America

Choose certainty.
Add value.

Report On

Application for Grant of Equipment Authorization of the
SMK Electronics Corp.
RC04 RF Remote Control

FCC Part 15 Subpart C §15.247
IC RSS-Gen and RSS-210 Issue 8 December 2010

Report No. SC1208772A Rev. 1 September 2012

REPORT ON	Radio Testing of the SMK Electronics Corp. RF Remote Control
TEST REPORT NUMBER	SC1208772A Rev. 1
PREPARED FOR	SMK Electronics Corp. 1055 Tierra Del Rey, Suite H Chula Vista, CA 91910
CONTACT PERSON	Nikolay Shtin RF Engineer (619) 216-6400 nshtin@smkusa.com
PREPARED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Chip R. Fleury **Name** Authorized Signatory
DATED	September 10, 2012

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

Revision History

SC1208772A Rev. 1 SMK Electronics Corp. RC04 RF Remote Control					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
09/10/12	Initial Release				Ferdinand Custodio
09/27/12	Initial Release	Rev. 1	Removed all pictures referencing the EUT		Ferdinand Custodio

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

CONTENTS

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

SECTION 1

REPORT SUMMARY

Radio Testing of the
SMK Electronics Corp.
RF Remote Control

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the SMK Electronics Corp. RF Remote Control to the requirements of FCC Part 15 Subpart C §15.247 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	SMK Electronics Corp.
Model Number(s)	RC04
FCC ID Number	TC2-RC03
IC Number	5959A-RC03
Serial Number(s)	N/A
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (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	August 23, 2012
Finish of Test	September 09, 2012
Name of Engineer(s)	Ferdinand S. Custodio Juan Manuel Gonzalez Kathy MacKenzie
Related Document(s)	• KDB 558074 Revision to Compliance Measurement guidance for 15.247 Digital Transmission Systems (April 24, 2012). • 558074 D01 DTS Meas Guidance v01 (Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, January 18, 2012) • ANSI C63.10-2009 (American National Standard for Testing Unlicensed Wireless Devices. • 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 §15.247 with cross-reference to the corresponding IC RSS standard is shown below.

Section	§15.247 Spec Clause	RSS	Test Description	Result	Comments/ Base Standard
2.1	§15.247(b)(3)	RSS-210 A8.4 (4)	Peak Output Power	Compliant	
2.2	§15.207(a)	RSS-Gen 7.2.4	Conducted Emissions	N/A*	
2.3		RSS-Gen 4.6.1	99% Emission Bandwidth	Compliant	
2.4	§15.247(a)(2)	RSS-210 A8.2(a)	Minimum 6 dB RF Bandwidth	Compliant	
2.5	§15.247(d)	RSS-210 A8.5	Out-of-Band Emissions - Conducted	Compliant	
2.6	§15.247(d)	RSS-210 A8.5	Band-edge Compliance of RF Conducted Emissions	Compliant	
2.7	§15.247(d)	RSS-210 A8.5	Spurious Radiated Emissions	Compliant	
2.7		RSS-Gen 4.10	Receiver Spurious Emissions	Compliant	
2.8	§15.247(e)	RSS-210 A8.2(b)	Power Spectral Density for Digitally Modulated Device	Compliant	

* Not applicable. EUT is battery powered.

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a SMK Electronics Corp**.** RF Remote Control. The EUT is a remote control for the Roku streaming player. The EUT operates using WLAN channels in the 2.4GHz and 5.0 GHz bands.

1.3.2 EUT General Description

EUT Description	RF Remote Control
Model Number(s)	RC04
Rated Voltage	3.0VDC from 2 (two) AA alkaline batteries.

Output Power

Mode	Average (conducted)	Peak (conducted)
802.11 b	-2.3 dBm	7.48 dBm
802.11 g	-7.6 dBm	7.41 dBm
802.11 a	-11.05 dBm	5.6 dBm

Frequency Range	2412 MHz to 2462 MHz in the 2400 MHz to 2483.5 MHz Band 5745 MHz to 5825 MHz in the 5725 MHz to 5850 MHz Band
Number of Operating Frequencies	11 (802.11 b/g) 4 (802.11 a)
Channels Verified (802.11 b/g)	Channel 1 (Low Channel 2412 MHz) Channel 6(Mid Channel 2437 MHz) Channel 11 (High Channel 2462 MHz)
Channels Verified (802.11 a)	Channel 149 (Low Channel 5745 MHz) Channel 153(Mid Channel 5765 MHz) Channel 161 (High Channel 5805 MHz)
Modulation Used	DSSS (802.11 b), OFDM/DSSS (802.11 g), OFDM (802.11 a)

1.3.3 Antenna Details

Model	Reach Xtend™ Part No. FR05-S1-NO-1-004
Manufacturer	Fractus®
Antenna Type	Compact Dual-Band Chip Antenna

Antenna Gain (802.11 b/g)	1.77 dBi
Antenna Gain (802.11 a)	4.9 dBi
EUT Antenna Connector	N/A (small SMD chip antenna).
Maximum Dimensions	7mm x 3mm x 2mm

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configurations	Description
A	Antenna port conducted measurement. Manufacturer provided a SMA test port for conducted measurements. Power setting set to "SPW 1".
B	Radiated emissions test configuration. EUT configured to transmit on either antenna #1 or antenna#2. Power setting set to "SPW 1".

1.4.2 EUT Exercise Software

Client provided a programming software (AT_Cont131.exe) using Prolific USB-to-Serial adapter. The software allows the following channels: 1-14, 36,40,44,48,149,153,157 and 161. The following data rates were used: 1, 2, 5.5,11,6,9,12,18 and 24 Mbps.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Ozmo	Debug Jig (USB-to-Serial programmer)	Interface to program EUT (Channel, Data Rate, Power and Antenna). Not part of the test setup, removed during radiated emissions test.

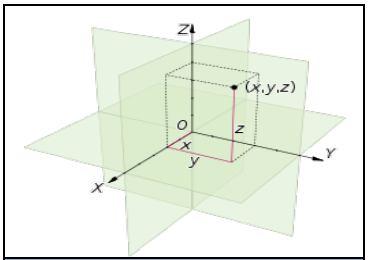
Laptop used during programming is generic and can be different brand and model.

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report based from Peak Output Power measurements:

Mode	Channel	Data Rate
802.11b	11 (High Channel)	1Mbps
802.11g	11 (High Channel)	6Mbps
802.11a	149 (Low Channel)	6Mbps

EUT is a portable device. For radiated measurements X, Y and Z orientations were verified. Worst case position is "Y".



"X,Y,Z" Configuration

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 N/A		
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.: US5281

TUV SUD America Inc. (San Diego), a §2.498 listed test firm operates the EMC Laboratory registered under Sony Electronics Inc. Product Quality Division EMC. This laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is US5281.

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
SMK Electronics Corp.
RF Remote Control

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.1 PEAK OUTPUT POWER

2.1.1 Specification Reference

Part 15 Subpart C §15.247(b)(3)

2.1.2 Standard Applicable

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

2.1.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

September 6, 2012/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	23.2°C
Relative Humidity	50.5%
ATM Pressure	99.1 kPa

2.1.7 Additional Observations

- This is a conducted test using Option 3: Peak Power Meter Method discussed under KDB 558074 (Revision to Compliance Measurement Guidance for 15.247 Digital Transmission Systems, April 24, 2012).
- All available modes and data rates were verified. The worst case data rate for each mode (marked bold and italic) will be verified for each test throughout this test report.

2.1.8 Test Results

See attached table

802.11 b				
Channel	**Frequency (MHz)**	**Data Rate (Mbps)**	**Average Power (dBm)**	**Peak Power (dBm)**
1	***2412***	***1***	***-4.4***	***7.09***
6	***2437***	***1***	***-2.4***	***7.26***
11	***2462***	***1***	***-2.3***	***7.48***
1	2412	2	-4.4	7.06
6	2437	2	-4	7.3
11	2462	2	-3.7	7.46
1	2412	5.5	-5.5	7.07
6	2437	5.5	-5.2	7.3
11	2462	5.5	-5.1	7.47
1	2412	11	-6.7	7.15
6	2437	11	-6.4	7.34
11	2462	11	-6.3	7.4

802.11 g				
Channel	**Frequency (MHz)**	**Data Rate (Mbps)**	**Average Power (dBm)**	**Peak Power (dBm)**
1	***2412***	***6***	***-8.2***	***6.81***
6	***2437***	***6***	***-7.8***	***7.15***
11	***2462***	***6***	***-7.6***	***7.41***
1	2412	9	-9.5	6.51
6	2437	9	-9.2	6.81
11	2462	9	-9.1	7.2
1	2412	12	-10.7	6.47
6	2437	12	-10.3	6.96
11	2462	12	-10.1	7.08
1	2412	18	-11.9	6.52
6	2437	18	-11.6	6.86
11	2462	18	-11.3	7.13
1	2412	24	-12.9	6.62
6	2437	24	-12.6	6.94
11	2462	24	-12.4	6.99

802.11 a				
Channel	**Frequency (MHz)**	**Data Rate (Mbps)**	**Average Power (dBm)**	**Peak Power (dBm)**
149	***5745***	***6***	***-11.05***	***5.6***
153	***5765***	***6***	***-11.2***	***5.49***
161	***5805***	***6***	***-11.63***	***5.19***
149	5745	9	-12.4	5.17
153	5765	9	-12.6	4.73

161	5805	9	-13.02	4.5
149	5745	12	-13.5	4.93
153	5765	12	-13.68	4.81
161	5805	12	-14.1	4.52
149	5745	18	-14.8	5.19
153	5765	18	-15.01	4.78
161	5805	18	-15.4	4.81
149	5745	24	-15.89	5.11
153	5765	24	-16.1	5.26
161	5805	24	-16.45	4.73

2.2 CONDUCTED EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.2.2 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 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	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.*

2.2.3 Equipment Under Test and Modification State

Not performed. EUT is battery operated only.

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

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: N/A / Test Configuration A

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

September 7, 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	23.5°C
Relative Humidity	47.4%
ATM Pressure	99.1 kPa

2.3.7 Additional Observations

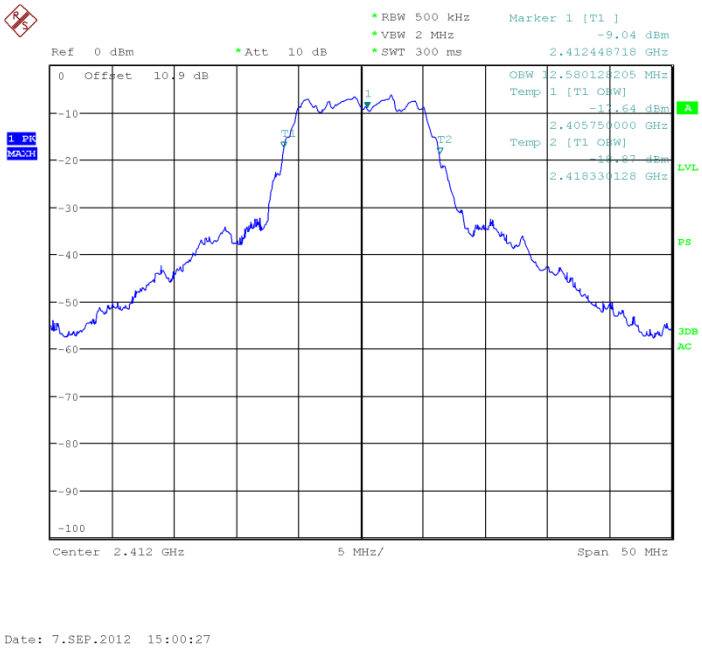
- This is a conducted test.
- An offset of 10.9dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.

- 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.

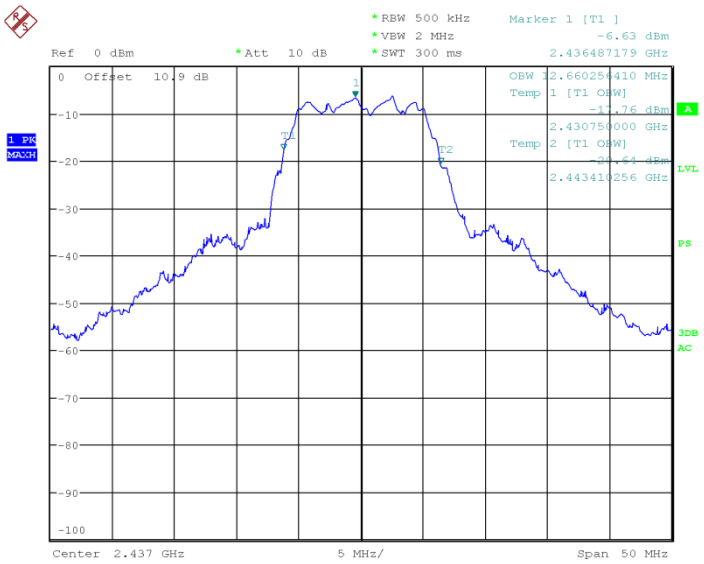
2.3.8 Test Results (For reporting purposes only)

Mode	Channel	Measured 99% Bandwidth (MHz)
802.11b	1 (2412 MHz)	12.58
	6 (2437 MHz)	12.66
	11 (2462 MHz)	12.66
802.11g	1 (2412 MHz)	19.79
	6 (2437 MHz)	19.79
	11 (2462 MHz)	19.47
802.11a	149 (5745 MHz)	18.67
	153 (5765 MHz)	18.59
	161 (5805 MHz)	18.83

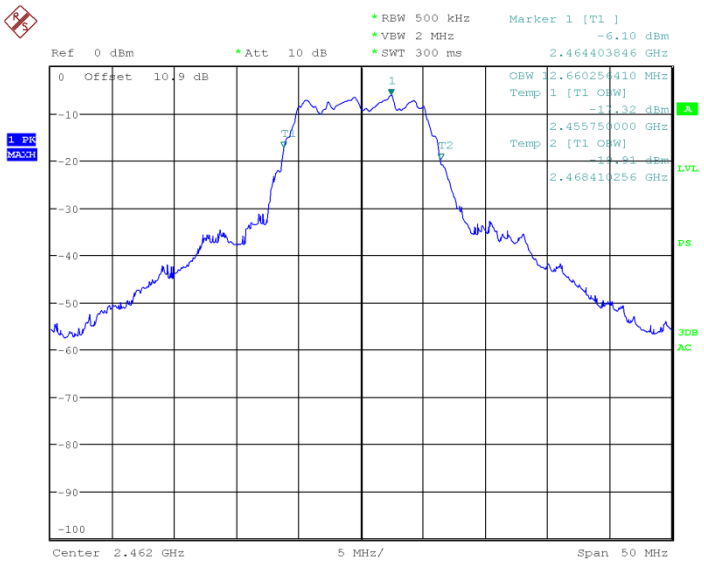
2.3.9 Test Results Plots



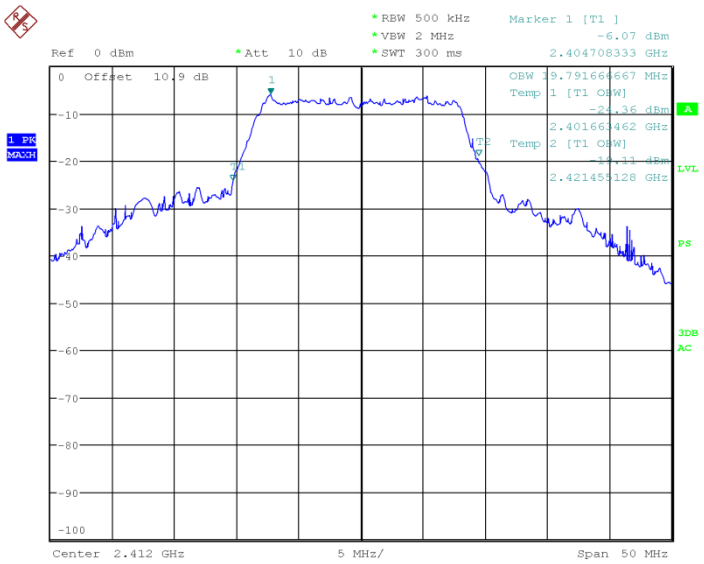
802.11b Low Channel



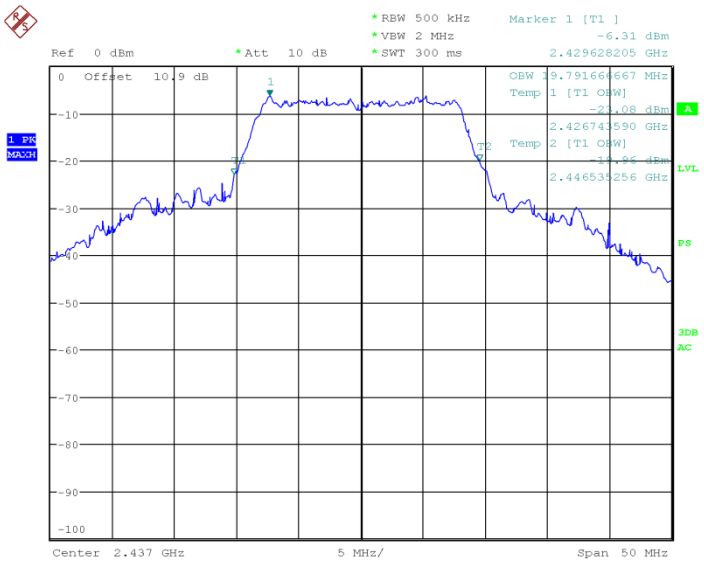
802.11b Mid Channel



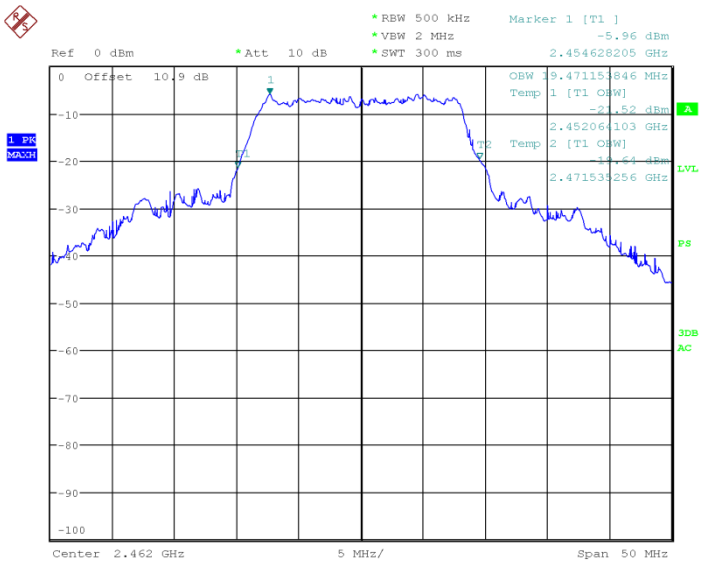
802.11b High Channel



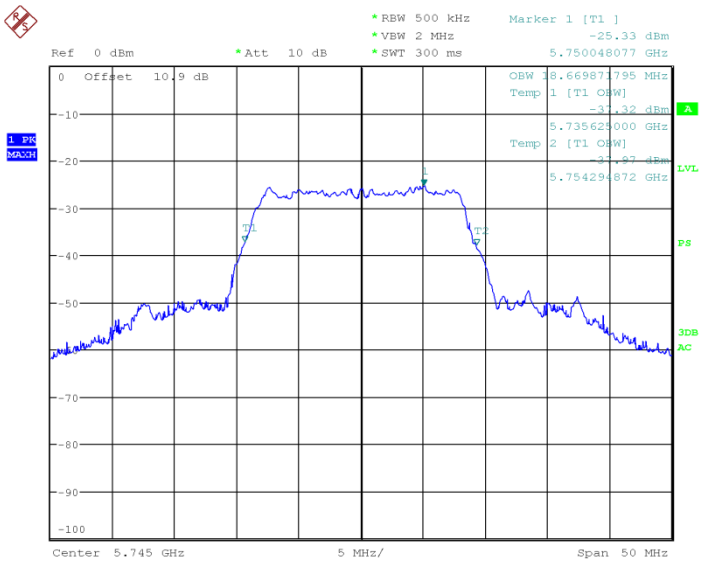
802.11g Low Channel



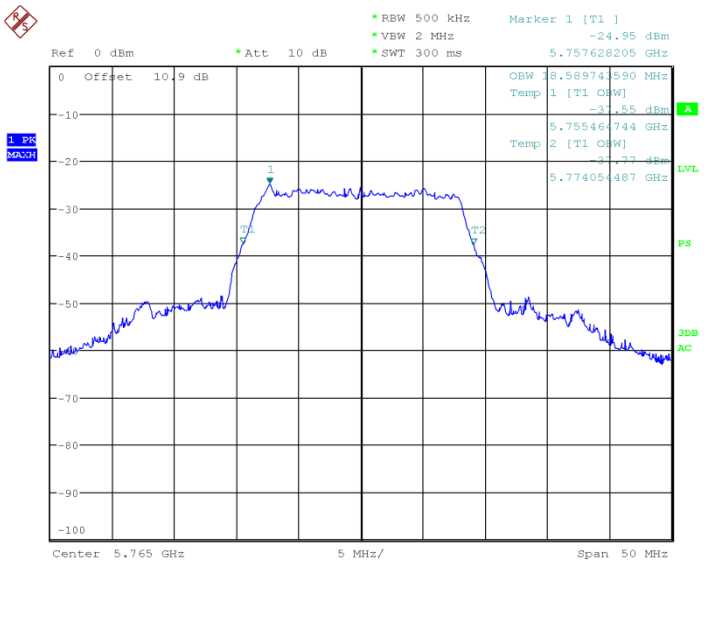
802.11g Mid Channel



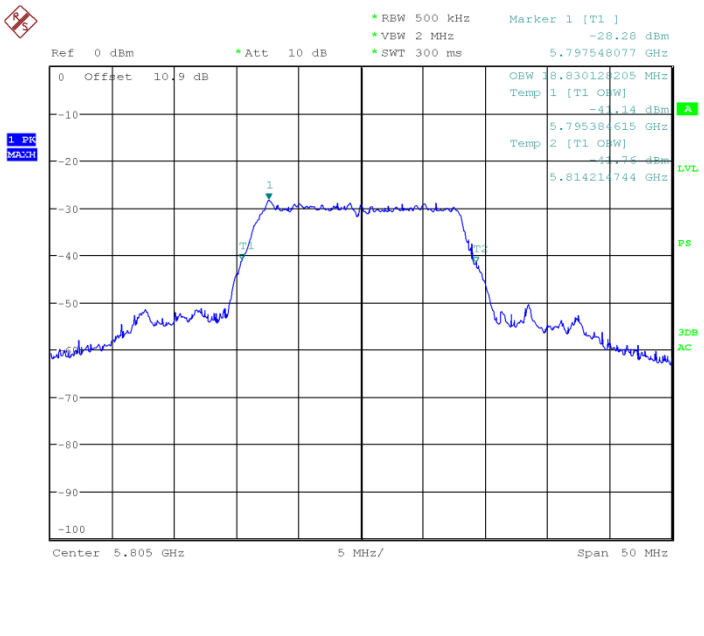
802.11g High Channel



802.11a Low Channel



802.11a Mid Channel



802.11a High Channel

2.4 MINIMUM 6 dB RF BANDWIDTH

2.4.1 Specification Reference

Part 15 Subpart C §15.247(a)(2)

