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Report On

Application for Grant of Equipment Authorization of the
On-Ramp Wireless Inc.
Dual Latency System Access Point (AP) Configuration

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

Report No. SD72111752-1115 **January 2016**

REPORT ON	Radio Testing of the On-Ramp Wireless Inc. Access Point (AP) Configuration
TEST REPORT NUMBER	SD72111752-1115
PREPARED FOR	On-Ramp Wireless Inc. 10920 Via Frontera #200 San Diego, CA 92127 USA
CONTACT PERSON	Alain Charles Hardware Engineer (858) 592-6008 alain.charles@onrampwireless.com
PREPARED BY	Alex Chang **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Juan Manuel Gonzalez Name Authorized Signatory Title: Commercial/Wireless EMC Lab Manager
DATED	January 20, 2016

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

Revision History

SD72111752-1115 On-Ramp Wireless Inc. Dual Latency System Access Point (AP) Configuration					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
01/20/2016	Initial Release				Juan M. Gonzalez

CONTENTS

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SECTION 1

REPORT SUMMARY

Radio Testing of the
On-Ramp Wireless Inc.
Dual Latency System Access Point (AP) Configuration

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 On-Ramp Wireless Inc. Dual Latency System Access Point (AP) Configuration 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	On-Ramp Wireless Inc.
Model Number(s)	ULPAP310
FCC ID Number	XTE-ULPAP310
IC Number	8655A-ULPAP310
Serial Number(s)	N/A
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2015). • IC RSS-247 Issue 1 May 2015. Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices. • IC RSS-Gen Issue 4 November 2014 - General Requirements for Compliance of Radio Apparatus. • 558074 D01 DTS Meas Guidance v03r03, (June 09, 2015) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.
Start of Test	November 23, 2015
Finish of Test	January 11, 2016
Name of Engineer(s)	Alex Chang Ferdinand Custodio
Related Document(s)	None. 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	
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-Gen 8.9 and 8.10	Spurious Radiated Emissions	Compliant	
2.6		RSS-Gen 7.1	Receiver Spurious Emissions	Compliant	
2.7	§15.247(d)	RSS-Gen 8.9 and 8.10	Radiated Band Edge Measurements	Compliant	
2.8	§15.247(e)	RSS-247 5.2(2)	Power Spectral Density for Digitally Modulated Device	Compliant	

N/A Not applicable. EUT is a DC powered device.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a On-Ramp Wireless Inc. Dual Latency System Access Point (AP) Configuration. The EUT is an Access Point (AP) System that utilizes two identical Access Points combined/split through a diplexer to/from a single antenna. The system processes two independent information streams through the diplexer to the antenna. Each diplexer sub-band will allow three or four 1MHz channels. There are four possible sub-bands. The system is professionally installed. During the evaluation the worst case two sub-bands were chosen which the lower and upper bands for final evaluation. The Unequal Loss Protection (ULP) transmit function of the EUT was verified and evaluated in this test report

1.3.2 EUT General Description

EUT Description	Access Point (AP) Configuration
Model Name	Dual Latency System
Model Number(s)	ULPAP310
Rated Voltage	48VDC
Mode Verified	Unequal Loss Protection (ULP)
Capability	Unequal Loss Protection (ULP)
Primary Unit (EUT)	☐ Production
	☒ Pre-Production
	☐ Engineering
Antenna Type	2.4GHz Dipole Antenna
Antenna Gain	9 dBi (per customer declaration power reduction will be used along with this new (9 dBi). See Annex A at the end of this test report.

1.3.3 Maximum Conducted Output Power (Average)

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
Low Sub Band	2402 – 2406	29.98	995.41
High Sub Band	2471 – 2476	29.85	966.05

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Antenna conducted port test configuration. The EUT is configured in Tx mode with max power through the antenna port.
B	Radiated emissions test configuration. The EUT is configured in Tx mode with Low, Mid, or High channels in each sub-band for evaluation.

1.4.2 EUT Exercise Software

A software "On-Ramp Wireless EMC Certification Tool" version "0.4.3" was used to exercise the EUT that able to configure in different sub-band and channels. Each sub-band and channel is verified and evaluation in the test report.

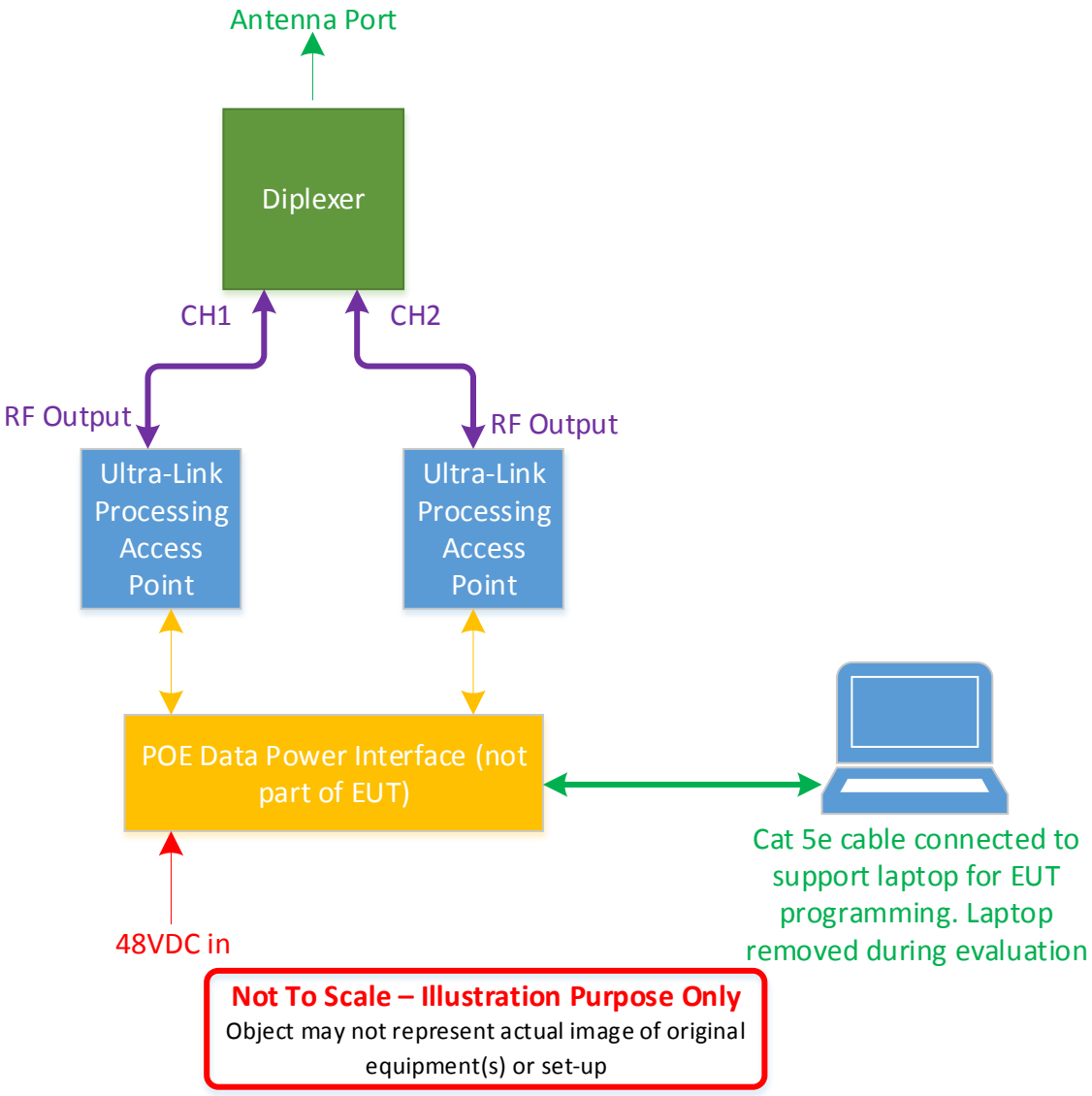
1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Adapter Technology	Support Equipment: AC-DC External Power Supply	AC-DC power supply provided 48VDC to power the EUT
Dell	Support Equipment: Laptop	Laptop used to configure the EUT. Model: Latitude E6520
Dell	Support Equipment: AC-DC External Power Supply	Power supply provided for support laptop, model: LA90PS0-00

1.4.4 Worst Case Configuration

Not applicable. Worst case configuration evaluated based on the EUT installed provided by customer.

1.4.5 Simplified Test Configuration Diagram



1.5 DEVIATIONS FROM THE STANDARD

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

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: N/A		
N/A	—	—

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

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2014, 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 C63.4-2014. 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
On-Ramp Wireless Inc.
Dual Latency System Access Point (AP) Configuration

2.1 PEAK OUTPUT POWER

2.1.1 Specification Reference

Part 15 Subpart C §15.247(b)(3)

2.1.2 Standard Applicable

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

2.1.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

November 23, 2015 / AC

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.0 °C
Relative Humidity	21.1 %
ATM Pressure	99.0 kPa

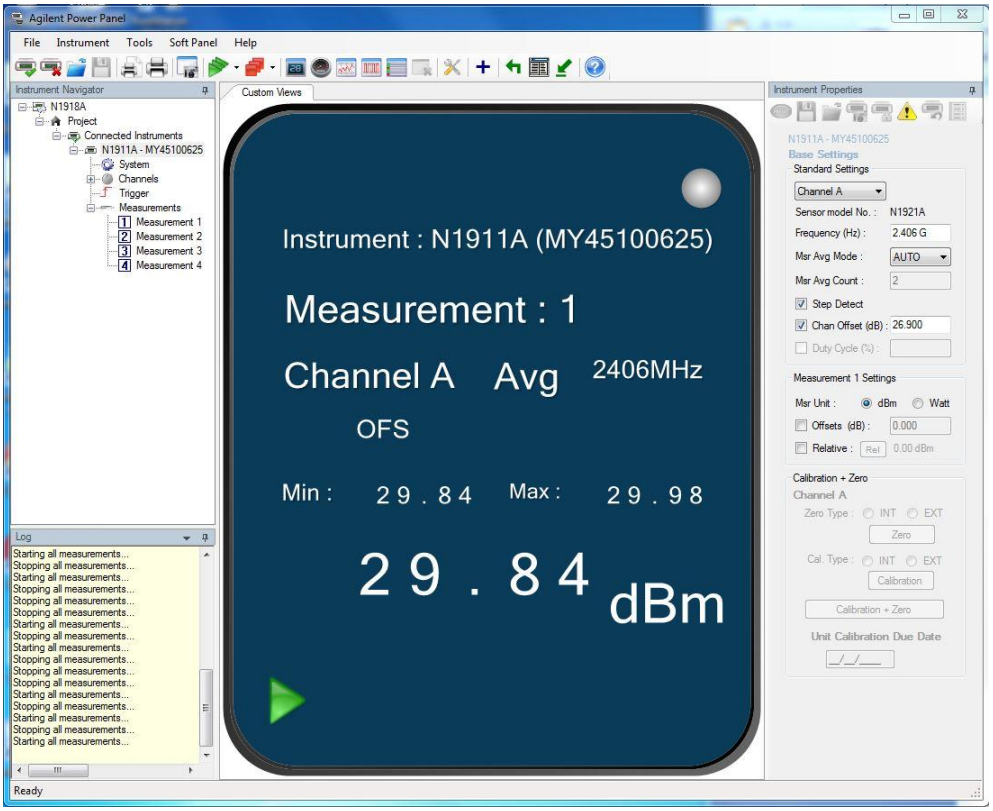
2.1.7 Additional Observations

- This is a conducted test (Conducted Output Power) using connection to a power meter.
- An offset of 26.9dB was added to compensate for the external attenuator, splitter and cable used from the antenna port to the power meter.
- Test methodology is per Clause 9.1.2 of KDB 558074 D01 (DTS Meas Guidance v03r03, June 09, 2015). All conditions under this Clause were satisfied.

2.1.8 Test Results

Mode	Channel	Modulation	Measured Average Power (dBm)	Measured Average Power (mW)
Low Sub Band	1 (2402 MHz)	DSSS @ 1Mbps	29.68	928.97
	2 (2403.99 MHz)		29.35	860.99
	3 (2405.98 MHz)		29.98	995.41
High Sub Band	36 (2471.65 MHz)	DSSS @ 1Mbps	29.50	891.25
	37 (2473.64 MHz)		29.85	966.05
	38 (2475.63 MHz)		29.38	866.96

2.1.9 Sample Test Plot



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: N/A / Test Configuration A

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

November 23, 2015 / AC

2.2.5 Test Equipment Used

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

2.2.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.0 °C
Relative Humidity	21.1 %
ATM Pressure	99.0 kPa

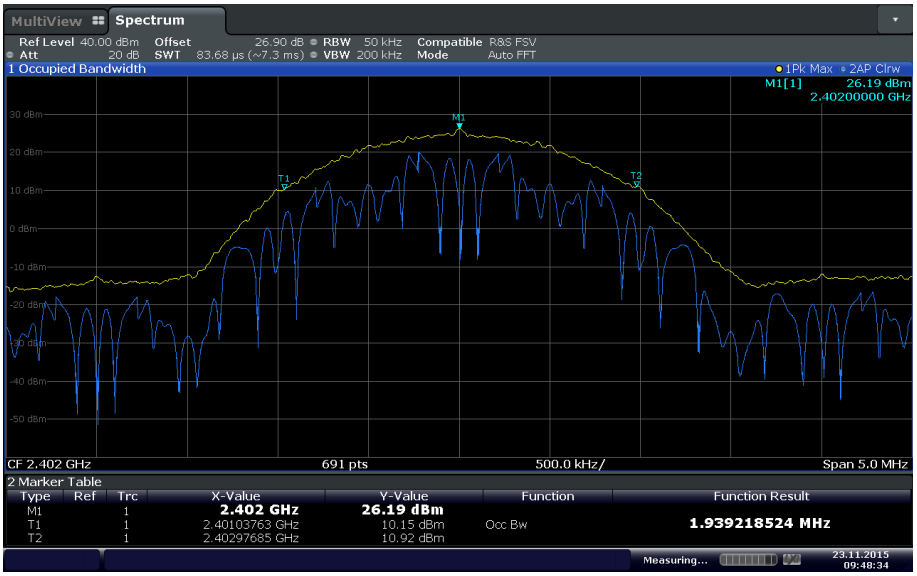
2.2.7 Additional Observations

- This is a conducted test.
- A correction factor of 26.9 dB was used to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% to 5% 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.

