

2.5V Drive Pch+SBD MOS FET

QS5U28

●Structure

Silicon P-channel MOS FET
Schottky Barrier DIODE

●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.

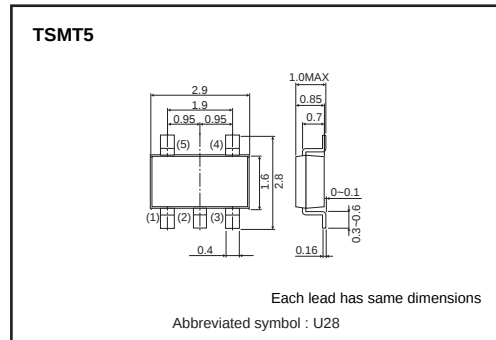
●Applications

Load switch, DC/DC conversion

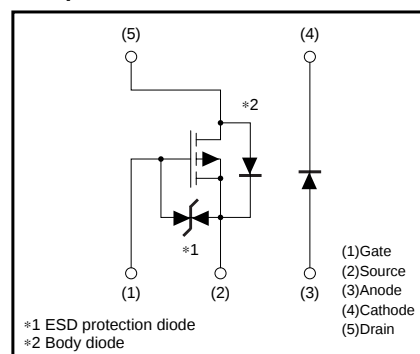
●Packaging specifications

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

●External dimensions (Unit : mm)



●Equivalent circuit



* A protection diode has been built 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.

Transistor

●Absolute maximum ratings (Ta=25°C)

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Parameter	Symbol	Limits	Unit
Drain-source voltage	V_{DS}	-20	V
Gate-source voltage	V_{GS}	±12	V
Drain current	Continuous	I_D	±2.0
	Pulsed	I_{DP}^{*1}	±8.0
Source current (Body diode)	Continuous	I_S	-1.0
	Pulsed	I_{SP}^{*1}	-8.0
Channel temperature	T_{ch}	150	°C
Power dissipation	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	T_J	150	°C
Power dissipation	P_D^{*3}	0.7	W/ELEMENT

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Parameter	Symbol	Limits	Unit
Total power dissipation	P_D^{*3}	1.25	W/TOTAL
Range of storage temperature	T_{stg}	-55 to +150	°C

*1 $P_w \leq 10 \mu s$, Duty cycle $\leq 1\%$ *2 60Hz - 1cyc. *3 Mounted on a ceramic board.

●Electrical characteristics (Ta=25°C)

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Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	-	-	±10	μA	$V_{GS} = \pm 12V$, $V_{DS} = 0V$
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	$R_{DS(on)}^{*}$	-	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	$V_{DD} \approx -15V$ $V_{GS} = -4.5V$
Rise time	t_r^{*}	-	16	-	ns	$I_D = -1A$
Turn-off delay time	$t_{d(off)}^{*}$	-	32	-	ns	$R_L = 15\Omega$
Fall time	t_f^{*}	-	15	-	ns	$R_G = 10\Omega$
Total gate charge	Q_g^{*}	-	4.8	-	nC	$V_{DD} \approx -15V$ $V_{GS} = -4.5V$
Gate-source charge	Q_{gs}^{*}	-	1.0	-	nC	$I_D = -2A$
Gate-drain charge	Q_{gd}^{*}	-	1.3	-	nC	$R_L = 7.5\Omega$ $R_G = 10\Omega$

* 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	$V_R = 20V$

Transistor

●Electrical characteristic curves

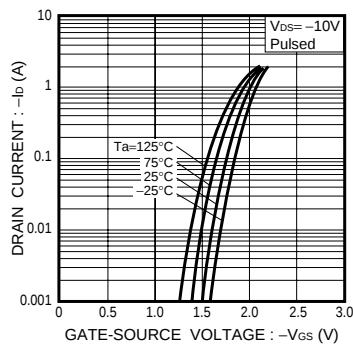


Fig.1 Typical Transfer Characteristics

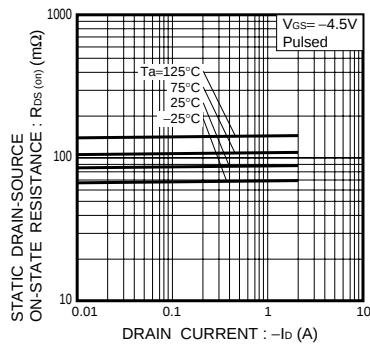


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (I)

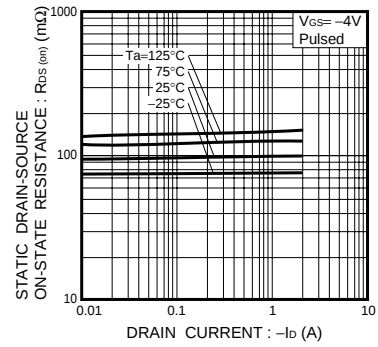


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (II)

