# 4V Drive Nch + Nch MOSFET

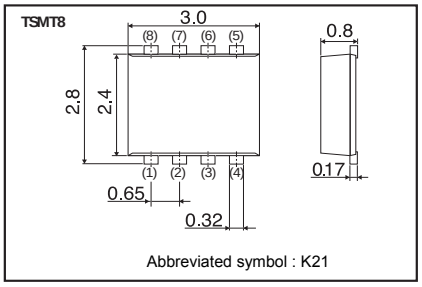
## QS8K21

### ● Structure
Silicon N-channel MOSFET

### ● Features
1) Low on-resistance.
2) High power package(TSMT8).
3) Low voltage drive(4V drive).

### ● Application
Switching

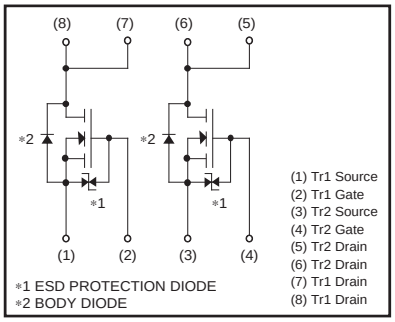
### ● Dimensions (Unit : mm)




### ● Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TR |
| | Basic ordering unit (pieces) | 3000 |
| QS8K21 | | O |

### ● Inner circuit




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

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | 45 | V |
| Gate-source voltage | | $V_{GSS}$ | ±20 | V |
| Drain current | Continuous | $I_D$ | ±4 | A |
| | Pulsed | $I_{DP}$ *1 | ±12 | A |
| Source current (Body Diode) | Continuous | $I_s$ | 1 | A |
| | Pulsed | $I_{sp}$ *1 | 12 | A |
| Power dissipation | | $P_D$ *2 | 1.5 | W / TOTAL |
| | | | 1.25 | W / ELEMENT |
| Channel temperature | | Tch | 150 | °C |
| Range of storage temperature | | Tstg | −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 | Rth (ch-a)* | 83.3 | °C / W /TOTAL |
| | | 100 | C / W /ELEMENT |

*Mounted on a ceramic board.

●**Electrical characteristics** (Ta = 25°C)
<It is the same ratings for Tr1 and Tr2.>

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | - | - | ±10 | μA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 45 | - | - | V | $I_D$=1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=45V, $V_{GS}$=0V |
| Gate threshold voltage | $V_{GS\ (th)}$ | 1.0 | - | 2.5 | V | $V_{DS}$=10V, $I_D$=1mA |
| Static drain-source on-state resistance | $R_{DS\ (on)}$* | - | 38 | 53 | mΩ | $I_D$=4A, $V_{GS}$=10V |
| | | - | 48 | 67 | | $I_D$=4A, $V_{GS}$=4.5V |
| | | - | 53 | 75 | | $I_D$=4A, $V_{GS}$=4.0V |
| Forward transfer admittance | $\|Y_{fs}\|$* | 2 | - | - | S | $I_D$=4A, $V_{DS}$=10V |
| Input capacitance | $C_{iss}$ | - | 460 | - | pF | $V_{DS}$=10V |
| Output capacitance | $C_{oss}$ | - | 110 | - | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | - | 55 | - | pF | f=1MHz |
| Turn-on delay time | $t_{d(on)}$* | - | 9 | - | ns | $I_D$=2A, $V_{DD}$≒25V |
| Rise time | $t_r$ * | - | 25 | - | ns | $V_{GS}$=10V |
| Turn-off delay time | $t_{d(off)}$* | - | 30 | - | ns | $R_L$≒12.5Ω |
| Fall time | $t_f$ * | - | 7 | - | ns | $R_G$=10Ω |
| Total gate charge | $Q_g$ * | - | 5.4 | - | nC | $I_D$=4A, $V_{DD}$≒ 25V |
| Gate-source charge | $Q_{gs}$ * | - | 2.0 | - | nC | $V_{GS}$=5V $R_L$≒ 6.3Ω |
| Gate-drain charge | $Q_{gd}$ * | - | 1.6 | - | nC | $R_G$=10Ω |

*Pulsed

●**Body diode characteristics** (Source-Drain) (Ta = 25°C)
<It is the same ratings for Tr1 and Tr2.>

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_{SD}$* | - | - | 1.2 | V | $I_s$=4A, $V_{GS}$=0V |

