Test of Polycom Spectralink 8450 Wi-Fi handset with Bluetooth

To: FCC 47 CFR Part 15, SubPart B & ICES-003

Test Report Serial No.: POLY06-U21 Rev A

MiCOM Labs

opening wireless markets

TEST REPORT

From

Test of: Polycom Spectralink 8450 Wi-Fi handset with Bluetooth

To: FCC 47 CFR Part 15, SubPart B & ICES-003

Test Report Serial No.: POLY06-U21 Rev A

This report supersedes: None

Applicant:	Polycom 4750 Willow Road Pleasanton, CA 94588-2708 USA
Product Function:	Wi-Fi handset with Bluetooth
Copy No: pdf	**Issue Date:** 14th February 2011

This Test Report is Issued Under the Authority of;

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TESTING CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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1 ACCREDITATION, LISTINGS & RECOGNITION

1.1 TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. 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 8 January 2009*).

Presented this 14th day of April 2010.

President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2011

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

1.2 RECOGNITION

MiCOM Labs, Inc has widely recognized Electrical testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA** countries. Our test reports are widely accepted for global type approvals.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	Listing #: 4143A
Japan	VCCI	-	-	No. 2959
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.
Phase I - recognition for product testing
Phase II – recognition for both product testing and certification
N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB – Notified Body

1.3 PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard EN ISO/IEC Guide 65. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence as a

Product Certification Body

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC Guide 65:1996 *General requirements for bodies operating product certification systems*. This accreditation demonstrates technical competence for a defined scope and the operation of a quality management system for a Telecommunications Certification Body (TCB) meeting FCC (U.S.), and IC (Canada) requirements.

Presented this 24th day of June 2010.

President & CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2011

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

United States of America – Telecommunication Certification Body

TCB Identifier – US0159

Industry Canada – Certification Body

CAB Identifier – US0159

Europe – Notified Body

Notified Body Identifier - 2280

2 DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft		
Rev A	14th February 2011	Initial Release

3 TEST RESULT CERTIFICATE

Applicant:	Polycom 4750 Willow Road Pleasanton California , 94588-2708, USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
Product:	Spectralink 8400 series Wi-Fi handsets	Telephone:	+1 925 462 0304
Model No.:	Spectralink 8450 handset	Fax:	+1 925 462 0306
S/No's:	600826769		
Date(s) Tested:	Nov 19th, 2010 – Jan 3rd, 2011	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15, SubPart B & ICES-003	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:

ACCREDITED

TESTING CERTIFICATE #2381.01

Graeme Grieve
Quality Manager MiCOM Labs, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

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4 REFERENCES AND MEASUREMENT UNCERTAINTY

4.1 Normative References

Ref.	Publication	Year	Title
i.	47 CFR Part 15, SubPart B	2010	47 CFR Part 15, SubPart B; Unintentional Radiators
ii.	ICES-003	2004	Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard Digital Apparatus; Issue 4
iii.	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
iv.	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
v.	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
vi.	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
vii.	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
viii.	A2LA	9th June 2010	Reference to A2LA Accreditation Status – A2LA Advertising Policy

4.2 Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

5 TEST SUMMARY

List of Measurements: The following table represents the list of measurements required under FCC 47 CFR Part 15, SubPart B & ICES-003.

Standard Section(s)	Test Description	Condition	Result	Test Report Section
15.109	Radiated Emissions - Unintentional Radiator	Radiated	Pass	7.1
15.107	AC Mains Emissions 0.15 – 30 MHz	Conducted	Pass	7.2

Note 1: Test results reported in this document relate only to the items tested

Note 2: The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

Note 3: Section 6.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix

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6 PRODUCT DETAILS AND TEST CONFIGURATIONS

6.1 Test Program Scope

The scope of the test program was to test the Polycom Spectralink 8450 Wi-Fi handset in three different configurations as listed below for compliance against FCC 47 CFR Part 15, SubPart B & Industry Canda ICES-003.

Test Configurations

8450 Handset + AC-DC Adapter /Charger: SA106B-05 + Headset

8450 Handset + AC-DC Adapter: HK-U-120A050-CP + Charging Dock + Headset

8450 Handset + AC-DC Adapter: HK-AX-120A200-CP + Speaker Dock + Headset

APPLICANT: Polycom **PRODUCT:** Spectralink 8450 Wi-Fi handsets Front

APPLICANT: Polycom **PRODUCT:** Spectralink 8450 Wi-Fi handset Back

APPLICANT: Polycom **PRODUCT:** AC-DC Adapter/ Charger for Spectralink 8400 series handsets

APPLICANT: Polycom **PRODUCT:** Charging Dock for Spectralink 8400 series handsets

APPLICANT: Polycom **PRODUCT:** AC-DC Adapter for Charging Dock

APPLICANT: Polycom **PRODUCT:** Speaker Dock for Spectralink 8400 series handsets

APPLICANT: Polycom **PRODUCT:** AC-DC Adapter for Speaker Dock

6.2 EUT Details

Detail	Description
Purpose:	Test of the Polycom Spectralink 8450 Wi-Fi handset with Bluetooth for compliance against FCC 47 CFR Part 15, SubPart B & ICES-003
Applicant:	Polycom 4750 Willow Road Pleasanton, CA 94588-2708 USA
Manufacturer:	Same as Applicant
Test Laboratory:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	POLY06-U21
Date EUT received:	11/11/2010
Dates of test (from - to):	11/19/2010 - 01/03/2011
No of Units Tested:	1 – S/N: 600826769
Product Name:	Spectralink 8400 series Wi-Fi handsets
Manufacturers Trade Name:	Polycom Spectralink 8400 series Wi-Fi handsets
Model No.:	Spectralink 8450 handset
Equipment Primary Function:	Wi-Fi handset with Bluetooth
Equipment Secondary Function(s):	Bar code reader
Type of Technology:	802.11bg / Bluetooth
Installation type:	Portable
Construction/Location for Use:	Indoor/Outdoor
Software/Firmware Release:	BootROM Mink Phoenix E6 FCC Test 14.
Test Software Release:	BootROM Mink Phoenix E6 FCC Test 14.
Rated Input Voltage and Current DC:	Nominal: 3.8V; Battery: 3.5V - 4.2V, Charger (USB or Base) supply: 5V +/- 10%
Operating Temperature Range ºC:	Min: 0 °C Max: 40 °C
Equipment Dimensions:	5.75” x 2.125” x 0.9”
Weight:	8 oz
Long Term Frequency Stability:	20 p.p.m.
Transmit/Receive Operation:	Full Duplex
Output Power Type	Fixed

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6.3 External A.C. / D.C. Power Adaptor

Model	Description
SA106B-05	GCI Technologies switching adaptor: Input: 100 - 240V AC; 50-60 Hz; 0.25 Amp Output: 5V DC; 1 Amp
HK-U-120A050-CP	Hon-Kwang I.T.E. Power Supply Input: 100 - 240V AC; 50/60 Hz; 0.2 Amp Output: 12V DC; 0.5 Amp
HK-AX-120A200-CP	Hon-Kwang I.T.E. Power Supply Input: 100-240V AC 50/60 Hz; 0.8 Amp Output: 12V DC; 2.0 Amp

6.4 Cabling and I/O Ports

The following is a description of the cable and input, output ports available on the EUT.

Type of I/O Ports	Description	Screened (Y/N)	Length	Qty	Tested (Y/N)
Battery terminal	Battery connections for removable battery	N	N/A	1	N
1/8th" stereo Connector	for connection to hands free headset	Y	< 3 meters	1	Y
Power Supply	Power connector - mini USB for charging using AC-DC Adapter/ Charger SA106B-05	Y	< 3 meters	1	Y
Charging terminals	Charging terminal for charging EUT with docking options	N	N/A	1	Y

6.5 EUT Configurations

EUT + AC-DC Adapter: HK-AX-120A200-CP + Speaker Dock + Headset
EUT + AC-DC Adapter: HK-U-120A050-CP + Charging Dock + Headset
EUT + AC-DC Adapter /Charger: SA106B-05 + Headset

6.6 Equipment Details

The following is a description of supporting equipment used during the test program.

Equipment	Equipment Description	Manufacturer	Model No.	Serial No (s).	Tested
Battery	Alpha SAMPLE	Polycom	ESB-RS657+002	AC10103200B7	Y
Battery	Alpha SAMPLE	Polycom	ESB-RS657+002	AC1010320232	Y
Battery	Alpha SAMPLE	Polycom	ESB-RS657+002	AC101032008E	Y
Battery	Alpha SAMPLE	Polycom	ESB-RS658+002	AD101032019C	Y
Charging Dock	Alpha SAMPLE	Polycom	ESB-DCA39+001	AlphaB39174 1033	Y
AC-DC Adapter	I.T.E. Power Supply	HON-KWANG	HK-U-120A050-CP	N/A	Y
AC-DC Adapter/ Charger	Switching Adapter	GCi technologies	SA106B-05	N/A	Y
Speaker Dock	10uF @ U8 Pin4 to Ground Dock PCB Revision X4	Polycom	N/A	N/A	Y
AC-DC Adapter	I.T.E. Power Supply	HON-KWANG	HK-AX-120A200-CP	N/A	Y
Headset	Encore Headset	Plantronics	P/N: 29951-12	0E0723 K7	Y

6.7 Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. NONE

6.8 Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

7 TEST RESULTS

7.1 Radiated Spurious Emissions – Digital Apparatus

Standard Reference

FCC, Part 15 Subpart B §15.109
Industry Canada ICES-003 §5

Test Procedure

Testing was performed in a 3-meter semi-anechoic chamber. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. Preliminary emissions were recorded with in Spectrum Analyzer mode, using a maximum peak detector while in peak hold mode.

