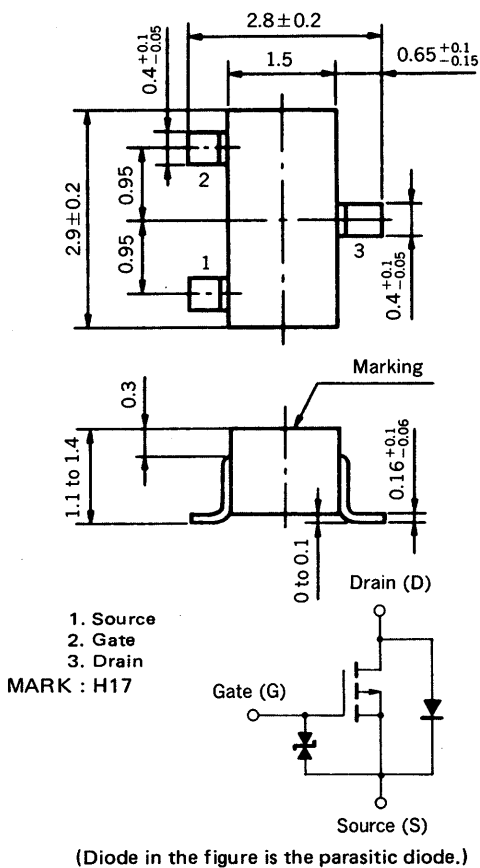


# MOS FIELD EFFECT TRANSISTOR 2SJ209

## P-CHANNEL MOS FET FOR SWITCHING

### PACKAGE DIMENSIONS (Unit : mm)



The 2SJ209, 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.

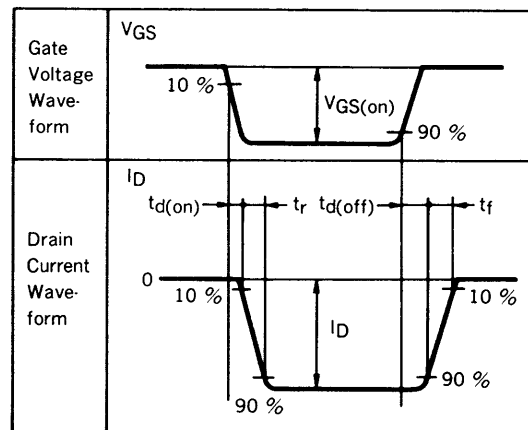
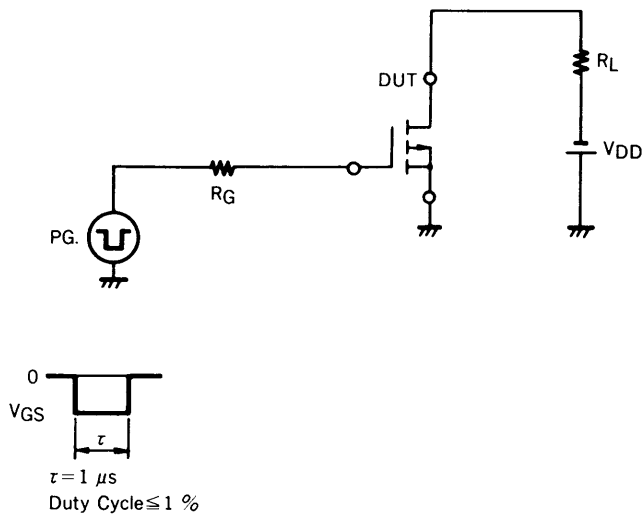
### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25\text{ }^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT	TEST CONDITIONS
Drain to Source Voltage	$V_{DSS}$	-100	V	$V_{GS} = 0$
Gate to Source Voltage	$V_{GSS}$	$\pm 16$	V	$V_{DS} = 0$
Drain Current	$I_D(DC)$	$\pm 100$	mA	
Drain Current	$I_D(\text{pulse})$	$\pm 200$	mA	$PW \leq 10\text{ ms}$ , Duty Cycle $\leq 50\%$
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)

