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 E §15.407: 2014
IC RSS-247 Issue 1 May 2015

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

REPORT ON	Radio Testing of the Sotera Wireless Visi Mobile 92-10010 Wrist Transceiver Dual Band
TEST REPORT NUMBER	SD72106244-0515B
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

SD72106244-0515B Sotera Wireless Visi Mobile Wrist Transceiver Dual Band					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
06/292015	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	11
1.5	Deviations From The Standard	13
1.6	Modification Record	13
1.7	Test Methodology	13
2	**TEST DETAILS**	**15**
2.1	26 dB Bandwidth	16
2.2	99% Emission Bandwidth	24
2.3	Minimum 6dB Bandwidth	32
2.4	Maximum Conducted Output Power	40
2.5	Maximum Power Spectral Density (PSD)	47
2.6	Unwanted Emissions Measurement	51
2.7	Band-Edge Measurements	69
2.8	Frequency Stability	79
2.9	Indoor Operation Only	82
3	**TEST EQUIPMENT USED**	**83**
3.1	Test Equipment Used	84
3.2	Measurement Uncertainty	85
4	**DIAGRAM OF TEST SETUP**	**87**
4.1	Test Setup Diagram	88
5	**ACCREDITATION, DISCLAIMERS AND COPYRIGHT**	**91**
5.1	Accreditation, Disclaimers And Copyright	92

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 Wrist Transceiver Dual Band to the requirements of the following:
FCC Part 15 Subpart E §15.407
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 Name	Visi Mobile
Model Number(s)	92-10010
FCC ID Number	ARI-VISI-MOBILE-1
IC Number	8810A-VISIMOBILE2
Serial Number(s)	WTDB20150500001, WTDB20150500004
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart E §15.407 (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 for Compliance of Radio Apparatus (Issue 4, November 2014).
Start of Test	June 12, 2015
Finish of Test	June 18, 2014
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• KDB789033 D02 General UNII Test Procedures New Rules v01 (Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E) June 06, 2014. • 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 E §15.407 with cross-reference to the corresponding IC RSS standard is shown below.

Operation in the U-NII 1 and U-NII 3 Bands (New Rules)					
Section	**Spec Clause**	**RSS**	**Test Description**	**Result**	**Comments/Base Standard**
-	§15.407(a)	RSS-Gen 8.8	Conducted Emissions	N/A*	See Note
2.1	§15.403(i)		26 dB Bandwidth	As Reported	
2.2		RSS-Gen 6.6	99% Emission Bandwidth	As Reported	
2.3	§15.407(e)	RSS-247 6.2.4(1)	Minimum 6dB Bandwidth	Compliant	
2.4	§15.407(a)(1)(IV) and §15.407(a)(3)	RSS-247 6.2.4(1)	Maximum Conducted Output Power	Compliant	
2.5	§15.407(a)(1)(IV) and §15.407(a)(3)	RSS-247 6.2.3(1)	Maximum Power Spectral Density (PSD)	Compliant	
2.6	§15.407(b)(1),(4) and (7) / 15.209	RSS-247 6.2.4(2)	Unwanted Emissions Measurement	Compliant	
2.7	§15.407(b)(1),(4) and (7)	RSS-247 6.2.4(2)	Band-Edge Measurements	Compliant	
2.8	§15.407(g)	RSS-Gen 6.11	Frequency Stability	Compliant	
2.9		RSS-247 6.2.2(2)	Indoor Operation Only	Client Declaration	

**: Not applicable. EUT is a battery operated device.*

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 a/n WLAN (U-NII)
Capability	802.11 b/g/n WLAN 2.4GHz and 5GHz
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
Manufacturer Declared Voltage Range	3.4VDC to 4.2VDC
Manufacturer Declared Temperature Range	0°C to 45°C
Antenna Type	Integral Chip type
Manufacturer	Fractus
Antenna Model	P/N: FR05-S1-NO-1004
Antenna Gain	1.8dBi (2.4GHz) 4.9dBi (5GHz)

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

1.3.3 Channel Table

5150-5250 MHz band (U-NII 1)				
Mode	**Channel**	**Frequency (MHz)**	**Bandwidth (MHz)**	**Modulation Technology**
802.11 a/n	36	5180	20	OFDM
802.11 a/n	40	5200	20	OFDM
802.11 a/n	44	5220	20	OFDM
802.11 a/n	48	5240	20	OFDM

5725-5850 MHz band (U-NII 3)				
Mode	**Channel**	**Frequency (MHz)**	**Bandwidth (MHz)**	**Modulation Technology**
802.11 a/n	149	5745	20	OFDM
802.11 a/n	153	5765	20	OFDM
802.11 a/n	157	5785	20	OFDM
802.11 a/n	161	5805	20	OFDM
802.11 a/n	165	5825	20	OFDM

1.3.4 Maximum Conducted Output Power

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
802.11n HT20 (U-NII 1)	5180-5240	11.39	13.77
802.11n HT20 (U-NII 3)	5745-5825	11.40	13.80
802.11a (U-NII 1)	5180-5240	11.24	13.30
802.11a (U-NII 3)	5745-5825	11.68	14.72

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 TeraTerm (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

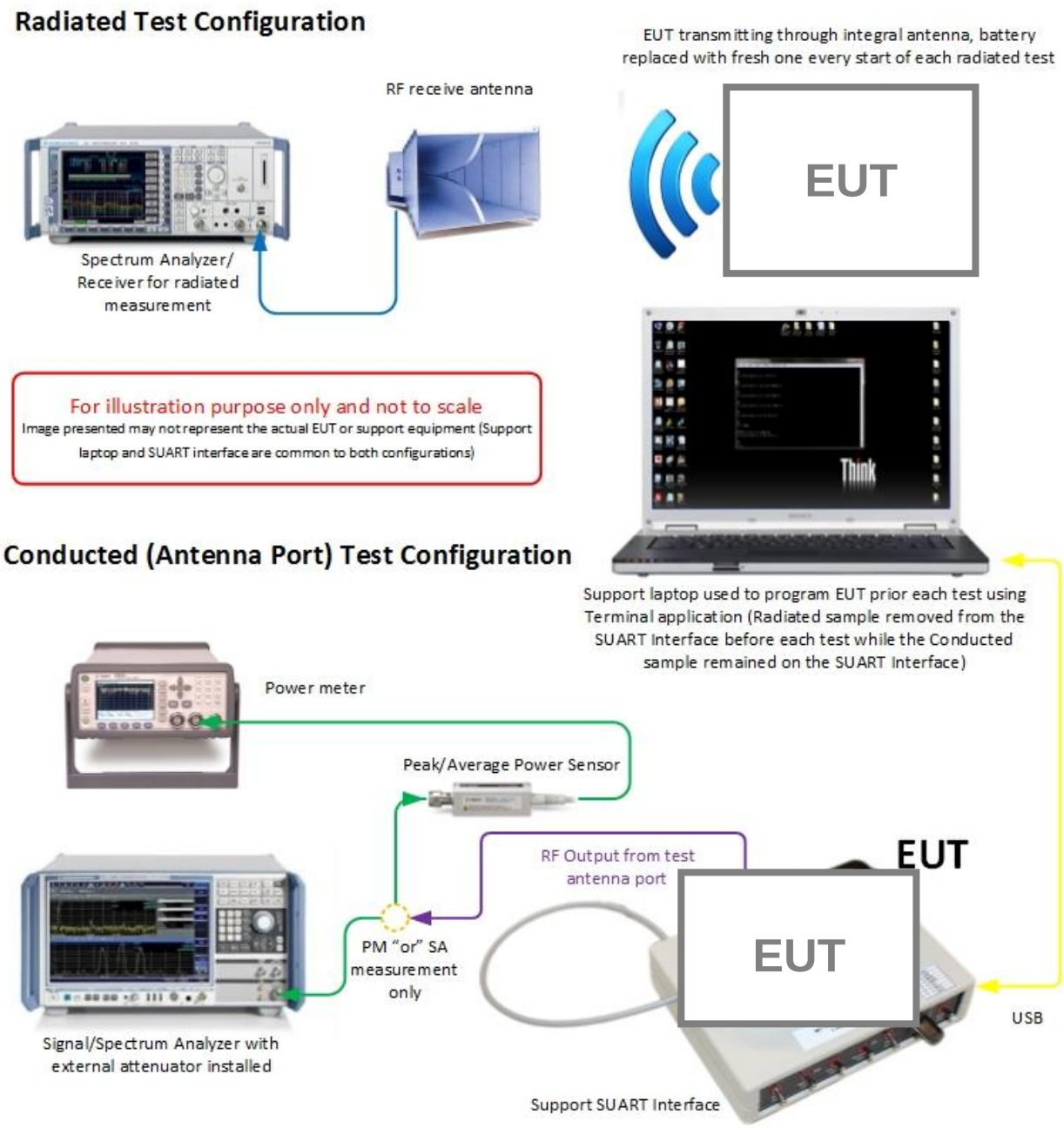
Worst-case configuration used in this test report based from Peak Output Power measurements:

Mode	Channel	BW	Data Rate
802.11n HT20 (U-NII 1)	36 (Low Channel)	20 MHz	MCS 1 (14.4 Mbps)
802.11n HT20 (U-NII 3)	149 (Low Channel)	20 MHz	MCS 4 (43.3 Mbps)
802.11a (U-NII 1)	36 (Low Channel)	20 MHz	12 Mbps
802.11a (U-NII 3)	149 (Low Channel)	20 MHz	6 Mbps

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
Serial Number 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 and KDB 789033 D02 General UNII Test Procedures New Rules v01 (Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E) June 06, 2014.
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 26 dB BANDWIDTH

2.1.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.403(i)

2.1.2 Standard Applicable

(i) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement..

2.1.3 Test Methodology

Section II (C) (1) of 789033 D02 General UNII Test Procedures New Rules v01.

2.1.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

June 16, 2015/XYZ

2.1.6 Test Equipment Used

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

2.1.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.4°C
Relative Humidity	51.8%
ATM Pressure	98.6 kPa

2.1.8 Additional Observations

- This is a conducted test.
- Test methodology is per Section II (C) (1) of 789033 D02 General UNII Test Procedures New Rules v01. All conditions under this Section were satisfied.
- The cable loss was measured and entered as the offset.
- Span is wide enough to capture the channel transmission.
- RBW is 1% initially set approx. to 1% of anticipated EBW.
- VBW > RBW.
- Trace is max hold.
- Detector is peak.
- Sweep time is set to Auto.
- “n dB down” (26dB) marker function of the spectrum analyzer was used for this test.

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

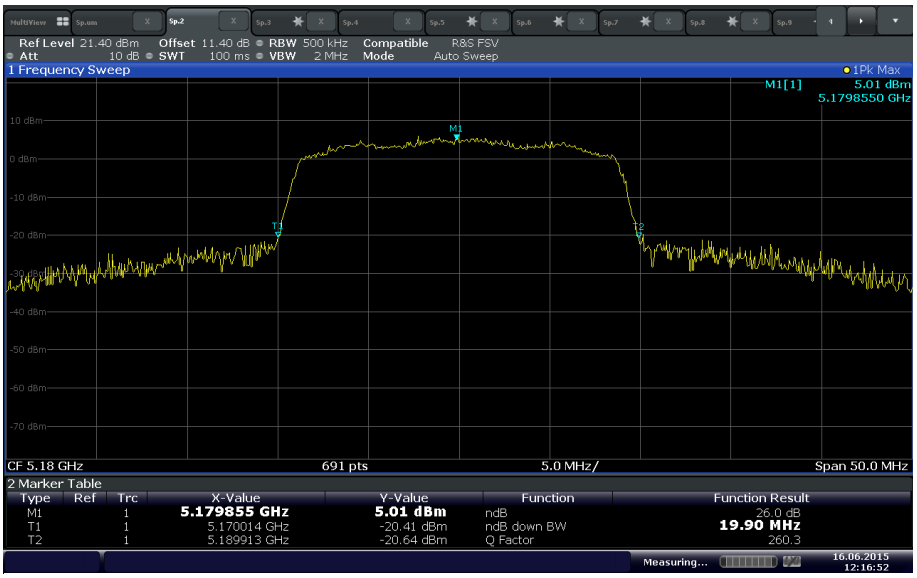
- RBW adjusted until RBW/EBW ratio is approximately 1% or as the SA setting permits (i.e next setting after 300kHz RBW is limited to 500kHz).

2.1.9 Summary Test Results (as reported)

26 dB Bandwidth 802.11n HT20			
WiFi Mode	**Low Channel (Channel No./ BW in MHz)**	**Mid Channel (Channel No./ BW in MHz)**	**High Channel (Channel No./ BW in MHz)**
U-NII 1 20 MHz BW	36 / 19.90 MHz	40 / 19.83 MHz	48 / 19.83 MHz
U-NII 3 20 MHz BW	149 / 20.12 MHz	157 / MHz	165 / 20.84MHz
26 dB Bandwidth 802.11 a			
WiFi Mode	**Low Channel (Channel No./ BW in MHz)**	**Mid Channel (Channel No./ BW in MHz)**	**High Channel (Channel No./ BW in MHz)**
U-NII 1 20 MHz BW	36 / 19.39 MHz	40 / 19.32 MHz	48 / 19.32 MHz
U-NII 3 20 MHz BW	149 / 19.75MHz	157 / 19.68 MHz	165 / 19.97MHz

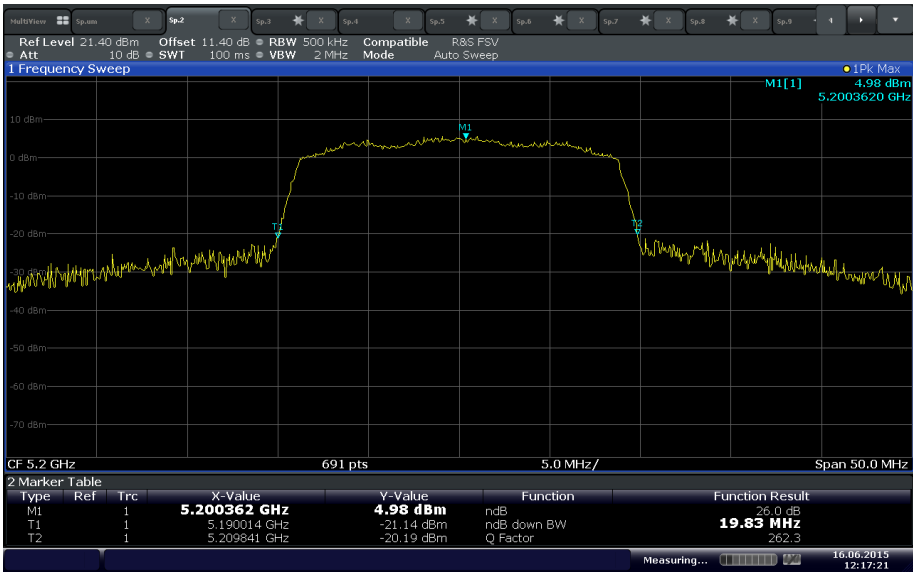
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.1.10 Test Plots