Emissions nearest the limits were chosen for maximization and formal measurement using a CISPR Compliant receiver. Emissions from 30 MHz – 1000 MHz are measured utilizing a CISPR compliant quasi-peak detector with a tuned receiver, using a bandwidth of 120 kHz. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. Only the highest emissions relative to the limit are listed.

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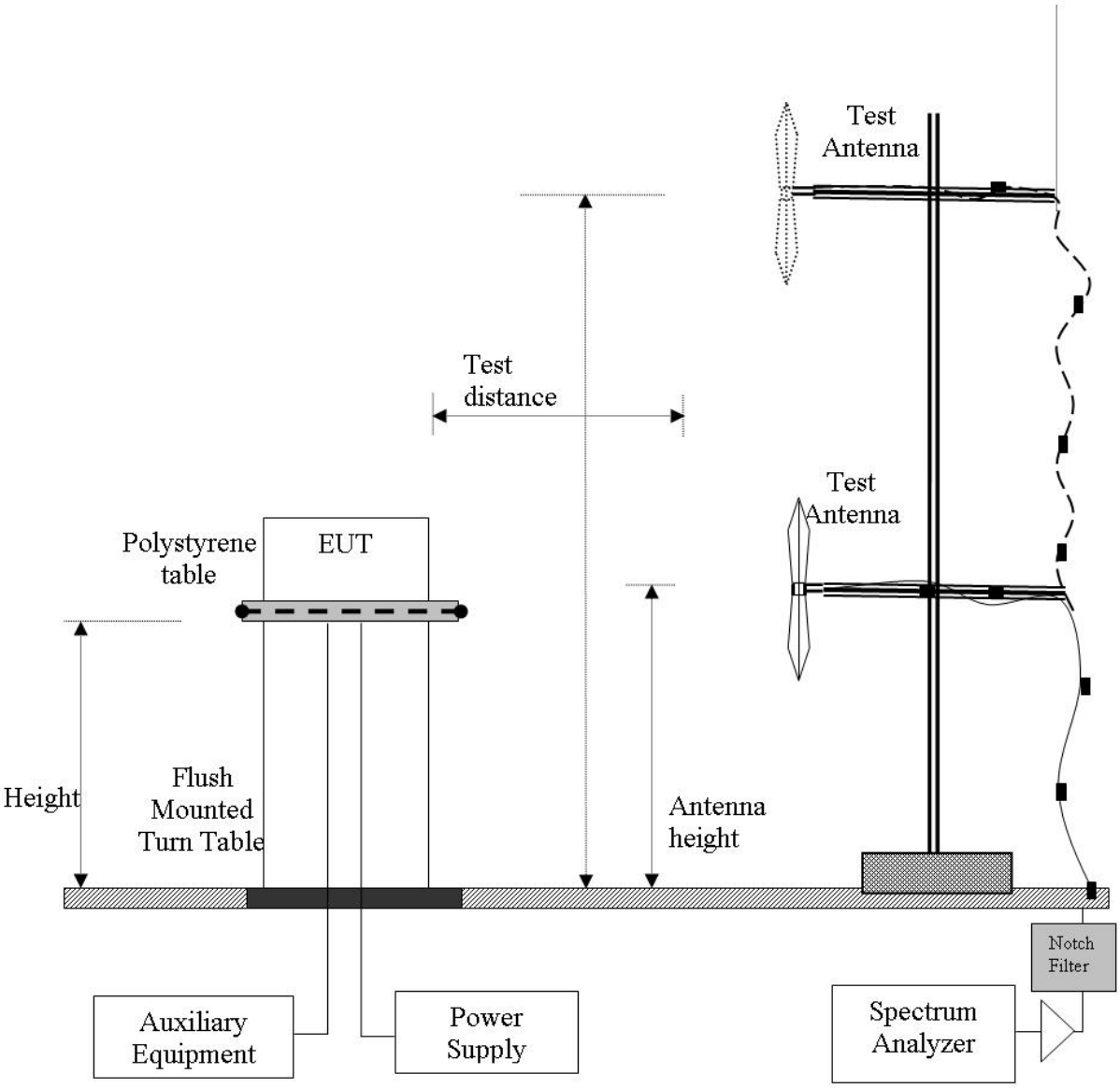
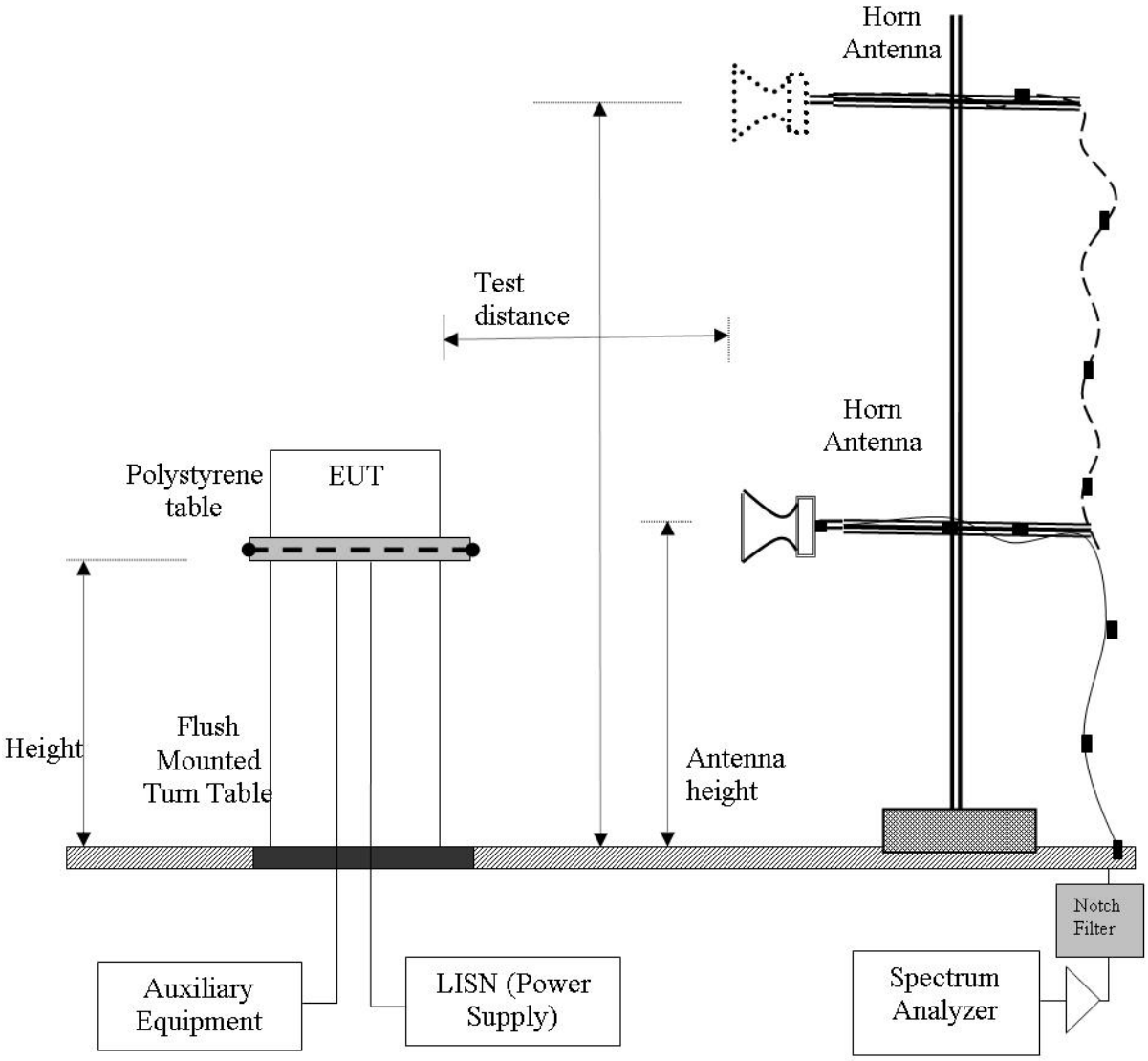
Test Measurement Setup



Measurement setup for Radiated Emission Test < 1 GHz



Measurement setup for Radiated Emission Test > 1 GHz

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR – FO

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
FO = Distance Falloff Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss
AG = Amplifier Gain
NFL = Notch Filter Loss or Waveguide Loss

Field Strength Calculation Example:

Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Specification

Radiated Spurious Emissions – Digital Apparatus

FCC, Part 15 Subpart B §15.109
A representative type or model of each digital apparatus shall be tested in accordance with the measurement methods described in FCC Part 15; Subpart A - General and FCC Subpart B – Unintentional Radiators.

