

4V Drive Pch+SBD MOSFET

US5U35

●Structure

Silicon P-channel MOSFET
Schottky Barrier DIODE

●Features

- 1) The US5U35 combines Pch MOSFET with a Schottky barrier diode in a TUMT5 package.
- 2) With fast switching.
- 3) Built-in schottky barrier diode has low forward voltage.

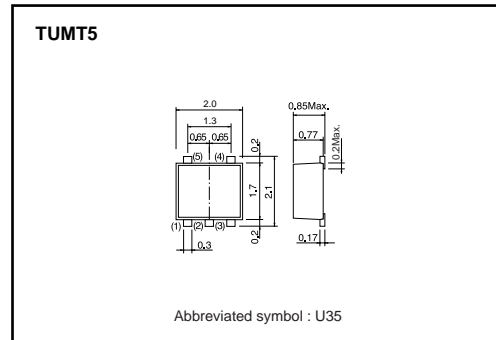
●Applications

Switching

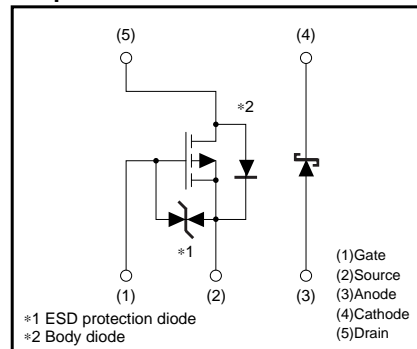
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
US5U35		○

●Dimensions (Unit : mm)



●Equivalent circuit



Transistor

●Absolute maximum ratings (Ta=25°C)

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Parameter	Symbol	Limits	Unit
Drain-source voltage	V _{DSS}	-45	V
Gate-source voltage	V _{GSS}	±20	V
Drain current	Continuous	I _D	±0.7
	Pulsed	I _{DP} *1	±2.8
Source current (Body diode)	Continuous	I _S	-0.4
	Pulsed	I _{SP} *1	-2.8
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}	45	V
Reverse voltage	V _R	40	V
Forward current	I _F	100	mA
Forward current surge peak	I _{FSM} *2	1.0	A
Junction temperature	T _j	150	°C
Power dissipation	P _D *3	0.5	W / ELEMENT

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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} =±20V, V _{DS} =0V
Drain-source breakdown voltage	V _{(BR) DSS}	-45	-	-	V	I _D =-1mA, V _{GS} =0V
Zero gate voltage drain current	I _{DSS}	-	-	-1	μA	V _{DS} =-45V, V _{GS} =0V
Gate threshold voltage	V _{GS(th)}	-1.0	-	-2.5	V	V _{DS} =-10V, I _D =-1mA
Static drain-source on-state resistance	R _{DS(on)} *	-	0.6	0.8	Ω	I _D =-0.7A, V _{GS} =-10V
		-	0.9	1.3	Ω	I _D =-0.7A, V _{GS} =-4.5V
		-	1.0	1.4	Ω	I _D =-0.35A, V _{GS} =-4.0V
Forward transfer admittance	Y _{fs} *	0.6	-	-	S	V _{DS} =-10V, I _D =-0.7A
Input capacitance	C _{iss}	-	120	-	pF	V _{DS} =-10V
Output capacitance	C _{oss}	-	14	-	pF	V _{GS} =0V
Reverse transfer capacitance	C _{rss}	-	11	-	pF	f=1MHz
Turn-on delay time	t _{d(on)} *	-	6	-	ns	I _D =-0.35A
Rise time	t _r *	-	5	-	ns	V _{DD} ≐-25V V _{GS} =-10V
Turn-off delay time	t _{d(off)} *	-	17	-	ns	R _L ≐71Ω
Fall time	t _f *	-	6	-	ns	R _G =10Ω
Total gate charge	Q _g	-	1.7	-	nC	V _{DD} ≐-25V, V _{GS} =-5V
Gate-source charge	Q _{gs}	-	0.8	-	nC	I _D =-0.7A
Gate-drain charge	Q _{gd}	-	0.5	-	nC	R _L ≐36Ω, R _G =10Ω

* Pulsed

<Body diode (source-drain)>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V _{SD} *	-	-	-1.2	V	I _S =-0.7A, V _{GS} =0V

