TEST REPORT

Report No.:	TW2309412-03E
Applicant:	Stellar Private Cable Inc.
Product:	eHub
Model No.:	2.0
Trademark:	Sentrics
FCC ID:	2BDDH-A3E6C
Test Standards:	FCC Part 15.249
Test result:	It is herewith confirmed and found to comply with the requirements set up by ANSI C63.10 &FCC Part 15 Subpart C, Paragraph 15.249 regulations for the evaluation of electromagnetic compatibility

Approved By:

Terry Tang

Terry Tang

Manager

Dated: Oct 20, 2023

Results appearing herein relate only to the sample tested
The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com

Special Statement:

FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

Industry Canada (IC) —Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

CAB identifier: CN0033

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Test Report Conclusion

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1.0 General Details

1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.
Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China
Telephone: (755) 83448688
Fax: (755) 83442996
Site on File with the Federal Communications Commission – United Sates
Registration Number: 744189
For 3m Anechoic Chamber

1.2 Applicant Details

Applicant: Stellar Private Cable Inc.
Address: 975 E. Tallmadge Ave., Akron OH 44310 USA
Telephone: --
Fax: --

1.3 Description of EUT

Product:	eHub
Manufacturer:	Stellar Private Cable Inc.
Address:	975 E. Tallmadge Ave., Akron OH 44310 USA
Trademark:	Sentrics
Additional Trademark:	N/A
Model Number:	2.0
Additional Model Name	N/A
Rating:	DC12V, 1.5A
Power Supply:	Model: FJ-SW1201500N Input: AC100-240V~, 50/60Hz, 0.6A; Output: DC12.0V, 1.5A
Modulation Type:	GFSK (Bluetooth Low Energy)
Operation Frequency:	2402-2480MHz
Channel Separate:	2MHz
Channel Number:	40
Hardware Version:	RKS230712_V1.0
Software Version:	V2.x
Serial No.:	N/A
Antenna Designation	FPC antenna used. The gain is 2.8dBi (Get from the antenna specification)

1.4 Submitted Sample: 2 Samples

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1.5 Test Duration

2023-09-29 to 2023-10-20

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions below 1GHz Uncertainty =4.7dB

Radiated Emissions above 1GHz Uncertainty =6.0dB

Conducted Power Uncertainty =6.0dB

Occupied Channel Bandwidth Uncertainty =5%

Conducted Emissions Uncertainty =3.6dB

Note: The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

1.7 Test Engineer

The sample tested by _____

Print Name: Andy Ling

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2023-07-14	2024-07-13
LISN	R&S	EZH3-Z5	100294	2023-07-14	2024-07-13
LISN	R&S	EZH3-Z5	100253	2023-07-14	2024-07-13
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2023-07-14	2024-07-13
Loop Antenna	EMCO	6507	00078608	2022-07-18	2025-07-17
Spectrum	R&S	FSIQ26	100292	2023-07-14	2024-07-13
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2022-07-18	2025-07-17
Horn Antenna	R&S	BBHA 9120D	9120D-631	2022-07-18	2024-07-17
Power meter	Anritsu	ML2487A	6K00003613	2023-07-14	2024-07-13
Power sensor	Anritsu	MA2491A	32263	2023-07-14	2024-07-13
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2022-07-18	2025-07-17
9*6*6 Anechoic	--	--	N/A	2022-07-26	2025-07-25
EMI Test Receiver	RS	ESVB	826156/011	2023-07-14	2024-07-13
EMI Test Receiver	RS	ESCS 30	834115/006	2023-07-14	2024-07-13
Spectrum	HP/Agilent	E4407B	MY50441392	2023-07-14	2024-07-13
Spectrum	RS	FSP	1164.4391.38	2023-07-14	2024-07-13
RF Cable	Zhengdi	ZT26-NJ-NJ-8 M/FA	--	2023-07-14	2024-07-13
RF Cable	Zhengdi	7m	--	2023-07-14	2024-07-13
Pre-Amplifier	Schwarebeck	BBV9743	#218	2023-07-14	2024-07-13
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2023-07-14	2024-07-13
LISN	SCHAFFNER	NNB42	00012	2023-07-14	2024-07-13

2.2 Automation Test Software

For Conducted Emission Test

Name	Version
EZ-EMC	Ver.EMC-CON 3A1.1

For Radiated Emissions

Name	Version
EMI Test Software BL410-EV18.91	V18.905
EMI Test Software BL410-EV18.806 High Frequency	V18.06

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3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.203	Antenna Requirement	Pass	Complies
FCC Part 15, Paragraph 15.207	Conducted Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.249(a) & 15.249(b) Limit	Field Strength of Fundamental	Pass	Complies
FCC Part 15, Paragraph 15.209	Radiated Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.249(d) Limit	Band Edge Test	Pass	Complies

3.2 Test Standards

FCC Part 15 Subpart C, Paragraph 15.249 , ANSI C63.4 :2014 and ANSI C63.10 :2013

4.0 EUT Modification

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES

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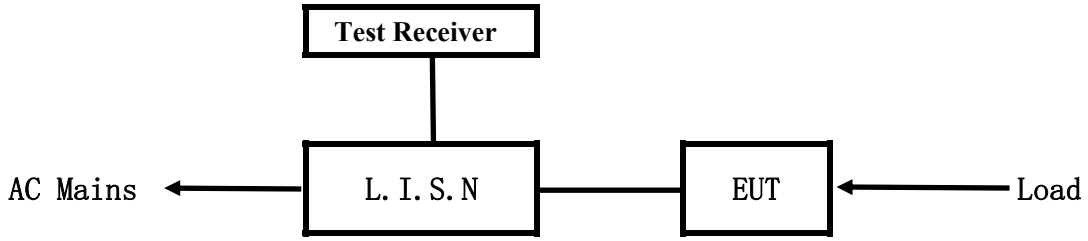
5. Power Line Conducted Emission Test

5.1 Schematics of the test



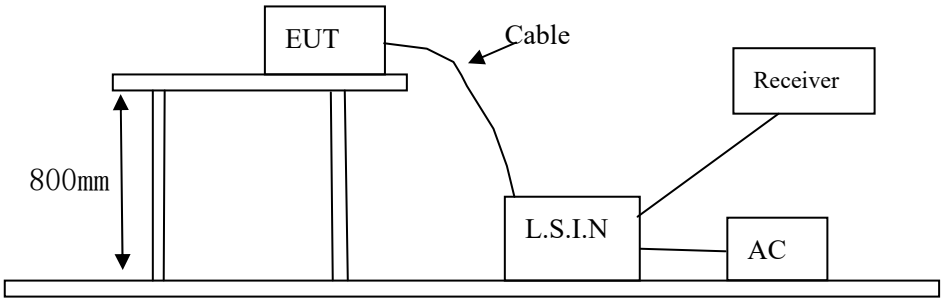
EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013.The Frequency spectrum from 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10 –2013.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



