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Report On

Radio Testing of the
iLOC Technologies
TRiLOC PLD Personal GPS Locator

FCC Part 15 Subpart C §15.249
IC RSS-Gen and RSS-210 Issue 8 December 2010

Report No. SC1301827A_Rev1.0

April 2013



America

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REPORT ON	Radio Testing of the iLOC Technologies Personal GPS Locator
TEST REPORT NUMBER	SC1301827A_Rev1.0
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DATED	April 26, 2013



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Revision History

SC1301827A_Rev1.0 iLOC Technologies TRiLOC PLD Personal GPS Locator					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
03/14/13	Initial Release				Ferdinand Custodio
04/26/13	Initial Release	1.0	Remove pictures from page 7 & 9/ Extract photos from 1.4.4 page 9 /	7 & 9	Juan M. Gonzalez



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SECTION 1

REPORT SUMMARY

Radio Testing of the
iLOC Technologies
Personal GPS Locator



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the iLOC Technologies Personal GPS Locator to the requirements of FCC Part 15 Subpart C §15.249 and IC RSS-Gen and RSS-210 Issue 8 December 2010.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	iLOC Technologies
Model Number(s)	iL1000
FCC ID Number	ST8TRiLOC01
IC Number	10925A-TRiLOC01
Serial Number(s)	Sample 78
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.249 (October 1, 2011). • RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010).
Start of Test	March 05, 2013
Finish of Test	March 13, 2012
Name of Engineer(s)	Ferdinand S. Custodio Juan Manuel Gonzalez
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.249 with cross-reference to the corresponding IC RSS standard is shown below.

Section	Spec Clause	RSS	Test Description	Result	Comments/Base Standard
2.1	§15.207(a)	RSS-Gen 7.2.4	Conducted Emissions	Compliant	
2.2	§15.215(c)	RSS-Gen 4.6.3	20 dB Bandwidth	Compliant	
2.3		RSS-Gen 4.6.1	99% Emission Bandwidth	Compliant	
2.4	§15.249(a)	RSS-210 A2.9(a)	Field Strength Limits for Fundamental and Harmonics	Compliant	
2.5	§15.249(d)	RSS-210 A2.9(b)	Spurious Radiated Emissions	Compliant	
2.6		RSS-Gen 4.10	Receiver Spurious Emissions	Compliant	



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The model iL1000 TRILOC GPS Locator is designed to be worn on an individual's wrist allowing care givers to locate that individual remotely using a proprietary Location Server User Web Portal or proprietary smart phone App. Location data is obtained using the integrated GPS receiver, processed by a microcontroller and communicated to the care giver over the cellular network. Emergency bi-directional cellular voice communication with auto-answer is possible using the integrated speaker and microphone. A voice call can be initiated by the user by pressing the multi-function SOS button located on the side of the case. A Bluetooth 4.0 transceiver is included to provide a short range low power radio frequency link compatible accessories used to provide indoor location data, wireless connection to residential or commercial security systems, biosensor data, or other Bluetooth 4.0 services. System power is derived from a rechargeable lithium-ion polymer battery.



1.3.2 EUT General Description

EUT Description	Personal GPS Locator
Model Name	TRiLOC PLD
Model Number(s)	iL1000
Rated Voltage	3.7VDC from integral Polymer Li-Ion Cell
Output Power	88.9dBμV/m @ 3 meters (232.8μW EIRP Average @ 100% Duty Cycle)
Frequency Range	2402MHz to 2480 MHz in the 2400 MHz to 2483.5 MHz Band
Number of Operating Frequencies	40
Channels Verified	Low Channel 2402MHz Mid Channel 2440MHz High Channel 2480MHz
Antenna Type (used during evaluation)	Integral (Complies with Part 15.203 requirements)
Modulation Used	GFSK

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	Radiated only configuration. EUT will transmit through the integral antenna. Provided AC charger was connected to the EUT during radiated verification to prevent battery cut-off during testing due to continuous transmit mode.

1.4.2 EUT Exercise Software

A test firmware was loaded to the EUT which enable cycling of Low, Mid and High channels both modulated and unmodulated as well as Receive modes.

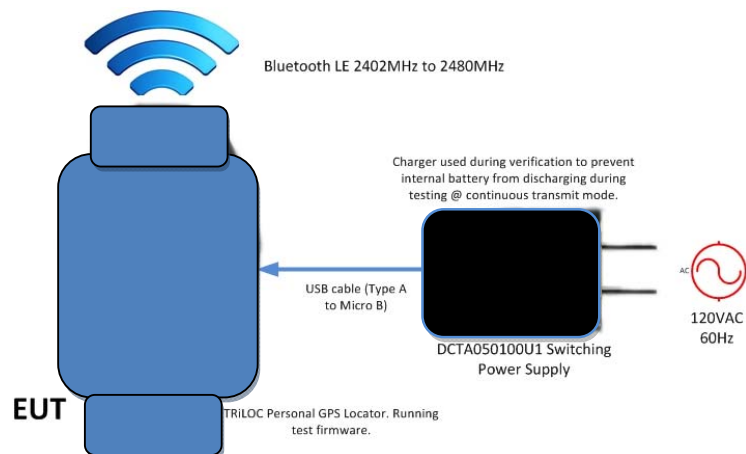
1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
-	EUT (USB charger) to EUT (main unit)	1.0 meter, shielded, USB Type A to Micro-B
iLOC	Switching Power Supply	Model No. DCTA050100U1 5VDC @ 1A

1.4.4 Worst Case Configuration

For radiated measurements X, Y and Z orientations were verified. Worst case position is "X". Pictures can be found at the Worst case Configuration test set up photos exhibit.

1.4.5 Simplified Test Configuration Diagram





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number Sample 78		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.



SECTION 2

TEST DETAILS

Radio Testing of the
iLOC Technologies
Personal GPS Locator

2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.1.2 Standard Applicable

An intentional radiator 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 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.1.3 Equipment Under Test and Modification State

Serial No: Sample 78 /Default Test Configuration

2.1.4 Date of Test/Initial of test personnel who performed the test

March 13, 2013/FSC

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

Ambient Temperature 23.5°C
Relative Humidity 37.9%
ATM Pressure 99.4kPa

2.1.7 Additional Observations

- EUT is a battery powered device, to show compliance to the general requirement, the EUT was verified in transmit mode while charging with the supplied AC USB charger.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.1.8 for sample computation.



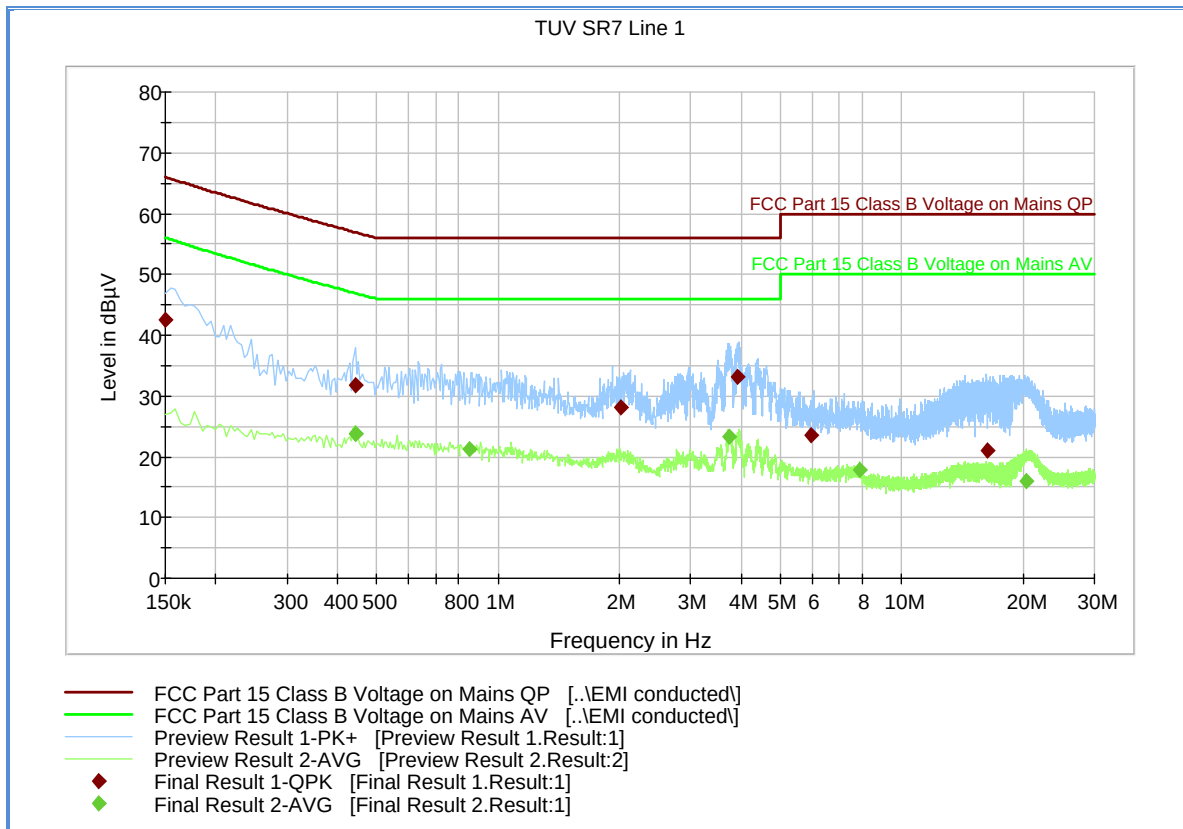
2.1.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbμV) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbμV) @ 150kHz			26.2

2.1.9 Test Results

Compliant. See attached plots and tables.

