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TEST REPORT

Report No. ..... :	**CHTEW21110198**	Report Verification:
Project No.....:	**SHT2110030701EW**	
FCC ID..... :	**TWNE32-A**	
Applicant's name..... :	**Pro-Lite, Inc.**	
Address.....:	3505 Cadillac Ave. Building D Costa Mesa. CA 92626	
Test item description ..... :	**SMD Wireless Module**	
Trade Mark .....:	-	
Model/Type reference.....:	E32-A	
Listed Model(s) .....:	-	
Standard ..... :	**FCC CFR Title 47 Part 15 Subpart C Section 15.231**	
Date of receipt of test sample.....:	Nov.08, 2021	
Date of testing.....:	Nov.08, 2021- Dec.14, 2021	
Date of issue.....:	Dec.14, 2021	
Result..... .....:	**PASS**	

Compiled by (Position+Printed name+Signature):	File administrator Echo Wei	Echo Wei
Supervised by (Position+Printed name+Signature):	Project Engineer Kiki Kong	Kiki Kong
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Contents

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

– FCC Rules Part 15.231(e): Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

– ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices

1.2. Report version

Revision No.	Date of issue	Description
N/A	2021-12-14	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result
5.1	Antenna Requirement	15.203	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	20dB Bandwidth	15.231(c)	PASS
5.4	99% Occupied Bandwidth	-	PASS*1
5.5	Silent period time	15.231(e)	PASS
5.6	Duty cycle corrected factor	-	PASS*1
5.7	Field strength of the Fundamental signal	15.231(e)	PASS
5.8	Radiated Spurious Emission	15.231(e)/15.205/15.209	PASS

Note:

– The measurement uncertainty is not included in the test result.

– *1: No requirement on standard, only report these test data.

3. SUMMARY

3.1. Client Information

Applicant:	Pro-Lite, Inc.
Address:	3505 Cadillac Ave. Building D Costa Mesa. CA 92626
Manufacturer:	Ningbo Youwon Technology Electronics Co., Ltd.
Address:	NO.430 kemao Road, Wangchun Industrial Zone, Haishu District,NingBo,China.
Factory:	Ningbo Youwon Technology Electronics Co., Ltd.
Address:	NO.430 kemao Road, Wangchun Industrial Zone, Haishu District,NingBo,China.

3.2. Product Description

Name of EUT:	SMD Wireless Module
Trade Mark:	-
Model No.:	E32-A
Listed Model(s):	-
Power supply:	DC 5V
Hardware version:	V1.0
Software version:	V1.0

3.3. Radio Specification Description

Operation frequency:	432-435MHz
Modulation:	LORA
Channel number:	4
Channel separation:	1MHz
Antenna type:	FPC Antenna
Antenna gain:	2.6dBi

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Connect information:	Phone: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC	762235

4. TEST CONFIGURATION

4.1. Test frequency list

According to section ANSI C63.10 section 5.6.1,

Measurements of unlicensed wireless devices shall be performed and, if required, reported for each band in which the EUT can be operated with the device operating at the number of frequencies in each band specified in Table 4

Table 4—Number of frequencies to be tested

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

So test frequency as follow:

Channel	Frequency (MHz)
CH_L	**432**
CH_M	**433**
CH_{M1}	**434**
CH_H	**435**

4.2. Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?					
✓ Yes					
Item	Equipement	Trade Name	Model No.	FCC ID	Power cord
1	Laptop	DELL	Inspiron 13-5378	-	-
2					

4.4. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.5. Measurement uncertainty

Test Item	Measurement Uncertainty
AC Conducted Emission (150kHz~30MHz)	3.00 dB
Radiated Emission (30MHz~1000MHz	4.36 dB
Radiated Emissions (1GHz~25GHz)	5.10 dB
Peak Output Power	0.77dB
Power Spectral Density	0.77dB
Conducted Spurious Emission	0.77dB
6dB Bandwidth	70Hz for <1GHz 130Hz for >1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.6. Equipment Used during the Test

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2021/9/14	2022/9/13
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2021/9/17	2022/9/16
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2021/9/13	2022/9/12
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLEX_142	EF-NM-BNCM-2M	2021/9/17	2022/9/16
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-6th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2022/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2021/9/14	2022/9/13
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2021/04/06	2022/04/05
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0123	VULB9163	538	2021/04/06	2022/04/05
●	Pre-Amplifer	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2021/11/5	2022/11/4
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2021/02/26	2022/02/25
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX104	501184/4	2021/02/26	2022/02/25
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-7th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2022/09/26
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2021/9/13	2022/9/12
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2020/4/27	2023/4/27
●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2021/11/5	2022/11/4
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2021/03/05	2022/03/04
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2021/02/26	2022/02/25
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2021/02/26	2022/02/25
●	RF Connection Cable	HUBER+SUHNER	HTWE0119-05	6m 3GHz RG Serisa	N/A	2021/02/26	2022/02/25
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2021/02/26	2022/02/25
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2021/02/26	2022/02/25
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

●	RF Conducted Method					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2021/9/13	2022/9/12
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2021/9/13	2022/9/12
●	Power Meter	Anritsu	ML249A	N/A	2021/9/13	2022/9/12
○	Radio communication tester	R&S	CMW500	137688-Lv	2021/9/13	2022/9/12

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Requirement

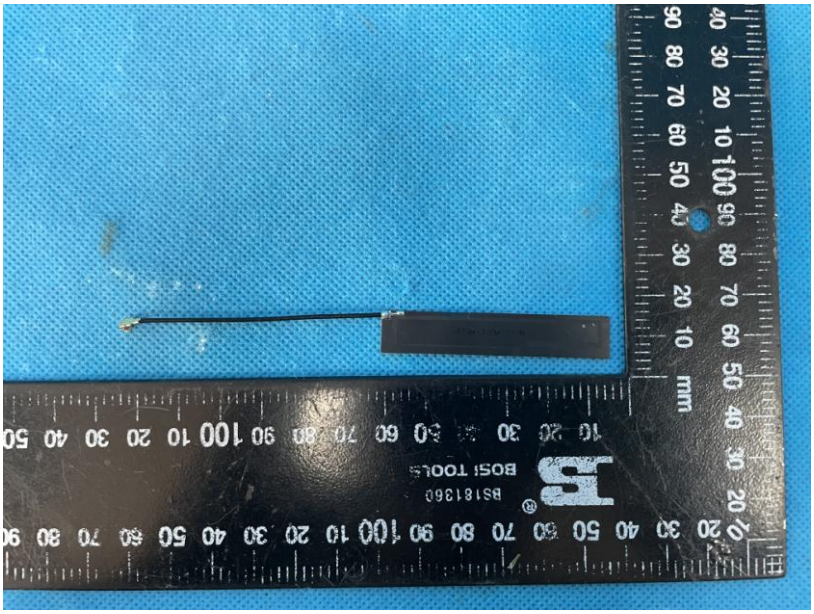
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

The antenna type is a FPC antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. AC Conducted Emission

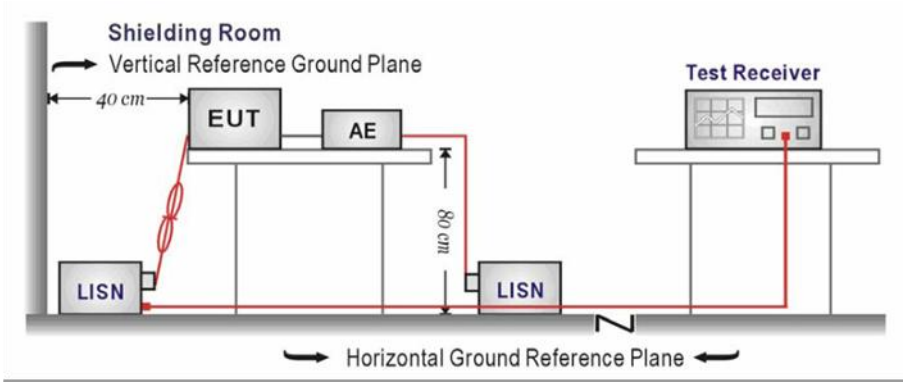
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

