TEST REPORT

Report No.:	BCTC2408523726E
Applicant:	Shenzhen Changzheng Yuanda Optoelectronic Technology Co., Ltd.
Product Name:	Laser pen
Test Model:	CZ210
Tested Date:	2024-08-28 to 2024-09-04
Issued Date:	2024-09-13

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2BKMW-CZ200

Product Name:	Laser pen
Trademark:	N/A
Model/Type Ref.:	CZ210,CZ215,CZ218,CZ223,CZ235,CZ247,CZ258,CZ264,CZ278,CZ299
Prepared For:	Shenzhen Changzheng Yuanda Optoelectronic Technology Co., Ltd.
Address:	Floor 4, building 6,Zone A,Yintian XIFAindustrial zone, Xixiang Street,Bao 'andistrict,Shenzhen Guangdong China
Manufacturer:	Shenzhen Changzheng Yuanda Optoelectronic Technology Co., Ltd.
Address:	Floor 4, building 6,Zone A,Yintian XIFAindustrial zone, Xixiang Street,Bao 'andistrict,Shenzhen Guangdong China
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2024-08-28
Sample tested Date:	2024-08-28 to 2024-09-04
Report No.:	BCTC2408523726E
Test Standards:	FCC Part15.249 ANSI C63.10-2013
Test Results:	PASS

Tested by:

Brave Zeng/ Project Handler

Approved by:

Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

Table Of Content

Test Report Declaration Page
1. Version 4
2. Test Summary 5
3. Measurement Uncertainty 6
4. Product Information And Test Setup 7
4.1 Product Information 7
4.2 Test Setup Configuration 8
4.3 Support Equipment 8
4.4 Channel List 9
4.5 Test Mode 9
5. Test Facility And Test Instrument Used 10
5.1 Test Facility 10
5.2 Test Instrument Used 10
6. Conducted Emissions 12
6.1 Block Diagram Of Test Setup 12
6.2 Limit 13
6.3 Test Procedure 14
6.4 EUT Operating Conditions 15
6.5 Test Result 16
6.6 Field Strength Calculation 20
7. 100 kHz Bandwidth Of Frequency Band Edge 21
7.1 Block Diagram Of Test Setup 21
7.2 Applicable Standard 21
7.3 Test Procedure 21
7.4 EUT Operating Conditions 21
7.5 Test Result 22
8. 20 dB Bandwidth 26
8.1 Block Diagram Of Test Setup 26
8.2 Limit 26
8.3 Test Procedure 26
8.4 EUT Operation Conditions 26
8.5 Test Result 27
9. Antenna Requirement 29
9.1 Limit 29
9.2 Test Result 29
10. EUT Test Setup Photographs 30
(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2408523726E	2024-09-13	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Conducted Emission	15.207	N/A*
2	20dB Bandwidth	15.215	PASS
3	Fundamental &Radiated Spurious Emission Measurement	15.249	PASS
4	Band Edge Emission	15.205	PASS
5	Antenna Requirement	15.203	PASS

Remark:
N/A is an abbreviation for not applicable.
NOTE1: The EUT is powered by the DC only, the test item is not applicable
NOTE2: The report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.

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℃

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	CZ210,CZ215,CZ218,CZ223,CZ235,CZ247,CZ258,CZ264,CZ278,CZ299
Model differences:	The following models of units we produce are identical in electrical, mechanical and physical structure; The difference is the appearance size and color, we finally have CZ210 as test model
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	2402MHz,2440MHz,2480MHz
Type of Modulation:	GFSK
Number Of Channel	3 Channel
Antenna installation:	Internal antenna
Antenna Gain:	3.85 dBi
Remark:	The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
Ratings:	DC 1.5V from battery

4.2 Test Setup Configuration

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

Radiated Spurious Emission

EUT

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	N/A	N/A	N/A	N/A	N/A
E-2	N/A	N/A	N/A	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
N/A	N/A	N/A	N/A	N/A

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

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
1	2402	2	2440	3	2480

4.5 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible 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	CH1	GFSK
Mode 2	CH2	
Mode 3	CH3	
Mode 4	TX mode (Radiated emission)	

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

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

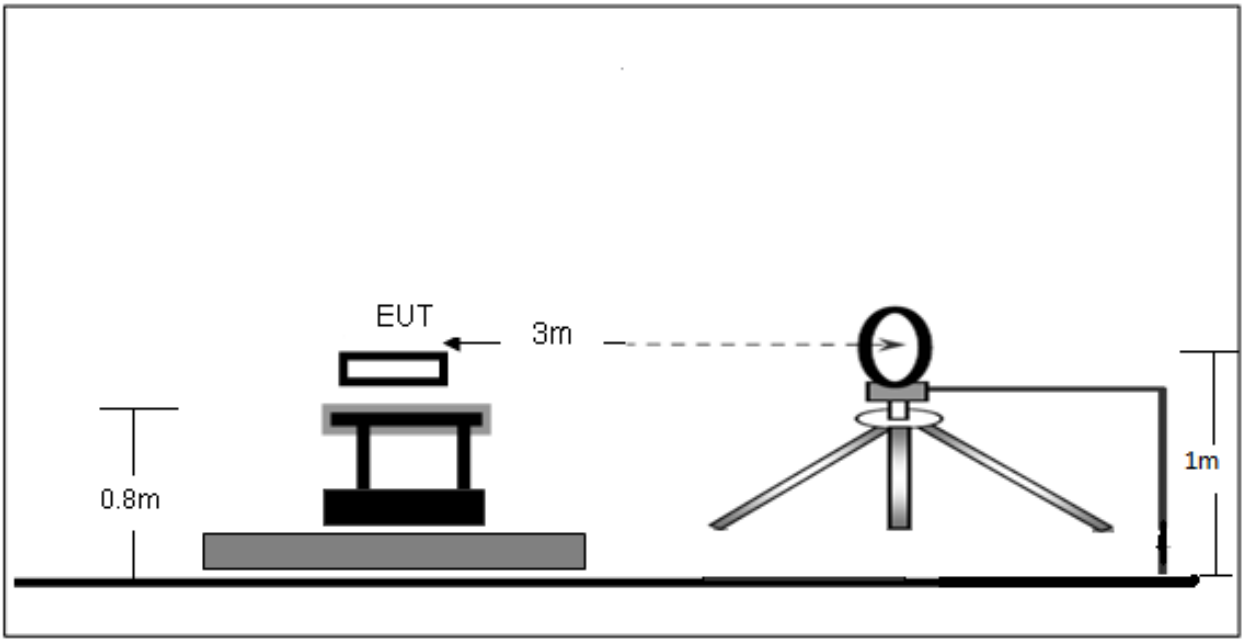
RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power meter	Keysight	E4419	\	May 16, 2024	May 15, 2025
Power Sensor (AV)	Keysight	E9300A	\	May 16, 2024	May 15, 2025
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 16, 2024	May 15, 2025
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 16, 2024	May 15, 2025

