

Coaxial

# Amplifier

50Ω Low Power 0.05 to 500 MHz

## Features

- wideband, 0.05 to 500 MHz
- rugged, shielded case
- low noise, 5.3 dB typ.
- protected by US Patent, 6,943,629

## Applications

- instrumentation
- lab use
- VHF/UHF

ZFL-500+  
ZFL-500



SMA version shown  
CASE STYLE: V480

Connectors	Model	Price	Qty.
SMA	ZFL-500(+)	\$69.95	(1-8)
BNC	ZFL-500-BNC	\$74.95	(1-8)
	BRACKET (OPTION "B")	\$2.50	(1-1)

+ RoHS compliant in accordance  
with EU Directive (2002/95/EC)

The +Suffix identifies RoHS Compliance. See our web site  
for RoHS Compliance methodologies and qualifications.

## Amplifier Electrical Specifications

MODEL NO.	FREQUENCY (MHz)	GAIN (dB)	MAXIMUM POWER (dBm)		DYNAMIC RANGE		VSWR (1:1) Typ.	DC POWER	
			Output (1 dB Compr.)	Input (no damage)	NF (dB) Typ.	IP3 (dBm) Typ.		Volt (V) Nom.	Current (mA) Max.
ZFL-500(+)	0.05 to 500	20 Min. ±1.0	-9	+5	5.3	+18	In 1.9 Out 1.9	15	80

Open load is not recommended, potentially can cause damage.  
With no load derive max input power by 20 dB

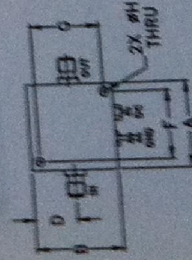
## Maximum Ratings

Operating Temperature	-20°C to 71°C
Storage Temperature	-55°C to 100°C
DC Voltage	+17V Max.

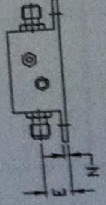
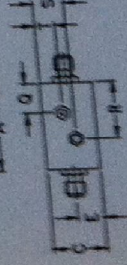
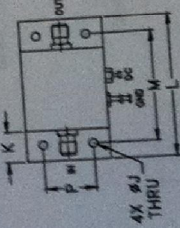
Permanent damage may occur if any of these limits are exceeded.

## Outline Drawing

STANDARD



OPTION "B"



## Outline Dimensions (inches/mm)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	Wt.
1.25	1.25	.75	.63	.36	1.000	1.000	.125	.125	.125	.46	2.18	1.688	.06	.750	.50	.80	.45	.29	grams
31.75	31.75	19.05	16.00	9.14	25.40	25.40	3.18	3.18	3.18	11.68	55.37	42.88	1.52	19.05	12.70	20.32	11.43	7.31	36

Mini-Circuits®

ISO 9001 ISO 14001 AS 9100 CERTIFIED

The Design Engineers Search Engine

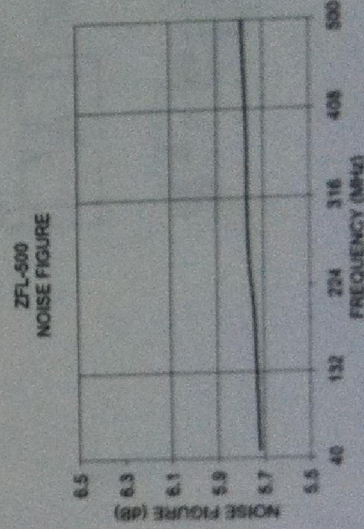
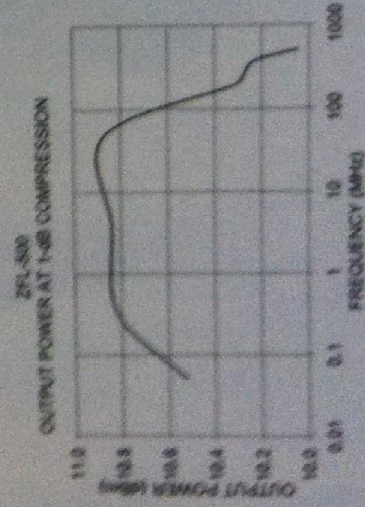
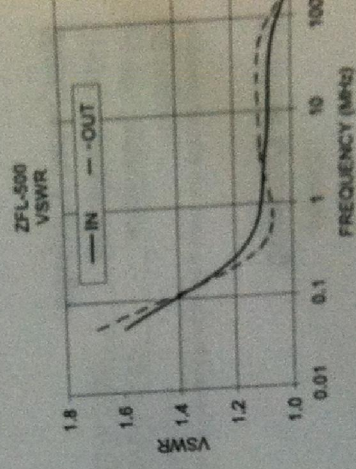
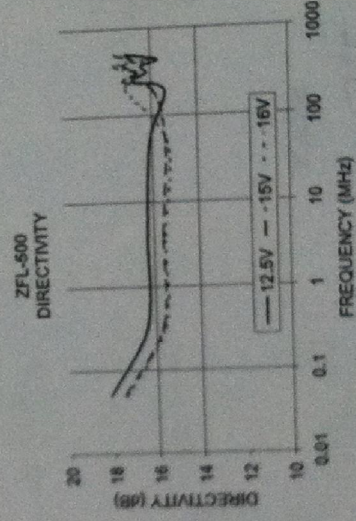
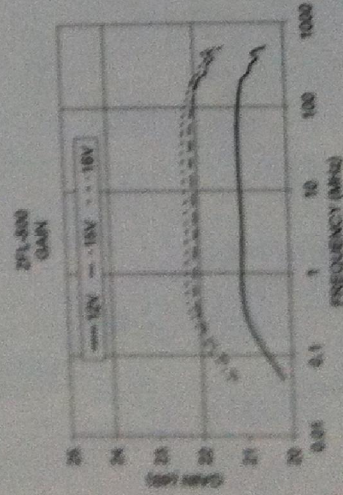
Provides ACTUAL Data instantly at [minicircuits.com](http://minicircuits.com)

For detailed performance specs  
& shipping info see web site



# Typical Performance Data/Curves

FREQUENCY (MHz)	GAIN (dB)			DIRECTIVITY (dB)		VSWR (:1) 15V		NOISE FIGURE (dB)	P <sub>OUT</sub> at 1 dB COMPR. (dBm)	
	12V	15V	16V	12V	15V	16V	IN	OUT	15V	15V
0.05	20.16	21.24	21.41	18.10	17.50	17.40	1.59	1.69	10.52	
0.33	21.00	22.06	22.23	16.40	15.70	15.60	1.17	1.11	10.82	
0.33	21.03	22.08	22.27	16.30	15.60	15.50	1.09	1.11	10.84	
3.90	21.08	22.13	22.30	16.10	15.40	15.30	1.07	1.11	10.87	5.72
47.90	21.08	22.13	22.30	16.10	15.40	15.30	1.01	1.01	10.31	5.74
192.30	20.96	21.93	22.07	15.40	15.90	17.10	1.01	1.01	10.28	5.76
243.60	20.79	21.74	21.90	16.80	17.20	16.80	1.01	1.01	10.26	5.77
307.70	20.74	21.70	21.84	16.20	16.60	16.60	1.01	1.02	10.23	5.77
371.80	20.58	21.55	21.70	16.40	17.20	17.60	1.01	1.03	10.14	5.78
435.90	20.69	21.65	21.80	15.70	16.80	16.10	1.01	1.03	10.05	5.79
500.00	20.40	21.36	21.52	17.10	17.70	16.70	1.01	1.02		





**FINAL DATA SHEET  
AMPLIFIER**

Serial # 0002A  
Model Part # SU164S12

Freq. In GHz	Gain dB	P-1 dBm	Input VSWR	Output VSWR	Noise dB
6.0	29.8	15.1	2.19	1.69	2.1
9.0	31.2	16.1	1.68	1.52	1.7
12.0	30.8	15.9	1.70	1.88	1.8
15.0	31.1	15.2	1.92	1.77	2.1
18.0	30.4	15.2	1.64	1.95	2.4
Min.	29.8	15.1	—	—	—
Max.	32.0	—	2.19	2.09	2.4
Spec.	25 to 35	15 Min	2.21 Max	2.20 Max	2.5 Max

Bias @ -12.0 V, 100 mA 215mA  
Bias mA 225 mA TYP



QA: Genelle M. Stephens  
Date: 8/24/06

Tested by G. Stephens  
Date 8-24-06

All Measurements Taken at 25°C Ambient Room



## FINAL DATA SHEET AMPLIFIER

Serial # 0003B  
POM Part # SL18-2515

Freq. In GHz	Gain dB	P-1 dBm	Input VSWR	Output VSWR	Noise dB
6.0	30.4	15.1	1.54	2.08	2.3
9.0	32.5	17.0	1.35	1.58	2.1
12.0	31.6	16.1	1.09	2.11	2.2
15.0	32.1	16.2	1.31	1.61	2.3
18.0	32.1	15.2	1.48	1.60	2.3
Min.	30.4	15.1	---	---	---
Max.	33.1	---	2.18	2.17	2.3
Spec.	25 to 35	15 Min	2.20 Max	2.20 Max	2.5 Max

Bias @ +12.0 V, IT = 238mA  
225 mA mA TYP

QA/Cable M. Seperson  
Date: 8/24/06

Tech: M. H. Lee  
Date: 8-28-06

All Measurements Taken at 25°C Ambient Room

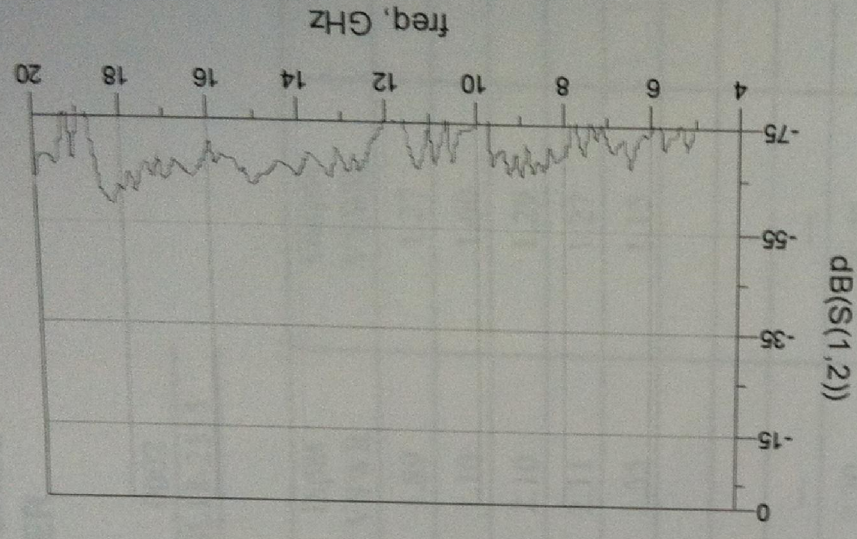
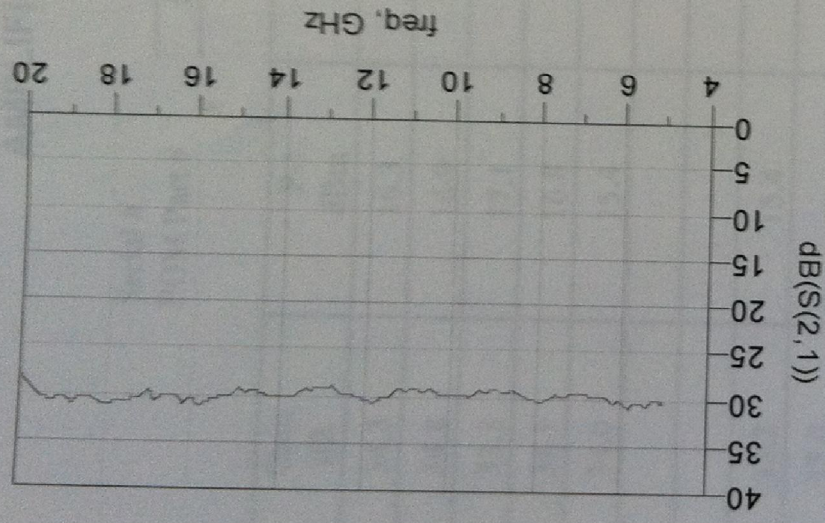
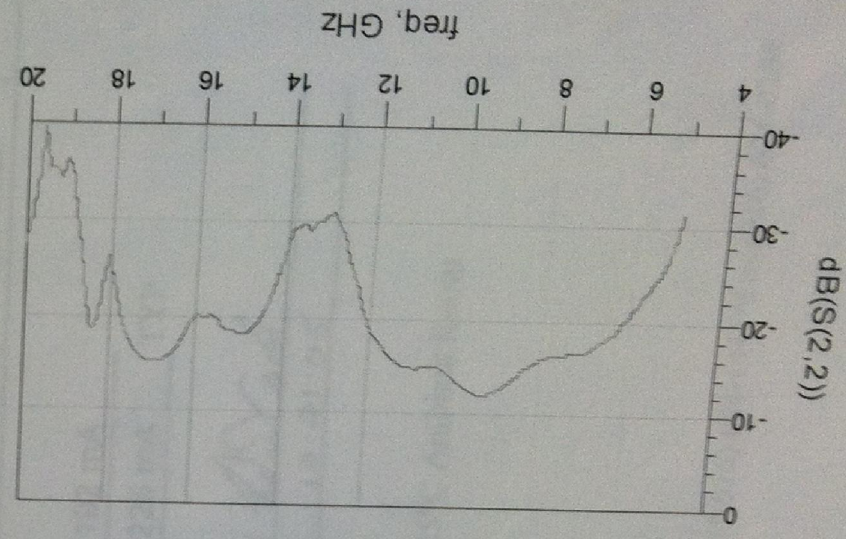
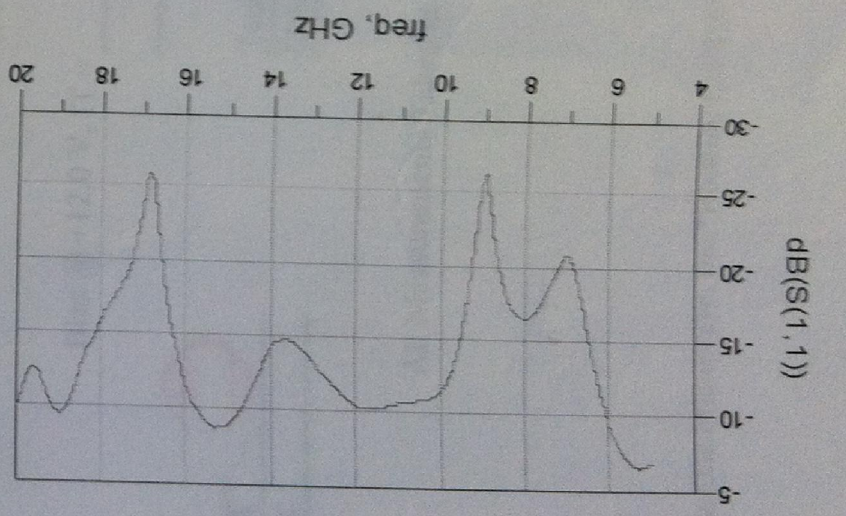


Serial number: 0002  
Available units: 2  
Carson

Date: 26th May 30, 2006

# 6-18 GHz PhaseOne SL08-2515 Amplifier

1





**FINAL DATA SHEET  
AMPLIFIER**

Serial # 0002  
POM Part # SL18-2515

Freq. In GHz	Gain dB	P-1 dBm	Input VSWR	Output VSWR	Noise dB
6.0	34.3	16.3	1.89	1.27	2.2
9.0	34.8	16.9	1.10	1.60	1.9
12.0	33.3	17.1	2.10	1.29	2.0
15.0	34.1	16.8	2.11	1.27	2.3
18.0	34.0	15.4	1.55	1.15	2.5
Min.	33.2	15.4	---	---	---
Max.	35.0	---	2.20	1.73	2.5
Spec.	25 to 35	15 Min	2.20 Max	2.20 Max	2.5 Max

Bias @ +12.0 V, IT = 192 mA  
225 mA TYP

QA: Sh. H. Hest  
Date: 12-21-05

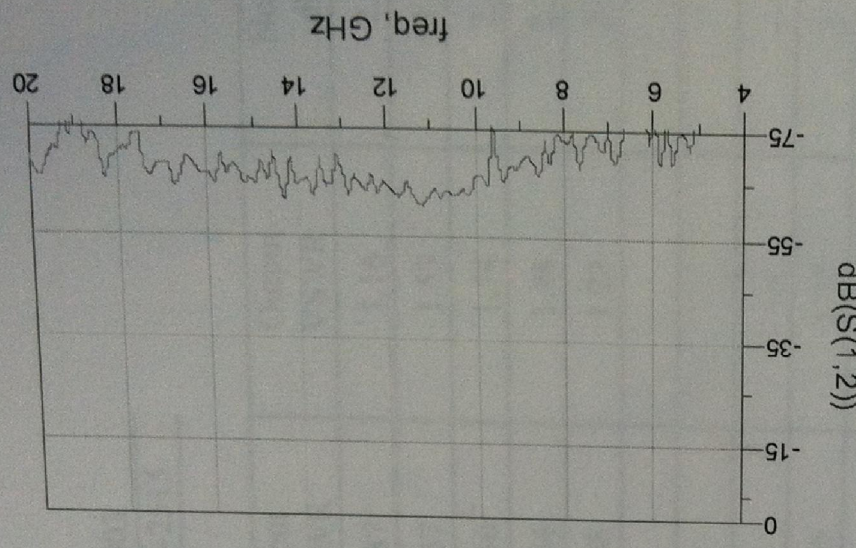
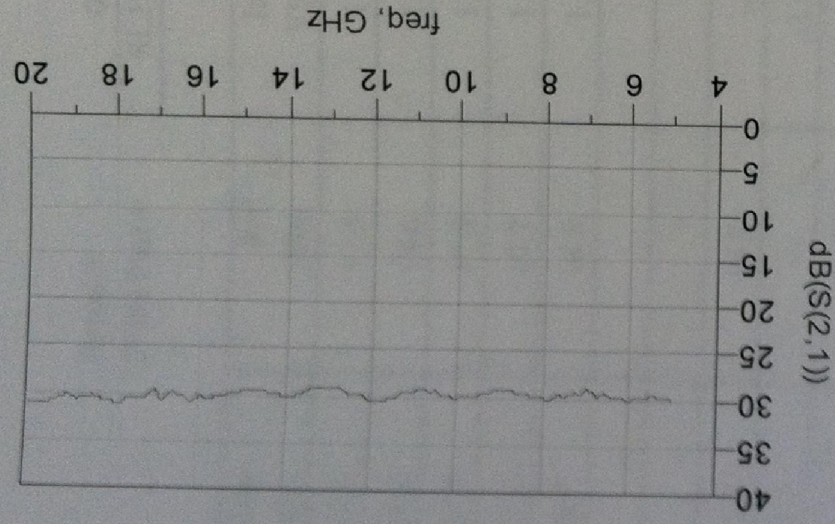
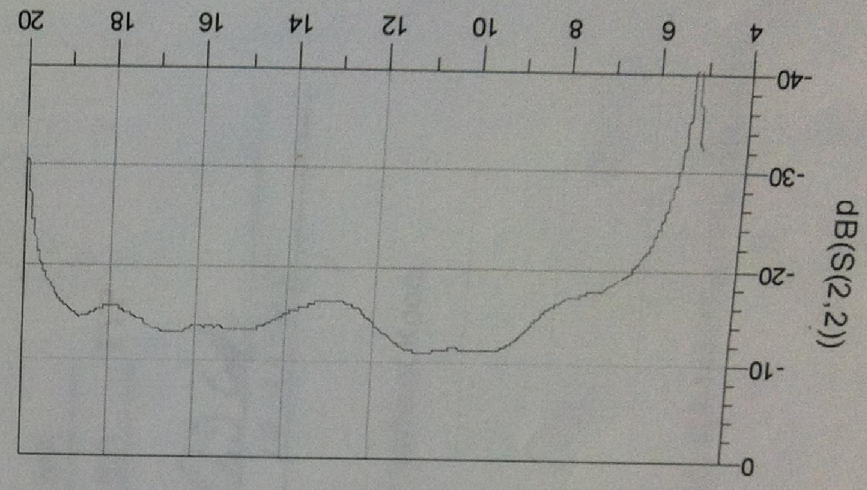
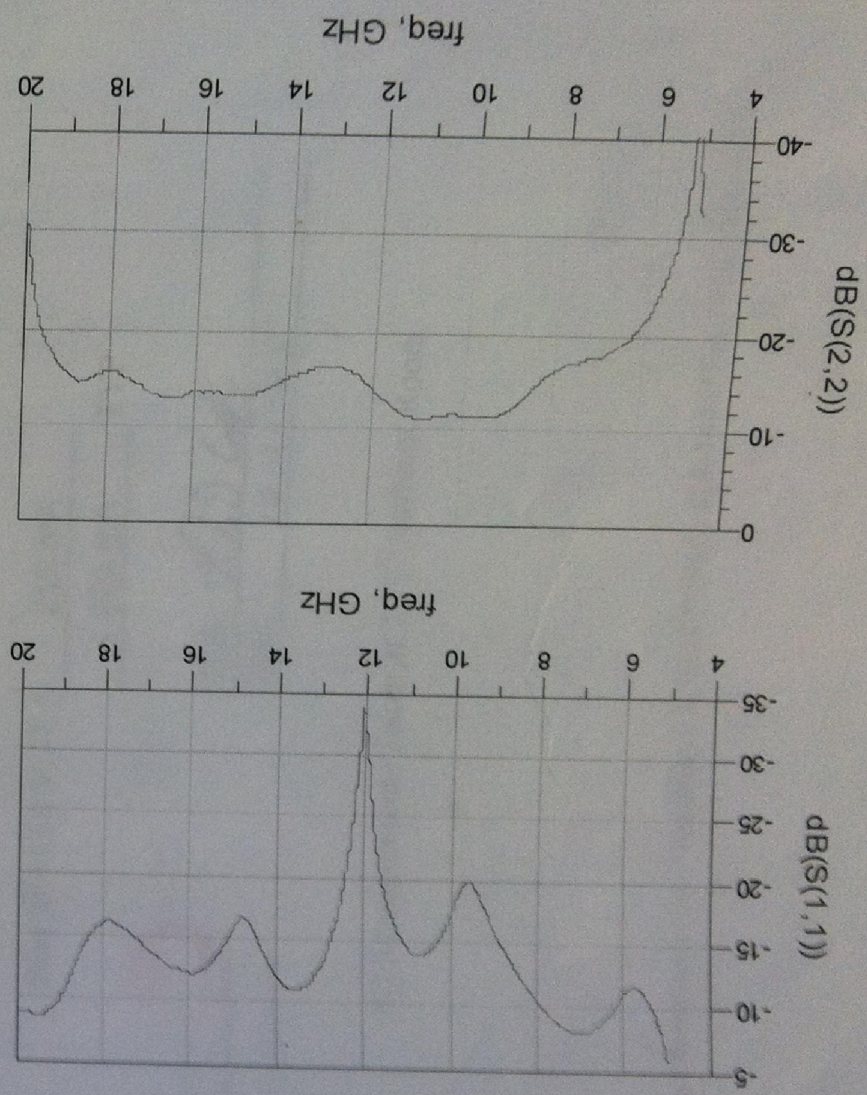
Tech: Ad. S. Lark  
Date: 12-21-05

