

Project name: Maxell

Project No: 000724 **Antenna type:** Inverted-F

Prepared by: JRY **Model name:** BT Antenna

Date of release: 2005-01-24 **Connecting:** Direct soldering

Approved by: MHK

Antenna measurement of Maxell Bluetooth pen

Document history

Date	Sign	Revision	Description
2005-01-24	JRY	A	Measurement report

CONFIDENTIAL

The content of this document is the property of Flextronics and may not be communicated to any other party without written permission of Flextronics.

1 INTRODUCTION	3
1.1 Description	3
1.2 Orientation in radiation measurement free space.....	3
1.3 Orientation in radiation measurement hand position	4
1.4 Used hardware	4
1.5 Matching network.....	4
2 MEASUREMENTS	5
2.1 VSWR Measurement	5
2.2 Efficiency Measurement.....	6
2.3 Radiation pattern.....	7
2.3.1 Free space.....	7
2.3.2 Hand position	8
3 CONCLUSION.....	9

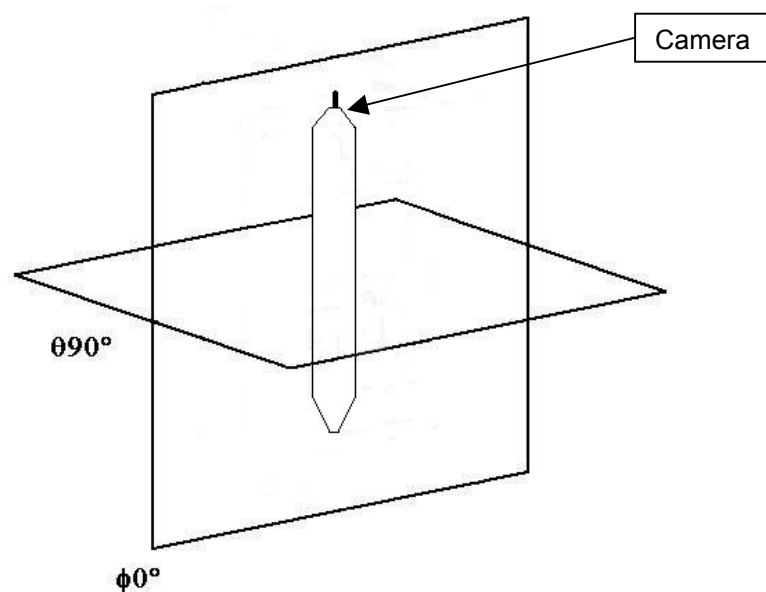
1 INTRODUCTION

1.1 Description

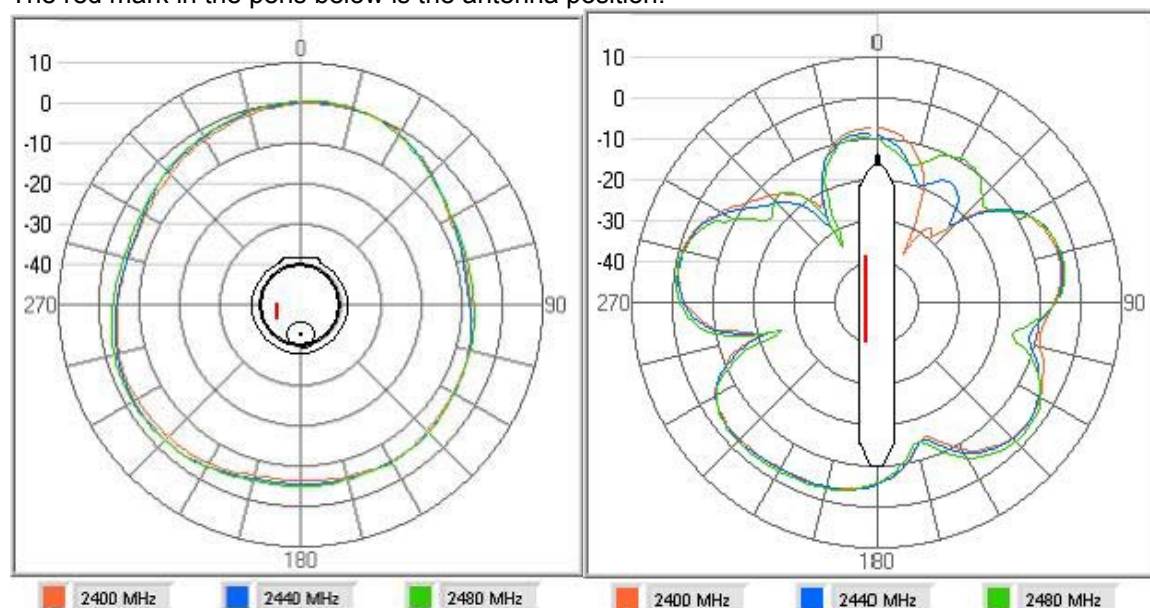
The module has been removed and a coax cable is soldered in at the pad that goes to the antenna-feeding pad. See pictures on last page.

