

2.5V Drive Nch MOS FET

RTR040N03

●Structure

Silicon N-channel
MOS FET

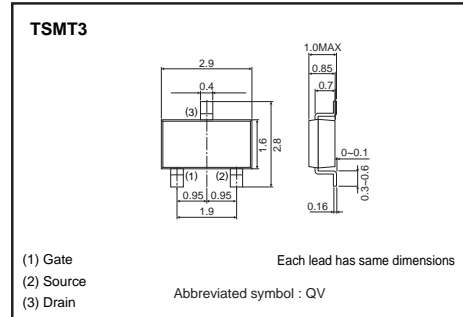
●Features

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

●Application

Power switching, DC / DC converter.

●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_{DSS}	30	V	
Gate-source voltage	V_{GSS}	12	V	
Drain current	Continuous	I_D	± 4.0	A
	Pulsed	I_{DP} *1	± 16	A
Source current (Body diode)	Continuous	I_S	0.8	A
	Pulsed	I_{SP} *1	16	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 $\leq 1\%$

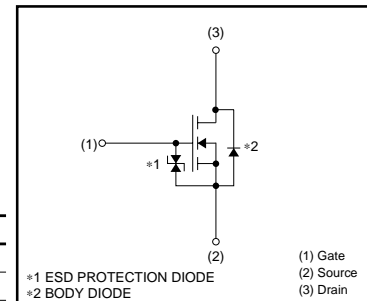
*2 Mounted on a ceramic board

●Thermal resistance

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

* Mounted on a ceramic board

●Equivalent circuit



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	mΩ	I _D =4.0A, V _{GS} =4.5V
		–	36	50	mΩ	I _D =4.0A, V _{GS} =4.0V
		–	47	66	mΩ	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 =7.5Ω
Total gate charge	Q _g *	–	5.9	8.3	nC	R _G =10Ω
Gate-source charge	Q _{gs} *	–	1.0	–	nC	V _{DD} ≐15V
Gate-drain charge	Q _{gd} *	–	2.0	–	nC	V _{GS} =4.5V
						I _D =4.0A
						R _L =3.75Ω
						R _G =10Ω

