

TEST REPORT

Report number : KR23-SRT0039
Issue date : 2023.08.09

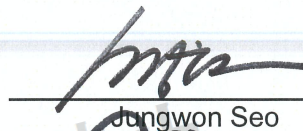
Applicant	: THINKWARE CORPORATION A, 9FL., Samwhan Hipex, 240, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea TEL : +82 2-589-9425 FAX : +82 2-589-9600
Equipment under test (EUT)	: Rear camera
Model name	: BCQH-500
Test procedure	: 特小移動体検知センサー (24.15GHz) 特定無線設備の技術基準適合証明等に関する規則 第2条第1項第8号の無線設備
Test method	: 総務省告示第88号別表第22第16(告示13項)
Date of test	: 2023-07-24 ~ 2023-07-26
Test place	: Eurofins KCTL Co., Ltd. 65 Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi- do, Korea
Test results	: PASS

The results in this report are applicable only to the equipment tested.

This report shall not be re-produced except in full without the written approval of **Eurofins KCTL Co., Ltd.**

Eurofins KCTL Co., Ltd. is in compliance with KS Q ISO 17025.

Tested by;


Jungwon Seo

Approved by;


Heesu Ahn

1. Summary of Test

1. Purpose of test

Ordinance on Technical Standards Conformity Certification of Specified Radio Equipment
24.15 GHz Band Moving object detection sensor

2. Standards

Certification Ordinance 23 証明規則第2条第1項第8号に掲げる無線設備, 同号第13項に該当する無線設備

1) Test Methods

Ministry of Internal Affairs and Communications Notification Article 23 Appendix 22-16

2) Deviation from standards

None

3. List of applied test to the EUT

Article 23 Appendix 22-16	Classification of EUT	Condition	Result
4	Frequency Tolerance	Radiated	PASS
4	Occupied Bandwidth	Radiated	PASS
6	RF Output Power Tolerance	Radiated	PASS
5	Unwanted (Spurious) Emission Strength	Radiated	PASS
7	Secondarily Emitted Radio Wave Strength	Radiated	N/T

1) Note : If you can not only received in the operational state of the device, and are not tested.

2) Test set up

Table-Top

3) Modification to the EUT by laboratory

None

1. Test Information

1. Applicant

THINKWARE CORPORATION

A, 9FL., Samwhan Hipex, 240, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea

2. Equipment under test

Rear camera

3. Model number

BCQH-500

4. Serial number

N/A

5. Size

(W) 79.3 mm x (D) 36.9 mm x (H) 31.9 mm

6. Terminal limitation

-10°C to 60°C

7. RF Specification Frequency range

24.05 to 24.25 GHz

8. Number of RF Channels

3Channels

9. Modulation method

CW

10. Data rate

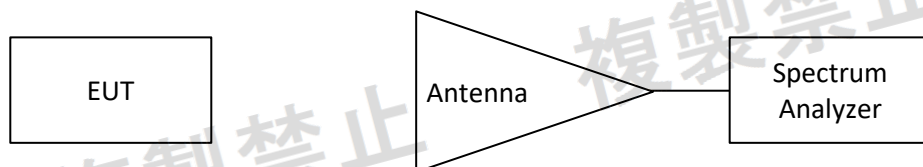
None

11. Variation of the family model(s)

None

2. Configuration of equipment

1. Frequency tolerance, Occupied bandwidth, Unwanted(Spurious) Emission Strength, RF Output Power



3. Test results (Rated voltage)

S/N : N/A

Environment of test room	Date of test	2023-07-24	2023-07-25	2023-07-26
	Temperature	23.3 °C	23.5 °C	22.9 °C
	Humidity	50.3 %	49.4 %	55.5 %

Peak Antenna Gain	2.00	dBi
Declaration Output Power	0.70	mW
	-1.55	dBm
E.I.R.P.	0.45	dBm
Input Power Voltage	3.30	VDC

Tested Circuit Insertion Loss		0	dB
Transmission Time	ON TIME (1sec or less)	-Not applicable-	sec
	OFF TIME (0.1sec or more)	-Not applicable-	sec
	Ratio	-Not applicable-	%
Packet Type (Mode)		-Not applicable-	mode

Test category ;	Specified low power radio equipment (Moving body detection sensors)
The reason why the tests are performed only at rated voltage;	

Channel Number			Ch.	1	2	3	Result	Limit	Note
Frequency Measurements			GHz	24.06	24.15	24.24	---	---	
Frequency Tolerance	Normal state	Lower	GHz	24.0545	24.1442	24.2337	PASS	24.05GHz or more	
		Upper		24.0643	24.1537	24.2433	PASS	24.25GHz or below	
	After the vibration test	Lower	GHz	24.0546	24.1439	24.2340	PASS	24.05GHz or more	
		Upper		24.0641	24.1538	24.2433	PASS	24.25GHz or below	
	After the test temperature (-20 ℃)	Lower	GHz	24.0545	24.1440	24.2338	PASS	24.05GHz or more	
		Upper		24.0644	24.1539	24.2432	PASS	24.25GHz or below	
	After the test temperature (50 ℃)	Lower	GHz	24.0547	24.1441	24.2338	PASS	24.05GHz or more	
		Upper		24.0644	24.1541	24.2433	PASS	24.25GHz or below	
	After the humidity test 35 ℃、-95%	Lower	GHz	24.0544	24.1436	24.2338	PASS	24.05GHz or more	
		Upper		24.0650	24.1549	24.2431	PASS	24.25GHz or below	
Occupied Bandwidth			MHz	9.801	9.481	9.618	PASS	200MHz or below	
RF Output Power			mW	0.798	0.682	0.714	PASS	20mW or below	
RF Output Power Tolerance			%	13.999	-2.523	2.071	PASS	+50 to -50%	

Unwanted (Spurious) Emission Strength	30 to 1000MHz	uW	0.013	0.017	0.014	PASS	2.5uW or below	
		MHz	37.412	37.462	38.407	-----		
	1 to 18GHz	uW	0.008	0.008	0.009	PASS	2.5uW or below	
		MHz	17556.230	17105.490	17114.210	-----		
	18 to 23.65GHz	uW	0.003	0.003	0.003	PASS	2.5uW or below	
		MHz	19084.800	18751.450	19395.550	-----		
	24.65GHz to 40GHz	uW	0.003	0.007	0.010	PASS	2.5uW or below	
		MHz	36408.000	37007.000	35763.000	-----		
	40GHz to 49GHz *4	uW				PASS	2.5uW or below	
		MHz				-----		
Secondarily Emitted Radio Wave Strength (RX Spurious Emission)	30 to 1000MHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	1 to 18GHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	18 to 40GHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	40 to 49GHz *3, *4	uW				PASS	2.5uW or below	
		MHz				-----		

*1: Except to 24.25GHz from 24.05GHz.

*2: If not the state of the non-modulated continuous wave in the operational state of the device does not perform the measurement.

*3: If you can not only received in the operational state of the device, and are not tested.

*4: No spurious detected.

*5 The test was performed in the Fully-Anechoic Chamber(FAC) to which the substitution method was applied.

3. Test results (-10% voltage)

S/N : N/A

Environment of test room	Date of test	2023-07-24	2023-07-25	2023-07-26
	Temperature	23.3 °C	23.5 °C	22.9 °C
	Humidity	50.3 %	49.4 %	55.5 %

Peak Antenna Gain	2.00	dBi
Declaration Output Power	0.70	mW
	-1.55	dBm
E.I.R.P.	0.45	dBm
Input Power Voltage	2.97	VDC

Tested Circuit Insertion Loss		0	dB
Transmission Time	ON TIME (1sec or less)	-Not applicable-	sec
	OFF TIME (0.1sec or more)	-Not applicable-	sec
	Ratio	-Not applicable-	%
Packet Type (Mode)		-Not applicable-	mode

Test category ;	Specified low power radio equipment (Moving body detection sensors)
The reason why the tests are performed only at rated voltage;	

Channel Number			Ch.	1	2	3	Result	Limit	Note
Frequency Measurements			GHz	24.06	24.15	24.24	---	---	
Frequency Tolerance	Normal state	Lower	GHz	24.0546	24.1440	24.2335	PASS	24.05GHz or more	
		Upper		24.0642	24.1541	24.2436	PASS	24.25GHz or below	
	After the vibration test	Lower	GHz	24.0544	24.1444	24.2338	PASS	24.05GHz or more	
		Upper		24.0642	24.1535	24.2434	PASS	24.25GHz or below	
	After the test temperature (-20 °C)	Lower	GHz	24.0548	24.1439	24.2336	PASS	24.05GHz or more	
		Upper		24.0640	24.1538	24.2435	PASS	24.25GHz or below	
	After the test temperature (50 °C)	Lower	GHz	24.0544	24.1439	24.2338	PASS	24.05GHz or more	
		Upper		24.0642	24.1543	24.2431	PASS	24.25GHz or below	
	After the humidity test 35 °C、-95%	Lower	GHz	24.0543	24.1440	24.2338	PASS	24.05GHz or more	
		Upper		24.0658	24.1540	24.2432	PASS	24.25GHz or below	
Occupied Bandwidth			MHz	9.617	10.120	10.052	PASS	200MHz or below	
RF Output Power			mW	0.670	0.684	0.713	PASS	20mW or below	
RF Output Power Tolerance			%	-4.302199	-2.298336	1.836147	PASS	+50 to -50%	

Unwanted (Spurious) Emission Strength	30 to 1000MHz	uW	0.014	0.015	0.015	PASS	2.5uW or below	
		MHz	33.980	36.069	37.860	-----		
	1 to 18GHz	uW	0.009	0.008	0.009	PASS	2.5uW or below	
		MHz	17302.530	16902.350	17809.940	-----		
	18 to 23.65GHz	uW	0.004	0.003	0.003	PASS	2.5uW or below	
		MHz	19700.650	19079.150	18943.550	-----		
	24.65GHz to 40GHz	uW	0.007	0.007	0.007	PASS	2.5uW or below	
		MHz	36470.000	36592.000	36485.000	-----		
	40GHz to 49GHz *4	uW				PASS	2.5uW or below	
		MHz				-----		
Secondarily Emitted Radio Wave Strength (RX Spurious Emission)	30 to 1000MHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	1 to 18GHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	18 to 40GHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	40 to 49GHz *3, *4	uW				PASS	2.5uW or below	
		MHz				-----		

*1: Except to 24.25GHz from 24.05GHz.

*2: If not the state of the non-modulated continuous wave in the operational state of the device does not perform the measurement.

*3: If you can not only received in the operational state of the device, and are not tested.

*4: No spurious detected.

*5 The test was performed in the Fully-Anechoic Chamber(FAC) to which the substitution method was applied.

