

Transistors

2.5V Drive Nch+SBD MOSFET

US5U1

●Structure

Silicon N-channel MOSFET /
Schottky barrier diode

●Features

- 1) Nch MOSFET and schottky barrier diode are put in TUMT5 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
US5U1		○

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

<MOSFET>

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V_{DSS}	30	V	
Gate-source voltage	V_{GSS}	12	V	
Drain current	Continuous	I_D	± 1.5	A
	Pulsed	I_{DP} *1	± 6.0	A
Source current (Body diode)	Continuous	I_S	0.75	A
	Pulsed	I_{SP} *1	6.0	A
Power dissipation	P_D *2	0.7	W / ELEMENT	
Channel temperature	T_{ch}	150	$^\circ\text{C}$	

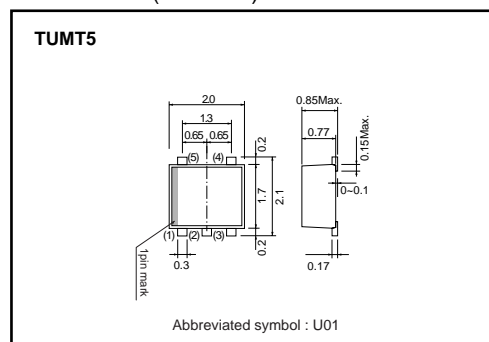
*1 $P_{ws} \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$
*2 Mounted on a ceramic board

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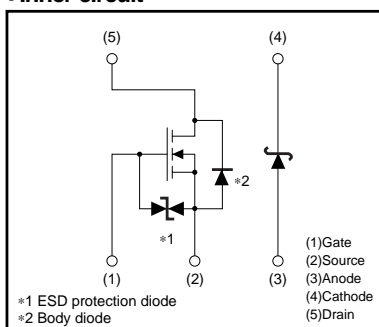
Parameter	Symbol	Limits	Unit
Repetitive peak reverse voltage	V_{RM}	30	V
Reverse voltage	V_R	20	V
Forward current	I_F	0.5	A
Forward current surge peak	I_{FSM} *1	2.0	A
Power dissipation	P_D *2	0.5	W / ELEMENT
Junction temperature	T_j	150	$^\circ\text{C}$

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

●Dimensions (Unit : mm)



●Inner circuit



Transistors

<MOSFET and Di>

Parameter	Symbol	Limits	Unit
Total 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)

<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	$R_{DS(on)}$ *	–	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	$R_L=20\Omega$
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	$R_L=10\Omega, R_G=10\Omega$

*Pulsed

<Body diode characteristics (Source-drain)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}	–	–	1.2	V	$I_S=0.75A, V_{GS}=0V$

<Di>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_F	–	–	0.36	V	$I_S=0.1A$
		–	–	0.47	V	$I_S=0.5A$
Reverse current	I_R	–	–	100	μA	$I_S=20V$

Transistors

●Electrical characteristics curves

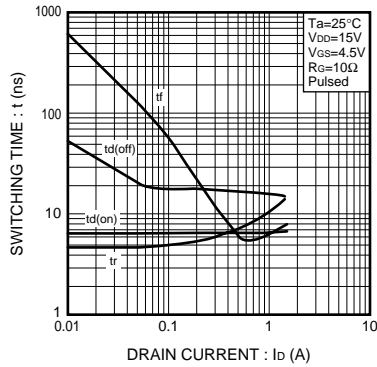


Fig.1 Switching Characteristics

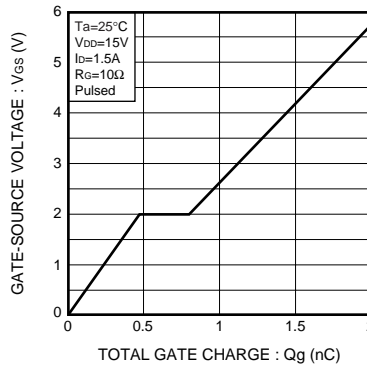


Fig.2 Dynamic Input Characteristics

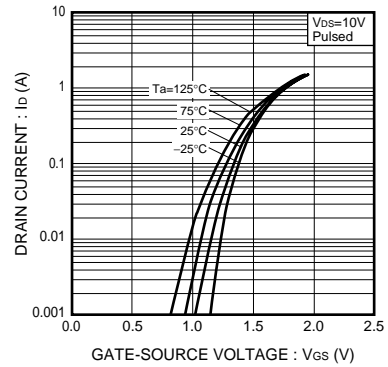


Fig.3 Typical Transfer Characteristics

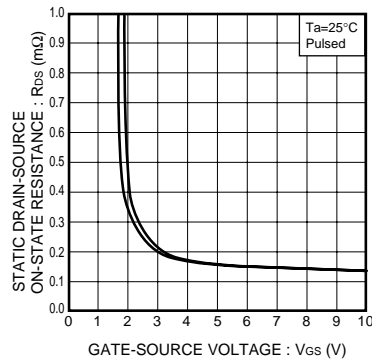


Fig.4 Static Drain-Source On-State Resistance vs. Gate source Voltage

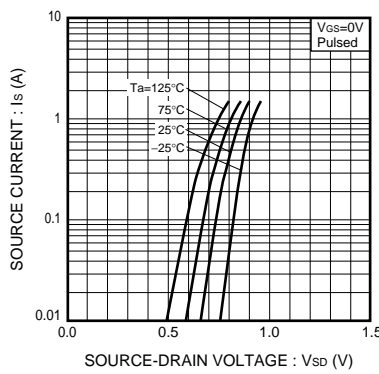


Fig.5 Source Current vs. Source-Drain Voltage

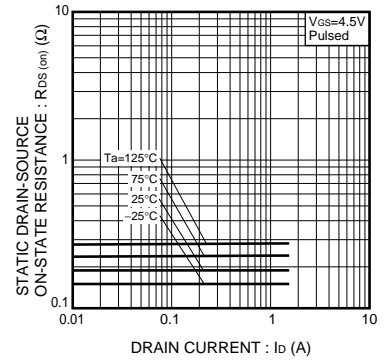


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (I)

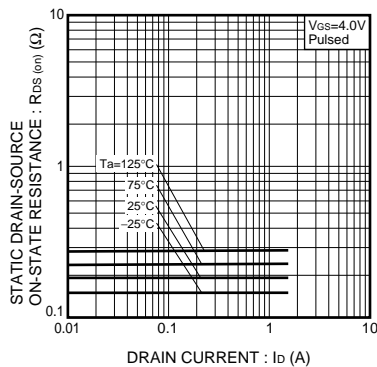


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (II)

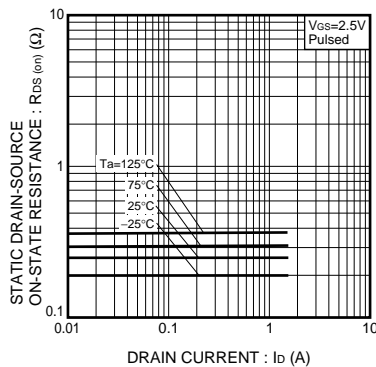


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (III)

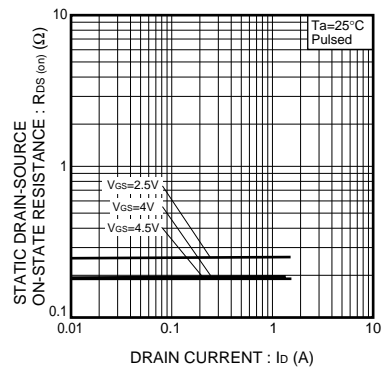


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current (IV)

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