

< Low Noise GaAs HEMT >

# MGF4921AM

4pin flat lead package

## DESCRIPTION

The MGF4921AM super-low noise InGaAs HEMT (High Electron Mobility Transistor) is designed for use in L to C band amplifiers.

The 4pin flat lead package is small-thin size, and offers high cost performance.

## FEATURES

•Low noise figure

NFmin. = 0.35dB (Typ.) @ f=2.4GHz

NFmin. = 0.35dB (Typ.) @ f=4GHz

•High associated gain

Gs = 18.0dB (Typ.) @ f=2.4GHz

Gs = 13.0dB (Typ.) @ f=4GHz

## APPLICATION

L to C band low noise amplifiers

## QUALITY GRADE

GG

## RECOMMENDED BIAS CONDITIONS

VDS=2V , ID=10~25mA

## ORDERING INFORMATION

Tape & reel 15000pcs/reel

## RoHS COMPLIANT

MGF4921AM is a RoHS compliant product. RoHS compliance is indicated by the letter "G" after the Lot Marking.

## ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
VGDO	Gate to drain voltage	-3	V
VGSO	Gate to source voltage	-3	V
ID	Drain current	IDSS	mA
PT	Total power dissipation	130	mW
Tch	Channel temperature	125	°C
Tstg	Storage temperature	-55 to +125	°C

## ELECTRICAL CHARACTERISTICS (Ta=25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX	
V(BR)GDO	Gate to drain breakdown voltage	IG=-78μA	-3.5	--	--	V
IGSS	Gate to source leakage current	VGS=-2V, VDS=0V	--	--	50	μA
IDSS	Saturated drain current	VGS=0V, VDS=2V	50	--	100	mA
VGS(off)	Gate to source cut-off voltage	VDS=2V, ID=390μA	-0.2	--	-1.5	V
Gs	Associated gain	VDS=2V, ID=10mA, f=2.4GHz	--	18	--	dB
NFmin.	Minimum noise figure		--	0.35	--	dB
Gs	Associated gain	VDS=2V, ID=15mA, f=4GHz	11.5	13	--	dB
NFmin.	Minimum noise figure		--	0.35	0.55	dB

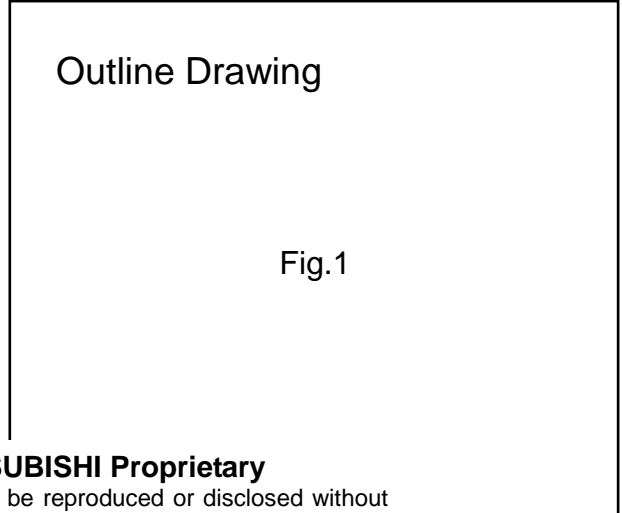
Note 1: Gs and NFmin. @2.4GHz are not tested.

Note 2: Gs and NFmin. @4GHz are tested with sampling inspection.

