

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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EOL announced Product

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MOS FIELD EFFECT TRANSISTOR  
**2SK1590**

**N-CHANNEL MOSFET  
 FOR SWITCHING**

**DESCRIPTION**

The 2SK1590, N-channel vertical type MOSFET, is a switching device which can be driven directly by the output of ICs having a 5 V power source.

The MOSFET 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.

**ORDERING INFORMATION**

PART NUMBER	PACKAGE
2SK1590	SC-59 (Mini Mold)

Marking: G16

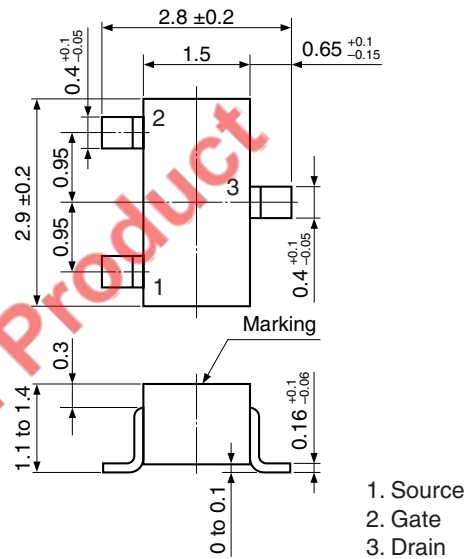
**ABSOLUTE MAXIMUM RATINGS (TA = 25°C)**

Drain to Source Voltage (VGS = 0 V)	V <sub>DSS</sub>	60	V
Gate to Source Voltage (VDS = 0 V)	V <sub>GSS</sub>	±20	V
Drain Current (DC)	I <sub>D(DC)</sub>	±200	mA
Drain Current (pulse) <small>Note</small>	I <sub>D(pulse)</sub>	±400	mA
Total Power Dissipation	P <sub>T</sub>	200	mW
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

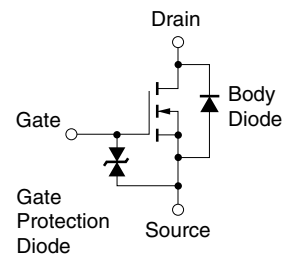
**Note** PW ≤ 10 ms, Duty Cycle ≤ 50%

**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

**PACKAGE DRAWING (Unit: mm)**



**EQUIVALENT CIRCUIT**



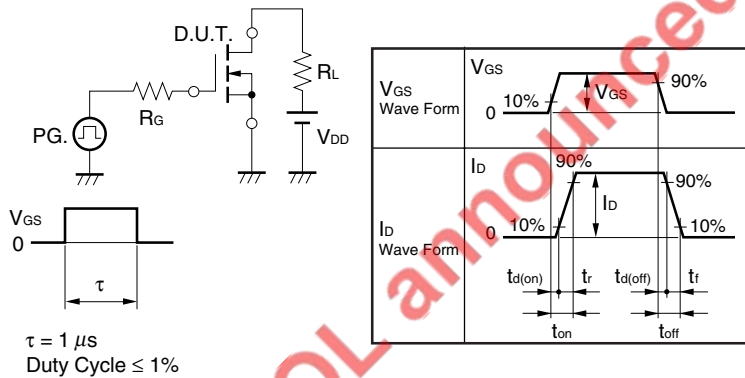
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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V			1.0	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±1.0	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 5.0 V, I <sub>D</sub> = 1.0 μA	0.8	1.2	1.8	V
Forward Transfer Admittance <sup>Note</sup>	y <sub>fs</sub>	V <sub>DS</sub> = 5.0 V, I <sub>D</sub> = 10 mA	20	65		mS
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 10 mA		3.2	6.0	Ω
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 mA		2.4	3.0	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 5.0 V		26		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		20		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		4.0		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 5.0 V, I <sub>D</sub> = 10 mA		50		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 5.0 V		140		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		200		ns
Fall Time	t <sub>f</sub>			190		ns

