

TEST REPORT

EMI Test for FCC Certification / ISED of LCU-001 Model

APPLICANT

LG Electronics Inc.

REPORT NO.

HCT-EM-2002-FI005

DATE OF ISSUE

February 25, 2020

HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 645 6300 Fax. +82 31 645 6401



HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 645 6300 Fax. +82 31 645 6401

TEST REPORT

EMI Test for
FCC Certification
/ ISED

REPORT NO.
HCT-EM-2002-FI005

DATE OF ISSUE
February 25, 2020

FCC ID. / IC
BEJ-LCU001 / 2703N-LCU001

Applicant **LG Electronics Inc.**

170, Seongsanpaechong-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do,
51533, Korea

Product Name UWB Module
Model Name LCU-001

Date of Test February 21, 2020 to February 22, 2020

Test Standard Used FCC CFR 47 PART 15 Subpart B Class B / ICES-003 Issue 6 Class B
ANSI C63.4-2014

Test Results Refer to the present document

Manufacturer LG Electronics Inc.

The result shown in this test report refer only to the sample(s) tested unless
otherwise stated.

Tested by
Kyoung-Hee Yoon

(signature)

Technical Manager
Jeong-Hyun Choi

(signature)

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	February 25, 2020	Initial Release

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation), which signed the ILAC-MRA.

CONTENTS

1. GENERAL INFORMATION	5
1.1 Description of EUT	5
1.2 Tested System Details	5
1.3 Cable Description	6
1.4 Noise Suppression Parts on Cable. (I/O Cable)	6
1.5 Test Facility	7
1.6 Calibration of Measuring Instrument	7
1.7 Measurement Uncertainty	7
2. DESCRIPTION OF TEST	8
2.1 Measurement of Conducted Emission	8
2.2 Measurement of Radiated Emission	9
2.3 Configuration of Tested System	10
3. PRELIMINARY TEST	10
3.1 Conducted Emission	11
3.2 Radiated Emission	11
4. EMISSION TEST SUMMARY	12
4.1 Conducted Emission	12
4.2 Radiated Emission Below 1 GHz	25
4.3 Radiated Emission Above 1 GHz	27
5. CONCLUSION	31
6. APPENDIX A. TEST SETUP PHOTO	32

1. GENERAL INFORMATION

1.1 Description of EUT

FCC ID	BEJ-LCU001
IC	2703N-LCU001
Model Name	LCU-001
Product Name	UWB Module
Frequency	6 GHz to 7 GHz
Supply Voltage	2.8 V
Manufacturer	LG Electronics Inc.

1.2 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Serial Number	Manufacturer
EUT	LCU-001	-	LG Electronics
JIG Board	-	-	LG Electronics
Notebook PC	ProBook656b	5CB2053MXF	HP
Notebook PC adaptor	PPP014H-S F1-09040230370D	-	Hipro Electronics (Suzhou)
Gateway	DIR-806M	-	D-LINK
AC/DC adaptor	AMS1-0501200FK	-	D-LINK
Mouse	Serial 2 Button mouse	02031069	Radio Shack
RJ45 cable	-	-	-

1.3 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	USB	N	N	(P,D) 0.3
Notebook PC	USB	N/A	Y	(D) 0.3
	RJ 45	N/A	N	(D) 1.6
	Serial mouse	N/A	N	(D) 1.5
	DC IN	N	N/A	(P) 1.8
Gateway	DC IN	N	N/A	(P) 1.8

NOTE. The marked “(D)” means the data cable and “(P)” means the power cable.

1.4 Noise Suppression Parts on Cable (I/O Cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	USB	N/A	N/A	Y	Notebook PC End
Notebook PC	USB	N/A	N/A	Y	Notebook PC End
	RJ 45	N/A	N/A	N	N/A
	Serial mouse	N/A	N/A	Y	Notebook PC End
Gateway	RJ 45	N/A	N/A	N	N/A

1.5 Test Facility

Test site is located at 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, South Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2014. The Normalized site attenuations (30 MHz to 1 GHz) and Site validation (1 GHz to 18 GHz) were performed in accordance with the standard in ANSI C63.4-2014

Measurement Facilities	Designation No.
Radiated Field strength measurement facility 3 m Semi Anechoic chamber	KR0032
Radiated Field strength measurement facility 10 m Semi Anechoic chamber #1	
Radiated Field strength measurement facility 10 m Semi Anechoic chamber #2	
Filing the EMI Measurement Facility (3 m Semi Anechoic Chamber and Shielded Room)	IC 5944A-4
Filing the EMI Measurement Facility (10 m Semi-Anechoic Chamber)	IC 5944A-2

1.6 Calibration of Measuring Instrument

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturers recommendations for utilizing calibration equipment, which is traceable to recognized national standards. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5:2017

1.7 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty
Conducted Emission (0.15 MHz to 30 MHz)	1.8 dB
Radiated Emissions (30 MHz to 1 GHz)	4.8 dB
Radiated Emissions (1 GHz to 18 GHz)	5.4 dB
Radiated Emissions (18 GHz to 40 GHz)	5.7 dB

2. DESCRIPTION OF TEST

2.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 7.3

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).

