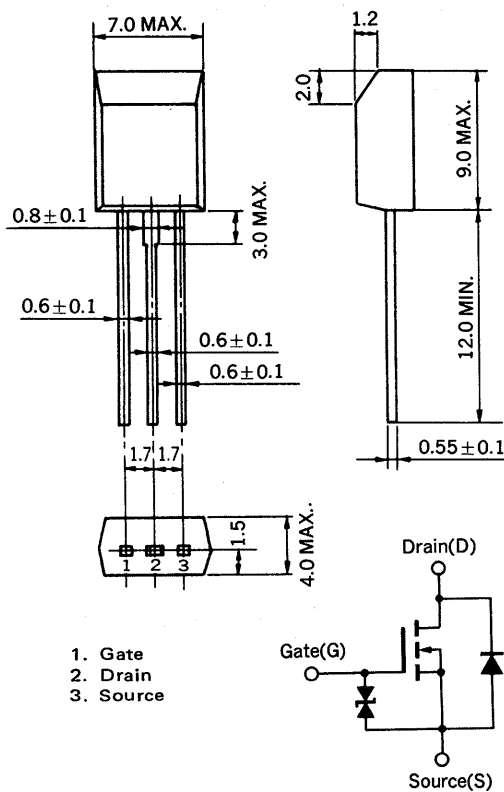


# MOS FIELD EFFECT TRANSISTOR 2SK681A

## N-CHANNEL MOS FET FOR HIGH SPEED SWITCHING

### PACKAGE DIMENSIONS (Unit : mm)



(Diode in the figure is the parasitic diode.)

The 2SK681A, N-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 for use as a high-speed switching device in digital circuits.

### FEATURES

- Directly driven by 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.
- Low ON-state resistance

$$R_{DS(on)} = 1.0 \Omega \text{ TYP. at } V_{GS} = 4 \text{ V, } I_D = 0.5 \text{ A}$$

$$R_{DS(on)} = 0.7 \Omega \text{ TYP. at } V_{GS} = 10 \text{ V, } I_D = 0.5 \text{ A}$$

### 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.

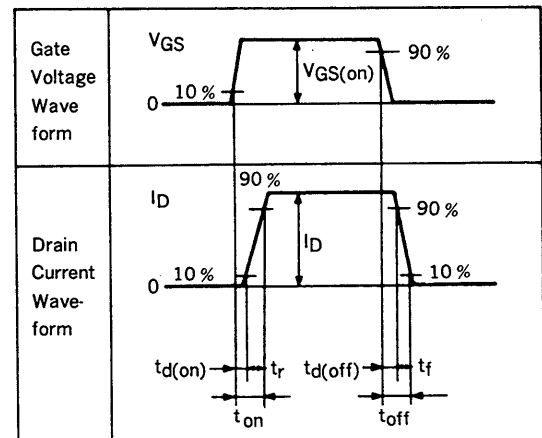
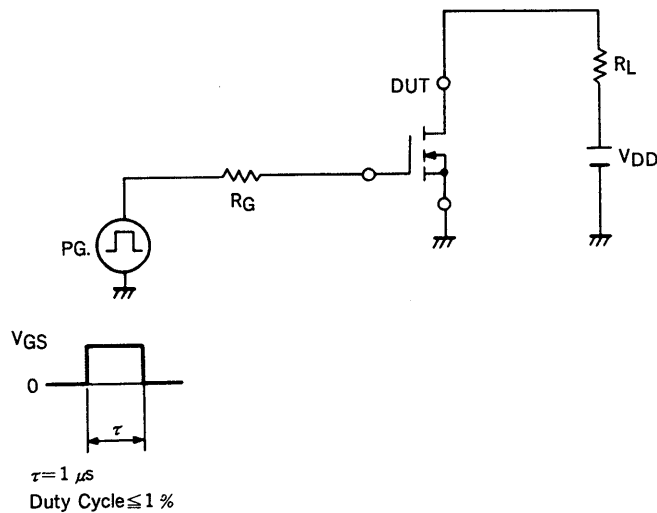
### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT	TEST CONDITIONS
Drain to Source Voltage	$V_{DSS}$	30	V	$V_{GS} = 0$
Gate to Source Voltage	$V_{GSS}$	$\pm 20$	V	$V_{DS} = 0$
Drain Current	$I_D(\text{DC})$	$\pm 1.0$	A	
Drain Current	$I_D(\text{pulse})$	$\pm 2.0$	A	$PW \leq 10 \text{ ms, Duty Cycle} \leq 50 \%$
Total Power Dissipation	$P_T$	1.0	W	
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$	

