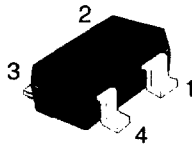# 2SK2685

GaAs HEMT

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Application

UHF low noise amplifier

Features

- Excellent low noise characteristics.
  Fmin = 0.83 dB Typ. (3 V, 10 mA, 2 GHz)
- High associated gain.
  Ga = 17 dB Typ. (3 V, 10 mA, 2 GHz)
- High voltage.
  V_{DS} = 6 or more voltage.
- Small package. (CMPAK-4)

Outline

CMPAK-4

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

2SK2685

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	6	V
Gate to source voltage	V_{GSO}	–6	V
Gate to drain voltage	V_{GDO}	–7	V
Drain current	I_D	20	mA
Channel power dissipation	Pch	100	mW
Channel temperature	Tch	125	°C
Storage temperature	Tstg	–55 to +125	°C

Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.

Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Gate to source leak current	I_{GSS}	—	—	–20	µA	V_{GS} = –6 V, V_{DS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–0.3	—	–2.0	V	V_{DS} = 3 V, I_D = 100 µA
Drain current	I_{DSS}	35	50	70	mA	V_{DS} = 3 V, V_{GS} = 0 (Pulse Test)
Forward transfer admittance	$|y_{fs}|$	40	60	—	mS	V_{DS} = 3 V, I_D = 10 mA, f = 1 kHz
Associated gain	Ga	—	17.0	—	dB	V_{DS} = 3 V, I_D = 10 mA, f = 2 GHz
Associated gain	Ga	—	15.2	—	dB	V_{DS} = 3 V, I_D = 3 mA, f = 2 GHz
Associated gain	Ga	16	21.4	—	dB	V_{DS} = 3 V, I_D = 10 mA, f = 900 MHz
Associated gain	Ga	—	19.7	—	dB	V_{DS} = 3 V, I_D = 3 mA, f = 900 MHz
Minimum noise figure	Fmin	—	0.83	—	dB	V_{DS} = 3 V, I_D = 10 mA, f = 2 GHz
Minimum noise figure	Fmin	—	1.08	—	dB	V_{DS} = 3 V, I_D = 3 mA, f = 2 GHz
Minimum noise figure	Fmin	—	0.52	1.0	dB	V_{DS} = 3 V, I_D = 10 mA, f = 900 MHz
Minimum noise figure	Fmin	—	0.74	—	dB	V_{DS} = 3 V, I_D = 3 mA, f = 900 MHz

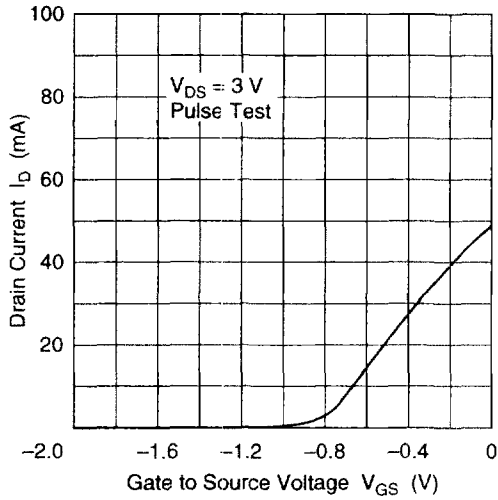Note: Marking is "ZT–".

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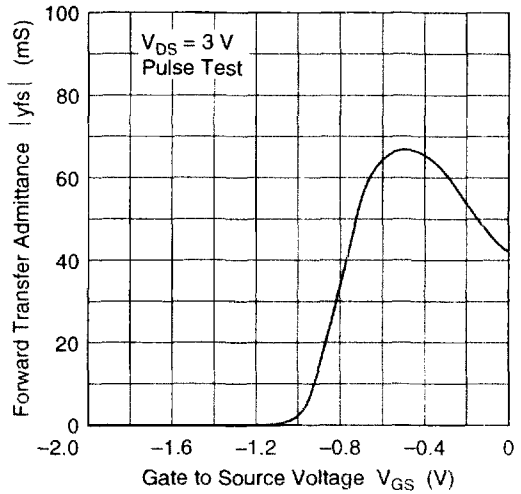## Maximum Channel Power Dissipation Curve
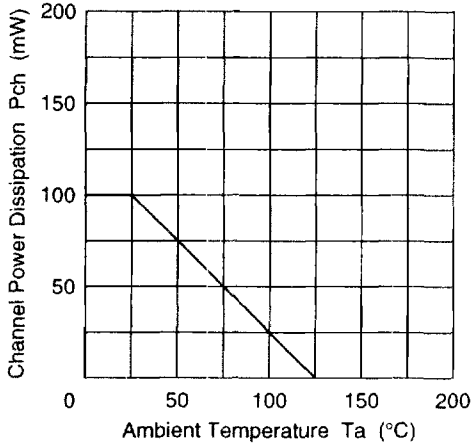
Typical Output Characteristics
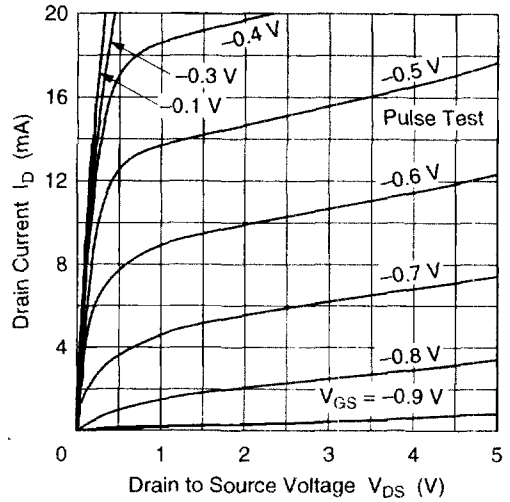
Typical Transfer Characteristics

