Test of XBRG-1100-A
This covers the following Product Series:

XBRG-1100
To: FCC 47 CFR Part 15B & Co-Location

Test Report Serial No.: TRIL04-U13 Rev B

TEST REPORT

FROM

Test of XBRG-1100-A
This covers the following Product Series:
XBRG-1100

To FCC 47 CFR Part 15B & Co-Location

Test Report Serial No.: TRIL04-U13 Rev B

This report supersedes TRIL04-U13 Rev A

Applicant: Trilliant Networks, Inc
1100 Island Drive
Redwood City
CA 94065

Product Function: SecureMesh™ Wireless WAN 5 GHz Mesh Backhaul and 2.4 GHz NAN Collector

Copy No: pdf Issue Date: 12th June 2012

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
440 Boulder Court, Suite 200
Pleasanton, CA 94566 USA
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ACCREDITED
TEST CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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ACCREDITATION, LISTINGS & RECOGNITION

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

ilac-MRA

A2LA World Class Accreditation

The American Association for Laboratory 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 27th day of March 2012.

President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2013

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

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-2
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	210
	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

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

USA Telecommunication Certification Body (TCB) - TCB Identifier – US0159

Industry Canada Certification Body - CAB Identifier – US0159

European Notified Body - Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB) - RCB Identifier - 210

DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft		
Rev A	7th June 2012	Initial release.
Rev B	12th June 2012	Correction of typos.

1. TEST RESULT CERTIFICATE

Applicant:	Trilliant Networks, Inc 1100 Island Drive Redwood City CA 94065	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	SecureMesh™ Extender Bridge	Tel:	+1 925 462 0304
Model:	XBRG-1100-A The results of testing reported in this report cover the following Product Series: XBRG-1100	Fax:	+1 925 462 0306
S/N:	FL10001475		
Test Date(s):	21st March 2012	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15B & Co-Location	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.

ACCREDITED
TESTING CERTIFICATE #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
i.	FCC 47 CFR Part 15B	2010	Code of Federal Regulations
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+A 1:2007	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	March 2012	Reference to A2LA Accreditation Status – A2LA Advertising Policy

2.2. 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.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the XBRG-1100-A in the frequency ranges 5,150 to 5,250 MHz, 5250 – 5350 MHz, 5470 – 5725 MHz, 5725 – 5850 MHz and 2400 – 2483.5 MHz to FCC Part 15B and Co-Location regulations.
Applicant:	Trilliant Networks, Inc 1100 Island Drive Redwood City CA 94065
Manufacturer:	Extron Logistics Inc
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	TRIL04-U13 Rev B
Date EUT received:	8th March 2012
Standard(s) applied:	FCC 47 CFR Part 15.247;15.407
Dates of test (from - to):	21st March 2012
No of Units Tested:	One
Type of Equipment:	802.11a Wireless WAN Mesh Node and 802.15.4 Wireless NAN Collector Node.
Product Name:	SecureMesh™ Extender Bridge
Models:	XBRG-1100-A EM0069 NAN Radio Module
Hardware Release	Rev 6
Software Release	2.1
Type of Modulation:	Per 802.11 –CCK, BPSK, QPSK, DSSS, OFDM
Declared Nominal Average Output Power:	802.11a Leg: 5150-5250 MHz: +5.76 dBm 5250-5350 MHz: +11.6 dBm 5470-5725 MHz: +12.8 dBm 5725-5850 MHz: +30.0 dBm 802.15.4 DSSS: 2400-2483.5 MHz: +30.0 dBm
EUT Modes of Operation:	Legacy 802.11a and 802.15.4 DSSS
Transmit/Receive Operation:	Half Duplex
Rated Input Voltage and Current:	POE Adaptor Rated: 100 – 240V Current: 1Amp max, Output 24V 2Amps.
Operating Temperature Range:	Declared range -40° to +70ºC
Equipment Dimensions:	Base Diameter 12”, Height 25”
Weight:	15 lbs
Primary function of equipment:	Wireless WAN Mesh Backhaul
Secondary function of equipment:	Wireless NAN Collector

3.2. Scope of Test Program

The purpose of this test report is to show compliance of the Trilliant Networks Inc XBRG-1100-A Wireless WAN Mesh Node and EM0069 NAN Radio Module with FCC emissions and Radio collocation requirements when operating simultaneously in the 5.0 GHz and 2.4 GHz bands.

EUT

Trilliant Networks Inc. supplied a SecureMesh™ Wireless WAN XBRG-1100-A device that contains an 802.11a mesh backhaul radio as being representative of operation in the 5 GHz bands for all of the XBRG-1100 Series products and an EM0069 NAN radio module that operates in the 2.4 GHz band.

The XBRG-1100-A was tested with an EM0069 2.4 GHz NAN Radio Module.

Trilliant Networks Inc

SecureMesh™ Extender Bridge

The customer supplied the following information about the products that are represented by the radio product.

There are no hardware differences between the 802.11a 5 GHz mesh radios. Differences between models are country specific, regulatory settings that are incorporated in the software.

Summary Table of Model Numbers
Extender Bridges
XBRG-1100-A XBRG-1100-N XBRG-1100-E XBRG-1100-XX (where X is 0 to 9, A to Z or blank)

Explanation of Model Numbers

Product Name: SecureMesh™ Wireless WAN Extender Bridge Series
Model Numbers: XBRG-1100 Series
The SecureMesh™ Wireless WAN Extender Bridge Series consists of the following models:
XBRG-1100-A, XBRG-1100-N, XBRG-1100-E; XBRG-1100-XX
(where X is 0 to 9, A to Z or blank)

3.3. Equipment Model(s) and Serial Number(s)

The following is a description of supporting equipment used with the EUT, see diagram below for the test set-up.

