

# Small switching (30V, 0.1A)

## EM6K1

### ●Features

- 1) Two 2SK3019 transistors in a single EMT package.
- 2) The MOSFET elements are independent, eliminating interference.
- 3) Mounting cost and area can be cut in half.
- 4) Low on-resistance.
- 5) Low voltage drive (2.5V) makes this device ideal for portable equipment.

### ●Applications

Interfacing, switching (30V, 100mA)

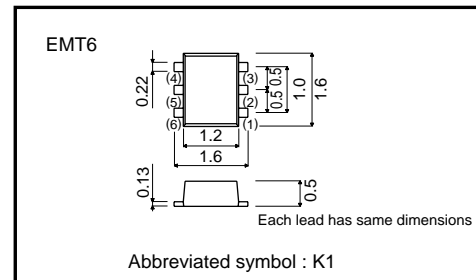
### ●Structure

Silicon N-channel  
MOSFET

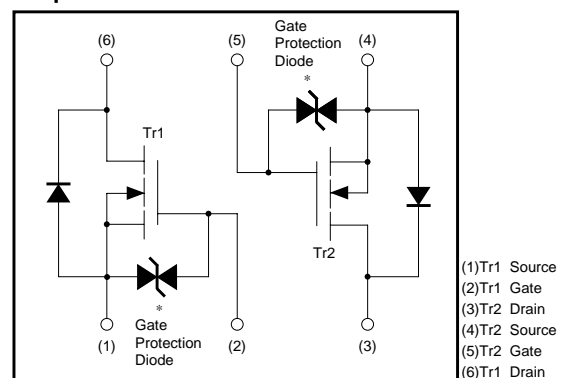
### ●Packaging specifications

| Type  | Package                      | Taping |
|-------|------------------------------|--------|
|       | Code                         | T2R    |
|       | Basic ordering unit (pieces) | 8000   |
| EM6K1 |                              | ○      |

### ●External dimensions (Units : mm)



### ●Equivalent circuit



\* A protection diode has been built in between the gate and the source to protect against static electricity when the product is in use. Use the protection circuit when rated voltages are exceeded.

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

| Parameter                         | Symbol     | Limits         | Unit                       |
|-----------------------------------|------------|----------------|----------------------------|
| Drain-source voltage              | $V_{DS}$   | 30             | V                          |
| Gate-source voltage               | $V_{GS}$   | $\pm 20$       | V                          |
| Drain current                     | Continuous | $I_D$          | 100 mA                     |
|                                   | Pulsed     | $I_{DP}^{*1}$  | 400 mA                     |
| Reverse drain current             | Continuous | $I_{DR}$       | 100 mA                     |
|                                   | Pulsed     | $I_{DRP}^{*1}$ | 400 mA                     |
| Total power dissipation (Tc=25°C) | $P_D^{*2}$ | 150            | mW/TOTAL<br>120mW/1ELEMENT |
| Channel temperature               | Tch        | 150            | °C                         |
| Storage temperature               | Tstg       | -55~+150       | °C                         |

\*1  $P_w \leq 10 \mu s$ , Duty cycle  $\leq 1\%$

\*2 With each pin mounted on the recommended lands.

Transistor

●Electrical characteristics (Ta=25°C)

