

Prüfbericht-Nr.: Test report no.:	CN21R8N6 001	Auftrags-Nr.: Order no.:	168329971	Seite 1 von 47 Page 1 of 47
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2021-08-01	
Auftraggeber: Client:	Dongguan Hengxin Plastic Technology Co., Ltd Building 1, No.33, Dongwai Ring Road, Dongkeng Town, Dongguan City, Guangdong Province, China			
Prüfgegenstand: Test item:	Naughty or Nice Christmas Ornament			
Bezeichnung / Typ-Nr.: Identification / Type no.:	NON-2021A			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.209			
Wareneingangsdatum: Date of sample receipt:	2021-08-01	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no.:	3003			
Prüfzeitraum: Testing period:	2021-07-28 – 2021-08-06			
Ort der Prüfung: Place of testing:	Shenzhen Huaxia Testing Technology Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:			genehmigt von: authorized by:	
Datum: Date:	2021-08-15	Ausstellungsdatum: Issue date:		2021-08-15
Stellung / Position:	Project Manager	Stellung / Position:		Reviewer
Sonstiges / Other:	FCC ID: 2A2K4-ZINC			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V05

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 6dB BANDWIDTH

RESULT: Pass

5.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Pass

5.1.6 RADIATED SPURIOUS EMISSION

RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

N/A

2 Test Sites

2.1 Test Facilities

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street,
Longhua District, Shenzhen, China

FCC Registration No.: 522263

ISED wireless device testing laboratory: 22984-1

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (TS8997)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Signal Analyzer	R&S	FSU	CQA038	2021-09-22
Control PC	Lenovo	N/A	CQA043	N/A
Test Software	Tonsend	2.6	N/A	N/A
Power Meter	Tonsend	Ji0806-2	CQA052	2021-9-21
Shielding Room 1#	Auchno	OJN-9605	CQA-S004	2021-07-23
Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR7	CQA-005	2021-9-25
Spectrum analyzer	R&S	FSU26	CQA-038	2021-10-27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2021-9-25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2021-11-1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2021-10-27
Bilog Antenna	R&S	HL562	CQA-011	2021-9-25
Horn Antenna	R&S	HF906	CQA-012	2021-9-25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021-9-25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2021-9-25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2021-9-25
Antenna Connector	CQA	RFC-01	CQA-080	2021-9-25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021-9-25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021-9-25
high-low temperature chamber	Auchno	OJN-9606	CQA-S003	2021-09-24

Conducted Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESPI3	CQA-013	2021/9/25
LISN	R&S	ENV216	CQA-003	2021/11/4
Coaxial cable	CQA	N/A	CQA-C009	2021/9/25

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radiated Emission (Below 1GHz)	±5.12dB
Radiated Emission (Above 1GHz)	±4.60dB
Conducted Disturbance (0.15~30MHz)	±3.34dB
Radio Frequency	3×10^{-8}
Duty cycle	0.6 %.
Occupied Bandwidth	1.1%
RF conducted power	0.86dB
RF power density	0.74
Conducted Spurious emissions	0.86dB
Temperature test	0.8°C
Humidity test	2.0%
Supply voltages	0.5 %.
time	0.6 %.
Frequency Error	5.5 Hz

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Shenzhen Huaxia Testing Technology Co., Ltd. Test facility located at **Error! Reference source not found.** is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Naughty or Nice Christmas Ornament, which supports Bluetooth low energy wireless technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Naughty or Nice Christmas Ornament
Type Designation:	NON-2021A
FCC ID:	2A2K4-ZINC
Operating Voltage:	DC 4.5V
Testing Voltage:	DC 4.5V
Antenna Type:	PCB antenna
Antenna Gain:	0 dBi
Technical Specification of Bluetooth LE	
Frequency Range:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK
Channel Number:	40 channels
Data Rate:	1 Mbps
Channel Separation:	2 MHz

Table 3: RF Channel and Frequency of BLE

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Test frequencies are lowest channel: 2402 MHz, middle channel: 2440 MHz and highest channel: 2480 MHz for BLE

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth LE transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, Charging with APP connecting mode
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- User Manual
- Schematics
- Block Diagram

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

Table 4: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N
Laptop	Lenovo	131ML	MP1RVBCB

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

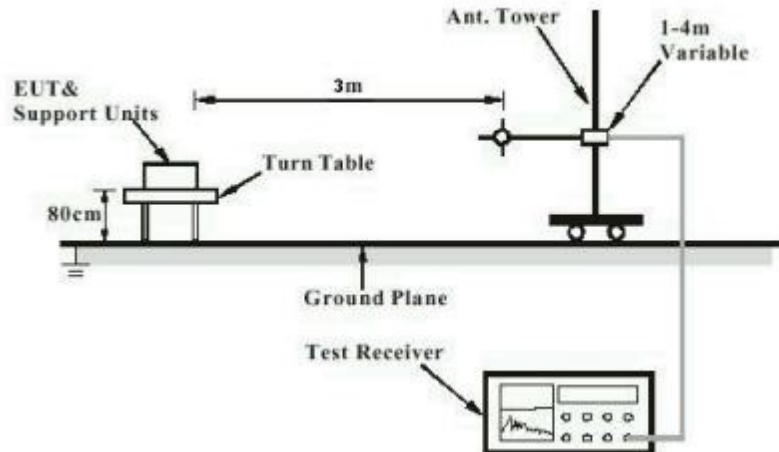


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

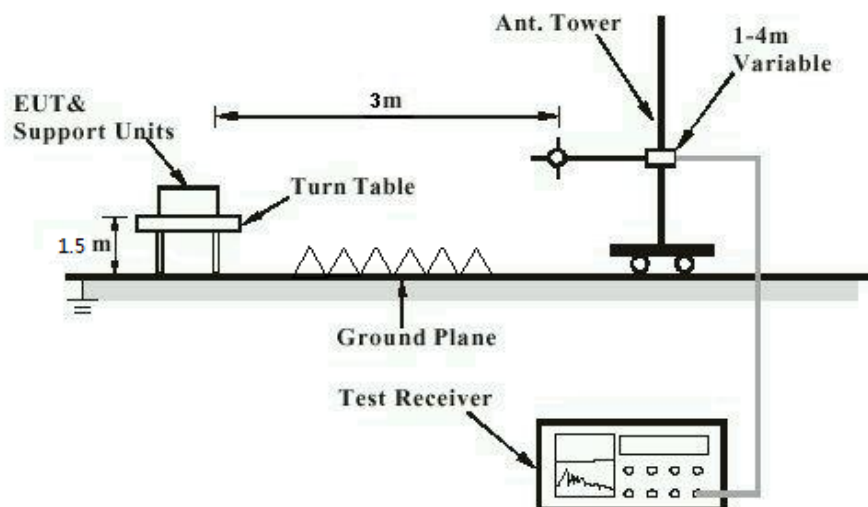


Diagram of Measurement Configuration for Mains Conduction Measurement

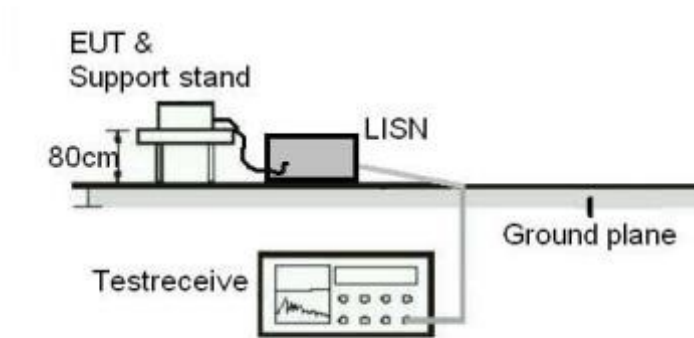
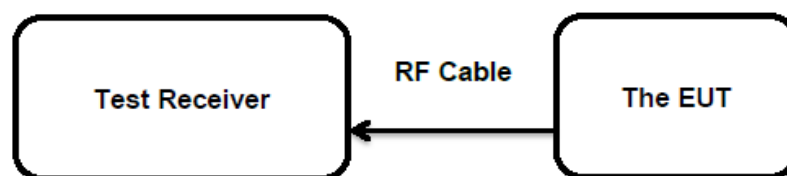


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has a PCB antenna, the directional gain of antenna is 0 dBi, which that permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(b)(3)

Basic standard : ANSI C63.10: 2013

Limits : 1.0 Watts

Kind of test site : Shielded Room

Test Setup

Date of testing : 2021-04-20

Input voltage : DC 4.5V

Operation mode : A

Test channel : Low / Middle / High

Ambient temperature : 25.7 °C

Relative humidity : 52 %

Atmospheric pressure : 101 kPa

Table 5: Test Result of Maximum Peak Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
BLE	2402	-1.78	0.0007	< 1.0
	2440	1.27	0.0013	
	2480	2.78	0.0019	
Max. Measured Value		2.78	0.0019	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 0 dBi

5.1.3 Conducted Power Spectral Density

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(e)

Basic standard : ANSI C63.10: 2013

Limits : < 8 dBm / 3kHz

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : DC 4.5V

Operation mode : A

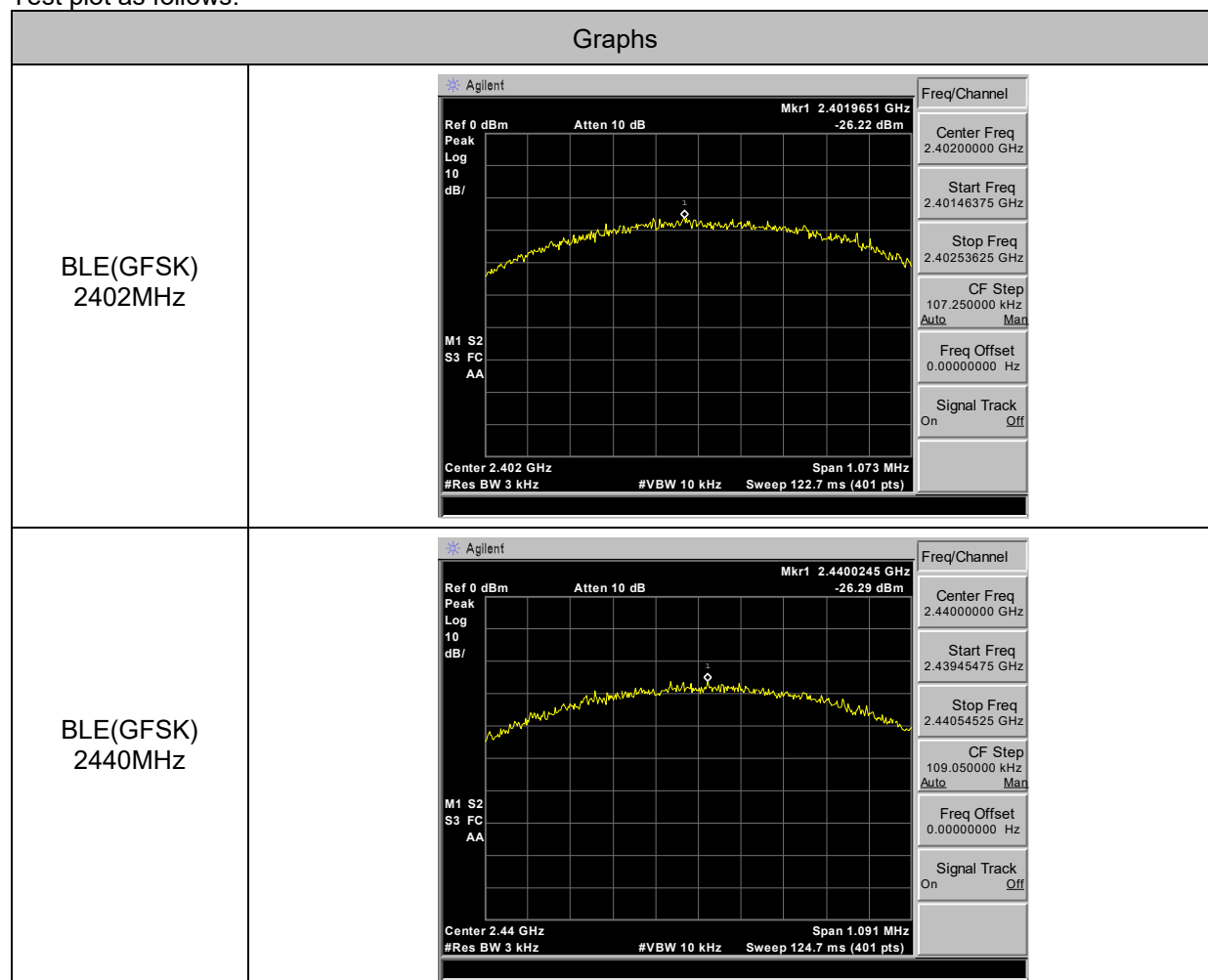
Test channel : Low / Middle / High

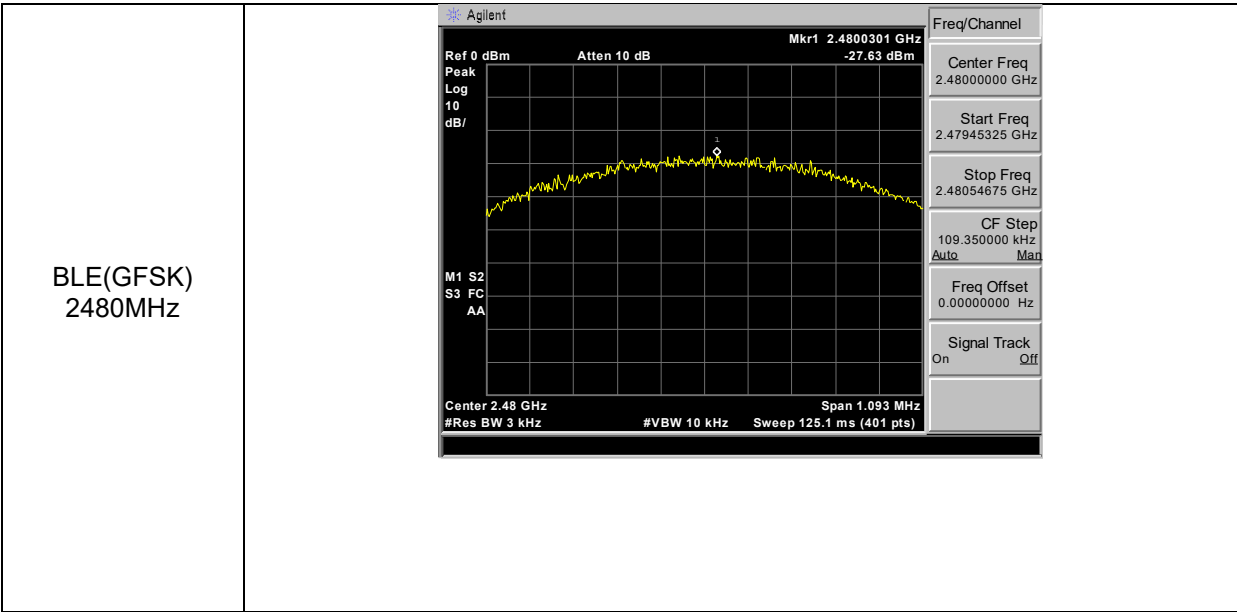
Ambient temperature : 25.7 °C

Relative humidity : 52 %

Atmospheric pressure : 101 kPa

Test plot as follows:





5.1.4 6dB Bandwidth

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(a)(2)

Basic standard : ANSI C63.10: 2013

Limits : > 500 KHz

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : DC 4.5V

Operation mode : A

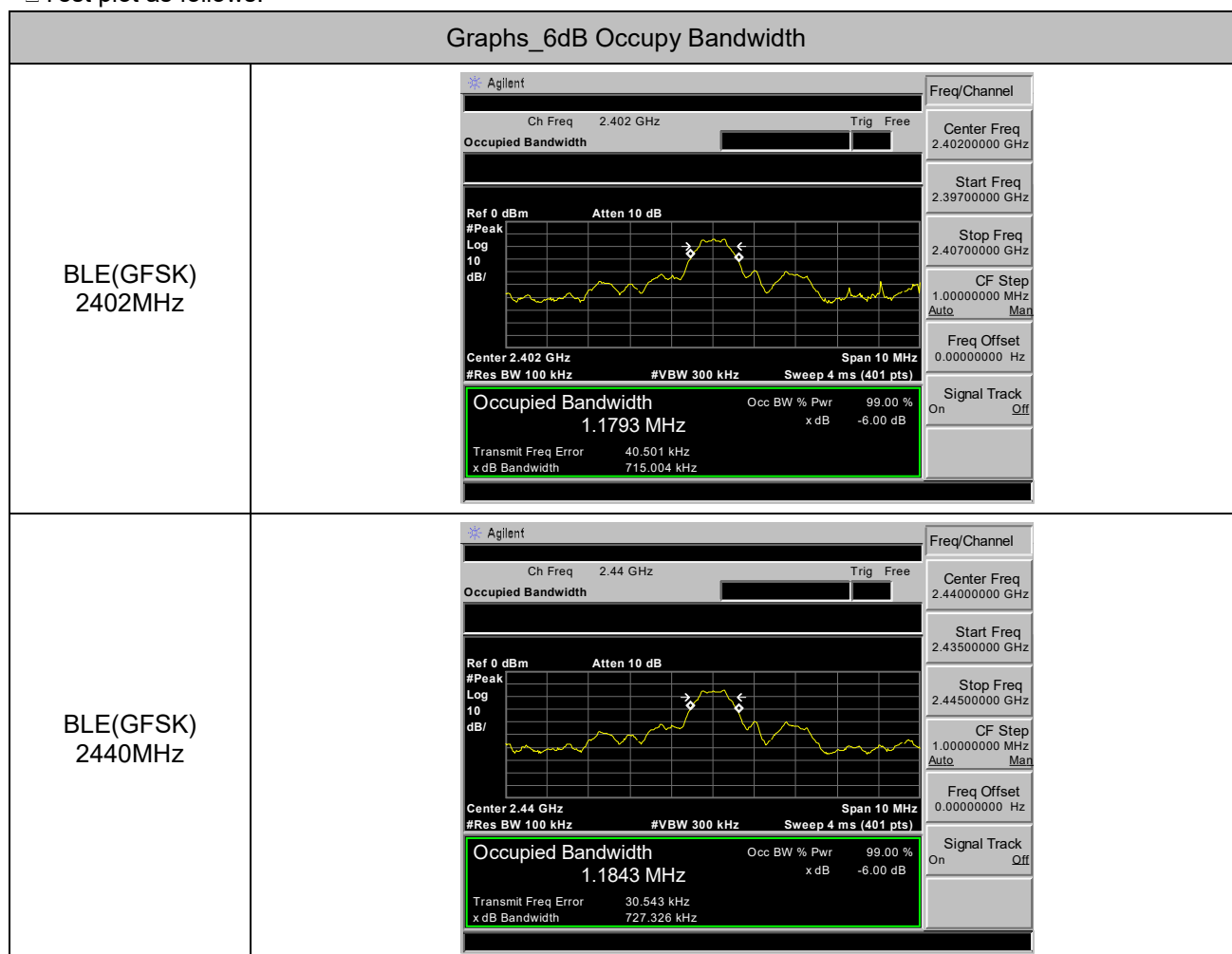
Test channel : Low / Middle / High

Ambient temperature : 25.7 °C

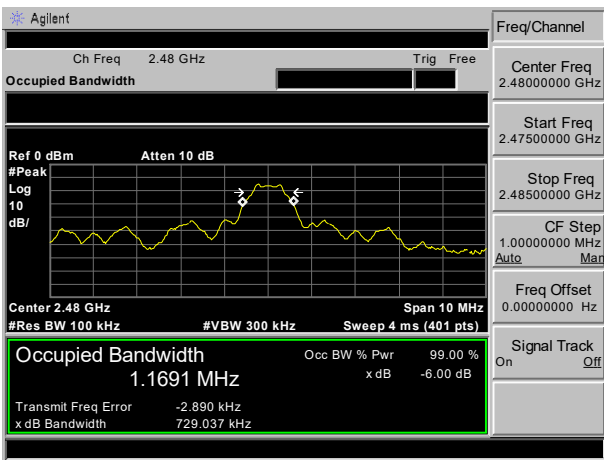
Relative humidity : 52 %

Atmospheric pressure : 101 kPa

☐ Test plot as follows:



BLE(GFSK)
2480MHz



5.1.5 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(d)

Basic standard : ANSI C63.10: 2013

Limits : 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);
In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : DC 4.5V

Operation mode : A

Test channel : Low / Middle / High

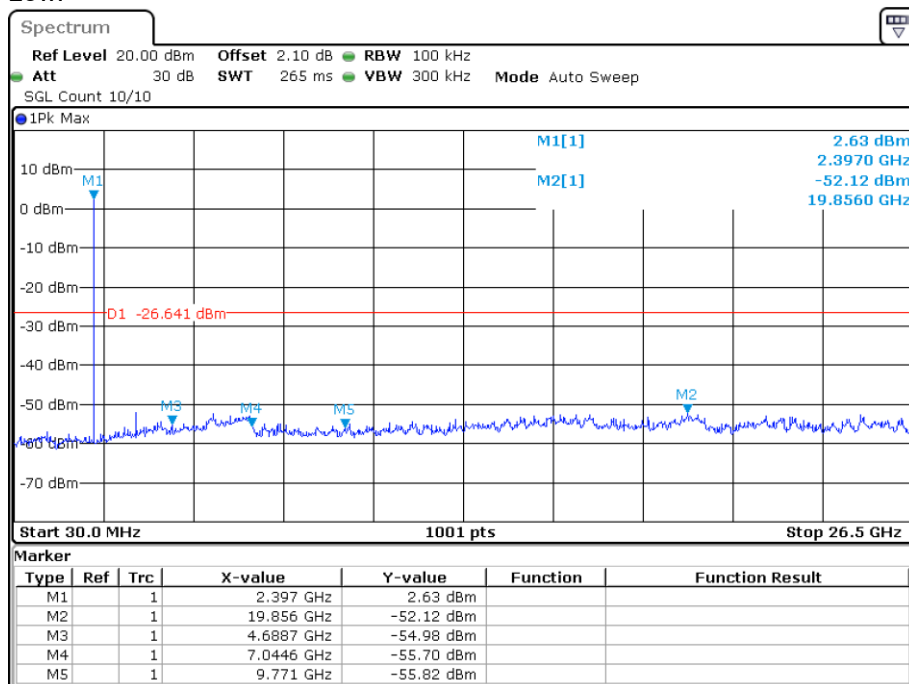
Ambient temperature : 25.7 °C

Relative humidity : 52 %

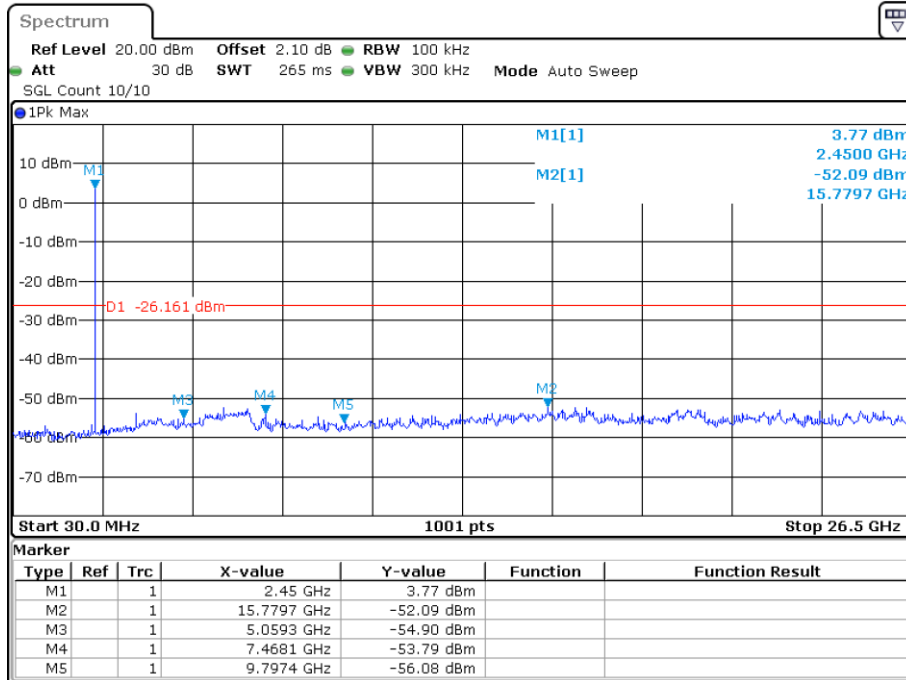
Atmospheric pressure : 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

Low:

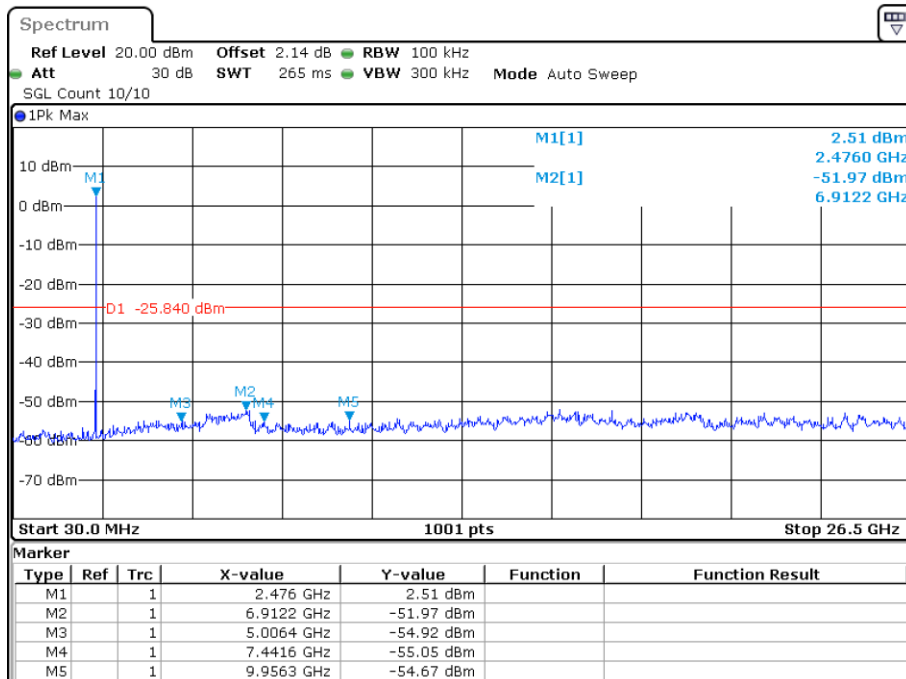


Middle :