2.2.8 Test Results (For reporting purposes only)

Mode	Channel	Measured 99% Bandwidth (MHz)
Low Sub Band	1 (2402 MHz)	1.939
	2 (2403.99 MHz)	1.939
	3 (2405.98 MHz)	1.975
High Sub Band	36 (2471.65 MHz)	1.889
	37 (2473.64 MHz)	1.903
	38 (2475.63 MHz)	1.954

2.2.9 Test Plots



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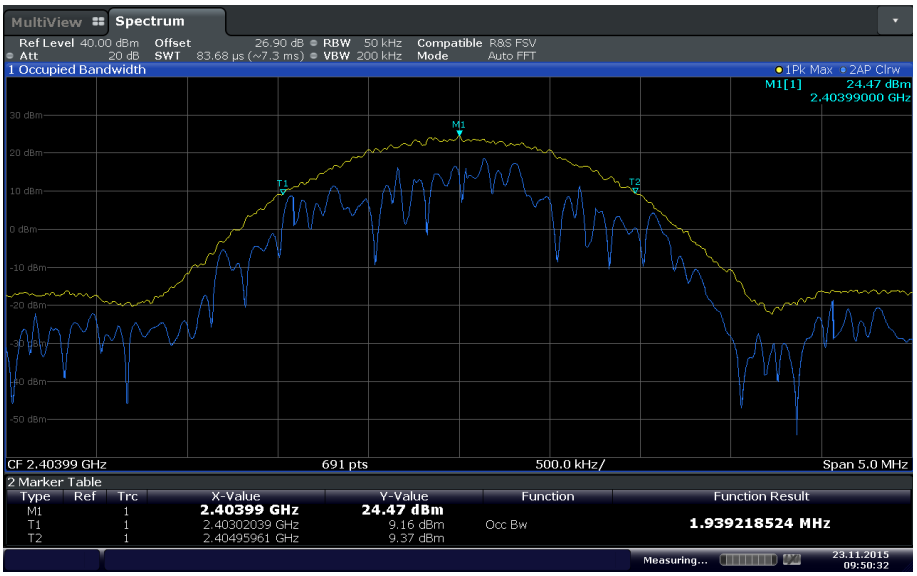
Low Sub Band_Low Channel 1 (2402 MHz)



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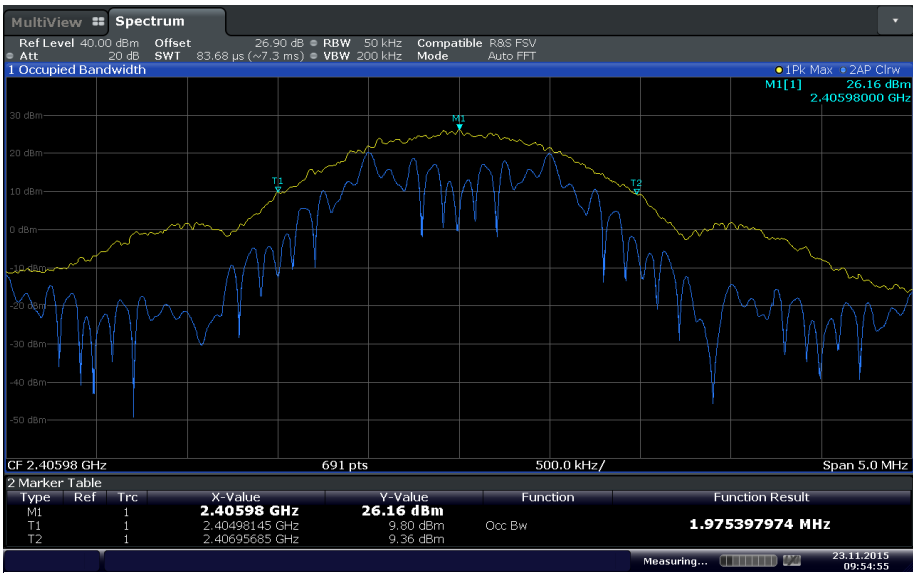
Low Sub Band_Mid Channel 2 (2403.99 MHz)



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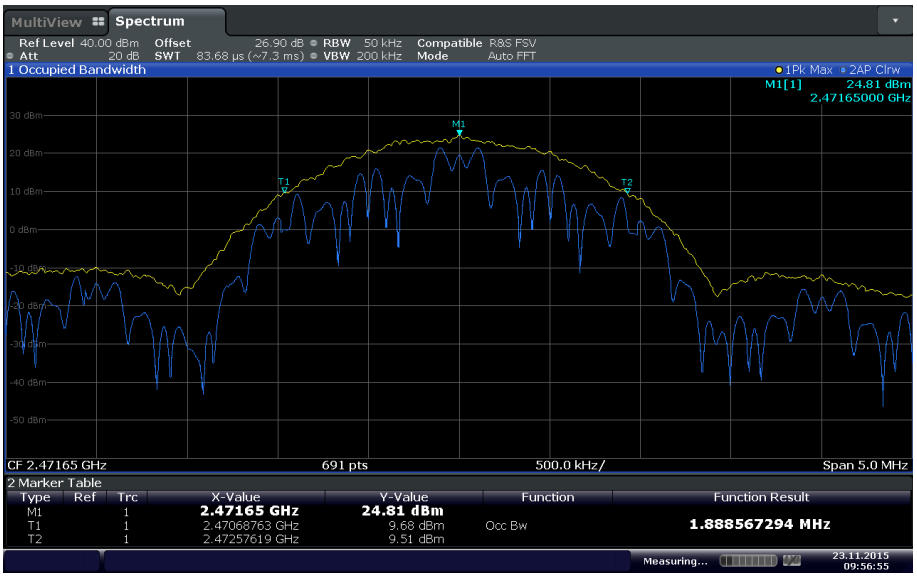
Low Sub Band_High Channel 3 (2405.98 MHz)



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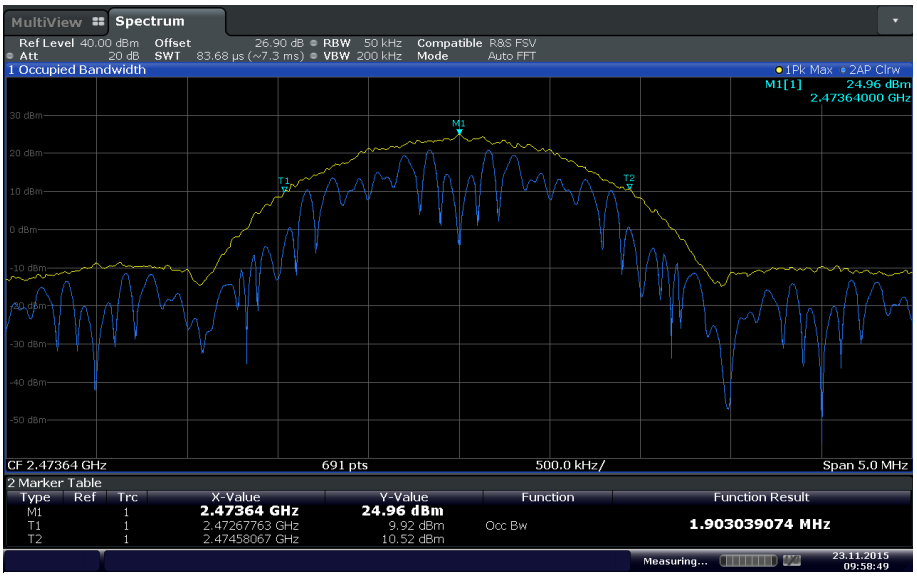
High Sub Band_Low Channel 36 (2471.65 MHz)



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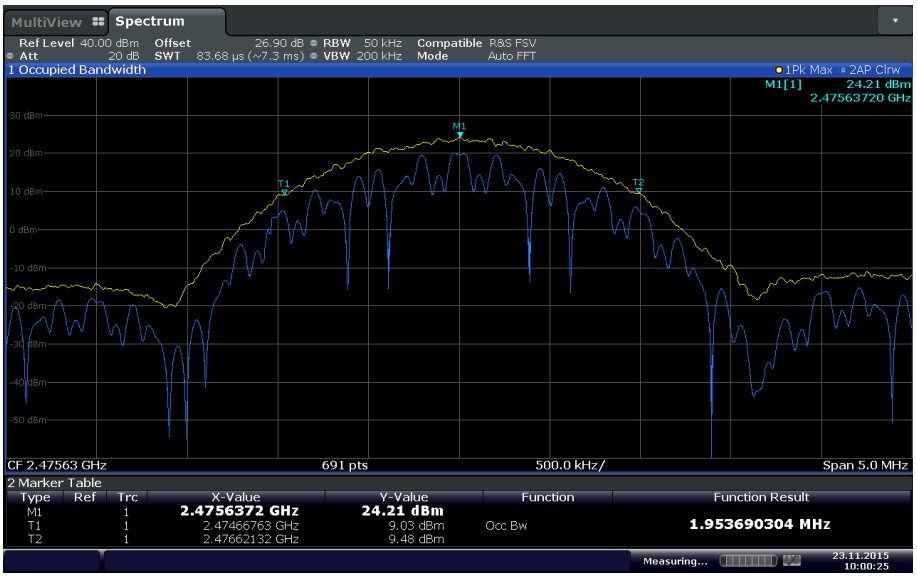
High Sub Band_Mid Channel 37 (2473.64 MHz)



Date: 23.NOV.2015 10:00:26

High Sub Band_High Channel 38 (2475.63 MHz)

2.3 MINIMUM 6 dB RF BANDWIDTH

2.3.1 Specification Reference

Part 15 Subpart C §15.247(a)(2)

2.3.2 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.

2.3.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

November 23, 2015 / AC

2.3.5 Test Equipment Used

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

2.3.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.0 °C
Relative Humidity	21.1 %
ATM Pressure	99.0 kPa

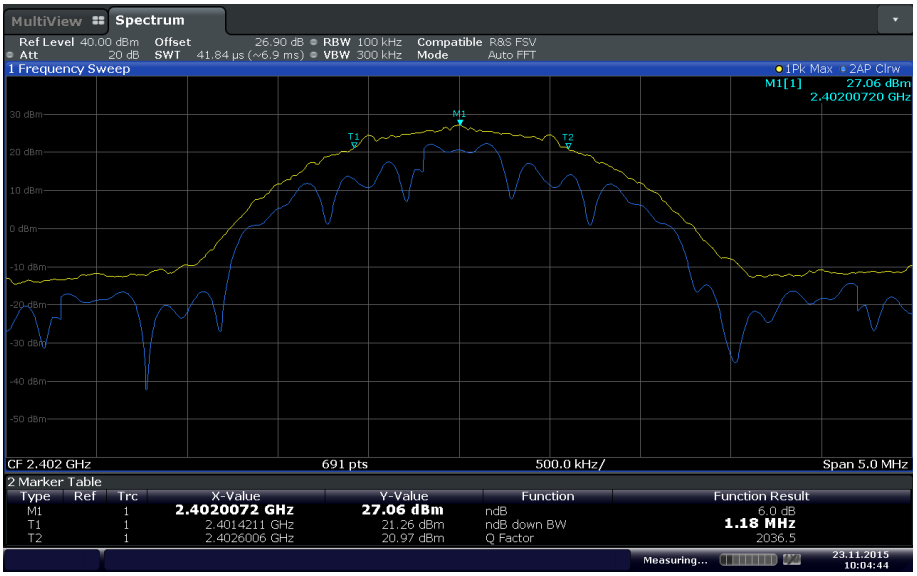
2.3.7 Additional Observations

- This is a conducted test.
- A correction factor of 26.9 dB was used to compensate for the external attenuator and cable used.
- 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.

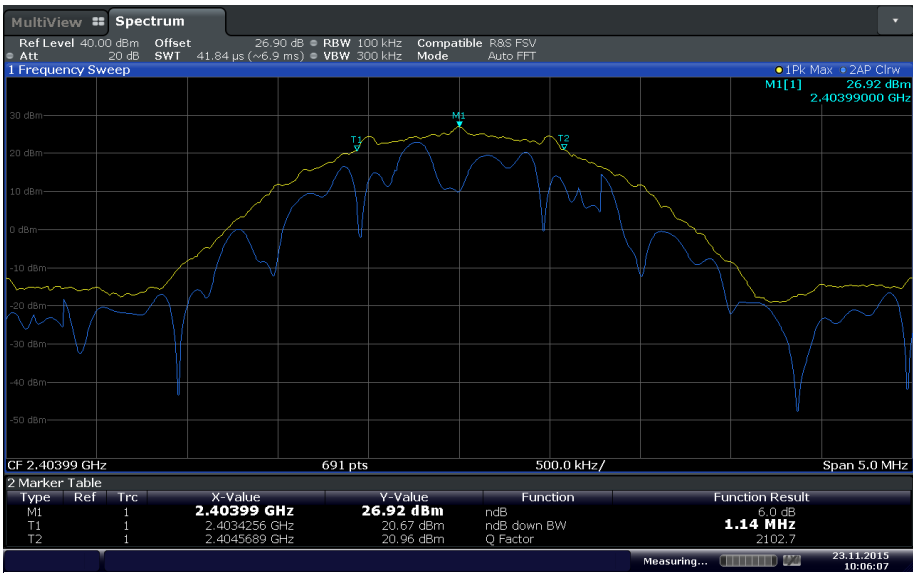
2.3.8 Test Results

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
Low Sub Band	1 (2402 MHz)	1.18	0.500	Complies
	2 (2403.99 MHz)	1.14	0.500	Complies
	3 (2405.98 MHz)	1.14	0.500	Complies
High Sub Band	36 (2471.65 MHz)	1.17	0.500	Complies
	37 (2473.64 MHz)	1.21	0.500	Complies
	38 (2475.63 MHz)	1.19	0.500	Complies

2.3.9 Test Results Plots



Low Sub Band_Low Channel 1 (2402 MHz)



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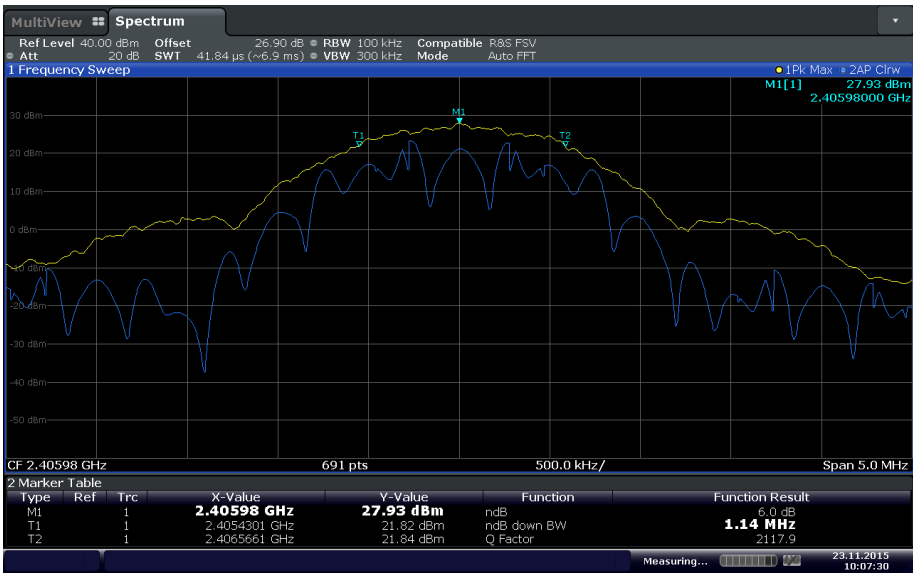
Low Sub Band_Mid Channel 2 (2403.99 MHz)



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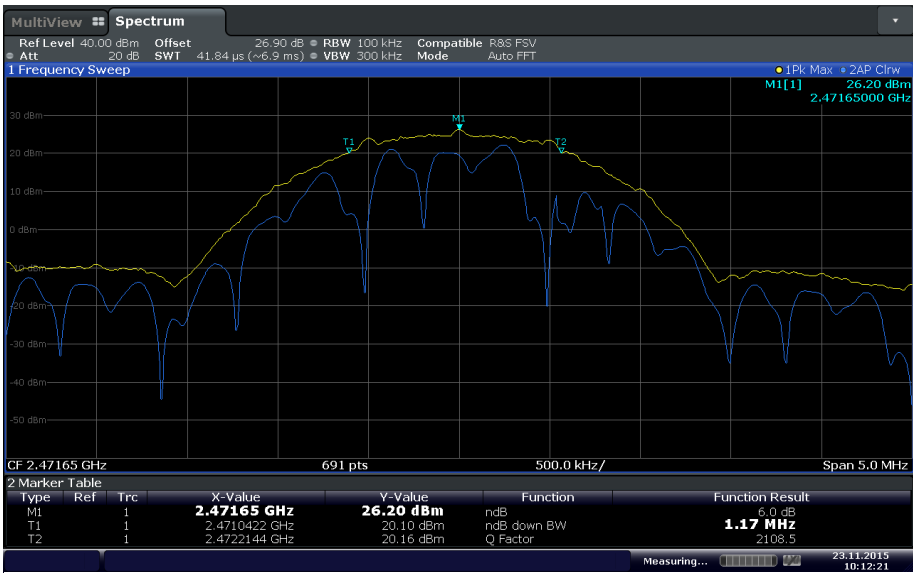
Low Sub Band_High Channel 3 (2403.98 MHz)



