# 2.5V Drive Nch + Nch MOSFET

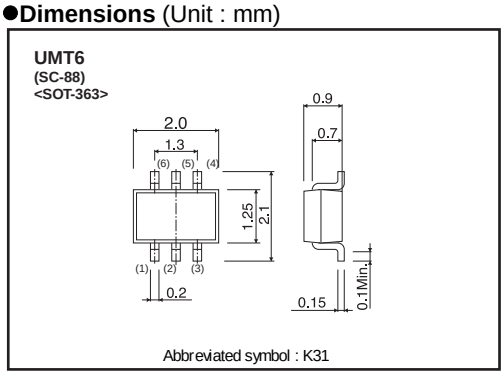
## UM6K31N

### ●Structure
Silicon N-channel MOSFET

### ●Features
1) High speed switing.
2) Small package(UMT6).
3) Low voltage drive(2.5V drive).

### ●Application
Switching

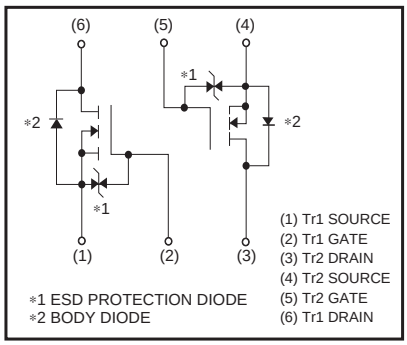
### ●Dimensions (Unit : mm)




### ●Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TN |
| | Basic ordering unit (pieces) | 3000 |
| UM6K31N | | O |

### ●Inner circuit




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

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | 60 | V |
| Gate-source voltage | | $V_{GSS}$ | ±20 | V |
| Drain current | Continuous | $I_D$ | ±250 | mA |
| | Pulsed | $I_{DP}$ *1 | ±1 | A |
| Source current (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 | | Tch | 150 | °C |
| Range of storage temperature | | Tstg | −55 to +150 | °C |

*1 Pw≤10μs, Duty cycle≤1%

*2 Each terminal mounted on a recommended land.

### ●Thermal resistance

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Channel to ambient | Rth (ch-a)* | 833 | °C / W /TOTAL |
| | | 1042 | °C / W /ELEMENT |

* Each terminal mounted on a recommended land.

●**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 | $V_{(BR)DSS}$ | 60 | - | - | V | $I_D$=1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=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 | Ω | $I_D$=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 | $\lvert Y_{fs} \rvert$* | 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, $V_{DD}$≒ 30V |
| Rise time | $t_r$ * | - | 5 | - | ns | $V_{GS}$=10V |
| Turn-off delay time | $t_{d(off)}$* | - | 18 | - | ns | $R_L$≒ 300Ω |
| Fall time | $t_f$ * | - | 28 | - | ns | $R_G$=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 | $I_s$=250mA, $V_{GS}$=0V |

*Pulsed

## ●Electrical characteristic curves

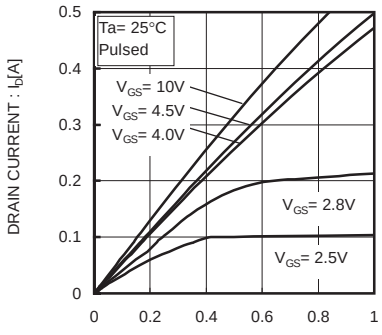



Fig.1 Typical Output Characteristics(Ⅰ)

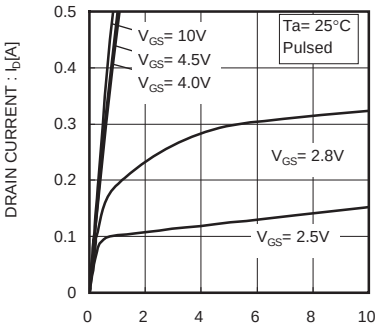



Fig.2 Typical Output Characteristics(Ⅱ)

