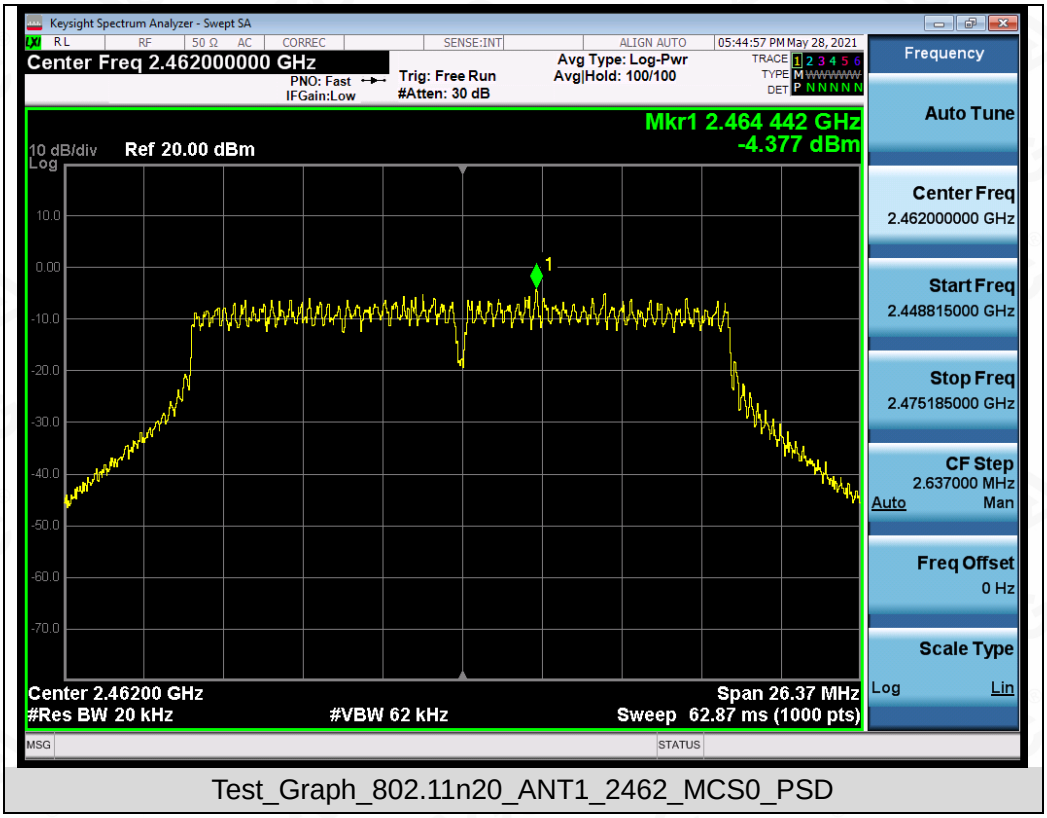


Test_Graph_802.11n20_ANT1_2462_MCS0_PSD

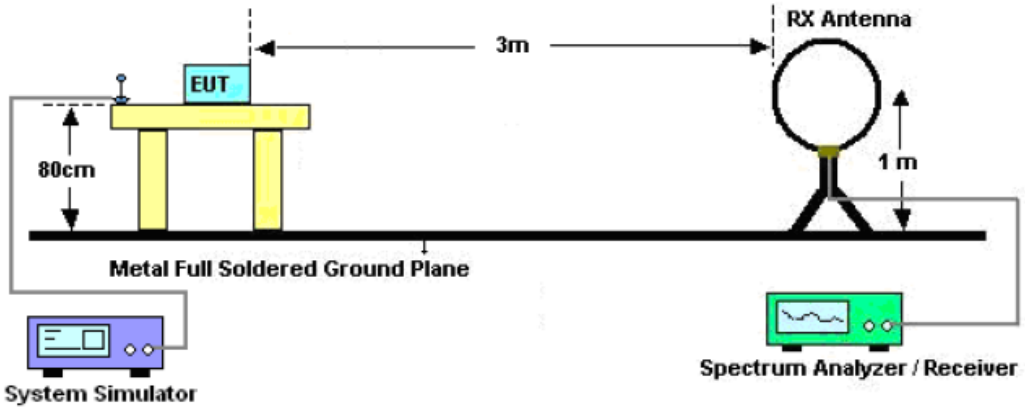
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

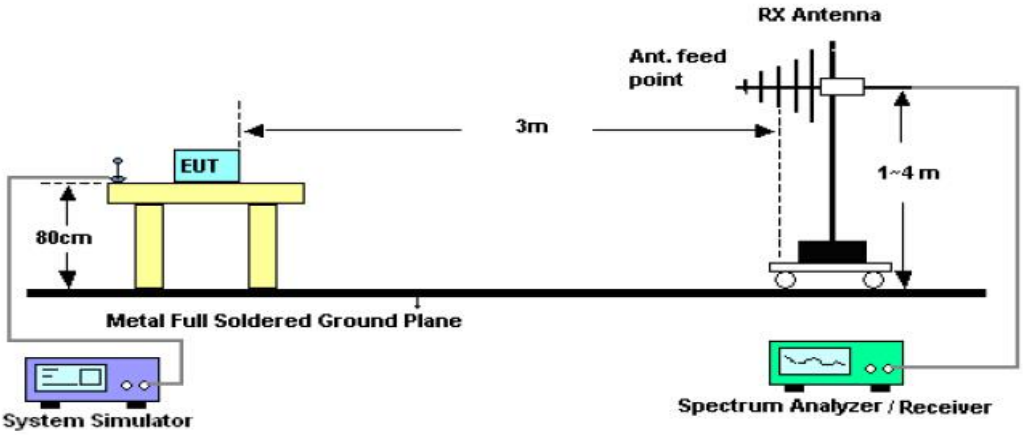
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

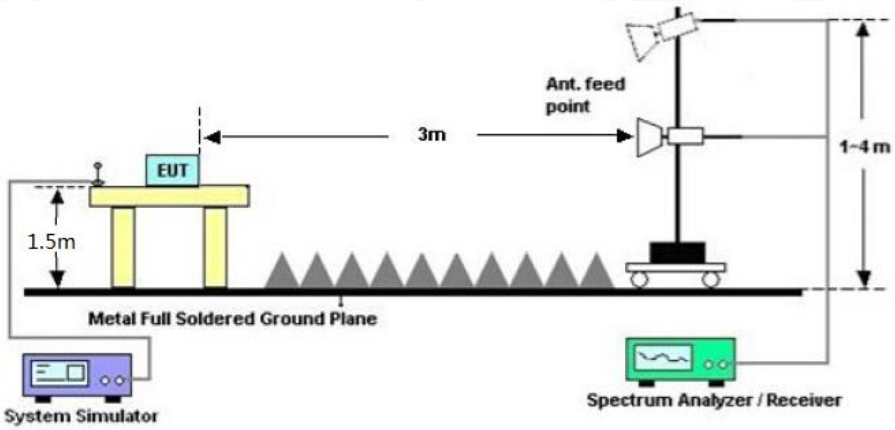
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

