RADIO TEST REPORT
FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.247**
Product name	**AX3000 Wi-Fi 6 Smart Home Gateway Wi-Fi 6 AX3000 IoT Gateway**
Brand Name	**D-Link**
Model No.	**MS30**
Test Result	**Pass**
Statements of Conformity	**Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:

sehni . Hu

Sehni Hu
Supervisor

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 30, 2024	Initial Issue	ALL	Peggy Tsai

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	D-Link Corporation 14420 Myford Road Suite 100 Irvine California United States 92606
Manufacturer	D-Link Corporation 14420 Myford Road Suite 100 Irvine California United States 92606
Equipment	AX3000 Wi-Fi 6 Smart Home Gateway Wi-Fi 6 AX3000 IoT Gateway
Model No.	MS30
Model Discrepancy	N/A
Brand Name	D-Link
Received Date	January 31, 2024
Date of Test	April 23 ~ June 24, 2024
EUT Power Rating	EUT Power from Adapter. (1) AMIGO / AMS200-1201500FU I/P: 100-240Vac, 50/60Hz, 0.8A Max/50VA O/P: 12.0Vdc, 1.5A (2) AMIGO / AMS200-1201500F I/P: 100-240Vac, 50/60Hz, 0.8A Max/50VA O/P: 12.0Vdc, 1.5A, 18.0W
S.W Version	1.00
H.W: Version	A1

Remark:
1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.2 EUT CHANNEL INFORMATION

Frequency Range	2402MHz-2480MHz
Modulation Type	GFSK for BLE 125 kbps GFSK for BLE 500 kbps GFSK for BLE 1 Mbps GFSK for BLE 2 Mbps
Number of channel	40 Channels

Remark:
Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

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

1.3 ANTENNA INFORMATION

Antenna Type	☐ PIFA ☐ PCB ☒ Dipole ☐ Coils
Antenna Gain	Gain: 0.34 dBi
Antenna Trade / Model	JAE / AP02DL2527489C0
Antenna Connector	MHF compatible

Notes:
1.The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.213 dB
Channel Bandwidth	± 2.7 %
RF output power (Power Meter + Power sensor)	± 0.243 dB
Power Spectral density	± 2.739 dB
Conducted Bandedge	± 2.739 dB
Conducted Spurious Emission	± 2.742 dB
Radiated Emission_9kHz-30MHz	± 3.761 dB
Radiated Emission_30MHz-200MHz	± 3.473 dB
Radiated Emission_200MHz-1GHz	± 3.946 dB
Radiated Emission_1GHz-6GHz	± 4.797 dB
Radiated Emission_6GHz-18GHz	± 4.803 dB
Radiated Emission_18GHz-26GHz	± 3.459 dB
Radiated Emission_26GHz-40GHz	± 3.297 dB

Remark:
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Ben Yang	-
Radiation	Tony Chao、Ray Li	-
RF Conducted	Marco Chan	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC pubic Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.6 INSTRUMENT CALIBRATION

Conducted_FCC/IC/NCC (All)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Power Sensor	Anritsu	MA2411B	1911387	2023/07/25	2024/07/24
Power Meter	Anritsu	ML2496A	2136002	2023/11/16	2024/11/15
Signal Analyzer	KEYSIGHT	N9030B	MY62291089	2023-10-13	2024-10-12
Software	Radio Test Software Ver. 21				

966A_Radiated					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Signal Analyzer	KEYSIGHT	N9010A	MY54200716	2023-10-13	2024-10-12
Thermo-Hygro Meter	WISEWIND	1206	D07	2023-12-08	2024-12-07
Active Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2023-12-13	2024-12-12
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2023-08-08	2024-08-07
Preamplifier	EMEC	EM330	060609	2024-02-21	2025-02-20
Cable	Huber+Suhner	104PEA	20995+21000+182330	2024-02-21	2025-02-20
Horn Antenna	ETC	MCTD 1209	DRH13M02003	2023-12-28	2024-12-27
Preamplifier	HP	8449B	3008A00965	2023-12-22	2024-12-21
Cable	EMCI	EMC101G	221213+221011+221012	2023-10-17	2024-10-16
Attenuator	Mini-Circuits	BW-S9W5	BWS9W5-09-966A-01	2024-02-07	2025-02-06
High Pass Filters	Titan Microwave	T04H30001800070S01	22011402-4	2023-06-17	2024-06-16
				2024-06-12	2025-06-11
Horn Antenna	SCHWARZBECK	BBHA9170	1047	2023-12-13	2024-12-12
Pre-Amplifier	EMCI	EMC184045SE	980860	2023-12-12	2024-12-11
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Site Validation	CCS	966A	N/A	2023-07-10	2024-07-09
Software	e3 V9-210616c				

Remark:
1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

AC Mains Conduction					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EMI Test Receiver	R&S	ESCI	100064	2024-06-14	2025-06-13
LISN	TESEQ	LN2-16N	22012	2024-02-29	2025-02-27
Cable	EMCI	CFD300-NL	CERF	2023-06-27	2024-06-26
				2024-06-26	2025-06-25
Software	e3 V6-110812				

Remark:
1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

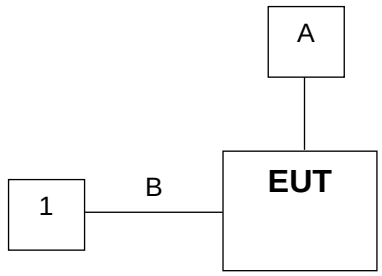
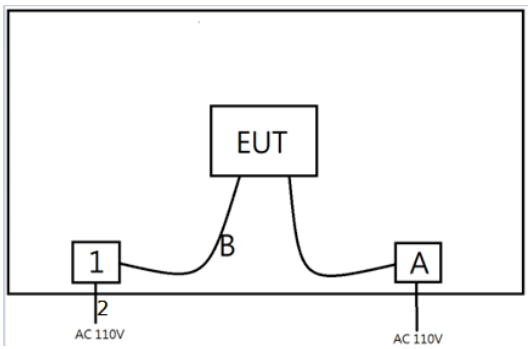
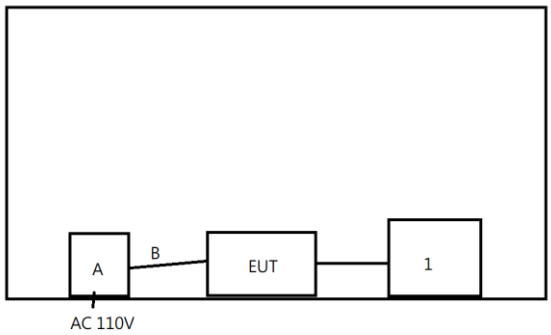
EUT Accessories Equipment						
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**	**IC**
	N/A					

Support Equipment (Conducted)					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	NB(L)	Lenovo	X260	N/A	N/A
A	Adapter	AMIGO	AMS200-1201500FU	N/A	N/A
B	Cable Type A to TTL	Nienyi Group	OP-1012C33V-PBAM04D1	N/A	N/A

Support Equipment (RSE)					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
A	Adapter	AMIGO	AMS200-1201500FU	N/A	N/A
B	Cable Type A to TTL	Nienyi Group	OP-1012C33V-PBAM04D1	N/A	N/A

Support Equipment (Conduction)					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
A	Adapter	AMIGO	AMS200-1201500FU	N/A	N/A
B	Cable Type A to TTL	Nienyi Group	OP-1012C33V-PBAM04D1	N/A	N/A

1.8 TEST SET UP DIAGRAM

Conducted	RSE
	
Conduction	
	

1.9 TEST PROGRAM

The EUT connection corresponds to the surrounding fixture control board.

This EUT uses " Iot_Evaluation v1.3.5" software to set the frequency, modulation, and power to allow the sample to continuously transmit (including frequency hopping mode and Co-Location).

1.10 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 558074.

2. TEST SUMMERY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	4.1	AC Conducted Emission	Pass
15.247(a)(2)	4.2	6 dB Bandwidth	Pass
-	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)(3)	4.3	Output Power Measurement	Pass
15.247(e)	4.4	Power Spectral Density	Pass
15.247(d)	4.5	Conducted Band Edge	Pass
15.247(d)	4.5	Conducted Spurious Emission	Pass
15.247(d) 15.205, 15.209	4.6	Radiation Band Edge	Pass
15.247(d) 15.205, 15.209	4.6	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	BLE Mode (125 kbps) BLE Mode (500 kbps) BLE Mode (1Mbps) BLE Mode (2Mbps)
Test Channel Frequencies	1.Lowest Channel : 2402MHz 2.Middle Channel : 2442MHz 3.Highest Channel : 2480MHz

Remark:
1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.
2. Based on FCC Part 15.31(m), the laboratory conducts a comprehensive evaluation of CH low, CH middle, and CH high. Other additional channels only evaluate the radiated restricted bands of operation and powers.

