

1.5V Drive Pch +SBD MOSFET

TT8U1

●Structure

Silicon P-channel MOSFET / schottky barrier diode

●Features

- 1) Low On-resistance.
- 2) High Power Package.
- 3) Low voltage drive. (1.5V)

●Applications

Switching

●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
TT8U1		○

●Absolute maximum ratings (Ta=25°C)

<MOSFET>

Parameter	Symbol	Limits	Unit	
Drain-source voltage	V_{DSS}	-20	V	
Gate-source voltage	V_{GSS}	± 10	V	
Drain current	Continuous	I_D	± 2.4	A
	Pulsed	I_{DP} *1	± 9.6	A
Source current (Body diode)	Continuous	I_S	-0.8	A
	Pulsed	I_{SP} *1	-9.6	A
Channel temperature	T_{ch}	150	°C	
Power dissipation	P_D *2	1.0	W / ELEMENT	

*1 $P_w \leq 10\mu s$, 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	1.0	A
Forward current surge peak	I_{FSM} *1	3.0	A
Junction temperature	T_j	150	°C
Power dissipation	P_D *2	1.0	W / ELEMENT

*1 60Hz / 1Cycle

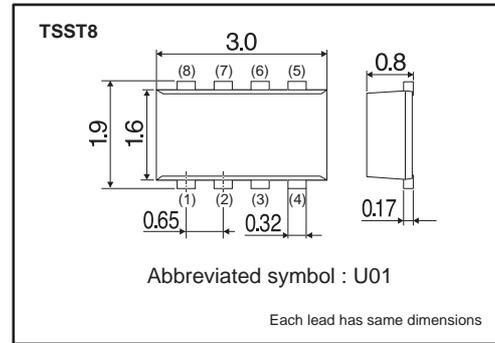
*2 Mounted on a ceramic board

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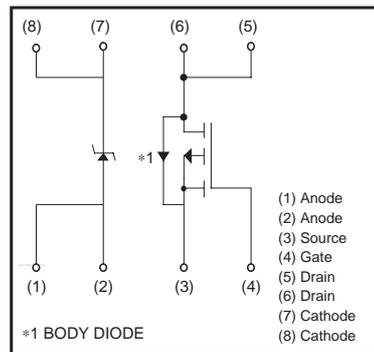
Parameter	Symbol	Limits	Unit
Total power dissipation	P_D *	1.25	W / TOTAL
Range of Storage temperature	T_{stg}	-55 to +150	°C

* Mounted on a ceramic board

●Dimensions (Unit : mm)



●Inner circuit



●Electrical characteristics (Ta=25°C)

<MOSFET>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	–	–	±100	nA	$V_{GS}=\pm 10V, V_{DS}=0V$
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	$V_{GS(th)}$	–0.3	–	–1.0	V	$V_{DS}=-10V, I_D=-1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	–	80	105	mΩ	$I_D=-2.4A, V_{GS}=-4.5V$
		–	105	140	mΩ	$I_D=-1.2A, V_{GS}=-2.5V$
		–	150	225	mΩ	$I_D=-1.2A, V_{GS}=-1.8V$
		–	180	360	mΩ	$I_D=-0.5A, V_{GS}=-1.5V$
Forward transfer admittance	$ Y_{fs} $ *	2.4	–	–	S	$V_{DS}=-10V, I_D=-2.4A$
Input capacitance	C_{iss}	–	850	–	pF	$V_{DS}=-10V$
Output capacitance	C_{oss}	–	60	–	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	–	50	–	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	–	9	–	ns	$V_{DD}\doteq -10V$
Rise time	t_r *	–	25	–	ns	$V_{GS}=-4.5V$ $I_D=-1.2A$
Turn-off delay time	$t_{d(off)}$ *	–	55	–	ns	$R_L\doteq 8.3\Omega$
Fall time	t_f *	–	45	–	ns	$R_G=10\Omega$
Total gate charge	Q_g *	–	6.7	–	nC	$V_{DD}\doteq -10V$ $V_{GS}=-4.5V$
Gate-source charge	Q_{gs} *	–	1.7	–	nC	$I_D=-2.4A$
Gate-drain charge	Q_{gd} *	–	0.6	–	nC	$R_L\doteq 4.2\Omega / R_G=10\Omega$

*Pulsed

<MOSFET> Body diode (source-drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD} *	–	–	–1.2	V	$I_S=-2.4A, V_{GS}=0V$

*Pulsed

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Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage drop	V_F	–	0.37	0.41	V	$I_F=1.0A$
Reverse leakage	I_R	–	–	500	μA	$V_R=20V$

