# 1.5V Drive Pch MOSFET

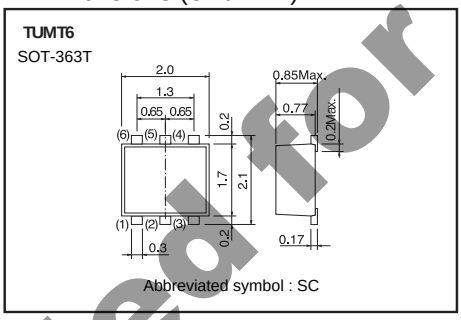
## RAL045P01

### ● Structure
Silicon P-channel MOSFET

### ● Features
1) Low On-resistance.
2) Small high power package.
3) Low voltage drive.(1.5V)

### ● Application
Switching

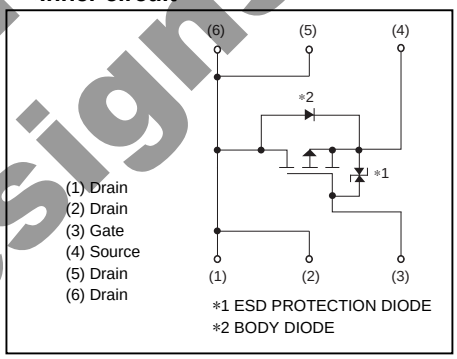
### ● Dimensions (Unit : mm)




### ● Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TCR |
| | Basic ordering unit (pieces) | 3000 |
| RAL045P01 | | O |

### ● Inner circuit




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

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | −12 | V |
| Gate-source voltage | | $V_{GSS}$ | 0 to −8 | V |
| Drain current | Continuous | $I_D$ | ±4.5 | A |
| | Pulsed | $I_{DP}$ *1 | ±18 | A |
| Source current (Body Diode) | Continuous | $I_S$ | −0.8 | A |
| | Pulsed | $I_{SP}$ *1 | −18 | A |
| Power dissipation | | $P_D$ *2 | 1 | W |
| Channel temperature | | Tch | 150 | °C |
| Range of storage temperature | | Tstg | −55 to +150 | °C |

*1 Pw≤10μs, Duty cycle≤1%
*2 Mounted on a ceramic board.

### ● Thermal resistance

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Channel to Ambient | Rth (ch-a)* | 125 | °C / W |

*Mounted on a ceramic board.

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | - | - | −10 | μA | $V_{GS}$=−8V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | −12 | - | - | V | $I_D$=−1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | −10 | μA | $V_{DS}$=−12V, $V_{GS}$=0V |
| Gate threshold voltage | $V_{GS\ (th)}$ | −0.3 | - | −1.0 | V | $V_{DS}$=−6V, $I_D$=−1mA |
| Static drain-source on-state resistance | $R_{DS\ (on)}$* | - | 22 | 30 | mΩ | $I_D$=−4.5A, $V_{GS}$=−4.5V |
| | | - | 28 | 39 | | $I_D$=−2.2A, $V_{GS}$=−2.5V |
| | | - | 38 | 57 | | $I_D$=−2.2A, $V_{GS}$=−1.8V |
| | | - | 50 | 100 | | $I_D$=−0.9A, $V_{GS}$=−1.5V |
| Forward transfer admittance | $\|Y_{fs}\|$* | 5.5 | - | - | S | $I_D$=−4.5A, $V_{DS}$=−6V |
| Input capacitance | $C_{iss}$ | - | 4200 | - | pF | $V_{DS}$=−6V |
| Output capacitance | $C_{oss}$ | - | 350 | - | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | - | 330 | - | pF | f=1MHz |
| Turn-on delay time | $t_{d(on)}$* | - | 16 | - | ns | $I_D$=−2.2A, $V_{DD}$≒−6V |
| Rise time | $t_r$ * | - | 60 | - | ns | $V_{GS}$=−4.5V |
| Turn-off delay time | $t_{d(off)}$* | - | 400 | - | ns | $R_L$=2.7Ω |
| Fall time | $t_f$ * | - | 150 | - | ns | $R_G$=10Ω |
| Total gate charge | $Q_g$ * | - | 40 | - | nC | $I_D$=−4.5A |
| Gate-source charge | $Q_{gs}$ * | - | 6.5 | - | nC | $V_{DD}$≒−6V |
| Gate-drain charge | $Q_{gd}$ * | - | 6.0 | - | nC | $V_{GS}$=−4.5V |