All Measurements Taken at 25°C Ambient Room



# 6-18 GHz PhaseOne SL08-2515 Amplifier

Serial number: 0003  
 Available units: 2  
 Carson  
 Date: 26th May 30, 2006





# FINAL DATA SHEET AMPLIFIER

Serial #

POM Part #

0003

SL18-2515

freq MHz	Gain dB	P-1 dBm	Input VSWR	Output VSWR	Noise dB
6.0	32.2	17.5	1.87	1.16	2.4
9.0	34.4	18.6	1.37	1.53	2.4
12.0	33.7	17.9	1.10	1.54	2.1
15.0	33.2	17.7	1.34	1.48	2.5
18.0	33.7	16.8	1.48	1.23	2.5
Min.	32.2	16.8	---	---	---
Max.	34.7	---	2.15	1.72	2.5
Spec.	25 to 35	15 Min	2.20 Max	2.20 Max	2.5 Max

Bias @ +12.0 V, IT = 219 mA

225 mA TYP

*MLH*  
12-21-05

Tech: *John Cost*

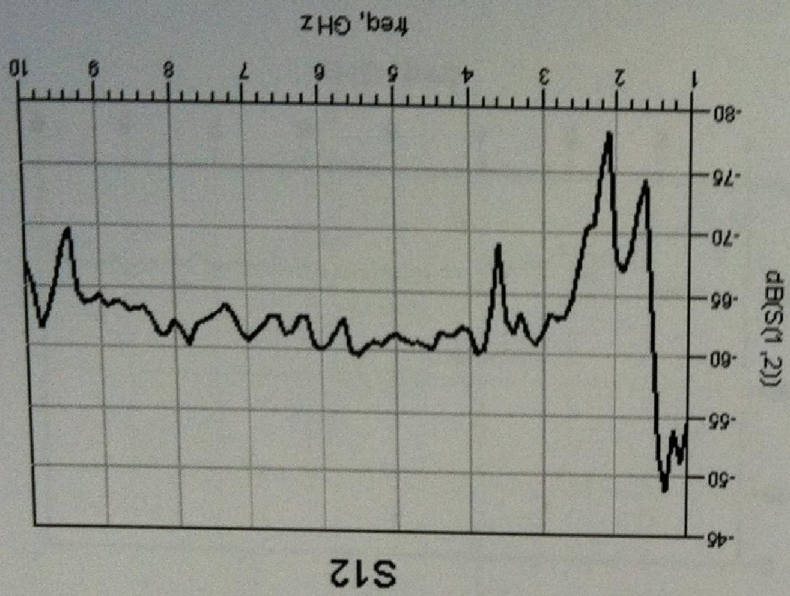
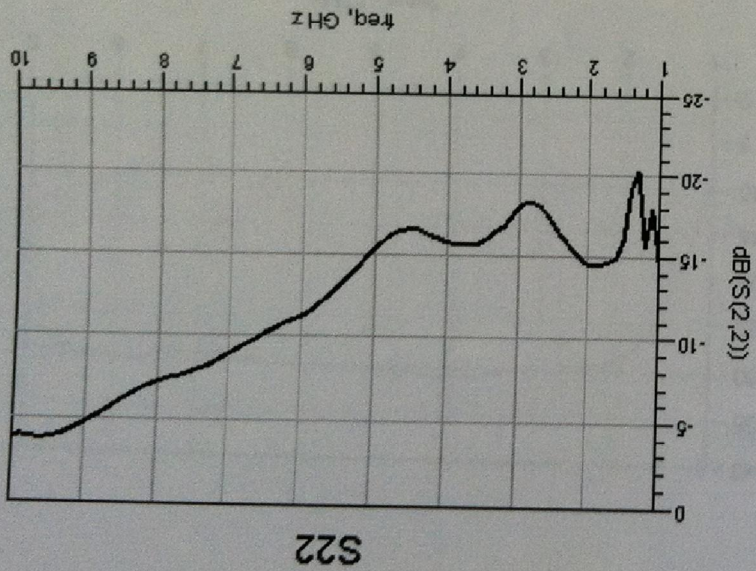
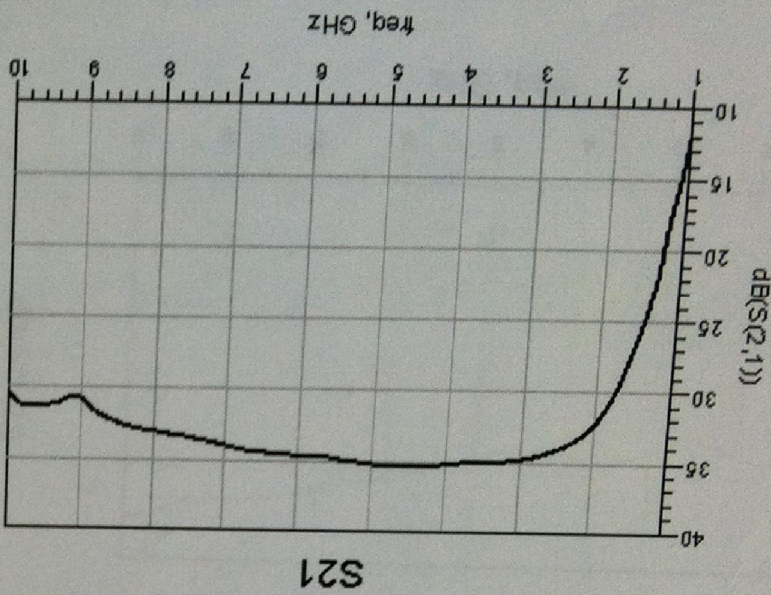
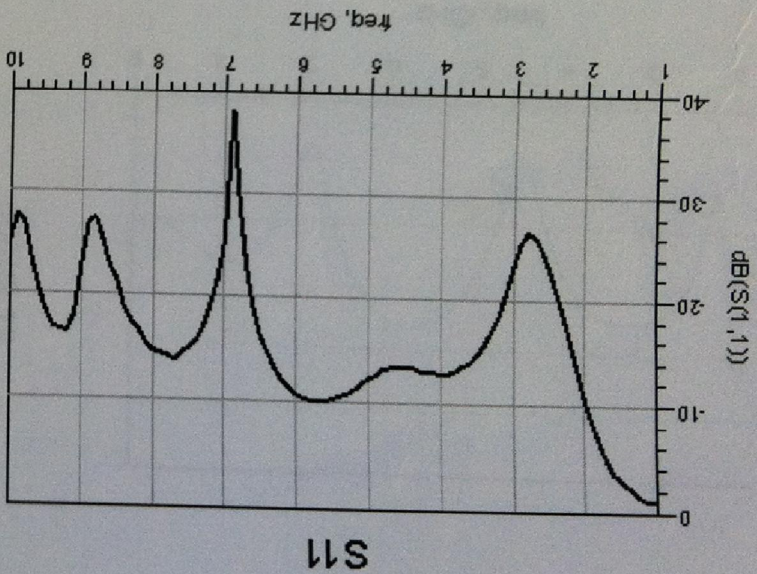
Date: 12-21-05

All Measurements Taken at 25°C Ambient Room



# 2-8 GHz LNA

Vdc = 12 V, Idc = 190 mA, Pin = -30 dBm





# 2-8 GHz PhaseOne SL-2515 Amplifier

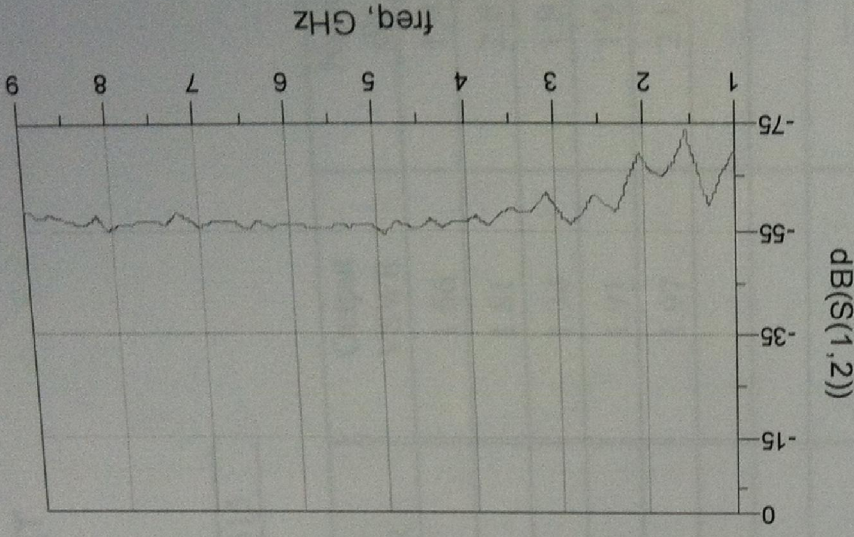
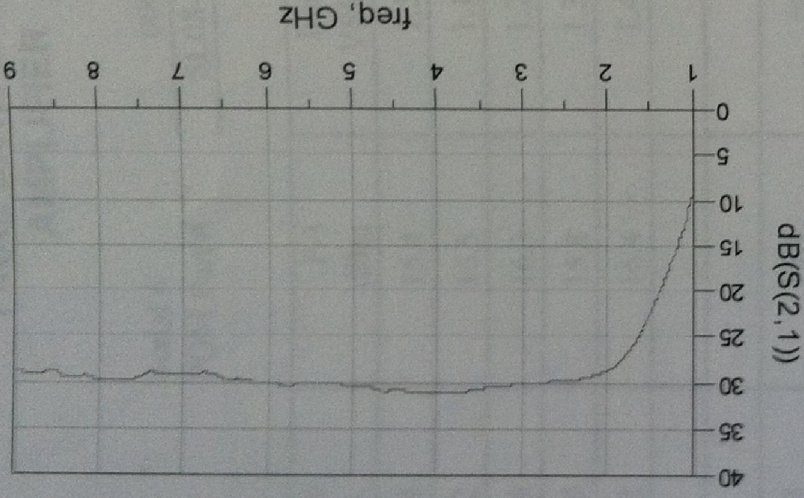
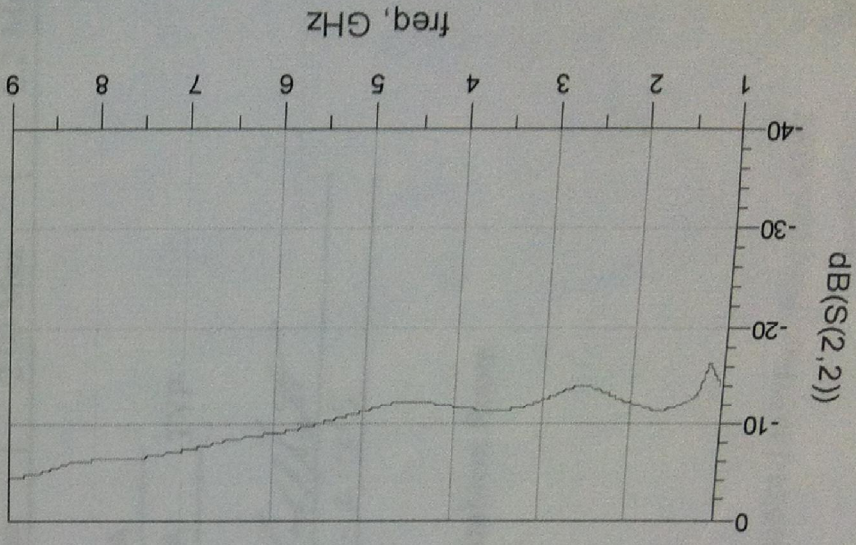
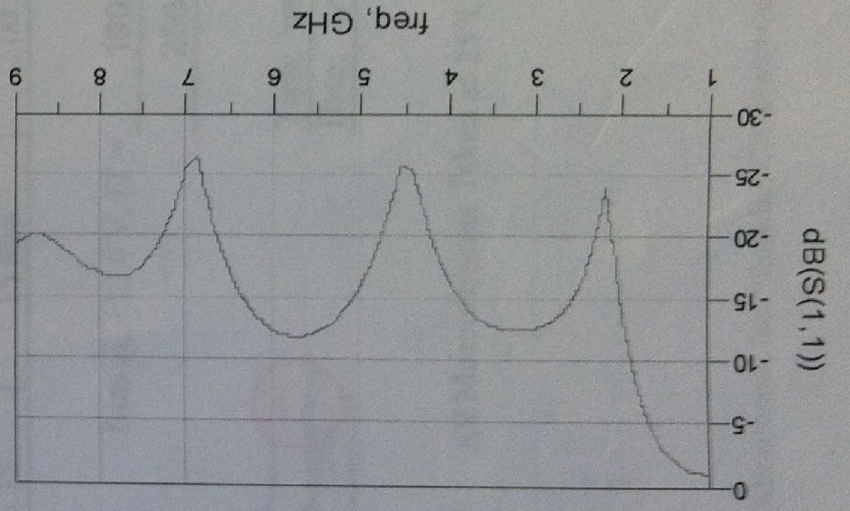
08

Serial number: 0002

Available units: 2

Carson

Date: 26th May 30, 2006





**FINAL DATA SHEET**  
**AMPLIFIER**

Serial # 0002  
POM Part # SL08-2515

Freq. In GHz	Gain dB	P-1 dBm	Input VSWR	Output VSWR	Noise dB
2.0	30.4	15.4	1.51	1.66	1.9
3.5	32.2	16.5	1.14	1.81	2.0
5.0	32.9	16.3	1.22	1.34	1.9
6.5	31.9	15.8	1.39	1.91	1.9
8.0	31.2	16.4	1.40	1.97	2.1
Min.	30.4	15.4	---	---	---
Max.	32.9	---	1.93	1.97	2.1
Spec.	25 to 35	15 Min	2.00 Max	2.00 Max	2.2 Max