5.3 Configuration of the EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

40 channels are provided to the EUT

A. EUT

Device	Manufacturer	Model	FCC ID
eHub	Stellar Private Cable Inc.	2.0	2BDDH-A3E6C

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B. Internal Device

Device	Trademark	Model	FCC ID/DOC
Adapter	SHENZHEN FUJIA APPLIANCE cO. LTD	FJ-SW1201500N	DOC

C. Peripherals

Device	Trademark	Model	Rating
Flat Panel Monitor	DELL	U2720QM	100-240V~, 50/60Hz, 2.5A

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ～ 0.50	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	56.0	46.0
5.00 ～ 30.00	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

5.6 Test Results:

Pass

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A: Conducted Emission on Live Terminal (150kHz to 30MHz)

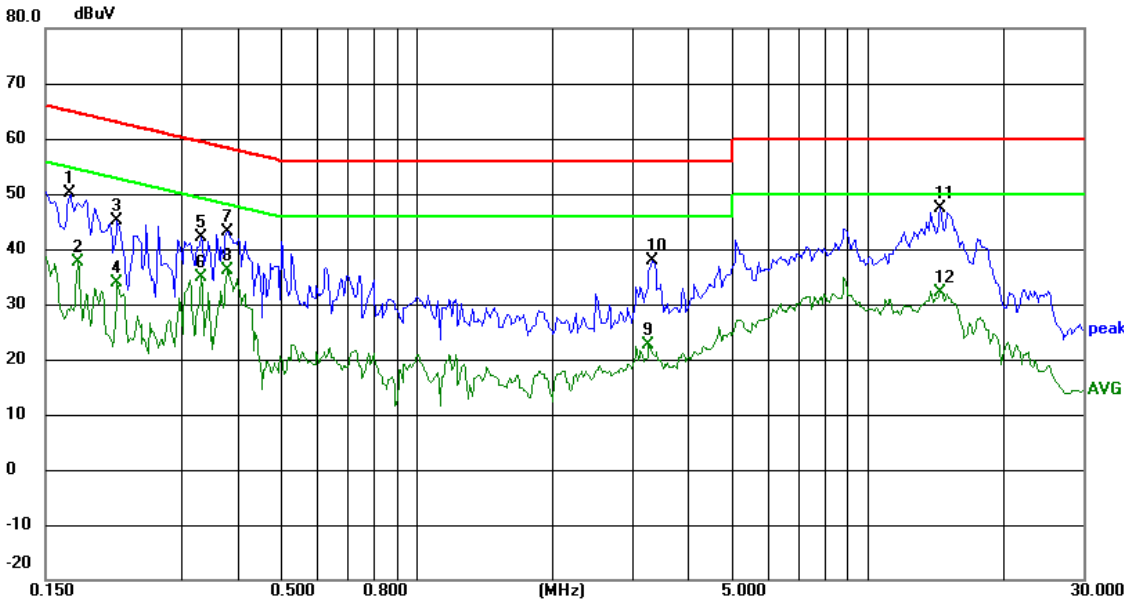
EUT Operating Environment

Temperature: 25℃ Humidity: 65%RH Atmospheric Pressure: 101 kPa

EUT set Condition: Communication by BT

Results: Pass **Test Power:AC120V/60Hz**

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1695	40.45	9.77	50.22	64.98	-14.76	peak	P
2	0.1773	27.92	9.77	37.69	54.61	-16.92	AVG	P
3	0.2162	35.47	9.75	45.22	62.96	-17.74	peak	P
4	0.2162	24.01	9.75	33.76	52.96	-19.20	AVG	P
5	0.3331	32.39	9.76	42.15	59.37	-17.22	peak	P
6	0.3331	25.00	9.76	34.76	49.37	-14.61	AVG	P
7	0.3800	33.43	9.76	43.19	58.28	-15.09	peak	P
8 *	0.3800	26.43	9.76	36.19	48.28	-12.09	AVG	P
9	3.2652	12.72	9.85	22.57	46.00	-23.43	AVG	P
10	3.3119	27.91	9.86	37.77	56.00	-18.23	peak	P
11	14.4504	22.58	24.81	47.39	60.00	-12.61	peak	P
12	14.4504	7.35	24.81	32.16	50.00	-17.84	AVG	P

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B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

