# 4V Drive Pch MOSFET

## RRR040P03

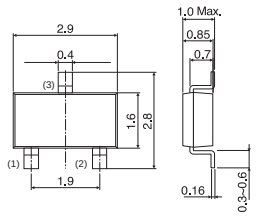
### ● Structure
Silicon P-channel MOSFET

### ● Features
1) Low On-resistance.
2) Space saving small surface mount package (TSMT3).
3) 4V drive.

### ● Application
Switching

### ● Dimensions (Unit : mm)

TSMT3

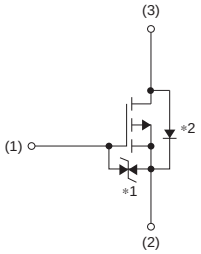



Abbreviated symbol : UG

### ● Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TL |
| | Basic ordering unit (pieces) | 3000 |
| RRR040P03 | | ○ |

### ● Inner circuit




(1) Gate
(2) Source
(3) Drain

∗1 ESD PROTECTION DIODE
∗2 BODY DIODE

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

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | −30 | V |
| Gate-source voltage | | $V_{GSS}$ | ±20 | V |
| Drain current | Continuous | $I_D$ | ±4 | A |
| | Pulsed | $I_{DP}$ *1 | ±16 | A |
| Source current (Body Diode) | Continuous | $I_S$ | −0.8 | A |
| | Pulsed | $I_{SP}$ *1 | −16 | A |
| Power dissipation | | $P_D$ *2 | 1.0 | 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.

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | - | - | ±10 | μA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | −30 | - | - | V | $I_D$=−1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | −1 | μA | $V_{DS}$=−30V, $V_{GS}$=0V |
| Gate threshold voltage | $V_{GS\ (th)}$ | −1.0 | - | −2.5 | V | $V_{DS}$=−10V, $I_D$=−1mA |
| Static drain-source on-state resistance | $R_{DS\ (on)}$ * | - | 32 | 45 | mΩ | $I_D$=−4A, $V_{GS}$=−10V |
| | | - | 45 | 63 | | $I_D$=−2A, $V_{GS}$=−4.5V |
| | | - | 52 | 72 | | $I_D$=−2A, $V_{GS}$=−4.0V |
| Forward transfer admittance | $\|Y_{fs}\|$ * | 2.7 | - | - | S | $I_D$=−4A, $V_{DS}$=−10V |
| Input capacitance | $C_{iss}$ | - | 1000 | - | pF | $V_{DS}$=−10V |
| Output capacitance | $C_{oss}$ | - | 150 | - | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | - | 130 | - | pF | f=1MHz |
| Turn-on delay time | $t_{d(on)}$* | - | 15 | - | ns | $I_D$=−2A, $V_{DD}$≒−15V |
| Rise time | $t_r$ * | - | 30 | - | ns | $V_{GS}$=−10V |
| Turn-off delay time | $t_{d(off)}$* | - | 85 | - | ns | $R_L$=7.5Ω |
| Fall time | $t_f$ * | - | 45 | - | ns | $R_G$=10Ω |
| Total gate charge | $Q_g$ * | - | 10.5 | - | nC | $I_D$=−4A, $V_{DD}$≒−15V |
| Gate-source charge | $Q_{gs}$ * | - | 3.0 | - | nC | $V_{GS}$=−5V $R_L$=3.8Ω |
| Gate-drain charge | $Q_{gd}$ * | - | 3.3 | - | nC | $R_G$=10Ω |

*Pulsed

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_{SD}$ * | - | - | −1.2 | V | $I_s$=−4A, $V_{GS}$=0V |

*Pulsed

## ● Electrical characteristics curves

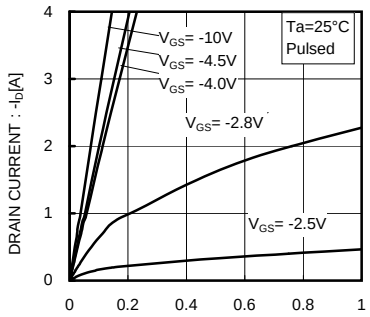



Fig.1 Typical Output Characteristics( Ⅰ )

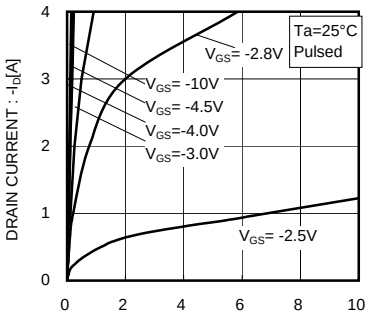



Fig.2 Typical Output Characteristics( Ⅱ )

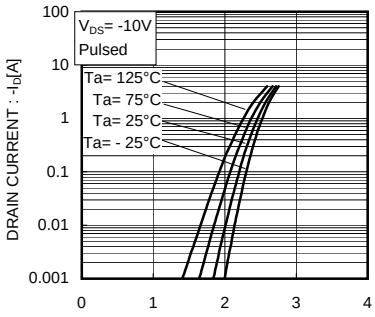



Fig.3 Typical Transfer Characteristics

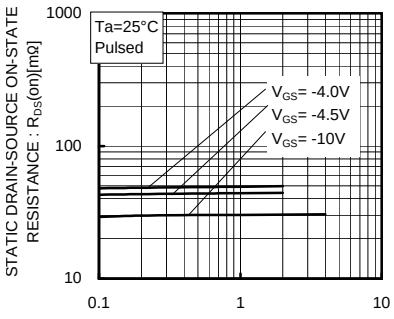



Fig.4 Static Drain-Source On-State Resistance vs. Drain Current( Ⅰ )

