

TEST REPORT

EMC Test for IET10N

APPLICANT
SJIT Co.,Ltd

REPORT NO.
HCT-EM-2405-FI001

DATE OF ISSUE
May 31, 2024

Tested by
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TEST REPORT

FCC Certification
/ISED

REPORT NO.
HCT-EM-2405-FI001

DATE OF ISSUE
May 31, 2024

FCC ID. / IC
2BEK7IET10N / 32019-IET10N

Applicant **SJIT Co.,Ltd**
54-11, Dongtanhana 1-gil, Hwaseong-si, Gyeonggi-do,
Republic of Korea

Product Name Asset Tracker
Model Name IET10N

Date of Test 05.24.2024

Location of Test Permanent Testing Lab On Site Testing Lab
(Address: See clause 1.2)

Test Standard Used FCC CFR 47 PART 15 Subpart B Class B
ICES-003 Issue 7 Class B
ANSI C63.4-2014

Test Results Refer to the present document

Manufacturer SJIT Co.,Ltd

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	May 31, 2024	Initial Release

Notice

Content

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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1. TESTING LABORATORY

1.1 General Information

Organization Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383. Rep. of Korea
Telephone	+82 31 645 6300
FAX	+82 31 645 6401

1.2 Location of the Test Site

The test site is located at the following address.;

Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383. Rep. of Korea
Telephone	+82 31 645 6300
FAX	+82 31 645 6401

2. GENERAL INFORMATION

2.1 Description of EUT

FCC ID.	2BEK7IET10N
IC	32019-IET10N
Product Name	Asset Tracker
Model Name	IET10N
Operating Frequency	Bluetooth: 2 402 MHz to 2 480 MHz GNSS: 1 559 MHz to 1 610 MHz SIGFOX: RC2: 902.1375 MHz to 904.6625 MHz for TX 905.1375 MHz to 907.6625 MHz for RX RC4: 920.1375 MHz to 922.6625 MHz for TX 921.6375 MHz to 924.1625 MHz for RX WLAN 2.4 GHz: 2 412 MHz to 2 462 MHz for TX/RX NFC: 13.56 MHz
Rated Power	Battery: DC 3.6 V
Manufacturer	SJIT Co.,Ltd

NOTE.

This product uses built-in battery (AA size * 2EA) as power source. (3.6 VDC)

2.2 Power Source

During the test, the following power supply levels are utilized/provided.;

Power supply: DC 3.6 V (Battery)

2.3 Tested System Details

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

Device Type	Model Name	Serial Number	Manufacturer
Asset Tracker	IET10N	-	SJIT Co.,Ltd
Phone	G7	-	LG Electronics

2.4 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	DC IN	N	N	- (P)

“(D)” data cable and “(P)” power cable.

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

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	DC IN	N	N/A	N	N/A

2.6 Test Facility

The 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 and ANSI C63.4a-2017

Our laboratories are accredited and designated in accordance with the provisions of Radio Waves ACT and International Standard ISO/IEC 17025:2017. (National Radio Research Agency, CABID No. KR0032)

2.7 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.

2.8 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	Test Site	Expanded Uncertainty
Radiated Emission (30 MHz to 1 GHz)	3 m Semi Anechoic Chamber #1	5.8 dB
Radiated Emission (1 GHz to 18 GHz)	3 m Semi Anechoic Chamber #1	4.8 dB

3. DESCRIPTION OF TESTING

3.1 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;

FCC Part15 Subpart B

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

[*] Decreases with the logarithm of the frequency.

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

NOTE. The more stringent limit applies at transition frequencies.

[*] The limit level in dBµV decreases linearly with the logarithm of frequency.

※ In the frequency band, the FCC limit value and the IC limit value are the same.

3.2 Measurement of Radiated Emission

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

- a. 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.
- b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. 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.
- f. 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.
- g. 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;

FCC Part15 Subpart B

Frequency (MHz)	Class A			Class B		
	Antenna Distance (m)	Field Strength ($\mu\text{V}/\text{m}$)	Quasi-Peak ($\text{dB}\mu\text{V}/\text{m}$)	Antenna Distance (m)	Field Strength ($\mu\text{V}/\text{m}$)	Quasi-Peak ($\text{dB}\mu\text{V}/\text{m}$)
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 ($\text{dB}\mu\text{V}/\text{m}$)	Average ($\text{dB}\mu\text{V}/\text{m}$)	Peak ($\text{dB}\mu\text{V}/\text{m}$)	Average ($\text{dB}\mu\text{V}/\text{m}$)	
Above 1 000	3	80	60	74	54	

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Frequency (MHz)	Class A (3 m) Quasi-Peak (dB μ V/m)	Class A (10 m) Quasi-Peak (dB μ V/m)	Class B (3 m) Quasi-Peak (dB μ V/m)	Class B (10 m) Quasi-Peak (dB μ V/m)
30 to 88	50.0	40.0	40.0	30.0
88 to 216	54.0	43.5	43.5	33.1
216 to 230	56.9	46.4	46.0	35.6
230 to 960	57.0	47.0	47.0	37.0
960 to 1 000	60.0	49.5	54.0	43.5

NOTE. The more stringent limit applies at transition frequencies.

Frequency (GHz)	Antenna Distance (m)	Class A ^{ii, iii, iv} Average (dB(μ V/m))	Class A ^{ii, iii, iv} Peak (dB(μ V/m))	Class B ^{ii, iii, iv} Average (dB(μ V/m))	Class B ^{ii, iii, iv} Peak (dB(μ V/m))
1 – F_M	3	60	80	54	74

- i. The highest measurement frequency, F_M , in GHz, shall be determined as per clause 3.2.1
- ii. The measurement bandwidth shall be 1 MHz or greater.
- iii. These limit levels apply for a measurement distance of 3 m. If using a different measurement distance, the measured levels shall be extrapolated to the 3 m limit distance using a factor of 20 dB per decade of distance. The measurement distance shall place the measurement antenna in the far field of the ITE or digital apparatus under test.
- iv. The test site shall have been validated

※ In the above frequency band, the FCC limit value and the IC limit value are the same.

