RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

BRC

ISSUED TO
Hansong (Nanjing) Technology Ltd.

8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

Prepared by: Ye Hongji
Date: Dec. 29, 2021

Approved by: Wei Yanquan (Chief Engineer)
Date: Dec. 29, 2021

Report No.:	BL-SZ21A0210-601
EUT Name:	BRC
Model Name:	PRCIII
Brand Name:	Platin
Test Standard:	47 CFR Part 15 Subpart C
	RSS-Gen Issue 5
	RSS-210 Issue 10
FCC ID:	XCO-BM240-PRCIII
ISED Number:	7756A-BM240PRCIII
Test Conclusion:	Pass
Test Date:	Dec. 07, 2021 ~ Dec. 14, 2021
Date of Issue:	Dec. 29, 2021

Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
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Revision History

Version	Issue Date	Revisions
Rev. 01	Dec. 27, 2021	Initial Issue
Rev. 02	Dec. 29, 2021	Corrected the formula data in section A.3

TABLE OF CONTENTS

1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20℃ to 25℃
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

(1) The test report reference to the report template version v5.7.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Hansong (Nanjing) Technology Ltd.
Address	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

2.2 Manufacturer

Manufacturer	Hansong (Nanjing) Technology Ltd.
Address	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

2.3 Factory Information

Factory	Hansong (Nanjing) Technology Ltd.
Address	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

2.4 General Description for Equipment under Test (EUT)

EUT Name	BRC
Model Name Under Test	PRCIII
Series Model Name	N/A
Description of Model name differentiation	N/A
Serial Number	H212BM240RCB0014
Hardware Version	VP1.0
Software Version	VP1.0
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Technical Information

Network and Wireless connectivity	433MHz (Only TX)

Modulation Type	ASK
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Operating Frequency	433.92 MHz.
Antenna Type	PCB Antenna
Antenna Gain	3.0 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
4	RSS-210 Issue 10	Licence-Exempt Radio Apparatus: Category I Equipment

3.2 Verdict

No.	Description	FCC Part No.	ISED Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	RSS-Gen 6.8	--	Pass Note1
2	Conducted Emission	15.207	RSS-Gen 8.8	ANNEX A.1	N/A Note2
3	20 dB Bandwidth	15.231(c)	RSS-Gen 6.7	ANNEX A.2	Pass
4	Duty Cycle	15.35	--	ANNEX A.3	Pass
5	Field Strength of Fundamental Emissions	15.231(b)	RSS-210 8.9	ANNEX A.4	Pass
6	Radiated Emissions	15.209 15.231(b)	RSS-Gen 8.9	ANNEX A.5	Pass
7	Transmitting Time	15.231(a)	--	ANNEX A.6	Pass
Note 1: Please refer to section 5.1. Note 2: The EUT only powered by battery, so the Conducted Emission test is not applicable.					

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	3 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-40	101544	2021.04.01	2022.03.31
Bluetooth Signaling Unit	ROHDE&SCHWARZ	CMW500	142028	2021.06.01	2022.05.31
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.06.01	2022.05.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.06.01	2022.05.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.01	2022.05.31
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2022.07.01
Test Antenna-Horn (18-40 GHz)	A-INFO	LB-180400KF	J211060273	2021.07.02	2023.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2022.02.20
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60 *7.35m	N/A	2019.08.08	2022.08.07
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

4.3 Measurement Uncertainty

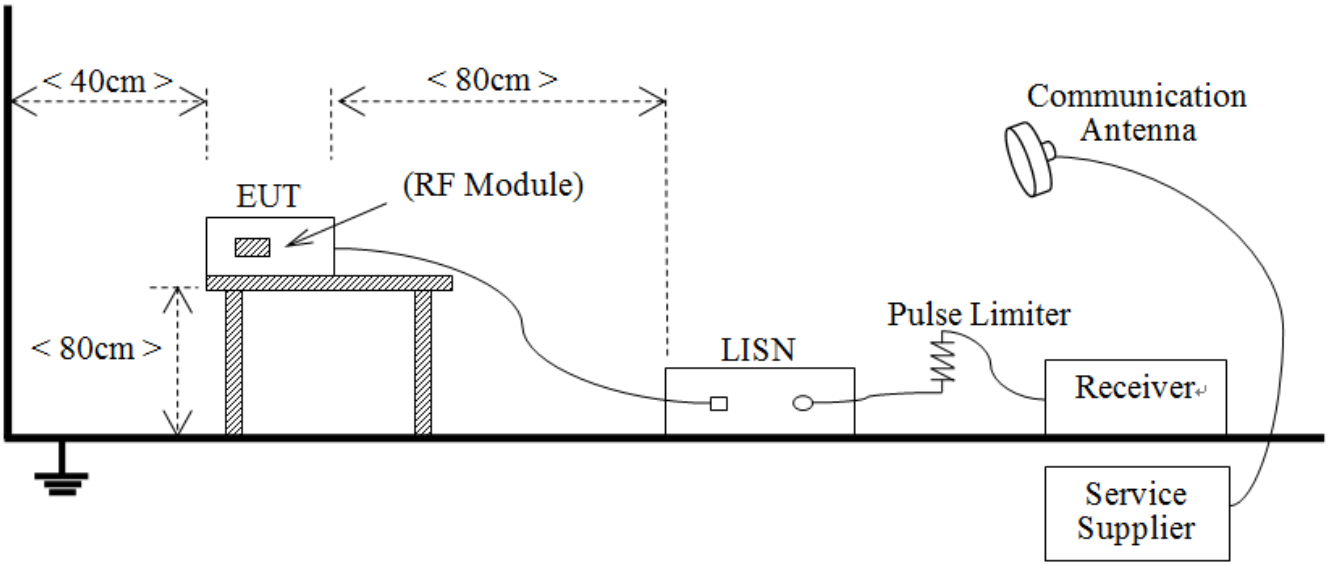
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.82°C
Humidity	4.1%

