



America

**Choose certainty.
Add value.**

Report On

Application for Grant of Equipment Authorization of the
NantWorks
HBox Access Point for Medical Devices

FCC Subpart C Part 15.249: 2014
IC RSS-210 Issue 8 December 2010



Report No. SD72102282-0215H

June 2015



America

TÜV SÜD America Inc., 10040 Mesa Rim Road, San Diego, CA 92121
Tel: (858) 678-1400. Website: www.TUVamerica.com

| | |
|---------------------------|--|
| REPORT ON | Radio Testing of the NantWorks HBox Access Point for Medical Devices |
| TEST REPORT NUMBER | SD72102282-0215H |
| PREPARED FOR | NantWorks 9920 Jefferson Blvd. Culver City, CA 90232 |
| CONTACT PERSON | David Lu Principal Engineer (858) 735-6852 dlu@nantworks.com |
| PREPARED BY |  Xiaoying Zhang Name Authorized Signatory Title: EMC/Wireless Test Engineer |
| APPROVED BY |  Juan M. Gonzalez Name Authorized Signatory Title: Commercial Wireless EMC Lab Manager |
| DATED | <u>June 23, 2015</u> |



America

TÜV SÜD America Inc., 10040 Mesa Rim Road, San Diego, CA 92121
Tel: (858) 678-1400. Website: www.TUVamerica.com

Revision History

| SD72102282-0215H NantWorks HBox Access Point for Medical Devices | | | | | |
|--|-----------------|--------------|--------|-------------------|-----------------|
| DATE | OLD REVISION | NEW REVISION | REASON | PAGES AFFECTED | APPROVED BY |
| 06/23/2015 | Initial Release | | | | Juan M Gonzalez |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |



CONTENTS

| Section | Page No |
|----------|---|
| 1 | REPORT SUMMARY5 |
| 1.1 | Introduction.....6 |
| 1.2 | Brief Summary of Results.....7 |
| 1.3 | Product Information8 |
| 1.4 | EUT Test configuration10 |
| 1.5 | Deviations from the Standard.....12 |
| 1.6 | Modification Record12 |
| 1.7 | test methodology12 |
| 1.8 | test facility12 |
| 2 | TEST DETAILS.....13 |
| 2.1 | Conducted Emissions14 |
| 2.2 | 20 dB bandwidth20 |
| 2.3 | 99% EMISSION bandwidth22 |
| 2.4 | Field Strength Limits for Fundamental and Harmonics24 |
| 2.5 | Radiated Spurious Emissions28 |
| 3 | TEST EQUIPMENT USED29 |
| 3.1 | Test Equipment Used.....30 |
| 3.2 | Measurement Uncertainty31 |
| 4 | Diagram of Test Setup32 |
| 4.1 | Radiated Emission Test Setup (Below 1GHz).....33 |
| 4.2 | Radiated Emission Test Setup (Above 1GHz).....34 |
| 5 | ACCREDITATION, DISCLAIMERS AND COPYRIGHT35 |
| 5.1 | Accreditation, Disclaimers and Copyright36 |



SECTION 1

REPORT SUMMARY

Radio Testing of the
NantWorks
HBox Access Point for Medical Devices



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the NantWorks HBox Access Point for Medical Devices to the requirements of FCC Subpart C Part 15.249 and IC RSS-210 Issue 8 December 2010.

| | |
|-------------------------------|---|
| Objective | To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer | NantWorks |
| Model Number(s) | 200-HBV-PDL |
| FCC ID Number | IFU1001011 |
| IC Number | N/A |
| Serial Number(s) | N/A (Sample #2) Conducted antenna service port testing sample, serial number not available due to temporary addition of an antenna port for testing / (Sample #1) (Radiated testing) |
| Number of Samples Tested | 2 |
| Test Specification/Issue/Date | <ul style="list-style-type: none">• FCC Subpart C Part 15.249 (October 1, 2014).• RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010).• RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014). |
| Start of Test | April 28, 2015 |
| Finish of Test | June 17, 2015 |
| Name of Engineer(s) | Xiaoying Zhang |
| Related Document(s) | None. Supporting documents for EUT certification are separate exhibits. |

1.2 BRIEF SUMMARY OF RESULTS

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

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

* Not applicable. EUT does not have a separate receive mode.



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a NantWorks HBox Access Point for Medical Devices. The EUT can connect to a network through Ethernet port or Wi-Fi. In normal operation, the EUT collects user data via USB, Bluetooth or Wi-Fi and upload the information back to a data server. The NFC function is for quick Bluetooth pairing by obtaining the device info when within NFC range of the EUT. Only the ISM900 functions verified in this test report.



1.3.2 EUT General Description

| | |
|---------------------------------|--|
| EUT Description | Access Point for Medical Devices |
| Model Name | HBox |
| Model Number(s) | 200-HBV-PDL |
| Output Power | 87.6 dBμV/m @ 3 meters |
| Frequency Range | 907.892 MHz in the 902 MHz to 928 MHz Band |
| Rated Voltage | Internal 3.7VDC Li-Ion Battery (GP Batteries 2501022), AC adapter/charger is Hon-Kwang Switching Power Supply Model: HK-AD-050A500-US, output is 5.0VDC 5.0A |
| Mode Verified | ISM900 |
| Capability | CDMA2000 1xRTT, 1xEvDO Release A, 802.11 a/b/g/n WLAN (DTS/U-NII), Bluetooth 2.0 + EDR, Bluetooth 4.0, ISM900 and NFC |
| Primary Unit (EUT) | <input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering |
| Number of Operating Frequencies | 2 |
| Modulation | 2FSK |
| Antenna Type | Integral |
| Antenna Gain | 1.0dBi |



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 main antenna (Ant.#1). Programmed using PuTTY SSH2 (Secure Shell) client software. |
| B | Radiated emissions test configuration. The EUT is programmed using PuTTY SSH2 (Secure Shell) client software. The EUT is connected to a support broadband router where the support laptop used to program the EUT is also connected. Client provided radio commands to modify modes, channel number and data rates. TX power is set to max power as a default setting. |

1.4.2 EUT Exercise Software

HBOX Function Tester. This is built-in within the firmware. Radio commands are executed via Ethernet using Putty from a support PC.