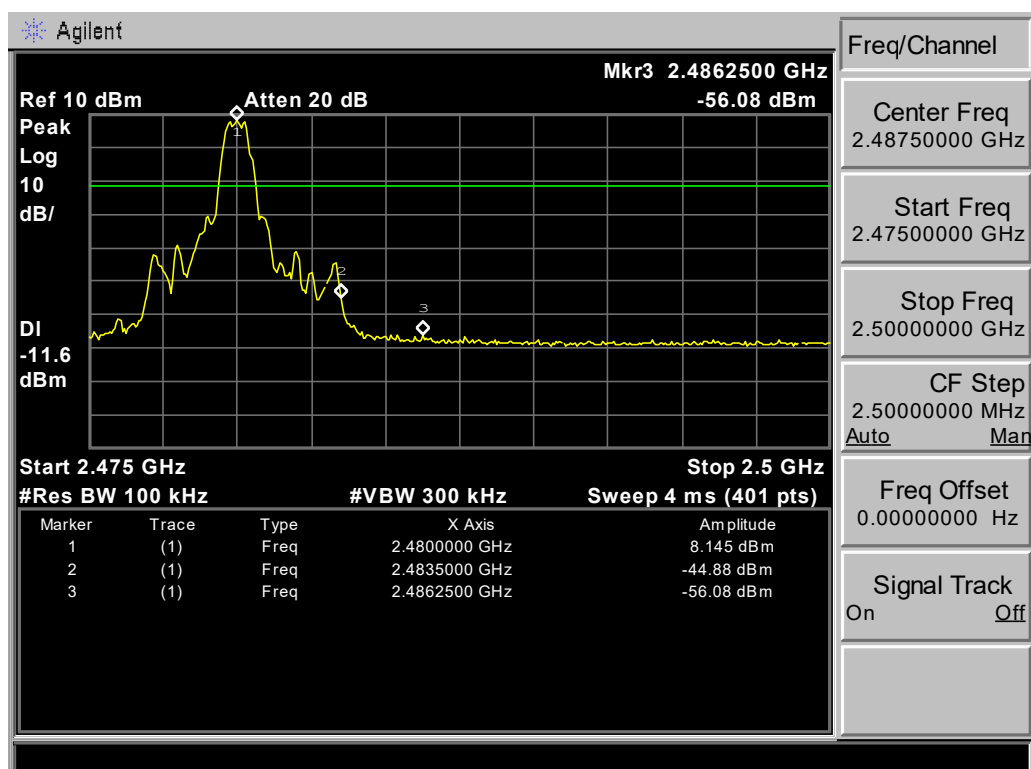
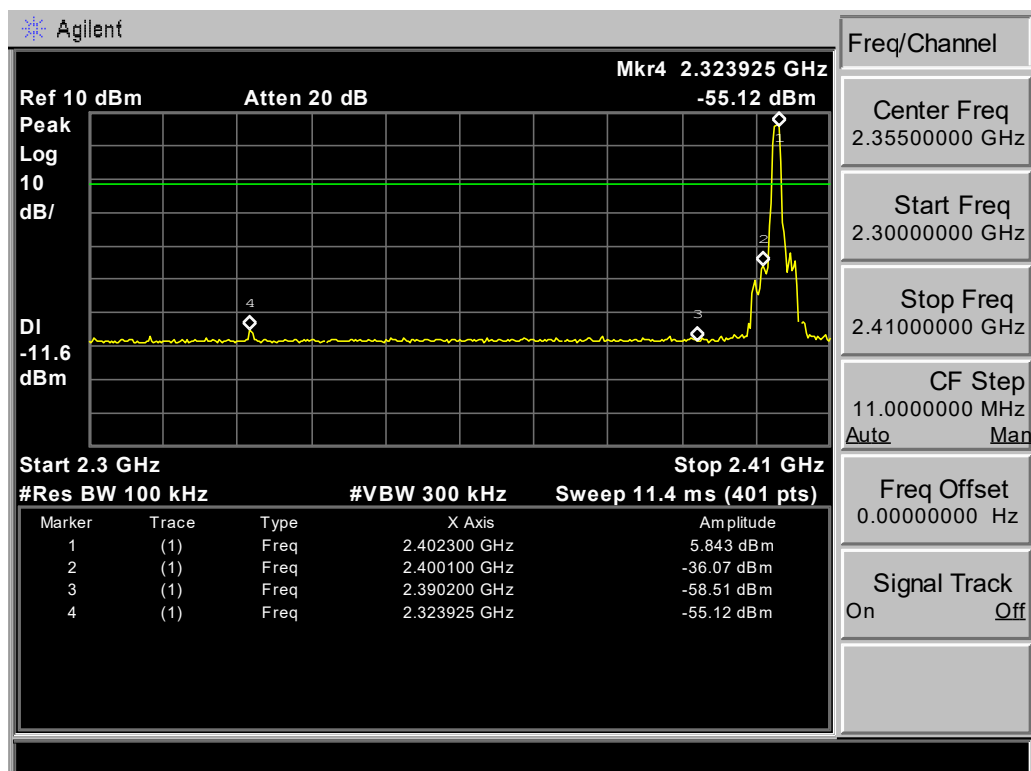
Date: 6.AUG.2021 14:37:29

High:



Date: 6.AUG.2021 14:39:51

Band edge:



5.1.6 Radiated Spurious Emission

RESULT:

Pass

Test Specification

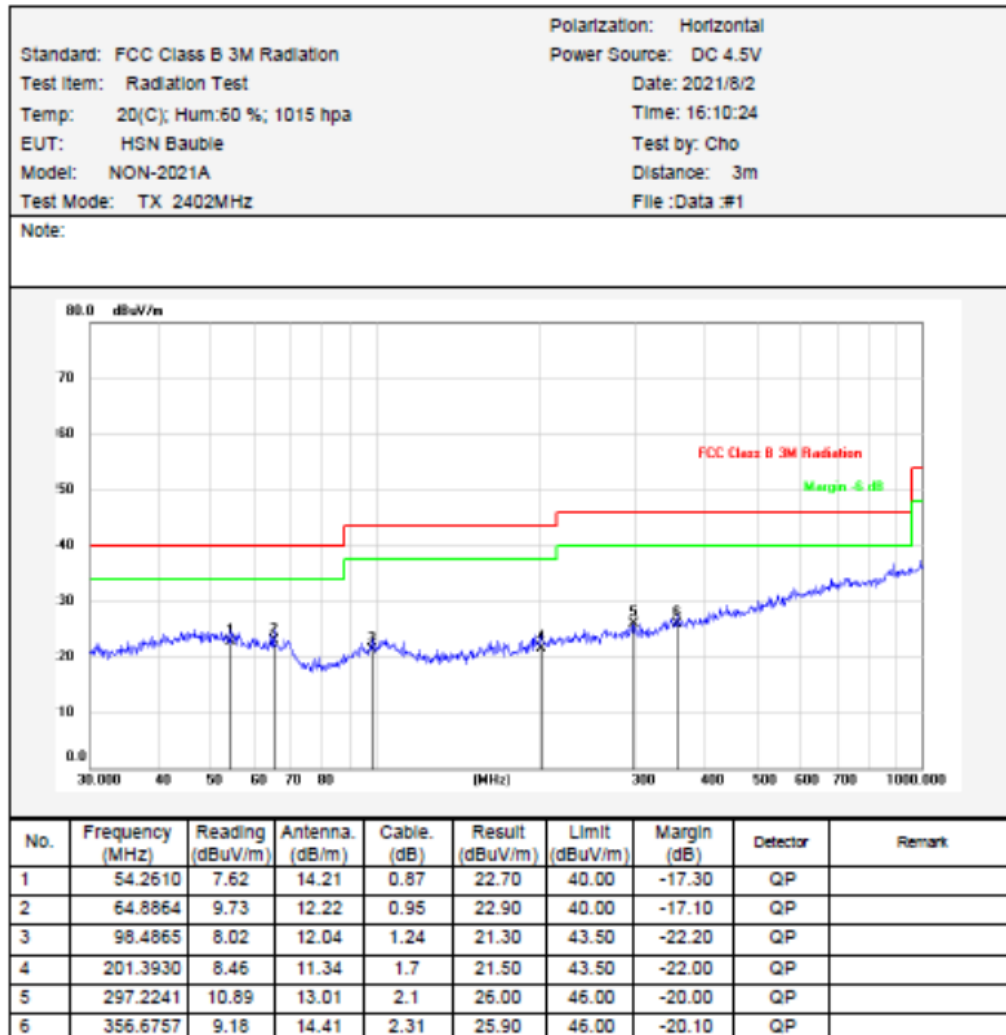
Test standard	: FCC Part 15.247(d) & FCC Part 15.205
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	: 3m Semi-anechoic Chamber

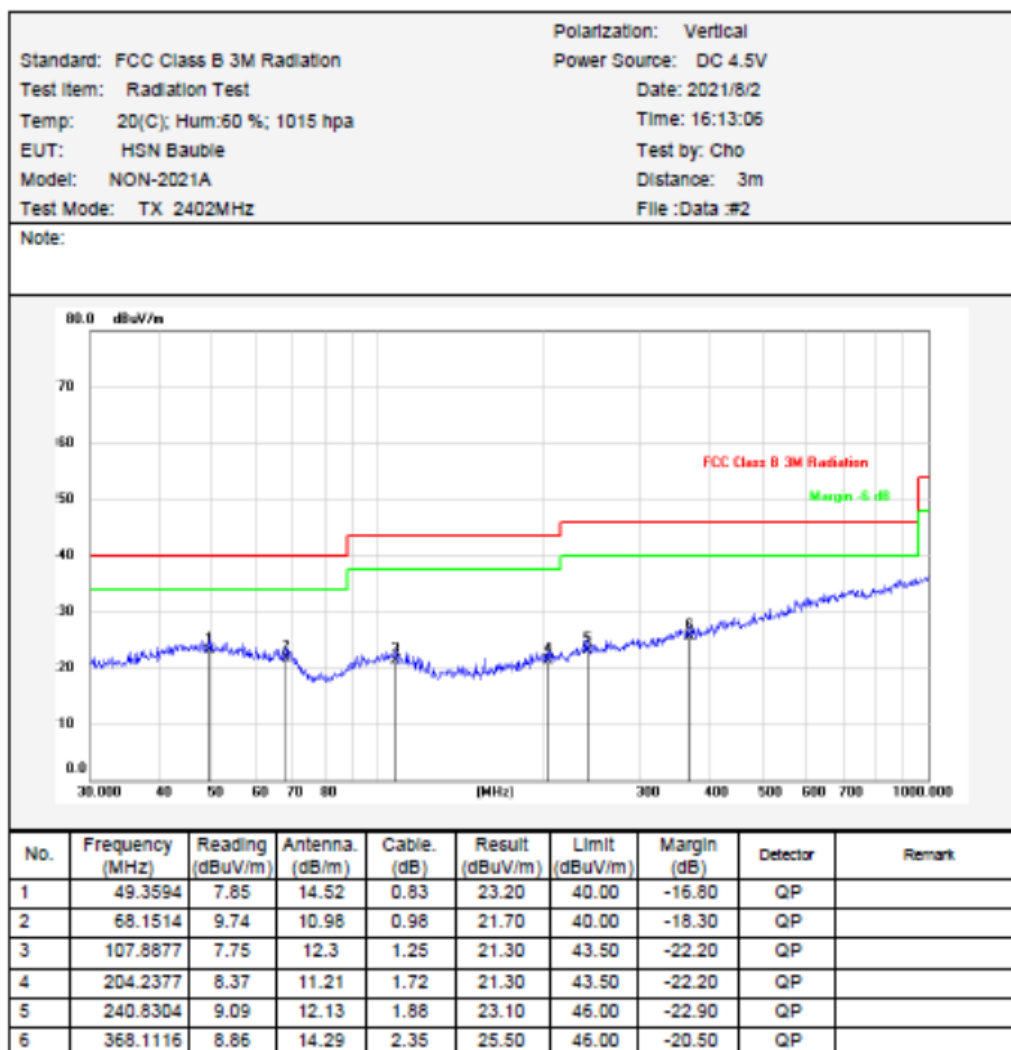
Test Setup

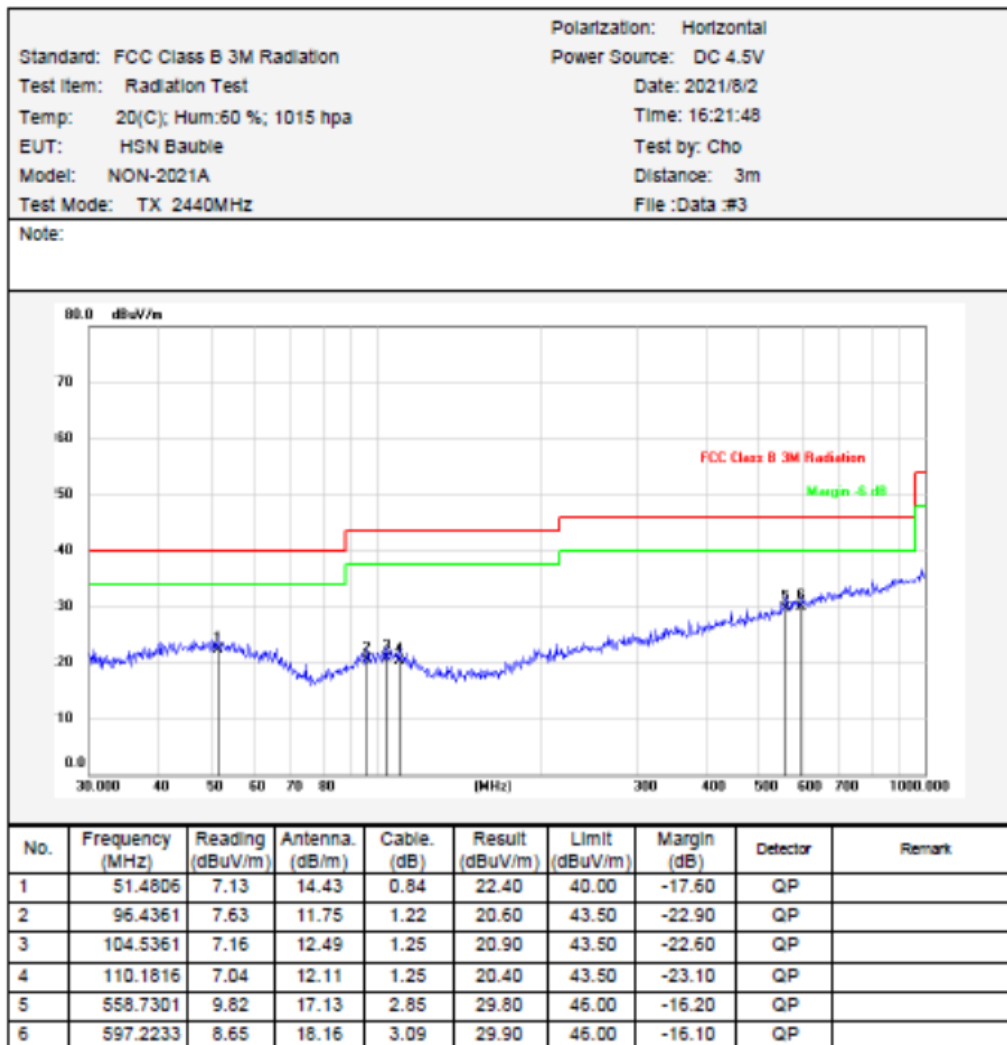
Date of testing	: 2021-04-25 ~ 2021-04-26
Input voltage	: DC 4.5V
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: 101 kPa