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Unique ID or Serial No.
EUT	SecureMesh™ Extender Bridge	Trilliant Networks Inc	XBRG-1100-A	FL07120012
EUT	2.4 GHz NAN Radio Module	Trilliant Networks Inc	EM0069	GEN3
Support	Laptop Computer	Dell		

3.4. Equipment Modifications

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

1. None.

3.5. Cabling and I/O Ports

1. Number and type of I/O ports
2. RJ45 10/100 Ethernet (x1)
3. RJ45 Serial Port (Console)

3.6. Deviations from the Test Standard

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

1. NONE

4. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.247 and 15.407.**

Standard Section(s)	Test Description	Condition	Result
15.205, 15.209	Radiated (Digital) Emissions	Radiated	Compliant
15.205, 15.209	Transmitter Radiated Spurious Emissions;	Radiated	Compliant

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

5. TEST RESULTS

Radiated Spurious Emissions – Digital Apparatus

Standard Reference

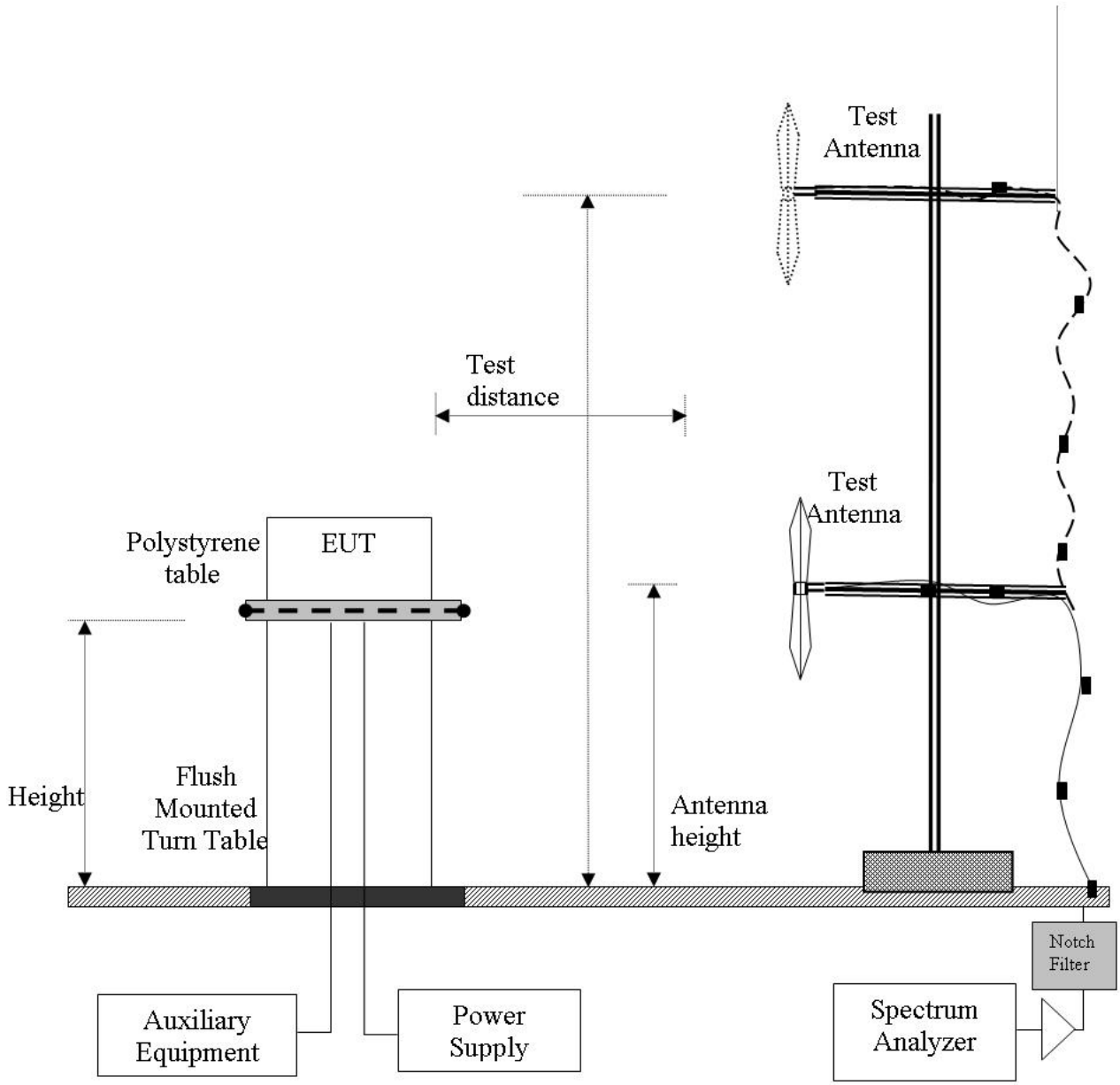
FCC, Part 15 Subpart B §15.109

Test Procedure

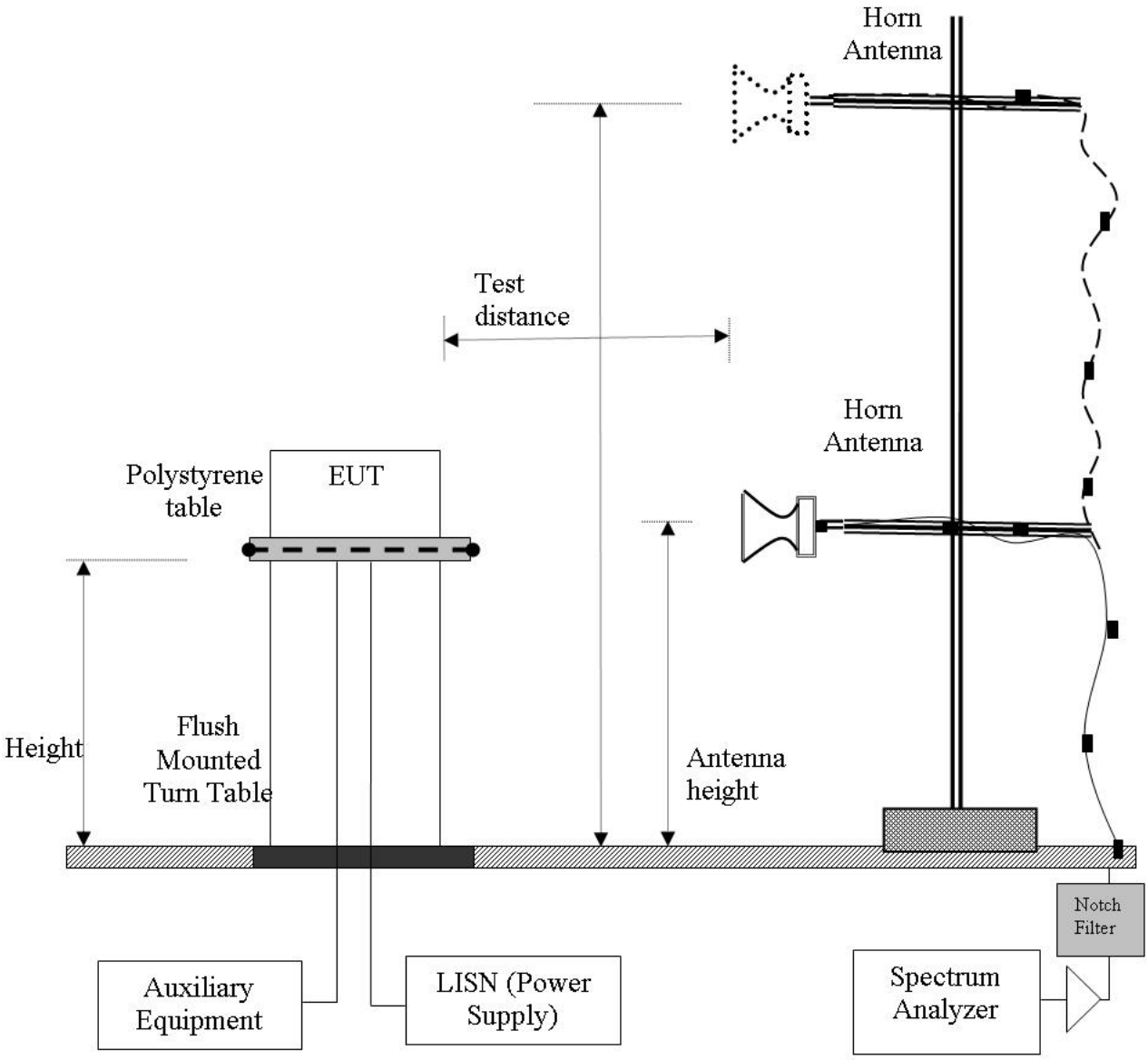
Testing was performed in a 3-meter semi-anechoic chamber. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. Preliminary emissions were recorded with in Spectrum Analyzer mode, using a maximum peak detector while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

