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Report On

EMC Evaluation of
Inseego Corp.
M1000 Wireless Hotspot Modem

FCC Part 15 Subpart B
ICES-003 Issue 6

Report No. 72146272E

May 2019



TÜV SÜD America Inc., 10040 Mesa Rim Road, San Diego, CA 92121
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REPORT ON EMC Evaluation of the
Inseego Corp.
M1000 Wireless Hotspot Modem

TEST REPORT NUMBER 72146272E

TEST REPORT DATE May 2019

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Revision History

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CONTENTS

Section		Page No
1	REPORT SUMMARY.....	4
1.1	Introduction.....	5
1.2	Brief Summary Of Results.....	6
1.3	Product Information.....	7
1.4	EUT Test Configuration.....	8
1.5	Deviations From The Standard.....	9
1.6	Modification Record.....	9
1.7	Test Methodology.....	9
1.8	Test Facility Location.....	9
1.9	Test Facility Registration.....	9
2	TEST DETAILS.....	11
2.1	Conducted Emissions.....	12
2.2	Radiated Emissions.....	16
2.3	Intermodulation Verification.....	20
3	TEST EQUIPMENT USED.....	39
3.1	Test Equipment Used.....	40
3.2	Measurement Uncertainty.....	41
4	DIAGRAM OF TEST SETUP.....	43
4.1	Test Setup Diagram.....	44
5	ACCREDITATION, DISCLAIMERS AND COPYRIGHT.....	48
5.1	Accreditation, Disclaimers and Copyright.....	49



SECTION 1

REPORT SUMMARY

EMC Evaluation of the
Inseego Corp.
M1000 Wireless Hotspot Modem



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Inseego Corp. M1000 Wireless Hotspot Modem to the requirements of FCC Part 15 Subpart B and Innovation, Science and Economic Development Canada ICES-003.

Objective	To perform EMC Evaluation to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. Verification includes intermodulation testing between the WLAN, cell modem and 5G radio modules.
Manufacturer	Inseego Corp.
Product Marketing Name	5G MiFi 1000
Model Number(s)	M1000
Serial Number(s)	FF130219B00624 and FF130219B00222
Number of Samples Tested	2
Highest Frequency Generated or Used	28.0 GHz (5G Band n261)
Test Specification/Issue/Date	<ul style="list-style-type: none"> • FCC Part 15 Subpart B (October 1, 2018) • Spectrum Management and Telecommunications Interference-Causing Equipment Standard ICES-003 Information Technology Equipment (ITE) — Limits and methods of measurement (Issue 6 April 2017).
Start of Test	March 19, 2019
Finish of Test	May 07, 2019
Name of Engineer(s)	Omar Castillo Sandipan Basu Xiaoying Zhang
Related Document(s)	None



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart B with cross-reference to Innovation, Science and Economic Development Canada Interference-Causing Equipment Standard ICES-003 is shown below.

Part 15	ICES-003	Test Description	Result	Comments/Base Standard
§15.107	Clause 6.1	Conducted Emissions	Compliant	Class B requirement
§15.109	Clause 6.2	Radiated Emissions	Compliant	Class B requirement
§15.31 (k)		Intermodulation Verification for Composite Systems	Compliant	§2.947 (f)



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) is a Inseego Corp. M1000 Wireless Hotspot Modem. The EUT is a Wireless Hotspot Modem supporting 3G/4G/5G/WLAN Technologies. The EUT is also equipped with a USB Port and AC Wall Power Adaptor.

1.3.2 Labelling Requirement for Innovation, Science and Economic Development Canada

The manufacturer, importer or supplier shall meet the labelling requirements set out in this section and in Notice 2014-DRS1003 for electronic labelling for every unit:

- (i) Prior to marketing in Canada, for ITE manufactured in Canada, and;
- (ii) Prior to importation into Canada, for imported ITE.

Each unit of an ITE model shall bear a label (see below) that represents the manufacturer's or the importer's SDoC with Innovation, Science and Economic Development Canada's ICES-003. This label shall be permanently affixed to the ITE or displayed electronically and its text must be clearly legible. If the dimensions of the device are too small or if it is not practical to place the label on the ITE and electronic labelling has not been implemented, the label shall be, upon agreement with Innovation, Science and Economic Development Canada, placed in a prominent location in the user manual supplied with the ITE. The user manual may be in an electronic format and must be readily available.

Innovation, Science and Economic Development Canada ICES-003 Compliance Label

CAN ICES-3 (B)/NMB-3(B)

* Insert either "A" or "B" but not both to identify the applicable Class of ITE.

1.3.3 Labelling Requirement for Part 15 (SDoC) Device

See FCC Publication Number: 784748 for details:

<https://apps.fcc.gov/oetcf/kdb/forms/FTSsearchResultPage.cfm?id=27980&switch=P>



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	The EUT is powered by AC/DC Power Supply and work in unintentional mode.
Simultaneous	The EUT is powered by internal battery or AC/DC Power Supply and work in WIFI, Cell Band and 5G Band simultaneous transmission mode.

1.4.2 EUT Exercise Software

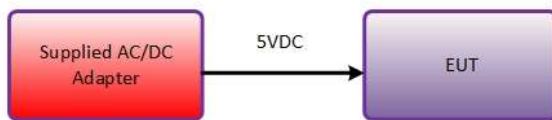
The EUT is connected to the support laptop via USB running Qualcomm Radio Control Tool Version 4.0.00113. The software allows RF configuration of the EUT such as mode, modulation, channel, bandwidth, antenna designation and recommended TX power level.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
DELL	Support Laptop	LATITUDE E6440, Inseego property No. 00455
Inseego Corp.	USB Cable	Type A to Type C USB Cable. M/N: NOV7000USB
Inseego Corp.	External AC-DC Power Adapter	Model: SSW-2783, PN: 40123126.01 Input: 100-240VAC, 50/60Hz, 0.5A Output: 5VDC, max. 2A

1.4.4 Simplified Test Configuration Diagram

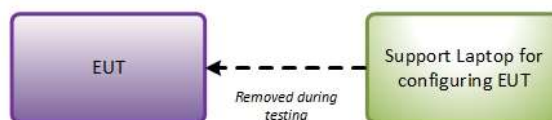
AC Conducted Emissions Test Setup



Radiated Emissions Test Setup



Intermodulation Radiated Emissions Test Setup





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: FF130219B00624 and FF130219B00222		
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 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)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678-1400 Fax: (858) 546-0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Designation 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 Designation is US1146.



1.9.2 Innovation, Science and Economic Development Canada (IC) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0280 and A-0281

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

1.9.6 RRA – Identification No. US0102

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.9.7 OFCA – U.S. Identification No. US0102

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.



SECTION 2

TEST DETAILS

EMC Evaluation of the
Inseego Corp.
M1000 Wireless Hotspot Modem



2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart B §15.107(a)

2.1.2 Standard Applicable

Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges

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

**Decreases with the logarithm of the frequency.*

2.1.3 Equipment Under Test and Modification State

Serial No: FF130219B00624 / Default Test Configuration

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

April 26, 2019/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature 23.1 °C
 Relative Humidity 53.6 %
 ATM Pressure 99.1 kPa



2.1.7 Additional Observations

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 2.1.8 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# 8822(20 dB attenuator)	19.9
	Asset# 1177 (cable)	0.15
	Asset# 1176 (cable)	0.35
	Asset# 7567(LISN)	0.30
Reported QuasiPeak Final Measurement (dbμV) @ 150kHz		26.2

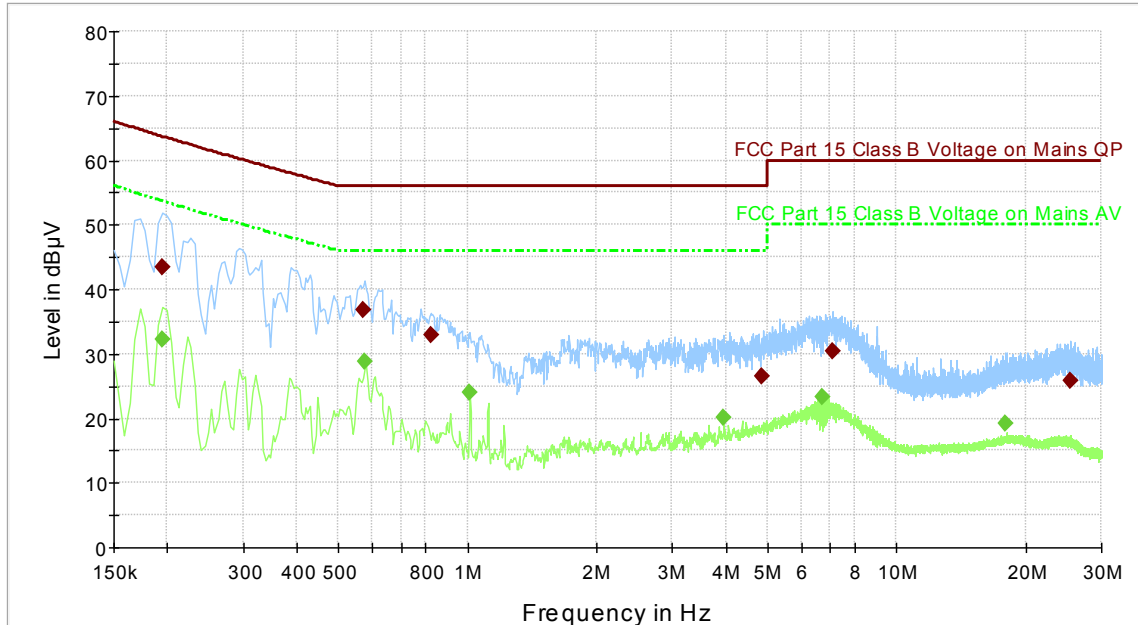
2.1.9 Test Results

Compliant. See attached plots and tables.



2.1.1 FCC Class B 120V 60Hz (Line 1 – Hot)

TUV SR7 Line 1 ESCS



- FCC Part 15 Class B Voltage on Mains QP [.\EMI conducted\]
- - - FCC Part 15 Class B Voltage on Mains AV [.\EMI conducted\]
- Preview Result 1-PK+ [Preview Result 1.Result:1]
- Preview Result 2-AVG [Preview Result 2.Result:2]
- ◆ Final Result 1-QPK [Final Result 1.Result:1]
- ◆ Final Result 2-AVG [Final Result 2.Result:1]

Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.195000	43.5	1000.0	9.000	Off	L1	20.2	20.2	63.7
0.573000	36.9	1000.0	9.000	Off	L1	20.2	19.1	56.0
0.820500	32.9	1000.0	9.000	Off	L1	20.1	23.1	56.0
4.857000	26.6	1000.0	9.000	Off	L1	20.5	29.4	56.0
7.075500	30.4	1000.0	9.000	Off	L1	20.5	29.6	60.0
25.431000	25.8	1000.0	9.000	Off	L1	20.7	34.2	60.0

