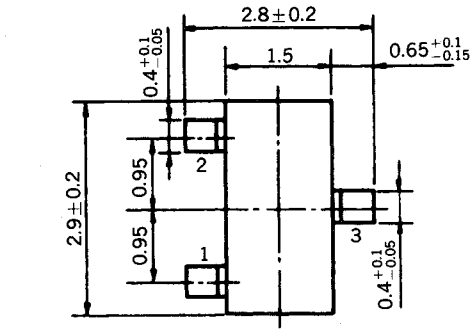
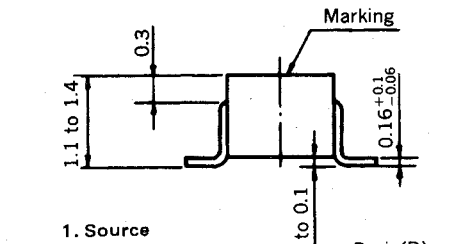
NEC

MOS FIELD EFFECT TRANSISTOR
2SK1590

N-CHANNEL MOS FET
FOR SWITCHING

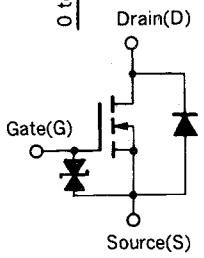
PACKAGE DIMENSIONS (Unit : mm)





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 °C)

PARAMETER	SYMBOL	RATINGS	UNIT	TEST CONDITIONS
Drain to Source Voltage	V_{DSS}	60	V	V_{GS} = 0
Gate to Source Voltage	V_{GSS}	±20	V	V_{DS} = 0
Drain Current	$I_{D(DC)}$	±200	mA	
Drain Current	$I_{D(pulse)}$	±400	mA	PW ≦ 10 ms, Duty Cycle ≦ 50 %
Total Power Dissipation	P_T	200	mW	
Channel Temperature	T_{ch}	150	°C	
Storage Temperature	T_{stg}	−55 to +150	°C	

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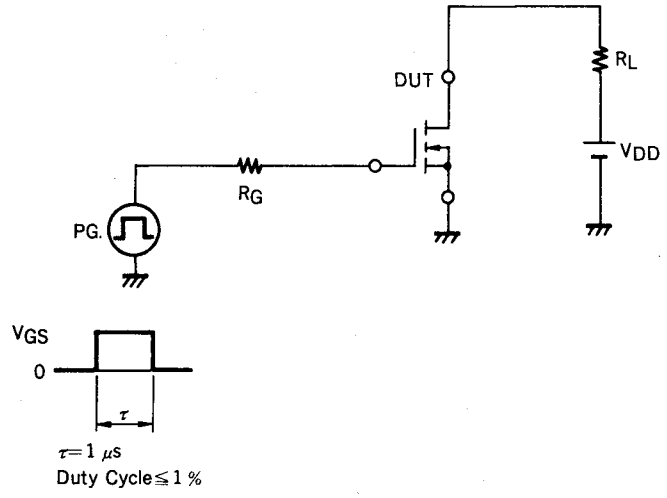
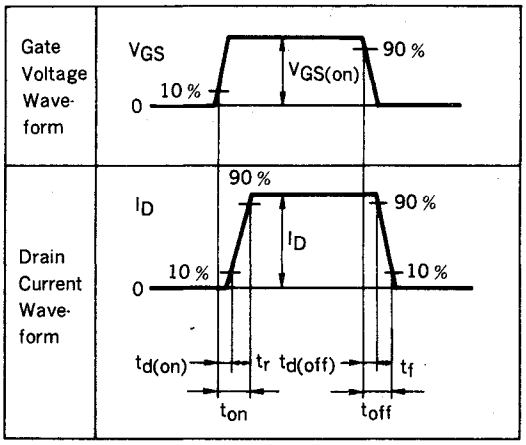
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	I_{DSS}			1.0	μA	V_{DS} = 60 V, V_{GS} = 0
Gate Leakage Current	I_{GSS}			±1.0	μA	V_{GS} = ±20 V, V_{DS} = 0
Gate Cut-off Voltage	$V_{GS(off)}$	0.8	1.2	1.8	V	V_{DS} = 5.0 V, I_D = 1.0 μA
Forward Transfer Admittance	$\|y_{fs}\|$	20	65		mS	V_{DS} = 5.0 V, I_D = 10 mA
Drain to Source On-State Resistance	$R_{DS(on)1}$		3.2	6.0	Ω	V_{GS} = 4.0 V, I_D = 10 mA
Drain to Source On-State Resistance	$R_{DS(on)2}$		2.4	3.0	Ω	V_{GS} = 10 V, I_D = 10 mA
Input Capacitance	C_{iss}		26		pF	V_{DS} = 5.0 V, V_{GS} = 0, f = 1 MHz
Output Capacitance	C_{oss}		20		pF	
Feedback Capacitance	C_{iss}		4		pF	
Turn-On Delay Time	$t_{d(on)}$		50		ns	V_{DD} = 5.0 V, I_D = 10 mA $V_{GS(on)}$ = 5.0 V, R_G = 10 Ω R_L = 500 Ω
Rise Time	t_r		140		ns	
Turn-Off Delay Time	$t_{d(off)}$		200		ns	
Fall Time	t_f		190		ns	

