

Measurement of Maximum Permissible Exposure

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

FCC ID	:	MSQWL330G
Product name	:	Pocket Wireless Access Point
Model name	:	WL-330g
Classification	:	Mobile Device (i) Under normal use condition, the antenna is at least 20cm away from the user; (ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user' s manual
Frequency Range	:	2.412 GHz ~ 2.462GHz
Supported Channel	:	11 Channels
Modulation Skill	:	DBPSK, DQPSK, CCK, OFDM
Power Type	:	Powered by the adapter, Model: DSA-0051-03 FCH 40100F I/P: 100-240VAC, 50/60Hz, 0.2A; O/P: 4VDC, 1.0A 188cm length, non-shielded, incorporates a ferrite core

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

Friis Transmission Formula:
$$S = \frac{PG}{4pR^2} = \frac{191.867 \times 1.3335}{4p(20)^2} = 0.05090 \text{ mW/cm}^2$$

Estimated safe separation:
$$R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{191.867 \times 1.3335}{4p}} = 4.512 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 4.512 cm."

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

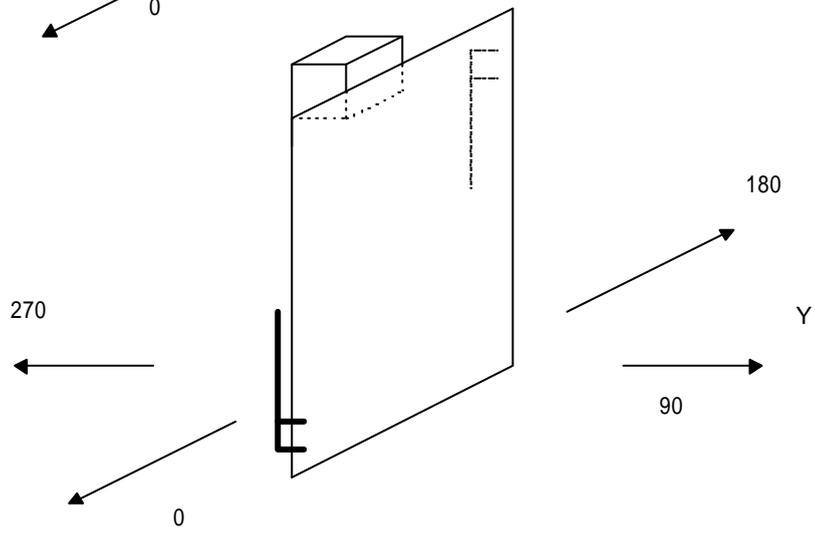
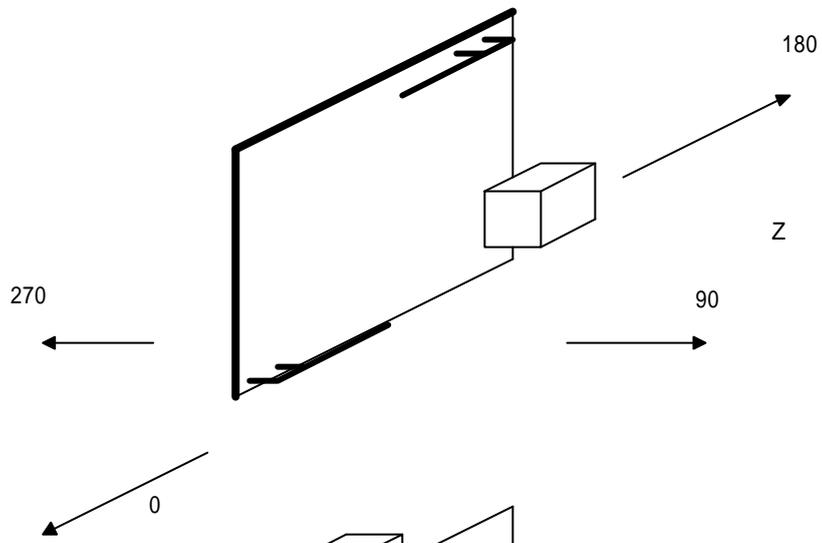
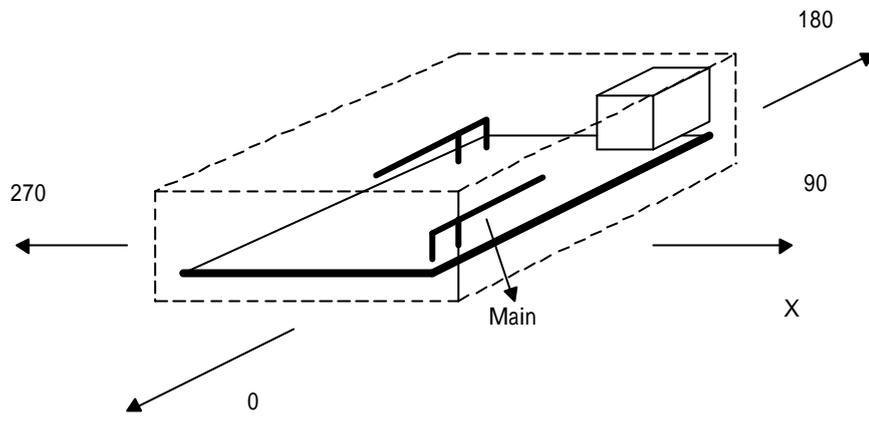
G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