If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).

Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.

c. The frequency range from 150 kHz to 30 MHz was searched.

Conducted Emission Limits

Frequency (MHz)	Resolution Bandwidth (kHz)	Class A		Class B	
		Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)
0.15 to 0.5	9	79	66	66 to 56*	56 to 46*
0.5 to 5	9	73	60	56	46
5 to 30	9	73	60	60	50

NOTE. Decreases with the logarithm of the frequency.

2.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 8.3

- The EUT was placed on the top of a turn table 0.8 meters above the ground at a semi-anechoic chamber.
The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from 1 m to 4 m 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.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- 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.
(1 GHz to 40 GHz)

Radiated Emission Limits

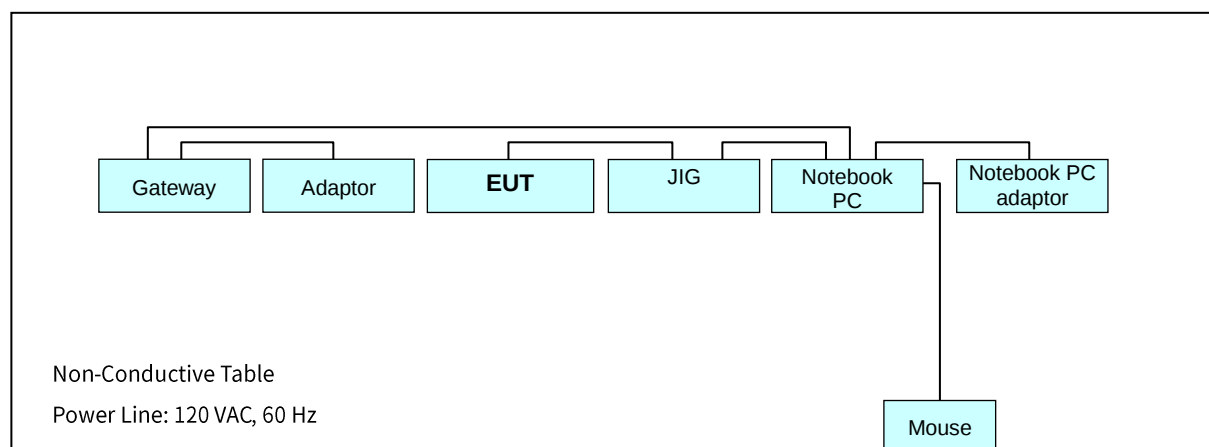
Frequency (MHz)	Class A			Class B		
	Antenna Distance (m)	Field Strength (μ V/m)	Quasi-Peak (dB μ V/m)	Antenna Distance (m)	Field Strength (μ V/m)	Quasi-Peak (dB μ V/m)
30 to 88	10	90	39.0	3	100	40.0
88 to 216	10	150	43.5	3	150	43.5
216 to 960	10	210	46.4	3	200	46.0
Above 960	10	300	49.5	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Class A		Class B		
		Peak (dB μ V/m)	Average (dB μ V/m)	Peak (dB μ V/m)	Average (dB μ V/m)	
Above 1 000	3	80	60	74	54	

2.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

2.3 Configuration of Tested System



3. PRELIMINARY TEST

3.1 Conducted Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Mode: Idle mode with case
Idle mode without case

3.2 Radiated Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Mode: Idle mode with case
Idle mode without case

4. CONDUCTED EMISSION AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission

4.1.1 Measuring instruments

Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	06.18.2019
LISN	Rohde & Schwarz	ENV216	102245	1 year	09.11.2019
LISN	Rohde & Schwarz	ENV216	100073	1 year	04.30.2019
Software	Rohde & Schwarz	EMC32	-	-	-

4.1.2 Operating Condition

The test results of conducted emission at mains ports provide the following information:

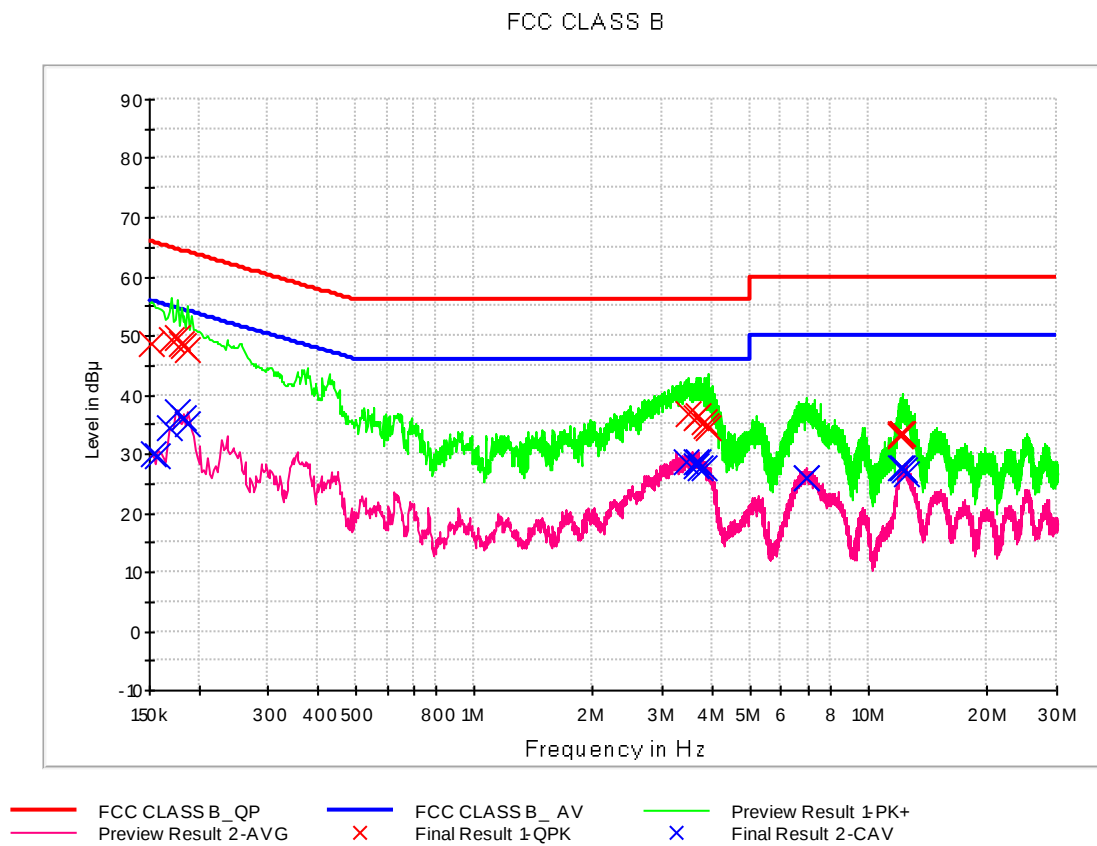
Test Standard Used	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 6 Class B ANSI C63.4-2014
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Kind of Test Site	EMI Shielded Room
Temperature	23.1 °C
Relative Humidity	42.4 %
Test Date	February 22, 2020

Calculation Formula:

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage

4.1.3 Measuring Data

Figure 1: Conducted Emission (0.15 MHz to 30 MHz), IDLE mode with case, Line (L1)



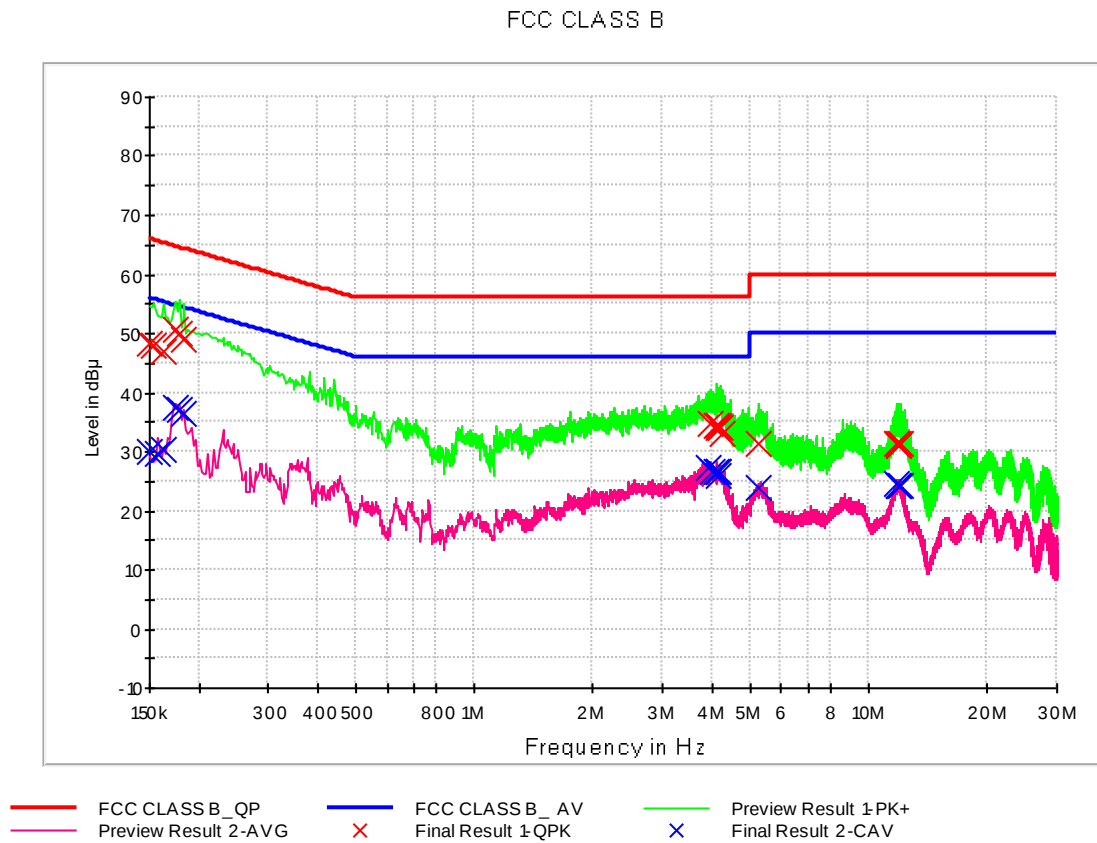
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	48.7	9.000	L1	9.7	17.2	65.9
0.170000	49.4	9.000	L1	9.7	15.6	65.0
0.176000	49.6	9.000	L1	9.7	15.1	64.7
0.180000	48.8	9.000	L1	9.7	15.7	64.5
0.184000	48.3	9.000	L1	9.7	16.0	64.3
0.188000	47.6	9.000	L1	9.7	16.6	64.1
3.504000	36.7	9.000	L1	9.8	19.3	56.0
3.660000	36.2	9.000	L1	9.8	19.8	56.0
3.690000	36.4	9.000	L1	9.8	19.6	56.0
3.814000	35.3	9.000	L1	9.8	20.7	56.0
3.862000	34.8	9.000	L1	9.8	21.2	56.0
3.910000	34.5	9.000	L1	9.8	21.5	56.0
12.044000	33.0	9.000	L1	10.0	27.0	60.0
12.096000	33.2	9.000	L1	10.0	26.8	60.0
12.108000	33.3	9.000	L1	10.0	26.7	60.0
12.168000	33.4	9.000	L1	10.0	26.6	60.0
12.182000	33.4	9.000	L1	10.0	26.6	60.0
12.186000	33.5	9.000	L1	10.0	26.5	60.0

CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	30.0	9.000	L1	9.7	25.8	55.8
0.158000	29.8	9.000	L1	9.7	25.8	55.6
0.168000	34.3	9.000	L1	9.7	20.8	55.1
0.176000	37.2	9.000	L1	9.7	17.4	54.7
0.184000	36.2	9.000	L1	9.7	18.2	54.3
0.188000	35.0	9.000	L1	9.7	19.1	54.1
3.464000	28.7	9.000	L1	9.8	17.3	46.0
3.634000	28.5	9.000	L1	9.8	17.5	46.0
3.660000	27.9	9.000	L1	9.8	18.1	46.0
3.690000	28.6	9.000	L1	9.8	17.4	46.0
3.730000	27.8	9.000	L1	9.8	18.2	46.0
3.814000	27.7	9.000	L1	9.8	18.3	46.0
6.960000	25.9	9.000	L1	9.9	24.1	50.0
6.974000	25.9	9.000	L1	9.9	24.1	50.0
12.118000	27.5	9.000	L1	10.0	22.5	50.0
12.246000	27.5	9.000	L1	10.0	22.5	50.0
12.304000	27.3	9.000	L1	10.0	22.7	50.0
12.450000	26.6	9.000	L1	10.0	23.4	50.0

Figure 2: Conducted Emission (0.15 MHz to 30 MHz), IDLE mode with case, Line (N)



