



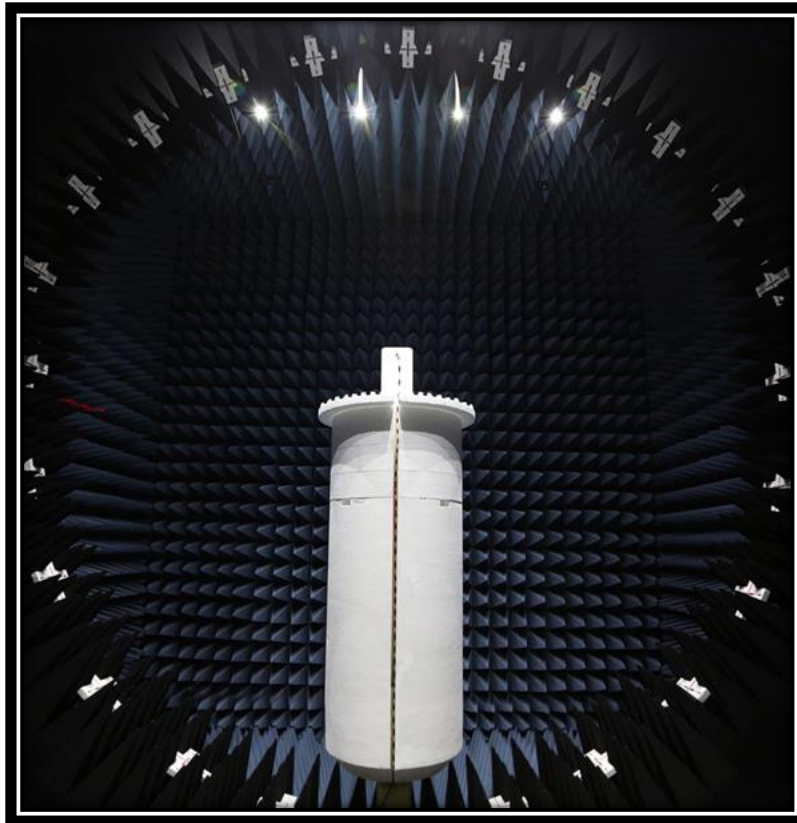
element

Emerson/Rosemount

Emerson Wireless 775 THUM Adapter, Model: 775

Antenna Pattern Measurements

Report: EMPM0178.0 Rev. 1, Issue Date: May 7, 2024



Approved by:

Eric Brandon, Department Manager

TABLE OF CONTENTS



Section	Page Number
Revision History	3
Accreditations.....	4
Facilities	5
Product Description.....	6
Modifications	7
Active 3D Antenna Pattern Measurements	8
End of Report.....	12

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Changed the Approver name	2024-05-07	Cover

ACCREDITATIONS AND AUTHORIZATIONS



United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

[California](#)

[Minnesota](#)

[Oregon](#)

[Texas](#)

[Washington](#)

