1.5V Drive Nch MOSFET

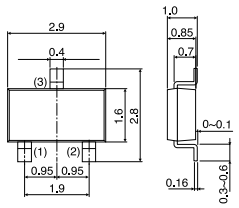
RUR040N02

●**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).

●**Dimensions** (Unit : mm)

TSMT3



(1) Gate
(2) Source
(3) Drain

Each lead has same dimensions

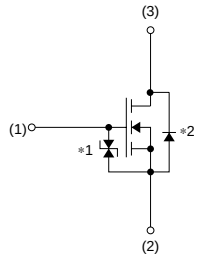
Abbreviated symbol : XF

●**Application**
Switching

●**Packaging specifications**

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

●**Equivalent circuit**



∗1 ESD PROTECTION DIODE
∗2 BODY DIODE

(1) Gate
(2) Source
(3) Drain

●**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	I_D	±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		Tch	150	°C
Range of storage temperature		Tstg	−55 to +150	°C

∗1 Pw≤10µs, Duty cycle≤1%
∗2 Mounted on a ceramic board

●**Thermal resistance**

Parameter	Symbol	Limits	Unit
Channel to ambient	Rth (ch-a) ∗	125	°C / W

∗ Mounted on a ceramic board

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	–	–	±10	μA	V_{GS}=±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}≒ 10V V_{GS}= 4.5V R_L≒5Ω, R_G=10Ω
Rise time	t_r *	–	30	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	50	–	ns	
Fall time	t_f *	–	60	–	ns	
Total gate charge	Q_g *	–	8	–	nC	I_D= 4.0A, V_{DD}≒ 10V V_{GS}= 4.5V R_L≒2.5Ω, R_G=10Ω
Gate-source charge	Q_{gs} *	–	1.8	–	nC	
Gate-drain charge	Q_{gd} *	–	1.3	–	nC	

*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

●**Electrical characteristic curves**

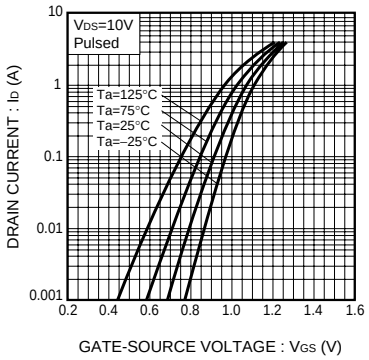


Fig.1 Typical Transfer Characteristics

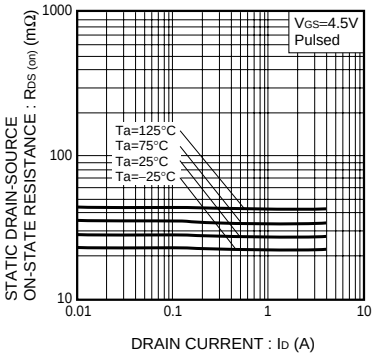


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (I)

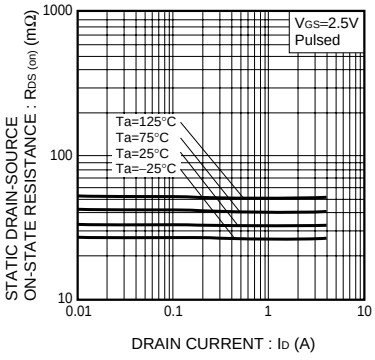


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (II)

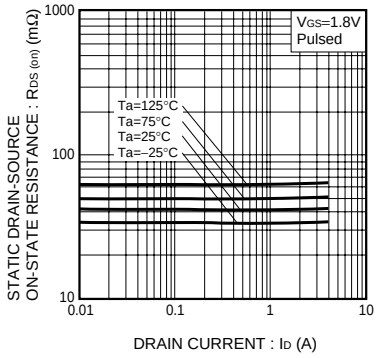


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (III)

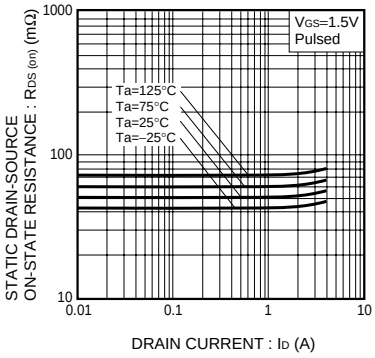


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (IV)

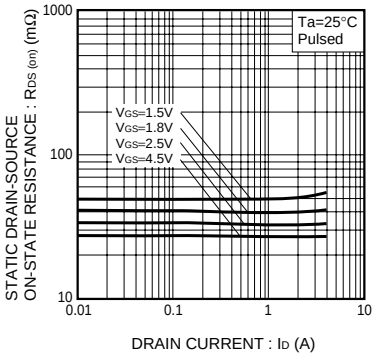


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (V)

