RENESAS

3SK296
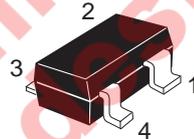
Silicon N-Channel Dual Gate MOS FET

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)

2
3   1
           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)

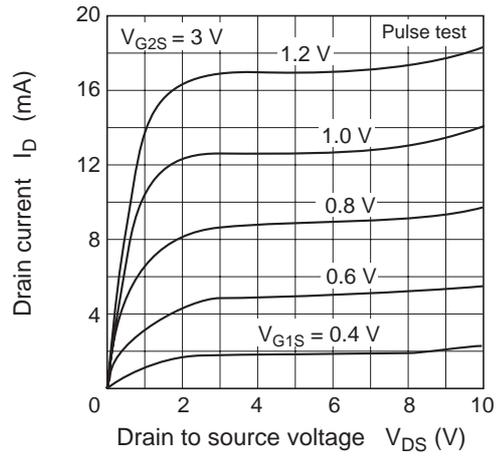| Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	12	V
Gate 1 to source voltage	V_{G1S}	±8	V
Gate 2 to source voltage	V_{G2S}	±8	V
Drain current	I_D	25	mA
Channel power dissipation	Pch	100	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	−55 to +150	°C

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 µA , V_{G1S} = −3 V, V_{G2S} = −3 V
Gate 1 to source breakdown voltage	$V_{(BR)G1SS}$	±8	—	—	V	I_{G1} = ±10 µA, V_{G2S} = V_{DS} = 0
Gate 2 to source breakdown voltage	$V_{(BR)G2SS}$	±8	—	—	V	I_{G2} = ±10 µA, V_{G1S} = V_{DS} = 0
Gate 1 cutoff current	I_{G1SS}	—	—	±100	nA	V_{G1S} = ±6 V, V_{G2S} = V_{DS} = 0
Gate 2 cutoff current	I_{G2SS}	—	—	±100	nA	V_{G2S} = ±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 µA
Gate 2 to source cutoff voltage	$V_{G2S(off)}$	0	—	+1.0	V	V_{DS} = 10 V, V_{G1S} = 3V, I_D = 100 µA
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	Ciss	1.2	1.5	2.2	pF	V_{DS} = 6 V, V_{G2S} = 3V, I_D = 10 mA, f = 1 MHz
Output capacitance	Coss	0.6	0.9	1.2	pF	
Reverse transfer capacitance	Crss	—	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	

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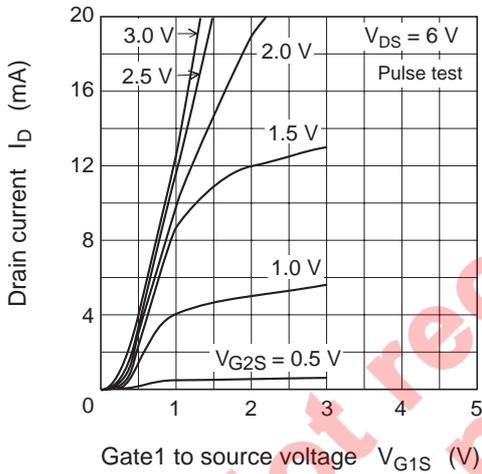
Maximum Channel Power Dissipation Curve

Channel Power Dissipation Pch (mW)

Ambient Temperature Ta (°C)
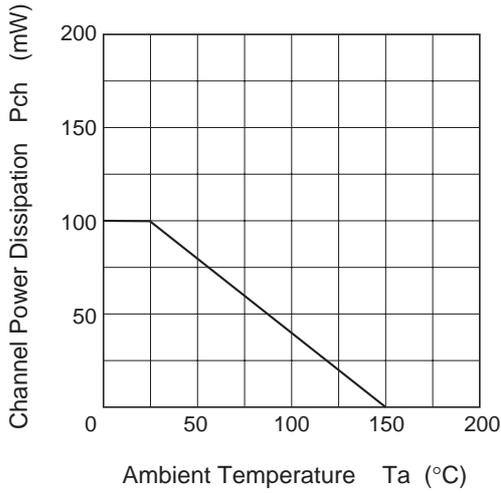
Typical Output Characteristics

