

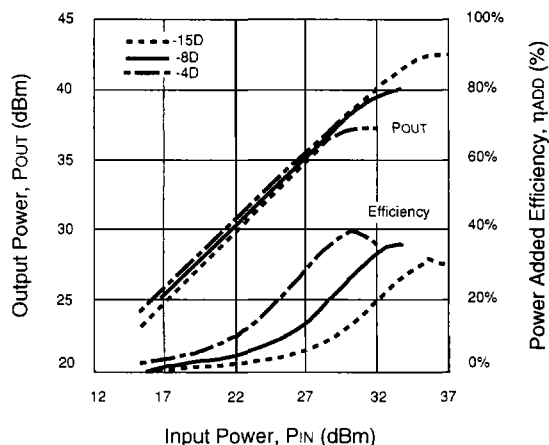
## C-BAND INTERNALLY MATCHED POWER GaAs MESFET

NEZ6472-15D  
NEZ6472-15DL  
NEZ6472-8D  
NEZ6472-8DL  
NEZ6472-4D  
NEZ6472-4DL

### FEATURES

- **HIGH P<sub>OUT</sub>**  
18W (42.5 dBm) Typ P<sub>1dB</sub> for NEZ6472-15D/15DL  
9W (39.5 dBm) Typ P<sub>1dB</sub> for NEZ6472-8D/8DL  
4.5W (36.5 dBm) Typ P<sub>1dB</sub> for NEZ6472-4D/4DL
- **HIGH EFFICIENCY**  
35%  $\eta_{ADD}$  for 4.5W Device  
33%  $\eta_{ADD}$  for 9W Device  
32%  $\eta_{ADD}$  for 18W Device
- **LOW IMD**  
-45 dBc IM<sub>3</sub> @ 31.5 dBm P<sub>OUT</sub> (SCL) -15DL  
-45 dBc IM<sub>3</sub> @ 29 dBm P<sub>OUT</sub> (SCL) -8DL  
-45 dBc IM<sub>3</sub> @ 26 dBm P<sub>OUT</sub> (SCL) -4DL
- **SiO<sub>2</sub> PASSIVATED CHIP**  
For Power/Gain Stability Under RF Overdrive
- **CLASS A OPERATION**
- **INTERNALLY MATCHED (IN/OUT)**
- **SUPERIOR GAIN FLATNESS**
- **INDUSTRY COMPATIBLE HERMETIC PACKAGES**

