

# 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

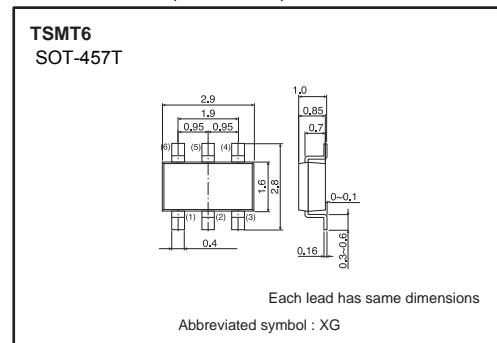
### ●Applications

Switching

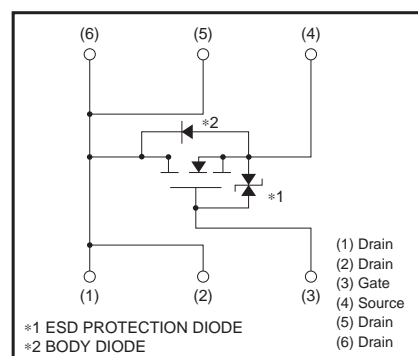
### ●Packaging specifications

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	$V_{GSS}$	$\pm 10$	V	
Drain current	Continuous	$I_D$	$\pm 5.0$	A
	Pulsed	$I_{DP}$ *1	$\pm 10$	A
Source current (Body diode)	Continuous	$I_S$	1.0	A
	Pulsed	$I_{SP}$ *1	10	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 <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V
Drain-source breakdown voltage	V <sub>(BR) DSS</sub>	20	-	-	V	I <sub>D</sub> = 1mA, V <sub>GS</sub> =0V
Zero gate voltage drain current	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> =0V
Gate threshold voltage	V <sub>GS (th)</sub>	0.3	-	1.0	V	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA
Static drain-source on-state resistance	R <sub>DSS (on)</sub> *	-	22	30	mΩ	I <sub>D</sub> = 5.0A, V <sub>GS</sub> = 4.5V
		-	27	38	mΩ	I <sub>D</sub> = 5.0A, V <sub>GS</sub> = 2.5V
		-	32	45	mΩ	I <sub>D</sub> = 2.5A, V <sub>GS</sub> = 1.8V
		-	40	80	mΩ	I <sub>D</sub> = 1.0A, V <sub>GS</sub> = 1.5V
Forward transfer admittance	Y <sub>fs</sub>   *	6.5	-	-	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 5.0A
Input capacitance	C <sub>iss</sub>	-	900	-	pF	V <sub>DS</sub> = 10V
Output capacitance	C <sub>oss</sub>	-	190	-	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	-	120	-	pF	f=1MHz
Turn-on delay time	t <sub>d (on)</sub> *	-	15	-	ns	V <sub>DD</sub> ≐ 10V
Rise time	t <sub>r</sub> *	-	25	-	ns	I <sub>D</sub> = 2.5A
Turn-off delay time	t <sub>d (off)</sub> *	-	70	-	ns	V <sub>GS</sub> = 4.5V
Fall time	t <sub>f</sub> *	-	100	-	ns	R <sub>L</sub> ≐ 4Ω
Total gate charge	Q <sub>g</sub> *	-	12	-	nC	V <sub>DD</sub> ≐ 10V, I <sub>D</sub> = 5.0A
Gate-source charge	Q <sub>gs</sub> *	-	2.5	-	nC	V <sub>GS</sub> = 4.5V
Gate-drain charge	Q <sub>gd</sub> *	-	1.7	-	nC	R <sub>L</sub> ≐ 2Ω, R <sub>G</sub> =10Ω

\*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>SD</sub> *	-	-	1.2	V	I <sub>S</sub> = 1.0A, V <sub>GS</sub> =0V

