

Small switching (−20V, −1.5A)

QS6U22

●Features

- 1) The QS6U22 combines Pch MOSFET with a Schottky barrier diode in a single TSMT6 package.
- 2) Pch Treueh MOSFET have a low on-state resistance with a fast switching.
- 3) Nch Treueh MOSFET is reacted a low voltage drive (4V).
- 4) The Independently connected Schottky barrier diode have a low forward voltage.

●Applications

Load switch, DC / DC conversion

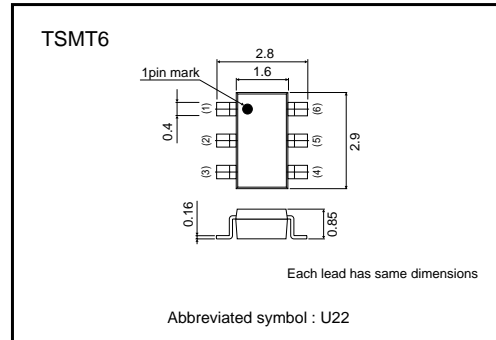
●Structure

Silicon P-channel MOSFET
Schottky Barrier DIODE

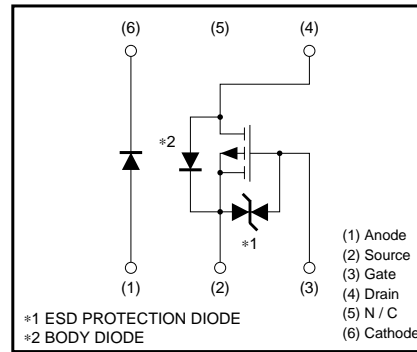
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS6U22		○

●External dimensions (Unit : mm)



●Equivalent circuit



*A protection diode has been 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)

〈MOSFET〉				
Parameter	Symbol	Limits	Unit	
Drain-source voltage	V _{DSS}	−20	V	
Gate-source voltage	V _{GSS}	±12	V	
Drain current	Continuous	I _D	±1.5	A
	Pulsed	I _{DP}	±6.0	A
Source current (Body diode)	Continuous	I _S	−0.75	A
	Pulsed	I _{SP}	−6.0	A
Channel temperature	T _{ch}	150	°C	
〈Di〉				
Parameter	Symbol	Limits	Unit	
Repetitive peak reverse voltage	V _{RM}	25	V	
Reverse voltage	V _R	20	V	
Forward current	I _F	0.7	A	
Forward current surge peak	I _{FSM}	3.0	A	*2
Junction temperature	T _J	150	°C	
〈MOSFET AND Di〉				
Parameter	Symbol	Limits	Unit	
Total power dissipation	P _D	1.25	W / Total	*3
Range of Storage temperature	T _{stg}	−55 to +150	°C	

*1 Pw≤10μs, Duty cycles≤1% *2 60Hz-1cyc. *3 Total mounted on a ceramic board

Transistors

●Electrical characteristics (Ta=25°C)

<MOSFET>

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	$R_{DS(on)}$	-	155	215	$m\Omega$	$I_D=-1.5A, V_{GS}=-4.5V$
		-	170	235	$m\Omega$	$I_D=-1.5A, V_{GS}=-4V$ *
		-	310	430	$m\Omega$	$I_D=-0.75A, V_{GS}=-2.5V$
Forward transfer admittance	$ Y_{fs} $	1.0	-	-	S	$V_{DS}=-10V, I_D=-0.75A$ *
Input capacitance	C_{iss}	-	270	-	pF	$V_{DS}=-10V$
Output capacitance	C_{oss}	-	40	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	35	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$	-	10	-	ns	$I_D=-0.75A$ *
Rise time	t_r	-	12	-	ns	$V_{DD}=-15V$ *
Turn-off delay time	$t_{d(off)}$	-	45	-	ns	$V_{GS}=-4.5V$ *
Fall time	t_f	-	20	-	ns	$R_L=20\Omega$ *
Total gate charge	Q_g	-	3.0	-	nC	$V_{DD}=-15V$ *
Gate-source charge	Q_{gs}	-	0.8	-	nC	$V_{GS}=-4.5V$ *
Gate-drain charge	Q_{gd}	-	0.85	-	nC	$R_L=10\Omega / R_G=10\Omega$ *

*Pulsed

●Body diode (Source-drain)

<MOSFET>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}	-	-	-1.2	V	$I_S=-0.75A, V_{GS}=0V$

<Di>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage drop	V_F	-	-	0.49	V	$I_F=0.7A$
Reverse leakage	I_R	-	-	200	μA	$V_R=20V$

●Electrical characteristic curves

<MOSFET>

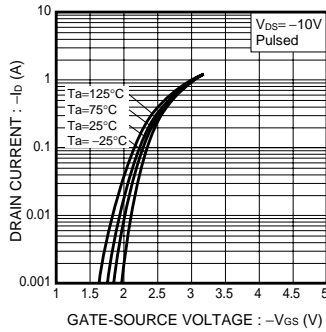


Fig.1 Typical Transfer Characteristics

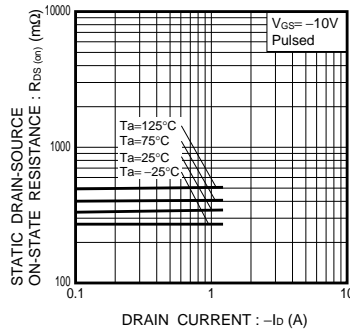


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (I)

