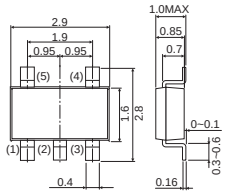
2.5V Drive Pch+SBD MOS FET

QS5U28

●Structure
Silicon P-channel MOS FET
Schottky Barrier DIODE

●External dimensions (Unit : mm)

TSMT5



Each lead has same dimensions

Abbreviated symbol : U28

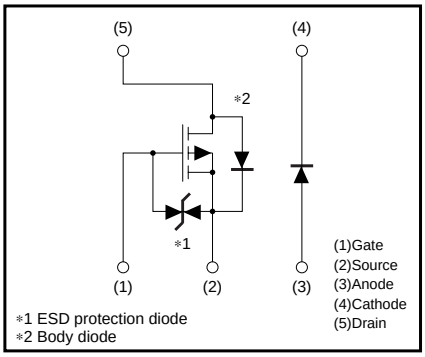
●Features
1) The QS5U28 combines Pch MOS FET with a Schottky barrier diode in TSMT5 package.
2) Low on-state resistance with fast switching.
3) Low voltage drive (2.5V).
4) Built-in schottky barrier diode has low forward voltage.

●Applications
Load switch, DC/DC conversion

●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS5U28		○

●Equivalent circuit



∗1 ESD protection diode
∗2 Body diode

∗ A protection diode has been buitt in between the gate and the source to protect against static electricity when the product is in use. Use the protection circuit when rated voltages are exceeded.

●Absolute maximum ratings (Ta=25°C)

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Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DSS}	−20	V
Gate-source voltage		V_{GSS}	±12	V
Drain current	Continuous	I_D	±2.0	A
	Pulsed	I_{DP} *1	±8.0	A
Source current (Body diode)	Continuous	I_S	−1.0	A
	Pulsed	I_{SP} *1	−8.0	A
Channel temperature		Tch	150	°C
Power dispation		P_D *3	0.9	W/ELEMENT

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Parameter	Symbol	Limits	Unit
Repetitive peak reverse voltage	V_{RM}	25	V
Reverse voltage	V_R	20	V
Forward current	I_F	1.0	A
Forward current surge peak	I_{FSM} *2	3.0	A
Junction temperature	Tj	150	°C
Power dispation	P_D *3	0.7	W/ELEMENT

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Parameter	Symbol	Limits	Unit
Total power dispation	P_D *3	1.25	W/ TOTAL
Range of strage temperature	Tstg	−55 to +150	°C

*1 Pw≤10μs, Duty cycle≤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-starte resistance	$R_{DS\ (on)}$ *	–	90	125	mΩ	I_D= −2A, V_{GS}= −4.5V
		–	97	135	mΩ	I_D= −2A, V_{GS}= −4.0V
		–	175	245	mΩ	I_D= −1A, V_{GS}= −2.5V
Forward transfer admittance	$\|Y_{fs}\|$ *	1.6	–	–	S	V_{DS}= −10V, I_D= −1A
Input capacitance	C_{iss}	–	450	–	pF	V_{DS}= −10V
Output capacitance	C_{oss}	–	70	–	pF	V_{GS}= 0V
Reverse transfer capacitance	C_{rss}	–	52	–	pF	f=1MHz
Turn-on delay time	$t_{d\ (on)}$ *	–	10	–	ns	V_{DD}≒ −15V V_{GS}= −4.5V I_D= −1A R_L= 15Ω R_G= 10Ω
Rise time	t_r *	–	16	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	32	–	ns	
Fall time	t_f *	–	15	–	ns	
Total gate charge	Q_g *	–	4.8	–	nC	V_{DD}≒ −15V V_{GS}= −4.5V I_D= −2A R_L= 7.5Ω R_G= 10Ω
Gate-source charge	Q_{gs} *	–	1.0	–	nC	
Gate-drain charge	Q_{gd} *	–	1.3	–	nC	

* Pulsed

<MOSFET> Body diode (Source-drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}	–	–	−1.2	V	I_S= −1.0V , V_{GS}= 0V

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Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_F	–	–	0.45	V	I_F= −1.0V
Reverse current	I_R	–	–	200	μA	V_R= 20V

●**Electrical characteristic curves**

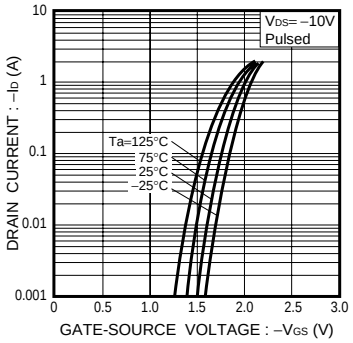

Fig.1 Typical Transfer Characteristics

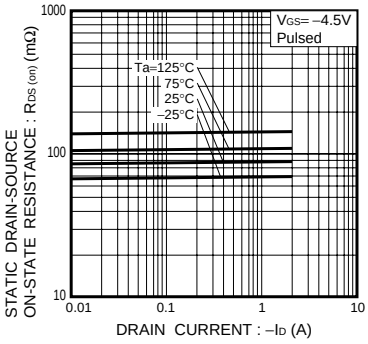

Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (I)