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

FCC Part15 Subpart B

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

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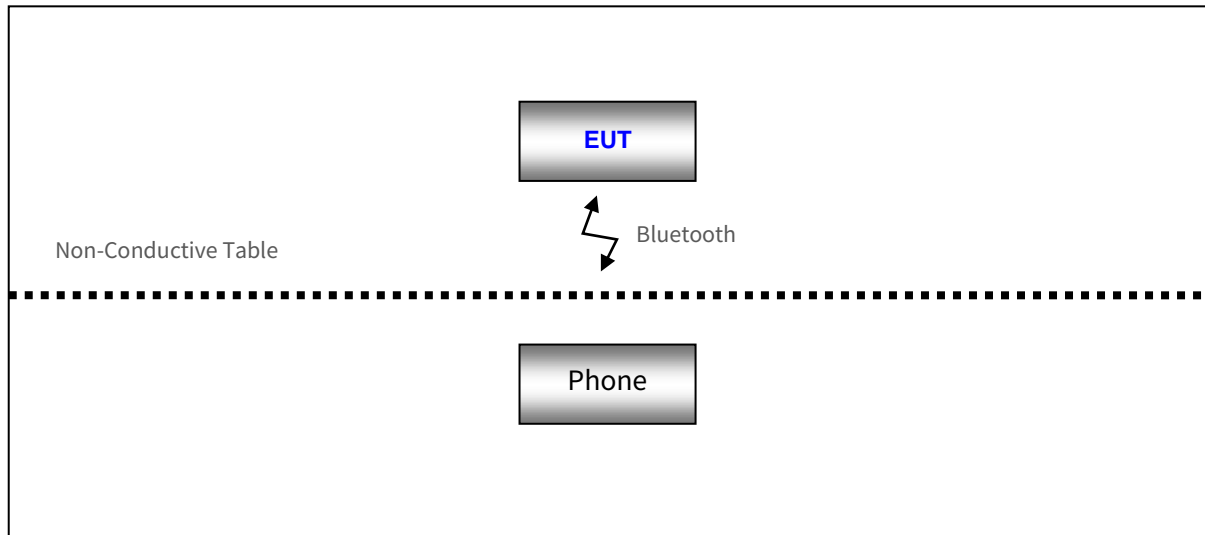
Highest internal frequency (F_x) ⁱ	Highest measurement frequency (F_M)
$F_x \leq 108$ MHz	1 GHz
108 MHz < $F_x \leq 500$ MHz	2 GHz
500 MHz < $F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	5 x F_x up to a maximum of 40 GHz

i. F_x is the highest fundamental frequency generated and/or used in the ITE or digital apparatus under test.

3.3 Configuration of Tested System

The EUT was configured in the following manner.

At the request of the manufacturer, the configuration of the tests was arranged.



4. OPERATION OF THE EUT

During preliminary test and final tests, the following operating mode was investigated.
It was tested the following operating mode, after connecting all peripheral devices.;

Operating Mode:

IDLE Mode ^{a)}

SIGFOX Mode(RC2 RX Low ch)

SIGFOX Mode(RC2 RX High ch)

SIGFOX Mode(RC4 RX Low ch)

SIGFOX Mode(RC4 RX High ch)

NOTE.

a) At the manufacturer's request, the preparation steps for entering commands after pairing a mobile phone with Bluetooth were tested in IDLE mode.

5. MEASURING INSTRUMENT

Type	Model Name	Manufacturer	Serial Number	Calibration Cycle	Next Calibration Date
Conducted emission					
<input type="checkbox"/>	LISN	ENV216	Rohde & Schwarz	102245	1 year 08.02.2024
<input type="checkbox"/>	Radio Communication Analyzer	MT8821C	Anritsu	6262192376	1 year 10.17.2024
<input type="checkbox"/>	Antenna	HyperLOG7060	Aaronia	66450	N/A -
<input type="checkbox"/>	Software	EMC32	Rohde & Schwarz	-	N/A -
Radiated emission below 1 GHz					
<input checked="" type="checkbox"/>	EMI Test Receiver	ESU40	Rohde & Schwarz	100524	1 year 05.07.2025
<input checked="" type="checkbox"/>	Bilog Antenna	VULB9168	Schwarzbeck	255	2 year 03.15.2025
<input checked="" type="checkbox"/>	Antenna master	MA4640-XP-ET	INNCO SYSTEM	-	N/A -
<input checked="" type="checkbox"/>	Turn Table	1060	INNCO SYSTEM	-	N/A -
<input checked="" type="checkbox"/>	Software	EMC32	Rohde & Schwarz	-	- -
Radiated emission above 1 GHz					
<input checked="" type="checkbox"/>	EMI test receiver	ESU40	Rohde & Schwarz	100524	1 year 05.07.2025
<input checked="" type="checkbox"/>	Horn Antenna	HF907	Rohde & Schwarz	103160	1 year 10.16.2024
<input checked="" type="checkbox"/>	Power Amplifier	TK-PA18H	TESTEK	170034-L	1 year 11.01.2024
<input type="checkbox"/>	Horn Antenna	BBHA 9170	Schwarzbeck	BBHA 9170 #786	1 year 11.01.2024
<input type="checkbox"/>	Power Amplifier	TK-PA1840H	TESTEK	170030-L	1 year 02.20.2025
<input checked="" type="checkbox"/>	Antenna master	MA4640-XP-ET	INNCO SYSTEM	-	N/A -
<input checked="" type="checkbox"/>	Turn Table	1060	INNCO SYSTEM	-	
<input checked="" type="checkbox"/>	Software	EMC32	Rohde & Schwarz	-	- -

6. EMISSION TEST SUMMARY

6.1 Conducted Emission (Not Applicable)

6.1.1 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 7 Class B ANSI C63.4-2014
Frequency Range	150 kHz to 30 MHz
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operating Mode	---
Test Site	EMI Shield Room
Temperature	min. ---- °C / max. ---- °C
Relative Humidity	min. ---- % / max. ---- %
Test Date	---

A conducted emission is calculated by the following equation.;

$$\begin{aligned} \text{Calculation Formula: } & \text{QuasiPeak or CAverage} = \text{Receiver Reading} + \text{Corr.} \\ & \text{Corr.} = \text{LISN Factor} + \text{Cable Loss} \\ & \text{Margin} = \text{Limit} - \text{QuasiPeak or CAverage} \\ & \text{L1} = \text{Live, N} = \text{Neutral} \end{aligned}$$

Two graphs measurement for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

6.1.2 Measurement Data

Not applicable

6.2 Radiated Emission Below 1 GHz

6.2.1 Operating Condition

The test results of radiated emission provide the following information:

