

Transistors

# Small switching (−20V, −1.5A)

## QS6J3

●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

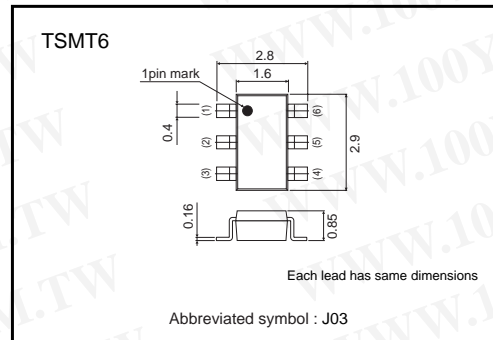
●Structure

Silicon P-channel MOSFET

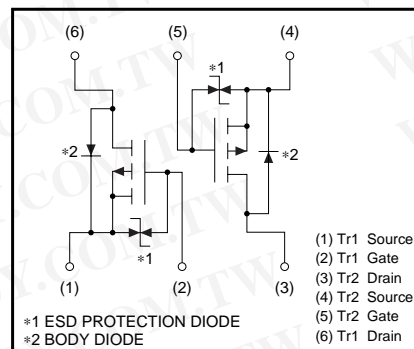
●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
QS6J3		○

●External dimensions (Unit : mm)



●Equivalent circuit



●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-source voltage	V <sub>DSS</sub>	−20	V
Gate-source voltage	V <sub>GSS</sub>	±12	V
Drain current	Continuous	I <sub>D</sub>	±1.5 A
	Pulsed	I <sub>DP</sub>	±6.0 A *1
Source current (Body diode)	Continuous	I <sub>S</sub>	−0.75 A *1
	Pulsed	I <sub>SP</sub>	−6.0 A
Total power dissipation	P <sub>D</sub>	1.25	W / Total *2
Channel temperature	T <sub>ch</sub>	150	°C
Range of Storage temperature	T <sub>stg</sub>	−55 to +150	°C

\*1 Pw≤10μs, Duty cycle≤1% \*2 Mounted on a ceramic board

●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to ambient	R <sub>th (ch-a)</sub>	100	°C / W / Total *

\* Mounted on a ceramic board

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●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 V <sub>DD</sub> =-15V *
Rise time	t <sub>r</sub>	-	12	-	ns	V <sub>GS</sub> =-4.5V *
Turn-off delay time	t <sub>d(off)</sub>	-	45	-	ns	R <sub>L</sub> =20Ω *
Fall time	t <sub>f</sub>	-	20	-	ns	R <sub>G</sub> =10Ω *
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

