

# **5.25GHZ Antenna Radiation**

## **Test Pattern**

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Feb 04, 2002

## Antenna Radiation Patterns

1. Plot 1 – Horn to Horn calibration.
2. Plots 2,3 – POC antenna radiation pattern.
3. Plots 4,5 – Circular antenna radiation pattern.
4. Plots 6,7 – SkyCross patch antenna (222-0189) radiation pattern.
5. Plots 8,9 – SkyCross omni directional antenna (222-0403) radiation pattern.
6. Plots 10,11 – SkyCross block antenna (222-0252) radiation pattern.
7. Plots 12,13 – Dipole antenna radiation pattern.
8. Plots 14,15 – Annular slot antenna radiation pattern.

### Set up:

1. Outdoor (Magis building east side parking lot).
2. Antenna distance about 2.5 meters
3. Antenna height from ground about 1 meter
4. Reference antennas = Wideband horn type
5. Rotator set at constant speed while measurement taken

### Note:

The rotator was a replacement and did not rotate at very constant speed. This caused measurement error and start/end points not meeting.



# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

Begin Freq (MHz) End Freq. (MHz)

5000

5500

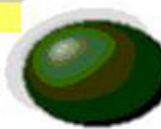
Step (MHz)

5

Variation  
Detection

100.00

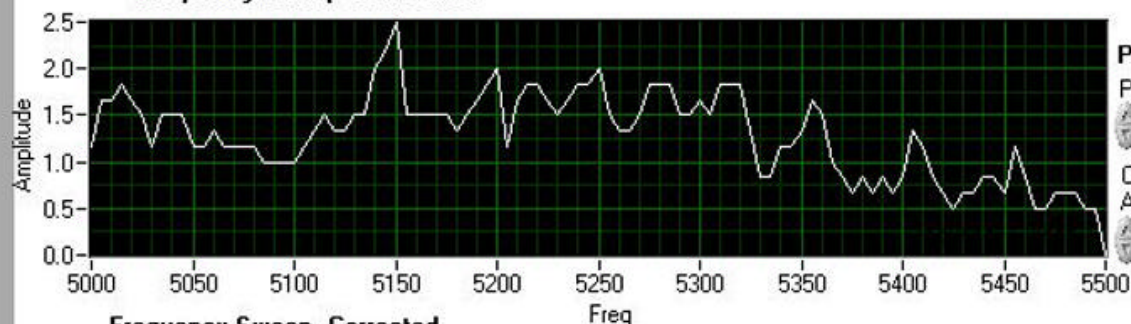
Progress Bar



## Antenna Details:

tx-newhorn,rx-oldhorn

### Frequency Sweep- Calibration



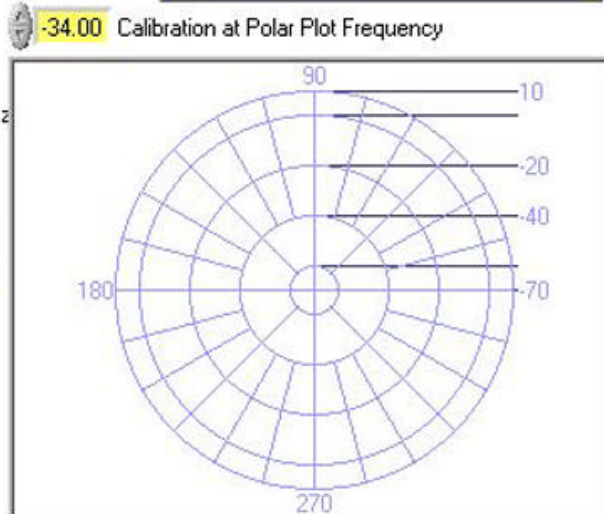
### Polar Plot 1

Plot1 Freq (MHz)

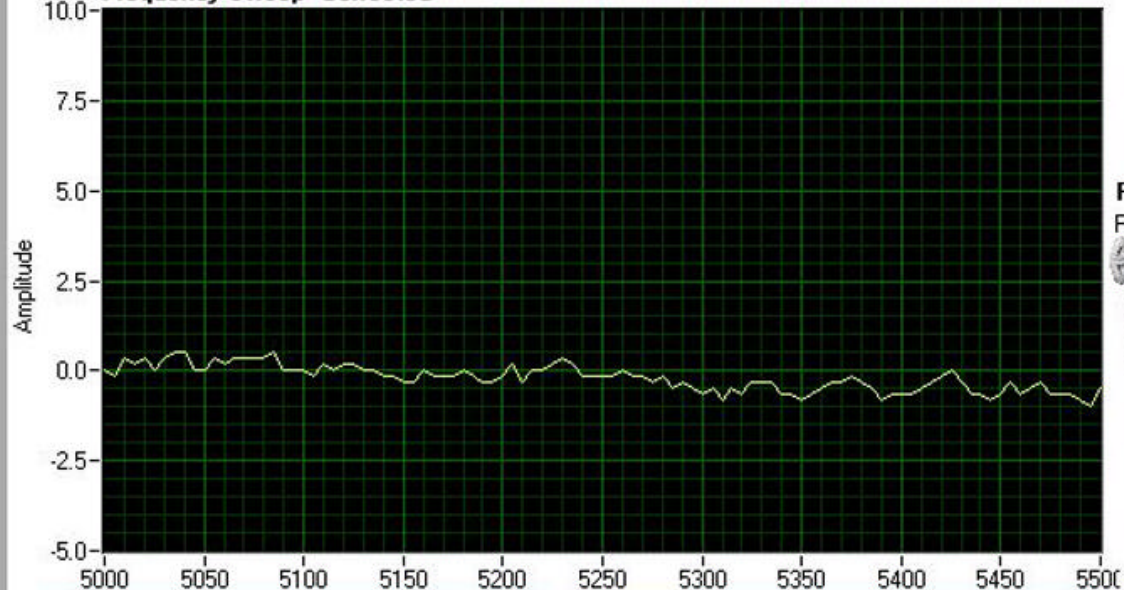
5250

Calibration  
Antenna Gain

0.00



### Frequency Sweep- Corrected



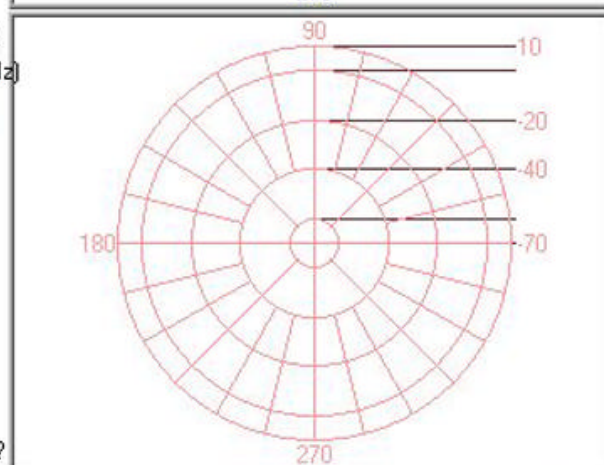
### Polar Plot 2

Plot2 Freq (MHz)

5250

Offset  
36.33

Variation  
Detected?



