

# 4V Drive Pch MOSFET

## RSD160P05

### ● Structure

Silicon P-channel MOSFET

### ● Features

- 1) Low on-resistance.
- 2) Fast switching speed.
- 3) Drive circuits can be simple.
- 4) Parallel use is easy.

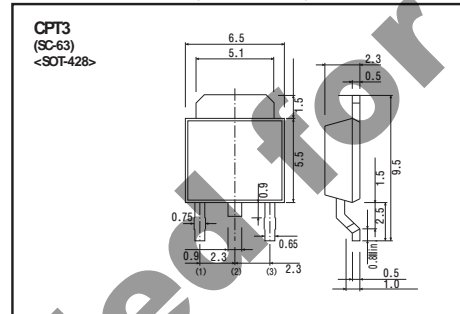
### ● Application

Switching

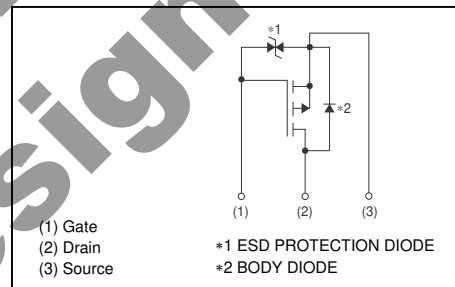
### ● Packaging specifications

| Type      | Package                      | Taping |
|-----------|------------------------------|--------|
|           | Code                         | TL     |
|           | Basic ordering unit (pieces) | 2500   |
| RSD160P05 |                              | ○      |

### ● Dimensions (Unit : mm)



### ● Inner circuit



### ● Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

| Parameter                    | Symbol     | Limits      | Unit             |
|------------------------------|------------|-------------|------------------|
| Drain-source voltage         | $V_{DSS}$  | -45         | V                |
| Gate-source voltage          | $V_{GSS}$  | $\pm 20$    | V                |
| Drain current                | Continuous | $I_D$       | $\pm 16$ A       |
|                              | Pulsed     | $I_{DP}$ *1 | $\pm 32$ A       |
| Source current (Body Diode)  | Continuous | $I_S$       | -16 A            |
|                              | Pulsed     | $I_{SP}$ *1 | -32 A            |
| Power dissipation            | $P_D$ *2   | 20          | W                |
| Channel temperature          | $T_{ch}$   | 150         | $^\circ\text{C}$ |
| Range of storage temperature | $T_{stg}$  | -55 to +150 | $^\circ\text{C}$ |

\*1  $P_w \leq 10 \mu\text{s}$ , Duty cycle  $\leq 1\%$

\*2  $T_c = 25^\circ\text{C}$

### ● Thermal resistance

| Parameter       | Symbol           | Limits | Unit                        |
|-----------------|------------------|--------|-----------------------------|
| Channel to Case | $R_{th(ch-c)}$ * | 6.25   | $^\circ\text{C} / \text{W}$ |

\*  $T_c = 25^\circ\text{C}$

●Electrical characteristics (T<sub>a</sub> = 25°C)

