

TEST REPORT

Report number:

DRTTEC2508-0053

Issue Date:

2025-08-01

Applicant

- Company Name : Insight SiP
- Address : 400 Avenue Roumanille Green Side Batiment 7, BP309, 06906
Sophia-Antipolis, France

Equipment under test

- Product Name : Bluetooth 6.0 BLE Module
- Model Name : ISP2454

Date of Test : 2025.07.01 ~ 2025.07.17

Laboratory

- Company Name : Dt&C Co., Ltd.
- Address : 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si,
Gyeonggi-do, Korea 449-935

Test Results : PASS

The results in this reports are applicable only to the samples tested.

This report shall not be re-produced except in full without the written approval of
Dt&C Co., Ltd.

Tested Engineer;



SeungMin Gil

Approval Person;



Jaemin Lee

1. Summary of Test

1. Purpose of test

Ordinance on Technical Standards Conformity Certification of Specified Radio Equipment
2.4GHz Band wide band low power data communication System

2. Standards

Certification Ordinance Article 2 Clause 1 Item19

1) Test Methods

Ministry of Internal Affairs and Communications Notification Article 88 Appendix 43

2) Deviation from standards

None

3. List of applied test to the EUT

Article 88 Appendix 43	Classification of EUT	Condition	Result
1	Voltage fluctuation	Conducted	PASS
3	Frequency Tolerance	Conducted	PASS
4	Occupied Bandwidth	Conducted	PASS
4	Spread Bandwidth	Conducted	NA
5	Unwanted (Spurious) Emission Strength	Conducted	PASS
6	RF Output Power Tolerance	Conducted	PASS
7	Secondary Emitted Radio Wave Strength	Conducted	PASS
8	Carrier Sensing Function (1)	Conducted	NA
9	Carrier Sensing Function (2)	Conducted	NA
10	Absolute Gain of Transmission Antenna	Conducted	NA
11	Angle Width of Principal Radiation from Transmission Antenna	Conducted	NA
12	Interference Prevention Function	Conducted	PASS
13	Hopping frequency dwell time	Conducted	NA

Note: Based on the power measurement results of LE 1M(1Mbps) and LE coded PHYs(125 kbps, 500kbps), the test was performed using LE 1M PHY.

1) Test set up

Table-Top

2) Modification to the EUT by laboratory

None

2. Test Information

1. Applicant

Insight SiP

2. Product Name

Bluetooth 6.0 BLE Module

3. Model Name

ISP2454

4. Serial number

Identical Prototype

5. Size

(W) 8 x (D) 8 x (H) 1 mm

6. Terminal limitation

-40°C to 105°C

7. RF Specification Frequency range

2402 - 2480 MHz

8. Number of RF Channels

40 Channels

9. Modulation method

Method of GFSK

(Frequency equal to the transmission rate of the modulation signal: 1MHz, 2Mbps)

10. Data rate

1 Msyms/s (LE 1 Mbps, LE Coded 125kbps, LE Coded 500kbps)

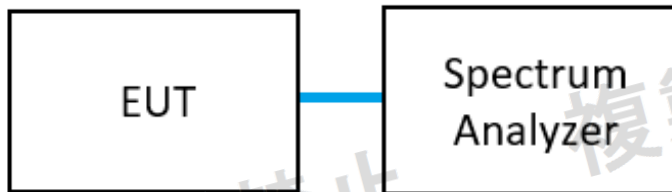
2 Msym/s (LE 2 Mbps)

11. Variation of the family model(s)

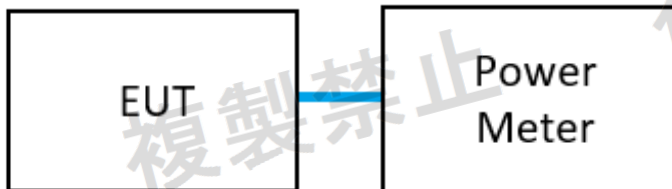
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3. Configuration of equipment

1. Frequency tolerance, Spread bandwidth, Occupied Bandwidth, Unwanted(Spurious) emission strength, Secondary emitted radio wave strength



2. RF output power tolerance



4. List of Measuring Instruments

USE	Equipment	Manufacturer	Model No.	Serial No.	Cal. by	Cal. Method	Cal. Due	Cal. Date
X	Spectrum analyzer	Agilent Technologies	N9020A	MY48011146	KTL	Λ(c)	Nov. 27, 2025	Nov. 27, 2024
X	Power Supply	Agilent Technologies	66332A	GB37470198	KTL	Λ(c)	Nov. 27, 2025	Nov. 27, 2024
X	Signal Generator	Rohde Schwarz	SMBV100A	255571	KTL	Λ(c)	Dec. 10, 2025	Dec. 10, 2024
X	Signal Generator	KEYSIGHT	M9383A	E76F804A28	KTL	Λ(c)	Dec. 10, 2025	Dec. 10, 2024
X	Multi-meter	FLUKE	17B+	36390701WS	KTL	Λ(c)	Nov. 27, 2025	Nov. 27, 2024
X	Thermohygrometer	YOWEXA	DWL-20E	211216DWL0122587	KTL	Λ(c)	Nov. 27, 2025	Nov. 27, 2024
X	Attenuator	SMAJK	SMAJK-50-10	15081903	KTL	Λ(c)	May. 26, 2026	May. 26, 2025
X	Power Meter	Agilent Technologies	ML2488B	0926003	KTL	Λ(c)	Nov. 28, 2025	Nov. 28, 2024
X	Power Sensor	Agilent Technologies	MA2472A	030031	KTL	Λ(c)	Nov. 28, 2025	Nov. 28, 2024

Note1: "X" は使用した測定機器です。
"X" used equipment.

Note2: 較正期限は、較正を行った日の翌月から起算して1年以内です。
The validity of measurement equipment is one year from the first day of the following month of the calibration date.

Note3: 較正方法
Cal.Method

a) : 国立研究開発法人情報通信研究機構（NICT）（以下「機構」という。）又は第百二条の十八第一項の指定較正機関（TELEC, インターテックジャパン、キーサイト）が行う較正

a) : Calibration conducted by the National Institute of Information and Communications Technology～NICT～ or a designated calibration agency under Article 102-18 paragraph (1)～ Telecom Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc～.

Ⓜ) : 計量法（平成四年法律第五十一号）第百三十五条 又は第百四十四条 の規定に基づく校正（JCSS校正）

b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)～Japan Calibration Service System～

ハ) : 外国において行う較正であつて、機構又は第百二条の十八第一項の指定較正機関（TELEC, インターテックジャパン、キーサイト）が行う較正に相当するもの

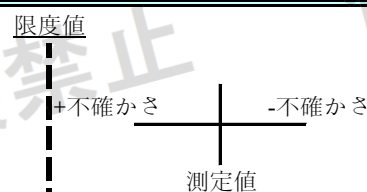
c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)～ Telecom Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc～.

ニ) : イからハまでのいずれかに掲げる較正等を受けたものを用いて行う較正等

d) : Calibration conducted by using other equipment that listed above from a) to c)

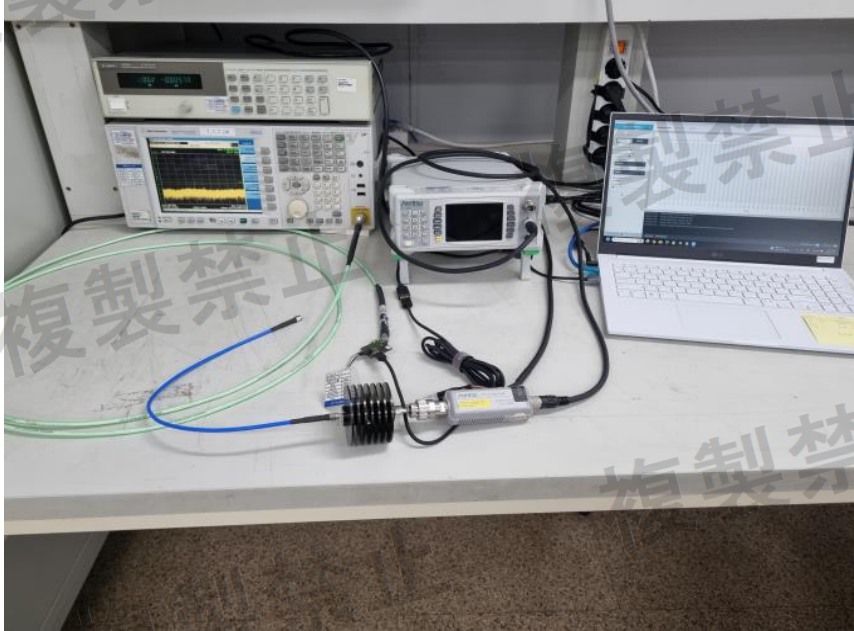
5. Uncertainty

Parameter	Uncertainty
Total RF power conducted	0.7 dB
Spurious emissions conducted	0.98 dB
Temperature	0.9℃
Humidity	3.0%