Current Freq 5500

Correction -36.33

Calibrated



Current Amplitude -36.83

Adjusted Amplitude -0.50

Current Phase 0.00

Current Amplitude 0.00

Report Directory:

C:\reports

SMIQ Address

28

SA Address

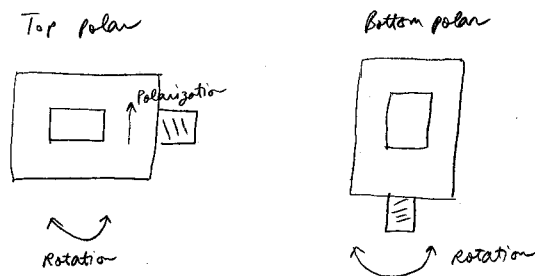
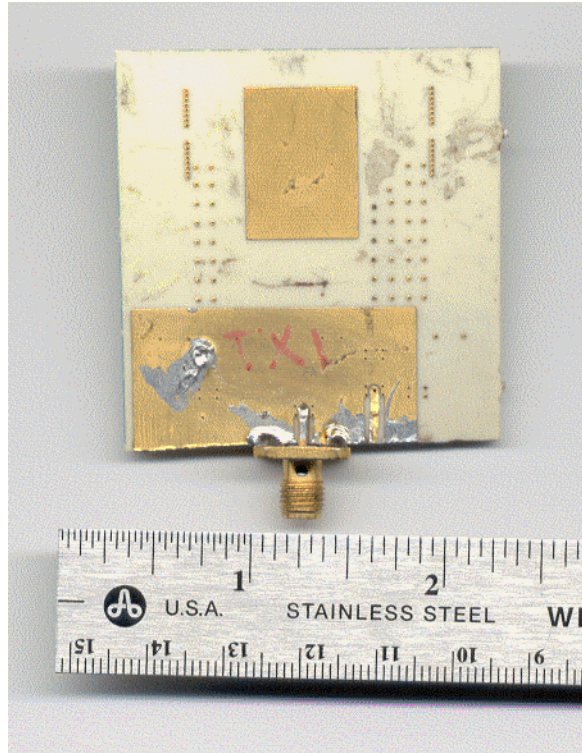
18

max value

0.00

# POC Antenna

## Radiation Pattern



Peak gain = +6.5 dBi at 5325MHz  
Ripple across passband = +/- 1dB  
Horizontal and Vertical polarization isolation = > 25dB

Notes:

- 1) Due to antenna mounting mechanism, polar plot is not symmetrical.
- 2) Relatively large ground plane provides higher gain than small antenna.
- 3) Ground size being used is quite normal for PCMCIA card packaging.





# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

Begin Freq (MHz)  End Freq. (MHz)  Step (MHz)  Variation Detection

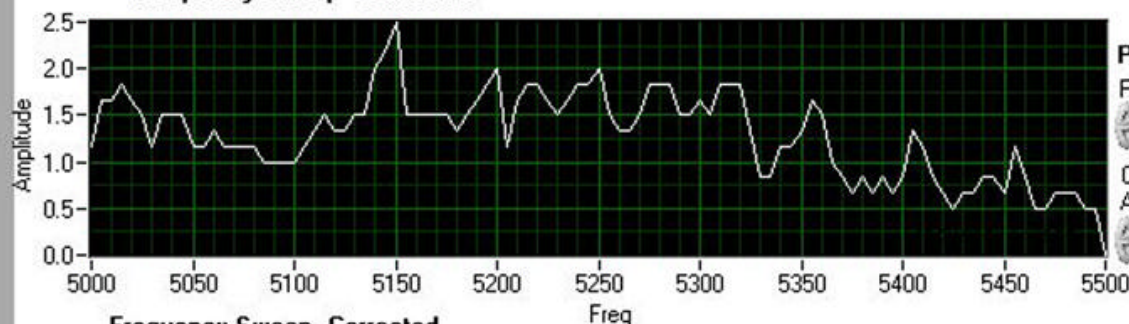
Progress Bar



## Antenna Details:

tx-newhorn,rx-poc

Calibration at Polar Plot Frequency

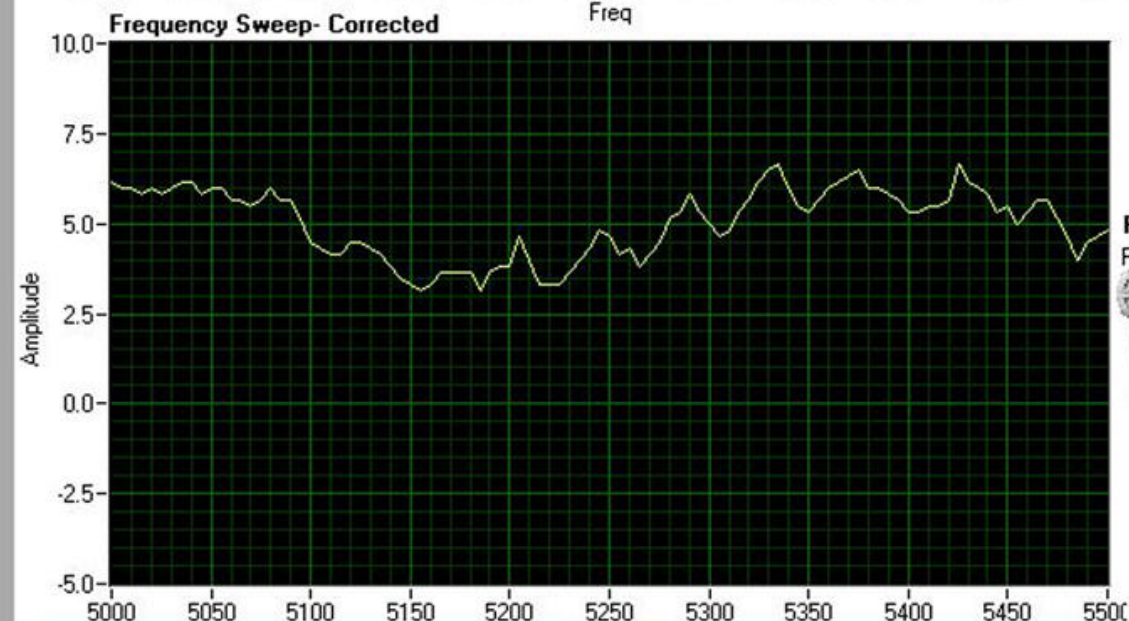
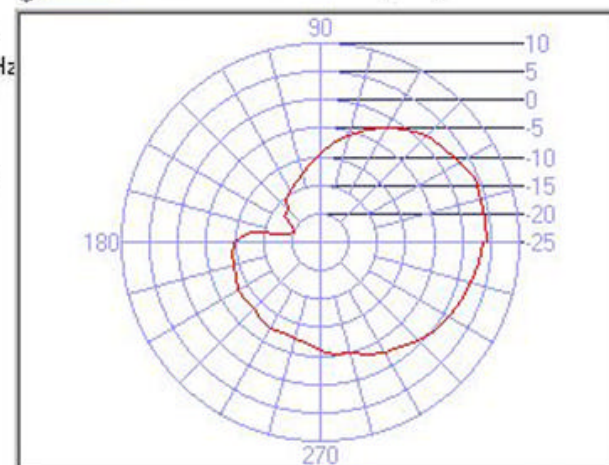


