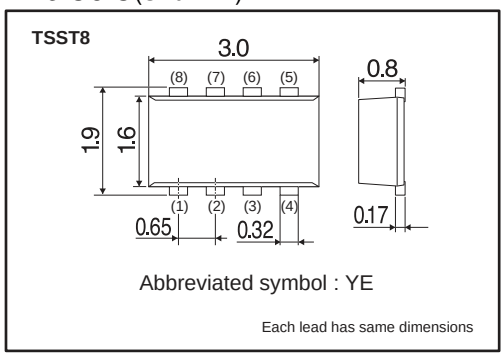
# 1.5V Drive Pch MOSFET

## RT1A040ZP

### ●Structure
Silicon P-channel MOSFET

### ●Features
1) Low on-resistance.
2) High power package.
3) Low voltage drive. (1.5V)

### ●Dimensions (Unit : mm)

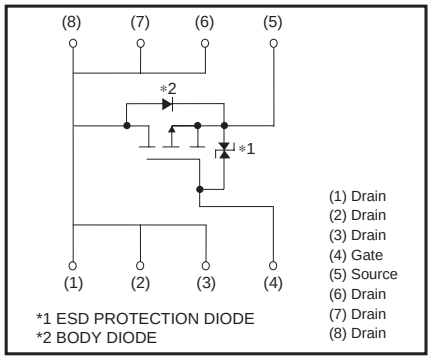



### ●Applications
Switching

### ●Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TR |
| | Basic ordering unit(piecies) | 3000 |
| RT1A040ZP | | ○ |

### ●Equivalent circuit




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

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | −12 | V |
| Gate-source voltage | | $V_{GSS}$ | ±10 | V |
| Drain current | Continuous | $I_D$ | ±4 | A |
| | Pulsed | $I_{DP}$ *1 | ±16 | A |
| Source current (Body diode) | Continuous | $I_S$ | −1 | A |
| | Pulsed | $I_{SP}$ *1 | −16 | A |
| Total power dissipation | | $P_D$ | 1.25 | W *2 |
| Channel temperature | | Tch | 150 | °C |
| Range of Storage temerature | | Tstg | −55 to +150 | °C |

*1 Pw≦10μs, Duty cycle≦1%
*2 When mounted on a ceramic board

### ●Thermal resistance

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Channel to ambient | Rth(ch-a) * | 100 | °C / W |

* When mounted on a ceramic board

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | – | – | ±10 | μA | $V_{GS}$=±10V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)\ DSS}$ | –12 | – | – | V | $I_D$= –1mA, $V_{GS}$=0V |
| Zero gete voltage drain current | $I_{DSS}$ | – | – | –1 | 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 | $I_D$= –4A, $V_{GS}$= –4.5V |
| | | – | 30 | 42 | mΩ | $I_D$= –2A, $V_{GS}$= –2.5V |
| | | – | 40 | 60 | mΩ | $I_D$= –2A, $V_{GS}$= –1.8V |
| | | – | 55 | 110 | mΩ | $I_D$= –0.8A, $V_{GS}$= –1.5V |
| Forward transfer admittance | $\|Y_{fs}\|$* | 6.5 | – | – | S | $V_{DS}$= –6V, $I_D$= –4A |
| Input capacitance | $C_{iss}$ | – | 2350 | – | pF | $V_{DS}$= –6V |
| Output capacitance | $C_{oss}$ | – | 310 | – | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | – | 280 | – | pF | f=1MHz |
| Turn-on delay time | $t_{d\ (on)}$ * | – | 11 | – | ns | $V_{DD}$ ≒ –6V<br>$I_D$= –2A<br>$V_{GS}$= –4.5V<br>$R_L$ ≒ 3Ω<br>$R_G$=10Ω |
| Rise time | $t_r$ * | – | 70 | – | ns | |
| Turn-off delay time | $t_{d\ (off)}$ * | – | 380 | – | ns | |
| Fall time | $t_f$ * | – | 210 | – | ns | |
| Total gate charge | $Q_g$ * | – | 30 | – | nC | $V_{DD}$ ≒ –6V $R_L$ ≒ 1.5Ω |
| Gate-source charge | $Q_{gs}$ * | – | 4.0 | – | nC | $I_D$= –4A $R_G$=10Ω |
| Gate-drain charge | $Q_{gd}$ * | – | 3.5 | – | 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 | $I_S$= –4A, $V_{GS}$=0V |

