

# Small switching (−20V, −1.5A)

## QS6J1

### ●Features

- 1) Two Pch MOSFET transistors 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 (2.5V).

### ●Applications

Switch

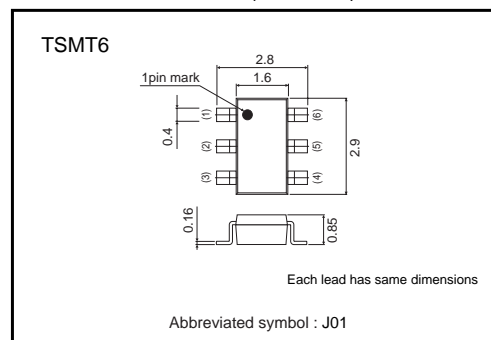
### ●Structure

Silicon P-channel MOSFET

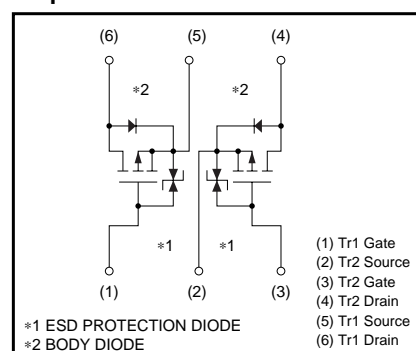
### ●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS6J1		○

### ●External dimensions (Unit : mm)



### ●Equivalent circuit



### ●Absolute maximum ratings (Ta=25°C)

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 A *1
Source current (Body diode)	Continuous	$I_S$	−0.75 A *1
	Pulsed	$I_{SP}$	−6 A
Total power dissipation	$P_D$	1.25	W / Total *2
Channel temperature	$T_{ch}$	150	°C
Range of Storage temperature	$T_{stg}$	−55 to +150	°C

\*1  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$  \*2 Mounted on a ceramic board

### ●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th}(ch-a)$	100	°C / W / Total

Transistors

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±12V, 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>	-0.7	-	-2.0	V	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1mA
Static drain-source on-state resistance	R <sub>DS(on)</sub>	-	155	215	mΩ	I <sub>D</sub> =-1.5A, V <sub>GS</sub> =-4.5V
		-	170	235	mΩ	I <sub>D</sub> =-1.5A, V <sub>GS</sub> =-4V *
		-	310	430	mΩ	I <sub>D</sub> =-0.75A, V <sub>GS</sub> =-2.5V
Forward transfer admittance	Y <sub>fs</sub>	1.0	-	-	S	V <sub>DS</sub> =-10V, I <sub>D</sub> =-0.75A *
Input capacitance	C <sub>iss</sub>	-	270	-	pF	V <sub>DS</sub> =-10V
Output capacitance	C <sub>oss</sub>	-	40	-	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	-	35	-	pF	f=1MHz
Turn-on delay time	t <sub>d(on)</sub>	-	10	-	ns	I <sub>D</sub> =-0.75A *
Rise time	t <sub>r</sub>	-	12	-	ns	V <sub>DD</sub> =-15V *
Turn-off delay time	t <sub>d(off)</sub>	-	45	-	ns	V <sub>GS</sub> =-4.5V *
Fall time	t <sub>f</sub>	-	20	-	ns	R <sub>L</sub> =20Ω *
Total gate charge	Q <sub>g</sub>	-	3.0	-	nC	V <sub>DD</sub> =-15V R <sub>L</sub> =10Ω
Gate-source charge	Q <sub>gs</sub>	-	0.8	-	nC	V <sub>GS</sub> =-4.5V R <sub>G</sub> =10Ω
Gate-drain charge	Q <sub>gd</sub>	-	0.85	-	nC	I <sub>D</sub> =-1.5A

\*Pulsed

●Body diode (Source-drain)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>SD</sub>	-	-	-1.2	V	I <sub>S</sub> =-0.75A, V <sub>GS</sub> =0V

