



COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

**9/12/2011
WUPN
Paradise, MI**

Antenna Type
Frequency
Drawing #

**DCRM4ED
95.1
23**

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



COMMUNICATION TECHNOLOGY

Date 9/12/2011
Call Letters WUPN
Location Paradise, MI

Antenna Type DCRM4ED
Frequency 95.1
Drawing # 23

PATTERN CERTIFICATION

Method of Measurement

The azimuth pattern for WUPN, Dielectric Document Sketch #23, was measured in the following manner.

A single 4.4 to 1 scale model "DCRM4ED" 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 #23. 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

Mike Spugnardi is a Senior Electrical Engineer here at Dielectric. He received a BS in Electrical Engineering from Worcester Polytechnic Institute in 1999. He has over 14 years experience in RF antenna engineering and has been employed by Dielectric Communications since 1997.

Signed by: 

Date: 9/12/2011



COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

9/12/2011
WUPN
Paradise, MI

Antenna Type
Frequency
Drawing #

DCRM4ED
95.1
23

FM AZIMUTH PATTERN APPROVAL

The azimuth pattern of the horizontal polarization and vertical polarization as supplied by Dielectric in the document labeled "Pattern 23", 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)



COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

9/12/2011
WUPN
Paradise, MI

Antenna Type
Frequency
Drawing #

DCRM4ED
95.1
23

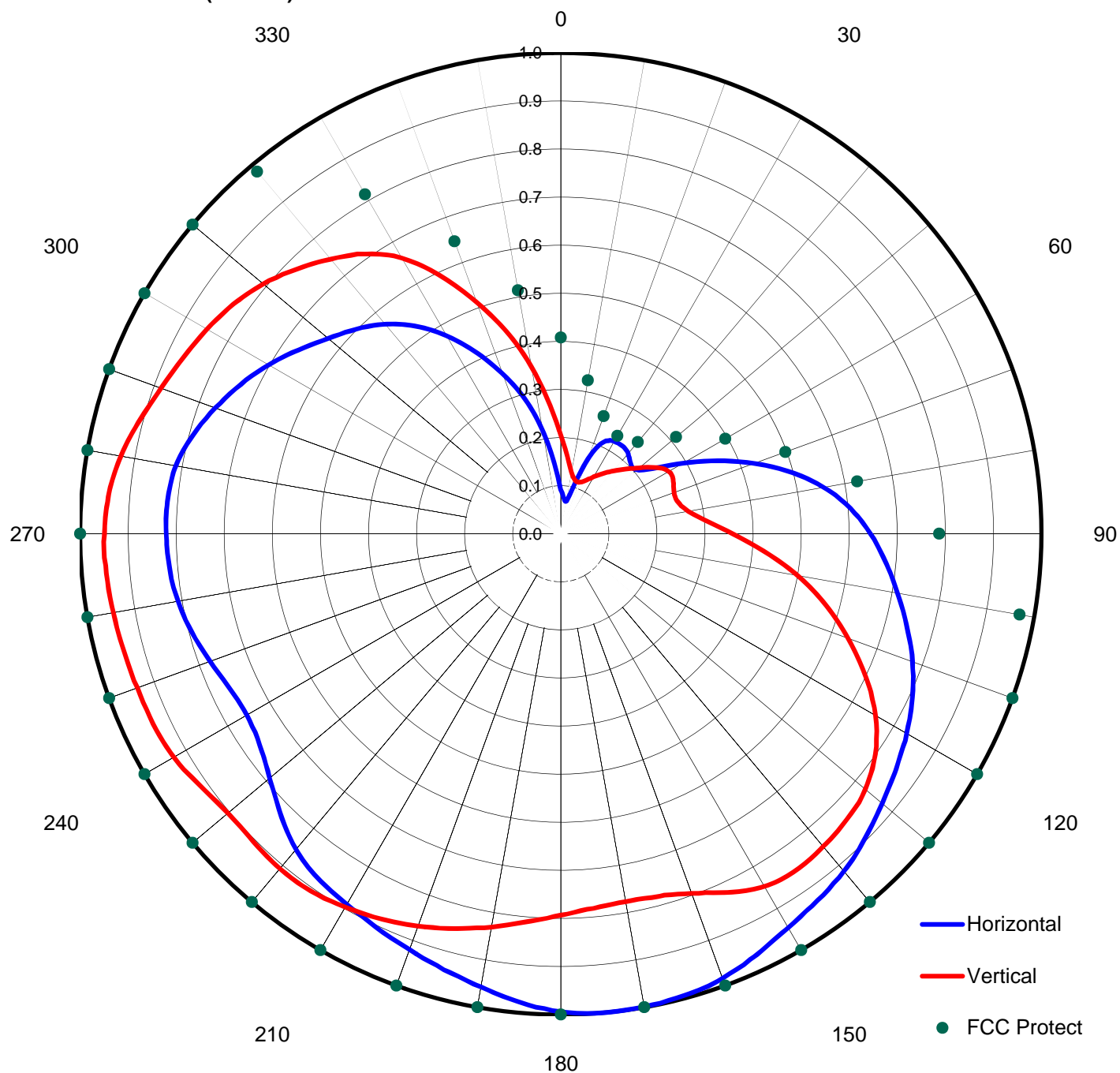
AZIMUTH PATTERN

88.66% Ccov 50.11% Hrms - 49.89% Vrms

Gain
2.03 (3.07 dB) HPOL
1.85 (2.67 dB) VPOL

Calculated / Measured

Measured





COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

9/12/2011
WUPN
Paradise, MI

Antenna Type
Frequency
Drawing #

DCRM4ED
95.1
23

TABULATION OF HORIZONTAL AZIMUTH PATTERN

Angle	Field	dBk	ERP kW
	0.091	-6.840	0.207
10	0.069	-9.244	0.119
20	0.166	-1.618	0.689
30	0.222	0.906	1.232
40	0.218	0.749	1.188
50	0.207	0.299	1.071
60	0.293	3.317	2.146
70	0.428	6.608	4.580
80	0.555	8.865	7.701
90	0.644	10.157	10.368
100	0.711	11.017	12.638
110	0.779	11.810	15.171
120	0.831	12.371	17.264
130	0.873	12.800	19.053
140	0.916	13.217	20.976
150	0.946	13.497	22.373
160	0.984	13.839	24.206
170	0.999	13.971	24.950
180	0.994	13.927	24.701
190	0.957	13.598	22.896
200	0.920	13.255	21.160
210	0.890	12.967	19.803
220	0.857	12.639	18.361
230	0.791	11.943	15.642
240	0.754	11.527	14.213
250	0.776	11.777	15.054
260	0.808	12.128	16.322
270	0.821	12.266	16.851
280	0.813	12.181	16.524
290	0.765	11.653	14.631
300	0.702	10.906	12.320
310	0.632	9.994	9.986
320	0.569	9.082	8.094
330	0.475	7.513	5.641
340	0.354	4.959	3.133
350	0.218	0.749	1.188



COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

**9/12/2011
WUPN
Paradise, MI**

Antenna Type
Frequency
Drawing #

**DCRM4ED
95.1
23**

TABULATION OF VERTICAL AZIMUTH PATTERN

Angle	Field	dBk	ERP kW
	0.204	0.172	1.040
10	0.129	-3.809	0.416
20	0.114	-4.883	0.325
30	0.137	-3.286	0.469
40	0.170	-1.412	0.723
50	0.213	0.547	1.134
60	0.259	2.245	1.677
70	0.251	1.973	1.575
80	0.269	2.574	1.809
90	0.357	5.033	3.186
100	0.500	7.959	6.250
110	0.636	10.049	10.112
120	0.756	11.550	14.288
130	0.827	12.330	17.098
140	0.849	12.558	18.020
150	0.847	12.537	17.935
160	0.796	11.998	15.840
170	0.777	11.788	15.093
180	0.793	11.965	15.721
190	0.831	12.371	17.264
200	0.868	12.750	18.836
210	0.897	13.035	20.115
220	0.909	13.151	20.657
230	0.904	13.103	20.430
240	0.930	13.349	21.623
250	0.937	13.414	21.949
260	0.945	13.488	22.326
270	0.949	13.525	22.515
280	0.929	13.340	21.576
290	0.885	12.918	19.581
300	0.850	12.568	18.063
310	0.808	12.128	16.322
320	0.745	11.423	13.876
330	0.662	10.397	10.956
340	0.513	8.182	6.579
350	0.353	4.935	3.115