1.2 Orientation in radiation measurement free space

The two cuts measured



The red mark in the pens below is the antenna position.



1.3 Orientation in radiation measurement hand position

The pen is positioned in same way (hand included) as in the free space measurements. So the hand position measurement and free space measurement is fully comparable.

The hand used in the measurement is made of rubber and is filled with a liquid to simulate human tissue.

1.4 Used hardware

The pen used was received 2004-12-20.

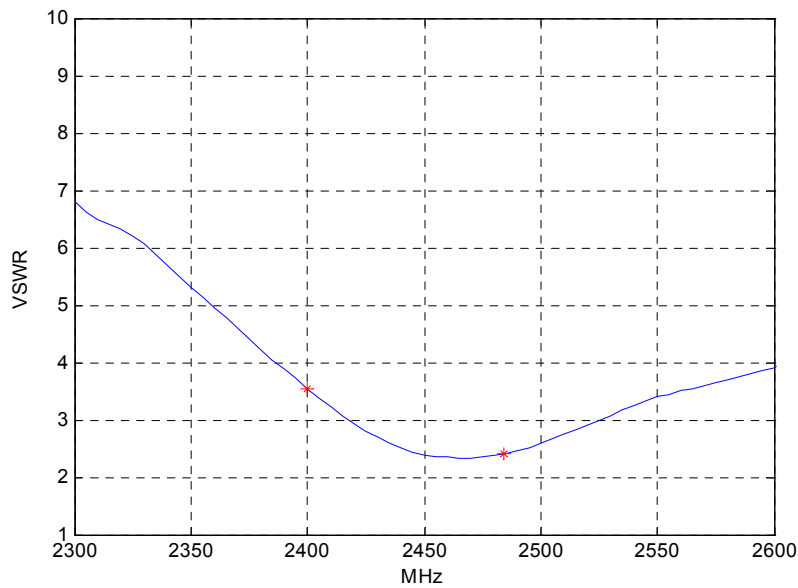
1.5 Matching network

No matching network included in the measurements in this report, but a matching network has been tested. Test shows that the impedance (matching) can be improved a little but the efficiency was only improved by 0.1 dB.

