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10V Drive Nch MOSFET

RCD050N20

● Structure

Silicon N-channel MOSFET

● Features

- 1) Low on-resistance.
- 2) High-speed switching.
- 3) Wide range of SOA.
- 4) Drive circuits can be simple.
- 5) Parallel use is easy.

● Application

Switching

● Packaging specifications

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	2500
RCD050N20		○

● 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	±5	A
	Pulsed	I_{DP} *1	±20	A
Source current (Body Diode)	Continuous	I_S *3	5	A
	Pulsed	I_{SP} *1	20	A
Avalanche current	I_{AS} *2	2.5	A	
Avalanche energy	E_{AS} *2	1.83	mJ	
Power dissipation	P_D *4	20	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 $L = 500 \mu H$, $V_{DD} = 50V$, $R_G = 25 \Omega$, $T_{ch} = 25^\circ C$

*3 Limited only by maximum temperature allowed.

*4 $T_C = 25^\circ C$

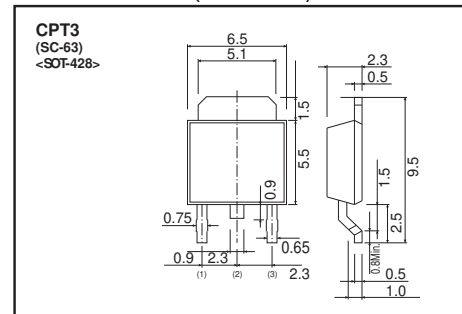
● Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to Case	$R_{th}(ch-c)$	6.25	°C / W

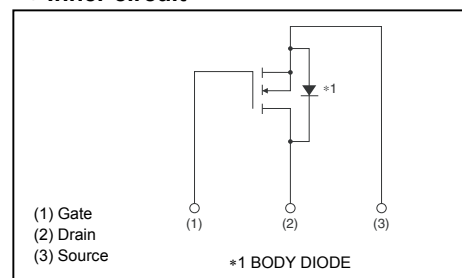
* $T_C = 25^\circ C$

* Limited only by maximum temperature allowed.

● 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	$V_{(BR)DSS}$	200	-	-	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	-	-	10	μA	$V_{DS}=200V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	3.25	-	5.25	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)*}$	-	470	618	mΩ	$I_D=2.5A, V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} ^*$	1	2	-	S	$V_{DS}=10V, I_D=2.5A$
Input capacitance	C_{iss}	-	380	-	pF	$V_{DS}=25V$
Output capacitance	C_{oss}	-	30	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	15	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	17	-	ns	$V_{DD}\approx 100V, I_D=2.5A$
Rise time	t_r^*	-	15	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	-	22	-	ns	$R_L=40\Omega$
Fall time	t_f^*	-	11	-	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	-	9.0	-	nC	$V_{DD}\approx 100V, I_D=5A$
Gate-source charge	Q_{gs}^*	-	3.5	-	nC	$V_{GS}=10V$
Gate-drain charge	Q_{gd}^*	-	3.5	-	nC	

*Pulsed

● Body diode characteristics (Source-Drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD}^*	-	-	1.5	V	$I_s=5A, V_{GS}=0V$

*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics (I)

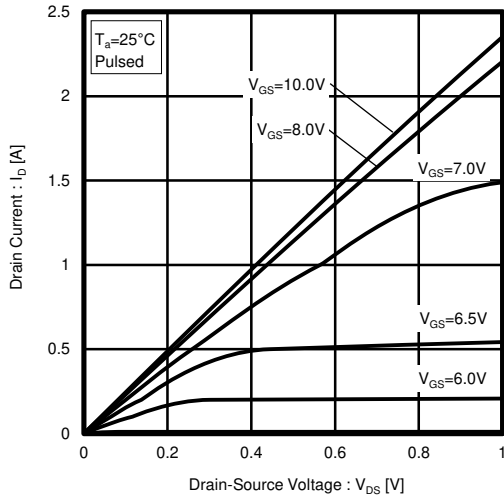


Fig.2 Typical Output Characteristics (II)