Date
Call Letters
Location

9/12/2011
WUPN
Paradise, MI

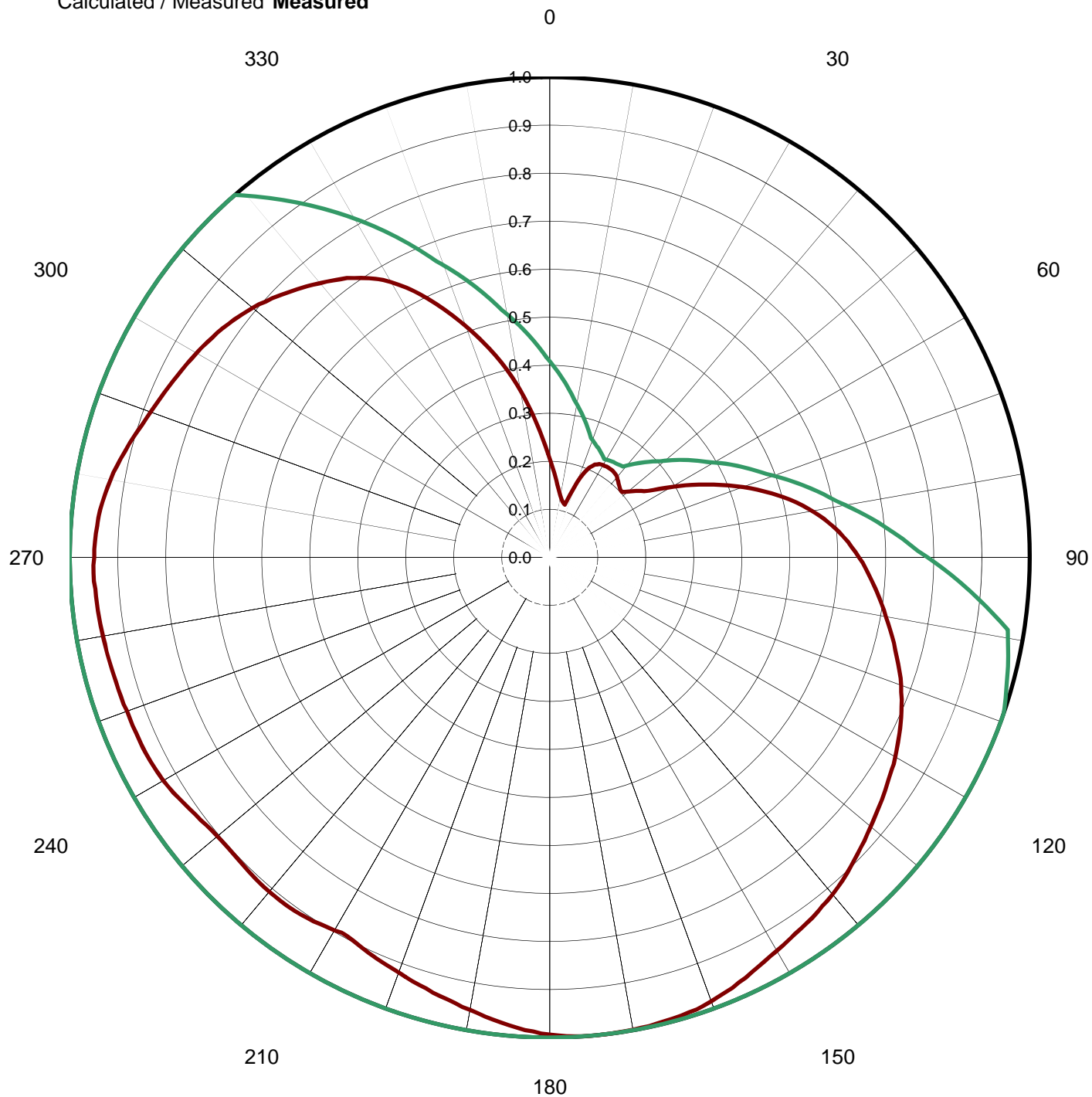
COMMUNICATION TECHNOLOGY

Antenna Type
Frequency
Drawing #

DCRM4ED
95.1
23

COMPOSITE AZIMUTH PATTERN

Calculated / Measured **Measured**





COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

9/12/2011
WUPN
Paradise, MI

Antenna Type
Frequency
Drawing #

DCRM4ED
95.1
23

TABULATION OF COMPOSITE AZIMUTH PATTERN

Angle	Field	dBk	Power kW	Input Power
	0.204	0.172	1.040	25.000
10	0.129	-3.809	0.416	25.000
20	0.166	-1.618	0.689	25.000
30	0.222	0.906	1.232	25.000
40	0.218	0.749	1.188	25.000
50	0.213	0.547	1.134	25.000
60	0.293	3.317	2.146	25.000
70	0.428	6.608	4.580	25.000
80	0.555	8.865	7.701	25.000
90	0.644	10.157	10.368	25.000
100	0.711	11.017	12.638	25.000
110	0.779	11.810	15.171	25.000
120	0.831	12.371	17.264	25.000
130	0.873	12.800	19.053	25.000
140	0.916	13.217	20.976	25.000
150	0.946	13.497	22.373	25.000
160	0.984	13.839	24.206	25.000
170	0.999	13.971	24.950	25.000
180	0.994	13.927	24.701	25.000
190	0.957	13.598	22.896	25.000
200	0.920	13.255	21.160	25.000
210	0.897	13.035	20.115	25.000
220	0.909	13.151	20.657	25.000
230	0.904	13.103	20.430	25.000
240	0.930	13.349	21.623	25.000
250	0.937	13.414	21.949	25.000
260	0.945	13.488	22.326	25.000
270	0.949	13.525	22.515	25.000
280	0.929	13.340	21.576	25.000
290	0.885	12.918	19.581	25.000
300	0.850	12.568	18.063	25.000
310	0.808	12.128	16.322	25.000
320	0.745	11.423	13.876	25.000
330	0.662	10.397	10.956	25.000
340	0.513	8.182	6.579	25.000
350	0.353	4.935	3.115	25.000



COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

**9/12/2011
WUPN
Paradise, MI**

Antenna Type
Frequency
Drawing #

**DCRM4ED
95.1
23**

CUSTOMER GAIN SUMMARY

Azimuth Pattern Gain of Horizontal Polarization	2.03 (3.07 dB)
Elevation Pattern Gain Per Polarization	2.10 (3.22 dB)
Peak Gain at Horizontal Polarization	4.26 (6.30 dB)



COMMUNICATION TECHNOLOGY

Date
Call Letters
Location

9/12/2011
WUPN
Paradise, MI

Antenna Type
Frequency
Drawing #

DCRM4ED
95.1
23

ELEVATION PATTERN

RMS Gain at Main Lobe **2.10 (3.22 dB)**
Per Polarization
Calculated / Measured **Calculated**

Beam Tilt
Frequency **95.1 MHz**

