

## ***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**

<b>FCC ID</b>	: MSQWL330GE
<b>Product name</b>	: Portable Wireless Access Point
<b>Model</b>	: WL-330gE
<b>Classification</b>	: 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
<b>Frequency Range</b>	: 2.412 GHz ~ 2.462GHz
<b>Supported Channel</b>	: 11 Channels
<b>Modulation Skill</b>	: DBPSK, DQPSK, CCK, OFDM
<b>Power Type</b>	: Powered by the switching adapter, <ol style="list-style-type: none"><li>1. Manufacture: LEADER ELECTRONICS INC. Model: MU12-2050100-A1 I/P: 100 ~ 240VAC ~ 50/60Hz 0.3A O/P: 5VDC 1.0A. 152cm length, non-shielded, without ferrite core</li><li>2. Manufacture: DVE Model: DSA-5P-05FUS 050100 I/P: 100 ~ 240VAC ~ 50/60Hz 0.2A 20VA O/P: 5VDC 1.0A. 158cm length, non-shielded, without ferrite core</li></ol>

**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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f <sup>2</sup>	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:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4\pi R^2} = \frac{277.97 \times 1.334}{4\pi(20)^2} = 0.0738 \text{ mW/cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{277.97 \times 1.334}{4\pi}} = 5.43 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 4.73cm"

Where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

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:

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

$$G = \text{Log}^{-1} (1.25 / 10) = 1.334$$

## *Appendix*

### **Antenna Specification**

# Antenna Information

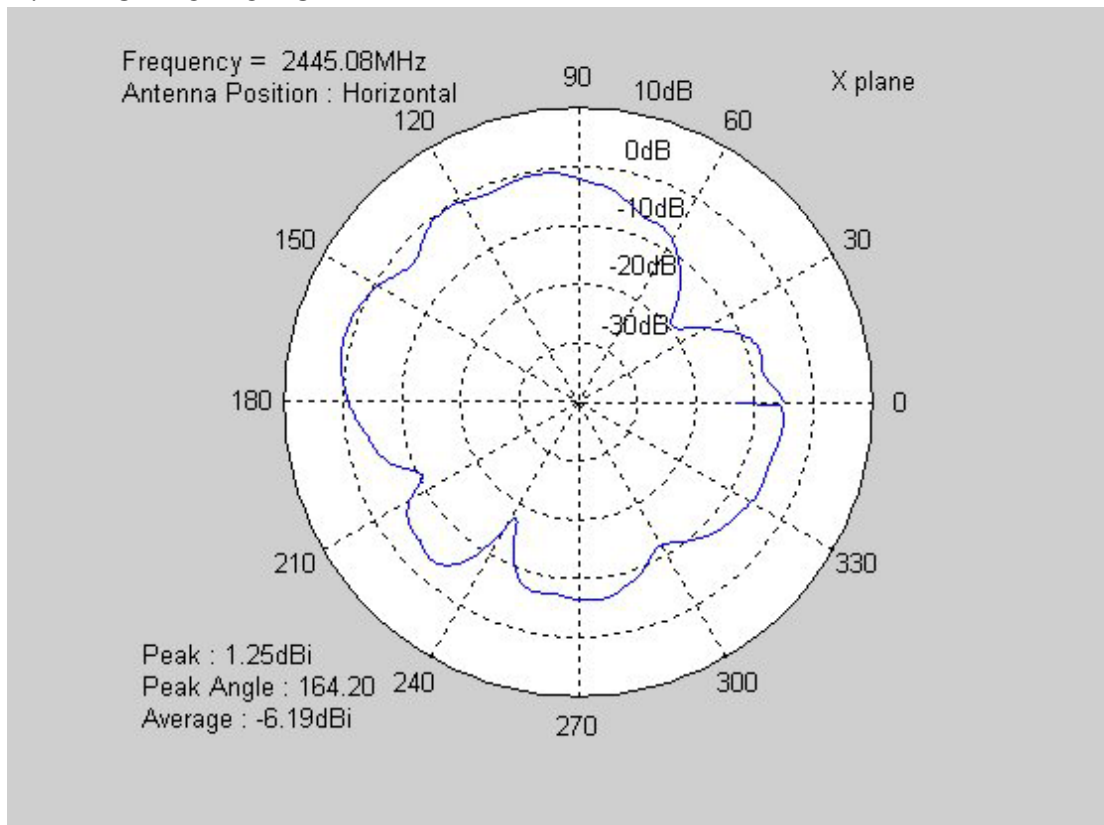
## 1. Antenna Specification and Radiation Characteristics

