2.5V Drive Pch+SBD MOSFET

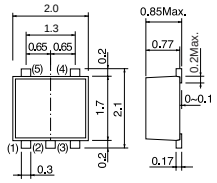
US5U38

●Structure
Silicon P-channel MOSFET
Schottky Barrier DIODE

●Features
1) The US5U38 combines Pch MOSFET with a Schottky barrier diode in a TUMT5 package.
2) Low on-resistance with fast switching.
3) Low voltage drive (2.5V).
4) Built-in schottky barrier diode has low forward voltage.

●Dimensions (Unit : mm)

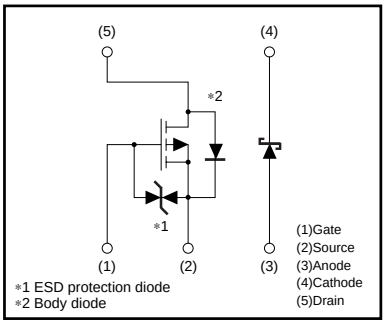
TUMT5



Abbreviated symbol : U38

●Applications
Switching

●Equivalent circuit



*1 ESD protection diode
*2 Body diode

●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
US5U38		○

●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	±1.0	A
	Pulsed	I_{DP} *1	±4.0	A
Source current (Body diode)	Continuous	I_S	−0.4	A
	Pulsed	I_{SP} *1	−4.0	A
Channel temperature		Tch	150	°C
Power dissipation		P_D *3	0.7	W / ELEMENT

<Di>

Repetitive peak reverse voltage	V_{RM}	25	V
Reverse voltage	V_R	20	V
Forward current	I_F	0.7	A
Forward current surge peak	I_{FSM} *2	3.0	A
Junction temperature	Tj	150	°C
Power dissipation	P_D *3	0.5	W / ELEMENT

<MOSFET AND Di>

Power dissipation	P_D *3	1.0	W / TOTAL
Range of storage temperature	Tstg	−55 to +150	°C

*1 Pw≤10μs, Duty cycle≤1% *2 60Hz・1cyc. *3 Mounted on a ceramic board

●**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	$R_{DS\ (on)}$ *	–	280	390	mΩ	I_D=–1A, V_{GS}=–4.5V
		–	310	430	mΩ	I_D=–1A, V_{GS}=–4.0V
		–	570	800	mΩ	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 V_{DD}≒–15V V_{GS}=–4.5V R_L≒30Ω R_G=10Ω
Rise time	t_r *	–	8	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	25	–	ns	
Fall time	t_f *	–	10	–	ns	
Total gate charge	Q_g *	–	2.1	–	nC	I_D=–1A, V_{DD}≒–15V
Gate-source charge	Q_{gs} *	–	0.5	–	nC	V_{GS}=–4.5V
Gate-drain charge	Q_{gd} *	–	0.5	–	nC	R_L≒15Ω, R_G=10Ω

* Pulsed

<Body diode (source–drain)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}	–	–	–1.2	V	I_S=–0.4A, V_{GS}=0V

<Di>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_F	–	–	0.49	V	I_F=0.7A
Reverse current	I_R	–	–	200	μA	V_R=20V

●**Electrical characteristic curves**

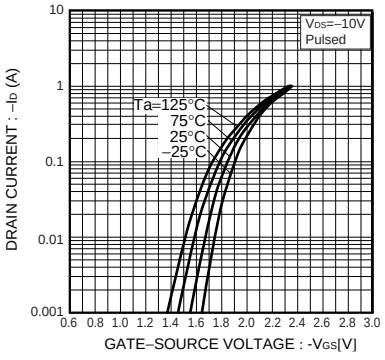


Fig.1 Typical Transfer Characteristics

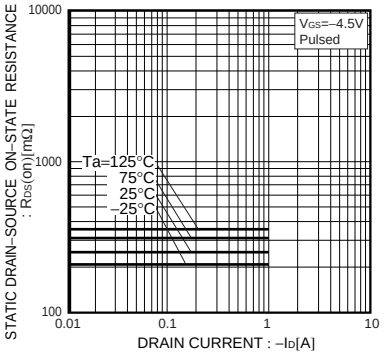


Fig.2 Static Drain–Source On–State Resistance vs.Drain Current (I)