Date: 16.JUN.2015 12:16:53

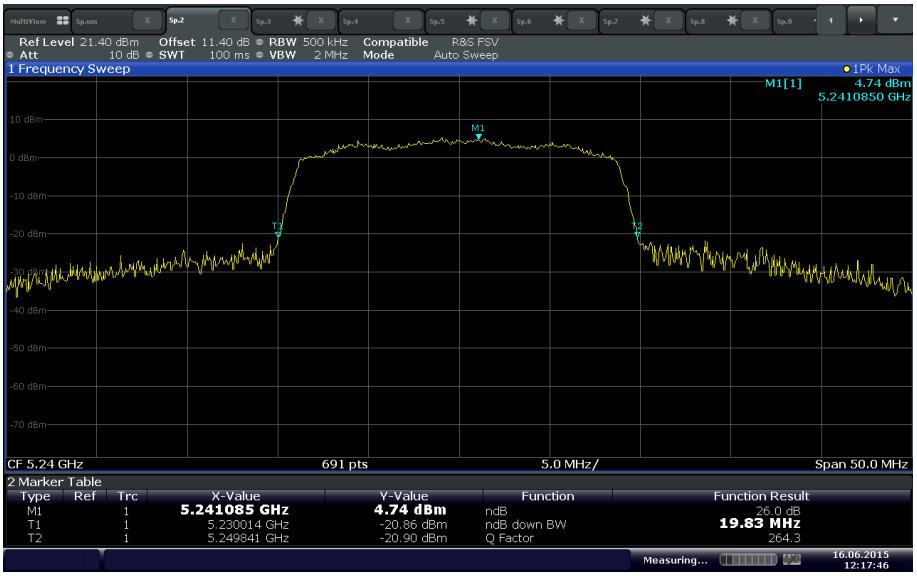
802.11n U-NII 1 Ch 36 20MHz BW



Date: 16.JUN.2015 12:17:21

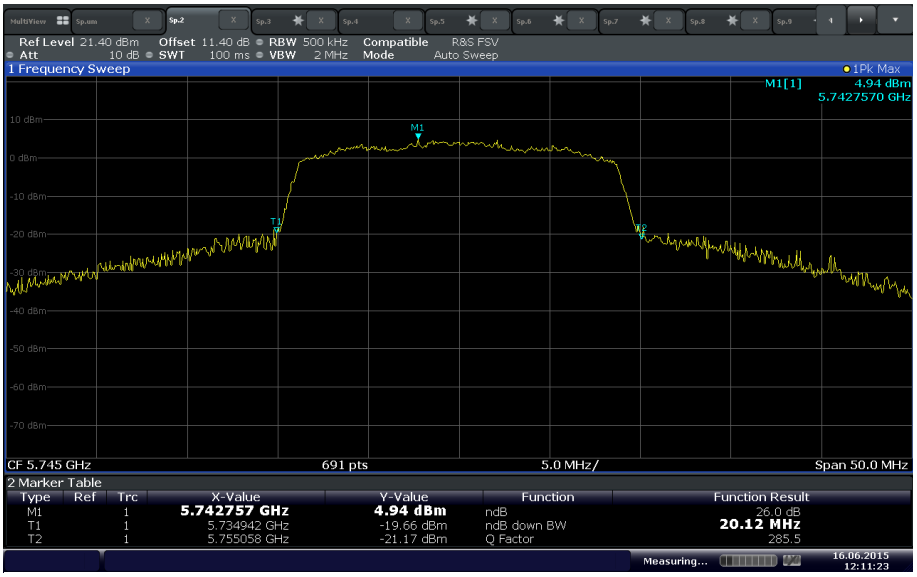
802.11n U-NII 1 Ch 40 20MHz BW

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



Date: 16.JUN.2015 12:17:47

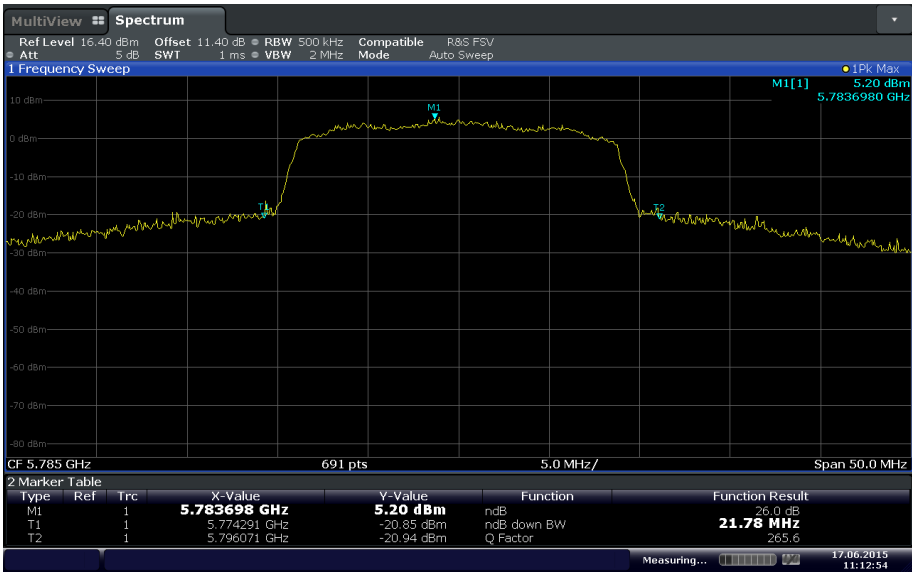
802.11n U-NII 1 Ch 48 20MHz BW



Date: 16.JUN.2015 12:11:23

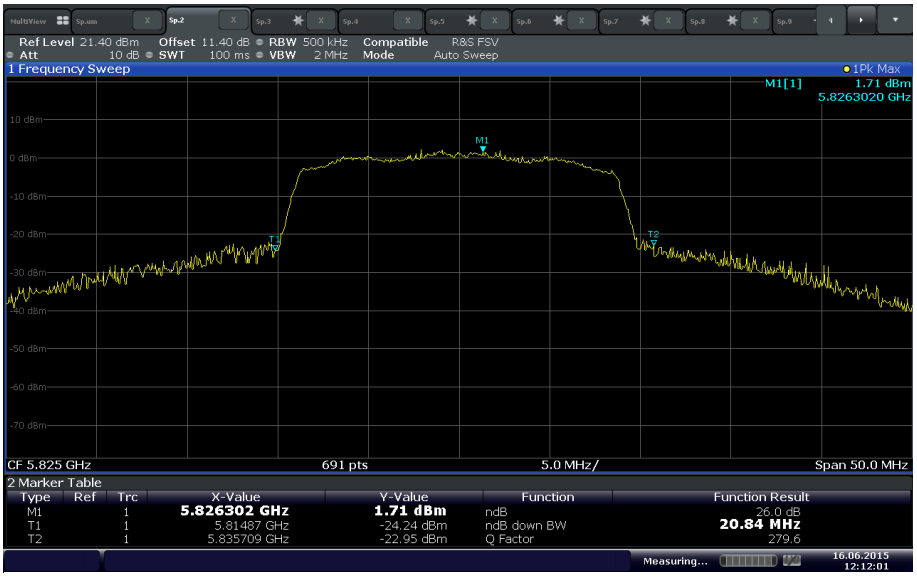
802.11n U-NII 3 Ch 149 20MHz BW

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



Date: 17.JUN.2015 11:12:53

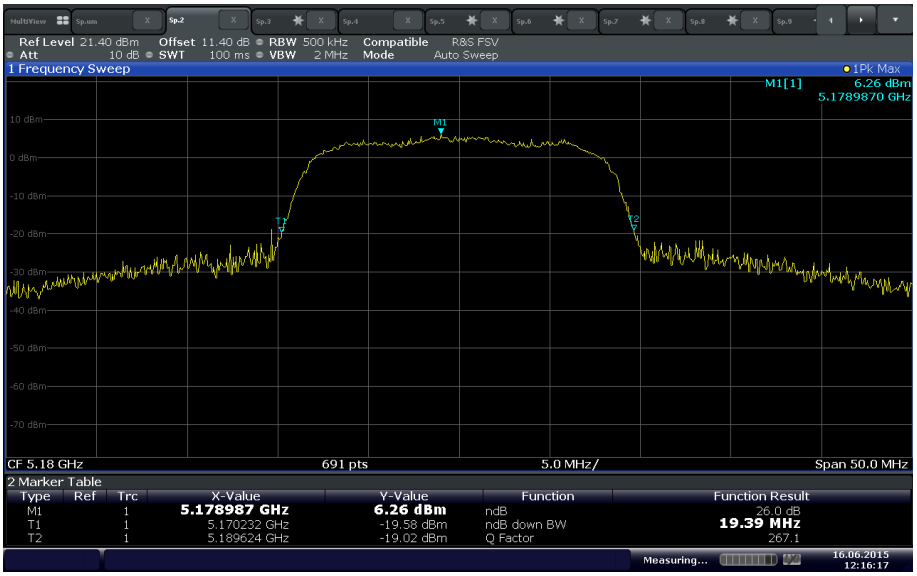
802.11n U-NII 3 Ch 157 20MHz BW



Date: 16.JUN.2015 12:12:02

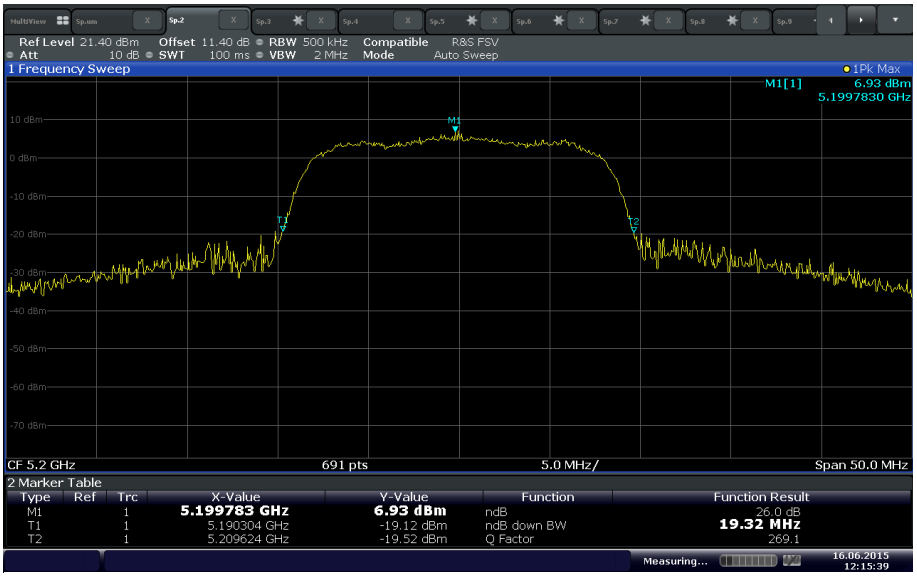
802.11n U-NII 3 Ch 165 20MHz BW

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



Date: 16.JUN.2015 12:16:17

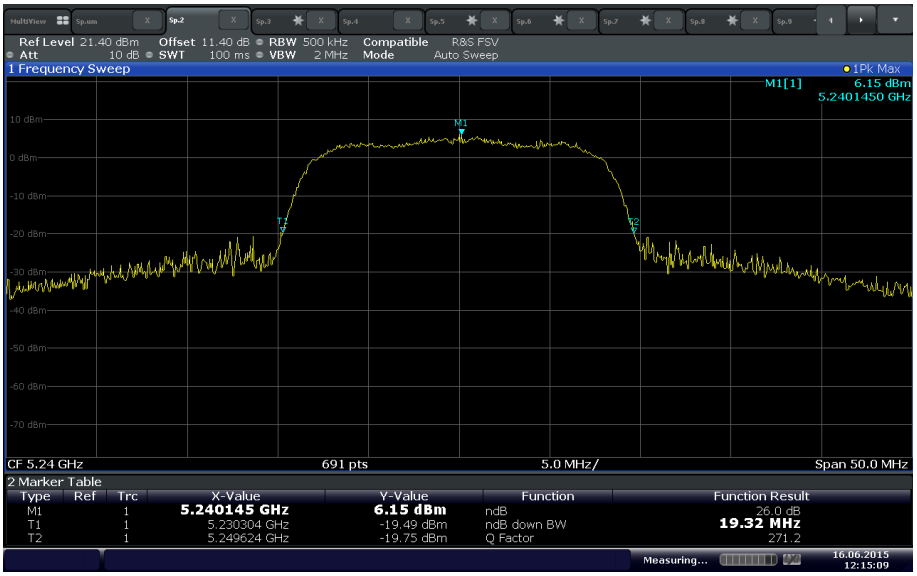
802.11a U-NII 1 Ch 36 20MHz BW



Date: 16.JUN.2015 12:15:40

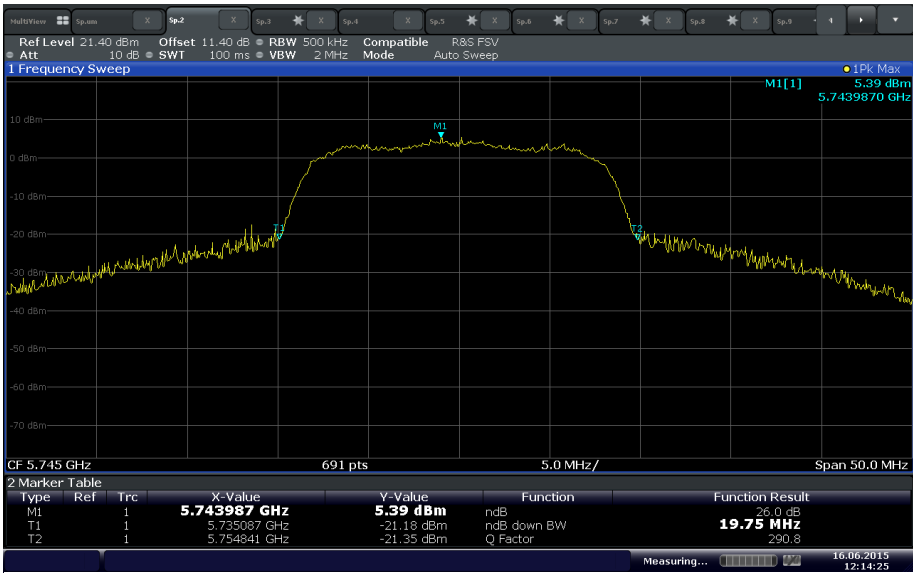
802.11a U-NII 1 Ch 40 20MHz BW

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



Date: 16.JUN.2015 12:15:09

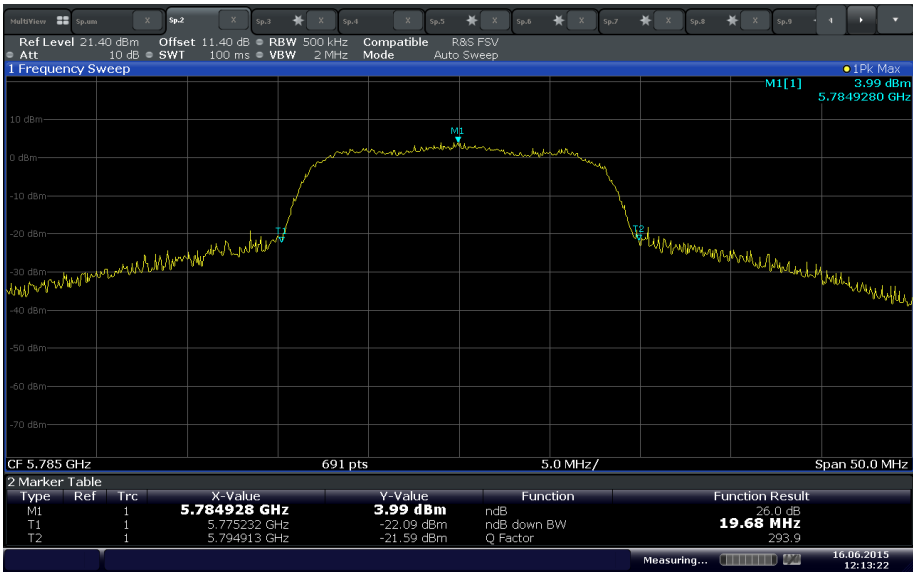
802.11a U-NII 1 Ch 48 20MHz BW



Date: 16.JUN.2015 12:14:26

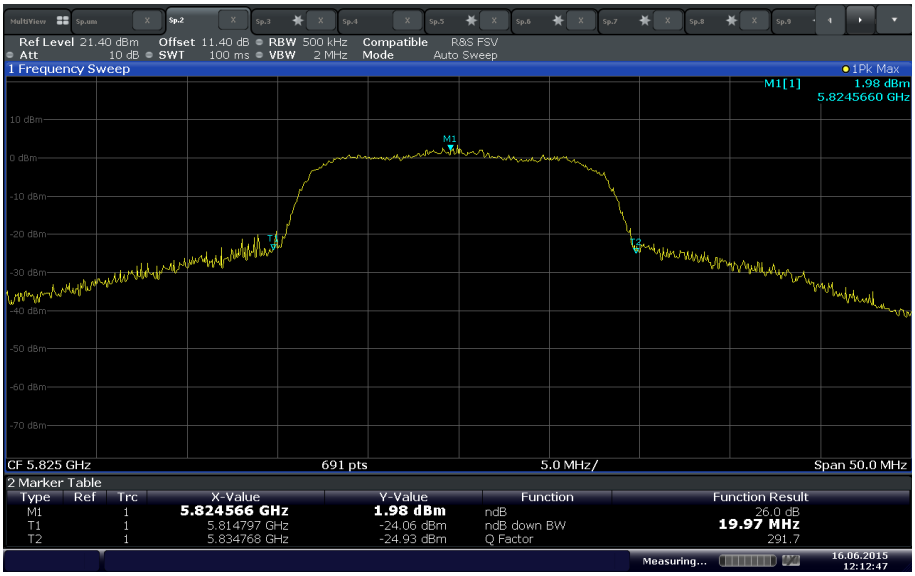
802.11a U-NII 3 Ch 149 20MHz BW

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



Date: 16.JUN.2015 12:13:21

802.11a U-NII 3 Ch 157 20MHz BW



Date: 16.JUN.2015 12:12:47

802.11a U-NII 3 Ch 165 20MHz BW

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

2.2 99% EMISSION BANDWIDTH

2.2.1 Specification Reference

RSS-Gen, Clause 6.6

2.2.2 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.

2.2.3 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

June 16, 2015/XYZ

2.2.5 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

2.2.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.4°C
Relative Humidity	51.8%
ATM Pressure	98.7 kPa

2.2.7 Additional Observations

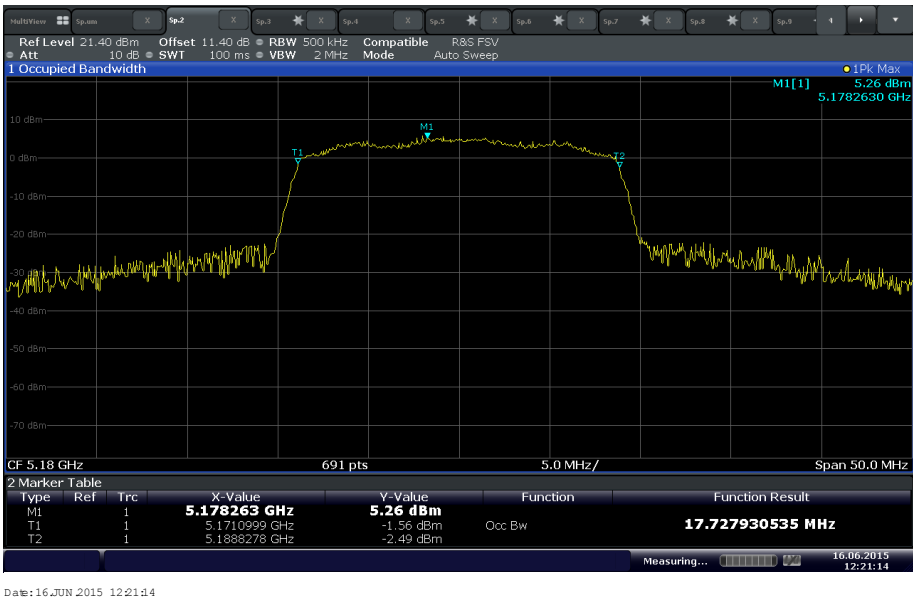
- This is a conducted test.
- The cable loss was measured and entered as the offset.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Trace is max hold.
- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.2.8 Summary Test Results (as reported)

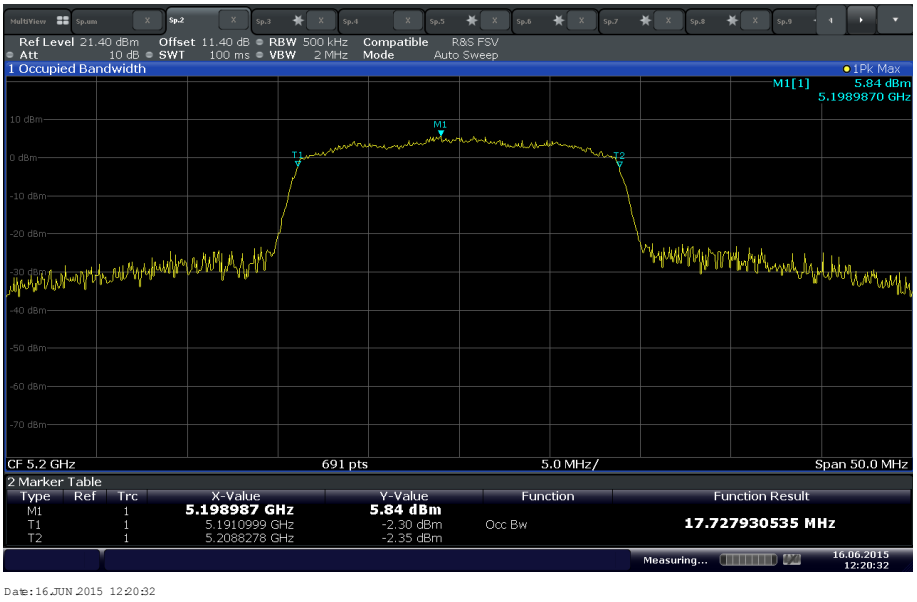
99% Emission Bandwidth 802.11n			
WiFi Mode	**Low Channel (Channel No./ BW in MHz)**	**Mid Channel (Channel No./ BW in MHz)**	**High Channel (Channel No./ BW in MHz)**
U-NII 1 20 MHz BW	36 / 17.73 MHz	40 / 17.73 MHz	48 / 17.73 MHz
U-NII 3 20 MHz BW	149 / 17.80 MHz	157 / 17.87 MHz	165 / 17.87 MHz
99% Emission Bandwidth 802.11 a			
WiFi Mode	**Low Channel (Channel No./ BW in MHz)**	**Mid Channel (Channel No./ BW in MHz)**	**High Channel (Channel No./ BW in MHz)**
U-NII 1 20 MHz BW	36 / 17.00 MHz	40 / 17.00 MHz	48 / 16.93 MHz
U-NII 3 20 MHz BW	149 / 17.15 MHz	157 / 17.08 MHz	165 / 17.15 MHz