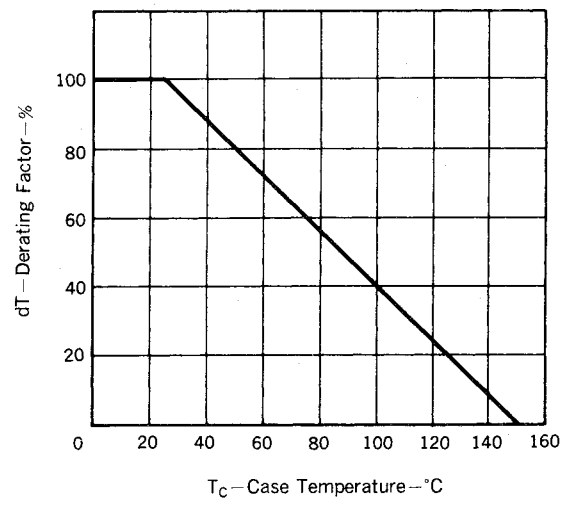
SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS



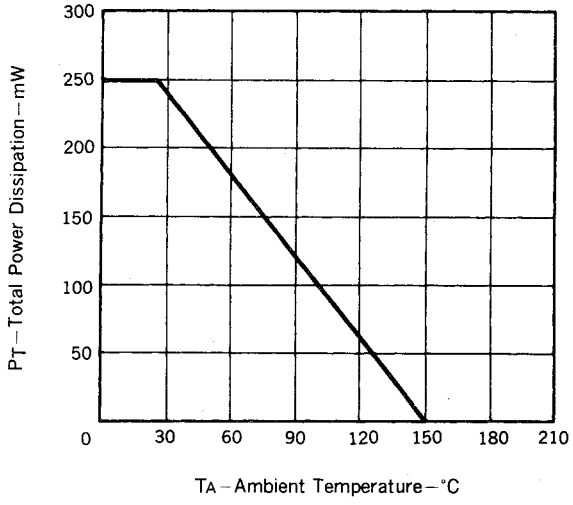


TYPICAL CHARACTERISTICS (T_A = 25 °C)

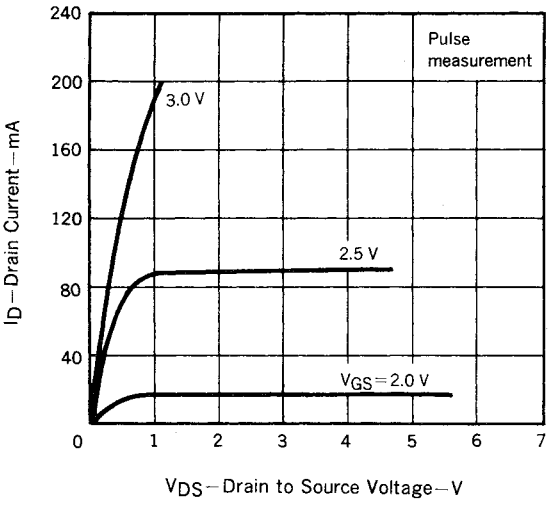
DERATING FACTOR OF FORWARD BIAS SAFE OPERATION AREA



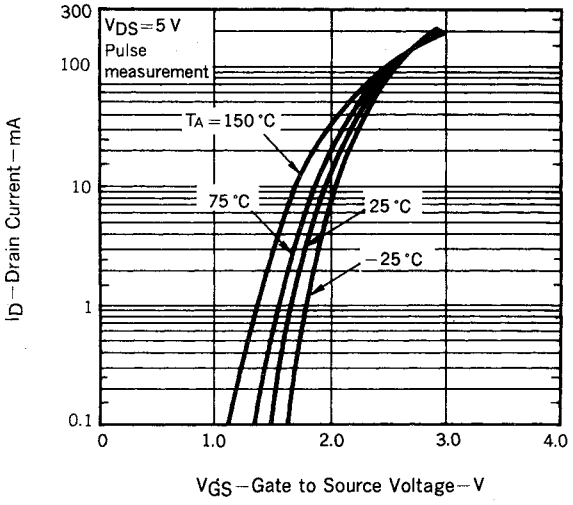
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