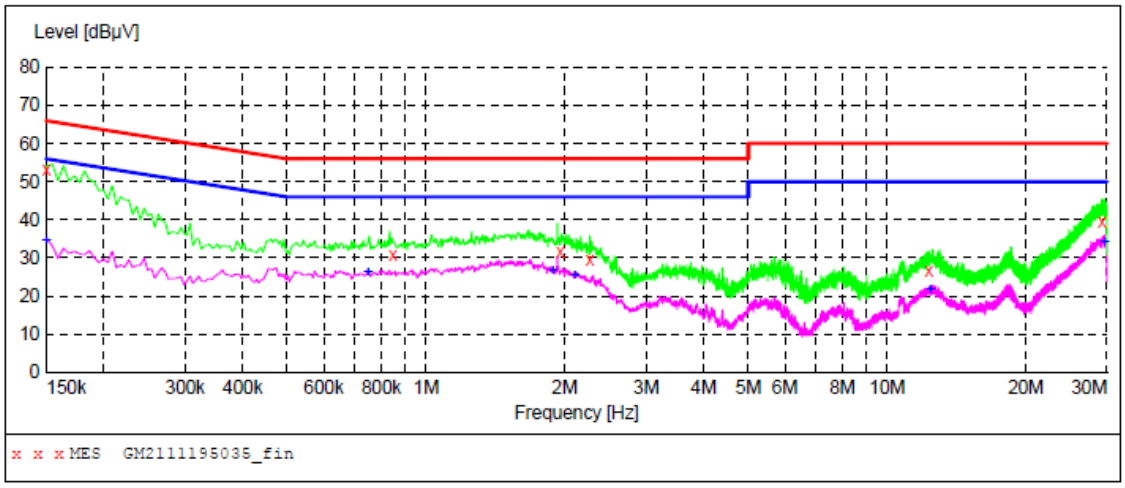
TEST MODE:

Please refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

Test Line:	L



MEASUREMENT RESULT: "GM2111195035_fin"

11/19/2021 1:34PM

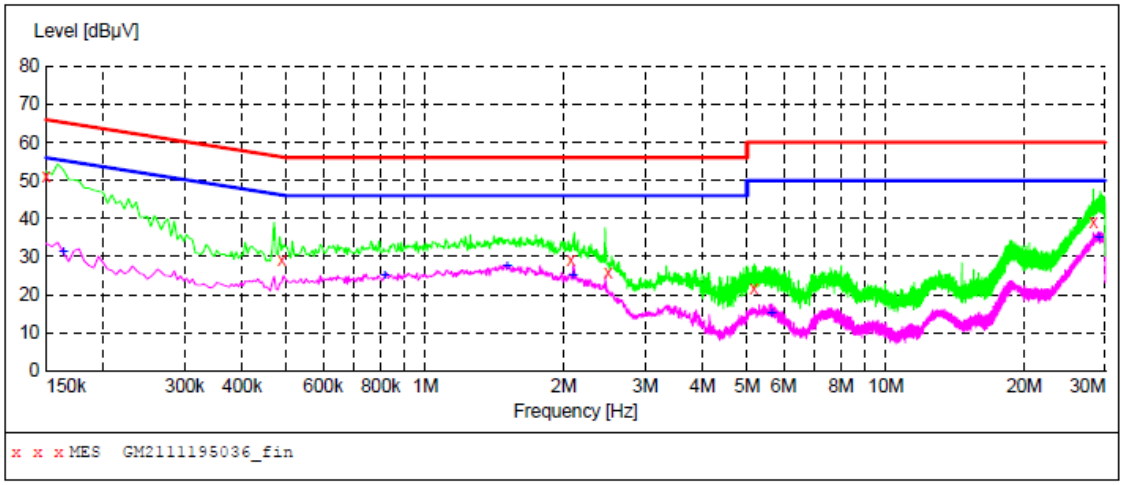
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	53.10	10.1	66	12.9	QP	L1	GND
0.847500	31.00	10.1	56	25.0	QP	L1	GND
1.954500	31.70	10.1	56	24.3	QP	L1	GND
2.260500	29.50	10.1	56	26.5	QP	L1	GND
12.313500	26.80	10.5	60	33.2	QP	L1	GND
29.296500	39.30	10.9	60	20.7	QP	L1	GND

MEASUREMENT RESULT: "GM2111195035_fin2"

11/19/2021 1:34PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	34.50	10.1	56	21.5	AV	L1	GND
0.748500	26.20	10.1	46	19.8	AV	L1	GND
1.882500	26.60	10.1	46	19.4	AV	L1	GND
2.103000	25.30	10.1	46	20.7	AV	L1	GND
12.408000	21.80	10.5	50	28.2	AV	L1	GND
29.647500	33.90	10.9	50	16.1	AV	L1	GND

Test Line:	N



MEASUREMENT RESULT: "GM2111195036_fin"

11/19/2021 1:37PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	51.10	10.1	66	14.9	QP	N	GND
0.487500	29.10	10.1	56	27.1	QP	N	GND
2.071500	29.30	10.1	56	26.7	QP	N	GND
2.499000	25.70	10.1	56	30.3	QP	N	GND
5.172000	21.50	10.3	60	38.5	QP	N	GND
28.234500	39.10	10.9	60	20.9	QP	N	GND

MEASUREMENT RESULT: "GM2111195036_fin2"

11/19/2021 1:37PM

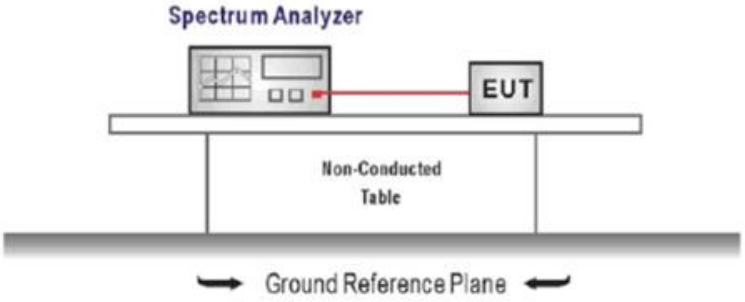
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	31.10	10.1	55	24.2	AV	N	GND
0.816000	24.90	10.1	46	21.1	AV	N	GND
1.504500	27.30	10.1	46	18.7	AV	N	GND
2.094000	24.80	10.1	46	21.2	AV	N	GND
5.649000	15.20	10.3	50	34.8	AV	N	GND
28.990500	35.00	10.9	50	15.0	AV	N	GND

5.3. 20dB bandwidth

LIMIT

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900 MHz.
For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

   Center Frequency = channel center frequency

   Span= approximately 2 to 3 times the 20 dB bandwidth

   RBW = 100 kHz, VBW ≥ 3 × RBW

   Sweep time= auto couple

   Detector = Peak

   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST Data

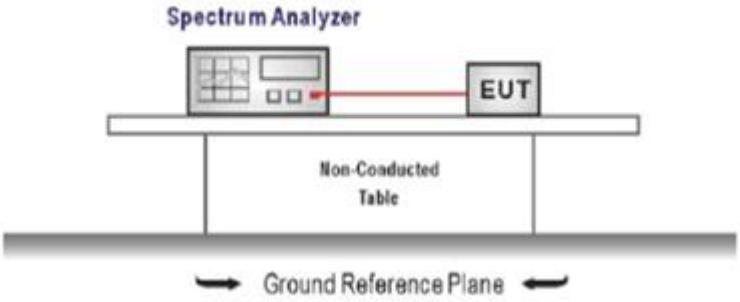
Please refer to appendix A on the appendix report

