

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

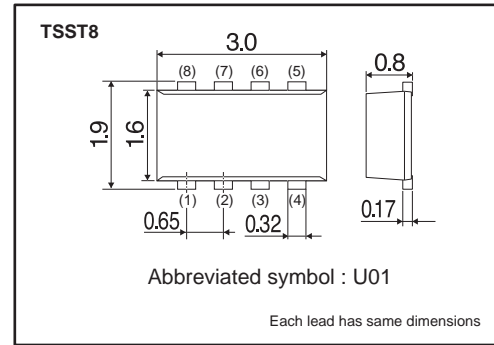
*1 60Hz / 1Cycle
*2 Mounted on a ceramic board

<MOSFET and Di>

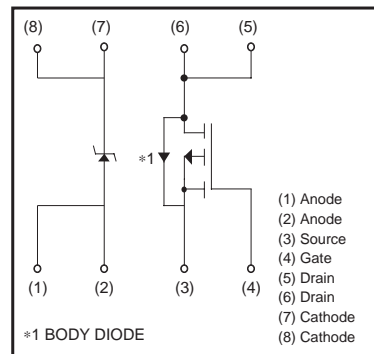
Parameter	Symbol	Limits	Unit
Total power dissipation	P_D *	1.25	W / TOTAL
Range of Storage temperature	T_{stg}	-55 to +150	°C

* 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	$V_{DD}=-10V$
Rise time	t_r *	-	25	-	ns	$V_{GS}=-4.5V$ $I_D=-1.2A$
Turn-off delay time	$t_{d(off)}$ *	-	55	-	ns	$R_L=8.3\Omega$
Fall time	t_f *	-	45	-	ns	$R_G=10\Omega$
Total gate charge	Q_g *	-	6.7	-	nC	$V_{DD}=-10V$ $V_{GS}=-4.5V$
Gate-source charge	Q_{gs} *	-	1.7	-	nC	$I_D=-2.4A$
Gate-drain charge	Q_{gd} *	-	0.6	-	nC	$R_L=4.2\Omega / R_G=10\Omega$

*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

<Di>

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

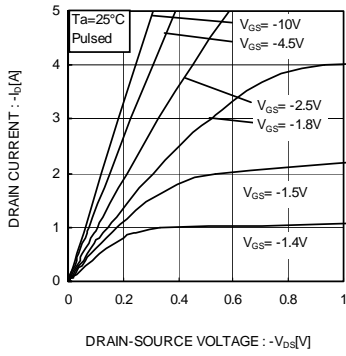


Fig.1 Typical output characteristics (I)

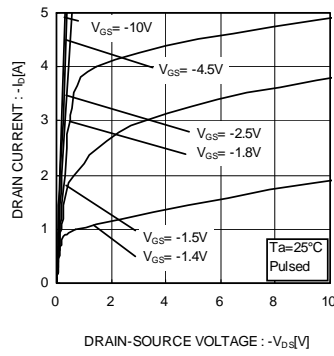


Fig.2 Typical output characteristics (II)

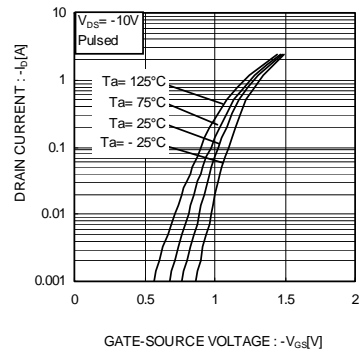


Fig.3 Typical Transfer Characteristics

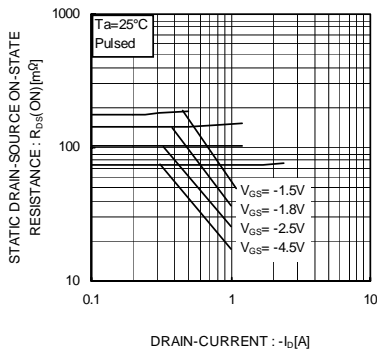


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (I)

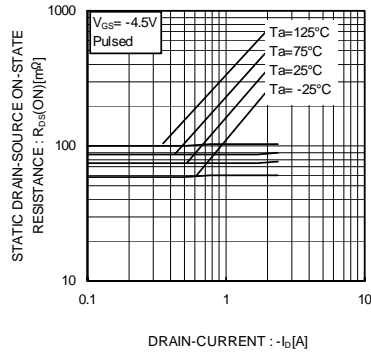


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (II)

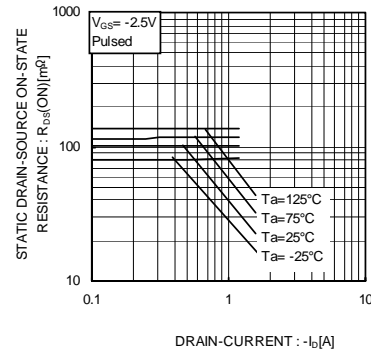


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (III)

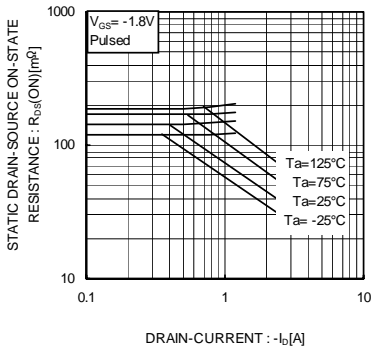


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (IV)

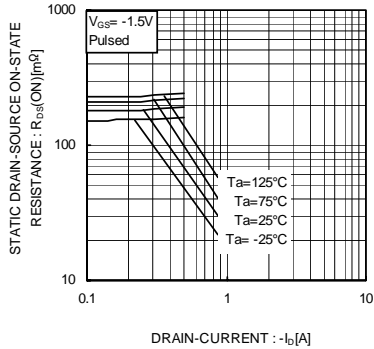


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (V)