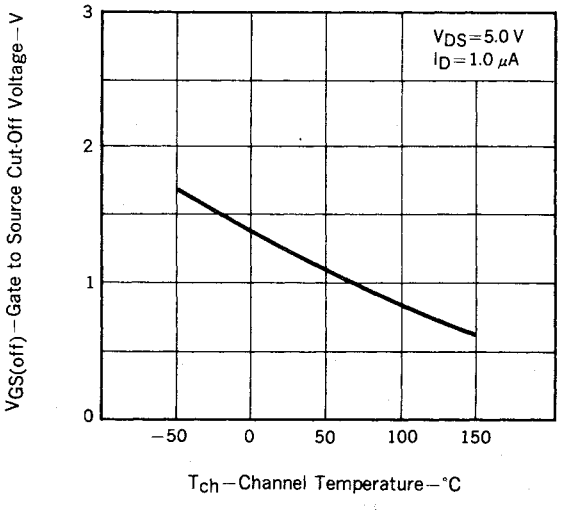
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



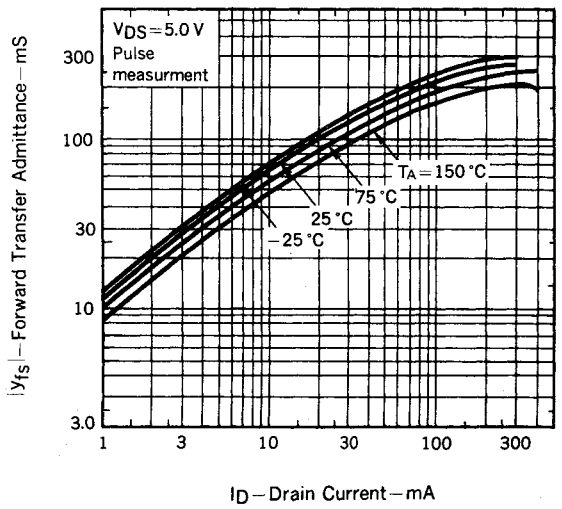
TRANSFER CHARACTERISTICS



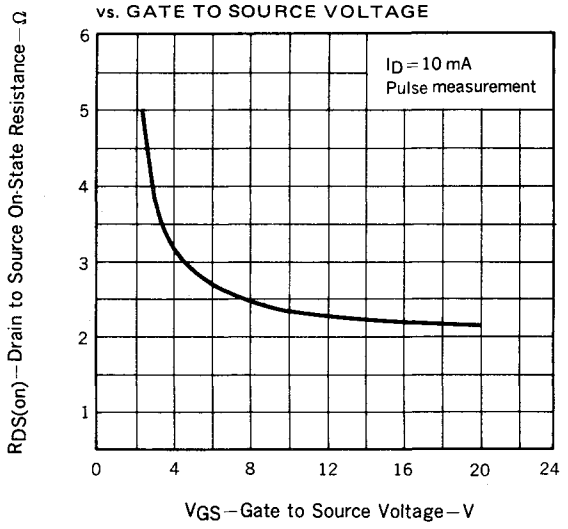
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



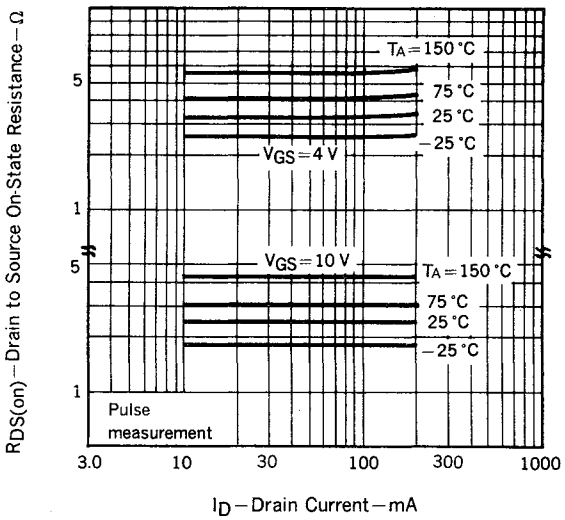
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



