

## 10V Drive Nch MOSFET

**RCD040N25**

## • 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
RCD040N25		O

- **Absolute maximum ratings** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Drain-source voltage	$V_{DSS}$	250	V
Gate-source voltage	$V_{GSS}$	$\pm 30$	V
Drain current	Continuous	$I_D$ *3	$\pm 4$
	Pulsed	$I_{DP}$ *1,3	$\pm 16$
Source current (Body Diode)	Continuous	$I_S$	4
	Pulsed	$I_{SP}$ *1	16
Avalanche current	$I_{AS}$ *2	2	A
Avalanche energy	$E_{AS}$ *2	1.61	mJ
Power dissipation	$P_D$ *4	20	W
Channel temperature	Tch	150	°C
Range of storage temperature	Tstg	-55 to +150	°C

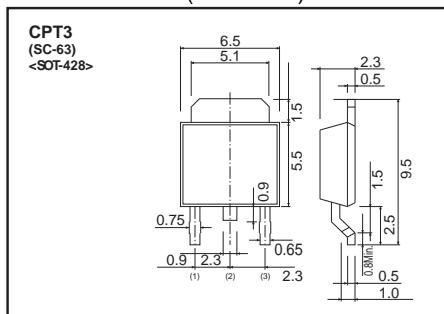
\*1  $P_{w} \leq 10 \mu\text{S}$ , Duty cycle  $\leq 1\%$

\*2 L = 500  $\mu$ H, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25  $\Omega$ , T<sub>ch</sub> = 25°C

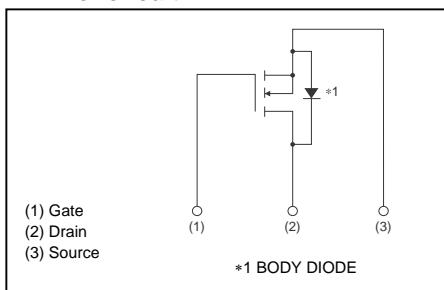
\*3 Limited only by maximum channel temperature allowed

\*4 T<sub>0</sub>=25°C

### ● Dimensions (Unit : mm)



- Inner circuit



### • Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to Case	Rth (ch-c)*	6.25	°C / W

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

\* Limited only by maximum channel temperature allowed.

## ● Electrical characteristics (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	250	-	-	V	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V
Zero gate voltage drain current	I <sub>DSS</sub>	-	-	10	μA	V <sub>DS</sub> =250V, V <sub>GS</sub> =0V
Gate threshold voltage	V <sub>GS (th)</sub>	3.5	-	5.5	V	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA
Static drain-source on-state resistance	R <sub>DS (on)</sub> *	-	780	1000	mΩ	I <sub>D</sub> =2A, V <sub>GS</sub> =10V
Forward transfer admittance	Y <sub>fs</sub>  *	1.2	-	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =2A
Input capacitance	C <sub>iss</sub>	-	410	-	pF	V <sub>DS</sub> =25V
Output capacitance	C <sub>oss</sub>	-	30	-	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	-	15	-	pF	f=1MHz
Turn-on delay time	t <sub>d(on)</sub> *	-	17	-	ns	V <sub>DD</sub> =125V, I <sub>D</sub> =2A
Rise time	t <sub>r</sub> *	-	15	-	ns	V <sub>GS</sub> =10V
Turn-off delay time	t <sub>d(off)</sub> *	-	20	-	ns	R <sub>L</sub> =62.5Ω
Fall time	t <sub>f</sub> *	-	12	-	ns	R <sub>G</sub> =10Ω
Total gate charge	Q <sub>g</sub> *	-	9.0	-	nC	V <sub>DD</sub> =125V, I <sub>D</sub> =4A
Gate-source charge	Q <sub>gs</sub> *	-	3.5	-	nC	V <sub>GS</sub> =10V
Gate-drain charge	Q <sub>gd</sub> *	-	3.5	-	nC	R <sub>L</sub> =31.25Ω R <sub>G</sub> =10Ω

\*Pulsed

## ● Body diode characteristics (Source-Drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V <sub>SD</sub> *	-	-	1.5	V	I <sub>s</sub> =4A, V <sub>GS</sub> =0V

\*Pulsed

●Electrical characteristic curves ( $T_a=25^\circ\text{C}$ )

Fig.1 Typical Output Characteristics ( I )