Test Measurement Set up



Measurement set up for Radiated Emission Test < 1 GHz



Measurement set up 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

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
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.

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 @ 3m (µV/m)	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 @ 10m (µV/m)	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

Laboratory Measurement Uncertainty for Spectrum Measurement

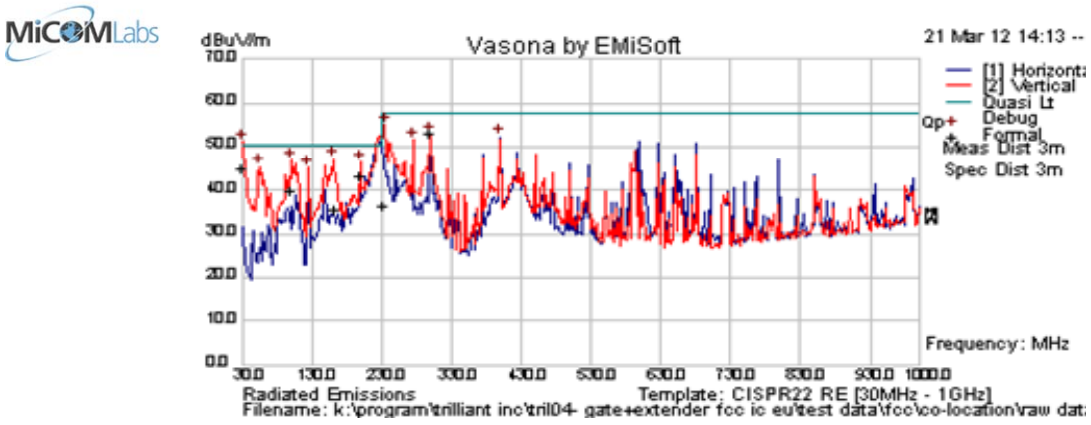
Measurement Uncertainty	+5.6/ -4.5 dB

Traceability

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

Measurement Results for Radiated Spurious Emissions – Digital Apparatus

Test Freq.	2440 MHz;5785MHz	**Engineer**	SB
Variant	Digital Emissions	**Temp (ºC)**	20.5
Freq. Range	30 MHz - 1000 MHz	**Rel. Hum.(%)**	36
Power Setting	2.4GHz=15; 5.8GHz=17(4W)	**Press. (mBars)**	1006
Antenna	2.4:7.5dBi dipole;5GHz:17dBi directional		
Test Notes 1	XBRG-1100 (5GHz Radio) & TMB-EM0069 NAN Radio (2.4GHz Radio);		
Test Notes 2	Firmware:SMGate2012-02-07dfstest21;Software:2.1		
Test Notes 3	110VAC; 60Hz		



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
299.994	65.3	5.1	-17.2	53.2	Quasi Max	V	159	159	57.5	-4.3	Pass	
30.595	51.8	3.5	-10.3	45.0	Quasi Max	V	98	98	50.5	-5.5	Pass	
199.992	57.2	4.6	-18.2	43.5	Quasi Max	V	246	246	50.5	-7.0	Pass	
99.980	56.9	4.1	-21.3	39.7	Quasi Max	V	114	114	50.5	-10.8	Pass	
162.365	50.1	4.4	-18.8	35.7	Quasi Max	V	205	205	50.5	-14.8	Pass	
231.952	51.0	4.8	-19.3	36.6	Quasi Max	V	187	187	57.5	-20.9	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

