

# 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 |                              | ○      |

### ●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<br>(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  $\leq 1\%$

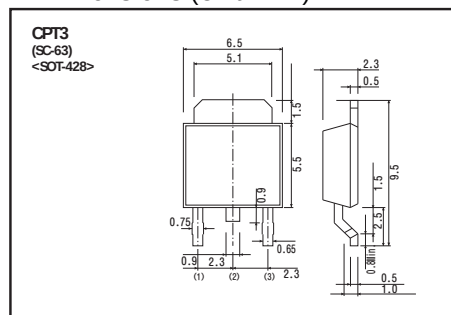
\*2  $T_c = 25^\circ\text{C}$

### ●Thermal resistance

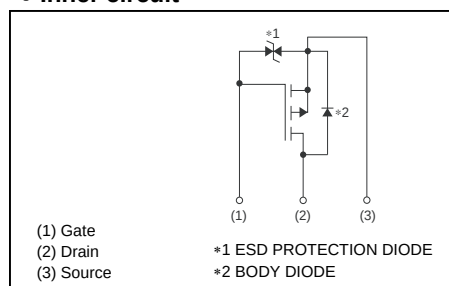
| Parameter       | Symbol           | Limits | Unit                        |
|-----------------|------------------|--------|-----------------------------|
| Channel to Case | $R_{th(ch-c)}^*$ | 6.25   | $^\circ\text{C} / \text{W}$ |

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

### ●Dimensions (Unit : mm)



### ●Inner circuit



●Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

| Parameter                               | Symbol         | Min. | Typ. | Max.     | Unit             | Conditions                                       |
|-----------------------------------------|----------------|------|------|----------|------------------|--------------------------------------------------|
| Gate-source leakage                     | $I_{GSS}$      | -    | -    | $\pm 10$ | $\mu\text{A}$    | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$ |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$  | -45  | -    | -        | V                | $I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$       |
| Zero gate voltage drain current         | $I_{DSS}$      | -    | -    | -1       | $\mu\text{A}$    | $V_{DS} = -45\text{V}$ , $V_{GS} = 0\text{V}$    |
| Gate threshold voltage                  | $V_{GS(th)}$   | -1.0 | -    | -3.0     | V                | $V_{DS} = -10\text{V}$ , $I_D = -1\text{mA}$     |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | -    | 35   | 50       | $\text{m}\Omega$ | $I_D = -16\text{A}$ , $V_{GS} = -10\text{V}$     |
|                                         |                | -    | 45   | 63       |                  | $I_D = -8\text{A}$ , $V_{GS} = -4.5\text{V}$     |
|                                         |                | -    | 50   | 70       |                  | $I_D = -8\text{A}$ , $V_{GS} = -4.0\text{V}$     |
| Forward transfer admittance             | $ Y_{fs} ^*$   | 8.0  | -    | -        | S                | $I_D = -8\text{A}$ , $V_{DS} = -10\text{V}$      |
| Input capacitance                       | $C_{iss}$      | -    | 2000 | -        | pF               | $V_{DS} = -10\text{V}$                           |
| Output capacitance                      | $C_{oss}$      | -    | 250  | -        | pF               | $V_{GS} = 0\text{V}$                             |
| Reverse transfer capacitance            | $C_{rss}$      | -    | 140  | -        | pF               | $f = 1\text{MHz}$                                |
| Turn-on delay time                      | $t_{d(on)}^*$  | -    | 13   | -        | ns               | $I_D = -8.0\text{A}$ , $V_{DD} = -25\text{V}$    |
| Rise time                               | $t_r^*$        | -    | 22   | -        | ns               | $V_{GS} = -10\text{V}$                           |
| Turn-off delay time                     | $t_{d(off)}^*$ | -    | 90   | -        | ns               | $R_L = 3.1\Omega$                                |
| Fall time                               | $t_f^*$        | -    | 50   | -        | ns               | $R_G = 10\Omega$                                 |
| Total gate charge                       | $Q_g^*$        | -    | 16.0 | -        | nC               | $V_{DD} = -25\text{V}$                           |
| Gate-source charge                      | $Q_{gs}^*$     | -    | 5.2  | -        | nC               | $I_D = -16\text{A}$ ,                            |
| Gate-drain charge                       | $Q_{gd}^*$     | -    | 5.0  | -        | nC               | $V_{GS} = -5\text{V}$                            |

