America

Choose certainty.
Add value.

Report On

Application for Grant of Equipment Authorization of the
Sotera Wireless
Visi Mobile 92-10010 Wrist Transceiver Dual Band

FCC Part 15 Subpart C §15.247: 2014
IC RSS-Gen Issue 4 November 2014
IC RSS-247 Issue 1 May 2015

Report No. SD72106244-0515A **June 2015**

REPORT ON	Radio Testing of the Sotera Wireless Visi Mobile 92-10010 Wrist Transceiver Dual Band
TEST REPORT NUMBER	SD72106244-0515A
PREPARED FOR	Sotera Wireless 10020 Huennekins St. San Diego, CA 92121
CONTACT PERSON	Alex Hermphill Electrical Engineer (858) 373-4867 netphantom9@gmail.com
PREPARED BY	Xiaoying Zhang **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
DATED	June 29, 2015

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

Revision History

SD72106244-0515A Sotera Wireless Visi Mobile Wrist Transceiver Dual Band					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
06/29/2015	Initial Release				Ferdinand S. Custodio

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

CONTENTS

Section		Page No
1	**REPORT SUMMARY**	**5**
1.1	Introduction	6
1.2	Brief Summary Of Results	7
1.3	Product Information	8
1.4	EUT Test Configuration	10
1.5	Deviations From The Standard	12
1.6	Modification Record	12
1.7	Test Methodology	12
1.8	Test Facility Location	12
1.9	Test Facility Registration	13
2	**TEST DETAILS**	**14**
2.1	Peak Output Power	15
2.2	Conducted Emissions	19
2.3	99% Emission Bandwidth	20
2.4	Minimum 6 dB RF Bandwidth	27
2.5	Out-Of-Band Emissions - Conducted	33
2.6	Band-Edge Compliance Of RF Conducted Emissions	39
2.7	Spurious Radiated Emissions	43
2.8	Radiated Band Edge Measurements And Immediate Restricted Bands	57
2.9	Power Spectral Density	61
3	**TEST EQUIPMENT USED**	**64**
3.1	Test Equipment Used	65
3.2	Measurement Uncertainty	66
4	**DIAGRAM OF TEST SETUP**	**67**
4.1	Test Setup Diagram	68
5	**ACCREDITATION, DISCLAIMERS AND COPYRIGHT**	**70**
5.1	Accreditation, Disclaimers And Copyright	71

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
Sotera Wireless
Visi Mobile 92-10010 Wrist Transceiver Dual Band

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 Sotera Wireless Visi Mobile Wrist Transceiver Dual Band to the requirements of FCC Part 15 Subpart C §15.247 and IC RSS-247 Issue 1 May 2015.

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	Sotera Wireless
Model Number(s)	92-10010
FCC ID Number	ARIV-VISI-MOBILE-1
IC Number	8810A-VISIMOBILE2
Serial Number(s)	• WTDB20150500001 (Conducted antenna port testing - Sample #1) • WTDB20150500004 (Radiated testing - Sample #2)
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2014). • RSS-247 – Digital Transmission Systems (DTSs) Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices (Issue 1, May 2015). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014).
Start of Test	May 19, 2015
Finish of Test	June 17, 2015
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• KDB558074 D01 DTS Meas Guidance v03r02, (June 05, 2014) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247. • Supporting documents for EUT certification are separate exhibits.

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

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-247 5.4(4)	Peak Output Power	Compliant	
-	§15.207(a)	RSS-Gen 8.8	Conducted Emissions	N/A*	See Note
2.2		RSS-Gen 6.6	99% Emission Bandwidth	Compliant	
2.3	§15.247(a)(2)	RSS-247 5.2(1)	Minimum 6 dB RF Bandwidth	Compliant	
2.4	§15.247(d)	RSS-247 5.5	Out-of-Band Emissions - Conducted	Compliant	
2.5	§15.247(d)	RSS-247 5.5	Band-edge Compliance of RF Conducted Emissions	Compliant	
2.6	§15.247(d)	RSS-247 5.5	Spurious Radiated Emissions	Compliant	
-		RSS-Gen 7.1	Receiver Spurious Emissions	N/A**	See Note
2.7	§15.247(d)	RSS-247 5.5	Radiated Band Edge Measurements	Compliant	
2.8	§15.247(e)	RSS-247 5.2(2)	Power Spectral Density for Digitally Modulated Device	Compliant	

*: *Not applicable. EUT is a battery operated device.*
**: *Not applicable. EUT has no Stand-Alone receiver port.*

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 Sotera Wireless Visi Mobile 92-10010 Wrist Transceiver Dual Band. The EUT is part of the Visi Mobile Monitoring System intended to be used for vital signs monitoring. The EUT uses 802.11 b, g and n technologies to connect wirelessly and transfers parameters monitored to iPads, iPhones, nurses' stations, etc.

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

1.3.2 EUT General Description

EUT Description	Wrist Transceiver Dual Band
Model Name	Visi Mobile
Model Number(s)	92-10010
Rated Voltage	Internal 3.7VDC Li-Ion Battery (iTech B00693LFTR 2000mAh 7.4Wh)
Mode Verified	802.11 b/g and n
Capability	802.11 a/b/g/n WLAN (DTS) 2.4GHz band 20MHz BW
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
Antenna Type	Integral Chip type
Manufacturer	Fractus
Antenna Model	P/N: FR05-S1-NO-1004
Antenna Gain	1.8 dBi (2.4GHz) 4.9 dBi (5GHz)

1.3.3 Maximum Conducted Output Power

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
802.11b	2412-2462	14.33	27.10
802.11g	2412-2462	13.71	23.50
802.11 n (ht20)	2412-2462	13.08	20.32

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 Configuration	Description
A	Antenna conducted port test configuration. All measurements were performed on the antenna port provided by the manufacturer for testing purposes only. EUT is programmed using terminal software via a USART test fixture connected by USB.
B	Radiated emissions test configuration. EUT is programmed using terminal software via a USART test fixture connected by USB.

1.4.2 EUT Exercise Software

Test routine provided by the manufacturer built within the firmware. Radio commands are executed via USB using a universal synchronous/asynchronous receiver/transmitter (USART) interface fixture (proprietary to Sotera Wireless) and Terminal v1.91b 20140110β – by Br@y++ (terminal application).

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Sony	Support Personal Computer (Y Series Laptop)	Model PCG-31311L
Sony	Support AC Adapter	Model PCGA-AC19V9 S/N:147839091 0023259
-	Support USART fixture	WT Connectivity Fixture V2 1-000486-00 rA S/N 003
-	Support USB cable	Shielded, 1.7m generic USB cable

1.4.4 Worst Case Configuration

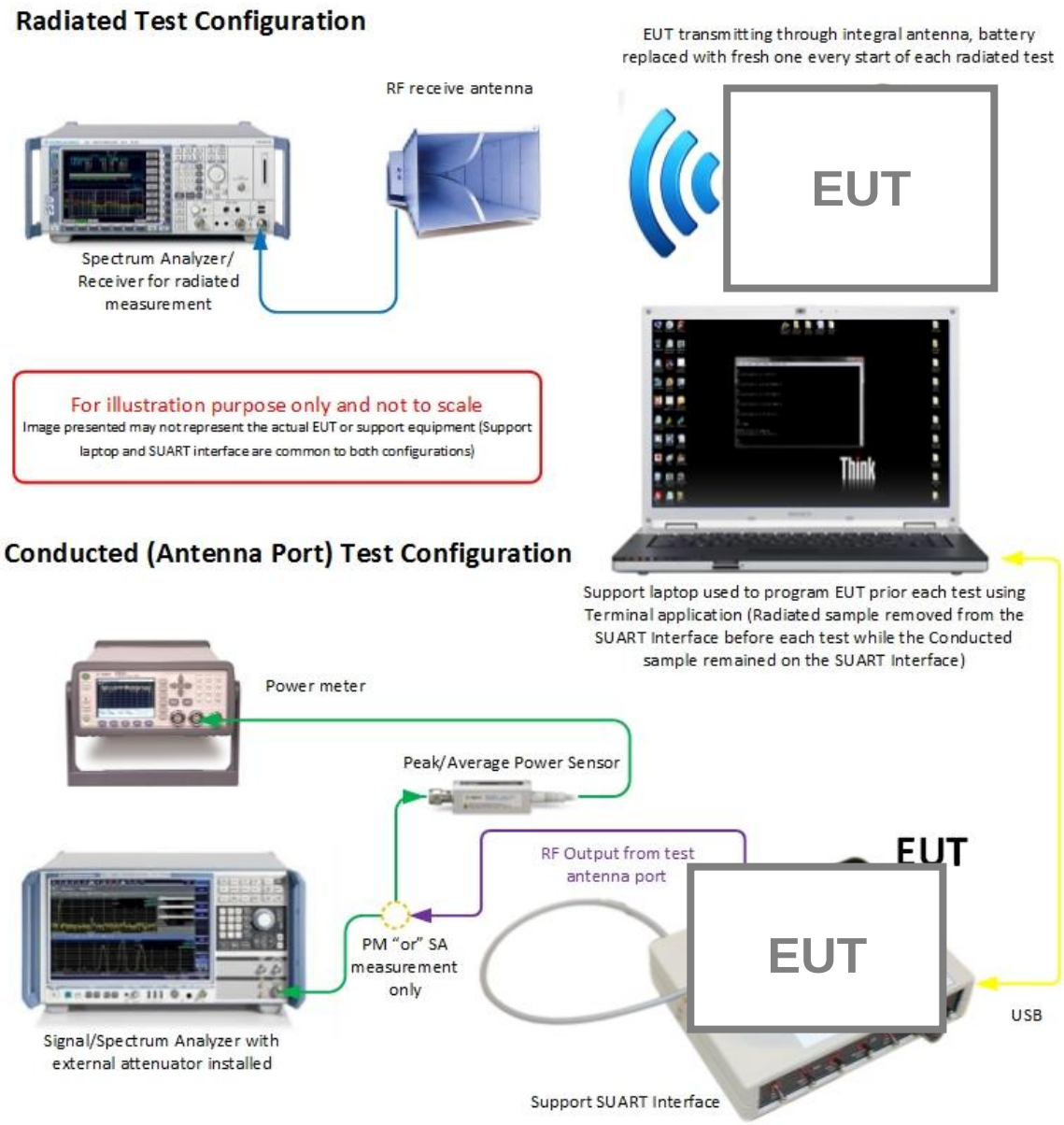
Worst-case configuration used in this test report as per maximum conducted output power measurements:

Mode	Channel	Data Rate
802.11b	1 (Low Channel)	1Mbps
802.11g	11 (High Channel)	24Mbps
802.11 n (ht20)	11 (High Channel)	72.2Mbps (mcs 7)

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

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

1.4.5 Simplified Test Configuration Diagram



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

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
WTDB20150500001 and WTDB20150500004		
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 LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

Sony Electronics Inc., Building #8 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 FAX: 858-546 0364

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

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 §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 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.

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

SECTION 2

TEST DETAILS

Radio Testing of the
Sotera Wireless
Visi Mobile 92-10010 Wrist Transceiver Dual Band

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

FCC 47 CFR Part 15, Clause 15.247(b)(3)
Industry Canada RSS-247, Clause 5.4(4)

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: WTDB20150500001 / Test Configuration A

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

May 19, 2015 / 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/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.7 °C
Relative Humidity	45.8 %
ATM Pressure	99.3 kPa

2.1.7 Additional Observations

- This is a conducted test (Maximum conducted [average] output power) using direct connection to a power meter.
- The path loss for WiFi was measured and entered as a level offset.
- Test methodology is per Clause 9.2.3.1 of KDB 558074 D01 (DTS Meas Guidance v03r01, April 09, 2013). All conditions under this Clause are satisfied.
- Both Peak and Average measurements were recorded.

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

2.1.8 Test Results

WLAN Mode	Channel	Data Rates (Mbps)	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11b	**1 (2412 MHz)**	**1**	**14.33**	**17.85**
		2	14.20	17.74
		5.5	14.22	17.69
		11	14.16	17.99
	6 (2437 MHz)	1	13.93	17.42
		2	13.28	16.65
		5.5	13.02	16.54
		11	12.93	16.71
	11 (2462 MHz)	1	13.98	17.43
		2	14.11	17.65
		5.5	14.04	17.49
		11	14.02	17.69
802.11g	**1 (2412 MHz)**	**6**	13.52	21.62
		9	12.77	21.69
		12	12.74	21.48
		18	12.65	21.49
		24	12.59	21.49
		36	12.45	21.57
		48	12.34	21.52
		54	12.20	21.66
	6 (2437 MHz)	6	12.66	21.32
		9	12.62	21.31
		12	12.55	21.29
		18	12.53	21.21
		24	12.42	21.33
		36	12.26	21.19
		48	12.01	21.40

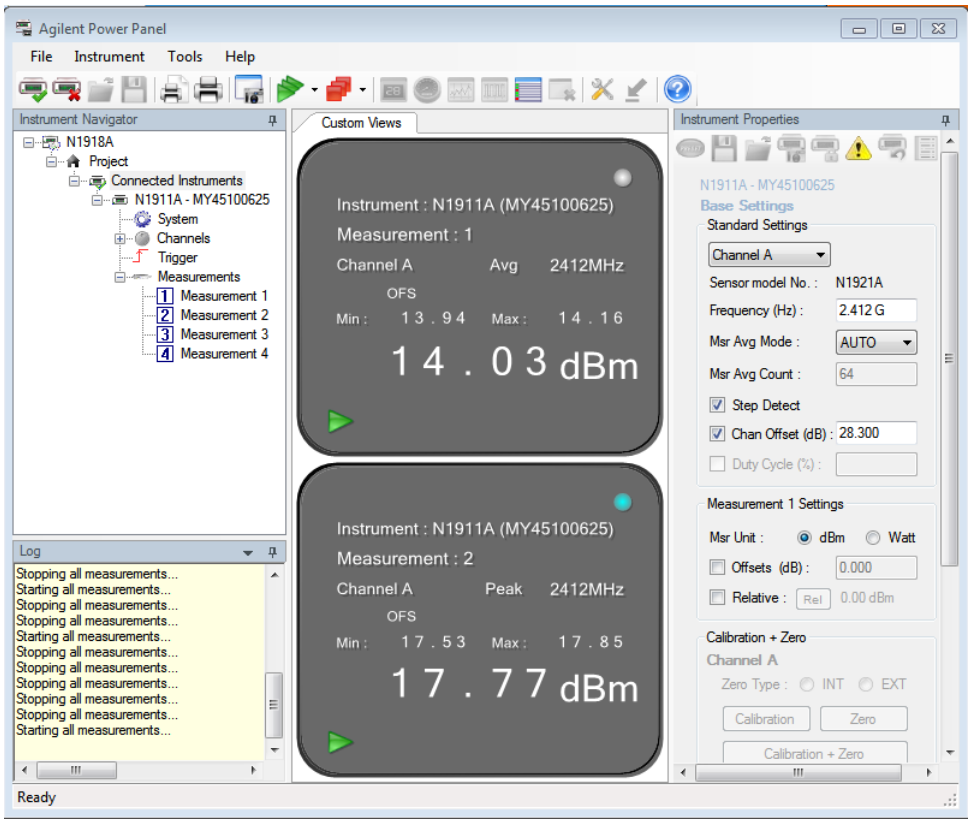
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

WLAN Mode	Channel	Data Rates (Mbps)	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11g	6 (2437 MHz)	54	11.94	21.39
	11 (2462 MHz)	6	13.40	21.94
		9	13.41	22.01
		12	13.53	22.08
		18	13.67	22.01
		24	13.71	22.03
		36	13.61	22.14
		48	13.63	22.06
		54	13.55	22.14
802.11n	**1 (2412 MHz)**	mcs 0 (7.2 Mbps)	12.52	21.73
		mcs 1(14.4 Mbps)	12.45	21.62
		mcs 2(21.7 Mbps)	12.53	21.63
		mcs 3 (28.9 Mbps)	12.62	21.62
		mcs 4 (43.3 Mbps)	12.58	21.66
		mcs 5 (57.8 Mbps)	12.67	21.84
		mcs 6 (65.0 Mbps)	12.51	21.92
		mcs 7 (72.2 Mbps)	12.34	21.87
	6 (2437 MHz)	mcs 0 (7.2 Mbps)	12.23	21.35
		mcs 1(14.4 Mbps)	12.24	21.29
		mcs 2(21.7 Mbps)	12.25	21.28
		mcs 3 (28.9 Mbps)	12.30	21.45
		mcs 4 (43.3 Mbps)	12.19	21.33
		mcs 5 (57.8 Mbps)	12.26	21.51
		mcs 6 (65.0 Mbps)	12.17	21.44
		mcs 7 (72.2 Mbps)	12.03	21.41

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

WLAN Mode	Channel	Data Rates (Mbps)	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11n	11 (2462 MHz)	mcs 0 (7.2 Mbps)	13.02	22.10
		mcs 1(14.4 Mbps)	13.03	22.11
		mcs 2(21.7 Mbps)	13.04	22.11
		mcs 3 (28.9 Mbps)	13.02	22.05
		mcs 4 (43.3 Mbps)	13.03	22.11
		mcs 5 (57.8 Mbps)	13.07	22.22
		mcs 6 (65.0 Mbps)	13.05	22.10
		mcs 7 (72.2 Mbps)	13.08	22.11

2.1.9 Sample Test Display



802.11 "b" mode

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

2.2 CONDUCTED EMISSIONS

2.2.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.207(a)
Industry Canada RSS-GEN, Clause 8.8

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

Test not performed. EUT is a battery operated device. Charger for the EUT was verified separately.