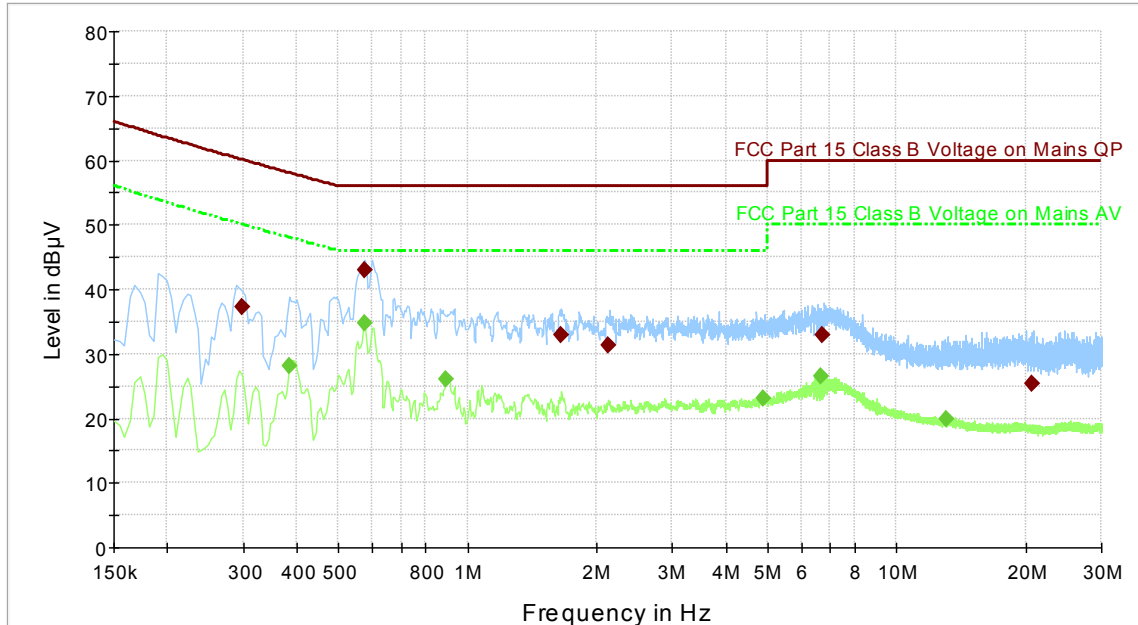
Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.195000	32.2	1000.0	9.000	Off	L1	20.2	21.5	53.7
0.577500	28.8	1000.0	9.000	Off	L1	20.2	17.2	46.0
1.014000	24.1	1000.0	9.000	Off	L1	20.1	21.9	46.0
3.957000	20.1	1000.0	9.000	Off	L1	20.5	25.9	46.0
6.729000	23.4	1000.0	9.000	Off	L1	20.5	26.6	50.0
17.970000	19.2	1000.0	9.000	Off	L1	20.8	30.8	50.0



2.1.2 FCC Class B 120V 60Hz (Line 2 – Neutral)

TUV SR7 Line 2 ESCS



- FCC Part 15 Class B Voltage on Mains QP [.\EMI conducted\]
- - - FCC Part 15 Class B Voltage on Mains AV [.\EMI conducted\]
- Preview Result 1-PK+ [Preview Result 1.Result:1]
- Preview Result 2-AVG [Preview Result 2.Result:2]
- ◆ Final Result 1-QPK [Final Result 1.Result:1]
- ◆ Final Result 2-AVG [Final Result 2.Result:1]

Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.298500	37.3	1000.0	9.000	Off	N	20.1	22.8	60.1
0.577500	43.0	1000.0	9.000	Off	N	20.1	13.0	56.0
1.657500	33.0	1000.0	9.000	Off	N	20.1	23.0	56.0
2.134500	31.3	1000.0	9.000	Off	N	20.4	24.7	56.0
6.715500	32.8	1000.0	9.000	Off	N	20.6	27.2	60.0
20.724000	25.5	1000.0	9.000	Off	N	20.7	34.5	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.384000	28.1	1000.0	9.000	Off	N	20.2	19.9	48.0
0.577500	34.7	1000.0	9.000	Off	N	20.1	11.3	46.0
0.892500	26.1	1000.0	9.000	Off	N	20.1	19.9	46.0
4.902000	23.1	1000.0	9.000	Off	N	20.4	22.9	46.0
6.688500	26.6	1000.0	9.000	Off	N	20.6	23.4	50.0
13.015500	20.0	1000.0	9.000	Off	N	20.7	30.0	50.0



2.2 RADIATED EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart B §15.109(a)

2.2.2 Standard Applicable

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field Strength (microvolts/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

2.2.3 Equipment Under Test and Modification State

Serial No: FF130219B00624 / Default Test Configuration

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

March 19 and April 26, 2019/OC

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 23.1 - 23.7 °C
 Relative Humidity 44.4 - 53.6 %
 ATM Pressure 99.0 - 99.1 kPa

2.2.7 Additional Observations

- The spectrum was searched from 30 MHz to 18 GHz in standby mode and from 30MHz to 100 GHz in simultaneous transmission mode.
- Verification was performed at 3 meters.
- 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.



2.2.8 Sample Computation (Radiated Emission)

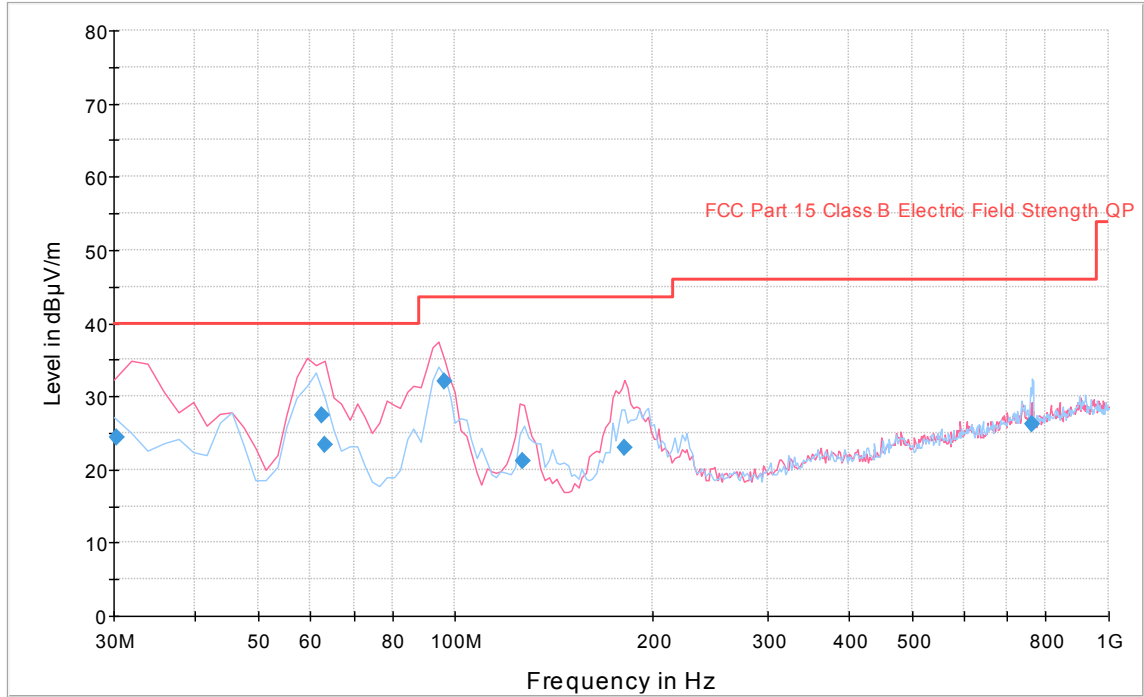
Measuring equipment raw measurement (db μ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1033 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbμV/m) @ 30MHz			11.8

2.2.9 Test Results

See attached plots.



2.2.9.1 Below 1GHz Radiated Emissions – Standby Mode



- FCC Part 15 Class B Electric Field Strength QP [..\EMI radiated\]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- - - Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- ◆ Final Result 1-QPK [Final Result 1.Result:1]

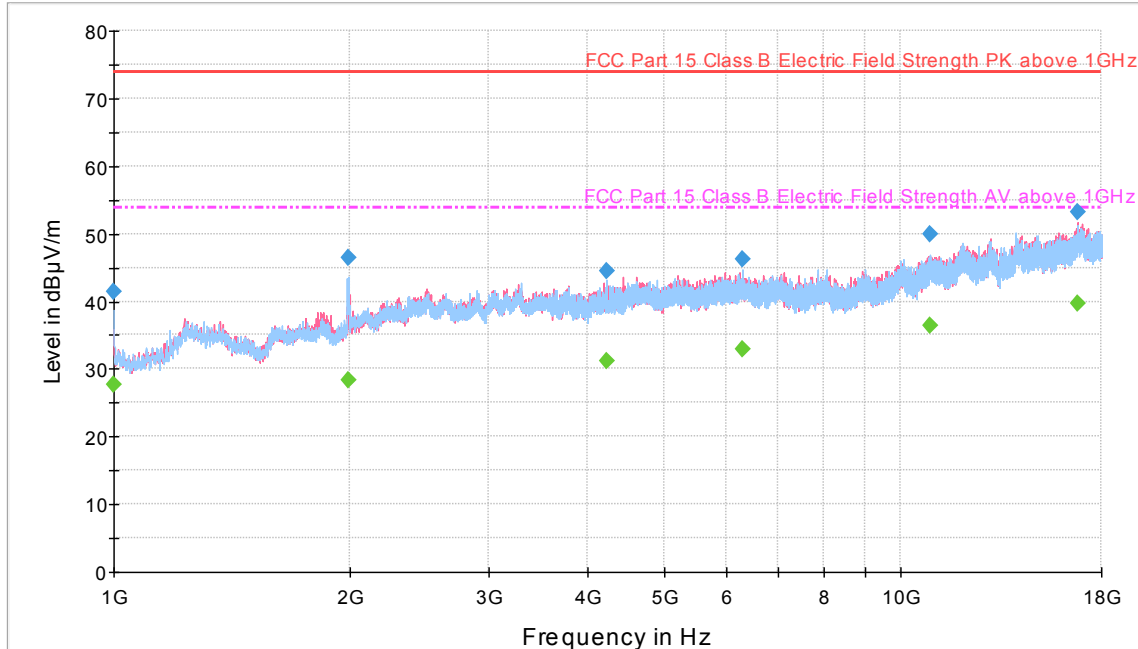
Quasi-Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.360000	24.3	1000.0	120.000	150.0	V	263.0	-7.9	15.7	40.0
62.598317	27.5	1000.0	120.000	132.0	V	128.0	-16.6	12.5	40.0
63.126092	23.4	1000.0	120.000	109.0	V	222.0	-16.6	16.6	40.0
96.188297	32.0	1000.0	120.000	100.0	V	87.0	-13.6	11.5	43.5
126.690501	21.2	1000.0	120.000	100.0	V	15.0	-14.3	22.3	43.5
181.943246	23.0	1000.0	120.000	100.0	V	174.0	-11.5	20.5	43.5
763.069579	26.3	1000.0	120.000	243.0	H	-2.0	3.1	19.7	46.0

Test Notes:



2.2.9.2 Above 1GHz Radiated Emission Test – Standby Mode



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

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	41.3	1000.0	1000.000	264.3	H	6.0	-6.9	32.6	73.9
1986.366667	46.3	1000.0	1000.000	400.0	H	76.0	-2.3	27.6	73.9
4230.200000	44.5	1000.0	1000.000	284.2	H	20.0	2.8	29.4	73.9
6307.966667	46.2	1000.0	1000.000	128.7	H	208.0	6.2	27.7	73.9
10910.233333	49.9	1000.0	1000.000	251.3	H	180.0	11.9	24.0	73.9
16824.400000	53.1	1000.0	1000.000	146.7	V	38.0	17.9	20.8	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)
1000.400000	27.6	1000.0	1000.000	264.3	H	6.0	-6.9	26.3	53.9
1986.366667	28.3	1000.0	1000.000	400.0	H	76.0	-2.3	25.6	53.9
4230.200000	31.2	1000.0	1000.000	284.2	H	20.0	2.8	22.7	53.9
6307.966667	32.9	1000.0	1000.000	128.7	H	208.0	6.2	21.0	53.9
10910.233333	36.4	1000.0	1000.000	251.3	H	180.0	11.9	17.5	53.9
16824.400000	39.7	1000.0	1000.000	146.7	V	38.0	17.9	14.2	53.9

Test Notes:



2.3 INTERMODULATION VERIFICATION

2.3.1 Specification Reference

Part 15 Subpart A §15.31(k) and Part 2 Subpart J §2.947 (f)

2.3.2 Standard Applicable

(k) Composite systems (i.e., systems that incorporate different devices contained in a single enclosure or in separate enclosures connected by wire or cable) shall be measured for compliance with the technical standards of this part in accordance with the procedures in §2.947(f) of this chapter. For digital devices that consist of a combination of Class A and Class B devices, the total combination of which results in a Class A digital device, it is only necessary to demonstrate that the equipment combination complies with the limits for a Class A device. This equipment combination may not be employed for obtaining a grant of equipment authorization or declaring compliance of a Class B digital device. However, if the digital device combination consists of a Class B central control unit, e.g., a personal computer, and a Class A internal peripheral(s), it must be demonstrated that the Class B central control unit continues to comply with the limits for a Class B digital device with the Class A internal peripheral(s) installed but not active

(f) A composite system is a system that incorporates different devices contained either in a single enclosure or in separate enclosures connected by wire or cable. If the individual devices in a composite system are subject to different technical standards, each such device must comply with its specific standards. In no event may the measured emissions of the composite system exceed the highest level permitted for an individual component. Testing for compliance with the different standards shall be performed with all of the devices in the system functioning. If the composite system incorporates more than one antenna or other radiating source and these radiating sources are designed to emit at the same time, measurements of conducted and radiated emissions shall be performed with all radiating sources that are to be employed emitting.