## Polar Plot 1

Plot1 Freq (MHz)

Calibration

Antenna Gain

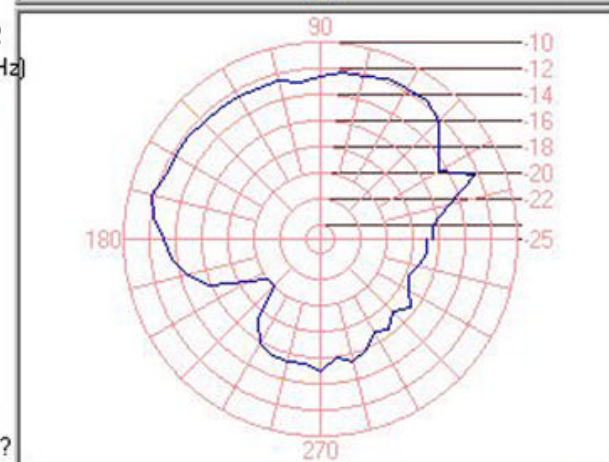


## Polar Plot 2

Plot2 Freq (MHz)

Offset

Variation Detected?



Current Freq

Correction

Calibrated



Current Amplitude

Adjusted Amplitude

Current Phase

Current Amplitude

Report Directory:

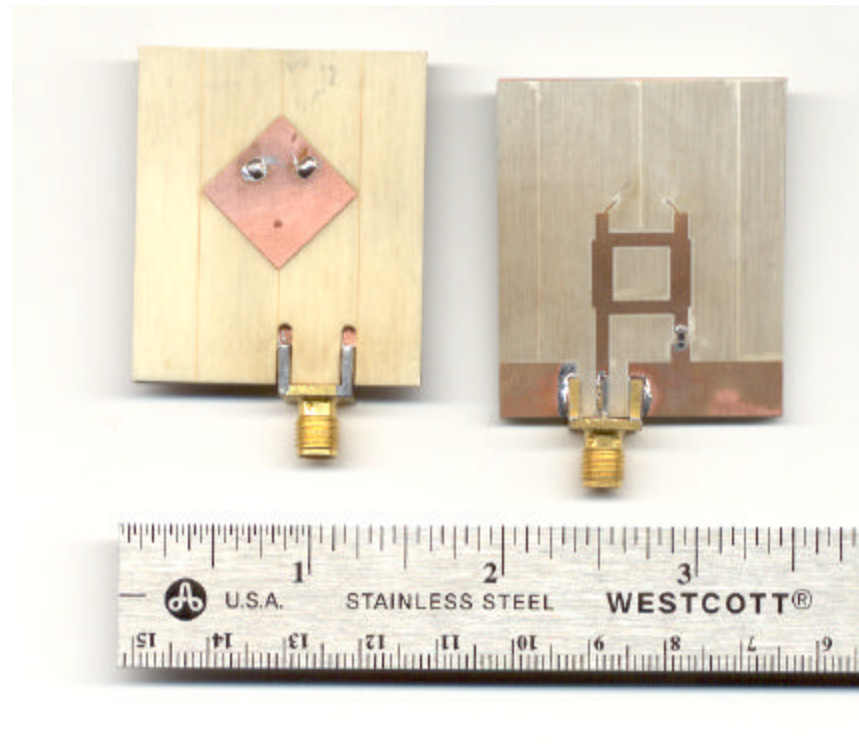
SMIQ Address

SA Address

max value

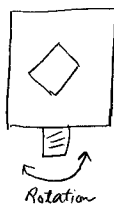
## Circular Polarized

### Patch Antenna

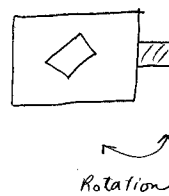


Peak gain = +4.5 dBi (assuming perfect cross polarization) at 5325MHz  
Gain ripple across passband = 1.5 dB peak to peak  
Horizontal and Vertical polarization difference = 1dB

*Top Polar*



*Bottom Polar*








# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

Begin Freq (MHz)  End Freq. (MHz)  Step (MHz)  Variation Detection

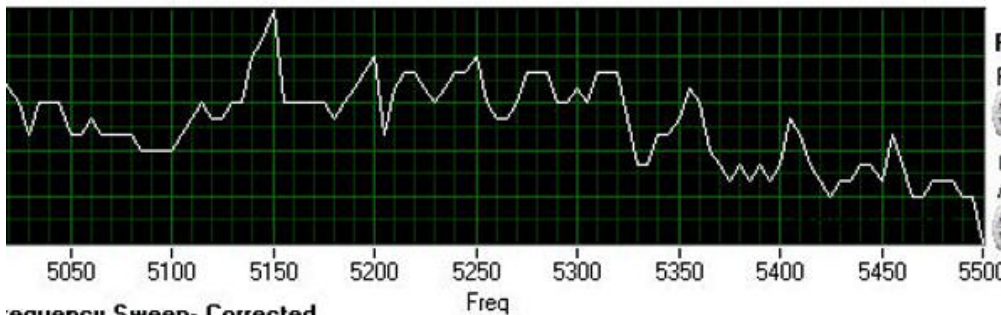
Progress Bar 



## Antenna Details:

tx-newhorn,rx-circular

### Frequency Sweep- Calibration



### Polar Plot 1

Plot1 Freq (MHz)