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

Industry Canada RSS-GEN, Clause 6.6

2.3.2 Standard Applicable

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.
When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 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 (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

Note: Video averaging is not permitted.
A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.
The trace data points are recovered and are directly summed in linear power level 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 (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.
The difference between the two recorded frequencies is the 99% occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

May 19, 2015 / FSC

2.3.5 Test Equipment Used

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

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

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.7 °C
Relative Humidity	45.8 %
ATM Pressure	99.3 kPa

2.3.7 Additional Observations

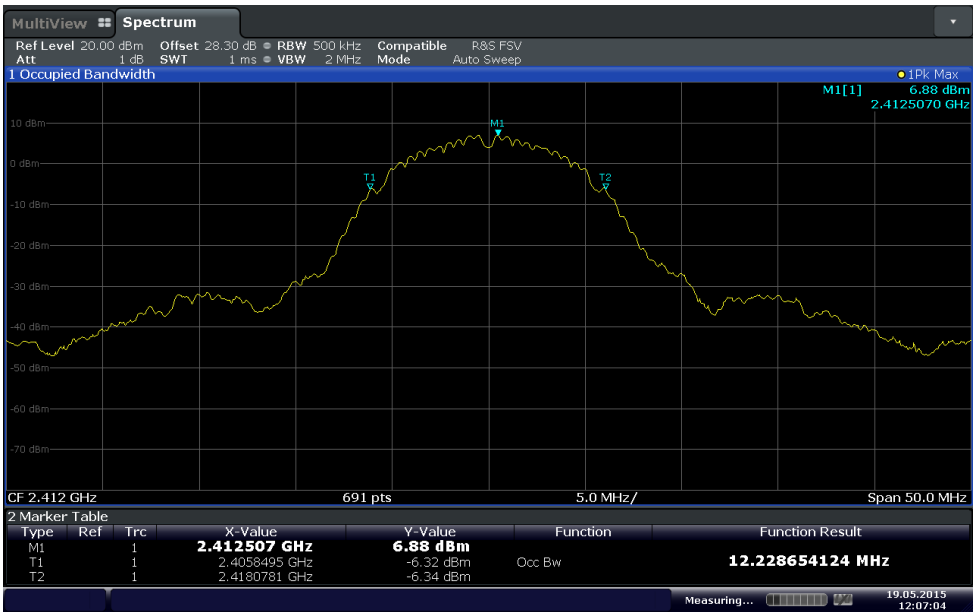
- This is a conducted test.
- The path loss for WiFi was measured and entered as a level offset.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 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)	12.229
	6 (2437 MHz)	12.229
	11 (2462 MHz)	12.229
802.11g	1 (2412 MHz)	17.077
	6 (2437 MHz)	17.077
	11 (2462 MHz)	16.787
802.11n HT20	1 (2412 MHz)	17.800
	6 (2437 MHz)	17.728
	11 (2462 MHz)	17.728

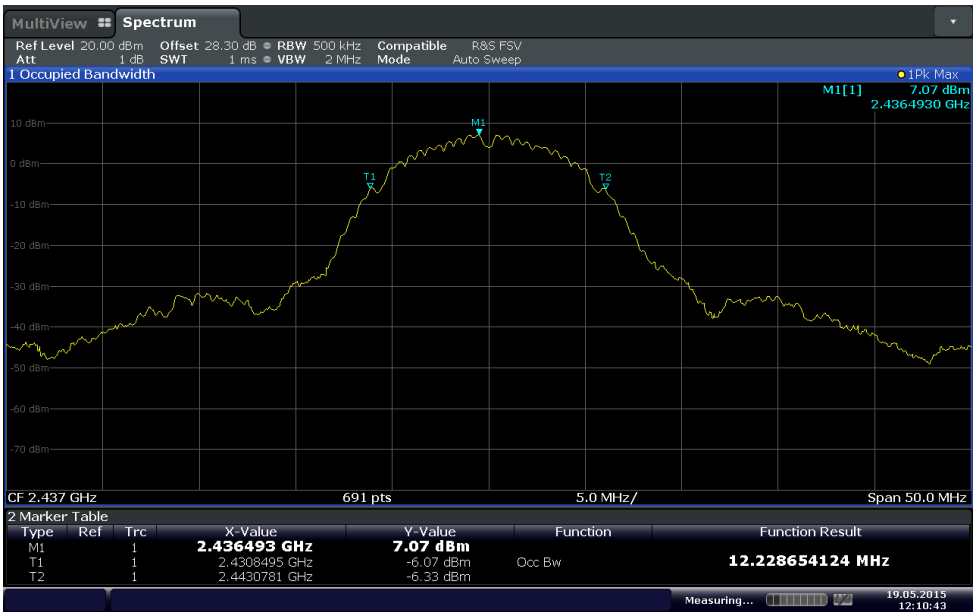
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.3.9 Test Results Plots



Date: 19.MAY.2015 12:07:05

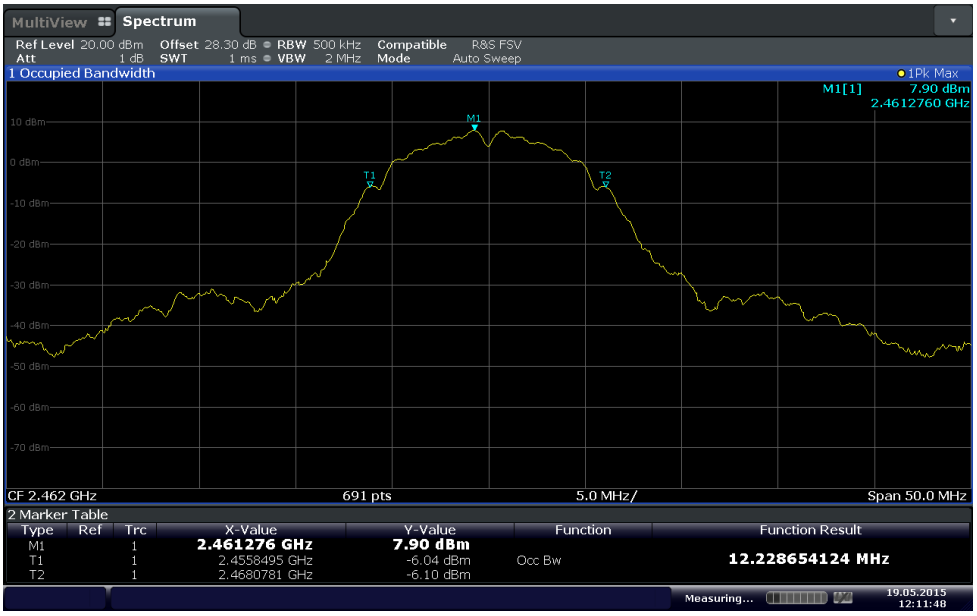
802.11b Low Channel



Date: 19.MAY.2015 12:10:44

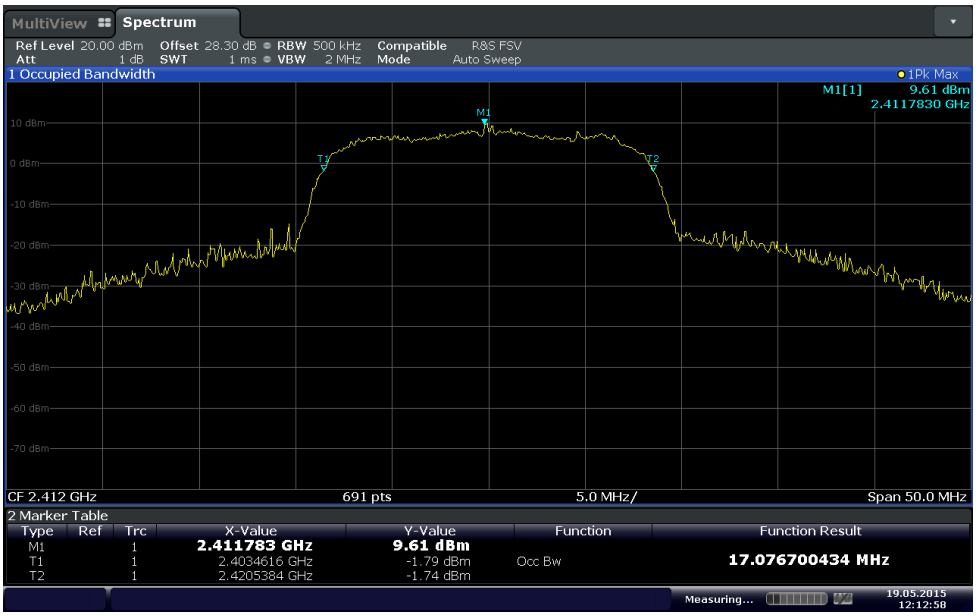
802.11b Mid Channel

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



Date: 19.MAY.2015 12:11:49

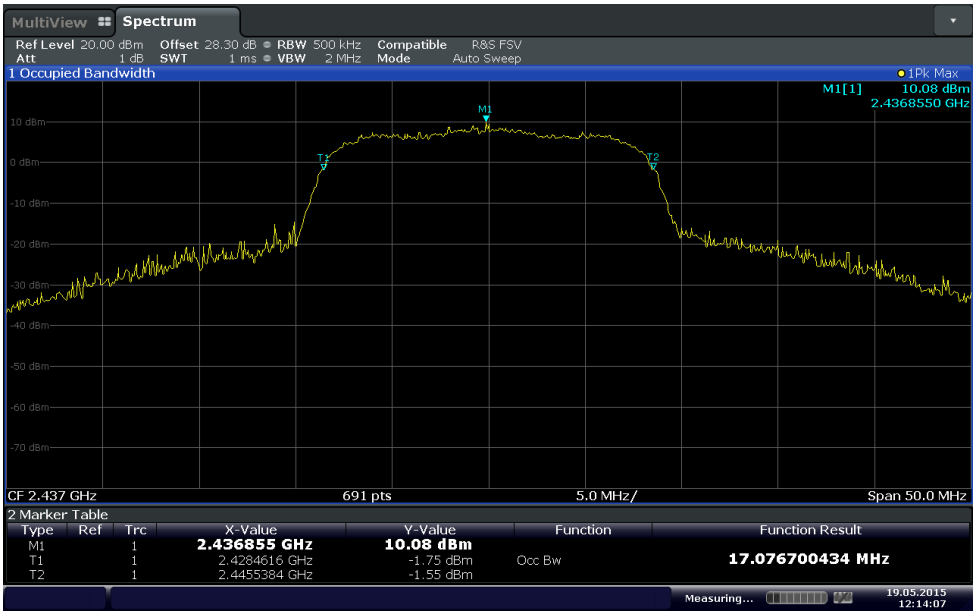
802.11b High Channel



Date: 19.MAY.2015 12:12:59

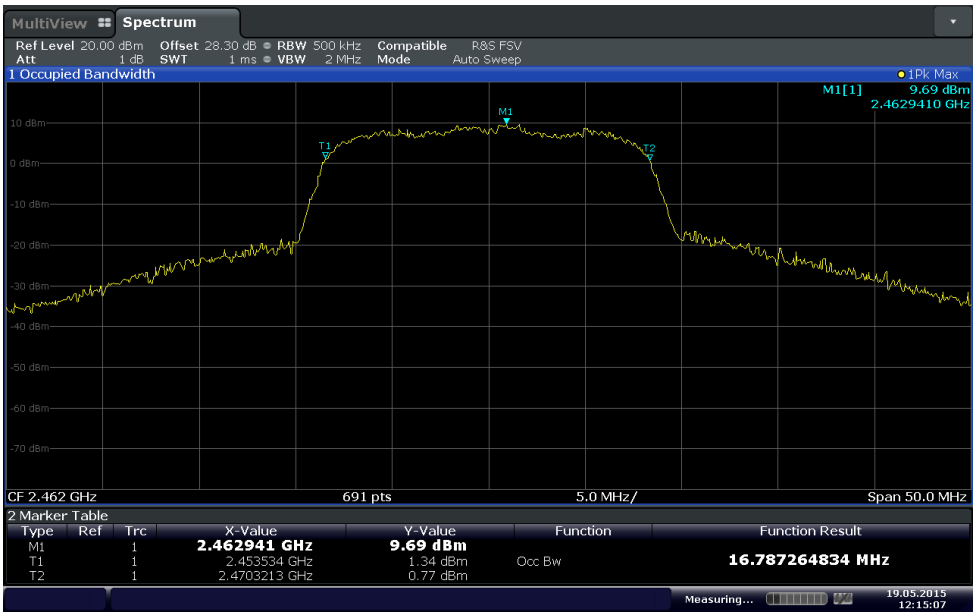
802.11g Low Channel

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



Date: 19.MAY.2015 12:14:08

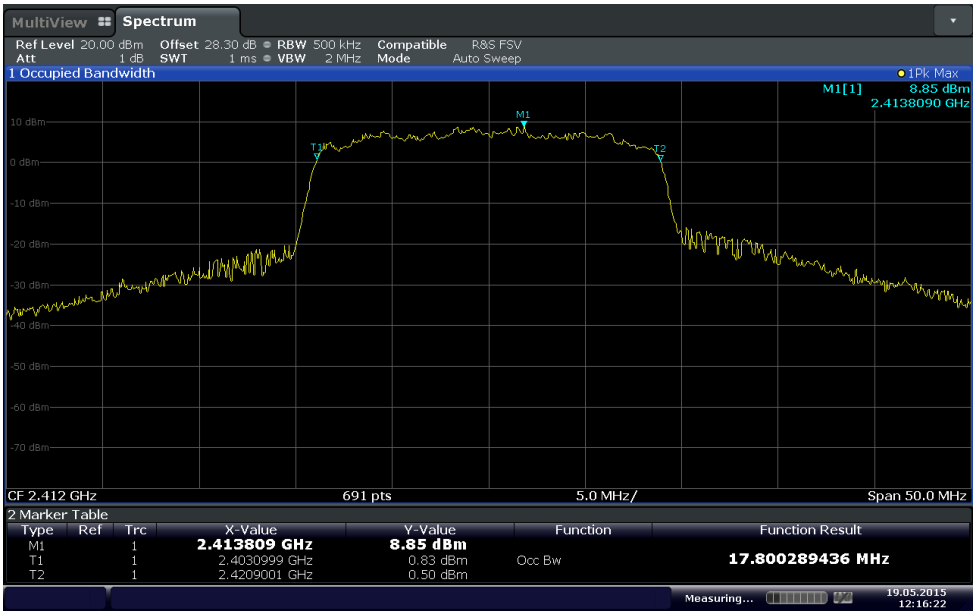
802.11g Mid Channel



Date: 19.MAY.2015 12:15:07

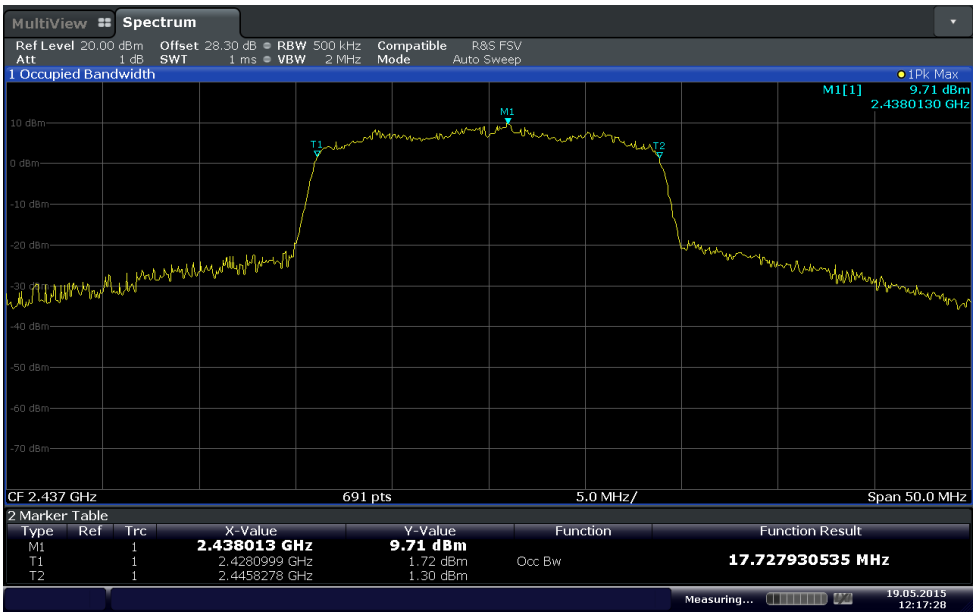
802.11g High Channel

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



Date: 19.MAY.2015 12:16:22

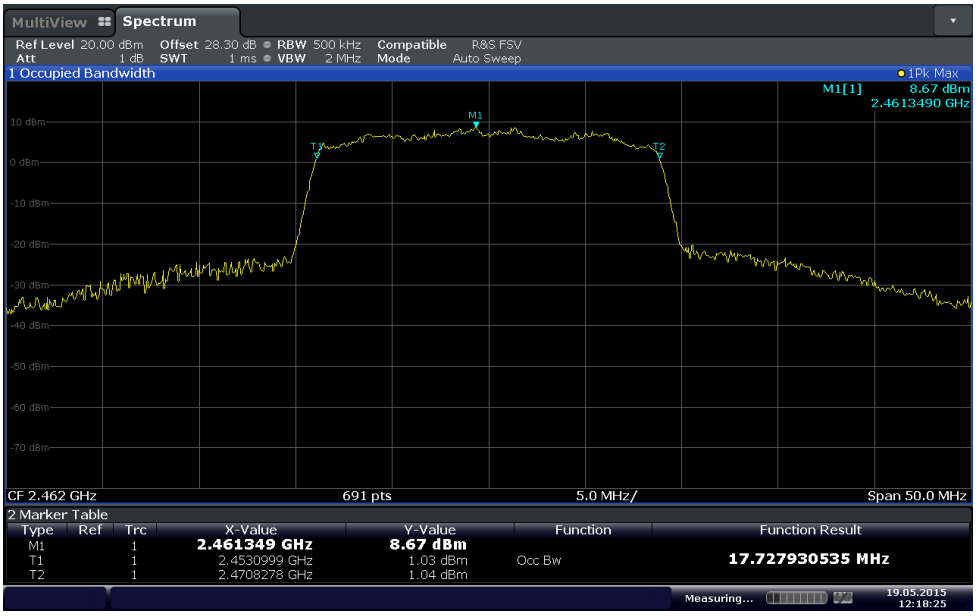
802.11n Low Channel



Date: 19.MAY.2015 12:17:28

802.11n Mid Channel

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



Date: 19.MAY.2015 12:18:25

802.11n High Channel

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

2.4 MINIMUM 6 dB RF BANDWIDTH

2.4.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(a)(2)
Industry Canada RSS-247, Clause 5.2(1)

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: WTDB20150500001 / Test Configuration A

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

May 19, 2015 / 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/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.7 °C
Relative Humidity	45.8 %
ATM Pressure	99.3 kPa

2.4.7 Additional Observations

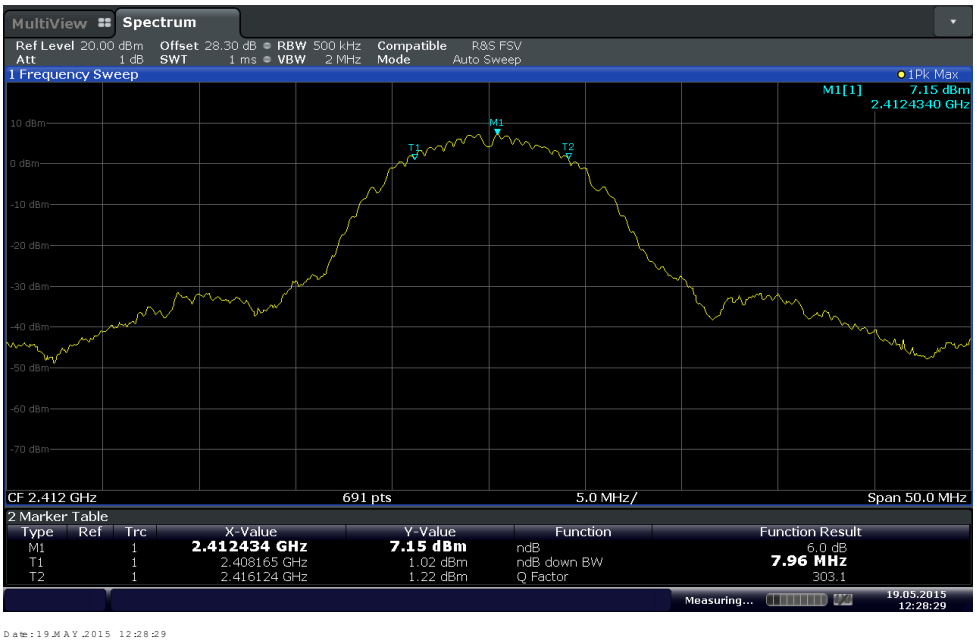
- This is a conducted test.
- The path loss for WiFi was measured and entered as a level offset.
- Span is wide enough to capture the channel transmission.
- RBW is set to 100 kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- The “n” dB down marker function of the spectrum analyzer was used for this test.
- For signal modulation where “n” dB down marker function is not practical, a peak measurement is performed while the trace is in max hold.

