

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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MOS FIELD EFFECT TRANSISTOR  
**Phase-out/Discontinued**

MOS FIELD EFFECT TRANSISTOR

# 2SK1398

## N-CHANNEL MOS FET FOR HIGH SPEED SWITCHING

### ★ DESCRIPTION

The 2SK1398 is N-channel MOS Field Effect Transistor designed for a high-speed switching device in digital circuits.

The 2SK1398 is driven by a 2.5-V power source, it is suitable for applications including headphone stereos which need power saving.

### ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK1398	SST

### FEATURES

- Directly driven by ICs having a 3-V power supply.
- Not necessary to consider driving current because of its high input impedance.
- Possible to reduce the number of parts by omitting the bias resistor.
- Can be used complementary with the 2SJ184.

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	50	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±7.0	V
Drain Current (DC)	I <sub>D(DC)</sub>	±100	mA
Drain Current (pulse) <sup>Note</sup>	I <sub>D(pulse)</sub>	±200	mA
Total Power Dissipation	P <sub>T</sub>	250	mW
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

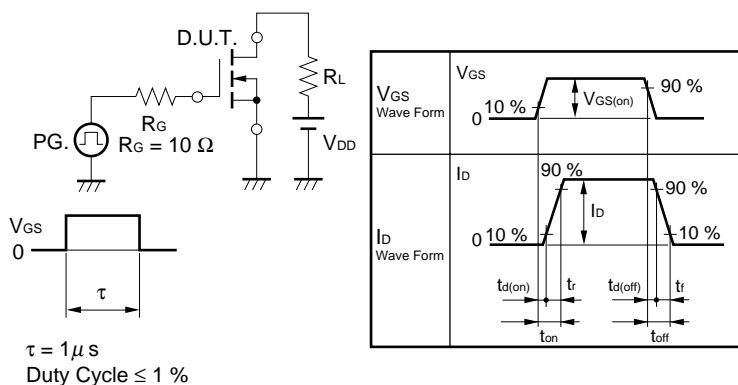
**Note** PW ≤ 10 ms, Duty cycle ≤ 50 %

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 Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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

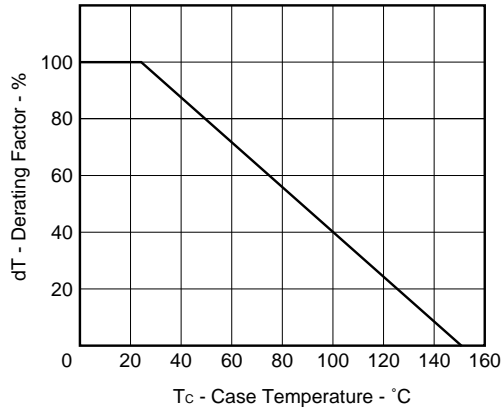
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V			10	μA
★ Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±7.0 V, V <sub>DS</sub> = 0 V			±5.0	μA
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 3.0 V, I <sub>D</sub> = 1.0 μA	0.9	1.2	1.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 3.0 V, I <sub>D</sub> = 10 mA	20	38		mS
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 10 mA		22	40	Ω
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 10 mA		14	20	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 3.0 V		8		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		7		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		3		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 3.0 V		15		ns
Rise Time	t <sub>r</sub>	I <sub>D</sub> = 20 mA		100		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>GS(on)</sub> = 3.0 V		30		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω, R <sub>L</sub> = 150 Ω		35		ns