2.1.10 Line 1 (120VAC 60Hz)



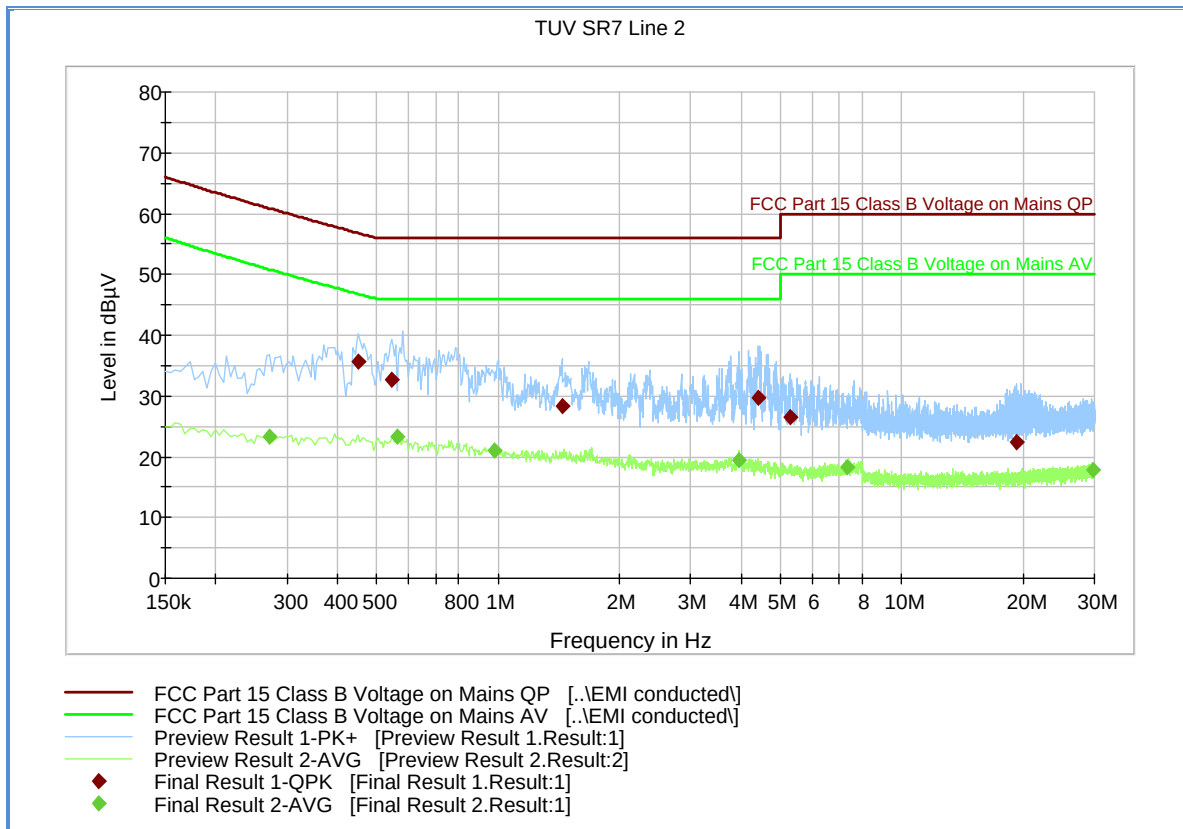
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.150000	42.6	1000.0	9.000	Off	L1	20.4	23.4	66.0
0.442500	31.8	1000.0	9.000	Off	L1	20.2	25.1	56.9
2.013000	28.0	1000.0	9.000	Off	L1	20.3	28.0	56.0
3.912000	33.1	1000.0	9.000	Off	L1	20.3	22.9	56.0
5.982000	23.5	1000.0	9.000	Off	L1	20.4	36.5	60.0
16.273500	21.1	1000.0	9.000	Off	L1	20.8	38.9	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.442500	23.9	1000.0	9.000	Off	L1	20.2	23.1	46.9
0.442500	23.8	1000.0	9.000	Off	L1	20.2	23.1	46.9
0.847500	21.3	1000.0	9.000	Off	L1	20.2	24.7	46.0
3.741000	23.4	1000.0	9.000	Off	L1	20.3	22.6	46.0
7.854000	17.9	1000.0	9.000	Off	L1	20.4	32.1	50.0
20.431500	16.1	1000.0	9.000	Off	L1	21.0	33.9	50.0

2.1.11 Line 2 (120VAC 60Hz)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.451500	35.7	1000.0	9.000	Off	N	21.1	21.0	56.8
0.546000	32.6	1000.0	9.000	Off	N	21.1	23.4	56.0
1.446000	28.4	1000.0	9.000	Off	N	21.1	27.6	56.0
4.402500	29.6	1000.0	9.000	Off	N	21.2	26.4	56.0
5.307000	26.5	1000.0	9.000	Off	N	21.2	33.5	60.0
19.261500	22.5	1000.0	9.000	Off	N	21.7	37.5	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.271500	23.3	1000.0	9.000	Off	N	21.1	27.5	50.8
0.564000	23.3	1000.0	9.000	Off	N	21.1	22.7	46.0
0.982500	21.0	1000.0	9.000	Off	N	21.1	25.0	46.0
3.943500	19.5	1000.0	9.000	Off	N	21.2	26.5	46.0
7.350000	18.2	1000.0	9.000	Off	N	21.2	31.8	50.0
29.665500	17.8	1000.0	9.000	Off	N	22.3	32.2	50.0



2.2 20 dB BANDWIDTH

2.2.1 Specification Reference

Part 15 Subpart C §15.215(c)

2.2.2 Standard Applicable

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

2.2.3 Equipment Under Test and Modification State

Serial No: Sample 78 / Default Test Configuration

2.2.4 Date of Test/Initial of test personnel who performed the test

March 12, 2012/FSC

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Ambient Temperature	25.2°C
Relative Humidity	35.1%
ATM Pressure	99.1kPa

2.2.7 Additional Observations

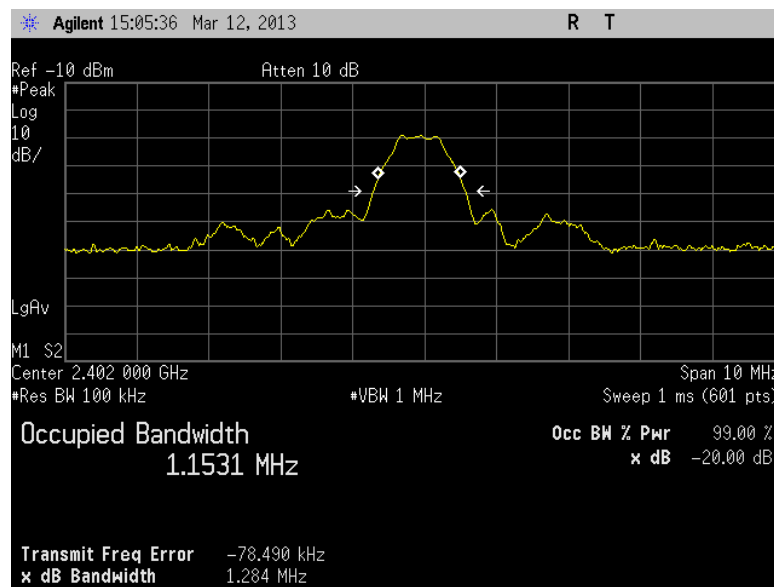
- This is a radiated test.
- OBW measurement function of the Spectrum Analyzer used (x dB function).
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span, VBW is $\geq 3X$ RBW.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.

2.2.8 Test Results

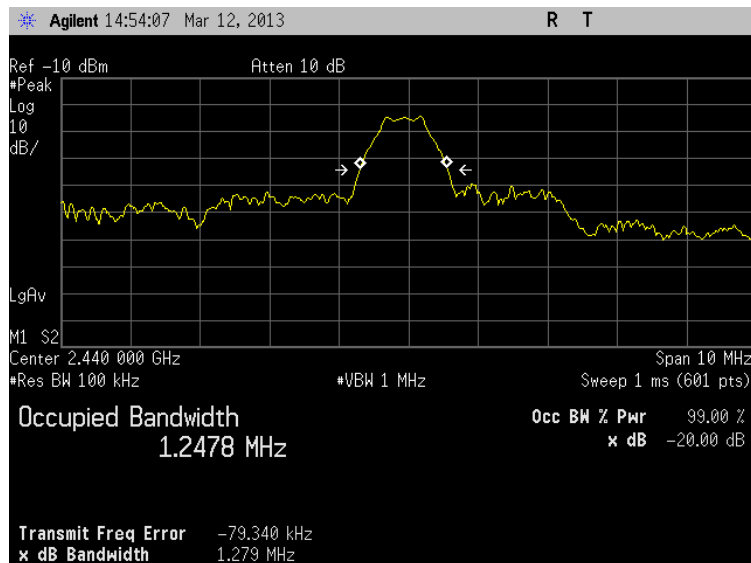
Low Channel (2402 MHz)	Mid Channel (2440MHz)	High Channel (2480MHz)
1.284 MHz	1.279 MHz	1.278 MHz