| Parameter                               | Symbol                | Min. | Typ. | Max. | Unit | Conditions                                   |
|---|-----------------------|------|------|------|------|--|
| Gate-source leakage                     | I <sub>GSS</sub>      | -    | -    | ±10  | μA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   |
| Drain-source breakdown voltage          | V <sub>(BR)DSS</sub>  | -45  | -    | -    | V    | I <sub>D</sub> =-1mA, V <sub>GS</sub> =0V    |
| Zero gate voltage drain current         | I <sub>DSS</sub>      | -    | -    | -1   | μA   | V <sub>DS</sub> =-45V, V <sub>GS</sub> =0V   |
| Gate threshold voltage                  | V <sub>GS(th)</sub>   | -1.0 | -    | -3.0 | V    | V <sub>DS</sub> =-10V, I <sub>D</sub> =-1mA  |
| Static drain-source on-state resistance | R <sub>DS(on)</sub> * | -    | 35   | 50   | mΩ   | I <sub>D</sub> =-16A, V <sub>GS</sub> =-10V  |
|   |                       | -    | 45   | 63   |      | I <sub>D</sub> =-8A, V <sub>GS</sub> =-4.5V  |
|   |                       | -    | 50   | 70   |      | I <sub>D</sub> =-8A, V <sub>GS</sub> =-4.0V  |
| Forward transfer admittance             | Y <sub>fs</sub>  *    | 8.0  | -    | -    | S    | I <sub>D</sub> =-8A, V <sub>DS</sub> =-10V   |
| Input capacitance                       | C <sub>iss</sub>      | -    | 2000 | -    | pF   | V <sub>DS</sub> =-10V                        |
| Output capacitance                      | C <sub>oss</sub>      | -    | 250  | -    | pF   | V <sub>GS</sub> =0V                          |
| Reverse transfer capacitance            | C <sub>rss</sub>      | -    | 140  | -    | pF   | f=1MHz                                       |
| Turn-on delay time                      | t <sub>d(on)</sub> *  | -    | 13   | -    | ns   | I <sub>D</sub> =-8.0A, V <sub>DD</sub> =-25V |
| Rise time                               | t <sub>r</sub> *      | -    | 22   | -    | ns   | V <sub>GS</sub> =-10V                        |
| Turn-off delay time                     | t <sub>d(off)</sub> * | -    | 90   | -    | ns   | R <sub>L</sub> =3.1Ω                         |
| Fall time                               | t <sub>f</sub> *      | -    | 50   | -    | ns   | R <sub>G</sub> =10Ω                          |
| Total gate charge                       | Q <sub>g</sub> *      | -    | 16.0 | -    | nC   | V <sub>DD</sub> =-25V                        |
| Gate-source charge                      | Q <sub>gs</sub> *     | -    | 5.2  | -    | nC   | I <sub>D</sub> =-16A,                        |
| Gate-drain charge                       | Q <sub>gd</sub> *     | -    | 5.0  | -    | nC   | V <sub>GS</sub> =-5V                         |

\*Pulsed

●Body diode characteristics (Source-Drain) (T<sub>a</sub> = 25°C)

| Parameter       | Symbol            | Min. | Typ. | Max. | Unit | Conditions                                |
|-----------------|-------------------|------|------|------|------|---|
| Forward Voltage | V <sub>SD</sub> * | -    | -    | -1.2 | V    | I <sub>S</sub> =-16A, V <sub>GS</sub> =0V |

\*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics ( I )

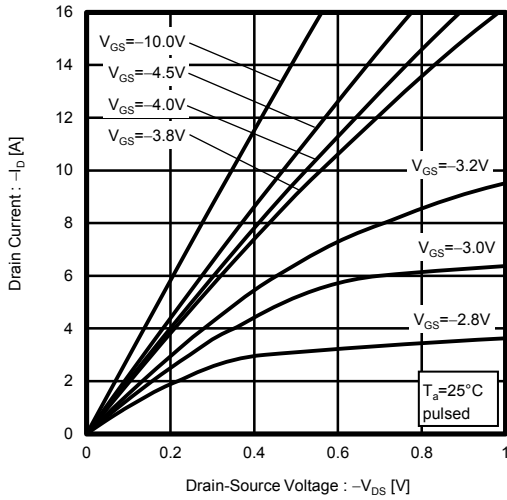


Fig.2 Typical Output Characteristics ( II )