OUTPUT POWER AND EFFICIENCY vs. INPUT POWER



### ELECTRICAL CHARACTERISTICS (T<sub>c</sub> = 25°C)

PART NUMBER			NEZ6472-4D NEZ6472-4DL T-61			NEZ6472-8D NEZ6472-8DL T-61			NEZ6472-15D NEZ6472-15DL T-65			TEST CONDITIONS
PACKAGE OUTLINE												
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
P <sub>1dB</sub>	Output Power at P <sub>1dB</sub> <sup>1</sup> I <sub>DSQ</sub> = 0.8A, (RF Off) I <sub>DSQ</sub> = 1.6A I <sub>DSQ</sub> = 4.0A	dBm dBm dBm	35.5	36.5		38.5	39.5		41.5	42.5		V <sub>DS</sub> = 10V f = 6.4 to 7.2 GHz Z <sub>s</sub> = Z <sub>L</sub> 50 ohms
$\eta_{ADD}$	Power Added Efficiency @ P <sub>1dB</sub>	%		35			33			32		
I <sub>DS</sub>	Drain Current at P <sub>1dB</sub>	A		1.1	1.5		2.2	3.0		4.4	6.0	
GL	Linear Gain	dB	8.0	9.0		7.5	8.5		7.0	8.0		V <sub>DS</sub> = 10V f <sub>1</sub> = 7.19 GHz f <sub>2</sub> = 7.20 GHz 2 Equal Tones
IM <sub>3</sub> -XDL Option Only	3rd Order Intermodulation Distortion <sup>3</sup> at P <sub>out</sub> = 26 dBm SCL <sup>2</sup> , I <sub>DSQ</sub> = 0.5 x I <sub>DS</sub> P <sub>out</sub> = 29 dBm SCL <sup>2</sup> , I <sub>DSQ</sub> = 0.5 x I <sub>DS</sub> P <sub>out</sub> = 31.5 dBm SCL <sup>2</sup> , I <sub>DSQ</sub> = 0.5 x I <sub>DS</sub>	dBc dBc dBc		-45	-42		-45	-42		-45	-42	
I <sub>DSS</sub>	Saturated Drain Current, V <sub>GS</sub> = 0 V	A	1.0	2.3	3.5	2.0	4.5	7.0	4.0	9.2	14.0	
V <sub>P</sub>	Pinch Off Voltage I <sub>DS</sub> = 15 mA I <sub>DS</sub> = 30 mA I <sub>DS</sub> = 60 mA	V V V	-3.5	-2.0	-0.5	-3.5	-2.0	-0.5	-3.5	-2.2	-0.5	V <sub>DS</sub> = 2.5 V
BV <sub>DGO</sub>	Drain - Gate Breakdown Voltage I <sub>DG</sub> = 15 mA I <sub>DG</sub> = 30 mA I <sub>DG</sub> = 60 mA	V V V	20	22		20	22		20	22		
g <sub>m</sub>	Transconductance I <sub>DS</sub> = 1 A I <sub>DS</sub> = 2 A I <sub>DS</sub> = 4 A	mS mS mS		1300			2600			5200		
R <sub>TH(CH-C)</sub>	Thermal Resistance (Channel to Case)	°C/W		5.0	6.0		2.5	3.0		1.3	1.5	
$\Delta T(CH-C)$	Channel Temperature Rise <sup>4</sup>	°C			48			48			60	

Notes:

1. P<sub>1dB</sub>: Output Power at the 1dB Gain Compression Point.
2. SCL: Single Carrier Level.

3. Maximum Spec Applies to -XDL Option Only.
4.  $\Delta T(CH-C) = T_{CH} - T_c = 10 V \times I_{DSQ} \times R_{TH(CH-C) MAX}$ .

**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (T<sub>C</sub> = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS		
			NEZ6472-4D/4DL	NEZ6472-8D/8DL	NEZ6472-15D/15DL
V <sub>DS</sub>	Drain to Source Voltage	V	15	15	15
V <sub>GS</sub>	Gate to Source Voltage	V	-12	-12	-12
V <sub>GD</sub>	Gate to Drain Voltage	V	-18	-18	-18
I <sub>DS</sub>	Drain Current	A	loss	loss	loss
I <sub>GRF</sub>	Gate Current	mA	25	50	100
T <sub>CH</sub>	Channel Temperature	°C	175	175	175
T <sub>STG</sub>	Storage Temperature	°C	-65 to +175	-65 to +175	-65 to +175
P <sub>T</sub>	Total Power Dissipation	W	25	50	100

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.