2402.00 MHz – (20dB BW/2) = 2401.358MHz (within the frequency band - **Compliant**)

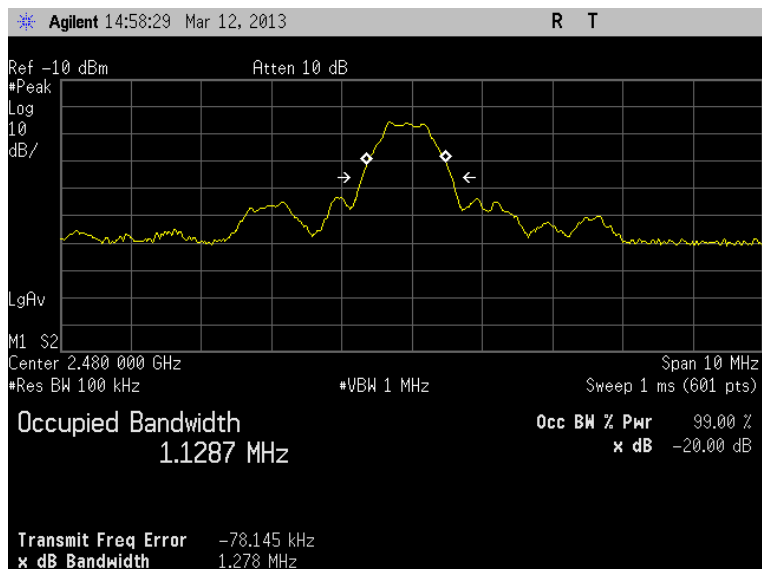
2480.00MHz + (20dB BW/2) = 2480.642MHz (within the frequency band - **Compliant**)



Low Channel



Mid Channel



High Channel



2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen Clause 4.6.1

2.3.2 Standard Applicable

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: Sample 78 / Default Test Configuration

2.3.4 Date of Test/Initial of test personnel who performed the test

March 12, 2012/FSC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

Ambient Temperature	25.2°C
Relative Humidity	35.1%
ATM Pressure	99.1kPa

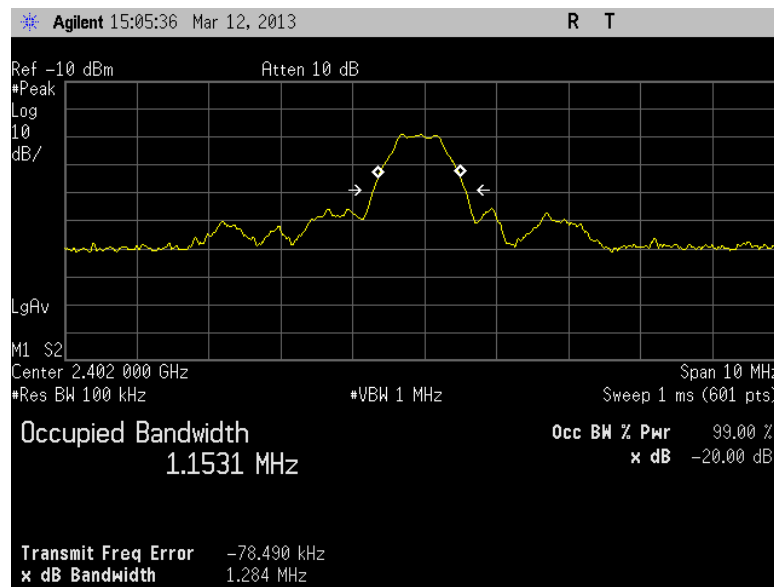
2.3.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.

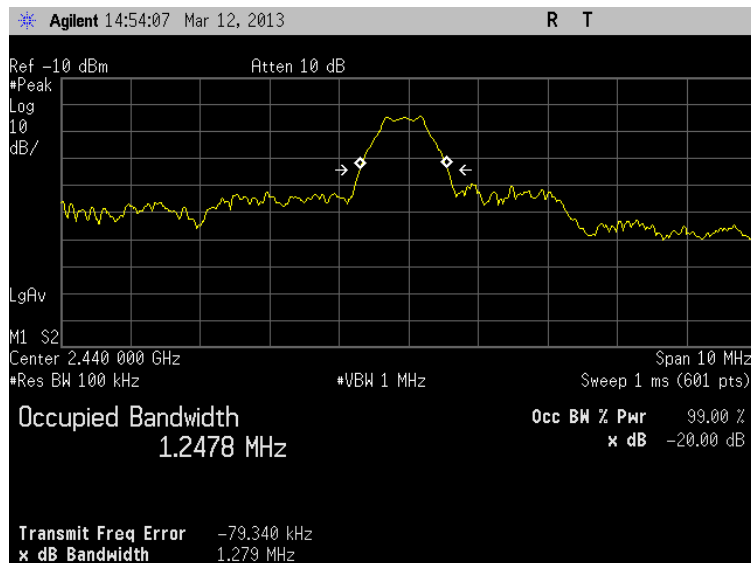
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.3.8 Test Results

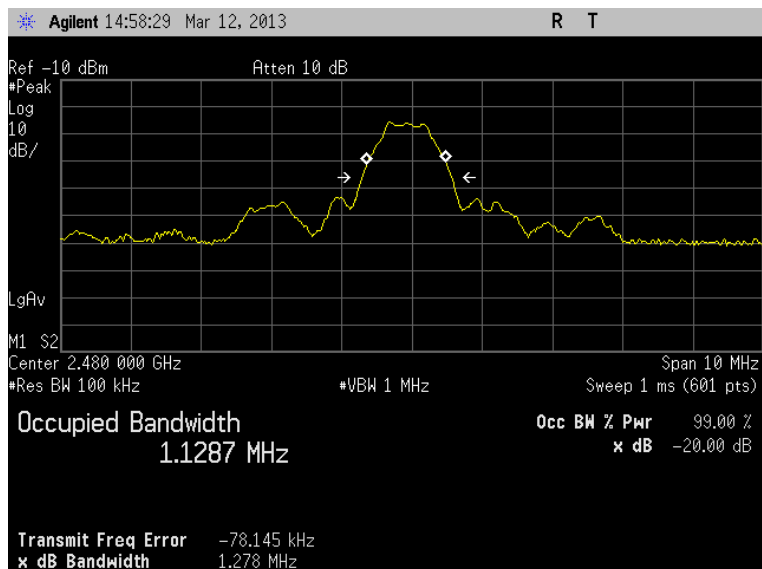
Low Channel (2402 MHz)	Mid Channel (2440MHz)	High Channel (2480MHz)
1.1531 MHz	1.2478 MHz	1.1287 MHz



Low Channel



Mid Channel



High Channel

2.4 FIELD STRENGTH LIMITS FOR FUNDAMENTAL AND HARMONICS

2.4.1 Specification Reference

Part 15 Subpart C §15.249(a)

2.4.2 Standard Applicable

(a) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

2.4.3 Equipment Under Test and Modification State

Serial No: Sample 78 / Default Test Configuration

2.4.4 Date of Test/Initial of test personnel who performed the test

March 12, 2012/FSC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

Ambient Temperature	25.2°C
Relative Humidity	35.1%
ATM Pressure	99.1kPa

2.4.7 Additional Observations

- This is a radiated test. The spectrum was searched from 1GHz to the 10th harmonic (25GHz).
- There are no emissions observed above 10GHz.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.4.8 for sample computation.



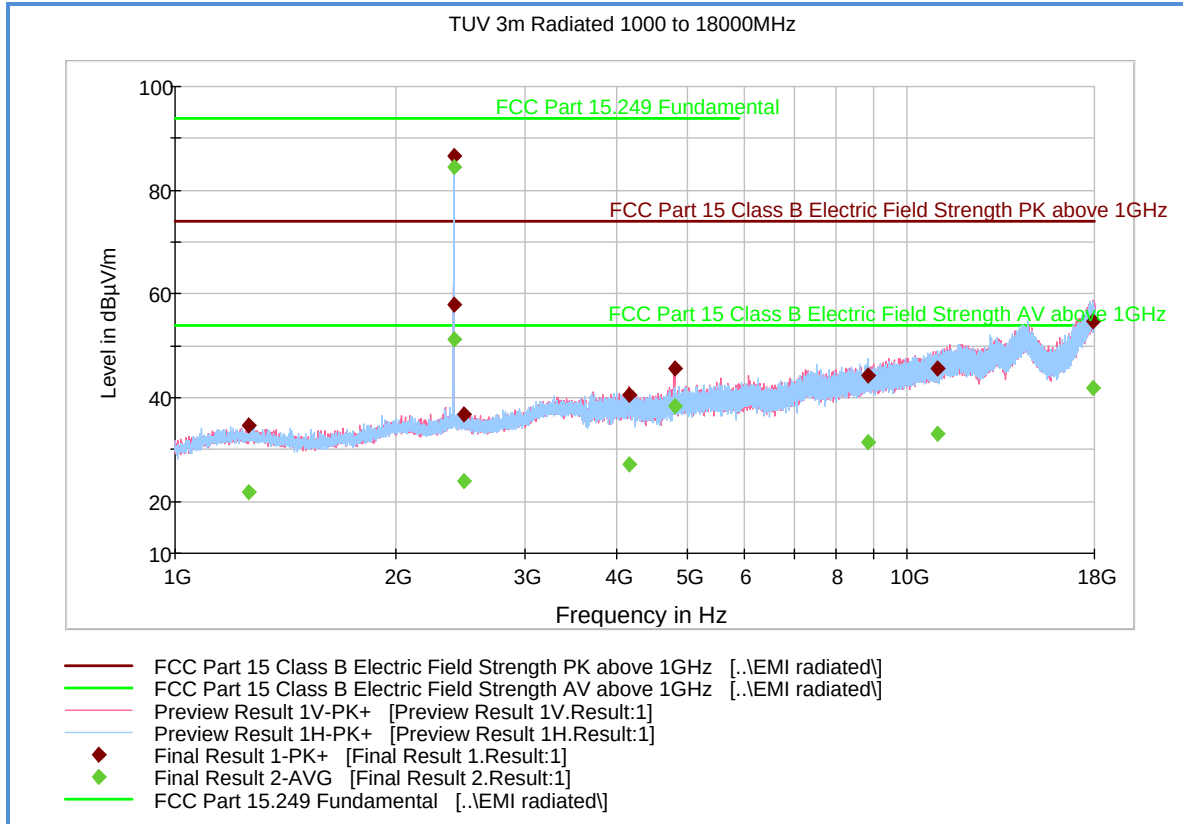
2.4.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ V) @ 2400 MHz			58.4
Correction Factor (dB)	Asset# 1153 (cable)	3.3	-4.8
	Asset# 8628 (preamplifier)	-36.4	
	Asset# 6669 (antenna)	28.3	
Reported Peak Final Measurement (db μ V/m) @ 2400 MHz			53.6

2.4.9 Test Results

See attached plots.