Bias @ +12.0 V, IT = 190mA  
250mA TYP

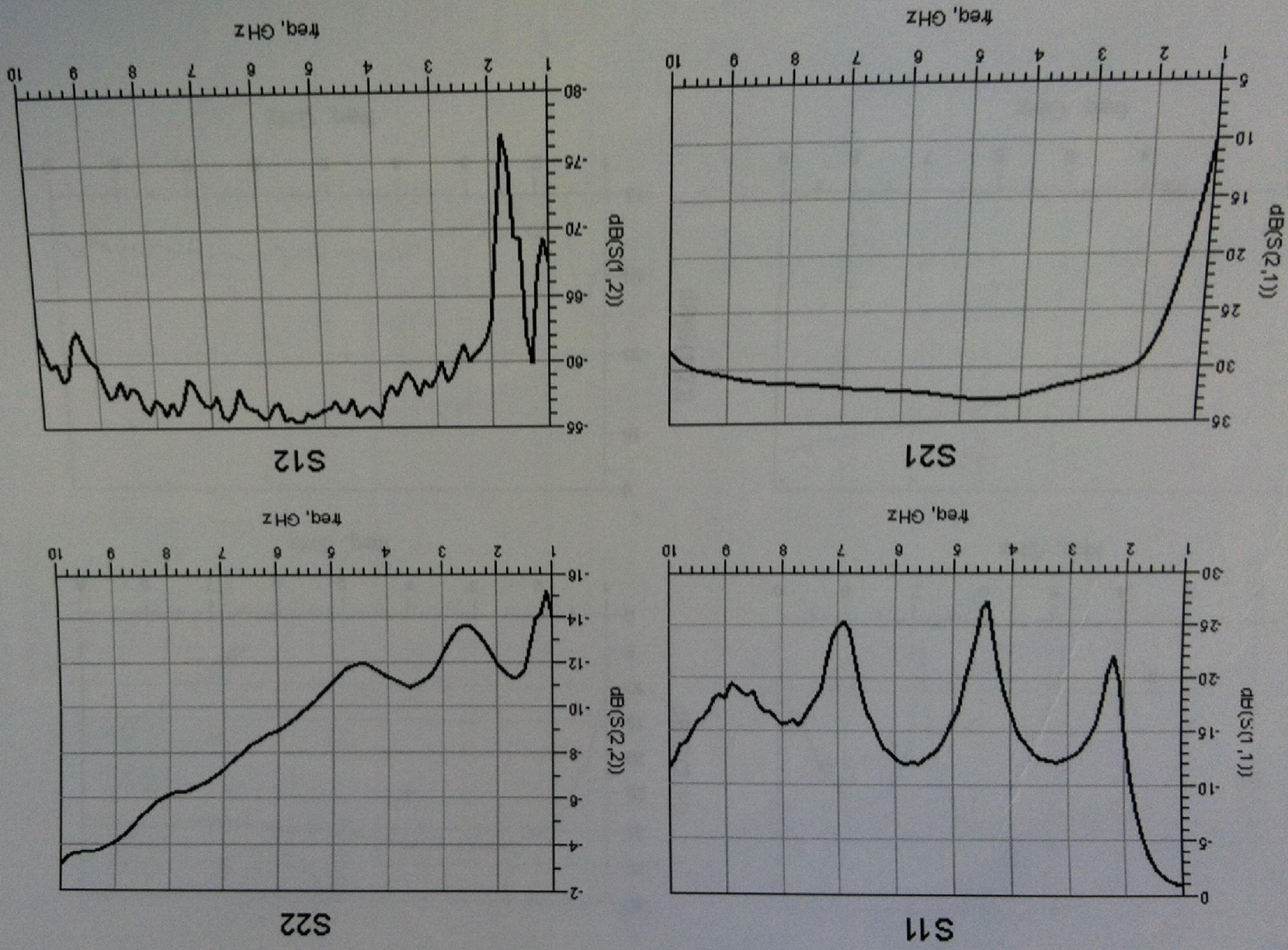
*M. C. Sullivan*  
12-21-05

Tech: *Salvatore*  
Date: 12-21-05

All Measurements Taken at 25°C Ambient Room



## 2-8 GHz LNA

 $V_{dc} = 12\text{ V}$ ,  $I_{dc} = 190\text{ mA}$ ,  $P_{in} = -30\text{ dBm}$ 



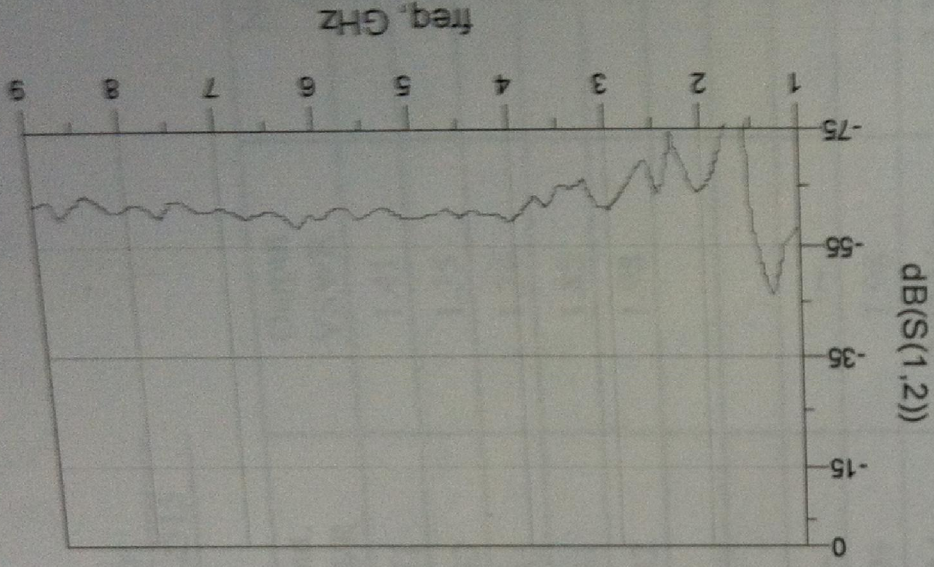
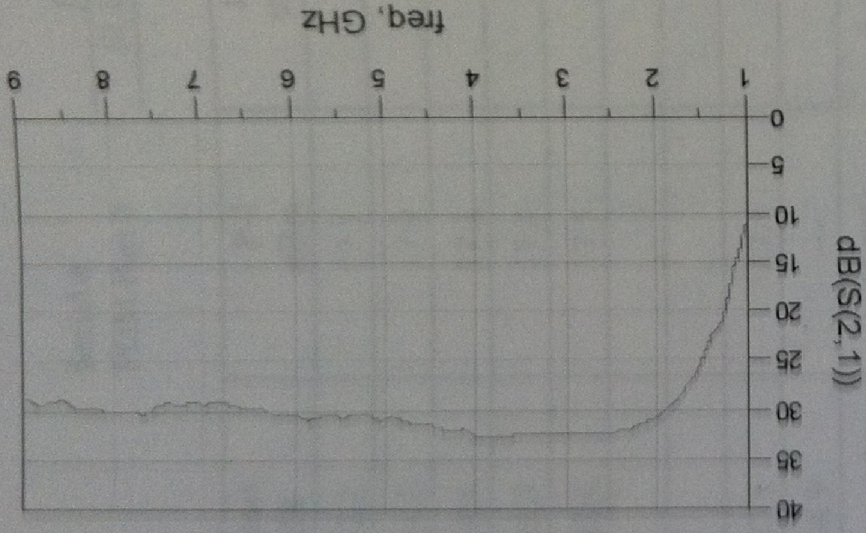
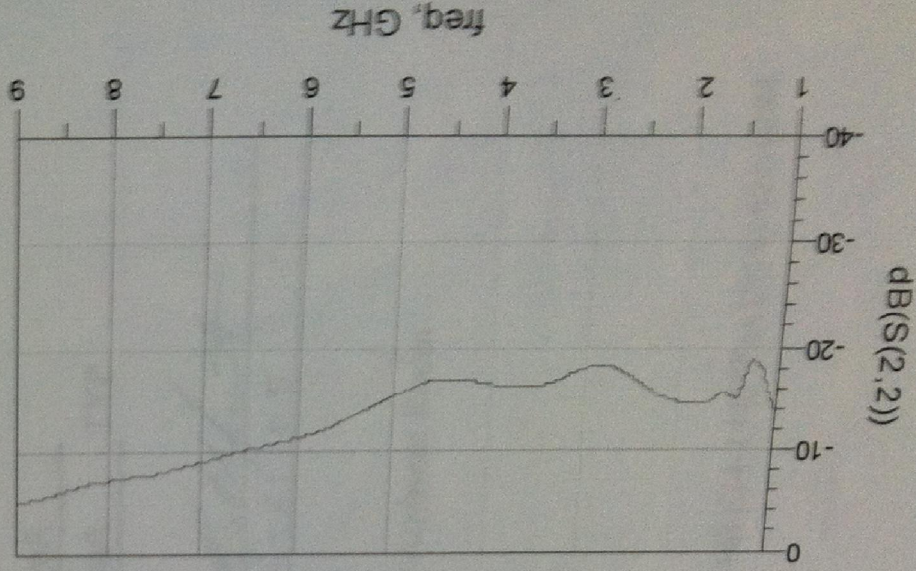
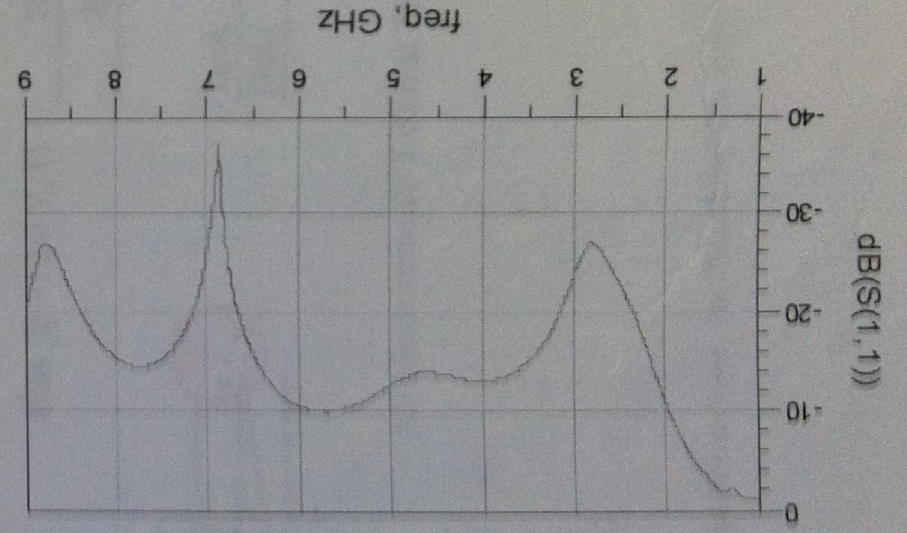
Serial number: 0001

Available units: 2

Carson

Date: 26th May 30, 2006

## 2-8 GHz PhaseOne SL-2515 Amplifier





**FINAL DATA SHEET  
AMPLIFIER**

Serial # 0001  
POM Part # SL08-2515

Freq. In GHz	Gain dB	P-1 dBm	Input VSWR	Output VSWR	Noise dB
2.0	32.1	17.1	1.71	1.41	2.0
3.5	34.6	17.9	1.42	1.35	2.1
5.0	34.8	17.3	1.41	1.26	1.9
6.5	33.9	17.4	1.41	1.85	1.9
8.0	32.6	17.5	1.42	1.98	2.2
Min.	32.1	17.1	---	---	---
Max.	34.9	---	1.93	1.98	2.2
Spec.	25 to 35	15 Min	2.00 Max	2.00 Max	2.2 Max

Bias @ +12.0 V, IT = 190mA  
250mA TYP

A: [Signature] Date: 12-21-05

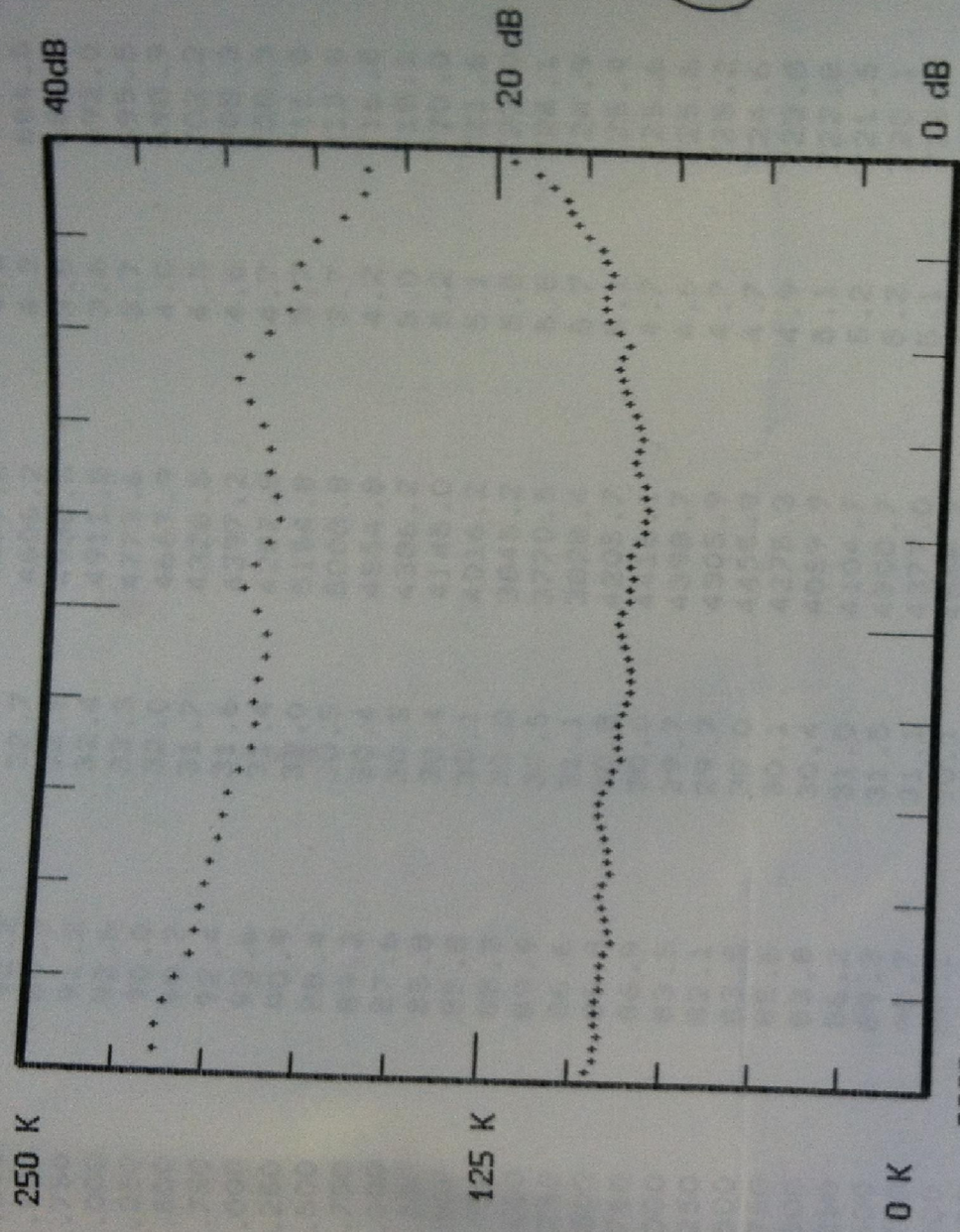
Tech: [Signature]  
Date: 12-21-05

All Measurements Taken at 25°C Ambient Room



7:44 4/9/2001 Tavg= 93.9 Tlo= 82.1 @ 14250 Ghigh=34.2 Glo=25.6 T=25.6  
 1.49 12.16 -0.093 1.74 12.11 -0.049 1.74 12.11 -0.078  
 -0.00 0.00 -0.688 0.00 0.00 -0.723

# Device Noise/Gain Meas.



Tavg= 93.9 Tlo= 82.1 @ 14250 Ghi= 34.2 Glo= 25.6

7:45 4/9/2001 Zero=1.7 AdB=23 Toff=293.3 Bench measurement

F, GHz  
11.500  
12.500  
13.500  
14.500  
15.500

Noise  
88.4  
85.8  
85.8  
83.5  
89.3

Gain, dB  
30.5  
30.1  
30.8  
30.0  
31.5

F, GHz  
12.000  
13.000  
14.000  
15.000  
16.000

Noise  
87.6  
89.9  
83.5  
83.8  
88.1

Gain, dB  
30.1  
30.1  
29.1  
30.1  
30.1

V<sub>b</sub> 1.5V

I<sub>b</sub> 12mA

V<sub>g</sub> -0.0989

I<sub>g</sub> -0.139

1st

2nd

3rd

1.75V

1.75V

12mA

12mA

-0.0525

-0.0855

-0.183

-0.0350

1.1



4:44 4/9/2001 Zero= 1.7 AdB=23 Toff=293.3 Bench measurement

F, GHz	Noise	Gain, dB	T(2)	G(2)	T(Hot)	T(Cold)
8.000	95.5	34.2	3929.6	5.1	663.4	293.3
8.250	93.3	34.1	3970.4	5.0	667.9	293.3
8.500	91.4	34.0	4140.5	4.8	672.2	293.3
8.750	93.0	33.8	4370.7	4.5	676.5	293.3
9.000	91.8	33.3	4477.5	4.3	680.5	293.3
9.250	92.2	32.7	4606.2	4.2	684.5	293.3
9.500	89.3	32.5	4938.6	3.8	688.3	293.3
9.750	91.2	32.4	4911.8	3.6	692.0	293.3
10.000	92.6	32.3	4773.6	3.7	695.5	293.3
10.250	90.0	32.0	4667.9	4.0	698.9	293.3
10.500	90.7	31.7	4326.5	4.5	702.2	293.3
10.750	92.4	31.6	4397.2	4.6	705.3	293.3
11.000	93.6	31.4	4287.8	4.7	708.3	293.3
11.250	90.9	31.0	5154.8	3.7	711.0	293.3
11.500	88.4	30.5	5008.8	3.7	713.6	293.3
11.750	89.2	30.4	4854.8	4.2	716.0	293.3
12.000	87.6	30.5	4386.2	5.0	718.1	293.3
12.250	85.8	30.4	4145.0	5.2	720.0	293.3
12.500	85.8	30.1	4016.2	5.1	721.6	293.3
12.750	88.3	30.0	3845.2	5.5	723.0	293.3
13.000	89.9	30.5	3770.5	5.8	724.1	293.3
13.250	86.6	31.1	3828.4	5.7	724.9	293.3
13.500	85.8	30.8	4205.7	5.1	725.4	293.3
13.750	86.9	30.0	4416.1	4.7	725.6	293.3
14.000	83.5	29.7	4398.7	4.6	725.6	293.3
14.250	82.1	29.7	4305.9	4.7	725.2	293.3
14.500	83.5	30.0	4455.9	4.7	724.6	293.3
14.750	85.6	30.1	4275.3	4.9	723.8	293.3
15.000	83.8	30.4	4059.9	5.1	722.8	293.3
15.250	86.2	31.0	4104.7	5.2	721.5	293.3
15.500	89.3	31.5	4300.7	5.2	720.1	293.3
15.750	90.7	31.1	4377.0	5.1	718.6	293.3
16.000	88.1	30.1	4556.2	4.7	717.1	293.3
16.250	93.4	29.2	4999.3	4.4	715.5	293.3
16.500	94.3	28.9	5254.4	4.3	714.0	293.3
16.750	93.1	28.7	5230.7	4.2	712.6	293.3
17.000	95.6	27.9	4987.1	4.3	711.4	293.3
17.250	102.3	26.7	5254.0	4.4	710.5	293.3
17.500	105.0	25.8	5098.8	4.4	710.1	293.3
17.750	113.1	25.6	5079.6	4.2	710.1	293.3
18.000	126.0	25.6	5363.5	4.1	710.7	293.3



9/18/11-0112

Freq 4.75/2000 Hz

1.89 12.24 -0.002

-0.00 0.00 -0.000

93.9 71.0 82.1 81.250

1.74 12.11 -0.009

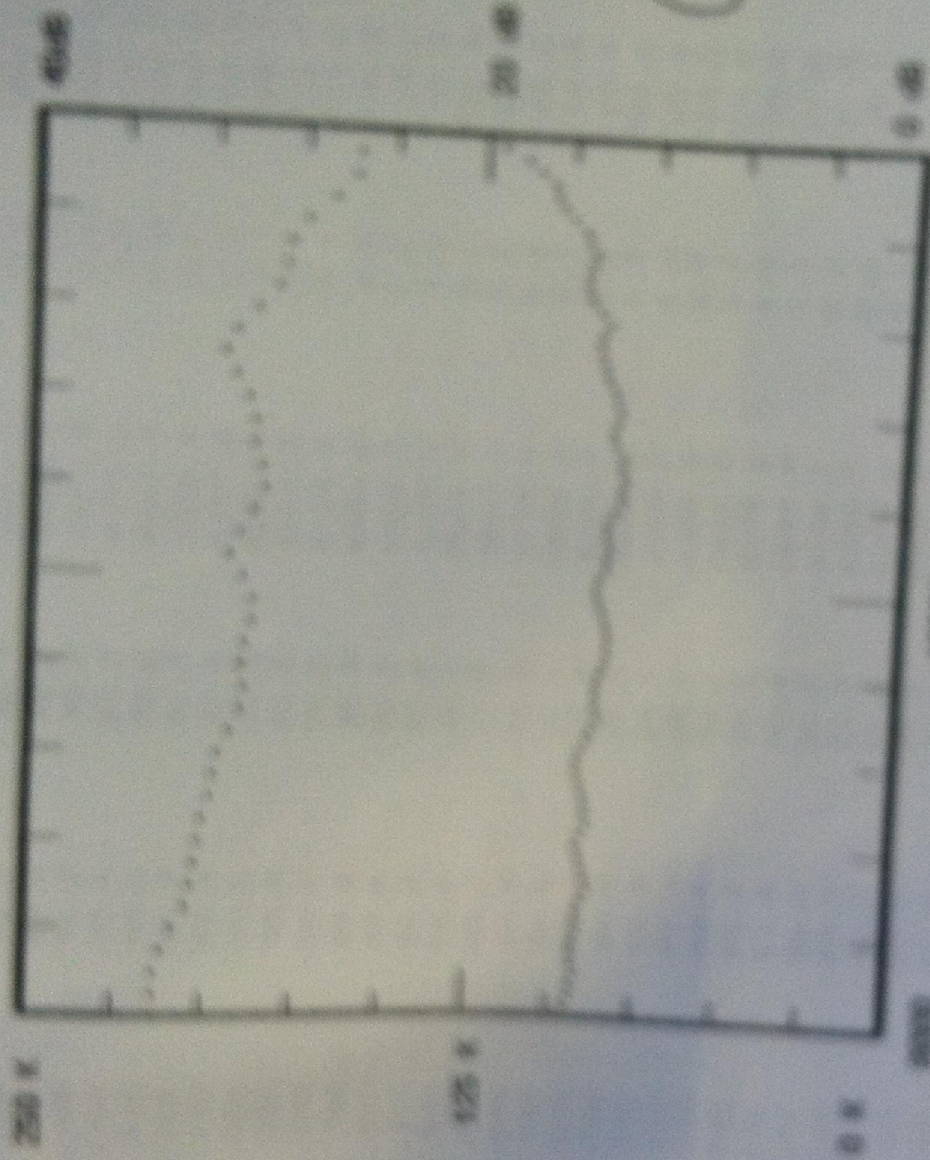
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Gain=34.2

Gain=28.5

-0.074

# Device Noise/Gain Meas.



Freq 4.75/2000 Hz

1.89 12.24 -0.002

-0.00 0.00 -0.000

93.9 71.0 82.1 81.250

1.74 12.11 -0.009

0.00 0.00 -0.723

Gain=34.2

Gain=28.5

-0.074

2000 Hz

Gain=34.2

Gain=28.5

-0.074

2000 Hz

Gain=34.2

Gain=28.5

-0.074

2000 Hz

Gain=34.2

11



44 4/9/2001 Zero= 1.7 AdB=23 Toff=293.3

F, GHz	Noise	Gain, dB	T(2)	G(2)	T(Hot)	T(Cold)
8.000	95.5	34.2	3929.6	5.1	663.4	293.3
8.250	93.3	34.1	3970.4	5.0	667.9	293.3
8.500	91.4	34.0	4140.5	4.8	672.2	293.3
8.750	93.0	33.8	4370.7	4.5	676.5	293.3
9.000	91.8	33.3	4477.5	4.3	680.5	293.3
9.250	92.2	32.7	4606.2	4.2	684.5	293.3
9.500	89.3	32.5	4938.6	3.8	688.3	293.3
9.750	91.2	32.4	4911.8	3.6	692.0	293.3
10.000	92.6	32.3	4773.6	3.7	695.5	293.3
10.250	90.0	32.0	4667.9	4.0	698.9	293.3
10.500	90.7	31.7	4326.5	4.5	702.2	293.3
10.750	92.4	31.6	4397.2	4.6	705.3	293.3
11.000	93.6	31.4	4287.8	4.7	708.3	293.3
11.250	90.9	31.0	5154.8	3.7	711.0	293.3
11.500	88.4	30.5	5008.8	3.7	713.6	293.3
11.750	89.2	30.4	4854.8	4.2	716.0	293.3
12.000	87.6	30.5	4386.2	5.0	718.1	293.3
12.250	85.8	30.4	4145.0	5.2	720.0	293.3
12.500	85.8	30.1	4016.2	5.1	721.6	293.3
12.750	88.3	30.0	3845.2	5.5	723.0	293.3
13.000	89.9	30.5	3770.5	5.8	724.1	293.3
13.250	86.6	31.1	3828.4	5.7	724.9	293.3
13.500	85.8	30.8	4205.7	5.1	725.4	293.3
13.750	86.9	30.0	4416.1	4.7	725.6	293.3
14.000	83.5	29.7	4398.7	4.6	725.6	293.3
14.250	82.1	29.7	4305.9	4.7	725.2	293.3
14.500	83.5	30.0	4455.9	4.7	724.6	293.3
14.750	85.6	30.1	4275.3	4.9	723.8	293.3
15.000	83.8	30.4	4059.9	5.1	722.8	293.3
15.250	86.2	31.0	4104.7	5.2	721.5	293.3
15.500	89.3	31.5	4300.7	5.2	720.1	293.3
15.750	90.7	31.1	4377.0	5.1	718.6	293.3
16.000	88.1	30.1	4556.2	4.7	717.1	293.3
16.250	93.4	29.2	4999.3	4.4	715.5	293.3
16.500	94.3	28.9	5254.4	4.3	714.0	293.3
16.750	93.1	28.7	5230.7	4.2	712.6	293.3
17.000	95.6	27.9	4987.1	4.3	711.4	293.3
17.250	102.3	26.7	5254.0	4.4	710.5	293.3
17.500	105.0	25.8	5098.8	4.4	710.1	293.3
17.750	113.1	25.6	5079.6	4.2	710.1	293.3
18.000	126.0	25.6	5363.5	4.1	710.7	293.3





