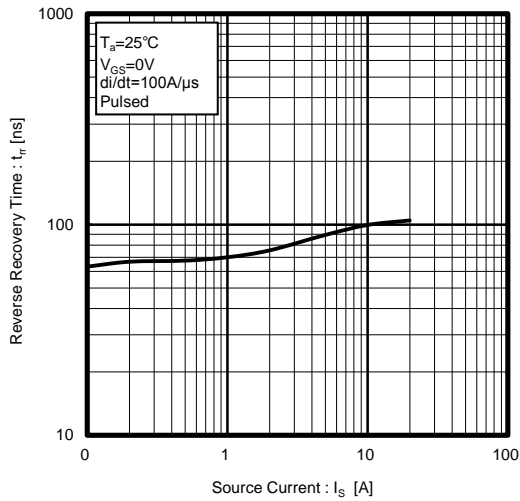


Fig.15 Reverse Recovery Time vs. Source Current



● Measurement circuits

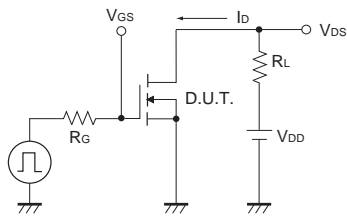


Fig.1-1 Switching Time Measurement Circuit

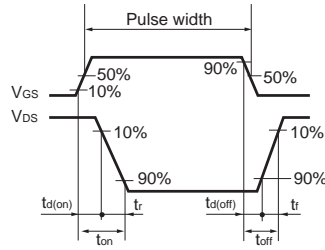


Fig.1-2 Switching Waveforms

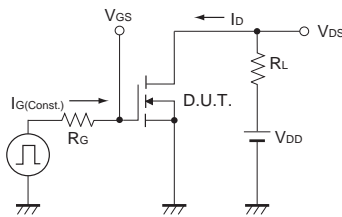


Fig.2-1 Gate Charge Measurement Circuit

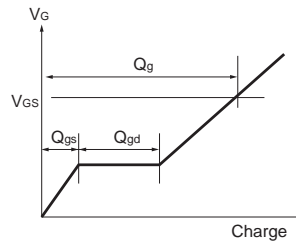


Fig.2-2 Gate Charge Waveform

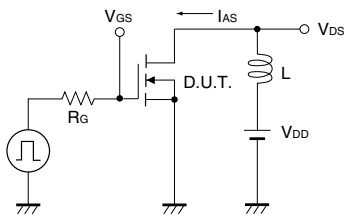


Fig.3-1 Avalanche Measurement Circuit

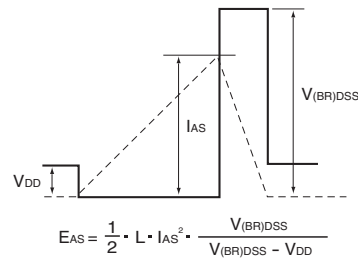


Fig.3-2 Avalanche Waveform

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