NEC

# MOS FIELD EFFECT TRANSISTOR
# 2SJ211

## P-CHANNEL MOSFET FOR SWITCHING

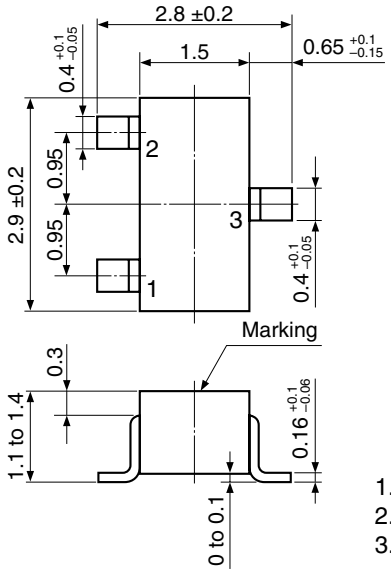
The 2SJ211, P-channel vertical type MOSFET, is a switching device which can be driven directly by the output of ICs having a 5 V power source.

The 2SJ211 has low on-state resistance and excellent switching characteristics, it is suitable for driving actuators such as motors, relays, and solenoids.

### FEATURES

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

### PACKAGE DRAWING (Unit: mm)




1. Source
2. Gate
3. Drain

<R> ### ORDERING INFORMATION

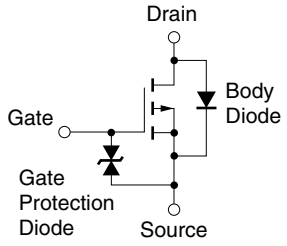
| PART NUMBER | PACKAGE |
|---|---|
| 2SJ211 | SC-59 (Mini Mold) |

**Marking: H18**

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

| | | | |
|---|---|---|---|
| Drain to Source Voltage ($V_{GS}$ = 0 V) | $V_{DSS}$ | −100 | V |
| Gate to Source Voltage ($V_{DS}$ = 0 V) | $V_{GSS}$ | ∓20 | V |
| Drain Current (DC) | $I_{D(DC)}$ | ∓200 | mA |
| Drain Current (pulse) **Note** | $I_{D(pulse)}$ | ∓400 | mA |
| Total Power Dissipation | $P_T$ | 200 | mW |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | −55 to +150 | °C |

### EQUIVALENT CIRCUIT




**Note** PW ≤ 10 ms, Duty Cycle ≤ 50%

<R> **Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.



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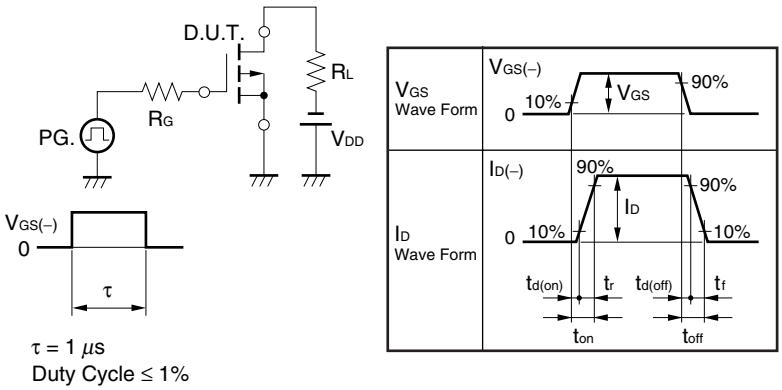
**The mark <R> shows major revised points.**
**The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.**

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = –100 V, $V_{GS}$ = 0 V | | | –1.0 | μA |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ∓20 V, $V_{DS}$ = 0 V | | | ∓1.0 | μA |
| Gate Cut-off Voltage | $V_{GS(off)}$ | $V_{DS}$ = –5.0 V, $I_D$ = –1.0 μA | –1.4 | –1.8 | –2.4 | V |
| Forward Transfer Admittance **Note** | $\|y_{fs}\|$ | $V_{DS}$ = –5.0 V, $I_D$ = –10 mA | 20 | 45 | | mS |
| Drain to Source On-state Resistance **Note** | $R_{DS(on)1}$ | $V_{GS}$ = –4.0 V, $I_D$ = –10 mA | | 15 | 30 | Ω |
| | $R_{DS(on)2}$ | $V_{GS}$ = –10 V, $I_D$ = –10 mA | | 11 | 20 | Ω |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = –5.0 V | | 27 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$ = 0 V | | 16 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | f = 1 MHz | | 2 | | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{GS}$ = –4.0 V, $R_G$ = 10 Ω | | 110 | | ns |
| Rise Time | $t_r$ | $V_{DD}$ = –5.0 V | | 150 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $I_D$ = –10 mA | | 160 | | ns |
| Fall Time | $t_f$ | | | 150 | | ns |

