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C2PC Radio Testing of the

LED Roadway Lighting Lighting Fixture Model: QD70

In accordance with FCC Part 15 Subpart C
§15.245 and ISED RSS-210 Issue 9 November
2017

LED Roadway Lighting
115 Chain Lake Dr.
Halifax, Nova Scotia Canada B3S 1B3

COMMERCIAL-IN-CONFIDENCE

Date: November 2019
Document Number: 72153526 Issue 01 | Version Number: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Alex Chang	November 12, 2019	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with FCC Part 15 Subpart C §15.245 and ISED RSS-210 Issue 9 November 2017.



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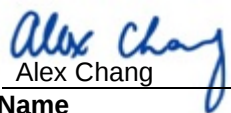
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REPORT ON	C2PC Radio Testing of the LED Roadway Lighting Model QD70 Lighting Fixture
TEST REPORT NUMBER	72153526
TEST REPORT DATE	November 2019
PREPARED FOR	LED Roadway Lighting 115 Chain Lake Dr. Halifax, Nova Scotia Canada B3S 1B3
CONTACT PERSON	Simon Lightbody Senior Design Engineer slightbody@ledroadwaylighting.com 877-533-5755
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APPROVED BY	 Alex Chang Name Authorized Signatory Title: Senior EMC/RF Wireless Test Engineer
DATED	November 12, 2019



Revision History

72153526 LED Roadway Lighting Model QD70 Lighting Fixture					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
11/12/2019	—	Initial Release			Alex Chang



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SECTION 1

1 REPORT SUMMARY

C2PC Radio Testing of the
LED Roadway Lighting
SLiQ Lighting Fixture



1.1 Introduction

The information contained in this report is intended to show verification of the LED Roadway Lighting SLiQ Lighting Fixture to the requirements of FCC Part 15 Subpart C §15.245 and ISSED RSS-210 Issue 9 November 2017.

Objective	To perform C2PC Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the test specification, for the series of tests carried out. The EUT uses an approved module (LMA, FCC ID 2ACR3-T100 and IC: 12047A-T100). This test report is to support C2PC application by the Grantee to add the EUT (SLiQ/QD70) as an approved host.
Manufacturer	LED Roadway Lighting
EUT	Lighting Fixture
Trade Name	SLiQ
Model Name	QD70
FCC ID	2ACR3-T100
IC Number	12047A-T100
Serial Number(s)	N/A
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.245 (October 1, 2018). • ISSED RSS-210 Issue 9 November 2017: License-Exempt Radio Apparatus: Category I Equipment
Start of Test	November 02, 2019
Finish of Test	November 03, 2019
Name of Engineer(s)	Ferdinand Custodio
Related Document(s)	• ANSI C63.10-2013. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices • Supporting documents for EUT certification are separate exhibits.



1.2 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.245 and ISED RSS-210 Issue 9 November 2017 with cross-reference to the corresponding ISED RSS standard are shown below.

Section	§15.245 Spec Clause	RSS	Test Description	Result	Comments /Base Standard
2.1	§15.245(b)	RSS-210 Annex F	Fundamental Emissions	Compliant	
2.2	§15.245(b)	RSS-210 Annex F	Spurious Emissions	Compliant	
-	-	RSS-Gen 6.7	99% Emission Bandwidth	N/A	
-		RSS-Gen 8.8	AC Powerline conducted Emissions	N/A	

N/A

Not performed as part of the C2PC test plan. The EUT was also subjected to a separate FCC Subpart B verification. FCC Subpart B test report available from the manufacturer upon request.



1.3 Product Information

1.3.1 Technical Description

The Equipment Under Test (EUT) is a LED Roadway Lighting SLiQ Lighting Fixture. The EUT is a luminaire ideal for roadway/street lighting, parking areas, bridges, and general outdoor area lighting applications.

1.3.2 EUT General Description

EUT Description	Lighting Fixture
Model Name	SLiQ
Model Number	QD70
Serial Number	N/A
Input Voltage	120VAC 60Hz
Output RF Power	16.47 dBm EIRP
Frequency Range (TX)	24103.19 MHz to 24174.65 MHz

1.4 EUT Test configuration

1.4.1 Test Configuration Description

Test Configuration	Description
Default	The EUT transmits at a pre-programmed (worst case) 24GHz radar frequency when plugged in to a 120VAC 60Hz supply.

1.4.2 EUT Exercise Software

None. No special software was utilized to exercise the EUT during verifications.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
-	-	-

1.4.4 Simplified Test Configuration Diagram

Not required. The EUT was verified on a stand-alone configuration.



1.5 Deviations from the Standard

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

1.6 Modification Record

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: N/A		
None	—	—

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 C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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 C63.10-2013. 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

TÜV SÜD 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 TÜV SÜD 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 TÜV SÜD 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)

TÜV 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)

TÜV SÜD 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

TÜV SÜD 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

TÜV SÜD 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

TÜV SÜD 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

2 TEST DETAILS

C2PC Radio Testing of the
LED Roadway Lighting
SLiQ Lighting Fixture



2.1 RF Power Output

2.1.1 Specification Reference

FCC 47 Chapter I Subchapter A Part 15 Subpart C §15.245
RSS-210, Annex F

2.1.2 Standard Applicable

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

Fundamental frequency (MHz)	Field strength of fundamental (mv/m)	Field strength of harmonics (mv/m)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

2.1.3 Equipment Under Test and Modification State

Serial No: N/A / Default Test Configuration

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

November 02, 2019 / 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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	26.0 °C
Relative Humidity	53.6 %
ATM Pressure	99.1 kPa

