

# MEASUREMENT REPORT

(FCC : Part 15 Subpart C (15.247) / ANSI C63.4-2014 /C63.10-2013)  
Classification : (DSS) Spread Spectrum Transmitter

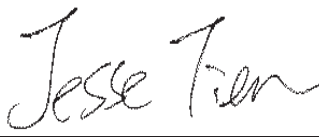
ilac-MRA

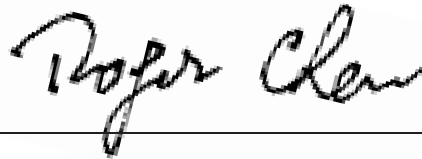


Testing Laboratory  
1288

Product.....: Dimensioner  
Trade Name.....: CIPHERLAB  
Model No.....: 2565  
Applicant.....: CIPHERLAB Co., Ltd.  
Applicant Address : 12F., No. 333,Sec. 2,Dunhua S. Rd.,  
Taipei City 106033, Taiwan

Report Number	MLT2406P15001A1-BT
Applicant	CIPHERLAB Co., Ltd.
Product	Dimensioner
Sample Received Date	2024/06/24
Sample Tested Date	2024/08/09

Report Prepared By	Jesse Tien
Signature	
Date Prepared	2024/08/22

Report Authorized By	Roger Chen
Signature	
Date Authorized	2024/08/22

Test By

Max Light Technology Co., Ltd.  
No.74-4, Shibachong Xi, Shiding Dist., New Taipei City 223,  
Taiwan R.O.C.

Office : Tel: 886-2-2363-2447 Fax: 886-2-2363-2597

Lab. : Tel: 886-2-2663-3486 Fax: 886-2-2663-3582

It may be duplicated completely for legal use with the allowance of the applicant.

It shall not be reproduced except in full, without the written approval of our  
laboratory.

This test report not include the evaluation of MU.  
The test results only relate to the submitted test sample.

## **Table of Contents :**

HISTORY OF TEST REPORT.....	4
1. GENERAL.....	5
2. CONDUCTED EMISSIONS REQUIREMENTS .....	10
3. RADIATED EMISSIONS REQUIREMENTS (BELOW 1GHZ).....	13
4. MINIMUM 20DB RF BANDWIDTH REQUIREMENTS .....	16
5. HOPPING FREQUENCY SEPARATION REQUIREMENTS .....	22
6. NUMBER OF HOPPING CHANNELS REQUIREMENTS .....	28
7. DWELL TIME OF EACH CHANNEL REQUIREMENTS.....	32
8. OUT OF BAND CONDUCTED SPURIOUS EMISSIONS REQUIREMENTS .....	37
9. MAXIMUM CONDUCTED OUTPUT POWER REQUIREMENTS .....	44
10. BAND EDGE REQUIREMENTS.....	50
11. RADIATED EMISSIONS REQUIREMENTS (ABOVE 1GHZ).....	55
12. ANTENNA REQUIREMENTS.....	76
APPENDIX I - EUT TEST SETUP .....	77
APPENDIX II - BRAND / TRADE NAME & MODEL NO. MULTIPLE LISTEE .....	80

## History of Test Report

Original Report Issue Date: 2024/08/15

☒ No additional attachment

☐ Additional attachments were issued as in the following record:

Attachment No.	Issue Date	Description
MLT2406P15001-BT	2024/08/15	Original Report
MLT2406P15001A1-BT	2024/08/22	<p>Change of Applicant (Details below): This is a case of forwarding report, and the test report will be forwarded by Champtek Incorporated to CIPHERLAB Co., Ltd. and the test data will be used in the original report MLT2406P15001-BT except for the differences described below.</p> <p>(1) Applicant: Champtek Incorporated changed to CIPHERLAB Co., Ltd.</p> <p>(2) Applicant's address: From 1F, No. 4, Alley 2, Shih-Wei Lane, Chung-Cheng Rd., Xindian Dist., New Taipei City 231, Taiwan changed to 12F., No. 333, Sec. 2, Dunhua S. Rd., Taipei City 106033, Taiwan</p> <p>(3) Model: VM200 changed to 2565</p> <p>(4) Product name: Handheld Volume Measurement Reader changed to Dimensioner</p> <p>(5) Trademark: Changed from Champtek and SCANTECH ID to CIPHERLAB</p>

## 1. General

### 1.1 Introduction:

The following measurement report is submitted on behalf of Champtek Incorporated In support of a Class B Digital Device certification in accordance with Part2 Subpart J and Part 15 Subpart C of the Commission's and Regulations.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Parameter	MU
Radio Frequency	12.3Hz
Total RF power (conducted)	3.65 dB
RF power density (conducted)	3.65 dB
Spurious emissions (conducted)	3.65 dB
All emissions (radiated)	3.95 dB

### 1.2 Customer Details:

<b>Applicant Name</b>	CIPHERLAB Co., Ltd.
<b>Applicant Address</b>	12F., No. 333,Sec. 2,Dunhua S. Rd., Taipei City 106033, Taiwan
<b>Manufacturer Name</b>	Champtek Incorporated
<b>Manufacturer Address</b>	1F, No. 4, Alley 2, Shih-Wei Lane, Chung-Cheng Rd., Xindian Dist., New Taipei City 231,Taiwan

### 1.3 Technical data of EUT:

Equipment	Dimensioner
<b>Model No</b>	2565
<b>Series Model Number</b>	N/A
<b>Model Difference</b>	N/A
<b>FCC ID</b>	Q3N-2565
<b>Power Type</b>	3.6 Vdc (From Li-ion Battery)
<b>Type of Modulation</b>	GFSK , $\pi/4$ -DQPSK , 8DPSK
<b>Transfer rate</b>	1 Mbps , 2 Mbps , 3 Mbps
<b>Type of Antenna</b>	CHIP Antenna
<b>Max Antenna Gain</b>	1.3 dBi
<b>Frequency of Channel</b>	See Next page 7

During testing the EUT was operated at Tx or Rx mode for each emission measured. This was done in order to ensure that maximum emission levels were attained.