1.4.3 Support Equipment and I/O cables

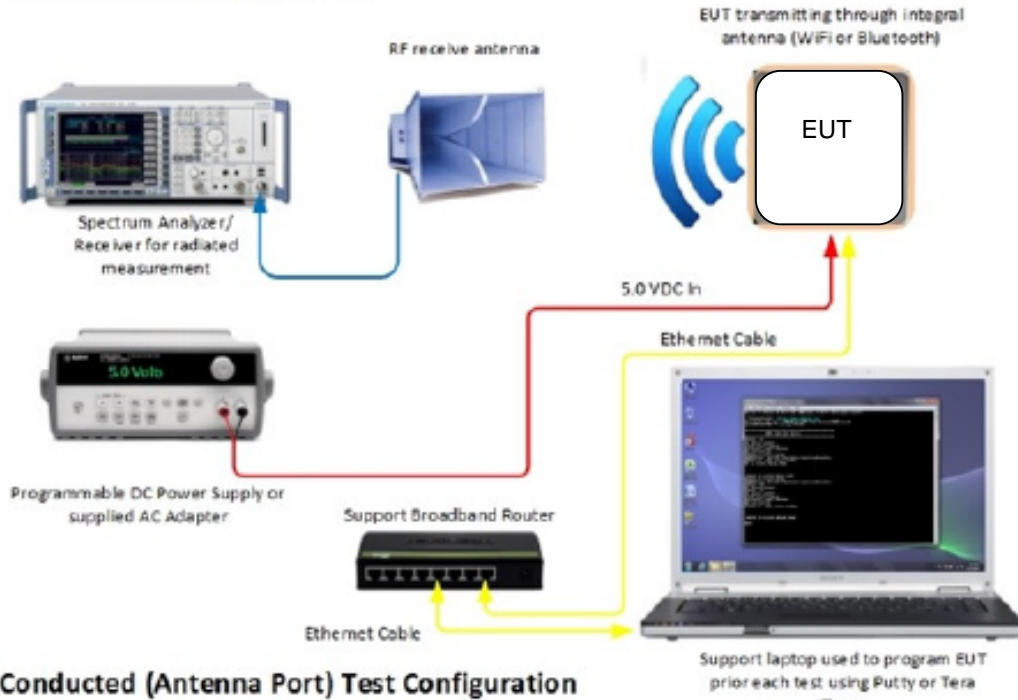
| Manufacturer | Equipment/Cable | Model | Description |
|--------------|-------------------------------------|------------------|--|
| Sony | Personal Computer (Y Series Laptop) | PCG-31311L | - |
| Sony | AC Adapter | PCGA-AC19V9 | S/N:147839091 0023259 |
| HON-KWANG | Switching Power Supply (x2) | HK-AD-050A500-US | 5VDC @ 5A |
| Trendnet | Broadband Router | TW100-S4W1CA, | S/N: RA1332S400789 |
| Lorom | CAT5E Patch Cable (x2) | - | Unshielded, 1.5 meters Ethernet cables |

1.4.4 Worst Case Configuration

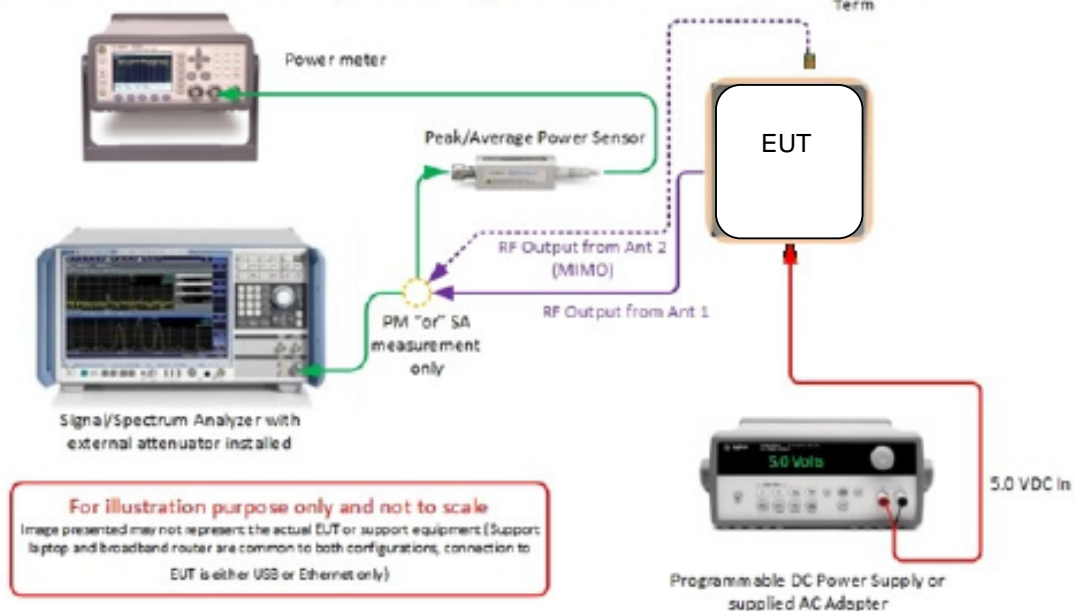
EUT is a mobile device. For radiated measurements X, Y and Z orientations were verified. Worst case position is "X".

1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration



Conducted (Antenna Port) Test Configuration





1.5 DEVIATIONS FROM THE STANDARD

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

1.6 MODIFICATION RECORD

| Description of Modification | Modification Fitted By | Date Modification Fitted |
|---|------------------------|--------------------------|
| Serial Number N/A (Sample #2) and (Sample #1) | | |
| 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 789033 D01 General U-NII Test Procedures v01r03 (Federal Communications Commission Office of Engineering and Technology Laboratory Division Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

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

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: 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.

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

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



SECTION 2

TEST DETAILS

Radio Testing of the
NantWorks
HBox Access Point for Medical Devices



2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

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

2.1.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

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

**Decreases with the logarithm of the frequency.*

2.1.3 Equipment Under Test and Modification State

Serial No: N/A (Sample #!) / Test Configuration B

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

April 28 and May 18, 2014/XYZ

2.1.5 Test Equipment Used

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

2.1.6 Environmental Conditions

Ambient Temperature 22.9 - 23.8 °C
Relative Humidity 45.2 - 47.1.%
ATM Pressure 99.2 - 99.9 kPa

2.1.7 Additional Observations

- The EUT was verified using AC adapter supplied by the manufacturer..
- EUT verified using input voltage of 120VAC 60Hz.
- There are no significant variations in test results between each operating modes. Only the worst case observed configuration is presented.
- Receive mode is also presented for comparison.



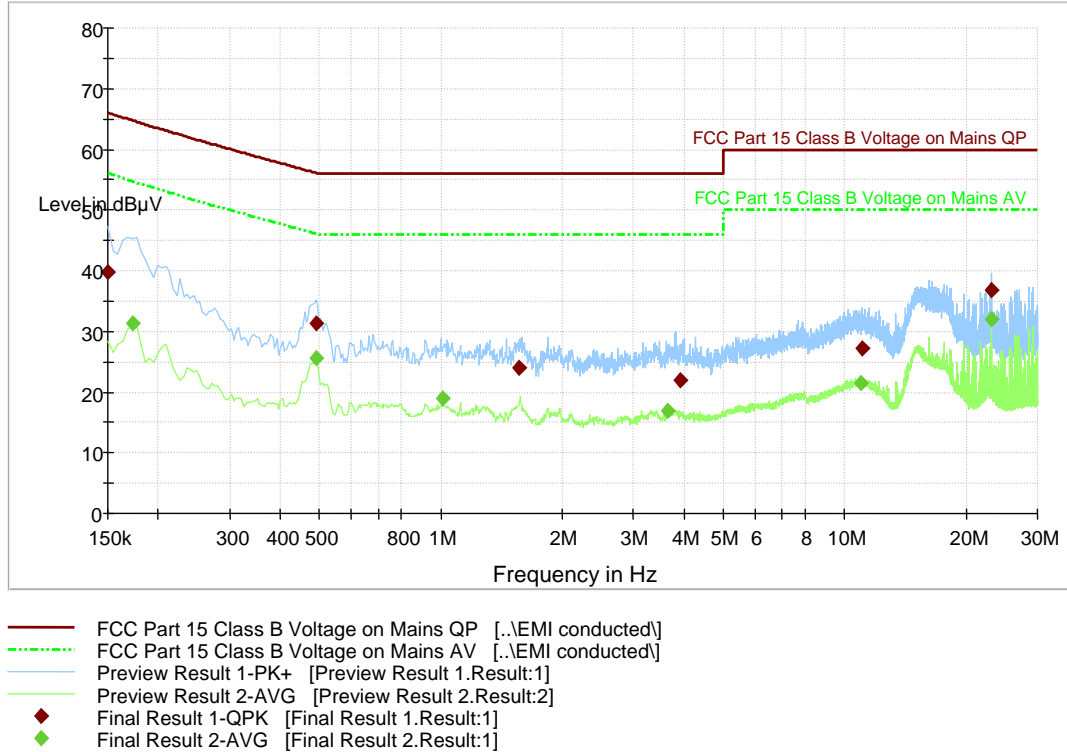
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.2.8 for sample computation.