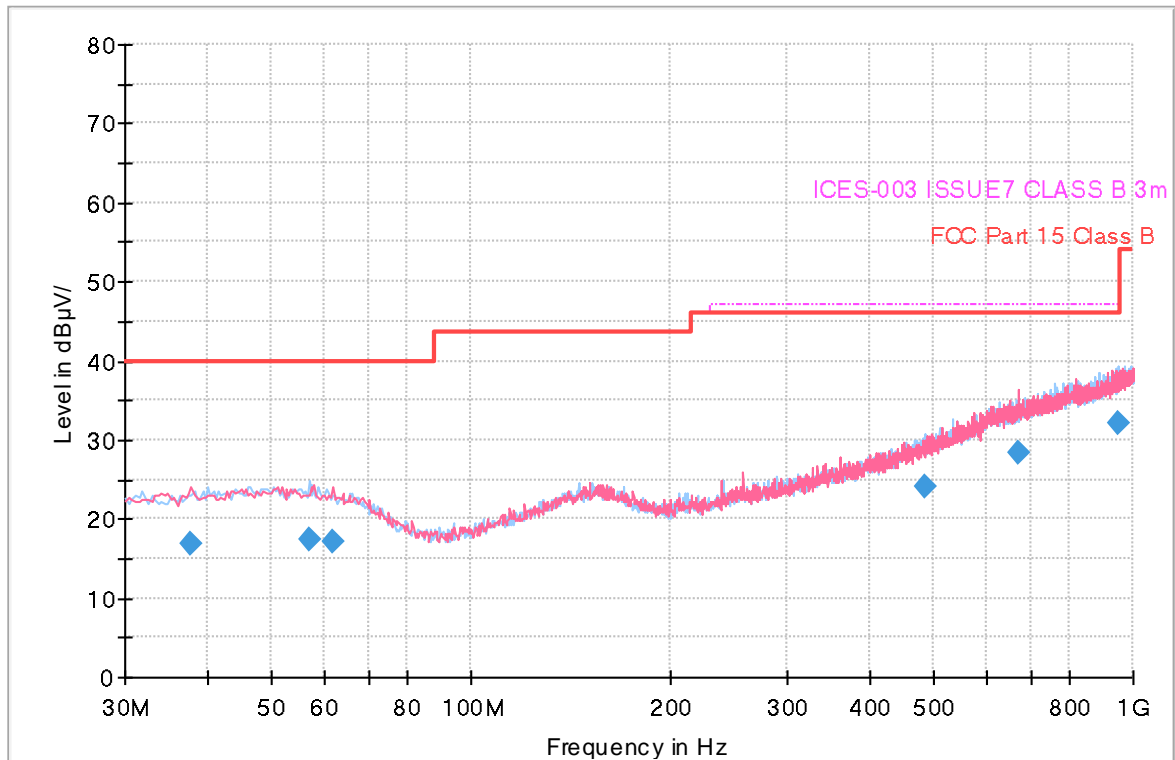
Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 7 Class B ANSI C63.4-2014
Frequency Range	30 MHz to 1 000 MHz
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Antenna Height	1 m to 4 m
Operating Mode	IDLE Mode SIGFOX Mode(RC2 RX Low ch) SIGFOX Mode(RC2 RX High ch) SIGFOX Mode(RC4 RX Low ch) SIGFOX Mode(RC4 RX High ch)
Test Site	3 m Semi Anechoic Chamber #1
Temperature	min. 24.1 °C, max. 25.8 °C
Relative Humidity	min. 35.8 %, max. 43.0 %
Test Date	05.24.2024

A field strength is calculated by the following equation.;

Calculation Formula: $QuasiPeak = Reading (Receiver Reading) + Corr.$
 $Corr. (Correction Factor) = Antenna Factor + Cable Loss$
 $Margin = Limit - QuasiPeak$
 Polarity H = Horizontal, Polarity V = Vertical

6.2.2 Measurement Data

IDLE Mode
Full Spectrum



— Preview Result 1H-PK+ — Preview Result 1V-PK+
- - - ICES-003 ISSUE7 CLASS B 3m — FCC Part 15 Class B
◆ Final Result QPK

Final_Result(FCC Part 15)

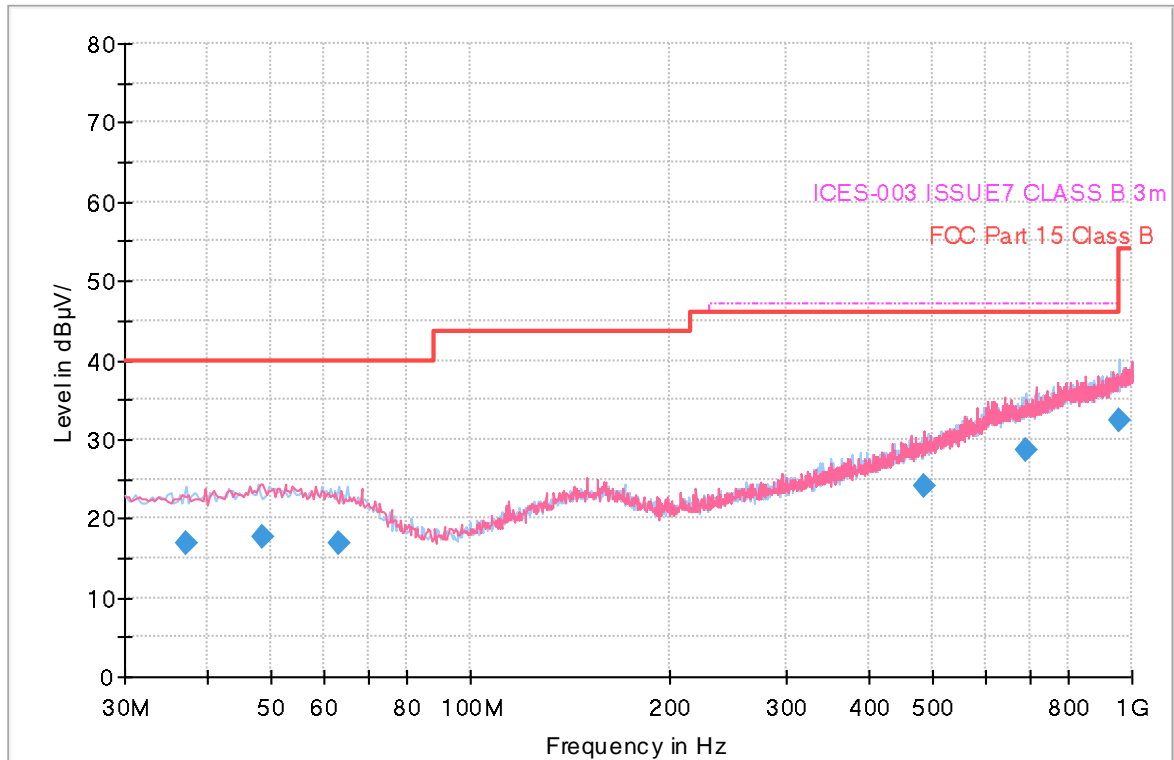
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.8432	16.83	40.00	23.17	285.9	V	292.0	19.4
56.8442	17.42	40.00	22.58	174.9	H	249.0	19.9
61.7356	16.99	40.00	23.01	201.8	V	201.0	19.5
484.7840	23.98	46.00	22.02	222.9	H	341.0	25.0
669.5007	28.26	46.00	17.74	174.8	V	275.0	28.4
949.6731	32.22	46.00	13.78	100.0	H	17.0	32.1

Final_Result(ICES-003 Issue 7)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.8432	16.83	40.00	23.17	285.9	V	292.0	19.4
56.8442	17.42	40.00	22.58	174.9	H	249.0	19.9
61.7356	16.99	40.00	23.01	201.8	V	201.0	19.5
484.7840	23.98	47.00	23.02	222.9	H	341.0	25.0
669.5007	28.26	47.00	18.74	174.8	V	275.0	28.4
949.6731	32.22	47.00	14.78	100.0	H	17.0	32.1

SIGFOX Mode(RC2 RX High ch)

Full Spectrum



- Preview Result 1H-PK+
- - - ICES-003 ISSUE7 CLASS B 3m
- ◆ Final Result QPK
- Preview Result 1V-PK+
- FCC Part 15 Class B

Final Result(FCC Part 15)