| Parameter                               | Symbol               | Min. | Typ. | Max. | Unit | Conditions                                 |
|---|----------------------|------|------|------|------|--|
| Gate-source leakage                     | I <sub>GSS</sub>     | -    | -    | ±1   | μA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V |
| Drain-source breakdown voltage          | V <sub>(BR)DSS</sub> | 30   | -    | -    | V    | I <sub>D</sub> =10μA, V <sub>GS</sub> =0V  |
| Zero gate voltage drain current         | I <sub>DSS</sub>     | -    | -    | 1.0  | μA   | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V  |
| Gate threshold voltage                  | V <sub>GS(th)</sub>  | 0.8  | -    | 1.5  | V    | V <sub>DS</sub> =3V, I <sub>D</sub> =100μA |
| Static drain-source on-state resistance | R <sub>DS(on)</sub>  | -    | 5    | 8    | Ω    | I <sub>D</sub> =10mA, V <sub>GS</sub> =4V  |
|   | R <sub>DS(on)</sub>  | -    | 7    | 13   | Ω    | I <sub>D</sub> =1mA, V <sub>GS</sub> =2.5V |
| Forward transfer admittance             | Y <sub>fs</sub>      | 20   | -    | -    | mS   | V <sub>DS</sub> =3V, I <sub>D</sub> =10mA  |
| Input capacitance                       | C <sub>iss</sub>     | -    | 13   | -    | pF   | V <sub>DS</sub> =5V                        |
| Output capacitance                      | C <sub>oss</sub>     | -    | 9    | -    | pF   | V <sub>GS</sub> =0V                        |
| Reverse transfer capacitance            | C <sub>rss</sub>     | -    | 4    | -    | pF   | f=1MHz                                     |
| Turn-on delay time                      | t <sub>d(on)</sub>   | -    | 15   | -    | ns   | I <sub>D</sub> =10mA, V <sub>DD</sub> =5V  |
| Rise time                               | t <sub>r</sub>       | -    | 35   | -    | ns   | V <sub>GS</sub> =5V                        |
| Turn-off delay time                     | t <sub>d(off)</sub>  | -    | 80   | -    | ns   | R <sub>L</sub> =500Ω                       |
| Fall time                               | t <sub>f</sub>       | -    | 80   | -    | ns   | R <sub>GS</sub> =10Ω                       |

●Electrical characteristic curves

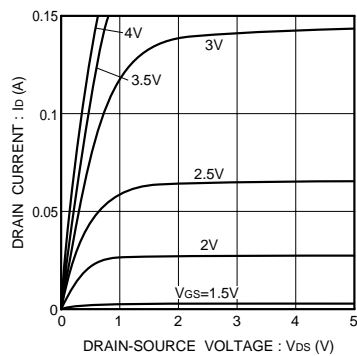


Fig.1 Typical Output Characteristics

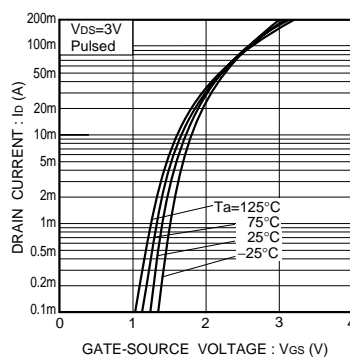


Fig.2 Typical Transfer Characteristics

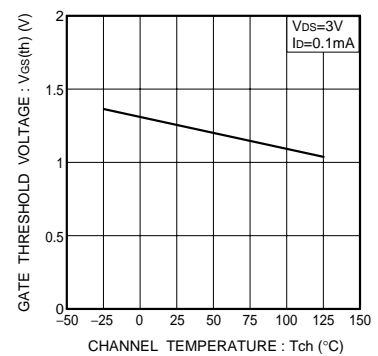


Fig.3 Gate Threshold Voltage vs. Channel Temperature

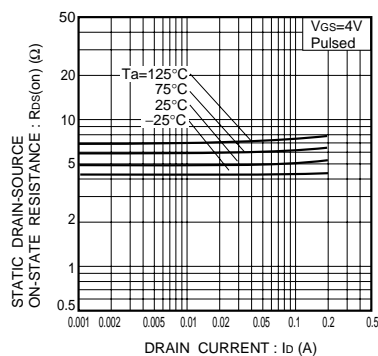


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (I)

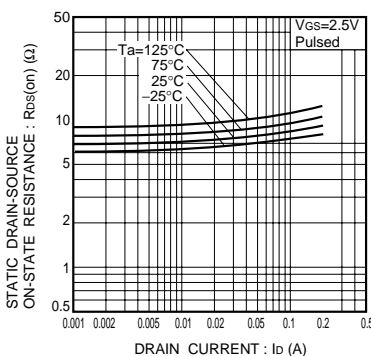


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (II)