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	**AC Power line conducted emission for line and neutral**
Power supply Mode	**Mode 1: EUT Power by Adapter(AMS200-1201500FU) Mode 2: EUT Power by Adapter(AMS200-1201500F)**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**

Radiated Emission Measurement Above 1G	
Test Condition	**Radiated Emission Above 1G**
Power supply Mode	**Mode 1: EUT Power by Adapter(AMS200-1201500FU) Mode 2: EUT Power by Adapter(AMS200-1201500F)**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**
Worst Position	**☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)**

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT Power by Adapter(AMS200-1201500FU) Mode 2: EUT Power by Adapter(AMS200-1201500F)**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**

Radiated Emission Measurement [Co-Location]	
Test Condition	**Radiated Emission [Co-Location]**
Power supply Mode	**Mode 1: EUT Power by BLE_2M+Wi-Fi 2.4G+Wi-Fi 5G**
Worst Mode	**☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4**

Remark:

1. The worst mode was record in this test report.
2. AC power line conducted emission were performed the EUT transmit at the highest output power channel as worse case.
3. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report

3.3 EUT DUTY CYCLE

Temperature: 21.1 ~ 23.6℃ **Test date:** April 23 ~ May 4, 2024

Humidity: 54 ~ 66% RH **Tested by:** Marco Chan

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
BLE 1M	100.00	0.00	0.33	0.01
BLE 2M	100.00	0.00	1.06	0.01
BLE 125k	83.27	0.80	0.32	1.00
BLE 500k	57.91	2.37	0.93	1.00

BLE_125k_LowCH00-2402

BLE_1M_LowCH00-2402

BLE_500k_LowCH00-2402

BLE_2M_LowCH00-2402

4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

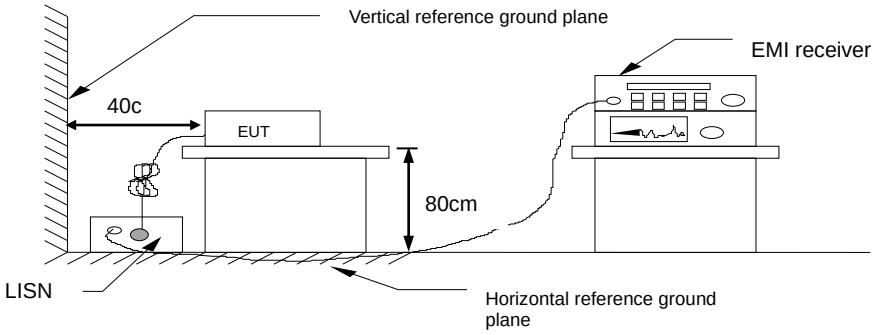
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

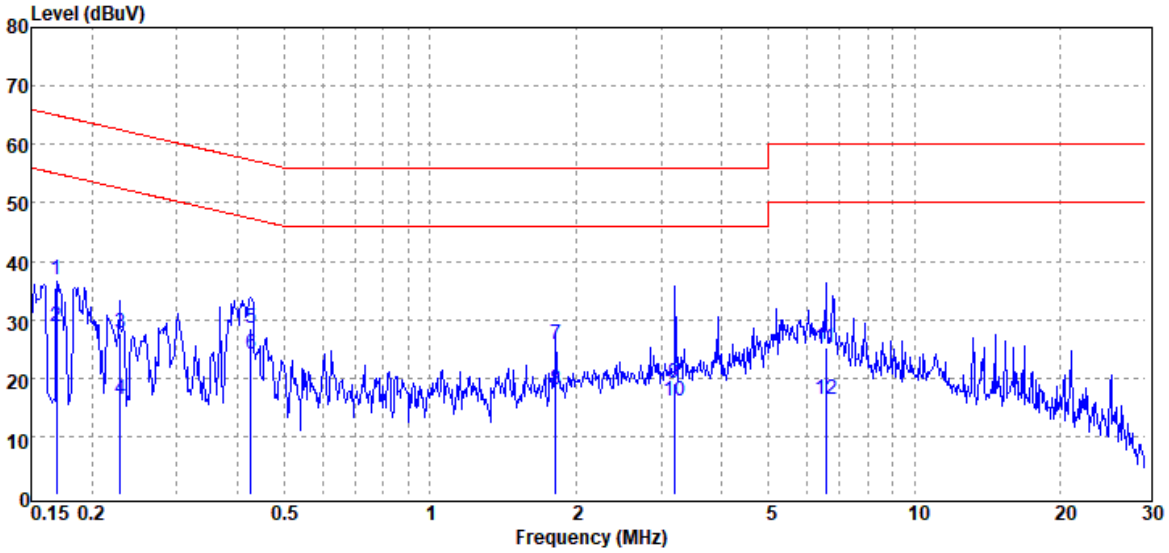
1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

4.1.3 Test Setup



4.1.4 Test Result

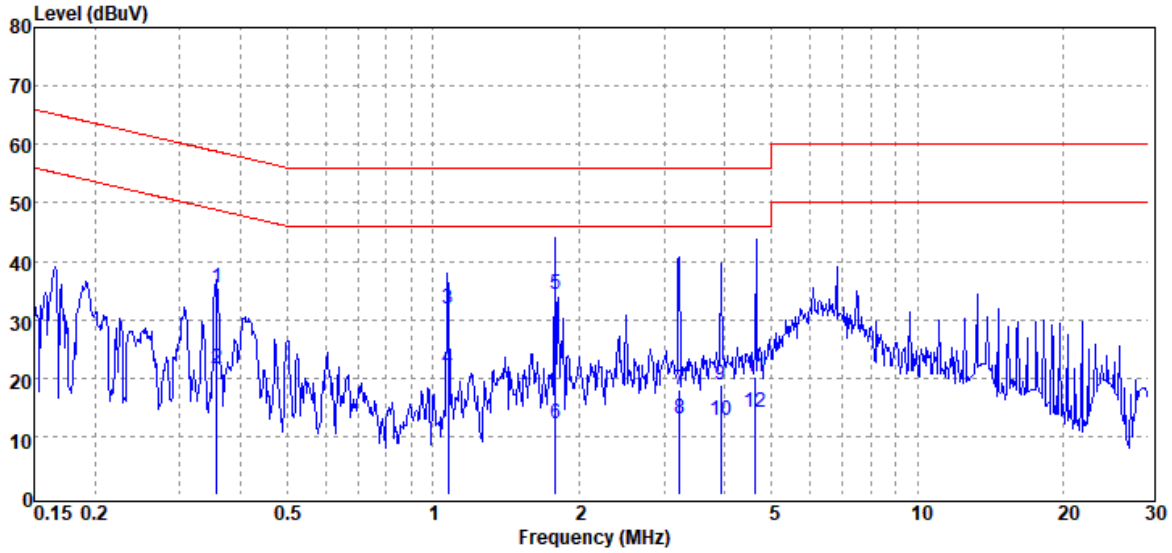
Project No	: TM-2309000207P	Test Date	: 2024-06-24
Operation Mode	: BLE	Temp./Humi.	: 23.4°C / 54%
Test Chamber	: Conduction	Engineer	: Ben Yang
Probe	: LINE	Test Voltage	: AC 120V/60Hz
Note	:		



Freq.	Detector Mode	Spectrum Read Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.169	QP	36.54	0.14	36.68	65.01	-28.33
0.169	Average	28.51	0.14	28.65	55.01	-26.36
0.229	QP	27.65	0.14	27.79	62.49	-34.70
0.229	Average	16.15	0.14	16.29	52.49	-36.20
0.426	QP	28.48	0.14	28.62	57.34	-28.72
0.426	Average	24.07	0.14	24.21	47.34	-23.13
1.813	QP	25.45	0.20	25.65	56.00	-30.35
1.813	Average	17.79	0.20	17.99	46.00	-28.01
3.197	QP	18.90	0.24	19.14	56.00	-36.86
3.197	Average	15.87	0.24	16.11	46.00	-29.89
6.556	QP	24.81	0.31	25.12	60.00	-34.88
6.556	Average	16.05	0.31	16.36	50.00	-33.64

Note: 1. Actual FS= Spectrum Read Level + Factor
Note: 2. Margin= Actual FS - Limit

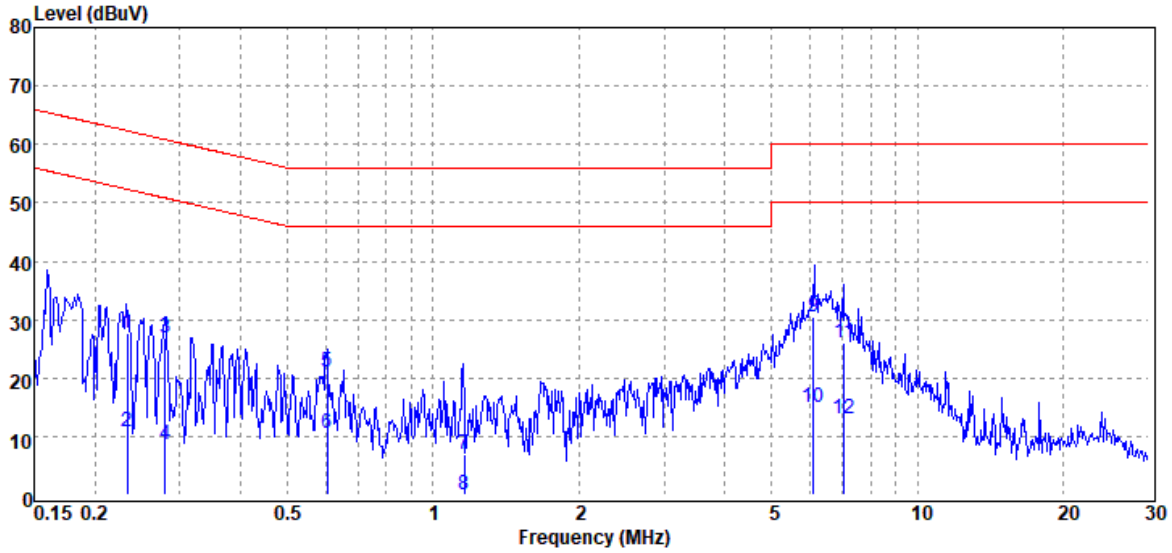
Project No	: TM-2309000207P	Test Date	: 2024-06-24
Operation Mode	: BLE	Temp./Humi.	: 23.4°C / 54%
Test Chamber	: Conduction	Engineer	: Ben Yang
Probe	: NEUTRAL	Test Voltage	: AC 120V/60Hz
Note	:		