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

2.2.9 Test Plots

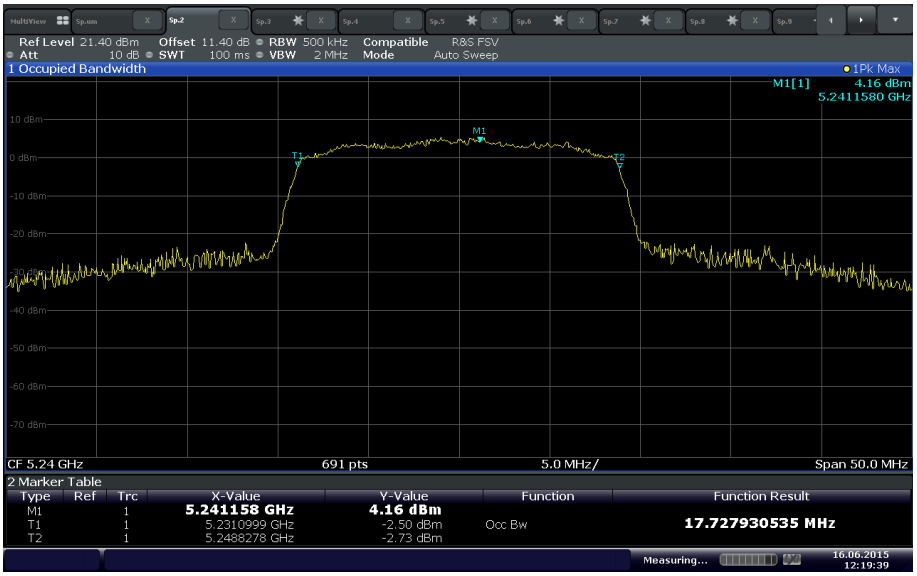


802.11n U-NII 1 Ch 36 20MHz BW



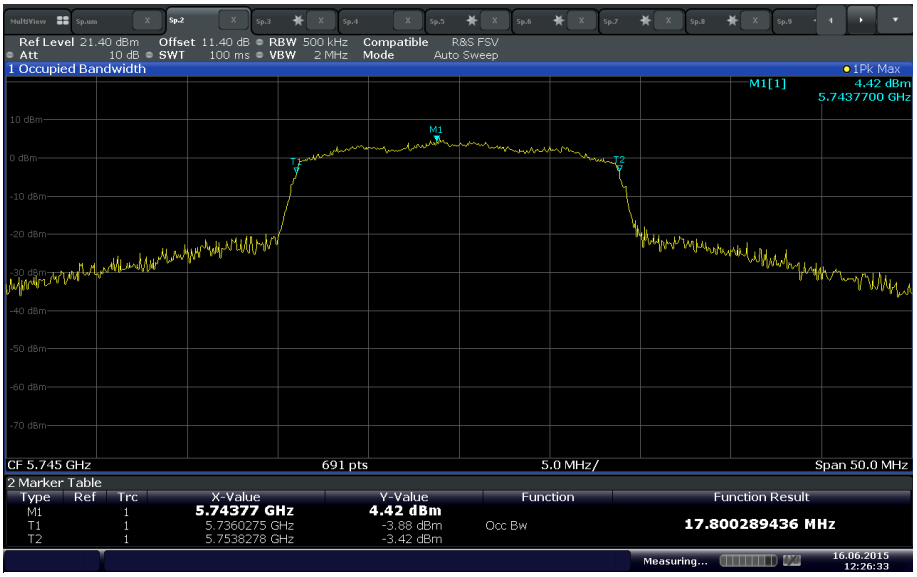
802.11n U-NII 1 Ch 40 20MHz BW

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



Date: 16.JUN.2015 12:19:39

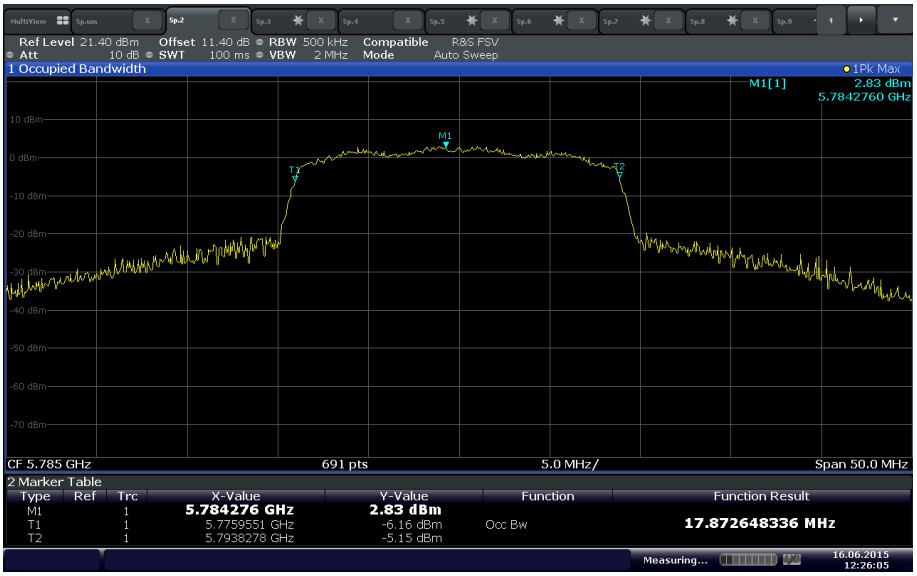
802.11n U-NII 1 Ch 48 20MHz BW



Date: 16.JUN.2015 12:26:33

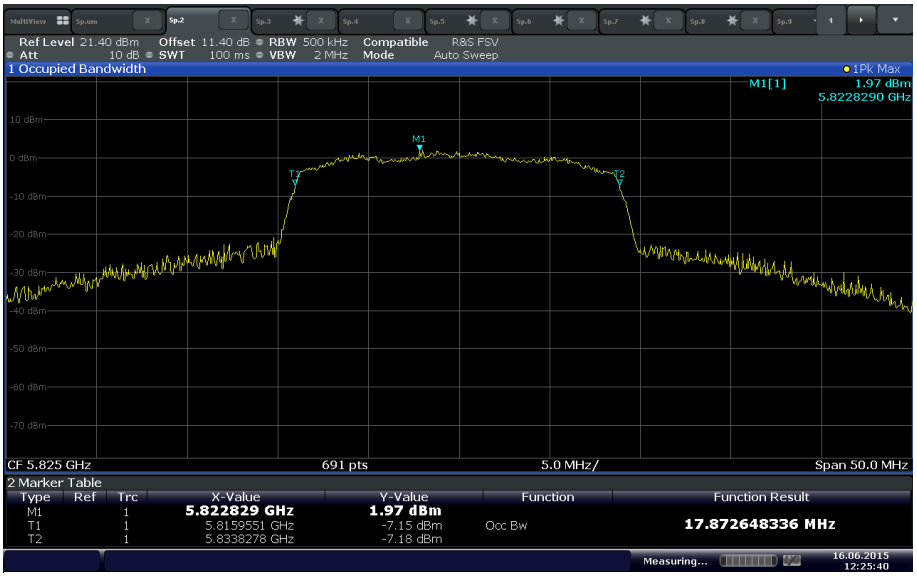
802.11n U-NII 3 Ch 149 20MHz BW

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



Date: 16.JUN.2015 12:26:05

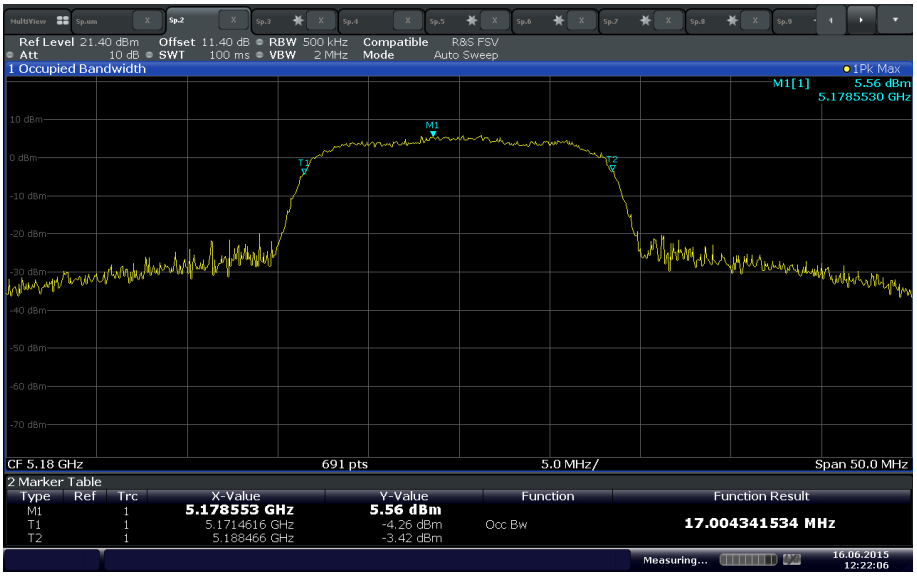
802.11n U-NII 3 Ch 157 20MHz BW



Date: 16.JUN.2015 12:25:40

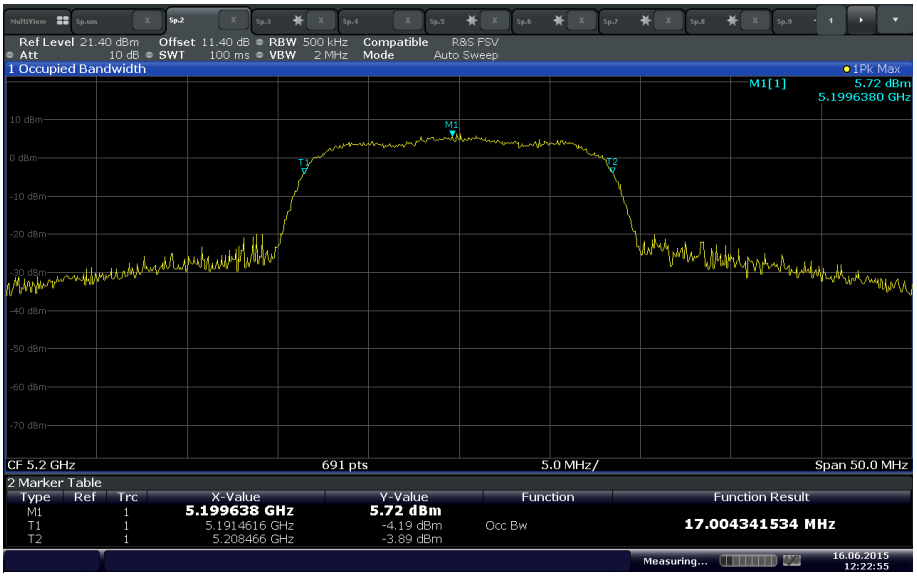
802.11n U-NII 3 Ch 165 20MHz BW

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



Date: 16.JUN.2015 12:22:06

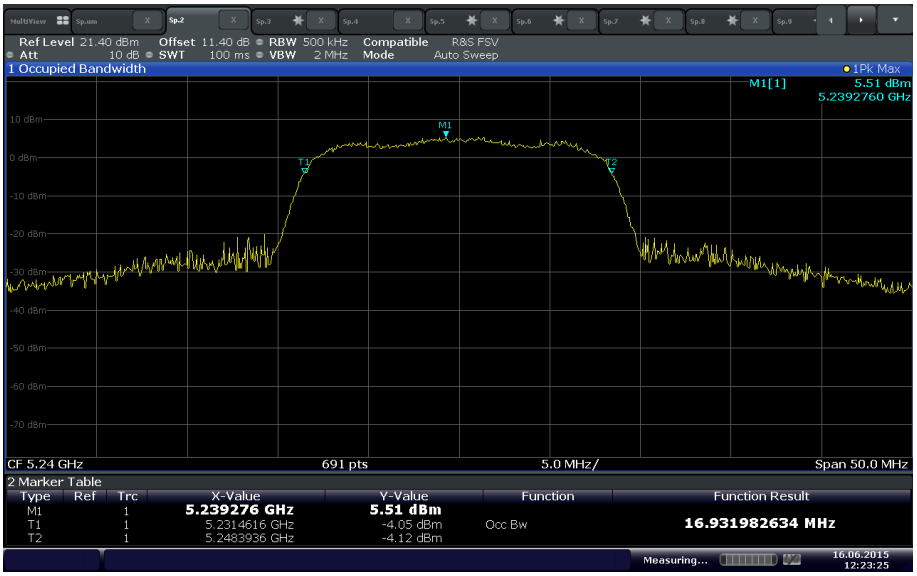
802.11a U-NII 1 Ch 36 20MHz BW



Date: 16.JUN.2015 12:22:56

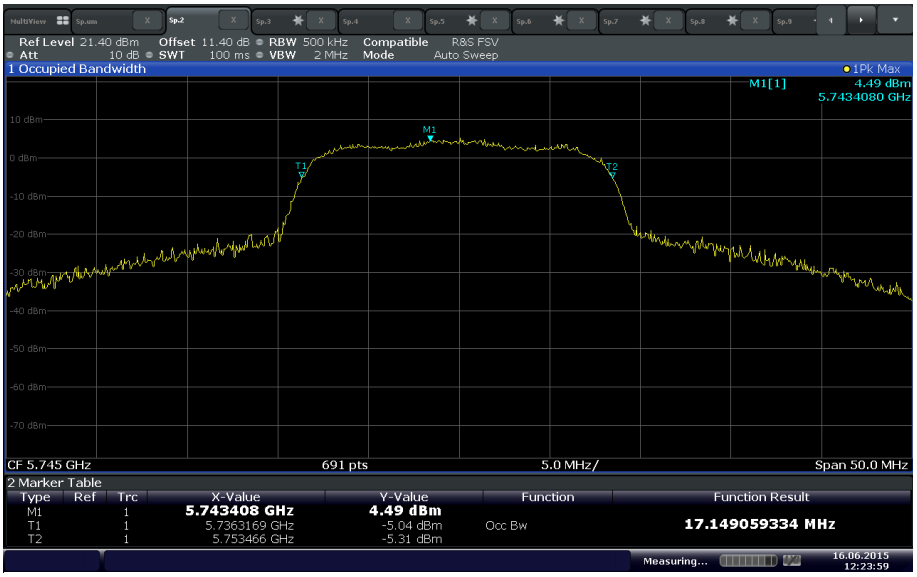
802.11a U-NII 1 Ch 40 20MHz BW

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



Date: 16.JUN.2015 12:23:25

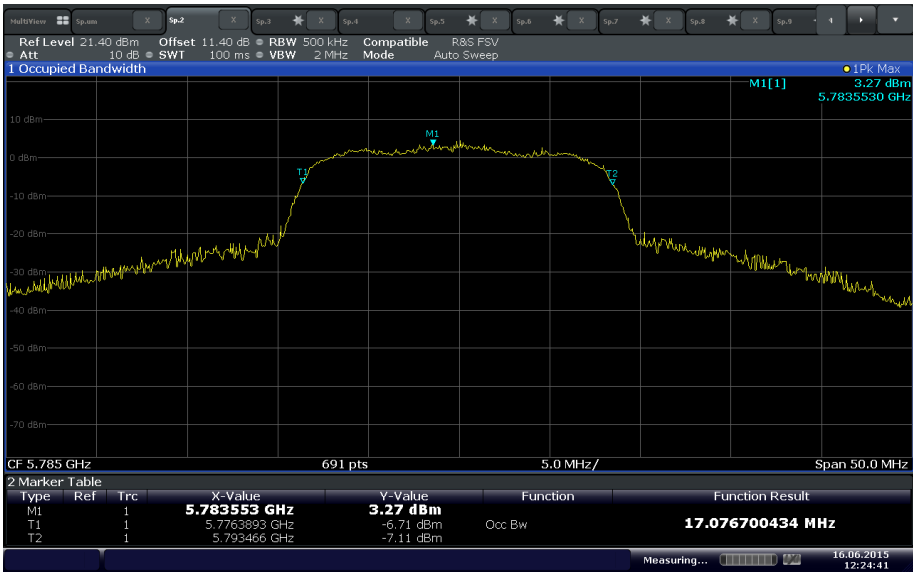
802.11a U-NII 1 Ch 48 20MHz BW



Date: 16.JUN.2015 12:23:59

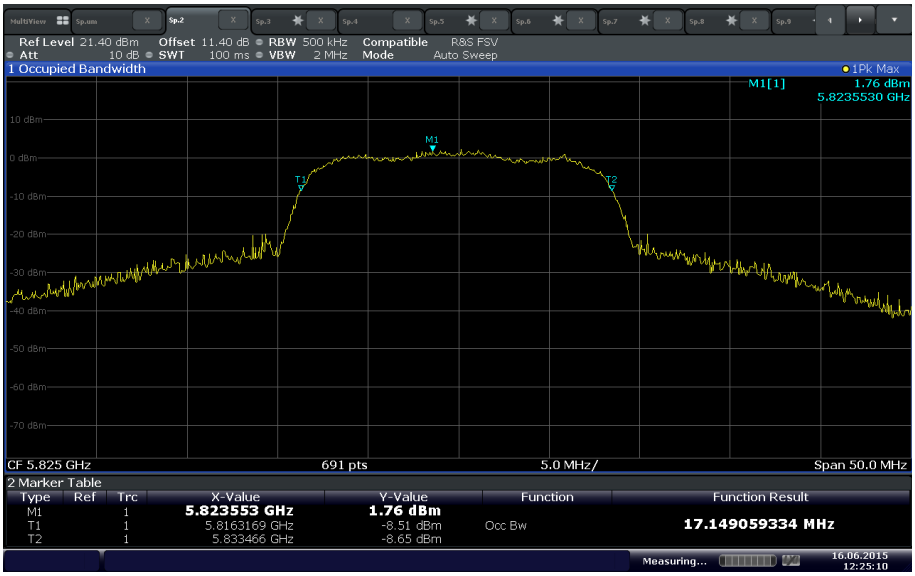
802.11a U-NII 3 Ch 149 20MHz BW

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



Date:16.JUN.2015 12:24:41

802.11a U-NII 3 Ch 157 20MHz BW



Date:16.JUN.2015 12:25:10

802.11a U-NII 3 Ch 165 20MHz BW

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

2.3 MINIMUM 6DB BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.407(e)
RSS-247, Clause 6.2.4(1)

2.3.2 Standard Applicable

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

2.3.3 Test Methodology

Section II (C) (2) of 789033 D02 General UNII Test Procedures New Rules v01.

2.3.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

June 16, 2015/XYZ

2.3.6 Test Equipment Used

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

2.3.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.4°C
Relative Humidity	51.8%
ATM Pressure	98.7 kPa

2.3.8 Additional Observations

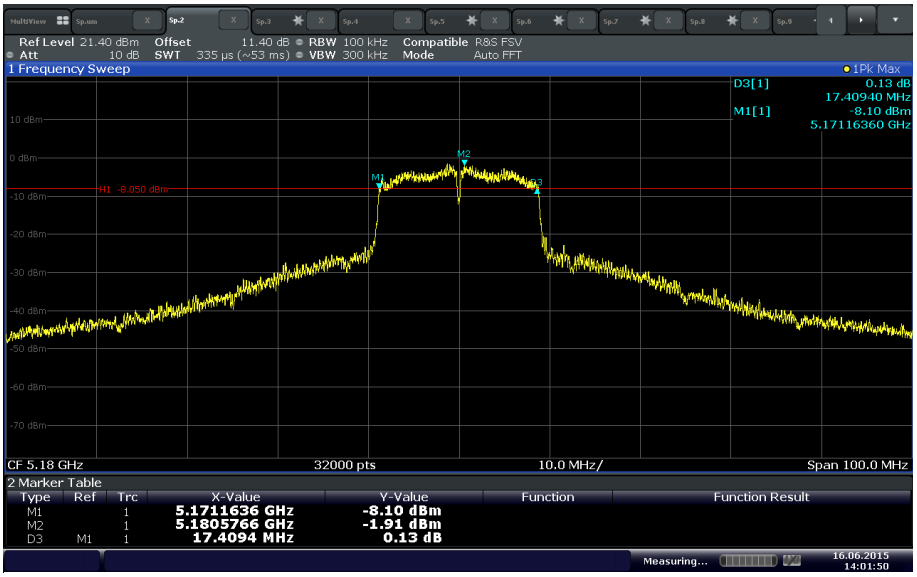
- This is a conducted test.
- The cable loss was measured and entered as the offset.
- Span is wide enough to capture the channel transmission.
- RBW is 100kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is Peak.
- Trace mode is Max Hold
- The two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission were measured by drawing a horizontal line and using marker delta function of the spectrum analyzer.

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

2.3.9 Summary Test Results

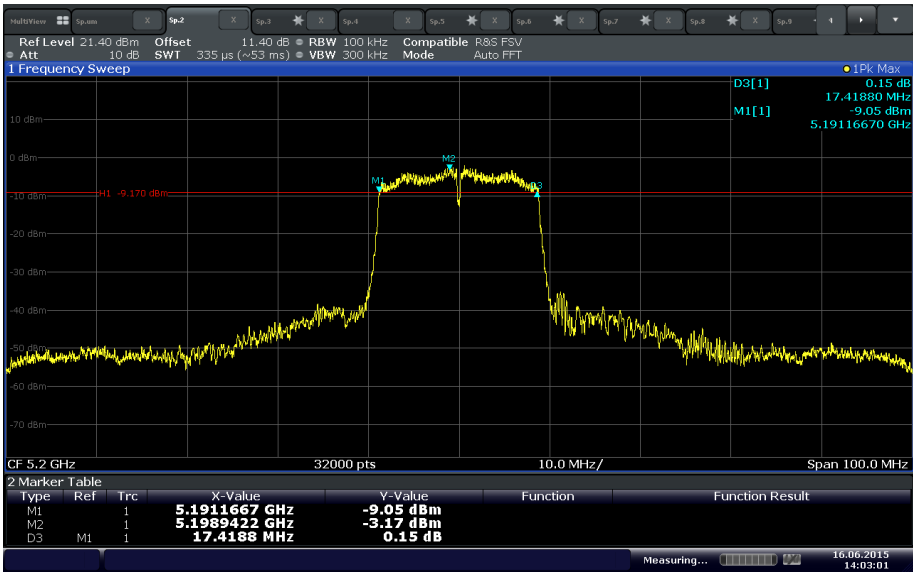
6 dB Bandwidth 802.11n HT20			
WiFi Mode	**Low Channel (Channel No./ BW in MHz)**	**Mid Channel (Channel No./ BW in MHz)**	**High Channel (Channel No./ BW in MHz)**
U-NII 1 20 MHz BW	36 / 17.41 MHz	40 / 17.42 MHz	48 / 17.57MHz
U-NII 3 20 MHz BW	149 / 17.48 MHz	157 / 17.06 MHz	165 / 17.24 MHz
6 dB Bandwidth 802.11 a			
WiFi Mode	**Low Channel (Channel No./ BW in MHz)**	**Mid Channel (Channel No./ BW in MHz)**	**High Channel (Channel No./ BW in MHz)**
U-NII 1 20 MHz BW	36 / 15.93 MHz	40 / 16.05 MHz	48 / 16.08 MHz
U-NII 3 20 MHz BW	149 / 16.28 MHz	157 / 15.92 MHz	165 / 16.07 MHz