*Pulsed

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_{SD}$* | - | - | −1.2 | V | $I_s$=−4.5A, $V_{GS}$=0V |

*Pulsed

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## ●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical output characteristics(Ⅰ)

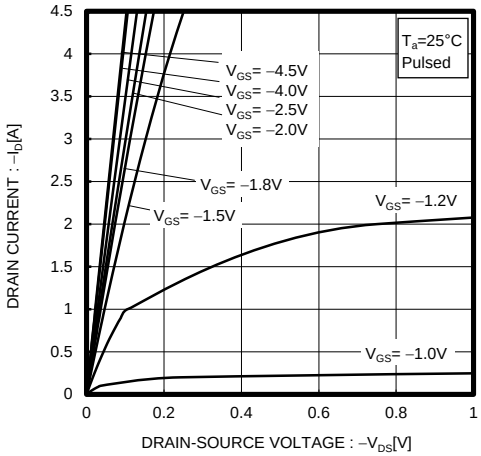



Fig.2 Typical output characteristics(Ⅱ)

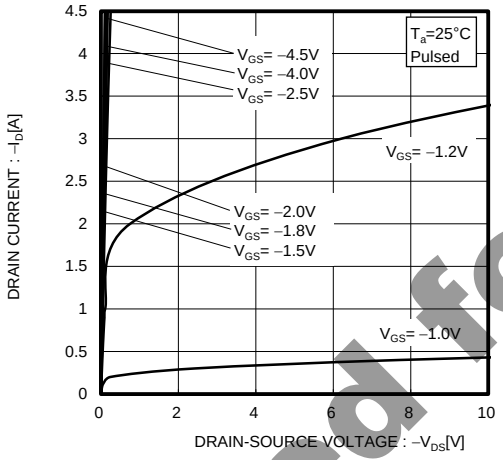



Fig.3 Typical Transfer Characteristics

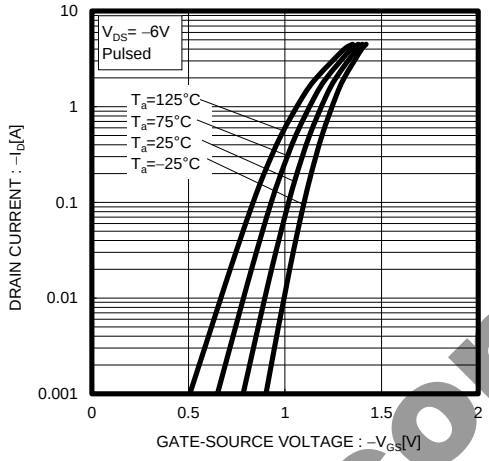



Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

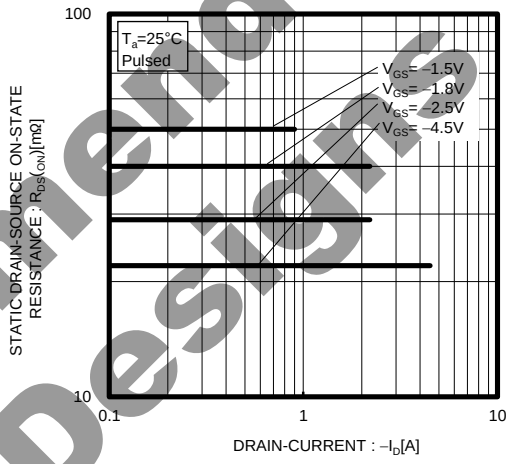



Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

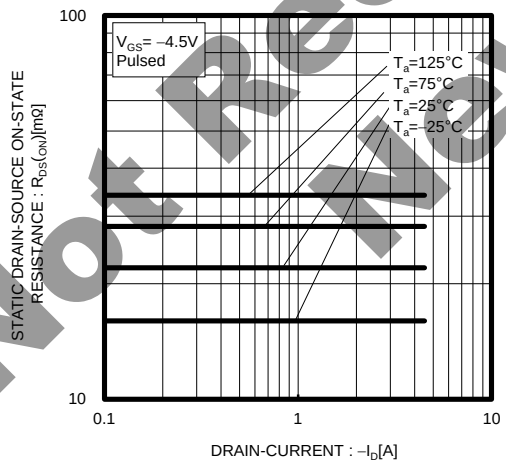
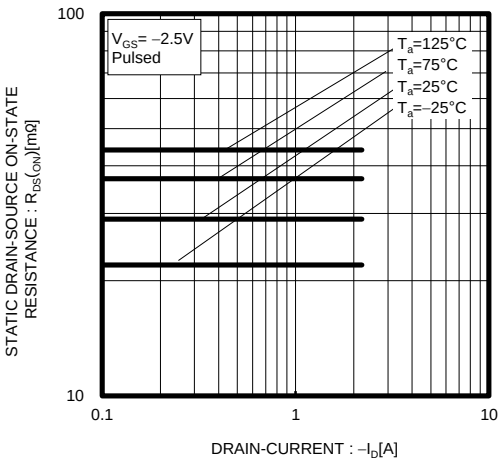



Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)




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

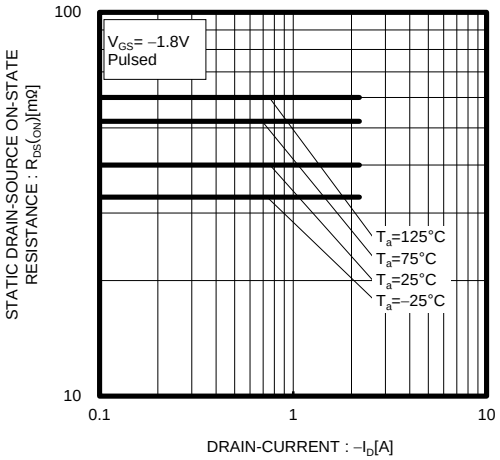



Fig.8 Static Drain-Source On-State Resistance vs. Drain Current(Ⅴ)

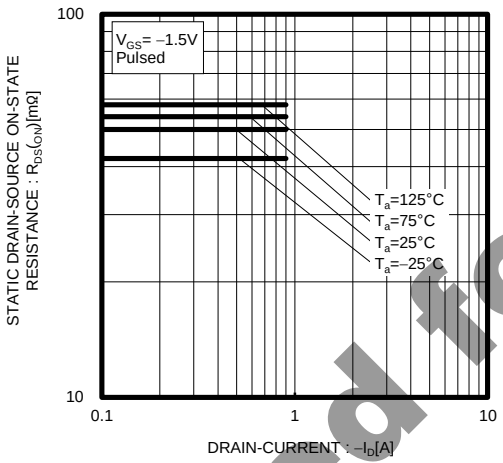



Fig.9 Forward Transfer Admittance vs. Drain Current

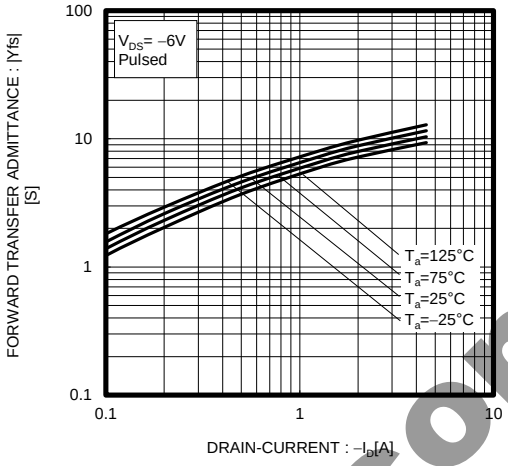



Fig.10 Reverse Drain Current vs. Sourse-Drain Voltage

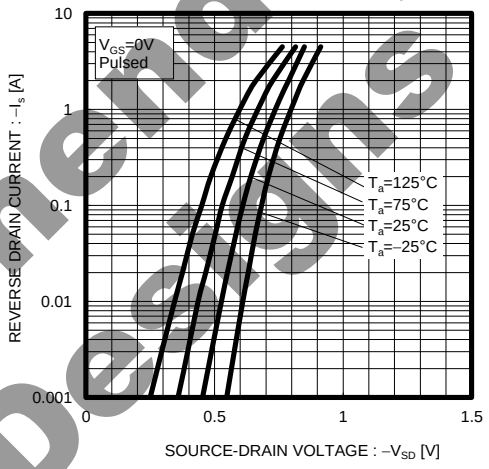



Fig.11 Static Drain-Source On-State Resistance vs. Gate Source Voltage

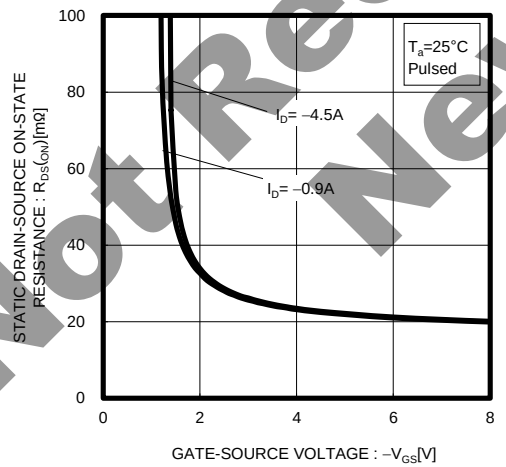
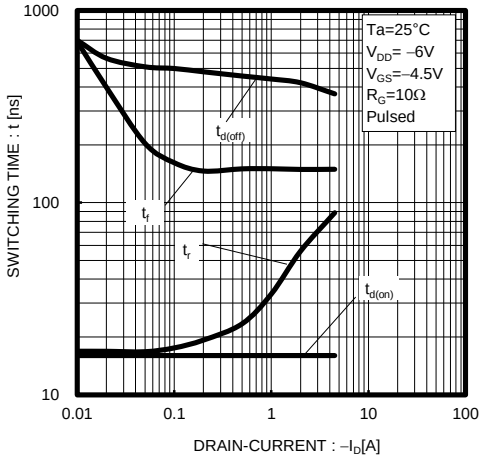



Fig.12 Switching Characteristics




