

# Small switching (-20V, -1A)

## US6J2

**●Features**

- 1) Two Pch MOSFET transistors in a single TUMT6 package.
- 2) Mounting cost and area can be cut in half.
- 3) Low on-resistance.
- 4) Low voltage drive (2.5V) makes this device ideal for portable equipment.
- 5) Easily designed drive circuits.

**●Applications**

switch

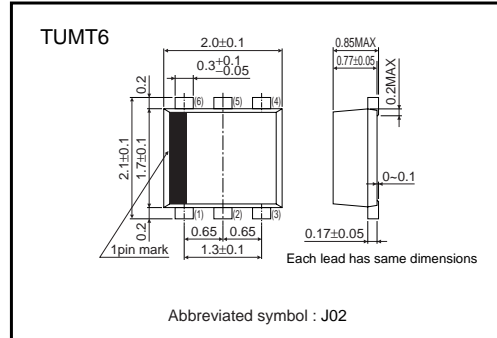
**●Structure**

Silicon P-channel  
MOS FET

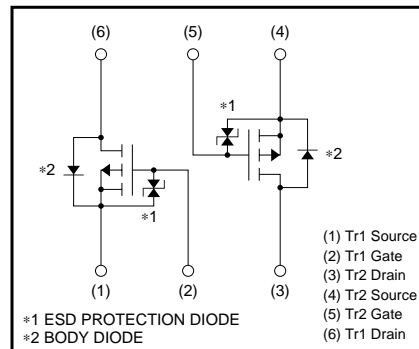
**●Packaging specifications**

| Type  | Package                      | Taping |
|-------|------------------------------|--------|
|       | Code                         | TR     |
|       | Basic ordering unit (pieces) | 3000   |
| US6J2 |                              | ○      |

**●External dimensions (Unit : mm)**



**●Equivalent circuit**



## Transistors

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

| Parameter                      | Symbol     | Limits      | Unit            |
|--------------------------------|------------|-------------|-----------------|
| Drain-source voltage           | $V_{DSS}$  | -20         | V               |
| Gate-source voltage            | $V_{GSS}$  | $\pm 12$    | V               |
| Drain current                  | Continuous | $I_D$       | $\pm 1$<br>A    |
|                                | Pulsed     | $I_{DP}$    | $\pm 4$<br>A *1 |
| Source current<br>(Body diode) | Continuous | $I_S$       | -0.4<br>A *1    |
|                                | Pulsed     | $I_{SP}$    | -1.6<br>A       |
| Total power dissipation        | $P_D$      | 1.0         | W *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  $\leq 50\%$ 

\*2 Mounted on a ceramic board

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

| Parameter                               | Symbol        | Min. | Typ. | Max.     | Unit      | Conditions                               |
|---|---------------|------|------|----------|-----------|--|
| Gate-source leakage                     | $I_{GSS}$     | -    | -    | $\pm 10$ | $\mu A$   | $V_{GS} = \pm 12V$ , $V_{DS} = 0V$       |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$ | -20  | -    | -        | V         | $I_D = -1mA$ , $V_{GS} = 0V$             |
| Zero gate voltage drain current         | $I_{DSS}$     | -    | -    | -1.0     | $\mu A$   | $V_{DS} = -20V$ , $V_{GS} = 0V$          |
| Gate threshold voltage                  | $V_{GS(th)}$  | -0.7 | -    | -2.0     | V         | $V_{DS} = -10V$ , $I_D = -1mA$           |
| Static drain-source on-state resistance | $R_{DS(on)}$  | -    | 280  | 390      | $m\Omega$ | $I_D = -1A$ , $V_{GS} = -4.5V$           |
|   |               | -    | 310  | 430      | $m\Omega$ | $I_D = -1A$ , $V_{GS} = -4V$             |
|   |               | -    | 570  | 800      | $m\Omega$ | $I_D = -0.5A$ , $V_{GS} = -2.5V$         |
| Forward transfer admittance             | $ Y_{fs} $    | 0.7  | -    | -        | S         | $V_{DS} = -10V$ , $I_D = -0.5A$          |
| Input capacitance                       | $C_{iss}$     | -    | 150  | -        | pF        | $V_{DS} = -10V$                          |
| Output capacitance                      | $C_{oss}$     | -    | 20   | -        | pF        | $V_{GS} = 0V$                            |
| Reverse transfer capacitance            | $C_{rss}$     | -    | 20   | -        | pF        | $f = 1MHz$                               |
| Turn-on delay time                      | $t_{d(on)}$   | -    | 9    | -        | ns        | $I_D = -0.5A$                            |
| Rise time                               | $t_r$         | -    | 8    | -        | ns        | $V_{DD} \doteq -15V$<br>$V_{GS} = -4.5V$ |
| Turn-off delay time                     | $t_{d(off)}$  | -    | 5    | -        | ns        | $R_L = 30\Omega$                         |
| Fall time                               | $t_f$         | -    | 10   | -        | ns        | $R_G = 10\Omega$                         |
| Total gate charge                       | $Q_g$         | -    | 2.1  | -        | nC        | $V_{DD} \doteq -15V$ $R_L = 15\Omega$    |
| Gate-source charge                      | $Q_{gs}$      | -    | 0.5  | -        | nC        | $V_{GS} = -4.5V$ $R_G = 10\Omega$        |
| Gate-drain charge                       | $Q_{gd}$      | -    | 0.5  | -        | nC        | $I_D = -1A$                              |

