

# 4V Drive Nch MOSFET

**RHU002N06FRA**

● **Structure**

Silicon N-channel  
MOSFET transistor

● **Features**

- 1) Low on-resistance.
- 2) High ESD.
- 3) High-speed switching.
- 4) Low-voltage drive (4V).
- 5) Drive circuits can be simple.
- 6) Parallel use is easy.

● **Applications**

Switching

● **Packaging specifications**

Type	Package	Taping
	Code	T106
	Basic ordering unit (pieces)	3000
RHU002N06FRA		○

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

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V <sub>DSS</sub>	60	V	
Gate-source voltage	V <sub>GSS</sub>	±20	V	
Drain current	Continuous	I <sub>D</sub>	±200	mA
	Pulsed	I <sub>DP</sub> *1	±800	mA
Source current (Body diode)	Continuous	I <sub>S</sub>	200	mA
	Pulsed	I <sub>SP</sub> *1	800	mA
Total power dissipation	P <sub>D</sub> *2	200	mW	
Channel temperature	T <sub>ch</sub>	150	°C	
Storage temperature	T <sub>stg</sub>	-55 to +150	°C	

\*1 P<sub>w</sub>≤10μs, Duty cycles≤1%

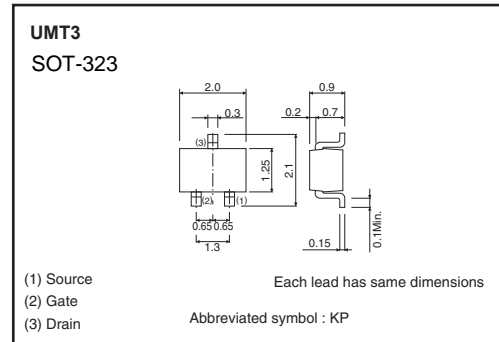
\*2 Each terminal mounted on a recommended

● **Thermal resistance**

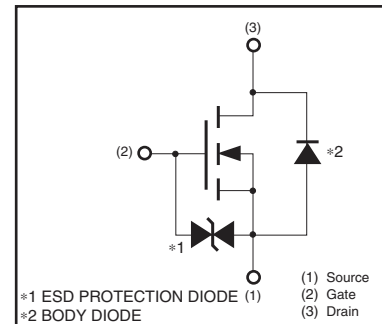
Parameter	Symbol	Limits	Unit
Channel to ambient	R <sub>th</sub> (ch-a) *	625	°C / W

\* With each pin mounted on the recommended land.

● **Dimensions (Unit : mm)**



● **Equivalent circuit**



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

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Gate leakage current	I <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	60	-	-	V	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V
Drain cutoff current	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V
Gate threshold voltage	V <sub>GS(th)</sub>	1	-	2.5	V	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA
Drain-source on-state resistance	R <sub>DS(on)*</sub>	-	1.7	2.4	Ω	I <sub>D</sub> =200mA, V <sub>GS</sub> =10V
		-	2.8	4.0		I <sub>D</sub> =200mA, V <sub>GS</sub> =4V
Forward transfer admittance	Y <sub>fs</sub>  *	0.1	-	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =200mA
Input capacitance	C <sub>iss</sub>	-	15	-	pF	V <sub>DS</sub> =10V
Output capacitance	C <sub>oss</sub>	-	8	-	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	-	4	-	pF	f=1MHz
Turn-on delay time	t <sub>d(on)*</sub>	-	6	-	ns	I <sub>D</sub> =100mA, V <sub>DD</sub> =30V
Rise time	t <sub>r</sub> *	-	5	-	ns	V <sub>GS</sub> =10V
Turn-off delay time	t <sub>d(off)*</sub>	-	12	-	ns	R <sub>L</sub> =300Ω
Fall time	t <sub>f</sub> *	-	95	-	ns	R <sub>G</sub> =10Ω
Total gate charge	Q <sub>g</sub> *	-	2.2	4.4	nC	V <sub>DD</sub> =30V
Gate-source charge	Q <sub>gs</sub> *	-	0.6	-	nC	V <sub>GS</sub> =10V
Gate-drain charge	Q <sub>gd</sub> *	-	0.3	-	nC	I <sub>D</sub> =200mA

\* Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>SD</sub> *	-	-	1.2	V	I <sub>S</sub> =200mA, V <sub>GS</sub> =0V

\*Pulsed

●Electrical characteristic curves

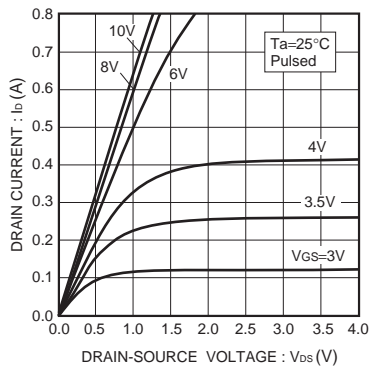


Fig.1 Typical Output Characteristics

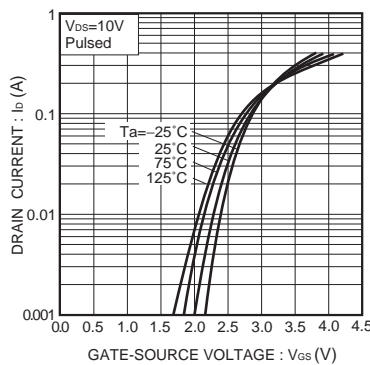


Fig.2 Typical Transfer Characteristics

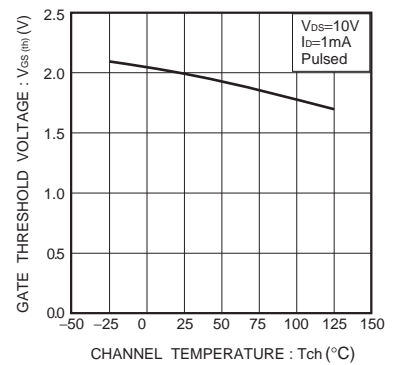


Fig.3 Gate Threshold Voltage vs. Channel Temperature

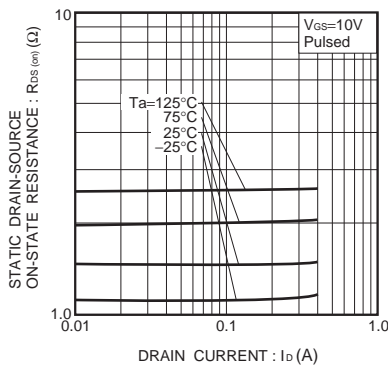


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current ( I )

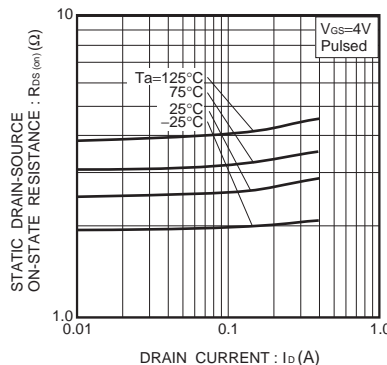


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current ( II )

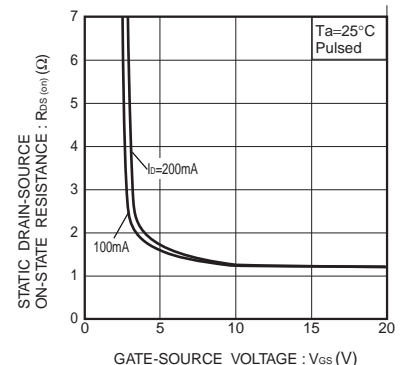


Fig.6 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

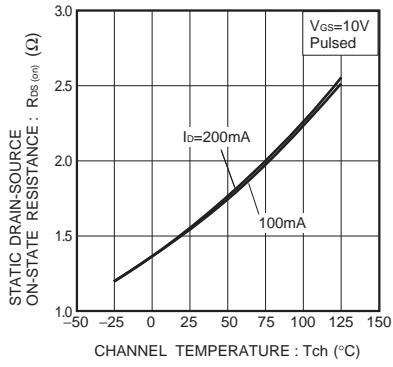


Fig.7 Static Drain-Source On-State Resistance vs. Channel Temperature

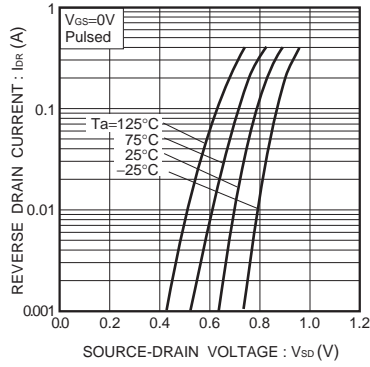


Fig.8 Reverse Drain Current vs. Source-Drain Voltage ( I )