2.1.8 Sample Computation (Conducted Emission – Quasi Peak)

| | | | |
|--|--------------------------------|------|------|
| Measuring equipment raw measurement (db μ V) @ 150kHz | | | 5.5 |
| Correction Factor (dB) | Asset# 8607 (20 dB attenuator) | 19.9 | 20.7 |
| | Asset# 1177 (cable) | 0.15 | |
| | Asset# 1176 (cable) | 0.35 | |
| | Asset# 7567 (LISN) | 0.30 | |
| Reported QuasiPeak Final Measurement (db μ V) @ 150kHz | | | 26.2 |

2.1.9 Test Results - Conducted Emissions Line 1 – Hot (Test Results for 907.892MHz mode)

TUV SR7 Line 1 ESCS



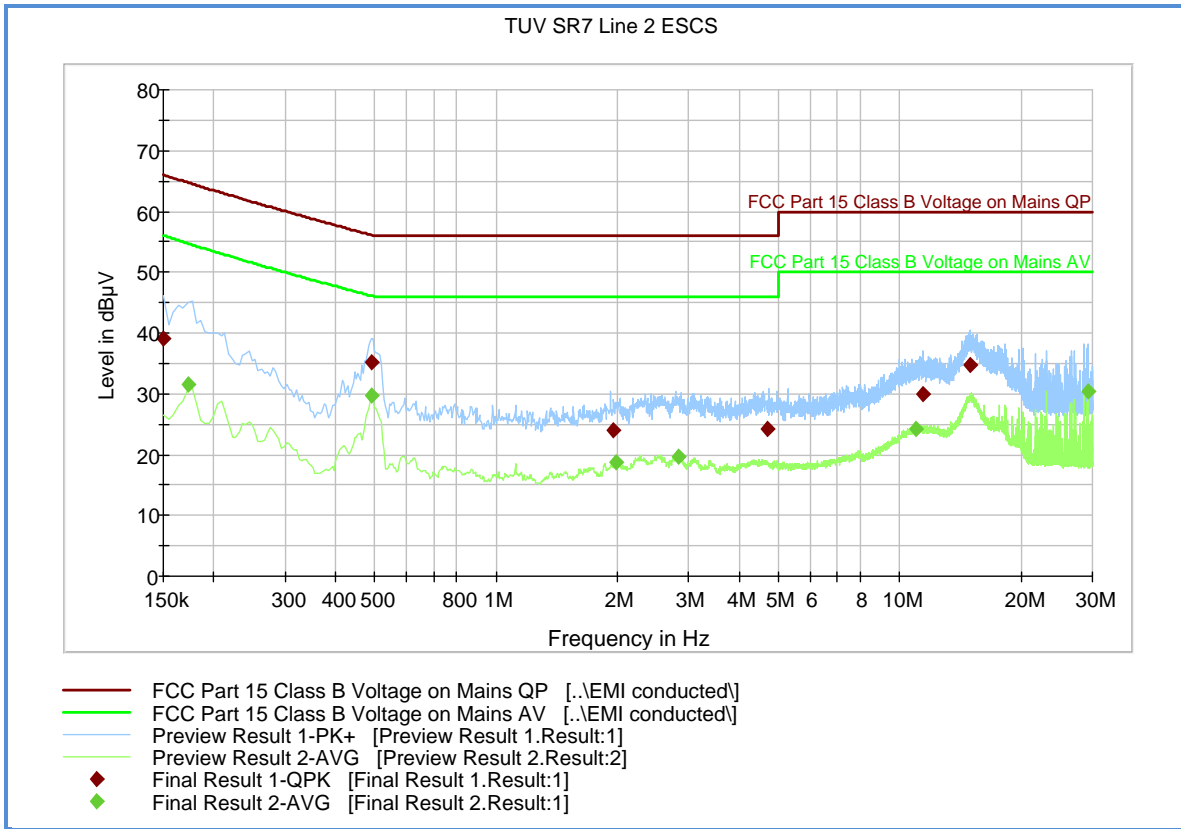
Quasi Peak

| Frequency (MHz) | QuasiPeak (dBμV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBμV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.150000 | 39.7 | 1000.0 | 9.000 | Off | N | 20.1 | 26.3 | 66.0 |
| 0.492000 | 31.3 | 1000.0 | 9.000 | Off | N | 20.1 | 24.9 | 56.1 |
| 1.563000 | 23.9 | 1000.0 | 9.000 | Off | N | 20.2 | 32.1 | 56.0 |
| 3.912000 | 22.0 | 1000.0 | 9.000 | Off | N | 20.5 | 34.0 | 56.0 |
| 11.022000 | 27.2 | 1000.0 | 9.000 | Off | N | 20.7 | 32.8 | 60.0 |
| 23.127000 | 36.7 | 1000.0 | 9.000 | Off | N | 20.9 | 23.3 | 60.0 |

Average

| Frequency (MHz) | Average (dBμV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - Ave (dB) | Limit - Ave (dBμV) |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.172500 | 31.4 | 1000.0 | 9.000 | Off | N | 20.1 | 23.4 | 54.7 |
| 0.492000 | 25.6 | 1000.0 | 9.000 | Off | N | 20.1 | 20.5 | 46.1 |
| 1.014000 | 19.1 | 1000.0 | 9.000 | Off | N | 20.2 | 26.9 | 46.0 |
| 3.655500 | 16.9 | 1000.0 | 9.000 | Off | N | 20.4 | 29.1 | 46.0 |
| 10.941000 | 21.5 | 1000.0 | 9.000 | Off | N | 20.7 | 28.5 | 50.0 |
| 23.127000 | 31.9 | 1000.0 | 9.000 | Off | N | 20.9 | 18.1 | 50.0 |