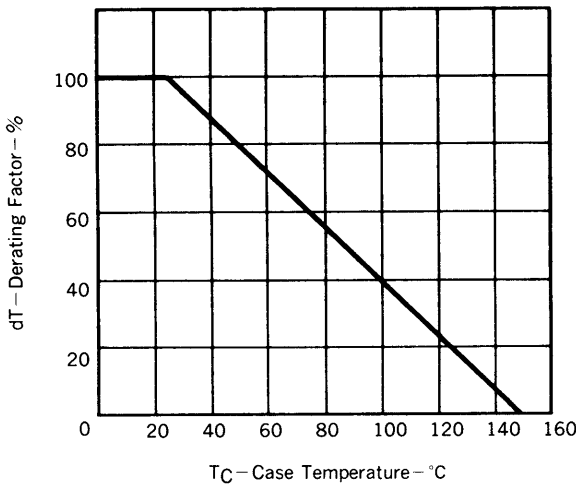
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	I <sub>DSS</sub>			-1.0	μA	V <sub>DS</sub> = -100 V, V <sub>GS</sub> = 0
Gate Leakage Current	I <sub>GSS</sub>			±10	μA	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0
Gate Cut-off Voltage	V <sub>GS(off)</sub>	-1.5	-2.0	-2.5	V	V <sub>DS</sub> = -5.0 V, I <sub>D</sub> = -1.0 μA
Forward Transfer Admittance	y <sub>fs</sub>	15	22		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>		60	100	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>		37	60	Ω	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -10 mA
Input Capacitance	C <sub>iss</sub>		17		pF	V <sub>DS</sub> = -5.0 V, V <sub>GS</sub> = 0, f = 1 MHz
Output Capacitance	C <sub>oss</sub>		9		pF	
Feedback Capacitance	C <sub>rss</sub>		1		pF	
Turn-On Delay Time	t <sub>d(on)</sub>		45		ns	V <sub>GS(on)</sub> = -4 V, R <sub>G</sub> = 10 Ω, V <sub>DD</sub> = -5 V, I <sub>D</sub> = -10 mA, R <sub>L</sub> = 500 Ω
Rise Time	t <sub>r</sub>		75		ns	
Turn-Off Delay Time	t <sub>d(off)</sub>		25		ns	
Fall Time	t <sub>f</sub>		80		ns	

SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS

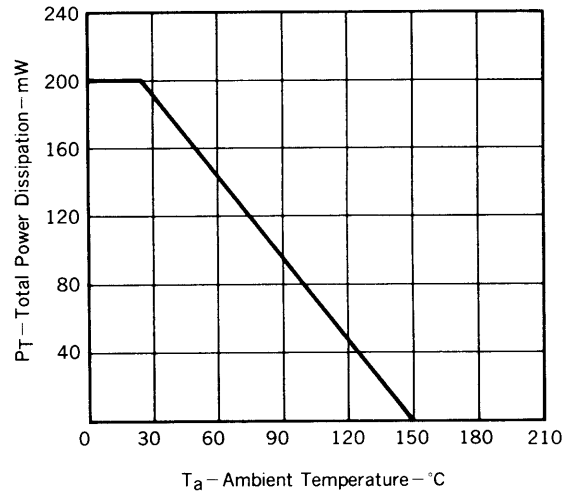


**TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )**

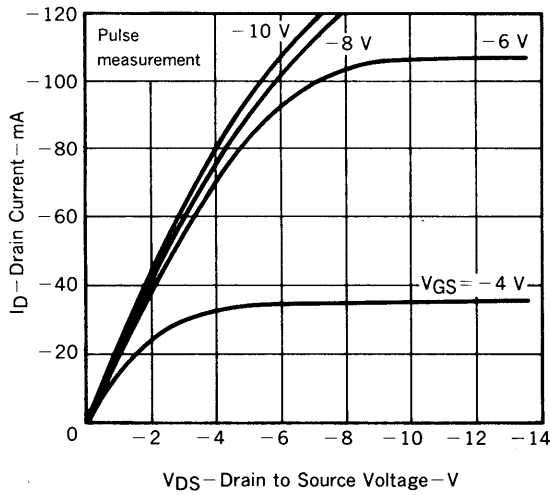
**DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA**



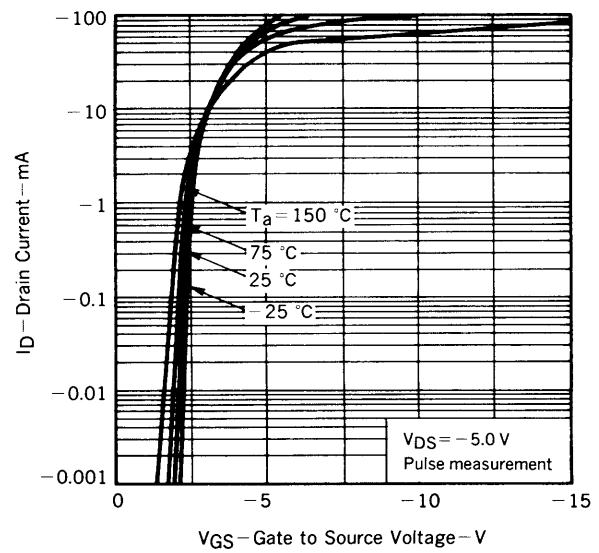
**TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE**



