

# 10V Drive Nch MOSFET

## R4008AND

### ● Structure

Silicon N-channel MOSFET

### ● Features

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

### ● Application

Switching

### ● Packaging specifications

| Type     | Package                      | Taping |
|----------|------------------------------|--------|
|          | Code                         | TL     |
|          | Basic ordering unit (pieces) | 2500   |
| R4008AND |                              | ○      |

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

| Parameter                      | Symbol      | Limits      | Unit             |   |
|--------------------------------|-------------|-------------|------------------|---|
| Drain-source voltage           | $V_{DSS}$   | 400         | V                |   |
| Gate-source voltage            | $V_{GSS}$   | ±30         | V                |   |
| Drain current                  | Continuous  | $I_D$ *4    | ±8               | A |
|                                | Pulsed      | $I_{DP}$    | ±32 *1<br>±48 *2 | A |
| Source current<br>(Body Diode) | Continuous  | $I_S$ *4    | 8                | A |
|                                | Pulsed      | $I_{SP}$    | 32 *1<br>48 *2   | A |
| Avalanche current              | $I_{AS}$ *3 | 4           | A                |   |
| Avalanche energy               | $E_{AS}$ *3 | 4.3         | mJ               |   |
| Power dissipation              | $P_D$ *5    | 20          | W                |   |
| 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  $P_w \leq 1 \mu s$ , Duty cycle  $\leq 1\%$  Limited by Safe Operating Area. ( $V_{DS} \leq 30V$ )

\*3  $L = 500 \mu H$ ,  $V_{DD} = 50V$ ,  $R_G = 25 \Omega$ ,  $T_{ch} = 25^\circ C$

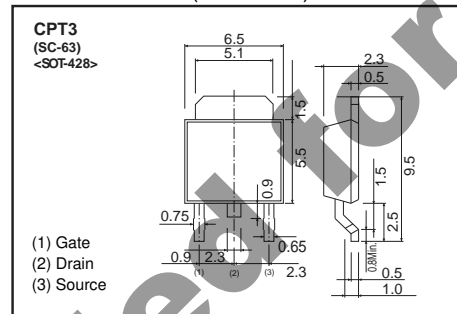
\*4 Limited only by maximum temperature allowed.

\*5  $T_C = 25^\circ C$

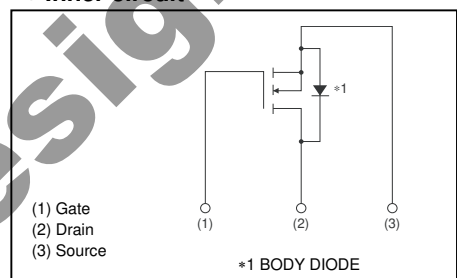
### ● Thermal resistance

| Parameter       | Symbol         | Limits | Unit   |
|-----------------|----------------|--------|--------|
| Channel to Case | $R_{th(ch-c)}$ | 6.25   | °C / W |

### ● Dimensions (Unit : mm)



### ● Inner circuit



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

| Parameter                               | Symbol         | Min. | Typ. | Max. | Unit | Conditions                  |
|---|----------------|------|------|------|------|-----------------------------|
| Gate-source leakage                     | $I_{GSS}$      | -    | -    | ±100 | nA   | $V_{GS}=\pm 30V, V_{DS}=0V$ |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$  | 400  | -    | -    | V    | $I_D=1mA, V_{GS}=0V$        |
| Zero gate voltage drain current         | $I_{DSS}$      | -    | -    | 100  | μA   | $V_{DS}=400V, V_{GS}=0V$    |
| Gate threshold voltage                  | $V_{GS(th)}$   | 2.5  | -    | 4.5  | V    | $V_{DS}=10V, I_D=1mA$       |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | -    | 0.73 | 0.95 | Ω    | $I_D=4A, V_{GS}=10V$        |
| Forward transfer admittance             | $ Y_{fs} ^*$   | 2    | -    | -    | S    | $V_{DS}=10V, I_D=4A$        |
| Input capacitance                       | $C_{iss}$      | -    | 500  | -    | pF   | $V_{DS}=25V$                |
| Output capacitance                      | $C_{oss}$      | -    | 280  | -    | pF   | $V_{GS}=0V$                 |
| Reverse transfer capacitance            | $C_{riss}$     | -    | 25   | -    | pF   | $f=1MHz$                    |
| Turn-on delay time                      | $t_{d(on)}^*$  | -    | 20   | -    | ns   | $V_{DD}=200V, I_D=4A$       |
| Rise time                               | $t_r^*$        | -    | 20   | -    | ns   | $V_{GS}=10V$                |
| Turn-off delay time                     | $t_{d(off)}^*$ | -    | 48   | -    | ns   | $R_L=50\Omega$              |
| Fall time                               | $t_f^*$        | -    | 16   | -    | ns   | $R_G=10\Omega$              |
| Total gate charge                       | $Q_g^*$        | -    | 15   | -    | nC   | $V_{DD}=200V$               |
| Gate-source charge                      | $Q_{gs}^*$     | -    | 3.5  | -    | nC   | $I_D=8A$                    |
| Gate-drain charge                       | $Q_{gd}^*$     | -    | 7    | -    | nC   | $V_{GS}=10V$                |

