

# 10V Drive Nch MOSFET

## R5205CND

### ● Structure

Silicon N-channel MOSFET

### ● Features

- 1) Low resistance.
- 2) High speed switching.

### ● Application

Switching

### ● Packaging specifications

| Type     | Package                      | Taping |
|----------|------------------------------|--------|
|          | Code                         | TL     |
|          | Basic ordering unit (pieces) | 2500   |
| R5205CND |                              | ○      |

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

| Parameter                         | Symbol      | Limits      | Unit     |   |
|-----------------------------------|-------------|-------------|----------|---|
| Drain-source voltage              | $V_{DSS}$   | 525         | V        |   |
| Gate-source voltage               | $V_{GSS}$   | $\pm 30$    | V        |   |
| Drain current                     | Continuous  | $I_D$ *1    | $\pm 5$  | A |
|                                   | Pulsed      | $I_{DP}$ *2 | $\pm 20$ | A |
| Source current (Body Diode)       | Continuous  | $I_S$ *1    | 5        | A |
|                                   | Pulsed      | $I_{SP}$ *2 | 20       | A |
| Avalanche current                 | $I_{AS}$ *3 | 2.5         | A        |   |
| Avalanche energy                  | $E_{AS}$ *3 | 1.6         | mJ       |   |
| Total power dissipation (Tc=25°C) | $P_D$       | 40          | W        |   |
| Channel temperature               | Tch         | 150         | °C       |   |
| Range of storage temperature      | Tstg        | -55 to +150 | °C       |   |

\*1 Limited only by maximum temperature allowed.

\*2  $P_w \leq 10 \mu s$  Duty Cycle  $\leq 1\%$

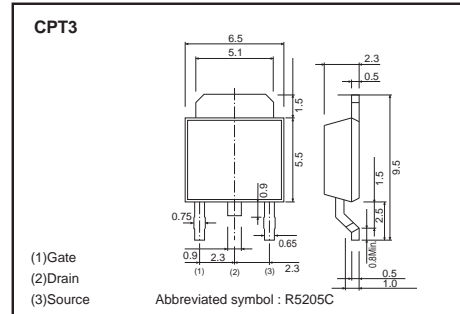
\*3  $L = 500 \mu H$ ,  $V_{DD} = 50V$ ,  $R_g = 25 \Omega$  STARTING Tch=25°C

### ● Thermal resistance

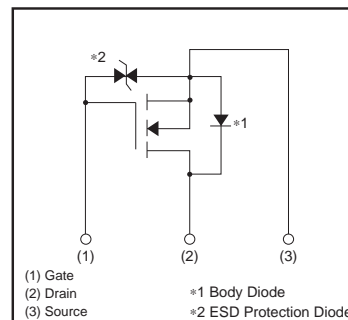
| Parameter       | Symbol           | Limits | Unit   |
|-----------------|------------------|--------|--------|
| Channel to case | $R_{th}(ch-c)^*$ | 3.13   | °C / W |

\* Limited only by maximum temperature allowed.