**TEST CIRCUIT SWITCHING TIME**

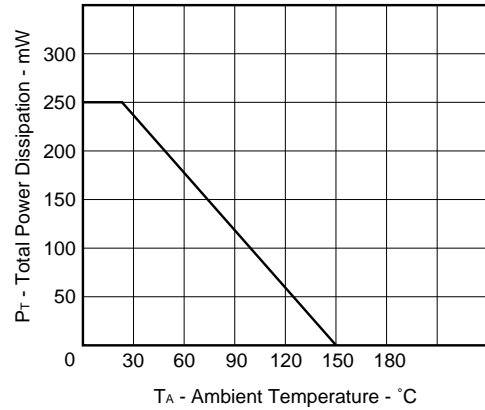


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

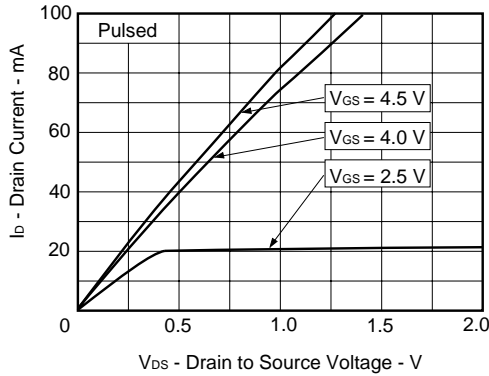
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



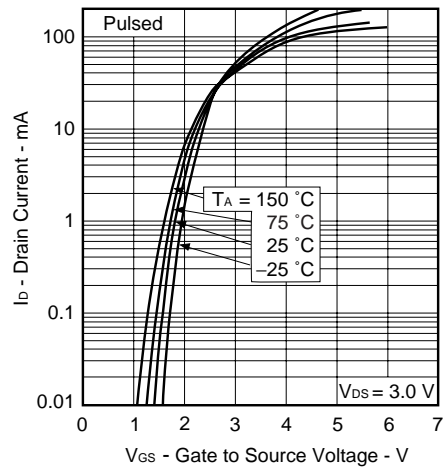
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



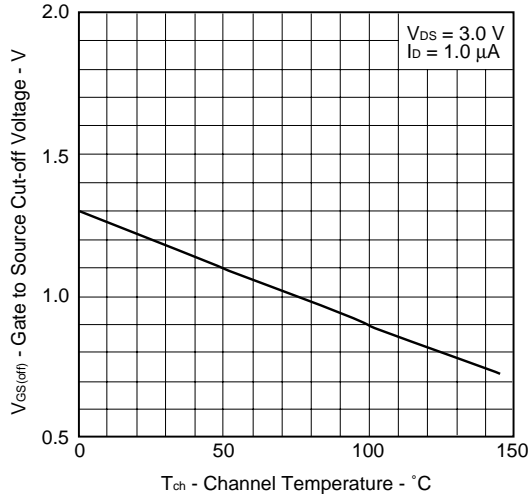
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



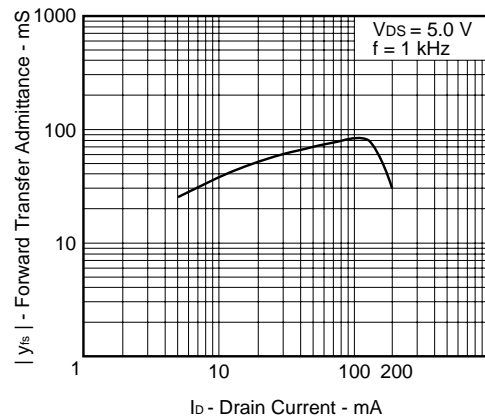
FORWARD TRANSFER CHARACTERISTICS



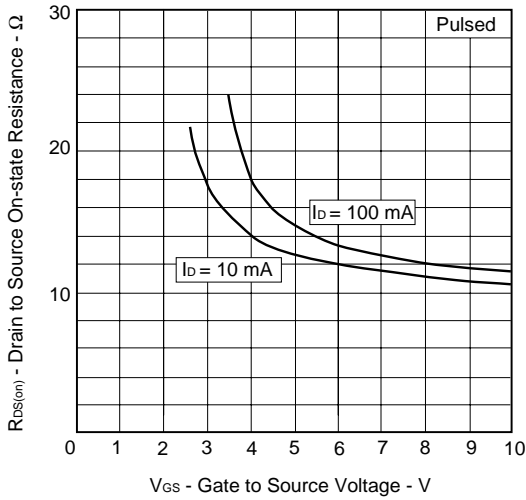
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