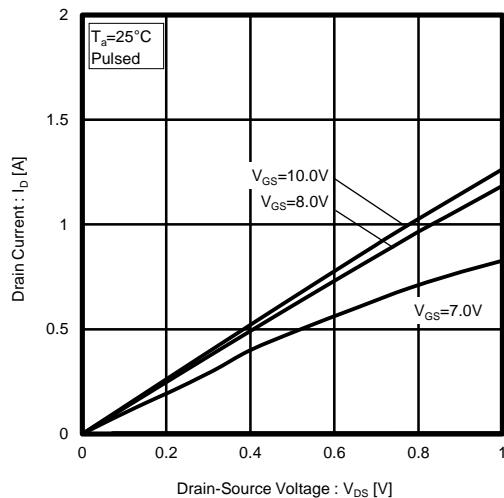


Fig.2 Typical Output Characteristics ( II )

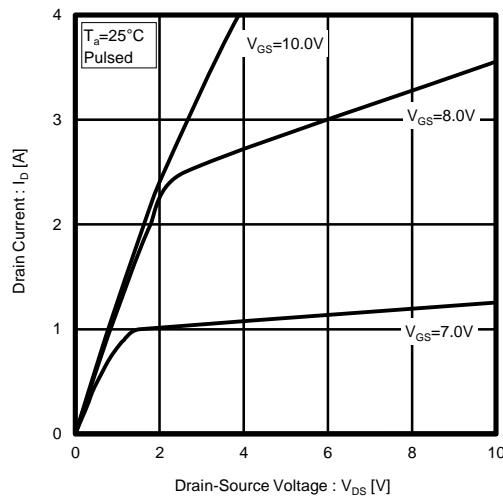


Fig.3 Typical Transfer Characteristics

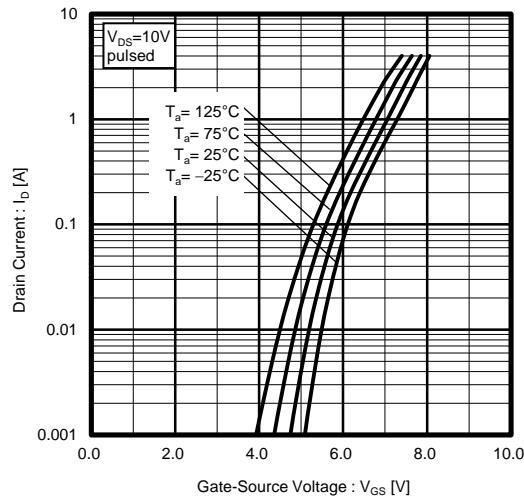


Fig.4 Gate Threshold Voltage vs. Channel Temperature

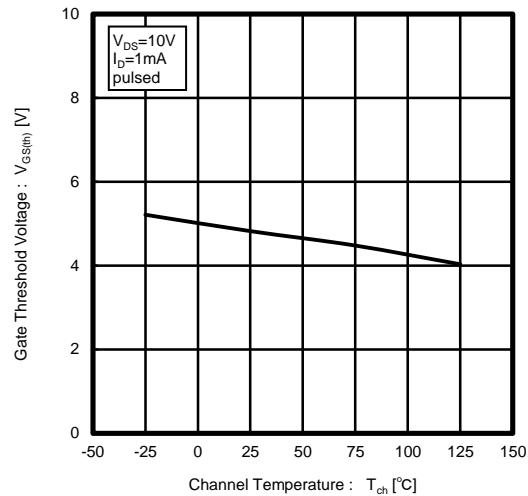


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

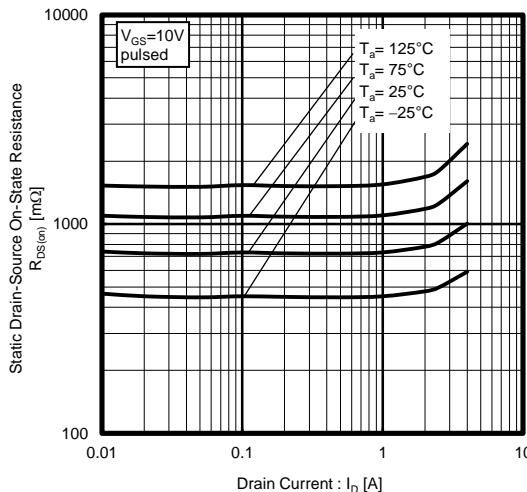


Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

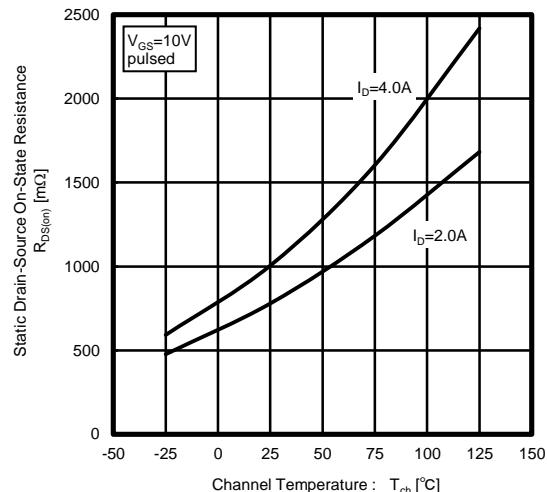


Fig.7 Forward Transfer Admittance vs. Drain Current

