

Small switching (−20V, −1.5A)

US5U30

●Features

- 1) The US5U30 combines Pch MOSFET with a Schottky barrier diode in a single TSMT5 package.
- 2) Pch MOSFET have a low on-state resistance with a fast switching.
- 3) Pch MOSFET is reacted a low voltage drive(2.5V)
- 4) The Independently connected Schottky barrier diode have a low forward voltate.

●Applications

Load switch, DC/DC conversion

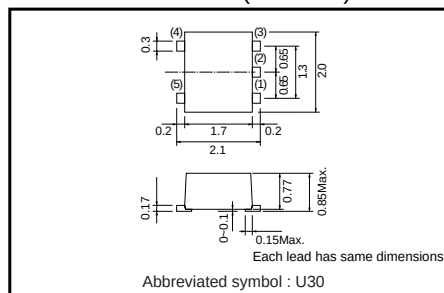
●Structure

Silicon P-channel MOSFET
Schottky Barrier DIODE

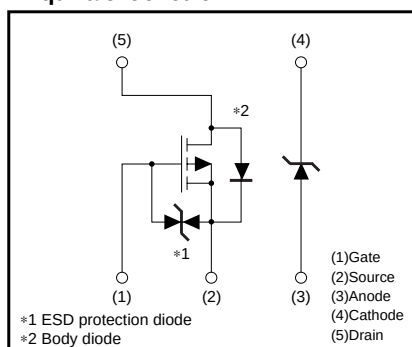
●Packaging specifications

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

●External dimensions (Unit : mm)



●Equivalent circuit



●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}	±4 A
Source current (Body diode)	Continuous	I_S	−0.4 A
	Pulsed	I_{SP}	−4 A
Channel temperature	T_{ch}	150	°C

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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}	2	A
Junction temperature	T_j	150	°C

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Total power dissipation	P_D	1.0	W/TOTAL/MOUNTED ON A CERAMIC BOARD
Range of storage temperature	T_{stg}	−55 to 150	°C

Transistor

●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
Gate-source charge	Q _{gs}	—	0.5	—	nC	V _{GS} =−4.5V
Gate-drain charge	Q _{gd}	—	0.5	—	nC	I _D =−1A
						R _L =15Ω
						R _G =10Ω

* Pulsed

<MOSFET>

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 drop	V _F	—	—	0.36	V	I _F =0.1A
		—	—	0.47	V	I _F =0.5A
Reverse leakage	I _R	—	—	100	μA	V _R =20V