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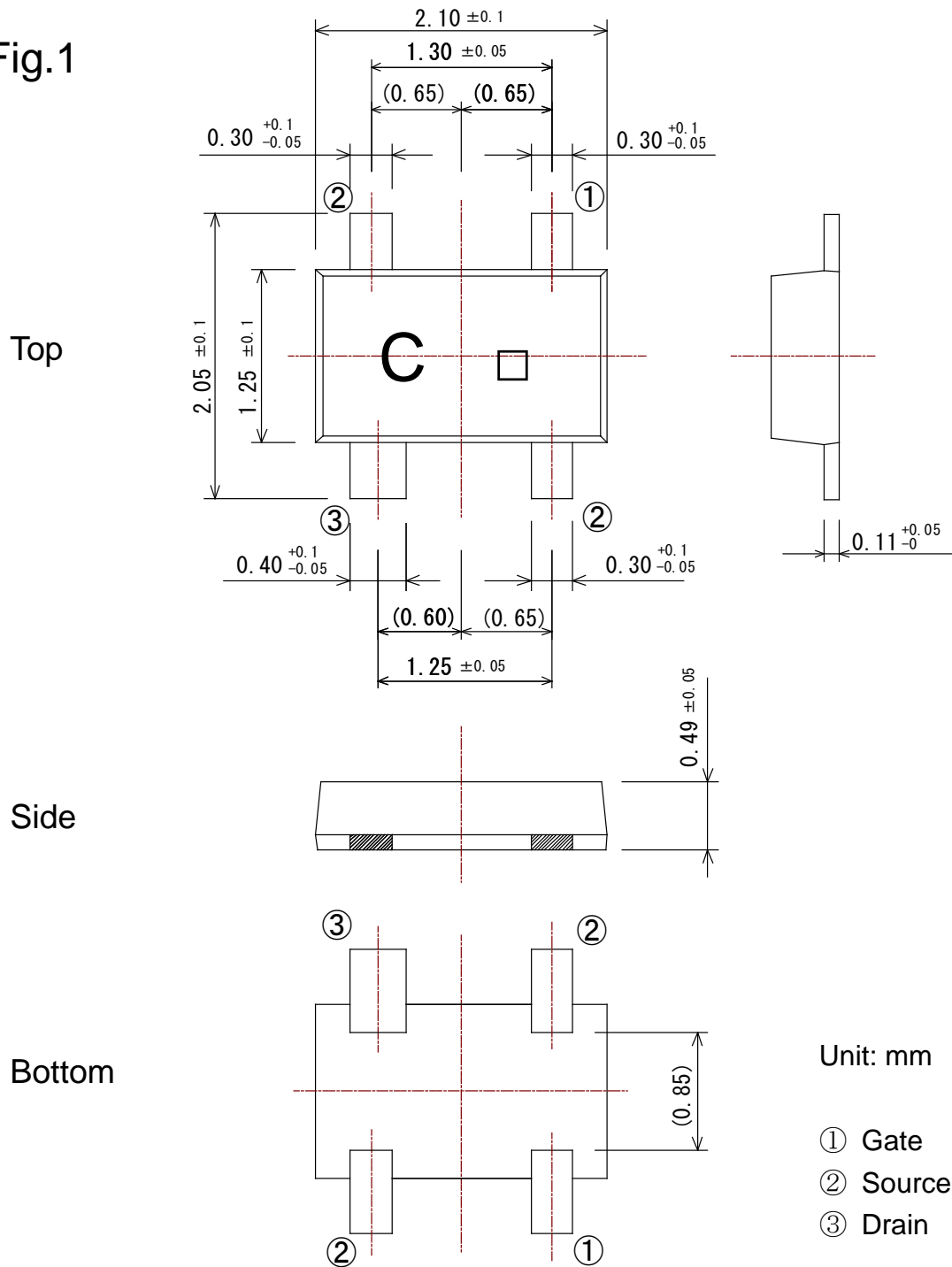
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Fig.1

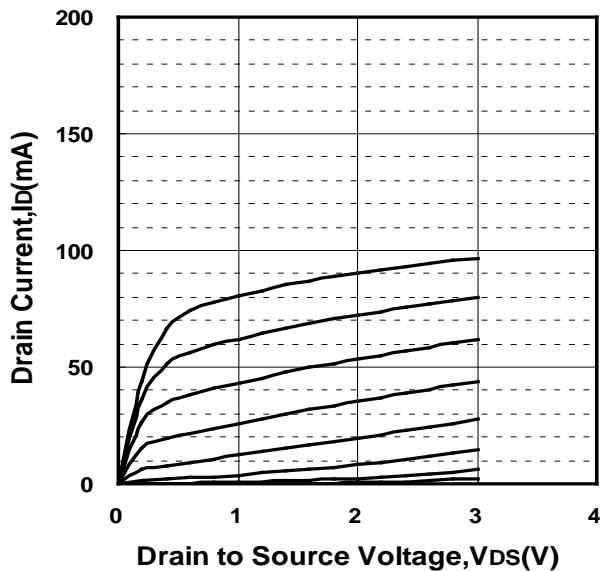


(GD-30)

TYPICAL CHARACTERISTICS (Ta=25°C)

