

# 1.5V Drive Nch MOSFET

## RUR040N02

### ●Structure

Silicon N-channel  
MOSFET

### ●Features

- 1) 1.5V drive
- 2) Low On-resistance.
- 3) Built-in G-S Protection Diode.
- 4) Small Surface Mount Package (TSMT3).

### ●Application

Switching

### ●Packaging specifications

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	3000
RUR040N02		○

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

Parameter	Symbol	Limits	Unit	
Drain-source voltage	$V_{DSS}$	20	V	
Gate-source voltage	$V_{GSS}$	$\pm 10$	V	
Drain current	Continuous	$\pm 4.0$	A	
	Pulsed	$I_{DP}$ *1	$\pm 8.0$	A
Source current (Body diode)	Continuous	$I_S$	0.8	A
	Pulsed	$I_{SP}$ *1	8.0	A
Total power dissipation	$P_D$ *2	1.0	W	
Channel temperature	$T_{ch}$	150	°C	
Range of storage temperature	$T_{stg}$	-55 to +150	°C	

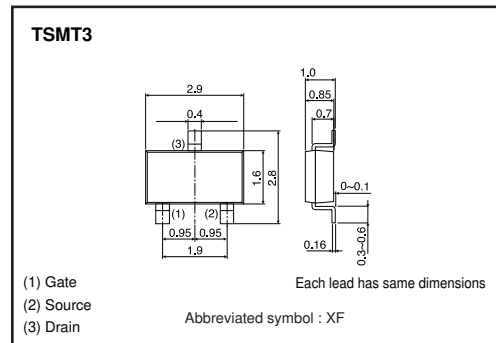
\*1  $P_w \leq 10 \mu s$ , Duty cycle  $\leq 1\%$   
\*2 Mounted on a ceramic board

### ●Thermal resistance

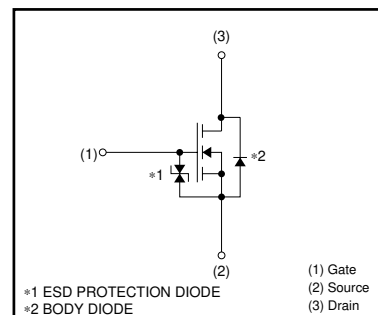
Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th}(ch-a)$ *	125	°C / W

\* Mounted on a ceramic board

### ●Dimensions (Unit : mm)



### ●Equivalent circuit



## Transistors

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	$I_{GSS}$	–	–	±10	μA	$V_{GS}=\pm 10V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	20	–	–	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	$I_{DSS}$	–	–	1	μA	$V_{DS}=20V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	0.3	–	1.3	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	–	25	35	mΩ	$I_D=4.0A, V_{GS}=4.5V$
		–	33	46	mΩ	$I_D=4.0A, V_{GS}=2.5V$
		–	42	59	mΩ	$I_D=2.0A, V_{GS}=1.8V$
		–	55	110	mΩ	$I_D=0.8A, V_{GS}=1.5V$
Forward transfer admittance	$ Y_{fs} $ *	5.0	–	–	S	$V_{DS}=10V, I_D=4.0A$
Input capacitance	$C_{iss}$	–	680	–	pF	$V_{DS}=10V$
Output capacitance	$C_{oss}$	–	150	–	pF	$V_{GS}=0V$
Reverse transfer capacitance	$C_{rss}$	–	90	–	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	–	10	–	ns	$I_D=2.0A, V_{DD}\hat{=}10V$ $V_{GS}=4.5V$
Rise time	$t_r$ *	–	30	–	ns	
Turn-off delay time	$t_{d(off)}$ *	–	50	–	ns	$R_L\hat{=}5\Omega, R_G=10\Omega$
Fall time	$t_f$ *	–	60	–	ns	
Total gate charge	$Q_g$ *	–	8	–	nC	$I_D=4.0A, V_{DD}\hat{=}10V$
Gate-source charge	$Q_{gs}$ *	–	1.8	–	nC	$V_{GS}=4.5V$
Gate-drain charge	$Q_{gd}$ *	–	1.3	–	nC	$R_L\hat{=}2.5\Omega, R_G=10\Omega$