2.3.3 Equipment Under Test and Modification State

Serial No: FF130219B00624 and FF130219B00222 / Simultaneous Test Configuration

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

March 19, 2018 / OC
May 2 and 7, 2019 / SB

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 and Mira Mesa facility

Ambient Temperature	23.4 – 25.1 °C
Relative Humidity	49.2 - 51.5 %
ATM Pressure	98.5 – 99.0 kPa



2.3.7 Additional Observations

- The spectrum was searched from 30MHz to 100GHz.
- Verification was performed at 3 meters and 1 meter.
- Measurement was done using EMC32 automated software below 40GHz. 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.
- No other spurious emissions observed above 40GHz. Maximized plots provided for verifications above 40GHz.

2.3.8 Sample Computation (Radiated Emission below 40GHz)

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 (dbμV/m) @ 30MHz			11.8

2.3.9 Sample Computation (Radiated Emission above 40GHz)

- **40GHz to 60GHz**
3 meters test distance. Offset programmed to account for antenna factor and overall line losses and gains. EUT complies with limits set forth by FCC Part 30.203 (Out-of-Band Spurious Emission).
- **60GHz to 75GHz**
1 meter test distance. Offset programmed to account for antenna factor and overall line losses and gains. EUT complies with limits set forth by FCC Part 30.203 (Out-of-Band Spurious Emission).
- **75GHz to 100GHz**
1 meter test distance. Offset programmed to account for antenna factor and overall line losses and gains. EUT complies with limits set forth by FCC Part 30.203 (Out-of-Band Spurious Emission).

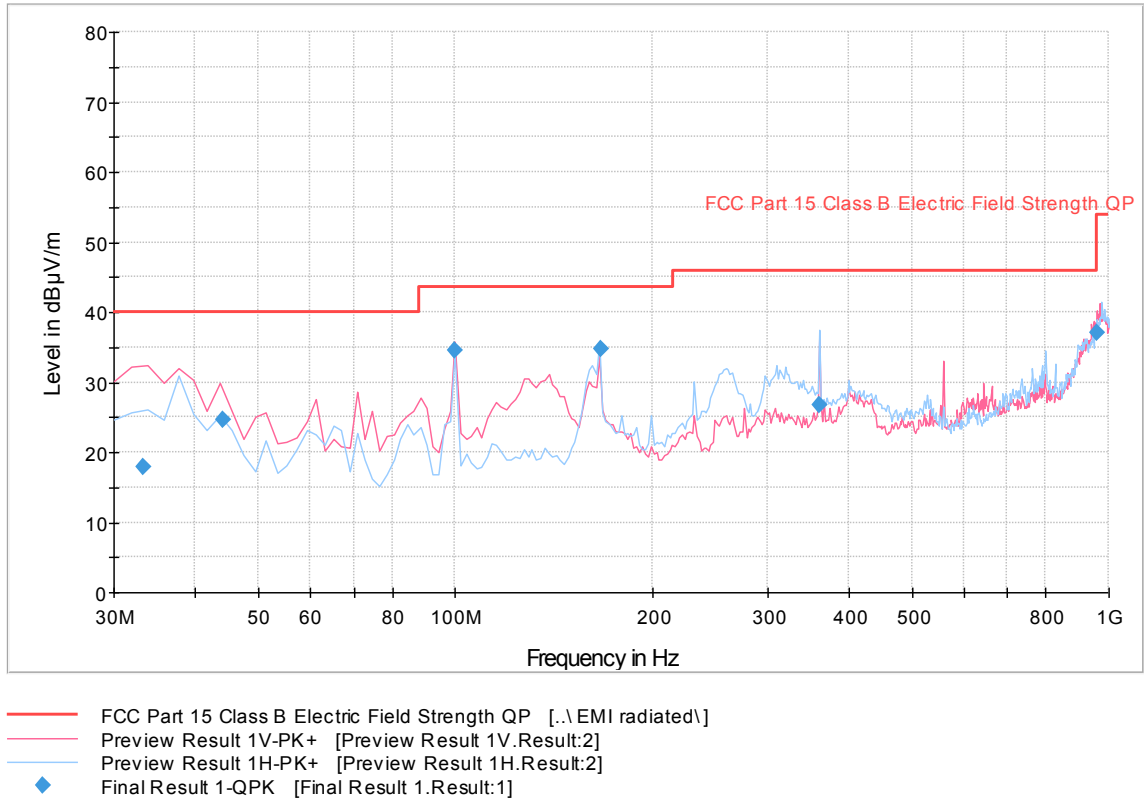
2.3.10 Test Results

See attached plots.



2.3.10.1 Below 1GHz Radiated Emission – 2.4GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Continuous Rotation TUV 3m Radiated 30 to 1000MHz



Quasi-Peak Data

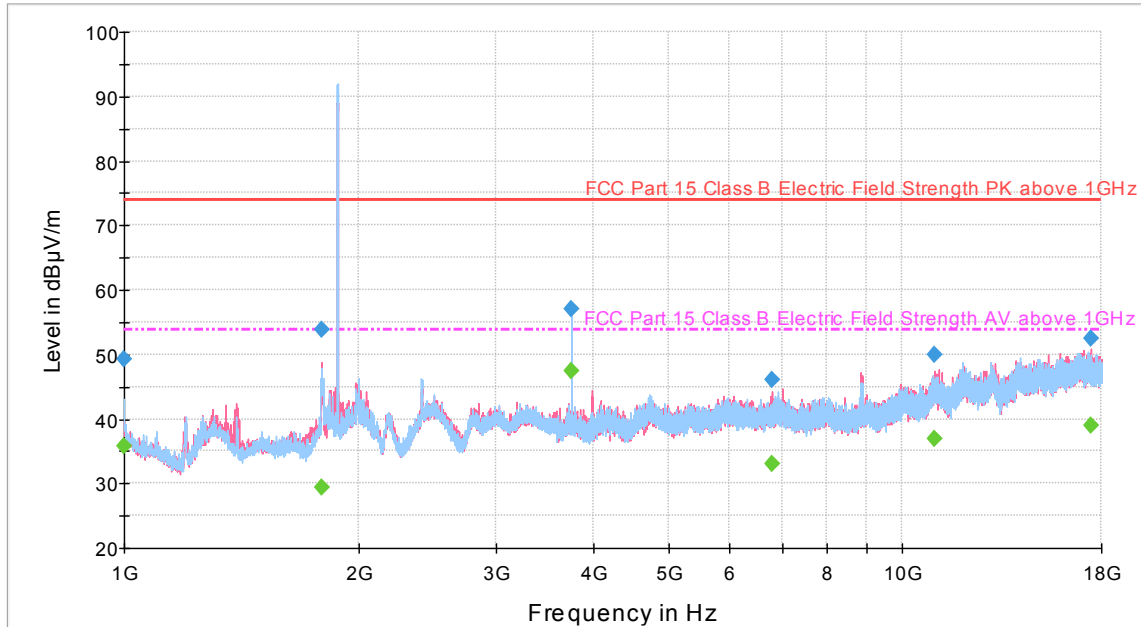
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.207776	17.9	1000.0	120.000	109.0	V	270.0	-9.2	22.1	40.0
44.167214	24.6	1000.0	120.000	109.0	V	288.0	-13.2	15.4	40.0
99.939960	34.6	1000.0	120.000	139.0	V	224.0	-13.3	8.9	43.5
166.592144	34.7	1000.0	120.000	201.0	H	258.0	-11.8	8.8	43.5
359.940922	26.8	1000.0	120.000	283.0	H	283.0	-4.7	19.2	46.0
960.578357	37.0	1000.0	120.000	100.0	V	80.0	5.4	16.9	53.9

Test Notes:



2.3.10.2 Above 1GHz Radiated Emission – 2.4GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



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

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	49.3	1000.0	1000.000	151.6	H	316.0	-6.9	24.6	73.9
1797.533333	53.8	1000.0	1000.000	117.7	V	98.0	-3.4	20.1	73.9
3760.466667	57.0	1000.0	1000.000	165.6	H	306.0	2.0	16.9	73.9
6805.300000	46.0	1000.0	1000.000	103.7	V	-1.0	6.5	27.9	73.9
10992.233333	49.8	1000.0	1000.000	99.7	V	2.0	11.8	24.1	73.9
17473.133333	52.4	1000.0	1000.000	204.5	V	124.0	17.8	21.5	73.9

Average Data

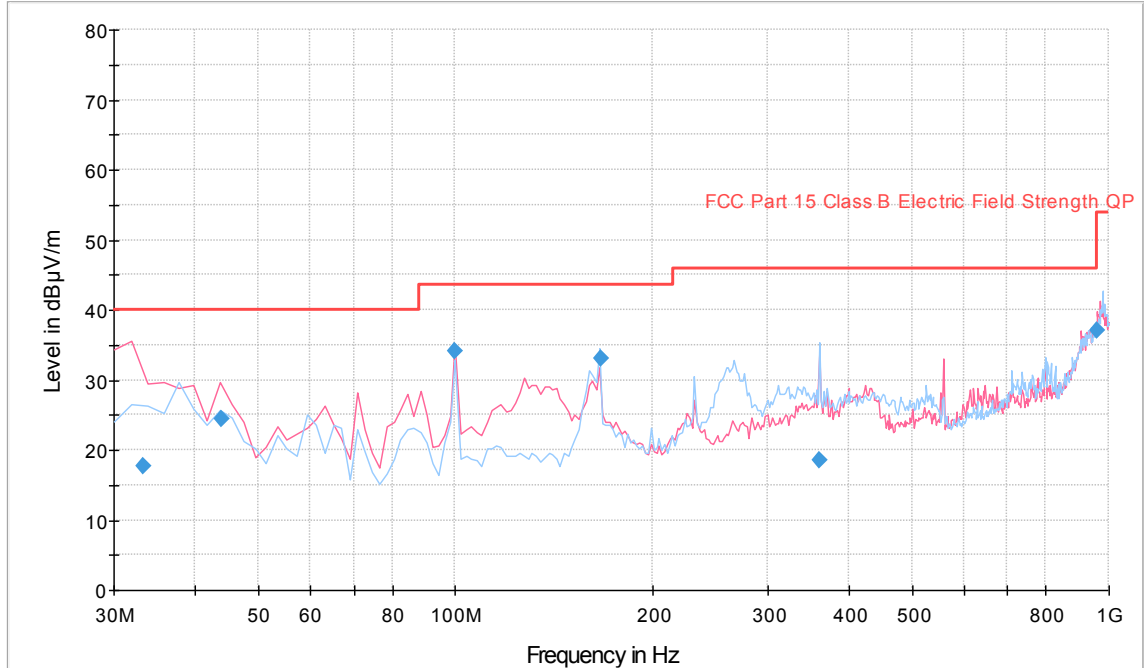
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	35.7	1000.0	1000.000	151.6	H	316.0	-6.9	18.2	53.9
1797.533333	29.4	1000.0	1000.000	117.7	V	98.0	-3.4	24.5	53.9
3760.466667	47.5	1000.0	1000.000	165.6	H	306.0	2.0	6.4	53.9
6805.300000	33.0	1000.0	1000.000	103.7	V	-1.0	6.5	20.9	53.9
10992.233333	36.8	1000.0	1000.000	99.7	V	2.0	11.8	17.1	53.9
17473.133333	39.0	1000.0	1000.000	204.5	V	124.0	17.8	14.9	53.9

Test Notes: A 2.4 GHz notch was used when testing. The spurious emission above the limit is the fundamental carrier of LTE Band 2.



