

2.5V Drive Pch+SBD MOSFET

US5U30

●Structure

Silicon P-channel MOSFET
Schottky Barrier DIODE

●Features

- 1) The US5U30 combines Pch MOSFET with a Schottky barrier diode in a TUMT5 package.
- 2) Low on-state resistance with fast switching.
- 3) Low voltage drive(2.5V)
- 4) Built-in schottky barrier diode has low forward voltage.

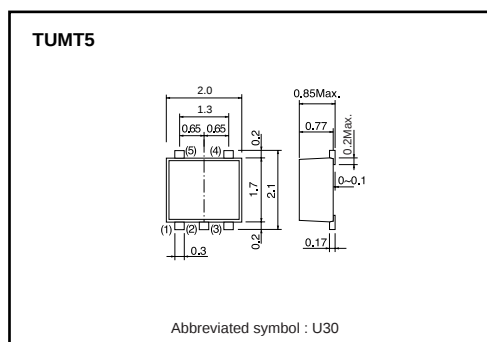
●Applications

Load switch, DC/DC conversion

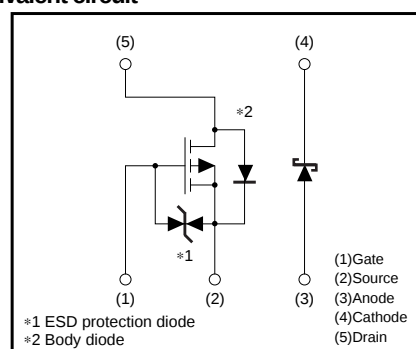
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
US5U30		○

●Dimensions (Unit : mm)



●Equivalent circuit



Transistor

●Absolute maximum ratings (Ta=25°C)

<MOSFET>

Parameter		Symbol	Limits	Unit
Drain-source voltage		V _{DSS}	−20	V
Gate-source voltage		V _{GSS}	±12	V
Drain current	Continuous	I _D	±1	A
	Pulsed	I _{DP} *1	±4	A
Source current (Body diode)	Continuous	I _S	−0.4	A
	Pulsed	I _{SP} *1	−4	A
Channel temperature		T _{ch}	150	°C
Power dissipation		P _D *3	0.7	W / ELEMENT

<Di>

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} *2	2	A
Junction temperature	T_j	150	°C
Power dissipation	P_D *3	0.5	W / ELEMENT

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Total power dissipation	P_D *3	1.0	W / TOTAL
Range of Storage temperature	T_{stg}	-55 to +150	°C

*1 $P_w \leq 10 \mu s$, Duty cycles $\leq 1\%$ *2 60Hz-1cyc. *3 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	$V_{GS} = \pm 12V$, $V_{DS} = 0V$
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	$V_{GS(th)}$	-0.7	-	-2.0	V	$V_{DS} = -10V$, $I_D = -1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	-	280	390	mΩ	$I_D = -1A$, $V_{GS} = -4.5V$
		-	310	430	mΩ	$I_D = -1A$, $V_{GS} = -4V$
		-	570	800	mΩ	$I_D = -0.5A$, $V_{GS} = -2.5V$
Forward transfer admittance	$ Y_{fs} $ *	0.7	-	-	S	$V_{DS} = -10V$, $I_D = -0.5A$
Input capacitance	C_{iss}	-	150	-	pF	$V_{DS} = -10V$
Output capacitance	C_{oss}	-	20	-	pF	$V_{GS} = 0V$
Reverse transfer capacitance	C_{rss}	-	20	-	pF	$f = 1MHz$
Turn-on delay time	$t_{d(on)}$ *	-	9	-	ns	$I_D = -0.5A$
Rise time	t_r *	-	8	-	ns	$V_{DD} \approx -15V$
Turn-off delay time	$t_{d(off)}$ *	-	25	-	ns	$V_{GS} = -4.5V$
Fall time	t_f *	-	10	-	ns	$R_L = 30\Omega$
Total gate charge	Q_g	-	2.1	-	nC	$V_{DD} \approx -15V$ $V_{GS} = -4.5V$
Gate-source charge	Q_{gs}	-	0.5	-	nC	$I_D = -1A$
Gate-drain charge	Q_{gd}	-	0.5	-	nC	$R_L = 15\Omega$ $R_G = 10\Omega$