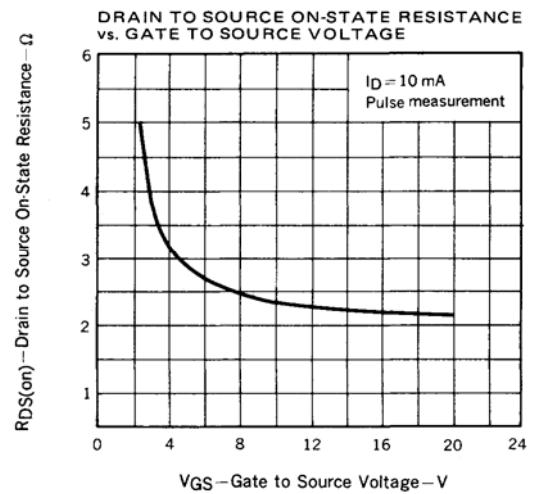
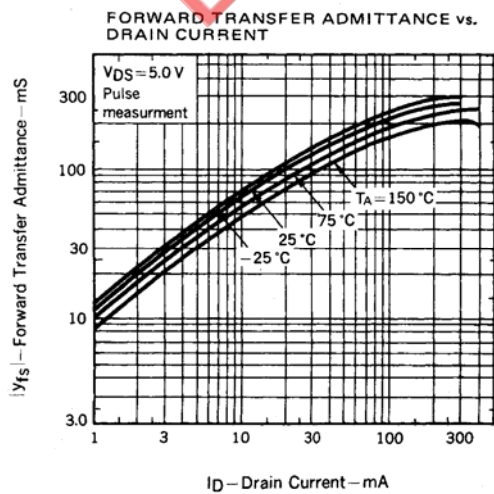
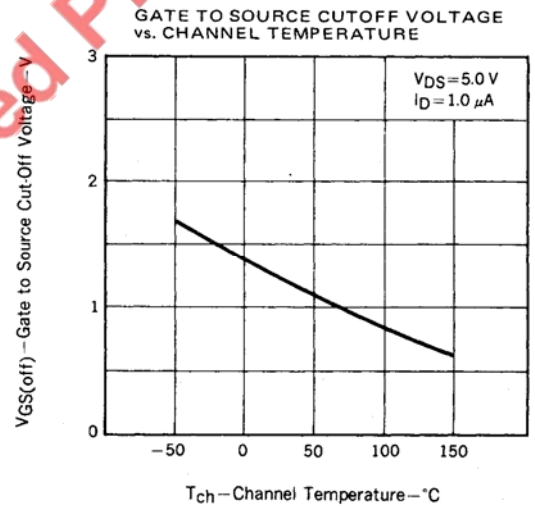
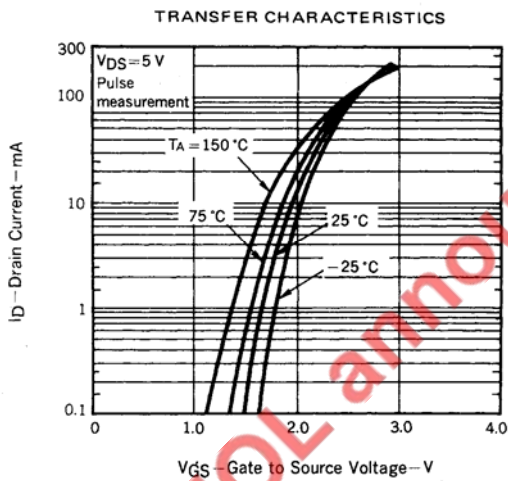
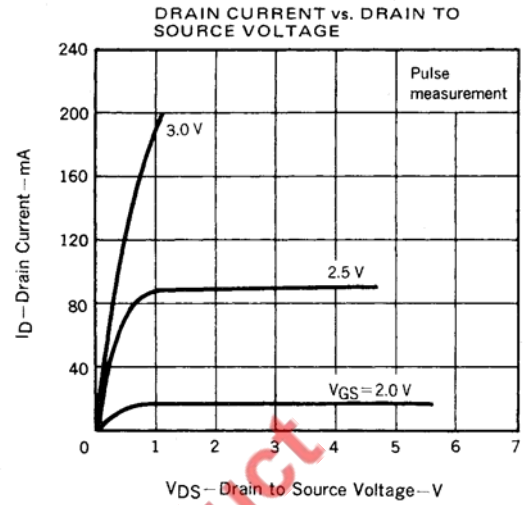
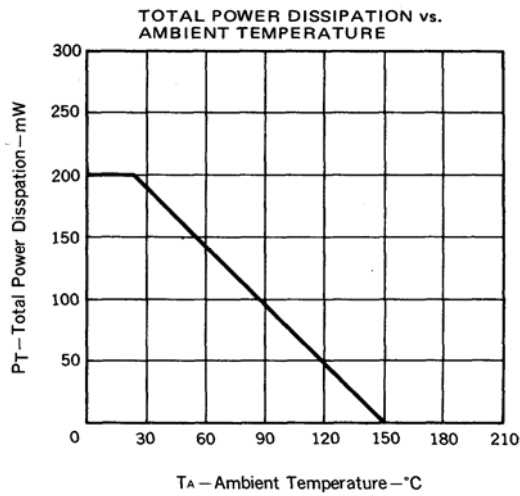
**Note** Pulsed