2.4.10 Test Results for Low Channel (Fundamental, Harmonics, Band Edges and Spurious Emissions)



Peak Data

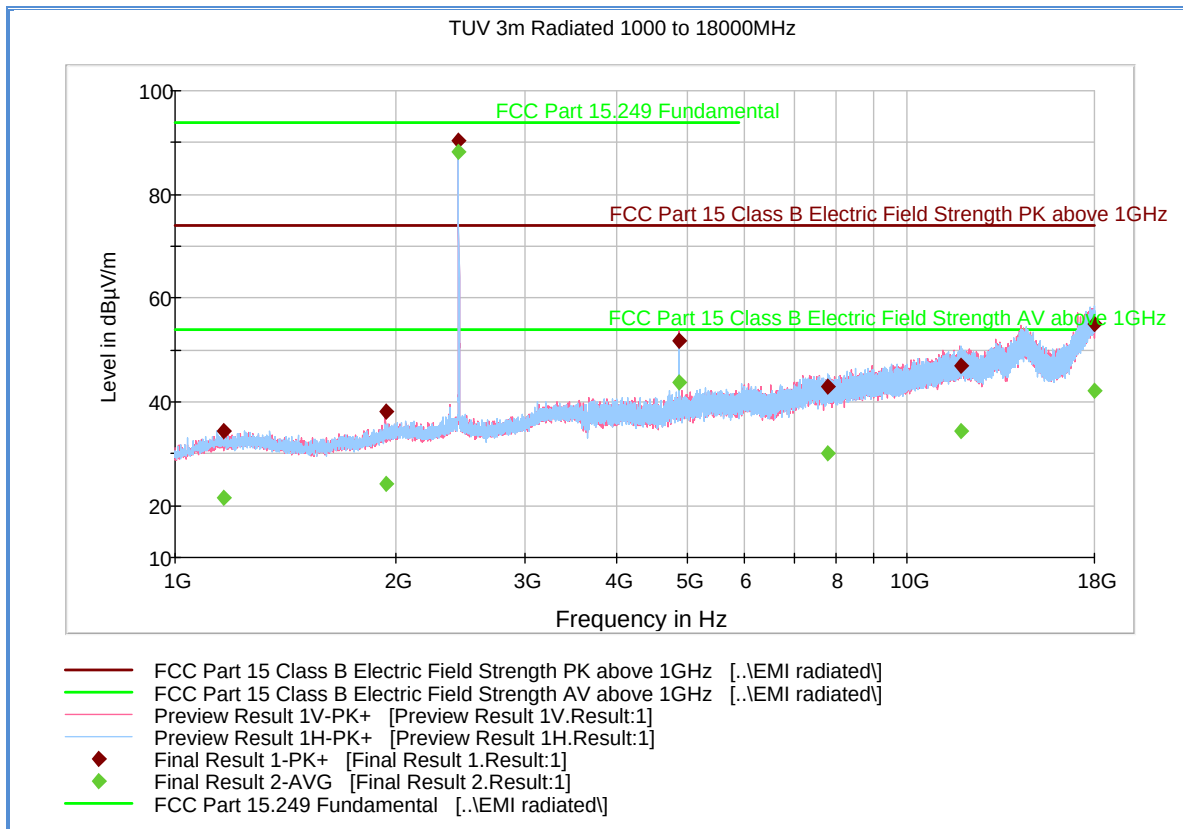
Frequency (MHz)	MaxPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1258.14000	34.5	1000.0	1000.000	367.0	V	268.0	-9.4	39.4	73.9
2400.00000	58.0	1000.0	1000.000	100.0	V	63.0	-4.8	15.9	73.9
2401.88666	86.6	1000.0	1000.000	100.0	V	66.0	-4.8	Fundamental	
2483.50000	36.9	1000.0	1000.000	307.0	V	129.0	-4.7	37.0	73.9
4165.58000	40.6	1000.0	1000.000	400.0	V	331.0	0.6	33.3	73.9
4805.83333	45.6	1000.0	1000.000	146.0	V	212.0	1.9	28.3	73.9
8850.62000	44.3	1000.0	1000.000	110.0	H	326.0	8.8	29.6	73.9
11012.2000	45.6	1000.0	1000.000	158.0	H	221.0	11.5	28.3	73.9
17904.7466	54.7	1000.0	1000.000	295.0	V	348.0	21.4	19.2	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1258.14000	21.8	1000.0	1000.000	367.0	V	268.0	-9.4	32.1	53.9
2400.00000	51.3	1000.0	1000.000	100.0	V	63.0	-4.8	2.6	53.9
2401.88666	84.4	1000.0	1000.000	100.0	V	66.0	-4.8	9.6	94.0
2483.50000	23.8	1000.0	1000.000	307.0	V	129.0	-4.7	30.1	53.9
4165.58000	27.2	1000.0	1000.000	400.0	V	331.0	0.6	26.7	53.9
4805.83333	38.3	1000.0	1000.000	146.0	V	212.0	1.9	15.6	53.9
8850.62000	31.3	1000.0	1000.000	110.0	H	326.0	8.8	22.6	53.9
11012.2000	33.0	1000.0	1000.000	158.0	H	221.0	11.5	20.9	53.9
17904.7466	41.8	1000.0	1000.000	295.0	V	348.0	21.4	12.1	53.9

Test Notes: Data presented is 100% duty cycle.

2.4.11 Test Results for Mid Channel (Fundamental, Harmonics and Spurious Emissions)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1162.78000	34.3	1000.0	1000.000	158.0	V	243.0	-10.0	39.6	73.9
1937.80666	38.0	1000.0	1000.000	356.0	V	258.0	-6.5	35.9	73.9
2439.67333	90.5	1000.0	1000.000	159.0	V	214.0	-4.7	Fundamental	
4880.34666	51.8	1000.0	1000.000	100.0	V	211.0	1.9	22.1	73.9
7788.00666	43.0	1000.0	1000.000	296.0	H	177.0	7.0	30.9	73.9
11857.8333	47.0	1000.0	1000.000	270.0	H	344.0	12.7	26.9	73.9
17965.6200	55.0	1000.0	1000.000	158.0	H	353.0	21.7	18.9	73.9