5.4. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output andthe spectrum analyzer).
   Center Frequency =channel center frequency
   Span≥1.5 x OBW
   RBW = 1%~5%OBW
   VBW ≥ 3 × RBW
   Sweep time= auto couple
   Detector = Peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST Data

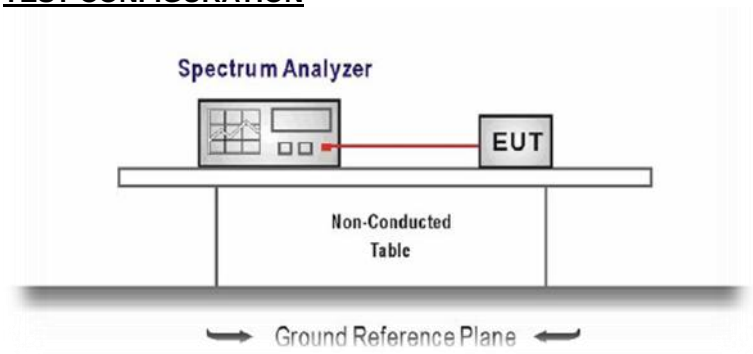
Please refer to appendix B on the appendix report

5.5. Silent Period Time

LIMIT

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be **at least 30 times the duration of the transmission but in no case less than 10 seconds**

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Frequency=Center carrier frequency
   RBW=1MHz, VBW=3MHz, Span= zero,
   Sweep time= 10second, Detector function = peak, Trace = single
4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.2

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

TEST Data

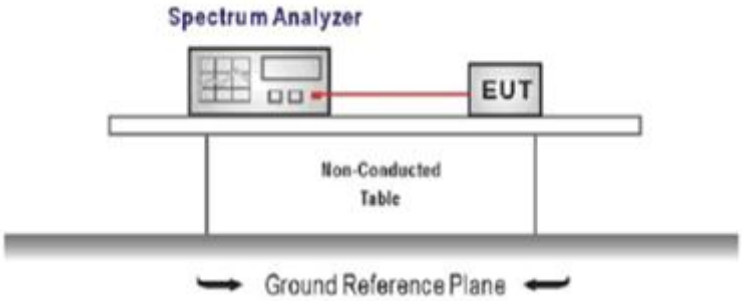
Please refer to appendix C on the appendix report

5.6. Duty Cycle Corrected Factor

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span=zero span, Frequency=centered channel, RBW= 1MHz, VBW ≥ RBW
   Sweep time=as necessary to capture the entire dwell time,
   Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

TEST MODE:

Please refer to the clause 4.2

TEST Data

Please refer to appendix D on the appendix report

5.7. Radiated field strength of the fundamental signal

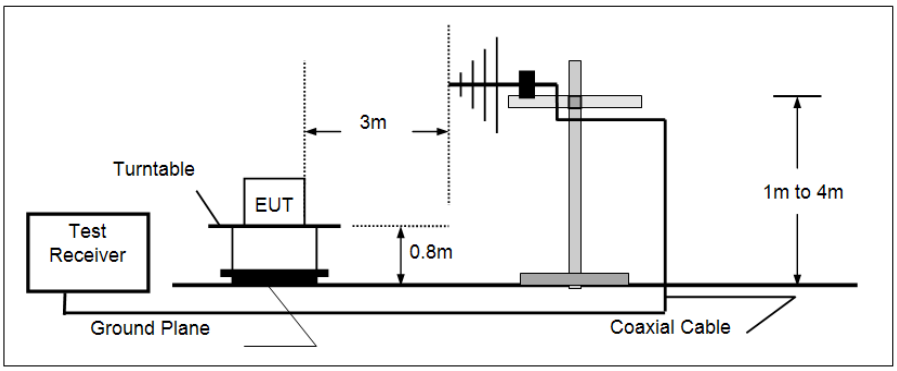
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.231(e)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

[1]Linear interpolations.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1GHz, The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   a) Span shall wide enough to fully capture the emission being measured;
   b) RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

   If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

TEST MODE:

Please refer to the clause 4.2

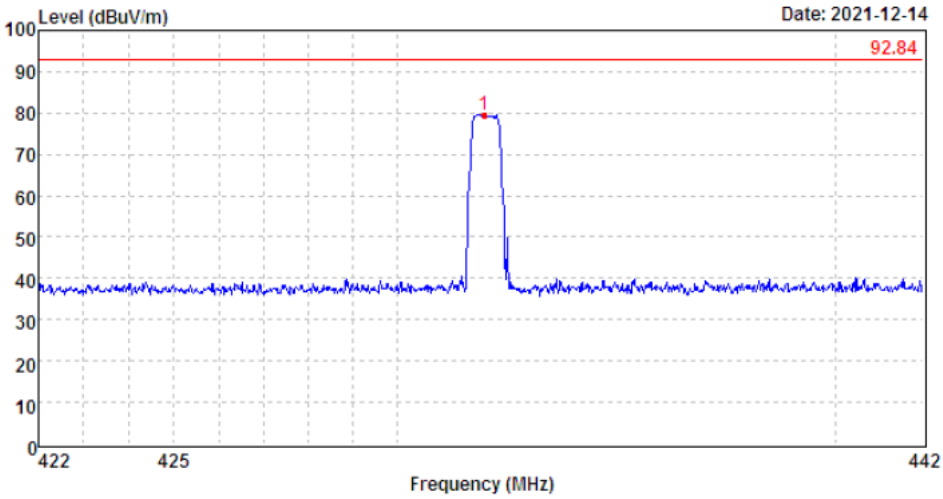
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:

1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
2) Over Limit = Level – Limit

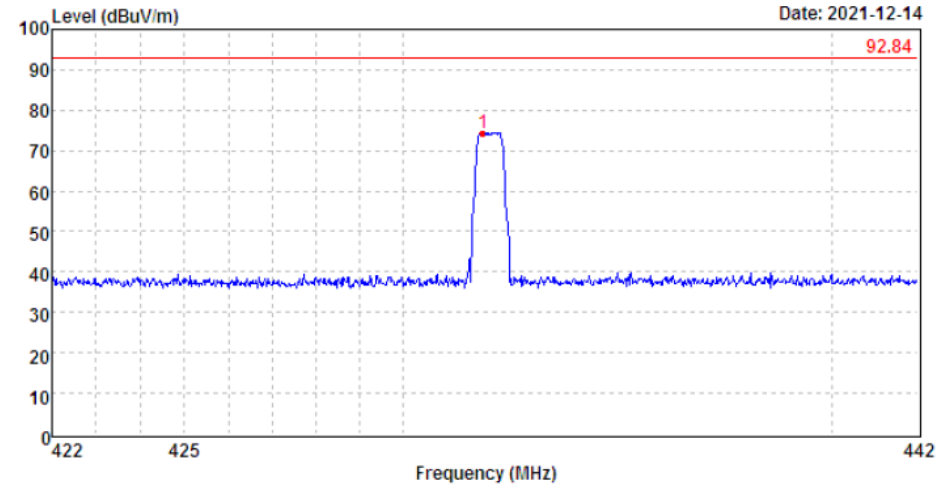
Test channel	CH_L	Polarity	Horizontal



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	431.96	54.83	15.34	9.29	0.00	79.46	92.84	-13.38	Peak

Fundamental of Average								
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity	Detector
1	431.96	79.46	-34.30	45.16	72.84	-27.68	Horizontal	AV