* Pulsed

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Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V _F	-	-	0.55	V	I _F =100mA
Reverse current	I _R	-	-	30	μA	V _R =10V

Transistor

●Electrical characteristic curves

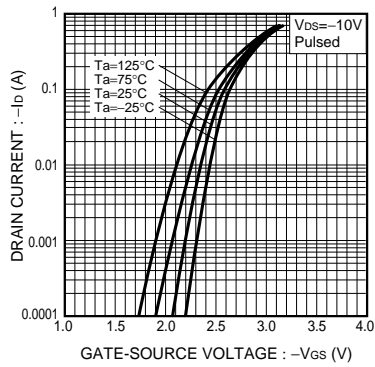


Fig.1 Typical Transfer Characteristics

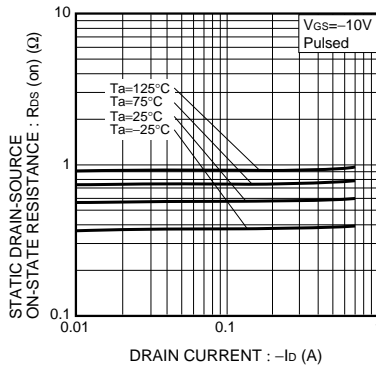


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current(I)

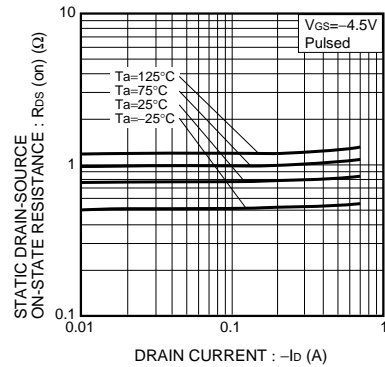


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current(II)

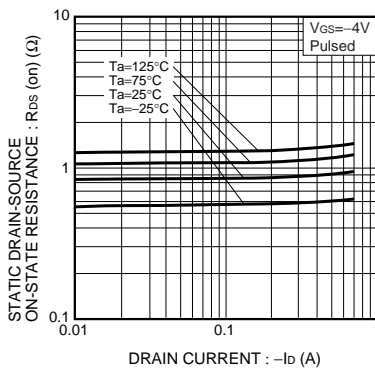


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(III)