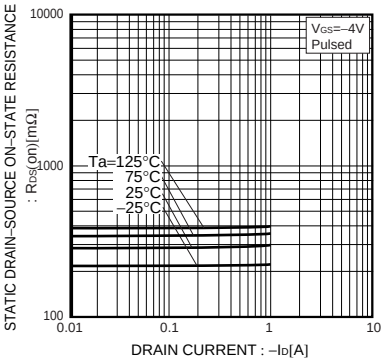


Fig.3 Static Drain–Source On–State Resistance vs.Drain Current (II)

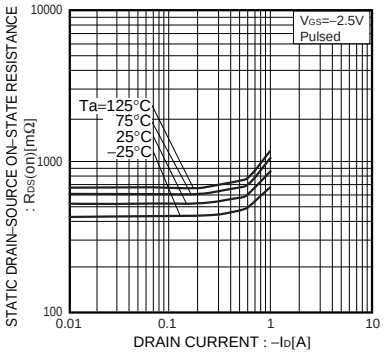


Fig.4 Static Drain–Source On–State Resistance vs.Drain–Current (III)

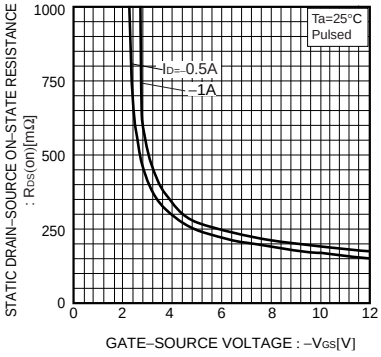


Fig.5 Static Drain–Source On–State Resistance vs.Gate–Source Voltage

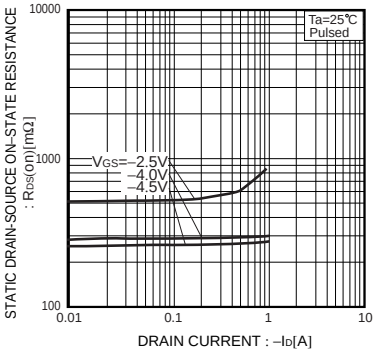


Fig.6 Static Drain–Source On–State Resistance vs.Drain Current

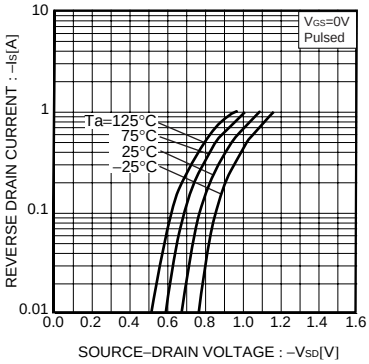


Fig.7 Reverse Drain Current vs. Source-Drain Current

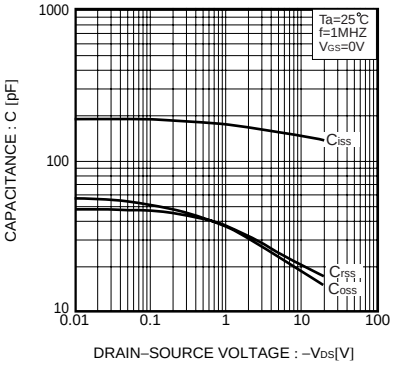


Fig.8 Typical Capactitance vs.Drain–Source Voltage

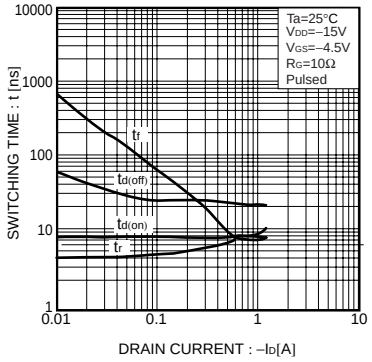


Fig.9 Switching Characteristics

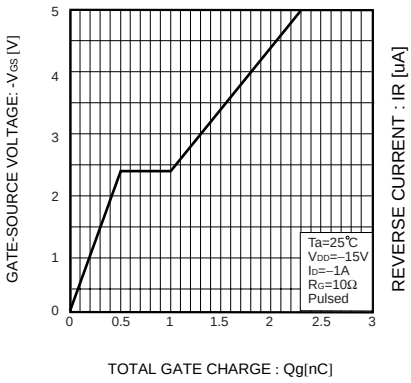


Fig.10 Dynamic Input Characteristics

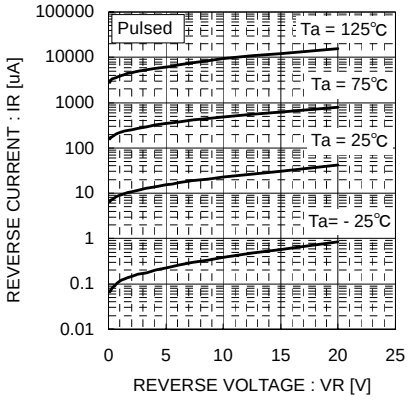


Fig.11 Reverse Current vs. Reverse Voltage

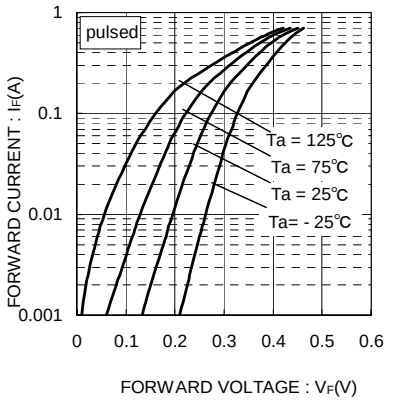


Fig.12 Forward Current vs. Forward Voltage

●Notice

1. SBD has a large reverse leak current compared to other type of diode. Therefore; it would raise a junction temperature, and increase a reverse power loss. Further rise of inside temperature would cause a thermal runaway.
   This built-in SBD has low V_F characteristics and therefore, higher leak current. Please consider enough the surrounding temperature, generating heat of MOSFET and the reverse current.

2. This product might cause chip aging and breakdown under the large electrified environment.
