

TEST REPORT

Report No.: BCTC2310543057E

Applicant: Locsmart IoT Technology (Suzhou) Co., Ltd

Product Name: AOA Positioning Base Station

Model/Type Reference: AG2

Tested Date: 2023-10-13 to 2023-10-23

Issued Date: 2023-10-24

Shenzhen BCTC Testing Co., Ltd.



FCC ID: 2A9XB-AG2

Product Name: AOA Positioning Base Station
Trademark: N/A
Model/Type Reference: AG2
AGXXXXX("X" can be 0-9, A-Z, a-z, or blank to indicate different case colors, sales regions, or customers)
Prepared For: Locsmart IoT Technology (Suzhou) Co., Ltd
Address: Building 16, Creative Industry park, No, 328 xinghu street, Suzhou Industrial Park, Suzhou, China
Manufacturer: Locsmart IoT Technology (Suzhou) Co., Ltd
Address: Building 16, Creative Industry park, No, 328 xinghu street, Suzhou Industrial Park, Suzhou, China
Prepared By: Shenzhen BCTC Testing Co., Ltd.
Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date: 2023-10-13
Sample Tested Date: 2023-10-13 to 2023-10-23
Issue Date: 2023-10-24
Report No.: BCTC2310543057E
Test Standards: FCC Part15.249
ANSI C63.10-2013
Test Results: PASS

Tested by:



Eric Yang/Project Handler

Approved by:



Zero Zhou/Reviewer

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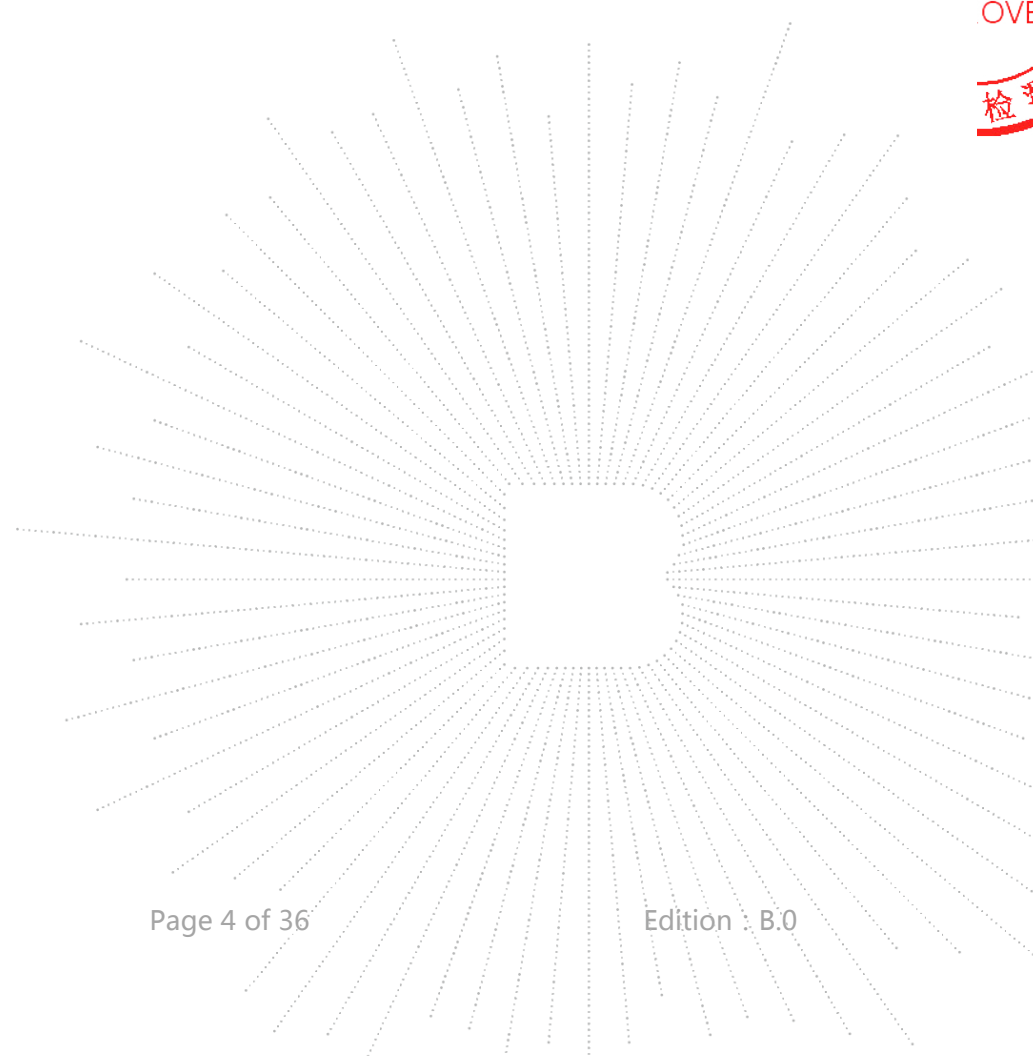
(Note: N/A Means Not Applicable)

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1. Version

Report No.	Issue Date	Description	Approved
BCTC2310543057E	2023-10-24	Original	Valid

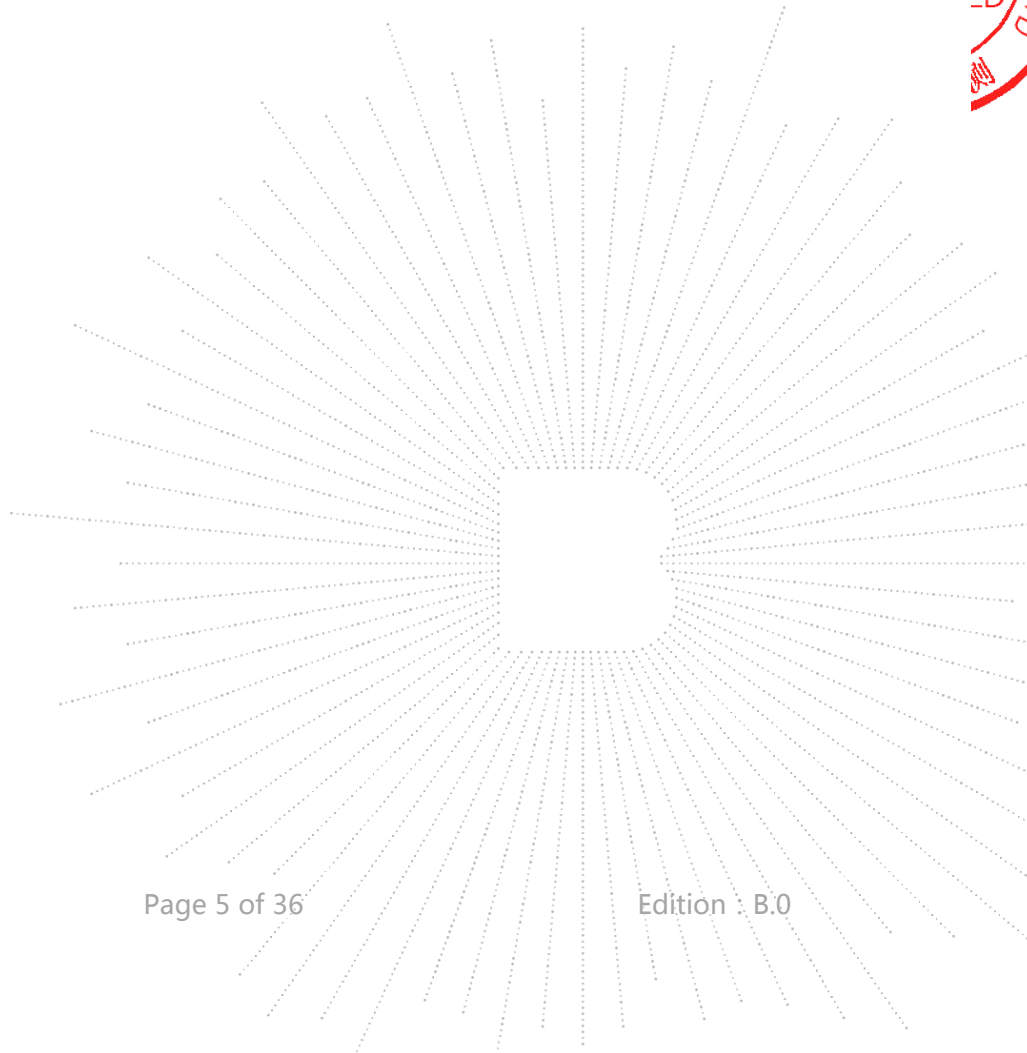
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2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Conducted Emission	15.207	PASS
2	20dB Bandwidth	15.215	PASS
3	Fundamental & Radiated Spurious Emission Measurement	15.249	PASS
4	Band Edge Emission	15.249	PASS
5	Antenna Requirement	15.203	PASS



3. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

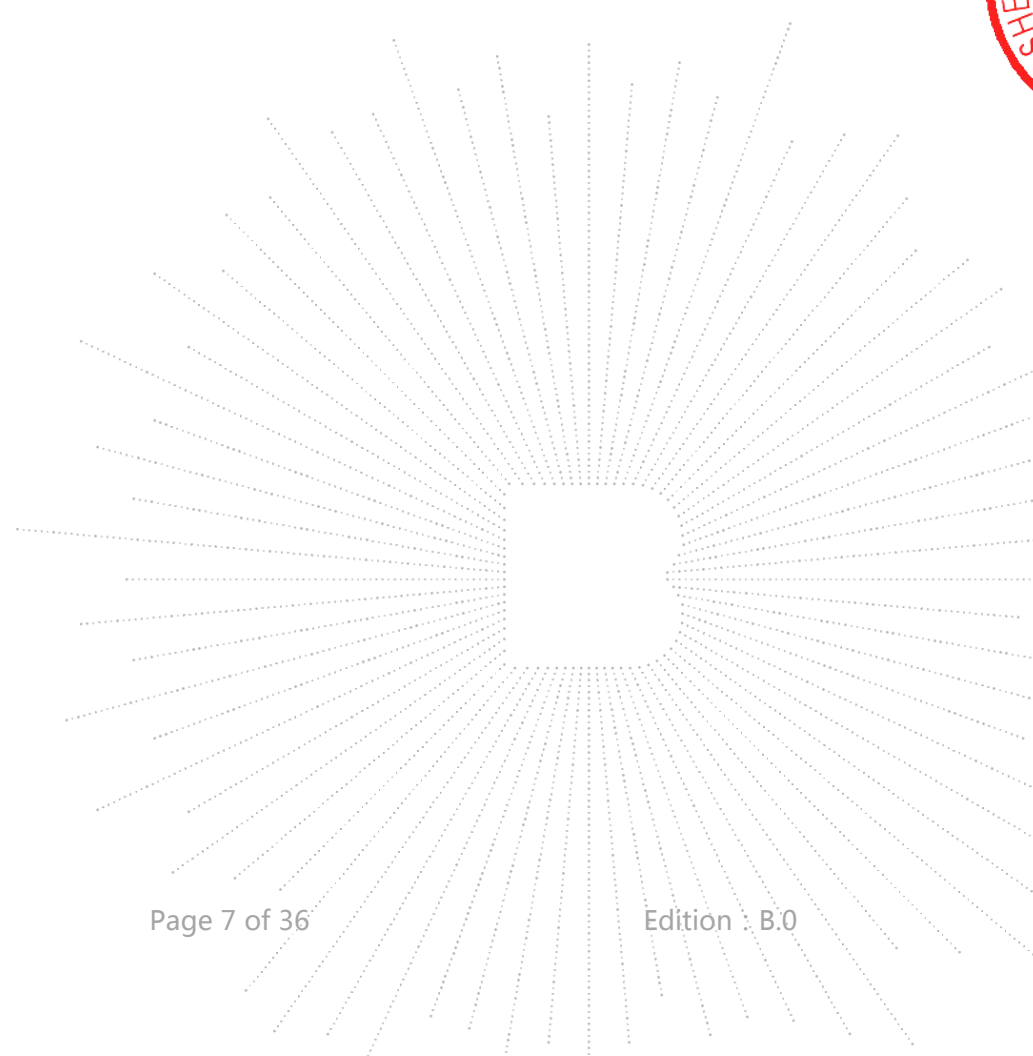
No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(9kHz-30MHz)	U=3.7dB
2	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission(150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59°C



4. Product Information And Test Setup

4.1 Product Information

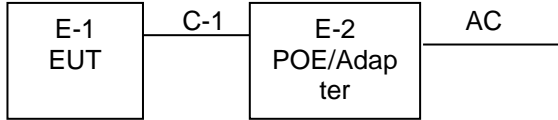
Model/Type Reference:	AG2 AGXXXXX("X" can be 0-9, A-Z, a-z, or blank to indicate different case colors, sales regions, or customers)
Model Differences:	All the model are the same circuit and RF module, except model names and appearance of the color.
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK
Number Of Channel	40CH
Antenna installation:	PCB antenna
Antenna Gain:	1.53 dBi
Ratings:	DC 48V From POE



4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

Conducted Emission and Radiated Spurious Emission:



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-2	POE	N/A	TL-R470GP-AC	N/A	Auxiliary
E-2	Adapter	N/A	T535122-2X1	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	N/A	Network cable unshielded

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



4.4 Channel List

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2422	21	2442
02	2404	12	2424	22	2444
03	2406	13	2426	23	2446
~	~	~	~	~	~
09	2418	19	2438	39	2478
10	2420	20	2440	40	2480

4.5 Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

For All Mode	Description	Modulation Type
Mode 1	CH01	GFSK
Mode 2	CH20	
Mode 3	CH40	
Mode 4	Link mode (Conducted Emission & Radiated emission)	

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) Fully-charged battery is used during the test

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5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850

FCC Designation Number: CN1212

ISED Registered No.: 23583

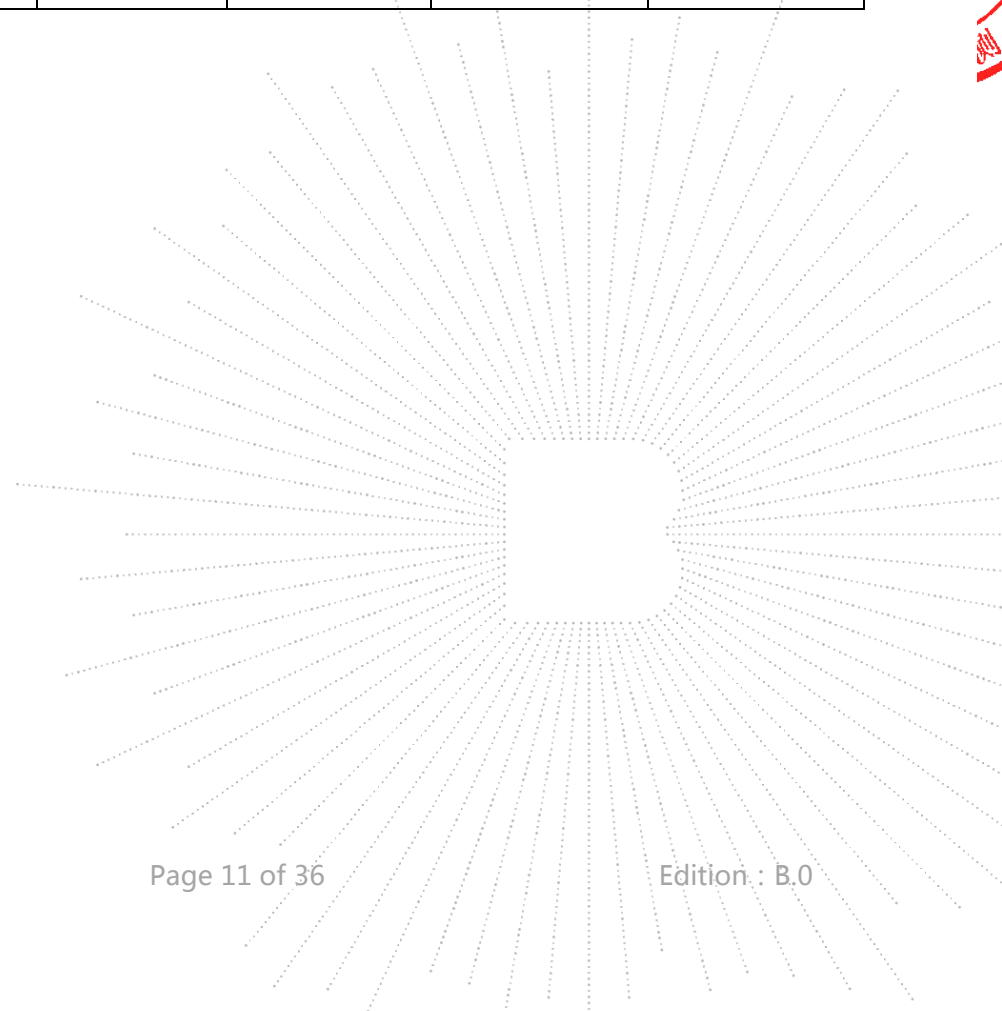
ISED CAB identifier: CN0017

5.2 Test Instrument Used

Conducted Emissions Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
LISN	R&S	ENV216	101375	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Pulse limiter	Schwarzbeck	VTSD9561-F	01323	Sept. 22, 2023	Sept. 21, 2024

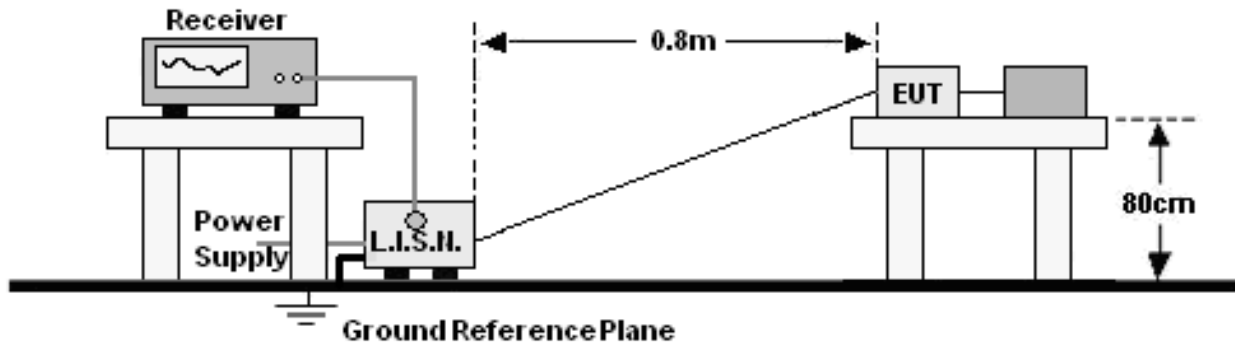
RF Conducted Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Power Metter	Keysight	E4419	\	May 15, 2023	May 14, 2024
Power Sensor (AV)	Keysight	E9300A	\	May 15, 2023	May 14, 2024
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Radio frequency control box	MAIWEI	MW100-RFC B	\	\	\
Software	MAIWEI	MTS 8310	\	\	\

Radiated Emissions Test (966 Chamber01)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 29, 2023	May 28, 2024
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 31, 2023	May 30, 2024
Amplifier	SKET	LAPA_01G18 G-45dB	SK2021040901	May 15, 2023	May 14, 2024
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 31, 2023	May 30, 2024
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 31, 2023	May 30, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	FA-03A2 RE	\	\



6. Conducted Emissions

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Limit (dBuV)	
	Quas-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Notes:
 1. *Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.