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

2.4.8 Test Results

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
802.11b	1 (2412 MHz)	7.96	0.500	Complies
	6 (2437 MHz)	7.96	0.500	Complies
	11 (2462 MHz)	8.18	0.500	Complies
802.11g	1 (2412 MHz)	15.92	0.500	Complies
	6 (2437 MHz)	15.99	0.500	Complies
	11 (2462 MHz)	15.85	0.500	Complies
802.11n HT20	1 (2412 MHz)	17.58	0.500	Complies
	6 (2437 MHz)	17.58	0.500	Complies
	11 (2462 MHz)	17.58	0.500	Complies

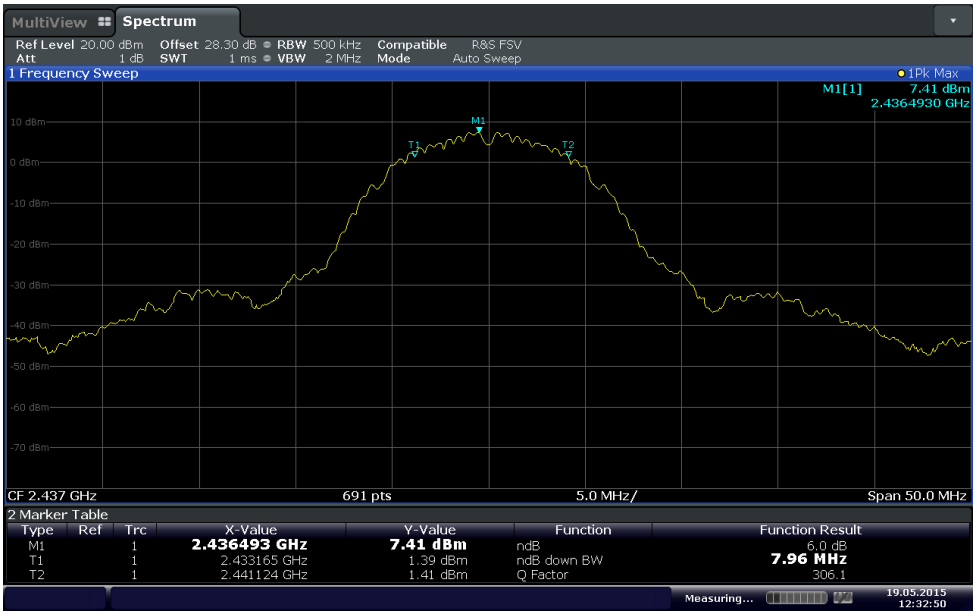
2.4.9 Test Results Plots



Date: 19.MAY.2015 12:28:29

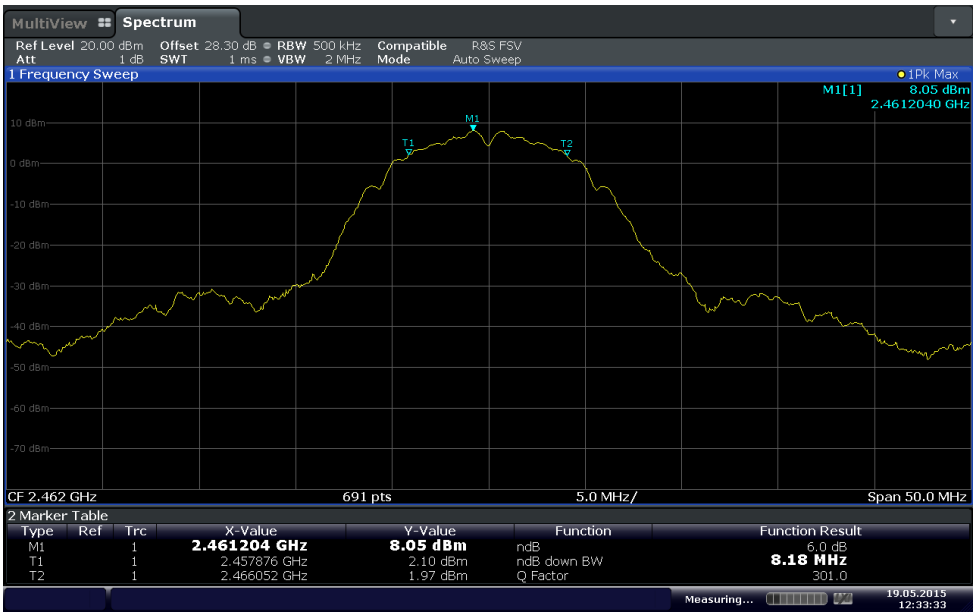
802.11b Low Channel

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



Date: 19.MAY.2015 12:32:50

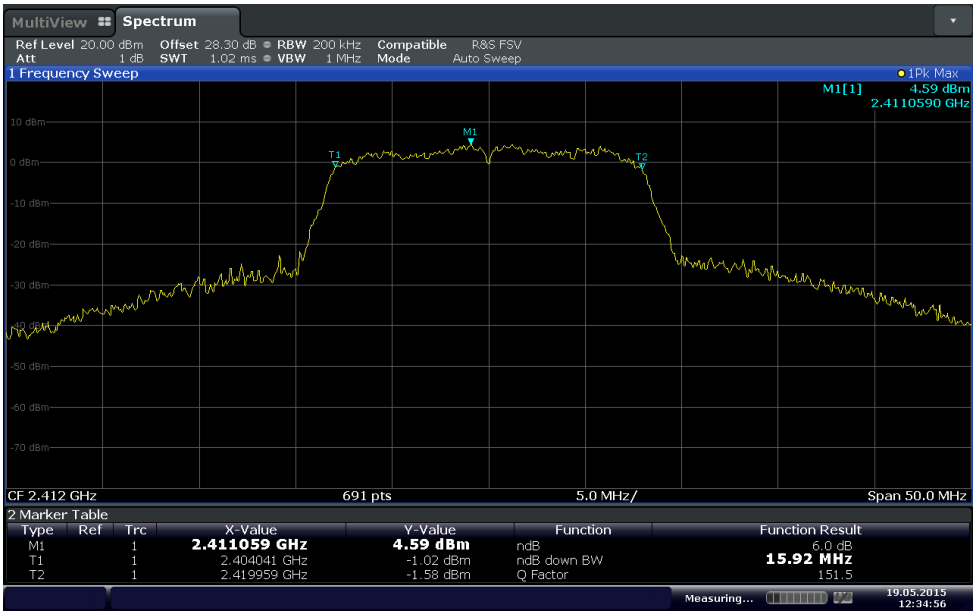
802.11b Mid Channel



Date: 19.MAY.2015 12:33:33

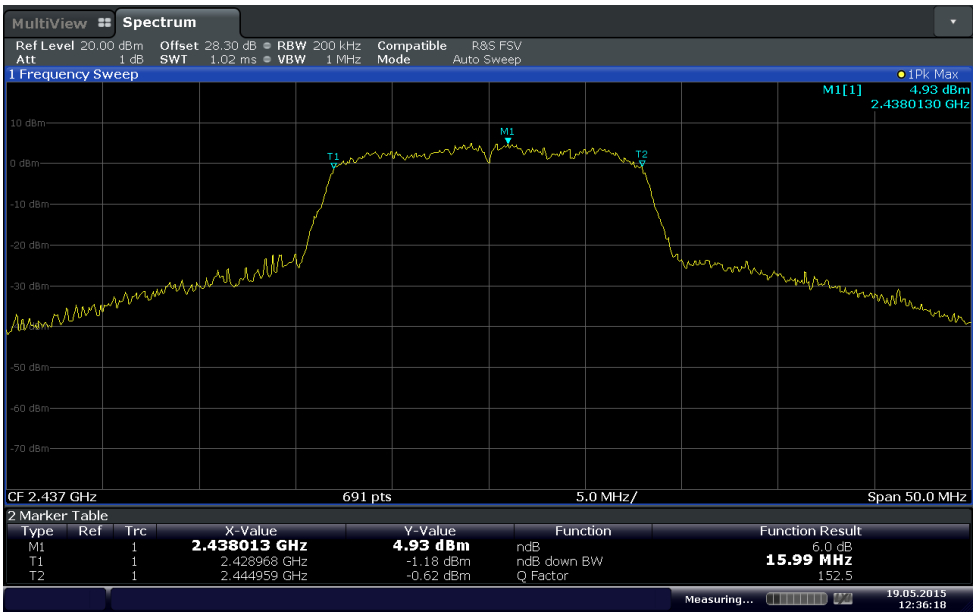
802.11b High Channel

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



Date: 19.MAY.2015 12:34:55

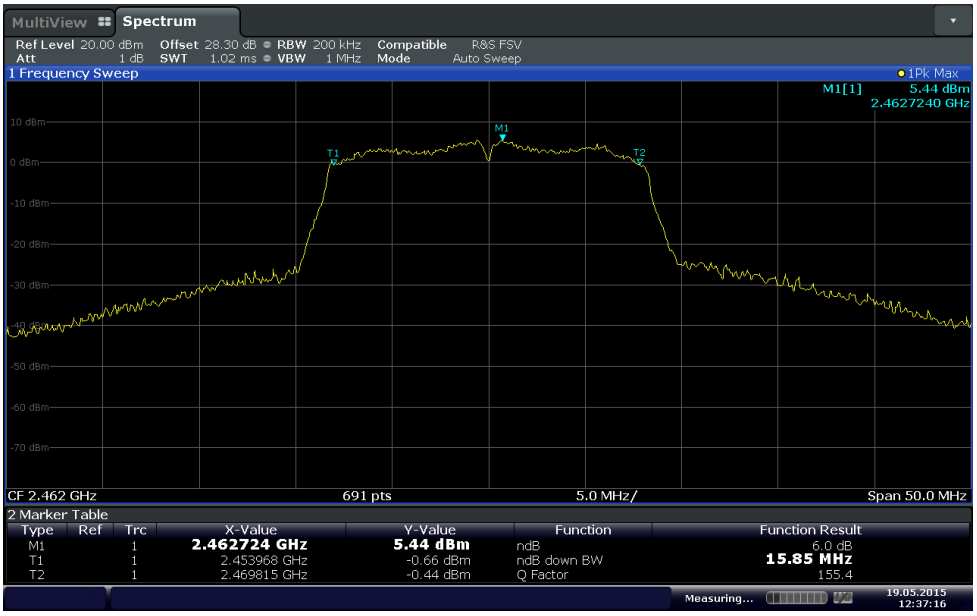
802.11g Low Channel



Date: 19.MAY.2015 12:36:17

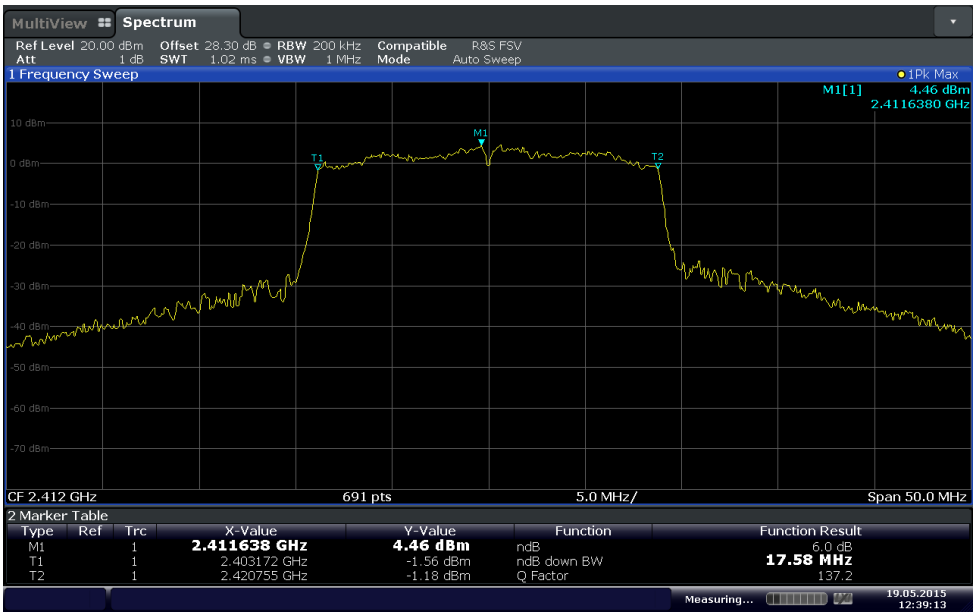
802.11g Mid Channel

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



Date: 19.MAY.2015 12:37:16

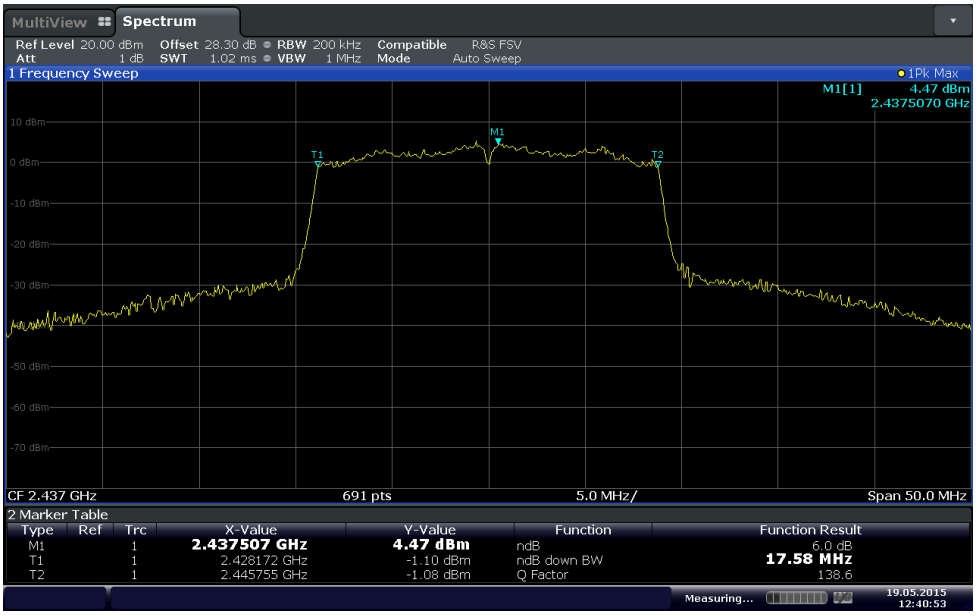
802.11g High Channel



Date: 19.MAY.2015 12:39:14

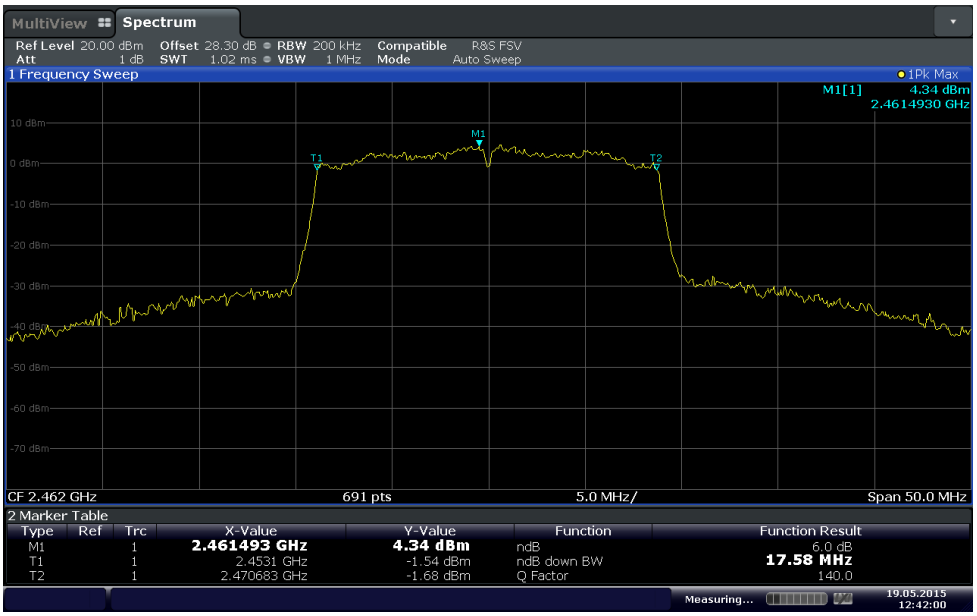
802.11n Low Channel

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



Date: 19.MAY.2015 12:40:54

802.11n Mid Channel



Date: 19.MAY.2015 12:42:00

802.11n High Channel

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

2.5 OUT-OF-BAND EMISSIONS - CONDUCTED

2.5.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
Industry Canada RSS-247, Clause 5.5

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: WTDB20150500001 / Test Configuration A

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

May 20, 2015/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/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

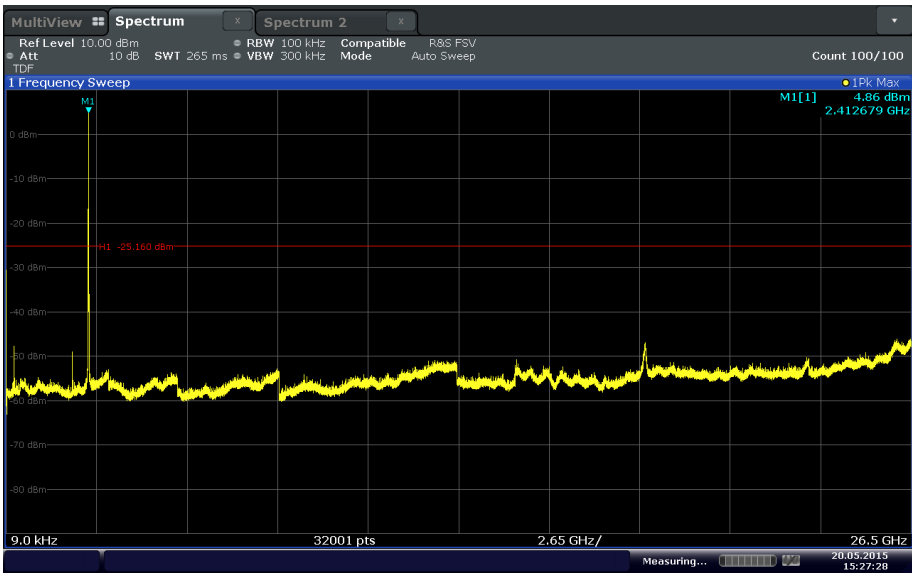
Ambient Temperature	19.4°C
Relative Humidity	19.3%
ATM Pressure	99.6 kPa

2.5.7 Additional Observations

- This is a conducted test.
- A transducer factor (TDF) 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.
- Spectrum was searched from 9 kHz up to 26.5GHz.