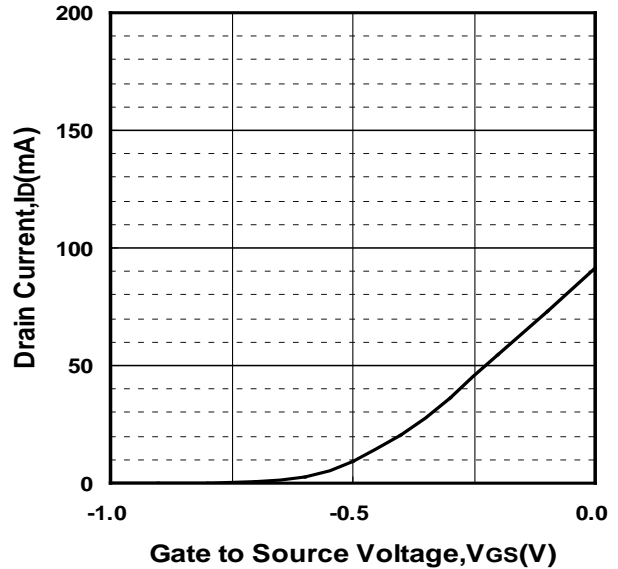
**ID vs. VDS**

(VGS=-0.1V/STEP)

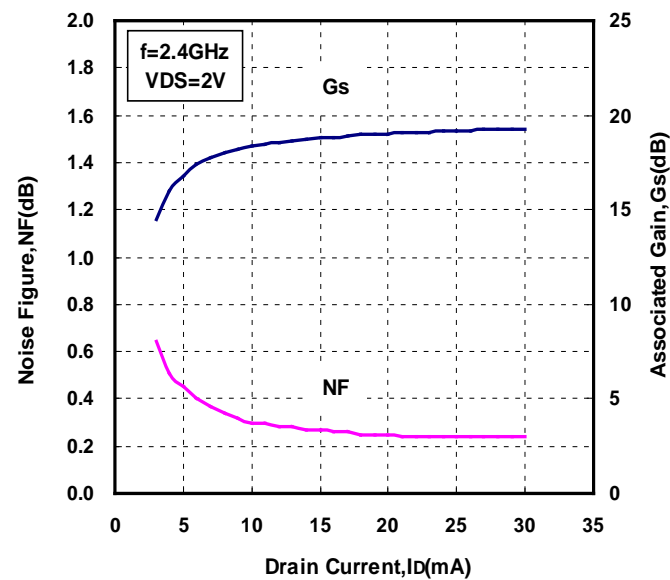


**ID vs. VGS**

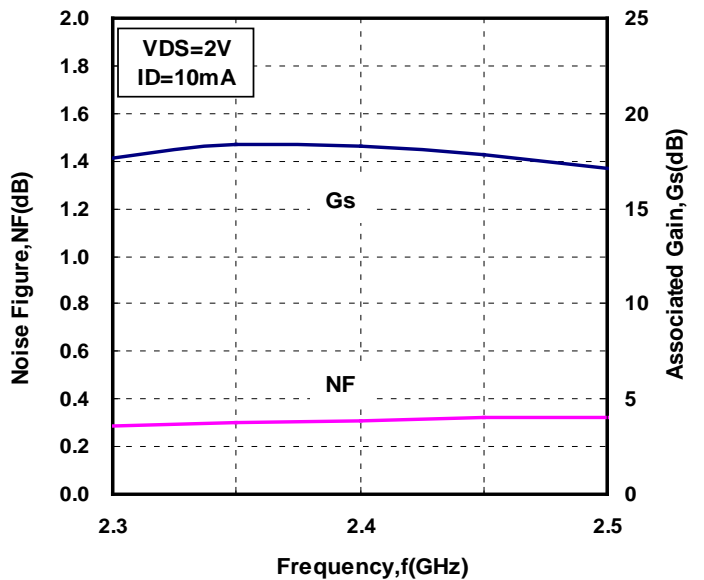
(VDS=2V)