6.3 Test Procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).

b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.

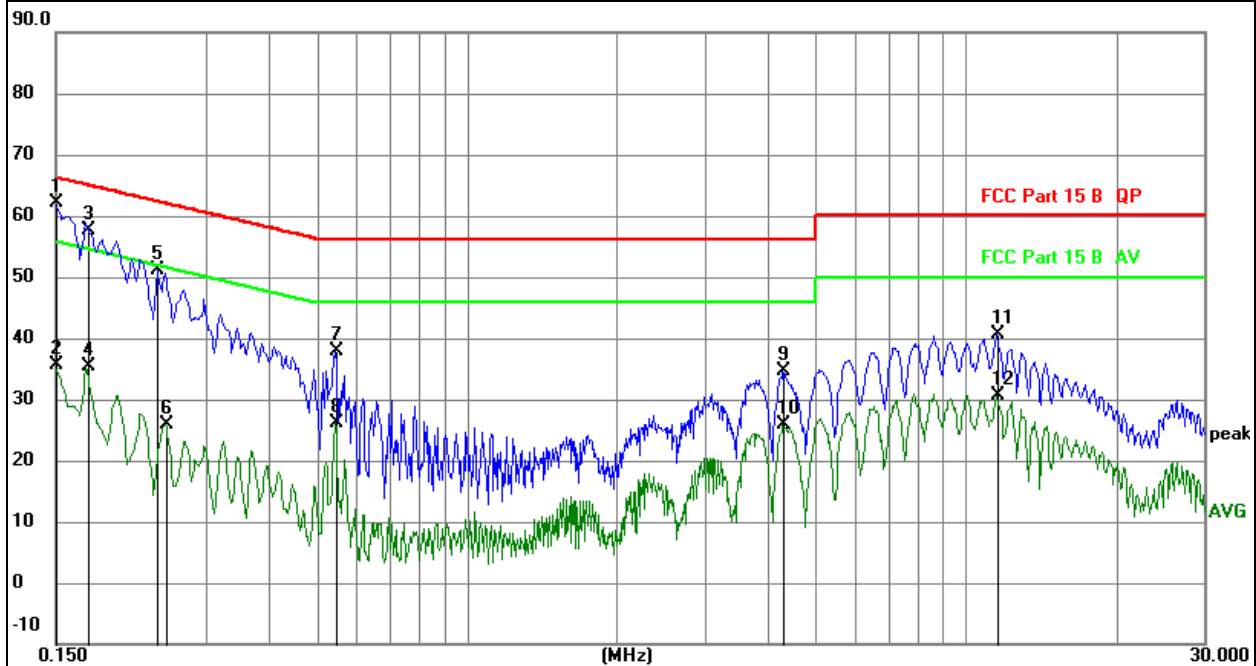
c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

6.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

6.5 Test Result

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 4	Test Voltage :	AC 120V/60Hz

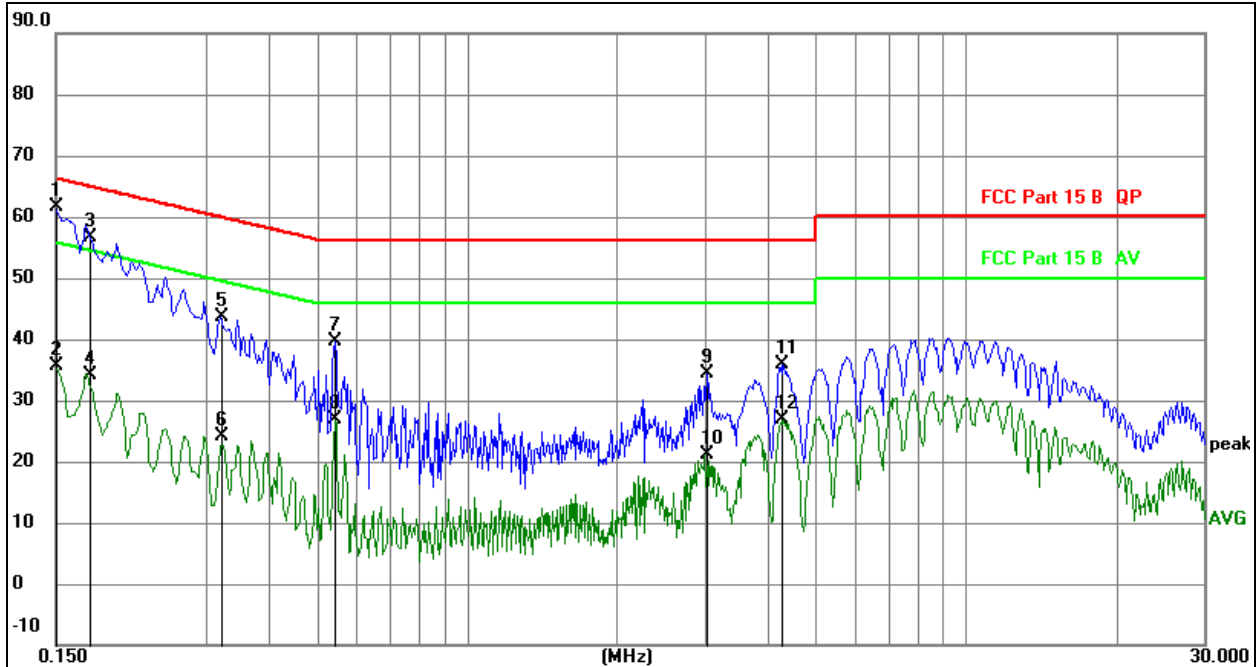


Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz		dB	dBuV	dBuV	dB	
1	*	0.1500	42.44	19.73	62.17	66.00	-3.83	QP
2		0.1500	15.82	19.73	35.55	56.00	-20.45	AVG
3		0.1749	37.82	19.78	57.60	64.72	-7.12	QP
4		0.1749	15.54	19.78	35.32	54.72	-19.40	AVG
5		0.2400	31.29	19.83	51.12	62.10	-10.98	QP
6		0.2490	6.12	19.83	25.95	51.79	-25.84	AVG
7		0.5460	18.11	19.84	37.95	56.00	-18.05	QP
8		0.5460	6.31	19.84	26.15	46.00	-19.85	AVG
9		4.2945	14.08	20.59	34.67	56.00	-21.33	QP
10		4.2945	5.30	20.59	25.89	46.00	-20.11	AVG
11		11.5485	20.76	19.88	40.64	60.00	-19.36	QP
12		11.5485	10.86	19.88	30.74	50.00	-19.26	AVG

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 4	Polarization :	N


Remark:

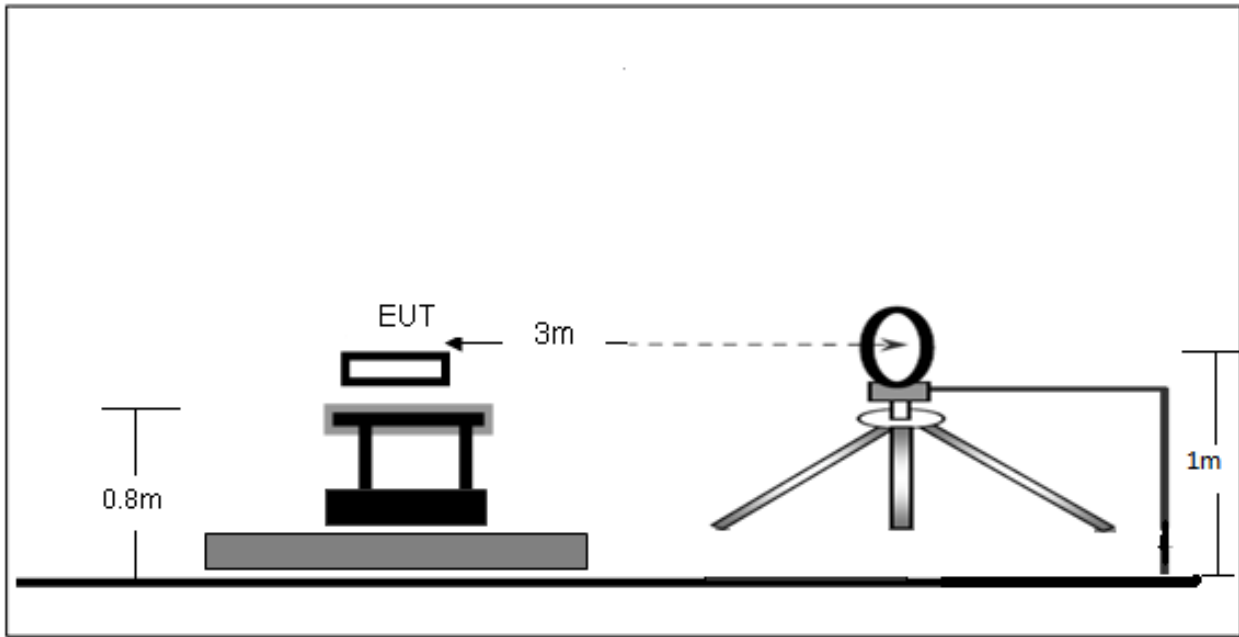
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Mk.	Freq. MHz	Reading Level	Correct Factor dB	Measurement dBuV	Limit dBuV	Over dB	Detector
1	*	0.1500	41.89	19.73	61.62	66.00	-4.38	QP
2		0.1500	15.87	19.73	35.60	56.00	-20.40	AVG
3		0.1758	36.78	19.78	56.56	64.68	-8.12	QP
4		0.1758	14.28	19.78	34.06	54.68	-20.62	AVG
5		0.3200	23.88	19.83	43.71	59.71	-16.00	QP
6		0.3200	4.22	19.83	24.05	49.71	-25.66	AVG
7		0.5435	19.72	19.84	39.56	56.00	-16.44	QP
8		0.5435	7.07	19.84	26.91	46.00	-19.09	AVG
9		3.0253	14.12	20.31	34.43	56.00	-21.57	QP
10		3.0253	0.84	20.31	21.15	46.00	-24.85	AVG
11		4.2918	15.23	20.59	35.82	56.00	-20.18	QP
12		4.2918	6.36	20.59	26.95	46.00	-19.05	AVG

