



166 South Carter, Genoa City, WI 53128

Company:	Whirlpool Corporation
Model Tested:	XPNFC
Report Number:	21060
Project Number:	7024

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

Subpart C – Intentional Radiators

Section 15.225

Operation within the band 13.110 – 14.010 MHz

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name:	NFC Module
Kind of Equipment:	Near Field Communication Transceiver
Frequency Range:	13.56 MHz
Test Configuration:	Stand Alone
Model Number(s):	XPNFC
Model(s) Tested:	XPNFC
Serial Number(s):	Normal unit with microcontroller: TS01 No microcontroller unit: 0214276355
Date of Tests:	April 29 th & 30 th & June 3 rd to June 8 th of 2015
Test Conducted For:	Whirlpool Corporation 750 Monte Road Benton Harbor, MI 49022 USA

NOTICE: “This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government”. Please see the "Description of Test Sample" page listed inside of this report.

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XPNFC
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SIGNATURE PAGE

Tested By:

A handwritten signature in black ink that reads "Craig Brandt". The signature is written in a cursive style with a long horizontal stroke at the end.

Craig Brandt
Senior Test Engineer

Reviewed By:

A handwritten signature in black ink that reads "William Stumpf". The signature is written in a cursive style with a long horizontal stroke at the end.

William Stumpf
OATS Manager

Approved By:

A handwritten signature in black ink that reads "Brian J. Mattson". The signature is written in a cursive style with a long horizontal stroke at the end.

Brian Mattson
General Manager



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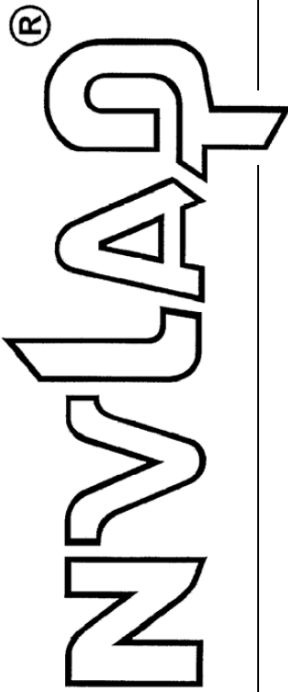


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United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*



2014-10-01 through 2015-09-30

Effective dates

Wm. D. M. L.

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



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Company: Whirlpool Corporation
Model Tested: XPNFC
Report Number: 21060
Project Number: 7024

1.0 Summary of Test Report

It was determined that the Whirlpool NFC module, Model XPNFC, complies with the requirements of CFR 47 Part 15 Subpart C Section 15.225.

Subpart C Section 15.225 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
Informational	20 dB Emission Bandwidth	ANSI C63.10-2009 Section 6.9.1	1	Yes
FCC 15.225 & 15.209	Radiated Emissions	ANSI C63.4-2009 & ANSI C63.10-2009	1	Yes
FCC 15.225(e)	Frequency Stability	ANSI C63.10-2009 Section 6.8.1	1	Yes
FCC 15.207	AC Line Conducted Emissions	ANSI C63.10-2009 Section 6.2	2	Yes

Note 1: Radiated emission measurement.

Note 2: AC Line Conducted emission measurement

2.0 Introduction

In April and June of 2015 the NFC module, Model XPNFC, as provided from Whirlpool Corporation was tested to the requirements of CFR 47 Part 15 Subpart C Section 15.225. To meet these requirements, the procedures contained within this report were performed by personnel of D.L.S Electronic Systems, Inc.

3.0 Test Facilities

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

Wisconsin Test Facility:

D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

Wheeling Test Facility:

D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, IL 60090

FCC Registration # 90531



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4.0 Description of Test Sample

Description:

The XPNFC Module is a Near Field Communication device. It is a circuit board attached to the user interface board of a Whirlpool appliance. The module controls the NFC Radio to read/write to NFC enabled smart phones and NFC Tags. It interfaces to the appliance controls using Whirlpool standard protocols. It contains an onboard PCB antenna.

Type of Equipment / Frequency Range:

Interface module / 13.56 MHz

Physical Dimensions of Equipment Under Test:

Length: 91mm x Width: 26mm x Height: 10mm

Power Source:

5 V DC

Internal Frequencies:

Radio oscillator 27.12MHz, μ P oscillator 16MHz

Transmit / Receive Frequencies Used For Test Purpose:

13.56 MHz

Type of Modulation(s) / Antenna Type:

ASK / PCB trace antenna

Description of Circuit Board(s) / Part Number:

xpnfc boards	Xpnfc rev: lp1
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5.0 Test Equipment

A list of the equipment used can be found in the table below. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

D.L.S. Wisconsin – AC Line Conducted (Screen Room)

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Receiver	Narda PMM	9010F	020WW40102	10Hz-50MHz	6-17-14	6-17-15
LISN	Solar	9252-50-R-24-BNC	961019	9 kHz – 30 MHz	5-21-15	5-21-16
Filter- High-Pass	SOLAR	7930-120	090702	120 kHz – 30 MHz	1-7-15	1-7-16
Limiter	Electro-Metrics	EM-7600	705	9 kHz – 30 MHz	1-7-15	1-7-16
Test Software	Narda PMM	PMM Emission Suite	Rel.2.17	N/A	N/A	N/A

RADIATED EMISSIONS TEST 9 kHz – 30 MHz (Site 2)

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	7-17-14	7-17-15
Antenna	Electro-Metrics	6502	1027	9 kHz – 30 MHz	7-25-13	7-25-15
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A

RADIATED EMISSIONS TEST 30 – 1000 MHz (Site 2)

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	7-17-14	7-17-15
Preamplifier	Rohde & Schwarz	TS-PR10	032001/004	9 kHz – 1 GHz	1-7-15	1-7-16
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	10-1-14	10-1-16
Antenna	EMCO	3146	1205	200 MHz – 1 GHz	10-24-14	10-24-16
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A

Temperature Chamber

Description	Manufacturer	Model Number	Serial Number	Temperature Range	Cal Dates	Cal Due Dates
Temperature Chamber	Test Equity	1007C	R035716	-73° C to +175° C	N/A	N/A
DC Power Supply	Hewlet Packard	6200B	6J4327	N/A	N/A	N/A
20 dB attenuator	Mini-Circuits	BW-S20W2+	N/A	DC – 18 GHz	2-3-15	2-3-16
Multimeter	Fluke	77	43390985	N/A	1-16-15	1-16-16
Thermometer	Tenma	72-2060	723662	N/A	7-21-14	7-21-15



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6.0 Test Arrangements

Radiated Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to ANSI C63.4-2009 and ANSI C63.10-2009, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up.

Unless otherwise noted, the bandwidth of the measuring receiver / analyzer used during testing is shown below.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

7.0 Test Conditions

Test Conditions recorded during test:

Temperature and Humidity:

65°F at 51% RH (or noted on the test data)

Voltage:

5V DC for radiated emission testing

120 V, 60Hz using AC/DC power supply for AC line conducted emission testing
(power supply: Oriental Hero Ele. Fty. Model OH1048A0501200U2)

4.25V to 5.75V DC for frequency stability testing

8.0 Modifications Made To EUT For Compliance

No modifications were made to the EUT for compliance.



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9.0 Additional Descriptions

The EUT was tested in Continuous Transmit Mode, with and without Tag. A lab built simulator was used to simulate load/termination of the wire harness.

All tests were performed on a unit containing the microcontroller.

Radiated emissions in the 30 MHz to 1000 MHz range were also tested on a unit without the microcontroller. This unit was connected to remote, shielded, support equipment which contained its own microcontroller.

The unit passes compliance testing with a 5 Volt DC input.

10.0 Results

Measurements were performed in accordance with ANSI C63.4-2009 and ANSI C63.10-2009. Graphical and tabular data can be found in Appendix B at the end of this report.

11.0 Conclusion

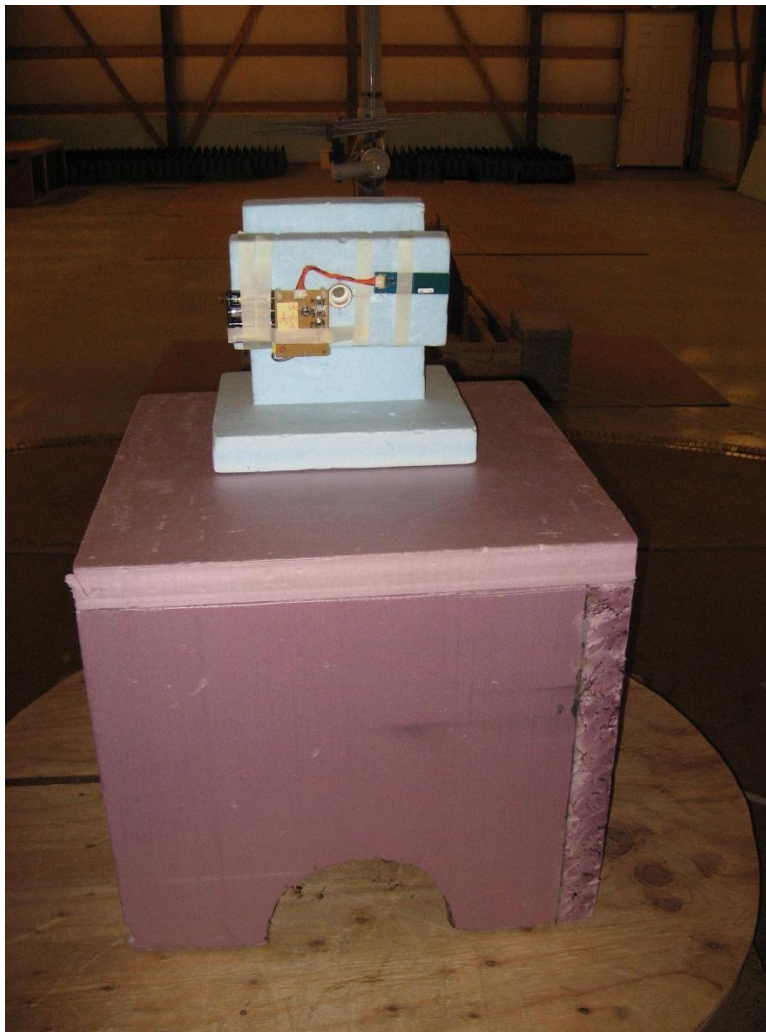
The NFC module, Model XPNFC, as provided from Whirlpool Corporation tested in April and June of 2015 **meets** the requirements of CFR 47 Part 15 Subpart C Section 15.225.

Appendix A – Test Photos

Photo Information and Test Setup:

Item: The NFC module, Model XPNFC with 12 cm unshielded wire harness to lab built load simulator and battery pack