Industry Canada ICES-003
A representative type or model of each digital apparatus shall be tested in accordance with the measurement method described in the publication referred to in Section 7.1 [Canadian Standards Association Standard CAN/CSA-CEI/IEC CISPR 22:02, "Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment."].

FCC, Part 15 Subpart B §15.109 Spurious Emissions Limits

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values.

Frequency (MHz)	Field Strength (µV/m) @ 3m	Measurement Distance (meters)	Field Strength (dBµV/m) @ 3m
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

Field Strength of radiated emissions for a Class A digital device are as follows.

Frequency (MHz)	Field Strength (µV/m) @ 10m	Measurement Distance (meters)	Field Strength (dBµV/m) @ 3m
30-88	90	3	49.5
88-216	150	3	54.0
216-960	210	3	57.0
Above 960	300	3	60.0

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ICES-003 §5 Spurious Emissions Limits

Class A Digital Device: The field intensity of radio noise emissions that are radiated from a Class A digital apparatus shall not exceed the limits specified in Table 5 of the publication referred to in Section 7.1, within the indicated frequency range.

Frequency range (MHz)	Quasi-peak limits dB(µV/m) @ 10m	Quasi-peak limits dB(µV/m) @ 3m
30 to 230	40	50.5
230 to 1000	47	57.5
Note 1	The lower limit shall apply at the transition frequency	
Note 2	Additional provisions may be required for cases where interference occurs	

Class B Digital Device: The field intensity of radio noise emissions that are radiated from a Class B digital apparatus shall not exceed the limits specified in Table 6 of the publication referred to in Section 7.1, within the indicated frequency range.

Frequency range (MHz)	Quasi-peak limits dB(µV/m) @ 10m	Quasi-peak limits dB(µV/m) @ 3m
30 to 230	30	40.5
230 to 1000	37	47.5
Note 1	The lower limit shall apply at the transition frequency.	
Note 2	Additional provisions may be required for cases where interference occurs	

Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement Uncertainty	+5.6/ -4.5 dB

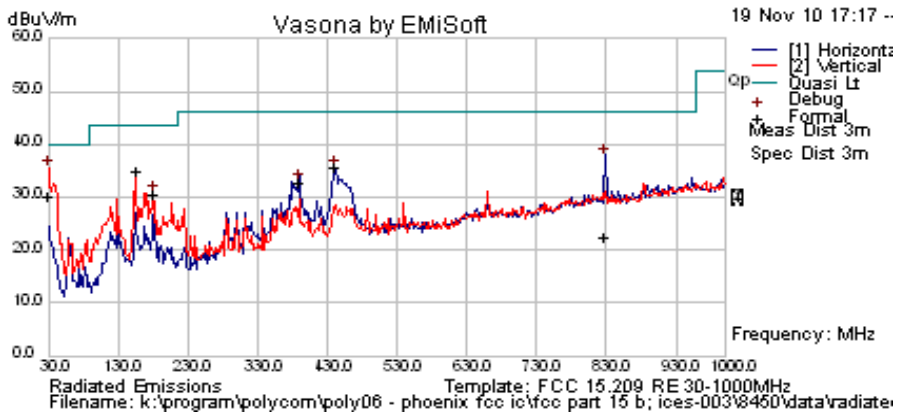
Traceability

Method	Test Equipment Used
Work instruction WI-03	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

7.1.1 Stand Alone Charger - Measurement Results for Radiated Spurious Emissions – Digital Apparatus

EUT emissions were investigated with the EUT arranged in X, Y, and Z axis. The highest emissions orientation was chosen for the final test. Only final data is presented in this test report.

Test Freq.	N/A	**Engineer**	EVF
Variant	Digital Emissions	**Temp (ºC)**	22.5
Freq. Range	30 MHz - 1000 MHz	**Rel. Hum. (%)**	34
Power Setting	Charger: 120VAC/ 60Hz	**Press. (mBars)**	99.7
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC1010320232) , headset connected, also connected to charger (Model: SA106B-05)		
Test Notes 2	Preliminary testing performed. EUT tested in horizontal position/ Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=1, DK=1		

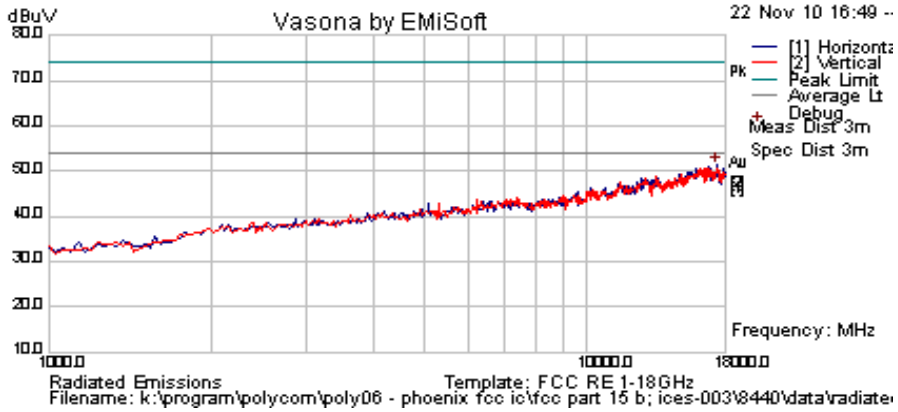


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
30.297	36.0	3.4	-9.4	30.0	Quasi Max	V	151	90	40	-10.0	Pass	DIG
155.996	48.7	4.5	-18.4	34.9	Quasi Max	V	98	87	43.5	-8.7	Pass	DIG
829.047	23.3	7.2	-7.9	22.6	Quasi Max	H	332	173	46	-23.4	Pass	DIG
179.994	45.6	4.7	-19.7	30.5	Peak [Scan]	V	98	360	43.5	-13.0	Pass	DIG
389.992	42.1	5.6	-14.9	32.8	Peak [Scan]	H	98	360	46	-13.2	Pass	DIG
441.988	43.5	5.8	-13.8	35.5	Peak [Scan]	H	98	360	46	-10.5	Pass	DIG

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

Test Freq.	N/A	**Engineer**	EVF
Variant	Digital Emissions	**Temp (ºC)**	21.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum. (%)**	34
Power Setting	Charger: 120VAC/ 60Hz	**Press. (mBars)**	1007
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (S/N: AC10103200B7) , headset connected, also connected to charger (Model: SA106B-05)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=1, DK=1		



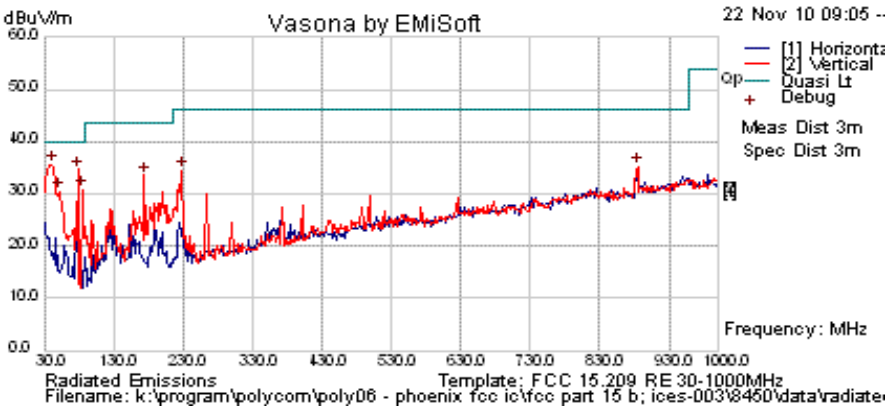
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No emissions above 1GHz.												

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

7.1.2 Charging Dock - Measurement Results for Radiated Spurious Emissions – Digital Apparatus

Test Freq.	N/A	**Engineer**	EVF
Variant	Digital Emissions	**Temp (ºC)**	21.5
Freq. Range	30 MHz - 1000 MHz	**Rel. Hum. (%)**	33
Power Setting	Dock: 120VAC/ 60Hz	**Press. (mBars)**	1009
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC10103200B7), headset connected, charging in dock with additional battery charging (SN: AD101032019C), AC-DC Adapter (Model: HK-U-120A050-CP)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=1, DK=1		