212 East Gutierrez Street  
Santa Barbara, California 93101  
(805) 564-4404 fax: (805) 966-3249  
E-mail: [spacek@silcom.com](mailto:spacek@silcom.com)

## TEST DATA

UCSD

Customer

Customer: 100-40 GHz Low Noise Amplifier

Description	18 to 40 GHz	Date
	6,105	09/05/06

SLKKA-27-5  
Serial No. 6300

Model No.	SLKKA-27-9	Serial No.	MV
		Tested by	
		100000000	

P.O. No. 10265516

Frequency (GHz)	Gain (dB)	Noise Figure (dB)
18.0	31.3	4.9
20.0	31.0	4.9
22.0	31.8	4.7
24.0	33.3	4.4
26.0	33.3	4.3
28.0	32.4	4.3
30.0	32.5	4.6
32.0	29.9	4.3
34.0	31.1	4.4
36.0	30.0	4.4
38.0	29.0	4.1
40.0	29.0	4.3

Comments:	Test Conditions:
	+8 to +12VDC @ .305A





## TEST DATA

Customer

UCSD

Description	40 to 50 GHz Low Noise Amplifier
Part Number	4050LNA
Frequency Range	40 to 50 GHz
Gain	15 to 20 dB
Noise Figure	2.5 to 3.5 dB
Power Handling	10 to 20 dBm
Size	10 mm x 10 mm
Weight	0.5 g
Operating Temperature	-40 to +85 °C
Reliability	100,000 hours
Lead Time	4 weeks
Price	\$150

212 East Gutierrez Street  
Santa Barbara, Calif.

212 East Gutierrez Street  
Santa Barbara, California 93101  
(805) 564-4404

E-mail: [snack@snack.com](mailto:snack@snack.com)

Model No SL4510-30-15V Serial No 6K09 Date 10/09/06

Model No. \_\_\_\_\_

Serial No. 6K09

4000540  
MV

Tested by

[illegible]

Comments: Test Conditions: +8 to + 12VDC @ 37A

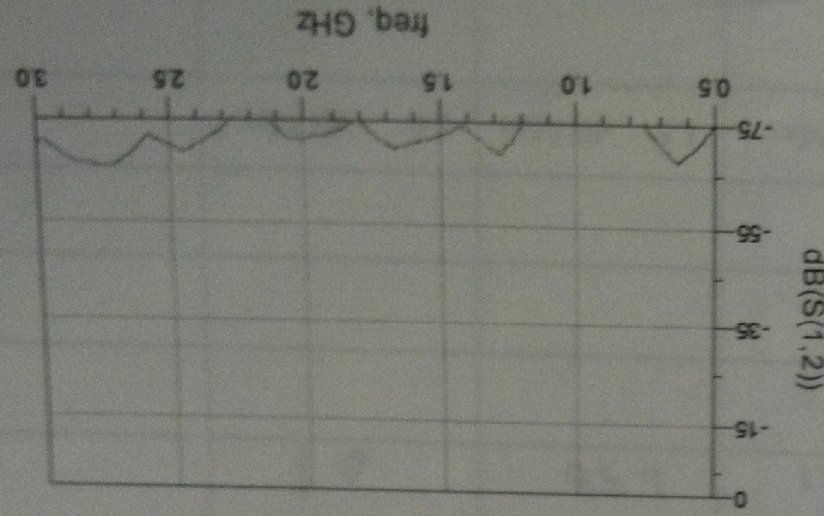
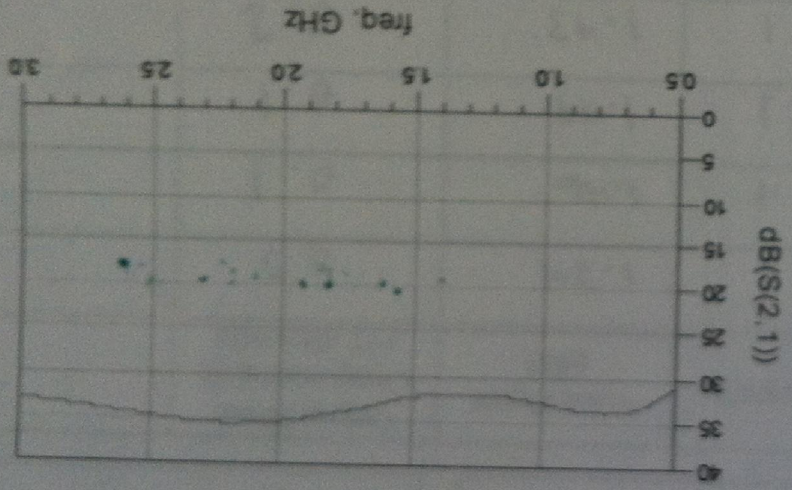
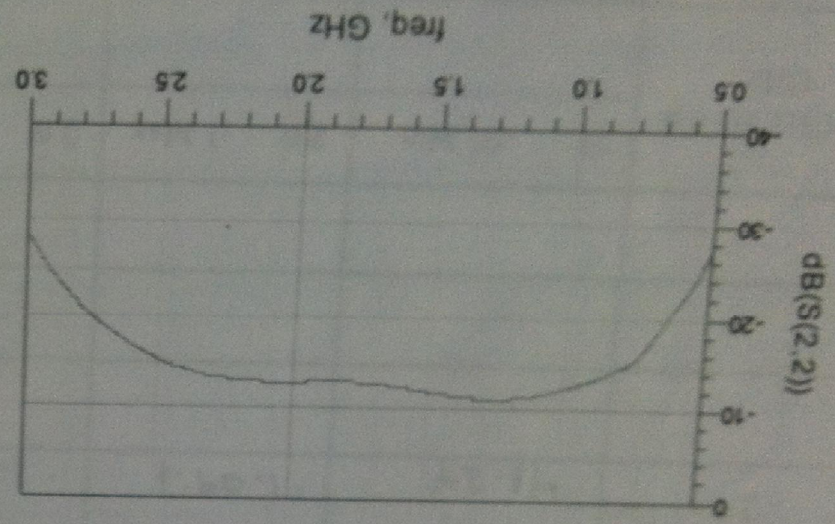
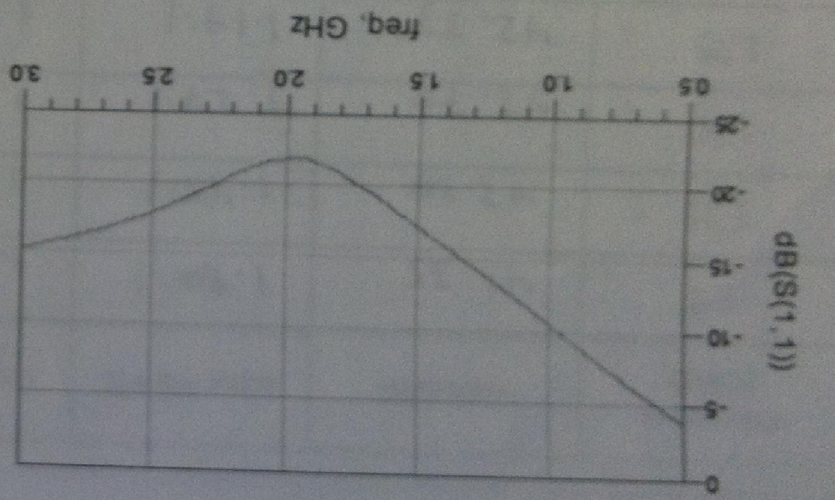
(Data sheet belongs to SGLS10-30-15V S/N: 6K09 Amp-Hose in Zuercher



Serial number: 101  
Available units: 2  
Carson

Date: 26th May 30, 2006

# 1-2 GHz CA12-302 Amplifier





Model No.	CA12-302
Serial No.	121
Job No.	1625
Customer	UNIVERSITY OF CALIFORNIA (UCSD)
Part No.	
Purchase Order	10255427
Contract No.	



4000 Via Pescador  
Camarillo, CA 93012  
Cage Code: 3DJKA

Frequency (GHz)	Gain (dB)	Input VSWR	Output VSWR	Noise Figure (dB)	Output Power Compression @ +15 dBm Min	Unconditional Stability Test
1.0	41.35	1.82:1	1.63:1	1.34	0.3	—
1.25	42.60	1.45:1	1.36:1	1.46	0.1	—
1.50	42.76	1.23:1	1.68:1	1.49	0.1	OK
1.75	42.33	1.14:1	1.60:1	1.43	0.2	—
2.0	41.24	1.09:1	1.65:1	1.38	0.1	—
Spec Limits	1.0 GHz TO 2.0 GHz	33 dB Min	2.0 :1 Max	2.0 :1 Max	1.5 dB Max	1.0 dB Max
Actual: Gain Flatness: +/- 1.0 MAX						



Checked By:



Spec: +15 VDC Min VDC Max @ 175 mA TYP  
Gain Flatness  
Checked: 12/7/05

Actual +15 VDC @ 168 mA

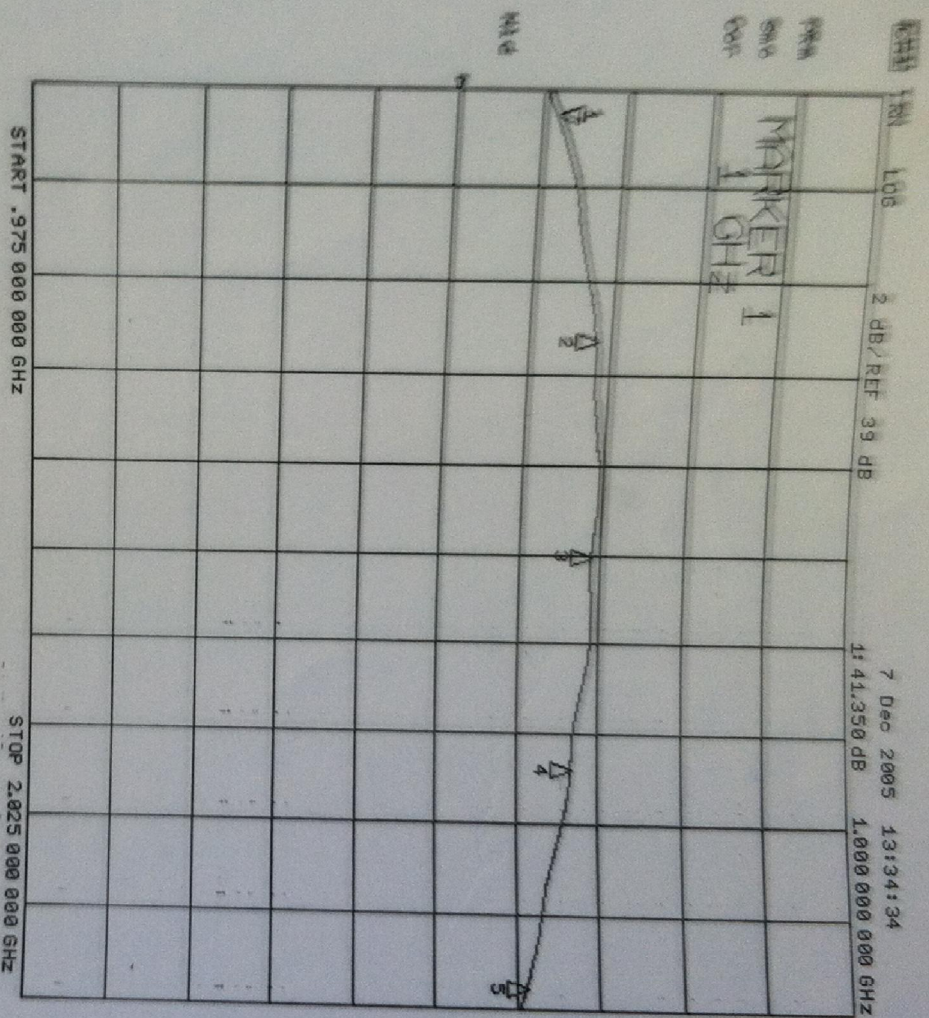
DEC 07 2005

DEC 07 2005



5/12/10 1

CA 12-302



CH1 Markers  
 2: 42.606 dB  
 1.25000 GHz  
 3: 42.762 dB  
 1.50000 GHz  
 4: 42.335 dB  
 1.75000 GHz  
 5: 41.246 dB  
 2.00000 GHz

CAIN



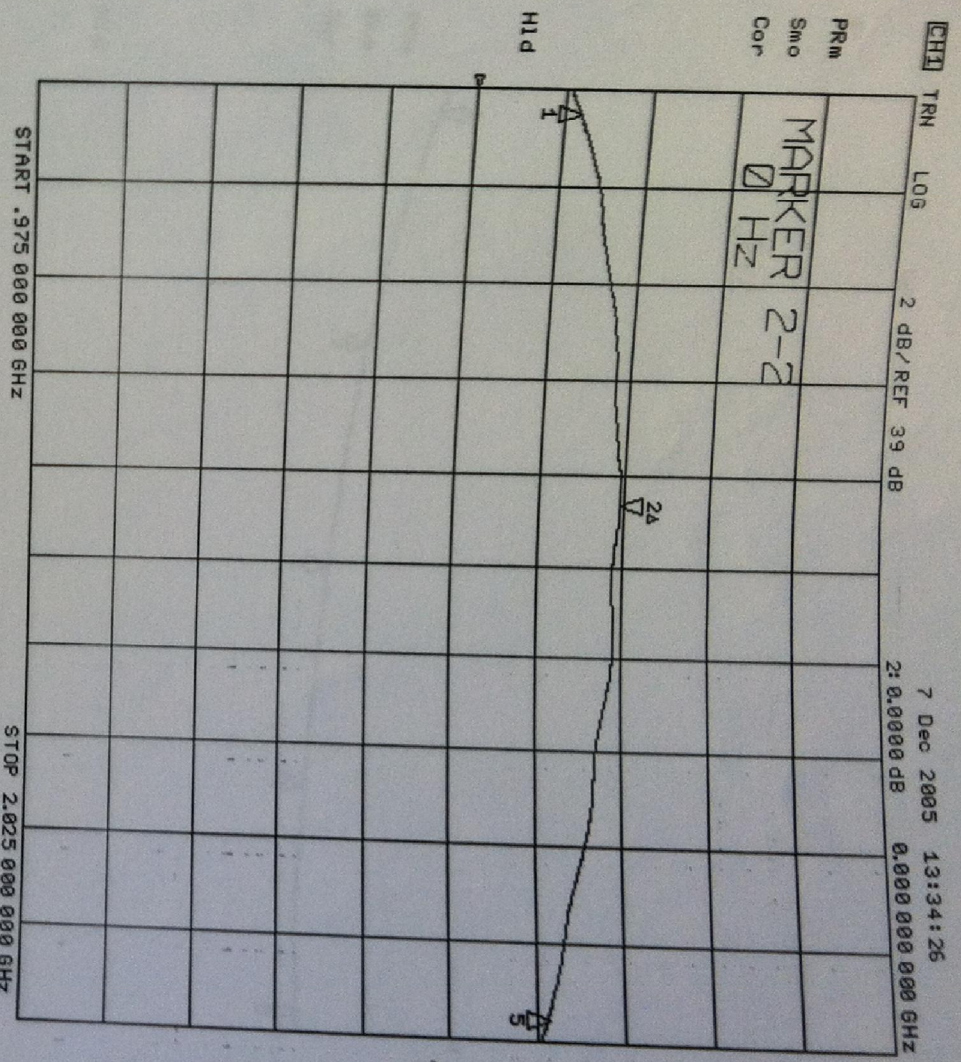
DEC 07 2005

DEC 07 2005



SL 101

CA 12-302



CH1 Markers  
Δ REF = 2  
11-1.5550 dB  
-426.500 MHz  
58-1.5590 dB  
573.500 MHz

CAW  
FLATNESS

9  
ACCEPT  
CIAO

3  
ACCEPT  
CIAO

DEC 07 2005

DEC 07 2005



512 181

CA 12-302

CH2 RFL SWR 500 m / REF 2 7 Dec 2005 13:24:37  
 1s 1.2385 1.800 000 000 GHz

MARKER 1  
 1 GHz

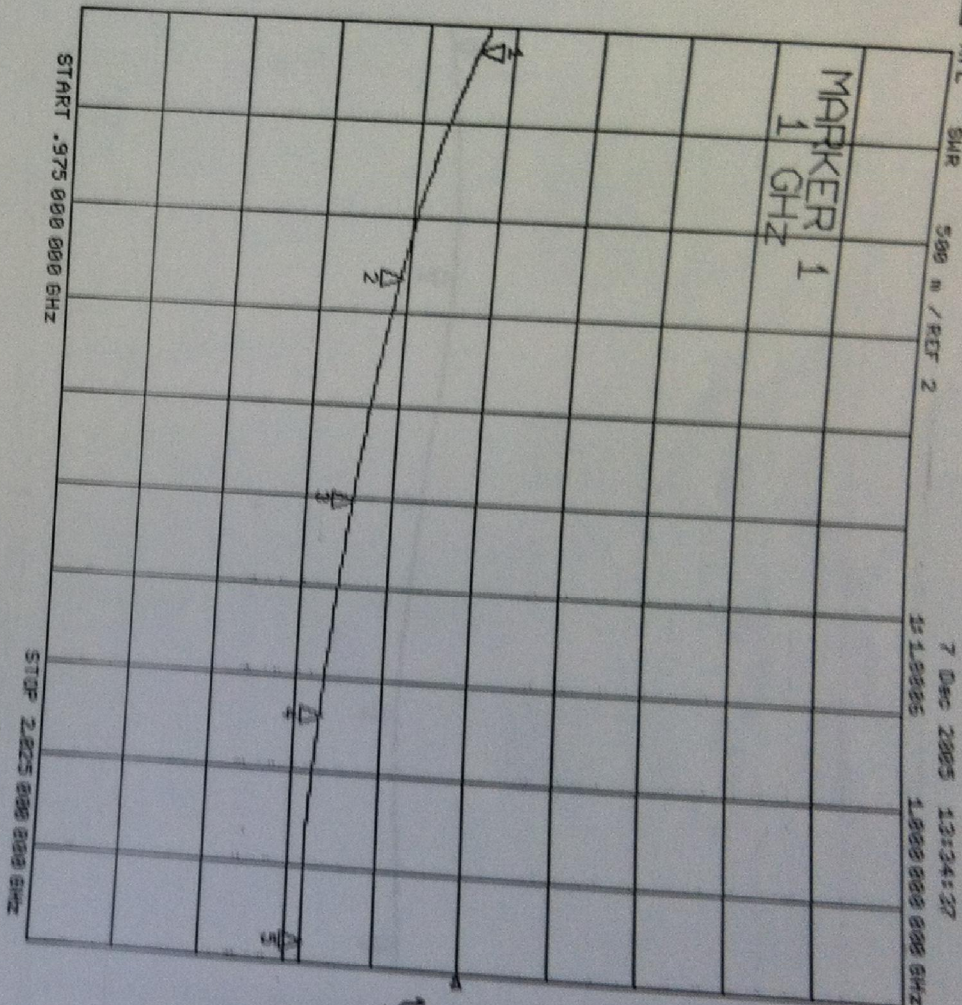
CH2 Markers  
 2s 1.4558  
 1.25000 GHz

3s 1.2748  
 1.50000 GHz  
 4s 1.1459  
 1.75000 GHz  
 5s 1.0913  
 2.00000 GHz

PRM  
 Smo  
 Cor

WR7  
 NSWR

H1d



9  
 ACCEPT  
 CMO

DEC 07 2005

3  
 ACCEPT  
 CMO

DEC 07 2005



SIN 101

CA12-302

CH2

RFL

SNR

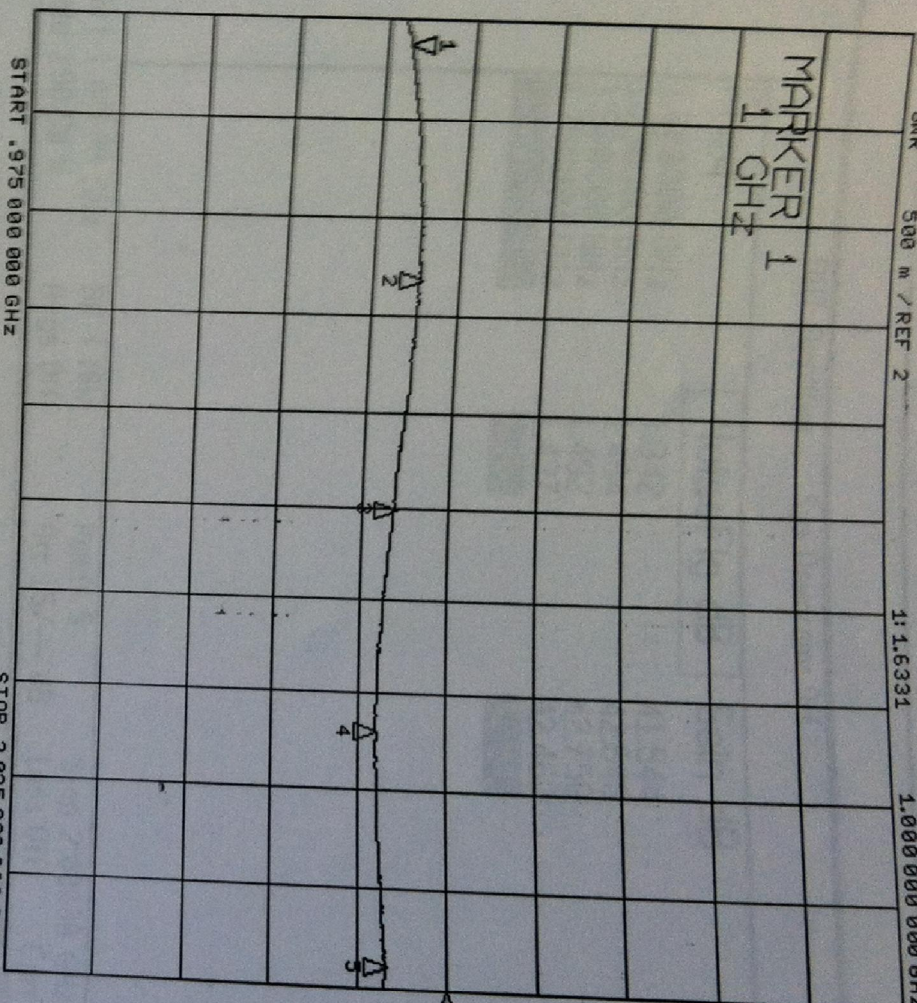
500 m / REF 2

7 Dec 2005 13:34:59

1: 1.6331

1.000 000 000 GHz

MARKER 1  
1 GHz



CH2 Markers  
2: 1.7695  
1.25000 GHz  
3: 1.6875  
1.50000 GHz  
4: 1.6034  
1.75000 GHz  
5: 1.6534  
2.00000 GHz

