



**THE DATASHEET OF  
RDN120N25**



# 10V Drive Nch MOS FET

## RDN120N25

### ●Structure

Silicon N-channel  
MOS FET

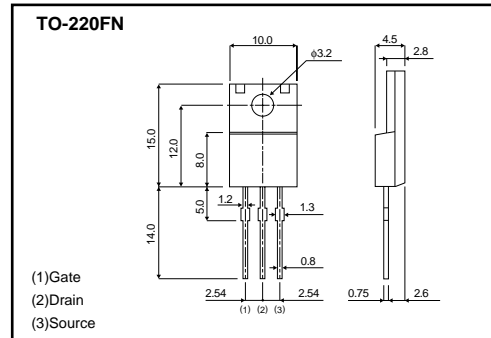
### ●Features

- 1) Low on-resistance.
- 2) Low input capacitance.
- 3) Excellent resistance to damage from static electricity.

### ●Application

Switching

### ●External dimensions (Unit : mm)



### ●Packaging specifications

Type	Package	Bulk
	Code	-
	Basic ordering unit (pieces)	500
RDN120N25		○

### ●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	$V_{DS}$	250	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	12 A
	Pulsed	$I_{DP}$ *1	48 A
Reverse Drain Current	Continuous	$I_{DR}$	12 A
	Pulsed	$I_{DRP}$ *1	48 A
Source Current (Body diode)	Continuous	$I_S$	12 A
	Pulsed	$I_{SP}$ *1	48 A
Avalanche Current	$I_{AS}$ *2	12	A
Avalanche Energy	$E_{AS}$ *2	216	mJ
Total Power Dissipation (Tc=25°C)	$P_D$	40	W
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature	$T_{stg}$	-55 to +150	°C

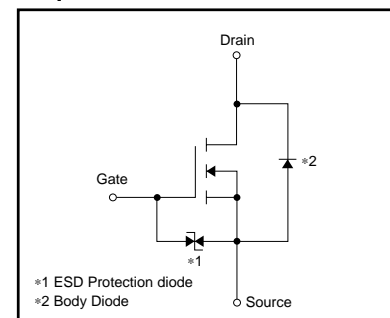
\*1  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$

\*2  $L \approx 2.4mH$ ,  $V_{DD}=50V$ ,  $R_G=25\Omega$ , 1Pulse,  $T_{ch}=25^\circ C$

### ●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to case	$R_{th(ch-c)}$	3.13	°C/W
Channel to ambient	$R_{th(ch-a)}$	62.5	°C/W

### ●Equivalent circuit



\*A protection diode is included between the gate and the source terminals to protect the diode against static electricity when the product is in use. Use the protection circuit when the fixed voltages are exceeded.

## Transistors

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-Source Leakage	I <sub>gss</sub>	—	—	±10	μA	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> =250μA, V <sub>GS</sub> =0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	25	μA	V <sub>DS</sub> =250V, V <sub>GS</sub> =0V
Gate Threshold Voltage	V <sub>GS(th)</sub>	2.0	—	4.0	V	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA
Static Drain-Source On-State Resistance	R <sub>DS(on)</sub> *	—	0.16	0.21	Ω	I <sub>D</sub> =6A, V <sub>GS</sub> =10V
Forward Transfer Admittance	Y <sub>fs</sub>   *	3.7	6.1	—	S	V <sub>DS</sub> =10V, I <sub>D</sub> =6.0A
Input Capacitance	C <sub>iss</sub>	—	1224	—	pF	V <sub>DS</sub> =10V
Output Capacitance	C <sub>oss</sub>	—	443	—	pF	V <sub>GS</sub> =0V
Reverse Transfer Capacitance	C <sub>rss</sub>	—	154	—	pF	f=1MHz
Turn-On Delay Time	t <sub>d(on)</sub> *	—	17	—	ns	I <sub>D</sub> =6.0A, V <sub>DD</sub> ≐100V
Rise Time	t <sub>r</sub> *	—	32	—	ns	V <sub>GS</sub> =10V
Turn-Off Delay Time	t <sub>d(off)</sub> *	—	58	—	ns	R <sub>L</sub> =16.7Ω
Fall Time	t <sub>f</sub> *	—	28	—	ns	R <sub>G</sub> =10Ω
Total Gate Charge	Q <sub>g</sub> *	—	31.0	62.0	nC	V <sub>DD</sub> =125V
Gate-Source Charge	Q <sub>gs</sub> *	—	7.0	—	nC	V <sub>GS</sub> =10V
Gate-Drain Charge	Q <sub>gd</sub> *	—	11.0	—	nC	I <sub>D</sub> =12A

\* Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>SD</sub> *	—	—	2.0	V	I <sub>S</sub> = 6A, V <sub>GS</sub> =0V
Reverse recovery time	t <sub>rr</sub> *	—	169	—	ns	I <sub>DR</sub> = 12A, V <sub>GS</sub> =0V
Reverse recovery charge	Q <sub>rr</sub> *	—	0.95	—	μC	di/dt= 100A / μs

\* Pulsed

Transistors

●Electrical characteristic curves

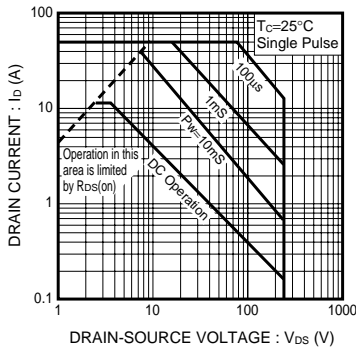


Fig.1 Maximum Safe Operating Area

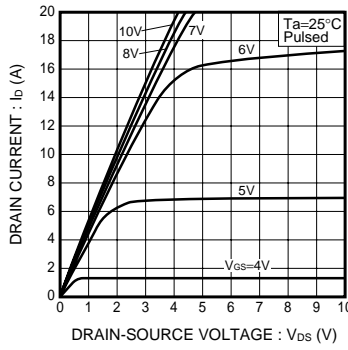


Fig.2 Typical Output Characteristics

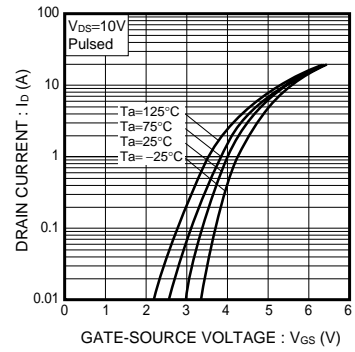


Fig.3 Typical Transfer Characteristics

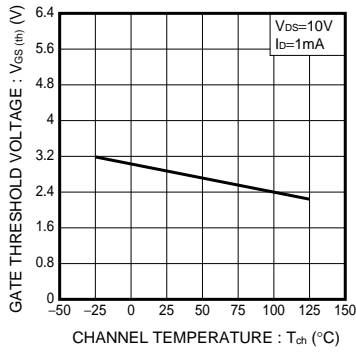


Fig.4 Gate Threshold Voltage vs. Channel Temperature

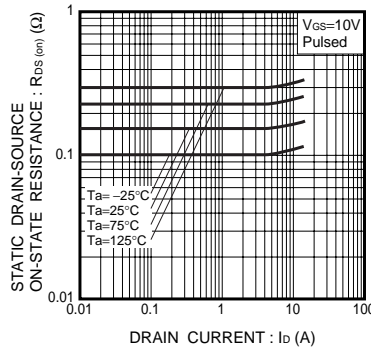


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

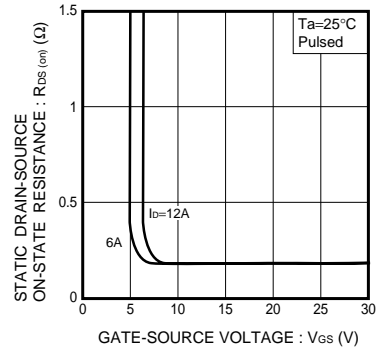


Fig.6 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