2.1.10 FCC Conducted Emissions Line 2 – Neutral (Test Results for 907.892MHz mode)



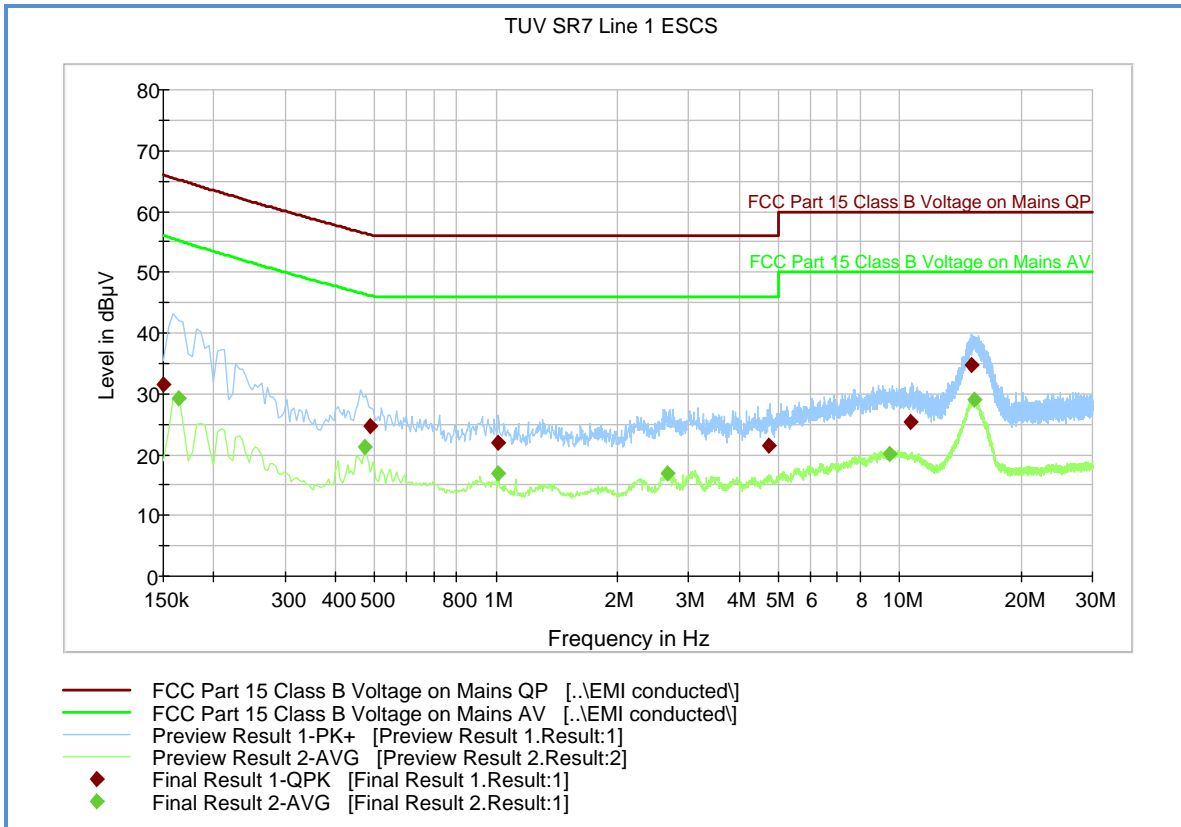
Quasi Peak

| Frequency (MHz) | QuasiPeak (dBμV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBμV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.150000 | 39.1 | 1000.0 | 9.000 | Off | N | 20.1 | 26.9 | 66.0 |
| 0.492000 | 35.1 | 1000.0 | 9.000 | Off | N | 20.1 | 21.0 | 56.1 |
| 1.950000 | 24.1 | 1000.0 | 9.000 | Off | N | 20.1 | 31.9 | 56.0 |
| 4.717500 | 24.2 | 1000.0 | 9.000 | Off | N | 20.4 | 31.8 | 56.0 |
| 11.377500 | 29.9 | 1000.0 | 9.000 | Off | N | 20.7 | 30.1 | 60.0 |
| 14.928000 | 34.7 | 1000.0 | 9.000 | Off | N | 20.7 | 25.3 | 60.0 |

Average

| Frequency (MHz) | Average (dBμV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - Ave (dB) | Limit - Ave (dBμV) |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.172500 | 31.5 | 1000.0 | 9.000 | Off | N | 20.1 | 23.2 | 54.7 |
| 0.492000 | 29.8 | 1000.0 | 9.000 | Off | N | 20.1 | 16.3 | 46.1 |
| 1.981500 | 18.7 | 1000.0 | 9.000 | Off | N | 20.2 | 27.3 | 46.0 |
| 2.827500 | 19.7 | 1000.0 | 9.000 | Off | N | 20.5 | 26.3 | 46.0 |
| 10.986000 | 24.2 | 1000.0 | 9.000 | Off | N | 20.7 | 25.8 | 50.0 |
| 29.233500 | 30.3 | 1000.0 | 9.000 | Off | N | 21.0 | 19.7 | 50.0 |

2.1.11 FCC Conducted Emissions Line 1 – Hot (Receive Mode)



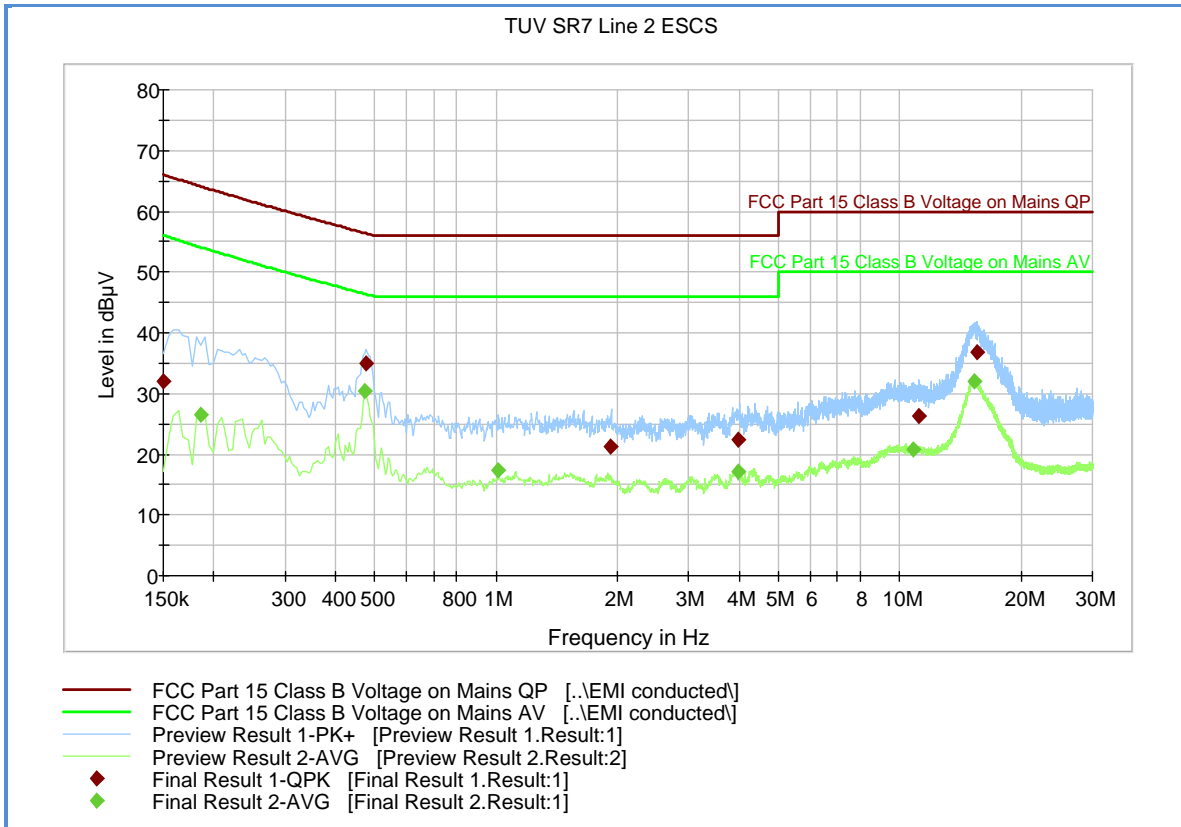
Quasi Peak

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.150000 | 31.6 | 1000.0 | 9.000 | Off | L1 | 20.1 | 34.4 | 66.0 |
| 0.487500 | 24.7 | 1000.0 | 9.000 | Off | L1 | 20.1 | 31.5 | 56.2 |
| 1.014000 | 21.9 | 1000.0 | 9.000 | Off | L1 | 20.2 | 34.1 | 56.0 |
| 4.722000 | 21.6 | 1000.0 | 9.000 | Off | L1 | 20.6 | 34.4 | 56.0 |
| 10.671000 | 25.4 | 1000.0 | 9.000 | Off | L1 | 20.7 | 34.6 | 60.0 |
| 15.076500 | 34.8 | 1000.0 | 9.000 | Off | L1 | 20.9 | 25.2 | 60.0 |