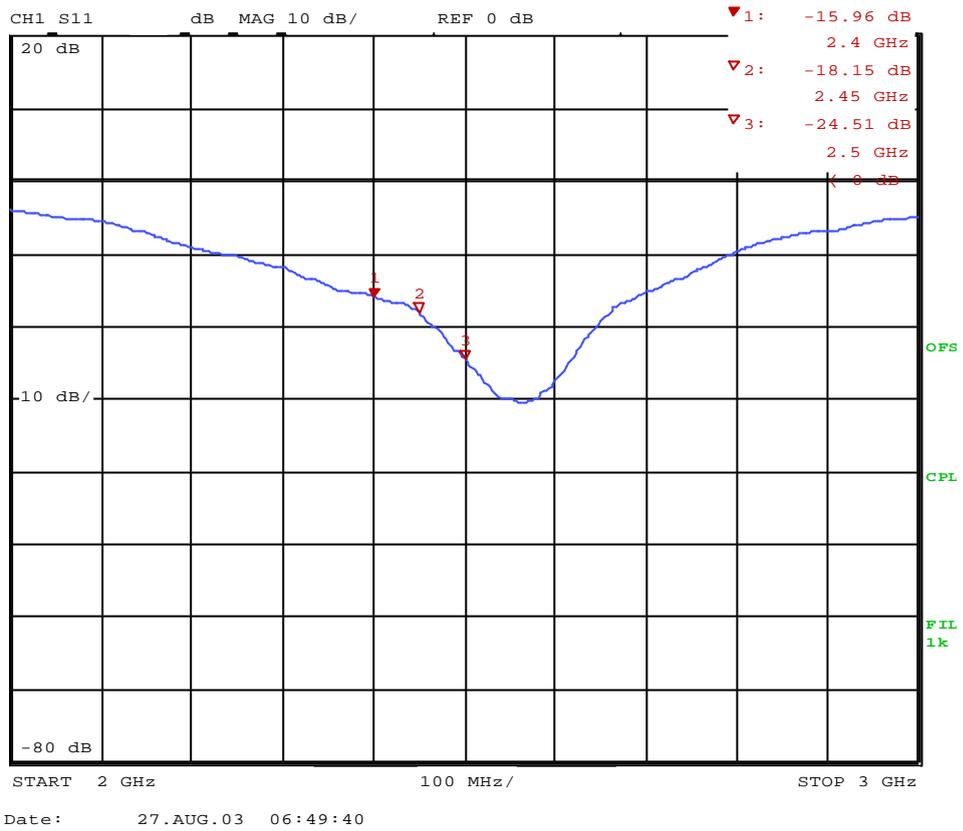
The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain} / 10)$$