Freq.	Detector Mode	Spectrum Read Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.357	QP	35.46	0.11	35.57	58.80	-23.23
0.357	Average	21.39	0.11	21.50	48.80	-27.30
1.073	QP	31.73	0.13	31.86	56.00	-24.14
1.073	Average	21.39	0.13	21.52	46.00	-24.48
1.787	QP	34.27	0.18	34.45	56.00	-21.55
1.787	Average	11.99	0.18	12.17	46.00	-33.83
3.230	QP	17.72	0.21	17.93	56.00	-38.07
3.230	Average	12.94	0.21	13.15	46.00	-32.85
3.929	QP	18.54	0.23	18.77	56.00	-37.23
3.929	Average	12.63	0.23	12.86	46.00	-33.14
4.635	QP	19.87	0.24	20.11	56.00	-35.89
4.635	Average	14.01	0.24	14.25	46.00	-31.75

Note: 1. Actual FS= Spectrum Read Level + Factor
Note: 2. Margin= Actual FS - Limit

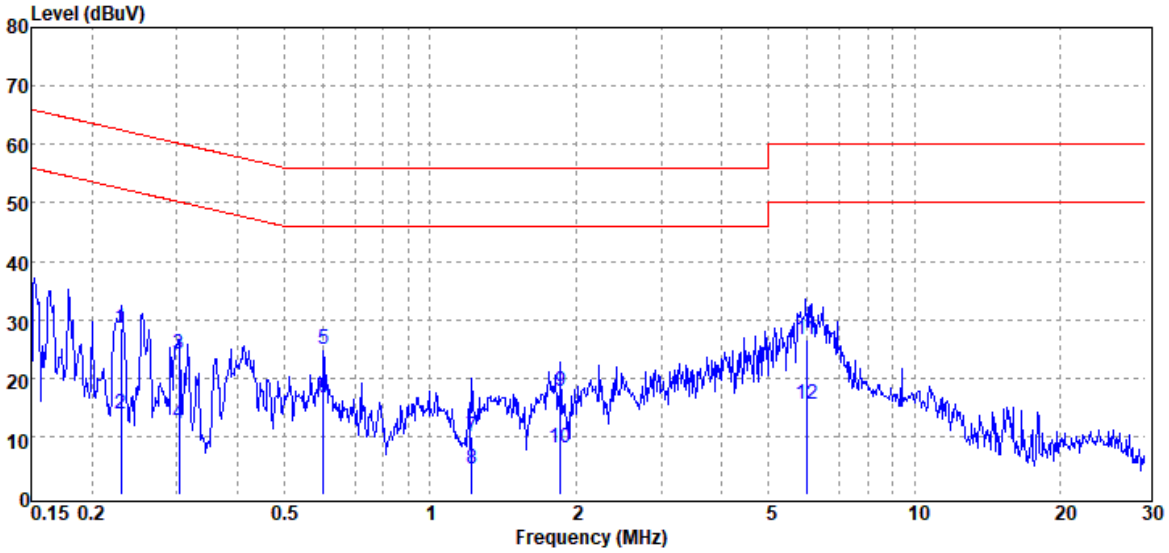
Project No	: TM-2309000207P	Test Date	: 2024-07-03
Operation Mode	: BLE	Temp./Humi.	: 23.4°C / 54%
Test Chamber	: Conduction	Engineer	: Ben Yang
Probe	: LINE	Test Voltage	: AC 230V/50Hz
Note	:		



Freq.	Detector Mode	Spectrum Read Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.233	QP	27.66	0.12	27.78	62.33	-34.55
0.233	Average	10.73	0.12	10.85	52.33	-41.48
0.280	QP	26.73	0.12	26.85	60.81	-33.96
0.280	Average	8.55	0.12	8.67	50.81	-42.14
0.604	QP	20.81	0.11	20.92	56.00	-35.08
0.604	Average	10.53	0.11	10.64	46.00	-35.36
1.158	QP	6.82	0.12	6.94	56.00	-49.06
1.158	Average	-0.17	0.12	-0.05	46.00	-46.05
6.111	QP	30.30	0.25	30.55	60.00	-29.45
6.111	Average	14.74	0.25	14.99	50.00	-35.01
7.048	QP	25.81	0.27	26.08	60.00	-33.92
7.048	Average	12.63	0.27	12.90	50.00	-37.10

Note: 1. Actual FS= Spectrum Read Level + Factor
Note: 2. Margin= Actual FS - Limit

Project No	: TM-2309000207P	Test Date	: 2024-07-03
Operation Mode	: BLE	Temp./Humi.	: 23.4°C / 54%
Test Chamber	: Conduction	Engineer	: Ben Yang
Probe	: NEUTRAL	Test Voltage	: AC 230V/50Hz
Note	:		



Freq.	Detector Mode	Spectrum Read Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.230	QP	28.30	0.09	28.39	62.44	-34.05
0.230	Average	13.67	0.09	13.76	52.44	-38.68
0.303	QP	24.13	0.08	24.21	60.16	-35.95
0.303	Average	12.08	0.08	12.16	50.16	-38.00
0.602	QP	24.78	0.08	24.86	56.00	-31.14
0.602	Average	16.45	0.08	16.53	46.00	-29.47
1.220	QP	9.79	0.11	9.90	56.00	-46.10
1.220	Average	4.32	0.11	4.43	46.00	-41.57
1.859	QP	17.60	0.13	17.73	56.00	-38.27
1.859	Average	8.02	0.13	8.15	46.00	-37.85
5.973	QP	26.39	0.23	26.62	60.00	-33.38
5.973	Average	15.16	0.23	15.39	50.00	-34.61

Note: 1. Actual FS= Spectrum Read Level + Factor
Note: 2. Margin= Actual FS - Limit

4.2 6dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

4.2.1 Test Limit

According to §15.247(a)(2),

6 dB Bandwidth ：

Limit	Shall be at least 500kHz

Occupied Bandwidth(99%) ： For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as KDB 558074 D01 and ANSI C63.10: 2013 clause 6.9.2.

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup

Refer to section 1.8.

4.2.4 Test Result

Temperature:	21.1 ~ 23.6℃	**Test date:**	April 23 ~ May 4, 2024
Humidity:	54 ~ 66% RH	**Tested by:**	Marco Chan

6dB BANDWIDTH

BLE 125k mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.6152	≧ 0.5	PASS
2442	0.6125	≧ 0.5	PASS
2480	0.6045	≧ 0.5	PASS

BLE 500k mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.6644	≧ 0.5	PASS
2442	0.6641	≧ 0.5	PASS
2480	0.6595	≧ 0.5	PASS

BLE 1M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	0.7411	≧ 0.5	PASS
2442	0.7366	≧ 0.5	PASS
2480	0.7359	≧ 0.5	PASS

BLE 2M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2402	1.393	≧ 0.5	PASS
2442	1.394	≧ 0.5	PASS
2480	1.389	≧ 0.5	PASS

