

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}	± 10	V	
Drain current	Continuous	± 4.0	A	
	Pulsed	I_{DP} *1	± 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	

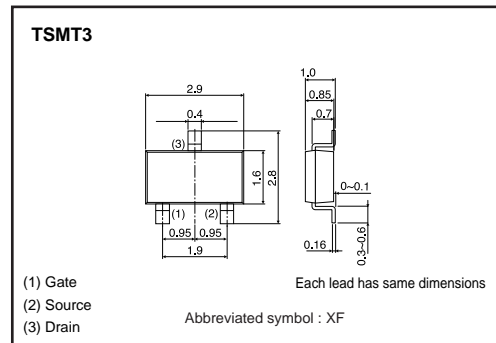
*1 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$
*2 Mounted on a ceramic board

●Thermal resistance

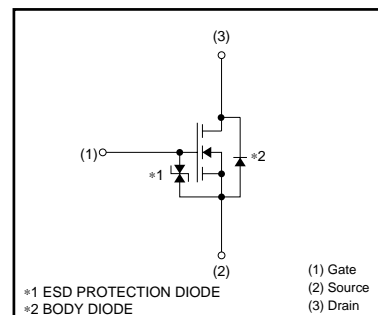
Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th(ch-a)}$ *	125	°C / W

* 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

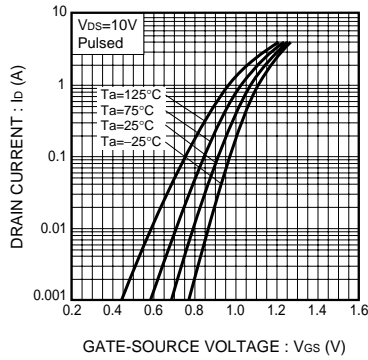


Fig.1 Typical Transfer Characteristics

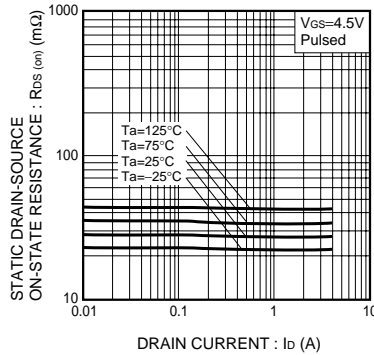


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (I)

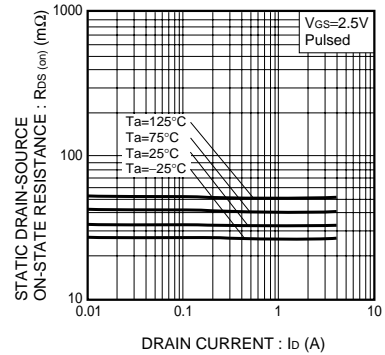


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (II)

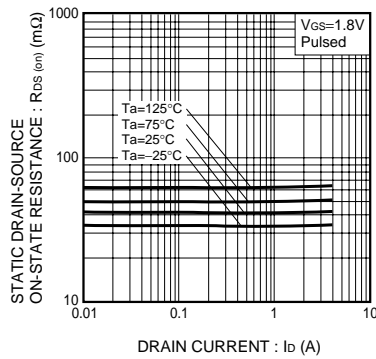


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (III)

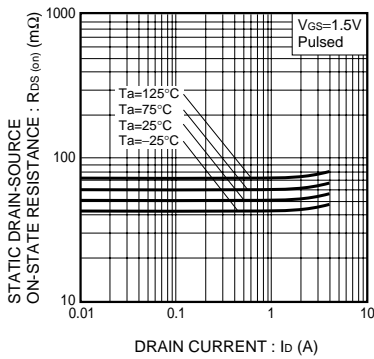


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (IV)

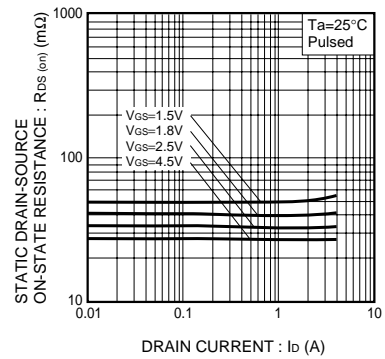


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (V)