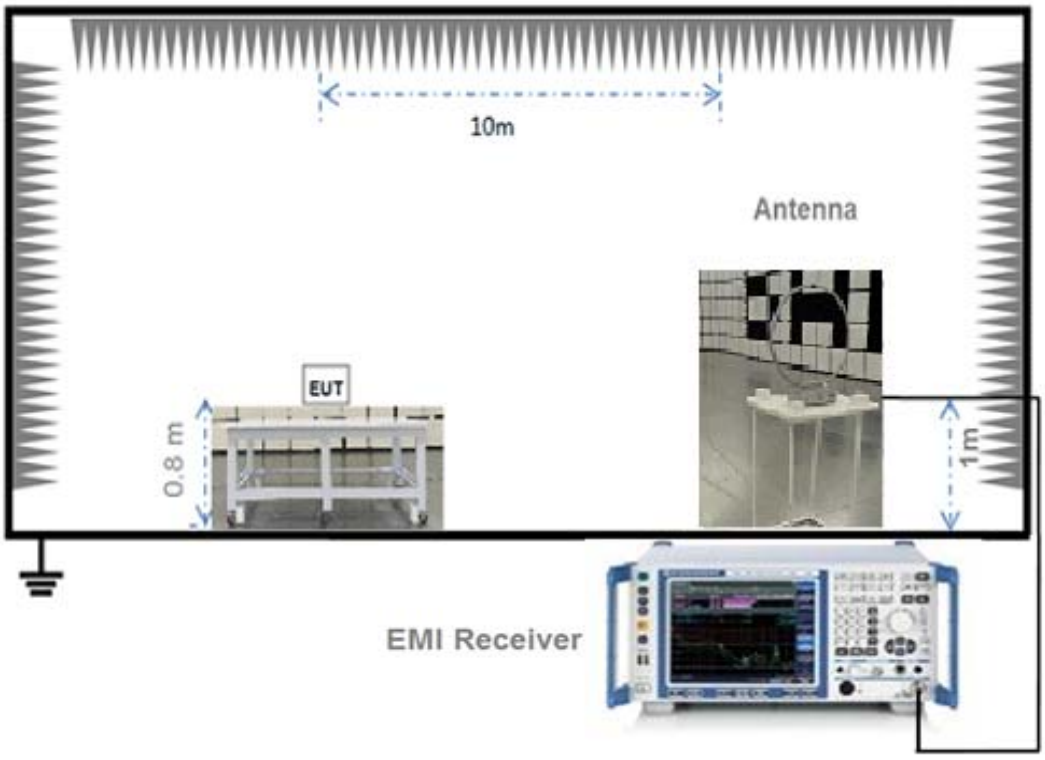
4.4 Description of Test Setup

4.4.1 For AC Power Supply Port Test



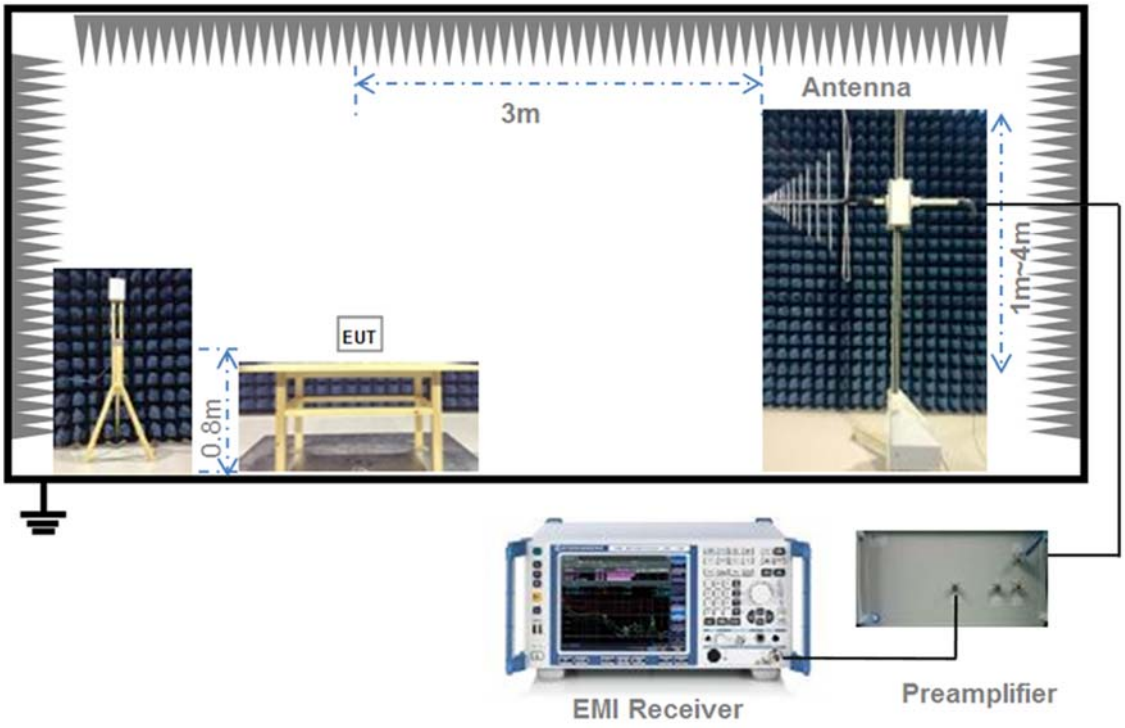
(Diagram 1)