Average

| Frequency (MHz) | Average (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - Ave (dB) | Limit - Ave (dBµV) |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.163500 | 29.3 | 1000.0 | 9.000 | Off | L1 | 20.1 | 25.9 | 55.2 |
| 0.474000 | 21.2 | 1000.0 | 9.000 | Off | L1 | 20.1 | 25.2 | 46.4 |
| 1.014000 | 17.0 | 1000.0 | 9.000 | Off | L1 | 20.2 | 29.0 | 46.0 |
| 2.661000 | 16.9 | 1000.0 | 9.000 | Off | L1 | 20.5 | 29.1 | 46.0 |
| 9.433500 | 20.1 | 1000.0 | 9.000 | Off | L1 | 20.7 | 29.9 | 50.0 |
| 15.310500 | 28.9 | 1000.0 | 9.000 | Off | L1 | 20.9 | 21.1 | 50.0 |

2.1.12 FCC Conducted Emissions Line 2 – Neutral (Receive Mode)



Quasi Peak

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV) |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.150000 | 32.1 | 1000.0 | 9.000 | Off | N | 20.1 | 33.9 | 66.0 |
| 0.478500 | 35.0 | 1000.0 | 9.000 | Off | N | 20.1 | 21.4 | 56.3 |
| 1.927500 | 21.1 | 1000.0 | 9.000 | Off | N | 20.1 | 34.9 | 56.0 |
| 3.975000 | 22.3 | 1000.0 | 9.000 | Off | N | 20.5 | 33.7 | 56.0 |
| 11.134500 | 26.3 | 1000.0 | 9.000 | Off | N | 20.7 | 33.7 | 60.0 |
| 15.513000 | 36.9 | 1000.0 | 9.000 | Off | N | 20.7 | 23.1 | 60.0 |

Average

| Frequency (MHz) | Average (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - Ave (dB) | Limit - Ave (dBµV) |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------------|--------------------|
| 0.186000 | 26.4 | 1000.0 | 9.000 | Off | N | 20.1 | 27.6 | 54.1 |
| 0.474000 | 30.4 | 1000.0 | 9.000 | Off | N | 20.1 | 16.0 | 46.4 |
| 1.014000 | 17.3 | 1000.0 | 9.000 | Off | N | 20.2 | 28.7 | 46.0 |
| 3.966000 | 17.1 | 1000.0 | 9.000 | Off | N | 20.5 | 28.9 | 46.0 |
| 10.770000 | 20.8 | 1000.0 | 9.000 | Off | N | 20.6 | 29.2 | 50.0 |
| 15.310500 | 32.0 | 1000.0 | 9.000 | Off | N | 20.7 | 18.0 | 50.0 |



2.2 20 dB BANDWIDTH

2.2.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.215(c)
Industry Canada RSS-GEN, Clause 6.6

2.2.2 Standard Applicable

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

2.2.3 Equipment Under Test and Modification State

Serial No: N/A (Sample #2) / Test Configuration A

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

June 17, 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.

2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

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

2.2.7 Additional Observations

- This is a conducted test.
- "n dB down" marker function of the Spectrum Analyzer used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the Span, VBW is 3XRBW.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.

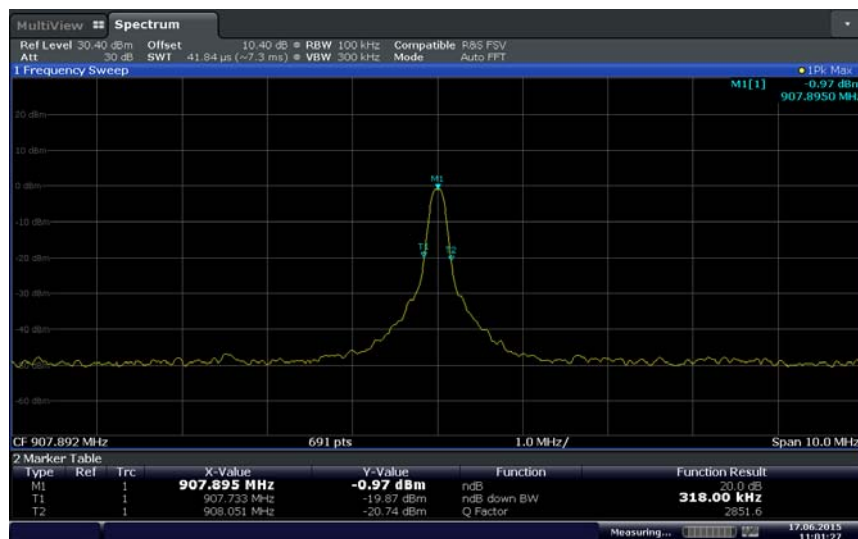
2.2.8 Test Results

| Frequency (MHz) | 20dB Bandwidth (kHz) |
|-----------------|----------------------|
| 907.892 | 318.0 |

Frequency Band: 902 MHz to 928 MHz Band

$907.892 \text{ MHz} - (20\text{dB BW}/2) = 907.733 \text{ (Within the frequency Band –Compliant)}$

$907.892 \text{ MHz} + (20\text{dB BW}/2) = 908.051 \text{ (Within the frequency Band –Compliant)}$



Date: 17 JUN 2015 11:01:27



2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

Industry Canada RSS-GEN, Clause 6.6

2.3.2 Standard Applicable

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

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth shall be set in the range of 1% to 5% of the occupied bandwidth (OBW) and the video bandwidth (VBW) shall be set to approximately 3 x RBW.

Video averaging is not permitted.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: N/A (Sample #2) / Test Configuration B

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

June 17, 2015/XYZ

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 Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

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



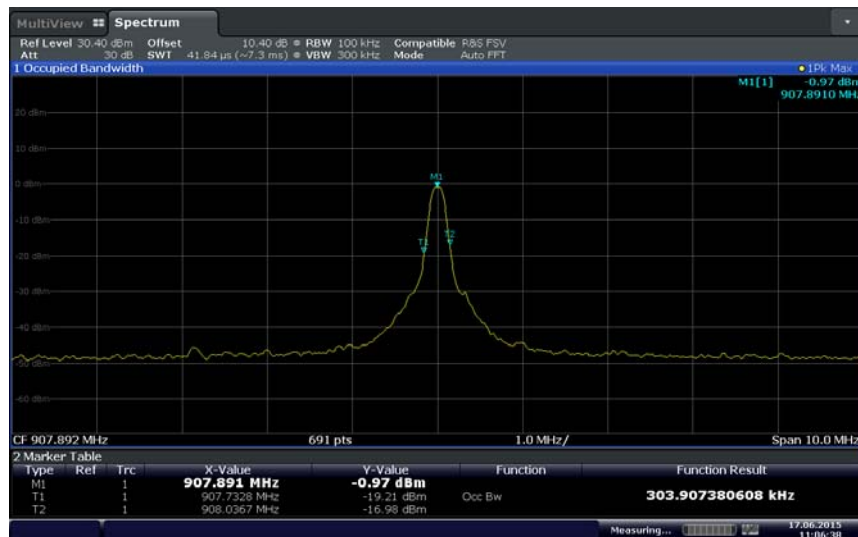
2.3.7 Additional Observations

- This is a conducted test.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the Span.VBW is 3XRBW.
- Sweep is auto.
- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.3.8 Test Results

| Frequency (MHz) | 99% Bandwidth (kHz) |
|-----------------|---------------------|
| 907.892 | 303.907 |