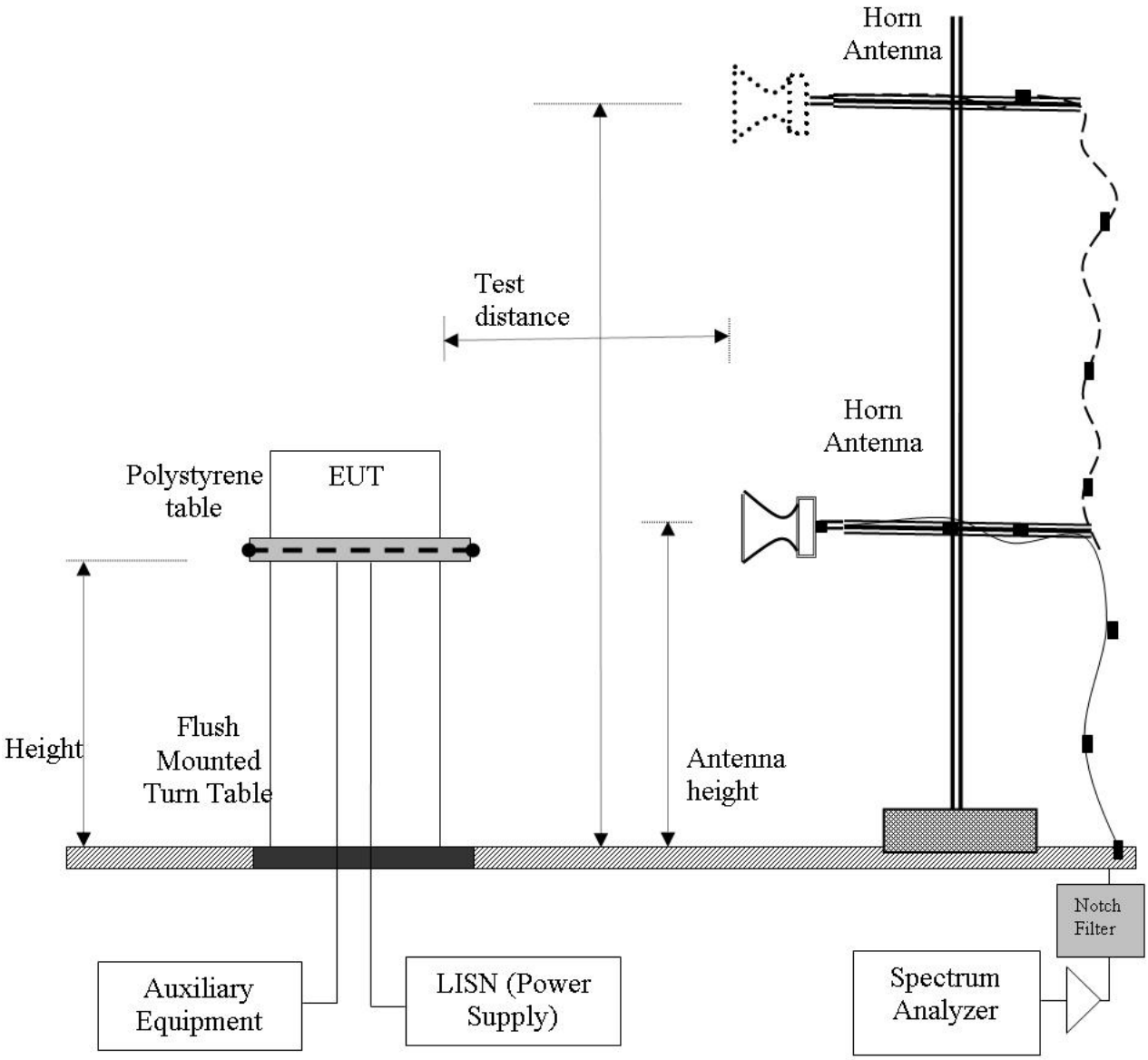
Radiated Spurious Emissions - Radio Collocation

Test Procedure

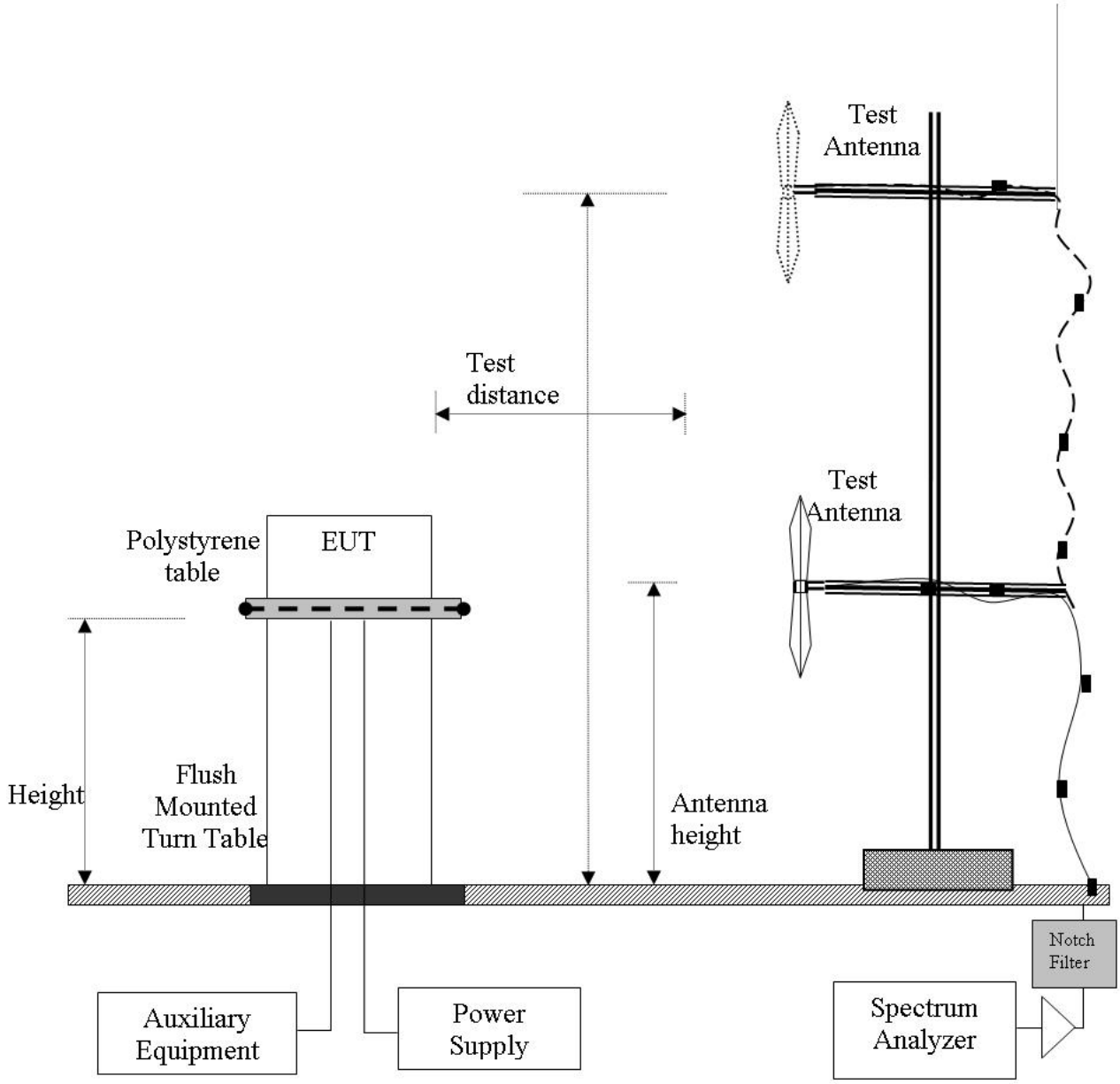
Testing was performed in a 3-meter anechoic chamber. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. Preliminary emissions were recorded with in Spectrum Analyzer mode, using a maximum peak detector while in peak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

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

Radiated Emission Measurement Setup – Above 1 GHz



Radiated Emission Measurement Setup – Below 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

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
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 FCC

Radiated Spurious Emissions

FCC §15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section §15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(a)).

