

# Switching (−30V, −4.0A)

## RSS040P03

### ●Features

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

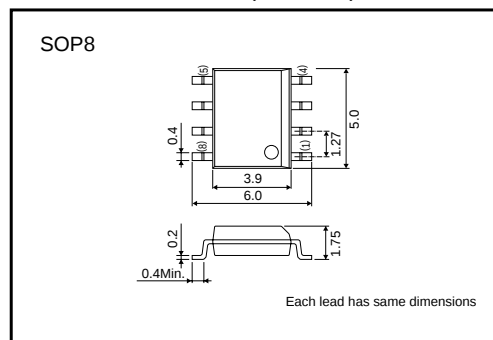
### ●Application

Power switching, DC / DC converter.

### ●Structure

Silicon P-channel  
MOS FET

### ●External dimensions (Unit : mm)



### ●Packaging specifications

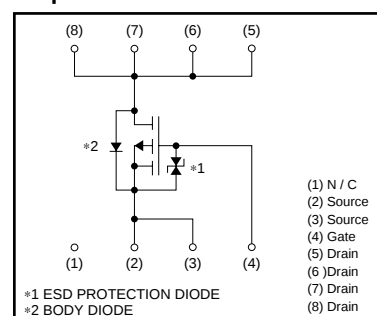
| Type      | Package                      | Taping |
|-----------|------------------------------|--------|
|           | Code                         | TB     |
|           | Basic ordering unit (pieces) | 2500   |
| RSS040P03 |                              | ○      |

### ●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 | $I_D$       | ±4.0 A   |
|                              | Pulsed     | $I_{DP}$    | ±16 A *1 |
| Source current (Body diode)  | Continuous | $I_S$       | −1.6 A   |
|                              | Pulsed     | $I_{SP}$    | −16 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                     | $I_{GSS}$      | —    | —    | $\pm 10$ | $\mu A$   | $V_{GS} = \pm 20V$ , $V_{DS} = 0V$ |
| Drain-source breakdown voltage          | $V_{(BR) DSS}$ | -30  | —    | —        | V         | $I_D = -1mA$ , $V_{GS} = 0V$       |
| Zero gate voltage drain current         | $I_{DSS}$      | —    | —    | -1       | $\mu A$   | $V_{DS} = -30V$ , $V_{GS} = 0V$    |
| Gate threshold voltage                  | $V_{GS(th)}$   | -1.0 | —    | -2.5     | V         | $V_{DS} = -10V$ , $I_D = -1mA$     |
| Static drain-source on-state resistance | $R_{DS(on)}$ * | —    | 42   | 58       | $m\Omega$ | $I_D = -4.0A$ , $V_{GS} = -10V$    |
|                                         |                | —    | 68   | 92       | $m\Omega$ | $I_D = -2.0A$ , $V_{GS} = -4.5V$   |
|                                         |                | —    | 78   | 106      | $m\Omega$ | $I_D = -2.0A$ , $V_{GS} = -4.0V$   |
| Forward transfer admittance             | $ Y_{fs} $ *   | 2.5  | —    | —        | S         | $V_{DS} = -10V$ , $I_D = -2.0A$    |
| Input capacitance                       | $C_{iss}$      | —    | 800  | —        | pF        | $V_{DS} = -10V$                    |
| Output capacitance                      | $C_{oss}$      | —    | 180  | —        | pF        | $V_{GS} = 0V$                      |
| Reverse transfer capacitance            | $C_{rss}$      | —    | 110  | —        | pF        | $f = 1MHz$                         |
| Turn-on delay time                      | $t_{d(on)}$ *  | —    | 12   | —        | ns        | $I_D = -2.0A$                      |
| Rise time                               | $t_r$ *        | —    | 25   | —        | ns        | $V_{DD} = -15V$                    |
| Turn-off delay time                     | $t_{d(off)}$ * | —    | 45   | —        | ns        | $V_{GS} = -10V$                    |
| Fall time                               | $t_f$ *        | —    | 15   | —        | ns        | $R_L = 7.5\Omega$                  |
| Total gate charge                       | $Q_g$          | —    | 8.0  | —        | nC        | $V_{DD} = -15V$                    |
| Gate-source charge                      | $Q_{gs}$       | —    | 2.5  | —        | nC        | $V_{GS} = -5V$                     |
| Gate-drain charge                       | $Q_{gd}$       | —    | 3.0  | —        | nC        | $I_D = -4.0A$                      |

