

Switching (−20V, −2.0A)

RTR020P02

●Features

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

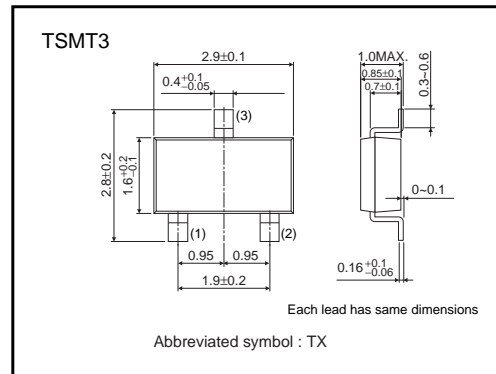
●Application

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
RTR020P02		○

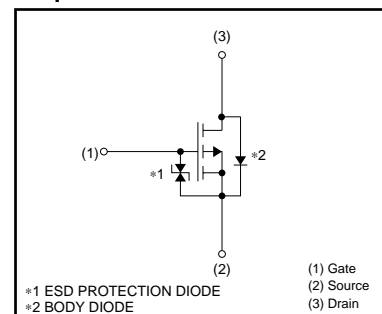
●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V_{DS}	−20	V	
Gate-source voltage	V_{GS}	±12	V	
Drain current	Continuous	I_D	±2.0	A
	Pulsed	I_{DP} *1	±8.0	A
Source current (Body diode)	Continuous	I_S	−0.8	A
	Pulsed	I_{SP} *1	−3.2	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

●Equivalent circuit



●Thermal resistance (Ta=25°C)

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

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●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}	–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)}	–0.7	–	–2.0	V	V _{DS} = –10V, I _D = –1mA
Static drain-source on-state resistance	R _{DS(on)} *	–	100	135	mΩ	I _D = –2.0A, V _{GS} = –4.5V
		–	110	150	mΩ	I _D = –2.0A, V _{GS} = –4.0V
		–	180	250	mΩ	I _D = –1.0A, V _{GS} = –2.5V
Forward transfer admittance	Y _{fs} *	1.2	–	–	S	V _{DS} = –10V, I _D = –1.0A
Input capacitance	C _{iss}	–	430	–	pF	V _{DS} = –10V
Output capacitance	C _{oss}	–	80	–	pF	V _{GS} =0V
Reverse transfer capacitance	C _{rss}	–	55	–	pF	f=1MHz
Turn-on delay time	t _{d(on)} *	–	11	–	ns	I _D = –1.0A
Rise time	t _r *	–	13	–	ns	V _{DD} = –15V
Turn-off delay time	t _{d(off)} *	–	38	–	ns	V _{GS} = –4.5V
Fall time	t _f *	–	12	–	ns	R _L =15Ω
Total gate charge	Q _g	–	4.9	–	nC	R _{GS} =10Ω
Gate-source charge	Q _{gs}	–	1.2	–	nC	V _{DD} = –15V
Gate-drain charge	Q _{gd}	–	1.3	–	nC	V _{GS} = –4.5V
						I _D = –2.0A

