

10V Drive Nch MOSFET

R5016FNX

● Structure

Silicon N-channel MOSFET

● Features

- 1) Low on-resistance.
- 2) Low input capacitance.
- 3) High ESD.

● Application

Switching

● Packaging specifications

Type	Package	Bulk
	Code	-
	Basic ordering unit (pieces)	500
R5016FNX		○

● 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}	±16	A
	Pulsed	I_{DP}^{*1}	±64	A
Source current (Body Diode)	Continuous	I_S^{*3}	16	A
	Pulsed	I_{SP}^{*1}	64	A
Avalanche current		I_{AS}^{*2}	8	A
Avalanche energy		E_{AS}^{*2}	17.1	mJ
Power dissipation		P_D^{*4}	50	W
Channel temperature		T_{ch}	150	°C
Range of storage temperature		T_{stg}	-55 to +150	°C

*1 $P_w \leq 10\text{W}$, Duty cycle $\leq 1\%$

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

*3 Limited only by maximum channel temperature allowed.

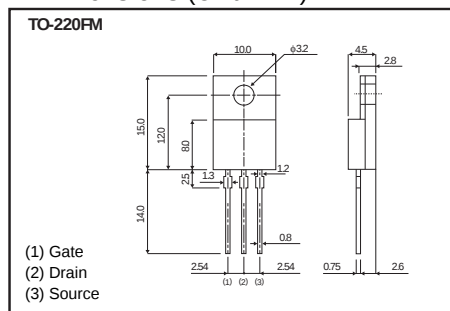
*4 $T_C = 25^\circ\text{C}$

● Thermal resistance

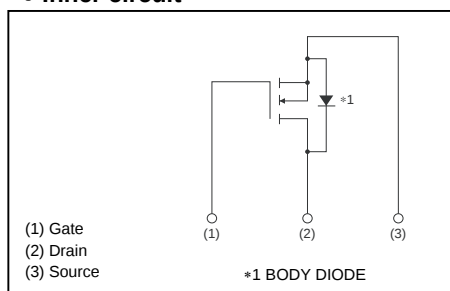
Parameter	Symbol	Limits	Unit
Channel to Case	$R_{th(ch-c)}^{*}$	2.5	°C / W

* $T_C = 25^\circ\text{C}$

● 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	$V_{(BR)DSS}$	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	$V_{GS(th)}$	3.0	-	5.0	V	$V_{DS}=10V$, $I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	-	0.25	0.325	Ω	$I_D=8A$, $V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} ^*$	6.2	11	-	S	$V_{DS}=10V$, $I_D=8A$
Input capacitance	C_{iss}	-	1700	-	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	-	1000	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	35	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	35	-	ns	$V_{DD}\approx 250V$, $I_D=8.0A$
Rise time	t_r^*	-	60	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	-	110	-	ns	$R_L=31.25\Omega$
Fall time	t_f^*	-	35	-	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	-	46	-	nC	$V_{DD}\approx 250V$
Gate-source charge	Q_{gs}^*	-	11	-	nC	$I_D=8.0A$
Gate-drain charge	Q_{gd}^*	-	19	-	nC	$V_{GS}=10V$

*Pulsed

● Body diode characteristics (Source-Drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}^*	-	-	1.5	V	$I_S=16A$, $V_{GS}=0V$
Reverse recovery time	t_{rr}^*	75	100	125	ns	$I_S=16A$, $V_{GS}=0V$ $di/dt=100A/\mu s$

*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics (I)