3. Test results (+10% voltage)

S/N : N/A

Environment of test room	Date of test	2023-07-24	2023-07-25	2023-07-26
	Temperature	23.3 °C	23.5 °C	22.9 °C
	Humidity	50.3 %	49.4 %	55.5 %

Peak Antenna Gain	2.00	dBi
Declaration Output Power	0.70	mW
	-1.55	dBm
E.I.R.P.	0.45	dBm
Input Power Voltage	3.63	VDC

Tested Circuit Insertion Loss		0	dB
Transmission Time	ON TIME (1sec or less)	-Not applicable-	sec
	OFF TIME (0.1sec or more)	-Not applicable-	sec
	Ratio	-Not applicable-	%
Packet Type (Mode)		-Not applicable-	mode

Test category ;	Specified low power radio equipment (Moving body detection sensors)
The reason why the tests are performed only at rated voltage;	

Channel Number			Ch.	1	2	3	Result	Limit	Note
Frequency Measurements			GHz	24.06	24.15	24.24	---	---	
Frequency Tolerance	Normal state	Lower	GHz	24.0547	24.1445	24.2334	PASS	24.05GHz or more	
		Upper		24.0640	24.1533	24.2436	PASS	24.25GHz or below	
	After the vibration test	Lower	GHz	24.0548	24.1445	24.2336	PASS	24.05GHz or more	
		Upper		24.0637	24.1533	24.2436	PASS	24.25GHz or below	
	After the test temperature (-20 °C)	Lower	GHz	24.0547	24.1441	24.2335	PASS	24.05GHz or more	
		Upper		24.0635	24.1537	24.2438	PASS	24.25GHz or below	
	After the test temperature (50 °C)	Lower	GHz	24.0542	24.1440	24.2343	PASS	24.05GHz or more	
		Upper		24.0654	24.1540	24.2426	PASS	24.25GHz or below	
	After the humidity test 35 °C、-95%	Lower	GHz	24.0546	24.1442	24.2336	PASS	24.05GHz or more	
		Upper		24.0651	24.1539	24.2433	PASS	24.25GHz or below	
Occupied Bandwidth			MHz	9.275	8.760	10.199	PASS	200MHz or below	
RF Output Power			mW	0.667	0.771	0.710	PASS	20mW or below	
RF Output Power Tolerance			%	-4.741890	10.129067	1.368253	PASS	+50 to -50%	

Unwanted (Spurious) Emission Strength	30 to 1000MHz	uW	0.014	0.018	0.013	PASS	2.5uW or below	
		MHz	37.412	35.721	38.258	-----		
	1 to 18GHz	uW	0.009	0.009	0.008	PASS	2.5uW or below	
		MHz	17257.190	15679.160	17136.880	-----		
	18 to 23.65GHz	uW	0.004	0.002	0.003	PASS	2.5uW or below	
		MHz	18791.000	18824.900	19186.500	-----		
	24.65GHz to 40GHz	uW	0.006	0.001	0.010	PASS	2.5uW or below	
		MHz	36562.000	36792.000	37314.000	-----		
	40GHz to 49GHz *4	uW				PASS	2.5uW or below	
		MHz				-----		
	23.65 to 24.65GHz *1	uW	0.310	0.001	0.164	PASS	2.5uW or below	
		MHz	24049.000	24479.000	24251.000	-----		
Secondarily Emitted Radio Wave Strength (RX Spurious Emission)	30 to 1000MHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	1 to 18GHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	18 to 40GHz *3	uW				PASS	2.5uW or below	
		MHz				-----		
	40 to 49GHz *3, *4	uW				PASS	2.5uW or below	
		MHz				-----		

*1: Except to 24.25GHz from 24.05GHz.

*2: If not the state of the non-modulated continuous wave in the operational state of the device does not perform the measurement.

*3: If you can not only received in the operational state of the device, and are not tested.

*4: No spurious detected.

*5 The test was performed in the Fully-Anechoic Chamber(FAC) to which the substitution method was applied.

4. Measurement equipment list

USE	Equipment	Company	Model No.	Serial No.	Calibrated by	Cal. Method	Cal. Due	Cal. Date
X	Bilog Antenna	ETS.LINDGREN	3143B	00228420	HCT	ハ(c)	Sep.28.2023	Sep.28.2022
X	Bilog Antenna	Teseq GmbH	CBL 6143A	35039	HCT	ハ(c)	May.10.2024	May.10.2023
X	Horn Antenna	ETS.lindgren	3117	161225	HCT	ハ(c)	May.04.2024	May.04.2023
X	Horn Antenna	ETS.lindgren	3117	227509	HCT	ハ(c)	Sep.20.2023	Sep.20.2022
X	Horn Antenna	ETS.lindgren	3116	00086632	HCT	ハ(c)	Jan.25.2024	Jan.25.2023
X	Horn Antenna	ETS-lindgren	3116C	251516	HCT	ハ(c)	Feb.02.2024	Feb.02.2023
X	Attenuator	WeinschelENGINEERING	10	AJ1239	HCT	ハ(c)	Apr.25.2024	Apr.25.2023
X	Broadband Amplifier	SONOMA INSTRUMENT	315	300314	HCT	ハ(c)	Jan.19.2024	Jan.19.2023
X	Amplifier	Narda-MITEQ	LNAS-55-01001800-22-10p	2265312	HCT	ハ(c)	Feb.03.2024	Feb.03.2023
X	Low Noise Amplifier	L-3 Narda-MITEQ	LNAS-50-18004000-33-5p	2210092	HCT	ハ(c)	Jul.04.2024	Jul.04.2023
X	Signal Generator	R&S	SMB100A	176206	HCT	ハ(c)	Jan.19.2024	Jan.19.2023
X	PXA Signal Analyzer	KEYSIGHT	N9040B	US55230151	HCT	ハ(c)	Jul.03.2024	Jul.03.2023
X	DC Power Supply	AGILENT	E3632A	MY40006352	HCT	ハ(c)	Apr.25.2024	Apr.25.2023
X	Antenna Mast	MATURO	EAS 1.5	042/8941211	HCT	ハ(c)	N/A	N/A
X	Antenna Mast	MATURO	EAS 1.5	043/8941211	HCT	ハ(c)	N/A	N/A
X	Turn Table	MATURO	TT 0.8 PF	041/8941211	HCT	ハ(c)	N/A	N/A
X	Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-1	HCT	ハ(c)	Oct.14.2023	Oct.14.2022
X	Vibration Tester	gana	GNV-500	EMC-TES079	HCT	ハ(c)	Jul.11.2024	Jul.11.2023
X	UXA Signal Analyzer	KEYSIGHT	N9041B	MY60100003	HCT	ハ(c)	Jan. 29, 2024	Jan. 29, 2023
X	Millimeter Wave Source Module	OML, Inc.	S19MS-A	190725-1	HCT	ハ(c)	Oct.26.2023	Oct.26.2022
X	Horn Antenna	OML, Inc.	M19RH	190621-1	HCT	ハ(c)	Aug.18.2023	Aug.18.2022
X	Horn Antenna	OML, Inc.	M19RH	190621-1	HCT	ハ(c)	Oct.28.2023	Oct.28.2022
X	Horn Antenna	OML, Inc.	M19RH	190621-2	HCT	ハ(c)	Aug.18.2023	Aug.18.2022
X	Horn Antenna	OML, Inc.	M19RH	190621-2	HCT	ハ(c)	Oct.28.2023	Oct.28.2022

Note1: "X" used equipment.

Note2: The validity of measurement equipment is one year from the first day of the following month of the calibration date.

Note3: 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 ~.

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 ~

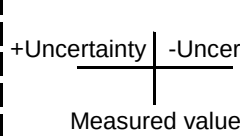
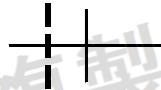
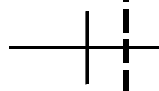
c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1) ~ TELECOM Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.

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

5. Uncertainty

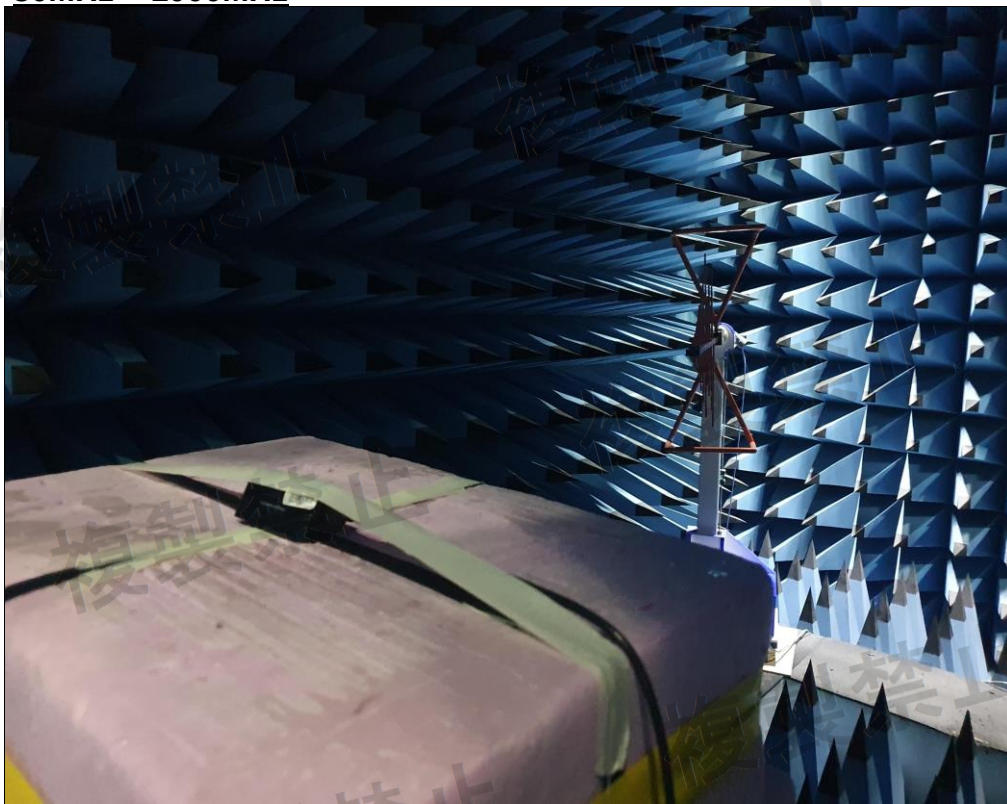
About uncertainty of measured value

Parameter	Uncertainty
Total RF power radiated	$\pm 2.4\text{dB}$
Spurious emissions radiated(Below 30MHz)	$\pm 2.3\text{dB}$
Spurious emissions radiated(30MHz to 1000MHz)	$\pm 2.5\text{dB}$
Spurious emissions radiated(1GHz to 18GHz)	$\pm 4.7\text{dB}$
Spurious emissions radiated(Above 18GHz)	$\pm 4.8\text{dB}$
Temperature	$\pm 0.8^{\circ}\text{C}$
Humidity	$\pm 3.3\%$

