TEST REPORT

Product Name	:	RGBW STRING LIGHT
Brand Mark	:	NO
Model No.	:	RE-RGBWA
Extension model	:	RE-RGBWB, RE-SOL, RE-DM
FCC ID	:	2A3K6JCD2021RE
Report Number	:	BLA-EMC-202109-A9601
Date of Sample Receipt	:	2021/9/29
Date of Test	:	2021/9/29 to 2021/10/27
Date of Issue	:	2021/10/27
Test Standard	:	47 CFR Part 15, Subpart C 15.231
Test Result	:	Pass

Prepared for:

SHEN ZHEN JING CHANG DA NONFERROUS METALS CO., LTD
No.29-4, Lian He Road, Yuan Shan Street, Long Gang District 518115

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.
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Compiled by: Jozu
Approved by: Blue Zhong

Review by: Sweets
Date: 2021/10/27

BlueAsia of Technical Services(Shenzhen) Co., Ltd. BLA

REPORT REVISE RECORD

Version No.	Date	Description
00	2021/10/27	Original
01	2021/11/4	Product name changed from RGB REMOTE CONTROLLER to RGBW STRING LIGHT

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1 TEST SUMMARY

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.231 (b)	Pass
Spurious emissions	15.231 (b)/15.209	Pass
20dB Bandwidth	15.231(c)	Pass
Dwell time	15.231 (a)(2)	Pass
Conducted Emission	15.207	N/A

Remarks:

N/A: The EUT not applicable of the test item.

Pass: The EUT complies with the essential requirements in the standard.

Test according to ANSI C63.4:2014 and ANSI C63.10:2013.

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2 GENERAL INFORMATION

Applicant	SHEN ZHEN JING CHANG DA NONFERROUS METALS CO., LTD
Address	No.29-4, Lian He Road, Yuan Shan Street, Long Gang District 518115
Manufacturer	KELLY LIGHTING VIET NAM CO.,LTD
Address	Dao Khe Town,Trung Hung Commune,Yen My District,Hung Yen Province,Viet Nam
Factory	SHEN ZHEN JING CHANG DA NONFERROUS METALS CO., LTD
Address	No.29-4, Lian He Road, Yuan Shan Street, Long Gang District 518115
Product Name	RGBW STRING LIGHT
Test Model No.	RE-RGBWA, RE-RGBWB, RE-SOL, RE-DM

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	N/A
Software Version	N/A
Operation Frequency:	433.92MHz
Channel numbers:	1
Modulation type:	ASK
Antenna Type:	External antenna
Antenna gain:	0dBi(Provided by customer)
Power supply:	DC 3V

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4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	DC3V

5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
Normal Working	Operate according to the user manual
Remark:Only the data of the worst mode would be recorded in this report.	

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30Mz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB

Parameter	Expanded Uncertainty (Confidence of 95%)
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %
Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Radiated Emission (1GHz ~ 18GHz)	±4.44 dB

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7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
--	--	--	--	--

Note:
"--" means no any support device during testing.

8 LABORATORY LOCATION

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co., Ltd.
Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673
No tests were sub-contracted.

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9 TEST INSTRUMENTS LIST

Test Equipment Of Radiated Emissions					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2021/10/12	2022/10/11
Receiver	R&S	ESR7	101199	2021/10/12	2022/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25
Amplifier	SKET	PA-000318G-45	N/A	2021/10/12	2022/10/11
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Field Strength of the Fundamental Signal (15.231(b))					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Chamber	SKET	966	N/A	2020/11/10	2023/11/9
Spectrum	R&S	FSP40	100817	2021/10/12	2022/10/11
Receiver	R&S	ESR7	101199	2021/10/12	2022/10/11
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	2020/9/26	2022/9/25
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	2020/9/26	2022/9/25

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Amplifier	SKET	PA-000318G-45	N/A	2021/10/16	2022/10/15
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2020/9/26	2022/9/25
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Dwell Time (15.231(a))					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Spectrum	R&S	FSP40	100817	2021/10/12	2022/10/11
Spectrum	Agilent	N9020A	MY49100060	2021/10/12	2022/10/11
Signal Generator	Agilent	N5182A	MY49060650	2021/10/12	2022/10/11
Signal Generator	Agilent	E8257D	MY44320250	2021/10/12	2022/10/11

Test Equipment Of 20dB Bandwidth					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal.Date**	**Cal.Due**
Spectrum	R&S	FSP40	100817	2021/10/12	2022/10/11
Spectrum	Agilent	N9020A	MY49100060	2021/10/12	2022/10/11
Signal Generator	Agilent	N5182A	MY49060650	2021/10/12	2022/10/11
Signal Generator	Agilent	E8257D	MY44320250	2021/10/12	2022/10/11

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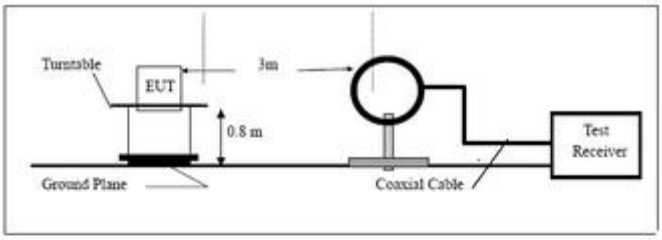
10 RADIATED EMISSIONS

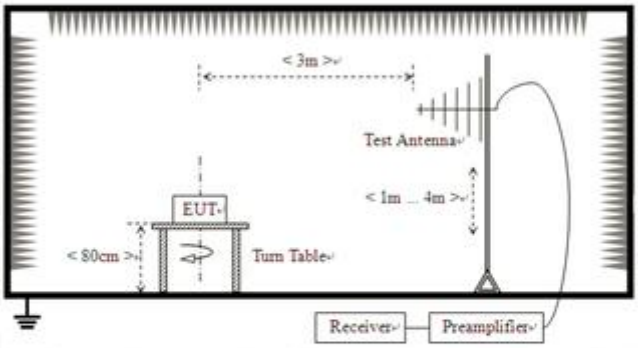
Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 6.4&6.5&6.6
Test Mode (Pre-Scan)	Normal Working
Test Mode (Final Test)	Normal Working
Tester	Jozu
Temperature	25℃
Humidity	60%