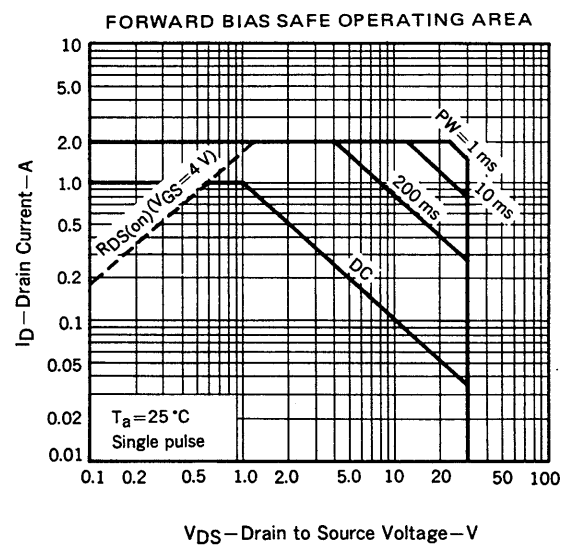
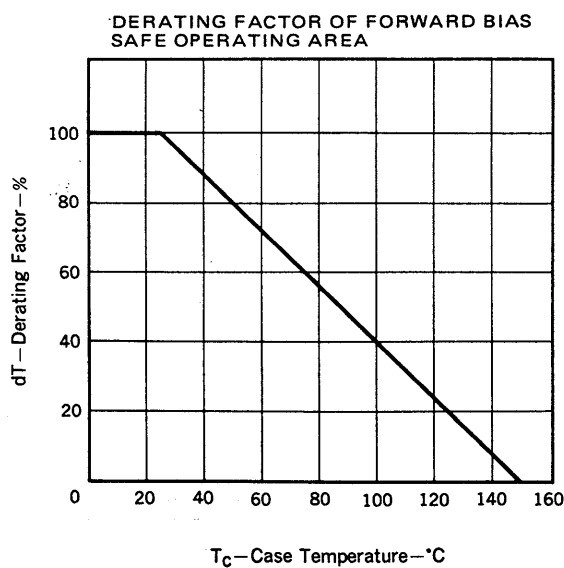
## ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	$I_{DSS}$			10	$\mu\text{A}$	$V_{DS} = 30\text{ V}, V_{GS} = 0$
Gate Leakage Current	$I_{GSS}$			$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0$
Gate Cut-off Voltage	$V_{GS(off)}$	1.0	1.6	2.5	V	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$
Forward Transfer Admittance	$ Y_{fs} $	0.4			S	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$
Drain to Source On-State Resistance	$R_{DS(on)1}$		0.6	1.0	$\Omega$	$V_{GS} = 4.0\text{ V}, I_D = 0.5\text{ A}$
Drain to Source On-State Resistance	$R_{DS(on)2}$		0.4	0.7	$\Omega$	$V_{GS} = 10\text{ V}, I_D = 0.5\text{ A}$
Input Capacitance	$C_{iss}$		130		pF	$V_{DS} = 5.0\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$
Output Capacitance	$C_{oss}$		70		pF	
Feedback Capacitance	$C_{rss}$		30		pF	
Turn-On Delay Time	$t_{d(on)}$		12		ns	$V_{GS(on)} = 10\text{ V}, R_G = 10\ \Omega$ $V_{DD} = 25\text{ V}, I_D = 0.5\text{ A}$ $R_L = 50\ \Omega$
Rise Time	$t_r$		44		ns	
Turn-Off Delay Time	$t_{d(off)}$		310		ns	
Fall Time	$t_f$		160		ns	