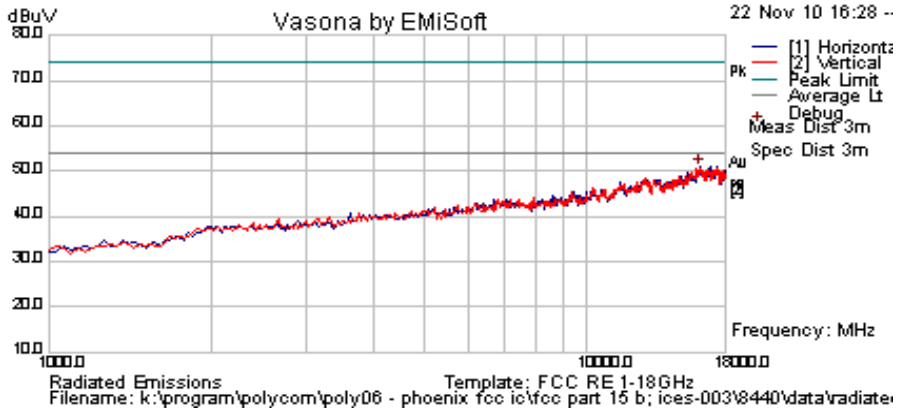


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
85.898	36.7	4.0	-23.7	17.0	Quasi Max	V	98	142	40	-23.0	Pass	DIG
53.539	46.8	3.8	-23.6	26.9	Quasi Max	V	102	33	40	-13.1	Pass	DIG
174.174	33.7	4.6	-19.4	18.9	Quasi Max	V	126	338	43.5	-24.6	Pass	DIG
883.643	29.8	7.3	-7.3	29.8	Quasi Max	V	400	360	46	-16.2	Pass	DIG
41.026	45.7	3.6	-17.7	31.6	Quasi Max	V	107	360	40	-8.4	Pass	DIG
77.995	42.3	4.0	-23.0	23.2	Quasi Max	V	154	244	40	-16.8	Pass	DIG

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

Test Freq.	N/A	**Engineer**	EVF
Variant	Digital Emissions	**Temp (ºC)**	21.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum. (%)**	34
Power Setting	Dock: 120VAC/ 60Hz	**Press. (mBars)**	1007
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC101032008E), headset connected, charging in dock with additional battery charging (SN: AD101032019C), AC-DC Adapter (Model: HK-U-120A050-CP)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=1, DK=1		



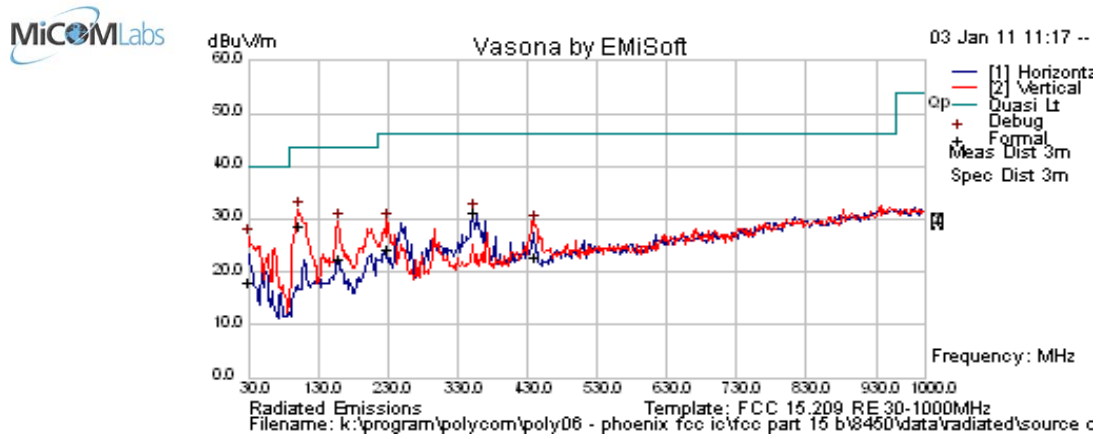
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No emissions above 1GHz.												

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

7.1.3 Speaker Dock - Measurement Results for Radiated Spurious Emissions – Digital Apparatus

Test Freq.	N/A	**Engineer**	EVF
Variant	Digital Emissions	**Temp (ºC)**	19.5
Freq. Range	30 MHz - 1000 MHz	**Rel. Hum. (%)**	37
Power Setting	Speaker Dock: 120VAC/ 60Hz	**Press. (mBars)**	1005
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC101032008E), headset connected, charging in dock with additional battery charging (SN: AD101032019C), AC-DC Adapter (Model: HK-AX-120A200-CP)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=0, DK=1		

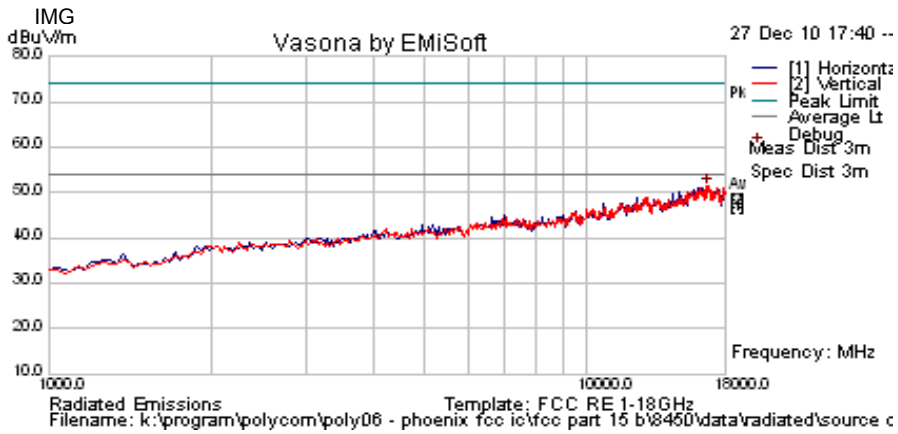


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
101.571	45.0	4.2	-20.6	28.6	Quasi Max	V	101	0	43.5	-14.9	Pass	DIG
31.311	25.1	3.4	-10.4	18.1	Quasi Max	V	276	183	40	-22.0	Pass	DIG
159.259	36.3	4.5	-18.4	22.4	Quasi Max	V	99	89	43.5	-21.1	Pass	DIG
351.992	41.1	5.5	-15.4	31.2	Quasi Max	H	159	10	46	-14.8	Pass	DIG
230.040	38.2	4.9	-18.9	24.2	Quasi Max	V	98	81	46	-21.8	Pass	DIG
441.827	30.7	5.8	-13.8	22.7	Quasi Max	V	136	208	46	-23.3	Pass	DIG

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

Test Freq.	N/A	**Engineer**	EVF
Variant	Digital Emissions	**Temp (ºC)**	19.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum. (%)**	41
Power Setting	Speaker Dock: 120VAC/ 60Hz	**Press. (mBars)**	1011
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC101032008E), headset connected, charging in dock with additional battery charging (SN: AD101032019C), AC-DC Adapter (Model: HK-AX-120A200-CP)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=0, DK=1		



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
No emissions above 1 GHz.												

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

7.2 Conducted Disturbance at Mains Terminal (150 kHz – 30 MHz)

Standard Reference

FCC, Part 15 Subpart C §15.107
Industry Canada ICES-003 §5.3

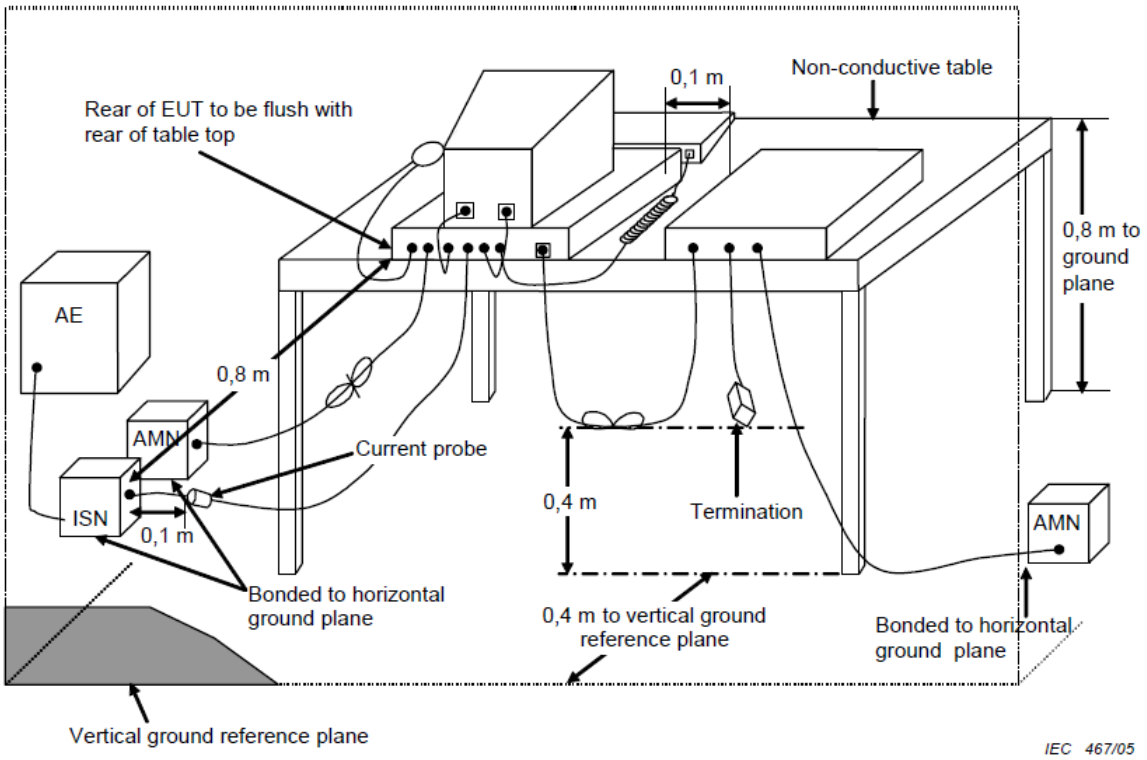
Test Procedure

The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

Test Measurement Setup



Measurement setup for Conducted Disturbance at Mains Terminals

Specification

Conducted Disturbance at Mains Terminal – Digital Apparatus

FCC, Part 15 Subpart B §15.107
(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

(b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Industry Canada ICES-003
The voltage of radio noise emissions that are conducted along the power supply lines of a Class A digital apparatus shall not exceed the limits specified in Table 1 of the publication referred to in Section 7.1 [Canadian Standards Association Standard CAN/CSA-CEI/IEC CISPR 22:02, "Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment."], within the indicated frequency range.