### ● Dimensions (Unit : mm)



### ● Inner circuit



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

| Parameter                               | Symbol         | Min. | Typ. | Max. | Unit | Conditions                  |
|---|----------------|------|------|------|------|-----------------------------|
| Gate-source leakage                     | $I_{GSS}$      | -    | -    | ±10  | μA   | $V_{GS}=\pm 25V, V_{DS}=0V$ |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$  | 525  | -    | -    | V    | $I_D=1mA, V_{GS}=0V$        |
| Zero gate voltage drain current         | $I_{DSS}$      | -    | -    | 100  | μA   | $V_{DS}=525V, V_{GS}=0V$    |
| Gate threshold voltage                  | $V_{GS(th)}$   | 2.5  | -    | 4.5  | V    | $V_{DS}=10V, I_D=1mA$       |
| Static drain-source on-state resistance | $R_{DS(on)}$ * | -    | 1.3  | 1.6  | Ω    | $I_D=2.5A, V_{GS}=10V$      |
| Forward transfer admittance             | $ Y_{fs} $ *   | 1.5  | 2.5  | -    | S    | $V_{DS}=10V, I_D=2.5A$      |
| Input capacitance                       | $C_{iss}$      | -    | 320  | -    | pF   | $V_{DS}=25V$                |
| Output capacitance                      | $C_{oss}$      | -    | 180  | -    | pF   | $V_{GS}=0V$                 |
| Reverse transfer capacitance            | $C_{rss}$      | -    | 15   | -    | pF   | $f=1MHz$                    |
| Turn-on delay time                      | $t_{d(on)}$ *  | -    | 20   | -    | ns   | $V_{DD}=250V, I_D=2.5A$     |
| Rise time                               | $t_r$ *        | -    | 25   | -    | ns   | $V_{GS}=10V$                |
| Turn-off delay time                     | $t_{d(off)}$ * | -    | 40   | -    | ns   | $R_L=100\Omega$             |
| Fall time                               | $t_f$ *        | -    | 20   | -    | ns   | $R_G=10\Omega$              |
| Total gate charge                       | $Q_g$ *        | -    | 10.8 | -    | nC   | $V_{DD}=250V, I_D=5A$       |
| Gate-source charge                      | $Q_{gs}$ *     | -    | 3.2  | -    | nC   | $V_{GS}=10V, R_L=50\Omega$  |
| Gate-drain charge                       | $Q_{gd}$ *     | -    | 4.4  | -    | nC   | $R_G=10\Omega$              |

\*Pulsed

● **Body diode characteristics** (Source-Drain) (Ta = 25°C)

| Parameter       | Symbol     | Min. | Typ. | Max. | Unit | Conditions          |
|-----------------|------------|------|------|------|------|---------------------|
| Forward voltage | $V_{SD}$ * | -    | -    | 1.5  | V    | $I_S=5A, V_{GS}=0V$ |