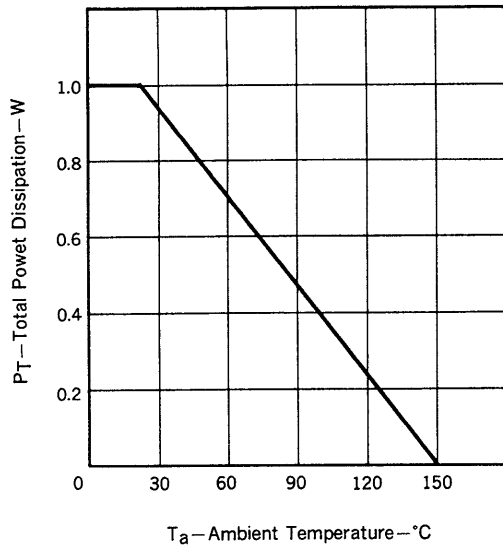
## SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS



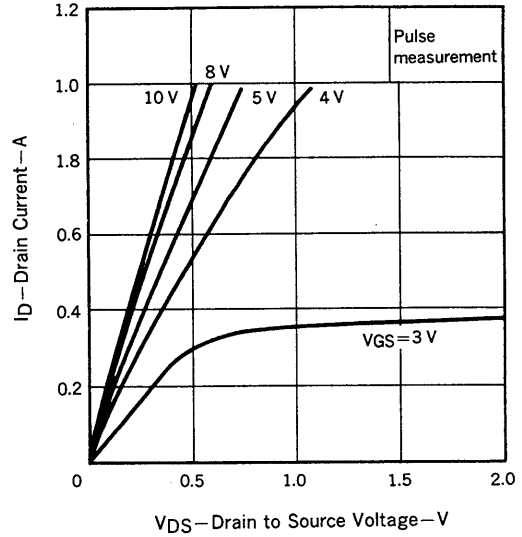
## TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



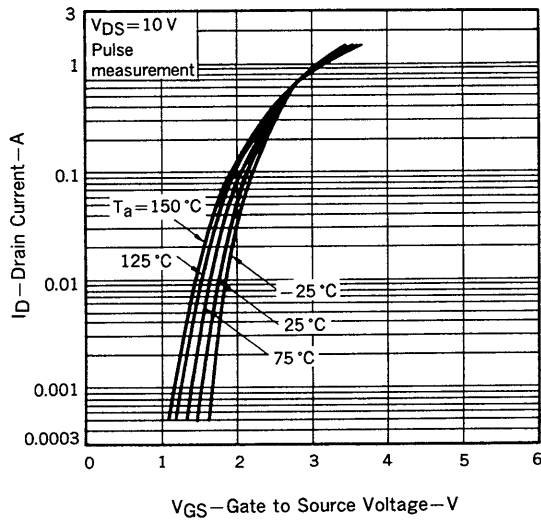
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



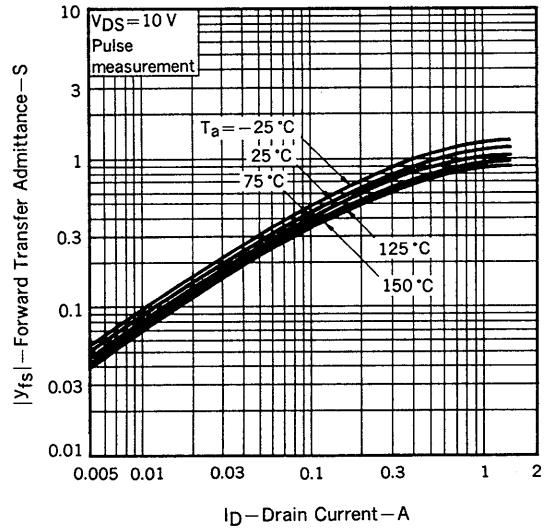
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