Transistor

●Electrical characteristic curves

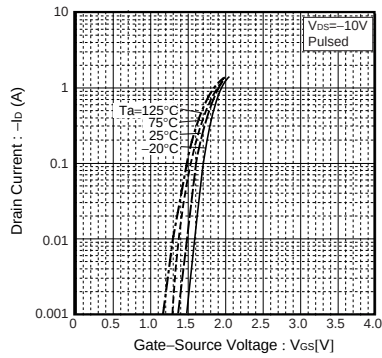


Fig.1 Typical Transfer Characteristics

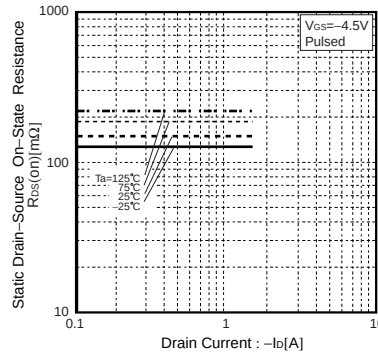


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

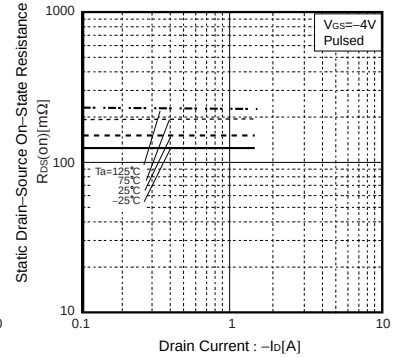


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

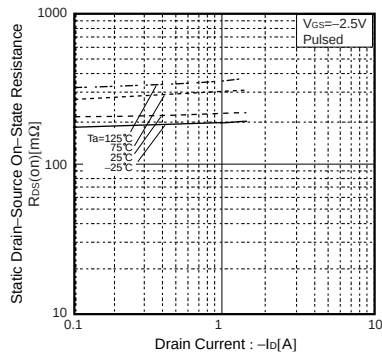


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

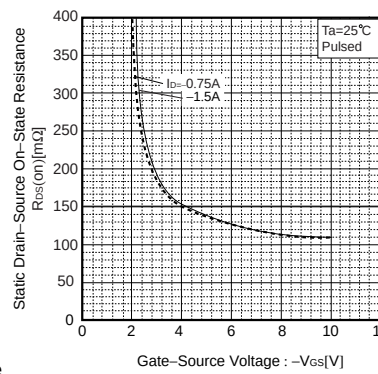


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

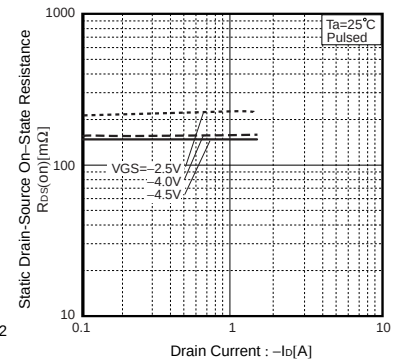


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

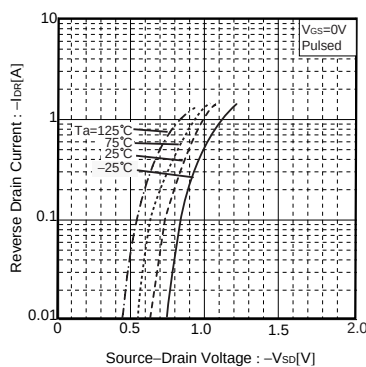


Fig.7 Reverse Drain Current vs. Source-Drain Current

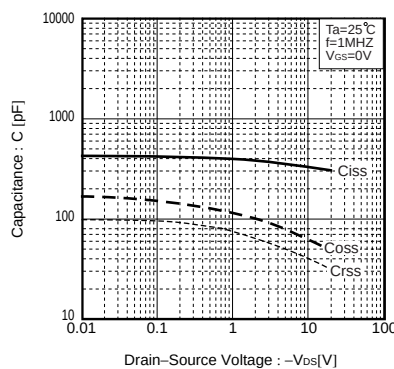


Fig.8 Typical Capacitance vs. Drain-Source Voltage

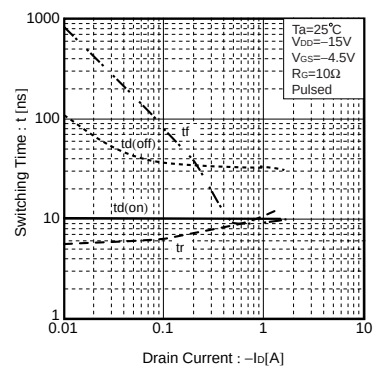


Fig.9 Switching Characteristics

Transistor

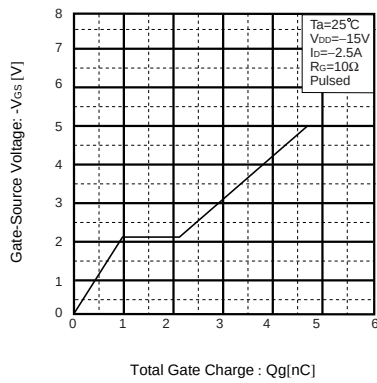


Fig.10 Dynamic Input Characteristics

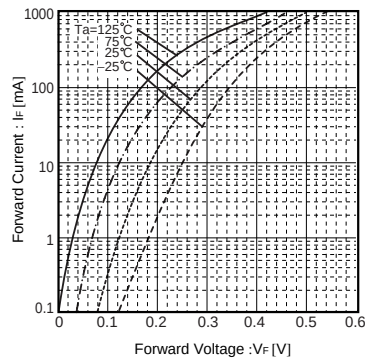


Fig.11 Forward Temperature Characteristics

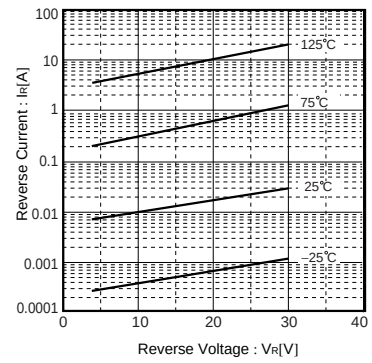


Fig.12 Reverse Temperature Characteristics

●Measurement circuits

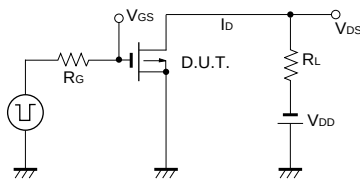


Fig.13 Switching Time Measurement Circuit

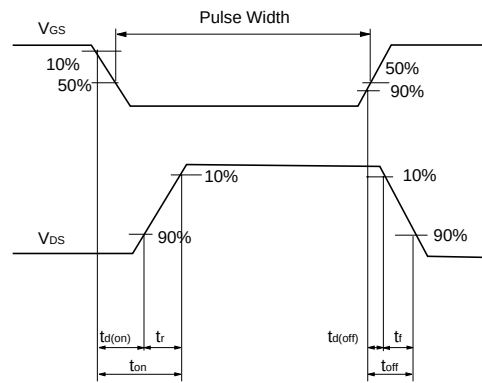


Fig.14 Switching Waveforms

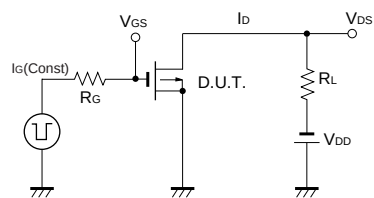


Fig.15 Gate Charge Measurement Circuit

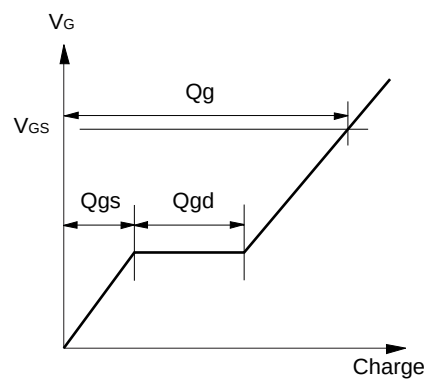


Fig.16 Gate Charge Waveforms

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