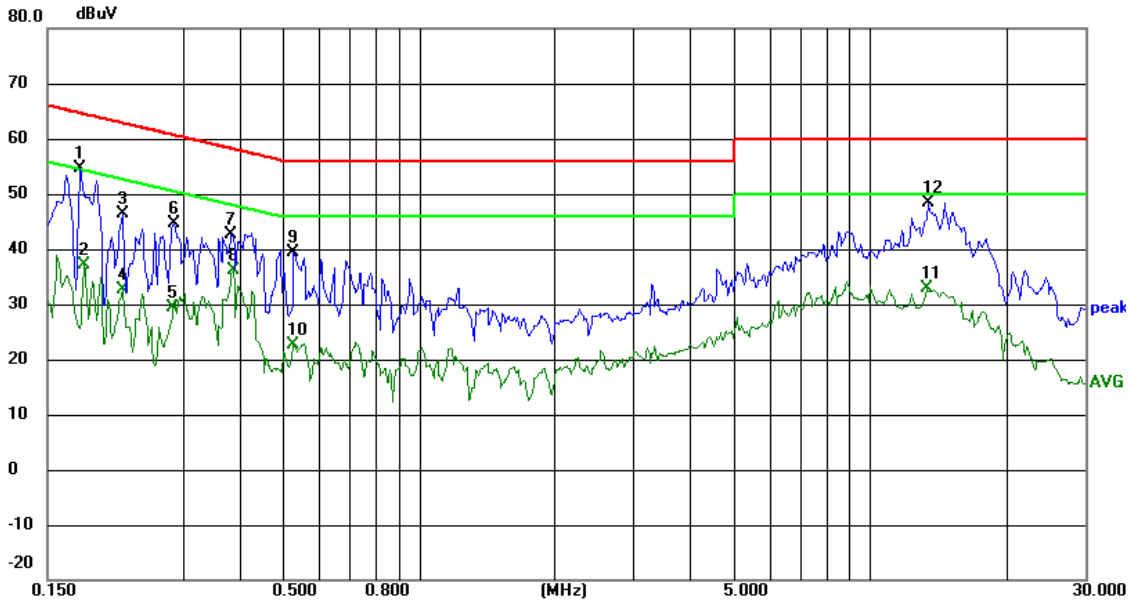
EUT Operating Environment

Temperature: 25℃ Humidity: 65%RH Atmospheric Pressure: 101 kPa

EUT set Condition: Communication by BT

Results: Pass **Test Power:AC120V/60Hz**

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1 *	0.1773	44.74	9.77	54.51	64.61	-10.10	peak	P
2	0.1811	27.37	9.76	37.13	54.44	-17.31	AVG	P
3	0.2202	36.63	9.75	46.38	62.81	-16.43	peak	P
4	0.2202	22.99	9.75	32.74	52.81	-20.07	AVG	P
5	0.2847	19.51	9.76	29.27	50.68	-21.41	AVG	P
6	0.2862	34.88	9.76	44.64	60.63	-15.99	peak	P
7	0.3840	32.76	9.76	42.52	58.19	-15.67	peak	P
8	0.3879	26.38	9.76	36.14	48.11	-11.97	AVG	P
9	0.5282	29.51	9.77	39.28	56.00	-16.72	peak	P
10	0.5282	12.83	9.77	22.60	46.00	-23.40	AVG	P
11	13.3701	9.24	23.68	32.92	50.00	-17.08	AVG	P
12	13.4403	24.67	23.75	48.42	60.00	-11.58	peak	P

Note：Both 240V and 120V voltages are tested, the data of the worst-case is shown in the report.

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6 Radiated Emission Test

6.1 Test Method and test Procedure:

(1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189

(2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.

(3) The frequency spectrum is set as follows:

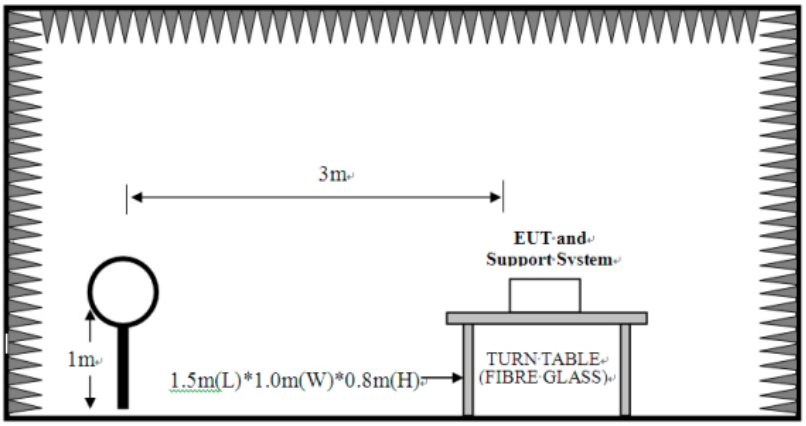
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

(4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.

(5) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup

For radiated emissions from 9kHz to 30MHz



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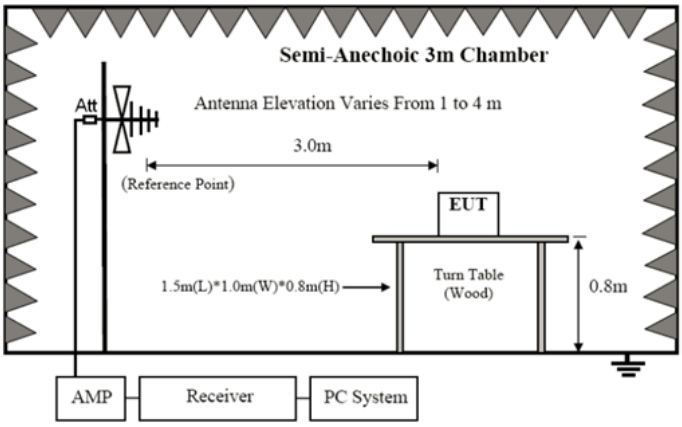
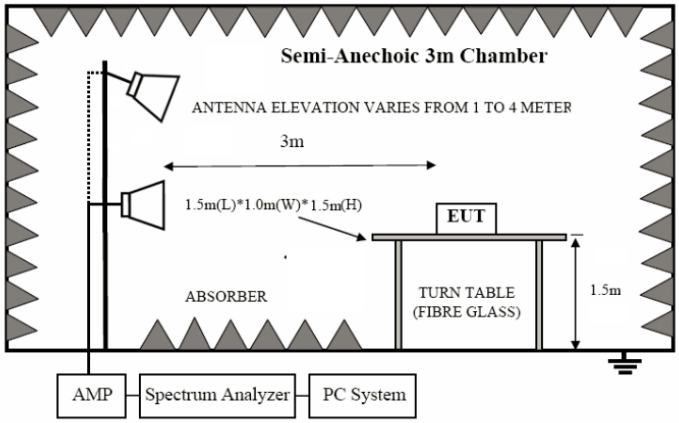
For radiated emissions from 30MHz to1GHz



For radiated emissions above 1GHz



6.2 Configuration of the EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

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6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

A FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)			Field Strength of Harmonics (3m)		
	mV/m	**dBuV/m**		**uV/m**	**dBuV/m**	
2400-2483.5	50	94 (Average)	114 (Peak)	500	54 (Average)	74 (Peak)

Note: 1. RF Field Strength (dBuV) = 20 log RF Voltage (uV)

2.Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log(2400/F(kHz)) +40log (300/3)
0.490-1.705	3	20log(24000/F(kHz)) +40log (30/3)
1.705-30	3	69.5
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

4. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-25G, the final emission level got using PK. For fundamental measurement, PK detector used.

5. For radiated emissions from 9kHz to 30MHz，the emission level is much less than the limit for more than 20dB. No necessary to take down the record.

6. BLE_1M and BLE_2M were tested and only the worst case was recorded in the test report and BLE_1M modulation was the worst case.