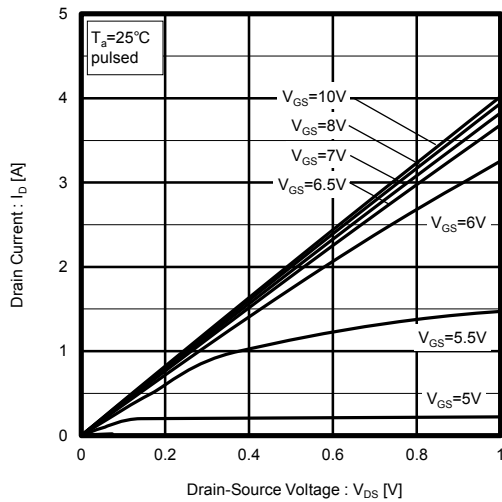


Fig.2 Typical Output Characteristics (II)

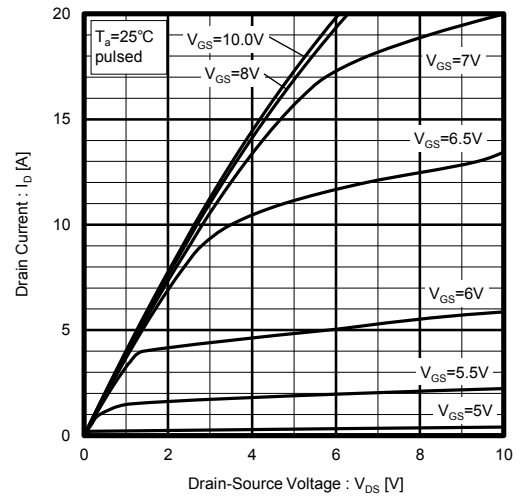


Fig.3 Typical Transfer Characteristics

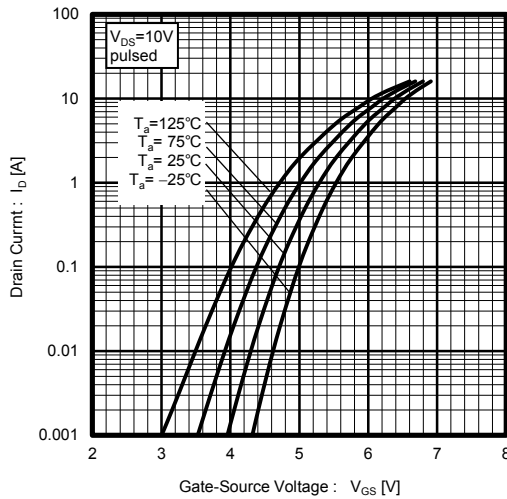


Fig.4 Gate Threshold Voltage vs. Channel Temperature

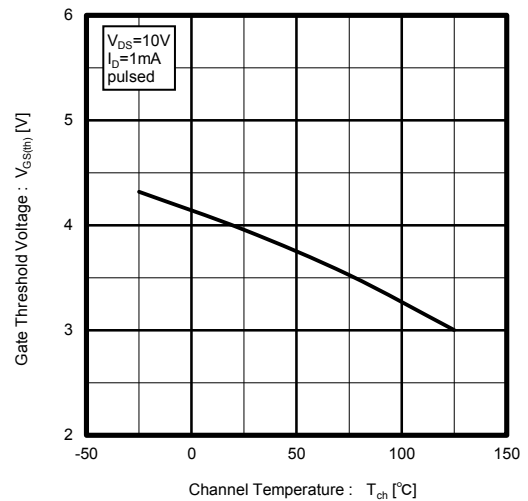


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

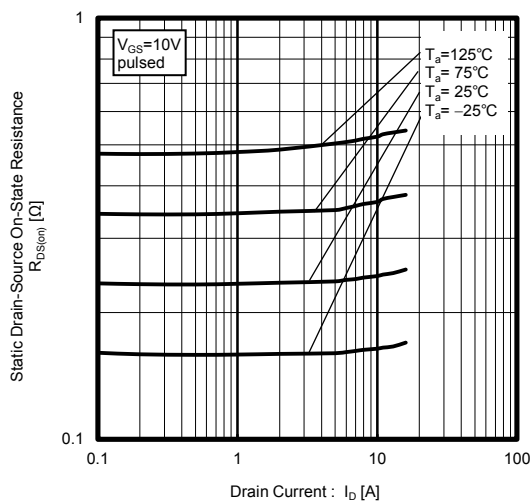


Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