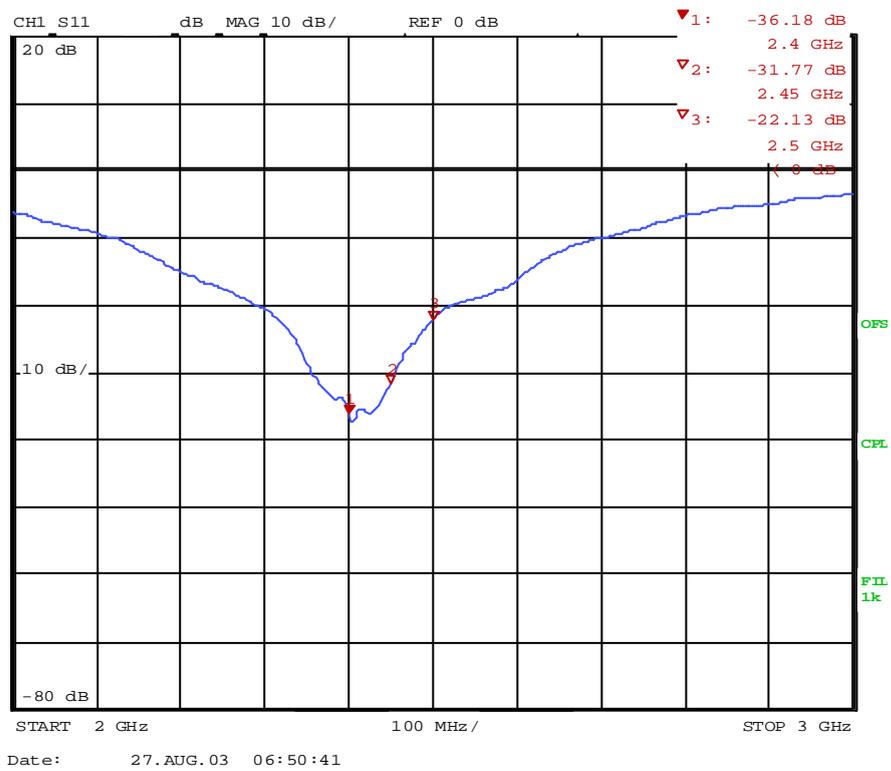
$$G = \text{Log}^{-1} (1.25 / 10) = 1.3335$$