**NF&Gs vs. ID**

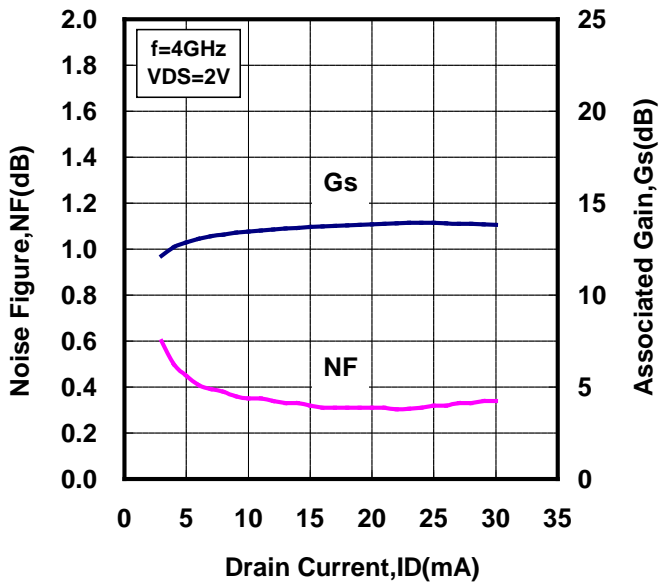


**NF&Gs vs f**

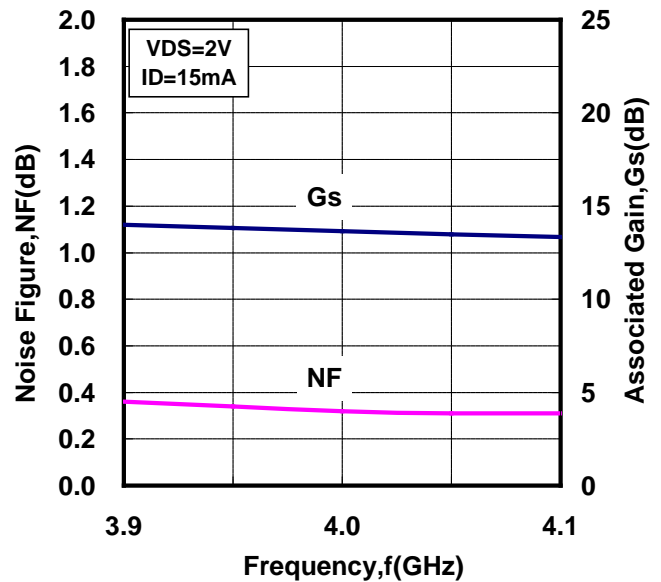


TYPICAL CHARACTERISTICS (Ta=25°C)