The voltage of radio noise emissions that are conducted along the power supply lines of a Class B digital apparatus shall not exceed the limits specified in Table 2 of the publication referred to in Section 7.1 [Canadian Standards Association Standard CAN/CSA-CEI/IEC CISPR 22:02, "Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment."], within the indicated frequency range.

FCC, Part 15 Subpart B §15.107 & Industry Canada ICES-003 Limits

Limits for conducted disturbance at the mains ports of class B ITE

Frequency of emission (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50
Note 1	* Decreases with the logarithm of the frequency	
Note 2	* The lower limit applies at the boundary between frequency ranges	

Limits for conducted disturbance at the mains ports of class A ITE

Frequency of emission (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15–0.5	79	66
0.5–30	73	60
Note 1	* The lower limit shall apply at the transition frequency	

Laboratory Measurement Uncertainty for Conducted Emissions

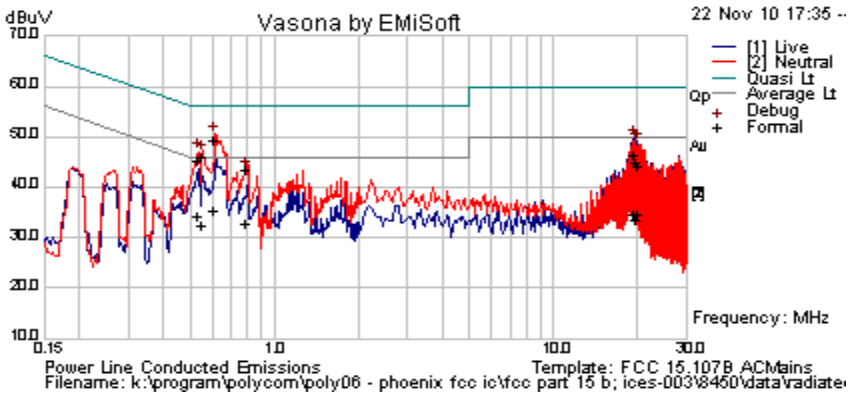
Measurement uncertainty	±2.64 dB

Traceability

Method	Test Equipment Used
Work instruction WI-EMC-01	0158, 0184, 0193, 0190, 0293, 0307

7.2.1 Stand Alone Charger - Conducted Disturbance at Mains Terminal

Test Freq.	N/A	**Engineer**	EVF
Variant	AC Line Emissions	**Temp (ºC)**	21.5
Freq. Range	0.150 MHz - 30 MHz	**Rel. Hum. (%)**	34
Power Setting	Charger: 120VAC/60Hz	**Press. (mBars)**	1007
Antenna	Intergal		
Test Notes 1	Handset (Model: 8450) with discharged battery (S/N: AC10103200B7) , headset connected, also connected to charger (Model: SA106B-05)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=1, DK=1		



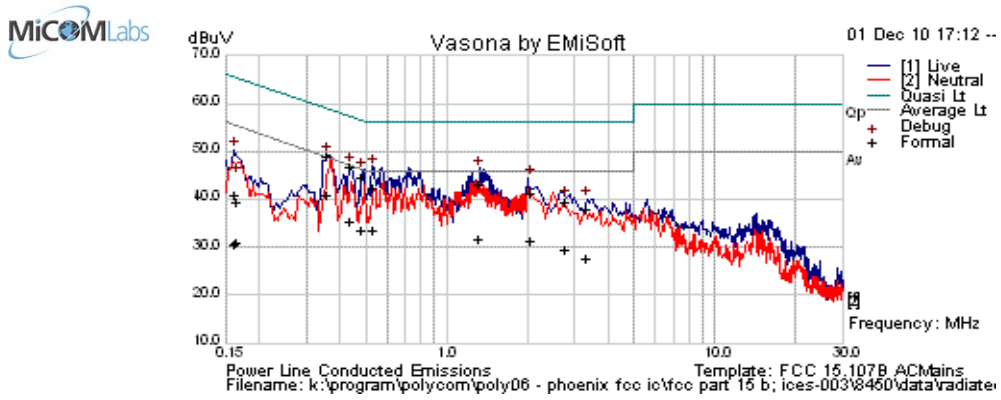
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.535	35.2	9.9	0.1	45.2	Quasi Peak	Neutral	56	-10.8	Pass	
0.535	24.4	9.9	0.1	34.5	Average	Neutral	46	-11.5	Pass	
0.553	36.1	9.9	0.1	46.1	Quasi Peak	Neutral	56	-9.9	Pass	
0.553	22.3	9.9	0.1	32.3	Average	Neutral	46	-13.7	Pass	
0.615	25.3	10.0	0.1	35.3	Average	Neutral	46	-10.7	Pass	
0.615	39.3	10.0	0.1	49.3	Quasi Peak	Neutral	56	-6.7	Pass	
0.800	33.5	10.0	0.1	43.5	Quasi Peak	Neutral	56	-12.5	Pass	
0.800	22.7	10.0	0.1	32.7	Average	Neutral	46	-13.3	Pass	
19.462	35.1	10.5	0.7	46.3	Quasi Peak	Live	60	-13.7	Pass	
19.462	23.4	10.5	0.7	34.6	Average	Live	50	-15.4	Pass	
19.727	33.5	10.5	0.7	44.8	Quasi Peak	Neutral	60	-15.2	Pass	
19.727	22.3	10.5	0.7	33.6	Average	Neutral	50	-16.4	Pass	
20.070	32.9	10.5	0.7	44.2	Quasi Peak	Live	60	-15.8	Pass	
20.070	23.3	10.5	0.7	34.5	Average	Live	50	-15.5	Pass	

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

7.2.2 Charging Dock - Conducted Disturbance at Mains Terminal

Test Freq.	N/A	**Engineer**	EVF
Variant	AC Line Emissions	**Temp (ºC)**	21
Freq. Range	0.150 MHz - 30 MHz	**Rel. Hum. (%)**	35
Power Setting	Dock: 120VAC/60Hz	**Press. (mBars)**	1006
Antenna	Intergal		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC10103200B7), headset connected, charging in dock with additional battery charging (SN: AD101032019C), AC-DC Adapter (Model: HK-U-120A050-CP)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=1, DK=1		



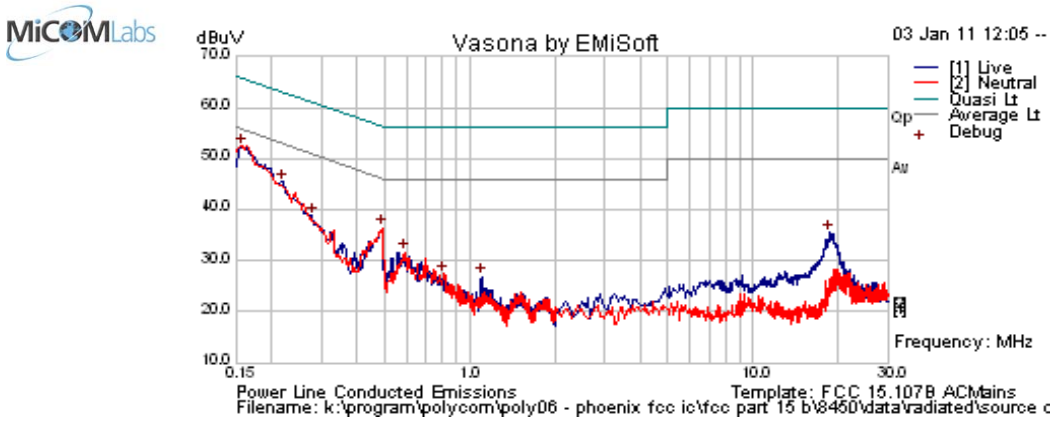
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.362	31.1	9.9	0.1	41	Average	Live	48.7	-7.7	Pass	
0.362	38.9	9.9	0.1	48.9	Quasi Peak	Live	58.7	-9.8	Pass	
0.44	25.4	9.9	0.1	35.4	Average	Live	47.1	-11.7	Pass	
0.44	36.8	9.9	0.1	46.8	Quasi Peak	Live	57.1	-10.3	Pass	
0.486	23.6	9.9	0.1	33.6	Average	Live	46.2	-12.6	Pass	
0.486	34.7	9.9	0.1	44.7	Quasi Peak	Live	56.2	-11.6	Pass	
0.537	23.6	9.9	0.1	33.6	Average	Live	46	-12.4	Pass	
0.537	32.4	9.9	0.1	42.4	Quasi Peak	Live	56	-13.6	Pass	
1.336	21.6	10	0.1	31.7	Average	Live	46	-14.3	Pass	
1.336	33	10	0.1	43.1	Quasi Peak	Live	56	-12.9	Pass	
2.071	21.2	10.1	0.1	31.4	Average	Live	46	-14.6	Pass	
2.071	31	10.1	0.1	41.2	Quasi Peak	Live	56	-14.8	Pass	
2.788	19.1	10.1	0.1	29.4	Average	Live	46	-16.6	Pass	
2.788	29.1	10.1	0.1	39.4	Quasi Peak	Live	56	-16.6	Pass	
3.337	17.5	10.1	0.2	27.8	Average	Live	46	-18.2	Pass	
3.337	27.7	10.1	0.2	38	Quasi Peak	Live	56	-18	Pass	

