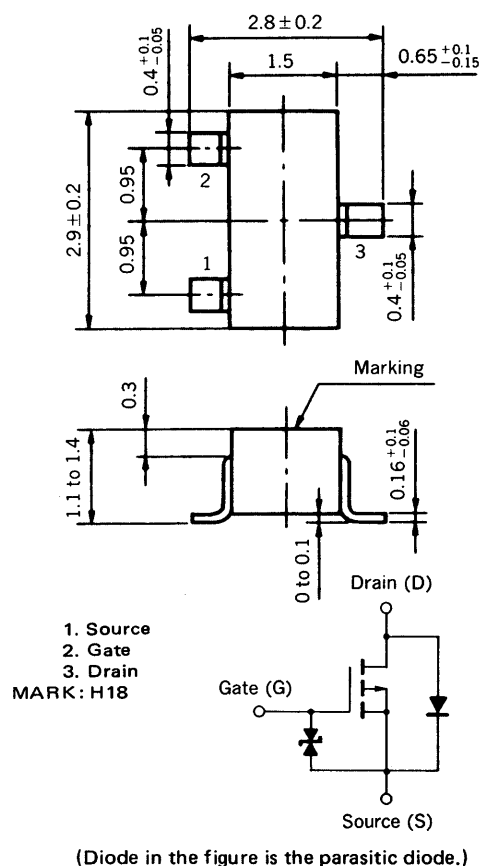


# MOS FIELD EFFECT TRANSISTOR

## 2SJ211

### P-CHANNEL MOS FET FOR SWITCHING

#### PACKAGE DIMENSIONS (Unit : mm)



The 2SJ211, 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.

As the MOS FET 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.

#### 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.

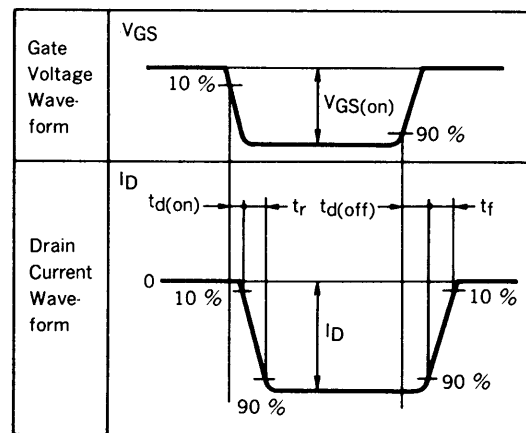
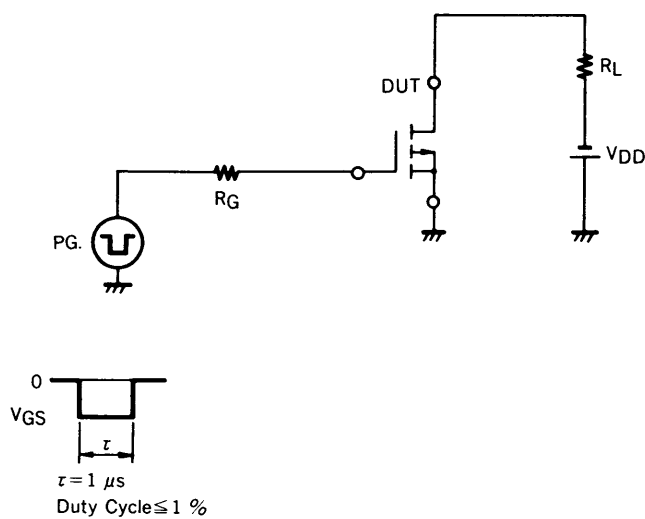
#### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