\*Pulsed

●Electrical characteristic curves

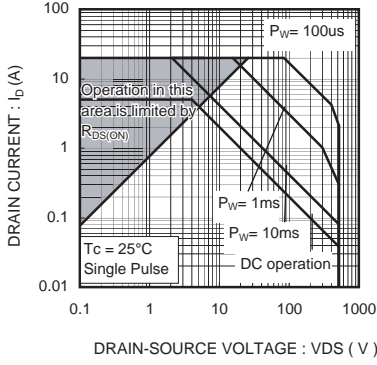


Fig.1 Maximum Safe Operating Area

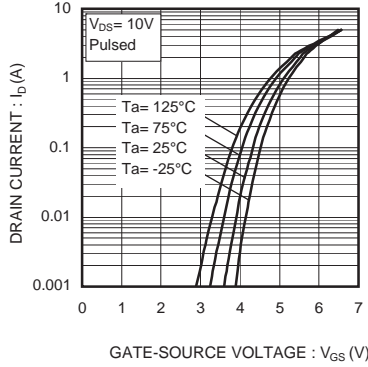


Fig.2 Typical Transfer Characteristics

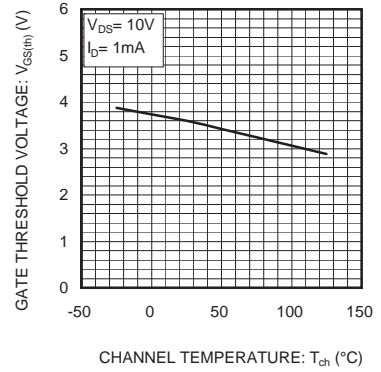


Fig.3 Gate Threshold Voltage vs. Channel Temperature

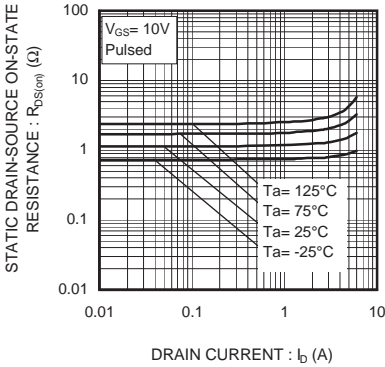


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

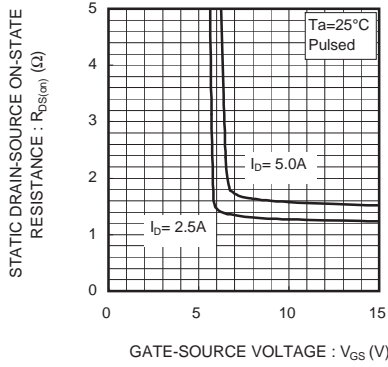


Fig.5 Static Drain-Source On-State Resistance vs. Gate Source

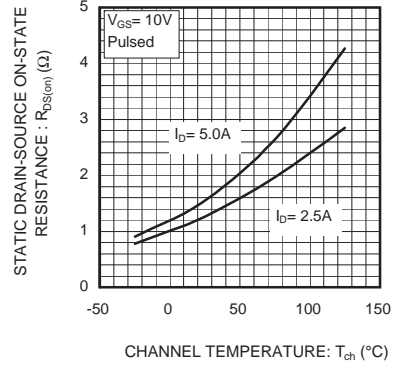


Fig.6 Static Drain-Source On-State Resistance vs. Channel

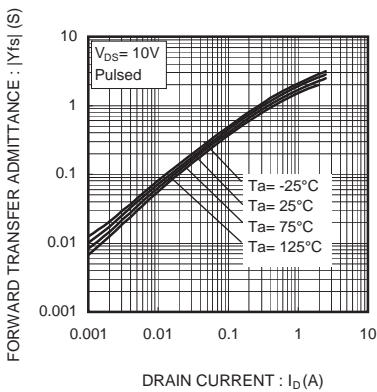


Fig.7 Forward Transfer Admittance vs. Drain Current

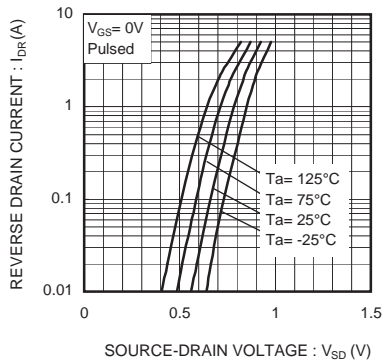


Fig.8 Reverse Drain Current vs. Source-Drain Voltage

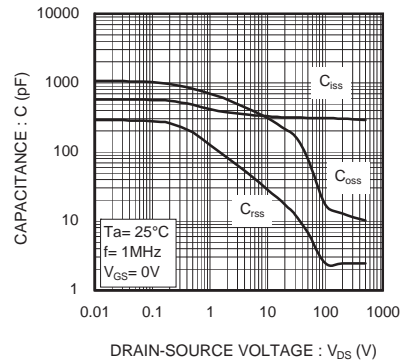


Fig.9 Typical Capacitance vs. Drain-Source Voltage

