

Transistors

# Switching (-20V, -2.5A)

## RTR025P02

●Features

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

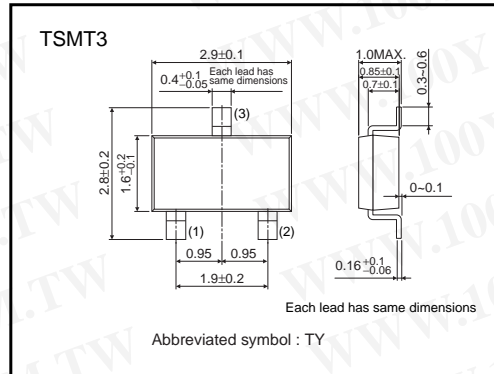
●Application

Power switching, DC / DC converter.

●Structure

Silicon P-channel  
 MOS FET

●External dimensions (Unit : mm)



●Packaging specifications

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	3000
RTR025P02		○

●Absolute maximum ratings (Ta=25°C)

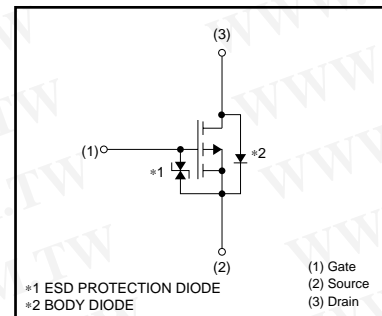
Parameter	Symbol	Limits	Unit	
Drain-source voltage	V <sub>DSS</sub>	-20	V	
Gate-source voltage	V <sub>GSS</sub>	±12	V	
Drain current	Continuous	I <sub>D</sub>	±2.5	A
	Pulsed	I <sub>DP</sub> *1	±10	A
Source current (Body diode)	Continuous	I <sub>S</sub>	-0.8	A
	Pulsed	I <sub>SP</sub> *1	-3.2	A
Total power dissipation	P <sub>D</sub> *2	1.0	W	
Channel temperature	T <sub>ch</sub>	150	°C	
Range of Storage temperature	T <sub>stg</sub>	-55 to +150	°C	

\*1 Pw≤10μs, Duty cycle≤1%  
 \*2 Mounted on a ceramic board

●Thermal resistance (Ta=25°C)

Parameter	Symbol	Limits	Unit
Channel to ambient	R <sub>th</sub> (ch-A)	125	°C / W

●Equivalent circuit



\*1 ESD PROTECTION DIODE  
 \*2 BODY DIODE

(1) Gate  
 (2) Source  
 (3) Drain

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●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> =±12V, 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>	-0.7	-	-2.0	V	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1mA
Static drain-source on-state resistance	R <sub>DS(on)</sub> *	-	70	95	mΩ	I <sub>D</sub> =-2.5A, V <sub>GS</sub> =-4.5V
		-	75	105	mΩ	I <sub>D</sub> =-2.5A, V <sub>GS</sub> =-4.0V
		-	115	160	mΩ	I <sub>D</sub> =-1.25A, V <sub>GS</sub> =-2.5V
Forward transfer admittance	Y <sub>fs</sub>  *	2.3	-	-	S	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1.2A
Input capacitance	C <sub>iss</sub>	-	630	-	pF	V <sub>DS</sub> =-10V
Output capacitance	C <sub>oss</sub>	-	110	-	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	-	75	-	pF	f=1MHz
Turn-on delay time	t <sub>d(on)</sub> *	-	12	-	ns	I <sub>D</sub> =-1.25A
Rise time	t <sub>r</sub> *	-	18	-	ns	V <sub>DD</sub> =-15V
Turn-off delay time	t <sub>d(off)</sub> *	-	50	-	ns	V <sub>GS</sub> =-4.5V
Fall time	t <sub>f</sub> *	-	20	-	ns	R <sub>L</sub> =12Ω
Total gate charge	Q <sub>g</sub>	-	7	-	nC	V <sub>DD</sub> =-15V
Gate-source charge	Q <sub>gs</sub>	-	1.5	-	nC	V <sub>GS</sub> =-4.5V
Gate-drain charge	Q <sub>gd</sub>	-	2.0	-	nC	I <sub>D</sub> =-2.5A

\*Pulsed

Body diode characteristics (source-drain characteristics)

Forward voltage	V <sub>SD</sub>	-	-	-1.2	V	I <sub>S</sub> =-0.8A, V <sub>GS</sub> =0V
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●Electrical characteristic curves