*Pulsed

## ●Electrical characteristics curves

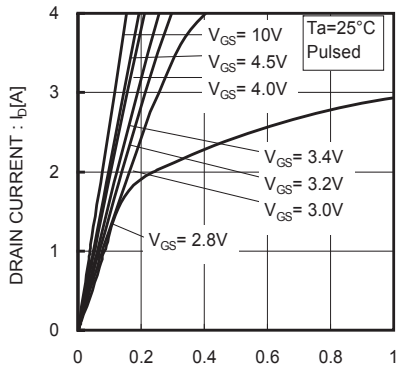



Fig.1 Typical Output Characteristics(Ⅰ)

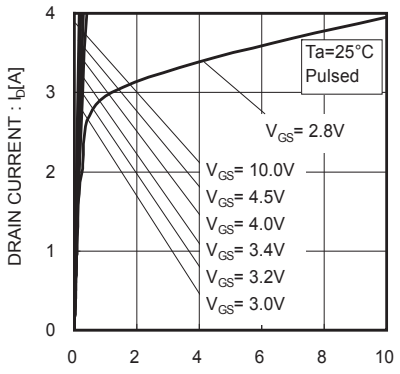



Fig.2 Typical Output Characteristics(Ⅱ)

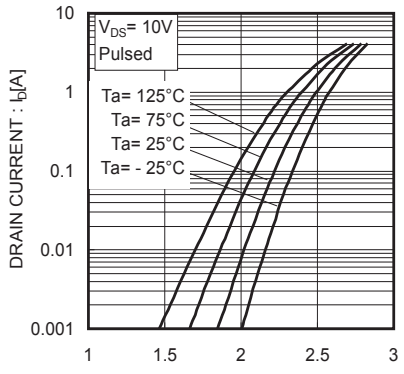



Fig.3 Typical Transfer Characteristics

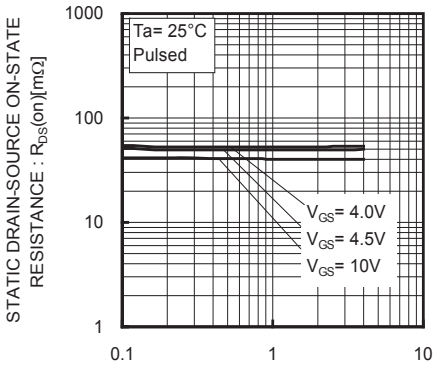



Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

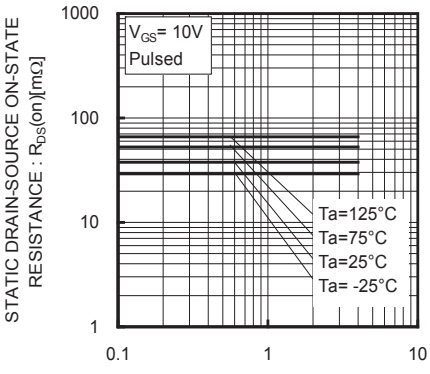



Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

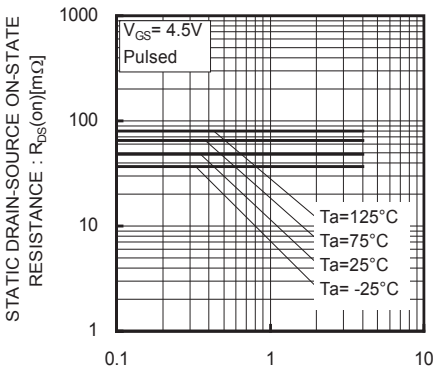



Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

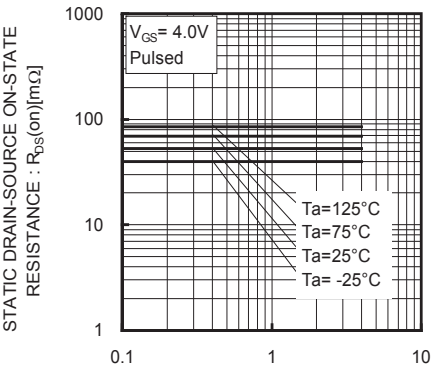



Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

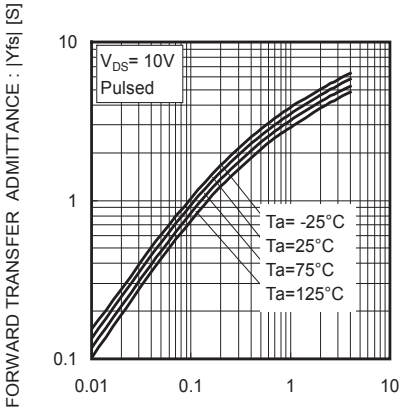



Fig.8 Forward Transfer Admittance vs. Drain Current

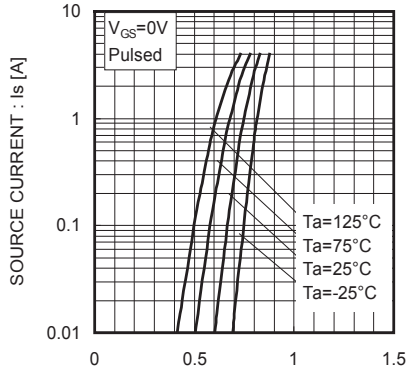



Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

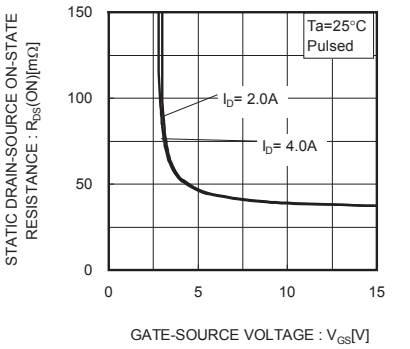



Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

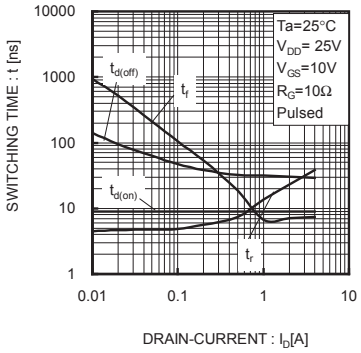



Fig.11 Switching Characteristics

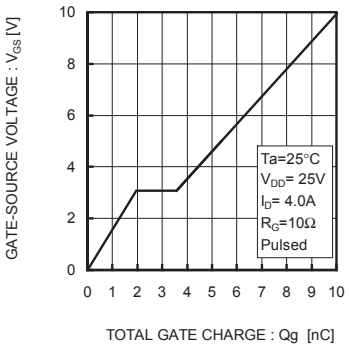



Fig.12 Dynamic Input Characteristics

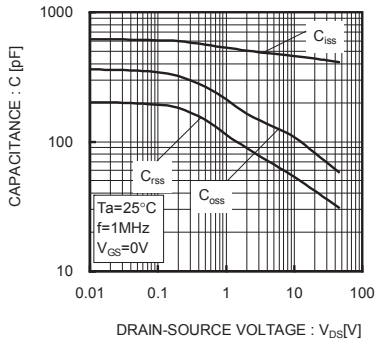



Fig.13 Typical Capacitance vs. Drain-Source Voltage

## ●Measurement circuits

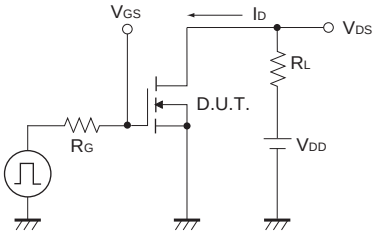



Fig.1-1 Switching time measurement circuit

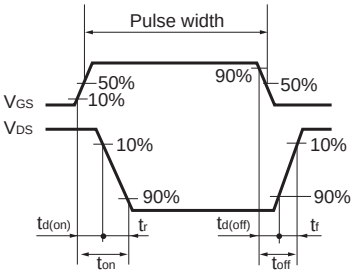



Fig.1-2 Switching waveforms

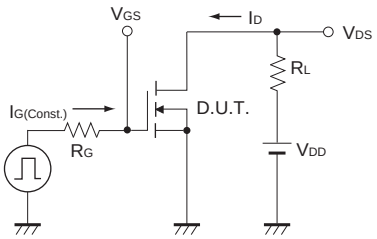



Fig.2-1 Gate charge measurement circuit

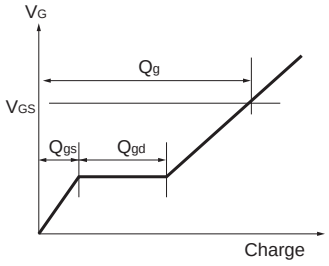



Fig.2-2 Gate charge waveform

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