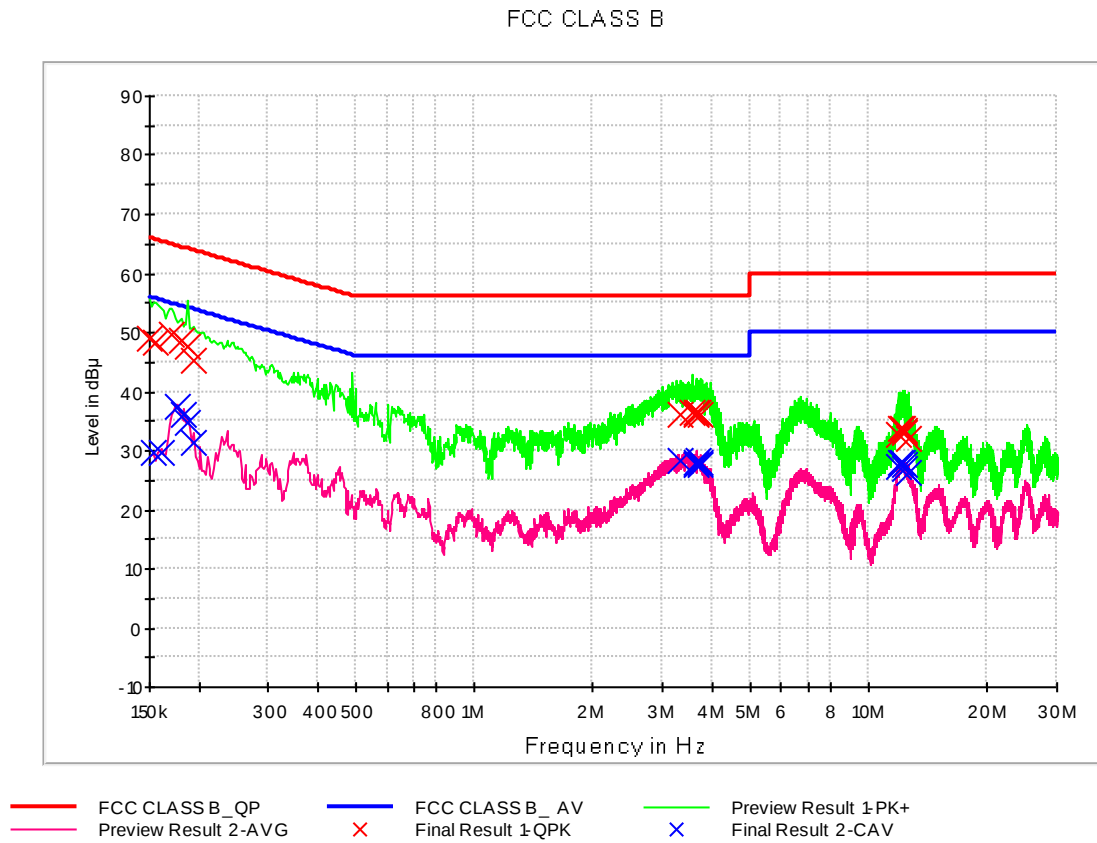
QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	48.4	9.000	N	9.7	17.6	66.0
0.154000	47.9	9.000	N	9.7	17.8	65.8
0.162000	47.0	9.000	N	9.7	18.4	65.4
0.174000	50.7	9.000	N	9.7	14.1	64.8
0.178000	50.1	9.000	N	9.7	14.5	64.6
0.184000	49.0	9.000	N	9.7	15.4	64.3
3.972000	34.9	9.000	N	9.8	21.1	56.0
4.086000	34.4	9.000	N	9.8	21.6	56.0
4.148000	34.5	9.000	N	9.8	21.5	56.0
4.178000	34.1	9.000	N	9.8	21.9	56.0
4.190000	34.2	9.000	N	9.8	21.8	56.0
4.278000	32.9	9.000	N	9.8	23.1	56.0
5.270000	31.4	9.000	N	9.8	28.6	60.0
11.816000	31.3	9.000	N	10.0	28.7	60.0
11.930000	31.2	9.000	N	10.0	28.8	60.0
11.948000	31.2	9.000	N	10.0	28.8	60.0
11.956000	31.1	9.000	N	10.0	28.9	60.0
12.000000	31.2	9.000	N	10.0	28.8	60.0

CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	30.0	9.000	N	9.7	26.0	56.0
0.158000	29.7	9.000	N	9.7	25.9	55.6
0.162000	30.3	9.000	N	9.7	25.0	55.4
0.174000	37.4	9.000	N	9.7	17.4	54.8
0.178000	37.1	9.000	N	9.7	17.5	54.6
0.182000	36.4	9.000	N	9.7	18.0	54.4
3.928000	27.1	9.000	N	9.8	18.9	46.0
4.012000	26.5	9.000	N	9.8	19.5	46.0
4.086000	26.5	9.000	N	9.8	19.5	46.0
4.148000	26.5	9.000	N	9.8	19.5	46.0
4.152000	26.6	9.000	N	9.8	19.4	46.0
4.178000	26.0	9.000	N	9.8	20.0	46.0
5.270000	23.9	9.000	N	9.8	26.1	50.0
11.816000	24.5	9.000	N	10.0	25.5	50.0
11.916000	24.3	9.000	N	10.0	25.7	50.0
11.930000	24.3	9.000	N	10.0	25.7	50.0
11.948000	24.4	9.000	N	10.0	25.6	50.0
12.000000	24.1	9.000	N	10.0	25.9	50.0

Figure 3: Conducted Emission (0.15 MHz to 30 MHz), IDLE mode without case, Line (L1)