\*Pulsed

●Body diode characteristics (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

| Parameter       | Symbol     | Min. | Typ. | Max. | Unit | Conditions                                 |
|-----------------|------------|------|------|------|------|--------------------------------------------|
| Forward Voltage | $V_{SD}^*$ | -    | -    | -1.2 | V    | $I_S = -16\text{A}$ , $V_{GS} = 0\text{V}$ |

\*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics ( I )

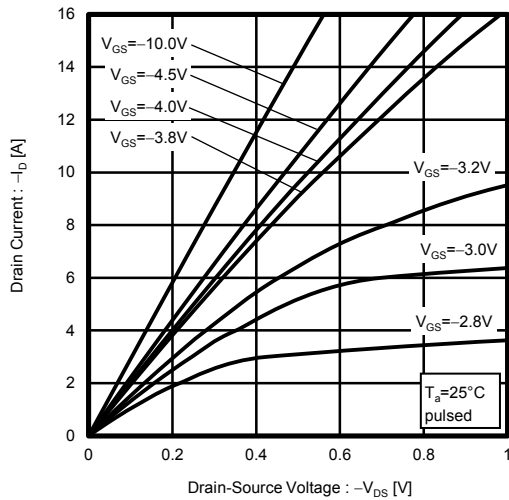


Fig.2 Typical Output Characteristics ( II )