BANDWIDTH 99%

BLE 125k mode

Frequency (MHz)	99%Bandwidth (MHz)
2402	1.0431
2442	1.0447
2480	1.0451

BLE 500k mode

Frequency (MHz)	99%Bandwidth (MHz)
2402	1.0103
2442	1.0112
2480	1.0107

BLE 1M mode

Frequency (MHz)	99%Bandwidth (MHz)
2402	1.0388
2442	1.0380
2480	1.0393

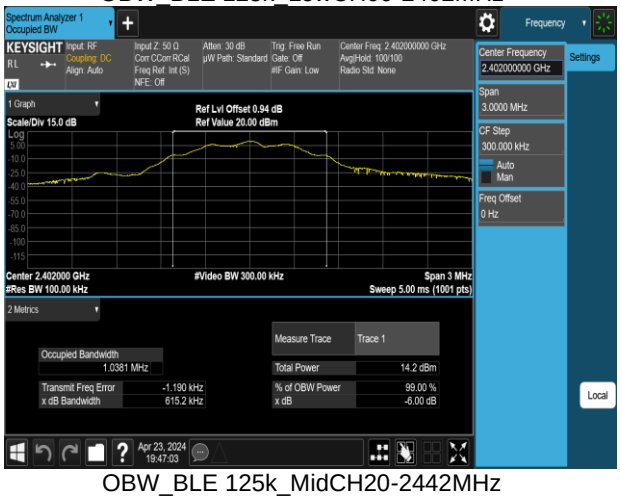
BLE 2M mode

Frequency (MHz)	99%Bandwidth (MHz)
2402	2.0557
2442	2.0555
2480	2.0552

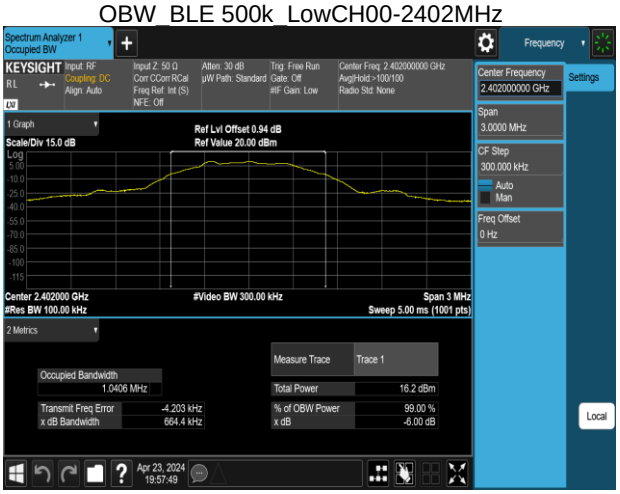
Test Data

6dB BANDWIDTH

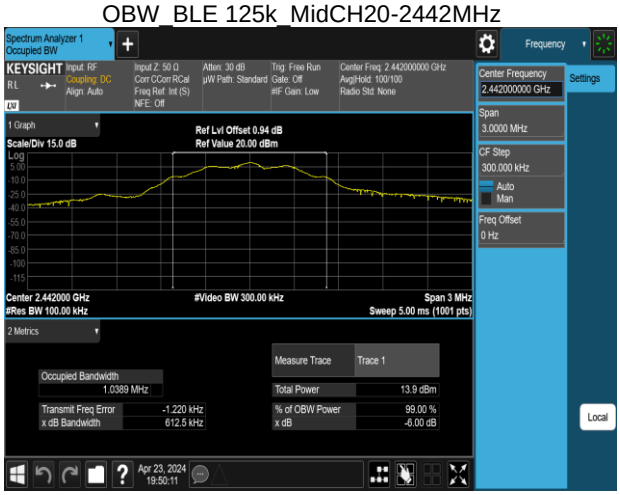
OBW_BLE 125k_LowCH00-2402MHz



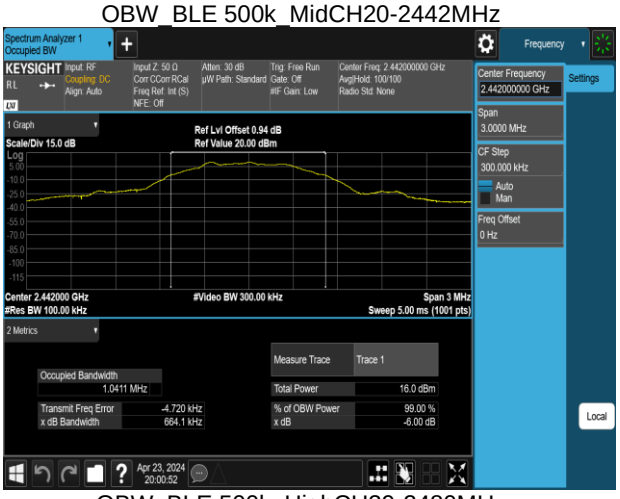
OBW_BLE 500k_LowCH00-2402MHz



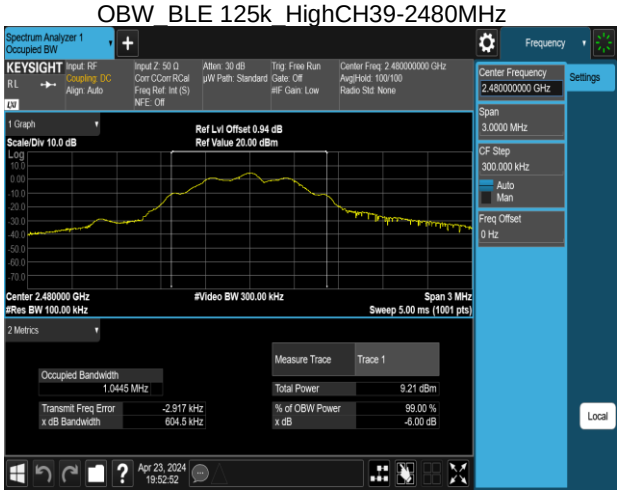
OBW_BLE 125k_MidCH20-2442MHz



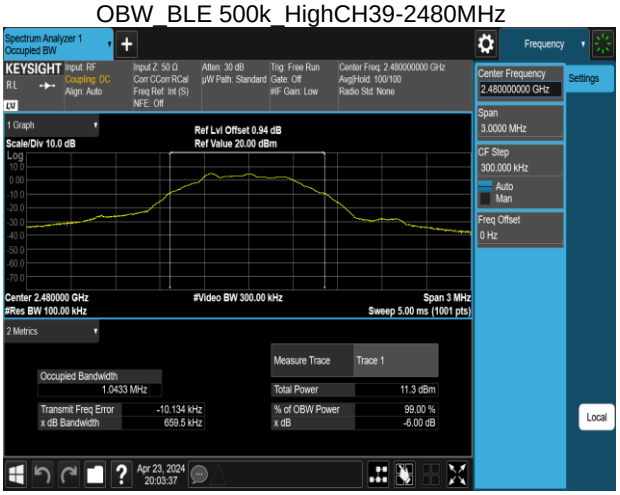
OBW_BLE 500k_MidCH20-2442MHz



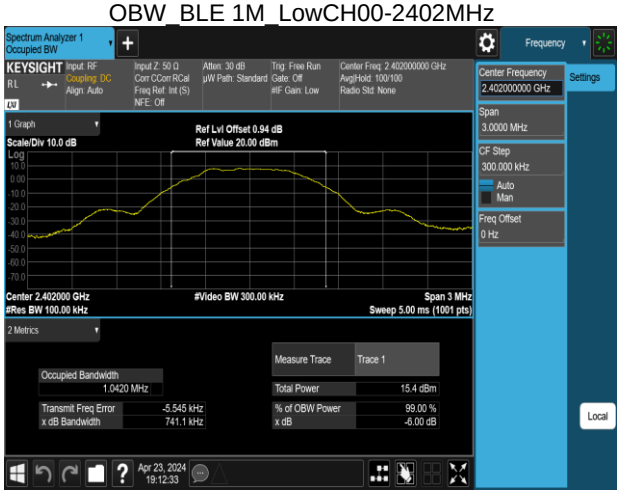
OBW_BLE 125k_HighCH39-2480MHz



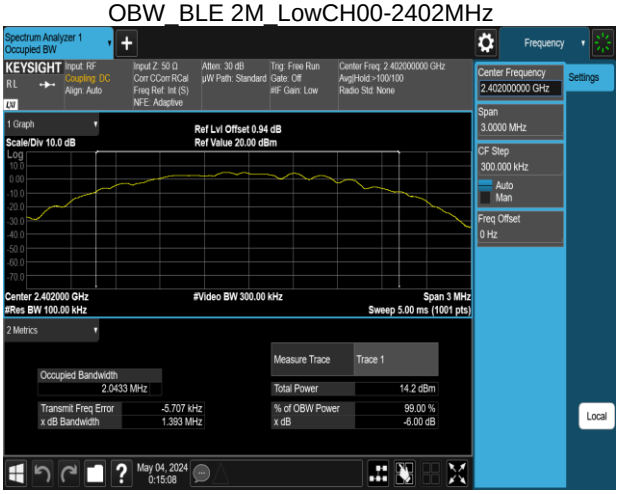
OBW_BLE 500k_HighCH39-2480MHz



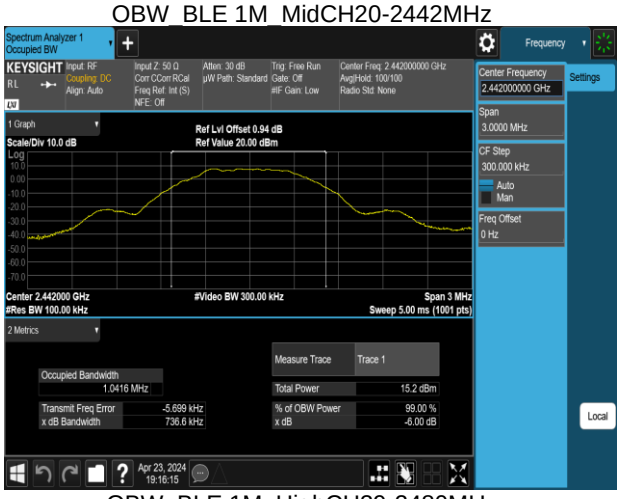
OBW_BLE 1M_LowCH00-2402MHz



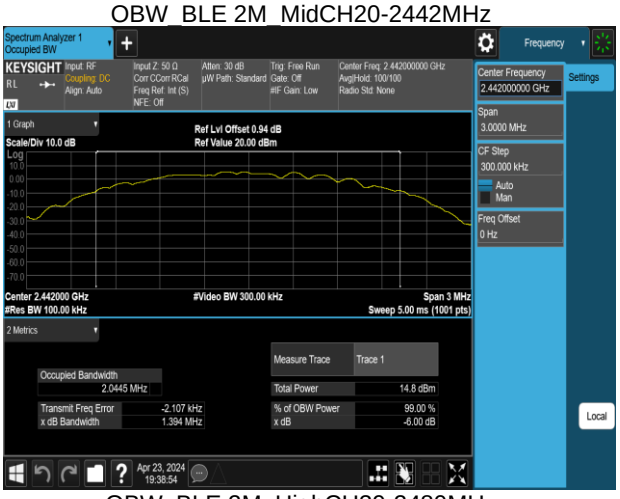
OBW_BLE 2M_LowCH00-2402MHz



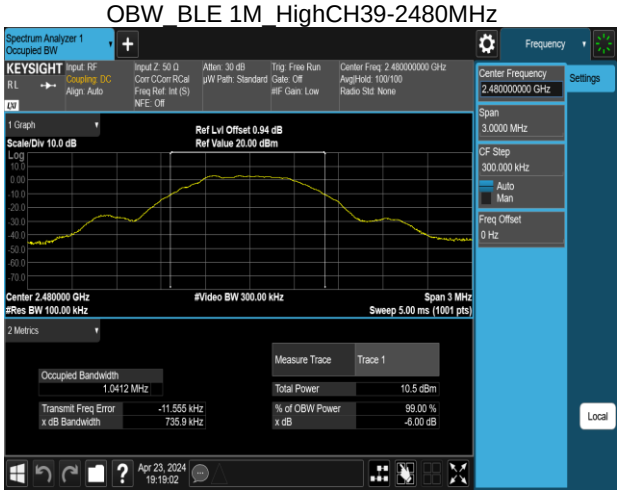
OBW_BLE 1M_MidCH20-2442MHz



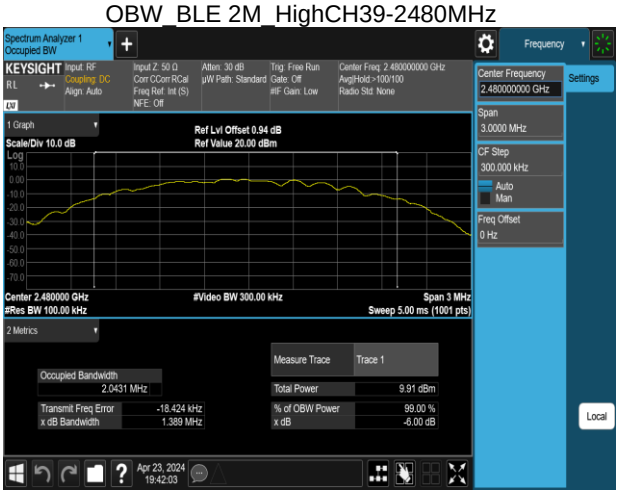