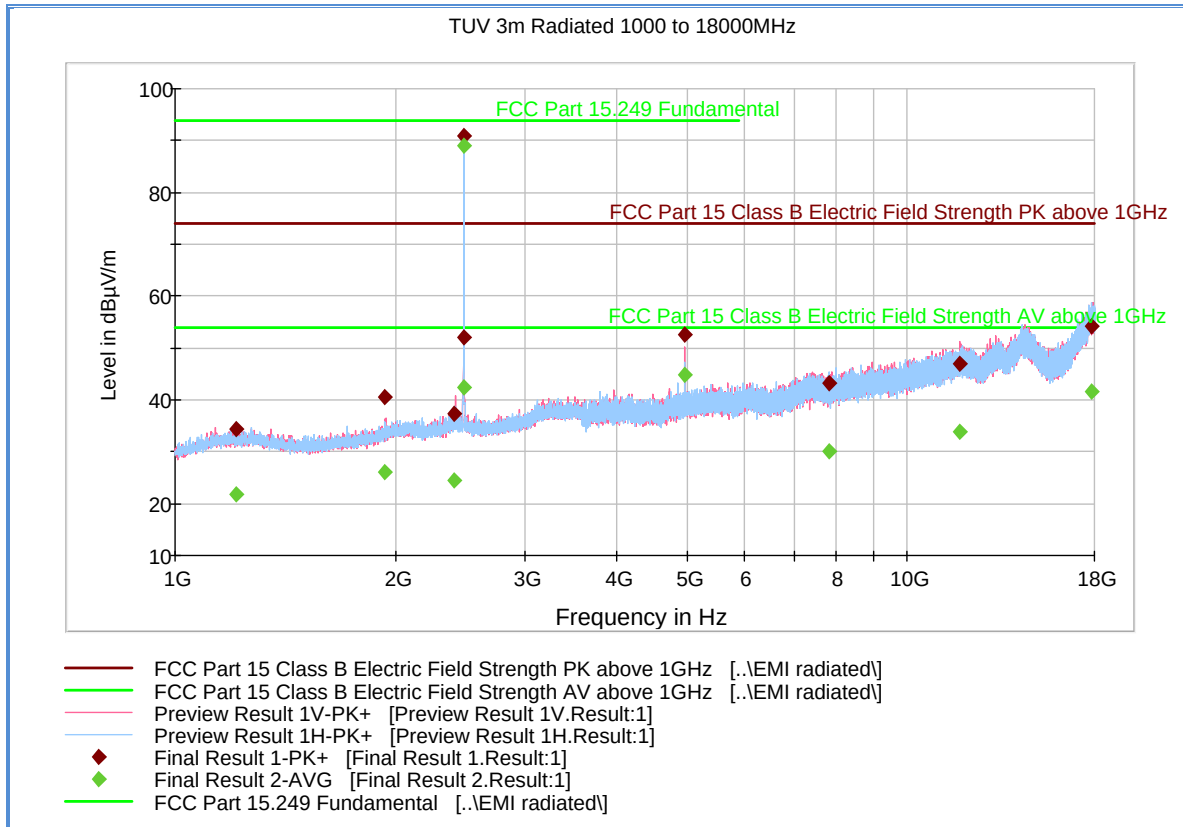


Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1162.78000	21.6	1000.0	1000.000	158.0	V	243.0	-10.0	32.3	53.9
1937.80666	24.2	1000.0	1000.000	356.0	V	258.0	-6.5	29.7	53.9
2439.67333	88.3	1000.0	1000.000	159.0	V	214.0	-4.7	5.7	94
4880.34666	43.8	1000.0	1000.000	100.0	V	211.0	1.9	10.1	53.9
7788.00666	30.1	1000.0	1000.000	296.0	H	177.0	7.0	23.8	53.9
11857.8333	34.5	1000.0	1000.000	270.0	H	344.0	12.7	19.4	53.9
17965.6200	42.0	1000.0	1000.000	158.0	H	353.0	21.7	11.9	53.9

Test Notes: Data presented is 100% duty cycle.

2.4.12 Test Results for High Channel (Fundamental, Harmonics, Band Edges and Spurious Emissions)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1212.76000	34.4	1000.0	1000.000	222.0	H	89.0	-9.7	39.5	73.9
1937.53333	40.5	1000.0	1000.000	358.0	V	1.0	-6.5	33.4	73.9
2400.00000	37.4	1000.0	1000.000	139.0	V	286.0	-4.8	36.5	73.9
2480.15333	91.0	1000.0	1000.000	100.0	V	222.0	-4.7	Fundamental	
2483.50000	52.0	1000.0	1000.000	100.0	V	283.0	-4.7	21.9	73.9
4959.36000	52.5	1000.0	1000.000	100.0	V	221.0	2.0	21.4	73.9
7818.04000	43.1	1000.0	1000.000	317.0	H	142.0	7.0	30.8	73.9
11801.3266	46.9	1000.0	1000.000	134.0	V	331.0	12.8	27.0	73.9
17841.4000	54.1	1000.0	1000.000	158.0	H	265.0	21.2	19.8	73.9



Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1212.76000	21.7	1000.0	1000.000	222.0	H	89.0	-9.7	32.2	53.9
1937.53333	26.1	1000.0	1000.000	358.0	V	1.0	-6.5	27.8	53.9
2400.00000	24.4	1000.0	1000.000	139.0	V	286.0	-4.8	29.5	53.9
2480.15333	88.9	1000.0	1000.000	100.0	V	222.0	-4.7	5.1	94
2483.50000	42.5	1000.0	1000.000	100.0	V	283.0	-4.7	11.4	53.9
4959.36000	44.7	1000.0	1000.000	100.0	V	221.0	2.0	9.2	53.9
7818.04000	30.2	1000.0	1000.000	317.0	H	142.0	7.0	23.7	53.9
11801.3266	33.7	1000.0	1000.000	134.0	V	331.0	12.8	20.2	53.9
17841.4000	41.5	1000.0	1000.000	158.0	H	265.0	21.2	12.4	53.9

Test Notes: Data presented is 100% duty cycle.



2.5 SPURIOUS RADIATED EMISSIONS

2.5.1 Specification Reference

Part 15 Subpart C §15.249(d)

2.5.2 Standard Applicable

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

2.5.3 Equipment Under Test and Modification State

Serial No: Sample 78 / Default Test Configuration

2.5.4 Date of Test/Initial of test personnel who performed the test

March 5, 2013/FSC

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Ambient Temperature 25.2°C
 Relative Humidity 32.7%
 ATM Pressure 99.5 kPa

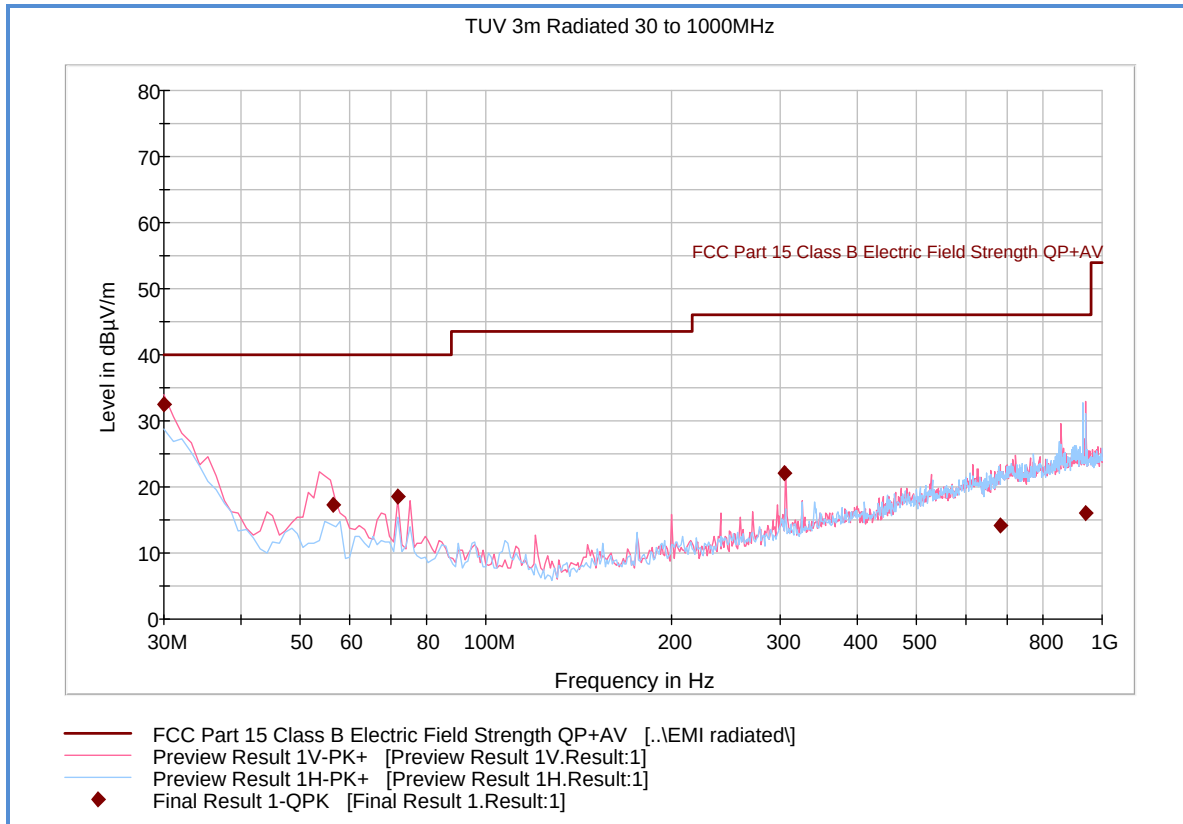
2.5.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz). There are no emissions observed beyond 18GHz.
- Above 1GHz measurement results are identical to test results presented under Section 2.4.10 up to Section 2.4.12 of this test report. No other significant spurious emissions observed other than harmonics of the fundamental frequency.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.5.8 for sample computation.

2.5.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbμV) @ 2400 MHz			58.4
Correction Factor (dB)	Asset# 1153 (cable)	3.3	-4.8
	Asset# 8628 (preamplifier)	-36.4	
	Asset# 6669 (antenna)	28.3	
Reported Peak Final Measurement (dbμV/m) @ 2400 MHz			53.6