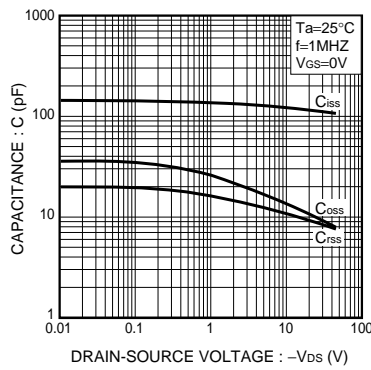


Fig.5 Typical Capacitance vs. Drain-Source Voltage

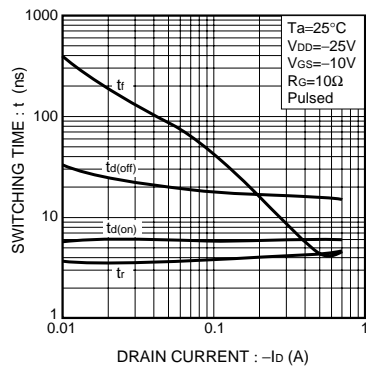


Fig.6 Switching Characteristics

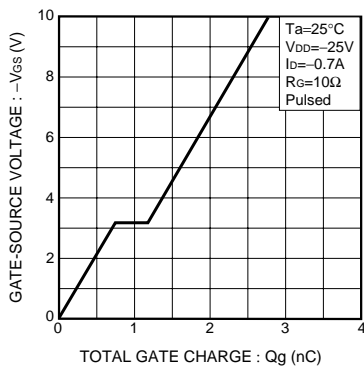


Fig.7 Dynamic Input Characteristics

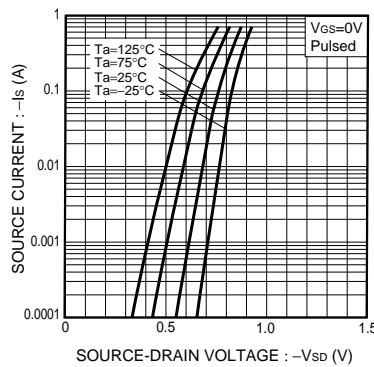


Fig.8 Source Current vs. Source-Drain Voltage

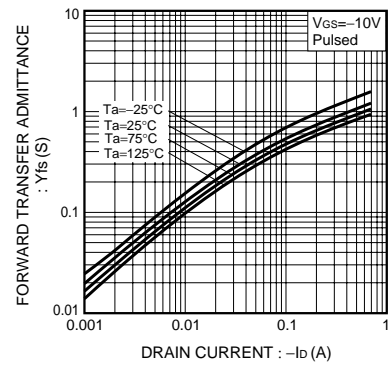


Fig.9 Forward Transfer Admittance vs. Drain Current

Transistor

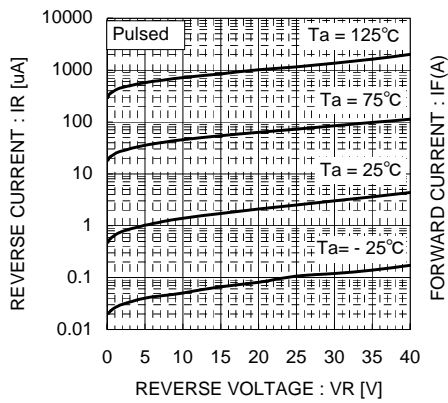


Fig.10 Reverse Current vs. Reverse Voltage

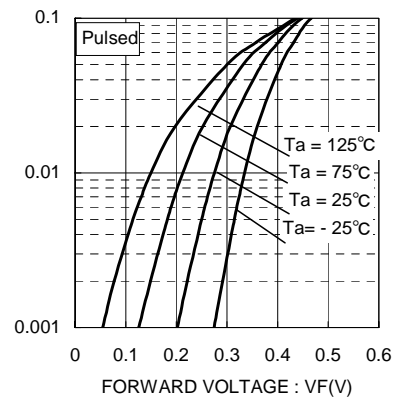


Fig.11 Forward Current vs. Forward Voltage

●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.

Transistor

● Measurement circuits

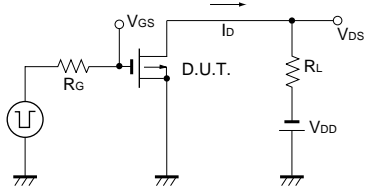


Fig.12 Switching Time Measurement Circuit

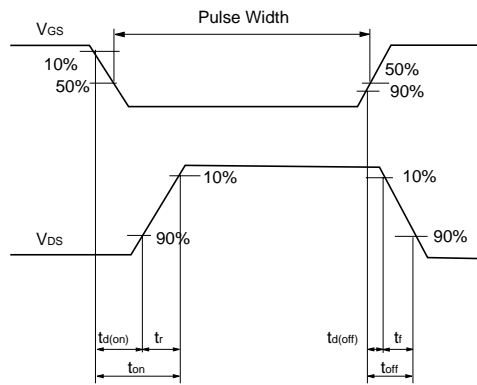


Fig.13 Switching Waveforms

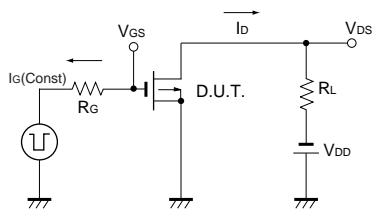


Fig.14 Gate Charge Measurement Circuit

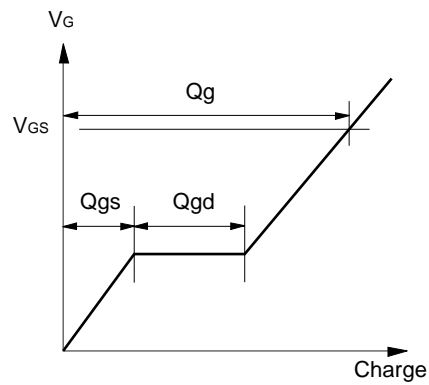


Fig.15 Gate Charge Waveforms

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