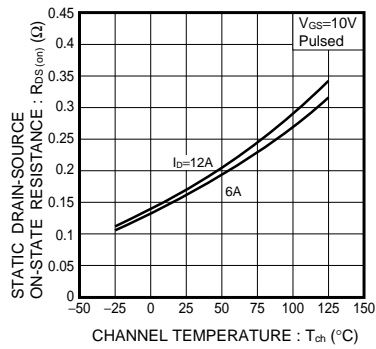


Fig.7 Static Drain-Source On-State Resistance vs. Channel Temperature

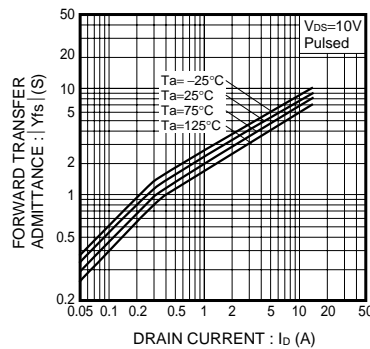


Fig.8 Forward Transfer Admittance vs. Drain Current

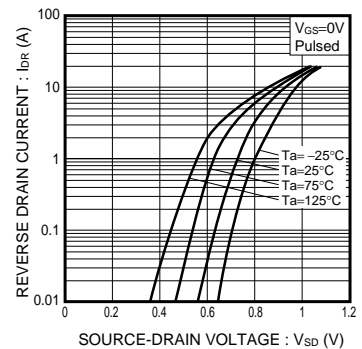


Fig.9 Reverse Drain Current vs. Source-Drain Voltage

Transistors

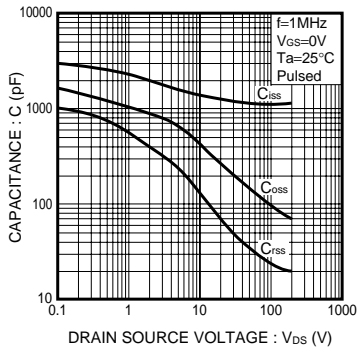


Fig.10 Typical Capacitance vs. Drain-Source Voltage

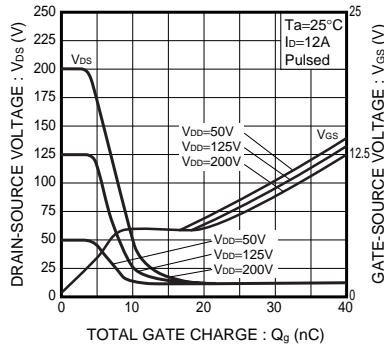


Fig.11 Dynamic Input Characteristics

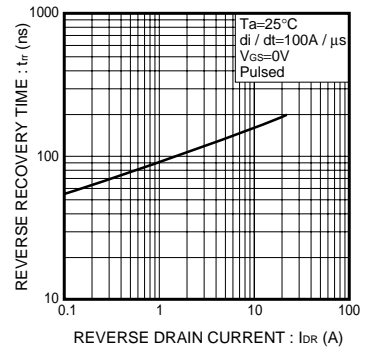


Fig.12 Reverse Recovery Time vs. Reverse Drain Current

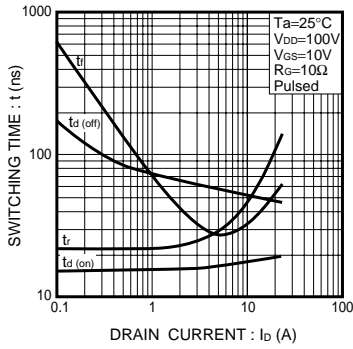


Fig.13 Switching Characteristics

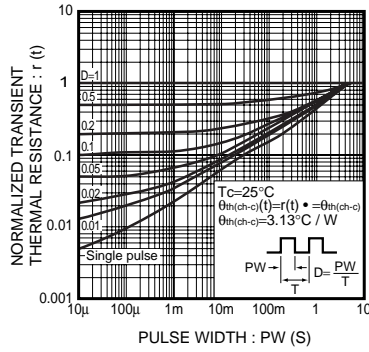


Fig.14 Normalized Transient Thermal Resistance vs. Pulse Width

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