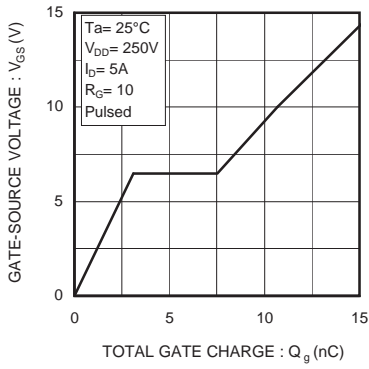


Fig.10 Dynamic Input Characteristics

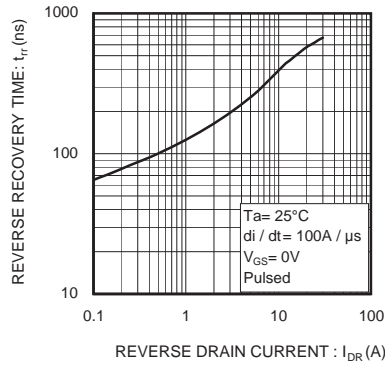


Fig.11 Reverse Recovery Time vs. Reverse Drain Current

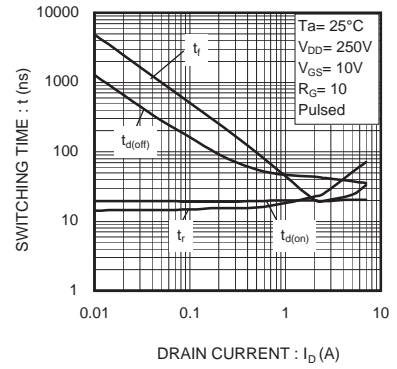


Fig.12 Switching Characteristics

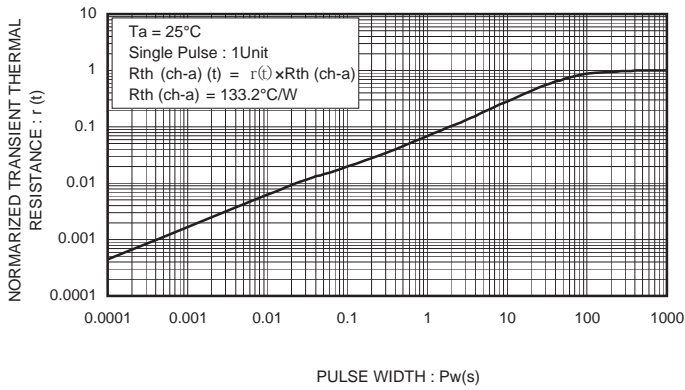


Fig.13 Normalized Transient Thermal Resistance vs. Pulse Width

● Measurement circuits

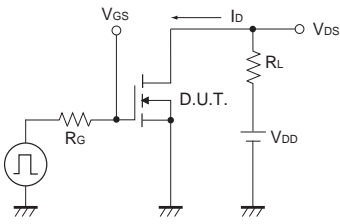


Fig.1-1 Switching time measurement circuit

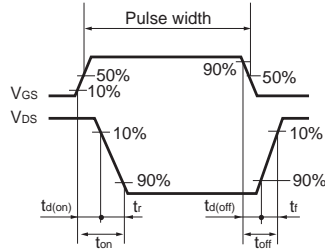


Fig.1-2 Switching waveforms

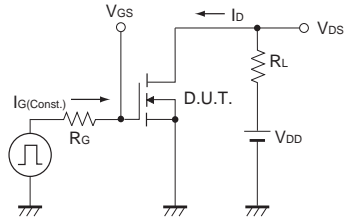


Fig.2-1 Gate charge measurement circuit

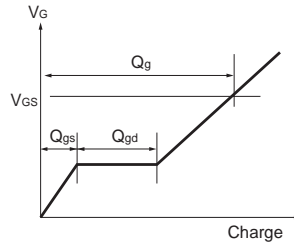


Fig.2-2 Gate charge waveform

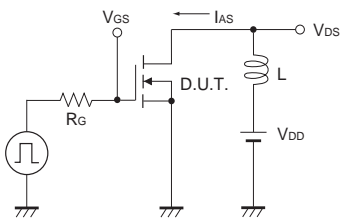


Fig.3-1 Avalanche Measurement circuit

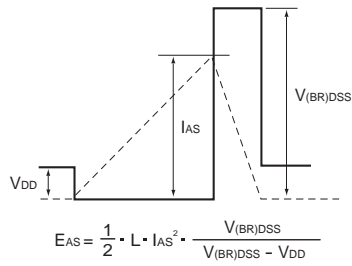


Fig.3-2 Avalanche waveform

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