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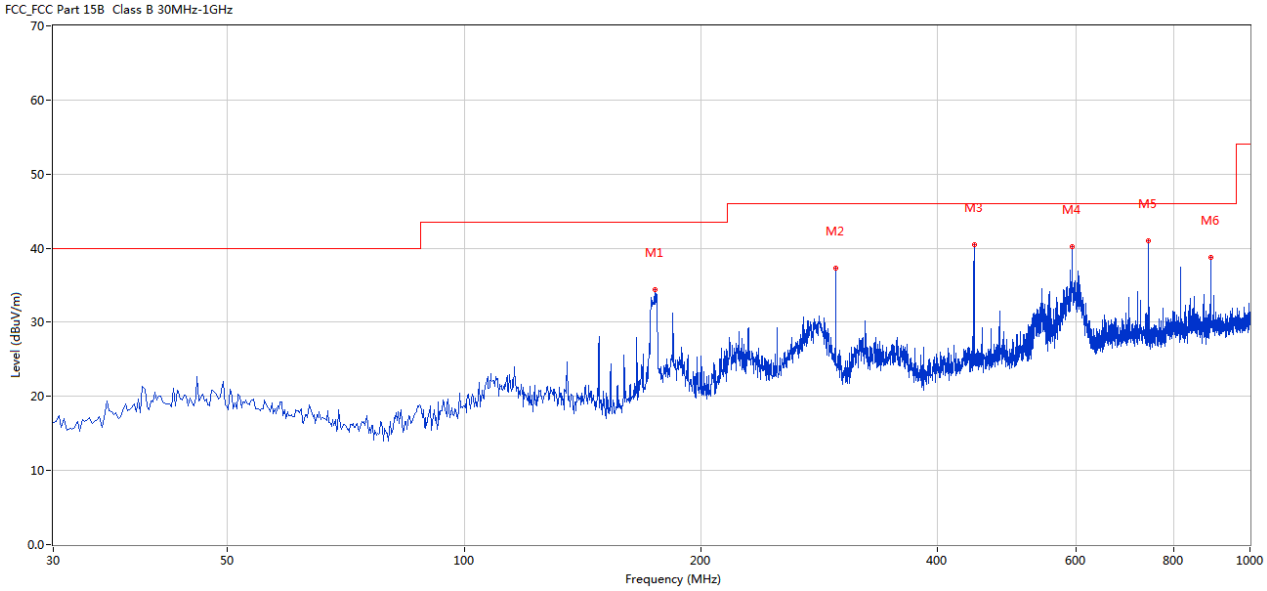
General Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	174.979	34.41	-15.68	43.5	9.09	Peak	95.00	100	Horizontal	Pass
2	296.926	37.37	-11.07	46.0	8.63	Peak	102.00	100	Horizontal	Pass
3	445.541	40.46	-8.02	46.0	5.54	Peak	0.00	100	Horizontal	Pass
4	594.156	40.15	-5.26	46.0	5.85	Peak	118.00	100	Horizontal	Pass
5	742.287	41.03	-3.44	46.0	4.97	Peak	95.00	100	Horizontal	Pass
6	890.902	38.78	-1.91	46.0	7.22	Peak	92.00	100	Horizontal	Pass

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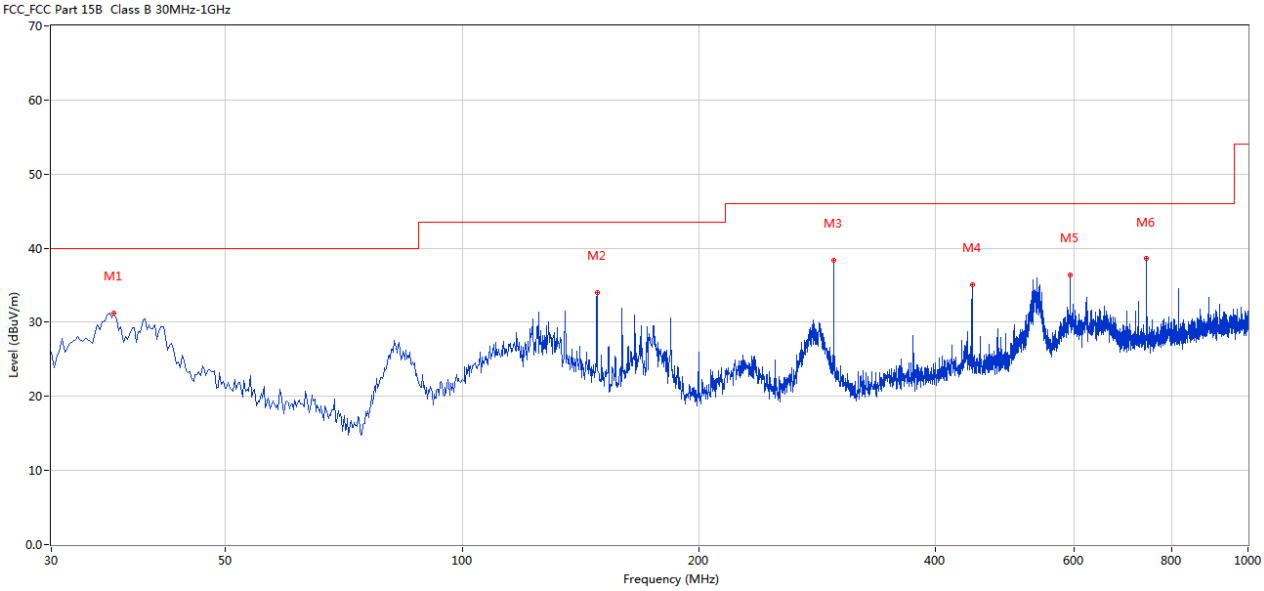
Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	36.061	31.20	-13.68	40.0	8.80	Peak	117.00	100	Vertical	Pass
2	148.553	34.06	-17.15	43.5	9.44	Peak	160.00	100	Vertical	Pass
3	296.926	38.35	-11.07	46.0	7.65	Peak	38.00	100	Vertical	Pass
4	445.541	35.08	-8.02	46.0	10.92	Peak	160.00	100	Vertical	Pass
5	593.914	36.33	-5.25	46.0	9.67	Peak	145.00	100	Vertical	Pass
6	742.287	38.57	-3.44	46.0	7.43	Peak	152.00	100	Vertical	Pass

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Operation Mode: Transmitting under Low Channel (2402MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dB μ V/m)
2402	85.54(Peak)	H	114(Peak)/ 94(AV)
2402	90.75(Peak)	V	114(Peak)/ 94(AV)
4804	46.86(Peak)	H	74(Peak)/ 54(AV)
4804	42.74(Peak)	V	74(Peak)/ 54(AV)
7206	--	H/V	74(Peak)/ 54(AV)
9608	--	H/V	74(Peak)/ 54(AV)
12010	--	H/V	74(Peak)/ 54(AV)
14412	--	H/V	74(Peak)/ 54(AV)
16814	--	H/V	74(Peak)/ 54(AV)
19216	--	H/V	74(Peak)/ 54(AV)
21618	--	H/V	74(Peak)/ 54(AV)
24020	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp
2. Remark "---" means that the emissions level is too low to be measured

