

3SK296

Silicon N-Channel Dual Gate MOS FET

REJ03G0815-0300
(Previous ADE-208-388A)
Rev.3.00
Aug.10.2005

Application

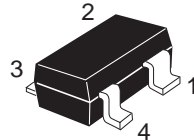
UHF RF amplifier

Features

- Low noise figure.
NF = 2.0 dB Typ. at f = 900 MHz
- Capable of low voltage operation

Outline

RENESAS Package code: PTSP0004ZA-A
(Package name: CMPAK-4)



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

Note: Marking is "ZQ-"

Attention:

This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

Absolute Maximum Ratings

(Ta = 25°C)

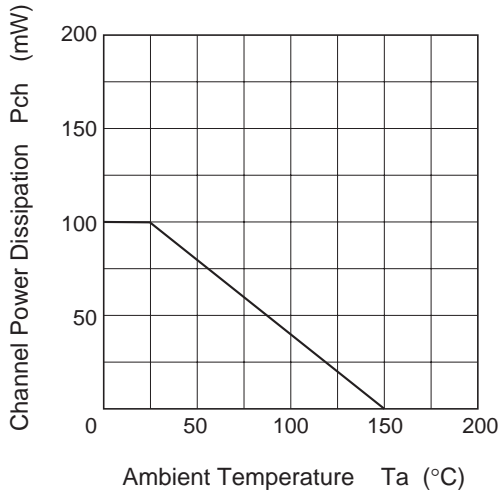
| Item | Symbol | Ratings | Unit |
|---------------------------|-----------|-------------|------|
| Drain to source voltage | V_{DS} | 12 | V |
| Gate 1 to source voltage | V_{G1S} | ± 8 | V |
| Gate 2 to source voltage | V_{G2S} | ± 8 | V |
| Drain current | I_D | 25 | mA |
| Channel power dissipation | Pch | 100 | mW |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | -55 to +150 | °C |

Electrical Characteristics

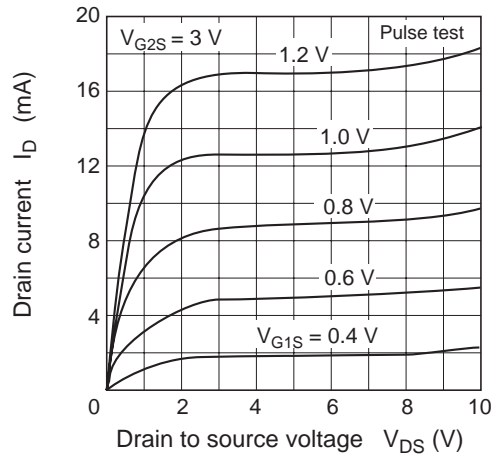
(Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|------------------------------------|----------------|---------|------|-----------|------|--|
| Drain to source breakdown voltage | $V_{(BR)DSX}$ | 12 | — | — | V | $I_D = 200 \mu A$, $V_{G1S} = -3 V$, $V_{G2S} = -3 V$ |
| Gate 1 to source breakdown voltage | $V_{(BR)G1SS}$ | ± 8 | — | — | V | $I_{G1} = \pm 10 \mu A$, $V_{G2S} = V_{DS} = 0$ |
| Gate 2 to source breakdown voltage | $V_{(BR)G2SS}$ | ± 8 | — | — | V | $I_{G2} = \pm 10 \mu A$, $V_{G1S} = V_{DS} = 0$ |
| Gate 1 cutoff current | I_{G1SS} | — | — | ± 100 | nA | $V_{G1S} = \pm 6 V$, $V_{G2S} = V_{DS} = 0$ |
| Gate 2 cutoff current | I_{G2SS} | — | — | ± 100 | nA | $V_{G2S} = \pm 6 V$, $V_{G1S} = V_{DS} = 0$ |
| Drain current | $I_{DS(on)}$ | 0.5 | — | 10 | mA | $V_{DS} = 6 V$, $V_{G1S} = 0.5V$, $V_{G2S} = 3 V$ |
| Gate 1 to source cutoff voltage | $V_{G1S(off)}$ | -0.5 | — | +0.5 | V | $V_{DS} = 10 V$, $V_{G2S} = 3V$, $I_D = 100 \mu A$ |
| Gate 2 to source cutoff voltage | $V_{G2S(off)}$ | 0 | — | +1.0 | V | $V_{DS} = 10 V$, $V_{G1S} = 3V$, $I_D = 100 \mu A$ |
| Forward transfer admittance | $ y_{fs} $ | 16 | 20.8 | — | mS | $V_{DS} = 6 V$, $V_{G2S} = 3V$, $I_D = 10 mA$, $f = 1 kHz$ |
| Input capacitance | C_{iss} | 1.2 | 1.5 | 2.2 | pF | $V_{DS} = 6 V$, $V_{G2S} = 3V$, $I_D = 10 mA$, $f = 1 MHz$ |
| Output capacitance | C_{oss} | 0.6 | 0.9 | 1.2 | pF | |
| Reverse transfer capacitance | C_{rss} | — | 0.01 | 0.03 | pF | |
| Power gain | PG | 16 | 19.5 | — | dB | $V_{DS} = 4 V$, $V_{G2S} = 3V$, $I_D = 10 mA$, $f = 900 MHz$ |
| Noise figure | NF | — | 2.0 | 3 | dB | |

