

# 2.5V Drive Nch + Nch MOSFET

## EM6K31

### ● Structure

Silicon N-channel MOSFET

### ● Features

- 1) High speed switing.
- 2) Small package(EMT6).
- 3) Low voltage drive(2.5V drive).

### ● Application

Switching

### ● Packaging specifications

| Type   | Package                      | Taping |
|--------|------------------------------|--------|
|        | Code                         | T2R    |
|        | Basic ordering unit (pieces) | 8000   |
| EM6K31 |                              | ○      |

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

| Parameter                      |            | Symbol      | Limits      | Unit         |
|--------------------------------|------------|-------------|-------------|--------------|
| Drain-source voltage           |            | $V_{DSS}$   | 60          | V            |
| Gate-source voltage            |            | $V_{GSS}$   | $\pm 20$    | V            |
| Drain current                  | Continuous | $I_D$       | $\pm 250$   | mA           |
|                                | Pulsed     | $I_{DP}$ *1 | $\pm 1$     | A            |
| Source current<br>(Body Diode) | Continuous | $I_S$       | 125         | mA           |
|                                | Pulsed     | $I_{SP}$ *1 | 1           | A            |
| Power dissipation              |            | $P_D$ *2    | 150         | mW / TOTAL   |
|                                |            |             | 120         | mW / 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  $\leq 1\%$

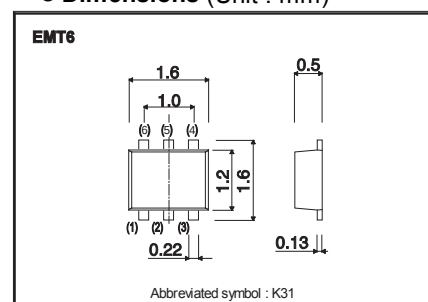
\*2 Each terminal mounted on a recommended land.

### ● Thermal resistance

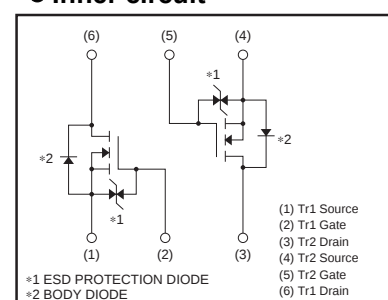
| Parameter          | Symbol           | Limits | Unit             |
|--------------------|------------------|--------|------------------|
| Channel to ambient | $R_{th(ch-a)}$ * | 833    | °C / W / TOTAL   |
|                    |                  | 1042   | °C / W / ELEMENT |

\* Each terminal mounted on a recommended land.

### ● Dimensions (Unit : mm)



### ● Inner circuit



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

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

| Parameter                               | Symbol         | Min. | Typ. | Max.     | Unit     | Conditions                        |
|-----------------------------------------|----------------|------|------|----------|----------|-----------------------------------|
| Gate-source leakage                     | $I_{GSS}$      | -    | -    | $\pm 10$ | $\mu A$  | $V_{GS}=\pm 20V$ , $V_{DS}=0V$    |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$  | 60   | -    | -        | V        | $I_D=1mA$ , $V_{GS}=0V$           |
| Zero gate voltage drain current         | $I_{DSS}$      | -    | -    | 1        | $\mu A$  | $V_{DS}=60V$ , $V_{GS}=0V$        |
| Gate threshold voltage                  | $V_{GS(th)}$   | 1.0  | -    | 2.3      | V        | $V_{DS}=10V$ , $I_D=1mA$          |
| Static drain-source on-state resistance | $R_{DS(on)}$ * | -    | 1.7  | 2.4      | $\Omega$ | $I_D=250mA$ , $V_{GS}=10V$        |
|                                         |                | -    | 2.1  | 3.0      |          | $I_D=250mA$ , $V_{GS}=4.5V$       |
|                                         |                | -    | 2.3  | 3.2      |          | $I_D=250mA$ , $V_{GS}=4.0V$       |
|                                         |                | -    | 3.0  | 12.0     |          | $I_D=10mA$ , $V_{GS}=2.5V$        |
| Forward transfer admittance             | $ Y_{fs} $ *   | 0.25 | -    | -        | S        | $I_D=250mA$ , $V_{DS}=10V$        |
| Input capacitance                       | $C_{iss}$      | -    | 15   | -        | pF       | $V_{DS}=25V$                      |
| Output capacitance                      | $C_{oss}$      | -    | 4.5  | -        | pF       | $V_{GS}=0V$                       |
| Reverse transfer capacitance            | $C_{rss}$      | -    | 2.0  | -        | pF       | $f=1MHz$                          |
| Turn-on delay time                      | $t_{d(on)}$ *  | -    | 3.5  | -        | ns       | $I_D=100mA$ , $V_{DD}\approx 30V$ |
| Rise time                               | $t_r$ *        | -    | 5    | -        | ns       | $V_{GS}=10V$                      |
| Turn-off delay time                     | $t_{d(off)}$ * | -    | 18   | -        | ns       | $R_L\approx 300\Omega$            |
| Fall time                               | $t_f$ *        | -    | 28   | -        | ns       | $R_G=10\Omega$                    |

