

## Transistors

# 2.5V Drive Nch+SBD MOSFET

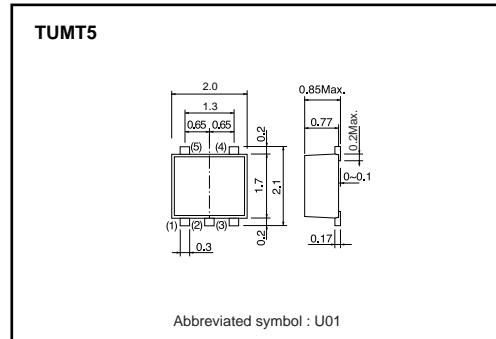
## US5U1

**●Structure**

Silicon N-channel MOSFET /  
Schottky barrier diode

**●Features**

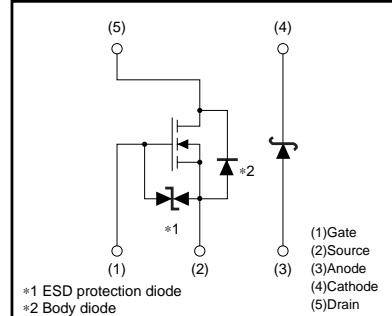
- 1) Nch MOSFET and schottky barrier diode are put in TUMT5 package.
- 2) High-speed switching, Low On-resistance.
- 3) Low voltage drive (2.5V drive).
- 4) Built-in Low V<sub>F</sub> schottky barrier diode.

**●Dimensions (Unit : mm)****●Applications**

Switching

**●Package specifications**

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
US5U1		○

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

<MOSFET>

Parameter	Symbol	Limits	Unit
Drain-source voltage	V <sub>DSS</sub>	30	V
Gate-source voltage	V <sub>GSS</sub>	12	V
Drain current	I <sub>D</sub>	±1.5	A
Pulsed	I <sub>DP</sub> *1	±6.0	A
Source current (Body diode)	I <sub>S</sub>	0.75	A
Pulsed	I <sub>SP</sub> *1	6.0	A
Power dissipation	P <sub>D</sub> *2	0.7	W / ELEMENT
Channel temperature	T <sub>ch</sub>	150	°C

\*1 P<sub>W</sub>≤10μs, Duty cycles≤1%

\*2 Mounted on a ceramic board

<Di>

Parameter	Symbol	Limits	Unit
Repetitive peak reverse voltage	V <sub>RM</sub>	30	V
Reverse voltage	V <sub>R</sub>	20	V
Forward current	I <sub>F</sub>	0.5	A
Forward current surge peak	I <sub>FSM</sub> *1	2.0	A
Power dissipation	P <sub>D</sub> *2	0.5	W / ELEMENT
Junction temperature	T <sub>j</sub>	150	°C

\*1 60Hz • 1cycle

\*2 Mounted on ceramic board

## Transistors

&lt;MOSFET and Di&gt;

Parameter	Symbol	Limits	Unit
Total power dissipation	P <sub>D</sub> *1	1.0	W / TOTAL
Range of storage temperature	T <sub>stg</sub>	-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 <sub>GSS</sub>	—	—	10	μA	V <sub>GS</sub> =12V, V <sub>DS</sub> =0V
Drain-source breakdown voltage	V <sub>(BR) DSS</sub>	30	—	—	V	I <sub>D</sub> = 1mA, V <sub>GS</sub> =0V
Zero gate voltage drain current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> =0V
Gate threshold voltage	V <sub>GS (th)</sub>	0.5	—	1.5	V	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA
Static drain-source on-state resistance	R <sub>DS (on)*</sub>	—	170	240	mΩ	I <sub>D</sub> = 1.5A, V <sub>GS</sub> = 4.5V
		—	180	250	mΩ	I <sub>D</sub> = 1.5A, V <sub>GS</sub> = 4V
		—	240	340	mΩ	I <sub>D</sub> = 1.5A, V <sub>GS</sub> = 2.5V
Forward transfer admittance	Y <sub>fs</sub>   *	1.5	—	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1.5A
Input capacitance	C <sub>iss</sub>	—	80	—	pF	V <sub>DS</sub> = 10V
Output capacitance	C <sub>oss</sub>	—	14	—	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	—	12	—	pF	f=1MHz
Turn-on delay time	t <sub>d (on)*</sub>	—	7	—	ns	V <sub>DD</sub> = 15V
Rise time	t <sub>r</sub> *	—	9	—	ns	I <sub>D</sub> = 0.75A
Turn-off delay time	t <sub>d (off)*</sub>	—	15	—	ns	V <sub>GS</sub> = 4.5V
Fall time	t <sub>f</sub> *	—	6	—	ns	R <sub>L</sub> = 20Ω
Total gate charge	Q <sub>g</sub> *	—	1.6	2.2	nC	R <sub>G</sub> =10Ω
Gate-source charge	Q <sub>gs</sub> *	—	0.5	—	nC	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 4.5V
Gate-drain charge	Q <sub>gd</sub> *	—	0.3	—	nC	I <sub>D</sub> = 1.5A
						R <sub>L</sub> = 10Ω, R <sub>G</sub> = 10Ω