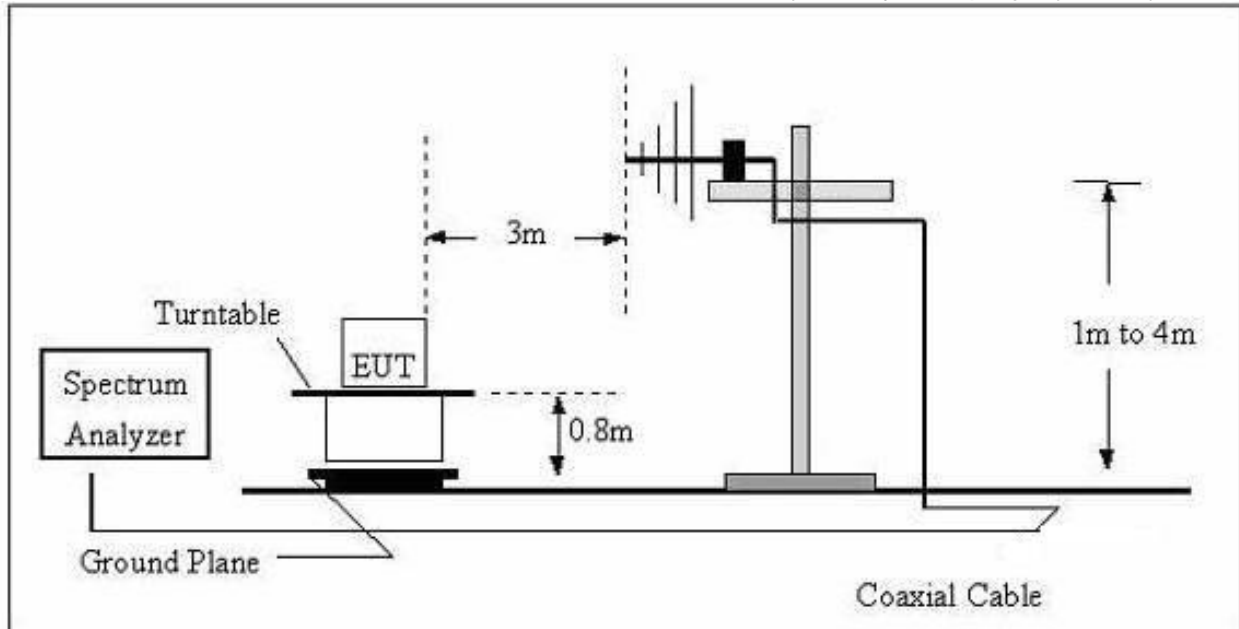
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

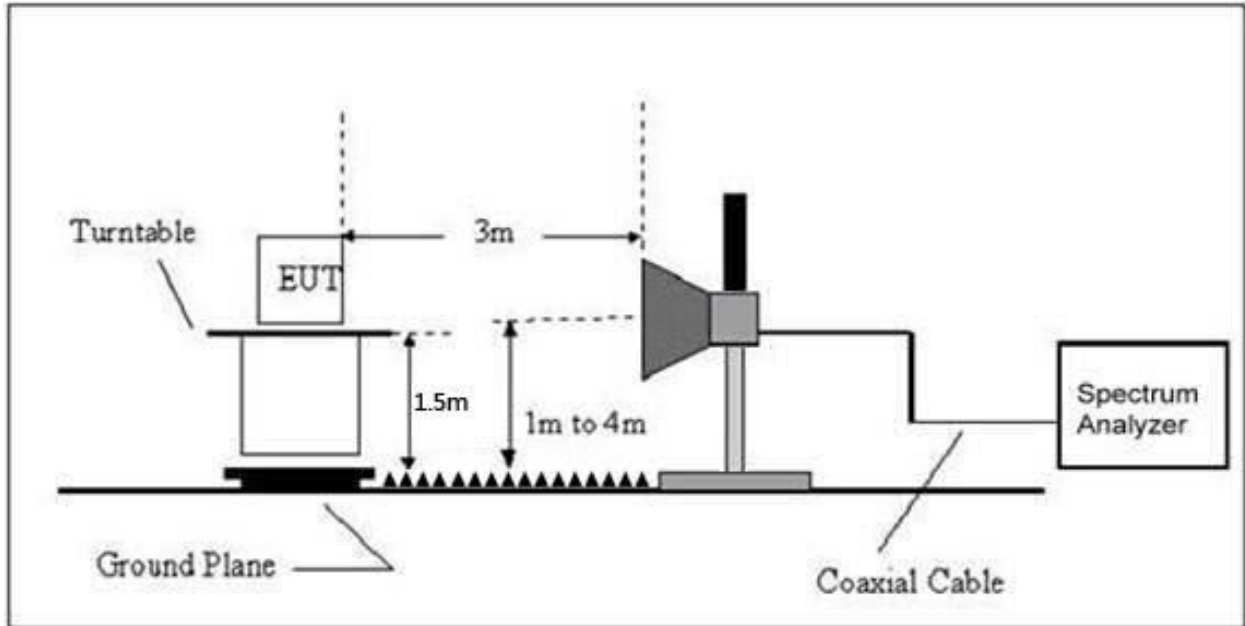
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Field Strength uV/m	Distance (m)	Field Strength Limit at 3m Distance	
			uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

Limits Of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit (dBuV/m) (at 3M)	
	Peak	Average
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Frequency Range Of Radiated Measurement (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

7.3 Test Procedure

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters 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 one meter to four meters 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 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel.

Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

Above 1GHz test procedure as below:

a.The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b.The EUT was set 3 meters 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 one meter to four meters 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 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g.Test the EUT in the lowest channel, the middlest channel, the highest channel.

Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

7.5 Test Result

Below 30MHz

Temperature:	26°C	Relative Humidity:	24%
Pressure:	101 kPa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 4		

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

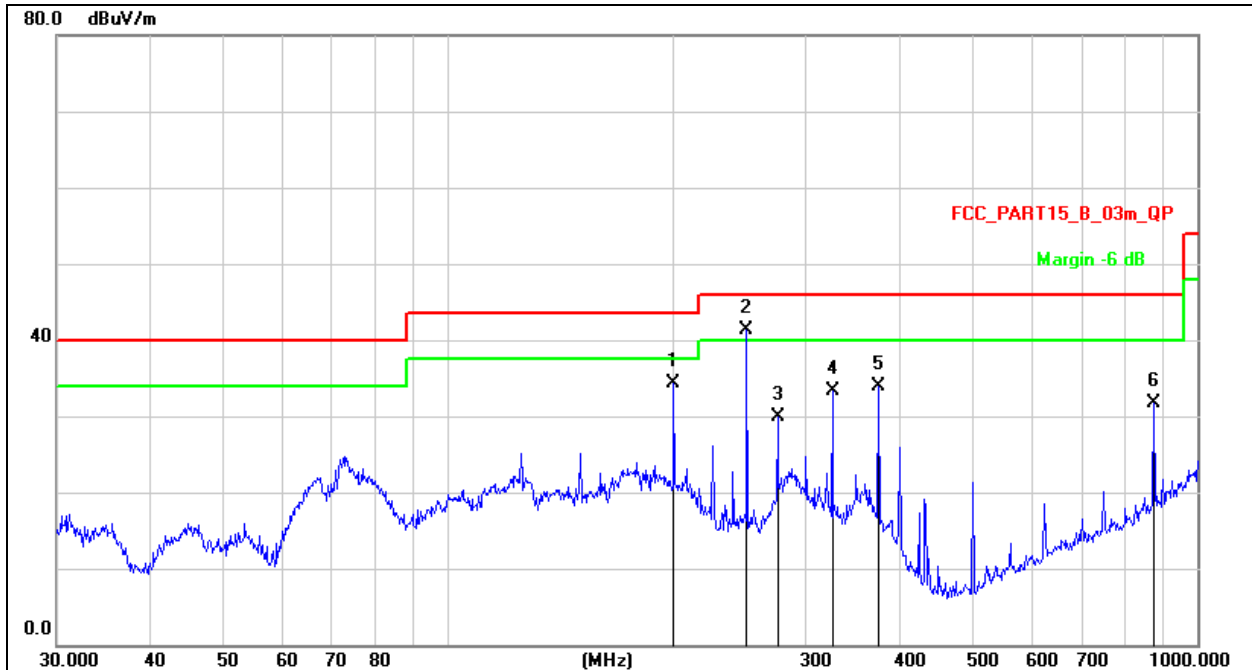
Distance extrapolation factor = $40 \log(\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