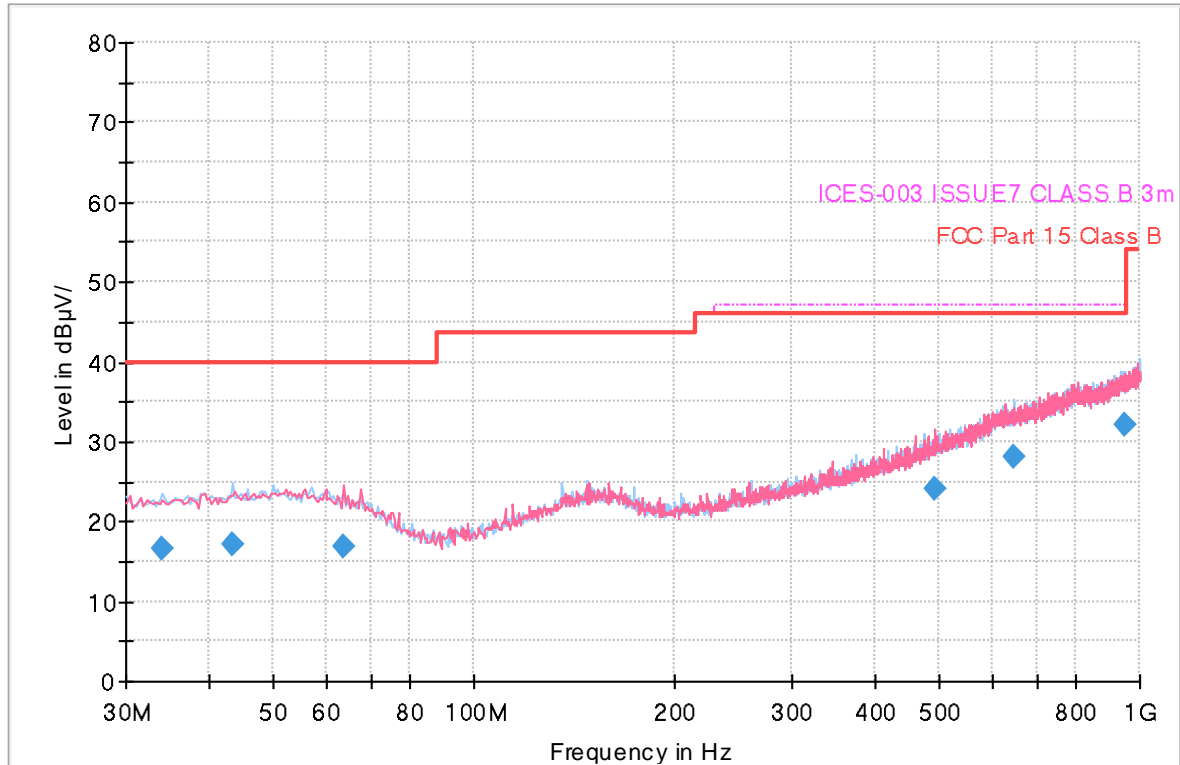
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.1109	16.85	40.00	23.15	286.0	H	222.0	19.3
48.3131	17.58	40.00	22.42	325.1	V	75.0	20.2
63.2353	16.87	40.00	23.13	185.7	H	86.0	19.3
486.2794	24.01	46.00	21.99	284.7	V	16.0	25.1
692.9692	28.61	46.00	17.39	400.0	H	188.0	28.7
955.2465	32.27	46.00	13.73	302.8	H	338.0	32.2

Final Result(ICES-003 Issue 7)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.1109	16.85	40.00	23.15	286.0	H	222.0	19.3
48.3131	17.58	40.00	22.42	325.1	V	75.0	20.2
63.2353	16.87	40.00	23.13	185.7	H	86.0	19.3
486.2794	24.01	47.00	22.99	284.7	V	16.0	25.1
692.9692	28.61	47.00	18.39	400.0	H	188.0	28.7
955.2465	32.27	47.00	14.73	302.8	H	338.0	32.2

SIGFOX Mode(RC2 RX Low ch)

Full Spectrum



— Preview Result 1H-PK+ — Preview Result 1V-PK+
- - - ICES-003 ISSUE7 CLASS B 3m — FCC Part 15 Class B
◆ Final Result QPK

Final_Result(FCC Part 15)

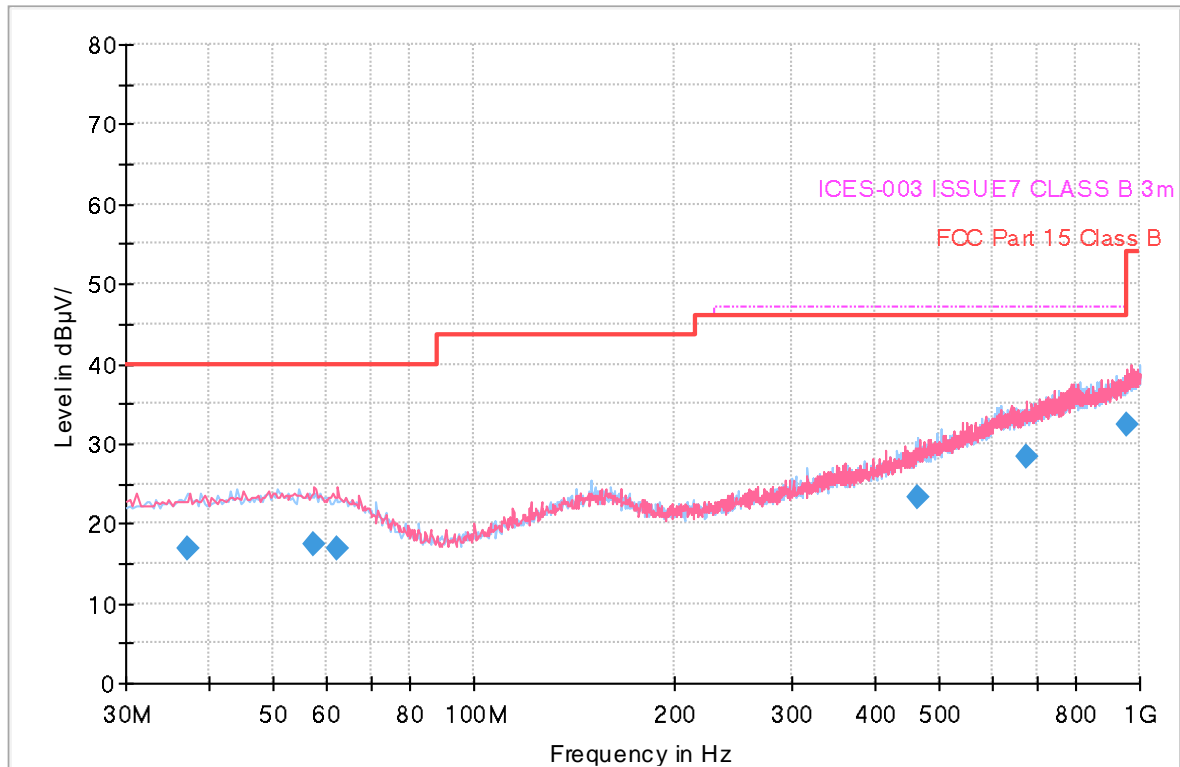
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.0983	16.69	40.00	23.31	375.0	H	64.0	19.0
43.4077	17.14	40.00	22.86	225.1	H	164.0	19.9
63.5703	16.87	40.00	23.13	109.8	V	201.0	19.2
491.1470	24.12	46.00	21.88	303.0	V	115.0	25.2
647.4672	28.01	46.00	17.99	125.3	H	224.0	28.1
952.6181	32.23	46.00	13.77	375.0	H	174.0	32.1