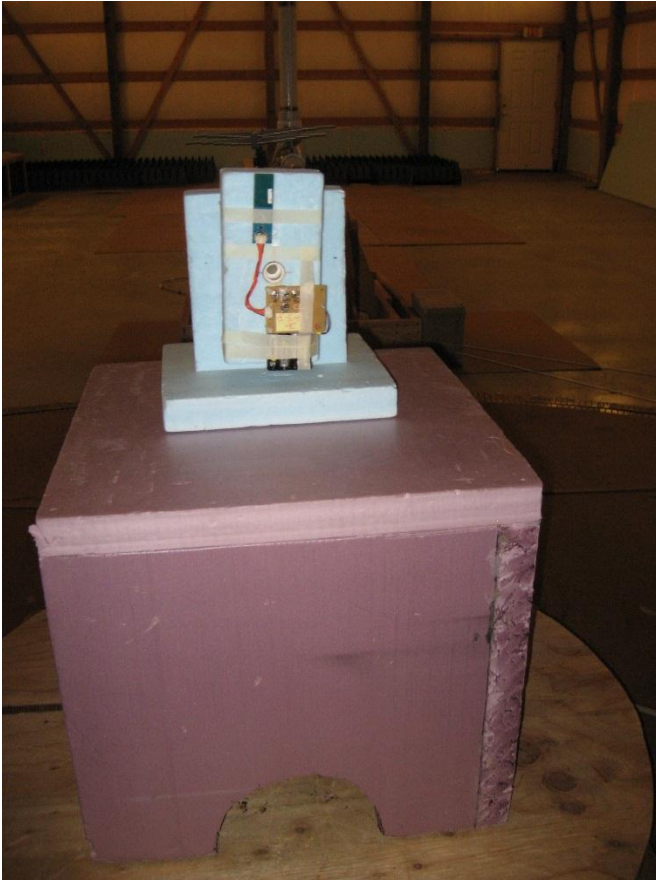
Radiated Emissions – Position X



Appendix A

Radiated Emissions

Position Y



Position Z



Appendix A

Radiated Emissions

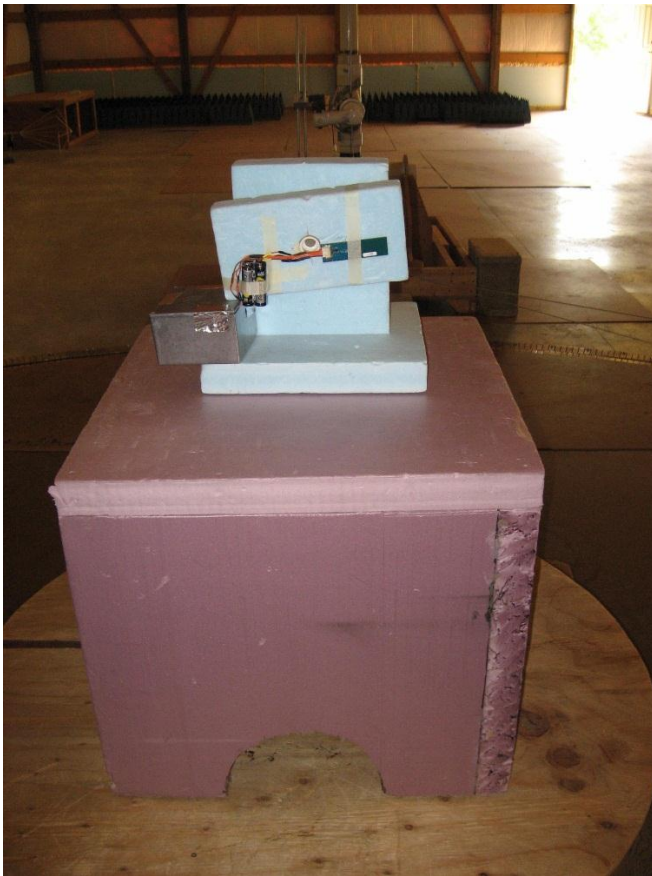
- With Tag



Appendix A

Radiated Emissions without Microcontroller

Position X



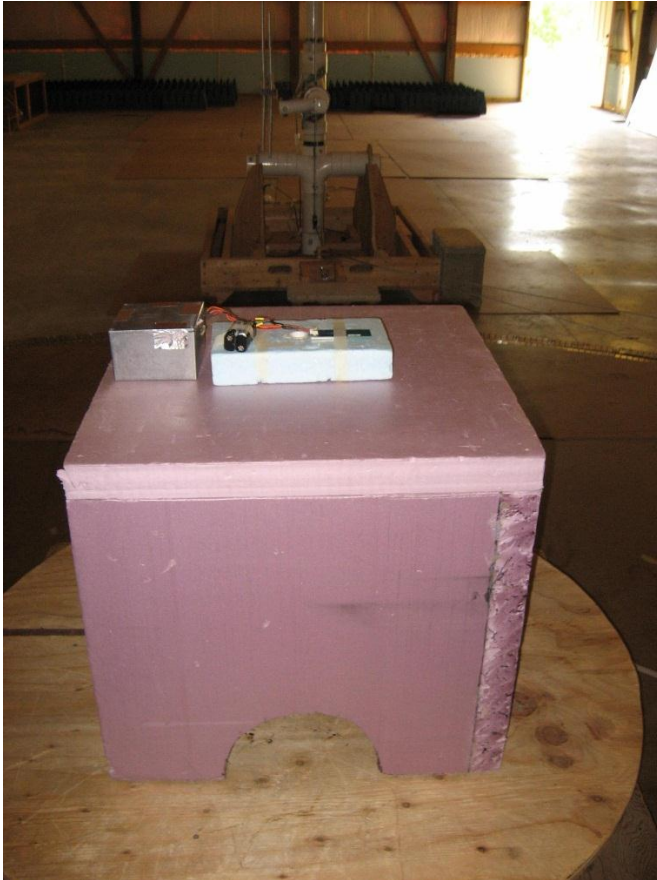
Position Y



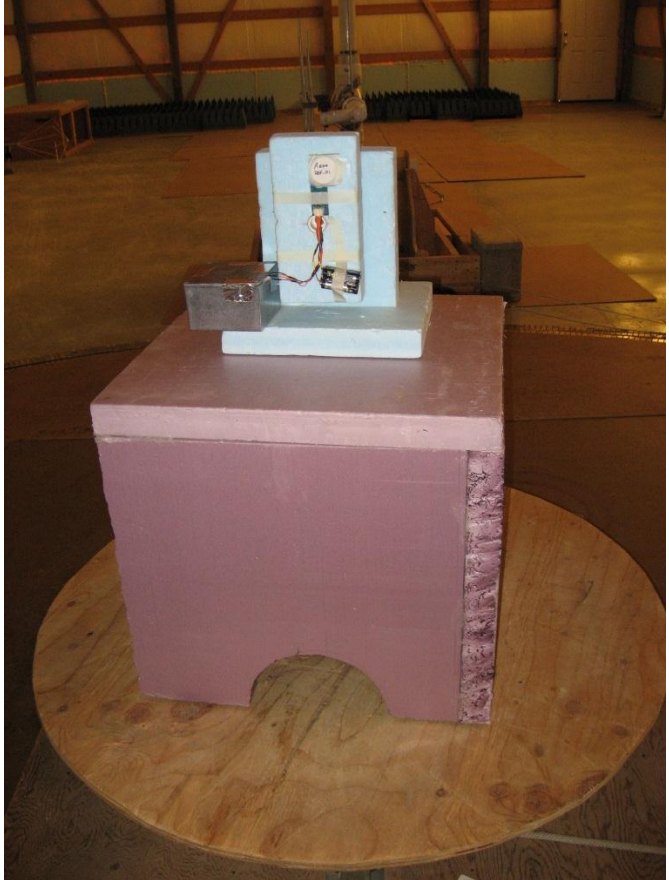
Appendix A

Radiated Emissions without Microcontroller

Position Z



With Tag



Appendix A

Temperature Chamber



Temperature Chamber – Close Up



Appendix A

AC Line Conducted Emissions





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Appendix B – Measurement Data

B1.0 Occupied Bandwidth – 20 dB

Rule Part: Informational

Test Procedure: ANSI C63.10:2009 Section 6.9.1

Limits: NA

Results: Compliant

Sample Equations: N/A

Notes: The EUT was set to transmit at its maximum power.



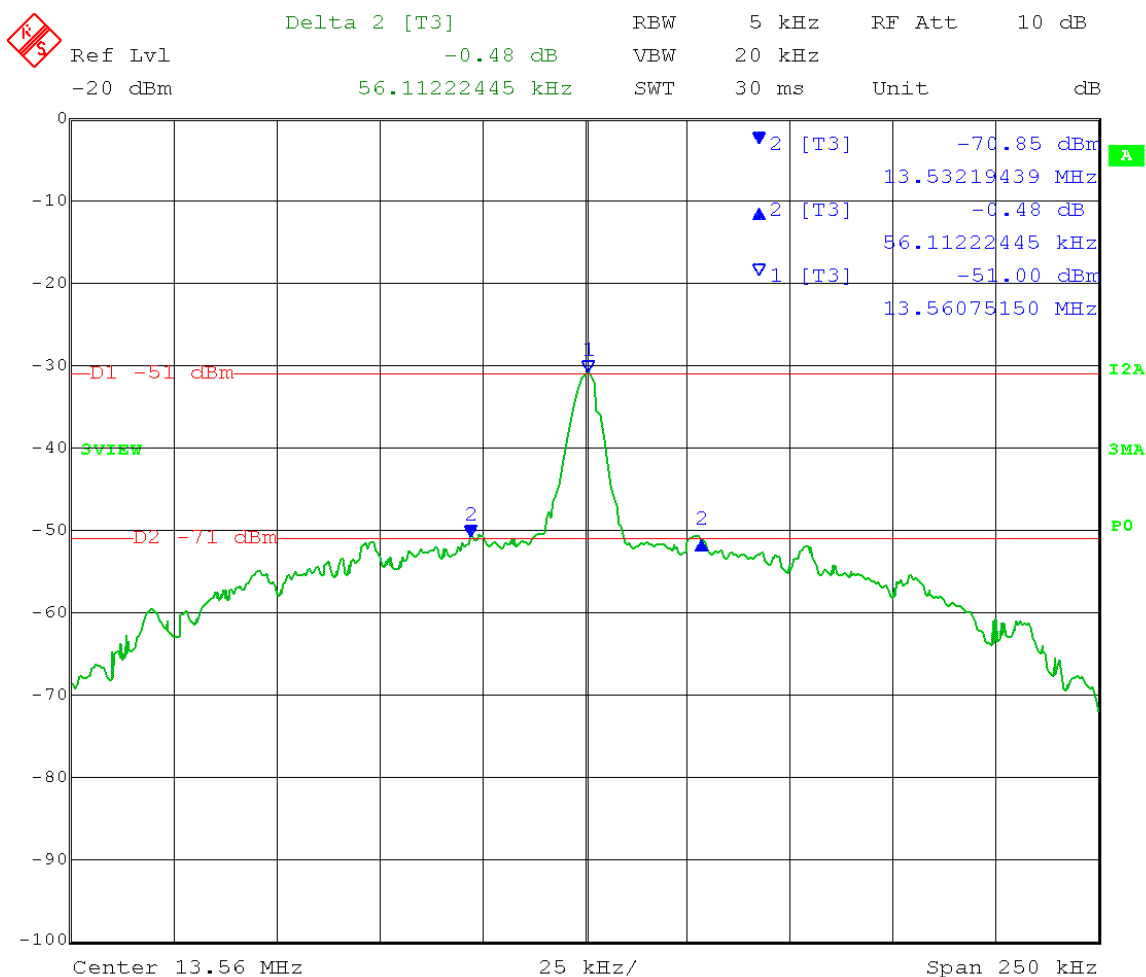
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Test Date: 06-05-2015
Company: Whirlpool Corporation
EUT: Model XPNFC NFC Radio @ 13.56MHz, 5 VDC input
Test: 20 dB Bandwidth
Comment: Frequency: 13.56 MHz

20 dB Bandwidth = 56 kHz



Date: 5.JUN.2015 11:47:50



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Appendix B

B2.0 Radiated Emissions

Rule Part: FCC Part 15.225 and FCC Part 15.209

Test Procedure: ANSI C63.4-2009 & ANSI C63.10-2009

Limits: 15,848 $\mu\text{V/m}$ at 30 meters: 13.553-13.567 MHz
334 $\mu\text{V/m}$ at 30 meters: 13.410-13.553 & 13.567-13.710 MHz
106 $\mu\text{V/m}$ at 30 meters: 13.110-13.410 & 13.710-14.010 MHz
15.209 general emission limits: outside 13.110-14.010 MHz

Results: Compliant

Sample Equations: Limit at 10 meters:
Fundamental limit at 30 meters = 15,848 $\mu\text{V/m}$
 $20 \log (15,848) = 84 \text{ dB}\mu\text{V/m}$ at 30 meters
Using a 40 dB/decade distance extrapolation factor as per ANSI C63.10-2009, section 5.3.2. = 19.08 dB
 $84 \text{ dB}\mu\text{V/m} + 19.08 \text{ dB} = \mathbf{103.08 \text{ dB}\mu\text{V/m}}$ at 10 meter distance

Notes: The EUT was set to transmit at its maximum power.

Field strength measurements were taken at a distance of 3 meters from 9 kHz to 150 kHz and a distance of 10 meters from 150 kHz to 30 MHz, using 40 dB/decade correction for the limit (ANSI C63.10-2009, section 5.3.2). Field strength measurements were taken at a distance of 3 meters from 30 MHz to 1 GHz using part 15.209 three meter limits.