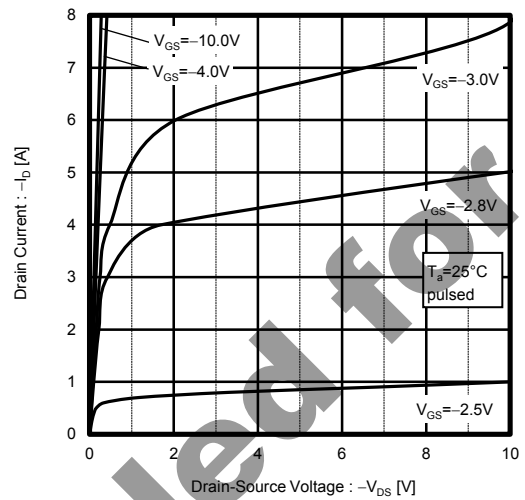


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

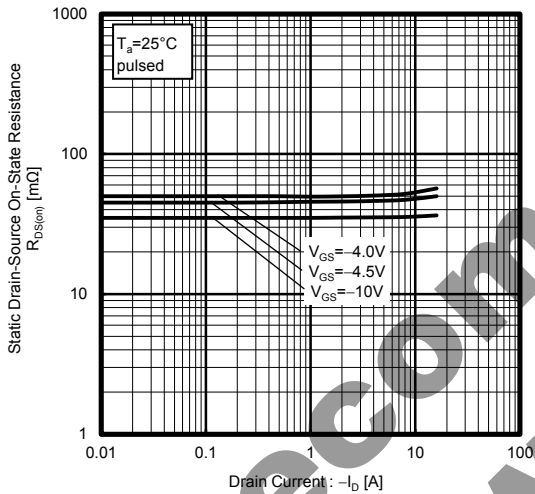


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

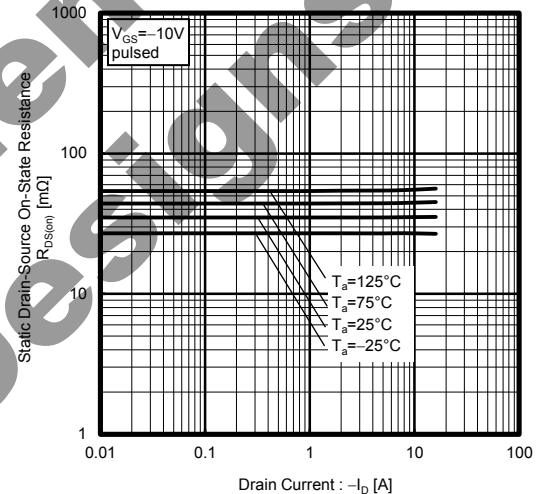


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

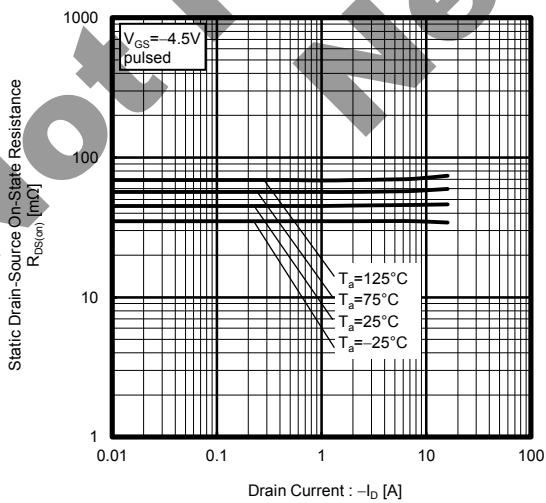


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

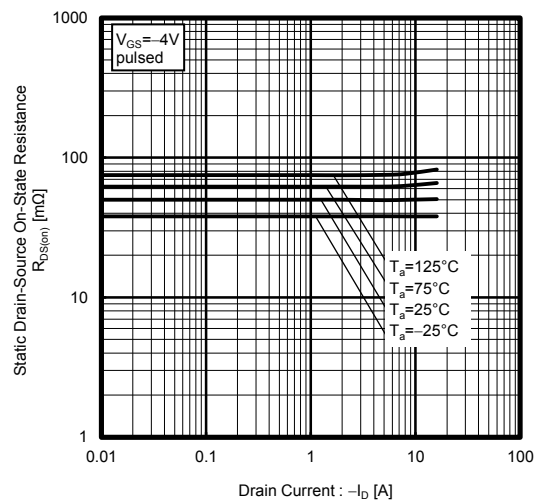


Fig.7 Forward Transfer Admittance vs. Drain Current

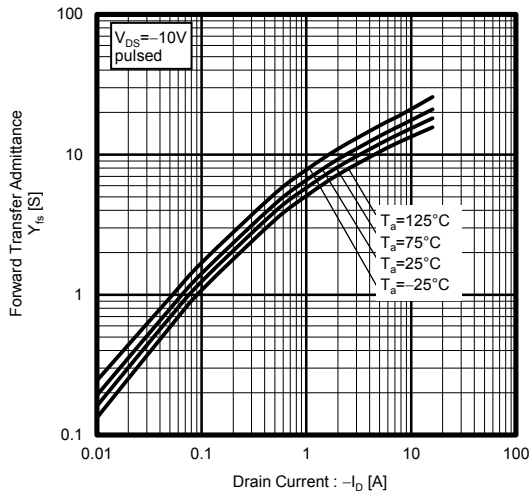


Fig.8 Typical Transfer Characteristics