OUTPI  
USWR



DEC 07 2005



DEC 07 2005



S/n 101

LA 12-302

Agilent 13:13:02 Dec 7, 2005

DUT Amplifier		Sys Downconv Off																			
<table border="1"> <thead> <tr> <th>Freq</th> <th>NoiseFig dB</th> <th>Gain dB</th> </tr> </thead> <tbody> <tr> <td>1.0000000 GHz</td> <td>1.342</td> <td>41.544</td> </tr> <tr> <td>1.2500000 GHz</td> <td>1.464</td> <td>42.648</td> </tr> <tr> <td>1.5000000 GHz</td> <td>1.492</td> <td>42.758</td> </tr> <tr> <td>1.7500000 GHz</td> <td>1.437</td> <td>42.462</td> </tr> <tr> <td>2.0000000 GHz</td> <td>1.380</td> <td>41.241</td> </tr> </tbody> </table>				Freq	NoiseFig dB	Gain dB	1.0000000 GHz	1.342	41.544	1.2500000 GHz	1.464	42.648	1.5000000 GHz	1.492	42.758	1.7500000 GHz	1.437	42.462	2.0000000 GHz	1.380	41.241
Freq	NoiseFig dB	Gain dB																			
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1.5000000 GHz	1.492	42.758																			
1.7500000 GHz	1.437	42.462																			
2.0000000 GHz	1.380	41.241																			
Start 1.00000 GHz    BM 4 MHz    Points 5    Stop 2.00000 GHz Tcold 296.50 K    Avgs Off    Att 15/-- dB    Loss Off    Corr																					
Frequency		Freq Mode Sweep																			
Start Freq		1.0000000 GHz																			
Stop Freq		2.0000000 GHz																			
Center Freq		1.5000000 GHz																			
Freq Span		1.00000000 GHz																			
Fixed Freq		14.7500000 GHz																			
More, 1 of 2																					



DEC 07 2005

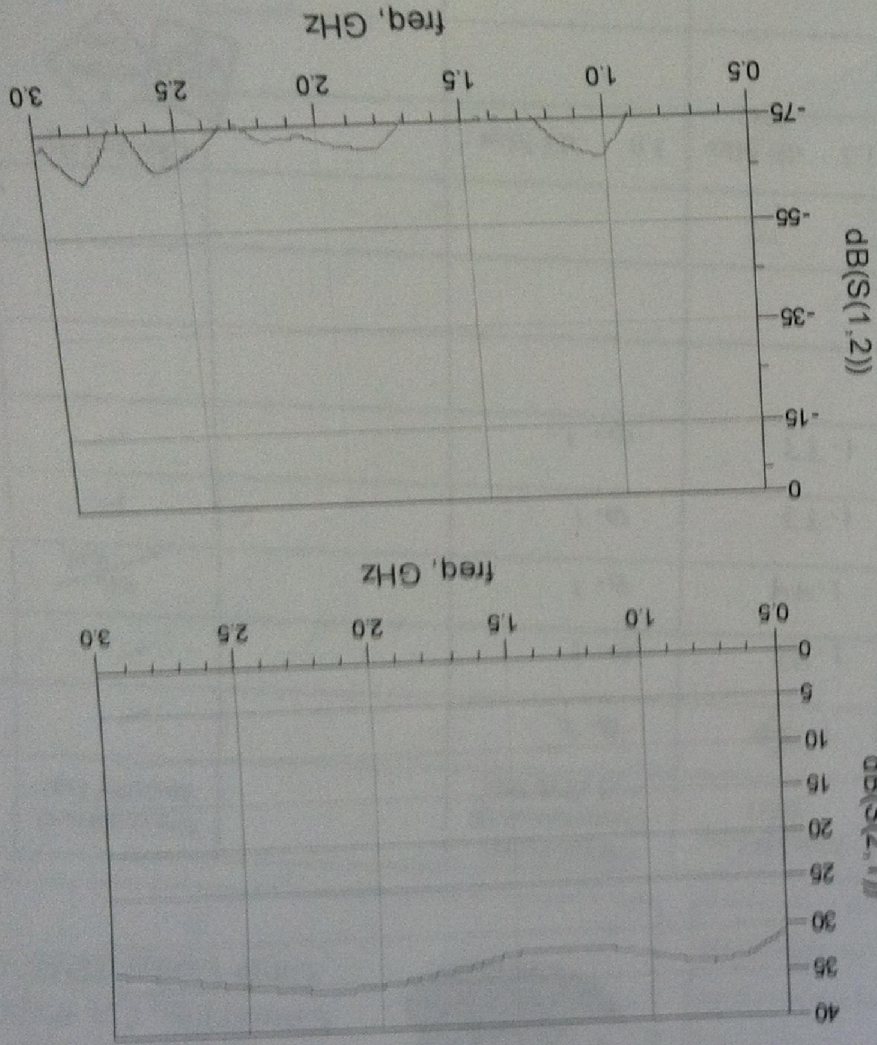
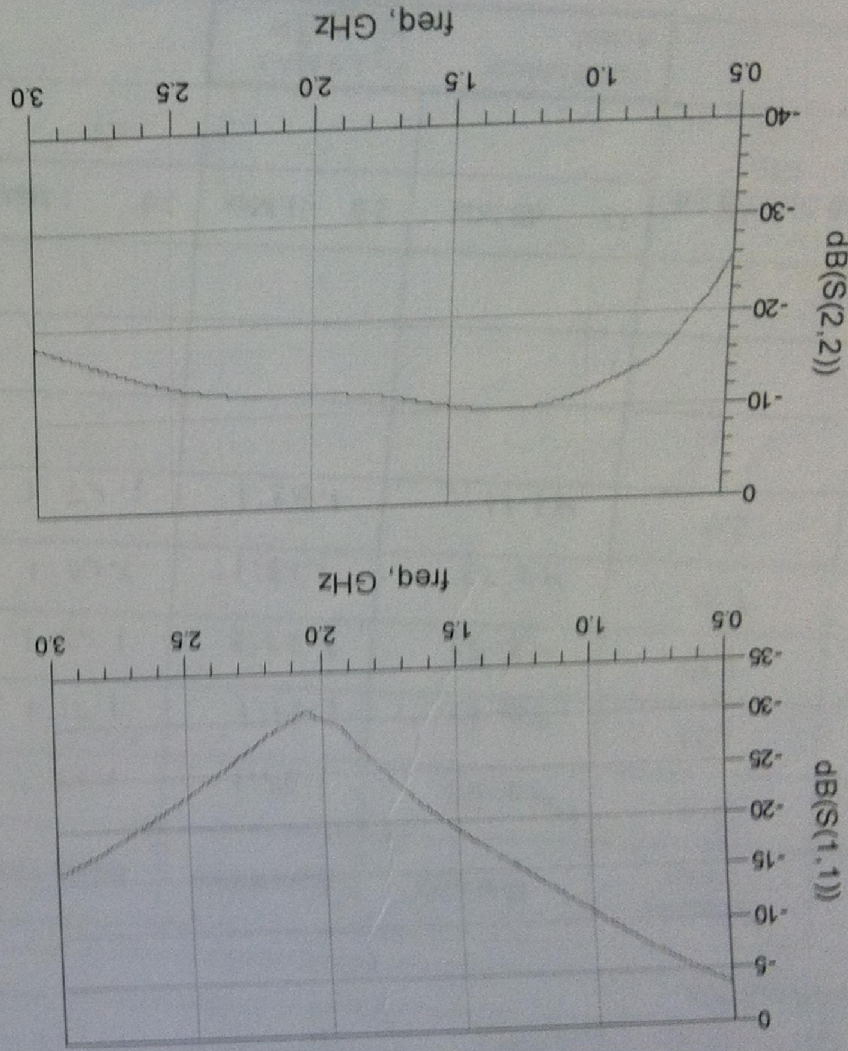


DEC 07 2005



# 1-2 GHz CA12-302 Amplifier

Serial number: 102  
 Available units: 2  
 Carson  
 Date: 26th May 30, 2006





Model No. CA12-302  
 Serial No. 192  
 Job No. 1625  
 Customer UNIVERSITY OF CALIFORNIA (UCSD)  
 Part No.  
 Purchase Order 10255427  
 Contract No.



4400 Via Pescador  
 Camarillo, CA 93012  
 CAGE CODE: 30314

Frequency (GHz)	Gain (dB)	Input VSWR	Output VSWR	Noise Figure (dB)	Output Power (Compression @ +15 dBm Min)	Unconditional Stability Test
1.0	40.82	1.49:1	1.67:1	1.30	0.2	/
1.25	42.21	1.44:1	1.41:1	1.43	0.1	/
1.50	42.51	1.52:1	1.52:1	1.44	0.1	OK
1.75	42.21	1.13:1	1.64:1	1.33	0.1	/
2.0	41.11	1.03:1	1.67:1	1.33	0.1	/
2.0 GHz TO 2.0 GHz	33 dB Min	2.0 1:1 Max	2.0 1:1 Max	1.5 dB Max	1.0 dB Max	Checked By: [Signature]
Actual: 47.10 MAX (Gain Flatness) +/- 0.4dB						

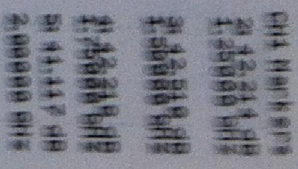
Actual  
 +15 VDC Min  
 +15 VDC @ 175 mA  
 TYP

Specs  
 +15 VDC Min  
 +15 VDC Max @ 175 mA  
 TYP  
 (Gain Flatness) +/- 0.4dB  
 Checked: 12/2/85  
 12/7/81



CA 112-302

7 Dec 2005	13:32:10
1:40.826 dB	1.000 000 000 0112

[illegible]

五

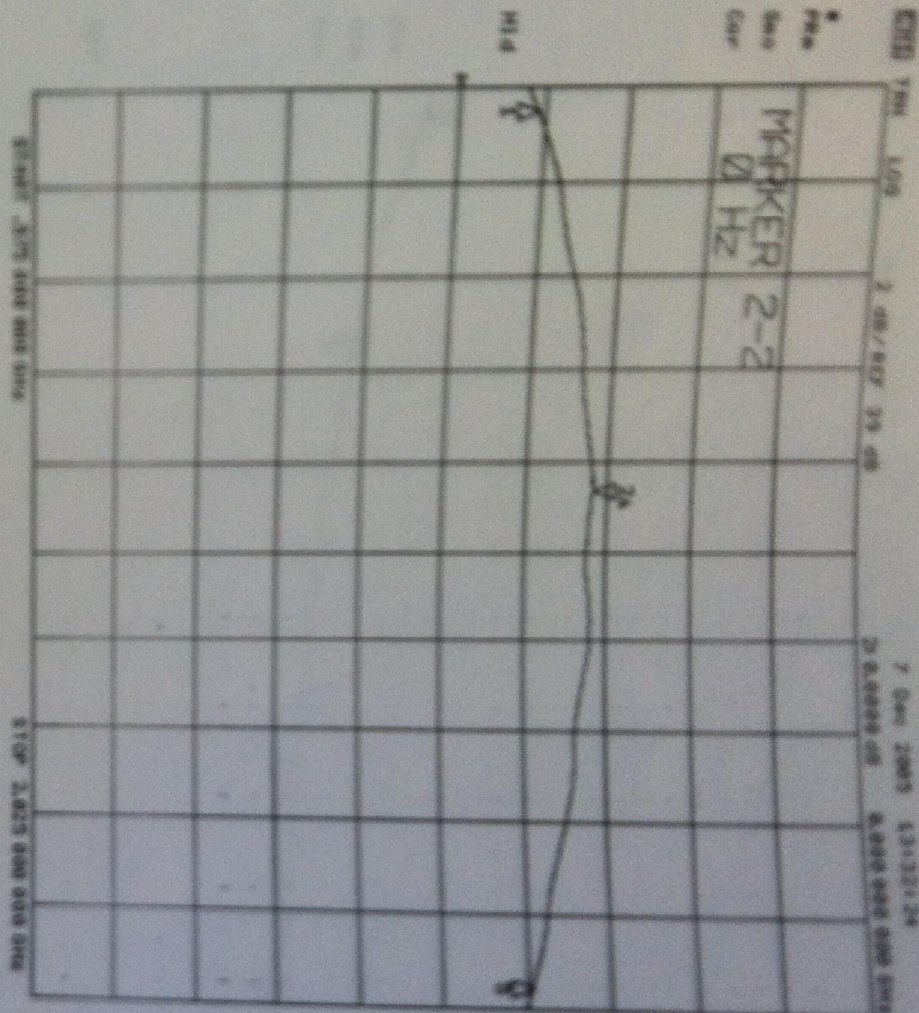
STOP 2.025 000 000 GHz





CA 11-701

• Pile  
• Sand  
• Cap



ON 07/07/07  
11:13:00 AM  
-11:13:00 AM  
5-11:13:00 AM

DATA  
FLAVORS



DEC 07 2007



DEC 07 2007

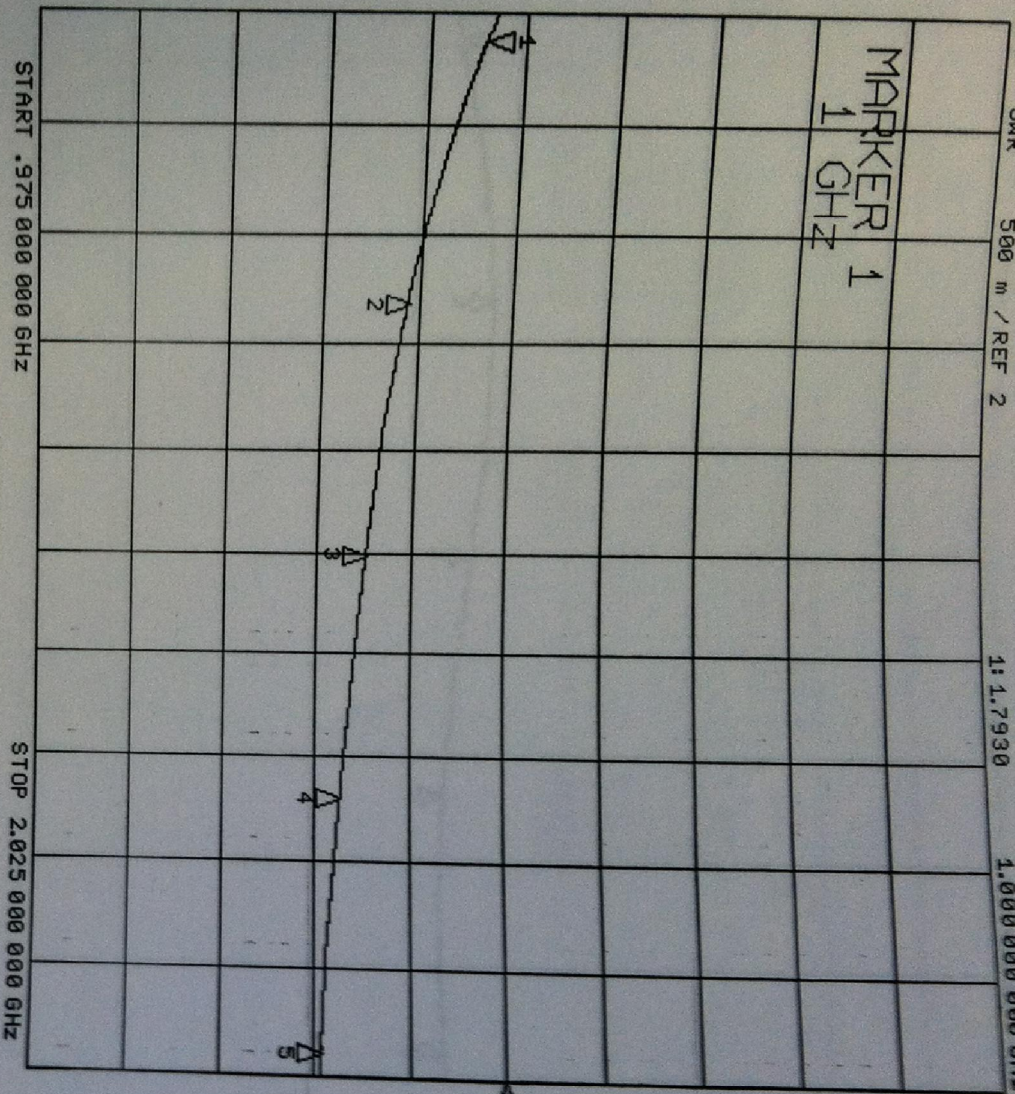


012 122

CA 12-302

CH2 RFL SUR 500 m / REF 2 7 Dec 2005 13:32:04 1:1.7930 1.000 000 000 GHz

MARKER 1  
1 GHz



CH2 Markers  
2: 1.4406  
1.25000 GHz  
3: 1.2592  
1.50000 GHz  
4: 1.1342  
1.75000 GHz  
5: 1.0398  
2.00000 GHz