Designator	Manufacturer	Antenna Type	Gain(dBi)
WL-330gE Portable Wireless Access Point	ASUS	Film Type Inverted F Antenna	please refer to next table

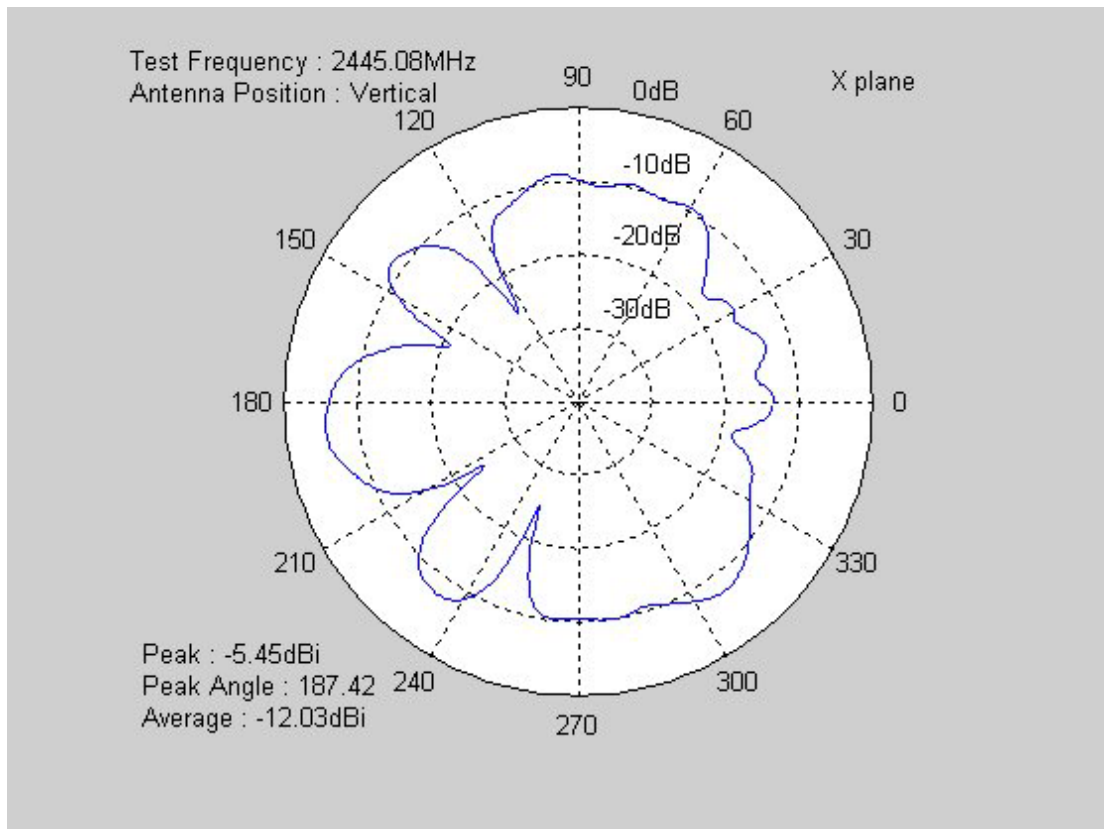
Position	Frequency(MHz)	Gain(dBi)	Horizontal	Vertical
X	2445.08MHz	peak	1.25dBi	-5.45dBi
		avg	-6.19dBi	-12.03dBi
Y	2445.08MHz	peak	-1.29dBi	-0.87dBi
		avg	-6.80dBi	-6.3dBi
Z	2445.08MHz	peak	-2.29dBi	0.94dBi
		avg	-10.47dBi	-2.53dBi