2 MEASUREMENTS

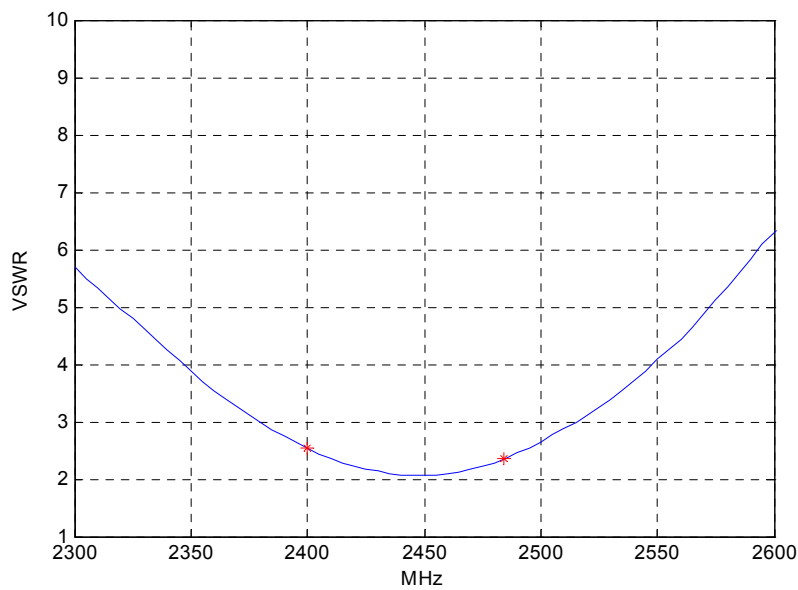
2.1 VSWR Measurement

Free space



2400 MHz: 3.5 2484 MHz: 2.4

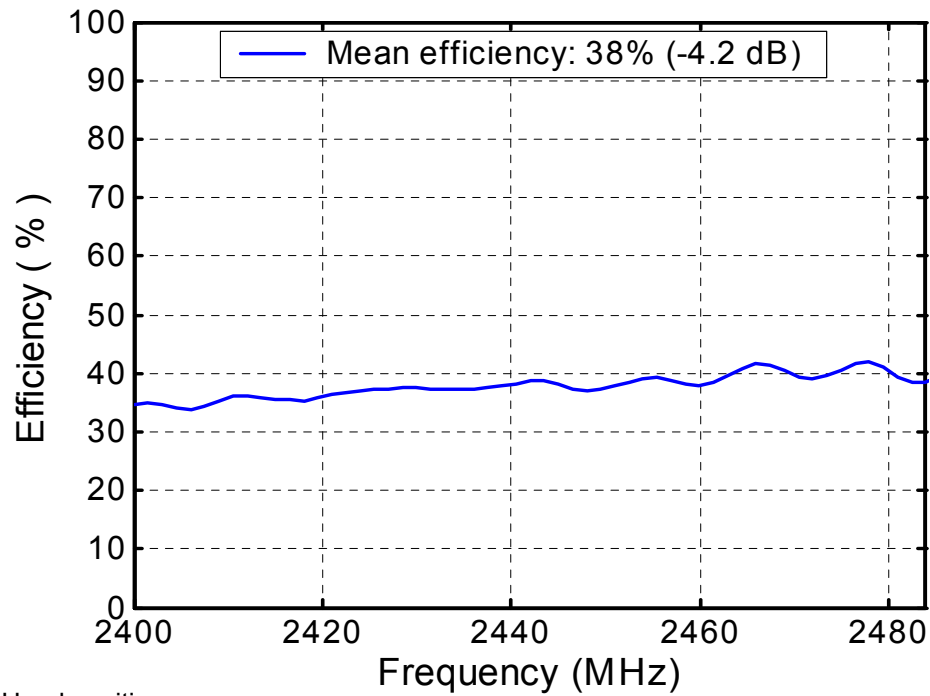
Hand position



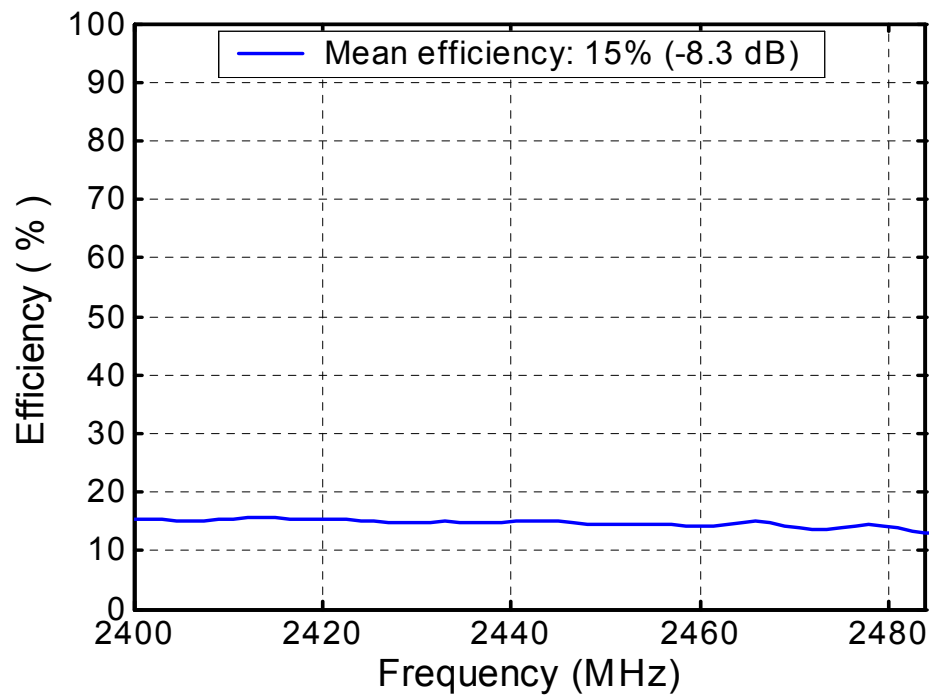
2400 MHz: 2.5 2484 MHz: 2.4

2.2 Efficiency Measurement

Free space



Hand position

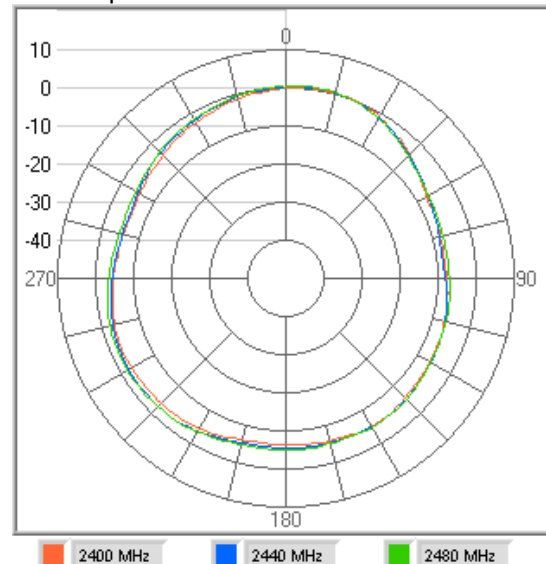


2.3 Radiation pattern

2.3.1 Free space

