

Switching (30V, 4.0A)

RTR040N03

●Features

- 1) Low On-resistance.
- 2) Built-in G-S Protection Diode.
- 3) Small and Surface Mount Package (TSMT3).

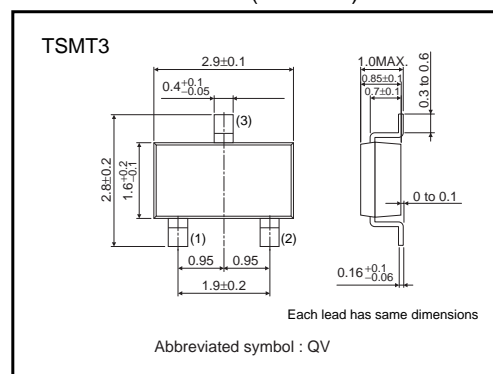
●Application

Power switching, DC / DC converter.

●Structure

Silicon N-channel
MOS FET

●External dimensions (Unit : mm)



●Packaging specifications

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	3000
RTR040N03		○

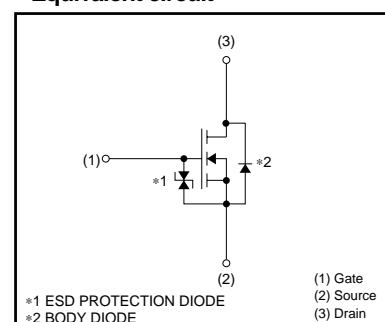
●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-source voltage	V_{DS}	30	V
Gate-source voltage	V_{GS}	12	V
Drain current	Continuous	I_D	± 4.0
	Pulsed	I_{DP} *1	± 16
Source current (Body diode)	Continuous	I_S	0.8
	Pulsed	I_{SP} *1	16
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

●Equivalent circuit



●Thermal resistance (Ta=25°C)

Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th} (ch-a)$	125	°C / W

Transistors

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	—	—	10	μA	$V_{GS}=12V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR) DSS}$	30	—	—	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS}=30V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	0.5	—	1.5	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	—	34	48	$m\Omega$	$I_D=4.0A, V_{GS}=4.5V$
		—	36	50	$m\Omega$	$I_D=4.0A, V_{GS}=4.0V$
		—	47	66	$m\Omega$	$I_D=4.0A, V_{GS}=2.5V$
Forward transfer admittance	$ Y_{fs} $ *	4.0	—	—	S	$V_{DS}=10V, I_D=4.0A$
Input capacitance	C_{iss}	—	475	—	pF	$V_{DS}=10V$
Output capacitance	C_{oss}	—	120	—	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	—	70	—	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	—	10	—	ns	$I_D=2.0A$
Rise time	t_r *	—	18	—	ns	$V_{DD}=15V$
Turn-off delay time	$t_{d(off)}$ *	—	37	—	ns	$V_{GS}=4.5V$
Fall time	t_f *	—	19	—	ns	$R_L=7.5\Omega$
Total gate charge	Q_g	—	5.9	8.3	nC	$V_{DD}=15V$
Gate-source charge	Q_{gs}	—	1.0	—	nC	$V_{GS}=4.5V$
Gate-drain charge	Q_{gd}	—	2.0	—	nC	$I_D=4.0A$
						$R_L=3.75\Omega$
						$R_G=10\Omega$

*Pulsed

Body diode characteristics (source-drain characteristics)

Forward voltage	V_{SD}	—	—	1.2	V	$I_S=0.8A, V_{GS}=0V$
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Transistors