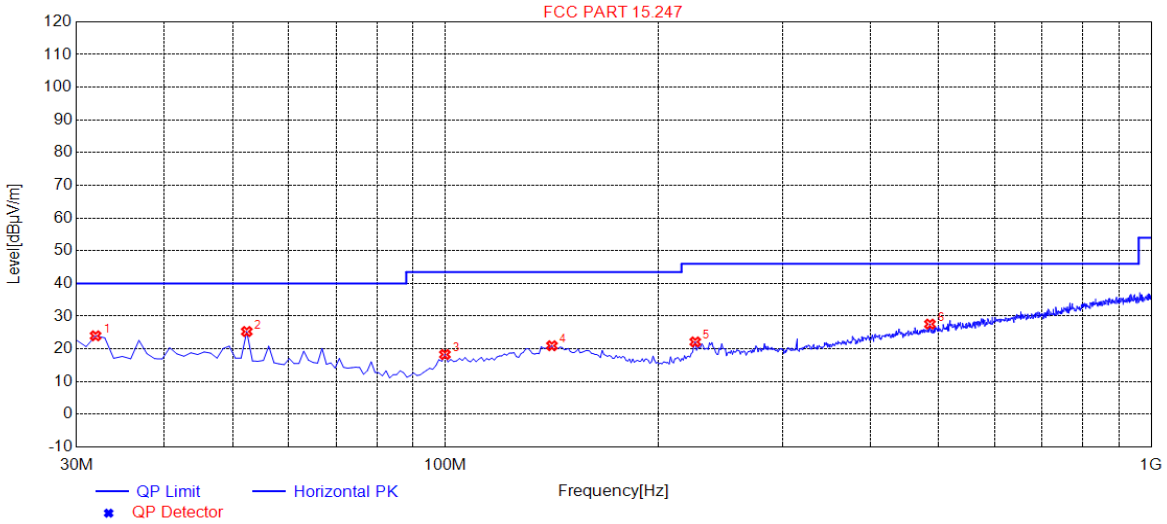
11.4. TEST RESULT

Radiated emission below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

Radiated emission from 30MHz to 1000MHz

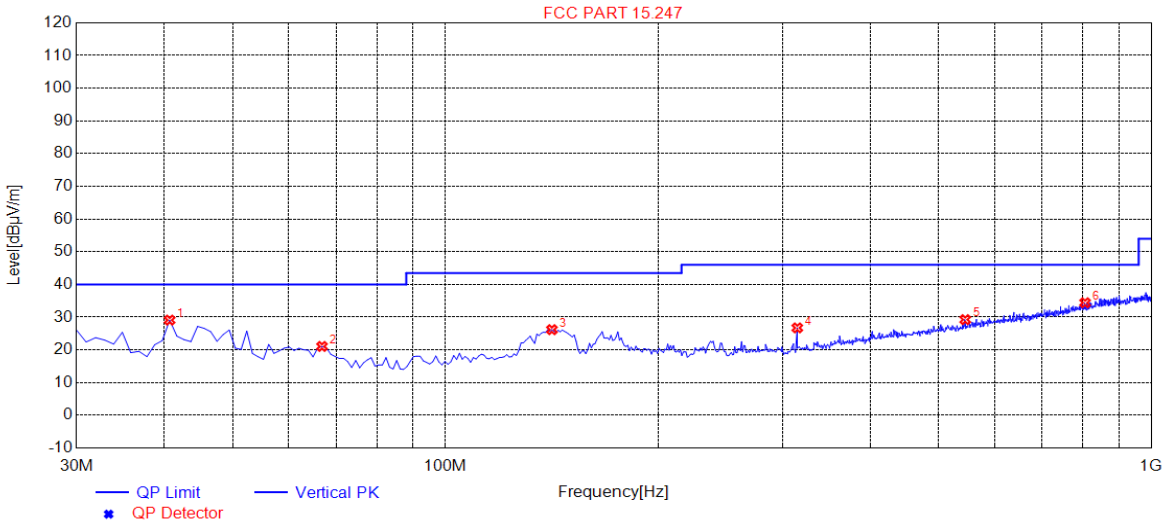
EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	31.9400	24.00	10.19	40.00	16.00	100	74	Horizontal
2	52.3100	25.31	11.49	40.00	14.69	100	251	Horizontal
3	99.8400	18.29	11.30	43.50	25.21	100	69	Horizontal
4	141.5500	20.97	14.88	43.50	22.53	100	94	Horizontal
5	225.9400	22.14	13.73	46.00	23.86	100	248	Horizontal
6	485.9000	27.59	21.85	46.00	18.41	100	1	Horizontal

RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6700	29.11	11.91	40.00	10.89	100	359	Vertical
2	66.8600	21.07	9.76	40.00	18.93	100	232	Vertical
3	141.5500	26.19	14.88	43.50	17.31	100	213	Vertical
4	315.1800	26.74	16.48	46.00	19.26	100	7	Vertical
5	545.0700	29.26	23.17	46.00	16.74	100	169	Vertical
6	806.0000	34.41	28.56	46.00	11.59	100	111	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin= Limit-Level.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

Radiated emission above 1GHz

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.000	54.26	0.08	54.34	74	-19.66	peak
4824.000	45.29	0.08	45.37	54	-8.63	AVG
7236.000	49.36	2.21	51.57	74	-22.43	peak
7236.000	40.23	2.21	42.44	54	-11.56	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.000	56.39	0.08	56.47	74	-17.53	peak
4824.000	45.13	0.08	45.21	54	-8.79	AVG
7236.000	51.57	2.21	53.78	74	-20.22	peak
7236.000	40.68	2.21	42.89	54	-11.11	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.000	56.37	0.14	56.51	74	-17.49	peak
4874.000	45.13	0.14	45.27	54	-8.73	AVG
7311.000	51.37	2.36	53.73	74	-20.27	peak
7311.000	40.57	2.36	42.93	54	-11.07	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.000	55.97	0.14	56.11	74	-17.89	peak
4874.000	46.38	0.14	46.52	54	-7.48	AVG
7311.000	50.27	2.36	52.63	74	-21.37	peak
7311.000	40.13	2.36	42.49	54	-11.51	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.000	55.43	0.22	55.65	74	-18.35	peak
4924.000	44.28	0.22	44.5	54	-9.5	AVG
7386.000	49.37	2.64	52.01	74	-21.99	peak
7386.000	40.16	2.64	42.8	54	-11.2	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.000	56.82	0.22	57.04	74	-16.96	peak
4924.000	45.37	0.22	45.59	54	-8.41	AVG
7386.000	51.37	2.64	54.01	74	-19.99	peak
7386.000	42.37	2.64	45.01	54	-8.99	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

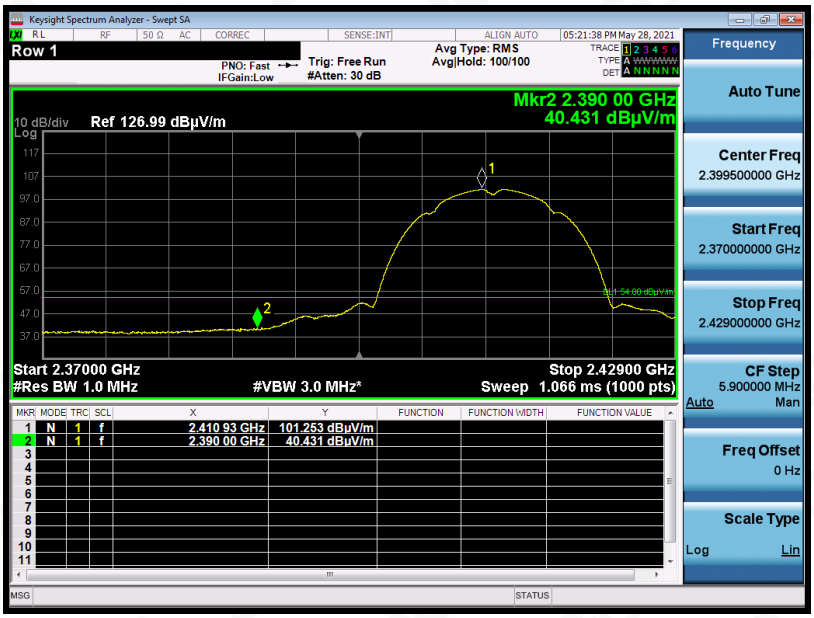
All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

