



731 Enterprise Drive  
Lexington, KY 40510

Telephone: 859-226-1000  
Facsimile: 859-226-1040  
www.intertek-etlsemko.com

# TEST REPORT

**Report Number:** 100164882LEX-001  
**Project Number:** G100164882

**Report Issue Date:** 7/29/2010


**Product Name:** Antenna Enclosure

**Standards:** Radiated Power Comparison Measurement

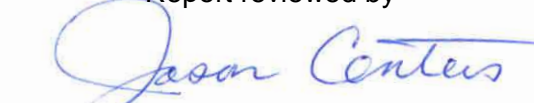
Tested by:  
Intertek Testing Services NA, Inc.  
731 Enterprise Drive  
Lexington, KY 40510

Client:  
Duratel  
212 W. Kinzie Street 4th Floor  
Chicago, IL 60610

Report prepared by

  
Bryan Taylor, Team Leader

Report reviewed by

  
Jason Centers, Senior Project Engineer



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## **1 Introduction**

At the request of Duratel the Antenna Enclosure was subjected to a series of radiated power comparison tests. The objective of this evaluation was to ascertain the impact of the Antenna Enclosure on the radiated power and antenna pattern of the enclosed antenna.

### **1.1 Test Location**

All testing was performed at the Intertek offices located at the following address:

Intertek  
731 Enterprise Drive  
Lexington, KY 40510

### **1.2 Test Sample Description**

The test sample was a 6 foot tall section of fiberglass material designed to install around outdoor antenna locations. The intent of the Antenna Enclosure is to provide protection from weather and other disturbances which might cause damage to the enclosed antenna.

**1.3 Photographs of Test Sample**



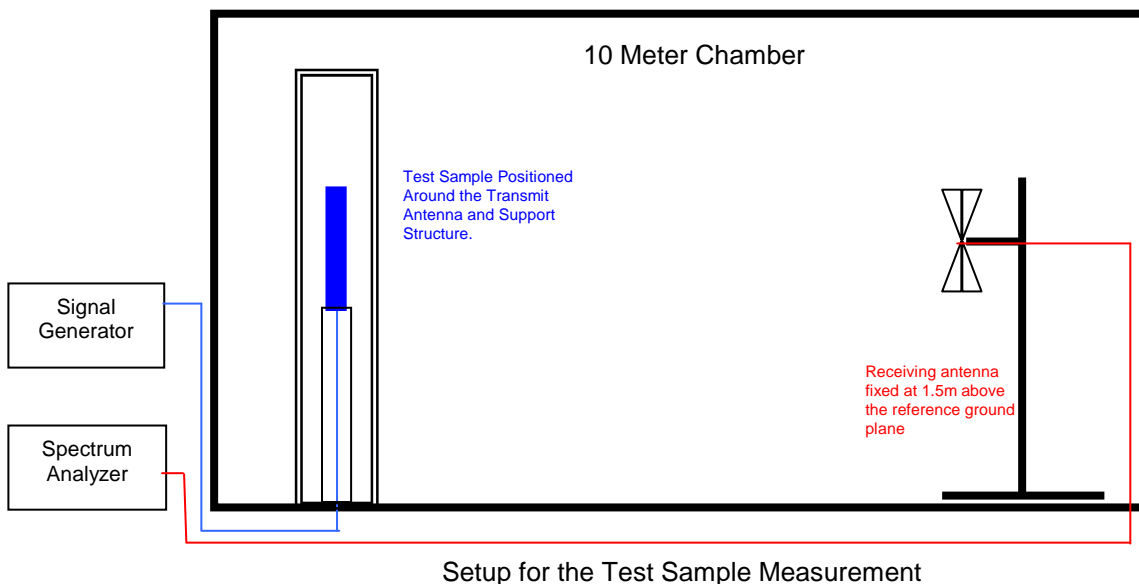
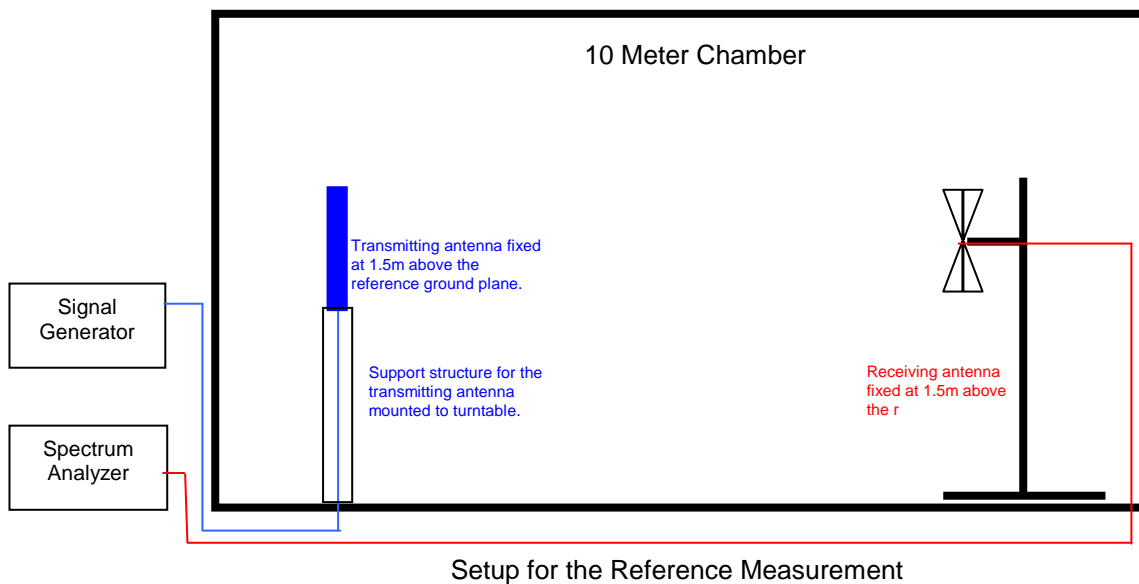
Photograph of Test Sample