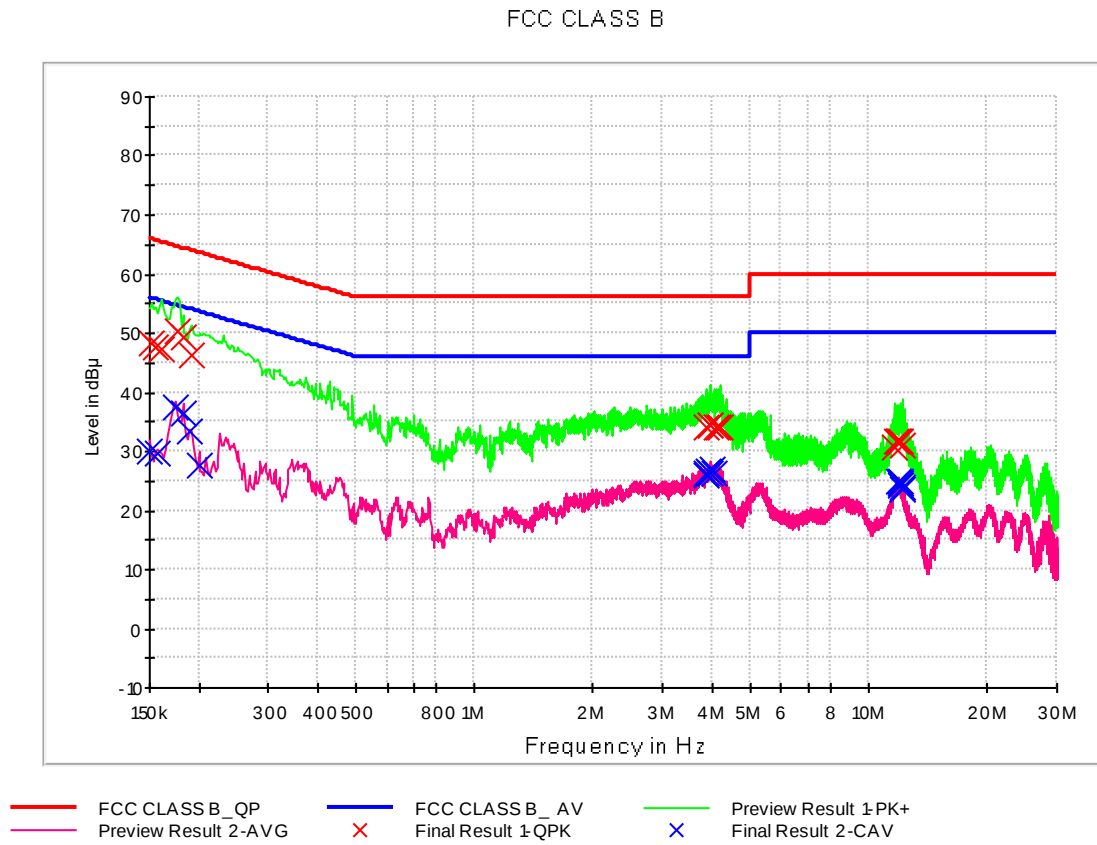
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150000	49.0	9.000	L1	9.7	17.0	66.0
0.156000	48.2	9.000	L1	9.7	17.5	65.7
0.170000	49.6	9.000	L1	9.7	15.3	65.0
0.180000	48.8	9.000	L1	9.7	15.7	64.5
0.188000	47.5	9.000	L1	9.7	16.6	64.1
0.194000	45.3	9.000	L1	9.7	18.6	63.9
3.342000	36.3	9.000	L1	9.8	19.7	56.0
3.560000	36.3	9.000	L1	9.8	19.7	56.0
3.654000	36.5	9.000	L1	9.8	19.5	56.0
3.660000	36.0	9.000	L1	9.8	20.0	56.0
3.696000	36.6	9.000	L1	9.8	19.4	56.0
3.762000	36.0	9.000	L1	9.8	20.0	56.0
11.918000	32.8	9.000	L1	10.0	27.2	60.0
12.108000	33.7	9.000	L1	10.0	26.4	60.0
12.210000	33.7	9.000	L1	10.0	26.3	60.0
12.326000	33.3	9.000	L1	10.0	26.7	60.0
12.364000	33.1	9.000	L1	10.0	26.9	60.0
12.572000	31.9	9.000	L1	10.0	28.1	60.0

CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	29.6	9.000	L1	9.7	26.2	55.8
0.160000	29.6	9.000	L1	9.7	25.9	55.5
0.176000	37.3	9.000	L1	9.7	17.4	54.7
0.184000	36.0	9.000	L1	9.7	18.3	54.3
0.188000	34.8	9.000	L1	9.7	19.3	54.1
0.194000	31.3	9.000	L1	9.7	22.6	53.9
3.342000	28.2	9.000	L1	9.8	17.8	46.0
3.654000	27.8	9.000	L1	9.8	18.2	46.0
3.660000	27.7	9.000	L1	9.8	18.3	46.0
3.696000	28.4	9.000	L1	9.8	17.6	46.0
3.724000	27.8	9.000	L1	9.8	18.2	46.0
3.762000	27.6	9.000	L1	9.8	18.4	46.0
11.918000	27.2	9.000	L1	10.0	22.8	50.0
12.108000	27.8	9.000	L1	10.0	22.2	50.0
12.210000	27.9	9.000	L1	10.0	22.1	50.0
12.326000	27.5	9.000	L1	10.0	22.5	50.0
12.404000	26.9	9.000	L1	10.0	23.1	50.0
12.572000	26.2	9.000	L1	10.0	23.8	50.0