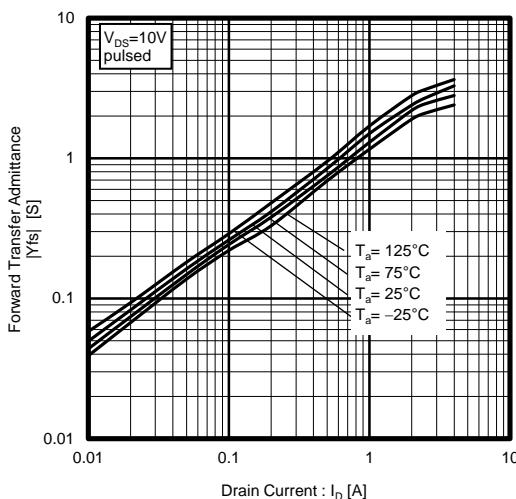


Fig.8 Source Current vs. Source-Drain Voltage

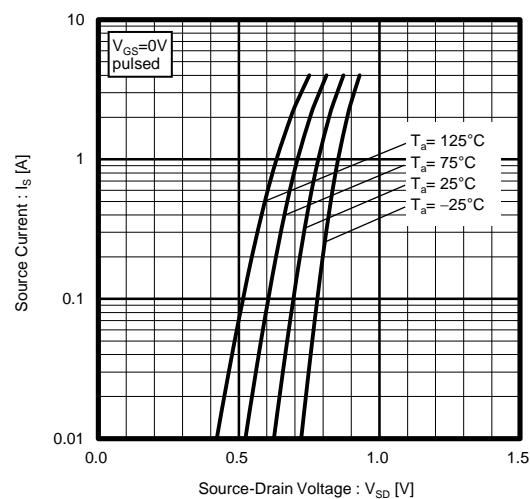


Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

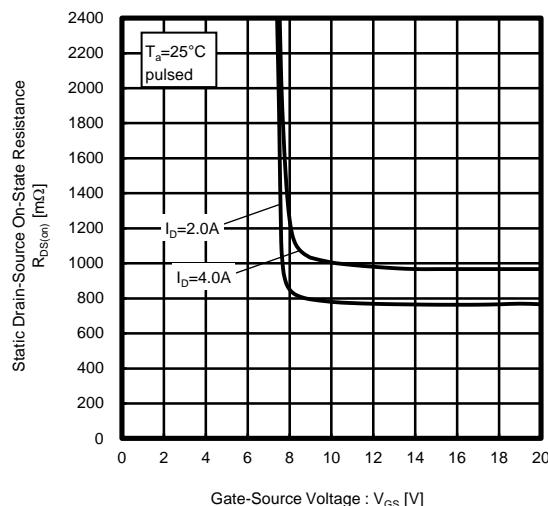


Fig.10 Switching Characteristics

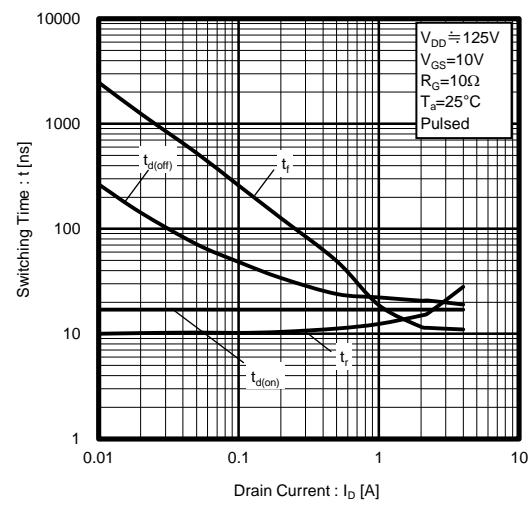


Fig.11 Dynamic Input Characteristics

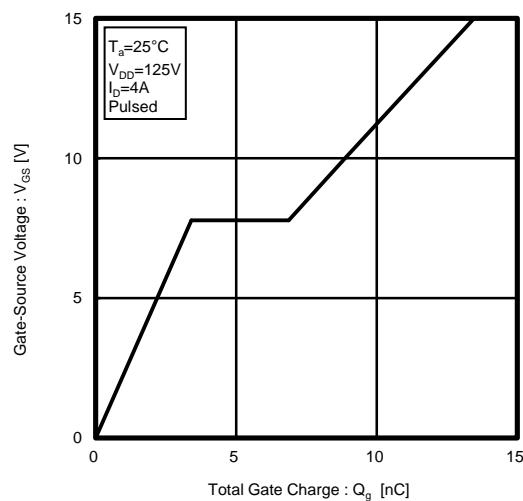
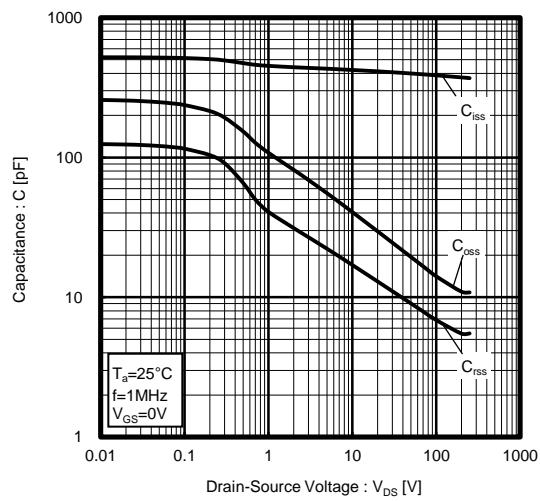
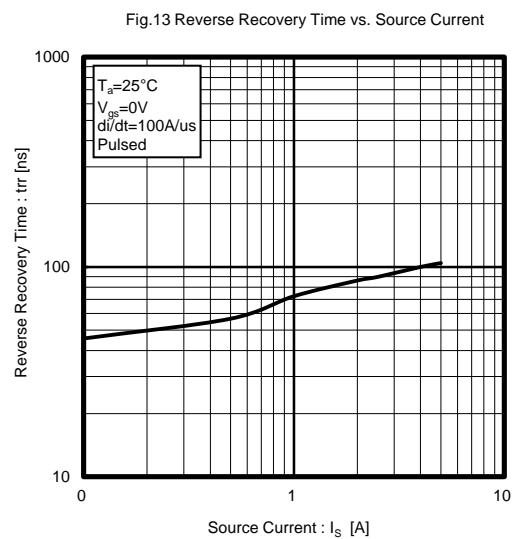


Fig.12 Typical Capacitance vs. Drain-Source Voltage