* Pulsed

<Body diode (source-drain)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}	-	-	-1.2	V	$I_S = -0.4A$, $V_{GS} = 0V$

<Di>

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

Transistor

●Electrical characteristic curves

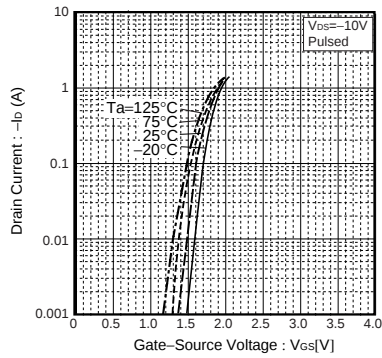


Fig.1 Typical Transfer Characteristics

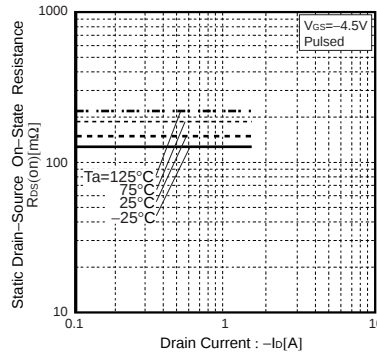


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

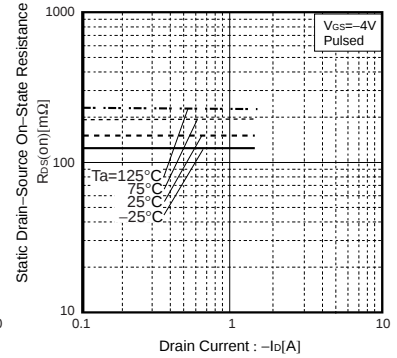


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

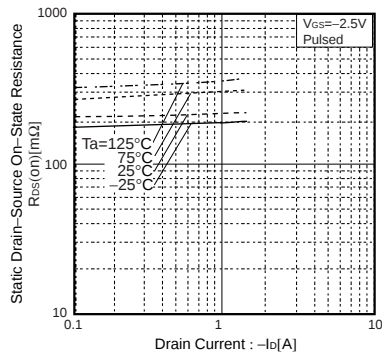


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

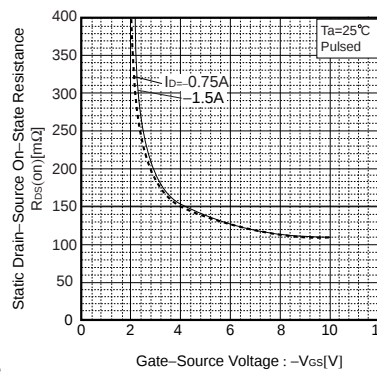


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

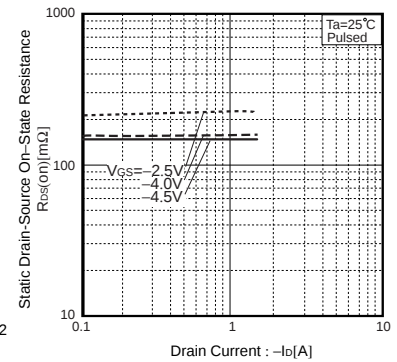


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

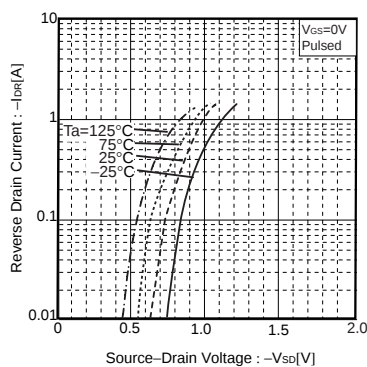


