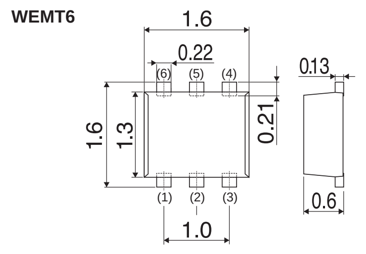
1.5V Drive Pch+SBD MOSFET

ES6U1

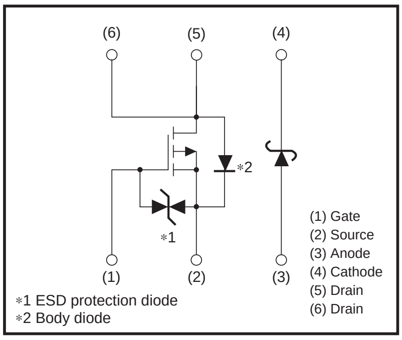
●Structure
Silicon P-channel MOSFET /
Schottky barrier diode

●Features
1) Pch MOSFET and schottky barrier diode are put in WEMT6 package.
2) High-speed switching, Low On-resistance.
3) Low voltage drive (1.5V drive).
4) Built-in Low V_F schottky barrier diode.

●Dimensions (Unit : mm)


Abbreviated symbol : U01

●Application
Switching

●Inner circuit


●Packaging specifications

Type	Package	Taping
	Code	T2R
	Basic ordering unit (pieces)	8000
ES6U1		○

●Absolute maximum ratings (Ta=25°C)
<MOSFET>

Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DSS}	−12	V
Gate-source voltage		V_{GSS}	±10	V
Drain current	Continuous	I_D	±1.3	A
	Pulsed	I_{DP} ∗1	±2.6	A
Source current (Body diode)	Continuous	I_S	−0.5	A
	Pulsed	I_{SP} ∗1	−2.6	A
Channel temperature		Tch	150	°C
Power dissipation		P_D ∗2	0.7	W / ELEMENT

∗1 Pw≤10µs, Duty cycle≤1%
∗2 Mounted on a ceramic board

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Parameter	Symbol	Limits	Unit
Repetitive peak reverse voltage	V_{RM}	25	V
Reverse voltage	V_R	20	V
Forward current	I_F	0.5	A
Forward current surge peak	I_{FSM} ∗1	2.0	A
Junction temperature	Tj	150	°C
Power dissipation	P_D ∗2	0.5	W / ELEMENT

∗1 60Hz • 1cycle
∗2 Mounted on a ceramic board

<MOSFET and Di>

Parameter	Symbol	Limits	Unit
Power dissipation	P_D ∗	0.8	W / TOTAL
Range of storage temperature	Tstg	−55 to +150	°C

∗ 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}= ±10V, V_{DS}=0V
Drain-source breakdown voltage	$V_{(BR)DSS}$	–12	–	–	V	I_D= –1mA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}	–	–	–1	μA	V_{DS}= –12V, V_{GS}=0V
Gate threshold voltage	$V_{GS(th)}$	–0.3	–	–1.0	V	V_{DS}= –6V, I_D= –1mA
Static drain-source on-state resistance	$R_{DS(on)}$ *	–	190	260	mΩ	I_D= –1.3A, V_{GS}= –4.5V
		–	280	390	mΩ	I_D= –0.6A, V_{GS}= –2.5V
		–	400	600	mΩ	I_D= –0.6A, V_{GS}= –1.8V
		–	530	1060	mΩ	I_D= –0.2A, V_{GS}= –1.5V
Forward transfer admittance	$\|Y_{fs}\|$ *	1.4	–	–	S	V_{DS}= –6V, I_D= –1.3A
Input capacitance	C_{iss}	–	290	–	pF	V_{DS}= –6V
Output capacitance	C_{oss}	–	28	–	pF	V_{GS}= 0V
Reverse transfer capacitance	C_{rss}	–	21	–	pF	f= 1MHz
Turn-on delay time	$t_{d(on)}$ *	–	8	–	ns	V_{DD}≒ –6V
Rise time	t_r *	–	10	–	ns	I_D= –0.6A
Turn-off delay time	$t_{d(off)}$ *	–	30	–	ns	V_{GS}= –4.5V, R_L≒10Ω
Fall time	t_f *	–	9	–	ns	R_G= 10Ω
Total gate charge	Q_g *	–	2.4	–	nC	V_{DD}≒–6V, R_L≒4.6Ω
Gate-source charge	Q_{gs} *	–	0.6	–	nC	I_D=–1.3A, R_G= 10Ω
Gate-drain charge	Q_{gd} *	–	0.4	–	nC	V_{GS}=–4.5V

*Pulsed

<MOSFET> Body diode (Source-drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD} *	–	–	–1.2	V	I_S= –1.3A, V_{GS}=0V