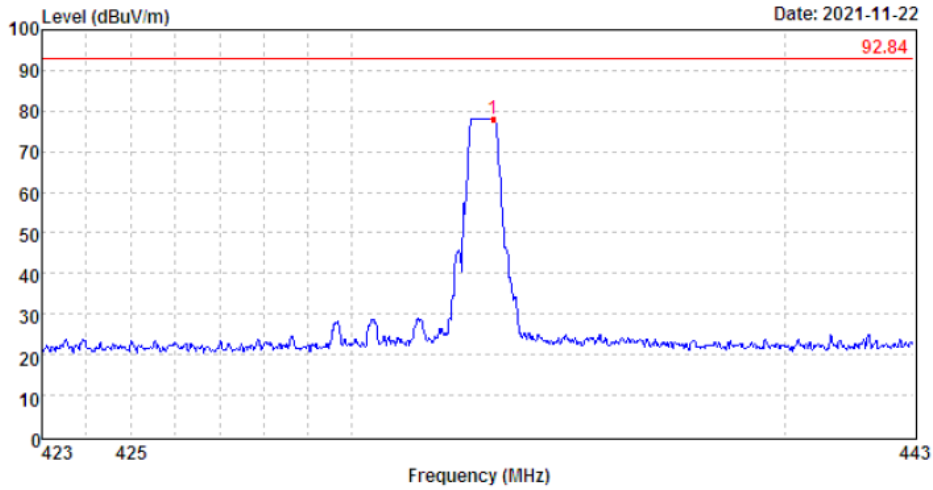
Test channel	CH_L	Polarity	Vertical



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	431.84	49.69	15.34	9.29	0.00	74.32	92.84	-18.52	Peak

Fundamental of Average								
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity	Detector
1	431.84	74.32	-34.30	40.02	72.84	-32.82	Vertical	AV

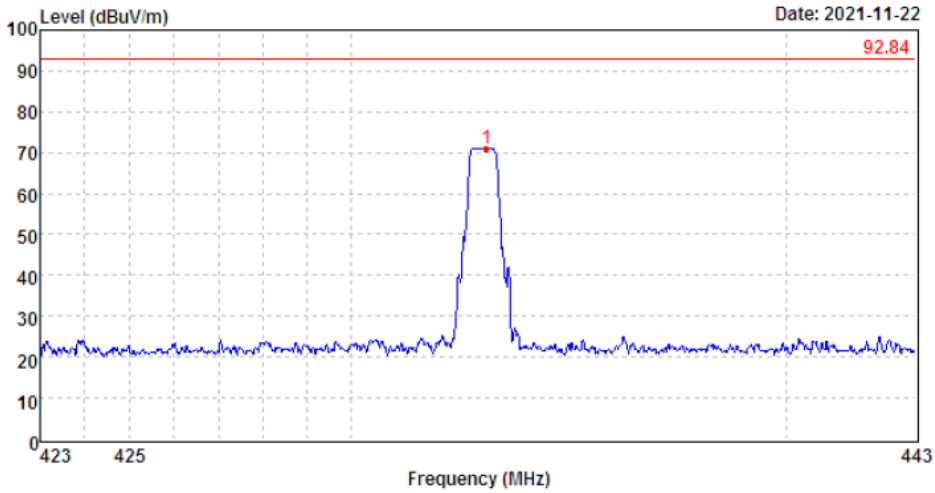
Test channel	CH_M	Polarity	Horizontal



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	433.24	83.66	15.37	9.30	30.15	78.18	92.84	-14.66	Peak

Fundamental of Average								
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity	Detector
1	433.24	78.18	-34.30	43.88	72.84	-28.96	Horizontal	AV

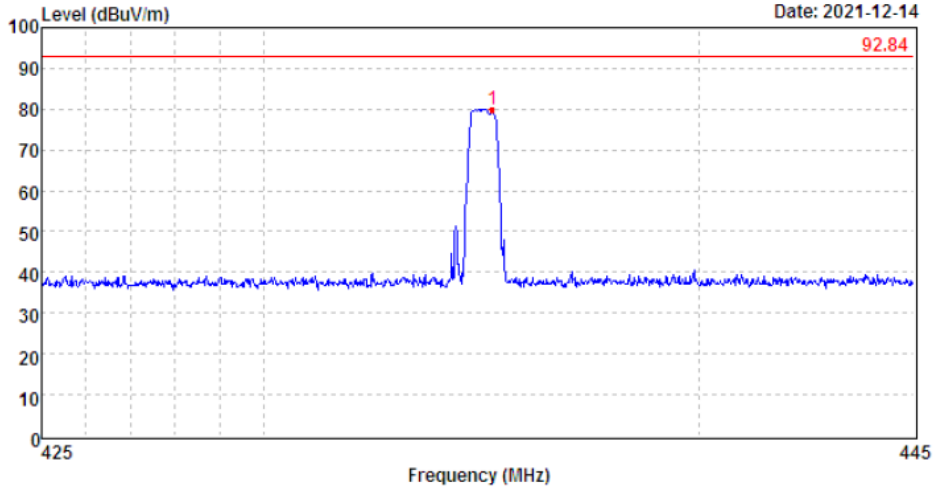
Test channel	CH_M	Polarity	Vertical



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	433.08	76.56	15.36	9.30	30.15	71.07	92.84	-21.77	Peak

Fundamental of Average								
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity	Detector
1	433.08	71.07	-34.30	36.77	72.84	-36.07	Vertical	AV

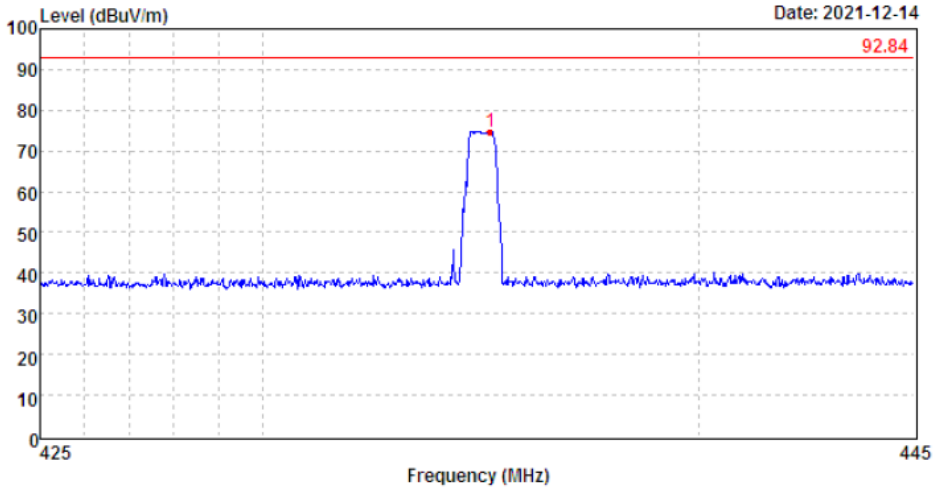
Test channel	CH_H	Polarity	Horizontal



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	435.23	55.20	15.40	9.31	0.00	79.91	92.84	-12.93	Peak

Fundamental of Average								
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity	Detector
1	435.23	79.91	-34.30	45.61	72.84	-27.23	Horizontal	AV

Test channel	CH_H	Polarity	Vertical



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	435.19	50.03	15.40	9.31	0.00	74.74	92.84	-18.10	Peak

Fundamental of Average								
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity	Detector
1	435.19	74.74	-34.30	40.44	72.84	-32.40	Vertical	AV

5.8. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.231(e)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

[1]Linear interpolations.