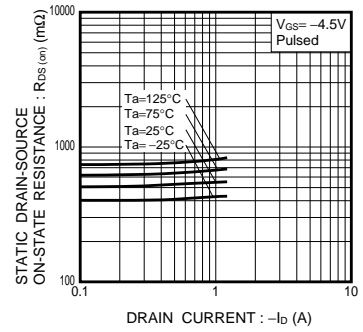


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (II)

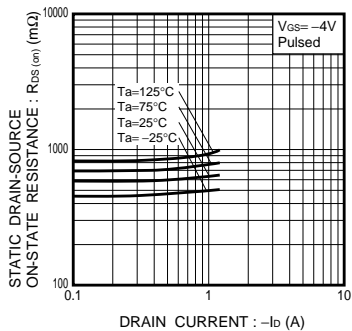


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (III)

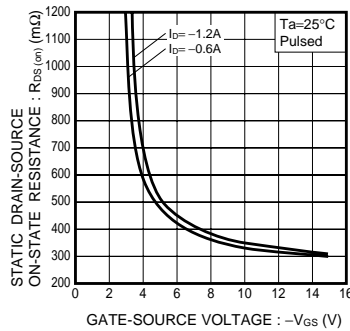


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

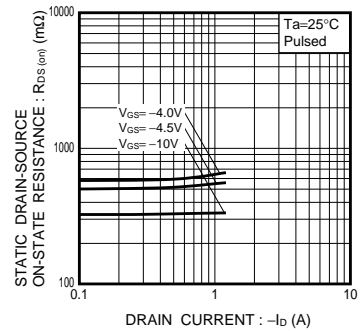


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current (IV)

Transistors

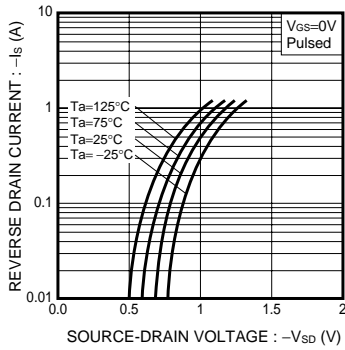


Fig.7 Reverse Drain Current vs. Source-Drain Voltage

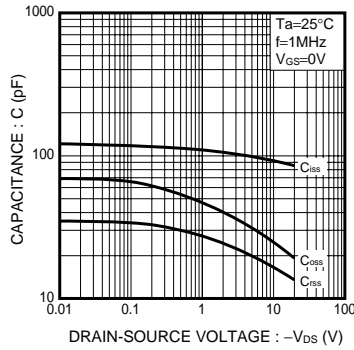


Fig.8 Typical Capacitance vs. Drain-Source Voltage

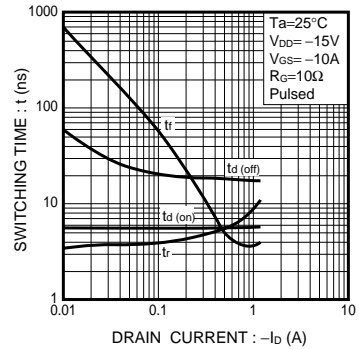


Fig.9 Switching Characteristics

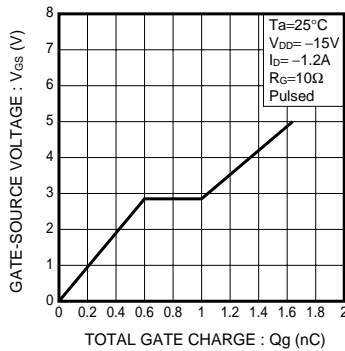


Fig.10 Dynamic Input Characteristics

●Measurement circuits

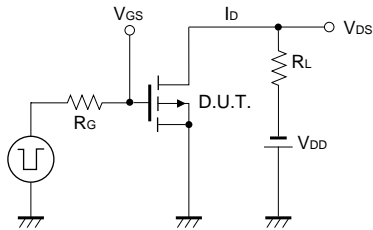


Fig.11 Switching Time Measurement Circuit

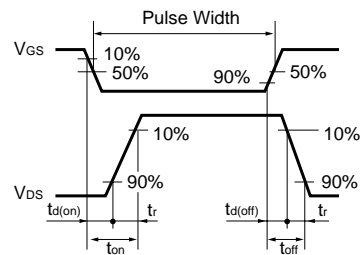


Fig.12 Switching Waveforms

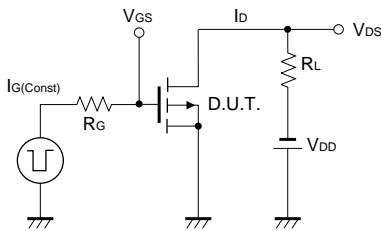


Fig.13 Gate Charge Measurement Circuit

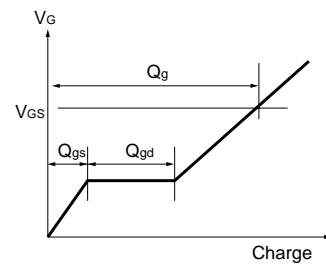


Fig.14 Gate Charge Waveform

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