

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

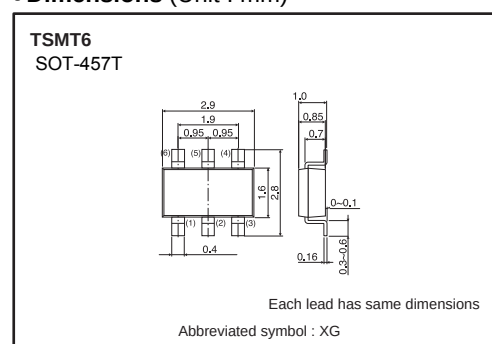
●Applications

Switching

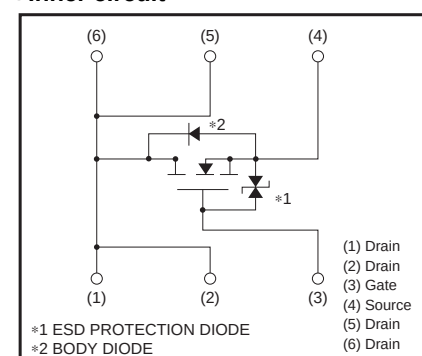
●Packaging specifications

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_{DS}	20	V
Gate-source voltage	V_{GS}	± 10	V
Drain current	Continuous	I_D	A
	Pulsed	I_{DP} *1	A
Source current (Body diode)	Continuous	I_S	A
	Pulsed	I_{SP} *1	A
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 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

*2 Mounted on a ceramic board

●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th(ch-a)}$ *	100	°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	$V_{GS}=\pm 10V$, $V_{DS}=0V$
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	$R_{DS(on)}$ *	—	22	30	m Ω	$I_D=5.0A$, $V_{GS}=4.5V$
		—	27	38	m Ω	$I_D=5.0A$, $V_{GS}=2.5V$
		—	32	45	m Ω	$I_D=2.5A$, $V_{GS}=1.8V$
		—	40	80	m Ω	$I_D=1.0A$, $V_{GS}=1.5V$
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	$V_{DD} \doteq 10V$
Rise time	t_r *	—	25	—	ns	$I_D=2.5A$
Turn-off delay time	$t_{d(off)}$ *	—	70	—	ns	$V_{GS}=4.5V$
Fall time	t_f *	—	100	—	ns	$R_L \doteq 4\Omega$
Total gate charge	Q_g *	—	12	—	nC	$V_{DD} \doteq 10V$, $I_D=5.0A$
Gate-source charge	Q_{gs} *	—	2.5	—	nC	$V_{GS}=4.5V$
Gate-drain charge	Q_{gd} *	—	1.7	—	nC	$R_L \doteq 2\Omega$, $R_G=10\Omega$

