REPORT No.: SZ25110224W01

TEST REPORT

APPLICANT	:	Twelve South, LLC
PRODUCT NAME	:	AirFly Pro 2
MODEL NAME	:	AFP2
BRAND NAME	:	twelve south
STANDARD(S)	:	MIC Notice No.88 Annex 43
RECEIPT DATE	:	2025-11-28
TEST DATE	:	2025-12-03 to 2025-12-26
ISSUE DATE	:	2026-01-16

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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Change History		
Version	**Date**	**Reason for change**
1.0	2026-01-16	First edition

1. Summary of Test Results

No.	Description of Test	Test Engineer	Result	Remark
1	Frequency Error	Lin Haoyang	PASS	/
2	Dwell Time	Lin Haoyang	PASS	/
3	Occupied Bandwidth	Lin Haoyang	PASS	/
4	Unwanted Emission Intensity	Lin Haoyang	PASS	/
5	Antenna Power Error	Lin Haoyang	PASS	/
6	Limitation of Collateral Emission of Receiver	Lin Haoyang	PASS	/
7	E.I.R.P.	Lin Haoyang	PASS	/
8	Radiation Angle of Antenna	Lin Haoyang	PASS	/
9	Radio Interference Prevention Capability	Lin Haoyang	PASS	/
10	Construction Protection Confirmation	N/A	PASS	/

Note 1: Any additions, deviation, or exclusions from the method shall be noted in the “Remark”.

1.1. Testing Applied Methods

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

• MIC Notice No.88 Annex 43

• Certification of technical standard conformity for specified radio equipment, etc. Article 2 Paragraph 1 of Item 19

• Radio Equipment Regulations Article 49-20

1.2. Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Due Date	Cal. Body	Cal. Method
EXA Signal Analyzer	Agilent	N9010A	MY5347 0836	2025.01.15	2026.01.14	SMQ	c
DC Power Supply	IVYTECH	IV3610	1709D36 1010	2025.09.03	2026.09.02	CCIC	c
Power Sensor	Agilent	U2021XA	MY5418 0008	2025.09.03	2026.09.02	CCIC	c
Radio Communication Tester	R&S	CMW500	108950	2025.01.06	2026.01.05	CCIC	c

Note 1: The equipment were calibrated by CCIC (Shenzhen) Metrology&Testing Service Co.,Ltd and Shenzhen Academy of Metrology and Quality Inspection.

Note 2: Calibration Method:

a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1);

b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992);

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);

d) Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c).

1.3. Measurement Uncertainty

No.	Test Items	Uncertainty	Remark
1	Frequency Error / 99% Bandwidth	$\pm 1.75\times 10^{-6}$	Confidence levels of 95%
2	Antenna Power	±1.14dB	Confidence levels of 95%
3	Spurious Emissions(<1GHz)	±2.23dB	Confidence levels of 95%
4	Spurious Emissions(>1GHz)	±1.72dB	Confidence levels of 95%
5	Transmission Antenna Gain	±2.49dB	Confidence levels of 95%

1.4. Testing Laboratory

Laboratory Name	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone	+86 755 36698555
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2. General Description

2.1. Information of Applicant and Manufacturer

Applicant	Twelve South, LLC
Applicant Address	1503 KING ST STE201, Charleston, SC 29405, USA
Manufacturer	Twelve South, LLC
Manufacturer Address	1503 KING ST STE201, Charleston, SC 29405, USA

2.2. Information of EUT

Product Name	AirFly Pro 2		
Sample No.	8#		
Hardware Version	SV03		
Software Version	V026		
Equipment Type	Bluetooth classic		
Bluetooth Version	5.3		
Modulation Technology	FHSS		
Modulation Type	GFSK(BR 1Mbps), π/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)		
Operating Frequency Range	2402MHz – 2480MHz (at interval of 1MHz)		
Channel List	Please refer as chapter 2.4 in this report.		
Power Supply	Type		Battery
	Voltage (V)	Low	3.0
		Rated	**3.7**
		High	4.2

Note 1: The black bold voltage values were selected for test, about the voltage fluctuation evaluation, please refer as chapter 2.6.2 in this report.

Note 2: The EUT description presented in the report are provided by applicant and/or manufacturer, and the test laboratory is not responsible for the accuracy of the information. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

2.3. Information of Antenna

Antenna Manufacturer	N/A
Brand Name	N/A
Model Name	N/A
Antenna Type	Chip Antenna
Antenna Gain	2.70dBi

2.4. Channel List of EUT

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		

Note 1: The black bold channels were selected for test.