2.4.2 Standard Applicable

(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

September 7, 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	23.5°C
Relative Humidity	47.4%
ATM Pressure	99.1 kPa

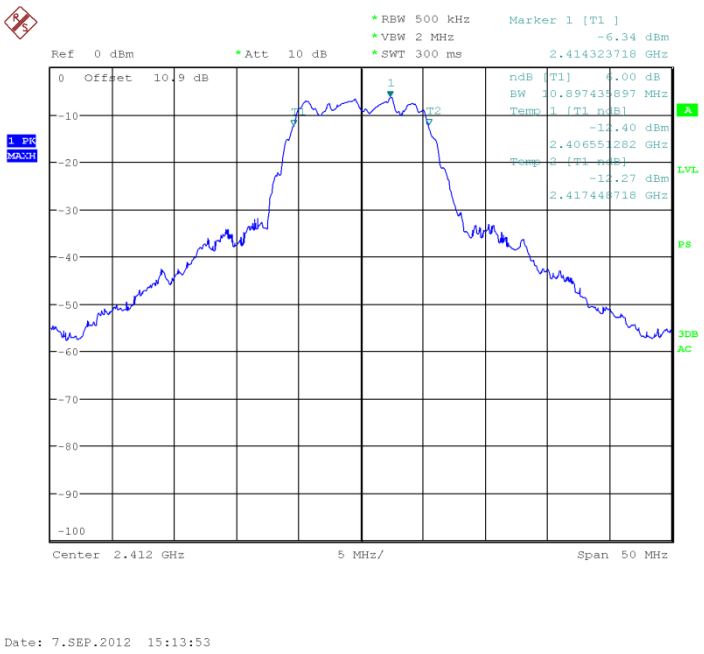
2.4.7 Additional Observations

- This is a conducted test as per DTS (6-dB) Bandwidth guidance of KDB 558074 (Revision to Compliance Measurement Guidance for 15.247 Digital Transmission Systems, April 24, 2012).
- An offset of 10.9dB was added to compensate for the external attenuator and cable used.
- Automatic bandwidth function of the spectrum analyzer was used for this test.
- Span is wide enough to capture the channel transmission.
- RBW is 1% to 5% of the fundamental bandwidth.
- VBW is 3X RBW.
- 100 kHz RBW setting not possible. Any RBW setting below 500 kHz will result in inaccurate measurement due to pronounced dip in the middle of the fundamental signal dividing the bandwidth by half when using automatic bandwidth function of the spectrum analyzer.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.

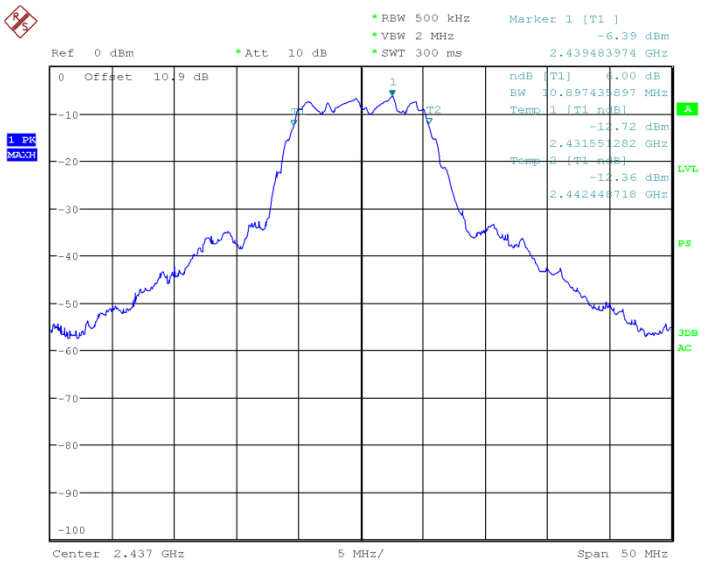
2.4.8 Test Results

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
802.11b	1 (2412 MHz)	10.89	0.500	Complies
	6 (2437 MHz)	10.81	0.500	Complies
	11 (2462 MHz)	10.89	0.500	Complies
802.11g	1 (2412 MHz)	16.99	0.500	Complies
	6 (2437 MHz)	16.99	0.500	Complies
	11 (2462 MHz)	17.06	0.500	Complies
802.11a	149 (5745 MHz)	17.06	0.500	Complies
	153 (5765 MHz)	16.98	0.500	Complies
	161 (5805 MHz)	17.06	0.500	Complies

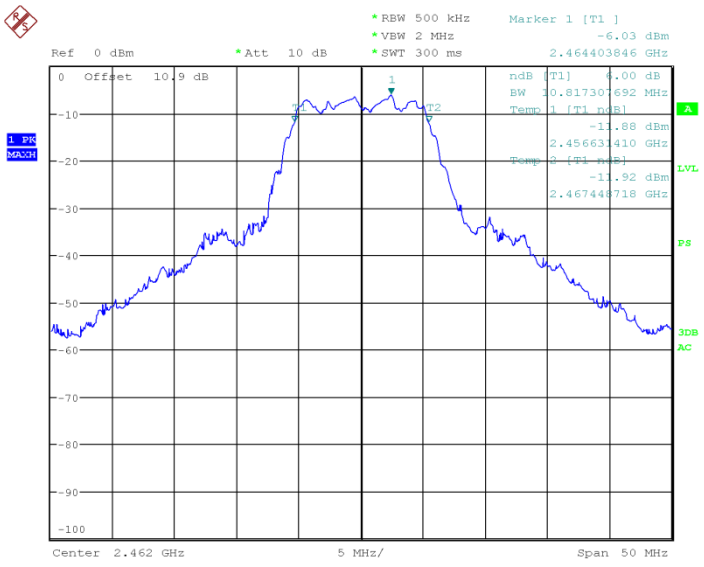
2.4.9 Test Results Plots



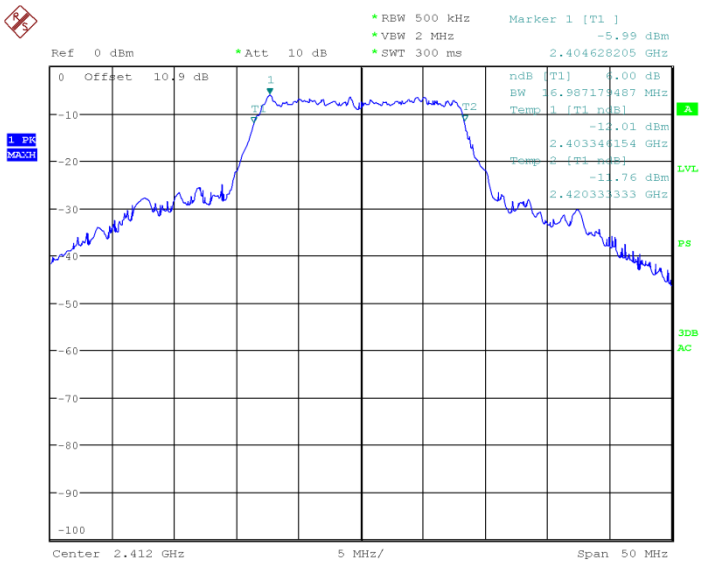
802.11b Low Channel



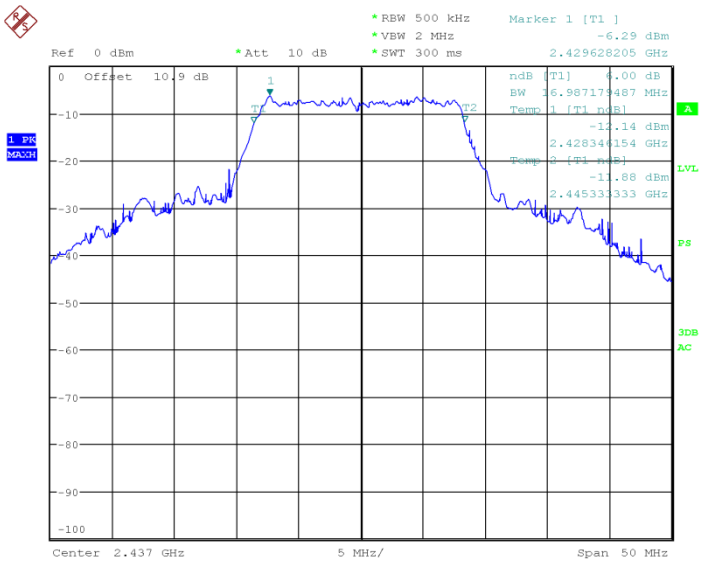
802.11b Mid Channel



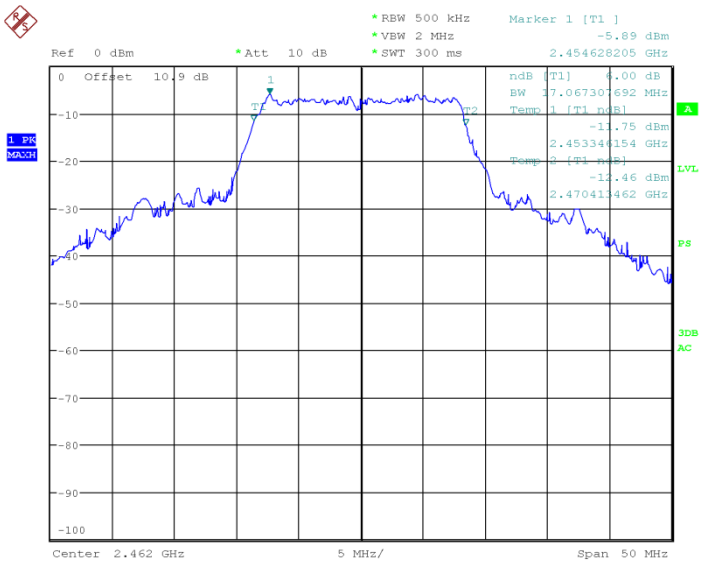
802.11b High Channel



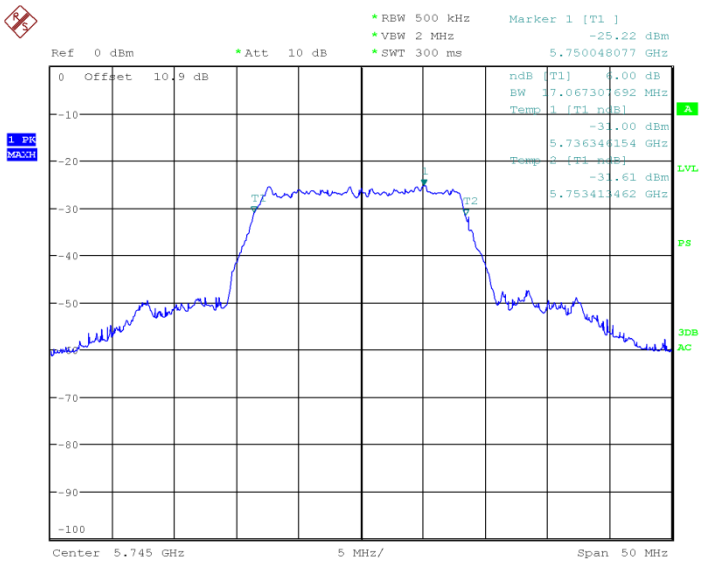
802.11g Low Channel



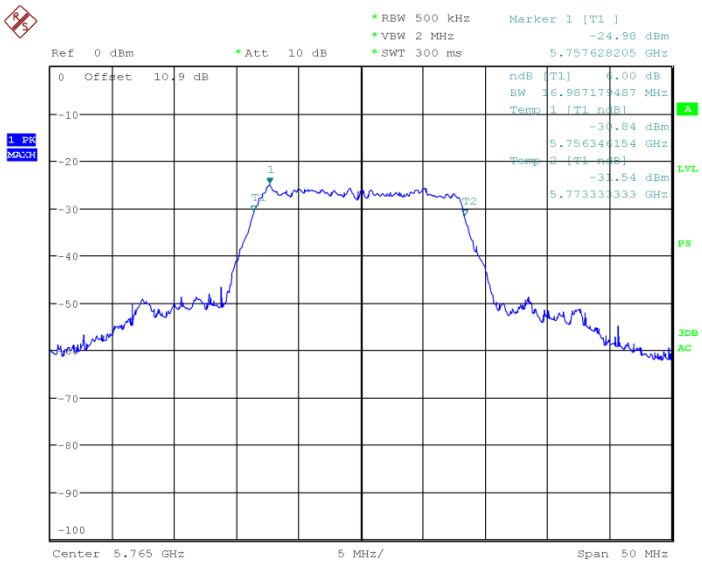
802.11g Mid Channel



802.11g High Channel

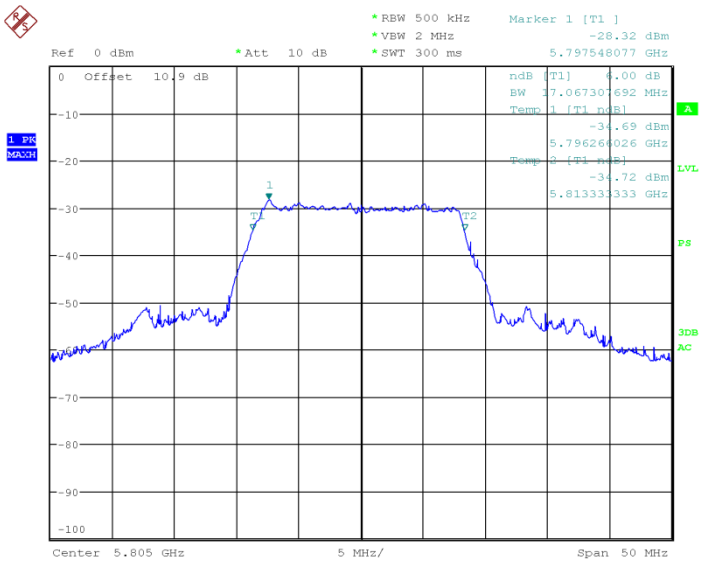


802.11a Low Channel



Date: 7.SEP.2012 15:28:35

802.11a Mid Channel



Date: 7.SEP.2012 15:30:12

802.11a High Channel

2.5 OUT-OF-BAND EMISSIONS - CONDUCTED

2.5.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.5.2 Standard Applicable

(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 a 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 in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.5.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

September 7, 2012/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

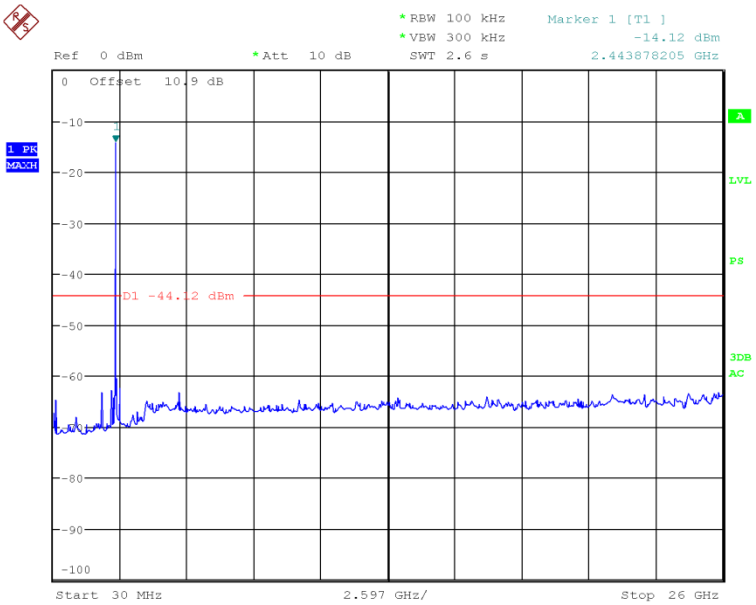
Ambient Temperature	23.5°C
Relative Humidity	47.4%
ATM Pressure	99.1 kPa

2.5.7 Additional Observations

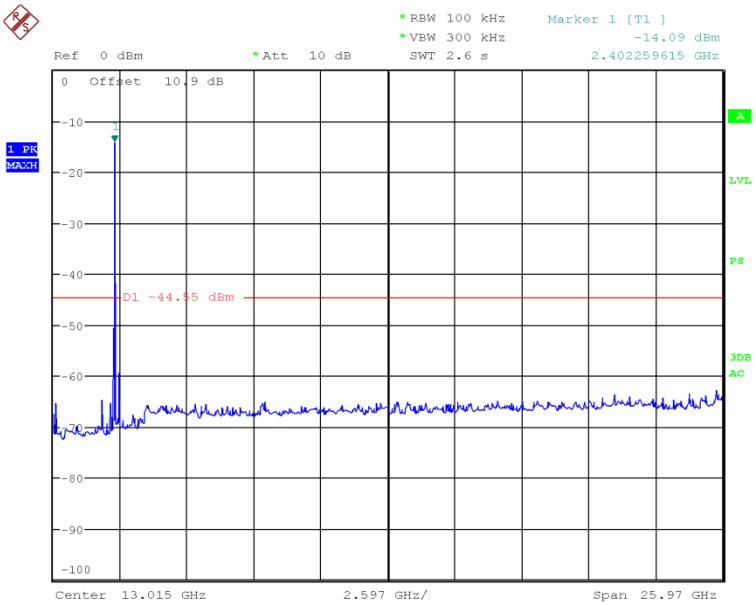
- This is a conducted test.
- An offset of 10.9dB (0.9dB for 802.11 a) was added to compensate for the external attenuator and cable used.
- RBW is 100kHz.VBW is 3X RBW.
- Sweep is auto. Detector is peak. Trace is max hold.
- Initial scan was performed to determine the highest level of the desired power within the band. Limit (display line) was drawn 30dB below this level (worst case).
- Spectrum was searched from 30MHz up to 26GHz (802.11 b/g) and up to 40GHz (802.11 a).

2.5.8 Test Results

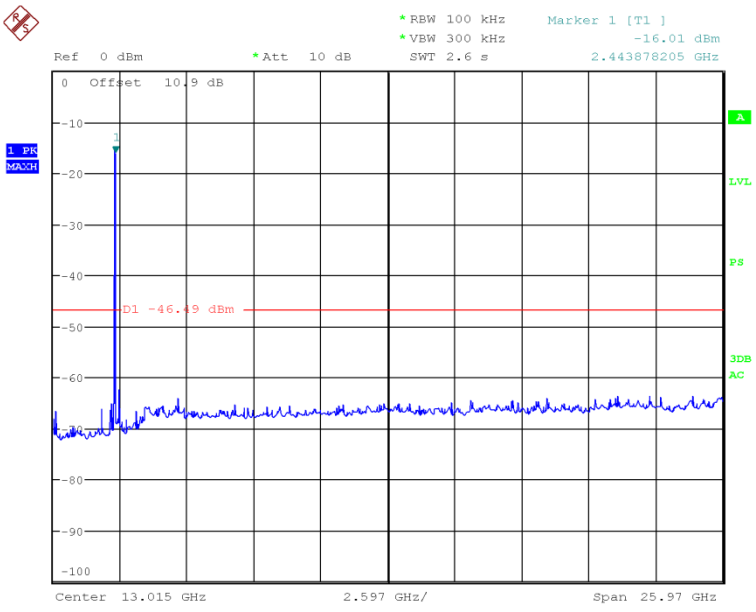
See attached plots.



