

# DC-DC Converter (–20V, –1.0A)

## RTF010P02

### ●Features

- 1) Low on-resistance. (80mΩ at 2.5V)
- 2) High power package.
- 3) High speed switching.
- 4) Low voltage drive. (2.5V)

### ●Applications

DC-DC converter

### ●Structure

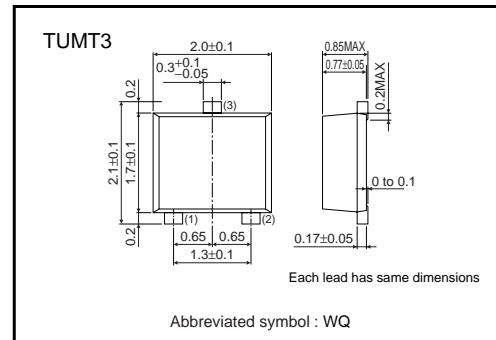
Silicon P-channel

MOS FET

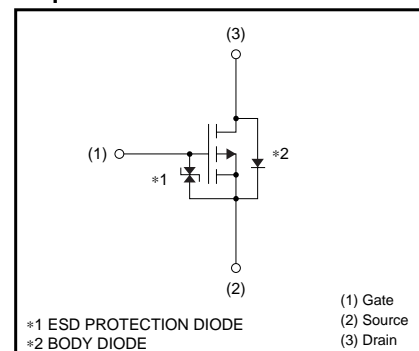
### ●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
RTF010P02		○

### ●External dimensions (Unit : mm)



### ●Equivalent circuit



## Transistors

## ●Absolute maximum ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-source voltage		$V_{DS}$	-20	V
Gate-source voltage		$V_{GS}$	$\pm 12$	V
Drain current	Continuous	$I_D$	$\pm 1$	A
	Pulsed	$I_{DP}$ *1	$\pm 4$	A
Source current (Body diode)	Continuous	$I_S$ *1	-0.4	A
	Pulsed	$I_{SP}$	-4	A
Total power dissipation		$P_D$ *2	0.8	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

## ●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	$I_{GSS}$	-	-	$\pm 10$	$\mu A$	$V_{GS} = \pm 12V$ , $V_{DS} = 0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	-20	-	-	V	$I_D = -1mA$ , $V_{GS} = 0V$
Zero gate voltage drain current	$I_{DSS}$	-	-	-1	$\mu A$	$V_{DS} = -20V$ , $V_{GS} = 0V$
Gate threshold voltage	$V_{GS(th)}$	-0.7	-	-2.0	V	$V_{DS} = -10V$ , $I_D = -1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	-	280	390	m $\Omega$	$I_D = -1A$ , $V_{GS} = -4.5V$
		-	310	430	m $\Omega$	$I_D = -1A$ , $V_{GS} = -4V$
		-	570	800	m $\Omega$	$I_D = -0.5A$ , $V_{GS} = -2.5V$
Forward transfer admittance	$ Y_{fs} $ *	0.7	-	-	S	$V_{DS} = -10V$ , $I_D = -0.5A$
Input capacitance	$C_{iss}$	-	150	-	pF	$V_{DS} = -10V$
Output capacitance	$C_{oss}$	-	20	-	pF	$V_{GS} = 0V$
Reverse transfer capacitance	$C_{rss}$	-	20	-	pF	$f = 1MHz$
Turn-on delay time	$t_{d(on)}$ *	-	9	-	ns	$I_D = -0.5A$
Rise time	$t_r$ *	-	8	-	ns	$V_{DD} \doteq -15V$
Turn-off delay time	$t_{d(off)}$ *	-	25	-	ns	$V_{GS} = -4.5V$
Fall time	$t_f$ *	-	10	-	ns	$R_L = 30\Omega$
Total gate charge	$Q_g$	-	2.1	-	nC	$V_{DD} \doteq -15V$ $R_L \doteq 15\Omega$
Gate-source charge	$Q_{gs}$	-	0.5	-	nC	$V_{GS} = -4.5V$ $R_{GS} = 10\Omega$
Gate-drain charge	$Q_{gd}$	-	0.5	-	nC	$I_D = -1A$

\*Pulsed

Body diode characteristics (source-drain characteristics)

Forward voltage	VSD	-	-	-1.2	V	$I_S = -0.4A$ , $V_{GS} = 0V$
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## Transistors