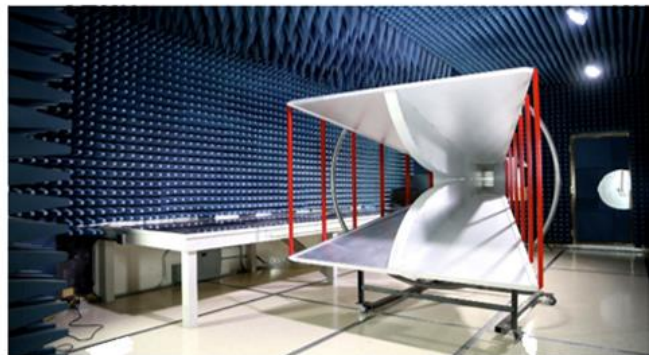
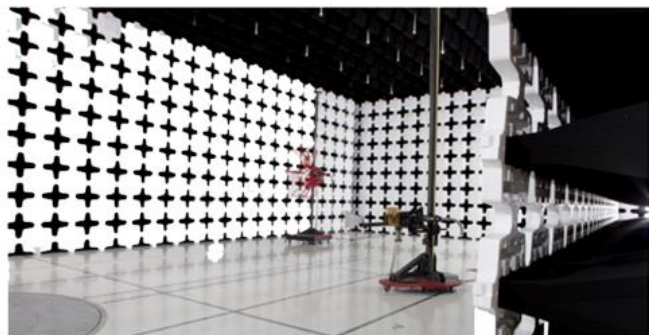
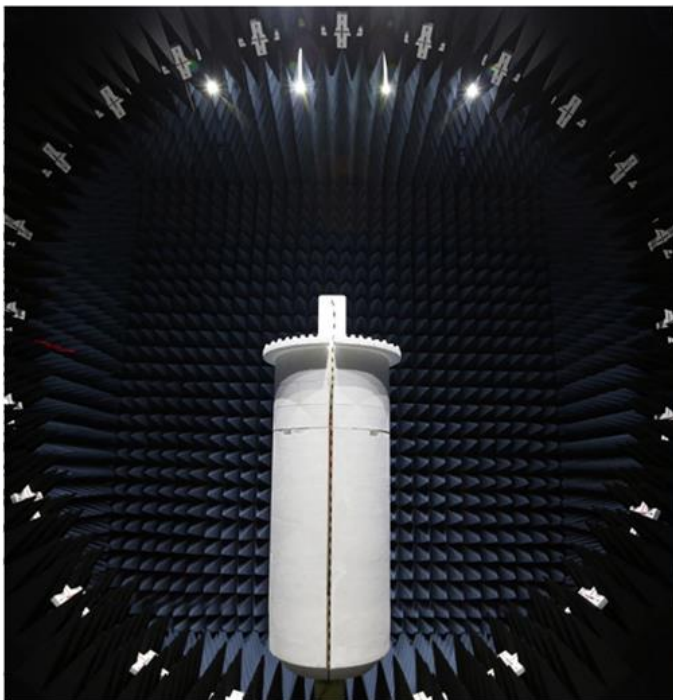
FACILITIES

Testing was performed at the following location(s)

Location	Labs ⁽¹⁾	Address	A2LA ⁽²⁾	ISED ⁽³⁾	BSMI ⁽⁴⁾	VCCI ⁽⁵⁾	CAB ⁽⁶⁾	FDA ⁽⁷⁾
<input type="checkbox"/> California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
<input checked="" type="checkbox"/> Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
<input type="checkbox"/> Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
<input type="checkbox"/> Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	A-0201	US0191	TL-54
<input type="checkbox"/> Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
<input type="checkbox"/> Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

- (1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
- (2) A2LA Certificate No.
- (3) ISED Company No.
- (4) BSMI No.
- (5) VCCI Site Filing No.
- (6) CAB Identifier. Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA
- (7) FDA ASCA No.





PRODUCT DESCRIPTION

Client and Equipment under Test (EUT) Information

Company Name:	Emerson/Rosemount
Address:	6021 Innovation Boulevard
City, State, Zip:	Shakopee, MN 55379
Test Requested By:	Elizabeth Reiersen
EUT:	Wireless 775 THUM Adapter, Model: 775
First Date of Test:	June 8, 2023
Last Date of Test:	June 8, 2023
Receipt Date of Samples:	June 8, 2023
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The Emerson/Rosemount Wireless 775 THUM Adapter is a product which connects to and is powered by a wired HART device, and wirelessly transmits HART measurement and diagnostic information from itself and the wired device to a wireless gateway for analysis. The Emerson 775 uses an on-board radio to communicate wirelessly in a network utilizing a 2.4GHz WirelessHART protocol.

Testing Objective:

To obtain 3D antenna pattern measurements and calculated antenna performance values (gain, efficiency, TRP, etc)

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2023-06-08	Active 3D Antenna Pattern Measurements	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OTA TEST DESCRIPTION



OTA 2018.01.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Network Analyzer	Agilent	E5071C	NAM	11/19/2022	36 mo
Antenna - Dipole	ETS Lindgren	3126-2450	OTF2	4/8/2021	36 mo
Chamber - OTA	ETS Lindgren	AMS-8923-195	OTA	4/19/2021	36 mo
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	5/22/2023	12 mo

TEST DESCRIPTION

Using the modes of operation and configurations noted within this report, a radiated pattern measurement test was performed. The frequency ranges investigated (scanned), are also noted in this report.

The EUT was placed on a low dielectric constant support structure (Phi Axis Positioner) in the 3D center of the measurement zone using a laser alignment system.

