

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.

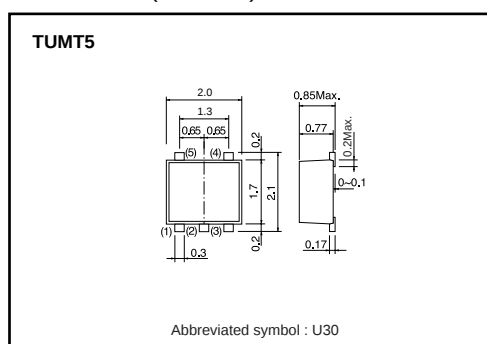
●Applications

Load switch, DC/DC conversion

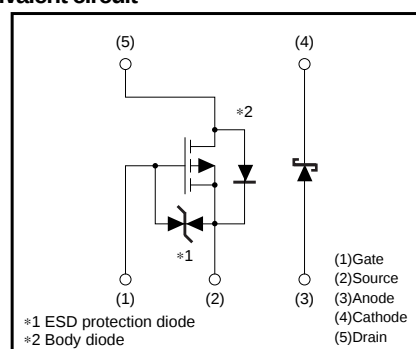
●Packaging specifications

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
	Pulsed	I _{DP} *1	±4
Source current (Body diode)	Continuous	I _S	−0.4
	Pulsed	I _{SP} *1	−4
Channel temperature	T _{ch}	150	°C
Power dissipation	P _D *3	0.7	W / ELEMENT

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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 Pw≤10μs, Duty cycles≤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} =±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} =−15V
Turn-off delay time	t _{d(off)} *	−	25	−	ns	V _{GS} =−4.5V
Fall time	t _f *	−	10	−	ns	R _L =30Ω
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 =15Ω R _G =10Ω