### Frequency of Each Channel (Working Frequency)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

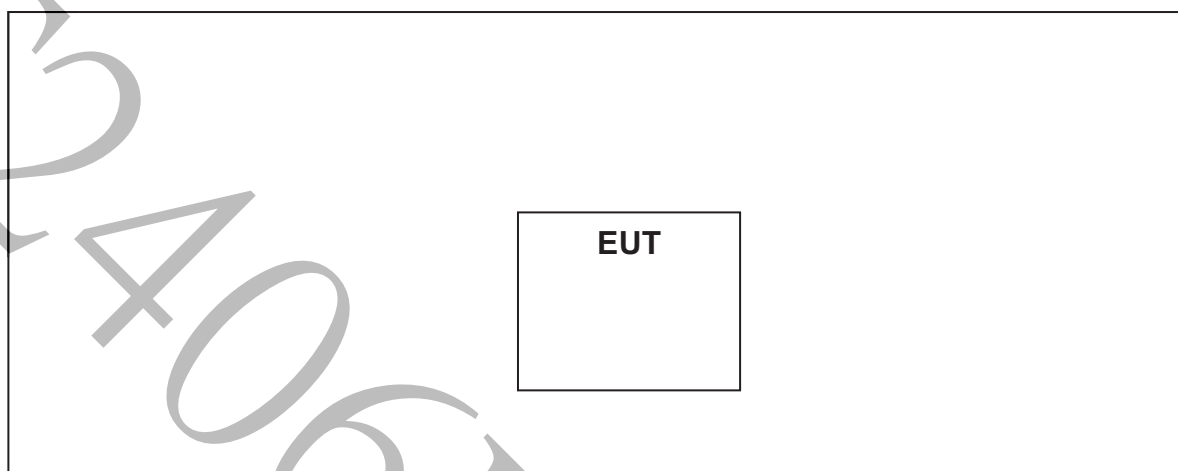
### 1.4 Summary Of Tests

47 CFR Part 15 Subpart C			
Reference	Test	Results	Note
15.207	Conducted Emission	N/A	
15.209	Radiated Emission	PASS	
15.247(a)(1)(i)-(ii)	20dB Bandwidth	PASS	
15.247(a)(1)	Hopping Frequency Separation	PASS	
15.247(a)(1)(iii)	Number of Hopping Channel	PASS	
15.247(a)(1)(iii)	Dwell Time of Each Channel	PASS	
15.247(b)	Max. Output Power	PASS	
15.247(d)	Band Edge Measurement	PASS	
15.247(c)	Out of Band Conducted Spurious Emission	PASS	
15.203	Antenna Requirement	PASS	

## 1.5 Description of Support Equipment

In order to construct the minimum system which required by the ANSI C63.4-2014 / C63.10-2013, following equipments were used as the support units.

## 1.6 Configuration of System Under Test:



Operate



## **1.7 Test Procedure:**

All measurements contained in this report were performed according to the techniques described in Measurement procedure ANSI C63.4-2014 followed FCC DA 00-75 or ANSI C63.10-2013 for this testing.

## **1.8 General Test Condition:**

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions which the EUT was considered likely to encounter in normal use were investigated. The system's radiated and conducted emissions were investigated while the computer alternately transferred data to the EUT as well as to the monitor and printer. Using a test program which sent a continuous data and transferred data to and from the EUT was proven to worst case emissions. The system's physical layout and cabling was randomly arranged to ensure that maximum emission levels were attained.

This assessment of the maximum conducted output power tests is base on the minimum transfer rate will produce a maximum output power.

Note: Since the transmitter is considered a portable unit, it was pre-tested on the positioned in each of 3 axis. It was found that the Z Axis was the worst. It was the worst. It was taken as the representative condition for testing and its data are recorded in the present document.

## 2. Conducted Emissions Requirements

### 2.1 General & Setup:

The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3825/2 Line Impedance Stabilization Networks (LISN). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPER quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.5.

This test method according to the techniques described in Measurement procedure ANSI C63.10-2013 (6.2) for this testing.

### 2.2 Test Equipment List:

Item	Mfr/Brand	Instruments	Serial No.	Model/Type No.	Calibrated Date	Next Cal. Date
1.	R&S	EMI Receiver	100085	ESPI	2024/03/12	2025/03/12
2.	EMCO	LISN	2654	3825/2	2023/12/14	2024/12/14

## 2.3 Test Condition:

EUT tested in accordance with the specifications given by the manufacturer, and exercised in the most unfavorable manner.

## 2.4 Conducted Emissions Limits:

### FCC Part 15

Frequency range (MHz)	Limits (dBuV)			
	Class A		Class B	
	QP	Avg.	QP	Avg.
0.15 to 0.50	79	66	66 to 56	56 to 46
0.50 to 5.0	73	60	56	46
5.0 to 30	73	60	60	50

## 2.5 Measurement Data Of Conducted Emissions:

### 2.5.1 Conducted Emissions

The following table shows a summary of the highest emissions of power line conducted emissions to the HOT and NEUTRAL conductor of the EUT power.