2.5. Test Configuration of EUT

2.5.1. Evaluation of The Worst Case

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel
Frequency Error	Unmodulated Single Carrier	0/39/78
Occupied Bandwidth	GFSK, π/4-DQPSK, 8-DPSK	Hopping
Dwell Time		Hopping
Unwanted Emission Intensity		0/39/78
Antenna Power and Antenna Power Error		0/39/78
Limitation of Collateral Emission of Receiver		0/39/78
Transmission Radiation Angle Width		0/39/78
Radio Interference Prevention Capability		Normal Use

2.5.2. Operation and Transmitter Power Setting

The EUT was tested while in a continues transmitter/receiver mode under the control of tool which is provided by manufacturer, all the items of transmitter were tested under the power setting as below:

Mode	Data Rate	Channel	Power Setting
Unmodulated Single Carrier	-	0/39/78	Default
GFSK	1Mbps	0/39/78	Default
π/4-DQPSK	2Mbps	0/39/78	Default
8-DPSK	3Mbps	0/39/78	Default

2.6. Test Conditions

2.6.1.Environment Condition

Temperature (°C)	20.6
Relative Humidity (%)	46

2.6.2.Power Supply Voltage Fluctuation

During the input supply voltage to the EUT from the external power source is varied by +/- 10%, the output voltage had been confirmed that the fluctuation of power supply to the RF unit of EUT is equal to or less +/- 1%.

Power Supply		**External Voltage V_E(V)**			**Internal Voltage V_I**		
		V_{EN}	**V_{EL}/V_{EH}**		**V_{IN}(V)**	**V_{IE}(V)**	**Variation of V_I**
Type1	Battery	3.7	V_{EL}	3.330	3.3	3.289	0.33%
			V_{EH}	4.070		3.307	0.21%

V_{EN}: Normal Voltage

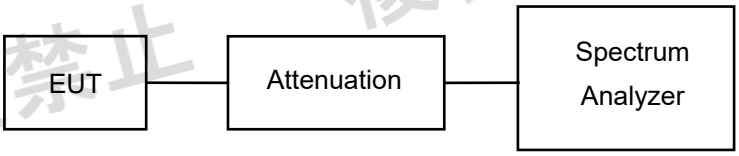
V_{EL}: V_{EL} is the declared low voltage provided that V_{EN}*90% is less than the declared low voltage, otherwise it is V_{EN}*90%

V_{EH}: V_{EH} is the declared high voltage provided that V_{EN}*110% is larger than the declared high voltage, otherwise it is V_{EN}*110%

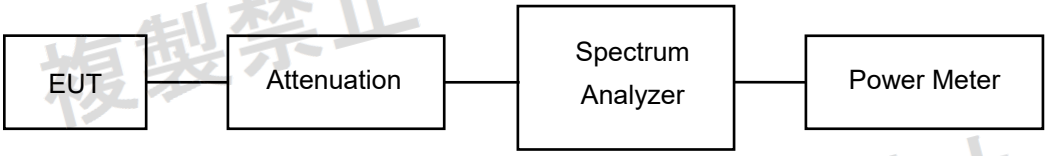
V_{IN}: The voltage supply to the radio unit.

2.7. Test Setup Layout Diagram

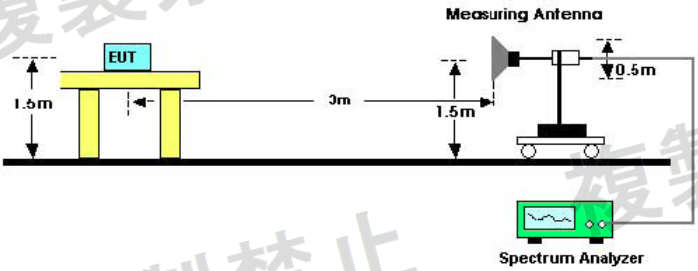
2.7.1.General Measurement



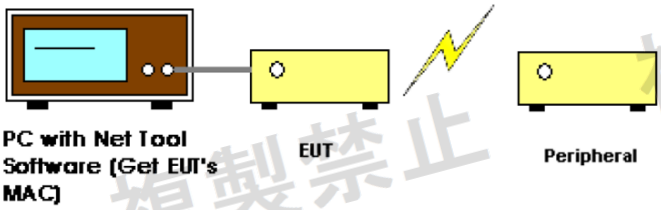
2.7.2.Antenna Power Measurement



2.7.3.Radiation Angle of Antenna



2.7.4.Radio Interference Prevention Capability Measurement



3. Description of Test Items

3.1. Frequency Error

3.1.1.Limits

Within +/-50ppm.