OBW_BLE 2M_MidCH20-2442MHz



OBW_BLE 1M_HighCH39-2480MHz



OBW_BLE 2M_HighCH39-2480MHz



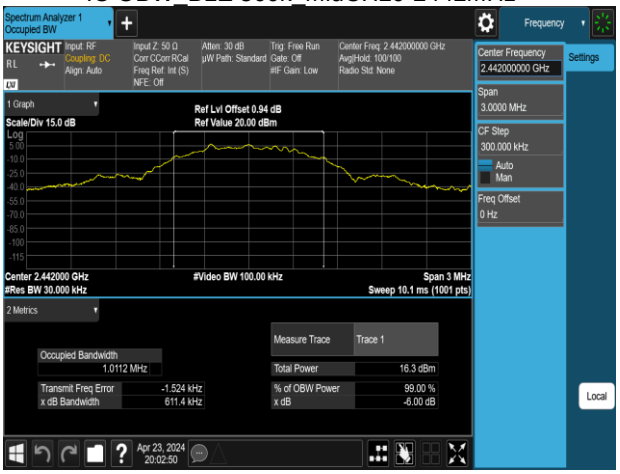
BANDWIDTH 99%

IC OBW_BLE 125k_LowCH00-2402MHz

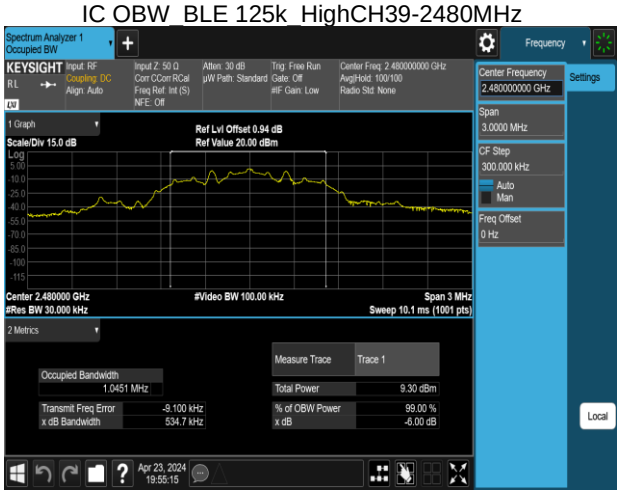
IC OBW_BLE 500k_LowCH00-2402MHz

IC OBW_BLE 125k_MidCH20-2442MHz

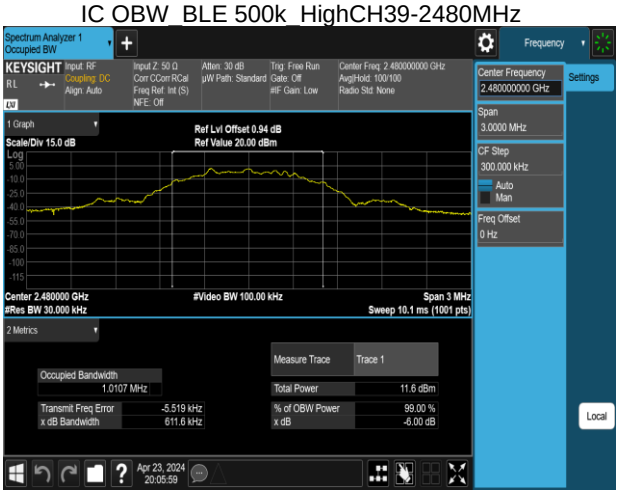
IC OBW_BLE 500k_MidCH20-2442MHz



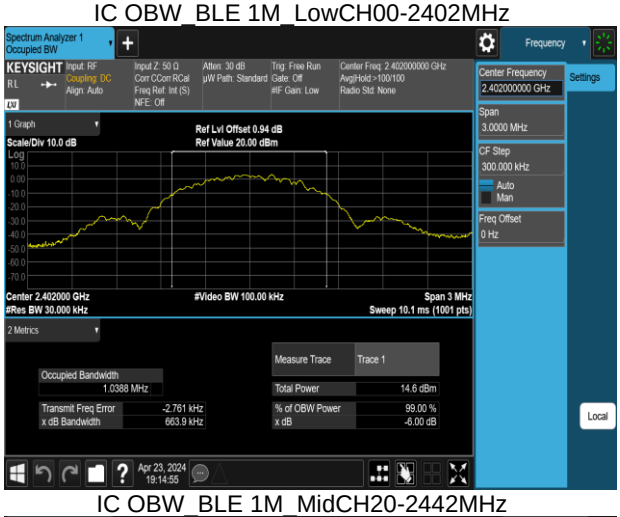
IC OBW_BLE 125k_HighCH39-2480MHz



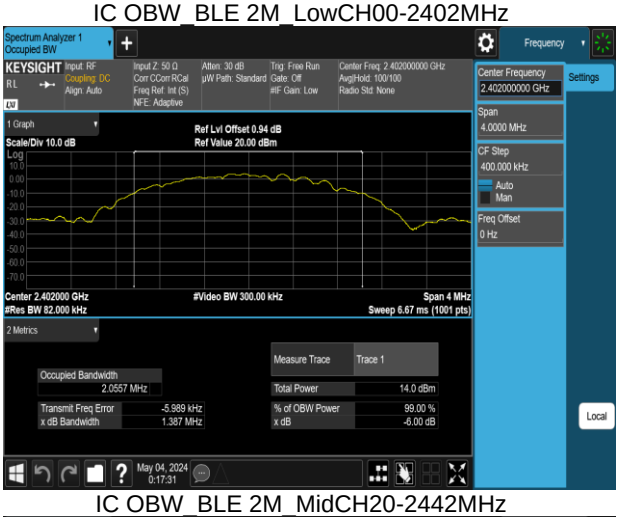
IC OBW_BLE 500k_HighCH39-2480MHz



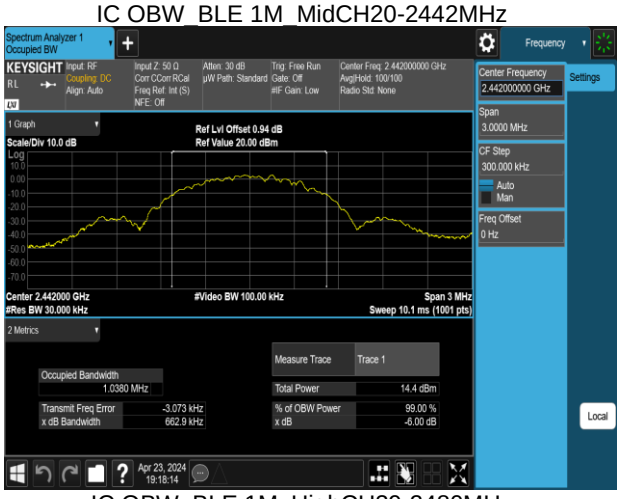
IC OBW_BLE 1M_LowCH00-2402MHz



IC OBW_BLE 2M_LowCH00-2402MHz

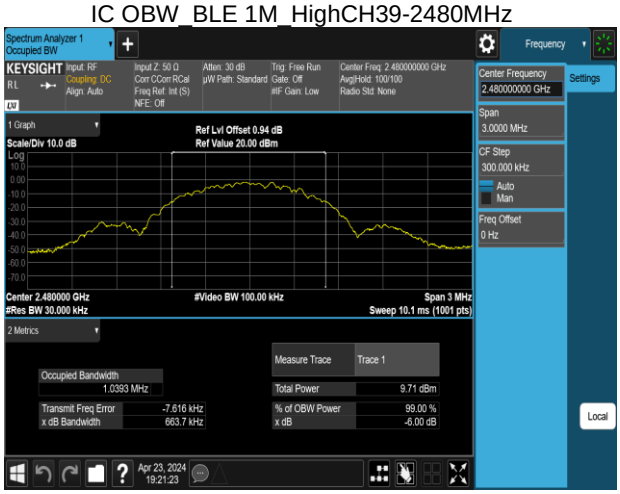


IC OBW_BLE 1M_MidCH20-2442MHz

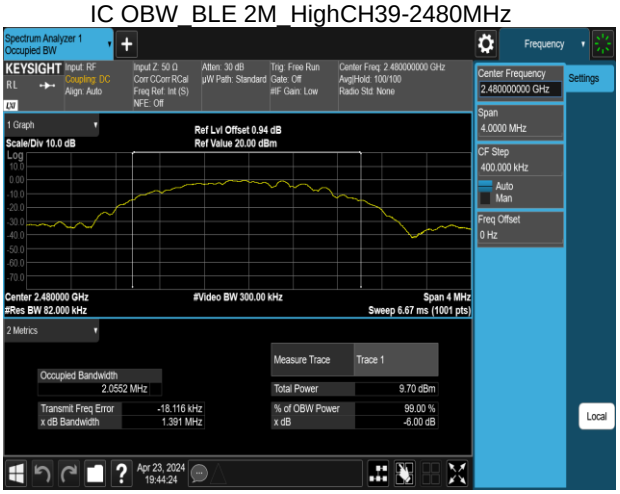


IC OBW_BLE 2M_MidCH20-2442MHz

IC OBW_BLE 1M_HighCH39-2480MHz



IC OBW_BLE 2M_HighCH39-2480MHz



4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(b)(3),

Peak output power：

FCC

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

Average output power：For reporting purposes only.

4.3.2 Test Procedure

Test method Refer as KDB 558074 D01

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

4.3.3 Test Setup

Refer to section 1.8.