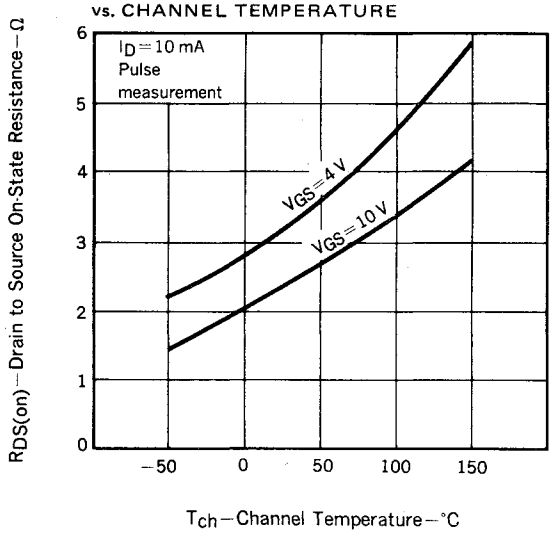
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



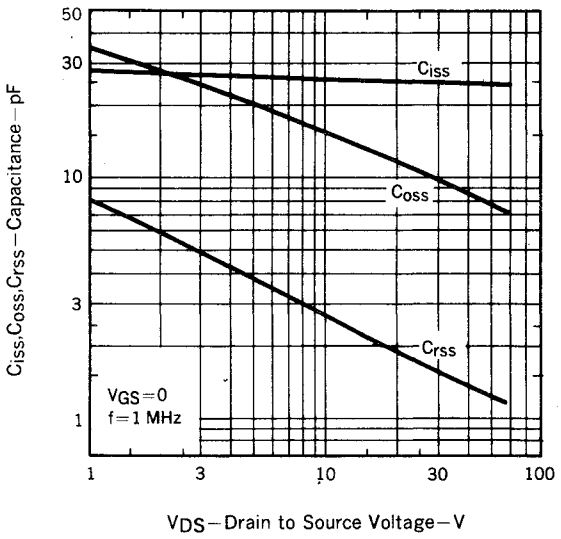
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



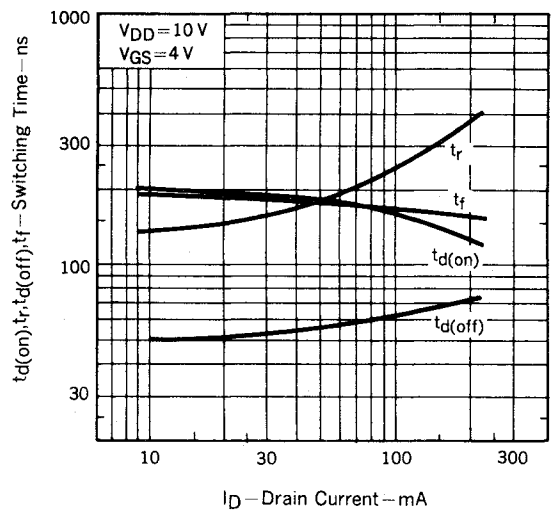
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



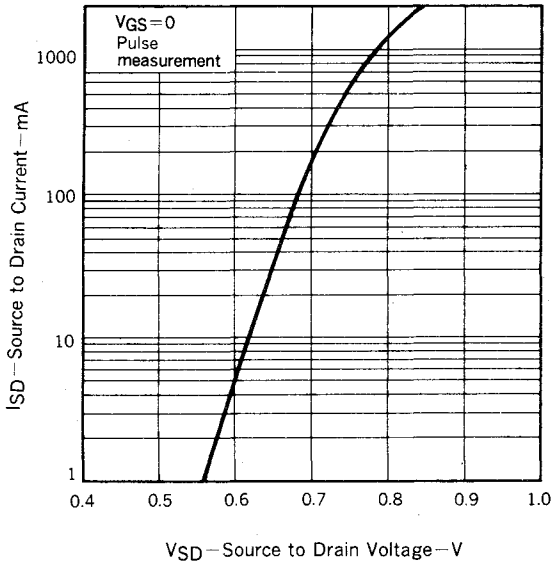
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



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 "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.