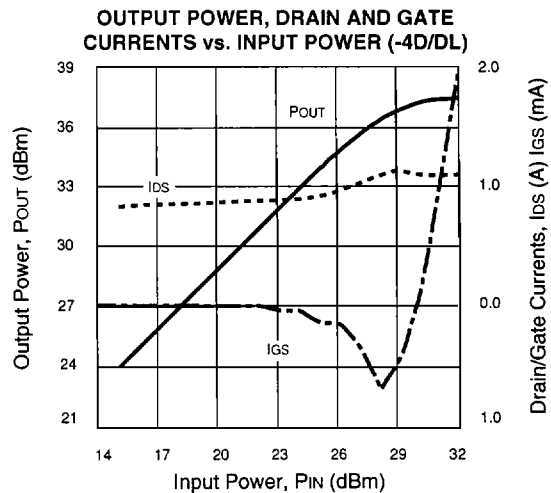
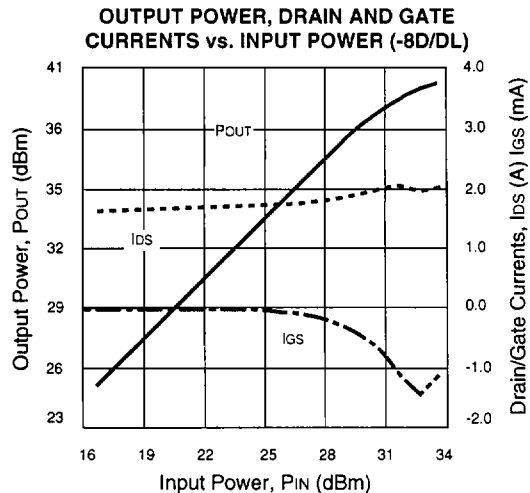
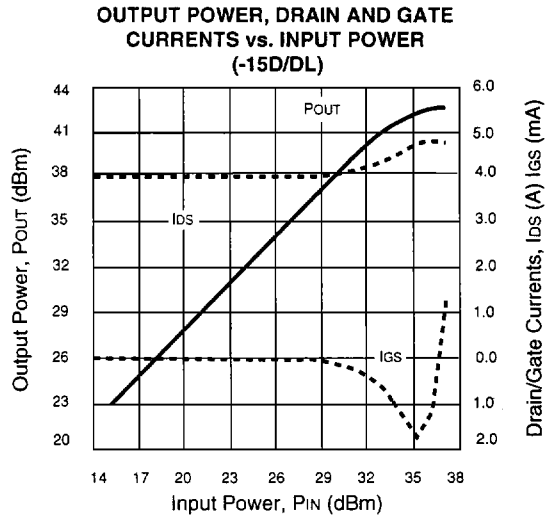
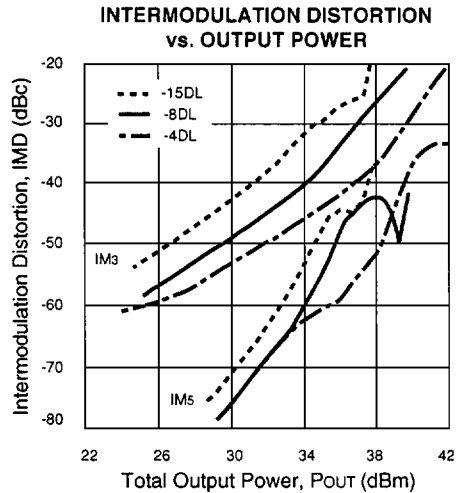
**MAXIMUM OPERATING LIMITS**

PART NUMBER	R <sub>g</sub> MAX <sup>1</sup> Ω	I <sub>GRF</sub> MAX mA	V <sub>DS</sub> MAX V
NEZ6472-4D/4DL	200	5	10
NEZ6472-8D/8DL	100	10	10
NEZ6472-15D/15DL	50	20	10

Note:

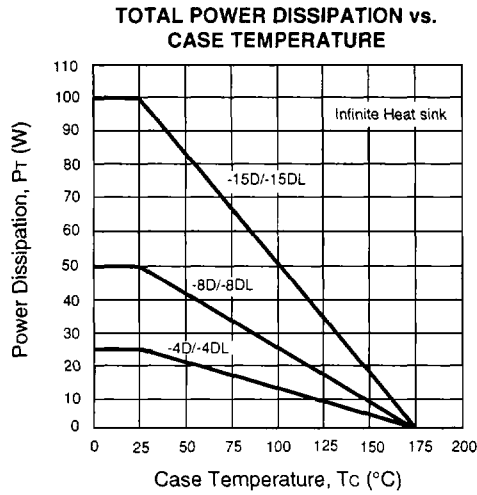
1. R<sub>g</sub> MAX is the maximum recommended series resistance between the Gate Supply and the FET Gate.