Test result for band edge emission at restricted bands

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement

Test Graph for Average Measurement

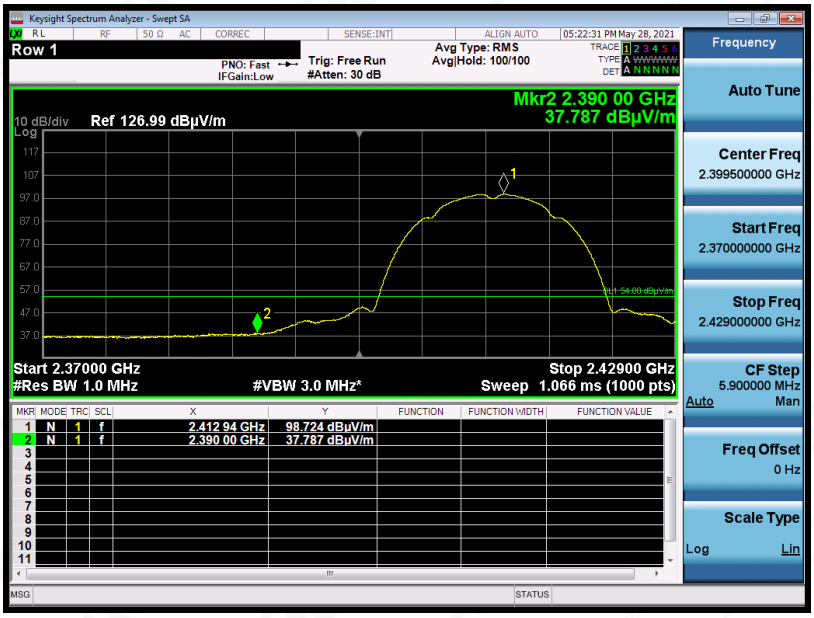


RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement

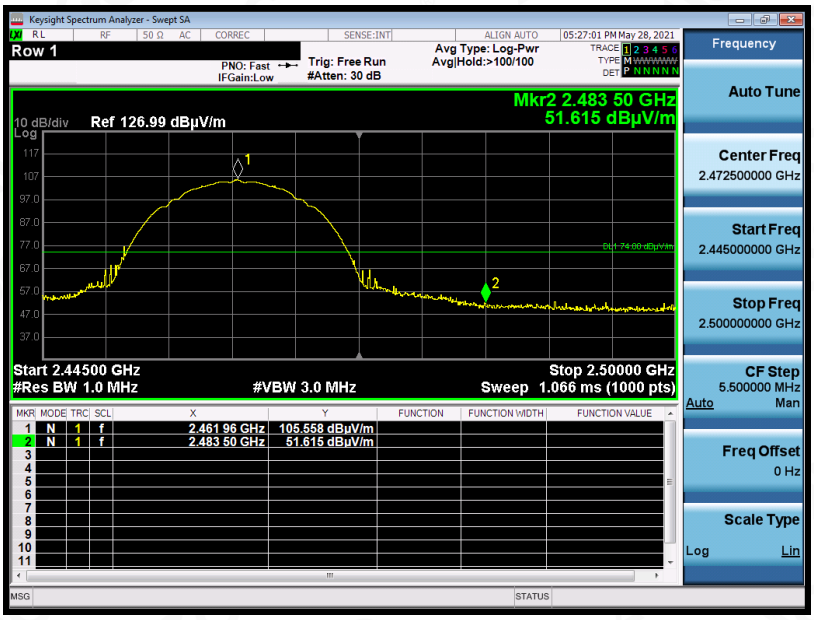
Test Graph for Average Measurement



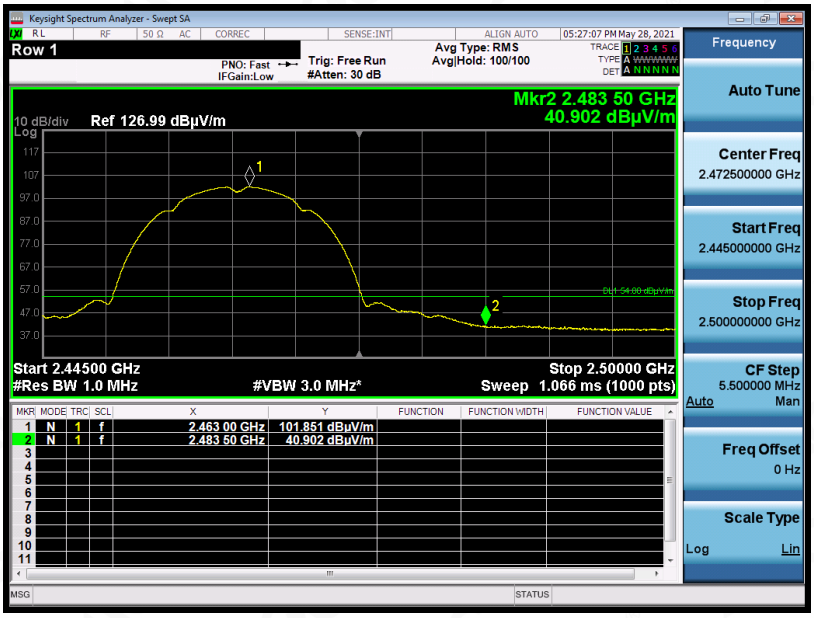
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement



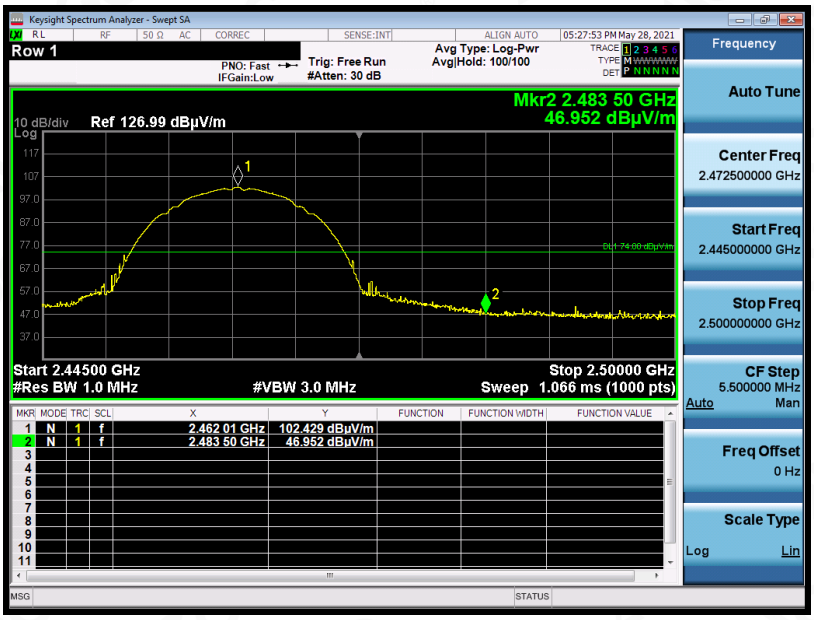
Test Graph for Average Measurement



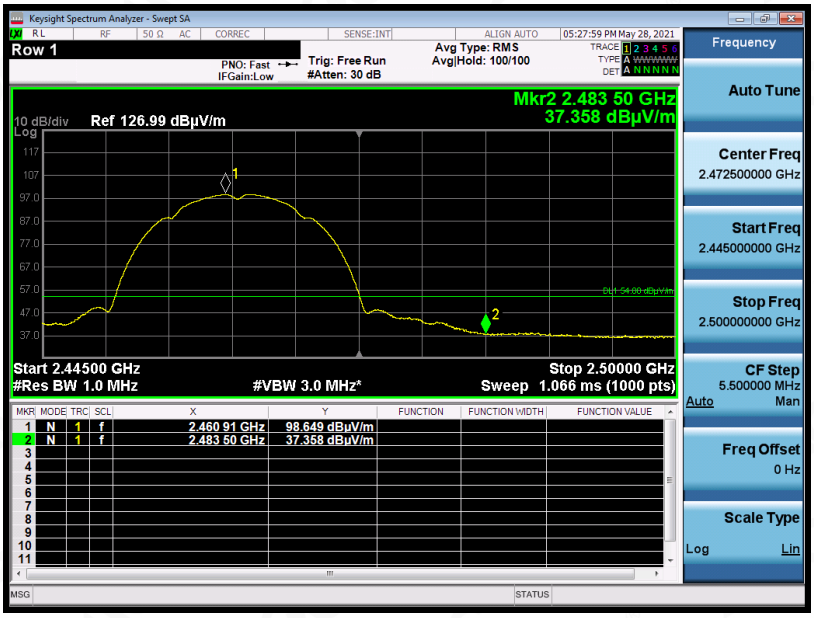
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



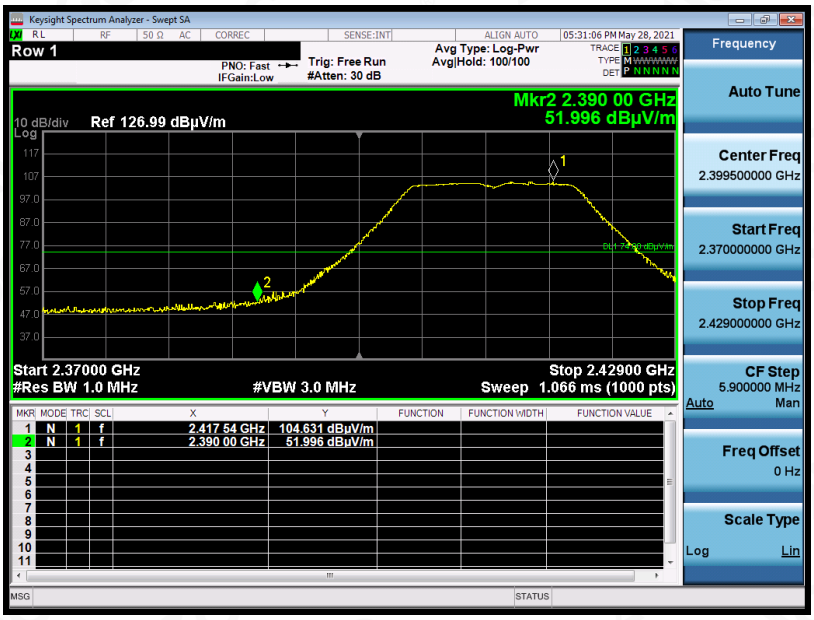
Test Graph for Average Measurement



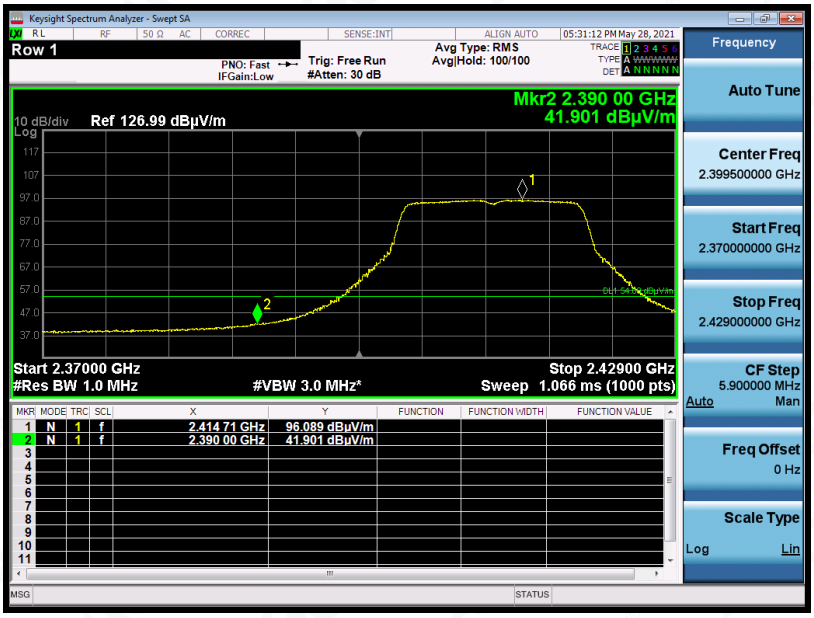
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement



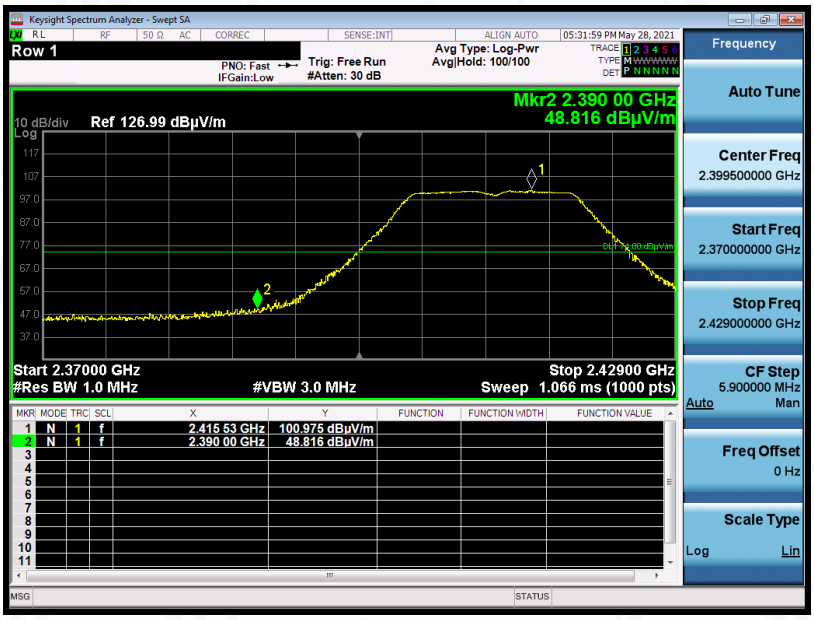
Test Graph for Average Measurement



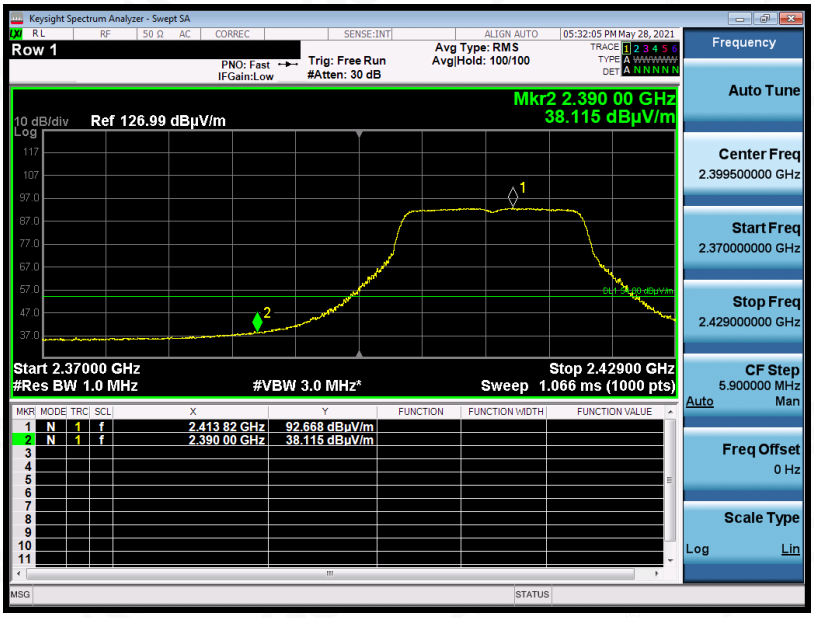
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



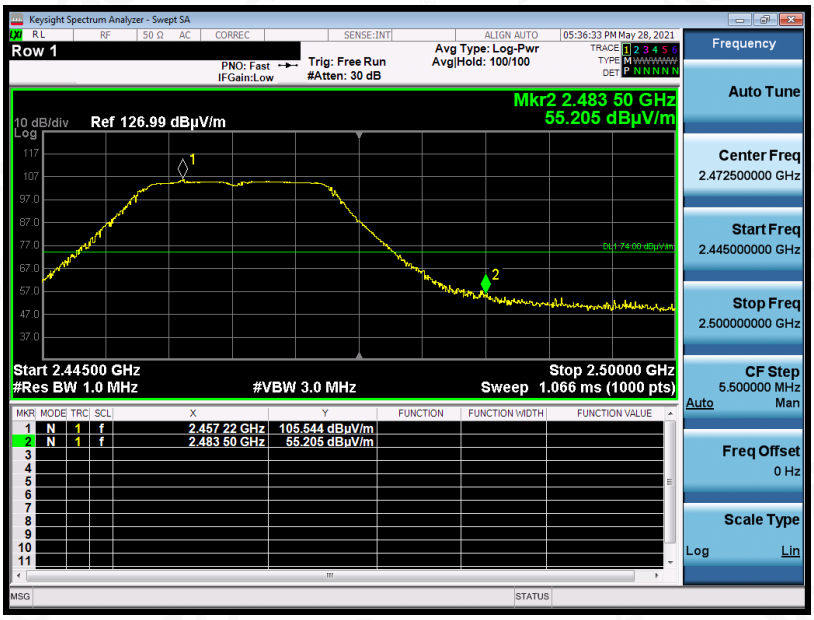
Test Graph for Average Measurement



RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement

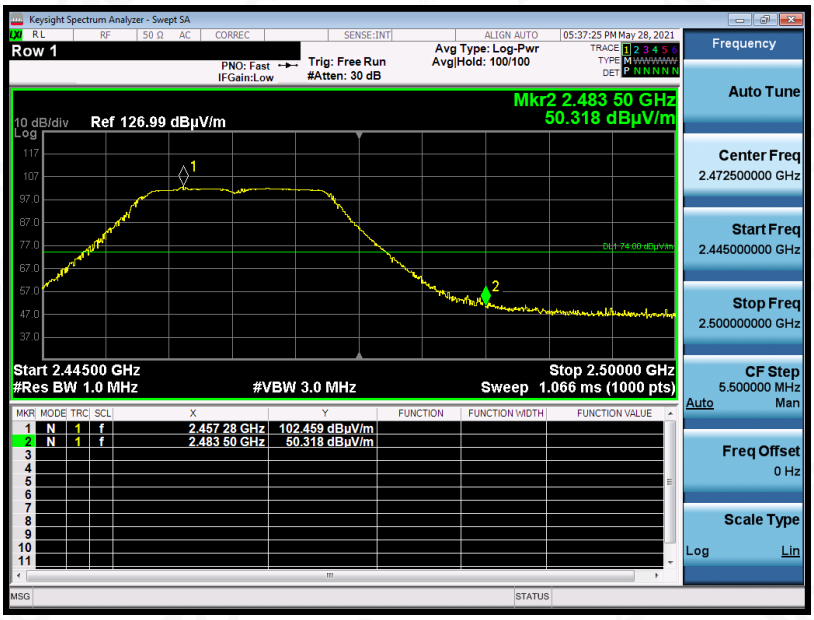


Test Graph for Average Measurement

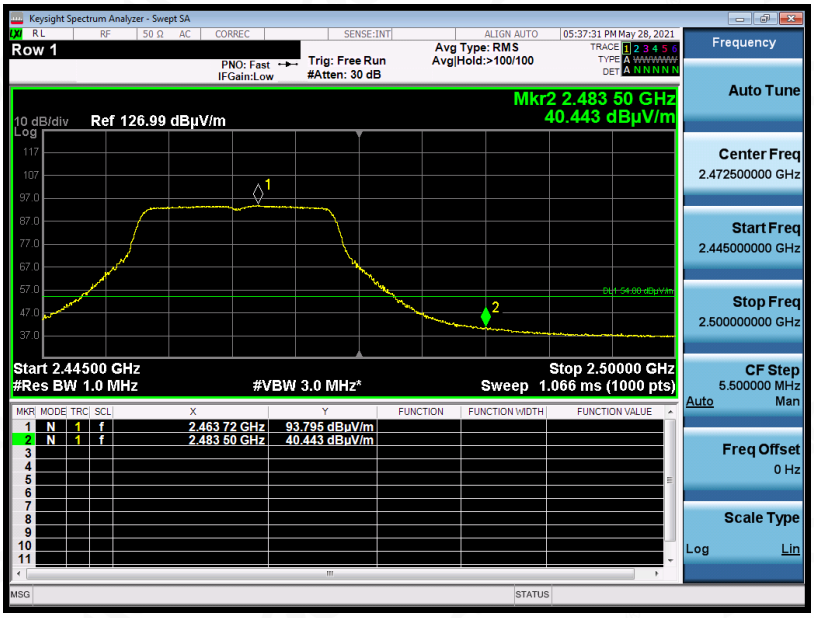
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement

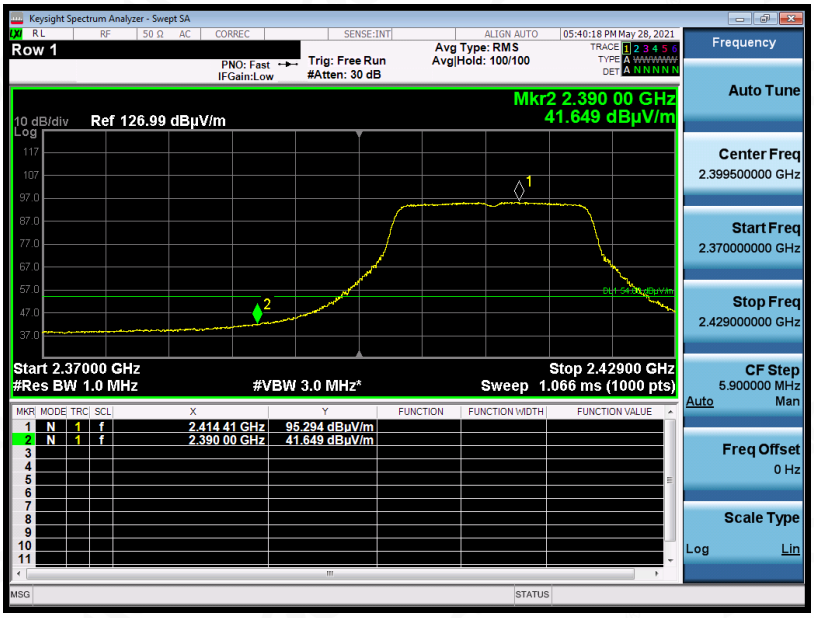


RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement

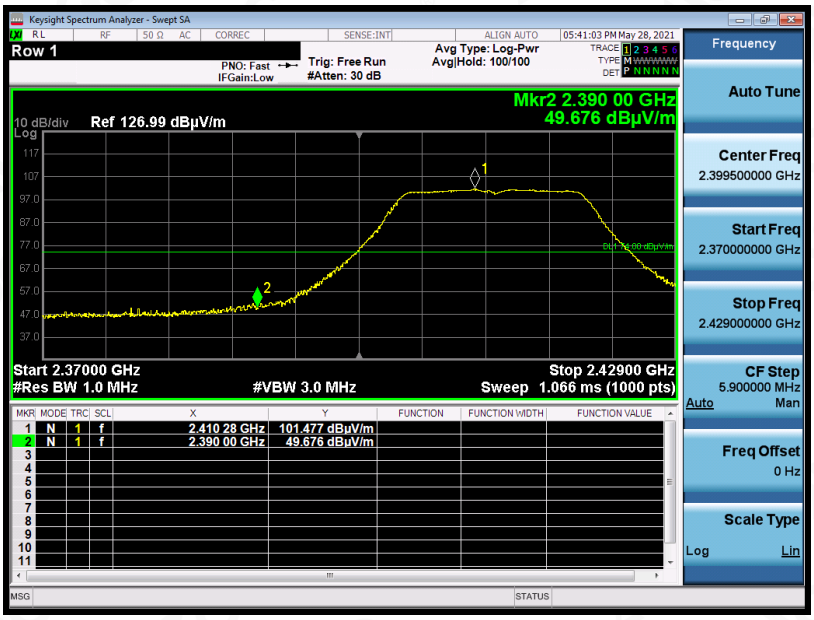
Test Graph for Average Measurement



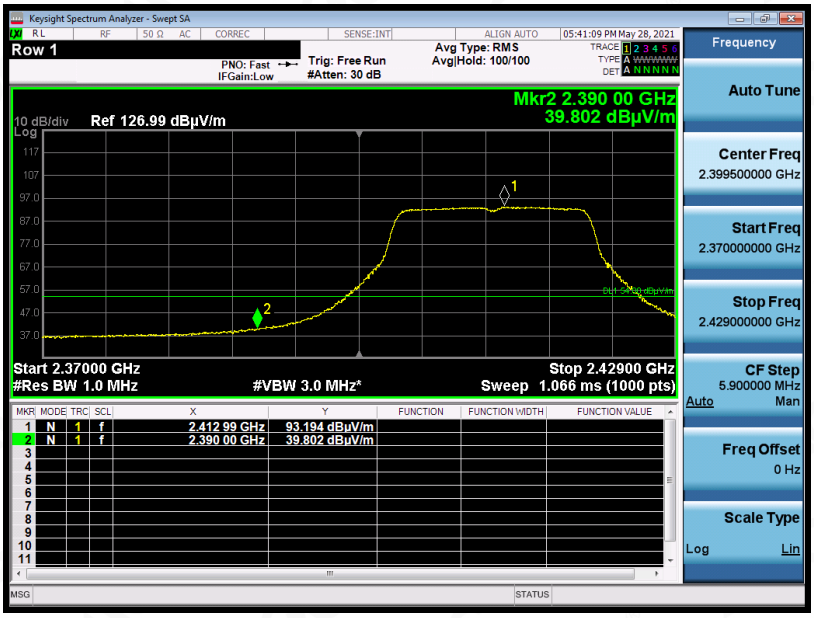
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement

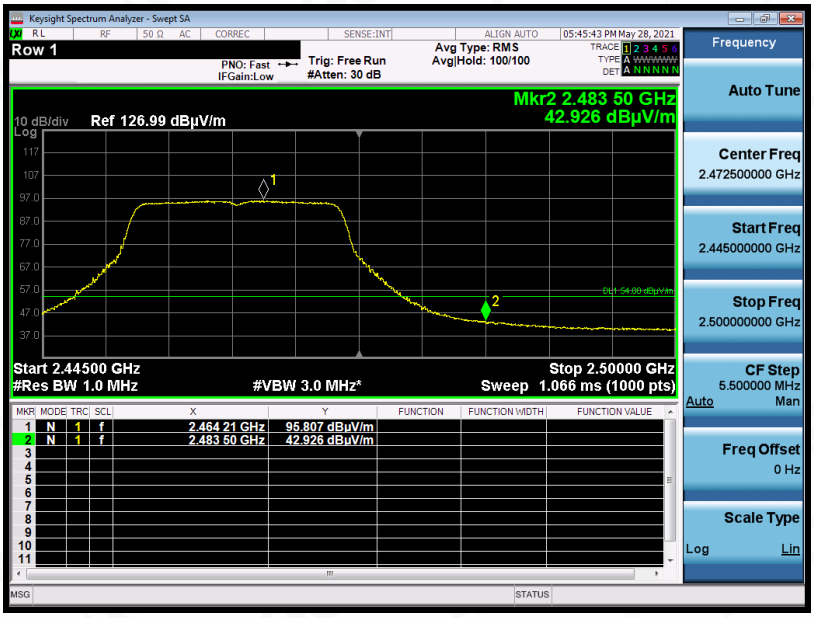


RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement

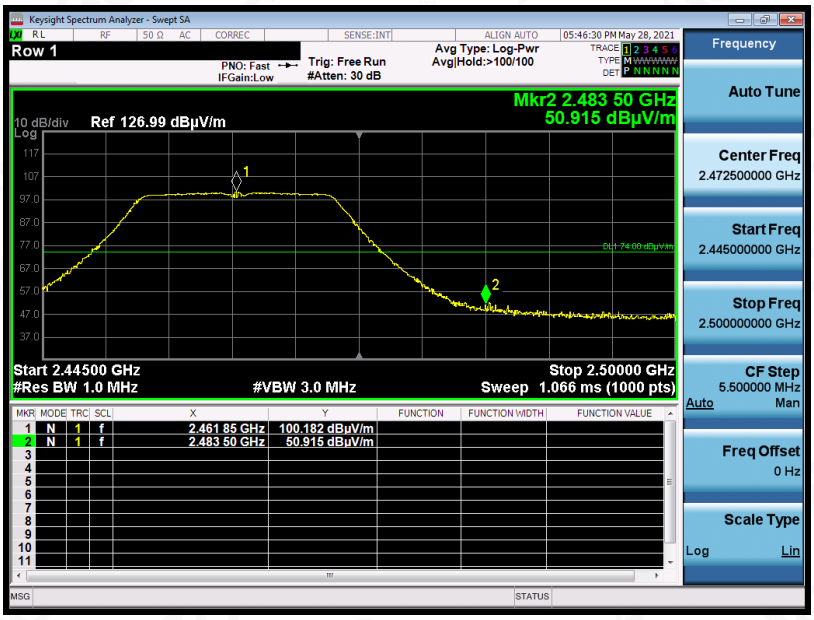
Test Graph for Average Measurement



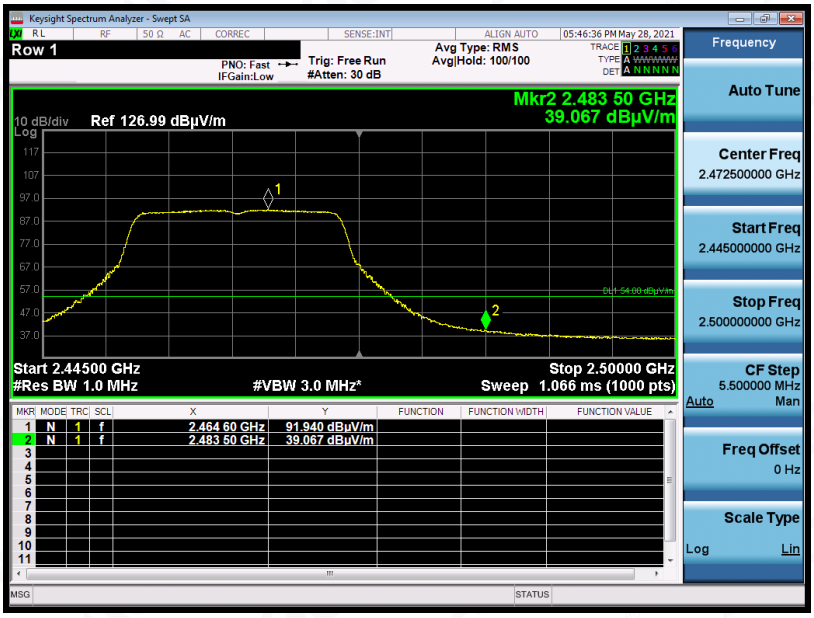
RESULT: PASS

EUT	Infrared Remote Control II	Model Name	SRW-002 PRO
Temperature	25℃	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS

12. LINE CONDUCTED EMISSION TEST

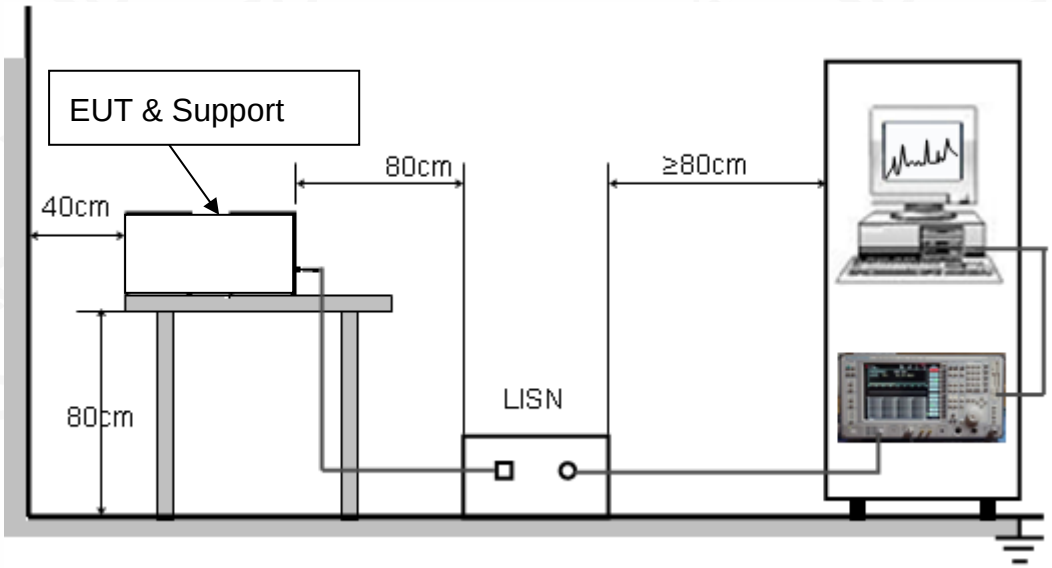
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 Ohm load; the second scan had Line 1 connected to a 50 Ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

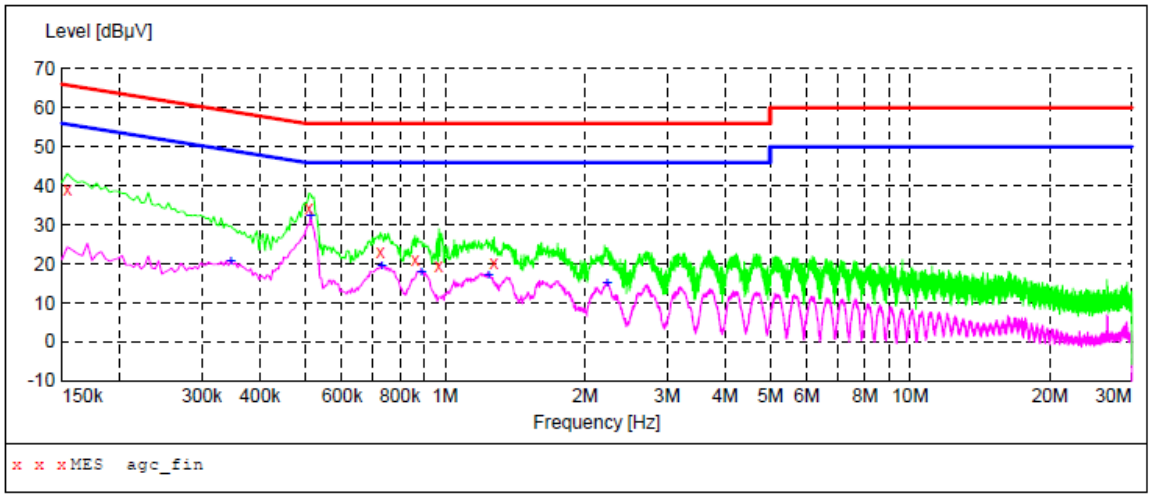
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case was reported on the Summary Data page.

12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



MEASUREMENT RESULT: "agc_fin"

2021/6/1 21:08

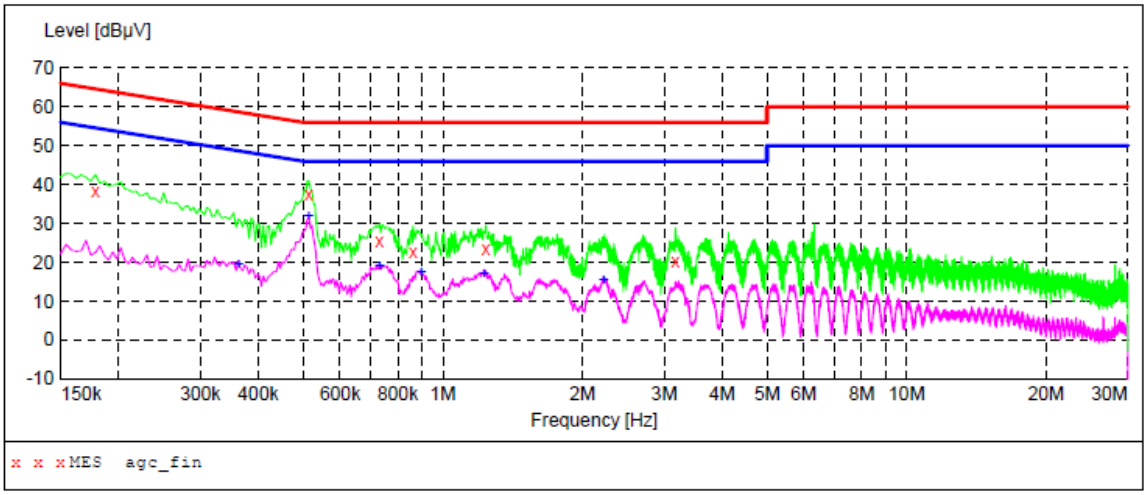
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.154000	38.90	12.4	66	26.9	QP	L1
0.510000	34.10	12.4	56	21.9	QP	L1
0.726000	23.20	12.4	56	32.8	QP	L1
0.862000	21.20	12.4	56	34.8	QP	L1
0.970000	19.50	12.4	56	36.5	QP	L1
1.274000	20.20	12.4	56	35.8	QP	L1

MEASUREMENT RESULT: "agc_fin2"

2021/6/1 21:08

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.346000	20.80	12.4	49	28.3	AV	L1
0.514000	32.10	12.4	46	13.9	AV	L1
0.730000	19.30	12.4	46	26.7	AV	L1
0.890000	18.00	12.4	46	28.0	AV	L1
1.238000	17.20	12.4	46	28.8	AV	L1
2.230000	14.90	12.5	46	31.1	AV	L1

Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT: "agc_fin"

2021/6/1 21:00

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.178000	38.10	12.4	65	26.5	QP	N
0.514000	37.50	12.4	56	18.5	QP	N
0.730000	25.30	12.4	56	30.7	QP	N
0.862000	22.80	12.4	56	33.2	QP	N
1.238000	23.50	12.4	56	32.5	QP	N
3.170000	20.30	12.5	56	35.7	QP	N

MEASUREMENT RESULT: "agc_fin2"

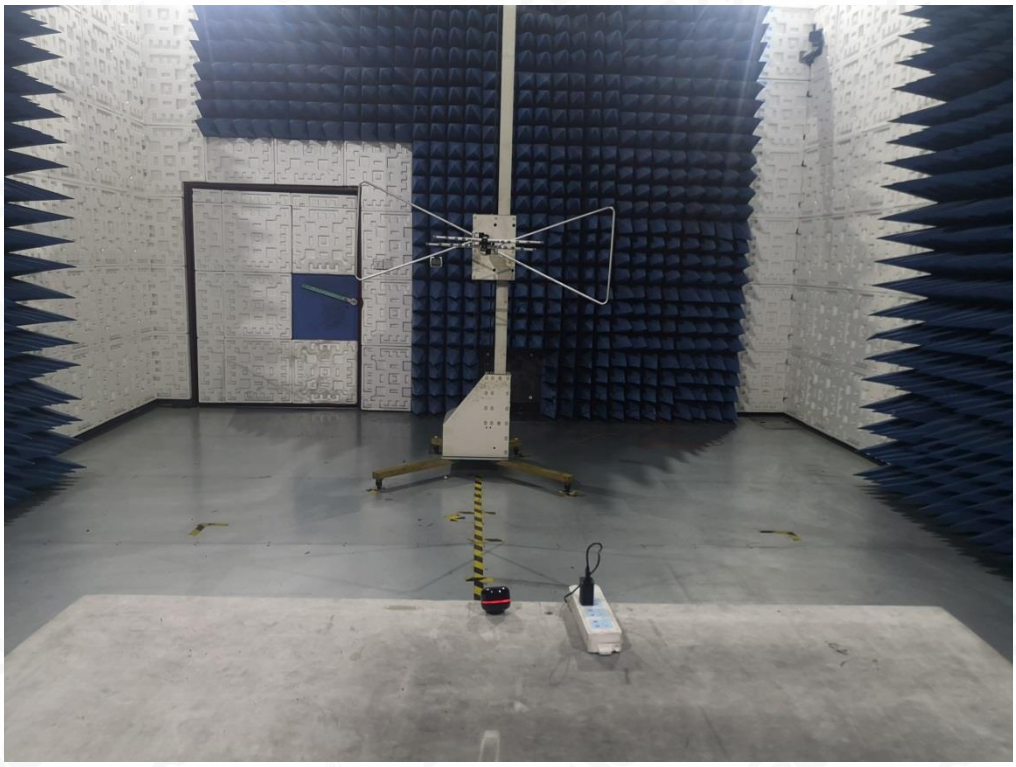
2021/6/1 21:00

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.362000	19.60	12.4	49	29.1	AV	N
0.514000	31.80	12.4	46	14.2	AV	N
0.730000	19.00	12.4	46	27.0	AV	N
0.898000	17.30	12.4	46	28.7	AV	N
1.226000	17.10	12.4	46	28.9	AV	N
2.222000	15.40	12.5	46	30.6	AV	N