4.4.2 For Radiated Test (Below 30 MHz)



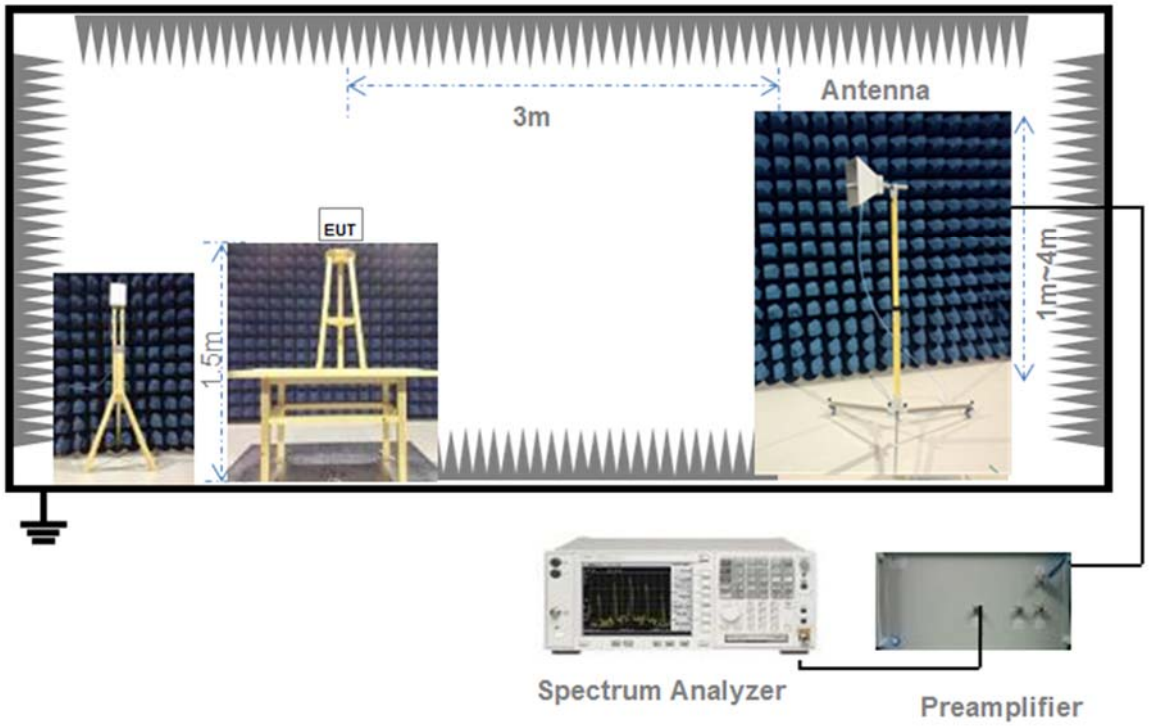
(Diagram 2)

4.4.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 3)

4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 4)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203 & 15.247(b); RSS-Gen 6.8

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Conducted Emission

5.2.1 Limit

FCC §15.207; RSS-Gen 8.8

For 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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.2.2 Test Setup

See section 4.4.1 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.
Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 20 dB Bandwidth

5.3.1 Limit

FCC §15.231; RSS-Gen 6.7

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3.2 Test Setup

See section 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = two times and five times the OBW

RBW = 1% to 5% of the OBW

VBW ≥ three times RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Field Strength of Fundamental Emissions and Radiated Emissions

5.4.1 Limit

FCC §15.231 & §15.209 RSS-210 8.9

According to FCC section 15.231(b), In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	[1]1250 to 3750	125 to 375
174-260	3750	375
260-470	[1]3750 to 12500	375 to 1250
Above 470	12500	1250
[1]Linear interpolations.		

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)
0.009 - 0.490	2400/F(kHz)
0.490 - 1.705	24000/F(kHz)
1.705 - 30.0	30
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Note:

1. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

2. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.4.2 Test Setup

See section 4.4.2 to 4.4.4 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.4.4 Test Result

Please refer to ANNEX A.4 & A.5.

5.5 Transmitting Time

5.5.1 Limit

FCC §15.231
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

5.5.2 Test Setup

See section 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The EUT transmitter was activated, the spectrum analyzer single sweep was triggered while a command on the EUT was activated and plots were captured

5.5.4 Test Result

Please refer to ANNEX A.6.

ANNEX A TEST RESULT

A.1 Conducted Emission

Note: Not applicable.