Final_Result(ICES-003 Issue 7)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.0983	16.69	40.00	23.31	375.0	H	64.0	19.0
43.4077	17.14	40.00	22.86	225.1	H	164.0	19.9
63.5703	16.87	40.00	23.13	109.8	V	201.0	19.2
491.1470	24.12	47.00	22.88	303.0	V	115.0	25.2
647.4672	28.01	47.00	18.99	125.3	H	224.0	28.1
952.6181	32.23	47.00	14.77	375.0	H	174.0	32.1

SIGFOX Mode(RC4 RX High ch)

Full Spectrum



— Preview Result 1H-PK+ — Preview Result 1V-PK+
- - - ICES-003 ISSUE7 CLASS B 3m — FCC Part 15 Class B
◆ Final Result QPK

Final_Result(FCC Part 15)

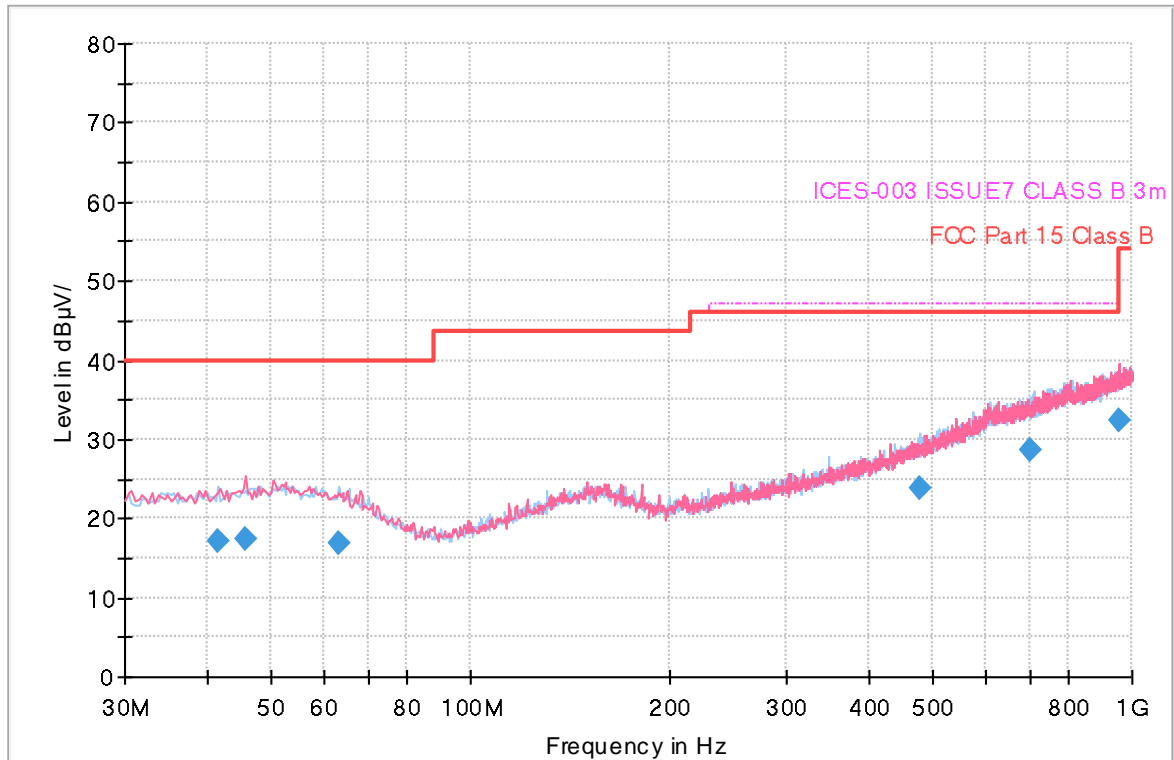
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.1023	16.81	40.00	23.19	182.7	H	72.0	19.3
57.6448	17.39	40.00	22.61	220.9	V	151.0	19.8
62.4863	16.88	40.00	23.12	125.2	V	255.0	19.4
464.2800	23.40	46.00	22.60	319.7	H	114.0	24.6
675.4480	28.33	46.00	17.67	185.9	V	189.0	28.5
957.4369	32.25	46.00	13.75	109.8	V	216.0	32.2

Final_Result(ICES-003 Issue 7)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.1023	16.81	40.00	23.19	182.7	H	72.0	19.3
57.6448	17.39	40.00	22.61	220.9	V	151.0	19.8
62.4863	16.88	40.00	23.12	125.2	V	255.0	19.4
464.2800	23.40	47.00	23.60	319.7	H	114.0	24.6
675.4480	28.33	47.00	18.67	185.9	V	189.0	28.5
957.4369	32.25	47.00	14.75	109.8	V	216.0	32.2

SIGFOX Mode(RC4 RX Low ch)

Full Spectrum



- Preview Result 1H-PK+
- - - ICES-003 ISSUE7 CLASS B 3m
- ◆ Final Result QPK
- Preview Result 1V-PK+
- FCC Part 15 Class B

Final Result(FCC Part 15)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.5777	17.02	40.00	22.98	283.7	H	313.0	19.7
45.6436	17.28	40.00	22.72	400.0	V	330.0	20.0
63.1791	16.88	40.00	23.12	400.0	H	105.0	19.3
477.6900	23.81	46.00	22.19	400.0	H	258.0	24.9
700.8307	28.68	46.00	17.32	274.9	H	315.0	28.8
958.1807	32.30	46.00	13.70	100.0	V	22.0	32.2

Final Result(ICES-003 Issue 7)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.5777	17.02	40.00	22.98	283.7	H	313.0	19.7
45.6436	17.28	40.00	22.72	400.0	V	330.0	20.0
63.1791	16.88	40.00	23.12	400.0	H	105.0	19.3
477.6900	23.81	47.00	23.19	400.0	H	258.0	24.9
700.8307	28.68	47.00	18.32	274.9	H	315.0	28.8
958.1807	32.30	47.00	14.70	100.0	V	22.0	32.2

6.3 Radiated Emission Above 1 GHz

6.3.1 Operating Condition

The test results of radiated emission provide the following information:

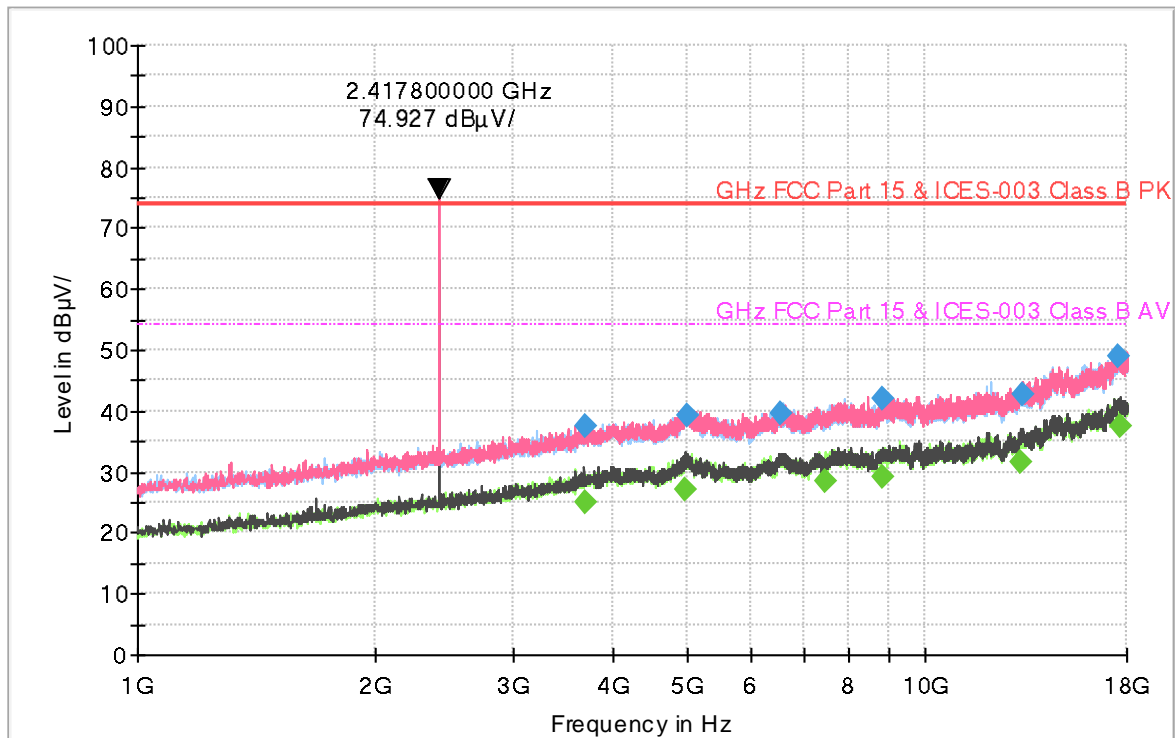
Used Test Standard	FCC CFR 47 PART 15 Subpart B Class B ICES-003 Issue 7 Class B ANSI C63.4-2014
Detector	Peak, CISPR-Average
Bandwidth	1 MHz
Highest Frequency	2 480 MHz
Tested Frequency Range	1 GHz to 18 GHz
Antenna Height	1 m to 4 m
Operating Mode	IDLE Mode SIGFOX Mode(RC2 RX Low ch) SIGFOX Mode(RC2 RX High ch) SIGFOX Mode(RC4 RX Low ch) SIGFOX Mode(RC4 RX High ch)
Test Site	3 m Semi Anechoic Chamber #1
Temperature	min. 24.1 °C, max. 25.8 °C
Relative Humidity	min. 35.8 %, max. 43.0 %
Test Date	05.24.2024

A field strength is calculated by the following equation.;

Calculation Formula: Peak or CAverage = Reading (Receiver Reading) + Corr.
 Corr. (Correction Factor) = Antenna Factor+ Cable Loss
 Margin = Limit - Peak or CAverage
 Polarity H = Horizontal, Polarity V = Vertical

6.3.2 Measurement Data

IDLE Mode
Full Spectrum



- Preview Result 2H-AVG
- Preview Result 2V-AVG
- GHz FCC Part 15 & ICES-003 Class B PK
- Preview Result 1H-PK+
- Preview Result 1V-PK+
- - - GHz FCC Part 15 & ICES-003 Class B AV
- ◆ Final Result PK+
- ◆ Final Result CAV

Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3694.8550	37.67	74.00	36.33	1000.000	224.9	V	25.0	-18.8
4975.0200	39.27	74.00	34.73	1000.000	179.7	V	4.0	-15.0
6567.2400	39.52	74.00	34.48	1000.000	308.6	H	18.0	-12.1
8828.7750	41.85	74.00	32.15	1000.000	321.8	H	202.0	-9.8
13288.650	42.82	74.00	31.18	1000.000	325.0	V	224.0	-3.9
17535.410	48.87	74.00	25.13	1000.000	174.7	V	326.0	4.6

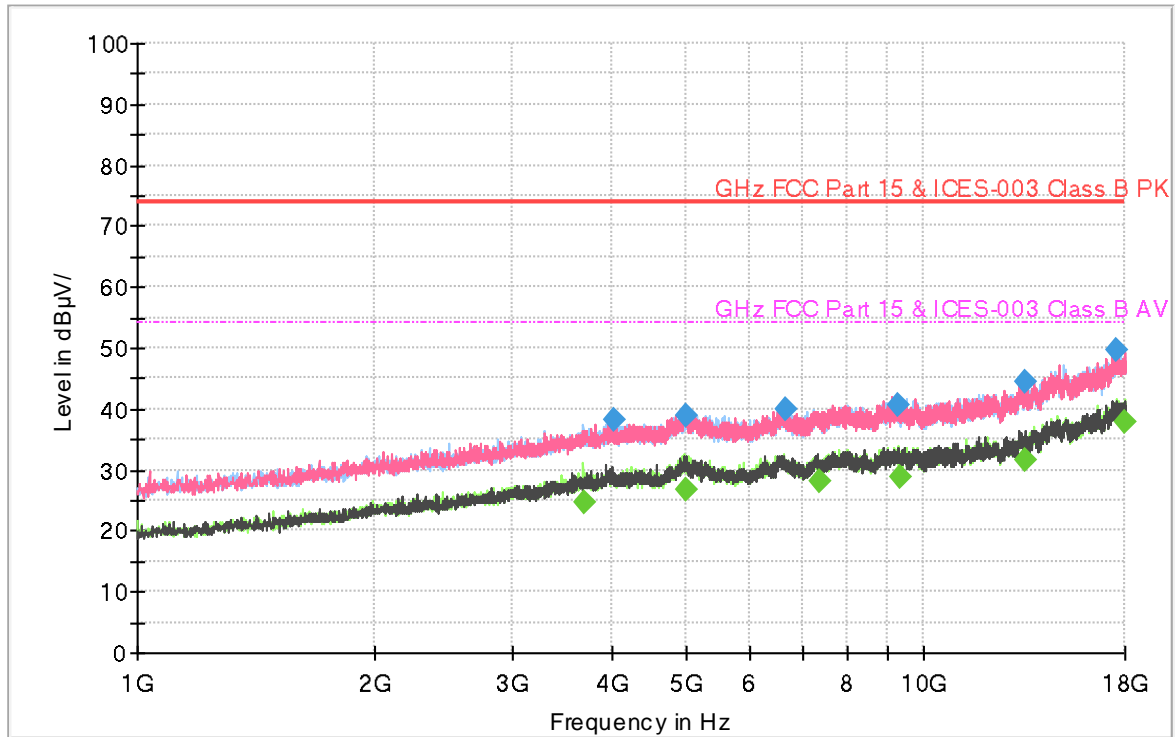
Final_Result_CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3700.9050	24.86	54.00	29.14	1000.000	125.2	V	80.0	-18.8
4952.3850	26.92	54.00	27.08	1000.000	125.2	V	1.0	-15.1
7477.5350	28.42	54.00	25.58	1000.000	189.6	H	53.0	-10.7
8834.8850	29.24	54.00	24.76	1000.000	174.6	H	130.0	-9.8
13182.185	31.62	54.00	22.38	1000.000	125.2	V	148.0	-4.1
17654.005	37.36	54.00	16.64	1000.000	124.9	V	112.0	5.0

Bluetooth Fundamental Frequency: 2.4178 GHz

SIGFOX Mode(RC2 RX High ch)