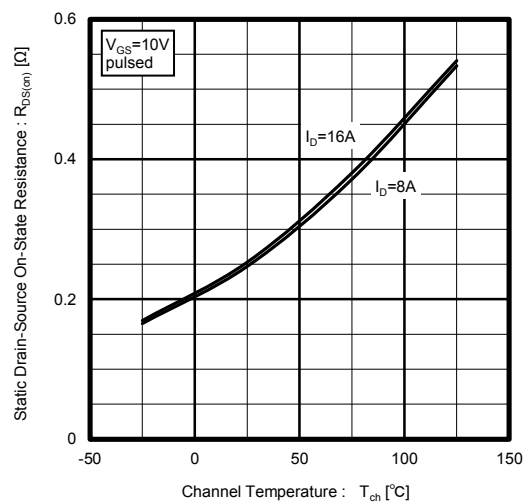


Fig.7 Forward Transfer Admittance vs. Drain Current

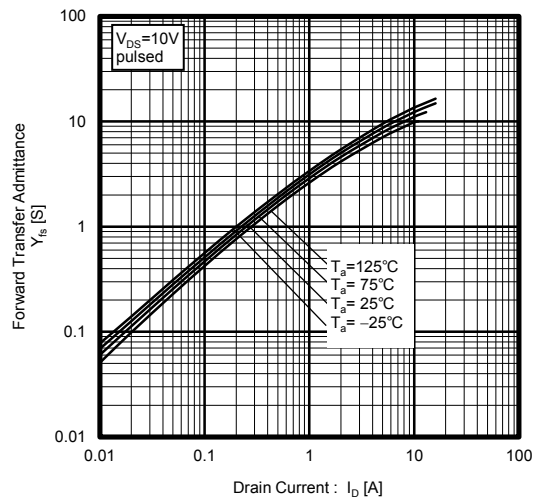


Fig.8 Source Current vs. Source-Drain Voltage

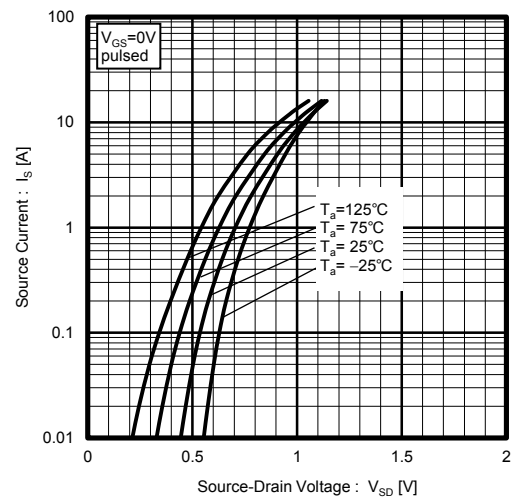


Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

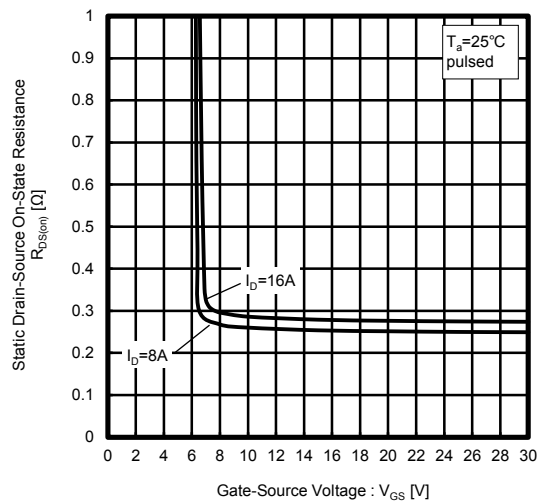


Fig.10 Switching Characteristics

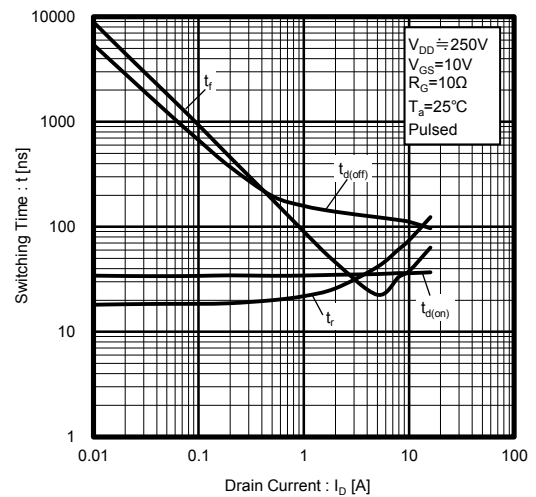


Fig.11 Dynamic Input Characteristics

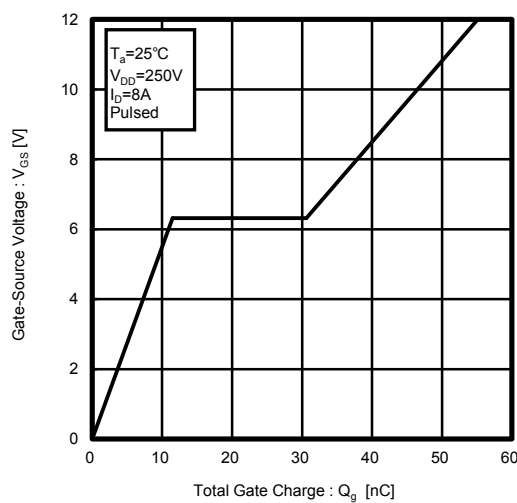