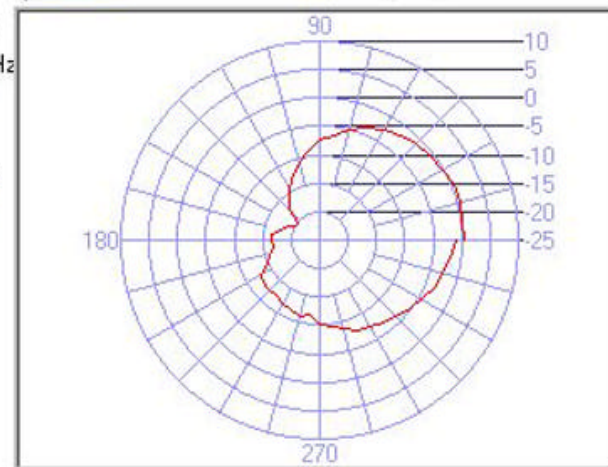
5250

Calibration

Antenna Gain

10.80

-34.00 Calibration at Polar Plot Frequency



### Frequency Sweep- Corrected



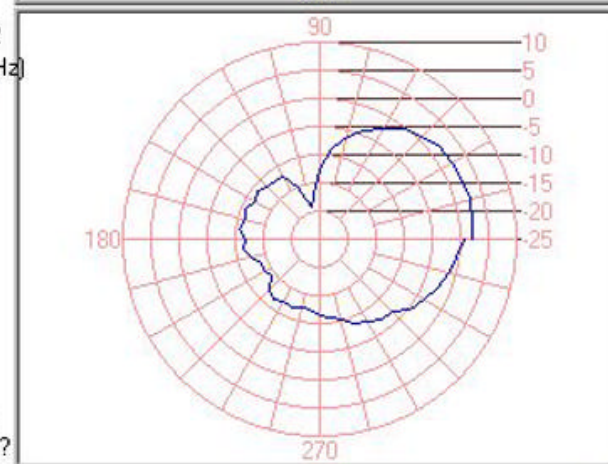
### Polar Plot 2

Plot2 Freq (MHz)

5250

Offset

36.33



Current Freq  Correction  Calibrated ☐

Current Amplitude  Adjusted Amplitude

Variation Detected? ☐

Current Phase  Current Amplitude

Directory:

ports

SMIQ Address  SA Address  max value

polar attribut

maximum

minimum

clip to min

log

grid color

plot color

polar attribut

maximum

minimum

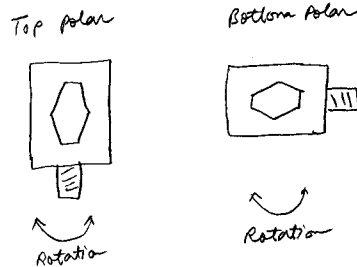
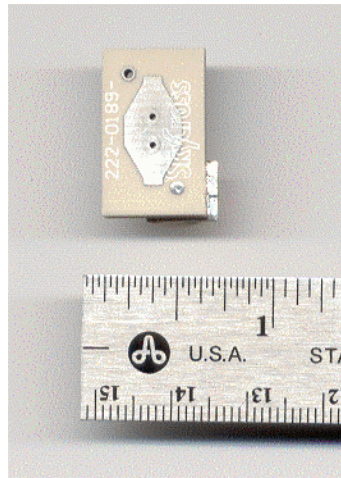
clip to min

log

grid color

plot color

## SkyCross Patch Antenna (222-0189) Radiation Pattern



Peak gain = +1.5 dBi at 5200MHz  
Gain ripple across passband = +/- 1.5dB  
Horizontal and Vertical polarization isolation = >20dB  
Front to Back gain difference = > 5dB  
Front to side gain difference = 5dB





# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

Begin Freq (MHz) End Freq. (MHz)

5000

5500

Step (MHz)

5

Variation  
Detection

100.00

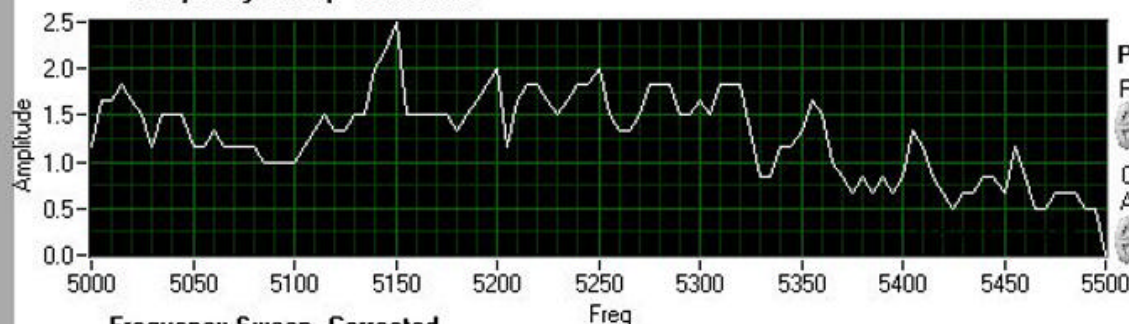
Progress Bar



Antenna Details:

tx-newhorn,rx-skycrosspatch

Frequency Sweep- Calibration



Frequency Sweep- Corrected



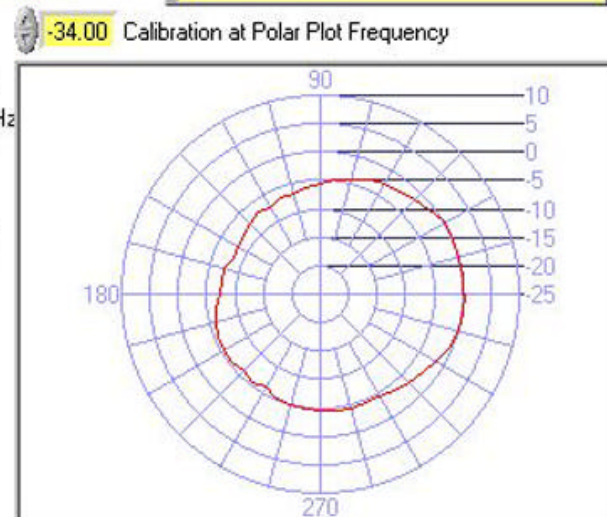
Polar Plot 1

Plot1 Freq (MHz)

5250

Calibration  
Antenna Gain

10.80



Polar Plot 2

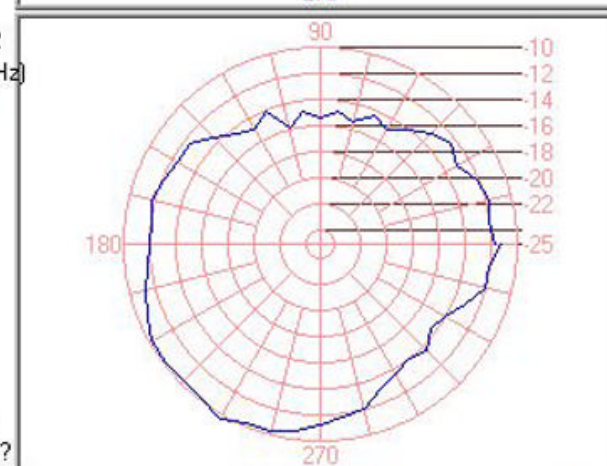
Plot2 Freq (MHz)

5250

Offset

36.33

Variation  
Detected?