2.3.10 Test Plots



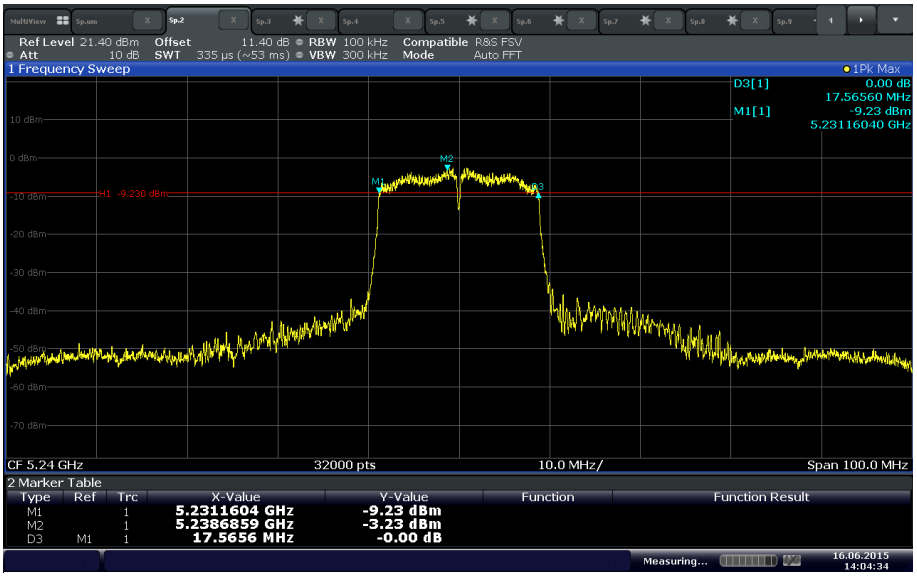
8.2.11n U-NII 1 Ch 36 20MHz BW

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



Date: 16.JUN.2015 14:03:02

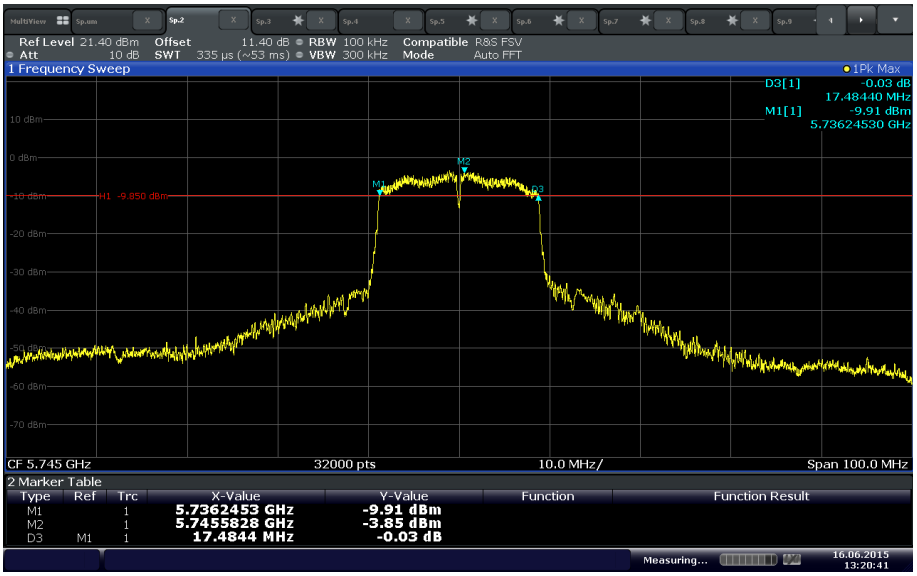
8.2.11n U-NII 1 Ch 40 20MHz BW



Date: 16.JUN.2015 14:04:33

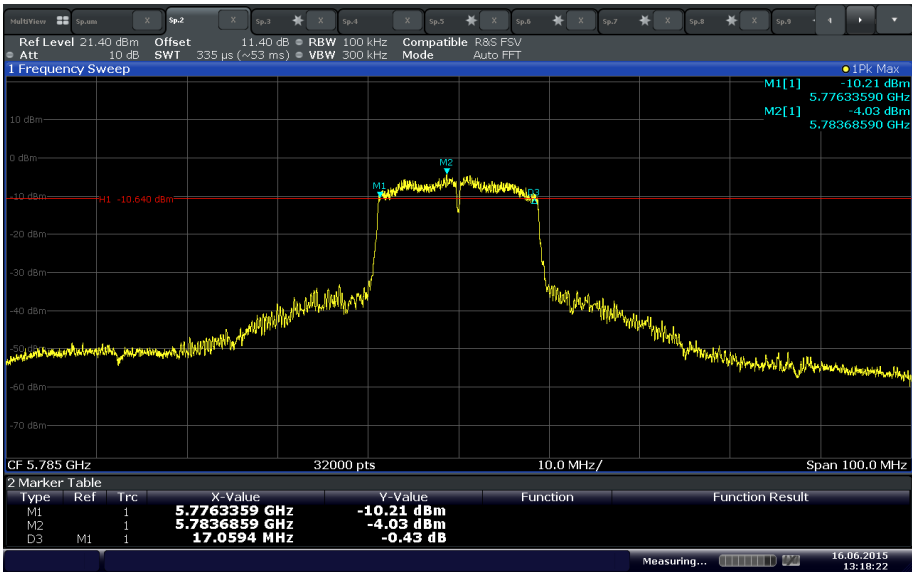
8.2.11n U-NII 1 Ch 48 20MHz BW

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



Date: 16.JUN.2015 13:20:42

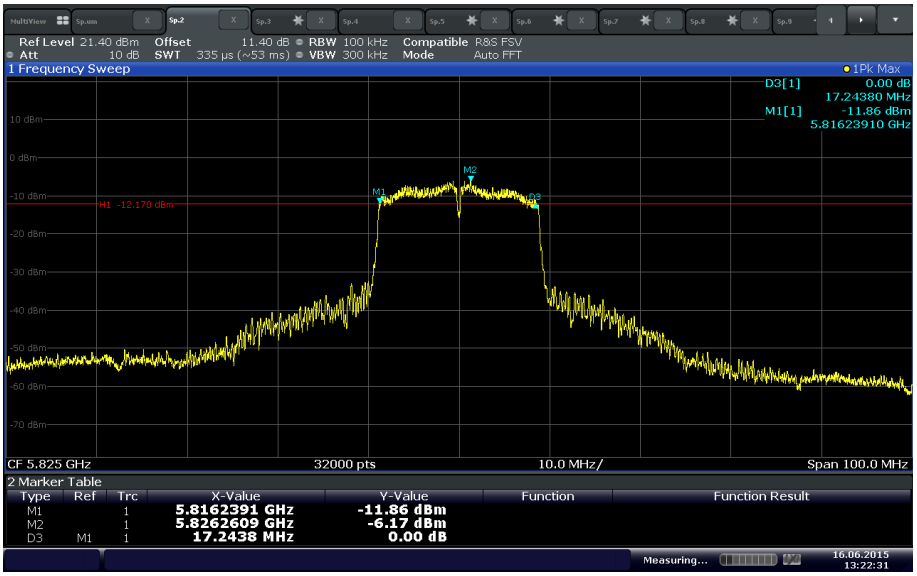
8.2.11n U-NII 3 Ch 149 20MHz BW



Date: 16.JUN.2015 13:18:22

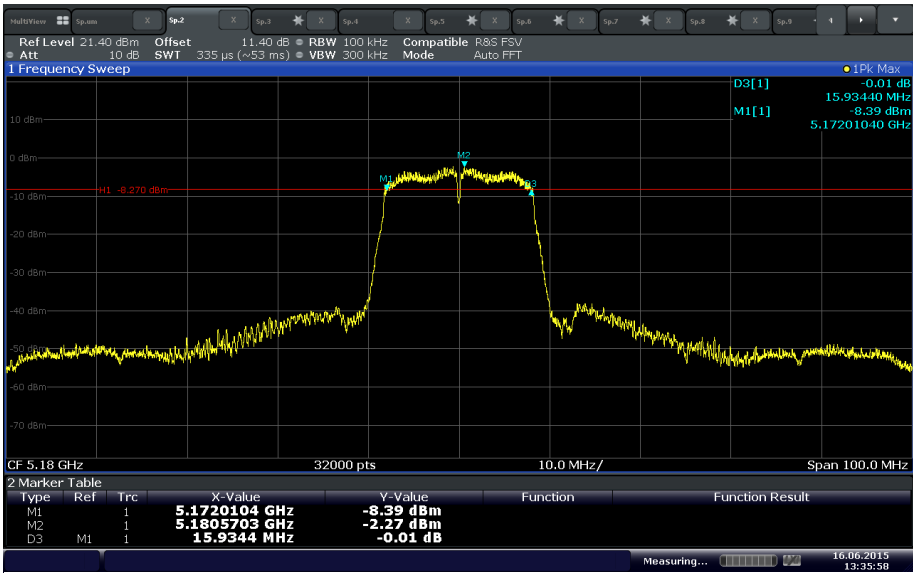
8.2.11n U-NII 3 Ch 157 20MHz BW

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



Date: 16.JUN.2015 13:22:31

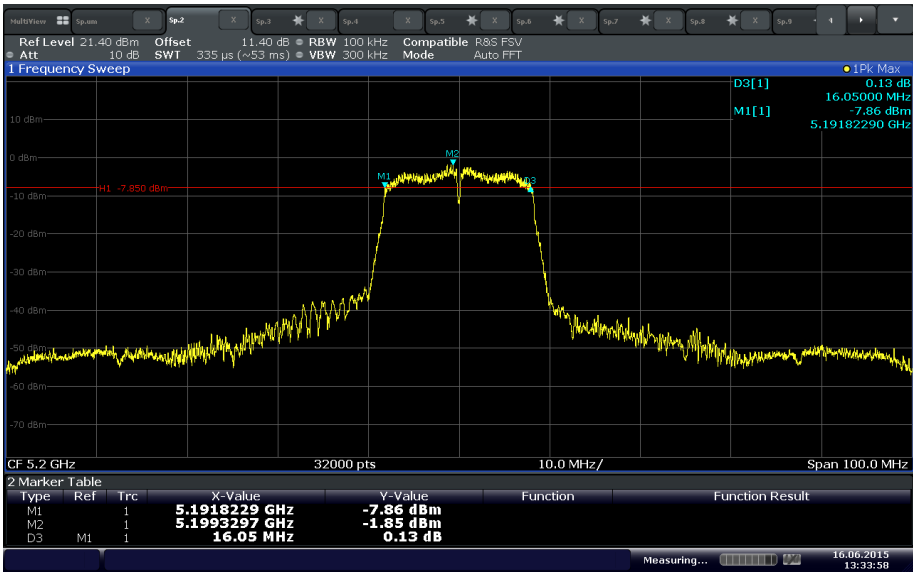
8.2.11n U-NII 3 Ch 165 20MHz BW



Date: 16.JUN.2015 13:35:58

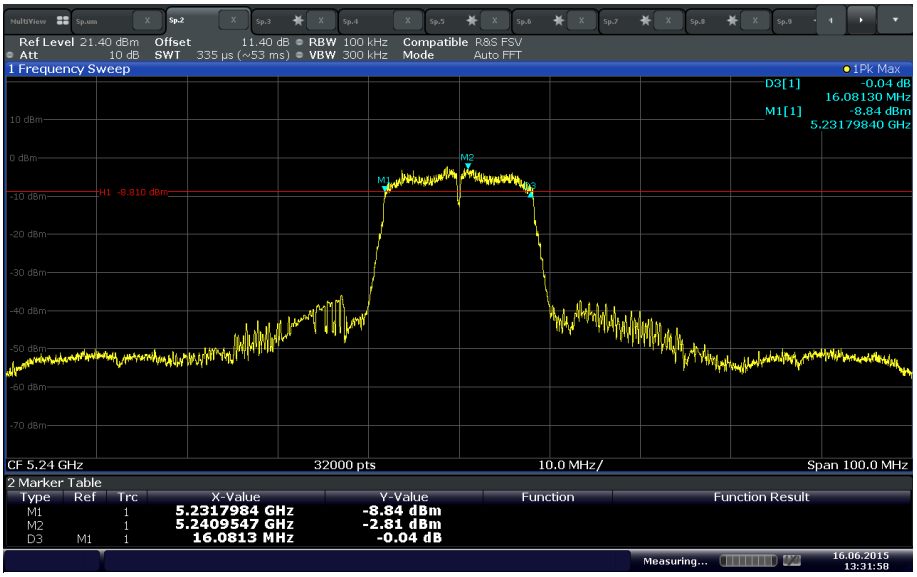
8.2.11a U-NII 1 Ch 36 20MHz BW

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



Date: 16.JUN.2015 13:33:59

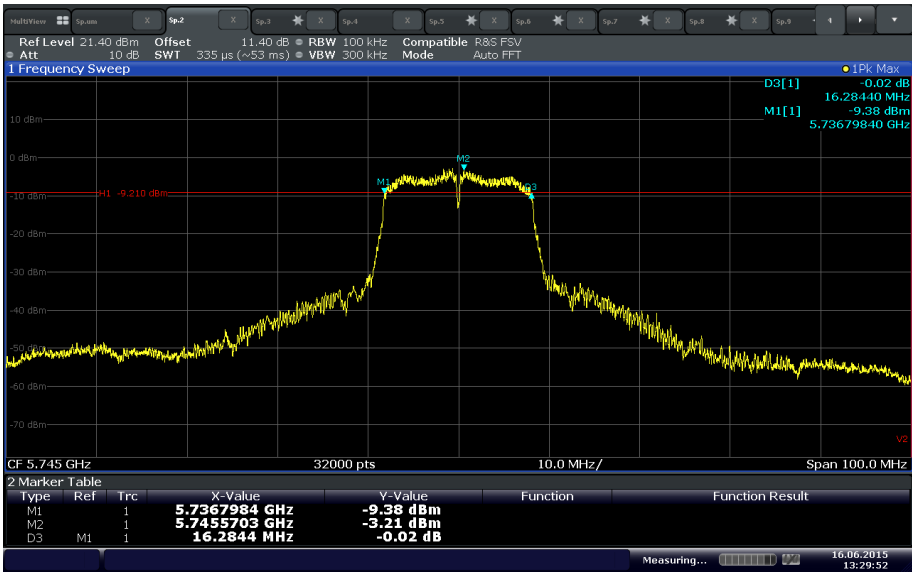
8.2.11a U-NII 1 Ch 40 20MHz BW



Date: 16.JUN.2015 13:31:58

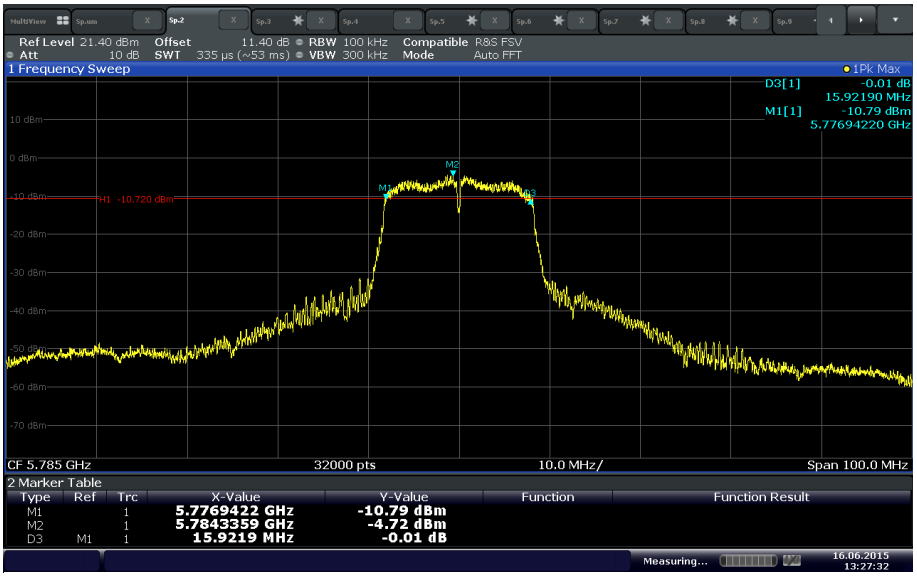
8.2.11a U-NII 1 Ch 48 20MHz BW

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



Date: 16.JUN.2015 13:29:52

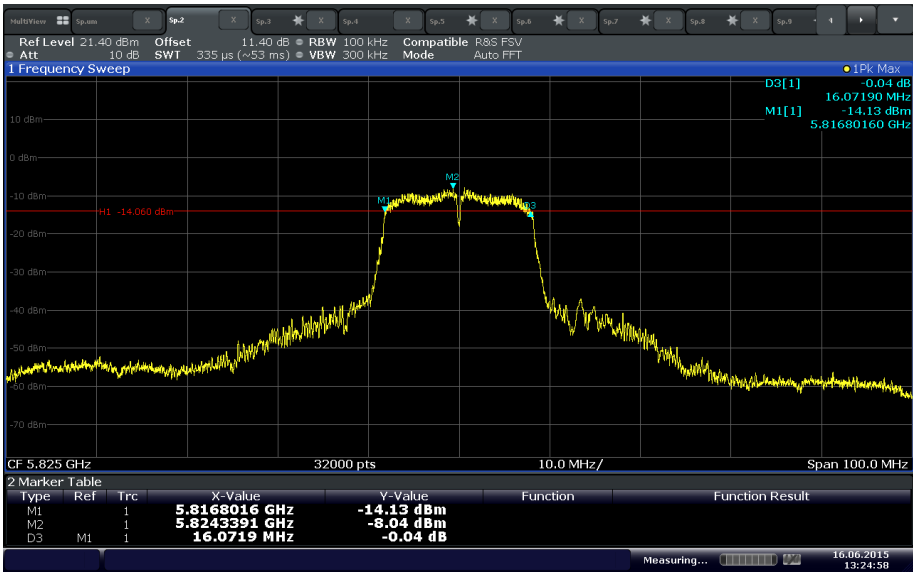
8.2.11a U-NII 3 Ch 149 20MHz BW



Date: 16.JUN.2015 13:27:32

8.2.11a U-NII 3 Ch 157 20MHz BW

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



Date:16.JUN.2015 13:24:58

8.2.11a U-NII 3 Ch 165 20MHz BW

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

2.4 MAXIMUM CONDUCTED OUTPUT POWER

2.4.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.407(a)(1)(IV) and (a)(3)
RSS-247, Clause 6.2.4(1)

2.4.2 Standard Applicable

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

2.4.3 Test Methodology

Section II (E)(3)(a) Method PM (Measurement using an RF average power meter) of 789033 D02 General UNII Test Procedures New Rules v01.

2.4.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

June 05 and 15, 2015 / XYZ

2.4.2 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

2.4.3 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.9 - 24.8°C
Relative Humidity	46.2 - 48.6%
ATM Pressure	99.2 - 99.4kPa

2.4.4 Additional Observations

- This is a conducted test.
- Test methodology is per Section II (E)(3)(a) Method PM (Measurement using an RF average power meter) of 789033 D02 General UNII Test Procedures New Rules v01. All conditions under this Section were satisfied.
- Duty Cycle was measured and calculated according to Section II(B)(2)(b) of 789033 D02 General UNII Test Procedures New Rules v01.
- The cable loss was measured and entered as the offset.
- Calculated Average Power is the sum of the measured average power and the corresponding duty cycle correction factor.

2.4.5 Duty Cycle Results

Bandwidth	Data Rate (Mbps)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11n 20 MHz	7.2	97.49	0.09
	14.4	97.05	0.22
	21.7	96.12	0.31
	28.9	94.46	0.43
	43.3	91.70	0.59
	57.8	87.06	0.73
	65.0	85.35	0.74
	72.2	83.78	0.89
802.11a 20 MHz	6.0	97.85	0.11
	9.0	95.12	0.13
	12.0	93.10	0.17
	18.0	90.51	0.25
	24.0	87.31	0.38
	36.0	84.57	0.60
	48.0	84.31	0.69
	54.0	81.56	0.77

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

2.4.6 Test Results

802.11 n 20MHz BW HT20					
WLAN Mode	**Channel**	**MCS**	**Measured Average Power (dBm)**	**Duty Cycle Correction Factor (dB)**	**Calculated Average Power (dBm)**
802.11n U-NII 1 (5150 MHz to 5250 MHz). **Limit is 24 dBm**	36 (5180 MHz)	0	11.24	0.09	11.33
		1	***11.17***	***0.22***	***11.39***
		2	10.83	0.31	11.14
		3	10.82	0.43	11.25
		4	10.72	0.59	11.31
		5	10.45	0.73	11.18
		6	10.43	0.74	11.17
		7	10.46	0.89	11.35
	40 (5200 MHz)	0	11.00	0.09	11.09
		1	10.85	0.22	11.07
		2	10.79	0.31	11.1
		3	10.75	0.43	11.18
		4	10.52	0.59	11.11
		5	10.44	0.73	11.17
		6	10.41	0.74	11.15
		7	10.19	0.89	11.08
	48 (5240 MHz)	0	10.70	0.09	10.79
		1	10.50	0.22	10.72
		2	10.48	0.31	10.79
		3	10.42	0.43	10.85
		4	10.08	0.59	10.67
		5	10.01	0.73	10.74
		6	10.04	0.74	10.78
		7	9.88	0.89	10.77
802.11n U-NII 3 (5725 MHz to 5850 MHz). **Limit is 30 dBm**	149 (5745 MHz)	0	11.08	0.09	11.17
		1	11.08	0.22	11.30
		2	10.85	0.31	11.16
		3	10.87	0.43	11.30
		4	***10.81***	***0.59***	***11.40***
		5	10.55	0.73	11.28
		6	10.44	0.74	11.18
		7	10.40	0.89	11.29
	157 (5785 MHz)	0	10.16	0.09	10.25
		1	9.89	0.22	10.11

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

		2	9.87	0.31	10.18
		3	9.84	0.43	10.27
		4	9.61	0.59	10.2
		5	9.43	0.73	10.16
		6	9.39	0.74	10.13
		7	9.31	0.89	10.2
	165 (5825 MHz)	0	10.21	0.09	10.3
		1	9.81	0.22	10.03
		2	9.72	0.31	10.03
		3	9.68	0.43	10.11
		4	9.34	0.59	9.93
		5	9.35	0.73	10.08
		6	9.21	0.74	9.95
		7	9.19	0.89	10.08

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

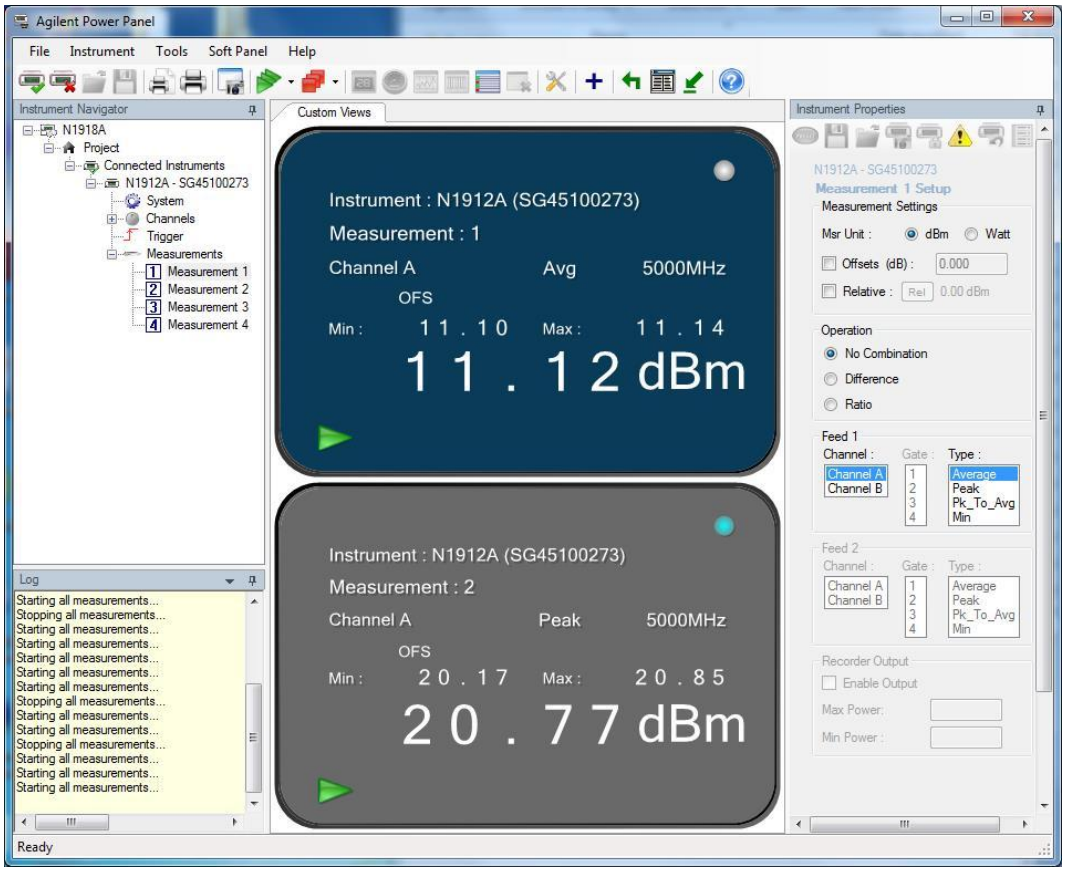
802.11 a 20MHz BW					
WLAN Mode	**Channel**	**Data Rate**	**Measured Average Power (dBm)**	**Duty Cycle Correction Factor (dB)**	**Calculated Average Power (dBm)**
802.11a U-NII 1 (5150 MHz to 5250 MHz). **Limit is 24 dBm**	***36 (5180 MHz)***	6Mbps	11.12	0.11	11.23
		9Mbps	11.05	0.13	11.18
		12Mbps	***11.07***	***0.17***	***11.24***
		18Mbps	10.79	0.25	11.04
		24Mbps	10.80	0.38	11.18
		36Mbps	10.60	0.60	11.2
		48Mbps	10.41	0.69	11.1
		54Mbps	8.91	0.77	9.68
	40 (5200 MHz)	6Mbps	11.02	0.11	11.13
		9Mbps	10.93	0.13	11.06
		12Mbps	10.90	0.17	11.07
		18Mbps	10.72	0.25	10.97
		24Mbps	10.67	0.38	11.05
		36Mbps	10.44	0.60	11.04
		48Mbps	10.30	0.69	10.99
		54Mbps	8.79	0.77	9.56
	48 (5240 MHz)	6Mbps	10.72	0.11	10.83
		9Mbps	10.67	0.13	10.8
		12Mbps	10.60	0.17	10.77
		18Mbps	10.45	0.25	10.7
		24Mbps	10.35	0.38	10.73
		36Mbps	10.22	0.60	10.82
		48Mbps	9.98	0.69	10.67
		54Mbps	8.57	0.77	9.34
802.11a U-NII 3 (5725 MHz to 5850 MHz). **Limit is 30 dBm**	149 (5745 MHz)	***6Mbps***	***11.57***	***0.11***	***11.68***
		9Mbps	11.45	0.13	11.58
		12Mbps	11.37	0.17	11.54
		18Mbps	11.26	0.25	11.51
		24Mbps	11.15	0.38	11.53
		36Mbps	10.99	0.60	11.59
		48Mbps	10.83	0.69	11.52
		54Mbps	9.46	0.77	10.23
	157 (5785 MHz)	6Mbps	10.36	0.11	10.47
		9Mbps	10.28	0.13	10.41

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

		12Mbps	10.20	0.17	10.37
		18Mbps	10.10	0.25	10.35
		24Mbps	10.00	0.38	10.38
		36Mbps	9.83	0.60	10.43
		48Mbps	9.65	0.69	10.34
		54Mbps	8.43	0.77	9.2
	165 (5825 MHz)	6Mbps	9.92	0.11	10.03
		9Mbps	9.84	0.13	9.97
		12Mbps	9.76	0.17	9.93
		18Mbps	9.70	0.25	9.95
		24Mbps	9.57	0.38	9.95
		36Mbps	9.38	0.60	9.98
		48Mbps	9.25	0.69	9.94
		54Mbps	7.87	0.77	8.64

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

2.4.7 Sample Test Plots



U-NII 1 802.11 a Ch 36 20MHz BW 6Mbps

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

2.5 MAXIMUM POWER SPECTRAL DENSITY (PSD)

2.5.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.407(a)(1)(IV) and (a)(3)
RSS-247, Clause 6.2.3(1)

2.5.2 Standard Applicable

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

2.5.3 Test Methodology

Section II (F) PSD of 789033 D02 General UNII Test Procedures New Rules v01

2.5.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

June 15, 2015/XYZ

2.5.6 Test Equipment Used

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

2.5.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.9°C
Relative Humidity	46.2%
ATM Pressure	99.4kPa

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

2.5.8 Additional Observations

- This is a conducted test as per Section II (F) PSD of 789033 D02 General UNII Test Procedures New Rules v01.
- Method SA-2 of Section II (E) was used for SA configuration.
- The cable loss was measured and entered as the offset.
- Only the worst case channel and data rate for each mode presented.
- Duty Cycle values are from Section 2.5.5 of this test report.
- RBW for U-NII 1 is 1MHz while 500 kHz for U-NII 3.

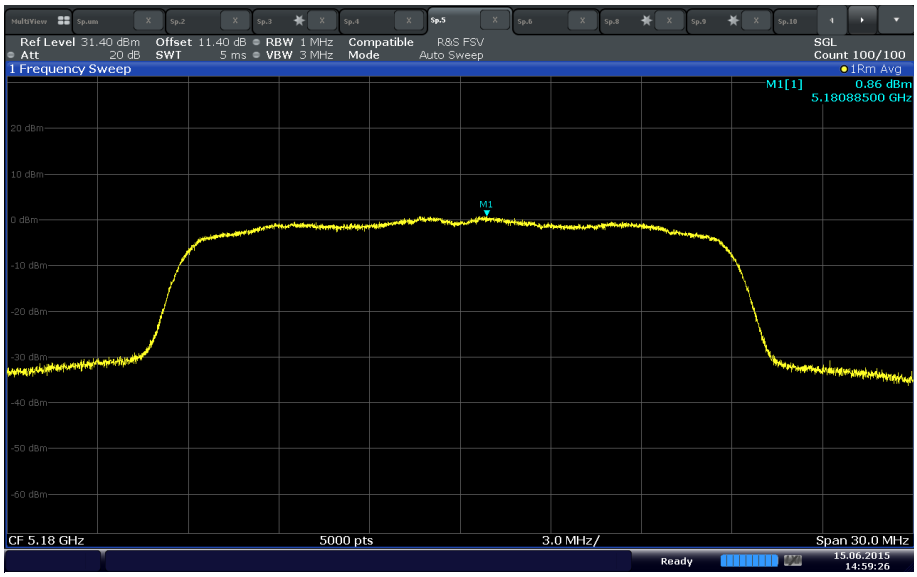
2.5.9 Test Results

802.11n HT20 U-NII 1(5150 MHz to 5250 MHz)						
Channel	**Bandwidth (MHz)**	**MCS Index**	**Peak of the Spectrum (dBm)**	**Duty Cycle Correction Factor (dB)**	**Calculated Maximum PSD (dBm)**	**Limit (dBm)**
36 (5180 MHz)	20	1	0.86	0.22	1.08	11 dBm/1 MHz
802.11n HT20 U-NII 3 (5745 MHz to 5825 MHz)						
Channel	**Bandwidth (MHz)**	**MCS Index**	**Peak of the Spectrum (dBm)**	**Duty Cycle Correction Factor (dB)**	**Calculated Maximum PSD (dBm)**	**Limit (dBm)**
149 (5745 MHz)	20	4	-1.54	0.59	-0.95	30 dBm/500 kHz

802.11a U-NII 1(5150 MHz to 5250 MHz)						
Channel	**Bandwidth (MHz)**	**Data Rate (Mbps)**	**Peak of the Spectrum (dBm)**	**Duty Cycle Correction Factor (dB)**	**Calculated Maximum PSD (dBm)**	**Limit (dBm)**
36 (5180 MHz)	20	12.0	0.94	0.17	1.11	11 dBm/1 MHz
802.11a U-NII 3 (5745 MHz to 5825 MHz)						
Channel	**Bandwidth (MHz)**	**MCS Index (Mbps)**	**Peak of the Spectrum (dBm)**	**Duty Cycle Correction Factor (dB)**	**Calculated Maximum PSD (dBm)**	**Limit (dBm)**
149 (5745 MHz)	20	6.0	-1.72	0.11	-1.61	30 dBm/500 kHz

