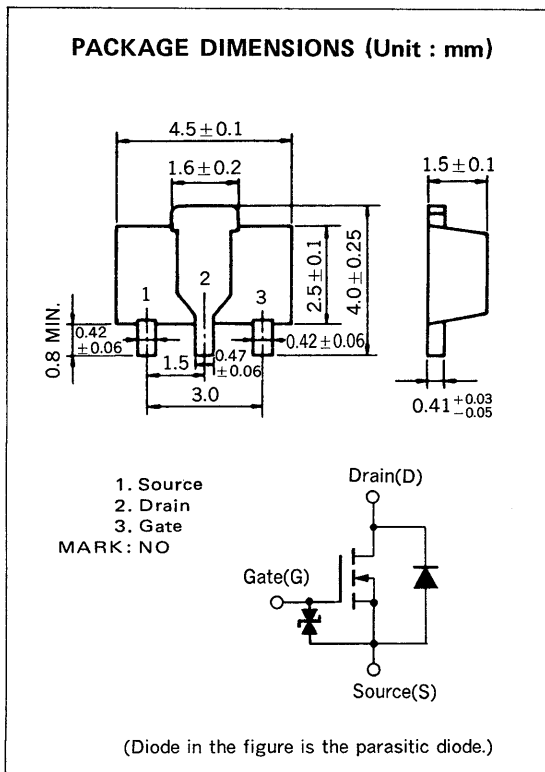


# MOS FIELD EFFECT TRANSISTOR 2SK1592

## N-CHANNEL MOS FET FOR SWITCHING



The 2SK1592, 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.

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 source.

- Has low on-state resistance.

$$R_{DS(on)1} = 2.5 \Omega \text{ MAX. @ } V_{GS} = 4.0 \text{ V, } I_D = 0.3 \text{ A}$$

$$R_{DS(on)2} = 2.0 \Omega \text{ MAX. @ } V_{GS} = 10 \text{ V, } I_D = 0.3 \text{ A}$$

### 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.

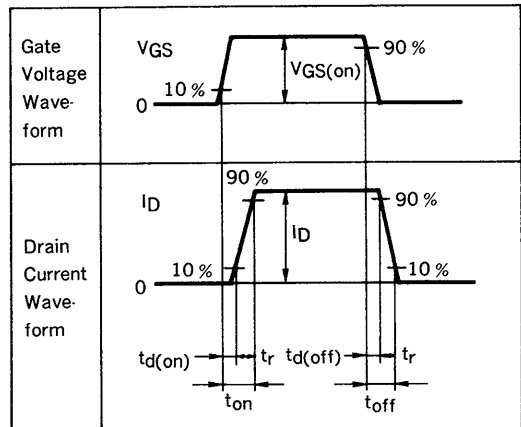
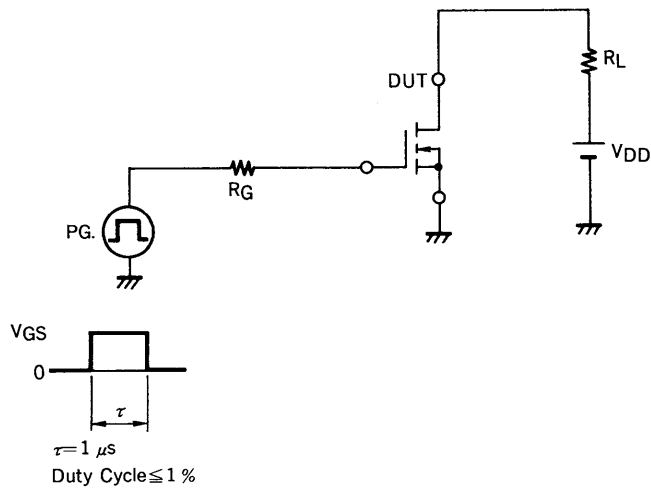
### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT	TEST CONDITIONS
Drain to Source Voltage	$V_{DS}$	60	V	$V_{GS} = 0$
Gate to Source Voltage	$V_{GS}$	$\pm 20$	V	$V_{DS} = 0$
Drain Current	$I_D(\text{DC})$	$\pm 500$	mA	
Drain Current	$I_D(\text{pulse})$	$\pm 1.0$	A	$PW \leq 10 \text{ ms, Duty Cycle} \leq 50 \%$
Total Power Dissipation	$P_T$	2.0	W	When using ceramic board of $16 \text{ cm}^2 \times 0.7 \text{ mm}$
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	$-55$ to $+150$	$^\circ\text{C}$	