Current Freq 5500

Correction -36.33

Calibrated



Current Amplitude -46.16

Adjusted Amplitude 0.97

Current Phase 360.00

Current Amplitude -11.20

Report Directory:

C:\reports

SMIQ Address

28

SA Address

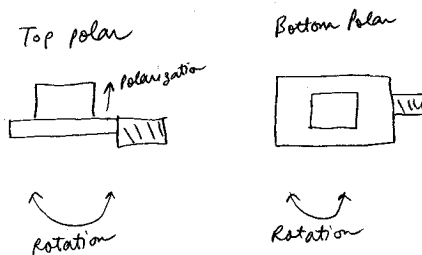
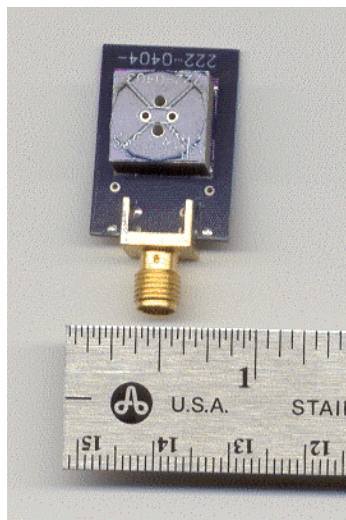
18

max value

-56.00

## SkyCross omni directional (222-0403) Antenna

### Radiation Pattern



Peak gain = +2dBi at 5325MHz

Gain ripple across passband = 2dB peak to peak

Horizontal to Vertical polarization isolation = 20dB

Gain difference between x and y direction = 3dB





# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

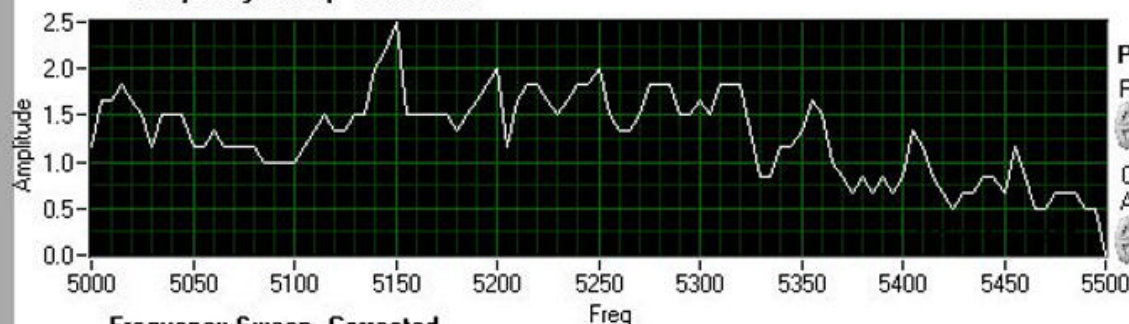
Begin Freq (MHz)  End Freq. (MHz)  Step (MHz)  Variation Detection



## Antenna Details:

tx-newhorn,rx-skycrossomn\_up\_side

Frequency Sweep- Calibration

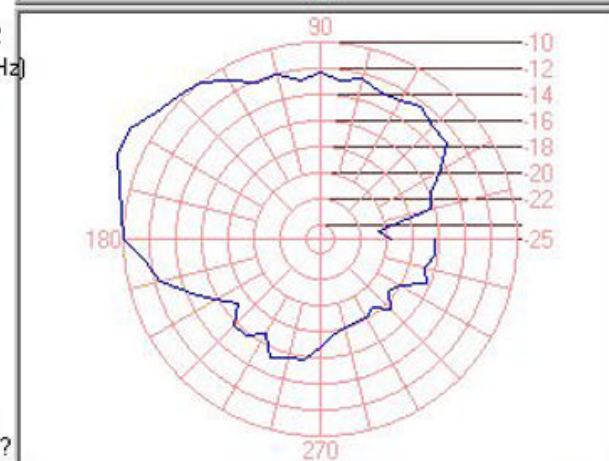
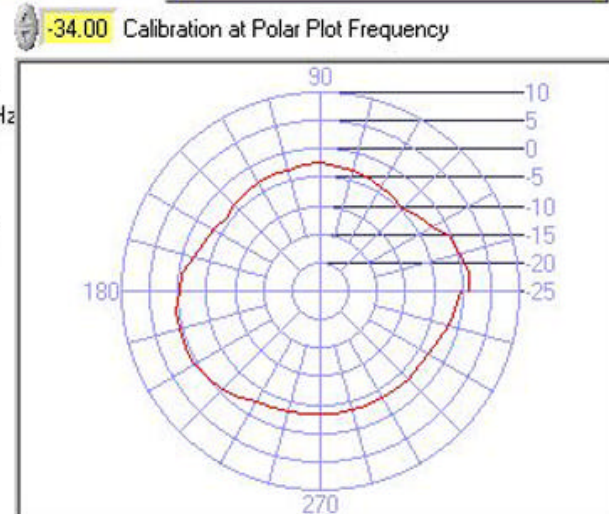


## Polar Plot 1

Plot1 Freq (MHz)

Calibration

Antenna Gain



## Polar Plot 2

Plot2 Freq (MHz)

Offset

Variation Detected?



