NEC

# MES FIELD EFFECT TRANSISTOR

# 3SK299

## RF AMP. FOR UHF TV TUNER
## N-CHANNEL GaAs DUAL-GATE MES FIFLD-EFFECT TRANSISTOR
## 4 PIN SMALL MINI MOLD

### FEATURES

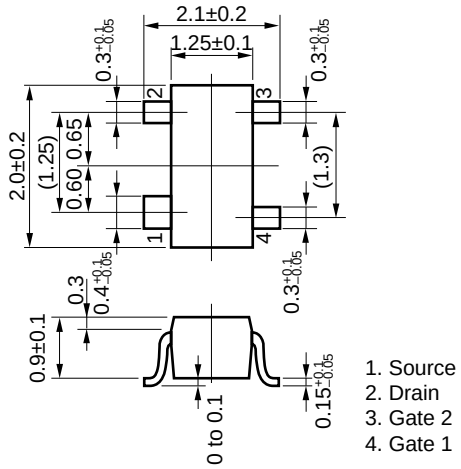
- Suitable for use as RF amplifier in UHF TV tuner.
- Low $C_{rss}$ : 0.02 pF TYP.
- High $G_{PS}$ : 20 dB TYP.
- Low NF : 1.1 dB TYP.
- 4 PIN SMALL MINI MOLD PACKAGE

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

| | | | |
|---|---|---|---|
| Drain to Source Voltage | $V_{DSX}$ | 13 | V |
| Gate1 to Source Voltage | $V_{G1S}$ | –4.5 | V |
| Gate2 to Source Voltage | $V_{G2S}$ | –4.5 | V |
| Drain Current | $I_D$ | 40 | mA |
| Total Power Dissipation | $P_T$ | 120 | mW |
| Channel Temperature | $T_{ch}$ | 125 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +125 | °C |

### PACKAGE DIMENSIONS

in millimeters




1. Source
2. Drain
3. Gate 2
4. Gate 1

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

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Drain Current | $I_{DSX}$ | | | 10 | μA | $V_{DS}$ = 13 V, $V_{G1S}$ = –4 V, $V_{G2S}$ = 0 |
| Drain Current | $I_{DSS}$ | 5 | 20 | 40 | mA | $V_{DS}$ = 5 V, $V_{G2S}$ = 0, $V_{G1S}$ = 0 |
| Gate1 to Source Cutoff Voltage | $V_{G1S(off)}$ | | | –3.5 | V | $V_{DS}$ = 5 V, $V_{G2S}$ = 0 , $I_D$ = 100 μA |
| Gate2 to Source Cutoff Voltage | $V_{G2S(off)}$ | | | –3.5 | V | $V_{DS}$ = 5 V, $V_{G1S}$ = 0, $I_D$ = 100 μA |
| Gate1 Reverse Current | $I_{G1SS}$ | | | 10 | μA | $V_{DS}$ = 0, $V_{G1S}$ = –4 V, $V_{G2S}$ = 0 |
| Gate2 Reverse Current | $I_{G2SS}$ | | | 10 | μA | $V_{DS}$ = 0, $V_{G2S}$ = –4 V, $V_{G1S}$ = 0 |
| Forward Transfer Admittance | $\|y_{fs}\|$ | 18 | 25 | 35 | ms | $V_{DS}$ = 5 V, $V_{G2S}$ = 1 V, $I_D$ = 10 mA f = 1.0 kHz |
| Input Capacitance | $C_{iss}$ | 0.5 | 1.0 | 1.5 | pF | $V_{DS}$ = 5 V, $V_{G2S}$ = 1 V, $I_D$ = 10 mA f = 1 MHz |
| Reverse Transfer Capacitance | $C_{rss}$ | | 0.02 | 0.03 | pF | |
| Power Gain | $G_{PS}$ | 16.0 | 20.0 | | dB | $V_{DS}$ = 5 V, $V_{G2S}$ = 1 V, $I_D$ = 10 mA f = 900 MHz |
| Noise Figure | NF | | 1.1 | 2.5 | dB | |