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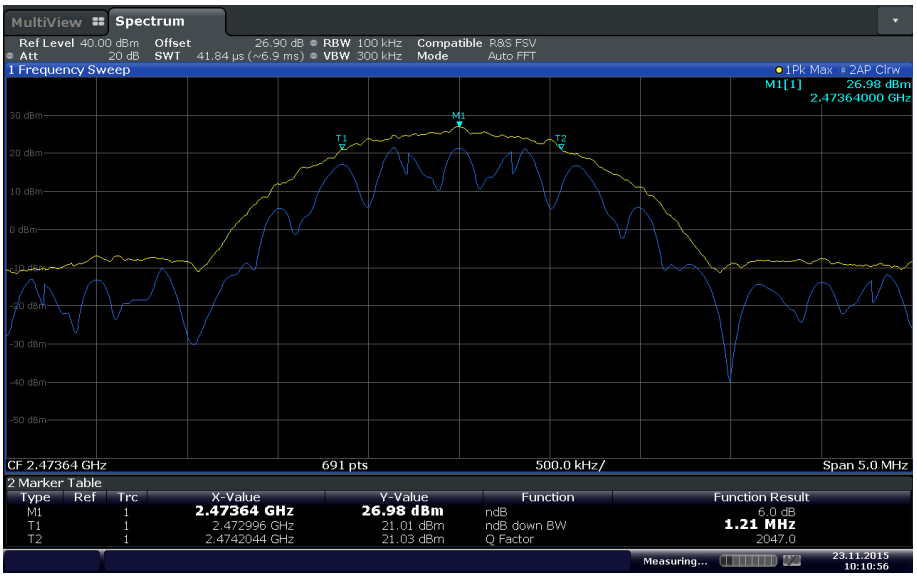
High Sub Band_Low Channel 36 (2471.65 MHz)



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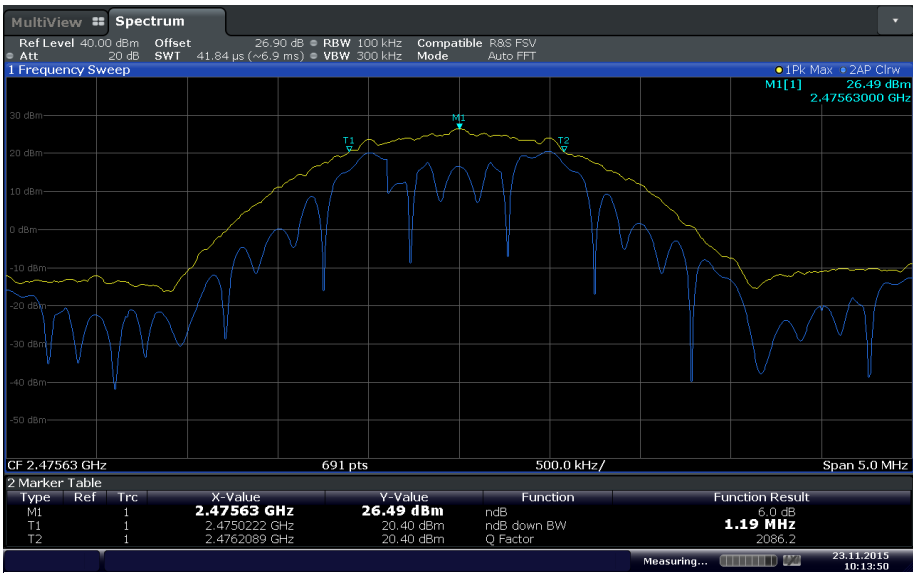
High Sub Band_Mid Channel 37 (2473.64 MHz)



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High Sub Band_High Channel 38 (2475.63 MHz)

2.4 OUT-OF-BAND EMISSIONS - CONDUCTED

2.4.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.4.2 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)).

2.4.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

November 23, 2015 / AC

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

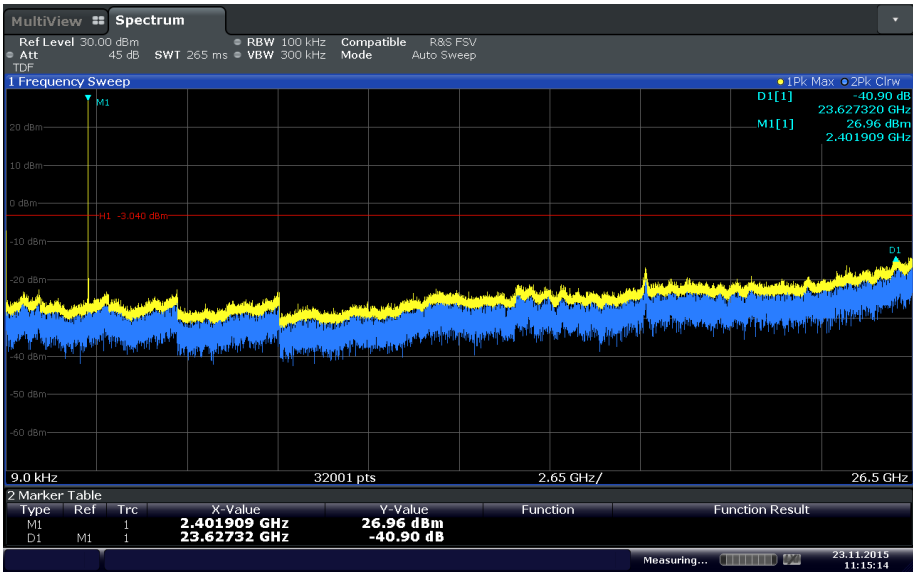
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.0 °C
Relative Humidity	21.1 %
ATM Pressure	99.0 kPa

2.4.7 Additional Observations

- This is a conducted test.
- TDF (Transducer Factor) was used 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. Sweep points set to maximum.
- 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.
- The sweep is also documented in both sub band channels transmit at the same time.

2.4.8 Test Results Plots (in single channel transmit)



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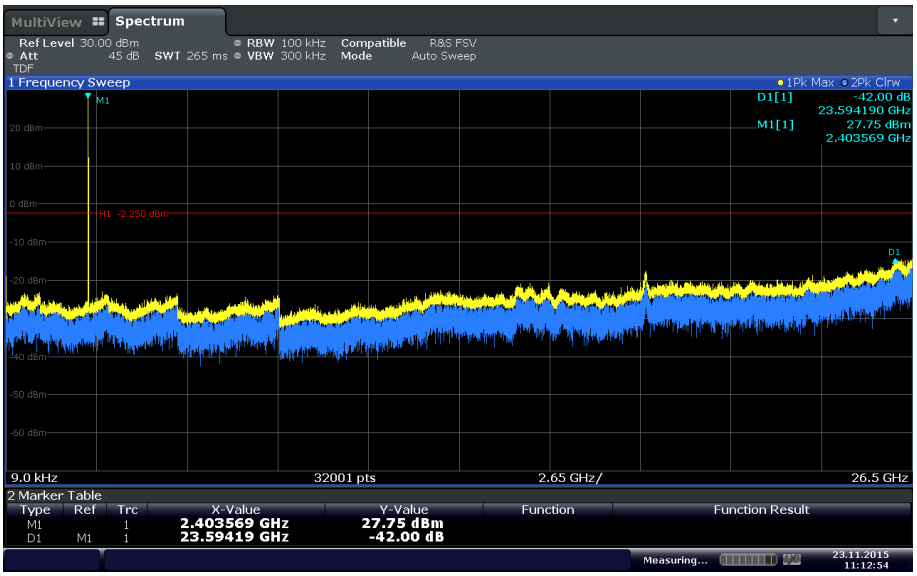
Low Sub Band_Low Channel 1 (2402 MHz)



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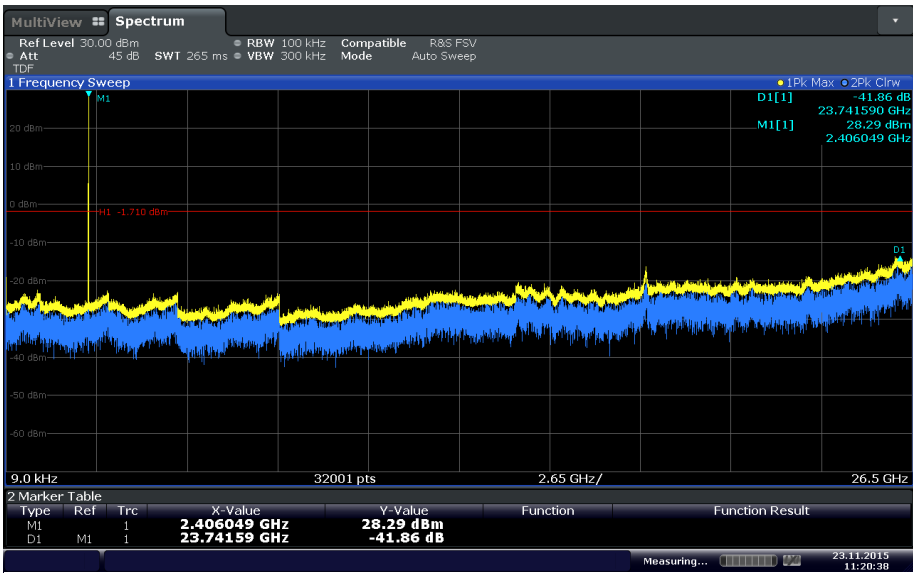
Low Sub Band_Mid Channel 2 (2403.99 MHz)



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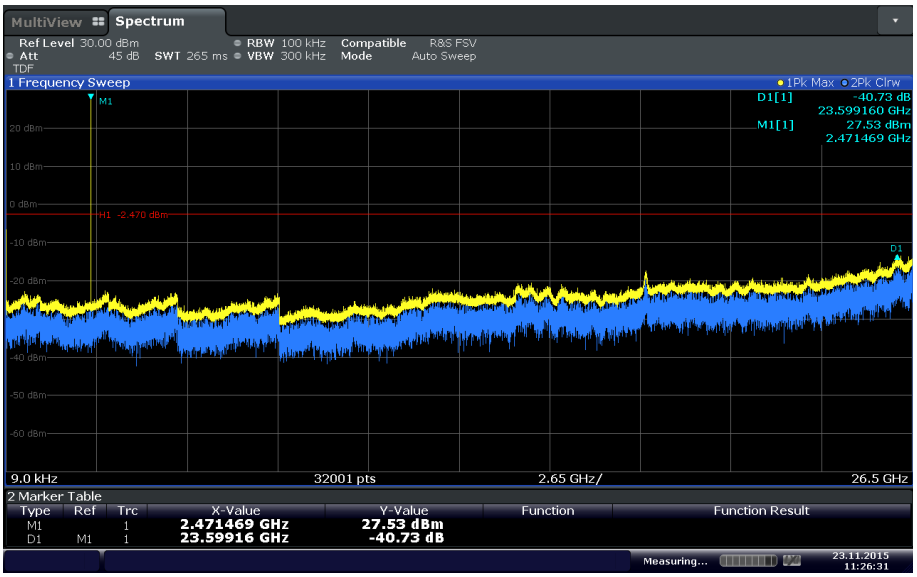
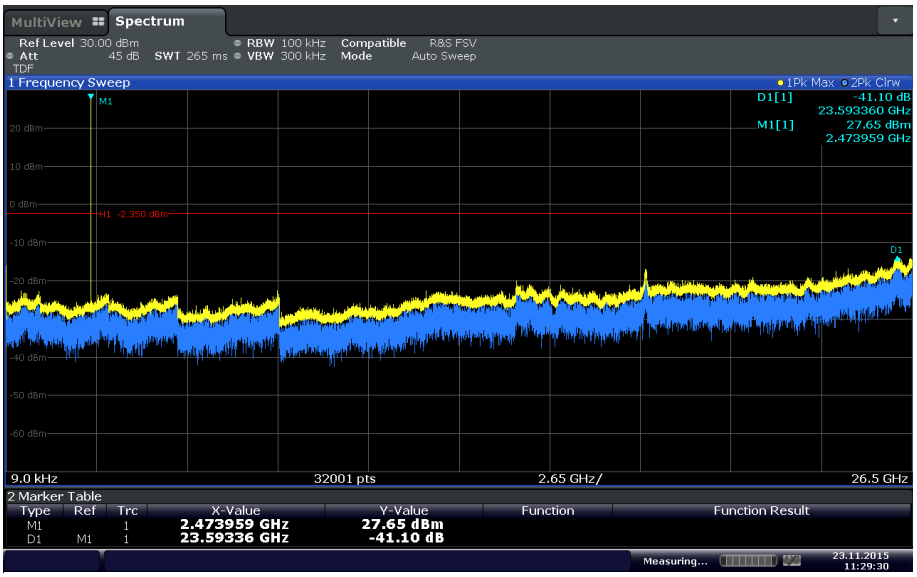
Low Sub Band_High Channel 3 (2405.98 MHz)



Date: 23.NOV.2015 11:26:31

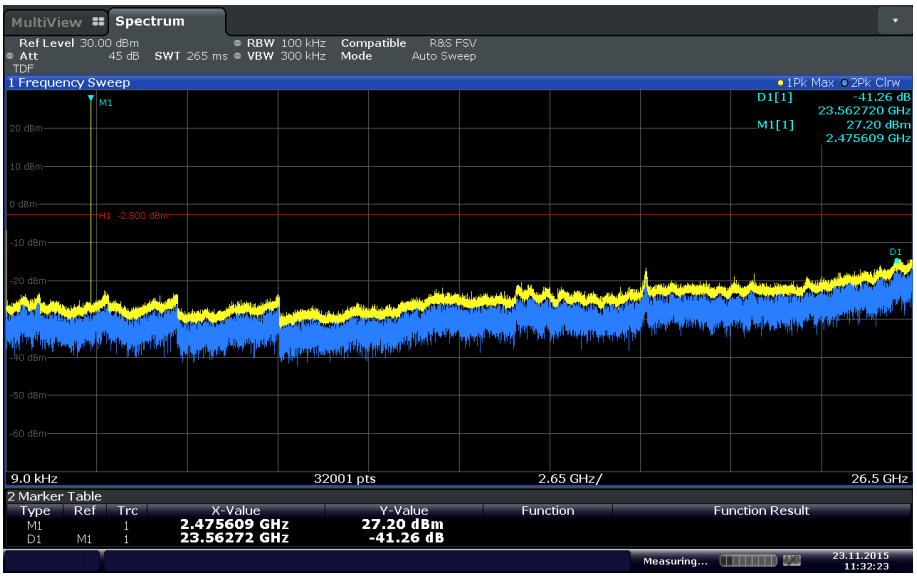
High Sub Band_Low Channel 36 (2471.65 MHz)

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



Date: 23.NOV.2015 11:29:30

High Sub Band_Mid Channel 37 (2473.64 MHz)