*Pulsed

## ●Electrical characteristic curves

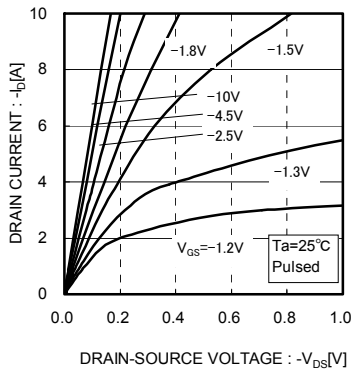



Fig.1 Typical Output Characteristics(Ⅰ)

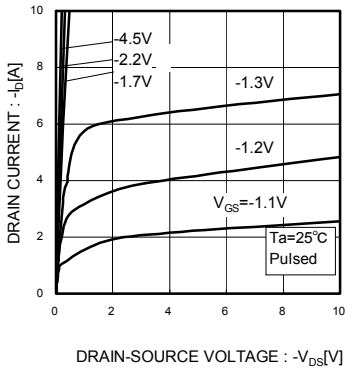



Fig.2 Typical Output Characteristics(Ⅱ)

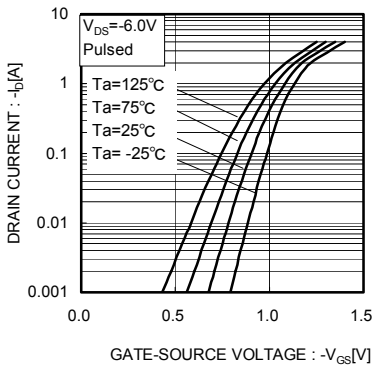



Fig.3 Typical Transfer Characteristics

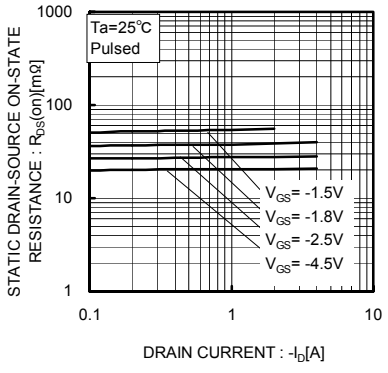



Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

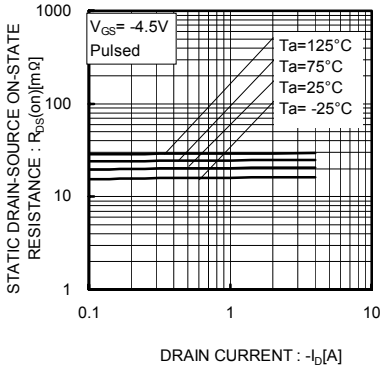



Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

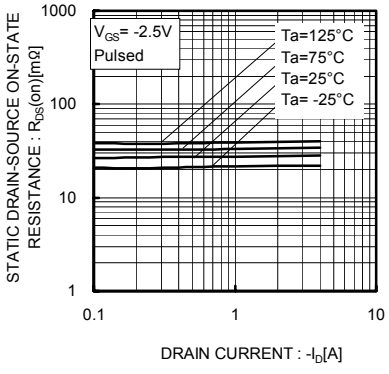



Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

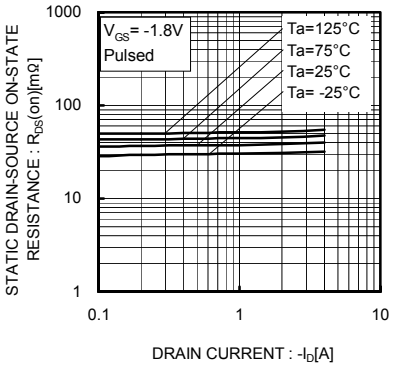



Fig.7 Static Drain-Source On-State Resistance vs. Drain

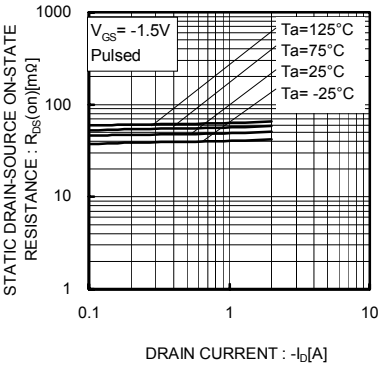



Fig.8 Static Drain-Source On-State Resistance vs. Drain

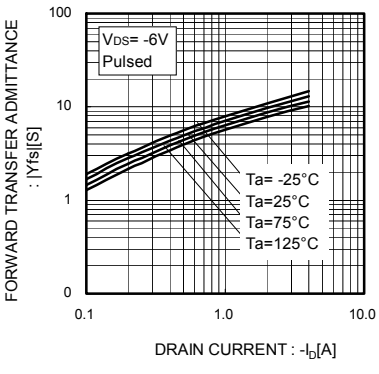



Fig.9 Forward Transfer Admittance vs. Drain Current