\*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    | $I_S=250mA$ , $V_{GS}=0V$ |

\*Pulsed

## ●Electrical characteristic curves

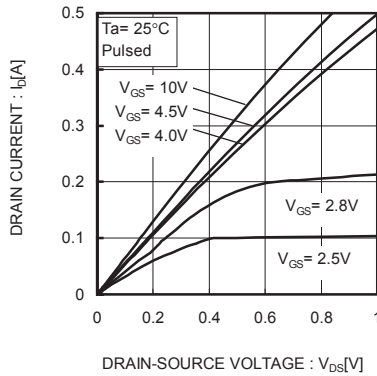


Fig.1 Typical Output Characteristics ( I )

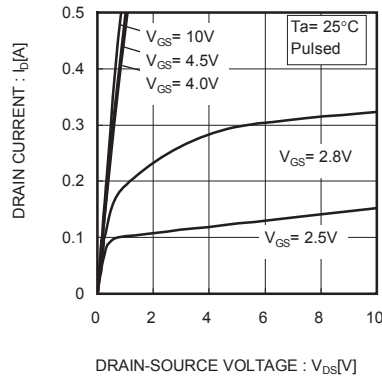


Fig.2 Typical Output Characteristics( II )

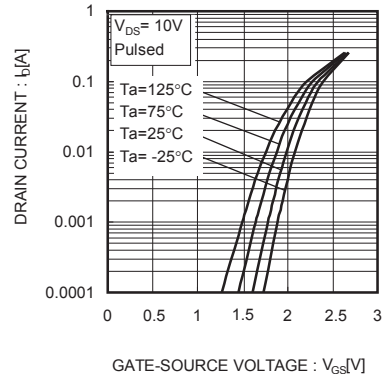


Fig.3 Typical Transfer Characteristics

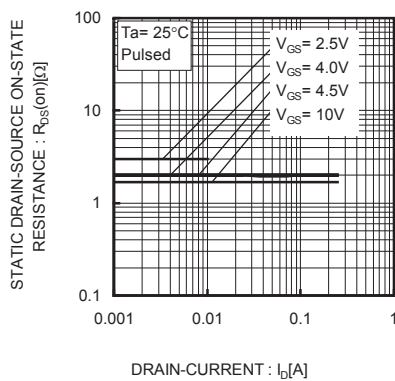


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current( I )

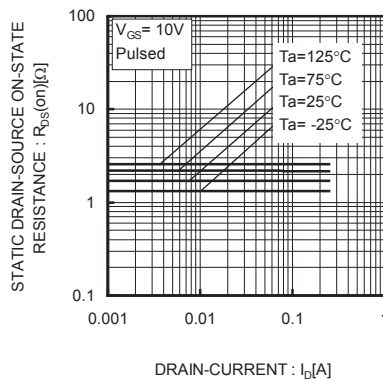


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current( II )

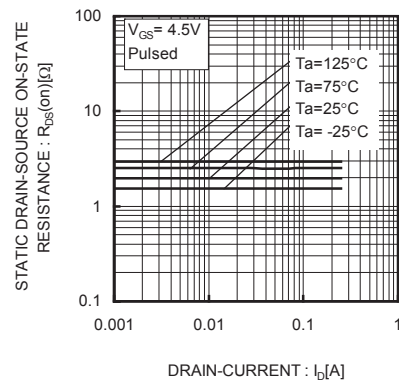


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current( III )