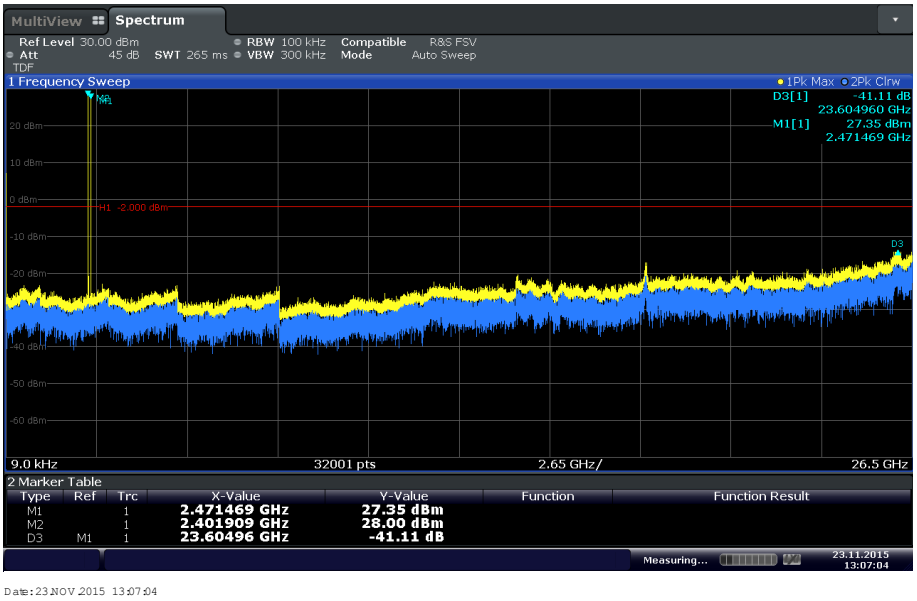
Date: 23.NOV.2015 11:32:23

High Sub Band_High Channel 38 (2475.63 MHz)

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

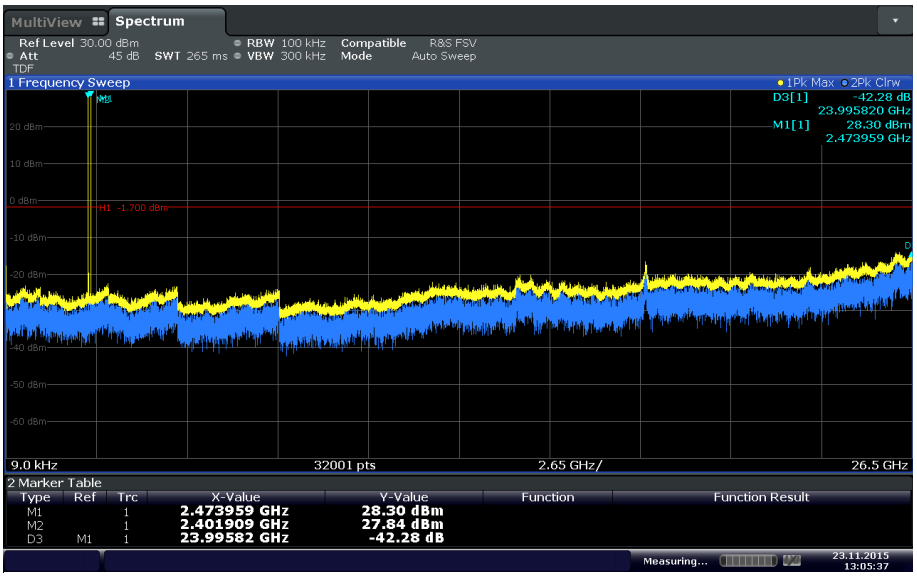
2.4.9 Summary of both sub bands transmitting at the same time

Low Sub Band Channel	Measured Power Level (dBm)	High Sub Band Channel	Measured Power Level (dBm)	Worst Case Power Level of Spurious Emission (dBm)
1 (2402 MHz)	28.00	36 (2471.65 MHz)	27.35	-41.11
1 (2402 MHz)	27.84	37 (2473.64 MHz)	28.30	-42.28
1 (2402 MHz)	25.98	38 (2475.63 MHz)	27.68	-41.79
2 (2403.99 MHz)	26.99	36 (2471.65 MHz)	27.36	-40.19
2 (2403.99 MHz)	28.38	37 (2473.64 MHz)	28.74	-42.92
2 (2403.99 MHz)	27.97	38 (2475.63 MHz)	27.71	-41.73
3 (2405.98 MHz)	27.67	36 (2471.65 MHz)	26.41	-42.03
3 (2405.98 MHz)	28.76	37 (2473.64 MHz)	28.49	-42.69
3 (2405.98 MHz)	28.13	38 (2475.63 MHz)	26.95	-42.15



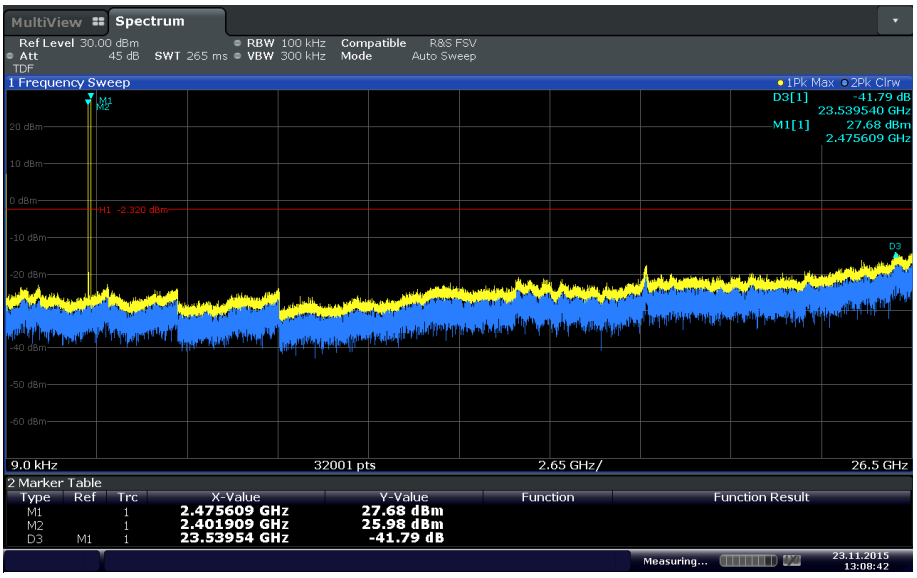
Date: 23.NOV.2015 13:07:04

Both sub band frequencies transmit at the same time
Channels 1 and 36 combination



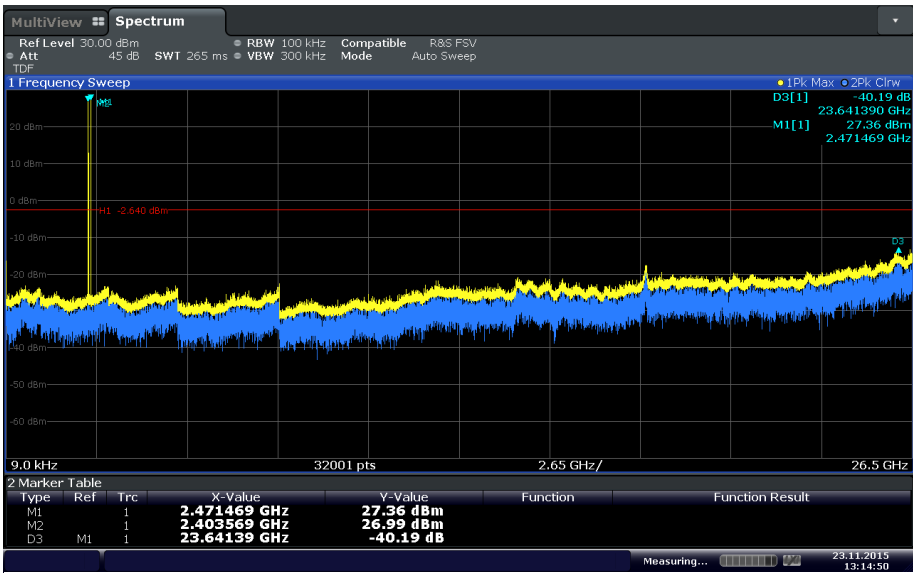
Date: 23.NOV.2015 13:05:37

Both sub band frequencies transmit at the same time
Channels 1 and 37 combination



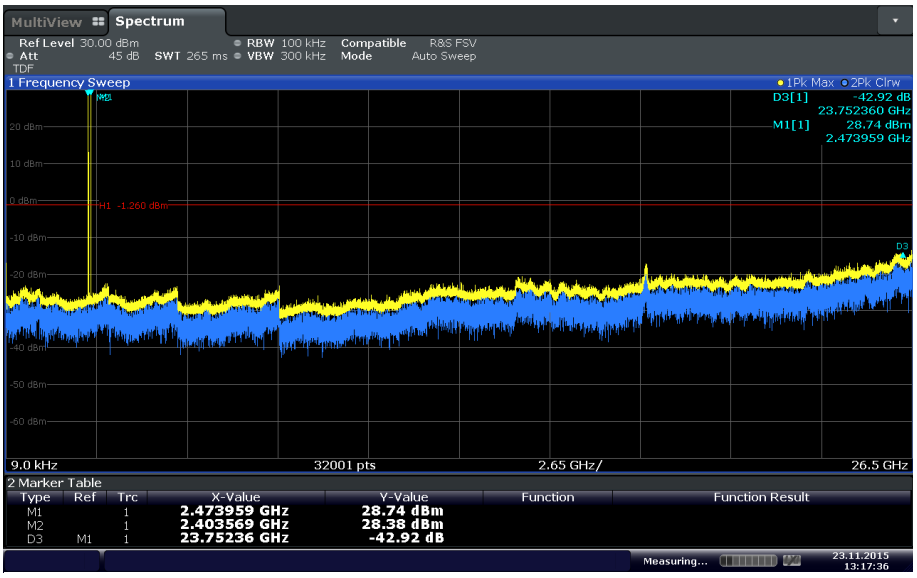
Date: 23.NOV.2015 13:08:42

Both sub band frequencies transmit at the same time
Channels 1 and 38 combination



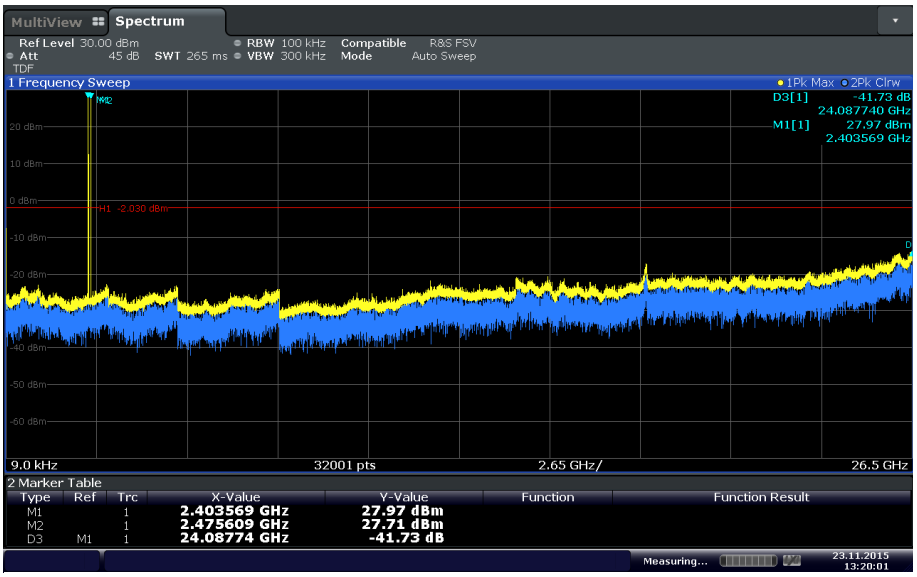
Date: 23.NOV.2015 13:14:50

Both sub band frequencies transmit at the same time
Channels 2 and 36 combination



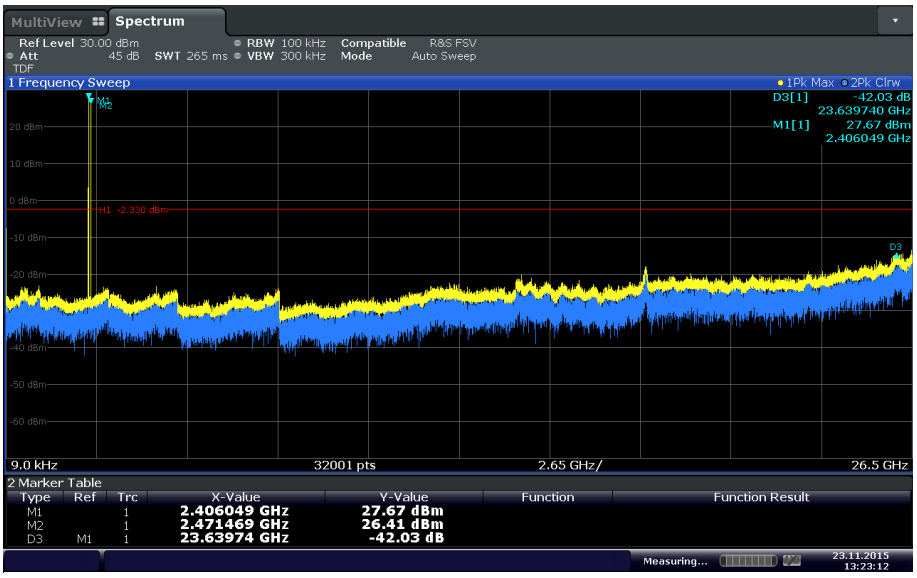
Date: 23.NOV.2015 13:17:37

Both sub band frequencies transmit at the same time
Channels 2 and 37 combination



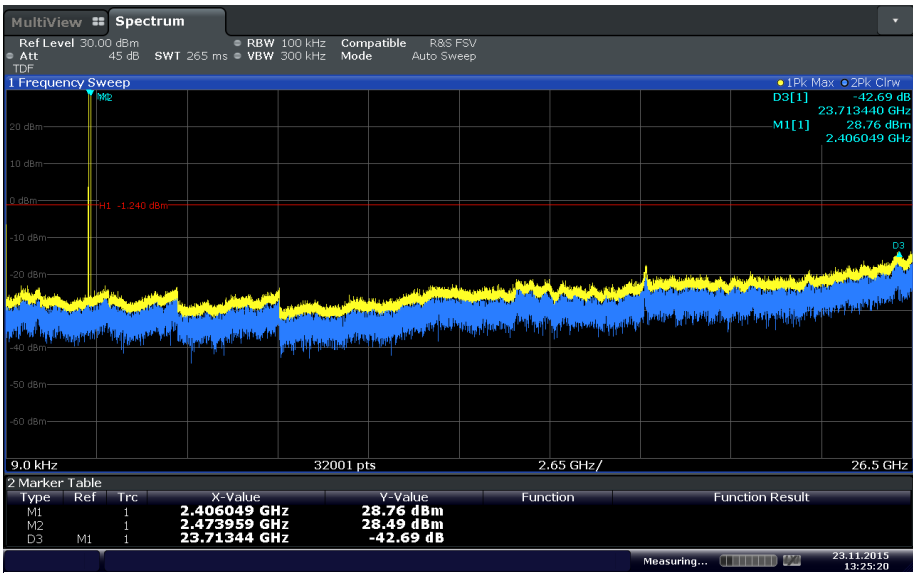
Date: 23.NOV.2015 13:20:01

Both sub band frequencies transmit at the same time
Channels 2 and 38 combination



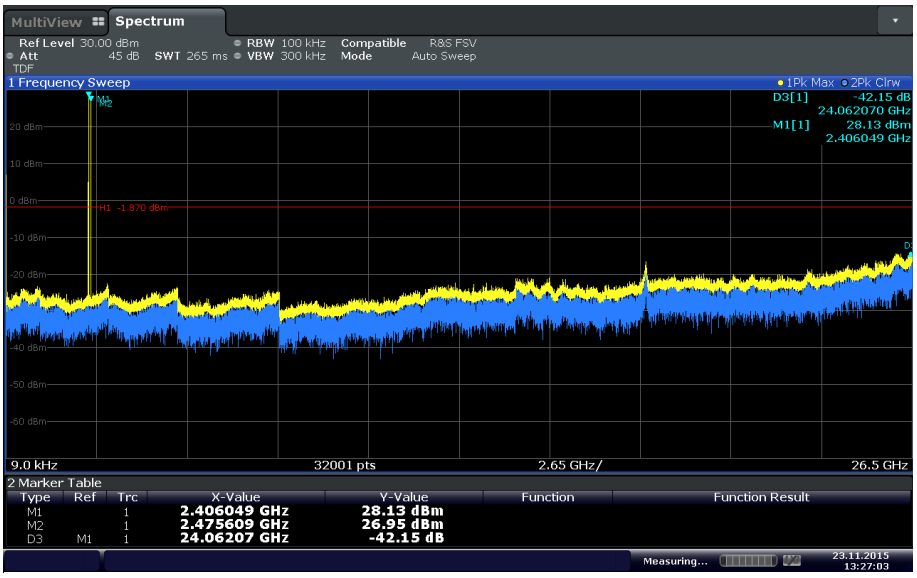
Date: 23.NOV.2015 13:23:13

Both sub band frequencies transmit at the same time
Channels 3 and 36 combination



Date: 23.NOV.2015 13:25:20

Both sub band frequencies transmit at the same time
Channels 3 and 37 combination



Date: 23.NOV.2015 13:27:04

Both sub band frequencies transmit at the same time
Channels 3 and 38 combination

2.5 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.5.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.5.2 Standard Applicable

See previous test.