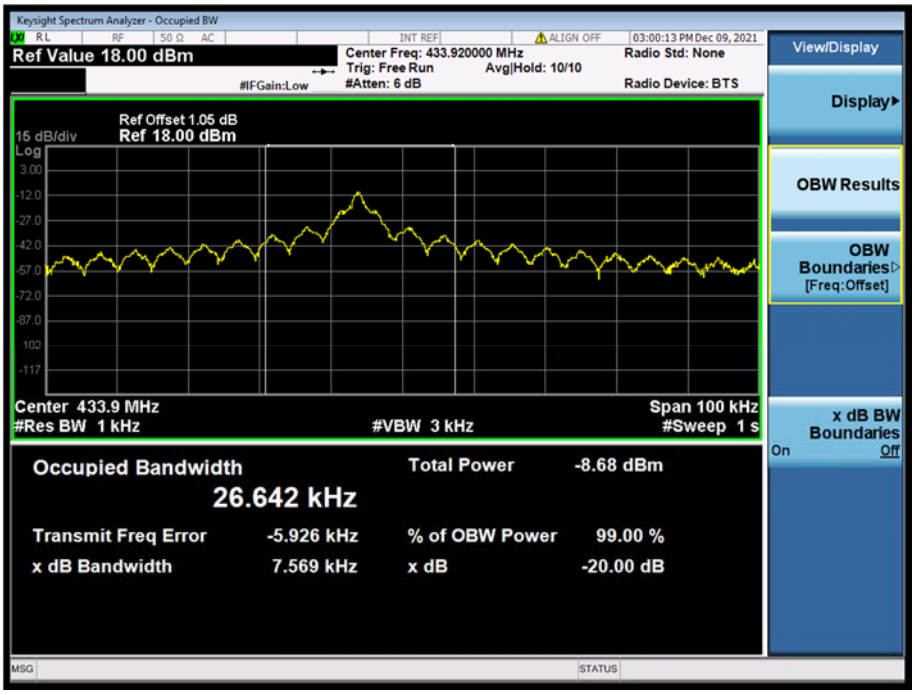
A.2 20 dB Bandwidth

Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Verdict
433.92	26.642	1084.8	Pass