FCC §15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

FCC §15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

FCC §15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

Table 1: FCC 15.209 Spurious Emissions Limits

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

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

Measurement Results:

XBRG-1100-A (5GHz Radio) and TMB-EM0069 NAN Radio (2.4 GHz) co-location

Testing was performed as detailed in the response to inquiry to FCC (Tracking Number 663683) concerning collocation testing of modules certified to two (2) different FCC parts.

Test Plan:

1) Test the device for spurious emissions with both radios operating to access any intermodulation / mixing of spurious frequencies.
2) These emissions should be less than the highest limits of the applicable rule parts for the radios used in the device.

Response per FCC inquiry #663683:

"If you are co-locating 2 certified devices and a motherboard into one enclosure, you must get a completely new certification for these devices co-located within the one enclosure.

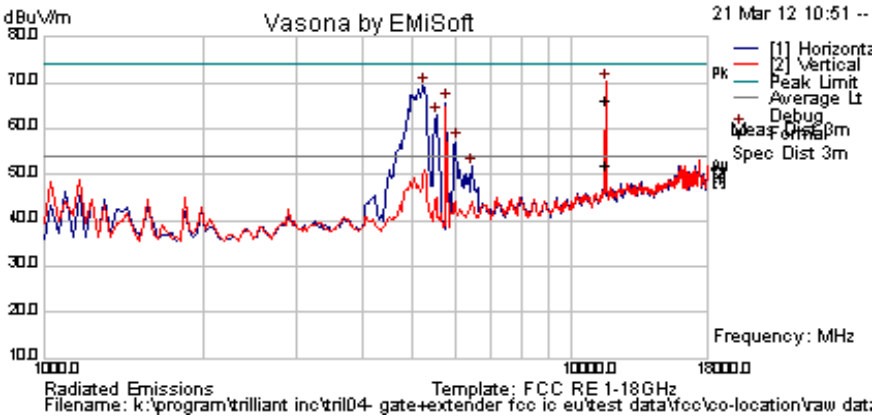
The testing is such that you must turn both transmitters on, i.e. both certified devices, and test the enclosure the device consisting of 2 certified devices such that they comply with all rule parts associated to each certified device.

Test Setup:
The Trilliant XBRG-1100-A (5GHz Radio) and TMB-EM0069 NAN Radio (2.4 GHz) were tested for radiated emissions while operating simultaneously.

Results Summary:
All emissions meet the requirements of their respective FCC parts.

Plot shows spurious emissions with both radios operating simultaneously and configured as indicated in the test results header. Notch filters were used to protect the test equipment receiver from the carrier power.

Test Freq.	2440 MHz ;5785 MHz	**Engineer**	SB
Variant	802.11g/a; 6.0 Mbs	**Temp (ºC)**	20.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	36
Power Setting	2.4GHz=15; 5.8GHz=17(4W)	**Press. (mBars)**	1006
Antenna	2.4:7.5dBi dipole;5GHz:17dBi directional	**Duty Cycle (%)**	100
Test Notes 1	XBRG-1100 (5GHz Radio) & TMB-EM0069 NAN Radio (2.4GHz Radio);		
Test Notes 2	Firmware:SMGate2012-02-07dfstest21;Software:2.1		
Test Notes 3	110VAC; 60Hz		



Formally measured emission peaks

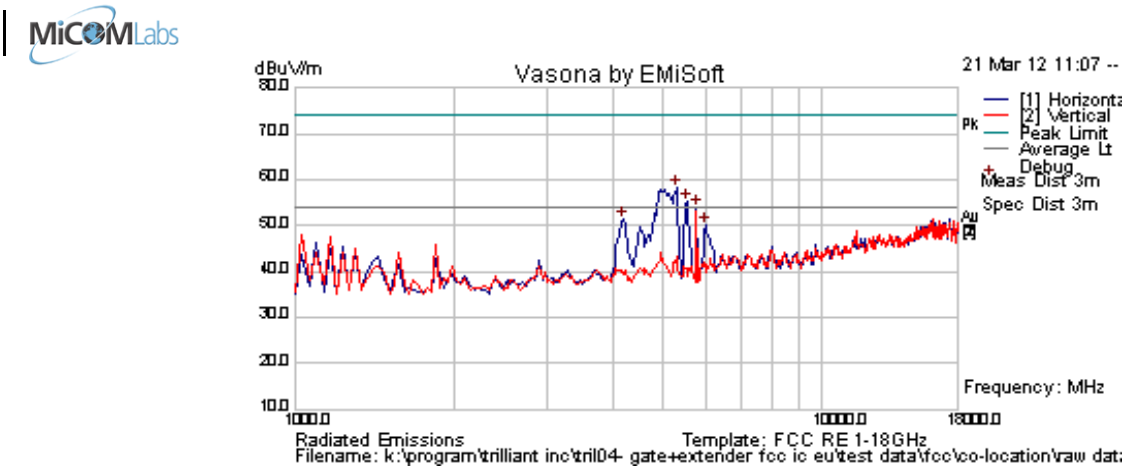
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11571.731	61.5	6.8	-2.0	66.3	Peak Max	V	98	145	74.0	-7.8	Pass	RB
11571.731	47.2	6.8	-2.0	52.0	Average Max	V	98	145	54.0	-2.0	Pass	RB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

The 5GHz emissions are due to the power from the 5GHz transmitter coming through the notch filter.

Plot shows spurious emissions with both radios operating simultaneously and configured as indicated in the test results header. Notch filters were used to protect the test equipment receiver from the carrier power.