Forward Transfer Admittance vs. Gate to Source Voltage

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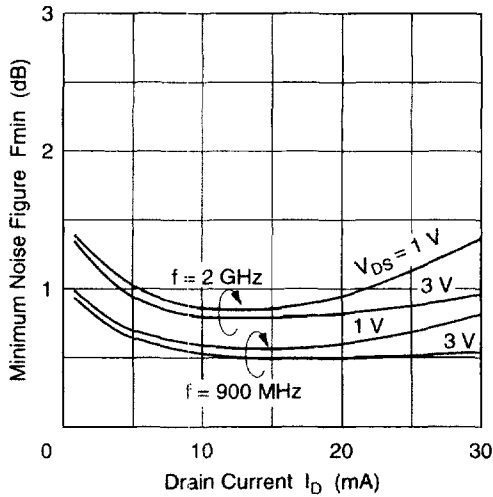1071

Forward Transfer Admittance vs. Drain Current

$V_{DS} = 3$ V
Pulse Test

Forward Transfer Admittance $|y_{fs}|$ (mS)
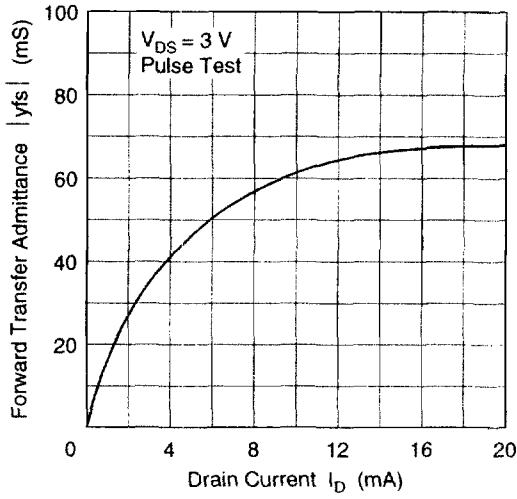
Drain Current I_D (mA)

Associated Gain vs. Drain Current

Associated Gain Ga (dB)

f = 900 MHz

3 V

1 V

3 V

$V_{DS} = 1$ V

f = 2 GHz
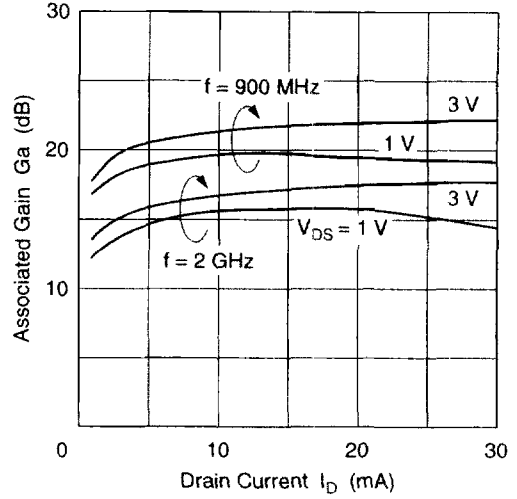
Drain Current I_D (mA)

Minimum Noise Figure vs. Drain Current

Minimum Noise Figure Fmin (dB)

f = 2 GHz

$V_{DS} = 1$ V

3 V

1 V

3 V

f = 900 MHz

Drain Current I_D (mA)