1. without covering

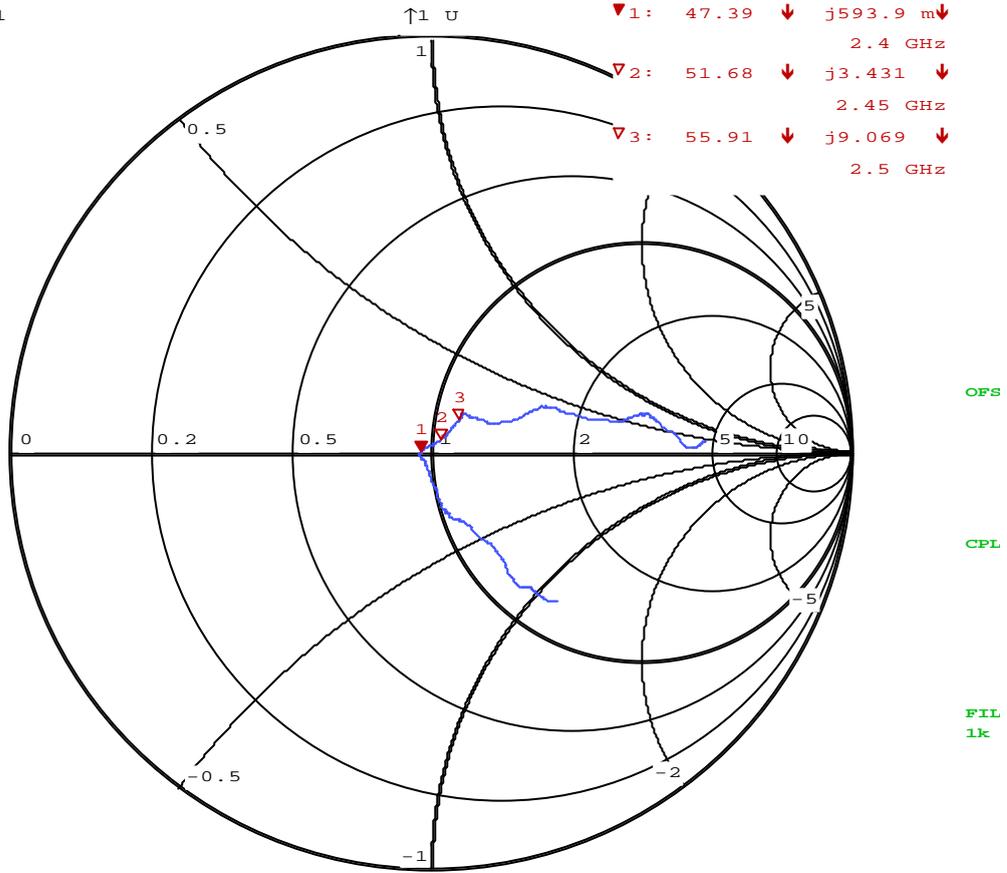


2. with covering



3. Smith Chart

CH1 S11

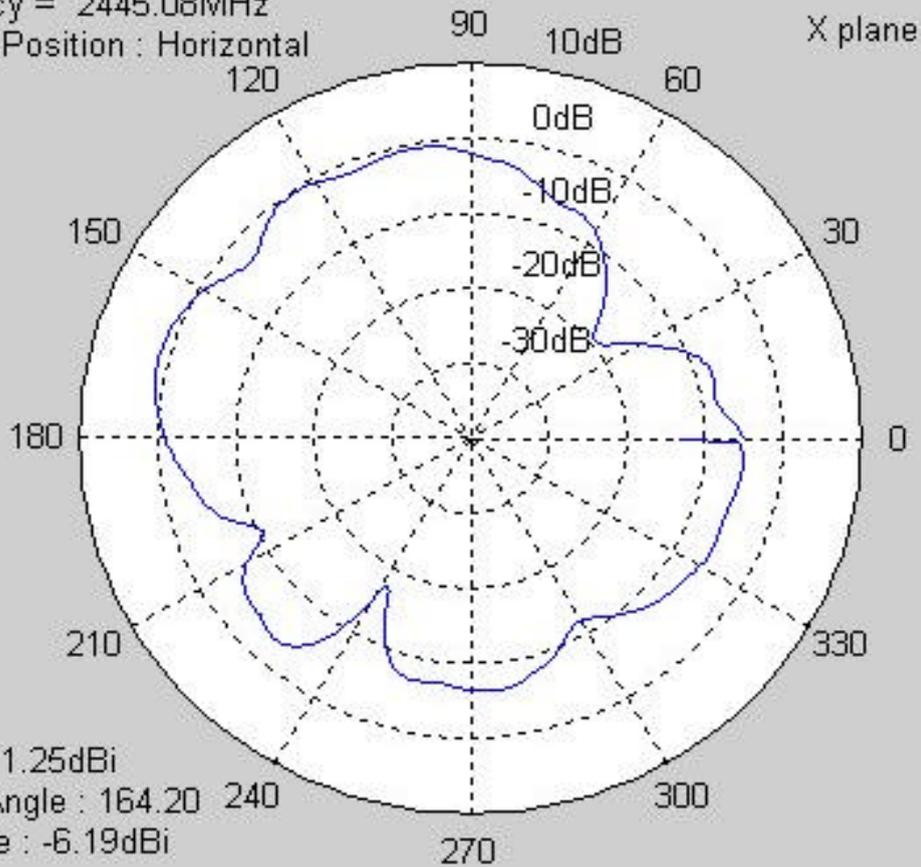


START 2 GHz

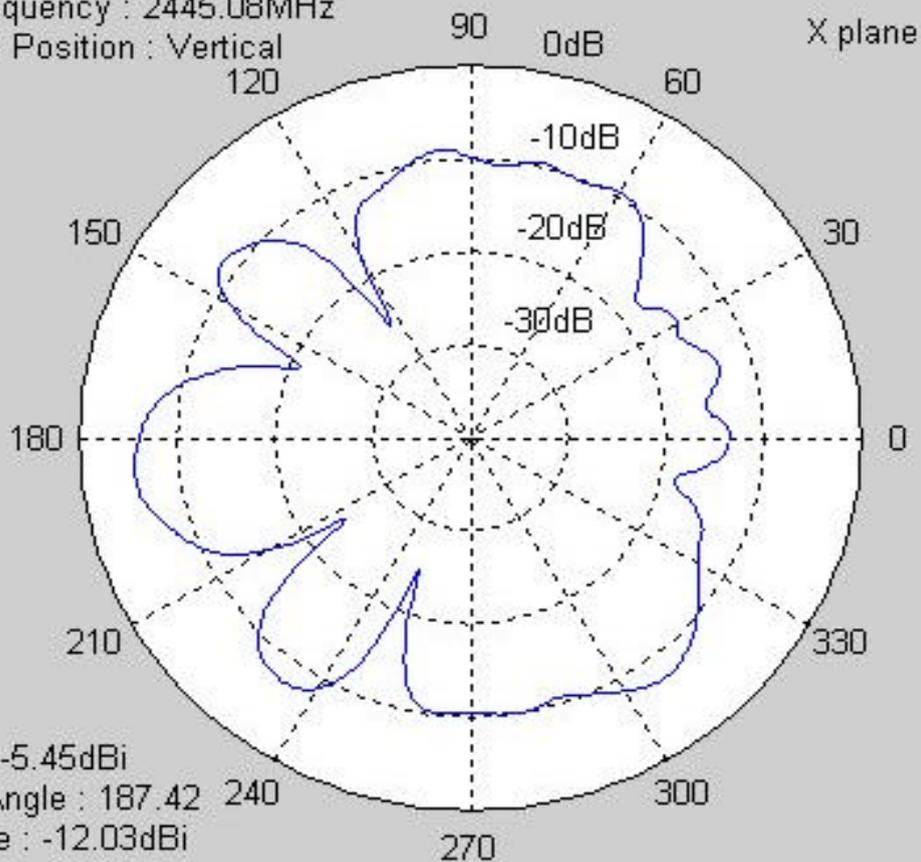
STOP 3 GHz