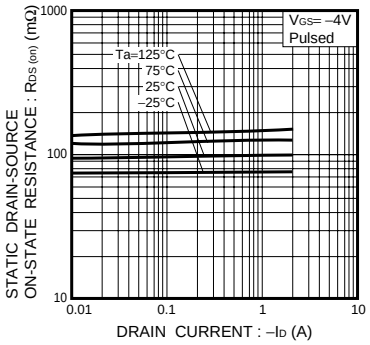

Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (II)

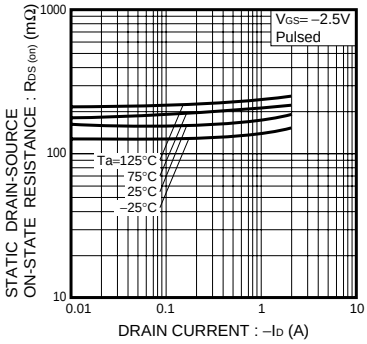

Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (III)

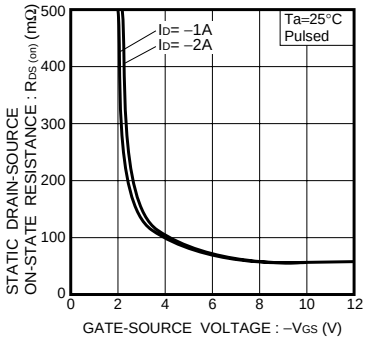

Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

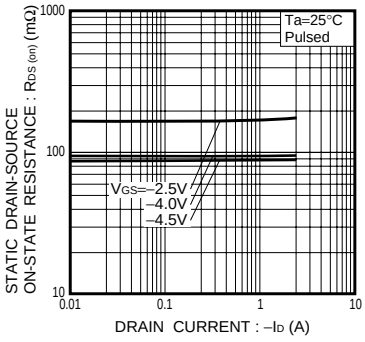

Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

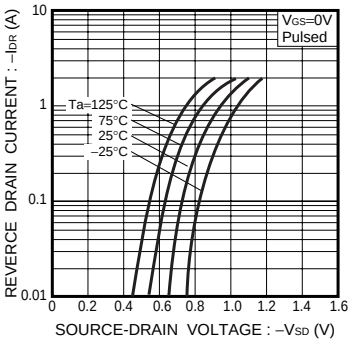

Fig.7 Reverse Drain Current vs. Source-Drain Voltage

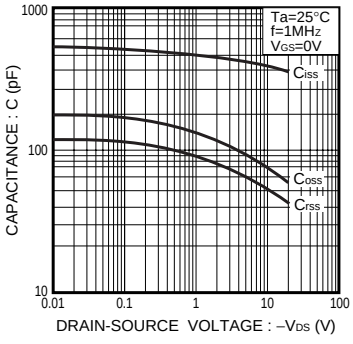

Fig.8 Typical Capacitance vs. Drain-Source Voltage

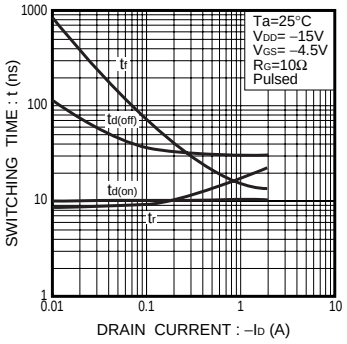

Fig.9 Switching Characteristics

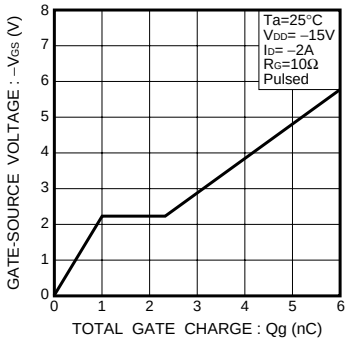

Fig.10 Dynamic Input Characteristics

●Measurement circuits

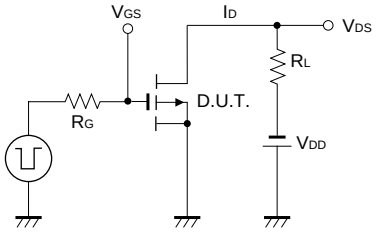

Fig.11 Switching Time Measurement Circuit

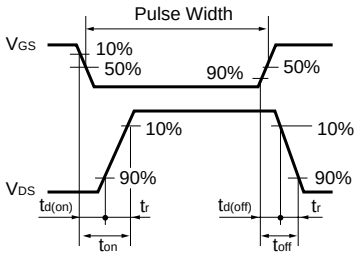

Fig.12 Switching Waveforms

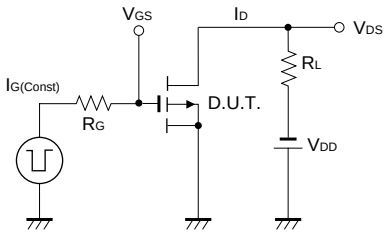

Fig.13 Gate Charge Measurement Circuit

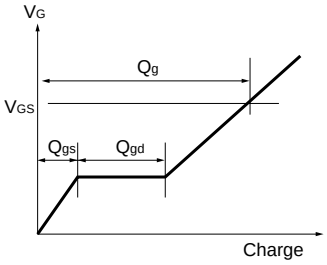

Fig.14 Gate Charge Waveforms

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