Small switching (30V, 2.0A)

QS5U13

●Features

1) The QS5U13 combines Nch MOSFET with a Schottky barrier diode in a single TSMT5 package.
2) Nch MOSFET have a low on-state resistance with a fast switching.
3) Nch MOSFET is reacted a low voltage drive (2.5V).
4) The Independently connected Schottky barrier diode have a low forward voltage.

●Applications

Load switch, DC / DC conversion

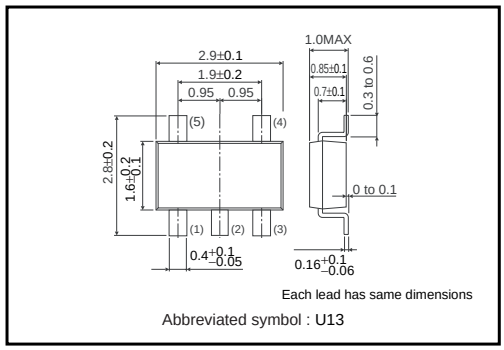
●Structure

Silicon N-channel MOSFET
Schottky Barrier DIODE

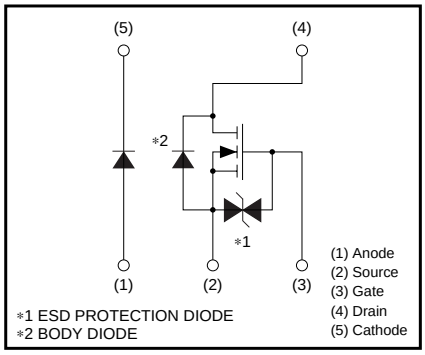
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS5U13		○

●External dimensions (Unit : mm)



●Equivalent circuit



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

<MOSFET>

Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DSS}	30	V
Gate-source voltage		V_{GSS}	12	V
Drain current	Continuous	I_D	±2.0	A
	Pulsed	I_{DP}	±8.0	A Pw≤10μs, Duty cycle≤1%
Source current (Body diode)	Continuous	I_S	0.8	A
	Pulsed	I_{SP}	3.2	A Pw≤10μs, Duty cycle≤1%
Channel temperature		Tch	150	°C
<Di>				
Repetitive peak reverse voltage		V_{RM}	30	V
Reverse voltage		V_R	20	V
Forward current		I_F	0.5	A
Forward current surge peak		I_{FSM}	2.0	A 60Hz · 1cyc.
Junction temperature		Tj	125	°C
<MOSFET AND Di>				
Total power dissipation		P_D	1.0	W / Total / Mounted on a ceramic board
Range of Storage temperature		Tstg	−50 to 150	°C

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

<MOSFET>

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	$R_{DS\ (on)}$ *	–	71	100	mΩ	I_D=2.0A, V_{GS}=4.5V
		–	76	107	mΩ	I_D=2.0A, V_{GS}=4V
		–	110	154	mΩ	I_D=2.0A, V_{GS}=2.5V
Forward transfer admittance	$\|Y_{fs}\|$	1.5	–	–	S	V_{DS}=10V, I_D=2.0A
Input capacitance	C_{iss}	–	175	–	pF	V_{DS}=10V
Output capacitance	C_{oss}	–	50	–	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	–	25	–	pF	f=1MHz
Turn-on delay time	$t_{d\ (on)}$ *	–	8	–	ns	I_D=1.0A V_{DD}≒15V V_{GS}=4.5V R_L=15Ω R_{GS}=10Ω
Rise time	t_r *	–	10	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	21	–	ns	
Fall time	t_f *	–	8	–	ns	
Total gate charge	Q_g	–	2.8	3.9	nC	V_{DD}≒15V
Gate-source charge	Q_{gs}	–	0.6	–	nC	V_{GS}=4.5V
Gate-drain charge	Q_{gd}	–	0.8	–	nC	I_D=2.0A