Full Spectrum



- Preview Result 2H-AVG
- Preview Result 2V-AVG
- GHz FCC Part 15 & ICES-003 Class B PK
- Preview Result 1H-PK+
- Preview Result 1V-PK+
- GHz FCC Part 15 & ICES-003 Class B AV
- ◆ Final Result PK+
- ◆ Final Result CAV

Final_Result_PK+

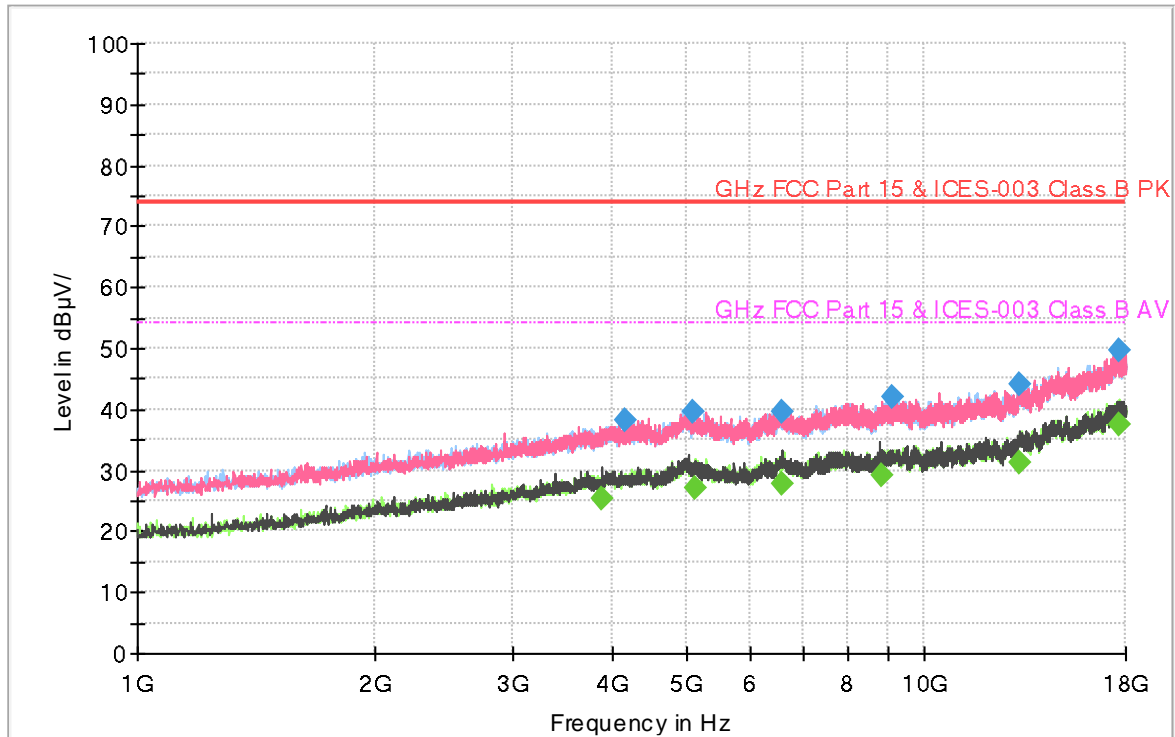
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4036.8900	38.25	74.00	35.75	1000.000	105.6	H	214.0	-17.5
4974.4700	38.75	74.00	35.25	1000.000	273.6	H	317.0	-15.0
6680.3800	40.02	74.00	33.98	1000.000	125.1	V	86.0	-11.9
9281.9450	40.69	74.00	33.31	1000.000	125.2	H	194.0	-9.4
13482.345	44.30	74.00	29.70	1000.000	104.9	V	315.0	-3.5
17608.340	49.53	74.00	24.47	1000.000	321.7	H	67.0	4.8

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3707.0550	24.72	54.00	29.28	1000.000	286.6	H	113.0	-18.8
4970.1300	26.65	54.00	27.35	1000.000	318.5	H	25.0	-15.0
7347.5450	28.20	54.00	25.80	1000.000	325.1	V	347.0	-10.9
9318.2750	28.69	54.00	25.31	1000.000	188.8	H	25.0	-9.4
13437.015	31.63	54.00	22.37	1000.000	317.7	V	62.0	-3.6
17955.925	37.77	54.00	16.23	1000.000	205.6	H	259.0	6.2

SIGFOX Mode(RC2 RX Low ch)

Full Spectrum


Final Result PK+

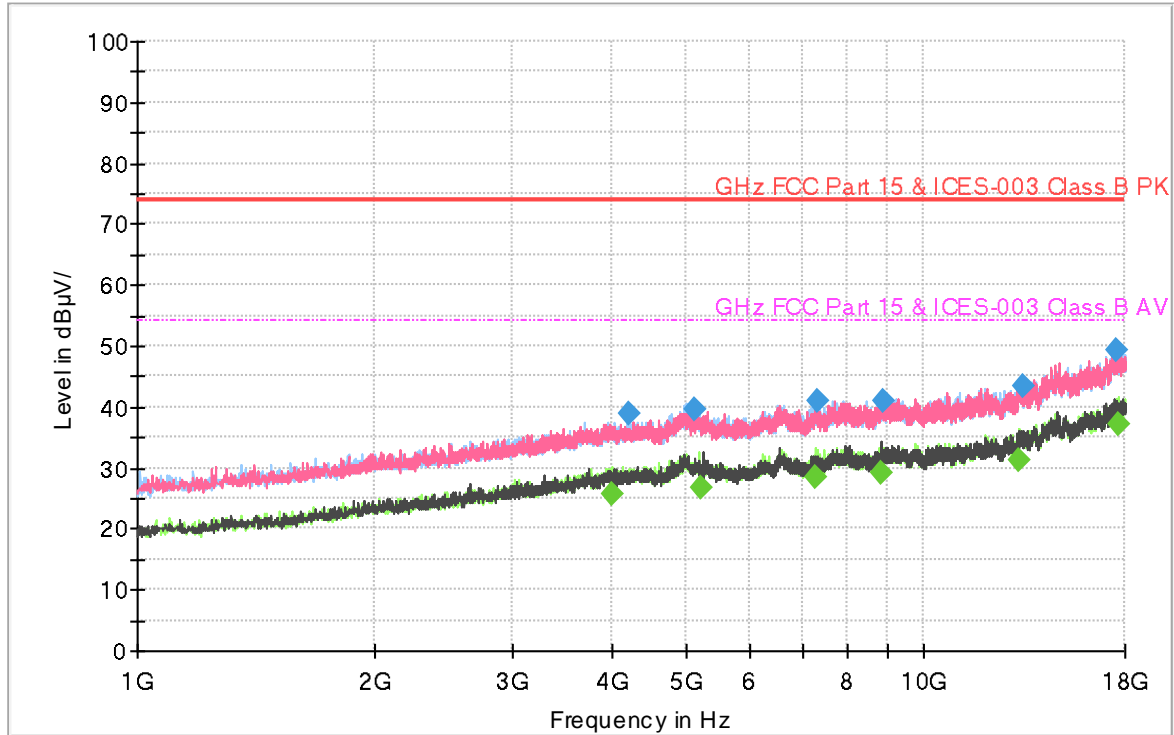
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4165.2600	38.07	74.00	35.93	1000.000	107.6	V	112.0	-17.3
5079.2200	39.69	74.00	34.31	1000.000	174.8	H	182.0	-14.8
6573.0300	39.54	74.00	34.46	1000.000	300.6	V	271.0	-12.1
9091.0050	42.03	74.00	31.97	1000.000	108.5	V	230.0	-9.6
13198.415	43.99	74.00	30.01	1000.000	325.1	V	214.0	-4.1
17675.470	49.52	74.00	24.48	1000.000	107.6	H	56.0	5.1