判定	測定データにおける不確かさの判断とその範囲	
適合	例 A 	測定結果と不確かさは与えられた 限度値内に入っています。 これを『適合』と呼びます。
	例 B 	完全には、限度値内でも限度値外 でもありません。 この場合の適合性については、確 実な結論を出すことは出来ません 。
不適合	例 C 	完全には、限度値内でも限度値外 でもありません。 この場合の適合性については、確 実な結論を出すことは出来ません 。
	例 D 	測定結果も不確かさも与えられた 限度値内に入っていません。 これは『不適合』と呼びます。

6. Configuration Photographs

Conducted Measurement Photo



7. Laboratory description

1. Location

- Name: Dt&C Co., Ltd.
- Address: 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935
- Phone: +81-031-321-2664
- Fax: +81-031-321-2855

2. Accreditation and Registration

1) VLAC

Accreditation No.: N/A

2) NVLAP

LAB CODE: N/A

3) BSMI

Laboratory Code: TL652

6) KOLAS

Registration number	Facility	Expiration date
KT393	Dt&C Co., Ltd.	2029-01-21

3. Test Site

1) Conducted test

Conducted Test-room

8. Test Results

LE 1Mbps

Environment of Test Room	Test Date	2025.07.01 ~ 2025.07.17
	Temperature	20 ~ 22 °C
	Humidity	45 ~ 49 %

Peak Antenna Gain	1.000	dBi
Declaration Output Power	4.515	mW
Declaration Output Power	6.547	dBm
E.I.R.P.	7.547	dBm
Input Power Voltage	3.300	VDC

Tested Circuit Insertion Loss		0.000	dB
Frequency equal to the Transmission rate		1.000	MHz
Transmission Time	ON TIME	2.132	ms
	OFF TIME	0.364	ms
	Ratio	85.417%	%
Packet Type (Mode)		Not Applicable	mode
Transmit Speed		Not Applicable	MHz

Note: The insertion loss was corrected during the test.

Test Category ;	2.4GHz Band Wideband Low-Power Data Communication System Bluetooth BLE_GFSK (1 Mbps)
The reason why the tests are performed only at rated voltage :	When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).

Measurement Frequency		MHz	2402	2440	2480	Result	Limit	Note
Channel Number		Ch.	0	19	39	---	---	
Reading Frequency		MHz	2401.966	2439.968	2479.968	---	---	
Frequency Tolerance		ppm	-14.363	-13.186	-13.004	PASS	±50×10 ⁻⁶ (50ppm)	
Occupied Bandwidth		MHz	1.083	1.086	1.084	PASS	26MHz or below	
Spread Bandwidth		MHz	-	-	-	N/A	500kHz or more	
RF Output Power		mW	3.479	3.711	4.097	PASS	10mW	
RF Output Power Tolerance		%	-22.945	-17.814	-9.260	PASS	+20 to -80%	
Tx Spurious Emission Strength	30 to 2387MHz	uW/MHz	0.013	0.039	0.013	PASS	2.5uW/MHz or below	
		MHz	2348.580	2312.280	2352.590	----		
	2387 to 2400MHz	uW/MHz	1.607	0.012	0.008	PASS	25uW/MHz or below	
		MHz	2399.428	2388.651	2392.005	----		
	2483.5 to 2496.5MHz	uW/MHz	0.009	0.016	0.285	PASS	25uW/MHz or below	
		MHz	2489.220	2496.227	2484.696	----		
	2496.5 to 12500MHz	uW/MHz	0.018	0.015	0.019	PASS	2.5uW/MHz or below	
		MHz	2529.510	2696.570	2536.510	----		
Rx Spurious Emission Strength	10 to 1000MHz	nW	0.324	0.287	0.284	PASS	4nW or below	
		MHz	64.005	64.005	64.005	----		
	1000 to 5000MHz	nW	0.160	0.127	0.123	PASS	20nW or below	
		MHz	4878.400	4878.000	3304.800	----		
	5000 to 12500MHz	nW	0.146	0.140	0.134	PASS	20nW or below	
		MHz	11950.060	11860.810	5754.880	----		
Interference Prevention Function		----	Good	Good	Good	PASS		

8. Test Results

LE 2Mbps

Environment of Test Room	Test Date	2025.07.01 ~ 2025.07.17
	Temperature	20 ~ 22 °C
	Humidity	45 ~ 49 %

Peak Antenna Gain	1.000	dBi
Declaration Output Power	4.647	mW
Declaration Output Power	6.672	dBm
E.I.R.P.	7.672	dBm
Input Power Voltage	3.300	VDC

Tested Circuit Insertion Loss		0.000	dB
Frequency equal to the Transmission rate		2.000	MHz
Transmission Time	ON TIME	1.080	ms
	OFF TIME	0.800	ms
	Ratio	57.447%	%
Packet Type (Mode)		Not Applicable	mode
Transmit Speed		Not Applicable	MHz

Note: The insertion loss was corrected during the test.

Test Category ;	2.4GHz Band Wideband Low-Power Data Communication System Bluetooth BLE_GFSK (2 Mbps)
The reason why the tests are performed only at rated voltage :	When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).

Measurement Frequency	MHz	2402	2440	2480	Result	Limit	Note
Channel Number	Ch.	0	19	39	---	---	
Reading Frequency	MHz	2401.988	2439.990	2479.990	---	---	
Frequency Tolerance	ppm	-5.183	-4.119	-4.113	PASS	$\pm 50 \times 10^{-6}$ (50ppm)	
Occupied Bandwidth	MHz	2.105	2.112	2.113	PASS	26MHz or below	
Spread Bandwidth	MHz	-	-	-	N/A	500kHz or more	
RF Output Power	mW	3.696	3.530	4.015	PASS	10mW	
RF Output Power Tolerance	%	-20.464	-24.044	-13.591	PASS	+20	
Tx Spurious Emission Strength	30 to 2387MHz	uW/MHz	0.005	0.032	0.005	PASS	2.5uW/MHz or below
		MHz	2273.860	2312.990	2224.130	----	
	2387 to 2400MHz	uW/MHz	22.295	0.012	0.006	PASS	25uW/MHz or below
		MHz	2399.948	2389.938	2391.160	----	
	2483.5 to 2496.5MHz	uW/MHz	0.006	0.016	0.736	PASS	25uW/MHz or below
		MHz	2489.415	2495.980	2483.630	----	
	2496.5 to 12500MHz	uW/MHz	0.005	0.011	0.039	PASS	2.5uW/MHz or below
		MHz	2657.810	2696.070	2608.040	----	
Rx Spurious Emission Strength	10 to 1000MHz	nW	0.645	0.573	0.568	PASS	4nW or below
		MHz	64.005	64.005	64.005	----	
	1000 to 5000MHz	nW	0.111	0.158	0.133	PASS	20nW or below
		MHz	3122.800	3289.200	3316.800	----	
	5000 to 12500MHz	nW	0.136	0.140	0.158	PASS	20nW or below
		MHz	12410.380	12277.250	12215.940	----	
Interference Prevention Function	----	Good	Good	Good	PASS		