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

7.2.3 Speaker Dock - Conducted Disturbance at Mains Terminal

Test Freq.	N/A	**Engineer**	EVF
Variant	AC Line Emissions	**Temp (ºC)**	19.5
Freq. Range	0.150 MHz - 30 MHz	**Rel. Hum.(%)**	36
Power Setting	Speaker Dock: 120VAC/ 60Hz	**Press. (mBars)**	1005
Antenna	Integral		
Test Notes 1	Handset (Model: 8450) with discharged battery (SN: AC101032008E), headset connected, charging in speaker dock with additional battery charging (SN: AD101032019C), AC-DC Adapter (Model: HK-AX-120A200-CP)		
Test Notes 2	Mode: BT Channel 39 Receive; WLAN Channel 06 Receive; WLAN=1, BT=1, BC=0, DK=1		



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.158	22.3	9.9	0.1	32.3	Average	Neutral	55.57	-23.3	Pass	
0.158	40.8	9.9	0.1	50.8	Quasi Peak	Neutral	65.57	-14.8	Pass	
0.217	13.1	9.9	0.1	23.1	Average	Neutral	52.93	-29.8	Pass	
0.217	32.5	9.9	0.1	42.5	Quasi Peak	Neutral	62.93	-20.5	Pass	
0.280	14.1	9.9	0.1	24.0	Average	Live	50.82	-26.8	Pass	
0.280	24.1	9.9	0.1	34.1	Quasi Peak	Live	60.82	-26.7	Pass	
0.494	11.7	9.9	0.1	21.7	Average	Neutral	46.1	-24.4	Pass	
0.494	24.1	9.9	0.1	34.1	Quasi Peak	Neutral	56.1	-22.0	Pass	
0.590	4.8	9.9	0.1	14.8	Average	Neutral	46	-31.2	Pass	
0.590	14.6	9.9	0.1	24.6	Quasi Peak	Neutral	56	-31.4	Pass	
0.821	6.9	9.9	0.1	16.9	Average	Neutral	46	-29.1	Pass	
0.821	12.8	9.9	0.1	22.9	Quasi Peak	Neutral	56	-33.2	Pass	
18.777	15.3	10.5	0.7	26.6	Average	Live	50	-23.5	Pass	
18.777	20.5	10.5	0.7	31.7	Quasi Peak	Live	60	-28.3	Pass	

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

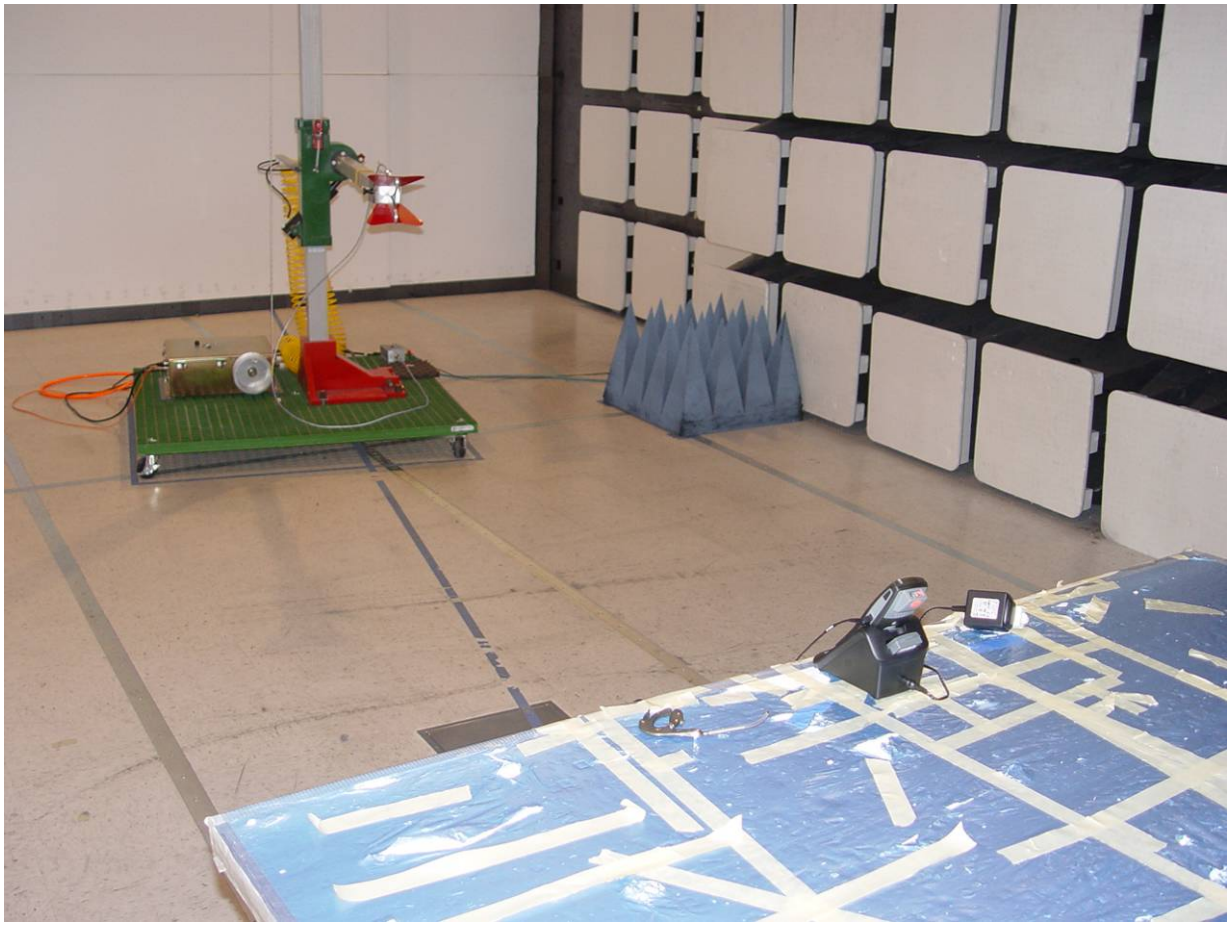
8 Photographs

8.1 Radiated Emission below 1 GHz with Stand Alone Charger

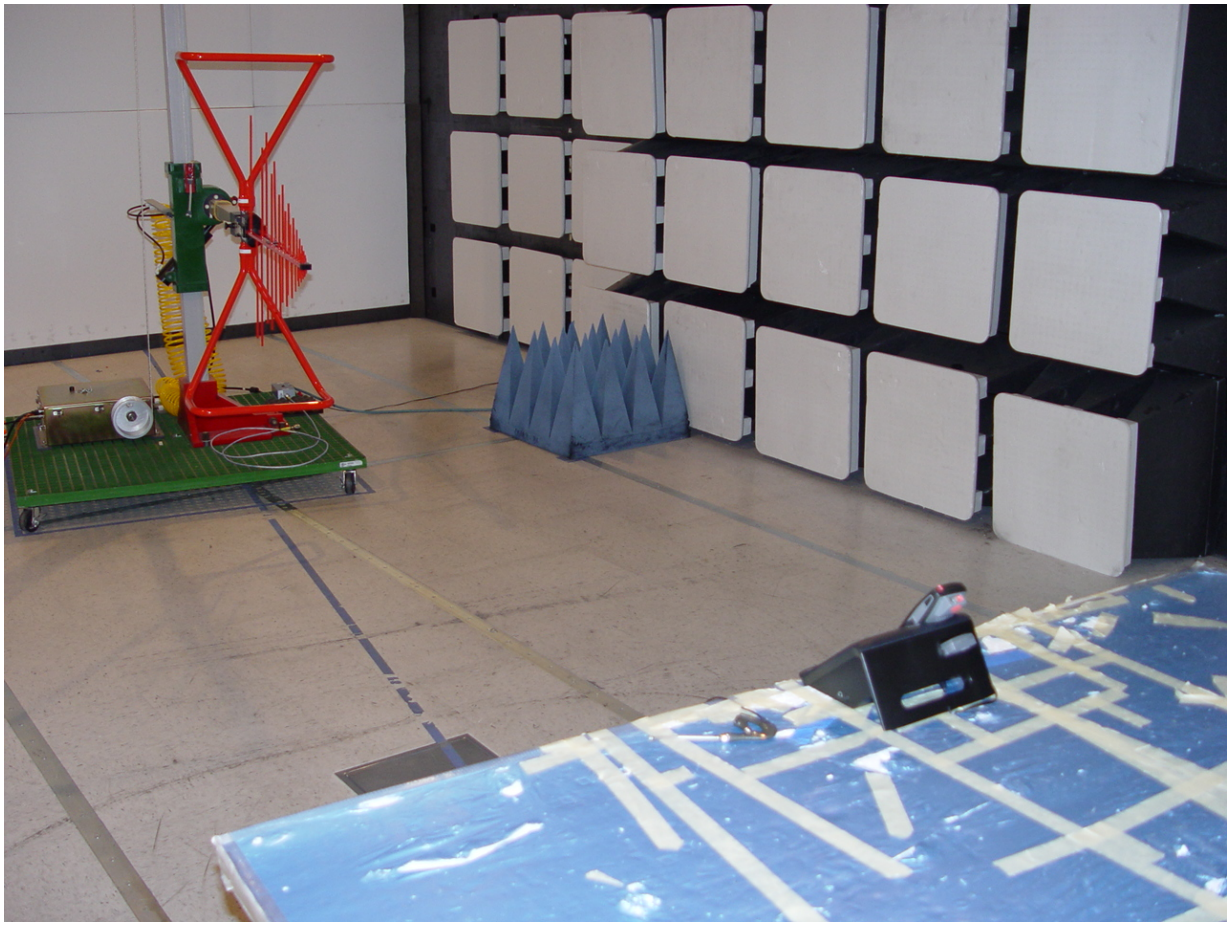
8.2 Radiated Emissions above 1 GHz with Stand Alone Charger