Date: 27.AUG.03 08:38:17

Frequency = 2445.08MHz
Antenna Position : Horizontal

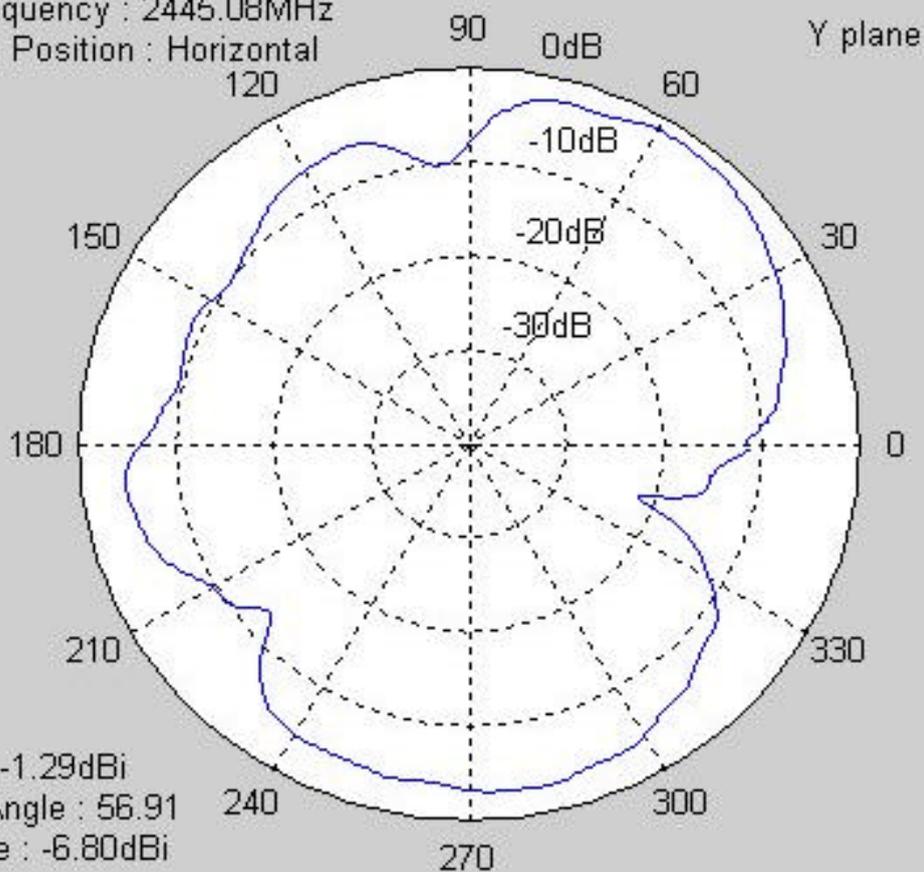


Test Frequency : 2445.08MHz
Antenna Position : Vertical



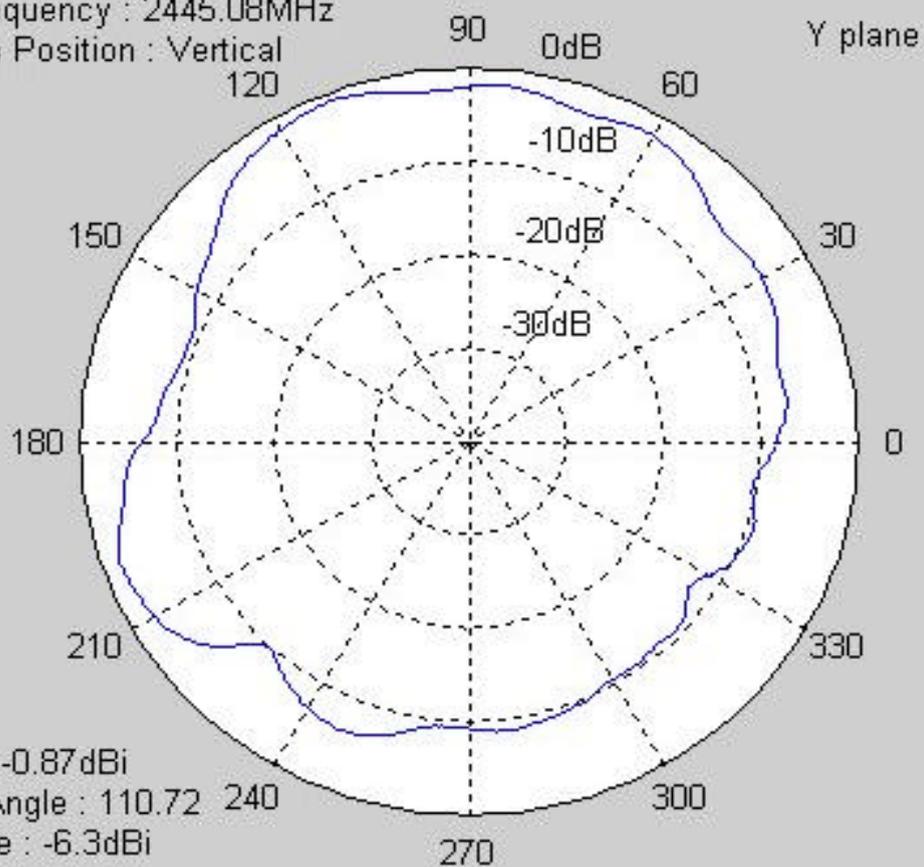