RESULT: PASS

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ



FCC RADIATED EMISSION TEST SETUP ABOVE 1GHZ

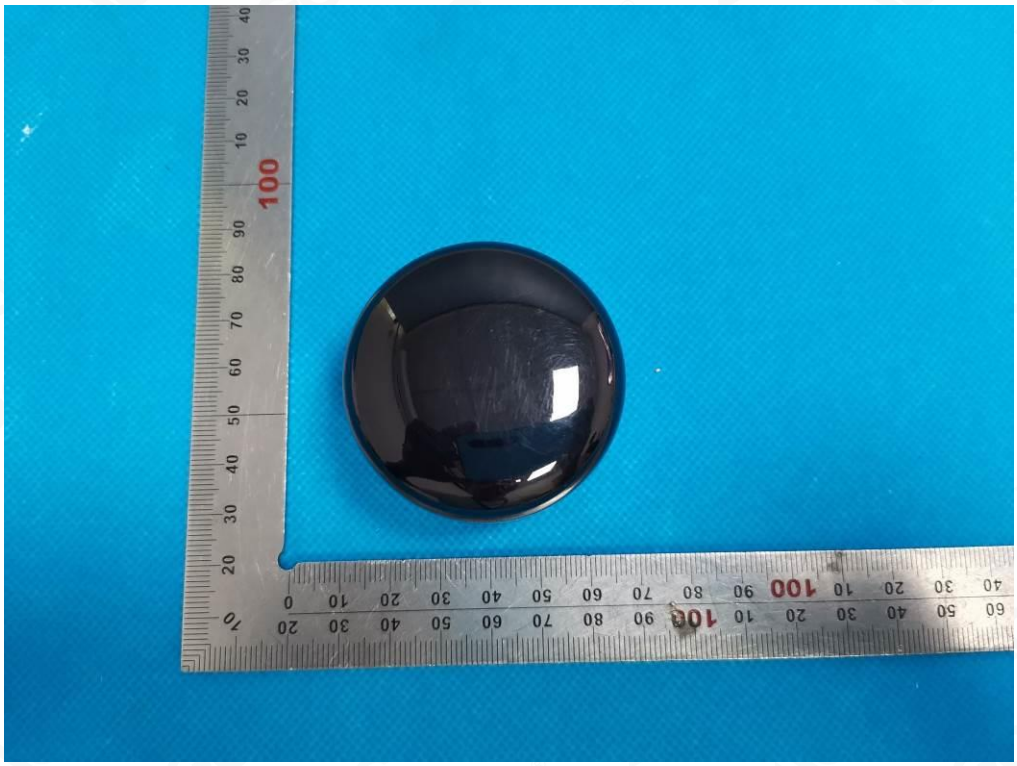
CONDUCTED EMISSION TEST SETUP

CONDUCTED TEST SETUP

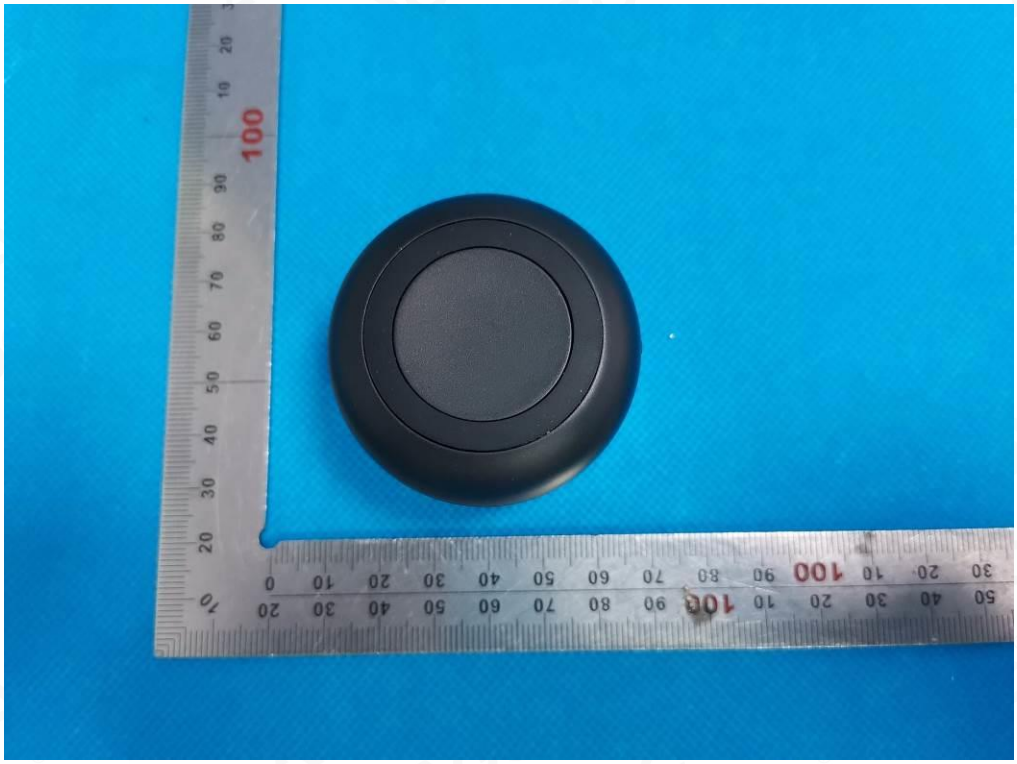
APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT

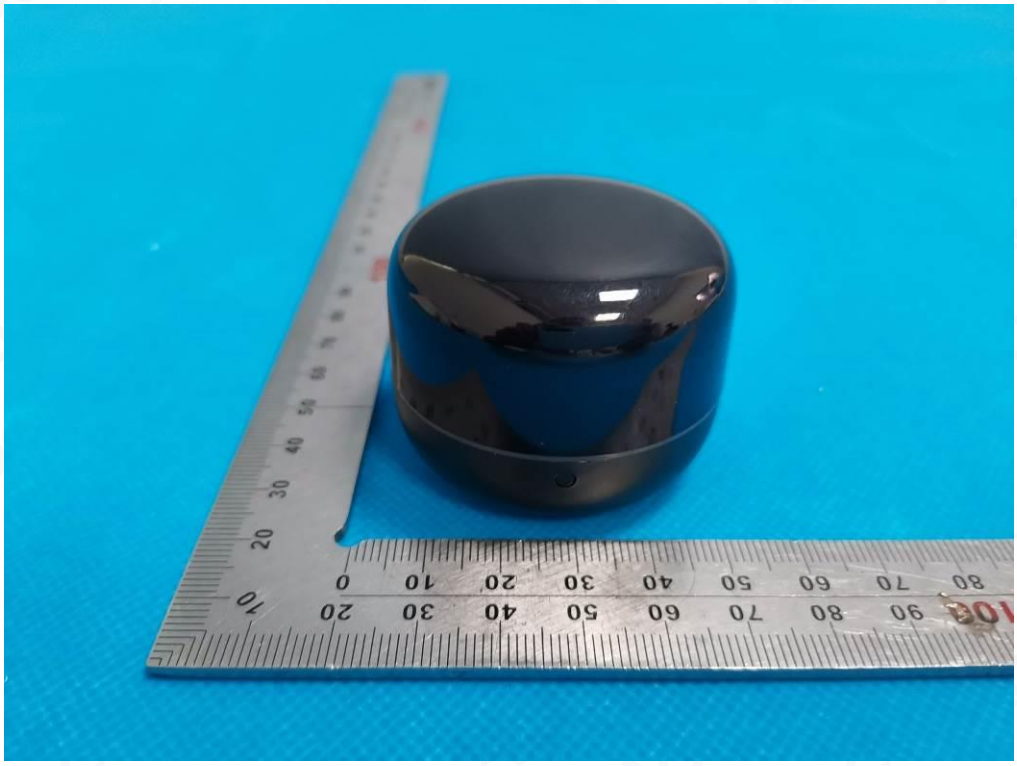
TOP VIEW OF EUT



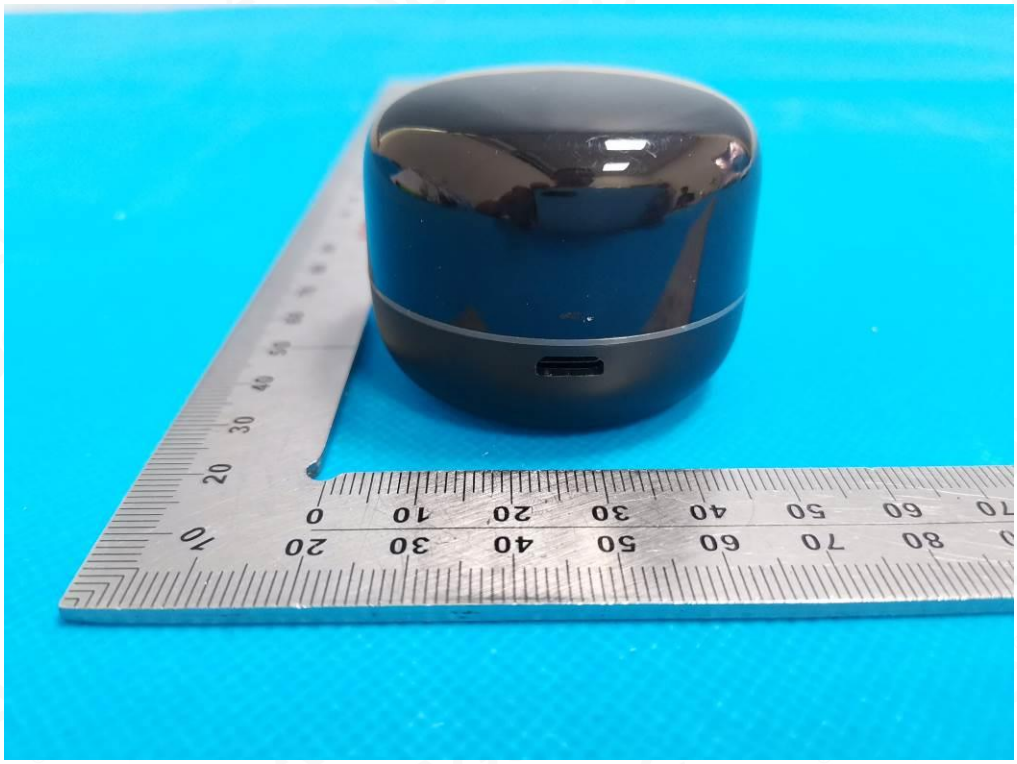
BOTTOM VIEW OF EUT



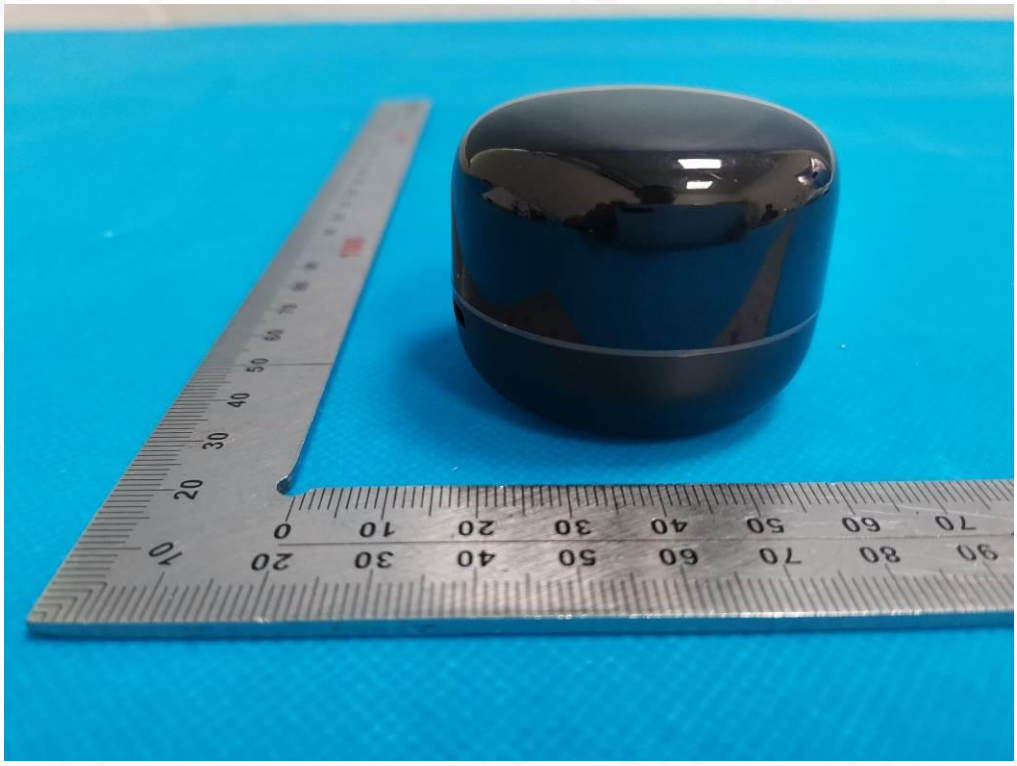
FRONT VIEW OF EUT



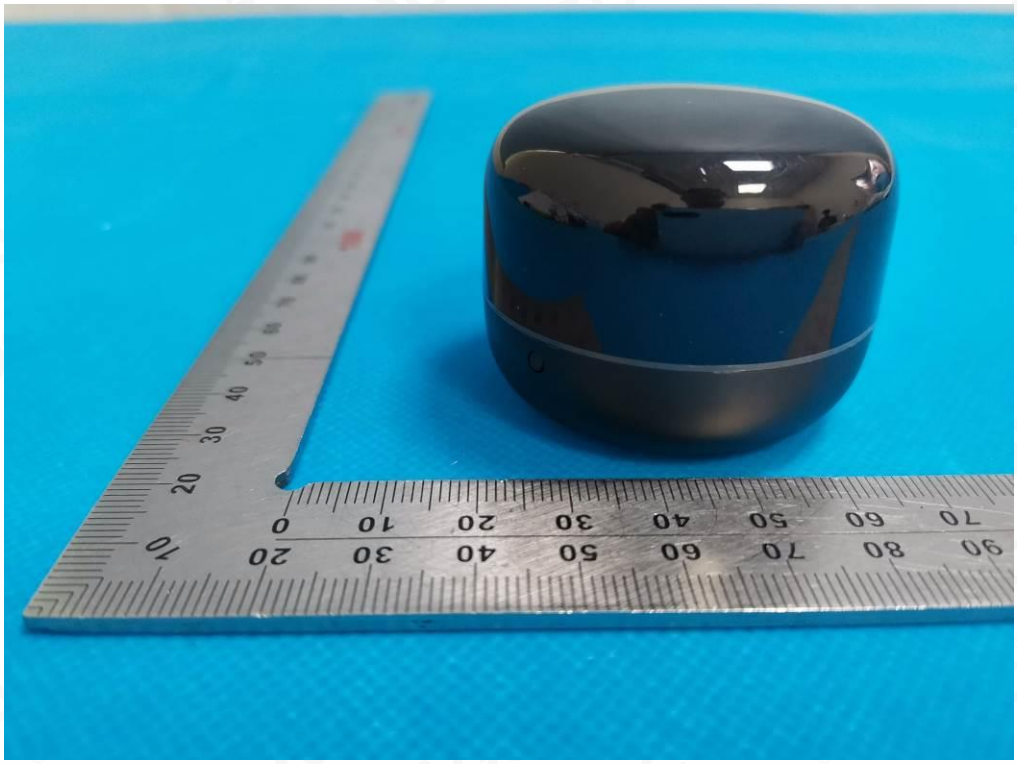
BACK VIEW OF EUT



LEFT VIEW OF EUT

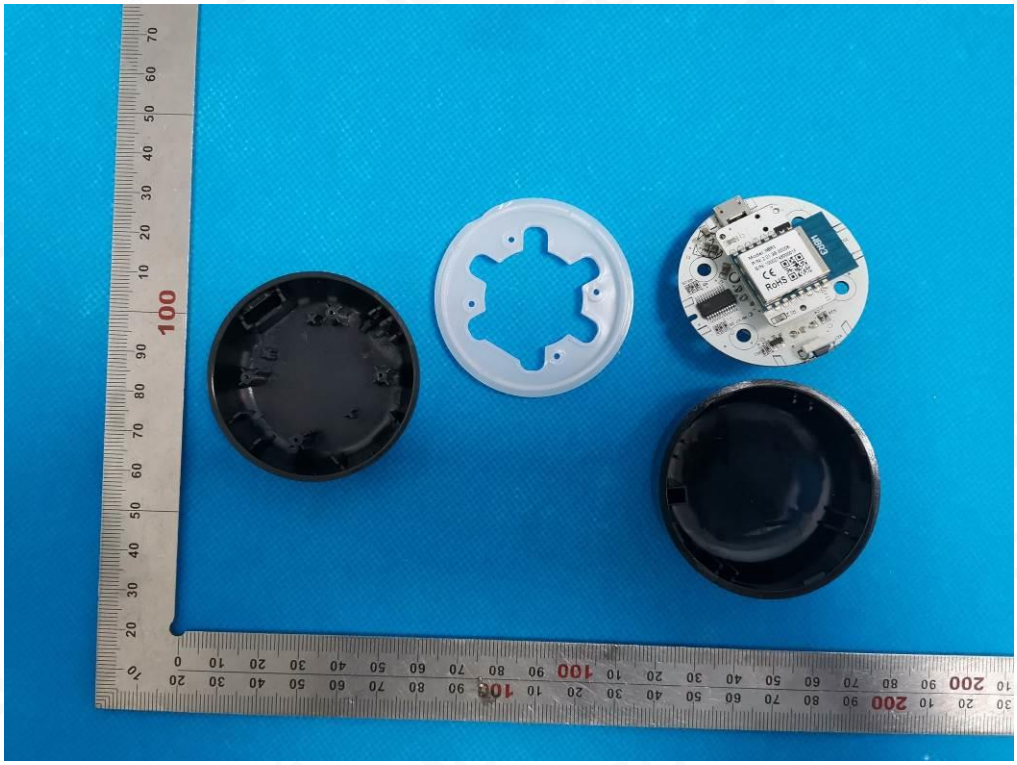


RIGHT VIEW OF EUT



VIEW OF EUT (PORT)

OPEN VIEW OF EUT-1



INTERNAL VIEW-1 OF EUT