

Transistors

1.5V Drive Nch MOSFET

RUL035N02

●Structure

Silicon N-channel MOSFET

●Features

- 1) Low On-resistance.
- 2) Space saving, small surface mount package (TUMT6).
- 3) Low voltage drive (1.5V drive).

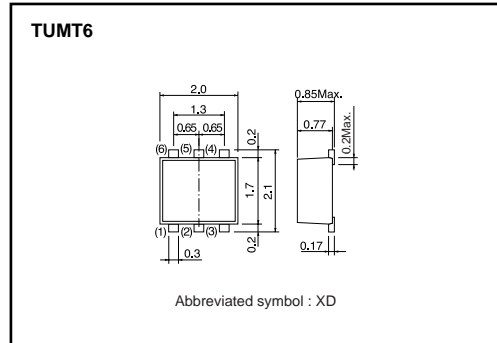
●Applications

Switching

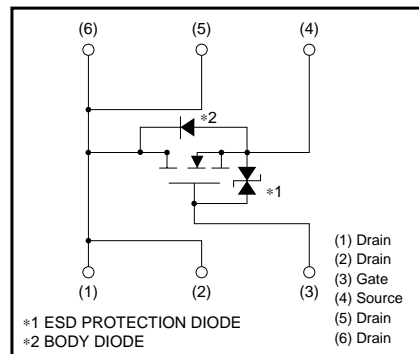
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
RUL035N02		○

●Dimensions (Unit : mm)



●Inner circuit



●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	± 3.5	A
	Pulsed	I_{DP} *1	± 7	A
Source current (Body diode)	Continuous	I_S	0.8	A
	Pulsed	I_{SP} *1	7	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

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●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	–	1.0	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	–	31	43	mΩ	$I_D=3.5A, V_{GS}=4.5V$
		–	38	53	mΩ	$I_D=3.5A, V_{GS}=2.5V$
		–	50	70	mΩ	$I_D=1.8A, V_{GS}=1.8V$
		–	66	93	mΩ	$I_D=0.7A, V_{GS}=1.5V$
Forward transfer admittance	$ Y_{fs} $ *	3.2	–	–	S	$V_{DS}=10V, I_D=3.5A$
Input capacitance	C_{iss}	–	460	–	pF	$V_{DS}=10V$
Output capacitance	C_{oss}	–	110	–	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	–	60	–	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	–	10	–	ns	$V_{DD}\cong 10V$
Rise time	t_r *	–	20	–	ns	$I_D=1.8A$
Turn-off delay time	$t_{d(off)}$ *	–	40	–	ns	$V_{GS}=4.5V$
Fall time	t_f *	–	50	–	ns	$R_L\cong 5.6\Omega$
Total gate charge	Q_g *	–	5.7	–	nC	$V_{DD}\cong 10V, I_D=3.5A$
Gate-source charge	Q_{gs} *	–	1.1	–	nC	$V_{GS}=4.5V$
Gate-drain charge	Q_{gd} *	–	0.9	–	nC	$R_L=2.9\Omega, R_G=10\Omega$

*Pulsed

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

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

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●Electrical characteristics curves