***Portable Wireless Access Point  
Brand: ASUS  
Model: WL-330gE***

## 2. Antenna Pattern

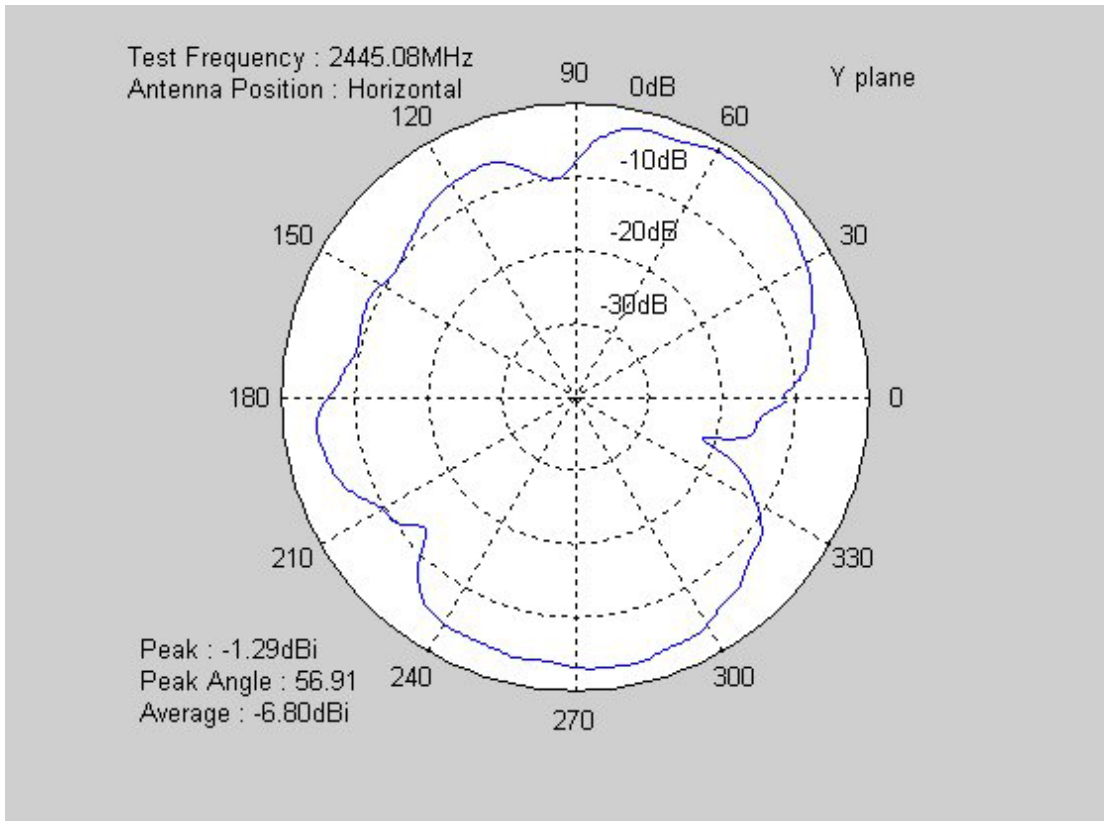


X-2400MHz-Hor.