Transistors

●Electrical characteristic curves

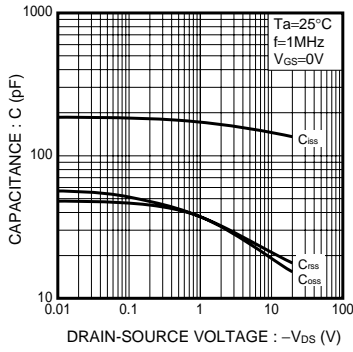


Fig.1 Typical Capacitance vs. Drain-Source Voltage

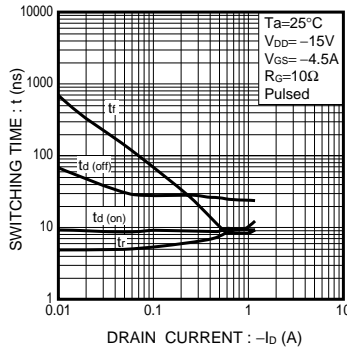


Fig.2 Switching Characteristics

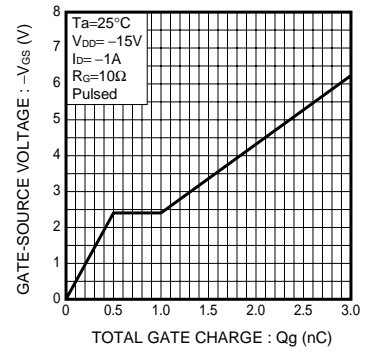


Fig.3 Dynamic Input Characteristics

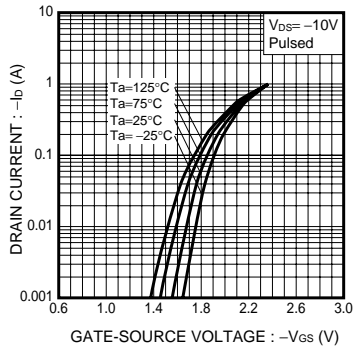


Fig.4 Typical Transfer Characteristics

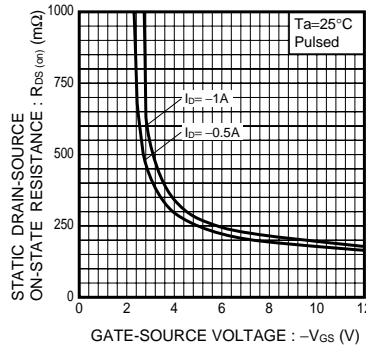


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

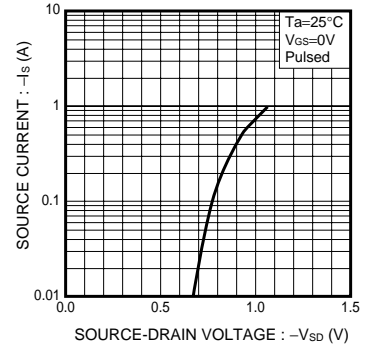


Fig.6 Source Current vs. Source-Drain Voltage

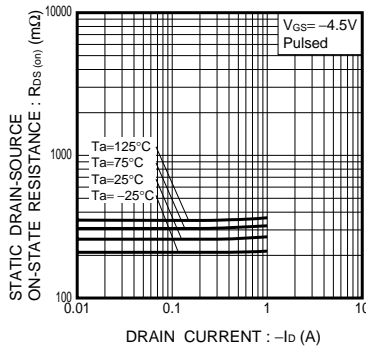


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current (II)

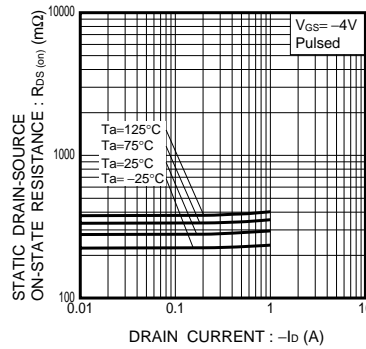


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current (III)

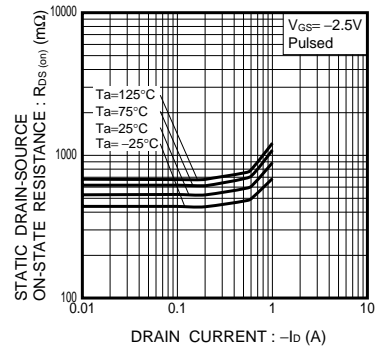


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current (I)

Transistors

●Measurement circuits

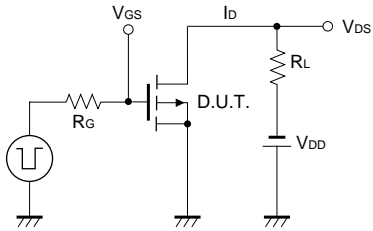


Fig.10 Switching Time Measurement Circuit

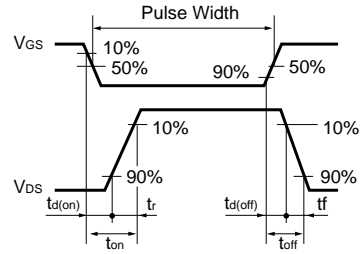


Fig.11 Switching Waveforms

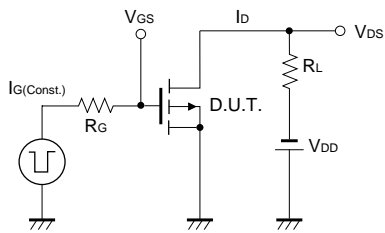


Fig.12 Gate Charge Measurement Circuit

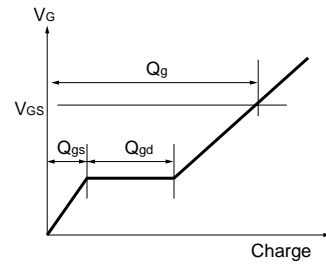


Fig.13 Gate Charge Waveform

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