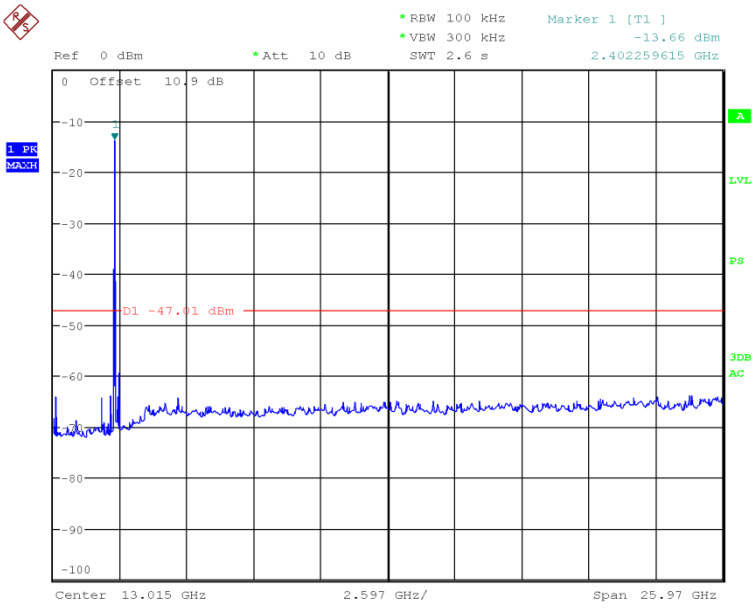
Low Channel (802.11 b)



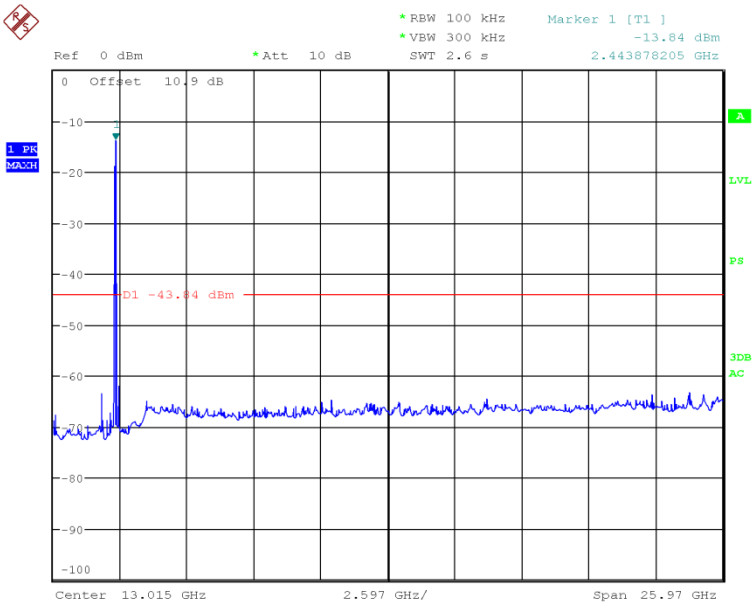
Mid Channel (802.11 b)



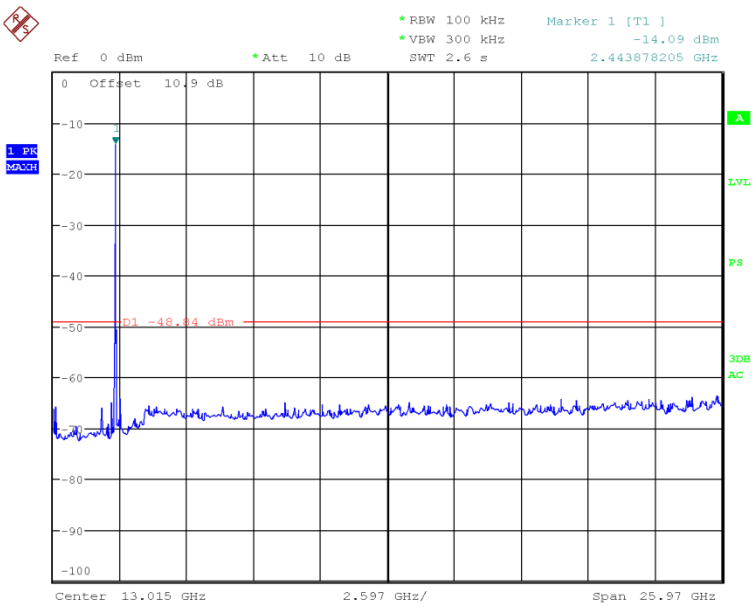
High Channel (802.11 b)



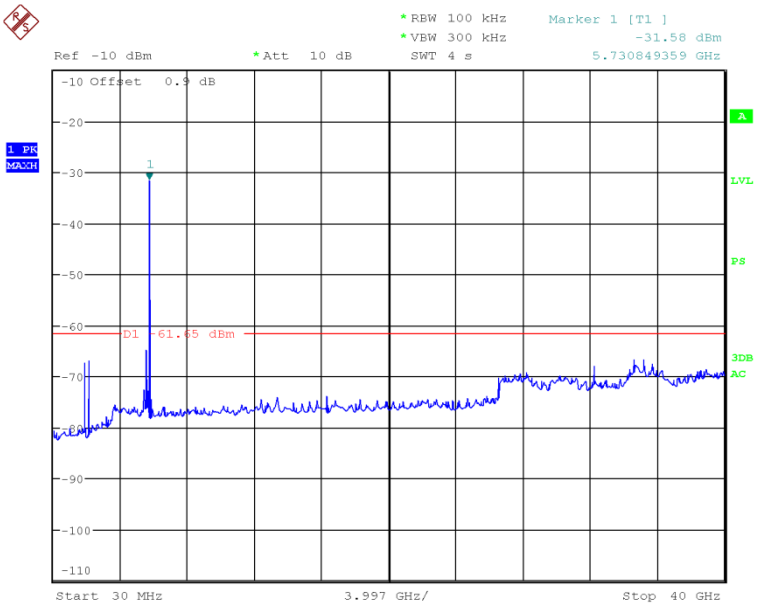
Low Channel (802.11 g)



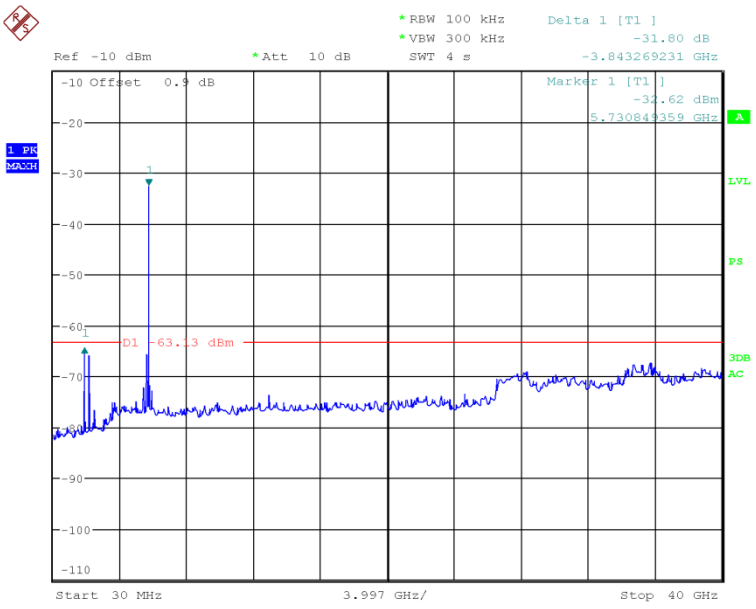
Mid Channel (802.11 g)



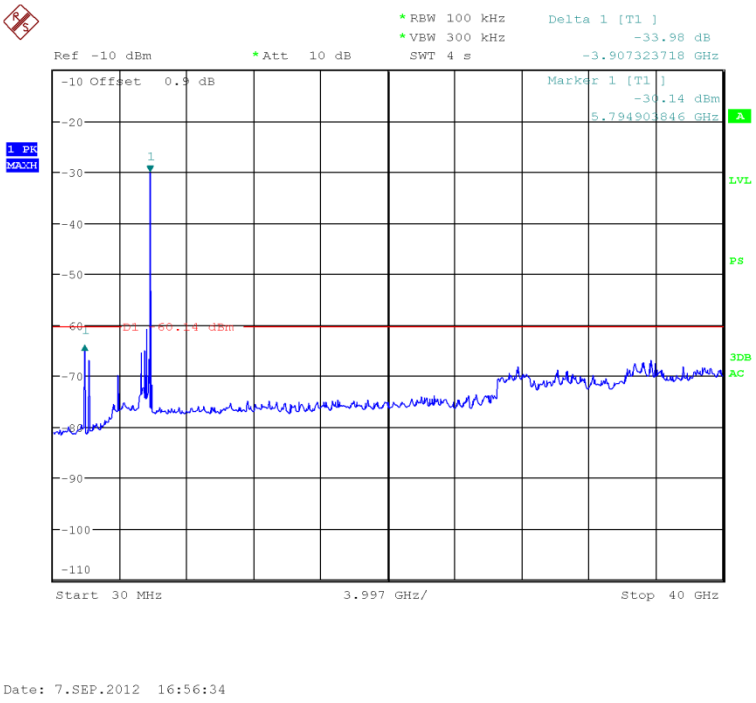
High Channel (802.11 g)



Low Channel (802.11 a)



Mid Channel (802.11 a)



High Channel (802.11 a)

2.6 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.6.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.6.2 Standard Applicable

See previous test.

2.6.3 Equipment Under Test and Modification State

Serial No: N/A/ Test Configuration A

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

September 9, 2012/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

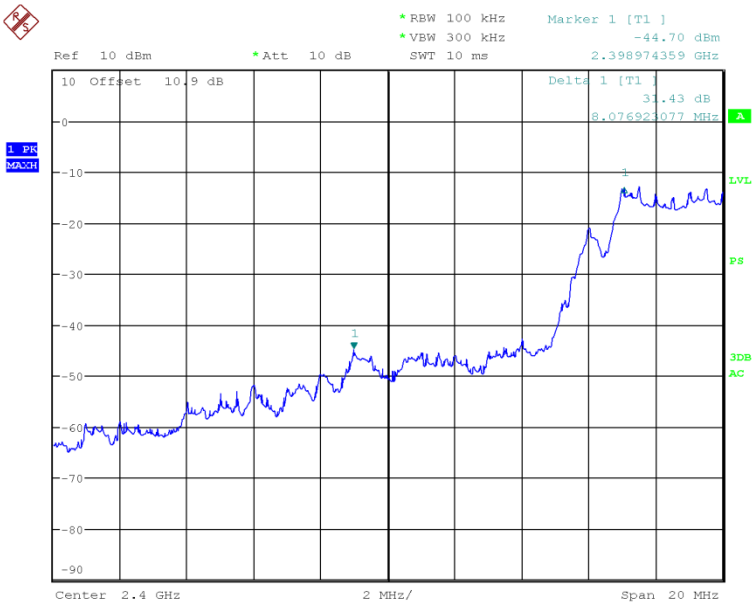
Ambient Temperature	23.5°C
Relative Humidity	47.4%
ATM Pressure	99.1 kPa

2.6.7 Additional Observations

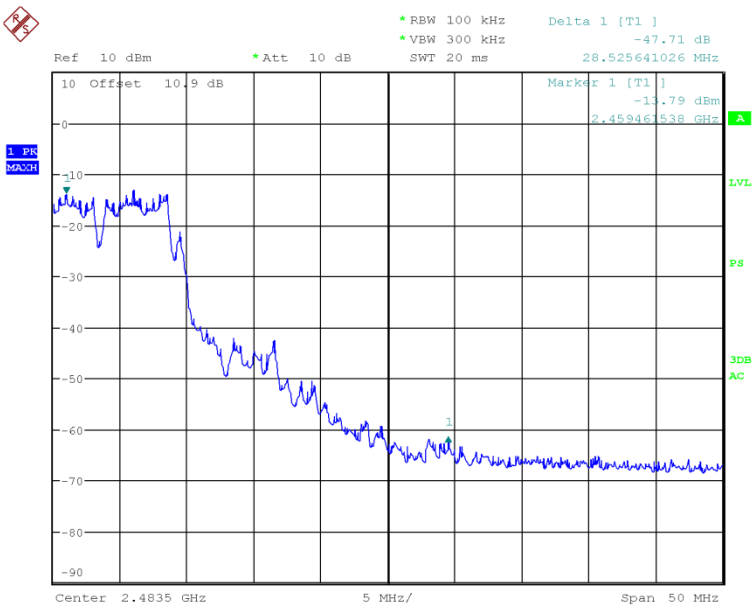
- Setup is identical to “Out-of-Band Emissions – Conducted“test (previous test).
- Band-edge (2400MHz and 2483.5MHz/5727MHz and 5850MHz) emissions were verified in this test.
- The spectrum analyzer was centred on the band-edge frequency while setting the EUT to the corresponding transmit channel (i.e. Low Channel for lower band-edge).
- RBW setting used is 100 kHz.
- Limit used is 20dB which is relative to the in-band peak output power in 100 kHz.
- The worst delta from the highest level of desired power to or beyond the band edge is presented in this test report.

2.6.8 Test Results

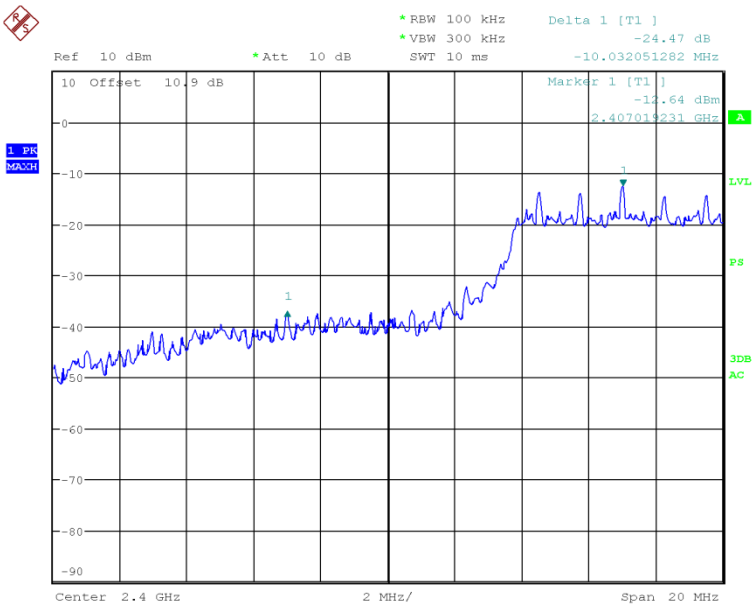
Complies. See attached plots.



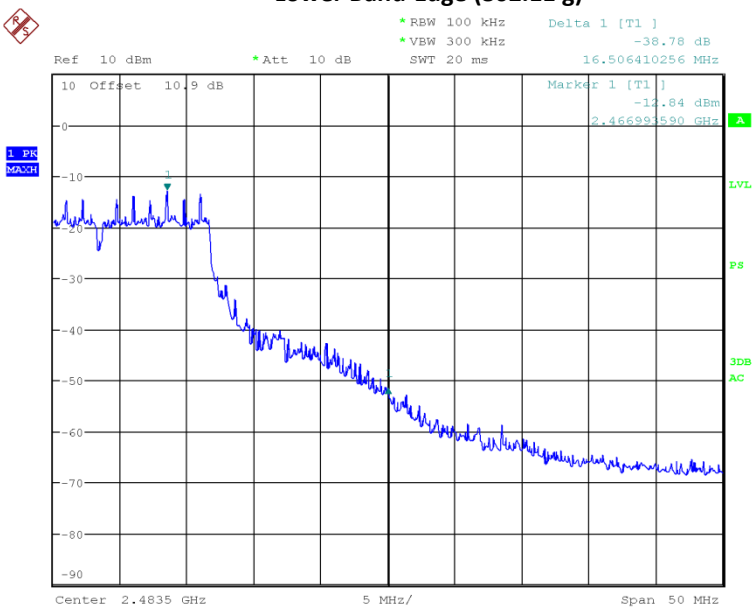
Lower Band-Edge (802.11 b)



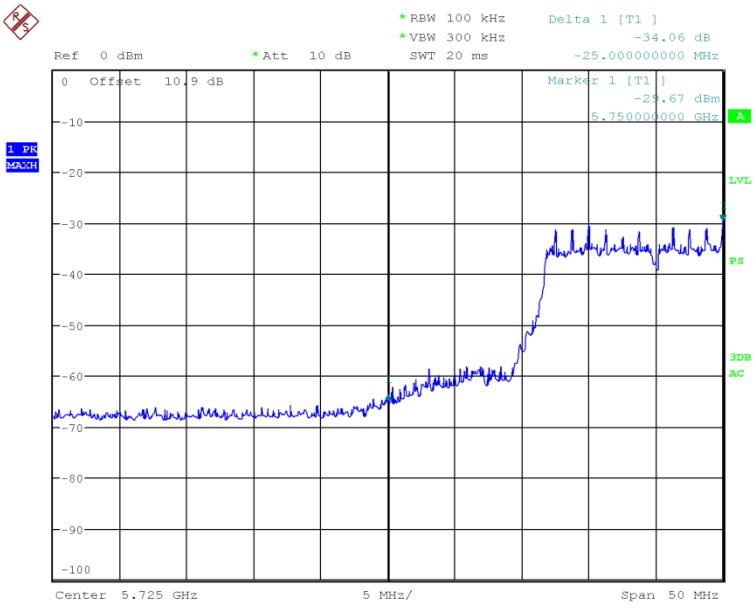
Higher Band-Edge (802.11 b)



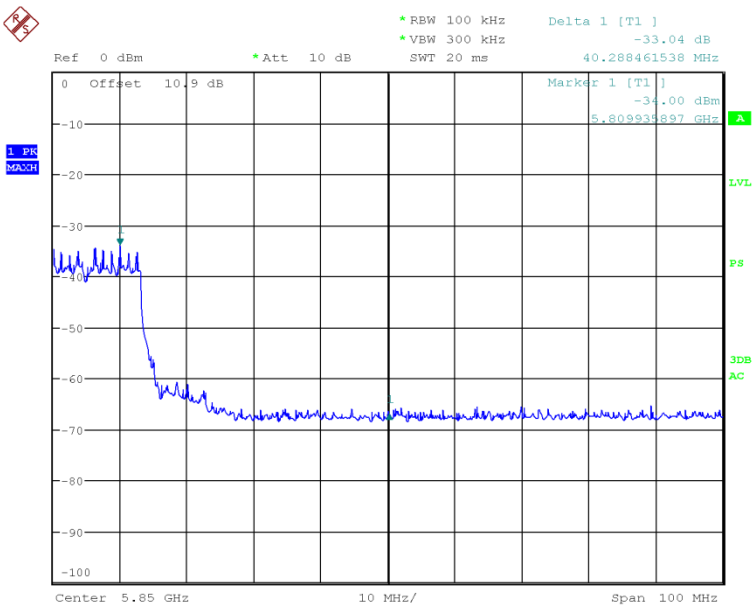
Lower Band-Edge (802.11 g)



Higher Band-Edge (802.11 g)



Lower Band-Edge (802.11 a)



Higher Band-Edge (802.11 a)

2.7 SPURIOUS RADIATED EMISSIONS

2.7.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.7.2 Standard Applicable

(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 a 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 in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.7.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration B

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

August 28 to September 9, 2012/FSC,JMG,KMK

2.7.5 Test Equipment Used

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

2.7.6 Environmental Conditions

Ambient Temperature	23.3 to 25.6°C
Relative Humidity	48.7 to 50.7%
ATM Pressure	99.2 to 100.1 kPa

2.7.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic.
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Test procedure is consistent with those specified under C63.10.
- Measurement was done using EMC32 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 2.7.8 for sample computation.

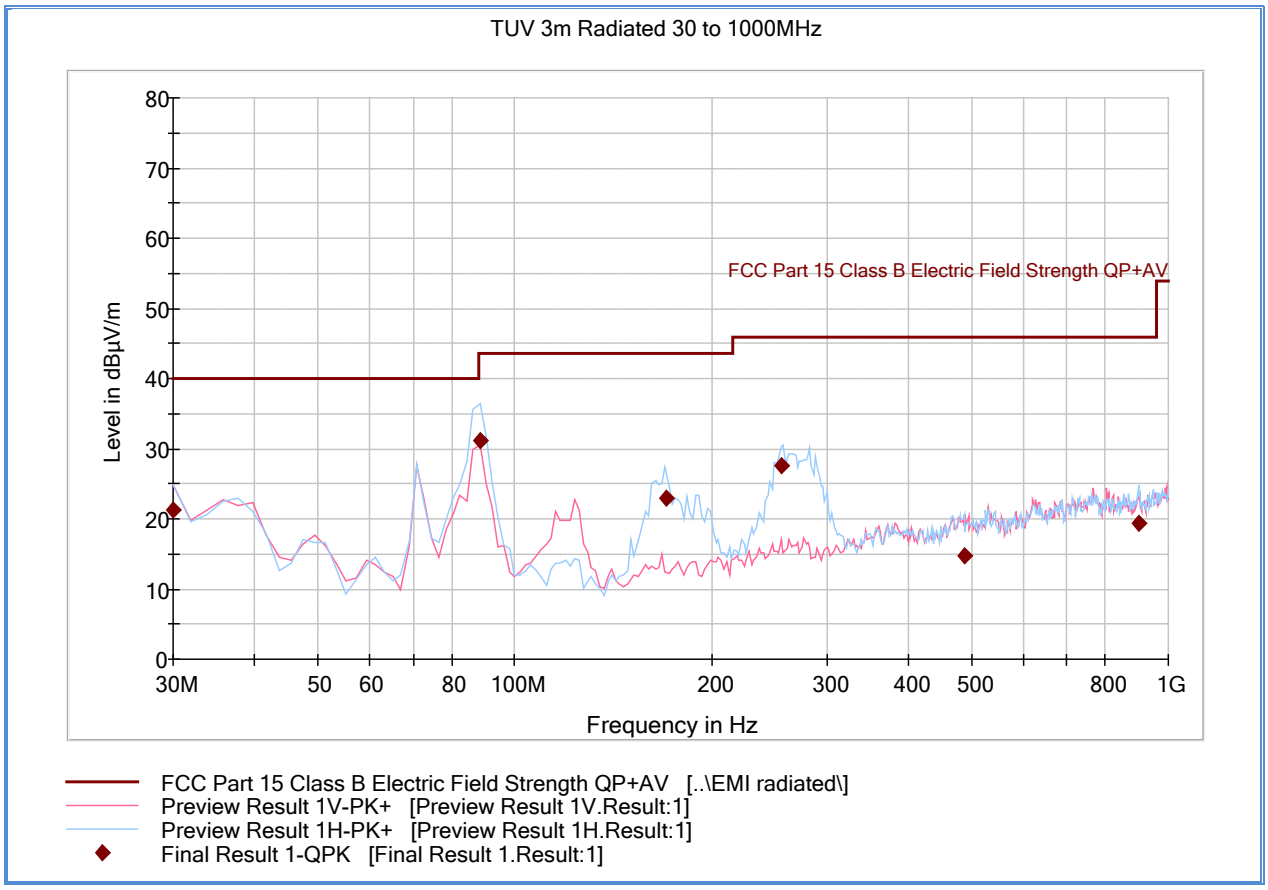
2.7.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.7.9 Test Results

See attached plots.