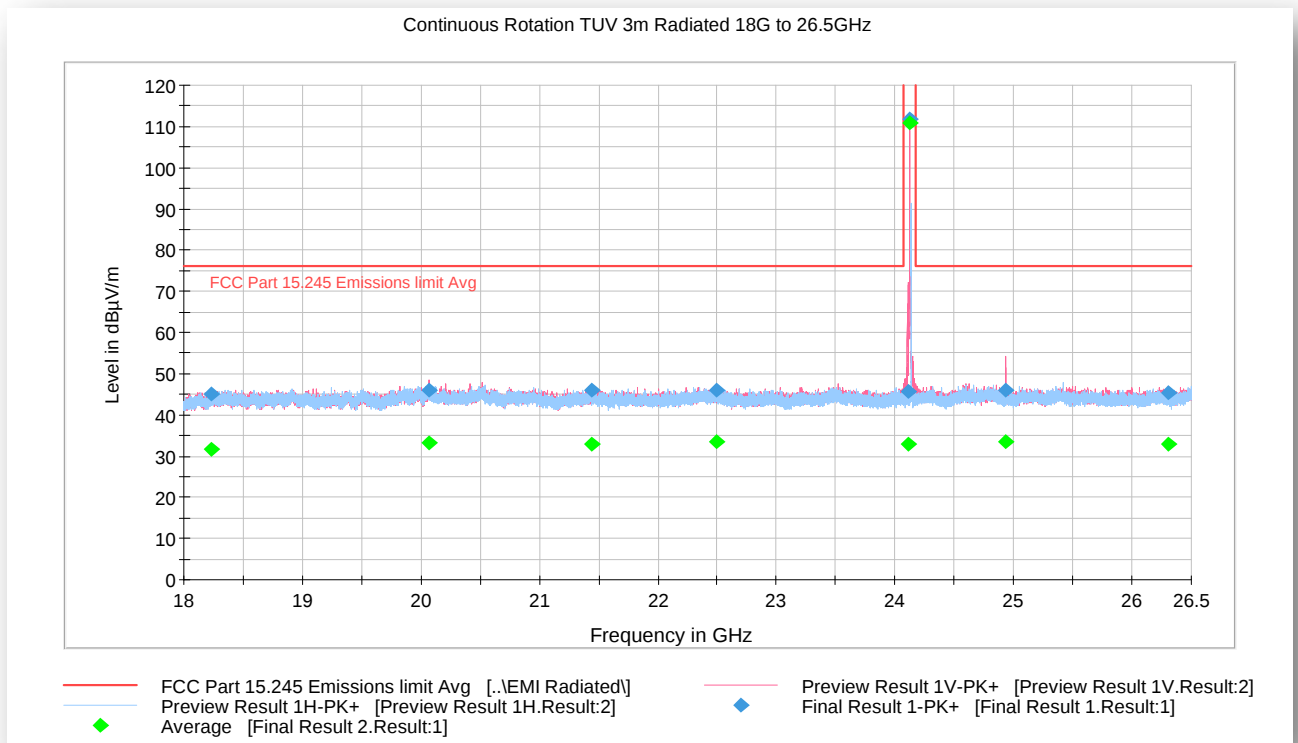
2.1.7 Additional Observations

- Test results are from Section 2.2.13 of this test report
- Fundamental was verified and compared to original filing electric field strength measurements.

2.1.8 Test Results

	Original Filing (worst case)	Verification Results
Peak (dBµV/m @ 3 meters)	112.91 dBµV/m	111.7 dBµV/m
Average (dBµV/m @ 3 meters)	112.84 dBµV/m	110.9 dBµV/m

2.1.9 From 18GHz to 26.5GHz Radiated Emission Test



Peak Data

Frequency (MHz)	Max Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
18231.633333	45.0	1000.0	1000.000	142.7	V	246.0	-0.6	31.2	76.2
20065.350000	45.9	1000.0	1000.000	127.7	V	38.0	-0.6	30.3	76.2
21445.616667	45.8	1000.0	1000.000	165.0	H	6.0	0.2	30.4	76.2
22487.800000	45.9	1000.0	1000.000	156.1	V	10.0	0.8	30.3	76.2
24106.116667	45.7	1000.0	1000.000	148.7	V	66.0	1.4	82.3	128.0
24129.500000	111.7	1000.0	1000.000	128.7	V	166.0	1.4	16.3	128.0
24937.133333	46.0	1000.0	1000.000	135.7	V	172.0	2.0	30.2	76.2
26305.883333	45.5	1000.0	1000.000	146.7	V	221.0	2.0	30.7	76.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
18231.633333	31.7	1000.0	1000.000	142.7	V	246.0	-0.6	44.5	76.2
20065.350000	33.1	1000.0	1000.000	127.7	V	38.0	-0.6	43.1	76.2
21445.616667	33.0	1000.0	1000.000	165.0	H	6.0	0.2	43.2	76.2
22487.800000	33.4	1000.0	1000.000	156.1	V	10.0	0.8	42.8	76.2
24106.116667	32.8	1000.0	1000.000	148.7	V	66.0	1.4	95.2	128.0
24129.500000	110.9	1000.0	1000.000	128.7	V	166.0	1.4	17.1	128.0
24937.133333	33.5	1000.0	1000.000	135.7	V	172.0	2.0	42.7	76.2
26305.883333	33.0	1000.0	1000.000	146.7	V	221.0	2.0	43.2	76.2



2.2 Spurious Emissions

2.2.1 Specification Reference

FCC 47 Chapter I Subchapter A Part 15 Subpart C §15.245
RSS-210, Annex F

2.2.2 Standard Applicable

(2) Field strength limits are specified at a distance of 3 meters.

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

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

2.2.3 Equipment Under Test and Modification State

Serial No: N/A / Default Test Configuration

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

November 02 and 03, 2019 / 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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	26.0 °C
Relative Humidity	53.6 %
ATM Pressure	99.1 kPa

2.2.7 Additional Observations

- This is a radiated test.
- The spectrum was searched from 9kHz to 100GHz.
- Limits used outside the frequency band 24075-24175MHz is per §15.209 which is identical to FCC Subpart B limit (§15.109 Class B).
- 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.