Radiated Emissions Test (966 Chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	May 16, 2024	May 15, 2025
Receiver	R&S	ESR3	102075	May 16, 2024	May 15, 2025
Receiver	R&S	ESRP	101154	May 16, 2024	May 15, 2025
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 16, 2024	May 15, 2025
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 21, 2024	May 20, 2025
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 21, 2024	May 20, 2025
Amplifier	SKET	LAPA_01G18G-45dB	SK2021040901	May 16, 2024	May 15, 2025
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 30, 2024	May 29, 2025
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 16, 2024	May 15, 2025
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 21, 2024	May 20, 2025
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 16, 2024	May 15, 2025
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

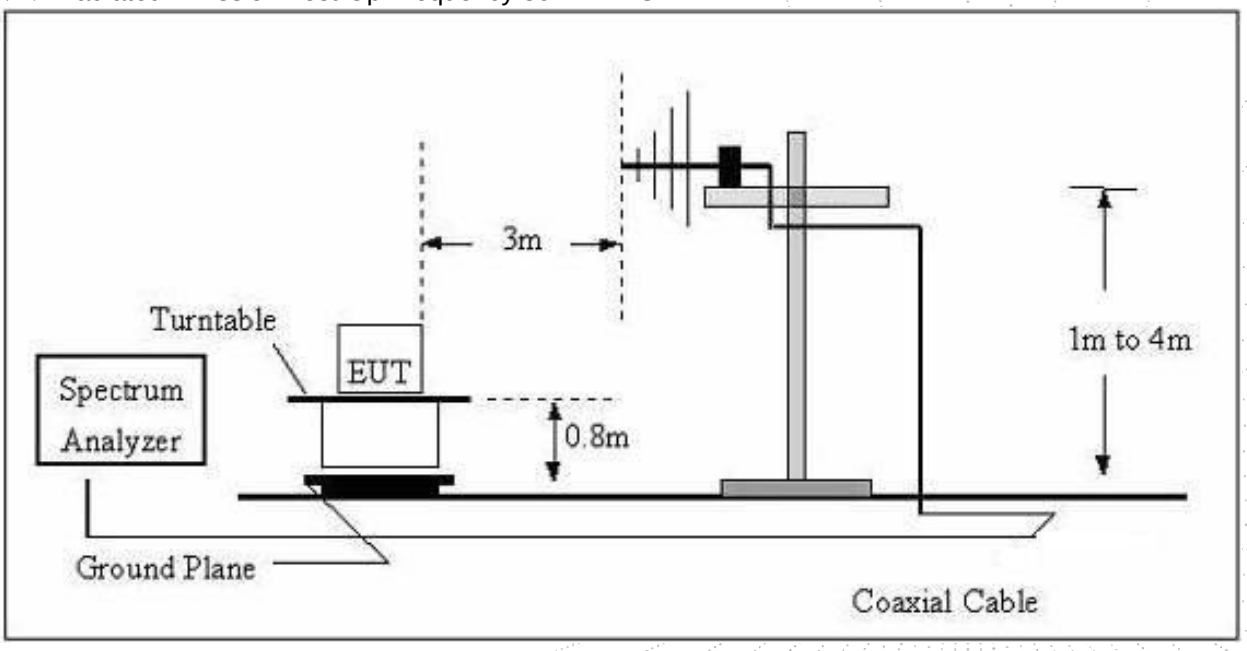
6. Conducted Emissions

6.1 Block Diagram Of Test Setup

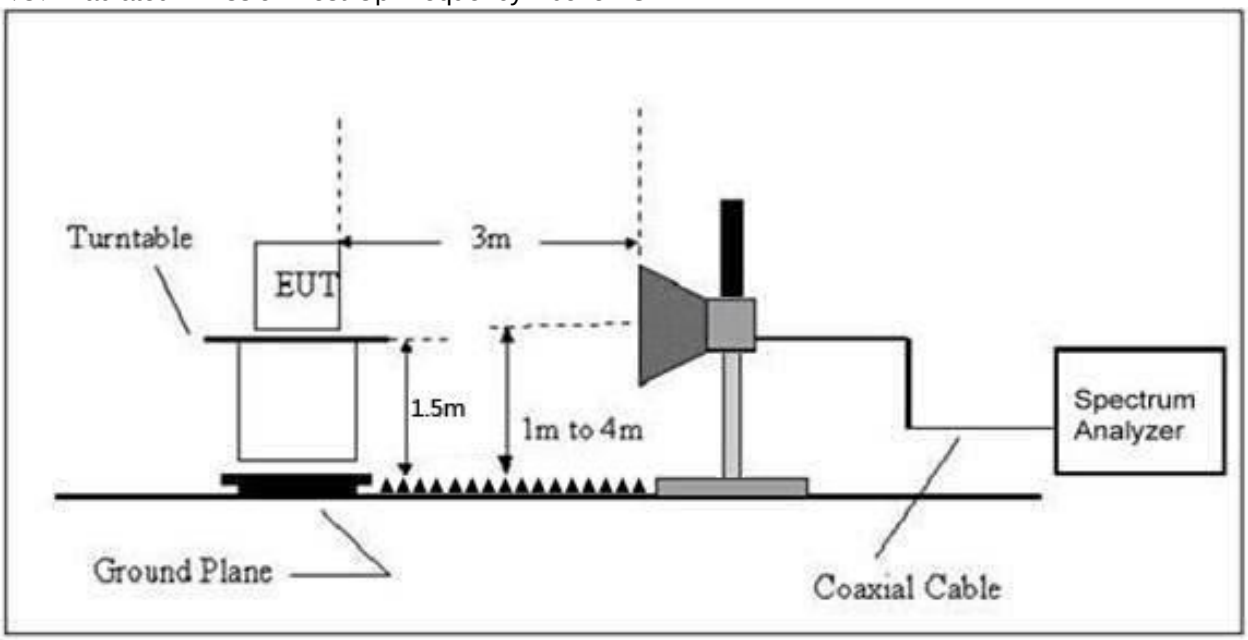
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