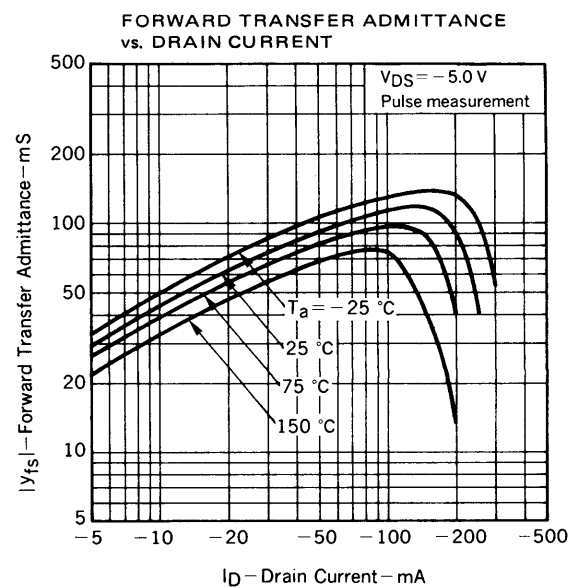
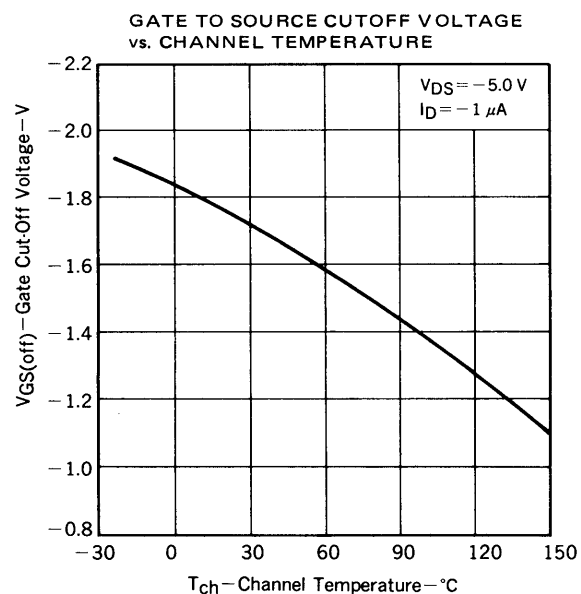
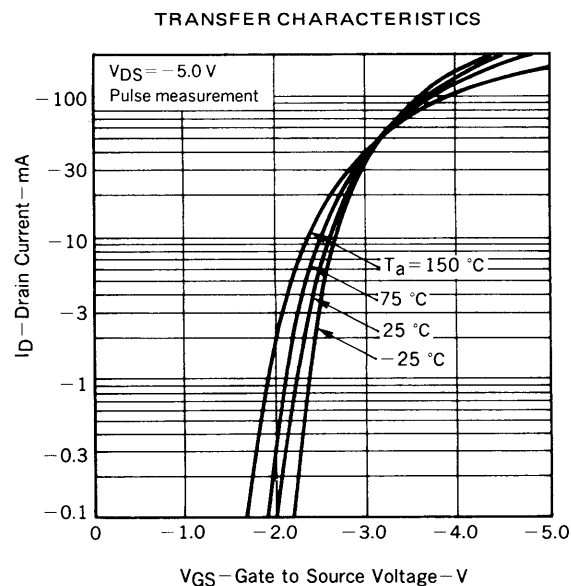
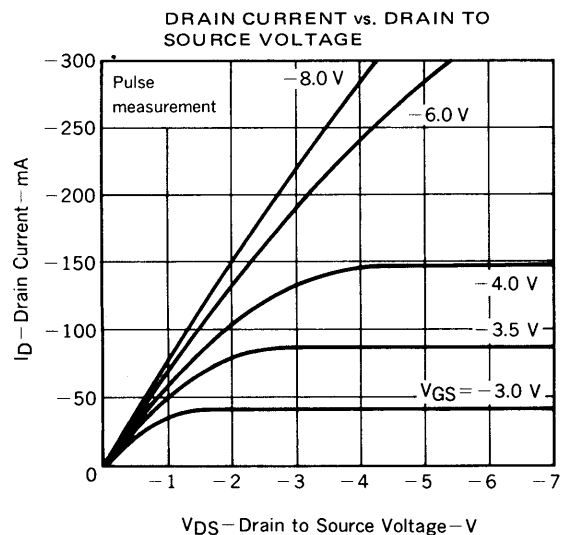
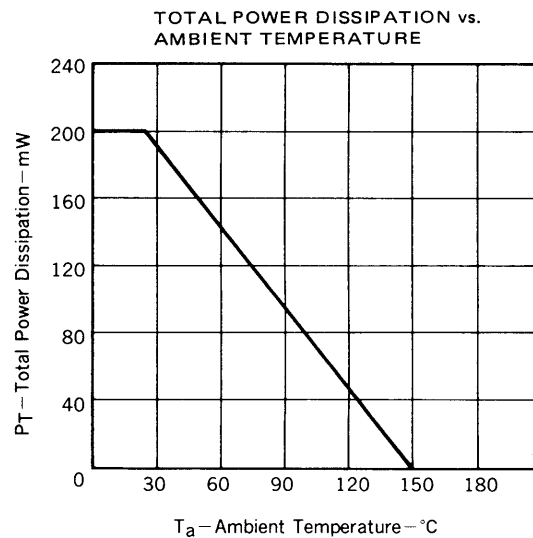
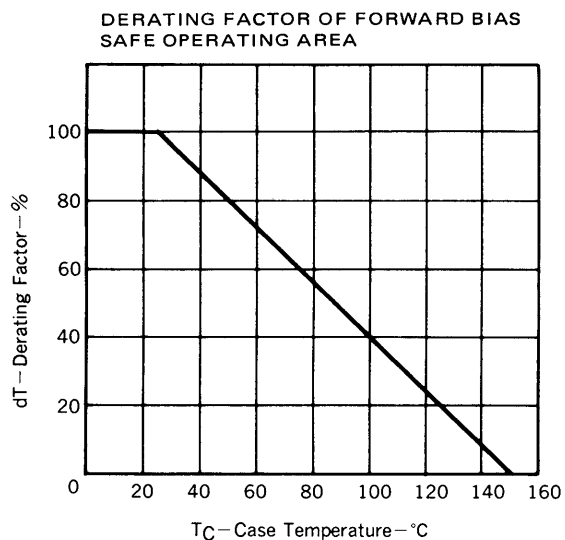
PARAMETER	SYMBOL	RATINGS	UNIT	TEST CONDITIONS
Drain to Source Voltage	$V_{DS}$	-100	V	$V_{GS} = 0$
Gate to Source Voltage	$V_{GSS}$	±20	V	$V_{DS} = 0$
Drain Current	$I_D(\text{DC})$	±200	mA	
Drain Current	$I_D(\text{pulse})$	±400	μA	$PW \leq 10 \text{ ms}$ , Duty Cycle $\leq 50 \%$
Total Power Dissipation	$P_T$	200	mW	
Channel Temperature	$T_{ch}$	150	°C	
Storage Temperature	$T_{stg}$	-55 to +150	°C	