2.3.10.3 Below 1GHz Radiated Emission – 5.2GHzHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Continuous Rotation TUV 3m Radiated 30 to 1000MHz



- FCC Part 15 Class B Electric Field Strength QP [..\EMI radiated\]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- ◆ Final Result 1-QPK [Final Result 1.Result:1]

Quasi-Peak Data

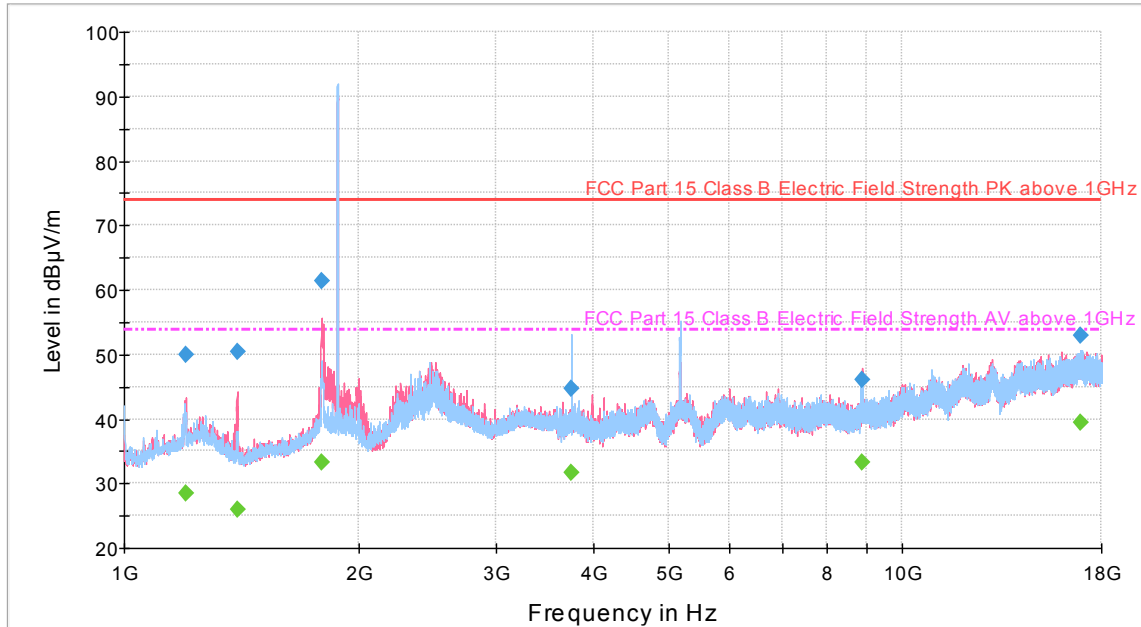
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.320000	17.7	1000.0	120.000	121.0	V	18.0	-9.3	22.3	40.0
43.847214	24.4	1000.0	120.000	100.0	V	275.0	-13.1	15.6	40.0
99.939960	34.1	1000.0	120.000	109.0	V	314.0	-13.3	9.4	43.5
166.592144	33.0	1000.0	120.000	105.0	H	252.0	-11.8	10.5	43.5
360.020922	18.4	1000.0	120.000	260.0	H	192.0	-4.7	27.6	46.0
960.618357	37.1	1000.0	120.000	100.0	V	90.0	5.4	16.8	53.9

Test Notes:



2.3.10.4 Above 1GHz Radiated Emission – 5.2GHz WiFi, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



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

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.033333	49.9	1000.0	1000.000	151.6	V	95.0	-6.4	24.0	73.9
1398.233333	50.5	1000.0	1000.000	194.5	V	84.0	-5.7	23.4	73.9
1796.000000	61.4	1000.0	1000.000	103.7	V	95.0	-3.4	12.5	73.9
3759.666667	44.8	1000.0	1000.000	151.6	H	263.0	2.0	29.1	73.9
8861.033333	46.1	1000.0	1000.000	169.6	V	-19.0	7.5	27.8	73.9
16924.100000	53.0	1000.0	1000.000	151.2	H	133.0	18.0	20.9	73.9

Average Data

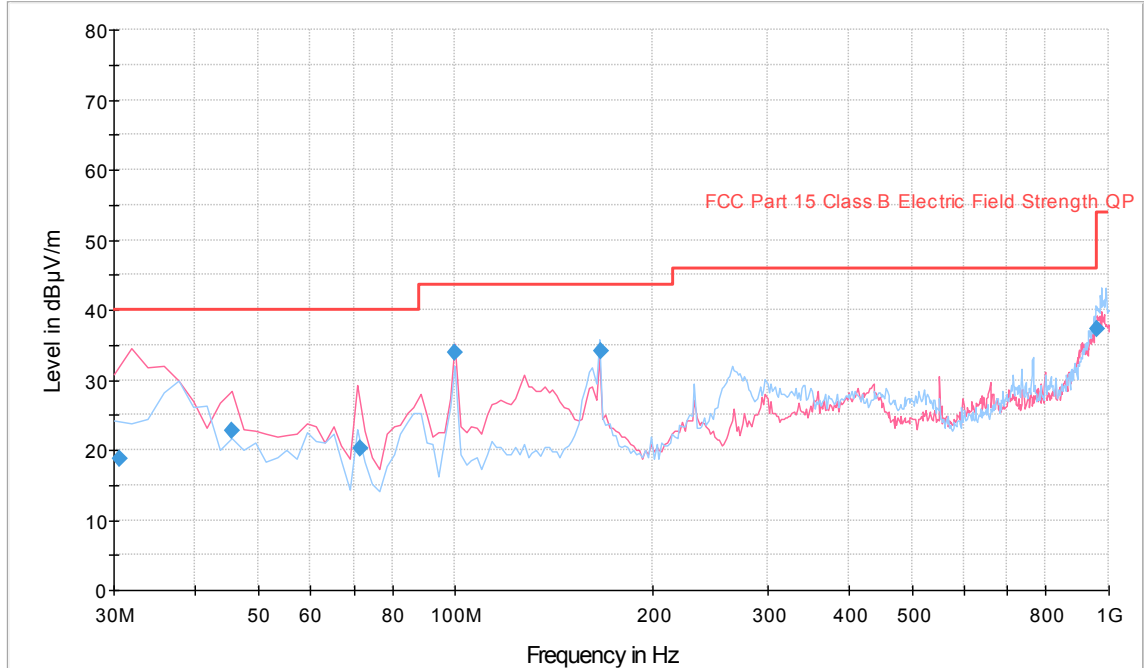
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.033333	28.5	1000.0	1000.000	151.6	V	95.0	-6.4	25.4	53.9
1398.233333	25.8	1000.0	1000.000	194.5	V	84.0	-5.7	28.1	53.9
1796.000000	33.3	1000.0	1000.000	103.7	V	95.0	-3.4	20.6	53.9
3759.666667	31.6	1000.0	1000.000	151.6	H	263.0	2.0	22.3	53.9
8861.033333	33.3	1000.0	1000.000	169.6	V	-19.0	7.5	20.6	53.9
16924.100000	39.5	1000.0	1000.000	151.2	H	133.0	18.0	14.4	53.9

Test Notes: A 5 GHz notch was used when testing. The spurious emission above the limit is the fundamental carrier of LTE Band 2.



2.3.10.5 Below 1GHz Radiated Emission – 5.8GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Continuous Rotation TUV 3m Radiated 30 to 1000MHz



- FCC Part 15 Class B Electric Field Strength QP [..\EMI radiated\]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- ◆ Final Result 1-QPK [Final Result 1.Result:1]

Quasi-Peak Data

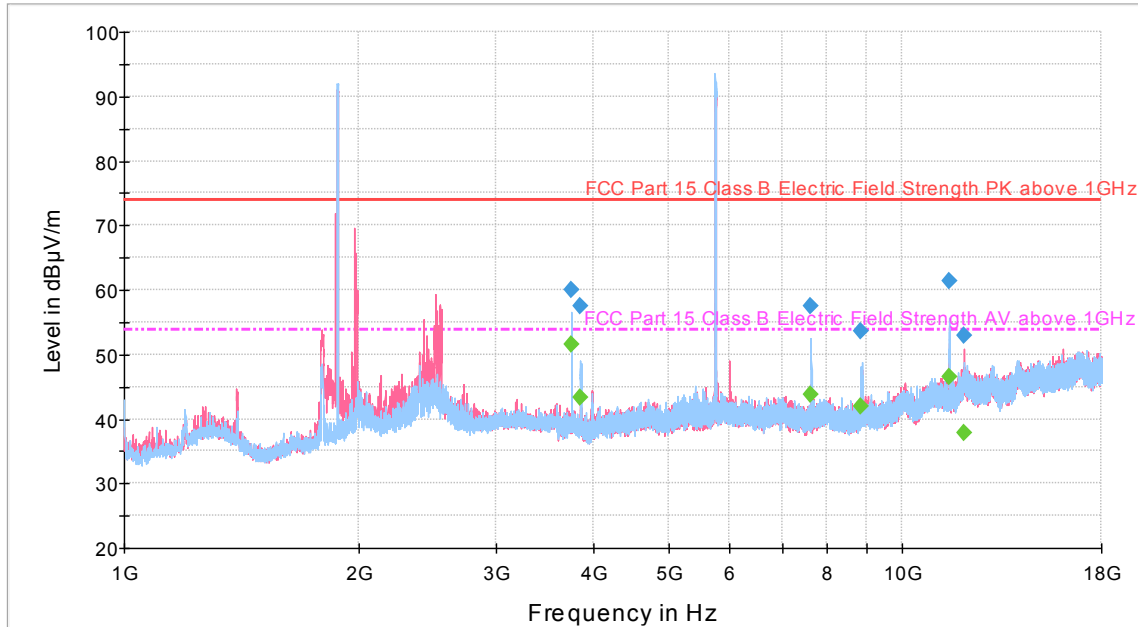
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.600000	18.7	1000.0	120.000	109.0	V	253.0	-8.0	21.3	40.0
45.471102	22.6	1000.0	120.000	100.0	V	62.0	-13.6	17.4	40.0
71.581643	20.3	1000.0	120.000	100.0	V	15.0	-17.2	19.7	40.0
99.939960	33.9	1000.0	120.000	110.0	V	240.0	-13.3	9.6	43.5
166.592144	34.1	1000.0	120.000	207.0	H	273.0	-11.8	9.4	43.5
957.250581	37.3	1000.0	120.000	100.0	H	104.0	5.4	8.7	46.0

Test Notes:



2.3.10.6 Above 1GHz Radiated Emission – 5.8GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



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

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
3759.333333	60.0	1000.0	1000.000	250.5	H	268.0	2.0	13.9	73.9
3859.033333	57.5	1000.0	1000.000	213.4	H	184.0	2.4	16.4	73.9
7618.133333	57.4	1000.0	1000.000	161.6	H	178.0	6.9	16.5	73.9
8833.800000	53.6	1000.0	1000.000	203.5	H	33.0	7.5	20.3	73.9
11489.766667	61.3	1000.0	1000.000	173.6	H	174.0	12.8	12.6	73.9
12000.900000	52.9	1000.0	1000.000	99.7	V	57.0	13.5	21.0	73.9