### 1.4 Test Configuration

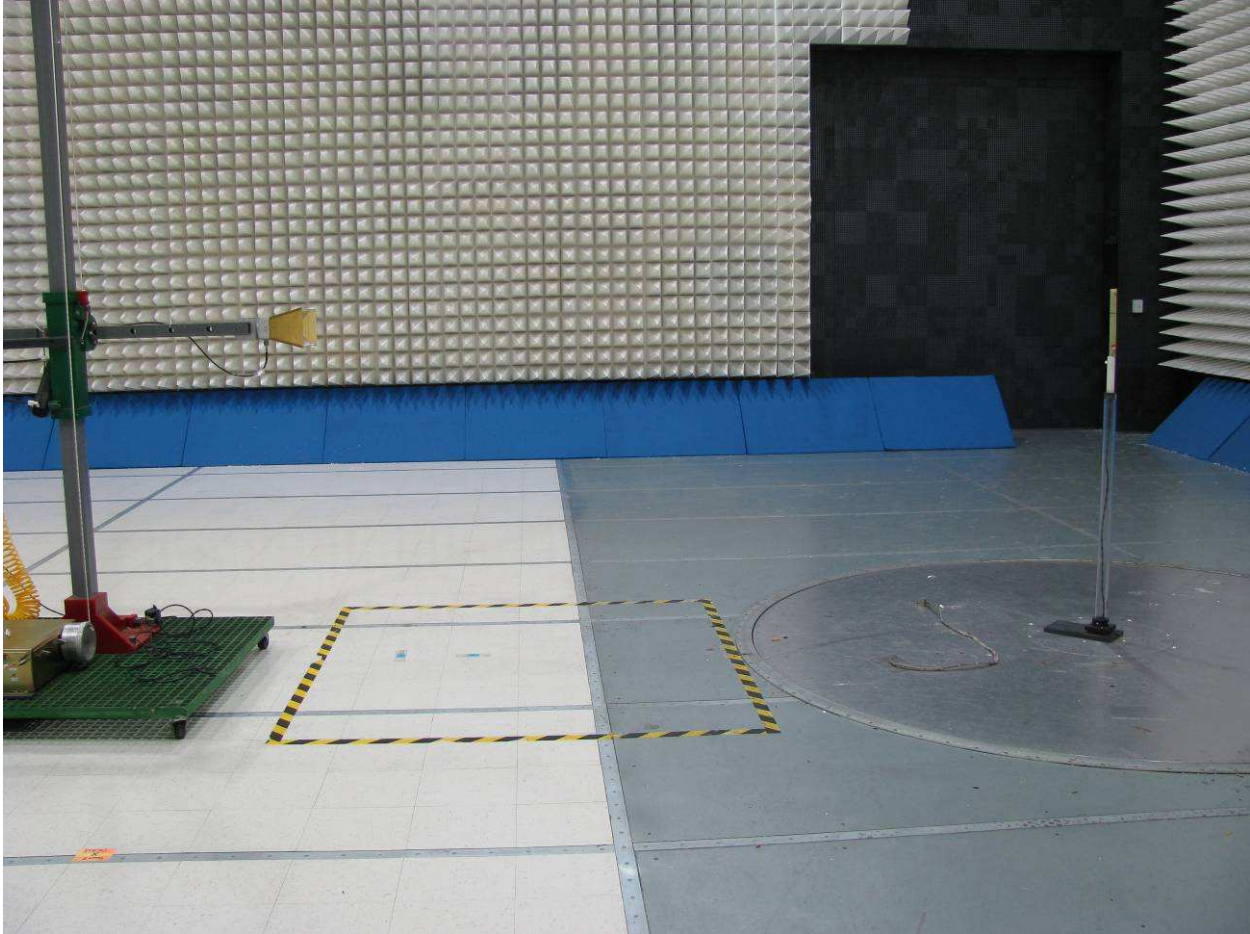
#### 1.5 Method:

A transmitting antenna was positioned at 1.5m above the ground reference plane on a turntable capable of rotating through 0 to 360 degrees. A receiving antenna was positioned 3 meters from the transmitting antenna at 1.5m above the ground reference plane. The radiated power was adjusted to approximately 0 dBm and the sample was rotated from 0 to 360 degrees in 10 degree increments. At each 10 degree increment the output power of the transmit antenna was measured and recorded. Once all of the data was recorded it was then plotted using polar coordinates to show the radiated power antenna pattern. This procedure was repeated at each of the four test frequencies (836.52MHz, 1880MHz, 2437MHz, and 5200MHz). The Antenna Enclosure was then installed around the transmitting antenna and supporting structure and the entire process repeated. The data with the Antenna Enclosure in place was plotted on the same graph as the reference data (without the test sample in place).

#### 1.6 Test Configuration Diagrams:



**1.7 Photographs of Test Configuration**



Reference Measurement Setup



Test Sample Measurement Setup



Photograph Showing the Transmitting Antenna Centered Within the Test Sample (Taken From Above)

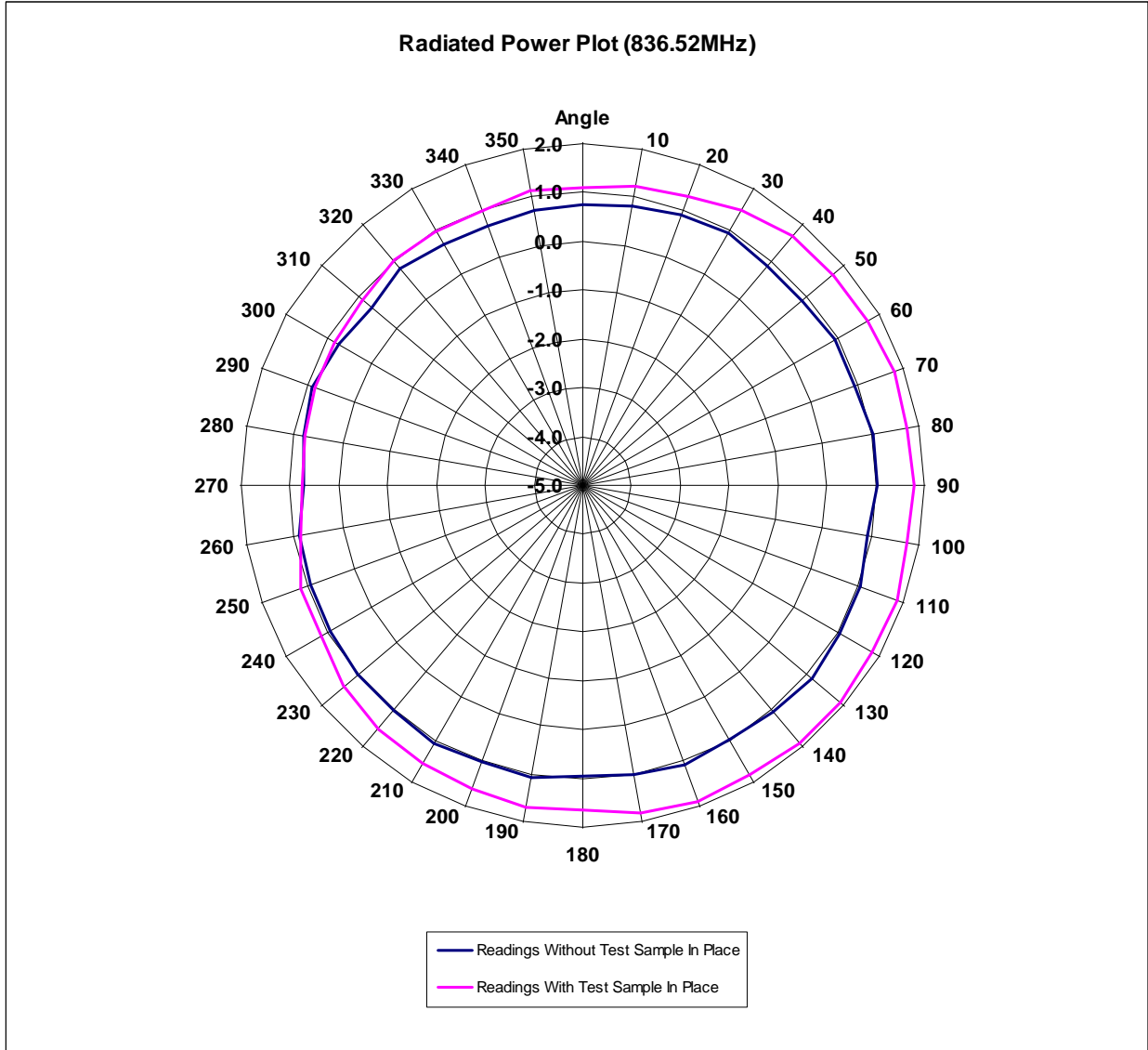
## 2 Antenna Pattern Measurement Data

### 2.1 Test Equipment Used:

Description	Asset Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	6/29/2010	6/29/2011
Signal Generator	3844A01327	Agilent	83620B	8/18/2009	8/18/2010
Horn Antenna (Rx)	6556	ETS	3115	8/4/2009	8/4/2010
Dipole Antenna (Tx)	3142	The Howland Company	VA100-2-D	12/3/2009	12/3/2010