Test plots

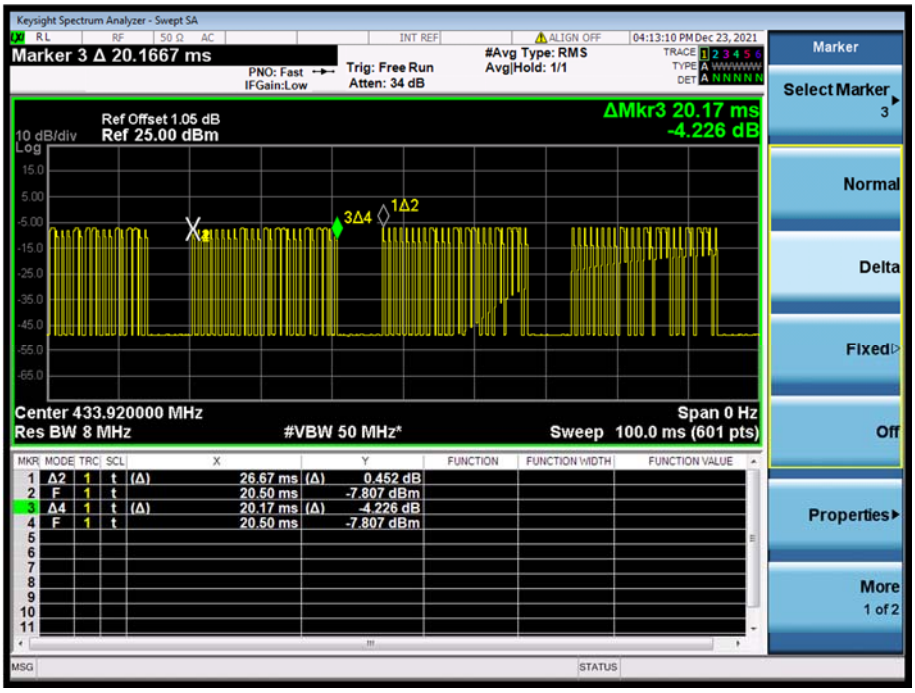
20 dB Bandwidth

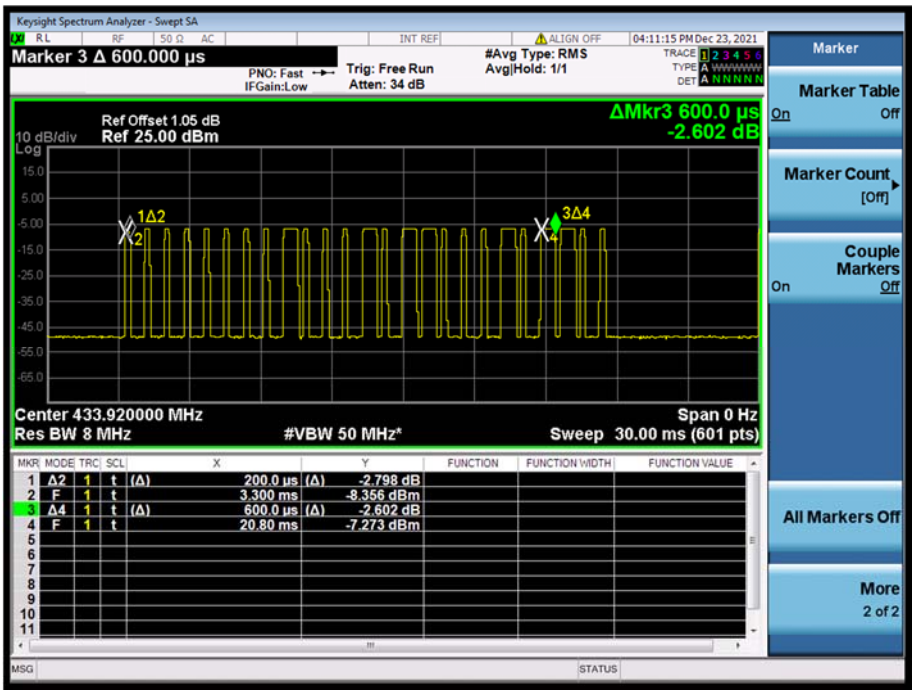


A.3 Duty cycle

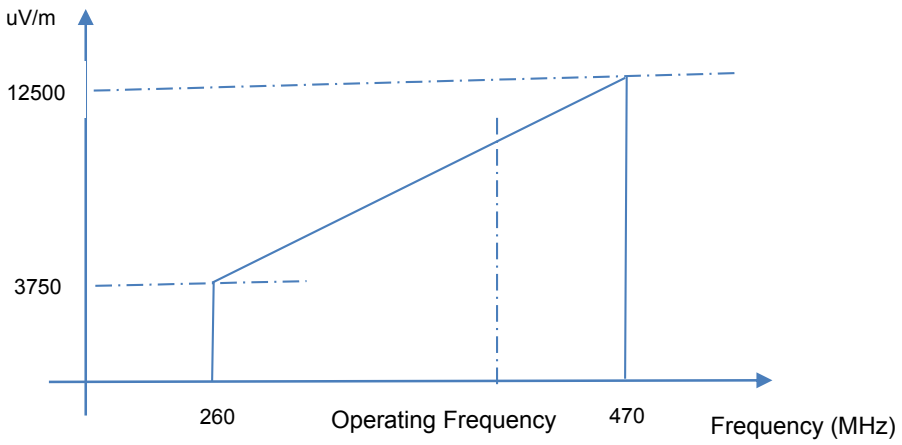
Test Data and Plot

Data Transmissions	
Duty cycle correction factor	20*log(0.29246)=-10.68 dB





A.4 Field Strength of Fundamental Emissions



The Field Strength of Fundamental Emissions (Operating Frequency) is:
3750 uV/m = 20*log (3750) dBuV/m = 71.48 dBuV/m

12500 uV/m = 20*log (12500) dBuV/m = 81.94 dBuV/m

Test Data

Field Strength of Fundamental Emissions and Field strength of spurious emissions Value					
Operating Frequency (MHz)	Field Strength (dBuV/m)	Detector	Limit @3m (dBuV/m)	Margin (dB)	Antenna
433.9	63.47	PEAK	100.8	37.33	Vertical
	70.95	PEAK	100.8	29.85	Horizontal
	52.79	AVERAGE	80.8	28.01	Vertical
	60.27	AVERAGE	80.8	20.53	Horizontal
900	29.48	PEAK	80.8	51.32	Vertical
	28.17	PEAK	80.8	52.63	Horizontal
	18.80	AVERAGE	60.8	42.00	Vertical
	17.49	AVERAGE	60.8	43.31	Horizontal

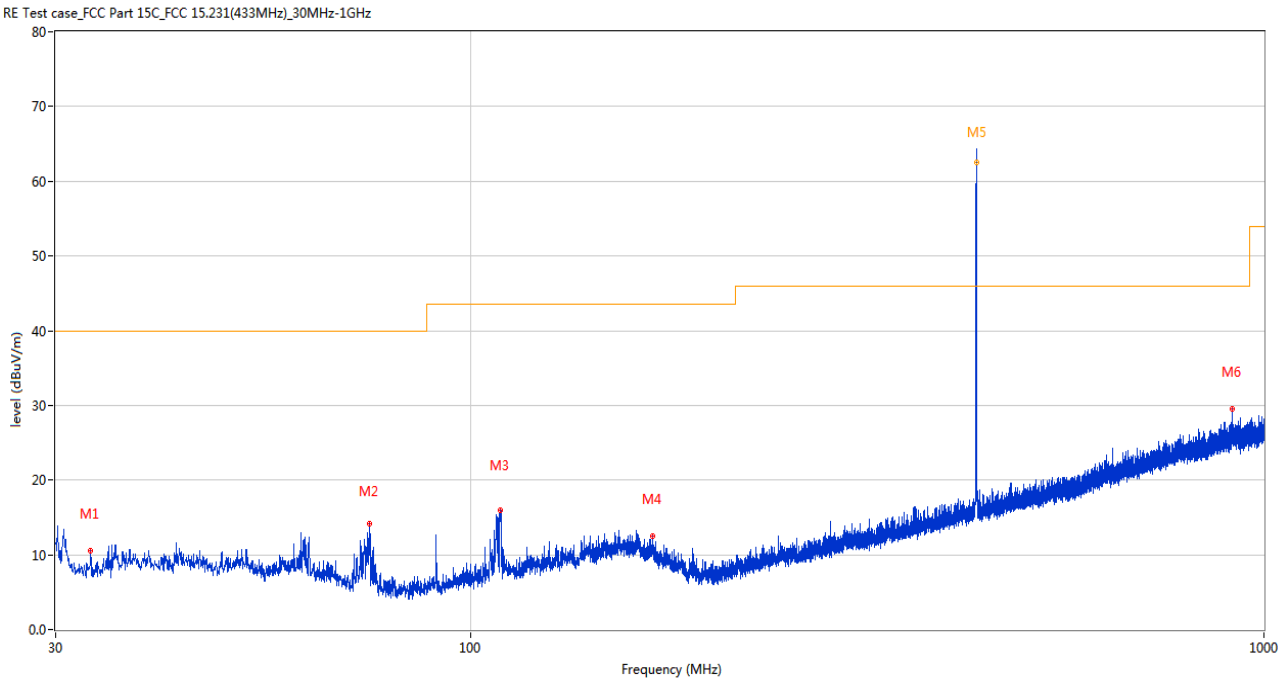
A.5 Radiated Emissions

Note [1]: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note [2]: The verdict please refer to the A.3 field strength of fundamental emissions and field strength of spurious emissions value.