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

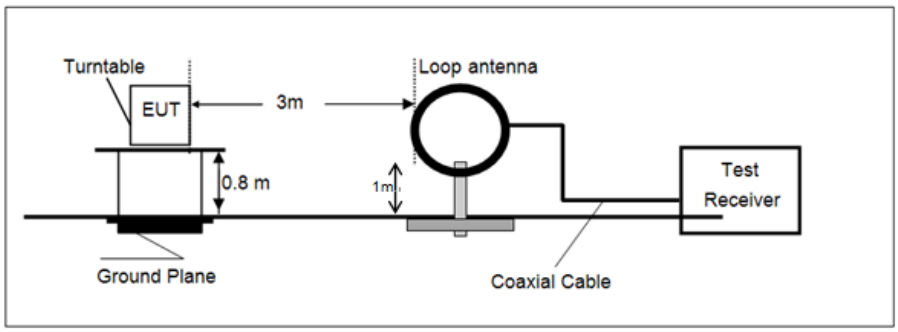
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

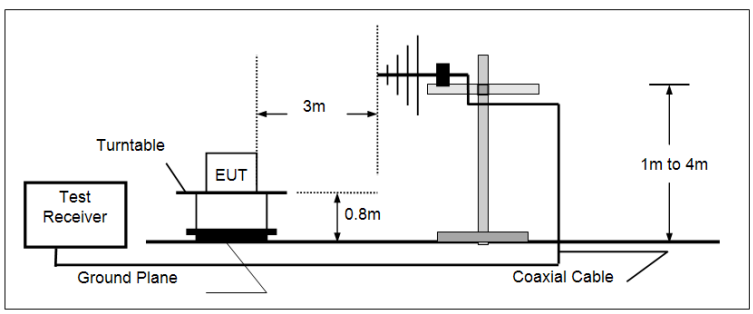
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

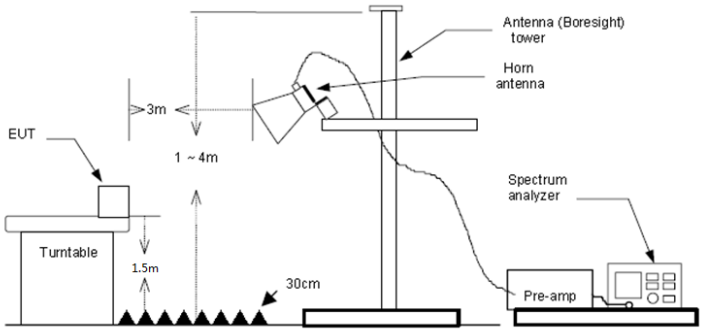
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   a) Span shall wide enough to fully capture the emission being measured;
   b) Below 1 GHz:

      RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

      If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

      For average measurement:

      Average level = Peak level – DCCF

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

Note:

1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
2) Margin = Limit – Level
3) Over Limit = Level – Limit

TEST DATA FOR 9 kHz ~ 30 MHz

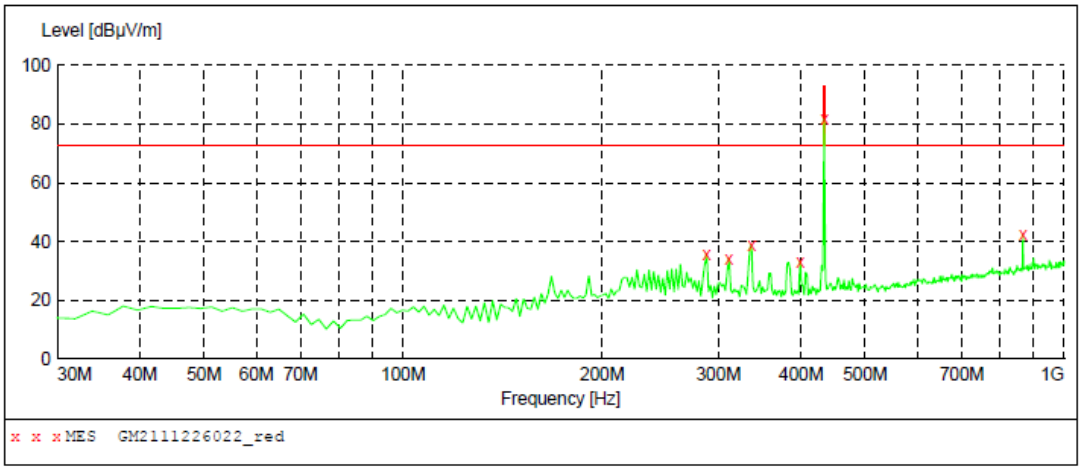
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

TEST DATA FOR 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH_M which it was worst case, so only show the worst case's data on this report.

TEST DATA FOR 30 MHz ~ 1000 MHz

Polarization:	Horizontal



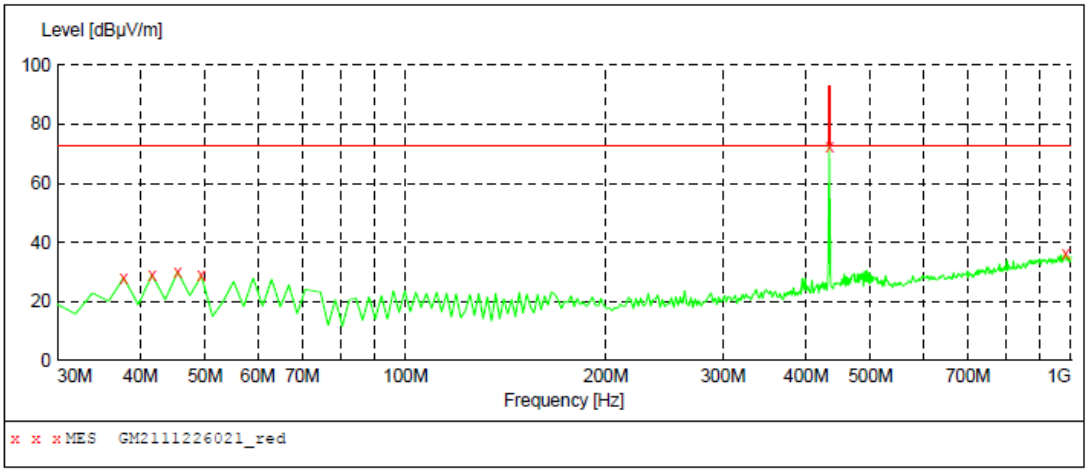
MEASUREMENT RESULT: "GM2111226022_red"

11/22/2021 9:52AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
288.020000	35.70	-7.4	72.8	37.1	PK	100.0	154.00	HORIZONTAL
311.300000	34.30	-6.8	72.8	38.5	PK	100.0	154.00	HORIZONTAL
336.520000	38.80	-5.7	72.8	34.0	PK	100.0	165.00	HORIZONTAL
398.600000	33.10	-3.9	72.8	39.7	PK	100.0	24.00	HORIZONTAL
433.520000	81.80	-3.1	92.8	11.0	PK	100.0	328.00	HORIZONTAL
866.140000	42.20	6.7	72.8	30.6	PK	100.0	192.00	HORIZONTAL

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity	Detector
1	288.02	35.70	-34.30	1.40	52.80	51.40	Horizontal	AV
2	311.30	34.30	-34.30	0.00	52.80	52.80	Horizontal	AV
3	336.52	38.80	-34.30	4.50	52.80	48.30	Horizontal	AV
4	398.60	33.10	-34.30	-1.20	52.80	54.00	Horizontal	AV
5	433.52	81.80	-34.30	47.50	72.80	25.30	Horizontal	AV
6	866.14	42.20	-34.30	7.90	52.80	44.90	Horizontal	AV

Polarization:	Vertical



MEASUREMENT RESULT: "GM2111226021_red"