3.1.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.1.3.Test Setup Layout

Refer to chapter 2.7.1 in this report.

3.1.4.Test Deviation

There is no deviation with the original standard.

3.1.5.Test Results

Refer to Annex A.1 in this report.

3.2. Dwell Time

3.2.1.Limits

The dwell time is the time spent at a particular frequency during any single hop.
The maximum dwell time shall be 0.4 s.

3.2.2.Test Procedures

According to MIC Notice No.88 Annex 43.

Hopping Period	Calculation Formula of Dwell Time
31.6 s	0.4*Spread Factor/Hopping Period*Single Pulse Time*Number of times occupied in 31.6 s
Can not be determined	Spread Factor*Single Pulse Time*Number of times occupied in 0.4 s

The value of spread factor is obtained by dividing the spreading bandwidth by the frequency equal to the transmission speed of the modulated signal.

3.2.3.Test Setup Layout

Refer to chapter 2.7.1 in this report.

3.2.4.Test Deviation

There is no deviation with the original standard.

3.2.5.Test Results

Refer to Annex A.2 in this report.

3.3. Occupied Bandwidth

3.3.1.Limits

Item	Type	Limits
Occupied Bandwidth	FHSS	≤83.5MHz
	DSSS	≤26MHz
	OFDM	
	Other	

3.3.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.3.3.Test Setup Layout

Refer to chapter 2.7.1 in this report.

3.3.4.Test Deviation

There is no deviation with the original standard.

3.3.5.Test Results

Refer to Annex A.3 in this report.

3.4. Unwanted Emission Intensity

3.4.1.Limits

Frequency Range	Limits
30MHz-1000MHz	≤0.25 μW/100kHz
1000MHz-2387MHz	≤2.5 μW/MHz
2387MHz-2400MHz	≤25 μW/MHz
2483.5MHz-2496.5MHz	≤25 μW/MHz
2496.5MHz-12500MHz	≤2.5 μW/MHz

3.4.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.4.3.Test Setup Layout

Refer to chapter 2.7.1 in this report.

3.4.4.Test Deviation

There is no deviation with the original standard.

3.4.5.Test Results

Refer to Annex A.4 in this report.

Note1: The spurious emissions mask that displayed on the plots is composed of several frequency ranges below:

Range	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Detector Type	Trace Mode	Limit (μW)
1	30	1000	100kHz	100kHz	Peak	Max Hold	0.25
2	1000	2387	1MHz	1MHz	Peak	Max Hold	2.5
3	2387	2400	1MHz	1MHz	Peak	Max Hold	25
4	2400	2483.5	1MHz	1MHz	Peak	Max Hold	20000
5	2483.5	2496.5	1MHz	1MHz	Peak	Max Hold	25
6	2496.5	12500	1MHz	1MHz	Peak	Max Hold	2.5

Note 2: Only the spurious with the minimum margin from the limit line will be displayed in the mark table (The lower window on the test plots).

3.5. Antenna Power Error

3.5.1.Limits

Type	Frequency Range	Limits	
		Antenna Power Density	Antenna Power Error
FHSS	2427-2470.75 MHz	≤3 mW/MHz	≤+20%
	2400-2483.5 MHz (except 2427-2470.75 MHz)	≤10 mW/MHz	
DSSS	2400-2483.5 MHz	≤10 mW/MHz	
OFDM	2400-2483.5 MHz	≤10 mW/MHz (20MHz System) ≤5 mW/MHz (40MHz System)	
Other	2400-2483.5 MHz	≤10 mW	

3.5.1.Test Procedures

According to MIC Notice No.88 Annex 43.

3.5.2.Test Setup Layout

Refer to chapter 2.7.2 in this report.

3.5.3.Test Deviation

There is no deviation with the original standard.

3.5.4.Test Results

Refer to Annex A.5 in this report.

