

# 1.8V Drive Nch+Nch MOSFET

## US6K4

### ●Structure

Silicon N-channel MOSFET

### ●Features

- 1) Two Nch MOSFETs are put in TUMT6 package.
- 2) High-speed switching, Low On-resistance.
- 3) 1.8V drive.

### ●Applications

Switching

### ●Packaging specifications

| Type  | Package                      | Taping |
|-------|------------------------------|--------|
|       | Code                         | TR     |
|       | Basic ordering unit (pieces) | 3000   |
| US6K4 |                              | ○      |

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

<It is the same ratings for the Tr1 and Tr2>

| Parameter                      |            | Symbol      | Limits      | Unit        |
|--------------------------------|------------|-------------|-------------|-------------|
| Drain-source voltage           |            | $V_{DS}$    | 20          | V           |
| Gate-source voltage            |            | $V_{GS}$    | $\pm 10$    | V           |
| Drain current                  | Continuous | $I_D$       | $\pm 1.5$   | A           |
|                                | Pulsed     | $I_{DP}$ *1 | $\pm 3.0$   | A           |
| Source current<br>(Body diode) | Continuous | $I_S$       | 0.6         | A           |
|                                | Pulsed     | $I_{SP}$ *1 | 2.4         | A           |
| Total power dissipation        |            | $P_D$ *2    | 1.0         | W / TOTAL   |
|                                |            |             | 0.7         | W / ELEMENT |
| 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  $\leq 1\%$

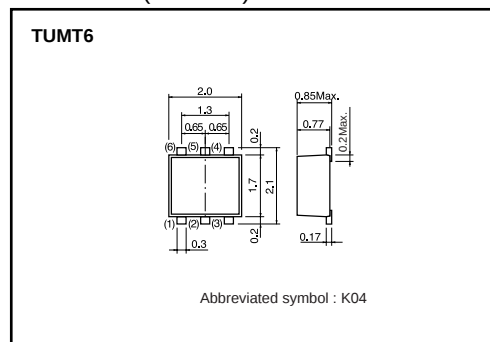
\*2 Mounted on a ceramic board

### ●Thermal resistance

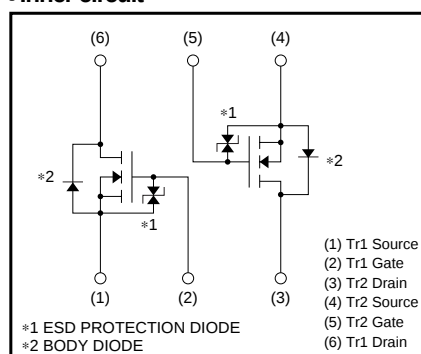
| Parameter          | Symbol           | Limits | Unit           |
|--------------------|------------------|--------|----------------|
| Channel to ambient | $R_{th(ch-a)}$ * | 125    | °C/W / TOTAL   |
|                    |                  | 179    | °C/W / ELEMENT |

\* Mounted on a ceramic board

### ●Dimensions (Unit : mm)



### ●Inner circuit



## Transistors

## ●Electrical characteristics (Ta=25°C)

&lt;It is the same characteristics for the Tr1 and Tr2&gt;

| Parameter                               | Symbol         | Min. | Typ. | Max. | Unit | Conditions                  |
|-----------------------------------------|----------------|------|------|------|------|-----------------------------|
| Gate-source leakage                     | $I_{GSS}$      | —    | —    | ±10  | μA   | $V_{GS}=±10V$ , $V_{DS}=0V$ |
| 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                  | $V_{GS(th)}$   | 0.3  | —    | 1.0  | V    | $V_{DS}=10V$ , $I_D=1mA$    |
| Static drain-source on-state resistance | $R_{DS(on)}$ * | —    | 130  | 180  | mΩ   | $I_D=1.5A$ , $V_{GS}=4.5V$  |
|                                         |                | —    | 170  | 240  | mΩ   | $I_D=1.5A$ , $V_{GS}=2.5V$  |
|                                         |                | —    | 220  | 310  | mΩ   | $I_D=0.8A$ , $V_{GS}=1.8V$  |
| Forward transfer admittance             | $ Y_{fs} $ *   | 1.6  | —    | —    | S    | $V_{DS}=10V$ , $I_D=1.5A$   |
| Input capacitance                       | $C_{iss}$      | —    | 110  | —    | pF   | $V_{DS}=10V$                |
| Output capacitance                      | $C_{oss}$      | —    | 18   | —    | pF   | $V_{GS}=0V$                 |
| Reverse transfer capacitance            | $C_{rss}$      | —    | 15   | —    | pF   | $f=1MHz$                    |
| Turn-on delay time                      | $t_{d(on)}$ *  | —    | 5    | —    | ns   | $I_D=1.0A$                  |
| Rise time                               | $t_r$ *        | —    | 5    | —    | ns   | $V_{DD}=10V$                |
| Turn-off delay time                     | $t_{d(off)}$ * | —    | 20   | —    | ns   | $V_{GS}=4.5V$               |
| Fall time                               | $t_f$ *        | —    | 3    | —    | ns   | $R_L=10Ω$                   |
| Total gate charge                       | $Q_g$ *        | —    | 1.8  | 2.5  | nC   | $V_{DD}=10V$                |
| Gate-source charge                      | $Q_{gs}$ *     | —    | 0.3  | —    | nC   | $V_{GS}=4.5V$               |
| Gate-drain charge                       | $Q_{gd}$ *     | —    | 0.3  | —    | nC   | $I_D=1.5A$                  |