Operation Mode: Transmitting g under Middle Channel (2440MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
2440	86.63(Peak)	H	114(Peak)/ 94(AV)
2440	92.38(Peak)	V	114(Peak)/ 94(AV)
4880	45.71(Peak)	H	74(Peak)/ 54(AV)
4880	44.63(Peak)	V	74(Peak)/ 54(AV)
7320	--	H/V	74(Peak)/ 54(AV)
9760	--	H/V	74(Peak)/ 54(AV)
12200	--	H/V	74(Peak)/ 54(AV)
14640	--	H/V	74(Peak)/ 54(AV)
17080	--	H/V	74(Peak)/ 54(AV)
19520	--	H/V	74(Peak)/ 54(AV)
21960	--	H/V	74(Peak)/ 54(AV)
24400	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp
2. Remark "---" means that the emissions level is too low to be measured

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Operation Mode: Transmitting under High Channel (2480MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
2480	86.07(Peak)	H	114(Peak)/ 94(AV)
2480	91.45(Peak)	V	114(Peak)/ 94(AV)
4960	45.85(Peak)	H	74(Peak)/ 54(AV)
4960	42.92(Peak)	V	74(Peak)/ 54(AV)
7440	--	H/V	74(Peak)/ 54(AV)
9920	--	H/V	74(Peak)/ 54(AV)
12400	--	H/V	74(Peak)/ 54(AV)
14880	--	H/V	74(Peak)/ 54(AV)
17360	--	H/V	74(Peak)/ 54(AV)
19840	--	H/V	74(Peak)/ 54(AV)
22320	--	H/V	74(Peak)/ 54(AV)
24800	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp

2. Remark "---" means that the emissions level is too low to be measured

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7. Band Edge

7.1 Test Method and test Procedure:

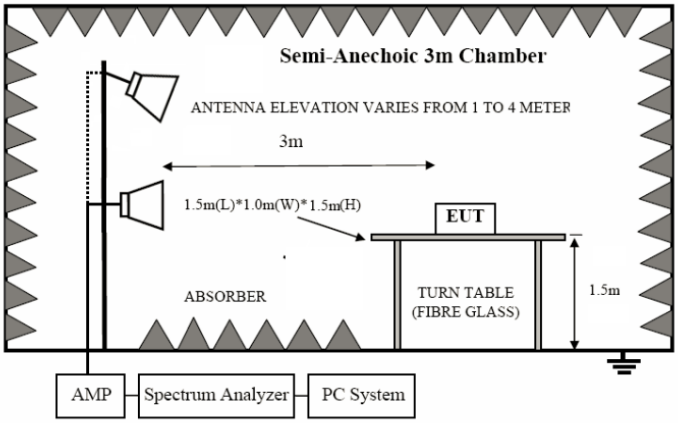
(1) The EUT was tested according to ANSI C63.10–2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189

(2) Set Spectrum as RBW=1MHz, VBW=3MHz and Peak detector used for PK value. RBW=1MHz, VBW=10Hz and Peak detector used for AV value.

(3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.

(4) The antenna polarization: Vertical polarization and Horizontal polarization.

7. 2 Radiated Test Setup



For the actual test configuration, please refer to the related items – Photos of Testing

7.3 Configuration of the EUT

Same as section 5.3 of this report

7.4 EUT Operating Condition

Same as section 5.4 of this report.

7.5 Band Edge Limit

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 Section 15.209, whichever is the lesser attenuation.

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7.6 Test Result

Restricted band Measurement

EUT	eHub		Model	2.0
Mode	Keeping Transmitting		Test Voltage	120V~
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
Low Channel, Vertical				
2390	PK (dBμV/m)	43.74	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)
2400	PK (dBμV/m)	45.85	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)
Low Channel, Vertical				
2390	PK (dBμV/m)	42.47	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)
2400	PK (dBμV/m)	46.85	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)

Restricted band Measurement

EUT	eHub		Model	2.0
Mode	Keeping Transmitting		Test Voltage	120V~
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
High Channel, Horizontal				
2483.5	PK (dBμV/m)	47.89	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)
High Channel, Vertical				
2483.5	PK (dBμV/m)	46.23	Limit	74(dBμV/m)
	AV (dBμV/m)	--		54(dBμV/m)

Note: 1. The PK emission level less than the AV limit. No necessary to record the AV emission level.
2. BLE_1M and BLE_2M were tested and only the worst case was recorded in the test report and BLE_1M modulation was the worst case.

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8.0 Antenna Requirement

Applicable Standard

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 shall be considered sufficient to comply with the provisions of this section.

1. The antenna is a FPC Antenna and no consideration of replacement. Antenna max gain is 2.8dBi from 2.4GHz to 2.5GHz. (Get from the antenna specification)

Test Result: Pass

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9.0 20dB Bandwidth Measurement

Type of Modulation: GFSK 1M

EUT	eHub		Model	2.0
Mode	Keep Transmitting		Input Voltage	120V~
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass/ Fail
Low	2402	1.129	--	Pass
Middle	2440	1.129	--	Pass
High	2480	1.129	--	Pass

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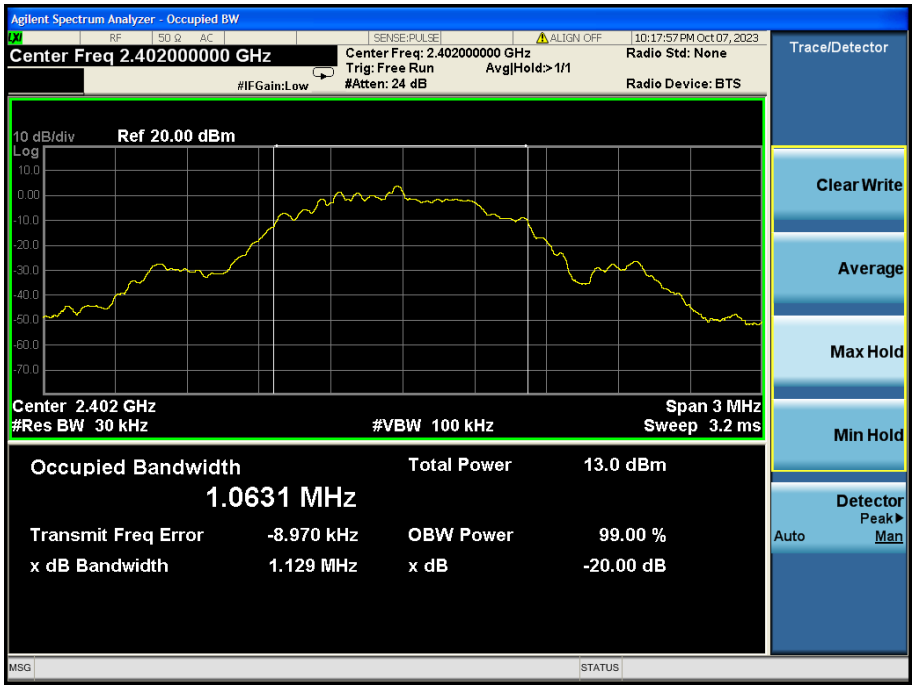