Average Data

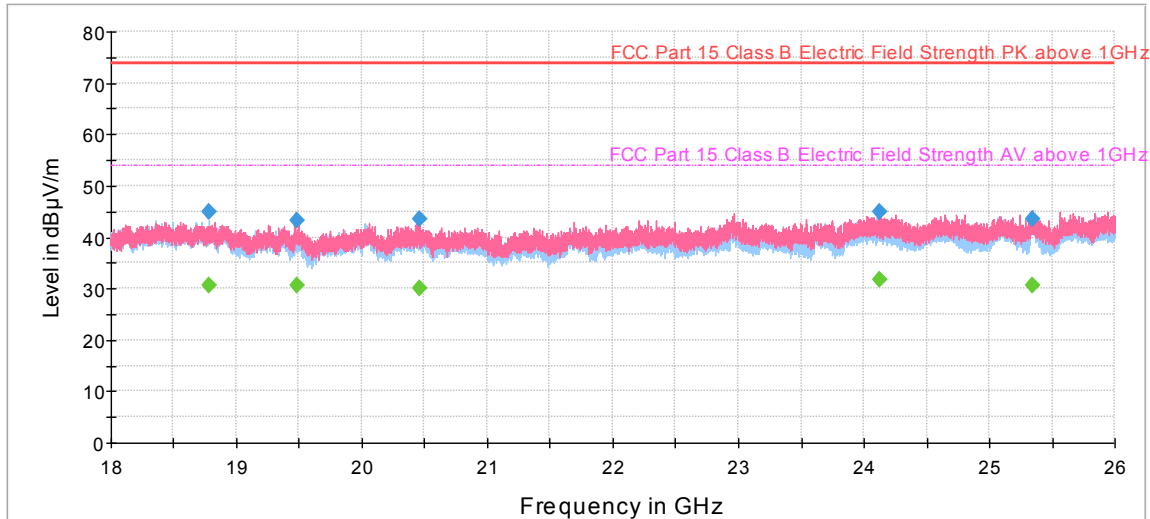
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
3759.333333	51.4	1000.0	1000.000	250.5	H	268.0	2.0	2.5	53.9
3859.033333	43.3	1000.0	1000.000	213.4	H	184.0	2.4	10.6	53.9
7618.133333	43.8	1000.0	1000.000	161.6	H	178.0	6.9	10.1	53.9
8833.800000	41.9	1000.0	1000.000	203.5	H	33.0	7.5	12.0	53.9
11489.766667	46.4	1000.0	1000.000	173.6	H	174.0	12.8	7.5	53.9
12000.900000	37.7	1000.0	1000.000	99.7	V	57.0	13.5	16.2	53.9

Test Notes: The spurious emissions above the limit are the fundamental carriers of LTE Band 2 and 5.8GHz WIFI.



2.3.10.7 18GHz to 26GHz Radiated Emission – 2.4GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Full Spectrum



- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI Radiated\]
- - - FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI Radiated\]
- ◆ Final_Result PK+ [Final_Result.Result:4]
- ◆ Final_Result AVG [Final_Result.Result:5]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
18782.441500	44.99	73.90	28.91	1000.0	1000.000	153.6	H	242.0	-3.3
19478.553000	43.25	73.90	30.65	1000.0	1000.000	138.8	V	125.0	-4.2
20458.937500	43.65	73.90	30.25	1000.0	1000.000	162.6	V	290.0	-4.1
24122.807000	44.80	73.90	29.10	1000.0	1000.000	162.6	V	162.0	0.0
25344.618500	43.62	73.90	30.28	1000.0	1000.000	162.6	V	280.0	0.7

Average Data

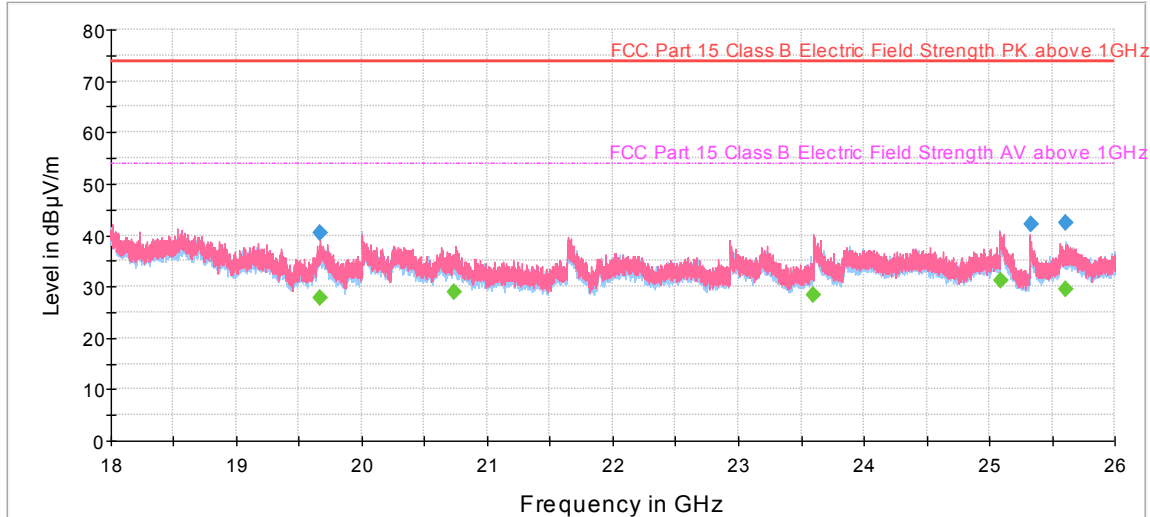
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
18782.441500	30.55	53.90	23.35	1000.0	1000.000	153.6	H	242.0	-3.3
19478.553000	30.61	53.90	23.29	1000.0	1000.000	138.8	V	125.0	-4.2
20458.937500	30.12	53.90	23.78	1000.0	1000.000	162.6	V	290.0	-4.1
24122.807000	31.71	53.90	22.19	1000.0	1000.000	162.6	V	162.0	0.0
25344.618500	30.68	53.90	23.22	1000.0	1000.000	162.6	V	280.0	0.7

Test Notes:



2.3.10.8 18GHz to 26GHz Radiated Emission – 5.2GHz WiFi, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Full Spectrum



- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI Radiated\]
- - - FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI Radiated\]
- ◆ Final_Result PK+ [Final_Result.Result:4]
- ◆ Final_Result AVG [Final_Result.Result:5]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
19671.645500	40.48	73.90	33.42	1000.0	1000.000	162.6	V	113.0	-4.4
25329.577500	41.97	73.90	31.93	1000.0	1000.000	162.6	V	292.0	0.7
25613.755500	42.44	73.90	31.46	1000.0	1000.000	162.6	H	297.0	1.0

Average Data

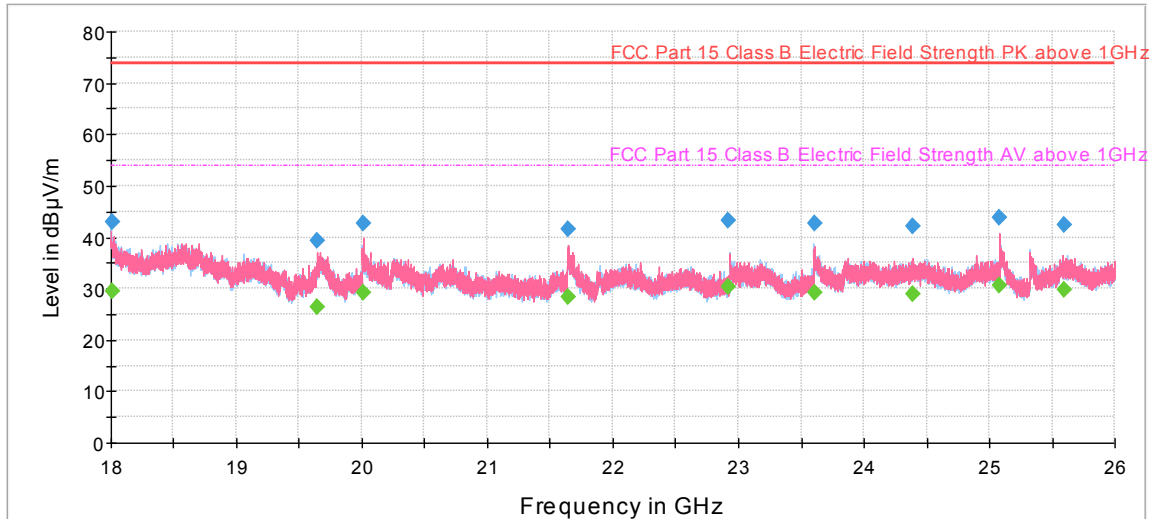
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
19671.645500	27.80	53.90	26.10	1000.0	1000.000	162.6	V	113.0	-4.4
20736.509500	28.96	53.90	24.94	1000.0	1000.000	162.6	V	37.0	-3.5
23595.780500	28.35	53.90	25.55	1000.0	1000.000	162.5	V	325.0	-0.7
25094.143500	31.14	53.90	22.76	1000.0	1000.000	162.6	H	66.0	0.6
25613.755500	29.35	53.90	24.55	1000.0	1000.000	162.6	H	297.0	1.0

Test Notes:



2.3.10.9 18GHz to 26GHz Radiated Emission – 5.8GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Full Spectrum



- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI Radiated\]
- - - FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI Radiated\]
- ◆ Final_Result PK+ [Final_Result.Result:4]
- ◆ Final_Result AVG [Final_Result.Result:5]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
18012.522520	42.85	73.90	31.05	1000.0	1000.000	149.8	H	350.0	-2.5
19642.692000	39.40	73.90	34.50	1000.0	1000.000	162.6	V	273.0	-4.4
20015.888500	42.65	73.90	31.25	1000.0	1000.000	137.5	V	93.0	-4.4
21643.806500	41.62	73.90	32.28	1000.0	1000.000	162.6	V	263.0	-2.6
22919.979500	43.29	73.90	30.61	1000.0	1000.000	162.6	H	13.0	-1.1
23610.648000	42.69	73.90	31.21	1000.0	1000.000	162.6	H	324.0	-0.7
24393.313500	42.07	73.90	31.83	1000.0	1000.000	162.4	V	63.0	0.1
25084.825500	43.66	73.90	30.24	1000.0	1000.000	162.6	V	289.0	0.6
25599.645000	42.43	73.90	31.47	1000.0	1000.000	162.6	H	185.0	1.0

Average Data

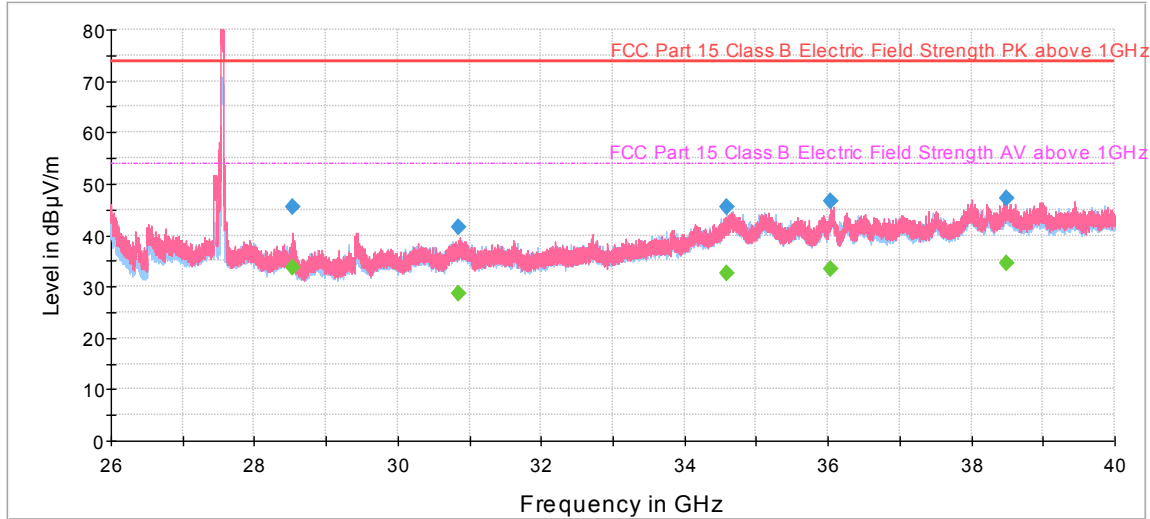
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
18012.522520	29.46	53.90	24.44	1000.0	1000.000	149.8	H	350.0	-2.5
19642.692000	26.49	53.90	27.41	1000.0	1000.000	162.6	V	273.0	-4.4
20015.888500	29.33	53.90	24.57	1000.0	1000.000	137.5	V	93.0	-4.4
21643.806500	28.44	53.90	25.46	1000.0	1000.000	162.6	V	263.0	-2.6
22919.979500	30.29	53.90	23.61	1000.0	1000.000	162.6	H	13.0	-1.1
23610.648000	29.20	53.90	24.70	1000.0	1000.000	162.6	H	324.0	-0.7
24393.313500	28.85	53.90	25.05	1000.0	1000.000	162.4	V	63.0	0.1
25084.825500	30.71	53.90	23.19	1000.0	1000.000	162.6	V	289.0	0.6
25599.645000	29.64	53.90	24.26	1000.0	1000.000	162.6	H	185.0	1.0