3.6. Limitation of Collateral Emission of Receiver

3.6.1.Limits

Frequency Range	Limits
30MHz-1000MHz	≤4nW/100kHz
1000MHz-12500MHz	≤20nW/MHz

3.6.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.6.3.Test Setup Layout

Refer to chapter 2.7.1 in this report.

3.6.4.Test Deviation

There is no deviation with the original standard.

3.6.5.Test Results

Refer to Annex A.6 in this report.

Note 1: The spurious emissions mask that displayed on the plots is composed of several frequency ranges below:

Range	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Detector Type	Trace Mode	Limit (nW)
1	30	1000	100kHz	100kHz	Peak	Max Hold	4
2	1000	12500	1MHz	1MHz	Peak	Max Hold	20

Note 2: Only the spurious with the minimum margin from the limit line will be displayed in the mark table (The lower window on the test plots).

3.7. E.I.R.P.

3.7.1.Limits

Type	Frequency Range	Limits
FHSS	2427-2470.75 MHz	6.91-16.91dBm/MHz
	2400-2483.5 MHz (except 2427-2470.75 MHz)	12.14-22.14dBm/MHz
DSSS	2400-2483.5 MHz	12.14-22.14dBm/MHz
OFDM	2400-2483.5 MHz	12.14-22.14dBm/MHz (20MHz System) 9.13-19.13dBm/MHz (40MHz System)
Other	2400-2483.5 MHz	12.14-22.14dBm (GFSK) 10dBm (except GFSK)

Note: This item not be applied to the transmission antenna which has a gain of 2.14dBi or less

3.7.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.7.3.Test Setup Layout

Refer to chapter 2.7.2 in this report.

3.7.4.Test Deviation

There is no deviation with the original standard.

3.7.5.Test Results

Refer to Annex A.7 in this report.

3.8. Radiation Angle of Antenna

3.8.1.Limits

Type	Limits
FHSS	360° /A; (A= E.I.R.P./ 6.91, if A<1; then A=1)
DSSS	360° /A; (A= E.I.R.P./ 12.14, if A<1; then A=1)
OFDM	
Other	

Note: This item not be applied to the transmission antenna which has a gain of 2.14dBi or less

3.8.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.8.3.Test Setup Layout

Refer to chapter 2.7.3 in this report.

3.8.4.Test Deviation

There is no deviation with the original standard.

3.8.5.Test Results

Refer to Annex A.8 in this report.

3.9. Radio Interference Prevention Capability

3.9.1.Limits

The one automatically to transmit and to receive identification code with the wireless equipment of the wireless station used in the same premises.

3.9.2.Test Procedures

According to MIC Notice No.88 Annex 43.

3.9.3.Test Setup Layout

Refer to chapter 2.7.4 in this report.

3.9.4.Test Deviation

There is no deviation with the original standard.

3.9.5.Test Results

Refer to Annex A.9 in this report.

3.10. Construction Protection Confirmation Method

3.10.1.Limits

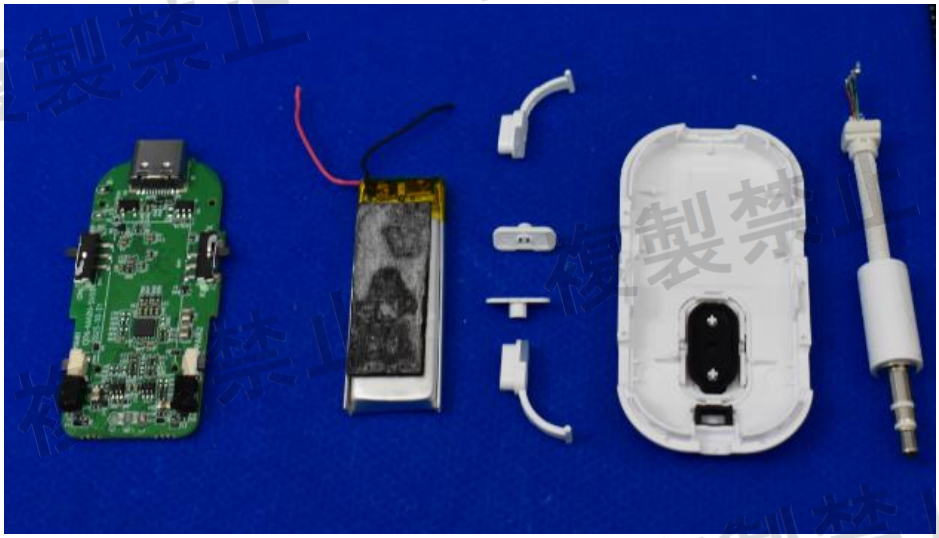
The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

3.10.2.Confirmation Method

The RF and modulation portions are protected against illegal modification as following method:

Protected Method	Description
Surface Mount Technology	RF and Modulation part are mounted on PCB with surface mount technology and there are no any adjustable parts on PCB or adjustable parts are not exposed.