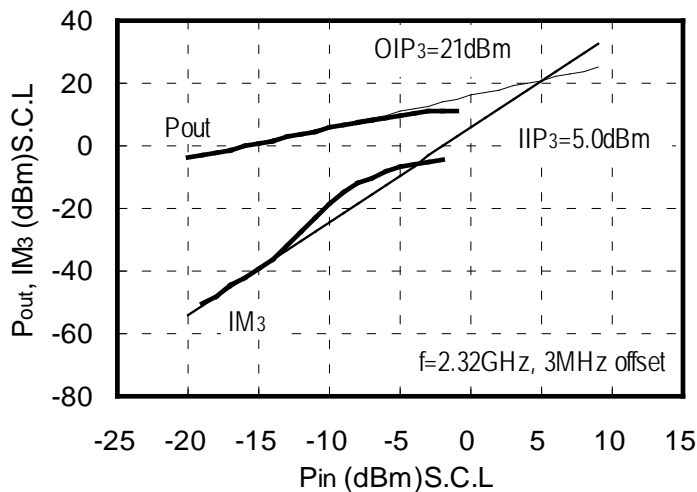
NF&Gs vs. ID



NF&Gs vs f

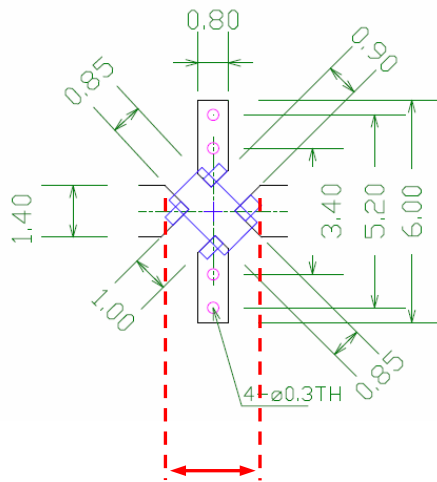


Po, IM3 vs. Pin



**S PARAMETERS** (VDS=2V, ID=10mA, Ta=room temperature)

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.951	-31.0	6.561	150.5	0.040	74.0	0.394	-22.9
2	0.824	-60.7	5.902	123.3	0.074	59.6	0.330	-44.8
3	0.684	-89.5	5.133	99.2	0.101	47.8	0.256	-66.3
4	0.557	-120.4	4.387	77.6	0.121	37.9	0.186	-94.3
5	0.481	-149.3	3.755	58.9	0.139	29.8	0.138	-126.6
6	0.458	-177.0	3.252	42.1	0.156	22.4	0.127	-165.0
7	0.461	157.6	2.833	26.6	0.170	15.3	0.149	160.4
8	0.485	136.9	2.496	12.2	0.185	7.9	0.194	135.0
9	0.531	120.3	2.232	-1.0	0.199	0.9	0.235	117.7
10	0.576	104.2	2.029	-14.0	0.213	-6.6	0.281	105.0
11	0.615	90.3	1.849	-27.2	0.227	-14.5	0.342	95.0
12	0.652	78.9	1.699	-39.6	0.237	-22.2	0.403	83.4
13	0.710	67.2	1.565	-52.8	0.252	-30.5	0.460	73.6
14	0.757	55.5	1.409	-67.1	0.257	-39.5	0.520	63.7
15	0.769	44.9	1.247	-79.8	0.259	-47.5	0.596	54.3
16	0.798	37.2	1.104	-91.4	0.265	-54.5	0.658	43.1



Measurement plane (2.5mm)

Recommended foot pattern; FR4 ( $\epsilon_r=4.8@1\text{MHz}$ ,  $t=0.8\text{mm}$ )

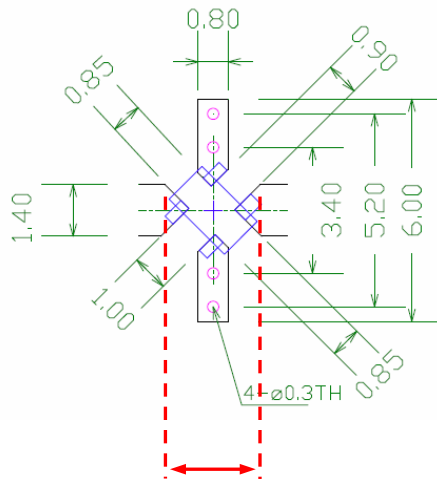
**Note:**

We are ready to provide nonlinear model for ADS and MWO users. If you are interested, please contact our sales offices.

**S PARAMETERS**

(VDS=2V, ID=15mA, Ta=room temperature)

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.937	-33.4	7.730	148.3	0.037	74.5	0.332	-23.6
2	0.787	-64.5	6.735	120.1	0.069	61.4	0.269	-45.5
3	0.636	-93.8	5.682	96.1	0.095	50.7	0.200	-67.0
4	0.512	-125.1	4.757	75.1	0.117	41.4	0.139	-98.3
5	0.444	-154.1	4.019	57.2	0.137	33.5	0.102	-137.5
6	0.429	178.5	3.457	41.1	0.156	25.8	0.109	179.6
7	0.440	153.6	2.998	26.1	0.173	18.1	0.146	148.1
8	0.468	133.6	2.635	12.3	0.190	10.1	0.197	126.3
9	0.517	117.7	2.355	-0.4	0.205	2.3	0.241	110.9
10	0.563	102.2	2.141	-13.0	0.219	-5.9	0.287	99.5
11	0.603	88.7	1.954	-25.9	0.233	-14.1	0.345	90.6
12	0.640	77.7	1.798	-37.8	0.243	-22.3	0.405	79.8
13	0.697	66.3	1.662	-50.7	0.255	-30.9	0.459	70.3
14	0.744	55.0	1.506	-64.8	0.260	-39.9	0.515	61.1
15	0.757	44.6	1.343	-77.4	0.261	-47.9	0.587	52.3
16	0.786	37.2	1.200	-89.0	0.267	-54.9	0.647	41.5



Measurement plane (2.5mm)

Recommended foot pattern; FR4 ( $\epsilon_r=4.8@1\text{MHz}$ ,  $t=0.8\text{mm}$ )

