

# 1.5V Drive Nch MOSFET

## RUF020N02

### ●Structure

Silicon N-channel MOSFET

### ●Features

- 1) Low On-resistance.
- 2) Space saving, small surface mount Package (TUMT3).
- 3) Low voltage drive (1.5V drive).

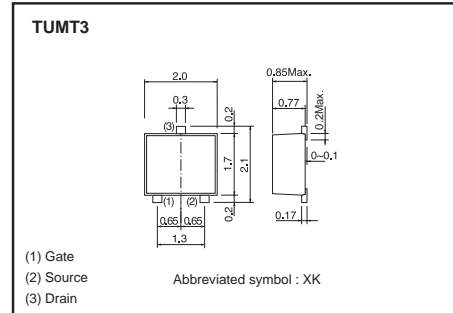
### ●Applications

Switching

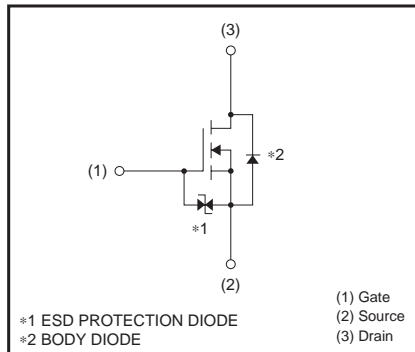
### ●Packaging specifications

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	3000
RUF020N02		○

### ●Dimensions (Unit : mm)



### ●Inner circuit



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

Parameter	Symbol	Limits	Unit	
Drain-source voltage	$V_{DS}$	20	V	
Gate-source voltage	$V_{GS}$	$\pm 10$	V	
Drain current	Continuous	$I_D$	$\pm 2$	A
	Pulsed	$I_{DP}$ *1	$\pm 6$	A
Source current (Body diode)	Continuous	$I_S$	0.6	A
	Pulsed	$I_{SP}$ *1	6	A
Total power dissipation	$P_D$ *2	0.8	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 When mounted on a ceramic board

### ●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th(ch-a)}$ *	156	°C/W

\* When mounted on a ceramic board

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	$I_{GSS}$	–	–	$\pm 10$	$\mu A$	$V_{GS}=\pm 10V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	20	–	–	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	$I_{DSS}$	–	–	1	$\mu A$	$V_{DS}=20V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	0.3	–	1.0	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	–	75	105	m $\Omega$	$I_D=2A, V_{GS}=4.5V$
		–	95	135	m $\Omega$	$I_D=2A, V_{GS}=2.5V$
		–	130	185	m $\Omega$	$I_D=1A, V_{GS}=1.8V$
		–	170	240	m $\Omega$	$I_D=0.4A, V_{GS}=1.5V$
Forward transfer admittance	$ Y_{fs} $ *	1.8	–	–	S	$V_{DS}=10V, I_D=2A$
Input capacitance	$C_{iss}$	–	180	–	pF	$V_{DS}=10V$
Output capacitance	$C_{oss}$	–	45	–	pF	$V_{GS}=0V$
Reverse transfer capacitance	$C_{rss}$	–	25	–	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	–	6	–	ns	$V_{DD}\doteq 10V$
Rise time	$t_r$ *	–	17	–	ns	$I_D=1A$ $V_{GS}=4.5V$
Turn-off delay time	$t_{d(off)}$ *	–	30	–	ns	$R_L\doteq 10\Omega$
Fall time	$t_f$ *	–	30	–	ns	$R_G=10\Omega$
Total gate charge	$Q_g$ *	–	2.0	–	nC	$V_{DD}\doteq 10V, I_D=2A$
Gate-source charge	$Q_{gs}$ *	–	0.6	–	nC	$V_{GS}=4.5V$
Gate-drain charge	$Q_{gd}$ *	–	0.4	–	nC	$R_L\doteq 5\Omega, R_G=10\Omega$

\*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	$V_{SD}$ *	–	–	1.2	V	$I_S=2A, V_{GS}=0V$