Test Freq.	2440 MHz ;5785 MHz	**Engineer**	SB
Variant	802.11g/a; 6.0 Mbs	**Temp (ºC)**	20.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	36
Power Setting	2.4GHz=15; 5.8GHz=5	**Press. (mBars)**	1006
Antenna	2.4:7.5dBi dipole;5GHz:17dBi directional	**Duty Cycle (%)**	100
Test Notes 1	XBRG-1100 (5GHz Radio) & TMB-EM0069 NAN Radio (2.4GHz Radio);		
Test Notes 2	Firmware:SMGate2012-02-07dfstest21;Software:2.1		
Test Notes 3	110VAC; 60Hz		



Formally measured emission peaks

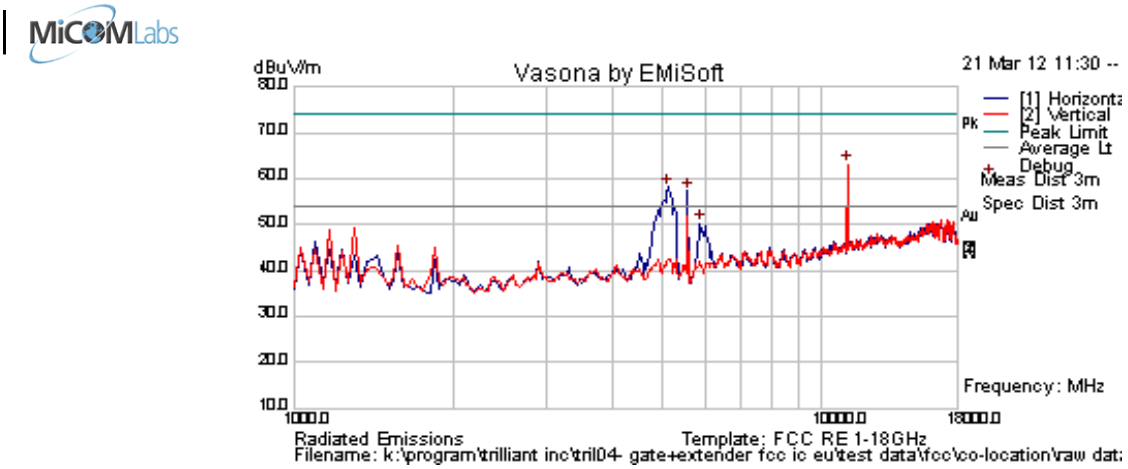
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5292.585	63.1	4.6	-9.6	58.2	Peak [Scan]	H						BE
5531.062124	60.1	4.6	-9.7	55.1	Peak [Scan]	H						BE
5769.539	58.7	4.8	-9.5	54.0	Peak [Scan]	H						FUND
4202.405	57.9	4.0	-10.7	51.3	Peak [Scan]	H	150	0	54	-2.8	Pass	NRB
6008.016	53.7	4.9	-8.6	50.0	Peak [Scan]	H	100	0	54	-4.0	Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

The 5GHz emissions are due to the power from the 5GHz transmitter coming through the notch filter.

Plot shows spurious emissions with both radios operating simultaneously and configured as indicated in the test results header. Notch filters were used to protect the test equipment receiver from the carrier power.

Test Freq.	2440 ;5580 MHz	**Engineer**	SB
Variant	802.11g/a; 6.0 Mbs	**Temp (ºC)**	20.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	36
Power Setting	2.4GHz=15; 5.58GHz=16(1W)	**Press. (mBars)**	1006
Antenna	2.4:7.5dBi dipole;5GHz:17dBi directional	**Duty Cycle (%)**	100
Test Notes 1	XBRG-1100 & TMB-EM0069 NAN Radio;		
Test Notes 2	Firmware:SMGate2012-02-07dfstest21;Software:2.1		
Test Notes 3	110VAC; 60Hz		



Formally measured emission peaks

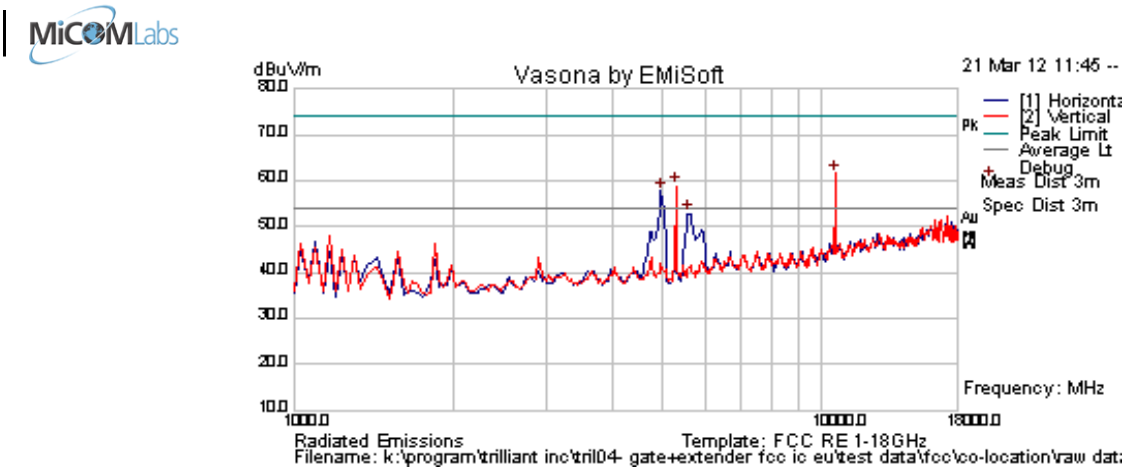
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11152.305	54.10	6.90	-3.0	58.00	Peak Max	V	100	0	74.0	-16.0	Pass	RB
11152.305	39.32	6.90	-3.0	43.22	Average Max	V	100	0	54.0	-10.8	Pass	RB
5160.244	63.4	4.6	-10.0	58.1	Peak [Scan]	H						BE
5565.130	62.4	4.7	-9.7	57.4	Peak [Scan]	H						FUND
5871.743	54.5	4.8	-9.1	50.3	Peak [Scan]	H						BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

The 5GHz emissions are due to the power from the 5GHz transmitter coming through the notch filter.

Plot shows spurious emissions with both radios operating simultaneously and configured as indicated in the test results header. Notch filters were used to protect the test equipment receiver from the carrier power.