Drain current I_D (mA)

V_{G2S} = 3 V
Pulse test
1.2 V
1.0 V
0.8 V
0.6 V
V_{G1S} = 0.4 V

Drain to source voltage V_{DS} (V)

Drain Current vs. Gate1 to Source Voltage

Drain current I_D (mA)

3.0 V
2.5 V
2.0 V
1.5 V
1.0 V
V_{G2S} = 0.5 V
V_{DS} = 6 V
Pulse test

Gate1 to source voltage V_{G1S} (V)

Drain Current vs. Gate2 to Source Voltage

Drain current I_D (mA)

2.0 V
1.5 V
1.0 V
V_{G1S} = 0.5 V
V_{DS} = 6 V
Pulse test

Gate2 to source voltage V_{G2S} (V)
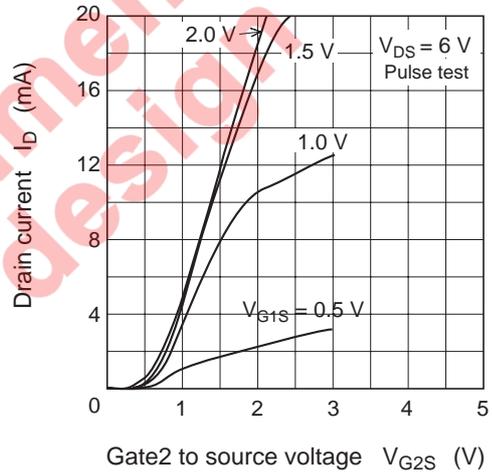
Forward Transfer Admittance vs. Gate1 to Source Voltage

Forward transfer admittance $|y_{fs}|$ (mS)

V_{DS} = 6 V
f = 1 kHz
V_{G2S} = 3.0 V
2.5 V
2.0 V
1.5 V
1.0 V
0.5 V

Gate1 to source voltage V_{G1S} (V)
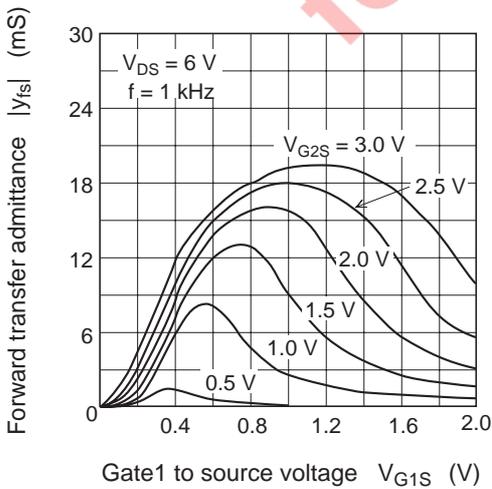
Power Gain vs. Drain Current

Power gain PG (dB)

V_{DS} = 4 V
V_{G2S} = 3 V
f = 900 MHz

Drain current I_D (mA)

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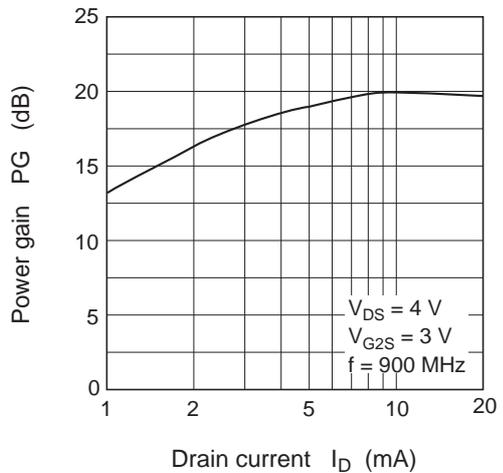
Noise Figure vs. Drain Current