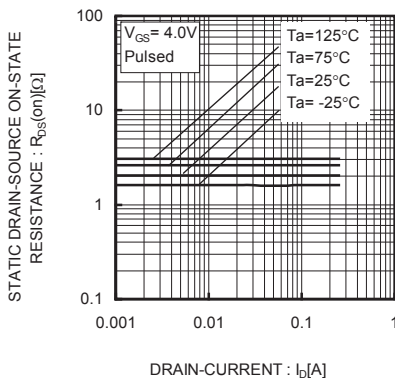


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current( IV )

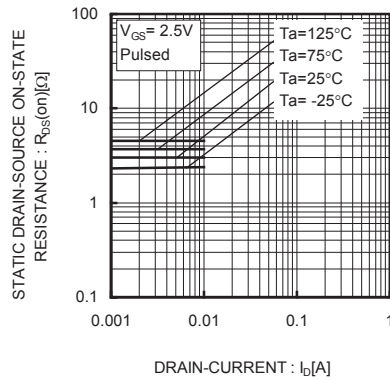


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current( V )

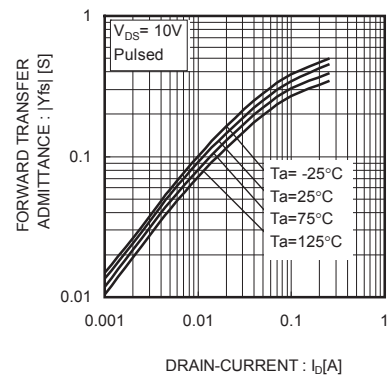


Fig.9 Forward Transfer Admittance vs. Drain Current

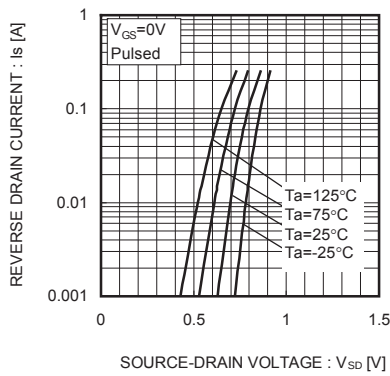


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

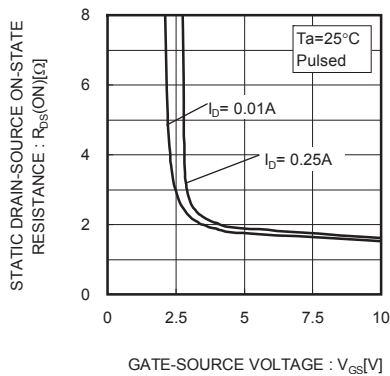


Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

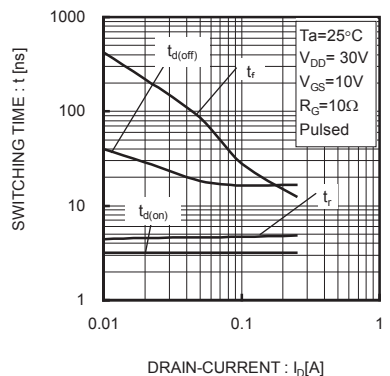


Fig.12 Switching Characteristics

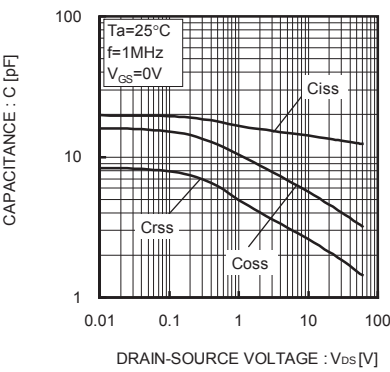


Fig.13 Typical Capacitance vs. Drain-Source Voltage

### ●Measurement circuits

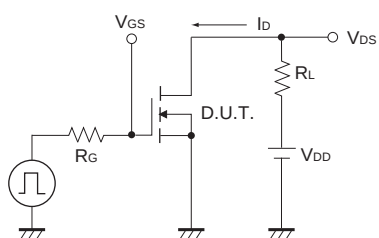


Fig.1-1 Switching time measurement circuit

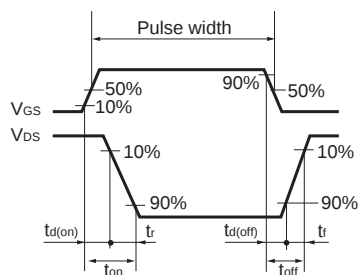


Fig.1-2 Switching waveforms

### ●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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