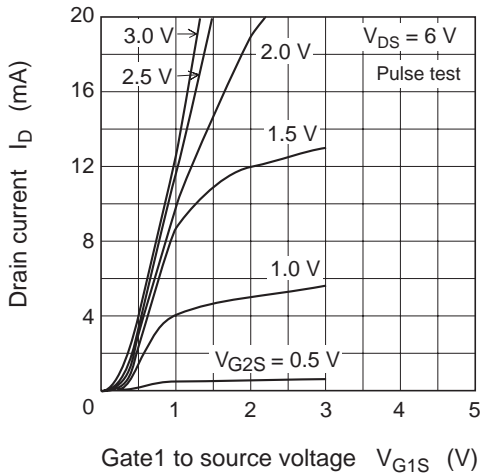
Maximum Channel Power Dissipation Curve



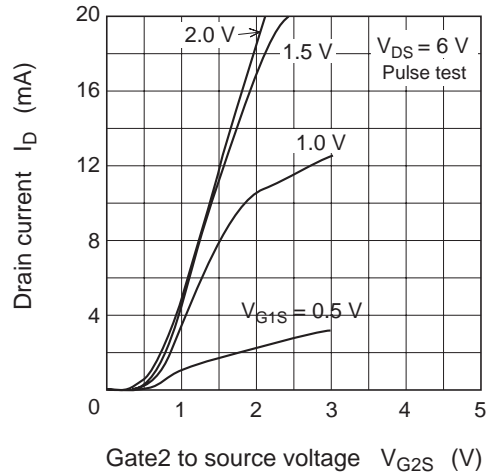
Typical Output Characteristics



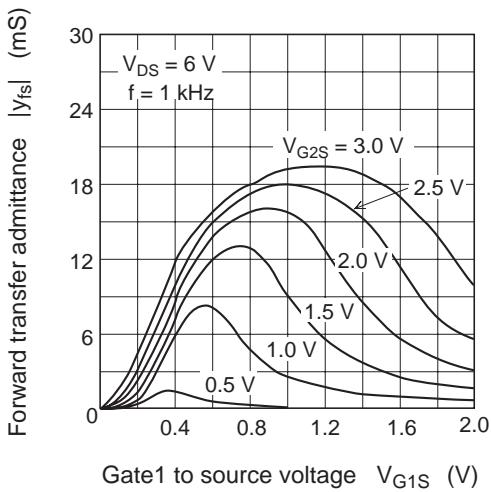
Drain Current vs. Gate1 to Source Voltage



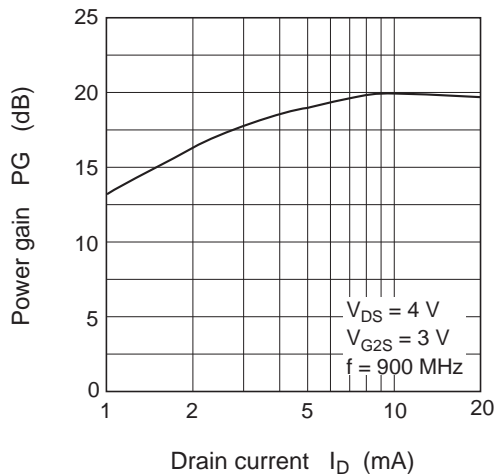
Drain Current vs. Gate2 to Source Voltage