8.3 Radiated Emission below 1 GHz with Charging Dock

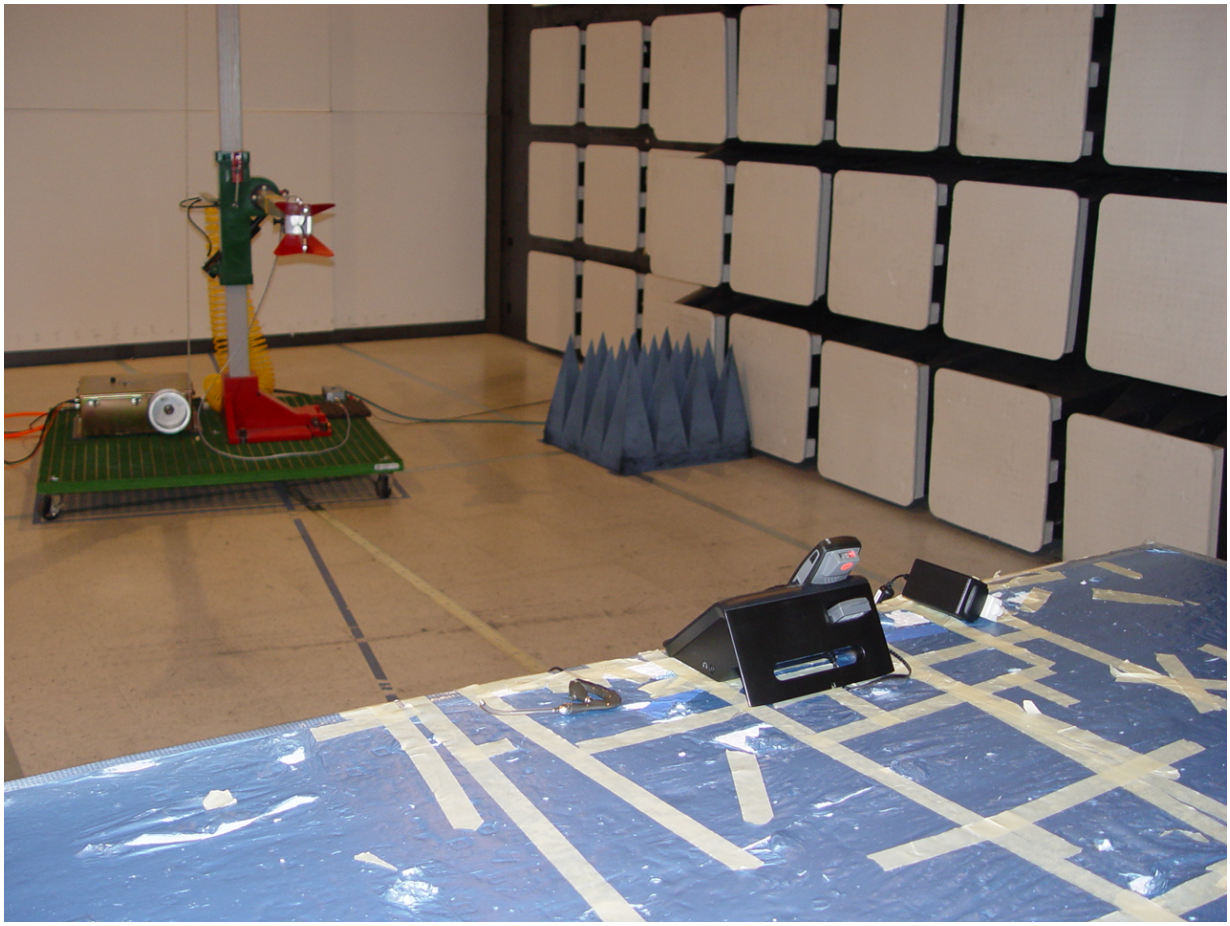
8.4 Radiated Emissions above 1 GHz with Charging Dock



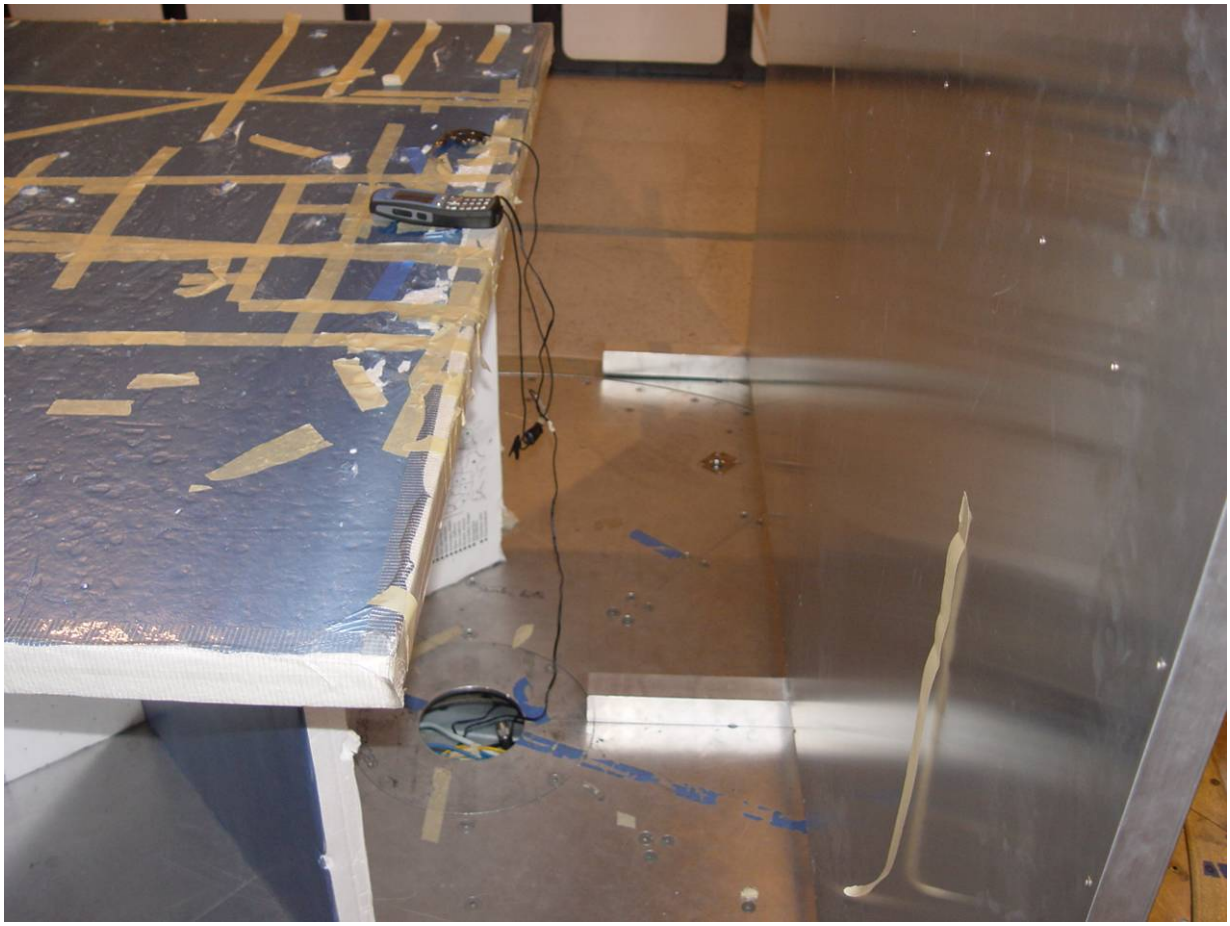
8.5 Radiated Emission below 1 GHz with Speaker Dock