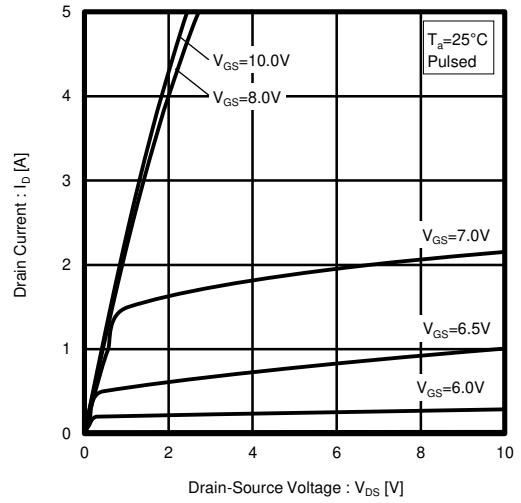


Fig.3 Typical Transfer Characteristics

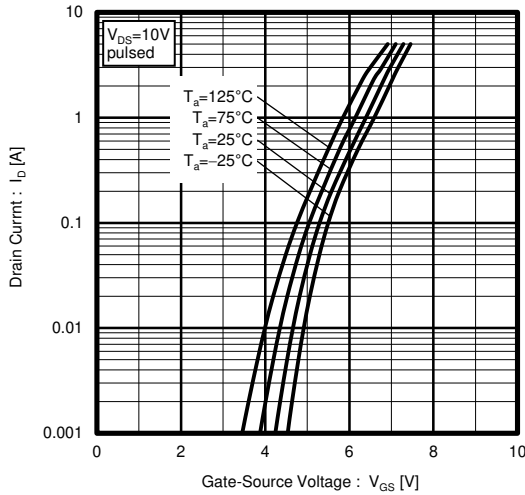


Fig.4 Gate Threshold Voltage vs. Channel Temperature

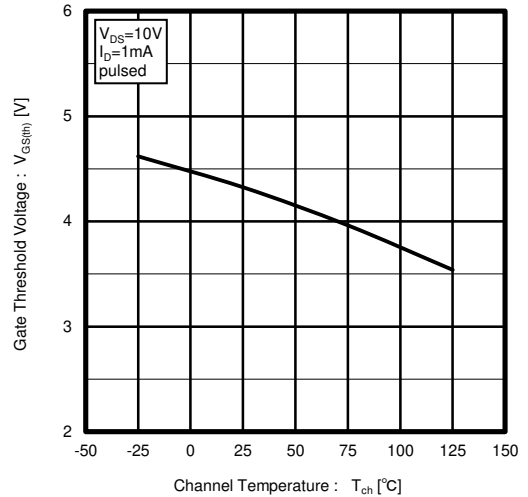


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

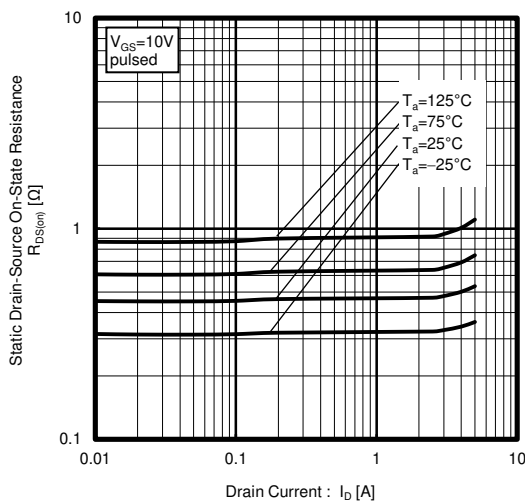


Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

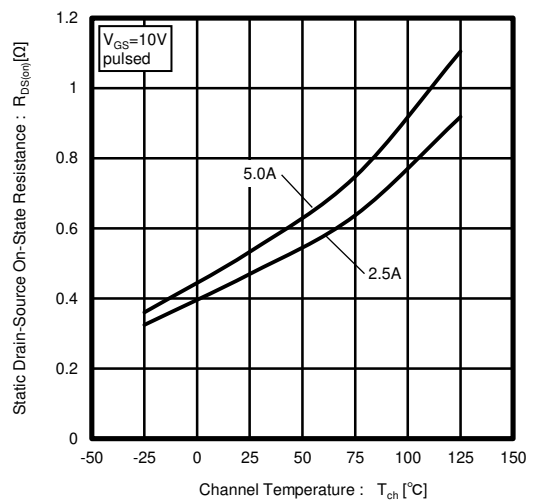


Fig.7 Forward Transfer Admittance vs. Drain Current

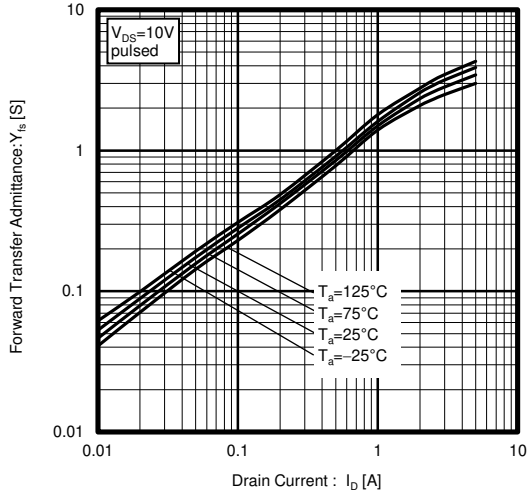


Fig.8 Source Current vs. Source-Drain Voltage