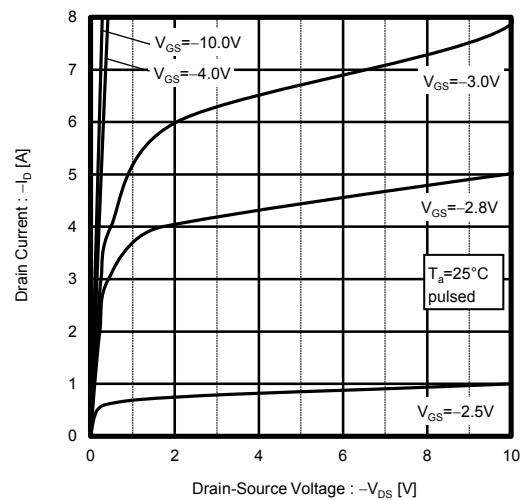


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

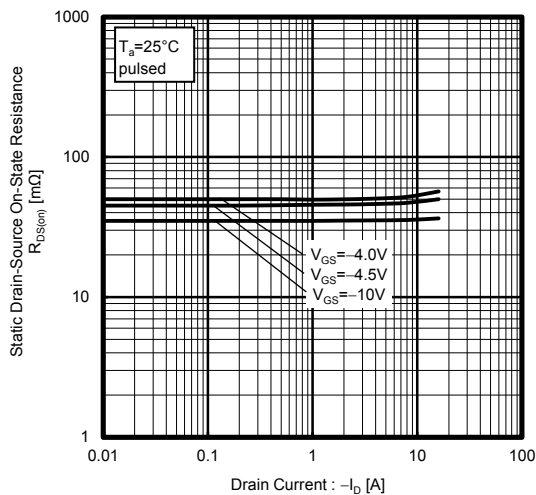


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

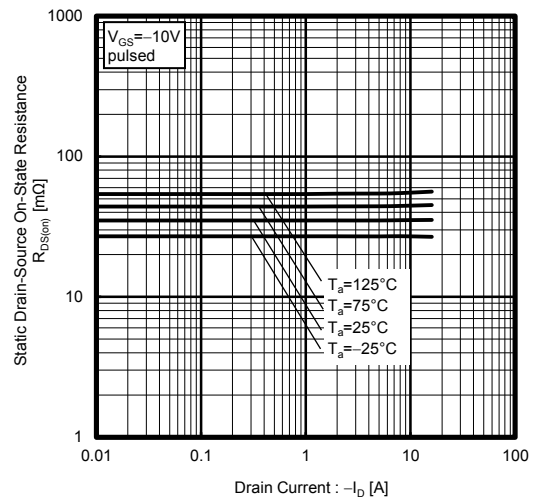


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

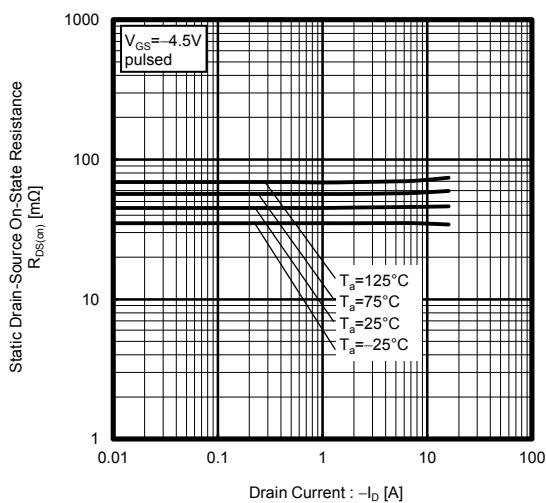


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

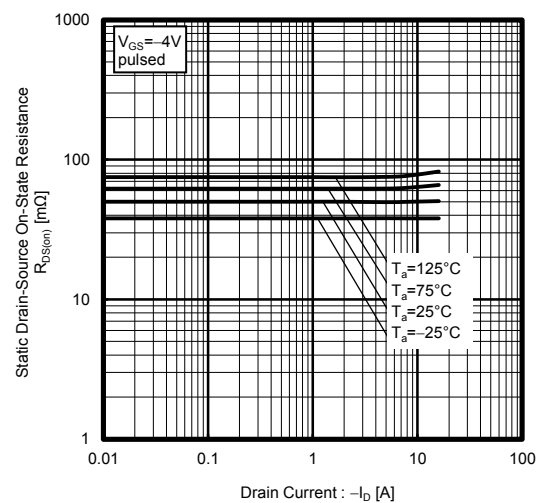


Fig.7 Forward Transfer Admittance vs. Drain Current

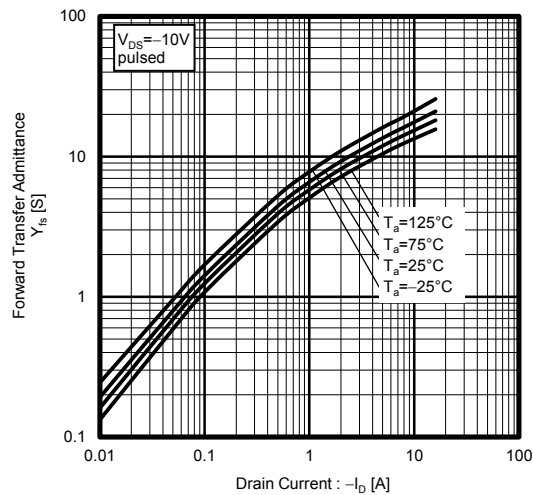