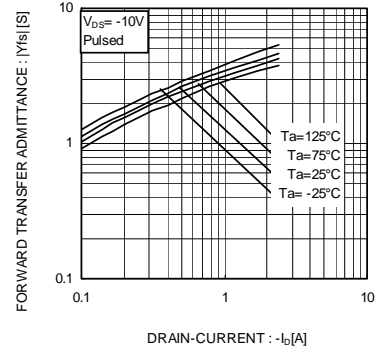


Fig.9 Forward Transfer Admittance vs. Drain Current

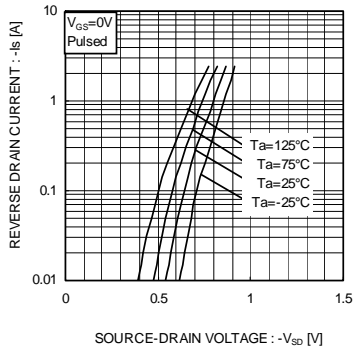


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

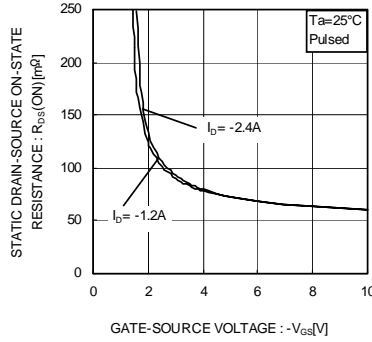


Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

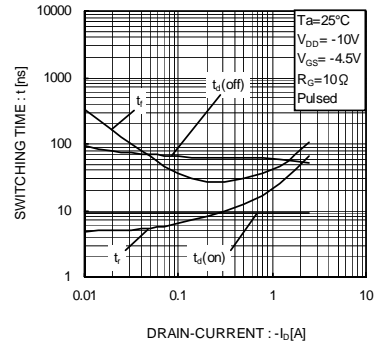


Fig.12 Switching Characteristics

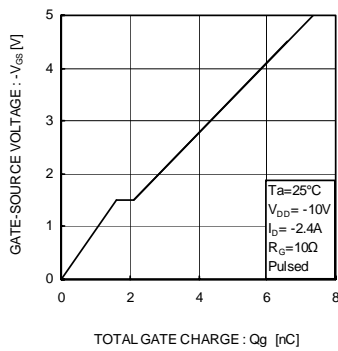


Fig.13 Dynamic Input Characteristics

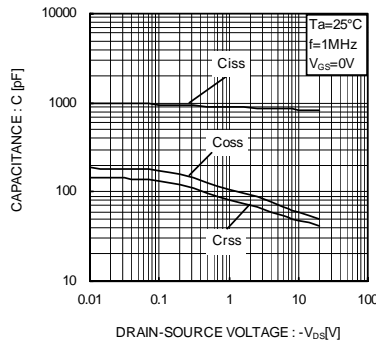


Fig.14 Typical Capacitance vs. Drain-Source Voltage

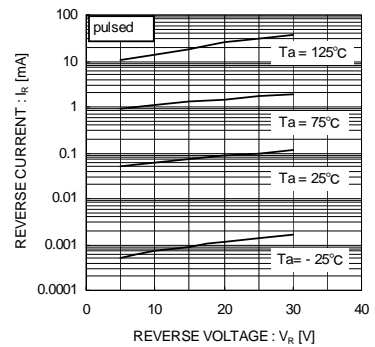


Fig.15 Reverse Current vs. Reverse Voltage

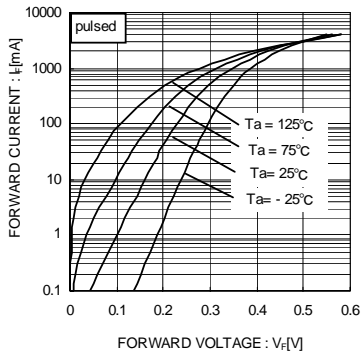


Fig.16 Forward Current vs. Forward Voltage

●Measurement circuits

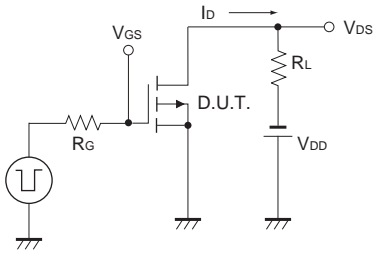


Fig.1-1 Switching Time Measurement Circuit

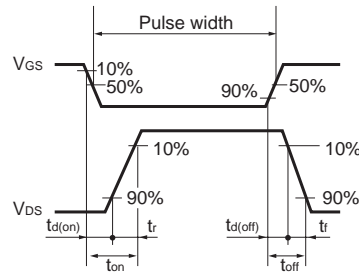


Fig.1-2 Switching Waveforms

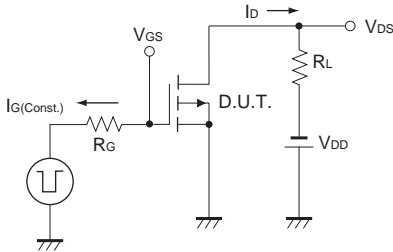


Fig.2-1 Gate Charge Measurement Circuit

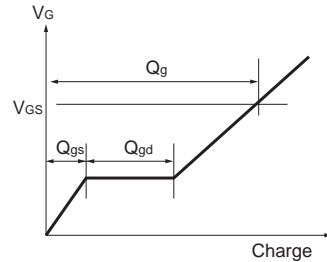


Fig.2-2 Gate Charge Waveform

●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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