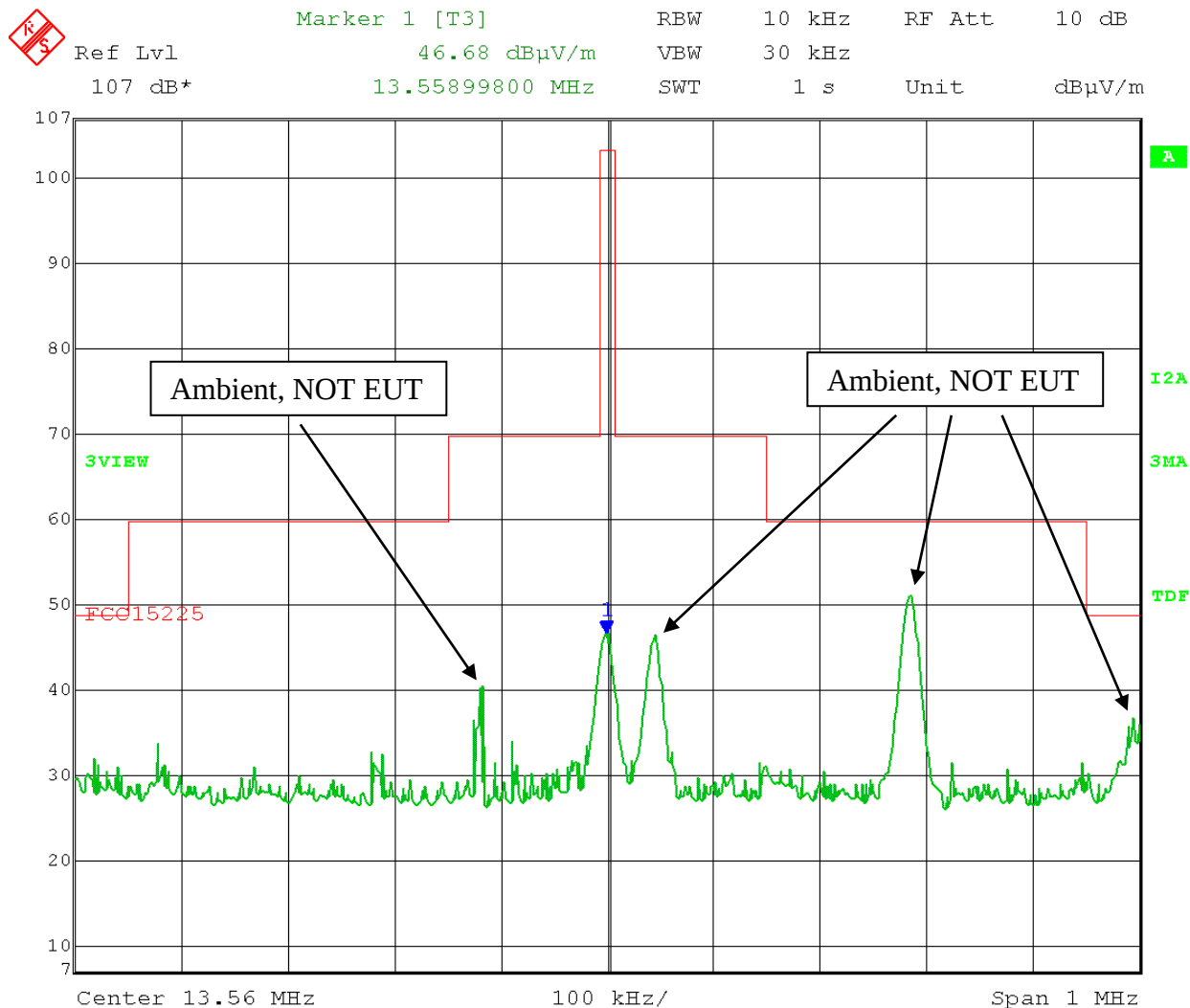


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Test Date: 06-04-2015
Company: Whirlpool Corporation
EUT: Model XPNFC NFC Radio @ 13.56 MHz, 5 VDC input
Test: Emission Mask – Radiated; Peak
Operator: Craig B
Comment: Frequency: 13.56 MHz
Test distance: 10 meters



Date: 4.JUN.2015 09:31:50

FCC Part 15.225 @ 3 meters

Electric Field Strength

EUT: XPNFC 13.56 MHz RF Module
Manufacturer: Whirlpool Corporation
Operating Condition: 66 degF; 54% R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig B #7024
Test Specification: Continuous transmit; 13.56 MHz
Comment: 5 V input; unit with microcontroller
Date: 06-04-2015

TEXT: "E-Field 3 meters"

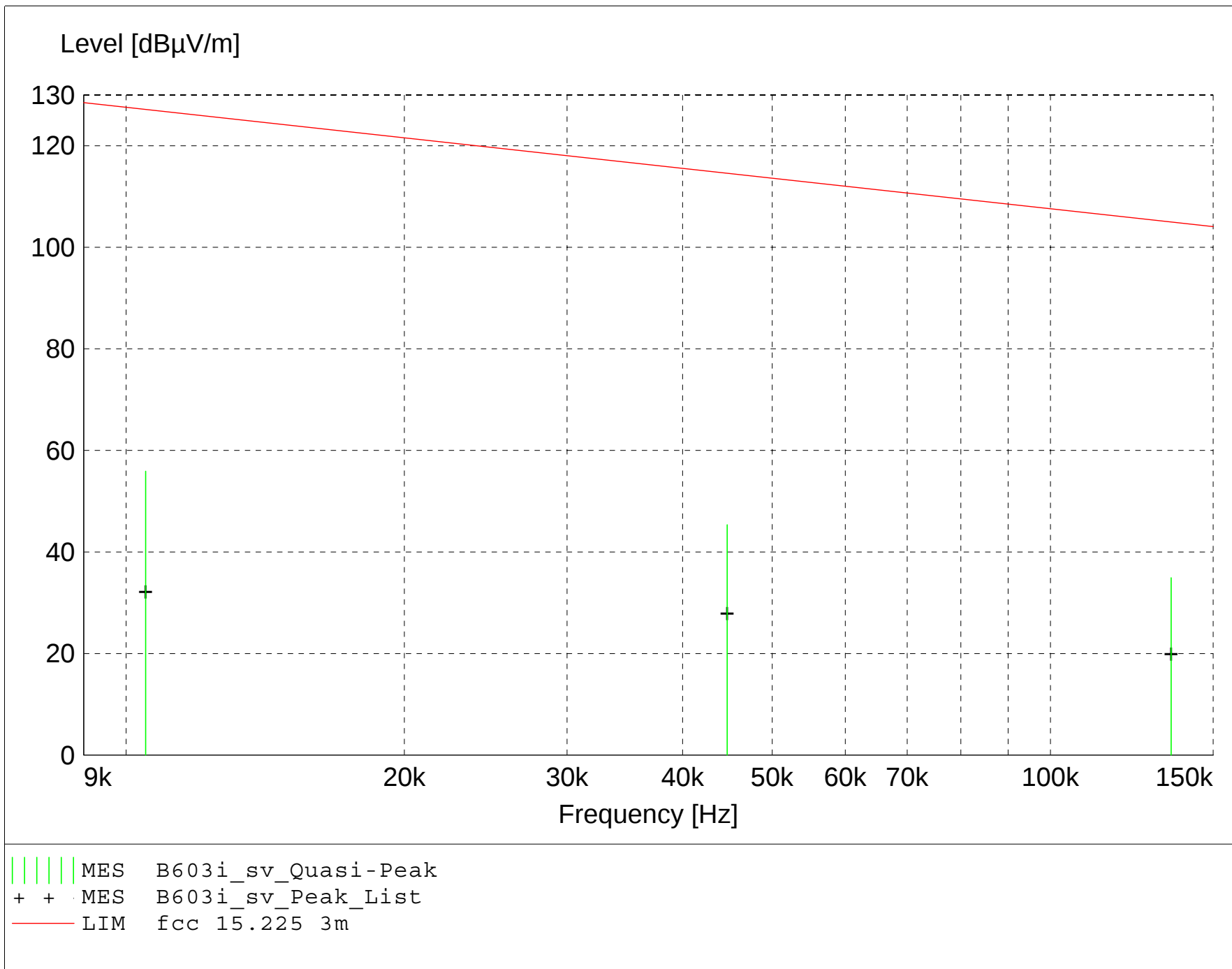
Short Description: E-Field

Test Set-up: EUT Measured at 3 Meters with Active Loop Antenna

Sample Equations:
$$\begin{array}{rclclcl} \text{Total Level (dB}\mu\text{V/m)} & = & \text{Level (dB}\mu\text{V)} & + & \text{System Loss (dB)} & + & \text{Antenna Factor (dB}\mu\text{V/m)} \\ 24.6 & & = 35.51 & + & (-22.1) & + & 11.20 \end{array}$$

$$\begin{array}{rclcl} \text{Margin (dB)} & = & \text{Limit (dB}\mu\text{V/m)} & - & \text{Total Level (dB}\mu\text{V/m)} \\ 15.4 & = & 40 & - & 24.6 \end{array}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
 | Final maximized level using Quasi-Peak detector
 X Final maximized level using Average detector
 # Final maximized level using Peak detector



MEASUREMENT RESULT: "B603i_sv_Final"

6/4/2015 10:44AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
0.044700	33.39	11.94	0.0	45.4	114.6	69.2	1.00	270	QUASI-PEAK	noise floor
0.135100	24.78	10.13	0.0	34.9	105.0	70.0	1.00	270	QUASI-PEAK	noise floor
0.010500	36.44	19.46	0.0	55.9	127.2	71.3	1.00	270	QUASI-PEAK	noise floor

FCC Part 15.225 @ 10 meters

Electric Field Strength

EUT: XPNFC 13.56 MHz RF Module
Manufacturer: Whirlpool Corporation
Operating Condition: 77 degF; 45% R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig B #7024
Test Specification: Continuous transmit at 13.56 MHz
Comment: 5 Volt DC input; unit with microcontroller
Date: 06-03-2015

TEXT: "E-Field 10 meters"

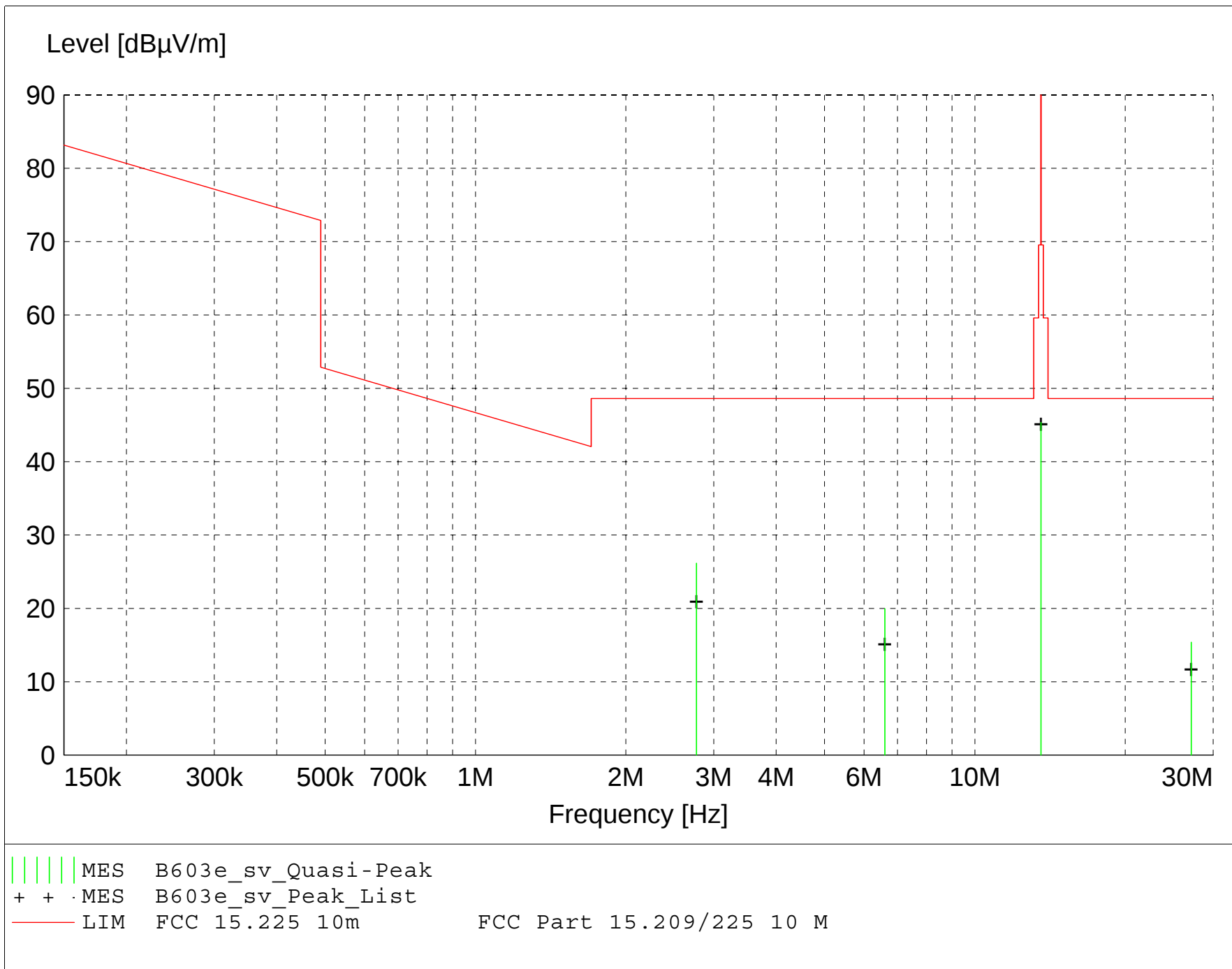
Short Description: E-Field

Test Set-up: EUT Measured at 10 Meters with Active Loop Antenna

Sample Equations:
$$\begin{array}{rclclcl} \text{Total Level (dB}\mu\text{V/m)} & = & \text{Level (dB}\mu\text{V)} & + & \text{System Loss (dB)} & + & \text{Antenna Factor (dB}\mu\text{V/m)} \\ 24.6 & & = & 35.51 & + & (-22.1) & + & 11.20 \end{array}$$

$$\begin{array}{rclcl} \text{Margin (dB)} & = & \text{Limit (dB}\mu\text{V/m)} & - & \text{Total Level (dB}\mu\text{V/m)} \\ 15.4 & = & 40 & - & 24.6 \end{array}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
 | Final maximized level using Quasi-Peak detector
 X Final maximized level using Average detector
 # Final maximized level using Peak detector