**Note:**

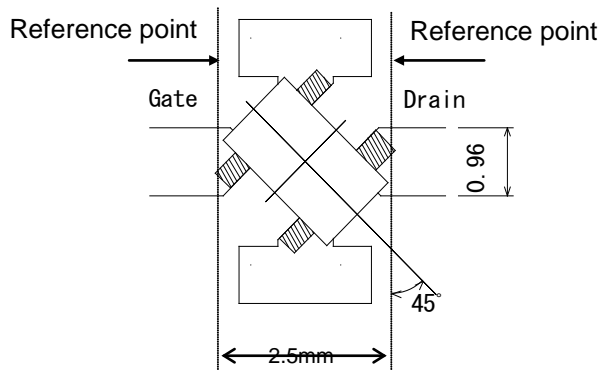
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**S PARAMETERS** (V<sub>DS</sub>=2V, I<sub>D</sub>=10mA, T<sub>a</sub>=room temperature)

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
2.0	0.873	-57.9	5.887	129.1	0.072	54.7	0.383	-50.0
2.2	0.853	-64.2	5.870	124.4	0.079	51.9	0.378	-54.0
2.4	0.833	-69.7	5.750	119.9	0.084	48.8	0.368	-58.7
2.6	0.818	-73.6	5.442	116.1	0.089	45.1	0.363	-65.0
2.8	0.795	-79.7	5.401	111.5	0.093	43.0	0.336	-68.9
3.0	0.769	-86.7	5.366	106.7	0.098	40.3	0.328	-73.9
3.2	0.752	-91.6	5.201	102.8	0.103	37.5	0.320	-78.7
3.4	0.737	-96.5	5.029	99.0	0.106	34.4	0.310	-84.8
3.6	0.714	-102.4	4.959	94.8	0.109	32.4	0.291	-89.1
3.8	0.694	-107.8	4.856	90.7	0.113	30.2	0.282	-93.1
4.0	0.680	-113.1	4.733	86.8	0.117	27.7	0.274	-98.2
4.2	0.667	-118.0	4.587	83.3	0.119	25.1	0.265	-104.0
4.4	0.648	-123.5	4.503	79.3	0.122	23.2	0.252	-108.7
4.6	0.634	-128.9	4.399	75.6	0.124	21.2	0.244	-113.4
4.8	0.621	-134.2	4.287	72.1	0.127	19.0	0.237	-118.8
5.0	0.612	-138.9	4.172	68.7	0.129	16.9	0.229	-124.4
5.2	0.602	-143.9	4.068	65.1	0.131	15.0	0.220	-130.1
5.4	0.591	-149.4	3.986	61.6	0.133	13.0	0.215	-135.6
5.6	0.583	-154.2	3.880	58.3	0.135	11.1	0.209	-140.4
5.8	0.577	-159.2	3.785	54.9	0.136	9.1	0.206	-147.0
6.0	0.569	-164.4	3.697	51.6	0.138	7.3	0.204	-152.6

**NOISE PARAMETERS** (V<sub>DS</sub>=2V, I<sub>D</sub>=10mA, T<sub>a</sub>=room temperature)

Freq. (GHz)	NFmin (dB)	Γ <sub>opt</sub>		R <sub>n</sub> (Ω)
		(mag)	(ang)	
2.0	0.36	0.86	13.9	0.23
2.2	0.37	0.83	16.5	0.22
2.4	0.35	0.81	19.4	0.22
2.6	0.33	0.79	22.5	0.21
2.8	0.34	0.76	25.7	0.20
3.0	0.33	0.74	29.1	0.19
3.2	0.35	0.71	32.6	0.19
3.4	0.35	0.69	36.4	0.18
3.6	0.35	0.66	40.3	0.17
3.8	0.37	0.64	44.4	0.16
4.0	0.35	0.62	48.6	0.15
4.2	0.41	0.60	53.0	0.15
4.4	0.39	0.59	57.6	0.14
4.6	0.38	0.57	62.3	0.13
4.8	0.40	0.56	67.1	0.12
5.0	0.38	0.55	72.0	0.12
5.2	0.39	0.54	77.1	0.11
5.4	0.40	0.54	82.3	0.10
5.6	0.40	0.54	87.7	0.10
5.8	0.39	0.54	93.1	0.09
6.0	0.39	0.55	98.7	0.08



Board: ε<sub>r</sub>=2.6 (PTFE)  
 Thickness: 0.4mm  
 (4-φ0.4: through-hole)

