

10V Drive Nch MOSFET

RCX450N20

● Structure

Silicon N-channel MOSFET

● Features

- 1) Low on-resistance.
- 2) High speed switching.
- 3) Gate-source voltage V_{GSS} guaranteed to be $\pm 30V$
- 4) High Power Package (TO-220FM).

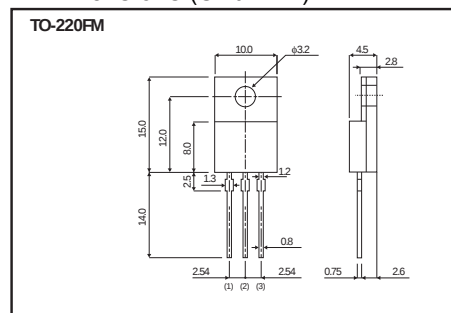
● Application

Switching

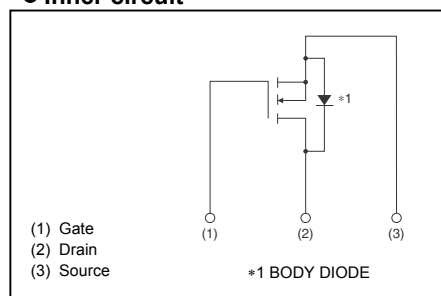
● Packaging specifications

Type	Package	Bulk
	Code	-
	Basic ordering unit (pieces)	500
RCX450N20		O

● Dimensions (Unit : mm)



● Inner circuit



● Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DSS}	200	V
Gate-source voltage		V_{GSS}	± 30	V
Drain current	Continuous	I_D *3	± 45	A
	Pulsed	I_{DP} *1	± 180	A
Source current (Body Diode)	Continuous	I_S *3	45	A
	Pulsed	I_{SP} *1	180	A
Avalanche current		I_{AS} *2	22.5	A
Avalanche energy		E_{AS} *2	160	mJ
Power dissipation (Tc=25°C)		P_D	40	W
Channel temperature		Tch	150	°C
Range of storage temperature		Tstg	-55 to +150	°C

*1 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

*2 $L \approx 500\mu H$, $V_{DD} = 50V$, $R_G = 25\Omega$, starting Tch=25°C

*3 Limited only by maximum temperature allowed.

● Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to Case	Rth (ch-c)	3.12	°C / W

* Tc=25°C

● 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	$V_{(BR)DSS}$	200	-	-	V	$I_D=1mA$, $V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=200V$, $V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	3	-	5	V	$V_{DS}=10V$, $I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	-	42	55	mΩ	$I_D=22.5A$, $V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} ^*$	17	-	-	S	$I_D=22.5A$, $V_{DS}=10V$
Input capacitance	C_{iss}	-	4200	-	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	-	270	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	160	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	52	-	ns	$I_D=22.5A$, $V_{DD}\approx 100V$
Rise time	t_r^*	-	210	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	-	90	-	ns	$R_L=4.4\Omega$
Fall time	t_f^*	-	70	-	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	-	80	-	nC	$I_D=45A$,
Gate-source charge	Q_{gs}^*	-	28	-	nC	$V_{DD}\approx 100V$
Gate-drain charge	Q_{gd}^*	-	28	-	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	$I_s=45A$, $V_{GS}=0V$

*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics (I)

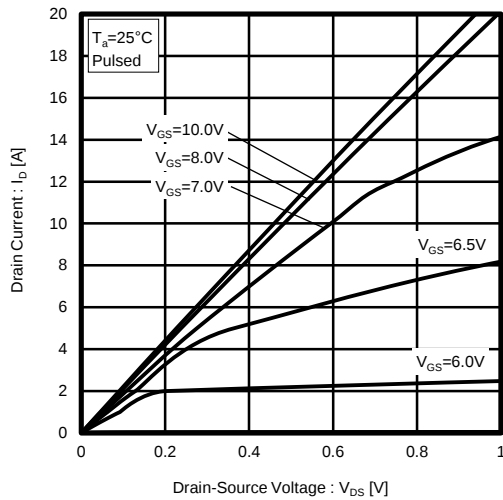


Fig.2 Typical Output Characteristics (II)