### $I_{DSS}$ Classification

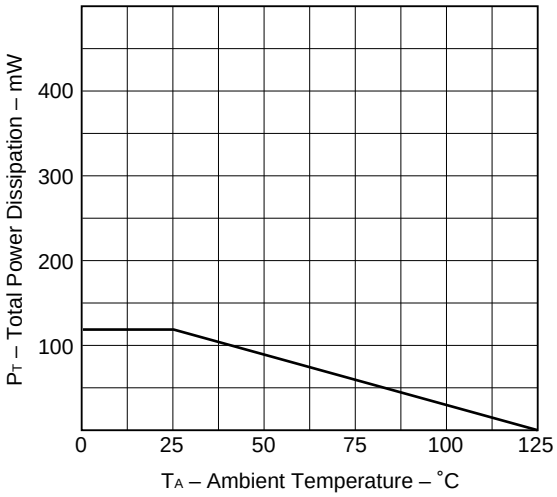
Unit: mA

| Class | U71 | U72 | U73 | U74 |
|---|---|---|---|---|
| Marking | U71 | U72 | U73 | U74 |
| $I_{DSS}$ | 5 to 15 | 10 to 25 | 20 to 35 | 30 to 40 |

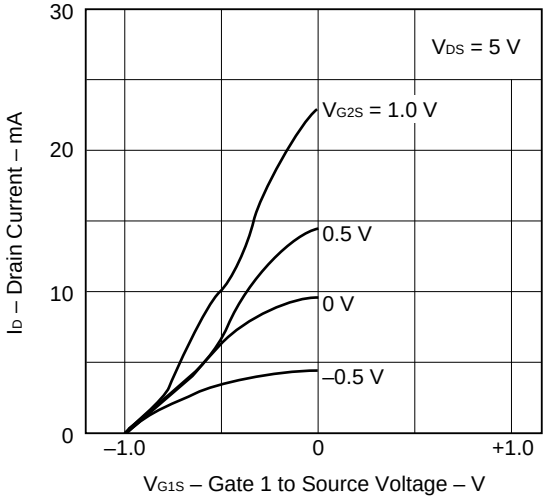
Document No. P11034EJ1V0DS00 (1st edition)
Date Published December 1995 P
Printed in Japan

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

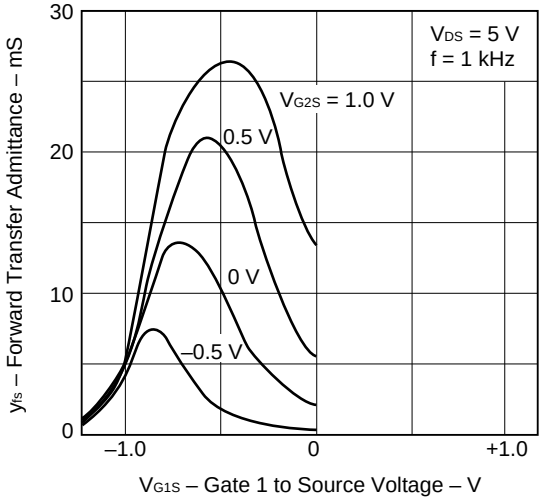
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



