

# 1.8V Drive Nch+SBD MOSFET

## QS5U34

### ●Structure

Silicon N-channel MOSFET  
Schottky Barrier DIODE

### ●Features

- 1) The QS5U34 combines Nch MOSFET with a Schottky barrier diode in a single TSMT5 package.
- 2) Low on-state resistance with fast switching.
- 3) Low voltage drive (1.8V).
- 4) The Independently connected Schottky barrier diode has low forward voltage.

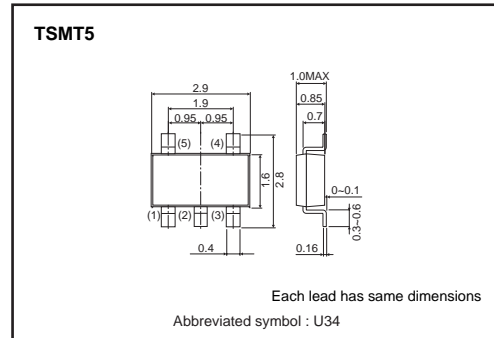
### ●Applications

Load switch, DC / DC conversion

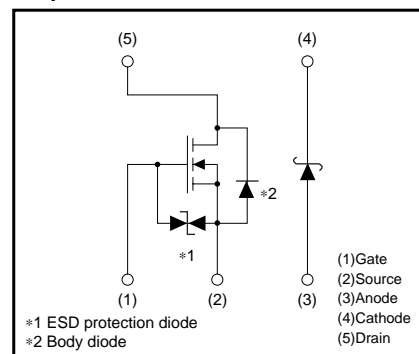
### ●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS5U34		○

### ●Dimensions (Unit : mm)



### ●Equivalent circuit



Transistors

●Absolute maximum ratings (Ta=25°C)

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Parameter	Symbol	Limits	Unit	
Drain-source voltage	V <sub>DSS</sub>	20	V	
Gate-source voltage	V <sub>GSS</sub>	10	V	
Drain current	Continuous	I <sub>D</sub>	±1.5	A
	Pulsed	I <sub>DP</sub> *1	±3.0	A
Source current (Body diode)	Continuous	I <sub>S</sub>	0.6	A
	Pulsed	I <sub>SP</sub> *1	2.4	A
Channel temperature	T <sub>ch</sub>	150	°C	
Power dissipation	P <sub>D</sub> *3	0.9	W/ELEMENT	

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Repetitive peak reverse voltage	V <sub>RM</sub>	30	V
Reverse voltage	V <sub>R</sub>	20	V
Forward current	I <sub>F</sub>	0.5	A
Forward current surge peak	I <sub>FSM</sub> *2	2.0	A
Junction temperature	T <sub>J</sub>	150	°C
Power dissipation	P <sub>D</sub> *3	0.7	W/ELEMENT

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Total power dissipation	P <sub>D</sub> *3	1.25	W / TOTAL
Range of Storage temperature	T <sub>stg</sub>	-55 to +150	°C

\*1 Pw≤10μs, Duty cycles≤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 <sub>GSS</sub>	-	-	10	μA	V <sub>GS</sub> =10V / V <sub>DS</sub> =0V
Drain-source breakdown voltage	V <sub>(BR) DSS</sub>	20	-	-	V	I <sub>D</sub> =1mA, / V <sub>GS</sub> =0V
Zero gate voltage drain current	I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =20V / V <sub>GS</sub> =0V
Gate threshold voltage	V <sub>GS(th)</sub>	0.3	-	1.3	V	V <sub>DS</sub> =10V / I <sub>D</sub> =1mA
Static drain-source on-state resistance	R <sub>DS(on)</sub> *	-	130	180	mΩ	I <sub>D</sub> =1.5A, V <sub>GS</sub> =4.5V
		-	170	240	mΩ	I <sub>D</sub> =1.5A, V <sub>GS</sub> =2.5V
		-	220	310	mΩ	I <sub>D</sub> =0.8A, V <sub>GS</sub> =1.8V
Forward transfer admittance	Y <sub>fs</sub>   *	1.6	-	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =1.5A
Input capacitance	C <sub>iss</sub>	-	110	-	pF	V <sub>DS</sub> =10V
Output capacitance	C <sub>oss</sub>	-	18	-	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>riss</sub>	-	15	-	pF	f=1MHz
Turn-on delay time	t <sub>d(on)</sub> *	-	5	-	ns	I <sub>D</sub> =1.0A
Rise time	t <sub>r</sub> *	-	5	-	ns	V <sub>DD</sub> ≐10V
Turn-off delay time	t <sub>d(off)</sub> *	-	20	-	ns	V <sub>GS</sub> =4.5V
Fall time	t <sub>f</sub> *	-	3	-	ns	R <sub>L</sub> =10Ω
Total gate charge	Q <sub>g</sub> *	-	1.8	2.5	nC	R <sub>G</sub> =10Ω
Gate-source charge	Q <sub>gs</sub> *	-	0.3	-	nC	V <sub>DD</sub> ≐10V
Gate-drain charge	Q <sub>gd</sub> *	-	0.3	-	nC	V <sub>GS</sub> =4.5V
						I <sub>D</sub> =1.5A

\*Pulsed

<MOSFET>Body diode (source-drain)

Forward voltage	V <sub>SD</sub>	-	-	1.2	V	I <sub>S</sub> =0.6A / V <sub>GS</sub> =0V
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Forward voltage	V <sub>F</sub>	-	-	0.36	V	I <sub>F</sub> =0.1A
		-	-	0.47	V	I <sub>F</sub> =0.5A
Reverse current	I <sub>R</sub>	-	-	100	μA	V <sub>R</sub> =20V