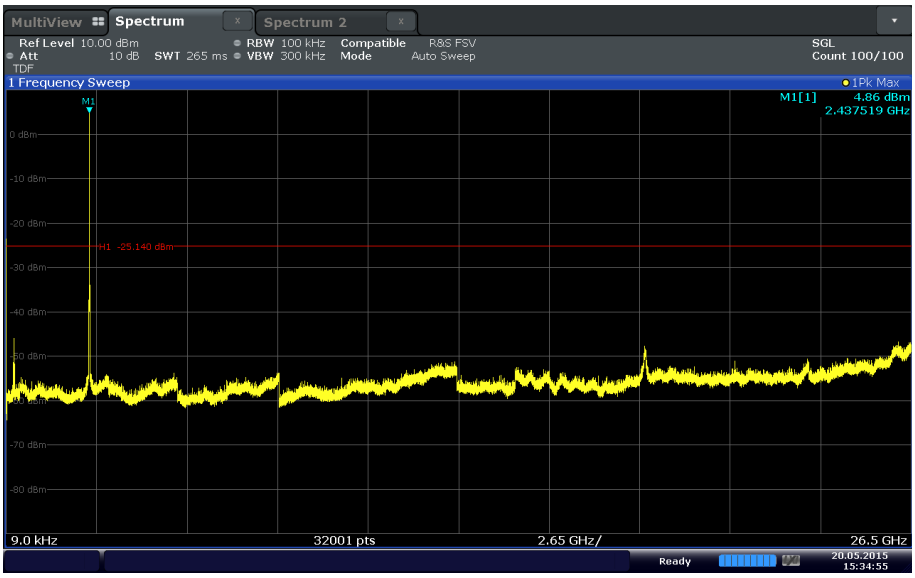
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.5.8 Test Results Plots



Date: 20 MAY 2015 15:27:28

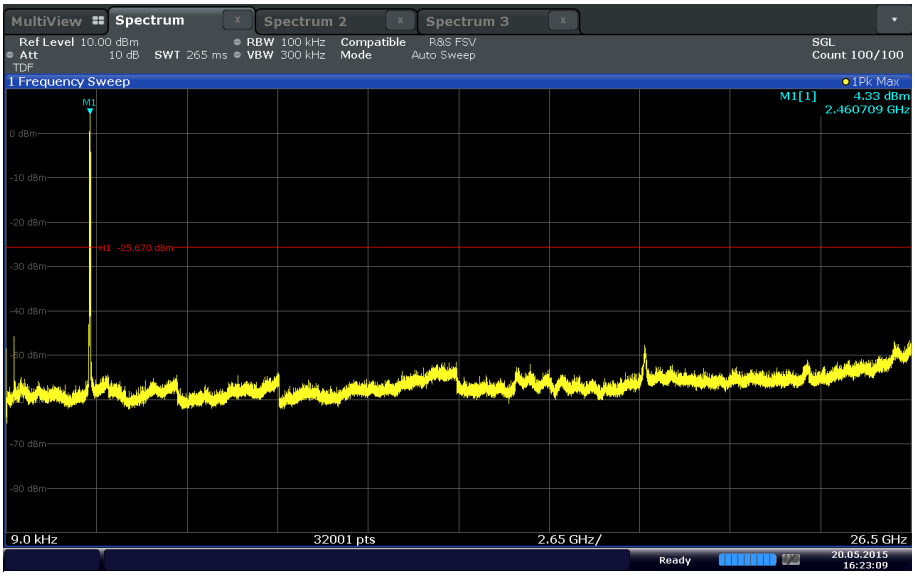
802.11b Low Channel



Date: 20 MAY 2015 15:34:56

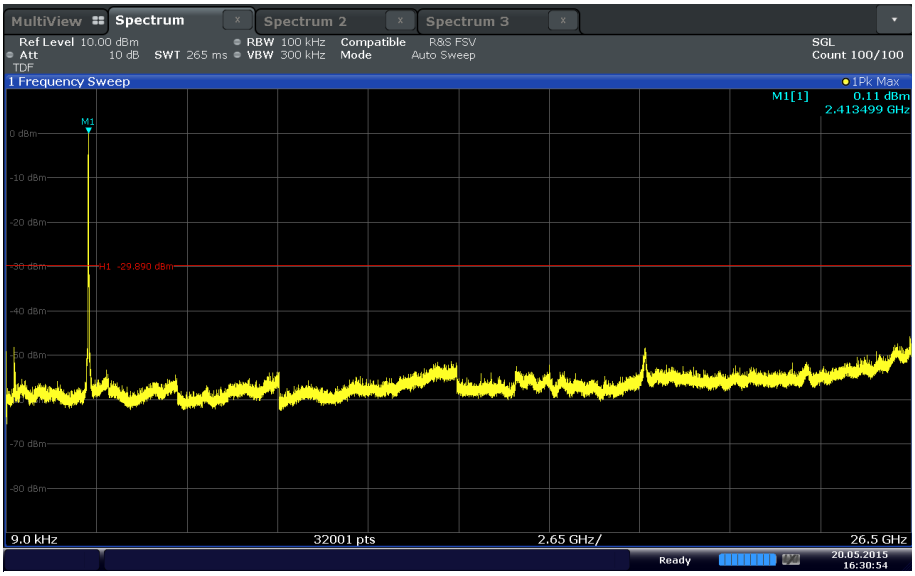
802.11b Mid Channel

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



Date: 20 MAY 2015 16:23:09

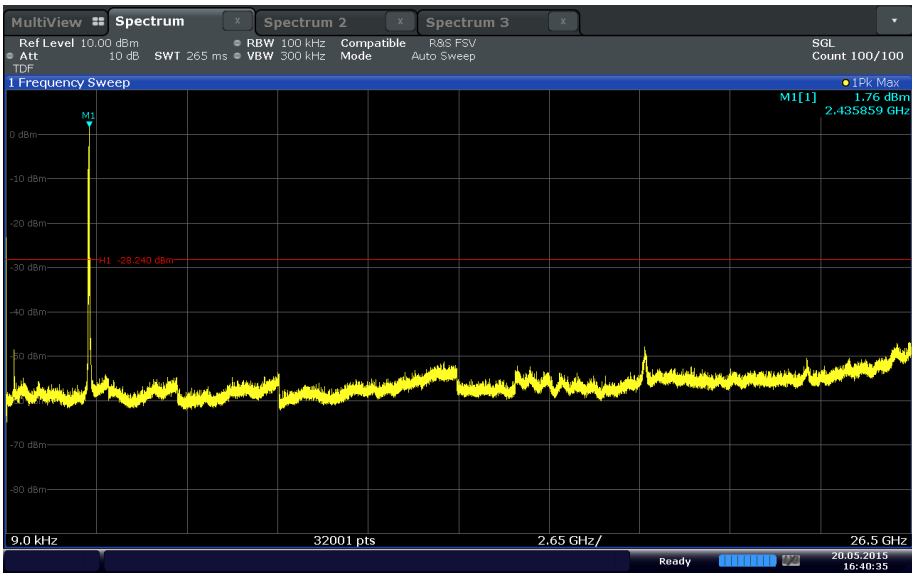
802.11b High Channel



Date: 20 MAY 2015 16:30:54

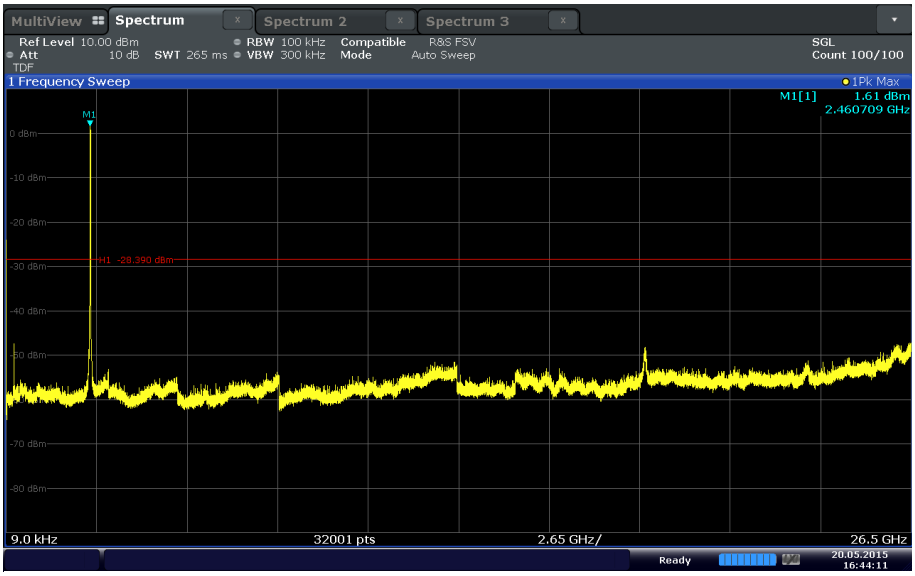
802.11g Low Channel

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



Date: 20 MAY 2015 16:40:35

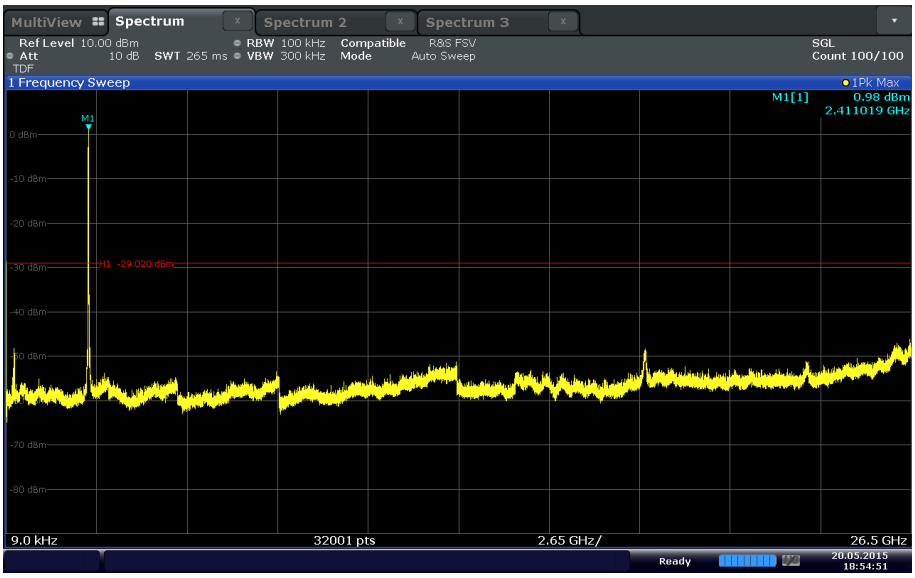
802.11g Mid Channel



Date: 20 MAY 2015 16:44:11

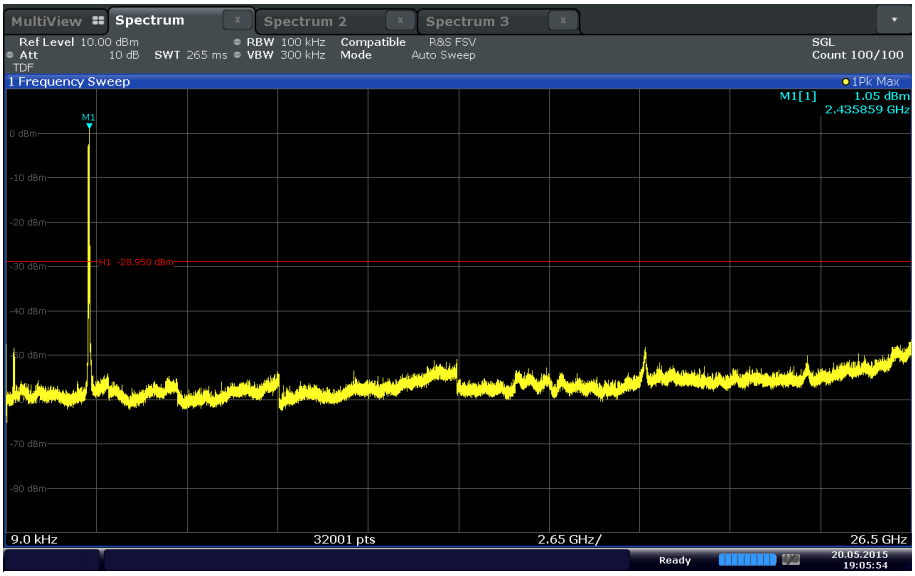
802.11g High Channel

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



Date: 20.MAY.2015 18:54:51

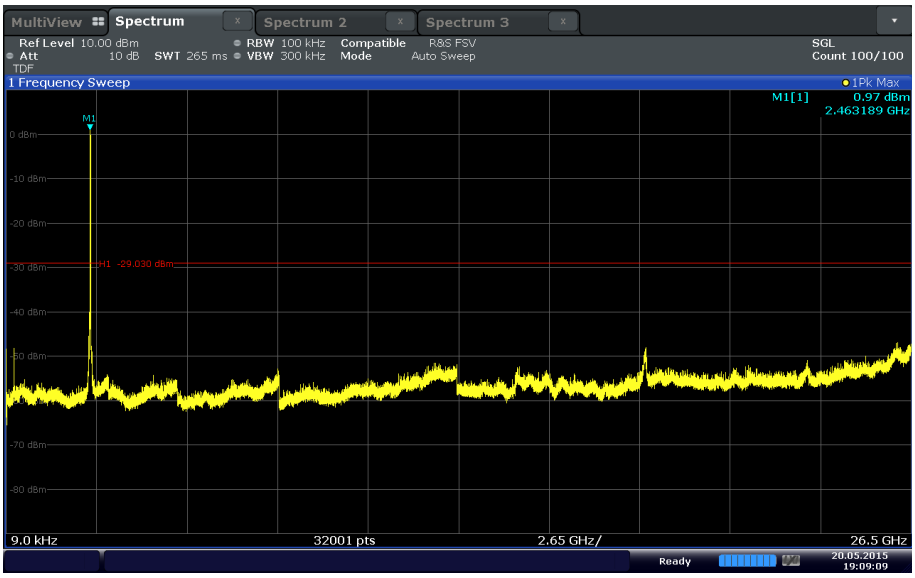
802.11n HT20 Low Channel



Date: 20.MAY.2015 19:05:54

802.11n HT20 Mid Channel

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



Date: 20 MAY 2015 19:09:09

802.11n HT20 High Channel

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

2.6 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.6.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
Industry Canada RSS-247, Clause 5.5

2.6.2 Standard Applicable

See previous test.

2.6.3 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

May 20, 2015/IR

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/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	19.4°C
Relative Humidity	19.3%
ATM Pressure	99.6 kPa

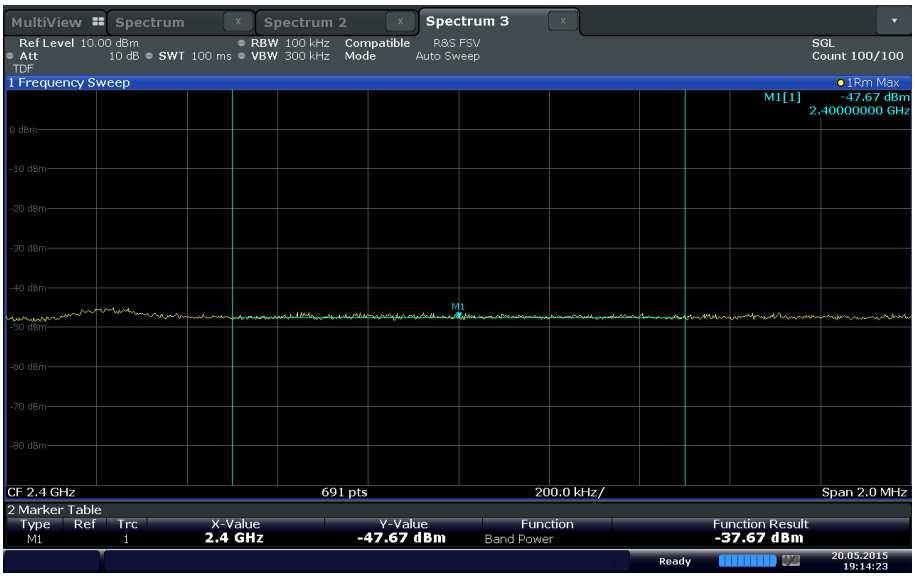
2.6.7 Additional Observations

- Setup is identical to “Out-of-Band Emissions – Conducted“test (previous test).
- 2.4GHZ band-edges (2400MHz and 2483.5MHz) were verified in this test.
- Test methodology is per Clause 13.3.2 of KDB 558074 (D01 DTS Meas Guidance v03r01, April 09, 2013); trace averaging with continuous EUT transmission at full power.
- Limits are from Section 2.5 of this test report. These are 30dBc from the highest level of the desired power within the band.

2.6.8 Test Results

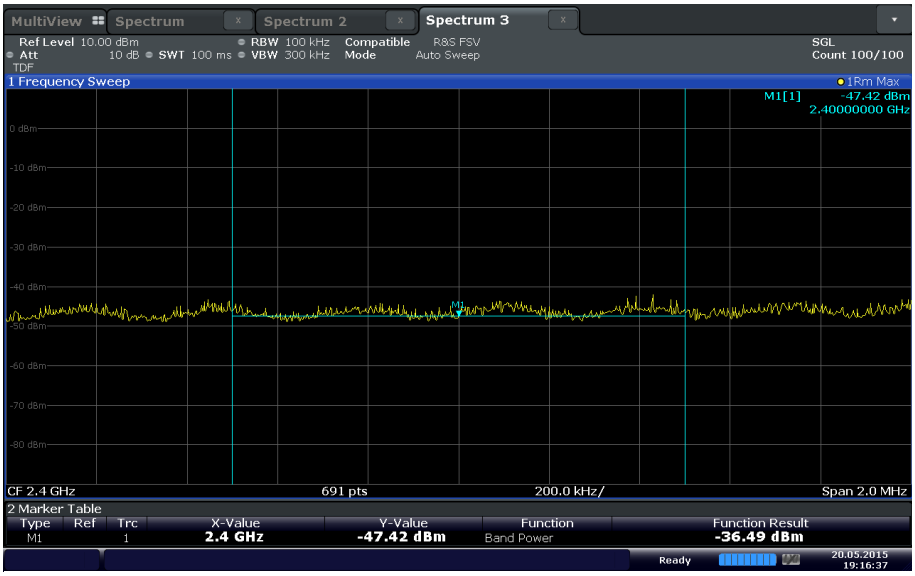
Complies. See attached plots.

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



Date: 20 MAY 2015 19:14:24

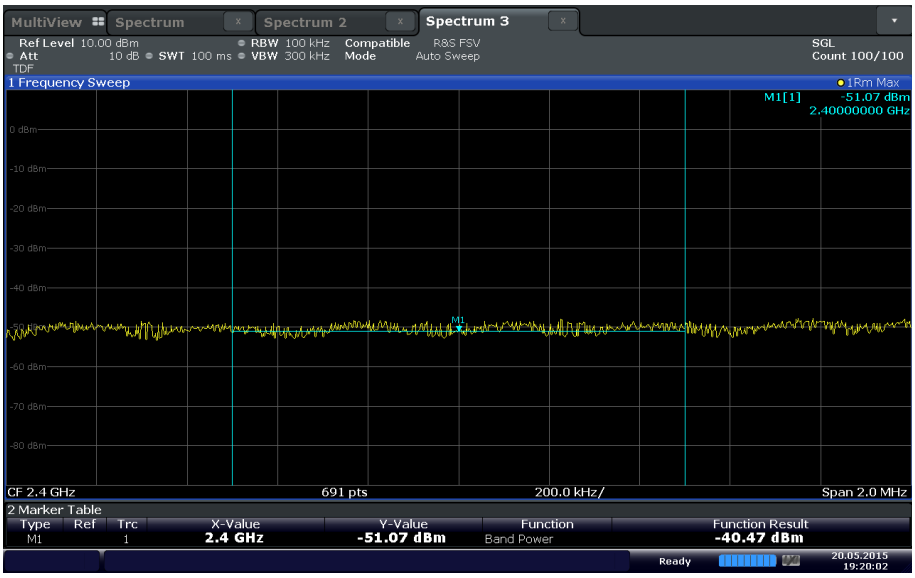
802.11b Low Channel (2412 MHz). Limit is -25.16 dBm. Margin is -12.51 dB.



Date: 20 MAY 2015 19:16:37

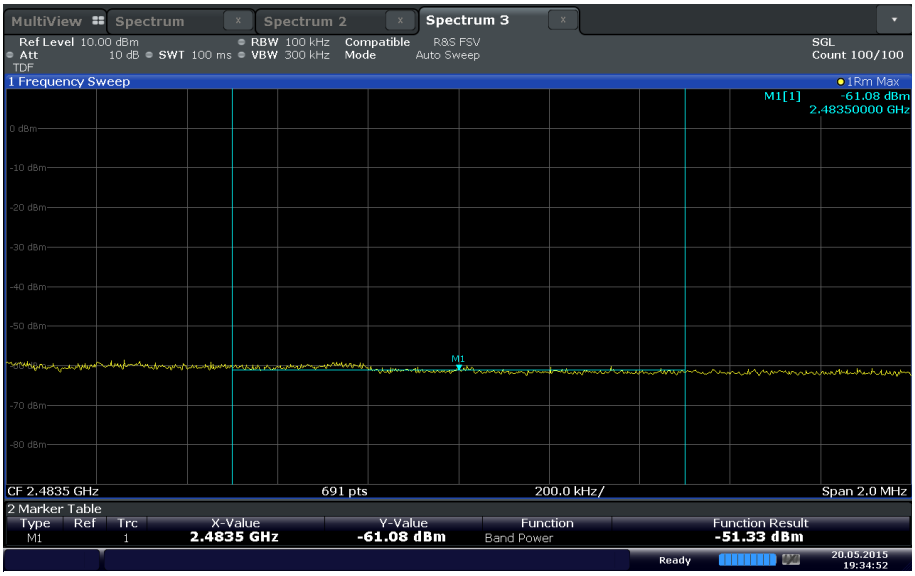
802.11g Low Channel (2412 MHz). Limit is -29.89dBm. Margin is -6.6 dB.