2.3.9 Test Plots



Date: 17 JUN 2015 11:06:39



2.4 FIELD STRENGTH LIMITS FOR FUNDAMENTAL AND HARMONICS

2.4.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.249(a)
Industry Canada RSS-210, Clause A2.9(a)

2.4.2 Standard Applicable

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

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of fundamental (dBμV/m) | Field strength of harmonics (microvolts/meter) | Field strength of harmonics (dBμV/m) |
|------------------------------|---|--|---|--|
| 902–928 MHz | 50 | 93.98 | 500 | 53.98 |
| 2400–2483.5 MHz | 50 | 93.98 | 500 | 53.98 |
| 5725–5875 MHz | 50 | 93.98 | 500 | 53.98 |
| 24.0–24.25 GHz | 250 | 107.96 | 2500 | 67.96 |

The field strength limits in paragraphs (a) of this section are based on average limits.

2.4.3 Equipment Under Test and Modification State

Serial No: N/A (Sample #1) / Test Configuration B

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

June 17 and 18, 2015/XYZ

2.4.5 Test Equipment Used

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

2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---------------------|-----------------|
| Ambient Temperature | 23.9°C |
| Relative Humidity | 46.2% |
| ATM Pressure | 99.4 - 99.6 kPa |



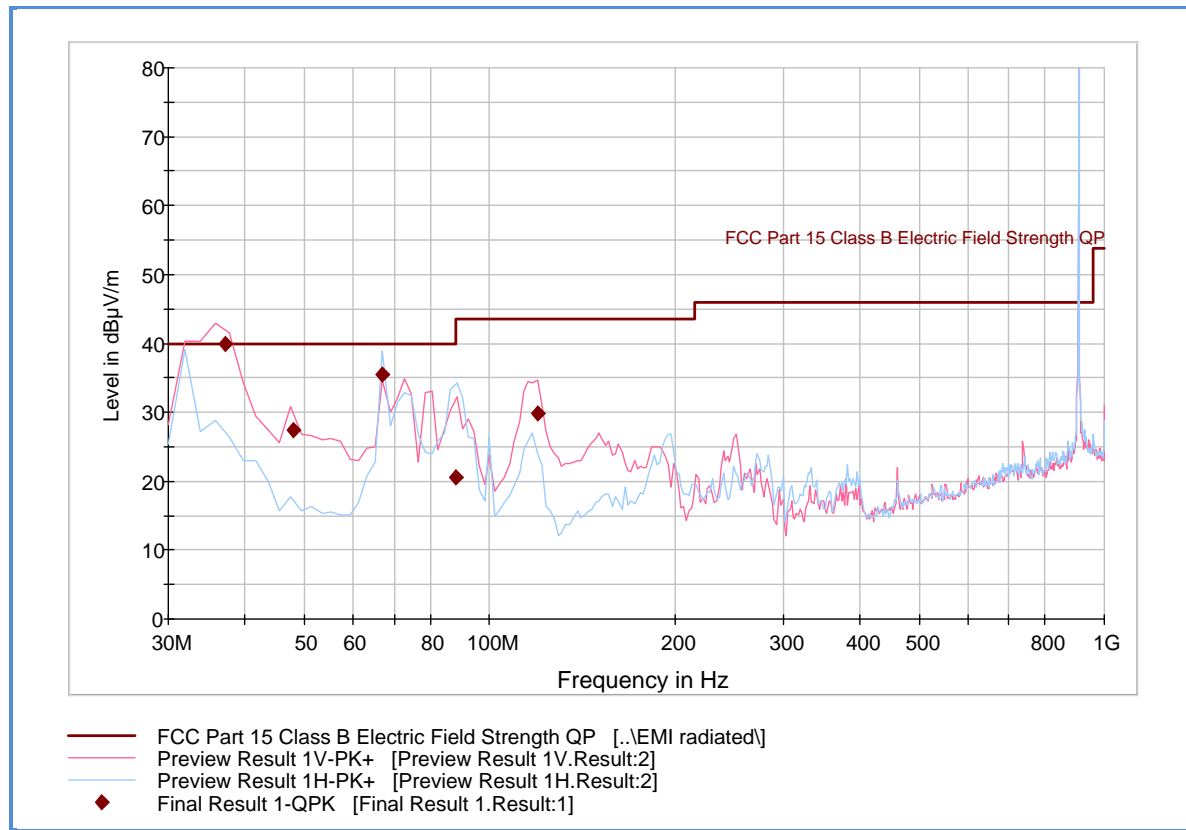
2.4.7 Additional Observations

- This is a radiated test. The spectrum was searched from 1GHz to at least the 10th harmonic (10GHz).
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.3.8 for sample computation.

2.4.8 Sample Computation (Radiated Emission)

| | | | |
|---|----------------------------|-------|-------|
| Measuring equipment raw measurement (db μ V) @ 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# 1033 (antenna) | 17.2 | |
| Reported QuasiPeak Final Measurement (db μ V/m) @ 30MHz | | | 11.8 |