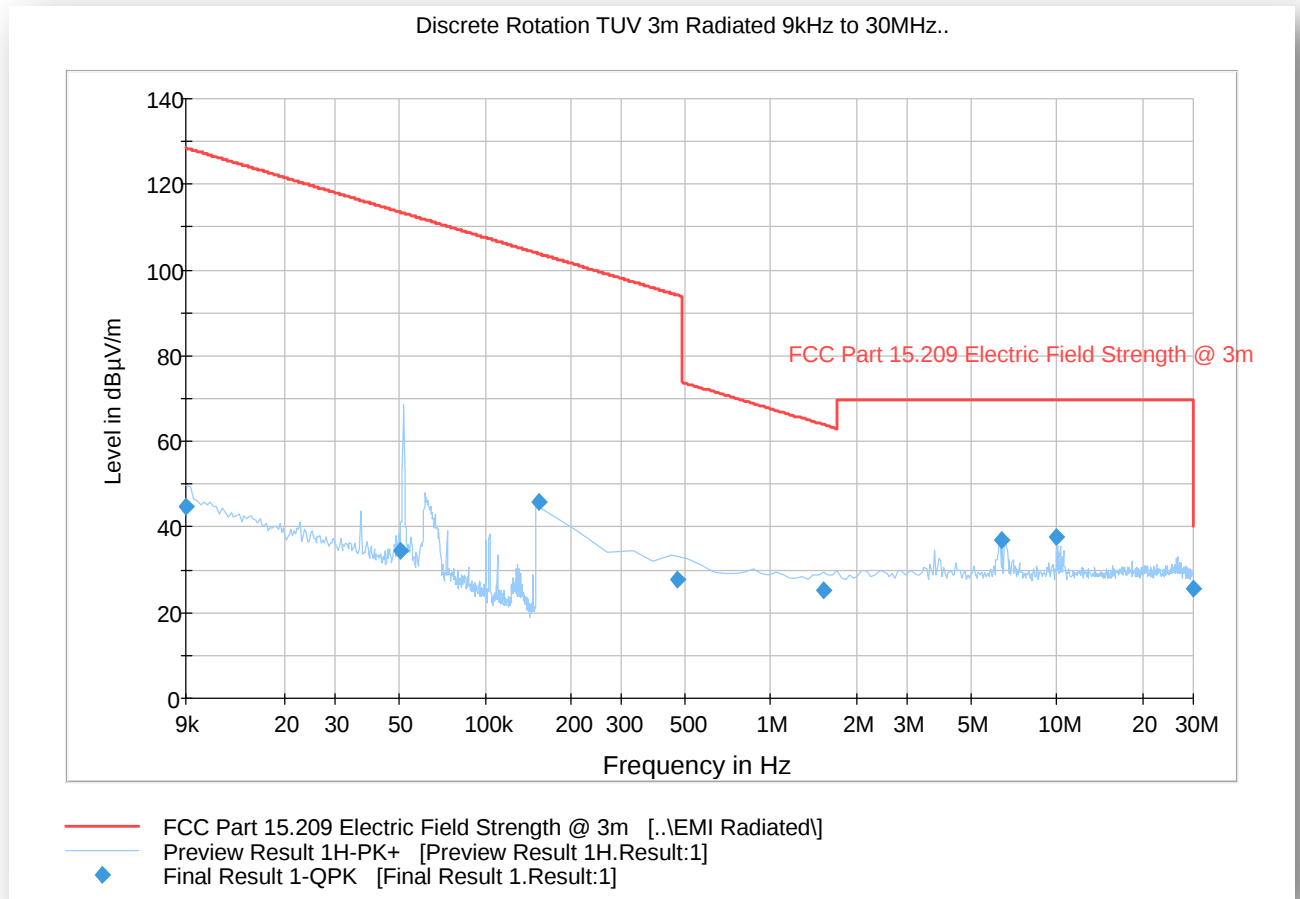
2.2.8 Sample Computation (Radiated Emission)

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

2.2.9 Test Results

Compliant. See attached plots.

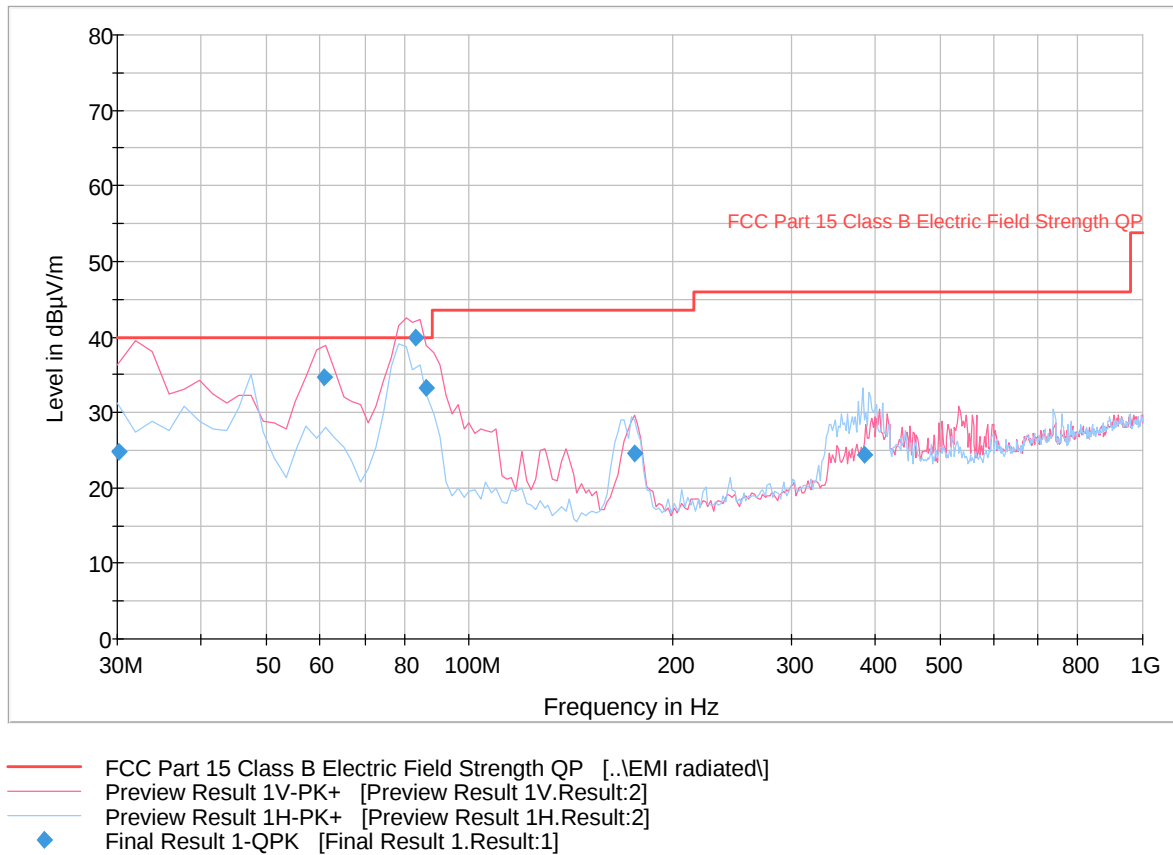
2.2.10 Below 30MHz Radiated Emission Test



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)
0.009000	44.9	1000.0	0.200	100.0	H	213.0	25.0	83.6	128.5
0.050950	34.6	1000.0	0.200	100.0	H	66.0	20.2	78.9	113.5
0.154000	45.9	1500.0	9.000	100.0	H	299.0	19.6	57.9	103.9
0.473918	27.7	1500.0	9.000	100.0	H	81.0	19.7	66.4	94.1
1.526491	25.2	1500.0	9.000	100.0	H	336.0	20.1	38.7	63.9
6.432062	37.0	1500.0	9.000	100.0	H	343.0	20.6	32.6	69.5
9.933241	37.7	1500.0	9.000	100.0	H	154.0	21.1	31.8	69.5
29.905000	25.7	1500.0	9.000	100.0	H	191.0	25.1	43.8	69.5