**TYPICAL PERFORMANCE CURVES** (T<sub>C</sub> = 25°C)



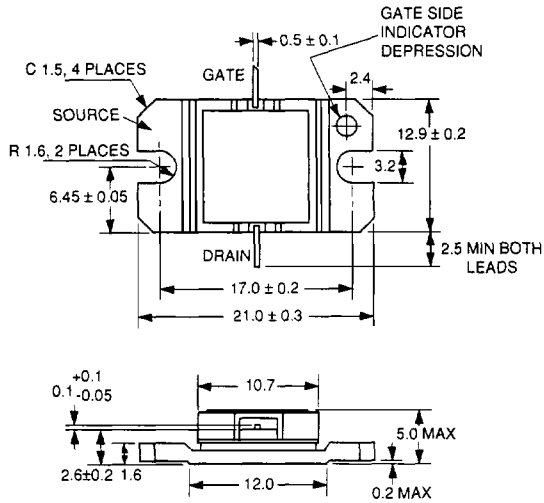
# NEZ6472-4D/4DL, -8D/8DL, -15D/15DL

## TYPICAL PERFORMANCE CURVES (T<sub>c</sub> = 25°C)

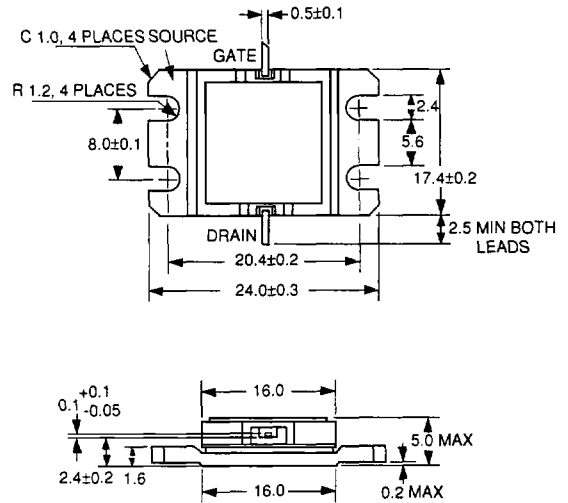


## OUTLINE DIMENSIONS (Units in mm)

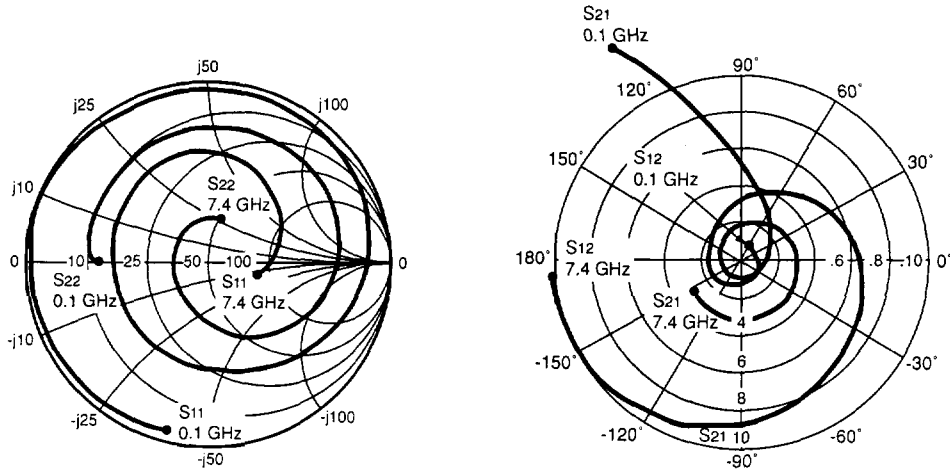
**PACKAGE OUTLINE T-61**



**PACKAGE OUTLINE T-65**



TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (Tc = 25°C)