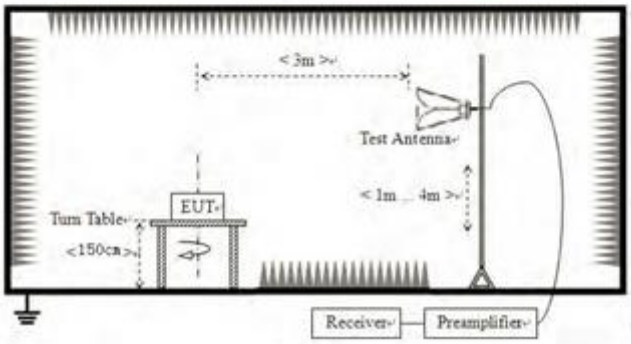
10.1 LIMITS

<table>
<tr><td rowspan="2">Limit:
(Field strength of the fundamental signal)</td><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">433.92 MHz</td><td>80.8</td><td>Average Value</td></tr>
<tr><td></td><td>100.8</td><td>Peak Value</td></tr>
<tr><td rowspan="9">Limit:
(Spurious Emissions)</td><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
<tr><td colspan="3">Or The maximum permitted unwanted emission level is 20 dB below themaximum permitted fundamental level whichever limit permits higher field strength.</td></tr>
<tr><td colspan="3">a. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and thenthe antenna was tuned to heights from 1 meter to 4 meters and the rotatabletable was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and SpecifiedBandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limitspecified, then testing could be stopped and the peak values of the EUT wouldbe reported. Otherwise the emissions that did not have 10dB margin would bere-tested one by one using peak, quasi-peak or average method as specified andthen reported in a data sheet.</td></tr>
</table>

10.2 BLOCK DIAGRAM OF TEST SETUP







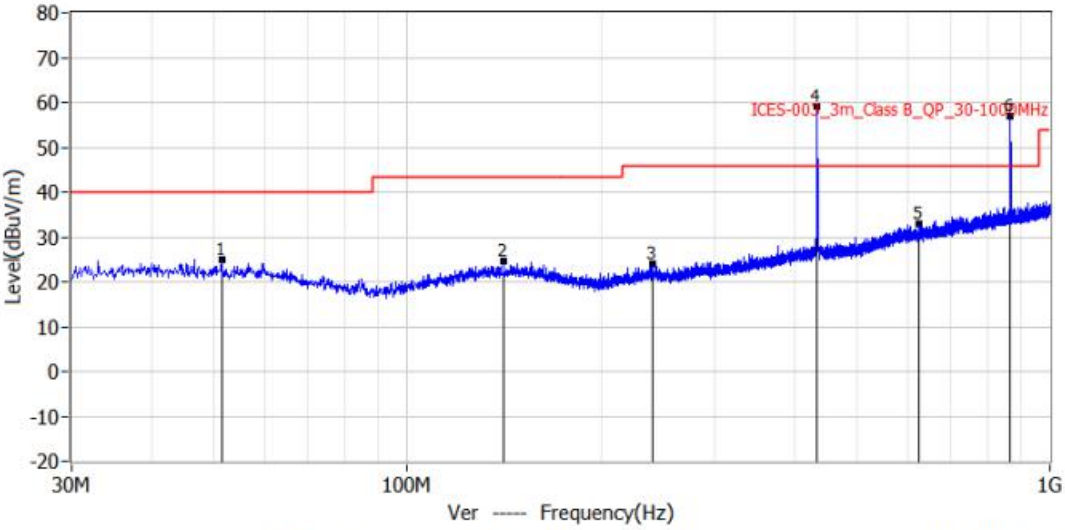
10.3 PROCEDURE

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

10.1 TEST DATA

30M-1G Vertical

Test Lab: BlueAsia EMC Lab（RE #1）	Project: 202109-A96
EUT: RGB REMOTE CONTROLLER	Test Engineer: charlie
M/N: RE-RGBWA	Temperature:
S/N:	Humidity:
Test Mode: TX mode	Test Voltage:
Note:	Test Data: 2021-10-22 18:16:21

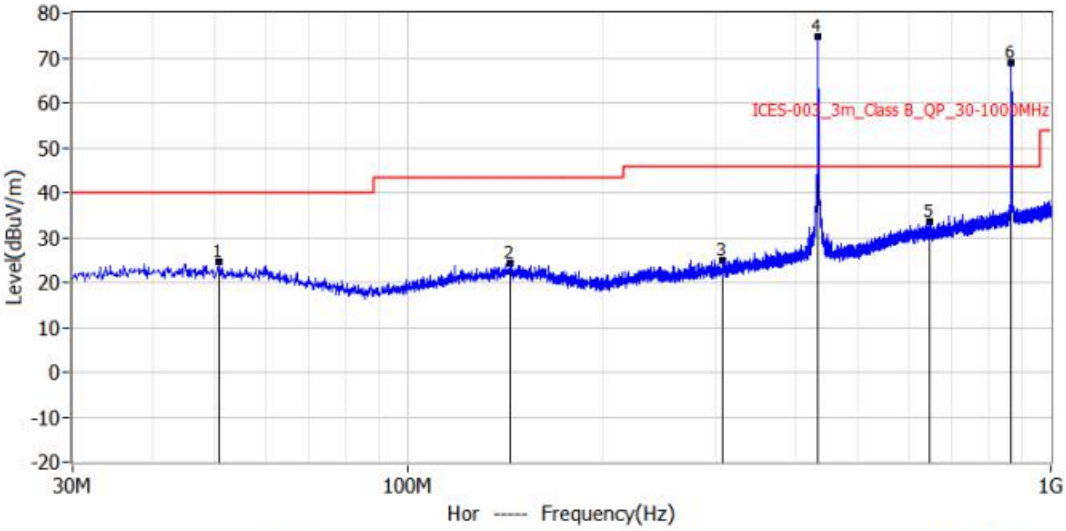


No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	51.340MHz	40.0	24.9	-15.1	1.1	23.8	QP	Ver	100.0	0.0
2*	141.065MHz	43.5	24.6	-18.9	0.9	23.7	QP	Ver	100.0	313.0
3*	240.490MHz	46.0	23.9	-22.1	1.1	22.8	QP	Ver	100.0	250.0
!4*	434.126MHz	46.0	59.2	13.2	31.5	27.7	QP	Ver	100.0	35.0
5*	624.610MHz	46.0	32.8	-13.2	1.4	31.4	QP	Ver	100.0	113.0
!6*	868.323MHz	46.0	56.8	10.8	22.1	34.7	QP	Ver	100.0	344.0