*Pulsed

<MOSFET>Body diode (source-drain)

Forward voltage	VSD	–	–	1.2	V	I_S=3.2A / V_{GS}=0V
<Di>						
Forward voltage	V_F	–	–	0.47	V	I_F=0.5A
Reverse leakage	I_R	–	–	100	μA	V_R=20V

●Electrical characteristic curves

<MOSFET>

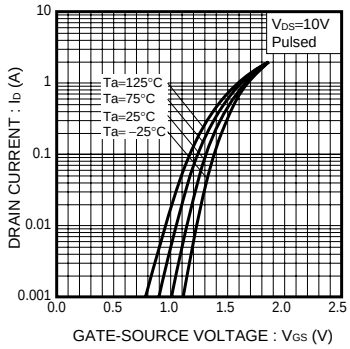


Fig.1 Typical Transfer Characteristics

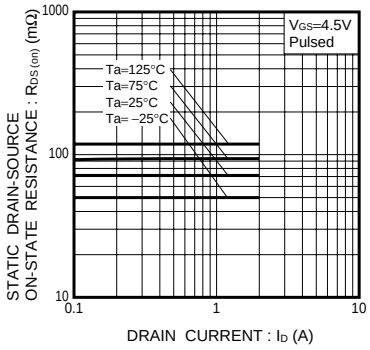


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

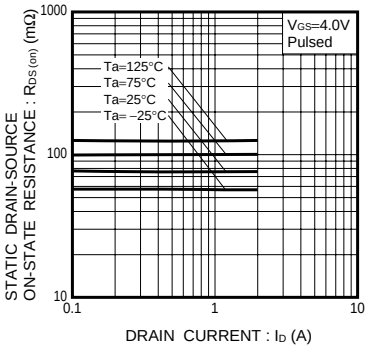


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

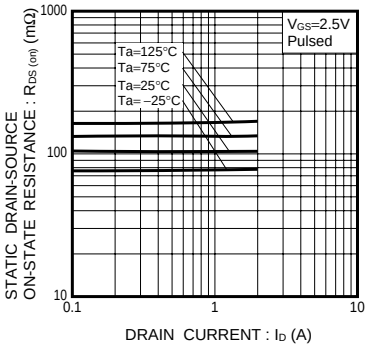


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

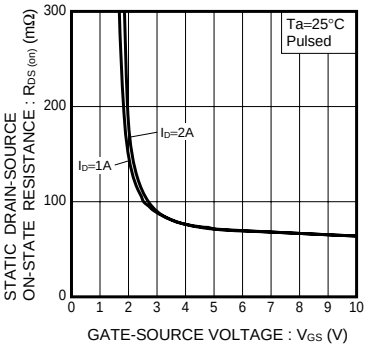


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

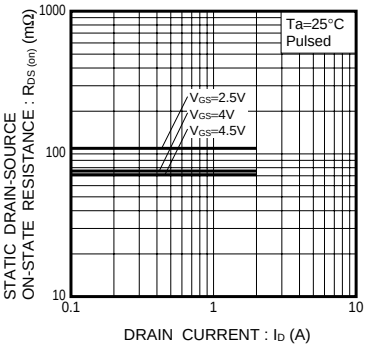


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

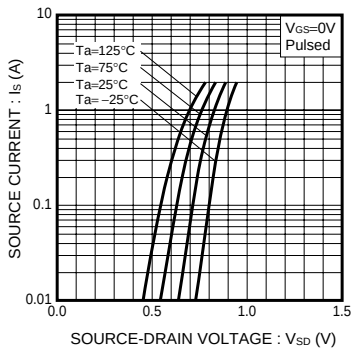


