To our customers,

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

April 1st, 2010
Renesas Electronics Corporation

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

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RENESAS

# MOS FIELD EFFECT TRANSISTOR

Phase-out/Discontinued

# 3SK255

## RF AMPLIFIER FOR UHF TUNER
## N-CHANNEL Si DUAL GATE MOS FIELD-EFFECT TRANSISTOR
## 4 PINS SUPER MINI MOLD

### FEATURES

- Low $V_{DD}$ Use : ($V_{DS}$ = 3.5 V)
- Driving Battery
- Low Noise Figure : NF = 1.8 dB TYP. (f = 900 MHz)
- High Power Gain : $G_{PS}$ = 18.0 dB TYP. (f = 900 MHz)
- Suitable for uses as RF amplifier in UHF TV tuner.
- Automatically Mounting : Embossed Type Taping
- Small Package : 4 Pins Super Mini Mold

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C)

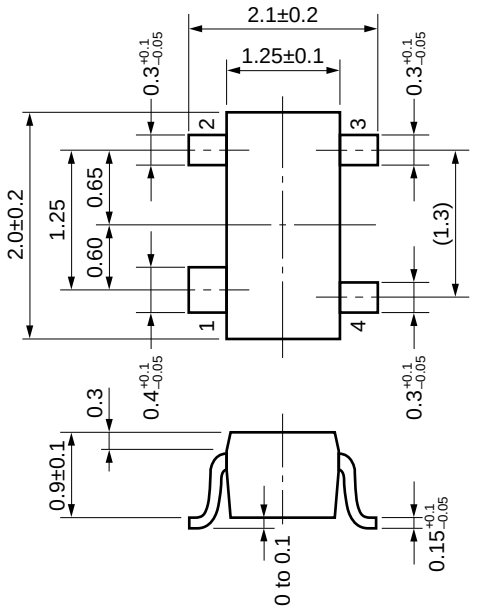
| | | | |
|---|---|---|---|
| Drain to Source Voltage | $V_{DSX}$ | 18 | V |
| Gate1 to Source Voltage | $V_{G1S}$ | ±8 ***1** | V |
| Gate2 to Source Voltage | $V_{G2S}$ | ±8 ***1** | V |
| Gate1 to Drain Voltage | $V_{G1D}$ | 18 | V |
| Gate2 to Drain Voltage | $V_{G2D}$ | 18 | V |
| Drain Current | $I_D$ | 25 | mA |
| Total Power Dissipation | $P_D$ | 130 | mW |
| Channel Temperature | $T_{ch}$ | 125 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +125 | °C |

***1:** $R_L \geq 10\ k\Omega$

***2:** Free air

### PACKAGE DIMENSIONS

(Unit: mm)




### PIN CONNECTIONS

1. Source
2. Drain
3. Gate2
4. Gate1

### PRECAUTION

Avoid high static voltages or electric fields so that this device would not suffer from any damage due to those voltage or fields.

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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C)