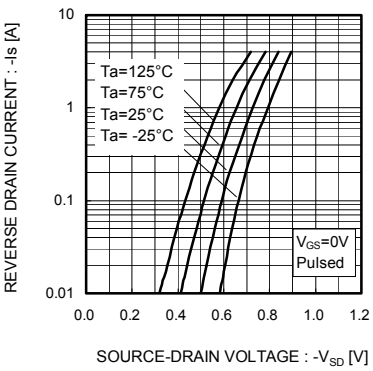



Fig.10 Reverse Drain Current vs. Sourse-Drain

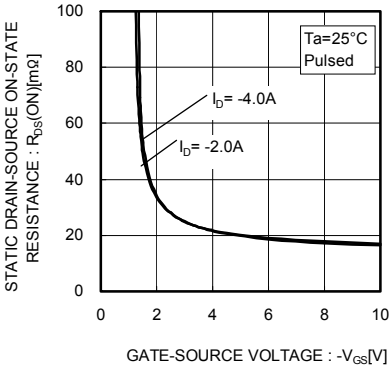



Fig.11 Static Drain-Source On-State Resistance vs. Gate Source

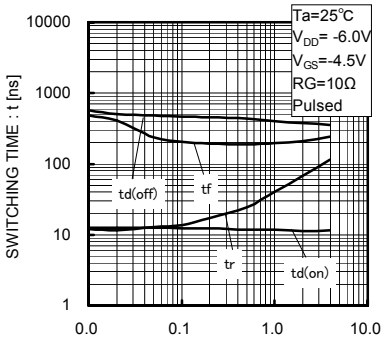



Fig.12 Switching Characteristics

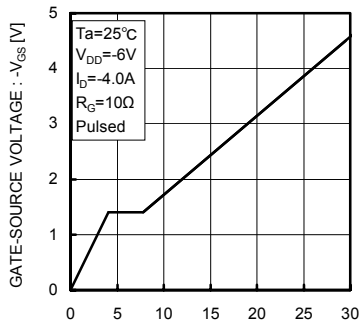



Fig.13 Dynamic Input Characteristics

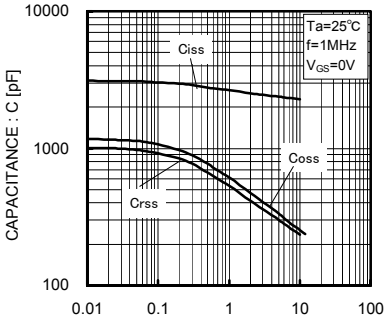



Fig.14 Typical Capacitance vs. Drain-Source

●**Measurement circuits**

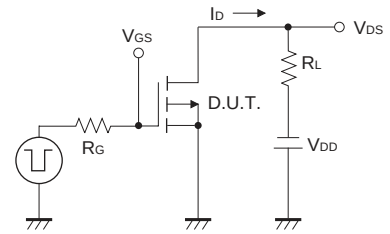



Fig.1-1 Switching Time Measurement Circuit

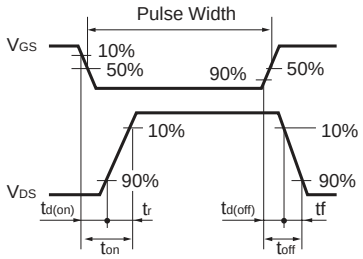



Fig.1-2 Switching Waveforms

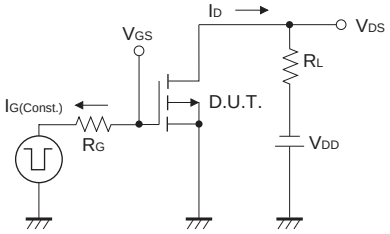



Fig.2-1 Gate Charge Measurement Circuit

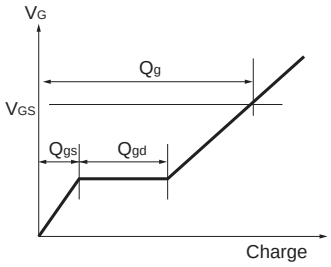



FIg.2-2 Gate Charge Waveform

●**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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