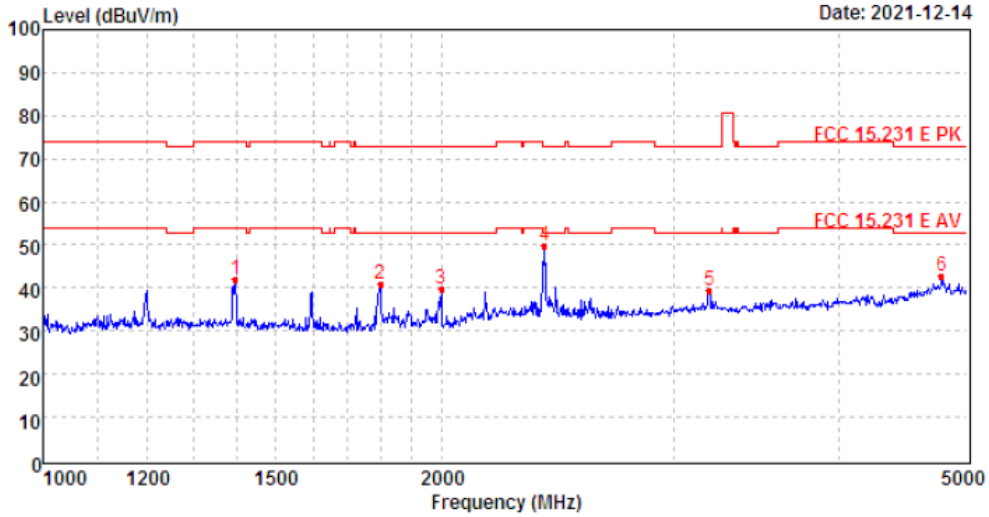
11/22/2021 9:49AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
37.760000	28.10	-10.6	72.8	44.7	PK	100.0	258.00	VERTICAL
41.640000	29.00	-9.6	72.8	43.8	PK	100.0	270.00	VERTICAL
45.520000	30.10	-8.8	72.8	42.7	PK	100.0	236.00	VERTICAL
49.400000	28.70	-8.8	72.8	44.1	PK	100.0	247.00	VERTICAL
433.520000	72.70	-3.1	92.8	20.1	PK	100.0	359.00	VERTICAL
982.540000	36.20	8.4	72.8	36.6	PK	100.0	247.00	VERTICAL

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity	Detector
1	37.76	28.10	-34.30	-6.20	52.80	59.00	Vertical	AV
2	41.64	29.00	-34.30	-5.30	52.80	58.10	Vertical	AV
3	45.52	30.10	-34.30	-4.20	52.80	57.00	Vertical	AV
4	49.40	28.70	-34.30	-5.60	52.80	58.40	Vertical	AV
5	433.52	72.70	-34.30	38.40	72.80	34.40	Vertical	AV
6	982.54	36.20	-34.30	1.90	52.80	50.90	Vertical	AV

TEST DATA FOR 1 GHz ~ 5 GHz

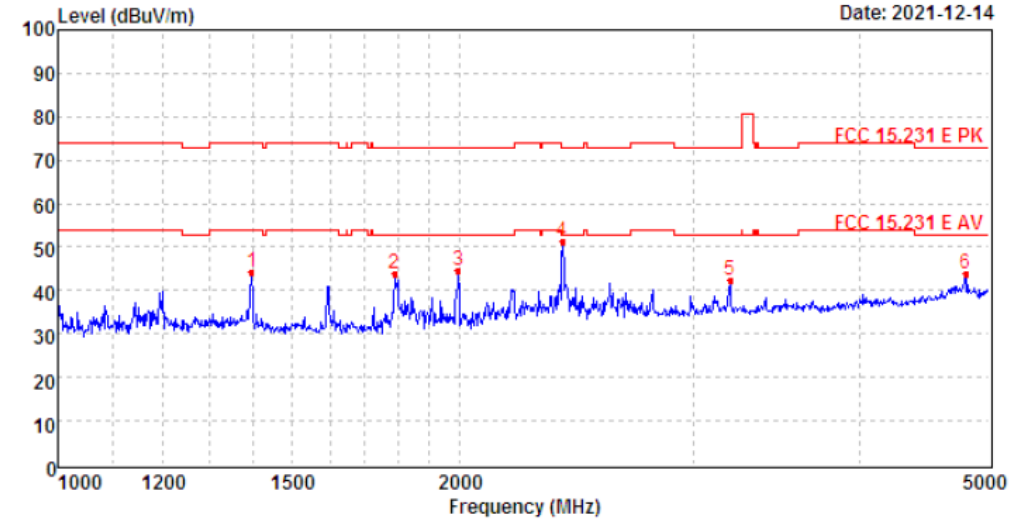
Test channel	CH_L	Polarity	Horizontal



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1397.61	48.13	26.11	4.17	36.56	41.85	74.00	-32.15	Peak
2	1799.39	47.83	25.40	4.75	37.11	40.87	72.84	-31.97	Peak
3	2001.04	45.95	26.11	5.02	37.23	39.85	72.84	-32.99	Peak
4	2396.30	53.77	27.71	5.53	37.23	49.78	72.84	-23.06	Peak
5	3191.23	41.27	28.92	6.45	37.07	39.57	72.84	-33.27	Peak
6	4787.38	37.26	31.40	8.41	34.15	42.92	72.84	-29.92	Peak

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Polarity	Detector
1	1397.61	41.85	-34.30	7.55	54.00	-45.29	Horizontal	AV
2	1799.39	40.87	-34.30	6.57	52.84	-46.27	Horizontal	AV
3	2001.04	39.85	-34.30	5.55	52.84	-47.29	Horizontal	AV
4	2396.30	49.78	-34.30	15.48	52.84	-37.36	Horizontal	AV
5	3191.23	39.57	-34.30	5.27	52.84	-47.57	Horizontal	AV
6	4787.38	42.92	-34.30	8.62	52.84	-44.22	Horizontal	AV

Test channel	CH_L	Polarity	Vertical



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1397.61	50.52	26.11	4.17	36.56	44.24	74.00	-29.76	Peak
2	1790.72	50.84	25.36	4.74	37.13	43.81	72.84	-29.03	Peak
3	1997.82	50.84	26.09	5.01	37.22	44.72	72.84	-28.12	Peak
4	2392.44	55.13	27.71	5.53	37.22	51.15	72.84	-21.69	Peak
5	3196.37	44.01	28.91	6.45	37.10	42.27	72.84	-30.57	Peak
6	4802.81	38.12	31.40	8.45	34.13	43.84	72.84	-29.00	Peak

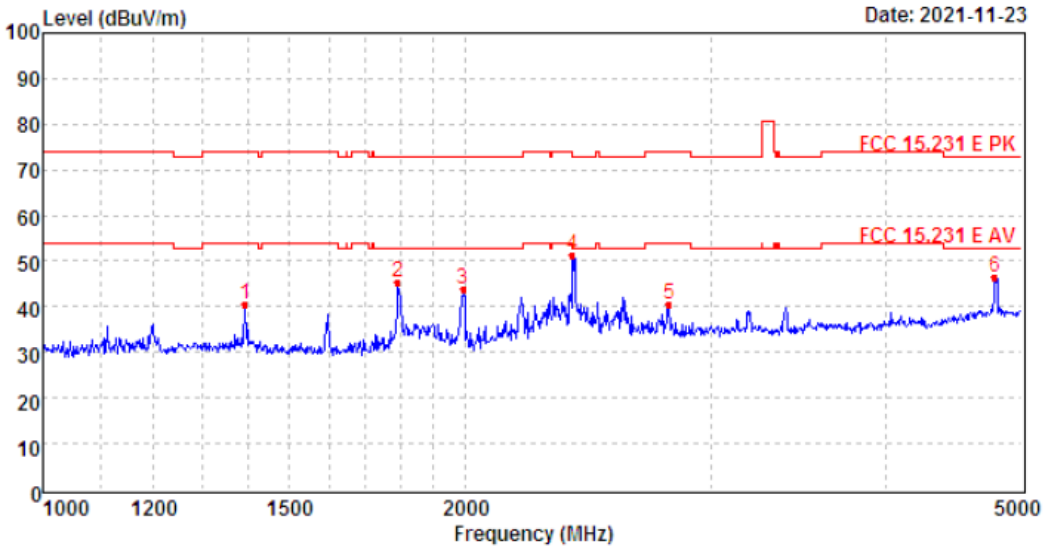
Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Polarity	Detector
1	1397.61	44.24	-34.30	7.47	54.00	-45.37	Vertical	AV
2	1790.72	43.81	-34.30	9.94	52.84	-42.90	Vertical	AV
3	1997.82	44.72	-34.30	9.51	52.84	-43.33	Vertical	AV
4	2392.44	51.15	-34.30	10.42	52.84	-42.42	Vertical	AV
5	3196.37	42.27	-34.30	16.85	52.84	-35.99	Vertical	AV
6	4802.81	43.84	-34.30	7.97	52.84	-44.87	Vertical	AV