Figure 4: Conducted Emission (0.15 MHz to 30 MHz), IDLE mode without case, Line (N)



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	48.2	9.000	N	9.7	17.7	65.9
0.156000	47.7	9.000	N	9.7	18.0	65.7
0.160000	47.1	9.000	N	9.7	18.3	65.5
0.176000	50.3	9.000	N	9.7	14.4	64.7
0.182000	49.4	9.000	N	9.7	14.9	64.4
0.192000	46.3	9.000	N	9.7	17.7	63.9
3.894000	34.2	9.000	N	9.8	21.8	56.0
3.964000	34.5	9.000	N	9.8	21.5	56.0
3.968000	34.5	9.000	N	9.8	21.5	56.0
4.108000	34.2	9.000	N	9.8	21.8	56.0
4.140000	34.1	9.000	N	9.8	21.9	56.0
4.208000	34.0	9.000	N	9.8	22.0	56.0
11.682000	30.8	9.000	N	10.0	29.2	60.0
11.824000	31.5	9.000	N	10.0	28.5	60.0
11.858000	31.7	9.000	N	10.0	28.3	60.0
11.948000	31.8	9.000	N	10.0	28.2	60.0
11.994000	31.6	9.000	N	10.0	28.4	60.0
12.136000	31.1	9.000	N	10.0	28.9	60.0

CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	29.8	9.000	N	9.7	26.2	56.0
0.158000	29.6	9.000	N	9.7	26.0	55.6
0.174000	37.5	9.000	N	9.7	17.3	54.8
0.182000	36.4	9.000	N	9.7	18.0	54.4
0.190000	33.5	9.000	N	9.7	20.5	54.0
0.200000	27.6	9.000	N	9.7	26.0	53.6
3.880000	26.3	9.000	N	9.8	19.7	46.0
3.894000	26.0	9.000	N	9.8	20.0	46.0
3.922000	26.8	9.000	N	9.8	19.2	46.0
3.948000	26.2	9.000	N	9.8	19.8	46.0
3.990000	27.1	9.000	N	9.8	18.9	46.0
4.054000	26.3	9.000	N	9.8	19.7	46.0
11.942000	24.8	9.000	N	10.0	25.2	50.0
11.982000	24.9	9.000	N	10.0	25.1	50.0
11.994000	24.5	9.000	N	10.0	25.5	50.0
12.052000	24.3	9.000	N	10.0	25.7	50.0
12.136000	23.8	9.000	N	10.0	26.2	50.0
12.156000	23.7	9.000	N	10.0	26.3	50.0

4.2 Radiated Emission Below 1 GHz

4.2.1 Measuring instruments

Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Calibration Date
EMI test receiver	Rohde & Schwarz	ESU40	100524	1 year	05.17.2019
Trilog antenna	Schwarzbeck	VULB 9168	255	2 year	03.26.2019
Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
Antenna master controller	INNCO Systems	CO3000	CO3000/870/ 35990515/L	N/A	-
Turn Table	INNCO Systems	1060-2M	-	N/A	-
Turn table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
Software	Rohde & Schwarz	EMC32	-	-	-

4.2.2 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 6 Class B ANSI C63.4-2014
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.1 °C
Relative Humidity	42.5 %
Test Date	February 21, 2020

4.2.3 Measuring Data

Idle mode with case

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.242501	29.1	100.0	V	320.0	18.3	10.9	40.0
56.170000	22.1	100.0	V	142.0	19.6	17.9	40.0
76.537400	24.4	100.0	V	345.0	16.6	15.6	40.0
96.028000	24.7	174.9	H	46.0	14.8	18.9	43.5
132.794600	27.5	100.0	V	263.0	18.5	16.0	43.5
266.553800	34.1	100.0	H	342.0	19.3	11.9	46.0

Idle mode without case

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.689397	28.7	116.7	V	317.0	18.4	11.3	40.0
67.302000	24.2	100.0	V	7.0	18.4	15.8	40.0
132.812200	28.2	100.0	V	279.0	18.5	15.3	43.5
266.554800	34.5	100.0	H	341.0	19.3	11.5	46.0
276.113400	27.5	100.0	H	320.0	19.7	18.5	46.0
692.436000	28.6	374.7	V	290.0	28.7	17.4	46.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak

4.3 Radiated Emission Above 1 GHz

4.3.1 Measuring instruments

Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Calibration Date
EMI test receiver	Rohde & Schwarz	ESI40	100524	1 year	05.17.2019
Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
Antenna master controller	INNCO Systems	CO3000	CO3000/870/ 35990515/L	N/A	-
Turn table	INNCO Systems	1060-2M	-	N/A	-
Turn table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
Low Noise amplifier	TESTEK	TK-PA18H	170034-L	1 year	03.04.2019
Low Noise amplifier	TESTEK	TK-PA1840H	170033-L	1 year	03.11.2019
Horn antenna	Schwarzbeck	BBHA 9120D	01836	1 year	07.19.2019
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170786	1 year	12.03.2019
Software	Rohde & Schwarz	EMC32	-	-	-