●Electrical characteristic curves

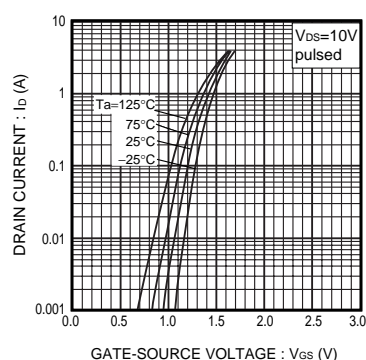


Fig.1 Typical Transfer Characteristics

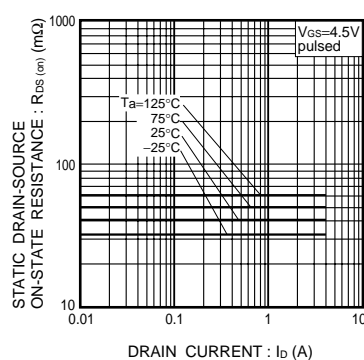


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

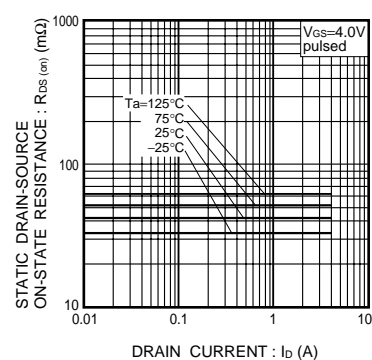


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

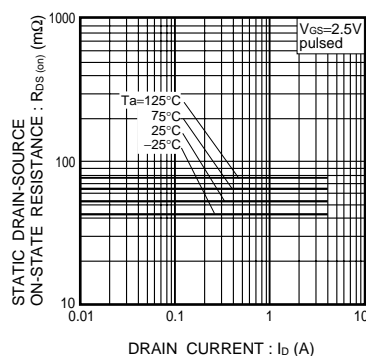


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

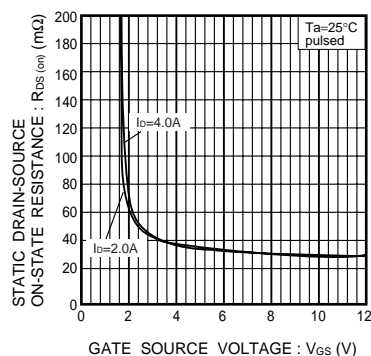


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

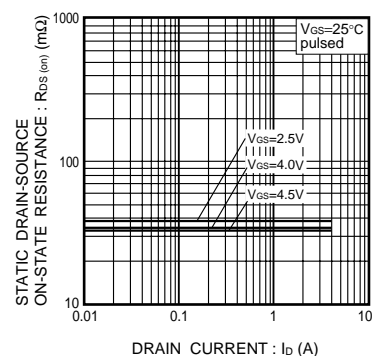


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

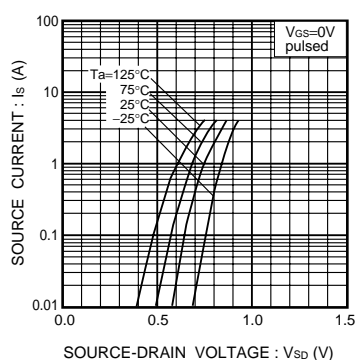


Fig.7 Source Current vs. Source-Drain Voltage

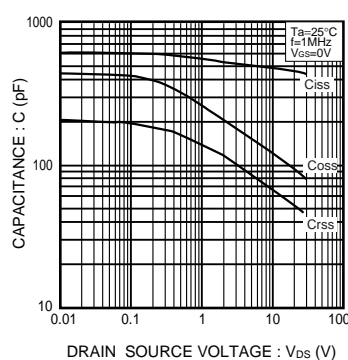


Fig.8 Typical Capacitance vs. Drain-Source Voltage

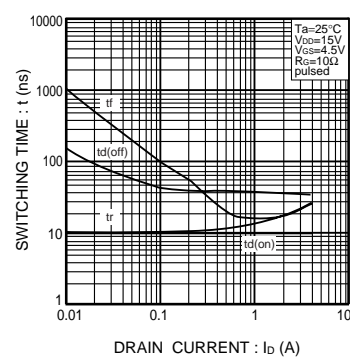


Fig.9 Switching Characteristics

Transistors

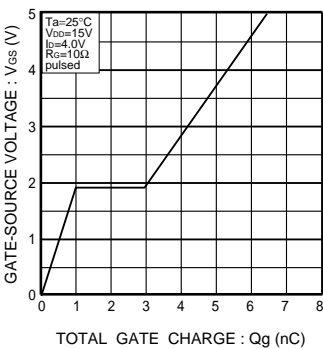


Fig.10 Dynamic Input Characteristics

●Measurement circuits

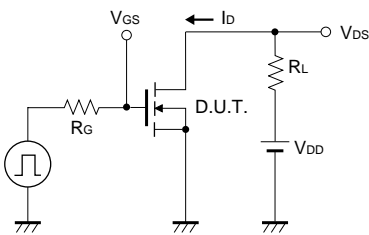


Fig.11 Switching Time Test Circuit

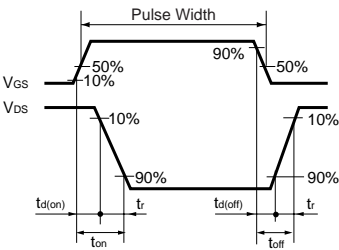


Fig.12 Switching Time Waveforms

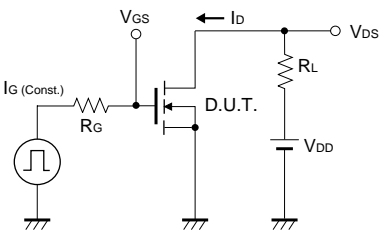


Fig.13 Gate Charge Test Circuit

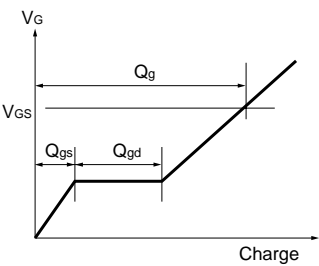


Fig.14 Gate Charge Waveform

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