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Report On

Application for Grant of Equipment Authorization of the
Motorola Solutions, Inc.

APX7000 LTE Multi-Band Portable Radio

FCC Part 15 Subpart C §15.247
IC RSS-210 Issue 8 December 2010

Report No. SC1400580D

July 2014



REPORT ON Radio Testing of the
Motorola Solutions, Inc.
Multi-Band Portable Radio

TEST REPORT NUMBER SC1400580D

PREPARED FOR Motorola Solutions, Inc.
8000 West Sunrise Blvd.
Ft. Lauderdale, FL 33322

ATTESTATION The EUT has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report. All instrumentations and accessories used to verify the EUT for compliance to the indicated standards are calibrated in accordance with ISO 17025:2005 requirements.

I attest that the necessary measurements were made under my supervision.

PREPARED BY


Ferdinand S. Custodio

Name
Authorized Signatory
Title: EMC/Wireless Test Engineer

APPROVED BY


Juan M. Gonzalez

Name
Authorized Signatory

DATED

July 08, 2014



Revision History

SC1400580D Motorola Solutions, Inc. APX7000 LTE Multi-Band Portable Radio					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
07/08/2014	Initial Release				Juan m. Gonzalez



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SECTION 1

REPORT SUMMARY

Radio Testing of the
Motorola Solutions, Inc.
Multi-Band Portable Radio

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Motorola Solutions, Inc. APX7000 LTE Multi-Band Portable Radio to the requirements of FCC Part 15 Subpart C §15.247 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	Motorola Solutions, Inc.
Model Number(s)	H97TGD9PW1AN
FCC ID Number	AZ489FT7059
IC Number	109U-89FT7059
Serial Number(s)	655CPX1128
Number of Sample/s Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2013). • 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 3, December 2010). • Public Notice (DA 00-705 Released March 30, 2000) Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
Start of Test	June 30, 2014
Finish of Test	July 02, 2014
Name of Engineer(s)	Ferdinand Custodio
Related Document(s)	Advanced Compliance Solutions, Inc. Test Report Number: 14-2074.W06.1B (FCC ID: AZ489FT7059/IC:109U-89FT7059 per FCC Part 15.247 and IC RSS-210 (July 3, 2014))



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.

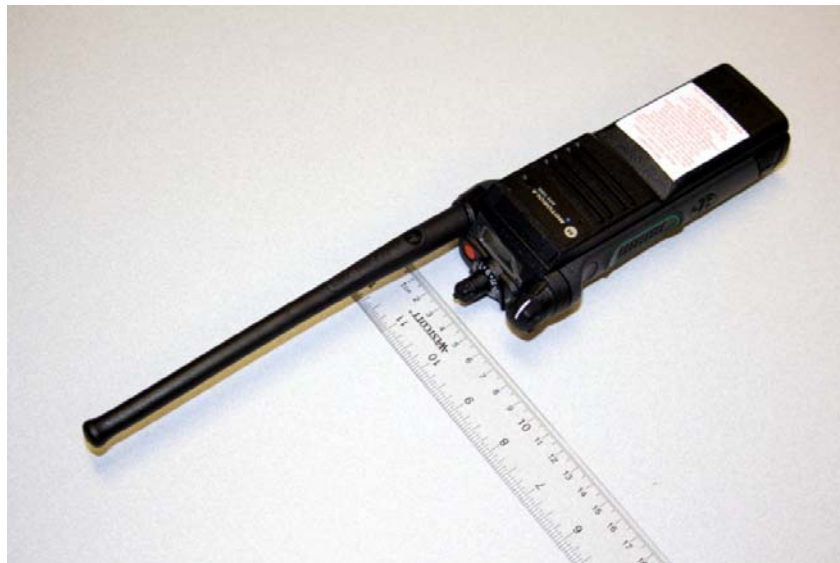
Section	§15.247 Spec Clause	RSS	Test Description	Result	Comments/ Base Standard
2.1	§15.207 (a)	RSS-Gen 7.2.4	Conducted Emissions	Compliant	
-	§15.247(a)(1)	RSS-210 A8.1(b)	Carrier Frequency Separation	N/A	
-	§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Number of Hopping Frequencies	N/A	
-	§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Time of Occupancy (Dwell Time)	N/A	
-	§15.215(c)	RSS-210 A8.1(a)	20 dB Bandwidth	N/A	
-		RSS-Gen 4.6.1	99% Emission Bandwidth	N/A	
-	§15.247(b)(1)	RSS-210 A8.4(2)	Peak Output Power	N/A	
-	§15.247(d)	RSS-210 A8.5	Band-edge Compliance of RF Conducted Emissions	N/A	
-	§15.247(d)	RSS-210 A8.5	Spurious RF Conducted Emissions	N/A	
2.2	§15.247(d)	RSS-210 2.2	Spurious Radiated Emissions	Compliant	
2.3	§15.247(d)	RSS-210 2.2	Radiated Immediate Restricted Bands	Compliant	
2.4		RSS-Gen 6.0	Receiver Spurious Emissions	Compliant	

N/A.- Not tested. Test results from Advanced Compliance Solutions, Inc. Test Report Number: 14-2074.W06.1B applies.

1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Motorola Solutions, Inc. APX7000 LTE Multi-Band Portable Radio as shown in the photograph below. The EUT is a licensed non-broadcast transmitter held to face (portable 2-way radio) with Bluetooth and LTE capability. This test report covers verification of the Bluetooth module.





1.3.2 EUT General Description

EUT Description	Multi-Band Portable Radio
Model Name	APX7000 LTE
Model Number(s)	H97TGD9PW1AN
Rated Voltage	7.5 VDC Nominal voltage.
Mode Verified	Bluetooth (V2.0 + EDR)
Capability	700-800/VHF, LTE Band 13, LTE Band 14(Public Safety) and Bluetooth (V2.0 + EDR)
Primary Unit (EUT)	☒ Production ☐ Pre-Production ☐ Engineering
Antenna Type/Details	FICA, 4.6 cm (Electrical Length)
Antenna Gain	-1.1 dBi

1.3.3 Maximum Conducted Output Power

Modulation	Frequency Range (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)
GFSK	2402-2480	8.20	6.61
$\pi/4$ -DQPSK	2402-2480	7.56	5.70
8DPSK	2402-2480	7.99	6.30

Antenna port conducted data is from Advanced Compliance Solutions, Inc. Test Report Number: 14-2074.W06.1B.

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	EUT is initially programmed for Bluetooth test mode using the USB programming cable connected to a support laptop and enabled via Telnet and AT commands..Once in BT test mode, the USB programming cable is removed. A CMW500 Wideband Radio Communication Tester is then use to connect with the EUT via Bluetooth. Radio functionality is directly controlled through the call box.

1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester. Prior to synching with the CMW500, the Bluetooth test mode is enabled via Telnet and AT commands through the optional USB programming cable.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Lenovo	Support Laptop	Model 2522-26U S/N R8-P39EN 11/02 Product ID:25226U
Motorola	USB programming cable	PMKN4012B Rev. B 15/12
Motorola	Adaptive Charger	Impres™ WPLN4114AR V3.40 Single Unit Charger S/N 0726 377673 7088MKF02
EMCO	Double-ridged waveguide horn antenna	Model 3115 S/N 94124364

1.4.4 Worst Case Configuration

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

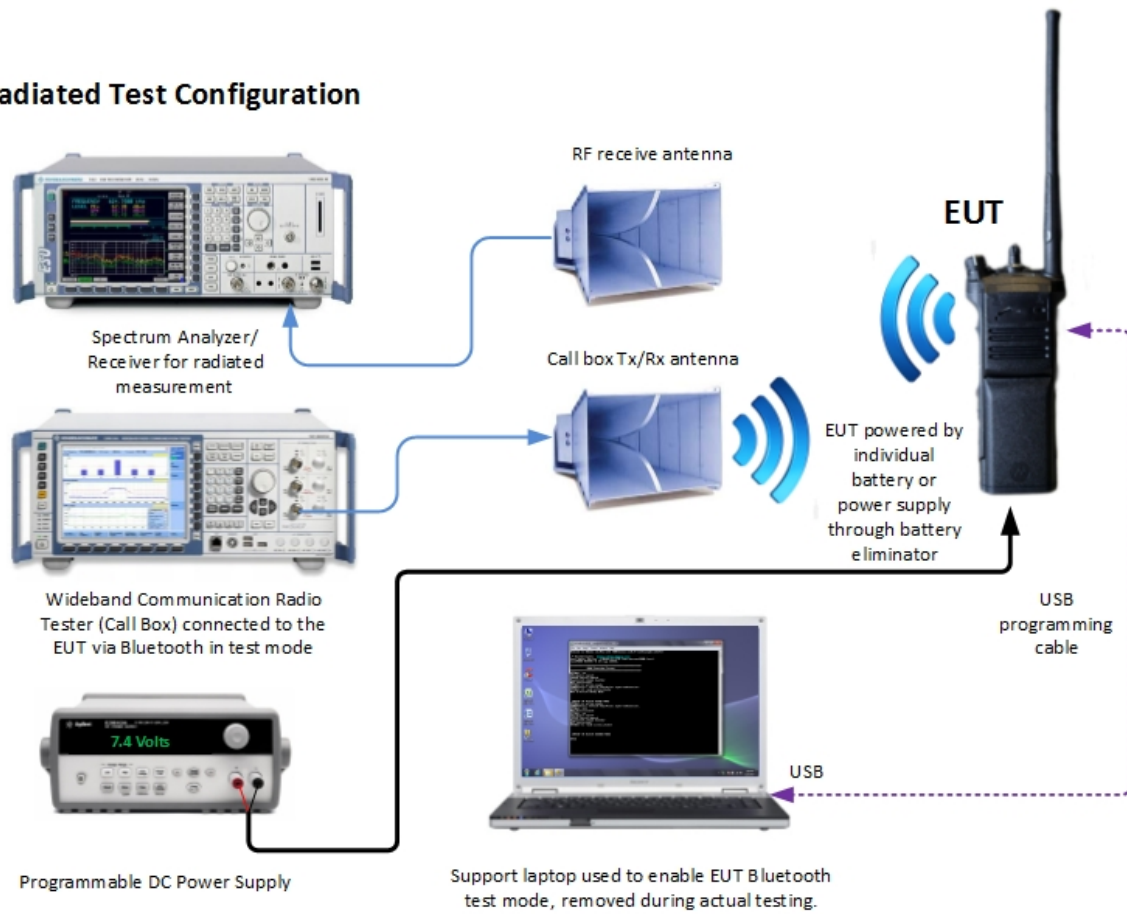
Modulation	Channel	Frequency	Packet Type	Pattern Type	Payload Length
GFSK	78	2480MHz	DH1	PRBS9	27 bytes

For radiated spurious measurements X, Y and Z orientations were verified. There are no significant spurious emissions variations between the three axes. Radiated spurious emissions verifications performed in "X" configuration.



1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration



For illustration purpose only and not to scale
Image presented may not represent the actual EUT or support equipment



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		

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

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

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

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

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

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.



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

The 10m Semi-anechoic chamber of TÜV SÜD 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
Motorola Solutions, Inc.
Multi-Band Portable Radio

2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart C §15.207(a)

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: 655CPX1128 / Default Test Configuration

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

July 02, 2014/FSC

2.1.5 Test Equipment Used

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

2.1.6 Environmental Conditions/Test Location

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

Ambient Temperature	24.6 °C
Relative Humidity	49.4. %
ATM Pressure	98.9 kPa

2.1.7 Additional Observations

- The EUT was verified using the Adaptive Charger 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 (See Section 1.4.4 of this test report for details).



- 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 2.1.8 for sample computation.

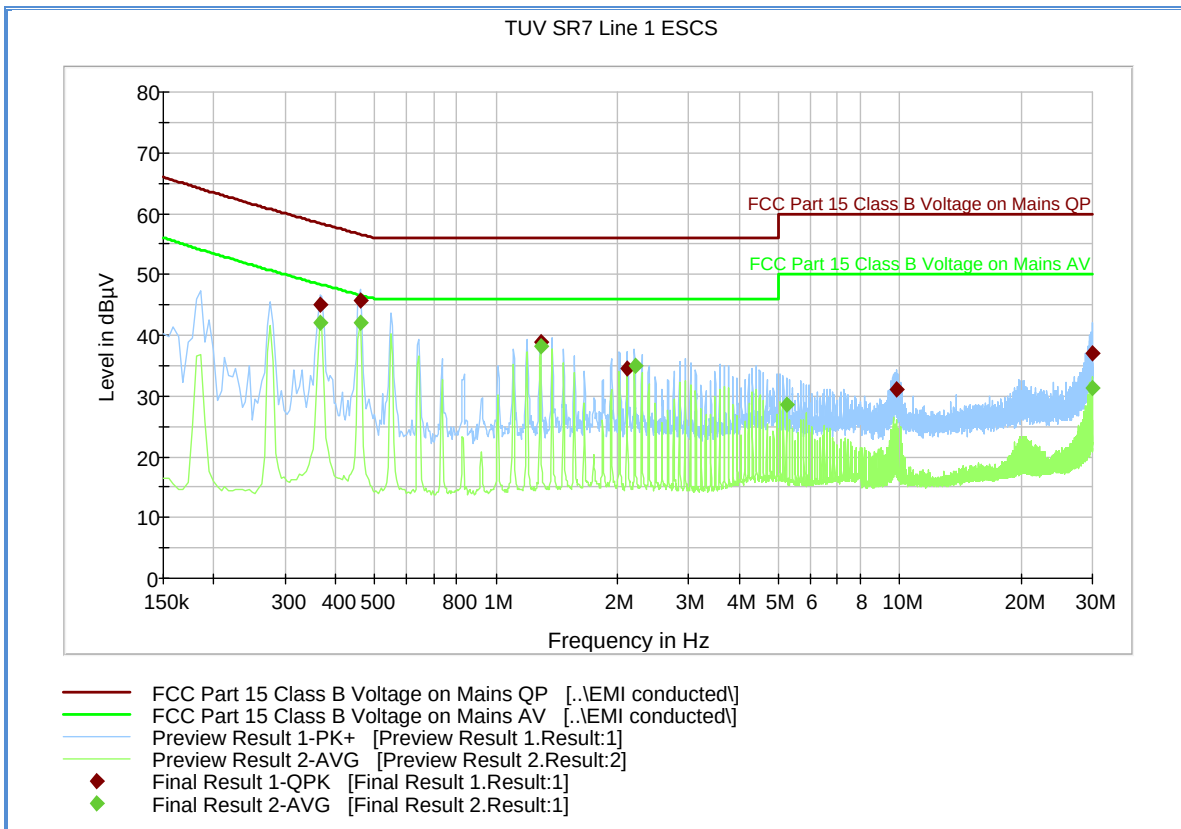
2.1.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbμV) @ 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 (dbμV) @ 150kHz			26.2

2.1.9 Test Results

Compliant. See attached plots and tables.

2.1.10 FCC Conducted Emissions Line 1 – Hot (Worst Case Transmit Mode)



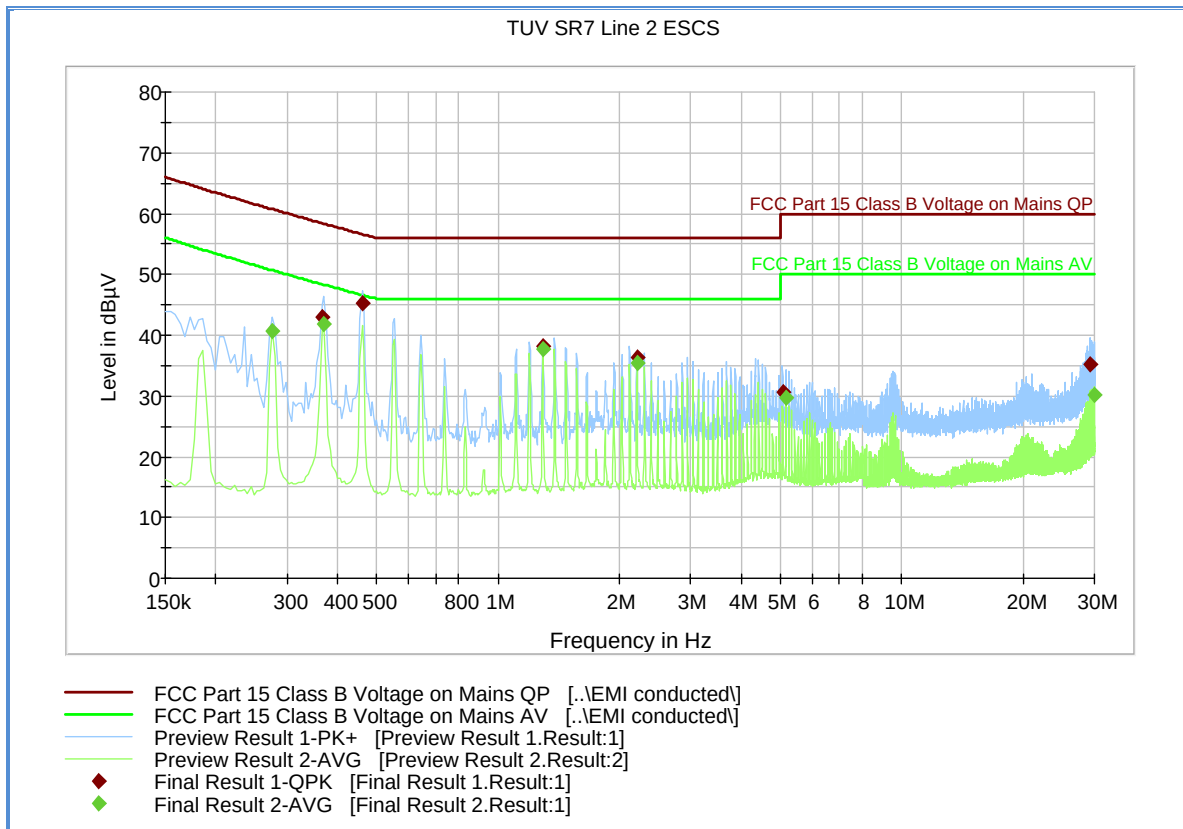
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.366000	45.1	1000.0	9.000	Off	L1	20.1	13.3	58.4
0.460500	45.8	1000.0	9.000	Off	L1	20.0	10.9	56.6
1.288500	38.8	1000.0	9.000	Off	L1	20.2	17.2	56.0
2.121000	34.6	1000.0	9.000	Off	L1	20.2	21.4	56.0
9.825000	31.1	1000.0	9.000	Off	L1	20.6	28.9	60.0
29.971500	37.1	1000.0	9.000	Off	L1	21.0	22.9	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.366000	42.1	1000.0	9.000	Off	L1	20.1	6.3	48.4
0.460500	42.1	1000.0	9.000	Off	L1	20.0	4.5	46.6
1.288500	38.1	1000.0	9.000	Off	L1	20.2	7.9	46.0
2.211000	35.0	1000.0	9.000	Off	L1	20.3	11.0	46.0
5.248500	28.6	1000.0	9.000	Off	L1	20.5	21.4	50.0
29.971500	31.3	1000.0	9.000	Off	L1	21.0	18.7	50.0

2.1.11 FCC Conducted Emissions Line 2 – Neutral (Worst Case Transmit Mode)



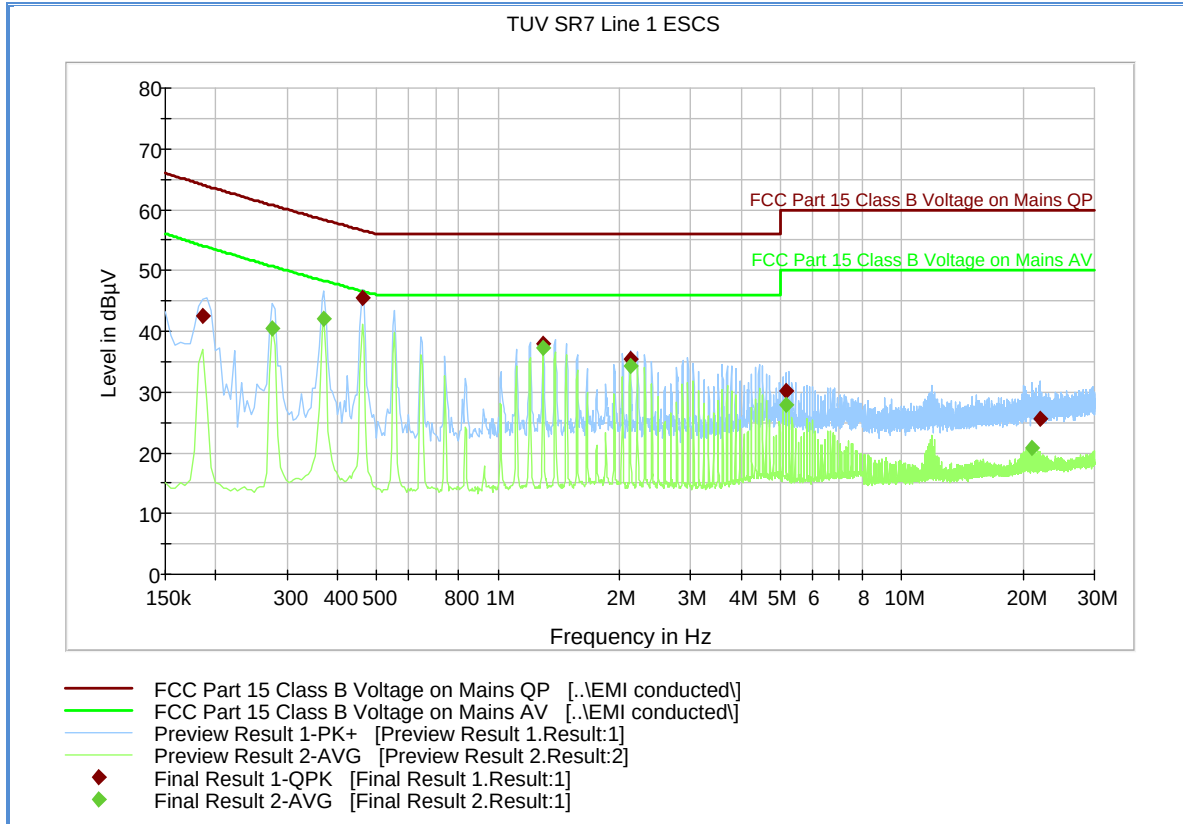
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.366000	43.0	1000.0	9.000	Off	N	20.1	15.4	58.4
0.460500	45.2	1000.0	9.000	Off	N	20.0	11.4	56.6
1.293000	38.3	1000.0	9.000	Off	N	20.1	17.7	56.0
2.215500	36.4	1000.0	9.000	Off	N	20.3	19.6	56.0
5.077500	30.7	1000.0	9.000	Off	N	20.4	29.3	60.0
29.382000	35.3	1000.0	9.000	Off	N	20.8	24.7	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.276000	40.7	1000.0	9.000	Off	N	20.1	10.0	50.7
0.370500	41.9	1000.0	9.000	Off	N	20.0	6.4	48.3
1.293000	37.6	1000.0	9.000	Off	N	20.1	8.4	46.0
2.215500	35.4	1000.0	9.000	Off	N	20.3	10.6	46.0
5.167500	29.8	1000.0	9.000	Off	N	20.5	20.2	50.0
29.971500	30.2	1000.0	9.000	Off	N	20.8	19.8	50.0

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



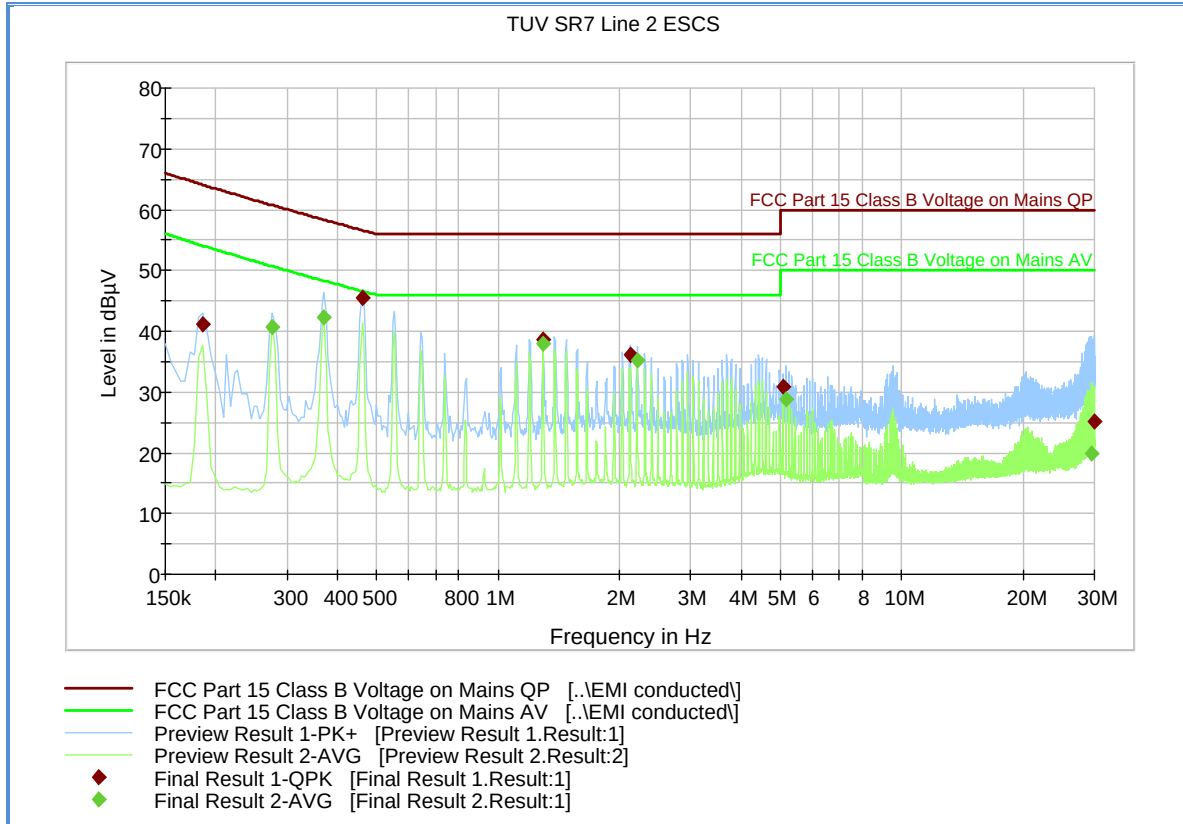
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.186000	42.4	1000.0	9.000	Off	L1	20.1	21.7	64.1
0.460500	45.4	1000.0	9.000	Off	L1	20.0	11.3	56.6
1.293000	38.0	1000.0	9.000	Off	L1	20.2	18.0	56.0
2.125500	35.4	1000.0	9.000	Off	L1	20.2	20.6	56.0
5.176500	30.2	1000.0	9.000	Off	L1	20.5	29.8	60.0
22.110000	25.5	1000.0	9.000	Off	L1	20.9	34.5	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.276000	40.5	1000.0	9.000	Off	L1	20.1	10.2	50.7
0.370500	42.2	1000.0	9.000	Off	L1	20.1	6.2	48.3
1.293000	37.3	1000.0	9.000	Off	L1	20.2	8.7	46.0
2.125500	34.4	1000.0	9.000	Off	L1	20.2	11.6	46.0
5.176500	27.9	1000.0	9.000	Off	L1	20.5	22.1	50.0
21.030000	20.9	1000.0	9.000	Off	L1	20.9	29.1	50.0

2.1.13 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)
0.186000	41.2	1000.0	9.000	Off	N	20.1	22.9	64.1
0.460500	45.5	1000.0	9.000	Off	N	20.0	11.1	56.6
1.293000	38.6	1000.0	9.000	Off	N	20.1	17.4	56.0
2.125500	36.2	1000.0	9.000	Off	N	20.2	19.8	56.0
5.082000	30.8	1000.0	9.000	Off	N	20.4	29.2	60.0
29.976000	25.2	1000.0	9.000	Off	N	20.8	34.8	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.276000	40.6	1000.0	9.000	Off	N	20.1	10.1	50.7
0.370500	42.3	1000.0	9.000	Off	N	20.0	6.1	48.3
1.293000	37.9	1000.0	9.000	Off	N	20.1	8.1	46.0
2.215500	35.2	1000.0	9.000	Off	N	20.3	10.8	46.0
5.172000	28.7	1000.0	9.000	Off	N	20.5	21.3	50.0
29.580000	19.8	1000.0	9.000	Off	N	20.8	30.2	50.0



2.2 SPURIOUS RADIATED EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.2.2 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)).

2.2.3 Equipment Under Test and Modification State

Serial No: 655CPX1128 / Default Test Configuration

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

June 30 to July 02, 2014/FSC

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	24.5-25.6°C
Relative Humidity	49.4-50.5.%
ATM Pressure	98.8-98.9 kPa

2.2.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz).
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Only the considered worst case configuration (High channel GFSK Basic Rate) presented for radiated emissions below 1GHz. There are no significant differences in radiated emissions between the three modulation types.



- 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 2.2.8 for sample computation.

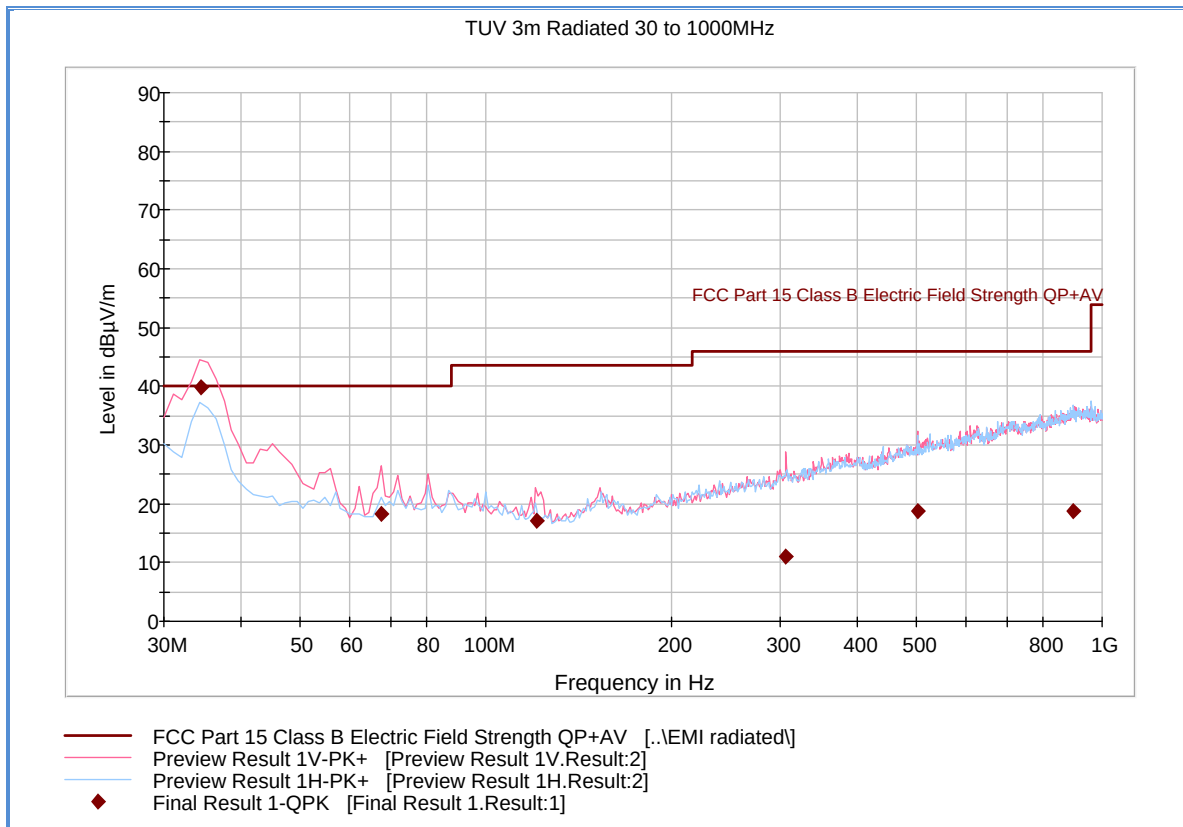
2.2.8 Sample Computation (Radiated Emission)

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# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (db μ V/m) @ 30MHz			11.8

2.2.9 Test Results

See attached plots.

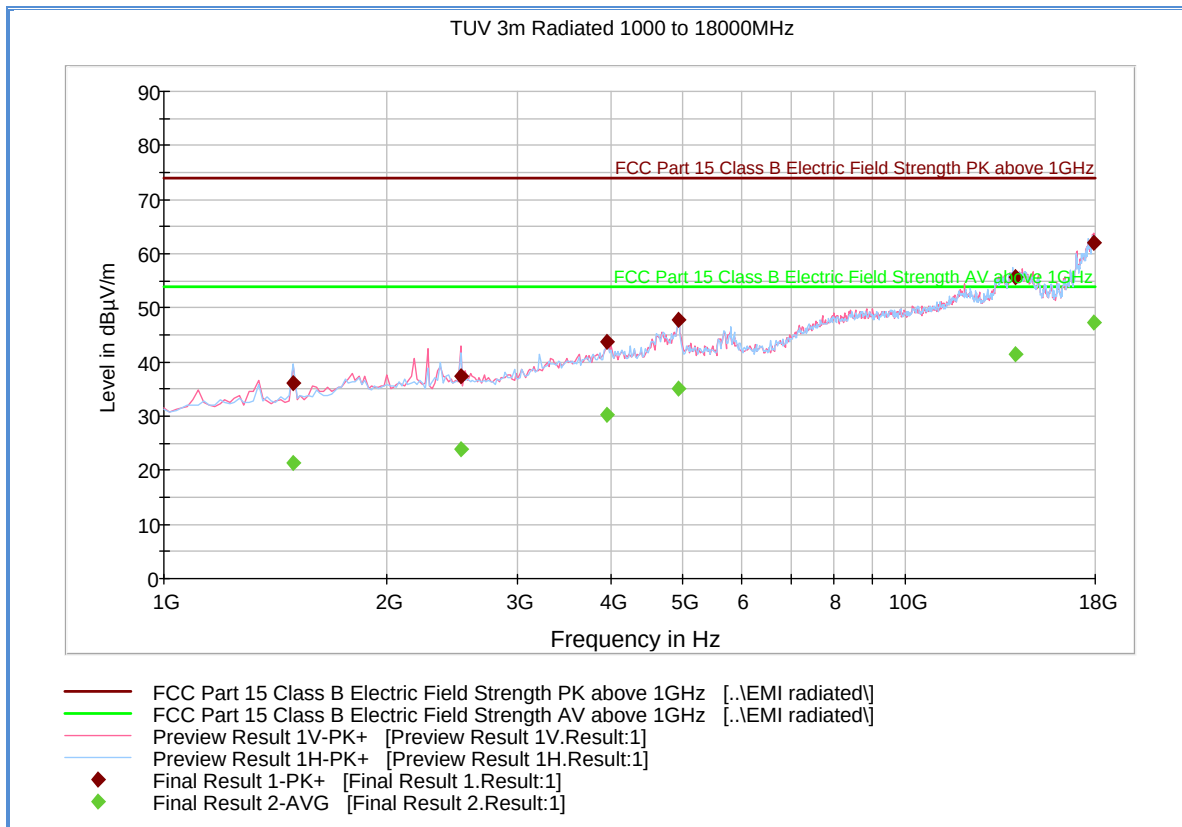
2.2.10 Test Results Below 1GHz (Receive Mode)



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)
34.391111	39.8	1000.0	120.000	100.0	V	152.0	-9.9	0.2	40.0
67.722222	18.2	1000.0	120.000	100.0	V	14.0	-18.5	21.8	40.0
120.613333	17.0	1000.0	120.000	100.0	V	312.0	-17.2	26.5	43.5
306.948889	11.0	1000.0	120.000	100.0	V	286.0	-10.4	35.0	46.0
501.108889	18.7	1000.0	120.000	100.0	V	354.0	-6.5	27.3	46.0
899.846667	18.6	1000.0	120.000	103.0	H	179.0	0.0	27.4	46.0

2.2.11 Test Results Above 1GHz (Receive Mode)



Peak Data

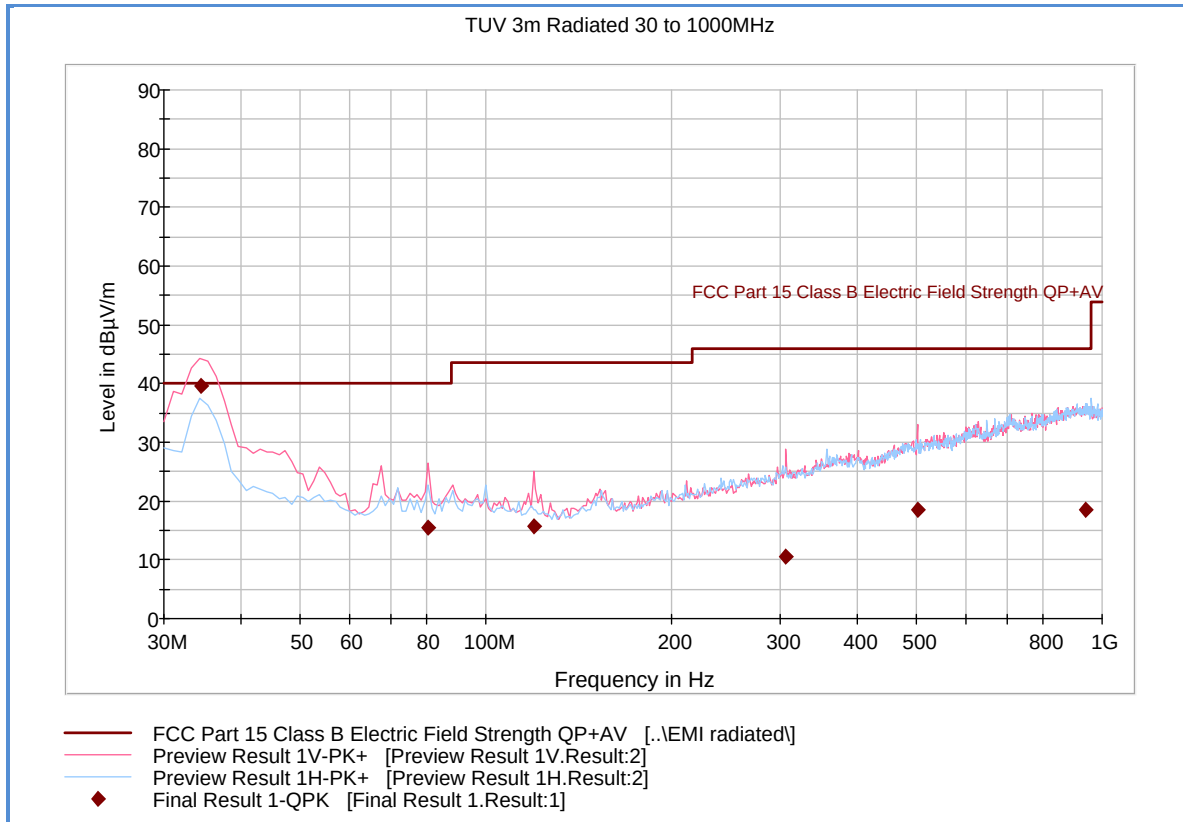
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1491.371111	36.2	1000.0	1000.000	103.0	H	158.0	4.5	37.7	73.9
2510.731111	37.3	1000.0	1000.000	100.0	V	23.0	7.9	36.6	73.9
3947.006667	43.7	1000.0	1000.000	100.0	V	92.0	11.6	30.2	73.9
4928.428889	47.7	1000.0	1000.000	103.0	H	23.0	12.9	26.2	73.9
14033.15333	55.7	1000.0	1000.000	103.0	H	295.0	27.7	18.2	73.9
17943.67333	62.0	1000.0	1000.000	100.0	V	203.0	33.5	11.9	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)
1491.371111	21.5	1000.0	1000.000	103.0	H	158.0	4.5	32.4	53.9
2510.731111	24.0	1000.0	1000.000	100.0	V	23.0	7.9	29.9	53.9
3947.006667	30.2	1000.0	1000.000	100.0	V	92.0	11.6	23.7	53.9
4928.428889	35.0	1000.0	1000.000	103.0	H	23.0	12.9	18.9	53.9
14033.15333	41.3	1000.0	1000.000	103.0	H	295.0	27.7	12.6	53.9
17943.67333	47.2	1000.0	1000.000	100.0	V	203.0	33.5	6.7	53.9

Test Notes: No significant emissions observed above 6GHz.

2.2.12 Test Results Below 1GHz (Bluetooth TX Worst Case – Non-hopping)

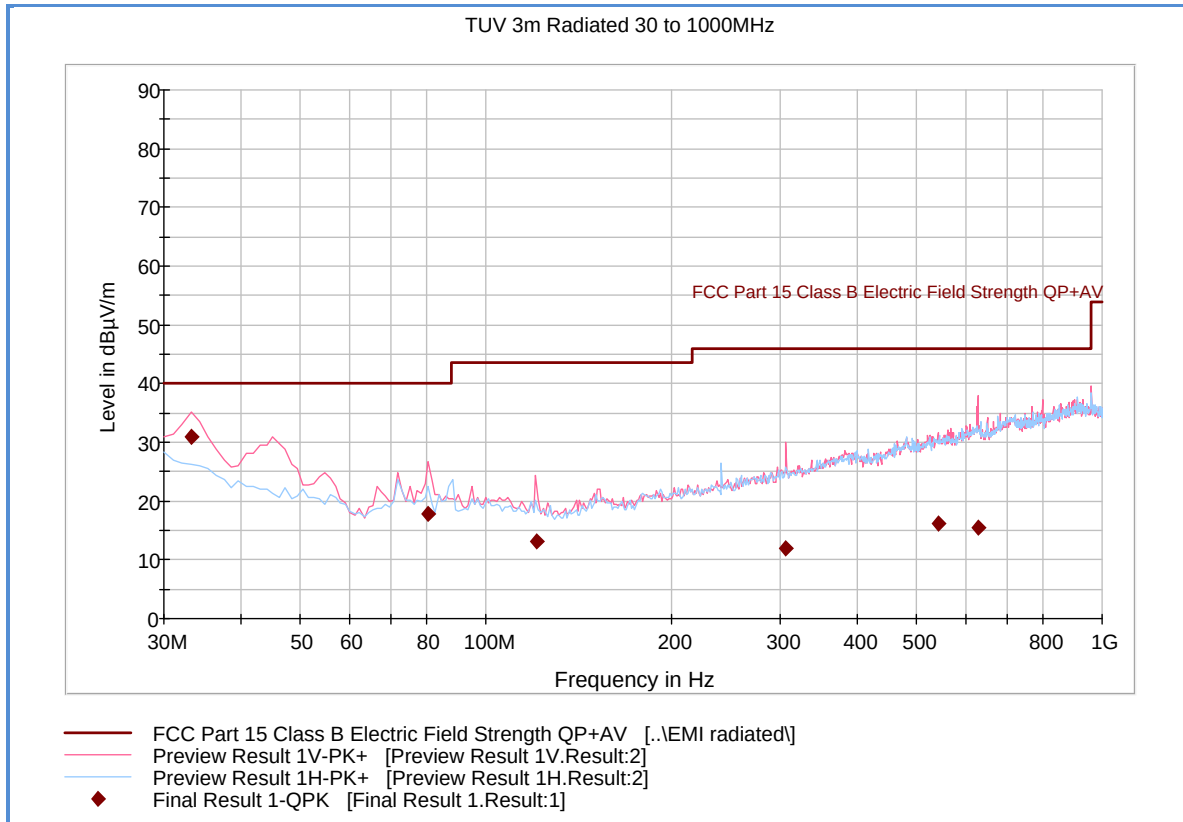


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
34.391111	39.7	1000.0	120.000	100.0	V	191.0	-9.9	0.3	40.0
80.535556	15.5	1000.0	120.000	100.0	V	262.0	-18.2	24.5	40.0
119.375556	15.8	1000.0	120.000	100.0	V	13.0	-17.1	27.7	43.5
307.028889	10.5	1000.0	120.000	100.0	V	5.0	-10.4	35.5	46.0
500.908889	18.6	1000.0	120.000	100.0	V	43.0	-6.5	27.4	46.0
939.604444	18.5	1000.0	120.000	103.0	H	110.0	0.2	27.5	46.0

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

2.2.13 Test Results Below 1GHz (Bluetooth TX Worst Case – Hopping)

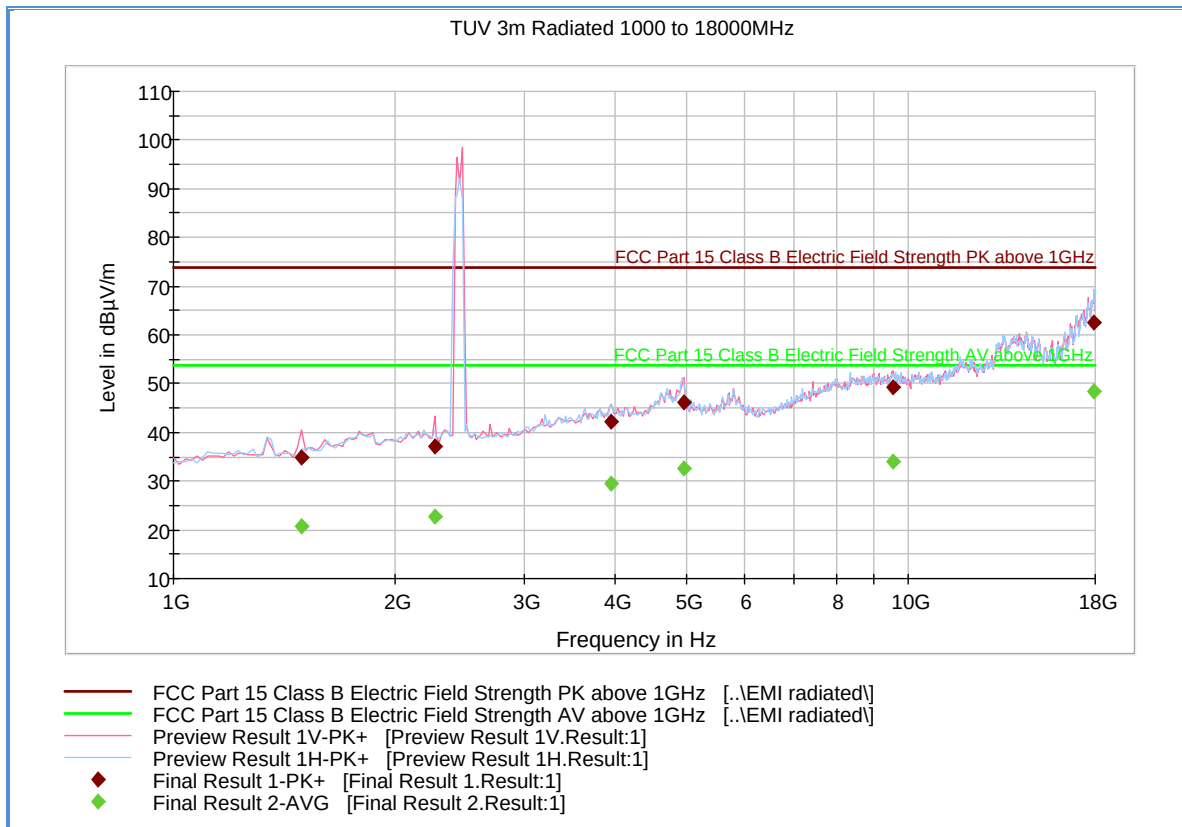


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.193333	30.9	1000.0	120.000	100.0	V	246.0	-9.1	9.1	40.0
80.575556	17.8	1000.0	120.000	100.0	V	268.0	-18.2	22.2	40.0
120.653333	13.1	1000.0	120.000	100.0	V	45.0	-17.2	30.4	43.5
306.988889	12.0	1000.0	120.000	100.0	V	247.0	-10.4	34.0	46.0
541.944444	16.2	1000.0	120.000	100.0	V	100.0	-5.1	29.8	46.0
628.166667	15.5	1000.0	120.000	100.0	V	45.0	-3.2	30.5	46.0

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

2.2.14 Test Results Above 1GHz (Bluetooth TX Worst Case – Hopping)



Peak Data

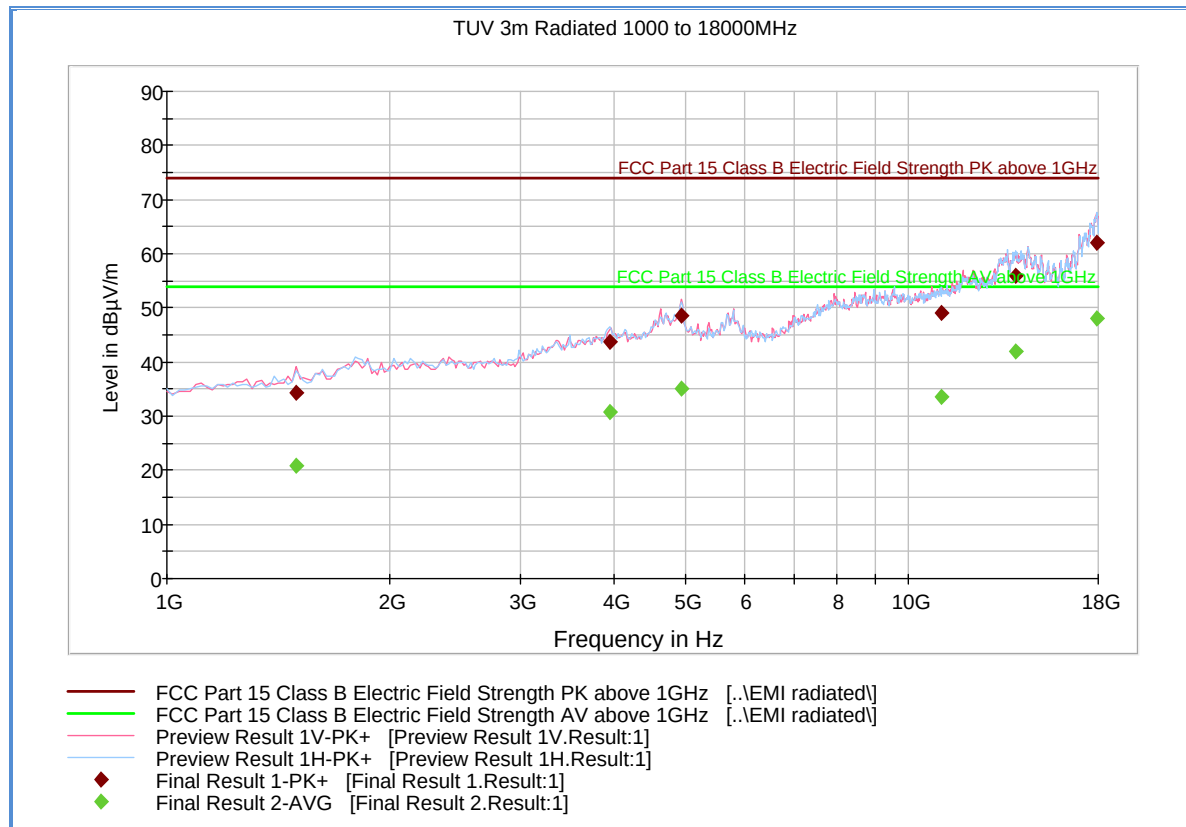
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1490.971111	34.9	1000.0	1000.000	100.0	V	70.0	3.9	39.0	73.9
2266.135556	37.1	1000.0	1000.000	100.0	V	-1.0	6.5	36.8	73.9
3946.806667	42.2	1000.0	1000.000	103.0	H	208.0	10.7	31.7	73.9
4947.277778	46.2	1000.0	1000.000	100.0	V	184.0	12.0	27.7	73.9
9556.446667	49.2	1000.0	1000.000	100.0	V	202.0	20.3	24.7	73.9
17943.873333	62.4	1000.0	1000.000	103.0	H	-1.0	33.7	11.5	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)
1490.971111	20.8	1000.0	1000.000	100.0	V	70.0	3.9	33.1	53.9
2266.135556	22.7	1000.0	1000.000	100.0	V	-1.0	6.5	31.2	53.9
3946.806667	29.4	1000.0	1000.000	103.0	H	208.0	10.7	24.5	53.9
4947.277778	32.7	1000.0	1000.000	100.0	V	184.0	12.0	21.2	53.9
9556.446667	33.9	1000.0	1000.000	100.0	V	202.0	20.3	20.0	53.9
17943.873333	48.5	1000.0	1000.000	103.0	H	-1.0	33.7	5.4	53.9

Test Notes: No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.15 Test Results Above 1GHz Low Channel (Bluetooth TX GFSK)



Peak Data

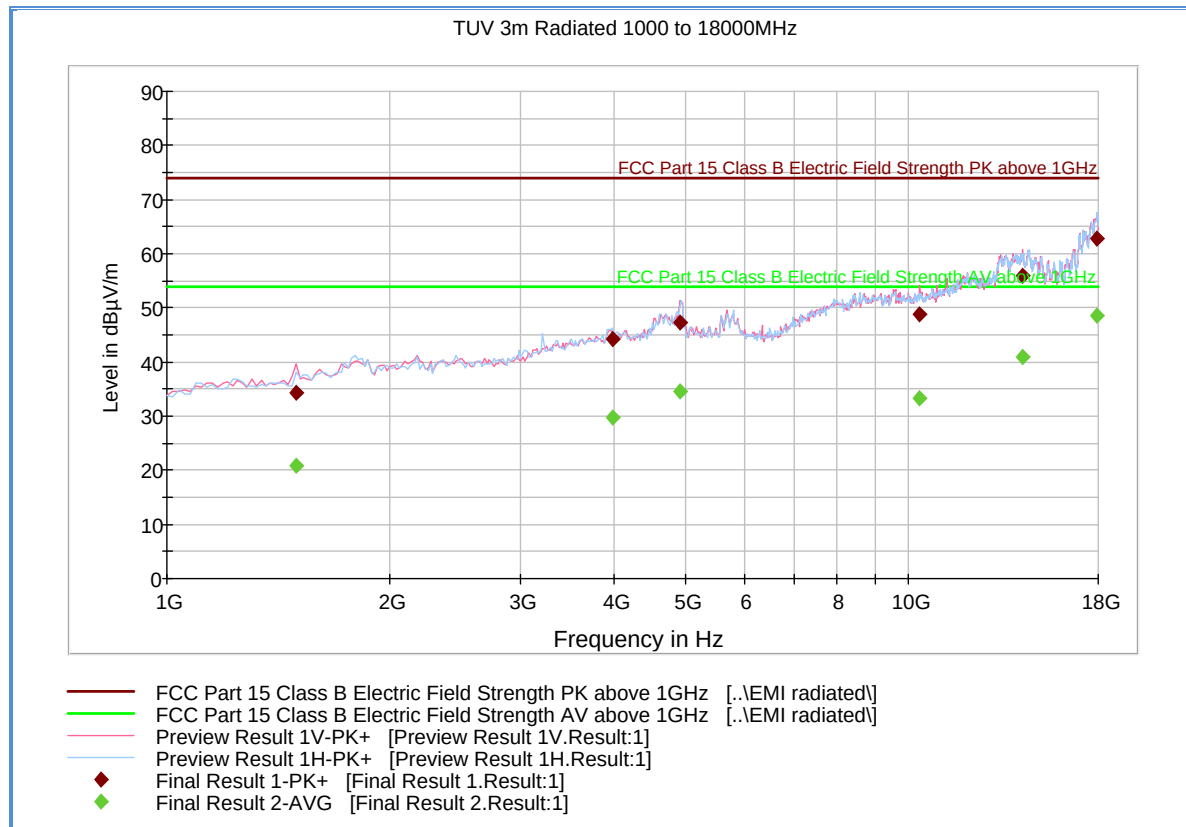
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1491.291111	34.3	1000.0	1000.000	100.0	V	338.0	4.5	39.6	73.9
3945.966667	43.6	1000.0	1000.000	103.0	H	157.0	11.6	30.3	73.9
4929.348889	48.6	1000.0	1000.000	100.0	V	309.0	12.9	25.3	73.9
11067.877778	49.1	1000.0	1000.000	103.0	H	157.0	23.3	24.8	73.9
13938.868889	55.9	1000.0	1000.000	103.0	H	21.0	27.4	18.0	73.9
17905.975556	62.0	1000.0	1000.000	103.0	H	322.0	33.3	11.9	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)
1491.291111	20.9	1000.0	1000.000	100.0	V	338.0	4.5	33.0	53.9
3945.966667	30.7	1000.0	1000.000	103.0	H	157.0	11.6	23.2	53.9
4929.348889	35.1	1000.0	1000.000	100.0	V	309.0	12.9	18.8	53.9
11067.877778	33.5	1000.0	1000.000	103.0	H	157.0	23.3	20.4	53.9
13938.868889	41.9	1000.0	1000.000	103.0	H	21.0	27.4	12.0	53.9
17905.975556	48.2	1000.0	1000.000	103.0	H	322.0	33.3	5.7	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.16 Test Results Above 1GHz Mid Channel (Bluetooth TX GFSK)



Peak Data

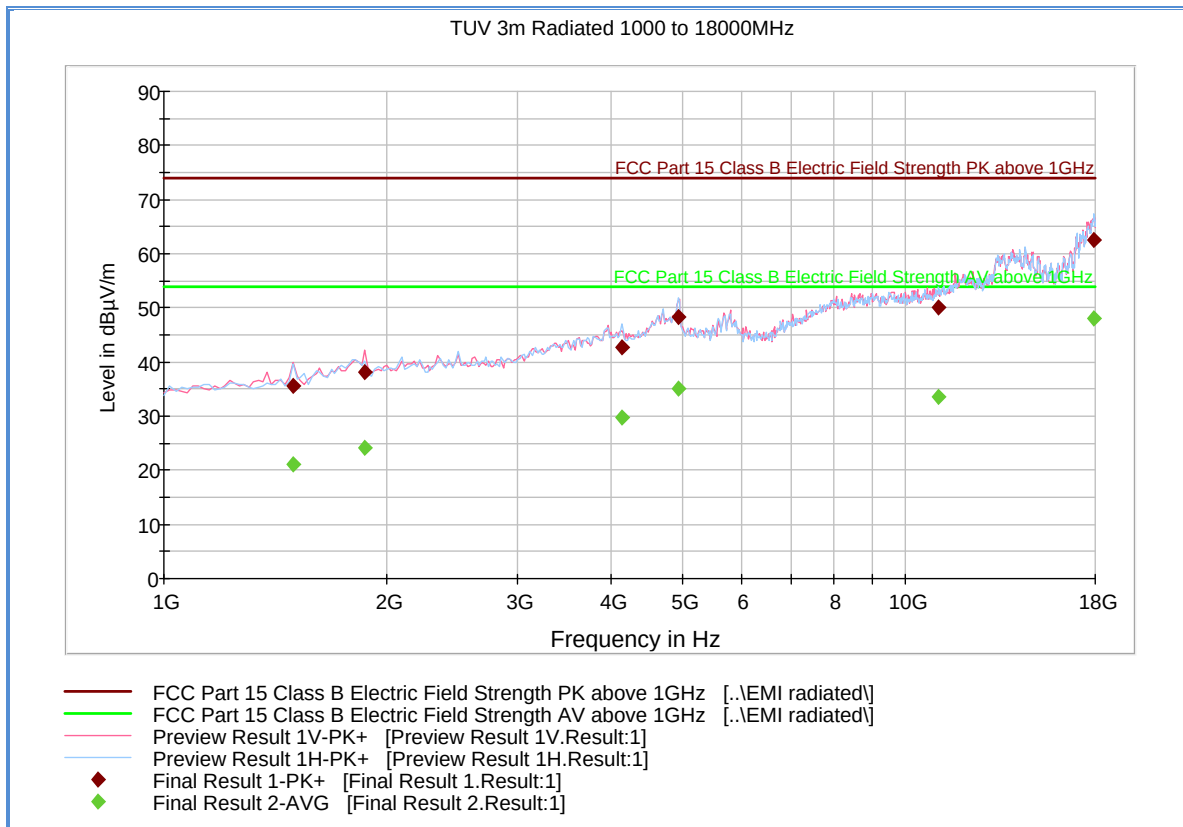
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1490.771111	34.3	1000.0	1000.000	100.0	V	41.0	4.5	39.6	73.9
3984.664444	44.4	1000.0	1000.000	103.0	H	317.0	11.8	29.5	73.9
4910.140000	47.2	1000.0	1000.000	100.0	V	221.0	12.8	26.7	73.9
10349.980000	48.7	1000.0	1000.000	100.0	V	150.0	22.4	25.2	73.9
14240.851111	56.0	1000.0	1000.000	100.0	V	218.0	28.2	17.9	73.9
17924.384444	62.8	1000.0	1000.000	103.0	H	23.0	33.4	11.1	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)
1490.771111	20.8	1000.0	1000.000	100.0	V	41.0	4.5	33.1	53.9
3984.664444	29.8	1000.0	1000.000	103.0	H	317.0	11.8	24.1	53.9
4910.140000	34.7	1000.0	1000.000	100.0	V	221.0	12.8	19.2	53.9
10349.980000	33.3	1000.0	1000.000	100.0	V	150.0	22.4	20.6	53.9
14240.851111	40.8	1000.0	1000.000	100.0	V	218.0	28.2	13.1	53.9
17924.384444	48.5	1000.0	1000.000	103.0	H	23.0	33.4	5.4	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.17 Test Results Above 1GHz High Channel (Bluetooth TX GFSK)



Peak Data

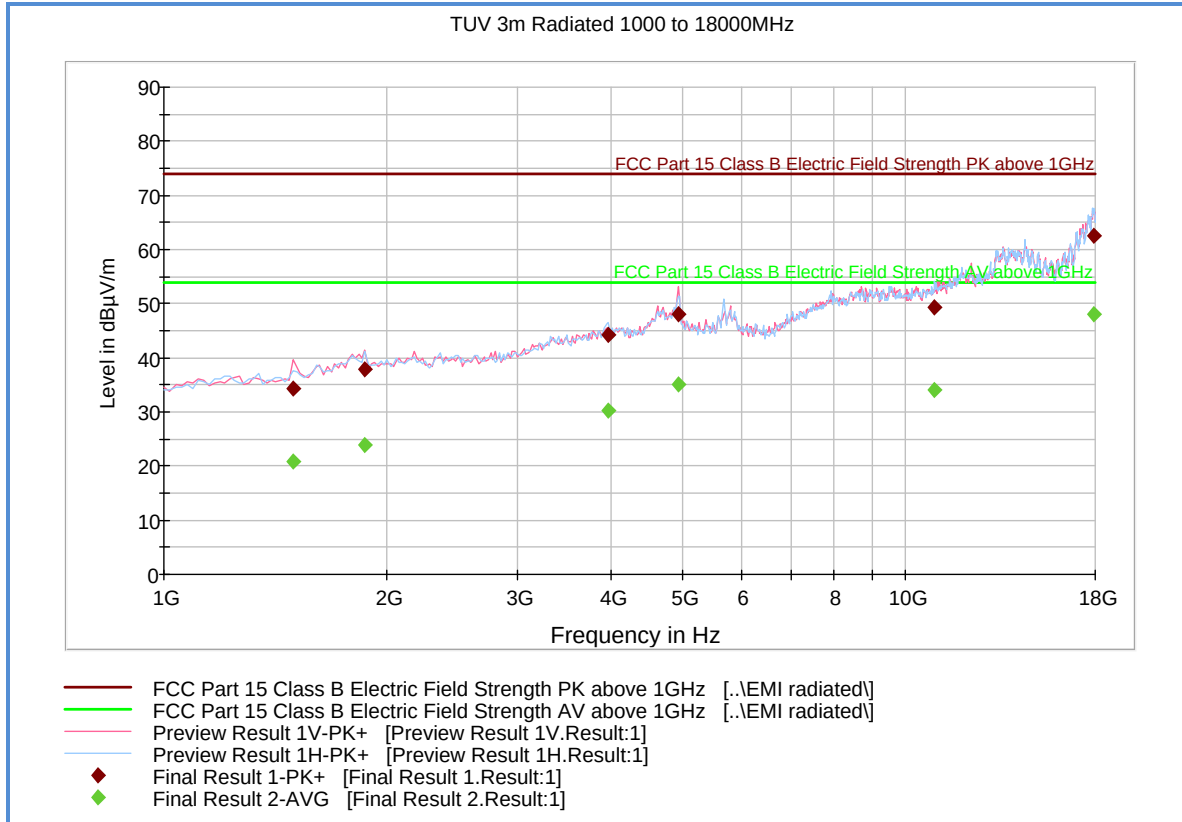
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1491.771111	35.5	1000.0	1000.000	100.0	V	1.0	4.5	38.4	73.9
1868.908889	38.2	1000.0	1000.000	100.0	V	66.0	6.5	35.7	73.9
4135.935556	42.6	1000.0	1000.000	103.0	H	170.0	11.2	31.3	73.9
4928.228889	48.2	1000.0	1000.000	103.0	H	163.0	12.9	25.7	73.9
11068.437778	50.0	1000.0	1000.000	103.0	H	43.0	23.3	23.9	73.9
17943.513333	62.4	1000.0	1000.000	103.0	H	-1.0	33.5	11.5	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)
1491.771111	21.0	1000.0	1000.000	100.0	V	1.0	4.5	32.9	53.9
1868.908889	24.2	1000.0	1000.000	100.0	V	66.0	6.5	29.7	53.9
4135.935556	29.8	1000.0	1000.000	103.0	H	170.0	11.2	24.1	53.9
4928.228889	35.1	1000.0	1000.000	103.0	H	163.0	12.9	18.8	53.9
11068.437778	33.6	1000.0	1000.000	103.0	H	43.0	23.3	20.3	53.9
17943.513333	48.0	1000.0	1000.000	103.0	H	-1.0	33.5	5.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.18 Test Results Above 1GHz Low Channel (Bluetooth TX $\pi/4$ -DQPSK)



Peak Data

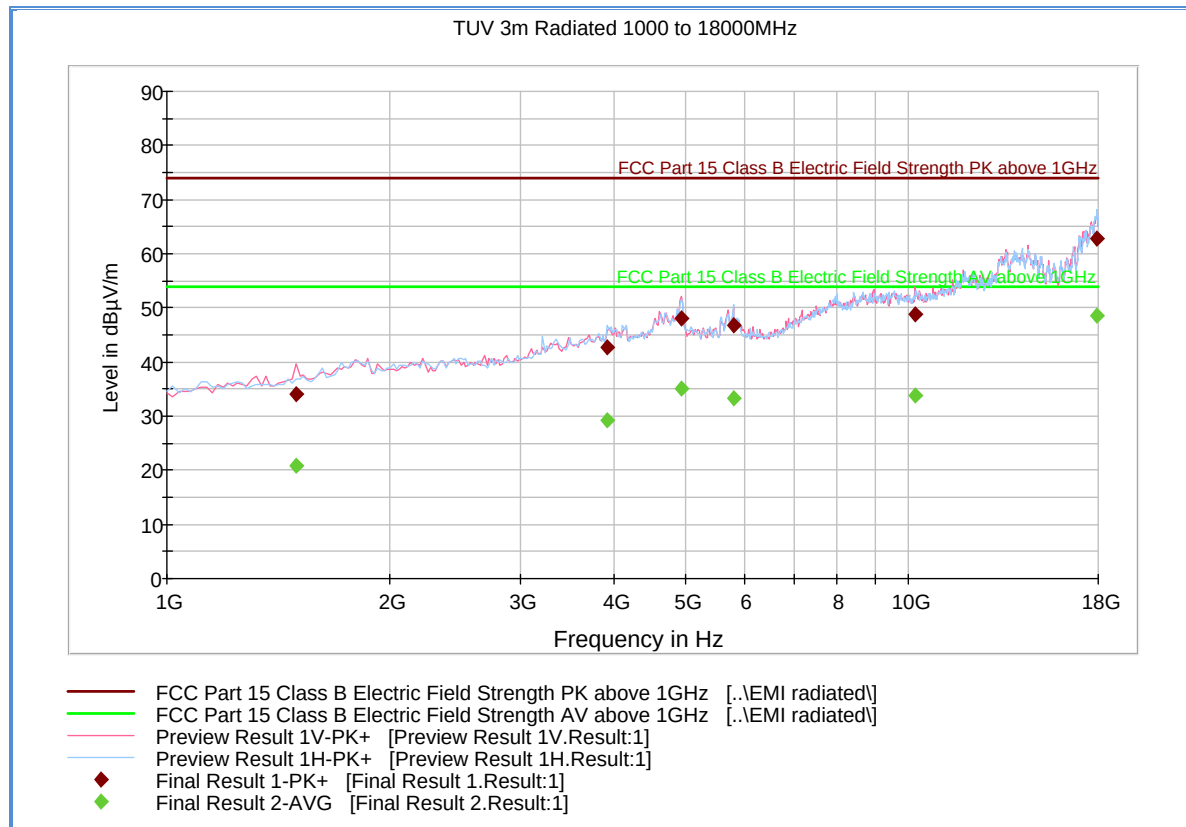
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1491.211111	34.3	1000.0	1000.000	100.0	V	261.0	4.5	39.6	73.9
1868.708889	37.9	1000.0	1000.000	100.0	V	215.0	6.5	36.0	73.9
3965.775556	44.2	1000.0	1000.000	103.0	H	291.0	11.7	29.7	73.9
4928.868889	48.0	1000.0	1000.000	100.0	V	21.0	12.9	25.9	73.9
10935.455556	49.4	1000.0	1000.000	103.0	H	153.0	23.0	24.5	73.9
17943.513333	62.5	1000.0	1000.000	103.0	H	256.0	33.5	11.4	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)
1491.211111	20.8	1000.0	1000.000	100.0	V	261.0	4.5	33.1	53.9
1868.708889	24.0	1000.0	1000.000	100.0	V	215.0	6.5	29.9	53.9
3965.775556	30.2	1000.0	1000.000	103.0	H	291.0	11.7	23.7	53.9
4928.868889	35.0	1000.0	1000.000	100.0	V	21.0	12.9	18.9	53.9
10935.455556	34.1	1000.0	1000.000	103.0	H	153.0	23.0	19.8	53.9
17943.513333	48.0	1000.0	1000.000	103.0	H	256.0	33.5	5.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.19 Test Results Above 1GHz Mid Channel (Bluetooth TX $\pi/4$ -DQPSK)



Peak Data

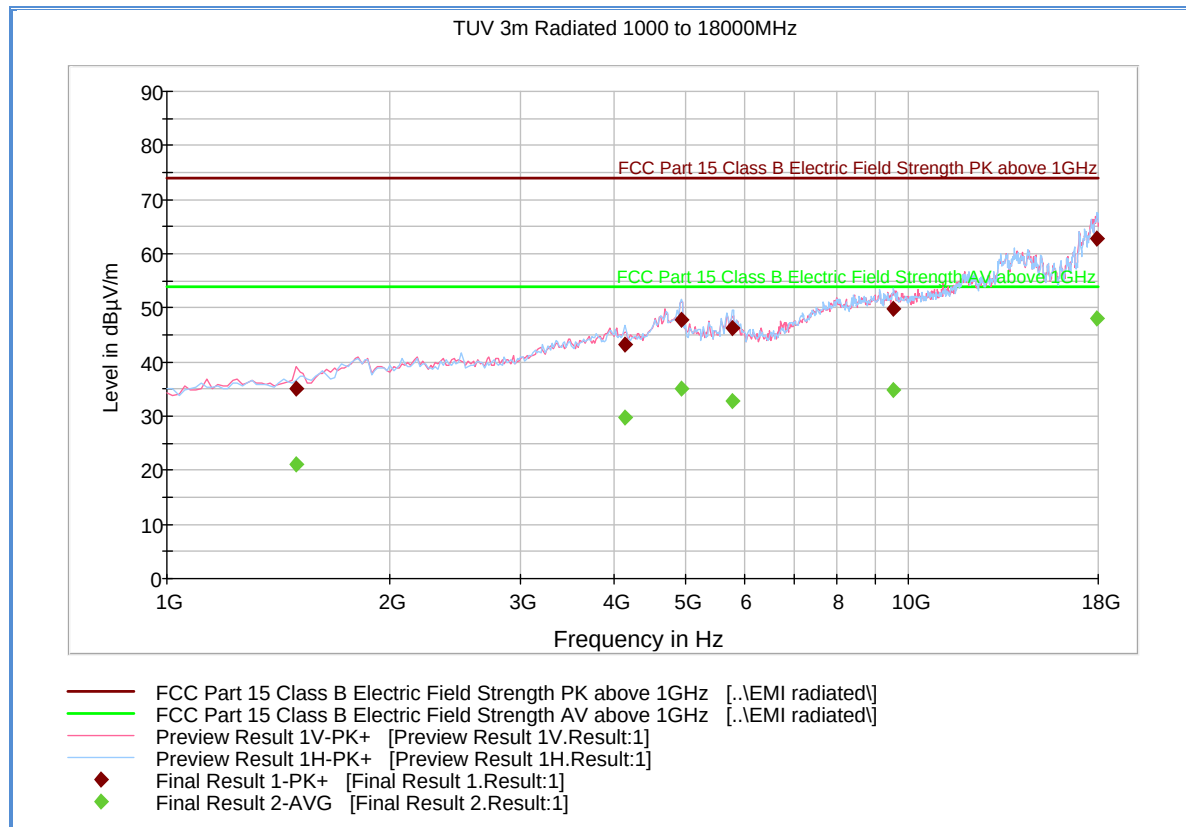
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1491.491111	34.2	1000.0	1000.000	100.0	V	136.0	4.5	39.7	73.9
3927.357778	42.8	1000.0	1000.000	103.0	H	178.0	11.6	31.1	73.9
4928.868889	48.0	1000.0	1000.000	100.0	V	31.0	12.9	25.9	73.9
5797.597778	46.9	1000.0	1000.000	103.0	H	193.0	13.4	27.0	73.9
10179.980000	48.8	1000.0	1000.000	100.0	V	336.0	22.2	25.1	73.9
17923.864444	62.9	1000.0	1000.000	103.0	H	32.0	33.4	11.0	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)
1491.491111	20.9	1000.0	1000.000	100.0	V	136.0	4.5	33.0	53.9
3927.357778	29.2	1000.0	1000.000	103.0	H	178.0	11.6	24.7	53.9
4928.868889	35.1	1000.0	1000.000	100.0	V	31.0	12.9	18.8	53.9
5797.597778	33.3	1000.0	1000.000	103.0	H	193.0	13.4	20.6	53.9
10179.980000	33.8	1000.0	1000.000	100.0	V	336.0	22.2	20.1	53.9
17923.864444	48.7	1000.0	1000.000	103.0	H	32.0	33.4	5.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.20 Test Results Above 1GHz High Channel (Bluetooth TX $\pi/4$ -DQPSK)



Peak Data

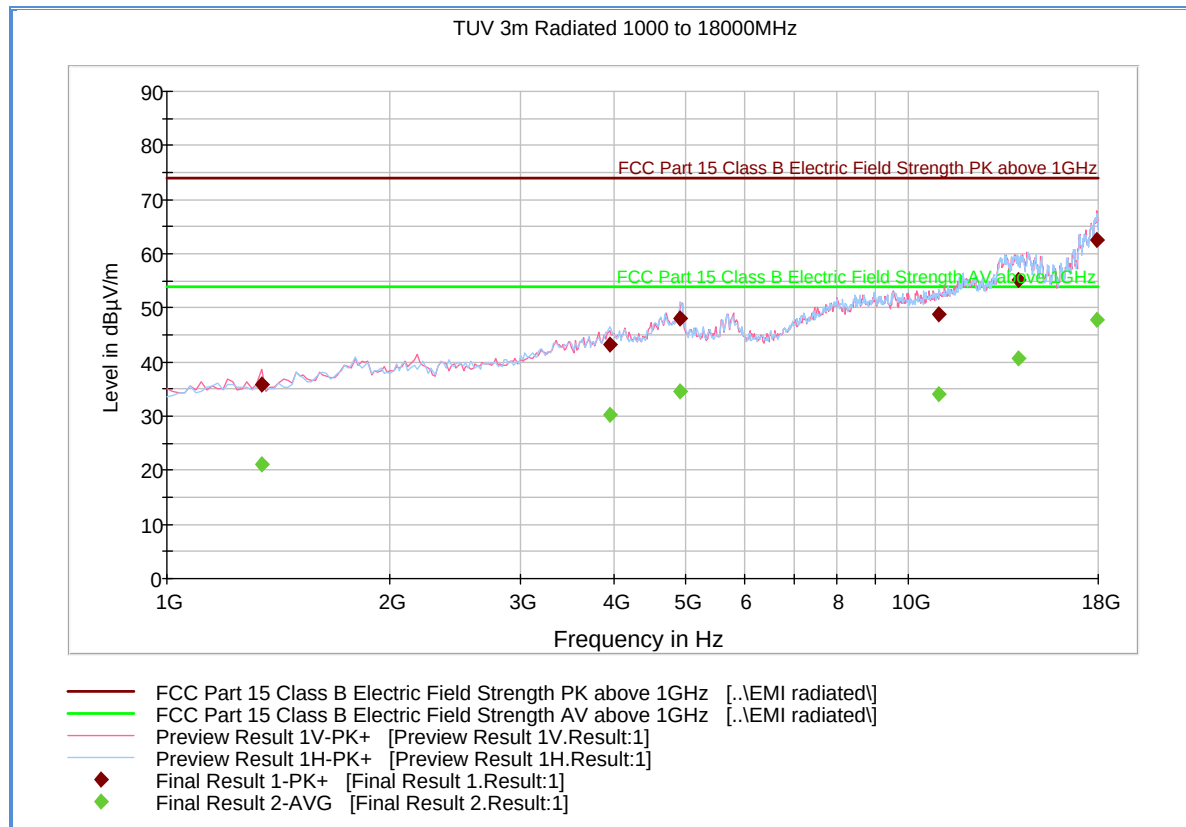
Frequency (MHz)	MaxPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1490.851111	35.1	1000.0	1000.000	100.0	V	1.0	4.5	38.8	73.9
4135.415556	43.2	1000.0	1000.000	103.0	H	145.0	11.2	30.7	73.9
4929.388889	47.9	1000.0	1000.000	103.0	H	266.0	12.9	26.0	73.9
5779.508889	46.4	1000.0	1000.000	103.0	H	22.0	13.3	27.5	73.9
9537.877778	49.8	1000.0	1000.000	103.0	H	288.0	21.5	24.1	73.9
17943.313333	62.8	1000.0	1000.000	103.0	H	285.0	33.5	11.1	73.9

Average Data

Frequency (MHz)	Average (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1490.851111	21.1	1000.0	1000.000	100.0	V	1.0	4.5	32.8	53.9
4135.415556	29.7	1000.0	1000.000	103.0	H	145.0	11.2	24.2	53.9
4929.388889	35.1	1000.0	1000.000	103.0	H	266.0	12.9	18.8	53.9
5779.508889	32.9	1000.0	1000.000	103.0	H	22.0	13.3	21.0	53.9
9537.877778	34.9	1000.0	1000.000	103.0	H	288.0	21.5	19.0	53.9
17943.313333	48.2	1000.0	1000.000	103.0	H	285.0	33.5	5.7	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.21 Test Results Above 1GHz Low Channel (Bluetooth TX 8DPSK)



Peak Data

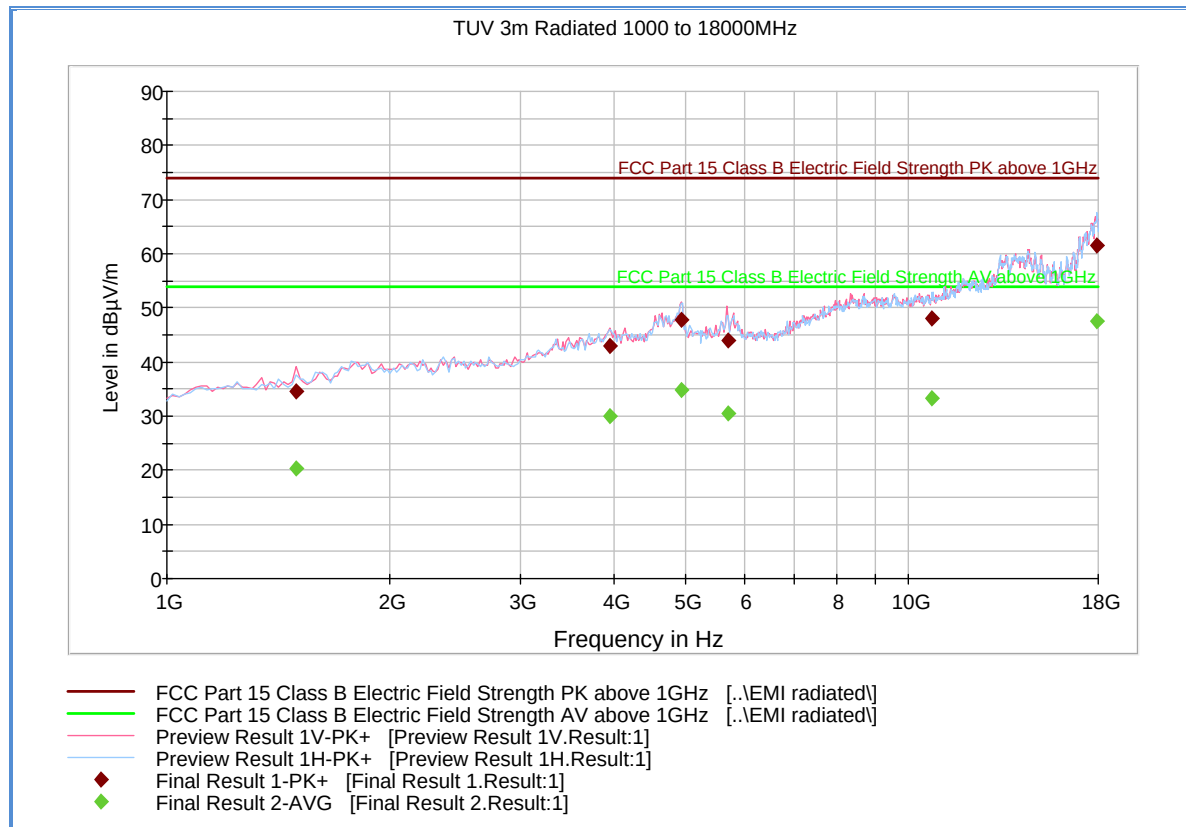
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1340.580000	35.9	1000.0	1000.000	100.0	V	66.0	4.3	38.0	73.9
3946.166667	43.2	1000.0	1000.000	103.0	H	-1.0	11.6	30.7	73.9
4910.500000	48.1	1000.0	1000.000	103.0	H	135.0	12.8	25.8	73.9
10992.642222	48.9	1000.0	1000.000	103.0	H	153.0	23.1	25.0	73.9
14071.051111	55.3	1000.0	1000.000	100.0	V	29.0	27.8	18.6	73.9
17905.415556	62.6	1000.0	1000.000	100.0	V	198.0	33.3	11.3	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1340.580000	21.2	1000.0	1000.000	100.0	V	66.0	4.3	32.7	53.9
3946.166667	30.3	1000.0	1000.000	103.0	H	-1.0	11.6	23.6	53.9
4910.500000	34.5	1000.0	1000.000	103.0	H	135.0	12.8	19.4	53.9
10992.642222	33.9	1000.0	1000.000	103.0	H	153.0	23.1	20.0	53.9
14071.051111	40.8	1000.0	1000.000	100.0	V	29.0	27.8	13.1	53.9
17905.415556	47.9	1000.0	1000.000	100.0	V	198.0	33.3	6.0	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.22 Test Results Above 1GHz Mid Channel (Bluetooth TX 8DPSK)



Peak Data

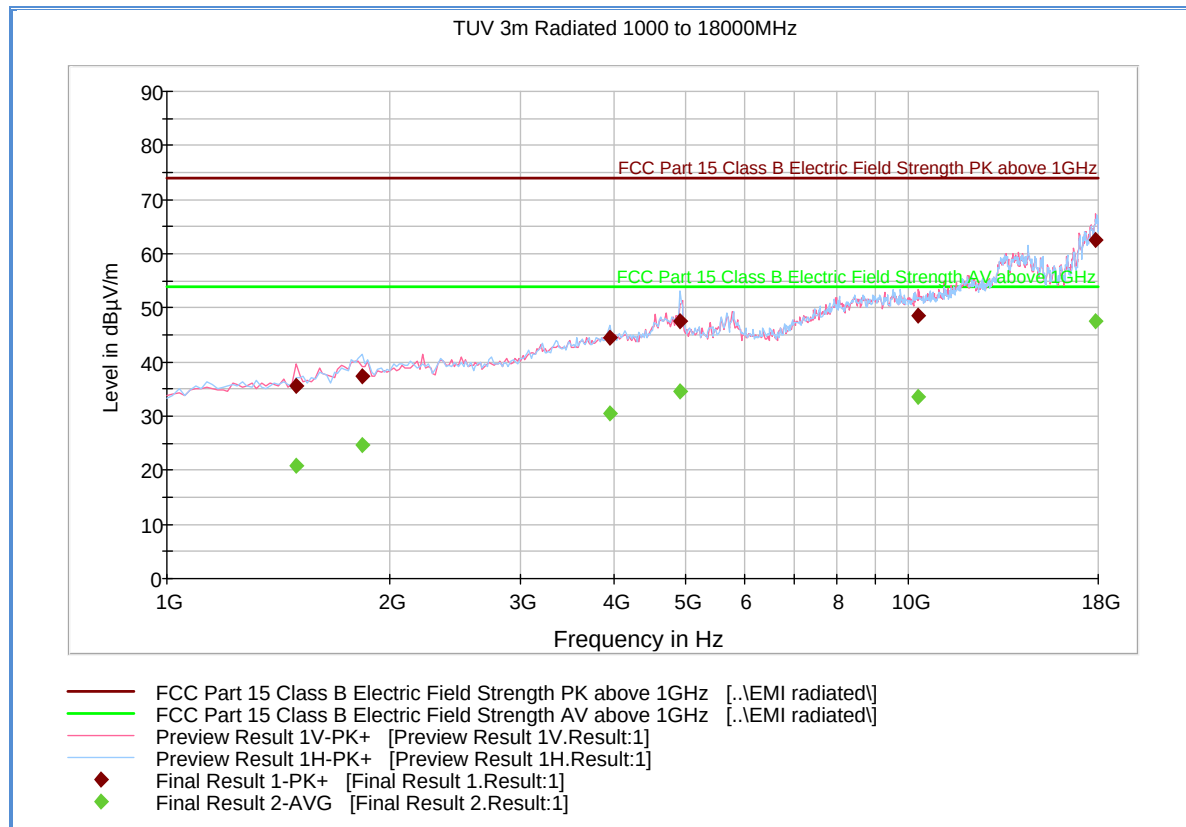
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1490.851111	34.5	1000.0	1000.000	100.0	V	338.0	4.5	39.4	73.9
3946.766667	43.1	1000.0	1000.000	100.0	V	-1.0	11.6	30.8	73.9
4928.708889	47.7	1000.0	1000.000	100.0	V	202.0	12.9	26.2	73.9
5702.873333	43.9	1000.0	1000.000	103.0	H	200.0	13.4	30.0	73.9
10746.286667	48.1	1000.0	1000.000	103.0	H	203.0	22.7	25.8	73.9
17943.593333	61.5	1000.0	1000.000	103.0	H	45.0	33.5	12.4	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)
1490.851111	20.3	1000.0	1000.000	100.0	V	338.0	4.5	33.6	53.9
3946.766667	30.1	1000.0	1000.000	100.0	V	-1.0	11.6	23.8	53.9
4928.708889	34.8	1000.0	1000.000	100.0	V	202.0	12.9	19.1	53.9
5702.873333	30.4	1000.0	1000.000	103.0	H	200.0	13.4	23.5	53.9
10746.286667	33.3	1000.0	1000.000	103.0	H	203.0	22.7	20.6	53.9
17943.593333	47.6	1000.0	1000.000	103.0	H	45.0	33.5	6.3	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.

2.2.23 Test Results Above 1GHz High Channel (Bluetooth TX 8DPSK)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1490.651111	35.6	1000.0	1000.000	100.0	V	13.0	4.5	38.3	73.9
1831.611111	37.4	1000.0	1000.000	103.0	H	59.0	6.4	36.5	73.9
3947.366667	44.4	1000.0	1000.000	103.0	H	1.0	11.6	29.5	73.9
4910.180000	47.6	1000.0	1000.000	103.0	H	81.0	12.8	26.3	73.9
10293.393333	48.4	1000.0	1000.000	100.0	V	301.0	22.3	25.5	73.9
17868.397778	62.5	1000.0	1000.000	100.0	V	224.0	33.2	11.4	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)
1490.651111	20.9	1000.0	1000.000	100.0	V	13.0	4.5	33.0	53.9
1831.611111	24.6	1000.0	1000.000	103.0	H	59.0	6.4	29.3	53.9
3947.366667	30.5	1000.0	1000.000	103.0	H	1.0	11.6	23.4	53.9
4910.180000	34.6	1000.0	1000.000	103.0	H	81.0	12.8	19.3	53.9
10293.393333	33.5	1000.0	1000.000	100.0	V	301.0	22.3	20.4	53.9
17868.397778	47.7	1000.0	1000.000	100.0	V	224.0	33.2	6.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 8GHz. Measurements above 8GHz are noise floor figures.



2.3 RADIATED IMMEDIATE RESTRICTED BANDS

2.3.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.3.2 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)).

2.3.3 Equipment Under Test and Modification State

Serial No: 655CPX1128 / Default Test Configuration

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

July 01, 2014/FSC

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	25.6°C
Relative Humidity	50.5.%
ATM Pressure	98.8kPa

2.3.7 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.
- Both Non-hopping and Hopping modes presented.



- Measurement was done using EMC32 V85.3 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.

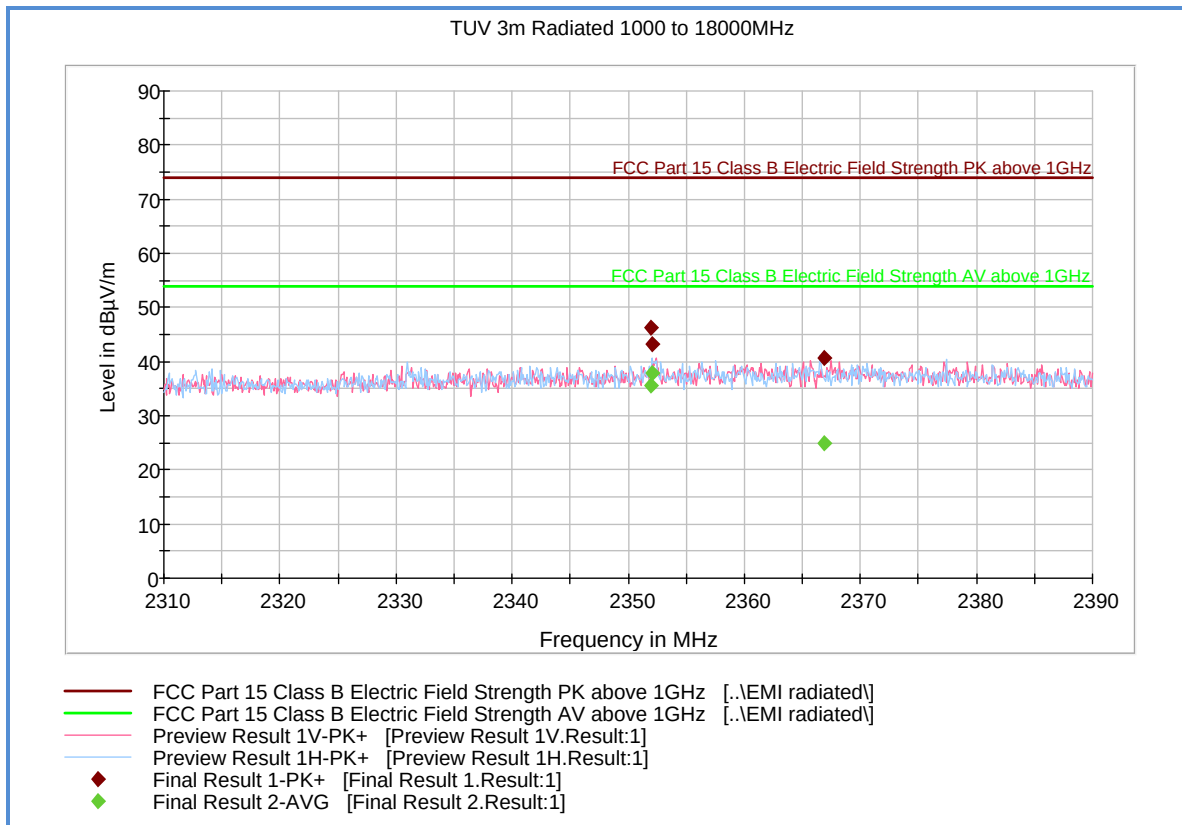
2.3.8 Sample Computation (Radiated Emission)

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

2.3.9 Test Results

See attached plots.

2.3.10 Test Results Restricted Band 2310MHz to 2390MHz (Hopping)



Peak Data

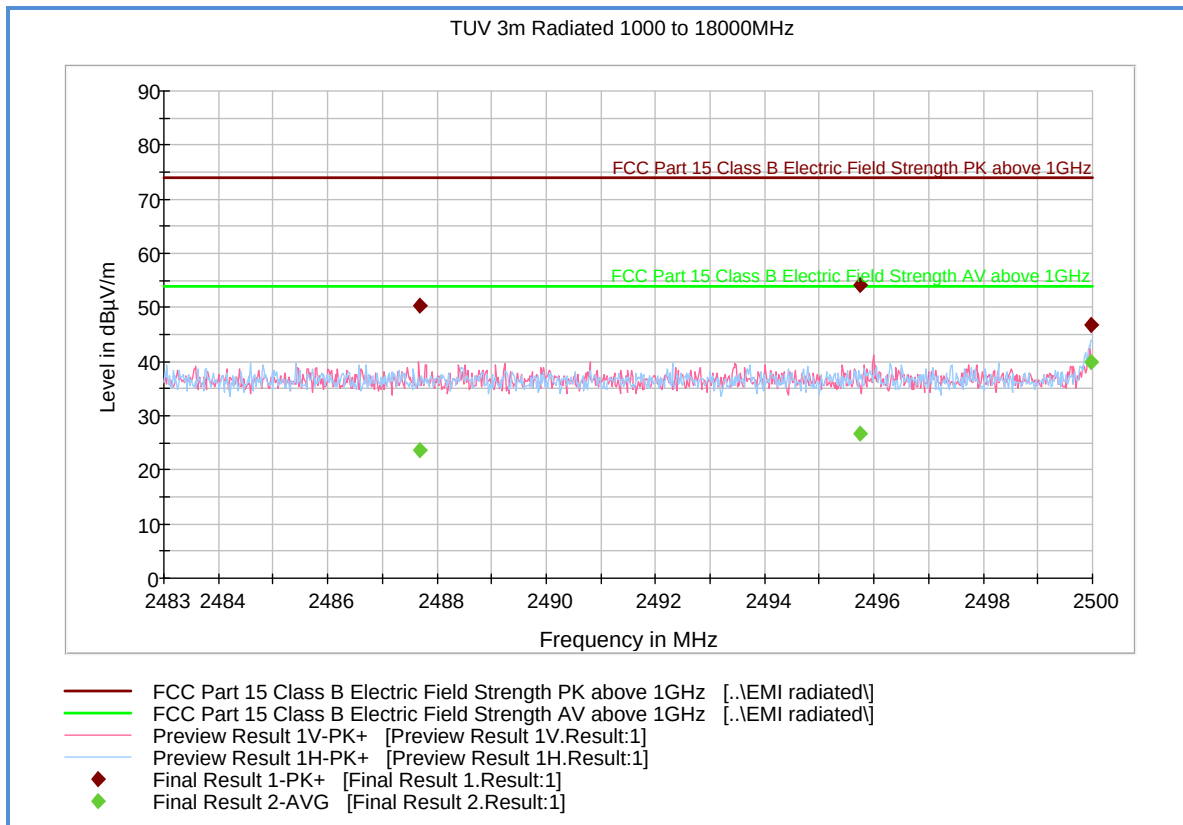
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2351.900000	46.3	1000.0	1000.000	100.0	V	356.0	6.8	27.6	73.9
2352.064444	43.3	1000.0	1000.000	103.0	H	31.0	6.8	30.6	73.9
2366.833333	40.7	1000.0	1000.000	103.0	H	45.0	6.9	33.2	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)
2351.900000	35.6	1000.0	1000.000	100.0	V	356.0	6.8	18.3	53.9
2352.064444	37.8	1000.0	1000.000	103.0	H	31.0	6.8	16.1	53.9
2366.833333	24.9	1000.0	1000.000	103.0	H	45.0	6.9	29.0	53.9

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

2.3.11 Test Results Restricted Band 2483.5MHz to 2500MHz (Hopping)



Peak Data

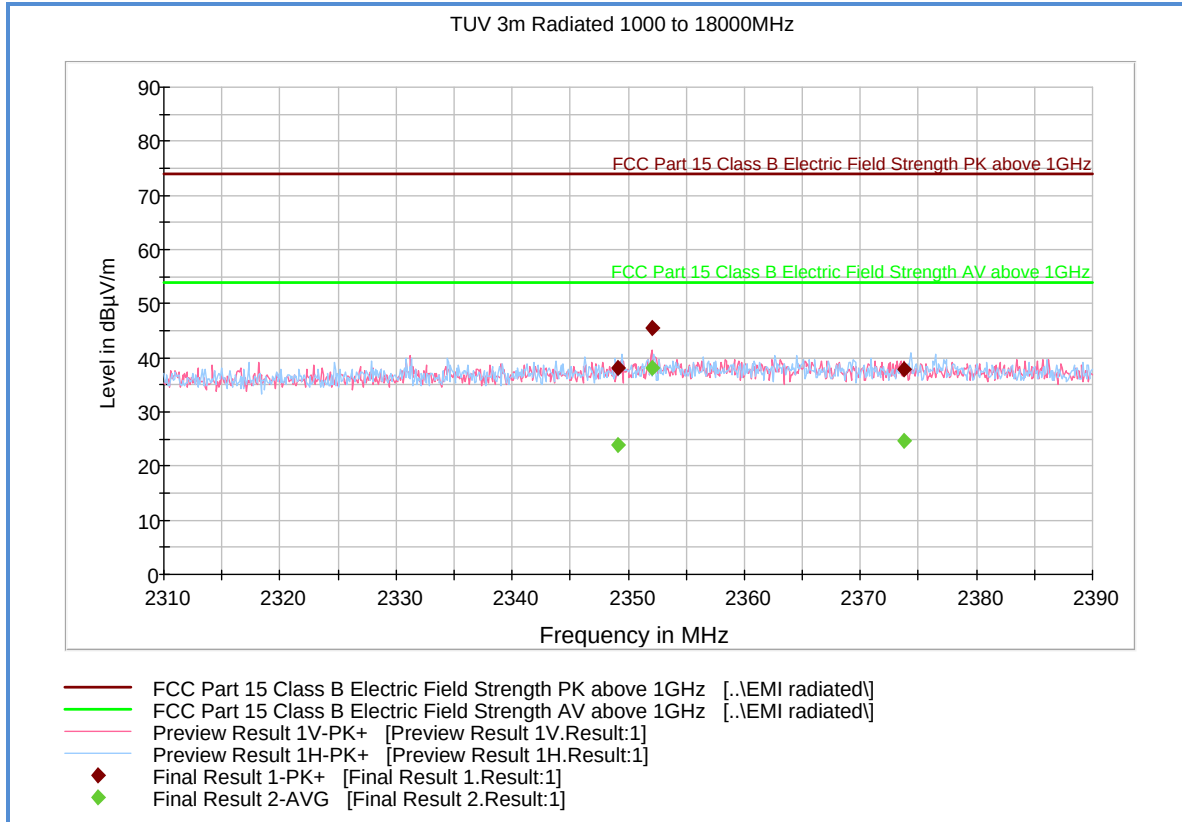
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2487.685556	50.4	1000.0	1000.000	100.0	V	51.0	7.3	23.5	73.9
2495.735556	54.2	1000.0	1000.000	100.0	V	45.0	7.3	19.7	73.9
2499.980000	46.7	1000.0	1000.000	103.0	H	239.0	7.3	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)
2487.685556	23.5	1000.0	1000.000	100.0	V	51.0	7.3	30.4	53.9
2495.735556	26.6	1000.0	1000.000	100.0	V	45.0	7.3	27.3	53.9
2499.980000	39.9	1000.0	1000.000	103.0	H	239.0	7.3	14.0	53.9

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

2.3.12 Test Results Restricted Band 2310MHz to 2390MHz (Non-Hopping GFSK)



Peak Data

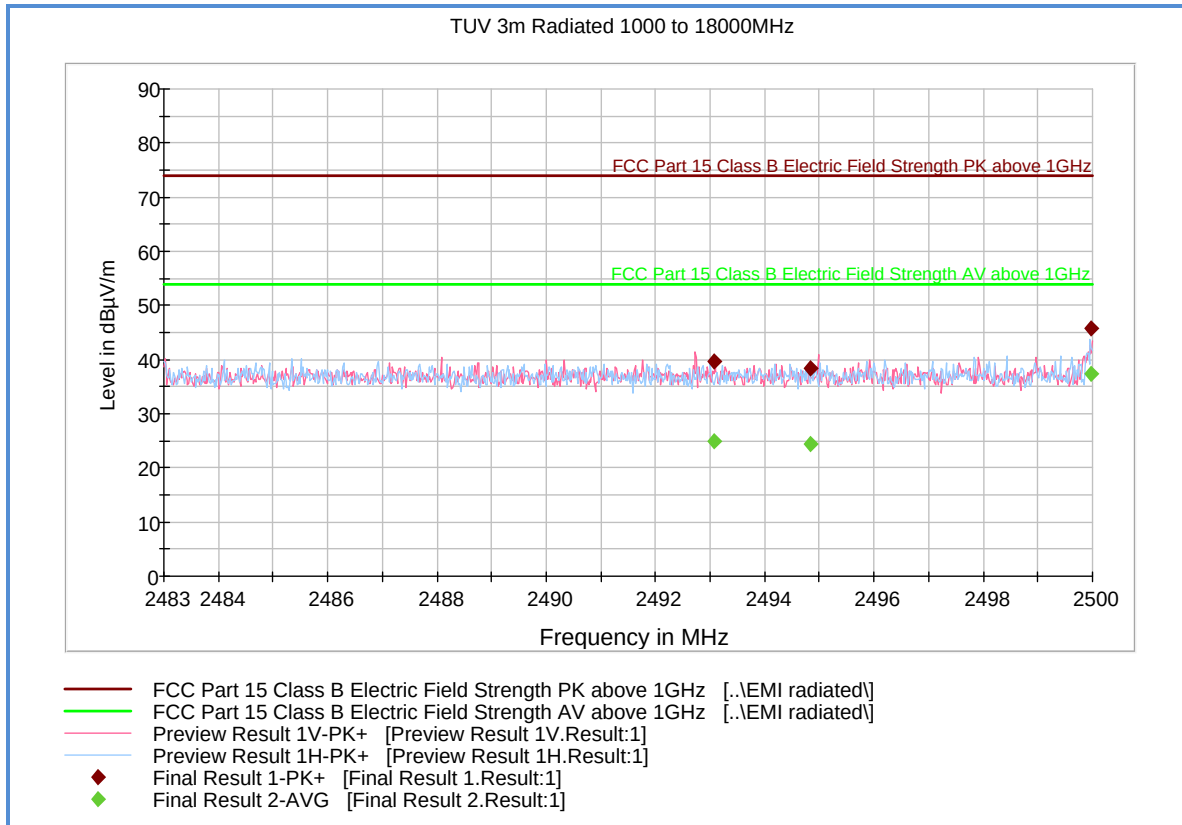
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2349.166667	38.0	1000.0	1000.000	103.0	H	-1.0	7.4	35.9	73.9
2352.024444	45.4	1000.0	1000.000	100.0	V	194.0	7.4	28.5	73.9
2373.735556	37.9	1000.0	1000.000	103.0	H	282.0	7.5	36.0	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)
2349.166667	24.0	1000.0	1000.000	103.0	H	-1.0	7.4	29.9	53.9
2352.024444	38.1	1000.0	1000.000	100.0	V	194.0	7.4	15.8	53.9
2373.735556	24.6	1000.0	1000.000	103.0	H	282.0	7.5	29.3	53.9

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

2.3.13 Test Results Restricted Band 2483.5MHz to 2500MHz (Non-Hopping GFSK)



Peak Data

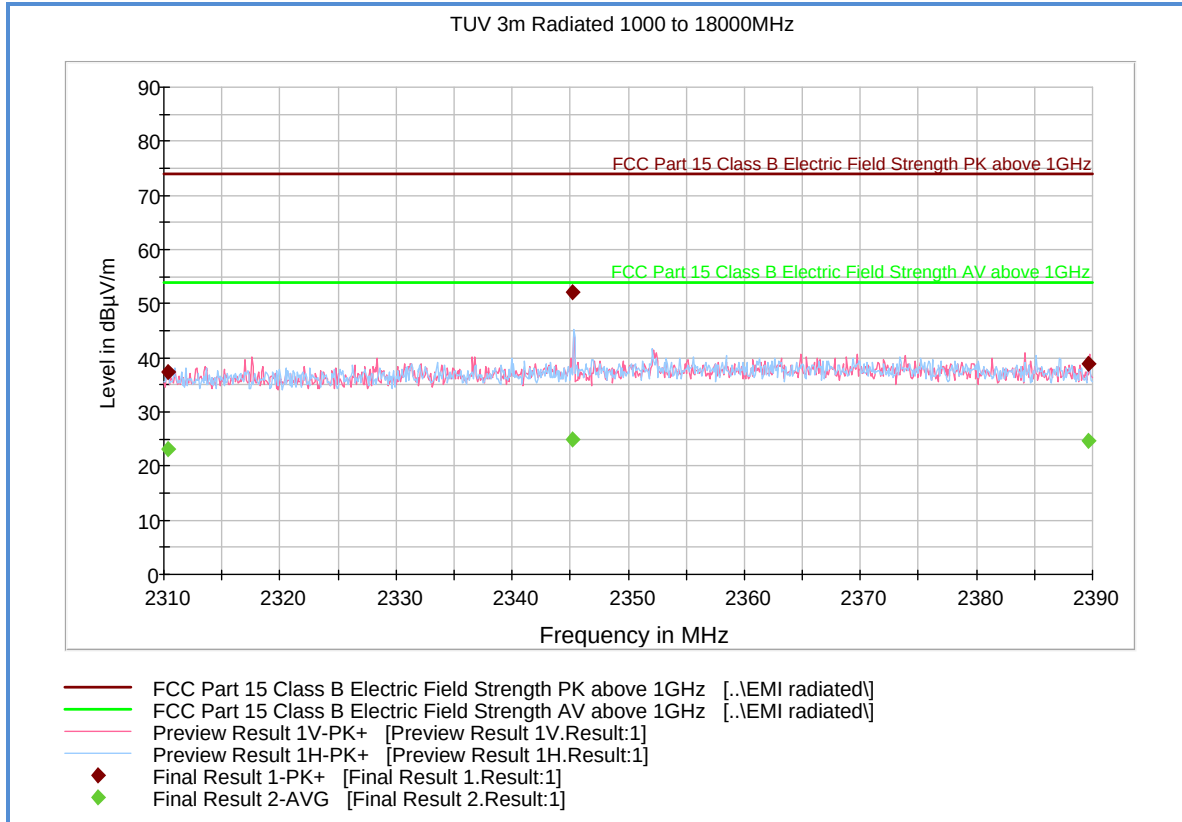
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2493.067778	39.5	1000.0	1000.000	100.0	V	154.0	7.9	34.4	73.9
2494.835556	38.3	1000.0	1000.000	100.0	V	235.0	7.9	35.6	73.9
2499.980000	45.8	1000.0	1000.000	103.0	H	187.0	7.9	28.1	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)
2493.067778	24.9	1000.0	1000.000	100.0	V	154.0	7.9	29.0	53.9
2494.835556	24.4	1000.0	1000.000	100.0	V	235.0	7.9	29.5	53.9
2499.980000	37.4	1000.0	1000.000	103.0	H	187.0	7.9	16.5	53.9

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

2.3.14 Test Results Restricted Band 2310MHz to 2390MHz (Non-Hopping $\pi/4$ -DQPSK)



Peak Data

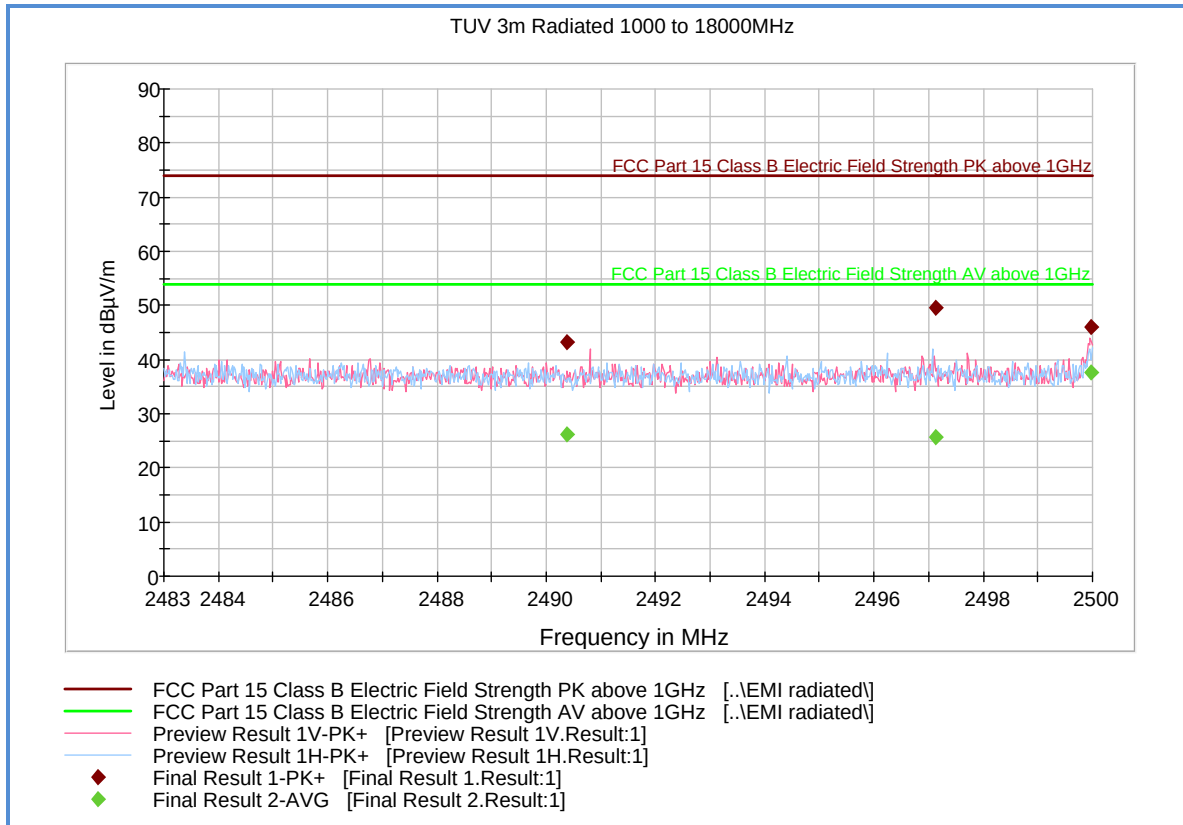
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2310.297778	37.3	1000.0	1000.000	100.0	V	285.0	7.2	36.6	73.9
2345.168889	52.1	1000.0	1000.000	103.0	H	349.0	7.4	21.8	73.9
2389.693333	38.9	1000.0	1000.000	100.0	V	136.0	7.6	35.0	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)
2310.297778	23.2	1000.0	1000.000	100.0	V	285.0	7.2	30.7	53.9
2345.168889	24.9	1000.0	1000.000	103.0	H	349.0	7.4	29.0	53.9
2389.693333	24.5	1000.0	1000.000	100.0	V	136.0	7.6	29.4	53.9

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

2.3.15 Test Results Restricted Band 2483.5MHz to 2500MHz (Non-Hopping $\pi/4$ -DQPSK)



Peak Data

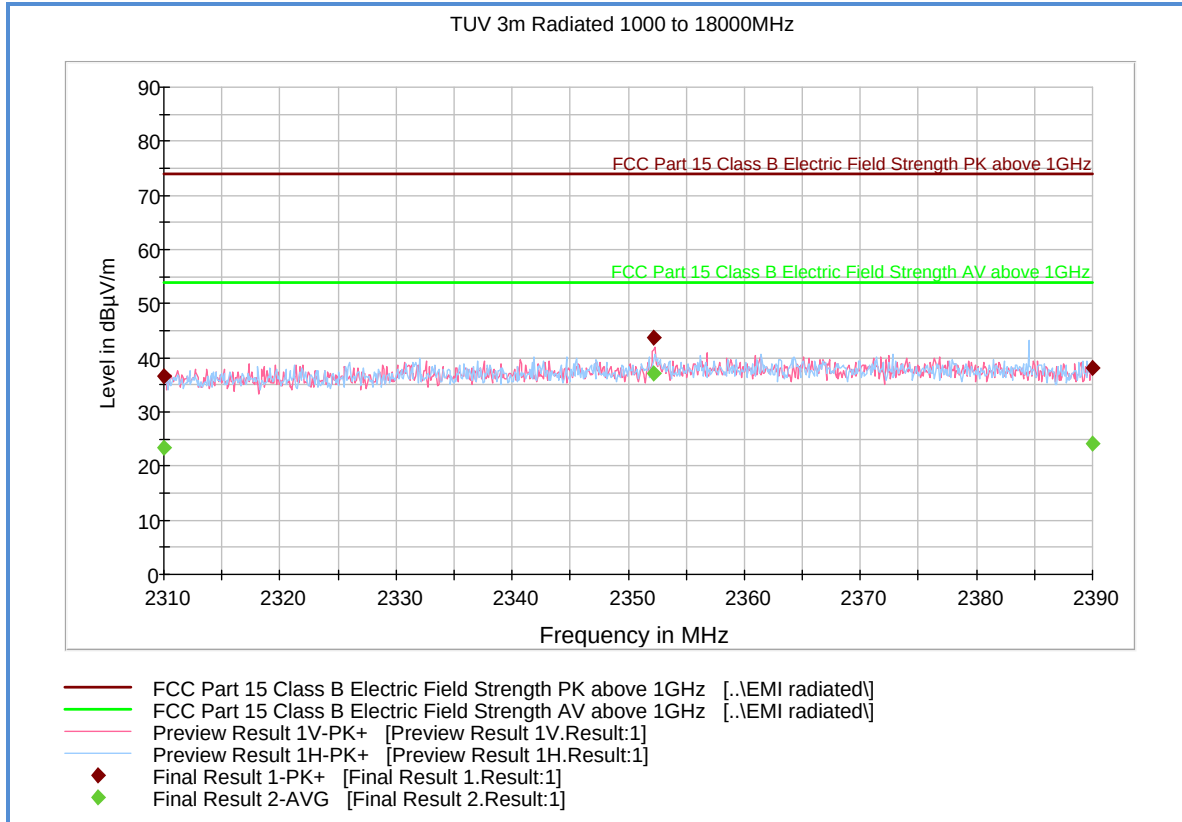
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2490.381111	43.1	1000.0	1000.000	100.0	V	154.0	7.9	30.8	73.9
2497.132222	49.5	1000.0	1000.000	103.0	H	326.0	7.9	24.4	73.9
2499.980000	45.9	1000.0	1000.000	100.0	V	315.0	7.9	28.0	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)
2490.381111	26.1	1000.0	1000.000	100.0	V	154.0	7.9	27.8	53.9
2497.132222	25.6	1000.0	1000.000	103.0	H	326.0	7.9	28.3	53.9
2499.980000	37.7	1000.0	1000.000	100.0	V	315.0	7.9	16.2	53.9

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

2.3.16 Test Results Restricted Band 2310MHz to 2390MHz (Non-Hopping 8DPSK)



Peak Data

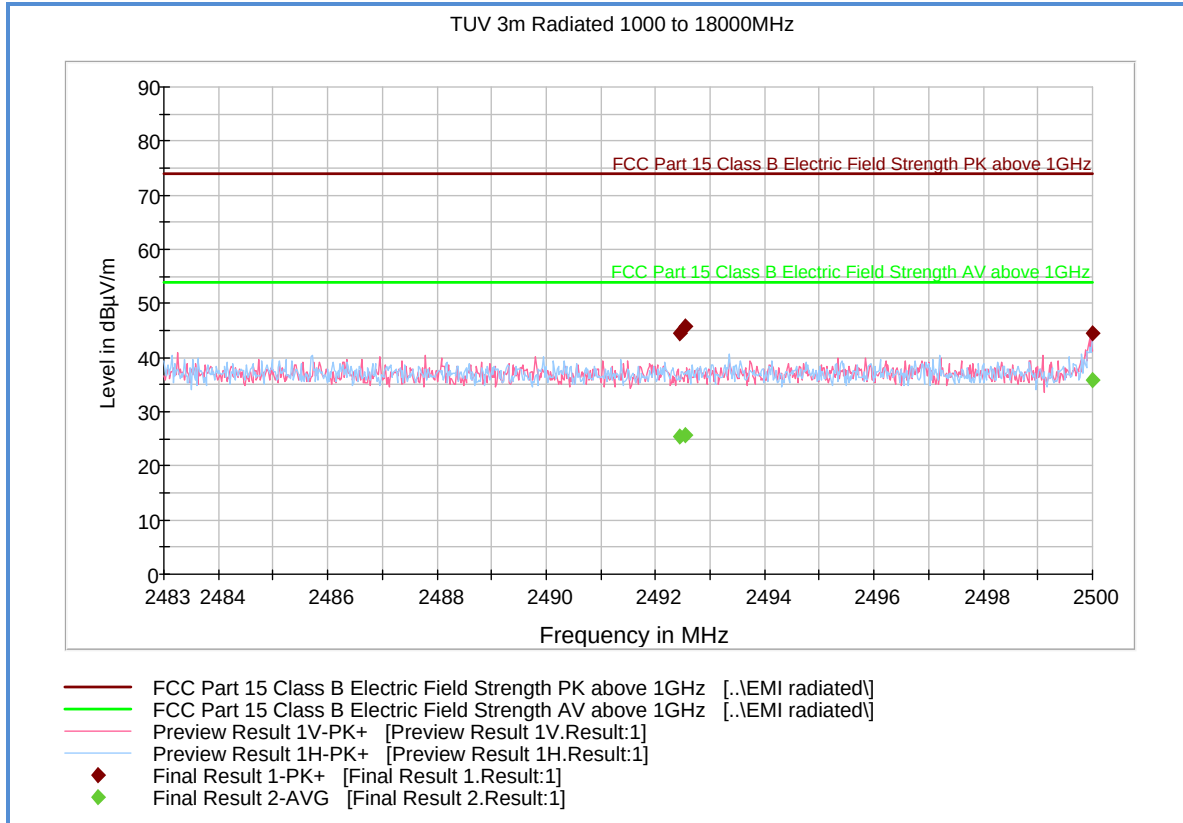
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2310.040000	36.6	1000.0	1000.000	100.0	V	280.0	7.2	37.3	73.9
2352.191111	43.7	1000.0	1000.000	100.0	V	196.0	7.4	30.2	73.9
2389.991111	38.0	1000.0	1000.000	100.0	V	187.0	7.7	35.9	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)
2310.040000	23.3	1000.0	1000.000	100.0	V	280.0	7.2	30.6	53.9
2352.191111	37.2	1000.0	1000.000	100.0	V	196.0	7.4	16.7	53.9
2389.991111	24.1	1000.0	1000.000	100.0	V	187.0	7.7	29.8	53.9

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

2.3.17 Test Results Restricted Band 2483.5MHz to 2500MHz (Non-Hopping 8DPSK)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2492.450000	44.5	1000.0	1000.000	103.0	H	349.0	7.9	29.4	73.9
2492.550000	45.8	1000.0	1000.000	100.0	V	138.0	7.9	28.1	73.9
2500.000000	44.6	1000.0	1000.000	100.0	V	31.0	7.9	29.3	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
2492.450000	25.5	1000.0	1000.000	103.0	H	349.0	7.9	28.4	53.9
2492.550000	25.7	1000.0	1000.000	100.0	V	138.0	7.9	28.2	53.9
2500.000000	36.0	1000.0	1000.000	100.0	V	31.0	7.9	17.9	53.9

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

2.4 RECEIVER SPURIOUS EMISSIONS

2.4.1 Specification Reference

RSS-Gen 6.0

2.4.2 Standard Applicable

Receivers shall comply with the limits of spurious emissions set out in this section, measured over the frequency range determined in accordance with Section 4.10 of RSS-Gen.

Table 2: Radiated Limits of Receiver Spurious Emissions

Frequency (MHz)	Field Strength (microvolts/m at 3 metres)*
30-88	100
88-216	150
216-960	200
Above 960	500

*Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7 of RSS-Gen.

2.4.3 Equipment Under Test and Modification State

Serial No: 655CPX1128 / Default Test Configuration

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

July 02, 2014/FSC

2.4.5 Test Equipment Used

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

2.4.6 Environmental Conditions/Test Location

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

Ambient Temperature 25.6°C
Relative Humidity 50.5.%
ATM Pressure 98.8kPa

2.4.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 3rd harmonic (up to 10th performed).
- Result identical to Section 2.2.10 and 2.2.11 of this test report.
- EUT in RX (Receive) mode configuration.



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 Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	04/05/14	04/05/15
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	10/09/13	10/09/15
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	07/10/13	07/10/14
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	01/30/14	01/30/15
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	01/30/14	01/30/15
Radiated Emissions						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/30/14	01/30/16
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	04/08/14	04/08/15
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/03/13	09/03/14
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	09/03/13	09/03/14
1150	Horn antenna	3160-09	012054-004	ETS	04/26/13	04/26/15
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	05/02/13	05/02/15
1027/1028	EMI Test Receiver	ESMI	848926/003	Rhode & Schwarz	05/17/14	05/17/15
1016	Pre-amplifier	PAM-0202	187	PAM	10/08/13	10/08/14
Miscellaneous						
6452	Multimeter	3478A	2911A52177	Hewlett Packard	08/02/13	08/02/14
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/30/14	01/30/15
	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	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.41
Coverage Factor (k):					2
Expanded Uncertainty:					4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.40
Coverage Factor (k):					2
Expanded Uncertainty:					4.81

3.2.1 AC Conducted Emissions Measurements

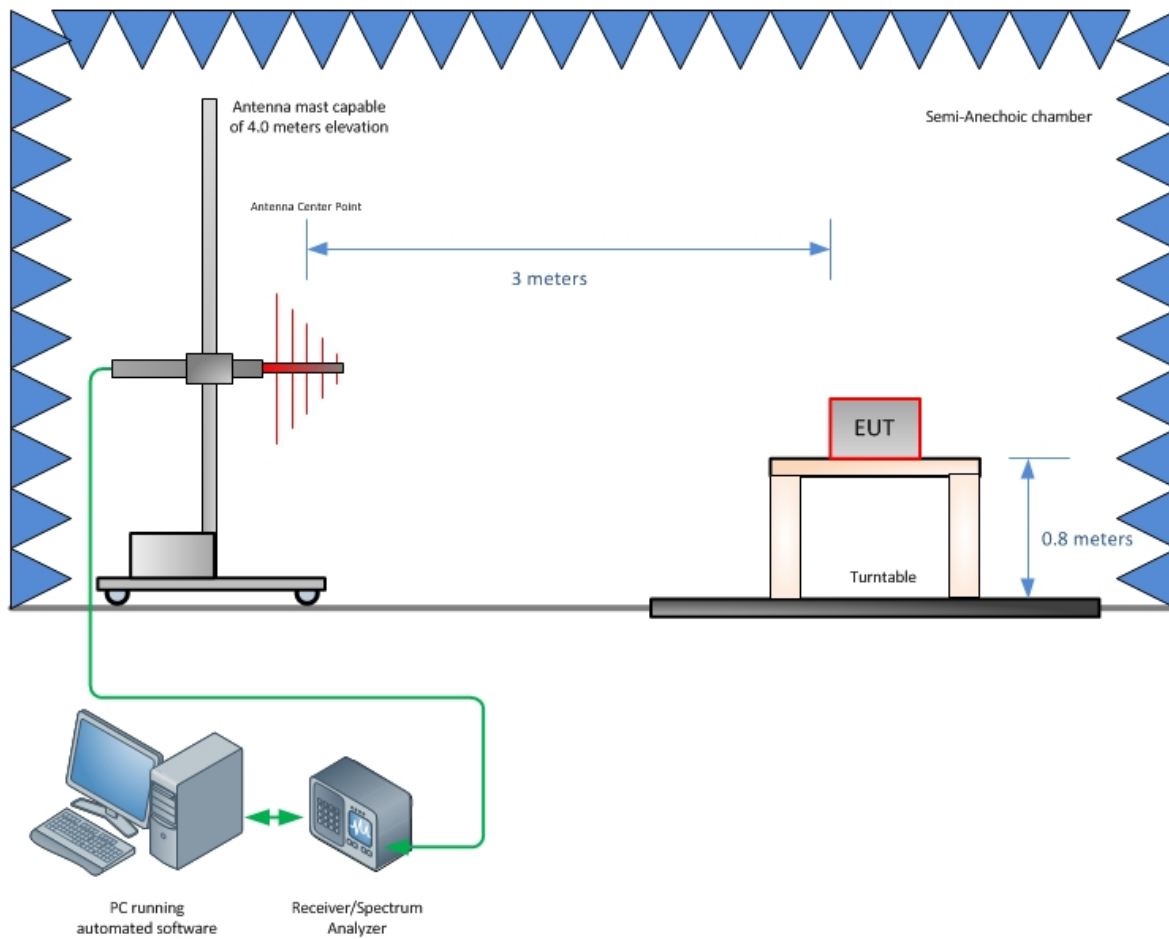
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular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



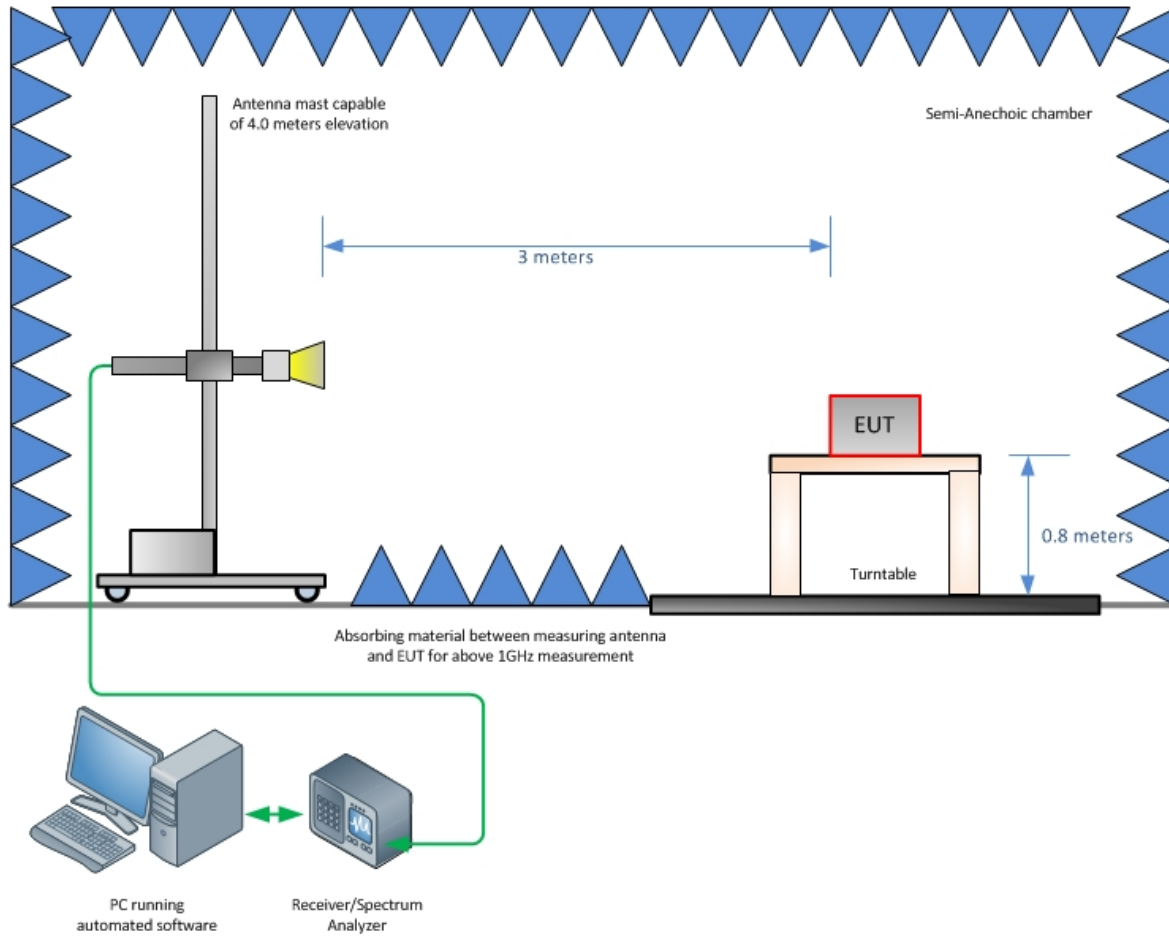
SECTION 4

DIAGRAM OF TEST SETUP

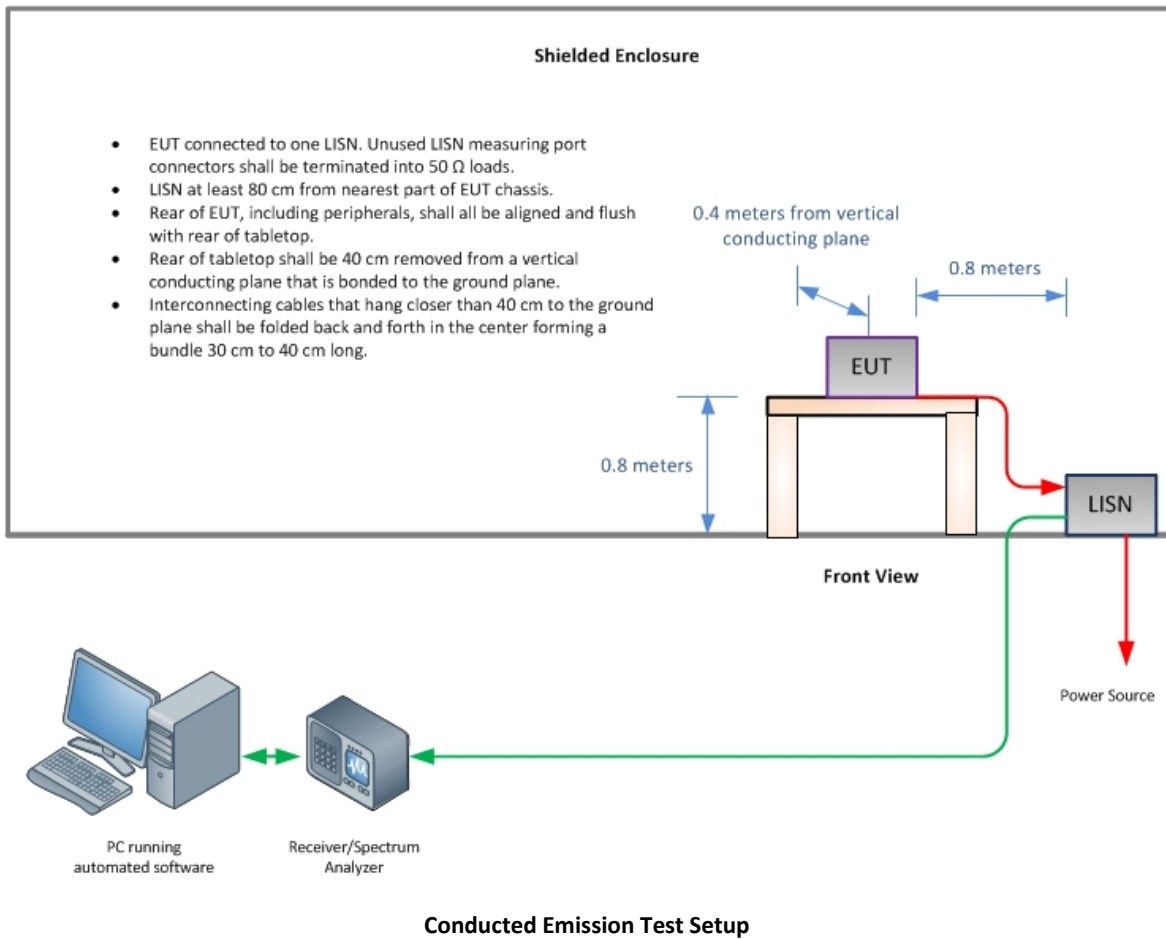
4.1 TEST SETUP DIAGRAM



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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