2.5.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

November 23, 2015 / AC

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.0 °C
Relative Humidity	21.1 %
ATM Pressure	99.0 kPa

2.5.7 Additional Observations

- This is a conducted test.
- A correction factor of 26.9 dB was used 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.
- Trace was centred on the band-edge frequency.
- Span was set to encompass the band-edge frequency and the peak of the emission.
- Using Marker function, peak of the emission was determined and the delta to the band-edge frequency measured.
- Band-edges were verified ≤ 30 dBc.

2.5.8 Test Results

Complies. See attached plots.

Date: 23.NOV.2015 10:25:36

Low Sub Band_Low Channel 1 (2402 MHz)

Date: 23.NOV.2015 10:27:50

High Sub Band_High Channel 38 (2475.63 MHz)

2.6 SPURIOUS RADIATED EMISSIONS

2.6.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.6.2 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)).

2.6.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration B

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

January 08 and 11, 2016 / FC

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.3 °C
Relative Humidity	39.5 %
ATM Pressure	98.8 kPa

2.6.7 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 worst case transmit frequency(ies) mode presented below 1GHz (both sub band_channel 2 and 36).
- Measurement was preformed with a dipole 9dBi antenna attached to the EUT antenna connector.
- 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 2.6.8 for sample computation.

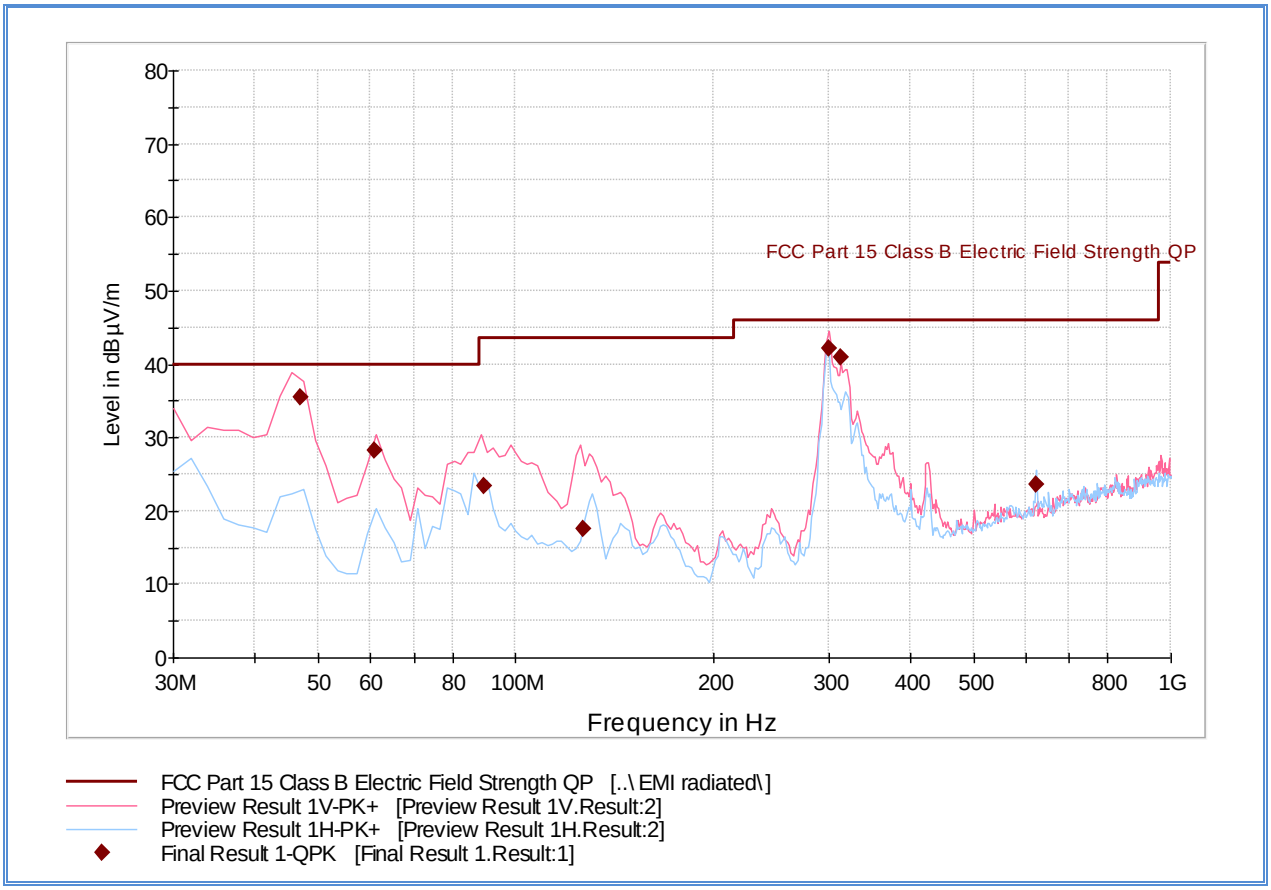
2.6.8 Sample Computation (Radiated Emission)

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 Quasi Peak Final Measurement (dBbµV/m) @ 30MHz			**11.8**

2.6.9 Test Results

See attached plots.

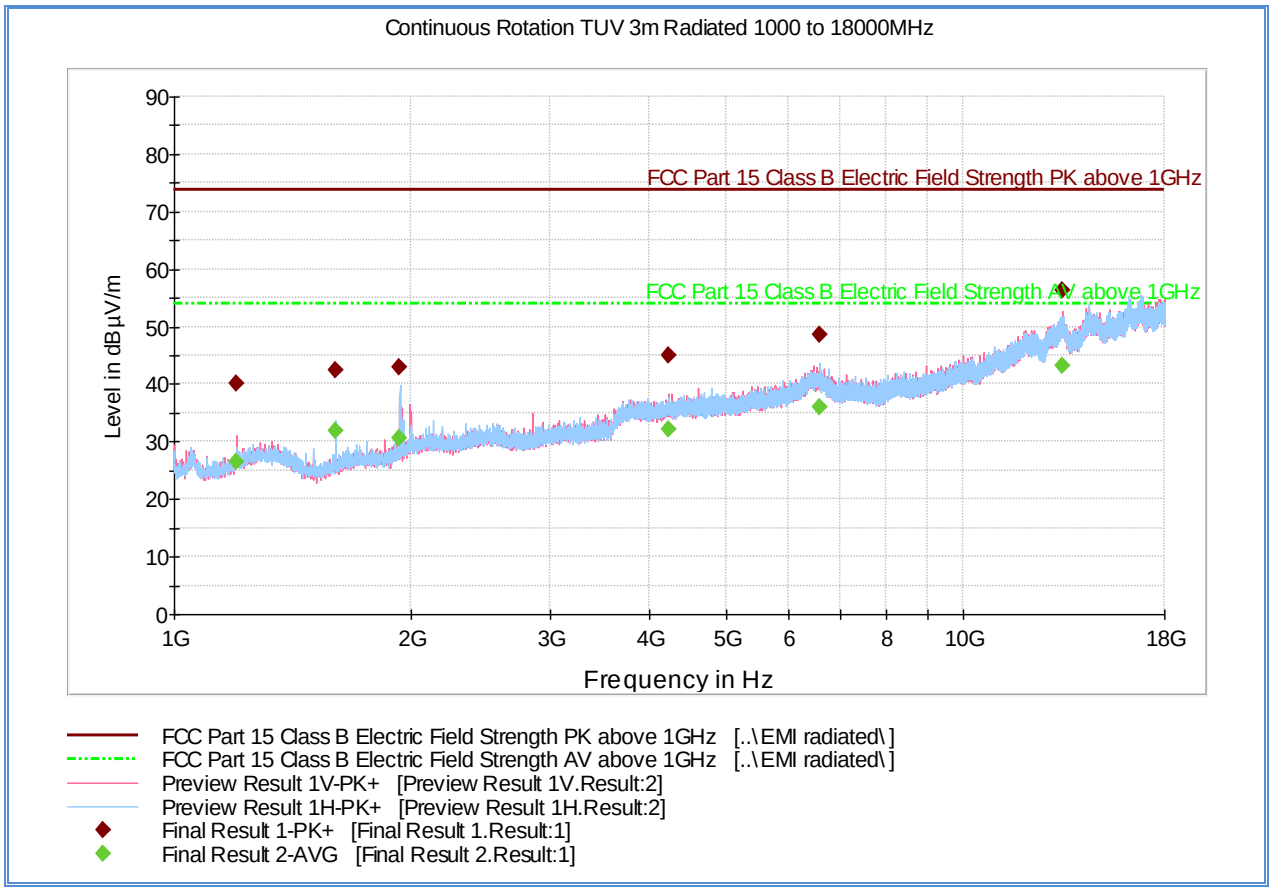
2.6.10 Test Results Below 1GHz (Receive Mode)



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)
46.951102	35.5	1000.0	120.000	102.0	V	45.0	-19.3	4.5	40.0
60.822204	28.3	1000.0	120.000	137.0	V	191.0	-22.0	11.7	40.0
89.636633	23.4	1000.0	120.000	100.0	V	7.0	-20.9	20.1	43.5
126.930501	17.6	1000.0	120.000	100.0	V	6.0	-20.9	25.9	43.5
300.240401	42.1	1000.0	120.000	165.0	V	197.0	-12.5	3.9	46.0
313.607615	41.0	1000.0	120.000	150.0	V	195.0	-12.1	5.0	46.0
622.205772	23.7	1000.0	120.000	115.0	H	267.0	-3.7	22.3	46.0

2.6.11 Test Results Above 1GHz (Receive Mode)



Peak Data

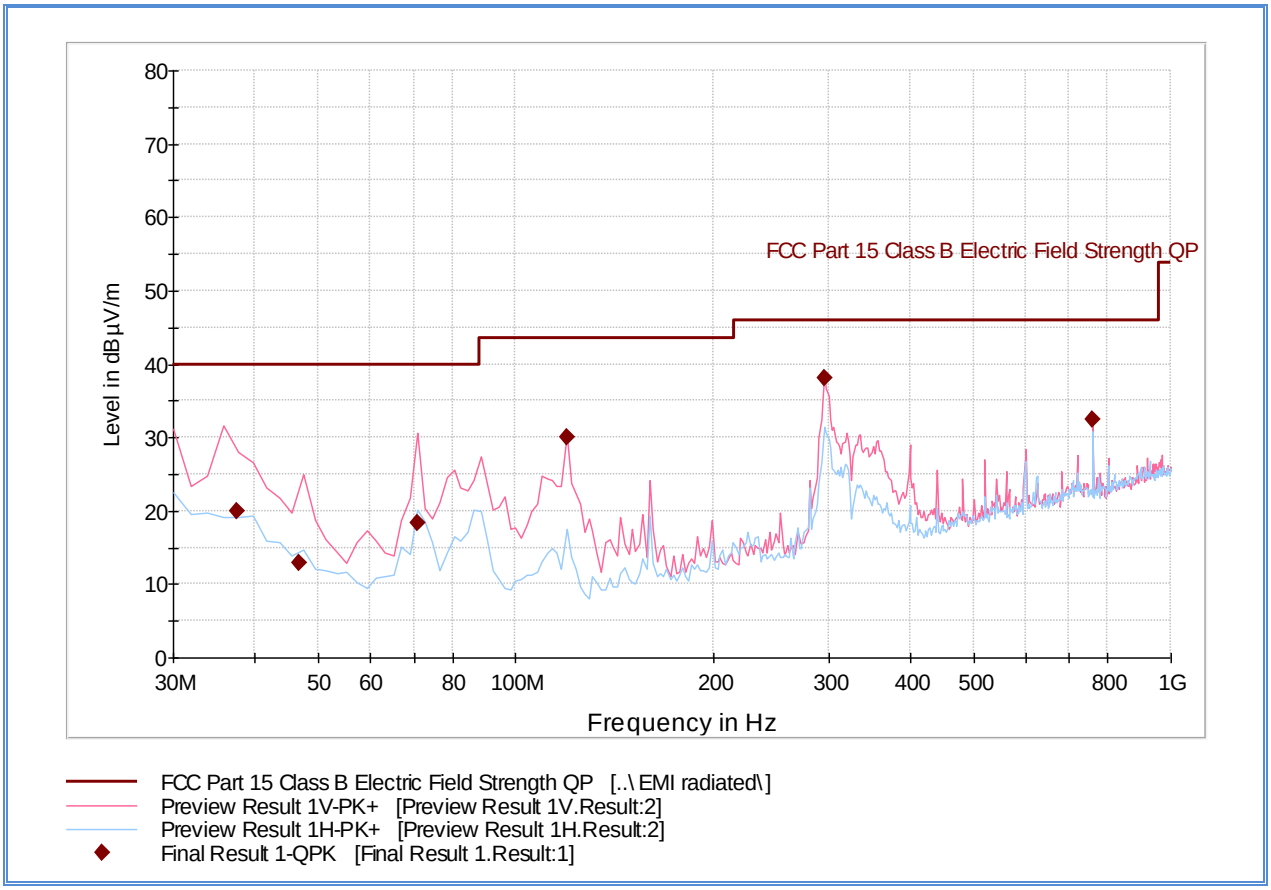
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.033333	40.0	1000.0	1000.000	312.2	V	10.0	-6.1	33.9	73.9
1600.133333	42.5	1000.0	1000.000	227.4	H	-16.0	-5.6	31.4	73.9
1932.533333	42.9	1000.0	1000.000	344.1	H	9.0	-2.3	31.0	73.9
4228.500000	45.0	1000.0	1000.000	133.7	V	108.0	5.4	28.9	73.9
6572.000000	48.6	1000.0	1000.000	203.3	H	253.0	11.5	25.3	73.9
13383.60000	56.2	1000.0	1000.000	402.1	V	-10.0	20.5	17.7	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)
1200.033333	26.6	1000.0	1000.000	312.2	V	10.0	-6.1	27.3	53.9
1600.133333	32.0	1000.0	1000.000	227.4	H	-16.0	-5.6	21.9	53.9
1932.533333	30.5	1000.0	1000.000	344.1	H	9.0	-2.3	23.4	53.9
4228.500000	32.2	1000.0	1000.000	133.7	V	108.0	5.4	21.7	53.9
6572.000000	36.0	1000.0	1000.000	203.3	H	253.0	11.5	17.9	53.9
13383.60000	43.1	1000.0	1000.000	402.1	V	-10.0	20.5	10.8	53.9

Test Notes: No significant emissions observed above 3GHz.