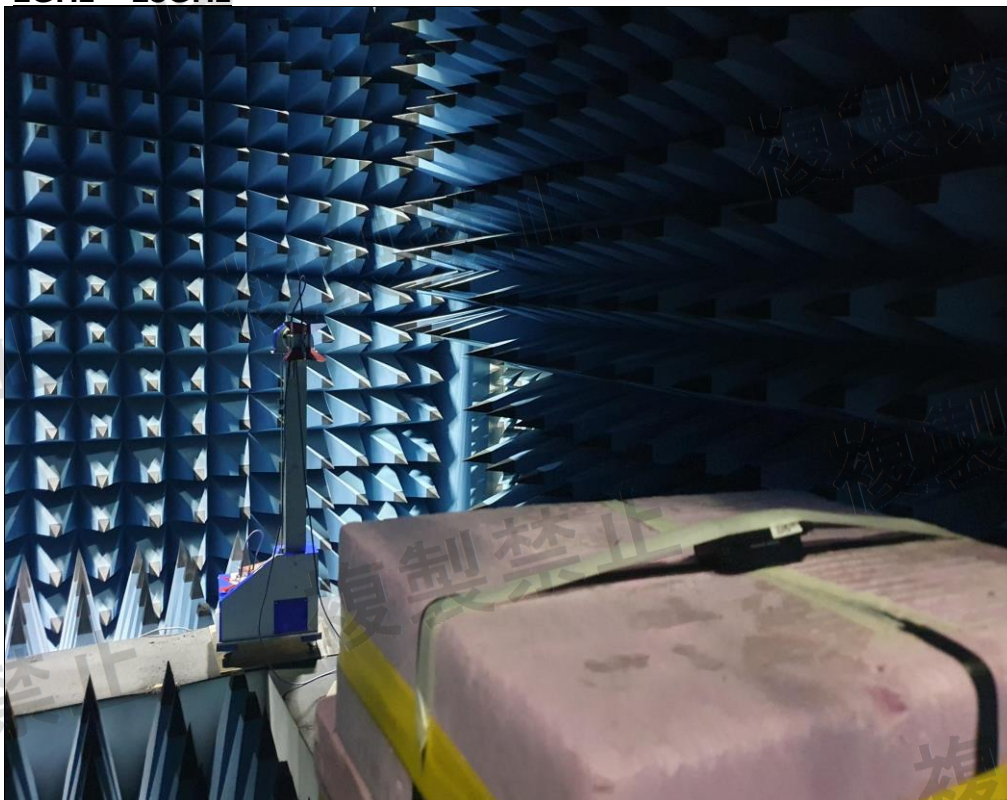
Judge	Measured value and standard limit value	
PASS	Standard limit value Case1  Even if it takes uncertainty into consideration, a standard limit value is fulfilled.	
	Case2  Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.	
FAIL	Case3  Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.	
	Case4  Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.	

6. Photographs

30MHz ~ 1000MHz



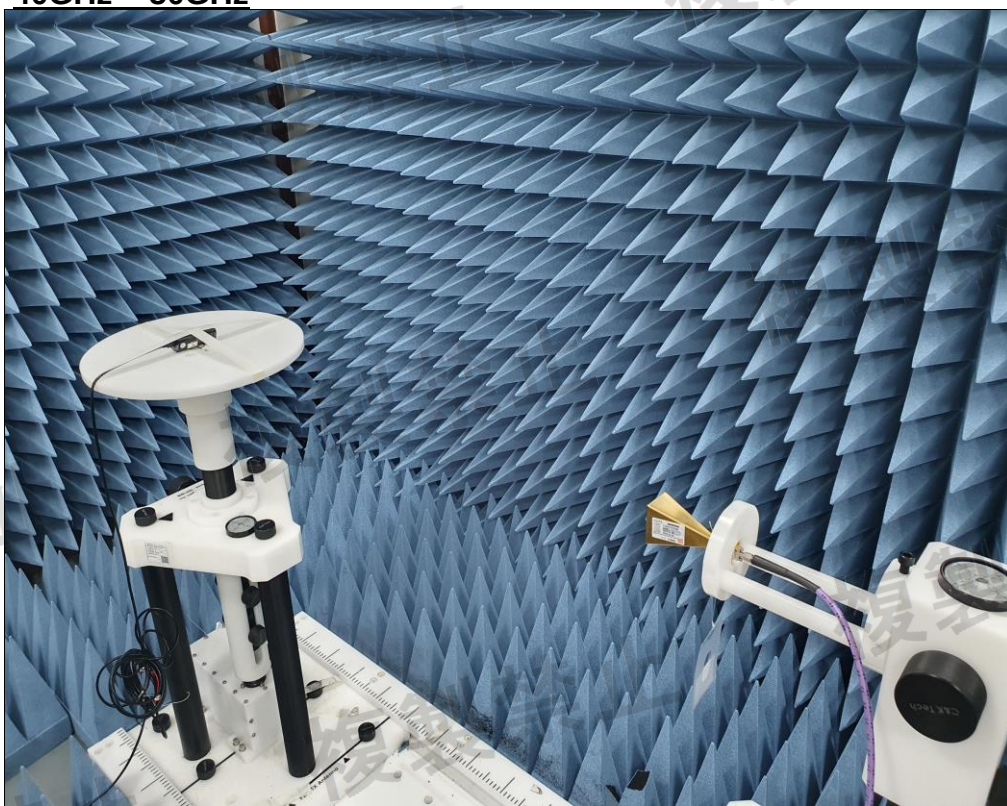
1GHz ~ 18GHz



18GHz ~ 40GHz



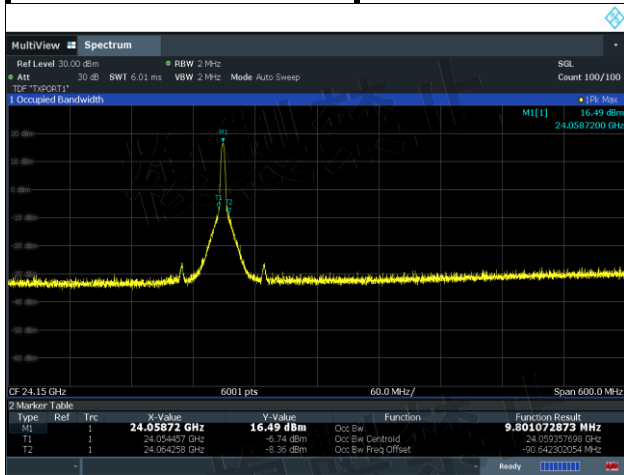
40GHz ~ 50GHz



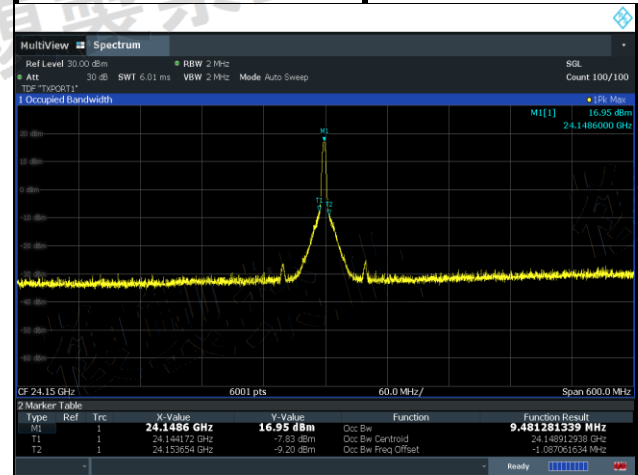
7. Test chart

7.1.1 Frequency tolerance / Occupied Bandwidth (Rated voltage)

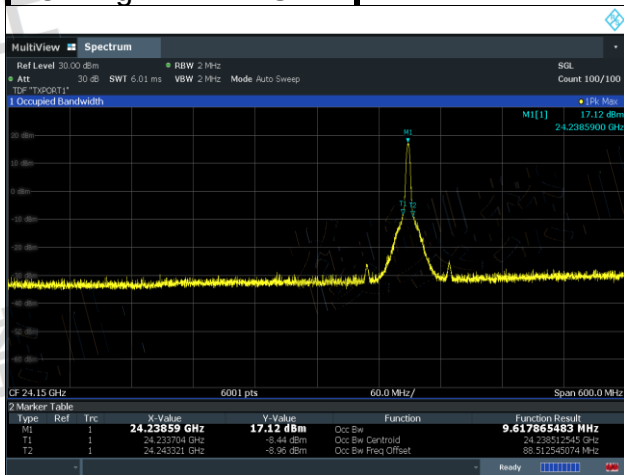
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



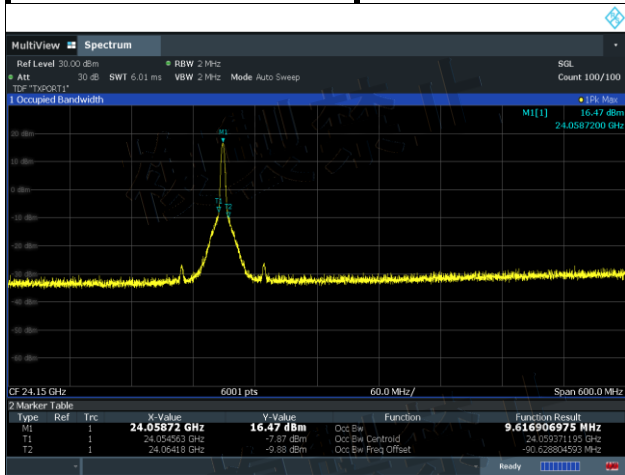
Ch.High : 24.24 GHz



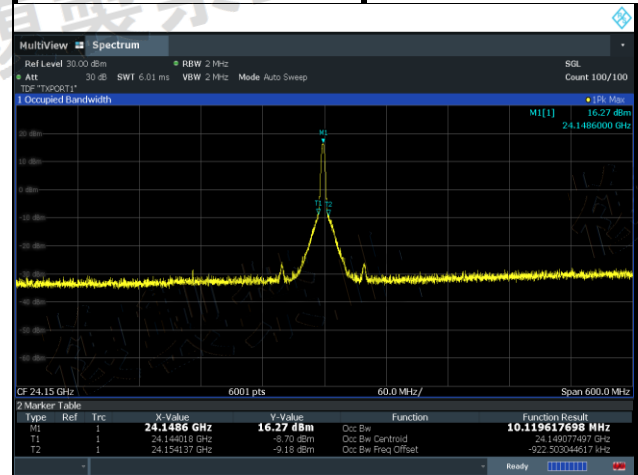
7. Test chart

7.1.1 Frequency tolerance / Occupied Bandwidth (-10% voltage)

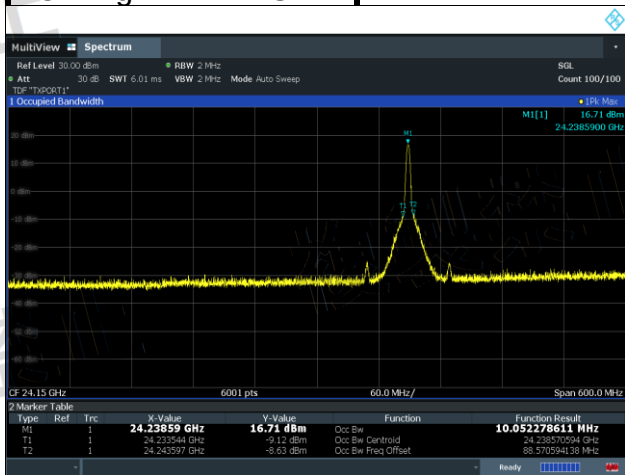
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