6.2 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	Field Strength	Distance	Field Strength Limit at 3m Distance	
(MHz)	uV/m	(m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
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(94 dBV/m)	500(54 dBV/m)
2400-2483.5 MHz	50(94 dBV/m)	500(54 dBV/m)
5725-5875 MHz	50(94 dBV/m)	500(54 dBV/m)
24.0-24.25 GHz	250(108 dBV/m)	2500(68 dBV/m)

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	5th harmonic of the highest frequency or 40 GHz, whichever is lower

6.3 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 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 (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.

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

Below 30MHz

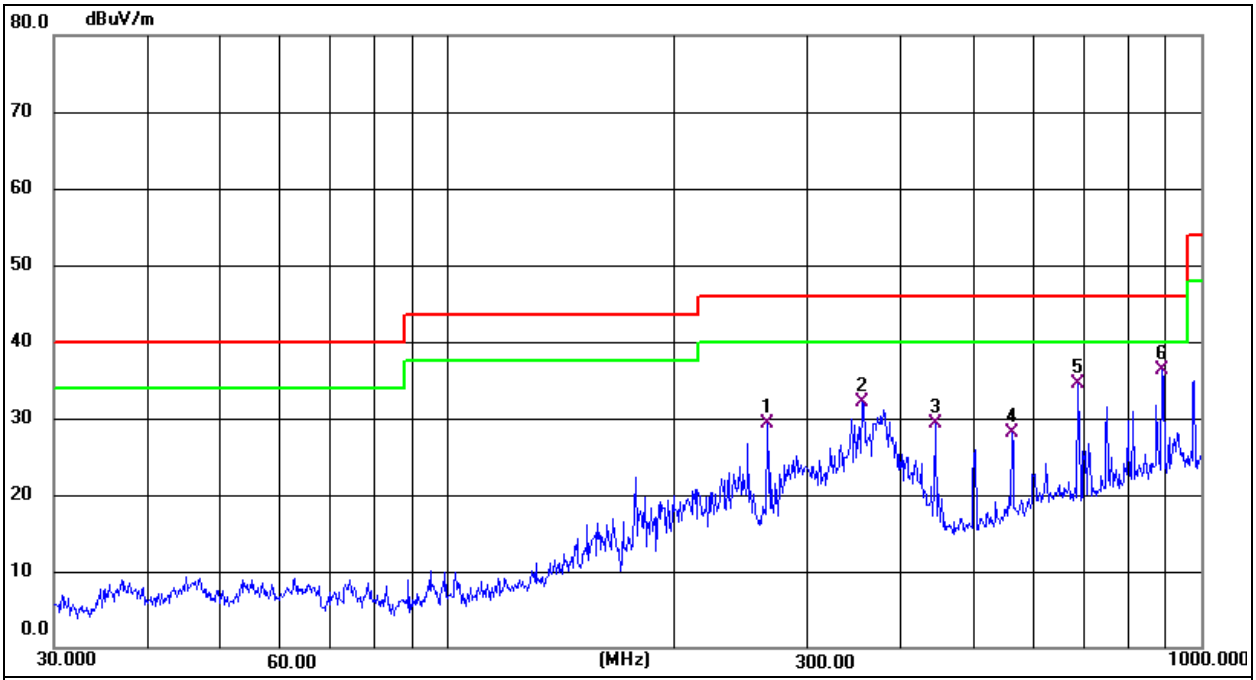
Temperature:	26℃	Relative Humidtity:	24%
Pressure:	101 kPa	Test Voltage:	DC 1.5V from battery
Test Mode:	Mode 4	Polarization:	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	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 (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30MHz – 1GHz

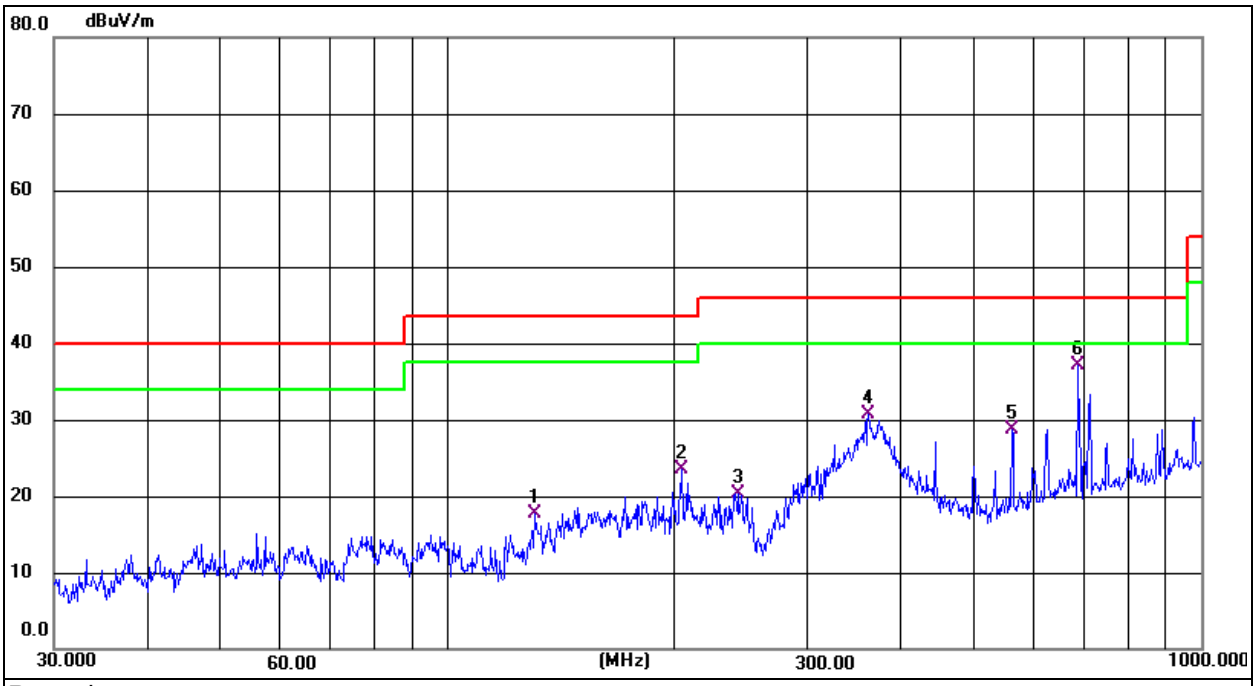
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 4	Remark:	N/A