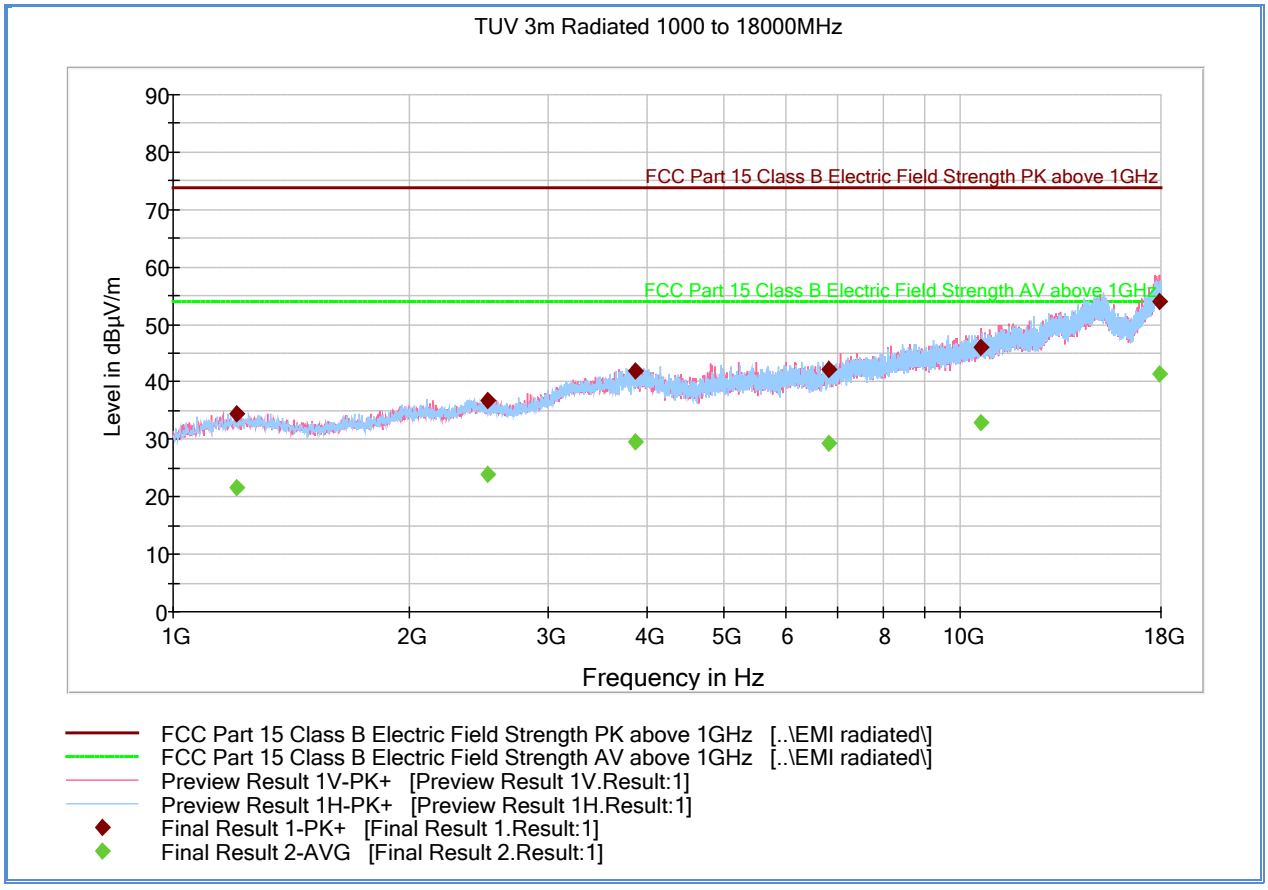
2.7.10 Test Results Below 1GHz (Receive Mode)



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)
30.000000	21.3	1000.0	120.000	134.0	V	358.0	-12.2	18.7	40.0
88.332745	31.1	1000.0	120.000	100.0	H	176.0	-21.2	12.4	43.5
170.359920	23.0	1000.0	120.000	188.0	H	71.0	-17.6	20.5	43.5
256.114870	27.6	1000.0	120.000	100.0	H	88.0	-13.9	18.4	46.0
488.637515	14.8	1000.0	120.000	372.0	V	22.0	-6.7	31.2	46.0
900.797836	19.3	1000.0	120.000	214.0	H	3.0	-0.2	26.7	46.0

2.7.11 Test Results Above 1GHz (Receive Mode)



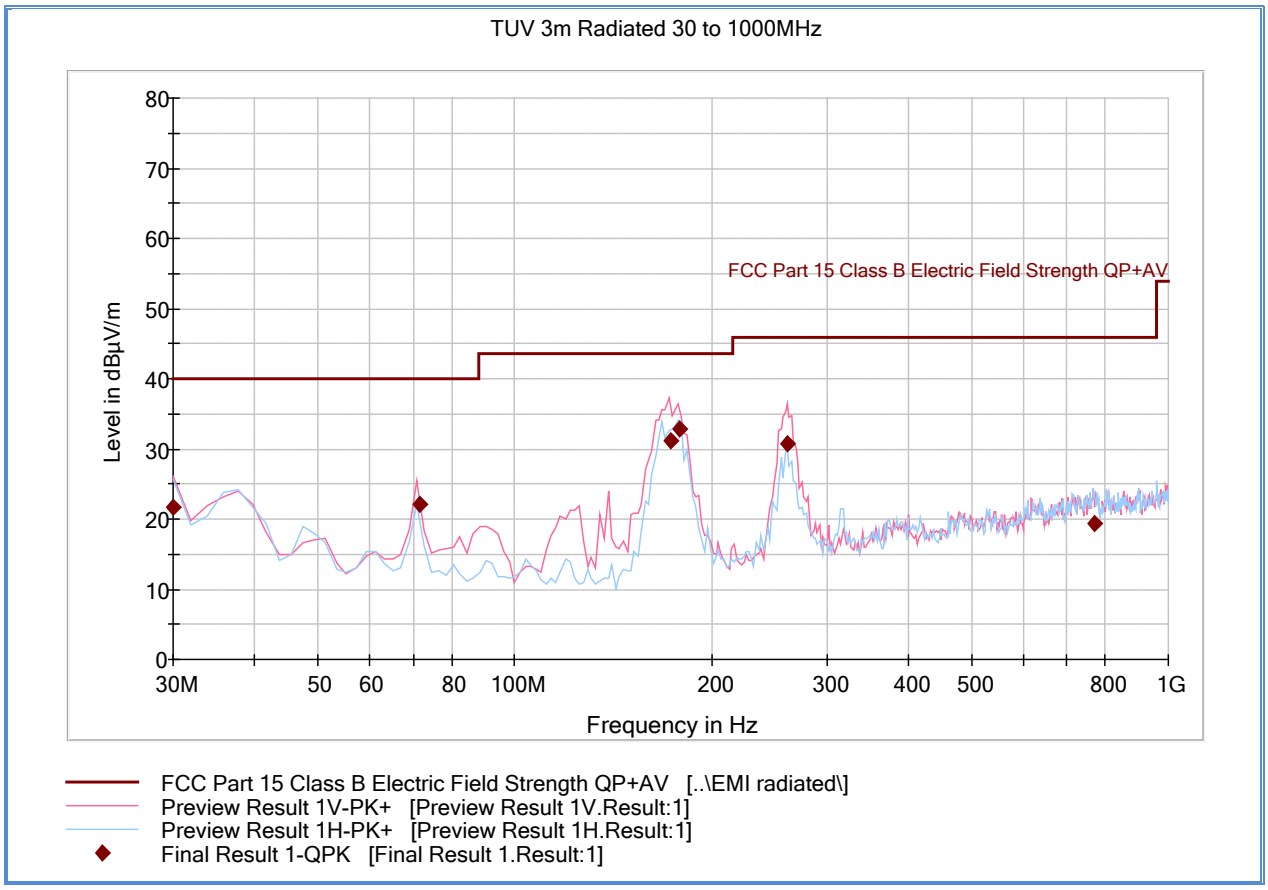
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1204.020000	34.5	1000.0	1000.000	206.0	H	16.0	-9.7	39.4	73.9
2509.380000	36.9	1000.0	1000.000	112.0	V	334.0	-4.5	37.0	73.9
3867.880000	41.9	1000.0	1000.000	376.0	V	199.0	3.3	32.0	73.9
6815.280000	42.1	1000.0	1000.000	100.0	V	0.0	5.4	31.8	73.9
10637.44000	46.0	1000.0	1000.000	122.0	V	53.0	11.0	27.9	73.9
17897.22000	54.0	1000.0	1000.000	400.0	V	61.0	20.9	19.9	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)
1204.020000	21.7	1000.0	1000.000	206.0	H	16.0	-9.7	32.2	53.9
2509.380000	23.9	1000.0	1000.000	112.0	V	334.0	-4.5	30.0	53.9
3867.880000	29.4	1000.0	1000.000	376.0	V	199.0	3.3	24.5	53.9
6815.280000	29.4	1000.0	1000.000	100.0	V	0.0	5.4	24.5	53.9
10637.44000	33.0	1000.0	1000.000	122.0	V	53.0	11.0	20.9	53.9
17897.22000	41.5	1000.0	1000.000	400.0	V	61.0	20.9	12.4	53.9

2.7.12 Test Results Below 1GHz (High Channel – 802.11 b)

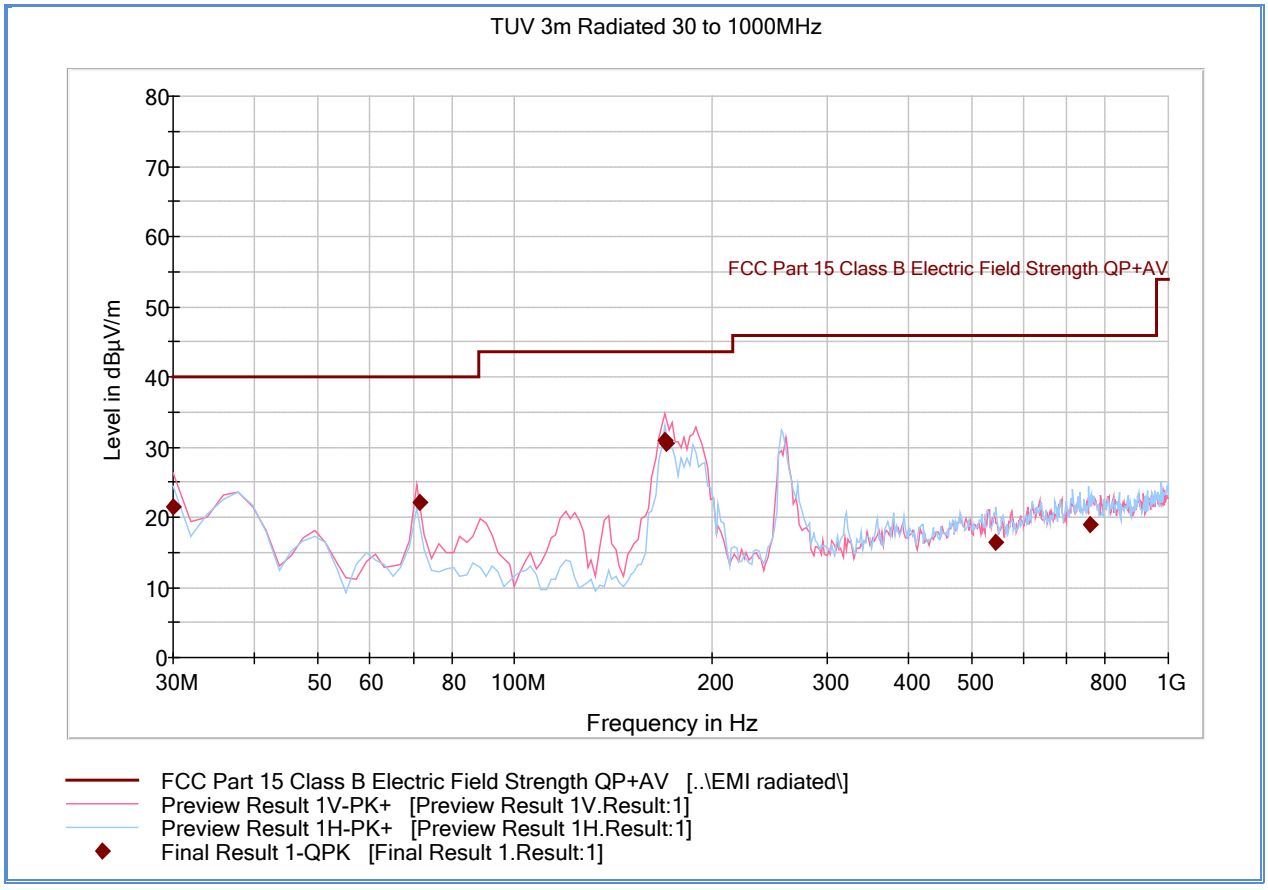


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.040000	21.6	1000.0	120.000	131.0	V	11.0	-12.3	18.4	40.0
71.421643	22.0	1000.0	120.000	234.0	V	214.0	-22.2	18.0	40.0
173.183808	31.1	1000.0	120.000	104.0	V	203.0	-17.6	12.4	43.5
178.535471	32.8	1000.0	120.000	100.0	V	189.0	-17.4	10.7	43.5
261.482645	30.8	1000.0	120.000	224.0	V	124.0	-13.8	15.2	46.0
769.357355	19.4	1000.0	120.000	243.0	V	120.0	-1.0	26.6	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.13 Test Results Below 1GHz (High Channel – 802.11 g)

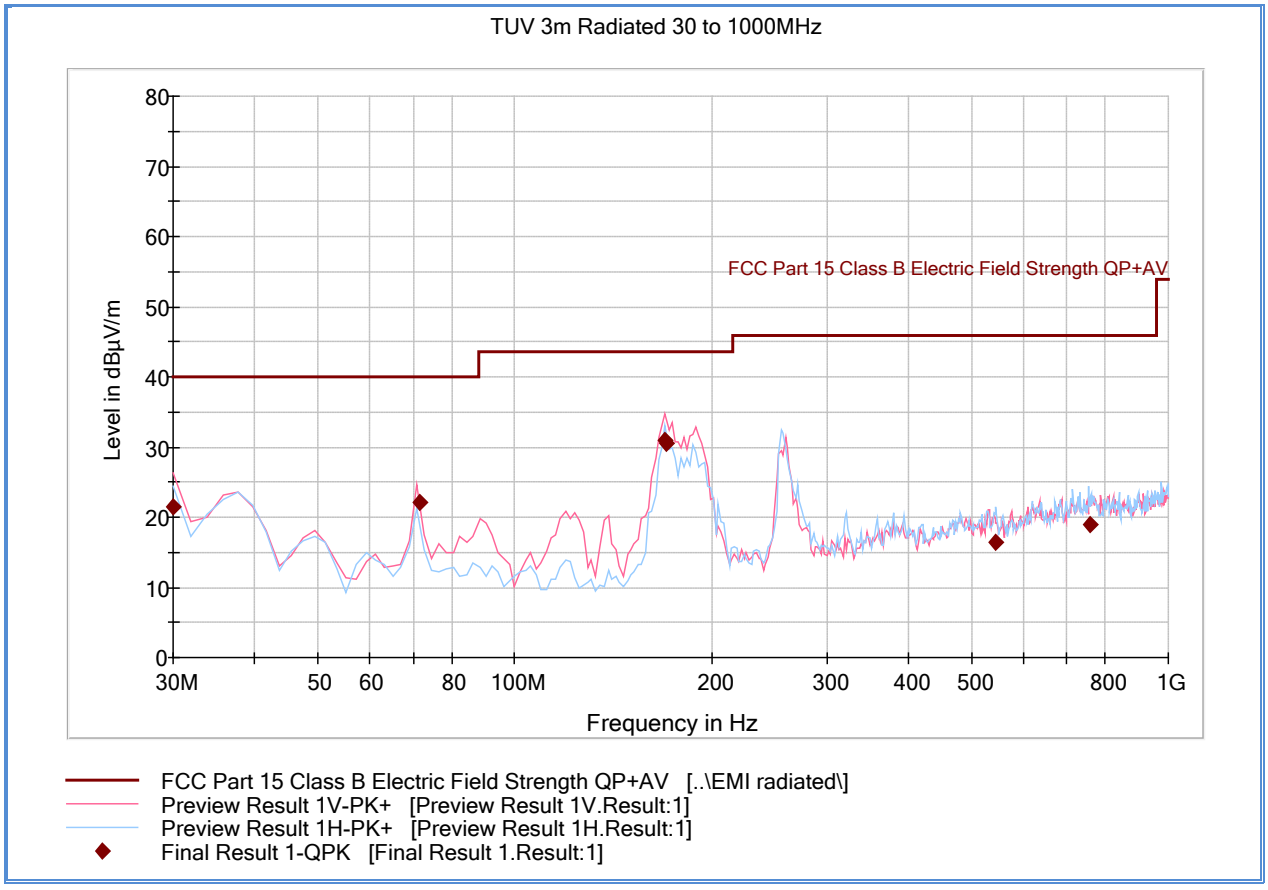


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.000000	21.4	1000.0	120.000	132.0	V	332.0	-12.2	18.6	40.0
71.461643	22.1	1000.0	120.000	238.0	V	333.0	-22.2	17.9	40.0
169.239920	30.9	1000.0	120.000	100.0	V	340.0	-17.6	12.6	43.5
170.407695	30.4	1000.0	120.000	103.0	V	326.0	-17.6	13.1	43.5
544.370261	16.4	1000.0	120.000	362.0	H	44.0	-6.1	29.6	46.0
757.390140	18.9	1000.0	120.000	112.0	H	166.0	-1.9	27.1	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.14 Test Results Below 1GHz (Low Channel – 802.11 a)

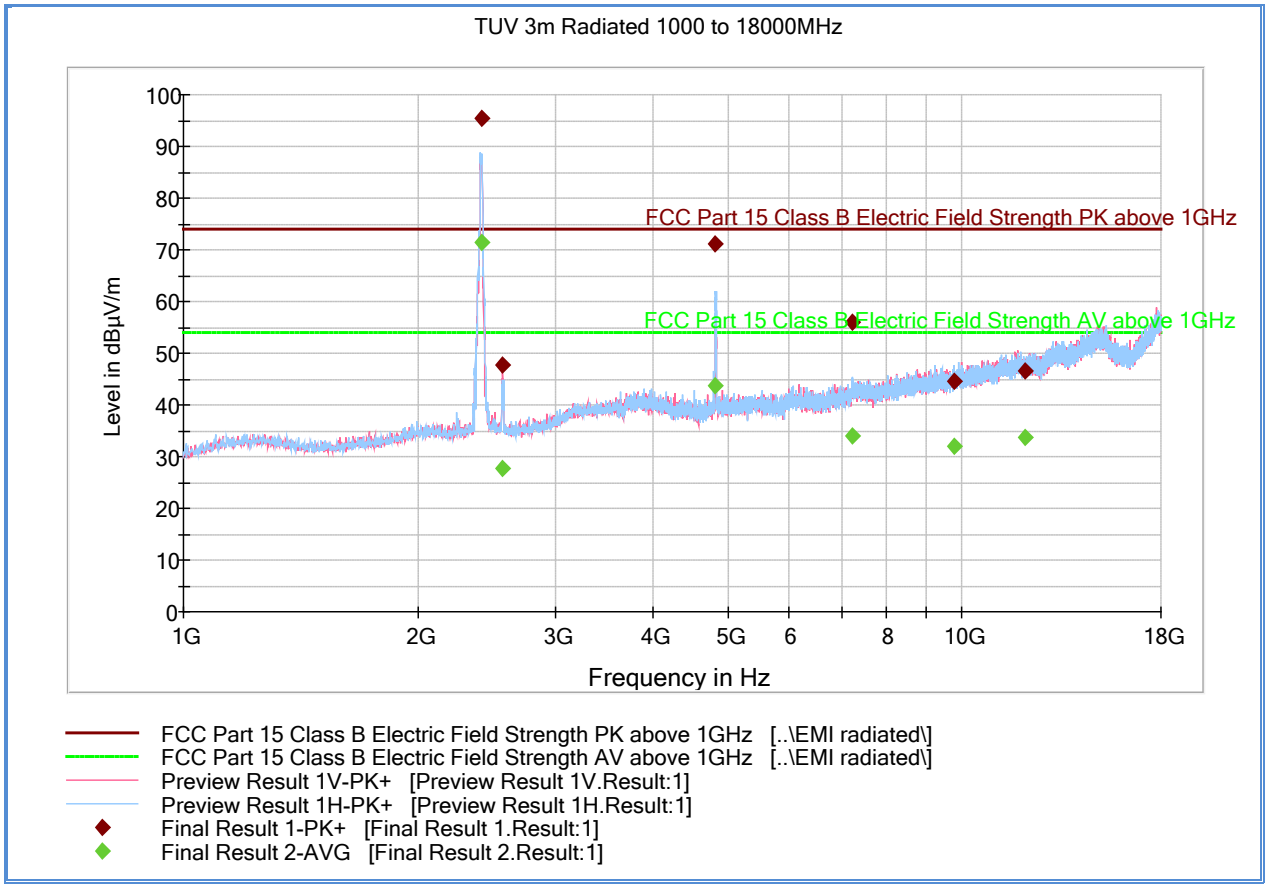


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.000000	21.4	1000.0	120.000	132.0	V	332.0	-12.2	18.6	40.0
71.461643	22.1	1000.0	120.000	238.0	V	333.0	-22.2	17.9	40.0
169.239920	30.9	1000.0	120.000	100.0	V	340.0	-17.6	12.6	43.5
170.407695	30.4	1000.0	120.000	103.0	V	326.0	-17.6	13.1	43.5
544.370261	16.4	1000.0	120.000	362.0	H	44.0	-6.1	29.6	46.0
757.390140	18.9	1000.0	120.000	112.0	H	166.0	-1.9	27.1	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.15 Test Results Above 1GHz (Low Channel -802.11 b)