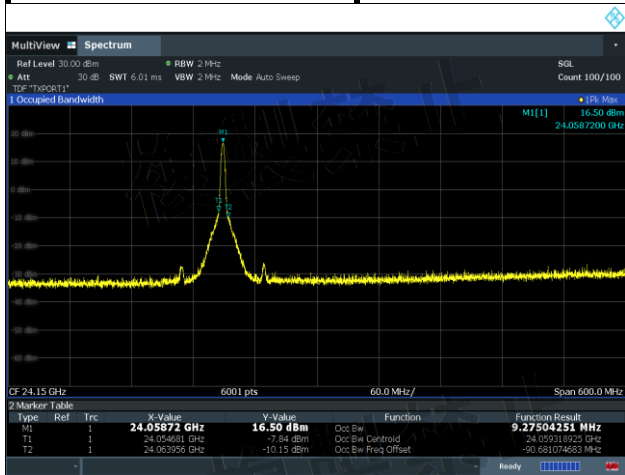
Ch.High : 24.24 GHz



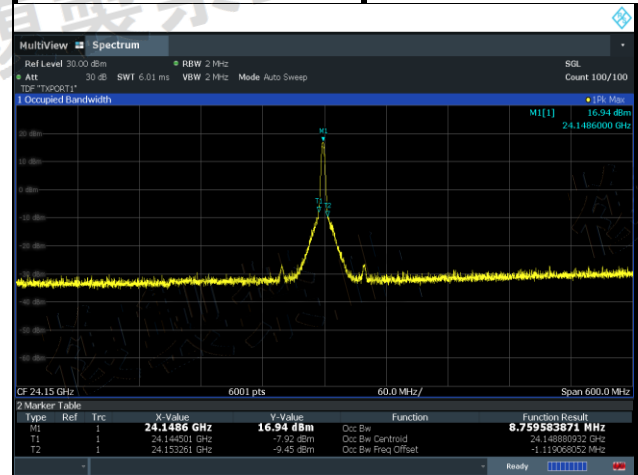
7. Test chart

7.1.1 Frequency tolerance / Occupied Bandwidth (+10% voltage)

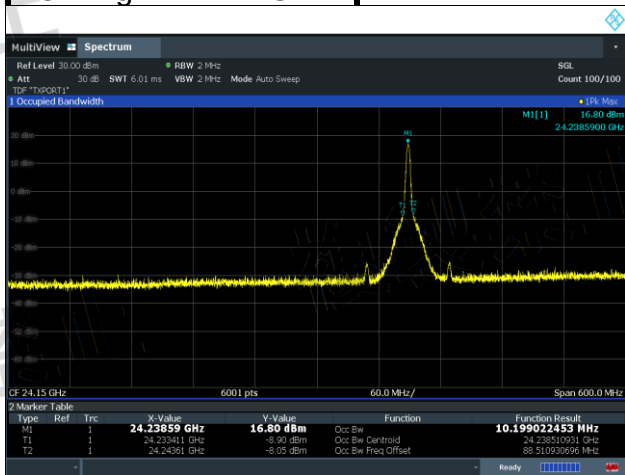
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



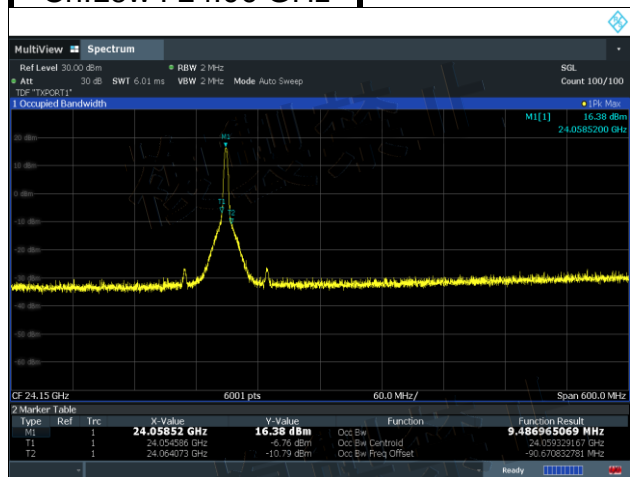
Ch.High : 24.24 GHz



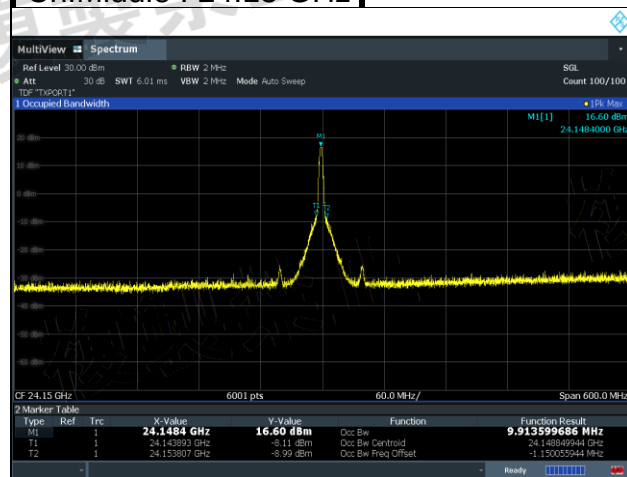
7. Test chart

7.1.2 Frequency Tolerance (After the vibration test) (Rated Voltage)

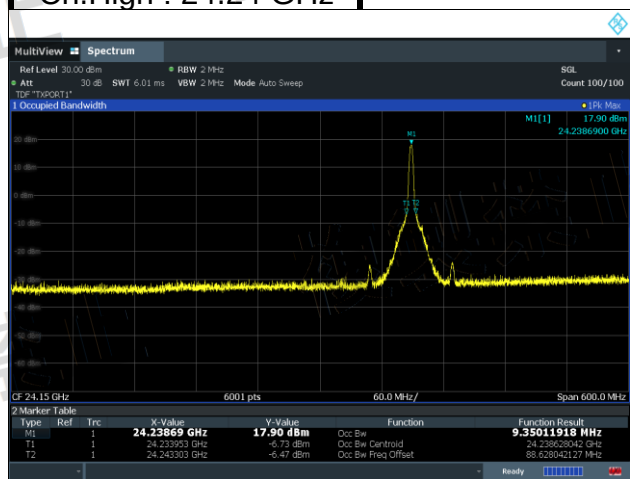
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



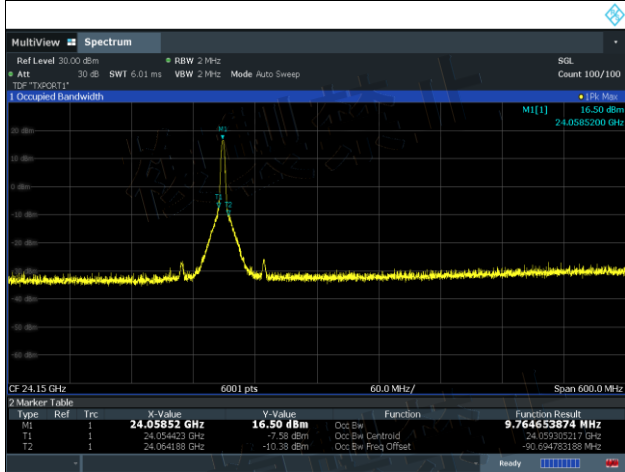
Ch.High : 24.24 GHz



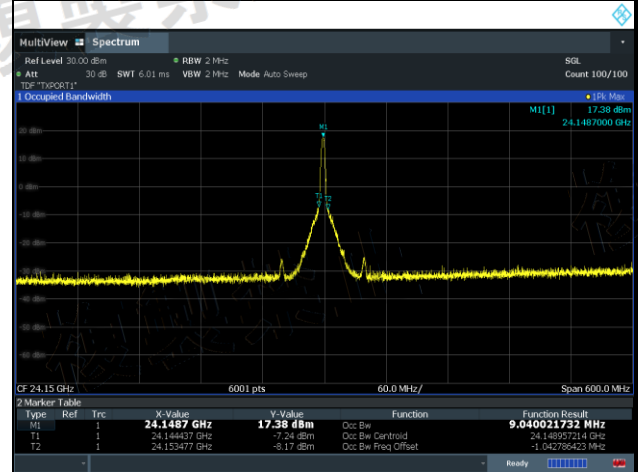
7. Test chart

7.1.2 Frequency Tolerance (After the vibration test) (-10% voltage)

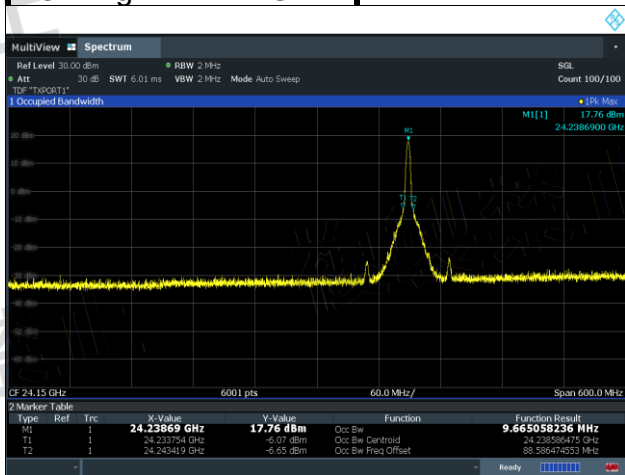
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