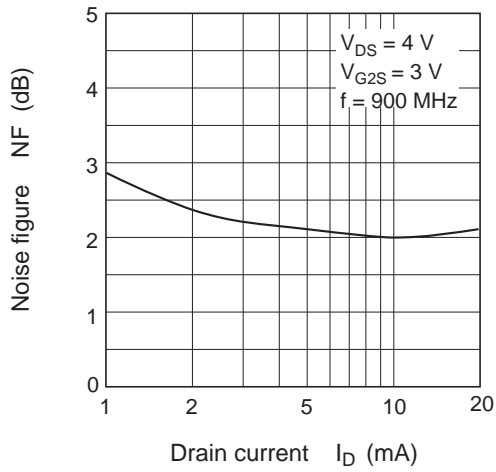
Forward Transfer Admittance vs. Gate1 to Source Voltage



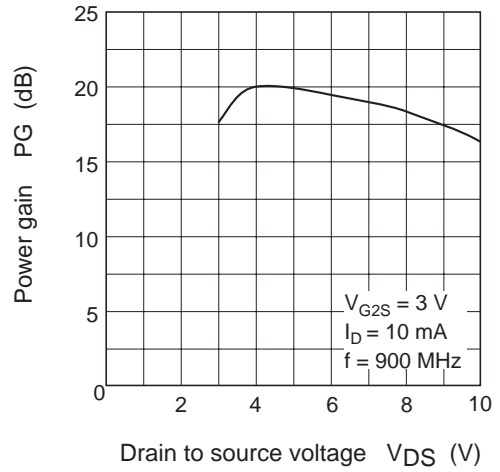
Power Gain vs. Drain Current



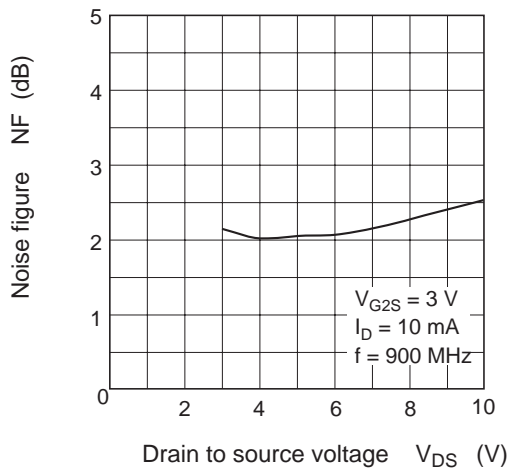
Noise Figure vs. Drain Current



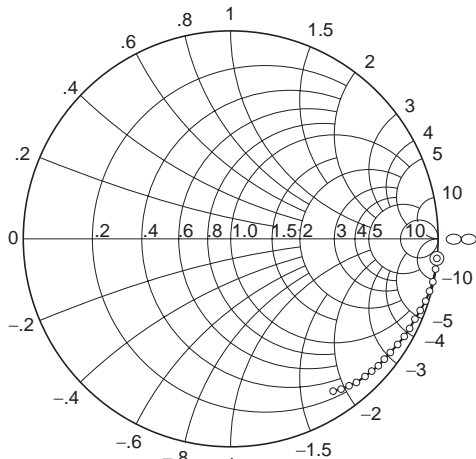
Power Gain vs. Drain to Source Voltage



Noise Figure vs. Drain to Source Voltage



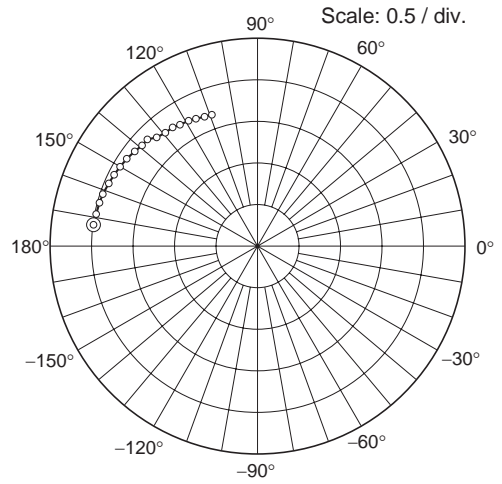
S11 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