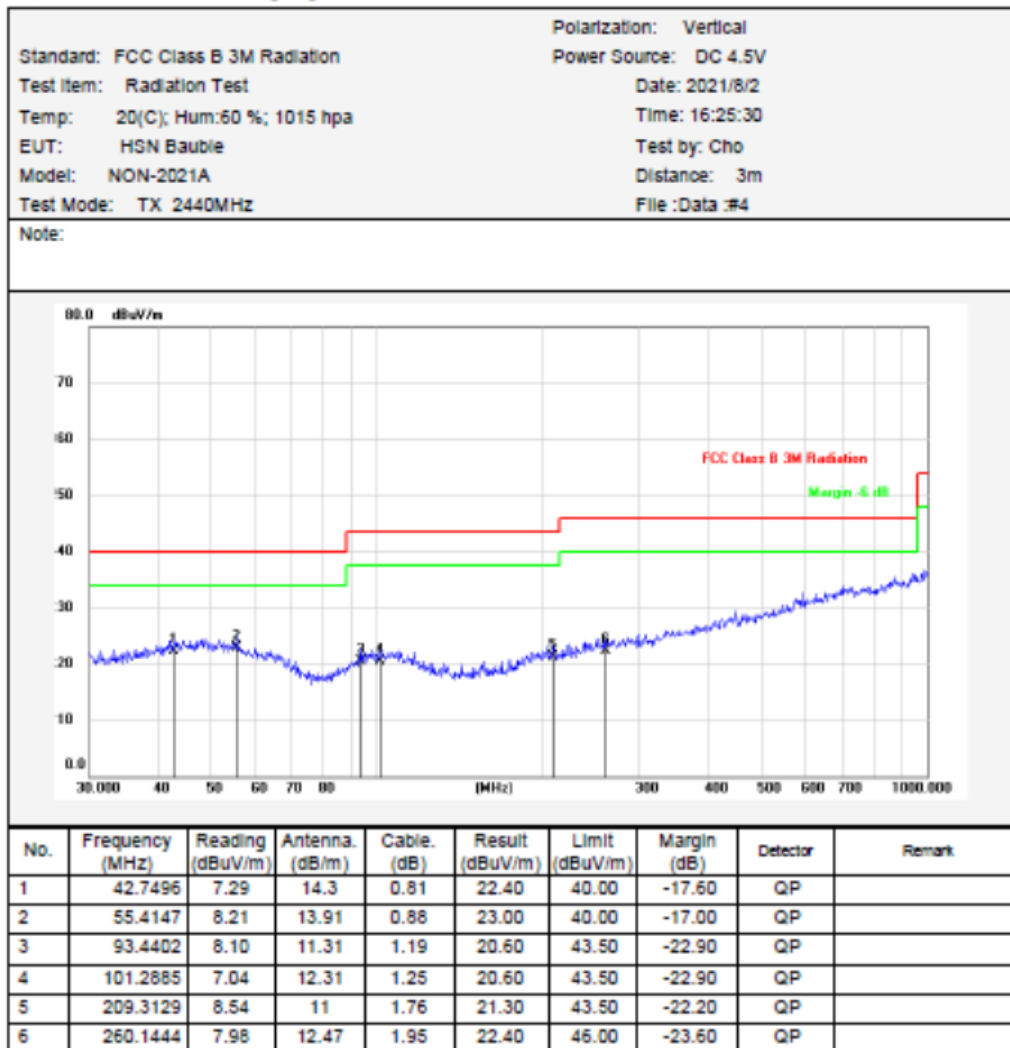
Remark:

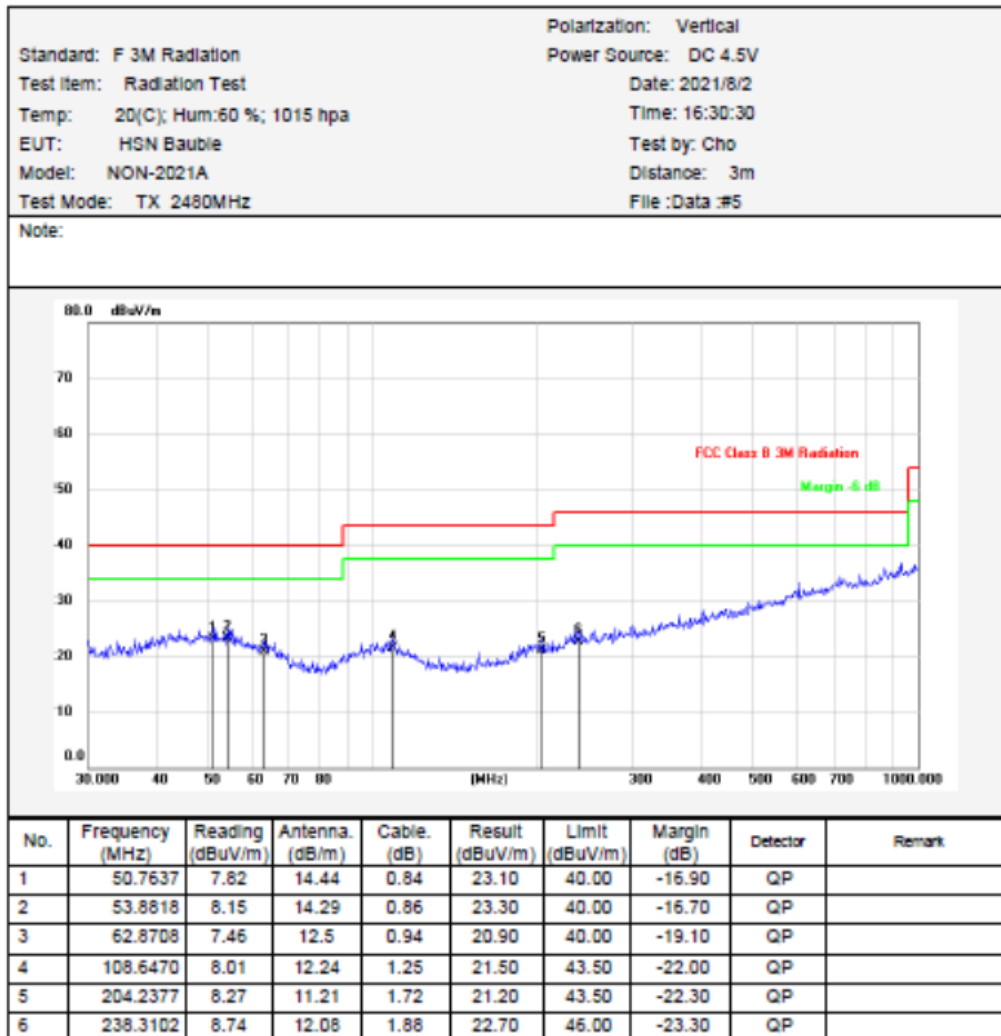
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