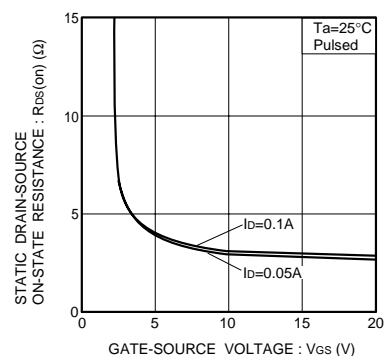


Fig.6 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

Transistor

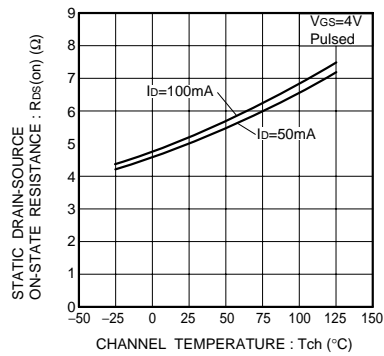


Fig.7 Static Drain-Source On-State Resistance vs. Channel Temperature

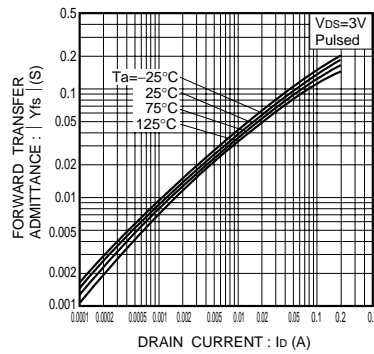


Fig.8 Forward Transfer Admittance vs. Drain Current

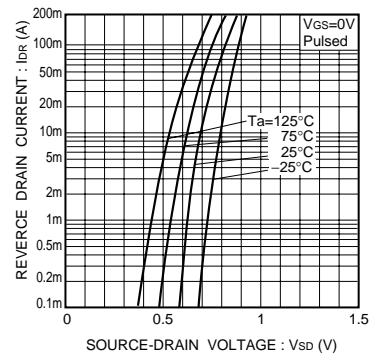


Fig.9 Reverse Drain Current vs. Source-Drain Voltage (I)

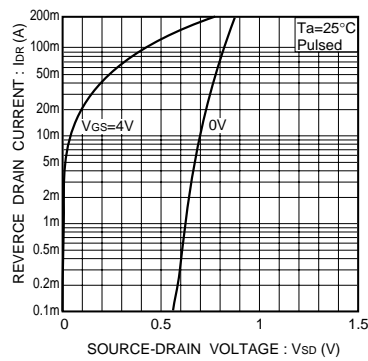


Fig.10 Reverse Drain Current vs. Source-Drain Voltage (II)

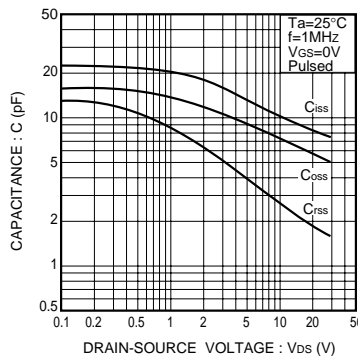


Fig.11 Typical Capacitance vs. Drain-Source Voltage

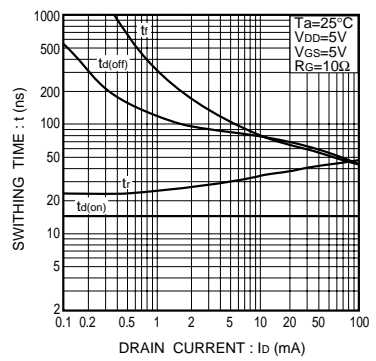


Fig.12 Switching Characteristics

●Switching characteristics measurement circuits

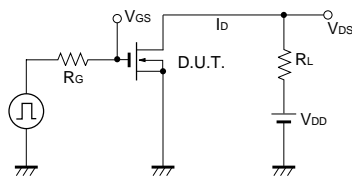


Fig.13 Switching Time Test Circuit

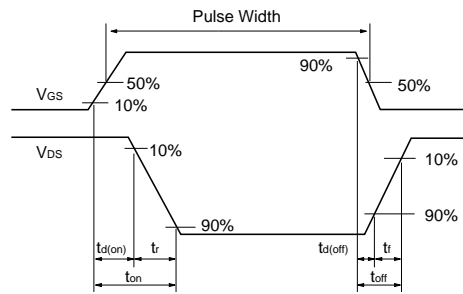


Fig.14 Switching Time Waveforms

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