MEASUREMENT RESULT: "B603e_sv_Final"

6/4/2015 10:51AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
2.771000	15.25	10.47	0.4	26.2	48.6	22.4	1.00	0	QUASI-PEAK	noise floor
6.604000	8.52	10.78	0.7	20.0	48.6	28.7	1.00	90	QUASI-PEAK	noise floor
27.120075	5.51	8.62	1.3	15.4	48.6	33.2	1.00	290	QUASI-PEAK	None
13.559525	33.94	10.52	0.9	45.4	103.1	57.7	1.00	0	QUASI-PEAK	fundamental

FCC Part 15.209

Electric Field Strength

EUT: XPNFC 13.56 MHz RF module
Manufacturer: Whirlpool Corporation
Operating Condition: 65 deg. F; 51% R.H.
Test Site: DLS Site 2
Operator: Craig B #7024
Test Specification: 5V DC input module; unit with microcontroller
Comment: Continuous transmit
Date: 06-03-2015

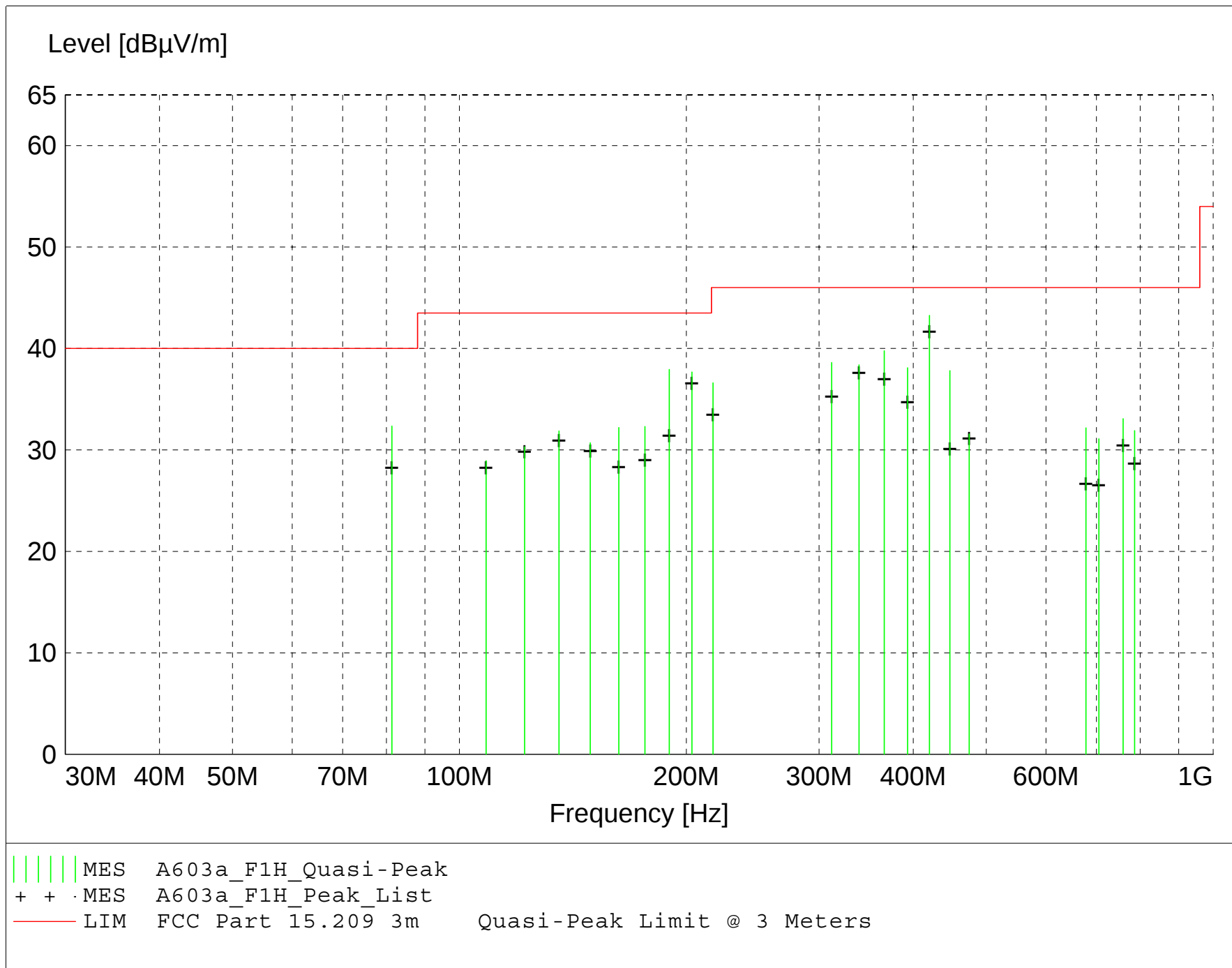
TEXT: "Horz 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization

Equations:
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
| Final maximized level using Quasi-Peak detector
X Final maximized level using Average detector
Final maximized level using Peak detector



MEASUREMENT RESULT: "A603a_F1H_Final"

6/3/2015 9:23AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level	dBμV/m	dB	Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m		m	deg		
420.340000	48.67	16.21	-21.6	43.3	46.0	2.7	1.70	0	QUASI-PEAK	None
189.830000	43.20	17.57	-22.8	37.9	43.5	5.6	1.00	0	QUASI-PEAK	None
203.390000	48.47	12.00	-22.8	37.7	43.5	5.8	1.30	180	QUASI-PEAK	None
366.100000	46.57	15.02	-21.8	39.8	46.0	6.2	2.20	0	QUASI-PEAK	None
311.860000	45.83	14.95	-22.2	38.6	46.0	7.4	1.00	190	QUASI-PEAK	None
338.980000	45.45	14.86	-21.9	38.4	46.0	7.6	2.50	0	QUASI-PEAK	None
81.345000	49.76	6.30	-23.7	32.4	40.0	7.6	2.30	0	QUASI-PEAK	None
393.220000	44.16	15.70	-21.8	38.1	46.0	7.9	2.00	0	QUASI-PEAK	None
447.460000	42.62	16.70	-21.5	37.8	46.0	8.2	1.60	170	QUASI-PEAK	None
216.950000	47.91	11.42	-22.7	36.6	46.0	9.4	1.00	0	QUASI-PEAK	None
176.275000	39.78	15.43	-22.9	32.3	43.5	11.2	1.00	0	QUASI-PEAK	None
162.710000	41.77	13.34	-22.9	32.2	43.5	11.3	1.10	0	QUASI-PEAK	None
135.590000	42.71	12.48	-23.3	31.9	43.5	11.6	1.60	0	QUASI-PEAK	None
149.150000	41.68	12.10	-23.1	30.7	43.5	12.8	2.20	0	QUASI-PEAK	None
759.330000	31.44	21.51	-19.9	33.1	46.0	12.9	1.00	225	QUASI-PEAK	None
122.035000	40.99	12.71	-23.4	30.3	43.5	13.2	2.50	0	QUASI-PEAK	None
677.970000	32.01	20.56	-20.4	32.2	46.0	13.8	1.00	0	QUASI-PEAK	None
786.440000	29.93	21.73	-19.8	31.9	46.0	14.1	1.00	225	QUASI-PEAK	None
474.580000	35.66	17.30	-21.4	31.6	46.0	14.4	2.10	170	QUASI-PEAK	None
108.475000	40.64	11.70	-23.4	28.9	43.5	14.6	2.20	0	QUASI-PEAK	None
705.090000	30.25	21.00	-20.2	31.1	46.0	14.9	1.00	215	QUASI-PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: XPNFC 13.56 MHz RF module
Manufacturer: Whirlpool Corporation
Operating Condition: 65 deg. F; 51% R.H.
Test Site: DLS Site 2
Operator: Craig B #7024
Test Specification: 5V DC input module; unit with microcontroller
Comment: Continuous transmit
Date: 06-03-2015

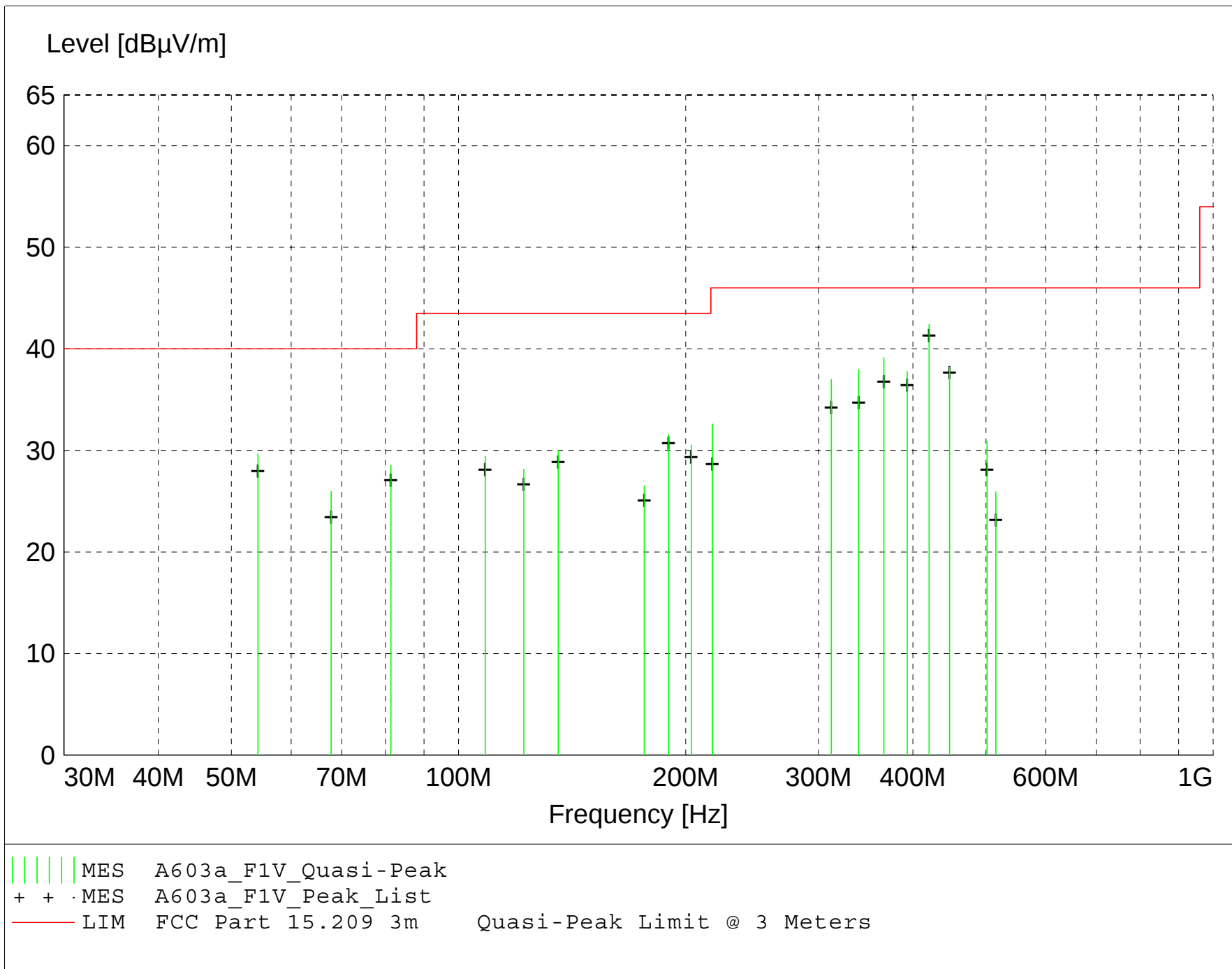
TEXT: "Vert 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with VERTICAL Antenna Polarization