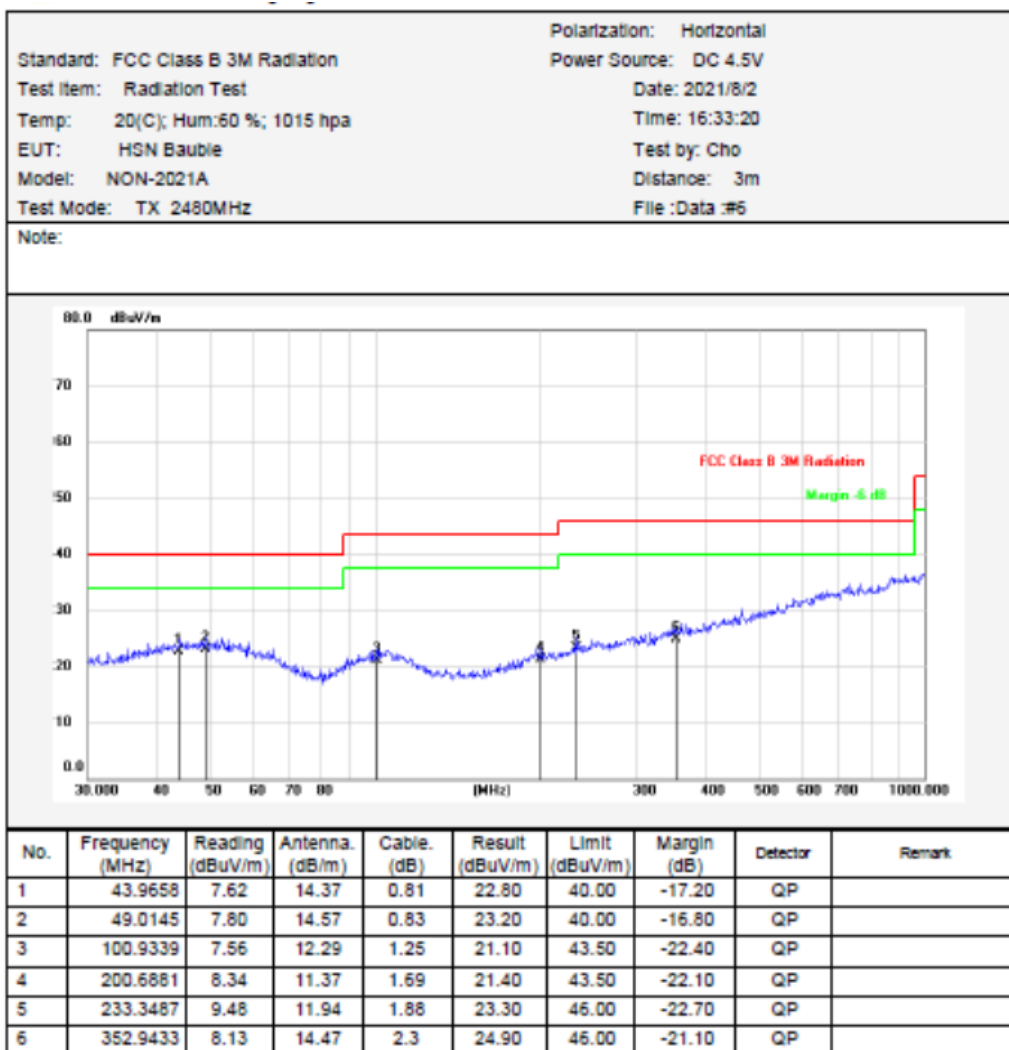


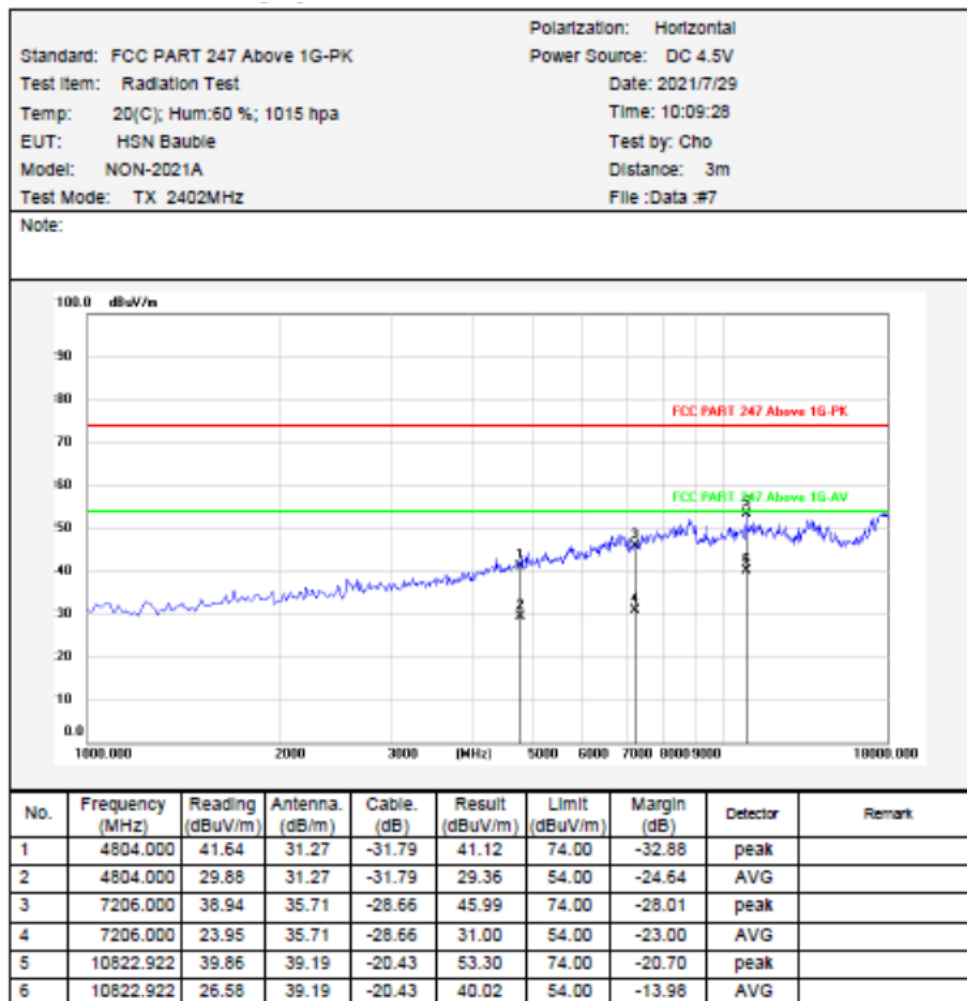


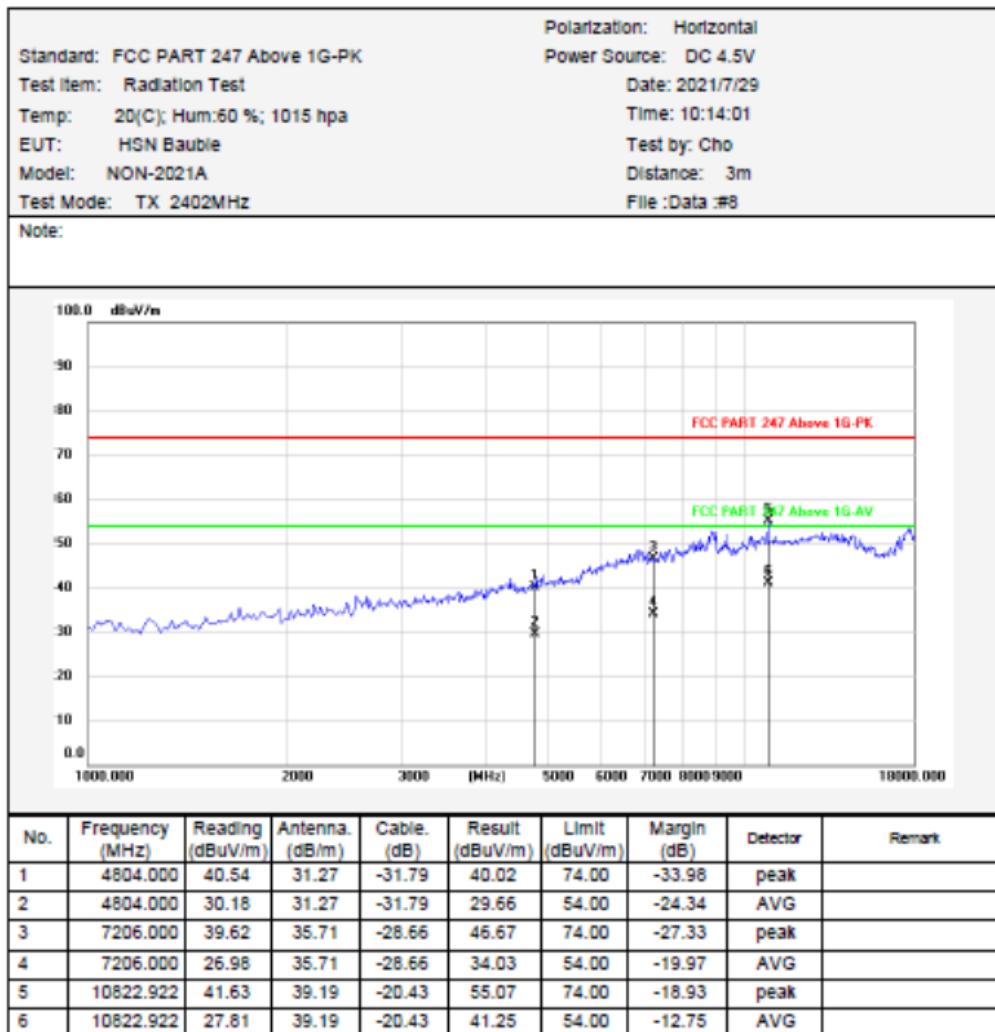


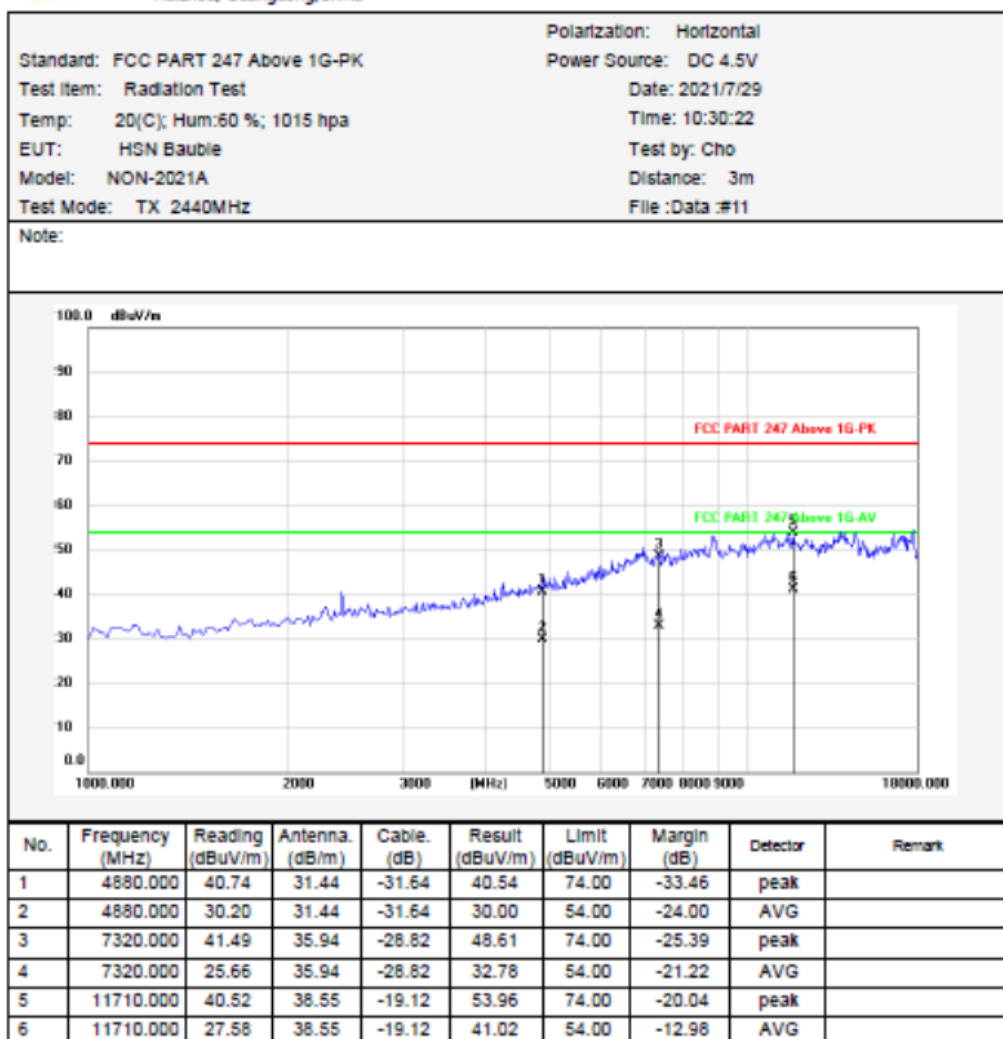


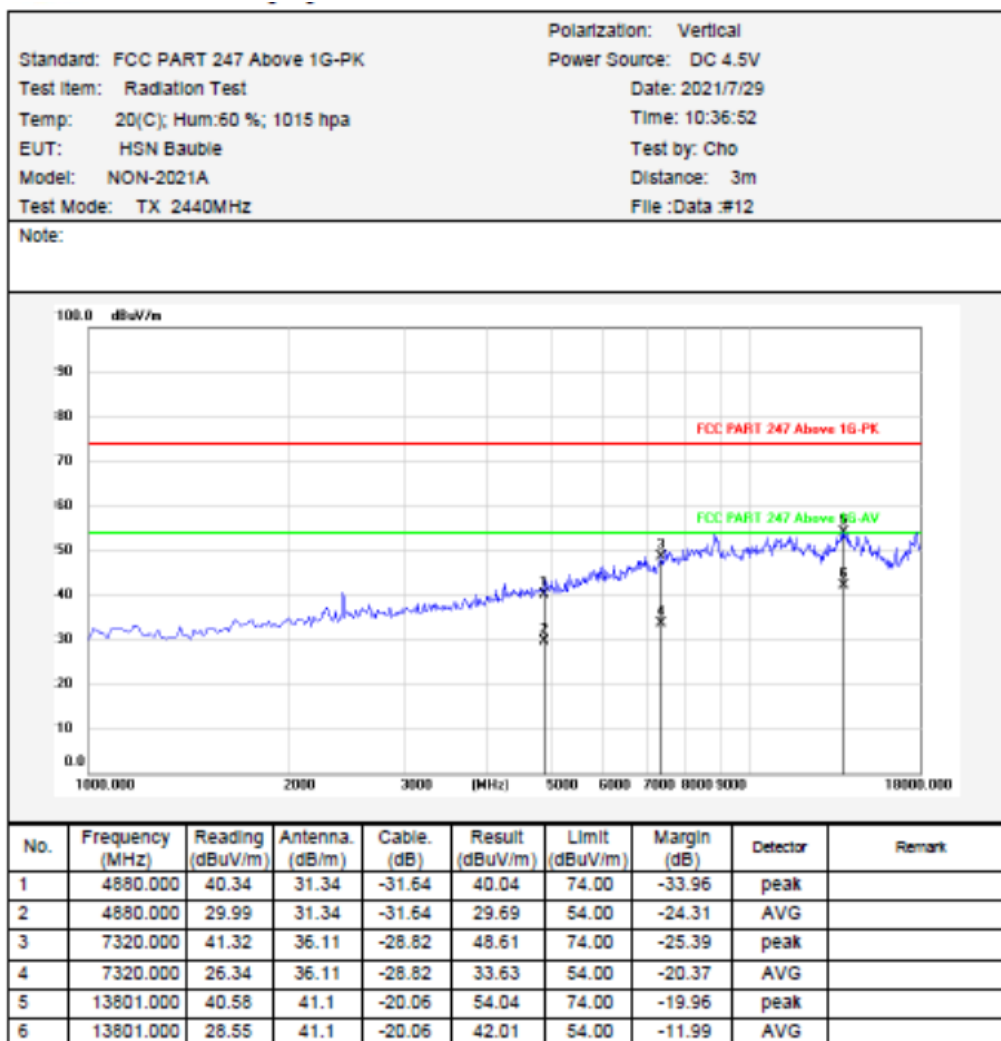


