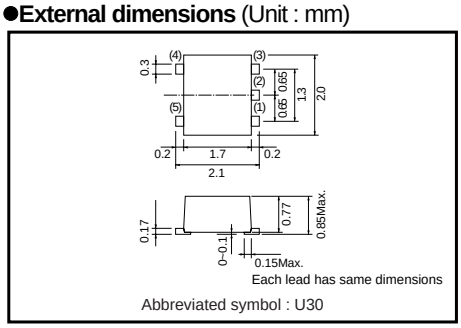
Small switching (–20V, –1.5A)

US5U30

●Features

1) The US5U30 conbines 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.

●External dimensions (Unit : mm)



Abbreviated symbol : U30

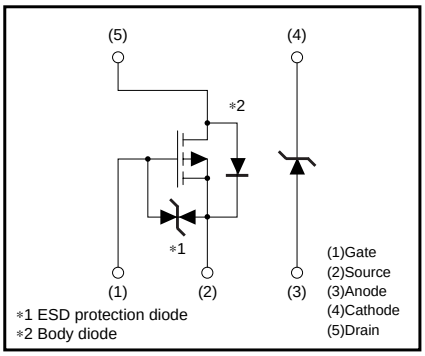
●Applications

Load switch, DC/DC conversion

●Structure

Silicon P-channel MOSFET
Schottky Barrier DIODE

●Equivalent circuit



∗1 ESD protection diode
∗2 Body diode

●Packaging specifications

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

●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}	±4	A	PW≤10μs DUTY CYCLE≤1%
Source current (Body diode)	Continuous	I_S	−0.4	A	
	Pulsed	I_{SP}	−4	A	PW≤10μs DUTY CYCLE≤1%
Channel temperature		Tch	150	℃	

< Di >

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 60HZ / 1CYC.
Junction temperature	Tj	150	℃

< MOSFET AND Di >

Total power dissipation	P_D	1.0	W/TOTAL/MOUNTED ON A CERAMIC BOARD
Range of storage temperature	Tstg	−55 to 150	℃

●**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 V_{DD}≒–15V V_{GS}=–4.5V R_L=30Ω R_G=10Ω
Rise time	t_r *	–	8	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	25	–	ns	
Fall time	t_f *	–	10	–	ns	
Total gate charge	Q_g	–	2.1	–	nC	V_{DD}≒–15V V_{GS}=–4.5V I_D=–1A R_L=15Ω R_G=10Ω
Gate-source charge	Q_{gs}	–	0.5	–	nC	
Gate-drain charge	Q_{gd}	–	0.5	–	nC	