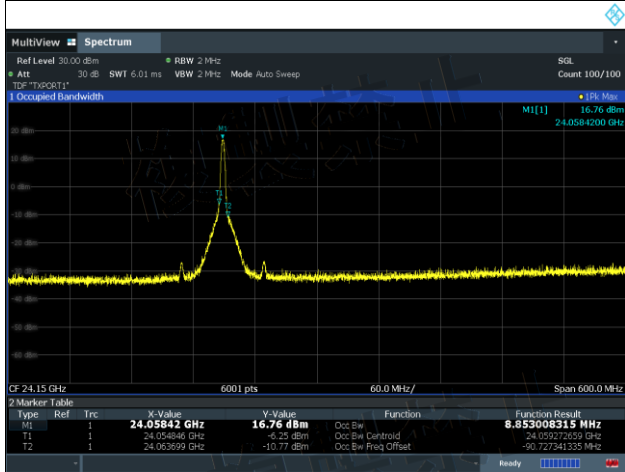
Ch.High : 24.24 GHz



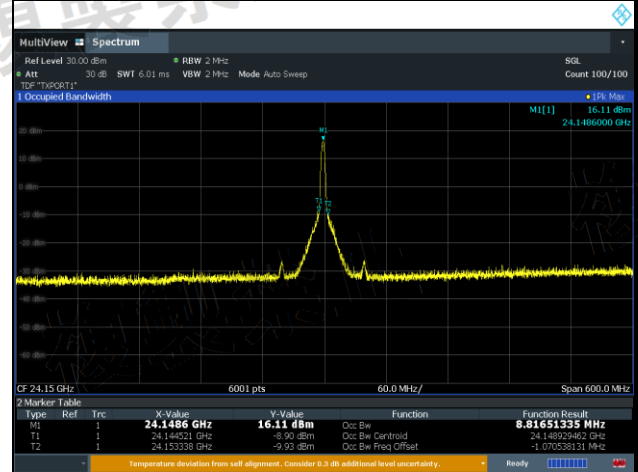
7. Test chart

7.1.2 Frequency Tolerance (After the vibration test) (+10% voltage)

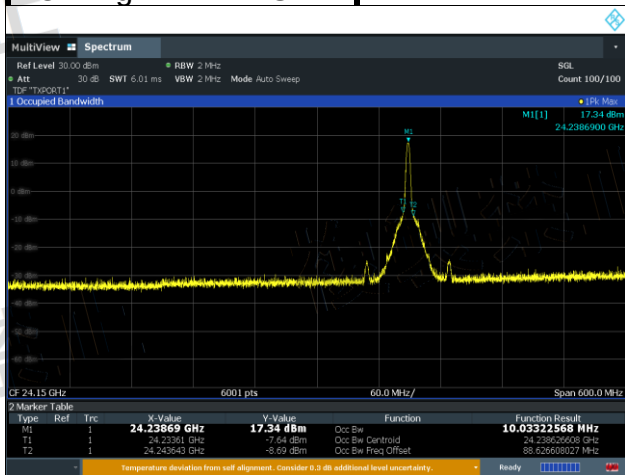
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



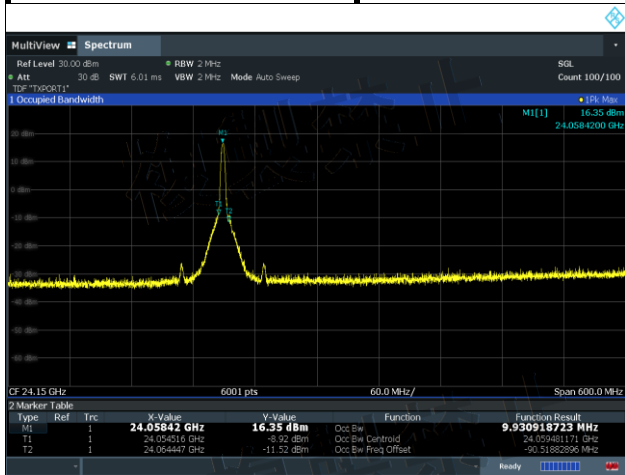
Ch.High : 24.24 GHz



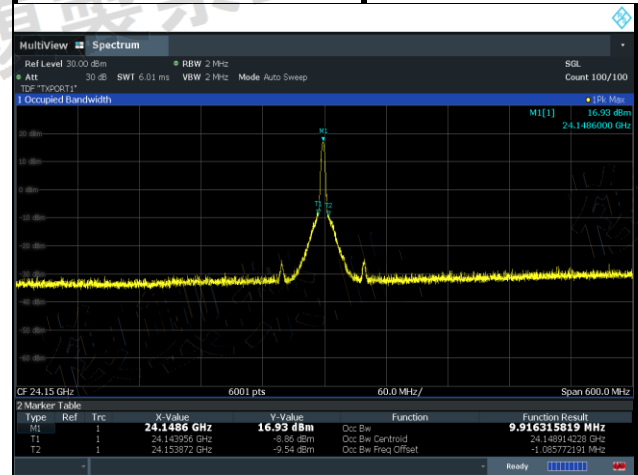
7. Test chart

7.1.3 Frequency Tolerance (After the test temperature (-10 °C)) (Rated Voltage)

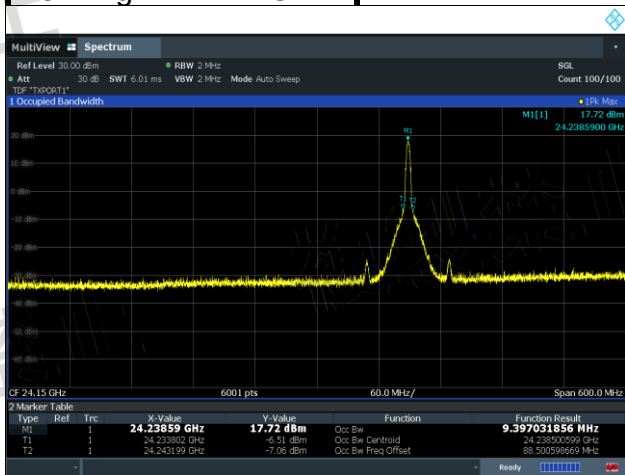
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



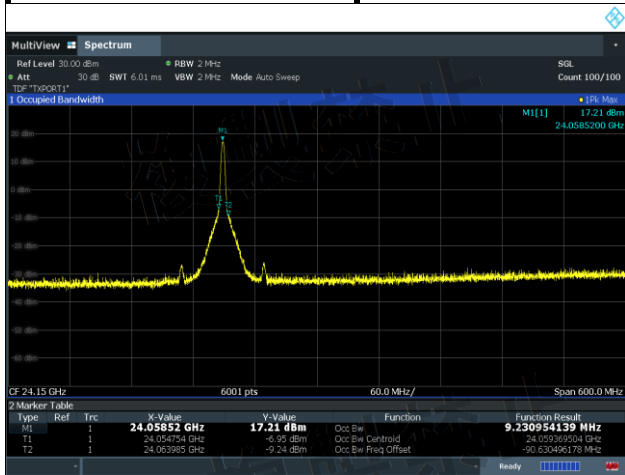
Ch.High : 24.24 GHz



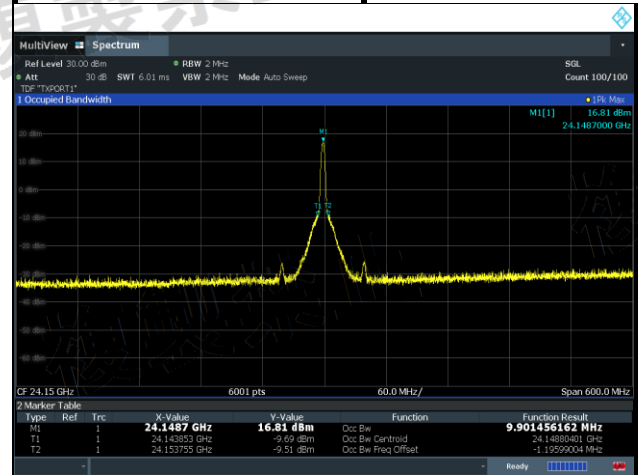
7. Test chart

7.1.3 Frequency Tolerance (After the test temperature (-10 °C)) (-10% voltage)

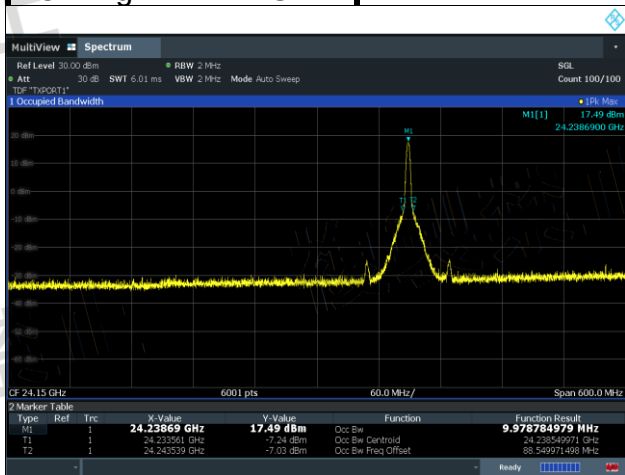
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



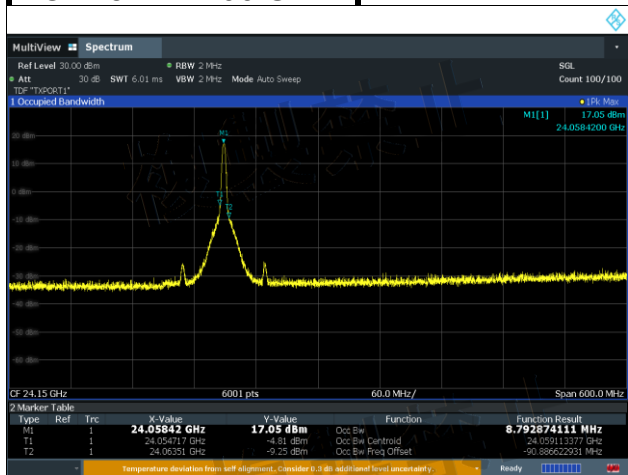
Ch.High : 24.24 GHz



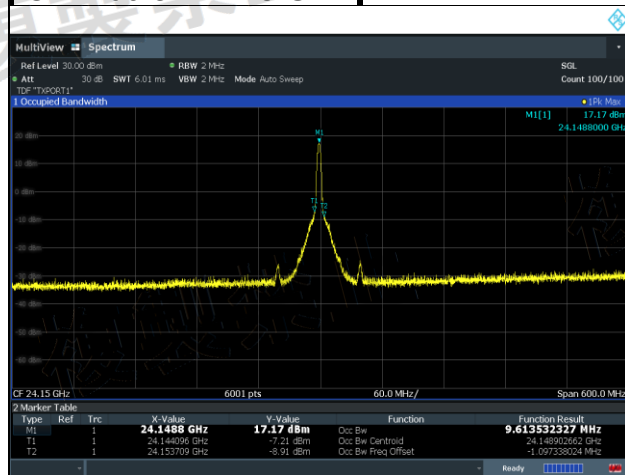
7. Test chart

7.1.3 Frequency Tolerance (After the test temperature (-10 °C)) (+10% voltage)

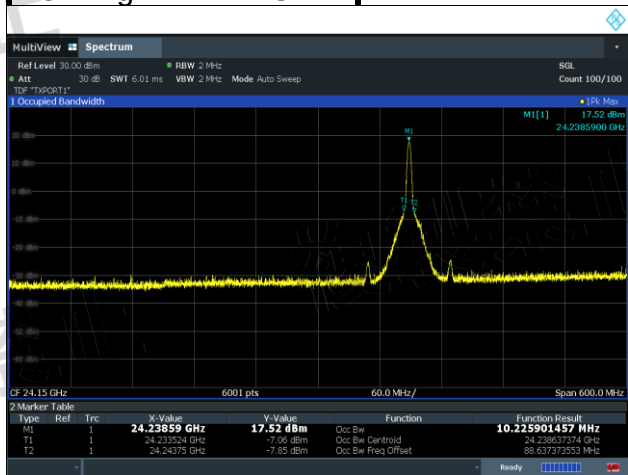
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



