

4V Drive Nch + Nch MOSFET

MP6K31

● Structure

Silicon N-channel MOSFET

● Features

- 1) Built-in G-S Protection Diode.
- 2) Small Surface Mount Package (MPT6).
- 3) Low voltage drive. (4V)

● Application

Switching

● Packaging specifications

| Type | Package | Taping |
|--------|------------------------------|--------|
| | Code | TR |
| | Basic ordering unit (pieces) | 1000 |
| MP6K31 | | ○ |

● Absolute maximum ratings (Ta = 25°C)

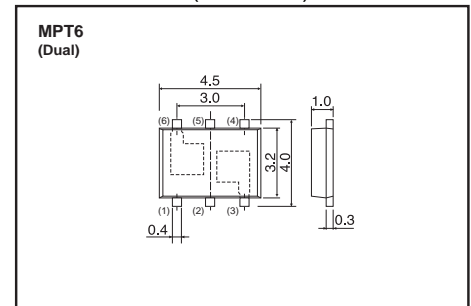
<It is the same ratings for Tr1 and Tr2.>

| Parameter | Symbol | Limits | Unit |
|------------------------------|------------|---------------|-------------|
| Drain-source voltage | V_{DSS} | 60 | V |
| Gate-source voltage | V_{GSS} | ± 20 | V |
| Drain current | Continuous | I_D | ± 2 A |
| | Pulsed | I_{DP}^{*1} | ± 8 A |
| Source current (Body Diode) | Continuous | I_S | 1.2 A |
| | Pulsed | I_{SP}^{*1} | 8 A |
| Power dissipation | P_D^{*2} | 2.0 | W / TOTAL |
| | | 1.4 | W / ELEMENT |
| Channel temperature | Tch | 150 | °C |
| Range of storage temperature | Tstg | -55 to +150 | °C |

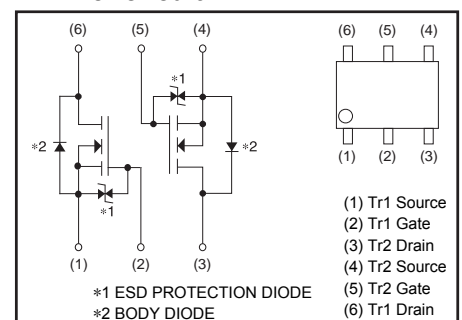
*1 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

*2 Mounted on a ceramic board.

● Dimensions (Unit : mm)



● Inner circuit



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

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|----------------|------|------|------|------|-----------------------------|
| Gate-source leakage | I_{GSS} | - | - | ±10 | μA | $V_{GS}=\pm 20V, V_{DS}=0V$ |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 60 | - | - | V | $I_D=1mA, V_{GS}=0V$ |
| Zero gate voltage drain current | I_{DSS} | - | - | 1 | μA | $V_{DS}=60V, V_{GS}=0V$ |
| Gate threshold voltage | $V_{GS(th)}$ | 1.0 | - | 2.5 | V | $V_{DS}=10V, I_D=1mA$ |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | - | 210 | 290 | mΩ | $I_D=2A, V_{GS}=10V$ |
| | | - | 240 | 330 | | $I_D=2A, V_{GS}=4.5V$ |
| | | - | 255 | 350 | | $I_D=2A, V_{GS}=4.0V$ |
| Forward transfer admittance | $ Y_{fs} ^*$ | 1.4 | - | - | S | $I_D=2A, V_{DS}=10V$ |
| Input capacitance | C_{iss} | - | 110 | - | pF | $V_{DS}=10V$ |
| Output capacitance | C_{oss} | - | 28 | - | pF | $V_{GS}=0V$ |
| Reverse transfer capacitance | C_{rss} | - | 12 | - | pF | $f=1MHz$ |
| Turn-on delay time | $t_{d(on)}^*$ | - | 6 | - | ns | $I_D=1A, V_{DD}=30V$ |
| Rise time | t_r^* | - | 10 | - | ns | $V_{GS}=10V$ |
| Turn-off delay time | $t_{d(off)}^*$ | - | 20 | - | ns | $R_L=30\Omega$ |
| Fall time | t_f^* | - | 9 | - | ns | $R_G=10\Omega$ |
| Total gate charge | Q_g^* | - | 2.0 | - | nC | $I_D=2A, V_{DD}=30V$ |
| Gate-source charge | Q_{gs}^* | - | 0.8 | - | nC | $V_{GS}=5V$ |
| Gate-drain charge | Q_{gd}^* | - | 0.4 | - | nC | |