\*Pulsed

## ●Body diode characteristics (Source-Drain)

| Parameter       | Symbol     | Min. | Typ. | Max. | Unit | Conditions          |
|-----------------|------------|------|------|------|------|---------------------|
| Forward Voltage | $V_{SD}^*$ | -    | -    | 1.5  | V    | $I_S=8A, V_{GS}=0V$ |

\*Pulsed

●Electrical characteristic curves

Fig.1 Maximum Safe Operating Area

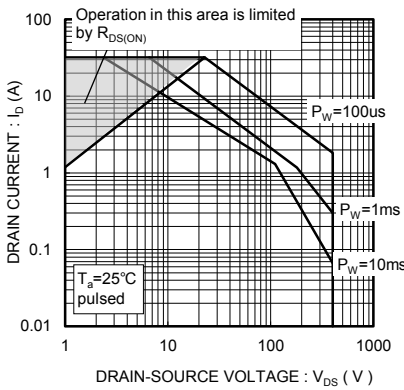


Fig.2 Typical Output Characteristics ( I )

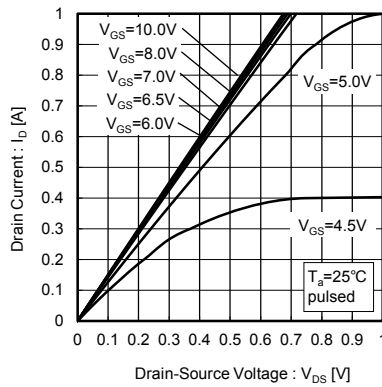


Fig.3 Typical Output Characteristics ( II )

