MITSUBISHI ELECTRIC

< 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.

Outline Drawing

Fig.1

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

V_{DS}=2V , I_D=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
V_{GDO}	Gate to drain voltage	-3	V
V_{GSO}	Gate to source voltage	-3	V
I_D	Drain current	IDSS	mA
PT	Total power dissipation	130	mW
T_{ch}	Channel temperature	125	°C
T_{stg}	Storage temperature	-55 to +125	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C)

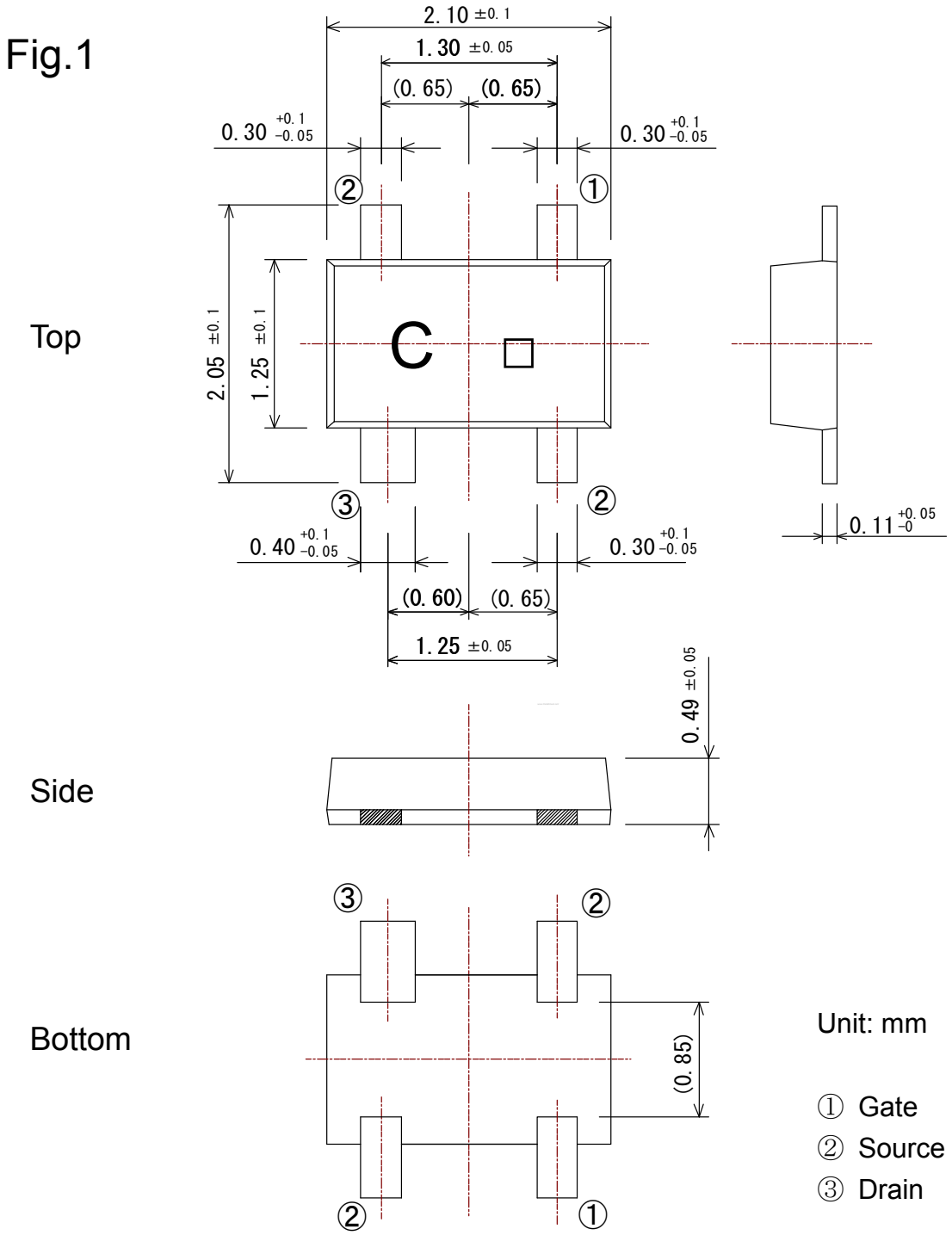
Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	I_G=-78μA	-3.5	--	--	V
I_{GSS}	Gate to source leakage current	V_{GS}=-2V,V_{DS}=0V	--	--	50	μA
I_{DSS}	Saturated drain current	V_{GS}=0V,V_{DS}=2V	30	--	150	mA
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS}=2V,I_D=390μA	-0.2	--	-1.5	V
Gs	Associated gain	V_{DS}=2V, I_D=10mA, f=2.4GHz	--	18	--	dB
NFmin.	Minimum noise figure		--	0.35	--	dB
Gs	Associated gain	V_{DS}=2V, I_D=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.

