

**Report No. QEC-2309083**

October 11, 2023

## **Antenna Measurement Report**

**JTI Chip Antenna P/N:  
2450AT14A0100001T**

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## 1. Abstract:

This measurement report includes antenna return loss, matching network, radiated efficiency, and radiation patterns for the Johanson Technology antenna P/N. 2450AT14A0100001T mounted on evaluation board. It also shows the test equipment information.

Evaluation Board and Recommended Mounting Configuration 1: 2450AT14A0100001CE1

Evaluation Board and Recommended Mounting Configuration 2: 2450AT14A0100001CE2

## 2. Antenna gain table summary:

### A. 2450AT14A0100001CE1

Unit in dBi	XY-plane		XZ-plane		YZ-plane		Efficiency
	Peak	Avg.	Peak	Avg.	Peak	Avg.	
@2400MHz	-5.0	-8.7	-2.6	-5.9	-2.8	-6.3	24.0%
@2440MHz	-4.4	-7.6	-2.5	-5.5	-2.4	-5.8	27.0%
@2480MHz	-5.0	-7.9	-2.8	-6.2	-3.5	-6.5	24.0%

### B. 2450AT14A0100001CE2

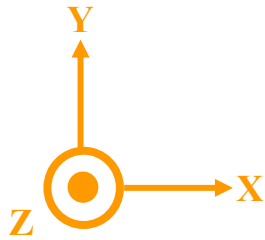
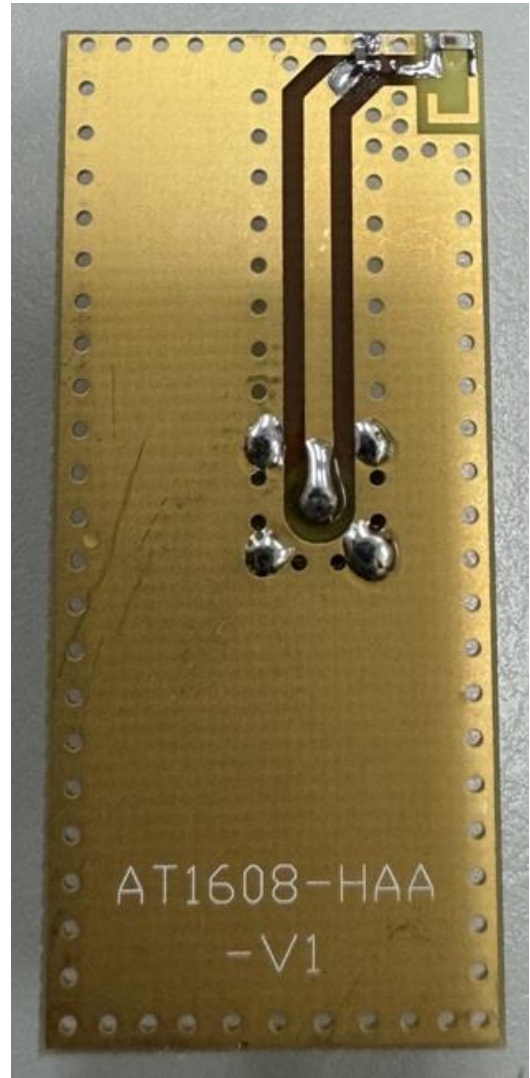
Unit in dBi	XY-plane		XZ-plane		YZ-plane		Efficiency
	Peak	Avg.	Peak	Avg.	Peak	Avg.	
@2400MHz	-1.9	-5.8	-0.8	-2.3	-0.5	-5.8	42.0%
@2440MHz	-1.4	-5.3	-0.9	-2.1	-1.0	-5.7	45.0%
@2480MHz	-1.6	-5.5	-0.9	-2.3	-1.1	-5.6	44.0%