No.	Frequency (MHz)	Peak Result (dBuV/m)	Duty cycle factor	Average Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
1	868.323	56.8	-9.09	47.71	60.8	-13.09	Pass

30M-1G Horizontal

Test Lab: BlueAsia EMC Lab（RE #1）	Project: 202109-A96
EUT: RGB REMOTE CONTROLLER	Test Engineer: charlie
M/N: RE-RGBWA	Temperature:
S/N:	Humidity:
Test Mode: TX mode	Test Voltage:
Note:	Test Data: 2021-10-22 18:15:55



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	50.734MHz	40.0	24.7	-15.3	0.9	23.8	QP	Hor	100.0	235.0
2*	144.218MHz	43.5	24.3	-19.2	0.7	23.6	QP	Hor	100.0	208.0
3*	307.663MHz	46.0	25.0	-21.0	0.7	24.3	QP	Hor	100.0	19.0
!4*	434.126MHz	46.0	74.8	28.8	47.1	27.7	QP	Hor	100.0	218.0
5*	648.011MHz	46.0	33.4	-12.6	1.8	31.6	QP	Hor	100.0	0.0
!6*	868.201MHz	46.0	68.8	22.8	34.1	34.7	QP	Hor	100.0	255.0

No.	Frequency (MHz)	Peak Result (dBuV/m)	Duty cycle factor	Average Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
1	868.201	68.8	-9.09	59.71	60.8	-1.09	Pass

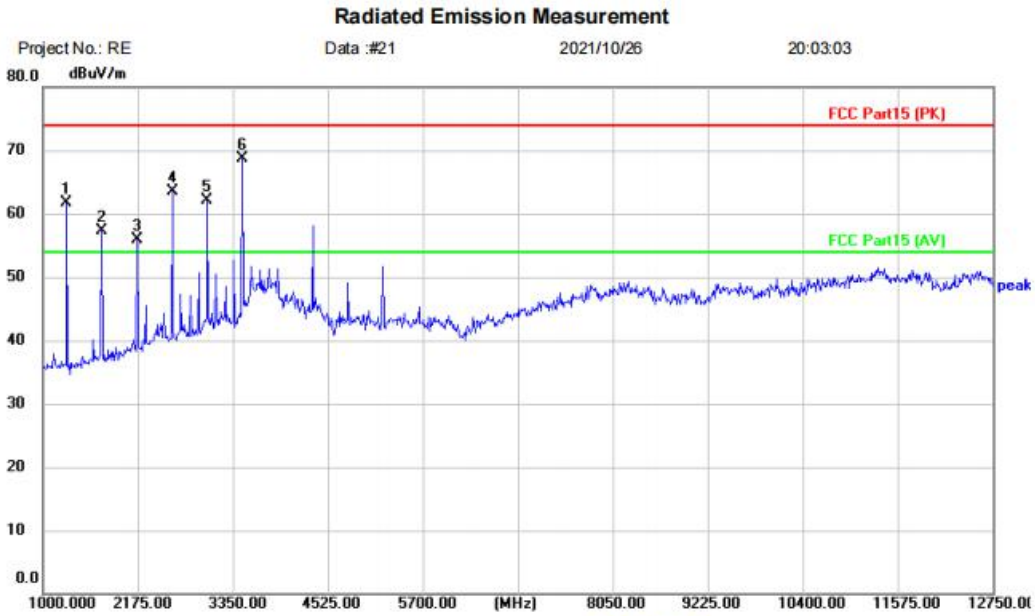
Remark:

1.Final Level =Receiver Read level +Correct factor

2.Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor

3.Average value = Peak value + Duty Cycle Factor

Above 1GHz Horizontal



Site
Limit: FCC Part15 (PK)
EUT: RGB REMOTE CONTROLLER
M/N: RE-RGBWA
Mode: TX
Note:

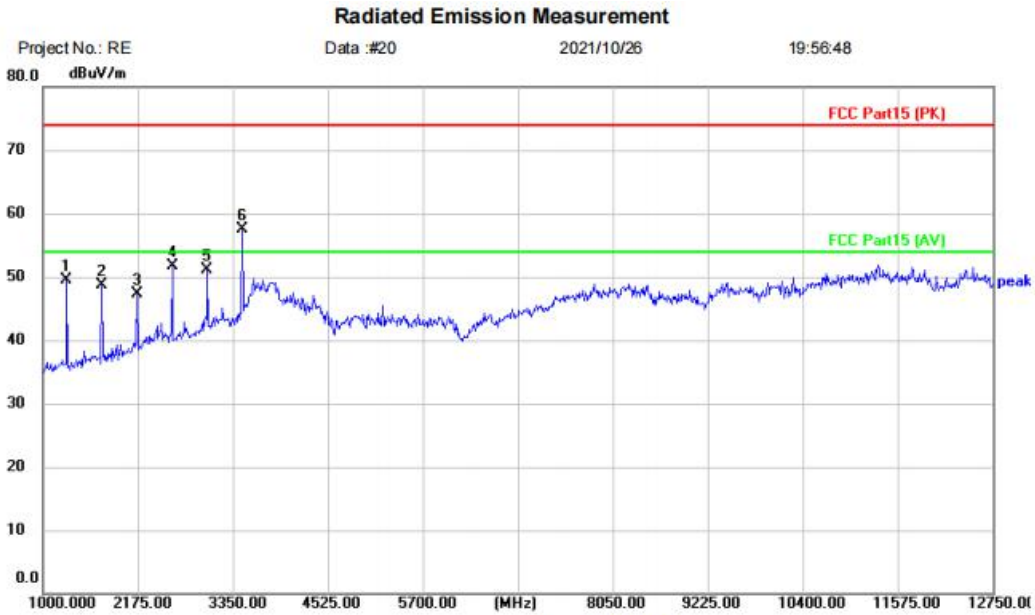
Polarization: ***Horizontal***
Power:

Temperature: (C)
Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		1293.750	69.03	-7.40	61.63	74.00	-12.37	peak	
2		1728.500	62.87	-5.57	57.30	74.00	-16.70	peak	
3		2163.250	59.29	-3.37	55.92	74.00	-18.08	peak	
4		2598.000	64.61	-1.10	63.51	74.00	-10.49	peak	
5		3032.750	61.47	0.70	62.17	74.00	-11.83	peak	
6	*	3467.500	65.27	3.44	68.71	74.00	-5.29	peak	