Equations:
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
| Final maximized level using Quasi-Peak detector
X Final maximized level using Average detector
Final maximized level using Peak detector



MEASUREMENT RESULT: "A603a_F1V_Final"

6/3/2015 9:15AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
420.340000	47.82	16.21	-21.6	42.4	46.0	3.6	1.10	80	QUASI-PEAK	None
366.100000	45.92	15.02	-21.8	39.1	46.0	6.9	1.40	280	QUASI-PEAK	None
447.460000	43.00	16.70	-21.5	38.2	46.0	7.8	1.00	340	QUASI-PEAK	None
338.980000	45.04	14.86	-21.9	38.0	46.0	8.0	1.30	260	QUASI-PEAK	None
393.220000	43.83	15.70	-21.8	37.8	46.0	8.2	1.30	125	QUASI-PEAK	None
311.870000	44.18	14.95	-22.2	37.0	46.0	9.0	1.50	225	QUASI-PEAK	None
54.240000	42.66	11.08	-24.1	29.7	40.0	10.3	1.00	270	QUASI-PEAK	None
81.355000	45.94	6.31	-23.7	28.5	40.0	11.5	1.00	135	QUASI-PEAK	None
189.835000	36.83	17.57	-22.8	31.6	43.5	11.9	1.00	30	QUASI-PEAK	None
203.390000	41.31	12.00	-22.8	30.5	43.5	13.0	2.50	270	QUASI-PEAK	None
216.950000	43.90	11.42	-22.7	32.6	46.0	13.4	1.80	0	QUASI-PEAK	None
135.590000	40.84	12.48	-23.3	30.0	43.5	13.5	1.00	10	QUASI-PEAK	None
67.800000	42.00	7.84	-23.9	26.0	40.0	14.0	1.00	45	QUASI-PEAK	None
108.475000	41.12	11.70	-23.4	29.4	43.5	14.1	1.00	0	QUASI-PEAK	None
501.700000	34.04	18.14	-21.2	30.9	46.0	15.1	1.00	225	QUASI-PEAK	None
122.030000	38.82	12.71	-23.4	28.2	43.5	15.3	1.00	135	QUASI-PEAK	None
176.265000	33.98	15.43	-22.9	26.5	43.5	17.0	1.00	90	QUASI-PEAK	None
515.260000	28.45	18.68	-21.2	25.9	46.0	20.1	1.00	290	QUASI-PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: XPNFC 13.56 MHz RF module
Manufacturer: Whirlpool Corporation
Operating Condition: 65 deg. F; 51% R.H.
Test Site: DLS Site 2
Operator: Craig B #7024
Test Specification: 5V DC input module; no microcontroller
Comment: Continuous transmit
Date: 06-03-2015

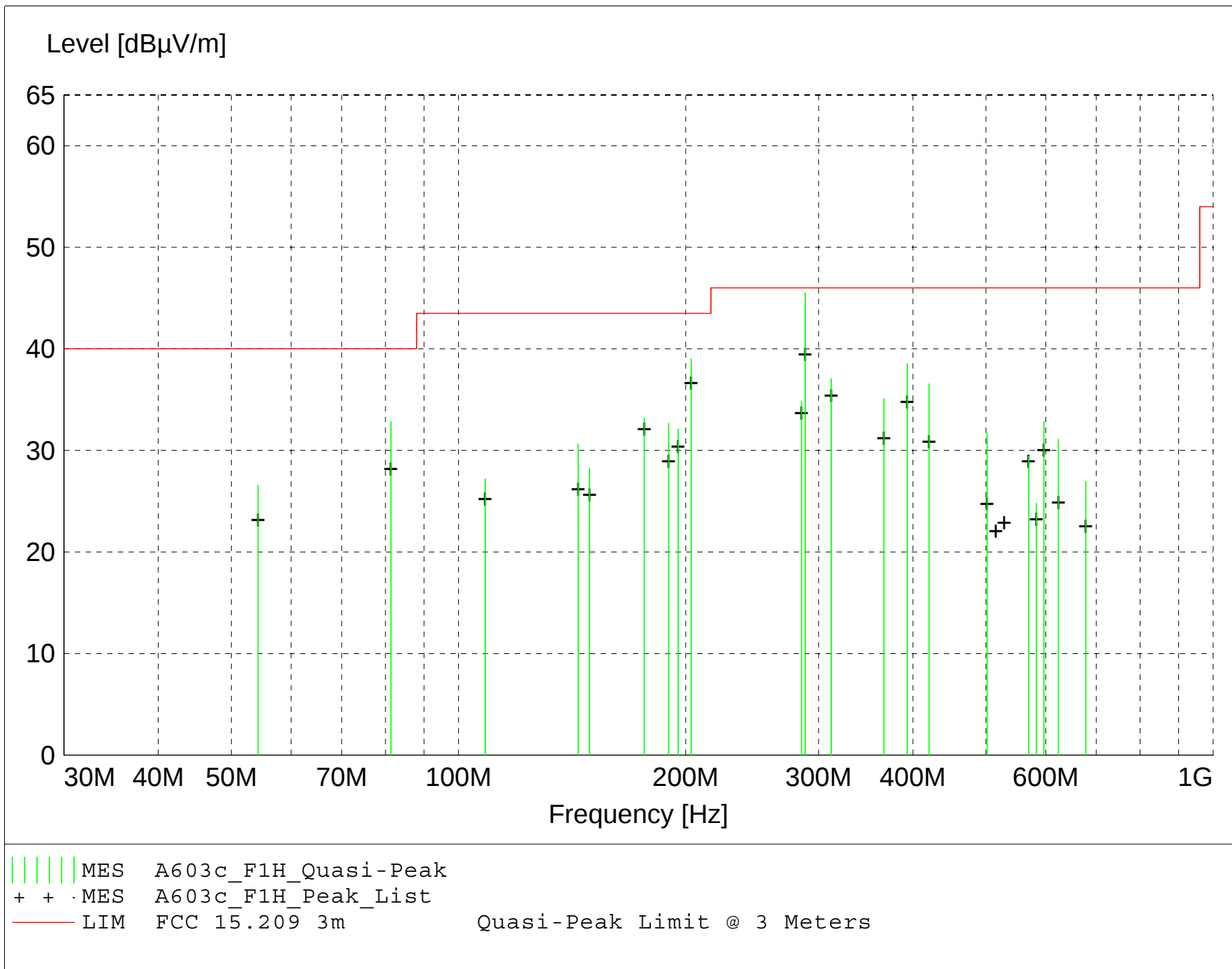
TEXT: "Horz 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization

Equations:
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
| Final maximized level using Quasi-Peak detector
X Final maximized level using Average detector
Final maximized level using Peak detector



MEASUREMENT RESULT: "A603c_F1H_Final"

6/3/2015 12:36PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
288.040000	53.76	13.92	-22.2	45.5	46.0	0.5	1.00	0	QUASI-PEAK	None
203.380000	49.81	12.00	-22.8	39.0	43.5	4.5	1.30	180	QUASI-PEAK	None
81.345000	50.24	6.30	-23.7	32.8	40.0	7.2	2.50	180	QUASI-PEAK	None
393.210000	44.60	15.70	-21.8	38.5	46.0	7.5	2.00	0	QUASI-PEAK	None
311.860000	44.27	14.95	-22.2	37.1	46.0	8.9	1.00	180	QUASI-PEAK	None
420.330000	41.96	16.21	-21.6	36.6	46.0	9.4	1.70	350	QUASI-PEAK	None
176.260000	40.67	15.43	-22.9	33.2	43.5	10.3	1.90	350	QUASI-PEAK	None
189.825000	37.96	17.57	-22.8	32.7	43.5	10.8	1.00	0	QUASI-PEAK	None
366.100000	41.91	15.02	-21.8	35.1	46.0	10.9	2.50	180	QUASI-PEAK	None
284.730000	43.25	13.78	-22.2	34.8	46.0	11.2	1.00	190	QUASI-PEAK	None
195.450000	37.31	17.60	-22.8	32.1	43.5	11.4	1.00	0	QUASI-PEAK	None
144.020000	41.73	12.10	-23.2	30.6	43.5	12.9	1.40	180	QUASI-PEAK	None
596.600000	34.24	19.30	-20.7	32.8	46.0	13.2	1.20	315	QUASI-PEAK	None
54.255000	39.57	11.07	-24.1	26.6	40.0	13.4	3.30	0	QUASI-PEAK	None
501.690000	34.83	18.14	-21.2	31.7	46.0	14.3	1.40	315	QUASI-PEAK	None
623.720000	32.05	19.70	-20.7	31.1	46.0	14.9	1.20	330	QUASI-PEAK	None
149.140000	39.21	12.10	-23.1	28.2	43.5	15.3	2.10	180	QUASI-PEAK	None
108.460000	38.90	11.70	-23.4	27.2	43.5	16.3	1.70	180	QUASI-PEAK	None
569.490000	31.56	18.71	-20.8	29.4	46.0	16.6	1.40	315	QUASI-PEAK	None
677.960000	26.77	20.56	-20.4	26.9	46.0	19.1	1.00	135	QUASI-PEAK	None
583.050000	26.91	18.62	-20.7	24.8	46.0	21.2	1.30	315	QUASI-PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: XPNFC 13.56 MHz RF module
Manufacturer: Whirlpool Corporation
Operating Condition: 65 deg. F; 51% R.H.
Test Site: DLS Site 2
Operator: Craig B #7024
Test Specification: 5V DC input module; no microcontroller
Comment: Continuous transmit
Date: 06-03-2015

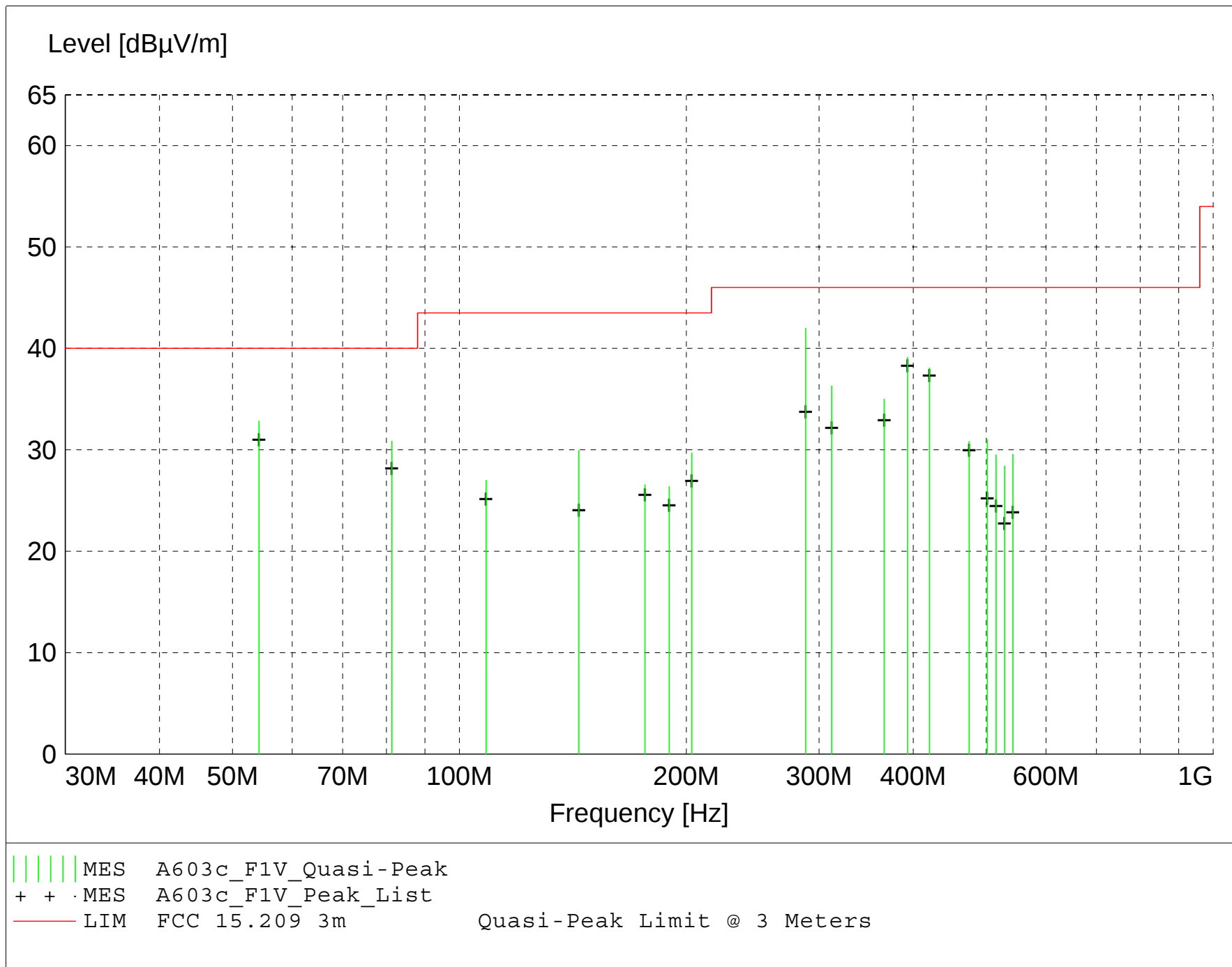
TEXT: "Vert 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with VERTICAL Antenna Polarization