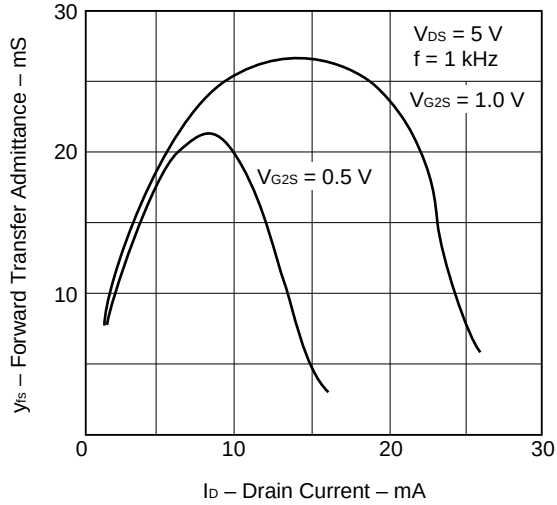

DRAIN CURRENT vs.
GATE1 TO SOURCE VOLTAGE



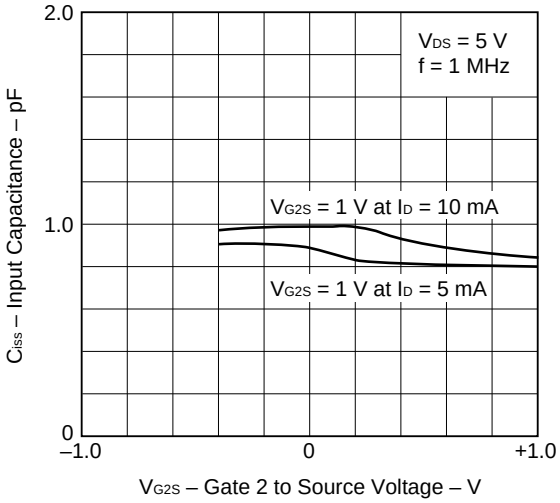

FORWARD TRANSFER ADMITTANCE vs.
GATE1 TO SOURCE VOLTAGE



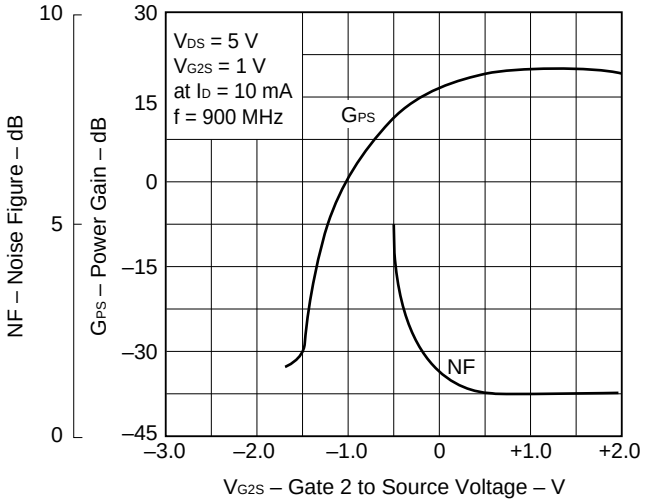

FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



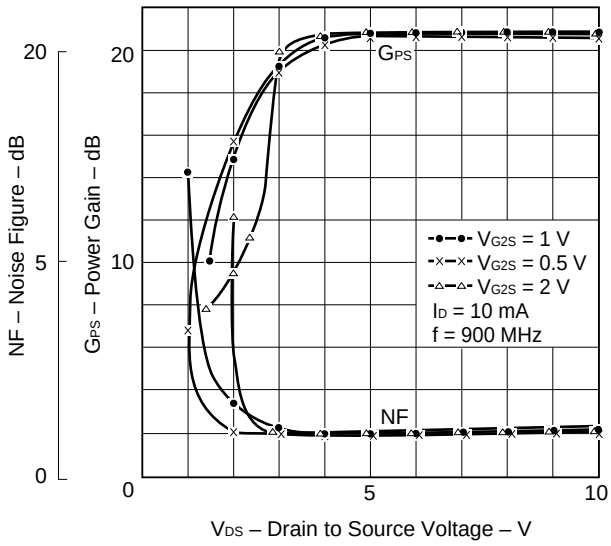

INPUT CAPACITANCE vs.
GATE2 TO SOURCE VOLTAGE



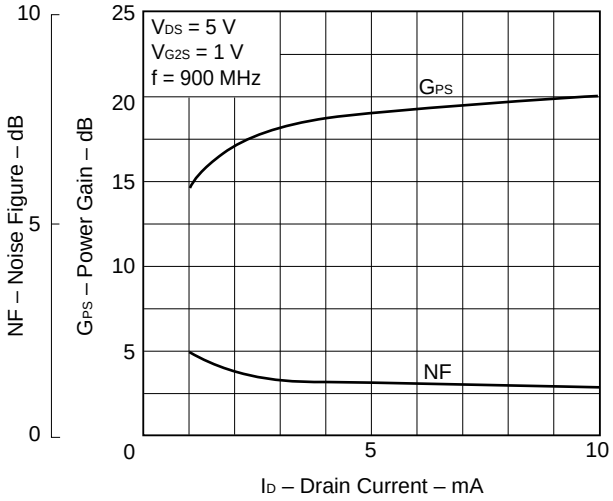

POWER GAIN AND NOISE FIGURE vs.
GATE2 TO SOURCE VOLTAGE



POWER GAIN AND NOISE FIGURE vs.
DRAIN TO SOURCE VOLTAGE



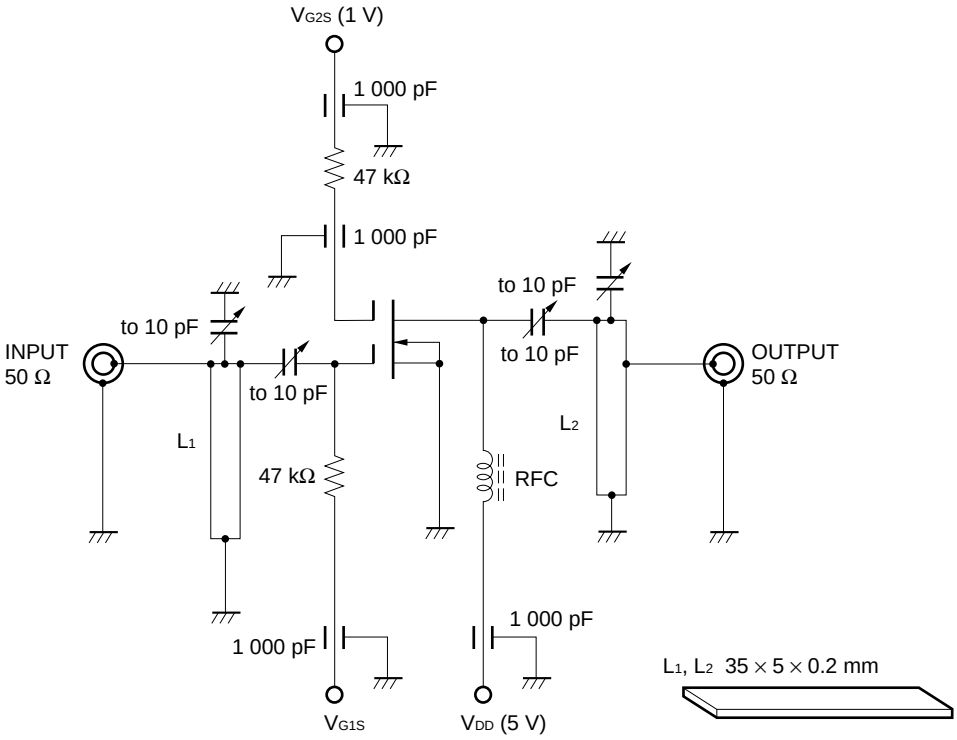

POWER GAIN AND NOISE FIGURE vs.
DRAIN CURRENT




**S-PARAMETER ($V_{DS}$ = 5 V, $V_{G2S}$ = 1 V, $I_D$ = 10 mA)**

| FREQUENCY | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.0000 | 0.999 | –3.3 | 2.359 | 177.2 | 0.006 | –122.3 | 0.969 | –1.3 |
| 200.0000 | 1.000 | –7.2 | 2.389 | 169.3 | 0.004 | 123.0 | 0.981 | –2.9 |