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Fig.13 Dynamic Input Characteristics

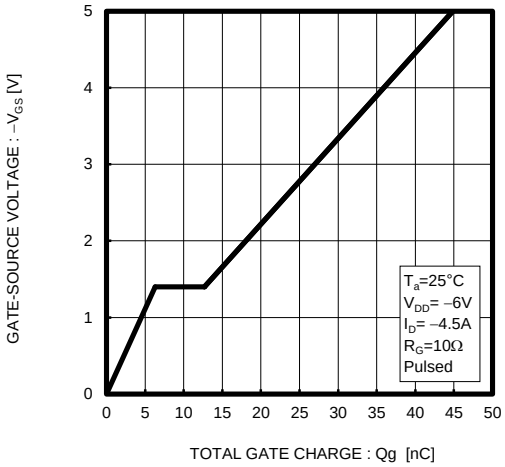
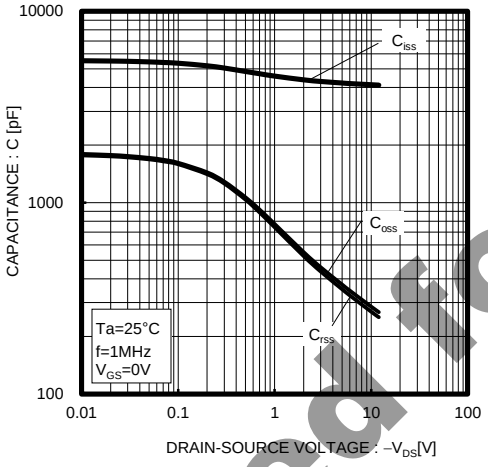



Fig.14 Typical Capacitance vs. Drain-Source Voltage




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● **Measurement circuits**

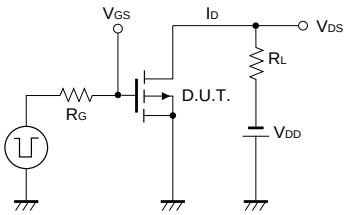



Fig.1-1 Switching Time Measurement Circuit

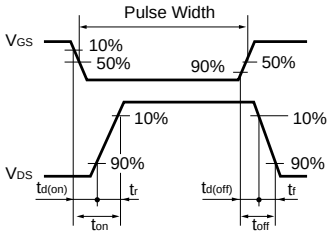



Fig.1-2 Switching Waveforms

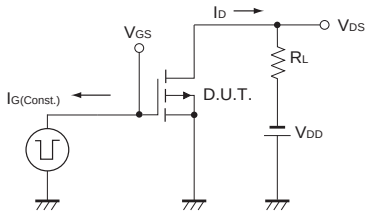



Fig.2-1 Gate Charge Measurement Circuit

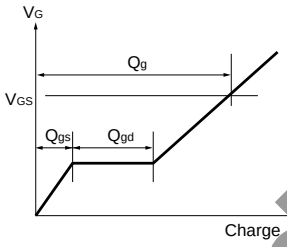



Fig.2-2 Gate Charge Waveform

● **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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