* 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

●Electrical characteristic curves

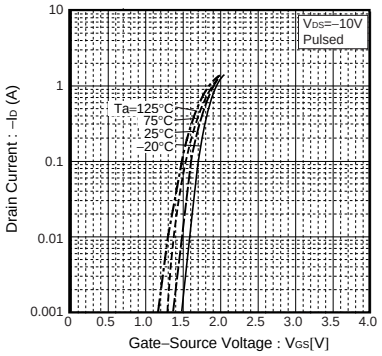


Fig.1 Typical Transfer Characteristics

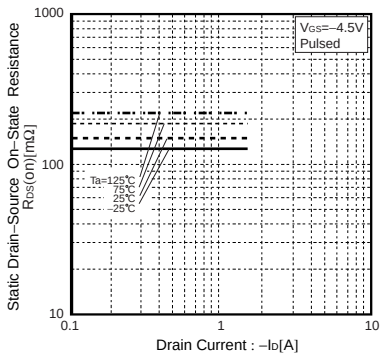


Fig.2 Static Drain–Source On–State Resistance vs.Drain Current

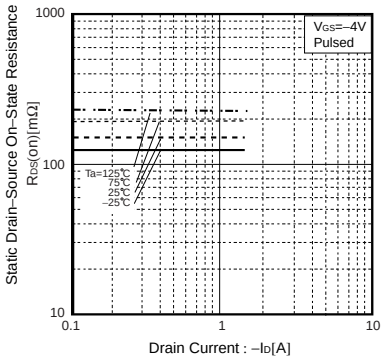


Fig.3 Static Drain–Source On–State Resistance vs.Drain Current

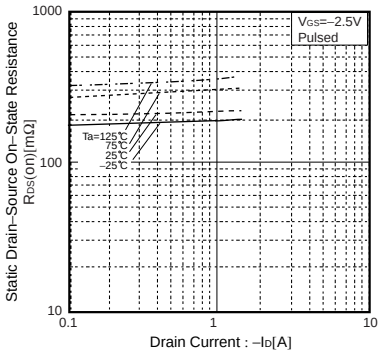


Fig.4 Static Drain–Source On–State Resistance vs.Drain–Current

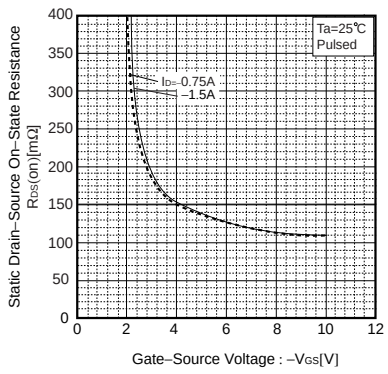


Fig.5 Static Drain–Source On–State Resistance vs.Gate–Source Voltage

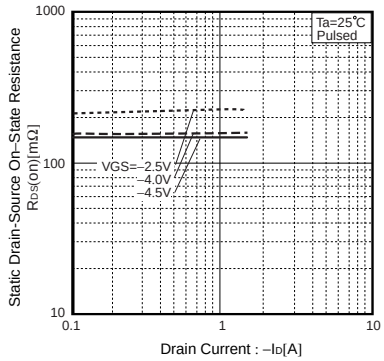


Fig.6 Static Drain–Source On–State Resistance vs.Drain Current

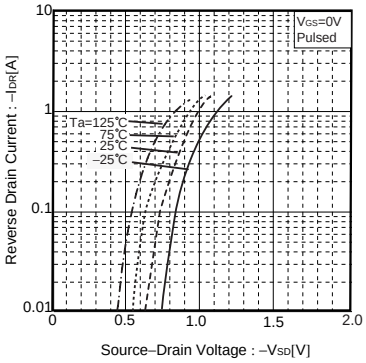


Fig.7 Reverse Drain Current vs. Source-Drain Current

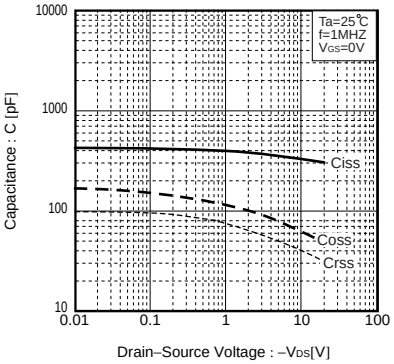


Fig.8 Typical Capactitance vs.Drain–Source Voltage

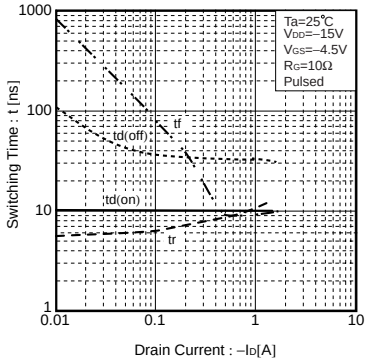


Fig.9 Switching Characteristics

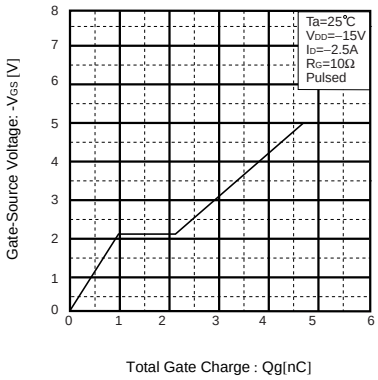


Fig.10 Dynamic Input Characteristics

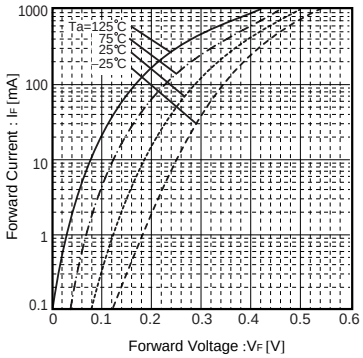


Fig.11 Forward Temperature Characteristics

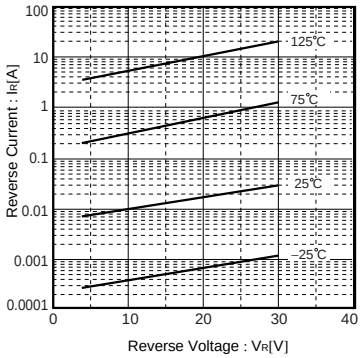


Fig.12 Reverse Temperature Characteristics

●Measurement circuits

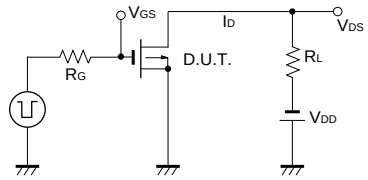


Fig.13 Switching Time Measurement Circuit

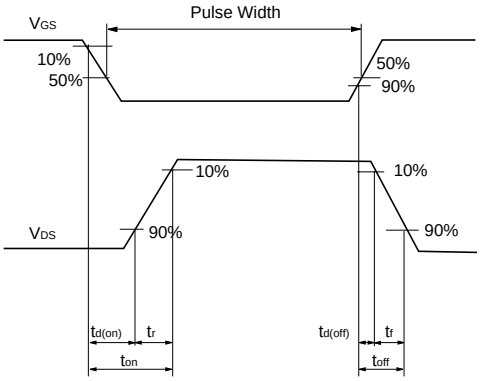


Fig.14 Switching Waveforms

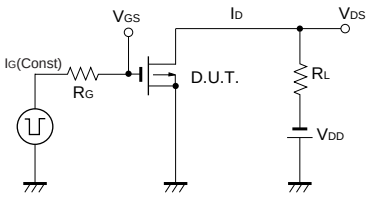


Fig.15 Gate Charge Measurement Circuit

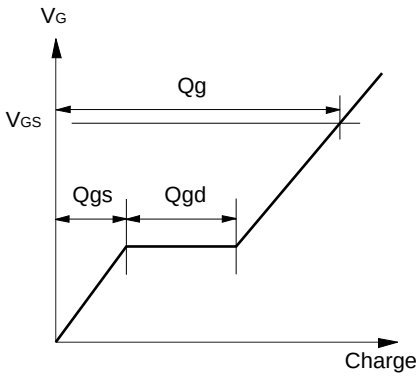


Fig.16 Gate Charge Waveforms