*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

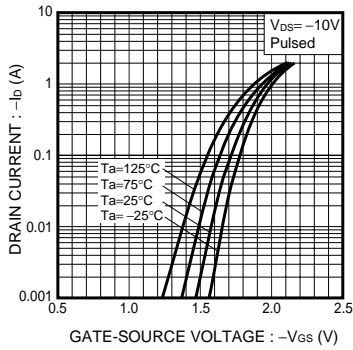


Fig.1 Typical Transfer Characteristics

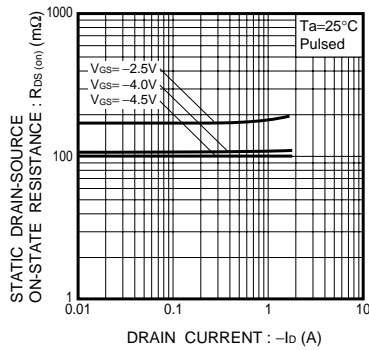


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

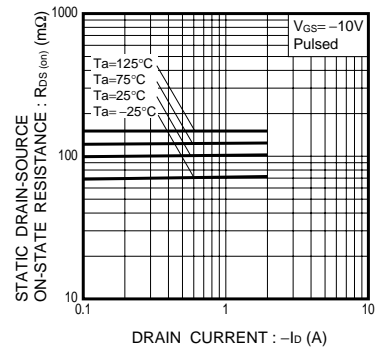


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

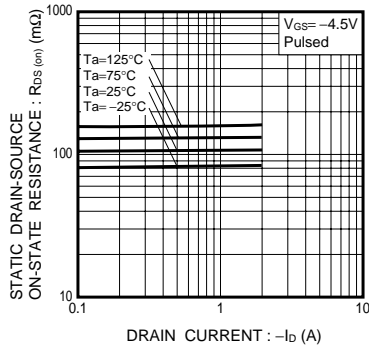


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

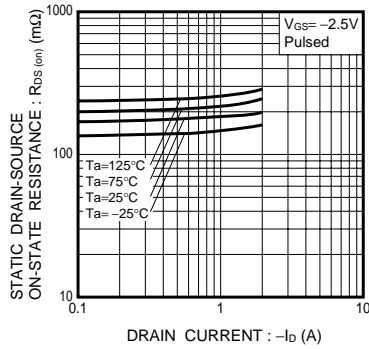


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

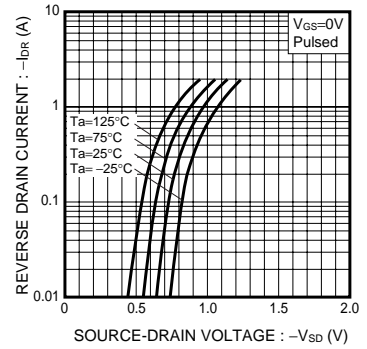


Fig.6 Reverse Drain Current vs. Source-Drain Voltage

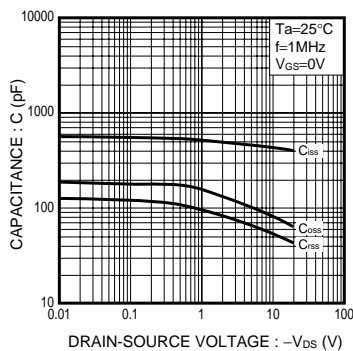


Fig.7 Typical Capacitance vs. Drain-Source Voltage

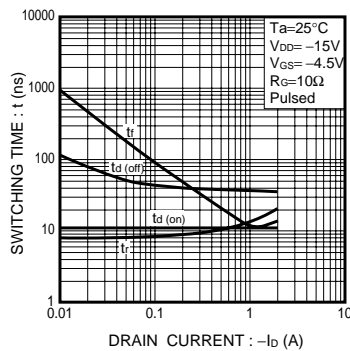


Fig.8 Switching Characteristics

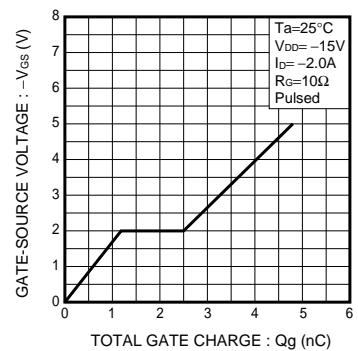


Fig.9 Dynamic Input Characteristics

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●Measurement circuits

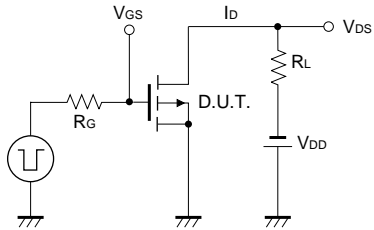


Fig.10 Switching Time Test Circuit

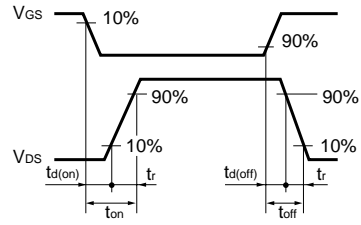


Fig.11 Switching Time Waveforms

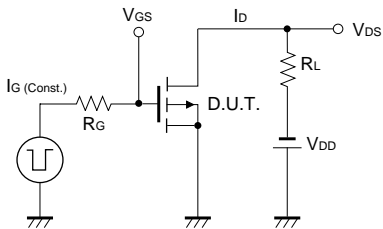


Fig.12 Gate Charge Test Circuit

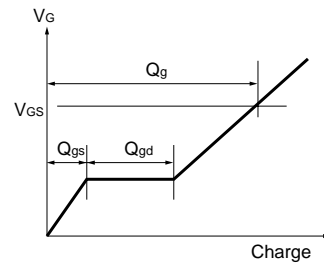


Fig.13 Gate Charge Waveform

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