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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	265.6757	44.30	-15.02	29.28	46.00	-16.72	QP
2	355.4273	43.92	-11.76	32.16	46.00	-13.84	QP
3	443.2943	38.37	-9.11	29.26	46.00	-16.74	QP
4	560.6928	34.09	-6.02	28.07	46.00	-17.93	QP
5	684.7454	37.54	-3.12	34.42	46.00	-11.58	QP
6 *	887.6099	35.67	0.71	36.38	46.00	-9.62	QP

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 4	Remark:	N/A



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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	130.3789	33.75	-16.05	17.70	43.50	-25.80	QP
2	204.2377	40.86	-17.38	23.48	43.50	-20.02	QP
3	243.3772	36.18	-15.91	20.27	46.00	-25.73	QP
4	361.7139	42.31	-11.59	30.72	46.00	-15.28	QP
5	560.6928	34.69	-6.02	28.67	46.00	-17.33	QP
6 *	684.7454	40.31	-3.12	37.19	46.00	-8.81	QP

(Above 1000 MHz)

GFSK							
Polar	Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low channel							
V	4804.00	62.73	-11.26	51.47	74.00	-22.53	PK
V	4804.00	48.11	-11.26	36.85	54.00	-17.15	AV
V	7206.00	58.64	-2.54	56.10	74.00	-17.90	PK
V	7206.00	45.17	-2.54	42.63	54.00	-11.37	AV
H	4804.00	65.69	-11.26	54.43	74.00	-19.57	PK
H	4804.00	51.74	-11.26	40.48	54.00	-13.52	AV
H	7206.00	61.53	-2.54	58.99	74.00	-15.01	PK
H	7206.00	44.25	-2.54	41.71	54.00	-12.29	AV
Middle channel							
V	4880.00	54.23	-12.41	40.00	74.00	-32.18	PK
V	4880.00	46.15	-12.41	33.98	54.00	-20.26	AV
V	7320.00	48.57	-2.32	37.81	74.00	-27.75	PK
V	7320.00	36.74	-2.32	28.30	54.00	-19.58	AV
H	4880.00	55.29	-12.41	36.45	74.00	-31.12	PK
H	4880.00	36.11	-12.41	26.71	54.00	-30.30	AV
H	7320.00	44.39	-2.32	36.68	74.00	-31.93	PK
H	7320.00	38.12	-2.32	28.04	54.00	-18.20	AV
High channel							
V	4960.00	56.23	-10.55	45.68	74.00	-28.32	PK
V	4960.00	46.15	-10.55	35.60	54.00	-18.40	AV
V	7440.00	47.28	-2.21	45.07	74.00	-28.93	PK
V	7440.00	36.33	-2.21	34.12	54.00	-19.88	AV
H	4960.00	52.58	-10.55	42.03	74.00	-31.97	PK
H	4960.00	44.36	-10.55	33.81	54.00	-20.19	AV
H	7440.00	52.15	-2.21	49.94	74.00	-24.06	PK
H	7440.00	36.35	-2.21	34.14	54.00	-19.86	AV

Remark:
Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level
Other harmonics emissions are lower than 20dB below the allowable limit.

6.6 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 Rusult:

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	DC 1.5V from battery		
Test Mode:	Mode 1/Mode 2/Mode 3		

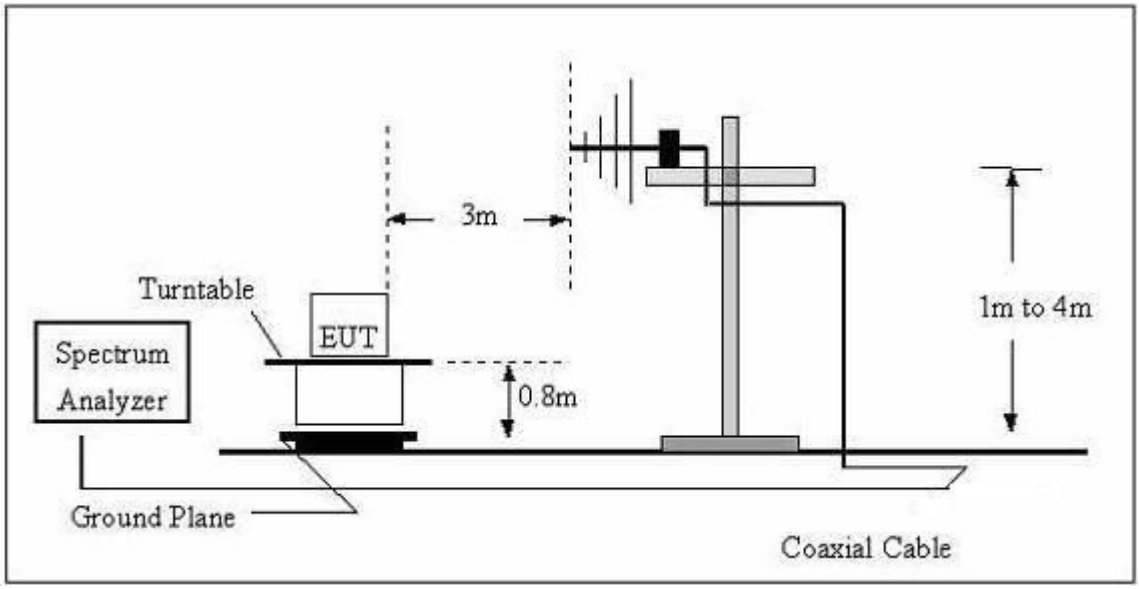
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2402	114.82	-19.24	95.58	114	-18.42	Peak
2402	102.14	-19.24	82.90	94	-11.10	Average
2440	116.55	-19.15	97.40	114	-16.60	Peak
2440	102.28	-19.15	83.13	94	-10.87	Average
2480	109.36	-19.02	90.34	114	-23.66	Peak
2480	100.06	-19.02	81.04	94	-12.96	Average
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. All interfaces was connected, and TX mode						

