

Transistors

1.5V Drive Nch MOSFET

RUQ050N02

●Structure

Silicon N-channel MOSFET

●Features

- 1) Low On-resistance.
- 2) Space saving, small surface mount package (TSMT6).
- 3) 1.5V drive

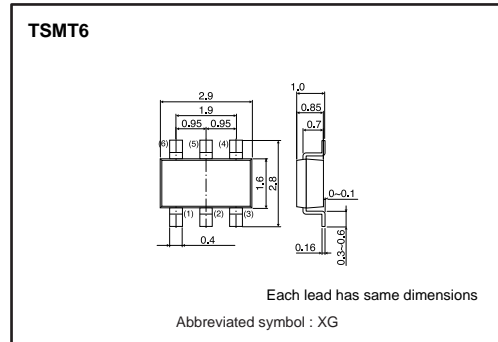
●Applications

Switching

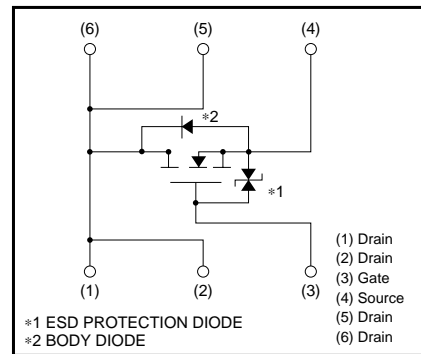
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
RUQ050N02		○

●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	±5.0
	Pulsed	I _{DP} *1	±10
Source current (Body diode)	Continuous	I _S	1.0
	Pulsed	I _{SP} *1	10
Total power dissipation	P _D *2	1.25	W
Channel temperature	T _{ch}	150	°C
Range of storage temperature	T _{stg}	-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	R _{th(ch-a)} *	100	°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	–	1.3	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	–	22	30	mΩ	$I_D=5.0A, V_{GS}=4.5V$
		–	27	38	mΩ	$I_D=5.0A, V_{GS}=2.5V$
		–	32	45	mΩ	$I_D=2.5A, V_{GS}=1.8V$
		–	40	80	mΩ	$I_D=1.0A, V_{GS}=1.5V$
Forward transfer admittance	$ Y_{fs} $ *	6.5	–	–	S	$V_{DS}=10V, I_D=5.0A$
Input capacitance	C_{iss}	–	900	–	pF	$V_{DS}=10V$
Output capacitance	C_{oss}	–	190	–	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	–	120	–	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	–	15	–	ns	$V_{DD}\cong 10V$
Rise time	t_r *	–	25	–	ns	$I_D=2.5A$ $V_{GS}=4.5V$
Turn-off delay time	$t_{d(off)}$ *	–	70	–	ns	$R_L\cong 4\Omega$
Fall time	t_f *	–	100	–	ns	$R_G=10\Omega$
Total gate charge	Q_g *	–	12	–	nC	$V_{DD}\cong 10V, I_D=5.0A$
Gate-source charge	Q_{gs} *	–	2.5	–	nC	$V_{GS}=4.5V$
Gate-drain charge	Q_{gd} *	–	1.7	–	nC	$R_L\cong 2\Omega, R_G=10\Omega$

*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD} *	–	–	1.2	V	$I_S=1.0A, V_{GS}=0V$

*Pulsed

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●Electrical characteristics curves