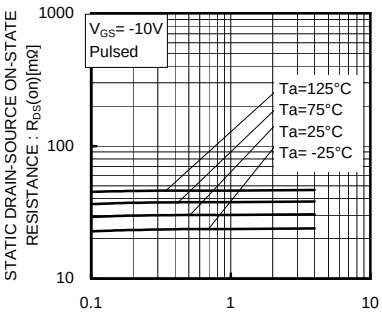



Fig.5 Static Drain-Source On-State Resistance vs. Drain Current( Ⅱ )

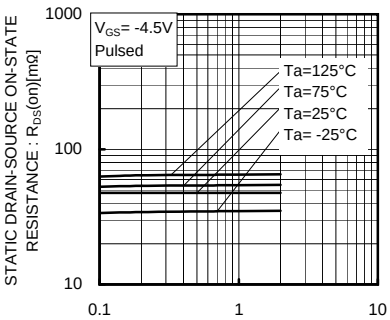



Fig.6 Static Drain-Source On-State Resistance vs. Drain Current( Ⅲ )

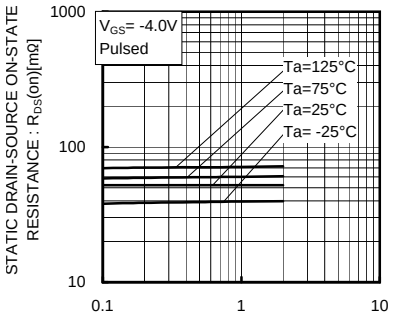



Fig.7 Static Drain-Source On-State Resistance vs. Drain Current( Ⅳ )

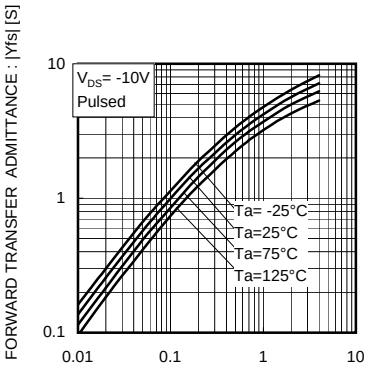



Fig.8 Forward Transfer Admittance vs. Drain Current

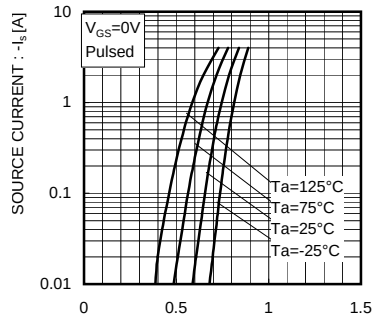



Fig.9 Reverse Drain Current vs. Sourse-Drain Voltage

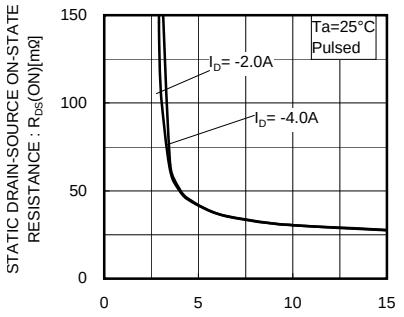



Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

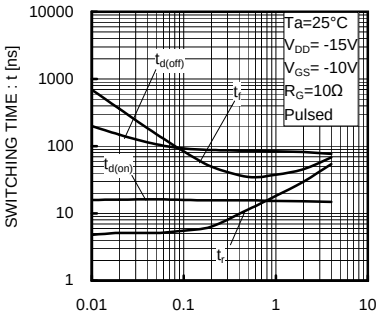



Fig.11 Switching Characteristics

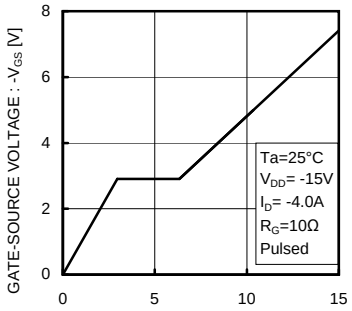



Fig.12 Dynamic Input Characteristics

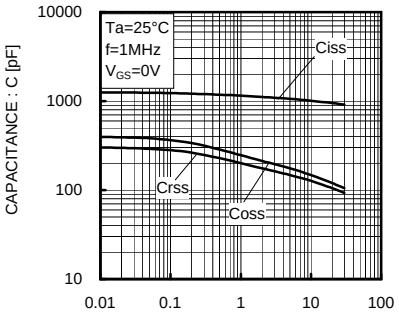



Fig.13 Typical Capacitance vs. Drain-Source Voltage

## ● Measurement circuits

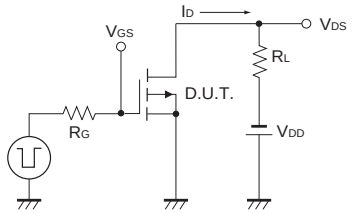



Fig.1-1 Switching time measurement circuit

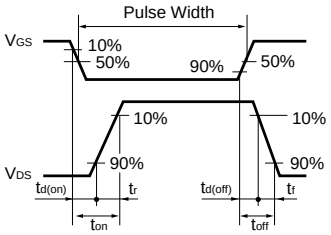



Fig.1-2 Switching Waveforms

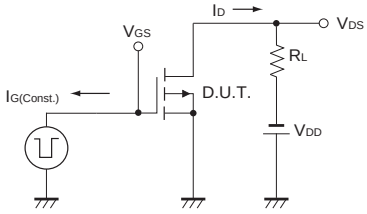



Fig.2-1 Gate charge measurement circuit

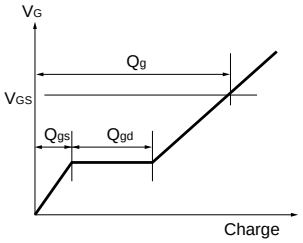



Fig.2-2 Gate Charge Waveform

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