\*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	$V_{SD}$ *	–	–	1.2	V	$I_S=0.8A, V_{GS}=0V$

\*Pulsed

Transistors

●Electrical characteristic curves

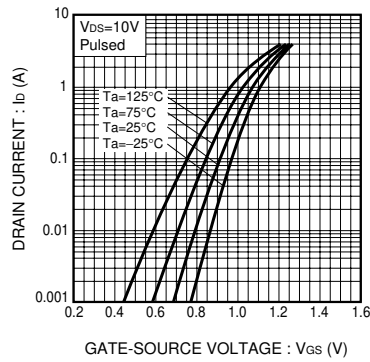


Fig.1 Typical Transfer Characteristics

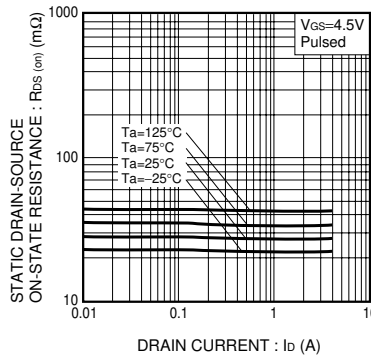


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (I)

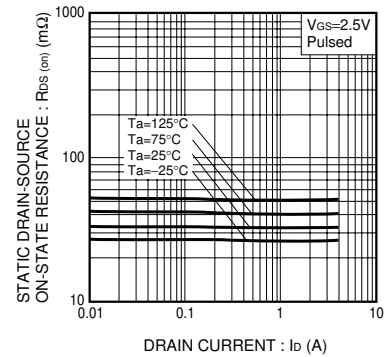


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (II)

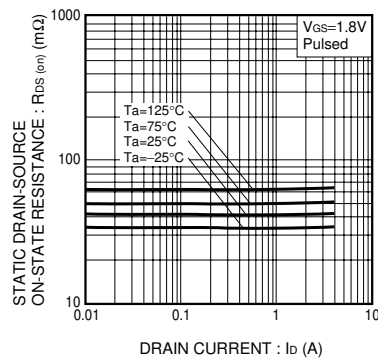


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (III)

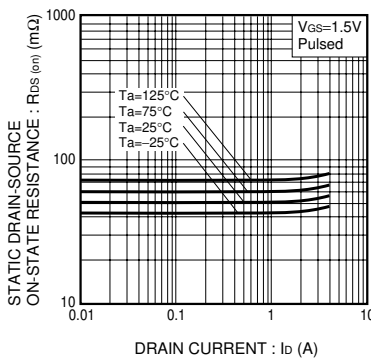


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (IV)

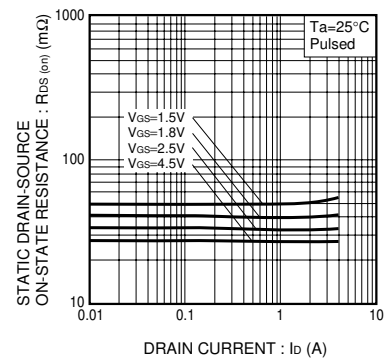


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (V)