Equations:
$$\text{Total Level (dB}\mu\text{V/m)} = \text{Level (dB}\mu\text{V)} + \text{System Loss (dB)} + \text{Antenna Factor (dB}\mu\text{V/m)}$$
$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

Graph Markers: + Frequency marker (Level of marker not related to final level)
| Final maximized level using Quasi-Peak detector
X Final maximized level using Average detector
Final maximized level using Peak detector



MEASUREMENT RESULT: "A603c_F1V_Final"

6/3/2015 12:42PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level			Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m	dBμV/m	dB	m	deg		
288.050000	50.24	13.92	-22.2	42.0	46.0	4.0	1.60	270	QUASI-PEAK	None
393.210000	45.19	15.70	-21.8	39.1	46.0	6.9	1.30	315	QUASI-PEAK	None
54.235000	45.83	11.08	-24.1	32.8	40.0	7.2	1.00	75	QUASI-PEAK	None
420.330000	43.46	16.21	-21.6	38.1	46.0	7.9	1.10	280	QUASI-PEAK	None
81.345000	48.26	6.30	-23.7	30.9	40.0	9.1	1.00	45	QUASI-PEAK	None
311.860000	43.50	14.95	-22.2	36.3	46.0	9.7	1.40	130	QUASI-PEAK	None
366.090000	41.79	15.02	-21.8	35.0	46.0	11.0	1.40	250	QUASI-PEAK	None
144.020000	41.04	12.10	-23.2	29.9	43.5	13.6	1.00	135	QUASI-PEAK	None
203.380000	40.48	12.00	-22.8	29.7	43.5	13.8	1.80	300	QUASI-PEAK	None
501.690000	34.12	18.14	-21.2	31.0	46.0	15.0	2.20	225	QUASI-PEAK	None
474.570000	34.92	17.30	-21.4	30.8	46.0	15.2	1.00	270	QUASI-PEAK	None
542.360000	32.17	18.35	-21.0	29.6	46.0	16.4	1.00	250	QUASI-PEAK	None
515.250000	32.03	18.69	-21.2	29.5	46.0	16.5	1.00	270	QUASI-PEAK	None
108.465000	38.68	11.70	-23.4	27.0	43.5	16.5	1.00	160	QUASI-PEAK	None
176.255000	34.02	15.43	-22.9	26.6	43.5	16.9	1.00	255	QUASI-PEAK	None
189.815000	31.64	17.56	-22.8	26.4	43.5	17.1	1.00	300	QUASI-PEAK	None
528.800000	31.28	18.20	-21.1	28.4	46.0	17.6	1.00	280	QUASI-PEAK	None



166 South Carter, Genoa City, WI 53128

Company:
Model Tested:
Report Number:
Project Number:

Whirlpool Corporation
XPNFC
21060
7024

Appendix B

B3.0 Frequency Stability

Rule Part: FCC Part 15.225(e)

Test Procedure: ANSI C63.10-2009 Section 6.8.1

Limits: 0.01% of the center frequency
Limit = $\pm 1.356 \text{ kHz}$ (0.01% of 13.56 MHz)

Results: Compliant

Sample Equations: N/A

Notes: The EUT was coupled to a spectrum analyzer using a near-field probe.

The DC voltage to the module's LDO voltage regulator was varied from 85% to 115% of its nominal input voltage. Carrier frequency measurements were performed and recorded at nominal temperature.

The temperature was varied from -30°C to $+85^{\circ}\text{C}$ in increments of 10° and at nominal DC voltage of 5 V to the input of the module's LDO voltage regulator. Carrier frequency measurements were performed and recorded at transmitter startup, 2 minutes after startup, 5 minutes after startup, and 10 minutes after startup.

DLS Electronic Systems, Inc.

Company: Whirlpool Corporation

Operator: Craig B

Dates of test: 06-05-2015 & 06-08-2015

Model: XPNFC NFC Radio @ 13.56 MHz 5V input

Limit = +/- 0.01% (+/- 1,356 Hz)

Frequency Stability FCC Part 15.225

Time after turn ON	Nominal Frequency (MHz)	Measured Frequency (MHz) (at 5 Volts DC)									
		+85 deg. C	Error (Hz)	+80 deg. C	Error (Hz)	+70 deg. C	Error (Hz)	+60 deg. C	Error (Hz)	+50 deg. C	Error (Hz)
immediate	13.560	13.559609	-390.780	13.559571	-428.860	13.559503	-496.990	13.559477	-523.050	13.559475	-525.050
2 min.	13.560	13.559633	-366.730	13.559593	-406.810	13.559519	-480.960	13.559481	-519.040	13.559473	-527.050
5 min.	13.560	13.559645	-354.710	13.559601	-398.800	13.559523	-476.950	13.559483	-517.030	13.559473	-527.050
10 min.	13.560	13.559647	-352.710	13.559603	-396.790	13.559523	-476.950	13.559483	-517.030	13.559473	-527.050

Frequency Stability FCC Part 15.225

Time after turn ON	Nominal Frequency (MHz)	Measured Frequency (MHz) (at 5 Volts DC)									
		+40 deg. C	Error (Hz)	+30 deg. C	Error (Hz)	+20 deg. C	Error (Hz)	+10 deg. C	Error (Hz)	0 deg. C	Error (Hz)
immediate	13.560	13.559491	-509.020	13.559521	-478.960	13.559541	-458.920	13.559571	-428.860	13.559587	-412.830
2 min.	13.560	13.559487	-513.030	13.559513	-486.970	13.559529	-470.940	13.559567	-432.870	13.559585	-414.830
5 min.	13.560	13.559485	-515.030	13.559509	-490.980	13.559525	-474.950	13.559565	-434.870	13.559583	-416.830
10 min.	13.560	13.559485	-515.030	13.559509	-490.980	13.559521	-478.960	13.559565	-434.870	13.559583	-416.830

Frequency Stability FCC Part 15.225

Time after turn ON	Nominal Frequency (MHz)	Measured Frequency (MHz) (at 5 Volts DC)									
		-10 deg. C	Error (Hz)	-20 deg. C	Error (Hz)	-30 deg. C	Error (Hz)				
immediate	13.560	13.559561	-438.880	13.559483	-517.030	13.559407	-593.190				
2 min.	13.560	13.559583	-416.830	13.559501	-499.000	13.559427	-573.150				
5 min.	13.560	13.559585	-414.830	13.559505	-494.990	13.559435	-565.130				
10 min.	13.560	13.559585	-414.830	13.559505	-494.990	13.559435	-565.130				

Frequency Stability FCC Part 15.225

	Nominal Frequency (MHz)	Measured Frequency (MHz) (at +20 deg. C)									
		4.25 Volts	Error (Hz)	5.00 Volts	Error (Hz)	5.75 Volts	Error (Hz)				
	13.560	13.559539	-460.920	13.559541	-458.920	13.559537	-462.930				



166 South Carter, Genoa City, WI 53128

Company:
Model Tested:
Report Number:
Project Number:

Whirlpool Corporation
XPNFC
21060
7024

Appendix B

B4.0 AC Line Conducted Emissions

Rule Part: FCC Part 15.207

Test Procedure: ANSI C63.10-2009, section 6.2

Limit: 15.207(a)

Results: Compliant

Notes: This was an AC Line Conducted emissions measurement. The EUT was powered with 5 V DC through an external AC/DC power supply (Oriental Hero Ele. Fty., model OH-1048A0501200U2) that was connected to a Line Impedance Stabilization Network. The EUT was set to transmit at its maximum output power.

Per FCC KDB 174176 D01 Line Conducted FAQ v01, the EUT was first tested with the antenna in place. The EUT was then tested with the antenna replaced by a dummy load.



Report issuing date : 04-29-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 1; AVERAGE - with antenna connected
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

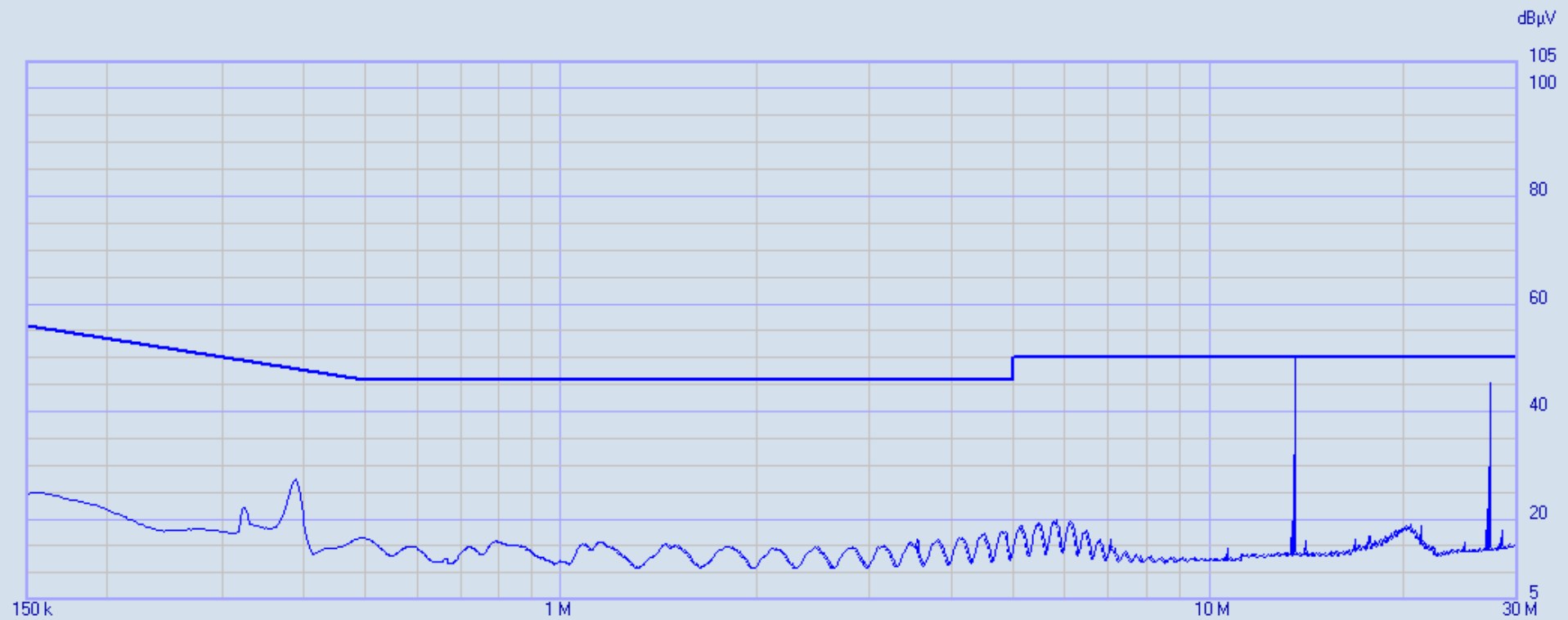
Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : Continuous transmit, with TAG