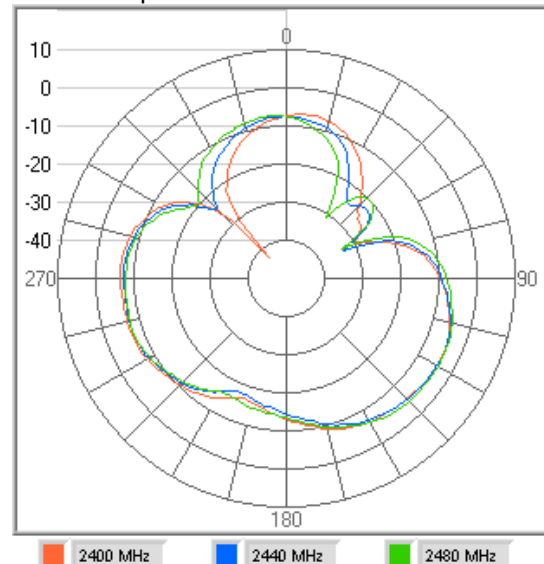
$\theta 90^\circ$

Vertical polarization



2400.00 MHz Mean: -4.17 dBi Max: 0.37 dBi
2440.00 MHz Mean: -3.78 dBi Max: 0.47 dBi
2480.00 MHz Mean: -3.47 dBi Max: 0.69 dBi

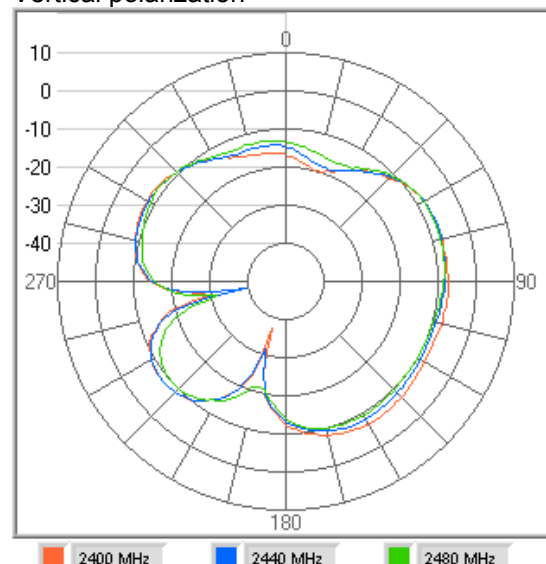
Horizontal polarization



2400.00 MHz Mean: -10.21 dBi Max: -4.20 dBi
2440.00 MHz Mean: -10.55 dBi Max: -4.18 dBi
2480.00 MHz Mean: -10.20 dBi Max: -4.06 dBi