<R> **Note** Pulsed

### TEST CIRCUIT SWITCHING TIME

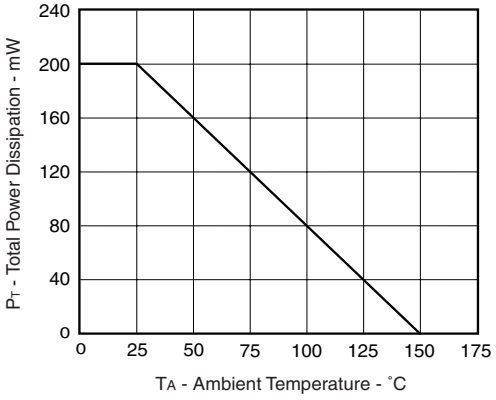



τ = 1 μs
Duty Cycle ≤ 1%

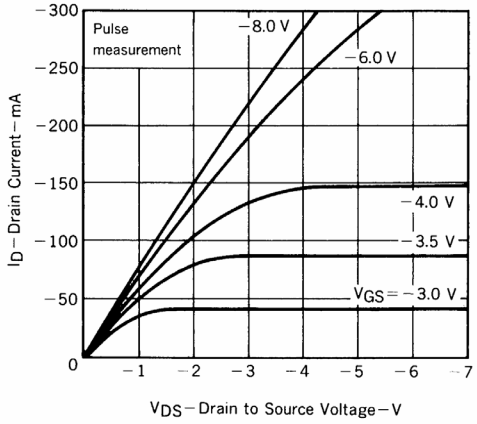
## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

<R>

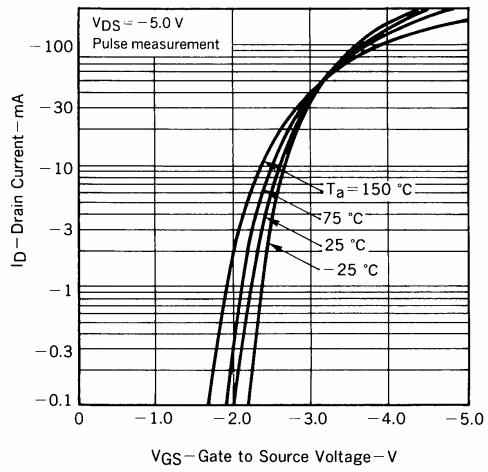
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