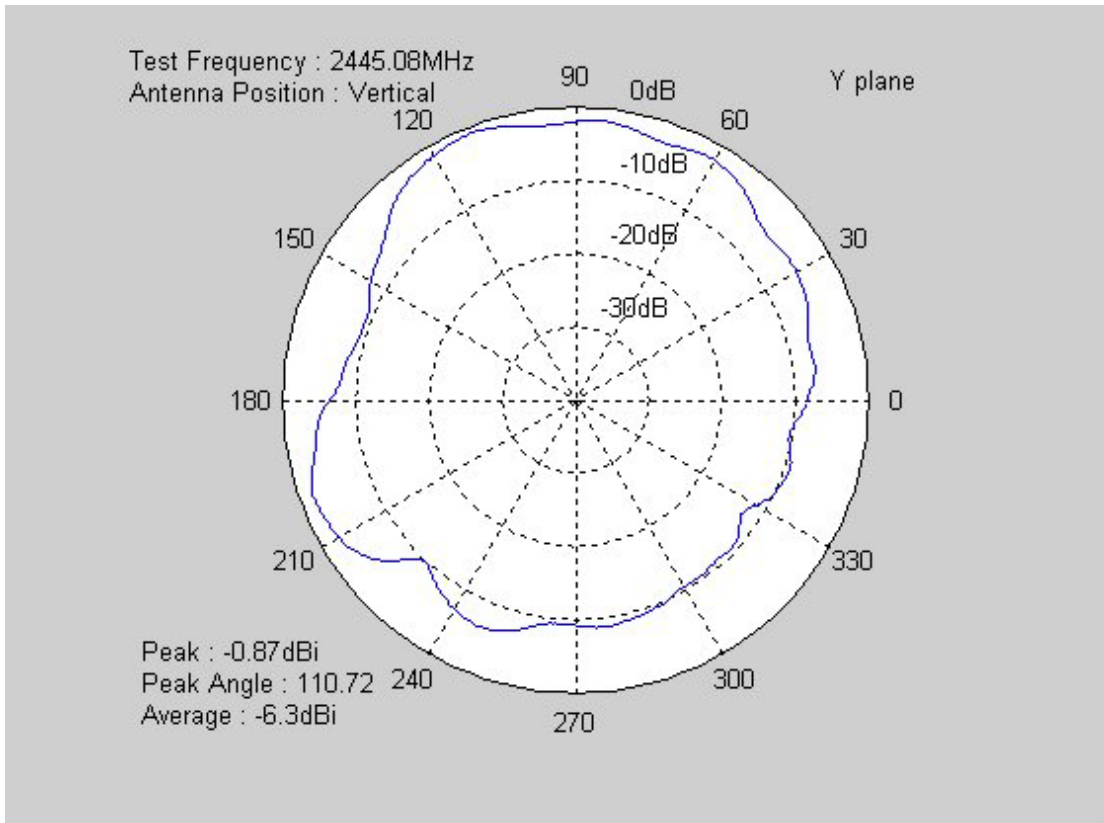


X-2400MHz-Ver.

