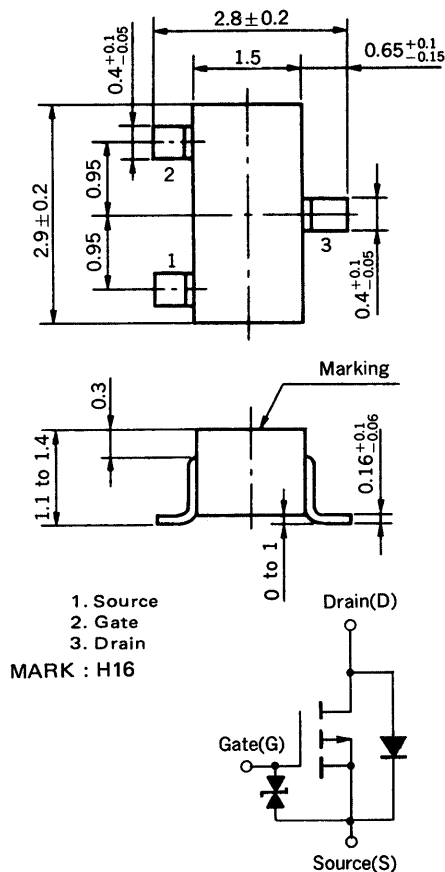


# MOS FIELD EFFECT TRANSISTOR

## 2SJ210

### P-CHANNEL MOS FET FOR SWITCHING

#### OUTLINE DIMENSIONS (Unit : mm)



(Diode in the figure is the parasitic diode.)

The 2SJ210, P-channel vertical type MOS FET, is a switching device which can be driven directly by the output of ICs having a 5 V power source.

The MOS FET has excellent switching characteristics and is suitable as a high-speed switching device in digital circuits.

#### FEATURES

- Directly driven by the output of ICs having a 5 V power source.
- Not necessary to consider driving current because of its high input impedance.
- Possible to reduce the number of parts by omitting the bias resistor.

#### QUALITY GRADE

Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

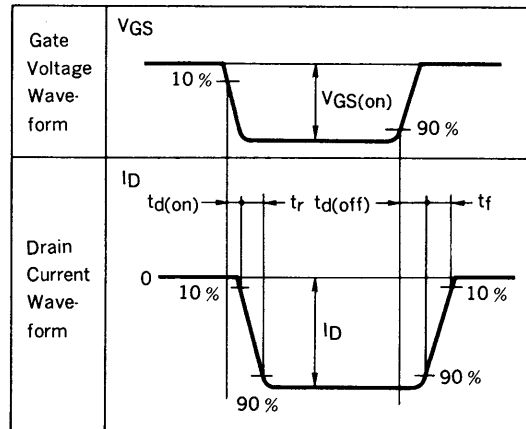
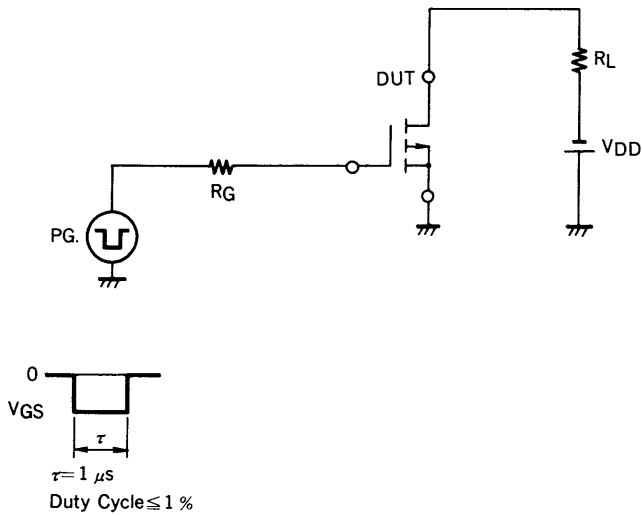
#### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

