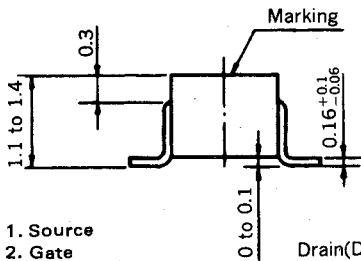
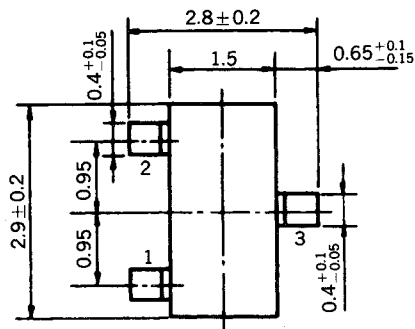


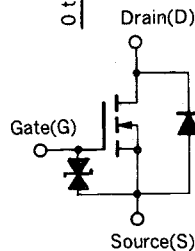
# MOS FIELD EFFECT TRANSISTOR 2SK1590

## N-CHANNEL MOS FET FOR SWITCHING

### PACKAGE DIMENSIONS (Unit : mm)



1. Source  
2. Gate  
3. Drain  
MARK: G16



(Diode in the figure is the parasitic diode.)

The 2SK1590, 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.

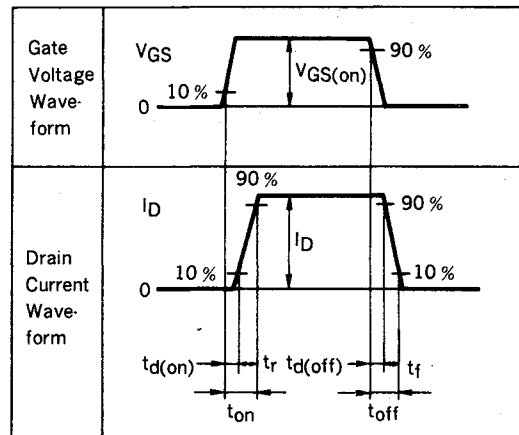
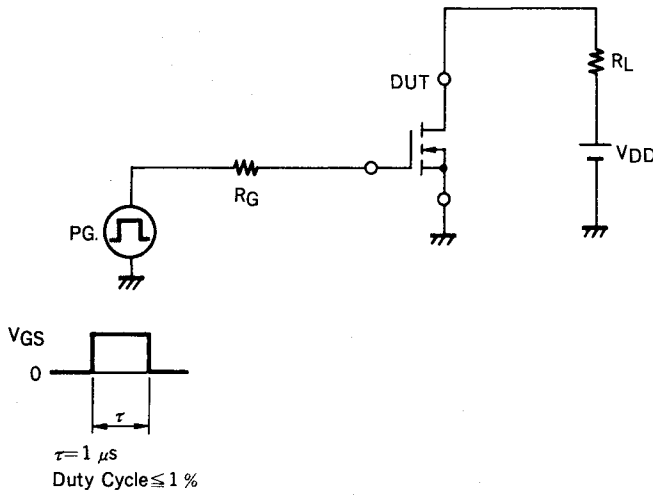
### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

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	$I_D(\text{DC})$	$\pm 200$	mA	
Drain Current	$I_D(\text{pulse})$	$\pm 400$	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)