4.3.2 Operating Condition

The test results of radiated emission provide the following information:

Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 6 Class B ANSI C63.4-2014
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Frequency	6.5 GHz
Tested Frequency Range	1 GHz to 40 GHz
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.1 °C
Relative Humidity	42.5 %
Test Date	February 21, 2020

NOTE. The measurement antenna aimed at the source of emission

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage

4.3.3 Measuring Data

Idle mode with case

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1331.960000	47.6	299.5	V	175.0	-26.3	26.4	74.0
1997.435000	51.9	111.4	V	51.0	-25.2	22.1	74.0
2592.910000	54.8	350.0	V	48.0	-23.0	19.2	74.0
2662.200000	47.2	127.8	V	3.0	-22.6	26.8	74.0
10461.660000	47.8	249.9	V	184.0	-3.5	26.2	74.0
17907.905000	54.0	100.0	V	192.0	7.4	20.0	74.0
19822.460000	42.2	139.6	H	0.0	2.5	31.8	74.0
22665.635000	43.3	125.8	H	49.0	6.2	30.7	74.0
24736.550000	46.3	150.1	V	310.0	8.6	27.7	74.0
26712.180000	48.5	124.6	V	295.0	10.3	25.5	74.0
27607.435000	50.3	137.5	V	0.0	10.5	23.7	74.0
30347.980000	49.6	100.0	H	62.0	11.5	24.4	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1331.960000	29.4	299.5	V	175.0	-26.3	24.6	54.0
1997.435000	35.5	111.4	V	51.0	-25.2	18.5	54.0
2592.910000	34.8	350.0	V	48.0	-23.0	19.2	54.0
2662.200000	28.5	127.8	V	3.0	-22.6	25.5	54.0
10461.660000	35.1	249.9	V	184.0	-3.5	18.9	54.0
17907.905000	41.2	100.0	V	192.0	7.4	12.8	54.0
19977.690000	28.9	100.0	V	331.0	2.6	25.1	54.0
23201.365000	31.7	100.0	H	190.0	6.8	22.3	54.0
24992.715000	33.4	100.0	V	110.0	9.2	20.6	54.0
26808.415000	35.6	100.0	H	51.0	10.4	18.4	54.0
27628.550000	36.9	100.0	V	206.0	10.5	17.1	54.0
30532.590000	36.5	100.0	H	50.0	11.8	17.5	54.0

Idle mode without case

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1329.750000	44.7	199.5	V	92.0	-26.3	29.3	74.0
1992.210000	51.9	111.6	V	47.0	-25.2	22.1	74.0
2595.575000	51.5	249.9	V	57.0	-23.0	22.5	74.0
2663.710000	48.7	249.9	V	21.0	-22.6	25.3	74.0
4481.190000	46.3	199.5	V	3.0	-17.5	27.7	74.0
17882.250000	53.8	150.1	V	135.0	7.2	20.2	74.0
19119.065000	42.1	99.7	V	212.0	2.1	31.9	74.0
22988.850000	45.1	150.0	H	38.0	6.7	28.9	74.0
25001.365000	46.3	99.9	V	37.0	9.2	27.7	74.0
26796.690000	48.4	125.9	H	114.0	10.4	25.6	74.0
27211.280000	49.6	139.6	H	0.0	10.6	24.4	74.0
31372.660000	50.4	99.8	V	143.0	12.5	23.6	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1329.750000	26.7	199.5	V	92.0	-26.3	27.3	54.0
1992.210000	35.3	111.6	V	47.0	-25.2	18.7	54.0
2595.575000	32.5	249.9	V	57.0	-23.0	21.5	54.0
2663.710000	29.6	249.9	V	21.0	-22.6	24.4	54.0
4481.190000	29.5	199.5	V	3.0	-17.5	24.5	54.0
17882.250000	40.9	150.1	V	135.0	7.2	13.1	54.0
18971.665000	29.4	99.8	V	142.0	2.0	24.6	54.0
22750.685000	31.2	99.9	V	0.0	6.4	22.8	54.0
25372.590000	33.3	99.9	V	36.0	9.2	20.8	54.0
26734.495000	35.6	114.4	V	216.0	10.3	18.4	54.0
27601.685000	37.0	99.9	V	240.0	10.5	17.0	54.0
31393.630000	37.4	99.7	V	11.0	12.5	16.6	54.0

5. CONCLUSION

The data collected shows that the **Product Name: UWB Module, Model Name: LCU-001** complies with § 15.107 and § 15.109 of the FCC rules and ICES-003 Issue 6 of the IC rules.

6. APPENDIX A. TEST SETUP PHOTO

Please refer to Appendix. A and test setup photo file no. as follows;

File No.	Date of Issue	Description
HCT-EM-2002-FI005-P	February 25, 2020	Initial Release

End of report