9. Trace Data

9.1 Frequency Tolerance

LE 1Mbps

Ch.0: 2402 MHz



Ch.19: 2440 MHz



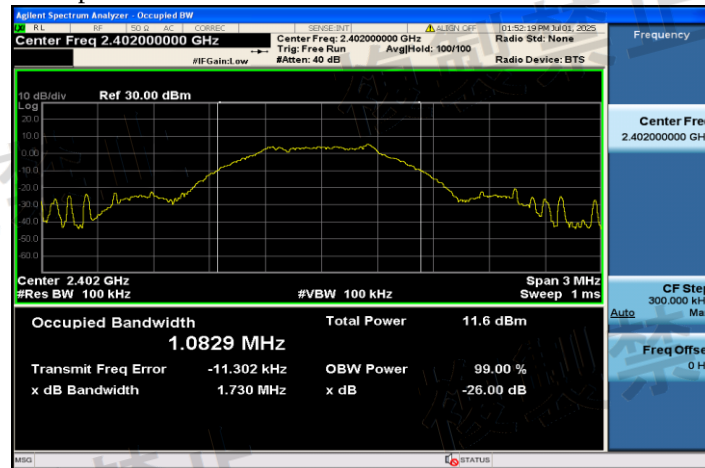
Ch.39: 2480 MHz



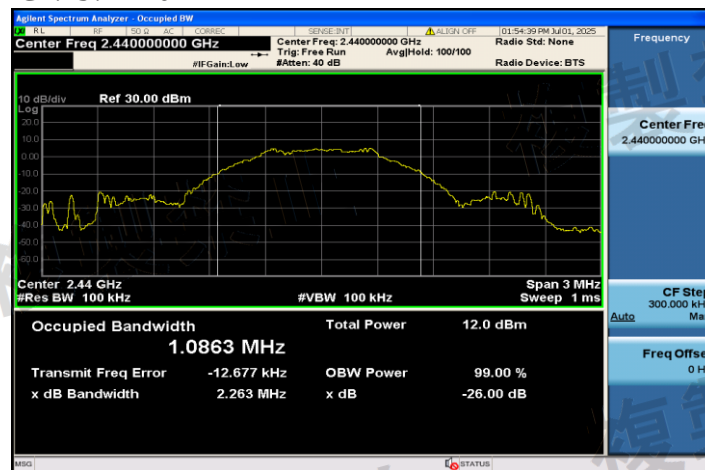
9.2 Occupied Bandwidth

Ch.0: 2402 MHz

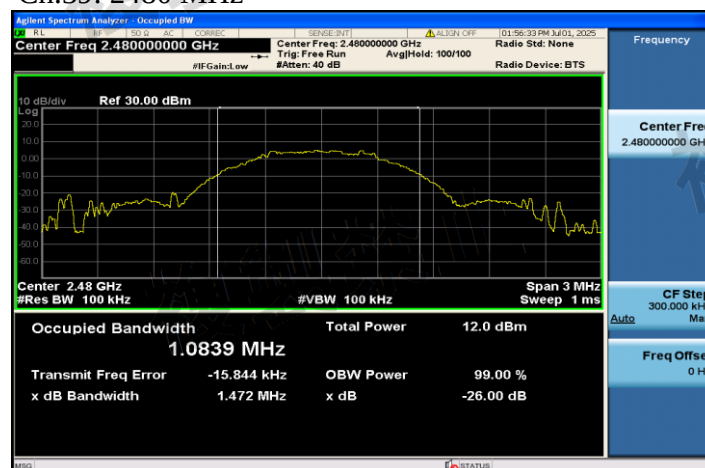
Occupied Bandwidth



Ch.19: 2440 MHz



Ch.39: 2480 MHz

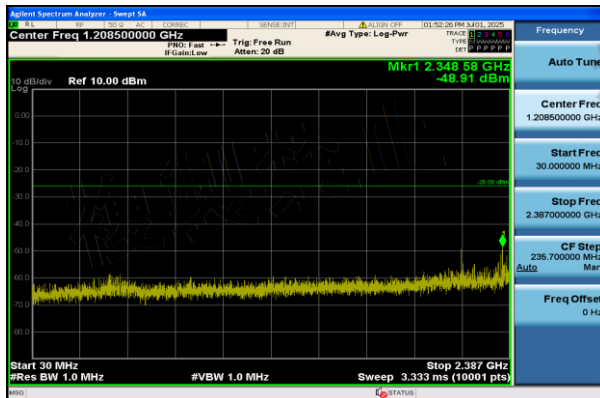


9.3 Tx Spurious Emission Strength

Ch.0: 2402 MHz

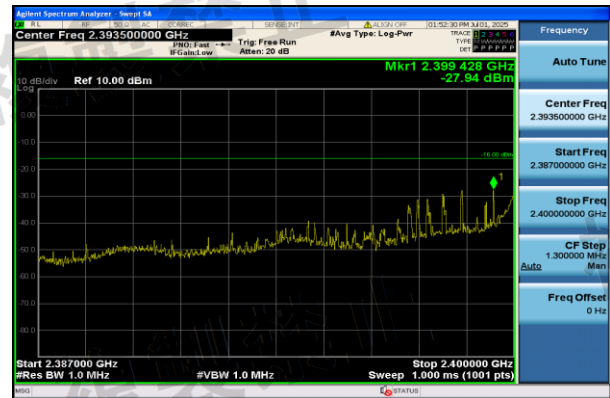
30.0 MHz ~ 2387.0 MHz

1.0 MHz



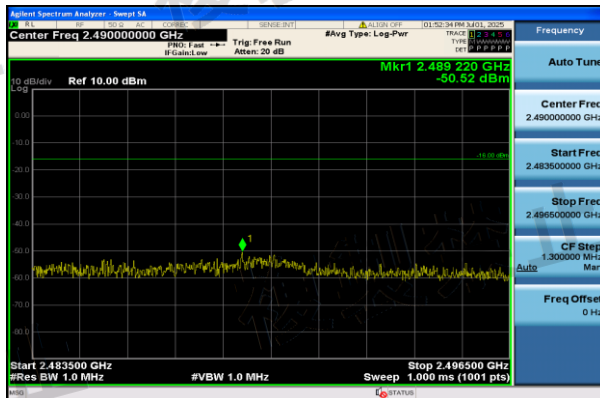
2387.0 MHz ~ 2400.0 MHz

1.0 MHz



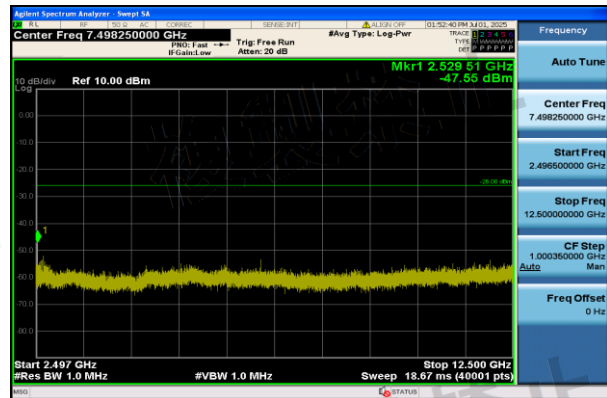
2483.5 MHz ~ 2496.5 MHz

1.0 MHz



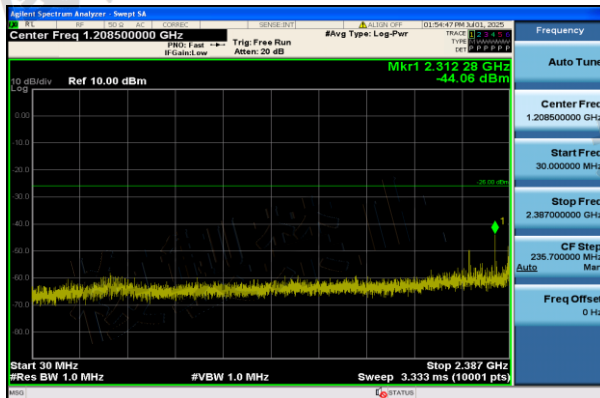
2496.5 MHz ~ 12500.0 MHz