Fig.12 Typical Capacitance vs. Drain-Source Voltage

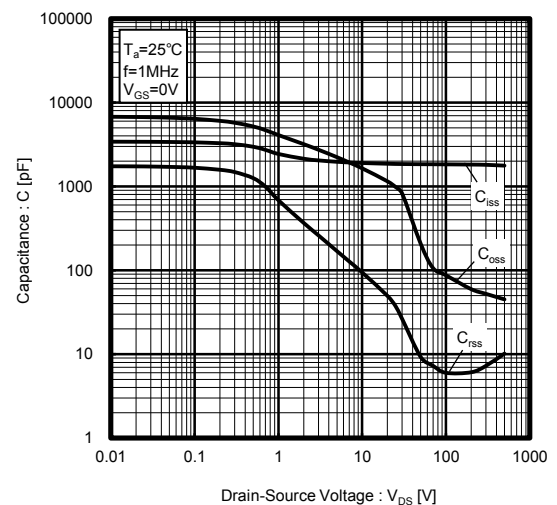


Fig.13 Normalized Transient Thermal Resistance v.s. Pulse Width

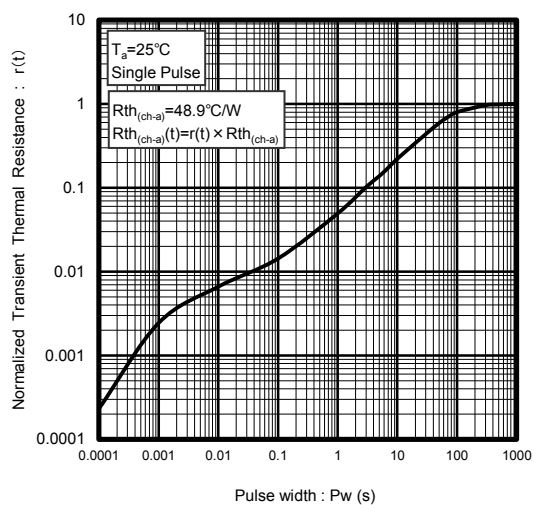


Fig.14 Maximum Safe Operating Area

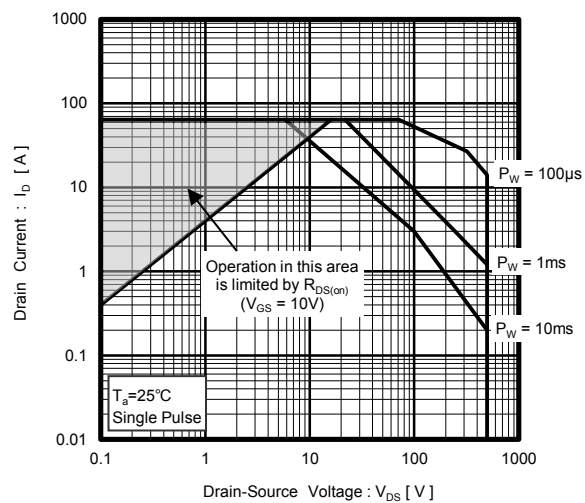
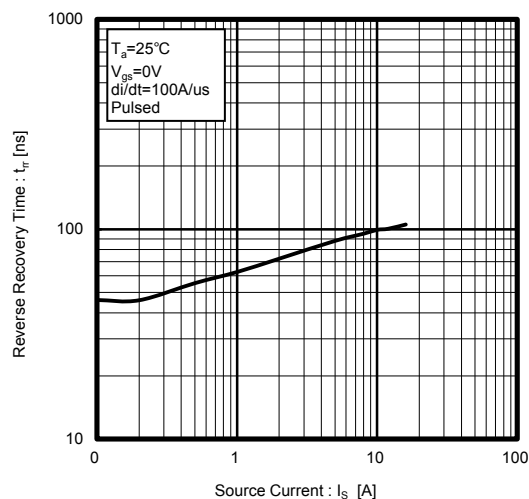


Fig.15 Reverse Recovery Time vs. Source Current



● Measurement circuits

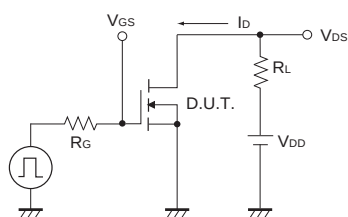


Fig.1-1 Switching Time Measurement Circuit