Between 30MHz – 1GHz

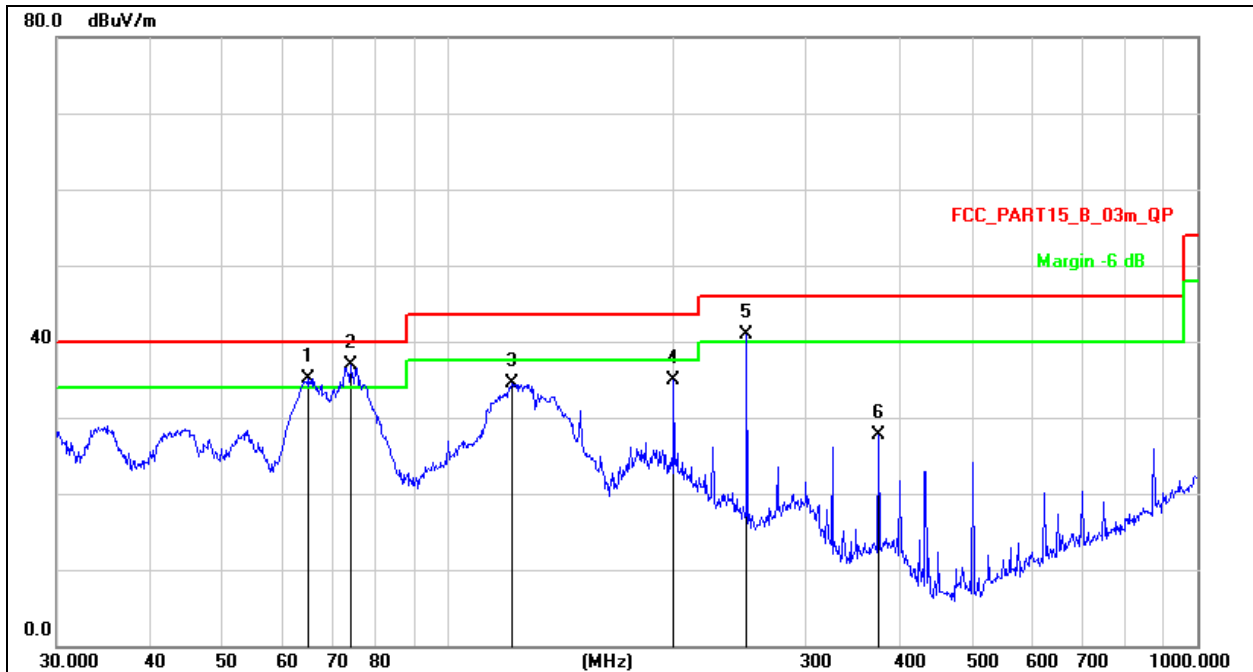
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 4	Test Voltage:	AC120V/60Hz



Remark:
 1. Factor = Antenna Factor + Cable Loss – Pre-amplifier
 2. Measurement=Reading Level+ Correct Factor
 3. Over=Measurement-Limit

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		199.9856	48.26	-14.02	34.24	43.50	-9.26	QP
2	*	250.3012	57.39	-16.11	41.28	46.00	-4.72	QP
3		275.1569	47.64	-17.73	29.91	46.00	-16.09	QP
4		325.5957	50.98	-17.62	33.36	46.00	-12.64	QP
5		375.9384	49.99	-16.06	33.93	46.00	-12.07	QP
6		875.2468	37.86	-6.24	31.62	46.00	-14.38	QP

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 4	Test Voltage:	AC120V/60Hz


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement=Reading Level+ Correct Factor
3. Over=Measurement-Limit

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1	!	65.1145	51.53	-16.45	35.08	40.00	-4.92	QP
2	*	74.1350	53.17	-16.21	36.96	40.00	-3.04	QP
3		121.5485	48.78	-14.33	34.45	43.50	-9.05	QP
4		199.9856	49.02	-14.02	35.00	43.50	-8.50	QP
5	!	250.3010	56.98	-16.11	40.87	46.00	-5.13	QP
6		375.9384	43.76	-16.06	27.70	46.00	-18.30	QP

BCTC
 3C
 PPR
 检测

Between 1GHz – 25GHz

GFSK							
Polar	Frequency	Reading	Correct Factor	Measurement	Limits	Over	Detector Type
		Level					
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low channel							
V	4804.00	70.91	-19.99	50.92	74.00	-23.08	PK
V	4804.00	61.46	-19.99	41.47	54.00	-12.53	AV
V	7206.00	62.74	-14.22	48.52	74.00	-25.48	PK
V	7206.00	52.15	-14.22	37.93	54.00	-16.07	AV
H	4804.00	69.64	-19.99	49.65	74.00	-24.35	PK
H	4804.00	58.97	-19.99	38.98	54.00	-15.02	AV
H	7206.00	60.48	-14.22	46.26	74.00	-27.74	PK
H	7206.00	52.55	-14.22	38.33	54.00	-15.67	AV
Middle channel							
V	4880.00	69.81	-19.84	49.97	74.00	-24.03	PK
V	4880.00	61.08	-19.84	41.24	54.00	-12.76	AV
V	7320.00	61.72	-13.90	47.82	74.00	-26.18	PK
V	7320.00	52.40	-13.90	38.50	54.00	-15.50	AV
H	4880.00	68.57	-19.84	48.73	74.00	-25.27	PK
H	4880.00	59.24	-19.84	39.40	54.00	-14.60	AV
H	7320.00	59.75	-13.90	45.85	74.00	-28.15	PK
H	7320.00	52.04	-13.90	38.14	54.00	-15.86	AV
High channel							
V	4960.00	71.53	-19.68	51.85	74.00	-22.15	PK
V	4960.00	62.33	-19.68	42.65	54.00	-11.35	AV
V	7440.00	63.66	-13.57	50.09	74.00	-23.91	PK
V	7440.00	52.73	-13.57	39.16	54.00	-14.84	AV
H	4960.00	68.89	-19.68	49.21	74.00	-24.79	PK
H	4960.00	58.89	-19.68	39.21	54.00	-14.79	AV
H	7440.00	60.81	-13.57	47.24	74.00	-26.76	PK
H	7440.00	52.14	-13.57	38.57	54.00	-15.43	AV

Remark:

1. Emission Level = Meter Reading + Factor,

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Over = Emission Level - Limit

2. If peak below the average limit, the average emission was no test.

3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB

4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

7.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows: $FS=RA+AF+CL-AG$

FS=Field Strength	CL=Cable Attenuation Factor (Cable Loss)
RA=Reading Amplitude	AG=Amplifier Gain
AF=Antenna Factor	

Test Result:

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		
Test Mode:	Mode 1/Mode 2/Mode 3		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2402	115.72	-24.92	90.80	114	-23.2	Peak
2402	111.37	-24.92	86.45	94	-7.55	Average
2440	116.25	-24.78	91.33	114	-22.67	Peak
2440	109.56	-24.78	84.64	94	-9.36	Average
2480	116.41	-24.69	91.49	114	-22.51	Peak
2480	110.21	-24.69	85.29	94	-8.71	Average

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All interfaces was connected, and TX mode

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		
Test Mode:	Mode 1/Mode 2/Mode 3		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2402	115.96	-24.92	91.04	114	-22.96	Peak
2402	110.85	-24.92	85.93	94	-8.07	Average
2440	117.11	-24.78	92.19	114	-21.81	Peak
2440	110.64	-24.78	85.72	94	-8.28	Average
2480	114.95	-24.69	90.03	114	-23.97	Peak
2480	110.34	-24.69	85.42	94	-8.58	Average

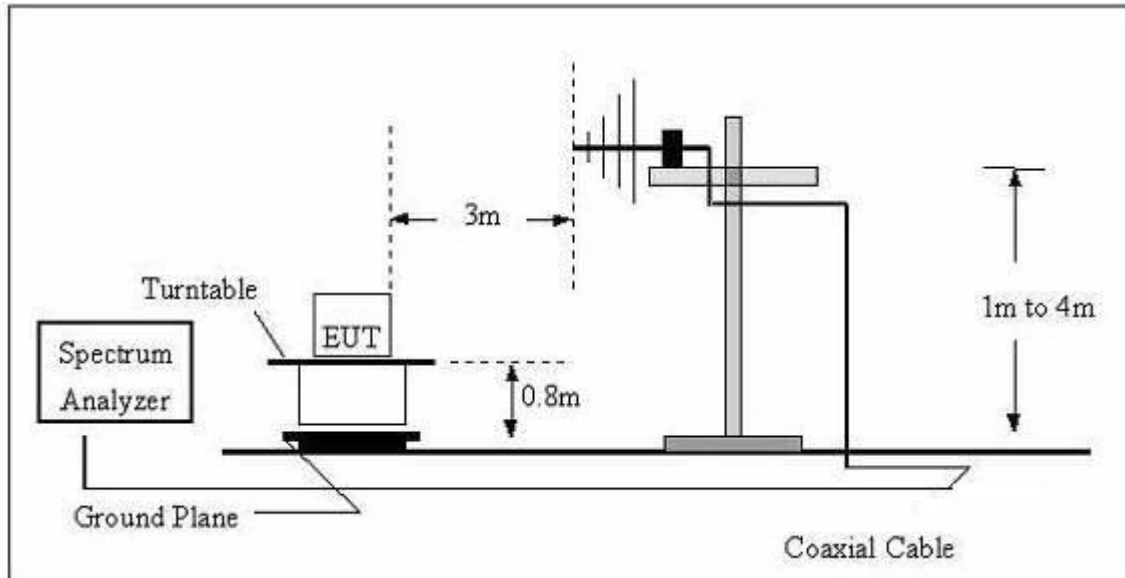
Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All interfaces was connected, and TX mode



8. Band Edge

8.1 Block Diagram Of Test Setup



8.2 Applicable Standard

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation

8.3 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

c. VBW for Peak, Quasi-peak, or Average Detector Function: $3 \times \text{RBW}$

d. Repeat above procedures until all measured frequencies were complete.