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L1

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V AV

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

C-Avg

7024 Whirlpool NFC 5V 120v L1 29/04/2015 10:15:50
 Rel. SW 2.19 (July 2014)
 Rel. FW 1.44 15/05/14
 Margin: 23 dB

	Frequency	C-Avg	Limit	Delta	Factor	Factor	Factor	Factor	
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..	
			[dBμV]		[dB]	[dB]	[dB]	[dB]	
1	0.38313	25.94	48.21	-22.27	9.74	0.98	0.09	0.60	
2	0.385175	26.90	48.17	-21.27	9.74	0.98	0.09	0.60	
3	0.38722	27.25	48.12	-20.87	9.75	0.97	0.09	0.59	
4	0.389265	27.37	48.08	-20.71	9.75	0.97	0.09	0.59	
5	0.39131	26.81	48.04	-21.23	9.75	0.96	0.08	0.59	
6	0.393355	25.84	47.99	-22.15	9.75	0.96	0.08	0.59	
7	13.587695	50.46	50.00	0.46	9.81	0.19	0.69	0.34	Transmitter fundamental frequency
8	27.199215	45.20	50.00	-4.80	9.88	0.32	0.87	0.42	



Report issuing date : 04-29-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 1; Quasi-Peak - with antenna connected
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : Continuous transmit, with TAG

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L1

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V QP

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

QPeak —

7024 Whirlpool NFC 5V 120v L1 29/04/2015 10:15:50
 Rel. SW 2.19 (July 2014)
 Rel. FW 1.44 15/05/14
 Margin: 23 dB

	Frequency	QPeak	Limit	Delta	Factor	Factor	Factor	Factor
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..
			[dBμV]		[dB]	[dB]	[dB]	[dB]
1	0.152045	43.09	65.89	-22.80	9.65	2.09	0.04	1.71
2	0.15409	42.96	65.78	-22.82	9.66	2.07	0.04	1.69
3	0.156135	42.76	65.67	-22.91	9.67	2.04	0.04	1.66
4	0.15818	42.65	65.56	-22.91	9.67	2.02	0.03	1.64
5	0.385175	35.26	58.17	-22.91	9.74	0.98	0.09	0.60
6	0.38722	35.58	58.12	-22.54	9.75	0.97	0.09	0.59
7	0.389265	35.64	58.08	-22.44	9.75	0.97	0.09	0.59
8	0.39131	35.06	58.04	-22.98	9.75	0.96	0.08	0.59
9	13.587695	53.64	60.00	-6.36	9.81	0.19	0.69	0.34
10	27.199215	47.79	60.00	-12.21	9.88	0.32	0.87	0.42



Report issuing date : 04-29-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 2; AVERAGE - with antenna connected
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

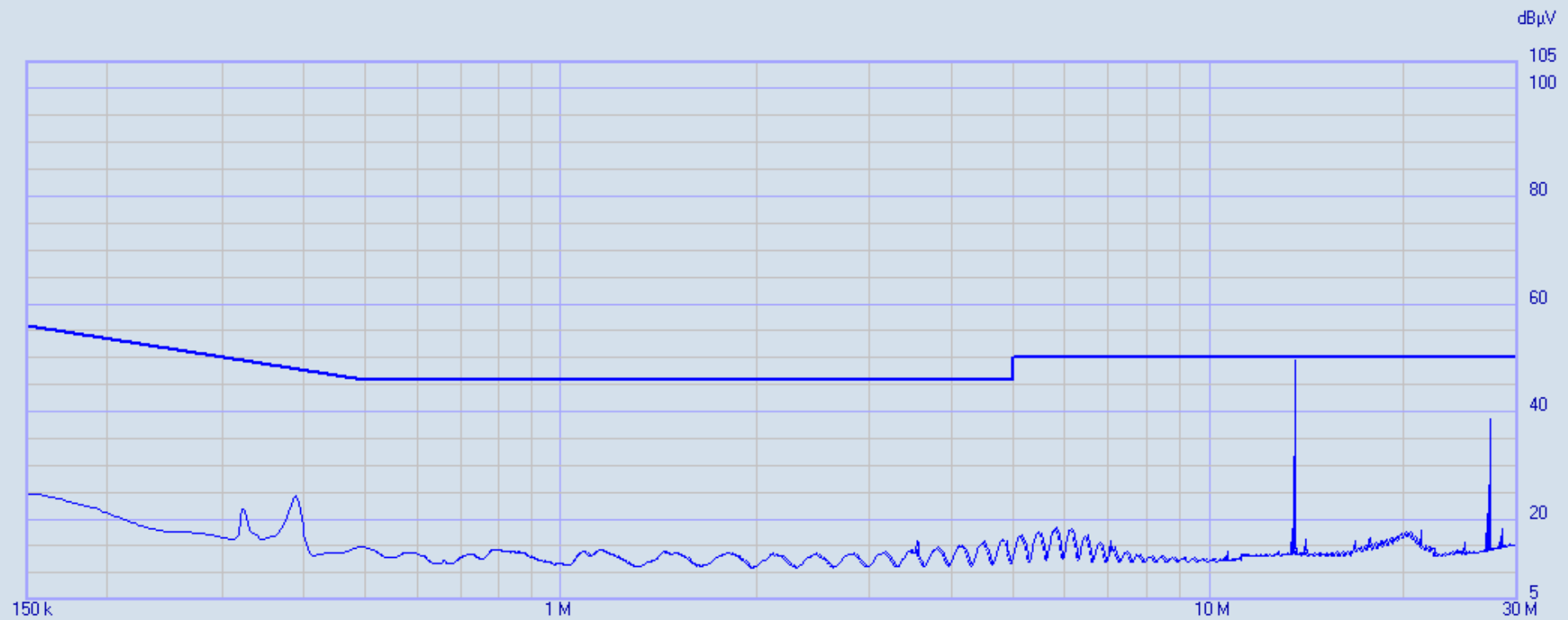
Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : Continuous transmit, with TAG

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L2

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V AV

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

C-Avg

7024 Whirlpool NFC 5V 120v L2 29/04/2015 12:23:11
 Rel. SW 2.19 (July 2014)
 Rel. FW 1.44 15/05/14
 Margin: 25 dB

	Frequency	C-Avg	Limit	Delta	Factor	Factor	Factor	Factor	
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..	
			[dBμV]		[dB]	[dB]	[dB]	[dB]	
1	0.385175	23.56	48.17	-24.61	9.74	0.98	0.09	0.60	
2	0.38722	23.95	48.12	-24.17	9.75	0.97	0.09	0.59	
3	0.389265	24.22	48.08	-23.86	9.75	0.97	0.09	0.59	
4	0.39131	23.84	48.04	-24.20	9.75	0.96	0.08	0.59	
5	0.393355	23.06	47.99	-24.93	9.75	0.96	0.08	0.59	
6	13.587695	49.54	50.00	-0.46	9.81	0.19	0.69	0.34	Transmitter fundamental frequency
7	27.199215	38.55	50.00	-11.45	9.88	0.32	0.87	0.42	



Report issuing date : 04-29-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 2; Quasi-Peak - with antenna connected
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : Continuous transmit, with TAG

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L2

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V QP

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

QPeak —

7024 Whirlpool NFC 5V 120v L2 29/04/2015 12:23:11
 Rel. SW 2.19 (July 2014)
 Rel. FW 1.44 15/05/14
 Margin: 23 dB

	Frequency	QPeak	Limit	Delta	Factor	Factor	Factor	Factor
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..
			[dBμV]		[dB]	[dB]	[dB]	[dB]
1	0.15	43.34	66.00	-22.66	9.64	2.12	0.04	1.73
2	0.152045	43.53	65.89	-22.36	9.65	2.09	0.04	1.71
3	0.15409	43.47	65.78	-22.31	9.66	2.07	0.04	1.69
4	0.156135	43.22	65.67	-22.45	9.67	2.04	0.04	1.66
5	0.15818	43.07	65.56	-22.49	9.67	2.02	0.03	1.64
6	0.160225	42.83	65.45	-22.62	9.68	1.99	0.03	1.61
7	0.16227	42.55	65.35	-22.80	9.69	1.97	0.03	1.59
8	0.164315	42.39	65.24	-22.85	9.70	1.94	0.03	1.56
9	13.587695	56.49	60.00	-3.51	9.81	0.19	0.69	0.34
10	27.199215	42.39	60.00	-17.61	9.88	0.32	0.87	0.42



Report issuing date : 04-30-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 1; AVERAGE
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

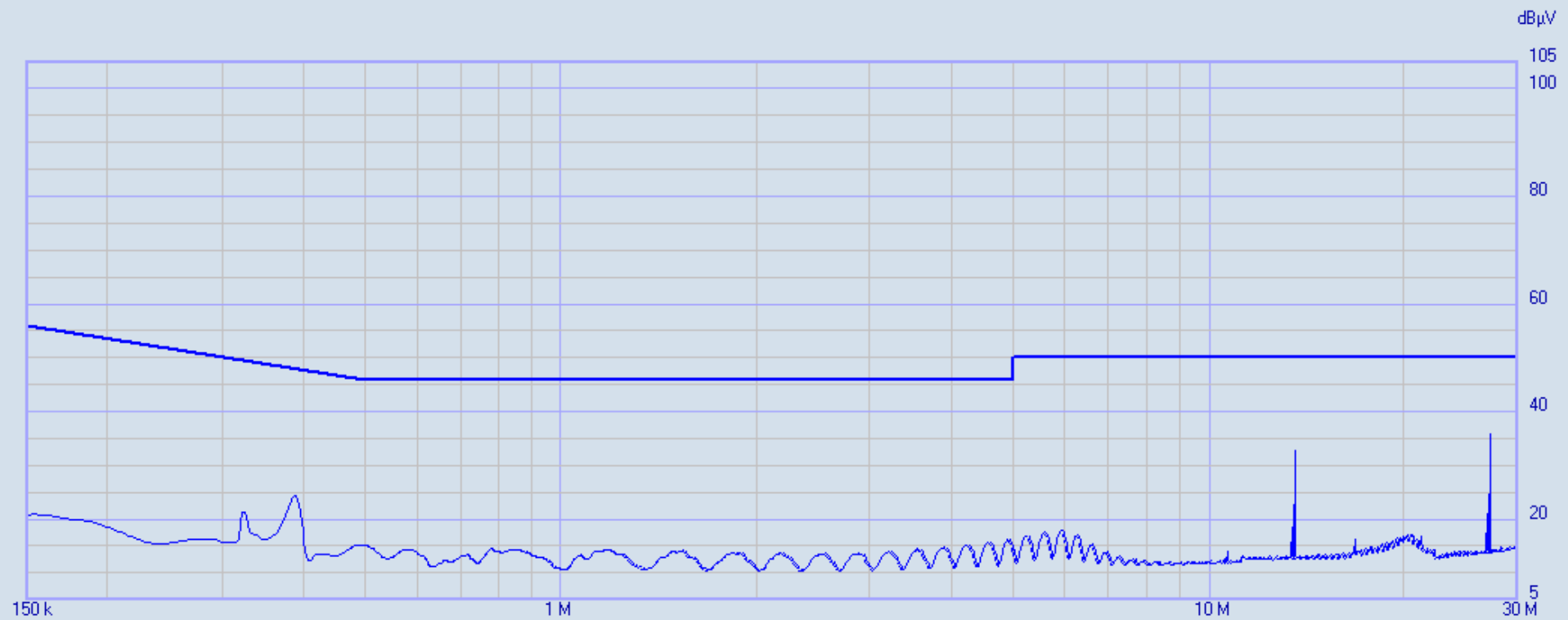
Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : ANTENNA REPLACED WITH DUMMY LOAD

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L1 DL

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V AV

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

C-Avg

7024 Whirlpool NFC 5V 120v L1 DL 30/04/2015 09:37:52

Rel. SW 2.19 (July 2014)

Rel. FW 1.44 15/05/14

Margin: 25 dB

	Frequency	C-Avg	Limit	Delta	Factor	Factor	Factor	Factor
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..
			[dBμV]		[dB]	[dB]	[dB]	[dB]
1	0.38313	23.46	48.21	-24.75	9.74	0.98	0.09	0.60
2	0.385175	24.09	48.17	-24.08	9.74	0.98	0.09	0.60
3	0.38722	24.40	48.12	-23.72	9.75	0.97	0.09	0.59
4	0.389265	24.31	48.08	-23.77	9.75	0.97	0.09	0.59
5	0.39131	23.84	48.04	-24.20	9.75	0.96	0.08	0.59
6	13.587695	32.77	50.00	-17.23	9.81	0.19	0.69	0.34
7	27.199215	35.94	50.00	-14.06	9.88	0.32	0.87	0.42



Report issuing date : 04-30-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 1; Quasi-Peak
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