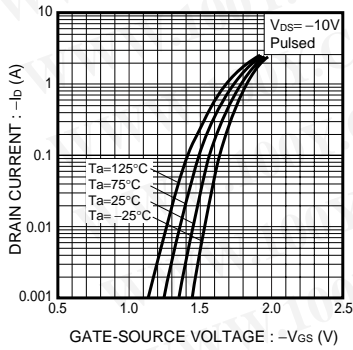


Fig.1 Typical Transfer Characteristics

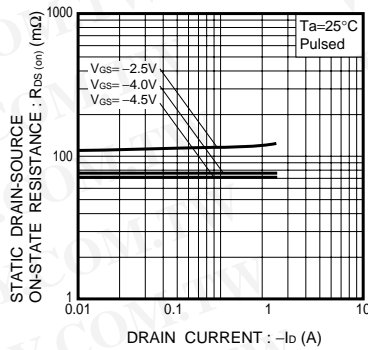


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

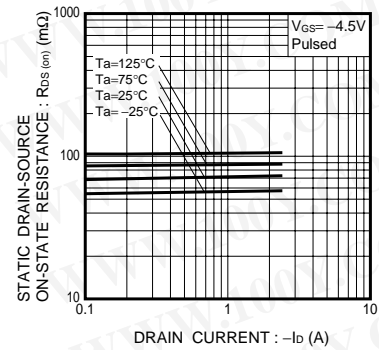


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

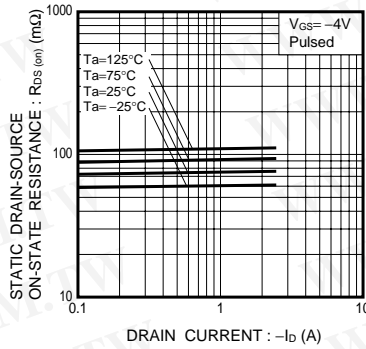


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

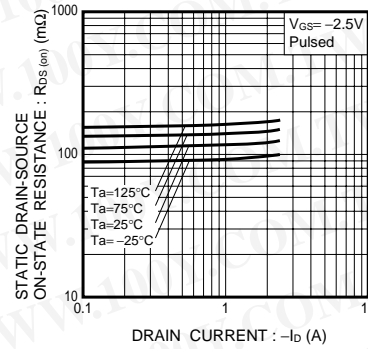


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

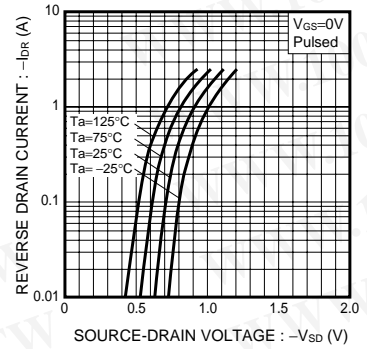


Fig.6 Reverse Drain Current vs. Source-Drain Voltage

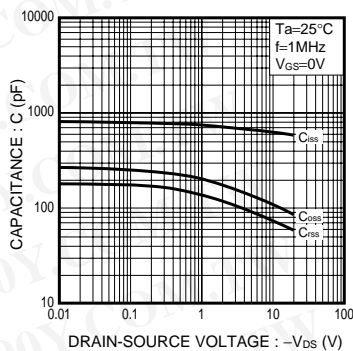


Fig.7 Typical Capacitance vs. Drain-Source Voltage

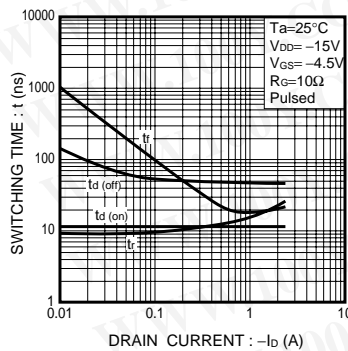


Fig.8 Switching Characteristics

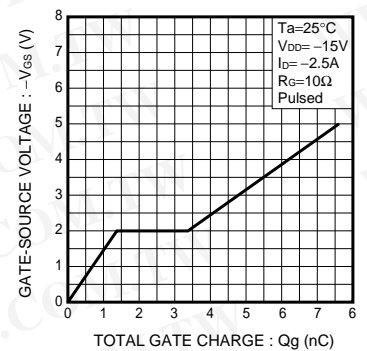


Fig.9 Dynamic Input Characteristics

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●Measurement circuits

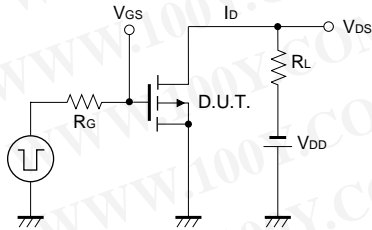


Fig.10 Switching Time Test Circuit

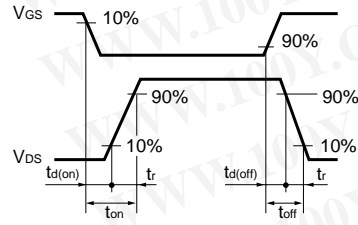


Fig.11 Switching Time Waveforms

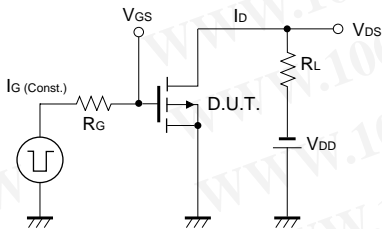


Fig.12 Gate Charge Test Circuit

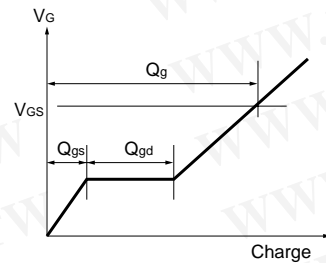


Fig.13 Gate Charge Waveform

## Appendix

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