Publication Date : Oct., 2011

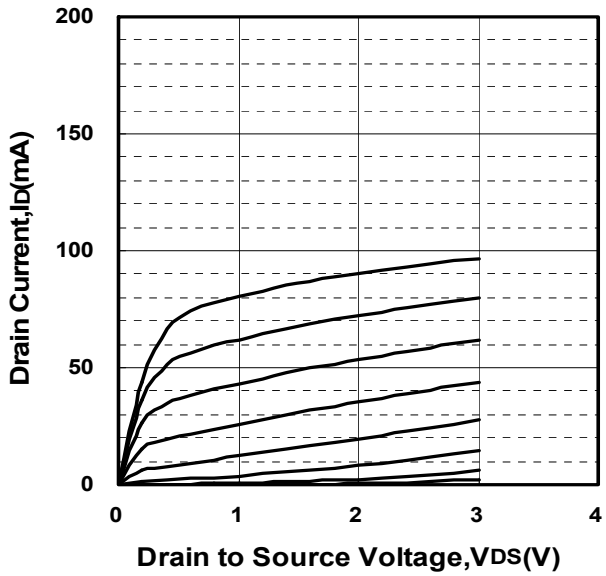
Fig.1


Top
Side
Bottom
2.10 ±0.1
1.30 ±0.05
(0.65)
(0.65)
0.30 +0.1 −0.05
0.30 +0.1 −0.05
2.05 ±0.1
1.25 ±0.1
C
0.11 +0.05 −0
0.40 +0.1 −0.05
0.30 +0.1 −0.05
(0.60)
(0.65)
1.25 ±0.05
0.49 ±0.05
(0.85)
③
②
①
Unit: mm
① Gate
② Source
③ Drain

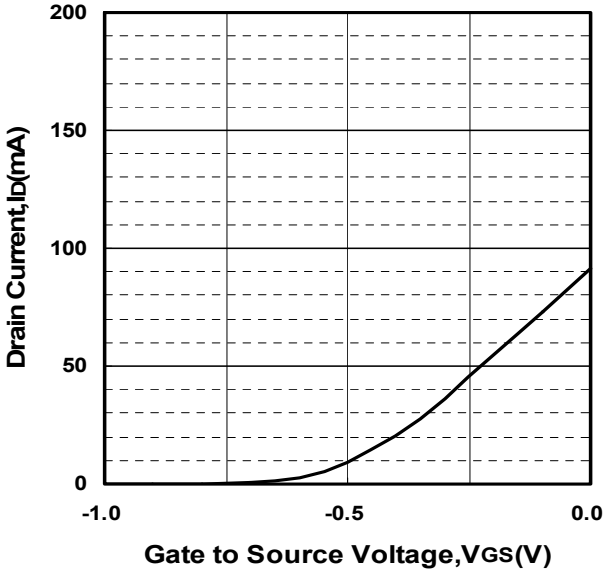
(GD-30)

TYPICAL CHARACTERISTICS (Ta=25°C)