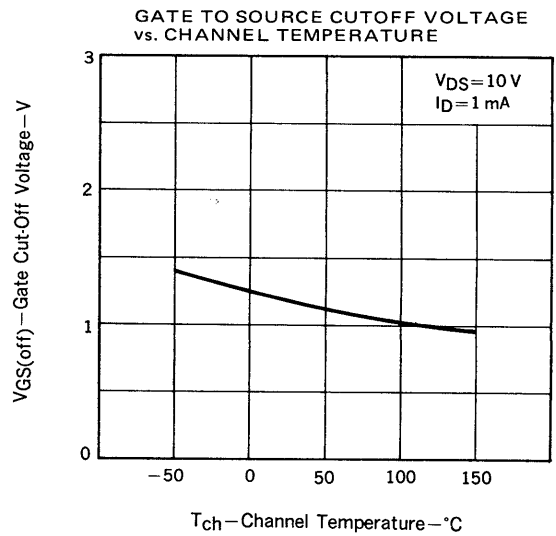
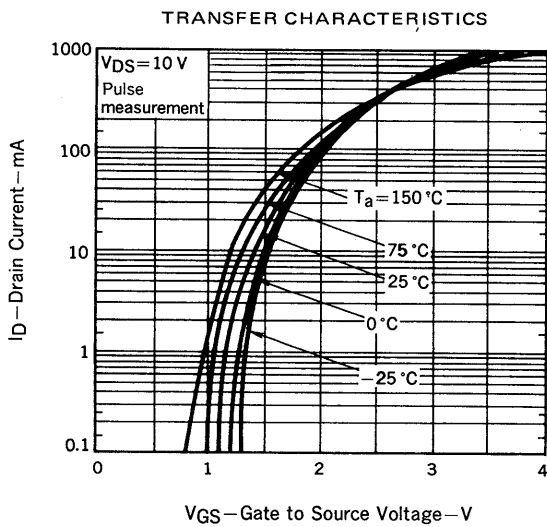
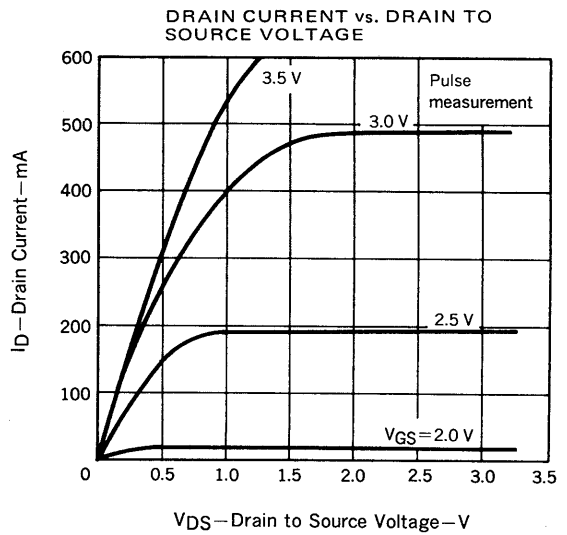
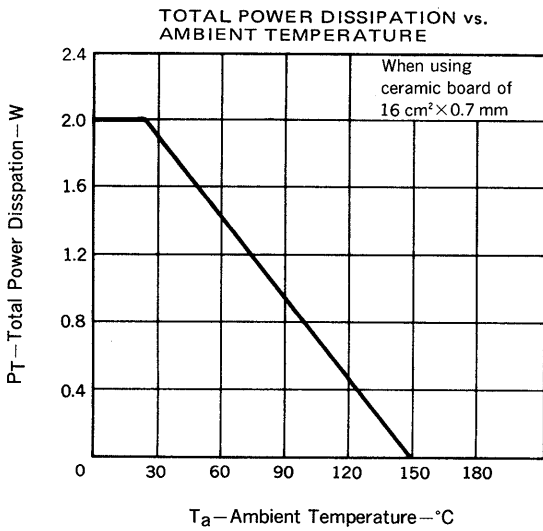
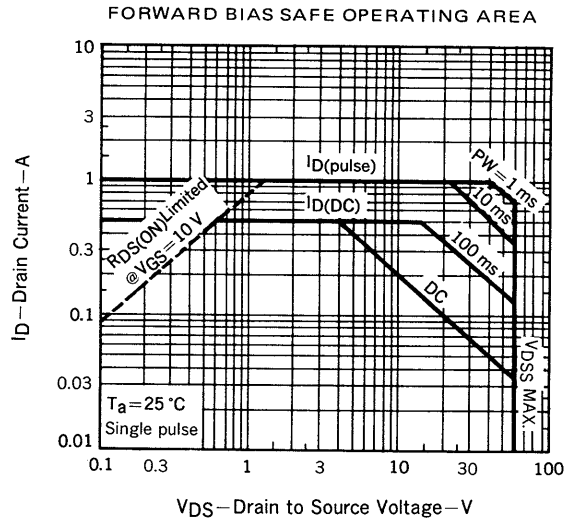
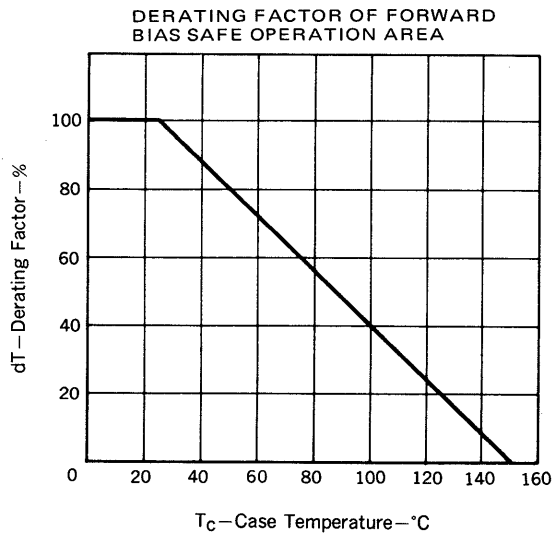
ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	I <sub>DSS</sub>			10	μA	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0
Gate Leakage Current	I <sub>GSS</sub>			±10	μA	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0
Gate Cut-off Voltage	V <sub>GS(off)</sub>	0.8	1.2	2.0	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Forward Transfer Admittance	Y <sub>fs</sub>	400	570		mS	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.5 A
Drain to Source On-State Resistance	R <sub>DS(on)1</sub>		1.6	2.5	Ω	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 0.3 A
Drain to Source On-State Resistance	R <sub>DS(on)2</sub>		1.2	2.0	Ω	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A
Input Capacitance	C <sub>iss</sub>		52		pF	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0, f = 1 MHz
Output Capacitance	C <sub>oss</sub>		34		pF	
Feedback Capacitance	C <sub>rss</sub>		7		pF	
Turn-On Delay Time	t <sub>d(on)</sub>		60		ns	V <sub>DD</sub> = 10 V, I <sub>D</sub> = 0.3 A V <sub>GS(on)</sub> = 4 V, R <sub>G</sub> = 10 Ω R <sub>L</sub> = 33 Ω
Rise Time	t <sub>r</sub>		150		ns	
Turn-Off Delay Time	t <sub>d(off)</sub>		150		ns	
Fall Time	t <sub>f</sub>		100		ns	