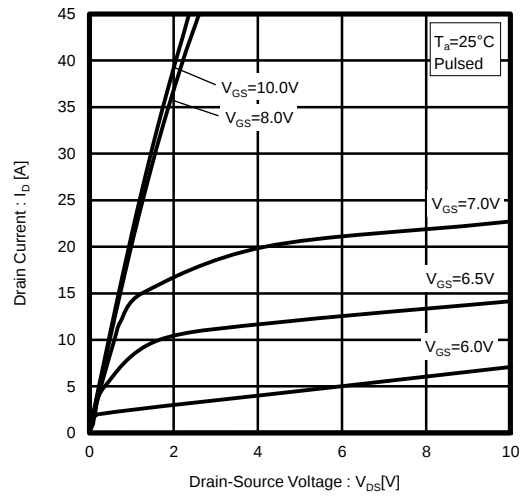


Fig.3 Typical Transfer Characteristics

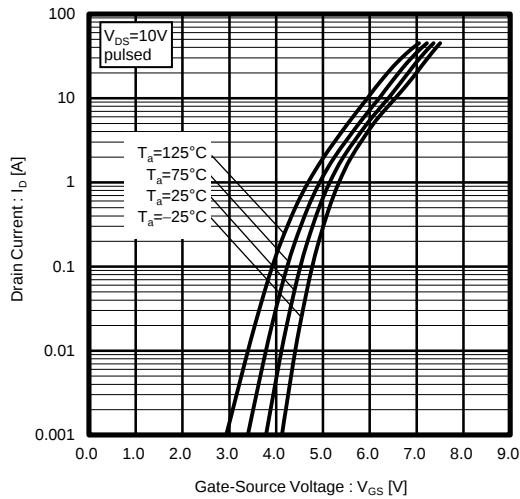


Fig.4 Gate Threshold Voltage vs. Channel Temperature

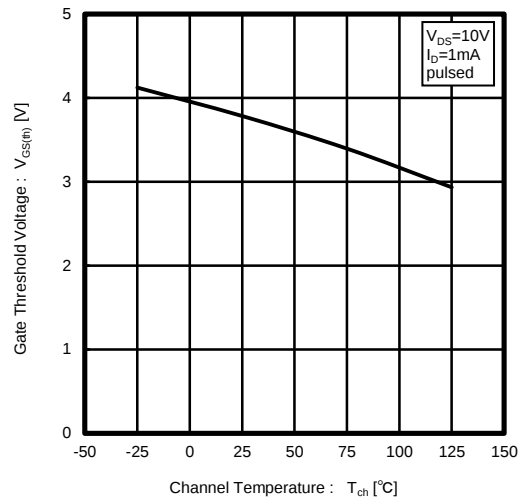


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

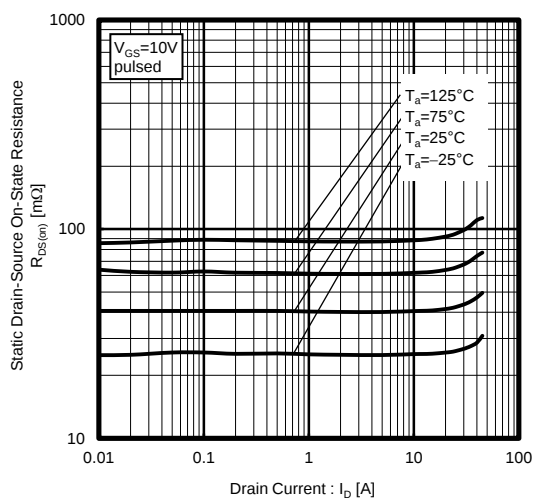


Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

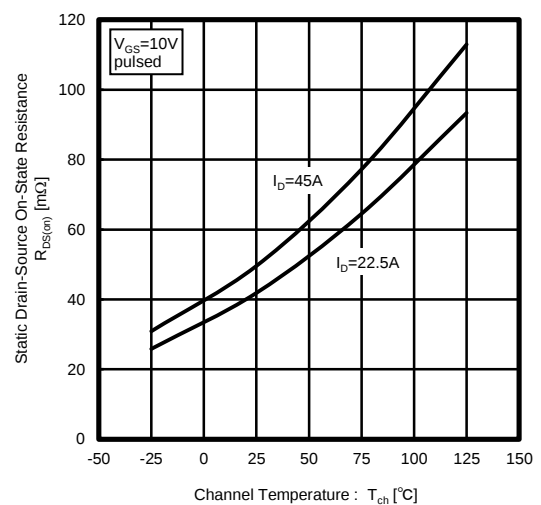