\*Pulsed

●Electrical characteristics curves

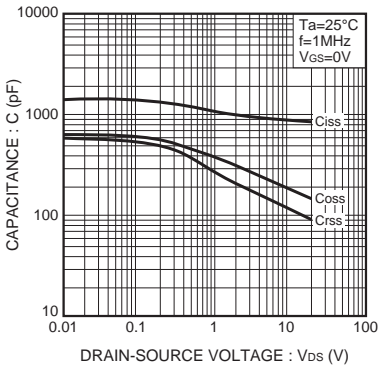


Fig.1 Typical Capacitance vs. Drain-Source Voltage

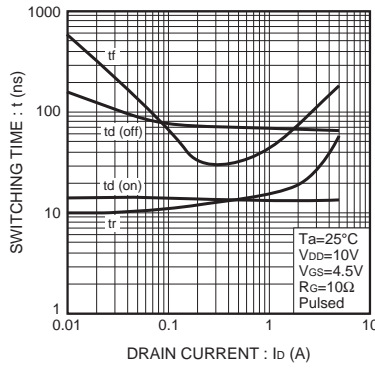


Fig.2 Switching Characteristics

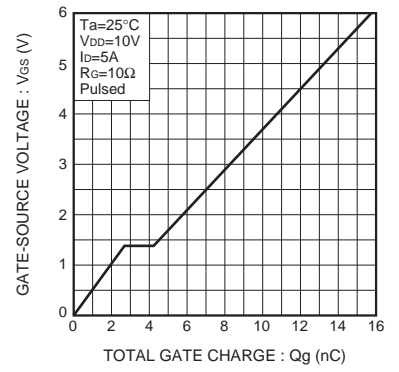


Fig.3 Dynamic Input Characteristics

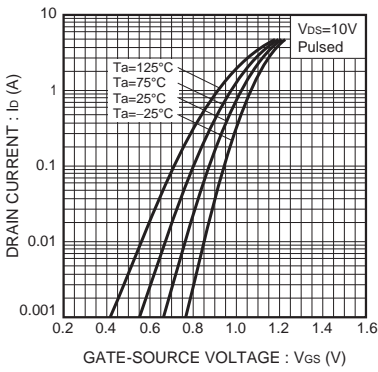


Fig.4 Typical Transfer Characteristics

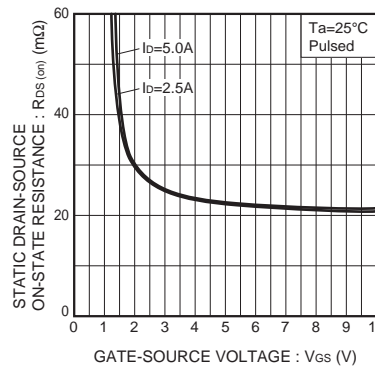


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

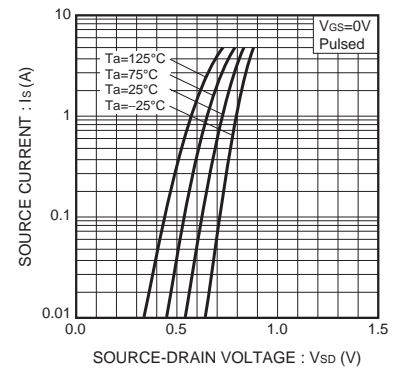


Fig.6 Source Current vs. Source-Drain Voltage

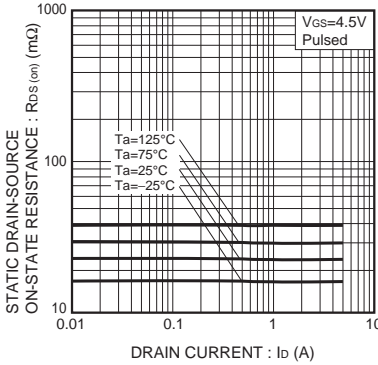


Fig.7 Static Drain-Source On-State Resistance vs. Drain current (I)

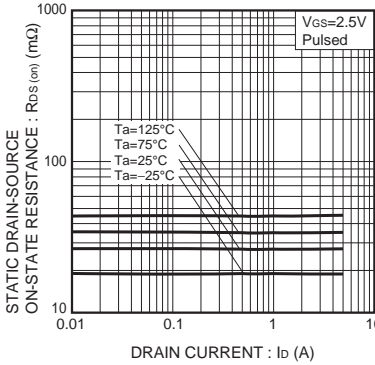


Fig.8 Static Drain-Source On-State Resistance vs. Drain current (II)