Fig.7 Reverse Drain Current vs. Source-Drain Current

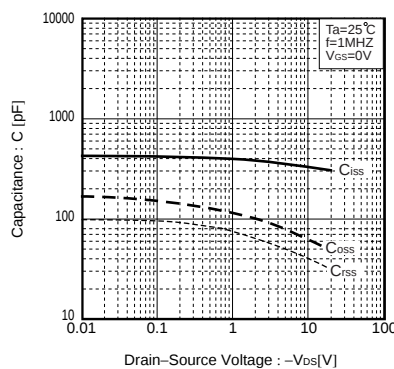


Fig.8 Typical Capacitance vs. Drain-Source Voltage

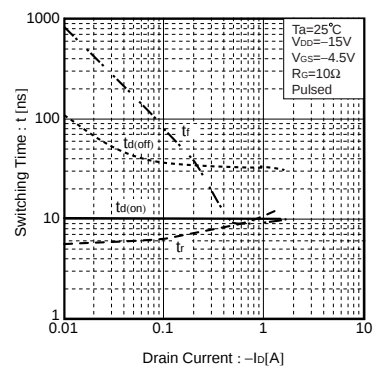


Fig.9 Switching Characteristics

Transistor

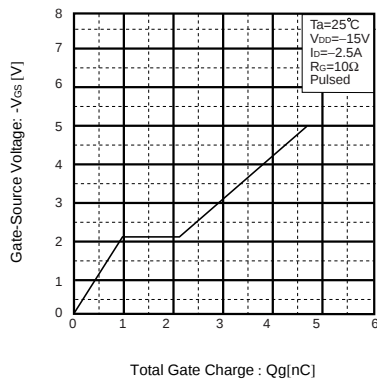


Fig.10 Dynamic Input Characteristics

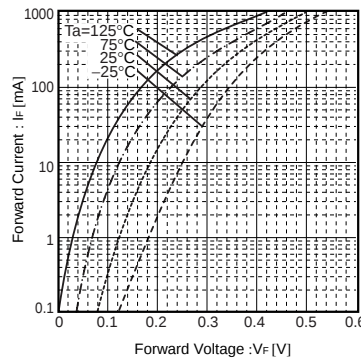


Fig.11 Forward Temperature Characteristics

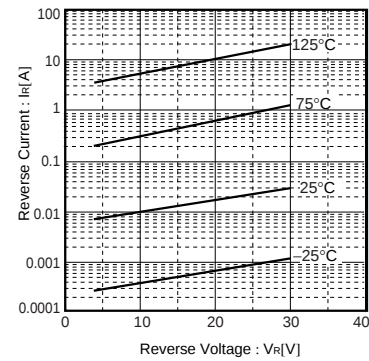


Fig.12 Reverse Temperature Characteristics

Measurement circuits

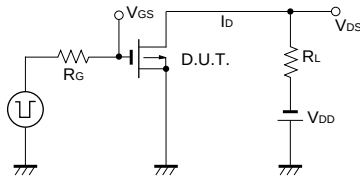


Fig.13 Switching Time Measurement Circuit

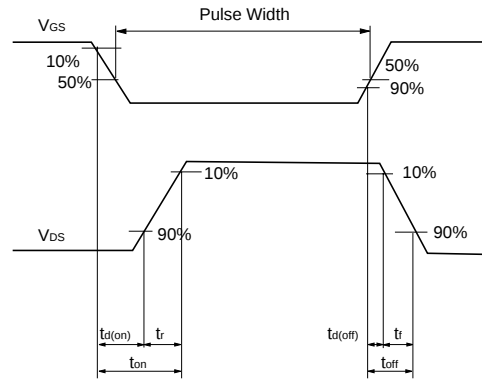


Fig.14 Switching Waveforms

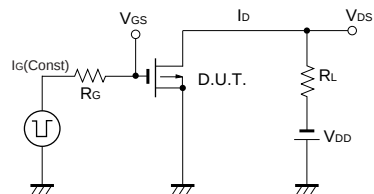


Fig.15 Gate Charge Measurement Circuit

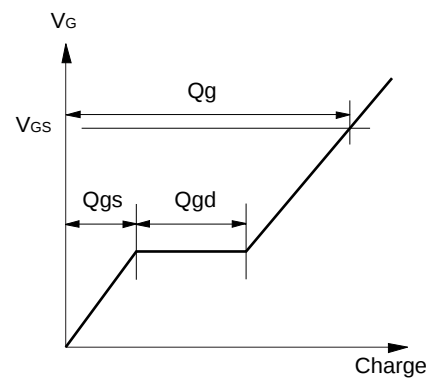


Fig.16 Gate Charge Waveforms

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