

# Switching (−30V, −9.0A)

## RSS090P03

### ●Features

- 1) Low On-resistance.
- 2) Built-in G-S Protection Diode.
- 3) Small and Surface Mount Package (SOP8).

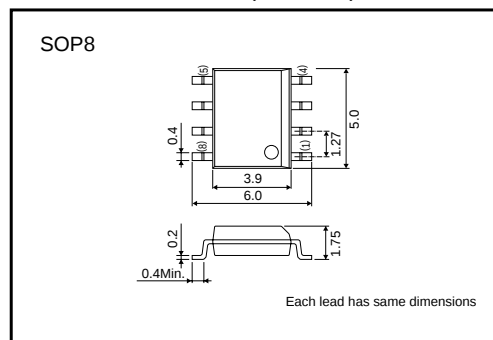
### ●Application

Power switching, DC / DC converter.

### ●Structure

Silicon P-channel  
MOS FET

### ●External dimensions (Unit : mm)



### ●Packaging specifications

| Type      | Package                      | Taping |
|-----------|------------------------------|--------|
|           | Code                         | TB     |
|           | Basic ordering unit (pieces) | 2500   |
| RSS090P03 |                              | ○      |

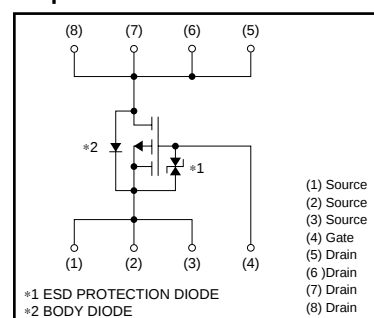
### ●Absolute maximum ratings (Ta=25°C)

| Parameter                    |            | Symbol    | Limits      | Unit |
|------------------------------|------------|-----------|-------------|------|
| Drain-source voltage         |            | $V_{DS}$  | −30         | V    |
| Gate-source voltage          |            | $V_{GS}$  | ±20         | V    |
| Drain current                | Continuous | $I_D$     | ±9.0        | A    |
|                              | Pulsed     | $I_{DP}$  | ±36         | A *1 |
| Source current (Body diode)  | Continuous | $I_S$     | −1.6        | A    |
|                              | Pulsed     | $I_{SP}$  | −36         | A *1 |
| Total power dissipation      |            | $P_D$     | 2.0         | W *2 |
| Channel temperature          |            | $T_{ch}$  | 150         | °C   |
| Range of Storage temperature |            | $T_{stg}$ | −55 to +150 | °C   |

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

\*2 Mounted on a ceramic board

### ●Equivalent circuit



### ●Thermal resistance (Ta=25°C)

| Parameter          | Symbol          | Limits | Unit     |
|--------------------|-----------------|--------|----------|
| Channel to ambient | $R_{th (ch-a)}$ | 62.5   | °C / W * |

\* Mounted on a ceramic board.

## Transistors

## ●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 | $R_{DS(on)}$ * | —    | 10   | 14   | mΩ   | $I_D = -9.0A$ , $V_{GS} = -10V$  |
|                                         |                | —    | 15   | 21   | mΩ   | $I_D = -4.5A$ , $V_{GS} = -4.5V$ |
|                                         |                | —    | 17   | 23   | mΩ   | $I_D = -4.5A$ , $V_{GS} = -4.0V$ |
| Forward transfer admittance             | $ Y_{fs} $ *   | 6.0  | —    | —    | S    | $V_{DS} = -10V$ , $I_D = -4.5A$  |
| Input capacitance                       | $C_{iss}$      | —    | 4000 | —    | pF   | $V_{DS} = -10V$                  |
| Output capacitance                      | $C_{oss}$      | —    | 750  | —    | pF   | $V_{GS}=0V$                      |
| Reverse transfer capacitance            | $C_{rss}$      | —    | 580  | —    | pF   | $f=1MHz$                         |
| Turn-on delay time                      | $t_{d(on)}$ *  | —    | 25   | —    | ns   | $I_D = -4.5A$                    |
| Rise time                               | $t_r$ *        | —    | 50   | —    | ns   | $V_{DD} = -15V$                  |
| Turn-off delay time                     | $t_{d(off)}$ * | —    | 150  | —    | ns   | $V_{GS} = -10V$                  |
| Fall time                               | $t_f$ *        | —    | 80   | —    | ns   | $R_L=3.3Ω$                       |
| Total gate charge                       | $Q_g$          | —    | 39   | —    | nC   | $V_{DD} = -15V$                  |
| Gate-source charge                      | $Q_{gs}$       | —    | 7.0  | —    | nC   | $V_{GS} = -5V$                   |
| Gate-drain charge                       | $Q_{gd}$       | —    | 15   | —    | nC   | $I_D = -9.0A$                    |

\*Pulsed

## Body diode characteristics (source-drain characteristics)

|                 |          |   |   |      |   |                             |
|-----------------|----------|---|---|------|---|-----------------------------|
| Forward voltage | $V_{SD}$ | — | — | −1.2 | V | $I_S = -1.6A$ , $V_{GS}=0V$ |
|-----------------|----------|---|---|------|---|-----------------------------|