## ●Electrical characteristic curves

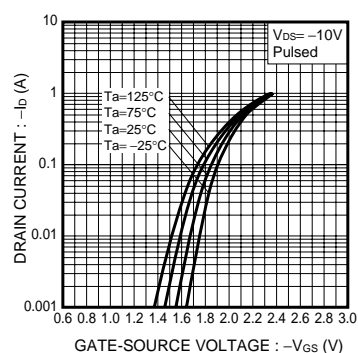


Fig.1 Typical Transfer Characteristics

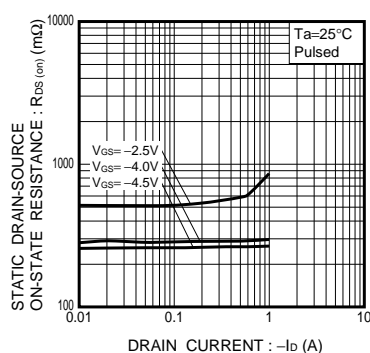


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

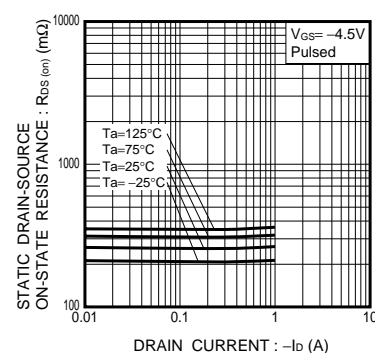


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

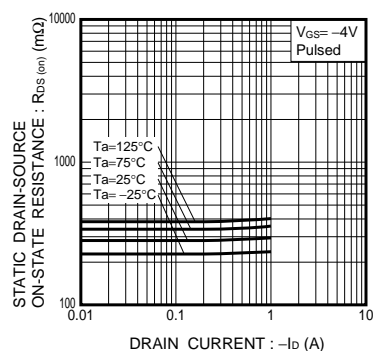


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

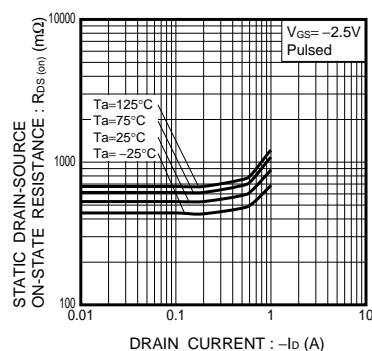


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

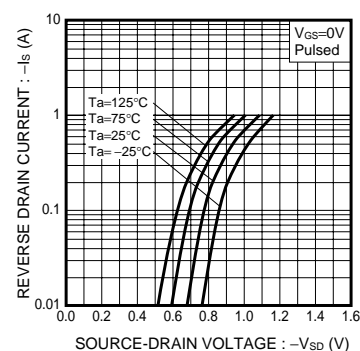


Fig.6 Reverse Drain Current vs. Source-Drain Voltage

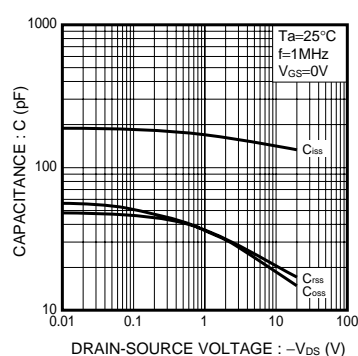


Fig.7 Typical Capacitance vs. Drain-Source Voltage

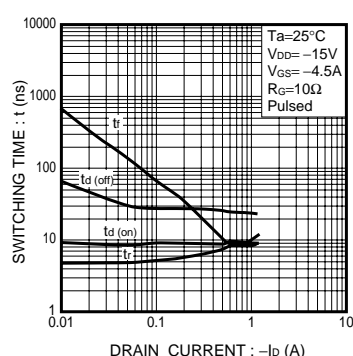


Fig.8 Switching Characteristics

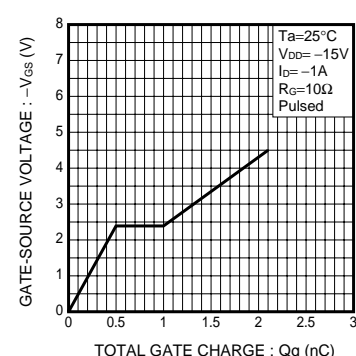


Fig.9 Dynamic Input Characteristics

## Transistors

### ●Measurement circuits

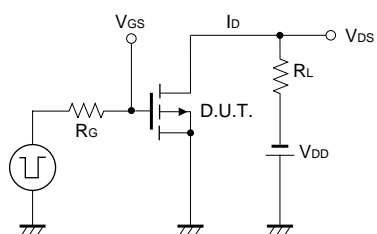


Fig.10 Switching Time Measurement Circuit

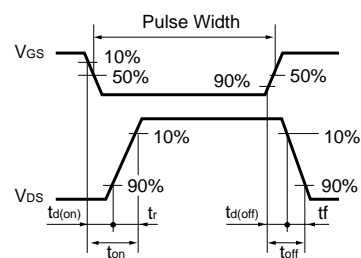


Fig.11 Switching Waveforms

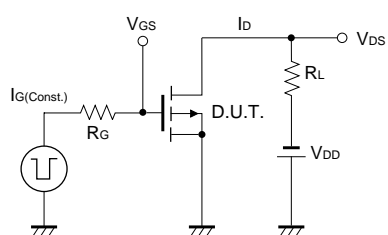


Fig.12 Gate Charge Measurement Circuit

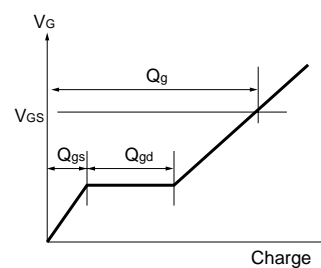


Fig.13 Gate Charge Waveforms

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