Associated Gain vs. Drain to Source Voltage

Associated Gain Ga (dB)

f = 900 MHz

2 GHz

$I_D = 10$ mA

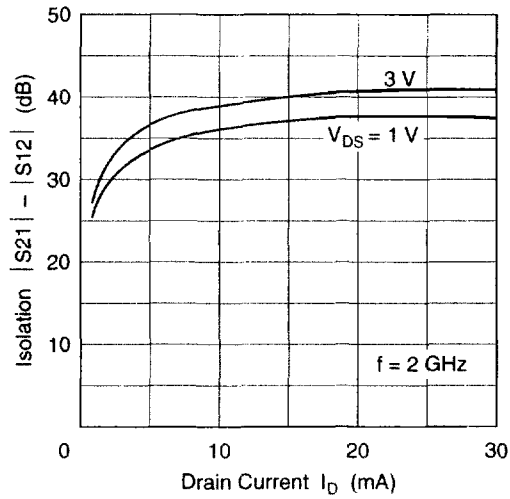Drain to Source Voltage V_{DS} (V)
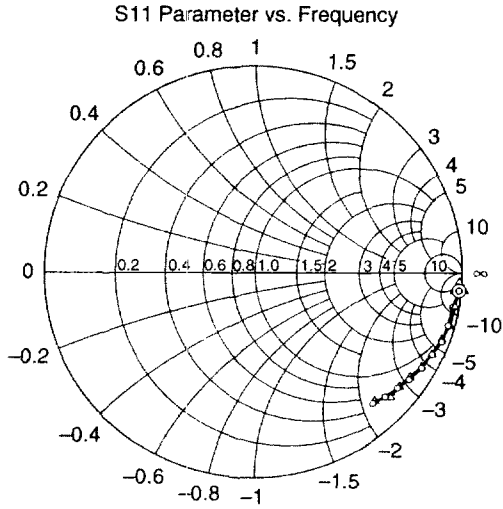
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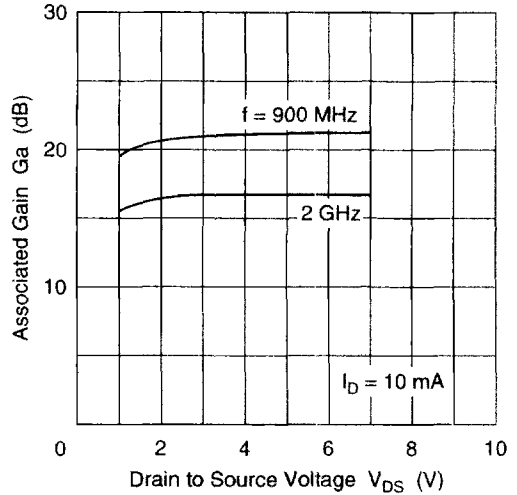
Minimum Noise Figure vs.
Drain to Source Voltage
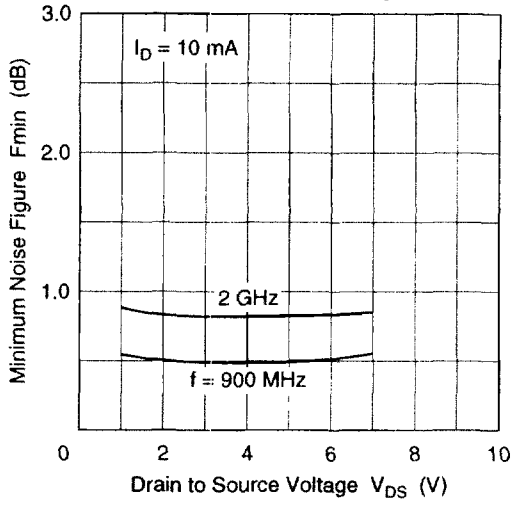
Isolation vs. Drain Current

Isolation vs. Drain Current
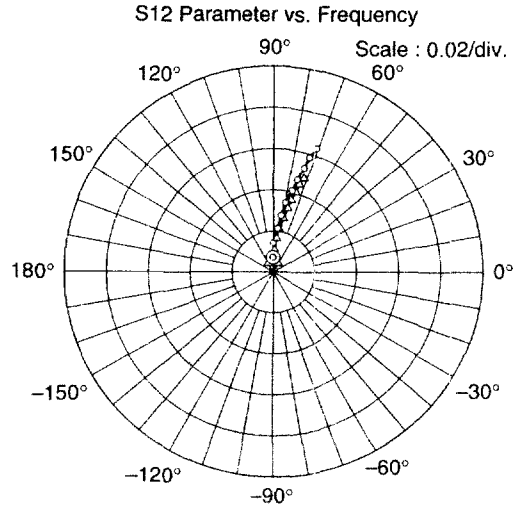
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S11 Parameter vs. Frequency

Condition : I_D = 10 mA, Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
⊚————○ (V_{DS} = 1 V)
△————△ (V_{DS} = 3 V)

S12 Parameter vs. Frequency

Scale : 0.02/div.