Frequency Sweep- Corrected



Current Freq

Correction

Calibrated



Current Amplitude

Adjusted Amplitude

Current Phase

Current Amplitude

Report Directory:

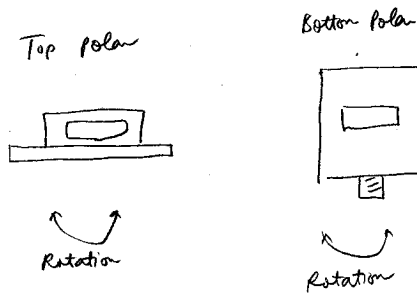
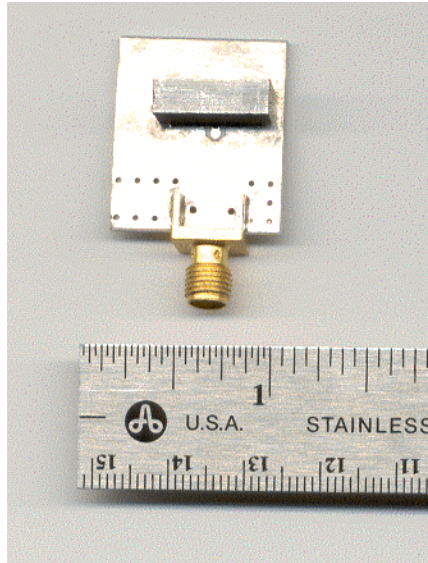
SMIQ Address

SA Address

max value



## SkyCross Block Antenna (222-0252) Radiation Pattern



Peak gain = +0.5 dBi at 5200MHz  
Gain ripple across passband = 1.25dB peak to peak



## ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot Generate Report

Begin Freq (MHz) End Freq (MHz)

5000

5500

Step (MHz)

5

Variation  
Detection

100.00

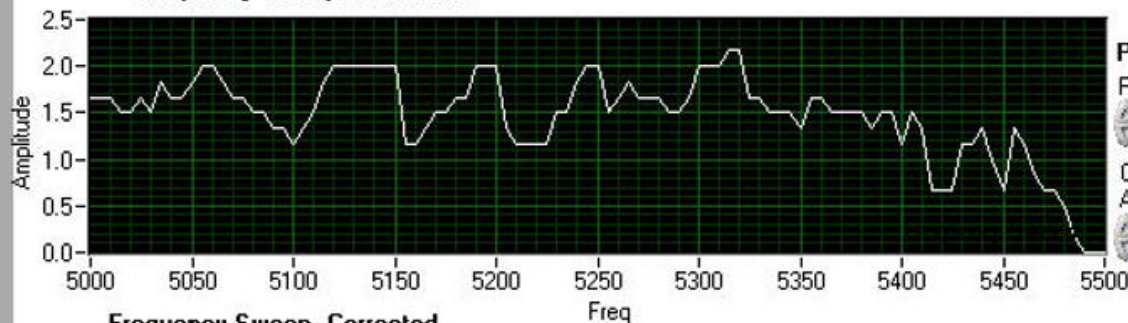
Progress Bar



### Antenna Details:

skycrossblock front up

### Frequency Sweep- Calibration



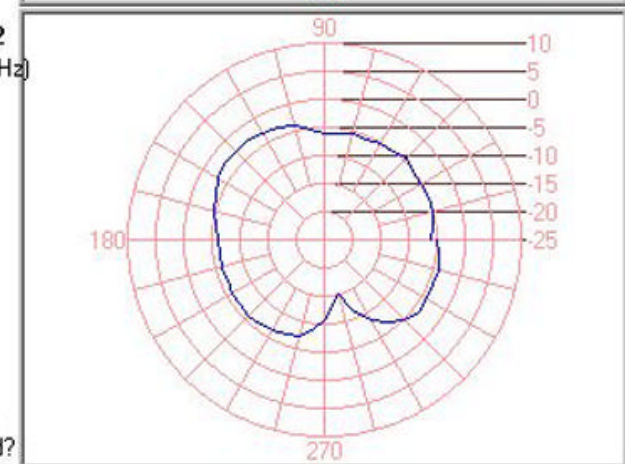
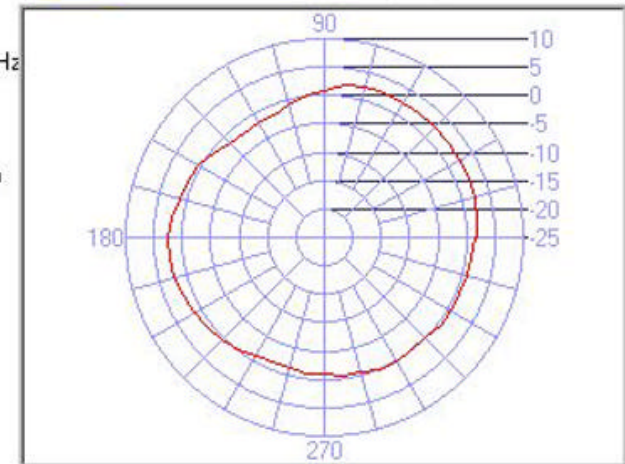
### Polar Plot 1

Plot1 Freq (MHz)

5250

Calibration  
Antenna Gain

10.80



### Polar Plot 2

Plot2 Freq (MHz)

5250

Offset

33.50

Variation  
Detected?



Current Freq

5500

Correction

-33.50

Calibrated



Current Amplitude

-45.16

Adjusted Amplitude

-0.86

Current Phase

360.00

Current Amplitude

-5.03

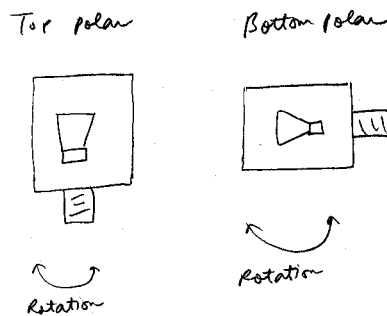
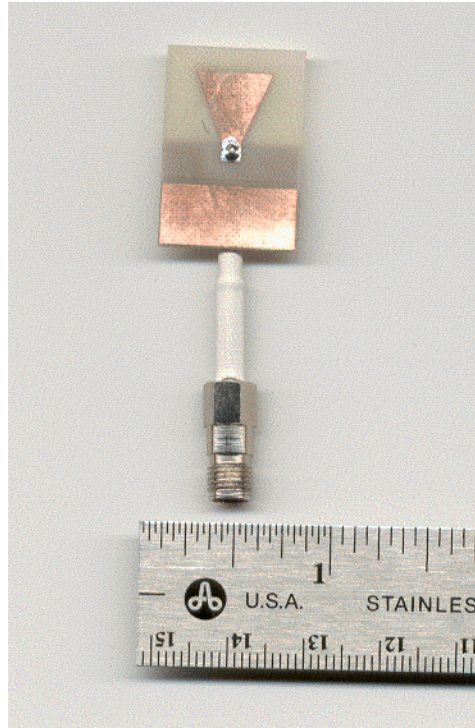
Report Directory