Peak Data

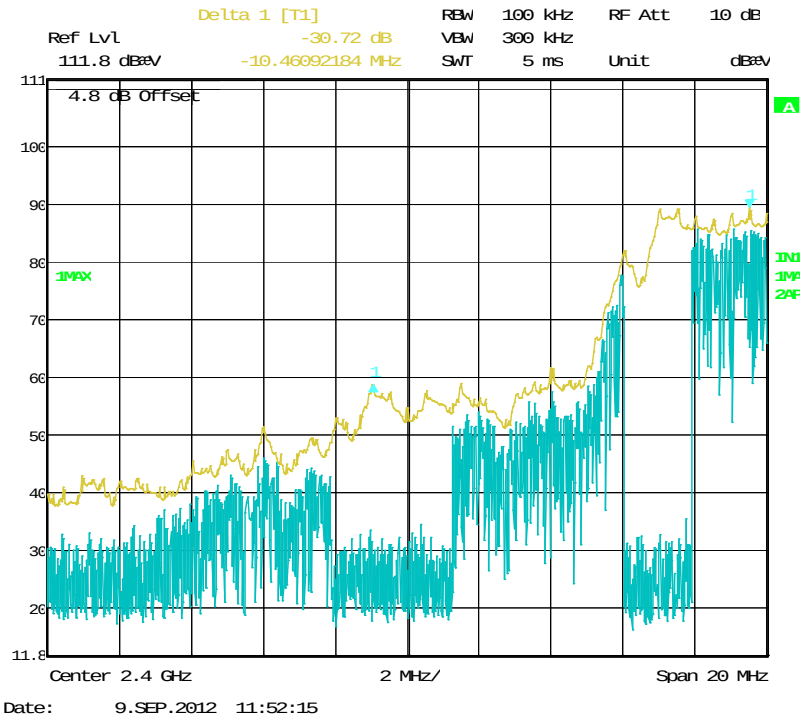
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2413.240000	95.5	1000.0	1000.000	100.0	H	135.0	-4.7	-21.6	73.9
2572.600000	47.8	1000.0	1000.000	104.0	V	169.0	-4.4	26.1	73.9
4825.220000	71.0	1000.0	1000.000	100.0	H	136.0	2.1	2.9	73.9
7242.220000	55.9	1000.0	1000.000	100.0	H	231.0	6.6	18.0	73.9
9755.700000	44.6	1000.0	1000.000	178.0	H	191.0	9.6	29.3	73.9
12060.140000	46.5	1000.0	1000.000	297.0	V	222.0	12.6	27.4	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)
2413.240000	71.3	1000.0	1000.000	100.0	H	135.0	-4.7	-17.4	53.9
2572.600000	27.7	1000.0	1000.000	104.0	V	169.0	-4.4	26.2	53.9
4825.220000	43.8	1000.0	1000.000	100.0	H	136.0	2.1	10.1	53.9
7242.220000	34.0	1000.0	1000.000	100.0	H	231.0	6.6	19.9	53.9
9755.700000	31.9	1000.0	1000.000	178.0	H	191.0	9.6	22.0	53.9
12060.140000	33.9	1000.0	1000.000	297.0	V	222.0	12.6	20.0	53.9

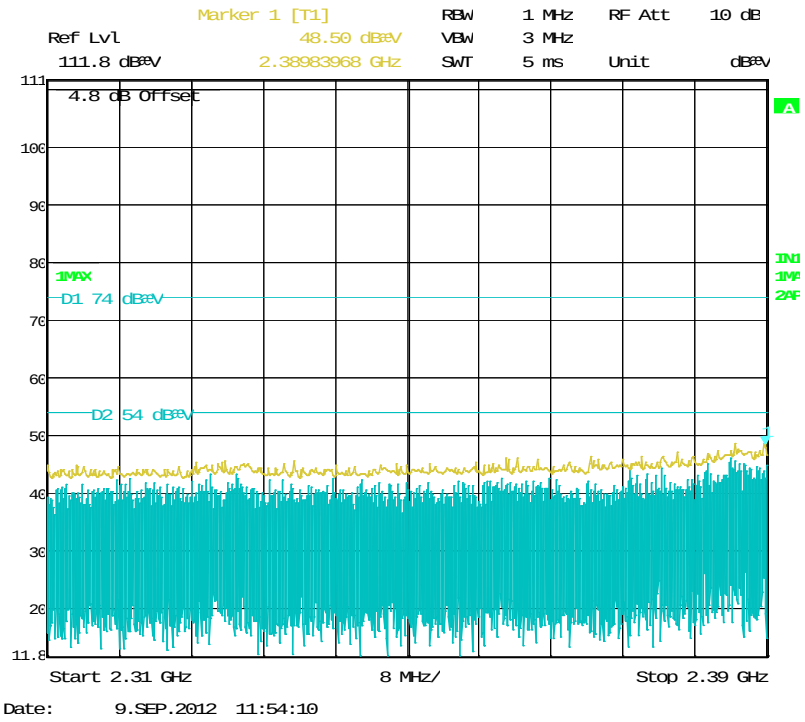
Test Notes: 2413.2MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.7.16 Test Results Lower Band Edge 802.11 b (Radiated - Low Channel using 100 kHz RBW)



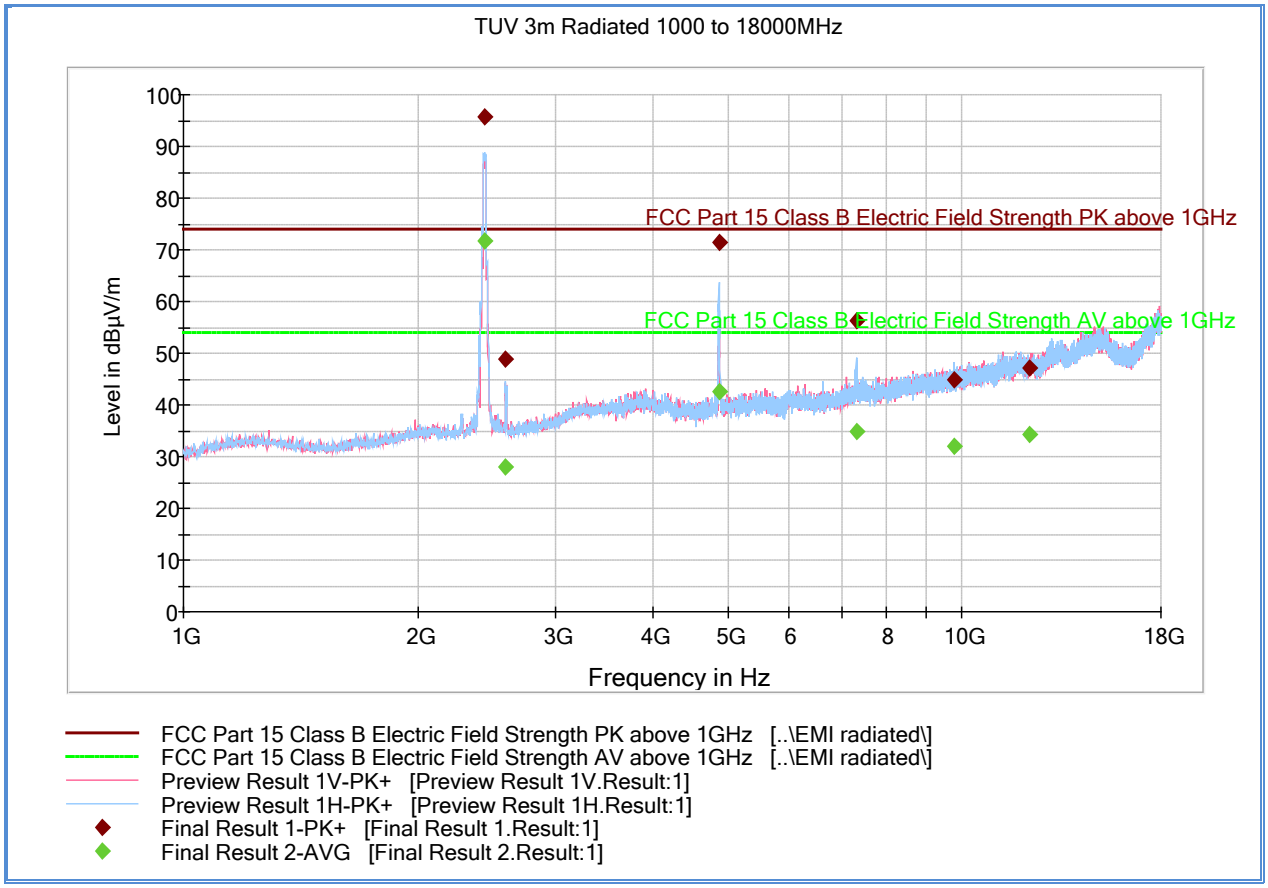
Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of 4.8dB is from the cable, antenna and preamp used. Limit for this test is 20dBc.

2.7.17 Test Results Restricted Band (2310MHz to 2390MHz) 802.11 b



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of 4.8dB is from the cable, antenna and preamp used. Peak complies with Average limit therefore no Average measurement performed.

2.7.18 Test Results Above 1GHz 802.11 b (Mid Channel)



Peak Data

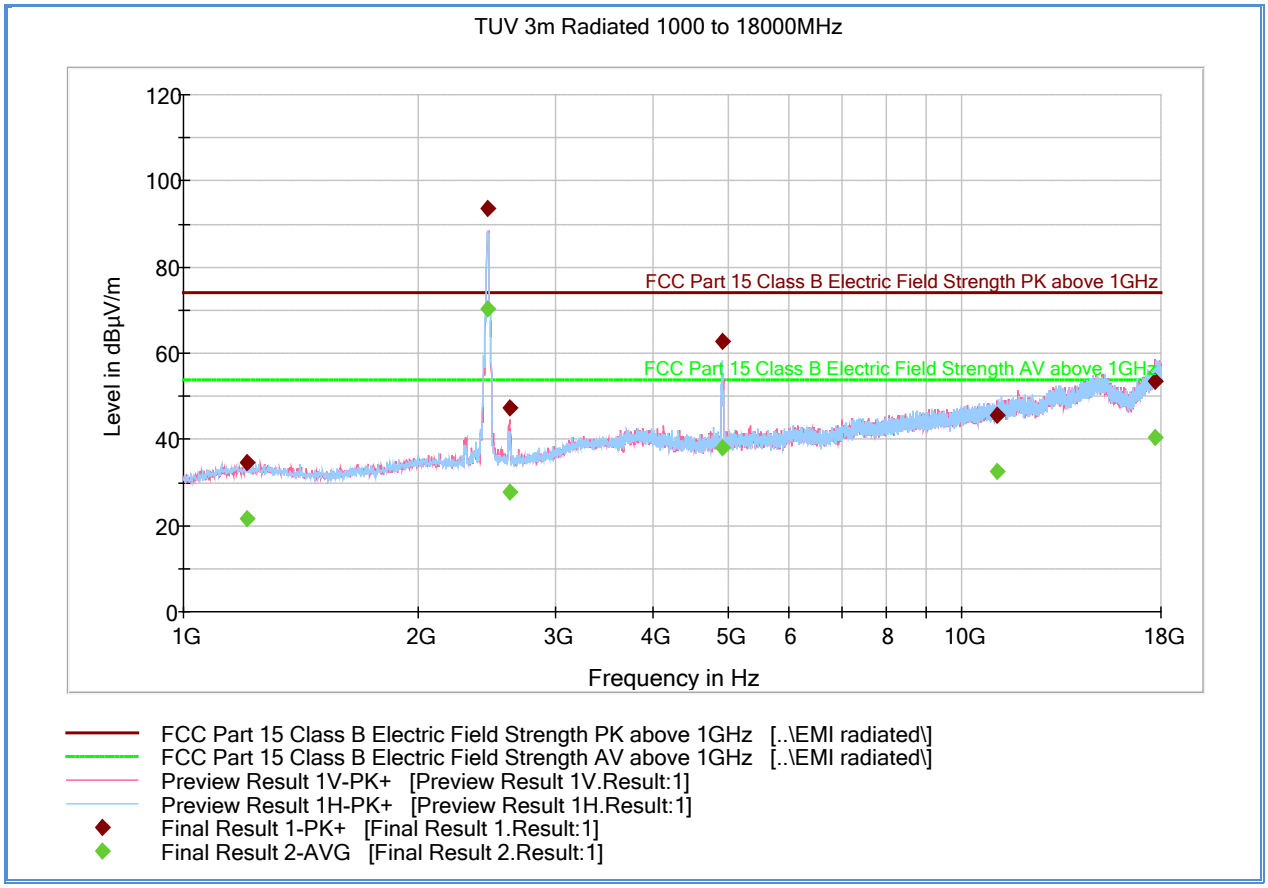
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2439.480000	95.8	1000.	1000.000	100.0	H	137.0	-4.7	-21.9	73.9
2589.480000	48.8	1000.	1000.000	100.0	V	170.0	-4.3	25.1	73.9
4869.620000	71.3	1000.	1000.000	100.0	H	279.0	2.2	2.6	73.9
7307.220000	56.4	1000.	1000.000	100.0	H	137.0	7.1	17.5	73.9
9771.940000	44.9	1000.	1000.000	292.0	V	88.0	9.6	29.0	73.9
12186.38000	47.2	1000.	1000.000	380.0	H	289.0	12.4	26.7	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)
2439.480000	71.7	1000.0	1000.000	100.0	H	137.0	-4.7	-17.8	53.9
2589.480000	27.9	1000.0	1000.000	100.0	V	170.0	-4.3	26.0	53.9
4869.620000	42.7	1000.0	1000.000	100.0	H	279.0	2.2	11.2	53.9
7307.220000	35.0	1000.0	1000.000	100.0	H	137.0	7.1	18.9	53.9
9771.940000	31.9	1000.0	1000.000	292.0	V	88.0	9.6	22.0	53.9
12186.380000	34.3	1000.0	1000.000	380.0	H	289.0	12.4	19.6	53.9

Test Notes: 2439MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.7.19 Test Results Above 1GHz (High Channel - 802.11 b)



Peak Data

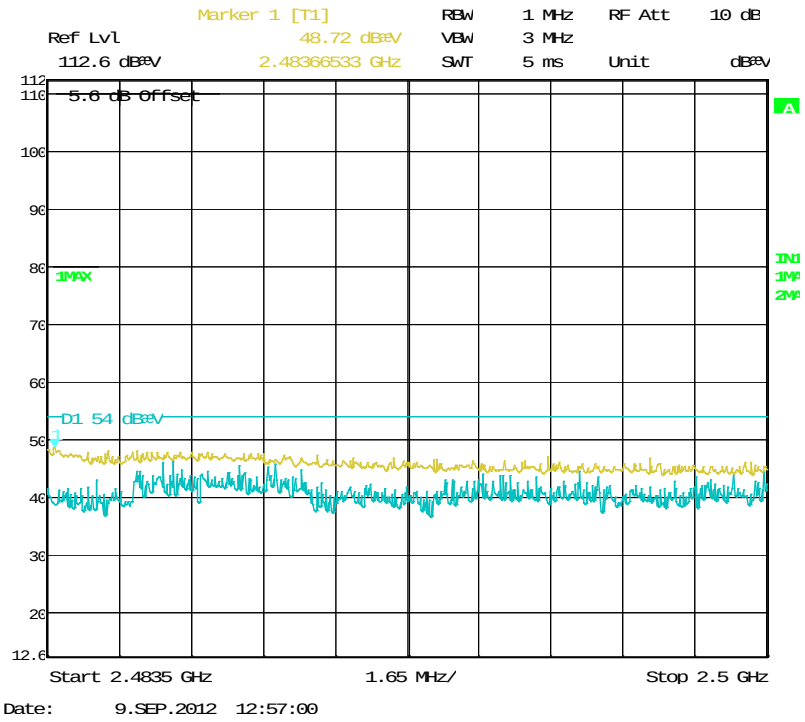
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1209.000000	34.7	1000.0	1000.000	247.0	H	63.0	-9.7	39.2	73.9
2454.120000	93.6	1000.0	1000.000	100.0	H	126.0	-4.7	-19.7	73.9
2623.240000	47.4	1000.0	1000.000	125.0	V	23.0	-4.2	26.5	73.9
4923.980000	62.8	1000.0	1000.000	100.0	H	291.0	2.3	11.1	73.9
11093.320000	45.6	1000.0	1000.000	219.0	V	290.0	11.7	28.3	73.9
17723.480000	53.6	1000.0	1000.000	253.0	V	134.0	20.6	20.3	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)
1209.000000	21.6	1000.0	1000.000	247.0	H	63.0	-9.7	32.3	53.9
2454.120000	70.1	1000.0	1000.000	100.0	H	126.0	-4.7	-16.2	53.9
2623.240000	27.8	1000.0	1000.000	125.0	V	23.0	-4.2	26.1	53.9
4923.980000	37.9	1000.0	1000.000	100.0	H	291.0	2.3	16.0	53.9
11093.320000	32.6	1000.0	1000.000	219.0	V	290.0	11.7	21.3	53.9
17723.480000	40.4	1000.0	1000.000	253.0	V	134.0	20.6	13.5	53.9

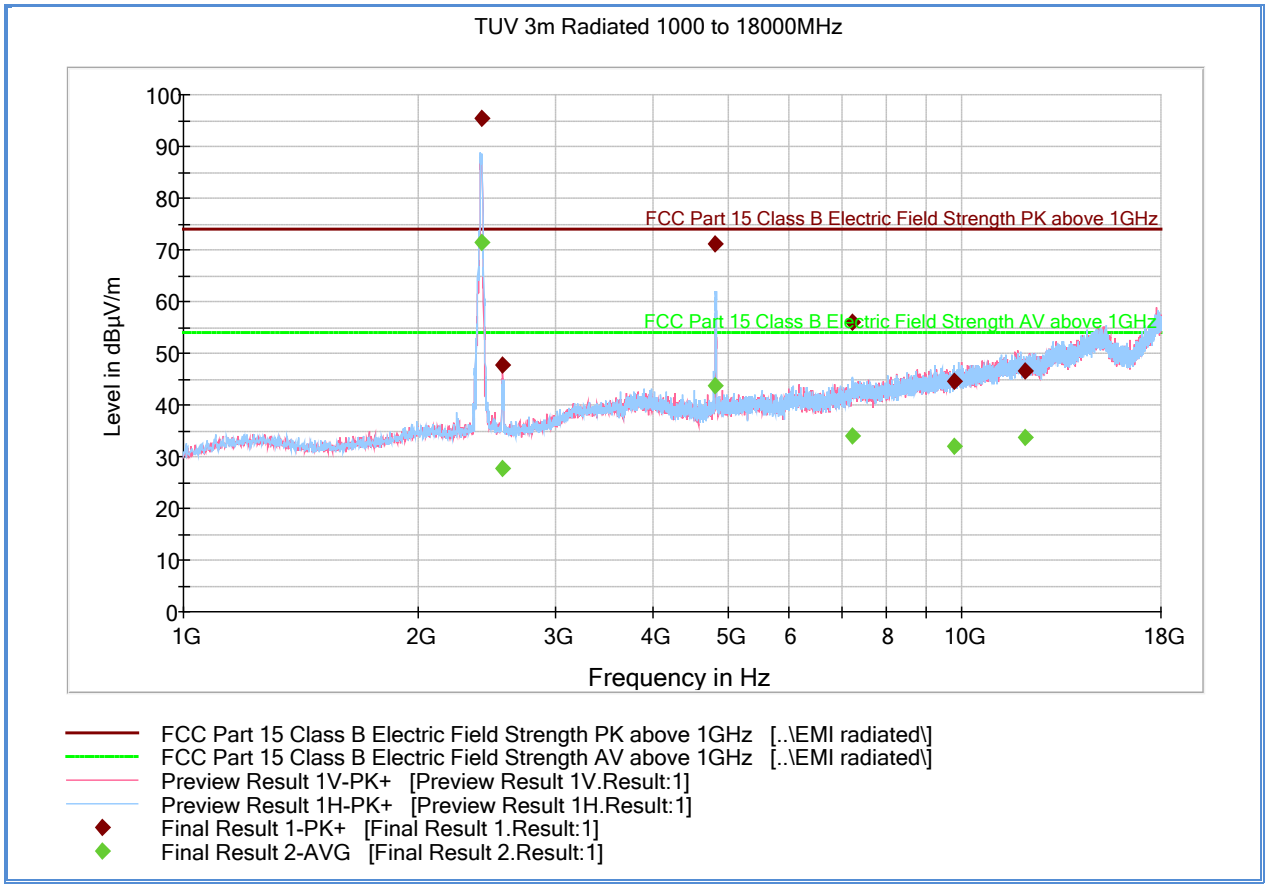
Test Notes: 2454.1MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.7.20 Test Results Restricted Band (2483.5MHz to 2500MHz) 802.11 b



Test Notes: Carrier frequency (High Channel) was maximized for this test. Correction factor of 5.6dB is from the cable, antenna and preamp used. Peak complies with Average limit therefore no Average measurement performed.

