

Transistors

# 2.5V Drive Nch+SBD MOSFET

## US6U37

●Structure

Silicon N-channel MOSFET /  
Schottky barrier diode

●Features

- 1) Nch MOSFET and schottky barrier diode are put in TUMT6 package.
- 2) High-speed switching, Low On-resistance.
- 3) Low voltage drive (2.5V drive).
- 4) Built-in Low  $V_F$  schottky barrier diode.

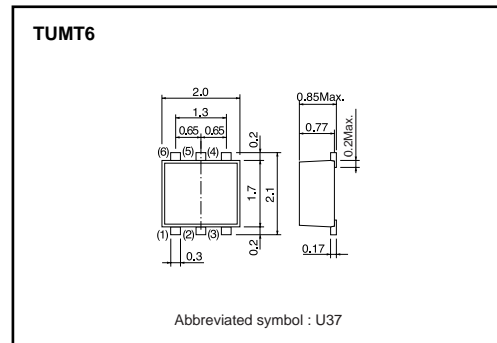
●Applications

Switching

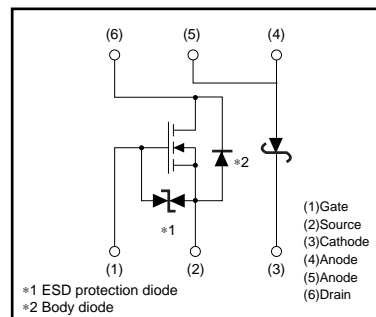
●Package specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
US6U37		○

●Dimensions (Unit : mm)



●Inner circuit



●Absolute maximum ratings ( $T_a=25^\circ\text{C}$ )

<MOSFET>

Parameter	Symbol	Limits	Unit	
Drain-source voltage	$V_{DS}$	30	V	
Gate-source voltage	$V_{GS}$	$\pm 12$	V	
Drain current	Continuous	$I_D$	$\pm 1.5$	A
	Pulsed	$I_{DP}$ *1	$\pm 6.0$	A
Source current (Body diode)	Continuous	$I_S$	0.6	A
	Pulsed	$I_{SP}$ *1	6.0	A
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$	
Power dissipation	$P_D$ *2	0.7	W / ELEMENT	

\*1  $P_w \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$   
\*2 Mounted on a ceramic board

<Di>

Parameter	Symbol	Limits	Unit
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	$I_{FSM}$ *1	10	A
Junction temperature	$T_J$	150	$^\circ\text{C}$
Power dissipation	$P_D$ *2	0.5	W / ELEMENT

\*1 60Hz · 1cycle  
\*2 Mounted on ceramic board

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&lt;MOSFET and Di&gt;

Parameter	Symbol	Limits	Unit
Power dissipation	$P_D$ *1	1.0	W / TOTAL
Range of storage temperature	Tstg	-55 to +150	°C

\*1 Mounted on a ceramic board

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

&lt;MOSFET&gt;

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	$I_{GSS}$	-	-	±10	μA	$V_{GS}=\pm 12V, V_{DS}=0V$
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	$R_{DS(on)}$ *	-	170	240	mΩ	$I_D=1.5A, V_{GS}=4.5V$
		-	180	250	mΩ	$I_D=1.5A, V_{GS}=4V$
		-	240	340	mΩ	$I_D=1.5A, V_{GS}=2.5V$
Forward transfer admittance	$ Y_{fs} $ *	1.5	-	-	S	$V_{DS}=10V, I_D=1.5A$
Input capacitance	$C_{iss}$	-	80	-	pF	$V_{DS}=10V$
Output capacitance	$C_{oss}$	-	14	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	$C_{rss}$	-	12	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	-	7	-	ns	$V_{DD}\doteq 15V$ $I_D=0.75A$
Rise time	$t_r$ *	-	9	-	ns	$V_{GS}=4.5V$
Turn-off delay time	$t_{d(off)}$ *	-	15	-	ns	$R_L\doteq 20\Omega$
Fall time	$t_f$ *	-	6	-	ns	$R_G=10\Omega$
Total gate charge	$Q_g$ *	-	1.6	2.2	nC	$V_{DD}\doteq 15V, V_{GS}=4.5V$
Gate-source charge	$Q_{gs}$ *	-	0.5	-	nC	$I_D=1.5A$
Gate-drain charge	$Q_{gd}$ *	-	0.3	-	nC	$R_L\doteq 10\Omega, R_G=10\Omega$