**Note:**

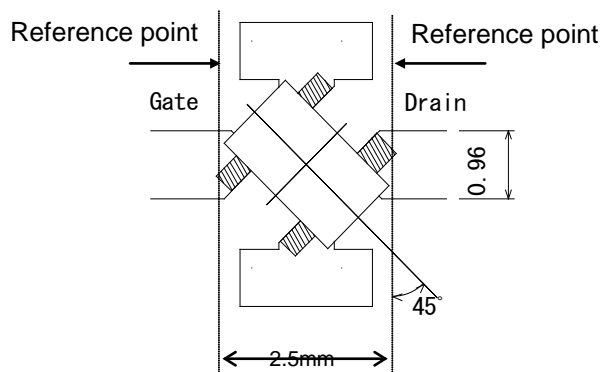
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**S PARAMETERS** (V<sub>DS</sub>=2V, I<sub>D</sub>=15mA, T<sub>a</sub>=room temperature)

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
2.0	0.851	-61.9	6.821	126.7	0.066	55.4	0.313	-54.2
2.2	0.826	-68.4	6.756	121.7	0.072	52.5	0.308	-58.8
2.4	0.804	-74.0	6.578	117.2	0.077	49.7	0.298	-63.9
2.6	0.789	-78.5	6.248	113.4	0.082	46.3	0.292	-70.9
2.8	0.762	-84.7	6.160	108.7	0.085	44.5	0.270	-74.7
3.0	0.734	-91.7	6.063	103.8	0.090	41.9	0.262	-80.6
3.2	0.716	-96.8	5.857	100.0	0.094	39.4	0.255	-85.9
3.4	0.701	-102.0	5.661	96.2	0.097	36.6	0.246	-92.5
3.6	0.677	-107.8	5.544	91.9	0.100	34.8	0.231	-97.3
3.8	0.657	-113.2	5.397	88.0	0.104	32.7	0.223	-101.9
4.0	0.643	-118.7	5.244	84.2	0.107	30.5	0.217	-107.5
4.2	0.629	-123.8	5.076	80.7	0.109	28.2	0.210	-113.8
4.4	0.612	-129.2	4.965	76.8	0.112	26.5	0.198	-119.4
4.6	0.599	-134.5	4.826	73.2	0.115	24.6	0.194	-124.8
4.8	0.587	-139.9	4.692	69.7	0.117	22.6	0.190	-130.7
5.0	0.578	-144.6	4.557	66.4	0.119	20.7	0.185	-136.9
5.2	0.570	-149.6	4.435	63.0	0.122	19.0	0.180	-143.5
5.4	0.561	-155.0	4.326	59.6	0.124	17.1	0.178	-149.4
5.6	0.554	-159.8	4.207	56.4	0.126	15.4	0.175	-154.7
5.8	0.549	-164.8	4.096	53.2	0.128	13.6	0.175	-161.7
6.0	0.543	-169.9	3.993	49.9	0.130	11.9	0.177	-167.5

**NOISE PARAMETERS** (V<sub>DS</sub>=2V, I<sub>D</sub>=15mA, T<sub>a</sub>=room temperature)

Freq. (GHz)	NFmin (dB)	Γ <sub>opt</sub>		R <sub>n</sub> (Ω)
		(mag)	(ang)	
2.0	0.33	0.80	12.7	0.20
2.2	0.33	0.77	15.3	0.19
2.4	0.35	0.75	18.2	0.19
2.6	0.33	0.72	21.1	0.18
2.8	0.32	0.70	24.3	0.17
3.0	0.34	0.67	27.7	0.16
3.2	0.36	0.65	31.3	0.16
3.4	0.31	0.63	35.1	0.15
3.6	0.32	0.61	39.0	0.14
3.8	0.32	0.59	43.2	0.13
4.0	0.35	0.58	47.5	0.13
4.2	0.34	0.56	52.0	0.12
4.4	0.35	0.55	56.6	0.12
4.6	0.36	0.54	61.5	0.11
4.8	0.34	0.53	66.4	0.10
5.0	0.35	0.53	71.6	0.10
5.2	0.33	0.53	76.8	0.09
5.4	0.36	0.53	82.3	0.09
5.6	0.37	0.54	87.9	0.08
5.8	0.36	0.55	93.6	0.07
6.0	0.38	0.56	99.4	0.07



Board: ε<sub>r</sub>=2.6 (PTFE)  
 Thickness: 0.4mm  
 (4-φ0.4: through-hole)