2.4.9 Test Results for 907.892MHz below 1GHz (Fundamental, Band Edges and Immediate Restricted Bands)

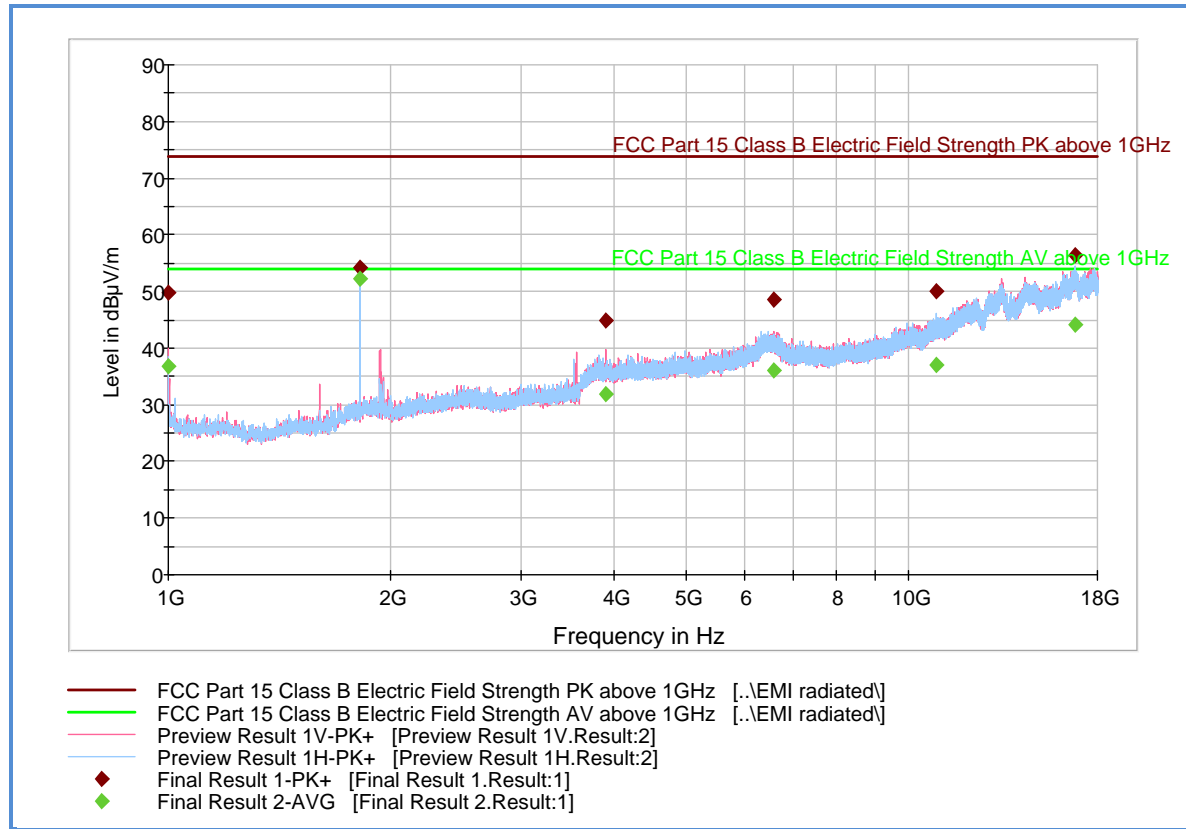


Quasi Peak Data

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 37.111663 | 40.0 | 1000.0 | 120.000 | 100.0 | V | -1.0 | -15.2 | 0.0 | 40.0 |
| 48.014990 | 27.5 | 1000.0 | 120.000 | 122.0 | V | 166.0 | -19.5 | 12.5 | 40.0 |
| 66.773868 | 35.4 | 1000.0 | 120.000 | 109.0 | H | 227.0 | -22.3 | 4.6 | 43.5 |
| 87.972745 | 20.6 | 1000.0 | 120.000 | 200.0 | H | -2.0 | -21.2 | 19.4 | 46.0 |
| 119.946613 | 29.9 | 1000.0 | 120.000 | 100.0 | V | -8.0 | -20.3 | 13.6 | 46.0 |
| 907.877275 | 89.0 | 1000.0 | 120.000 | 256.0 | H | 227.0 | 1.0 | 5.0 | 94.0 |

Test Notes: All spurious emissions complies with the general requirement of 15.209 and 15.249. The fundamental complies with 15.249.

2.4.10 Test Results for 907.892MHz above 1GHz (Harmonics)



Peak Data

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 1000.00000 | 49.7 | 1000.0 | 1000.000 | 202.5 | V | 206.0 | -7.2 | 24.2 | 73.9 |
| 1815.63333 | 54.2 | 1000.0 | 1000.000 | 115.8 | H | 78.0 | -3.5 | 19.7 | 73.9 |
| 3905.13333 | 44.8 | 1000.0 | 1000.000 | 131.7 | V | 106.0 | 5.1 | 29.1 | 73.9 |
| 6565.20000 | 48.6 | 1000.0 | 1000.000 | 406.7 | V | 2.0 | 11.3 | 25.3 | 73.9 |
| 10891.1666 | 49.9 | 1000.0 | 1000.000 | 265.3 | H | 199.0 | 14.5 | 24.0 | 73.9 |
| 16819.3000 | 56.3 | 1000.0 | 1000.000 | 236.4 | H | 2.0 | 23.6 | 17.6 | 73.9 |

Average Data

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 1000.00000 | 36.7 | 1000.0 | 1000.000 | 202.5 | V | 206.0 | -7.2 | 17.2 | 53.9 |
| 1815.63333 | 52.3 | 1000.0 | 1000.000 | 115.8 | H | 78.0 | -3.5 | 1.6 | 53.9 |
| 3905.13333 | 32.0 | 1000.0 | 1000.000 | 131.7 | V | 106.0 | 5.1 | 21.9 | 53.9 |
| 6565.20000 | 36.0 | 1000.0 | 1000.000 | 406.7 | V | 2.0 | 11.3 | 17.9 | 53.9 |
| 10891.1666 | 37.0 | 1000.0 | 1000.000 | 265.3 | H | 199.0 | 14.5 | 16.9 | 53.9 |
| 16819.3000 | 44.1 | 1000.0 | 1000.000 | 236.4 | H | 2.0 | 23.6 | 9.8 | 53.9 |

Test Notes: All harmonics complies with the general requirement of 15.209. (The Average limit for 15.249 is 89.0 dBµV/m – 50 = 39.0dBµV/m, and the Peak limit for 15.249 is 66.8 dBµV/m. The limits of 15.209 are applicable.)



2.5 RADIATED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.249(d)
Industry Canada RSS-210, Clause A2.9(b)

2.5.2 Standard Applicable

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

2.5.3 Equipment Under Test and Modification State

Serial No: N/A (Sample #1) / Test Configuration B

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

June 17 and 18, 2015/XYZ

2.5.5 Test Equipment Used

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

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---------------------|-----------------|
| Ambient Temperature | 23.9°C |
| Relative Humidity | 46.2% |
| ATM Pressure | 99.4 - 99.6 kPa |

2.5.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to at least the 10th harmonic (10GHz).
- The measurement results are identical to test results presented under Section 2.3.9 up to Section 2.4.10 of this test report. No other significant spurious emissions observed other than harmonics of the fundamental frequency.



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

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

| ID Number (SDGE/SDRB) | Test Equipment | Type | Serial Number | Manufacturer | Cal Date | Cal Due Date |
|--------------------------|--------------------------------------|-----------------|---------------|----------------------------|---------------------------|--------------|
| Conducted Port Setup | | | | | | |
| 7582 | Signal/Spectrum Analyzer | FSW26 | 101614 | Rhode & Schwarz | 12/22/14 | 12/22/15 |
| 1003 | Signal Generator | SMR 40 | 1104.0002.40 | Rhode & Schwarz | 04/29/15 | 04/29/16 |
| 7604 | Series Power Meter | N1912A | SG45100273 | Agilent | 05/27/15 | 05/27/16 |
| - | 10dB Attenuator | PE7010-10 | 3 | PASTERNAK | Verified by 7604 and 1003 | |
| Radiated Test Setup | | | | | | |
| 1002 | Bilog Antenna | 3142C | 00058717 | ETS-Lindgren | 01/30/14 | 01/30/16 |
| 1051 | Double-ridged waveguide horn antenna | 3115 | 9408-4329 | EMCO | 02/28/14 | 02/28/16 |
| 8628 | Pre-amplifier | QLJ 01182835-JO | 8986002 | QuinStar Technologies Inc. | 03/20/15 | 03/20/16 |
| 1040 | EMI Test Receiver | ESIB40 | 100292 | Rhode & Schwarz | 09/29/14 | 09/29/15 |
| 1049 | EMI Test Receiver | ESU | 100133 | Rhode & Schwarz | 03/11/15 | 03/11/16 |
| 1016 | Pre-amplifier | PAM-0202 | 187 | PAM | 12/10/14 | 12/10/15 |
| Miscellaneous | | | | | | |
| 6792 | Multimeter | 3478A | 2911A70964 | Hewlett Packard | 08/12/14 | 08/12/15 |
| | Test Software | EMC32 | V8.53 | Rhode & Schwarz | N/A | |