Condition : I_D = 10 mA, Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
⊚————○ (V_{DS} = 1 V)
△————△ (V_{DS} = 3 V)

S21 Parameter vs. Frequency

Scale : 2/div.

Condition : I_D = 10 mA, Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
⊚————○ (V_{DS} = 1 V)
△————△ (V_{DS} = 3 V)

S22 Parameter vs. Frequency

Condition : I_D = 10 mA, Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
⊚————○ (V_{DS} = 1 V)
△————△ (V_{DS} = 3 V)

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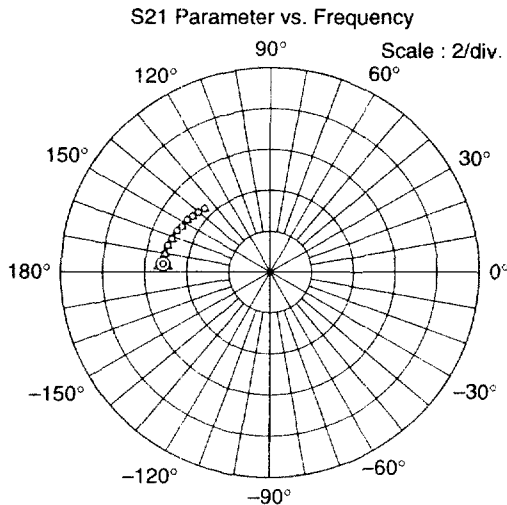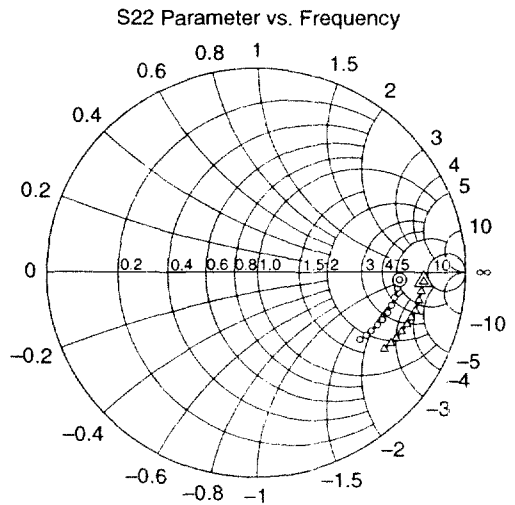
S Parameter ($V_{DS} = 1$ V, $I_D = 10$ mA, $Z_O = 50$ Ω)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.996	−4.8	5.12	175.8	0.00691	89.8	0.688	−3.2
400	0.980	−9.5	5.13	169.9	0.0143	88.2	0.682	−6.5
600	0.977	−15.0	5.07	165.4	0.0210	83.3	0.674	−10.6
800	0.970	−19.9	4.94	161.6	0.0276	81.5	0.668	−13.8
1000	0.952	−24.4	4.84	156.5	0.0399	79.3	0.658	−17.2
1200	0.938	−29.2	4.74	152.7	0.0404	76.0	0.648	−20.7
1400	0.916	−34.0	4.67	147.7	0.0462	74.8	0.636	−23.7
1600	0.896	−38.2	4.55	144.1	0.0523	73.1	0.622	−27.1
1800	0.882	−42.9	4.47	140.0	0.0578	72.0	0.611	−29.9
2000	0.859	−47.1	4.36	135.8	0.0630	70.3	0.597	−33.1

S Parameter ($V_{DS} = 3$ V, $I_D = 10$ mA, $Z_O = 50$ Ω)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.998	−4.0	5.13	175.8	0.00581	89.8	0.802	−3.2
400	0.988	−9.2	5.14	170.1	0.0110	85.5	0.796	−6.5
600	0.978	−14.5	5.08	165.2	0.0163	83.3	0.790	−9.8
800	0.968	−19.4	4.95	161.4	0.0216	82.0	0.783	−13.3
1000	0.953	−24.2	4.85	156.4	0.0363	79.2	0.774	−16.4
1200	0.937	−28.7	4.75	152.5	0.0312	76.5	0.764	−19.4
1400	0.917	−33.3	4.68	147.8	0.0358	75.3	0.753	−22.5
1600	0.900	−37.5	4.57	144.0	0.0401	73.2	0.742	−25.4
1800	0.883	−41.9	4.49	140.1	0.0442	72.8	0.731	−28.1
2000	0.858	−46.1	4.37	135.9	0.0477	71.4	0.718	−31.1

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