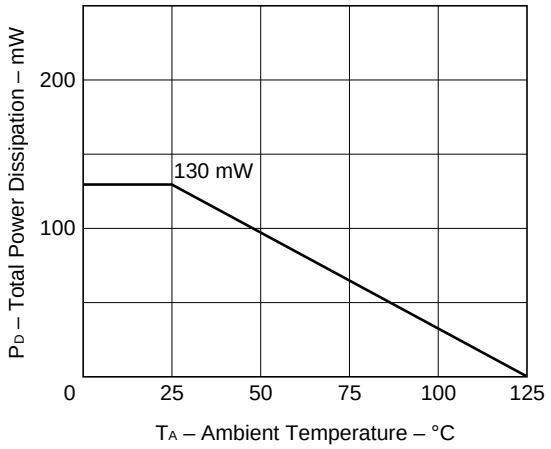
| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Drain to Source Breakdown Voltage | $BV_{DSX}$ | 18 | | | V | $V_{G1S}$ = $V_{G2S}$ = –2 V, $I_D$ = 10 μA |
| Drain Current | $I_{DSX}$ | 0.5 | | 7.0 | mA | $V_{DS}$ = 3.5 V, $V_{G2S}$ = 3 V, $V_{G1S}$ = 0.75 V |
| Gate1 to Source Cutoff Voltage | $V_{G1S(off)}$ | –1.0 | 0 | +1.0 | V | $V_{DS}$ = 3.5 V, $V_{G2S}$ = 3 V, $I_D$ = 10 μA |
| Gate2 to Source Cutoff Voltage | $V_{G2S(off)}$ | 0 | 0.5 | 1.0 | V | $V_{DS}$ = 3.5 V, $V_{G1S}$ = 3 V, $I_D$ = 10 μA |
| Gate1 Reverse Current | $I_{G1SS}$ | | | ±20 | nA | $V_{DS}$ = 0, $V_{G2S}$ = 0, $V_{G1S}$ = ±6 V |
| Gate2 Reverse Current | $I_{G2SS}$ | | | ±20 | nA | $V_{DS}$ = 0, $V_{G1S}$ = 0, $V_{G2S}$ = ±6 V |
| Forward Transfer Admittance | $\|y_{fs}\|$ | 14 | 19 | 24 | mS | $V_{DS}$ = 3.5 V, $V_{G2S}$ = 3 V, $I_D$ = 7 mA f = 1 kHz |
| Input Capacitance | $C_{iss}$ | 1.2 | 1.7 | 2.2 | pF | $V_{DS}$ = 3.5 V, $V_{G2S}$ = 3 V, $I_D$ = 7 mA f = 1 MHz |
| Output Capacitance | $C_{oss}$ | 0.5 | 1.0 | 1.5 | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 0.01 | 0.03 | pF | |
| Power Gain | $G_{ps}$ | 15 | 18 | 21 | dB | $V_{DS}$ = 3.5 V, $V_{G2S}$ = 3 V, $I_D$ = 7 mA f = 900 MHz |
| Noise Figure | NF | | 1.8 | 3.0 | dB | |

### $I_{DSX}$ Classification

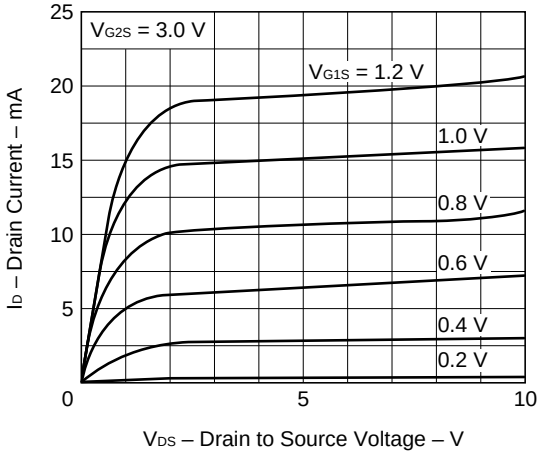
| Rank | U1G |
|---|---|
| Marking | U1G |
| $I_{DSX}$ (mA) | 0.5 to 7.0 |

## TYPICAL CHARACTERISTICS ($T_A$ = 25 °C)

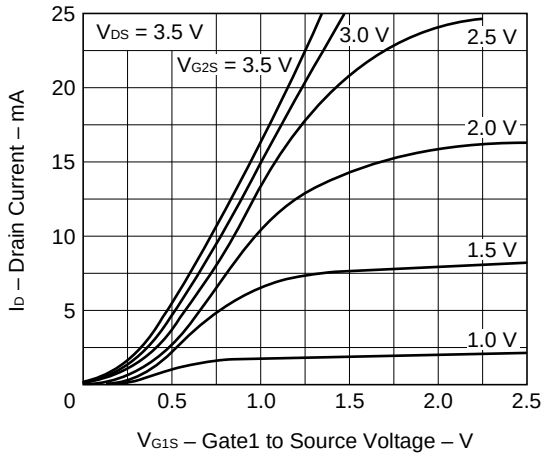
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