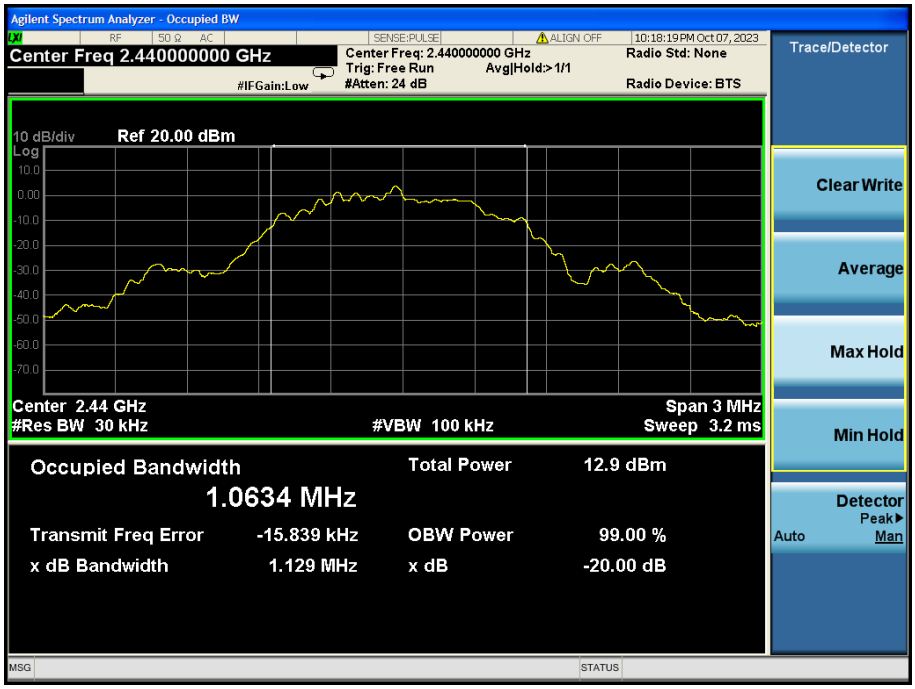

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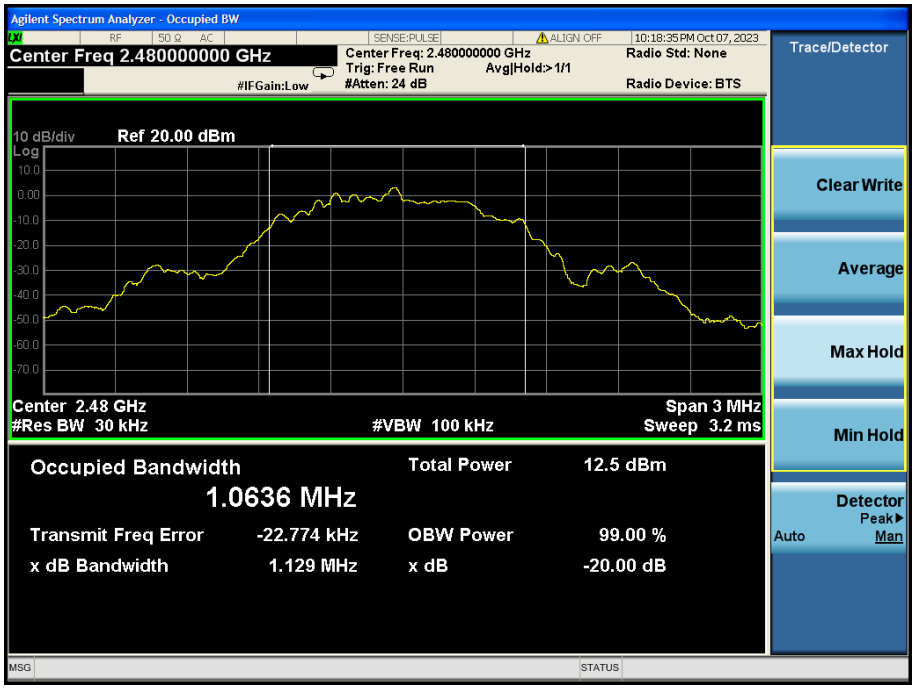

Type of Modulation: GFSK 2M

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EUT	eHub		Model	2.0
Mode	Keep Transmitting		Input Voltage	DC5.0V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass/ Fail
Low	2402	2.216	--	Pass
Middle	2440	2.236	--	Pass
High	2480	2.252	--	Pass

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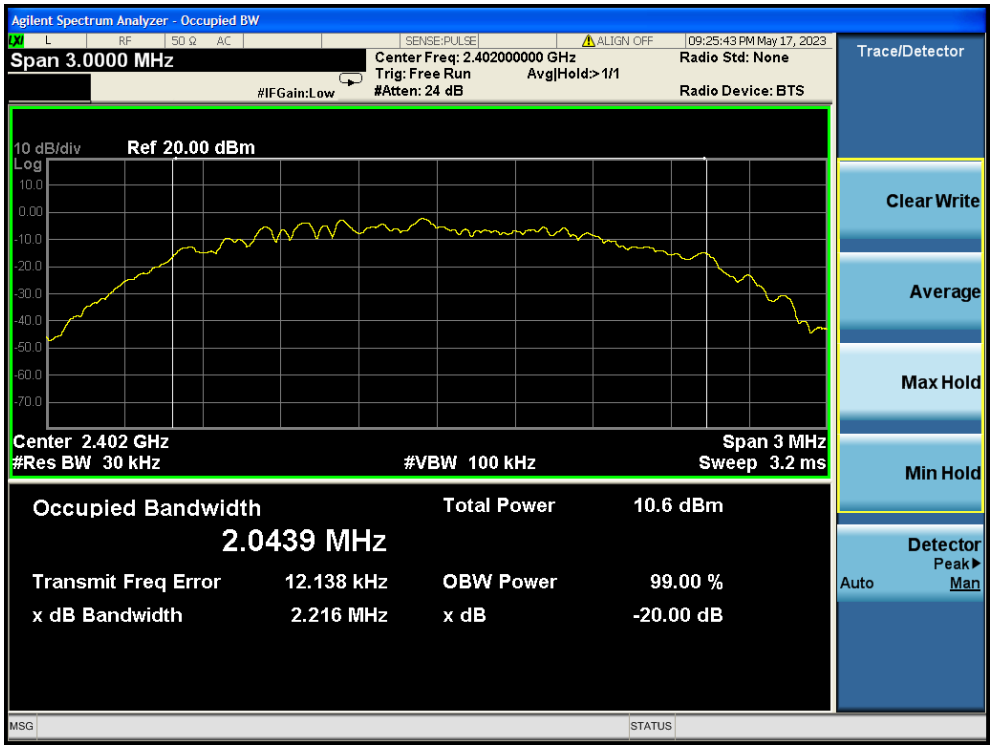