## Transistors

## ●Electrical characteristic curves

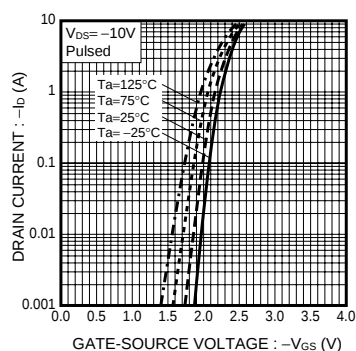


Fig.1 Typical Transfer Characteristics

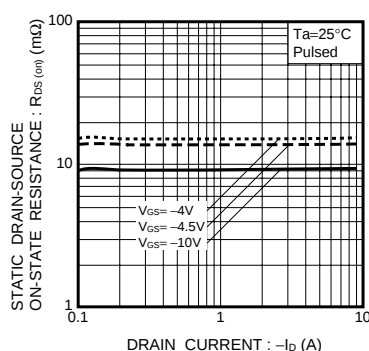


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

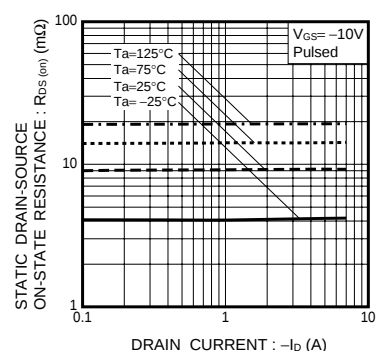


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

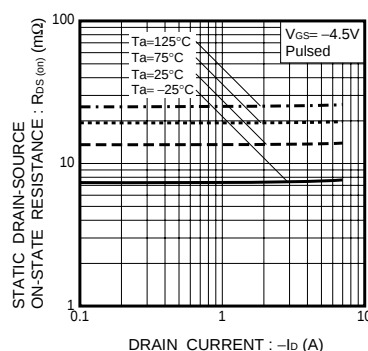


Fig.4 Static Drain-Source On-State vs. Drain Current

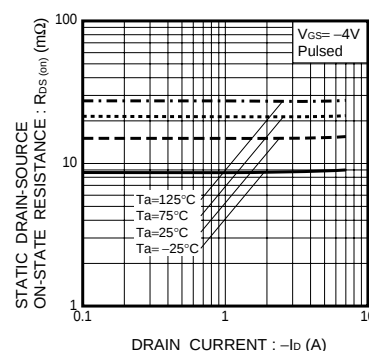


Fig.5 Static Drain-Source On-State vs. Drain Current

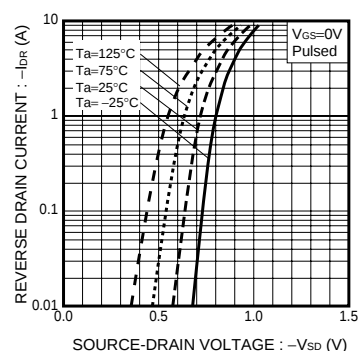


Fig.6 Reverse Drain Current Source-Drain Current

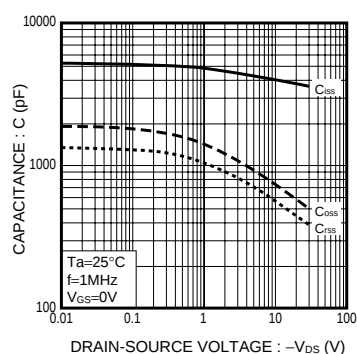


Fig.7 Typical Capacitance vs. Drain-Source Voltage

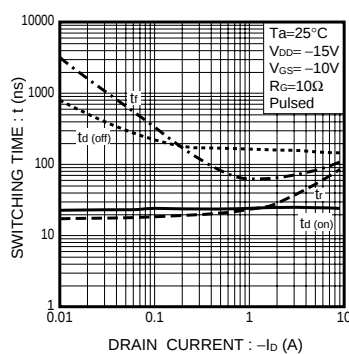


Fig.8 Switching Characteristics

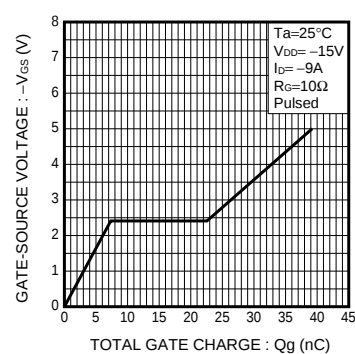


Fig.9 Dynamic Input Characteristics

## Transistors

### ●Measurement circuits

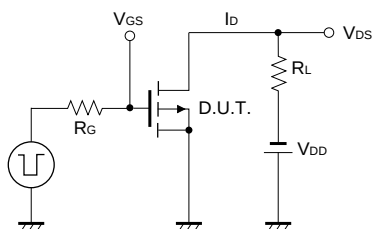


Fig.10 Switching Time Test Circuit

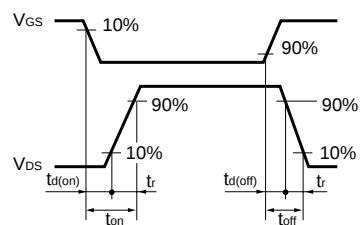


Fig.11 Switching Time Waveforms

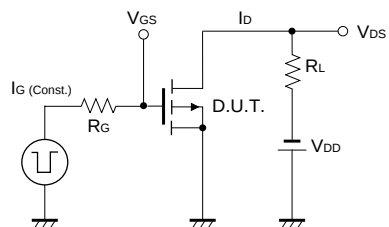


Fig.12 Gate Charge Test Circuit

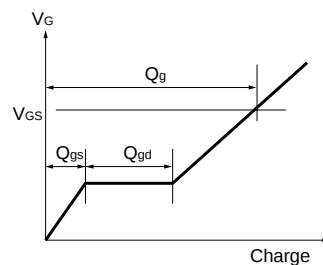


Fig.13 Gate Charge Waveform

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