* 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

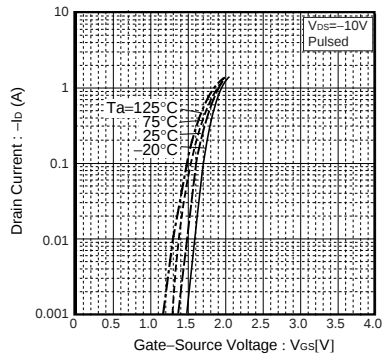


Fig.1 Typical Transfer Characteristics

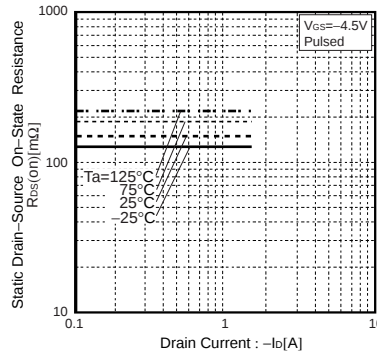


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

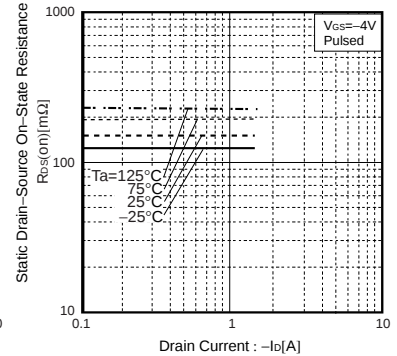


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

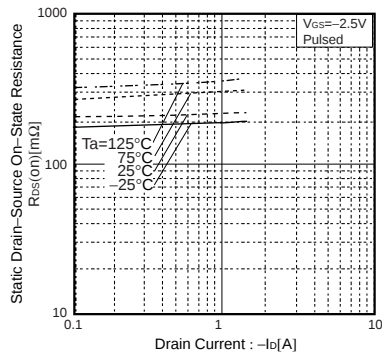


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

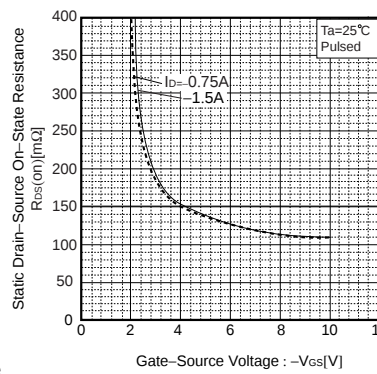


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

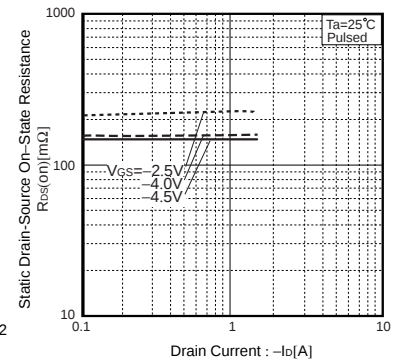


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

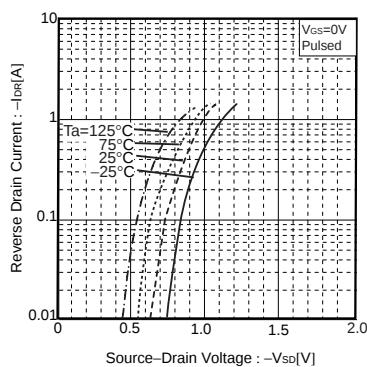


Fig.7 Reverse Drain Current vs. Source-Drain Current

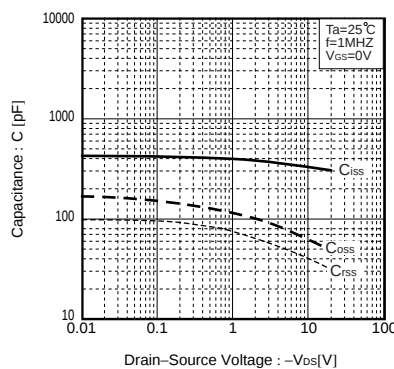


Fig.8 Typical Capacitance vs. Drain-Source Voltage

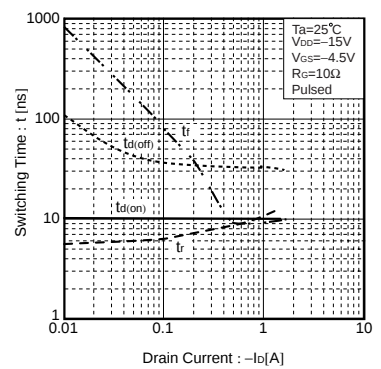


Fig.9 Switching Characteristics

Transistor

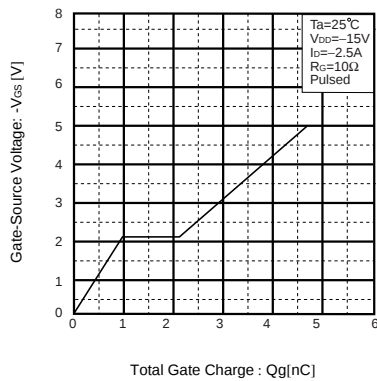


Fig.10 Dynamic Input Characteristics

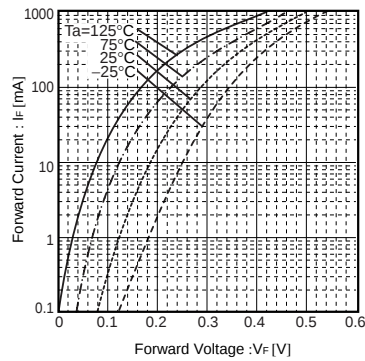


Fig.11 Forward Temperature Characteristics

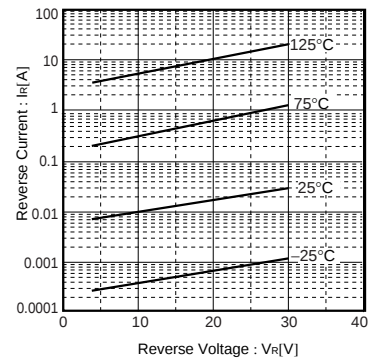


Fig.12 Reverse Temperature Characteristics

●Measurement circuits

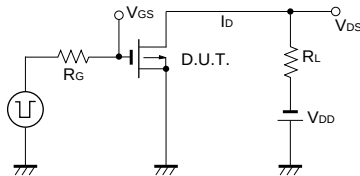


Fig.13 Switching Time Measurement Circuit

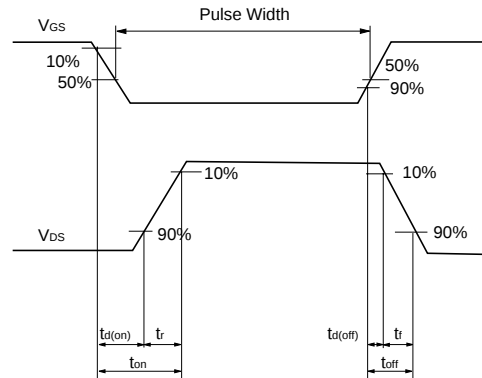


Fig.14 Switching Waveforms

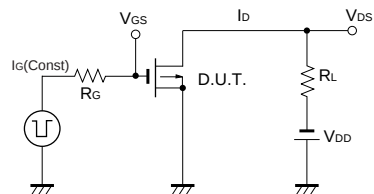


Fig.15 Gate Charge Measurement Circuit

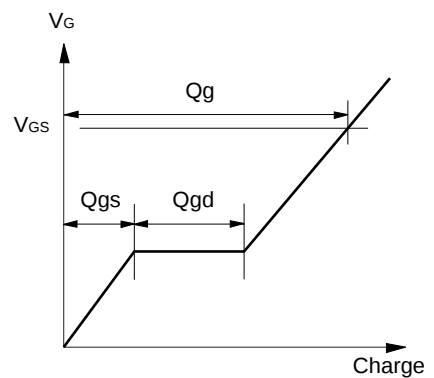


Fig.16 Gate Charge Waveforms

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