Final Result_CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3888.4950	25.26	54.00	28.74	1000.000	202.6	V	40.0	-18.1
5095.3750	27.14	54.00	26.86	1000.000	181.7	H	202.0	-14.7
6586.6700	27.74	54.00	26.26	1000.000	125.2	V	253.0	-12.1
8797.6700	29.09	54.00	24.91	1000.000	225.0	V	271.0	-9.9
13183.590	31.29	54.00	22.71	1000.000	325.1	V	351.0	-4.1
17657.055	37.41	54.00	16.59	1000.000	125.2	H	158.0	5.0

SIGFOX Mode(RC4 RX High ch)

Full Spectrum



- Preview Result 2H-AVG
- Preview Result 2V-AVG
- GHz FCC Part 15 & ICES-003 Class B PK
- Preview Result 1H-PK+
- Preview Result 1V-PK+
- GHz FCC Part 15 & ICES-003 Class B AV
- ◆ Final Result PK+
- ◆ Final Result CAV

Final Result PK+

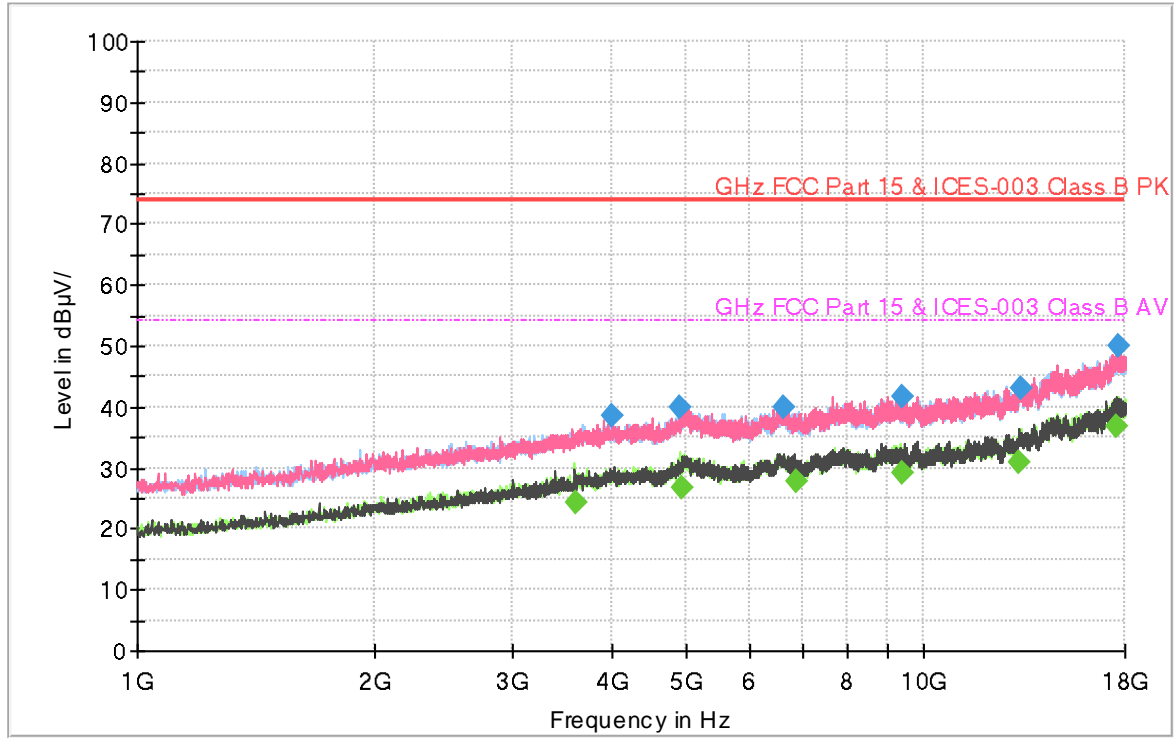
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4205.9100	38.74	74.00	35.26	1000.000	120.4	H	160.0	-17.2
5109.1400	39.56	74.00	34.44	1000.000	118.6	V	274.0	-14.7
7319.1050	40.94	74.00	33.06	1000.000	124.9	H	302.0	-10.9
8864.0700	40.87	74.00	33.13	1000.000	325.1	H	306.0	-9.8
13403.070	43.40	74.00	30.60	1000.000	190.5	H	204.0	-3.7
17572.600	49.40	74.00	24.60	1000.000	206.5	V	310.0	4.7

Final Result CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4004.7200	25.80	54.00	28.20	1000.000	174.7	H	51.0	-17.6
5216.4250	26.82	54.00	27.18	1000.000	182.7	V	0.0	-14.5
7296.5350	28.31	54.00	25.69	1000.000	274.6	H	112.0	-11.0
8811.2000	29.12	54.00	24.88	1000.000	125.2	V	25.0	-9.8
13171.425	31.19	54.00	22.81	1000.000	281.6	H	103.0	-4.1
17626.315	37.27	54.00	16.73	1000.000	325.1	H	210.0	4.9

SIGFOX Mode(RC4 RX Low ch)

Full Spectrum



- Preview Result 2H-AVG
- Preview Result 2V-AVG
- GHz FCC Part 15 & ICES-003 Class B PK
- Preview Result 1H-PK+
- Preview Result 1V-PK+
- GHz FCC Part 15 & ICES-003 Class B AV
- ◆ Final Result PK+
- ◆ Final Result CAV

Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4001.8400	38.67	74.00	35.33	1000.000	125.1	H	0.0	-17.6
4899.8500	39.87	74.00	34.13	1000.000	306.5	H	149.0	-15.2
6624.8050	40.07	74.00	33.93	1000.000	174.7	V	345.0	-12.0
9412.1000	41.66	74.00	32.34	1000.000	274.6	H	257.0	-9.2
13258.515	43.17	74.00	30.83	1000.000	207.5	V	318.0	-4.0
17705.355	49.94	74.00	24.06	1000.000	216.5	V	20.0	5.2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3606.9400	24.38	54.00	29.62	1000.000	279.5	H	149.0	-19.1
4910.6350	26.60	54.00	27.40	1000.000	174.8	H	210.0	-15.2
6868.5800	27.95	54.00	26.05	1000.000	105.6	V	152.0	-11.6
9370.7900	29.10	54.00	24.90	1000.000	225.0	H	158.0	-9.3
13224.535	30.97	54.00	23.03	1000.000	285.6	V	26.0	-4.0
17564.585	36.87	54.00	17.13	1000.000	225.1	V	61.0	4.7

7. 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-2405-FI001-P	May 31, 2024	Initial Release

End of report