●Electrical characteristics curves

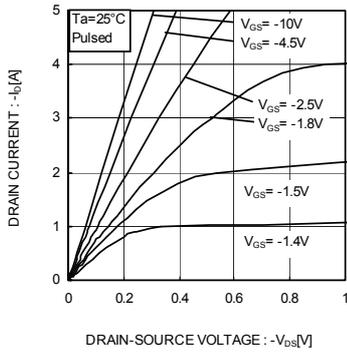


Fig.1 Typical output characteristics (I)

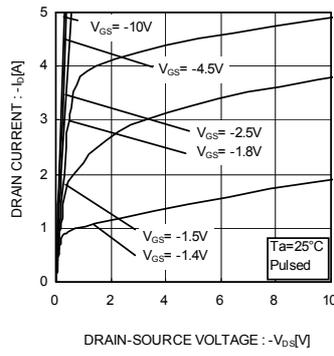


Fig.2 Typical output characteristics (II)

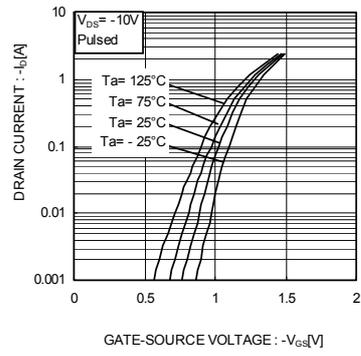


Fig.3 Typical Transfer Characteristics

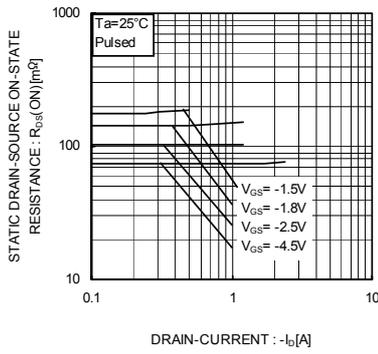


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (I)

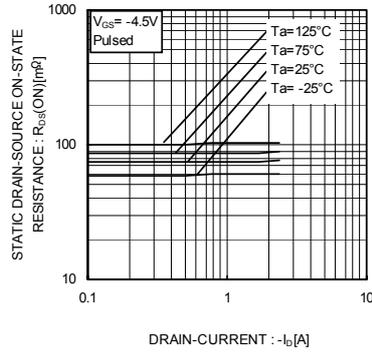


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (II)

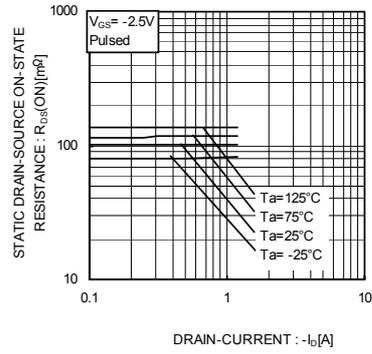


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (III)

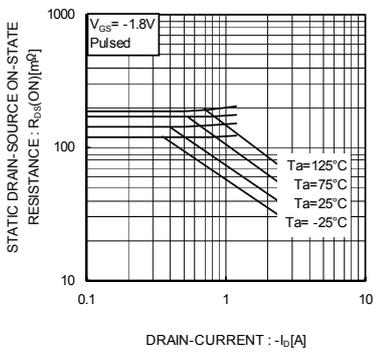


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (IV)

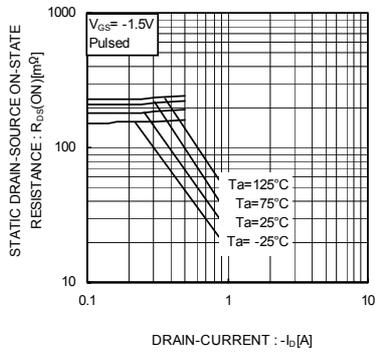


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (V)