\*Pulsed

## ●Body diode characteristics (Source-drain) (Ta=25°C)

&lt;It is the same characteristics for the Tr1 and Tr2&gt;

| Parameter       | Symbol   | Min. | Typ. | Max. | Unit | Conditions               |
|-----------------|----------|------|------|------|------|--------------------------|
| Forward voltage | $V_{SD}$ | —    | —    | 1.2  | V    | $I_S=0.6A$ , $V_{GS}=0V$ |

## Transistors

## ●Electrical characteristics curves

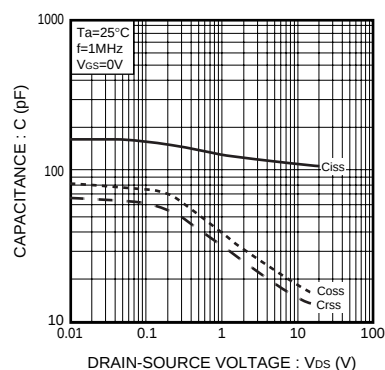


Fig.1 Typical Capacitance vs. Drain-Source Voltage

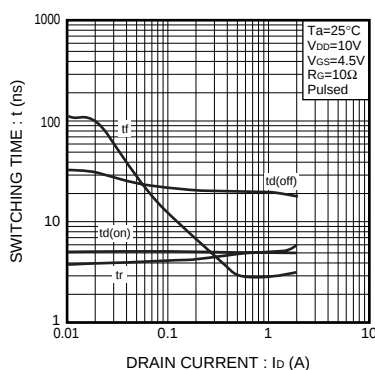


Fig.2 Switching Characteristics

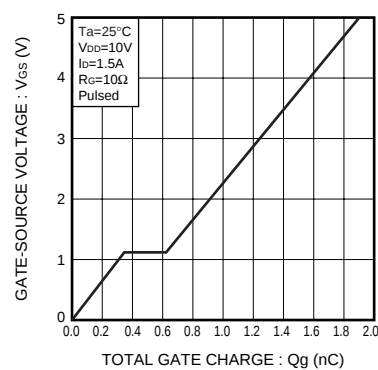


Fig.3 Dynamic Input Characteristics

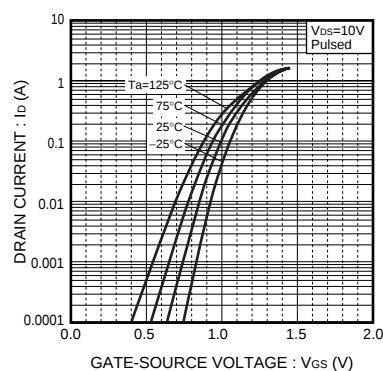


Fig.4 Typical Transfer Characteristics

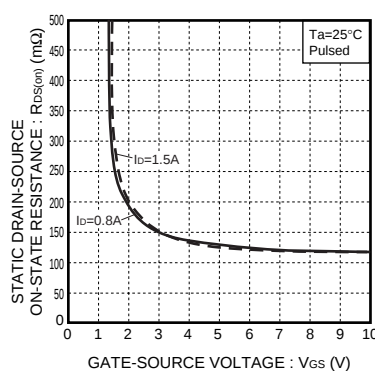


Fig.5 Static Drain-Source On-State Resistance vs. Gate-source Voltage

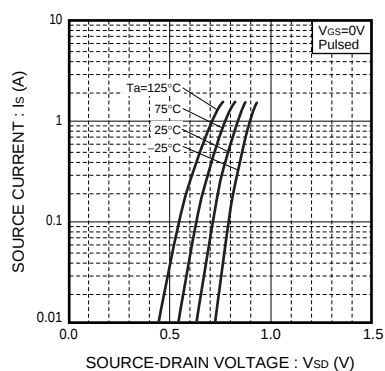


Fig.6 Source Current vs. Source-Drain Voltage

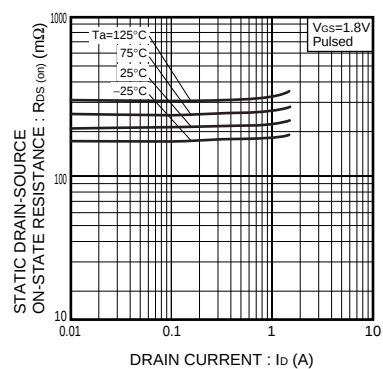


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current ( I )

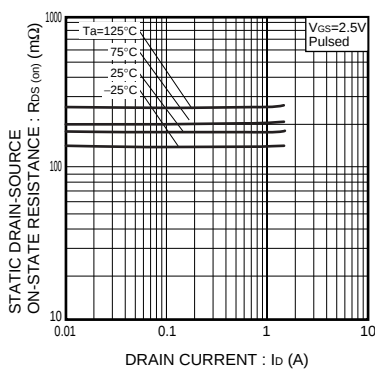


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current ( II )

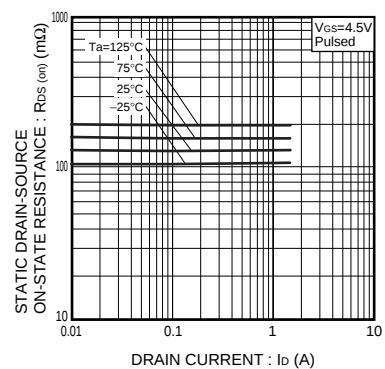


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current ( III )

## ●Notice

This product might cause chip aging and breakdown under the large electrified environment.  
Please consider to design ESD protection circuit.

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