**TEST CIRCUIT SWITCHING TIME**

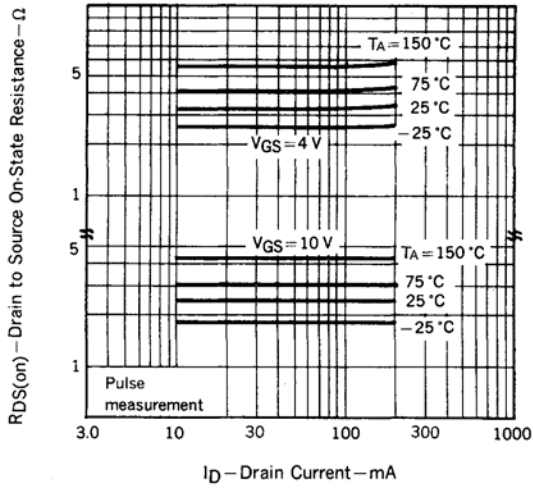


EOL announced Product

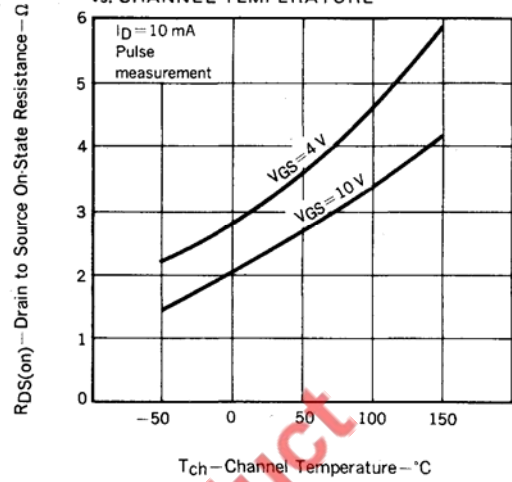
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



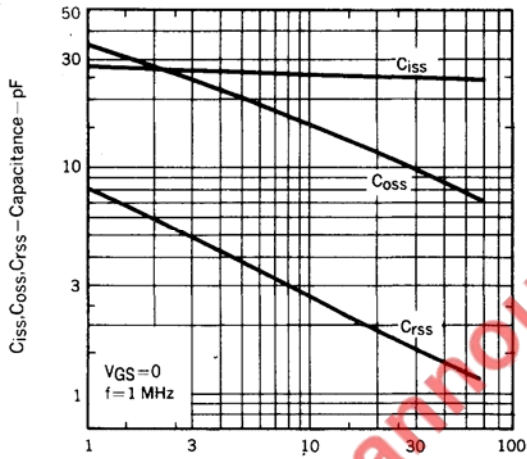
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



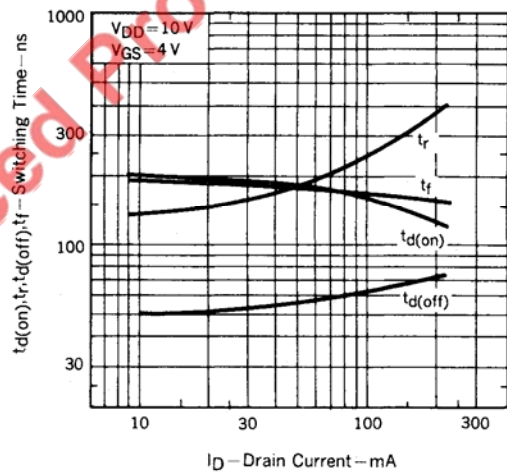
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



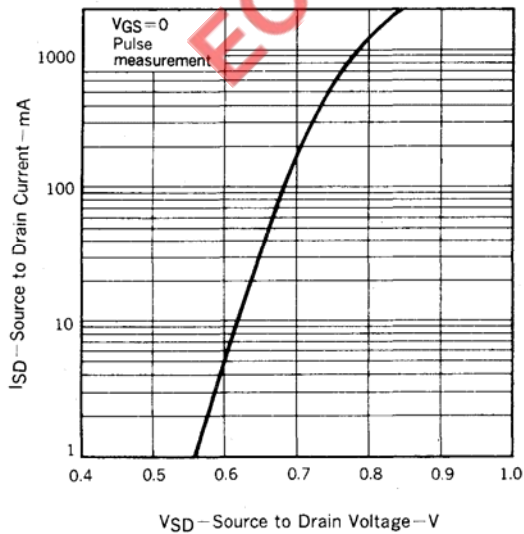
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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