**Portable Wireless Access Point**  
**Brand: ASUS**  
**Model: WL-330gE**

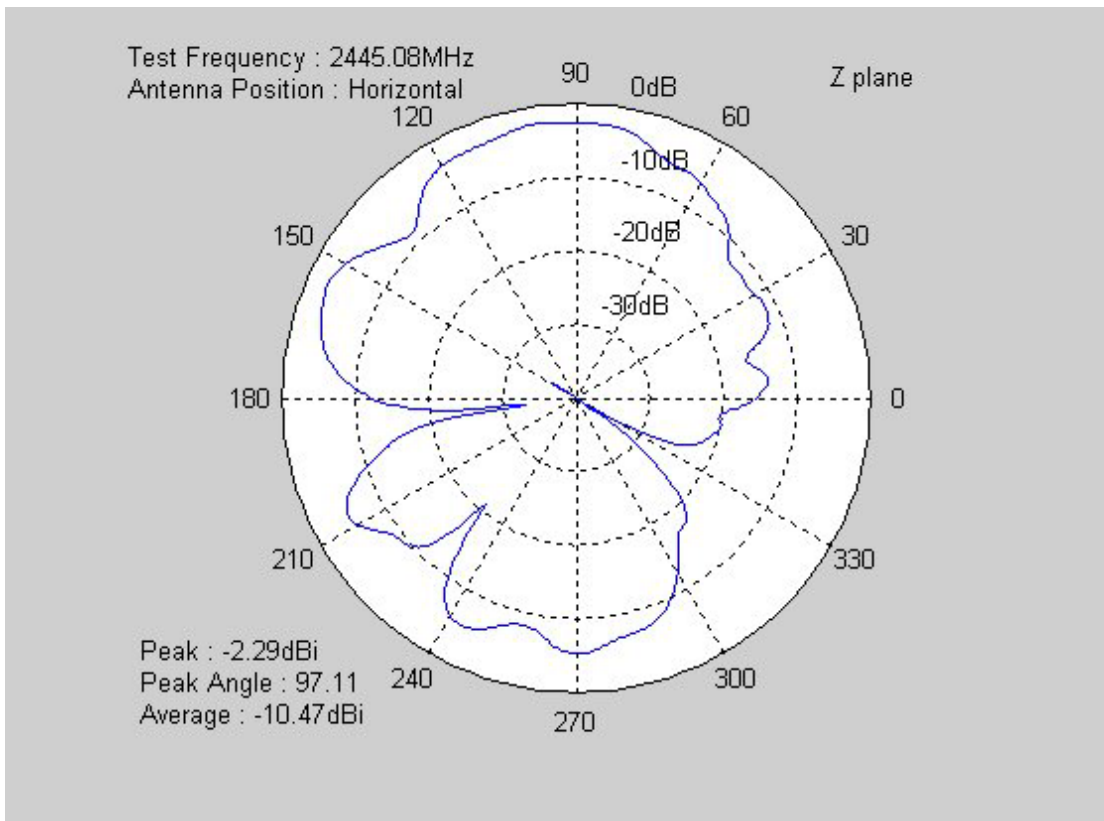


Y-2400MHz-Hor.

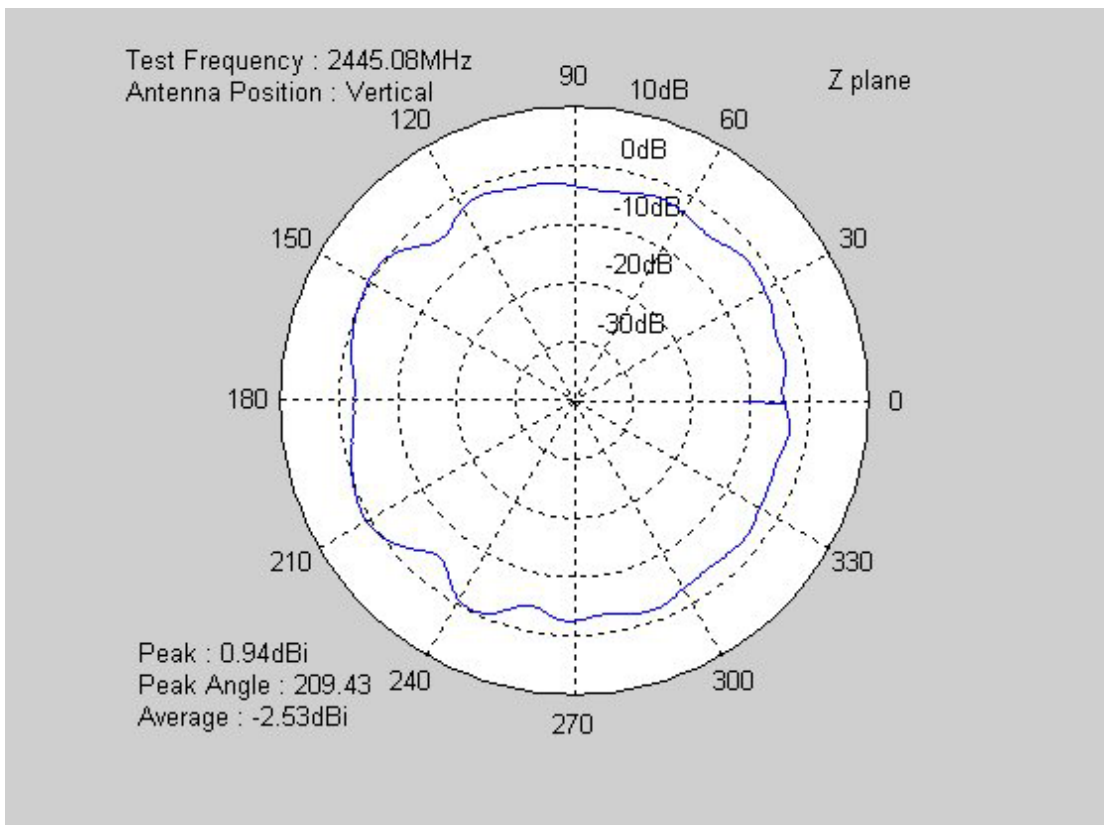


Y-2400MHz-Ver.

**Portable Wireless Access Point**  
**Brand: ASUS**  
**Model: WL-330gE**



Z-2400MHz-Hor.



Z-2400MHz-Ver.

**Portable Wireless Access Point**  
**Brand: ASUS**  
**Model: WL-330gE**