Fig.7 Reverse Drain Current vs. Source-Drain Current

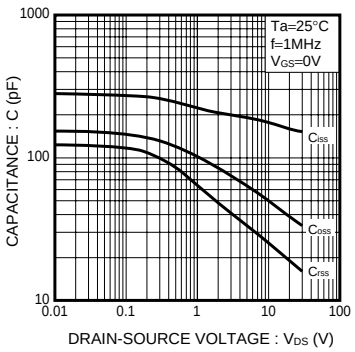


Fig.8 Typical Capacitance vs. Drain-Source Voltage

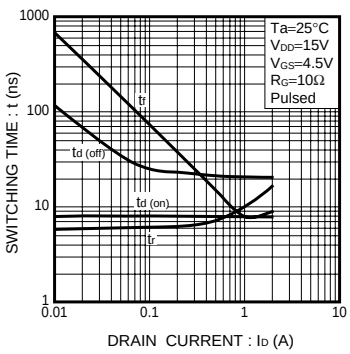


Fig.9 Switching Characteristics

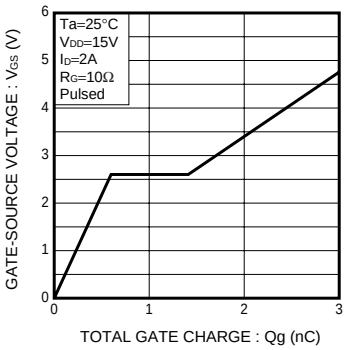


Fig.10 Dynamic Input Characteristics

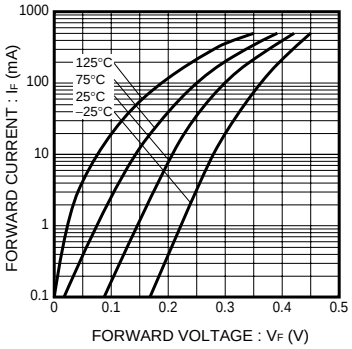


Fig.11 Forward Current vs. Forward Voltage

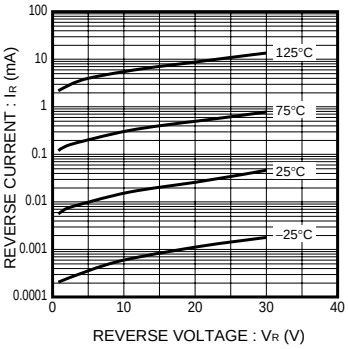


Fig.12 Reverse Current vs. Reverse Voltage

●Measurement circuits

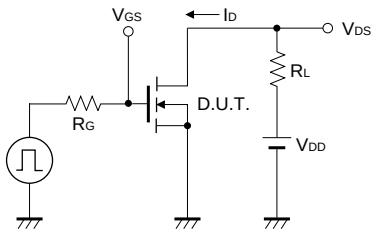


Fig.13 Switching Time Measurement Circuit

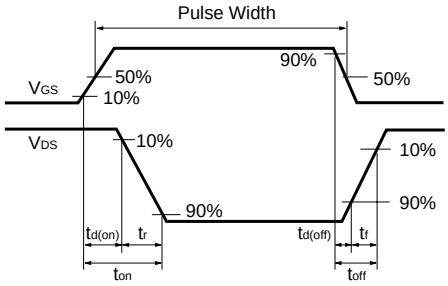


Fig.14 Switching Waveforms

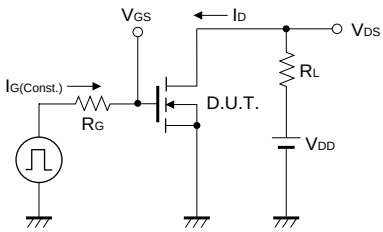


Fig.15 Gate Charge Measurement Circuit

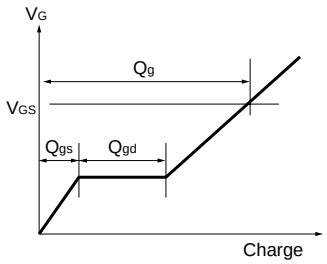


Fig.16 Gate Charge Waveform

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