Fig.7 Forward Transfer Admittance vs. Drain Current

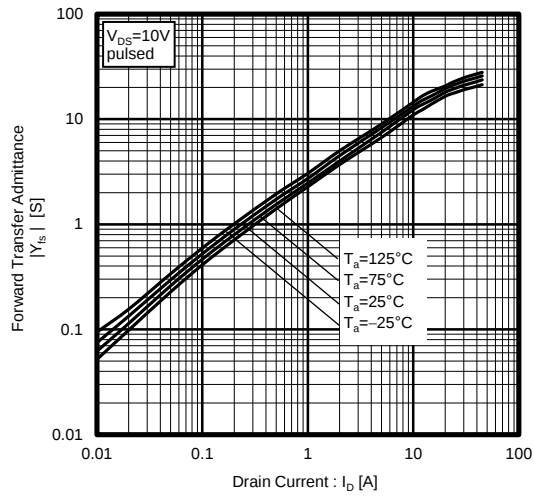


Fig.8 Source Current vs. Source-Drain Voltage

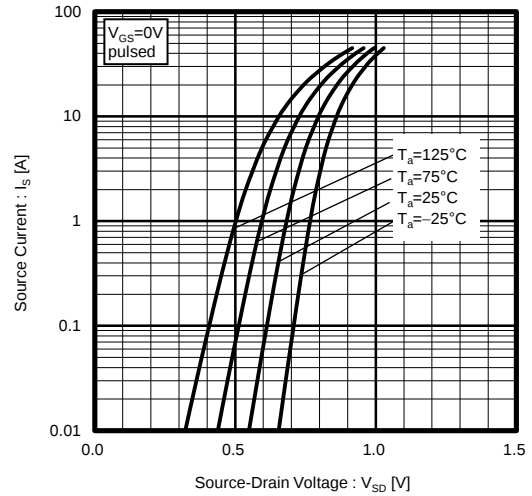


Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

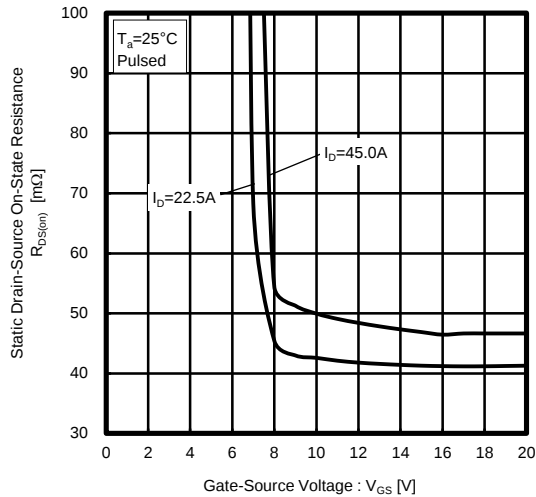


Fig.10 Switching Characteristics

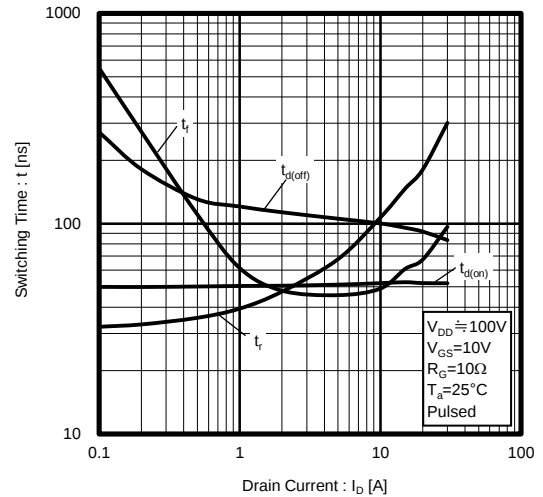


Fig.11 Dynamic Input Characteristics

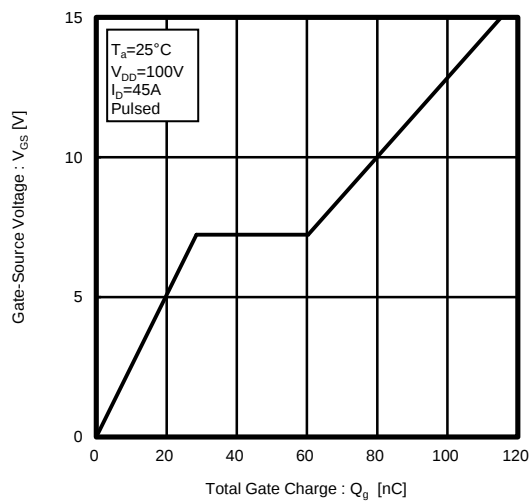


Fig.12 Typical Capacitance vs. Drain-Source Voltage

