



**COMMUNICATION TECHNOLOGY**

Date  
Call Letters  
Location  
Customer  
Antenna Type  
Frequency  
Drawing #

**8/7/2013**  
**WAYG**  
**Grand Rapids, MI**  
**WAYG**  
**DCRM4E50P**  
**89.7**  
**44**

## **PATTERN CERTIFICATION**

### **TABLE OF CONTENTS**

**Narrative Pattern Certification**

**FM Azimuth Pattern Approval**

**Azimuth Patterns of Horizontal and Vertically Polarized Planes**

**Tabulation of Measured Horizontal and Vertically Polarized Planes**

**Composite Pattern of Horizontal and Vertically Polarized Planes**

**Tabulation of Composite Pattern**

**Gain Summary**

**Rectangular Plot of Vertical Plane Pattern**

**Sketch of Scale Model Test**



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## **PATTERN CERTIFICATION**

### **Method of Measurement**

The azimuth pattern for WAYG, Dielectric Document Sketch #44, was measured in the following manner.

A single 4.4 to 1 scale model "DCRM4E50P" bay radiator was mounted on a similarly scaled model of the tower according to information provided to Dielectric by the customer; refer to Dielectric Document Sketch #44. The antenna under test, all parasitics, all known tower appurtenances, and the tower section were rotated through 360 degrees while receiving a signal at the appropriate frequency from a linear cavity-backed source antenna. Both the horizontal and vertical polarization azimuth patterns were measured in an anechoic test range.

The transmit and scale model antennas are mounted at identical elevations and at opposite ends of the chamber. A Hewlett Packard model 8752C network analyzer was used to supply the RF signal to the source antenna at 4.4 times the fundamental FM frequency and to receive the signal intercepted by the antenna under test. The received signal was converted to a relative level, referenced to the source. This level was stored on a computer acting as the master controller. The computer controls the measurement system via IEEE-488 control bus through a GPIB card.

### **Statement of Qualifications**

Jon Hanson is an Electrical Engineer here at Dielectric. He received a BS in Electrical Engineering from the North Dakota State University in 2004. He has 6 years experience in RF antenna engineering and has been employed by Dielectric Communications since 2008.

Signed by: \_\_\_\_\_

Date: \_\_\_\_\_



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## **FM AZIMUTH PATTERN APPROVAL**

The azimuth pattern of the horizontal polarization and vertical polarization as supplied by Dielectric in the document labeled "Pattern 44", is acknowledged as acceptable. We understand that Dielectric does not guarantee or predict signal strength in any particular location.

\_\_\_\_\_  
(Customer's name)

By: \_\_\_\_\_  
(Name typed or printed)

Title: \_\_\_\_\_

\_\_\_\_\_  
(Signature)