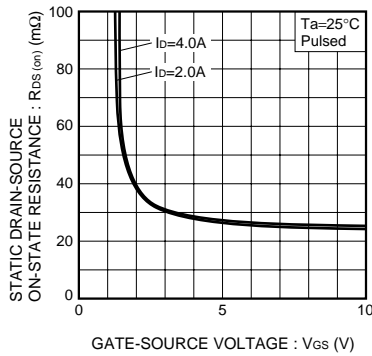


Fig.7 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

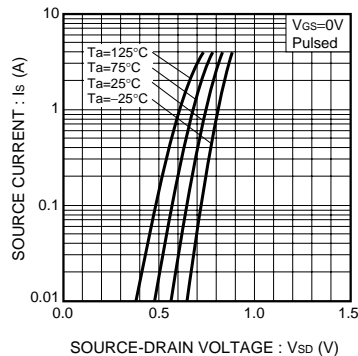


Fig.8 Source Current vs. Source-Drain Voltage

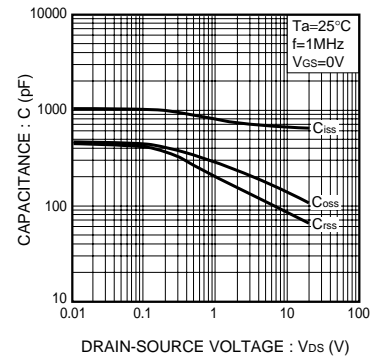


Fig.9 Typical Capacitance vs. Drain-Source Voltage

Transistors

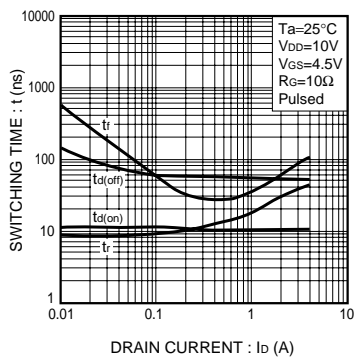


Fig.10 Switching Characteristics

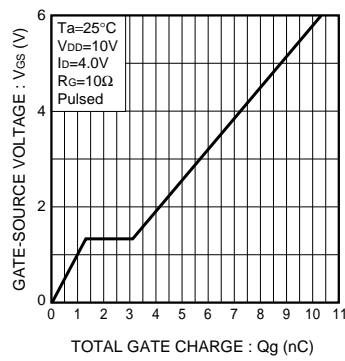


Fig.11 Dynamic Input Characteristics

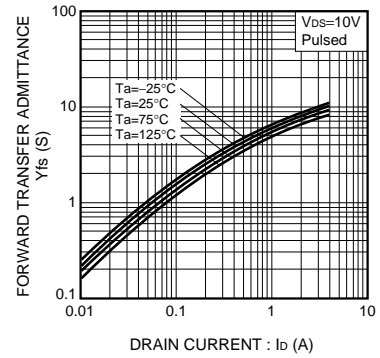


Fig.12 Forward Transfer Admittance vs. Drain Current

●Measurement circuits

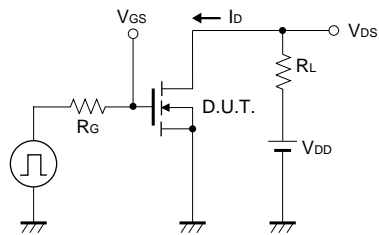


Fig.13 Switching Time Test Circuit

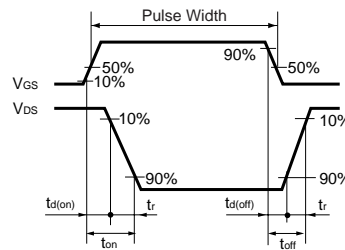


Fig.14 Switching Time Waveforms

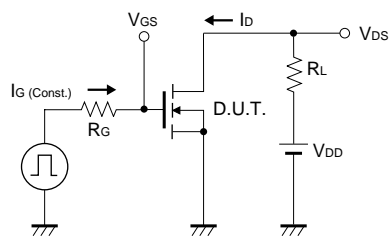


Fig.15 Gate Charge Test Circuit

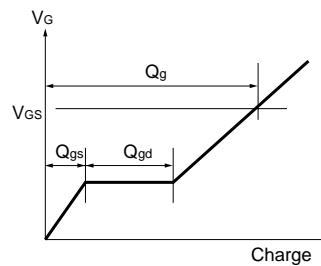


Fig.16 Gate Charge Waveform

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