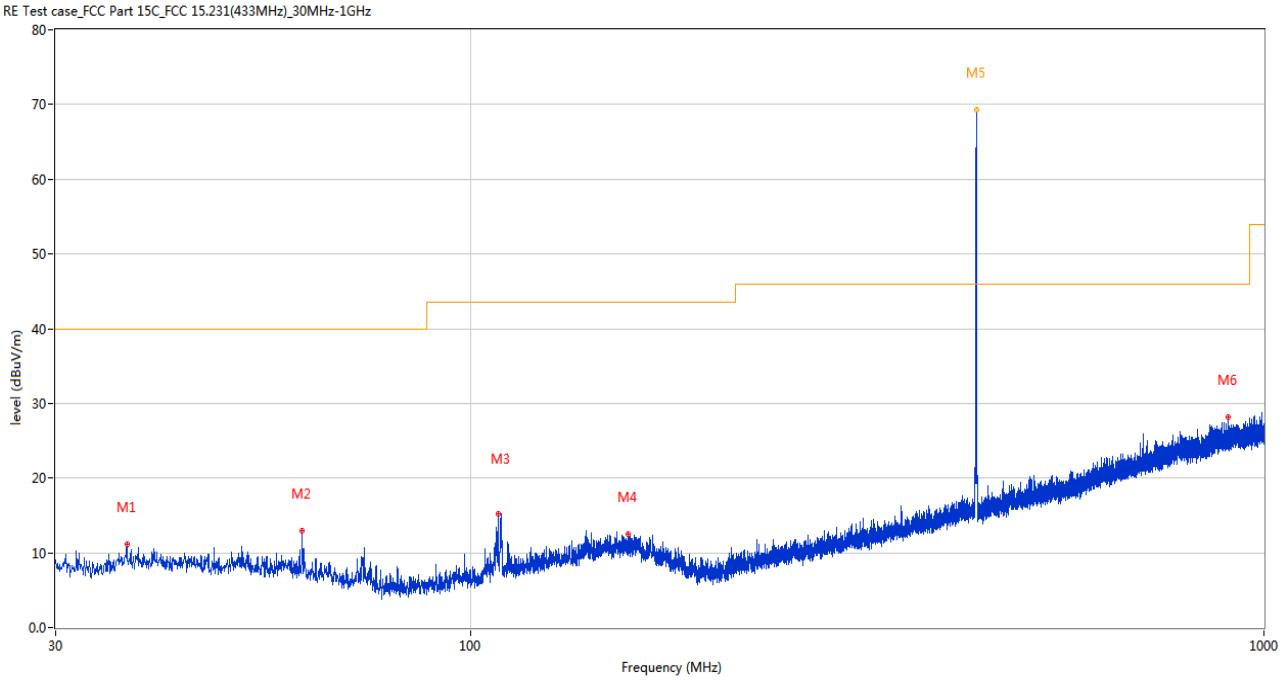
Test Data and Plots (30 MHz ~ 10th Harmonic)