Test Notes:



2.3.10.1026GHz to 40GHz Radiated Emission – 2.4GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Full Spectrum



- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI Radiated\]
- FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI Radiated\]
- ◆ Final_Result PK+ [Final_Result.Result:4]
- ◆ Final_Result AVG [Final_Result.Result:5]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
28541.688461	45.58	73.90	28.32	1000.0	1000.000	116.1	V	-9.0	1.2
30857.505769	41.57	73.90	32.33	1000.0	1000.000	125.0	V	57.0	1.9
34591.399231	45.34	73.90	28.56	1000.0	1000.000	101.5	H	95.0	5.4
36038.460384	46.65	73.90	27.25	1000.0	1000.000	105.7	V	174.0	5.9
38497.398462	47.21	73.90	26.69	1000.0	1000.000	101.2	V	175.0	6.9

Average Data

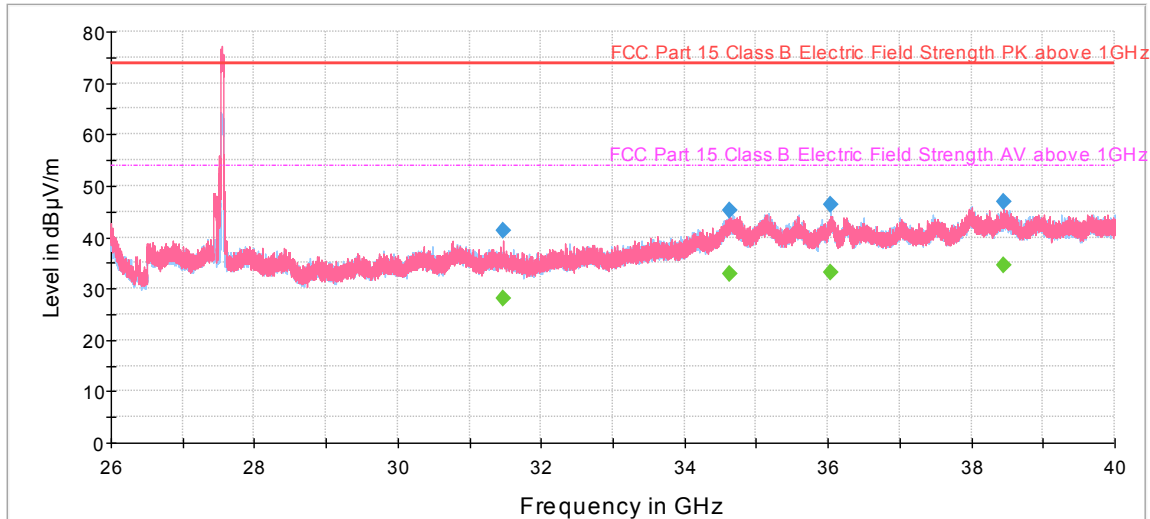
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
28541.688461	33.55	53.90	20.35	1000.0	1000.000	116.1	V	-9.0	1.2
30857.505769	28.64	53.90	25.26	1000.0	1000.000	125.0	V	57.0	1.9
34591.399231	32.69	53.90	21.21	1000.0	1000.000	101.5	H	95.0	5.4
36038.460384	33.44	53.90	20.46	1000.0	1000.000	105.7	V	174.0	5.9
38497.398462	34.66	53.90	19.24	1000.0	1000.000	101.2	V	175.0	6.9

Test Notes: 5G fundamental will be ignored for this test.



2.3.10.1126GHz to 40GHz Radiated Emission – 5.2GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Full Spectrum



- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI Radiated\]
- - - FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI Radiated\]
- ◆ Final_Result PK+ [Final_Result.Result:4]
- ◆ Final_Result AVG [Final_Result.Result:5]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
31470.014615	41.40	73.90	32.50	1000.0	1000.000	125.1	V	331.0	2.1
34626.776154	45.31	73.90	28.59	1000.0	1000.000	125.0	V	85.0	5.4
36035.521154	46.20	73.90	27.70	1000.0	1000.000	139.4	H	266.0	5.9
38447.648847	47.00	73.90	26.90	1000.0	1000.000	100.0	H	13.0	7.0

Average Data

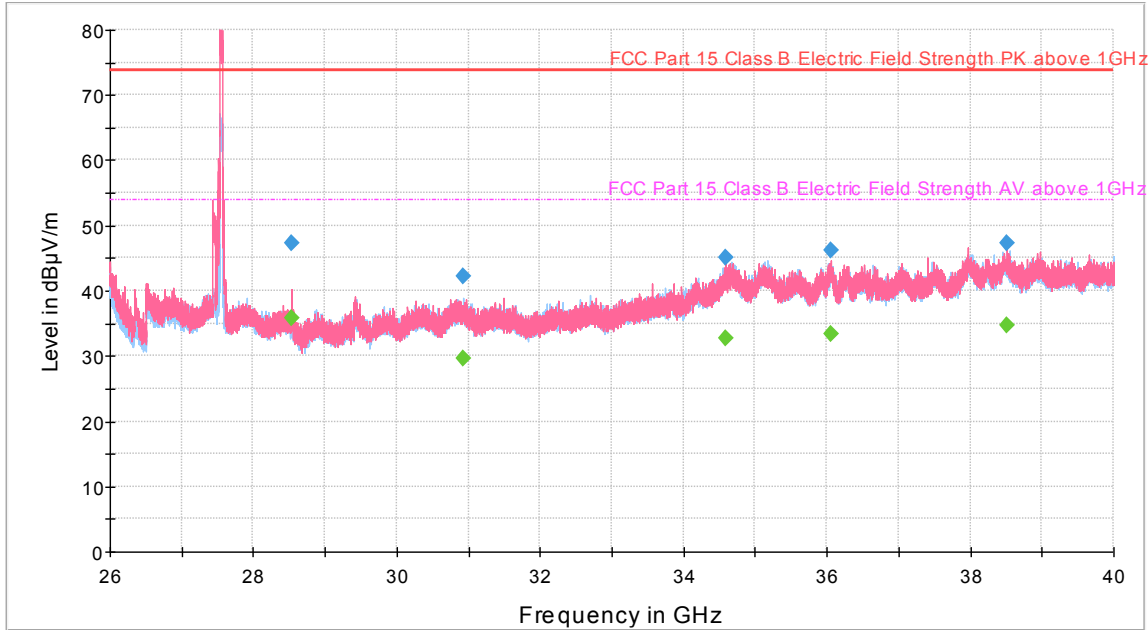
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
31470.014615	28.11	53.90	25.79	1000.0	1000.000	125.1	V	331.0	2.1
34626.776154	32.95	53.90	20.95	1000.0	1000.000	125.0	V	85.0	5.4
36035.521154	33.12	53.90	20.78	1000.0	1000.000	139.4	H	266.0	5.9
38447.648847	34.42	53.90	19.48	1000.0	1000.000	100.0	H	13.0	7.0

Test Notes: 5G fundamental will be ignored for this test.



2.3.10.1226GHz to 40GHz Radiated Emission – 5.8GHz WIFI, LTE Band 2 and 5G Band n261 Simultaneous Transmission Mode

Full Spectrum



- Preview Result 1H-PK+ [Preview Result 1H.Result:2]
- Preview Result 1V-PK+ [Preview Result 1V.Result:2]
- FCC Part 15 Class B Electric Field Strength PK above 1GHz [..\EMI Radiated\]
- - - - - FCC Part 15 Class B Electric Field Strength AV above 1GHz [..\EMI Radiated\]
- ◆ Final_Result PK+ [Final_Result.Result:4]
- ◆ Final_Result AVG [Final_Result.Result:5]

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
28527.701154	47.28	73.90	26.62	1000.0	1000.000	119.0	V	94.0	1.2
30933.237692	42.16	73.90	31.74	1000.0	1000.000	153.9	H	185.0	2.0
34587.050000	45.19	73.90	28.71	1000.0	1000.000	103.5	V	270.0	5.4
36060.391154	46.18	73.90	27.72	1000.0	1000.000	125.2	V	2.0	5.9
38519.312693	47.20	73.90	26.70	1000.0	1000.000	124.7	V	-5.0	6.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)
28527.701154	35.70	53.90	18.20	1000.0	1000.000	119.0	V	94.0	1.2
30933.237692	29.69	53.90	24.21	1000.0	1000.000	153.9	H	185.0	2.0
34587.050000	32.66	53.90	21.24	1000.0	1000.000	103.5	V	270.0	5.4
36060.391154	33.46	53.90	20.44	1000.0	1000.000	125.2	V	2.0	5.9
38519.312693	34.77	53.90	19.13	1000.0	1000.000	124.7	V	-5.0	6.9

Test Notes: 5G fundamental will be ignored for this test.



2.3.10.1340GHz to 100GHz Radiated Emission – Simultaneous Transmission Mode



15:37:49 02.05.2019

2.4GHz WIFI, LTE Band 2 and 5G Band n261 (40 to 60GHz)



15:26:48 02.05.2019

5.2GHz WIFI, LTE Band 2 and 5G Band n261 (40 to 60GHz)



15:35:48 02.05.2019

5.8GHz WIFI, LTE Band 2 and 5G Band n261 (40 to 60GHz)



15:52:56 02.05.2019

2.4GHz WIFI, LTE Band 2 and 5G Band n261 (60 to 75GHz)



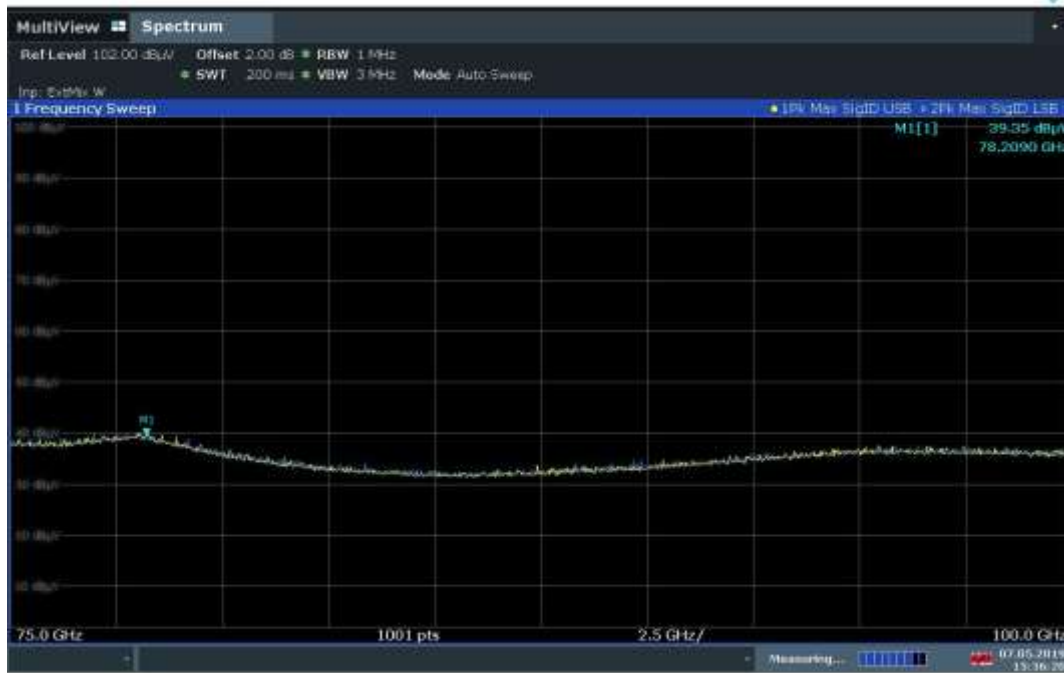
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5.2GHz WIFI, LTE Band 2 and 5G Band n261 (60 to 75GHz)