Test Freq.	2440 ;5300 MHz	**Engineer**	SB
Variant	802.11g/a; 6.0 Mbs	**Temp (ºC)**	20.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	36
Power Setting	2.4GHz=15; 5.3GHz=14(1W)	**Press. (mBars)**	1006
Antenna	2.4:7.5dBi dipole;5GHz:18 dBi directional	**Duty Cycle (%)**	100
Test Notes 1	XBRG-1100 & TMB-EM0069 NAN Radio;		
Test Notes 2	Firmware:SMGate2012-02-07dfstest21;Software:2.1		
Test Notes 3	110VAC; 60Hz		



Formally measured emission peaks

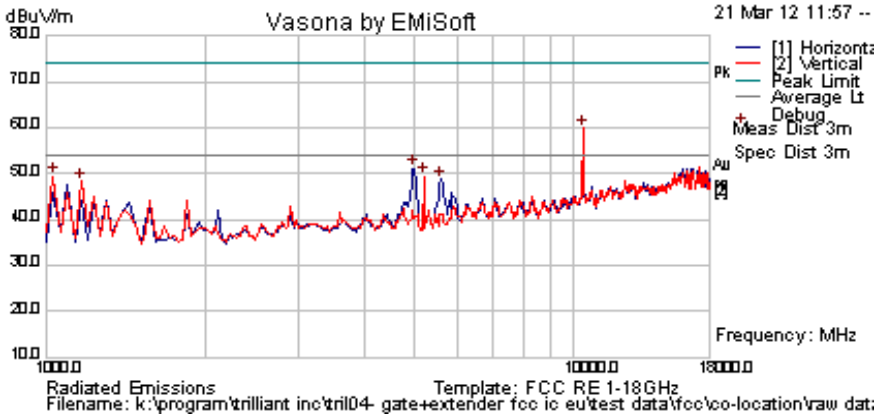
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10607.214	56.1	6.8	-2.4	60.5	Peak Max	V	100	0	74.0	-13.5	Pass	RB
10607.214	43.5	6.8	-2.4	47.9	Average Max	V	100	0	54.0	-6.1	Pass	RB
5292.58517	63.9	4.6	-9.6	58.9	Peak [Scan]	V						FUND
4951.904	63.0	4.6	-9.8	53.0	Peak [Scan]	H						BE
5599.198	57.8	4.7	-9.7	52.8	Peak [Scan]	H						BE

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

The 5GHz emissions are due to the power from the 5GHz transmitter coming through the notch filter.

Plot shows spurious emissions with both radios operating simultaneously and configured as indicated in the test results header. Notch filters were used to protect the test equipment receiver from the carrier power.

Test Freq.	2440 ;5200 MHz	**Engineer**	SB
Variant	802.11g/a; 6.0 Mbs	**Temp (ºC)**	20.5
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	36
Power Setting	2.4GHz=15; 5.2GHz=6(1W)	**Press. (mBars)**	1006
Antenna	2.4:7.5dBi dipole;5GHz:18 dBi directional	**Duty Cycle (%)**	100
Test Notes 1	XBRG-1100 & TMB-EM0069 NAN Radio;		
Test Notes 2	Firmware:SMGate2012-02-07dfstest21;Software:2.1		
Test Notes 3	110VAC; 60Hz		



Formally measured emission peaks

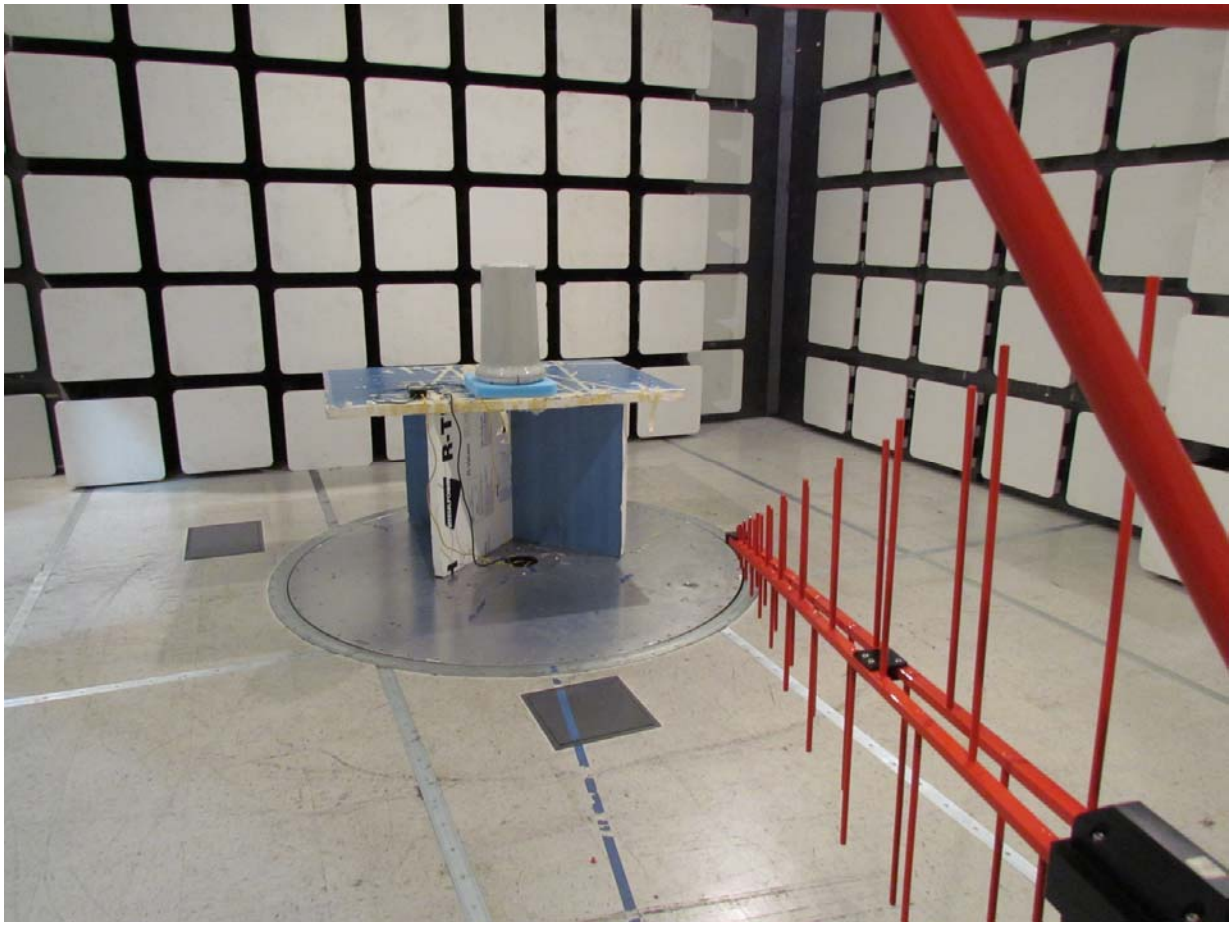
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10402.806	51.2	6.7	-2.5	55.4	Peak [Scan]	H	100	0	74.0	-18.6		NRB
10402.806	38.3	6.7	-2.5	42.5	Peak [Scan]	H	100	0	54.0	-11.5		NRB
4951.903808	56.4	4.6	-9.8	51.2	Peak [Scan]	H						BE
5190.381	54.7	4.6	-9.9	49.5	Peak [Scan]	V						FUND
1034.068	63.2	2.0	-15.8	49.4	Peak [Scan]	V	100	0	54	-4.6	Pass	
5599.198	53.9	4.7	-9.7	48.8	Peak [Scan]	H						BE
1170.341	61.5	2.1	-15.3	48.4	Peak [Scan]	V	150	0	54	-5.6	Pass	

