

DC-DC Converter (−20V, −4.0A)

RTQ040P02

●Features

- 1) Low on-resistance. (110mΩ at 2.5V)
- 2) High power package.
- 3) High speed switching.
- 4) Low voltage drive. (2.5V)

●Applications

DC-DC converter

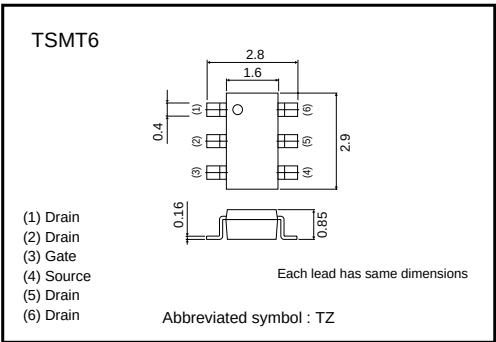
●Structure

Silicon P-channel
MOS FET

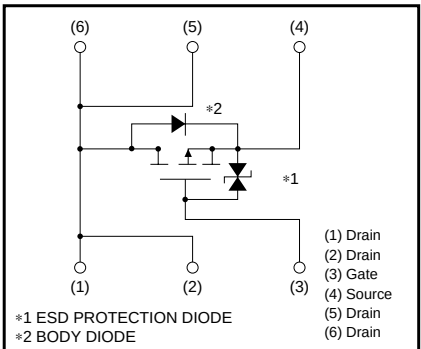
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
RTQ040P02		○

●External dimensions (Unit : mm)



●Equivalent circuit



Transistors

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-source voltage	V _{DSS}	−20	V
Gate-source voltage	V _{GSS}	±12	V
Drain current	Continuous	I _D	±4.0 A
	Pulsed	I _{DP}	±16 A *1
Source current (Body diode)	Continuous	I _S	−1 A *1
	Pulsed	I _{SP}	−16 A
Total power dissipation	P _D	1.25	W *2
Channel temperature	T _{ch}	150	°C
Range of Storage temperature	T _{stg}	−55 to +150	°C

*1 P_W≤10μs, Duty cycle≤1%

*2 Mounted on a ceramic board

●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)}	−	35	50	mΩ	I _D = −4A, V _{GS} = −4.5V *
		−	40	55	mΩ	I _D = −4A, V _{GS} = −4V *
		−	60	85	mΩ	I _D = −2.0A, V _{GS} = −2.5V *
Forward transfer admittance	Y _{fs}	3.5	−	−	S	V _{DS} = −10V, I _D = −2.0A *
Input capacitance	C _{iss}	−	1350	−	pF	V _{DS} = −10V
Output capacitance	C _{oss}	−	210	−	pF	V _{GS} =0V
Reverse transfer capacitance	C _{rss}	−	150	−	pF	f=1MHz
Turn-on delay time	t _{d(on)}	−	15	−	ns	I _D = −2.0A *
Rise time	t _r	−	35	−	ns	V _{DD} ≐ −15V *
Turn-off delay time	t _{d(off)}	−	60	−	ns	V _{GS} = −4.5V *
Fall time	t _f	−	30	−	ns	R _L =7.5Ω *
Total gate charge	Q _g	−	12.2	−	nC	V _{DD} ≐ −15V R _L ≐3.75Ω
Gate-source charge	Q _{gs}	−	2.6	−	nC	V _{GS} = −4.5V R _{GS} =10Ω
Gate-drain charge	Q _{gd}	−	3.4	−	nC	I _D = −4.0A

*Pulsed

Body diode characteristics (source-drain characteristics)

Forward voltage	V _{SD}	−	−	−1.2	V	I _S = −1A, V _{GS} =0V
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Transistors