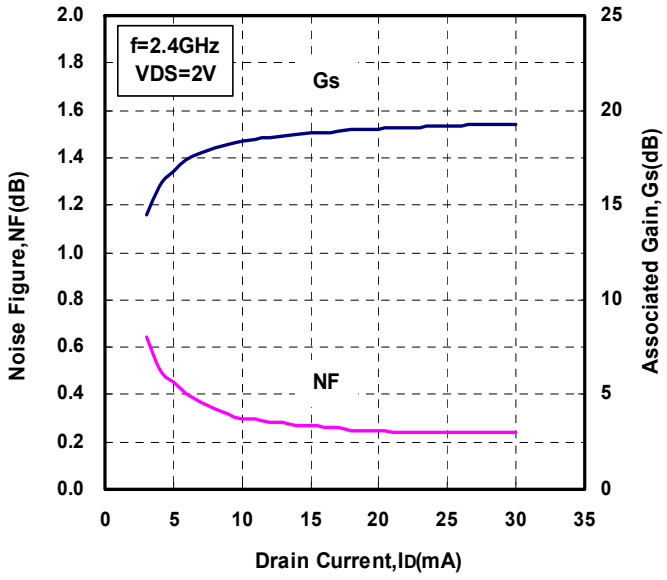
ID vs. VDS
(VGS=~0.1V/STEP)



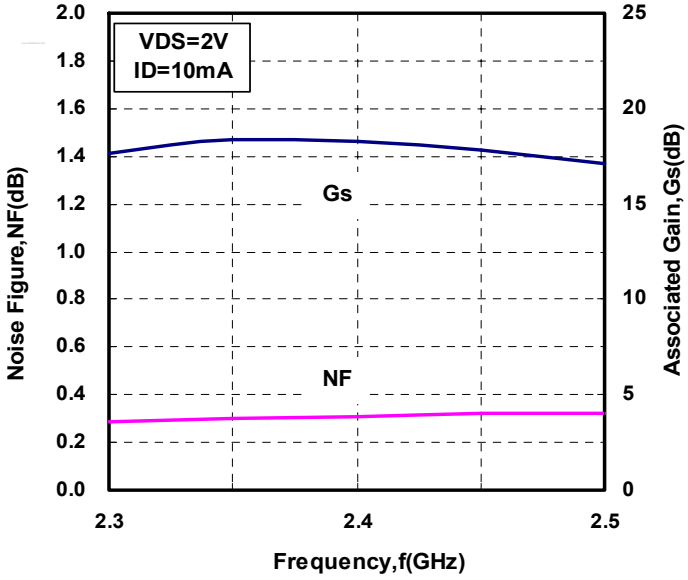
ID vs. VGS
(VDS=2V)