The test begins with a measurement path configured (via ETS-Lindgren EMQuest Data Acquisition and Analysis Software) such that an electrical path is present from the Theta polarization element of the -165° detector antenna, to the measurement port of a spectrum analyzer. The EUT is commanded to transmit at the desired frequency and an absolute power measurement is obtained at the spectrum analyzer. The measurement path is then reconfigured (again via EMQuest) such that an electrical path is present from the Phi polarization element of the -165° detector antenna, to the measurement port of the spectrum analyzer. Another absolute power measurement is obtained at the spectrum analyzer. This process is repeated at each of the 23 detector antennas in turn. This process is repeated for every rotation of the Phi Axis Positioner up to 180° - Phi Axis Resolution. When this process is complete, EMQuest applies factors from a Range Calibration and Normalization to produce a final data set with 1D/2D/3D patterns and tabular values such as antenna efficiency, Equivalent Isotropic Radiated Power (EIRP), Total Radiated Power (TRP), etc.

A measurement uncertainty estimation has been performed for this testing. When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution. The expanded measurement uncertainty, 95% confidence level (K=2), for Maximum Gain / Efficiency for 2400-2483.5 MHz on active measurements is +/-1.08 dB. The expanded measurement uncertainty, 95% confidence level (K=2), for Maximum Gain / Efficiency for 2400-2483.5 MHz on passive measurements is +/-1.29. The calculations for estimating measurement uncertainty are available upon request.

Procedures for the Range Calibration and Normalization can be found in Element Materials Technology document: WP Antenna Pattern Measurements (3D)

ACTIVE 3D ANTENNA PATTERN MEASUREMENTS



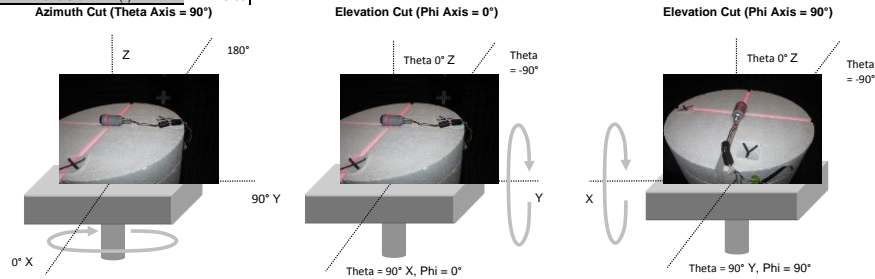
EUT:	775 Wireless Adapter
Serial Number:	2
Customer:	Emerson
Attendees:	Bryan Robertson
Customer Project:	None
Tested By:	Christopher Heintzelman
Test Run Description:	Active SN2 2440_2

Work Order:	EMPM0151
Date:	6/8/2023
Temperature:	21.5 °C
Relative Humidity:	47.1% RH
Bar. Pressure:	1015 mbar
Job Site:	MN10