| 300.0000 | 0.998 | –9.3 | 2.313 | 164.4 | 0.000 | –145.0 | 0.979 | –3.3 |
| 400.0000 | 0.974 | –13.4 | 2.233 | 160.0 | 0.004 | 79.2 | 0.967 | 5.6 |
| 500.0000 | 1.005 | –15.7 | 2.420 | 158.4 | 0.007 | 29.7 | 0.999 | –5.8 |
| 600.0000 | 0.942 | –19.1 | 2.300 | 150.0 | 0.003 | 65.0 | 0.958 | –7.7 |
| 700.0000 | 0.968 | –22.2 | 2.332 | 145.5 | 0.004 | 45.5 | 0.997 | –8.5 |
| 800.0000 | 0.920 | –25.2 | 2.229 | 141.5 | 0.008 | 80.1 | 0 957 | –9.4 |
| 900.0000 | 0.952 | 28.9 | 2.447 | 136.8 | 0.004 | 8.3 | 0.999 | –12.5 |
| 1000.0000 | 0.898 | –29.4 | 2.303 | 131.1 | 0.001 | 50.9 | 0.968 | –11.1 |
| 1100.0000 | 0.915 | –35.1 | 2.348 | 125.8 | 0.004 | 71.4 | 0.984 | –14.8 |
| 1200.0000 | 0.879 | –35.2 | 2.367 | 123.5 | 0.000 | 91.1 | 0.989 | –13.0 |

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




$V_{DS}$ = 5 V, $V_{G2S}$ = 1 V, $I_D$ = 10 mA

[MEMO]