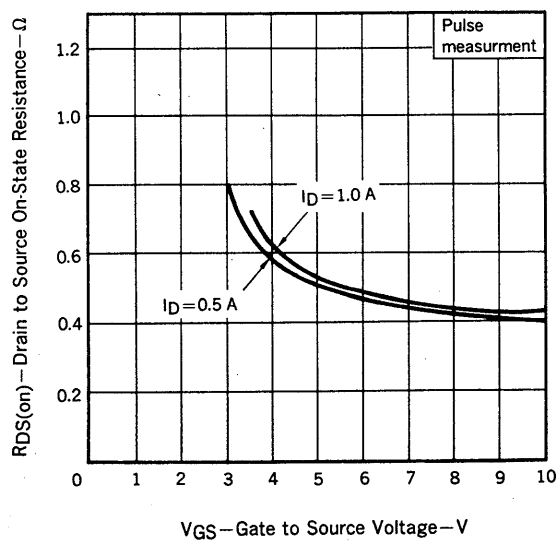
TRANSFER CHARACTERISTICS



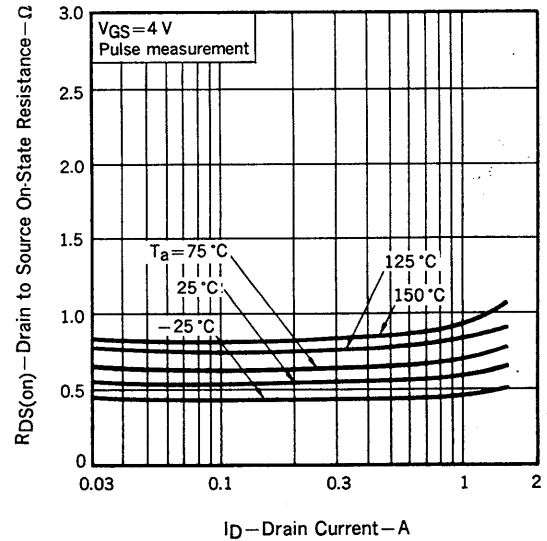
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



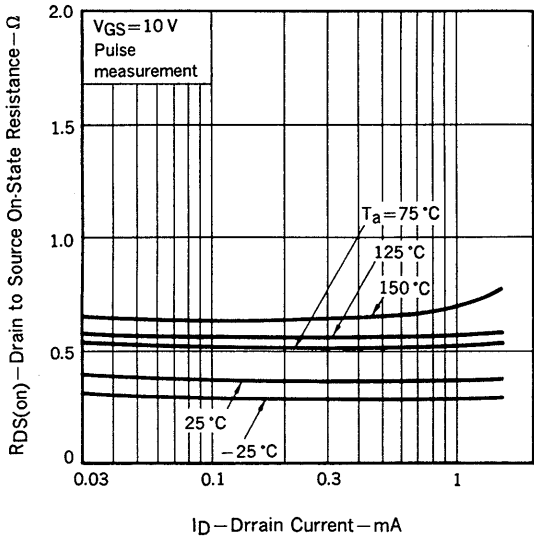
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



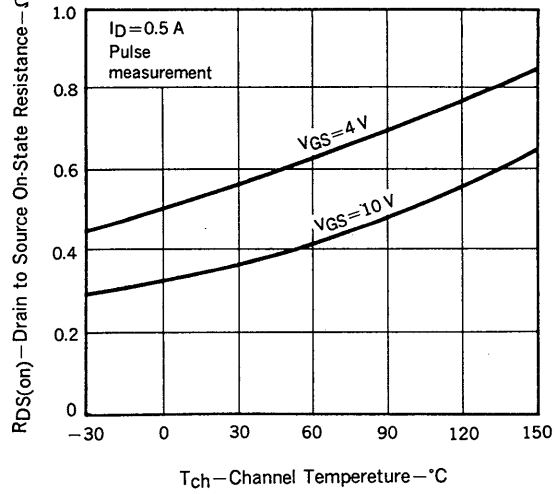
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