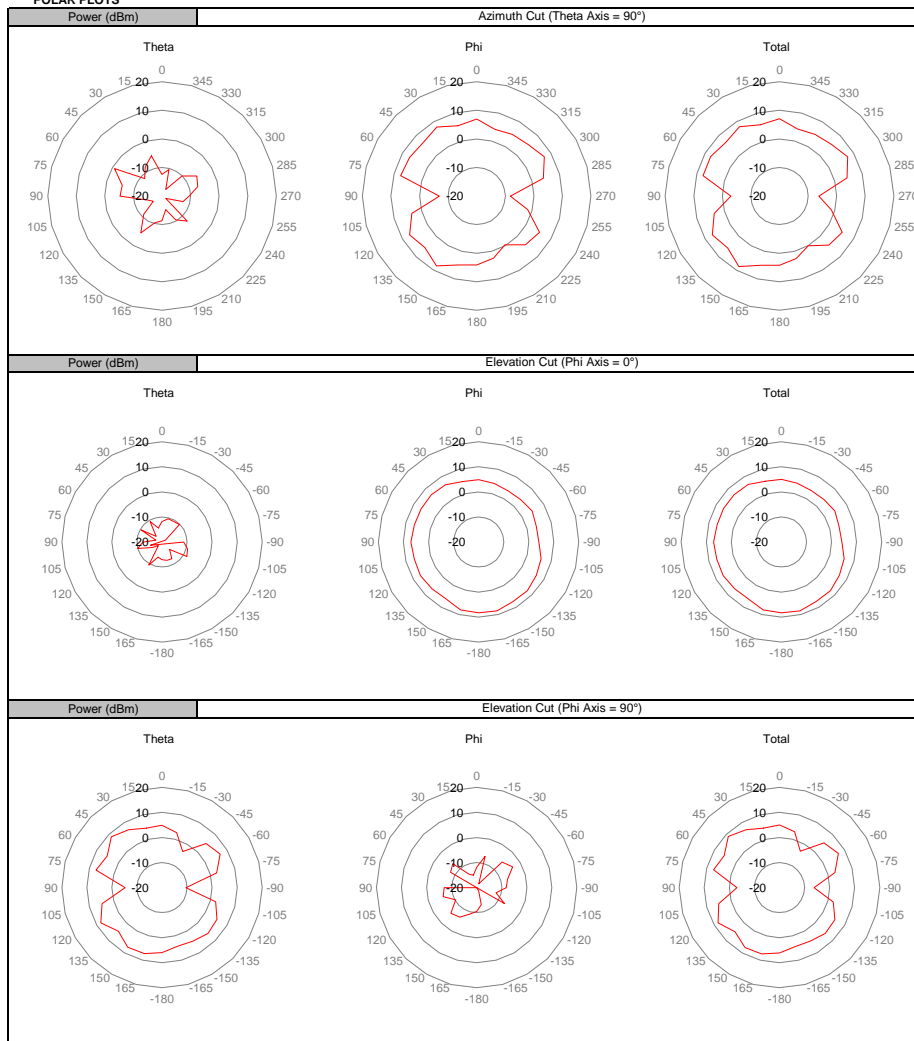
COMMENTS

Ferrites added to power/control cables, usb programmer removed. The APIP is a rated power and was provided by the customer.

3D PATTERN DATA	
Frequency (MHz)	2440
Ant. Port Input Pwr. (dBm)	8.00
Tot. Rad. Pwr. (dBm)	6.02
Peak EIRP (dBm)	9.64
Directivity (dBi)	3.62
Efficiency (dB)	-1.98
Efficiency (%)	63.36
Gain (dBi)	1.64
Average Gain (dB)	-1.98
E-Plane 3 dB BW (°)	29.00



POLAR PLOTS



ACTIVE 3D ANTENNA PATTERN MEASUREMENTS



EUT:	775 Wireless Adapter
Serial Number:	2
Customer:	Emerson
Attendees:	Bryan Robertson
Customer Project:	None
Tested By:	Christopher Heintzelman
Test Run Description:	Active SN2 2405_2

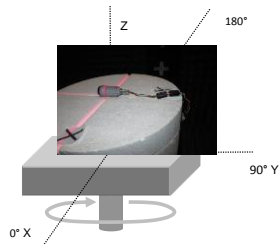
Work Order:	EMPM0151
Date:	6/8/2023
Temperature:	21.5 °C
Relative Humidity:	47.1% RH
Bar. Pressure:	1015 mbar
Job Site:	MN10

COMMENTS

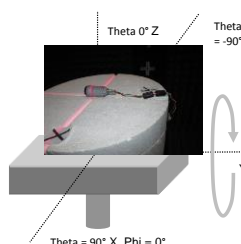
Ferrites added to power/control cables, usb programmer removed. The APIP is a rated power and was provided by the customer.

3D PATTERN DATA	
Frequency (MHz)	2405
Ant. Port Input Pwr. (dBm)	8.00
Tot. Rad. Pwr. (dBm)	4.27
Peak EIRP (dBm)	8.27
Directivity (dBi)	4.00
Efficiency (dB)	-3.73
Efficiency (%)	42.38
Gain (dBi)	0.27
Average Gain (dB)	-3.73
E-Plane 3 dB BW (°)	30.00

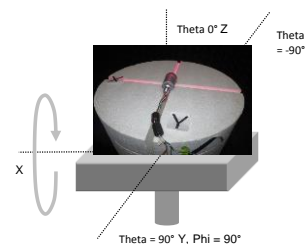
Azimuth Cut (Theta Axis = 90°)