1.0 MHz



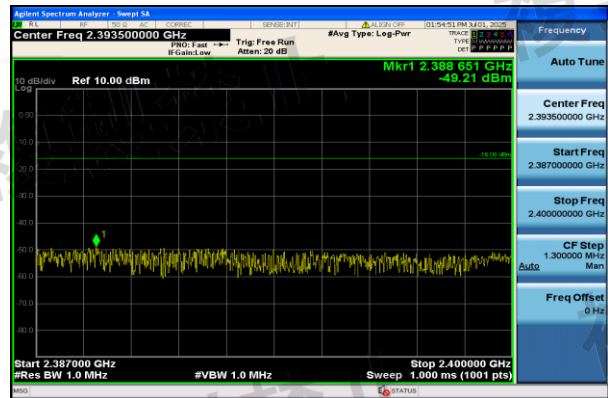
Ch.19: 2440 MHz
30.0 MHz ~ 2387.0 MHz

1.0 MHz



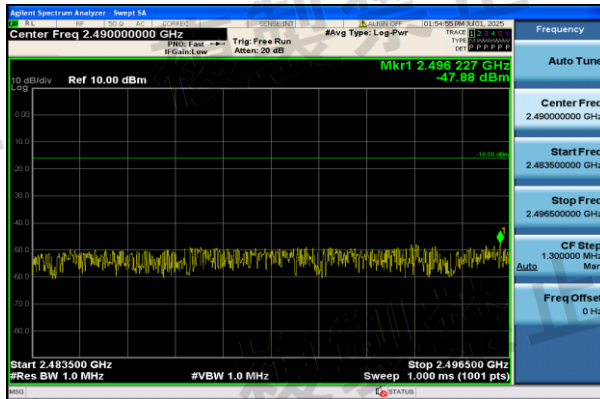
2387.0 MHz ~ 2400.0 MHz

1.0 MHz



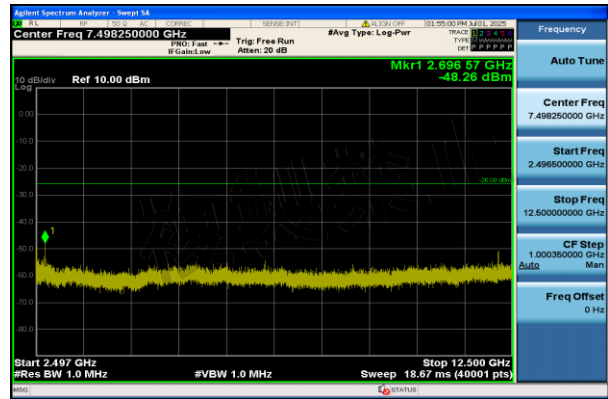
2483.5 MHz ~ 2496.5 MHz

1.0 MHz



2496.5 MHz ~ 12500.0 MHz

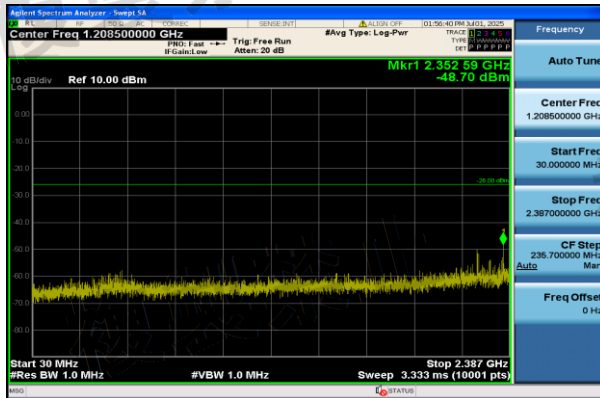
1.0 MHz



Ch.39: 2480 MHz

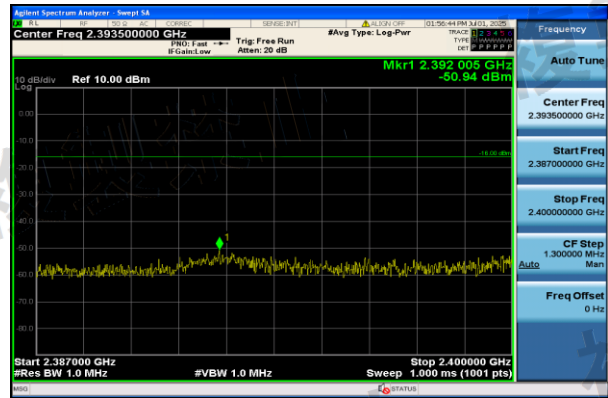
30.0 MHz ~ 2387.0 MHz

1.0 MHz



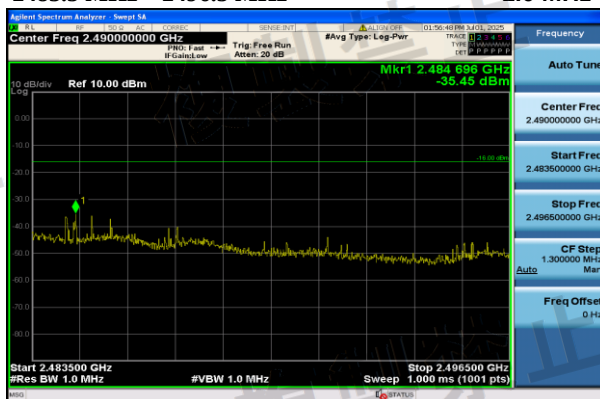
2387.0 MHz ~ 2400.0 MHz

1.0 MHz



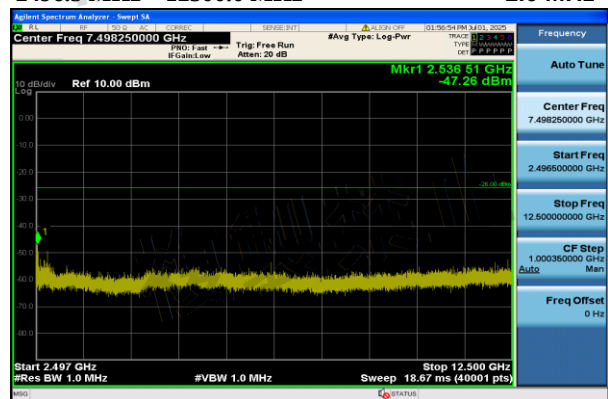
2483.5 MHz ~ 2496.5 MHz

1.0 MHz



2496.5 MHz ~ 12500.0 MHz

1.0 MHz



9.4 RF Output Power

Ch.0: 2402 MHz



Ch.19: 2440 MHz



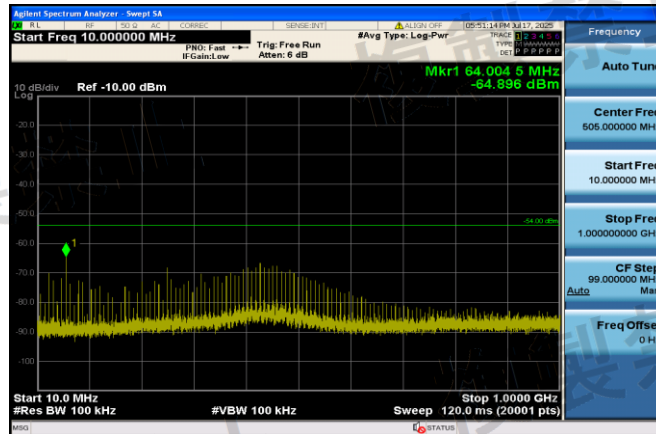