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



Date: 20 MAY 2015 19:20:03

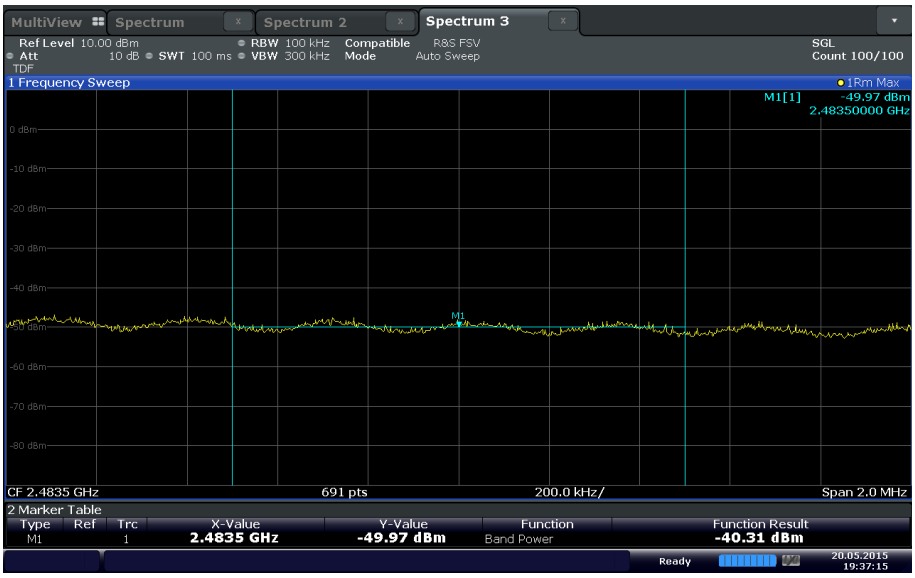
802.11n HT20 Low Channel (2412 MHz). Limit is -29.02 dBm. Margin is -11.45 dB.



Date: 20 MAY 2015 19:34:52

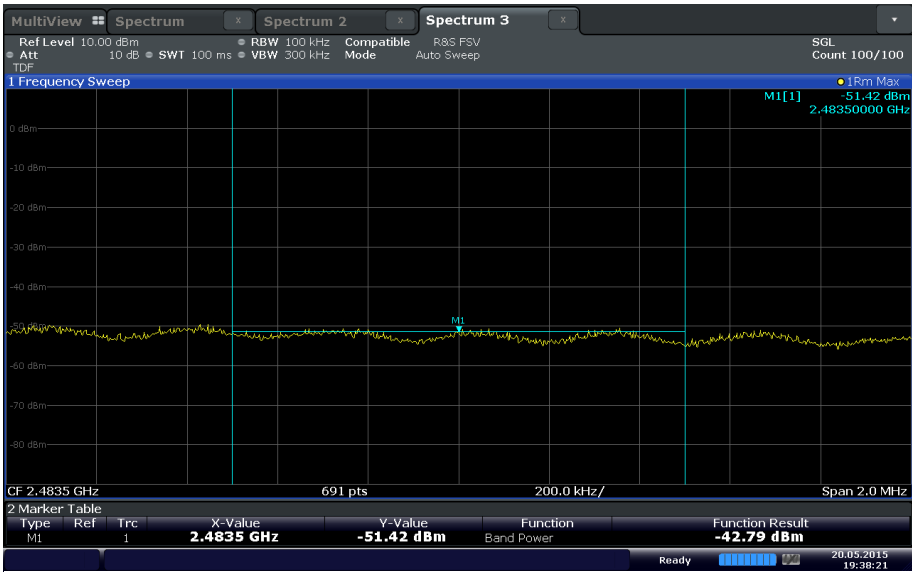
802.11b High Channel (2462 MHz). Limit is -25.67 dBm. Margin is -25.66 dB.

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



Date: 20.MAY.2015 19:37:15

802.11g High Channel (2462 MHz). Limit is -28.39 dBm. Margin is -11.92 dB.



Date: 20.MAY.2015 19:38:22

802.11n HT20 High Channel (2462 MHz). Limit is -29.03 dBm. Margin is -13.76dB.

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

2.7 SPURIOUS RADIATED EMISSIONS

2.7.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
Industry Canada RSS-247, Clause 5.5

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: WTDB20150500004 / Test Configuration B

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

May 27 and 28, 2015/IR

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/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.6 - 25.9°C
Relative Humidity	41.6 - 43.7%
ATM Pressure	98.9 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).
- Only the considered worst case WLAN configuration (802.11b, Low Channel, 5.5Mbps) presented for radiated emissions below 1GHz. There are no significant differences in emissions between all modes below 1GHz.

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

- Only noise floor measurements observed above 18GHz.
- 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)

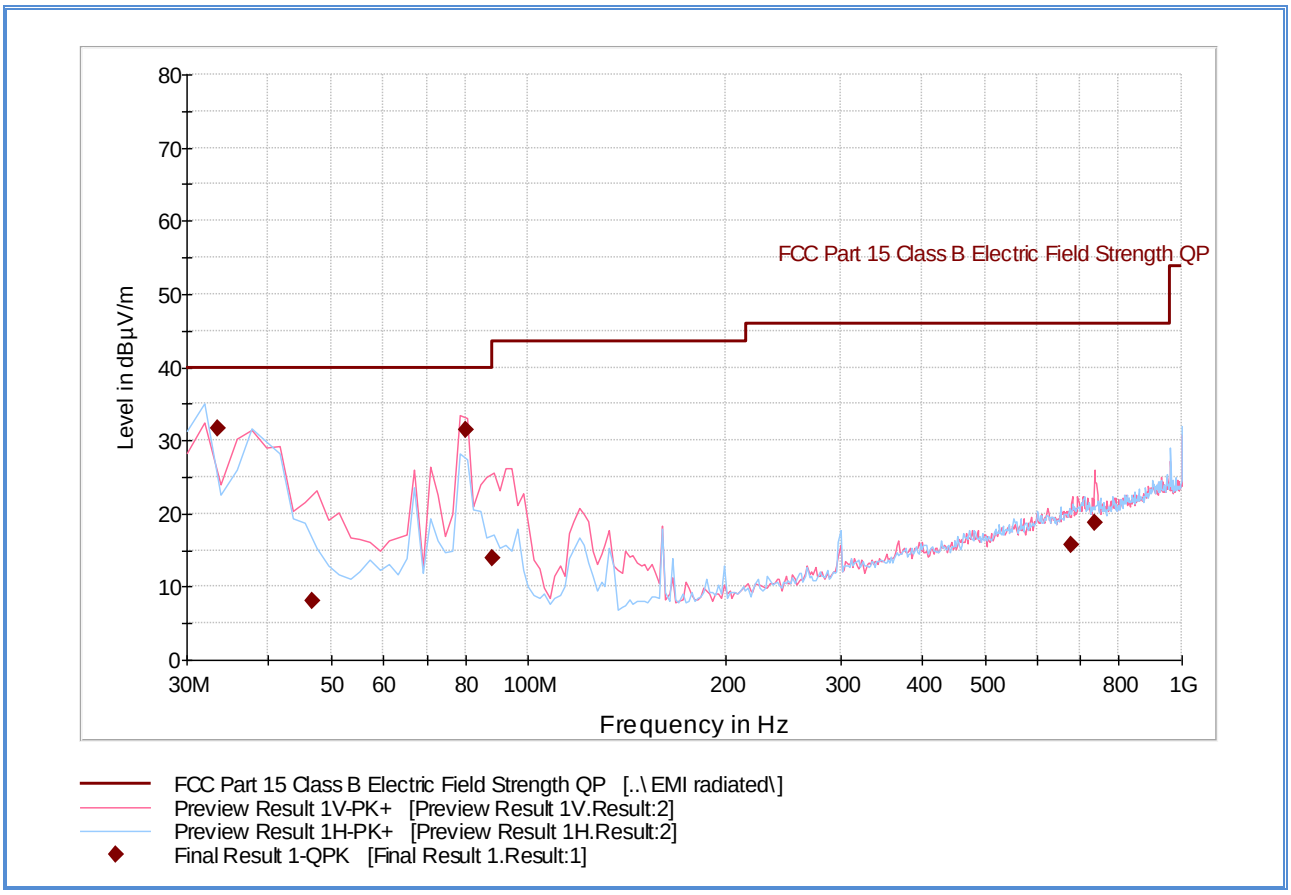
Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.7.9 Test Results

See attached plots.

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

2.7.10 Test Results Below 1GHz (Receive Mode)

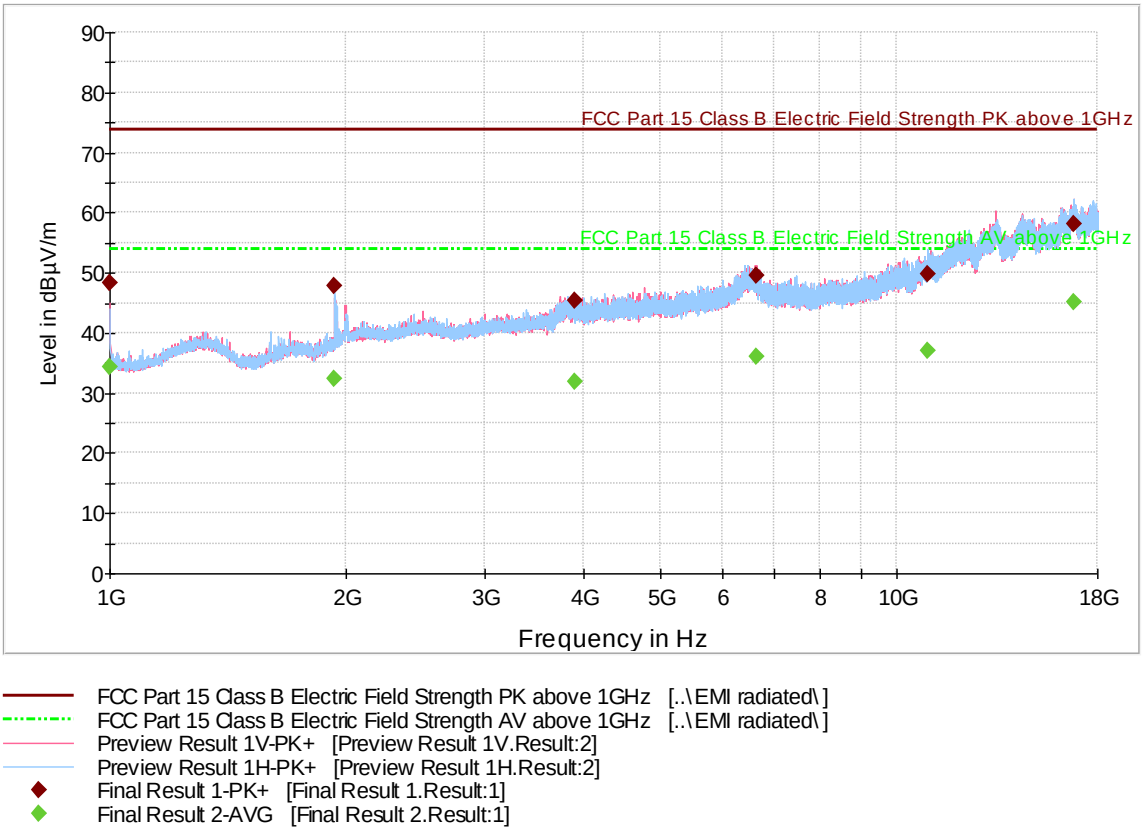


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.400000	31.6	1000.0	120.000	105.0	H	222.0	-13.3	8.4	40.0
46.694990	8.0	1000.0	120.000	100.0	V	169.0	-19.1	32.0	40.0
79.997194	31.4	1000.0	120.000	117.0	V	227.0	-22.0	8.6	40.0
88.052745	14.0	1000.0	120.000	250.0	V	11.0	-21.2	29.5	43.5
678.378517	15.8	1000.0	120.000	164.0	V	317.0	-2.6	30.2	46.0
735.871263	18.6	1000.0	120.000	100.0	V	236.0	-1.7	27.4	46.0

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

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)
1000.400000	48.4	1000.0	1000.000	183.5	V	280.0	-7.2	25.5	73.9
1931.966667	47.7	1000.0	1000.000	202.3	H	182.0	-2.3	26.2	73.9
3899.866667	45.4	1000.0	1000.000	192.5	H	9.0	5.0	28.5	73.9
6623.800000	49.6	1000.0	1000.000	344.1	V	270.0	10.9	24.3	73.9
10936.06666	49.7	1000.0	1000.000	258.3	H	0.0	14.7	24.2	73.9
16781.53333	58.0	1000.0	1000.000	322.2	H	350.0	23.7	15.9	73.9

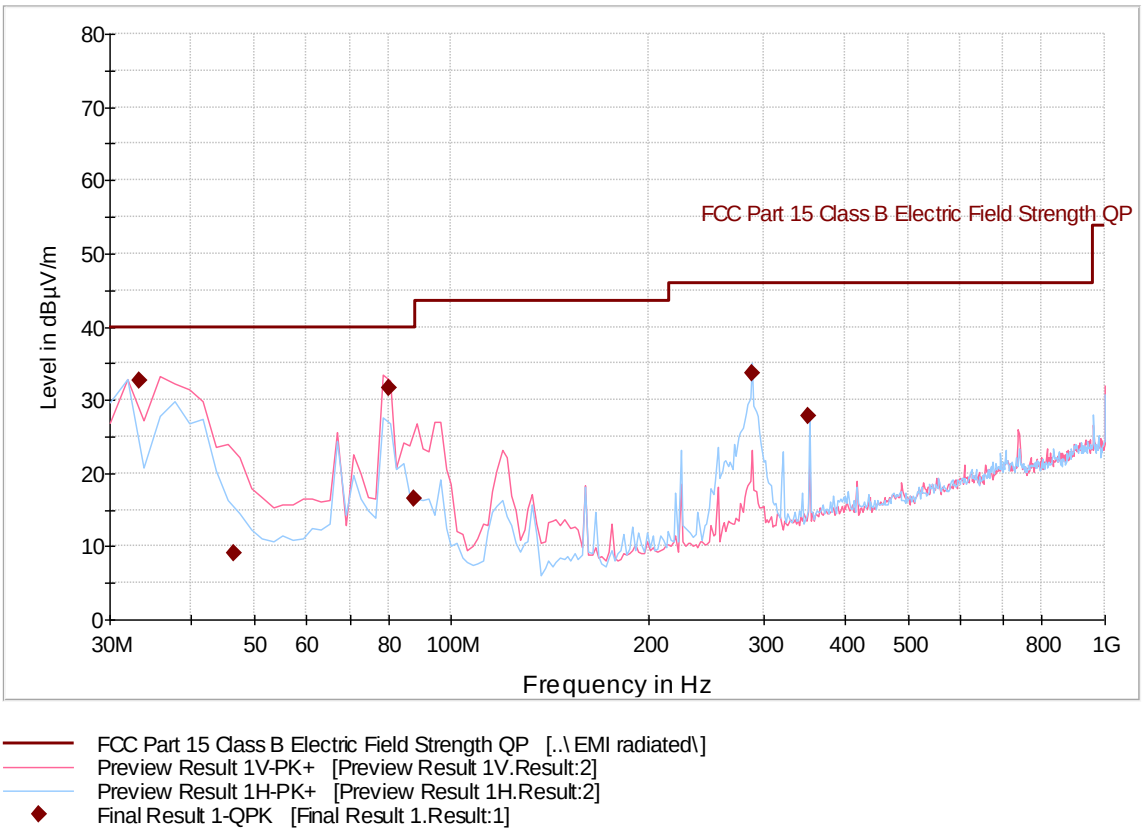
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	34.3	1000.0	1000.000	183.5	V	280.0	-7.2	19.6	53.9
1931.966667	32.3	1000.0	1000.000	202.3	H	182.0	-2.3	21.6	53.9
3899.866667	31.9	1000.0	1000.000	192.5	H	9.0	5.0	22.0	53.9
6623.800000	36.1	1000.0	1000.000	344.1	V	270.0	10.9	17.8	53.9
10936.06666	37.0	1000.0	1000.000	258.3	H	0.0	14.7	16.9	53.9
16781.53333	45.1	1000.0	1000.000	322.2	H	350.0	23.7	8.8	53.9

Test Notes: No significant emissions observed above 18GHz.

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

2.7.12 Test Results Below 1GHz (WLAN worst Case Configuration)



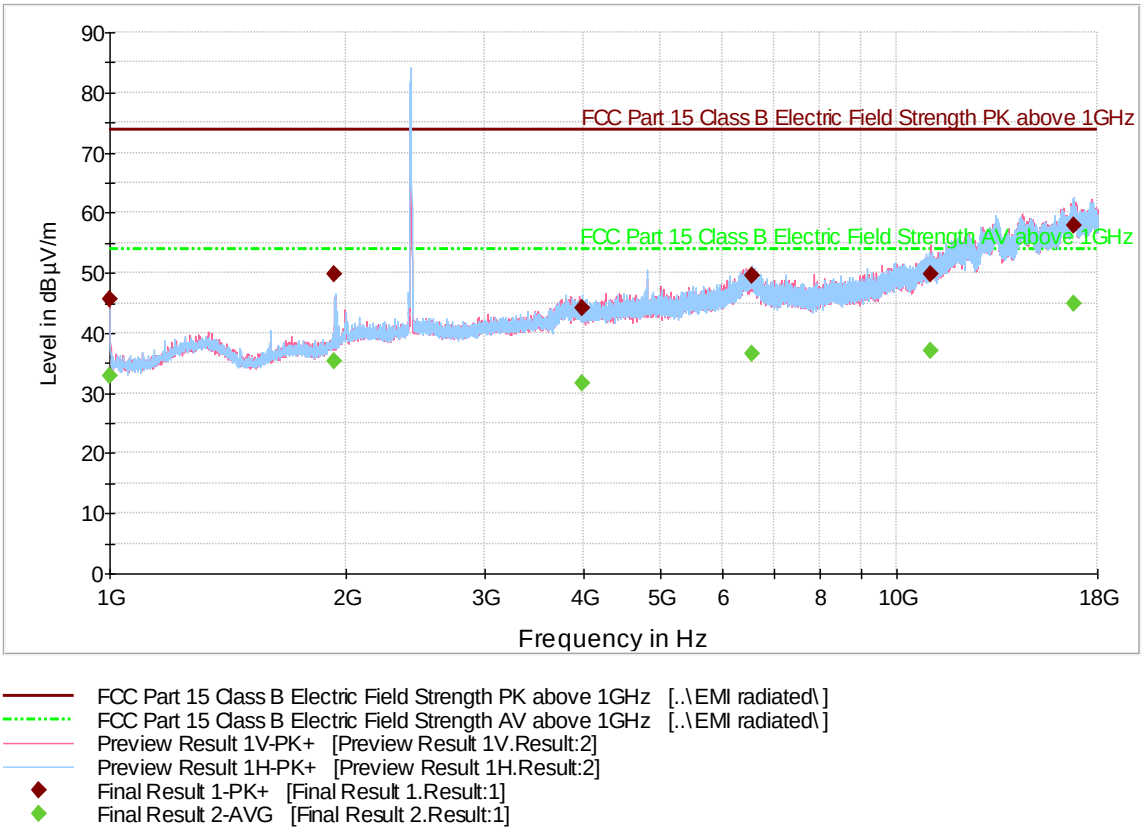
Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.271663	32.7	1000.0	120.000	169.0	V	18.0	-13.2	7.3	40.0
46.471102	9.1	1000.0	120.000	105.0	V	254.0	-19.1	30.9	40.0
79.997194	31.7	1000.0	120.000	109.0	V	71.0	-22.0	8.3	40.0
87.652745	16.5	1000.0	120.000	150.0	V	7.0	-21.3	23.5	43.5
288.017074	33.6	1000.0	120.000	100.0	H	321.0	-13.4	12.4	43.5
352.005371	27.8	1000.0	120.000	100.0	H	321.0	-10.6	18.2	46.0