### 3. EVB assembly and 3D plane definition:

2450AT14A0100001CE1

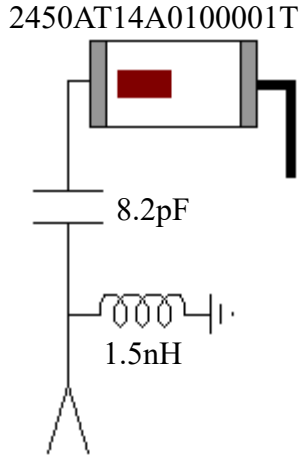


2450AT14A0100001CE2

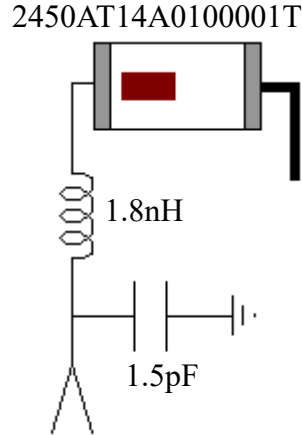


#### 4. Antenna matching networks:

##### 2450AT14A0100001CE1



##### 2450AT14A0100001CE2



#### Johanson Technology Part Numbers Used\* :

<b>2450AT14A0100001CE1</b>	8.2pF	1.5nH
	<a href="#">QSCF500Q8R2B1GV001T</a>	<a href="#">LRC0402CS1N5GV001T</a>
<b>2450AT14A0100001CE2</b>	1.8nH	1.5pF
	<a href="#">LRC0402CS1N8GV001T</a>	<a href="#">QSCF500Q1R5B1GV001T</a>

\* It is recommended that the designer leave available slots for a "pi" (or shunt-series-shunt) network. The antenna matching network above is used when antenna is mounted on Johanson's evaluation board. The matching network values on client's PCB will be different, depending on the layout, thickness, material, etc. Go to: <https://www.johansontechnology.com/tuning> and see how to obtain the new values.

## 5. Equipment Information:

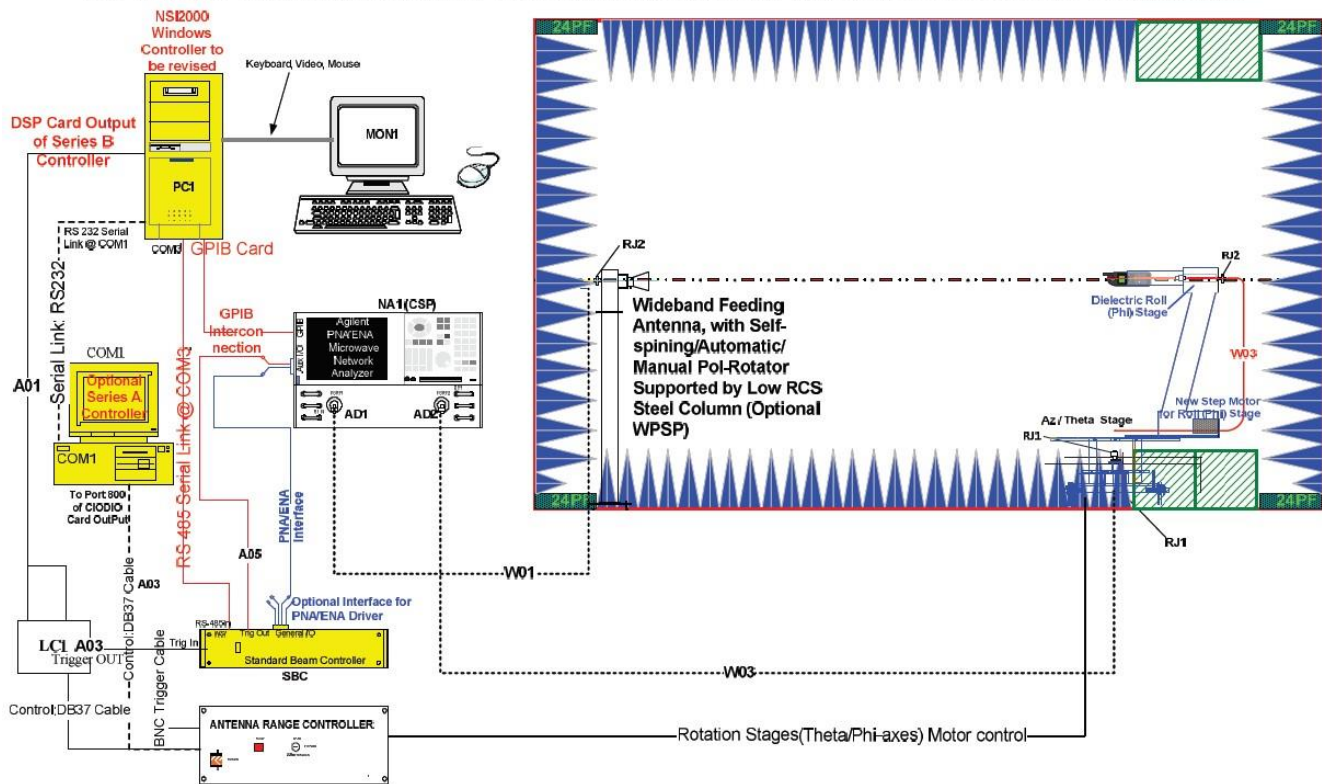
### A. Return Loss / VSWR:

- ◆ **Instrument:** Vector Network Analyzer - Agilent E5071C
- ◆ **Calibration method:** open/short/load – Cal.Kit 85052D

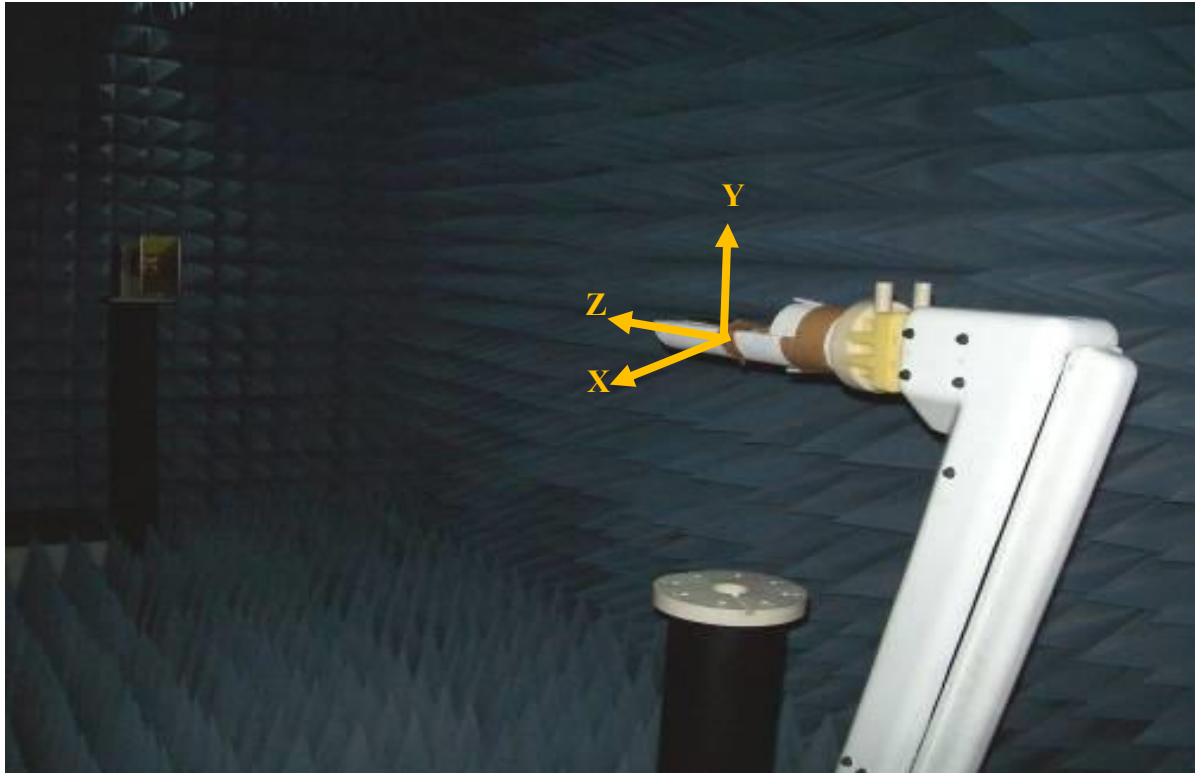
### B. Radiation Patterns:

- ◆ **Instrument (3D Radiation pattern):** NSI 800F-10 Far Field antenna measurement system

**3D Far-Field Antenna Measurement System Wiring Schematic with NSI-Based Controller Configuration**



◆ Scanning direction



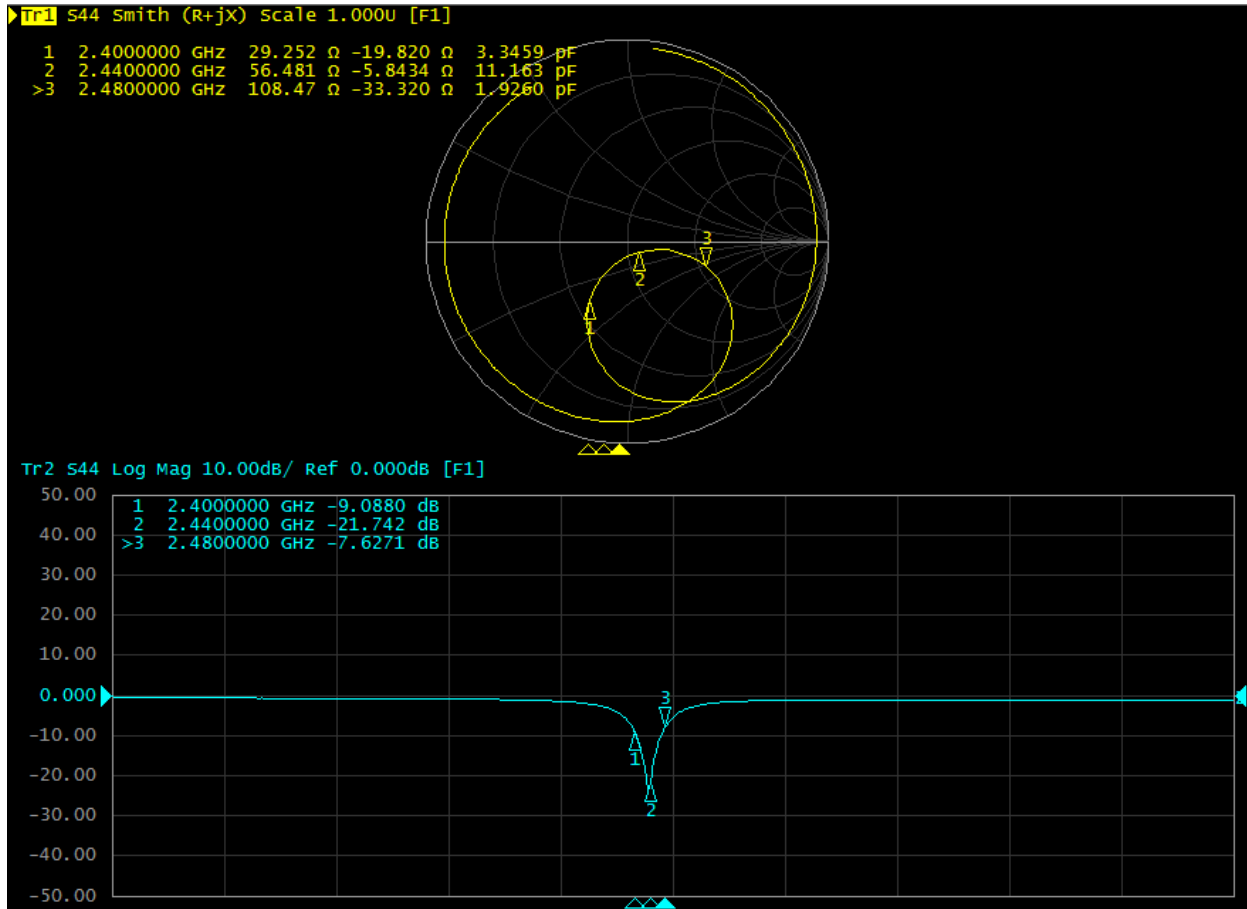
◆ Plane definition

XY-plane	Theta=90°
XZ-plane	Phi=0°
YZ-plane	Phi=90°

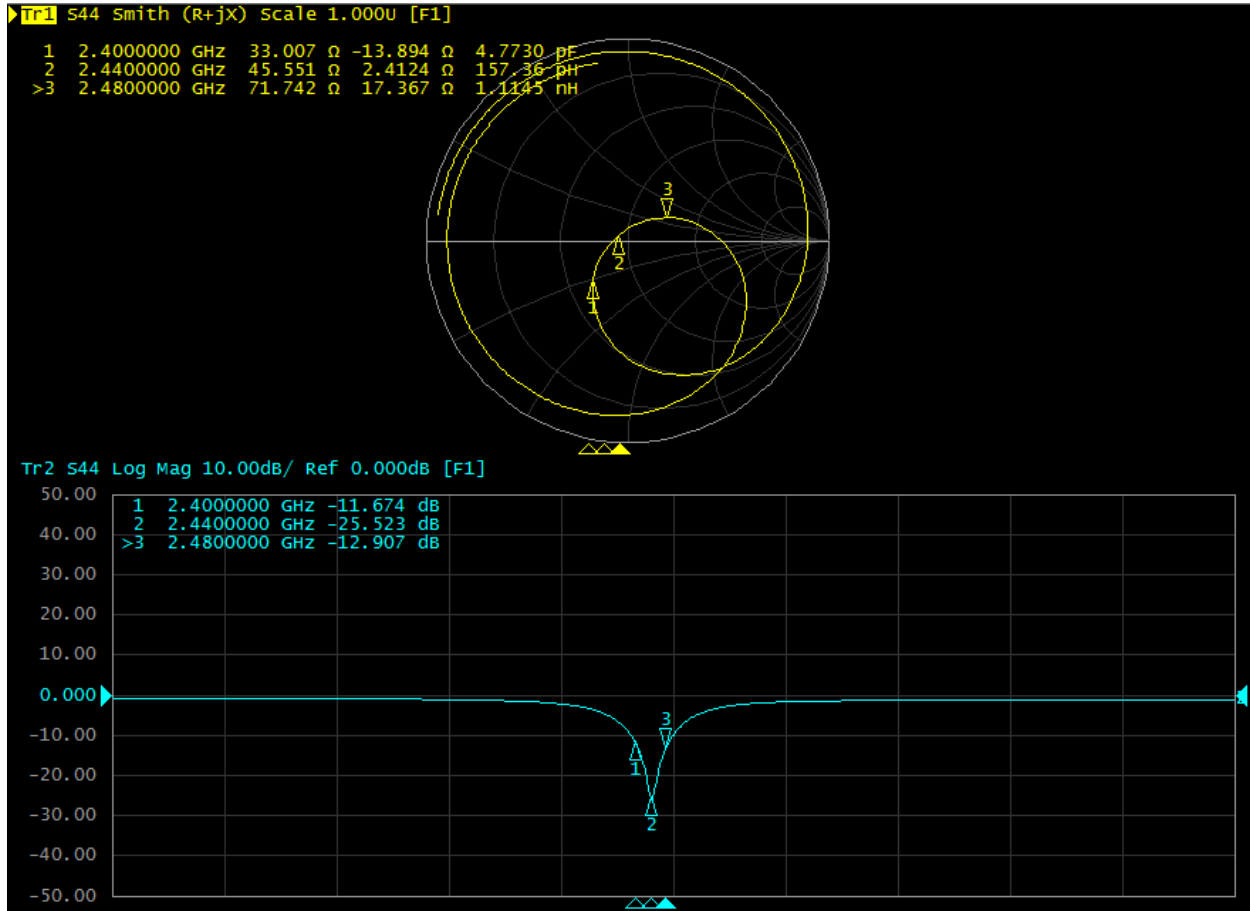
## 6. Measurement results:

### A. Return Loss with matching circuits

**2450AT14A0100001CE1**



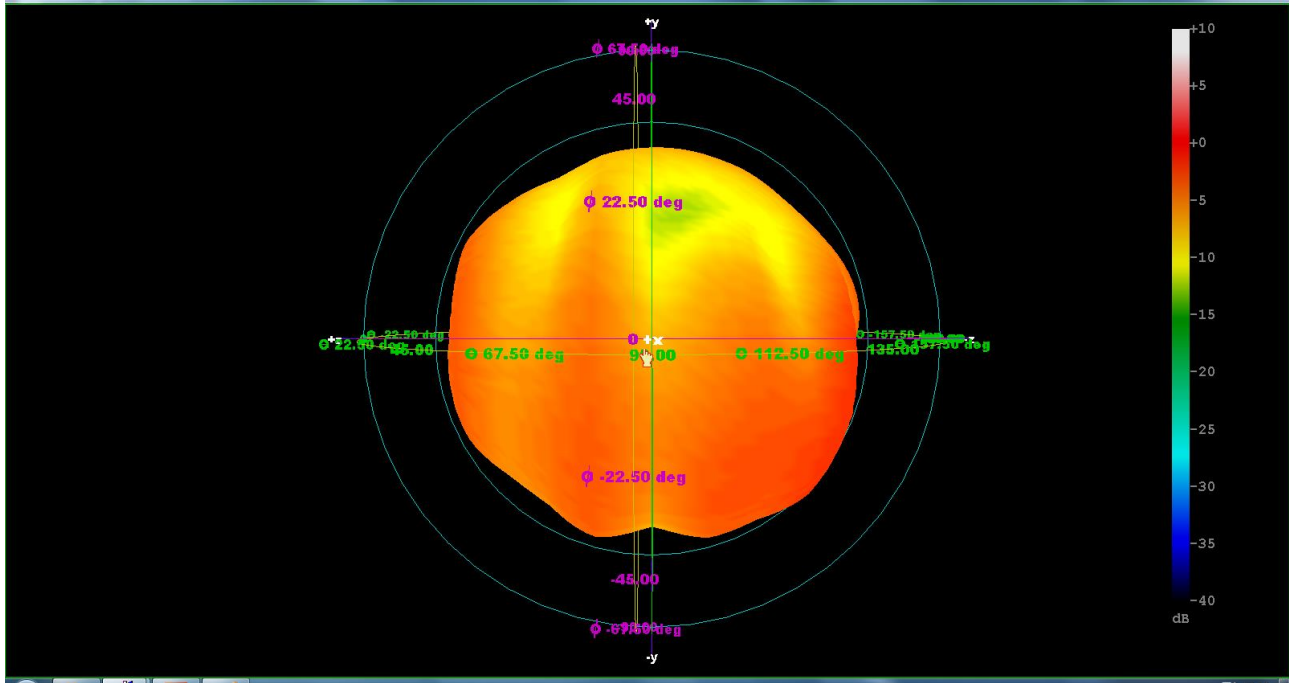
**2450AT14A0100001CE2**



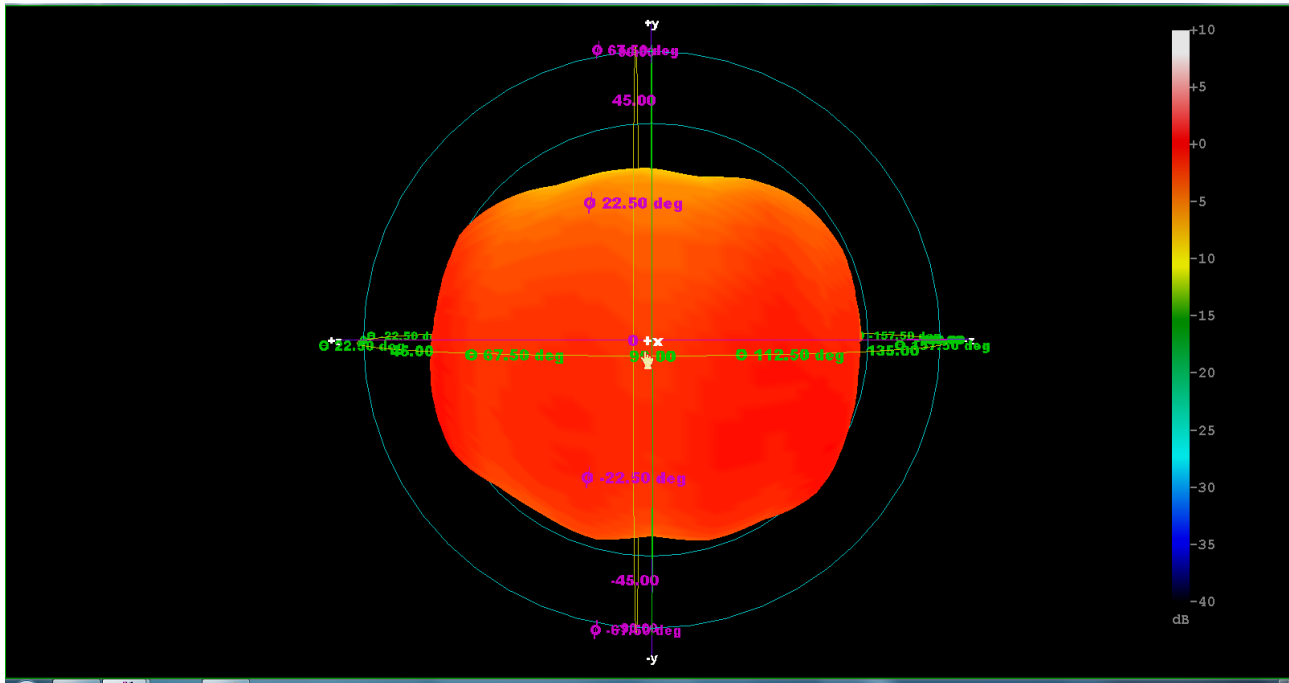


### B. Measured 3D Radiation Pattern

**2450AT14A0100001CE1 @2440MHz**



**2450AT14A0100001CE2 @2440MHz**

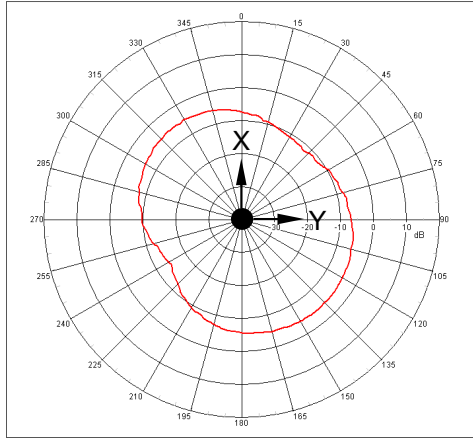


### C. Measured 2-D Cut Radiation Pattern

#### 2450AT14A0100001CE1 @2440MHz

◆ **XY-plane**