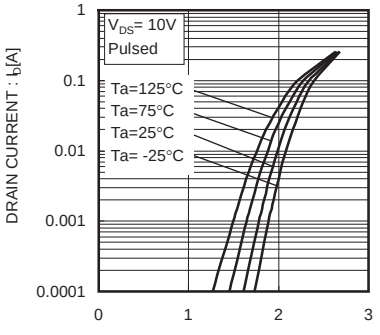



Fig.3 Typical Transfer Characteristics

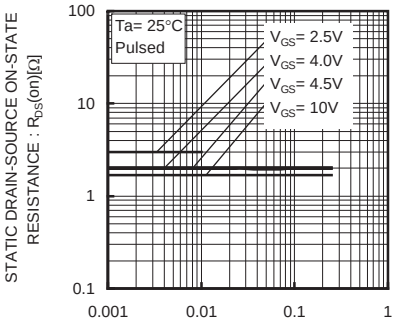



Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

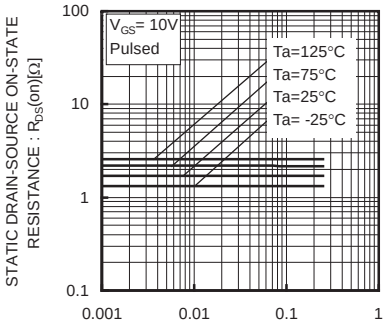



Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

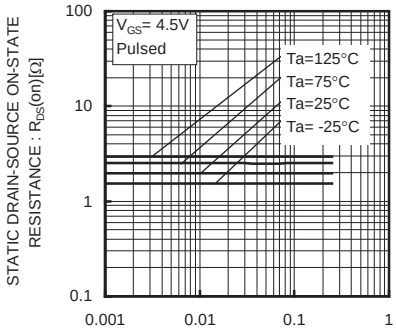



Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

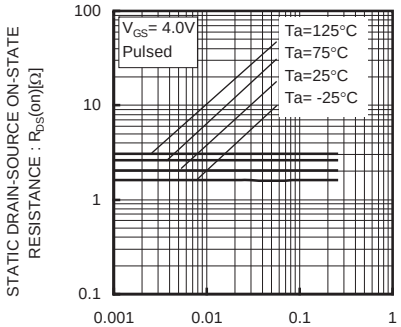



Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

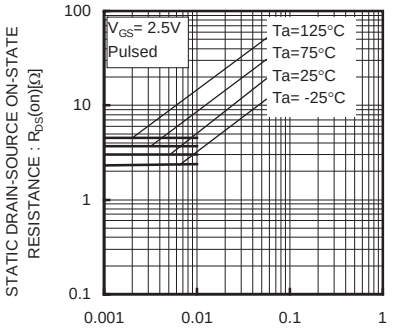



Fig.8 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

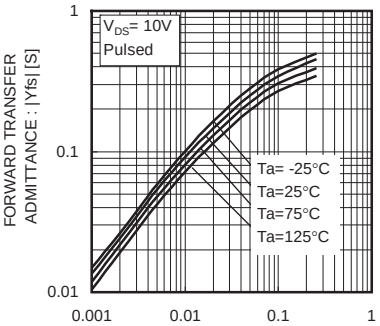



Fig.9 Forward Transfer Admittance vs. Drain Current

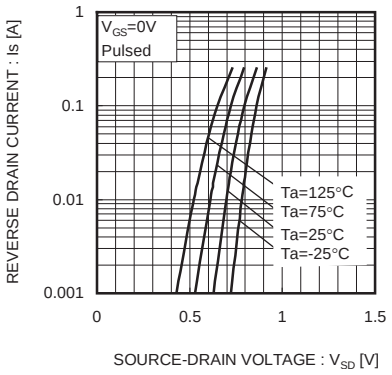



Fig.10 Reverse Drain Current vs. Sourse-Drain Voltage

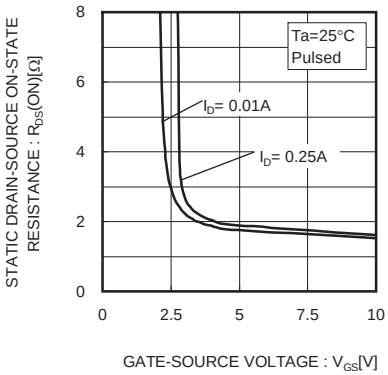



Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

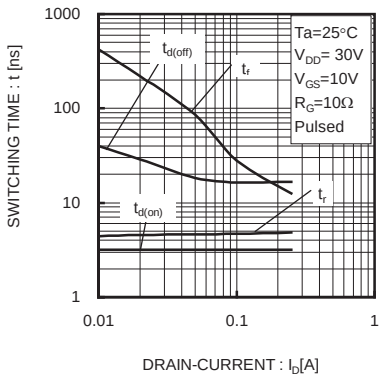



Fig.12 Switching Characteristics

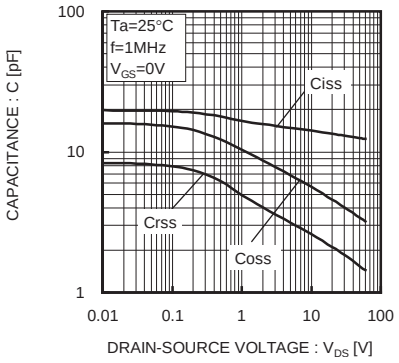



Fig.13 Typical Capacitance vs. Drain-Source Voltage

## ●Measurement circuits

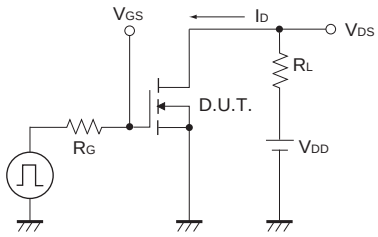



Fig.1-1 Switching time measurement circuit

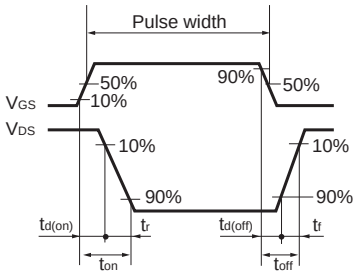



Fig.1-2 Switching waveforms

## ●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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