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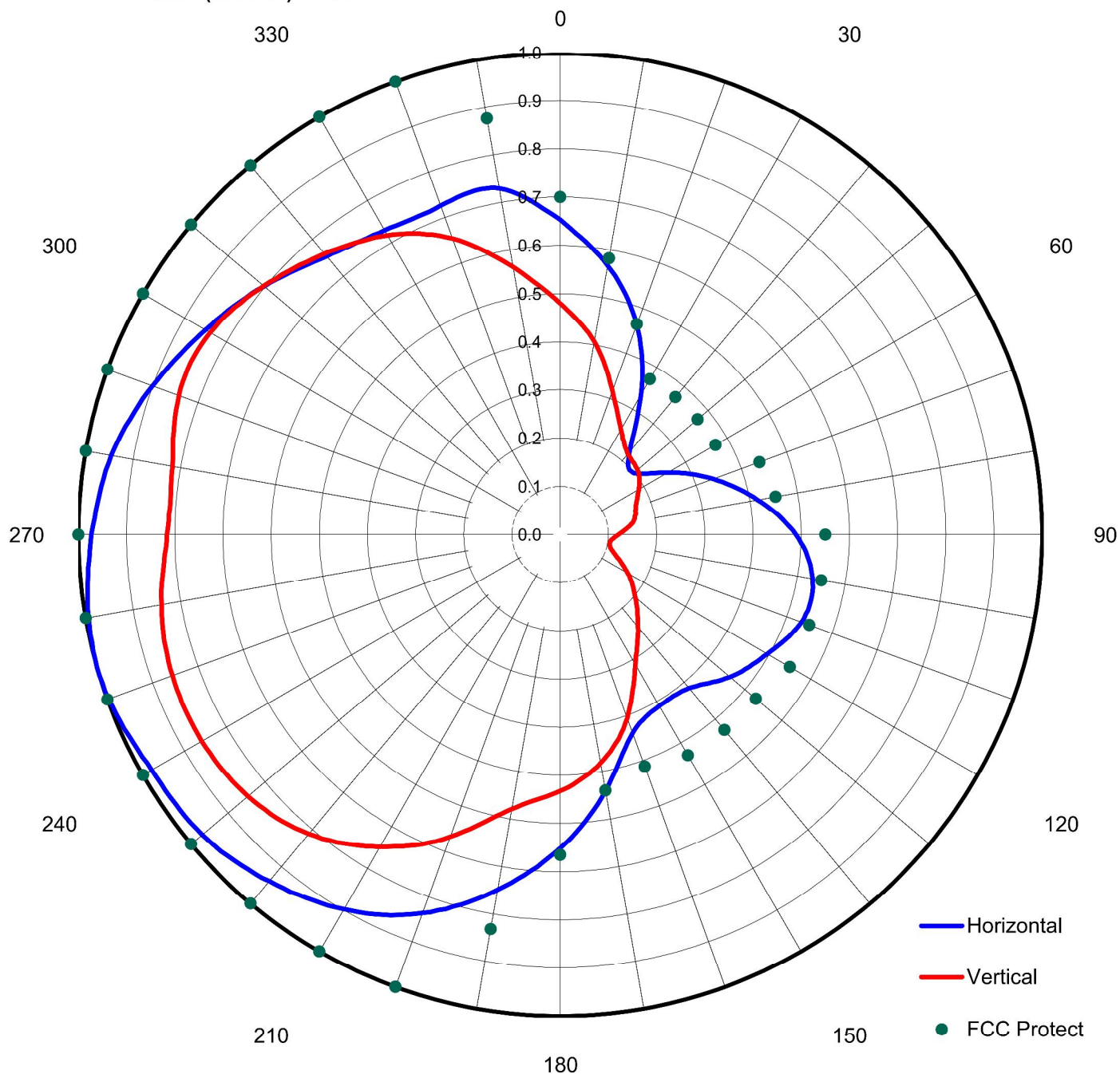
### AZIMUTH PATTERN

89.1% Ccov 54.6% Hrms - 45.4% Vrms

Gain 2.11 (3.25 dB) HPOL  
2.25 (3.52 dB) VPOL

Calculated / Measured

Measured





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## TABULATION OF HORIZONTAL AZIMUTH PATTERN

Angle	Field	dBk	ERP kW
	0.653	1.350	1.365
10	0.567	0.123	1.029
20	0.464	-1.618	0.689
30	0.335	-4.448	0.359
40	0.224	-7.944	0.161
50	0.199	-8.971	0.127
60	0.258	-6.716	0.213
70	0.338	-4.370	0.366
80	0.416	-2.567	0.554
90	0.489	-1.162	0.765
100	0.532	-0.430	0.906
110	0.533	-0.414	0.909
120	0.496	-1.039	0.787
130	0.460	-1.693	0.677
140	0.416	-2.567	0.554
150	0.411	-2.672	0.541
160	0.439	-2.099	0.617
170	0.540	-0.301	0.933
180	0.651	1.323	1.356
190	0.749	2.541	1.795
200	0.836	3.496	2.236
210	0.898	4.117	2.580
220	0.939	4.505	2.822
230	0.970	4.787	3.011
240	0.979	4.867	3.067
250	0.997	5.025	3.181
260	0.994	4.999	3.162
270	0.973	4.814	3.030
280	0.946	4.569	2.864
290	0.900	4.136	2.592
300	0.850	3.640	2.312
310	0.802	3.135	2.058
320	0.754	2.599	1.819
330	0.729	2.306	1.701
340	0.726	2.270	1.687
350	0.729	2.306	1.701
Additional Point 253	1.000	5.051	3.200