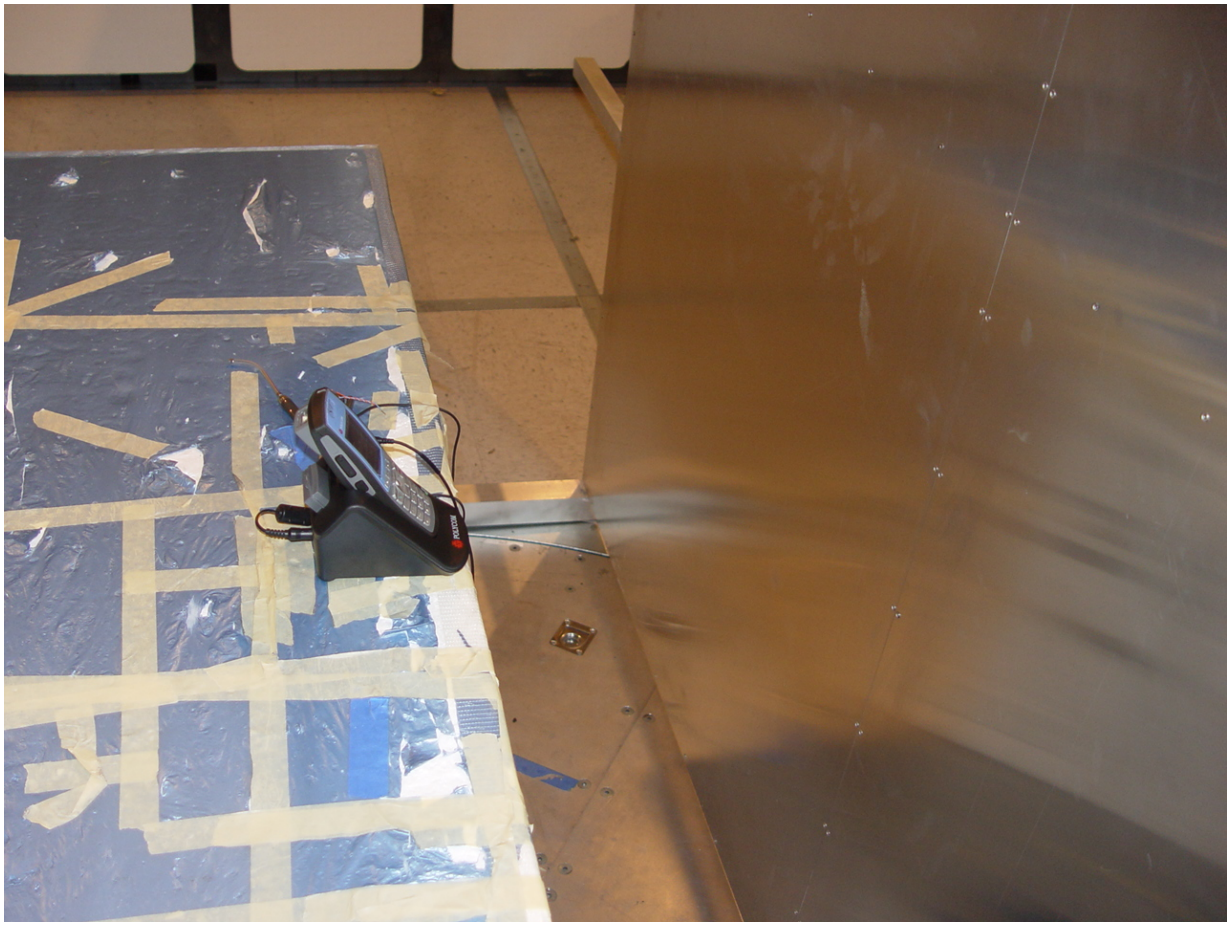
8.6 Radiated Emission above 1 GHz with Speaker Dock



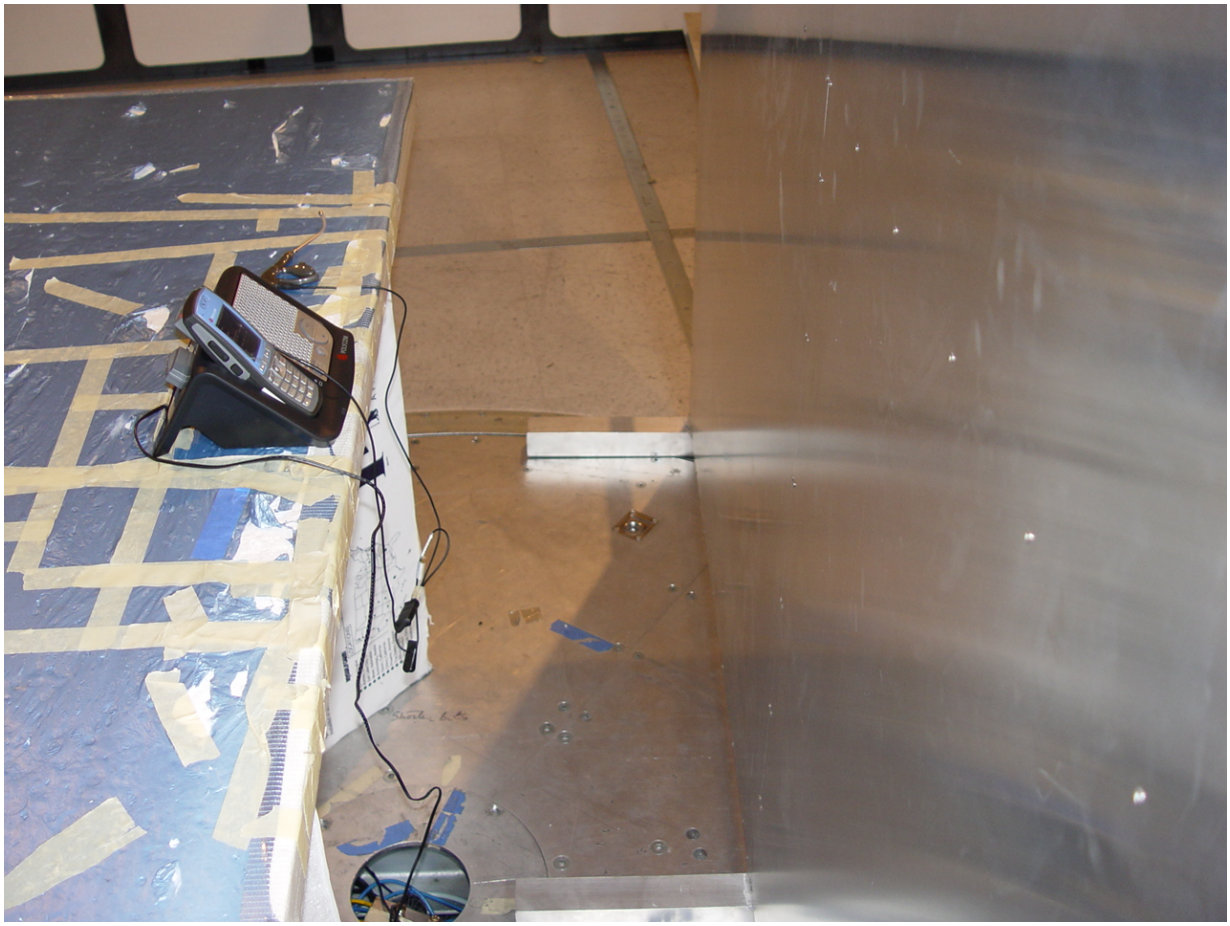
8.7 AC Mains Conducted Emissions with Stand Alone Charger



8.8 AC Mains Conducted Emissions with Charging Dock



8.9 AC Mains Conducted Emissions with Speaker Dock



9 TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #
0134	Amplifier	Com Power	PA 122	181910
0158	Barometer /Thermometer	Control Co.	4196	E2846
0287	EMI Receiver	Rhode & Schwartz	ESIB 40	100201
0193	EMI Receiver	Rhode & Schwartz	ESIB 7	838496/007
0252	SMA Cable	Megaphase	Sucoflex 104	None
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001
0313	Coupler	Hewlett Packard	86205A	3140A01285
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623
0070	Power Meter	Hewlett Packard	437B	3125U11552
0116	Power Sensor	Hewlett Packard	8485A	3318A19694
0117	Power Sensor	Hewlett Packard	8487D	3318A00371
0184	Pulse Limiter	Rhode & Schwartz	ESH3Z2	357.8810.52
0190	LISN	Rhode & Schwartz	ESH3Z5	836679/006
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001
0301	5.6 GHz Notch Filter	Micro-Tronics	RBC50704	001
0302	5.25 GHz Notch Filter	Micro-Tronics	BRC50703	002
0303	5.8 GHz Notch Filter	Micro-Tronics	BRC50705	003
0304	2.4GHzHz Notch Filter	Micro-Tronics	--	001
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002
0335	1-18GHz Horn Antenna	ETS- Lindgren	3117	00066580
0337	Amplifier	MiCOM Labs	--	--
0338	Antenna	Sunol Sciences	JB-3	A052907

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