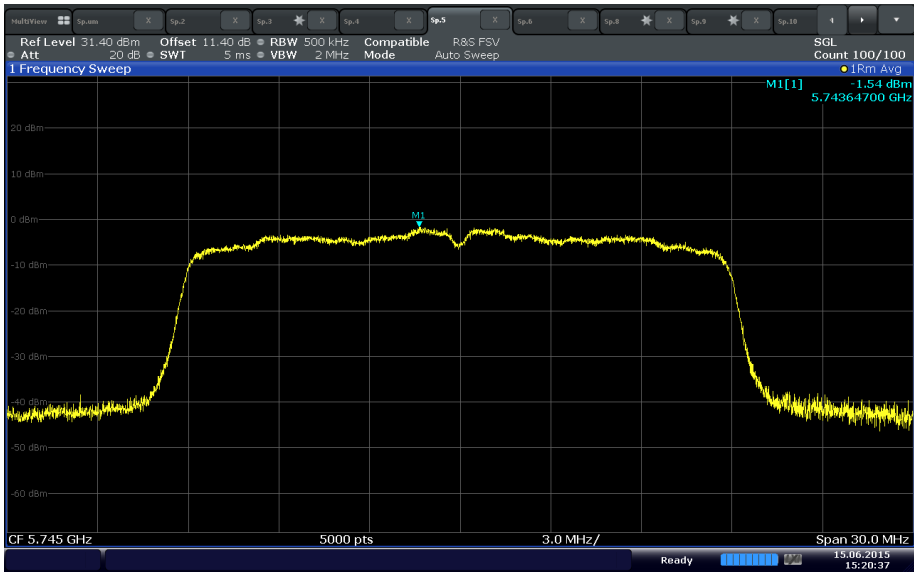
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.5.10 Example Test Plots



Date: 15.JUN.2015 14:59:26

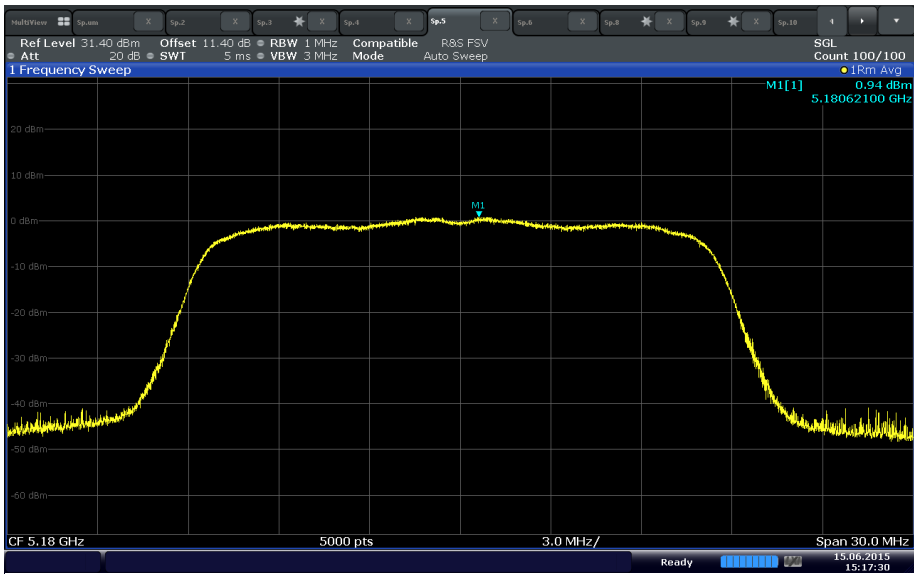
802.11n U-NII 1 20MHz BW Channel 36 (5180 MHz)



Date: 15.JUN.2015 15:20:37

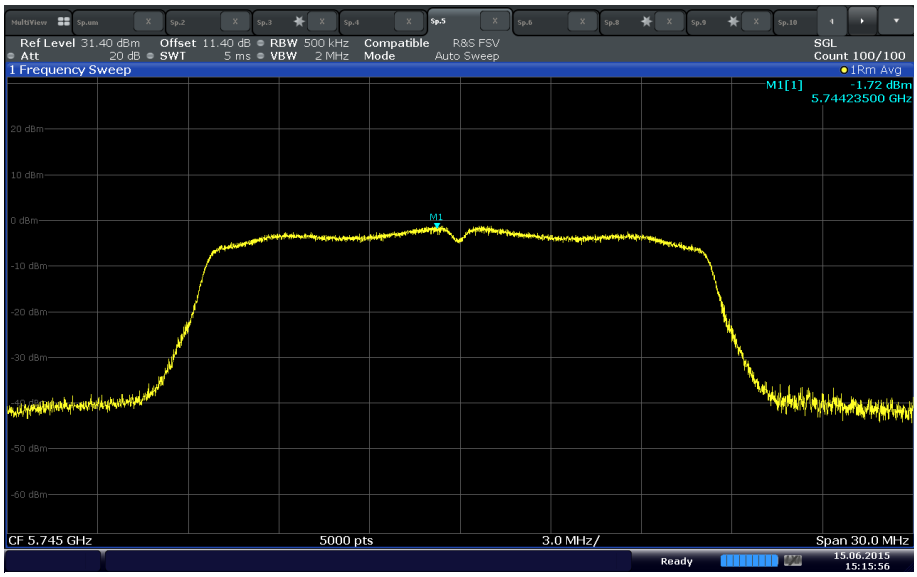
802.11n U-NII 3 20MHz BW Channel 149 (5745 MHz)

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



Date: 15.JUN.2015 15:17:30

802.11a U-NII 1 20MHz BW Channel 36 (5180 MHz)



Date: 15.JUN.2015 15:15:57

802.11a U-NII 3 20MHz BW Channel 149 (5745 MHz)

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

2.6 UNWANTED EMISSIONS MEASUREMENT

2.6.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.407(b)(1),(4) and (7)
FCC 47 CFR Part 15, Clause 15.209
RSS-247, Clause 6.2.4(2)

2.6.2 Standard Applicable

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

2.6.3 Test Methodology

Section II (G) Unwanted Emission Measurement of 789033 D02 General UNII Test Procedures New Rules v01

2.6.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A and B

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

June 16 and 18, 2015/XYZ

2.6.6 Test Equipment Used

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

2.6.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.4 - 23.9°C
Relative Humidity	46.20- 51.8%
ATM Pressure	98.7 - 99.4kPa

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

2.6.8 Additional Observations

- This is an antenna-port conducted measurement test plus radiated cabinet emissions measurements.
- Only the worst case data rate presented for both 802.11n and 802.11a covering all available bandwidths.
- Sweep time is set to auto.
- If an Average measurement is required. The offset will be adjusted to include the duty cycle correction factor found under Section 2.5.5 of this test report. However no such emissions observed that requires further evaluation (i.e Section II (G)(6) Unwanted Emission Measurement of 789033 D02 General UNII Test Procedures New Rules v01).
- If an Average measurement is required, trace stabilization was adjusted by the Duty Cycle Correction Factor.
- The field strength limit of 15.209 is first converted to dBm (EIRP) using the formula under Section G(2)(d)(III) of 789033 D02 General UNII Test Procedures New Rules v01. Prescans were performed against this limit. If Peak complies with the limit, no Average evaluation will be performed.
- There were no unwanted emissions observed that falls in the Restricted Bands.
- Any emissions that is not in the restricted band will be evaluated to -27dBm/MHz (U-NII 1) and -17dBm/MHz (U-NII 3) limit.
- Radiated 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 2.7.9 for sample computation.

2.6.9 Sample Computation (Radiated Emission)

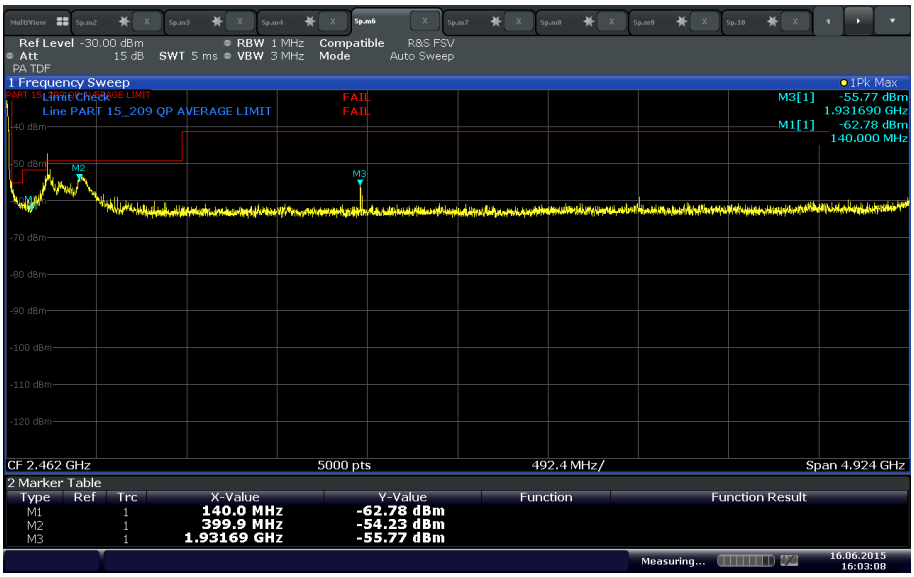
Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.6.10 Test Results

See attached plots.

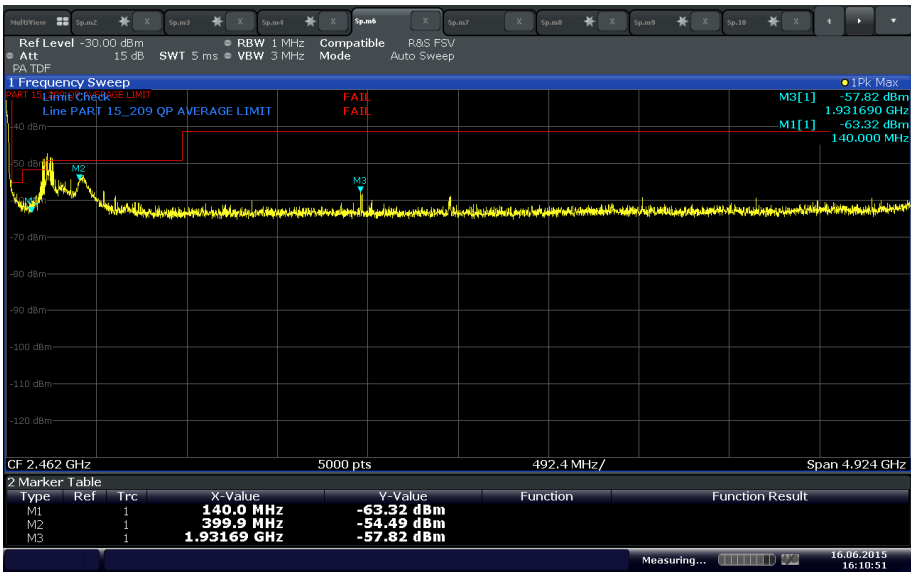
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.6.11 Test Plots



Date: 16.JUN.2015 16:03:09

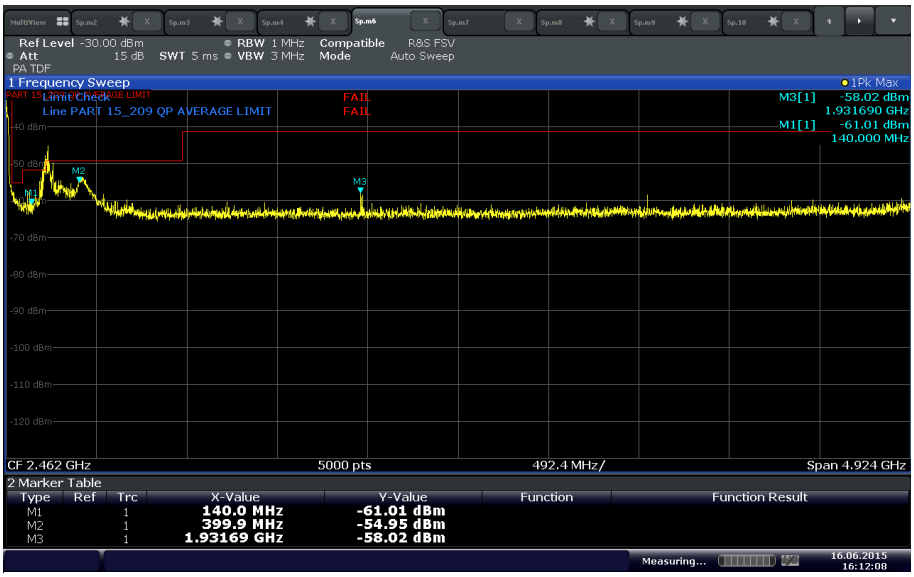
802.11 n U-NII 1 Ch 36 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



Date: 16.JUN.2015 16:10:52

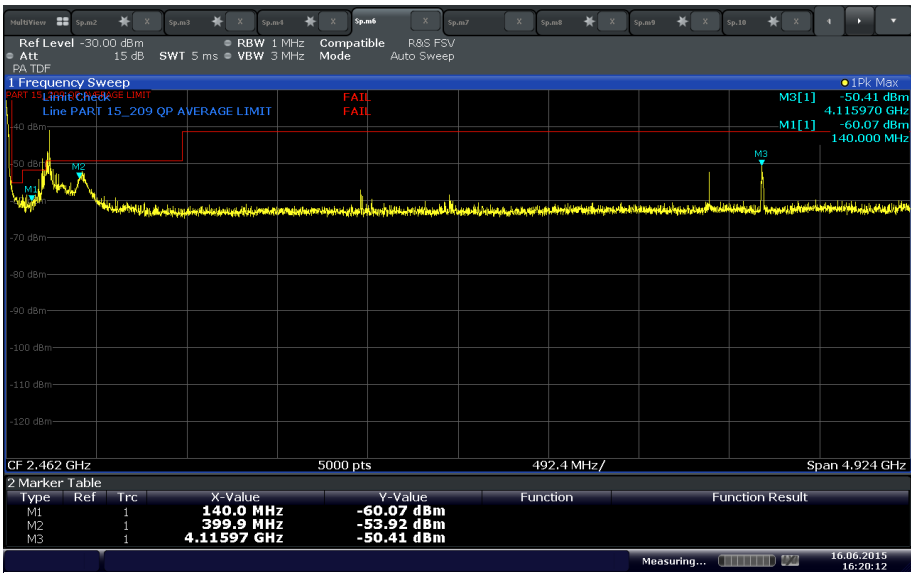
802.11 n U-NII 1 Ch 40 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)

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



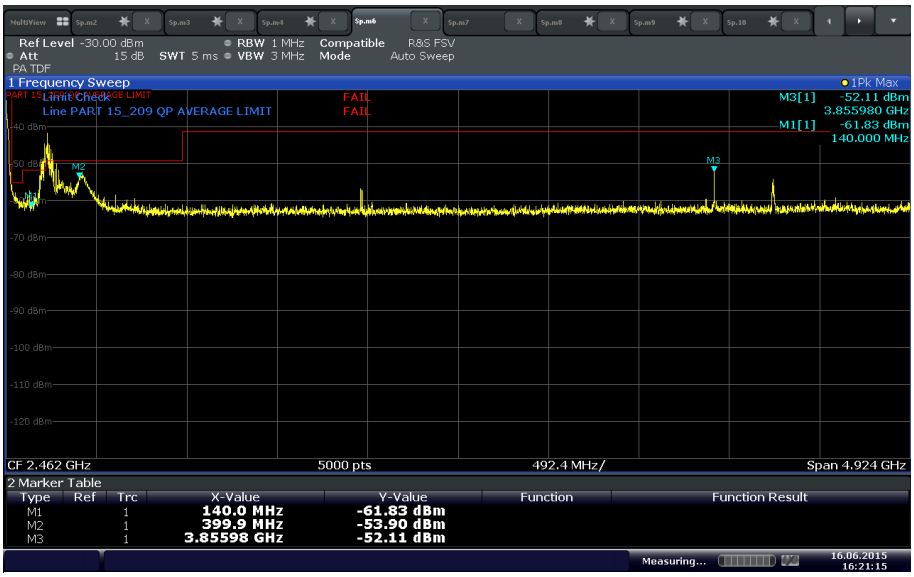
Date:16.JUN.2015 16:12:09

802.11 n U-NII 1 Ch 48 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



Date:16.JUN.2015 16:20:12

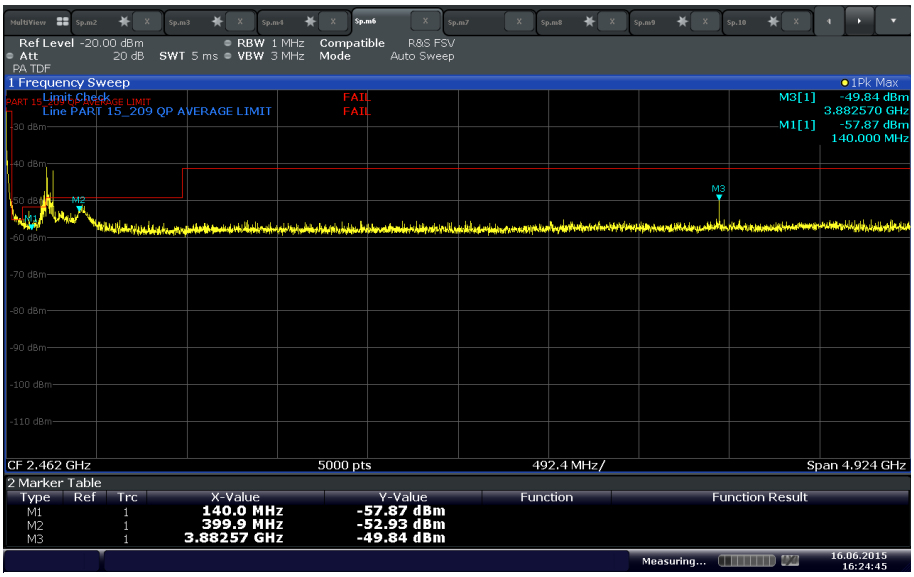
802.11 n U-NII 3 Ch 149 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



Date:16.JUN.2015 16:21:16

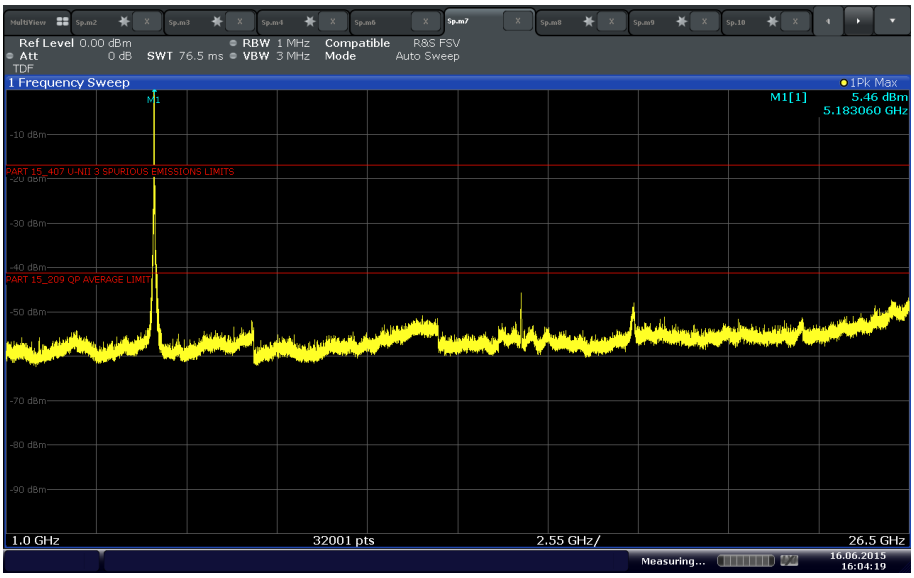
802.11 n U-NII 3 Ch 157 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)

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



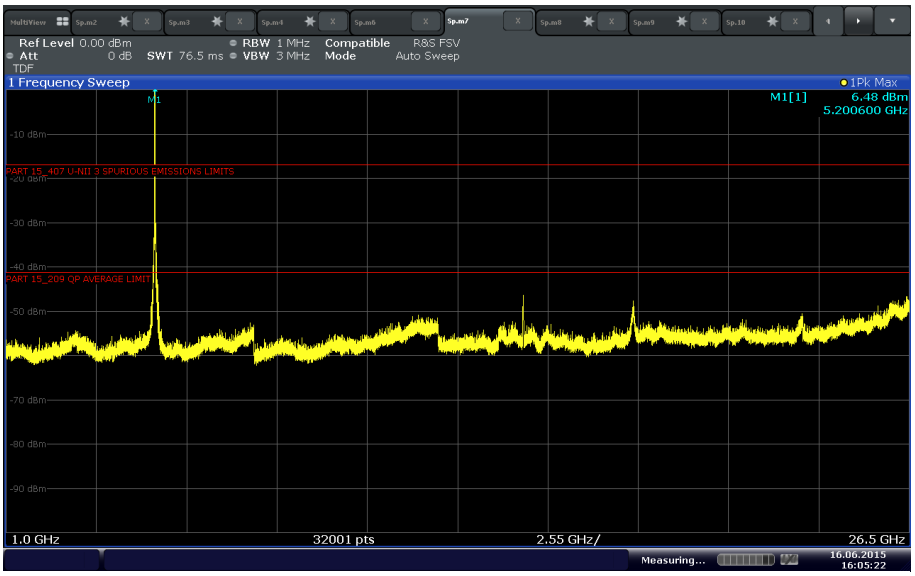
Date:16.JUN.2015 16:24:45

802.11 n U-NII 3 Ch 165 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



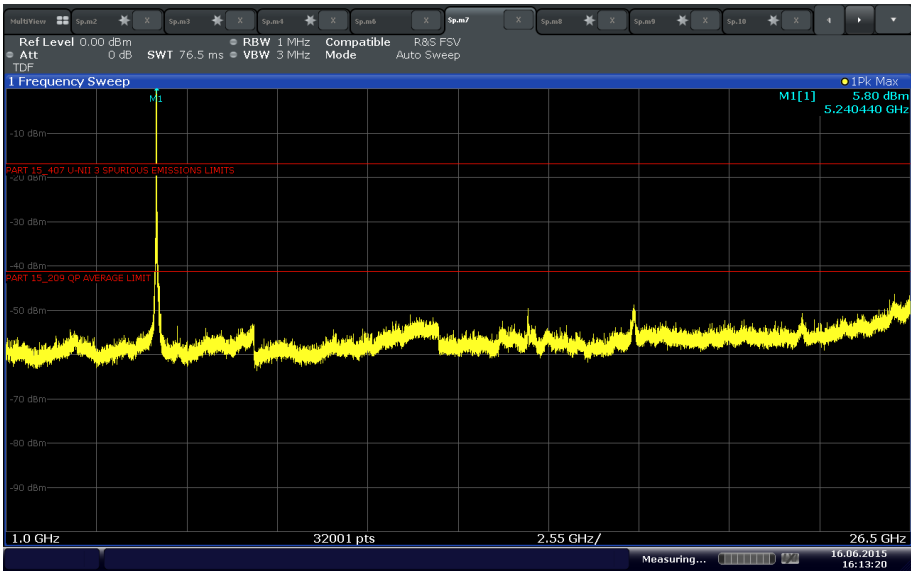
Date:16.JUN.2015 16:04:19

802.11 n U-NII 1 Ch 36 above 1GHz 20 MHz BW



Date:16.JUN.2015 16:05:22

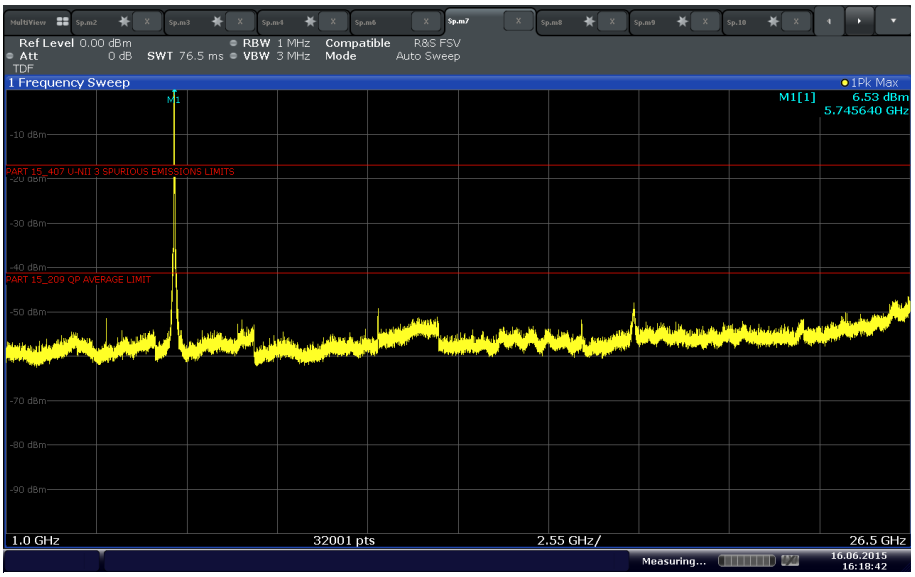
802.11 n U-NII 1 Ch 40 above 1GHz 20 MHz BW