V_{DS} = 4 V
V_{G2S} = 3 V
f = 900 MHz

Noise figure   NF (dB)

Drain current I_D (mA)
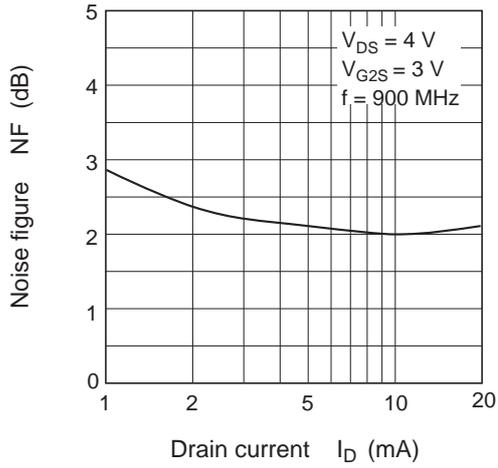
Power Gain vs. Drain to Source Voltage

V_{G2S} = 3 V
I_D = 10 mA
f = 900 MHz

Power gain   PG (dB)

Drain to source voltage V_{DS} (V)
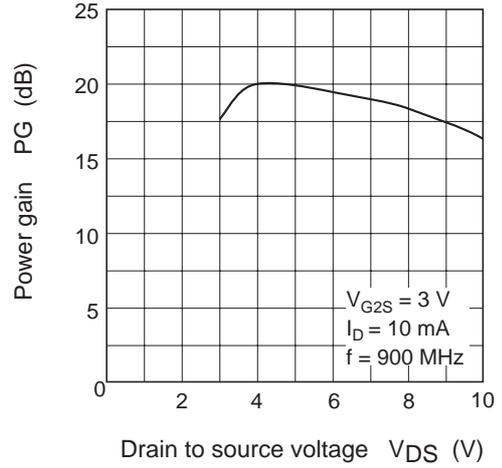
Noise Figure vs. Drain to Source Voltage

V_{G2S} = 3 V
I_D = 10 mA
f = 900 MHz

Noise figure   NF (dB)

Drain to source voltage V_{DS} (V)

Not recommend for new design

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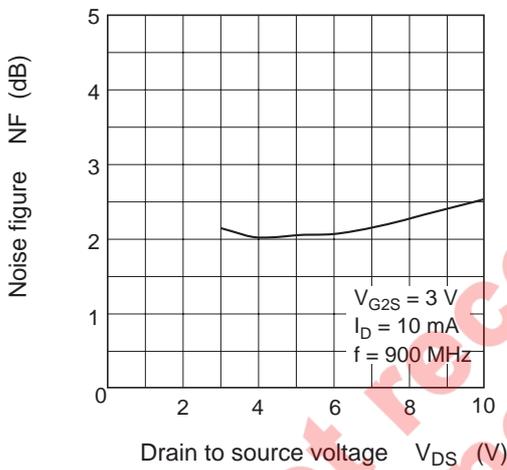
S11 Parameter vs. Frequency
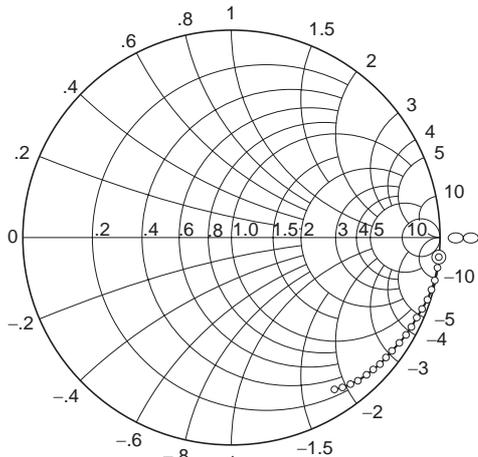
Condition: V_{DS} = 4 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
100 to 1000 MHz (50 MHz step)