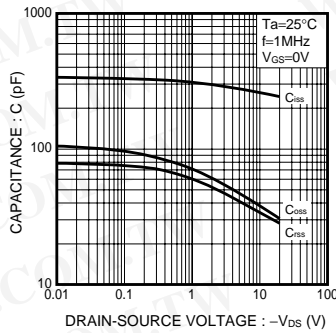


Fig.1 Typical Capacitance vs. Drain-Source Voltage

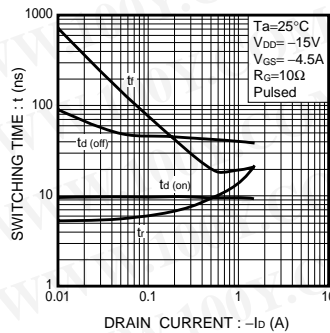


Fig.2 Switching Characteristics

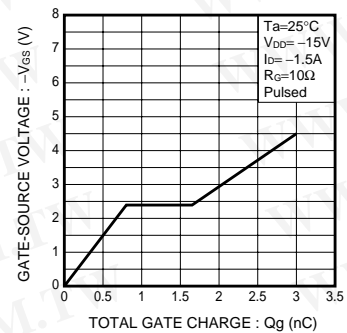


Fig.3 Dynamic Input Characteristics

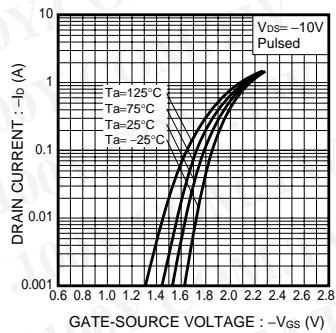


Fig.4 Typical Transfer Characteristics

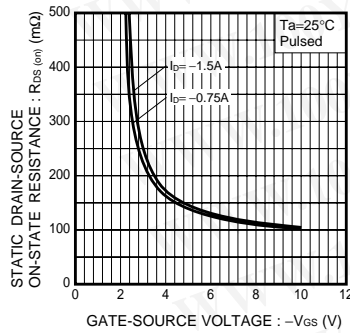


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

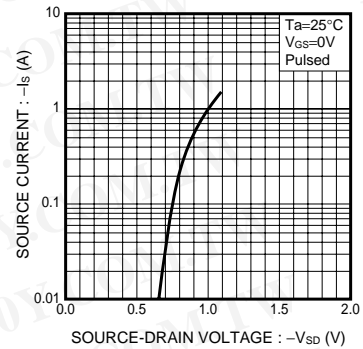


Fig.6 Source Current vs. Source-Drain Voltage

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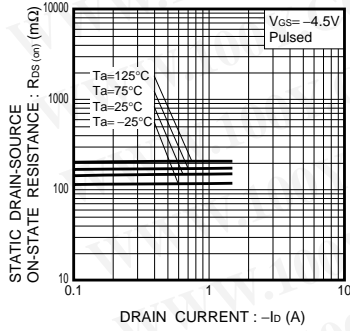


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (I)

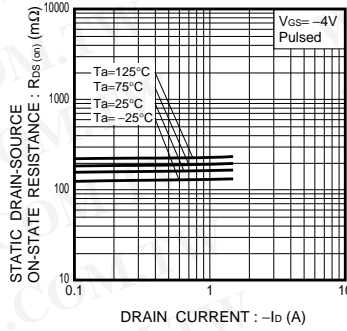


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (II)

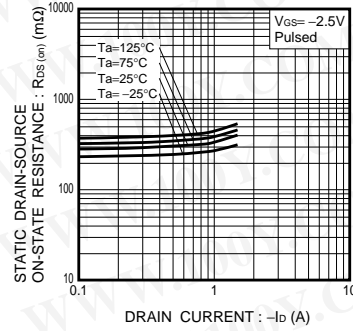


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current (III)

●Measurement circuits

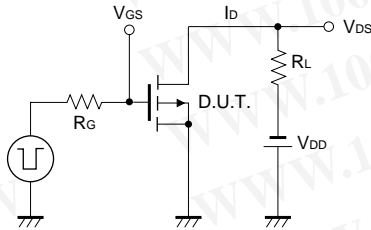


Fig.10 Switching Time Measurement Circuit

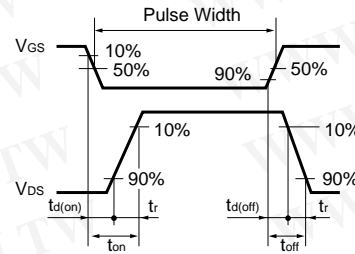


Fig.11 Switching Waveforms

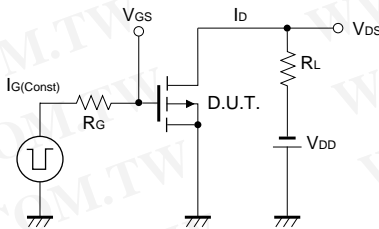


Fig.12 Gate Charge Measurement Circuit

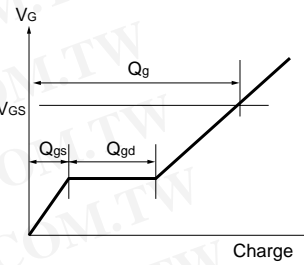


Fig.13 Gate Charge Waveform

## Appendix

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