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

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

2.7.13 Test Results Above 1GHz (802.11b 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)
1000.000000	45.5	1000.0	1000.000	165.6	V	303.0	-7.2	28.4	73.9
1932.533333	49.9	1000.0	1000.000	321.2	H	0.0	-2.3	24.0	73.9
3981.066667	44.2	1000.0	1000.000	402.0	H	0.0	4.9	29.7	73.9
6554.100000	49.6	1000.0	1000.000	402.0	H	170.0	11.3	24.3	73.9
11064.233333	49.7	1000.0	1000.000	125.7	V	90.0	14.7	24.2	73.9
16802.266667	57.9	1000.0	1000.000	124.7	V	208.0	23.8	16.0	73.9

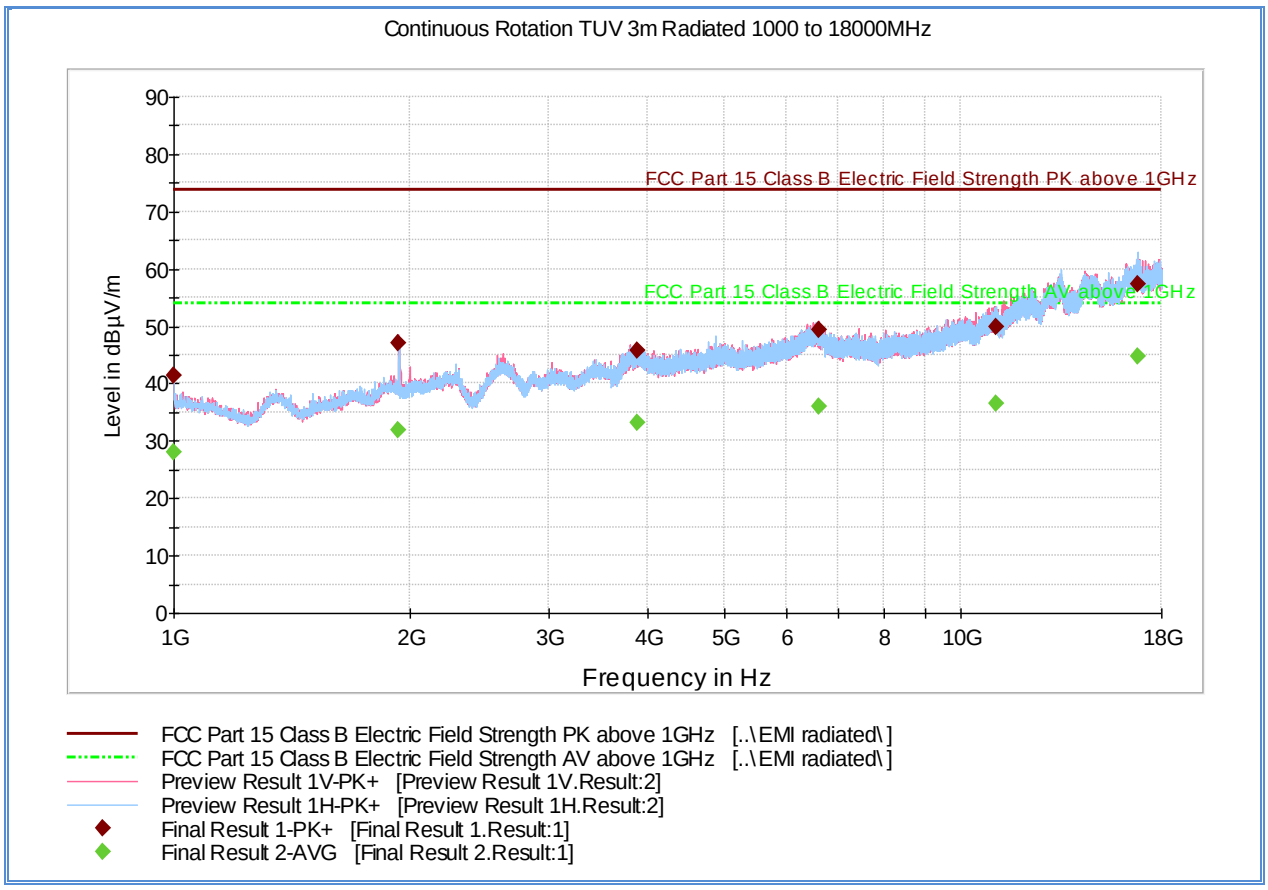
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	32.7	1000.0	1000.000	165.6	V	303.0	-7.2	21.2	53.9
1932.533333	35.2	1000.0	1000.000	321.2	H	0.0	-2.3	18.7	53.9
3981.066667	31.6	1000.0	1000.000	402.0	H	0.0	4.9	22.3	53.9
6554.100000	36.7	1000.0	1000.000	402.0	H	170.0	11.3	17.2	53.9
11064.233333	37.0	1000.0	1000.000	125.7	V	90.0	14.7	16.9	53.9
16802.266667	45.0	1000.0	1000.000	124.7	V	208.0	23.8	8.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.14 Test Results Above 1GHz (802.11b 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)
1000.000000	41.3	1000.0	1000.000	211.4	H	37.0	-7.2	32.6	73.9
1932.366667	47.0	1000.0	1000.000	379.1	V	143.0	-2.3	26.9	73.9
3875.100000	45.9	1000.0	1000.000	117.7	V	20.0	4.9	28.0	73.9
6607.566667	49.5	1000.0	1000.000	116.7	V	-3.0	11.1	24.4	73.9
11078.733333	49.8	1000.0	1000.000	201.5	H	297.0	14.6	24.1	73.9
16761.633333	57.4	1000.0	1000.000	191.5	H	301.0	23.6	16.5	73.9

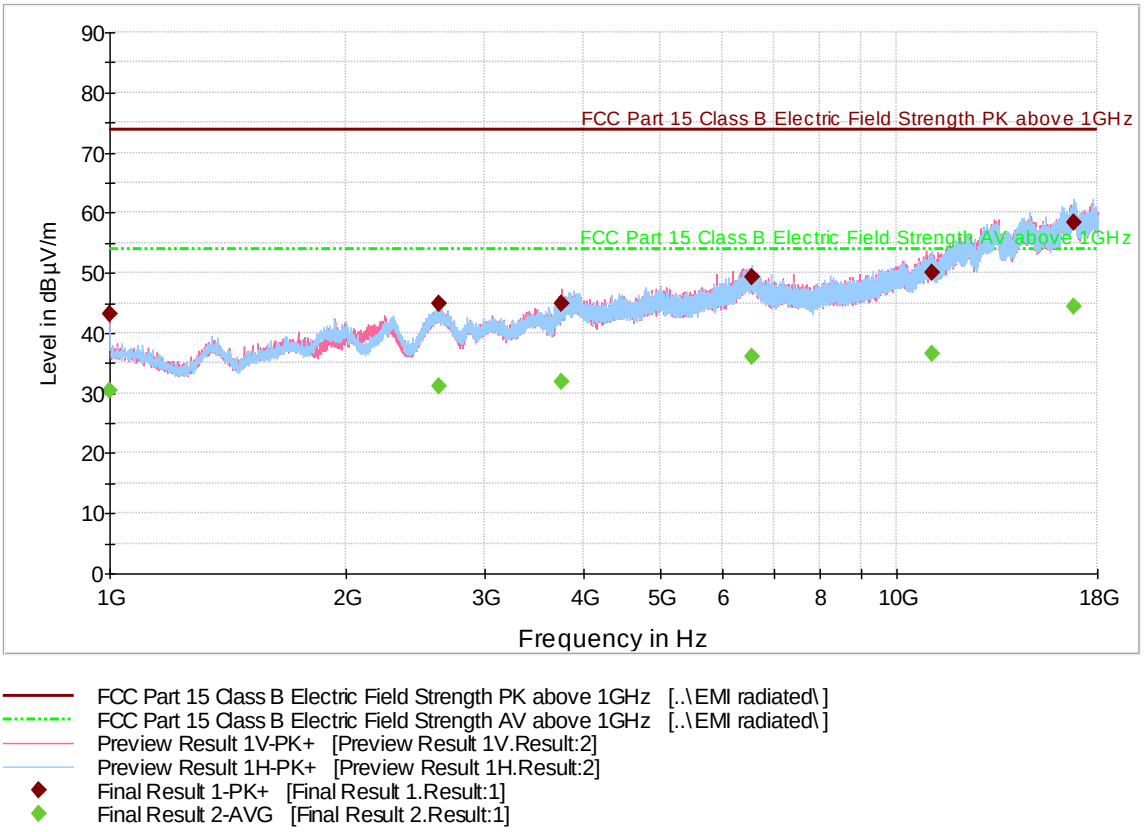
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	28.0	1000.0	1000.000	211.4	H	37.0	-7.2	25.9	53.9
1932.366667	32.0	1000.0	1000.000	379.1	V	143.0	-2.3	21.9	53.9
3875.100000	33.1	1000.0	1000.000	117.7	V	20.0	4.9	20.8	53.9
6607.566667	36.0	1000.0	1000.000	116.7	V	-3.0	11.1	17.9	53.9
11078.733333	36.5	1000.0	1000.000	201.5	H	297.0	14.6	17.4	53.9
16761.633333	44.7	1000.0	1000.000	191.5	H	301.0	23.6	9.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.15 Test Results Above 1GHz (802.11b 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)
1000.000000	43.2	1000.0	1000.000	247.3	V	40.0	-7.2	30.7	73.9
2617.100000	44.8	1000.0	1000.000	238.4	V	0.0	-0.1	29.1	73.9
3743.366667	44.8	1000.0	1000.000	279.3	V	20.0	4.4	29.1	73.9
6548.766667	49.2	1000.0	1000.000	248.3	H	147.0	11.3	24.7	73.9
11079.666667	50.0	1000.0	1000.000	401.9	H	122.0	14.6	23.9	73.9
16821.866667	58.3	1000.0	1000.000	155.6	H	85.0	23.6	15.6	73.9

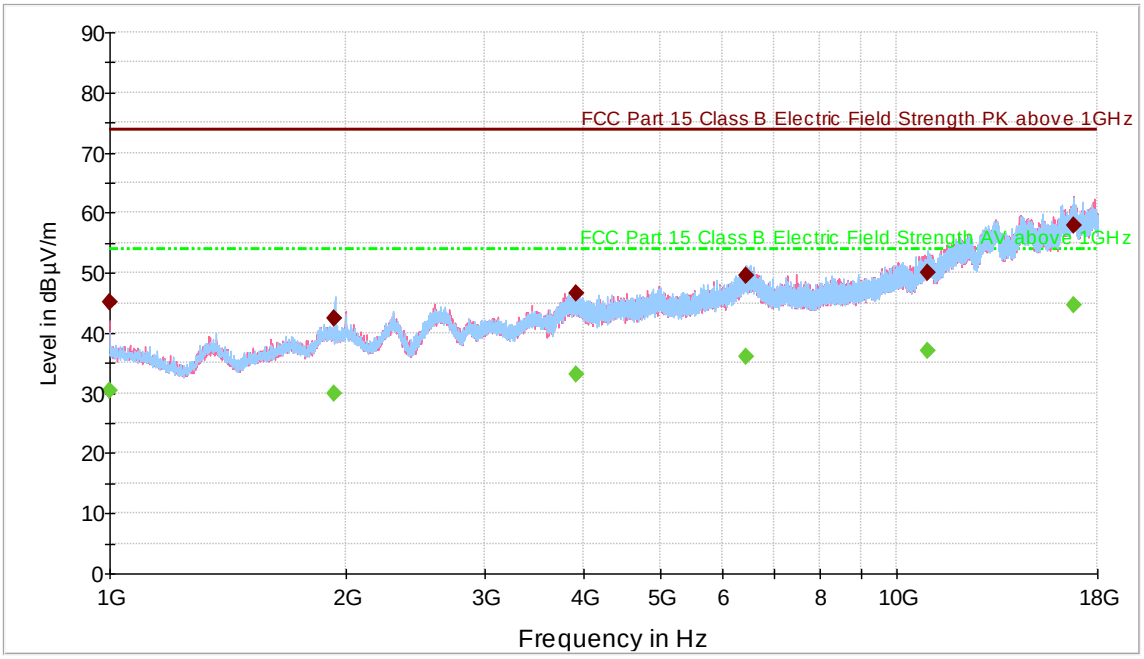
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	30.4	1000.0	1000.000	247.3	V	40.0	-7.2	23.5	53.9
2617.100000	31.2	1000.0	1000.000	238.4	V	0.0	-0.1	22.7	53.9
3743.366667	31.9	1000.0	1000.000	279.3	V	20.0	4.4	22.0	53.9
6548.766667	36.2	1000.0	1000.000	248.3	H	147.0	11.3	17.7	53.9
11079.666667	36.6	1000.0	1000.000	401.9	H	122.0	14.6	17.3	53.9
16821.866667	44.4	1000.0	1000.000	155.6	H	85.0	23.6	9.5	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.16 Test Results Above 1GHz (802.11g Low Channel)



FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI radiated\ ]
FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI radiated\ ]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Final Result 1-PK+ [Final Result 1.Result:1]
Final Result 2-AVG [Final Result 2.Result:1]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.500000	45.1	1000.0	1000.000	282.2	V	232.0	-7.2	28.8	73.9
1932.133333	42.5	1000.0	1000.000	344.1	H	9.0	-2.3	31.4	73.9
3908.666667	46.6	1000.0	1000.000	191.5	V	300.0	5.1	27.3	73.9
6427.366667	49.6	1000.0	1000.000	401.9	V	10.0	11.2	24.3	73.9
10966.566667	50.0	1000.0	1000.000	250.3	H	323.0	14.8	23.9	73.9
16814.200000	58.0	1000.0	1000.000	401.9	V	357.0	23.7	15.9	73.9

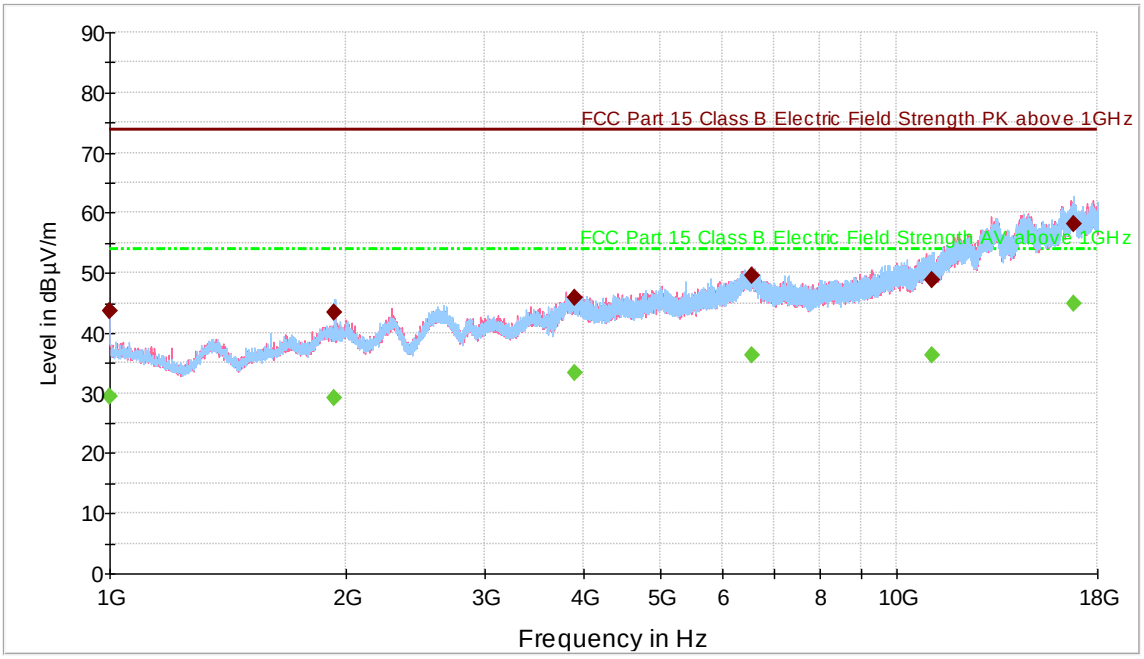
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.500000	30.3	1000.0	1000.000	282.2	V	232.0	-7.2	23.6	53.9
1932.133333	29.9	1000.0	1000.000	344.1	H	9.0	-2.3	24.0	53.9
3908.666667	33.2	1000.0	1000.000	191.5	V	300.0	5.1	20.7	53.9
6427.366667	35.9	1000.0	1000.000	401.9	V	10.0	11.2	18.0	53.9
10966.566667	37.1	1000.0	1000.000	250.3	H	323.0	14.8	16.8	53.9
16814.200000	44.5	1000.0	1000.000	401.9	V	357.0	23.7	9.4	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

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



FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI radiated\ ]
FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI radiated\ ]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Final Result 1-PK+ [Final Result 1.Result:1]
Final Result 2-AVG [Final Result 2.Result:1]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	43.6	1000.0	1000.000	258.3	H	73.0	-7.2	30.3	73.9
1932.533333	43.5	1000.0	1000.000	368.1	H	-16.0	-2.3	30.4	73.9
3907.233333	46.0	1000.0	1000.000	401.9	H	127.0	5.1	27.9	73.9
6557.700000	49.7	1000.0	1000.000	102.7	V	50.0	11.3	24.2	73.9
11084.600000	48.9	1000.0	1000.000	103.7	H	286.0	14.6	25.0	73.9
16800.600000	58.2	1000.0	1000.000	322.2	H	257.0	23.9	15.7	73.9