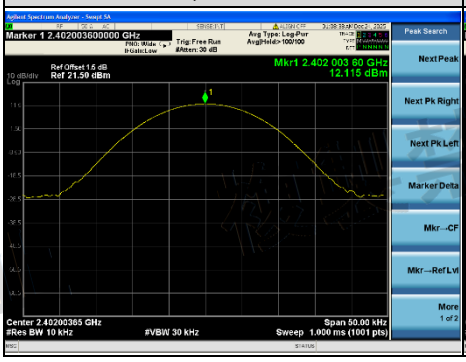
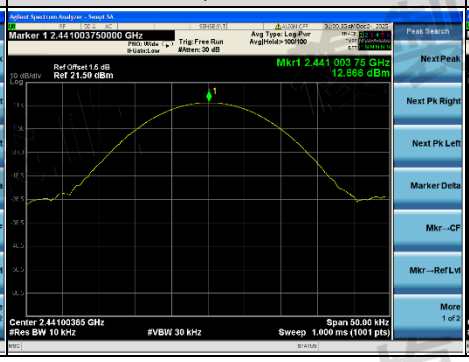
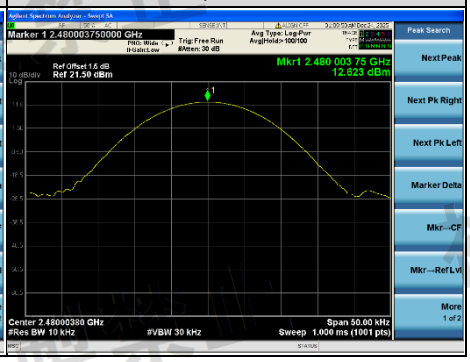
3.10.3.Reference Documents

Reference Documents	Item
Photo	

Annex A Test Data and Results

A.1. Frequency Error

Channel	Frequency f_c (MHz)	Test Frequency f (MHz)	Frequency Error (ppm)	Verdict
0	2402	2402.0036	1.50	PASS
39	2441	2441.0038	1.56	PASS
78	2480	2480.0038	1.53	PASS

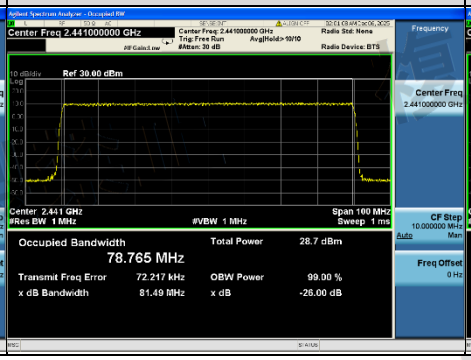
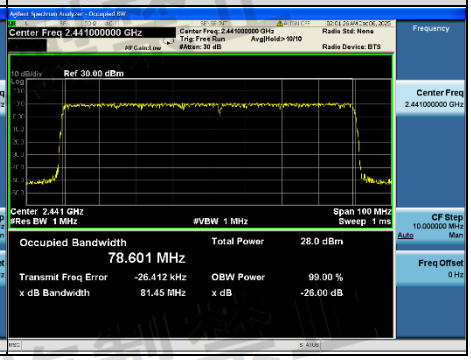
CH0, 2402MHz	CH39, 2441MHz	CH78, 2480MHz
		

A.2. Dwell Time

Test Mode	Freq. (MHz)	Package Mode	Hopping Period (s)	Single Pulse Time (ms)	Number of times occupied in 31.6s	Dwell Time (s)	Limit (s)	Verdict
GFSK	2402	DH5	31.6	2.880	9	0.234	0.4	PASS
π/4-DQPSK	2402	2-DH5	31.6	2.880	12	0.156		PASS
8-DPSK	2402	3-DH5	31.6	2.880	19	0.165		PASS

A.3. Occupied Bandwidth

Test Mode	99% Occupied Bandwidth (MHz)	Verdict
GFSK	78.614	PASS
π/4-DQPSK	78.765	PASS
8-DPSK	78.601	PASS