Far-field Power Distribution(Total) on X-Y Plane  
 Plot Peak Gain(Total)= -4.4 dBi; Plot AvgGain(Total)= -7.6dBi @2.44000 GHz

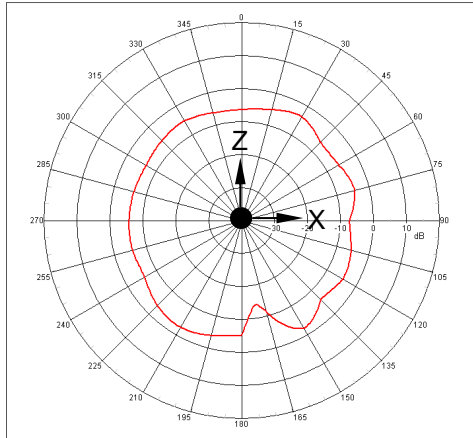


Unit : dBi

	Peak gain	Avg. gain
XY-plane	-4.4	-7.6

◆ **XZ-plane**

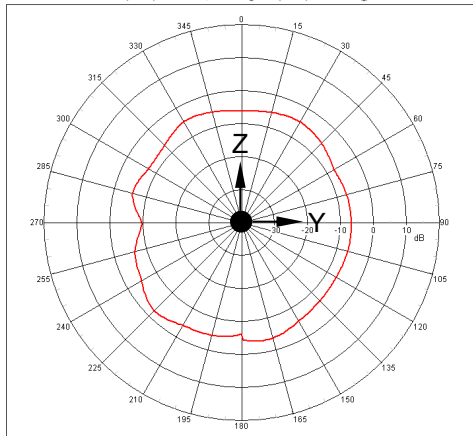
Far-field Power Distribution(Total) on X-Z Plane  
 Plot Peak Gain(Total)= -2.5 dBi; Plot AvgGain(Total)= -5.5dBi @2.44000 GHz