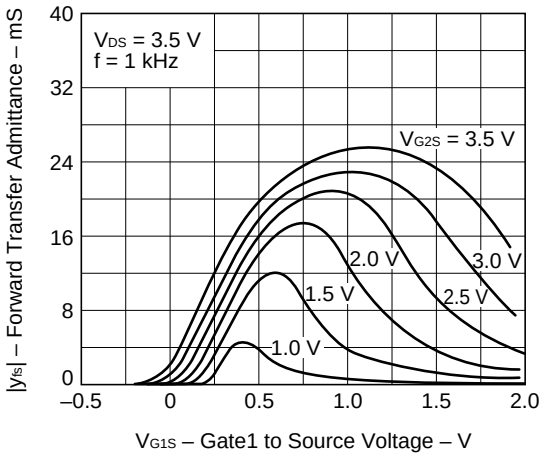

DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



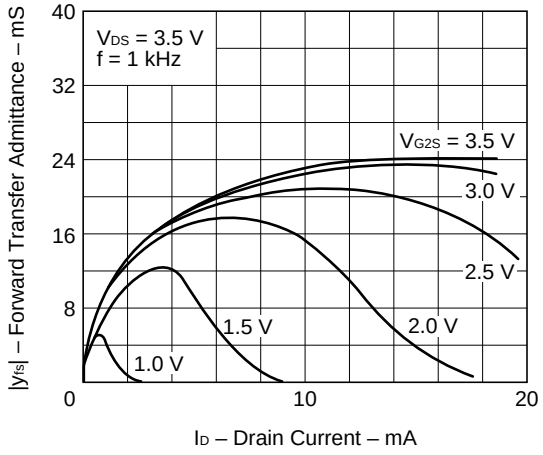

DRAIN CURRENT vs.
GATE1 TO SOURCE VOLTAGE



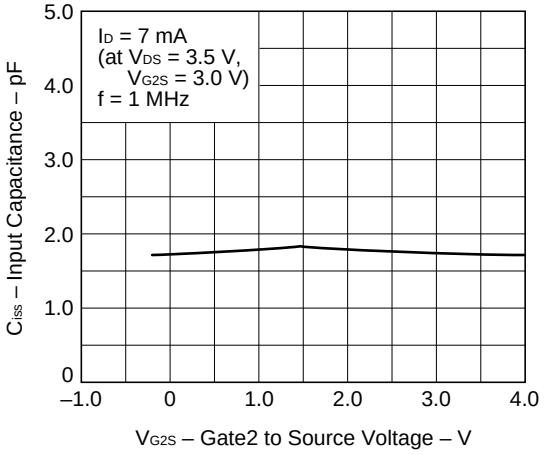

FORWARD TRANSFER ADMITTANCE vs.
GATE1 TO SOURCE VOLTAGE



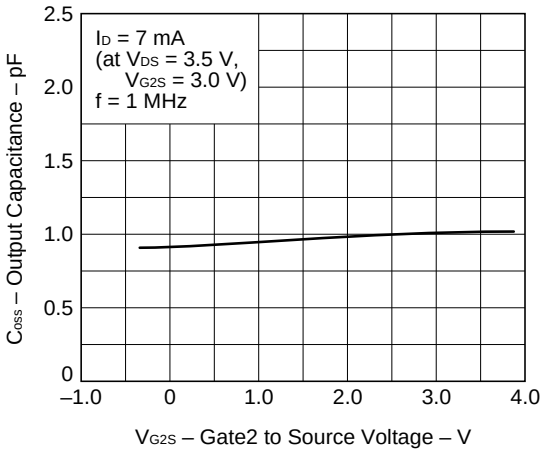

FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



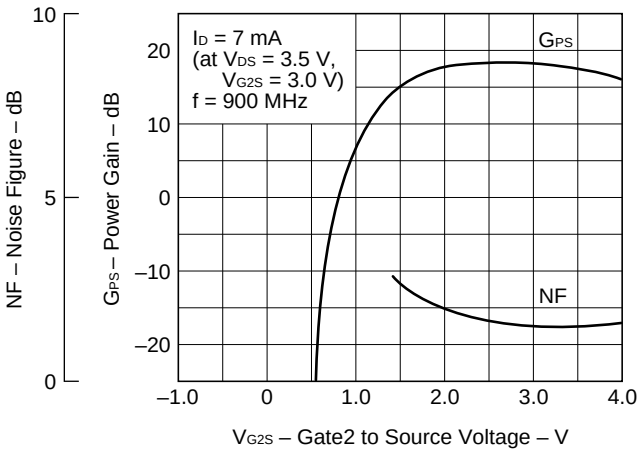

INPUT CAPACITANCE vs.
GATE2 TO SOURCE VOLTAGE



OUTPUT CAPACITANCE vs.
GATE2 TO SOURCE VOLTAGE




POWER GAIN AND NOISE FIGURE vs.
GATE2 TO SOURCE VOLTAGE

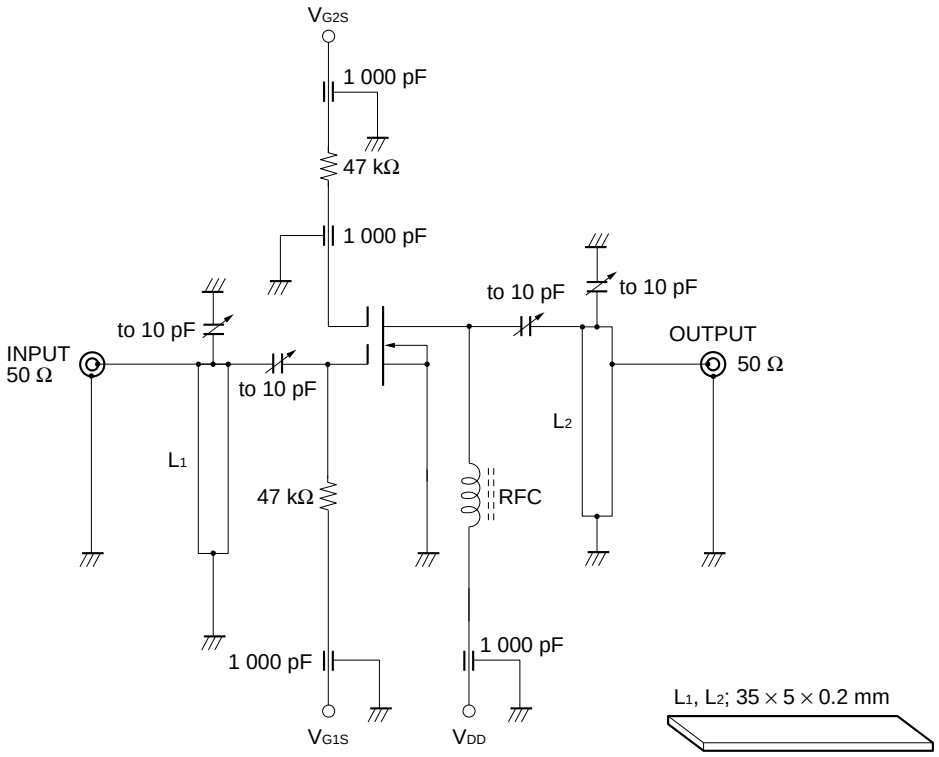



## S-Parameter

$V_{DS}$ = 3.5 V, $V_{G2S}$ = 3 V, $I_D$ = 7 mA

| Frequency | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 1.017 | –6.5 | 2.057 | 173.3 | 0.035 | –88.2 | 0.985 | –2.9 |