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 1.5V from battery		
Test Mode:	Mode 1/Mode 2/Mode 3		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2402	108.54	-19.24	89.30	114	-24.70	Peak
2402	103.06	-19.24	83.82	94	-10.18	Average
2440	105.48	-19.15	86.33	114	-27.67	Peak
2440	102.51	-19.15	83.36	94	-10.64	Average
2480	107.49	-19.02	88.47	114	-25.53	Peak
2480	102.04	-19.02	83.02	94	-10.98	Average
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. All interfaces was connected, and TX mode						

7. 100 kHz Bandwidth Of Frequency Band Edge

7.1 Block Diagram Of Test Setup



7.2 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

7.3 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 × RBW

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

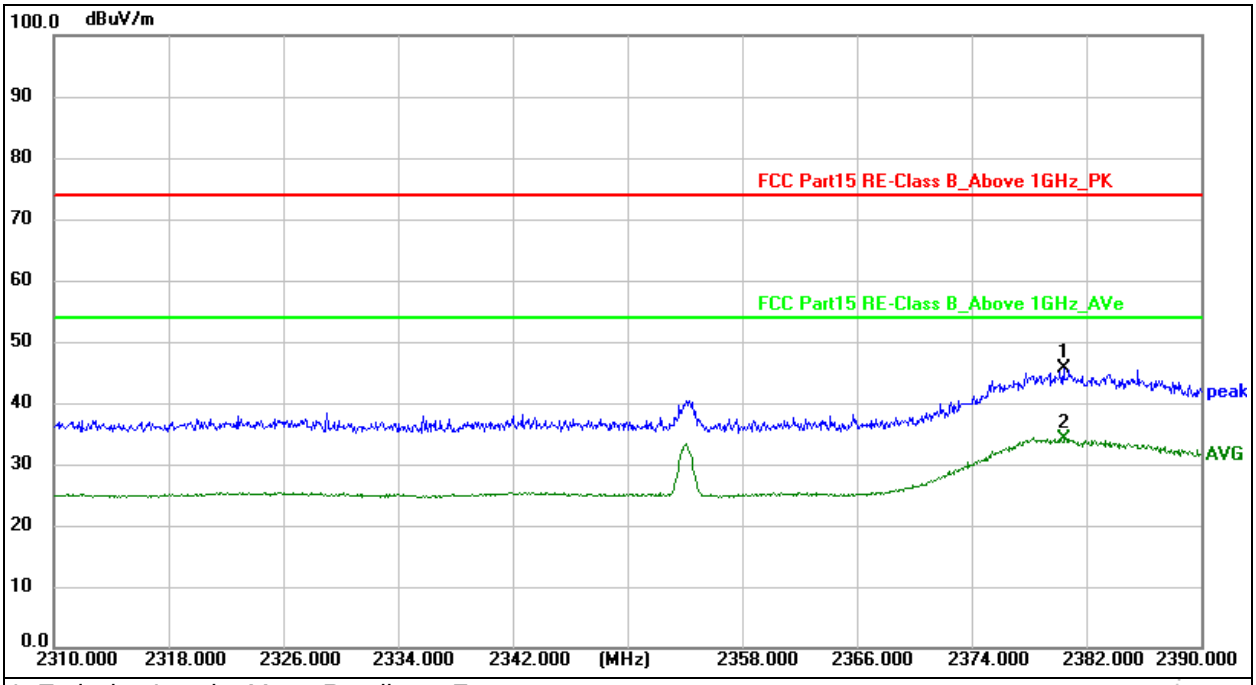
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 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.

7.5 Test Result

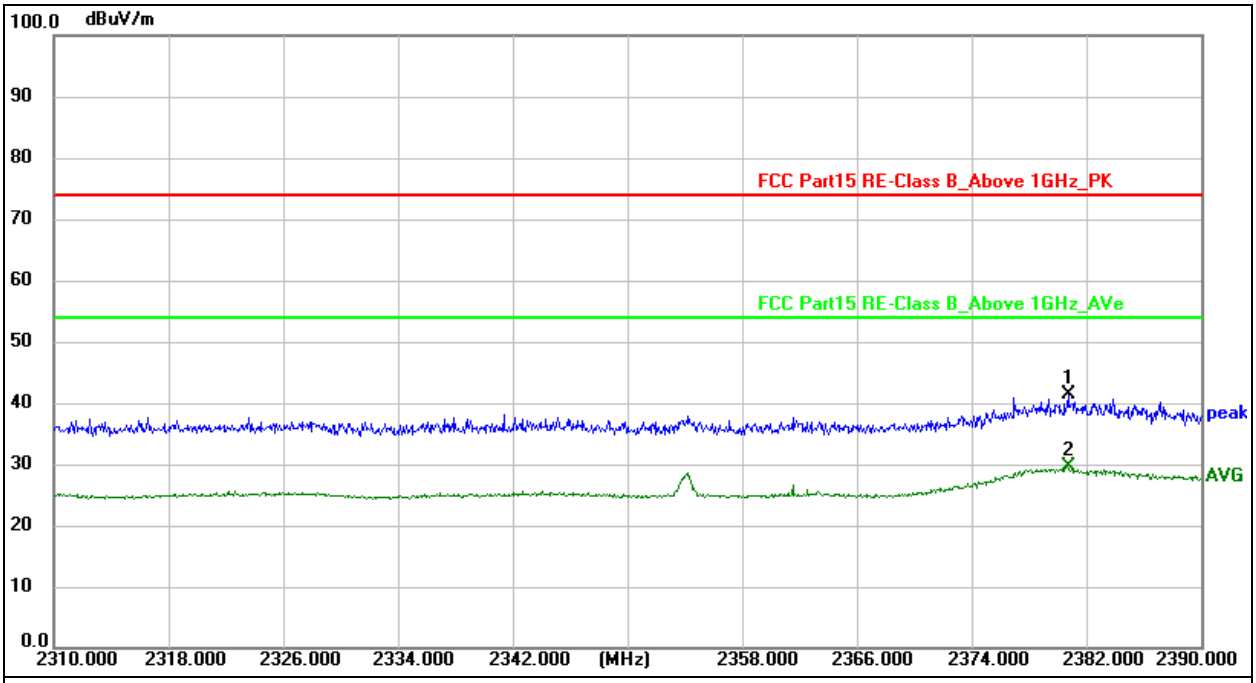
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage :	DC 1.5V from battery
Test Mode :	TX (2402MHz)	Phase :	Horizontal