4.3.4 Test Result

Temperature:	21.1 ~ 23.6℃	**Test date:**	April 23 ~ May 4, 2024
Humidity:	54 ~ 66% RH	**Tested by:**	Marco Chan

Peak & Average output power：

BLE 125k mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
37	2402	31	**9.60**	30
18	2442	31	9.38	30
35	2476	31	9.53	30
36	2478	28	7.52	30
39	2480	24	5.07	30
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
37	2402	31	9.51	30
18	2442	31	9.36	30
35	2476	31	9.52	30
36	2478	28	7.36	30
39	2480	24	4.88	30

Note:

1.Measured by power meter, cable loss 0.94 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

BLE 500k mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
37	2402	31	**9.60**	30
18	2442	31	9.38	30
35	2476	31	9.54	30
36	2478	28	7.57	30
39	2480	24	5.04	30
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
37	2402	31	9.59	30
18	2442	31	9.36	30
35	2476	31	9.49	30
36	2478	28	7.54	30
39	2480	24	5.03	30

Note:

1.Measured by power meter, cable loss 0.94 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

BLE 1M mode:

CH	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Required Limit (dBm)
37	2402	31	**9.60**	30
18	2442	31	9.38	30
35	2476	31	9.53	30
36	2478	28	7.52	30
39	2480	24	5.04	30
CH	**Frequency (MHz)**	**Power Setting**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
37	2402	31	9.49	30
18	2442	31	9.26	30
35	2476	31	9.41	30
36	2478	28	7.19	30
39	2480	24	4.72	30

Note:

1.Measured by power meter, cable loss 0.94 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

BLE 2M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
37	2402	30	9.28	30
18	2442	31	9.37	30
35	2476	31	**9.52**	30
36	2478	30	8.81	30
39	2480	24	5.02	30
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
37	2402	30	8.99	30
18	2442	31	9.16	30
35	2476	31	9.28	30
36	2478	30	8.44	30
39	2480	24	4.45	30

Note:

1.Measured by power meter, cable loss 0.94 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Limit	☒ Antenna not exceed 6 dBi：8dBm ☐ Antenna with DG greater than 6 dBi [Limit = 8 – (DG – 6)] ☐ Point-to-point operation：

4.4.2 Test Procedure

Test method Refer as KDB 558074 D01

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 10kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
4. The path loss was compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup

Refer to section 1.8.

4.4.4 Test Result

Temperature:	21.1 ~ 23.6℃	**Test date:**	April 23 ~ May 4, 2024
Humidity:	54 ~ 66% RH	**Tested by:**	Marco Chan

BLE 125k mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	3.50	8	PASS
2442	3.22	8	PASS
2480	-1.32	8	PASS

Note:

1.cable loss as 0.94dB that offsets in the spectrum

BLE 500k mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	3.32	8	PASS
2442	3.06	8	PASS
2480	-1.49	8	PASS

Note:

1.cable loss as 0.94dB that offsets in the spectrum

BLE 1M mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-8.37	8	PASS
2442	-8.62	8	PASS
2480	-13.31	8	PASS

Note:

1.cable loss as 0.94dB that offsets in the spectrum

BLE 2M mode

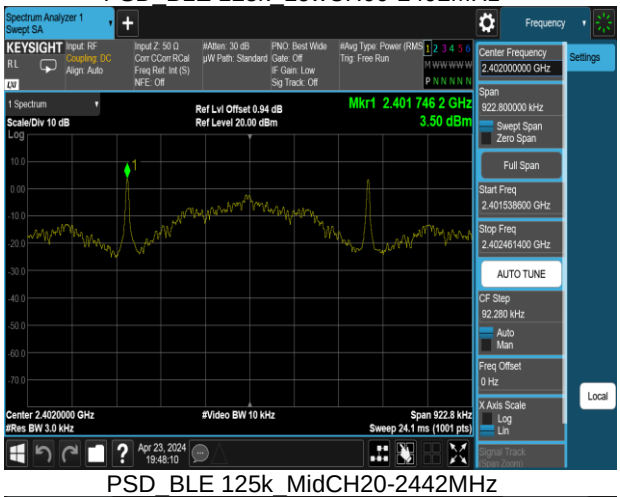
Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2402	-9.30	8	PASS
2442	-8.78	8	PASS
2480	-13.58	8	PASS

Note:

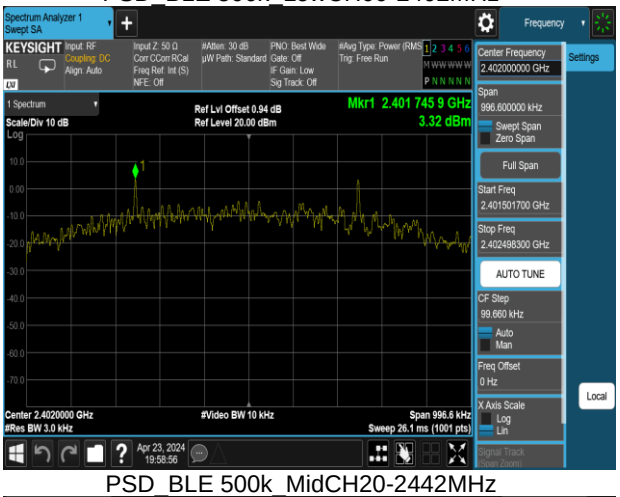
1.cable loss as 0.94dB that offsets in the spectrum