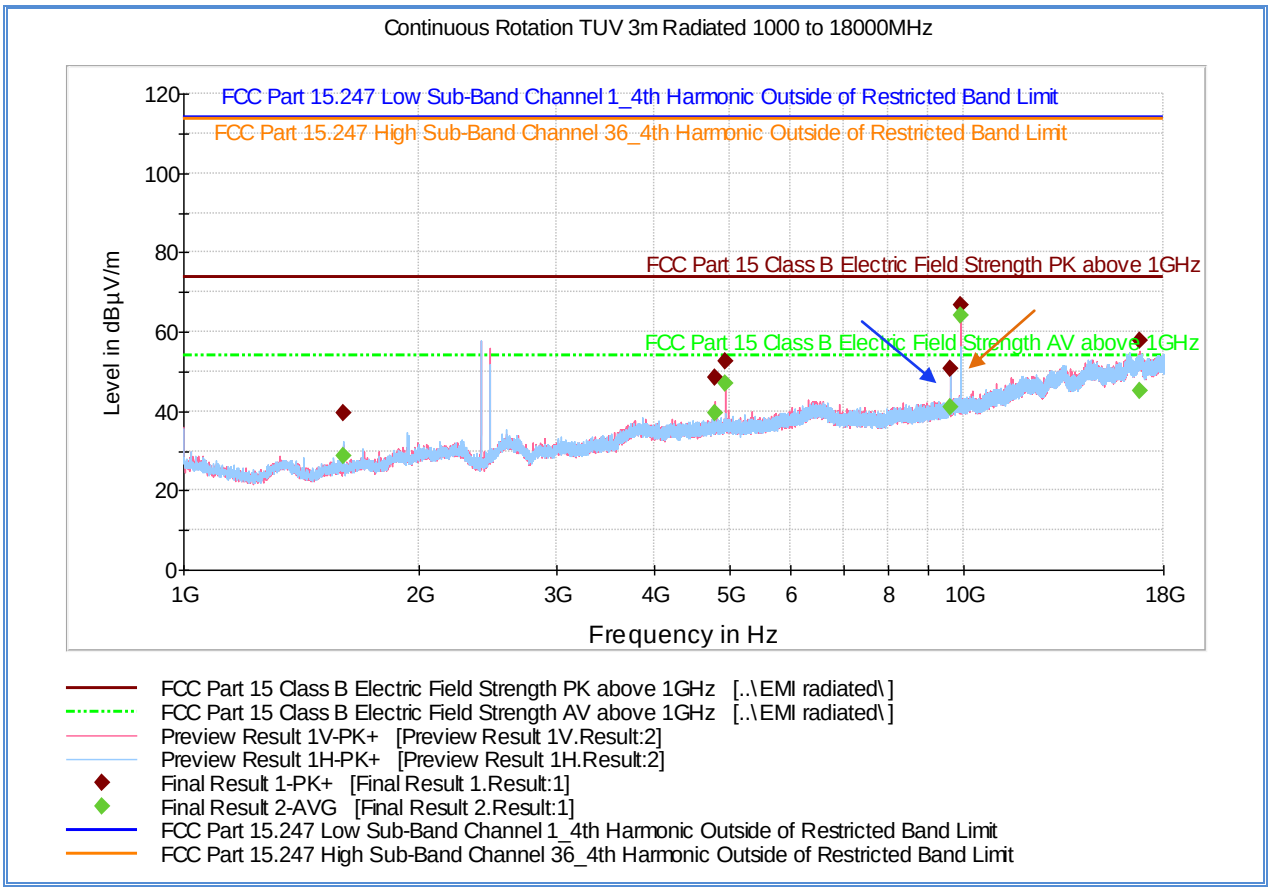
2.6.12 Test Results Below 1GHz (both sub band_channel 2 and 36_worst case presented)



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)
37.431663	20.0	1000.0	120.000	100.0	V	278.0	-15.5	20.0	40.0
46.654990	12.8	1000.0	120.000	100.0	V	255.0	-18.8	27.2	40.0
70.861643	18.3	1000.0	120.000	100.0	V	9.0	-22.3	21.7	40.0
120.018838	29.9	1000.0	120.000	100.0	V	45.0	-20.1	13.6	43.5
296.392625	38.2	1000.0	120.000	150.0	V	357.0	-12.4	7.8	46.0
760.021804	32.4	1000.0	120.000	106.0	V	238.0	-1.6	13.6	46.0

2.6.13 Test Results Above 1GHz (both sub band Tx mode_channel 1 and 36)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	39.5	1000.0	1000.000	155.6	V	185.0	-5.6	34.4	73.9
4804.233333	48.6	1000.0	1000.000	103.7	V	341.0	5.8	25.3	73.9
4943.233333	52.7	1000.0	1000.000	115.8	V	9.0	6.4	21.2	73.9
*9608.033333	50.6	1000.0	1000.000	139.7	V	63.0	12.3	63.3	113.9
*9886.666667	66.6	1000.0	1000.000	200.5	V	110.0	12.9	47.1	113.7
16776.533333	57.7	1000.0	1000.000	146.7	V	291.0	24.6	16.2	73.9

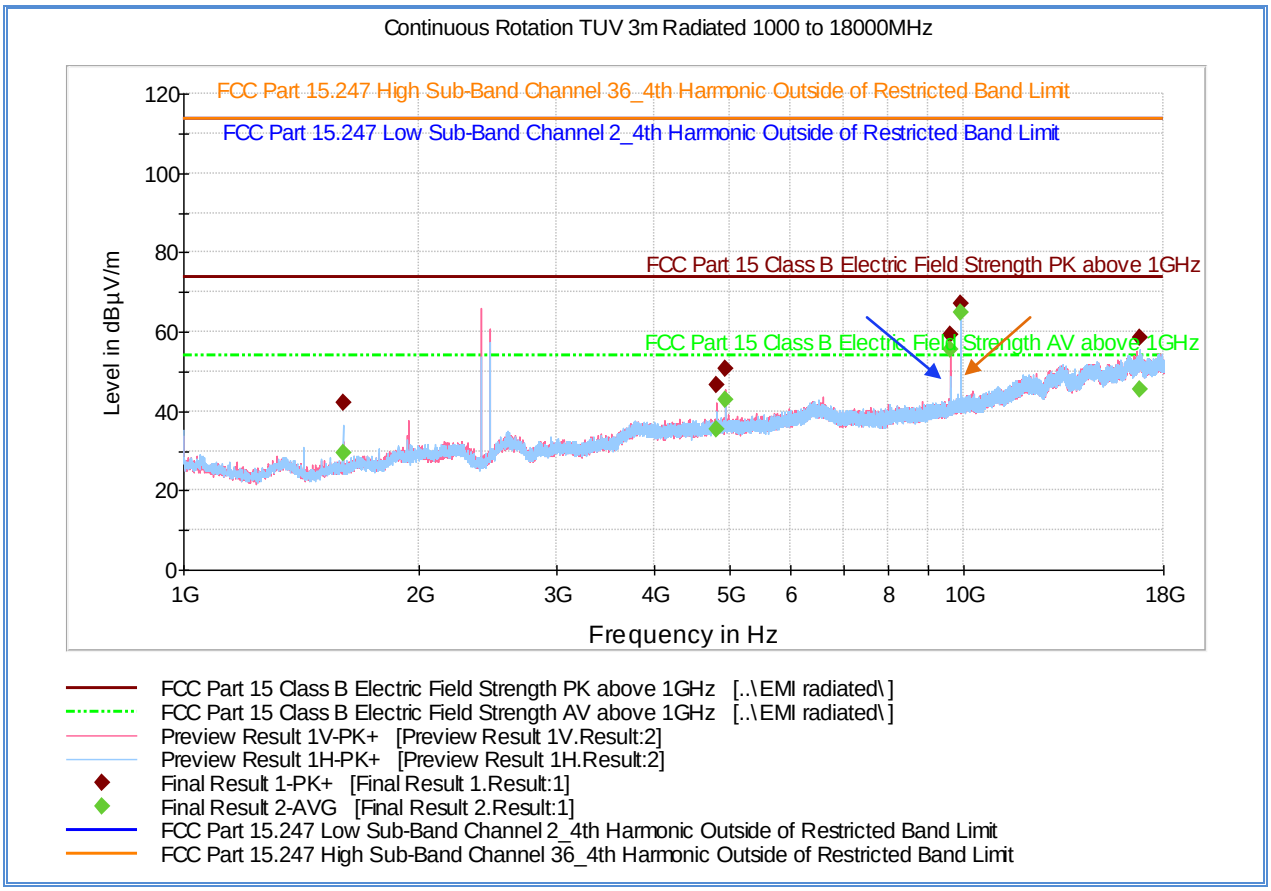
Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	28.6	1000.0	1000.000	155.6	V	185.0	-5.6	25.3	53.9
4804.233333	39.5	1000.0	1000.000	103.7	V	341.0	5.8	14.4	53.9
4943.233333	47.1	1000.0	1000.000	115.8	V	9.0	6.4	6.8	53.9
*9608.033333	41.1	1000.0	1000.000	139.7	V	63.0	12.3	72.81	113.9
*9886.666667	64.2	1000.0	1000.000	200.5	V	110.0	12.9	49.53	113.7
16776.533333	45.1	1000.0	1000.000	146.7	V	291.0	24.6	8.8	53.9

Test Notes: Measurement was performed with 2.4GHz notch filter. No significant emission observed above 10GHz. Measurement above 10GHz are noise floor figures.

* Measured harmonic frequencies are outside of the restricted bands; therefore, FCC Subpart B limits do not apply.

2.6.14 Test Results Above 1GHz (both sub band Tx mode_channel 2 and 36)



Peak Data

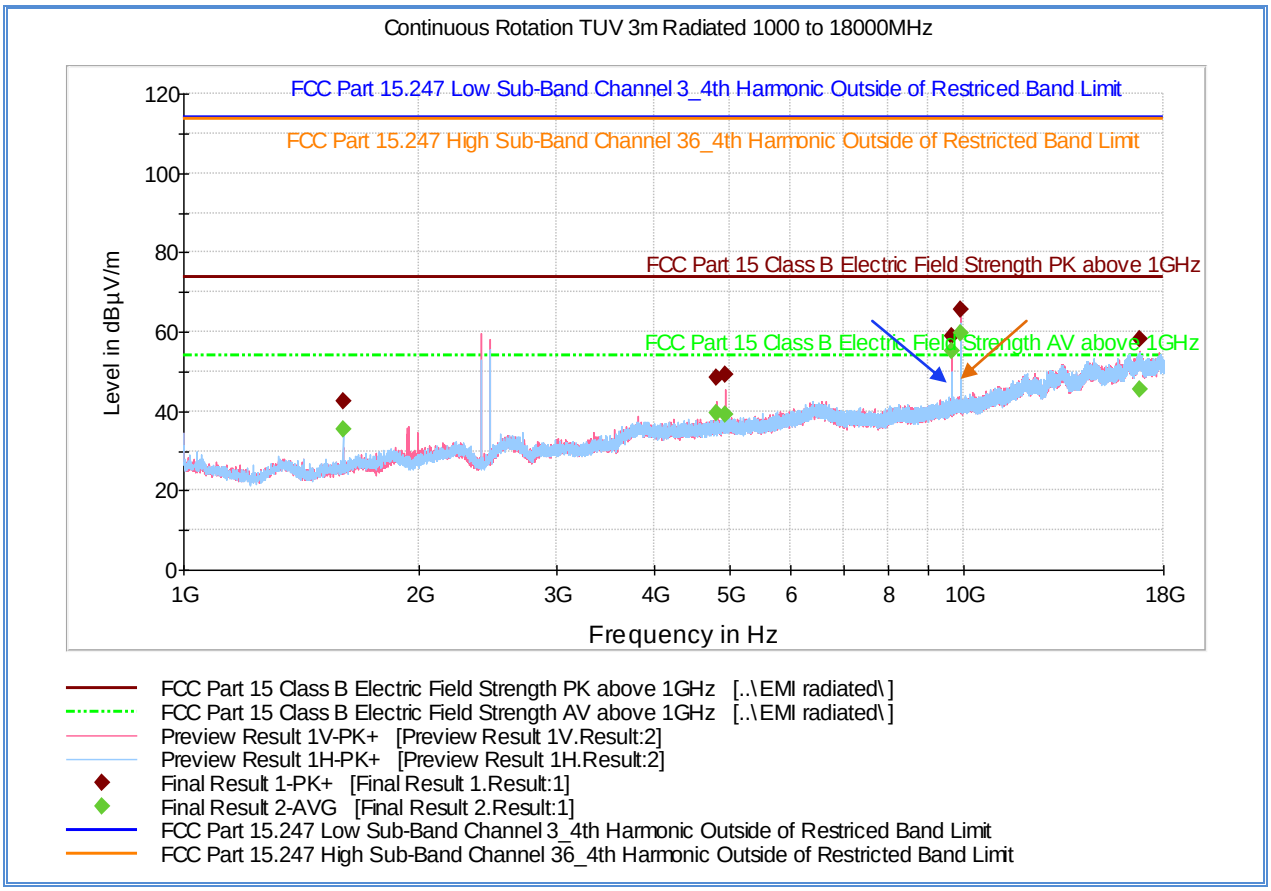
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	42.0	1000.0	1000.000	234.4	H	207.0	-5.6	31.9	73.9
4807.800000	46.8	1000.0	1000.000	262.3	V	159.0	5.8	27.1	73.9
4943.233333	50.5	1000.0	1000.000	232.4	V	96.0	6.4	23.4	73.9
*9615.966667	59.3	1000.0	1000.000	128.7	V	20.0	12.3	54.3	113.6
*9886.666667	67.2	1000.0	1000.000	205.5	V	296.0	12.9	46.5	113.7
16798.466667	58.5	1000.0	1000.000	300.5	H	106.0	24.8	15.4	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	29.5	1000.0	1000.000	234.4	H	207.0	-5.6	24.4	53.9
4807.800000	35.4	1000.0	1000.000	262.3	V	159.0	5.8	18.5	53.9
4943.233333	42.9	1000.0	1000.000	232.4	V	96.0	6.4	11.0	53.9
*9615.966667	55.5	1000.0	1000.000	128.7	V	20.0	12.3	58.1	113.6
*9886.666667	64.7	1000.0	1000.000	205.5	V	296.0	12.9	49.0	113.7
16798.466667	45.5	1000.0	1000.000	300.5	H	106.0	24.8	8.4	53.9

Test Notes: Measurement was performed with 2.4GHz notch filter. No significant emission observed above 10GHz. Measurement above 10GHz are noise floor figures.
* Measured harmonic frequencies are outside of the restricted bands; therefore, FCC Subpart B limits do not apply.

2.6.15 Test Results Above 1GHz (both sub band Tx mode_channel 3 and 36)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	42.5	1000.0	1000.000	195.5	H	206.0	-5.6	31.4	73.9
4812.166667	48.5	1000.0	1000.000	116.7	V	73.0	5.8	25.4	73.9
4943.233333	49.1	1000.0	1000.000	202.3	V	23.0	6.4	24.8	73.9
*9623.900000	59.0	1000.0	1000.000	116.7	V	313.0	12.3	55.2	114.2
*9886.666667	65.7	1000.0	1000.000	204.5	V	297.0	12.9	48.0	113.7
16797.566667	58.1	1000.0	1000.000	165.6	V	340.0	24.7	15.8	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1599.933333	35.4	1000.0	1000.000	195.5	H	206.0	-5.6	18.5	53.9
4812.166667	39.5	1000.0	1000.000	116.7	V	73.0	5.8	14.4	53.9
4943.233333	39.2	1000.0	1000.000	202.3	V	23.0	6.4	14.7	53.9
*9623.900000	55.2	1000.0	1000.000	116.7	V	313.0	12.3	59.0	114.2
*9886.666667	59.8	1000.0	1000.000	204.5	V	297.0	12.9	53.9	113.7
16797.566667	45.3	1000.0	1000.000	165.6	V	340.0	24.7	8.6	53.9

Test Notes: Measurement was performed with 2.4GHz notch filter. No significant emission observed above 10GHz. Measurement above 10GHz are noise floor figures.