| 200 | 1.000 | –13.4 | 2.034 | 163.6 | 0.014 | –121.6 | 0.987 | –6.9 |
| 300 | 0.999 | –19.8 | 1.991 | 155.5 | 0.006 | 67.0 | 0.988 | –10.4 |
| 400 | 0.993 | –26.6 | 1.996 | 146.8 | 0.006 | 71.3 | 0.983 | –13.8 |
| 500 | 0.984 | –32.6 | 1.956 | 136.7 | 0.005 | 117.8 | 0.985 | –17.1 |
| 600 | 0.966 | –39.1 | 1.930 | 130.4 | 0.002 | –23.3 | 0.983 | –20.8 |
| 700 | 0.948 | –45.5 | 1.901 | 122.7 | 0.002 | –162.4 | 0.979 | –24.6 |
| 800 | 0.934 | –51.4 | 1.897 | 114.5 | 0.003 | 37.8 | 0.986 | –27.9 |
| 900 | 0.908 | –57.5 | 1.897 | 105.6 | 0.011 | –146.3 | 0.991 | –32.1 |
| 1000 | 0.901 | –83.8 | 1.984 | 96.6 | 0.010 | –144.3 | 1.024 | –36.4 |

**$G_{PS}$ AND NF TEST CIRCUIT AT f = 900 MHz**



**[MEMO]**

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