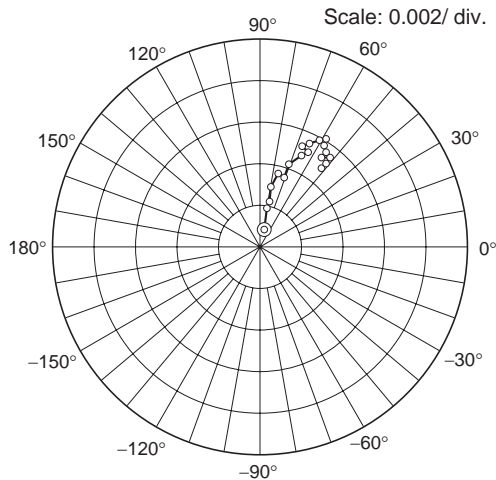
S21 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



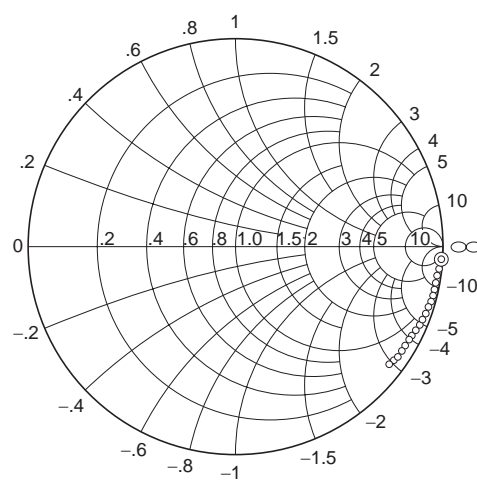
S12 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



S22 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)