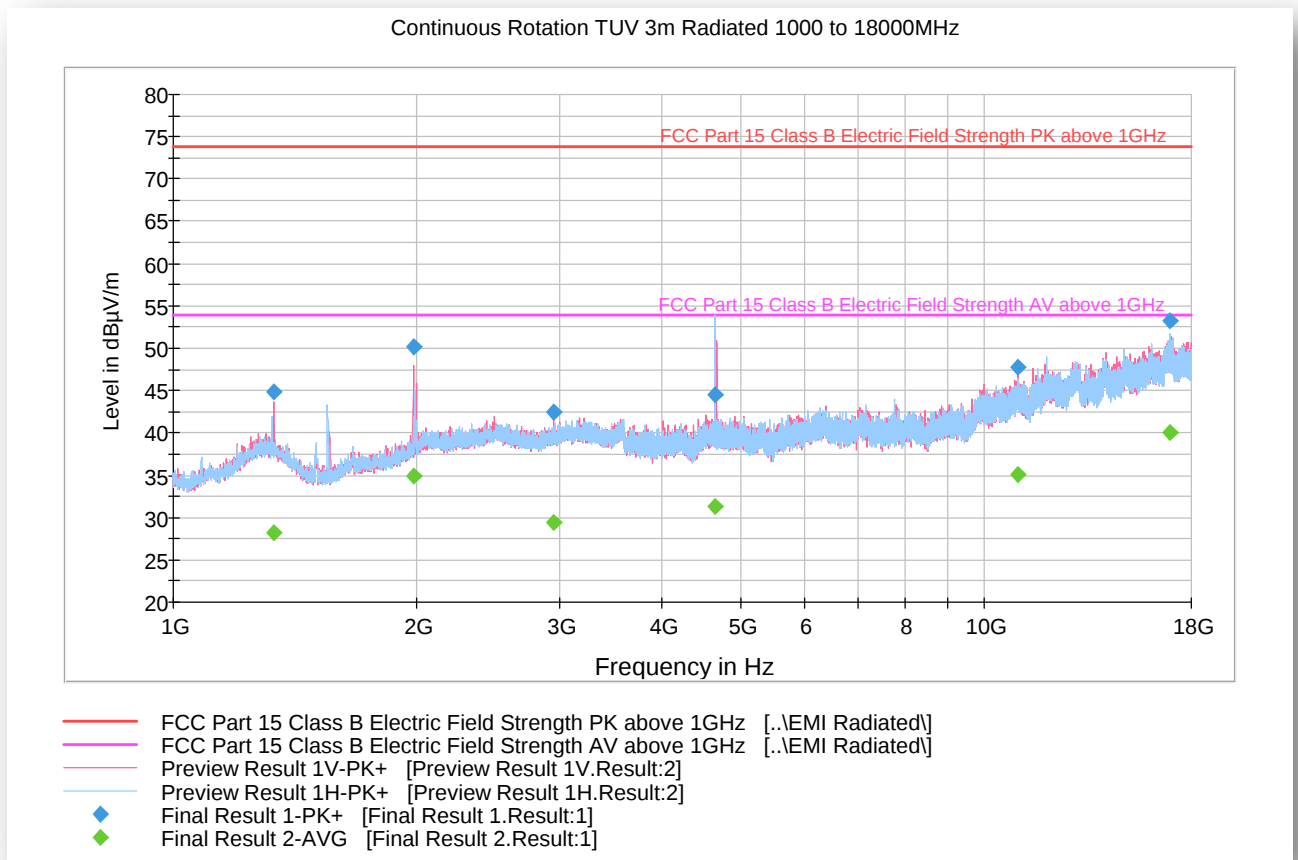
2.2.11 Below 1GHz Radiated Emission Test



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)
30.160000	24.7	1000.0	120.000	100.0	V	184.0	-8.3	15.3	40.0
60.718317	34.7	1000.0	120.000	133.0	V	135.0	-17.8	5.3	40.0
83.101082	40.0	1000.0	120.000	150.0	V	18.0	-17.7	0.0	40.0
86.132745	33.2	1000.0	120.000	100.0	V	93.0	-17.0	6.8	40.0
176.271583	24.6	1000.0	120.000	100.0	V	253.0	-12.8	18.9	43.5
385.187575	24.3	1000.0	120.000	100.0	H	78.0	-5.8	21.7	46.0

2.2.12 From 1GHz to 18GHz Radiated Emission Test



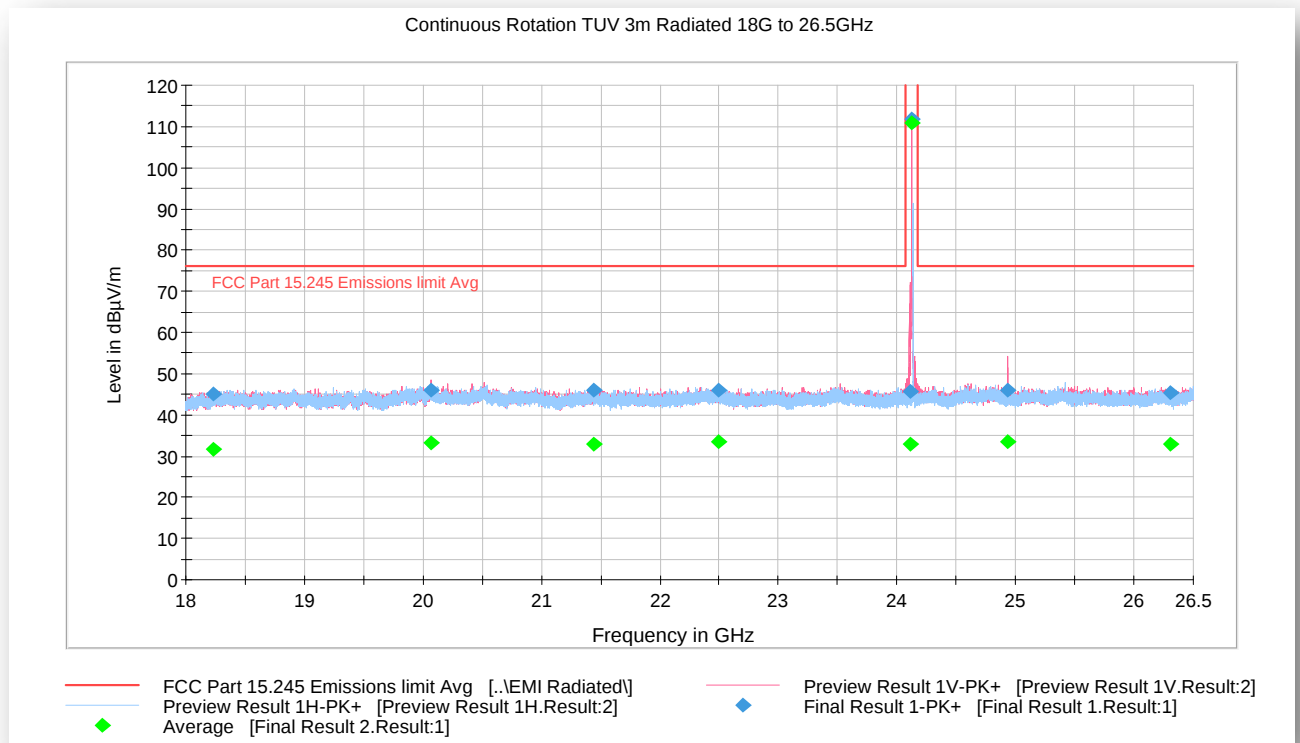
Peak Data

Frequency (MHz)	Max Peak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1328.233333	44.9	1000.0	1000.000	100.0	V	-4.0	-5.1	29.0	73.9
1976.600000	50.1	1000.0	1000.000	399.0	V	259.0	-2.3	23.8	73.9
2949.533333	42.5	1000.0	1000.000	406.8	V	259.0	0.3	31.4	73.9
4648.333333	44.5	1000.0	1000.000	230.0	H	322.0	3.6	29.4	73.9
11017.166667	47.7	1000.0	1000.000	136.0	V	58.0	11.8	26.2	73.9
16953.900000	53.3	1000.0	1000.000	410.0	H	121.0	18.0	20.6	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1328.233333	28.2	1000.0	1000.000	100.0	V	-4.0	-5.1	25.7	53.9
1976.600000	34.9	1000.0	1000.000	399.0	V	259.0	-2.3	19.0	53.9
2949.533333	29.5	1000.0	1000.000	406.8	V	259.0	0.3	24.4	53.9
4648.333333	31.4	1000.0	1000.000	230.0	H	322.0	3.6	22.5	53.9
11017.166667	35.0	1000.0	1000.000	136.0	V	58.0	11.8	18.9	53.9
16953.900000	40.0	1000.0	1000.000	410.0	H	121.0	18.0	13.9	53.9

2.2.13 From 18GHz to 26.5GHz Radiated Emission Test



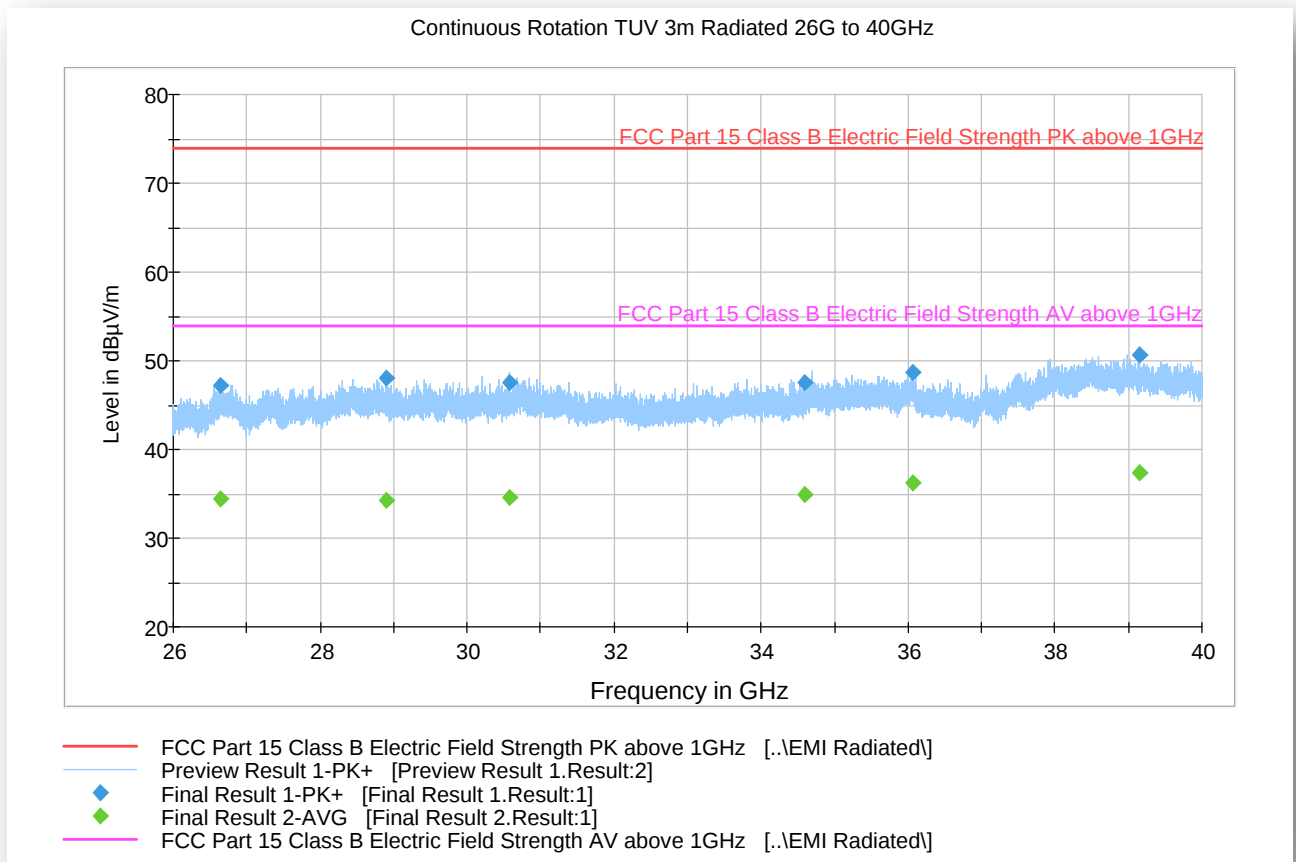
Peak Data

Frequency (MHz)	Max Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
18231.633333	45.0	1000.0	1000.000	142.7	V	246.0	-0.6	31.2	76.2
20065.350000	45.9	1000.0	1000.000	127.7	V	38.0	-0.6	30.3	76.2
21445.616667	45.8	1000.0	1000.000	165.0	H	6.0	0.2	30.4	76.2
22487.800000	45.9	1000.0	1000.000	156.1	V	10.0	0.8	30.3	76.2
24106.116667	45.7	1000.0	1000.000	148.7	V	66.0	1.4	82.3	128.0
24129.500000	111.7	1000.0	1000.000	128.7	V	166.0	1.4	16.3	128.0
24937.133333	46.0	1000.0	1000.000	135.7	V	172.0	2.0	30.2	76.2
26305.883333	45.5	1000.0	1000.000	146.7	V	221.0	2.0	30.7	76.2

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
18231.633333	31.7	1000.0	1000.000	142.7	V	246.0	-0.6	44.5	76.2
20065.350000	33.1	1000.0	1000.000	127.7	V	38.0	-0.6	43.1	76.2
21445.616667	33.0	1000.0	1000.000	165.0	H	6.0	0.2	43.2	76.2
22487.800000	33.4	1000.0	1000.000	156.1	V	10.0	0.8	42.8	76.2
24106.116667	32.8	1000.0	1000.000	148.7	V	66.0	1.4	95.2	128.0
24129.500000	110.9	1000.0	1000.000	128.7	V	166.0	1.4	17.1	128.0
24937.133333	33.5	1000.0	1000.000	135.7	V	172.0	2.0	42.7	76.2
26305.883333	33.0	1000.0	1000.000	146.7	V	221.0	2.0	43.2	76.2

2.2.14 From 26.5GHz to 40GHz Radiated Emission Test



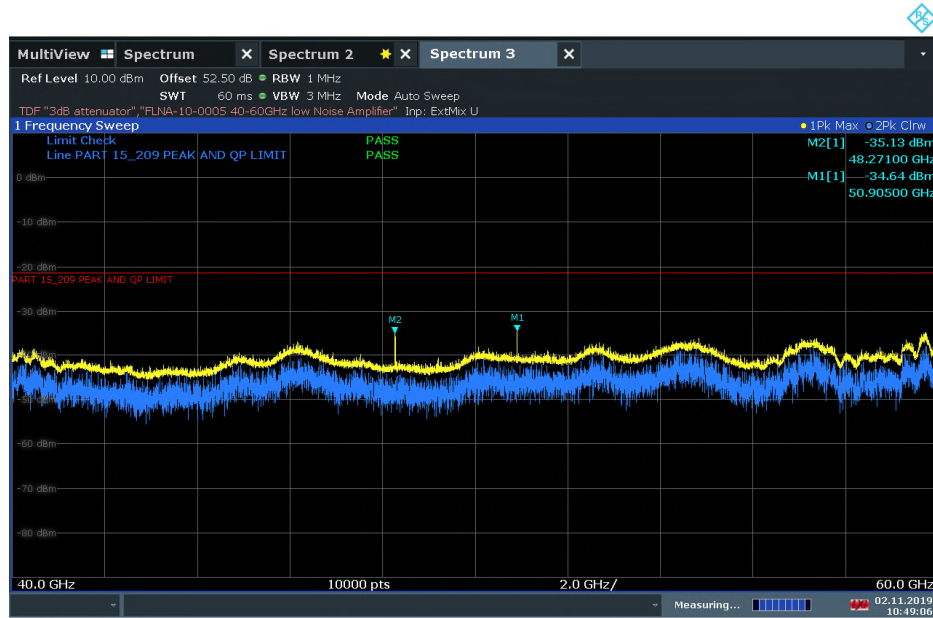
Peak Data

Frequency (MHz)	Max Peak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
26646.600000	47.2	1000.0	1000.000	100.0	V	-6.0	2.2	26.7	73.9
28901.066667	48.0	1000.0	1000.000	100.0	V	23.0	3.5	25.9	73.9
30576.800000	47.5	1000.0	1000.000	125.0	V	43.0	4.0	26.4	73.9
34596.866667	47.6	1000.0	1000.000	147.0	V	71.0	6.1	26.3	73.9
36055.133333	48.6	1000.0	1000.000	175.0	V	-3.0	6.4	25.3	73.9
39147.266667	50.6	1000.0	1000.000	125.0	H	230.0	8.1	23.3	73.9

Average Data

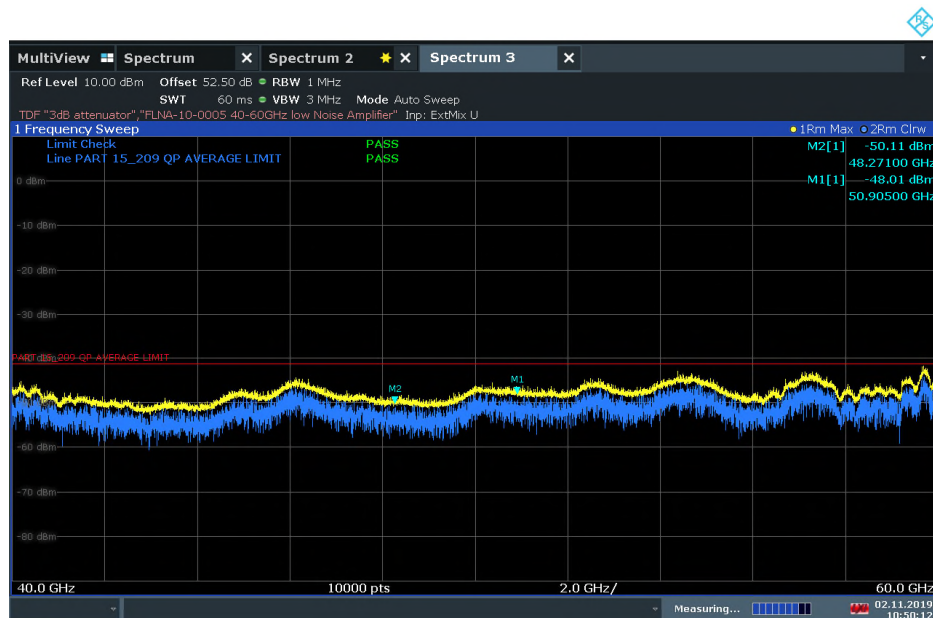
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
26646.600000	34.4	1000.0	1000.000	100.0	V	-6.0	2.2	19.5	53.9
28901.066667	34.3	1000.0	1000.000	100.0	V	23.0	3.5	19.6	53.9
30576.800000	34.7	1000.0	1000.000	125.0	V	43.0	4.0	19.2	53.9
34596.866667	34.9	1000.0	1000.000	147.0	V	71.0	6.1	19.0	53.9
36055.133333	36.2	1000.0	1000.000	175.0	V	-3.0	6.4	17.7	53.9
39147.266667	37.4	1000.0	1000.000	125.0	H	230.0	8.1	16.5	53.9

2.2.15 Maximized Plot from 40GHz to 60GHz



10:49:07 02.11.2019

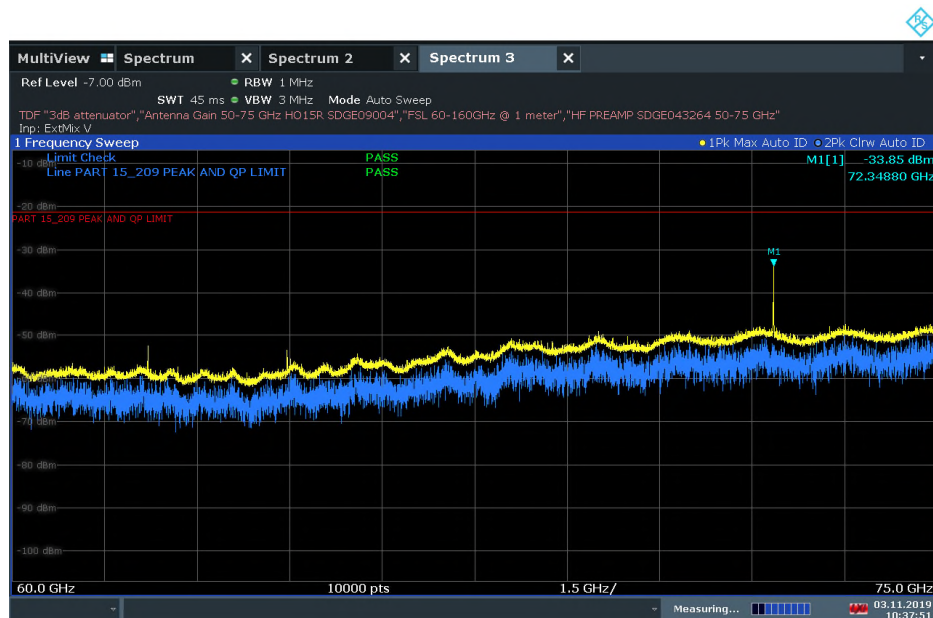
Peak Verification



10:50:13 02.11.2019

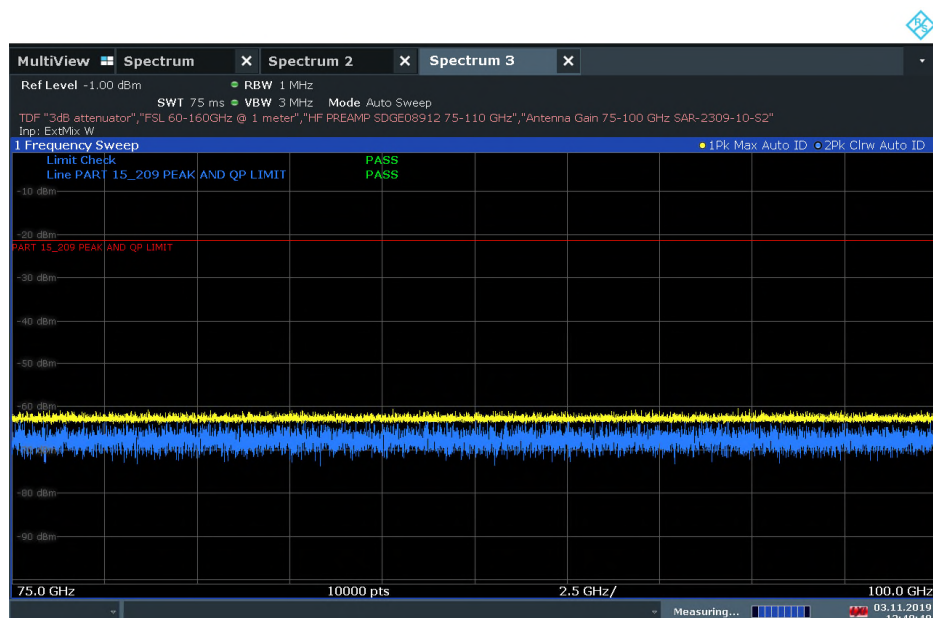
Average Verification

2.2.16 Maximized Plot from 60GHz to 100GHz



10:37:51 03.11.2019

60GHz to 75GHz Verification



13:49:41 03.11.2019

75GHz to 100GHz Verification



SECTION 3

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
Radiated Emission						
1033	Bilog Antenna	3142C	00044556	EMCO	11/06/18	11/06/20
7631	Double-ridged waveguide horn	3117	00205418	ETS-Lindgren	08/20/18	08/20/20
8628	Pre-amplifier	QLI-01182835-JO	8986002	Quinstar	03/07/19	03/07/20
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 1003 and 7620	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 1003 and 7620	
40815	Pre-amplifier (18-40 GHz)	19D18	15G27	Spacek Labs	Verified by 1003 and 7620	
9001	Horn antenna (18-26.5GHz)	HO42S	101	Custom Microwave	09/09/19	09/09/21
9003	Horn antenna (26-40 GHz)	HO28S	102	Custom Microwaves	09/09/19	09/09/21
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	06/20/19	06/20/20
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/11/19	10/11/20
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	10/18/19	10/18/20
1016	Pre-Amplifier	PAM-0202	187	PAM	03/08/19	03/08/20
9003	Horn antenna (40-60 GHz)	HO19R	103	Custom Microwaves	Verified as standard gain horn	
9004	Horn antenna (50-75 GHz)	HO15R	104	Custom Microwaves	10/10/19	10/10/21
9005	Horn antenna (75-110 GHz)	HO10R	105	Custom Microwaves	Verified as standard gain horn	
-	Pre-amplifier (40-60 GHz)	SBL-4036033080-1919-E1	-	Sage Millimeter, Inc.	Verified by 1003 and 7620	
-	Pre-amplifier (50-75 GHz)	SBL-5037533050-1515-E1	-	Sage Millimeter, Inc.	Verified by 1003 and 7620	
-	Pre-amplifier (75-110 GHz)	FLNA-10-0005	FTL10839	Farran Technology Ltd.	Verified by 1003 and 7620	
7637	Harmonics mixer (40-60 GHz)	FS-Z60	100009	Rhode & Schwarz	05/31/18	05/31/20
7636	Harmonics mixer (60-90 GHz)	FS-Z90	100092	Rhode & Schwarz	04/11/18	04/11/20
Miscellaneous						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/18/18	01/07/20
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	11312	04/16/19	04/16/20
-	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 Measurement Uncertainty

Calculation of Measurement Uncertainty per CISPR 16-4-2:2011 with Corr. 1

3.2.1 Radiated 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)

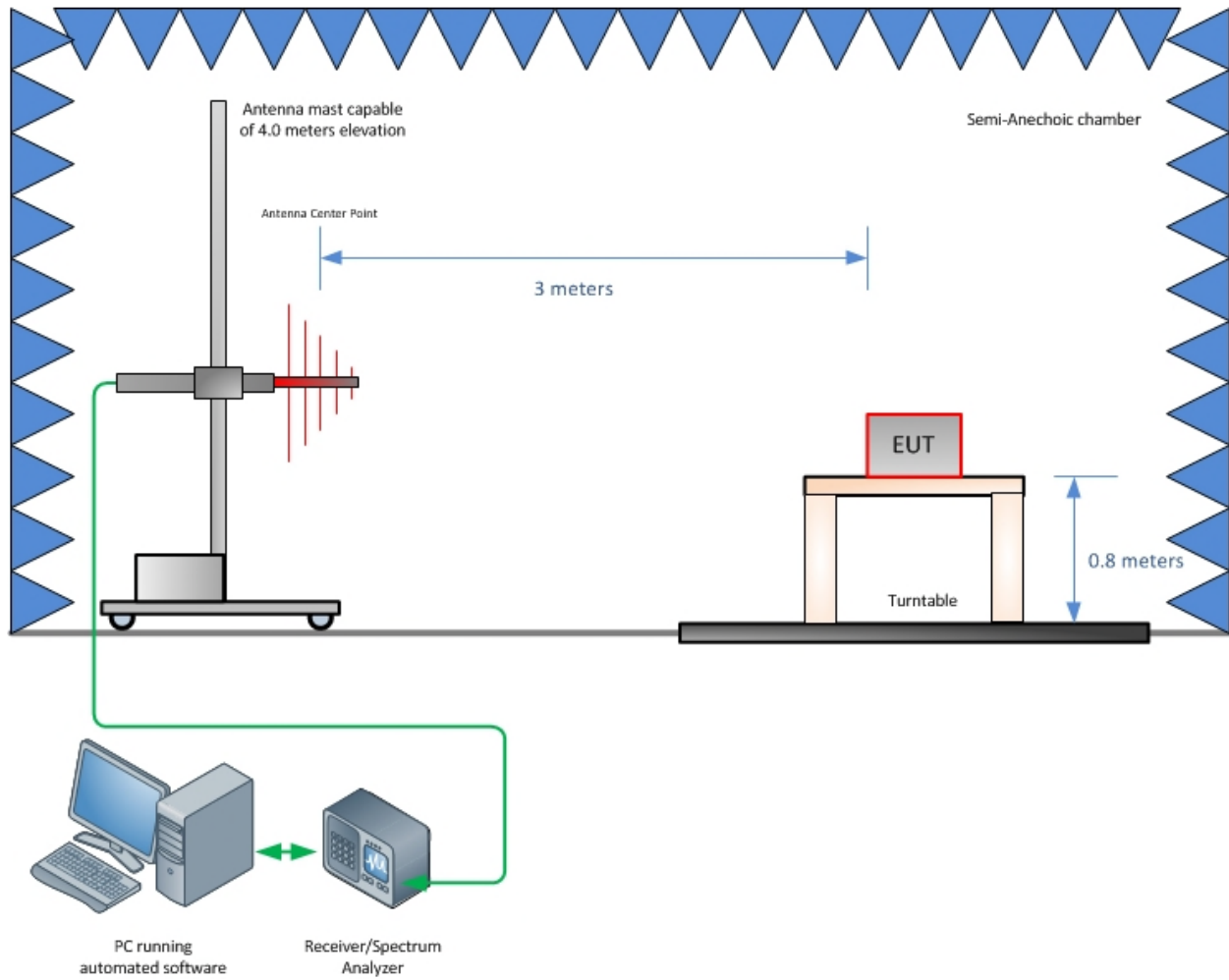
	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.75 dB	Normal, k=2	2.000	0.38	0.14
4	Receiver sinewave accuracy	0.45 dB	Normal, 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	



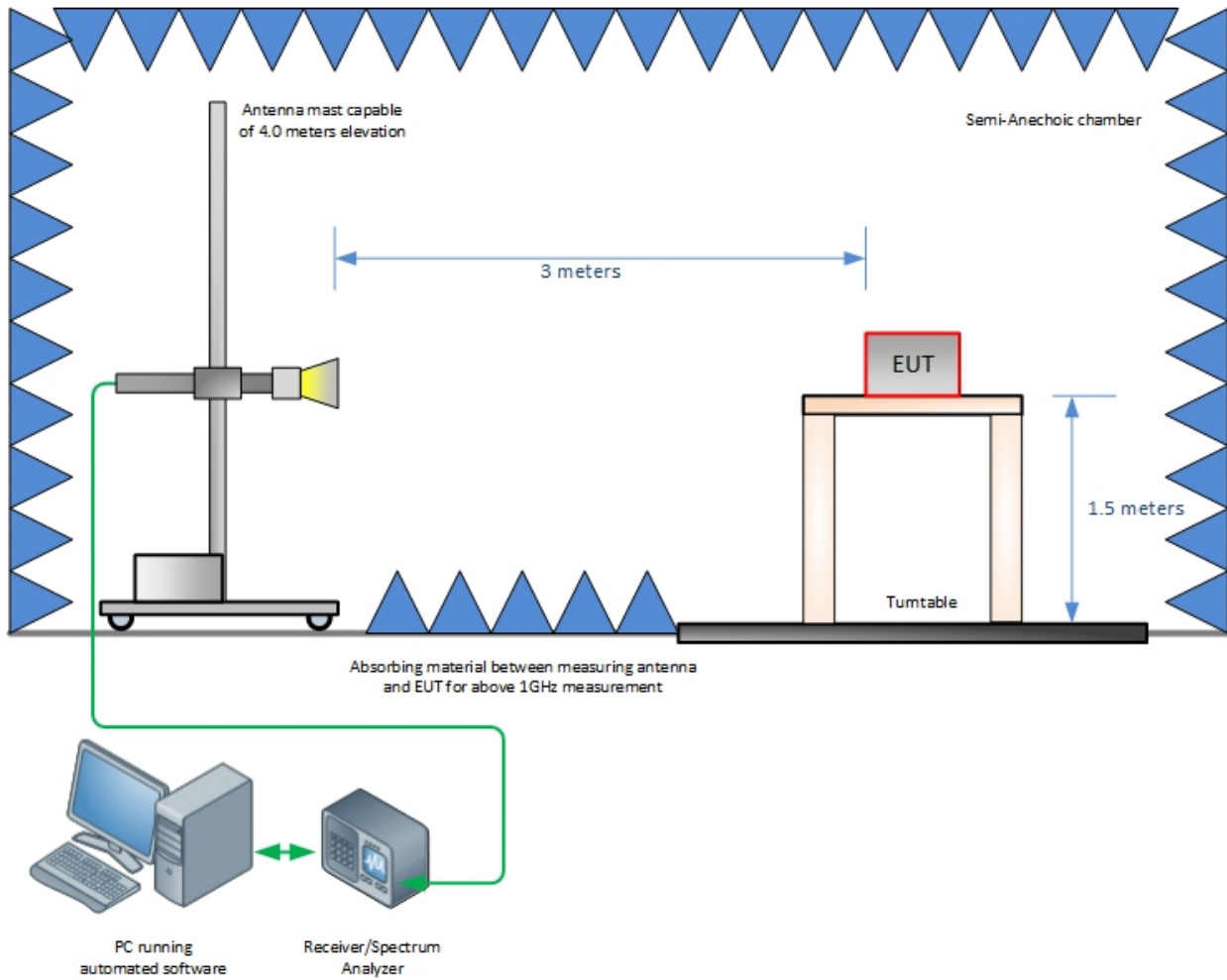
SECTION 4

4 Diagram of Test Setup

4.1 Test Setup Diagram



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



SECTION 5

5 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 Accreditation, Disclaimers and Copyright

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