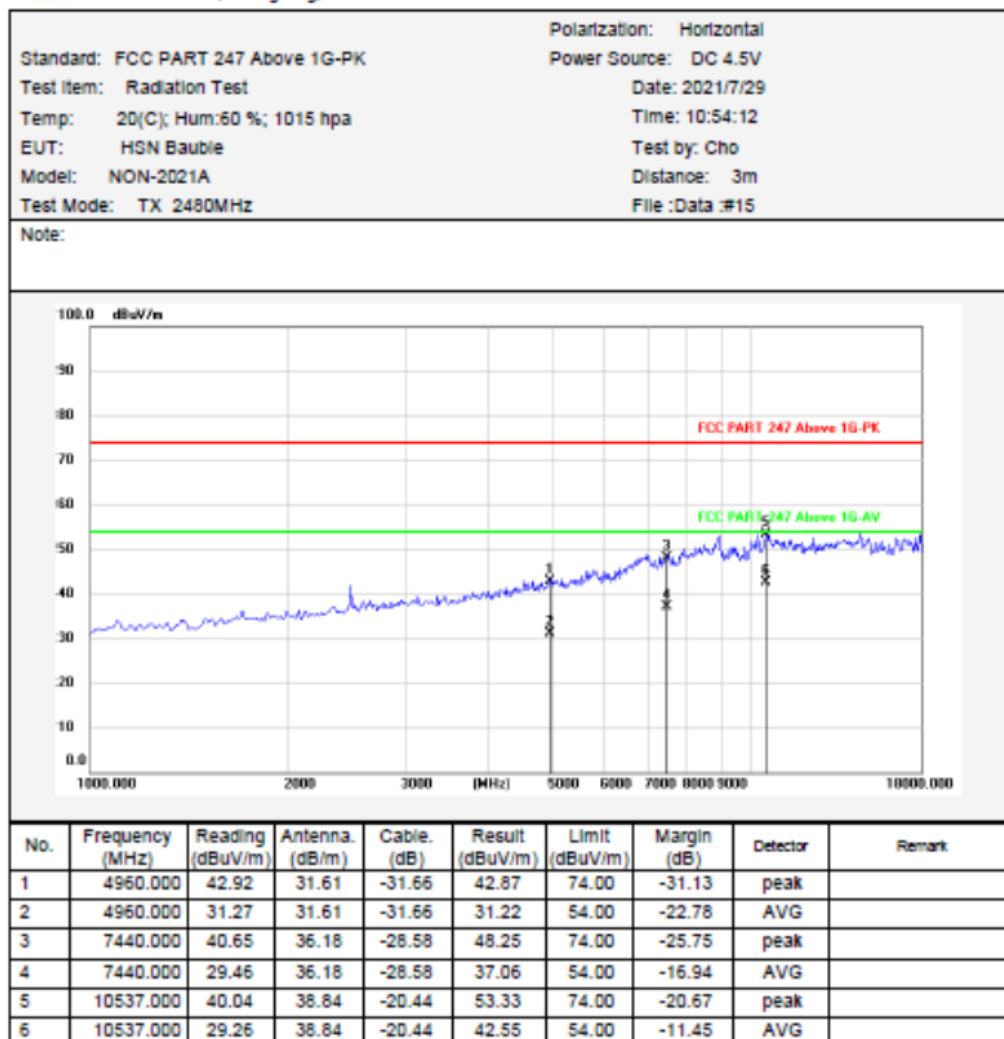


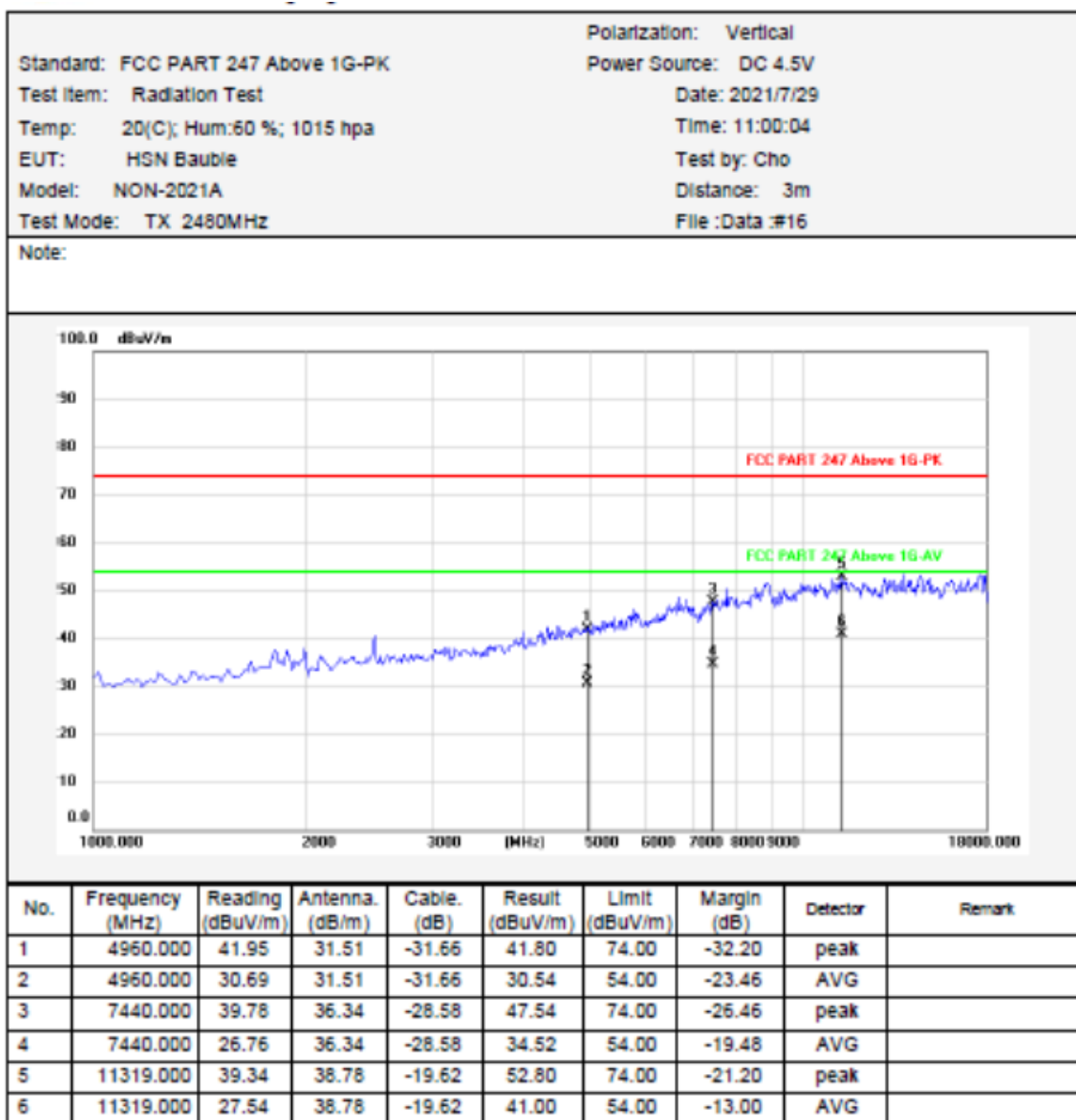


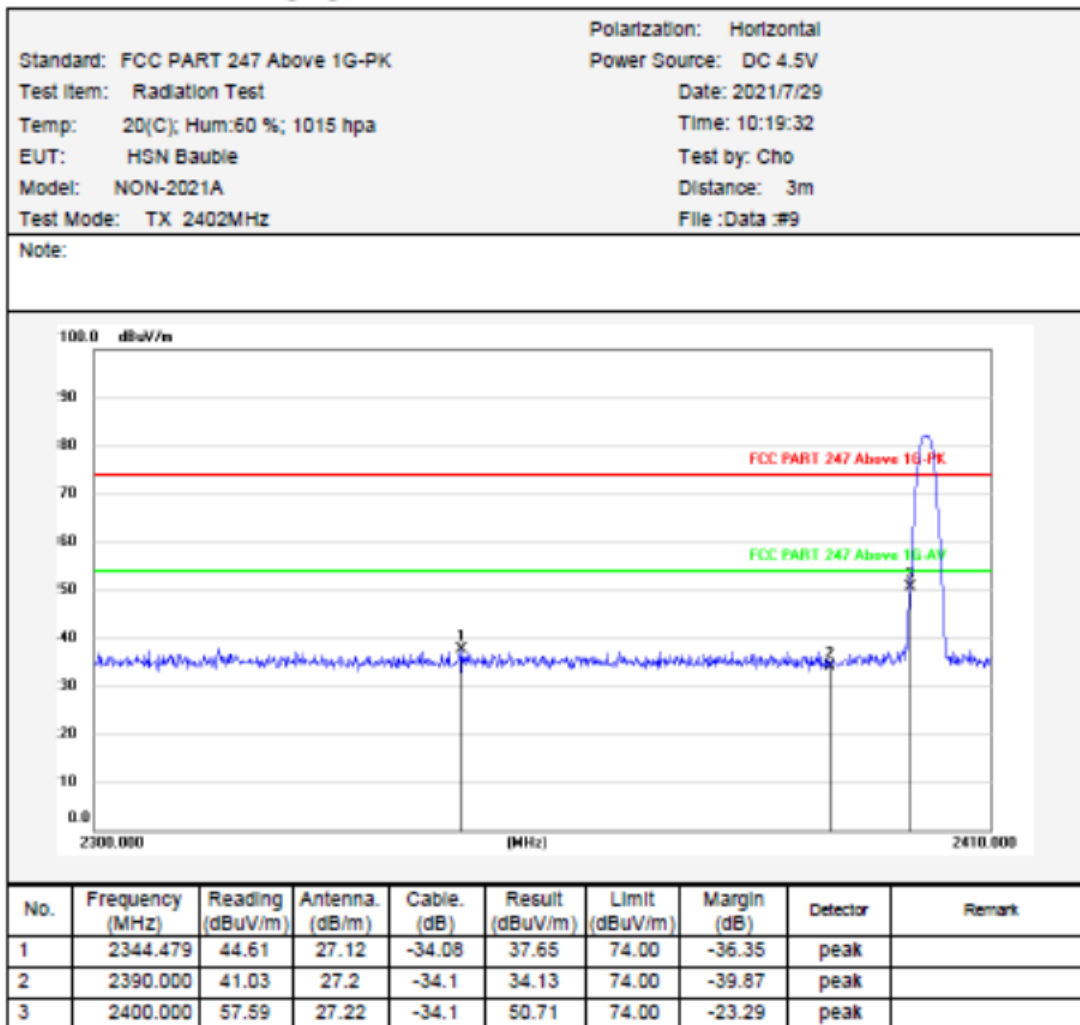


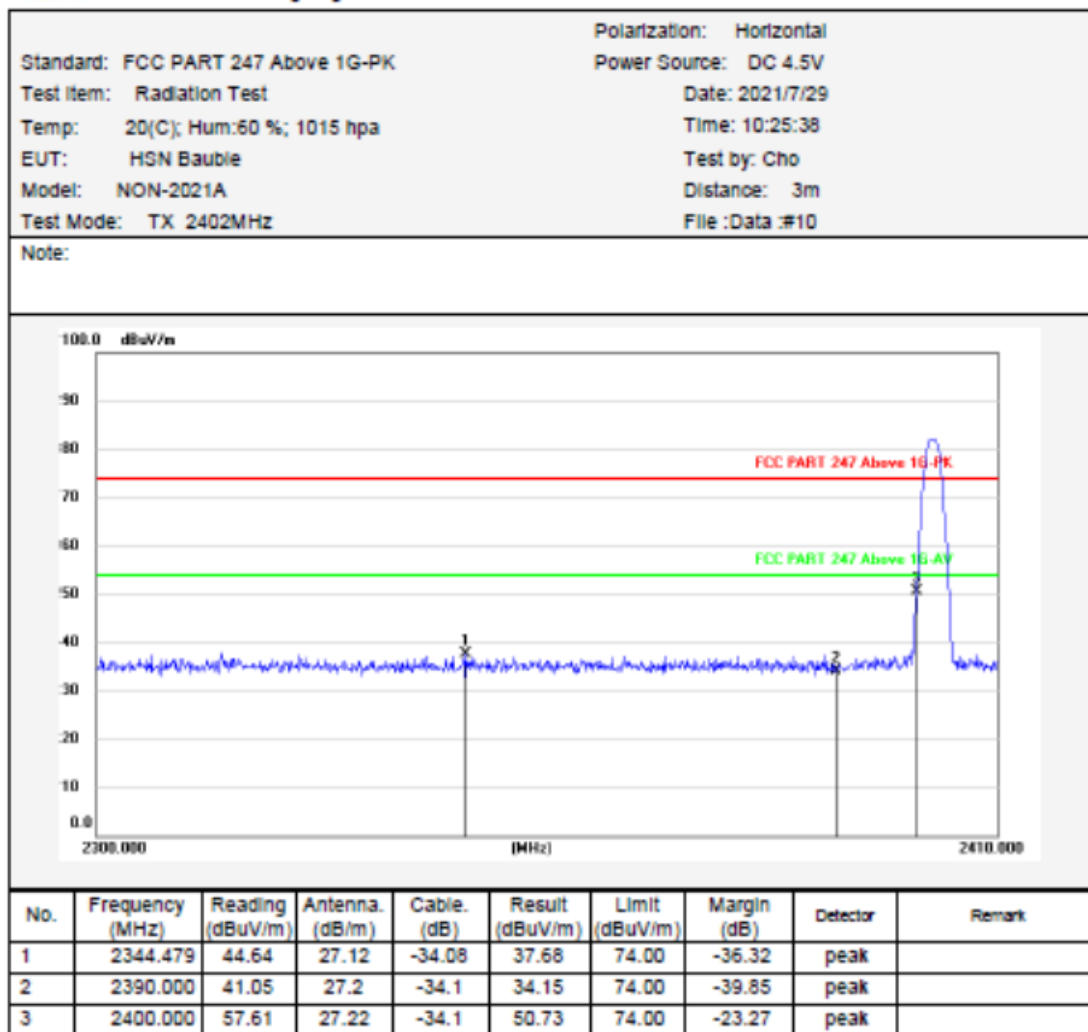


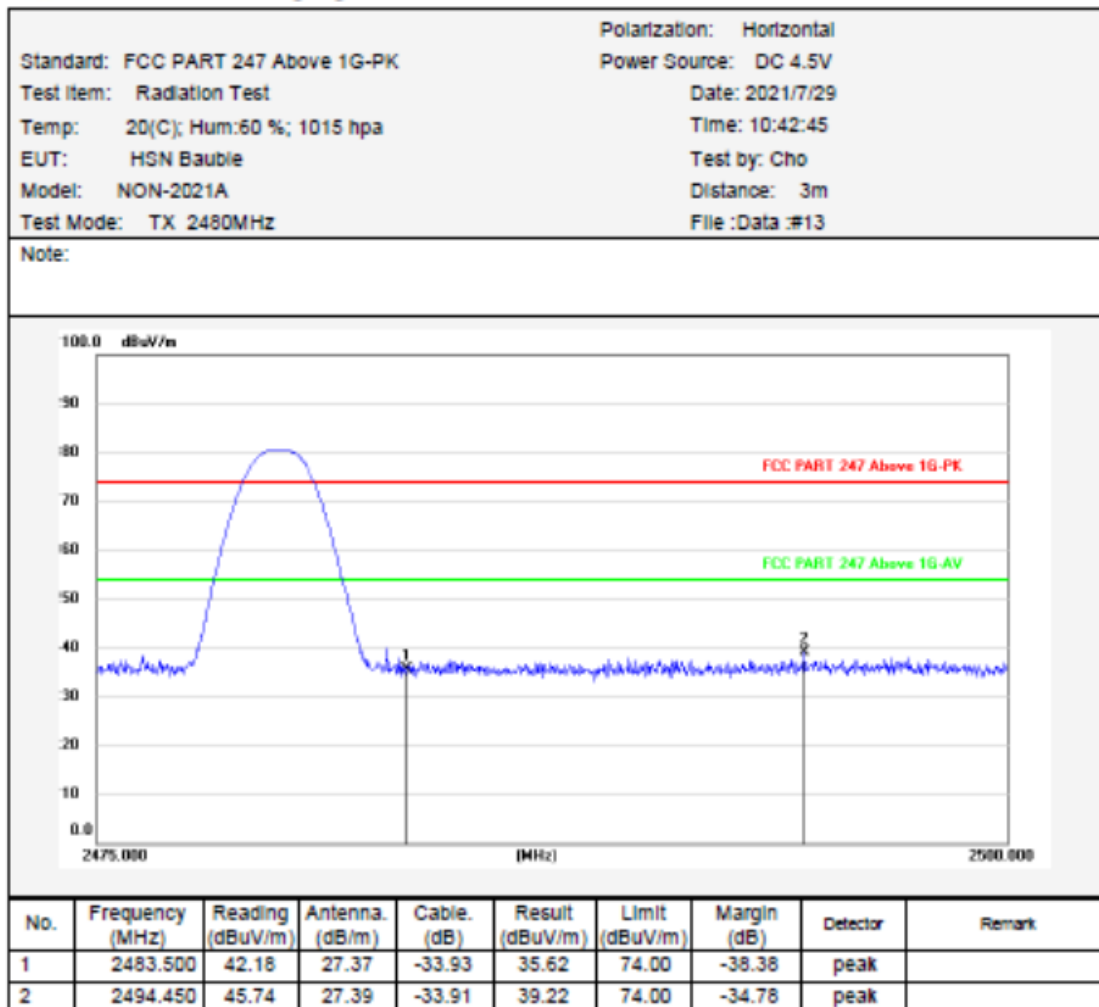


