

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 ±48 *2 | A |
| Source current (Body Diode) | Continuous | I_S *4 | 8 | A |
| | Pulsed | I_{SP} | 32 *1 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 $L = 500 \mu H$, $V_{DD} = 50V$, $R_G = 25 \Omega$, $T_{ch} = 25^\circ C$

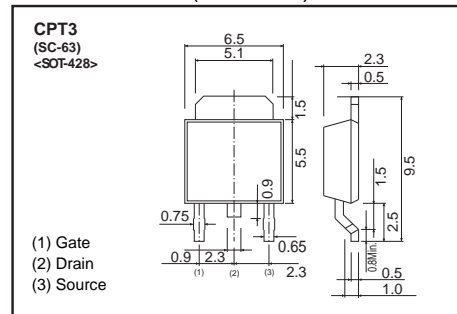
*4 Limited only by maximum temperature allowed.

*5 $T_C = 25^\circ C$

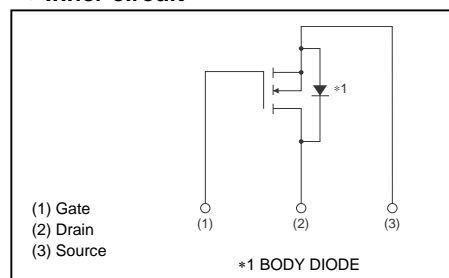
● Thermal resistance

| 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_{rss} | - | 25 | - | pF | $f=1MHz$ |
| Turn-on delay time | $t_{d(on)}^*$ | - | 20 | - | ns | $V_{DD}\approx 200V, I_D=4A$ |
| 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 | $V_{DD}\approx 200V$ |
| 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

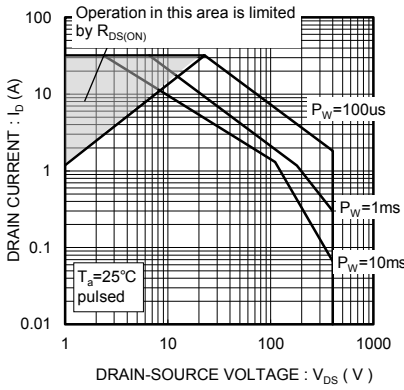


Fig.2 Typical Output Characteristics (I)

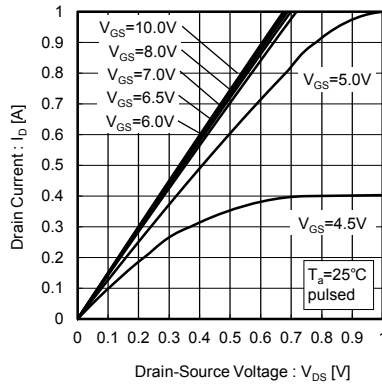


Fig.3 Typical Output Characteristics (II)

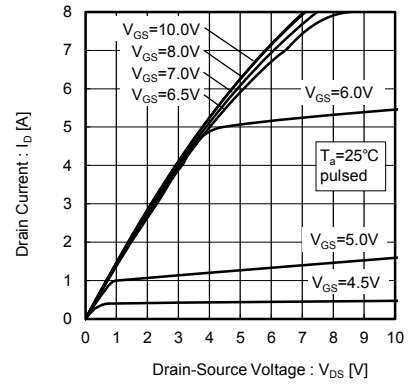


Fig.4 Typical Transfer Characteristics

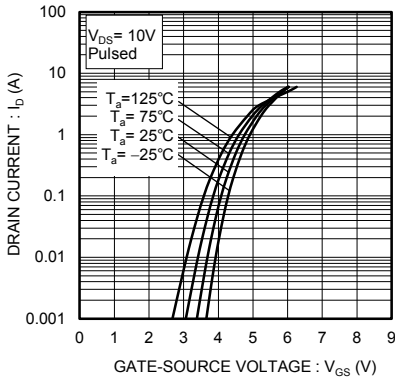


Fig.5 Gate Threshold Voltage vs. Channel Temperature

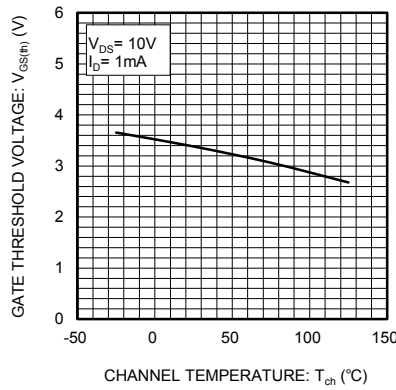


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current

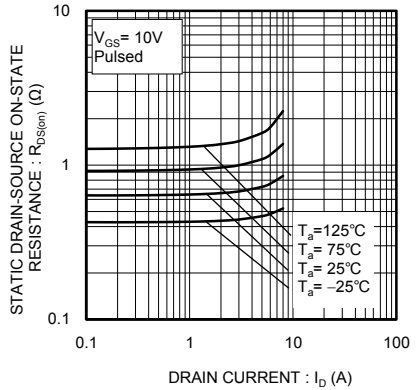


Fig.7 Static Drain-Source On-State Resistance vs. Gate Source Voltage

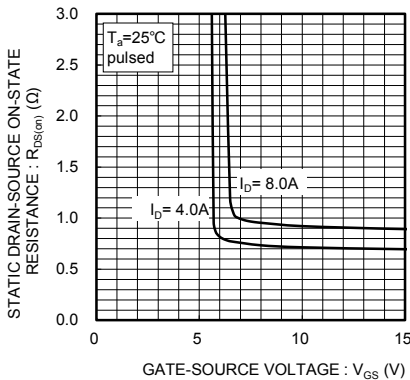


Fig.8 Static Drain-Source On-State Resistance vs. Channel Temperature

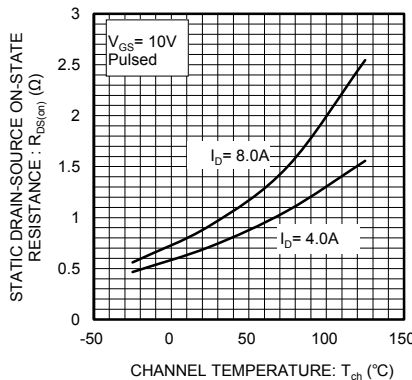


Fig.9 Forward Transfer Admittance vs. Drain Current

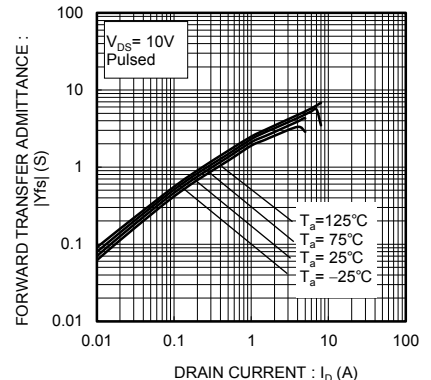


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

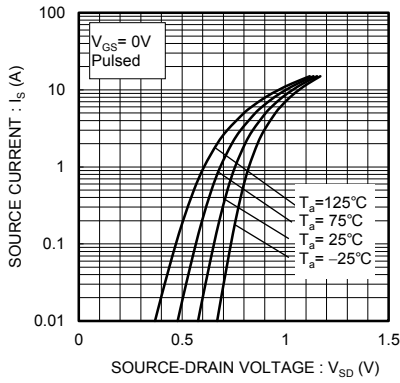


Fig.11 Typical Capacitance vs. Drain-Source Voltage

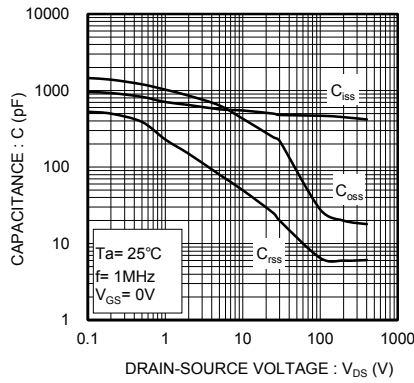


Fig.12 Dynamic Input Characteristics

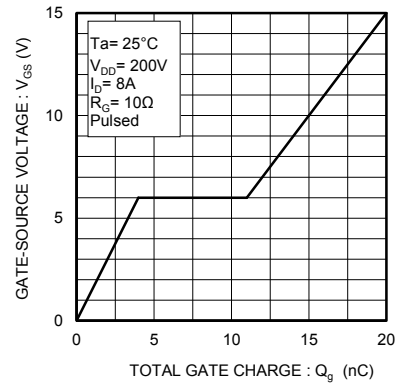


Fig.13 Reverse Recovery Time vs. Source Current

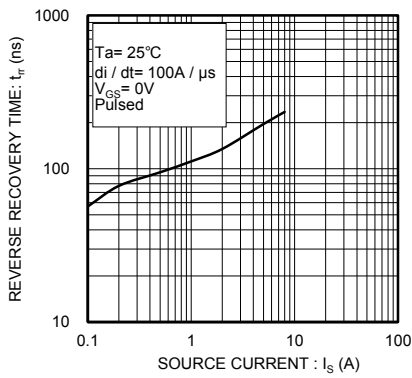


Fig.14 Switching Characteristics

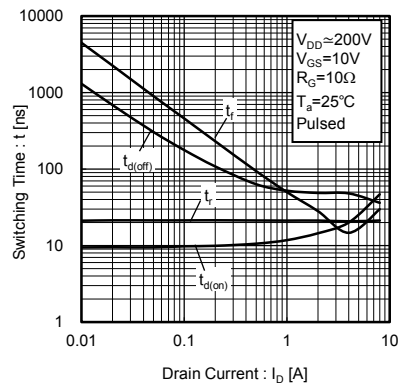
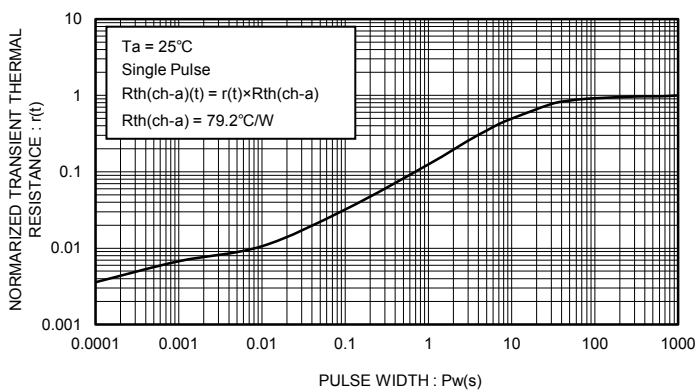


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width



● Measurement circuits

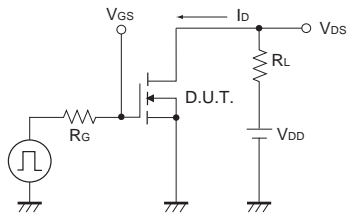


Fig.1-1 Switching Time Measurement Circuit

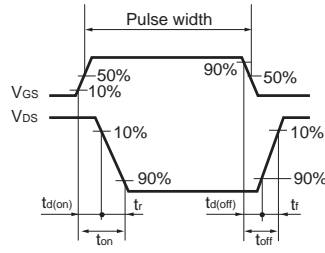


Fig.1-2 Switching Waveforms

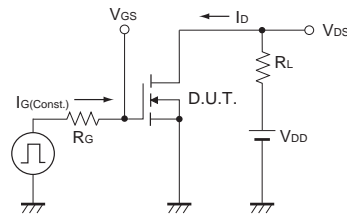


Fig.2-1 Gate Charge Measurement Circuit

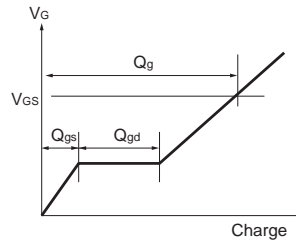


Fig.2-2 Gate Charge Waveform

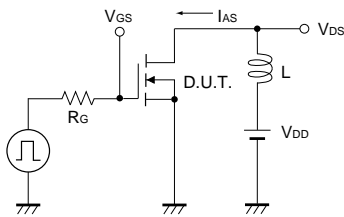


Fig.3-1 Avalanche Measurement Circuit

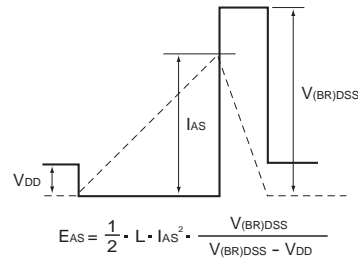


Fig.3-2 Avalanche Waveform

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