INPUT  
VSUR

H1d

9  
ACCEPT  
CIAO

3  
ACCEPT  
CIAO

DEC 07 2005

DEC 07 2005



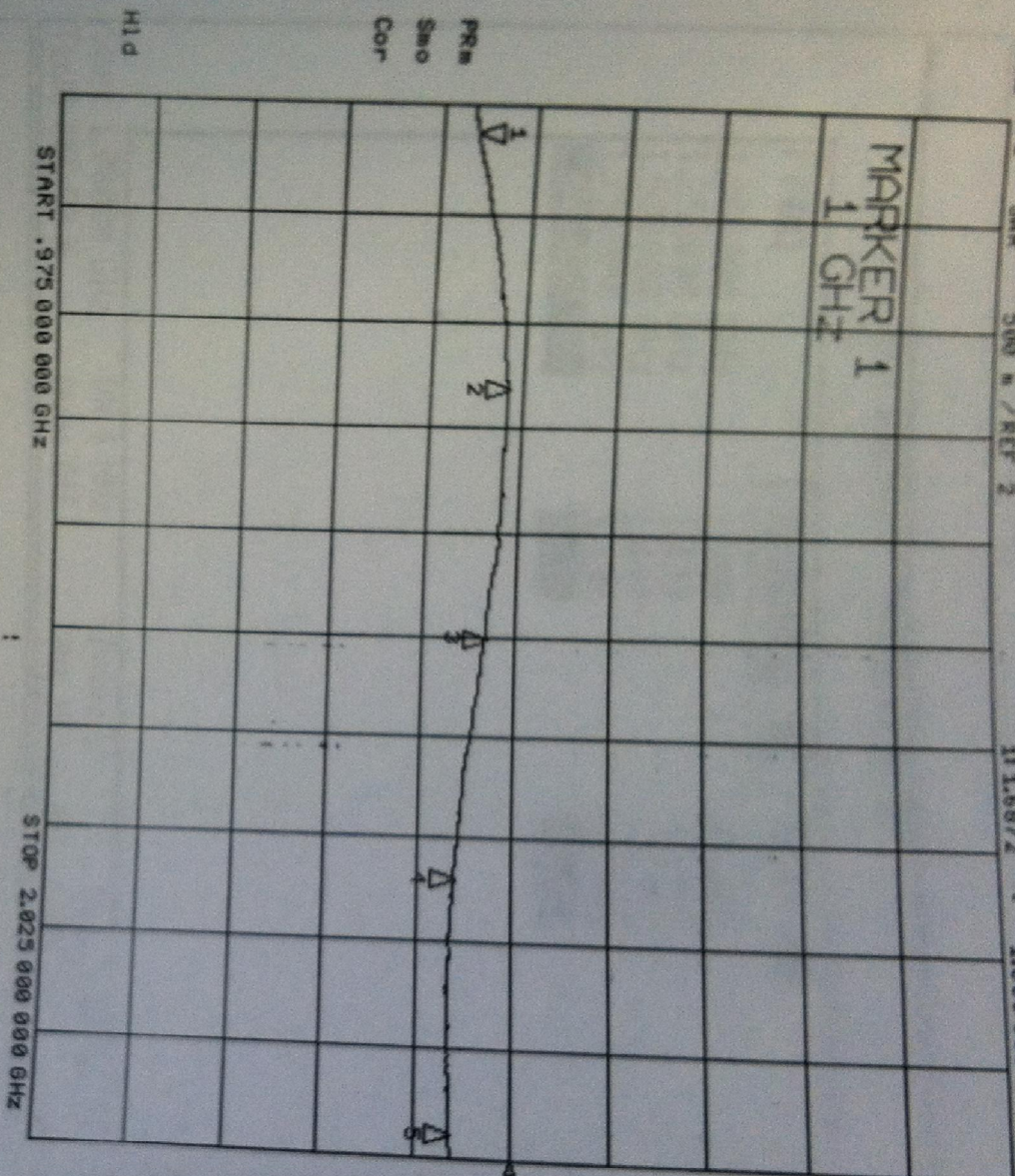
SLR 102

CA 12-302

CH2 RFL SUR 500 n / REF 2

7 Dec 2005 13:31:42  
111.6872 - 1.000 000 000 GHz

MARKER 1  
1 GHz



CH2 Markers  
2: 1.9131  
1.25000 GHz  
3: 1.6383  
1.50000 GHz  
4: 1.6982  
1.75000 GHz  
5: 1.6797  
2.00000 GHz

output  
usur

9  
ACCEPT  
CIAO

DEC 07 2005

3  
ACCEPT  
CIAO

DEC 07 2005



SL 102

CA 12-302

\* Agilent 13:13:41 Dec 7, 2005

DUT Amplifier		Sys Downconv Off																			
<table border="1"> <thead> <tr> <th>Freq</th> <th>NoiseFig dB</th> <th>Gain dB</th> </tr> </thead> <tbody> <tr><td>1.0000000 GHz</td><td>1.306</td><td>41.095</td></tr> <tr><td>1.2500000 GHz</td><td>1.432</td><td>42.344</td></tr> <tr><td>1.5000000 GHz</td><td>1.444</td><td>42.553</td></tr> <tr><td>1.7500000 GHz</td><td>1.338</td><td>42.458</td></tr> <tr><td>2.0000000 GHz</td><td>1.338</td><td>41.244</td></tr> </tbody> </table>				Freq	NoiseFig dB	Gain dB	1.0000000 GHz	1.306	41.095	1.2500000 GHz	1.432	42.344	1.5000000 GHz	1.444	42.553	1.7500000 GHz	1.338	42.458	2.0000000 GHz	1.338	41.244
Freq	NoiseFig dB	Gain dB																			
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1.5000000 GHz	1.444	42.553																			
1.7500000 GHz	1.338	42.458																			
2.0000000 GHz	1.338	41.244																			
<table border="1"> <tr> <td>Start 1.00000 GHz</td> <td>BM 4 MHz</td> <td>Points 5</td> <td>Stop 2.00000 GHz</td> </tr> <tr> <td>Tcold 296.50 K</td> <td>Avgs Off</td> <td>Att 15/--- dB</td> <td>Loss Off</td> </tr> <tr> <td colspan="4">Corr</td> </tr> </table>				Start 1.00000 GHz	BM 4 MHz	Points 5	Stop 2.00000 GHz	Tcold 296.50 K	Avgs Off	Att 15/--- dB	Loss Off	Corr									
Start 1.00000 GHz	BM 4 MHz	Points 5	Stop 2.00000 GHz																		
Tcold 296.50 K	Avgs Off	Att 15/--- dB	Loss Off																		
Corr																					
<table border="1"> <tr> <td>Frequency</td> <td>Freq Mode, Sweep</td> <td>Start Freq 1.00000000 GHz</td> <td>Stop Freq 2.00000000 GHz</td> <td>Center Freq 1.50000000 GHz</td> <td>Freq Span 1.00000000 GHz</td> <td>Fixed Freq 14.75000000 GHz</td> <td>More, 1 of 2</td> </tr> </table>				Frequency	Freq Mode, Sweep	Start Freq 1.00000000 GHz	Stop Freq 2.00000000 GHz	Center Freq 1.50000000 GHz	Freq Span 1.00000000 GHz	Fixed Freq 14.75000000 GHz	More, 1 of 2										
Frequency	Freq Mode, Sweep	Start Freq 1.00000000 GHz	Stop Freq 2.00000000 GHz	Center Freq 1.50000000 GHz	Freq Span 1.00000000 GHz	Fixed Freq 14.75000000 GHz	More, 1 of 2														



DEC 07 2005



DEC 07 2005



# Low Noise Amplifier



0.1 to 500 MHz

- VHF/UHF
- small signal amplifier
- communications system

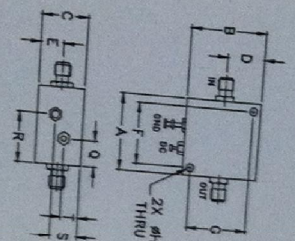
Low Noise Amplifier Electrical Specifications							
MODEL NO.	FREQUENCY (MHz)	NOISE FIGURE (dB)	GAIN (dB)	MAXIMUM POWER (dbm)	INTERCEPT (dbm)	VSWR (typ.)	RF POWER
	$f_c$		Flatness Max.				
ZFL-600,N(+)	500	Typ.	Total	(1 dB Comp.)	Input	IP3	Gain
m = mid range [2 L to 1U/2]	0.1	2.9	Min.	+5	+5	Typ.	15
n = narrow band [1L to 1U/2]			+0.5			+18	Current (mA) Min.
							Max.

**Maximum Ratings**  
Operating Temperature

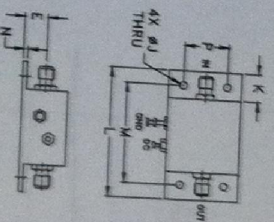
Storage Temperature	-20°C to 71°C
DC Voltage	-55°C to 100°C

+17V Max.  
Permanent damage may occur if any of these limits are exceeded

**STANDARD**



OPTION "B"



	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt
1.25	1.25	.75	.03	.30	1.00	1.00	.125	.125	.46	2.18	1.688	.06	.750	.50	.60	.45	.29	39	
31.75	31.75	19.05	16.00	9.14	25.40	25.40	3.18	3.18	11.68	55.37	42.68	1.52	19.05	12.70	20.32	11.43	7.37		

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Association  
ISO 9001 ISO 14001 AS 9100 CERTIFIED

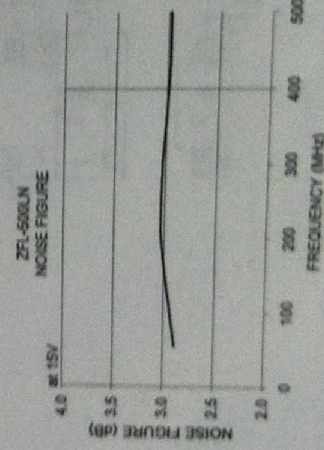
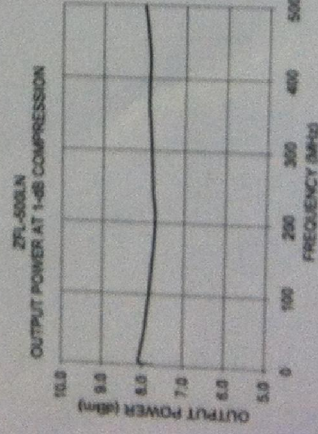
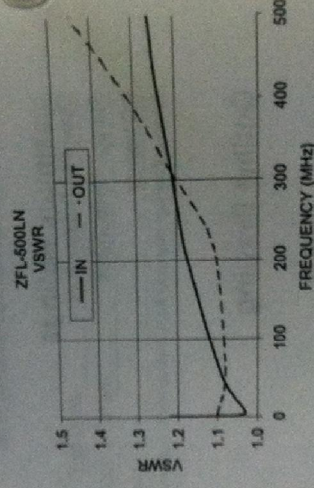
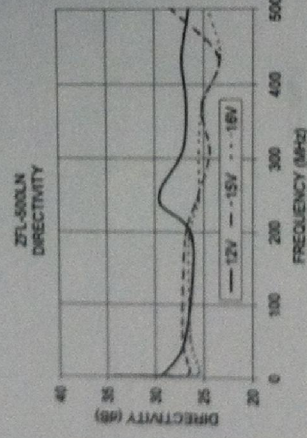
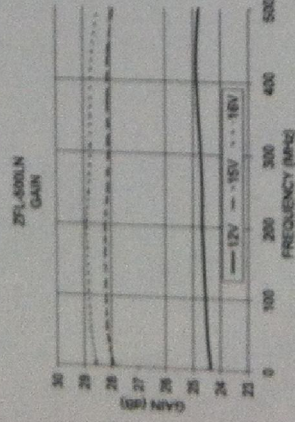
**Notes 1:** Performance and quality attributes and conditions not expressly stated in this specification shall be inferred to those of the best performing and quality product of the same type and performance data contained herein are based on Minicircuits' applicable established test performance criteria and measurement tolerances. 2: Minicircuits standard limited warranty and terms and conditions (collectively, "Standard Terms") Purchases of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Minicircuits' website at [www.minicircuits.com/MiGStore/terms.jsp](http://www.minicircuits.com/MiGStore/terms.jsp).

REV D  
21-00000  
00000  
Page 1 of 2



### Typical Performance Data/Curves

FREQUENCY (MHz)	GAIN (dB)			DIRECTIVITY (dB)			VSWR (:1)	NOISE FIGURE (dB)	POUT at 1 dB COMPL (dBm)
	12V	15V	16V	12V	15V	16V			
0.10	24.30	27.80	28.40	34.40	27.80	30.80	1.22	1.17	7.74
0.60	24.41	27.98	28.60	30.00	28.80	28.40	1.05	1.10	7.97
5.40	24.37	27.64	28.56	29.00	26.50	26.50	1.03	1.10	7.94
53.30	24.40	28.15	28.75	28.90	27.20	26.40	1.09	1.08	7.72
192.40	24.65	28.21	28.88	26.20	26.90	26.50	1.17	1.10	7.78
243.60	24.66	28.12	28.81	29.60	25.70	25.50	1.19	1.13	7.82
307.70	24.75	28.10	28.75	27.20	24.40	25.50	1.21	1.21	7.89
371.80	24.83	28.11	28.74	26.60	25.20	25.10	1.23	1.28	7.88
436.90	24.88	28.09	28.68	27.20	23.50	23.30	1.25	1.36	8.01
500.00	24.79	27.86	28.44	26.50	26.30	24.60	1.26	1.45	2.98







100 Davids Drive  
Hauppauge, NY 11788  
Tel: (631) 436-7400

Serial #

1012024

Model #

JP2-26004000-100-20A

Project #

RM0212593

Customer

UNIV. OF CALIFORNIA SAN DIEGO

Customer PO

20349138

Stock #

Voltage (V)

+8V/-8V

Current (mA)

504mA/37mA

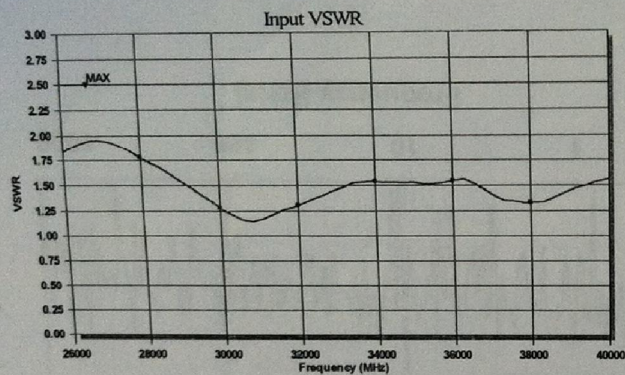
Temp (°C)

23

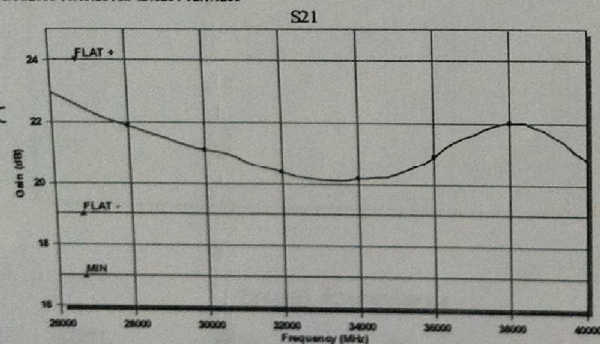
Tested By

JM

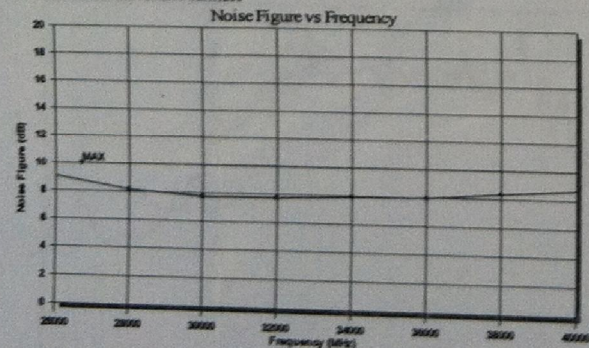
Comments



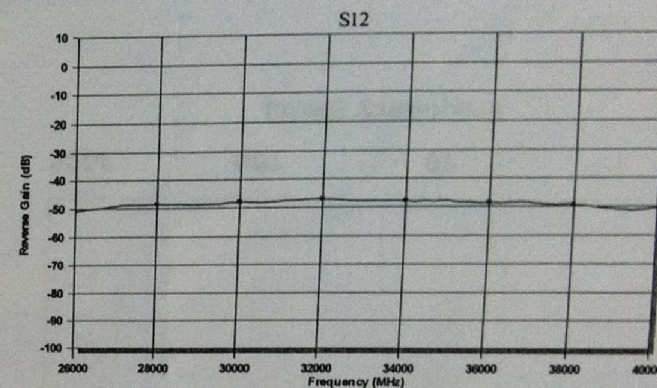
8/14/2006 11:19:28 AM ID:6234 V2.1.1280



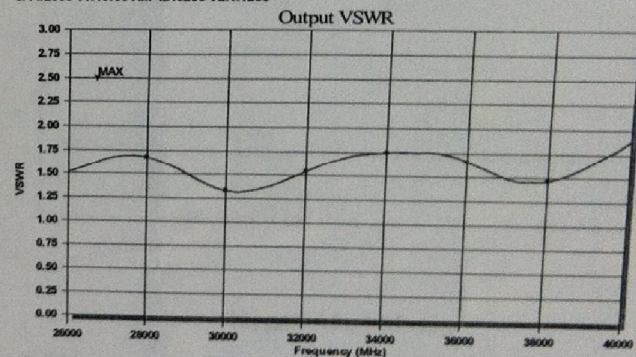
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8/14/2006 11:24:29 AM ID:6238 V2.1.1280



8/14/2006 11:19:33 AM ID:6235 V2.1.1280



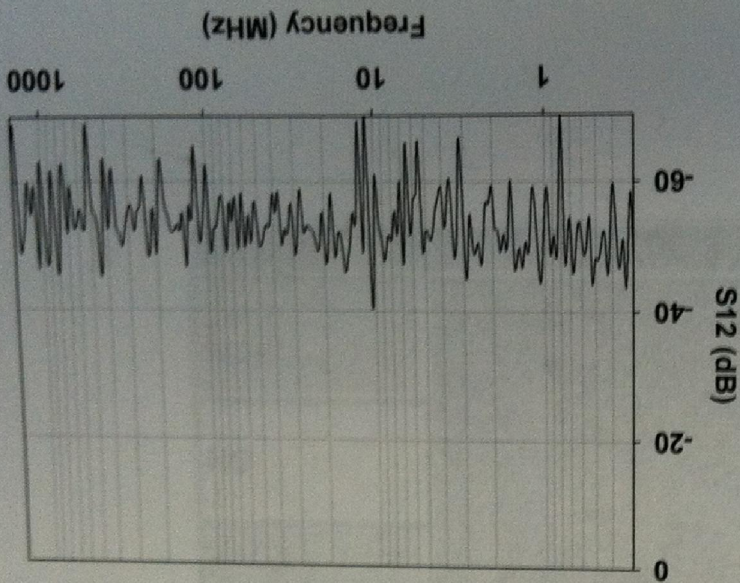
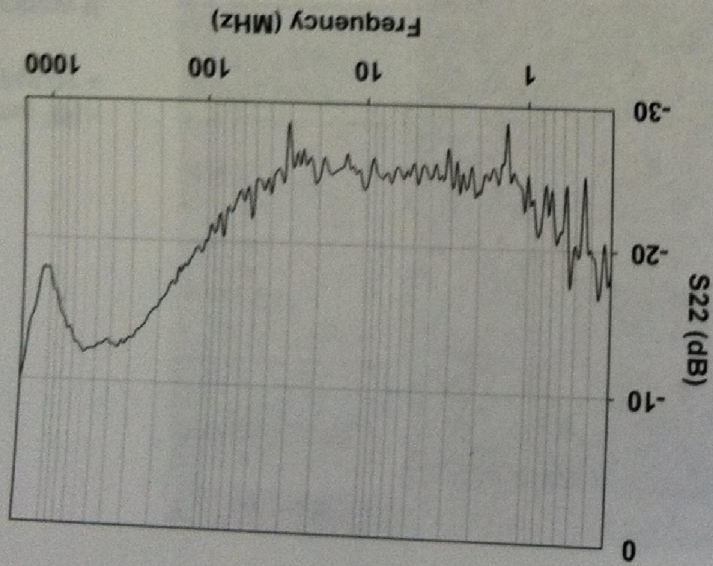
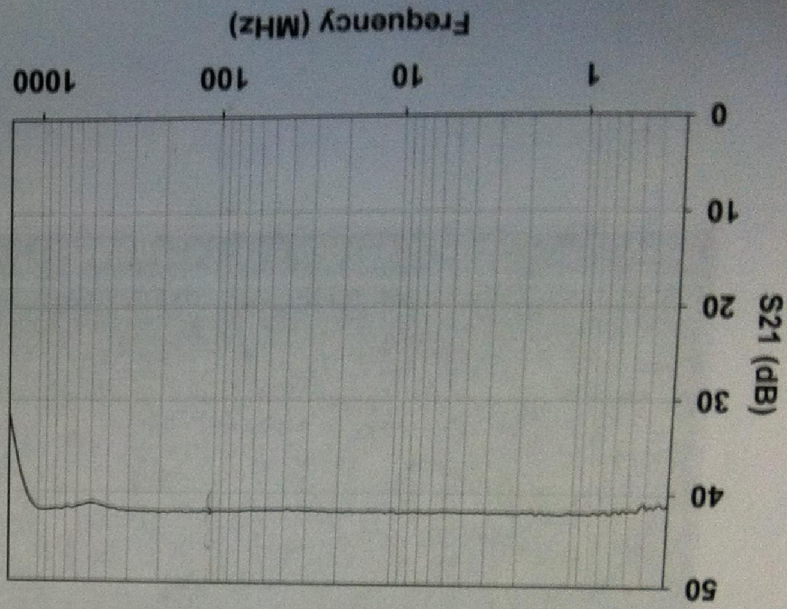
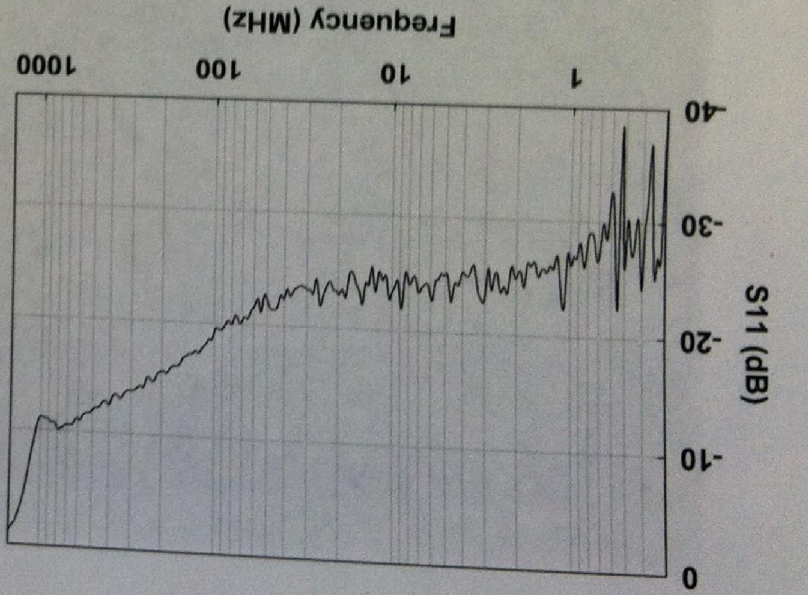
8/14/2006 11:19:40 AM ID:6237 V2.1.1280