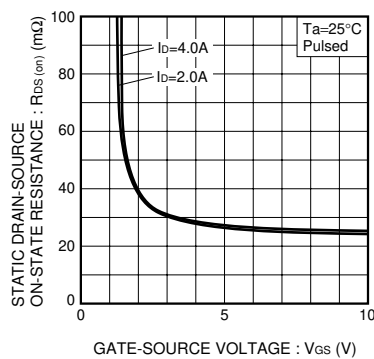


Fig.7 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

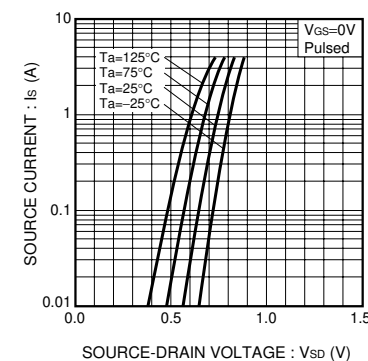


Fig.8 Source Current vs. Source-Drain Voltage

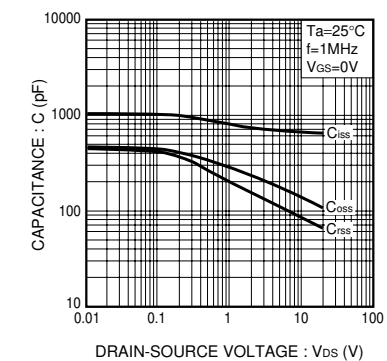


Fig.9 Typical Capacitance vs. Drain-Source Voltage

Transistors

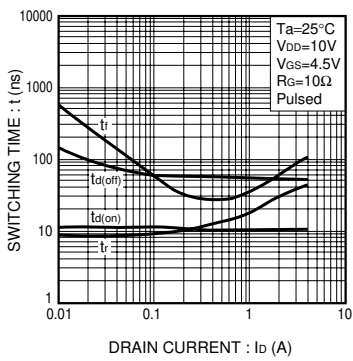


Fig.10 Switching Characteristics

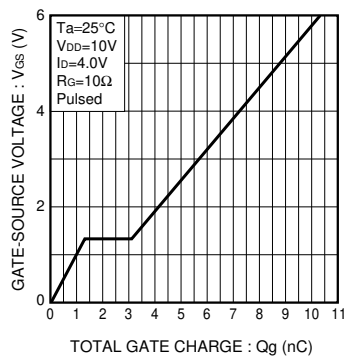


Fig.11 Dynamic Input Characteristics

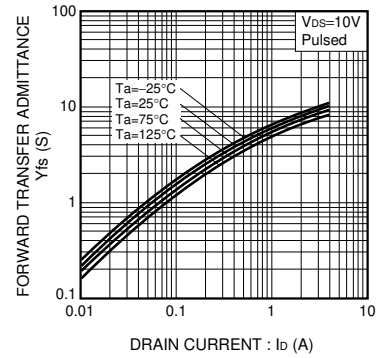


Fig.12 Forward Transfer Admittance vs. Drain Current

●Measurement circuits

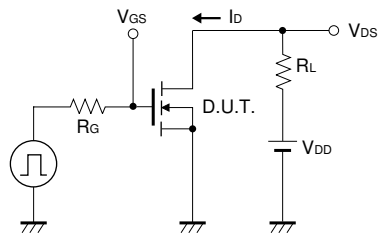


Fig.13 Switching Time Test Circuit

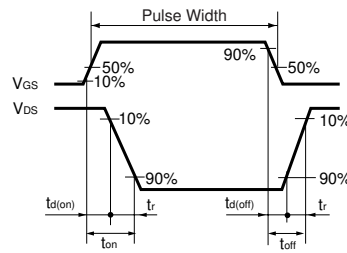


Fig.14 Switching Time Waveforms

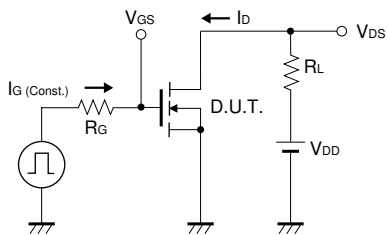


Fig.15 Gate Charge Test Circuit

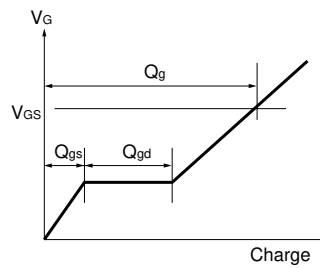


Fig.16 Gate Charge Waveform

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