NF&Gs vs. ID

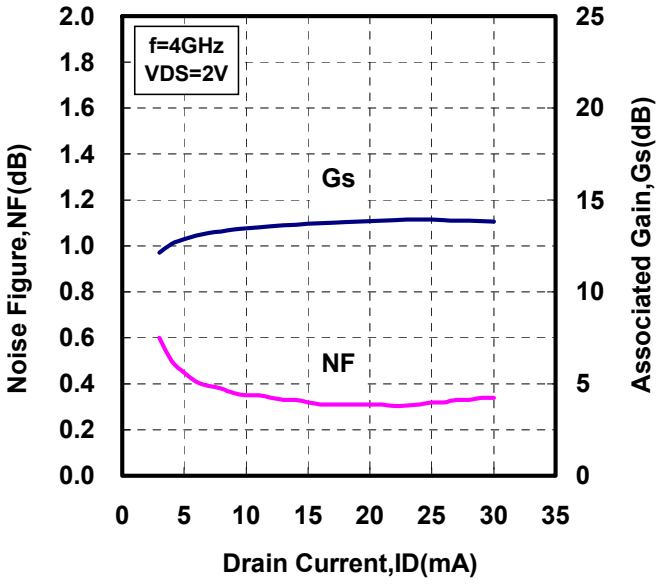


NF&Gs vs f

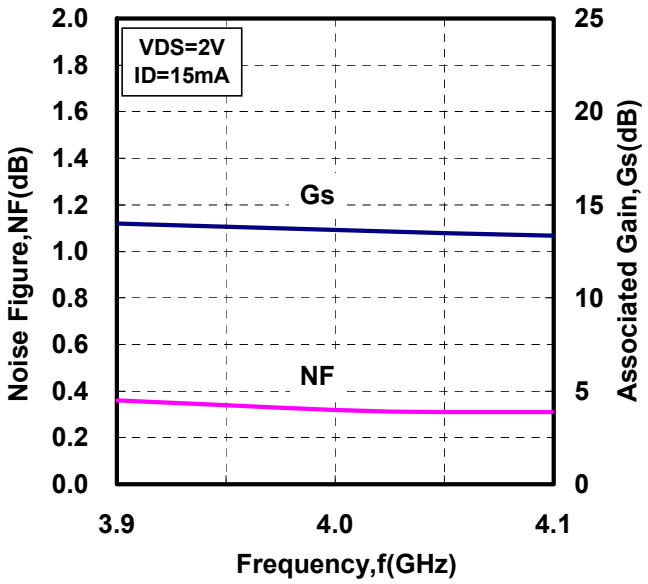


TYPICAL CHARACTERISTICS (Ta=25°C)

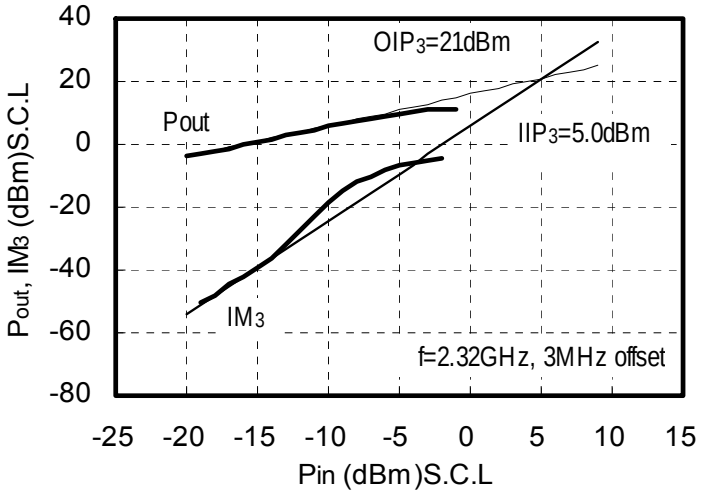
NF&Gs vs. ID



NF&Gs vs f

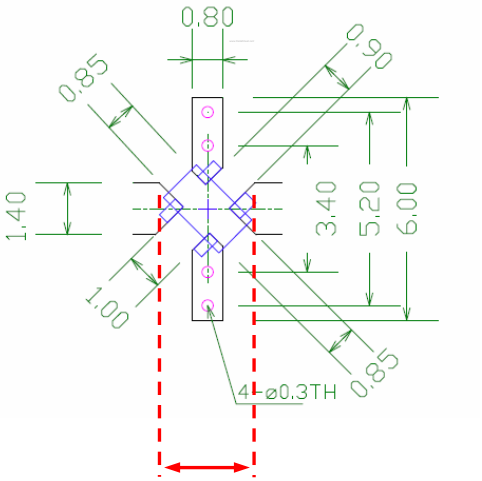


Po,IM3 vs. Pin



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

Freq.	S11		S21		S12		S22	
(GHz)	(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



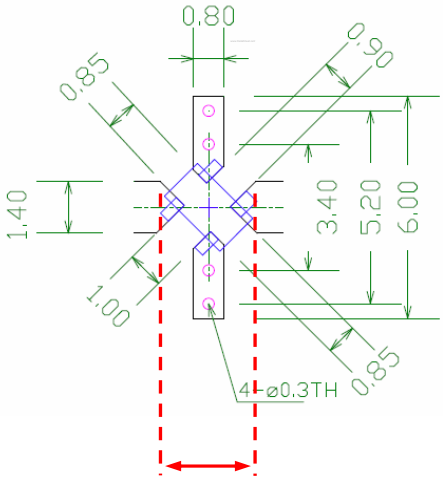
Measurement plane (2.5mm)