Test Frequency : 2445.08MHz

Antenna Position : Horizontal



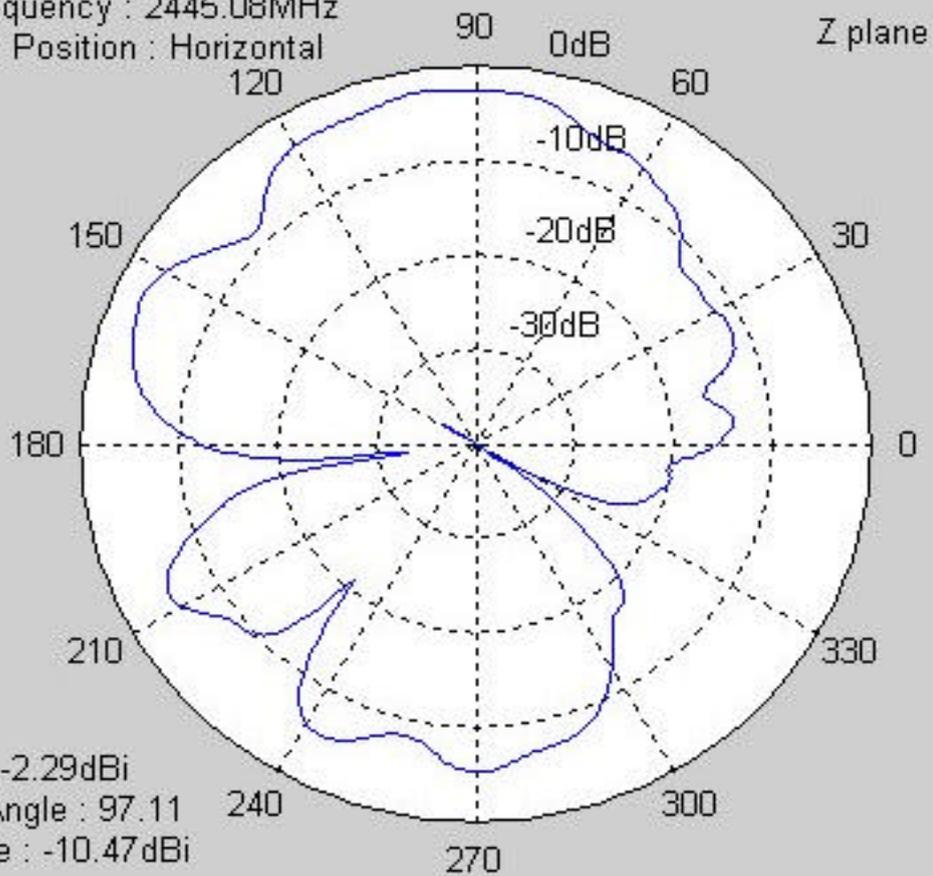
Test Frequency : 2445.08MHz

Antenna Position : Vertical



Test Frequency : 2445.08MHz

Antenna Position : Horizontal