Test Mode : Charge

Conducted Emissions (Class B)										
Test Port	Freq (MHz)	Read(dBuV)		Factor	Limits (dBuV)		Amplitude (dBuV)		Margin (dBuV)	
		QP	AV		QP	AV	QP	AV	QP	AV
L1	0.1898	55.12	45.35	0.06	64.05	54.05	55.18	45.41	-8.87	-8.64
	0.2495	50.60	37.45	0.05	61.77	51.77	50.65	37.50	-11.12	-14.27
	0.3092	45.34	33.02	0.04	59.99	49.99	45.38	33.06	-14.61	-16.93
	0.3689	44.30	31.60	0.03	58.53	48.53	44.33	31.63	-14.20	-16.90
	0.4286	39.48	26.54	0.03	57.28	47.28	39.51	26.57	-17.77	-20.71
	0.4983	41.25	29.95	0.03	56.03	46.03	41.28	29.98	-14.75	-16.05
	0.6177	39.54	28.26	0.03	56.00	46.00	39.57	28.29	-16.43	-17.71
L2	0.1898	51.80	--	0.07	64.05	54.05	51.87	--	-12.18	--
	0.2495	50.77	--	0.05	61.77	51.77	50.82	--	-10.95	--
	0.3192	45.99	--	0.05	59.73	49.73	46.04	--	-13.69	--
	0.3689	47.96	--	0.04	58.53	48.53	48.00	--	-10.53	--
	0.4983	46.23	27.89	0.04	56.03	46.03	46.27	27.93	-9.76	-18.10
	0.5978	46.30	27.89	0.04	56.00	46.00	46.34	27.93	-9.66	-18.07
	0.7868	44.38	--	0.03	56.00	46.00	44.41	--	-11.59	--

- Notes :
1. L1: One end & Ground L2: The other end & Ground
  2. Height of table on which the EUT was placed : 0.8 m.
  3. The Quasi-Peak Value have already met the Average Value Limit showed on above limits.
  4. The above test results are obtained under the normal condition.
  5. Amplitude = Read + Factor

### 3. Radiated Emissions Requirements (Below 1GHz)

#### 3.1 General & Setup:

Prior to open-field testing, the EUT was placed in a shielded enclosure and scanned at a close distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration which produced the highest emissions was noted so it could be reproduced later during the open-field tests. This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT. The radiated emissions test is made at a 10 meters open site from 30MHz to 1GHz. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard E7403A Spectrum Analyzer, EMCO Biconilog Antenna (Model 3142C ) for 30MHz -1GHz. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization. Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post-detector video filters were used in the test. The spectrum analyzer's 6 dB bandwidth was set to 120 KHz, and the analyzer was operated in the quasi-peak detection mode. The highest emission amplitudes relative to the appropriate limit were measured and recorded in paragraph 3.5.

This test method according to the techniques described in Measurement procedure ANSI C63.10-2013 (6.5) for this testing.

#### 3.2 Test Equipment List:

Item	Mfr/Brand	Instruments	Serial No.	Model/Type No.	Calibrated Date	Next Cal. Date
1.	Agilent	Spectrum Analyzer	US40240137	E7403A	2024/01/12	2025/01/12
2.	Agilent	Spectrum Analyzer	MY46471764	N0920A	2023/12/22	2024/12/22
3.	EMCO	Biconilog Antenna	00044568	3142C	2023/09/21	2024/09/21
4.	MLT	Pre Amplifier	20110301	PREAMP6G-02	2024/03/12	2025/03/12
5.	MLT	Pre Amplifier	20110209	PREAMP6G-01	2024/03/12	2025/03/12
6.	MLT	Pre Amplifier	RF-01	0.10~19.1GHz 60dBm	2024/03/12	2025/03/12

### 3.3 Test Condition:

EUT tested in accordance with the specifications given by the manufacturer, and exercised in the most unfavorable manner.

### 3.4 Radiated Emissions Limits:

#### CISPR 22

Frequency range (MHz)	Limits (dBuV)			
	Class A		Class B	
	Distance (Meter)	Limits (dBuV/m)	Distance (Meter)	Limits (dBuV/m)
30 to 230	10	40	10	30
230 to 1000	10	47	10	37

#### FCC Part 15

Frequency range (MHz)	Limits (dBuV)			
	Class A		Class B	
	Distance (Meter)	Limits (dBuV/m)	Distance (Meter)	Limits (dBuV/m)
30 to 88	10	39	3	40
88 to 216	10	43.5	3	43.5
216 to 960	10	46.5	3	46
960 to 1000	10	49.5	3	54

### 3.5 Measurement Data Of Radiated Emissions:

#### 3.5.1 Open Field Radiated Emissions

The highest peak values of radiated emissions from the EUT at various antenna heights, antenna polarization, EUT orientation, etc. are recorded on the following

Test Mode : Worst case(Z Axis)2480MHz 3M Rate Mode

Radiated Emissions (VERTICAL)Class B							
Frequency (MHz)	Read (dBuV/m)	Factor	Ant. (cm)	Table (Degree)	Amplitude (dBuV/m)	Limits (dBuV/m)	Margin (dB)
81.20	37.99	-24.29	100	309	13.70	40	-26.30
240.30	46.99	-17.94	100	159	29.05	46	-16.95
249.48	39.84	-17.52	100	151	22.32	46	-23.68
359.06	38.48	-12.96	100	360	25.52	46	-20.48
384.00	47.67	-12.50	100	326	35.17	46	-10.83
400.19	40.17	-12.23	100	168	27.94	46	-18.06