**Note:**

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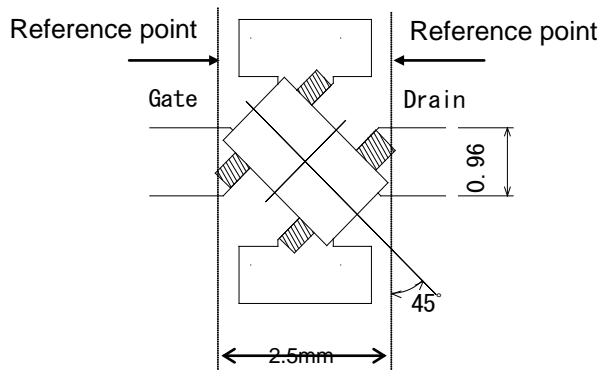


**S PARAMETERS** (V<sub>DS</sub>=2V, I<sub>D</sub>=20mA, T<sub>a</sub>=room temperature)

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
2.0	0.839	-63.7	7.275	125.6	0.064	55.9	0.283	-56.2
2.2	0.813	-70.2	7.173	120.5	0.069	53.2	0.278	-61.1
2.4	0.790	-75.9	6.969	116.0	0.074	50.4	0.268	-66.5
2.6	0.773	-80.6	6.635	112.1	0.078	47.3	0.261	-73.6
2.8	0.747	-86.9	6.513	107.4	0.082	45.4	0.241	-77.6
3.0	0.718	-93.8	6.383	102.6	0.086	42.9	0.234	-84.0
3.2	0.699	-99.0	6.161	98.7	0.090	40.5	0.228	-89.6
3.4	0.683	-104.3	5.951	94.9	0.093	37.9	0.220	-96.4
3.6	0.660	-110.1	5.808	90.7	0.096	36.2	0.206	-101.6
3.8	0.640	-115.4	5.641	86.9	0.100	34.2	0.199	-106.4
4.0	0.625	-120.9	5.476	83.1	0.103	32.1	0.194	-112.3
4.2	0.612	-126.2	5.297	79.6	0.105	29.9	0.188	-118.9
4.4	0.596	-131.5	5.171	75.9	0.108	28.3	0.178	-125.0
4.6	0.583	-136.7	5.018	72.3	0.111	26.4	0.175	-130.5
4.8	0.571	-142.2	4.872	68.8	0.114	24.5	0.173	-136.7
5.0	0.564	-146.9	4.730	65.6	0.116	22.7	0.169	-143.2
5.2	0.556	-151.8	4.598	62.2	0.118	21.0	0.166	-150.1
5.4	0.547	-157.2	4.480	58.9	0.121	19.2	0.165	-156.1
5.6	0.541	-162.0	4.354	55.7	0.123	17.5	0.163	-161.5
5.8	0.536	-167.0	4.237	52.5	0.125	15.7	0.165	-168.6
6.0	0.531	-172.0	4.126	49.4	0.127	14.1	0.169	-174.3

**NOISE PARAMETERS** (V<sub>DS</sub>=2V, I<sub>D</sub>=20mA, T<sub>a</sub>=room temperature)

Freq. (GHz)	NFmin (dB)	Γ <sub>opt</sub>		R <sub>n</sub> (Ω)
		(mag)	(ang)	
2.0	0.34	0.78	12.5	0.19
2.2	0.32	0.76	15.0	0.18
2.4	0.33	0.74	17.9	0.18
2.6	0.34	0.72	20.9	0.17
2.8	0.31	0.70	24.0	0.16
3.0	0.32	0.68	27.4	0.15
3.2	0.30	0.66	31.0	0.15
3.4	0.33	0.64	34.8	0.14
3.6	0.33	0.62	38.7	0.13
3.8	0.34	0.60	42.9	0.13
4.0	0.33	0.59	47.2	0.12
4.2	0.32	0.57	51.7	0.12
4.4	0.33	0.56	56.3	0.11
4.6	0.34	0.55	61.1	0.10
4.8	0.35	0.54	66.1	0.10
5.0	0.33	0.54	71.2	0.09
5.2	0.34	0.53	76.5	0.08
5.4	0.32	0.53	81.9	0.08
5.6	0.34	0.53	87.5	0.07
5.8	0.35	0.53	93.2	0.07
6.0	0.34	0.54	99.0	0.06



Board: ε<sub>r</sub>=2.6 (PTFE)  
 Thickness: 0.4mm  
 (4-φ0.4: through-hole)

**Note:**

We are ready to provide nonlinear model for ADS and MWO users. If you are interested, please contact our sales offices.

### **Keep safety first in your circuit designs!**

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