	Peak gain	Avg. gain
XZ-plane	-2.5	-5.5

◆ **YZ-plane**

Far-field Power Distribution(Total) on Y-Z Plane  
 Plot Peak Gain(Total)= -2.4 dBi; Plot AvgGain(Total)= -5.8dBi @2.44000 GHz

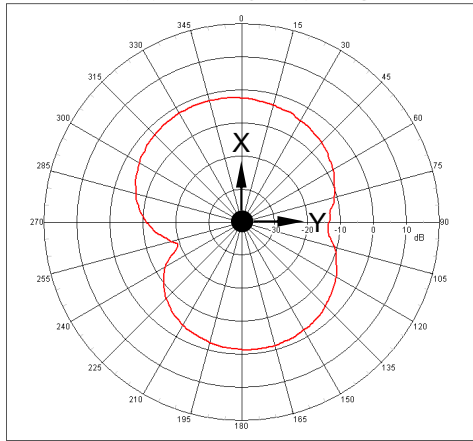


	Peak gain	Avg. gain
YZ-plane	-2.4	-5.8

**2450AT14A0100001CE2 @2440MHz**

◆ **XY-plane**

Far-field Power Distribution(Total) on X-Y Plane  
 Plot Peak Gain(Total)= -1.4 dBi; Plot AvgGain(Total)= -5.3dBi @2.44000 GHz

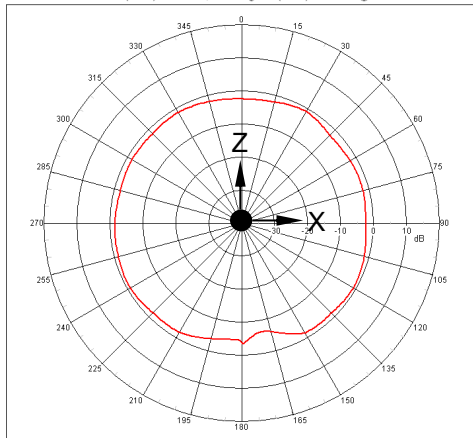


Unit : dBi

	Peak gain	Avg. gain
XY-plane	-1.4	-5.3

◆ **XZ-plane**

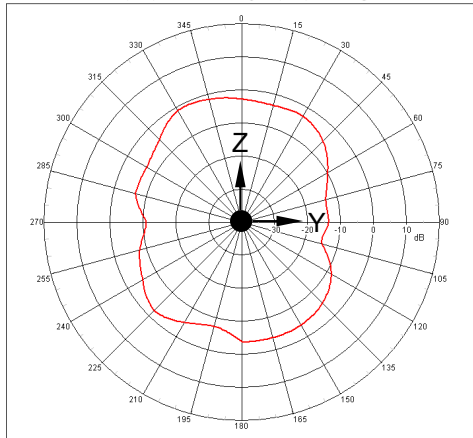
Far-field Power Distribution(Total) on X-Z Plane  
 Plot Peak Gain(Total)= -0.9 dBi; Plot AvgGain(Total)= -2.1dBi @2.44000 GHz



	Peak gain	Avg. gain
XZ-plane	-0.9	-2.1

◆ **YZ-plane**

Far-field Power Distribution(Total) on Y-Z Plane  
 Plot Peak Gain(Total)= -1.0 dBi; Plot AvgGain(Total)= -5.7dBi @2.44000 GHz



	Peak gain	Avg. gain
YZ-plane	-1.0	-5.7

## 7. Appendix

### A. Antenna Datasheet:

<https://www.johansontechnology.com/antennas>

### B. Antenna Tuning, Optimization, and Validation Services:

<https://www.johansontechnology.com/ipc-antenna-services>

### C. Johanson Chip RF Inductors:

<https://www.johansontechnology.com/ceramic-inductors>

### D. Johanson Chip RF Capacitors (High-Q):

<https://www.johansontechnology.com/high-q-multi-layer-capacitors>

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