S21 Parameter vs. Frequency
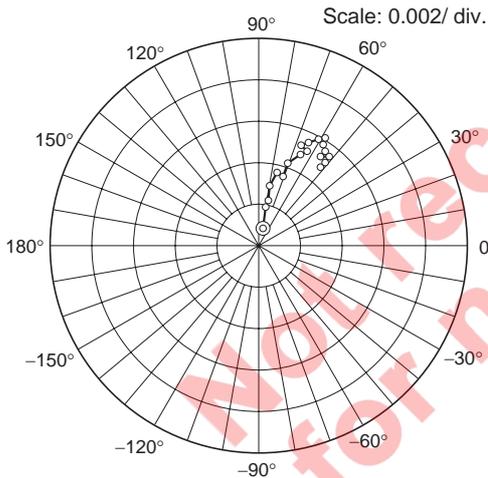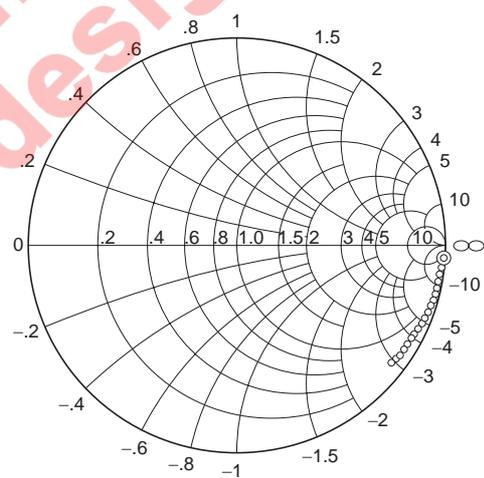
Scale: 0.5 / div.
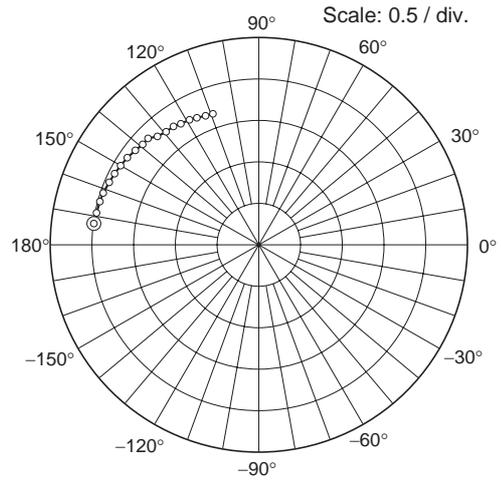
Condition: V_{DS} = 4 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
100 to 1000 MHz (50 MHz step)

S12 Parameter vs. Frequency

Scale: 0.002/ div.

Condition: V_{DS} = 4 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
100 to 1000 MHz (50 MHz step)