No.	Frequency (MHz)	Peak Result (dBuV/m)	Duty cycle factor	Average Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
1	1293.750	61.63	-9.09	52.54	60.8	-8.26	Pass
2	1728.500	57.30	-9.09	48.21	60.8	-12.59	Pass
3	2163.250	55.92	-9.09	46.83	60.8	-13.97	Pass
4	2598.000	63.51	-9.09	54.42	60.8	-6.38	Pass
5	3032.750	62.17	-9.09	53.08	60.8	-7.72	Pass
6	3467.500	68.71	-9.09	59.62	60.8	-1.2	Pass

Vertical



Site
Polarization: *Vertical*
Temperature: (C)
Limit: FCC Part15 (PK)
Power:
Humidity: %RH
EUT: RGB REMOTE CONTROLLER
M/N: RE-RGBWA
Mode: TX
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		1293.750	56.94	-7.40	49.54	74.00	-24.46	peak	
2		1728.500	54.18	-5.57	48.61	74.00	-25.39	peak	
3		2163.250	50.68	-3.37	47.31	74.00	-26.69	peak	
4		2598.000	52.83	-1.10	51.73	74.00	-22.27	peak	
5		3032.750	50.32	0.70	51.02	74.00	-22.98	peak	
6	*	3467.500	54.11	3.44	57.55	74.00	-16.45	peak	

No.	Frequency (MHz)	Peak Result (dBuV/m)	Duty cycle factor	Average Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
1	3467.500	57.55	-9.09	48.46	60.8	-12.34	Pass

Remark:

1.Final Level =Receiver Read level +Correct factor

2.Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor

3.Average value = Peak value + Duty Cycle Factor

11 FIELD STRENGTH OF THE FUNDAMENTAL SIGNAL (15.231(B))

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 6.5
Test Mode (Pre-Scan)	Normal Working
Test Mode (Final Test)	Normal Working
Tester	Jozu
Temperature	25℃
Humidity	60%

11.1 LIMITS

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	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 1250
Above 470	12500	1250
Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

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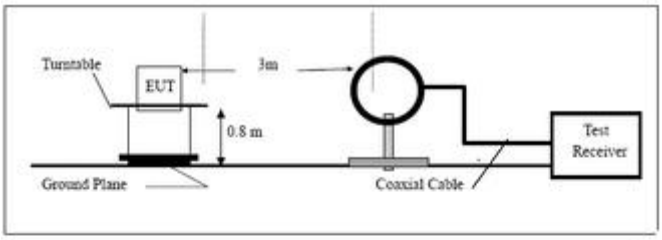
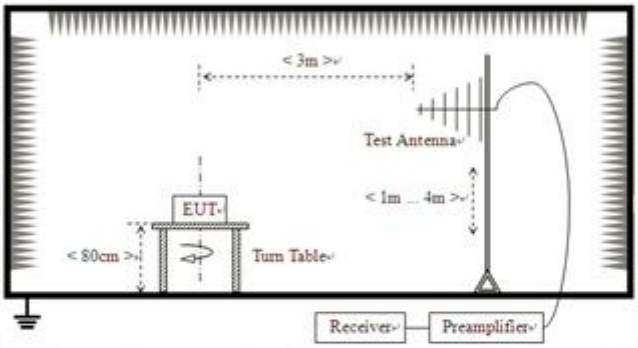
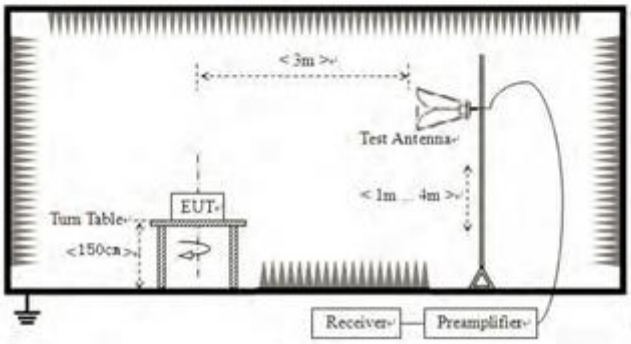
11.2 BLOCK DIAGRAM OF TEST SETUP







11.3 PROCEDURE

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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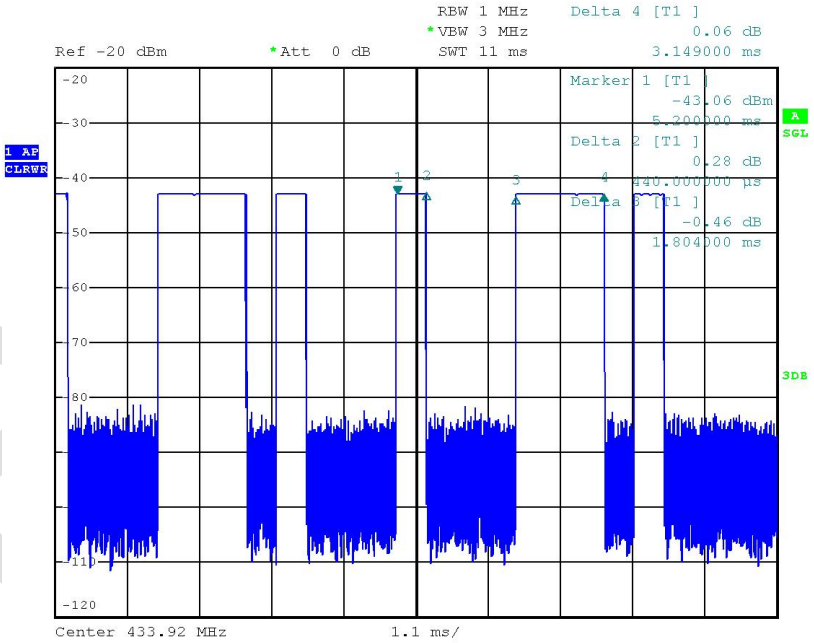
11.4 TEST DATA