Printed On: 8/15/2006 10:30:10 AM

PASS



Miteq AM-1533



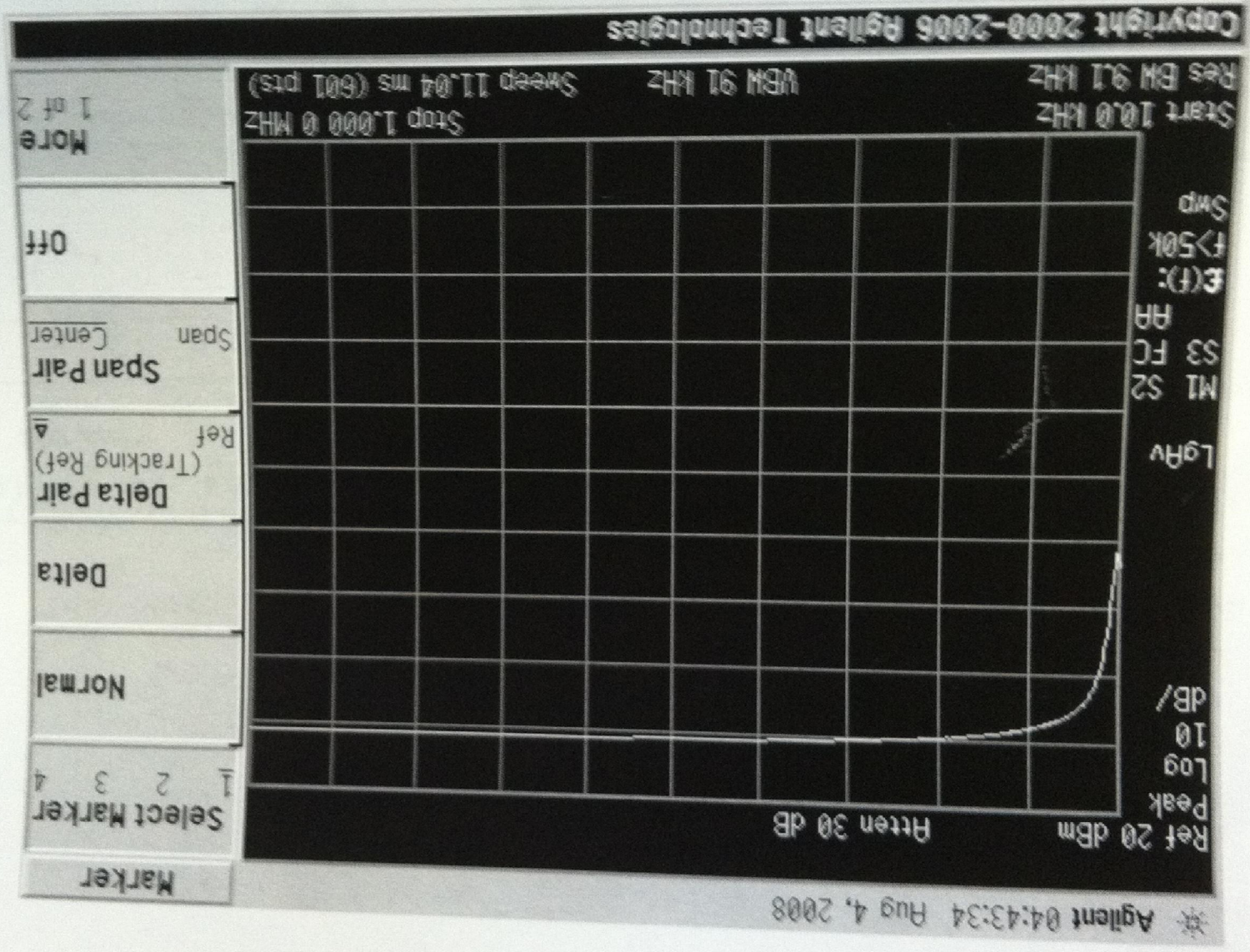
- 15 V DC supply
  - 120 mA total current
  - RF power = -30 dBm
  - 300 kHz - 1.5 GHz
- Mehmet Uzunkol &  
Woorim Shin



# Miteq AM-1533 Low Freq. Gain

- RF power = -30 dBm
- 10 kHz - 1 MHz

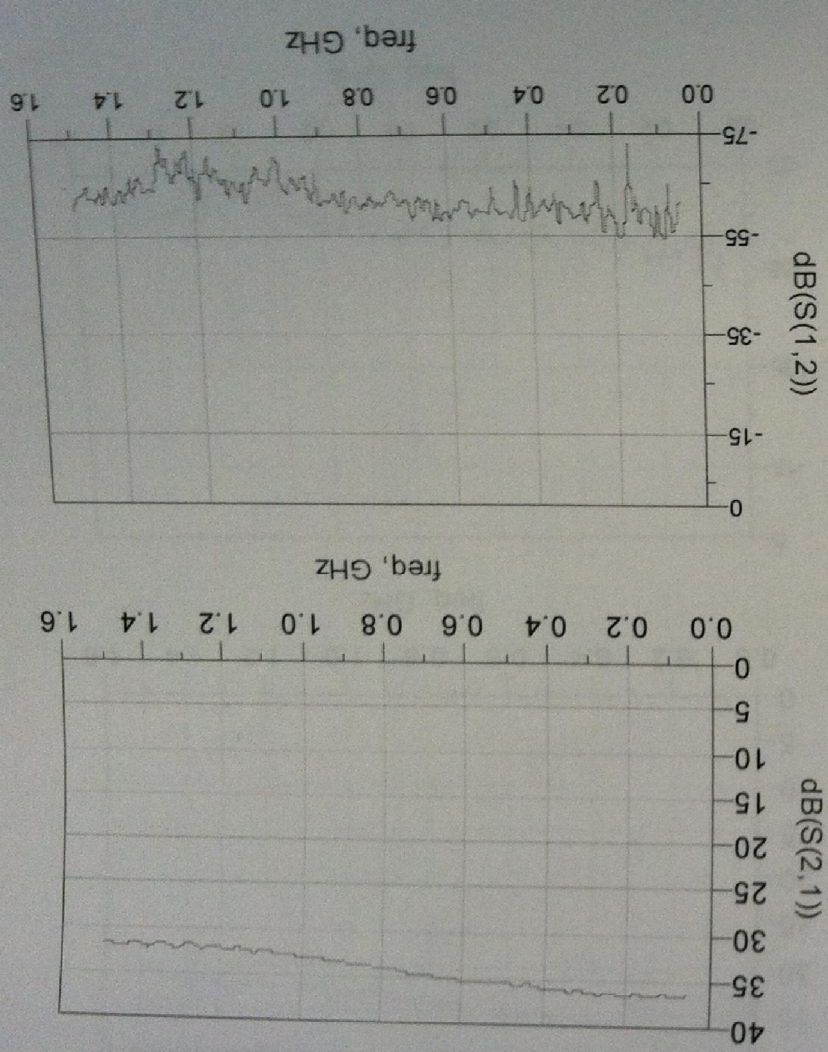
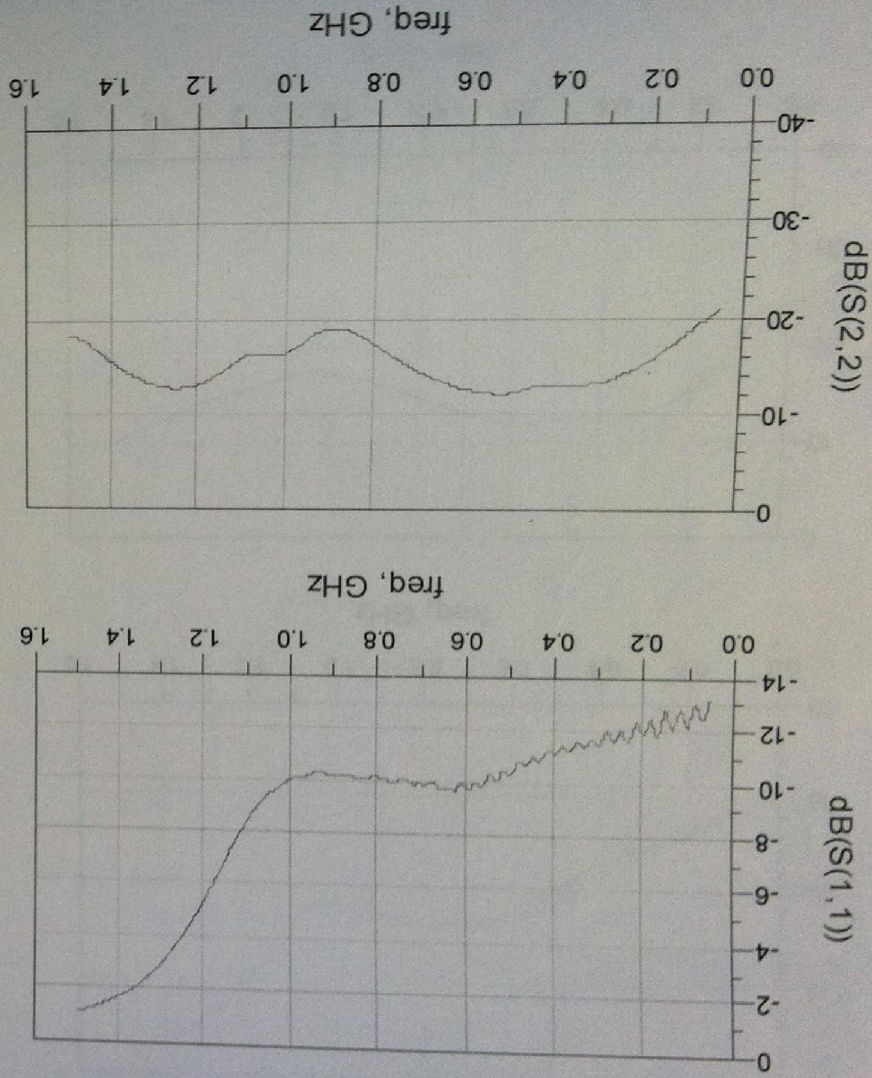
It works down to 50 - 100





# 0.001-1 GHz Miteq AM-1533 Amplifier

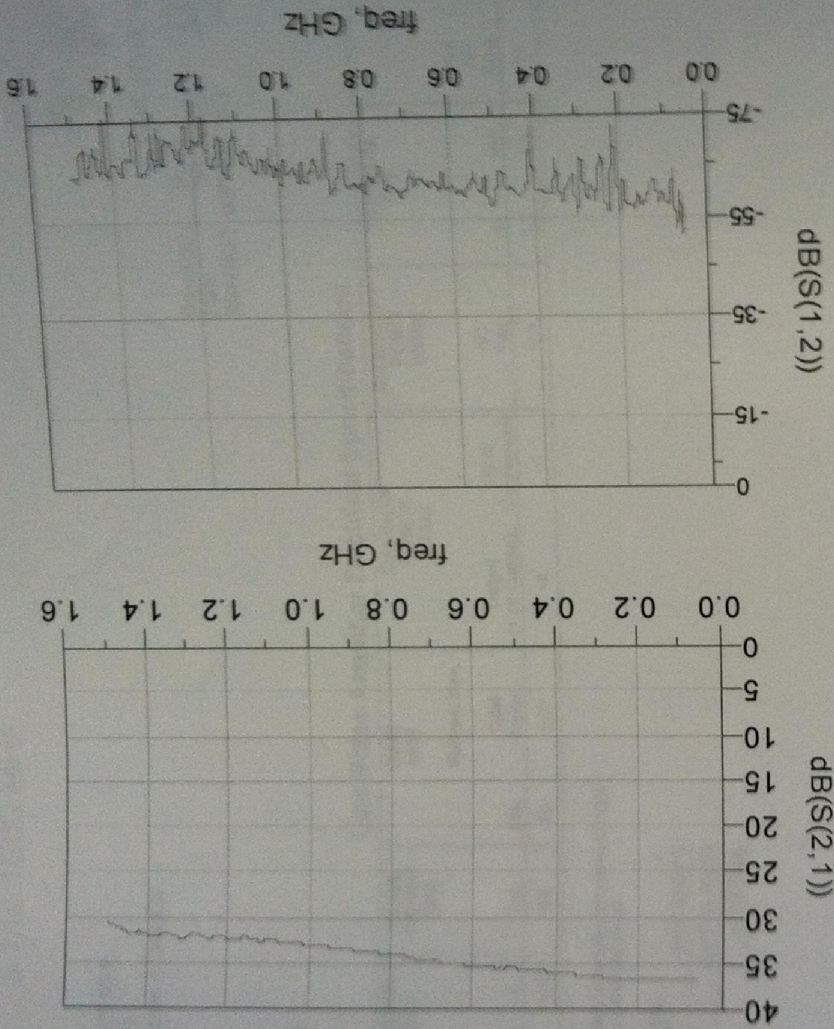
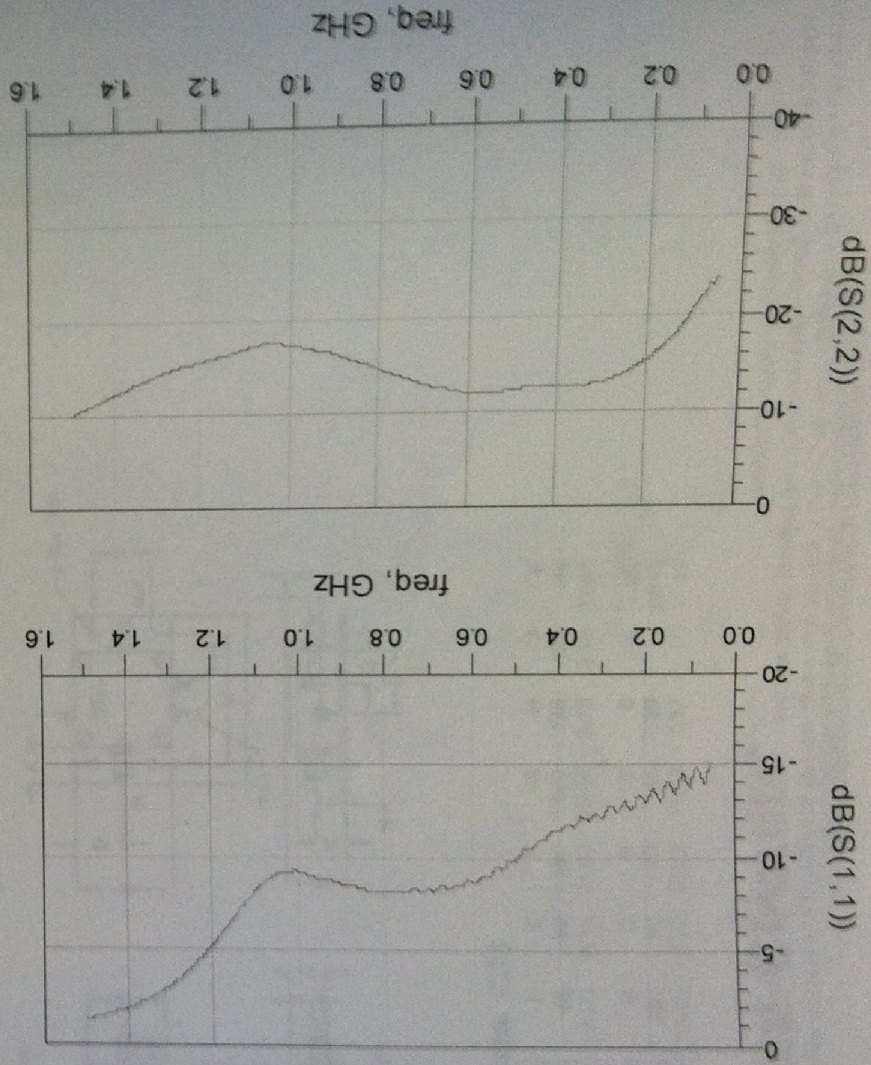
Serial Number: 1118374  
Available units: 2  
Done by: Sang-june  
Date: 26th May 30, 2006





# 0.001-1 GHz Miteq AM-1533 Amplifier

Serial Number: 1118375  
 Available units: 2  
 Done by: Sang-june  
 Date: 26th May 30, 2006





Coaxial

# Low Noise Amplifier

50Ω 0.1 to 1000 MHz

ZFL-1000LN



## Features

- wideband, 0.1 to 1000 MHz
- low noise, 2.9 dB typ.
- protected by US Patent, 6,943,629

## Applications

- VHF/UHF
- cellular
- small signal amplifier

CASE STYLE: Y460

Connectors	Model	Price	QTY.
SMA	ZFL-1000LN	\$89.95	(1-9)
BRACKET (OPTION "B")		\$2.50	(1+)

## Low Noise Amplifier Electrical Specifications

MODEL NO.	FREQUENCY (MHz)	NOISE FIGURE (dB)	GAIN (dB)	MAXIMUM POWER (dBm)		VSWR (1) Typ.	DC POWER	
				Flatness Max.	Output (1 dB Compr.) (no damage)		Volt (V) Nom.	Current (mA) Max.
ZFL-1000LN	0.1 to 1000	Typ. 2.9	Min. 20	Total Range ±0.5	+3	IP3 Typ. +14	In 1.5	Out 2.0
							15	60

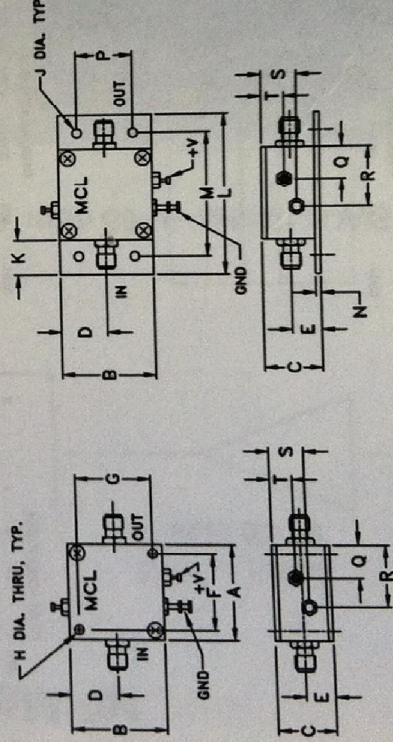
m = mid range [2 fL to fU/2]

Open load is not recommended, potentially can cause damage.  
With no load derate max input power by 20 dB

## Maximum Ratings

Operating Temperature	-54°C to 85°C
Storage Temperature	-55°C to 100°C
DC Voltage	+17V Max.