| CHARACTERISTIC          | SYMBOL              | CONDITIONS  | RATINGS     | UNIT             |
|-------------------------|---------------------|---|-------------|------------------|
| Drain to Source Voltage | $V_{DSS}$           | $V_{GS} = 0$  | -60         | V                |
| Gate to Source Voltage  | $V_{GSS}$           | $V_{DS} = 0$  | $\pm 20$    | V                |
| Drain Current           | $I_D(\text{DC})$    |   | $\pm 200$   | mA               |
| Drain Current           | $I_D(\text{pulse})$ | $PW \leq 10 \text{ ms}, \text{Duty Cycle} \leq 50 \%$ | $\pm 400$   | mA               |
| Total Power Dissipation | $P_T$               |   | 200         | mW               |
| Channel Temperature     | $T_{ch}$            |   | 150         | $^\circ\text{C}$ |
| Storage Temperature     | $T_{stg}$           |   | -55 to +150 | $^\circ\text{C}$ |

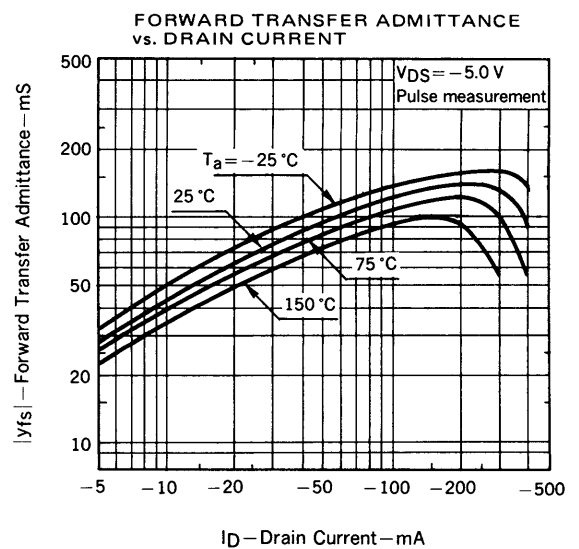
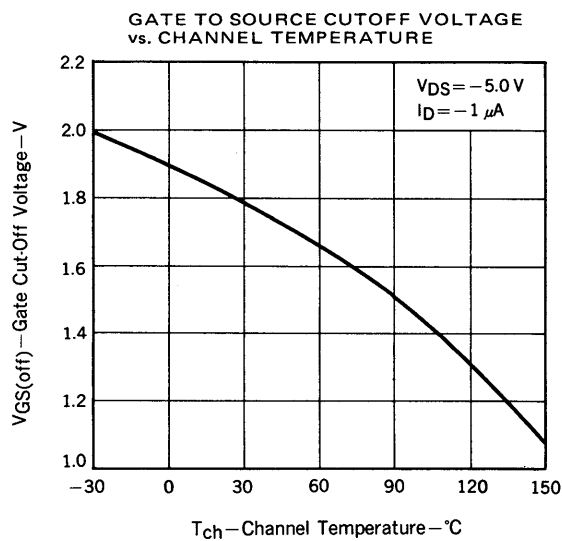
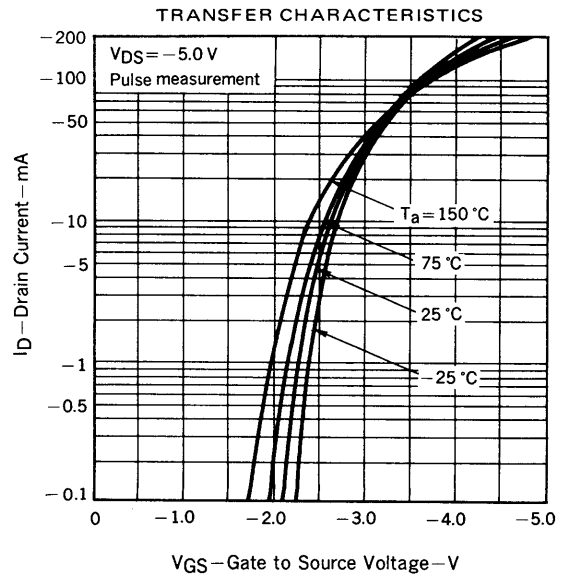
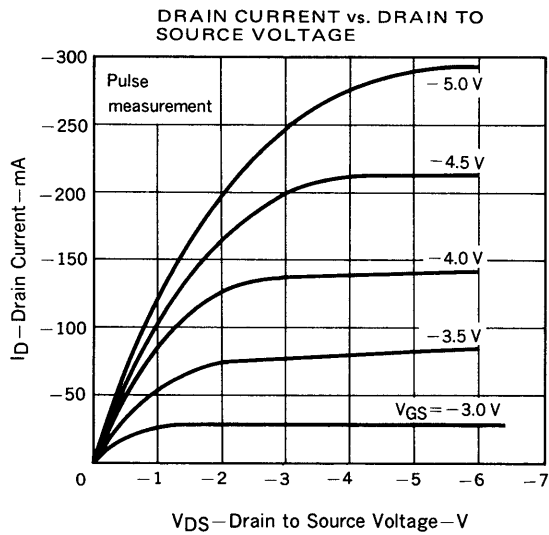
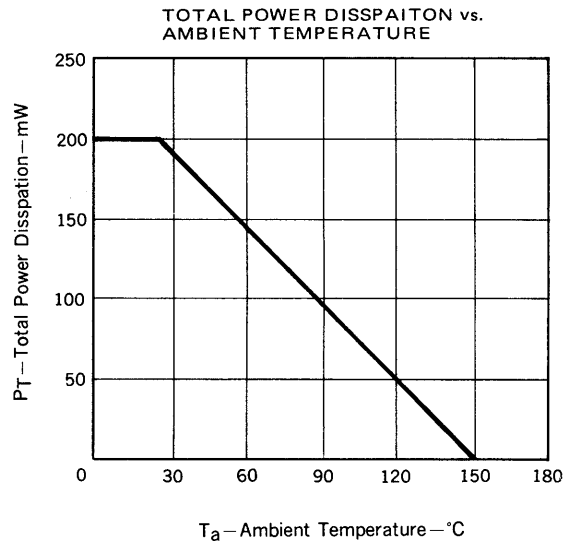
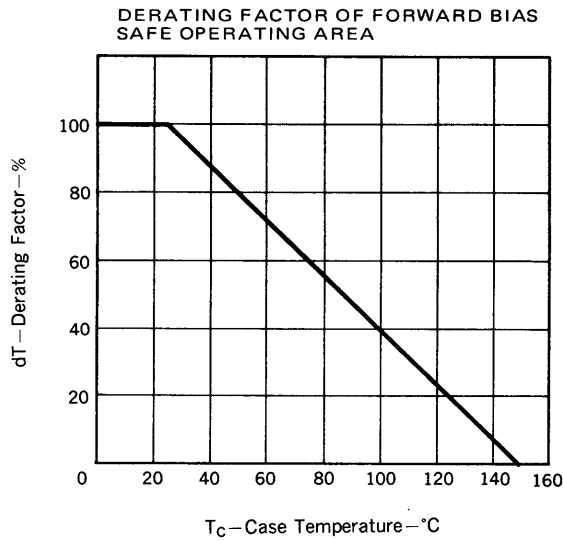
ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)