CMIO Address

CA Address

Antenna

## Dipole antenna Radiation Pattern



Peak gain = +1 dBi at 5325MHz

Gain ripple across passband = 2.5dB peak to peak

Horizontal and Vertical polarization isolation = 10dB

Notes:

1. Very uniform gain around phi at theta = 0
2. Test fixture does not allow rotation around theta





# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

Begin Freq (MHz) End Freq (MHz) Step (MHz)

5000

5500

5

Variation  
Detection

100.00

Progress Bar



Antenna Details:

tx-newhorn,rx-triangle

Frequency Sweep- Calibration



Polar Plot 1

Plot1 Freq (MHz)

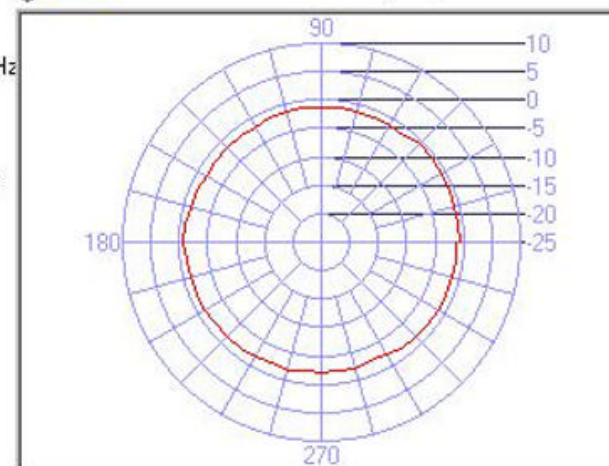
5250

Calibration

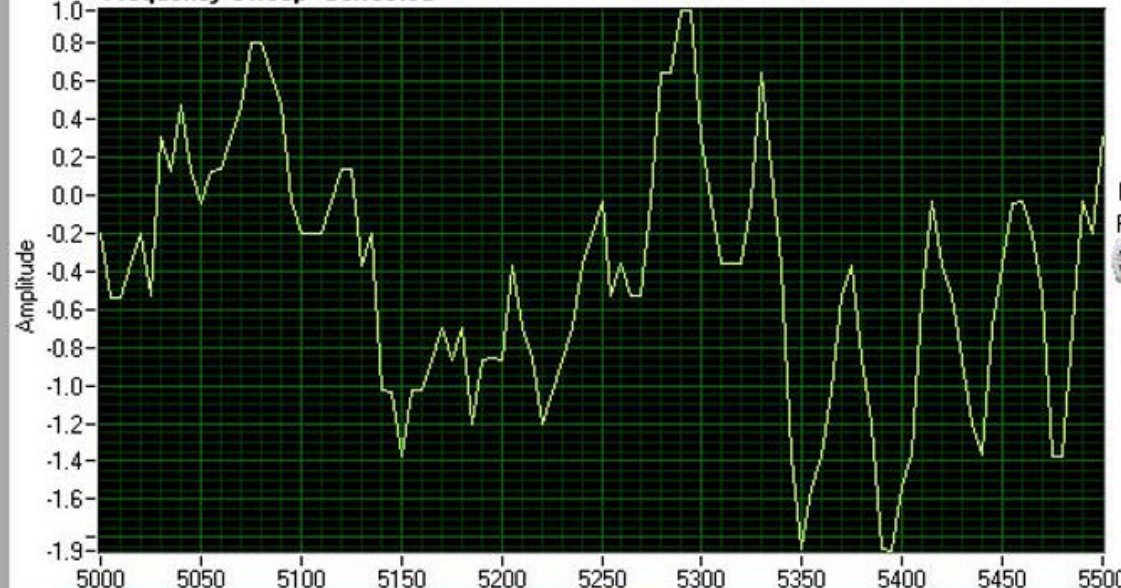
Antenna Gain

10.80

-34.00 Calibration at Polar Plot Frequency



Frequency Sweep- Corrected



Polar Plot 2

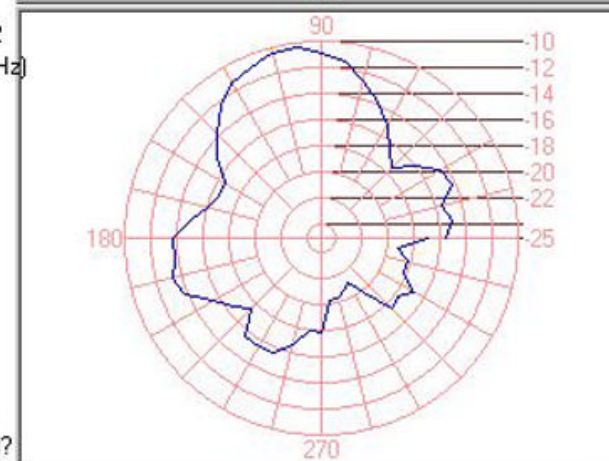
Plot2 Freq (MHz)

5250

Offset

36.33

Variation  
Detected?



Current Freq 5500

Correction -36.33

Calibrated



Current Amplitude -46.83

Adjusted Amplitude 0.30

Current Phase 360.00

Current Amplitude -16.86

Report Directory:

C:\reports

SMIQ Address

28

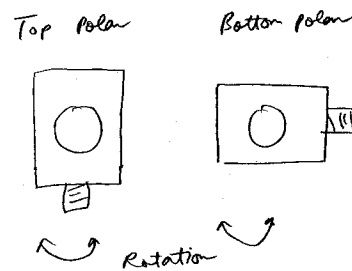
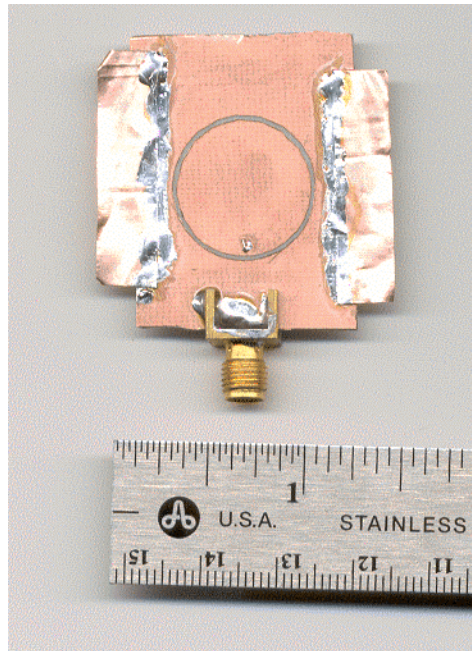
SA Address