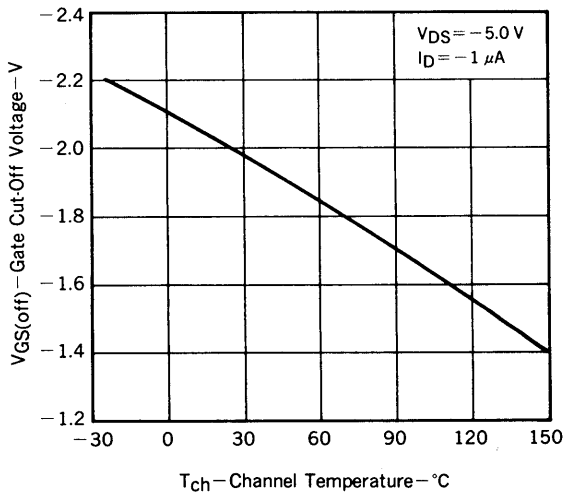
**DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE**



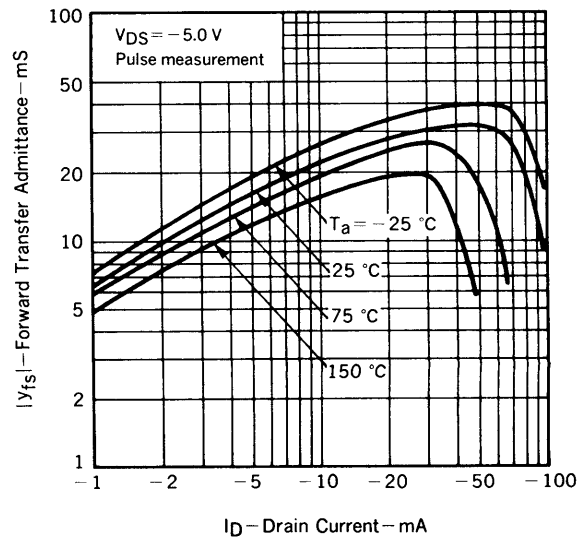
**TRANSFER CHARACTERISTICS**

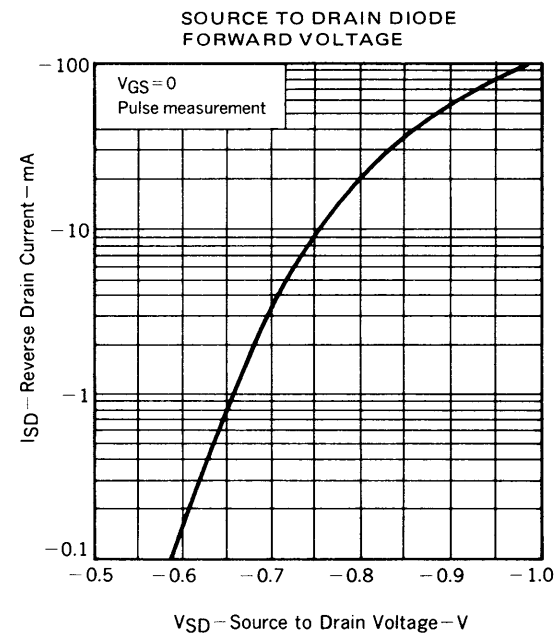
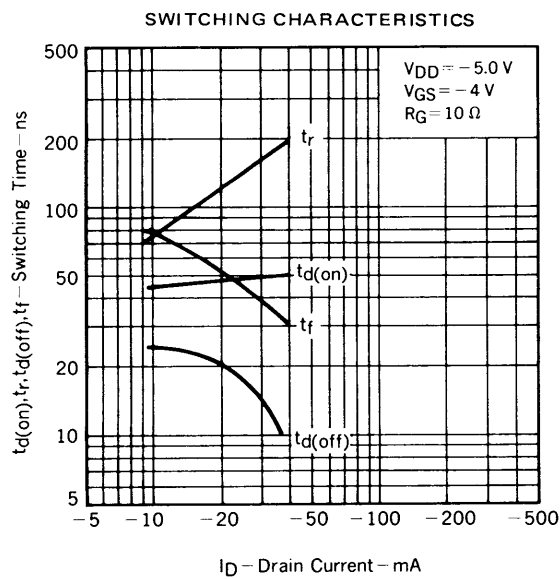
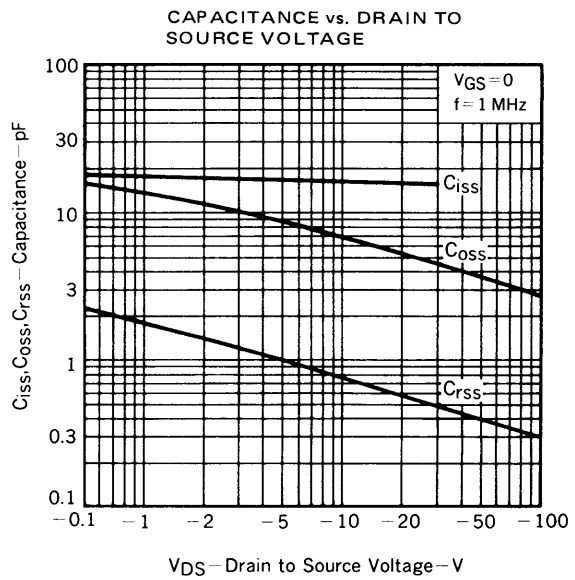
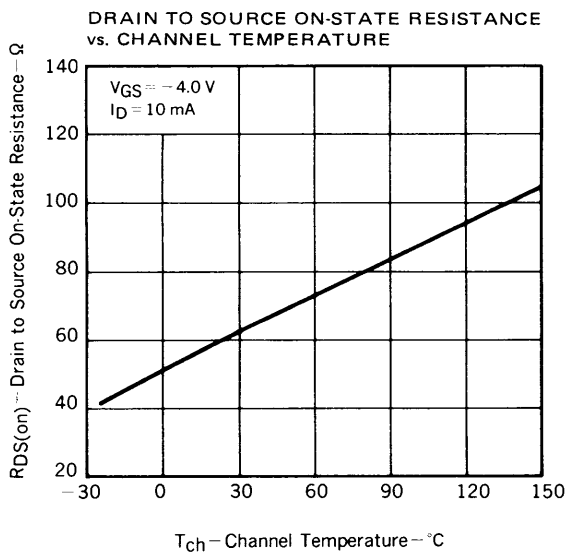