2.7.21 Test Results Above 1GHz (Low Channel - 802.11 g)



Peak Data

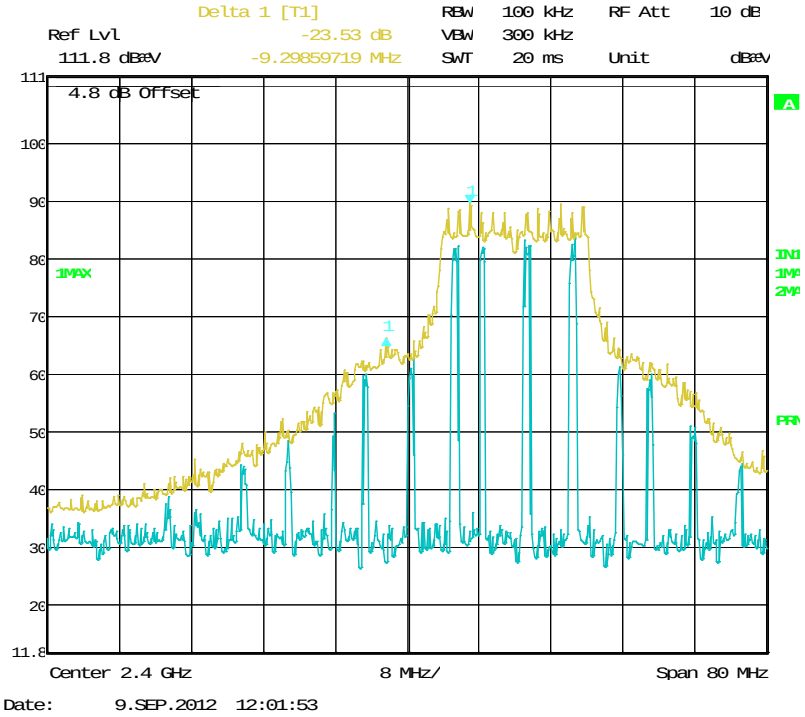
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2413.240000	95.5	1000.0	1000.000	100.0	H	135.0	-4.7	-21.6	73.9
2572.600000	47.8	1000.0	1000.000	104.0	V	169.0	-4.4	26.1	73.9
4825.220000	71.0	1000.0	1000.000	100.0	H	136.0	2.1	2.9	73.9
7242.220000	55.9	1000.0	1000.000	100.0	H	231.0	6.6	18.0	73.9
9755.700000	44.6	1000.0	1000.000	178.0	H	191.0	9.6	29.3	73.9
12060.140000	46.5	1000.0	1000.000	297.0	V	222.0	12.6	27.4	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)
2413.240000	71.3	1000.0	1000.000	100.0	H	135.0	-4.7	-17.4	53.9
2572.600000	27.7	1000.0	1000.000	104.0	V	169.0	-4.4	26.2	53.9
4825.220000	43.8	1000.0	1000.000	100.0	H	136.0	2.1	10.1	53.9
7242.220000	34.0	1000.0	1000.000	100.0	H	231.0	6.6	19.9	53.9
9755.700000	31.9	1000.0	1000.000	178.0	H	191.0	9.6	22.0	53.9
12060.140000	33.9	1000.0	1000.000	297.0	V	222.0	12.6	20.0	53.9

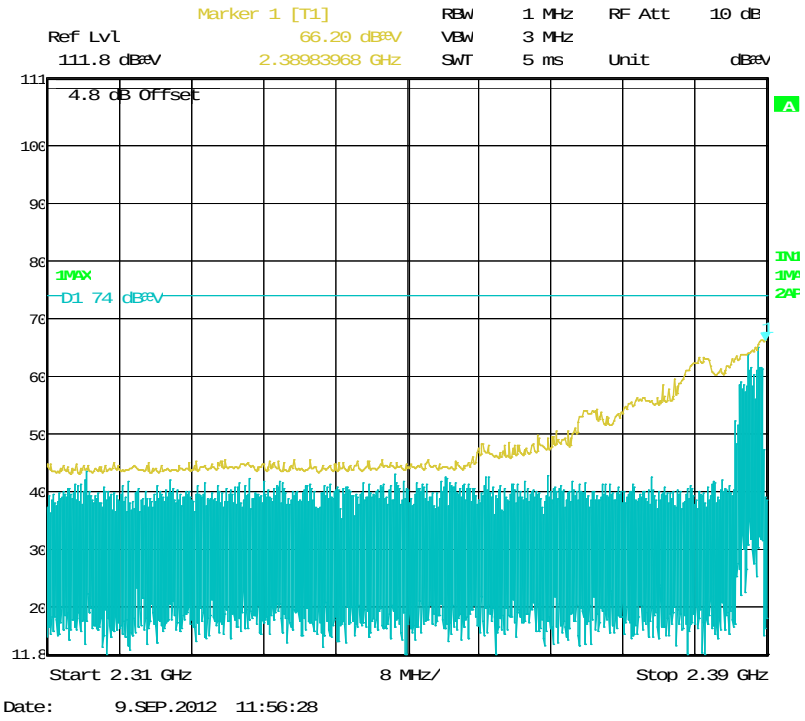
Test Notes: 2413.2MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

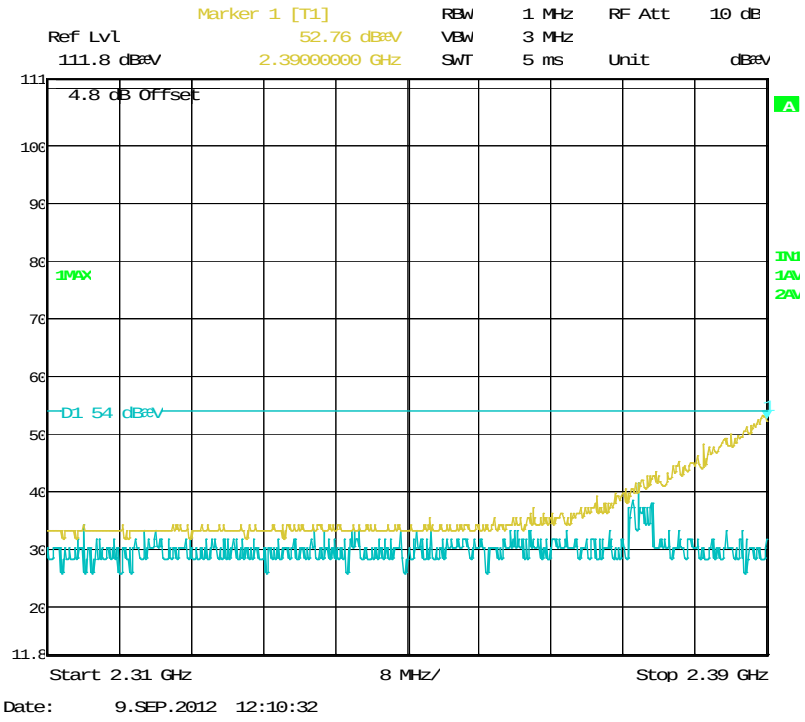
2.7.22 Test Results Lower Band Edge 802.11 g (Radiated - Low Channel using 100 kHz RBW)



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of 4.8dB is from the cable, antenna and preamp used. Limit for this test is 20dBc.

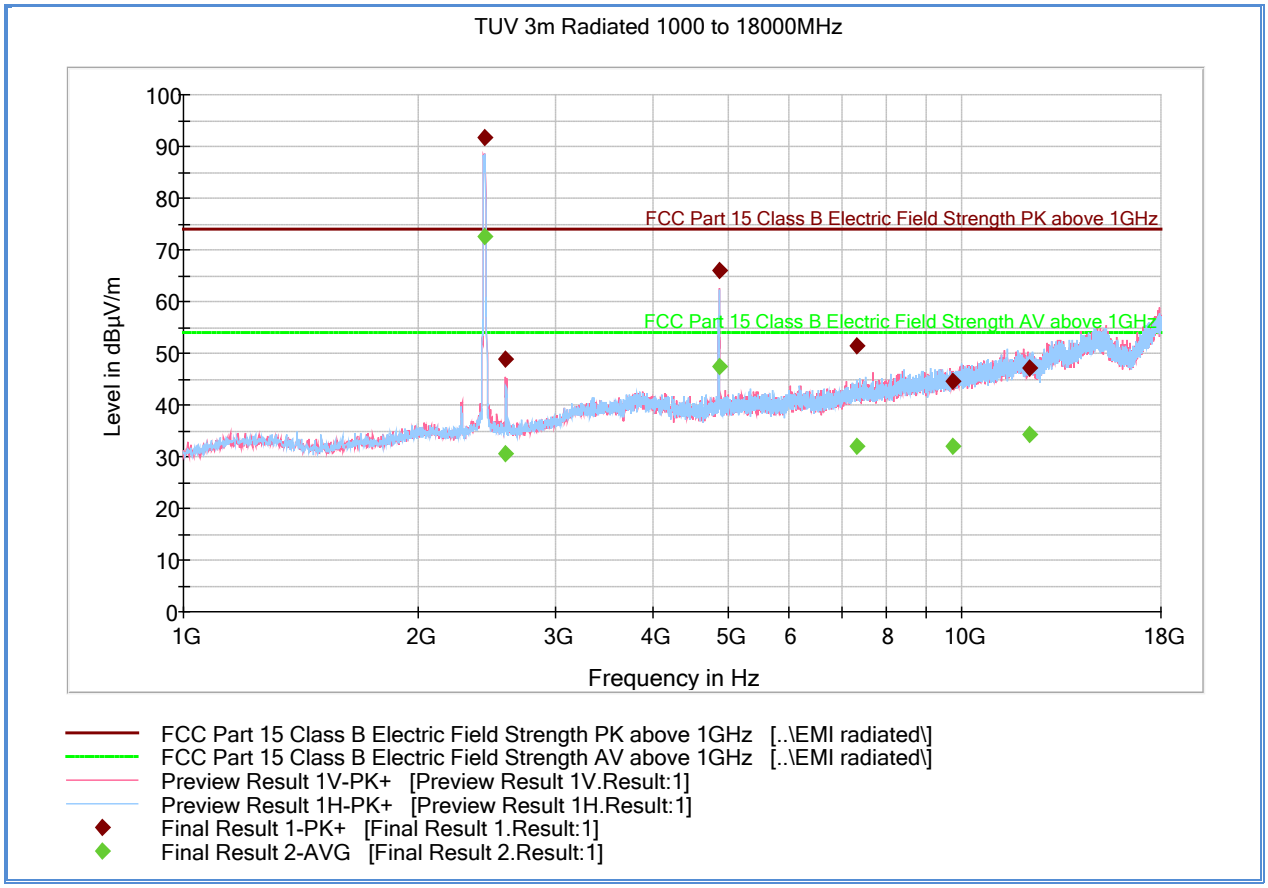
2.7.23 Test Results Restricted Band (2310MHz to 2390MHz) 802.11 g





Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of 4.8dB is from the cable, antenna and preamp used. Peak and Average plots presented with corresponding 15.209 limits.

2.7.24 Test Results Above 1GHz 802.11 g (Mid Channel)



Peak Data

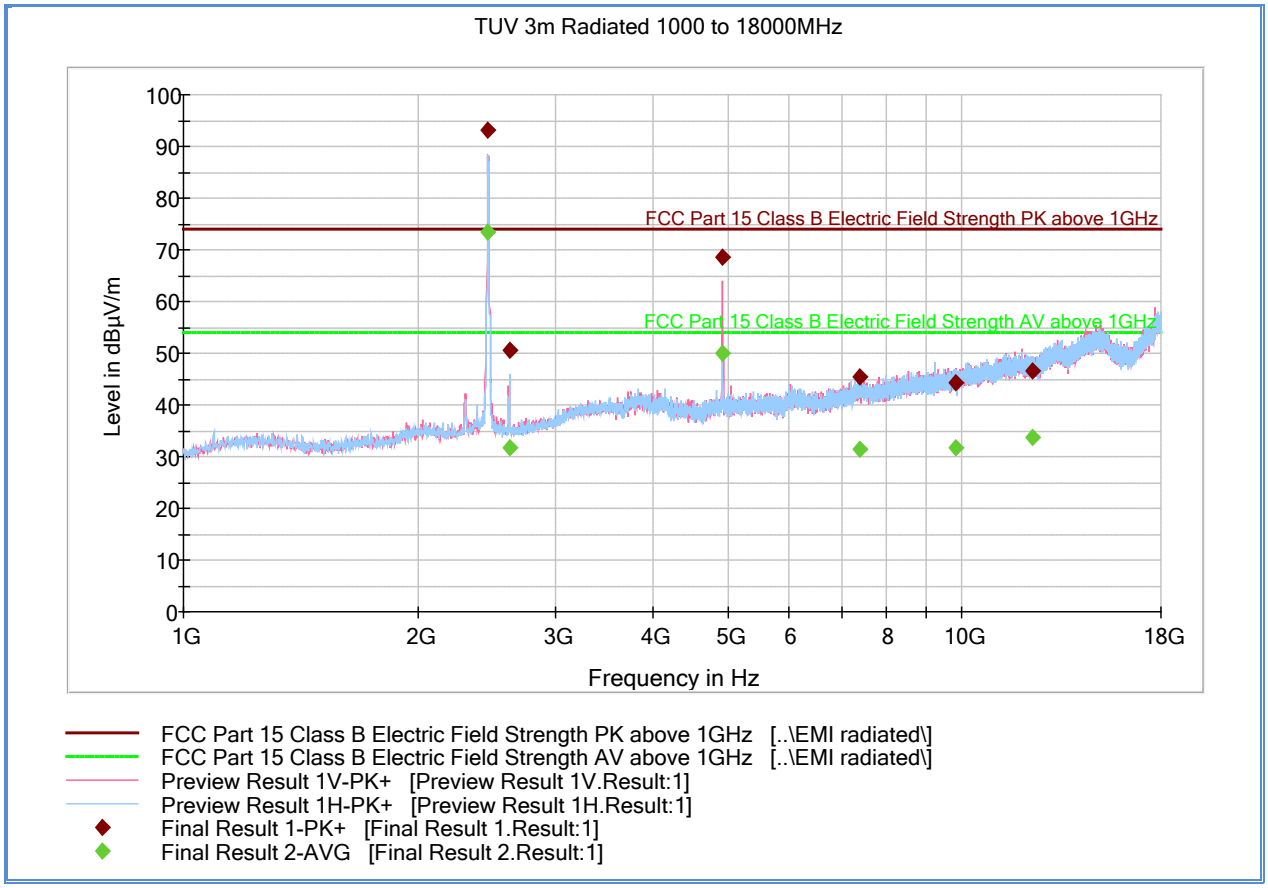
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2441.740000	91.8	1000.	1000.000	100.0	V	319.0	-4.7	-17.9	73.9
2591.980000	49.0	1000.	1000.000	100.0	V	167.0	-4.3	24.9	73.9
4874.000000	66.1	1000.	1000.000	100.0	V	287.0	2.2	7.8	73.9
7310.860000	51.3	1000.	1000.000	100.0	H	286.0	7.1	22.6	73.9
9733.440000	44.6	1000.	1000.000	155.0	V	307.0	9.5	29.3	73.9
12185.90000	47.1	1000.	1000.000	173.0	V	194.0	12.4	26.8	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)
2441.740000	72.5	1000.0	1000.000	100.0	V	319.0	-4.7	-18.6	53.9
2591.980000	30.5	1000.0	1000.000	100.0	V	167.0	-4.3	23.4	53.9
4874.000000	47.3	1000.0	1000.000	100.0	V	287.0	2.2	6.6	53.9
7310.860000	31.9	1000.0	1000.000	100.0	H	286.0	7.1	22.0	53.9
9733.440000	32.0	1000.0	1000.000	155.0	V	307.0	9.5	21.9	53.9
12185.900000	34.4	1000.0	1000.000	173.0	V	194.0	12.4	19.5	53.9

Test Notes: 2441.7MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.7.25 Test Results Above 1GHz 802.11 g (High Channel)



Peak Data

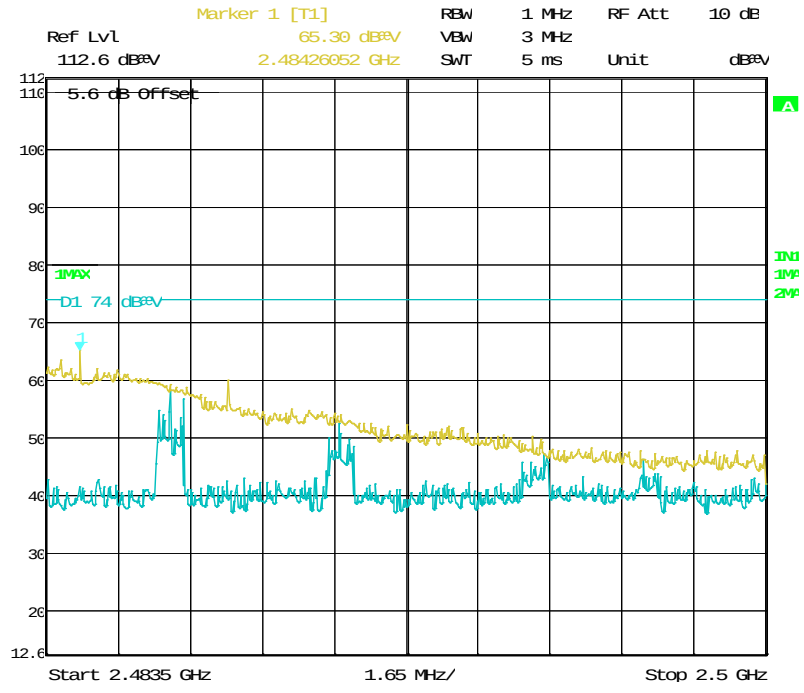
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2457.120000	93.1	1000.0	1000.000	100.0	H	286.0	-4.7	-19.2	73.9
2624.000000	50.4	1000.0	1000.000	104.0	H	132.0	-4.2	23.5	73.9
4923.980000	68.5	1000.0	1000.000	100.0	V	181.0	2.3	5.4	73.9
7380.040000	45.4	1000.0	1000.000	100.0	V	352.0	7.2	28.5	73.9
9816.940000	44.3	1000.0	1000.000	192.0	V	220.0	9.7	29.6	73.9
12311.500000	46.5	1000.0	1000.000	207.0	H	53.0	12.2	27.4	73.9

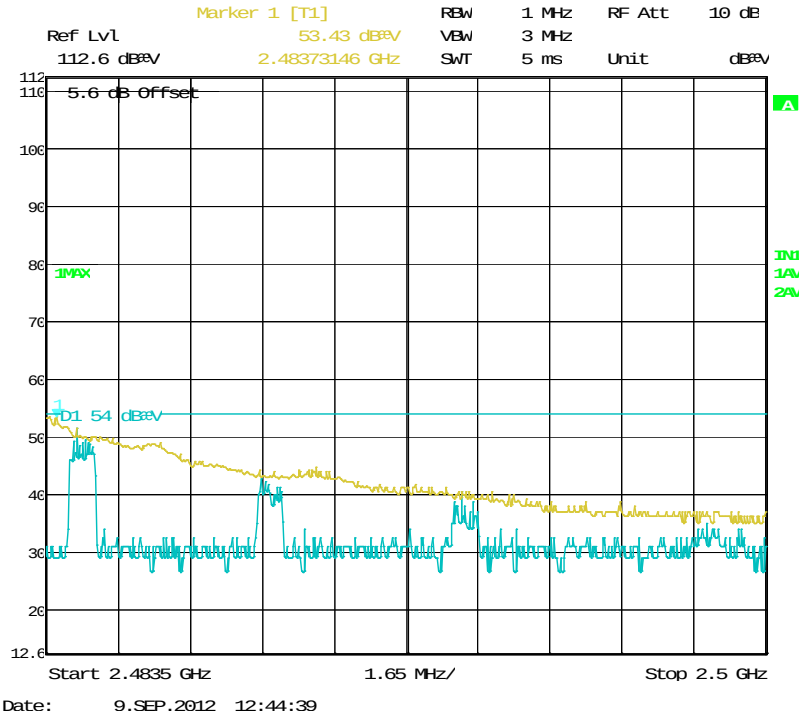
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2457.120000	73.3	1000.0	1000.000	100.0	H	286.0	-4.7	-19.4	53.9
2624.000000	31.8	1000.0	1000.000	104.0	H	132.0	-4.2	22.1	53.9
4923.980000	50.0	1000.0	1000.000	100.0	V	181.0	2.3	3.9	53.9
7380.040000	31.3	1000.0	1000.000	100.0	V	352.0	7.2	22.6	53.9
9816.940000	31.8	1000.0	1000.000	192.0	V	220.0	9.7	22.1	53.9
12311.500000	33.8	1000.0	1000.000	207.0	H	53.0	12.2	20.1	53.9