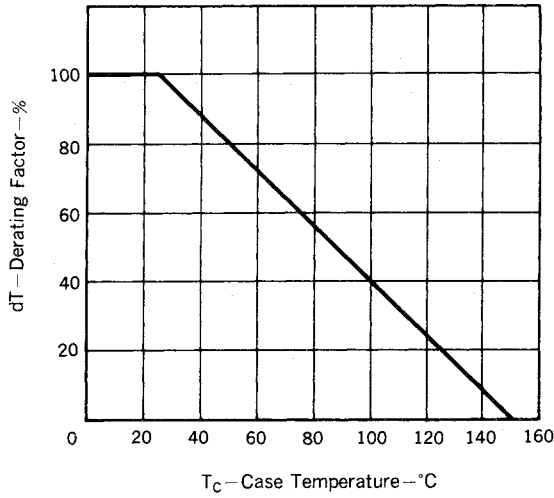
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	I <sub>DSS</sub>			1.0	μA	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0
Gate Leakage Current	I <sub>GSS</sub>			±1.0	μA	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0
Gate Cut-off Voltage	V <sub>GS(off)</sub>	0.8	1.2	1.8	V	V <sub>DS</sub> = 5.0 V, I <sub>D</sub> = 1.0 μA
Forward Transfer Admittance	Y <sub>fs</sub>	20	65		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>		3.2	6.0	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>		2.4	3.0	Ω	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 mA
Input Capacitance	C <sub>iss</sub>		26		pF	V <sub>DS</sub> = 5.0 V, V <sub>GS</sub> = 0, f = 1 MHz
Output Capacitance	C <sub>oss</sub>		20		pF	
Feedback Capacitance	C <sub>iss</sub>		4		pF	
Turn-On Delay Time	t <sub>d(on)</sub>		50		ns	V <sub>D</sub> = 5.0 V, I <sub>D</sub> = 10 mA V <sub>GS(on)</sub> = 5.0 V, R <sub>G</sub> = 10 Ω R <sub>L</sub> = 500 Ω
Rise Time	t <sub>r</sub>		140		ns	
Turn-Off Delay Time	t <sub>d(off)</sub>		200		ns	
Fall Time	t <sub>f</sub>		190		ns	

SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS

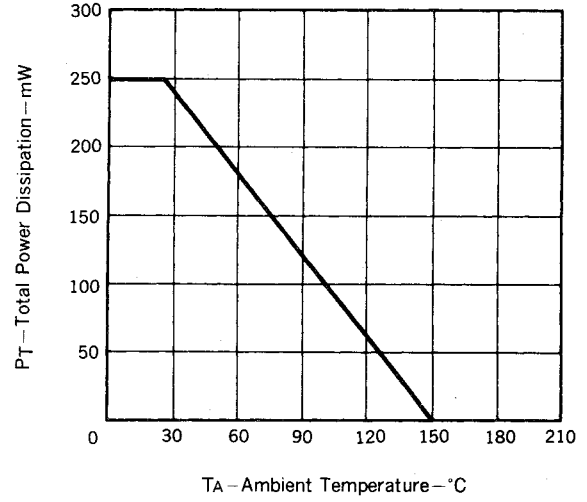


TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

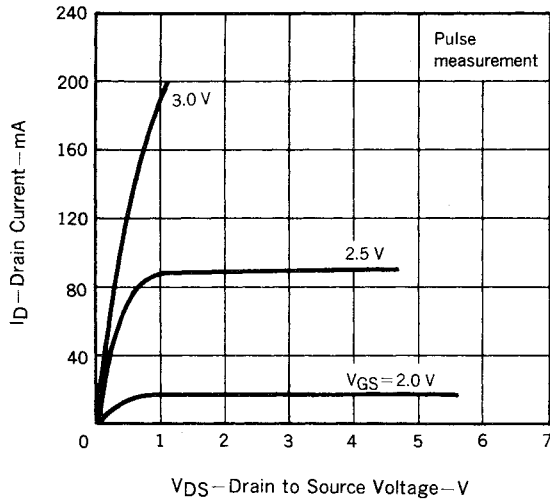
DERATING FACTOR OF FORWARD BIAS SAFE OPERATION AREA



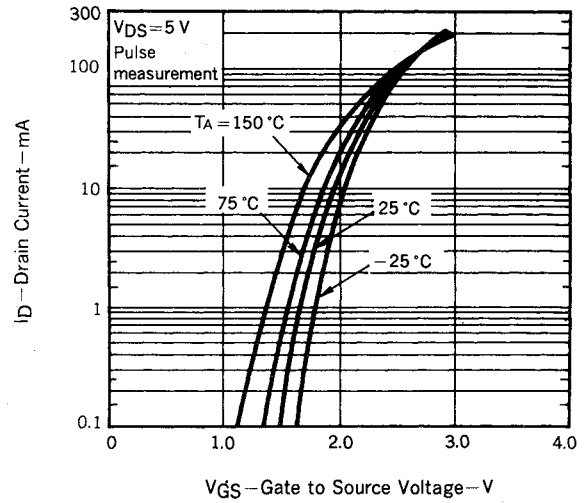
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