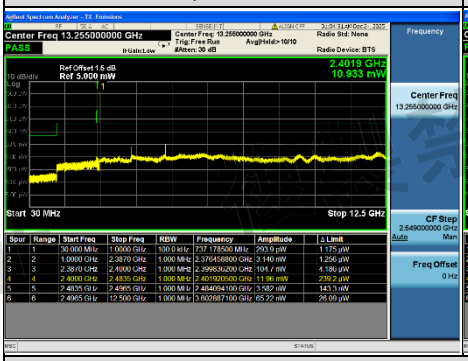
99%, GFSK	99%, π/4-DQPSK	99%, 8-DPSK
		

A.4. Unwanted Emission Intensity

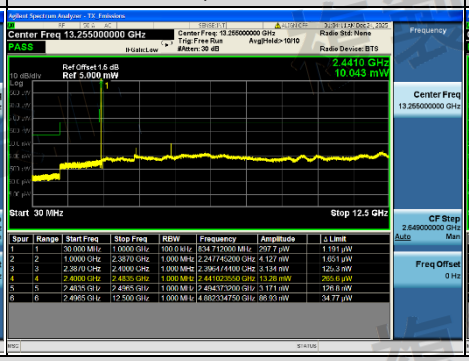
Mode	Frequency Range (MHz)	Test Result Value	Limit	Verdict
GFSK, π/4-DQPSK, 8-DPSK	30~1000	Refer to below plot	0.25μW/100kHz	PASS
	1000~2387		2.5μW/MHz	PASS
	2387~2400		25μW/MHz	PASS
	2483.5~2496.5		25μW/MHz	PASS
	2496.5~12500		2.5μW/MHz	PASS