\*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

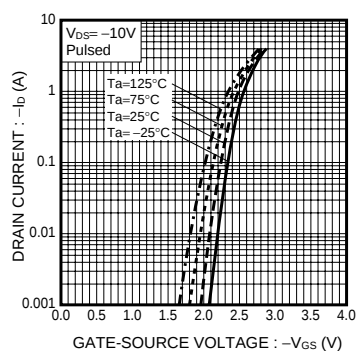


Fig.1 Typical Transfer Characteristics

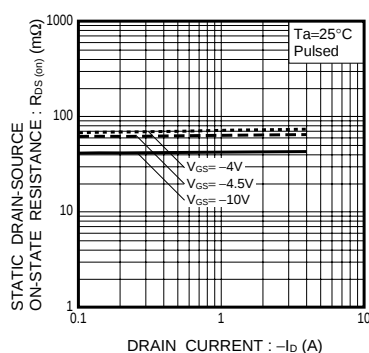


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

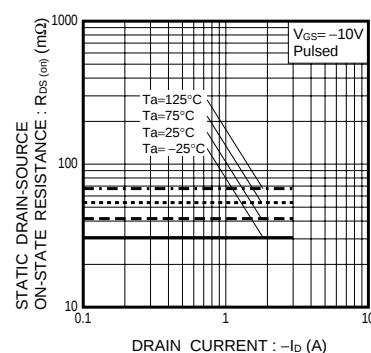


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

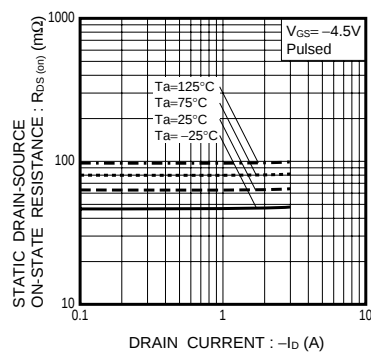


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

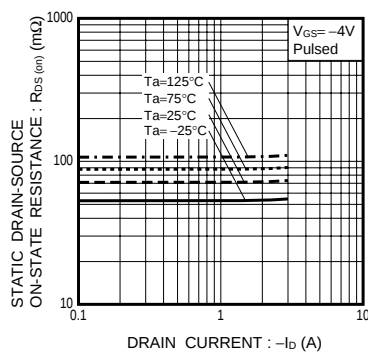


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

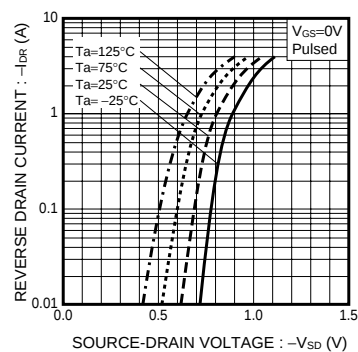


Fig.6 Reverse Drain Current Source-Drain Current

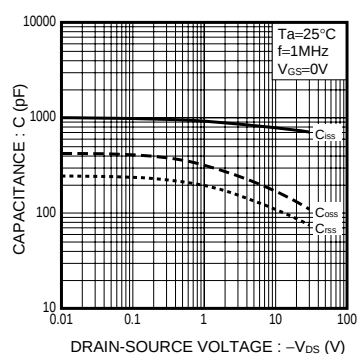


Fig.7 Typical Capacitance vs. Drain-Source Voltage

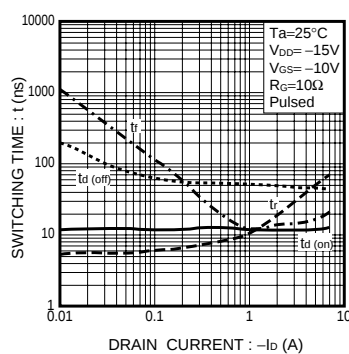


Fig.8 Switching Characteristics

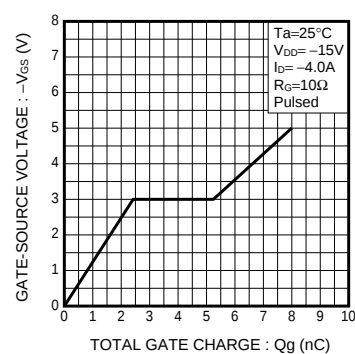


Fig.9 Dynamic Input Characteristics

## Transistors

### ●Measurement circuits

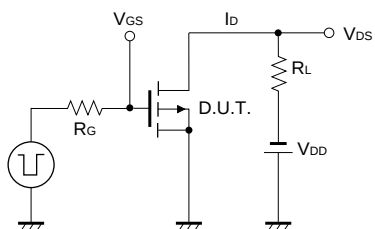


Fig.10 Switching Time Test Circuit

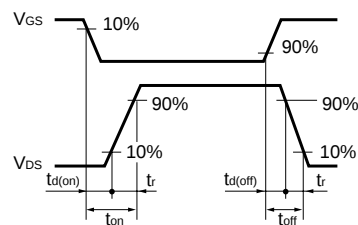


Fig.11 Switching Time Waveforms

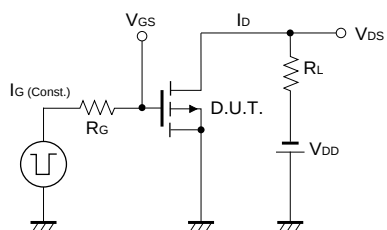


Fig.12 Gate Charge Test Circuit

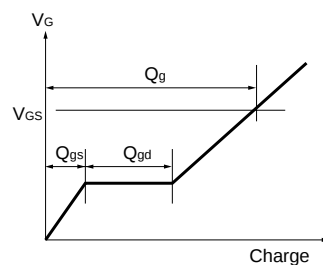


Fig.13 Gate Charge Waveform

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