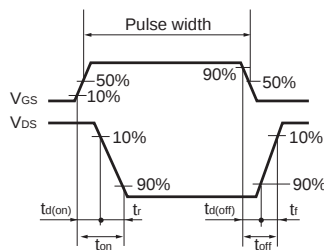


Fig.1-2 Switching Waveforms

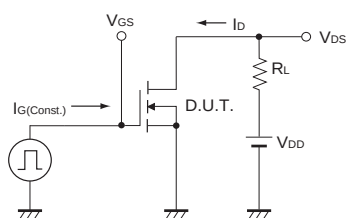


Fig.2-1 Gate Charge Measurement Circuit

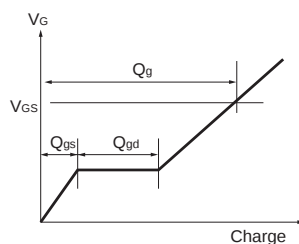


Fig.2-2 Gate Charge Waveform

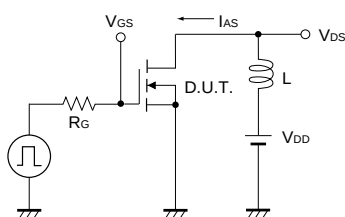


Fig.3-1 Avalanche Measurement Circuit

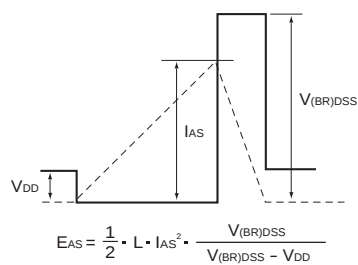


Fig.3-2 Avalanche Waveform

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Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331