Radiated Emissions (HORIZONTAL)Class B							
Frequency (MHz)	Read (dBuV/m)	Factor	Ant. (cm)	Table (Degree)	Amplitude (dBuV/m)	Limits (dBuV/m)	Margin (dB)
30.01	34.10	-11.80	100	360	22.30	40	-17.70
81.20	34.24	-24.29	100	39	9.95	40	-30.05
239.02	50.54	-17.98	100	329	32.56	46	-13.44
359.92	46.79	-12.91	100	223	33.88	46	-12.12
399.99	38.61	-12.23	100	0	26.38	46	-19.62
879.83	33.25	0.74	100	144	33.99	46	-12.01

- Notes :**
- 1.Margin= Amplitude - Limits
  - 2.Distance of Measurement : 3 Meter
  - 3.Height of table for EUT placed: 0.8 Meter.
  - 4.Amplitude= Reading Amplitude –Amplifier gain+ Cable loss + Antenna factor
  - 5.Pre amplifier Gain :38dB to 42dB

## 4. Minimum 20dB RF Bandwidth Requirements

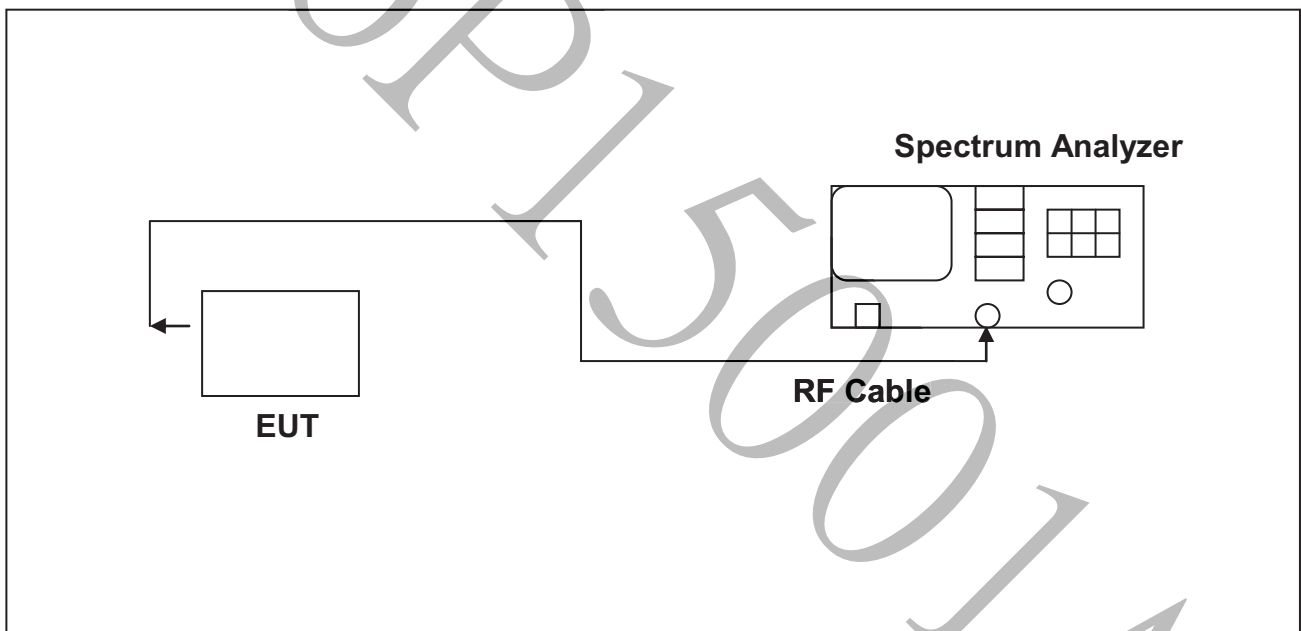
### 4.1 Test Condition & Setup:

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW set to 30 kHz .VBW set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel or the maximum 20 dB bandwidth of the hopping channel is 1 MHz. A peak output reading was taken, a display line was drawn 20 dB lower than peak level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.

This test method according to the techniques described in Measurement procedure ANSI C63.10-2013 (7.8.7) for this testing.

The test was performed at 3 channels (Channel 0, 39, 78)

### 4.2 Test Instruments Configuration:





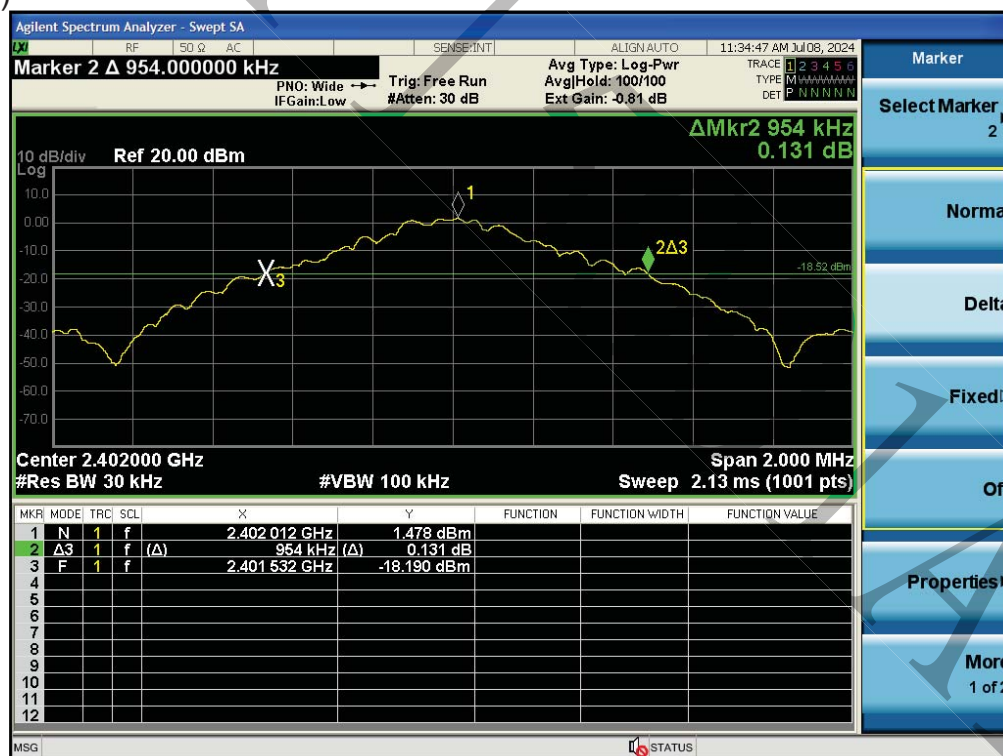
### 4.3 Test Equipment List:

Item	Mfr/Brand	Instruments	Serial No.	Model/Type No.	Calibrated Date	Next Cal. Date
1.	Agilent	Spectrum Analyzer	MY46471764	N9020A	2023/12/22	2024/12/22

### 4.4 Test Result:

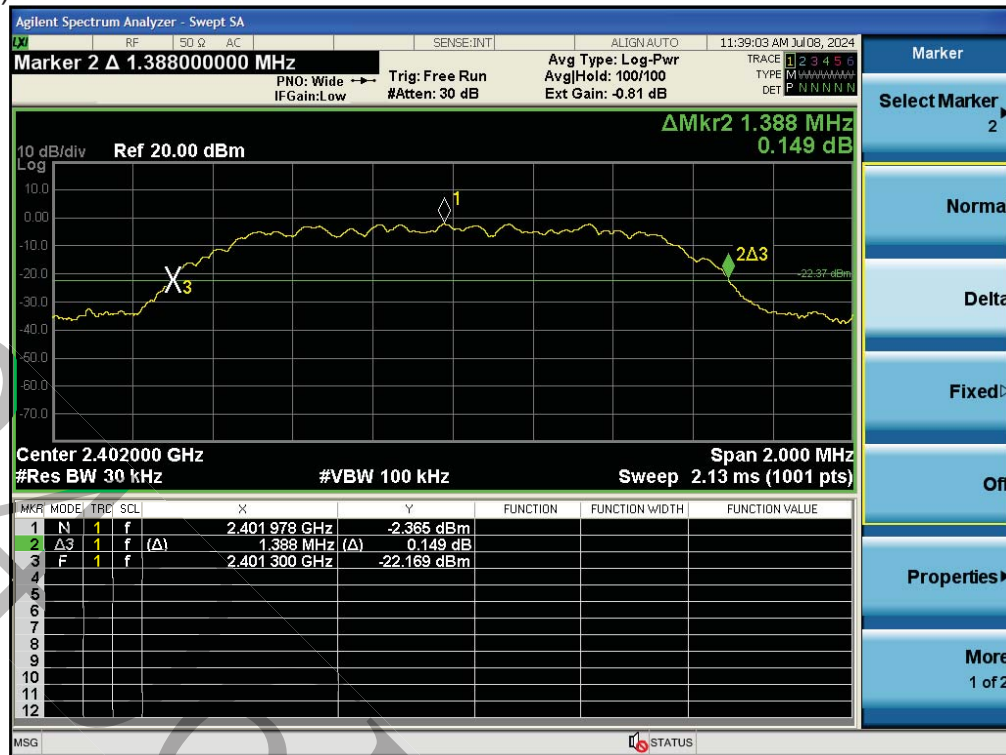
Channel	Data Rate (Mbps)	Frequency (MHz)	Results (MHz)	Limit
0	1M	2402	0.954	>25kHz
		2441	0.960	>25kHz
		2480	0.962	>25kHz
39	2M	2402	1.388	>25kHz
		2441	1.394	>25kHz
		2480	1.402	>25kHz
78	3M	2402	1.374	>25kHz
		2441	1.362	>25kHz
		2480	1.366	>25kHz

Data Rate : 1Mbps  
(2402MHz)

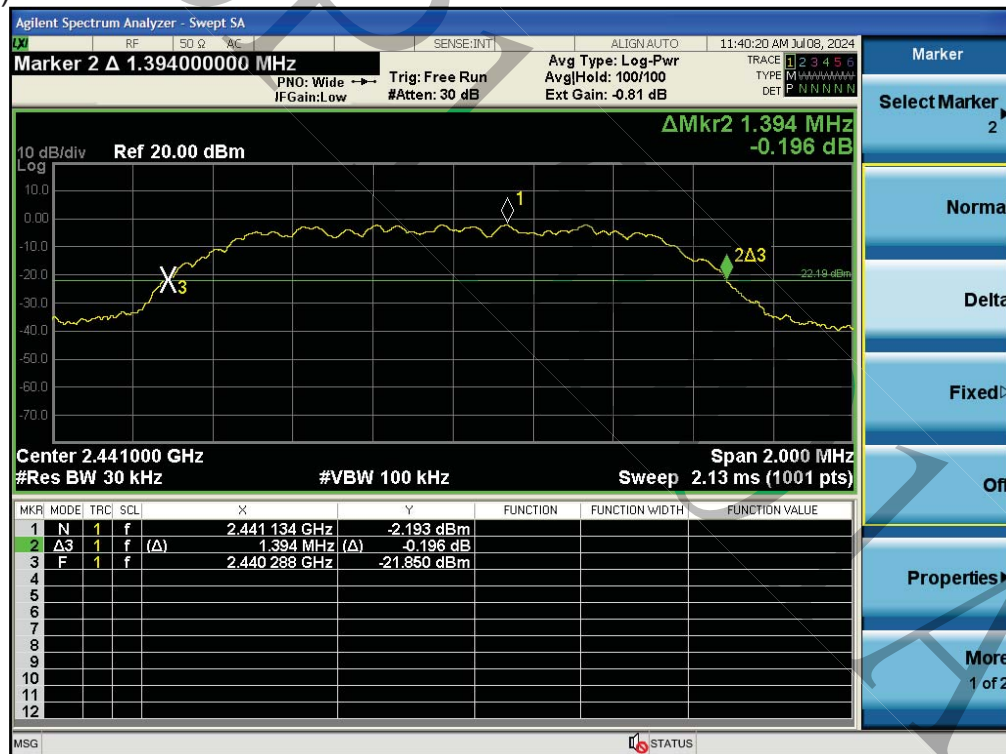


[illegible][illegible]