* Measured harmonic frequencies are outside of the restricted bands; therefore, FCC Subpart B limits do not apply.

2.7 RADIATED BAND EDGE MEASUREMENTS AND IMMEDIATE RESTRICTED BANDS

2.7.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.7.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.7.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration B

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

November 25, 2015 / AC

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.3 °C
Relative Humidity	39.5 %
ATM Pressure	98.8 kPa

2.7.7 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.
- Measurement was preformed with a dipole 9dBi antenna attached to the EUT antenna connector.

- 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.

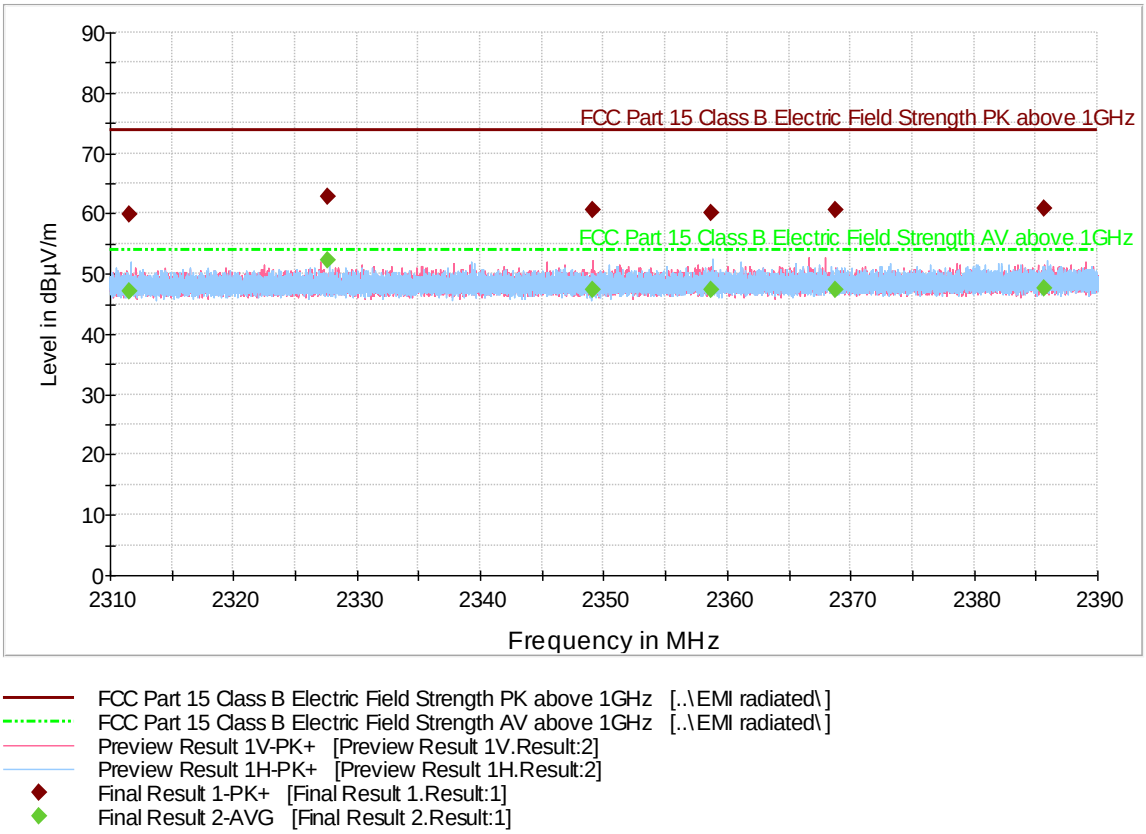
2.7.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dBµV) @ 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**

2.7.9 Test Results

See attached plots.

2.7.10 Test Results Restricted Band 2310MHz to 2390MHz (with Low Sub-Band_Low Channel 2402MHz and High Sub-Band_High Channel 2475.63MHz Transmit at the same time)



Peak Data

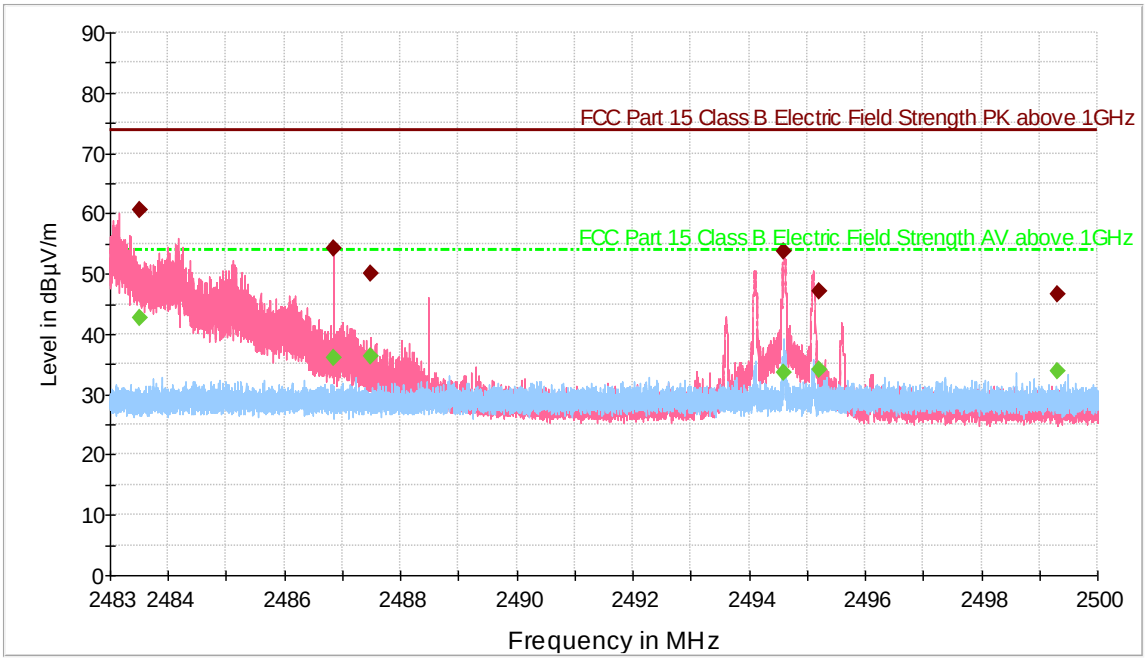
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2311.512000	59.8	1000.0	1000.000	171.6	H	16.0	34.8	14.1	73.9
2327.642667	62.8	1000.0	1000.000	173.6	V	149.0	34.8	11.1	73.9
2349.157333	60.6	1000.0	1000.000	132.7	V	63.0	34.7	13.3	73.9
2358.653333	60.2	1000.0	1000.000	400.7	H	344.0	34.7	13.7	73.9
2368.738667	60.7	1000.0	1000.000	400.7	V	344.0	34.8	13.3	73.9
2385.730667	60.8	1000.0	1000.000	103.7	H	330.0	34.8	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)
2311.512000	47.2	1000.0	1000.000	171.6	H	16.0	34.8	6.7	53.9
2327.642667	52.2	1000.0	1000.000	173.6	V	149.0	34.8	1.7	53.9
2349.157333	47.3	1000.0	1000.000	132.7	V	63.0	34.7	6.6	53.9
2358.653333	47.3	1000.0	1000.000	400.7	H	344.0	34.7	6.6	53.9
2368.738667	47.4	1000.0	1000.000	400.7	V	344.0	34.8	6.5	53.9
2385.730667	47.7	1000.0	1000.000	103.7	H	330.0	34.8	6.2	53.9

Test Notes: 2.4 GHz notch filter removed for this test. Preamp also removed for this test due to it was saturated to the fundamental frequency.

2.7.11 Test Results Restricted Band 2483.5MHz to 2500MHz (with Low Sub-Band_Low Channel 2402MHz and High Sub-Band_High Channel 2475.63MHz Transmit at the same time)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.500000	60.6	1000.0	1000.000	147.7	V	89.0	-0.1	13.3	73.9
2486.838600	54.2	1000.0	1000.000	103.7	V	270.0	0.0	22.5	73.9
2487.480800	50.1	1000.0	1000.000	103.7	V	305.0	0.0	23.8	73.9
2494.598733	53.6	1000.0	1000.000	132.7	V	304.0	0.0	26.1	73.9
2495.195700	47.0	1000.0	1000.000	180.6	V	281.0	0.0	26.9	73.9
2499.322367	46.7	1000.0	1000.000	171.6	V	231.0	0.0	27.2	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.500000	42.6	1000.0	1000.000	147.7	V	89.0	-0.1	11.3	53.9
2486.838600	36.2	1000.0	1000.000	103.7	V	270.0	0.0	17.7	53.9
2487.480800	36.2	1000.0	1000.000	103.7	V	305.0	0.0	17.7	53.9
2494.594733	33.6	1000.0	1000.000	132.7	V	304.0	0.0	20.3	53.9
2495.195700	34.1	1000.0	1000.000	180.6	V	281.0	0.0	19.8	53.9
2499.322367	33.7	1000.0	1000.000	171.6	V	231.0	0.0	20.2	53.9

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

2.8 POWER SPECTRAL DENSITY

2.8.1 Specification Reference

Part 15 Subpart C §15.247(e)

2.8.2 Standard Applicable

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

2.8.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

November 23, 2015 / AC

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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.0 °C
Relative Humidity	21.1 %
ATM Pressure	99.0 kPa

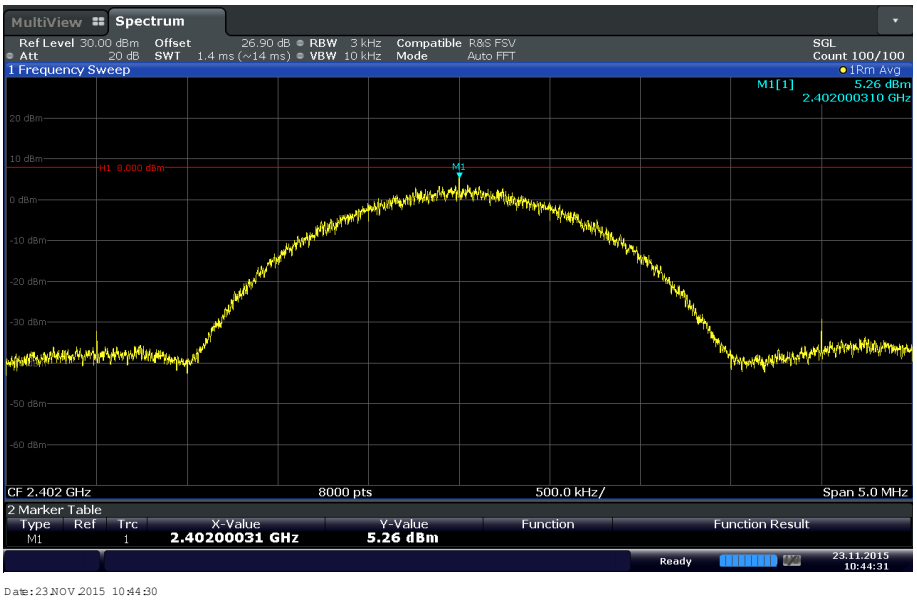
2.8.7 Additional Observations

- This is a conducted test.
- Test procedure is per Section 10.3 of KDB 558074 v03r03, (June 09, 2015).
- A correction factor of 26.9 dB was used to compensate for the external attenuator and cable used.
- Detector is Peak.
- Trace Mode is Max hold.
- Sweep time is Auto Couple.
- EUT complies with 100 kHz RBW.

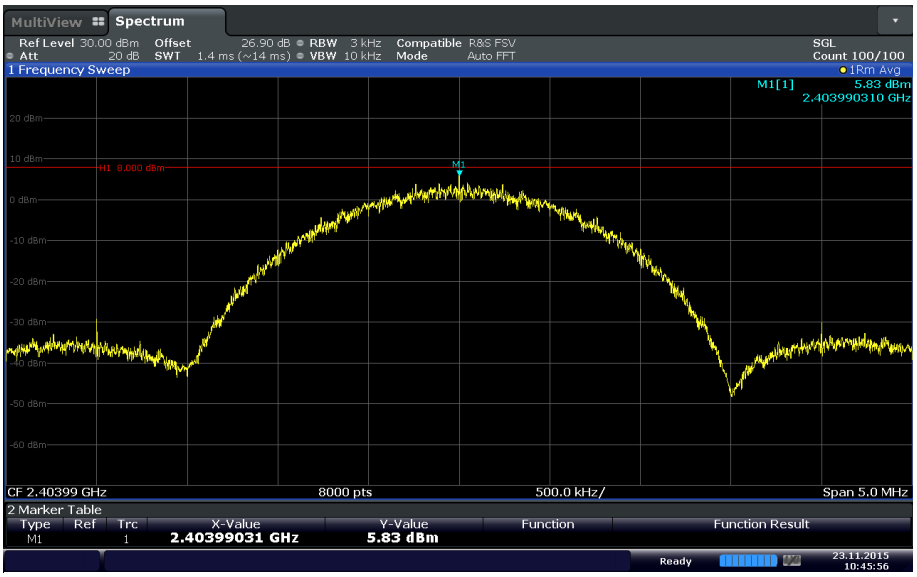
2.8.8 Test Results Summary (AVGPSD Method)

Mode	Channel	Marker Reading using 3 kHz RBW (dBm)	PSD Limit (dBm)	Compliance
Low Sub Band	1 (2402 MHz)	5.26	8	Complies
	2 (2403.99 MHz)	5.83	8	Complies
	3 (2405.98 MHz)	5.56	8	Complies
High Sub Band	36 (2471.65 MHz)	3.42	8	Complies
	37 (2473.64 MHz)	3.89	8	Complies
	38 (2475.63 MHz)	3.19	8	Complies

2.8.9 Test Results Plots

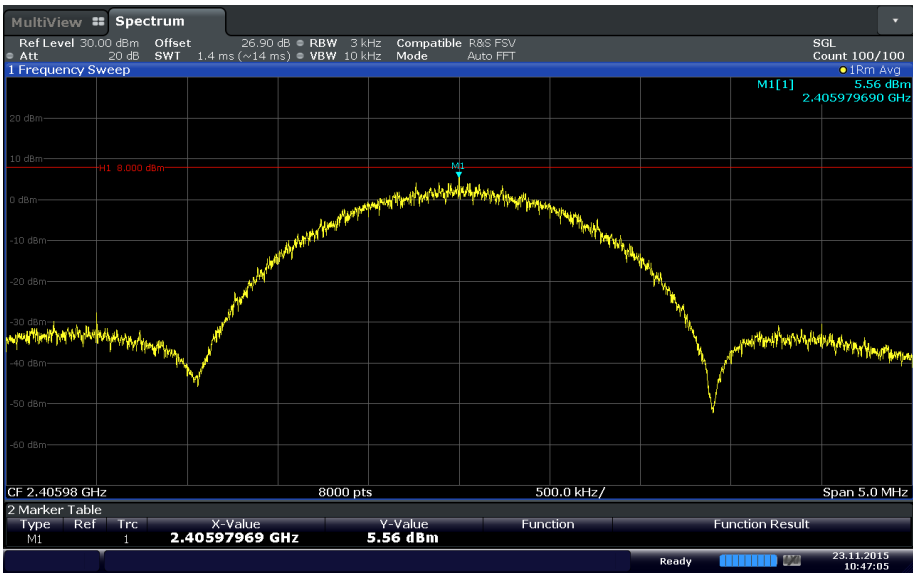


Low Sub Band_Low Channel 1 (2402 MHz)