● Measurement circuits

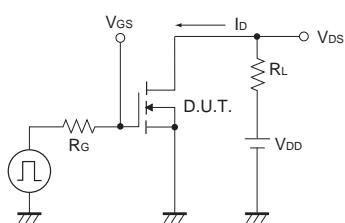


Fig.1-1 Switching Time Measurement Circuit

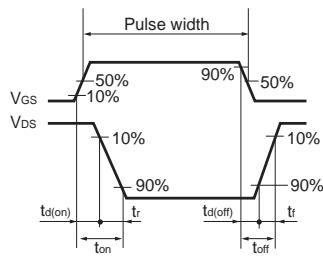


Fig.1-2 Switching Waveforms

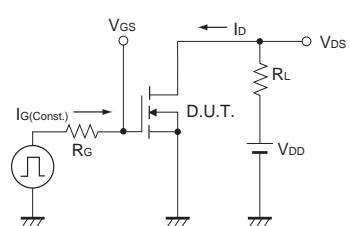


Fig.2-1 Gate Charge Measurement Circuit

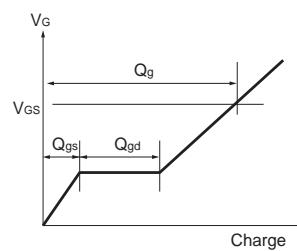


Fig.2-2 Gate Charge Waveform

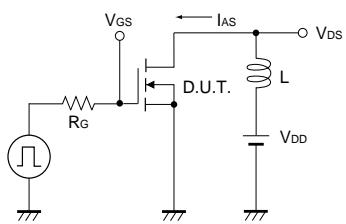


Fig.3-1 Avalanche Measurement Circuit

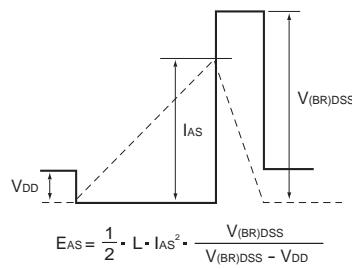


Fig.3-2 Avalanche Waveform

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