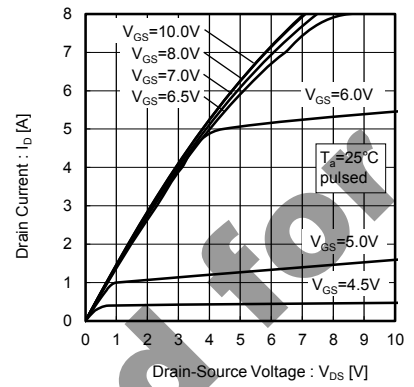


Fig.4 Typical Transfer Characteristics

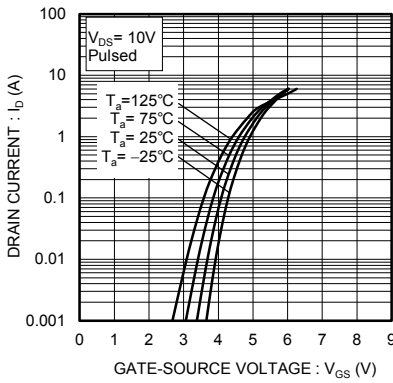


Fig.5 Gate Threshold Voltage vs. Channel Temperature

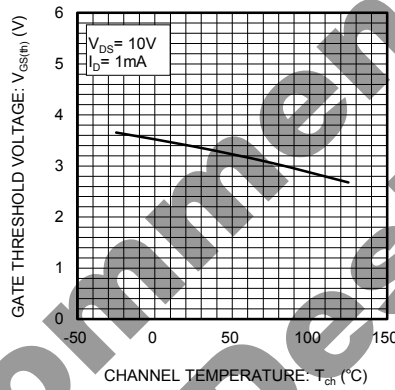


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

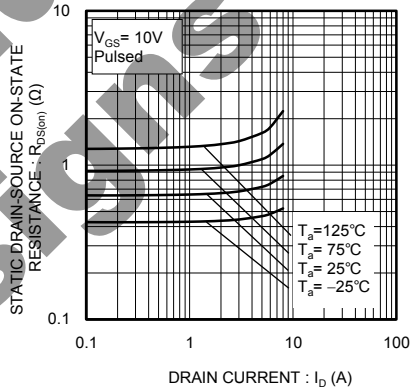


Fig.7 Static Drain-Source On-State Resistance vs. Gate Source Voltage

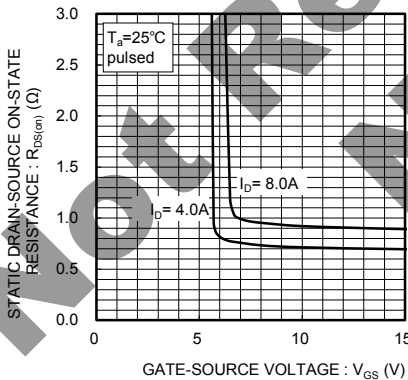


Fig.8 Static Drain-Source On-State Resistance vs. Channel Temperature

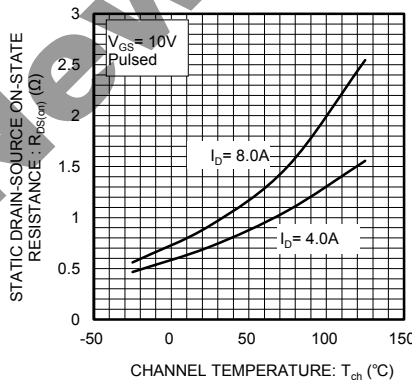


Fig.9 Forward Transfer Admittance vs. Drain Current

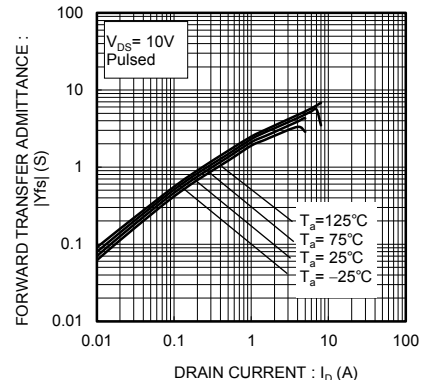


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

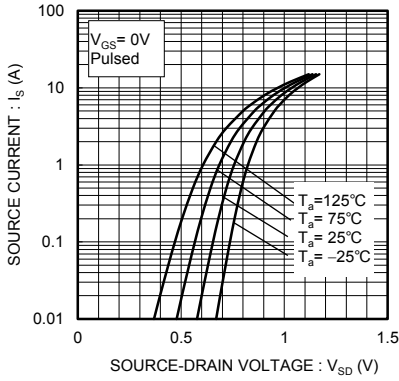


Fig.11 Typical Capacitance vs. Drain-Source Voltage

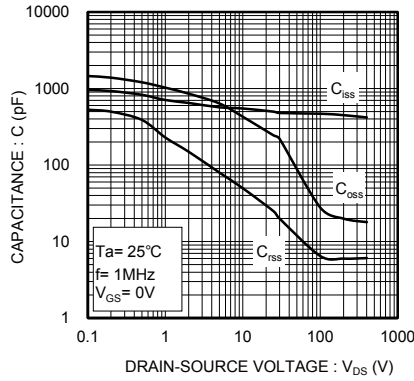


Fig.12 Dynamic Input Characteristics