NEZ6472-4D/4DL

V<sub>DS</sub> = 10.0 V, I<sub>DS</sub> = 800 mA

FREQUENCY GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		S <sub>21</sub> (dB)	K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG			
0.1	0.942	-103.4	13.187	121.3	0.008	62.3	0.625	179.6	0.55	22.4	32.1
0.2	0.958	-141.0	7.998	100.9	0.008	16.7	0.677	177.2	0.28	18.0	29.9
0.5	0.963	-177.8	3.473	71.0	0.009	-0.6	0.691	166.6	0.52	10.8	25.8
1.0	0.968	155.5	1.846	37.5	0.010	-12.2	0.701	151.7	0.73	5.3	22.6
1.5	0.960	133.3	1.294	6.3	0.010	-25.4	0.709	134.5	1.31	2.2	17.7
2.0	0.955	113.5	1.050	-23.5	0.011	-41.3	0.726	118.8	1.49	0.4	15.6
2.5	0.952	92.5	0.982	-52.9	0.012	-63.4	0.737	101.7	1.36	-0.1	15.5
3.0	0.949	71.5	0.914	-82.4	0.013	-85.6	0.748	84.7	1.27	-0.7	15.3
3.5	0.939	47.7	0.981	-115.0	0.016	-117.0	0.752	66.6	0.89	-0.1	17.7
4.0	0.930	23.9	1.047	-147.7	0.020	-148.4	0.756	48.6	0.69	0.3	17.1
4.5	0.872	-3.2	1.262	174.5	0.019	161.2	0.759	28.0	1.69	2.0	13.3
5.0	0.749	-35.9	1.547	134.8	0.024	127.1	0.728	5.8	2.59	3.7	11.1
5.5	0.590	-87.0	2.027	88.7	0.042	71.5	0.645	-21.3	2.28	6.1	10.4
5.8	0.553	-135.4	2.389	55.7	0.056	33.2	0.548	-44.2	1.89	7.5	10.8
6.0	0.528	-167.7	2.631	33.8	0.065	7.7	0.484	-59.5	1.70	8.4	11.1
6.2	0.562	158.3	2.849	9.7	0.072	-20.1	0.395	-78.7	1.51	9.0	11.7
6.4	0.600	126.3	3.002	-16.1	0.080	-46.7	0.305	-102.6	1.31	9.5	12.3
6.5	0.613	112.6	3.061	-28.6	0.083	-59.1	0.265	-117.9	1.24	9.7	12.6
6.6	0.617	98.8	3.134	-41.7	0.087	-71.9	0.234	-135.4	1.17	9.9	13.0
6.7	0.604	86.3	3.189	-54.2	0.092	-83.9	0.218	-154.9	1.13	10.0	13.1
6.8	0.580	73.1	3.195	-67.9	0.095	-97.7	0.204	-178.2	1.14	10.0	12.9
6.9	0.552	60.7	3.245	-81.2	0.101	-110.3	0.211	159.7	1.10	10.2	13.0
7.0	0.506	49.0	3.167	-94.1	0.103	-123.7	0.224	139.5	1.16	10.0	12.3
7.1	0.470	33.6	3.236	-108.6	0.107	-138.5	0.240	117.8	1.14	10.2	12.4
7.2	0.404	19.3	3.152	-121.6	0.106	-150.7	0.244	102.2	1.26	9.9	11.6
7.4	0.271	-17.1	3.068	-147.9	0.110	-175.1	0.248	76.6	1.39	9.7	10.7

Note:

1. Gain Calculations:

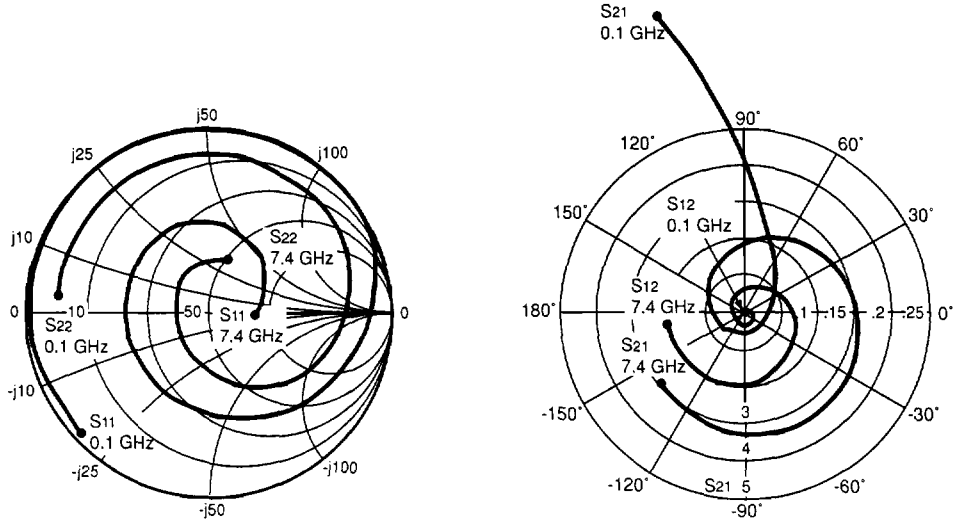
$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } MSG = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