| CHARACTERISTIC                      | SYMBOL               | MIN. | TYP. | MAX. | UNIT | CONDITIONS   |
|-------------------------------------|----------------------|------|------|------|------|--|
| Drain Cut-off Current               | I <sub>DSS</sub>     |      |      | -1.0 | μA   | V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0   |
| Gate Leakage Current                | I <sub>GSS</sub>     |      |      | ±1.0 | μA   | V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0   |
| Gate Cut-off Voltage                | V <sub>GS(off)</sub> | -1.4 | -1.8 | -2.4 | V    | V <sub>DS</sub> = -5.0 V, I <sub>D</sub> = -1.0 μA   |
| Forward Transfer Admittance         | y <sub>fs</sub>      | 20   | 45   |      | mS   | V <sub>DS</sub> = -5.0 V, I <sub>D</sub> = -10 mA  |
| Drain to Source On-State Resistance | R <sub>DS(on)1</sub> |      | 10   | 15   | Ω    | V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -10 mA  |
| Drain to Source On-State Resistance | R <sub>DS(on)2</sub> |      | 6    | 10   | Ω    | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -10 mA   |
| Input Capacitance                   | C <sub>iss</sub>     |      | 27   |      | pF   | V <sub>DS</sub> = -5.0 V, V <sub>GS</sub> = 0, f = 1 MHz   |
| Output Capacitance                  | C <sub>oss</sub>     |      | 21   |      | pF   |  |
| Feedback Capacitance                | C <sub>rss</sub>     |      | 3    |      | pF   |  |
| Turn-On Delay Time                  | t <sub>d(on)</sub>   |      | 120  |      | ns   | V <sub>GS(on)</sub> = -4.0 V, R <sub>G</sub> = 10 Ω<br>V <sub>DD</sub> = -5.0 V, I <sub>D</sub> = -10 mA<br>R <sub>L</sub> = 500 Ω |
| Rise Time                           | t <sub>r</sub>       |      | 190  |      | ns   |  |
| Turn-Off Delay Time                 | t <sub>d(off)</sub>  |      | 150  |      | ns   |  |
| Fall Time                           | t <sub>f</sub>       |      | 180  |      | ns   |  |

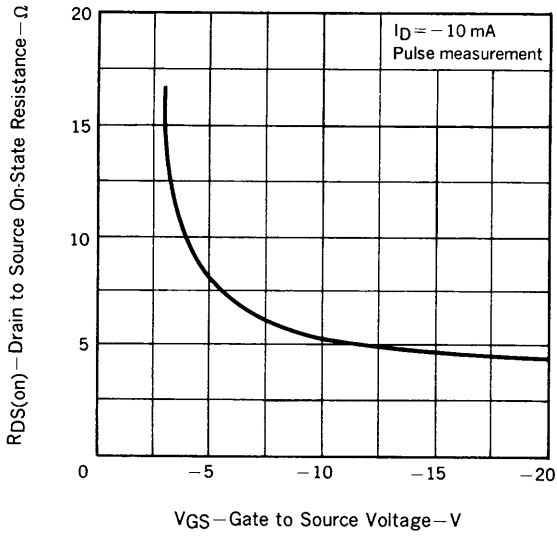
SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS



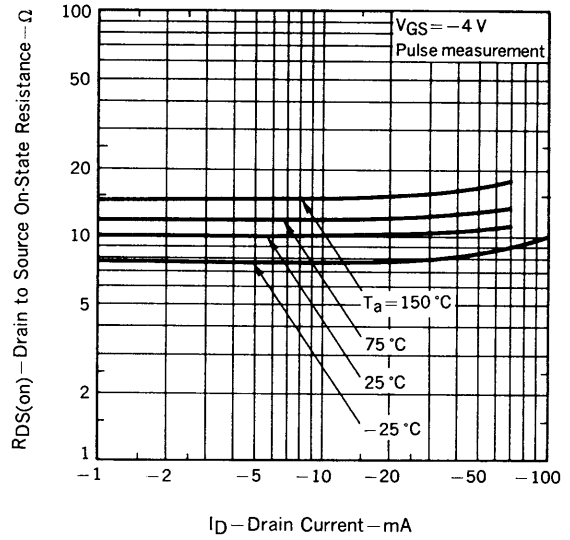
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



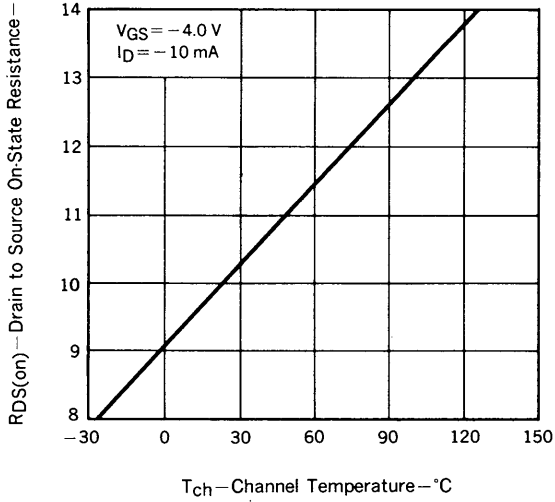
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



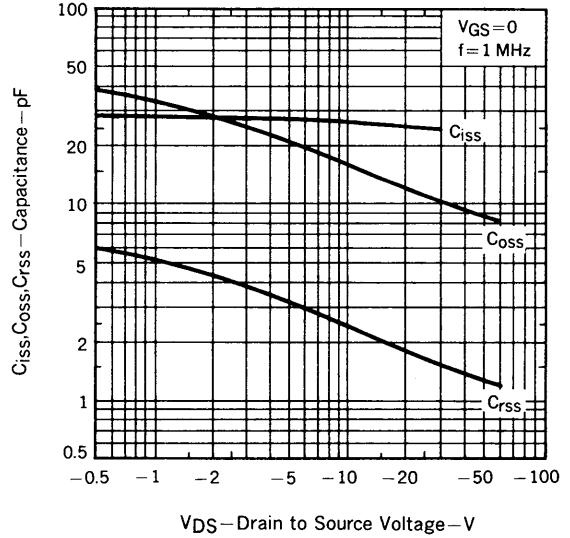
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



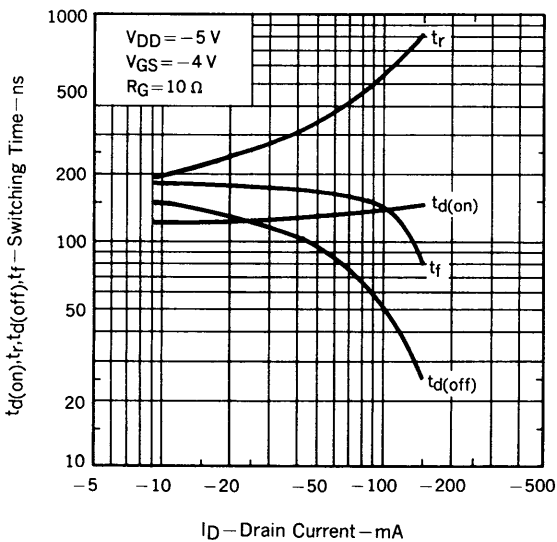
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



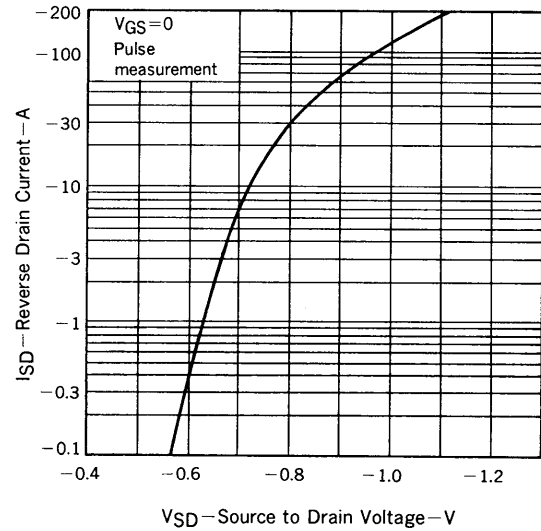
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



**RECOMMENDED SOLDERING CONDITIONS**

Mounting of this product by soldering should be done under the following conditions.  
 Please consult our representatives about soldering methods and conditions other than these.

**SURFACE MOUNT TYPE**

For details of the recommended soldering conditions, see the information document.  
 "Device Mounting Manual for Surface Mounting (IEI-616)."

| Soldering Method      | Soldering Conditions   | Symbol for Recommended Conditions |
|-----------------------|--|-----------------------------------|
| Infrared Reflow       | Package peak temp.: 230 °C<br>Soldering time: within 30 sec (above 210 °C)<br>Soldering times: 1, Days limitation: none* | IR30-00                           |
| Vapor Phase Soldering | Package peak temp.: 215 °C<br>Soldering time: within 40 sec (above 200 °C)<br>Soldering times: 1, Days limitation: none* | VP15-00                           |
| Wave Soldering        | Soldering bath temp.: below 260 °C<br>Soldering time: within 10 sec<br>Soldering times: 1, Days limitation: none*        | WS60-00                           |

\*: Stored days under storage conditions at 25 °C and below 65 % R.H. after the dry-pack has been opened.

**Note 1** Combination of soldering methods should be avoided.

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Application examples recommended by NEC Corporation

Standard: Data processing and office equipment, Communication equipment (terminal, mobile). Test and Measurement equipment, Audio and Video equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Communication equipment (trunk line), Train and Traffic control devices, industrial robots, Burning control systems, antidisaster systems, anticrime systems etc.