Ch.39: 2480 MHz



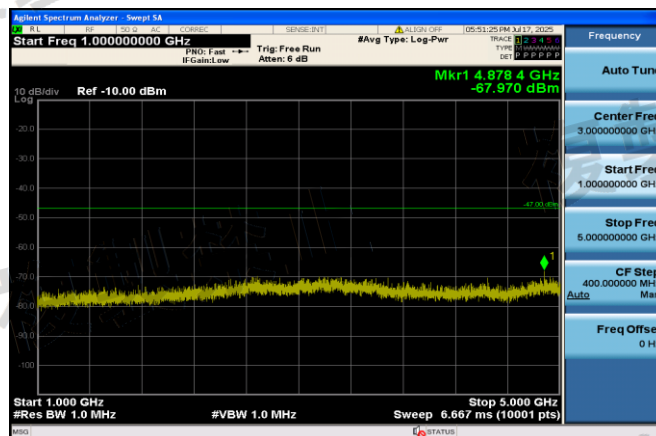
9.5 Rx Spurious Emission Strength

Ch.0: 2402 MHz

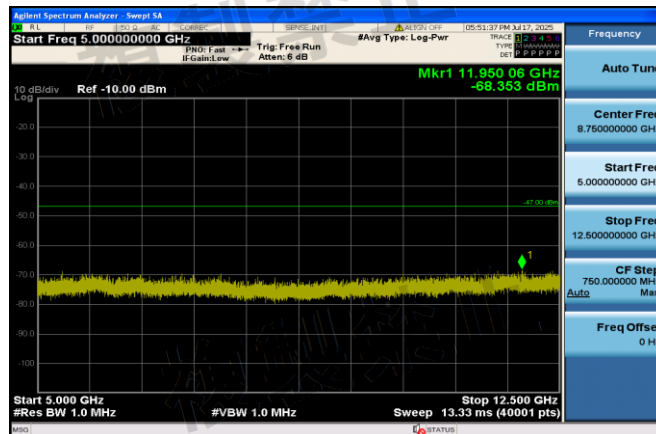
10 to 1000MHz



1000 to 5000MHz

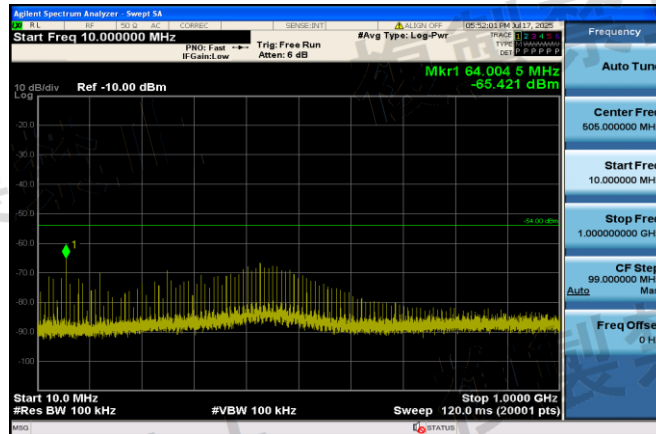


5000 to 12500MHz

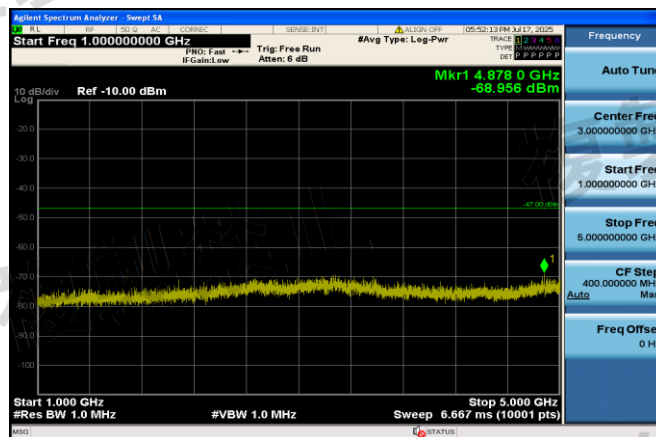


Ch.19: 2440 MHz

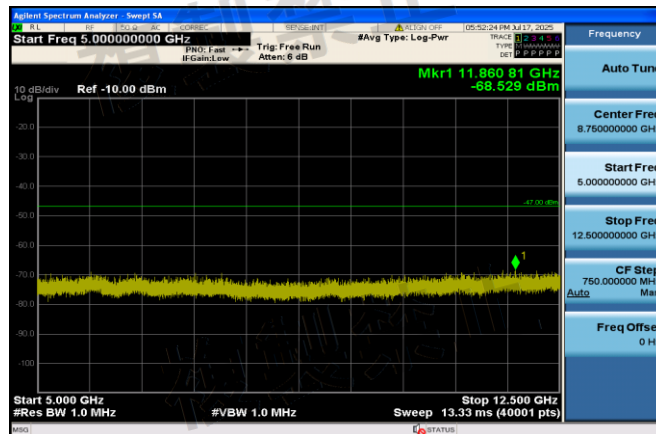
10 to 1000MHz



1000 to 5000MHz

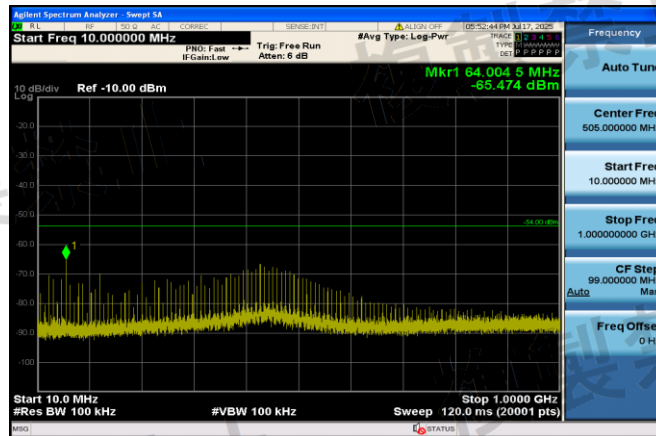


5000 to 12500MHz

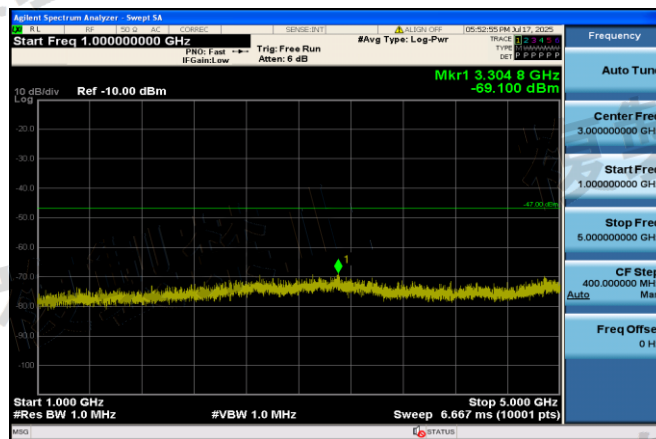


Ch.39: 2480 MHz

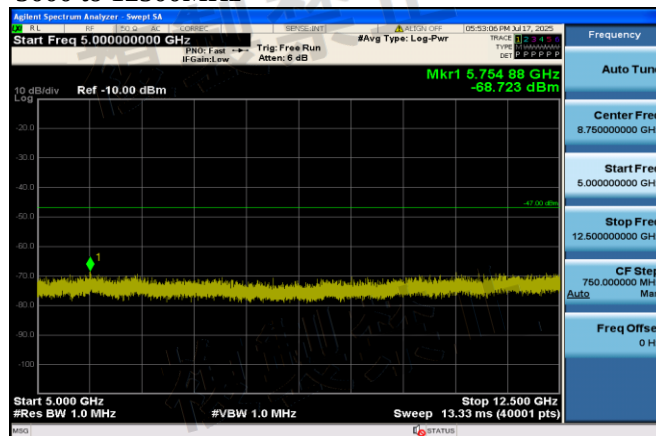
10 to 1000MHz



1000 to 5000MHz

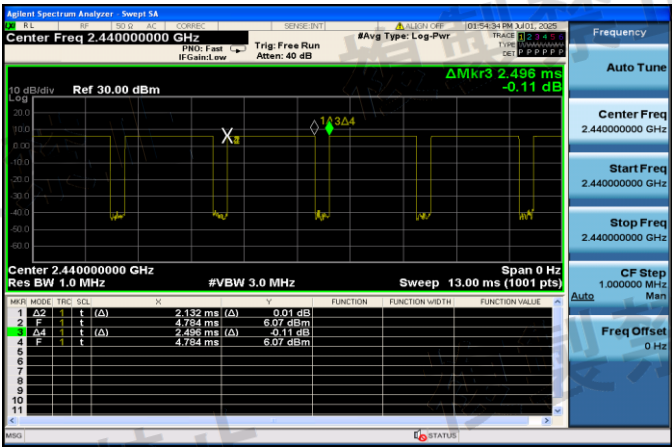


5000 to 12500MHz



9.6 Dwell Time

ON/OFF

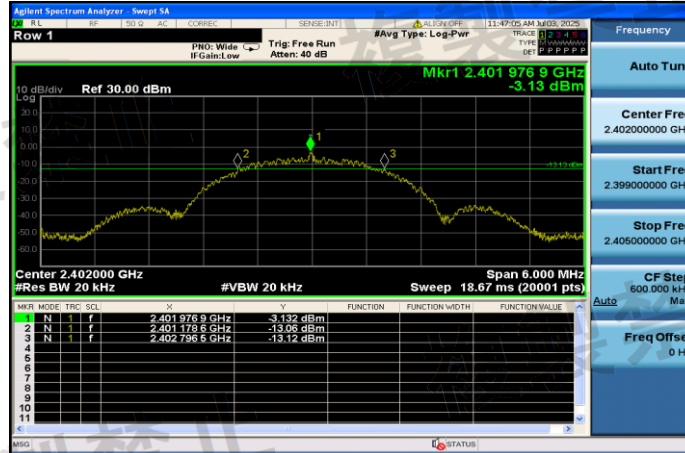