*Pulsed

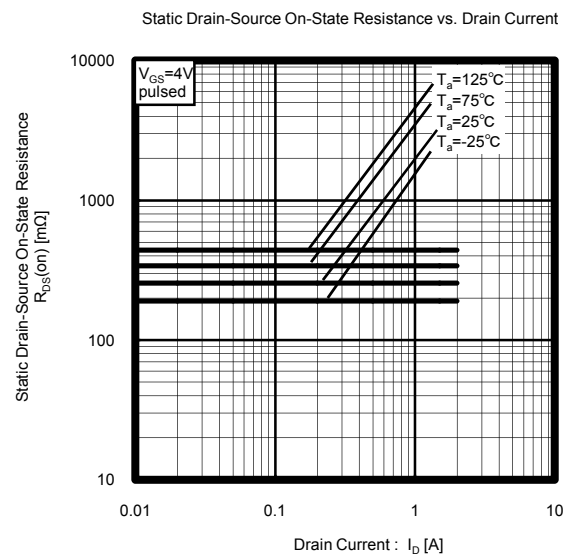
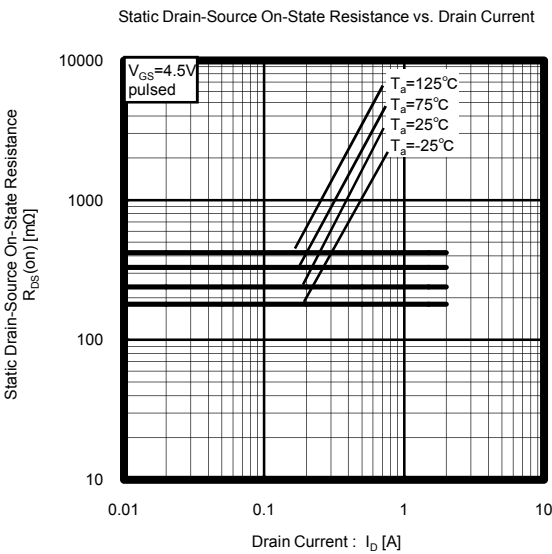
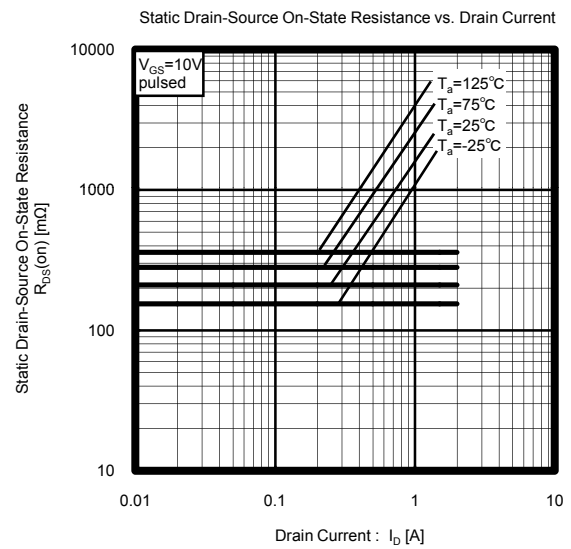
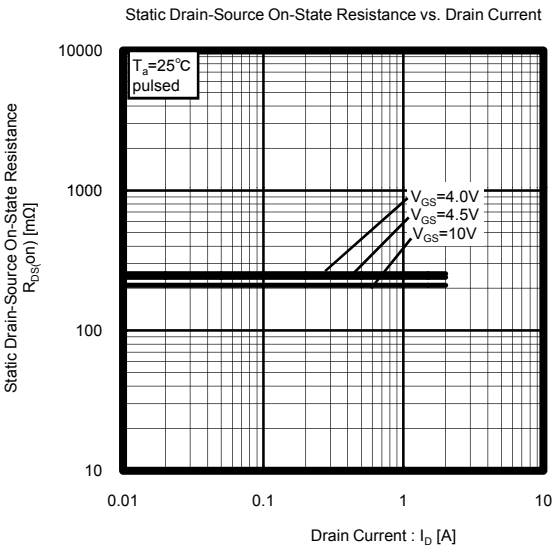
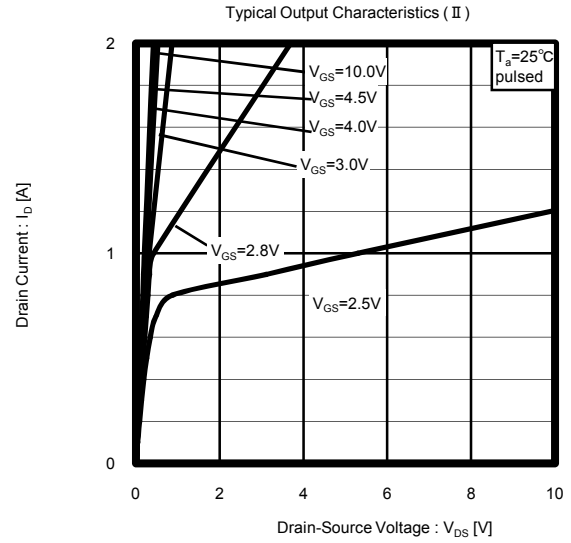
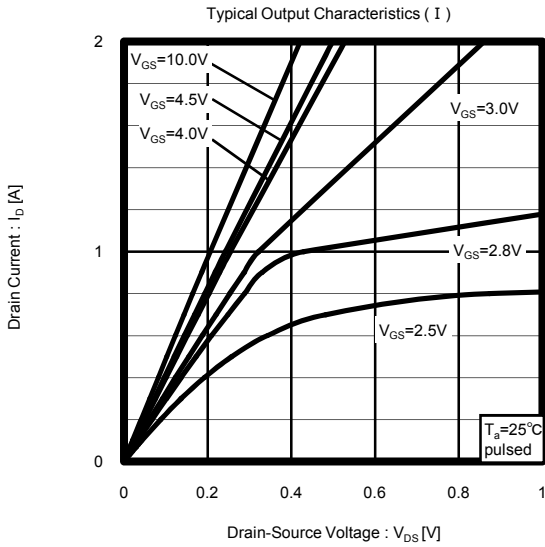
● **Body diode characteristics** (Source-Drain) (Ta = 25°C)

