

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.

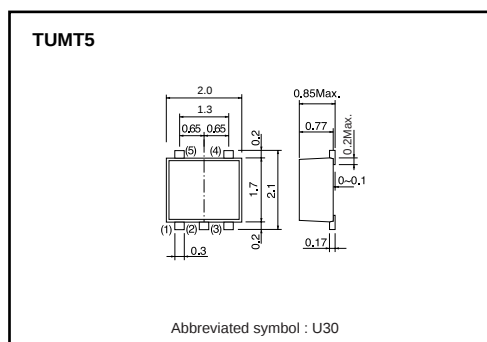
●Applications

Load switch, DC/DC conversion

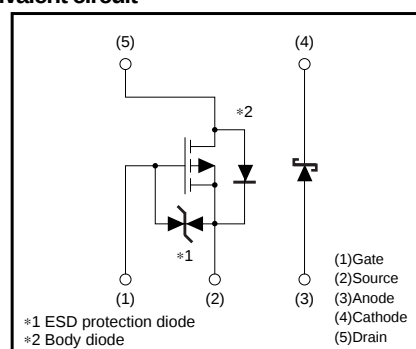
●Packaging specifications

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_{DS}	-20	V
Gate-source voltage	V_{GS}	± 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	m Ω	$I_D = -1A$, $V_{GS} = -4.5V$
		-	310	430	m Ω	$I_D = -1A$, $V_{GS} = -4V$
		-	570	800	m Ω	$I_D = -0.5A$, $V_{GS} = -2.5V$
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	$V_{DD} = -15V$
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	$V_{DD} = -15V$ $V_{GS} = -4.5V$
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