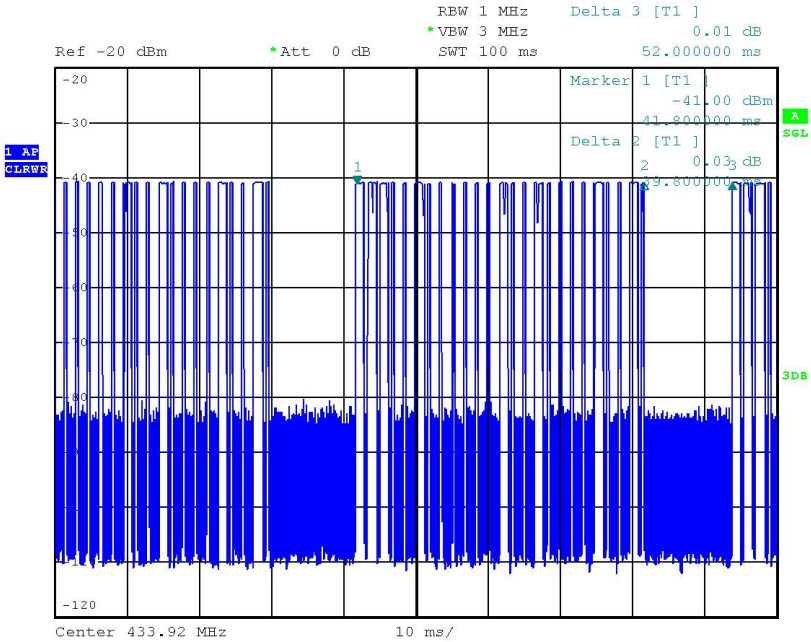
Peak value						
Frequency (MHz)	Read Level (dBuV)	Correct Facor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	59.4	27.7	87.1	100.80	-13.7	Horizontoal
433.92	43.1	27.7	70.8	100.80	-30	Vertical
Average value						
Frequency (MHz)	Peak value	Duty cycle factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	87.1	-9.09	78.01	80.80	-2.79	Horizontoal
433.92	70.8	-9.09	61.71	80.80	-19.07	Vertical

Calculate Formula:	Average value = Peak value + Duty Cycle Factor
	Duty cycle factor = 20log(Duty cycle)
	Duty cycle = on time/ period
Test data:	T on time =0.44ms*17+1.349ms*8=18.272(ms)
	T period =52.0(ms)
	Duty cycle =35.14%
	Duty cycle factor = 20log(Duty cycle) = -9.09



jjjj

Date: 22.OCT.2021 19:49:49

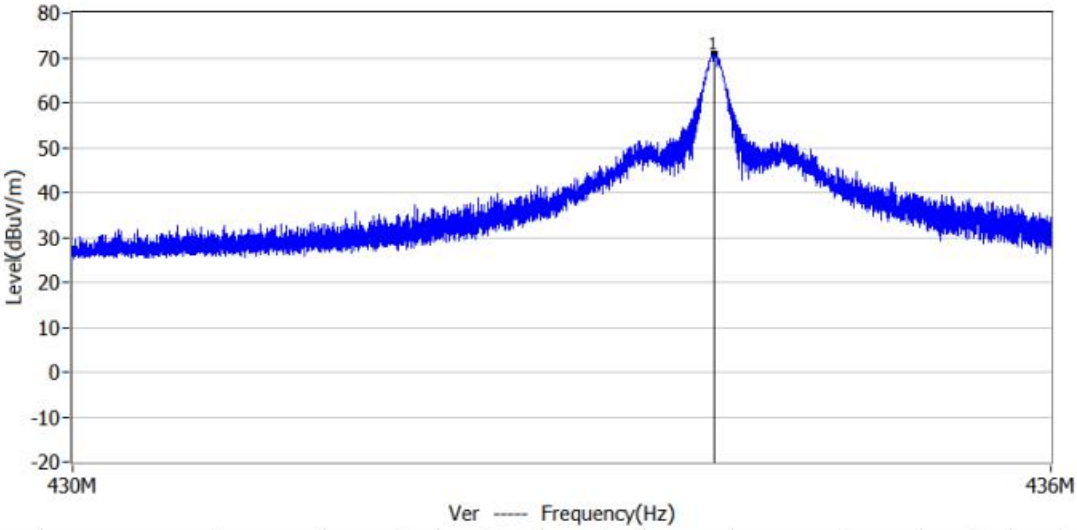


jjjj

Date: 22.OCT.2021 19:47:06

Vertical

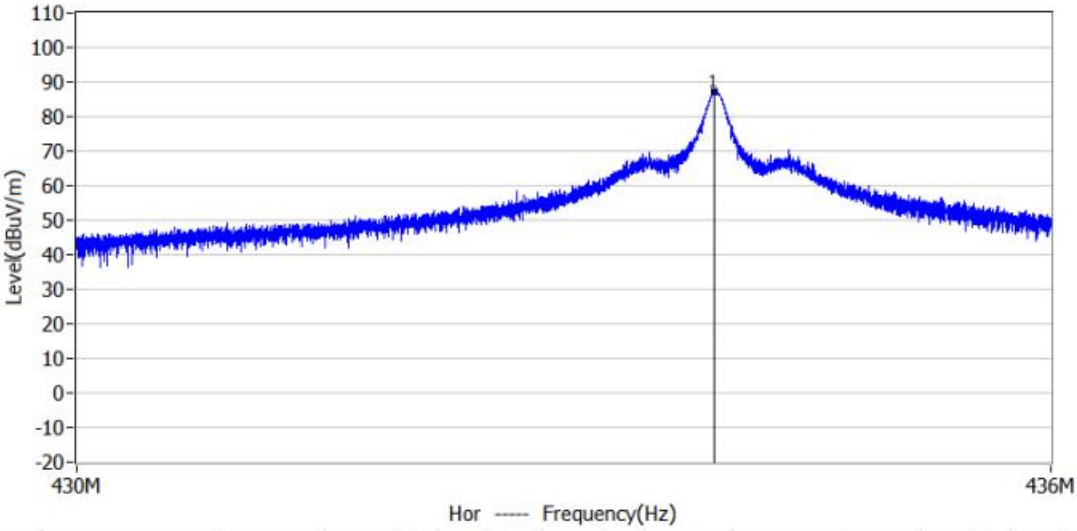
Test Lab: BlueAsia EMC Lab（RE #1）	Project: 202109-A96
EUT: RGB REMOTE CONTROLLER	Test Engineer: charlie
M/N: RE-RGBWA	Temperature:
S/N:	Humidity:
Test Mode: Working mode	Test Voltage:
Note:	Test Data: 2021-10-25 17:42:35



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	433.926MHz	NaN	70.8	NaN	43.1	27.7	PK	Ver	100.0	238.0