Test Data

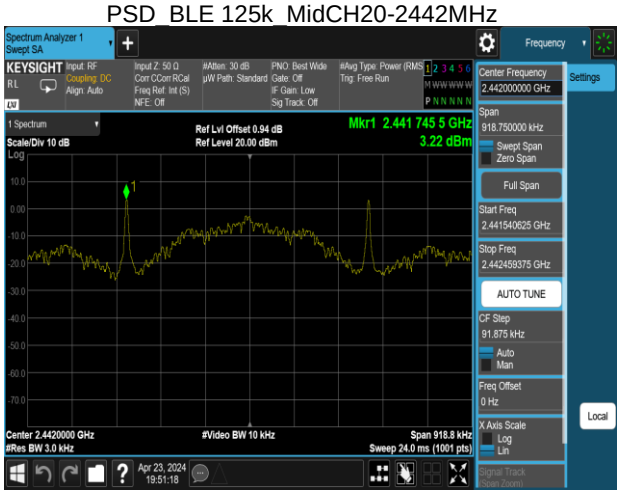
PSD_BLE 125k_LowCH00-2402MHz



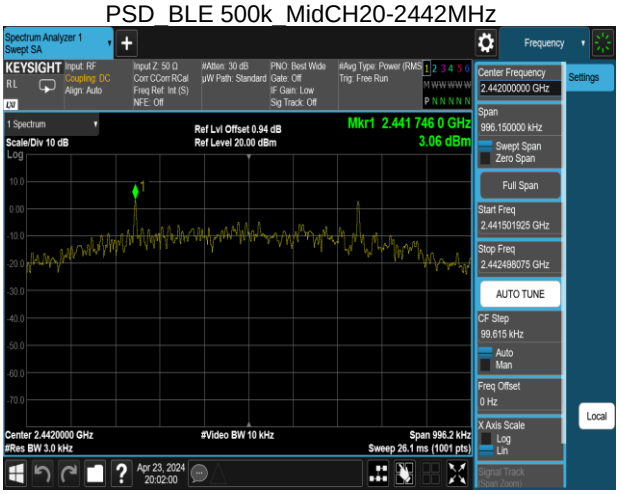
PSD_BLE 500k_LowCH00-2402MHz



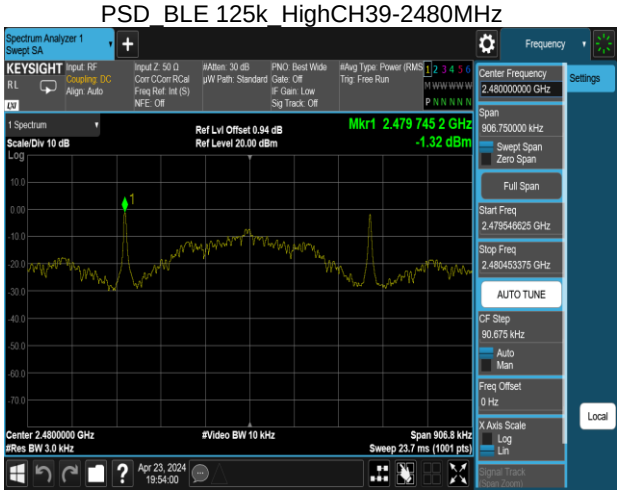
PSD_BLE 125k_MidCH20-2442MHz



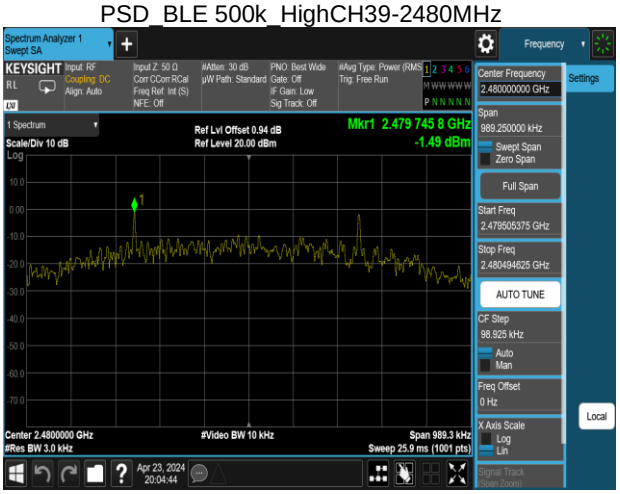
PSD_BLE 500k_MidCH20-2442MHz



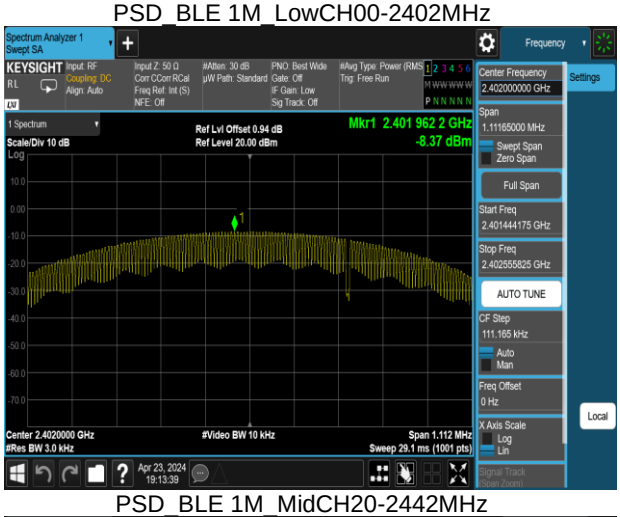
PSD_BLE 125k_HighCH39-2480MHz



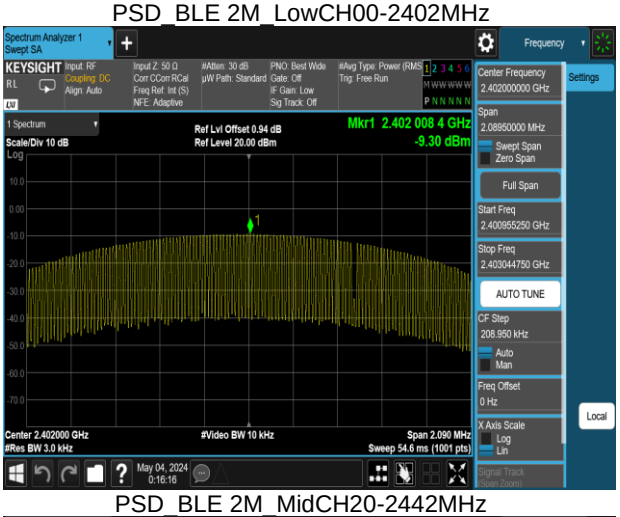
PSD_BLE 500k_HighCH39-2480MHz



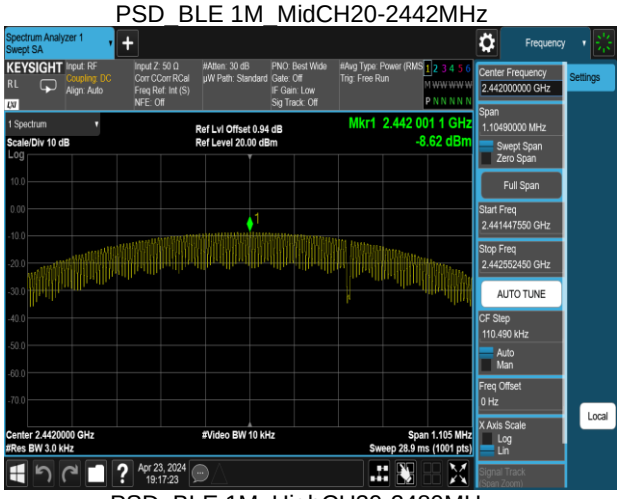
PSD_BLE 1M_LowCH00-2402MHz



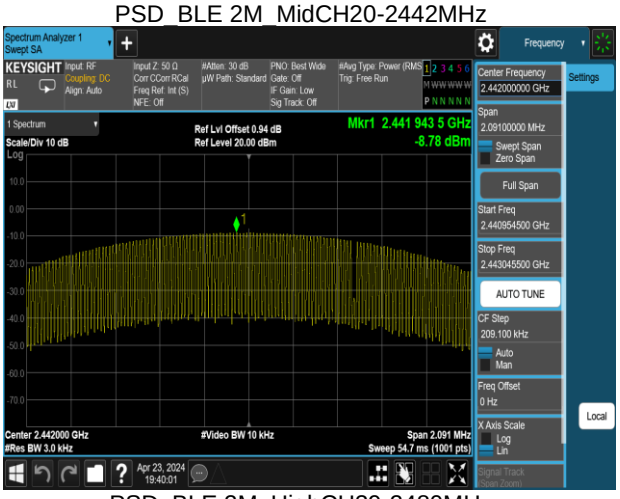
PSD_BLE 2M_LowCH00-2402MHz



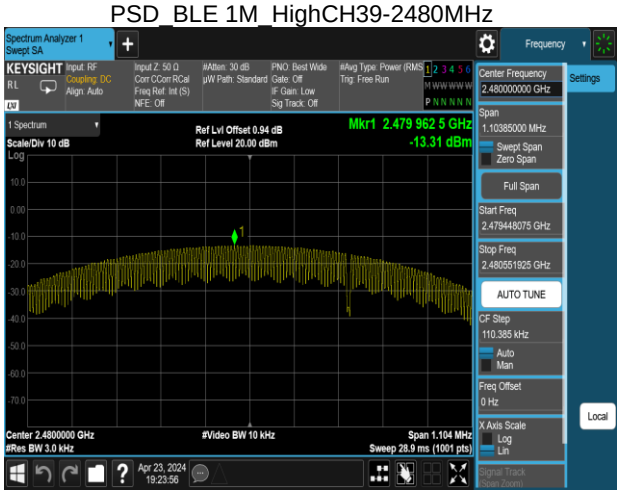
PSD_BLE 1M_MidCH20-2442MHz



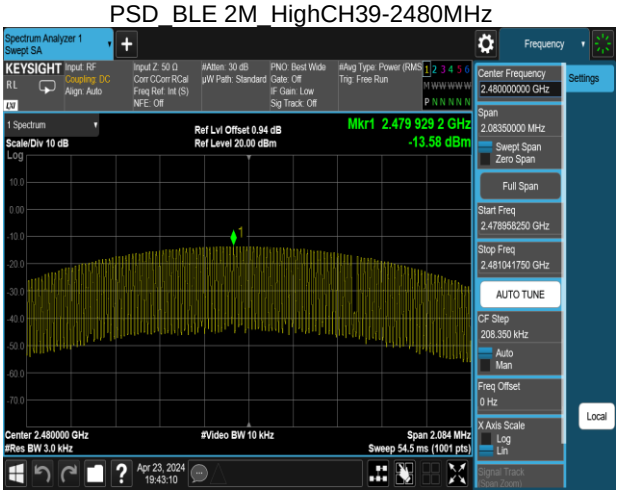
PSD_BLE 2M_MidCH20-2442MHz



PSD_BLE 1M_HighCH39-2480MHz



PSD_BLE 2M_HighCH39-2480MHz



4.5 CONDUCTED BAND EDGE AND SPURIOUS EMISSION

4.5.1 Test Limit

According to §15.247(d),

FCC: In any 100 kHz bandwidth outside the authorized frequency band,

Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

4.5.2 Test Procedure

Test method Refer as KDB 558074 D01

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.

2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.

3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

4.5.3 Test Setup

Refer to section 1.8.

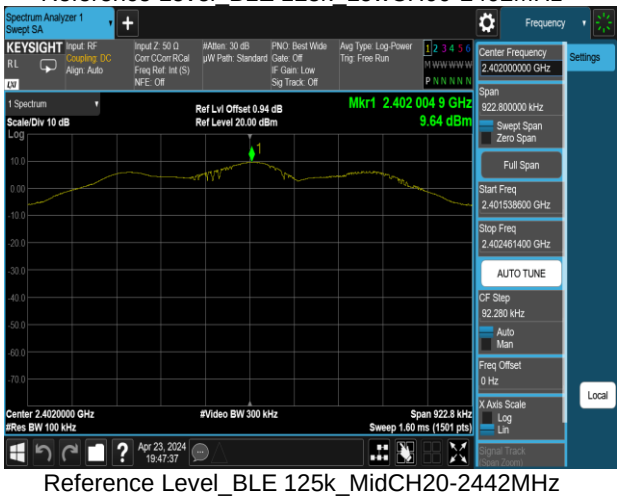
4.5.4 Test Result

Temperature:	21.1 ~ 23.6℃	**Test date:**	April 23 ~ May 4, 2024
Humidity:	54 ~ 66% RH	**Tested by:**	Marco Chan