*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

●Electrical characteristics curves

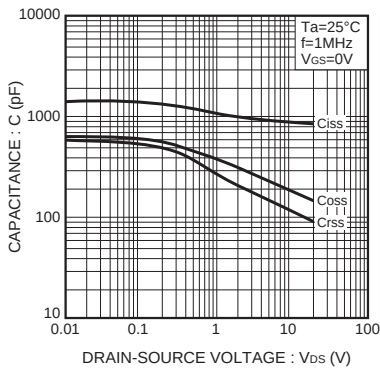


Fig.1 Typical Capacitance vs. Drain-Source Voltage

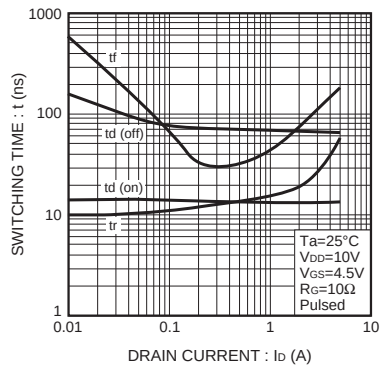


Fig.2 Switching Characteristics

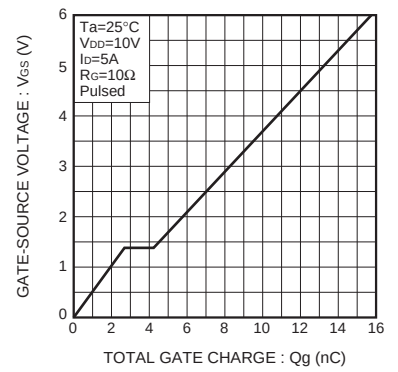


Fig.3 Dynamic Input Characteristics

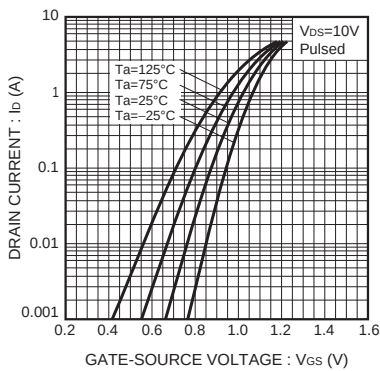


Fig.4 Typical Transfer Characteristics

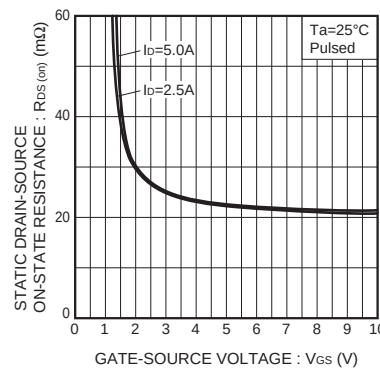


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

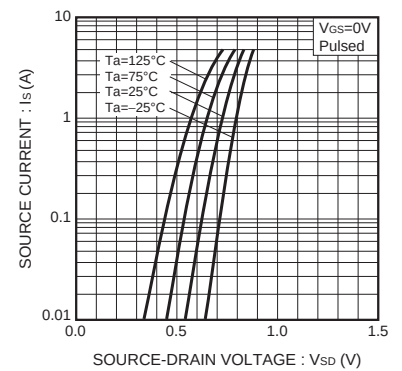


Fig.6 Source Current vs. Source-Drain Voltage

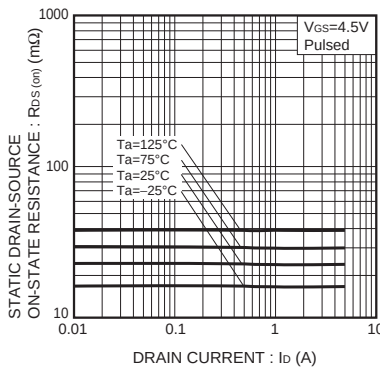


Fig.7 Static Drain-Source On-State Resistance vs. Drain current (I)

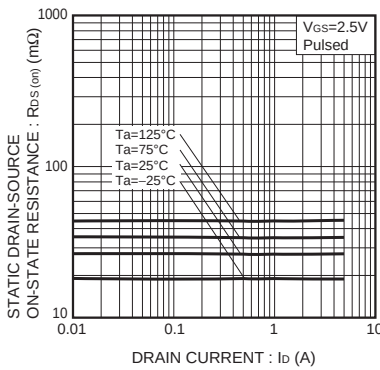


Fig.8 Static Drain-Source On-State Resistance vs. Drain current (II)

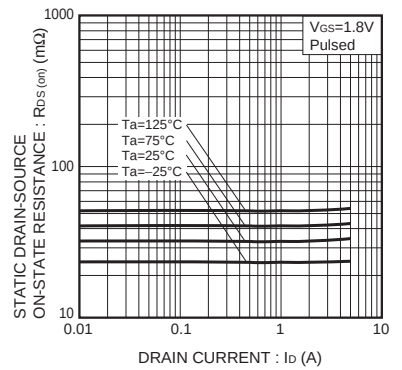


Fig.9 Static Drain-Source On-State Resistance vs. Drain current (III)

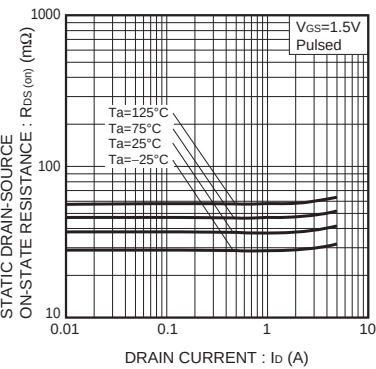


Fig.10 Static Drain-Source On-State Resistance vs. Drain current (IV)

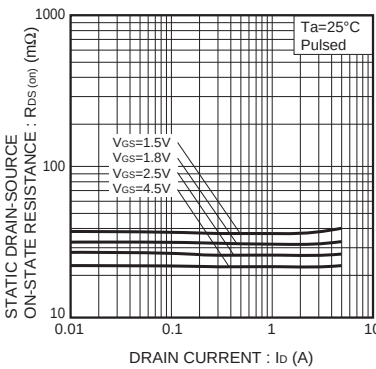


Fig.11 Static Drain-Source On-State Resistance vs. Drain current (V)

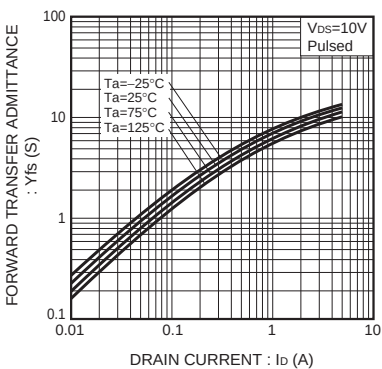


Fig.12 Forward Transfer Admittance vs. Drain current

●Measurement circuit

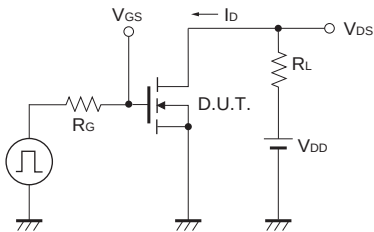


Fig.13 Switching Time Measurement Circuit

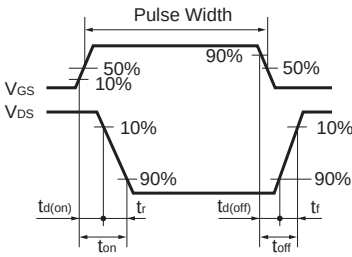


Fig.14 Switching Waveforms

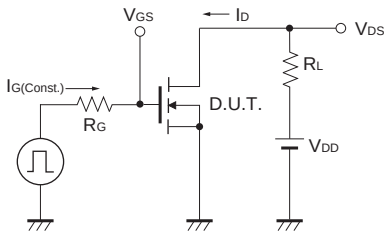


Fig.15 Gate Charge Measurement Circuit

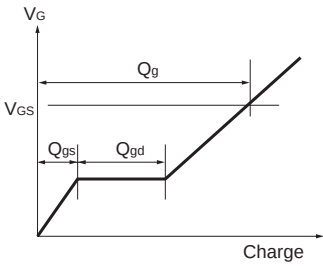


Fig.16 Gate Charge Waveform

Notes

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