Test Notes: 2457.1MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

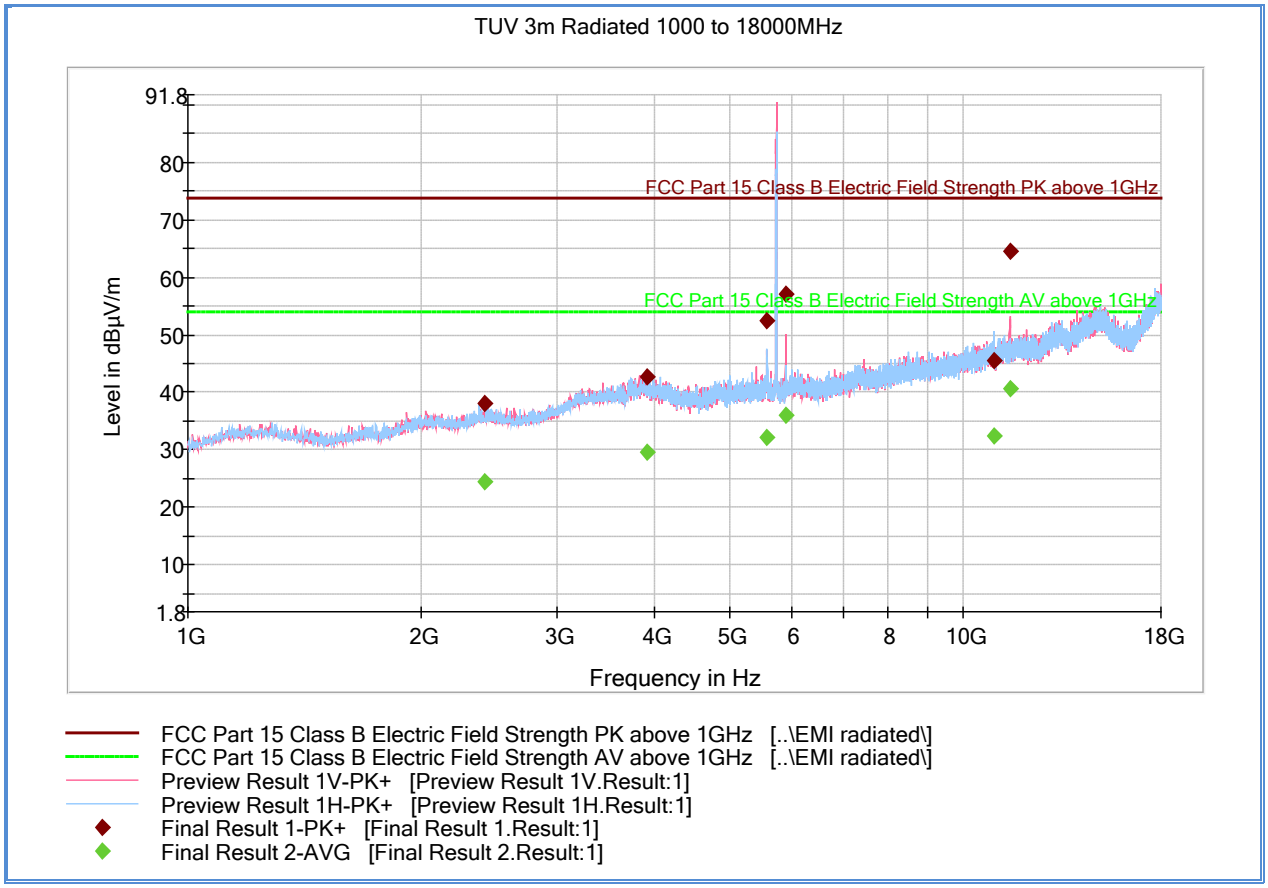
2.7.26 Test Results Restricted Band (2483.5MHz to 2500MHz) 802.11 g





Test Notes: Carrier frequency (High Channel) was maximized for this test. Correction factor of 5.6dB is from the cable, antenna and preamp used. Peak and Average plots presented with corresponding 15.209 limits.

2.7.27 Test Results Above 1GHz 802.11 a (Low Channel)



Peak Data

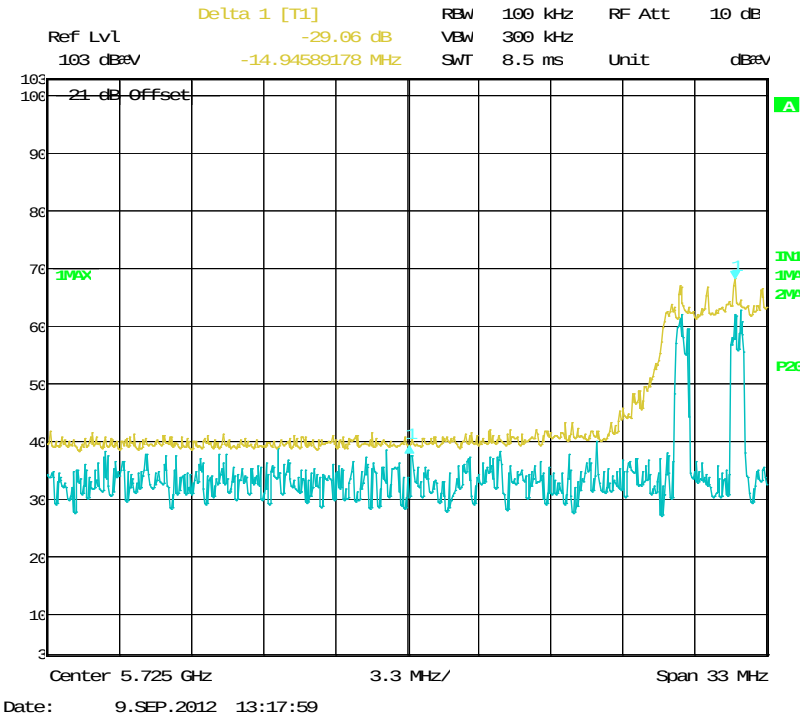
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2416.600000	38.0	1000.0	1000.000	110.0	V	85.0	-4.7	35.9	73.9
3903.980000	42.7	1000.0	1000.000	141.0	V	131.0	3.3	31.2	73.9
5577.480000	52.4	1000.0	1000.000	100.0	V	343.0	4.0	21.5	73.9
5912.500000	57.2	1000.0	1000.000	104.0	V	180.0	4.2	16.7	73.9
10970.000000	45.5	1000.0	1000.000	241.0	H	68.0	11.4	28.4	73.9
11492.140000	64.5	1000.0	1000.000	107.0	V	177.0	12.3	9.4	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)
2416.600000	24.4	1000.0	1000.000	110.0	V	85.0	-4.7	29.5	53.9
3903.980000	29.5	1000.0	1000.000	141.0	V	131.0	3.3	24.4	53.9
5577.480000	32.2	1000.0	1000.000	100.0	V	343.0	4.0	21.7	53.9
5912.500000	35.9	1000.0	1000.000	104.0	V	180.0	4.2	18.0	53.9
10970.000000	32.5	1000.0	1000.000	241.0	H	68.0	11.4	21.4	53.9
11492.140000	40.7	1000.0	1000.000	107.0	V	177.0	12.3	13.2	53.9

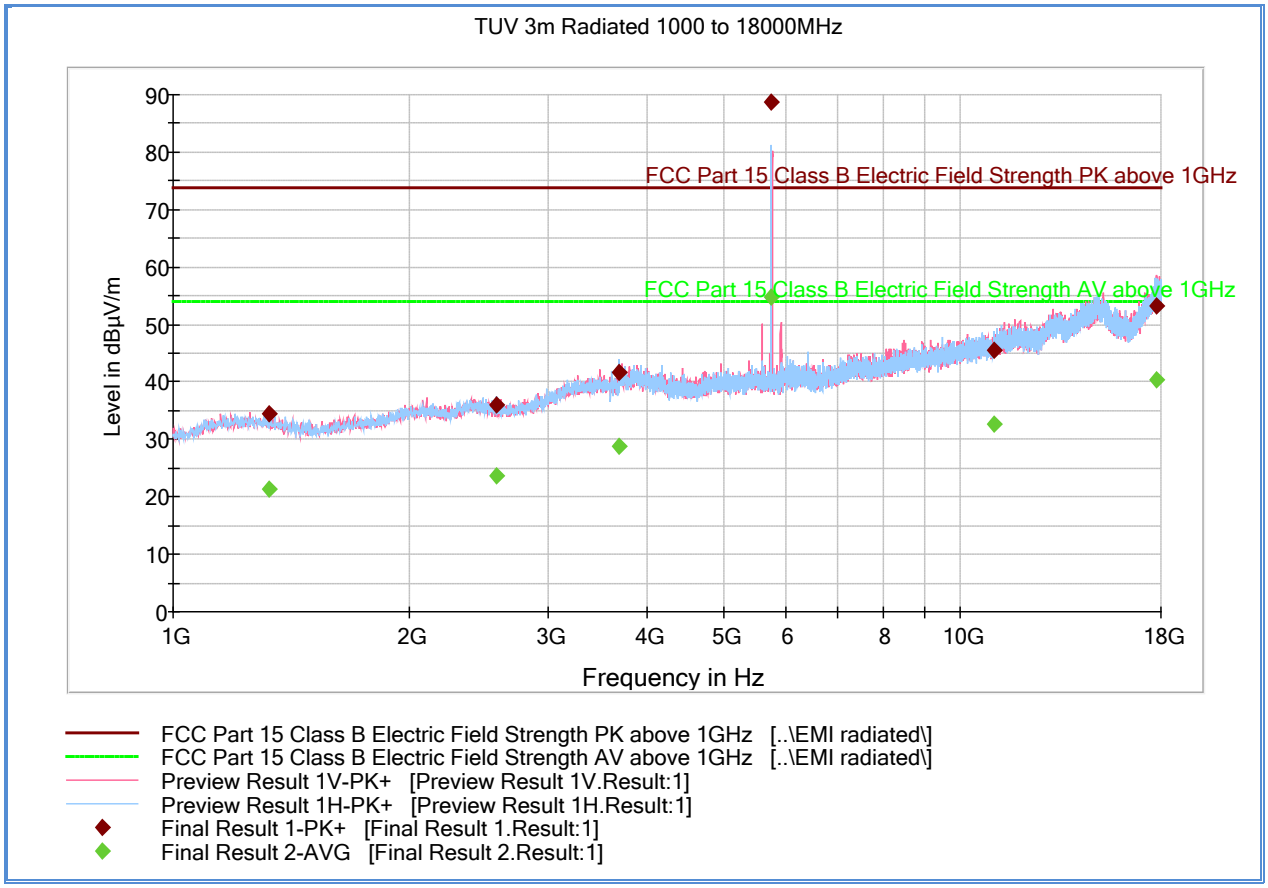
Test Notes: There are no emissions observed above 12GHz (noise floor measurements).

2.7.28 Test Results Lower Band Edge 802.11 a (Radiated - Low Channel using 100 kHz RBW)



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of 21dB is from the cable, antenna and preamp used. Limit for this test is 20dBc.

2.7.29 Test Results Above 1GHz 802.11 a (Mid Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1326.980000	34.4	1000.	1000.000	237.0	H	52.0	-9.2	39.5	73.9
2578.640000	36.1	1000.	1000.000	400.0	H	329.0	-4.3	37.8	73.9
3690.640000	41.6	1000.	1000.000	246.0	H	288.0	2.3	32.3	73.9
5758.720000	88.7	1000.	1000.000	172.0	H	155.0	3.9	-14.8	73.9
11055.12000	45.4	1000.	1000.000	175.0	H	90.0	11.6	28.5	73.9
17762.22000	53.3	1000.	1000.000	336.0	V	50.0	20.8	20.6	73.9

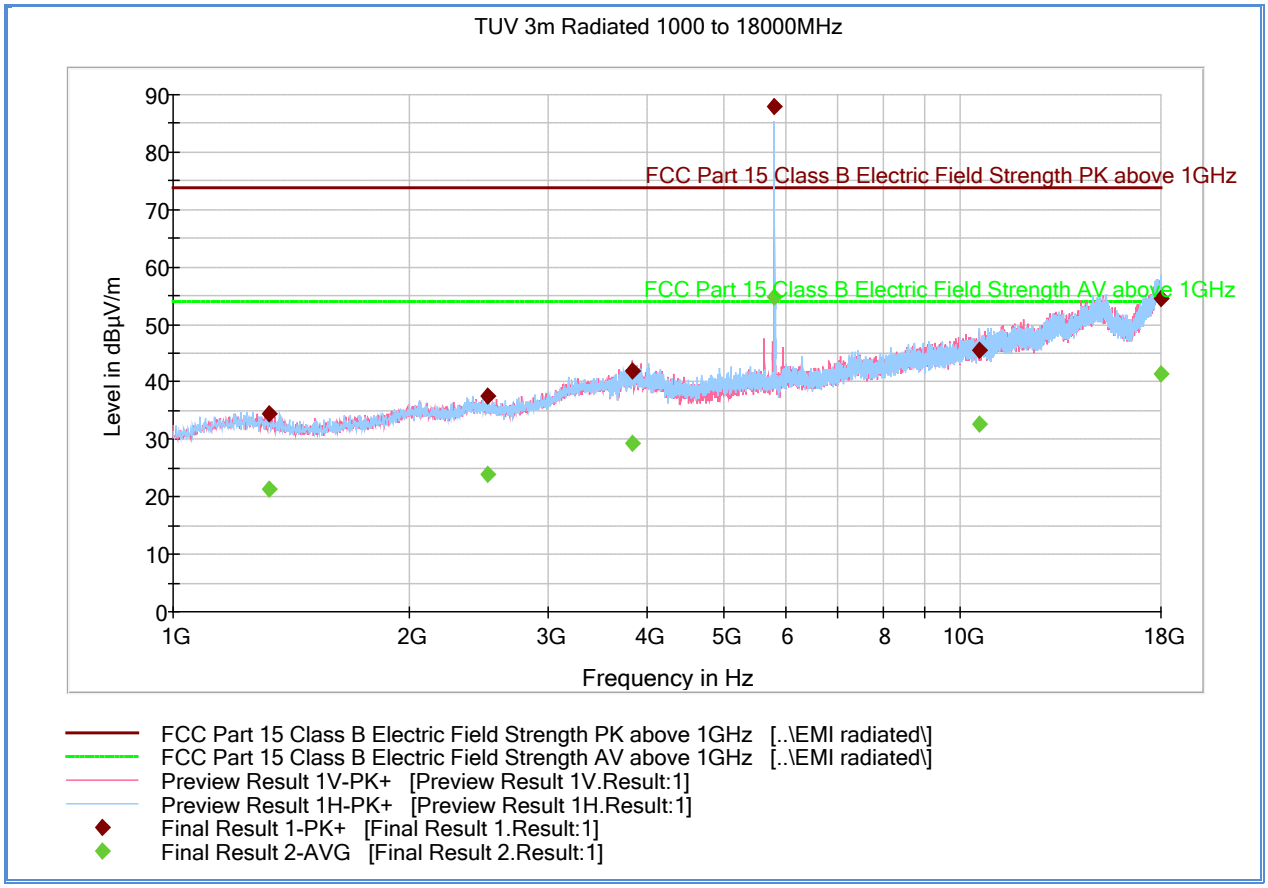
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1326.980000	21.4	1000.0	1000.000	237.0	H	52.0	-9.2	32.5	53.9
2578.640000	23.6	1000.0	1000.000	400.0	H	329.0	-4.3	30.3	53.9
3690.640000	28.7	1000.0	1000.000	246.0	H	288.0	2.3	25.2	53.9
5758.720000	54.8	1000.0	1000.000	172.0	H	155.0	3.9	-0.9	53.9
11055.120000	32.6	1000.0	1000.000	175.0	H	90.0	11.6	21.3	53.9
17762.220000	40.4	1000.0	1000.000	336.0	V	50.0	20.8	13.5	53.9

Test Notes: 5758.7MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.7.30 Test Results Above 1GHz 802.11 a (High Channel)



Peak Data

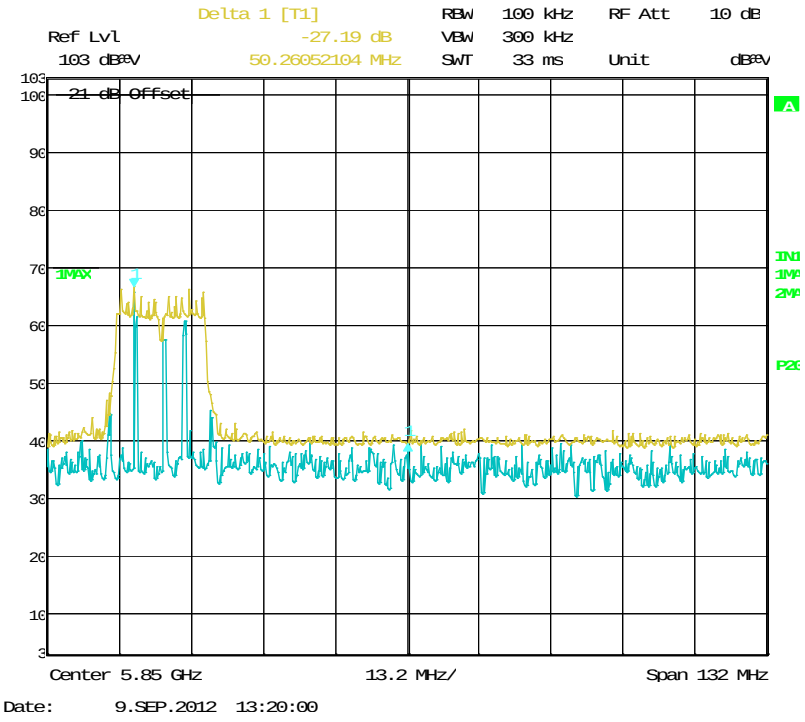
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1322.860000	34.4	1000.0	1000.000	236.0	V	225.0	-9.2	39.5	73.9
2507.920000	37.6	1000.0	1000.000	162.0	V	345.0	-4.5	36.3	73.9
3830.360000	42.0	1000.0	1000.000	110.0	V	297.0	3.3	32.0	73.9
5807.460000	88.1	1000.0	1000.000	120.0	H	152.0	3.9	-14.2	73.9
10560.740000	45.5	1000.0	1000.000	203.0	H	268.0	10.9	28.4	73.9
17988.520000	54.6	1000.0	1000.000	188.0	H	156.0	21.3	19.3	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)
1322.860000	21.5	1000.0	1000.000	236.0	V	225.0	-9.2	32.4	53.9
2507.920000	23.9	1000.0	1000.000	162.0	V	345.0	-4.5	30.0	53.9
3830.360000	29.4	1000.0	1000.000	110.0	V	297.0	3.3	24.5	53.9
5807.460000	54.8	1000.0	1000.000	120.0	H	152.0	3.9	-0.9	53.9
10560.740000	32.7	1000.0	1000.000	203.0	H	268.0	10.9	21.2	53.9
17988.520000	41.4	1000.0	1000.000	188.0	H	156.0	21.3	12.5	53.9

Test Notes: 5807.4MHz is part of fundamental measurement and not subjected to 15.209 and 15.205 limits. There are no emissions observed above 10GHz (noise floor measurements).

2.7.31 Test Results Upper Band Edge 802.11 a (Radiated -High Channel using 100 kHz RBW)



Test Notes: Carrier frequency (High Channel) was maximized for this test. Correction factor of 21dB is from the cable, antenna and preamp used. Limit for this test is 20dBc.

2.8 POWER SPECTRAL DENSITY

2.8.1 Specification Reference

Part 15 Subpart C §15.247(e)

2.8.2 Standard Applicable

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.8.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration B

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

September 9, 2012/FSC

2.8.5 Test Equipment Used

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

2.8.6 Environmental Conditions

Ambient Temperature	23.2°C
Relative Humidity	50.5%
ATM Pressure	99.1 kPa

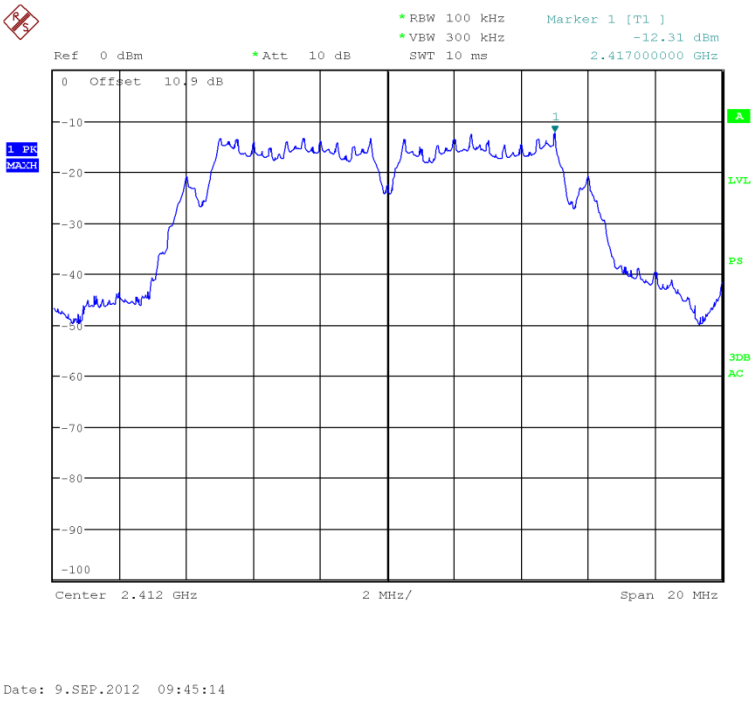
2.8.7 Additional Observations

- This is a conducted test.
- Test procedure is per Section 5.3.1 of KDB 558074 (January 18, 2012).
- An offset of 10.9dB was added to compensate for the external attenuator and cable used.
- Detector is Peak.
- Trace mode is Max Hold.
- Sweep time is Auto Couple.
- Bandwidth Correction Factor BWCF is from 10log(3kHz/100kHz).