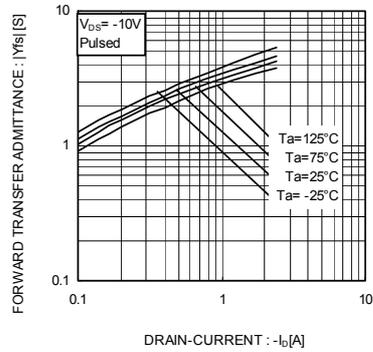


Fig.9 Forward Transfer Admittance vs. Drain Current

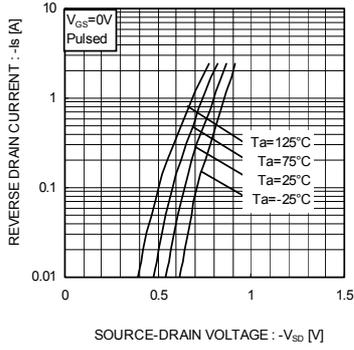


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

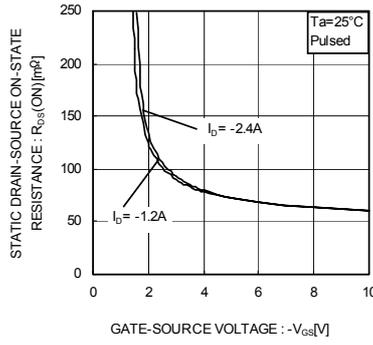


Fig.11 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

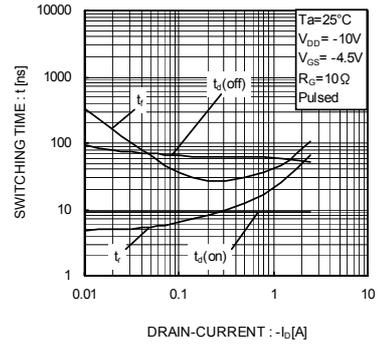


Fig.12 Switching Characteristics

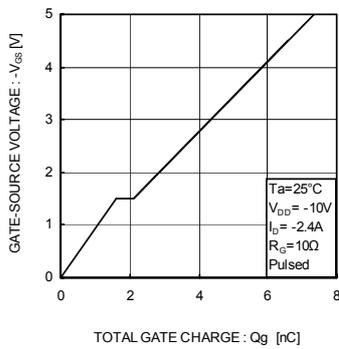


Fig.13 Dynamic Input Characteristics

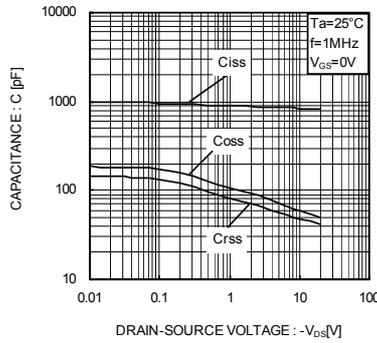


Fig.14 Typical Capacitance vs. Drain-Source Voltage

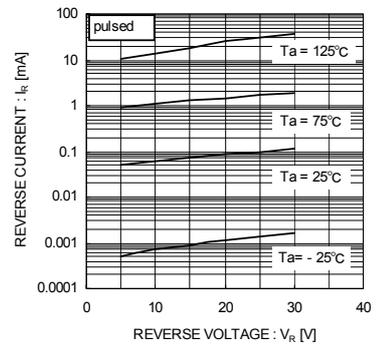


Fig.15 Reverse Current vs. Reverse Voltage

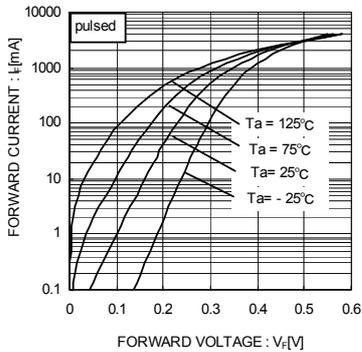


Fig.16 Forward Current vs. Forward Voltage

●Measurement circuits

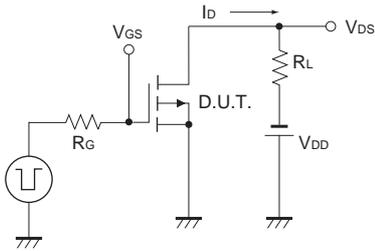


Fig.1-1 Switching Time Measurement Circuit

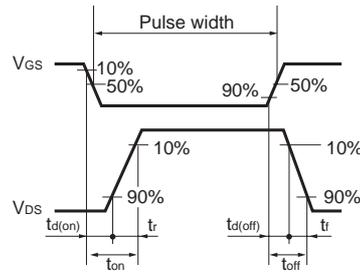


Fig.1-2 Switching Waveforms

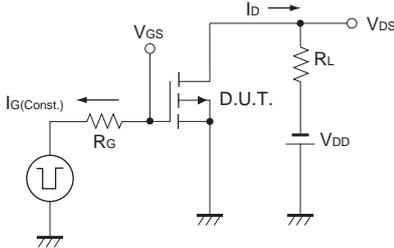


Fig.2-1 Gate Charge Measurement Circuit

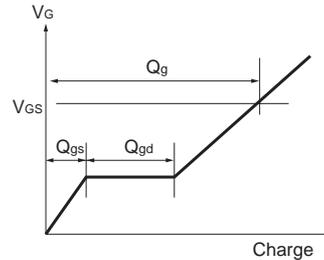


Fig.2-2 Gate Charge Waveform

●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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