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

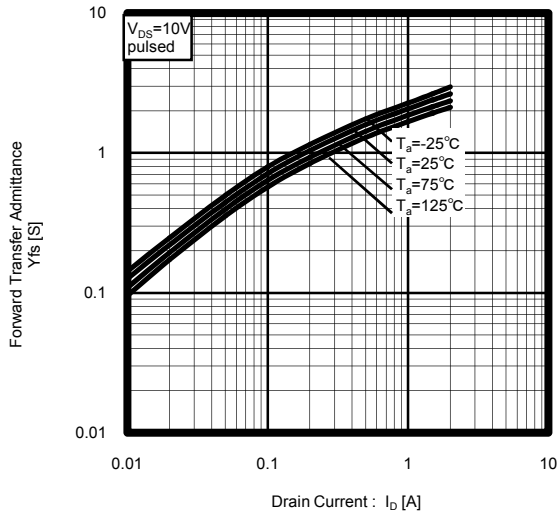
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------------|------------|------|------|------|------|-----------------------|
| Forward Voltage | V_{SD}^* | - | - | 1.2 | V | $I_S=1.2A, V_{GS}=0V$ |

*Pulsed

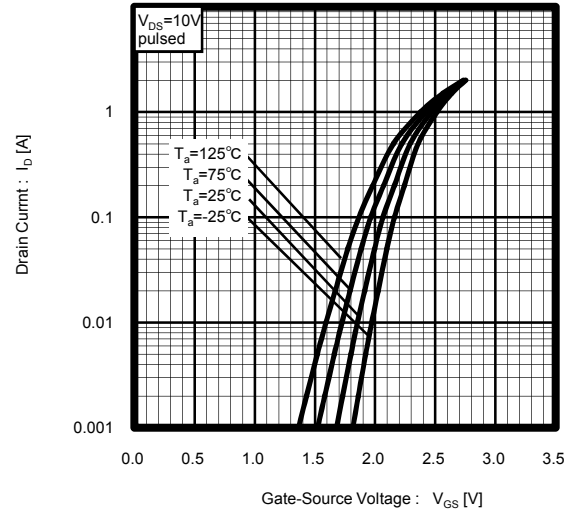
● Electrical characteristic curves (Ta = 25°C)