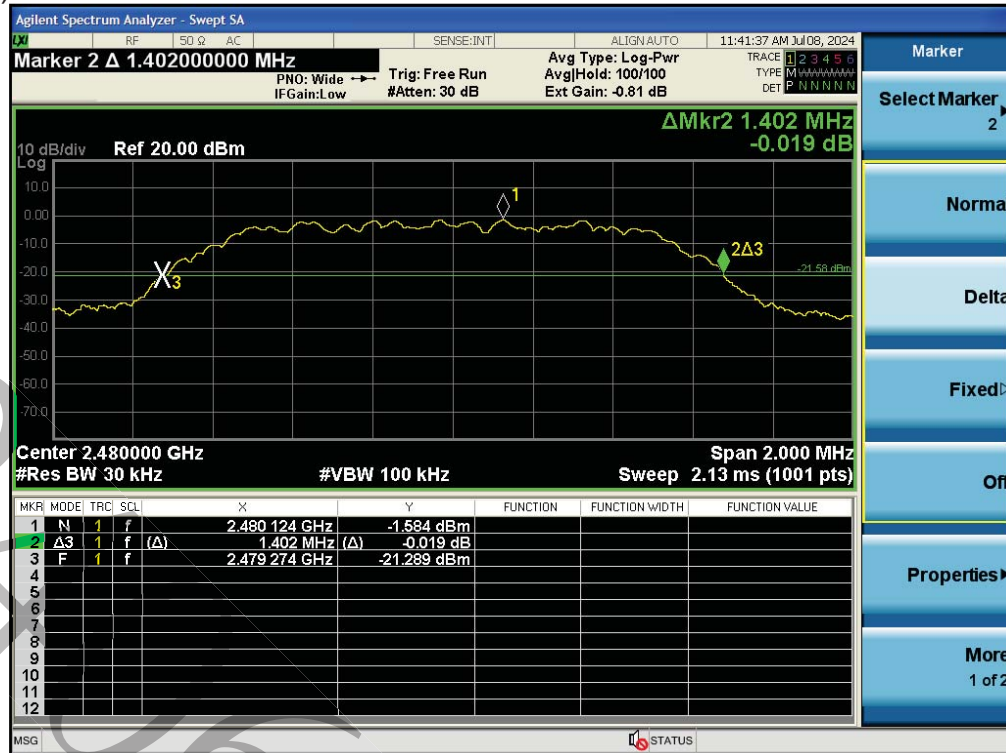
Data Rate : 2Mbps  
(2402MHz)



(2441MHz)

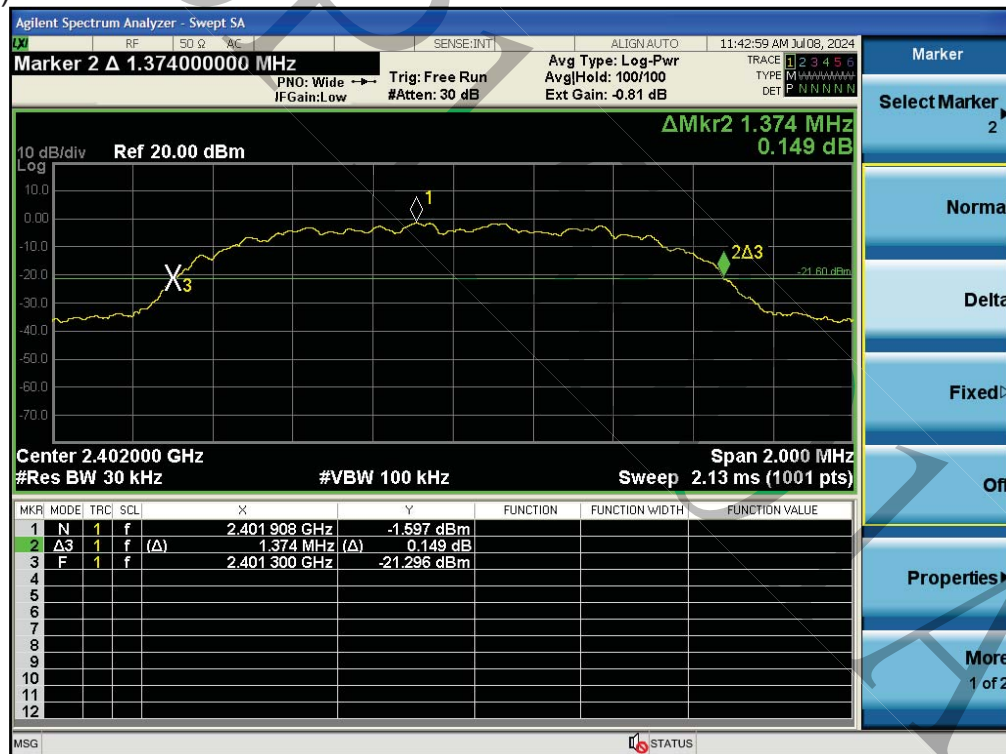


(2480MHz)