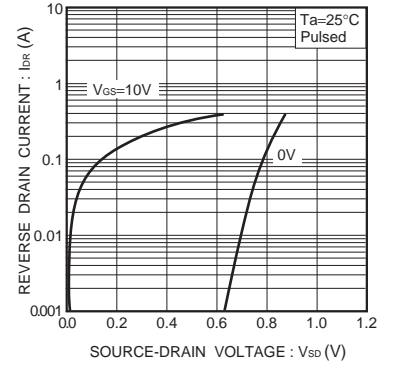


Fig.9 Reverse Drain Current vs. Source-Drain Voltage ( II )

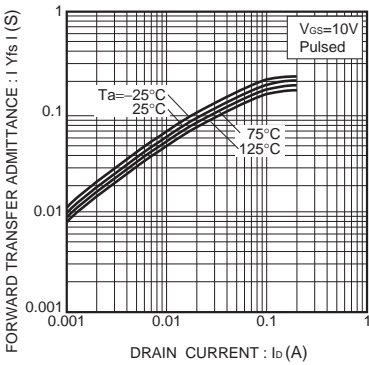


Fig.10 Forward Transfer Admittance vs. Drain Current

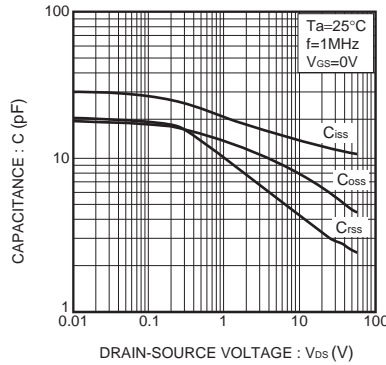


Fig.11 Typical Capacitance vs. Drain-Source Voltage

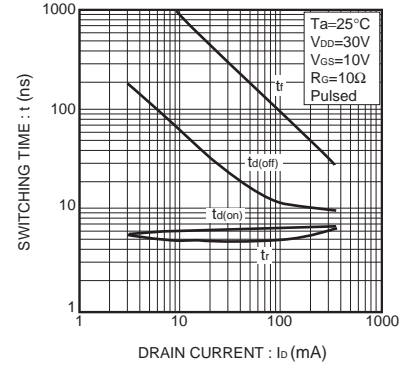


Fig.12 Switching Characteristics

●Switching characteristics measurement circuit

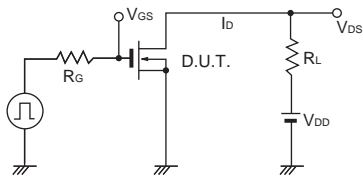


Fig.13 Switching time test circuit

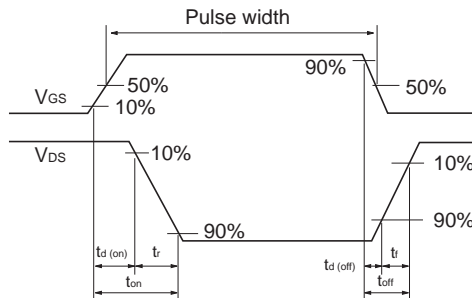


Fig.14 Switching time waveforms

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JAPAN	USA	EU	CHINA
CLASS III	CLASS III	CLASS II b	CLASS III
CLASS IV		CLASS III	

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  - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
  - [f] Sealing or coating our Products with resin or other coating materials
  - [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
  - [h] Use of the Products in places subject to dew condensation
4. The Products are not subject to radiation-proof design.
5. Please verify and confirm characteristics of the final or mounted products in using the Products.
6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
7. De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
8. Confirm that operation temperature is within the specified range described in the product specification.
9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

## Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

### Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
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This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

### Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
  - [a] the Products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [b] the temperature or humidity exceeds those recommended by ROHM
  - [c] the Products are exposed to direct sunshine or condensation
  - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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