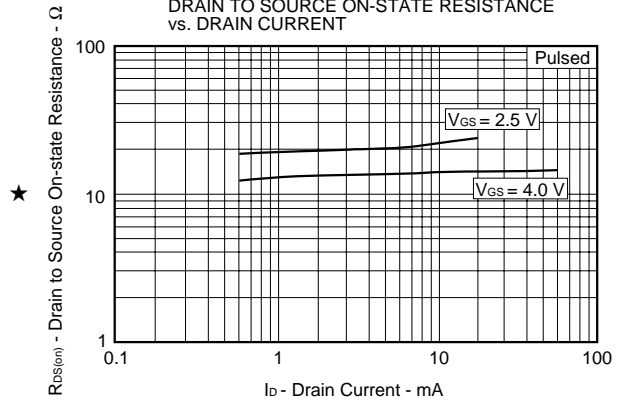
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



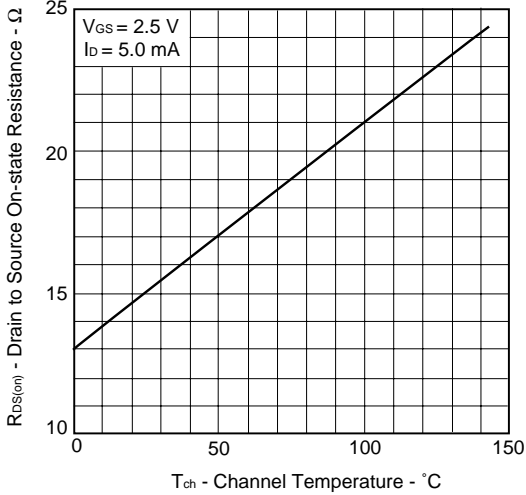
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



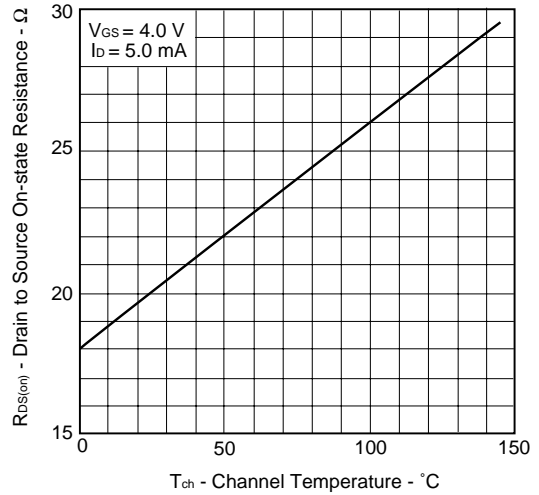
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



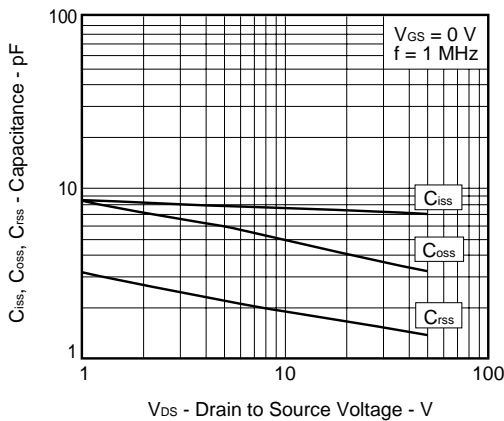
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



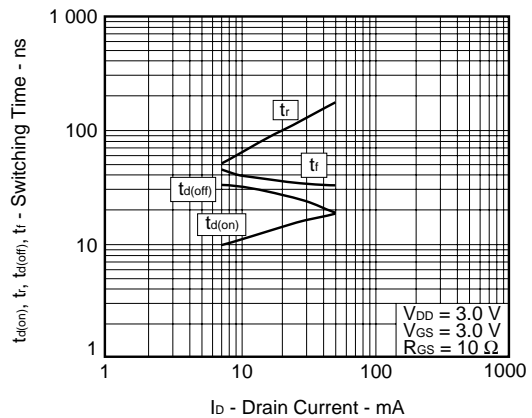
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE

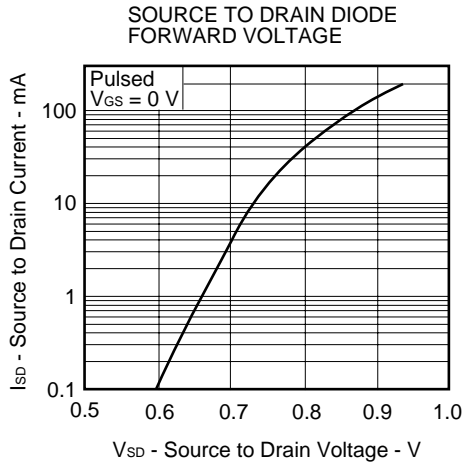


CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



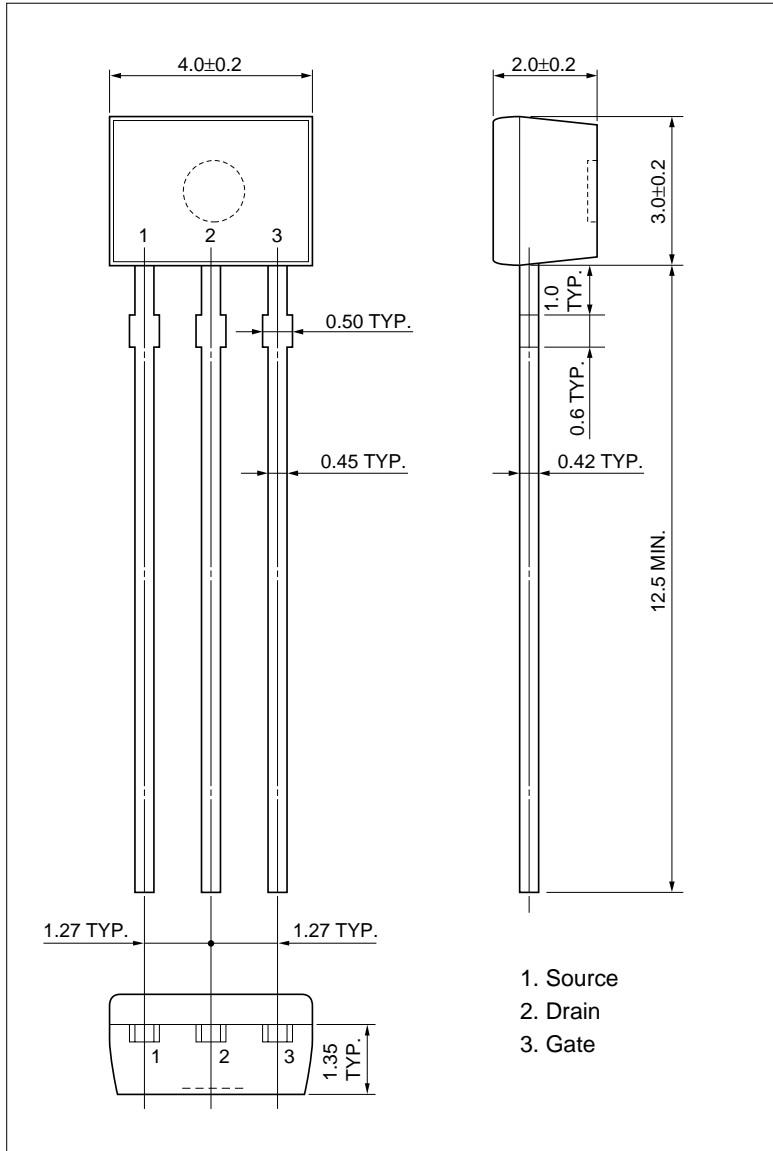
SWITCHING CHARACTERISTICS



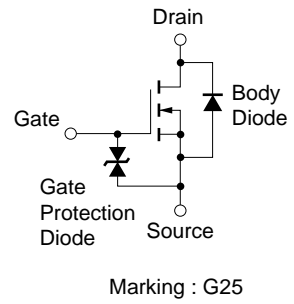


PACKAGE DRAWING (Unit: mm)

SST



EQUIVALENT CIRCUIT



**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.



[MEMO]

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