Date:16.JUN.2015 16:13:20

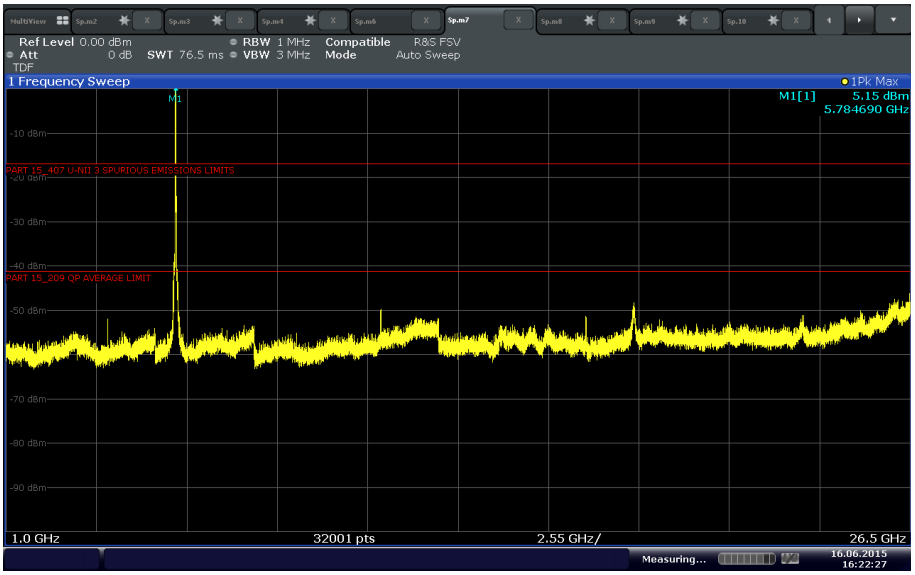
802.11 n U-NII 1 Ch 48 above 1GHz 20 MHz BW

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



Date:16.JUN.2015 16:18:42

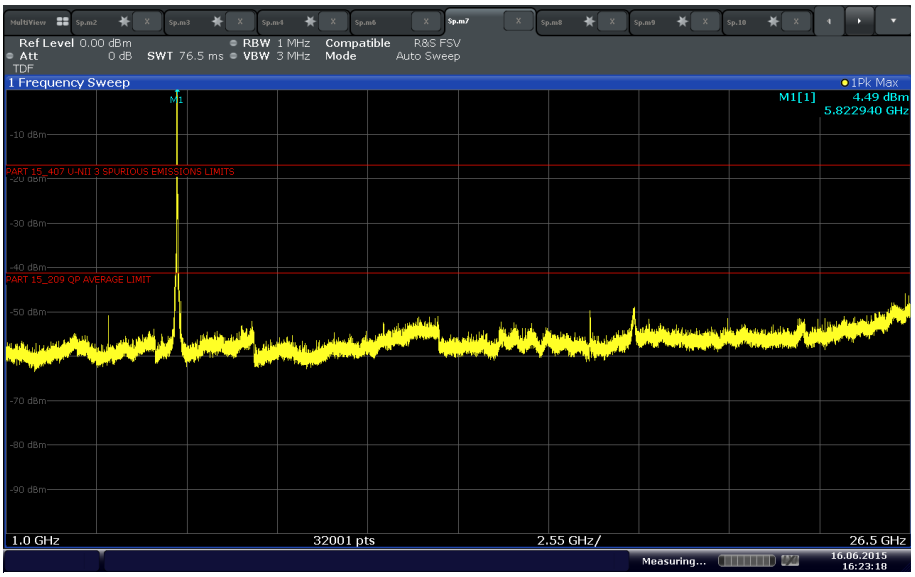
802.11 n U-NII 3 Ch 149 above 1GHz 20 MHz BW



Date:16.JUN.2015 16:22:27

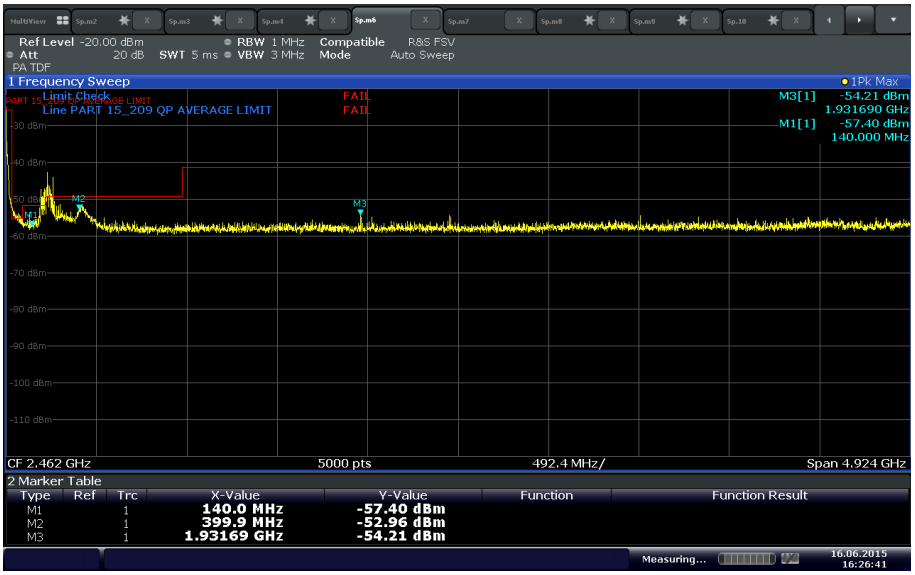
802.11 n U-NII 3 Ch 157 above 1GHz 20 MHz BW

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



Date:16.JUN.2015 16:23:18

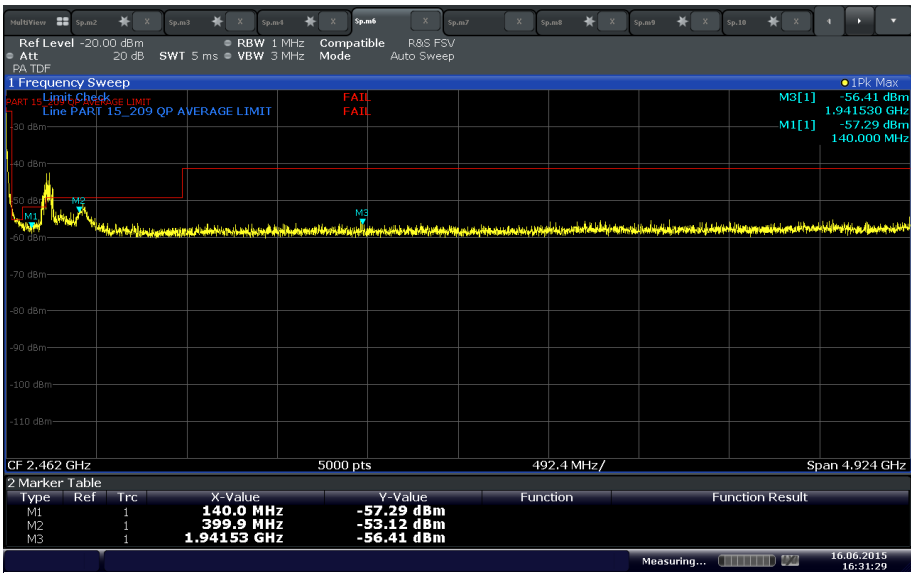
802.11 n U-NII 3 Ch 165 above 1GHz 20 MHz BW



Date:16.JUN.2015 16:26:41

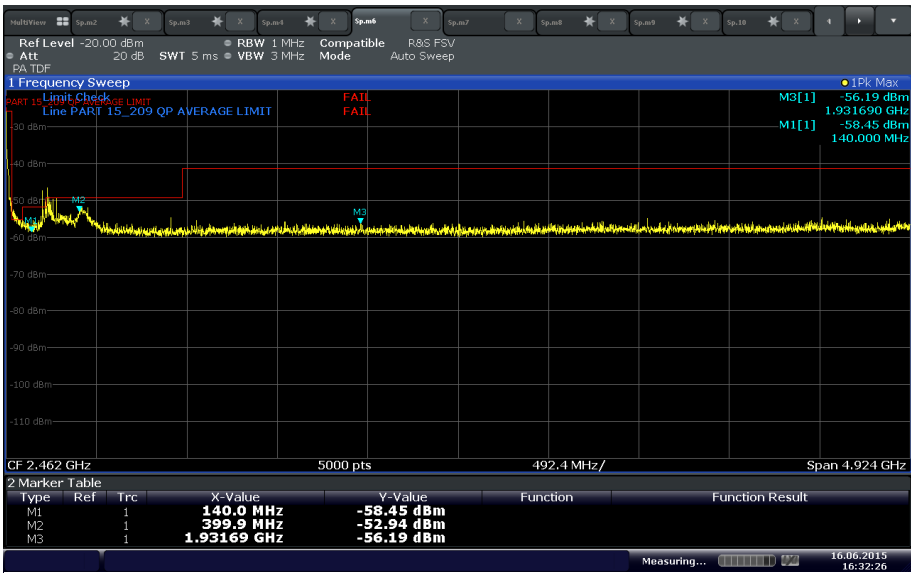
802.11 a U-NII 1 Ch 36 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)

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



Date:16.JUN.2015 16:31:29

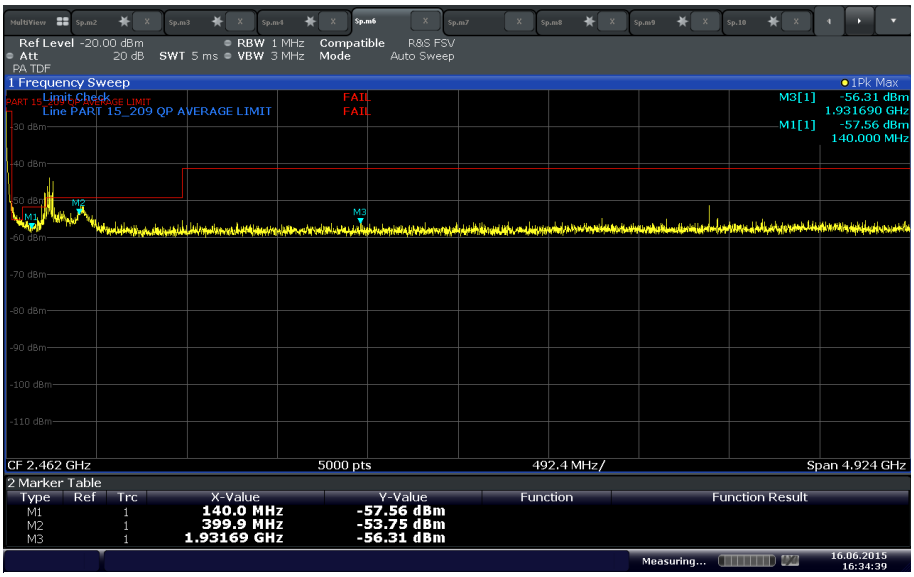
802.11 a U-NII 1 Ch 40 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



Date:16.JUN.2015 16:32:27

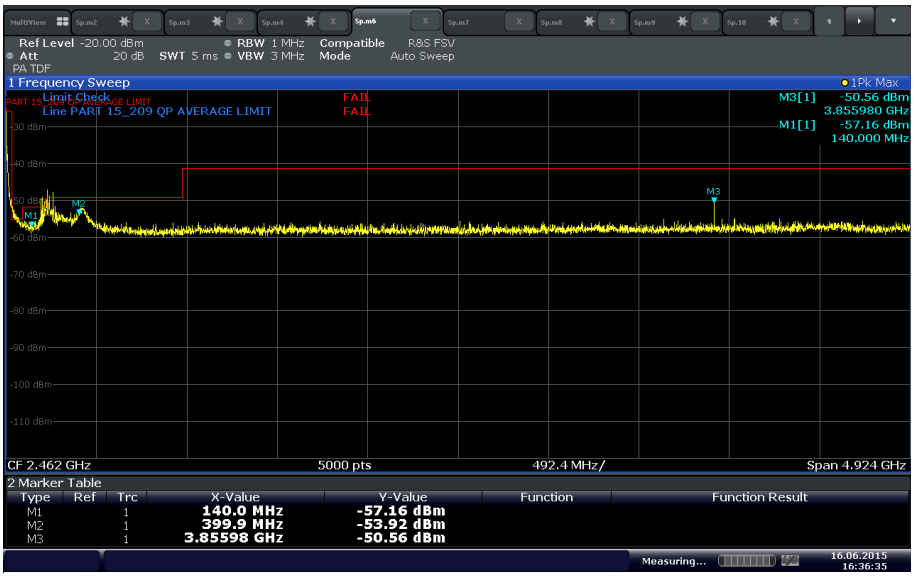
802.11 a U-NII 1 Ch 48 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)

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



Date:16.JUN.2015 16:34:40

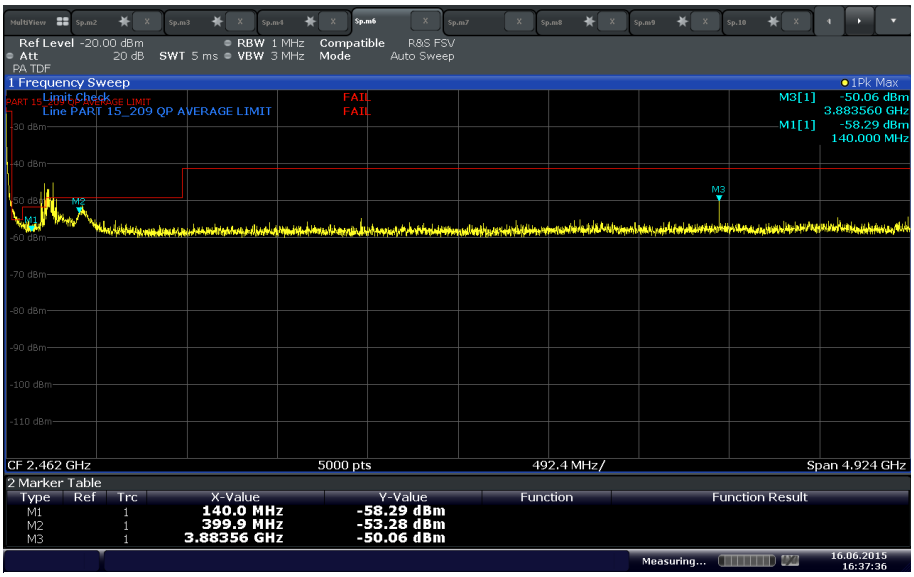
802.11 a U-NII 3 Ch 149 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



Date:16.JUN.2015 16:36:35

802.11 a U-NII 3 Ch 157 below 1GHz 20 MHz BW
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)

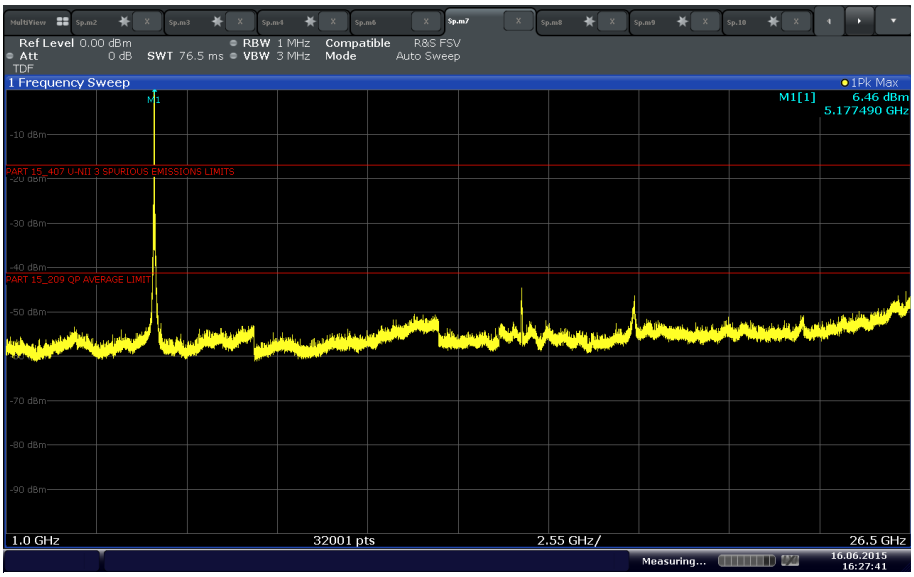
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364



Date:16.JUN.2015 16:37:35

802.11 a U-NII 3 Ch 165 below 1GHz 20 MHz BW

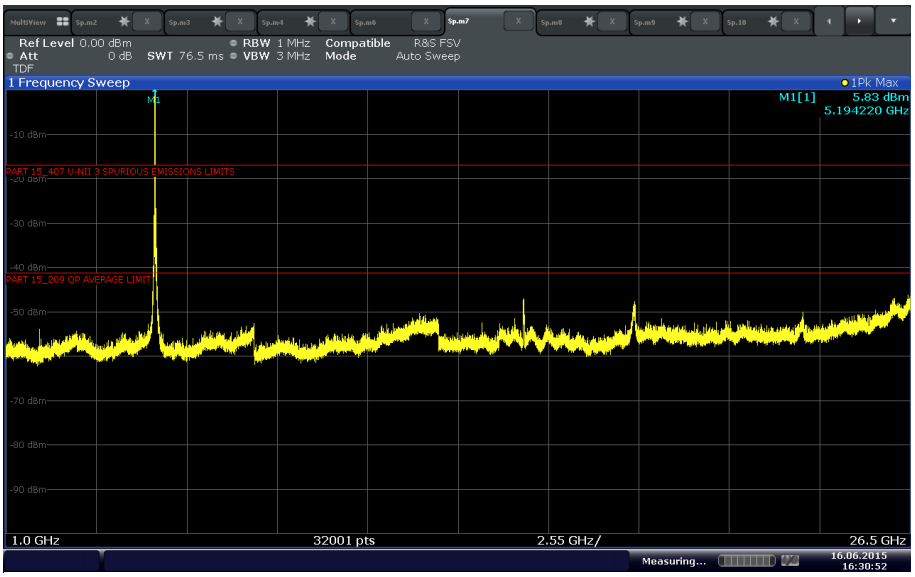
(Note: The spurious Emission is between 140MHz – 399.9MHz which is not the restricted band in 15.205)



Date:16.JUN.2015 16:27:42

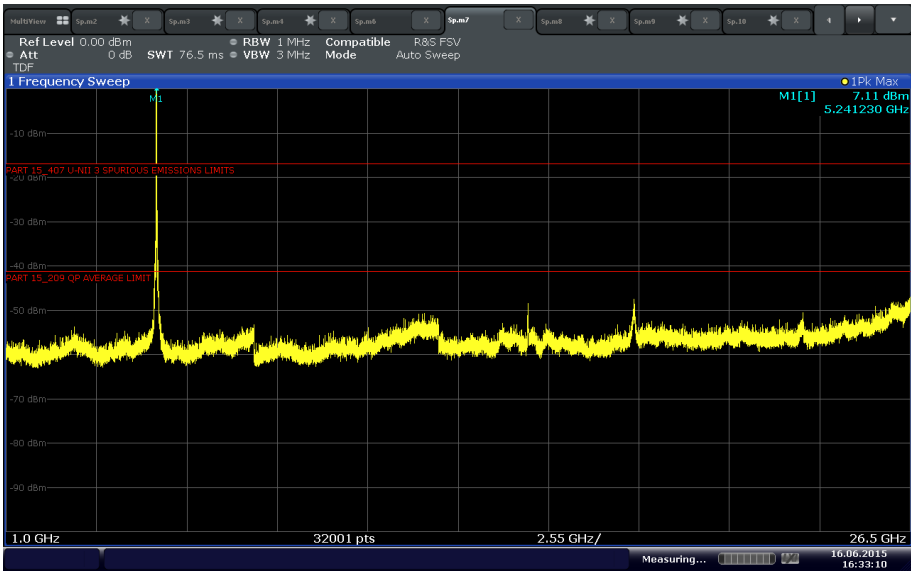
802.11 a U-NII 1 Ch 36 above 1GHz 20 MHz BW

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



Date:16.JUN.2015 16:30:52

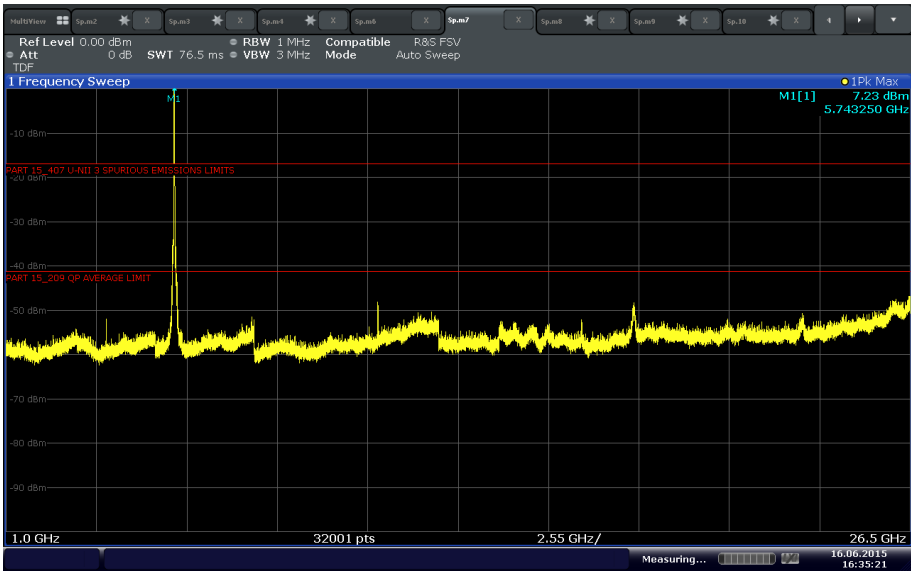
802.11 a U-NII 1 Ch 40 above 1GHz 20 MHz BW