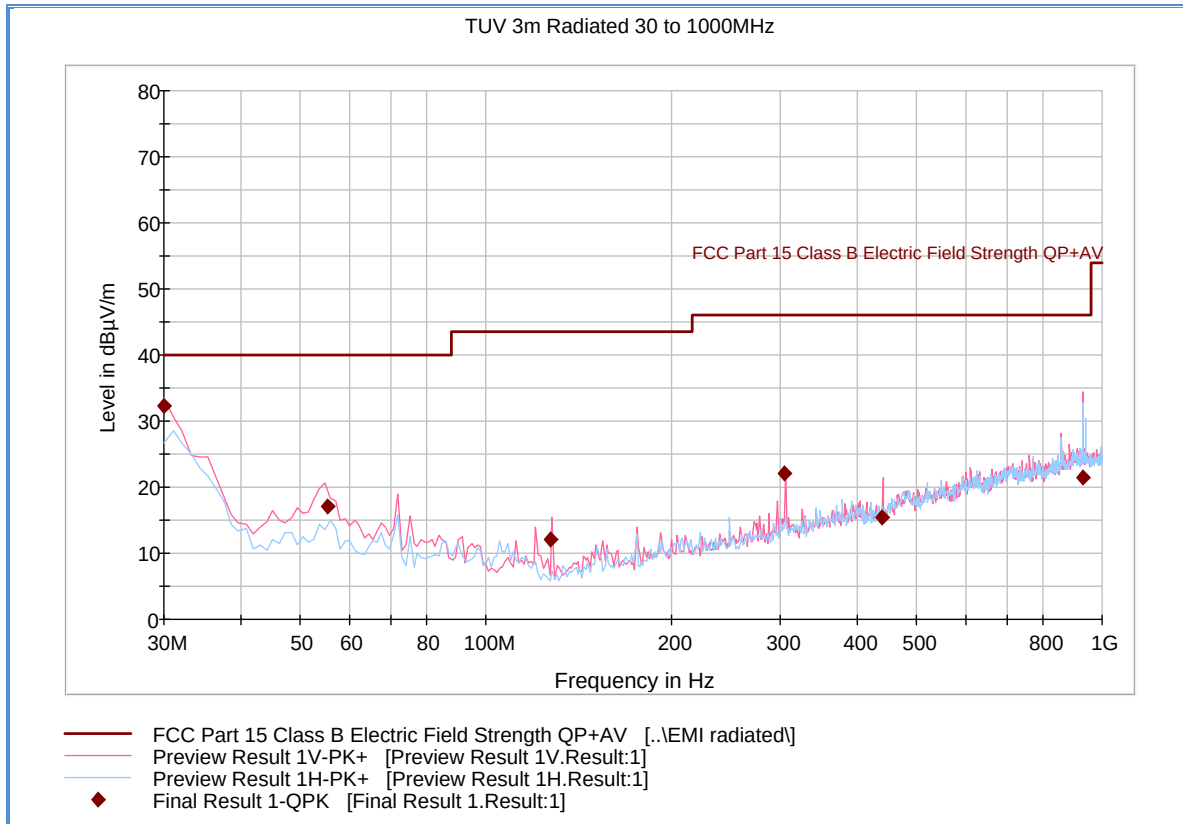
2.5.9 Test Results Below 1GHz (Low Channel)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.000000	32.4	1000.0	120.000	100.0	V	45.0	-12.6	7.6	40.0
56.431111	17.3	1000.0	120.000	100.0	V	228.0	-22.8	22.7	40.0
71.993333	18.5	1000.0	120.000	100.0	V	326.0	-24.4	21.5	40.0
305.428889	22.2	1000.0	120.000	100.0	V	225.0	-16.1	23.8	46.0
681.973333	14.2	1000.0	120.000	100.0	V	137.0	-8.0	31.8	46.0
941.242222	16.1	1000.0	120.000	100.0	V	256.0	-5.3	29.9	46.0

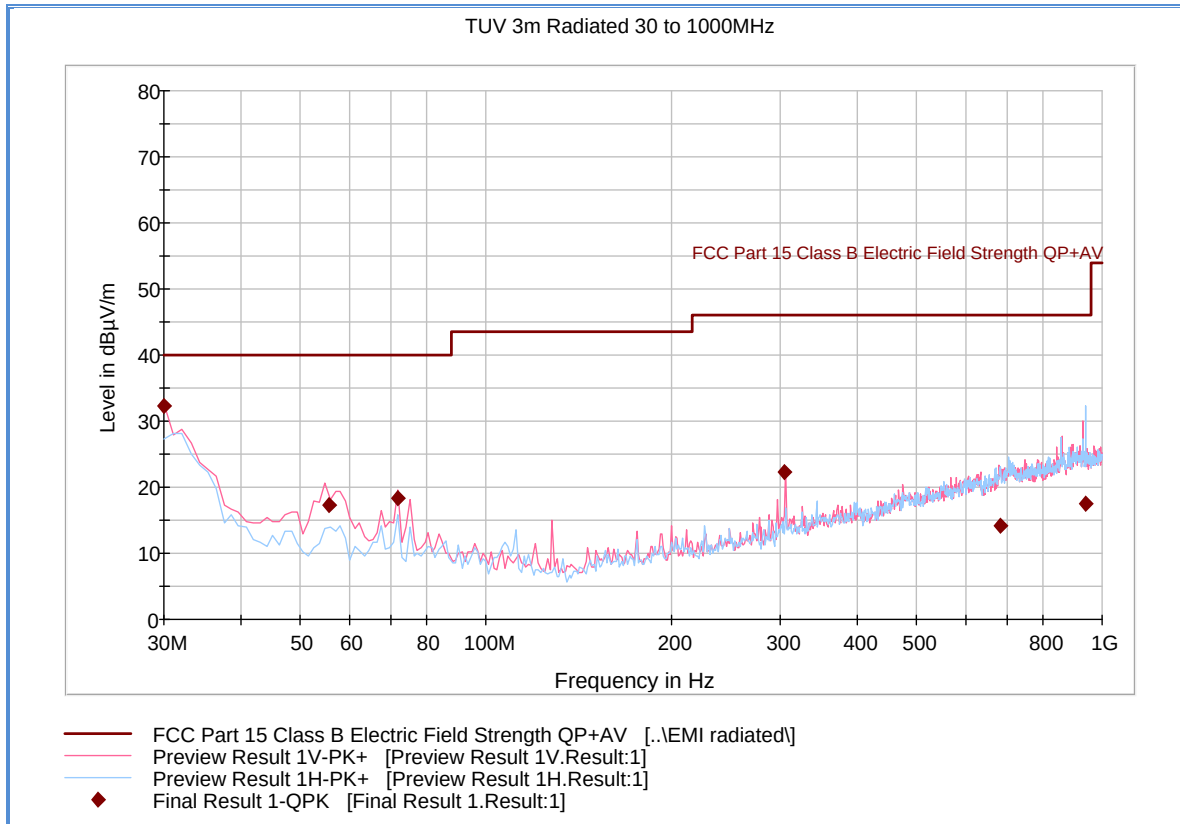
2.5.10 Test Results Below 1GHz (Mid Channel)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.000000	32.3	1000.0	120.000	100.0	V	120.0	-12.6	7.7	40.0
55.268889	17.0	1000.0	120.000	100.0	V	228.0	-22.6	23.0	40.0
127.237778	12.0	1000.0	120.000	100.0	V	5.0	-23.3	31.5	43.5
305.428889	22.0	1000.0	120.000	100.0	V	191.0	-16.1	24.0	46.0
439.073333	15.3	1000.0	120.000	100.0	V	-1.0	-13.3	30.7	46.0
929.662222	21.4	1000.0	120.000	100.0	V	282.0	-5.2	24.6	46.0

2.5.11 Test Results Below 1GHz (High Channel)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.000000	32.3	1000.0	120.000	100.0	V	1.0	-12.6	7.7	40.0
55.588889	17.3	1000.0	120.000	100.0	V	175.0	-22.6	22.7	40.0
71.993333	18.4	1000.0	120.000	100.0	V	185.0	-24.4	21.6	40.0
305.431111	22.2	1000.0	120.000	100.0	V	283.0	-16.1	23.8	46.0
683.377778	14.3	1000.0	120.000	100.0	V	36.0	-7.9	31.7	46.0
940.242222	17.5	1000.0	120.000	103.0	H	-1.0	-5.3	28.5	46.0

2.6 RECEIVER SPURIOUS EMISSIONS

2.6.1 Specification Reference

RSS-Gen 6.0

2.6.2 Standard Applicable

Receivers shall comply with the limits of spurious emissions set out in this section, measured over the frequency range determined in accordance with Section 4.10 of RSS-Gen.

Table 2: Radiated Limits of Receiver Spurious Emissions

Frequency (MHz)	Field Strength (microvolts/m at 3 metres)*
30-88	100
88-216	150
216-960	200
Above 960	500

*Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7 of RSS-Gen.

2.6.3 Equipment Under Test and Modification State

Serial No: Sample 78 / Default Test Configuration

2.6.4 Date of Test/Initial of test personnel who performed the test

March 5, 2013/FSC

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions

Ambient Temperature 25.2°C
Relative Humidity 32.7%
ATM Pressure 99.5 kPa

2.6.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 3rd harmonic (up to 18GHz performed).
- EUT in RX (Receive) mode configuration.
- Limit used is from FCC §15.209 which is identical to RSS-Gen limits.

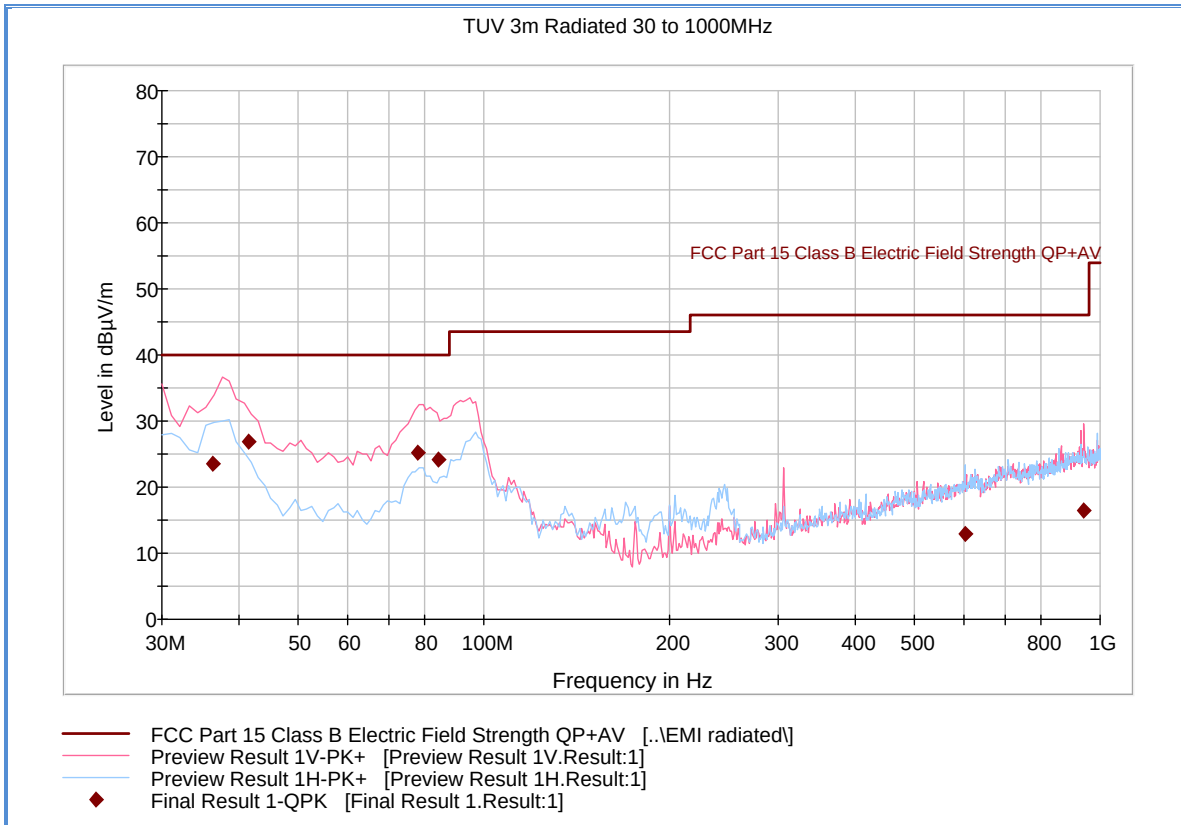


- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.6.8 for sample computation.