### 2.2 Results:

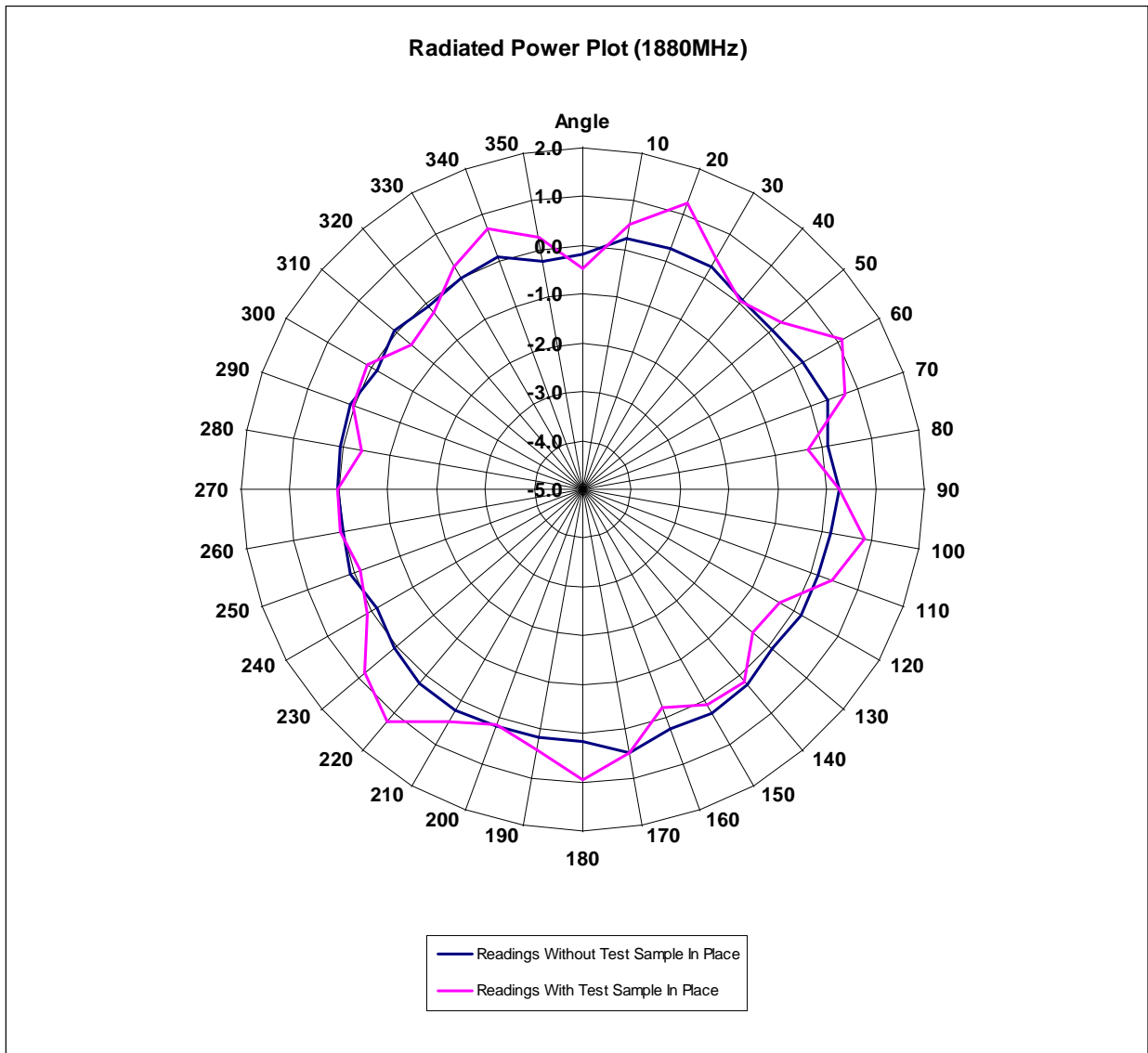
The following tabular data and plots show the effect of installing the Antenna Enclosure around a transmitting reference antenna at four different test frequencies (836.52MHz, 1880MHz, 2437MHz, and 5200MHz).