9. Trace Data

9.1 Frequency Tolerance

LE 2Mbps

Ch.0: 2402 MHz



Ch.19: 2440 MHz



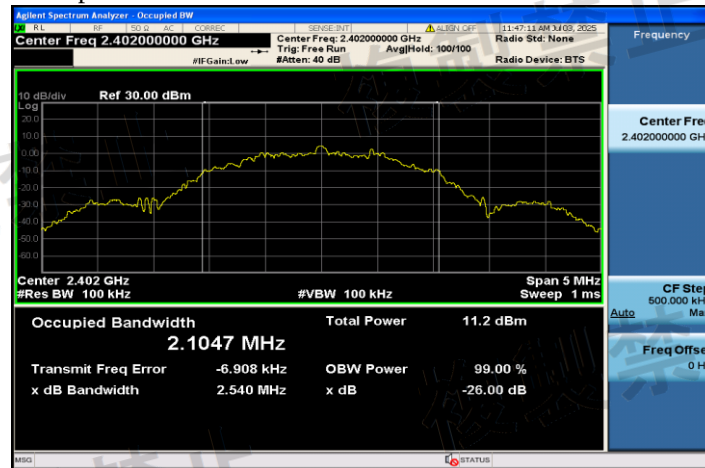
Ch.39: 2480 MHz



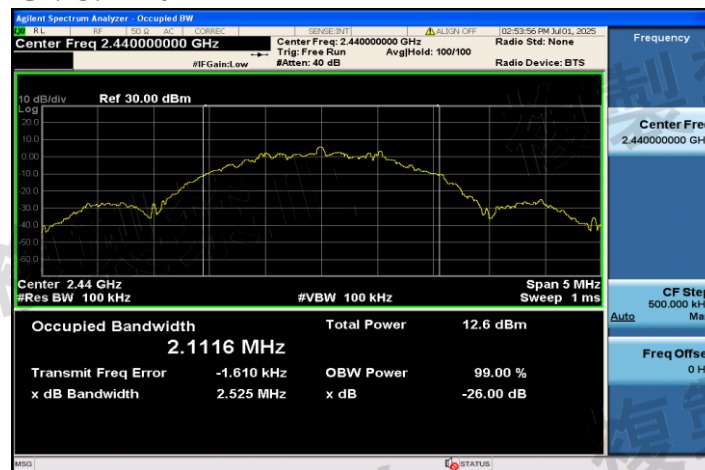
9.2 Occupied Bandwidth

Ch.0: 2402 MHz

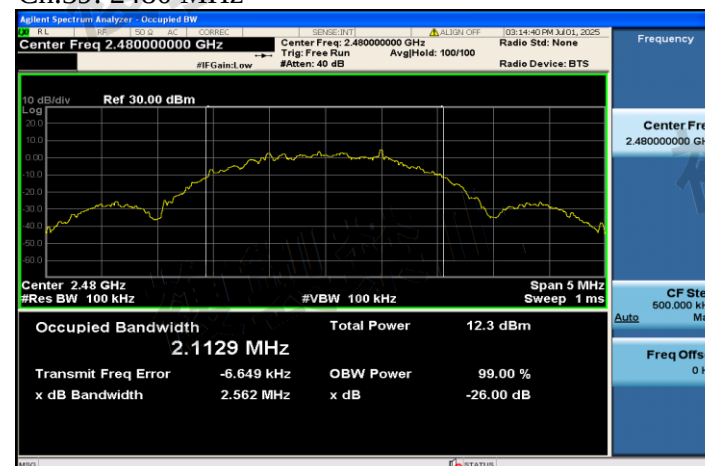
Occupied Bandwidth



Ch.19: 2440 MHz



Ch.39: 2480 MHz

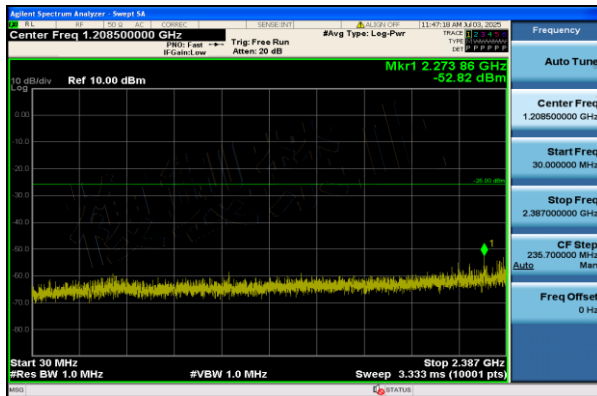


9.3 Tx Spurious Emission Strength

Ch.0: 2402 MHz

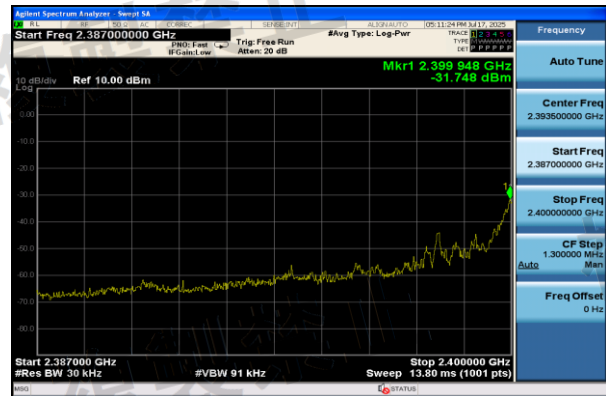
30.0 MHz ~ 2387.0 MHz

1.0 MHz



2387.0 MHz ~ 2400.0 MHz

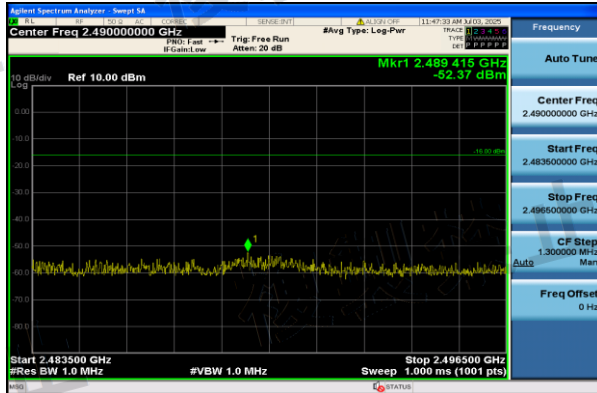
30 kHz



Note: $-31.748 \text{ dBm} + 15.23 \text{ dB} = -16.518 \text{ dBm}$

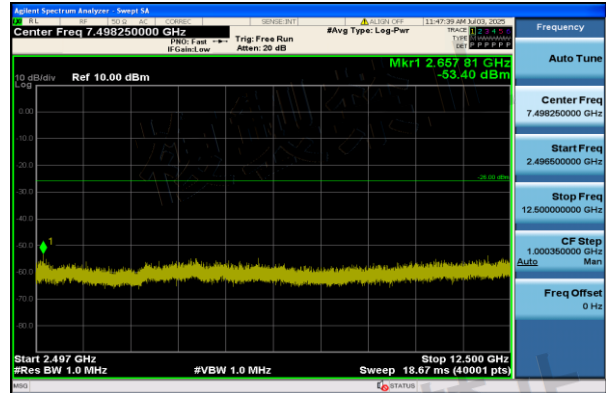
2483.5 MHz ~ 2496.5 MHz