\*Pulsed

●Electrical characteristics curves

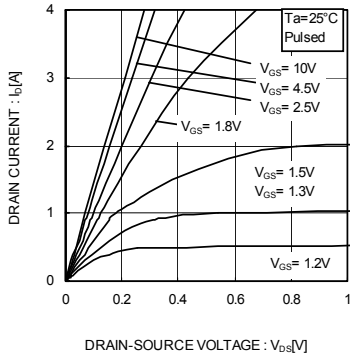


Fig.1 Typical Output Characteristics( I )

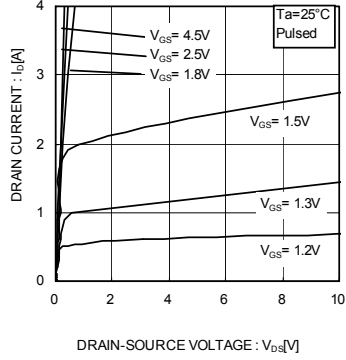


Fig.2 Typical Output Characteristics( II )

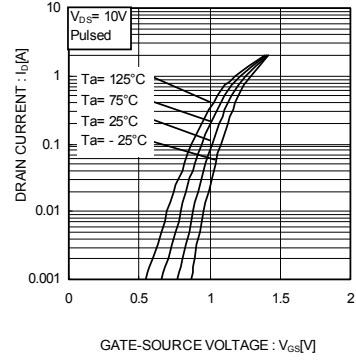


Fig.3 Typical Transfer Characteristics

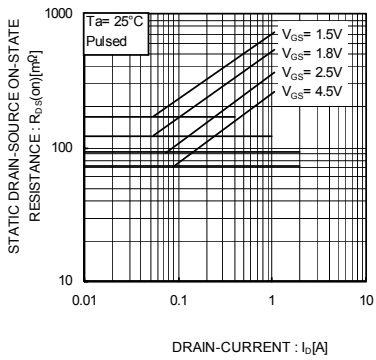


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current( I )

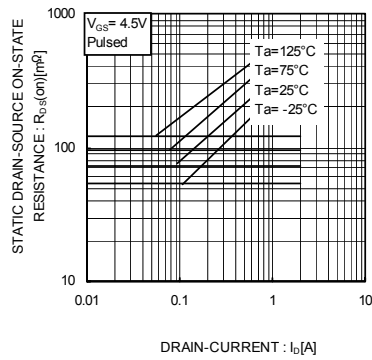


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current( II )

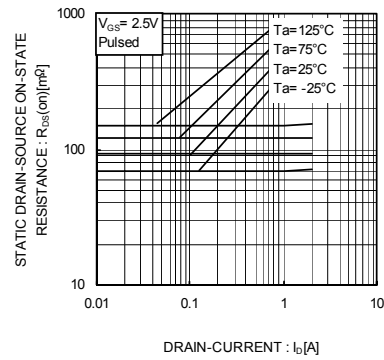


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current( III )

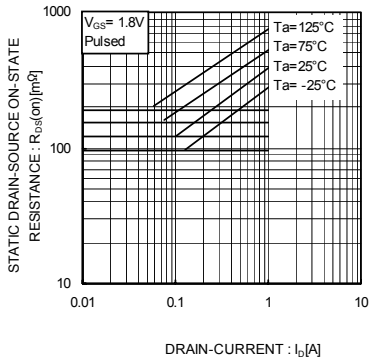


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(IV)

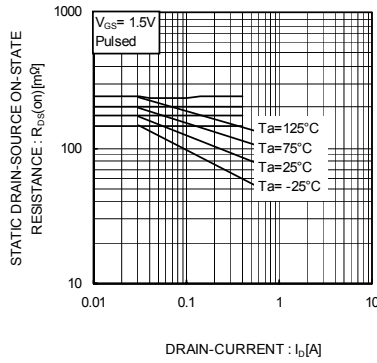


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current( V )