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	2380.400	62.48	-16.94	45.54	74.00	-28.46	peak
2 *	2380.400	51.09	-16.94	34.15	54.00	-19.85	AVG

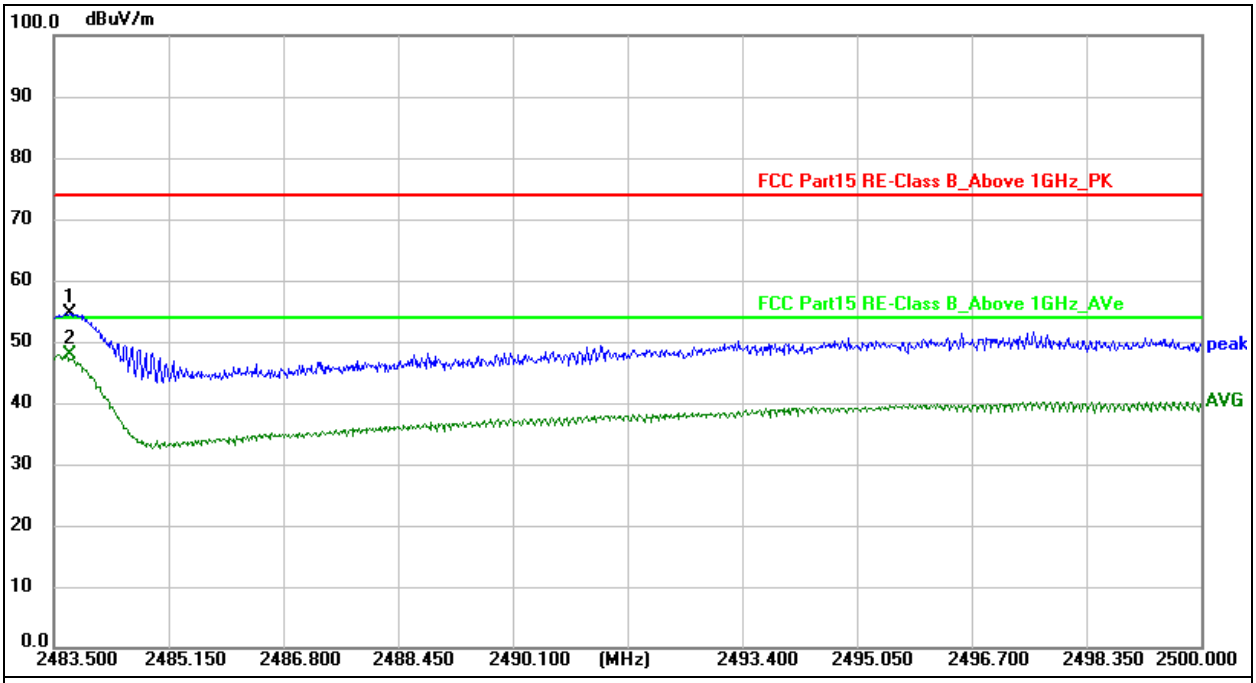
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage :	DC 1.5V from battery
Test Mode :	TX (2402MHz)	Phase :	Vertical



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	2380.720	58.33	-16.94	41.39	74.00	-32.61	peak
2 *	2380.720	46.46	-16.94	29.52	54.00	-24.48	AVG

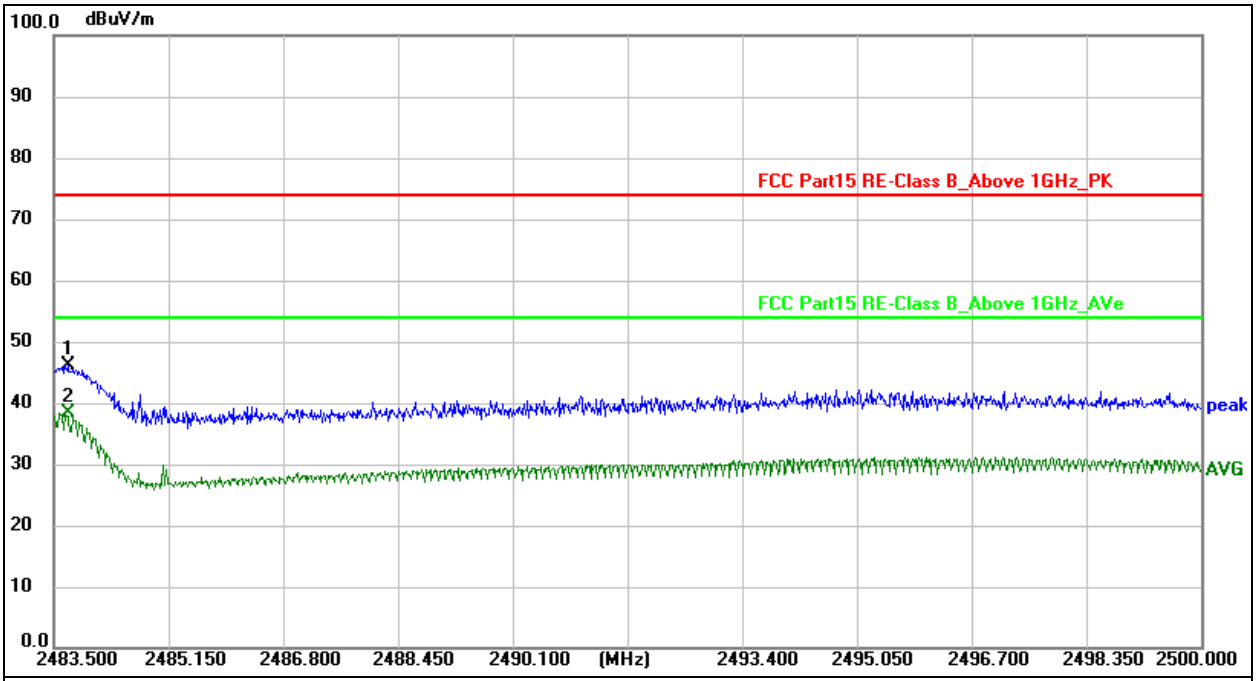
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage :	DC 1.5V from battery
Test Mode :	TX (2480MHz)	Phase :	Horizontal