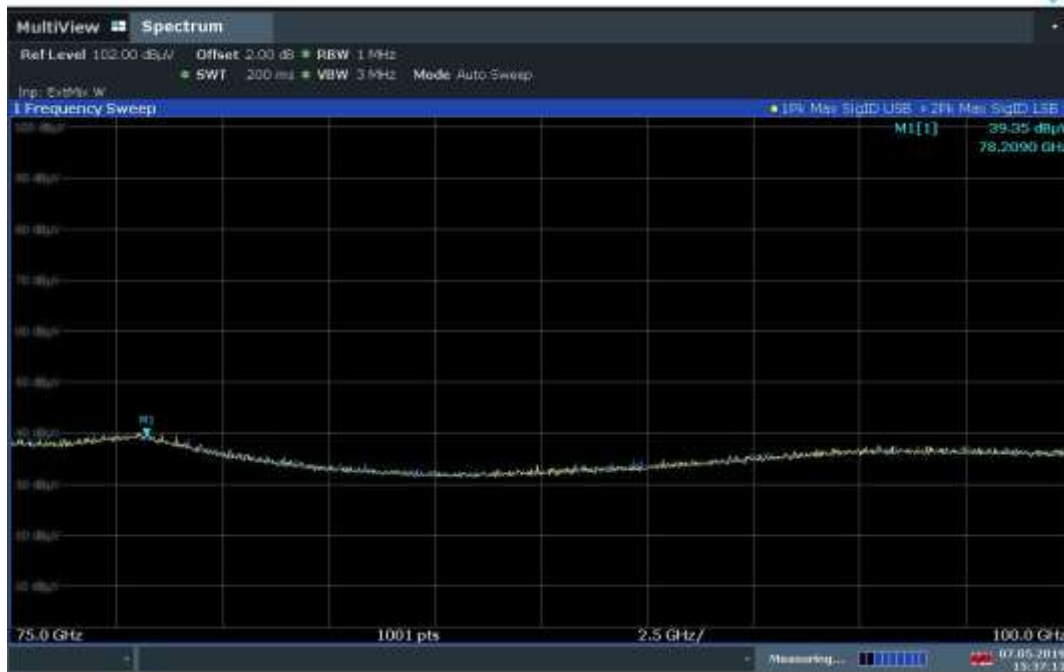
09:52:35 07.05.2019

5.8GHz WIFI, LTE Band 2 and 5G Band n261 (60 to 75GHz)



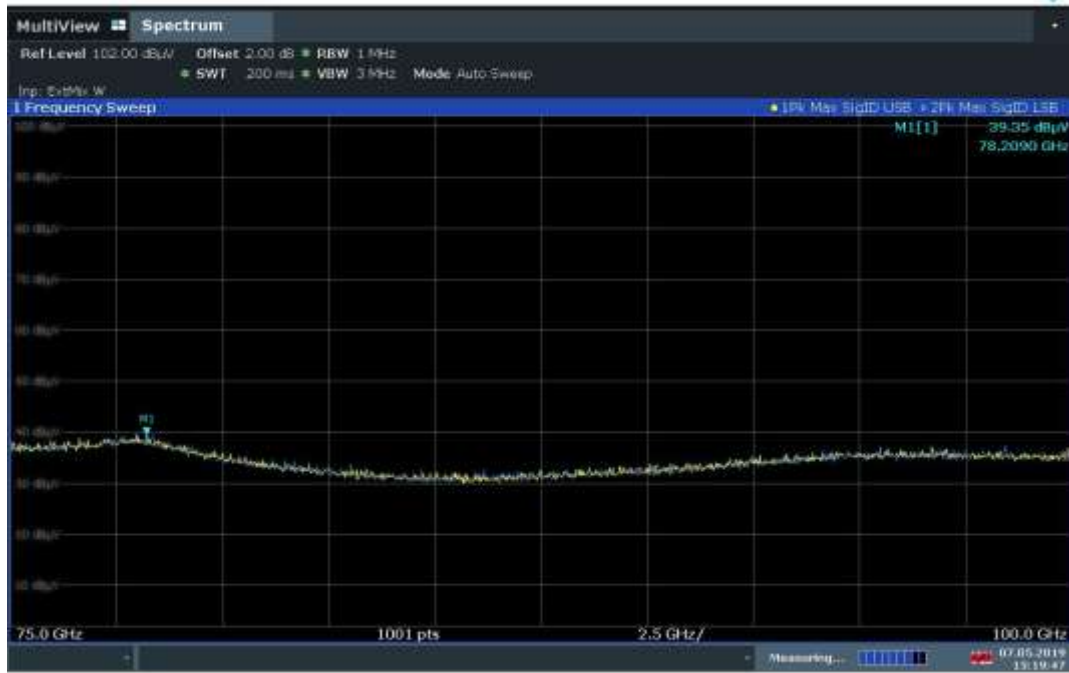
15:36:20 07.05.2019

2.4GHz WIFI, LTE Band 2 and 5G Band n261 (75 to 100GHz)



15:37:14 07.05.2019

5.2GHz WIFI, LTE Band 2 and 5G Band n261 (75 to 100GHz)



15:19:48 07.05.2019

5.8GHz WIFI, LTE Band 2 and 5G Band n261 (75 to 100GHz)



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
AC Conducted Emissions Test Setup						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	09/19/18	09/19/19
7567	LISN	FCC-LISN-50-25-2	120304	Fischer Custom Comm.	12/14/17	12/14/19
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7608 and 7582	
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	Verified by 7608 and 7582	
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
Radiated Test Setup						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	01/07/19	01/07/20
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/20/17	11/20/19
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/16/18	06/16/20
1016	Pre-amplifier	PAM-0202	187	A.H. Systems, Inc.	03/08/19	03/08/20
8921	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7608 and 7582	
8923	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7608 and 7582	
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/15/18	10/15/19
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/13/18	07/13/19
8628	Pre-amplifier	QLI-01182835-JO	8986002	Quinstar	03/07/19	03/07/20



3.2 MEASUREMENT UNCERTAINTY

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

3.2.1 Radiated Emission Measurements (Below 1GHz)

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.76 dB	Triangular	2.449	1.54	2.36
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
Combined standard uncertainty				Normal	2.95 dB	
Expanded uncertainty				Normal, k=2	5.90 dB	



3.2.2 Radiated Emission Measurements (Above 1GHz)

	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, k=2	2.000	0.23	0.05
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.25 dB	Triangular	2.449	1.33	1.76
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77 dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00 dB				0.00
Combined standard uncertainty				Normal	2.85 dB	
Expanded uncertainty				Normal, k=2	5.70 dB	

3.2.3 Conducted Measurements

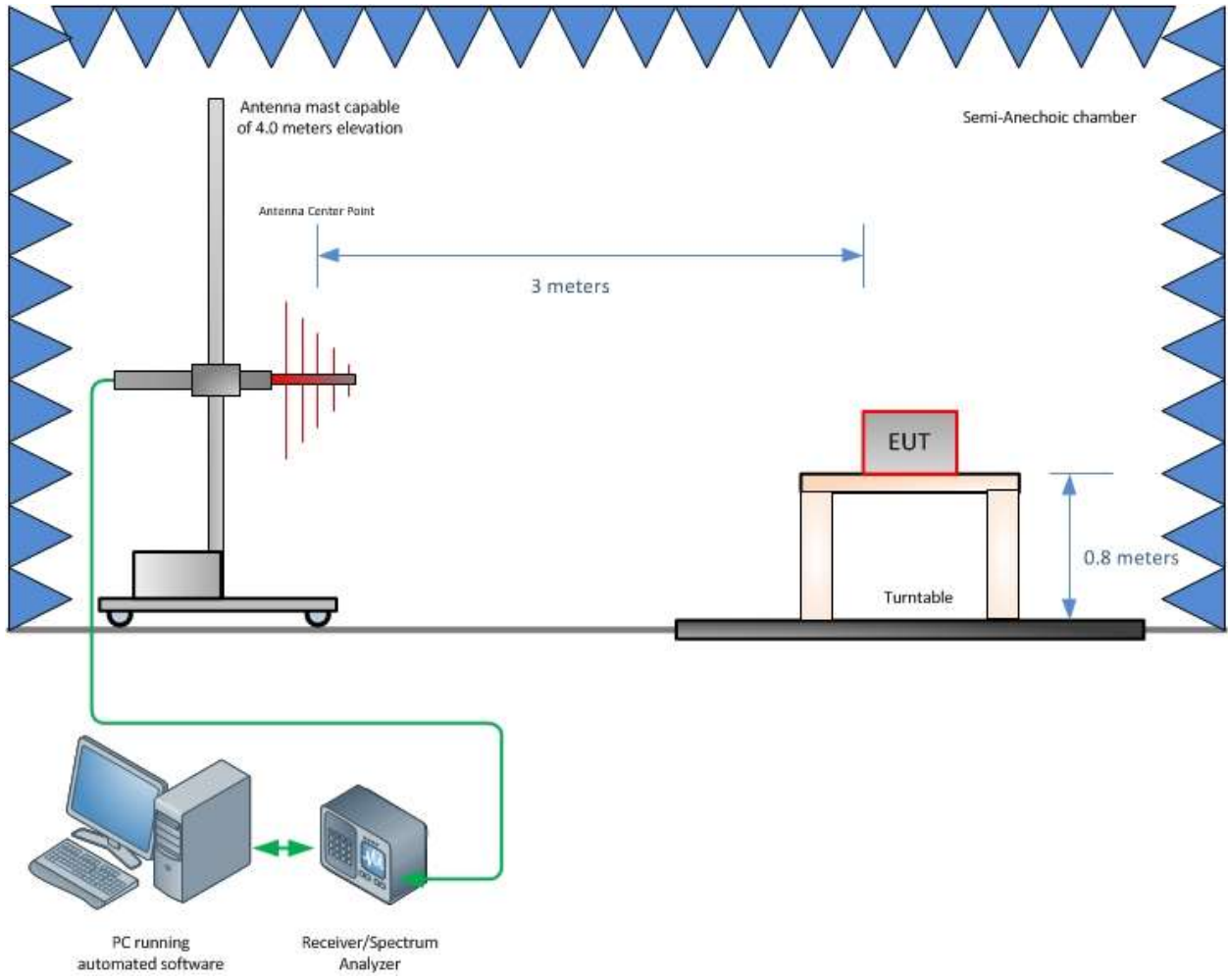
	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	LISN-receiver attenuation	0.10 dB	Normal, k=2	2.000	0.05	0.00
3	LISN voltage division factor	0.30 dB	Normal, k=2	2.000	0.15	0.02
4	Receiver sinewave accuracy	0.36 dB	Normal, k=2	2.000	0.18	0.03
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.00 dB	Rectangular	1.732	0.00	0.00
8	AMN VDF frequency interpolation	0.10 dB	Rectangular	1.732	0.06	0.00
9	Mismatch	0.07 dB	U-shaped	1.414	0.05	0.00
10	LISN impedance	2.65 dB	Triangular	2.449	1.08	1.17
11	Effect of mains disturbance	0.00 dB			0.00	0.00
12	Effect of the environment					
Combined standard uncertainty				Normal	1.66 dB	
Expanded uncertainty				Normal, k=2	3.31 dB	