\*Pulsed

&lt;Body diode characteristics (Source-drain)&gt;

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	$V_{SD}$	-	-	1.2	V	$I_S=0.6A, V_{GS}=0V$

&lt;Di&gt;

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

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●Electrical characteristics curves

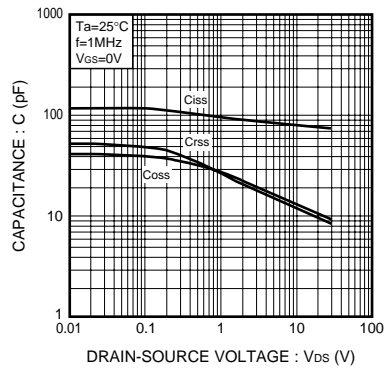


Fig.1 Typical Capacitance vs. Drain-Source Voltage

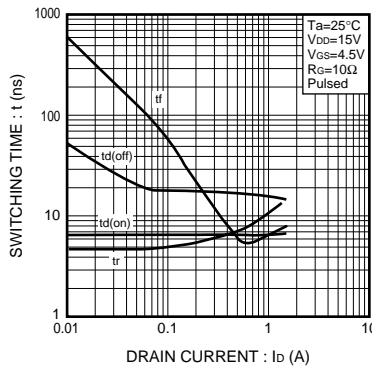


Fig.2 Switching Characteristics

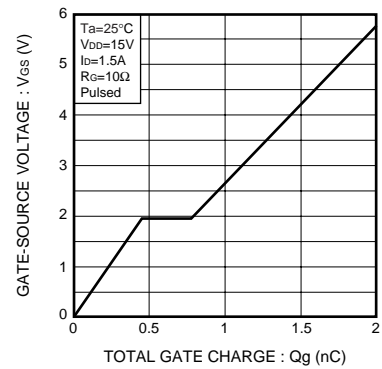


Fig.3 Dynamic Input Characteristics

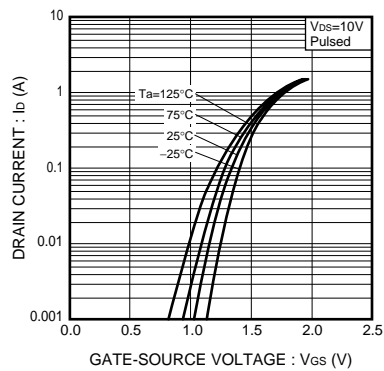


Fig.4 Typical Transfer Characteristics

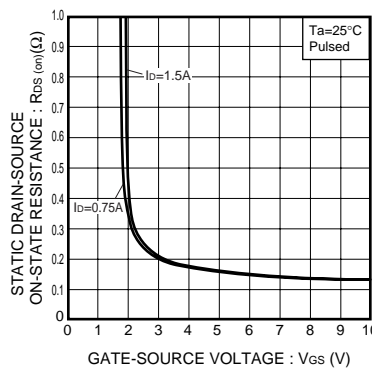


Fig.5 Static Drain-Source On-State Resistance vs. Gate source Voltage

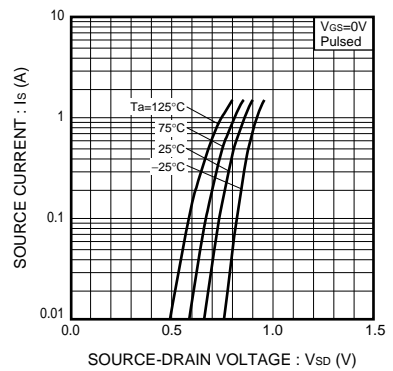


Fig.6 Source Current vs. Source-Drain Voltage

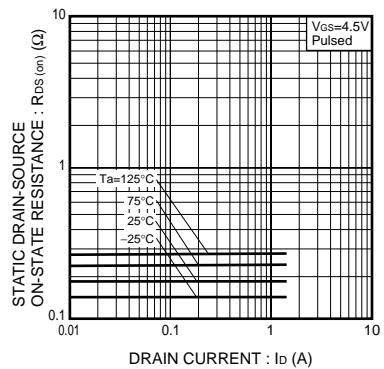


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current ( I )