\*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>SD</sub>	—	—	1.2	V	I <sub>S</sub> = 0.75A, V <sub>GS</sub> =0V

&lt;Di&gt;

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>F</sub>	—	—	0.36	V	I <sub>S</sub> = 0.1A
		—	—	0.47	V	I <sub>S</sub> = 0.5A
Reverse current	I <sub>R</sub>	—	—	100	μA	I <sub>S</sub> = 20V

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## ● Electrical characteristics curves

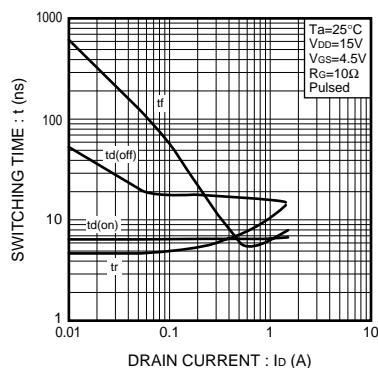


Fig.1 Switching Characteristics

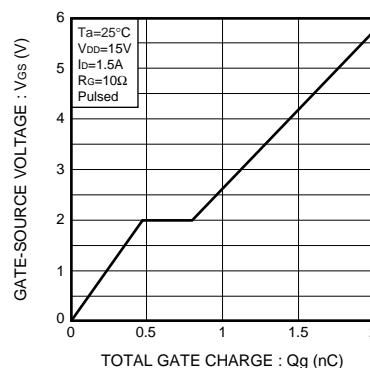


Fig.2 Dynamic Input Characteristics

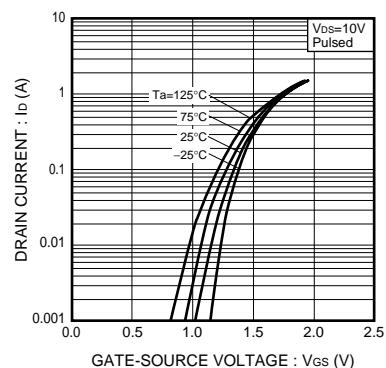


Fig.3 Typical Transfer Characteristics

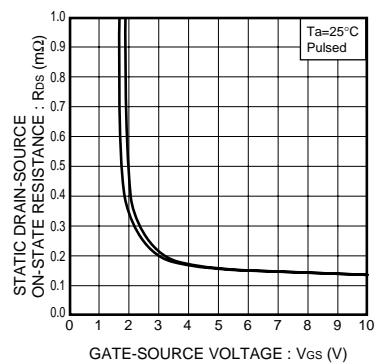


Fig.4 Static Drain-Source On-State Resistance vs. Gate source Voltage

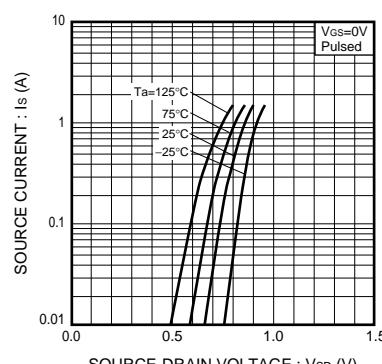


Fig.5 Source Current vs. Source-Drain Voltage

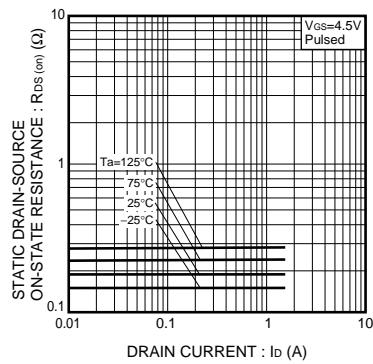


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current ( I )

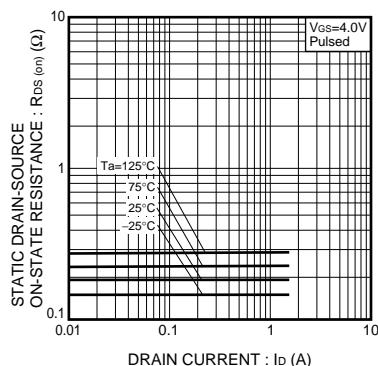


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current ( II )

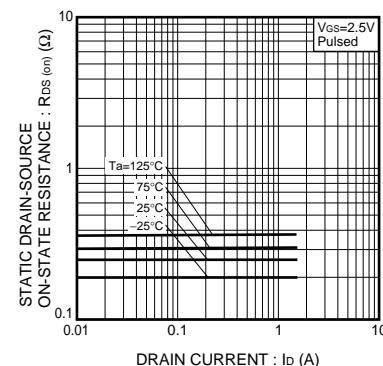


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current ( III )

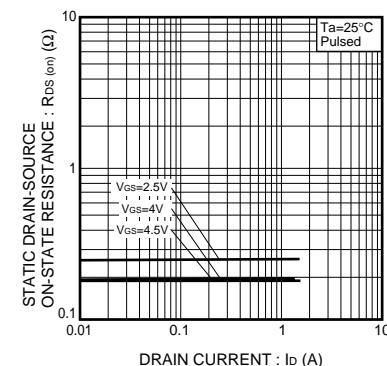


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current ( IV )

## Appendix

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