*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

Transistors

● Electrical characteristic curves

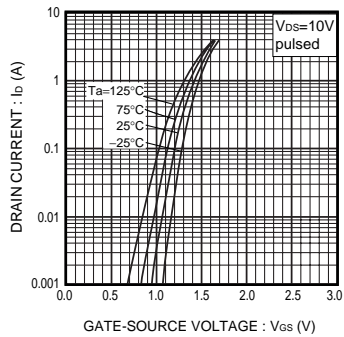


Fig.1 Typical Transfer Characteristics

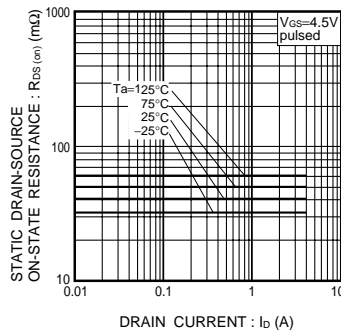


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

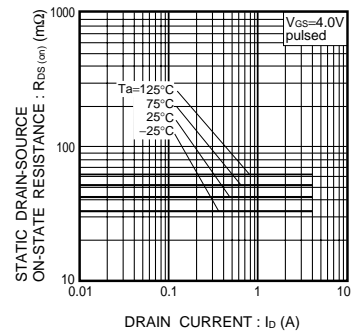


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

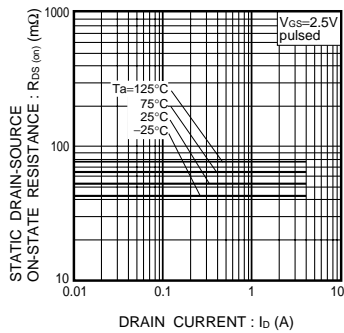


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

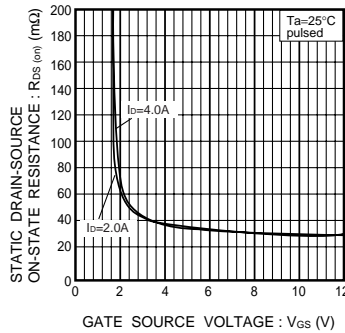


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

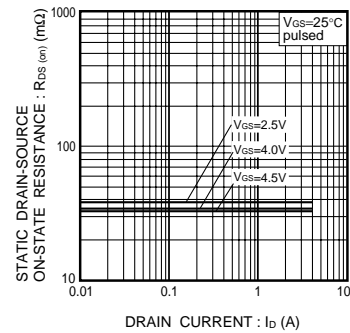


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

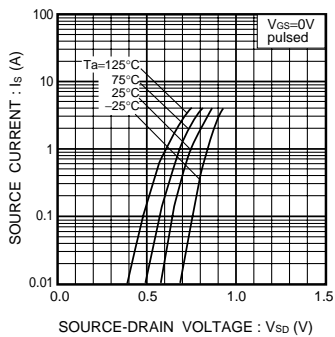


Fig.7 Source Current vs. Source-Drain Voltage

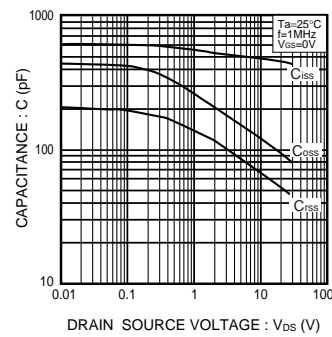


Fig.8 Typical Capacitance vs. Drain-Source Voltage

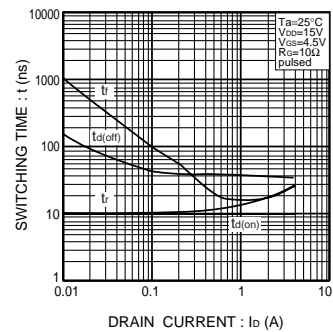


Fig.9 Switching Characteristics

Transistors

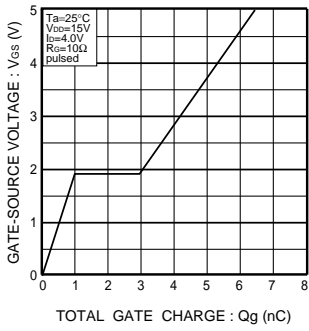


Fig.10 Dynamic Input Characteristics

● Measurement circuits

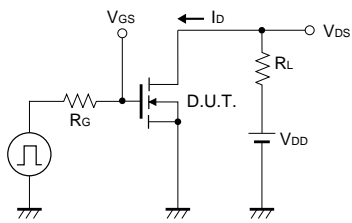


Fig.11 Switching Time Test Circuit

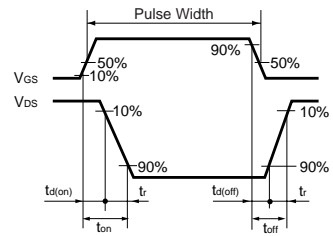


Fig.12 Switching Time Waveforms

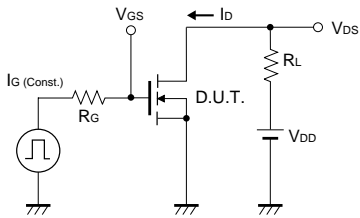


Fig.13 Gate Charge Test Circuit

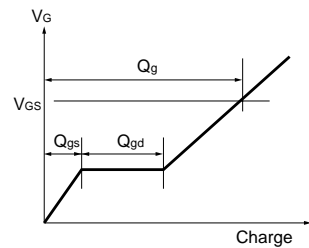


Fig.14 Gate Charge Waveform

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