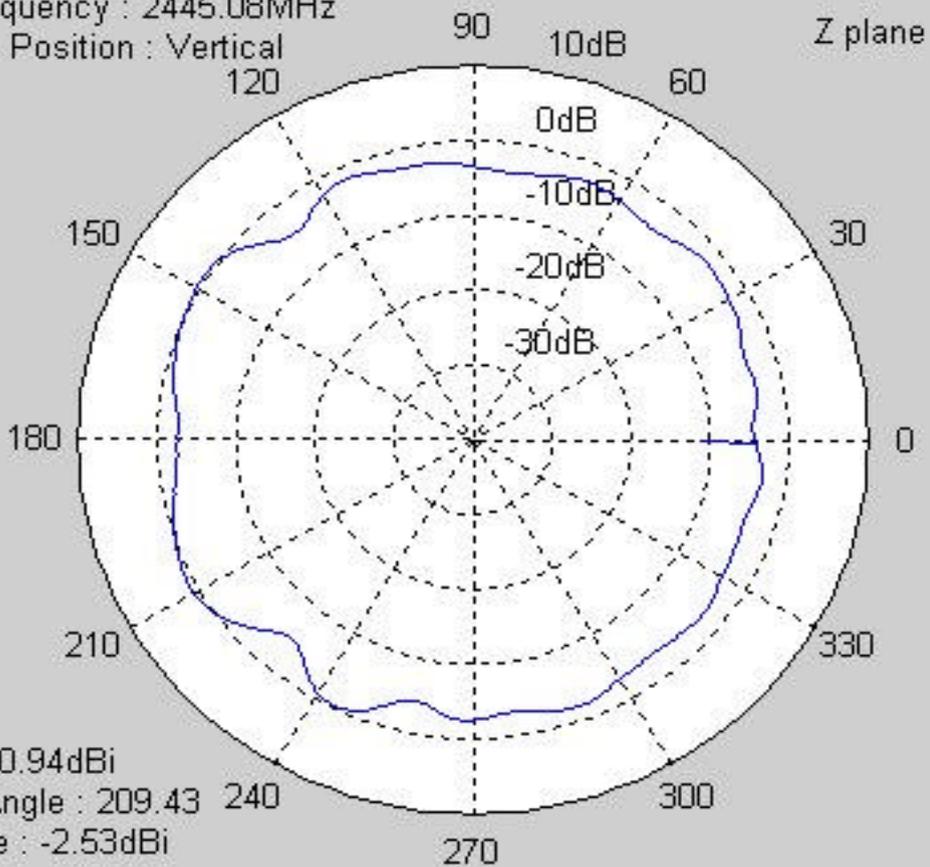
Peak : -2.29dBi

Peak Angle : 97.11

Average : -10.47dBi

Test Frequency : 2445.08MHz

Antenna Position : Vertical



Peak : 0.94dBi

Peak Angle : 209.43

Average : -2.53dBi