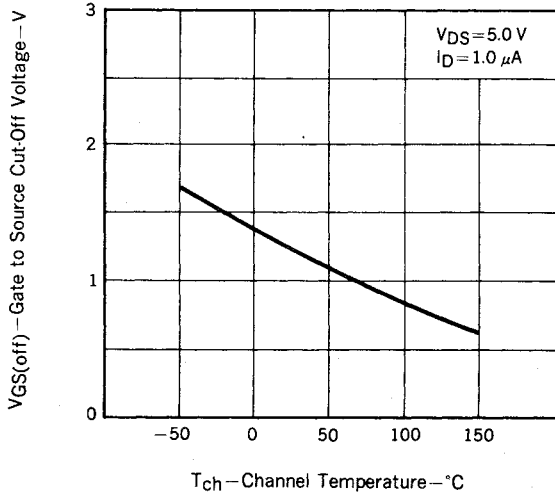
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



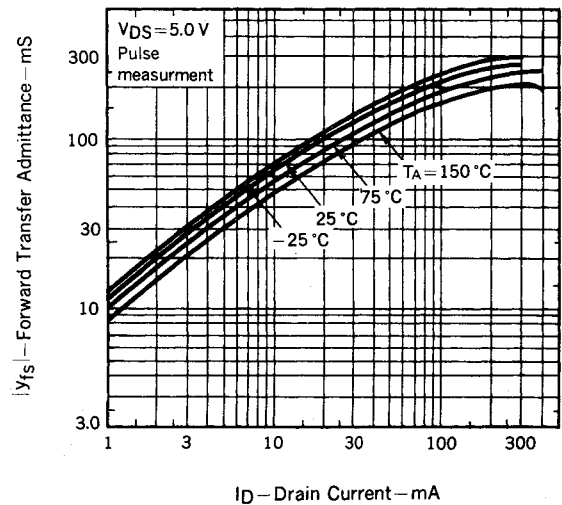
TRANSFER CHARACTERISTICS

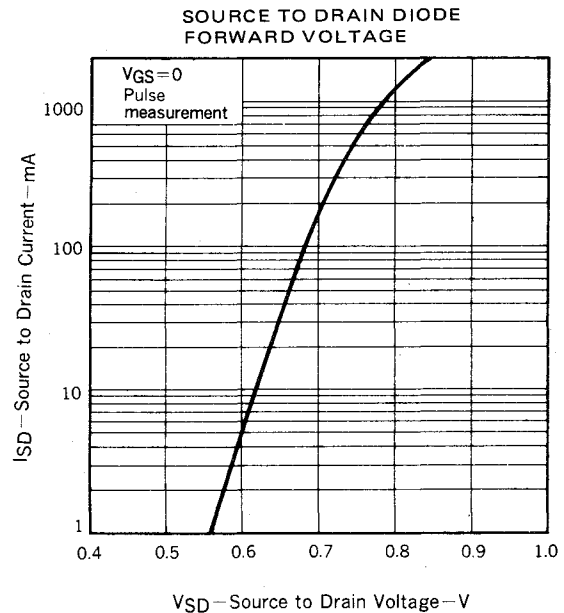
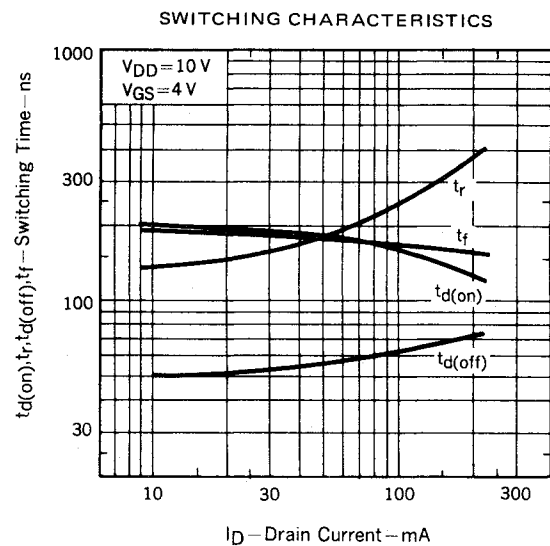
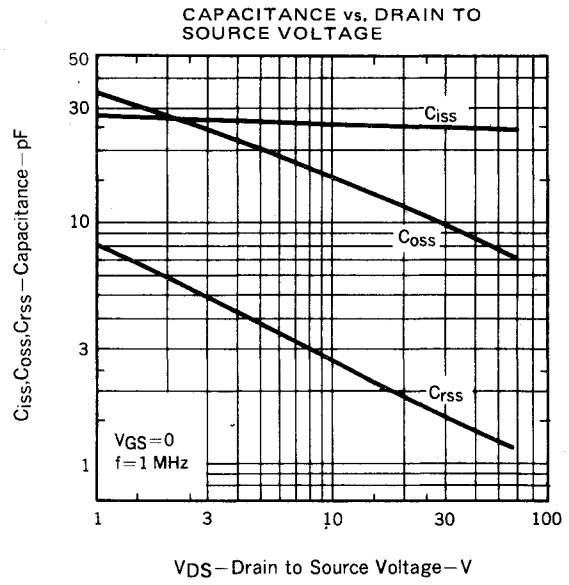
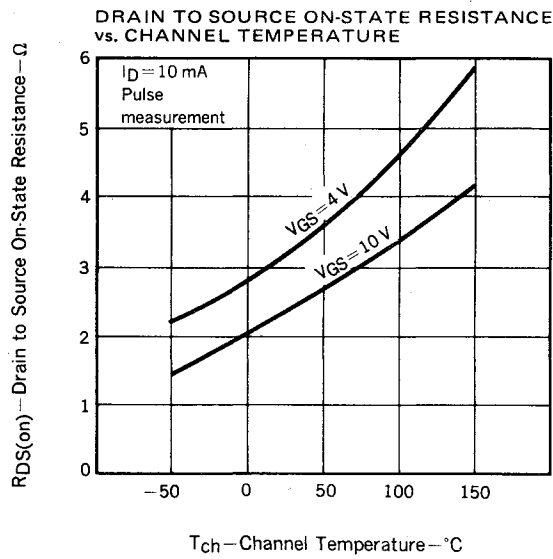