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	2483.747	71.25	-16.55	54.70	74.00	-19.30	peak
2 *	2483.747	64.46	-16.55	47.91	54.00	-6.09	AVG

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage :	DC 1.5V from battery
Test Mode :	TX (2480MHz)	Phase :	Vertical

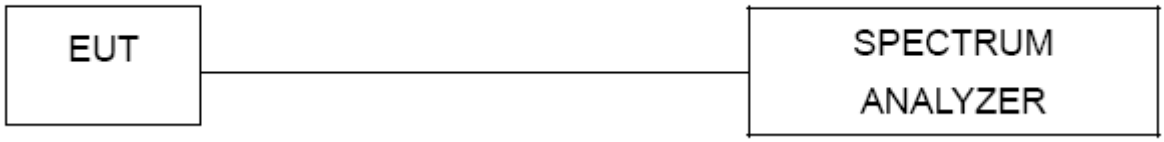


1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3. In restricted bands of operation, The spurious emissions 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)	Detector
1	2483.698	62.57	-16.55	46.02	74.00	-27.98	peak
2 *	2483.698	54.97	-16.55	38.42	54.00	-15.58	AVG

8. 20 dB Bandwidth

8.1 Block Diagram Of Test Setup



8.2 Limit

FCC Part15 (15.249), Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.249	Bandwidth	2402-2480	PASS

8.3 Test Procedure

1. Set resolution bandwidth (RBW) = 1-5%
2. Set the video bandwidth (VBW) ≥ 3 x 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.

8.4 EUT Operation Conditions

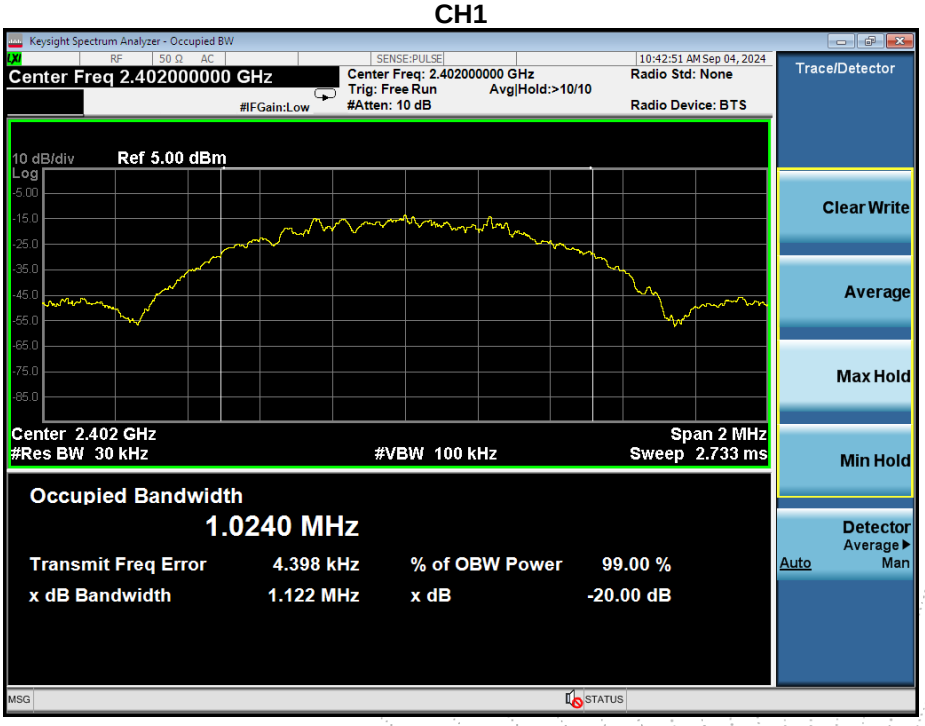
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 Test Result

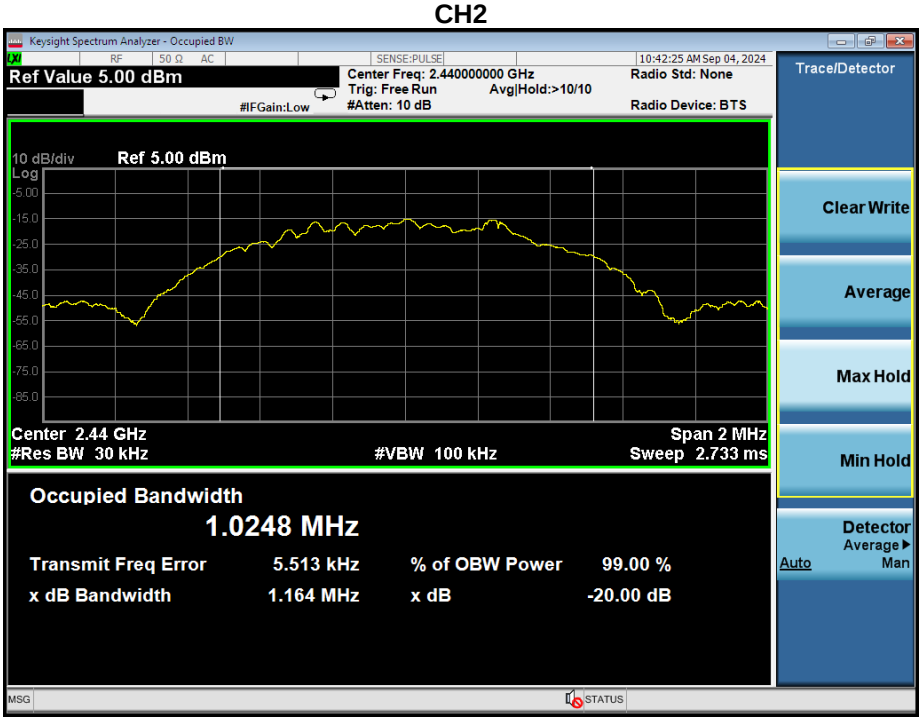
Temperature:	26℃	Relative Humidity:	54%
Test Voltage:	DC 1.5V from battery	Remark:	N/A