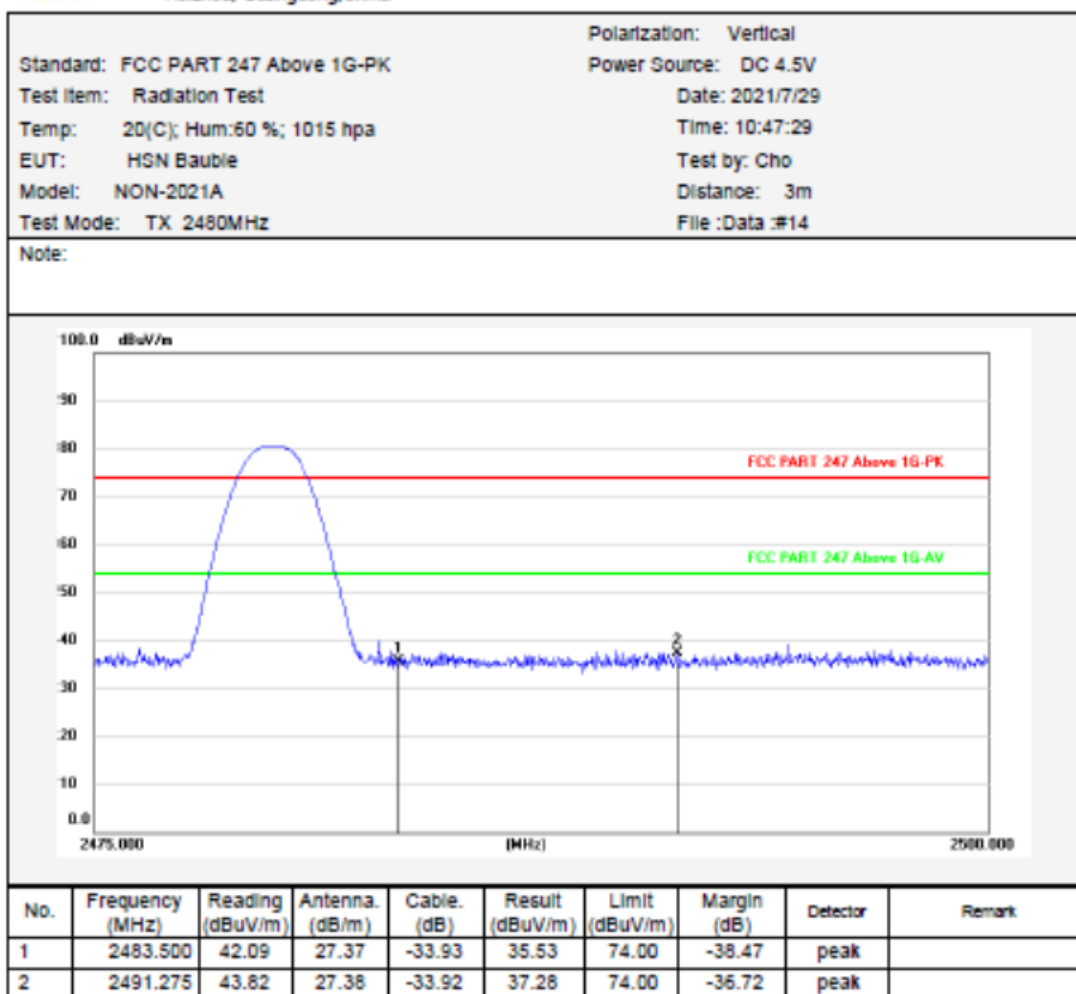


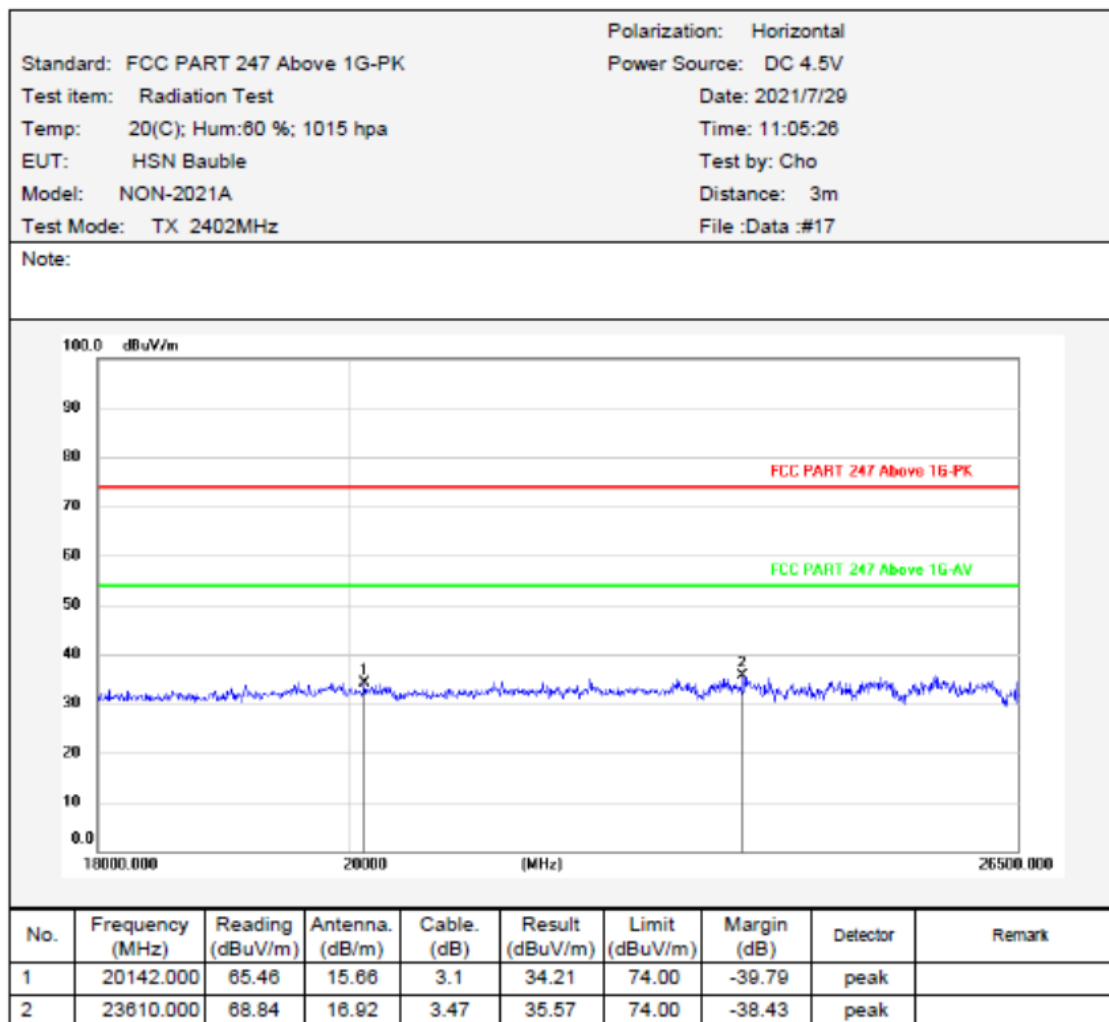


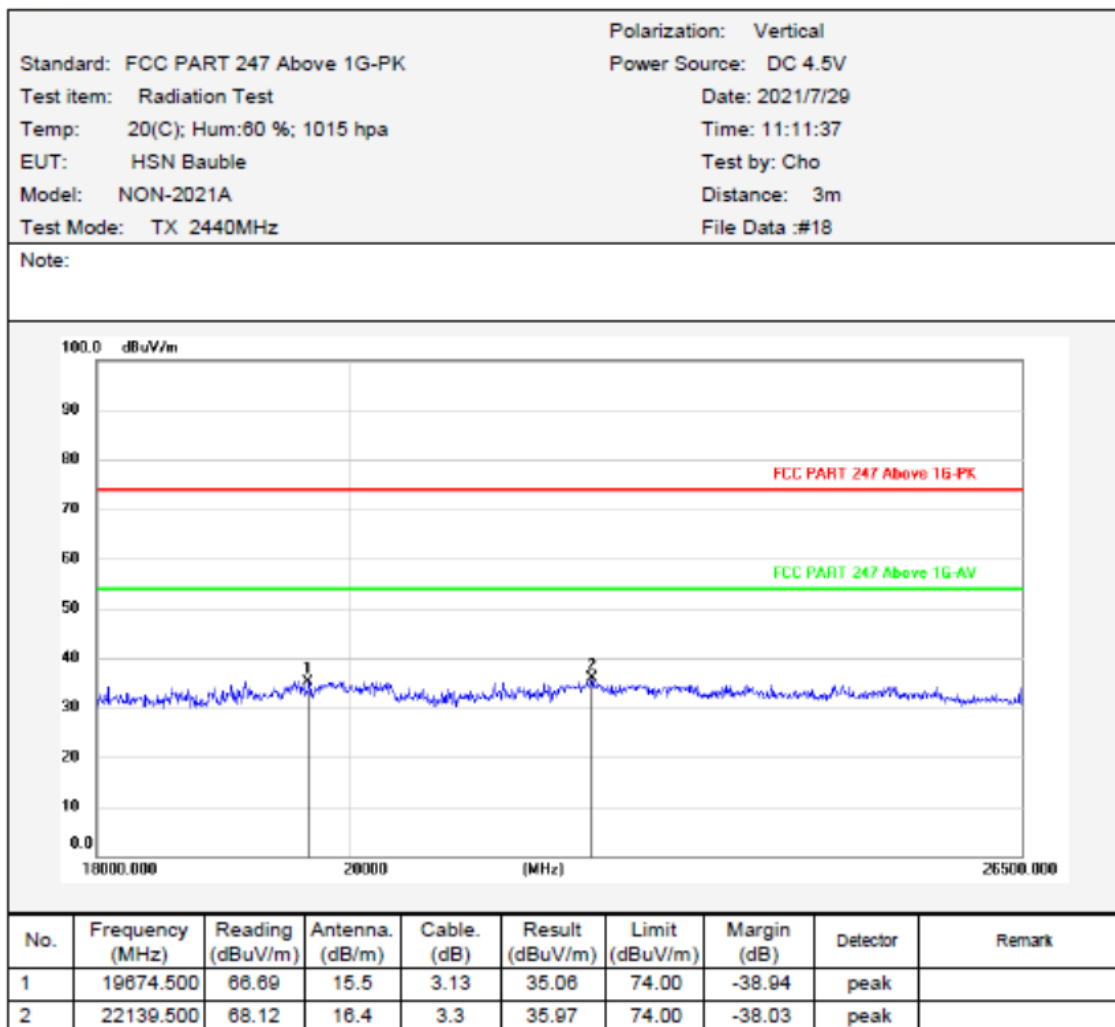


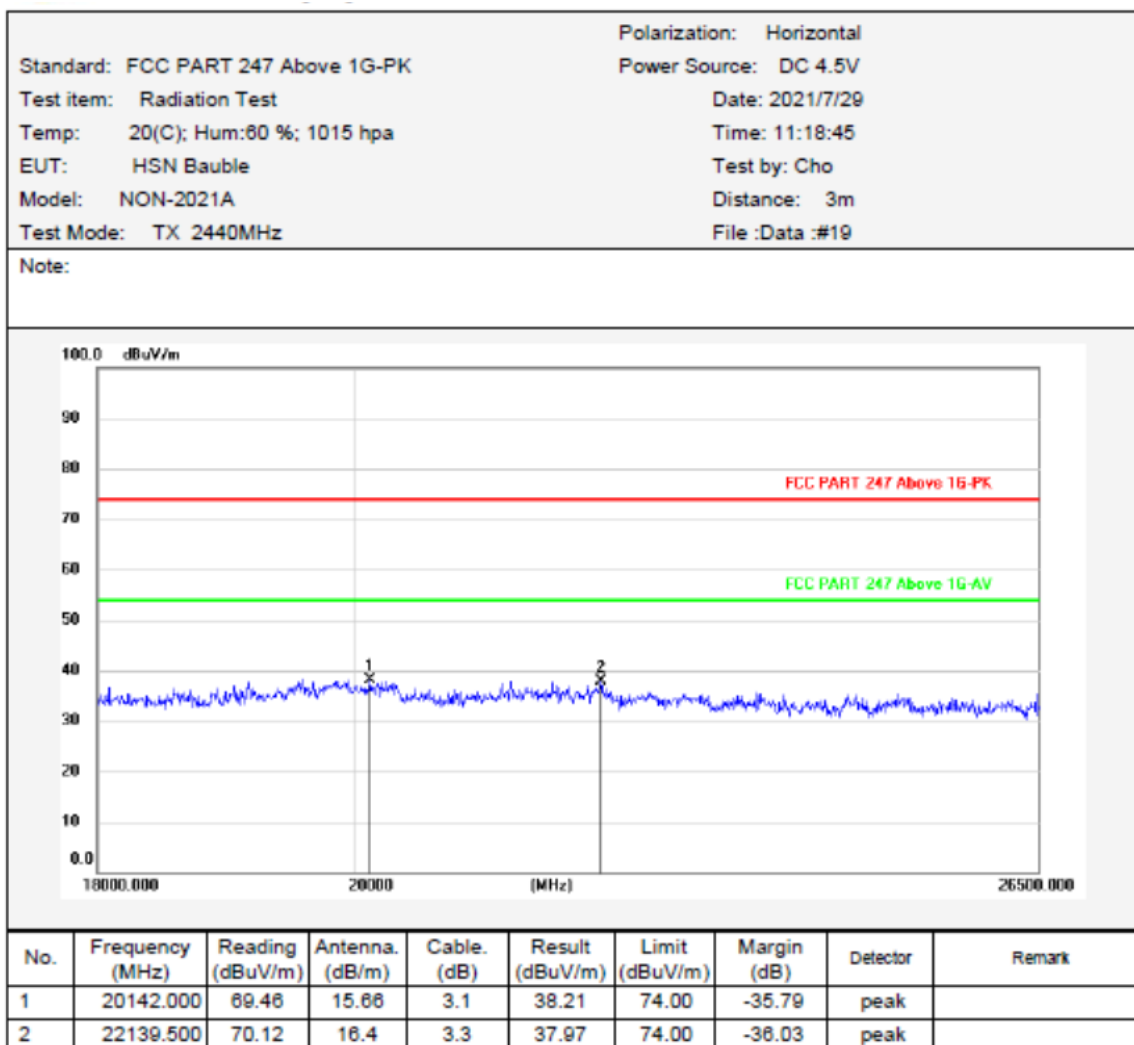


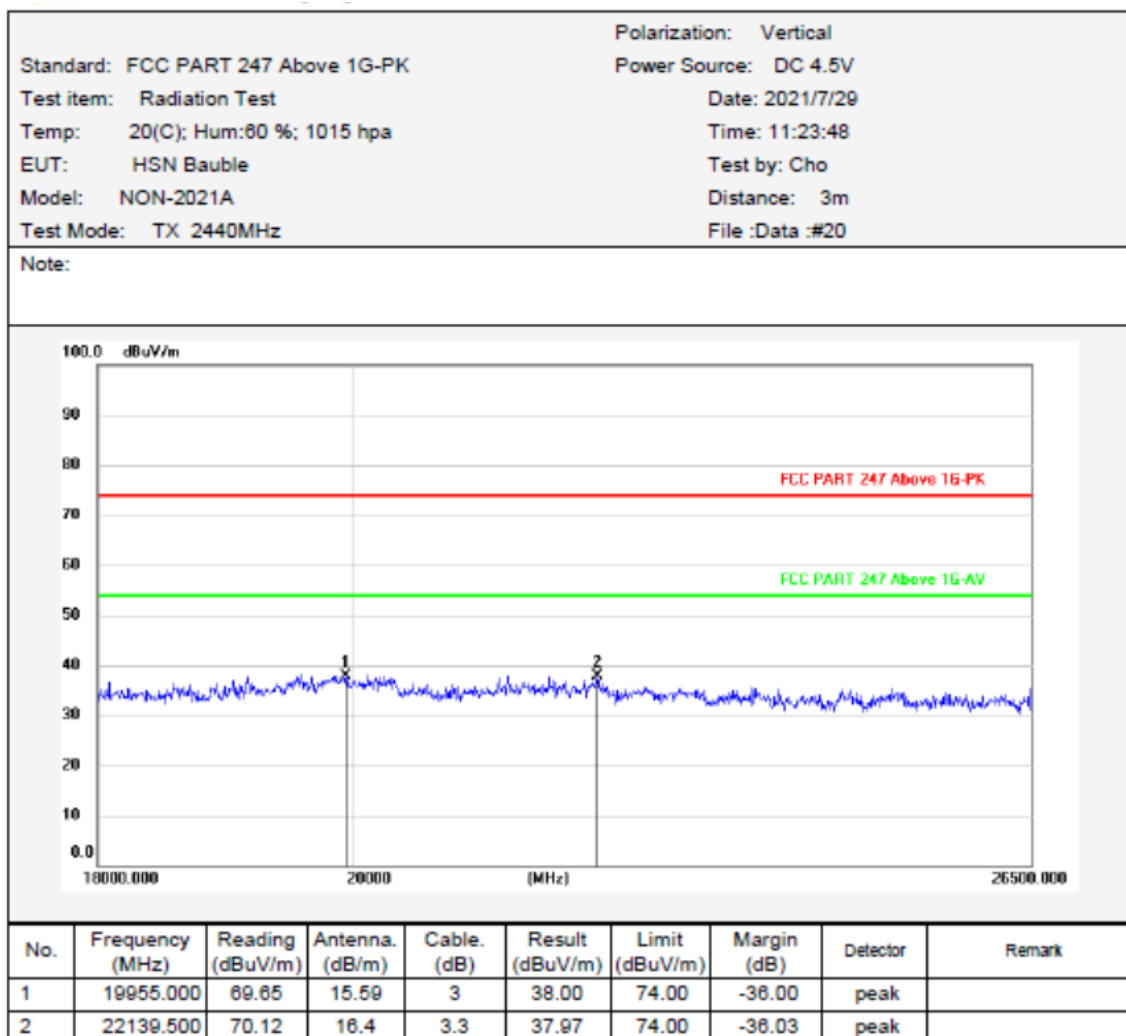