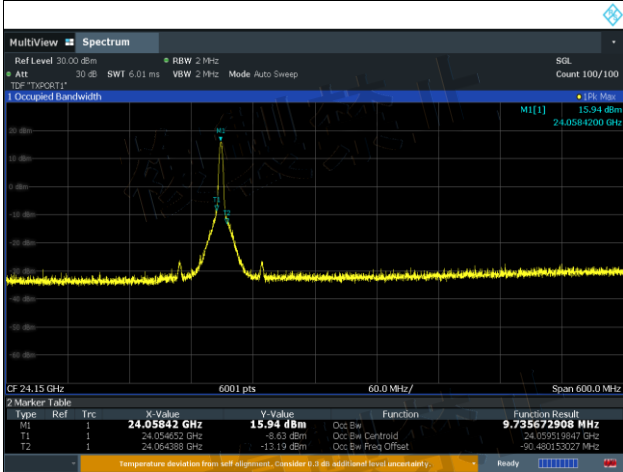
Ch.High : 24.24 GHz



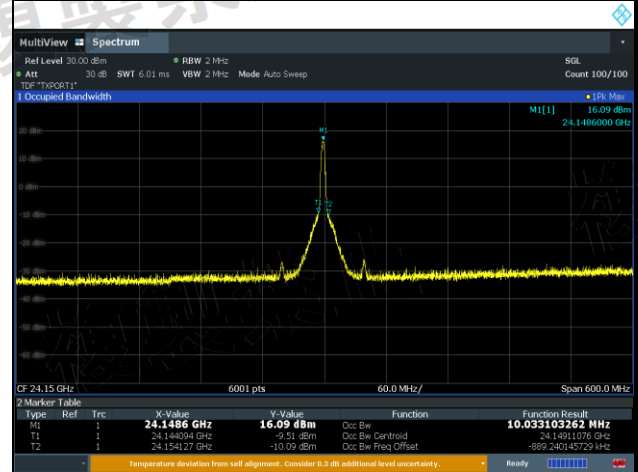
7. Test chart

7.1.4 Frequency Tolerance (After the test temperature (60 °C)) (Rated voltage)

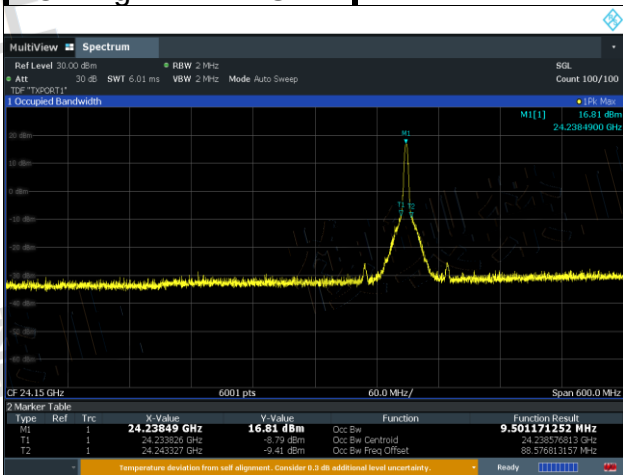
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



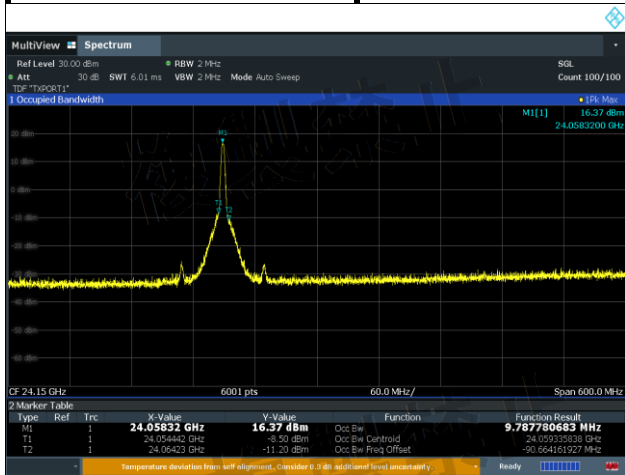
Ch.High : 24.24 GHz



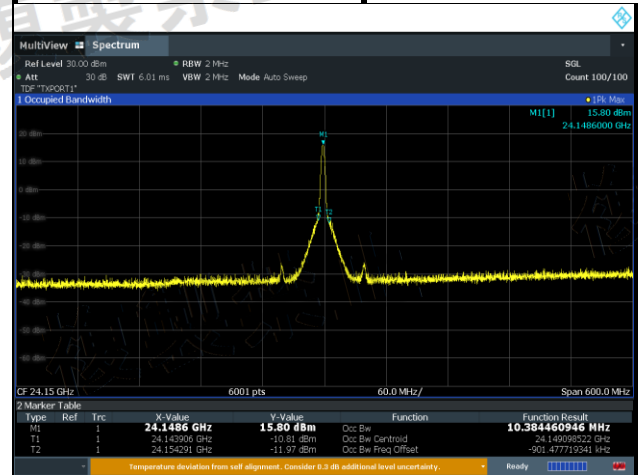
7. Test chart

7.1.4 Frequency Tolerance (After the test temperature (60 °C)) (-10% voltage)

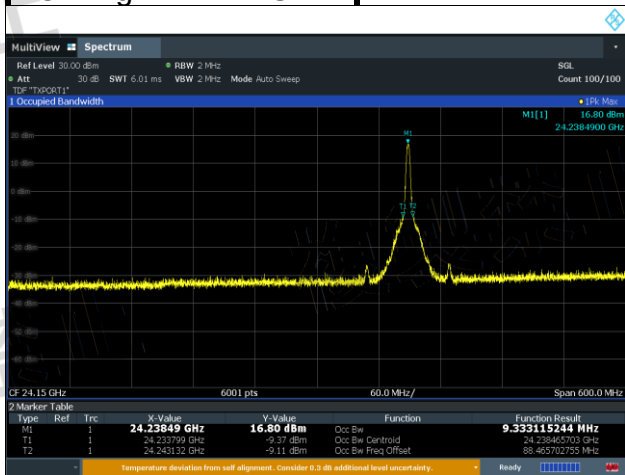
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



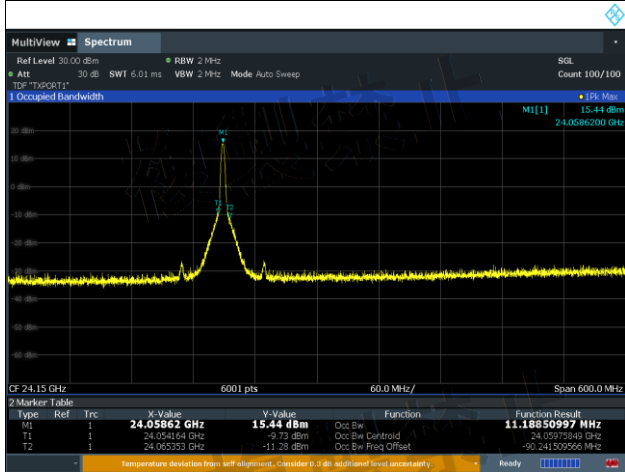
Ch.High : 24.24 GHz



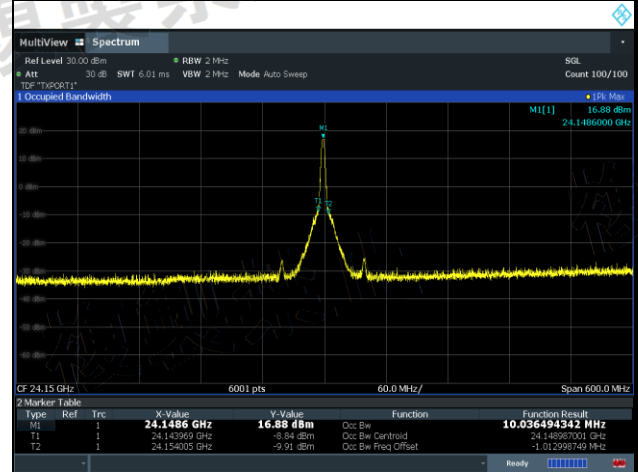
7. Test chart

7.1.4 Frequency Tolerance (After the test temperature (60 °C)) (+10% voltage)

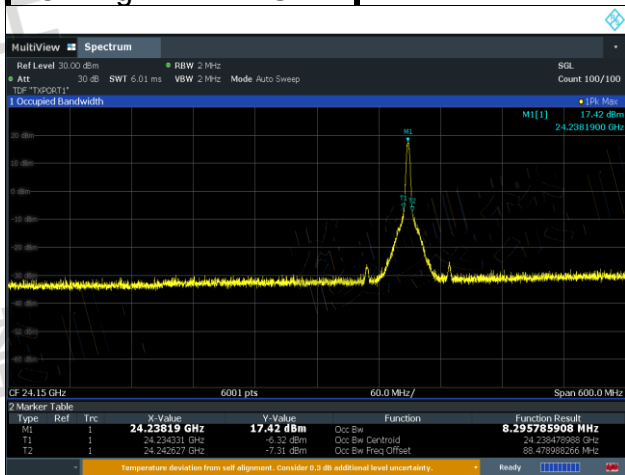
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



