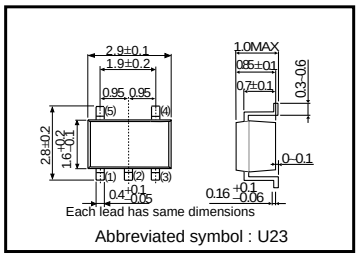
Small switching (–20V, –1.5A)

QS5U23

●Features

1) The QS5U23 conbines Pch MOSFET with a Schottky barrier diode in a single TSMT5 package.
2) Pch MOSSFET have a low on-state resistance with a fast switching.
3) Pch MOSFET is reacted a low voltage drive(2.5V)
4) The independently connected Schottky barrier diode have a low forward voltage.

●External dimensions (Units : mm)

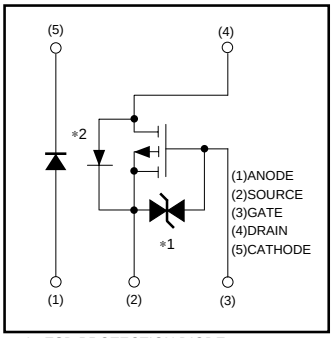


●Applications

Load switch , DC/DC conversion

●Structure

• Silicon P-channel MOSFET
• Schottky Barrier DIODE



*1 ESD PROTECTION DIODE
*2 BODY DIODE

●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS5U23		◯

●Equivalent circuit

●Absolute maximum ratings (Ta=25°C)

< MOSFET >

Parameter		Symbol	Limits	Unit	
Drain–source voltage		V_{DSS}	–20	V	
Gate–source voltage		V_{GSS}	±12	V	
Drain current	Continuous	I_D	±1.5	A	
	Pulsed	I_{DP}	±6.0	A	Pw≦10μs, Duty cycle≦1%
Source current (Body diode)	Continuous	I_S	–0.75	A	
	Pulsed	I_{SP}	–3.0	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 strage temperature	Tstg	–40~125	°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	$V_{(BR)DSS}$	–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	$R_{DS(on)}$ ∗Pulsed	–	160	200	mΩ	I_D=–1.5A, V_{GS}=–4.5V
		–	180	240	mΩ	I_D=–1.5A, V_{GS}=–4V
		–	260	340	mΩ	I_D=–0.75A, V_{GS}=–2.5V
Forward transfer admittance	$\|Y_{fs}\|$ ∗Pulsed	1.0	–	–	S	V_{DS}=–10V, I_D=–0.75A
Input capacitance	C_{iss}	–	325	–	pF	V_{DS}=–10V
Output capacitance	C_{oss}	–	60	–	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	–	40	–	pF	f=1MHz
Turn–on delay time	$t_{d(on)}$ ∗Pulsed	–	10	–	ns	I_D=–0.75A
Rise Time	t_r ∗Pulsed	–	10	–	ns	V_{DD} ≒–15
Turn off delay time	$t_{d(off)}$ ∗Pulsed	–	35	–	ns	V_{GS}=–4.5V R_L=20Ω
Fall time	t_f ∗Pulsed	–	10	–	ns	R_{GS}=10Ω
Total gate charge	Qg	–	4.2	–	nC	V_{DD} ≒–15V
Gate–source charge	Qgs	–	1.0	–	nC	V_{GS}=–4.5V
Gate–drain charge	Qgd	–	1.1	–	nC	I_D=–1.5A

< MOSFET >Body diode(source–drain)

Forward voltage	VSD	–	–	–1.2	V	I_S=–0.75A/ V_{GS}=0V

< Di >

Foward voltage drop	V_F	–	–	0.36	V	I_F=0.1A
		–	–	0.47	V	I_F=0.5A
Reverse leakage	I_R	–	–	100	μA	V_R=20V