Horizontoal

Test Lab: BlueAsia EMC Lab（RE #1）	Project: 202109-A96
EUT: RGB REMOTE CONTROLLER	Test Engineer: charlie
M/N: RE-RGBWA	Temperature:
S/N:	Humidity:
Test Mode: Working mode	Test Voltage:
Note:	Test Data: 2021-10-25 17:40:09



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	433.921MHz	NaN	87.1	NaN	59.4	27.7	PK	Hor	100.0	130.0

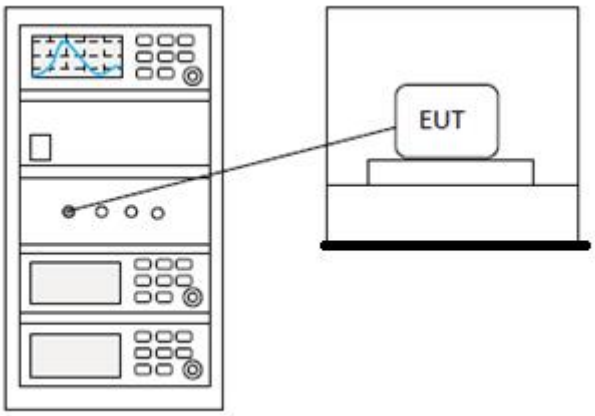
12 DWELL TIME (15.231(A))

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 7.8.4
Test Mode (Pre-Scan)	Normal Working
Test Mode (Final Test)	Normal Working
Tester	Jozu
Temperature	25℃
Humidity	60%

12.1 LIMITS

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically actived transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

12.2 BLOCK DIAGRAM OF TEST SETUP



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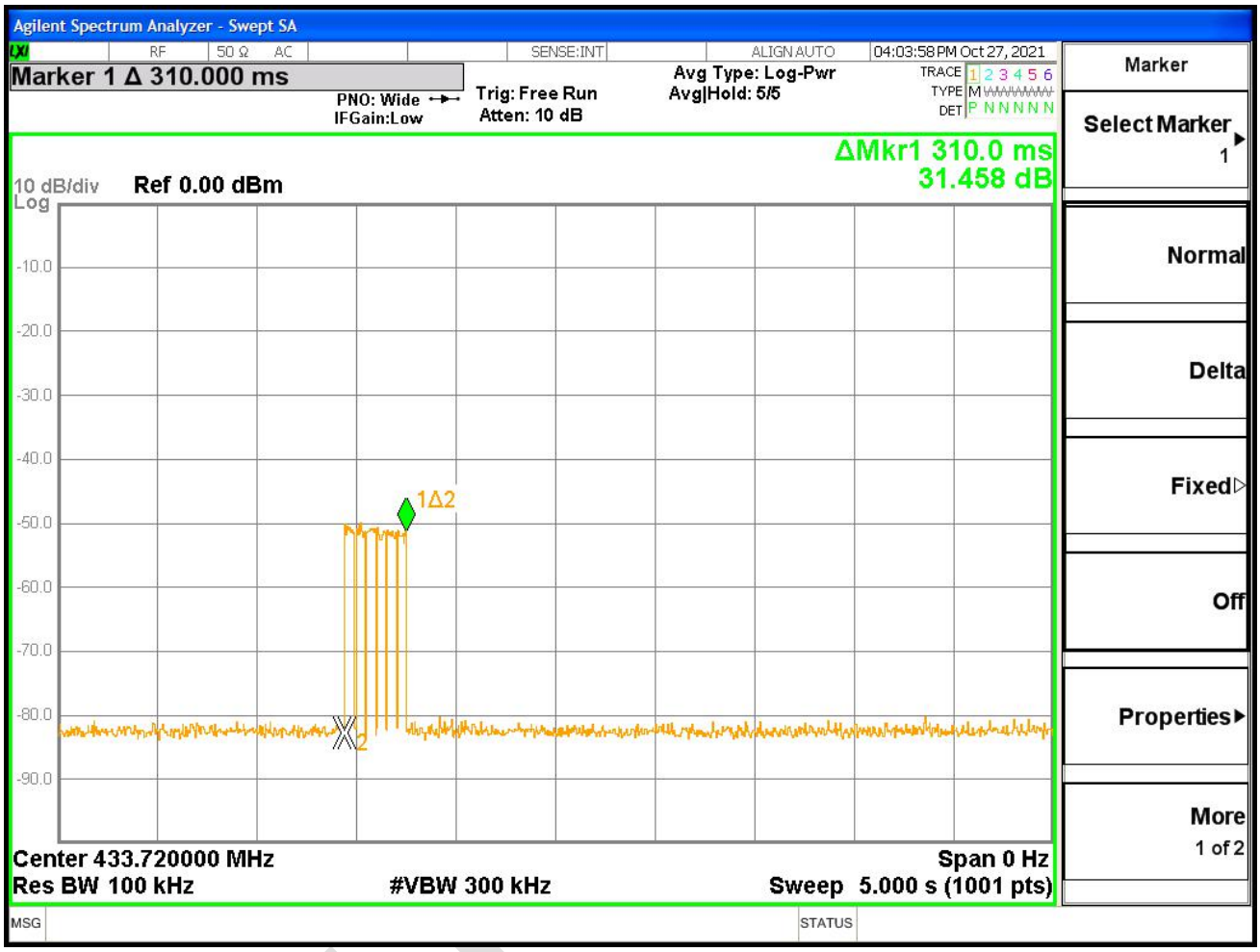
12.3 TEST DATA



Measurement Data

Duration time (second)	Limit (second)	Result
0.31	<5.0	Pass

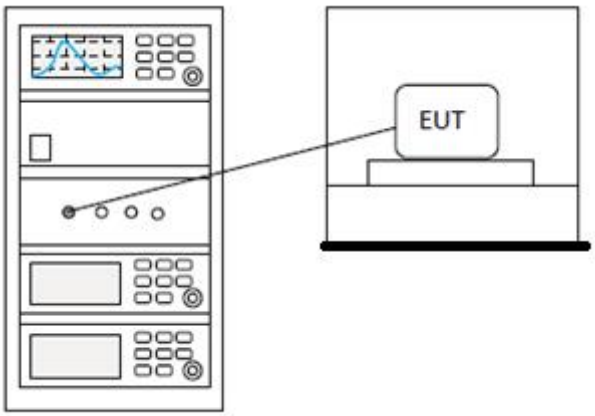
13 20DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 6.9
Test Mode (Pre-Scan)	Normal Working
Test Mode (Final Test)	Normal Working
Tester	Jozu
Temperature	25℃
Humidity	60%