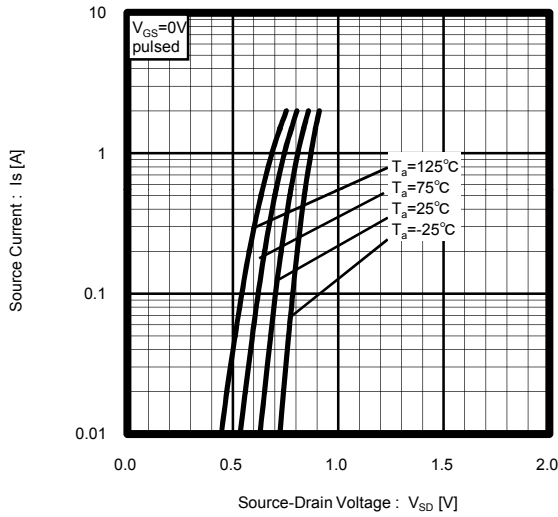
Forward Transfer Admittance vs. Drain Current



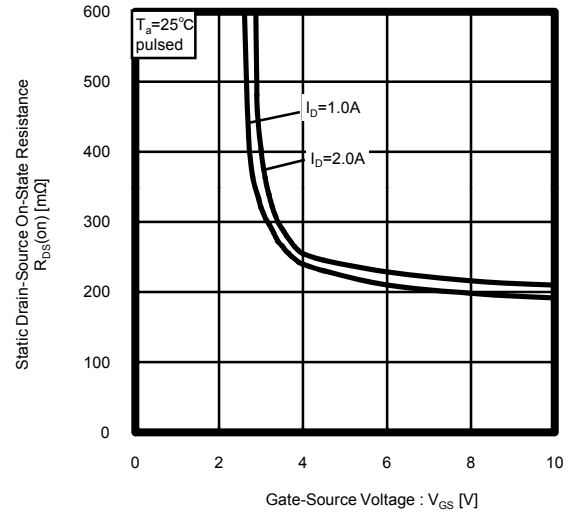
Typical Transfer Characteristics



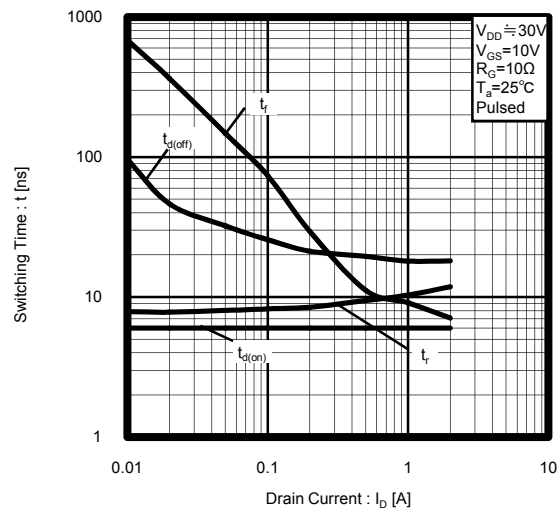
Source Current vs. Source-Drain Voltage



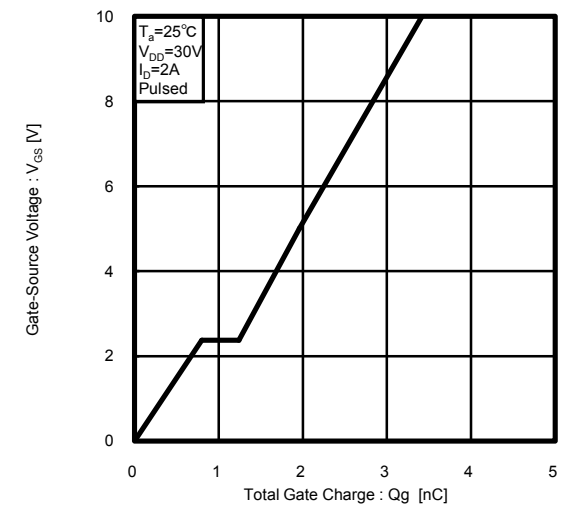
Static Drain-Source On-State Resistance vs. Gate-Source Voltage