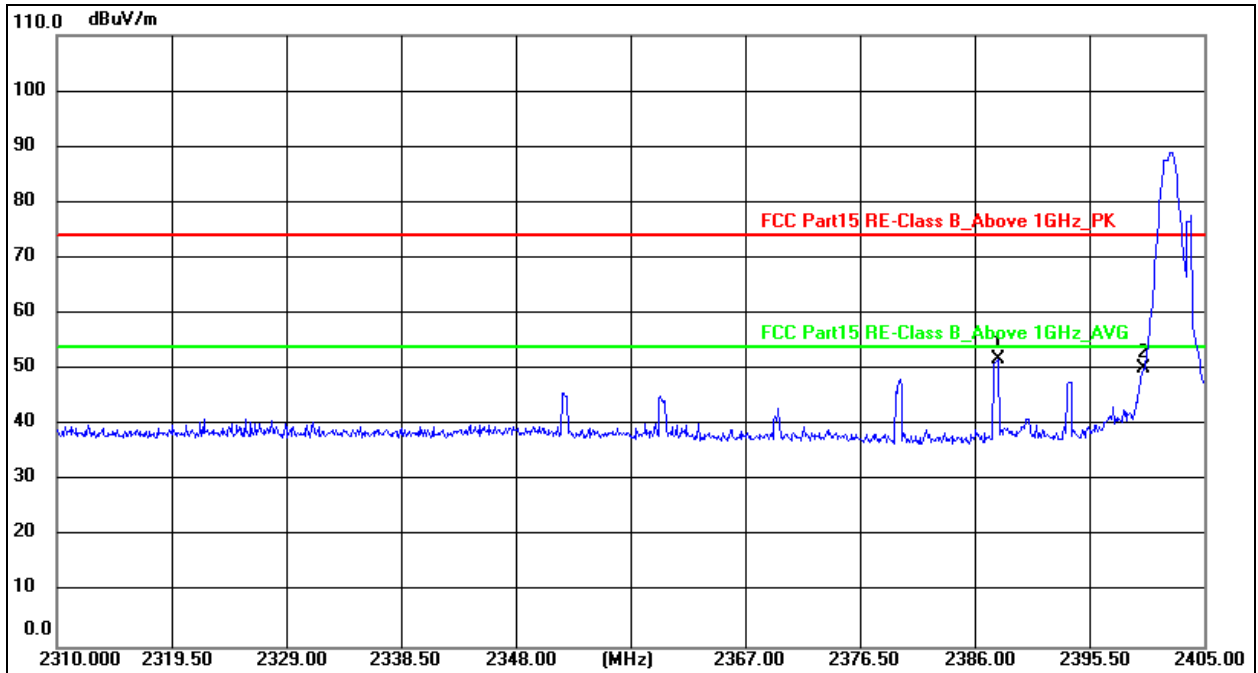
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

8.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 Test Result

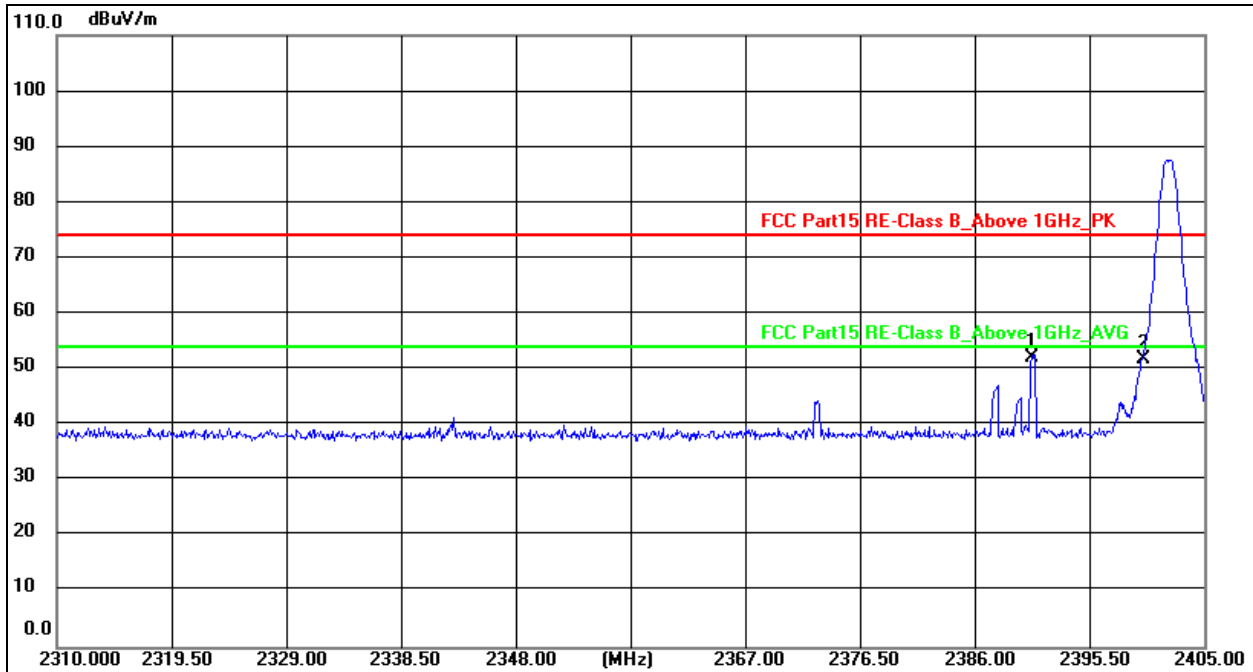
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage:	AC 120V/60Hz
Test Mode:	Transmitting (2402MHz)	Phase:	Horizontal



1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	2387.995	76.70	-24.95	51.75	74.00	-22.25	peak
2	2400.000	75.17	-24.92	50.25	74.00	-23.75	peak

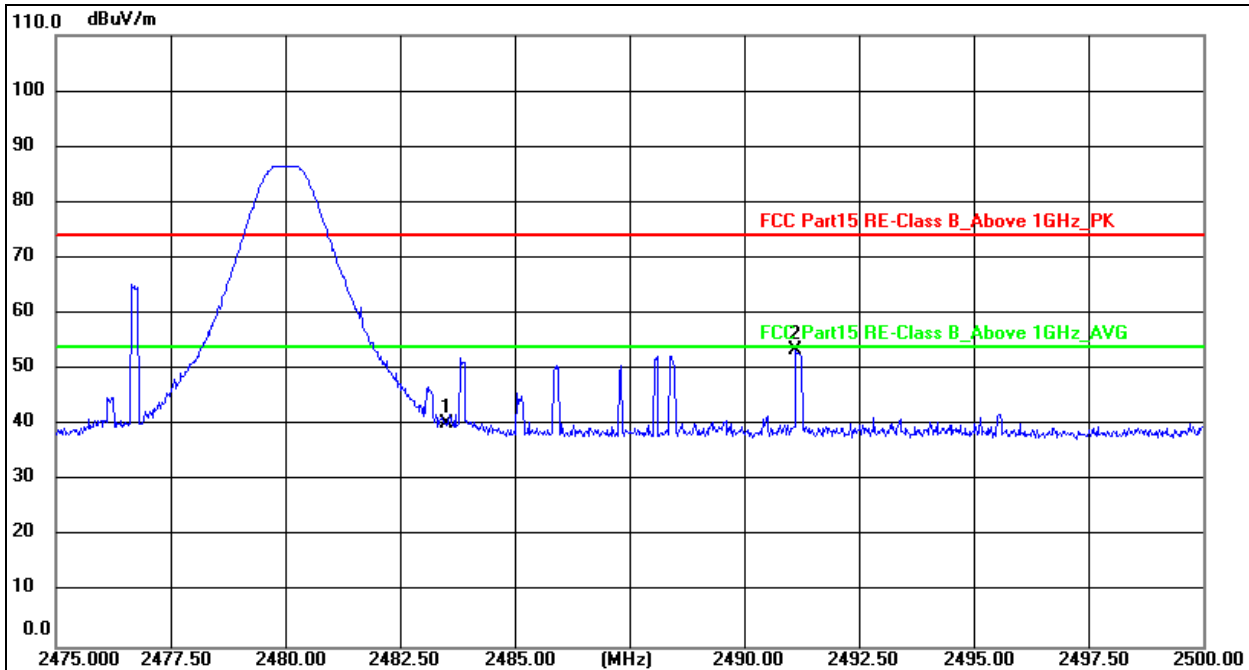
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage:	AC 120V/60Hz
Test Mode:	Transmitting (2402MHz)	Phase:	Vertical



1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	2390.750	77.17	-24.95	52.22	74.00	-21.78	peak
2	2400.000	76.65	-24.92	51.73	74.00	-22.27	peak