Test channel	CH_M	Polarity	Horizontal

Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1195.60	49.03	25.58	3.86	36.70	41.77	74.00	-32.23	Peak
2	1397.61	47.34	26.11	4.17	36.56	41.06	74.00	-32.94	Peak
3	1799.39	52.70	25.40	4.75	37.11	45.74	72.84	-27.10	Peak
4	2396.30	52.24	27.71	5.53	37.23	48.25	72.84	-24.59	Peak
5	2601.29	49.86	27.51	5.83	37.29	45.91	72.84	-26.93	Peak
6	3196.37	41.11	28.91	6.45	37.10	39.37	72.84	-33.47	Peak

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Polarity	Detector
1	1195.60	41.77	-34.30	7.47	54.00	-46.53	Horizontal	AV
2	1397.61	41.06	-34.30	6.76	54.00	-47.24	Horizontal	AV
3	1799.39	45.74	-34.30	11.44	52.84	-41.40	Horizontal	AV
4	2396.30	48.25	-34.30	13.95	52.84	-38.89	Horizontal	AV
5	2601.29	45.91	-34.30	11.61	52.84	-41.23	Horizontal	AV
6	3196.37	39.37	-34.30	5.07	52.84	-47.77	Horizontal	AV

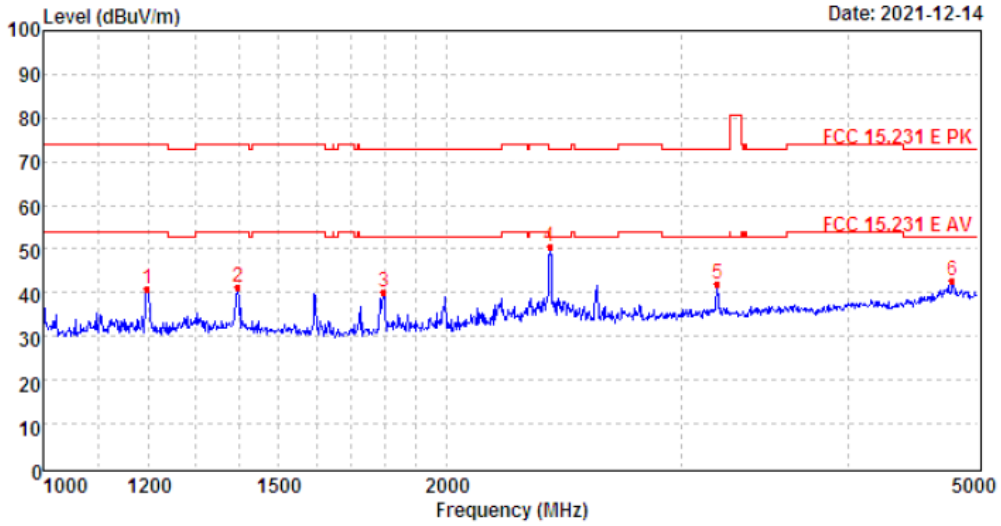
Test channel	CH_M	Polarity	Vertical



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1395.36	46.82	26.12	4.17	36.55	40.56	74.00	-33.44	Peak
2	1793.60	52.19	25.37	4.75	37.12	45.19	72.84	-27.65	Peak
3	1994.61	50.15	26.08	5.01	37.22	44.02	72.84	-28.82	Peak
4	2388.60	55.38	27.72	5.53	37.20	51.43	74.00	-22.57	Peak
5	2801.18	43.43	28.40	6.04	37.36	40.51	74.00	-33.49	Peak
6	4787.38	40.71	31.40	8.41	34.15	46.37	72.84	-26.47	Peak

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Polarity	Detector
1	1395.36	40.56	-34.30	6.26	54.00	-46.58	Vertical	AV
2	1793.60	45.19	-34.30	10.89	52.84	-41.95	Vertical	AV
3	1994.61	44.02	-34.30	9.72	52.84	-43.12	Vertical	AV
4	2388.60	51.43	-34.30	17.13	54.00	-36.87	Vertical	AV
5	2801.18	40.51	-34.30	6.21	54.00	-47.79	Vertical	AV
6	4787.36	46.37	-34.30	12.07	52.84	-40.77	Vertical	AV

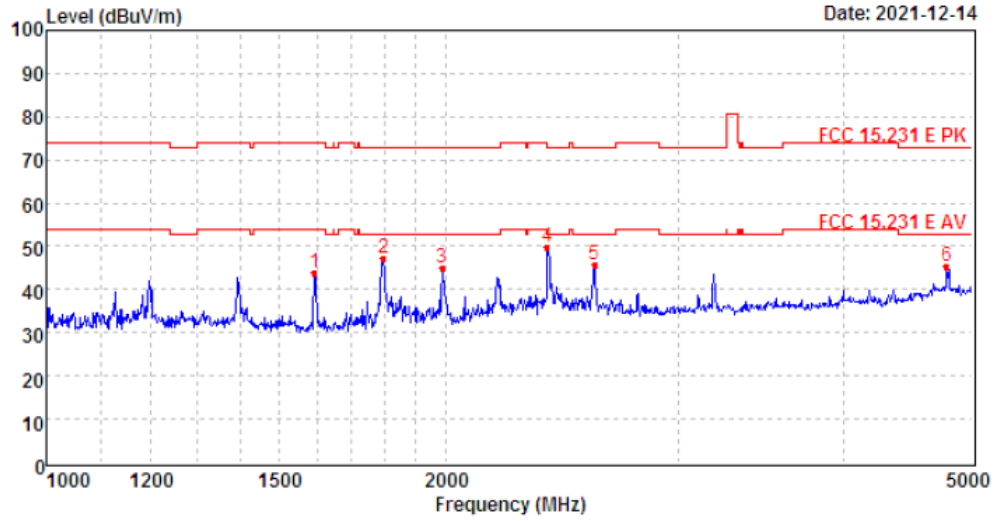
Test channel	CH_H	Polarity	Horizontal



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1195.60	48.02	25.58	3.86	36.70	40.76	74.00	-33.24	Peak
2	1397.61	47.68	26.11	4.17	36.56	41.40	74.00	-32.60	Peak
3	1796.49	47.26	25.39	4.75	37.12	40.28	72.84	-32.56	Peak
4	2392.44	54.56	27.71	5.53	37.22	50.58	72.84	-22.26	Peak
5	3191.23	43.71	28.92	6.45	37.07	42.01	72.84	-30.83	Peak
6	4787.38	37.20	31.40	8.41	34.15	42.86	72.84	-29.98	Peak

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Polarity	Detector
1	1195.60	40.76	-34.30	6.46	54.00	-47.54	Horizontal	AV
2	1397.61	41.40	-34.30	7.10	54.00	-46.90	Horizontal	AV
3	1796.49	40.28	-34.30	5.98	52.84	-46.86	Horizontal	AV
4	2392.44	50.58	-34.30	16.28	52.84	-36.56	Horizontal	AV
5	3191.23	42.01	-34.30	7.71	52.84	-45.13	Horizontal	AV
6	4787.38	42.86	-34.30	8.56	52.84	-44.28	Horizontal	AV