Channel	Frequency (MHz)	20dB bandwidth (MHz)
1	2402	1.122
2	2440	1.164
3	2480	1.159

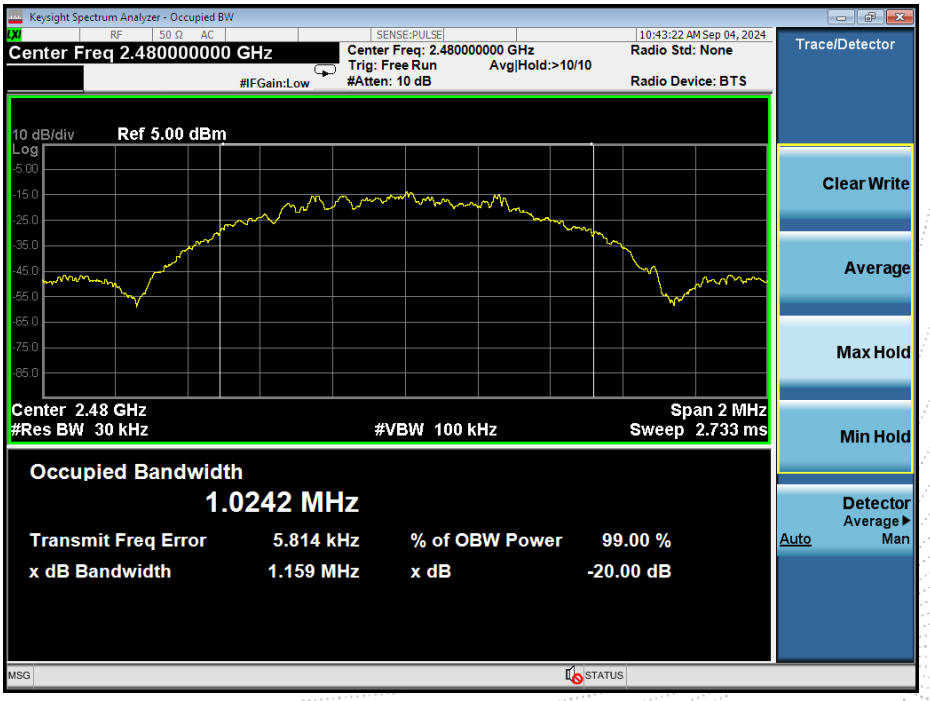
CH1



CH2


Keysight Spectrum Analyzer - Occupied BW
Ref Value 5.00 dBm
Center Freq: 2.440000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
10:42:25 AM Sep 04, 2024
Trace/Detector
10 dB/div
Ref 5.00 dBm
Clear Write
Average
Max Hold
Min Hold
Center 2.44 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.733 ms
Occupied Bandwidth
1.0248 MHz
Transmit Freq Error 5.513 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.164 MHz
x dB -20.00 dB
Detector
Auto
Man

CH3


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
10:43:22 AM Sep 04, 2024
Trace/Detector
10 dB/div
Ref 5.00 dBm
Clear Write
Average
Max Hold
Min Hold
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.733 ms
Occupied Bandwidth
1.0242 MHz
Transmit Freq Error 5.814 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.159 MHz
x dB -20.00 dB
Detector
Auto
Man

9. Antenna Requirement

9.1 Limit

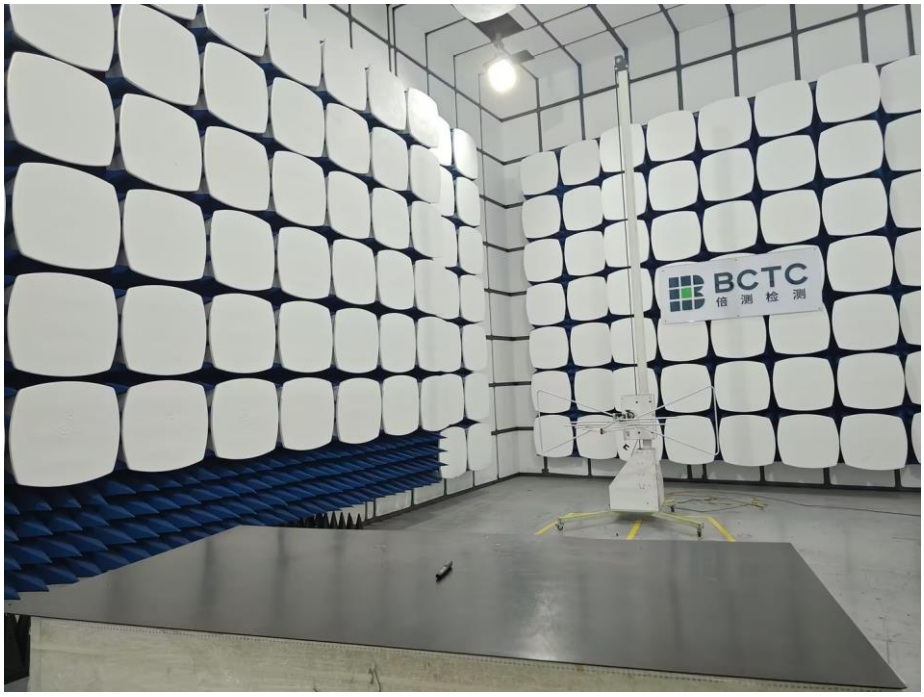
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 Test Result

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

10. EUT Test Setup Photographs

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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TEL:400-788-9558

P.C.: 518103

FAX:0755-33229357

Website:http://www.chnbctc.com

Consultation E-mail: bctc@bctc-lab.com.cn

Complaint/Advice E-mail: advice@bctc-lab.com.cn

※※※※※ **END** ※※※※※