30 MHz to 1 GHz, ANT V



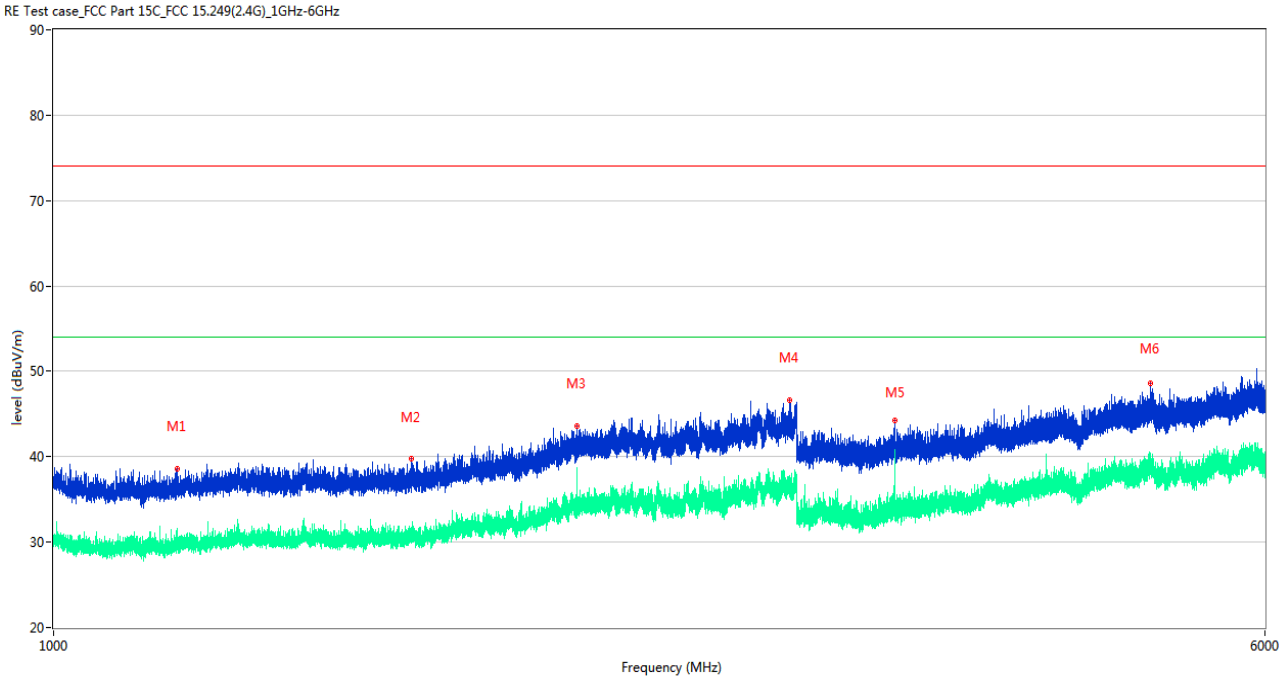
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	33.201	10.56	-26.92	40.0	-29.44	Peak	81.00	100	Vertical	Pass
2	74.523	14.20	-29.84	40.0	-25.80	Peak	360.00	200	Vertical	Pass
3	109.055	15.98	-28.46	43.5	-27.52	Peak	360.00	200	Vertical	Pass
4	169.486	12.52	-25.51	43.5	-30.98	Peak	87.00	100	Vertical	Pass
5	433.918	63.47	-20.33	100.8	-37.33	Peak	194.00	200	Vertical	Pass
5*	433.918	62.47	-20.33	80.8	-18.33	QP	194.00	200	Vertical	Pass
6	911.487	29.48	-11.01	46.0	-16.52	Peak	360.00	200	Vertical	Pass

30 MHz to 1 GHz, ANT H



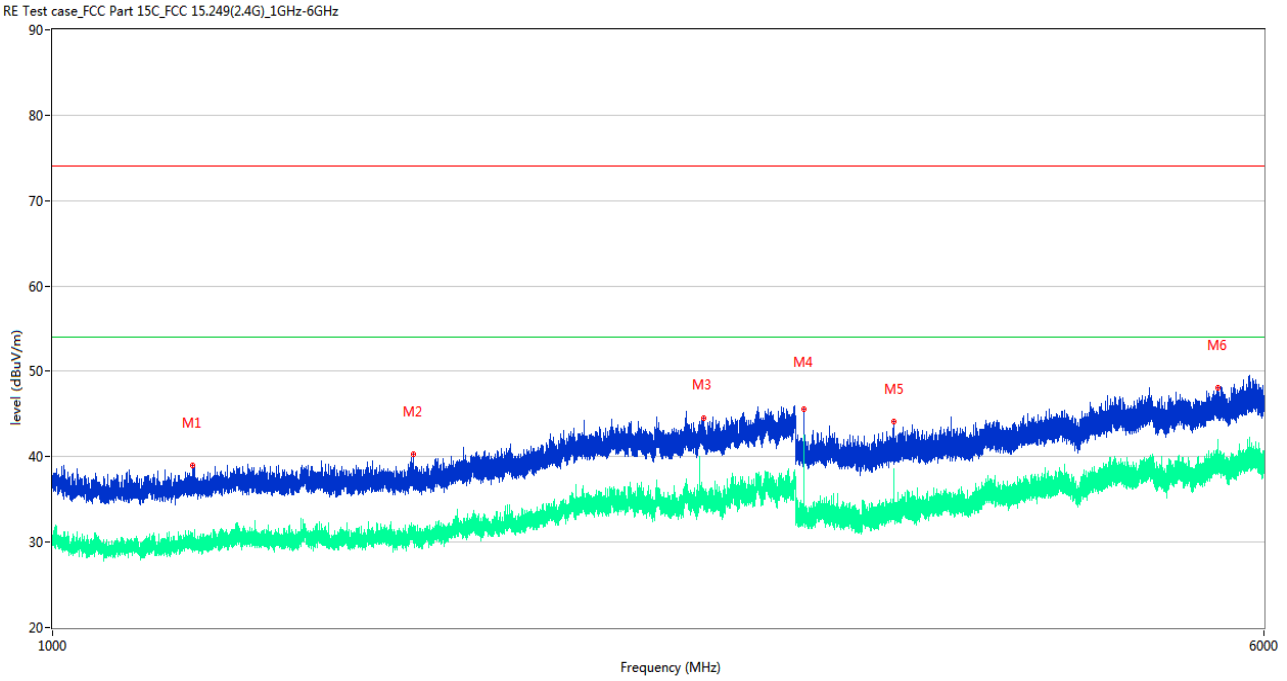
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	36.887	11.12	-26.49	40.0	-28.88	Peak	114.00	200	Horizontal	Pass
2	61.380	12.92	-27.36	40.0	-27.08	Peak	166.00	100	Horizontal	Pass
3	108.327	15.28	-28.54	43.5	-28.22	Peak	0.00	200	Horizontal	Pass
4	157.943	12.58	-24.65	43.5	-30.92	Peak	0.00	200	Horizontal	Pass
5	433.918	70.95	-20.33	100.8	-29.85	Peak	64.00	101	Horizontal	Pass
5*	433.918	69.32	-20.33	80.8	-11.48	QP	64.00	101	Horizontal	Pass
6	902.224	28.17	-11.38	46.0	-17.83	Peak	90.00	100	Horizontal	Pass