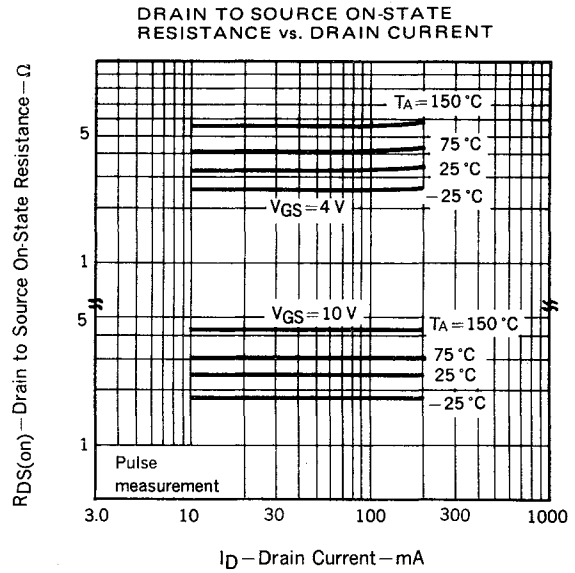
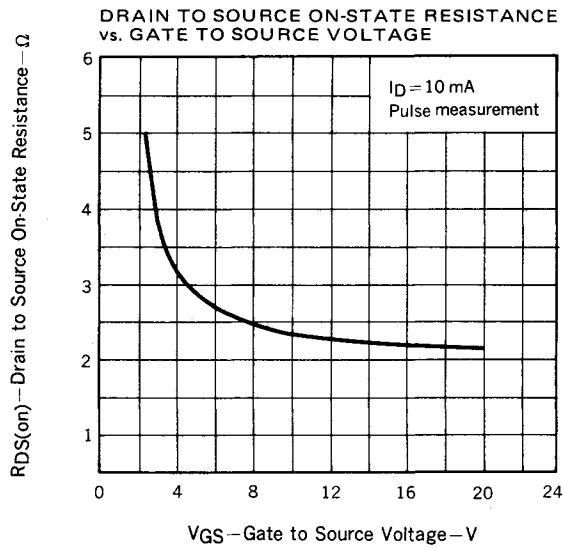


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



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 "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.

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"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.