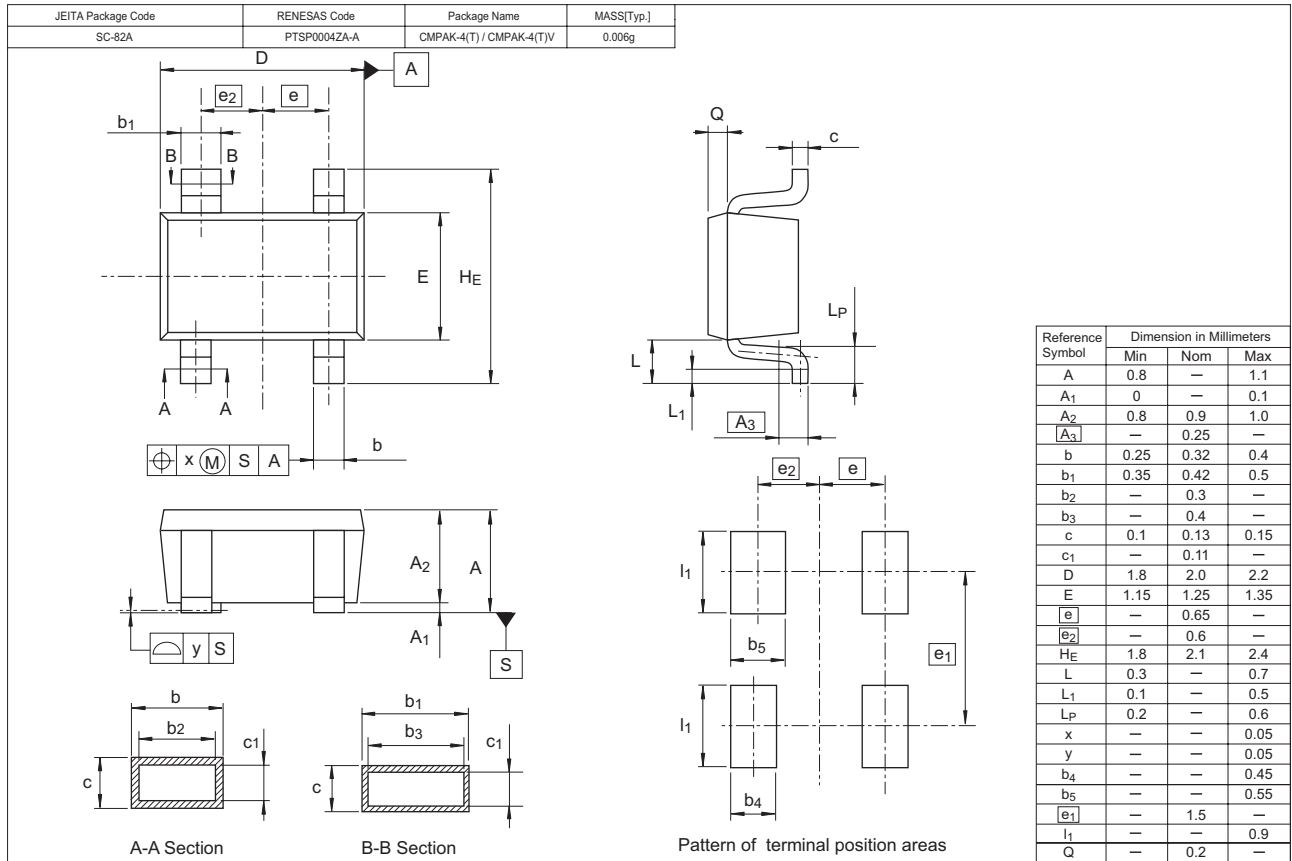


S Parameter

 $(V_{DS} = 4 \text{ V}, V_{GS} = 3 \text{ V}, I_D = 10 \text{ mA}, Z_O = 50 \Omega)$

| Freq. (MHz) | S11 | | S21 | | S12 | | S22 | |
|----------------|-------|-------|------|-------|---------|------|-------|-------|
| | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. |
| 100 | 0.999 | -6.1 | 1.98 | 172.2 | 0.00094 | 79.2 | 0.989 | -4.2 |
| 150 | 0.998 | -9.1 | 1.97 | 168.4 | 0.00189 | 80.4 | 0.987 | -6.1 |
| 200 | 0.992 | -11.9 | 1.96 | 165.0 | 0.00230 | 79.5 | 0.986 | -7.9 |
| 250 | 0.988 | -14.8 | 1.96 | 161.0 | 0.00286 | 79.9 | 0.984 | -9.8 |
| 300 | 0.985 | -17.9 | 1.94 | 157.1 | 0.00364 | 75.2 | 0.981 | -11.5 |
| 350 | 0.976 | -20.6 | 1.92 | 153.7 | 0.00353 | 71.8 | 0.978 | -13.4 |
| 400 | 0.971 | -23.2 | 1.91 | 149.9 | 0.00419 | 70.7 | 0.975 | -15.2 |
| 450 | 0.964 | -26.3 | 1.88 | 146.8 | 0.00495 | 65.5 | 0.972 | -17.2 |
| 500 | 0.961 | -29.1 | 1.87 | 142.8 | 0.00509 | 62.7 | 0.968 | -19.1 |
| 550 | 0.951 | -32.2 | 1.86 | 139.4 | 0.00530 | 66.6 | 0.963 | -20.8 |
| 600 | 0.949 | -35.0 | 1.86 | 136.1 | 0.00550 | 63.8 | 0.960 | -22.8 |
| 650 | 0.935 | -37.6 | 1.81 | 132.9 | 0.00601 | 58.2 | 0.956 | -24.5 |
| 700 | 0.933 | -40.5 | 1.78 | 129.4 | 0.00582 | 60.6 | 0.950 | -26.3 |
| 750 | 0.923 | -42.9 | 1.77 | 125.7 | 0.00572 | 58.5 | 0.945 | -28.0 |
| 800 | 0.916 | -45.8 | 1.75 | 122.6 | 0.00553 | 56.3 | 0.941 | -29.9 |
| 850 | 0.908 | -49.0 | 1.72 | 119.1 | 0.00514 | 56.3 | 0.936 | -31.7 |
| 900 | 0.900 | -51.2 | 1.70 | 115.8 | 0.00543 | 52.9 | 0.930 | -33.4 |
| 950 | 0.890 | -54.0 | 1.67 | 112.6 | 0.00506 | 52.4 | 0.924 | -35.2 |
| 1000 | 0.876 | -56.4 | 1.65 | 109.3 | 0.00469 | 51.9 | 0.919 | -37.0 |

Package Dimensions



Ordering Information

| Part Name | Quantity | Shipping Container |
|---------------|----------|-----------------------------------|
| 3SK296ZQ-TL-E | 3000 | φ 178 mm Reel, 8 mm Emboss Taping |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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