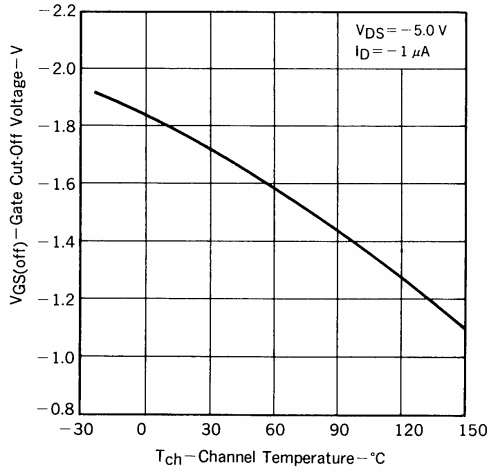

DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



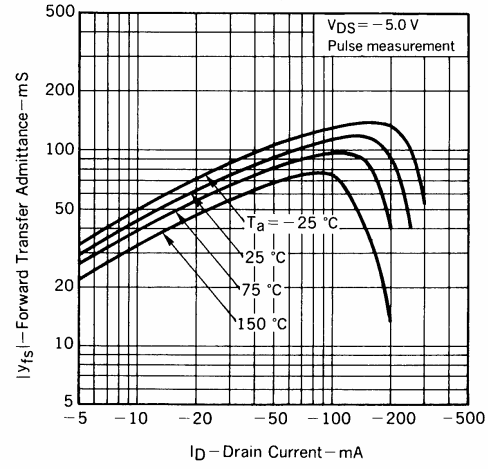

TRANSFER CHARACTERISTICS



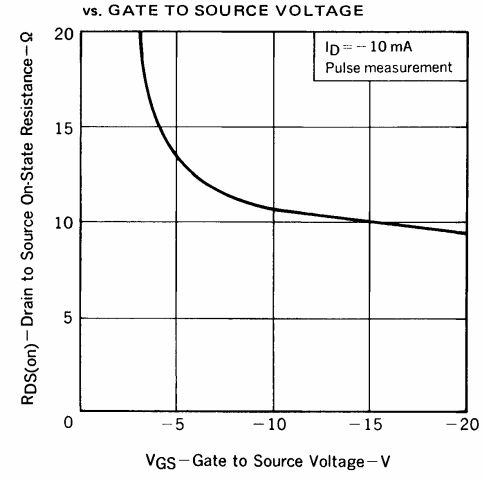

GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



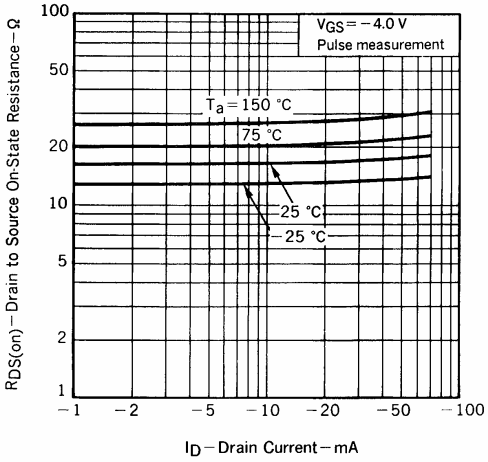

FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



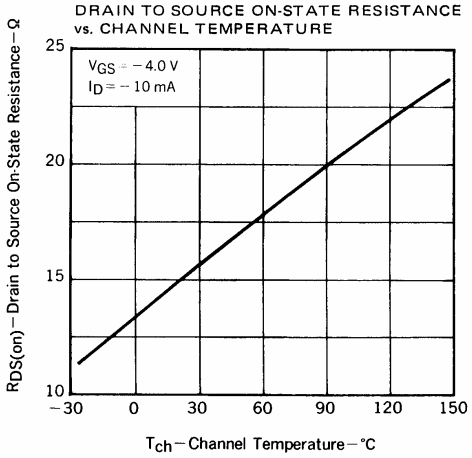

DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



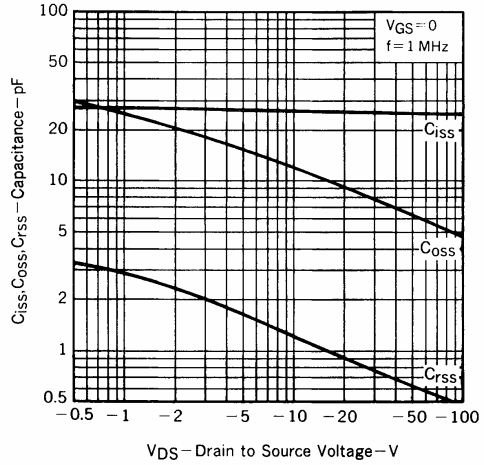
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



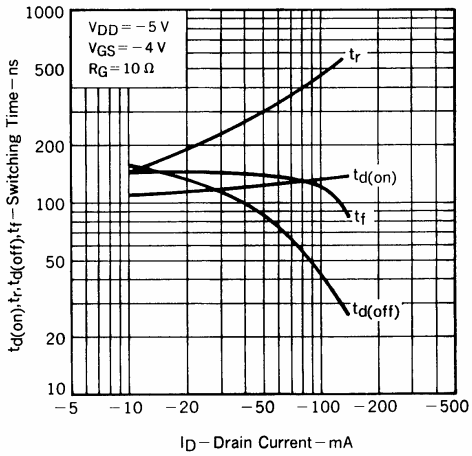

DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



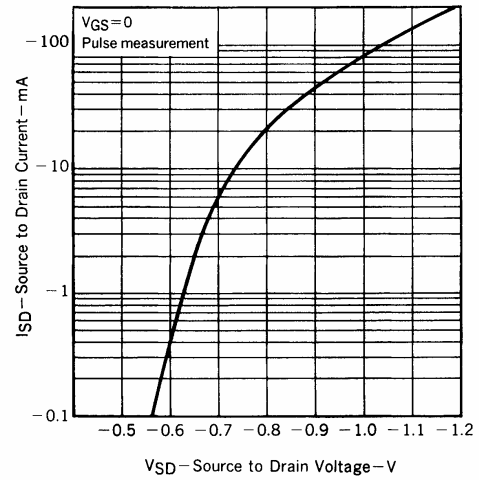

CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE




SWITCHING CHARACTERISTICS




SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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