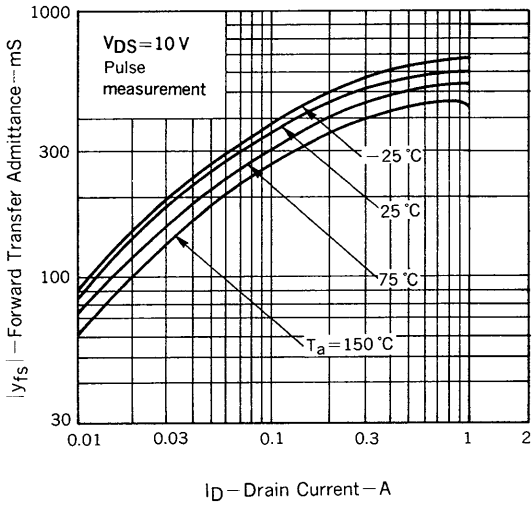
SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS



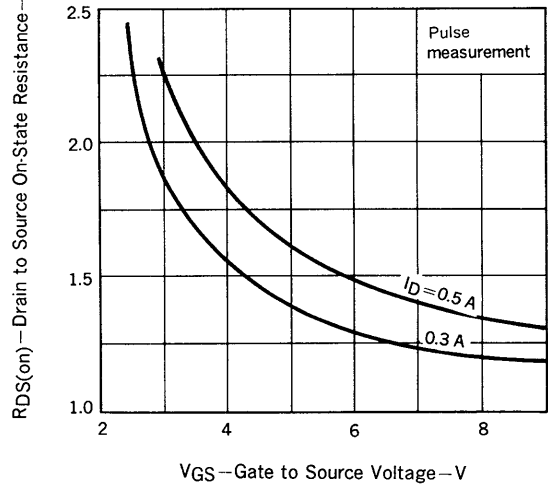
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