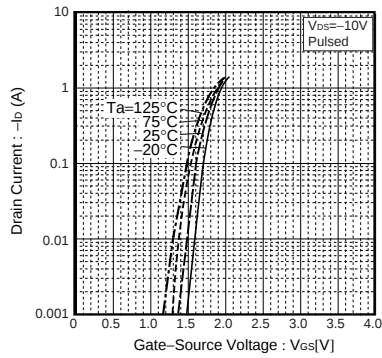


Fig.1 Typical Transfer Characteristics

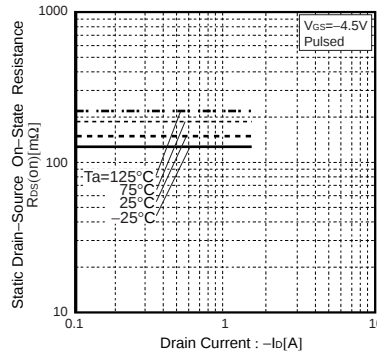


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

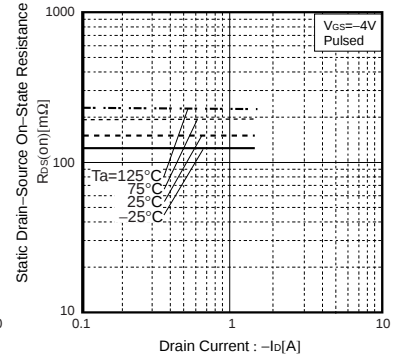


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

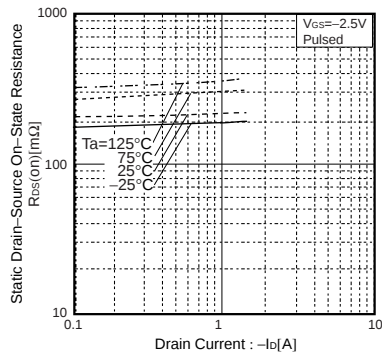


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

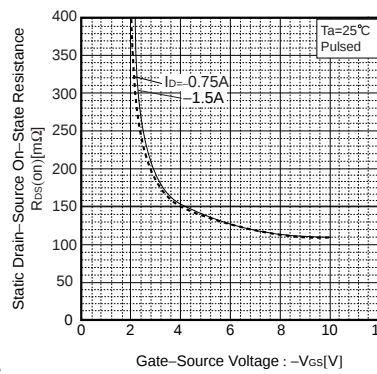


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

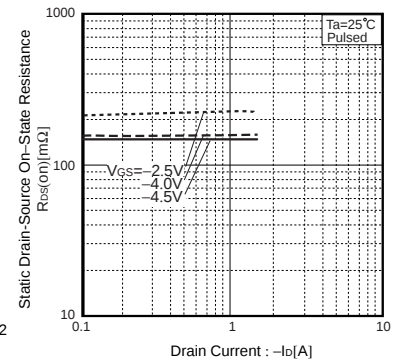


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

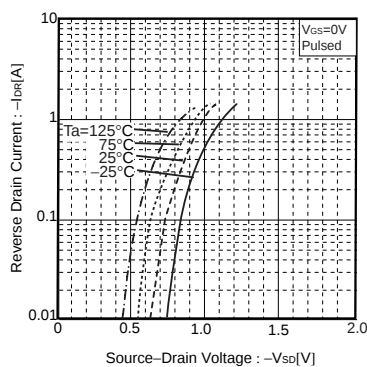


Fig.7 Reverse Drain Current vs. Source-Drain Current

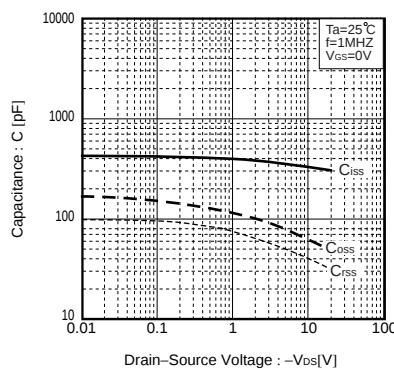


Fig.8 Typical Capacitance vs. Drain-Source Voltage

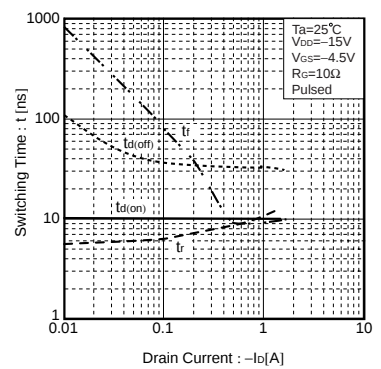


Fig.9 Switching Characteristics

Transistor

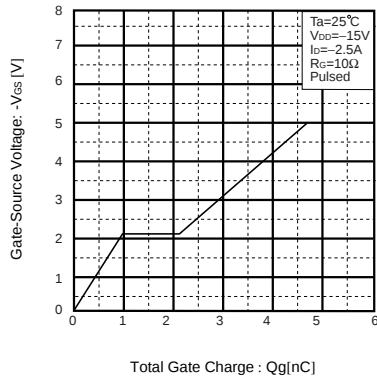


Fig.10 Dynamic Input Characteristics

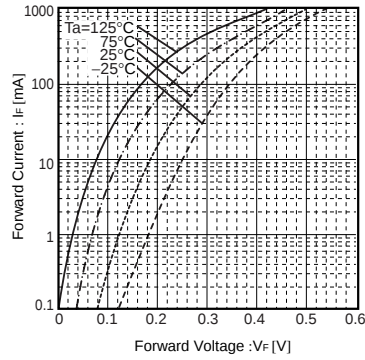


Fig.11 Forward Temperature Characteristics

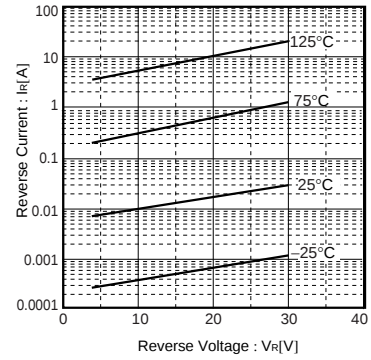


Fig.12 Reverse Temperature Characteristics

●Measurement circuits

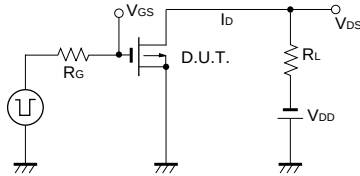


Fig.13 Switching Time Measurement Circuit

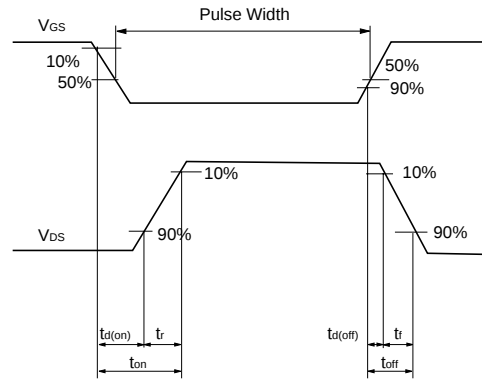


Fig.14 Switching Waveforms

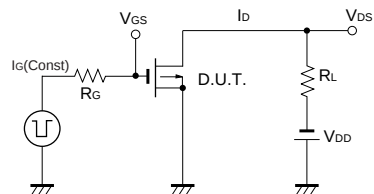


Fig.15 Gate Charge Measurement Circuit

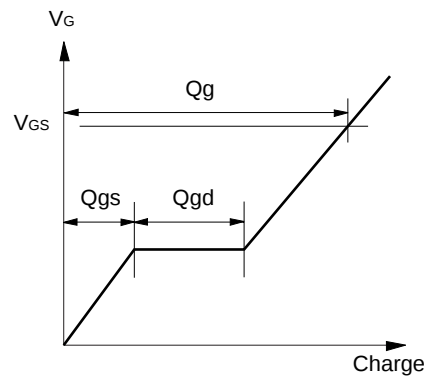


Fig.16 Gate Charge Waveforms

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