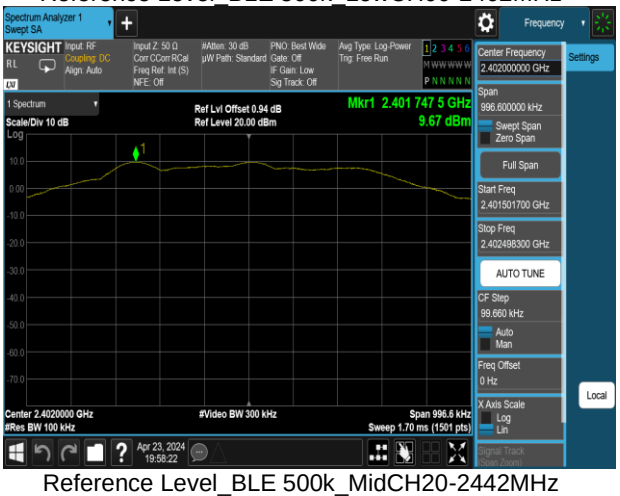
Test Data

Reference Level

Reference Level_BLE 125k_LowCH00-2402MHz

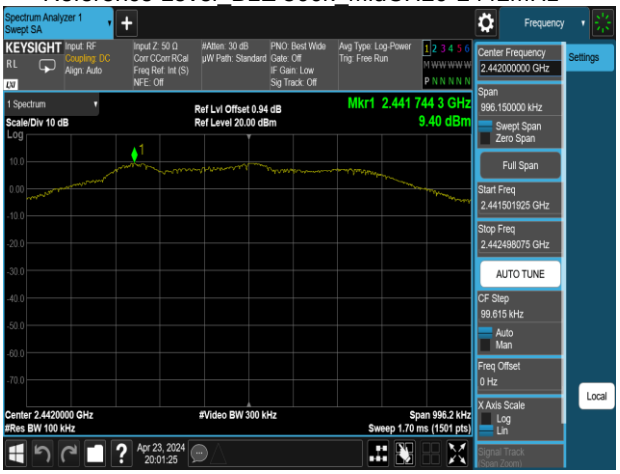


Reference Level_BLE 500k_LowCH00-2402MHz

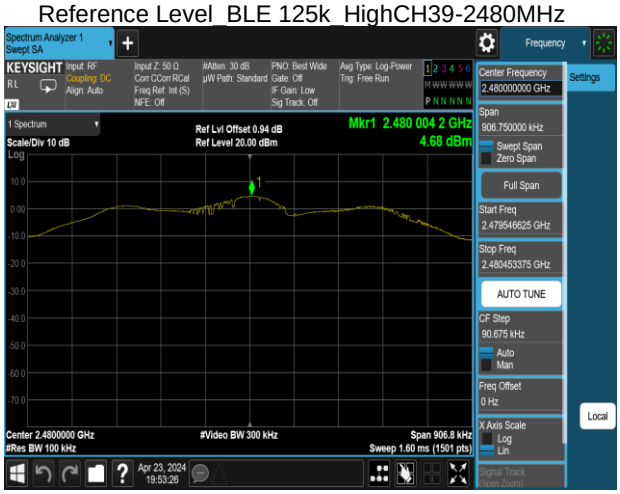


Reference Level_BLE 125k_MidCH20-2442MHz

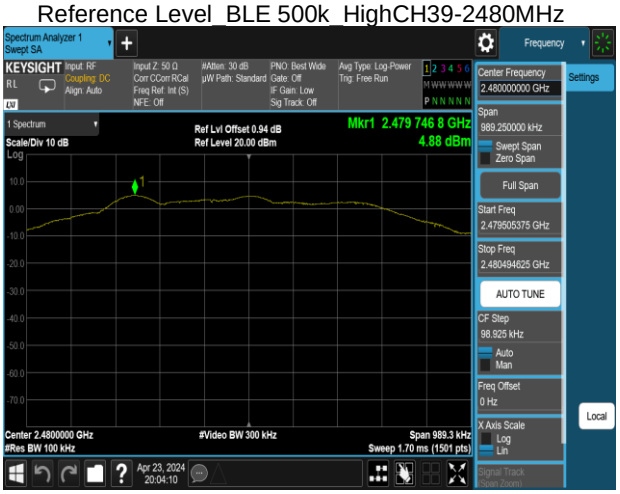
Reference Level_BLE 500k_MidCH20-2442MHz



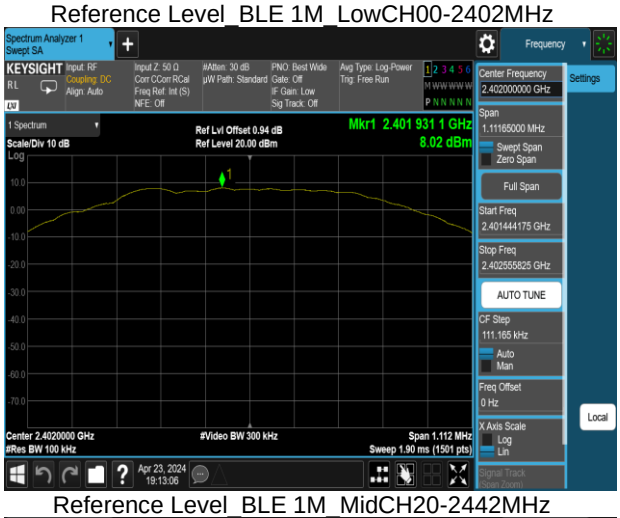
Reference Level_BLE 125k_HighCH39-2480MHz



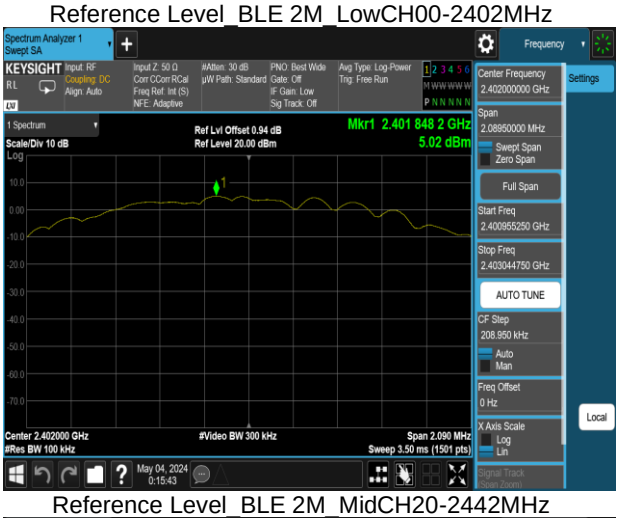
Reference Level_BLE 500k_HighCH39-2480MHz



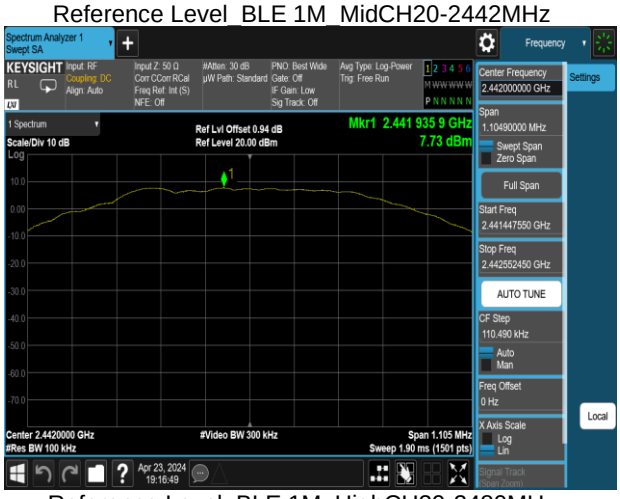
Reference Level_BLE 1M_LowCH00-2402MHz



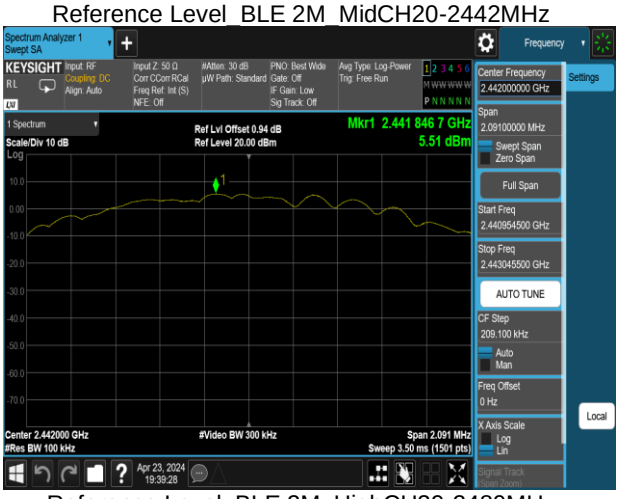
Reference Level_BLE 2M_LowCH00-2402MHz



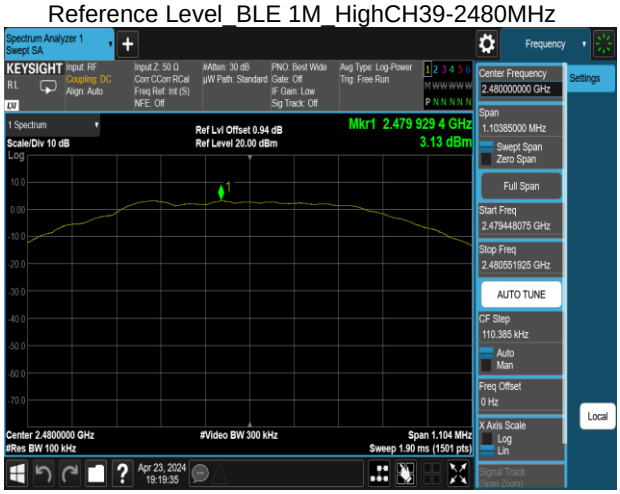
Reference Level_BLE 1M_MidCH20-2442MHz



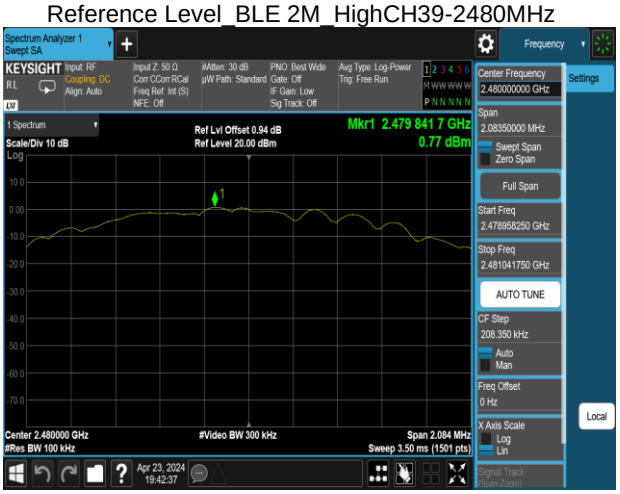
Reference Level_BLE 2M_MidCH20-2442MHz



Reference Level_BLE 1M_HighCH39-2480MHz



Reference Level_BLE 2M_HighCH39-2480MHz



Band Edge

Band Edge_BLE 125k_LowCH00-2402MHz

Band Edge_BLE 500k_LowCH00-2402MHz

Band Edge_BLE 125k_HighCH39-2480MHz

Band Edge_BLE 500k_HighCH39-2480MHz