18

max value

-61.66

## Annular Slot Antenna Radiation Pattern



Peak gain = +4 dBi at 5300MHz  
Gain ripple across passband = 1.5dB peak to peak  
Horizontal and Vertical polarization isolation = >10dB  
Front and back gain difference = 0dB  
Butterfly radiation pattern shape with peak point sideways  
Good for up and down radiation





# ANTENNA CHARACTERIZATION SOFTWARE

Magis Networks  
Rev. 15. 01/17/02  
A.Arora

Type of Plot

Begin Freq (MHz) End Freq (MHz) Step (MHz)

5000

5500

5

Variation  
Detection

100.00

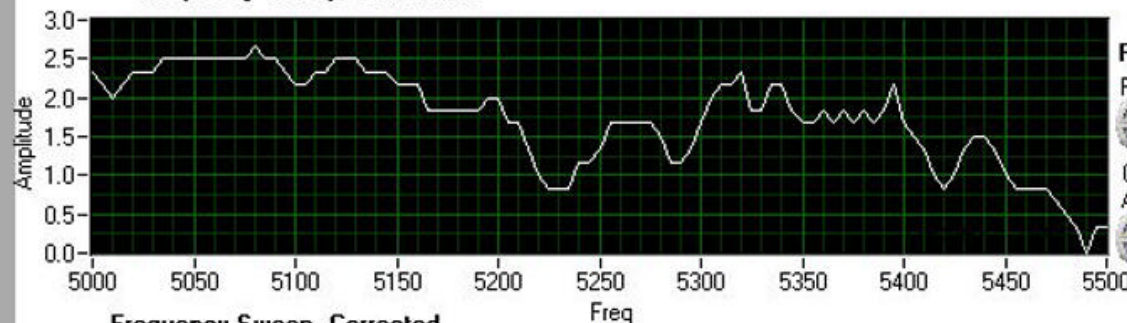
Progress Bar



Antenna Details:

Slot\_circular

Frequency Sweep- Calibration



Polar Plot 1

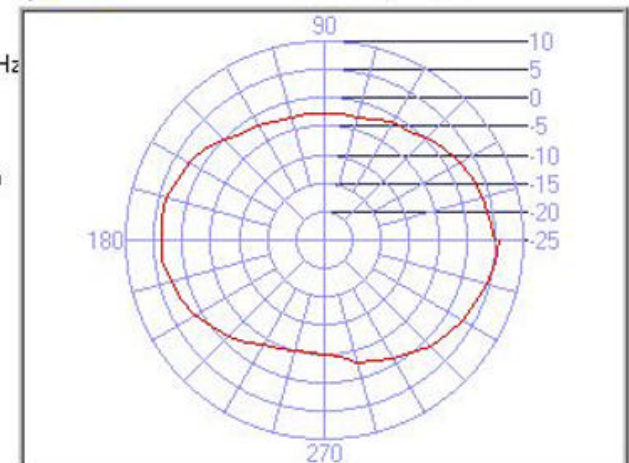
Plot1 Freq (MHz)

5250

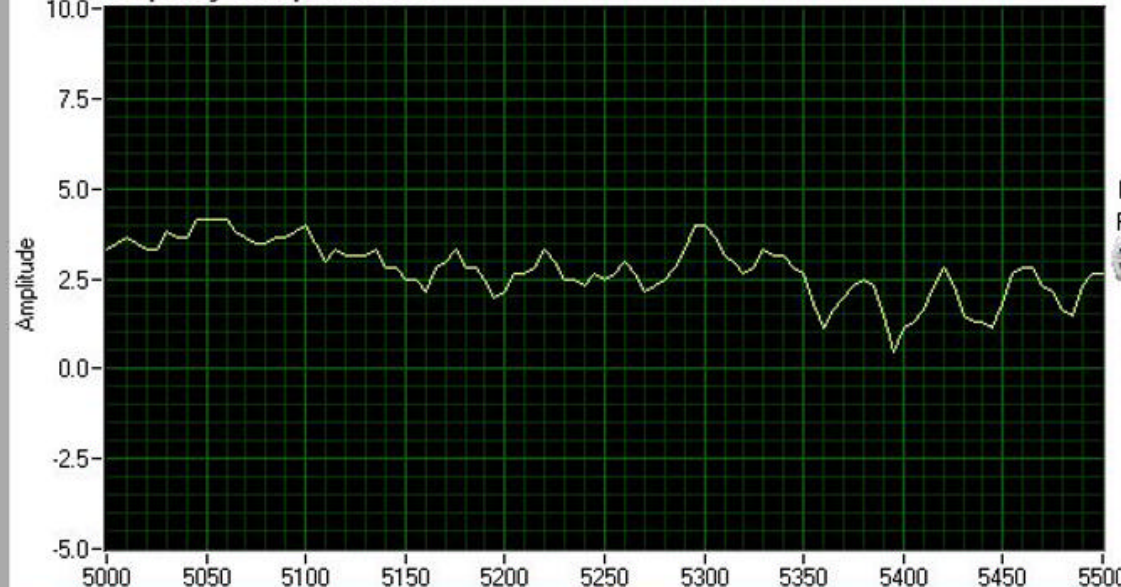
Calibration  
Antenna Gain

10.80

-34.00 Calibration at Polar Plot Frequency



Frequency Sweep- Corrected



Polar Plot 2

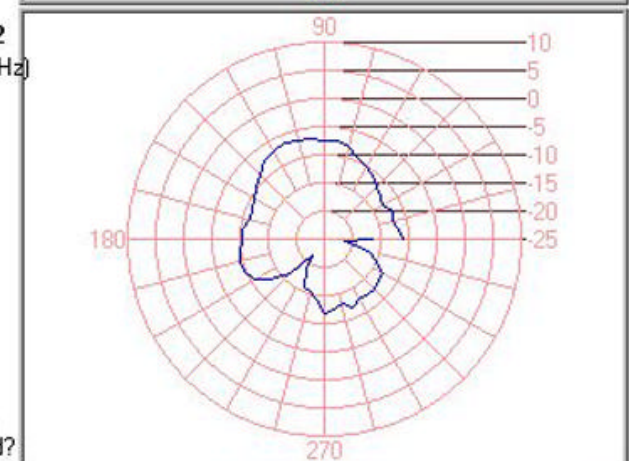
Plot2 Freq (MHz)

5250

Offset

32.50

Variation  
Detected?



Current Freq 5500

Correction -32.16

Calibrated



Current Amplitude -40.33

Adjusted Amplitude 2.63

Current Phase 360.00

Current Amplitude -16.36

Report Directory:

C:\reports

SMIQ Address

28

SA Address

18

max value

-61.16