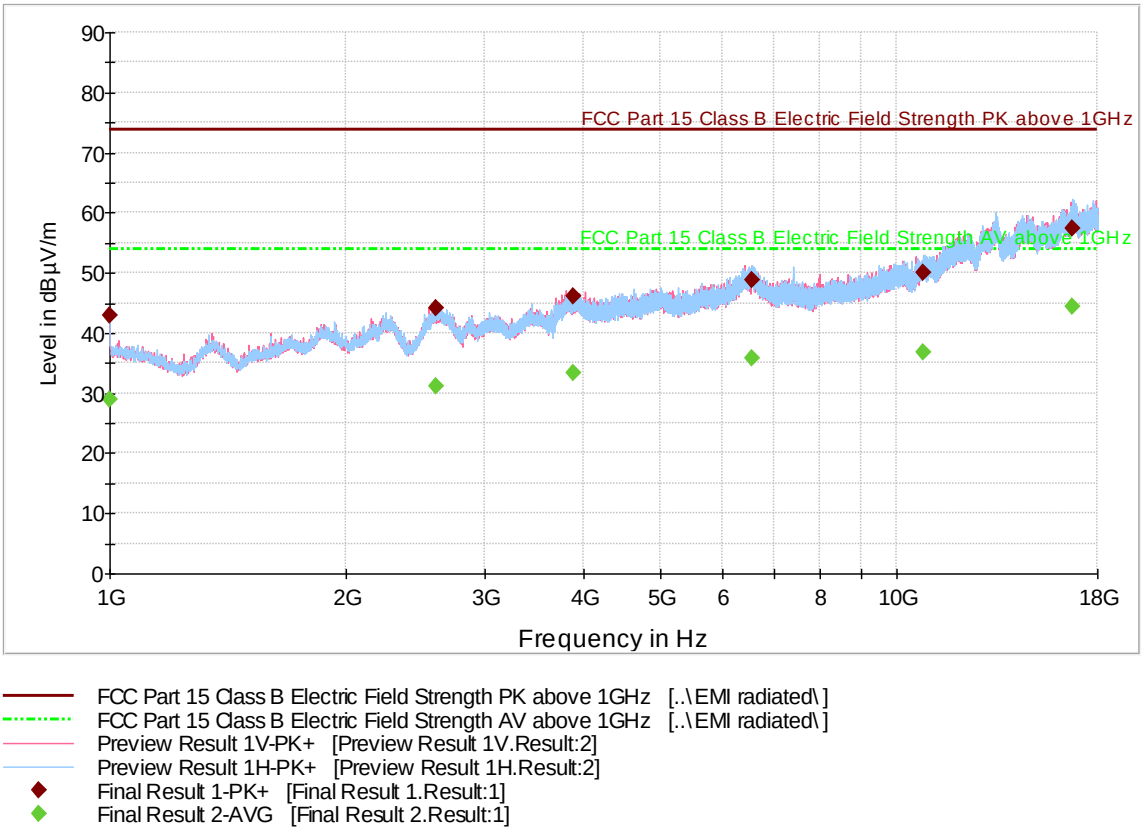
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	29.4	1000.0	1000.000	258.3	H	73.0	-7.2	24.5	53.9
1932.533333	29.2	1000.0	1000.000	368.1	H	-16.0	-2.3	24.7	53.9
3907.233333	33.2	1000.0	1000.000	401.9	H	127.0	5.1	20.7	53.9
6557.700000	36.2	1000.0	1000.000	102.7	V	50.0	11.3	17.7	53.9
11084.600000	36.4	1000.0	1000.000	103.7	H	286.0	14.6	17.5	53.9
16800.600000	44.9	1000.0	1000.000	322.2	H	257.0	23.9	9.0	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.18 Test Results Above 1GHz (802.11g 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)
1000.000000	42.9	1000.0	1000.000	227.4	H	186.0	-7.2	31.0	73.9
2601.066667	44.1	1000.0	1000.000	401.9	V	-18.0	0.0	29.8	73.9
3880.000000	46.2	1000.0	1000.000	247.4	V	280.0	4.9	27.7	73.9
6547.500000	48.8	1000.0	1000.000	131.7	H	105.0	11.3	25.1	73.9
10830.166667	50.1	1000.0	1000.000	124.7	H	244.0	14.3	23.8	73.9
16727.633333	57.3	1000.0	1000.000	266.3	H	234.0	23.4	16.6	73.9

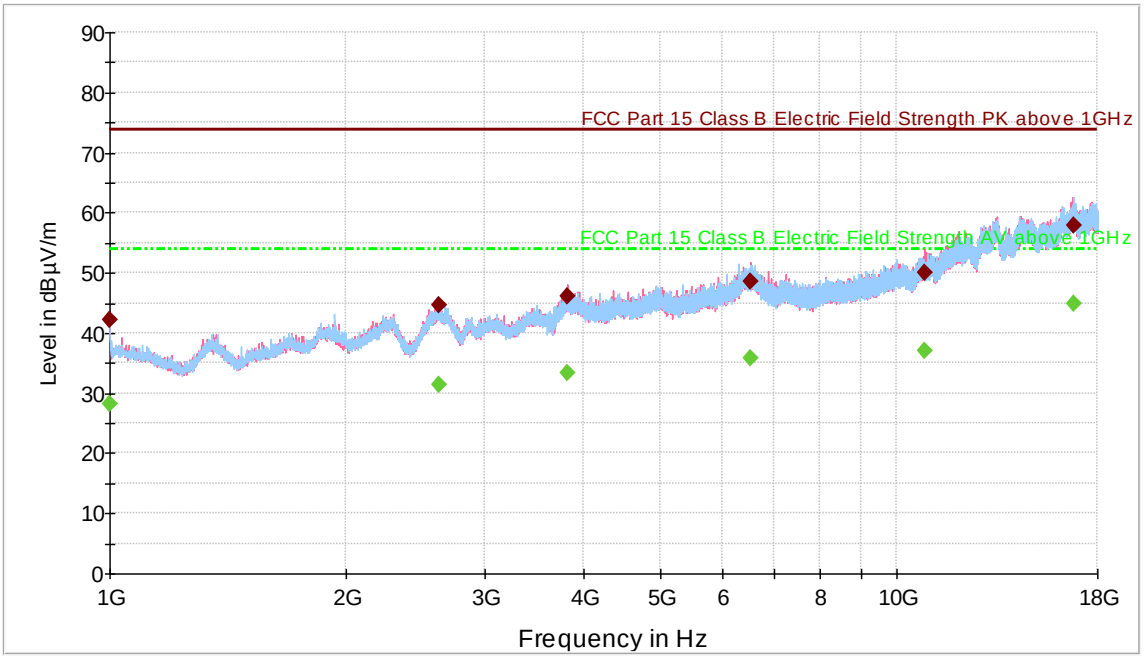
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	28.9	1000.0	1000.000	227.4	H	186.0	-7.2	25.0	53.9
2601.066667	31.0	1000.0	1000.000	401.9	V	-18.0	0.0	22.9	53.9
3880.000000	33.3	1000.0	1000.000	247.4	V	280.0	4.9	20.6	53.9
6547.500000	35.7	1000.0	1000.000	131.7	H	105.0	11.3	18.2	53.9
10830.166667	36.8	1000.0	1000.000	124.7	H	244.0	14.3	17.1	53.9
16727.633333	44.4	1000.0	1000.000	266.3	H	234.0	23.4	9.5	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.19 Test Results Above 1GHz (802.11n HT20 2.4GHz Low Channel)



FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI radiated\ ]
FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI radiated\ ]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Final Result 1-PK+ [Final Result 1.Result:1]
Final Result 2-AVG [Final Result 2.Result:1]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	42.1	1000.0	1000.000	237.4	H	156.0	-7.2	31.8	73.9
2619.333333	44.6	1000.0	1000.000	102.7	H	76.0	-0.1	29.3	73.9
3815.000000	46.1	1000.0	1000.000	103.7	V	330.0	4.9	27.8	73.9
6530.866667	48.4	1000.0	1000.000	140.7	V	-20.0	11.2	25.5	73.9
10859.266667	50.1	1000.0	1000.000	229.4	V	296.0	14.4	23.8	73.9
16765.100000	57.8	1000.0	1000.000	401.9	H	260.0	23.6	16.1	73.9

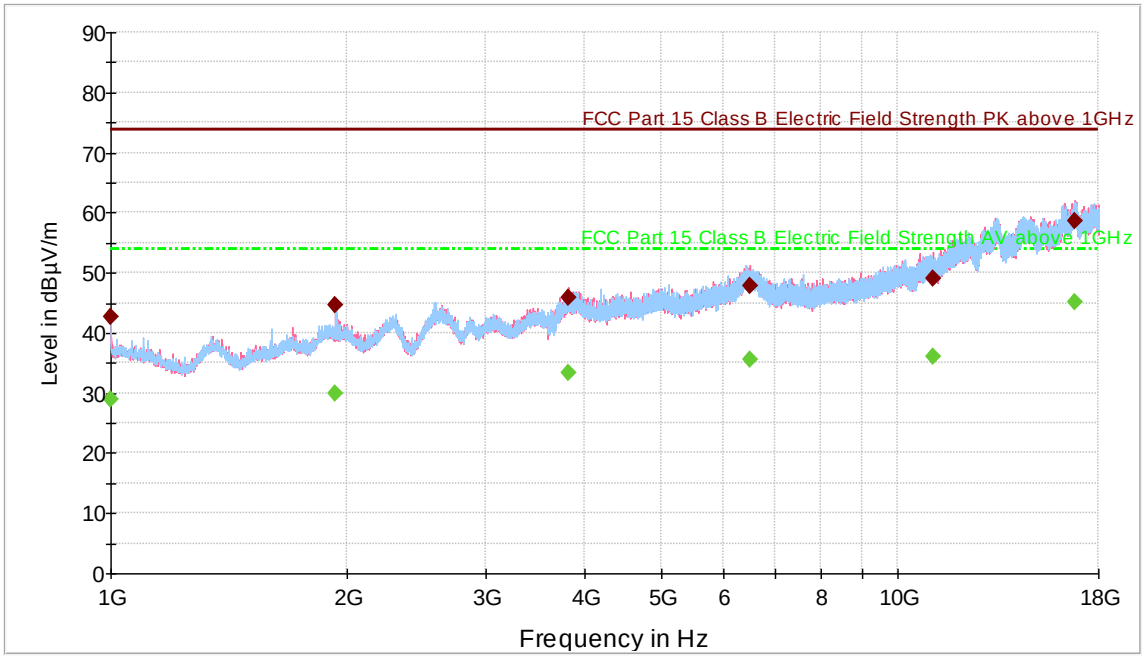
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	28.3	1000.0	1000.000	237.4	H	156.0	-7.2	25.6	53.9
2619.333333	31.4	1000.0	1000.000	102.7	H	76.0	-0.1	22.5	53.9
3815.000000	33.4	1000.0	1000.000	103.7	V	330.0	4.9	20.5	53.9
6530.866667	35.7	1000.0	1000.000	140.7	V	-20.0	11.2	18.2	53.9
10859.266667	37.1	1000.0	1000.000	229.4	V	296.0	14.4	16.8	53.9
16765.100000	45.0	1000.0	1000.000	401.9	H	260.0	23.6	8.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.20 Test Results Above 1GHz (802.11n HT20 2.4GHz Mid Channel)



FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI radiated\]
FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI radiated\]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Final Result 1-PK+ [Final Result 1.Result:1]
Final Result 2-AVG [Final Result 2.Result:1]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	42.7	1000.0	1000.000	247.3	H	-3.0	-7.2	31.2	73.9
1932.566667	44.7	1000.0	1000.000	332.1	H	0.0	-2.3	29.2	73.9
3818.733333	45.9	1000.0	1000.000	245.3	V	4.0	4.9	28.0	73.9
6490.633333	47.8	1000.0	1000.000	357.1	V	198.0	11.1	26.1	73.9
11109.466667	49.1	1000.0	1000.000	205.3	V	19.0	14.5	24.8	73.9
16798.466667	58.6	1000.0	1000.000	401.9	V	338.0	23.9	15.3	73.9

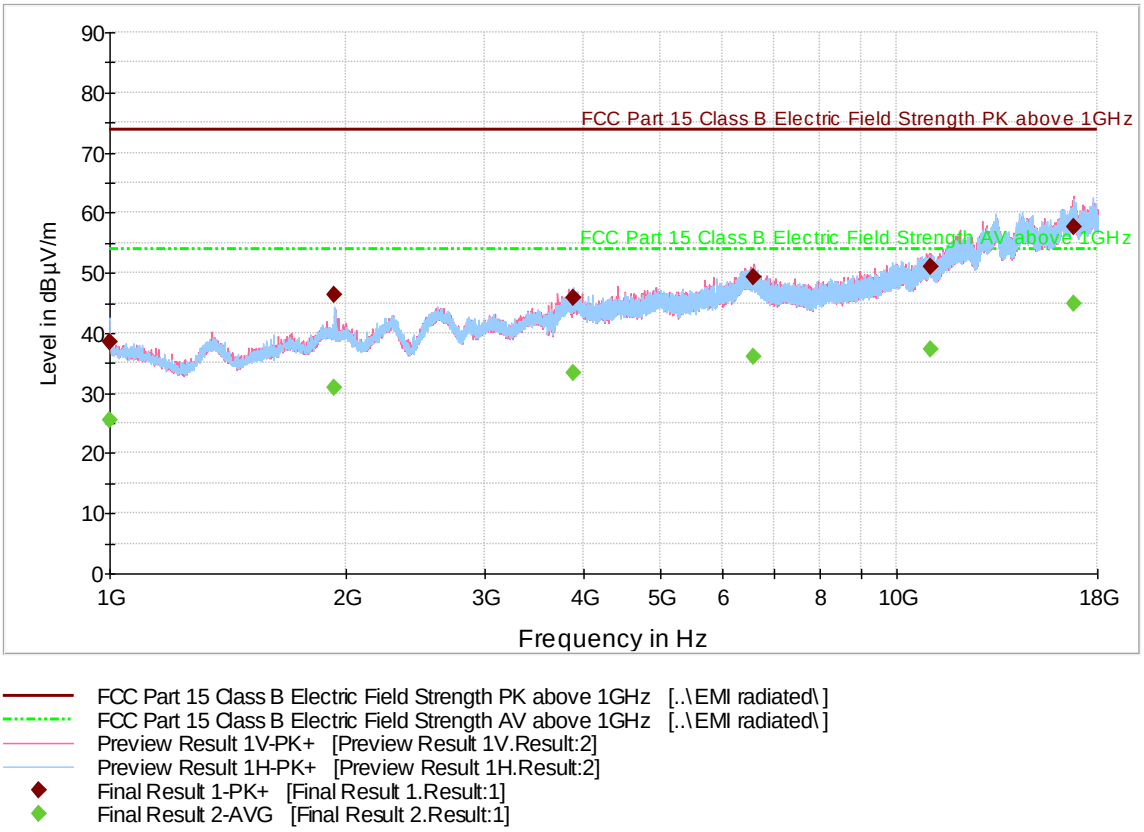
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	28.8	1000.0	1000.000	247.3	H	-3.0	-7.2	25.1	53.9
1932.566667	29.8	1000.0	1000.000	332.1	H	0.0	-2.3	24.1	53.9
3818.733333	33.3	1000.0	1000.000	245.3	V	4.0	4.9	20.6	53.9
6490.633333	35.5	1000.0	1000.000	357.1	V	198.0	11.1	18.4	53.9
11109.466667	36.1	1000.0	1000.000	205.3	V	19.0	14.5	17.8	53.9
16798.466667	45.1	1000.0	1000.000	401.9	V	338.0	23.9	8.8	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.7.21 Test Results Above 1GHz (802.11n HT20 2.4GHz 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)
1000.000000	38.5	1000.0	1000.000	365.1	V	145.0	-7.2	35.4	73.9
1932.166667	46.3	1000.0	1000.000	391.1	H	244.0	-2.3	27.6	73.9
3880.733333	45.9	1000.0	1000.000	123.7	H	82.0	4.9	28.0	73.9
6586.333333	49.3	1000.0	1000.000	246.3	V	314.0	11.2	24.6	73.9
11029.866667	51.0	1000.0	1000.000	183.5	V	256.0	14.8	22.9	73.9
16769.566667	57.7	1000.0	1000.000	401.9	V	109.0	23.6	16.3	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)
1000.000000	25.6	1000.0	1000.000	365.1	V	145.0	-7.2	28.3	53.9
1932.166667	30.9	1000.0	1000.000	391.1	H	244.0	-2.3	23.0	53.9
3880.733333	33.3	1000.0	1000.000	123.7	H	82.0	4.9	20.6	53.9
6586.333333	35.9	1000.0	1000.000	246.3	V	314.0	11.2	18.0	53.9
11029.866667	37.3	1000.0	1000.000	183.5	V	256.0	14.8	16.6	53.9
16769.566667	45.0	1000.0	1000.000	401.9	V	109.0	23.6	8.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

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

2.8 RADIATED BAND EDGE MEASUREMENTS AND IMMEDIATE RESTRICTED BANDS

2.8.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d)
Industry Canada RSS-247, Clause 5.5

2.8.2 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)).

2.8.3 Equipment Under Test and Modification State

Serial No: WTDB20150500004 / Test Configuration B

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

June 01 and 17, 2015/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/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.9 - 25.9°C
Relative Humidity	43.7 - 46.2%
ATM Pressure	98.9 - 99.4 kPa

2.8.7 Additional Observations

- This is a radiated test. The spectrum was searched from 2310MHz to 2390MHz for lower immediate restricted band and 2483.5MHz to 2500MHz for the upper immediate restricted band.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- Only worst-case WiFi mode presented (802.11 n HT20 2.4GHz).

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

- 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 2.8.8 for sample computation.

2.8.8 Sample Computation (Radiated Emission)

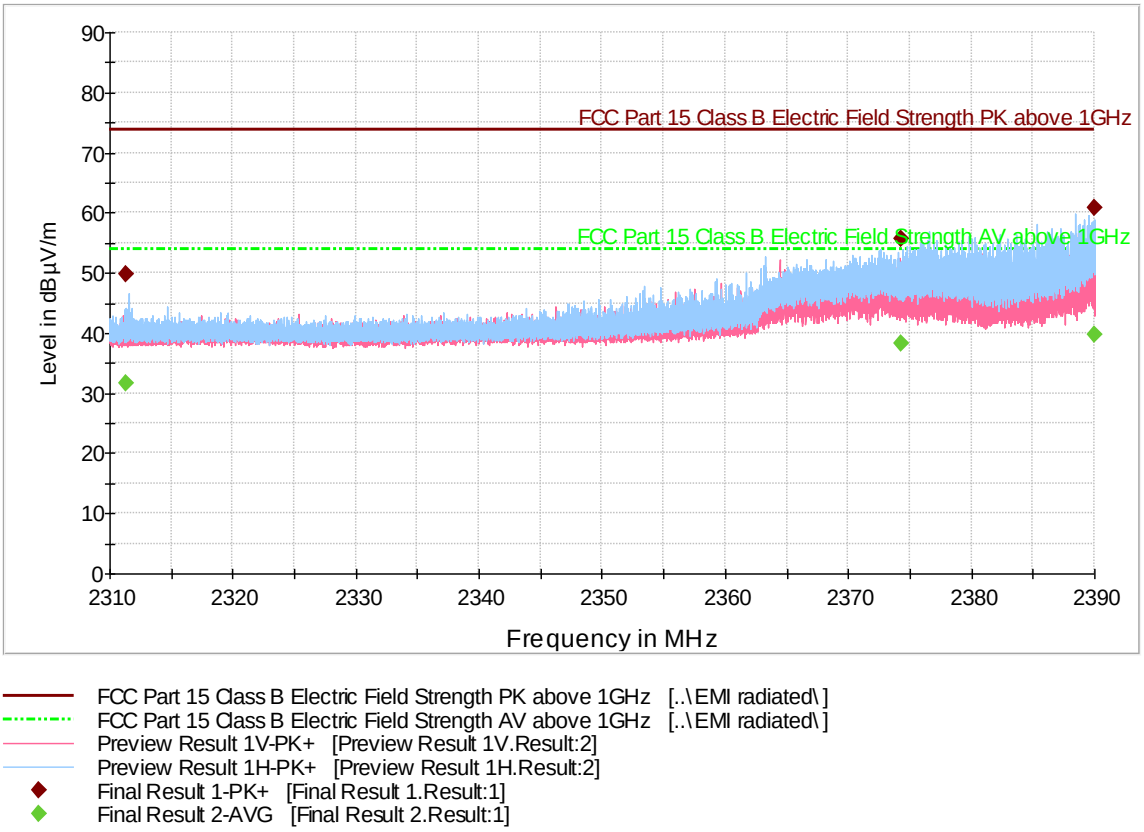
Measuring equipment raw measurement (dbµV) @ 2400 MHz			53.9
Correction Factor (dB)	Asset# 1153 (cable)	3.4	-0.4
	Asset# 8628(preamplifier)	-36.5	
	Asset#7575 (antenna)	32.7	
Reported Max Peak Final Measurement (dbµV/m) @ 2400 MHz			**53.5**

2.8.9 Test Results

See attached plots.