## Outline Drawing



## Outline Dimensions (inch)

A	B	C	D	E	F	G	H	J	K
1.25	1.25	.75	.63	.36	1.000	1.000	.125	.125	.46
31.75	31.75	19.05	16.00	9.14	25.40	25.40	3.18	3.18	11.68
L	M	N	P	Q	R	S	S	S	wt.
2.18	1.688	.06	.750	.50	.80	.45	.29		grams
55.37	42.88	1.52	19.05	12.70	20.32	11.43	7.37		38

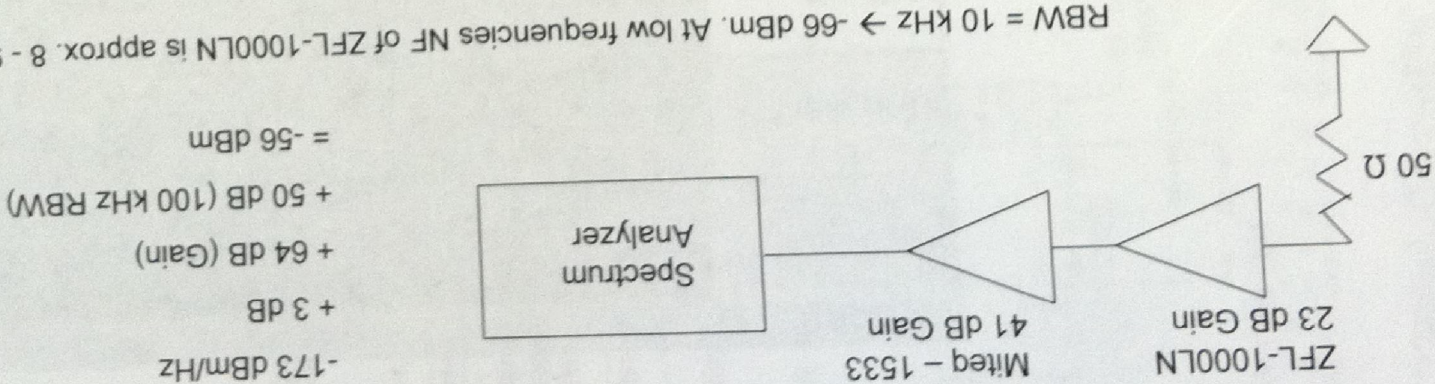
**Mini-Circuits®**

INTERNET <http://www.minicircuits.com>  
P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4561  
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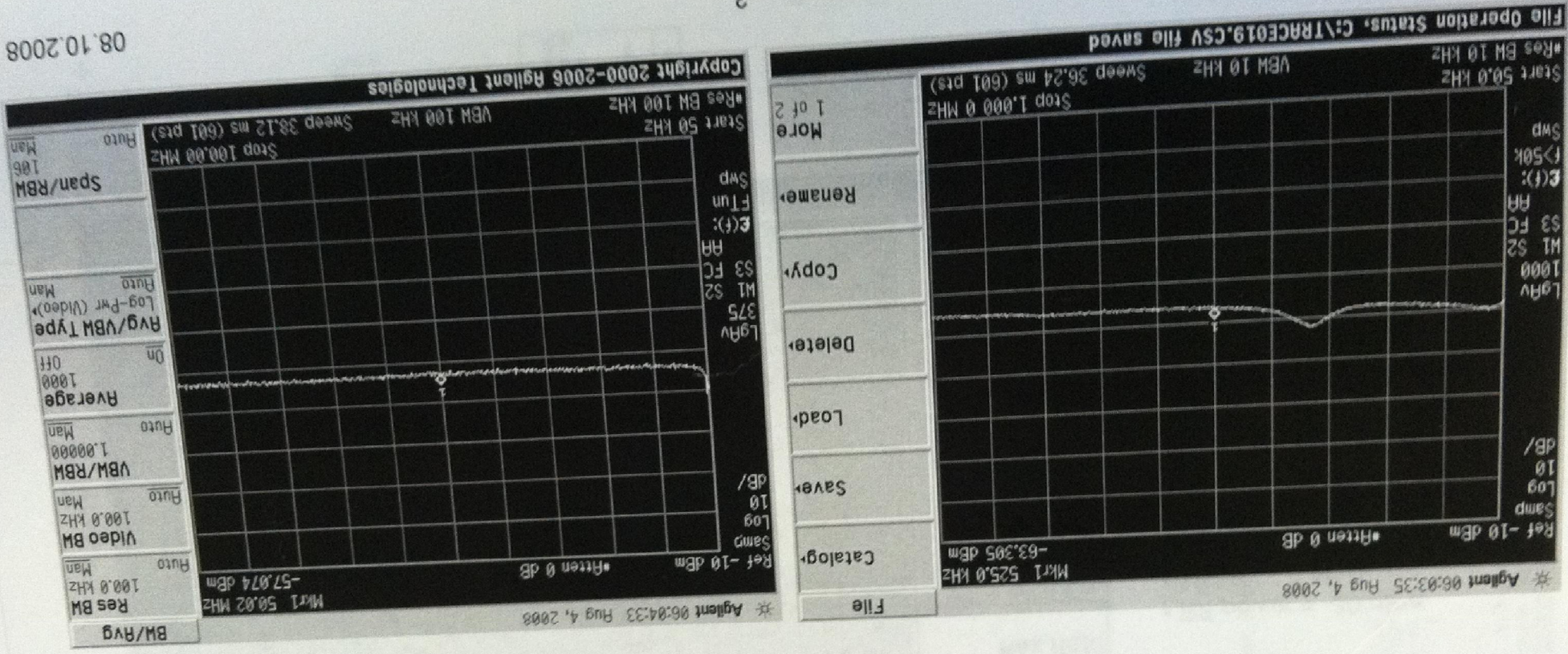
Mini-Circuits ISO 9001 & ISO 14001 Certified



NF Meas. of ZFL-1000LN

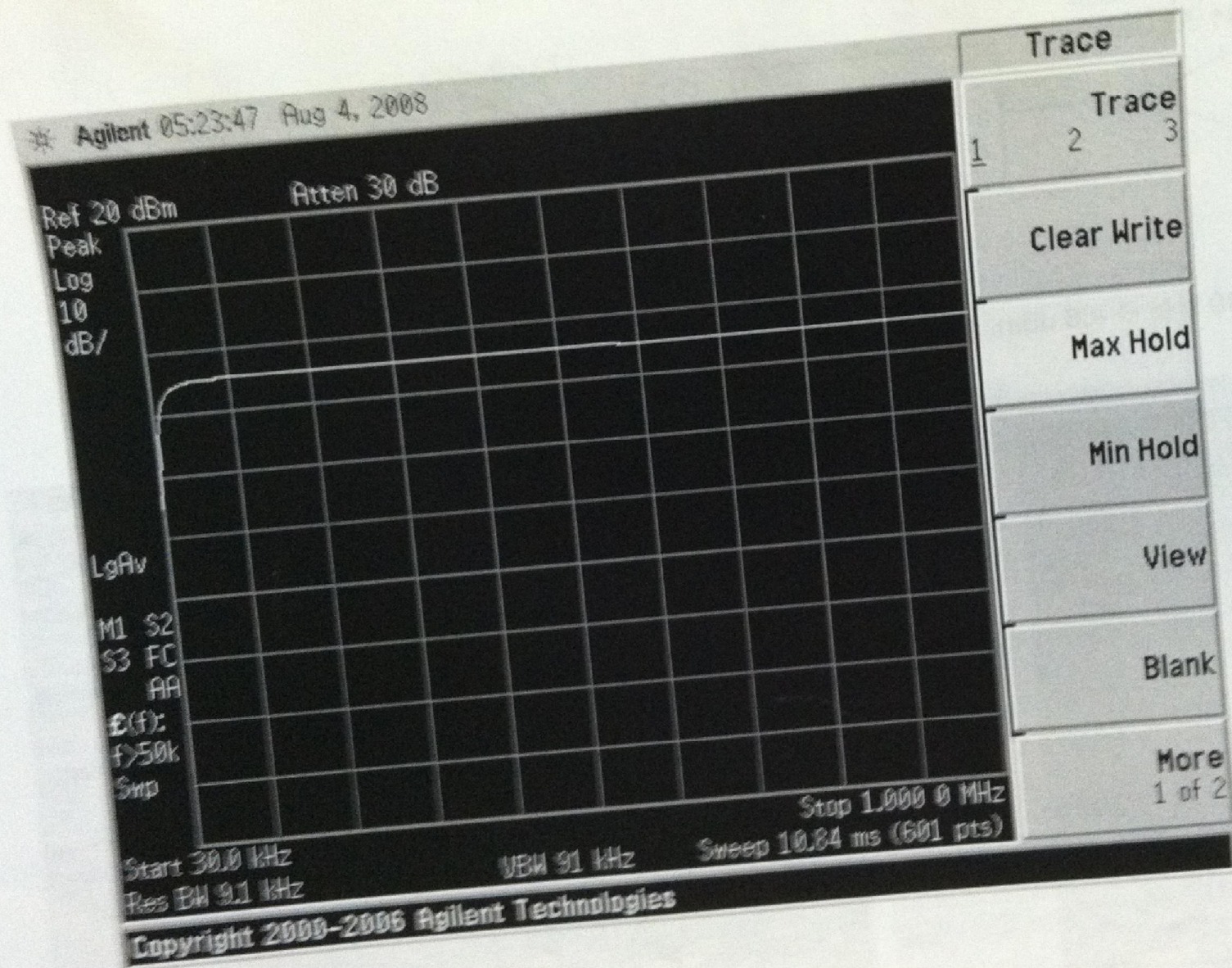


RBW = 10 kHz  $\rightarrow$  -66 dBm. At low frequencies NF of ZFL-1000LN is approx. 8 - 9 dB





# ZFL-1000LN Low Freq. Gain



- RF power = -30 dBm
- 30 kHz – 1 MHz

It works down to 50 kHz



# Connectorized Amplifier

50Ω, 20 MHz to 6 GHz

## Features

- Wide Bandwidth, 20 MHz to 6 GHz
- Low Noise Figure, 3.3 dB Typ.
- Protected by US Patent 6,790,049

## Applications

- Buffer Amplifier
- Cellular
- PCS
- Lab
- Instrumentation
- Test Equipment

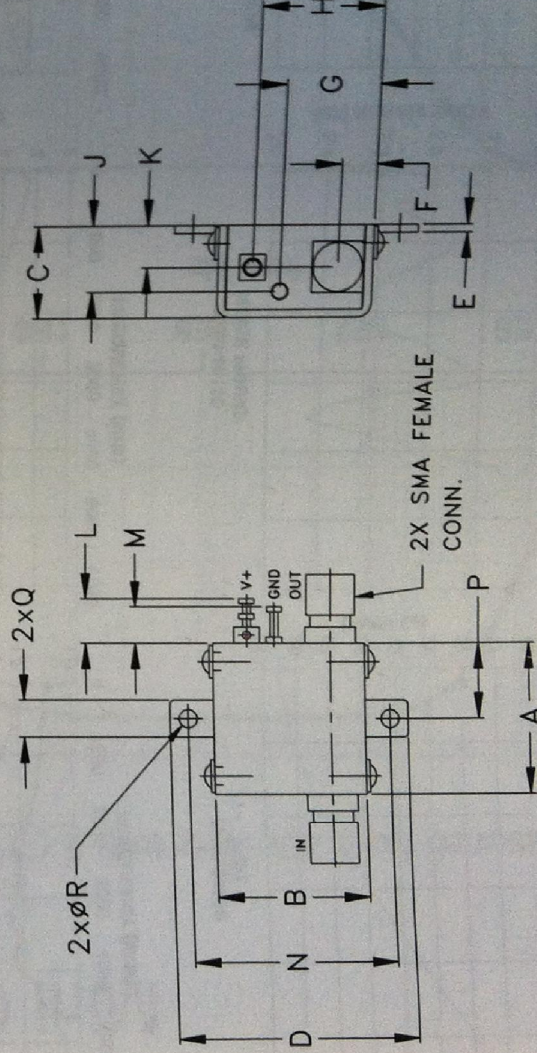
## Electrical Specifications at $T_{AMB} = 25^{\circ}\text{C}$

Electrical Specifications at $T_{AMB} = 25^{\circ}\text{C}$																				
MODEL NO.	FREQ. (GHz)	DC VOLTAGE @ Pin $V_+$ (V)	GAIN over frequency in GHz Typ (dB)					MAXIMUM POWER (dBm) Output (1 dB Comp.) Typ. $f_L$ - $f_u$		DYNAMIC RANGE NF IP3 (dB) (dBm) Typ. $f_L$ - $f_u$	VSWR (:1) Typ.		ACTIVE DIRECTIVITY (dB) Isolation-Gain	DC OPERATING CURRENT @ Pin $V_+$ (mA) Typ. Max.						
	$f_L$ - $f_u$		0.1	1.0	2.0	3.0	4.0	5.0	6.0	Min.at 2 GHz		$f_L$ -3 GHz 3- $f_u$ GHz In Out $f_L$ -3 GHz 3- $f_u$ GHz	Typ.							
ZX60-6013E(+)	0.02-6	12.0	16.2	15.9	15.2	14.3	13.4	12.7	12.1	13.0	13.4	5.8	3.3	28.7	1.4	1.6	1.2	1.2	39	50

## Maximum Ratings

Operating Temperature	-45°C to 85°C
Storage Temperature	-55°C to 100°C
DC Voltage	12.5V
Input Power(no Damage)	15dBm
Power	650mW

## Outline Drawing



## Outline Dimensions (Inch/mm)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	WL
	.74	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.18	1.00	0.37	.18	.09	.09	grams
	18.8	19.1	11.6	30.0	1.0	4.3	11.4	14.9	8.3	5.3	5.6	4.6	25.4	9.4	4.6	2.3	23.0	

ZX60-6013E+  
ZX60-6013E



CASE STYLE: GC957

Connectors	Model	Price	Qty.
SMA	ZX60-6013E-S+	\$49.95 ea.	(1-9)
SMA	ZX60-6013E-S	\$49.95 ea.	(1-9)

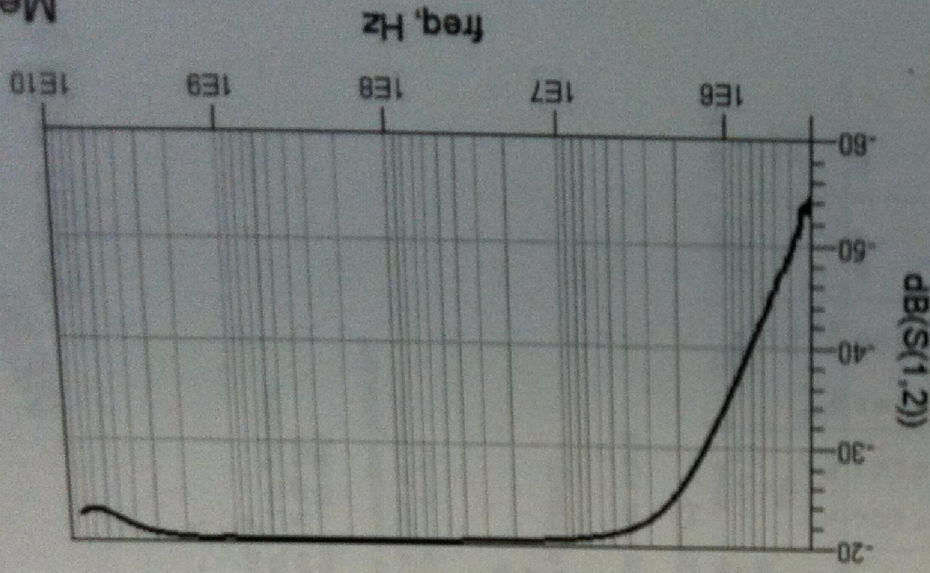
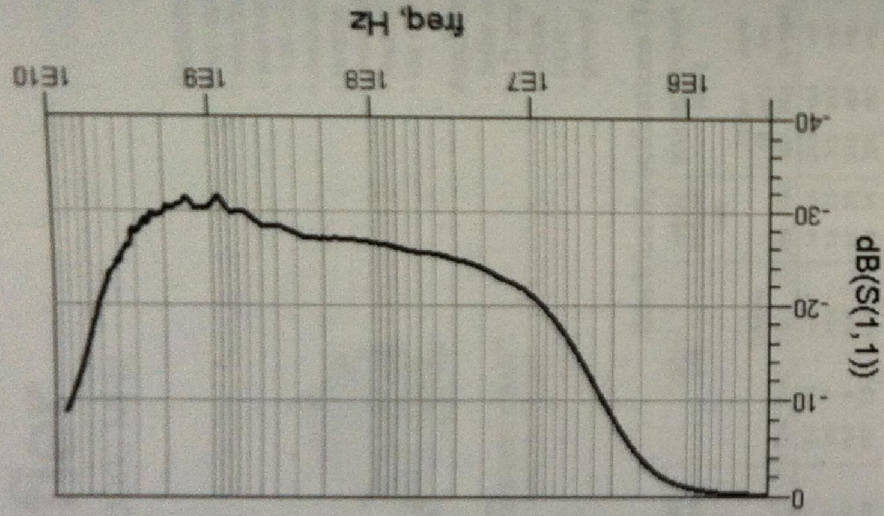
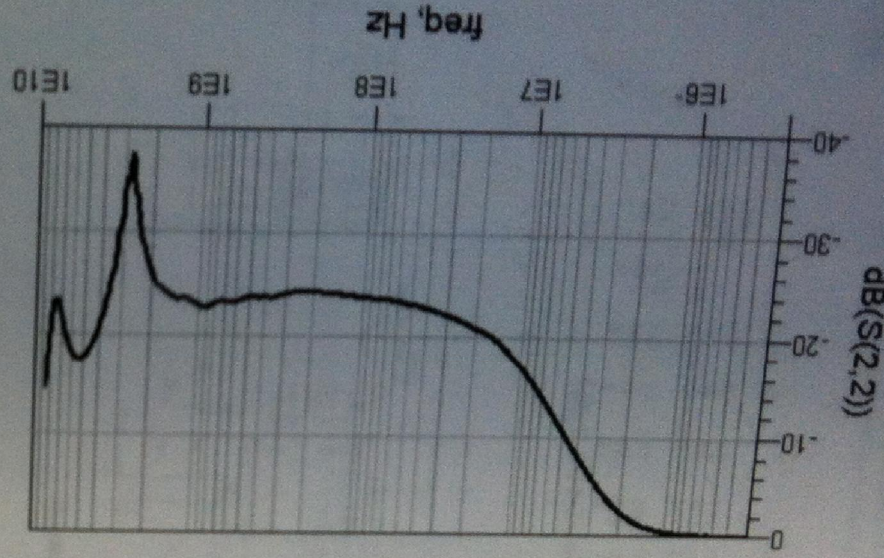
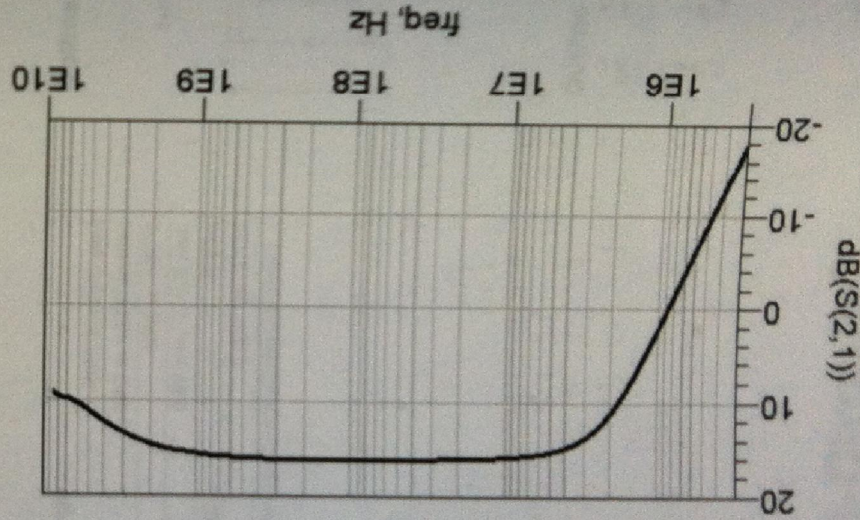
+ RoHS compliant in accordance  
with EU Directive (2002/95/EC)

This + suffix identifies RoHS Compliance. See our web site  
for RoHS Compliance methodologies and qualifications.



# Mini Circuits ZX60-6013E

Measured from 300 kHz to 8.5 GHz, it draws 40 mA current





Low Noise

# Amplifier

50Ω 400 to 3000 MHz

NEW! ZX60-3011



**BLUE CELL™**  
CASE STYLE GC857

- Features**
- high dynamic range
  - wide bandwidth, 0.4 to 3.0 GHz
  - low noise figure 1.5 dB typ.
  - 1dB compression, +19 dBm
  - medium IP3
  - reverse voltage connection protected
  - over-voltage transient protected
  - thermal over-load protected
  - low cost

- Applications**
- buffer amplifier
  - LO amplifiers for mixers
  - cellular
  - PCN
  - general purpose small signal

## Electrical Specifications (T<sub>AMB</sub> = 25°C)

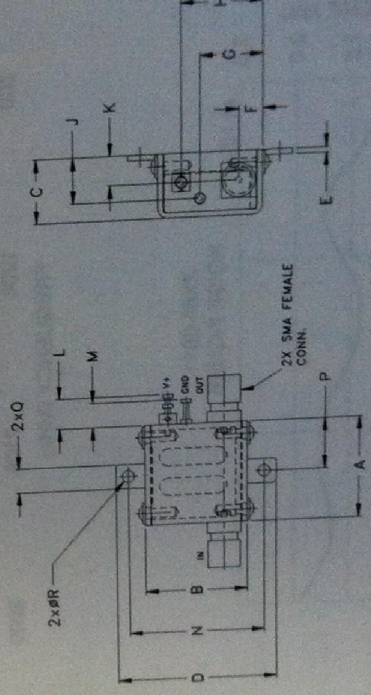
MODEL NO.	FREQ. (GHz)	GAIN (dB)		NOISE FIGURE (dB)	MAXIMUM POWER (dBm)		INTER-CEPT POINT (dBm)	VSWR (-1)		DC POWER		CASE STYLE	PRICE \$ QTY. (1-9)
		Typ.	Min.	Typ.	Output (1 dB Comp.)	Input (no damage)		Typ.	In	Typ.	Max. Current (mA)		
ZX60-3011	f <sub>c</sub> - f <sub>0</sub>												
	0.4-1.0	15.0	12	1.4	21.5	+15	31	1.7	1.6	12	120	GC857	139.95
	1.0-1.7	13.5	11	1.5	21.5	+15	31	1.7	1.6	12	120		
	1.7-2.4	11.5	9	1.7	21.0	+15	31	1.7	1.6	12	120		
	2.4-3.0	10.0	7.5	1.8	20.4	+15	31	1.7	1.6	12	120		

## Maximum Ratings

Operating Temperature	-40°C to +85°C case -40°C to +60°C ambient
Storage Temperature	-55°C to +100°C
DC Voltage	6.5V min. to 15V max.
Input Power (no damage)	15 dBm
Power	1.12W typ at 12V

\* Other voltages available in the 6.5 to 20V range, please contact factory.

## Outline Drawing



## Outline Dimensions (Inch mm)

A	B	C	D	E	F	G	H	J
0.74	.75	.46	1.18	.04	.17	.45	.59	.33
18.6	19.1	11.6	30.0	1.0	4.3	11.4	14.9	8.3
K	L	M	N	P	Q	R		wt. grams
.21	.22	.18	1.00	.37	.18	.00		23.0
5.3	5.6	4.6	25.4	9.4	4.6	2.3		