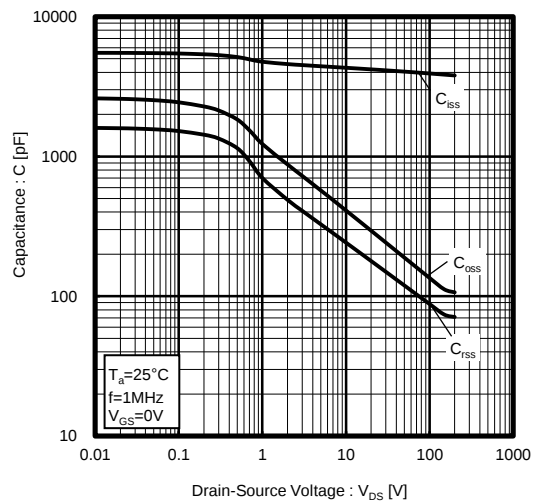


Fig.13 Reverse Recovery Time vs. Source Current

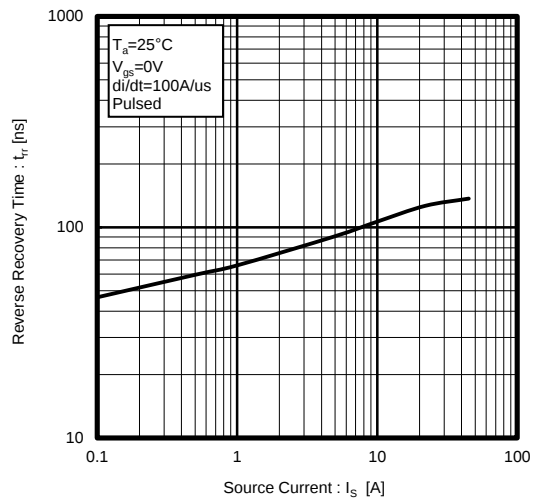


Fig.14 Maximum Safe Operating Area

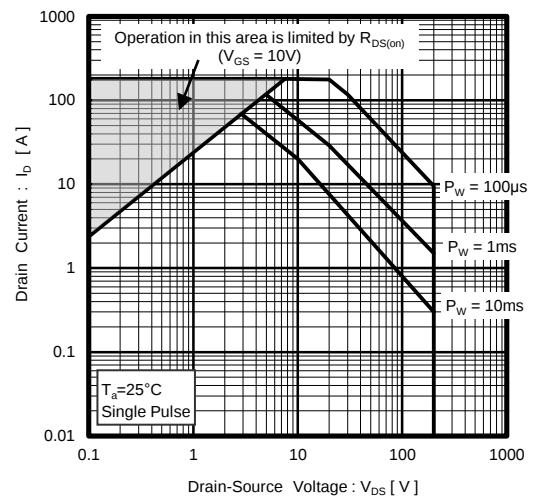
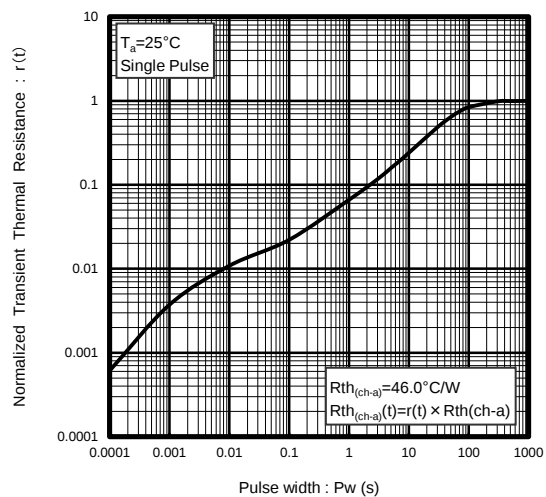


Fig.15 Normalized Transient Thermal Resistance v.s. Pulse Width



● Measurement circuits

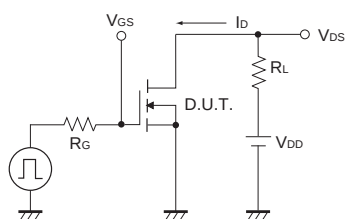


Fig.1-1 Switching Time Measurement Circuit

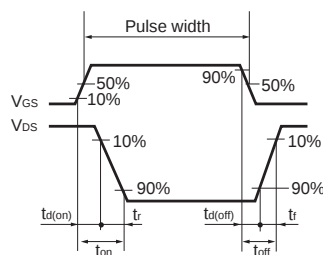


Fig.1-2 Switching Waveforms

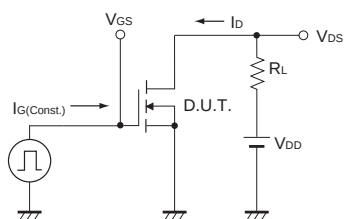


Fig.2-1 Gate Charge Measurement Circuit

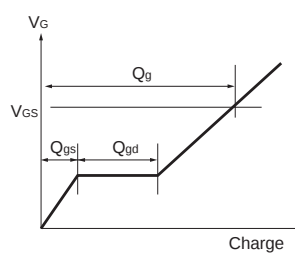


Fig.2-2 Gate Charge Waveform

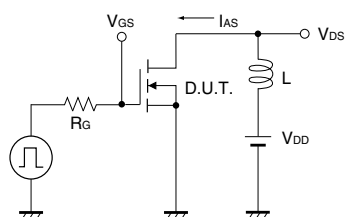


Fig.3-1 Avalanche Measurement Circuit

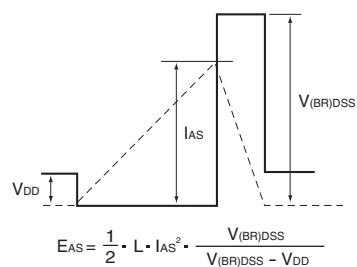


Fig.3-2 Avalanche Waveform

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