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

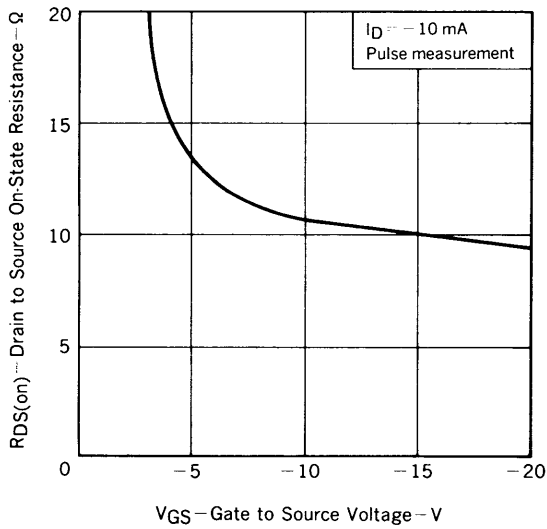
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	$I_{DSS}$			-1.0	$\mu\text{A}$	$V_{DS} = -100\text{ V}$ , $V_{GS} = 0$
Gate Leakage Current	$I_{GSS}$			$\pm 1.0$	$\mu\text{A}$	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0$
Gate Cut-off Voltage	$V_{GS(off)}$	-1.4	-1.8	-2.4	V	$V_{DS} = -5.0\text{ V}$ , $I_D = -1.0\text{ }\mu\text{A}$
Forward Transfer Admittance	$ y_{fs} $	20	45		mS	$V_{DS} = -5.0\text{ V}$ , $I_D = -10\text{ mA}$
Drain to Source On-State Resistance	$R_{DS(on)1}$		15	30	$\Omega$	$V_{GS} = -4.0\text{ V}$ , $I_D = -10\text{ mA}$
Drain to Source On-State Resistance	$R_{DS(on)2}$		11	20	$\Omega$	$V_{GS} = -10\text{ V}$ , $I_D = -10\text{ mA}$
Input Capacitance	$C_{iss}$		27		pF	$V_{DS} = -5.0\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$
Output Capacitance	$C_{oss}$		16		pF	
Feedback Capacitance	$C_{rss}$		2		pF	
Turn-On Delay Time	$t_{d(on)}$		110		ns	$V_{GS(on)} = -4\text{ V}$ , $R_G = 10\text{ }\Omega$ , $V_{DD} = -5\text{ V}$ , $I_D = -10\text{ mA}$ , $R_L = 500\text{ }\Omega$
Rise Time	$t_r$		150		ns	
Turn-Off Delay Time	$t_{d(off)}$		160		ns	
Fall Time	$t_f$		150		ns	

SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS

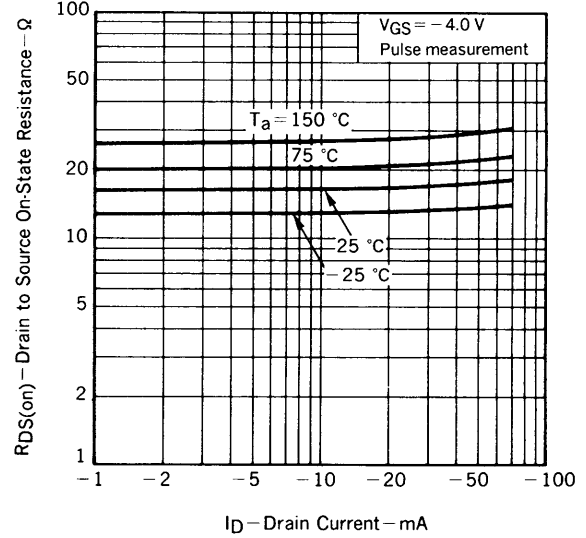


TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

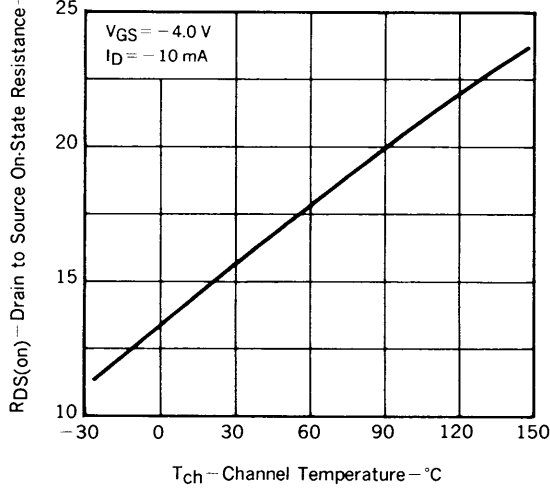
DRAIN TO SOURCE ON-STATE RESISTANCE  
vs. GATE TO SOURCE VOLTAGE



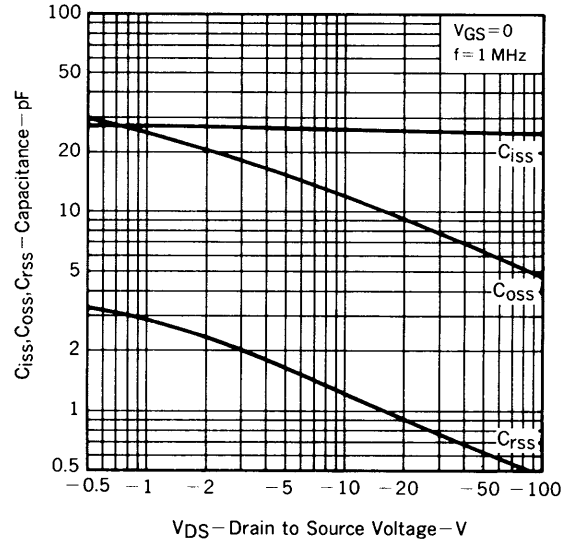
DRAIN TO SOURCE ON-STATE RESISTANCE  
vs. DRAIN CURRENT



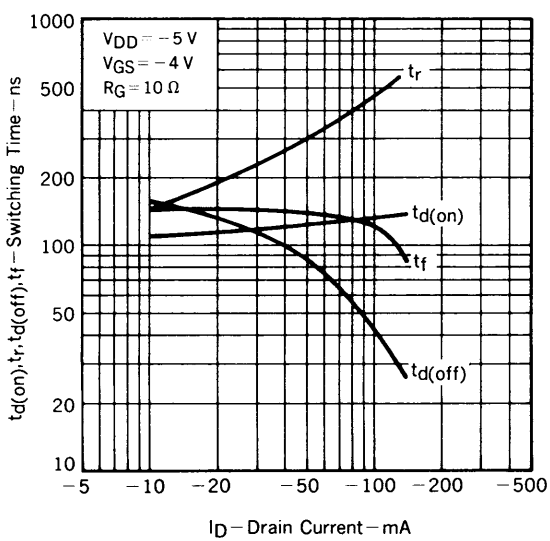
DRAIN TO SOURCE ON-STATE RESISTANCE  
vs. CHANNEL TEMPERATURE



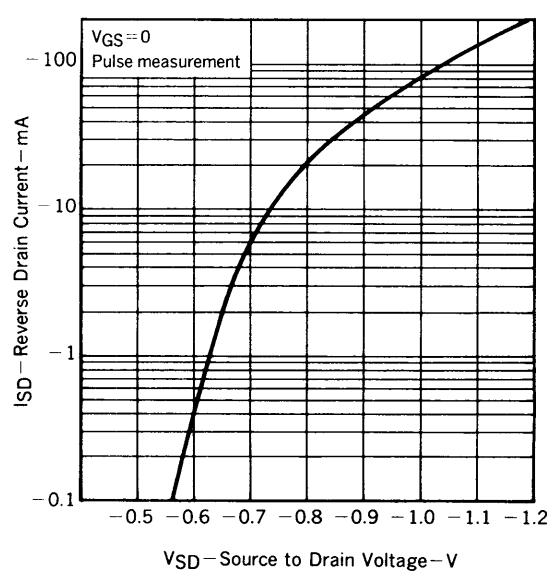
CAPACITANCE vs. DRAIN TO  
SOURCE VOLTAGE



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 Soldering time: within 30 sec (above 210 °C) Soldering times: 1, Days limitation: none*	IR30-00
Vapor Phase Soldering	Package peak temp.: 215 °C Soldering time: within 40 sec (above 200 °C) Soldering times: 1, Days limitation: none*	VP15-00
Wave Soldering	Soldering bath temp.: below 260 °C Soldering time: within 10 sec 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.

[MEMO]

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The devices listed in this document are not suitable for use in the field where very high reliability is required including, but not limited to, aerospace equipment, submarine cables, nuclear reactor control systems and life support systems. If customers intend to use NEC devices for above applications or those intended to use "Standard", or "Special" quality grade NEC devices for the applications not intended by NEC, please contact our sales people in advance.

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.