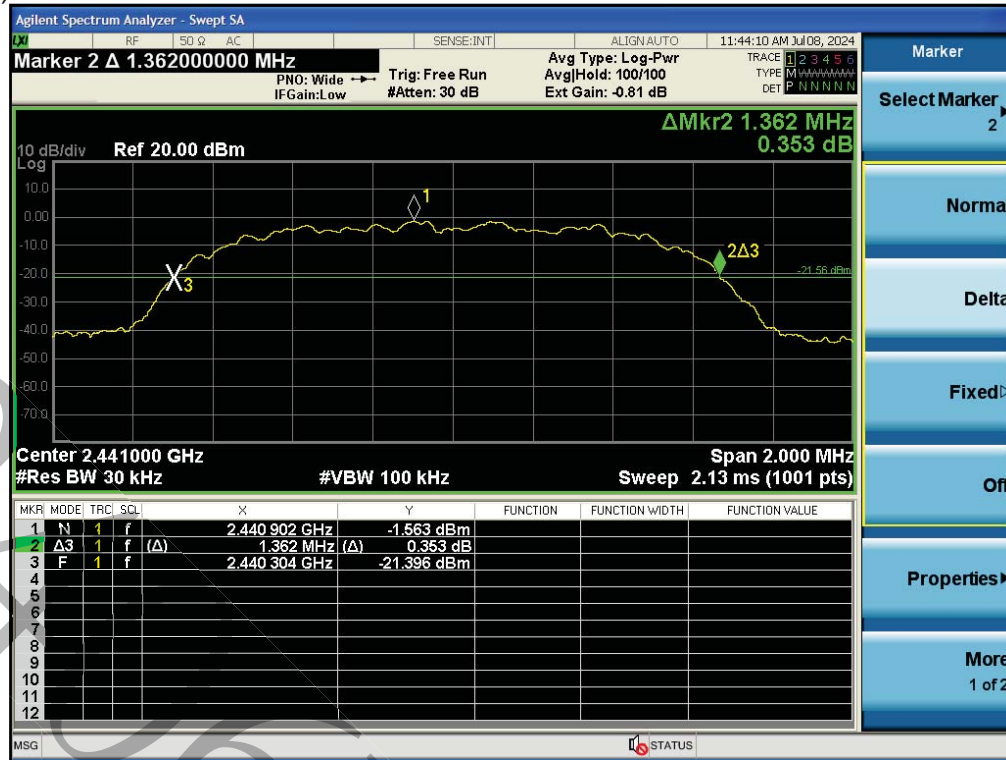


Data Rate : 3Mbps

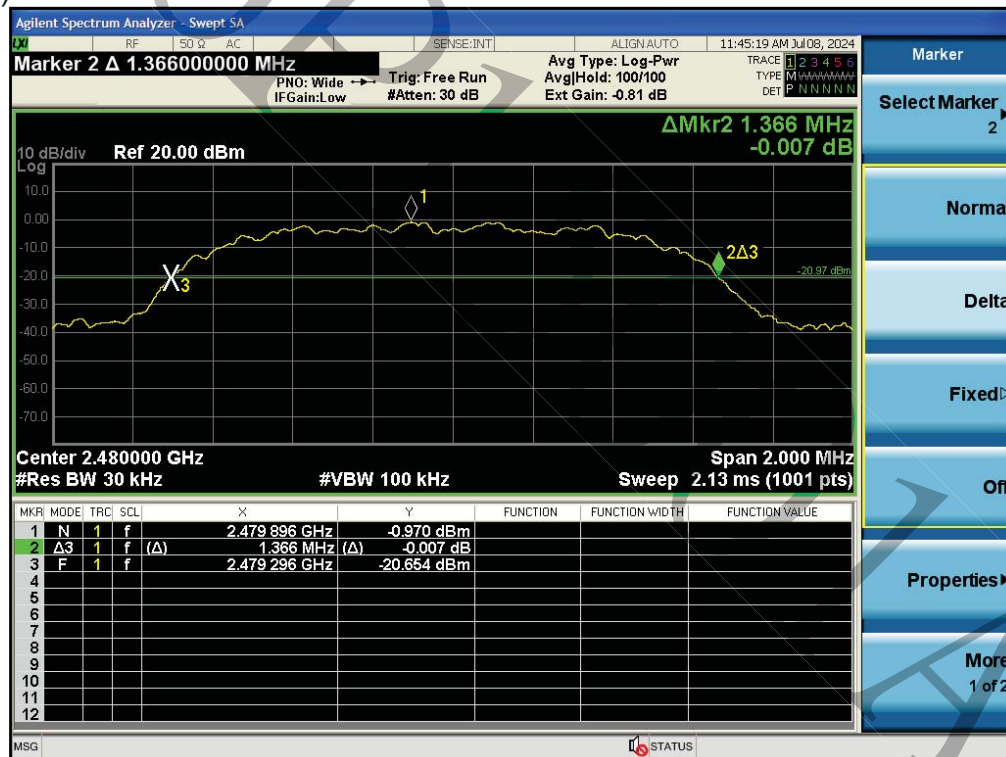
(2402MHz)



(2441MHz)



(2480MHz)