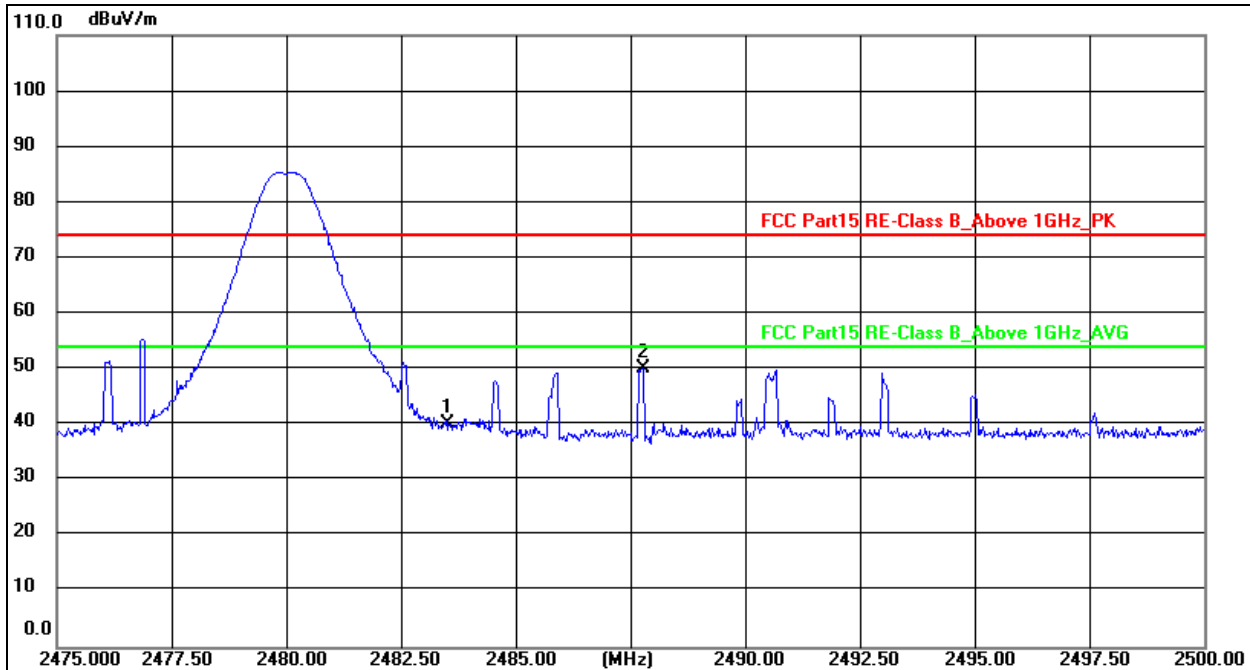
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage:	AC 120V/60Hz
Test Mode:	Transmitting (2480MHz)	Phase:	Horizontal



1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	64.96	-24.68	40.28	74.00	-33.72	peak
2 *	2491.125	78.19	-24.66	53.53	74.00	-20.47	peak

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage:	AC 120V/60Hz
Test Mode:	Transmitting (2480MHz)	Phase:	Vertical



1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	2483.500	65.05	-24.68	40.37	74.00	-33.63
2 *	2487.775	74.83	-24.67	50.16	74.00	-23.84

9. 20 dB Bandwidth

9.1 Block Diagram Of Test Setup



9.2 Limit

FCC Part15 (15.215), Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.215	Bandwidth	2402-2480	PASS

9.3 Test Procedure

1. Set resolution bandwidth (RBW) = 1-5%
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

9.4 EUT Operation Conditions

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

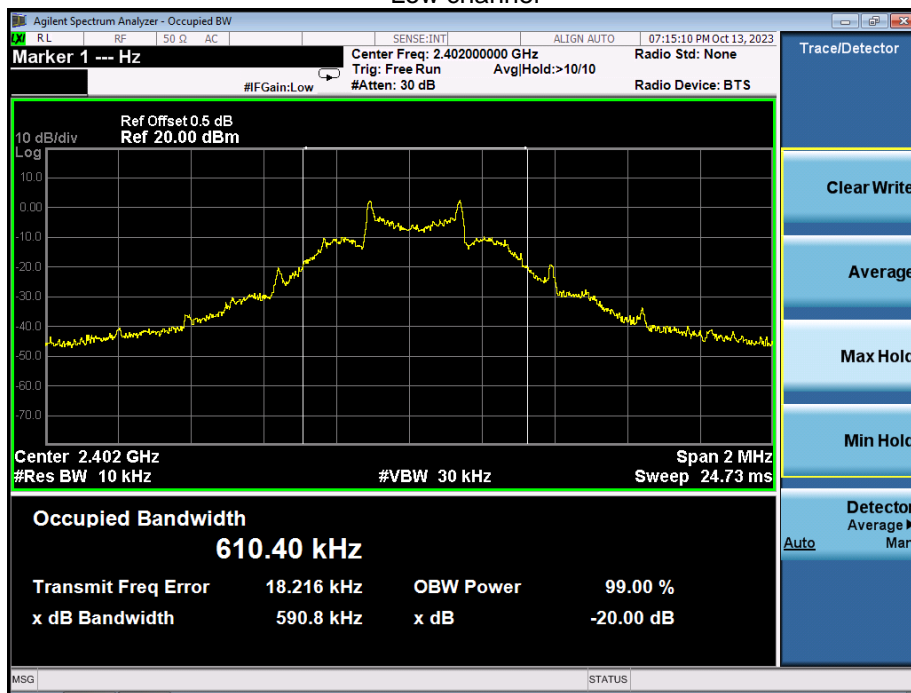


9.5 Test Result

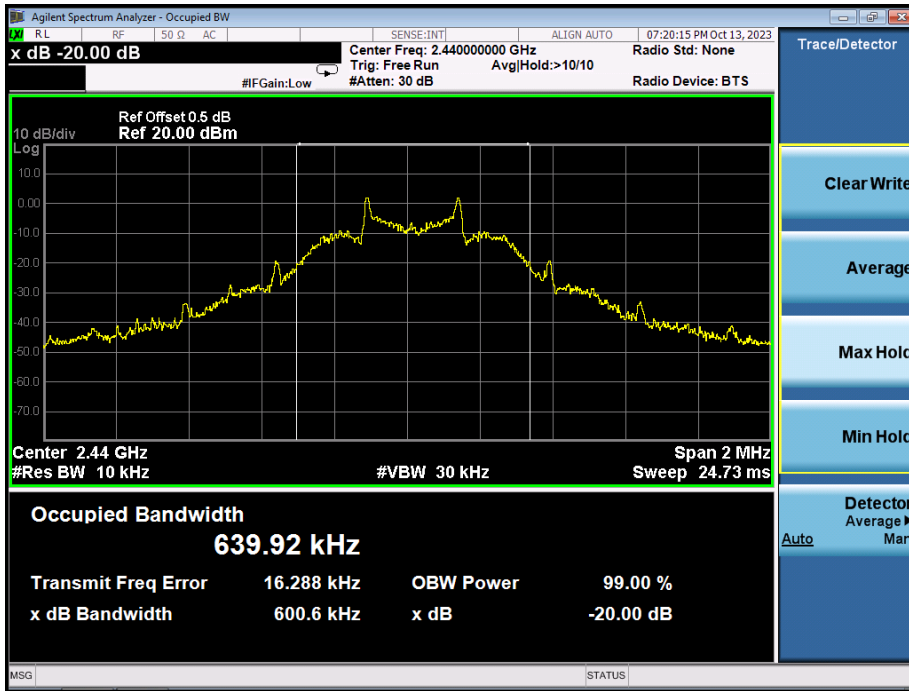
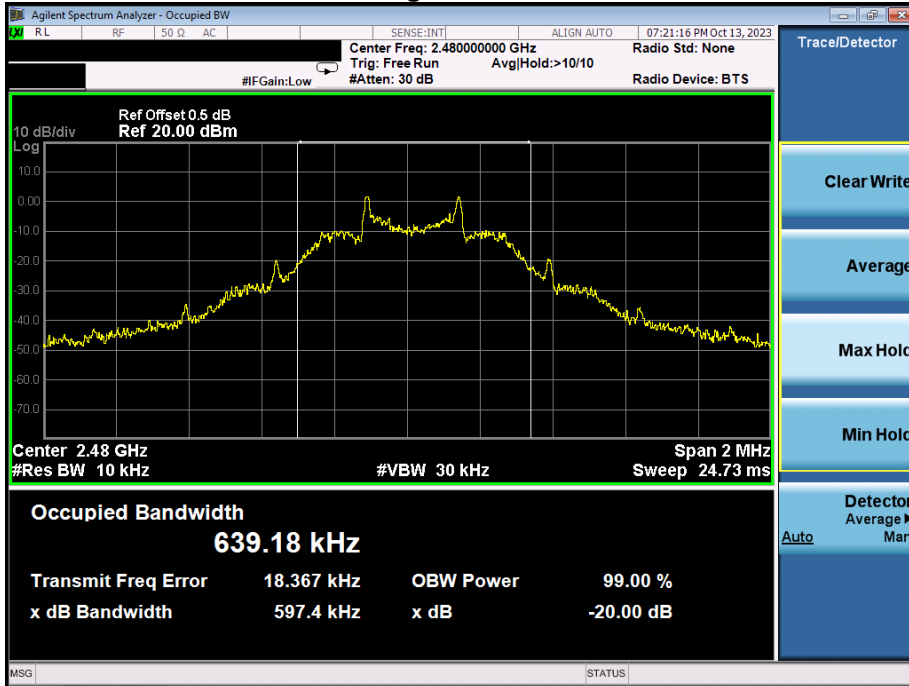
Temperature:	26°C	Relative Humidity:	54%
Test Voltage:	AC 120V/60Hz	Remark:	N/A

Channel	Frequency (MHz)	20dB bandwidth (MHz)
Low channel	2402	0.591
Middle channel	2440	0.601
High channel	2480	0.597