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	RB = Restricted Band (15.209 Limits); NRB = Non Restricted Band, Limit is 20dB below fundamental peak

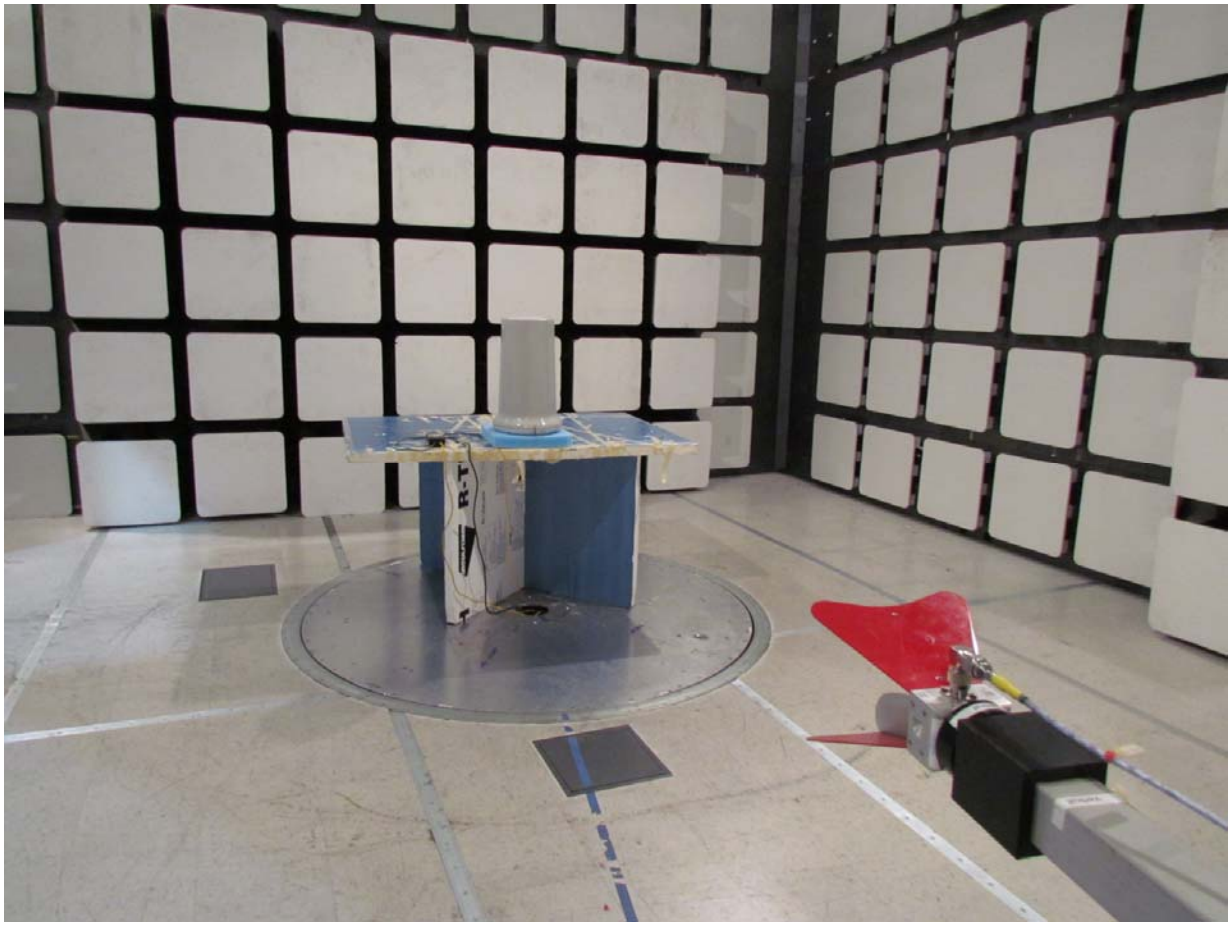
The 5GHz emissions are due to the power from the 5GHz transmitter coming through the notch filter.

6. PHOTOGRAPHS

6.1. Radiated Test Setup Below 1 GHz - Test Setup



6.2. Radiated Emissions Above 1 GHz - Test Setup



7. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #	Calibration Due Date
0070	Power Meter	Hewlett Packard	437B	3125U11552	28th Nov 12
0117	Power Sensor	Hewlett Packard	8487D	3318A00371	15th Nov 12
0223	Power Meter	Hewlett Packard	EPM-442A	US37480256	15th Nov 12
0374	Power Sensor	Hewlett Packard	8485A	3318A19694	29th Nov 12
0158	Barometer /Thermometer	Control Co.	4196	E2846	8th Dec 12
0193	EMI Receiver	Rhode & Schwartz	ESI 7	838496/007	2nd Dec 12
0287	EMI Receiver	Rhode & Schwartz	ESIB40	100201	16th Nov 12
0338	30 - 3000 MHz Antenna	Sunol	JB3	A052907	8th Nov 12
0335	1-18 GHz Horn Antenna	EMCO	3117	00066580	7th Nov 12
0252	SMA Cable	Megaphase	Sucoflex 104	None	N/A
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001	N/A
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002	N/A
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001	N/A
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001	N/A
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623	N/A

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