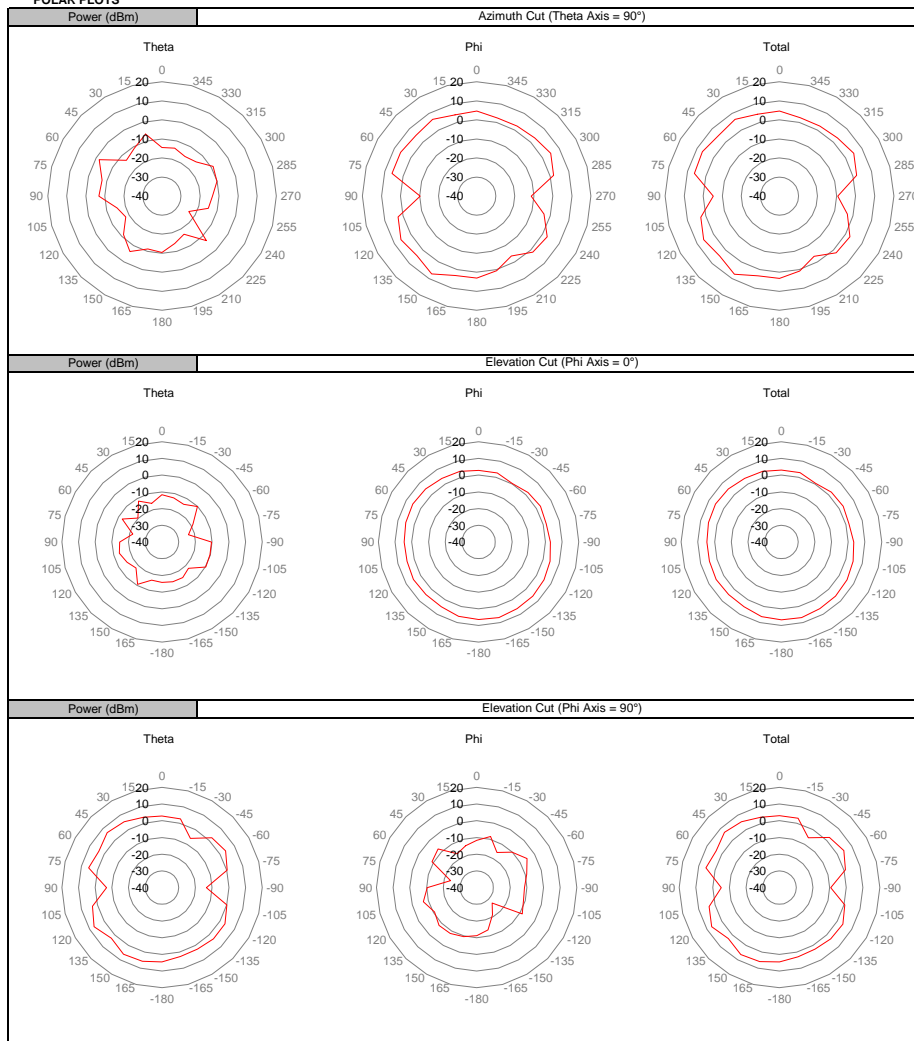
Elevation Cut (Phi Axis = 0°)



Elevation Cut (Phi Axis = 90°)



POLAR PLOTS



ACTIVE 3D ANTENNA PATTERN MEASUREMENTS



EUT:	775 Wireless Adapter
Serial Number:	2
Customer:	Emerson
Attendees:	Bryan Robertson
Customer Project:	None
Tested By:	Christopher Heintzelman
Test Run Description:	Active SN2 2475

Work Order:	EMPM0151
Date:	6/8/2023
Temperature:	21.5 °C
Relative Humidity:	47.1% RH
Bar. Pressure:	1015 mbar
Job Site:	MN10

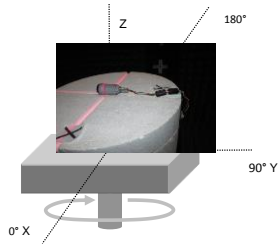
COMMENTS

Ferrites added to power/control cables, usb programmer removed. The APIP is a rated power and was provided by the customer.