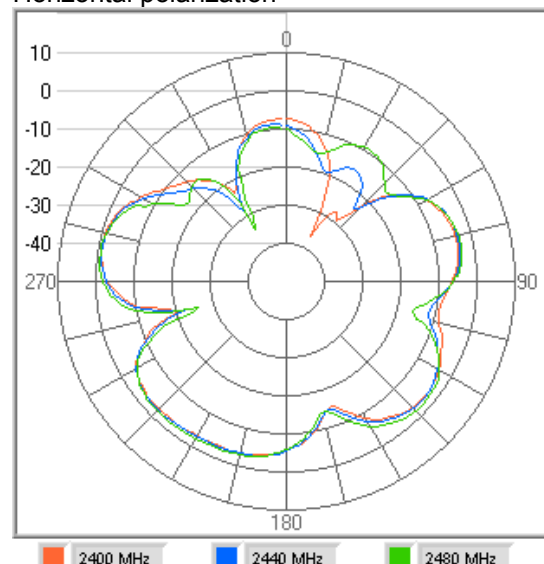
$\phi 0^\circ$

Vertical polarization



2400.00 MHz Mean: -10.73 dBi Max: -6.69 dBi
2440.00 MHz Mean: -11.17 dBi Max: -7.58 dBi
2480.00 MHz Mean: -11.54 dBi Max: -7.89 dBi

Horizontal polarization

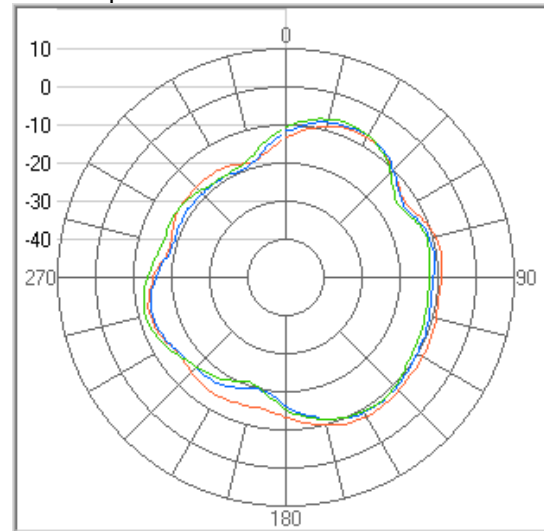


2400.00 MHz Mean: -7.02 dBi Max: -0.79 dBi
2440.00 MHz Mean: -7.06 dBi Max: -0.85 dBi
2480.00 MHz Mean: -6.74 dBi Max: -0.55 dBi

2.3.2 Hand position

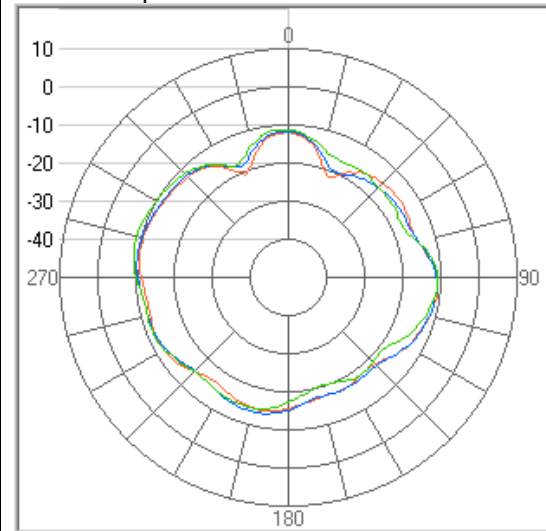
$\theta 90^\circ$

Vertical polarization



2400.00 MHz Mean: -11.93 dBi Max: -7.49 dBi
2440.00 MHz Mean: -12.96 dBi Max: -6.90 dBi
2480.00 MHz Mean: -12.82 dBi Max: -6.49 dBi