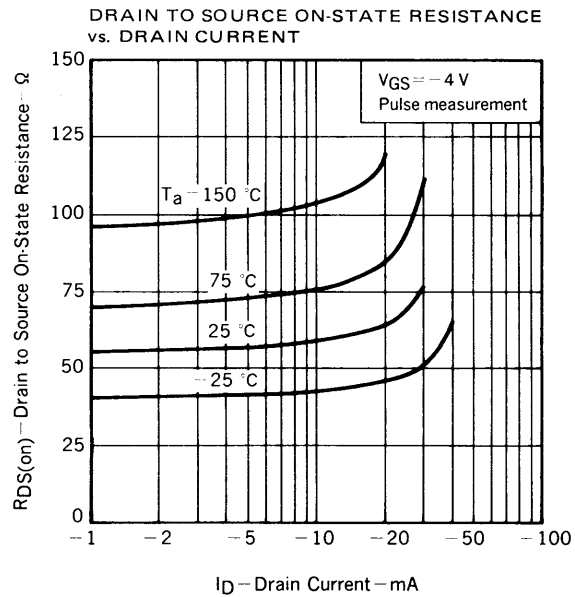
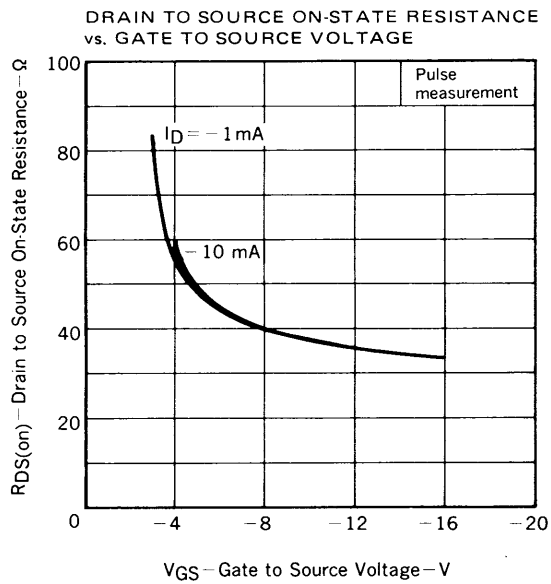


**GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE**



**FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT**





**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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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.