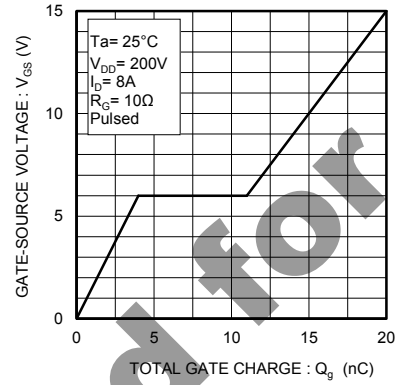


Fig.13 Reverse Recovery Time vs. Source Current

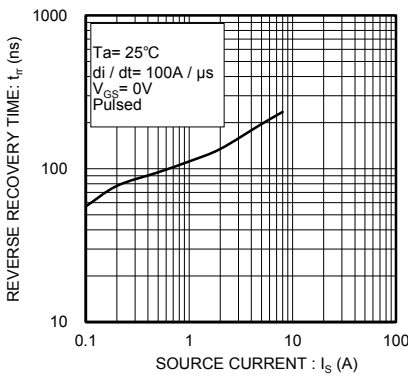


Fig.14 Switching Characteristics

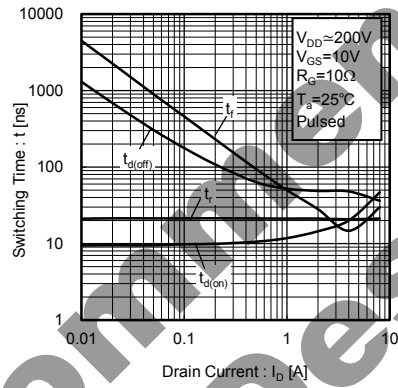
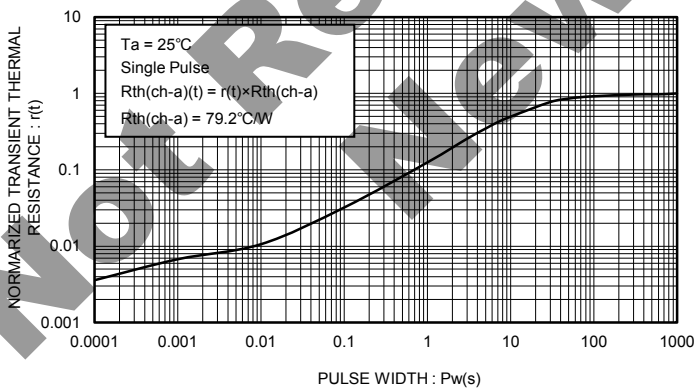


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



● Measurement circuits

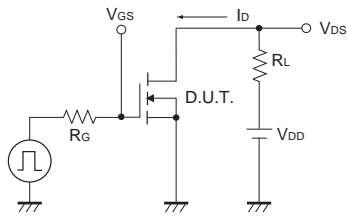


Fig.1-1 Switching Time Measurement Circuit

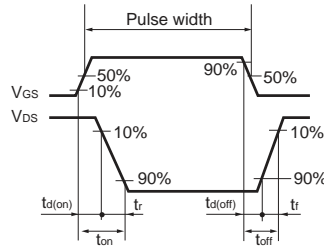


Fig.1-2 Switching Waveforms

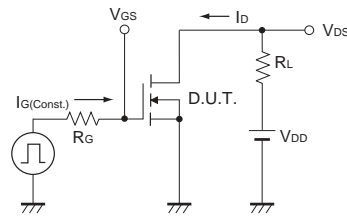


Fig.2-1 Gate Charge Measurement Circuit

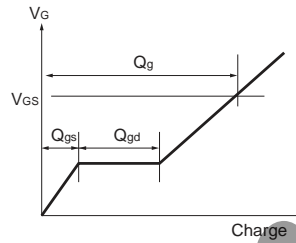


Fig.2-2 Gate Charge Waveform

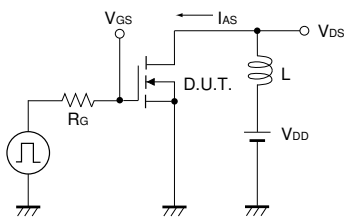


Fig.3-1 Avalanche Measurement Circuit

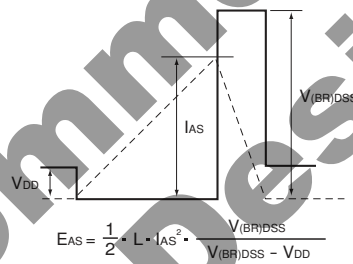


Fig.3-2 Avalanche Waveform

Not Recommended for New Designs

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