   Please consider to design ESD protection circuit.

●**Measurement circuits**

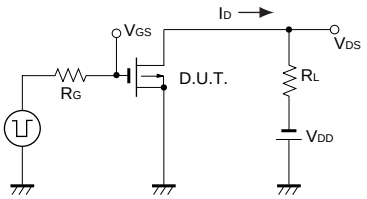


Fig.13 Switching Time Measurement Circuit

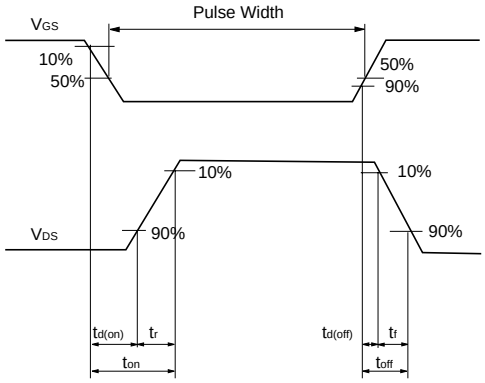


Fig.14 Switching Waveforms

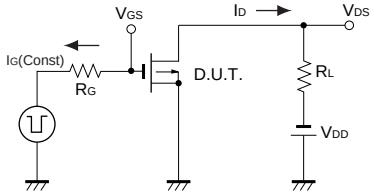


Fig.15 Gate Charge Measurement Circuit

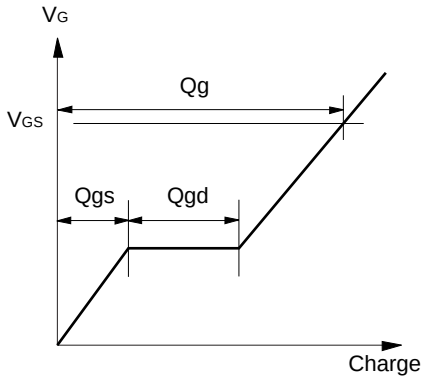


Fig.16 Gate Charge Waveforms

Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).
Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.
It is our top priority to supply products with the utmost quality and reliability. However, there is always a chance of failure due to unexpected factors. Therefore, please take into account the derating characteristics and allow for sufficient safety features, such as extra margin, anti-flammability, and fail-safe measures when designing in order to prevent possible accidents that may result in bodily harm or fire caused by component failure. ROHM cannot be held responsible for any damages arising from the use of the products under conditions out of the range of the specifications or due to non-compliance with the NOTES specified in this catalog.

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact your nearest sales office.

ROHM Customer Support System

THE AMERICAS / EUROPE / ASIA / JAPAN

www.rohm.com

Contact us : webmaster@rohm.co.jp

Copyright © 2008 ROHM CO.,LTD.

ROHM CO., LTD. 21 Saiin Mizosaki-cho, Ukyo-ku, Kyoto 615-8585, Japan
TEL : +81-75-311-2121
FAX : +81-75-315-0172