2.6.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ V) @ 2400 MHz			58.4
Correction Factor (dB)	Asset# 1153 (cable)	3.3	-4.8
	Asset# 8628 (preamplifier)	-36.4	
	Asset# 6669 (antenna)	28.3	
Reported Peak Final Measurement (db μ V/m) @ 2400 MHz			53.6

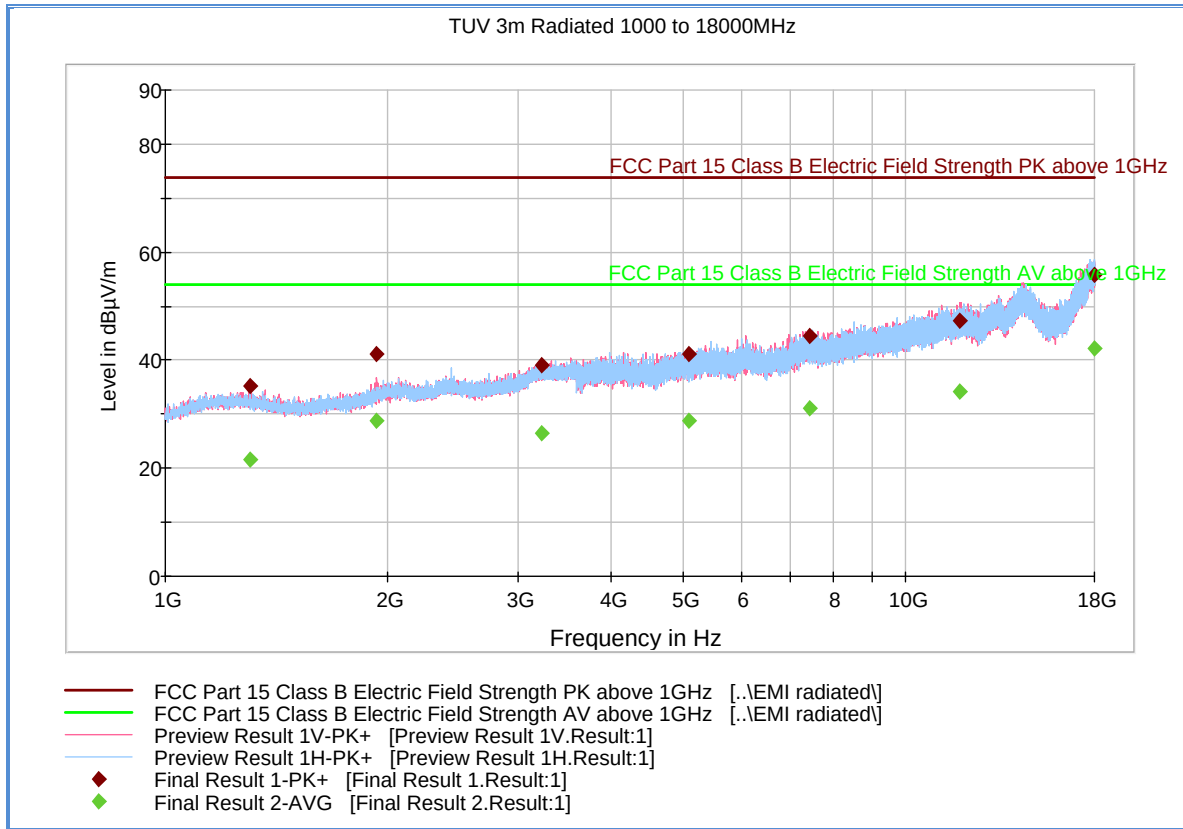
2.6.9 Test Results Below 1GHz (Receive Mode)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
36.344444	23.6	1000.0	120.000	100.0	V	183.0	-16.5	16.4	40.0
41.453333	26.9	1000.0	120.000	100.0	V	200.0	-18.8	13.1	40.0
78.017778	25.2	1000.0	120.000	100.0	V	12.0	-24.2	14.8	40.0
84.524444	24.3	1000.0	120.000	100.0	V	10.0	-23.7	15.7	40.0
603.375556	12.9	1000.0	120.000	103.0	H	226.0	-9.5	33.1	46.0
939.840000	16.4	1000.0	120.000	100.0	V	74.0	-5.3	29.6	46.0

2.6.10 Test Results Above 1GHz (Receive Mode)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1299.71333	35.1	1000.0	1000.000	134.0	V	335.0	-9.3	38.8	73.9
1932.58666	41.2	1000.0	1000.000	400.0	V	8.0	-6.5	32.7	73.9
3218.84666	39.2	1000.0	1000.000	220.0	V	36.0	-1.4	34.7	73.9
5095.55333	41.1	1000.0	1000.000	245.0	H	290.0	2.8	32.8	73.9
7422.62000	44.5	1000.0	1000.000	196.0	V	335.0	7.5	29.4	73.9
11862.7800	47.3	1000.0	1000.000	220.0	V	89.0	12.7	26.6	73.9
17996.8666	55.7	1000.0	1000.000	294.0	H	155.0	21.8	18.2	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1299.71333	21.7	1000.0	1000.000	134.0	V	335.0	-9.3	32.2	53.9
1932.58666	28.8	1000.0	1000.000	400.0	V	8.0	-6.5	25.1	53.9
3218.84666	26.4	1000.0	1000.000	220.0	V	36.0	-1.4	27.5	53.9
5095.55333	28.7	1000.0	1000.000	245.0	H	290.0	2.8	25.2	53.9
7422.62000	31.2	1000.0	1000.000	196.0	V	335.0	7.5	22.7	53.9
11862.7800	34.2	1000.0	1000.000	220.0	V	89.0	12.7	19.7	53.9
17996.8666	42.1	1000.0	1000.000	294.0	H	155.0	21.8	11.8	53.9



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Conducted Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	02/29/12	02/28/13
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	05/24/12	05/24/13
8607	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
8609	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	05/23/12	05/23/13
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	05/24/12	05/24/13
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	08/17/12	08/17/13
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	08/17/12	08/17/13
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	08/17/12	08/17/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/10/12	08/10/13
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	06/13/12	06/13/13
1016	Pre-amplifier	PAM-0202	187	PAM	08/17/12	08/17/13
1150	Horn antenna	RA42-K-F-4B-C	012054-004	CMT	Verified by 1003 and 1049	
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	Verified by 1003 and 1049	
Miscellaneous						
6452	Multimeter	3478A	2911A52177	Hewlett Packard	07/16/12	07/16/13
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	11/12/12	11/12/13
7539	DC Power Supply	6434B	1140A01866	Hewlett Packard	Verified by 6452	
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	07/12/12	07/12/13
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.23
Coverage Factor (k):					2
Expanded Uncertainty:					4.45

3.2.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.22
Coverage Factor (k):					2
Expanded Uncertainty:					4.44