●Electrical characteristic curves

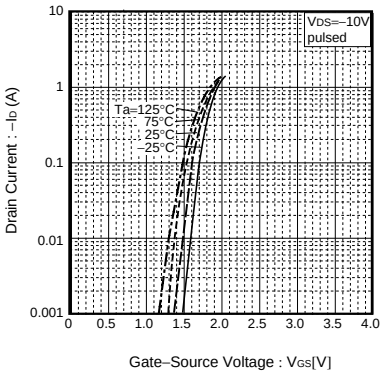


Fig.1 Typical Transfer Characteristics

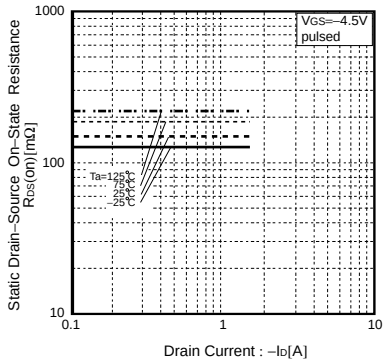


Fig.2 Static Drain−Source On−State Resistance vs. Drain Current

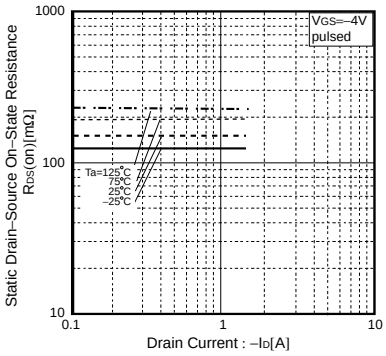


Fig.3 Static Drain−Source On−State Resistance vs. Drain Current

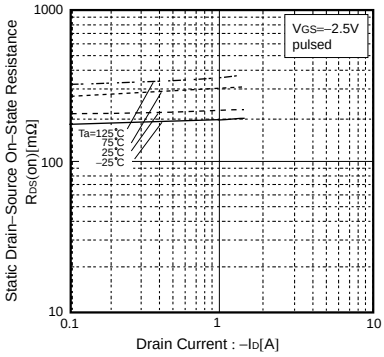


Fig.4 Static Drain−Source On−State Resistance vs. Drain−Current

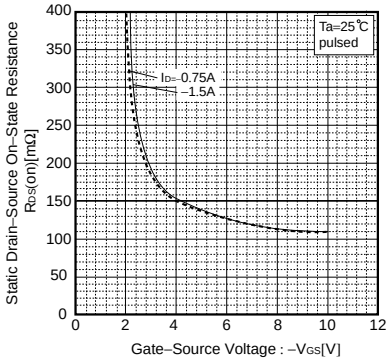


Fig.5 Static Drain−Source On−State Resistance vs.Gate−Source Voltage

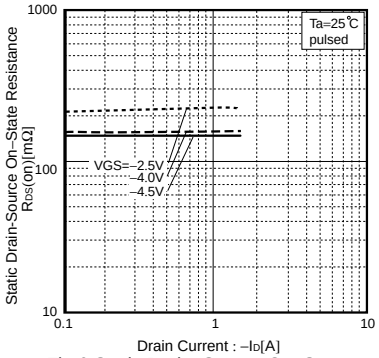


Fig.6 Static Drain−Source On−State Resistance vs. Drain Current

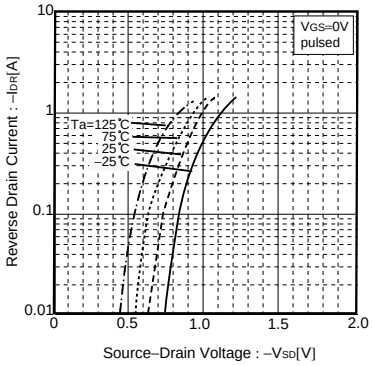


Fig.7 Reverse Drain Current VS. Source-Drain Current

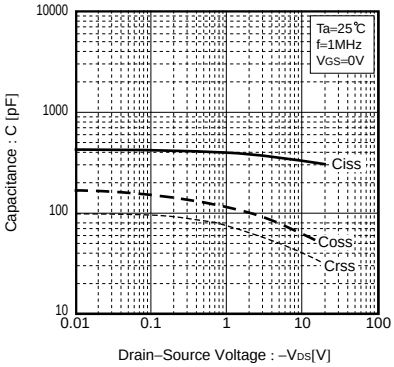