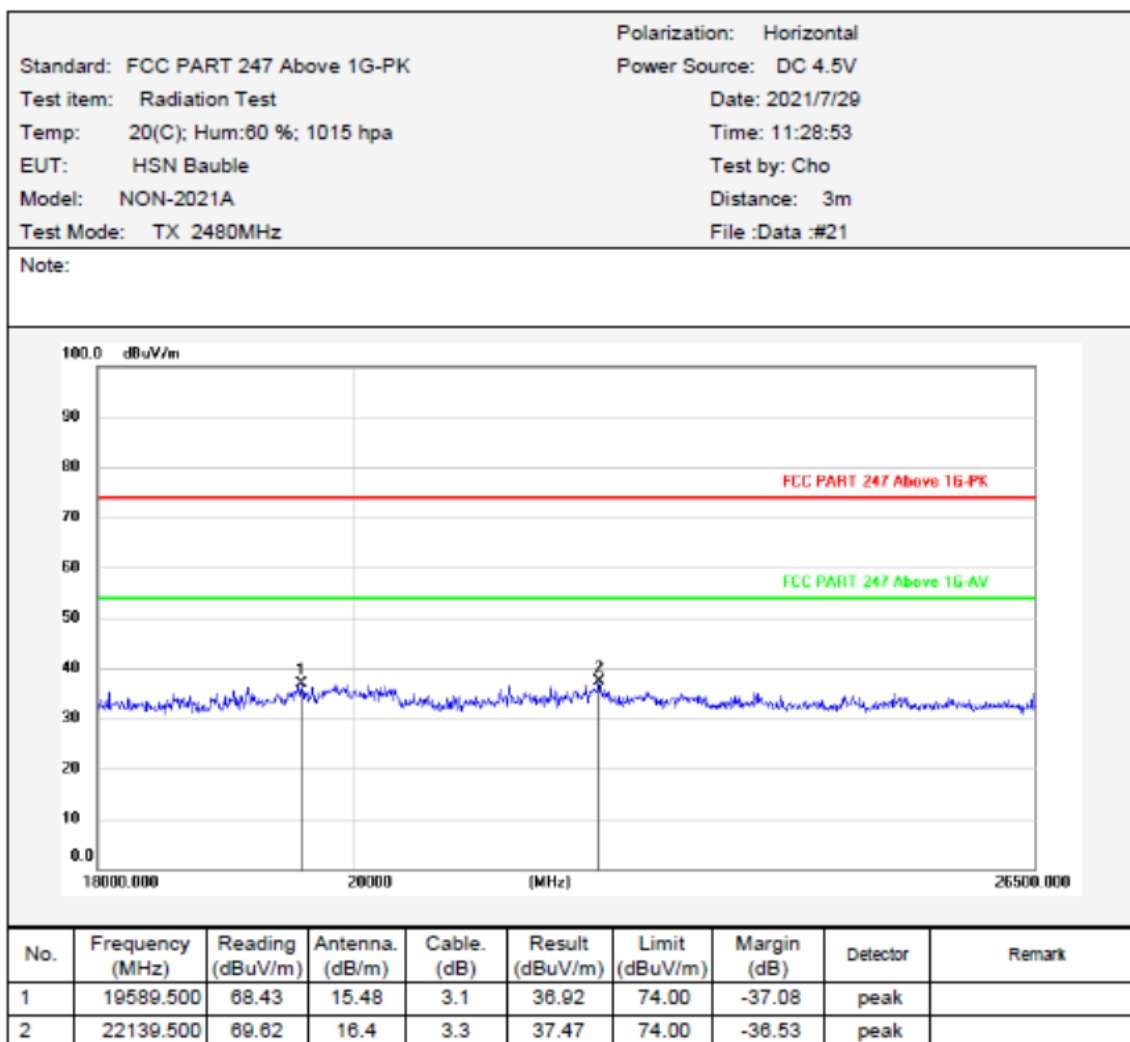


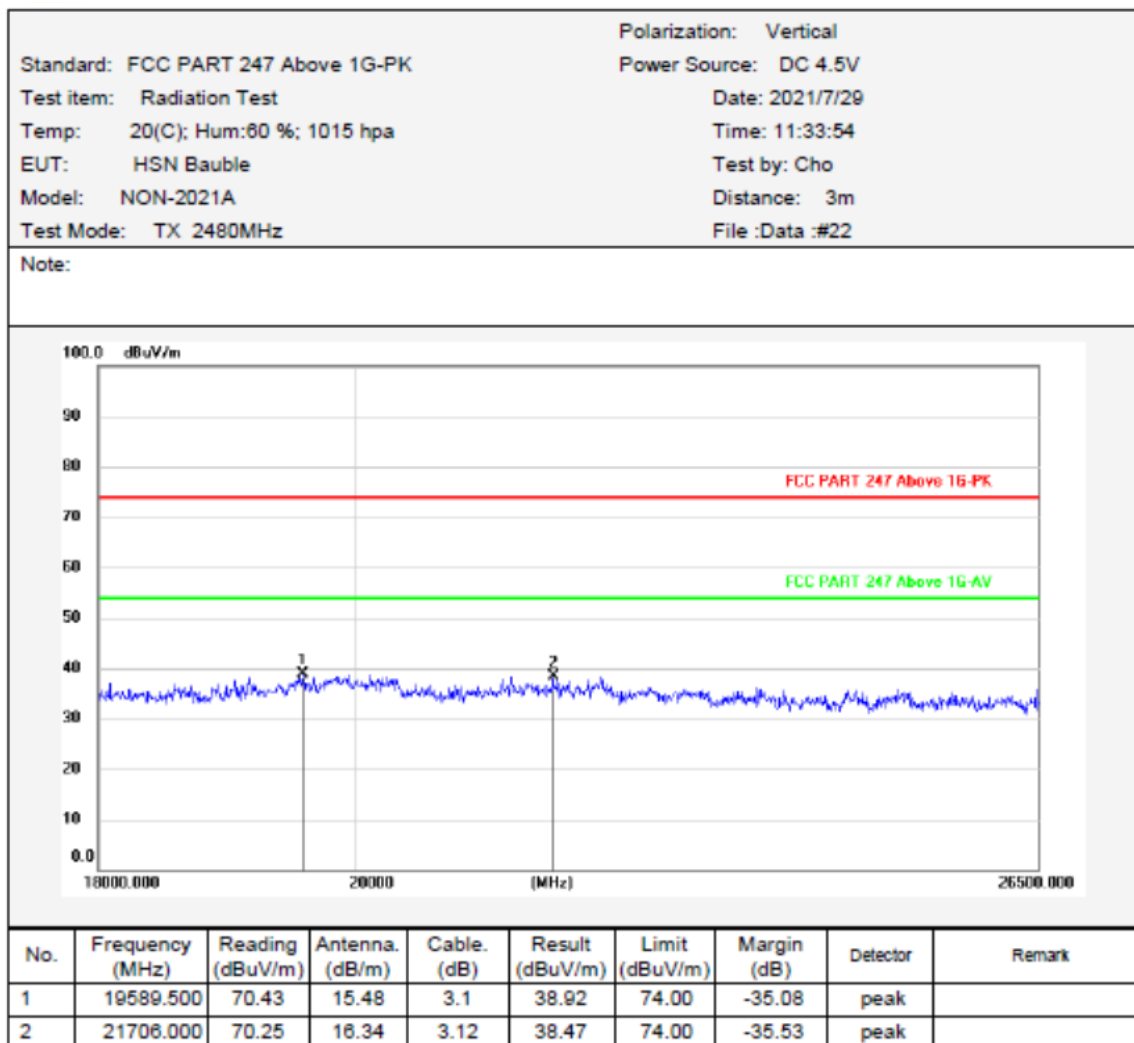




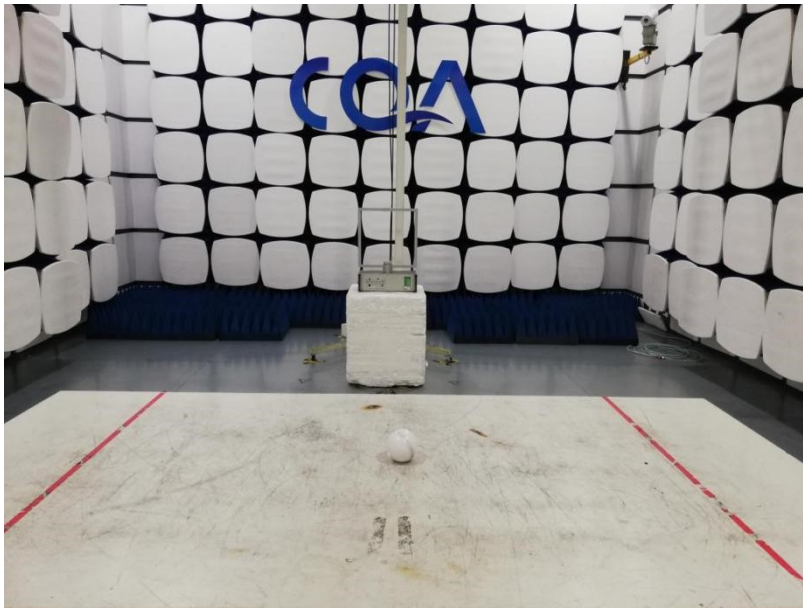








6 Photographs of the Test Set-Up





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