Radiated Power Plot at the Center of the Cellular Band (836.52MHz)

Angle	Radiated Power Reference (dBm)	Radiated Power Test Sample (dBm)
10	0.7	1.1
20	0.8	1.2
30	0.9	1.3
40	1.0	1.5
50	0.9	1.7
60	0.8	1.7
70	0.9	1.7
80	0.9	1.8
90	1.0	1.8
100	1.0	1.8
110	0.9	1.7
120	1.1	1.8
130	1.1	1.8
140	1.1	1.9
150	1.1	1.9
160	1.0	1.8
170	1.1	1.9
180	1.0	1.8
190	0.9	1.6
200	1.0	1.6
210	1.0	1.6
220	1.1	1.5
230	1.0	1.5
240	1.0	1.4
250	1.0	1.2
260	0.9	1.1
270	0.9	0.8
280	0.7	0.7
290	0.8	0.8
300	0.9	0.8
310	0.7	0.8
320	0.6	0.9
330	0.8	1.0
340	0.7	1.0
350	0.6	1.0
360	0.7	1.1

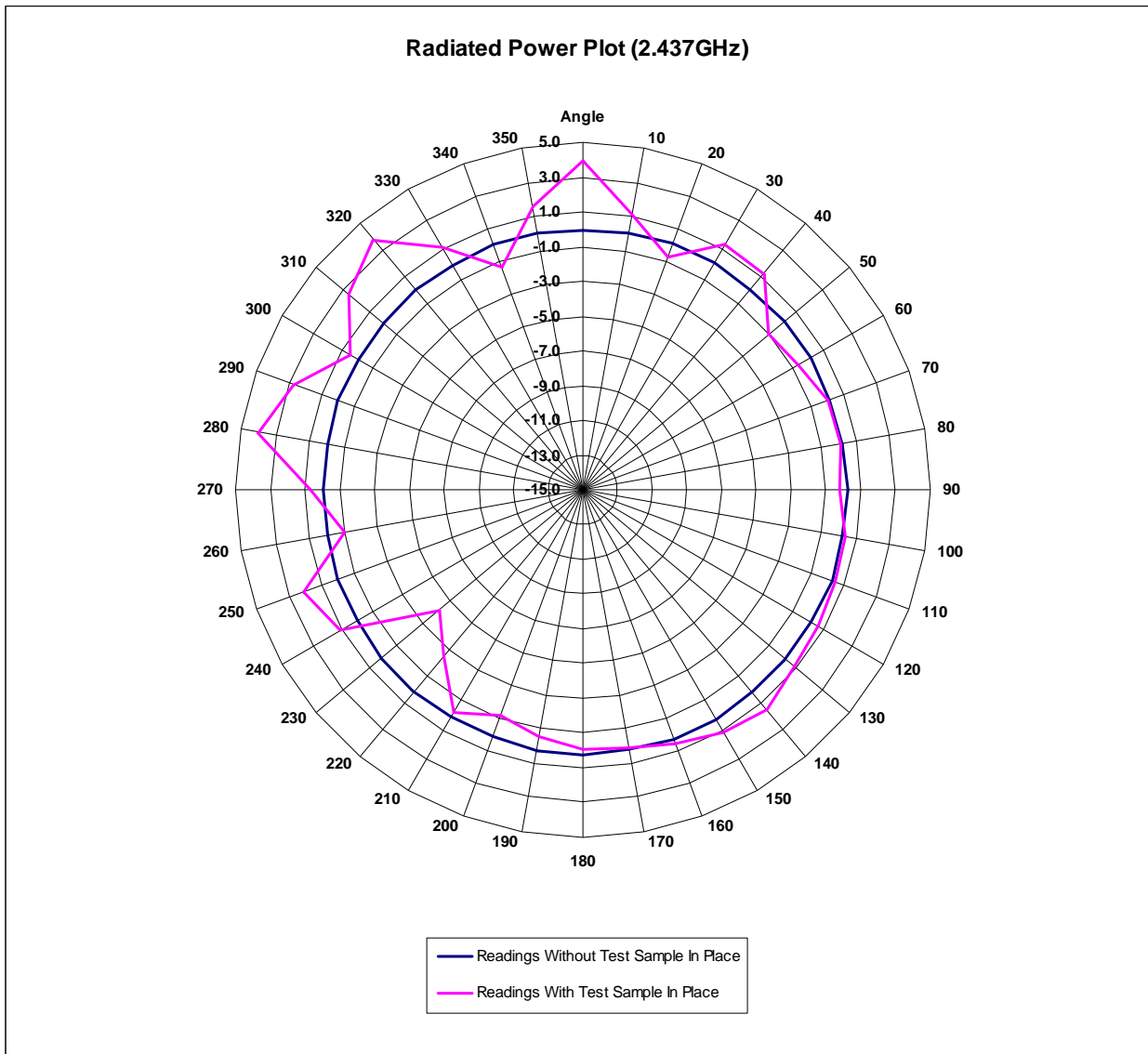
Tabular Data at the Center of the Cellular Band (836.52MHz)