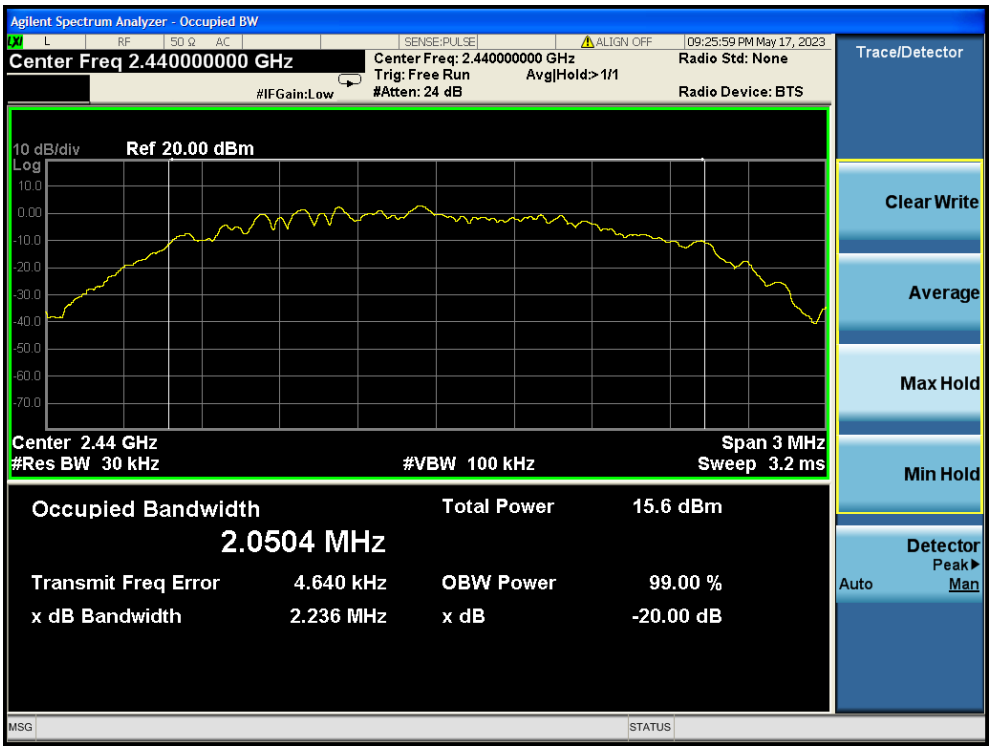

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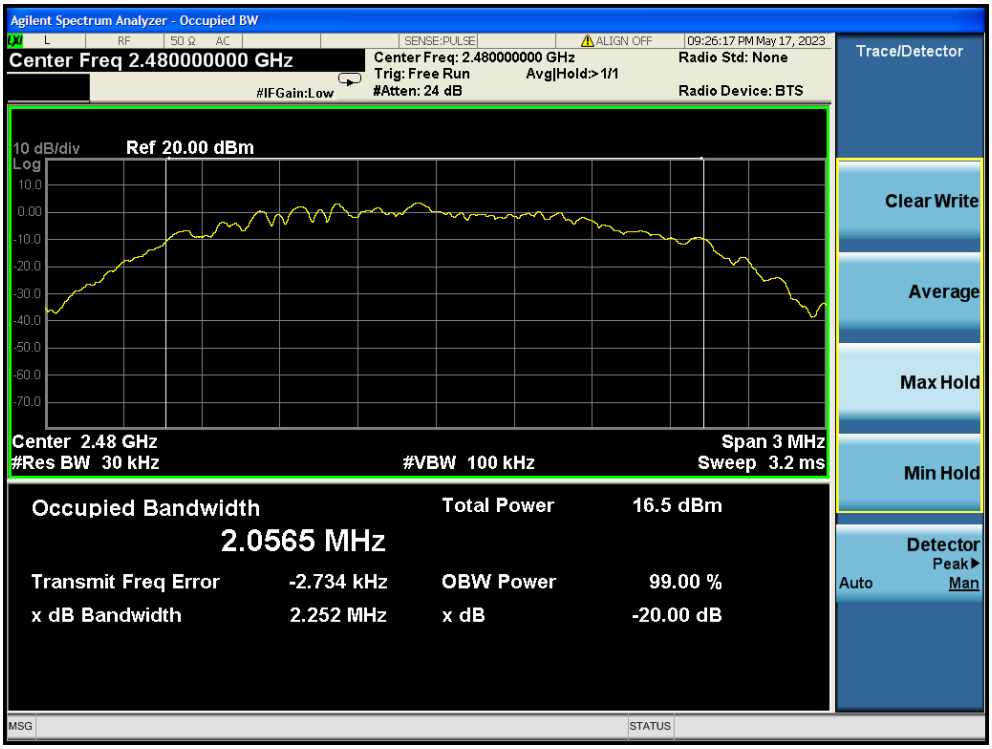