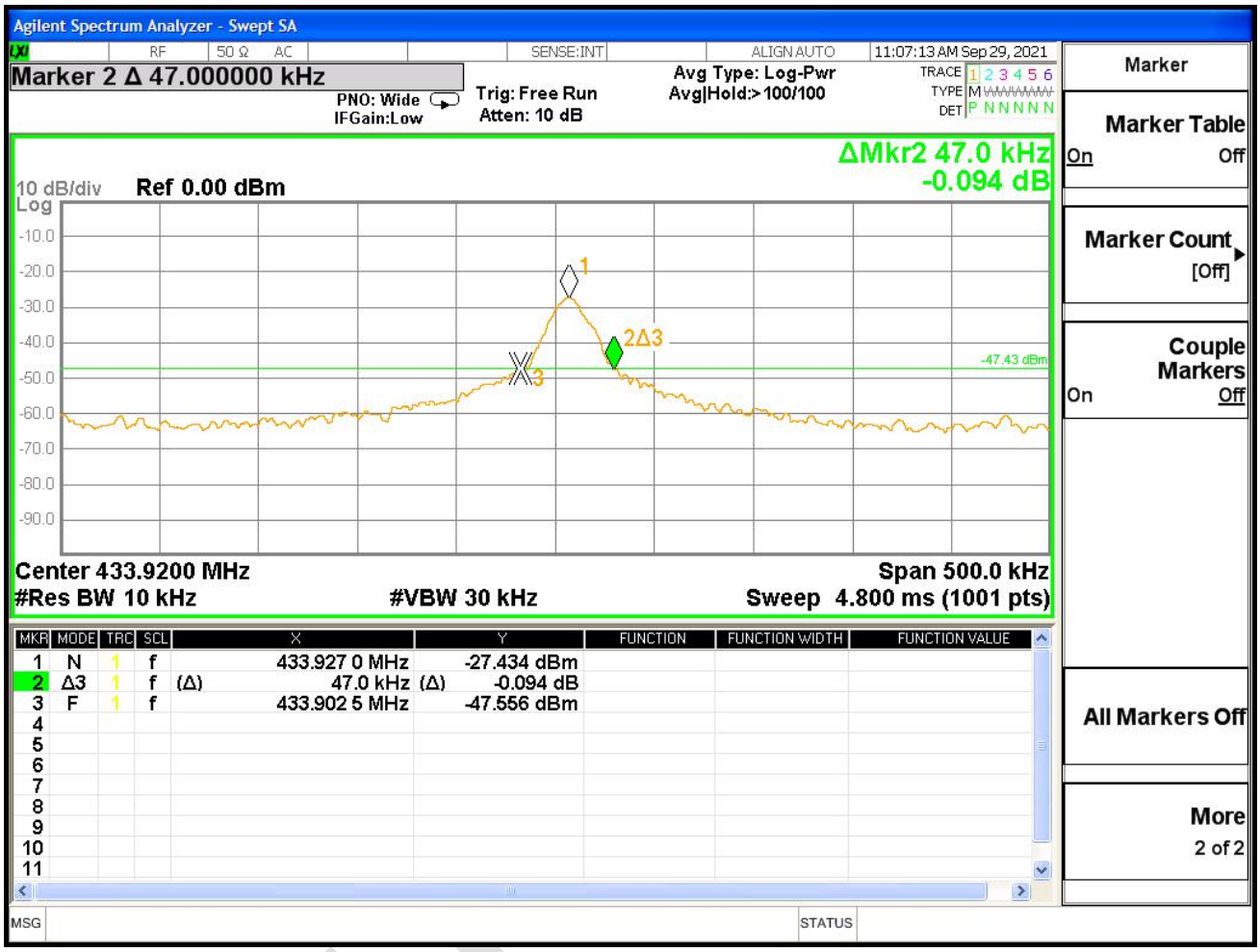
13.1 LIMITS

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

13.2 BLOCK DIAGRAM OF TEST SETUP



13.3 TEST DATA



Measurement Data

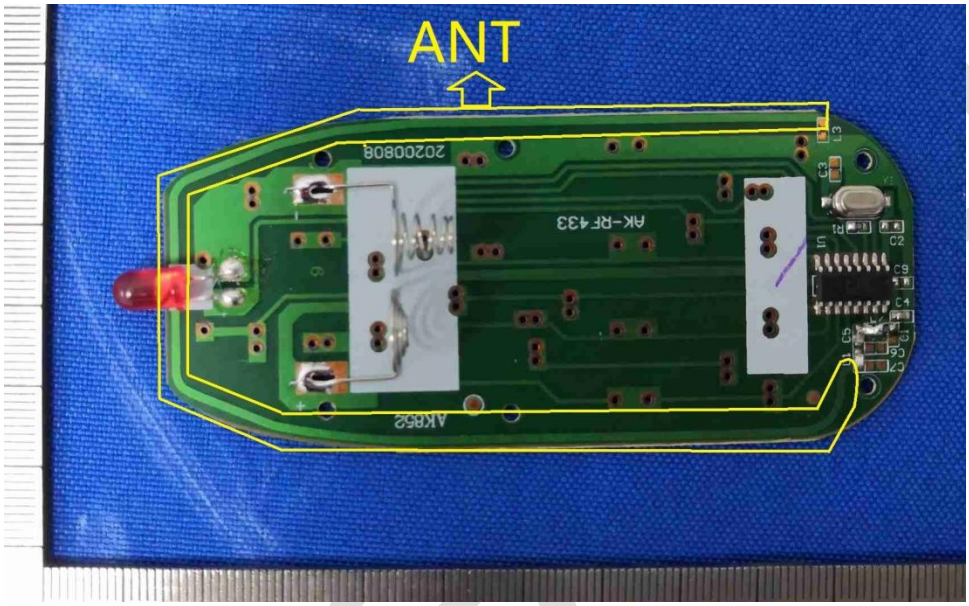
20dB bandwidth (MHz)	Limit (MHz)	Results
0.094	1.0848	Passed