Recommended foot pattern; FR4 (εr=4.8@1MHz, t=0.8mm)

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 (εr=4.8@1MHz, t=0.8mm)

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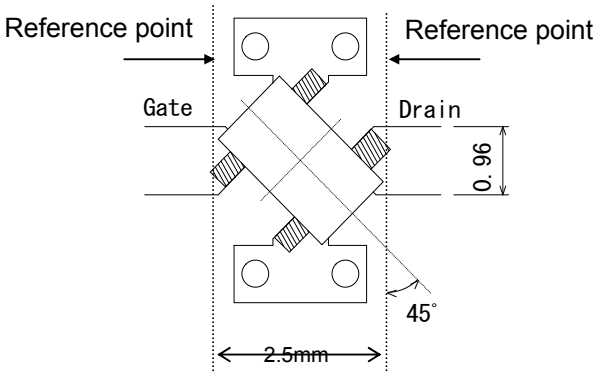
S PARAMETERS (VDS=2V,ID=10mA,Ta=room temperature)

Freq.	S11		S21		S12		S22	
(GHz)	(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_{DS}=2V,I_D=10mA, Ta=room temperature)

Freq.	NFmin	Γopt		Rn
(GHz)	(dB)	(mag)	(ang)	(Ω)
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_r=2.6 (PTFE)
Thickness: 0.4mm
(4-ϕ0.4: through-hole)

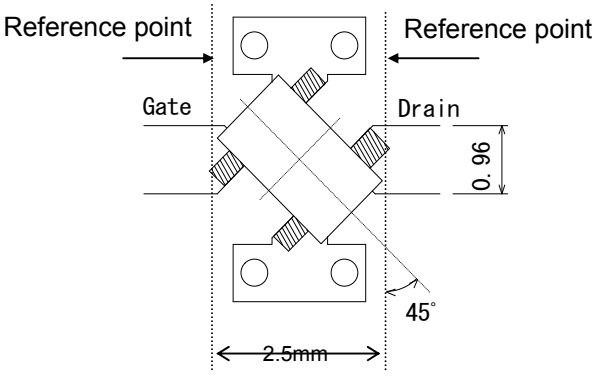
Note:
We are ready to provide nonlinear model for ADS and MWO users. If you are interested, please contact our sales offices.

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

Freq.	S11		S21		S12		S22	
(GHz)	(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_{DS}=2V,I_D=15mA, Ta=room temperature)

Freq.	NFmin	Γopt		Rn
(GHz)	(dB)	(mag)	(ang)	(Ω)
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_r=2.6 (PTFE)
Thickness: 0.4mm
(4-ϕ0.4: through-hole)

Note:
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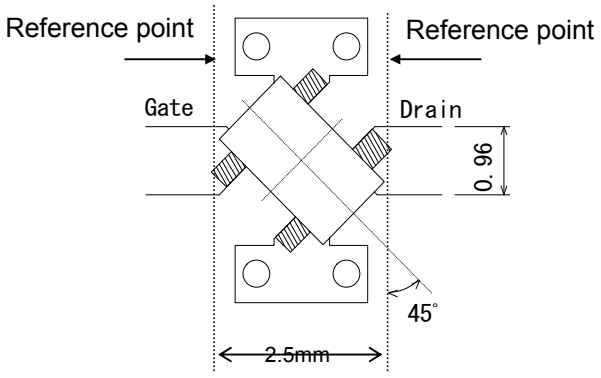
S PARAMETERS (VDS=2V,ID=20mA,Ta=room temperature)

Freq.	S11		S21		S12		S22	
(GHz)	(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_{DS}=2V,I_D=20mA, Ta=room temperature)

Freq.	NFmin	Γopt		Rn
(GHz)	(dB)	(mag)	(ang)	(Ω)
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_r=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.

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