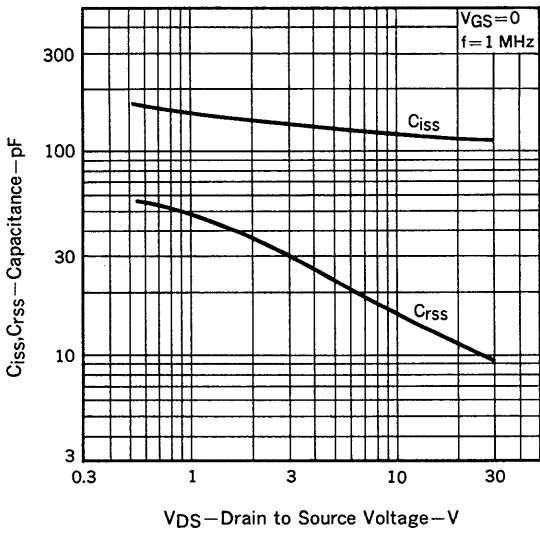
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



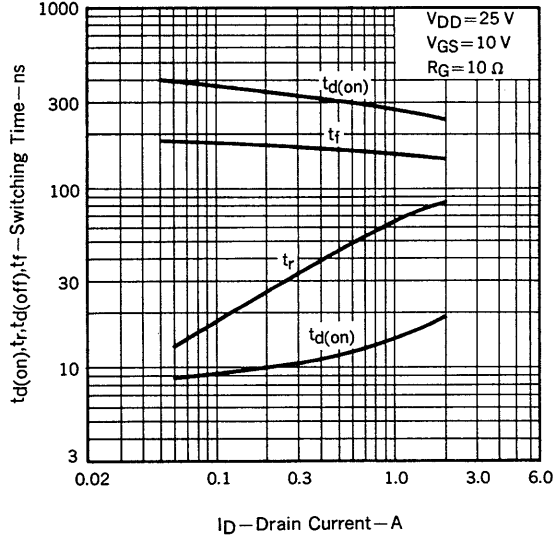
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



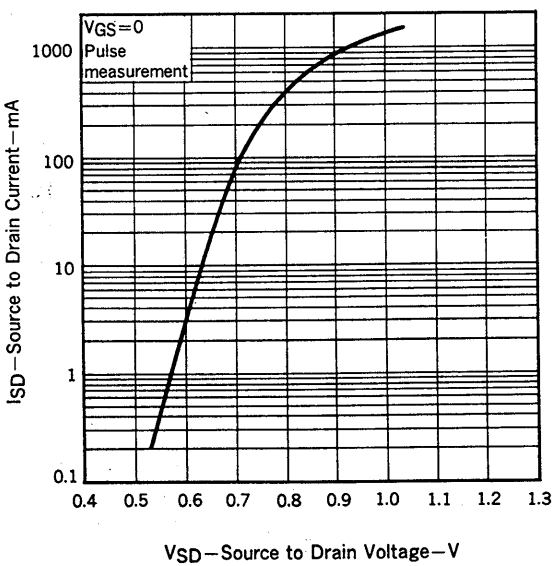
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



**RECOMMENDED SOLDERING CONDITIONS**

Solder this product under the following recommended conditions.

For soldering methods or soldering conditions other than those recommended in the table, please consult our NEC salespeople.

**Insert type**

Soldering method	Soldering conditions	Recommended condition code
Wave soldering	Solder bath temperature: 260 °C max. Soldering time: 10 sec max.	

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Application examples recommended by NEC Corporation

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

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