1.0 MHz



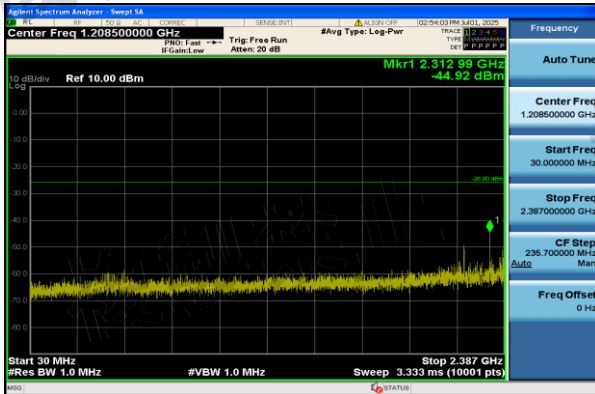
2496.5 MHz ~ 12500.0 MHz

1.0 MHz



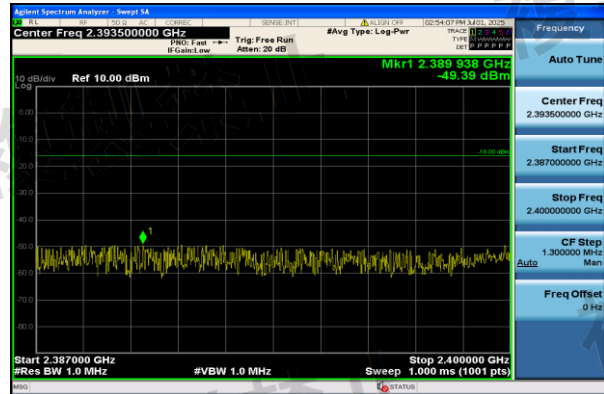
Ch.19: 2440 MHz
30.0 MHz ~ 2387.0 MHz

1.0 MHz



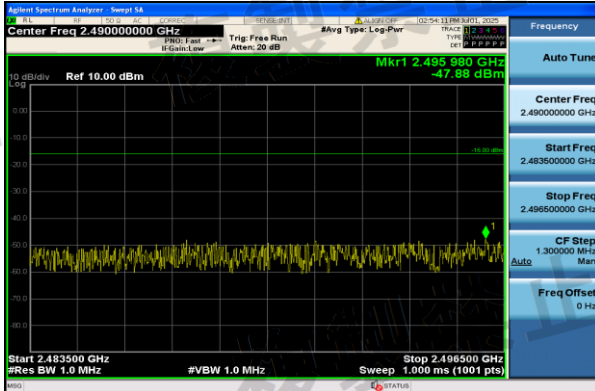
2387.0 MHz ~ 2400.0 MHz

1.0 MHz



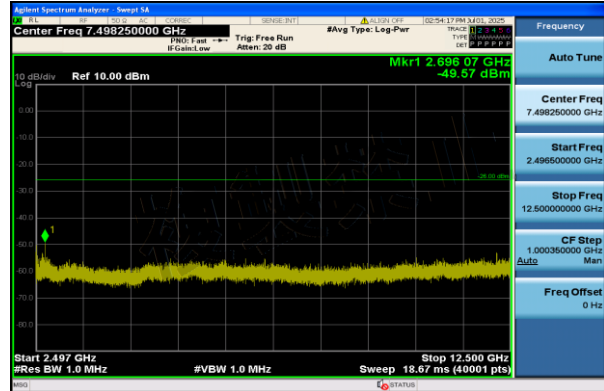
2483.5 MHz ~ 2496.5 MHz

1.0 MHz



2496.5 MHz ~ 12500.0 MHz

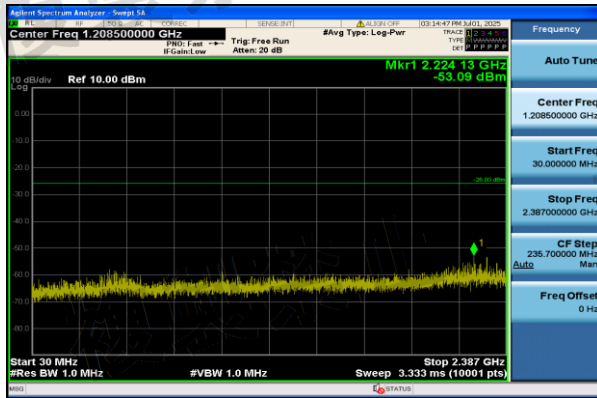
1.0 MHz



Ch.39: 2480 MHz

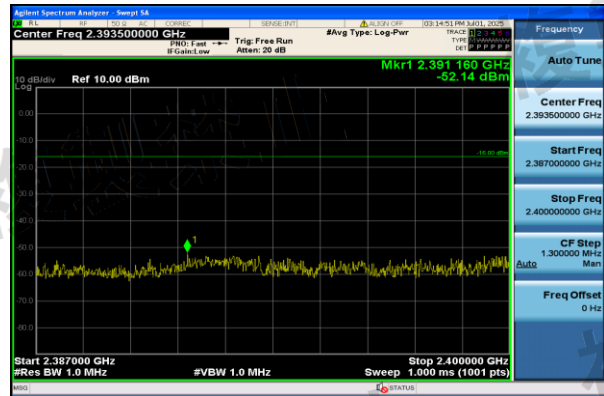
30.0 MHz ~ 2387.0 MHz

1.0 MHz



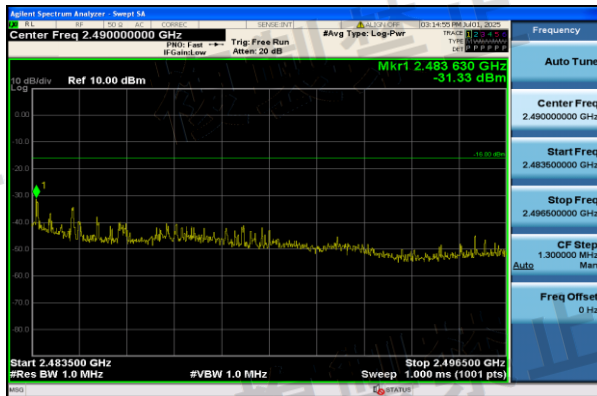
2387.0 MHz ~ 2400.0 MHz

1.0 MHz



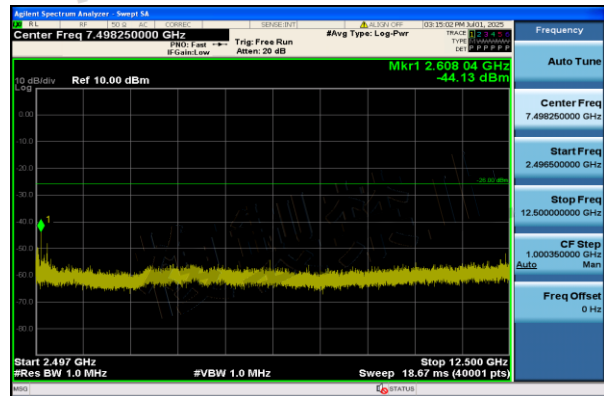
2483.5 MHz ~ 2496.5 MHz

1.0 MHz



2496.5 MHz ~ 12500.0 MHz

1.0 MHz



9.4 RF Output Power