3.2.3 Conducted Emissions Measurement

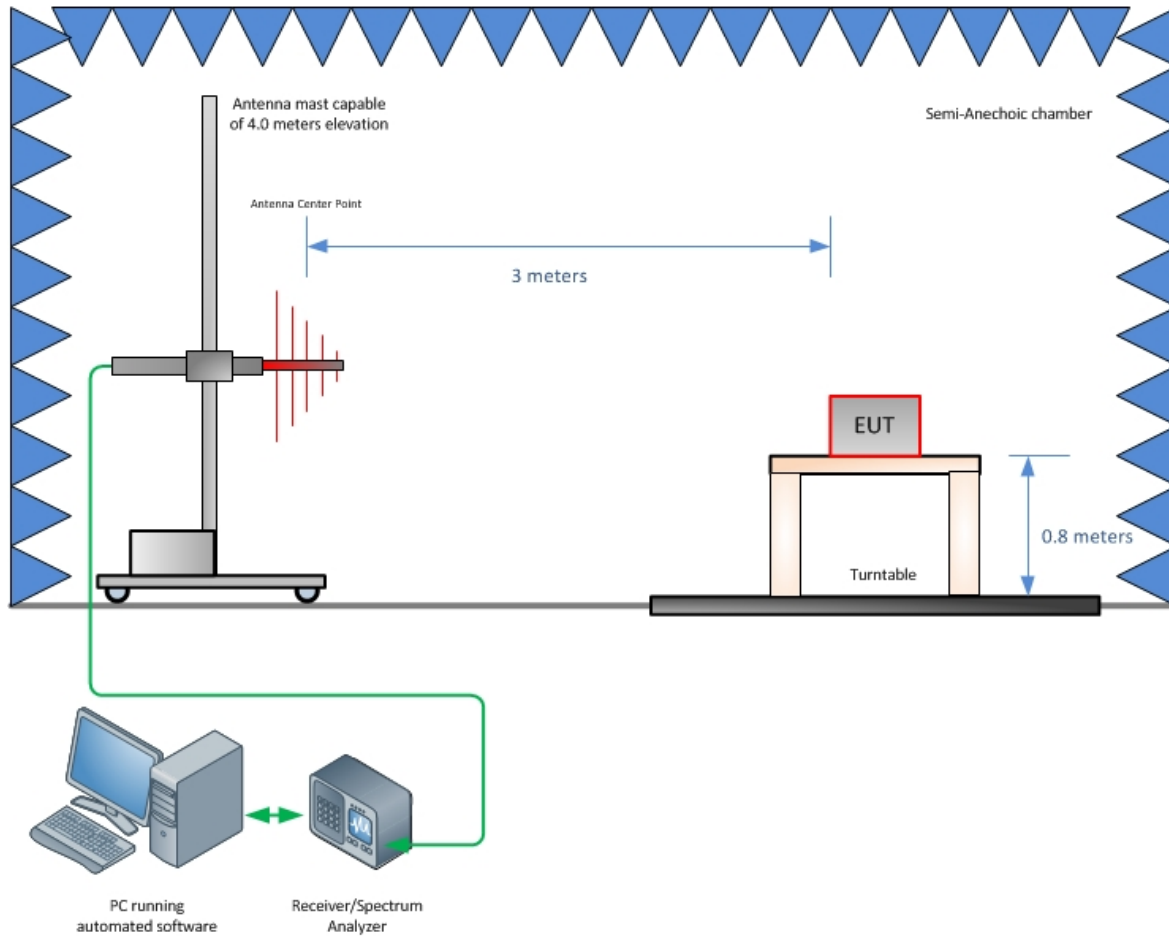
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
	Attenuator	Rectangular	0.30	0.17	0.03
Combined Uncertainty (u_c):					0.80
Coverage Factor (k):					2
Expanded Uncertainty:					1.59



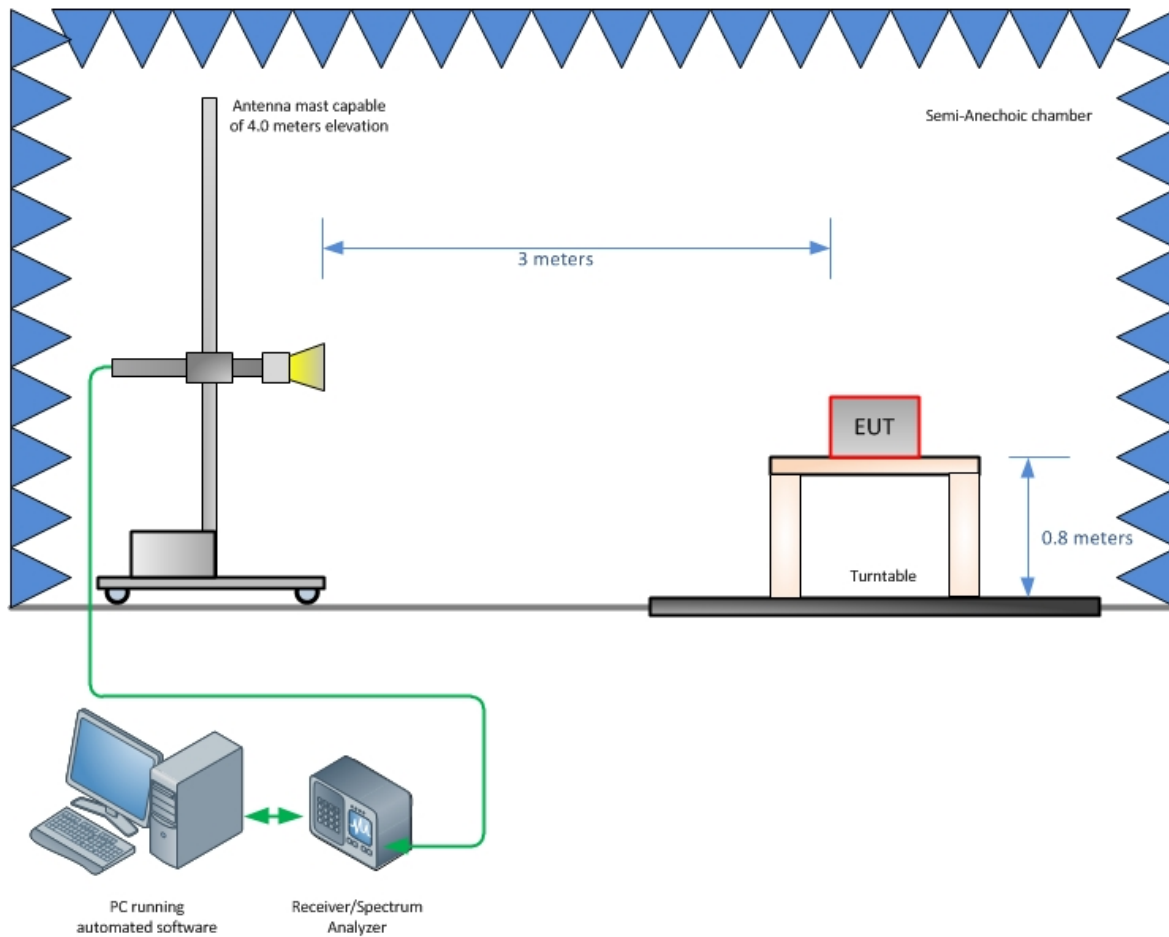
SECTION 4

DIAGRAM OF TEST SETUP

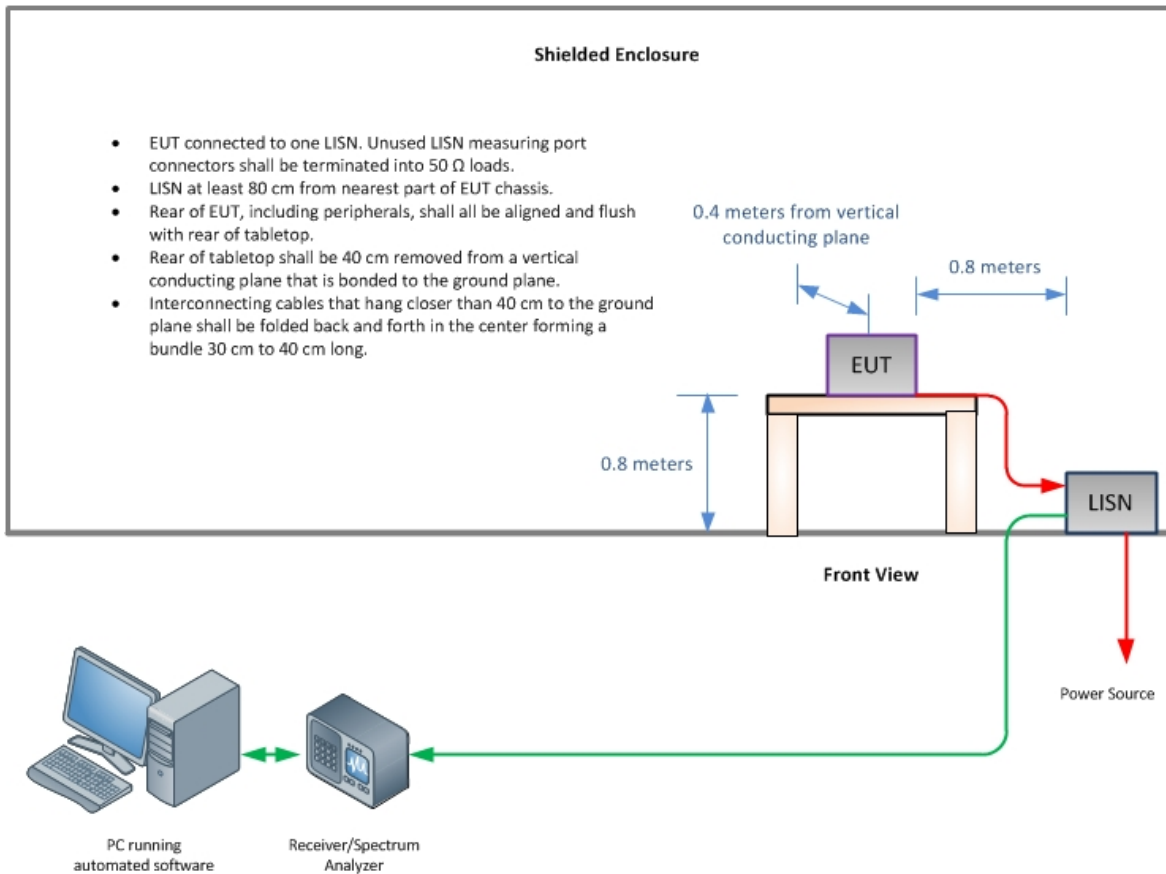
4.1 RADIATED EMISSION TEST SETUP (BELOW 1GHz)



4.2 RADIATED EMISSION TEST SETUP (ABOVE 1GHZ)



4.3 CONDUCTED EMISSION TEST SETUP





SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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