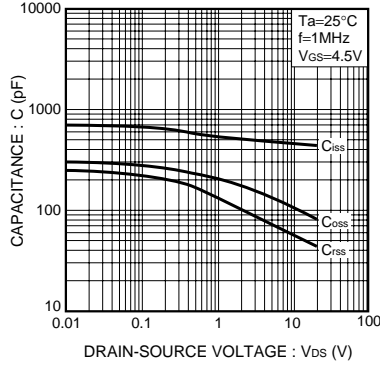


Fig.1 Typical Capacitance vs. Drain-Source Voltage

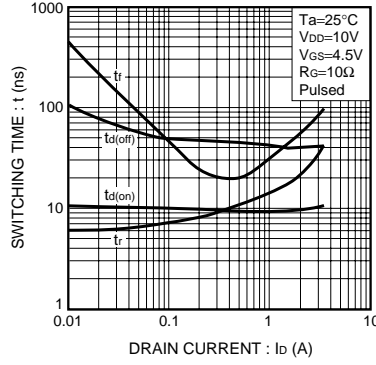


Fig.2 Switching Characteristics

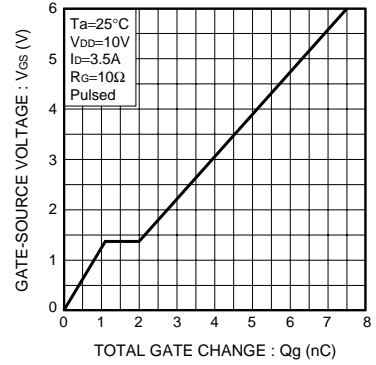


Fig.3 Dynamic Input Characteristics

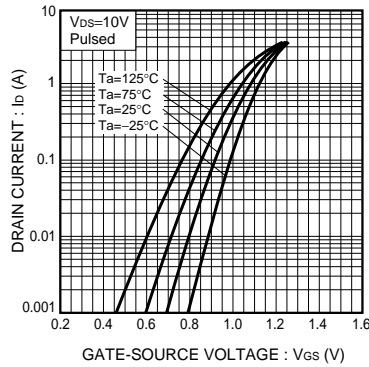


Fig.4 Typical Transfer Characteristics

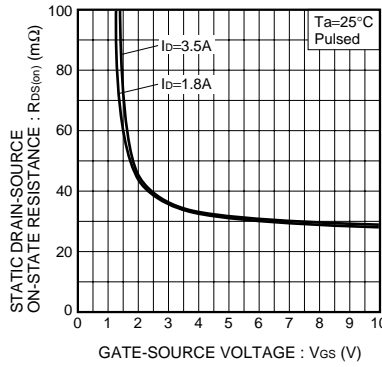


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

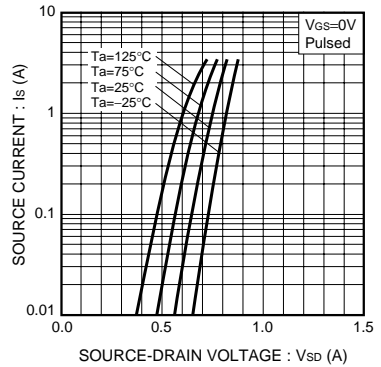


Fig.6 Source-Current vs. Source-Drain Voltage

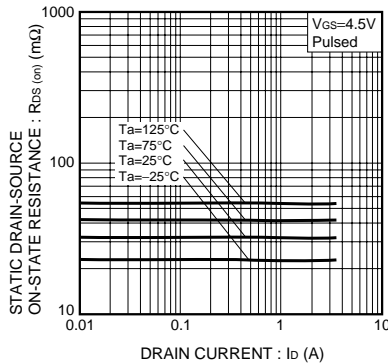


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (I)

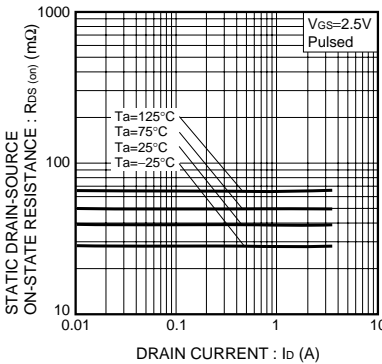


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (II)

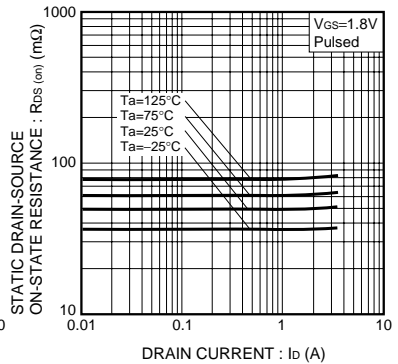


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current (III)

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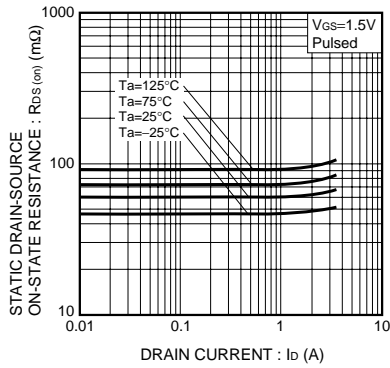


Fig.10 Static Drain-Source On-State Resistance vs. Drain Current (IV)

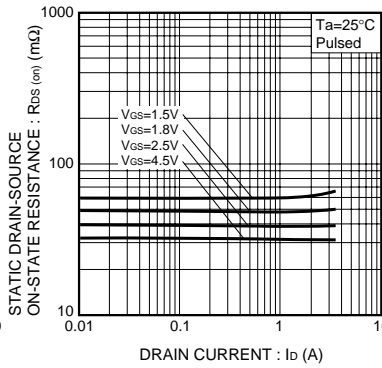


Fig.11 Static Drain-Source On-State Resistance vs. Drain Current (V)

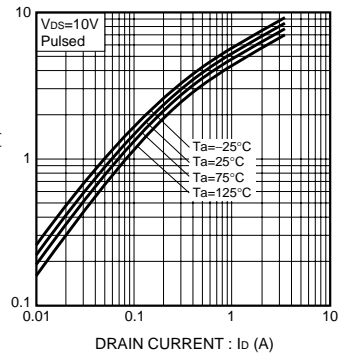


Fig.12 Forward Transfer Admittance vs. Drain Current

●Measurement circuit

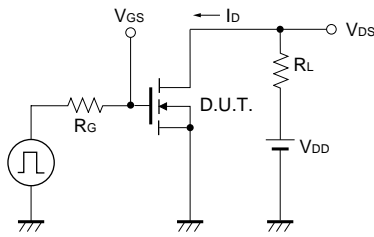


Fig.13 Switching Time Measurement Circuit

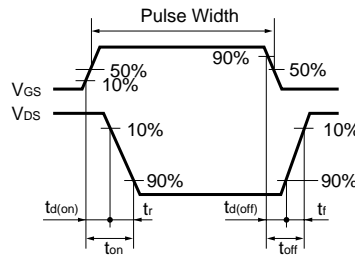


Fig.14 Switching Waveforms

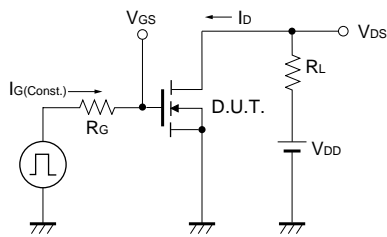


Fig.15 Gate Charge Measurement Circuit

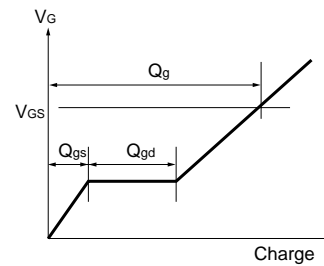


Fig.16 Gate Charge Waveform

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