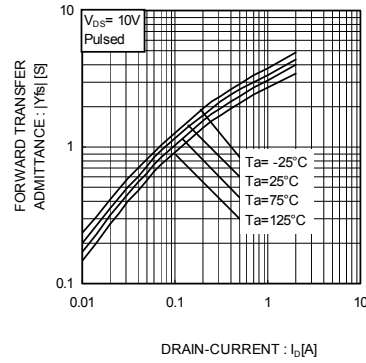


Fig.9 Forward Transfer Admittance vs. Drain Current

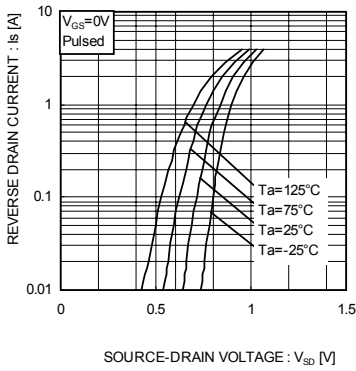


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

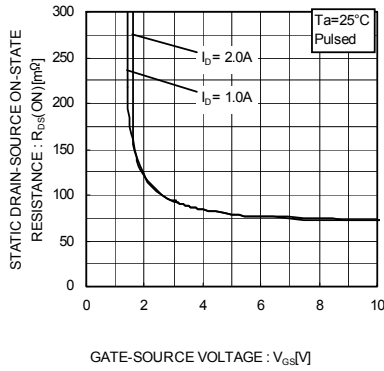


Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

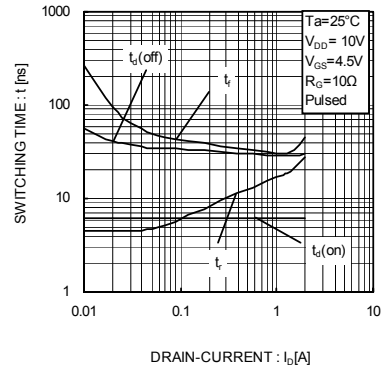


Fig.12 Switching Characteristics

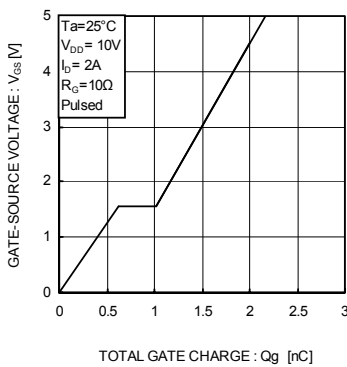


Fig.13 Dynamic Input Characteristics

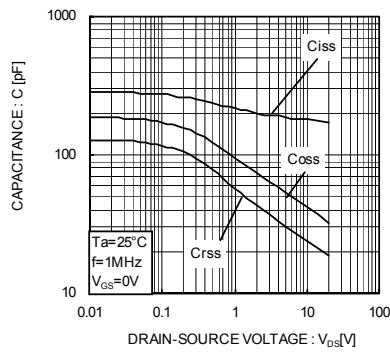


Fig.14 Typical Capacitance vs. Drain-Source Voltage

●Measurement circuit

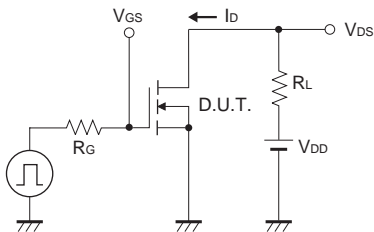


Fig.1-1 Switching Time Measurement Circuit

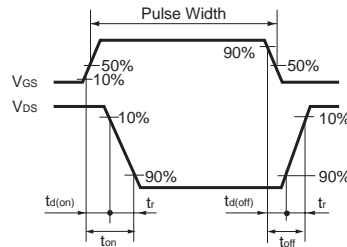


Fig.1-2 Switching Waveforms

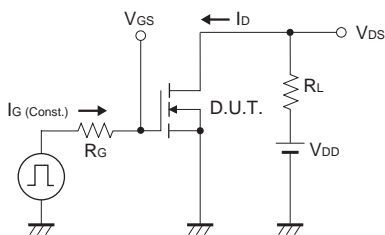


Fig.2-1 Gate Charge Measurement Circuit

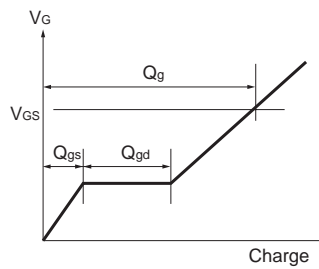


Fig.2-2 Gate Charge Waveform

●Notice

This product might cause chip aging and breakdown under the large electrified environment. Please consider to design ESD protection circuit.

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