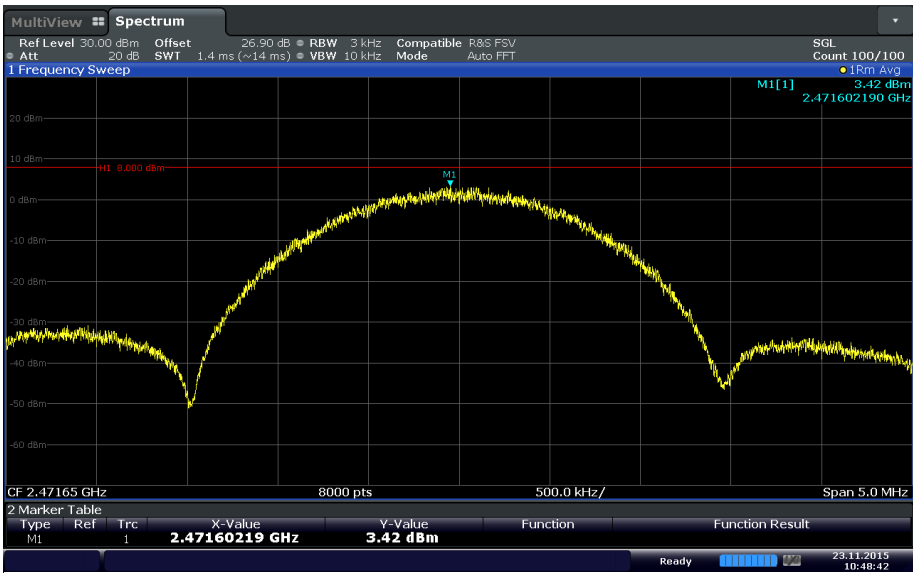
Date: 23.NOV.2015 10:45:56

Low Sub Band_Mid Channel 2 (2403.99 MHz)



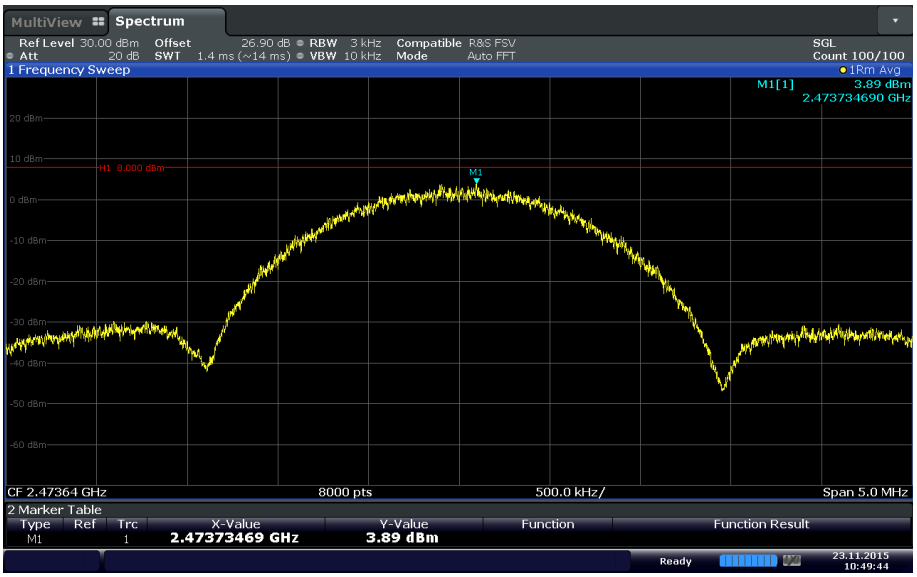
Date: 23.NOV.2015 10:47:05

Low Sub Band_High Channel 3 (2405.98 MHz)



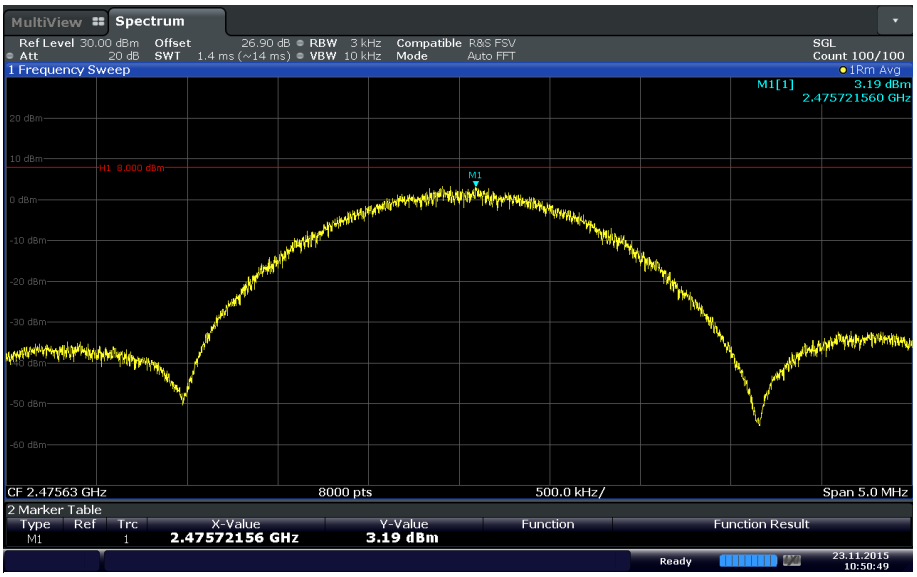
Date: 23.NOV.2015 10:48:42

High Sub Band_Low Channel 36 (2471.65 MHz)



Date: 23.NOV.2015 10:49:44

High Sub Band_Mid Channel 37 (2473.64 MHz)



High Sub Band_High Channel 38 (2475.63 MHz)

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

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

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Antenna Conducted Port Setup						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/05/15	10/05/16
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	06/19/15	06/19/16
7605	50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	04/10/15	04/10/16
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	07/29/15	07/29/16
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7582 and 7608	
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	09/25/14	09/25/16
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	09/29/15	09/29/16
1016	Pre-amplifier	PAM-0202	187	PAM	12/15/15	12/15/16
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	02/28/14	02/28/16
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/11/15	03/11/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	03/20/15	03/20/16
1150	Horn antenna	3160-09	012054-004	ETS	07/16/15	07/16/17
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	05/08/15	05/08/16
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 1049	
Miscellaneous						
7560	Barometer/Temperature/Humidity Transmitter	iBTHX-W	1240476	Omega	10/19/15	10/19/16
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

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

3.2.1 Radiated Emission Measurements (Below 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.78
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.57

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	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.78
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.56

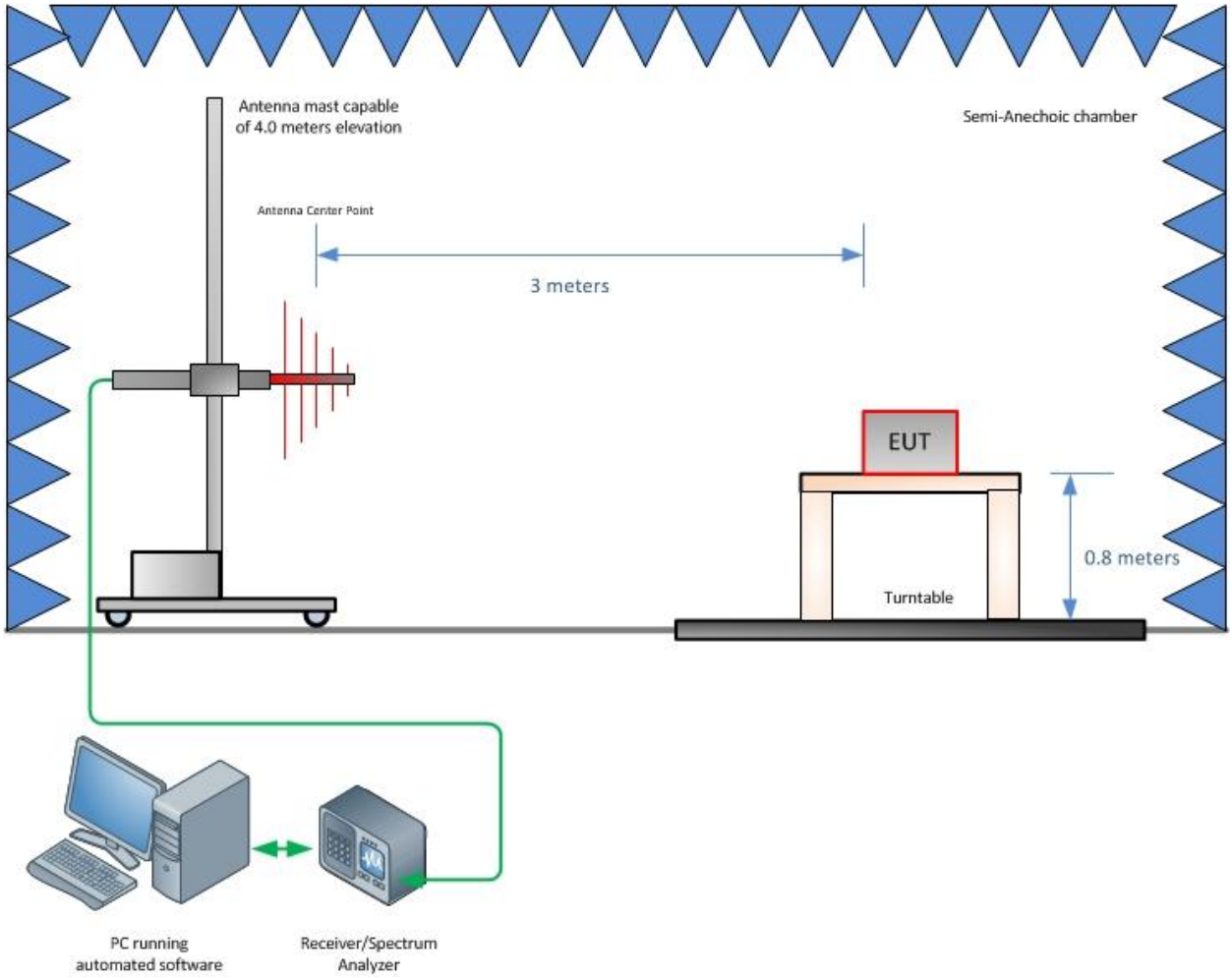
3.2.3 Conducted Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.08	0.05	0.00
2	Cables	Rectangular	0.30	0.17	0.03
3	EUT Setup	Rectangular	0.50	0.29	0.08
				Combined Uncertainty (u_c):	0.34
				Coverage Factor (k):	1.96
				Expanded Uncertainty:	0.67

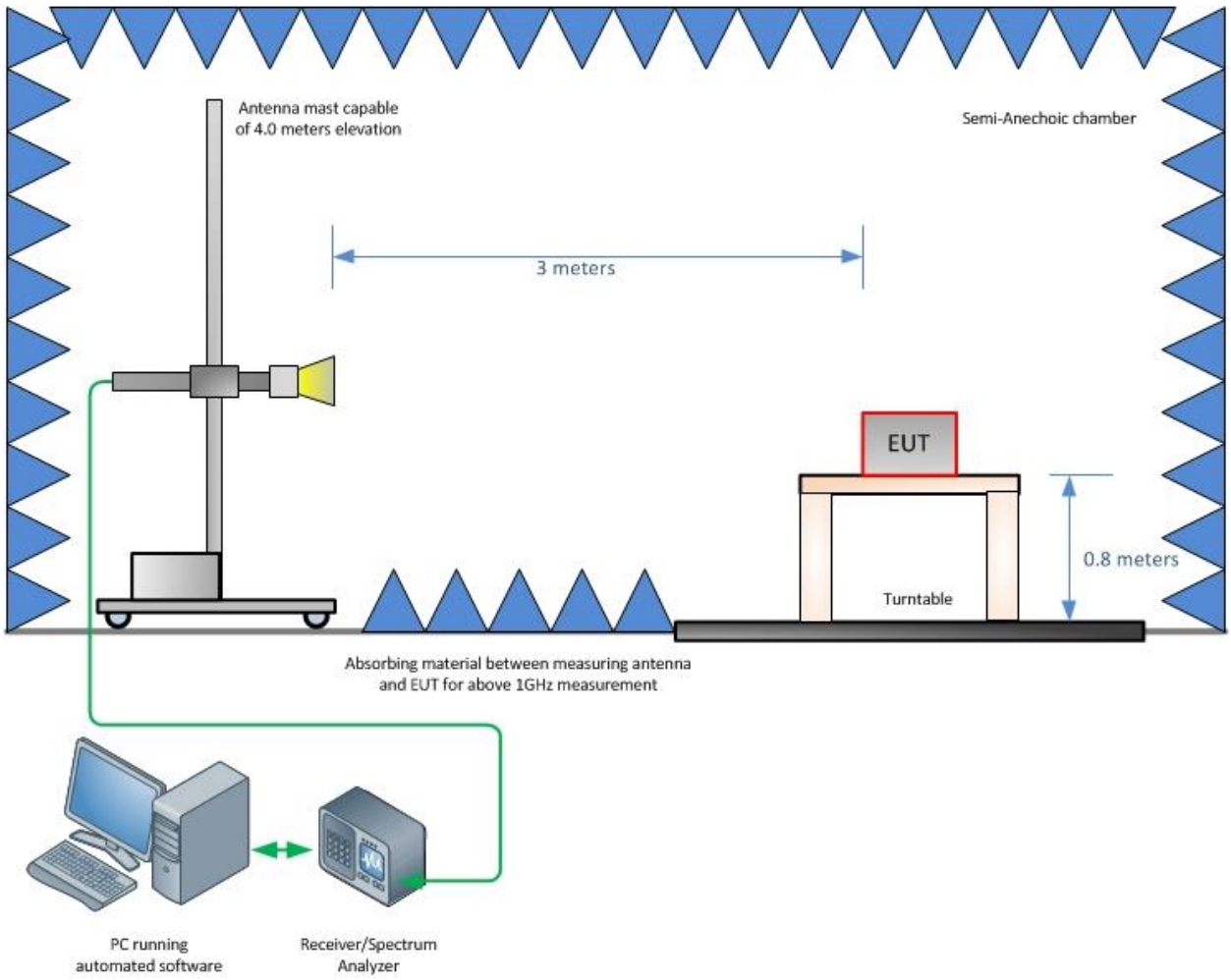
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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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

SECTION 6

Annex "A"

MAX POWER-ANTENNA ATTESTATION LETTER

On-Ramp Wireless, Inc
10920 Via Frontera, Suite 200
San Diego, CA 92127, USA
+1 858 592 6008 : phone
+1 858 592 6009 : fax
info@onrampwireless.com
www.onrampwireless.com

Jan 15, 2016

BABT FCB
Forsyth House,
Churchfield Road,
Walton-on-Thames,
Surrey, KT12 2TD

Attention: Reviewing Agency or TCB
FCC ID: XTE-ULPAP310

On behalf of On-Ramp Wireless, Inc., I certify that the Dual Latency system's output power is controlled by firmware to transmit a maximum sub-band antenna port power, P_{max}, of 30dbm. The absolute maximum sub-band power transmitted is limited to 36dBm E.I.R.P, such that $P_{max} = 36 + L - G$. G is the antenna gain in dB, not to exceed 9dBi and L the cable loss to the antenna based on the installation, typically less than 3dB. Furthermore, the system is designed to be operated with one or two sub-bands sharing the same antenna and each sub-band is an independent data stream.

Dated this 15th day of Jan, 2016.

Jason Wilson
VP Product Management, On-Ramp Wireless, Inc.
10920 Via Frontera, Suite 200, San Diego, CA 92127
Phone: 858-312-8356, Fax: 858-592-6009
jason.wilson@onrampwireless.com