Fig.8 Typical Transfer Characteristics

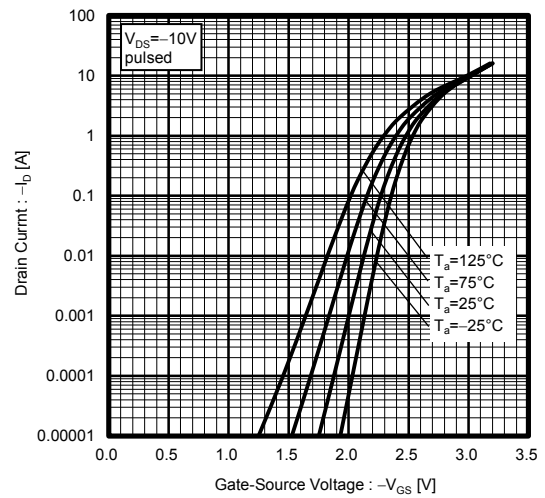


Fig.9 Source Current vs. Source-Drain Voltage

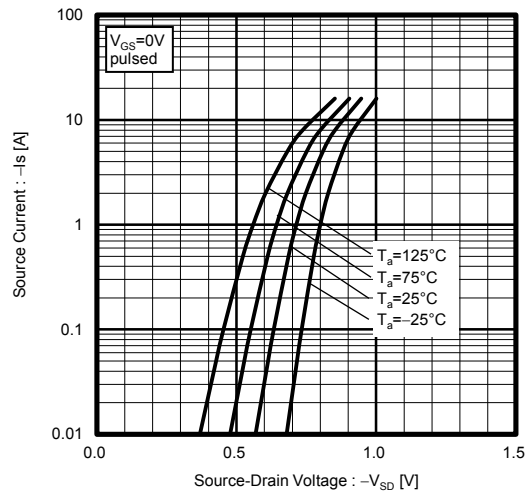


Fig.10 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

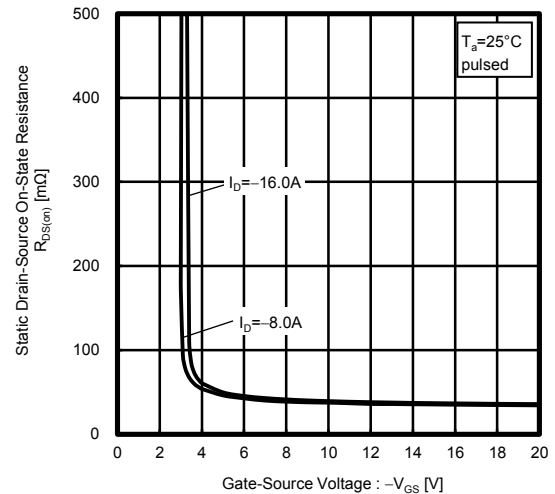


Fig.11 Switching Characteristics

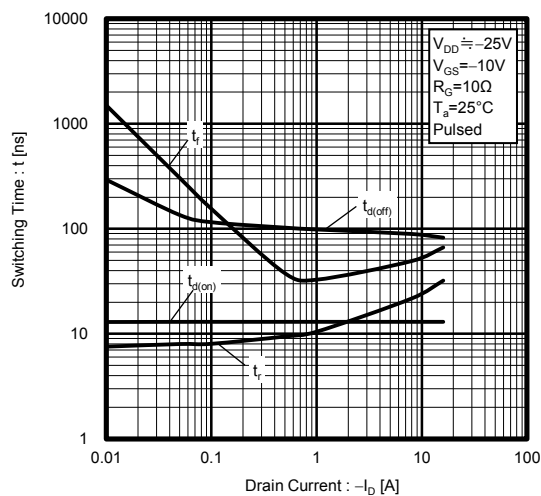


Fig.12 Dynamic Input Characteristics

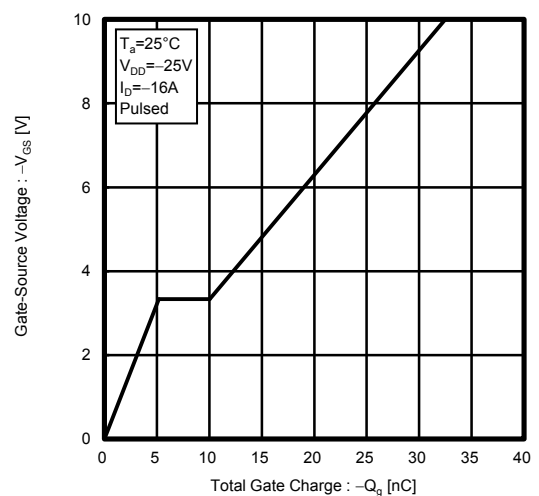


Fig.13 Typical Capacitance vs. Drain-Source Voltage

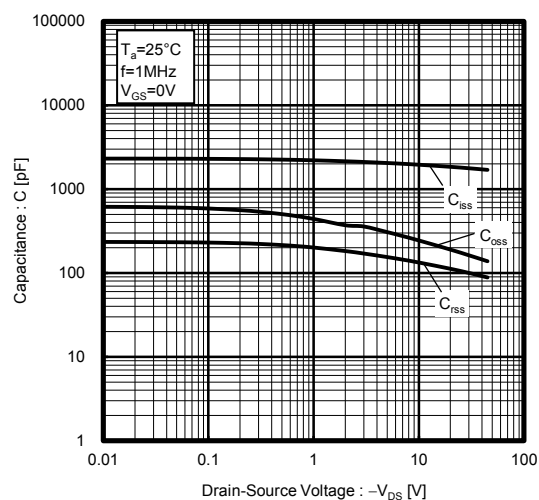


Fig.14 Maximum Safe Operating Area