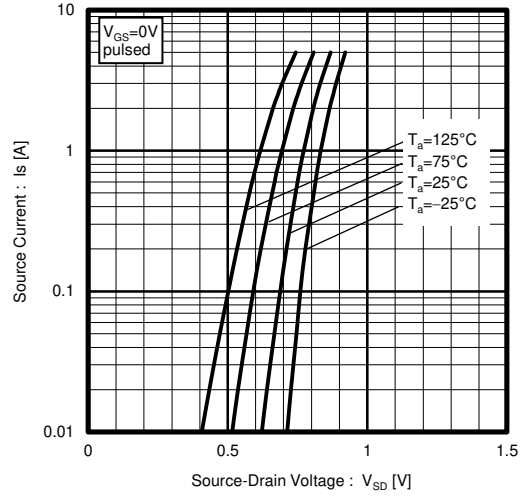


Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

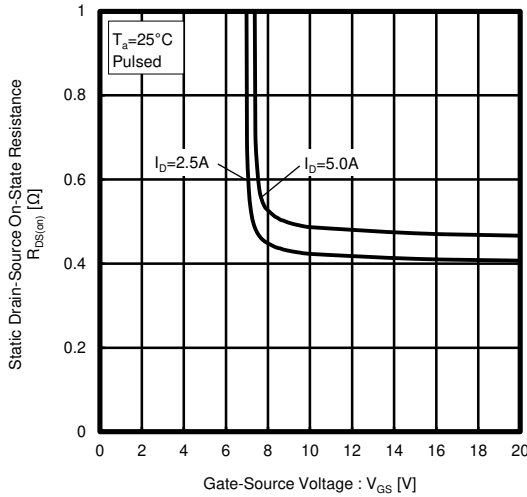


Fig.10 Switching Characteristics

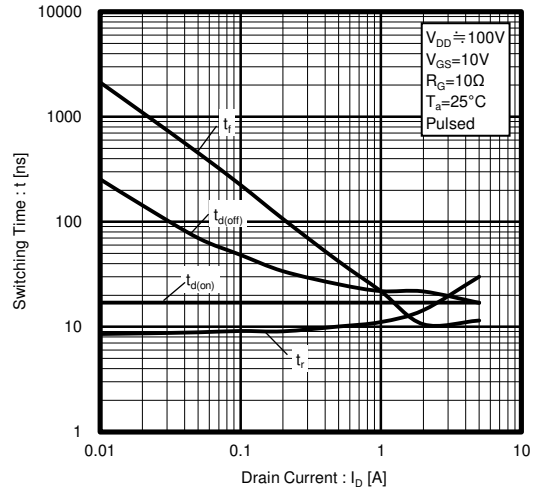


Fig.11 Dynamic Input Characteristics

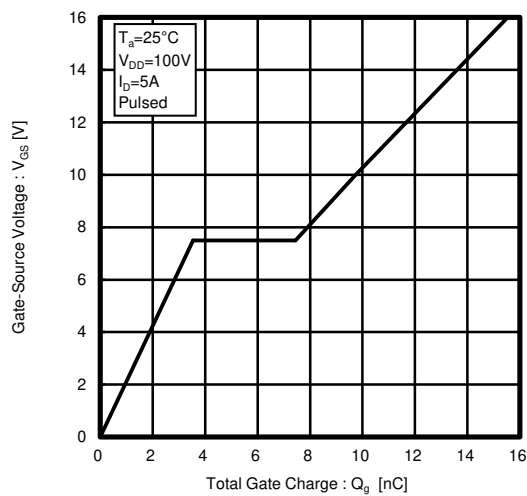


Fig.12 Typical Capacitance vs. Drain-Source Voltage

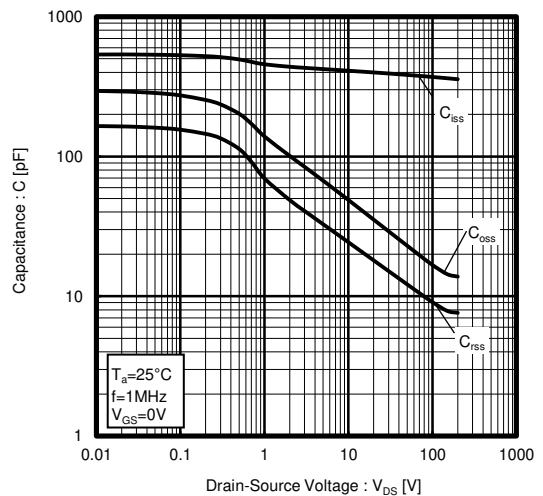


Fig.13 Maximum Safe Operating Area

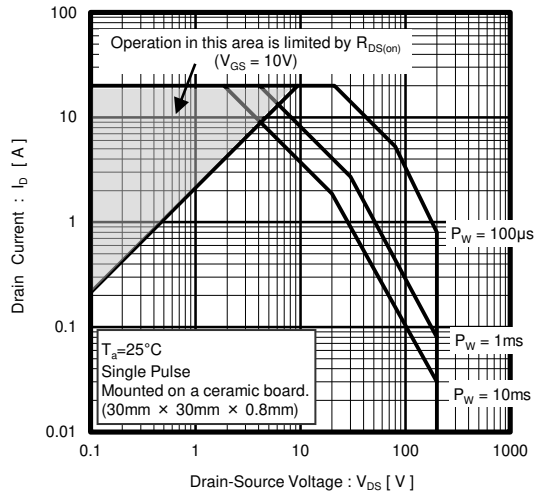
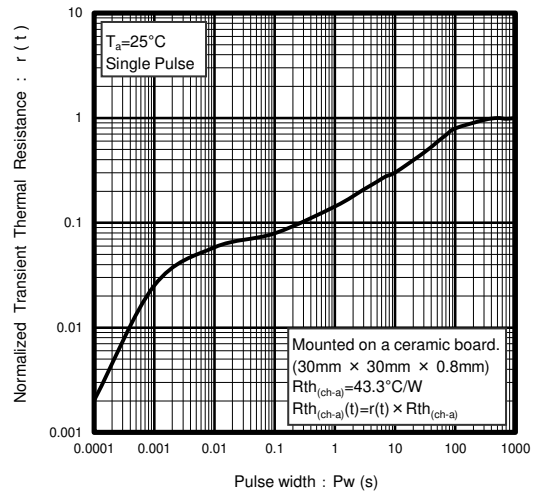


Fig.14 Normalized Transient Thermal Resistance v.s. Pulse Width