●Electrical characteristic curves

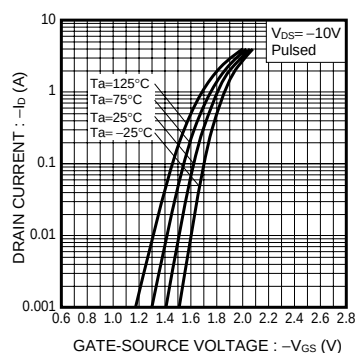


Fig.1 Typical Transfer Characteristics

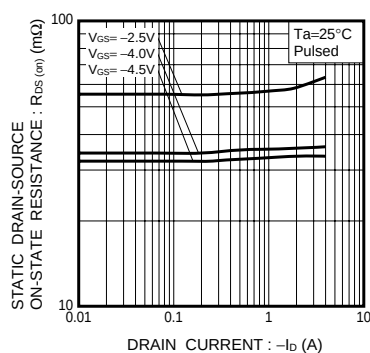


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

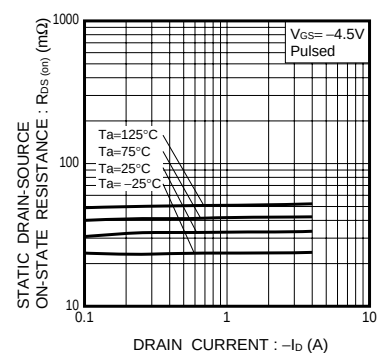


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

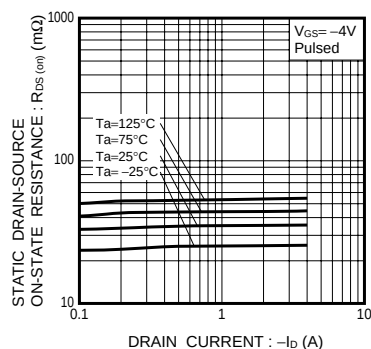


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

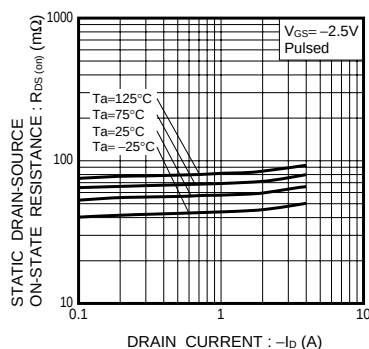


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

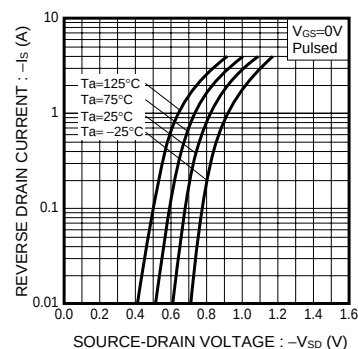


Fig.6 Reverse Drain Current vs. Source-Drain Voltage

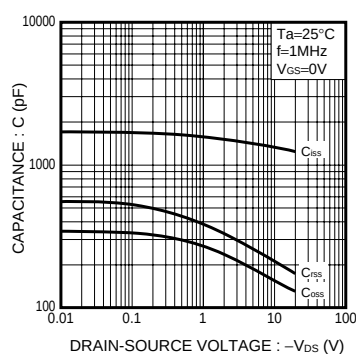


Fig.7 Typical Capacitance vs. Drain-Source Voltage

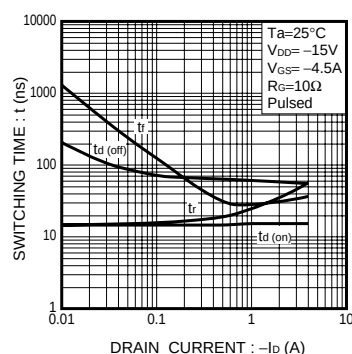


Fig.8 Switching Characteristics

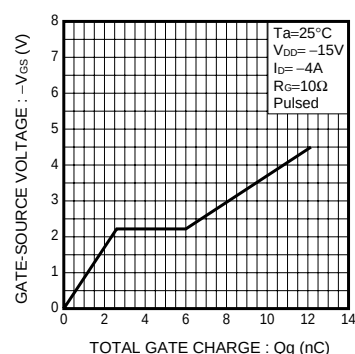


Fig.9 Dynamic Input Characteristics

Transistors

●Measurement circuits

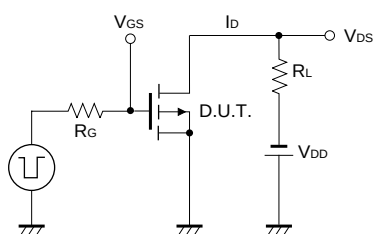


Fig.10 Switching Time Measurement Circuit

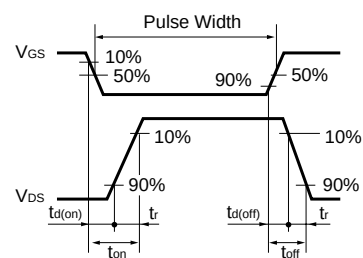


Fig.11 Switching Waveforms

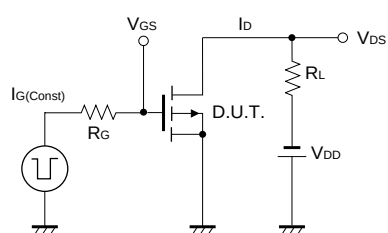


Fig.12 Gate Charge Measurement Circuit

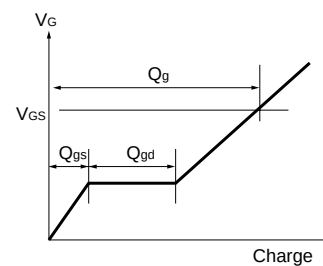


Fig.13 Gate Charge Waveforms

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