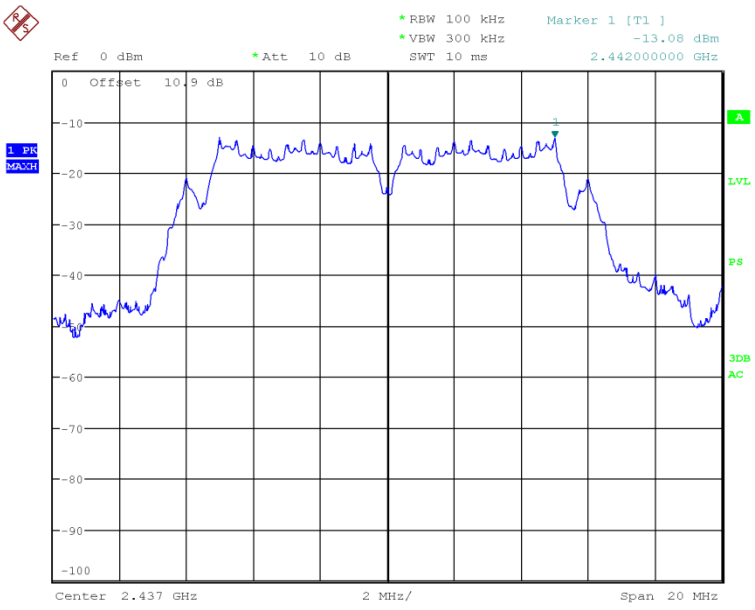
2.8.8 Test Results Summary

Mode	Channel	Marker Reading (dBm)	Bandwidth Correction Factor (BWCF)	PSD Level (dBm)	Limit (dBm)	Compliance
802.11b	1 (2412 MHz)	-12.31	15.228	-27.538	8	Complies
	6 (2437 MHz)	-13.08	15.228	-28.308	8	Complies
	11 (2462 MHz)	-13.52	15.228	-28.748	8	Complies
802.11g	1 (2412 MHz)	-12.57	15.228	-27.798	8	Complies
	6 (2437 MHz)	-12.83	15.228	-28.058	8	Complies
	11 (2462 MHz)	-12.80	15.228	-28.028	8	Complies
802.11a	149 (5745 MHz)	-29.46	15.228	-44.688	8	Complies
	153 (5765 MHz)	-29.96	15.228	-45.188	8	Complies
	161 (5805 MHz)	-33.14	15.228	-48.368	8	Complies

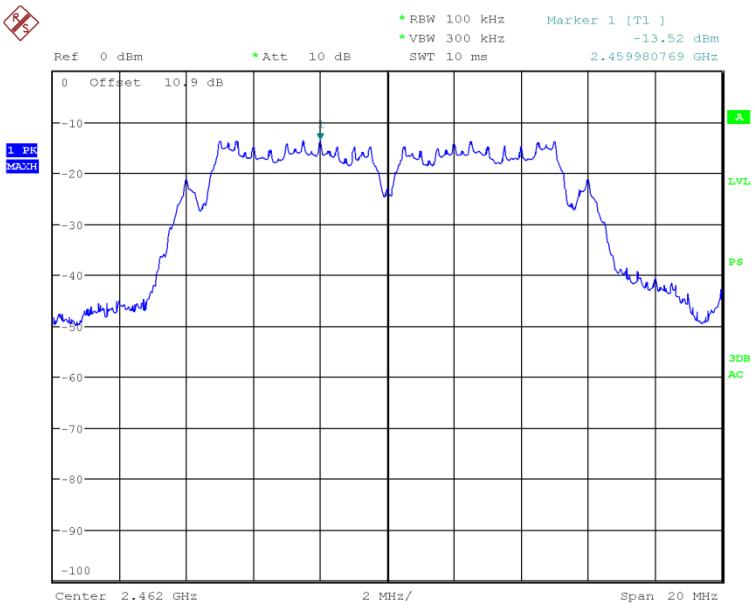
2.8.9 Test Results Plots



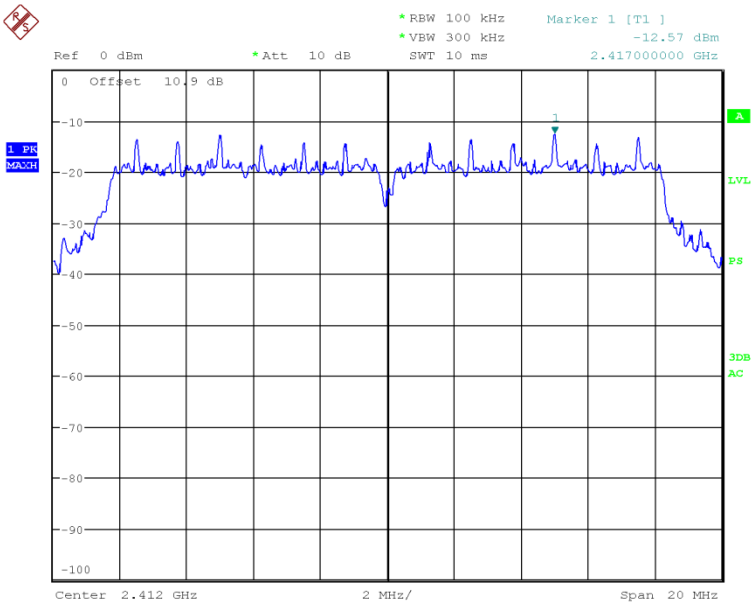
802.11 b Low Channel



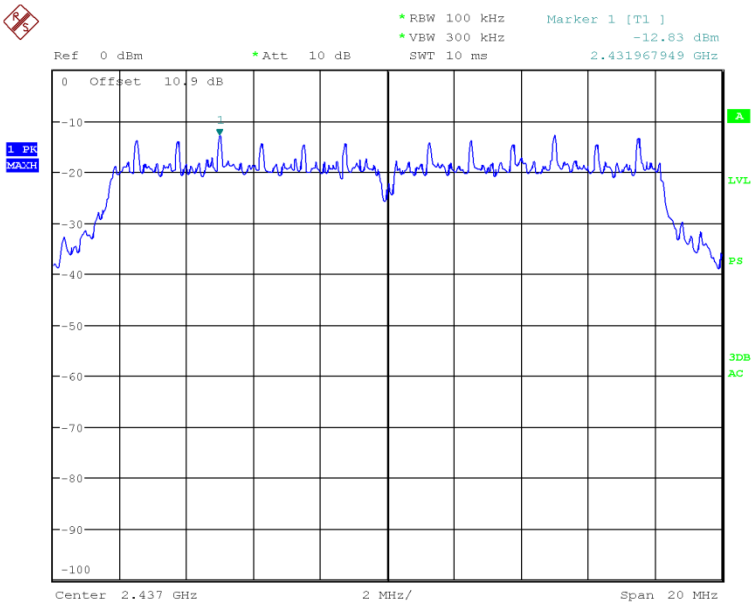
802.11 b Mid Channel



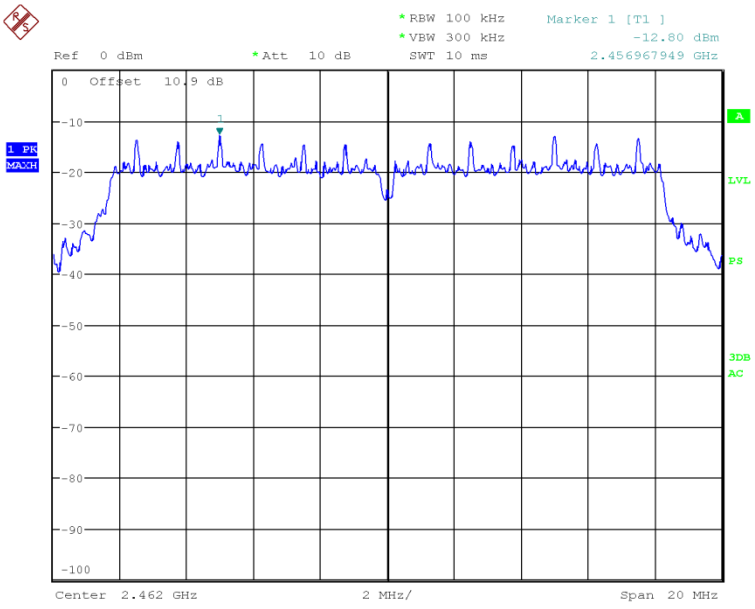
802.11 b High Channel



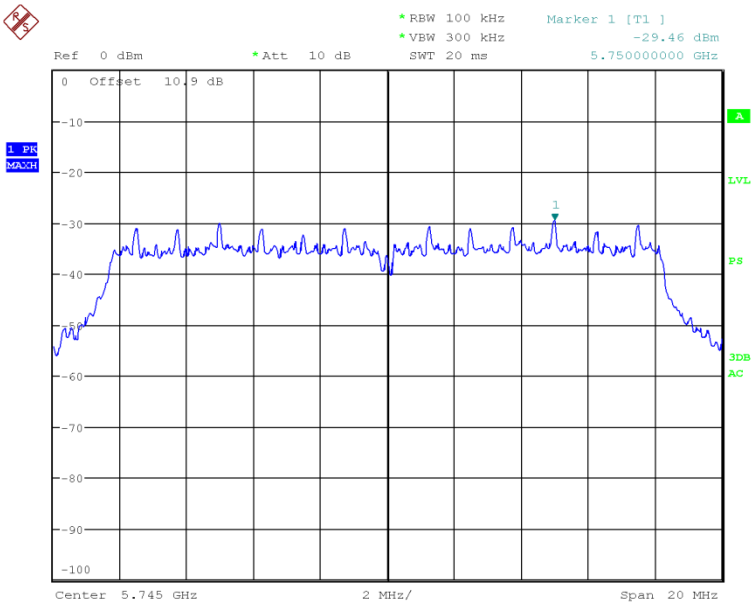
802.11 g Low Channel



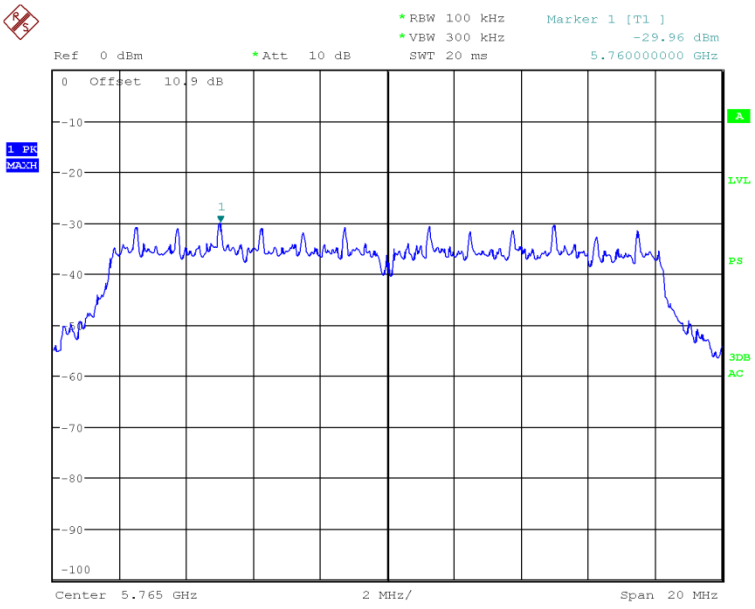
802.11 g Mid Channel



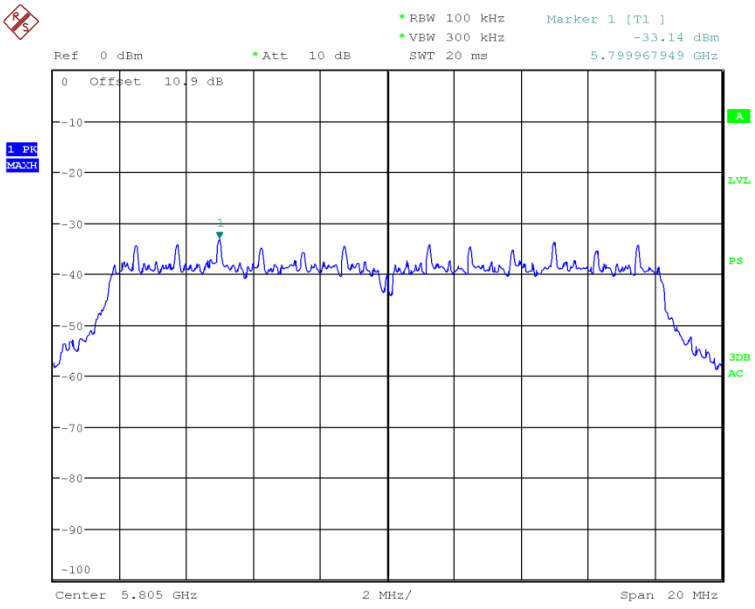
802.11 g High Channel



802.11 a Low Channel



802.11 a Mid Channel



802.11 a High Channel

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 Port Setup						
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	06/13/12	06/13/13
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	02/24/12	02/24/14
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	02/14/12	02/24/13
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	12/06/11	12/06/12
6669	Double-ridged waveguide horn antenna	3115	94124364	EMCO	11/07/11	11/07/12
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						
1072	DC Power Supply	E3610A	KR51311519	Hewlett Packard	Verified by 6452	
6452	Multimeter	3478A	2911A52177	Hewlett Packard	07/16/12	07/16/13
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	10/13/11	10/13/12
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

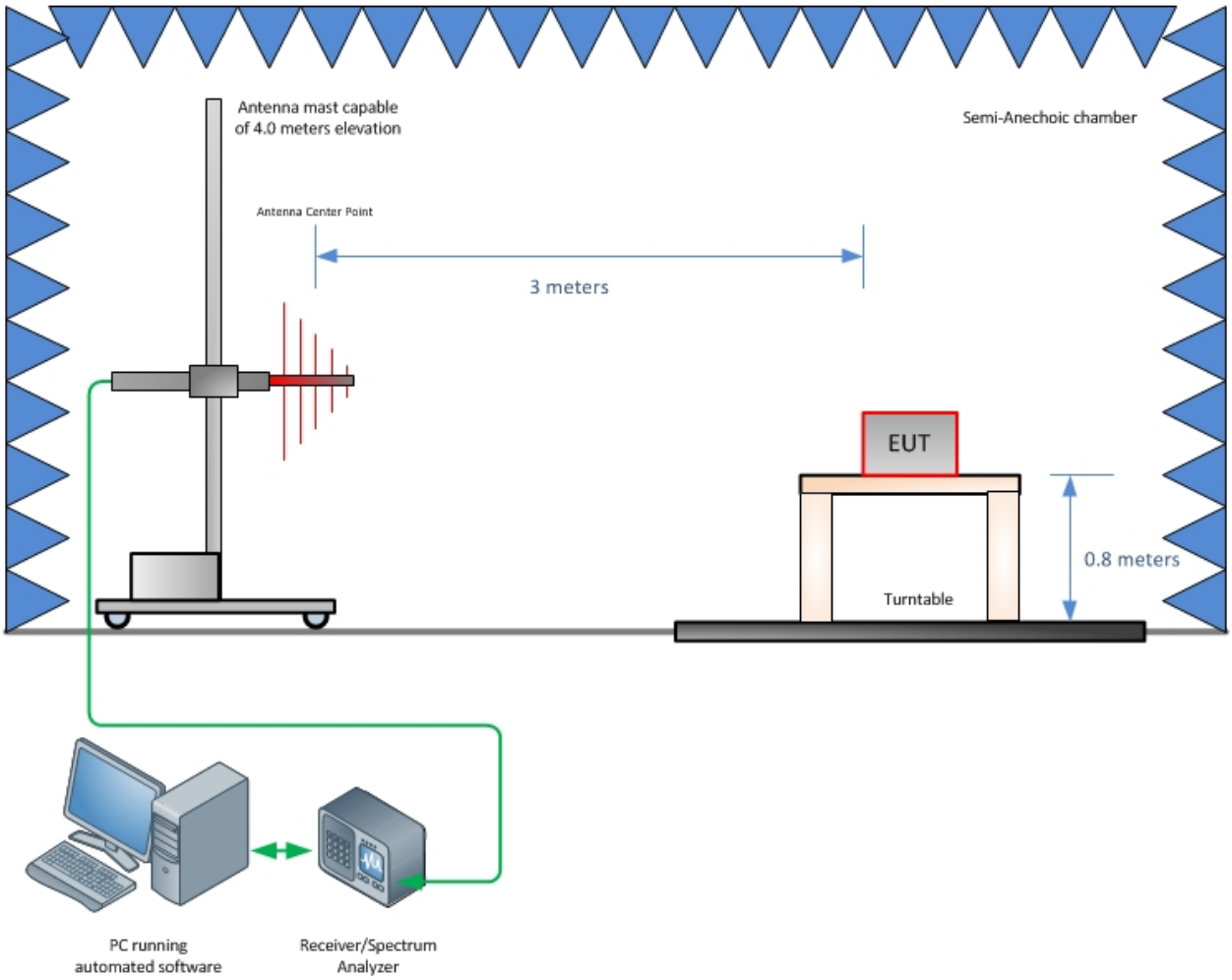
3.2.3 Conducted Antenna Port Measurement

	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	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.72
				Coverage Factor (k):	2
				Expanded Uncertainty:	1.45

SECTION 4

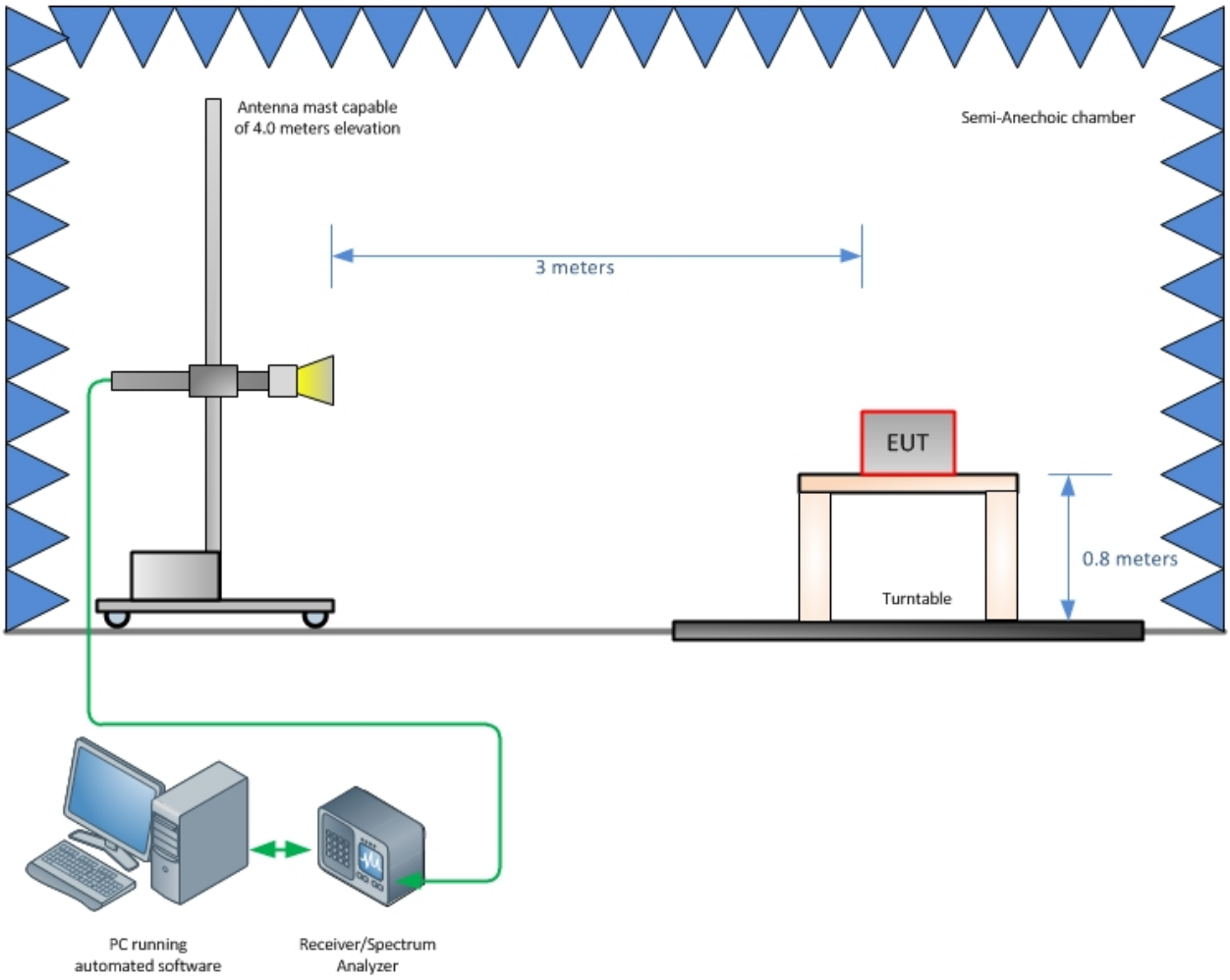
DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364



Radiated Emission Test Setup (Above 1GHz)

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and TÜV SÜD America, Inc., extracts from the test report shall not be reproduced, except in full without TÜV SÜD America, Inc.'s written approval.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

TÜV SÜD America, Inc. and its professional staff hold government
and professional organization certifications for
AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, NIST and VCCI.

NVLAP Lab Code: 100268-0

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364