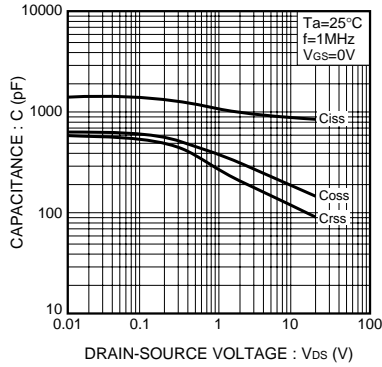


Fig.1 Typical Capacitance vs. Drain-Source Voltage

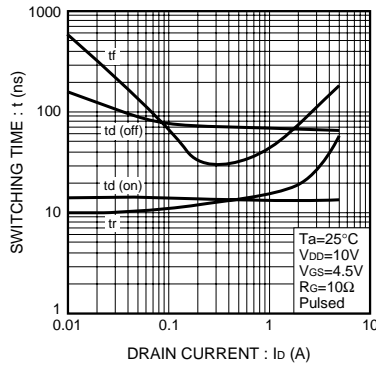


Fig.2 Switching Characteristics

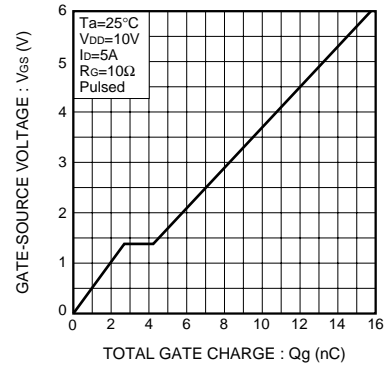


Fig.3 Dynamic Input Characteristics

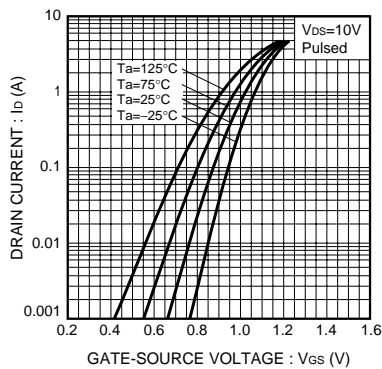


Fig.4 Typical Transfer Characteristics

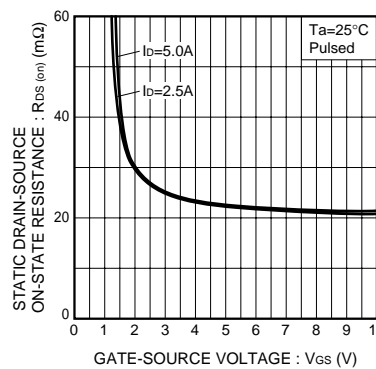


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

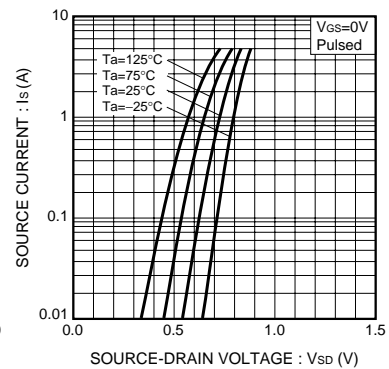


Fig.6 Source Current vs. Source-Drain Voltage

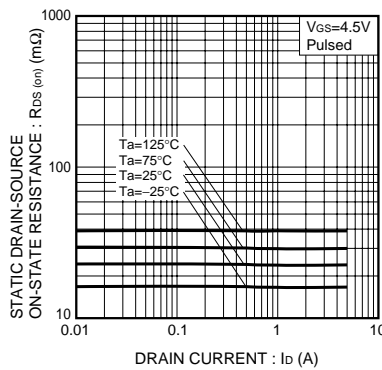


Fig.7 Static Drain-Source On-State Resistance vs. Drain current (I)

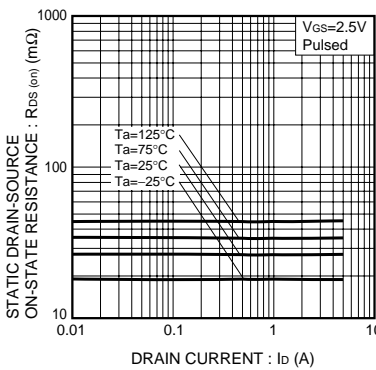


Fig.8 Static Drain-Source On-State Resistance vs. Drain current (II)

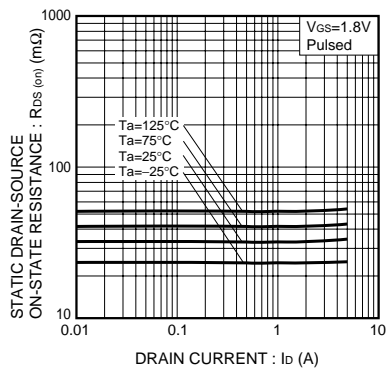


Fig.9 Static Drain-Source On-State Resistance vs. Drain current (III)

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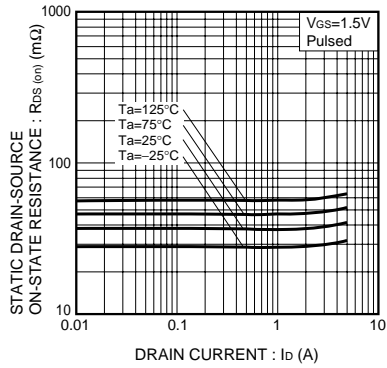


Fig.10 Static Drain-Source On-State Resistance vs. Drain current (IV)

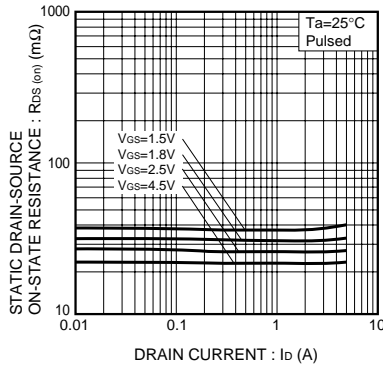


Fig.11 Static Drain-Source On-State Resistance vs. Drain current (V)

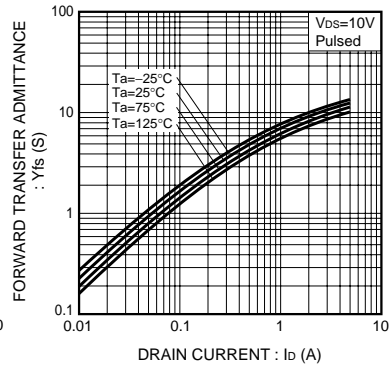


Fig.12 Forward Transfer Admittance vs. Drain current

●Measurement circuit

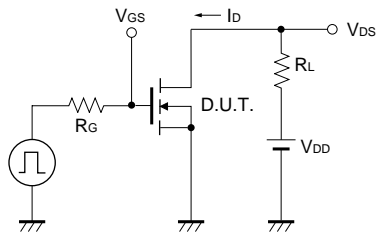


Fig.13 Switching Time Measurement Circuit

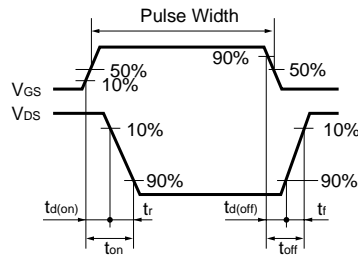


Fig.14 Switching Waveforms

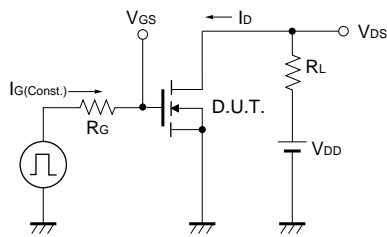


Fig.15 Gate Charge Measurement Circuit

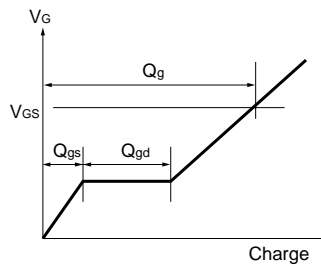


Fig.16 Gate Charge Waveform

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