Radiated Power Plot at the Center of the PCS Band (1880MHz)

Angle	Radiated Power Reference (dBm)	Radiated Power Test Sample (dBm)
10	-0.2	-0.5
20	0.2	0.5
30	0.2	1.2
40	0.2	0.5
50	0.1	0.0
60	0.1	0.3
70	0.2	1.1
80	0.3	0.7
90	0.1	-0.4
100	0.2	0.2
110	0.2	0.9
120	0.1	0.4
130	0.1	-0.4
140	0.1	-0.5
150	0.2	0.1
160	0.3	0.1
170	0.2	-0.3
180	0.5	0.5
190	0.2	0.9
200	0.1	0.4
210	0.2	0.1
220	0.2	0.5
230	0.2	1.2
240	0.0	0.8
250	-0.2	0.1
260	0.0	-0.2
270	0.0	0.0
280	0.0	0.0
290	0.0	-0.4
300	0.0	0.0
310	-0.2	0.1
320	0.0	-0.4
330	-0.1	-0.3
340	0.0	0.2
350	0.1	0.7
360	-0.3	0.2

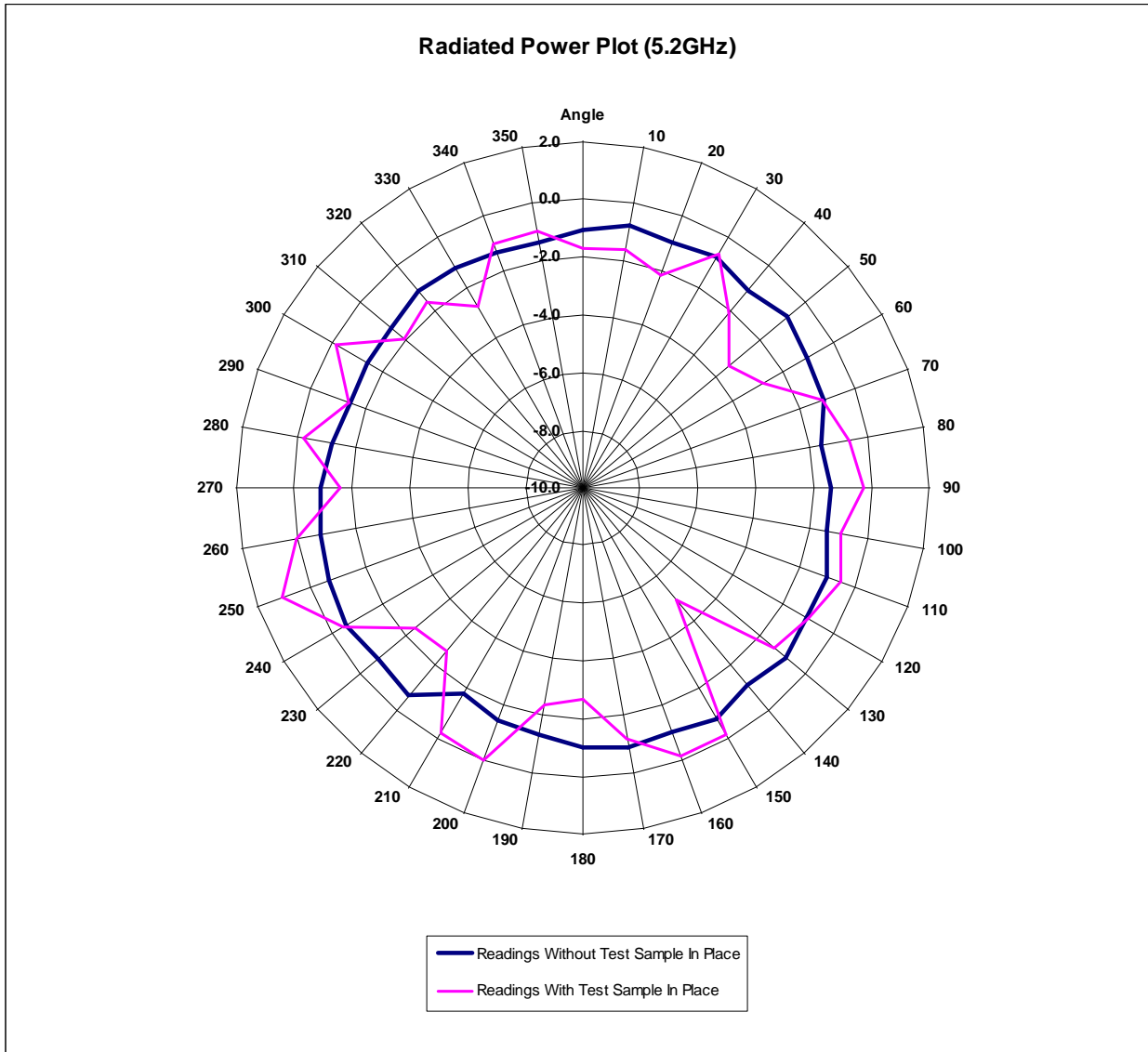
Tabular Data at the Center of the PCS Band (1880MHz)