S22 Parameter vs. Frequency

Condition: V_{DS} = 4 V , V_{G2S} = 3 V
I_D = 10 mA , Zo = 50 Ω
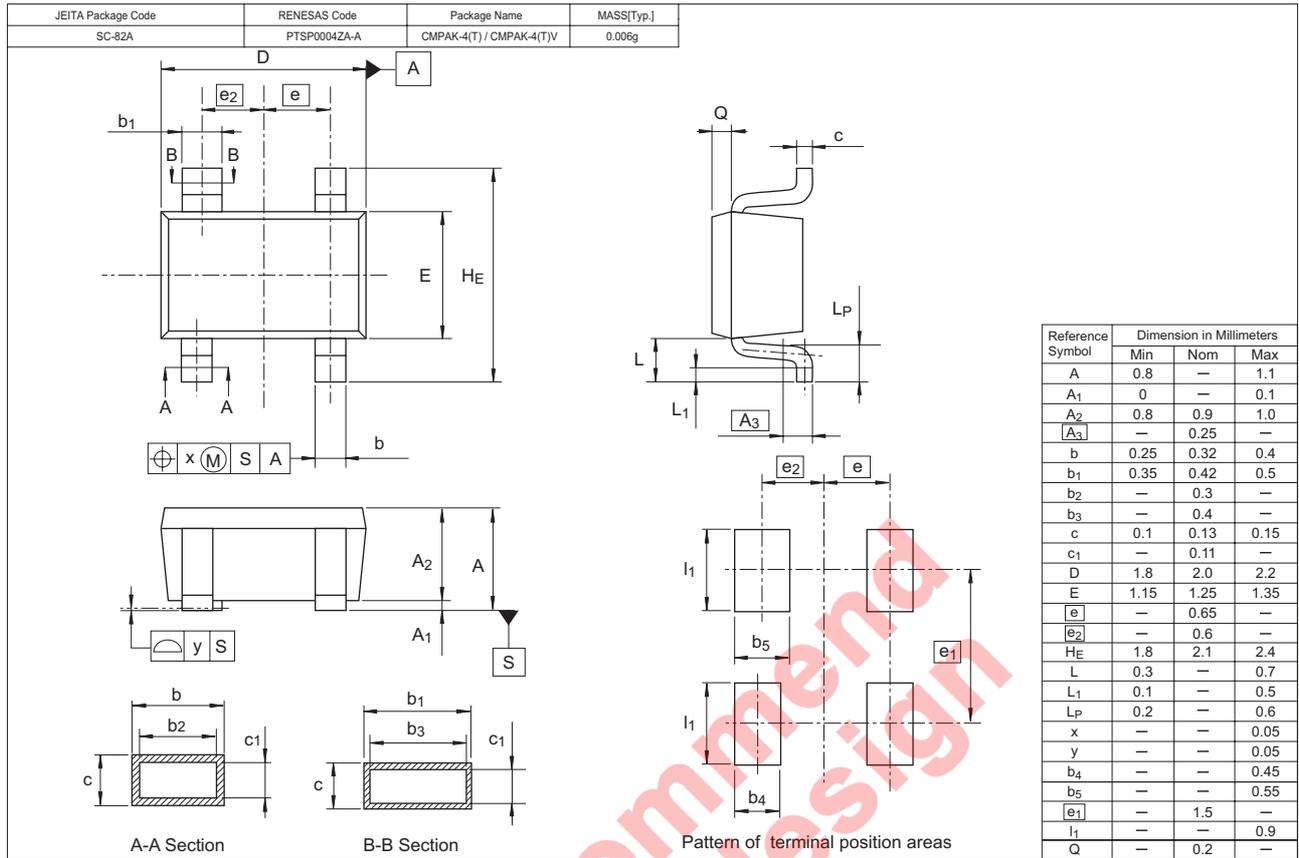100 to 1000 MHz (50 MHz step)

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S Parameter

$(V_{DS} = 4 \text{ V}, V_{G2S} = 3 \text{ V}, I_D = 10 \text{ mA}, Z_O = 50 \text{ }\Omega)$

Freq.	S11		S21		S12		S22	
(MHz)	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

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Package Dimensions

JEITA Package Code	RENESAS Code	Package Name	MASS[Typ.]
SC-82A	PTSP0004ZA-A	CMPAK-4(T) / CMPAK-4(T)V	0.006g

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	0.8	—	1.1
A₁	0	—	0.1
A₂	0.8	0.9	1.0
A₃	—	0.25	—
b	0.25	0.32	0.4
b₁	0.35	0.42	0.5
b₂	—	0.3	—
b₃	—	0.4	—
c	0.1	0.13	0.15
c₁	—	0.11	—
D	1.8	2.0	2.2
E	1.15	1.25	1.35
e	—	0.65	—
e₂	—	0.6	—
H_E	1.8	2.1	2.4
L	0.3	—	0.7
L₁	0.1	—	0.5
L_P	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
b₄	—	—	0.45
b₅	—	—	0.55
e₁	—	1.5	—
l₁	—	—	0.9
Q	—	0.2	—

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.

RENESAS

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RENESAS SALES OFFICES

http://www.renesas.com

Refer to "**http://www.renesas.com/en/network**" for the latest and detailed information.

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