Low channel



CO.LTD

Middle channel

High channel


SHENZHEN

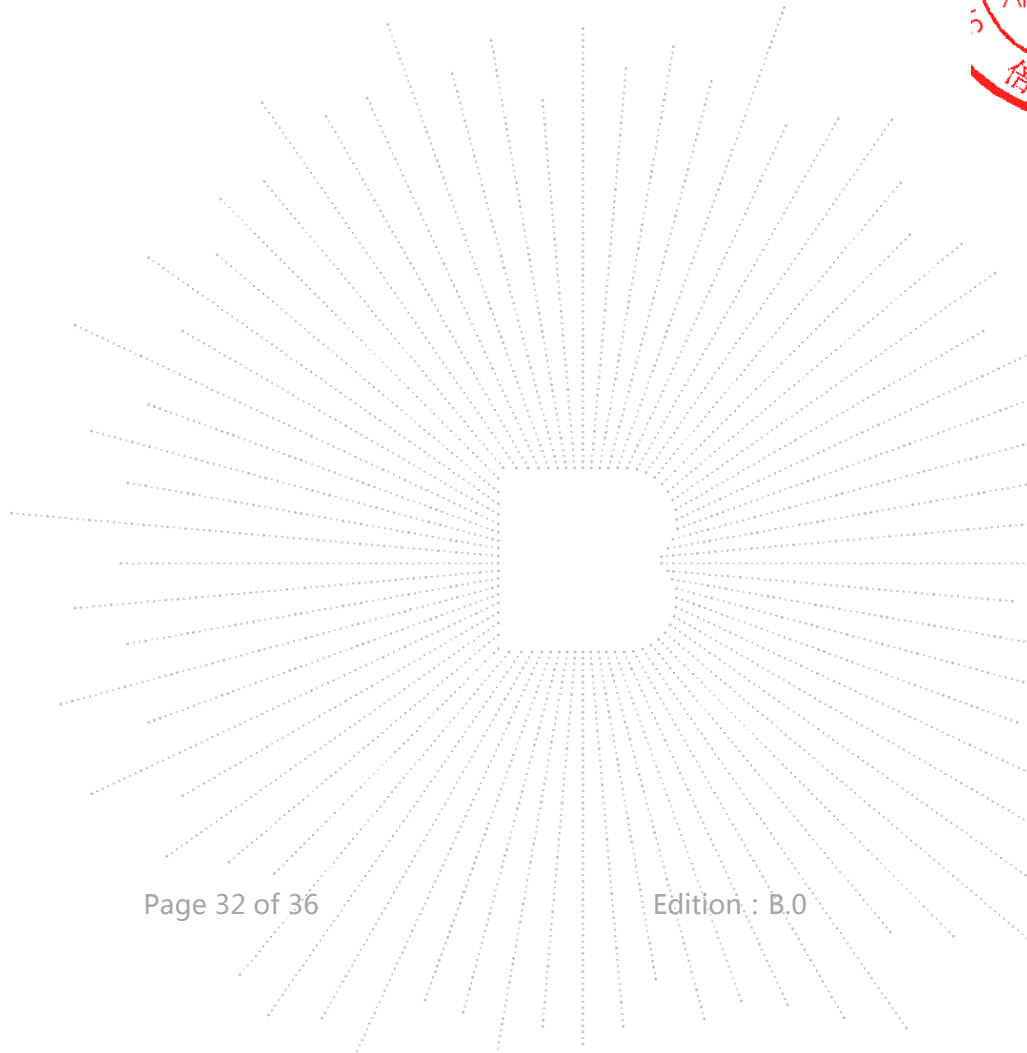
10. Antenna Requirement

10.1 Limit

15.203 requirement: For intentional device, according to 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.

10.2 Test Result

The EUT antenna is PCB antenna, fulfill the requirement of this section.



11. EUT Photographs



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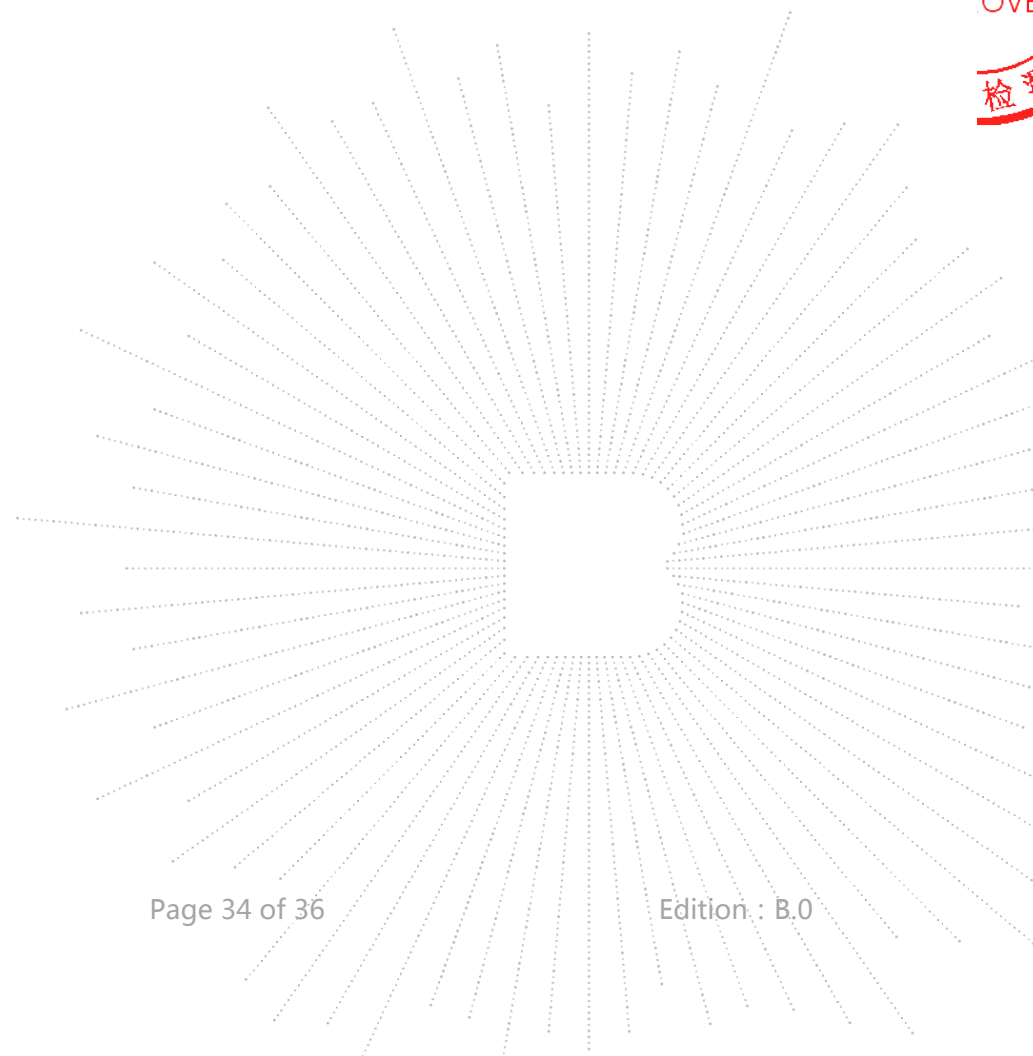
Appendix-Photographs Of EUT Constructional Details

12. EUT Test Setup Photographs

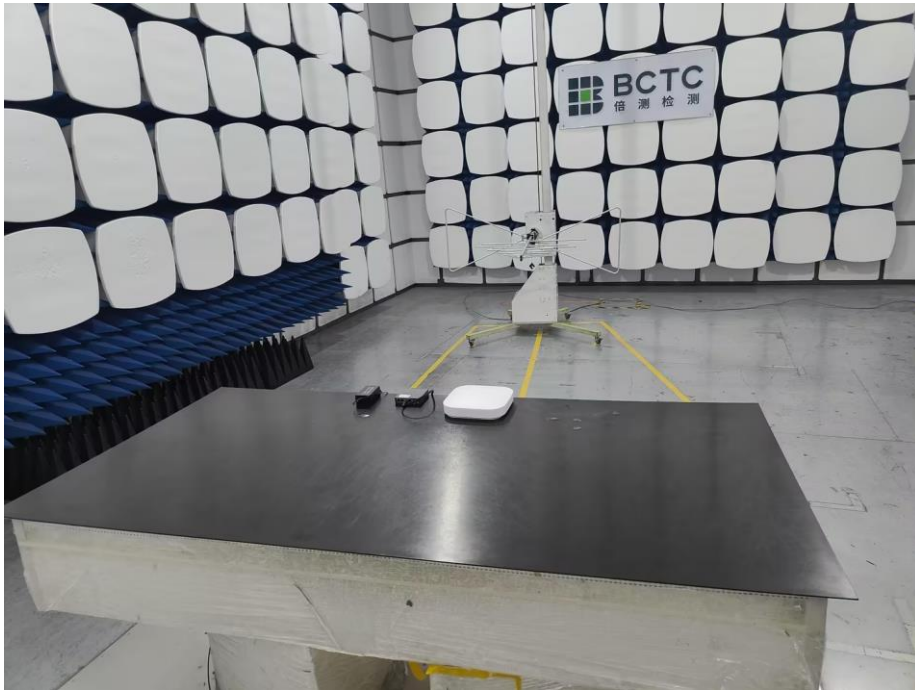
Conducted Measurement Photos



TEC
TC
OVB
檢



Radiated Measurement Photos



STATEMENT

1. The equipment lists are traceable to the national reference standards.
2. The test report can not be partially copied unless prior written approval is issued from our lab.
3. The test report is invalid without the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:

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