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

2.8.10 Test Results Restricted Band 2310MHz to 2390MHz (Low Channel Worst Case WiFi 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)
2311.322667	**49.7**	**1000.**	**1000.000**	**302.2**	**H**	**16.0**	**-0.8**	**24.2**	73.9
2374.237333	**55.8**	**1000.**	**1000.000**	**208.5**	**H**	**343.0**	**-0.7**	**18.1**	73.9
2390.000000	**60.8**	**1000.**	**1000.000**	**116.7**	**H**	**342.0**	**-0.6**	**13.1**	73.9

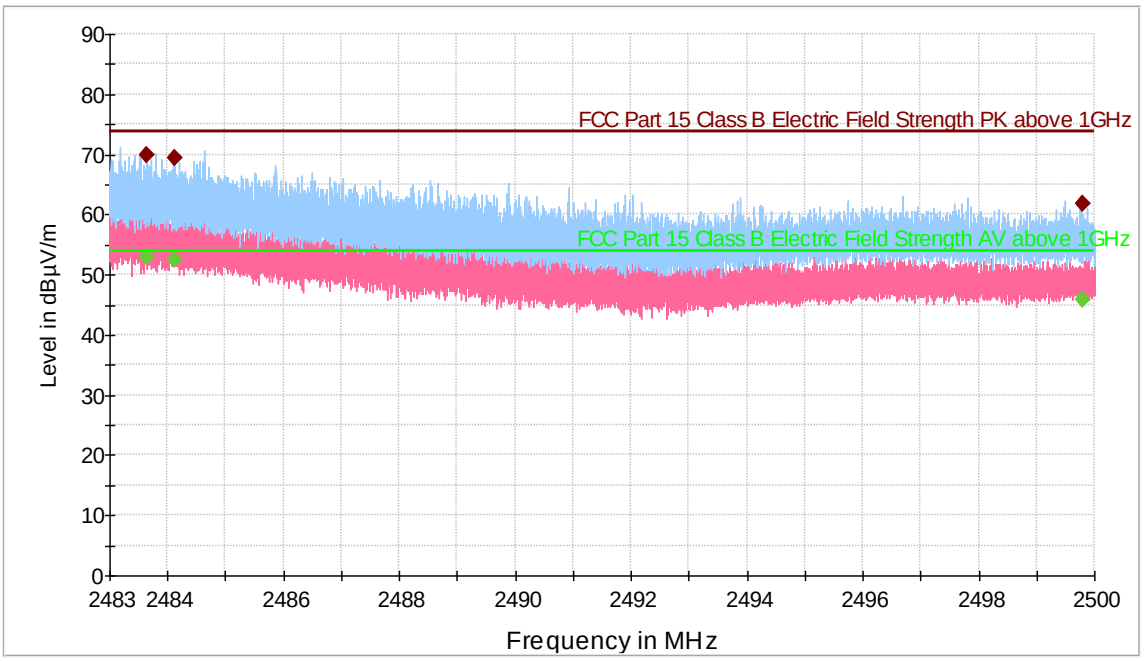
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2311.322667	31.6	1000.0	1000.000	302.2	H	16.0	-0.8	22.3	53.9
2374.237333	38.2	1000.0	1000.000	208.5	H	343.0	-0.7	15.7	53.9
2390.000000	39.7	1000.0	1000.000	116.7	H	342.0	-0.6	14.2	53.9

Test Notes: 2.4GHz notch filter removed for this test.

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

2.8.11 Test Results Restricted Band 2483.5MHz to 2500MHz (High Channel Worst Case WiFi Mode)



FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI radiated\]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Final Result 1-PK+ [Final Result 1.Result:1]
Final Result 2-AVG [Final Result 2.Result:1]
FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI radiated\]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.626333	69.8	1000.0	1000.000	102.8	H	304.0	-0.1	4.1	73.9
2484.126333	69.4	1000.0	1000.000	101.7	H	303.0	-0.1	4.5	73.9
2499.790933	61.9	1000.0	1000.000	103.7	H	309.0	-0.1	12.0	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)
2483.626333	52.9	1000.0	1000.000	102.8	H	304.0	-0.1	1.0	53.9
2484.126333	52.5	1000.0	1000.000	101.7	H	303.0	-0.1	1.4	53.9
2499.790933	45.9	1000.0	1000.000	103.7	H	309.0	-0.1	8.0	53.9

Test Notes: 2.4GHz notch filter removed for this test.

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

2.9 POWER SPECTRAL DENSITY

2.9.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(e)
Industry Canada RSS-247, Clause 5.2(2)

2.9.2 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.

2.9.3 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

May 26, 2015/IR

2.9.5 Test Equipment Used

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

2.9.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.6°C
Relative Humidity	50.4.%
ATM Pressure	99.98 kPa

2.9.7 Additional Observations

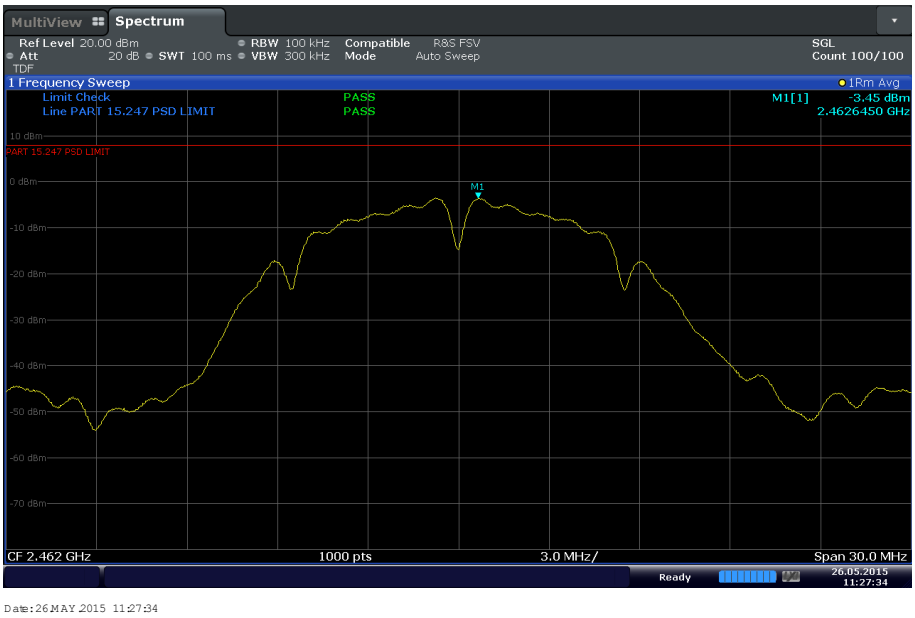
- This is a conducted test.
- Test procedure is per Section 10.3 of KDB 558074 (June 05, 2014).
- A transducer factor (TDF) was added to compensate for the external attenuator and cable used.
- Detector is RMS power averaging.
- Trace averaging mode over 100 traces.
- Sweep time is Auto Couple.
- EUT complies with 100 kHz RBW.

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

2.9.8 Test Results Summary

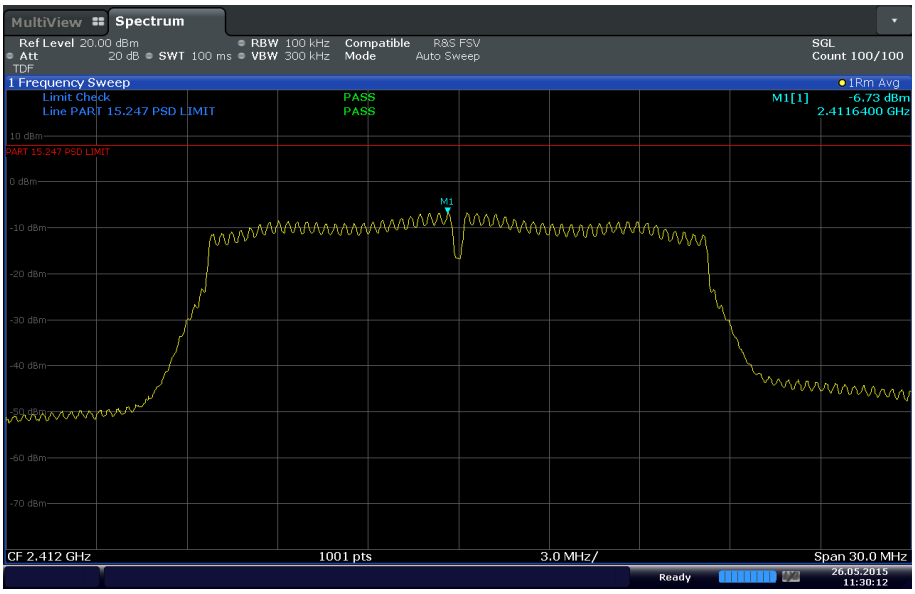
Mode	Channel	Marker Reading using 100 kHz RBW (dBm)	PSD Limit (dBm)	Margin (dB)	Compliance
802.11b	1 (2412 MHz)	-4.37	8	12.37	Complies
	6 (2437 MHz)	-3.55	8	11.55	Complies
	11 (2462 MHz)	-3.45	8	11.45	Complies
802.11g	1 (2412 MHz)	-6.73	8	14.73	Complies
	6 (2437 MHz)	-7.02	8	15.02	Complies
	11 (2462 MHz)	-7.23	8	15.23	Complies
802.11n HT20	1 (2412 MHz)	-7.51	8	15.51	Complies
	6 (2437 MHz)	-7.98	8	15.98	Complies
	11 (2462 MHz)	-7.76	8	15.76	Complies

2.9.9 Test Results Plots



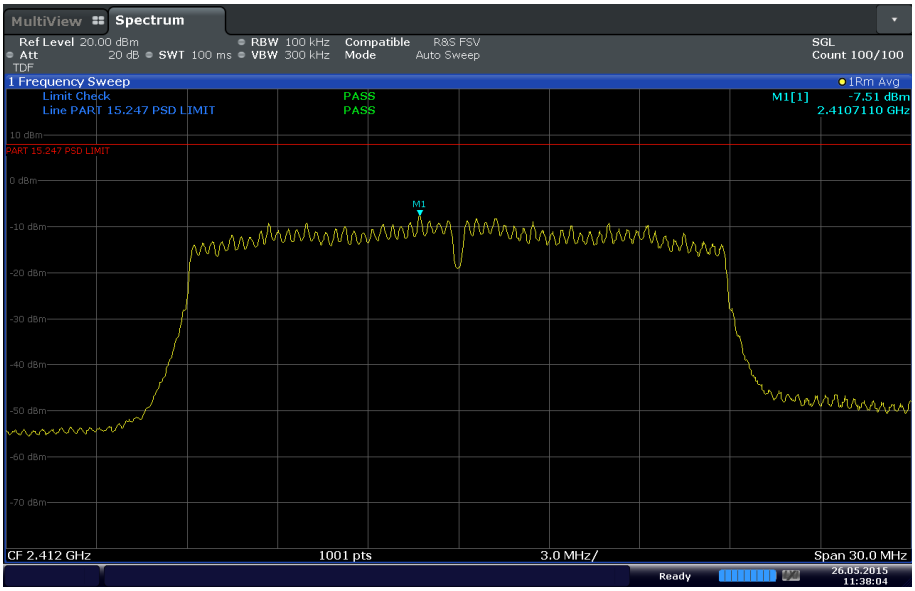
802.11b Worst Case Channel

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



Date: 26 MAY 2015 11:30:12

802.11g Worst Case Channel



Date: 26 MAY 2015 11:38:04

802.11n HT20 Worst Case Channel

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

SECTION 3

TEST EQUIPMENT USED

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

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
Antenna Conducted Port Setup						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	12/22/14	12/22/15
1003	Signal Generator	SMR 40	1104.0002.40	Rhode & Schwarz	04/29/15	04/29/16
7604	Series Power Meter	N1912A	SG45100273	Agilent	05/27/15	05/27/16
7605	50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	04/10/15	04/10/16
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 1189 and 7582	
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/30/14	01/30/16
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	02/28/14	02/28/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	03/20/15	03/20/16
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	09/29/14	09/29/15
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/11/15	03/11/16
1016	Pre-amplifier	PAM-0202	187	PAM	12/10/14	12/10/15
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 1189 and 7582	
Miscellaneous						
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/12/14	08/12/15
7554	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/30/14	01/30/16
1123	DC Power Supply	E3631A	N/A	Hewlett Packard	Verified by 6792	
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

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

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	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.41
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.82

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	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.40
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.81

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

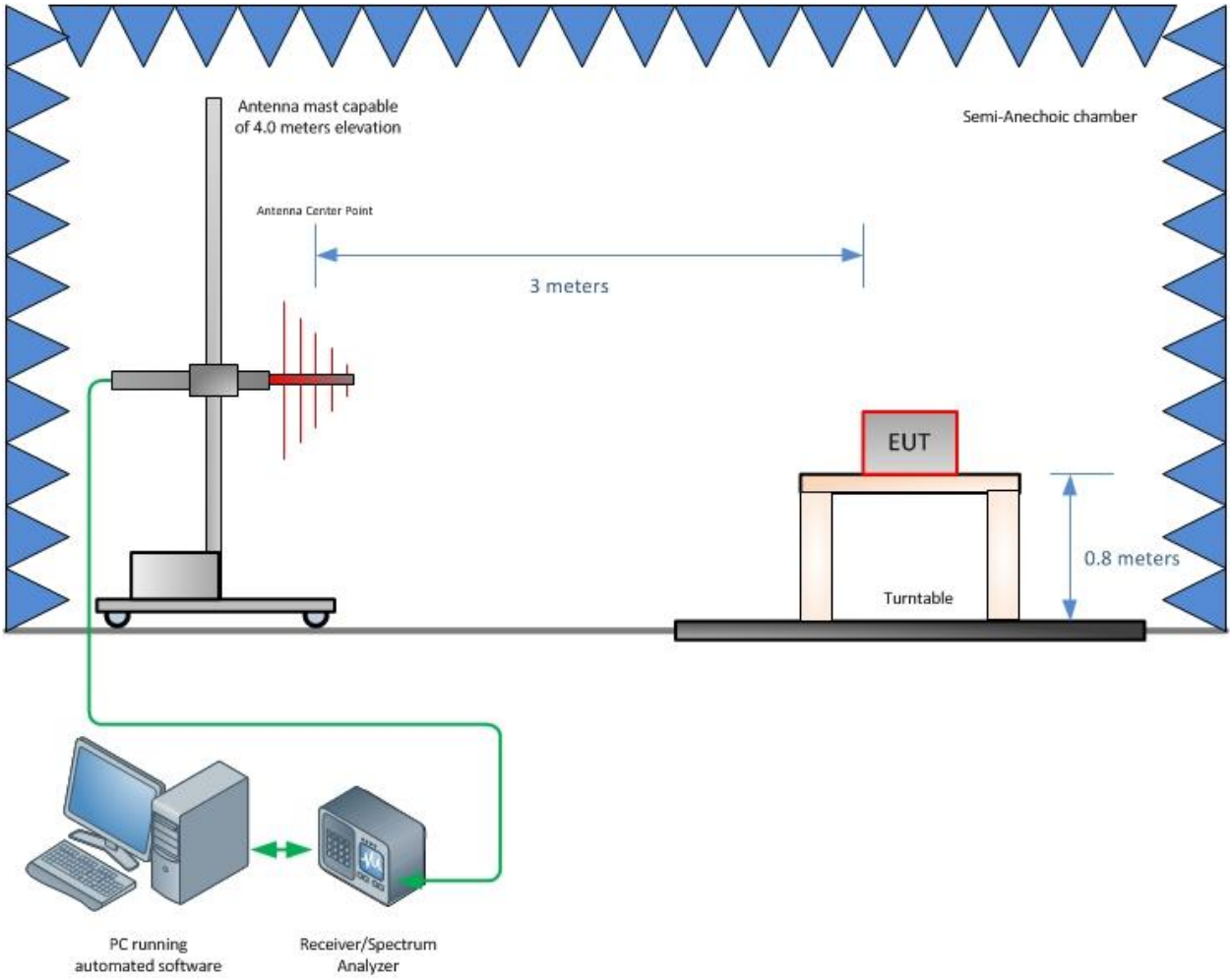
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

SECTION 4

DIAGRAM OF TEST SETUP

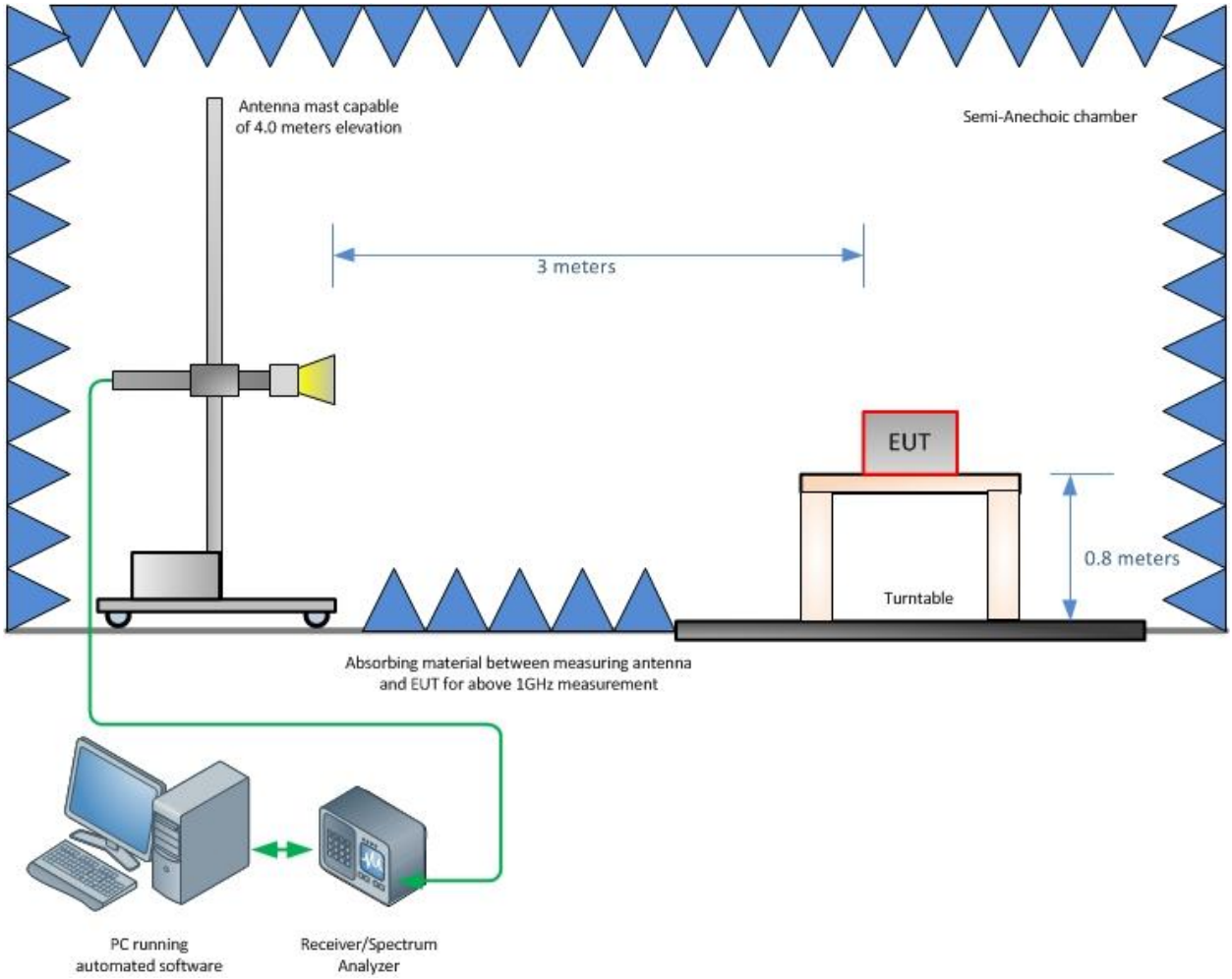
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

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)

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

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

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 A2LA, 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, A2LA, NIST and VCCI.

A2LA Cert. No. 2955.13

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