Radiated Power Plot at the Center of the 802.11b/g Band (2437MHz)

Angle	Radiated Power Reference (dBm)	Radiated Power Test Sample (dBm)
10	0.0	4.0
20	0.0	1.1
30	0.1	-0.8
40	0.1	1.3
50	0.0	1.3
60	0.1	-1.0
70	0.2	-0.8
80	0.1	0.0
90	0.2	0.1
100	0.2	-0.2
110	0.2	0.3
120	0.2	0.4
130	0.2	0.7
140	0.2	0.9
150	0.2	1.5
160	0.2	1.1
170	0.2	0.6
180	0.2	0.1
190	0.3	-0.1
200	0.2	-0.5
210	0.1	-1.2
220	0.1	-0.2
230	0.2	-2.5
240	0.1	-4.3
250	0.0	1.1
260	0.0	2.2
270	0.0	-1.1
280	-0.1	0.7
290	-0.1	4.0
300	0.0	2.7
310	0.0	0.4
320	-0.1	2.6
330	0.0	3.7
340	-0.1	1.1
350	0.0	-1.3
360	0.0	1.5

Tabular Data at the Center of the 802.11b/g Band (2437MHz)



Radiated Power Plot in the 802.11a Band (5.2GHz)

Angle	Radiated Power Reference (dBm)	Radiated Power Test Sample (dBm)
10	-1.1	-1.7
20	-0.8	-1.6
30	-1.0	-2.2
40	-0.8	-0.7
50	-1.1	-2.1
60	-0.8	-3.4
70	-1.1	-2.8
80	-1.1	-1.2
90	-1.6	-0.7
100	-1.4	-0.3
110	-1.4	-0.9
120	-1.1	-0.5
130	-1.1	-1.0
140	-0.8	-1.4
150	-1.1	-5.0
160	-0.8	-0.2
170	-1.0	-0.2
180	-0.9	-1.2
190	-1.0	-2.7
200	-1.3	-2.4
210	-1.5	0.0
220	-1.8	-0.2
230	-0.7	-2.6
240	-0.8	-2.4
250	-0.5	-0.5
260	-0.6	1.1
270	-0.8	0.0
280	-0.9	-1.6
290	-1.2	-0.2
300	-1.5	-1.4
310	-1.4	-0.1
320	-1.4	-2.0
330	-1.2	-1.6
340	-1.2	-2.7
350	-1.3	-1.1
360	-1.4	-1.0

Tabular Data in the 802.11a Band (5.2GHz)