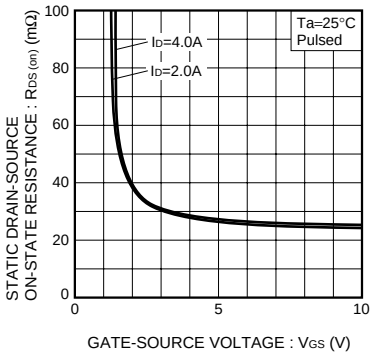


Fig.7 Static Drain-Source On-State Resistance vs. Gate-Source Voletage

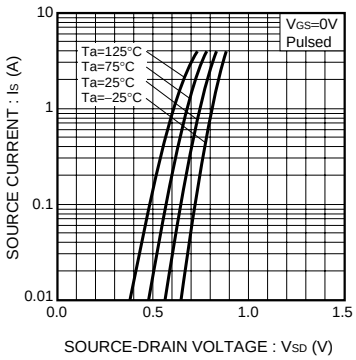


Fig.8 Source Current vs. Source-Drain Voltage

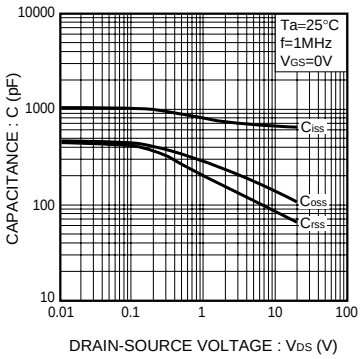


Fig.9 Typical Capacitance vs. Drain-Source Voltage

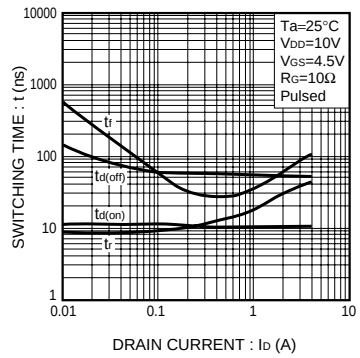


Fig.10 Switching Characteristics

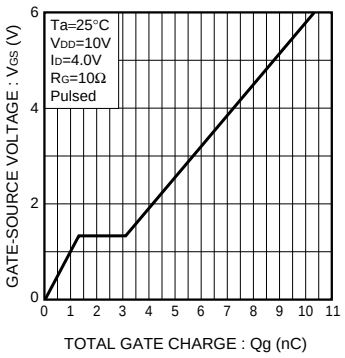


Fig.11 Dynamic Input Characteristics

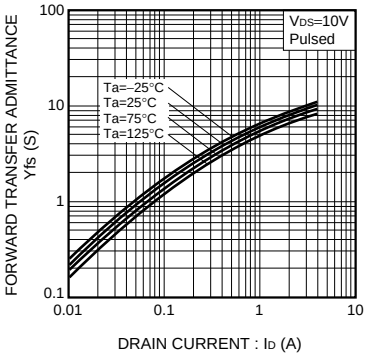


Fig.12 Forward Transfer Admittance vs. Drain Current

●Measurement circuits

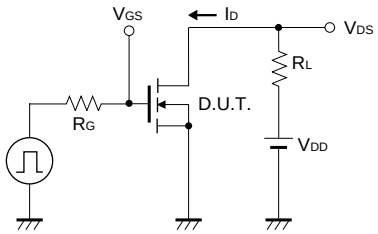


Fig.13 Switching Time Test Circuit

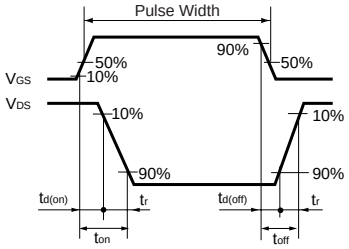


Fig.14 Switching Time Waveforms

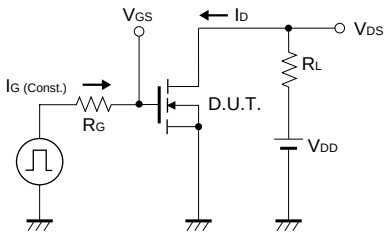


Fig.15 Gate Charge Test Circuit

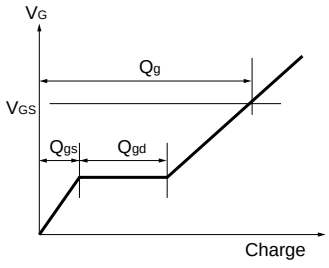


Fig.16 Gate Charge Waveform

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