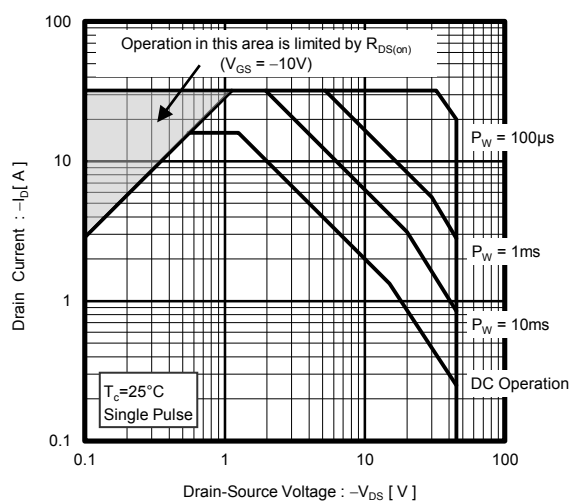
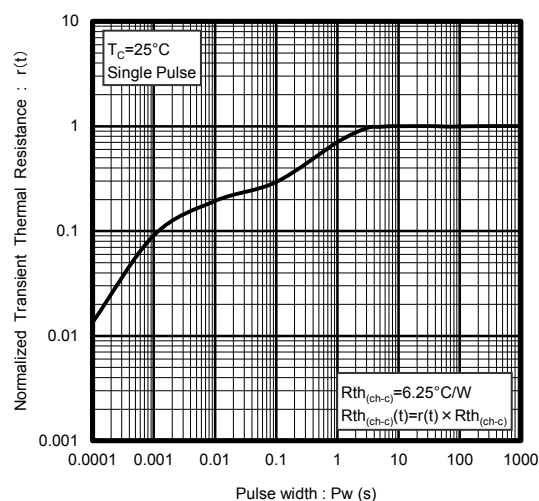


Fig.15 Normalized Transient Thermal Resistance v.s. Pulse Width



## ● Measurement circuits

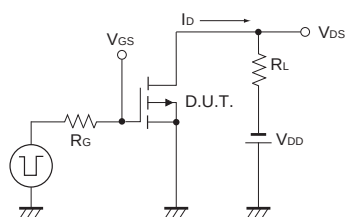


Fig.1-1 Switching Time Measurement Circuit

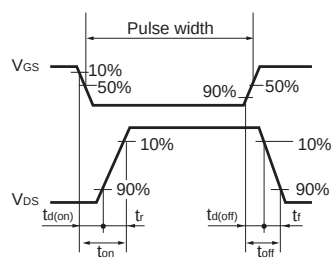


Fig.1-2 Switching Waveforms

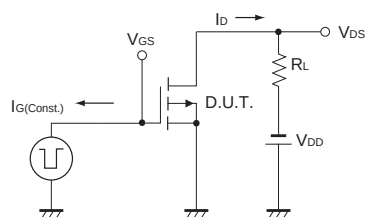


Fig.2-1 Gate Charge Measurement Circuit

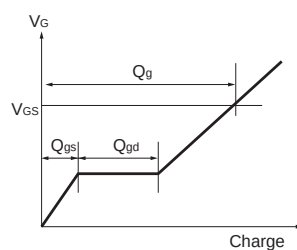


Fig.2-2 Gate Charge Waveform

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