Test channel	CH_H	Polarity	Vertical

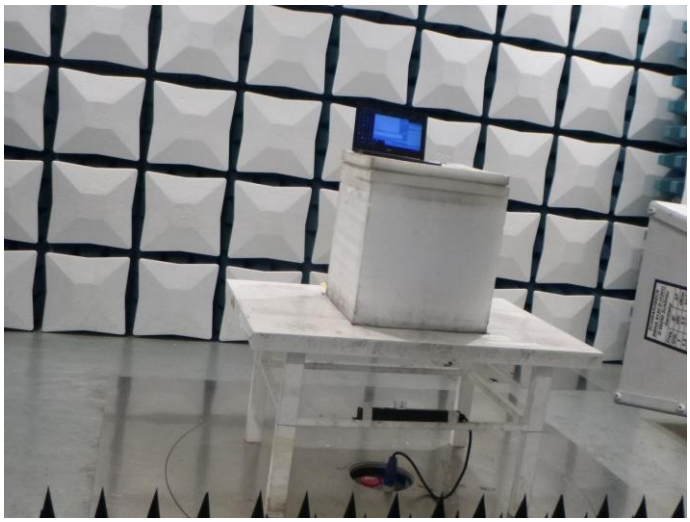


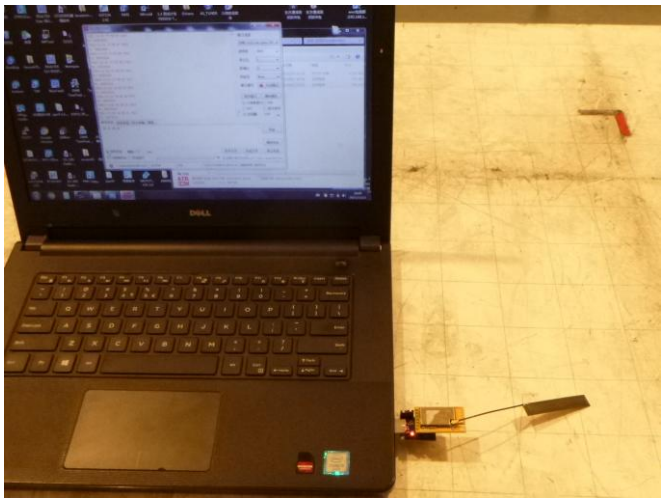
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1594.78	51.27	25.41	4.46	37.15	43.99	74.00	-30.01	Peak
2	1796.49	54.04	25.39	4.75	37.12	47.06	72.84	-25.78	Peak
3	1991.40	51.14	26.07	5.00	37.22	44.99	72.84	-27.85	Peak
4	2388.60	53.80	27.72	5.53	37.20	49.85	74.00	-24.15	Peak
5	2592.93	49.54	27.49	5.82	37.26	45.59	72.84	-27.25	Peak
6	4787.38	39.70	31.40	8.41	34.15	45.36	72.84	-27.48	Peak

Spurious Emission of Average								
No.	Freq. [MHz]	PK level [dBµV/m]	DCCF [dB]	Level [dBµV/m]	Limit [dBµV/m]	Over Limit [dB]	Polarity	Detector
1	1594.78	43.99	-34.30	9.69	54.00	-43.15	Vertical	AV
2	1796.49	47.06	-34.30	12.76	52.84	-40.08	Vertical	AV
3	1991.40	44.99	-34.30	10.69	52.84	-42.15	Vertical	AV
4	2388.60	49.85	-34.30	15.55	54.00	-38.45	Vertical	AV
5	2595.93	45.59	-34.30	11.29	52.84	-41.55	Vertical	AV
6	4787.38	45.36	-34.30	11.06	52.84	-41.78	Vertical	AV

6. TEST SETUP PHOTOS

Radiated Emission

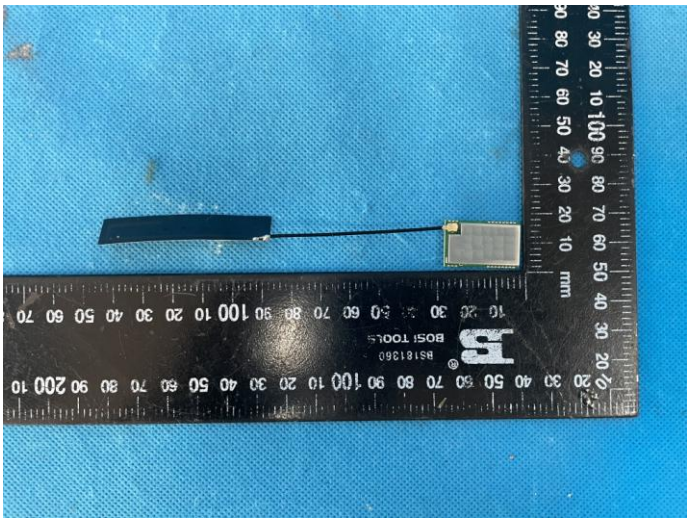


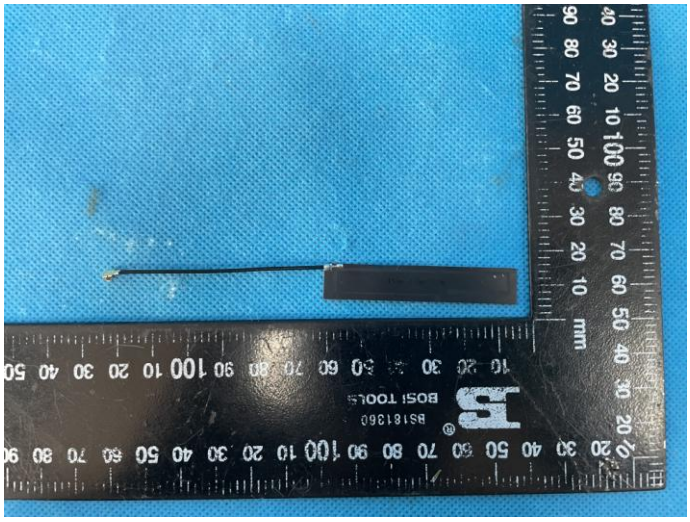


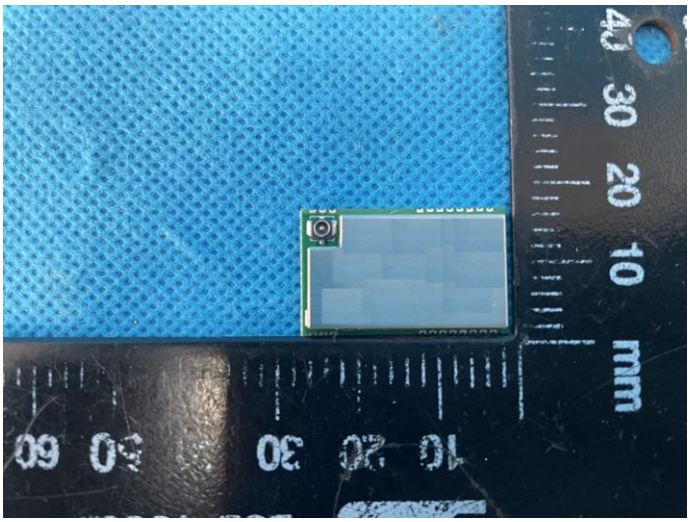
AC Conducted Emission

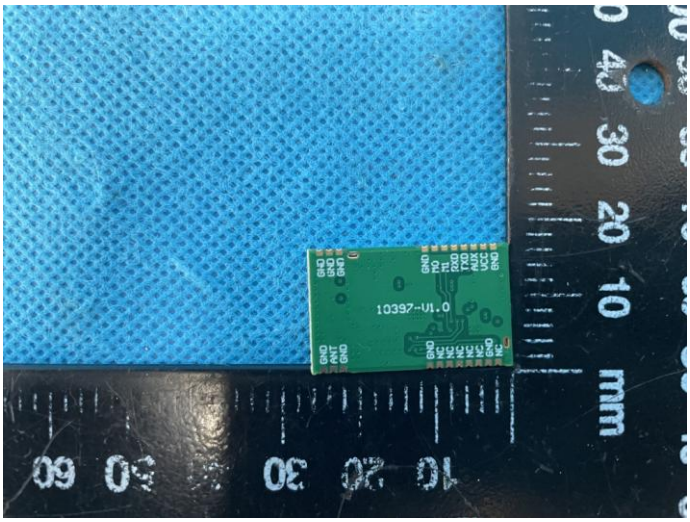
7. EXTERANAL AND INTERNAL PHOTOS

External Photos








10397-V1.0
mm

Internal Photos

8. Appendix