**NEZ6472-4D/DL, -8D/DL, -15D/DL**

**TYPICAL SMALL SIGNAL SCATTERING PARAMETERS (Tc = 25°C)**



**NEZ6472-8D/8DL**

Vds = 10.0 V, Ids = 1600 mA

FREQUENCY (GHz)	S11		S21		S12		S22		K	S21 (dB)	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG			
0.1	0.971	-136.9	8.298	106.7	0.004	20.4	0.801	177.0	0.284	18.3	33.1
0.2	0.975	-161.5	4.465	92.4	0.005	18.2	0.830	175.1	0.454	12.9	29.5
0.5	0.981	174.4	1.859	69.8	0.005	9.8	0.834	165.6	0.757	5.3	25.7
1.0	0.985	153.4	0.991	41.4	0.007	8.5	0.835	151.2	0.870	-0.0	21.5
1.5	0.978	133.4	0.703	13.5	0.008	0.8	0.833	136.2	1.394	-3.0	15.7
2.0	0.973	115.9	0.579	-13.1	0.010	-13.9	0.838	121.7	1.449	-4.7	13.6
2.5	0.962	98.3	0.520	-39.2	0.011	-33.9	0.833	106.5	1.888	-5.6	11.3
3.0	0.972	79.4	0.516	-66.4	0.012	-50.9	0.837	90.6	1.096	-5.7	14.4
3.5	0.984	59.3	0.547	-95.1	0.014	-72.0	0.837	74.6	0.200	-5.2	15.9
4.0	0.973	38.6	0.615	-126.0	0.019	-104.8	0.828	58.0	0.044	-4.2	15.1
4.5	0.955	16.7	0.764	-160.9	0.015	-144.0	0.846	39.9	0.289	-2.3	17.0
5.0	0.862	-8.2	0.965	162.4	0.020	-175.3	0.819	20.8	1.564	-0.3	12.4
5.5	0.720	-42.1	1.344	120.6	0.030	120.1	0.754	-0.4	2.473	2.5	9.7
5.8	0.606	-72.7	1.700	90.8	0.037	80.1	0.692	-17.2	2.720	4.6	9.4
6.0	0.532	-101.1	2.010	68.4	0.047	54.0	0.631	-31.4	2.418	6.0	9.6
6.2	0.477	-137.8	2.353	43.6	0.057	22.0	0.540	-48.7	2.186	7.4	9.9
6.4	0.464	177.9	2.702	15.3	0.070	-10.4	0.421	-71.0	1.842	8.6	10.5
6.5	0.472	156.9	2.837	0.8	0.076	-25.8	0.352	-85.5	1.705	9.0	10.8
6.6	0.486	136.3	2.988	-14.6	0.082	-43.1	0.287	-103.1	1.555	9.5	11.2
6.7	0.491	118.0	3.102	-29.8	0.088	-58.6	0.236	-125.7	1.430	9.8	11.5
6.8	0.488	99.4	3.150	-46.3	0.093	-76.0	0.196	-156.8	1.356	9.9	11.7
6.9	0.475	82.3	3.213	-62.6	0.100	-91.9	0.195	168.9	1.255	10.1	12.0
7.0	0.442	67.0	3.111	-78.6	0.103	-108.9	0.223	139.5	1.272	9.8	11.6
7.1	0.420	49.1	3.135	-95.5	0.105	-126.6	0.262	112.6	1.229	9.9	11.8
7.2	0.364	33.2	3.012	-110.8	0.104	-141.4	0.280	94.7	1.337	9.5	11.1
7.4	0.247	-5.5	2.834	-141.5	0.106	-171.1	0.294	70.1	1.509	9.0	10.0

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

When  $K \leq 1$ , MAG is undefined and MSG values are used.  $MSG = \frac{|S_{21}|}{|S_{12}|}$ ,  $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}$ ,  $\Delta = S_{11} S_{22} - S_{21} S_{12}$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain