RF TEST REPORT

Report number		RAPA19-O-045
Applicant	Name	Peace World Co., Ltd.
	Logo	Peace World
	Address	76, Hanam-daero, Hanam-si, Gyeonggi-do, Republic of Korea
Manufacturer	Name	Peace World Co., Ltd.
	Address	*76, Hanam-daero, Hanam-si, Gyeonggi-do, Republic of Korea*
Type of equipment		2.4G Wireless Module
Basic model name		A107
Multi model name		N/A
Serial number		N/A
FCC ID		2ATRY-A107
Test duration		August 28, 2019 to September 3, 2019
Date of issue		September 3, 2019
Total page		31 Pages (including this page)

SUMMARY

The equipment complies with the regulation; FCC Part 15 Subpart C Section 15.247

This test report only contains the result of a single test of the sample supplied for the examination.
It is not a general valid assessment of the features of the respective products of the mass-production.

September 3, 2019

Tested by MinGu Ji
Tester

September 3, 2019

Reviewed by Hwan-Bum Kang
Executive Managing Director

Test Report Version History

Version	Date	Reason for revision
1.0	September 3, 2019	Original Document

CONTENTS

1. Description of EUT

1.1 Applicant

• Company name : Peace World Co., Ltd.
• Address : 76, Hanam-daero, Hanam-si, Gyeonggi-do, Republic of Korea
• Contact person : Sangkyu Rim / Director / gdcom11@naver.com
• Phone/Fax : +82-2-529-5954 / +82-2-577-7832

1.2 Manufacturer

• Company name : Peace World Co., Ltd.
• Address : 76, Hanam-daero, Hanam-si, Gyeonggi-do, Republic of Korea
• Phone/Fax : +82-2-529-5954 / +82-2-577-7832

1.3 Basic description

• Product name : 2.4G Wireless Module
• Basic model name : A107
• Alternative model name : N/A

1.4 General description

• EQUIPMENT CLASS : DTS – Digital Transmission Systems

• Frequency Range : 2 410 MHz ~ 2 480 MHz
• Output Power : -1.40 dBm
• Modulation Type : FSK
• Number of Channel : 5
• Antenna Type : PCB Antenna
• Antenna Gain : -3.5 dBi
• Power Supply : DC 3.3 V

Frequency List	
Channel	Frequency (MHz)
1	2410
2	2420
3	2440
4	2460
5	2480

1.5 Alternative type(s)/model(s)

There is no alternative type(s) and/or model(s).

2. General information of test

2.1 Test standards and results

Applied Standards : FCC Part 15 Subpart C		
Section	**Description of Test**	**Result**
15.247 (a) (2)	Minimum 6 dB Bandwidth	Pass
15.247 (b) (3)	Maximum Peak Conducted Output Power	Pass
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Pass
	Radiated Emission which fall in the Restricted Band	Pass
15.247 (e)	Peak Power Spectral Density	Pass
15.207	Conducted Limits	Pass
15.209	Radiated Emission Limits	Pass
15.203	Antenna Requirement	Pass

2.2 Description of EUT during the test

During the test, keep the EUT in continuously transmitting mode.
There was no mechanical or circuitry modification to improve RF and spurious characteristic, and any RF and spurious suppression device(s) was not added against the device tested.
The EUT was moved throughout the X, Y, and Z axis and worst case data was recorded in this report.

2.3 Test configuration

• Type of peripheral equipment used

Model	Manufacturer	Description	Connected to
UC-RS	Peace World Co., Ltd.	Zig Board	EUT
EliteBook 8570p	HP	Notebook	EUT
PA-1900-32HT	LITE-ON TECHNOLOGY(CHANGZHOU_Co., Ltd.	Power Adapter	Notebook

2.4 Test Facility

• FCC Registration No: 931589
• IC Company address code: 9355B
• RRA Designation Number: KR0027

• Place of Test
Anyang Test Site(RF Test Room)
#101 & B104 Anyang Megavalley, 268, Hagui-ro, Dongan-gu, Anyang-si, Gyeonggi-do, 14056, Korea

2.5 PRELIMINARY TEST

2.5.1 AC Power line Conducted Emissions Tests

Operation Mode	The Worse operating condition (Please check one only)
Transmitting mode.	X

2.5.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting mode.	X

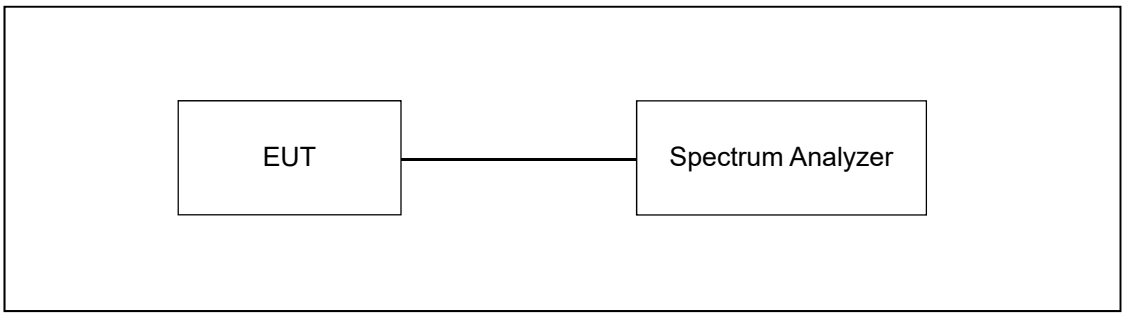
3. Measurement data

3.1 Minimum 6 dB Bandwidth

3.1.1 Requirement

- FCC Part15 subpart C Section 15.247

3.1.2 Test Procedure



The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.

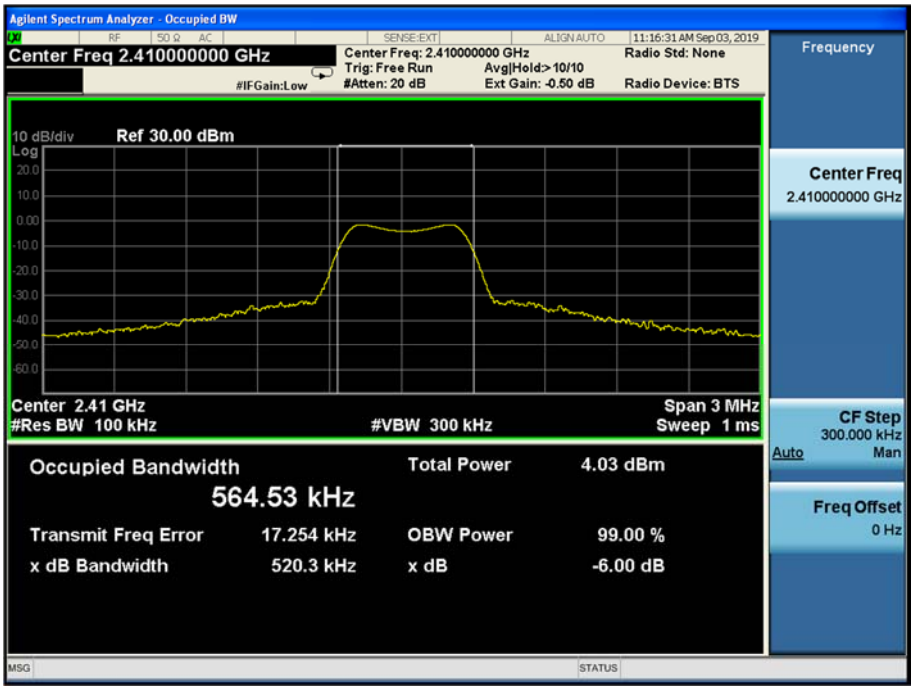
3.1.3 Test environment

• 24 °C, 48 % R.H.

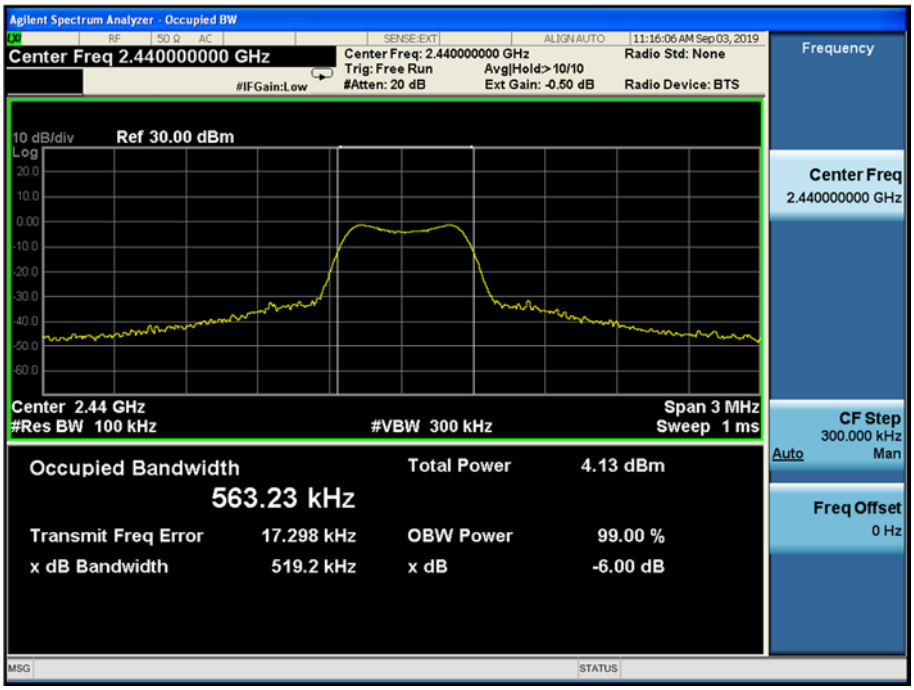
3.1.4 Test results

Frequency [MHz]		Measured Value [kHz]	Limit [kHz]	Result
Low	2410	520.3	500	PASS
Middle	2440	519.2	500	
High	2480	520.8	500	

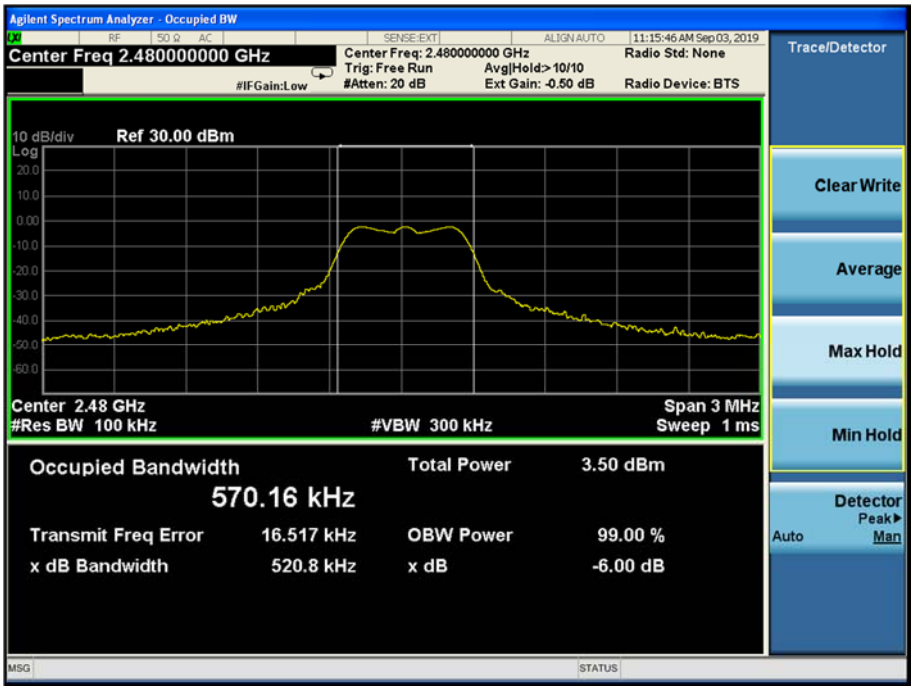
3.1.5 Test Plots



Low Channel



Middle Channel



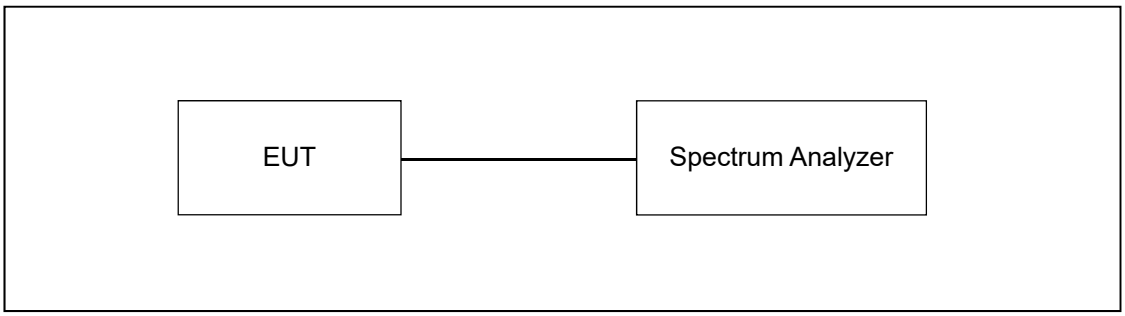
High Channel

3.2 Maximum Peak Conducted Output Power

3.2.1 Requirement

- FCC Part15 subpart C Section 15.247

3.2.2 Test Procedure



The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to ≥DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.

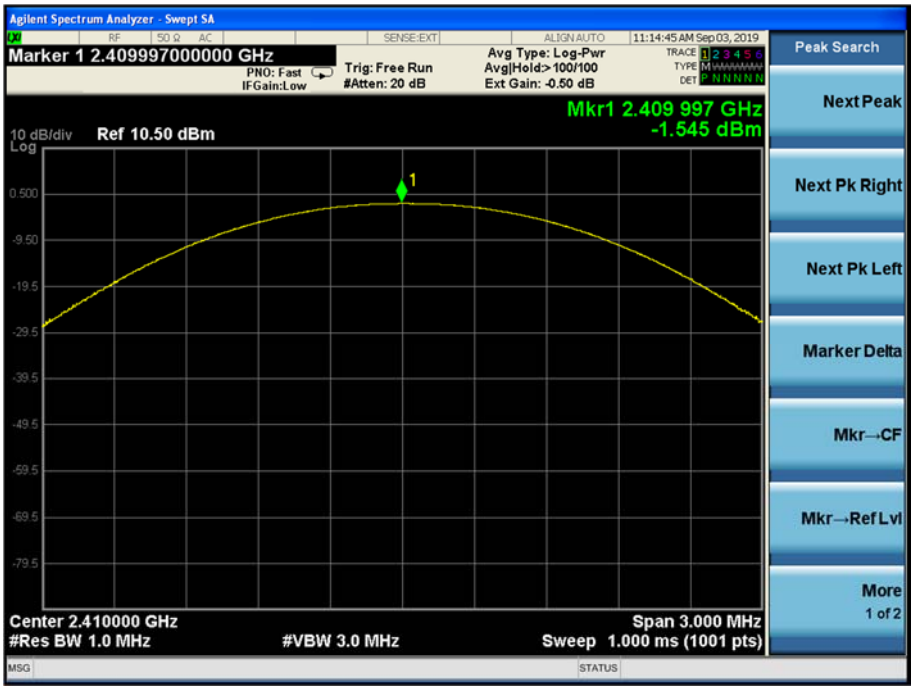
3.2.3 Test environment

• 24 °C, 48 % R.H.

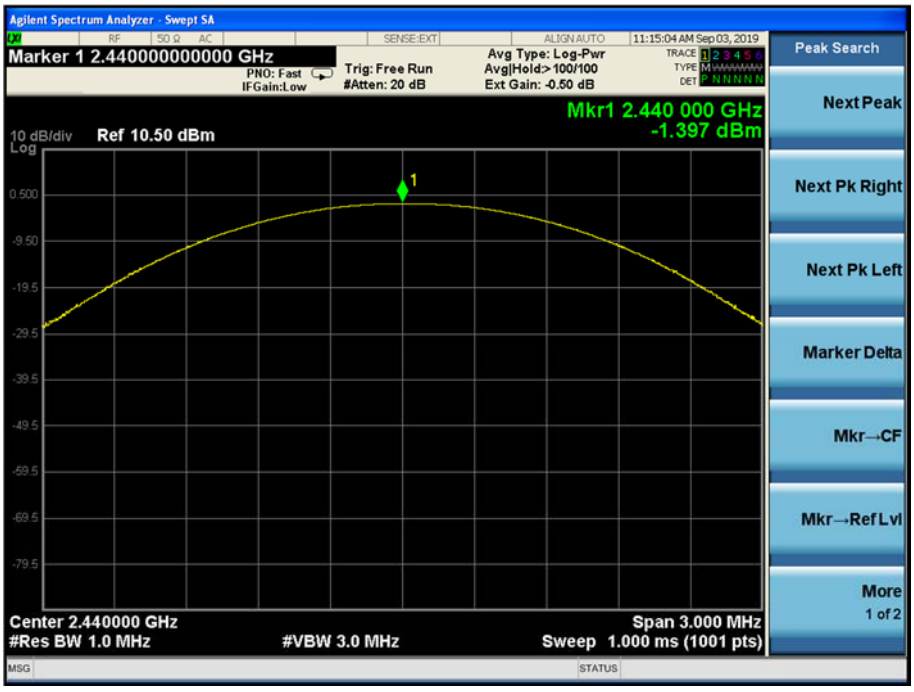
3.2.4 Test results

Frequency [MHz]		Measured Value [dBm]	Limit [dBm]	Result
Low	2410	-1.55	30.00	PASS
Middle	2440	-1.40	30.00	
High	2480	-2.43	30.00	

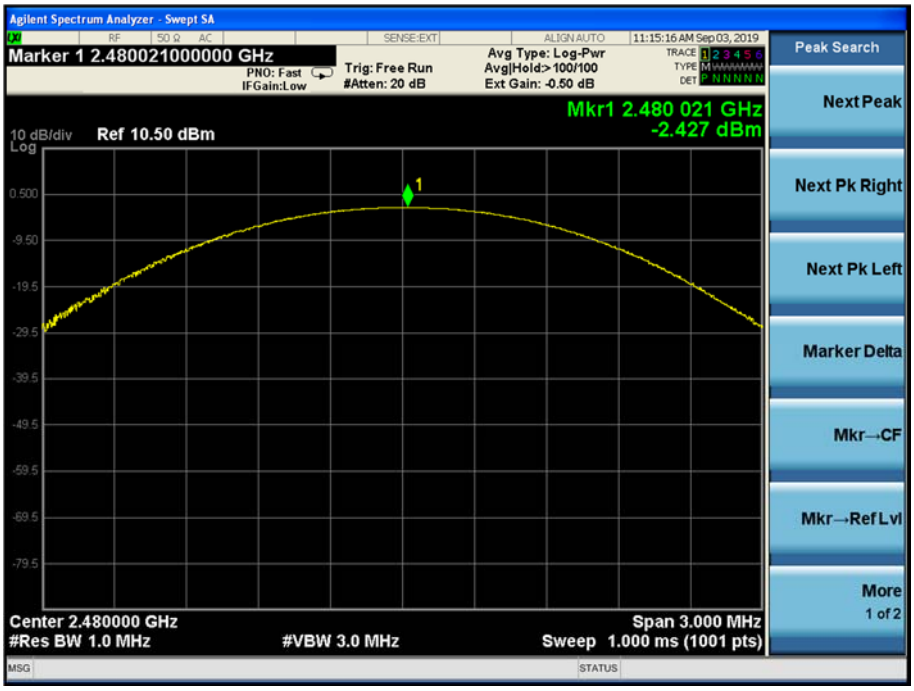
3.2.5 Test Plots



Low Channel



Middle Channel



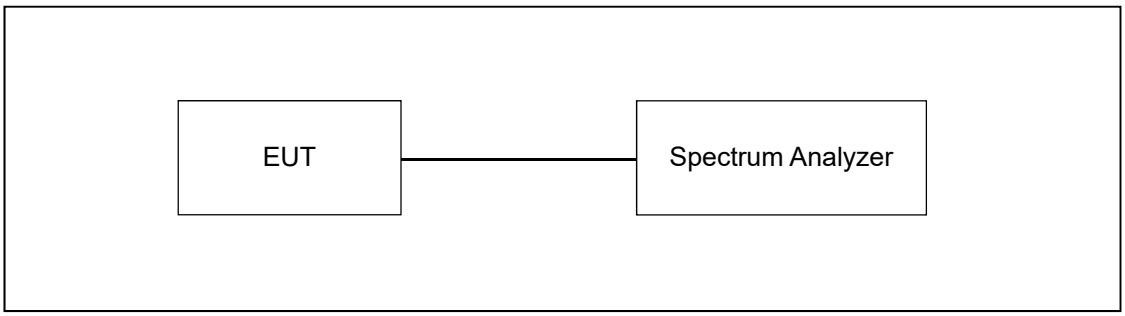
High Channel

3.3 100 kHz Bandwidth Outside the Frequency Band

3.3.1 Requirement

- FCC Part15 subpart C Section 15.247

3.3.2 Test Procedure

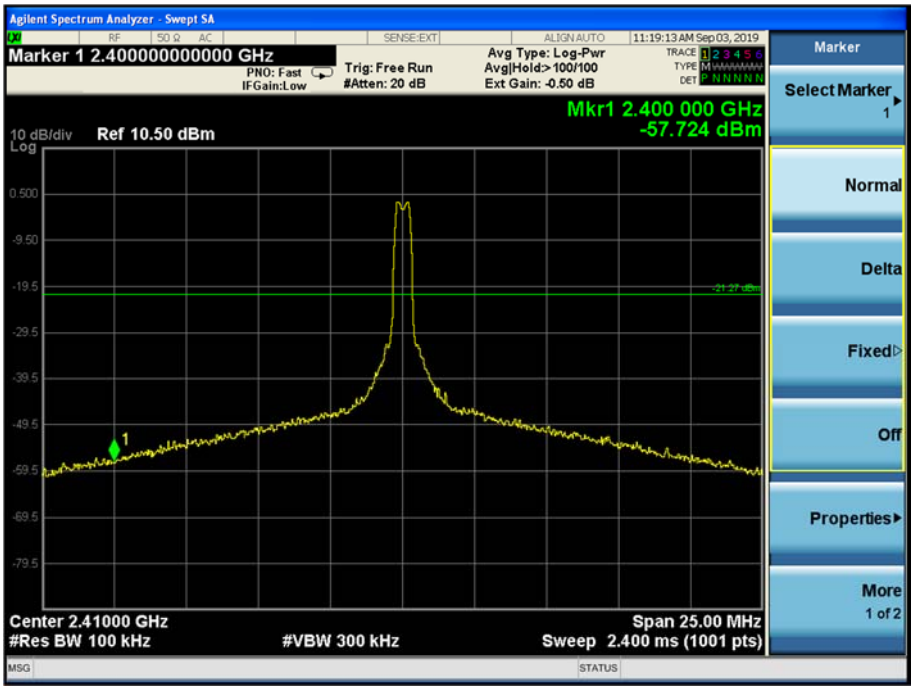


The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth and video bandwidth is set to 100 kHz, and peak detection was used.

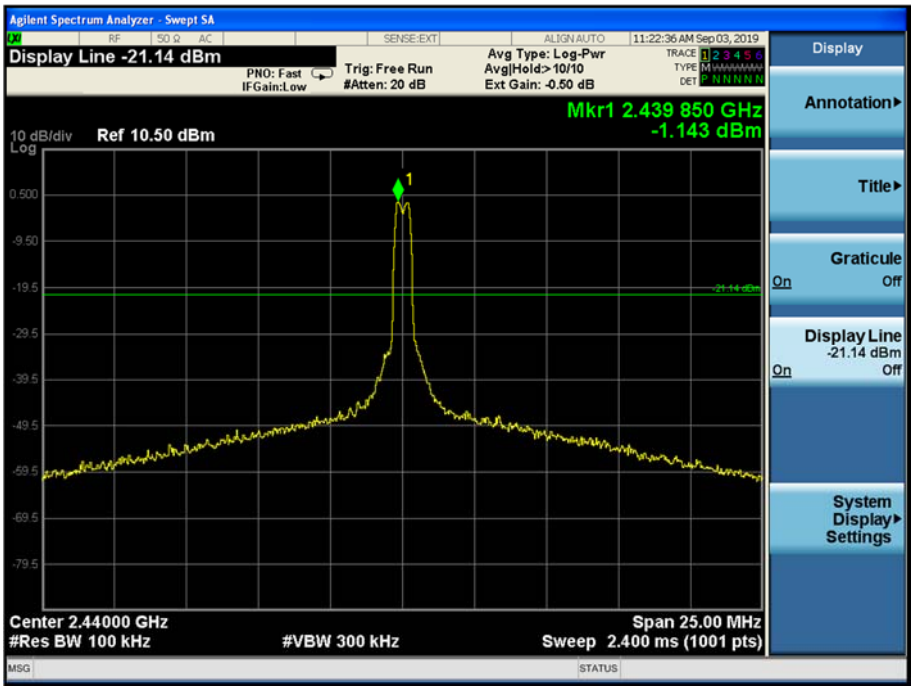
3.3.3 Test environment

- 24 °C, 48 % R.H.

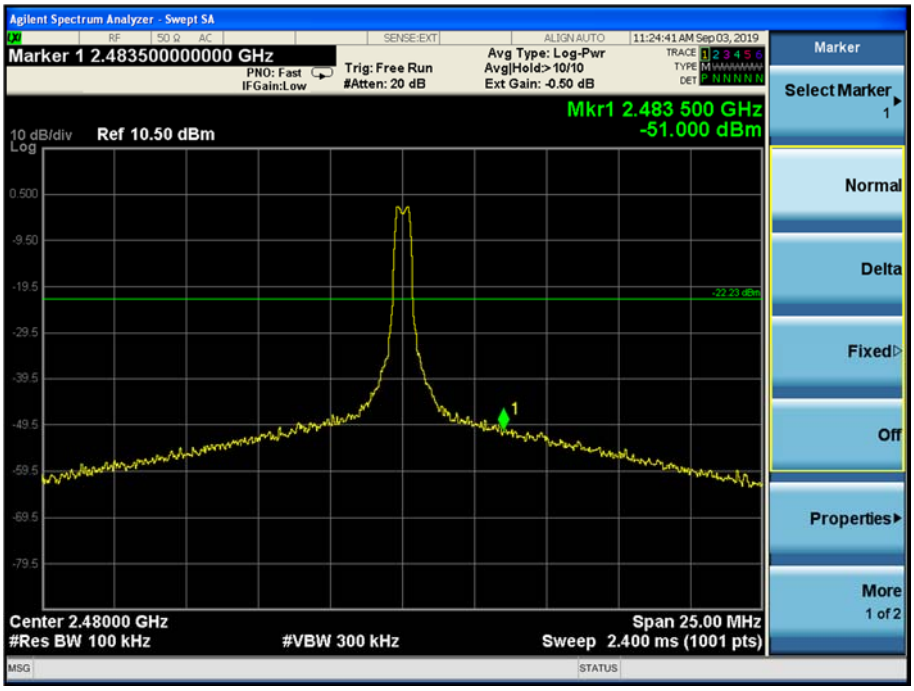
3.3.4 Test Plots



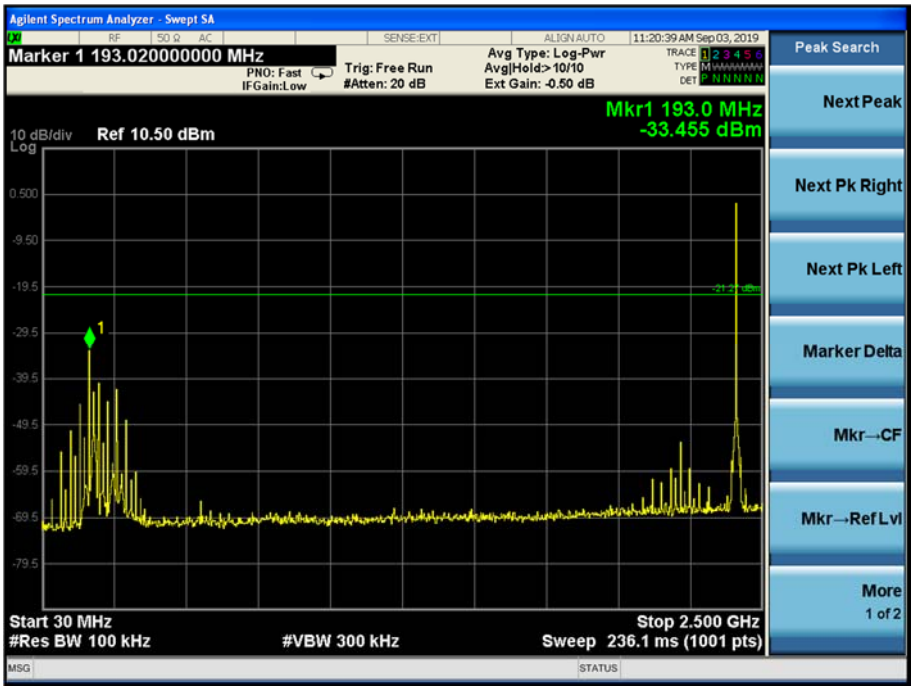
Low Channel



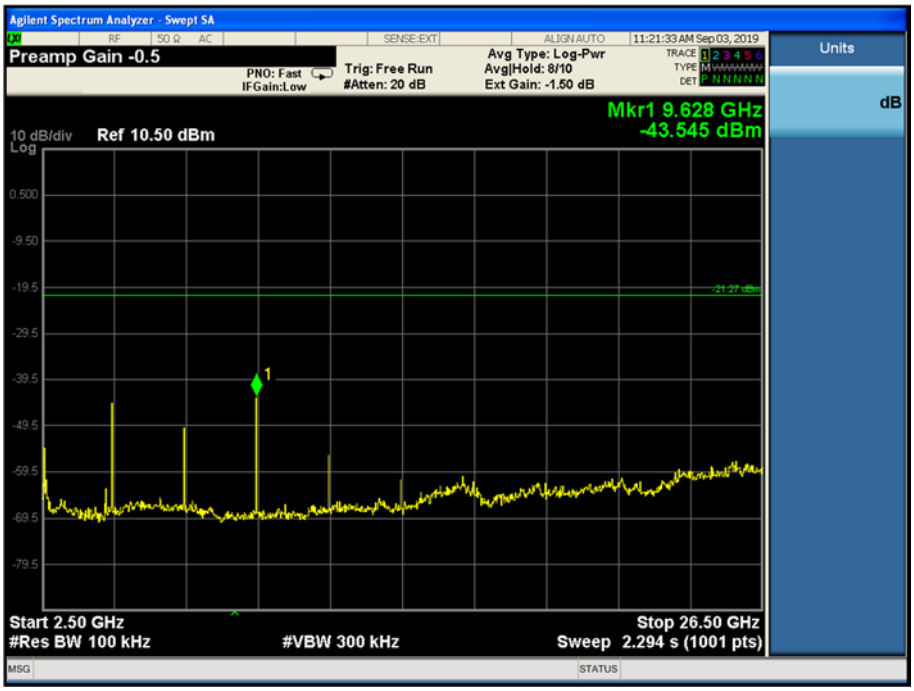
Middle Channel



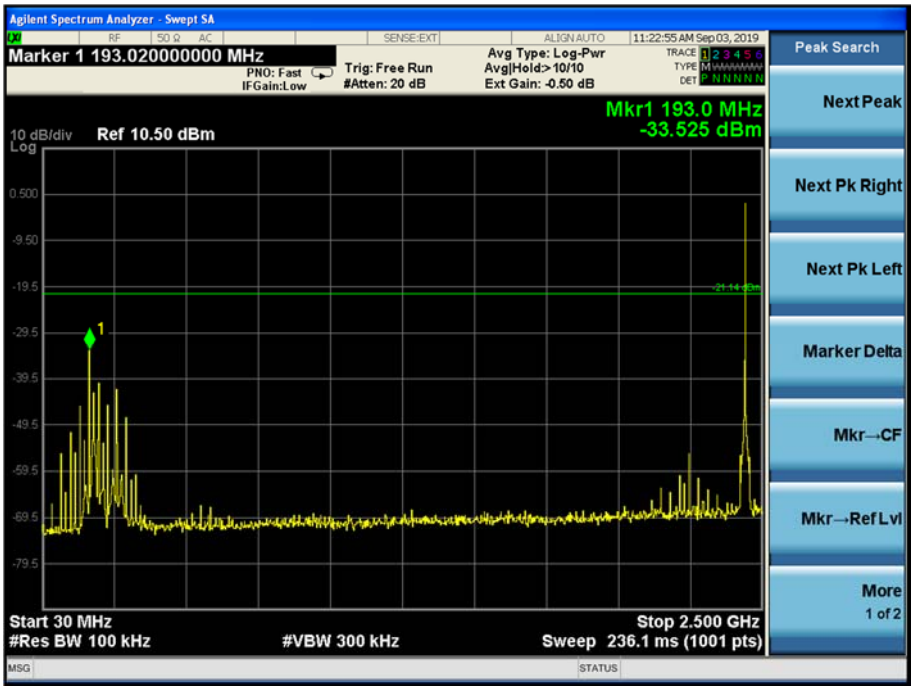
High Channel



Low Channel

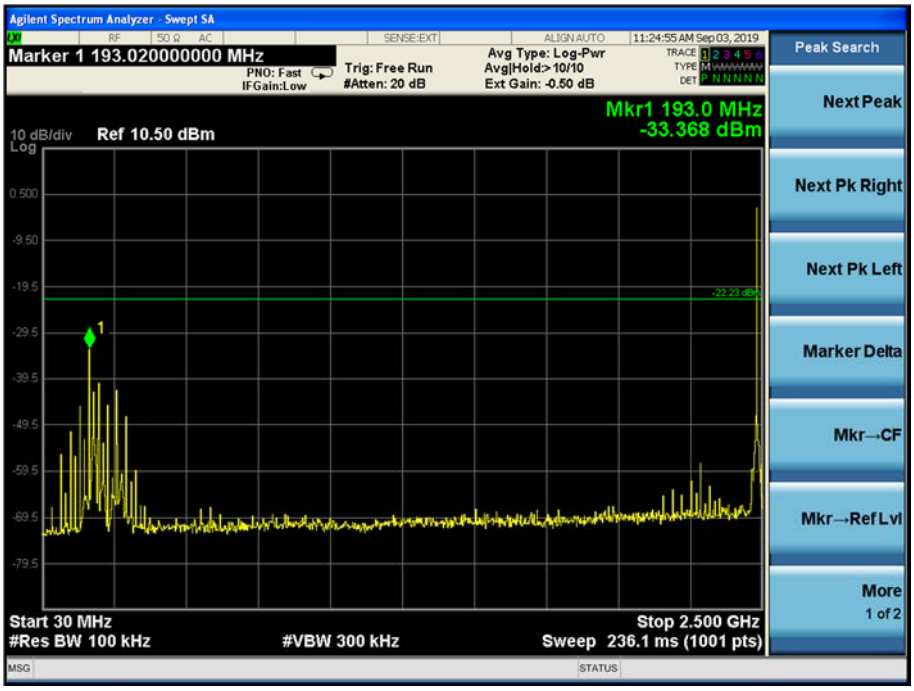


Low Channel

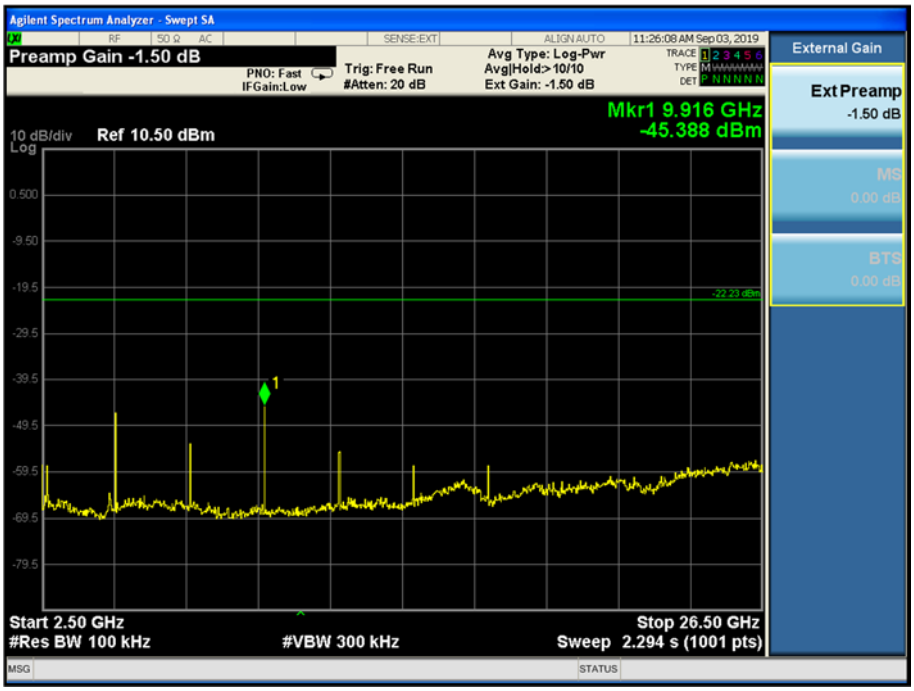


Middle Channel

Middle Channel



High Channel



High Channel

3.4 Radiated Emission

3.4.1 Requirement

• FCC Part15 subpart C Section 15.247

3.4.2 Test Procedure

The radiated emissions measurements were performed on the 3 m anechoic chamber. The EUT was placed on a non-conductive turntable above the ground plane. The frequency spectrum from 30 kHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

3.4.3 Test environment

• 24 °C, 45 % R.H.

3.4.4 Test results

3.4.4.1 Radiated Emission which fall in the Restricted Band

•.Resolution bandwidth : 1 MHz
• Video bandwidth : 3 MHz
•.Detector : Peak Mode(Peak), Average Mode(RMS)
•.Measurement distance : 3 m
•.Operating Condition : Highest Output Power Transmitting Mode(Low Channel and High Channel)
•.Result : PASS

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Low Channel									
2334.25	43.55	Peak	H	27.70	3.84	35.72	39.37	74.00	34.63
2362.04	32.29	Average	H				28.11	54.00	25.89
2362.39	45.45	Peak	V				41.27	74.00	32.73
2361.92	35.74	Average	V				31.56	54.00	22.44
High Channel									
2491.32	43.34	Peak	H	27.90	3.84	35.70	39.38	74.00	34.62
2494.64	31.28	Average	H				27.32	54.00	26.68
2483.51	43.90	Peak	V				39.94	74.00	34.06
2484.13	32.35	Average	V				28.39	54.00	25.61

Note 1. Total = Reading + Ant.Factor + Cable Loss – Amp Gain

3.4.4.2 Spurious & Harmonic Radiated Emission

•.Resolution bandwidth : 1 MHz
• Video bandwidth : 3 MHz
•.Detector : Peak Mode(Peak), Average Mode(RMS)
•.Measurement distance : 3 m
•.Frequency range : 1 GHz ~ 26.5 GHz
•.Operating Condition : Highest Output Power Transmitting Mode
•.Result : PASS

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Low Channel									
4820.00	52.42	Peak	H	31.20	5.93	35.12	54.43	74.00	19.57
4820.00	48.35	Average	H				50.36	54.00	3.64
4820.00	54.42	Peak	V				56.43	74.00	17.57
4820.00	50.96	Average	V				52.97	54.00	1.03
Middle Channel									
4880.00	51.41	Peak	H	31.30	5.93	35.10	53.54	74.00	20.46
4880.00	47.69	Average	H				49.82	54.00	4.18
4880.00	50.33	Peak	V				52.46	74.00	21.54
4880.00	46.56	Average	V				48.69	54.00	5.31
High Channel									
4960.00	50.41	Peak	H	31.40	5.93	35.08	52.66	74.00	21.34
4960.00	46.68	Average	H				48.93	54.00	5.07
4960.00	51.76	Peak	V				54.01	74.00	19.99
4960.00	48.35	Average	V				50.60	54.00	3.40

Note 1. Total = Reading + Ant.Factor + Cable Loss – Amp Gain

3.4.4.3 Spurious Radiated Emission

3.4.4.3.1 Test Data for Below 30 MHz

•. Detector : Quasi-Peak (6 dB Bandwidth: 200 Hz, 9 kHz)

•.Measurement distance : 3 m

•.Frequency range : 9 kHz ~ 30 MHz

•.Operating Condition : Highest Output Power Transmitting Mode

•.Result : PASS

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emissions observed were 20dB below the limit and thus not reported								

3.4.4.3.2 Test Data for 30 MHz ~ 1000 MHz

•. Detector : Quasi-Peak (6 dB Bandwidth: 120 kHz)

•.Measurement distance : 3 m

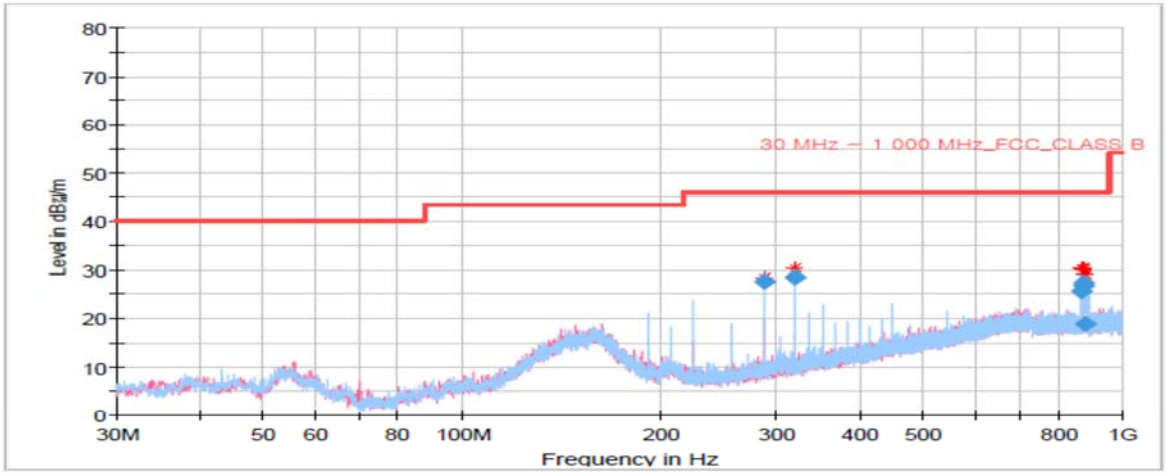
•.Frequency range : 30 MHz ~ 1000 MHz

•.Operating Condition : Highest Output Power Transmitting Mode

•.Result : PASS

Test 1 / 1

RE Test Report



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
288.02	27.55	46.00	18.45	15000.0	99.7	H	32.00	-20.7
320.03	28.43	46.00	17.57	15000.0	99.7	H	86.00	-19.8
869.75	25.52	46.00	20.48	15000.0	300.1	H	211.00	-11.9
874.60	27.20	46.00	18.80	15000.0	99.7	H	21.00	-11.8
875.03	26.82	46.00	19.18	15000.0	200.2	H	76.00	-11.8
881.39	18.99	46.00	27.01	15000.0	200.2	H	246.00	-11.8

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3.4.4.3.3 Test Data for Avove 1 GHz

•. Detector : Peak, Average (6 dB Bandwidth: 1 MHz)

•.Measurement distance : 3 m

•.Frequency range : 1 GHz ~ 26.5 GHz

•.Operating Condition : Highest Output Power Transmitting Mode

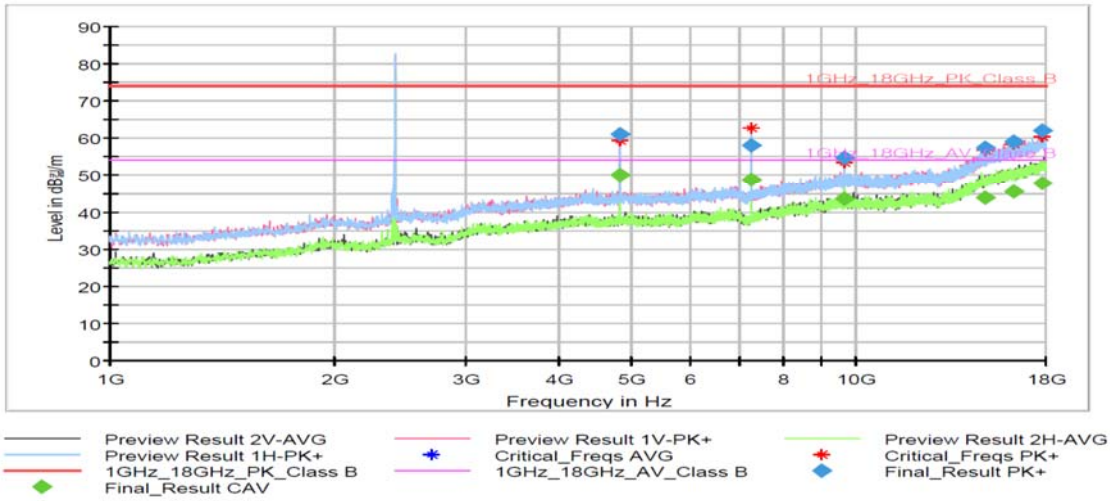
•.Result : PASS

•.Result : PASS

•. 1 GHz ~ 18 GHz

Test 1 / 1

RE Test Report



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4819.9	61.04	---	74.00	12.96	15000.0	400.0	V	280.00	5.1
4819.9	---	50.17	54.00	3.83	15000.0	400.0	V	280.00	5.1
7228.8	---	48.75	54.00	5.25	15000.0	300.0	H	275.00	7.4
7228.8	58.00	---	74.00	16.00	15000.0	300.0	H	275.00	7.4
9641.1	54.90	---	74.00	19.10	15000.0	100.0	V	197.00	9.5
9641.1	---	43.41	54.00	10.59	15000.0	100.0	V	197.00	9.5
14941.7	57.48	---	74.00	16.52	15000.0	100.0	V	28.00	16.6
14941.7	---	43.76	54.00	10.24	15000.0	100.0	V	28.00	16.6
16291.5	---	45.37	54.00	8.63	15000.0	400.0	V	275.00	17.7
16291.5	59.27	---	74.00	14.73	15000.0	400.0	V	275.00	17.7
17767.1	62.00	---	74.00	12.00	15000.0	100.0	H	194.00	20.6
17767.1	---	47.90	54.00	6.10	15000.0	100.0	H	194.00	20.6

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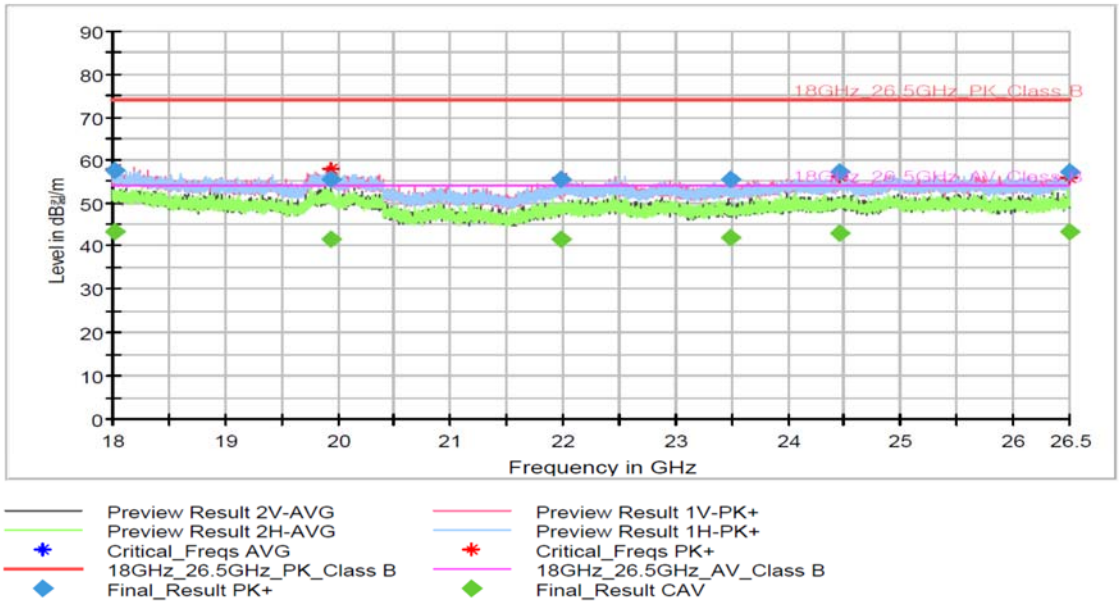
•. 18 GHz ~ 26.5 GHz

Test 1 / 1

RE Test Report



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
18024.7	---	43.36	54.00	10.64	15000.0	99.9	H	276.00	13.1
18024.7	57.30	---	74.00	16.70	15000.0	99.9	H	276.00	13.1
19943.1	55.42	---	74.00	18.58	15000.0	200.0	V	54.00	10.9
19943.1	---	41.65	54.00	12.35	15000.0	200.0	V	54.00	10.9
21987.4	---	41.70	54.00	12.30	15000.0	200.0	H	293.00	10.7
21987.4	55.54	---	74.00	18.46	15000.0	200.0	H	293.00	10.7
23484.2	55.51	---	74.00	18.49	15000.0	299.8	V	311.00	9.9
23484.2	---	41.79	54.00	12.21	15000.0	299.8	V	311.00	9.9
24455.8	57.17	---	74.00	16.83	15000.0	400.0	V	216.00	10.9
24455.8	---	43.09	54.00	10.91	15000.0	400.0	V	216.00	10.9
26494.9	57.07	---	74.00	16.93	15000.0	99.9	H	280.00	11.3
26494.9	---	43.24	54.00	10.76	15000.0	99.9	H	280.00	11.3

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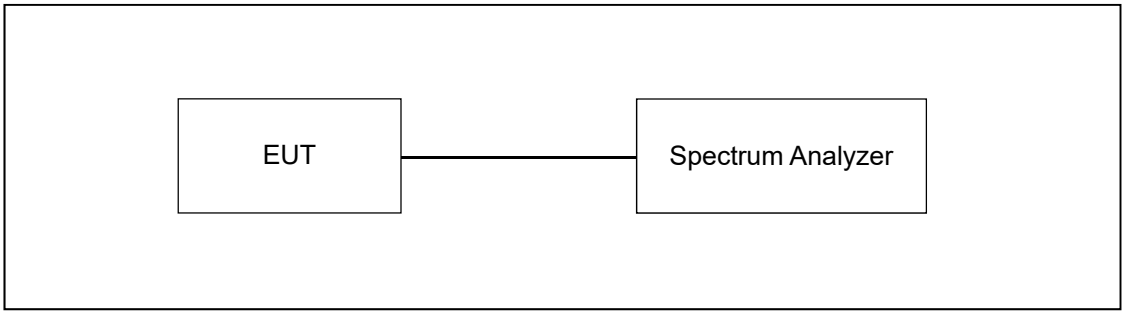
3.5 Peak Power Spectral Density

3.5.1 Requirement

- FCC Part15 subpart C Section 15.247

3.5.2 Test Procedure



The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 3 kHz ≤ RBW ≤ 100 kHz, the video bandwidth is set to 3 times the resolution bandwidth.

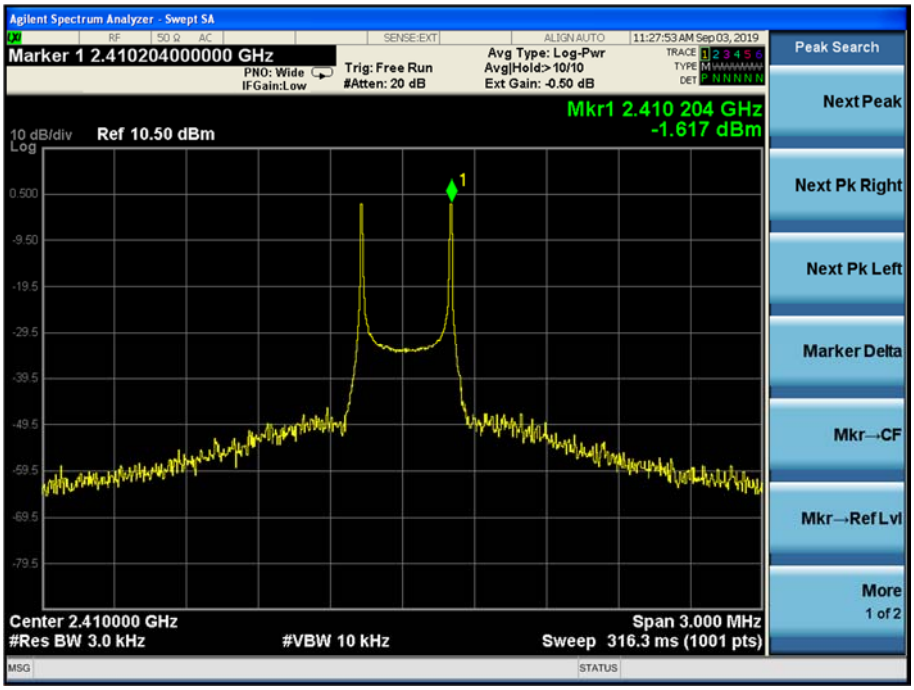
3.5.2 Test environment

- 24 °C, 48 % R.H.

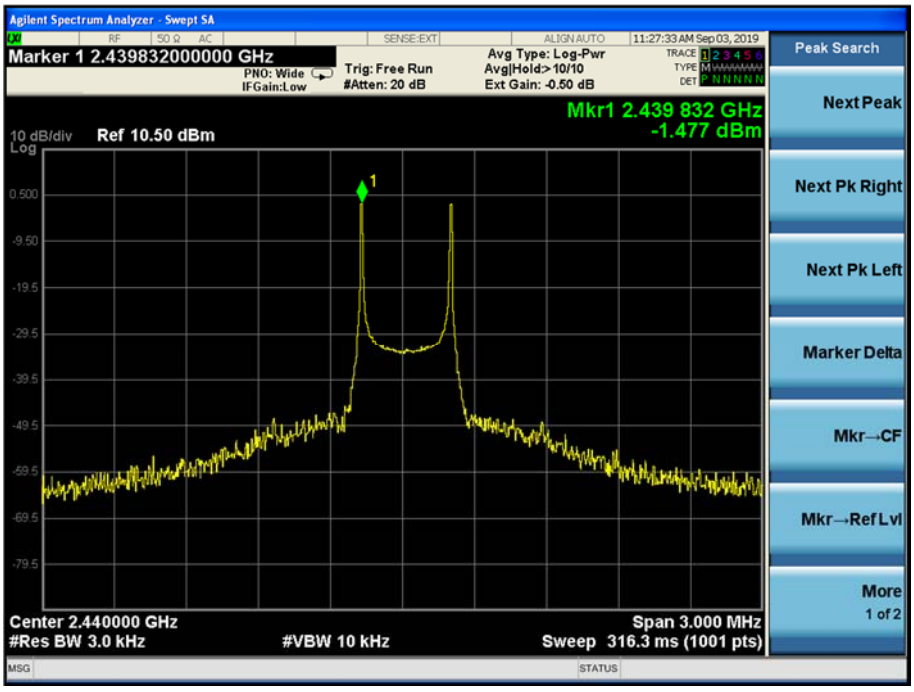
3.5.2 Test data

Frequency [MHz]		Measured Value [dBm]	Limit [dBm]	Result
Low	2410	-1.62	8.00	PASS
Middle	2440	-1.48	8.00	
High	2480	-2.49	8.00	

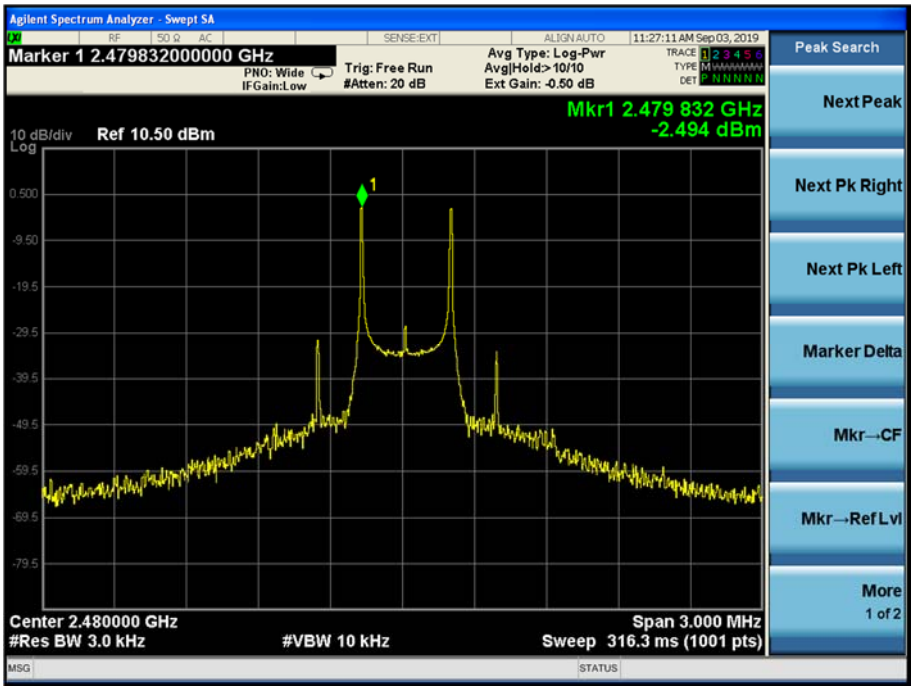
3.5.4 Test Plots



Low Channel



Middle Channel



High Channel

3.6 Conducted Emission Test

3.6.1 Requirement

- FCC Part15 subpart C Section 15.207

3.6.2 Test Procedure

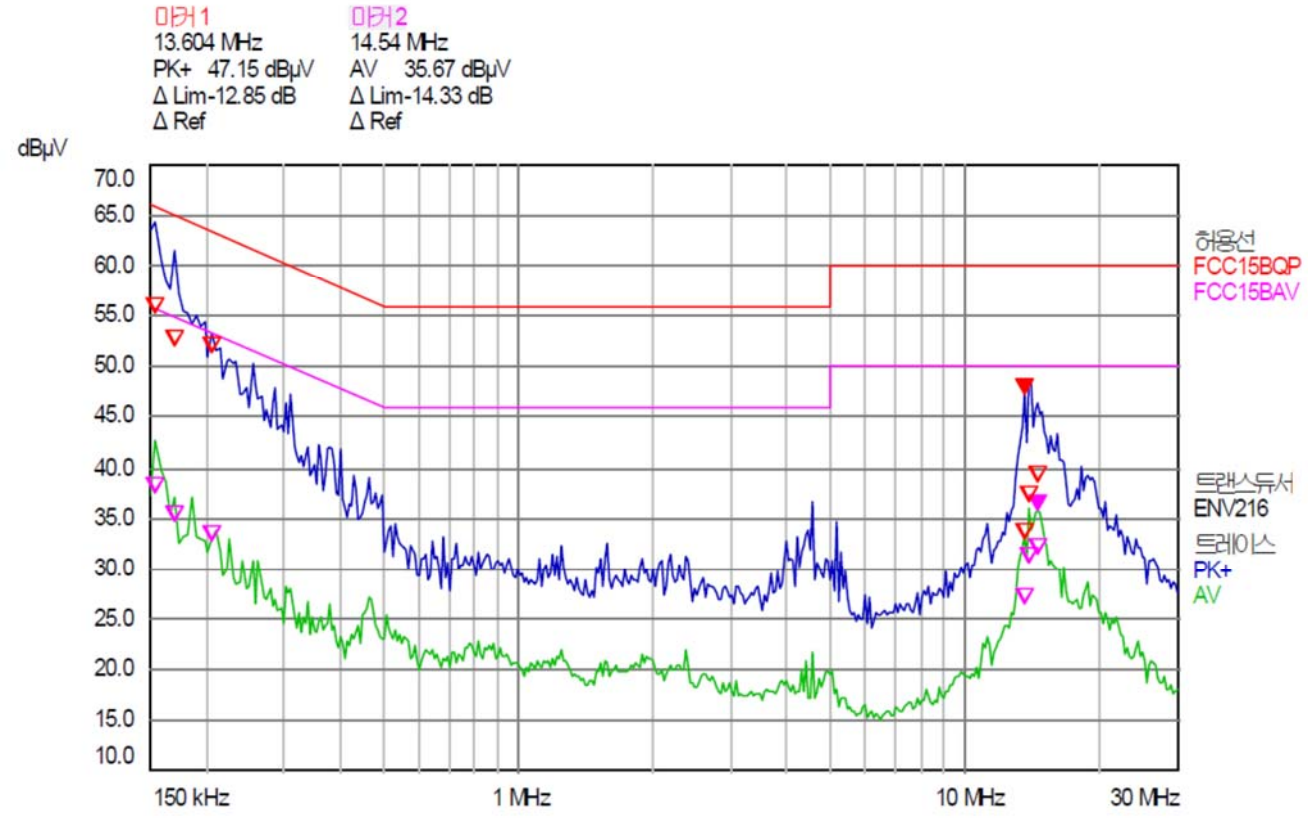
The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

3.6.3 Test data

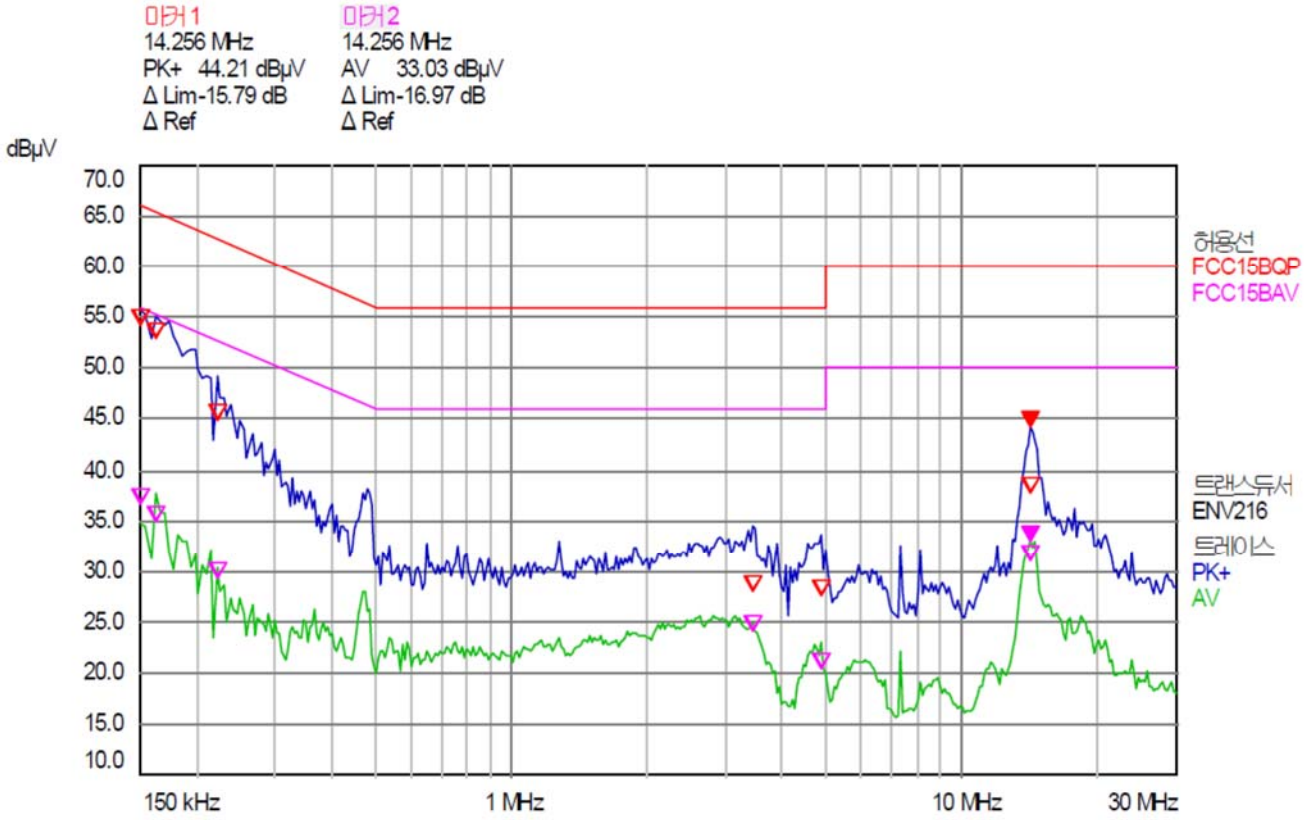
-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



-. Tested Line : NEUTRAL LINE



FREQ	Corr.Fator [dB]		[H/N]	Quasi-peak [dBuV]			C-Average [dBuV]		
[MHz]	LISN	cables		Measured	limit	Margin	Measured	limit	Margin
0.15	9.55	9.87	H	55.22	65.78	10.56	37.59	55.78	18.19
0.16	9.55	9.87	N	52.87	65.36	12.49	34.91	55.36	20.45
0.21	9.56	9.87	H	51.45	63.37	11.92	32.80	53.37	20.57
13.60	9.66	10.09	H	33.06	60.00	26.94	26.41	50.00	23.59
13.96	9.67	10.10	H	36.70	60.00	23.30	30.50	50.00	19.50
14.54	9.67	10.10	H	38.67	60.00	21.33	31.54	50.00	18.46

3.7 Antenna Requirement

3.7.1 Requirement

- FCC Part15 subpart C Section 15.203
- An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

3.7.2 Result

- The antenna of the EUT is a PCB Antenna on the board in the EUT.

4. Test equipment list

Use	Model Number	Manufacturer	Description	Serial Number	Cal. Date.(Interval)
☒	SCU 01	Rohde & Schwarz	Signal Conditioning Unit	10020	Jan 15, 2019(1Y)
☒	ESR	Rohde & Schwarz	EMI Test Receiver	101421	Feb 25, 2019(1Y)
☒	E3633A	AGILENT	DC Power Supply	SG40002272	Jan 14, 2019(1Y)
☒	DS 2000S	Innco GmbH	Turn Table	N/A	N/A
☒	MA4000-EP-HS	Innco GmbH	Antenna Mast	N/A	N/A
☒	MA4640-XP-ET	Innco GmbH	Tilt Antenna Mast	N/A	N/A
☒	CO3000	Innco GmbH	Controller	N/A	N/A
☒	CO3000	Innco GmbH	Controller	N/A	N/A
☒	N9020A	Agilent	Spectrum Analyzer	MY50200260	Jan 14, 2019(1Y)
☒	6502	EMCO	Loop Antenna	9609-3087	Oct 24, 2017(2Y)
☒	VULB 9168	SCHWARZBECK	Trilog-Broadband Antenna	9168-735	Oct 26, 2017(2Y)
☒	8449B	Agilent	Preamplifier	3008A02013	Jan 14, 2019(1Y)
☒	BBHA-9120D	Schwarzbeck	Horn Antenna	395	Jun 13, 2019(2Y)
☒	ESCI7	Rohde & Schwarz	EMI Test Receiver	100938	Jan 15, 2019(1Y)
☒	ESH-Z2	Rohde & Schwarz	Pulse Limter	101631	Dec 4, 2017(2Y)
☒	ENV216	Rohde & Schwarz	LISN	101264	Aug 7, 2019(1Y)
☒	ES-SCAN	Rohde & Schwarz	EMI Software	N/A	N/A
☒	EMC32	Rohde & Schwarz	EMI Software	N/A	N/A
☒	SAS-574	A.H.Systems	Horn Antenna	595	Dec 4, 2017(2Y)
☒	PAM-840A	Com-power	Preamplifier	461334	Aug 8, 2019(1Y)