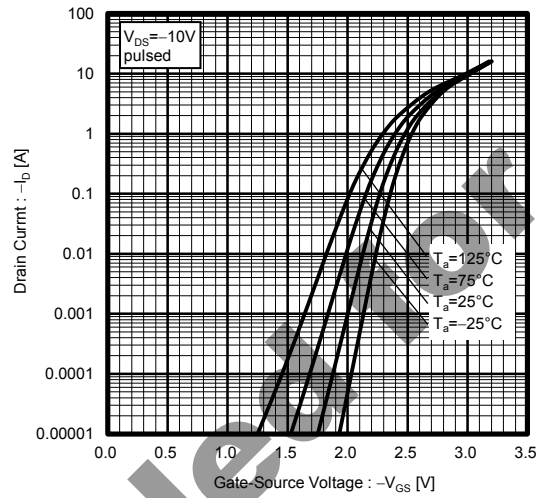


Fig.9 Source Current vs. Source-Drain Voltage

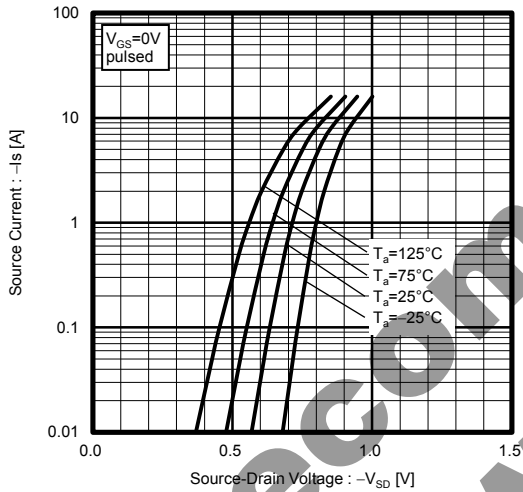


Fig.10 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

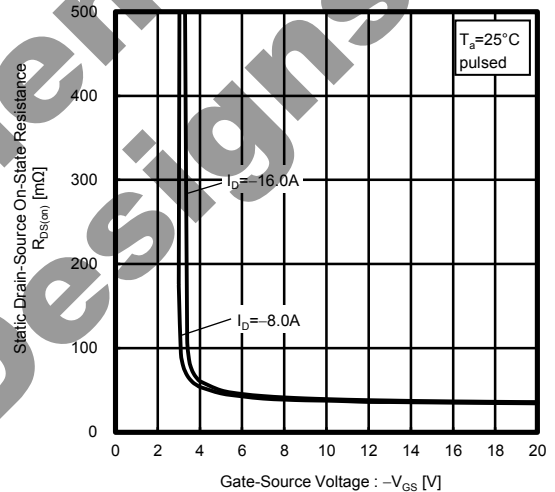


Fig.11 Switching Characteristics

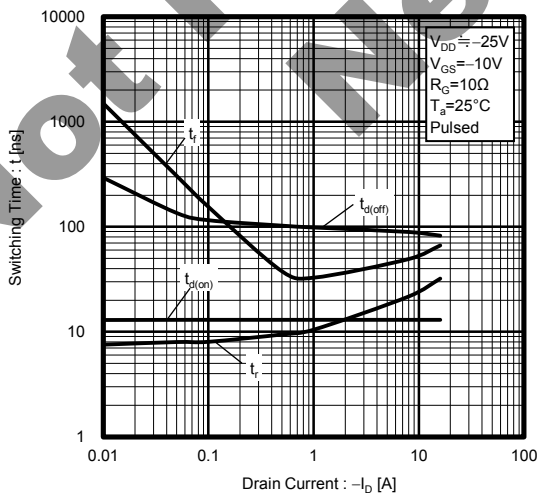


Fig.12 Dynamic Input Characteristics

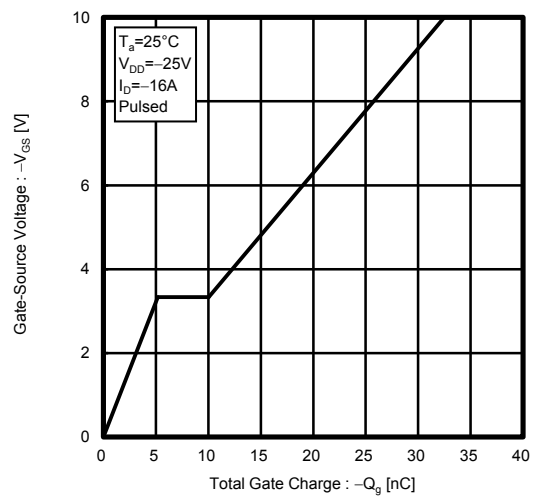


Fig.13 Typical Capacitance vs. Drain-Source Voltage

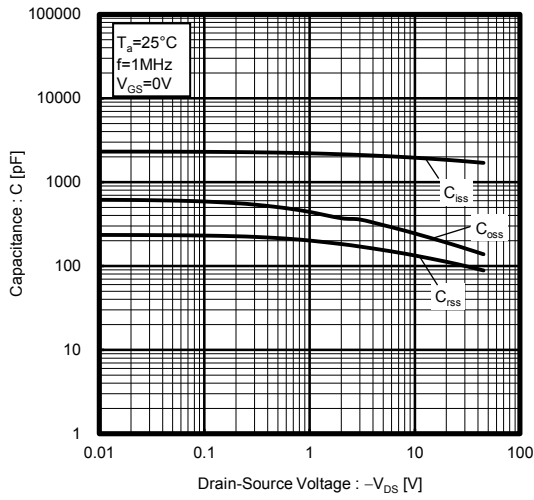


Fig.14 Maximum Safe Operating Area

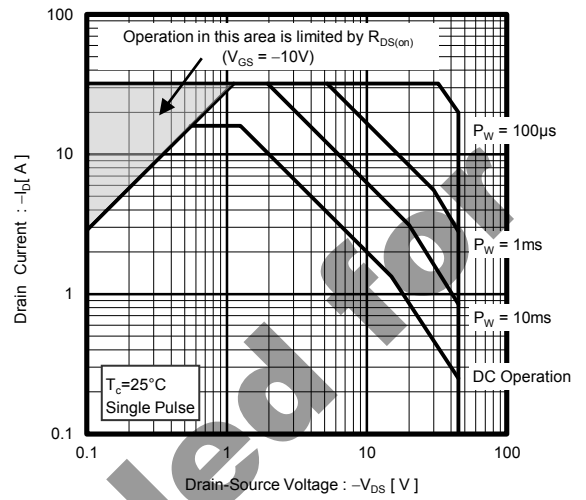