● Measurement circuits

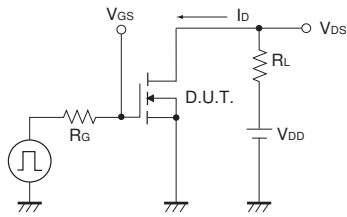


Fig.1-1 Switching Time Measurement Circuit

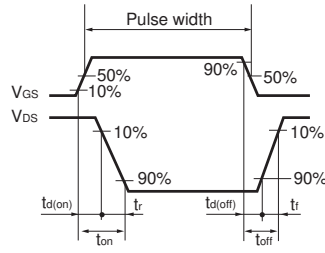


Fig.1-2 Switching Waveforms

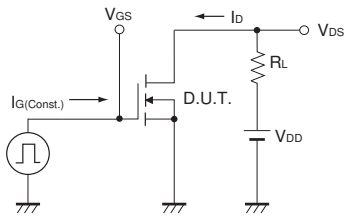


Fig.2-1 Gate Charge Measurement Circuit

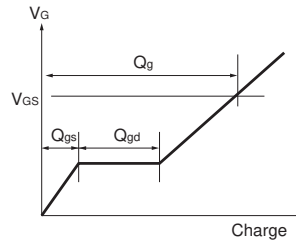


Fig.2-2 Gate Charge Waveform

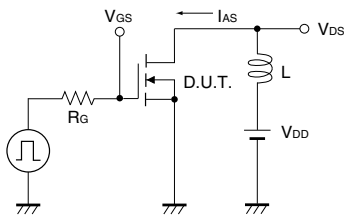


Fig.3-1 Avalanche Measurement Circuit

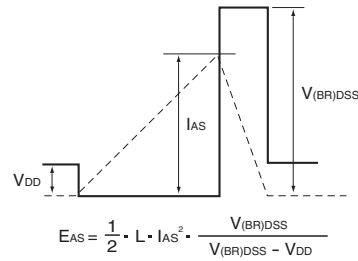


Fig.3-2 Avalanche Waveform

Notes

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