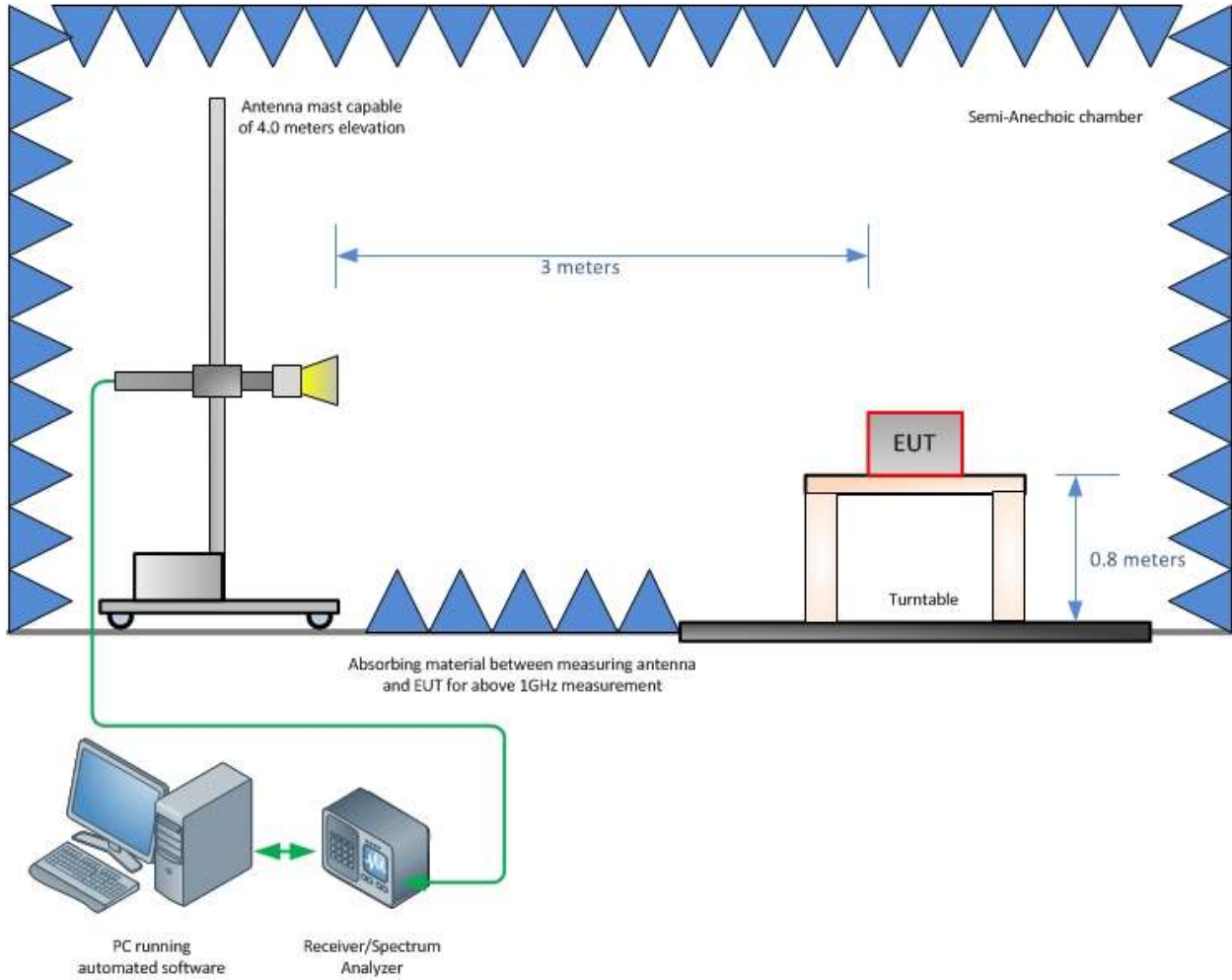
SECTION 4

DIAGRAM OF TEST SETUP

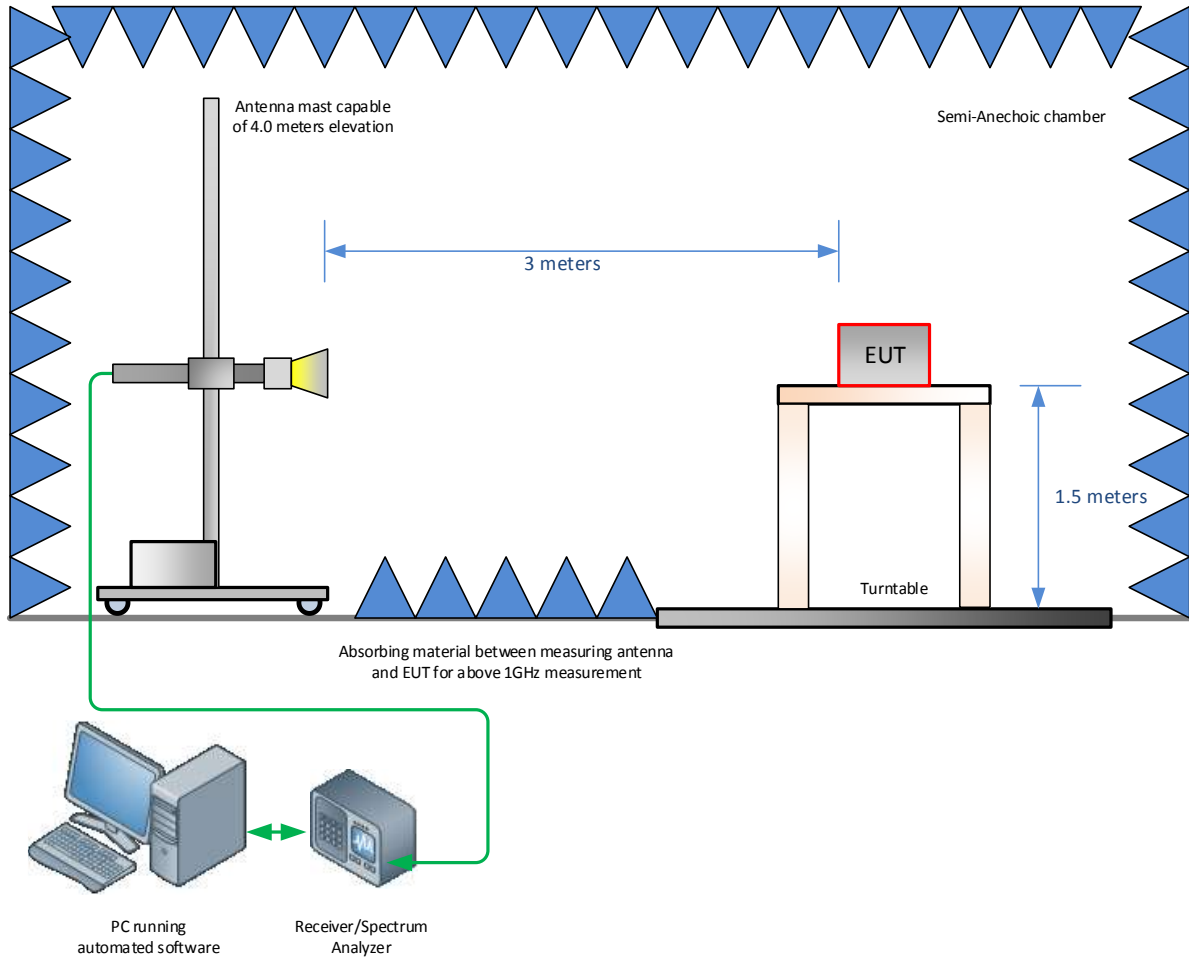
4.1 TEST SETUP DIAGRAM



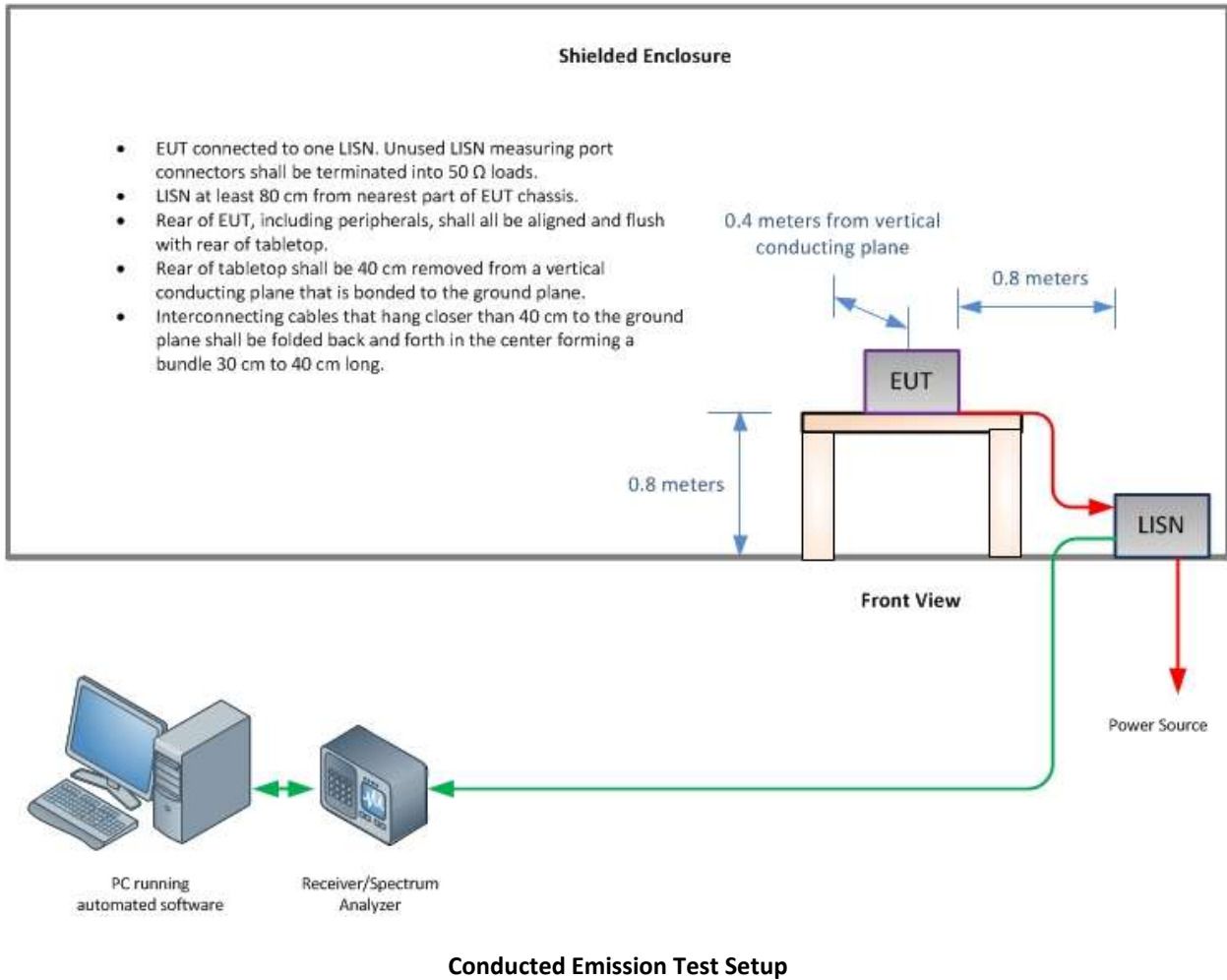
Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz) – Standby Mode



Radiated Emission Test Setup (Above 1GHz) – Transmission Mode





SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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