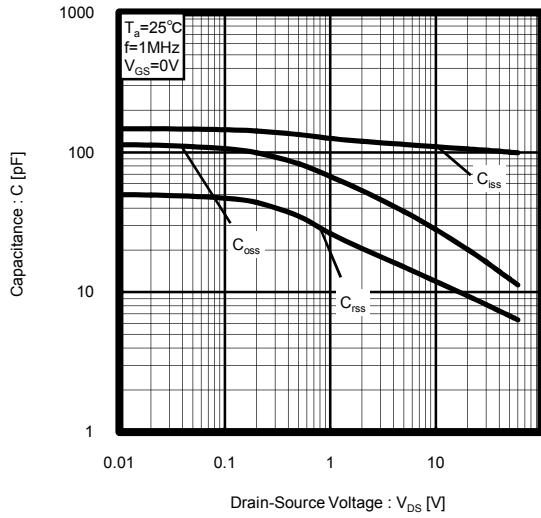
Switching Characteristics



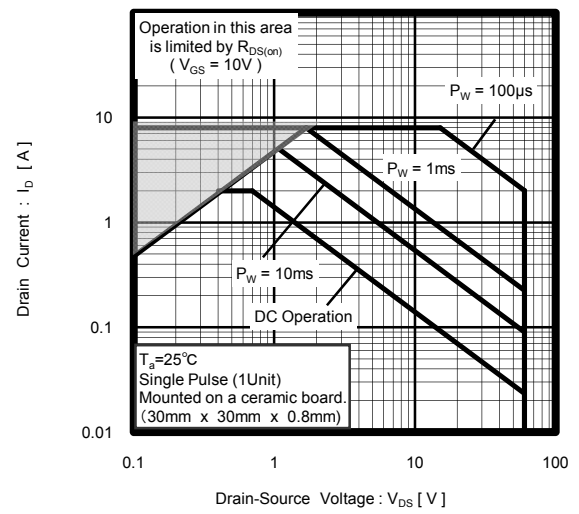
Dynamic Input Characteristics



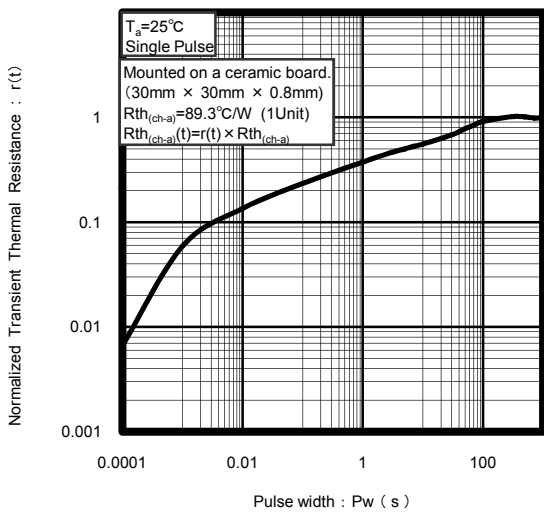
Typical Capacitance vs. Drain-Source Voltage



Maximum Safe Operating Area



Normalized Transient Thermal Resistance v.s. Pulse Width



● Measurement circuits

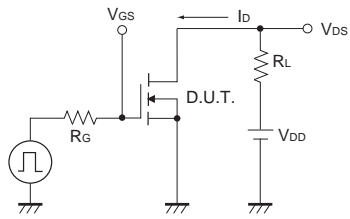


Fig.1-1 Switching time measurement circuit

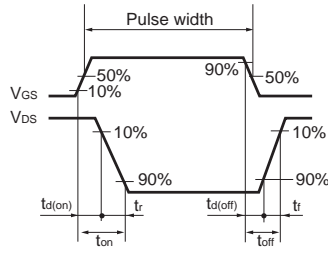


Fig.1-2 Switching waveforms

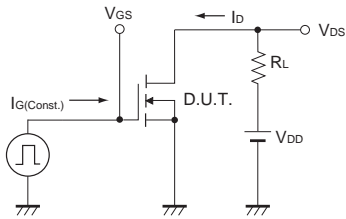


Fig.2-1 Gate charge measurement circuit

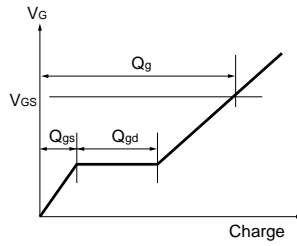


Fig.2-2 Gate Charge Waveform

Notes

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