Transistors

●Electrical characteristic curves

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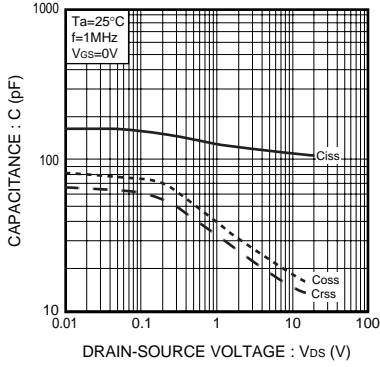


Fig.1 Typical Capacitance vs. Drain-Source Voltage

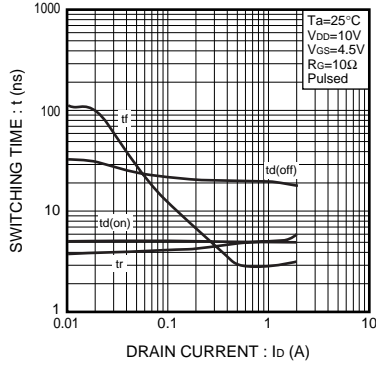


Fig.2 Switching Characteristics

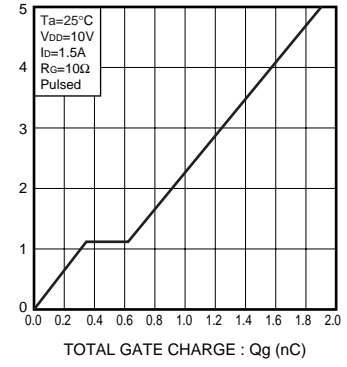


Fig.3 Dynamic Input Characteristics

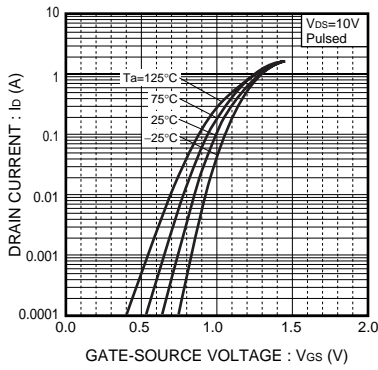


Fig.4 Typical Transfer Characteristics

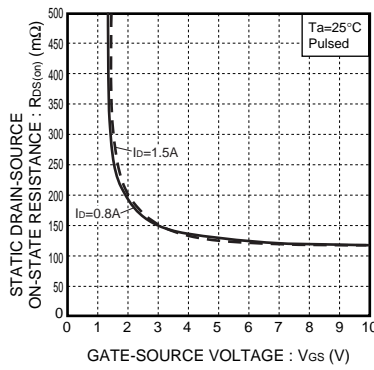


Fig.5 Static Drain-Source On-State Resistance vs. Gate-source Voltage

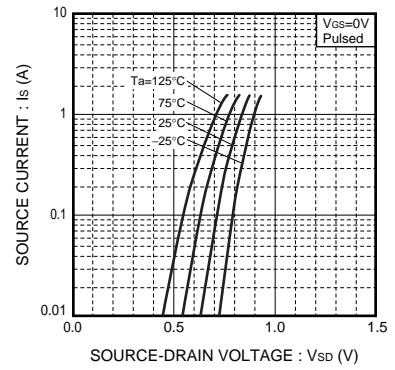


Fig.6 Source Current vs. Source-Drain Voltage

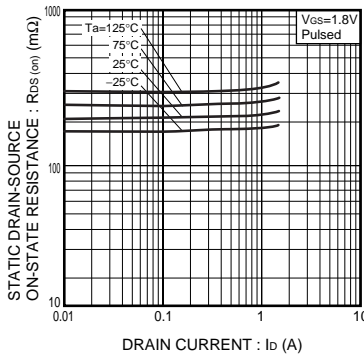


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current ( I )

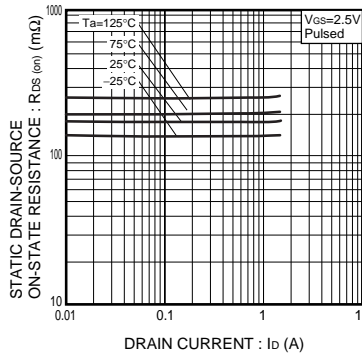


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current ( II )

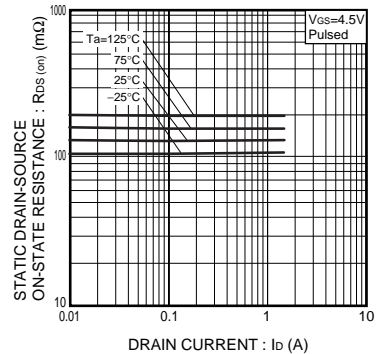


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current ( III )

Transistors

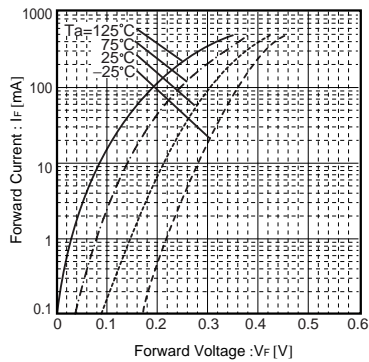


Fig.10 Forward Temperature Characteristics

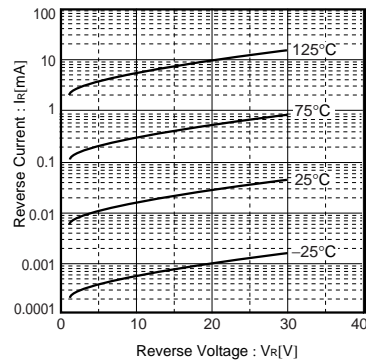


Fig.11 Reverse Temperature Characteristics

●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.

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