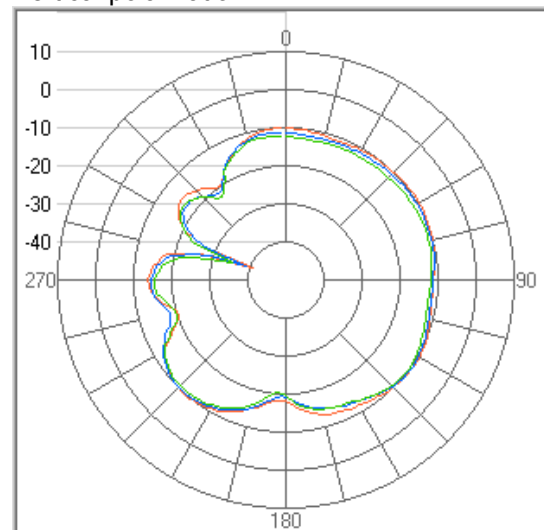
Horizontal polarization



2400.00 MHz Mean: -14.05 dBi Max: -10.37 dBi
2440.00 MHz Mean: -13.79 dBi Max: -9.88 dBi
2480.00 MHz Mean: -13.70 dBi Max: -8.66 dBi

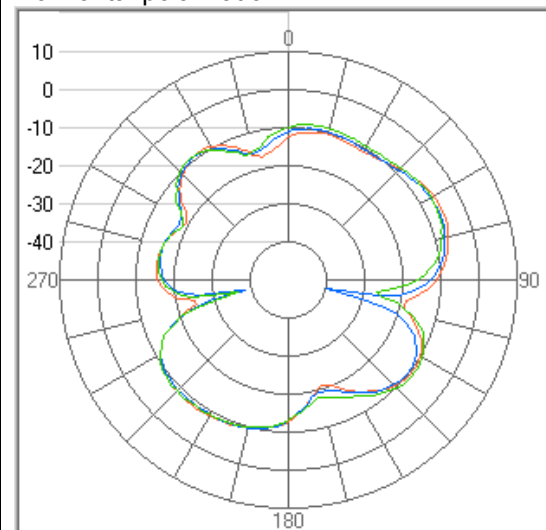
$\phi 0^\circ$

Vertical polarization



2400.00 MHz Mean: -12.46 dBi Max: -9.41 dBi
2440.00 MHz Mean: -13.01 dBi Max: -9.62 dBi
2480.00 MHz Mean: -13.69 dBi Max: -10.05 dBi

Horizontal polarization



2400.00 MHz Mean: -11.67 dBi Max: -5.80 dBi
2440.00 MHz Mean: -12.01 dBi Max: -6.61 dBi
2480.00 MHz Mean: -11.59 dBi Max: -6.69 dBi

1

2

3

4

5

6

7

8

形式・定格

普通寸法差

寸法区分

6以下

30以下

120以下

315以下

1000以下

仕上処理

()機械(精密)

()機械・モールド

()プレス抜

()プレス曲

()その他

±0.05

±0.1

±0.2

±0.15

±0.2

±0.3

±0.5

±0.8

±1.2

±2

部署

職場

類別

C

B

A

作業
単位

項番

部署

図番

品番

品名

定格または材質

備考

A

B

C

D

E

0.1

0.3

24.02

0.82

17.76

17.3

16.74

16.34

14.02

13.67

13.13

12.71

10.5

10.06

9.42

8.92

6.67

6.17

5.64

4.99

2.09

0.4

1.1

0.89

0.45

1

0.82

1.42

1

2.4

1.4

2.1

0.85

3.5

4-R0.2

18.47

18.01

16

15.6

14.76

14.41

12.39

11.97

11.24

10.8

8.68

8.18

7.42

6.92

4.95

4.38

0

出図承認

3D:3DP-*****

記号

来歴

年月日

訂正

審査

承認

形式

DP-201

投影法

尺度

5
1

名称

Bleutooth Antenna DP-201

枝番

1
1

入庫

製図(オノデラ)

04・10・12

日立マクセル株式会社

図番

訂正

モバイルデバイス事業部

デジタルペン設計部

033340

0119

00