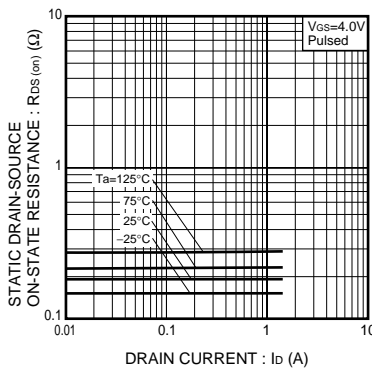


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current ( II )

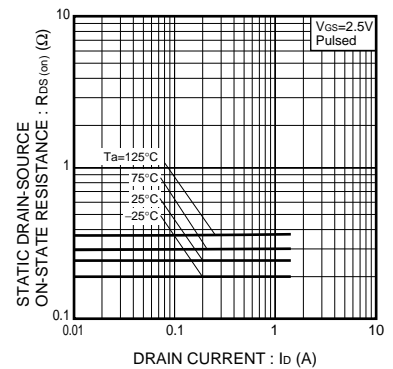


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current ( III )

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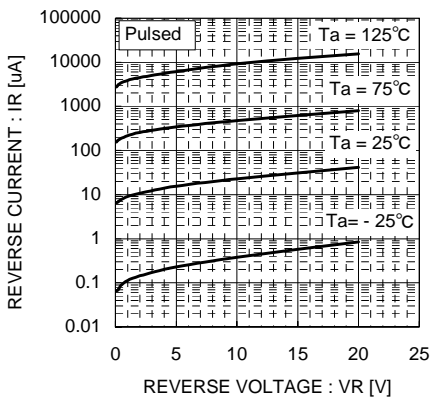


Fig.10 Reverse Current vs. Reverse

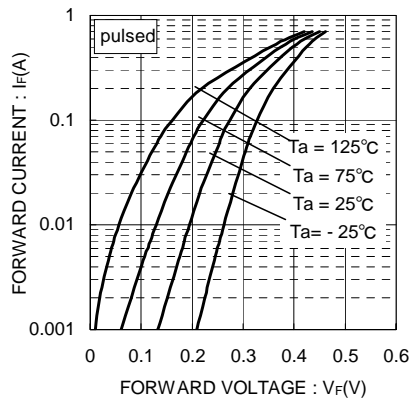


Fig.11 Forward Current vs. Forward Voltage

●Measurement circuit

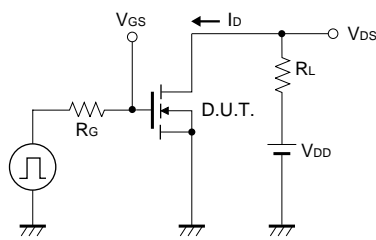


Fig.12 Switching Time Test Circuit

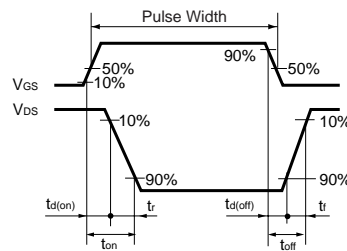


Fig.13 Switching Time Waveforms

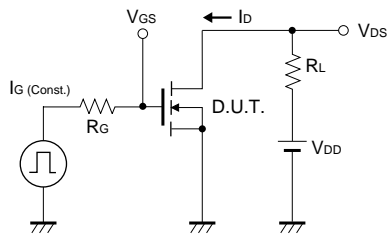


Fig.14 Gate Charge Measurement Circuit

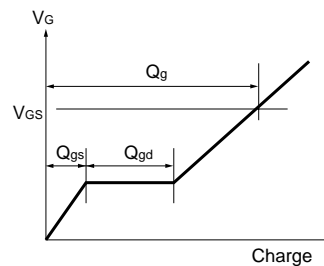


Fig.15 Gate Charge Waveform

●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 VF 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.

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