Date:16.JUN.2015 16:33:10

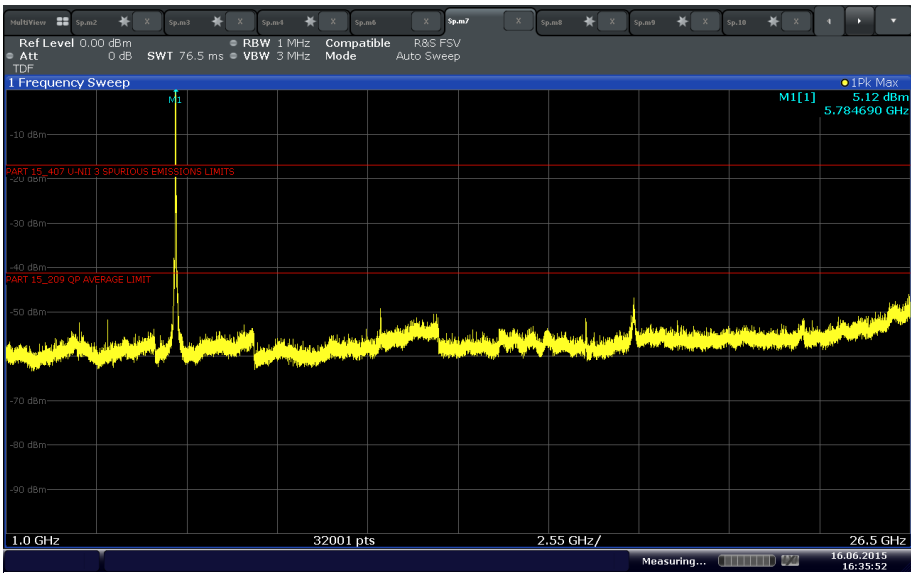
802.11 a U-NII 1 Ch 48 above 1GHz 20 MHz BW

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



Date:16.JUN.2015 16:35:20

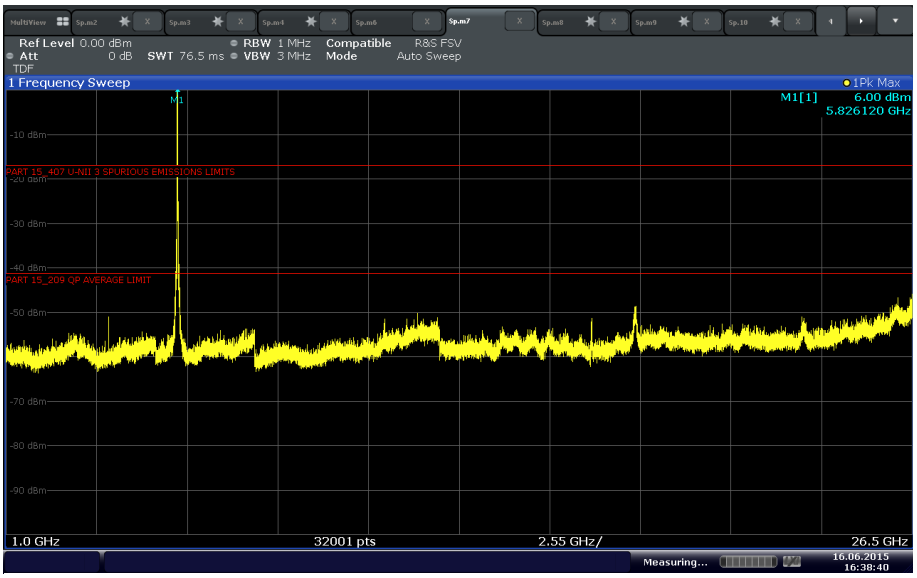
802.11 a U-NII 3 Ch 149 above 1GHz 20 MHz BW



Date:16.JUN.2015 16:35:52

802.11 a U-NII 3 Ch 157 above 1GHz 20 MHz BW

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

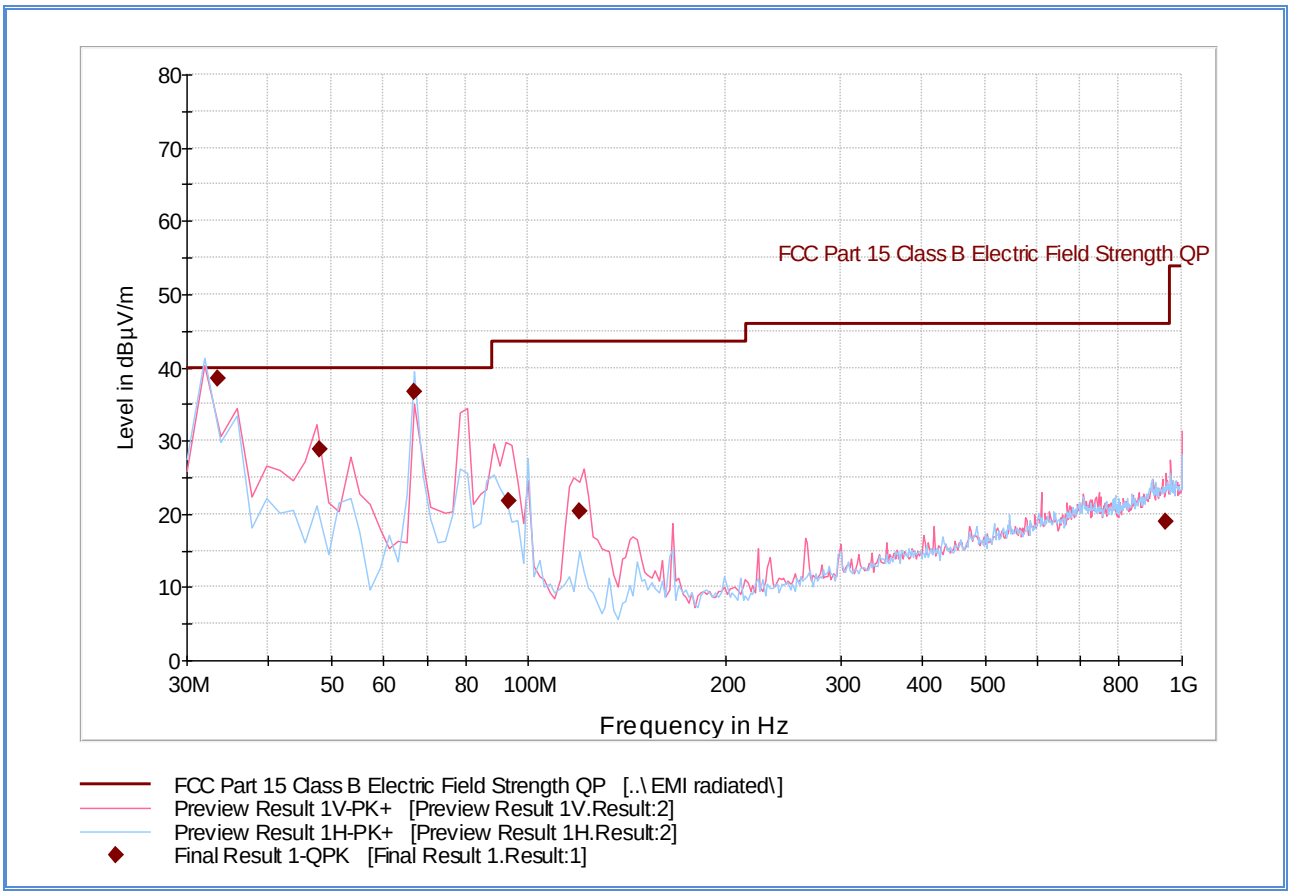


Date:16.JUN.2015 16:38:40

802.11 a U-NII 3 Ch 165 above 1GHz 20 MHz BW

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

2.6.12 Test Results Below 1GHz (Representative Cabinet Spurious Emissions)

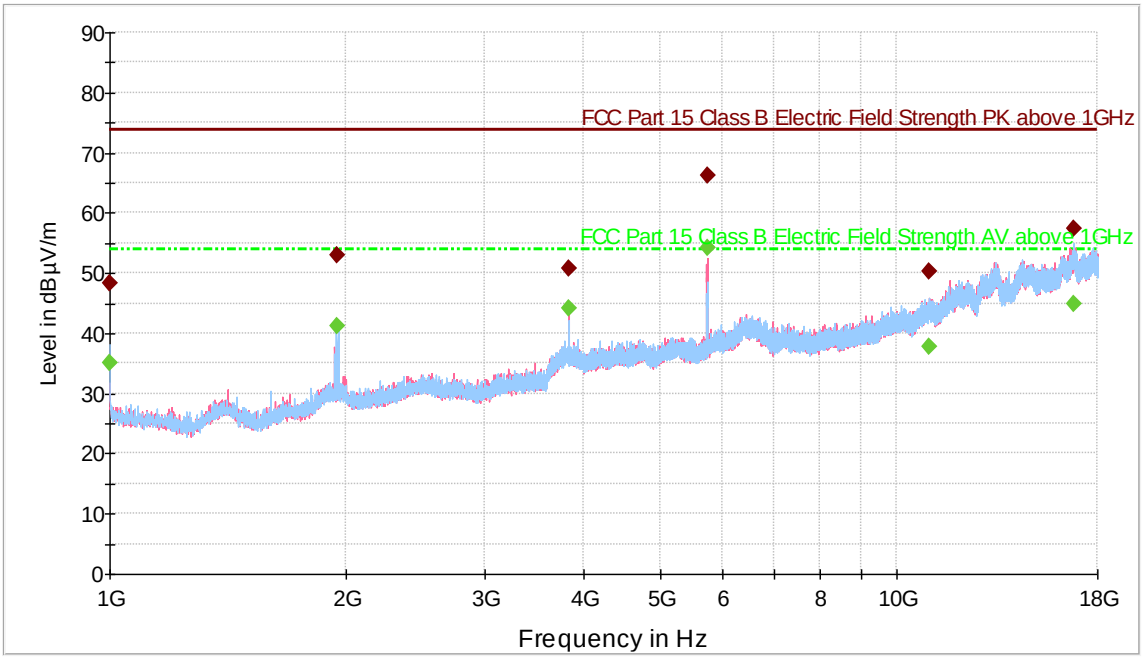


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.400000	38.6	1000.0	120.000	100.0	H	203.0	-13.3	1.4	40.0
48.014990	28.8	1000.0	120.000	100.0	V	131.0	-19.5	11.2	40.0
66.773868	36.6	1000.0	120.000	100.0	H	120.0	-22.3	3.4	40.0
93.364409	21.8	1000.0	120.000	100.0	V	18.0	-20.3	21.7	43.5
119.986613	20.3	1000.0	120.000	100.0	V	-12.0	-20.4	23.2	43.5
944.171142	19.0	1000.0	120.000	100.0	V	106.0	1.4	27.0	46.0

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

2.6.13 Test Results Above 1GHz (Representative Cabinet Spurious Emissions)



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	48.3	1000.0	1000.000	98.0	H	-3.0	-7.2	25.6	73.9
1941.066667	53.0	1000.0	1000.000	402.0	H	341.0	-2.3	20.9	73.9
3829.733333	50.8	1000.0	1000.000	98.0	V	285.0	4.9	23.1	73.9
5744.666667	66.1	1000.0	1000.000	277.0	V	298.0	8.2	7.8	73.9
10982.76666	50.2	1000.0	1000.000	406.9	V	159.0	14.9	23.7	73.9
16765.36666	57.4	1000.0	1000.000	200.0	H	332.0	23.6	16.5	73.9

Average Data (direct measurement using a Receiver)

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	35.1	1000.0	1000.000	98.0	H	-3.0	-7.2	18.8	53.9
1941.066667	41.1	1000.0	1000.000	402.0	H	341.0	-2.3	12.8	53.9
3829.733333	44.3	1000.0	1000.000	98.0	V	285.0	4.9	9.6	53.9
5744.666667	54.3	1000.0	1000.000	277.0	V	298.0	8.2	-0.4	53.9
10982.76666	37.7	1000.0	1000.000	406.9	V	159.0	14.9	16.2	53.9
16765.36666	44.8	1000.0	1000.000	200.0	H	332.0	23.6	9.1	53.9

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

Average Data with Duty Cycle Correction Factor

This section of the procedure was not performed. There was no significant spurious emission observed other than the fundamental.

Frequency (MHz)	Average (dBµV/m)	Duty Cycle Correction Factor (dB)	Calculated Average (dBµV/m)	Margin (dB)	Limit (dBµV/m)
-	-	-	-	-	53.9

Test Notes: Measurement was performed with a 5.0GHz notch filter. No significant emissions observed above 18GHz. Only the worst case configuration presented.

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

2.7 BAND-EDGE MEASUREMENTS

2.7.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.407(b)(1),(4) and (7)
FCC 47 CFR Part 15, Clause 15.209
RSS-247, Clause 6.2.4(2)

2.7.2 Standard Applicable

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

2.7.3 Test Methodology

Section II (G)(3)(d)(ii) Band Edge Measurement of 789033 D02 General UNII Test Procedures New Rules v01

2.7.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A and B

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

June 16, 2015/XYZ

2.7.6 Test Equipment Used

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

2.7.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	22.4°C
Relative Humidity	51.8%
ATM Pressure	98.7 kPa

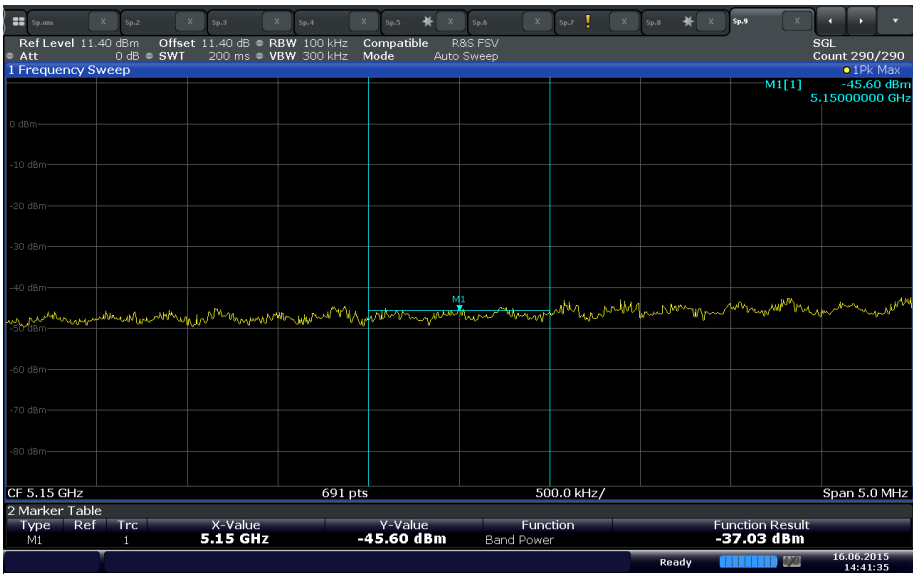
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.7.8 Additional Observations

- This is a conducted test using Integration Method as per Section II (G)(3)(d)(ii) Band Edge Measurement of 789033 D02 General UNII Test Procedures New Rules v01.
- RBW=100 kHz
- VBW=300 kHz
- Sweep time=Auto
- Detector is Peak for Peak measurements and RMS for Average measurements.
- Trace Mode=max hold (Peak); trace averaging (Average)
- If an Average measurement is required, trace stabilization was adjusted by the Duty Cycle Correction Factor.
- Sweep time is set to auto.
- The cable loss was measured and entered as the offset
- For Average measurements, the corresponding duty cycle correction factor will be added to the calculation.
- Integration performed across 1MHz bandwidth.
- Only the worst case bandwidth and data rate presented.
-

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

2.7.9 Test Results



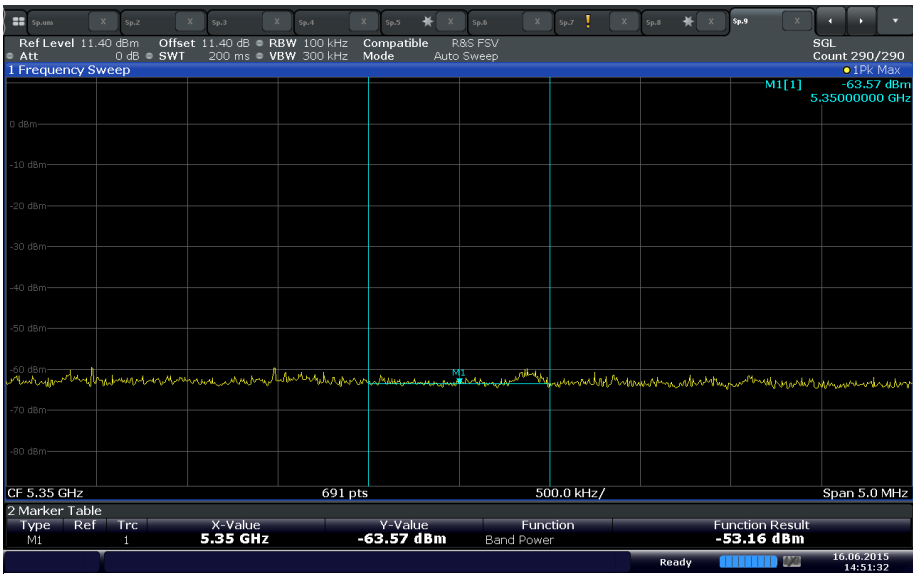
Date: 16.JUN.2015 14:41:35

802.11n U-NII 1 Low Channel (Ch 36) Band Edge (Peak Measurement) @ 5150 MHz

Lower band edge calculation:

- 5150 MHz (in the restricted band)
- Use the following formula as per Section Section G(2)(III) of 789033 D02 General UNII Test Procedures New Rules v01:

E(dBµV/m) = EIRP (dBm) + 95.2
= (-37.03 dBm + 4.9 dBi antenna gain) + 95.2
= 63.07 dBµV/m @ 3 meters (Complies with 74 dBµV/m limit)

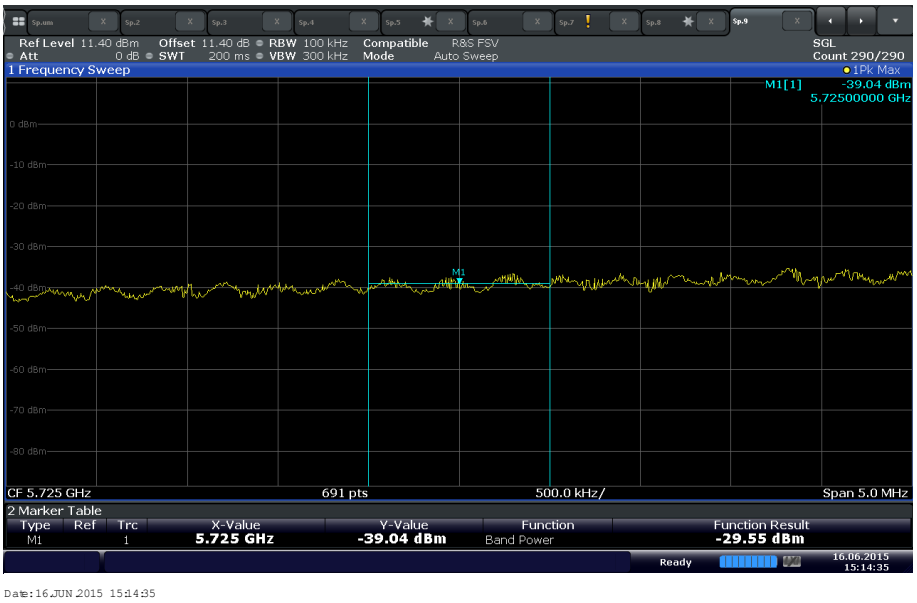


802.11n U-NII 1 High Channel (Ch 48) Band Edge (Peak Measurement) @ 5350 MHz

Upper band edge calculation (5350 MHz):

- 5350 MHz (in the restricted band)
- Use the following formula as per Section Section G(2)(III) of 789033 D02 General UNII Test Procedures New Rules v01:

E(dBµV/m) = EIRP (dBm) + 95.2
= (-53.16 dBm + 4.9 dBi antenna gain) + 95.2
= 46.94 dBµV/m @ 3 meters (Complies with 74 dBµV/m limit)



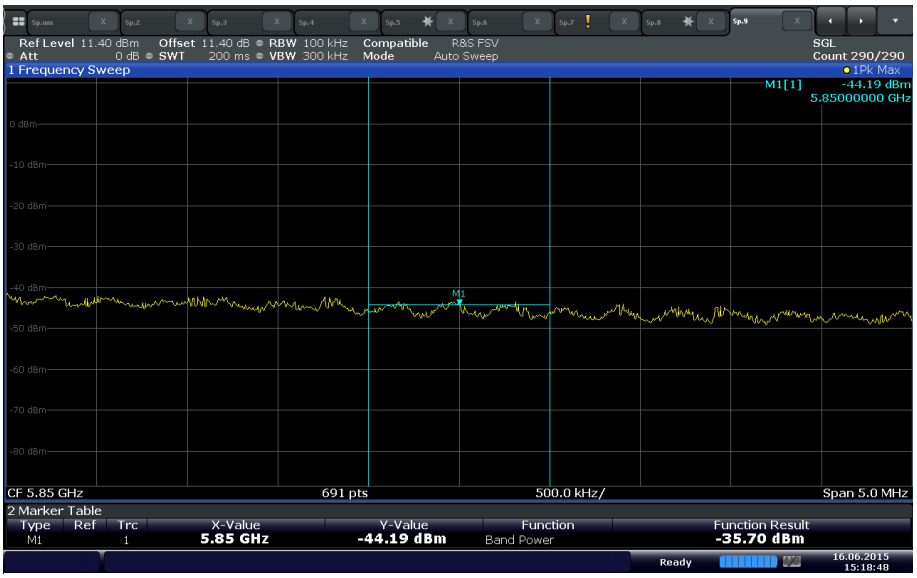
802.11n U-NII 3 Low Channel (Ch 149) Band Edge (Peak Measurement) @ 5725 MHz

Lower band edge calculation:

- 5725 MHz (not in the restricted bands)
- Limit is -17dBm EIRP
- Calculation @ 5725 MHz:

Integrated average measurement @ 5725 MHz	= -29.55 dBm
EIRP @ 5725 MHz	= -29.55 + 4.9 dBi (antenna gain)
	= -24.65 dBm
Margin of compliance	= -7.65dB

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



Date:16.JUN.2015 15:18:48

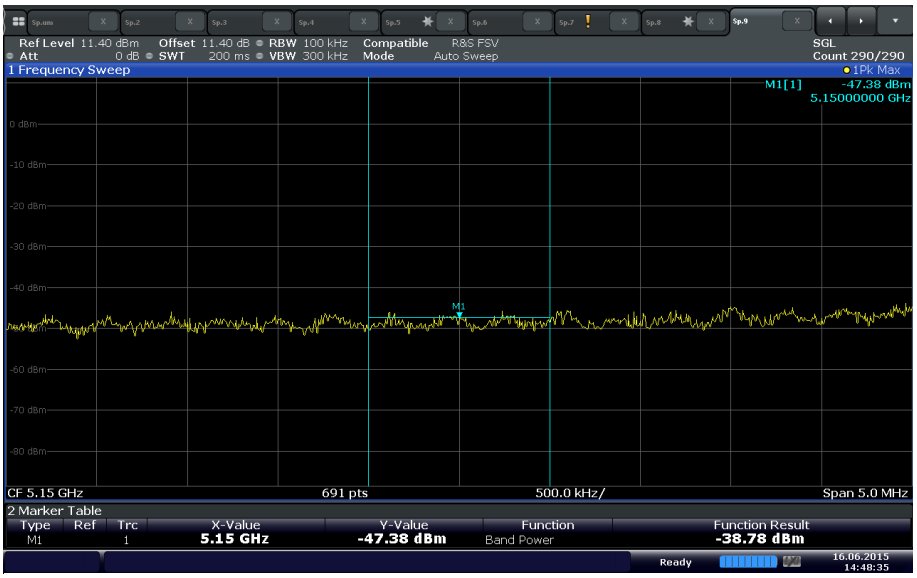
802.11n U-NII 3 High Channel (Ch 165) Band Edge (Peak Measurement) @ 5850 MHz

Lower band edge calculation:

- 5850 MHz (not in the restricted bands)
- Limit is -17dBm EIRP
- Calculation @ 5850 MHz:

Integrated average measurement @ 5850 MHz	= -35.70 dBm
EIRP @ 5850 MHz	= -35.70 + 4.9 dBi (antenna gain)
	= -30.80 dBm
Margin of compliance	= -13.80 dB

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



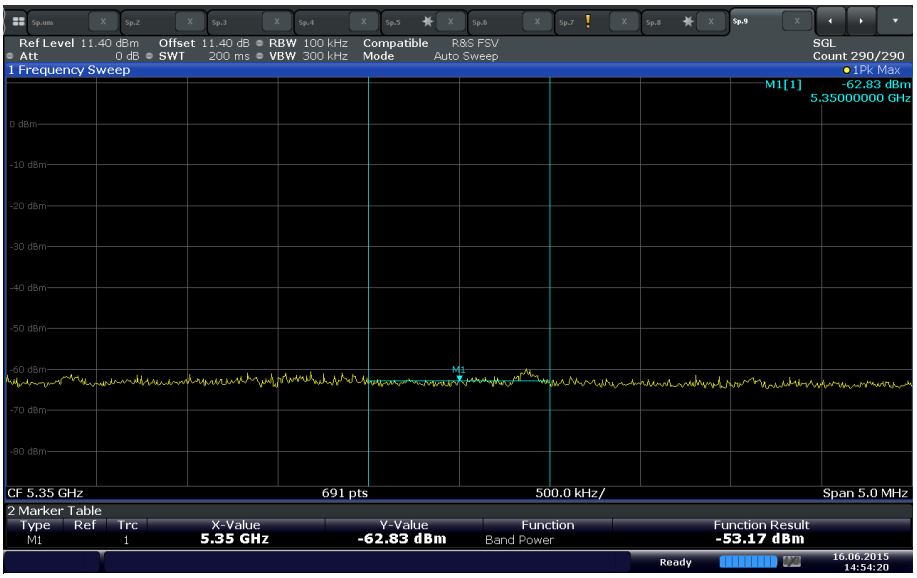
Date:16.JUN.2015 14:48:35

802.11a U-NII 1 Low Channel (Ch 36) Band Edge (Peak Measurement) @ 5150 MHz

Lower band edge calculation:

- 5150 MHz (in the restricted band)
- Use the following formula as per Section Section G(2)(III) of 789033 D02 General UNII Test Procedures New Rules v01:

E(dBµV/m) = EIRP (dBm) + 95.2
= (-38.78 dBm + 4.9 dBi antenna gain) + 95.2
= 61.32 dBµV/m @ 3 meters (Complies with 74 dBµV/m limit)



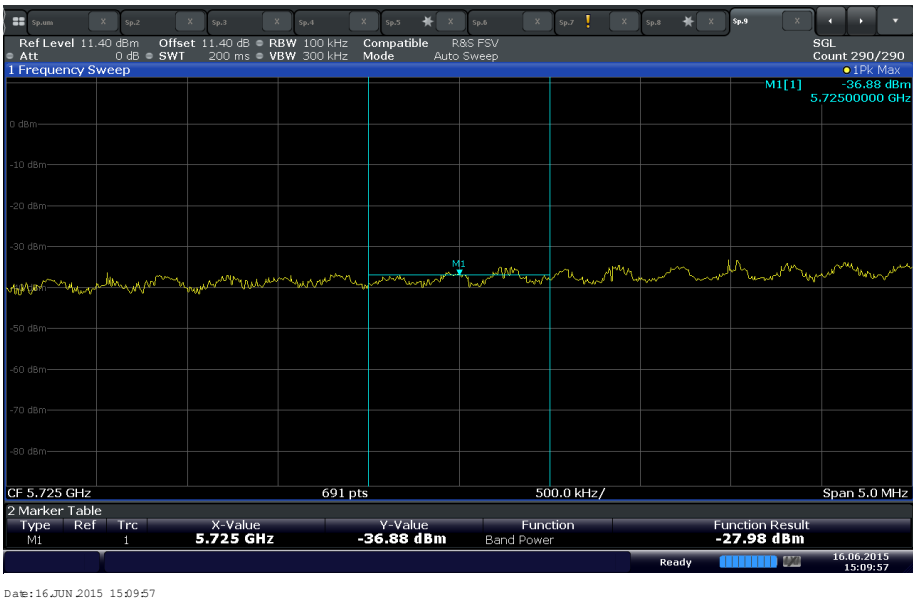
Date: 16.JUN.2015 14:54:20

802.11a U-NII 1 High Channel (Ch 48) Band Edge (Peak Measurement) @ 5350 MHz

Upper band edge calculation (5350 MHz):

- 5350 MHz (in the restricted band)
- Use the following formula as per Section Section G(2)(III) of 789033 D02 General UNII Test Procedures New Rules v01:

E(dBµV/m) = EIRP (dBm) + 95.2
= (-53.17 dBm + 4.9 dBi antenna gain) + 95.2
= 46.95 dBµV/m @ 3 meters (Complies with 74 dBµV/m limit)



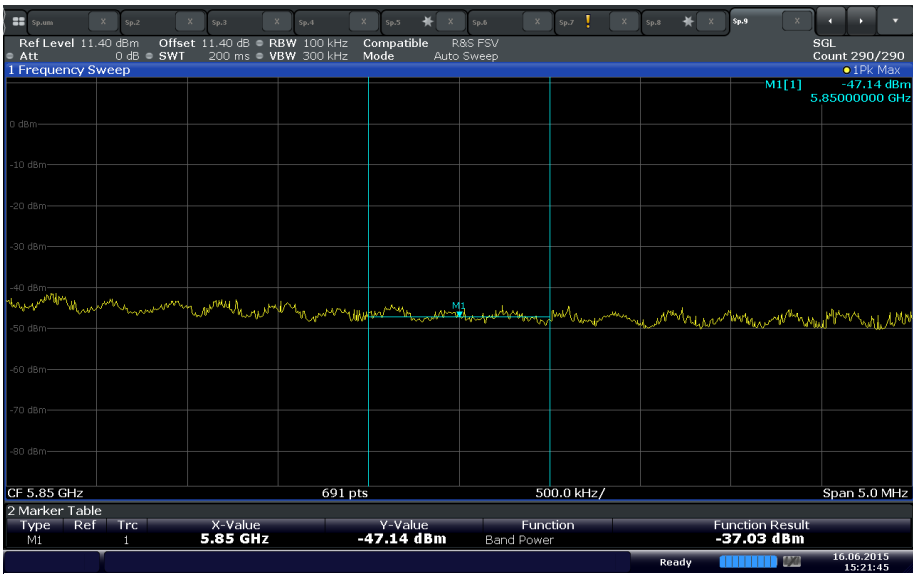
802.11a U-NII 3 Low Channel (Ch 149) Band Edge (Peak Measurement) @ 5725 MHz

Lower band edge calculation:

- 5725 MHz (not in the restricted bands)
- Limit is -17dBm EIRP
- Calculation @ 5725 MHz:

Integrated average measurement @ 5725 MHz	= -27.98 dBm
EIRP @ 5725 MHz	= -27.98 + 4.9 dBi (antenna gain)
	= -23.08 dBm
Margin of compliance	= -6.08dB

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



Date:16.JUN.2015 15:21:45

802.11a U-NII 3 High Channel (Ch 165) Band Edge (Peak Measurement) @ 5850 MHz

Lower band edge calculation:

- 5850 MHz (not in the restricted bands)
- Limit is -17dBm EIRP
- Calculation @ 5850 MHz:

Integrated average measurement @ 5850 MHz	= -37.03 dBm
EIRP @ 5850 MHz	= -37.03 + 4.9 dBi (antenna gain)
	= -32.13 dBm
Margin of compliance	= -15.13 dB

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

2.8 FREQUENCY STABILITY

2.8.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.407(g)
RSS-Gen, Clause 6.11

2.8.2 Standard Applicable

(g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

With the transmitter installed in an environmental test chamber, the unmodulated carrier frequency shall be measured under the conditions specified below. A sufficient stabilization period at each temperature shall be used prior to each frequency measurement. The following temperatures and supply voltage ranges apply, unless specified otherwise in the applicable RSS:

(a) at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer's rated supply voltage; and
(b) at the temperature of +20°C (+68°F) and at ±15% of the manufacturer's rated supply voltage.

If the frequency stability limits are only met within a temperature range that is smaller than the -30°C to +50°C range specified in (a), the frequency stability requirement will be deemed to be met if the transmitter is automatically prevented from operating outside this smaller temperature range and if the published operating characteristics for the equipment are revised to reflect this restricted temperature range.
In addition, if an unmodulated carrier is not available, the measurement method shall be described in the test report..

2.8.3 Test Methodology

FCC 47 CFR Part 2, Clause 2.1055

2.8.4 Equipment Under Test and Modification State

Serial No: WTDB20150500001 / Test Configuration A

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

June 18, 2015/XYZ

2.8.6 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

2.8.7 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.7°C
Relative Humidity	45.6%
ATM Pressure	99.4 kPa

2.8.8 Additional Observations

- This is a conducted test.
- EUT uses smart battery. Extreme voltage test not performed. Test performed on freshly charged battery.
- Unmodulated carrier is not available at the time of verification; frequency stability was verified by monitoring the 26 dB edge closer to the band edge, ensuring it stays within the band.
- Only worst case configuration presented.
- High channel with worst case data rate next to U-NII 2A band was used for U-NII 1 band.
- Low channel with worst case data rate next to UNII 2C band was used for U-NII 3 band.

2.8.9 Test Results Summary

5150-5250 MHz band (U-NII 1)				
Voltage (%)	***Power (VDC)***	***Temp (°C)***	***Frequency Deviation (Hz)***	***Complies (Y or N)***
100	3.7	-30	-145	Yes. EUT complies.
100		-20	-109	Yes. EUT complies.
100		-10	36	Yes. EUT complies.
100		0	-73	Yes. EUT complies.
100		+10	-36	Yes. EUT complies.
100		+20	-36	Yes. EUT complies.
100		+30	-72	Yes. EUT complies.
100		+40	36	Yes. EUT complies.
100		+50	36	Yes. EUT complies.
85	3.15	+20	-	-
115	4.26	+20	-	-

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

5725-5850 MHz band (U-NII 3)				
Voltage (%)	***Power (VDC)***	***Temp (°C)***	***Frequency Deviation (Hz)***	***Complies (Y or N)***
100	3.7	-30	-217	Yes. EUT complies.
100		-20	-10	Yes. EUT complies.
100		-10	-108	Yes. EUT complies.
100		0	-181	Yes. EUT complies.
100		+10	72	Yes. EUT complies.
100		+20	37	Yes. EUT complies.
100		+30	-27	Yes. EUT complies.
100		+40	-217	Yes. EUT complies.
100		+50	36	Yes. EUT complies.
85	3.15	+20	-	-
115	4.26	+20	-	-

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

2.9 INDOOR OPERATION ONLY

2.9.1 Specification Reference

RSS-247, Clause 6.2.2(2)

2.9.2 Standard Applicable

The user manual for local area network devices shall contain instructions related to the restrictions mentioned in the above sections, namely that the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

2.9.3 Manufacturer Declaration

See attached page from the user manual with a statement indicating compliance with this requirement.

Notice to Users in the Canada

The Wireless Print Adapter does not exceed the Class B limits for radio-emissions.
CAN ICES-3 (B)/NMB-3(B)

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

As a License-Exempt Local Area Network(LE-LAN) device, there are operational restrictions:

(1) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(2) the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and

(3) the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

Be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

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 Test Setup						
6447	Directional Coupler	11691D	1212A02137	Hewlett-Packard	Verified by 7608 and 7582	
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	12/22/14	12/22/15
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
1003	Signal Generator	SMR 40	1104.0002.40	Rhode & Schwarz	04/29/15	04/29/16
-	10dB Attenuator	PE7010-10	3	PASTERNACK	Verified by 7604 and 1003	
7579	Temperature Chamber	115	151617	TestQuity	07/21/14	07/21/15
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/30/14	01/30/16
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	04/27/15	04/27/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	03/20/15	03/20/16
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 1003 and 7611	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 1003 and 7611	
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/29/14	08/29/15
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
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
	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

3.2.1 AC Conducted Measurements

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.80
				Coverage Factor (k):	2
				Expanded Uncertainty:	1.59

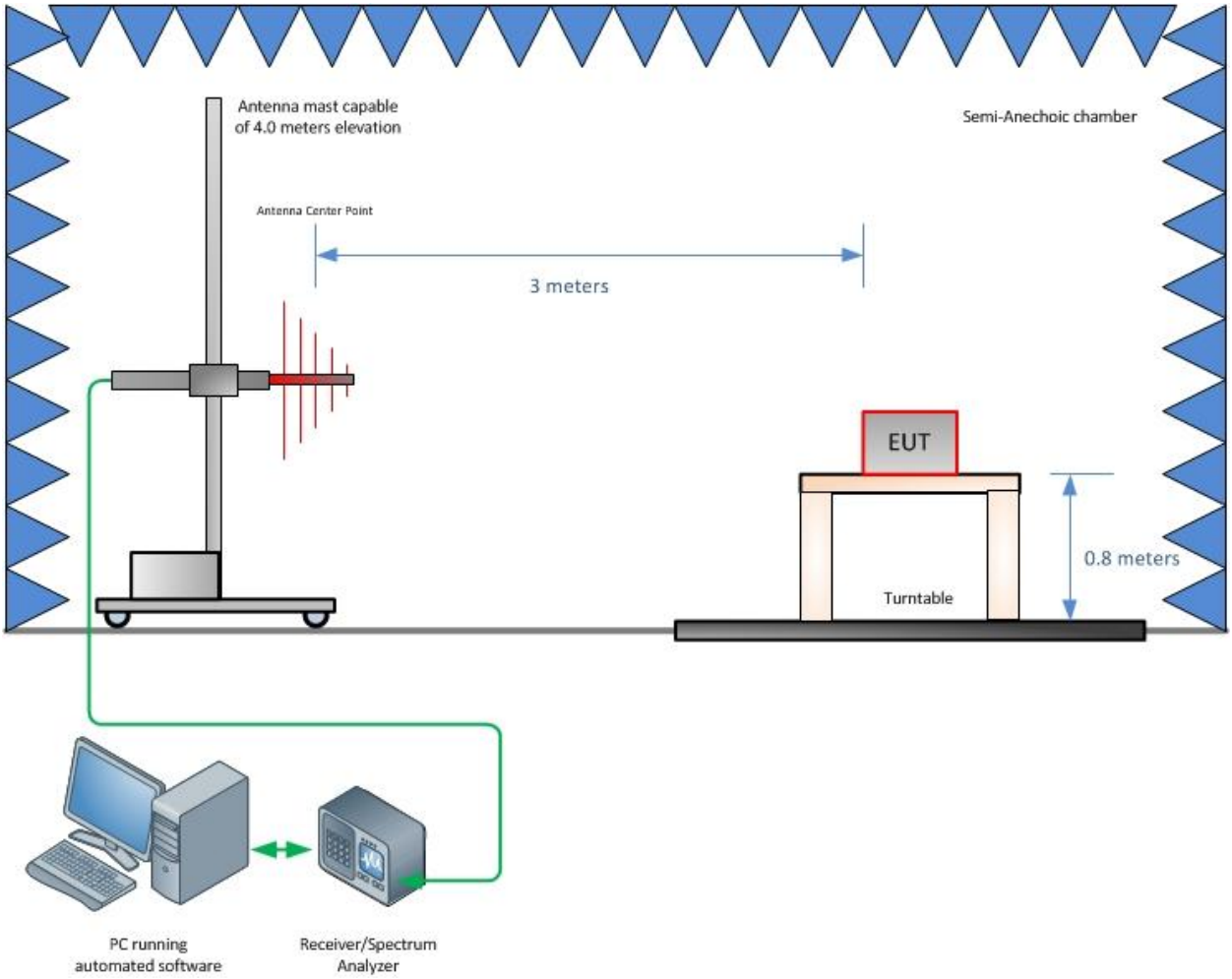
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

SECTION 4

DIAGRAM OF TEST SETUP

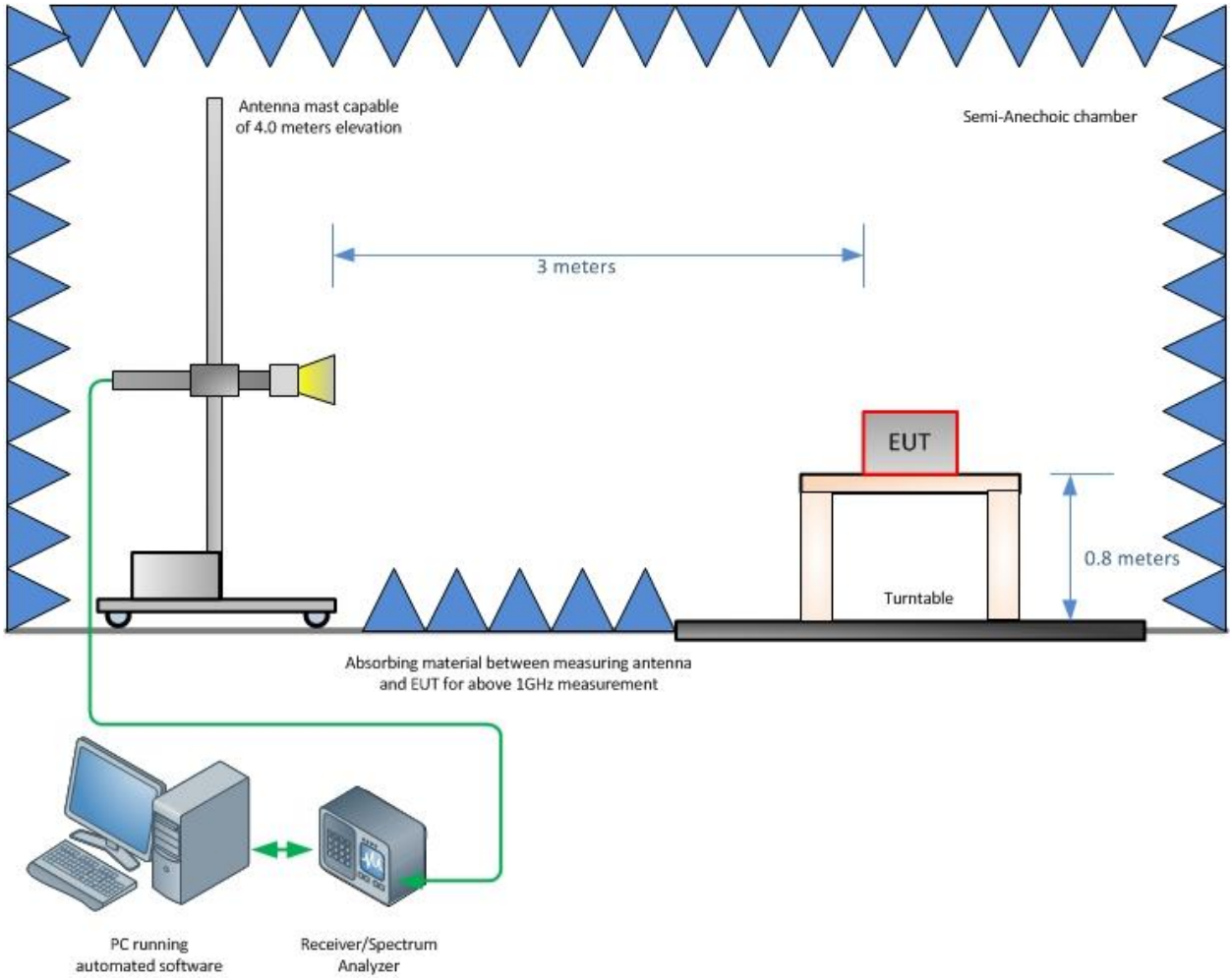
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

4.1 TEST SETUP DIAGRAM



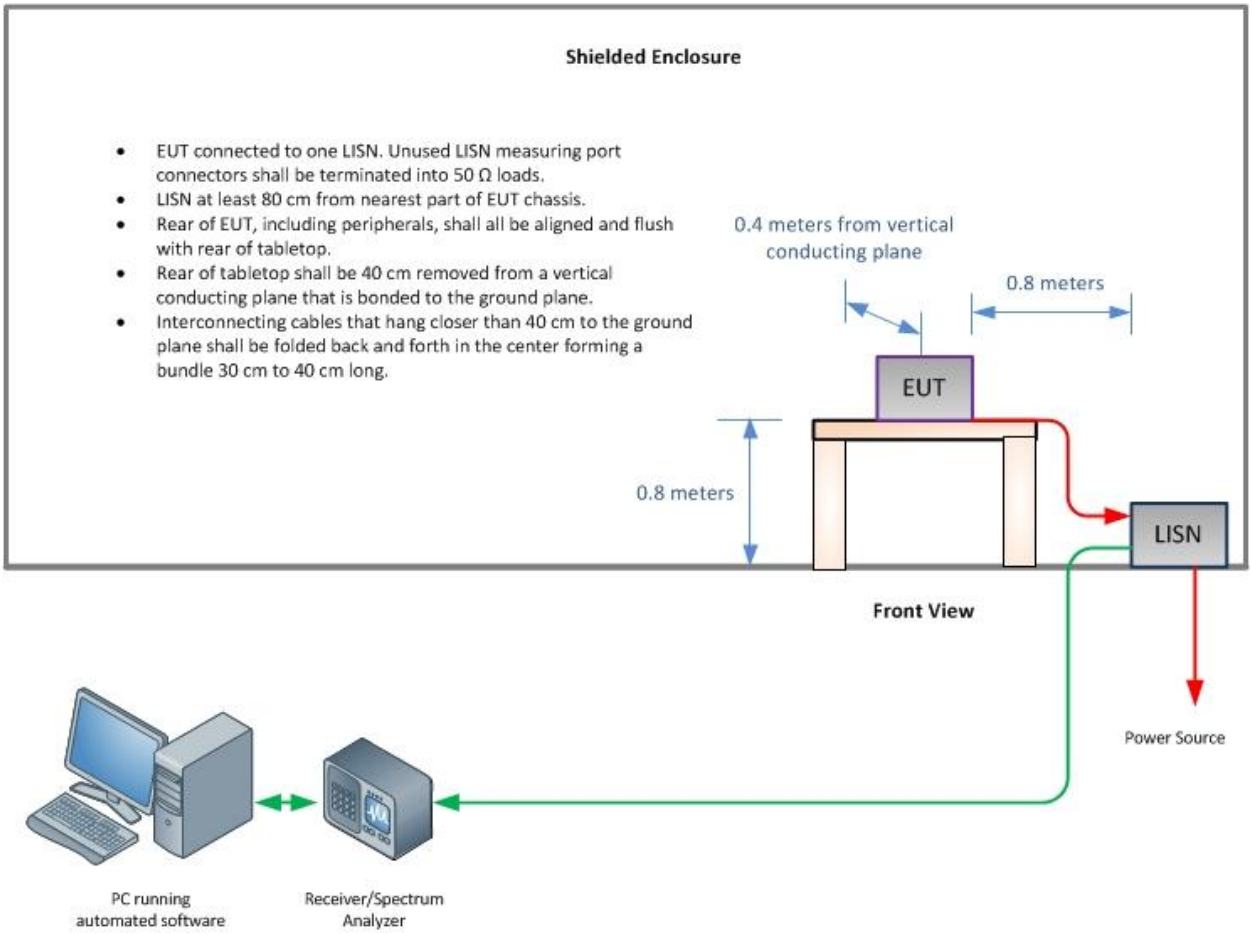
Radiated Emission Test Setup (Below 1GHz)

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



Conducted Emission Test Setup

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