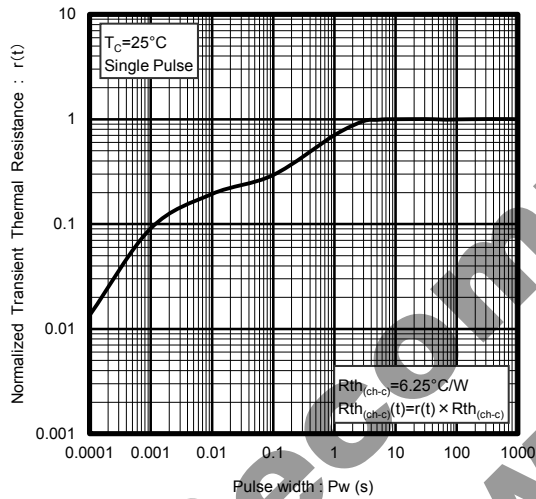


Fig.15 Normalized Transient Thermal Resistance v.s. Pulse Width



Not Recommended for New Designs

● Measurement circuits

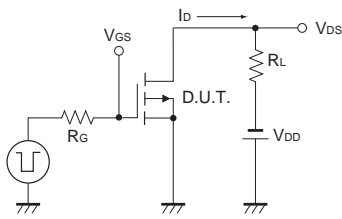


Fig.1-1 Switching Time Measurement Circuit

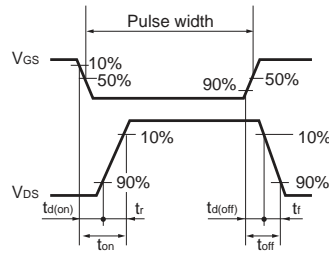


Fig.1-2 Switching Waveforms

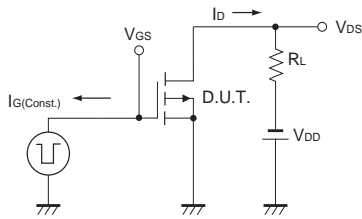


Fig.2-1 Gate Charge Measurement Circuit

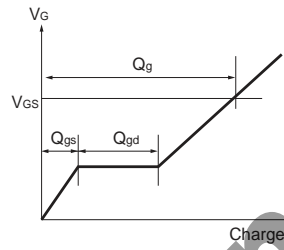


Fig.2-2 Gate Charge Waveform

Not Recommended for New Designs

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