*Pulsed

<Di>

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

●Electrical characteristics curves

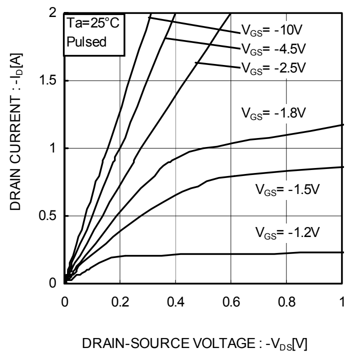

Fig.1 Typical Output Characteristics(Ⅰ)

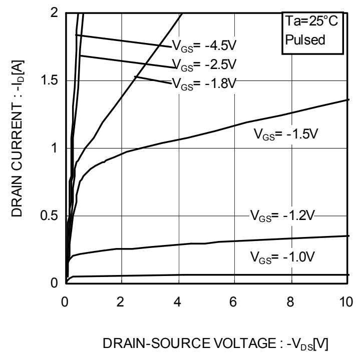

Fig.2 Typical Output Characteristics(Ⅱ)

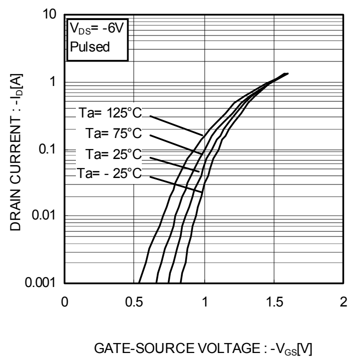

Fig.3 Typical Transfer Characteristics

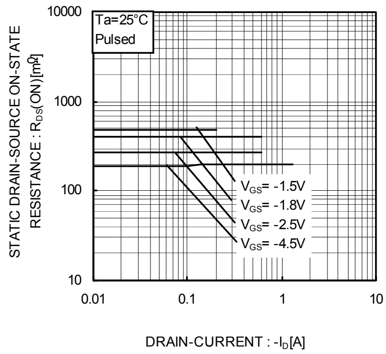

Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

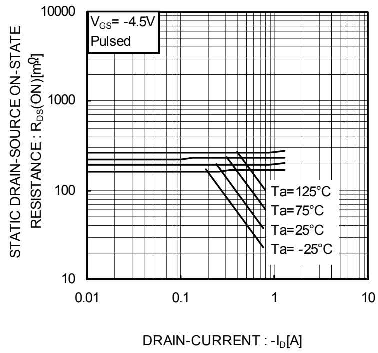

Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

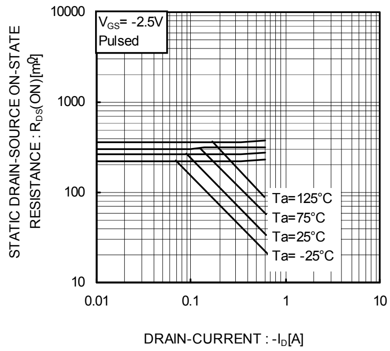

Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

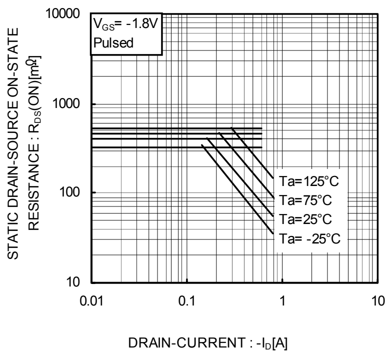

Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

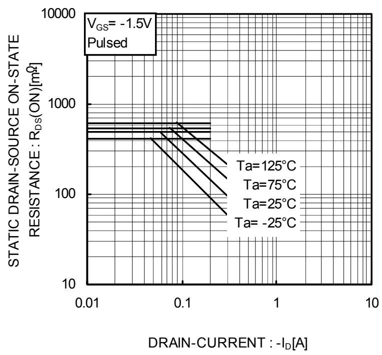

Fig.8 Static Drain-Source On-State Resistance vs. Drain Current(Ⅴ)