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## TABULATION OF VERTICAL AZIMUTH PATTERN

Angle	Field	dBk	ERP kW
	0.480	-1.324	0.737
10	0.407	-2.757	0.530
20	0.317	-4.927	0.322
30	0.252	-6.920	0.203
40	0.218	-8.179	0.152
50	0.209	-8.546	0.140
60	0.189	-9.419	0.114
70	0.167	-10.494	0.089
80	0.154	-11.198	0.076
90	0.121	-13.293	0.047
100	0.104	-14.608	0.035
110	0.121	-13.293	0.047
120	0.162	-10.758	0.084
130	0.203	-8.799	0.132
140	0.251	-6.955	0.202
150	0.312	-5.065	0.312
160	0.406	-2.778	0.527
170	0.482	-1.288	0.743
180	0.533	-0.414	0.909
190	0.579	0.305	1.073
200	0.668	1.547	1.428
210	0.749	2.541	1.795
220	0.812	3.243	2.110
230	0.846	3.599	2.290
240	0.859	3.731	2.361
250	0.856	3.701	2.345
260	0.840	3.537	2.258
270	0.816	3.285	2.131
280	0.817	3.296	2.136
290	0.842	3.558	2.269
300	0.839	3.527	2.253
310	0.803	3.146	2.063
320	0.761	2.679	1.853
330	0.717	2.162	1.645
340	0.654	1.363	1.369
350	0.564	0.077	1.018



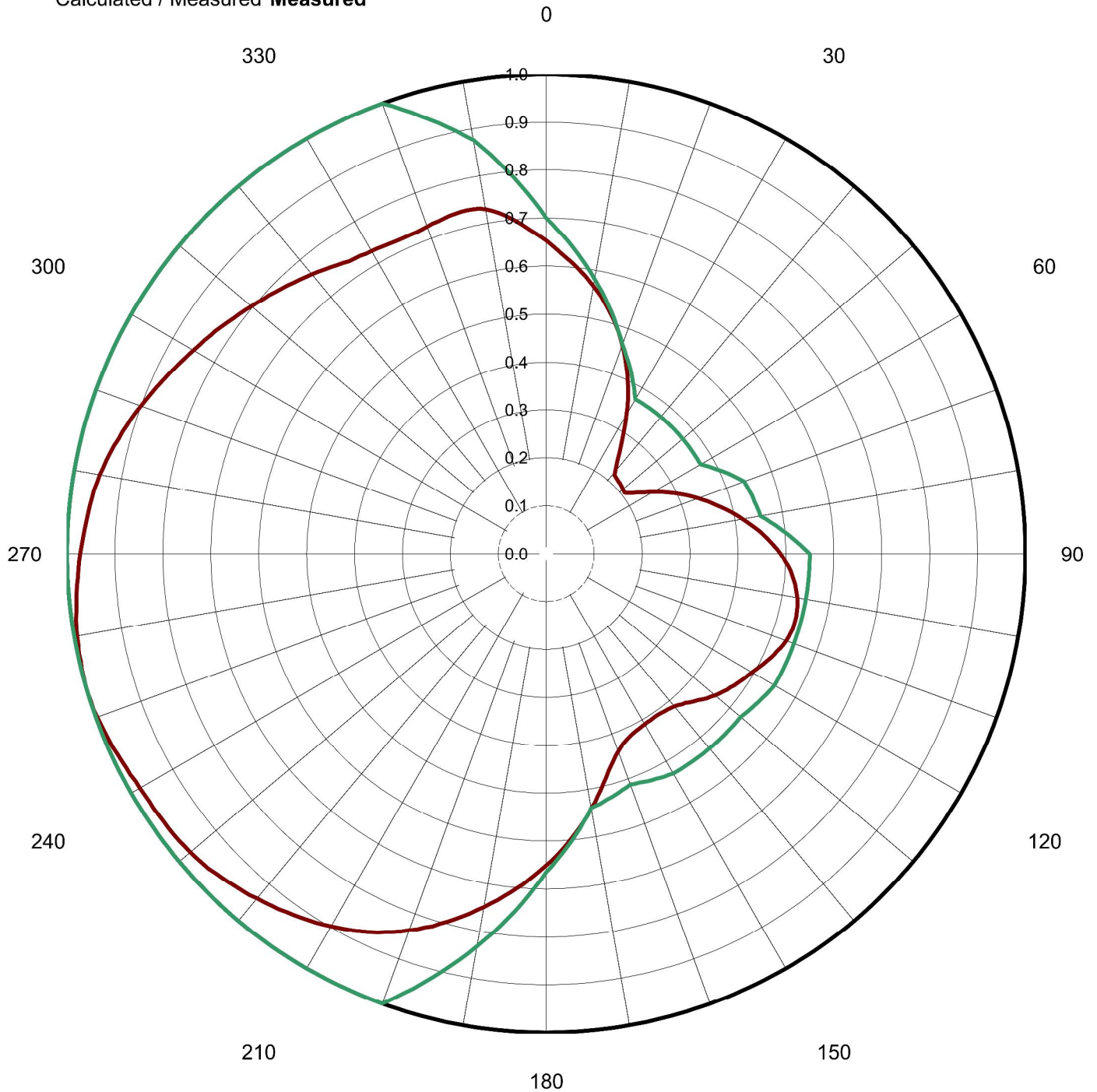
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COMPOSITE AZIMUTH PATTERN