Fig.8 Typical Capactitance vs. Drain−Source Voltage

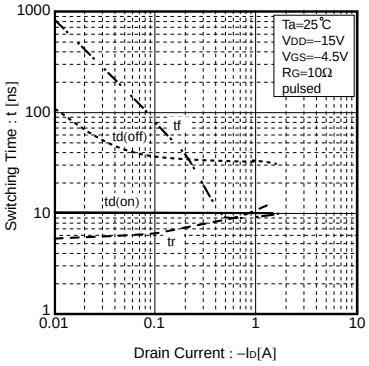


Fig.9 Switching Characteristics

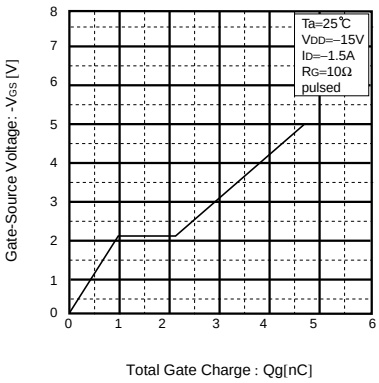


Fig.10 Dynamic Input Characteristics

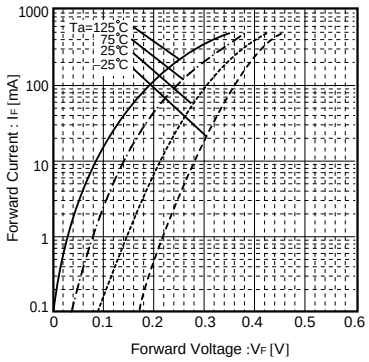


Fig.11 Forward Temperature Characteristics

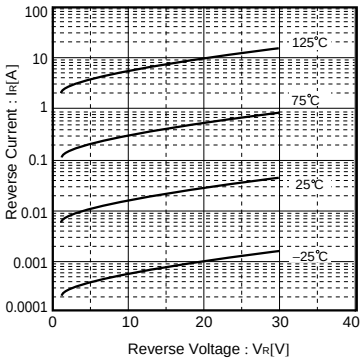


Fig.12 Reverse Temperature Characteristics

●Measurement circuits

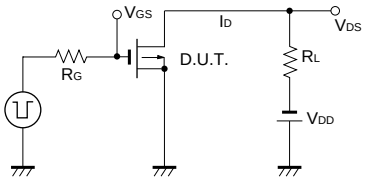


Fig.13 Switching Time Measurement Circuit

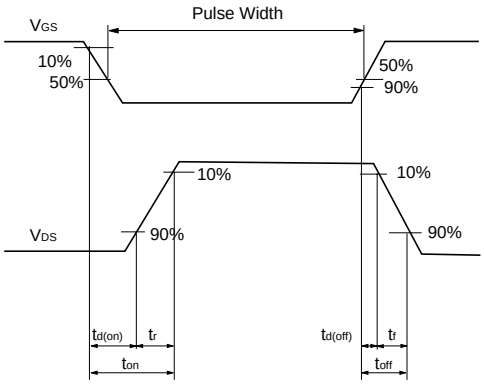


Fig.14 Switching Waveforms

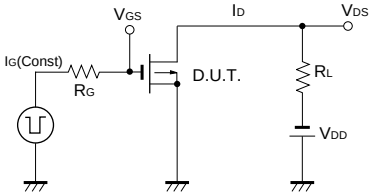


Fig.15 Gate Charge Measurement Circuit

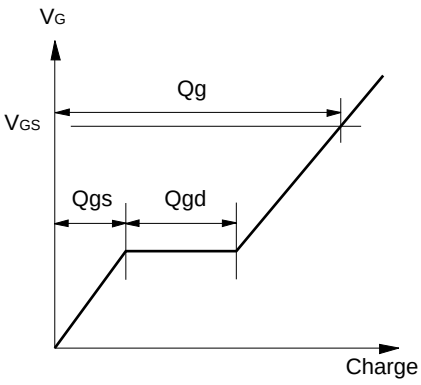


Fig.16 Gate Charge Waveforms

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