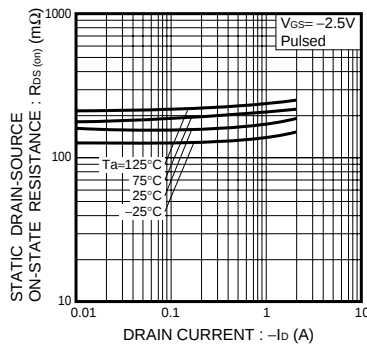


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (III)

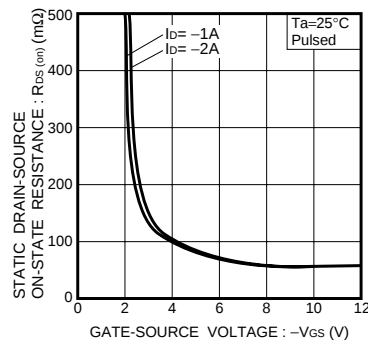


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

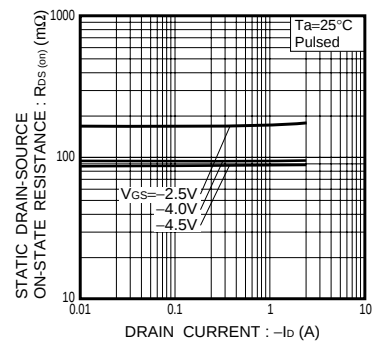


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

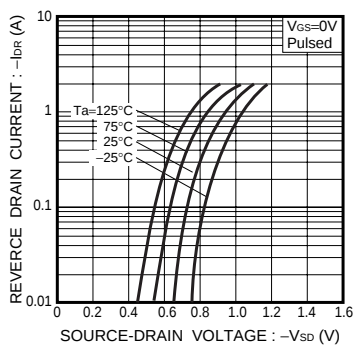


Fig.7 Reverse Drain Current vs. Source-Drain Voltage

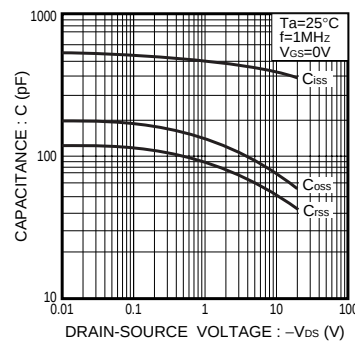


Fig.8 Typical Capacitance vs. Drain-Source Voltage

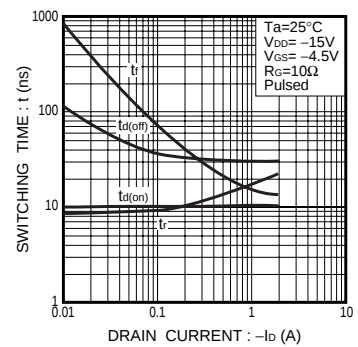


Fig.9 Switching Characteristics

Transistor

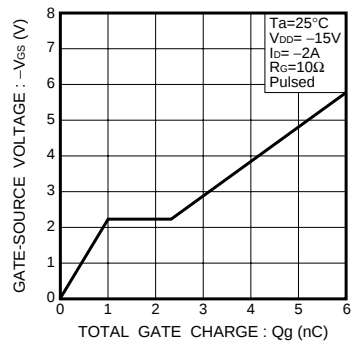


Fig.10 Dynamic Input Characteristics

●Measurement circuits

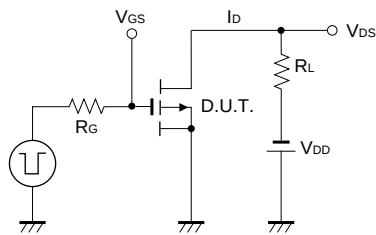


Fig.11 Switching Time Measurement Circuit

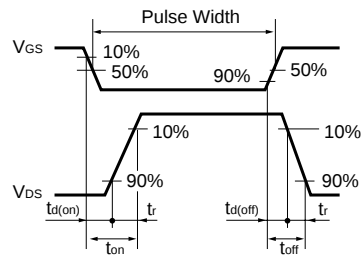


Fig.12 Switching Waveforms

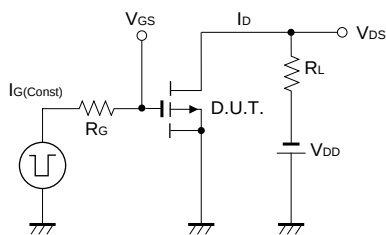


Fig.13 Gate Charge Measurement Circuit

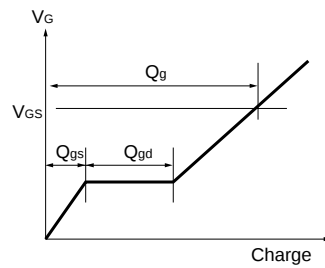


Fig.14 Gate Charge Waveforms

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