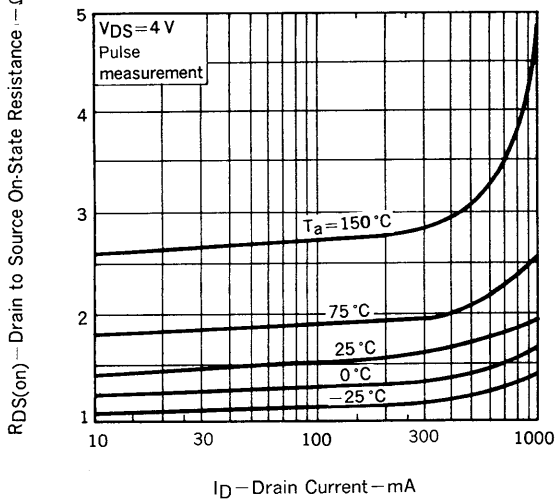
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



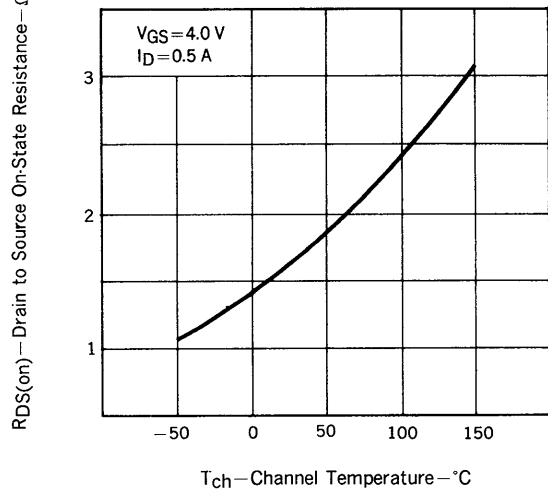
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



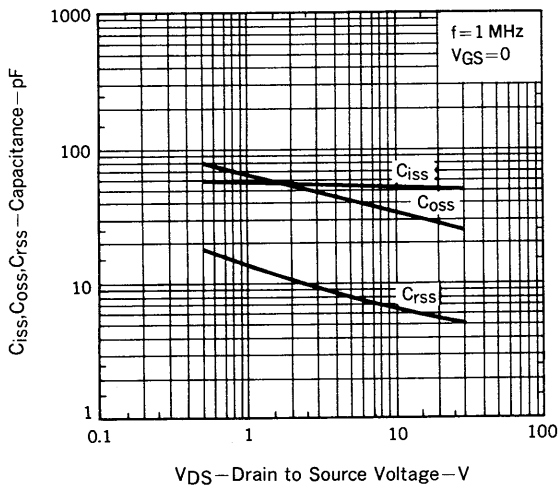
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



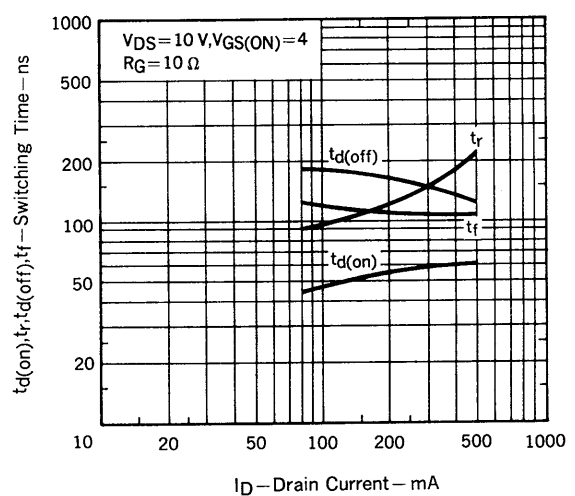
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE

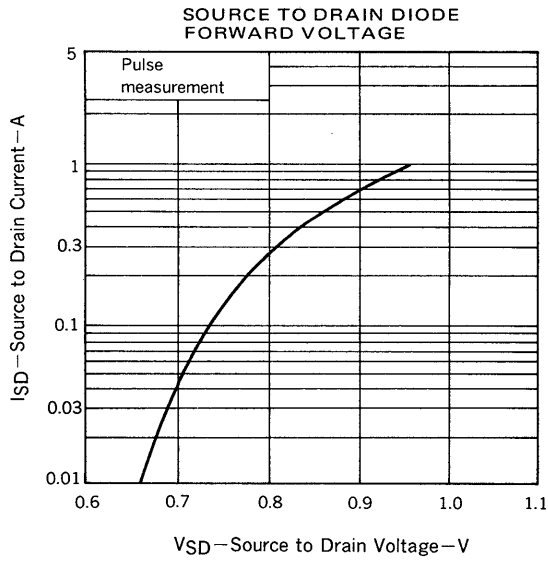


CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS





**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 "SMT MANUAL" (IEI-1207).

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.

REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134

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Application examples recommended by NEC Corporation

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.