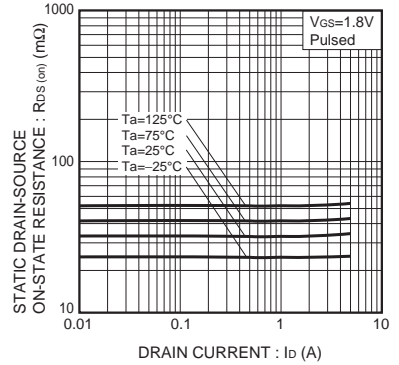


Fig.9 Static Drain-Source On-State Resistance vs. Drain current (III)

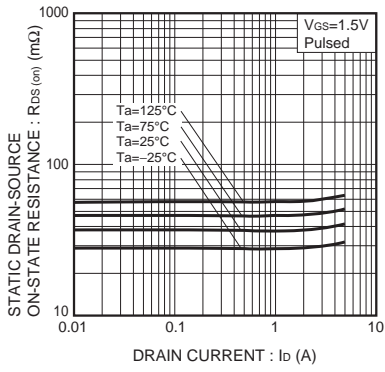


Fig.10 Static Drain-Source On-State Resistance vs. Drain current (IV)

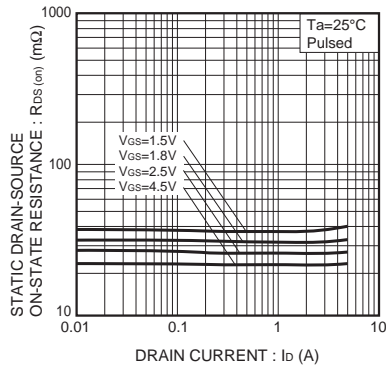


Fig.11 Static Drain-Source On-State Resistance vs. Drain current (IV)

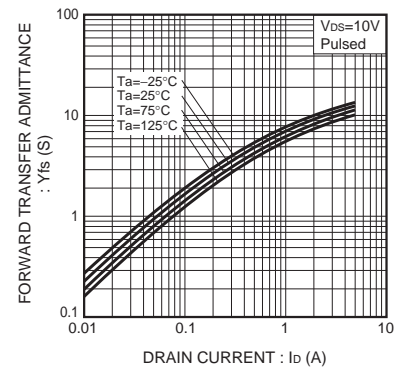


Fig.12 Forward Transfer Admittance vs. Drain current

● Measurement circuit

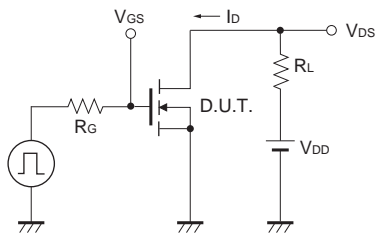


Fig.13 Switching Time Measurement Circuit

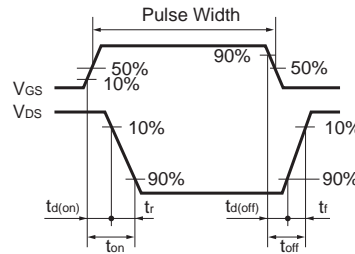


Fig.14 Switching Waveforms

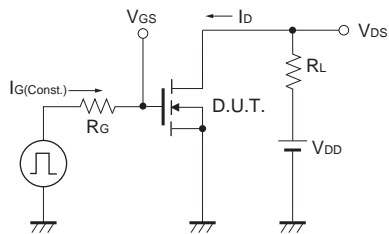


Fig.15 Gate Charge Measurement Circuit

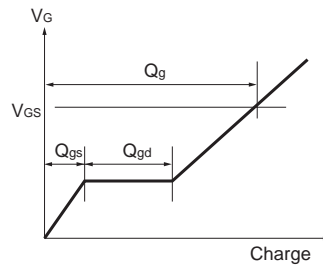


Fig.16 Gate Charge Waveform

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