●Electrical characteristic curves

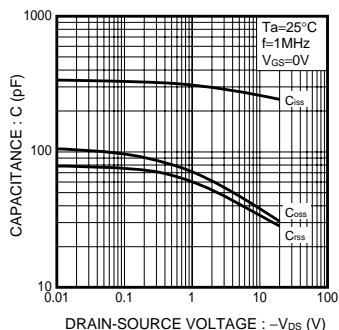


Fig.1 Typical Capacitance vs. Drain-Source Voltage

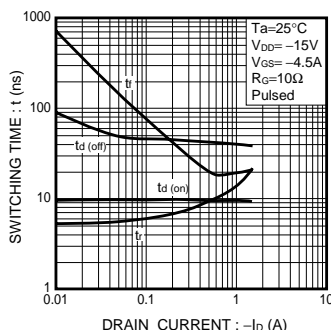


Fig.2 Switching Characteristics

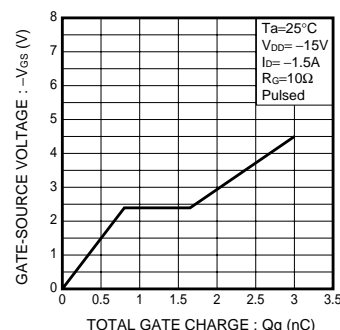


Fig.3 Dynamic Input Characteristics

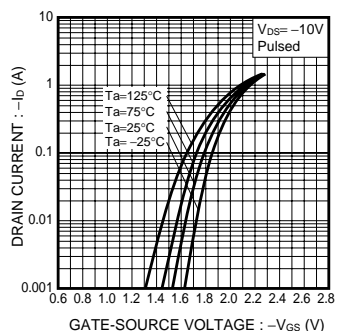


Fig.4 Typical Transfer Characteristics

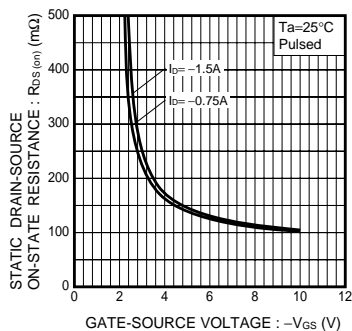


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

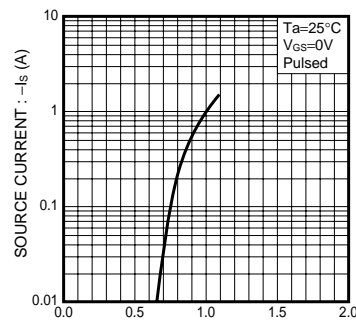


Fig.6 Source Current vs. Source-Drain Voltage

Transistors

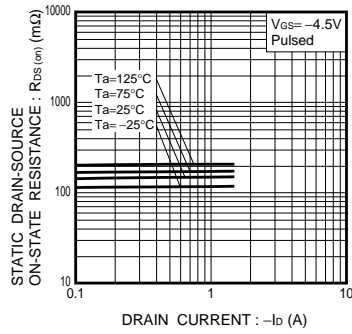


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (I)

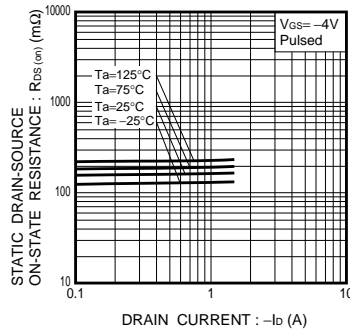


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (II)

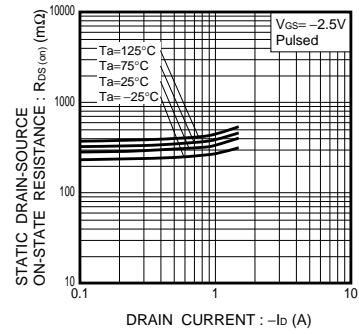


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current (III)

●Measurement circuits

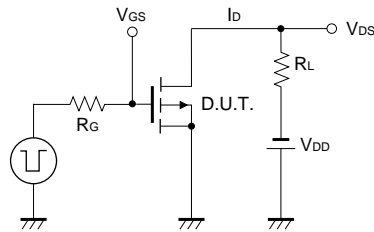


Fig.10 Switching Time Measurement Circuit

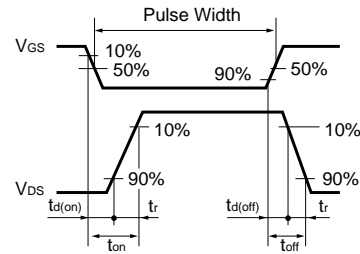


Fig.11 Switching Waveforms

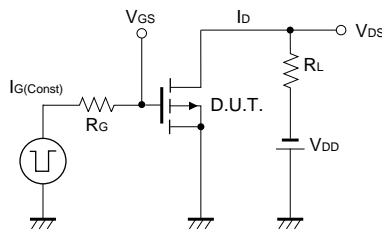


Fig.12 Gate Charge Measurement Circuit

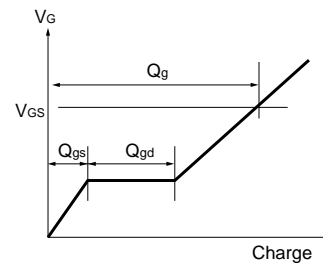


Fig.13 Gate Charge Waveform

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