1 GHz to 6 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1200.200	38.60	-11.74	74.0	-35.40	Peak	278.00	150	Vertical	Pass
1**	1200.200	28.97	-11.74	54.0	-25.03	AV	278.00	150	Vertical	Pass
2	1698.500	39.73	-11.23	74.0	-34.27	Peak	253.00	150	Vertical	Pass
2**	1698.500	31.18	-11.23	54.0	-22.82	AV	253.00	150	Vertical	Pass
3	2169.500	43.59	-7.53	74.0	-30.41	Peak	81.00	150	Vertical	Pass
3**	2169.500	37.47	-7.53	54.0	-16.53	AV	81.00	150	Vertical	Pass
4	2970.200	46.67	-3.95	74.0	-27.33	Peak	339.00	150	Vertical	Pass
4**	2970.200	37.75	-3.95	54.0	-16.25	AV	339.00	150	Vertical	Pass
5	3471.150	44.21	-6.23	74.0	-29.79	Peak	151.00	150	Vertical	Pass
5**	3471.150	39.84	-6.23	54.0	-14.16	AV	151.00	150	Vertical	Pass
6	5064.000	48.67	-0.44	74.0	-25.33	Peak	360.00	150	Vertical	Pass
6**	5064.000	38.21	-0.44	54.0	-15.79	AV	360.00	150	Vertical	Pass

1 GHz to 6 GHz, ANT H

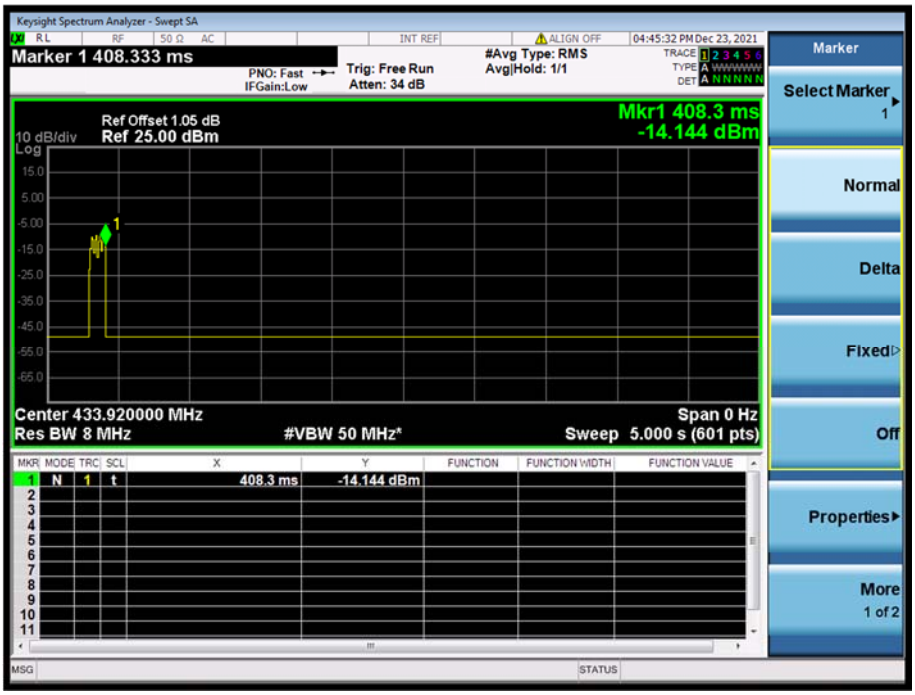


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1229.500	38.97	-11.39	74.0	-35.03	Peak	289.00	150	Horizontal	Pass
1**	1229.500	28.50	-11.39	54.0	-25.50	AV	289.00	150	Horizontal	Pass
2	1706.200	40.27	-11.31	74.0	-33.73	Peak	289.00	150	Horizontal	Pass
2**	1706.200	30.65	-11.31	54.0	-23.35	AV	289.00	150	Horizontal	Pass
3	2619.500	44.47	-4.47	74.0	-29.53	Peak	326.00	150	Horizontal	Pass
3**	2619.500	35.17	-4.47	54.0	-18.83	AV	326.00	150	Horizontal	Pass
4	3037.500	45.53	-6.86	74.0	-28.47	Peak	80.00	150	Horizontal	Pass
4**	3037.500	41.80	-6.86	54.0	-12.20	AV	80.00	150	Horizontal	Pass
5	3471.600	44.16	-6.23	74.0	-29.84	Peak	105.00	150	Horizontal	Pass
5**	3471.600	36.96	-6.23	54.0	-17.04	AV	105.00	150	Horizontal	Pass
6	5602.950	48.07	-0.08	74.0	-25.93	Peak	0.00	150	Horizontal	Pass
6**	5602.950	39.36	-0.08	54.0	-14.64	AV	0.00	150	Horizontal	Pass

A.6 Transmitter Time

Test Data and Plot

The active time is less than 1 seconds



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ21A0210-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ21A0210-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ21A0210-AI.PDF”.

--END OF REPORT--