Ch.0: 2402 MHz



Ch.19: 2440 MHz



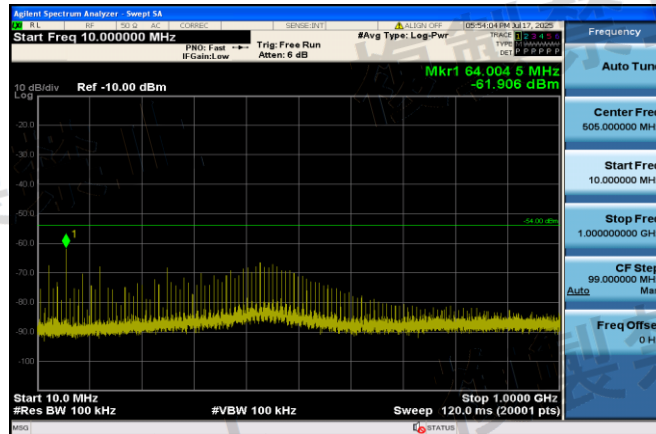
Ch.39: 2480 MHz



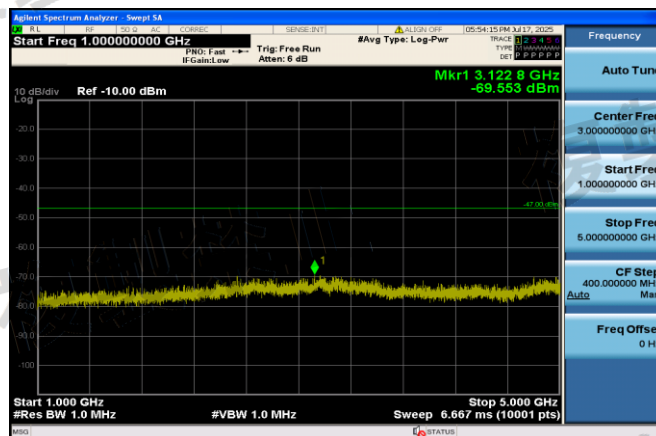
9.5 Rx Spurious Emission Strength

Ch.0: 2402 MHz

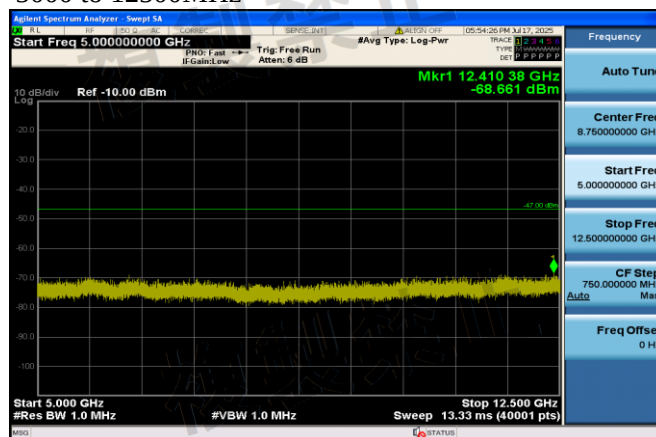
10 to 1000MHz



1000 to 5000MHz

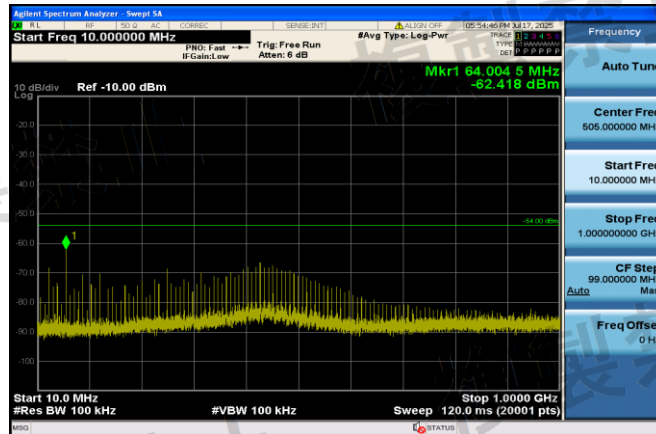


5000 to 12500MHz

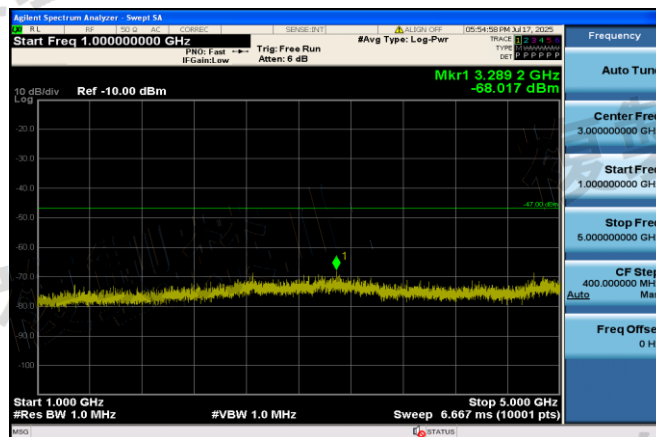


Ch.19: 2440 MHz

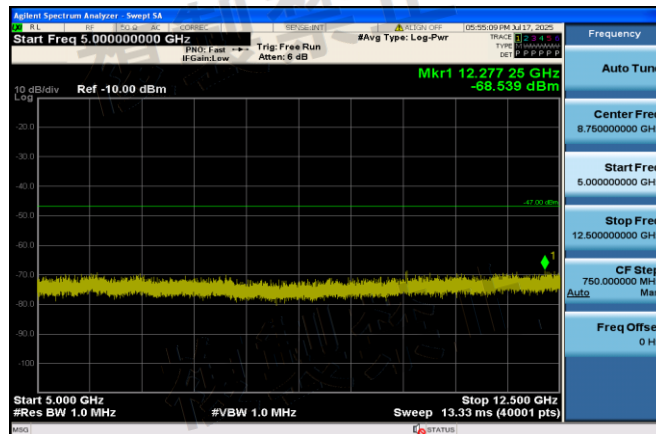
10 to 1000MHz



1000 to 5000MHz

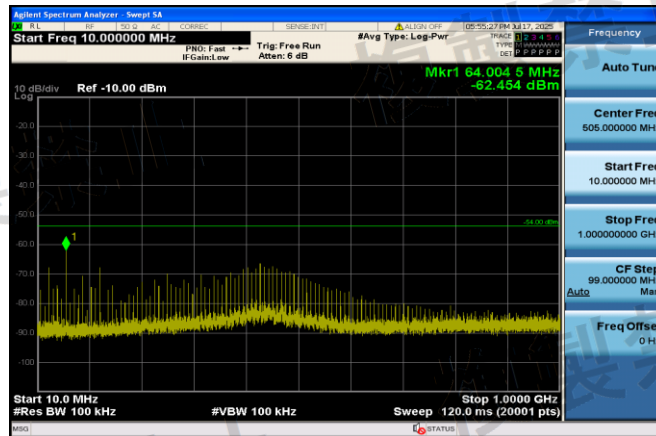


5000 to 12500MHz

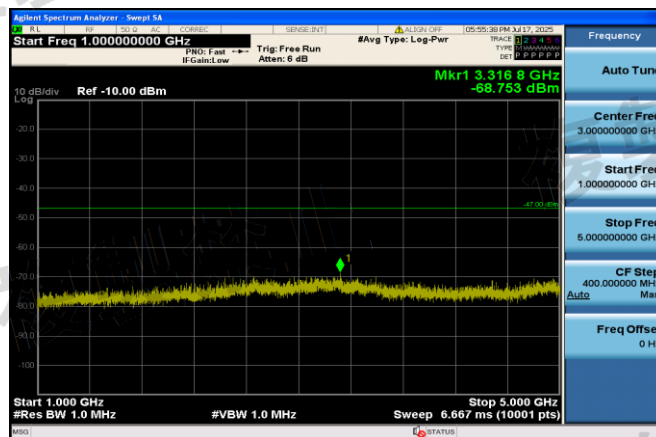


Ch.39: 2480 MHz

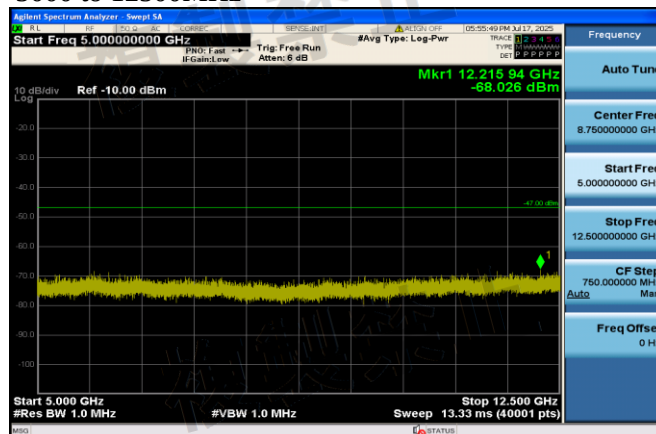
10 to 1000MHz



1000 to 5000MHz



5000 to 12500MHz



9.6 Dwell Time

ON/OFF