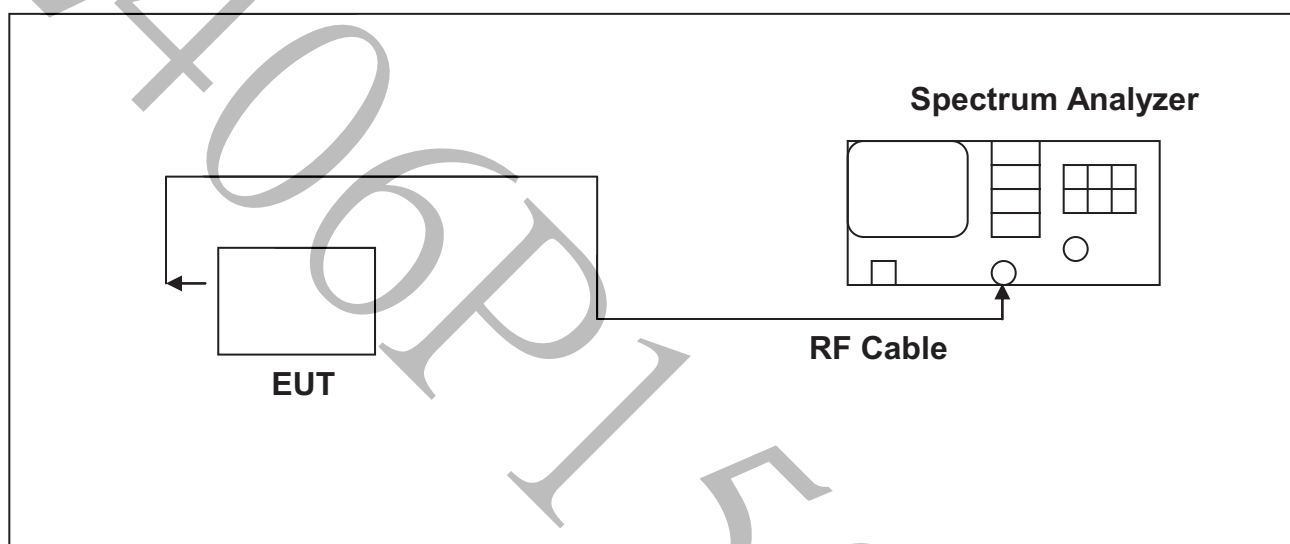
## 5. Hopping Frequency Separation Requirements

### 5.1 Test Condition & Setup:

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW set to 30 kHz .VBW set to 100kHz. The Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel.

This test method according to the techniques described in Measurement procedure ANSI C63.10-2013 (7.8.2) for this testing.

### 5.2 Test Instruments Configuration:



### 5.3 Test Equipment List:

Item	Mfr/Brand	Instruments	Serial No.	Model/Type No.	Calibrated Date	Next Cal. Date
1.	Agilent	Spectrum Analyzer	MY46471764	N9020A	2023/12/22	2024/12/22

## 5.4 Test Result:

Data Rate (Mbps)	Channel	Frequency (MHz)	Results (kHz)	Limit
1	0	2402	1000.00	separated by 25 kHz or two-thirds of the 20 dB bandwidth
	39	2441	1000.00	
	78	2480	1000.00	
2	0	2402	1002.00	
	39	2441	998.00	
	78	2480	1002.00	
3	0	2402	1000.00	
	39	2441	1000.00	
	78	2480	1000.00	

Data Rate : 1Mbps  
(2402MHz)



(2441MHz)

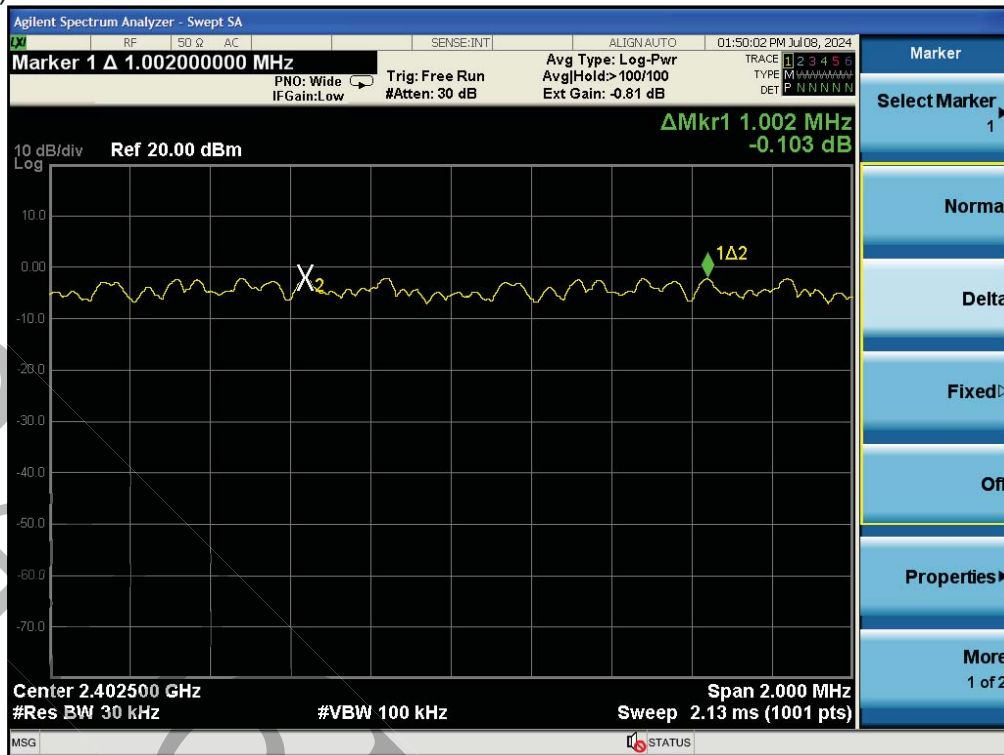


(2480MHz)





Data Rate : 2Mbps  
(2402MHz)



(2441MHz)