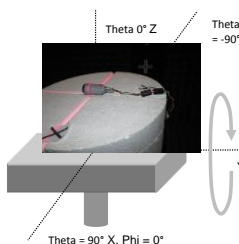
3D PATTERN DATA

Frequency (MHz)	2475
Ant. Port Input Pwr. (dBm)	8.00
Tot. Rad. Pwr. (dBm)	4.98
Peak EIRP (dBm)	8.55
Directivity (dBi)	3.57
Efficiency (dB)	-3.02
Efficiency (%)	49.86
Gain (dBi)	0.55
Average Gain (dB)	-3.02
E-Plane 3 dB BW (°)	30.00

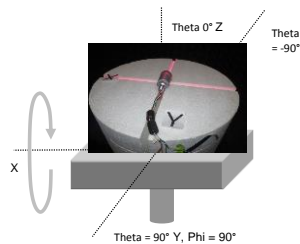
Azimuth Cut (Theta Axis = 90°)



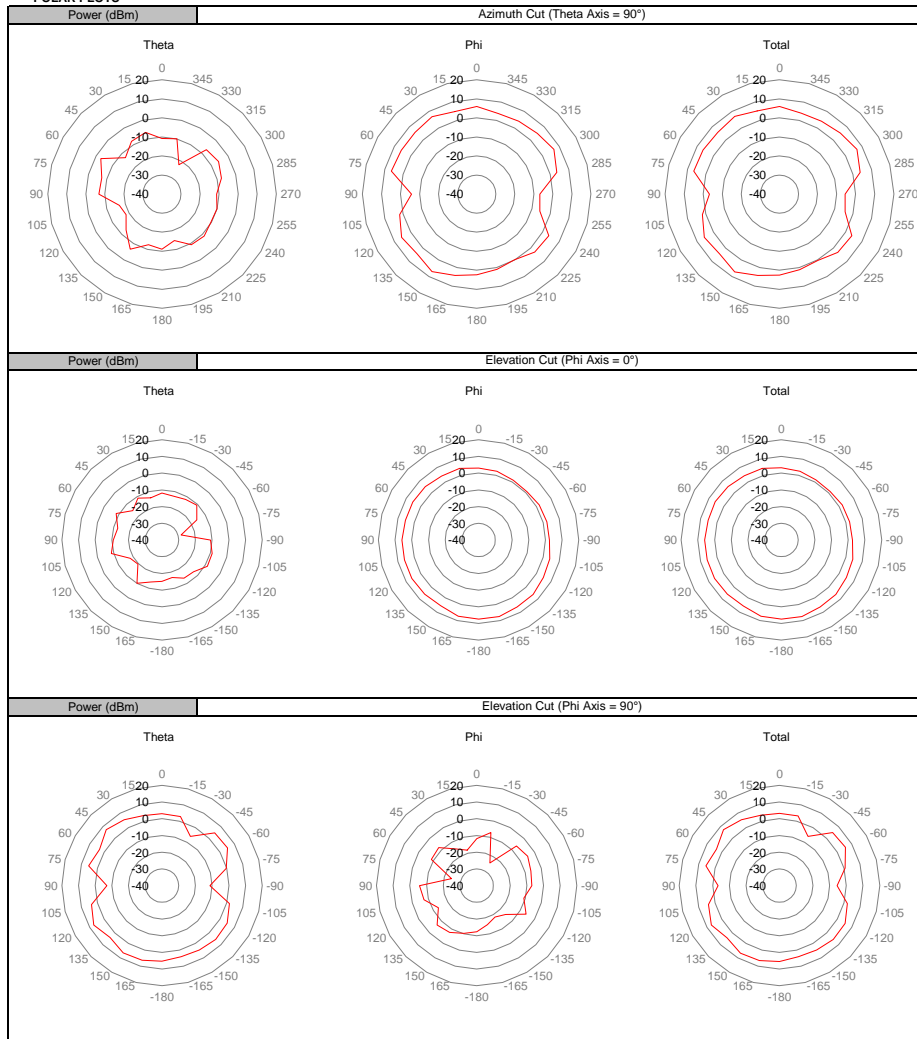
Elevation Cut (Phi Axis = 0°)



Elevation Cut (Phi Axis = 90°)



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End of Test Report