GFSK

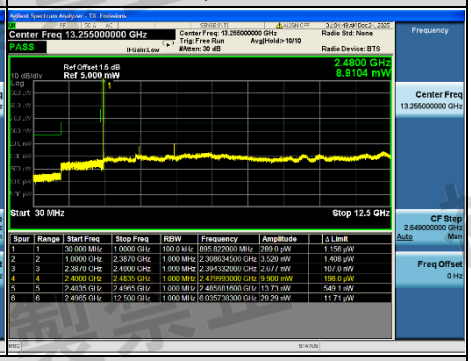
CH0, 2402MHz



CH39, 2441MHz

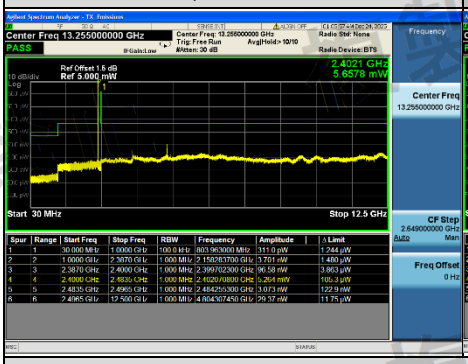


CH78, 2480MHz

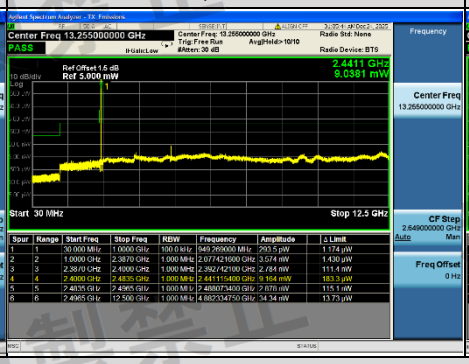


π/4-DQPSK

CH0, 2402MHz



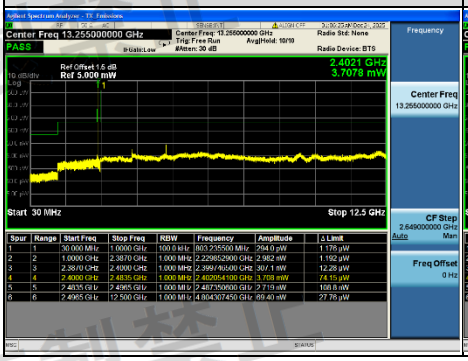
CH39, 2441MHz



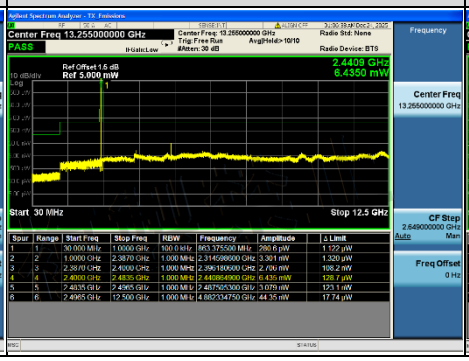
CH78, 2480MHz

8-DPSK

CH0, 2402MHz



CH39, 2441MHz



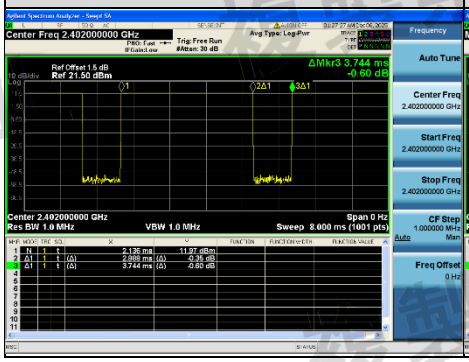
CH78, 2480MHz

A.5. Antenna Power Error

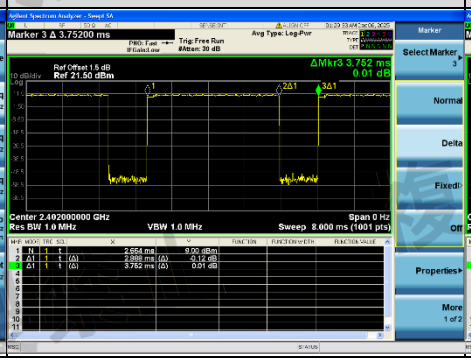
Mode	Power Test Value (dBm)	Spread spectrum BW (MHz)	Duty Factor	Antenna Power Density PD		Declare Power (mW/MHz)	Antenna Power Error	Verdict
				(dBm/MHz)	(mW/MHz)			
GFSK	11.44	71.23	1.13	-5.96	0.254	0.3	-15.33%	PASS
π/4-DQPSK	8.55	71.50	1.14	-8.85	0.130	0.3	-56.67%	PASS
8-DPSK	8.57	71.26	1.14	-8.82	0.131	0.3	-56.33%	PASS

Duty Cycle

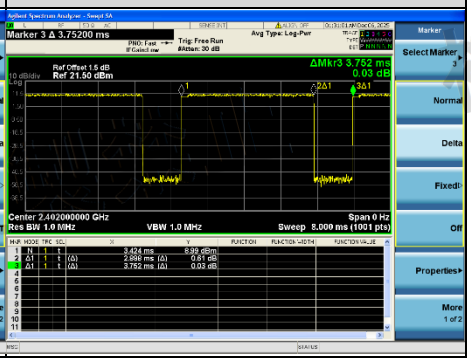
GFSK



π/4-DQPSK

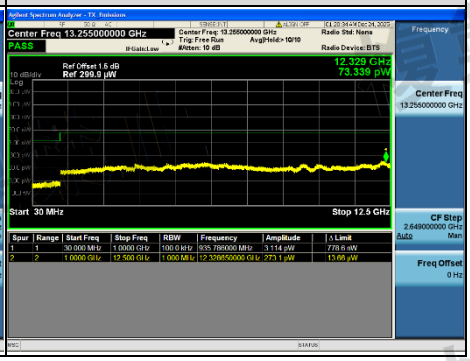


8-DPSK



A.6. Limitation of Collateral Emission of Receiver

Mode	Frequency Range (MHz)	Test Result Value	Limit	Verdict
Receive	30~1000	Refer to below plot	4nW/100kHz	PASS
	1000~12500		20nW/MHz	PASS

CH0, 2402MHz	CH39, 2441MHz	CH78, 2480MHz
		

A.7. E.I.R.P.

Test Mode	Measured E.I.R.P. (dBm/MHz)	Limit (dBm/MHz)	Verdict
GFSK	-3.26	12.70	PASS
π/4-DQPSK	-6.15		PASS
8-DPSK	-6.12		PASS

A.8. Radiation Angle of Antenna

Test Mode	3dB Beamwidth (Degree)	Limit (Degree)	Verdict
GFSK	85	360	PASS
π/4-DQPSK	87		PASS
8-DPSK	84		PASS

A.9. Radio Interference Prevention Capability

The identification code of the EUT is: 00025B00FF01

END OF REPORT