Calculated / Measured Measured





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Angle	Field	dBk	Power kW	Input Power
	0.653	1.350	1.365	3.200
10	0.567	0.123	1.029	3.200
20	0.464	-1.618	0.689	3.200
30	0.335	-4.448	0.359	3.200
40	0.224	-7.944	0.161	3.200
50	0.209	-8.546	0.140	3.200
60	0.258	-6.716	0.213	3.200
70	0.338	-4.370	0.366	3.200
80	0.416	-2.567	0.554	3.200
90	0.489	-1.162	0.765	3.200
100	0.532	-0.430	0.906	3.200
110	0.533	-0.414	0.909	3.200
120	0.496	-1.039	0.787	3.200
130	0.460	-1.693	0.677	3.200
140	0.416	-2.567	0.554	3.200
150	0.411	-2.672	0.541	3.200
160	0.439	-2.099	0.617	3.200
170	0.540	-0.301	0.933	3.200
180	0.651	1.323	1.356	3.200
190	0.749	2.541	1.795	3.200
200	0.836	3.496	2.236	3.200
210	0.898	4.117	2.580	3.200
220	0.939	4.505	2.822	3.200
230	0.970	4.787	3.011	3.200
240	0.979	4.867	3.067	3.200
250	0.997	5.025	3.181	3.200
260	0.994	4.999	3.162	3.200
270	0.973	4.814	3.030	3.200
280	0.946	4.569	2.864	3.200
290	0.900	4.136	2.592	3.200
300	0.850	3.640	2.312	3.200
310	0.803	3.146	2.063	3.200
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## **CUSTOMER GAIN SUMMARY**

Azimuth Pattern Gain of Horizontal Polarization	2.11 (3.25 dB)
Elevation Pattern Gain Per Polarization	1.30 (1.14 dB)
Peak Gain of Horizontal Polarization	2.75 (4.39 dB)



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## ELEVATION PATTERN

RMS Gain at Main Lobe      **1.30    ( 1.14 dB )**  
Per Polarization  
Calculated / Measured      **Calculated**

Beam Tilt  
Frequency      **89.7 MHz**