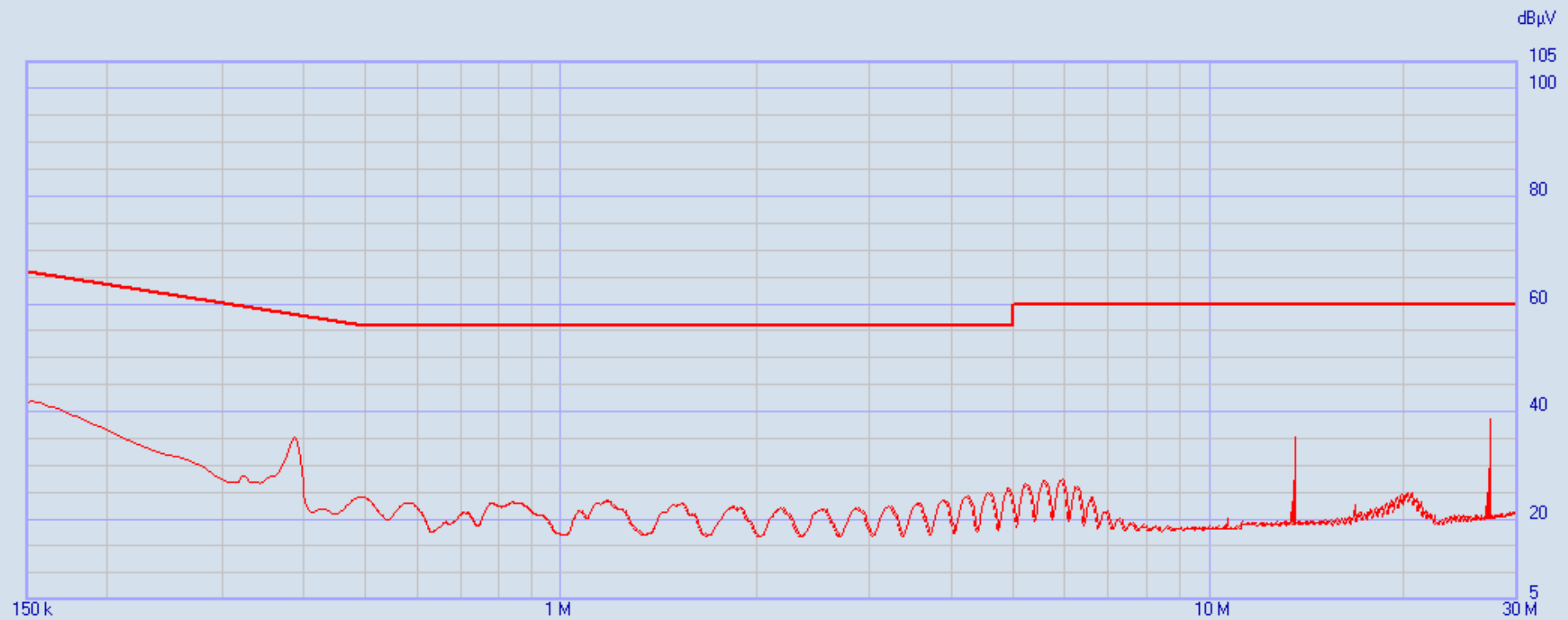
Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : ANTENNA REPLACED WITH DUMMY LOAD

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L1 DL

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V QP

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

QPeak —

7024 Whirlpool NFC 5V 120v L1 DL 30/04/2015 09:37:52

Rel. SW 2.19 (July 2014)

Rel. FW 1.44 15/05/14

Margin: 25 dB

	Frequency	QPeak	Limit	Delta	Factor	Factor	Factor	Factor
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..
			[dBμV]		[dB]	[dB]	[dB]	[dB]
1	0.15	41.66	66.00	-24.34	9.64	2.12	0.04	1.73
2	0.152045	41.88	65.89	-24.01	9.65	2.09	0.04	1.71
3	0.15409	41.73	65.78	-24.05	9.66	2.07	0.04	1.69
4	0.156135	41.56	65.67	-24.11	9.67	2.04	0.04	1.66
5	0.15818	41.38	65.56	-24.18	9.67	2.02	0.03	1.64
6	0.160225	41.19	65.45	-24.26	9.68	1.99	0.03	1.61
7	0.16227	40.98	65.35	-24.37	9.69	1.97	0.03	1.59
8	0.164315	40.72	65.24	-24.52	9.70	1.94	0.03	1.56
9	0.16636	40.45	65.14	-24.69	9.71	1.92	0.03	1.53
10	0.168405	40.17	65.04	-24.87	9.71	1.90	0.03	1.51
11	0.381085	33.51	58.26	-24.75	9.74	0.98	0.09	0.60
12	0.38313	34.26	58.21	-23.95	9.74	0.98	0.09	0.60
13	0.385175	34.85	58.17	-23.32	9.74	0.98	0.09	0.60
14	0.38722	35.12	58.12	-23.00	9.75	0.97	0.09	0.59
15	0.389265	34.95	58.08	-23.13	9.75	0.97	0.09	0.59
16	0.39131	34.24	58.04	-23.80	9.75	0.96	0.08	0.59
17	13.587695	35.26	60.00	-24.74	9.81	0.19	0.69	0.34
18	27.199215	38.55	60.00	-21.45	9.88	0.32	0.87	0.42



Report issuing date : 04-30-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 2; AVERAGE
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

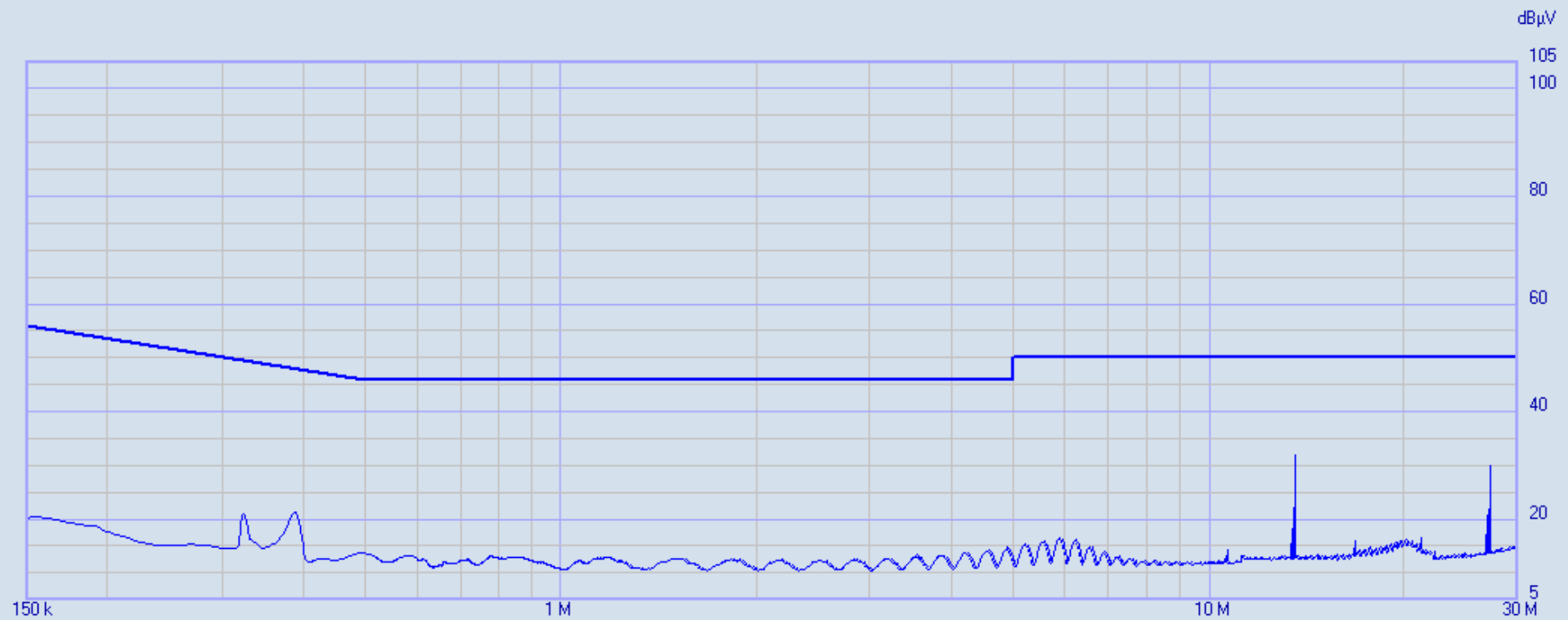
Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : ANTENNA REPLACED WITH DUMMY LOAD

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L2 DL

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V AV

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

C-Avg

7024 Whirlpool NFC 5V 120v L2 DL 30/04/2015 09:44:34

Rel. SW 2.19 (July 2014)

Rel. FW 1.44 15/05/14

Margin: 28 dB

	Frequency	C-Avg	Limit	Delta	Factor	Factor	Factor	Factor
	[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..
			[dBμV]		[dB]	[dB]	[dB]	[dB]
1	0.38313	20.51	48.21	-27.70	9.74	0.98	0.09	0.60
2	0.385175	21.01	48.17	-27.16	9.74	0.98	0.09	0.60
3	0.38722	21.31	48.12	-26.81	9.75	0.97	0.09	0.59
4	0.389265	21.17	48.08	-26.91	9.75	0.97	0.09	0.59
5	0.39131	20.72	48.04	-27.32	9.75	0.96	0.08	0.59
6	13.587695	31.87	50.00	-18.13	9.81	0.19	0.69	0.34
7	27.199215	29.85	50.00	-20.15	9.88	0.32	0.87	0.42



Report issuing date : 04-30-2015
Standard : FCC Part 15.207
Test Type : Voltage Mains
Test Site : DLS O.F. Screen Room
Temperature : 70 °F
Humidity : 29 %
Test Specs : 120 V 60 Hz; Line 2; Quasi-Peak
Operator : Craig B
DLS Project # : 7024
Result : Pass

EUT

Manufacturer : Whirlpool Corporation
Model : XPNFC, 5 Volt DC input
Product : NFC Radio @ 13.56 MHz
Comment : ANTENNA REPLACED WITH DUMMY LOAD

Testing Company : DLS Electronic Systems
Telephone : 262-279-0210
Web site : <http://www.dlsemc.com>

Receiver Details

Model : PMM 9010F
Brand : Narda
S/N : 020WW40102
Last Calibration : 06/17/2014

NOTE: The column in the table that is labeled "delta" shows the margin in dB with respect to the limit. A negative number indicates the level of the emission is under the limit by the given value, while a positive number indicates the emission level is above the limit by the given value.



7024 Whirlpool NFC 5V 120v L2 DL

	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C	1000 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = Infinite (3)

Limits:
FCC Class B V QP

Factors:
E-M L705
DLS#592
C43&45 150k-30M
LISN DLS#128

QPeak —

7024 Whirlpool NFC 5V 120v L2 DL 30/04/2015 09:44:34

Rel. SW 2.19 (July 2014)

Rel. FW 1.44 15/05/14

Margin: 25 dB

Frequency	QPeak	Limit	Delta	Factor	Factor	Factor	Factor
[MHz]	[dBμV]	FCC Class..	[dB]	E-M L705	DLS#592	C43&45 15..	LISN DLS#..
		[dBμV]		[dB]	[dB]	[dB]	[dB]
1 0.15	41.61	66.00	-24.39	9.64	2.12	0.04	1.73
2 0.152045	41.84	65.89	-24.05	9.65	2.09	0.04	1.71
3 0.15409	41.70	65.78	-24.08	9.66	2.07	0.04	1.69
4 0.156135	41.54	65.67	-24.13	9.67	2.04	0.04	1.66
5 0.15818	41.38	65.56	-24.18	9.67	2.02	0.03	1.64
6 0.160225	41.20	65.45	-24.25	9.68	1.99	0.03	1.61
7 0.16227	40.98	65.35	-24.37	9.69	1.97	0.03	1.59
8 0.164315	40.71	65.24	-24.53	9.70	1.94	0.03	1.56
9 0.16636	40.43	65.14	-24.71	9.71	1.92	0.03	1.53
10 0.168405	40.15	65.04	-24.89	9.71	1.90	0.03	1.51
11 0.385175	33.31	58.17	-24.86	9.74	0.98	0.09	0.60
12 0.38722	33.55	58.12	-24.57	9.75	0.97	0.09	0.59
13 0.389265	33.32	58.08	-24.76	9.75	0.97	0.09	0.59
14 13.587695	38.12	60.00	-21.88	9.81	0.19	0.69	0.34



166 South Carter, Genoa City, WI 53128

Company:
Model Tested:
Report Number:
Project Number:

Whirlpool Corporation
XPNFC
21060
7024

END OF REPORT

Revision #	Date	Comments	By
1.0	6-10-2015	Preliminary Release	JS
1.1	6-12-2015	Minor edits pages 8, 17, & 19	JS
1.2	6-19-2015	Added descriptions to page 6	JS