3.2 MEASUREMENT UNCERTAINTY

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

3.2.1 Radiated Emission Measurements (Below 1GHz)

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

3.2.2 Radiated Emission Measurements (Above 1GHz)

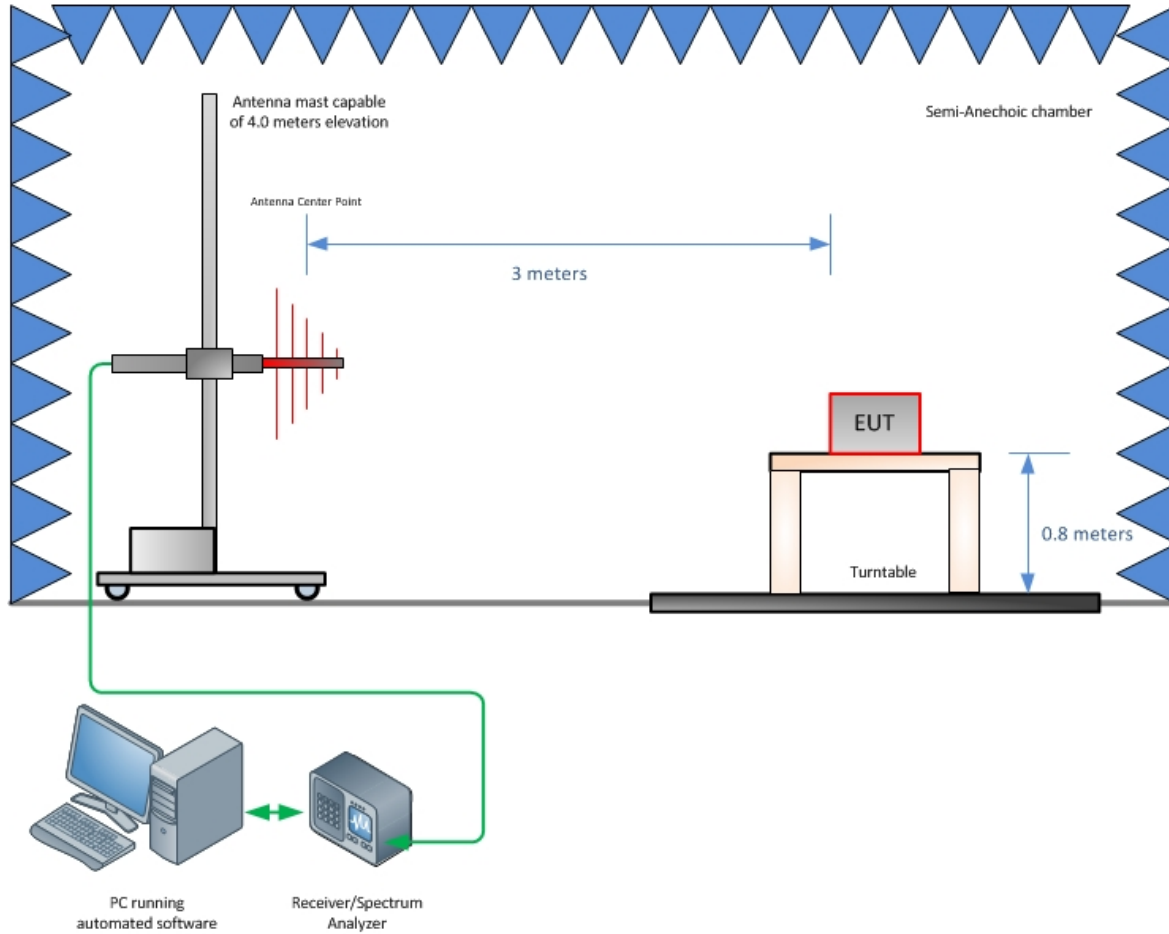
| Contribution | | Probability Distribution Type | Probability Distribution x_i | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---------------------------------|----------------------------|-------------------------------|--------------------------------|-------------------------------|--------------|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



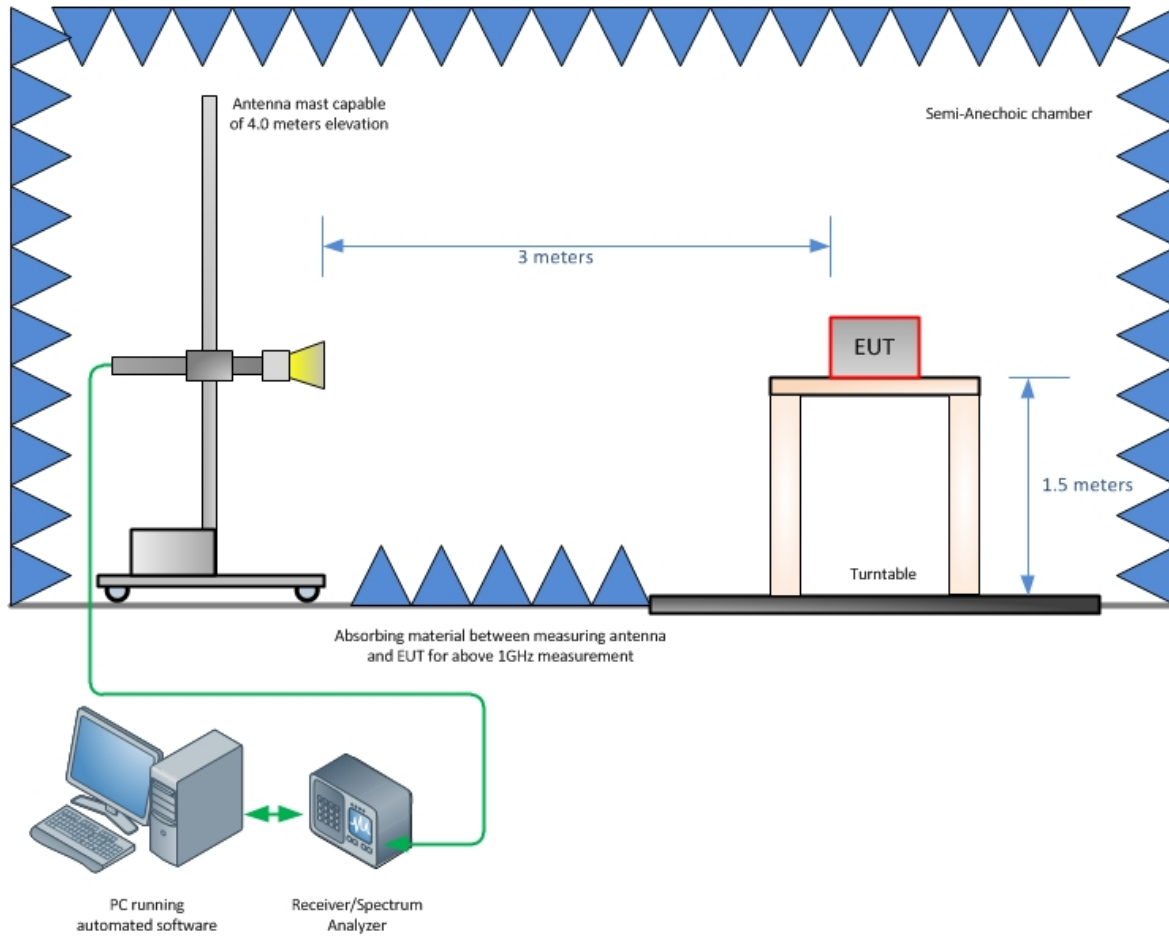
SECTION 4

DIAGRAM OF TEST SETUP

4.1 RADIATED EMISSION TEST SETUP (BELOW 1GHZ)



4.2 RADIATED EMISSION TEST SETUP (ABOVE 1GHZ)





SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

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

This report must not be used to claim product certification, approval, or endorsement by 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