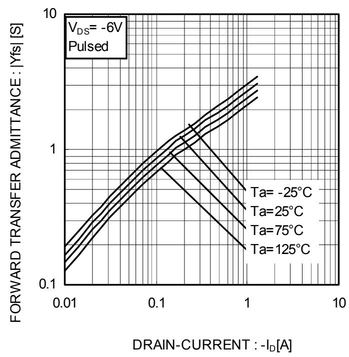

Fig.9 Forward Transfer Admittance vs. Drain Current

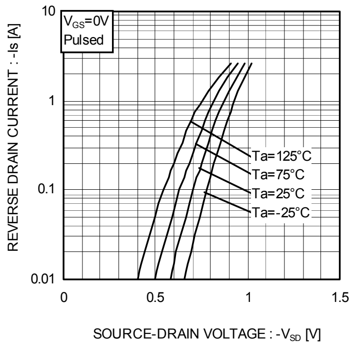

Fig.10 Reverse Drain Current vs. Sourse-Drain Voltage

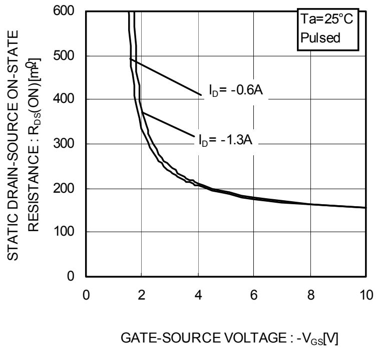

Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

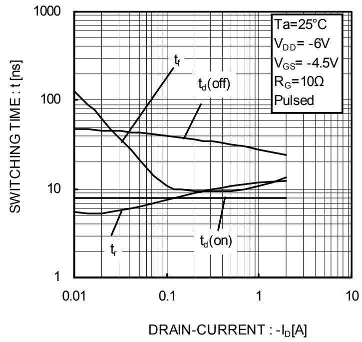

Fig.12 Switching Characteristics

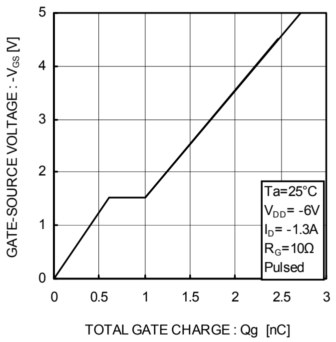

Fig.13 Dynamic Input Characteristics

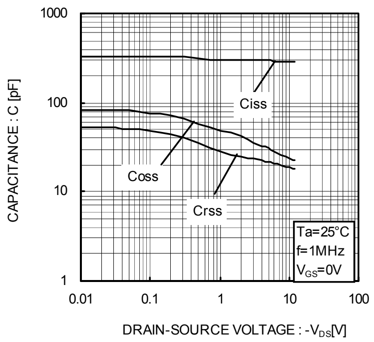

Fig.14 Typical Capacitance vs. Drain-Source Voltage

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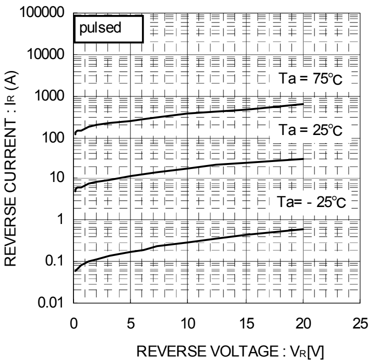

Fig.1 Reverse Current vs. Reverse Voltage

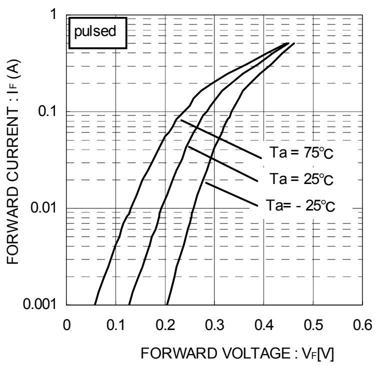

Fig.2 Forward Current vs. Forward Voltage

●Measurement circuits

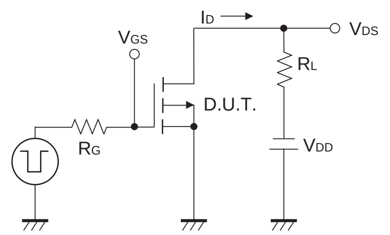

Fig.1-1 Switching Time Measurement Circuit

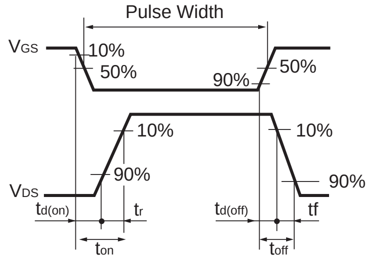

Fig.1-2 Switching Waveforms

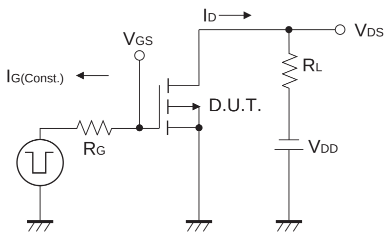

Fig.2-1 Gate Charge Measurement Circuit

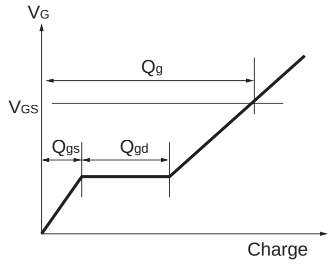

FIg.2-2 Gate Charge Waveform

●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 V_F 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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