Note: Limit= Fundamental frequency×0.25%=433.92×0.25%=1.0848MHz

14 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	N/A

14.1 CONCLUSION



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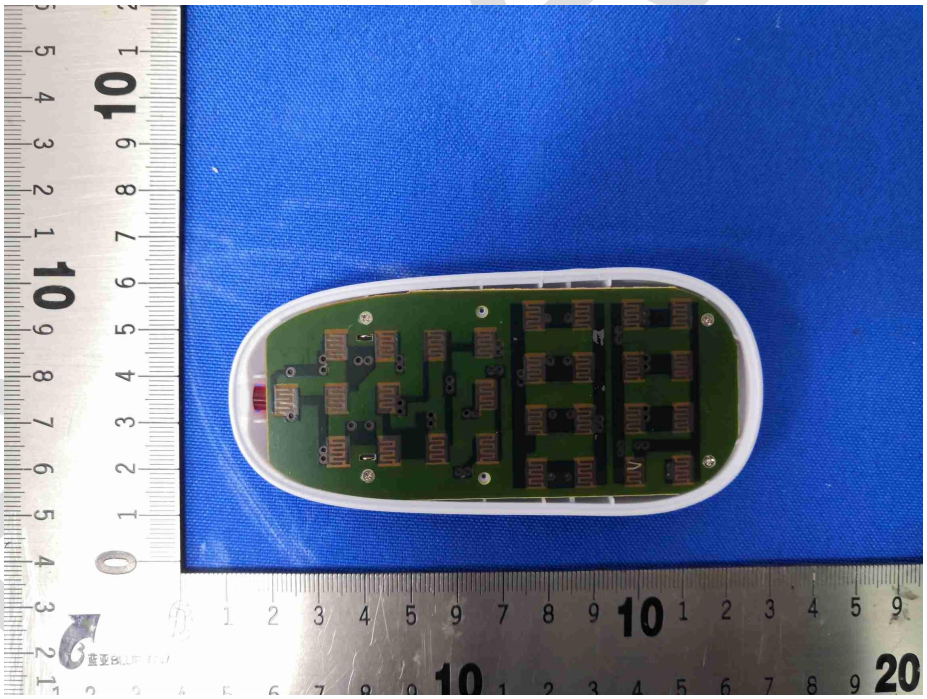
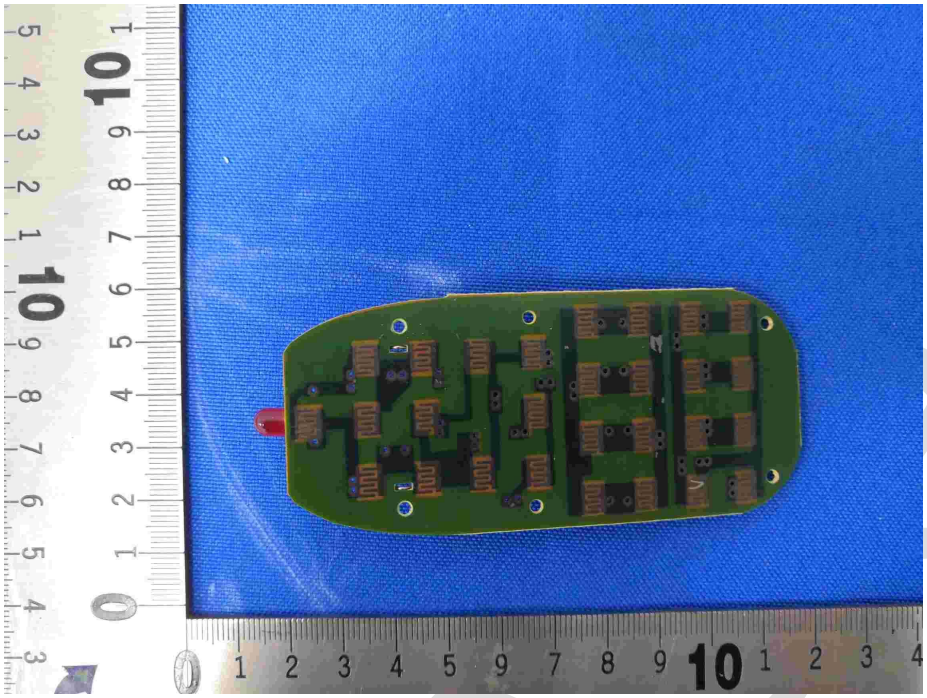
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

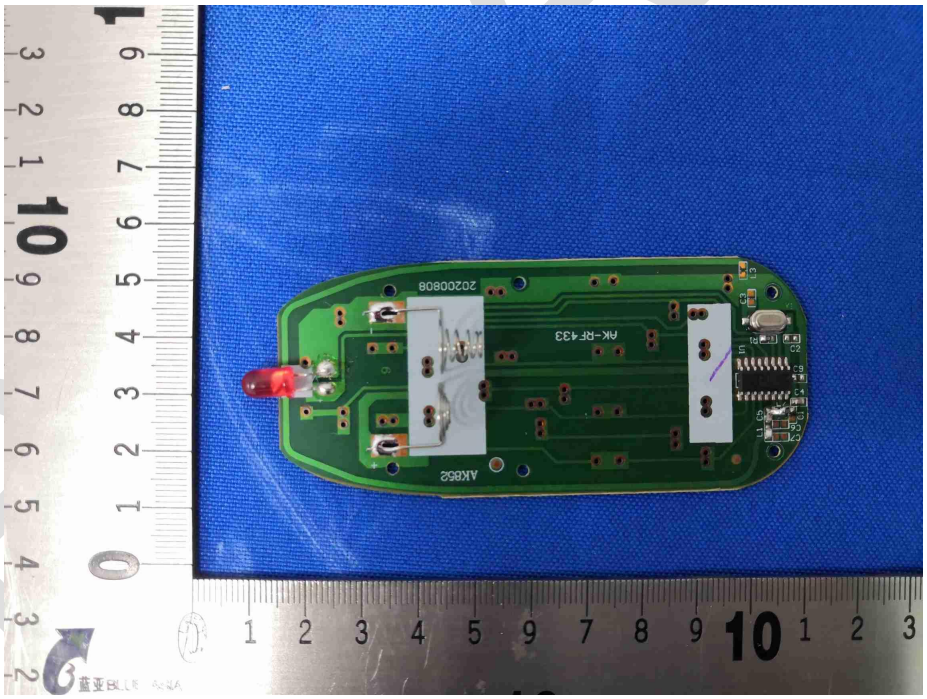
Radiated Emissions

APPENDIX B: PHOTOGRAPHS OF EUT

G
R
B
W
FLASH
STROBE
FADE
SMOOTH
FEIT
Electric






AK-RF433
20200808
AK8652

----END OF REPORT----

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