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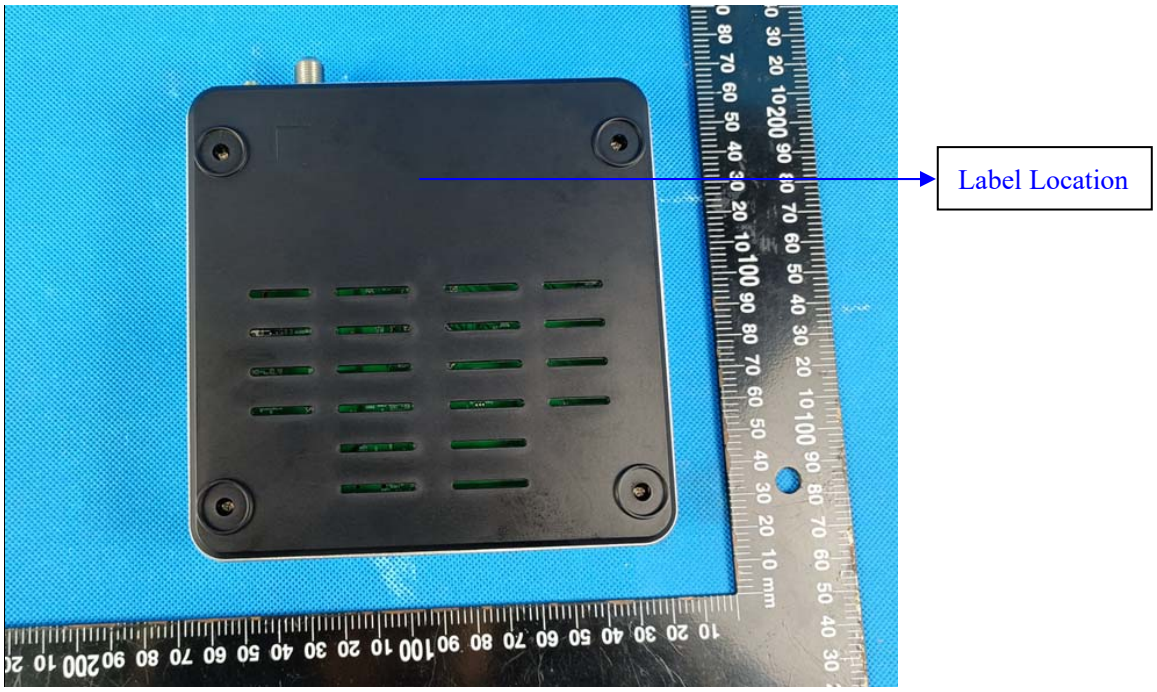
10.0 FCC ID Label

FCC ID: 2BDDH-A3E6C

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



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11.0 Photo of testing

11.1 Conducted test View

The report refers only to the sample tested and does not apply to the bulk.
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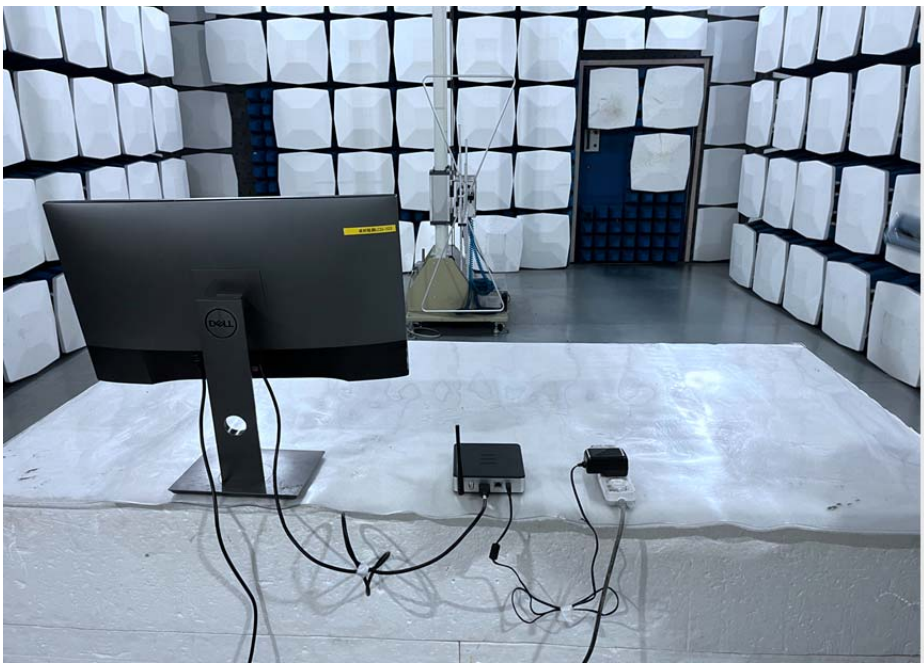
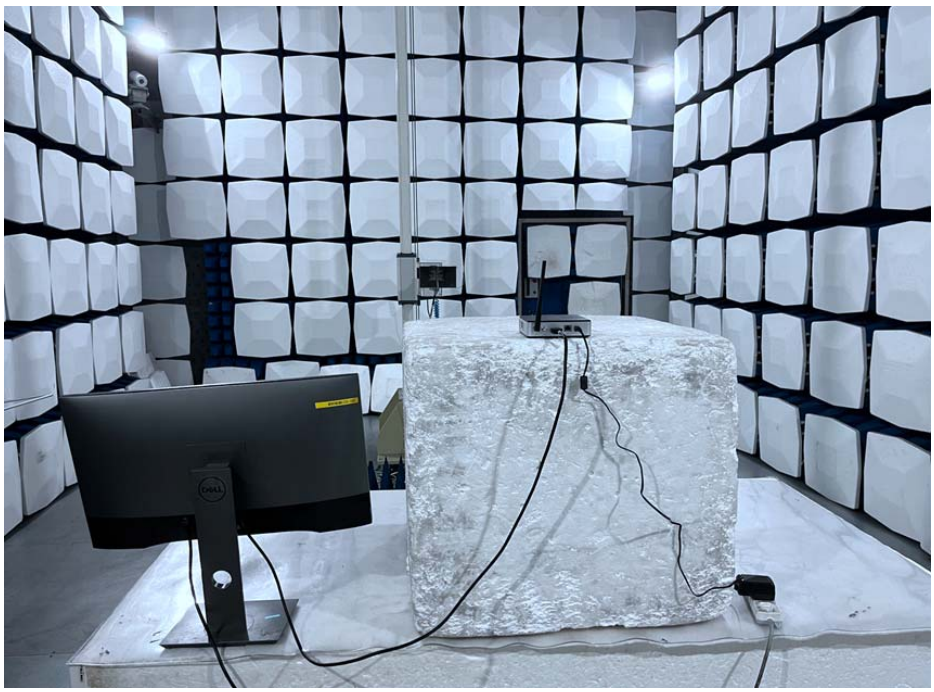
Radiated emission test view





Photographs – EUT

Please refer test report TW2309412-01E

--End of the report--

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