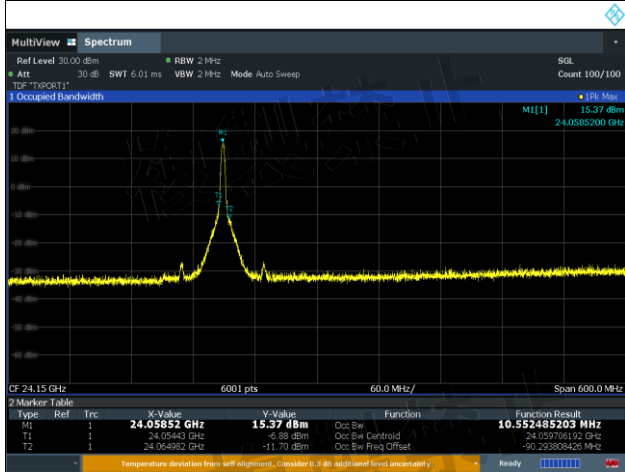
Ch.High : 24.24 GHz



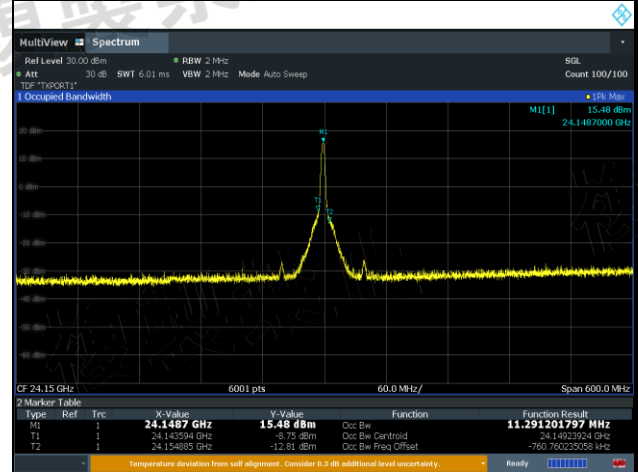
7. Test chart

7.1.5 Frequency Tolerance (After the humidity test (95%)) (Rated voltage)

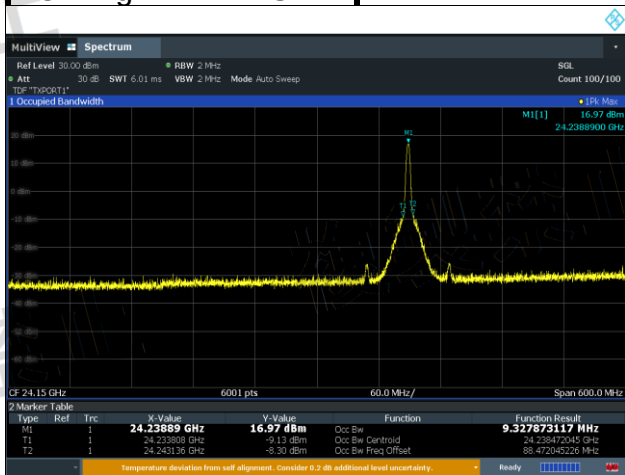
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



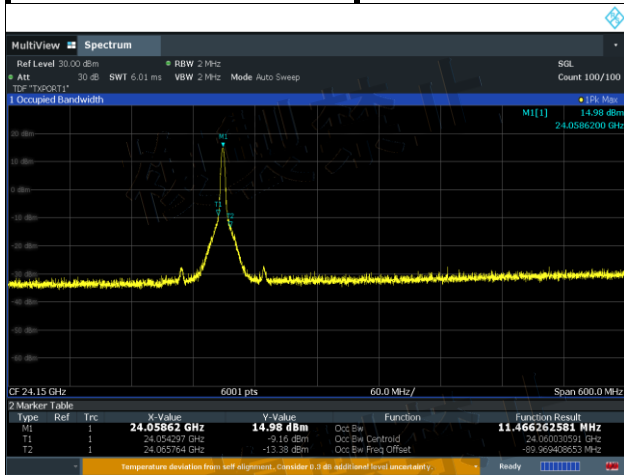
Ch.High : 24.24 GHz



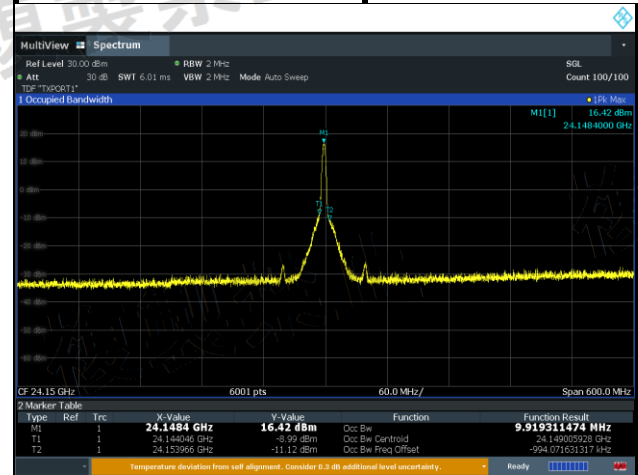
7. Test chart

7.1.5 Frequency Tolerance (After the humidity test (95%)) (-10% voltage)

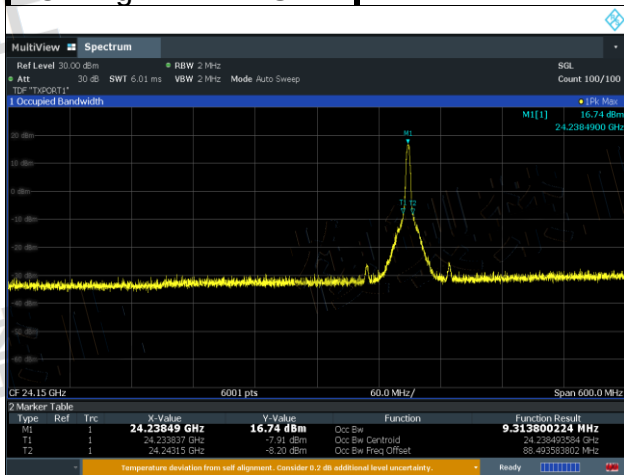
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz



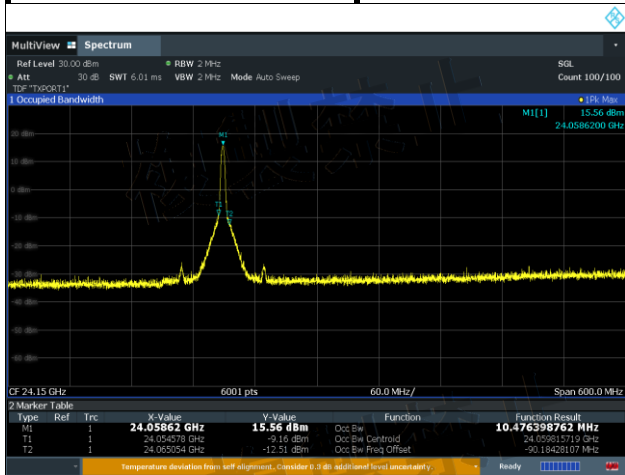
Ch.High : 24.24 GHz



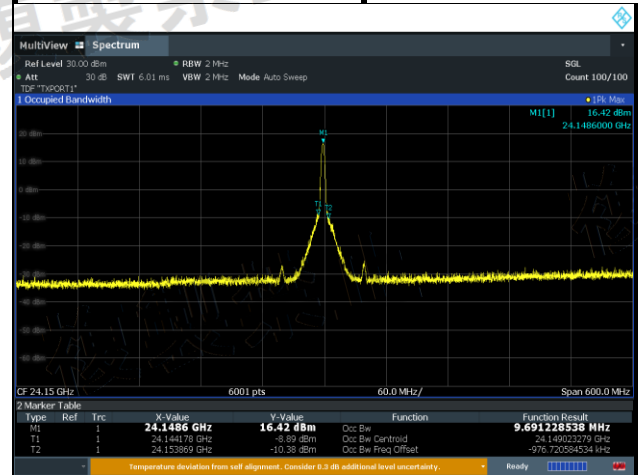
7. Test chart

7.1.5 Frequency Tolerance (After the humidity test (95%)) (+10% voltage)

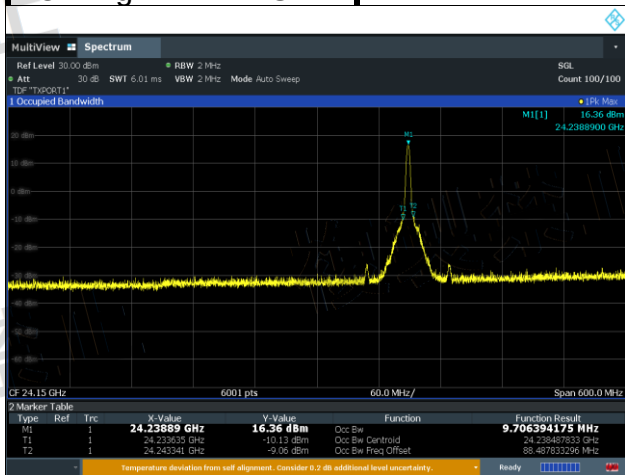
Ch.Low : 24.06 GHz



Ch.Middle : 24.15 GHz

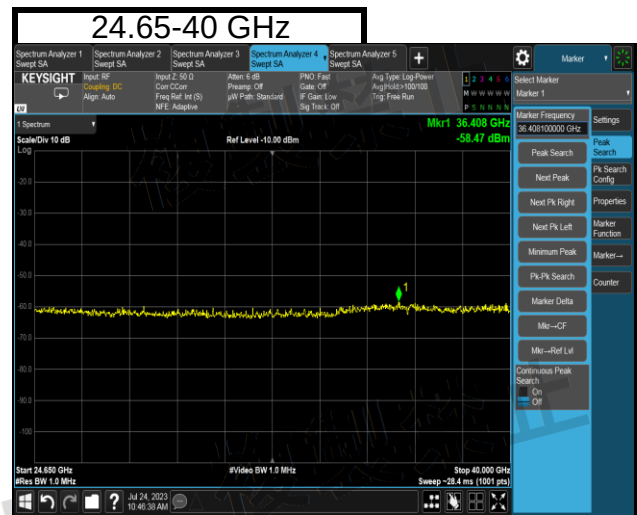
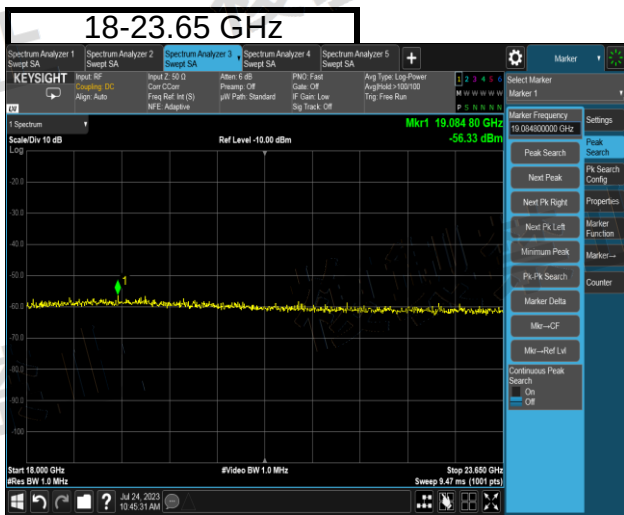
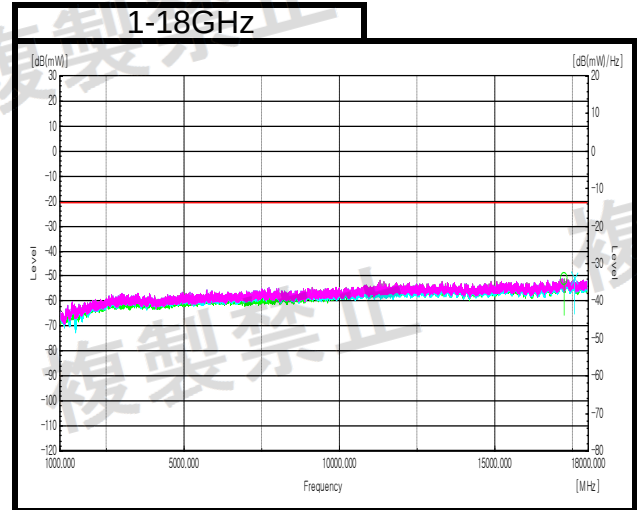
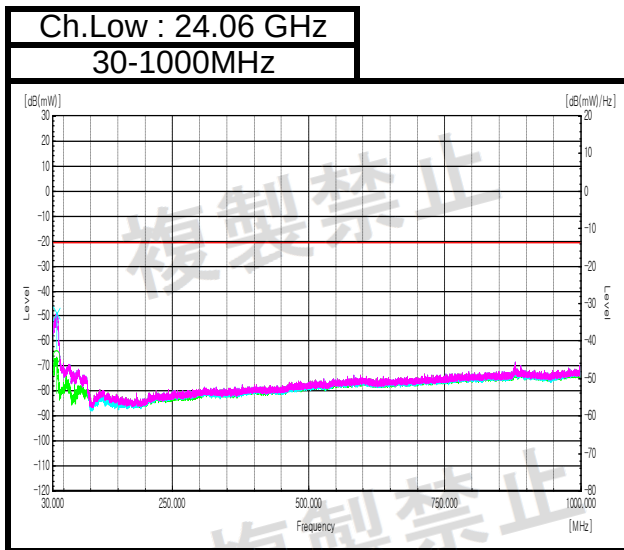


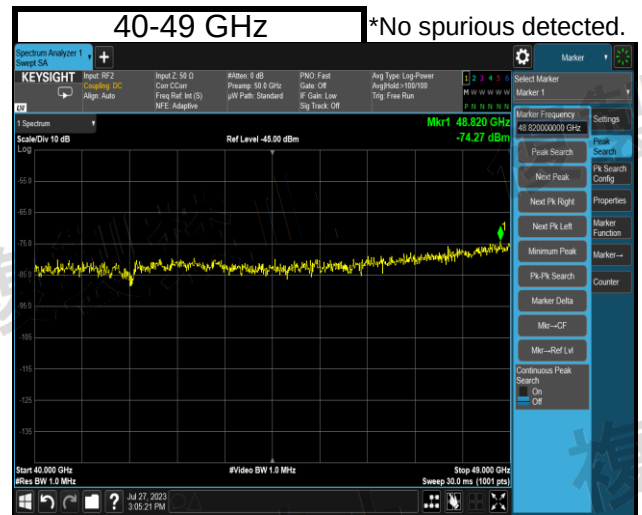
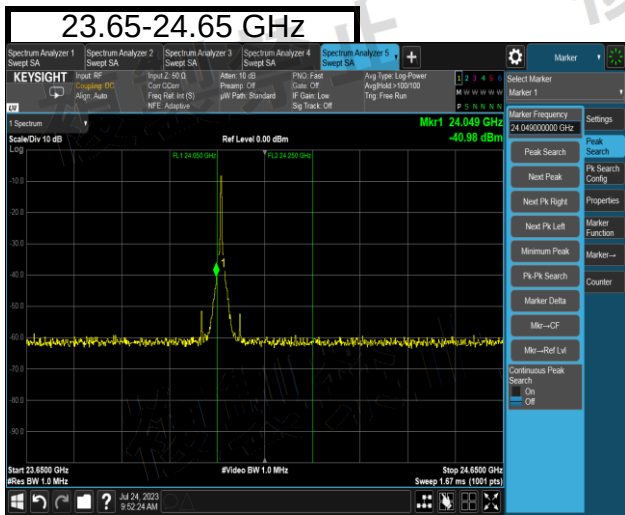
Ch.High : 24.24 GHz



7. Test chart

7.2 Unwanted(Spurious) emission strength (Rated voltage)

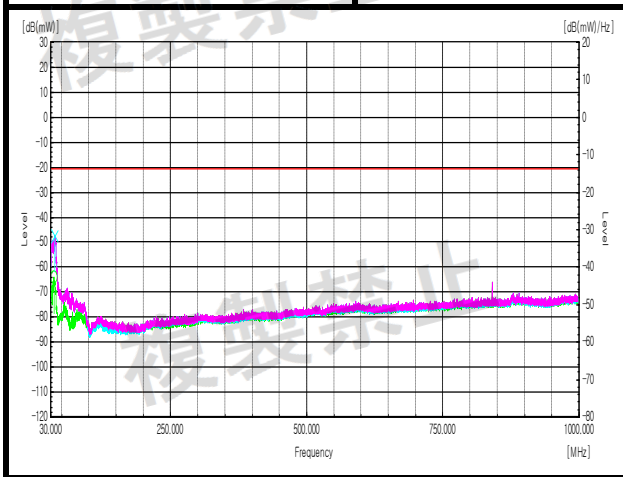




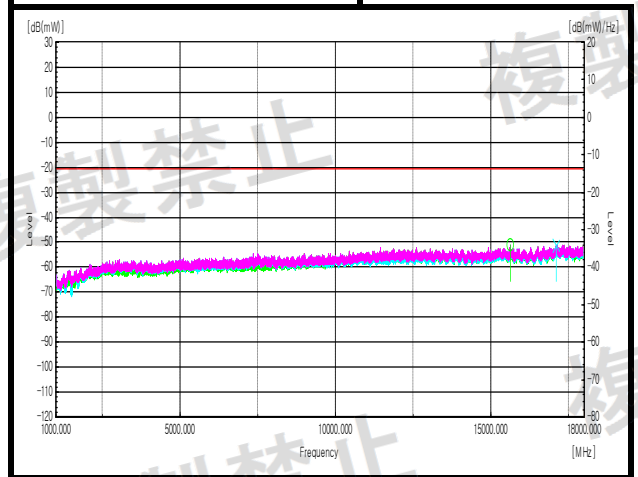
*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	37.412	-51.30	32.21	0.70	19.45	-34.95	1.02	-10.73	2.00	0.013490	2.500	2.487
V	17556.230	-56.90	59.71	11.68	41.11	-43.83	19.07	14.10	2.00	0.008318	2.500	2.492
V	19084.800	-56.33	58.47	14.05	44.40	-43.20	20.41	11.02	2.00	0.003475	2.500	2.497
V	24.049	-40.98	56.93	14.85	45.65	-21.75	22.58	12.45	2.00	0.409261	2.500	2.091
V	36408.000	-58.47	58.93	16.31	46.99	-38.71	26.83	12.97	2.00	0.003491	2.500	2.497

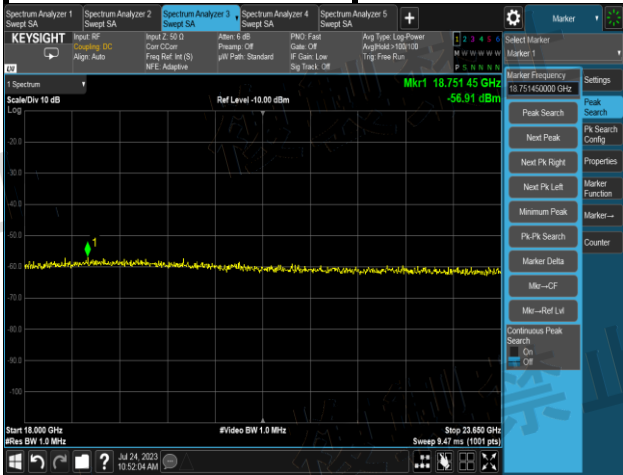
Ch.Middle : 24.15 GHz
30-1000MHz



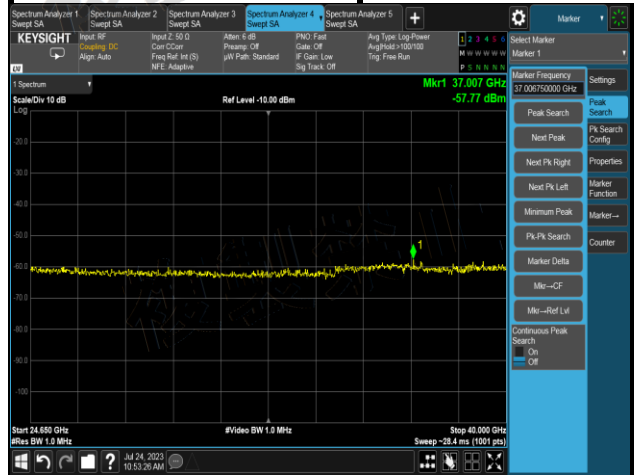
1-18GHz

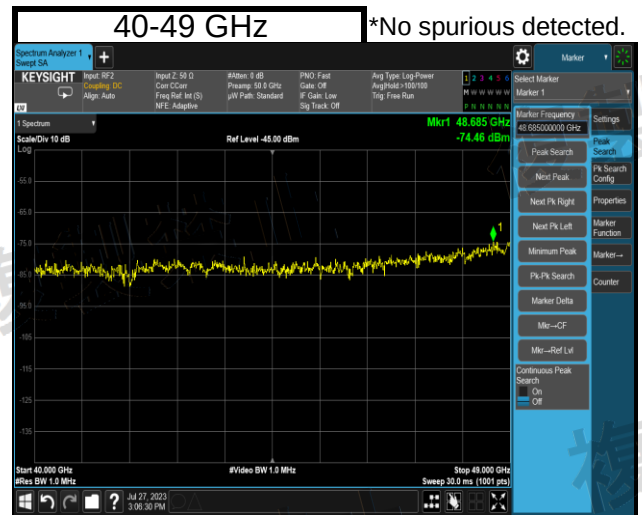
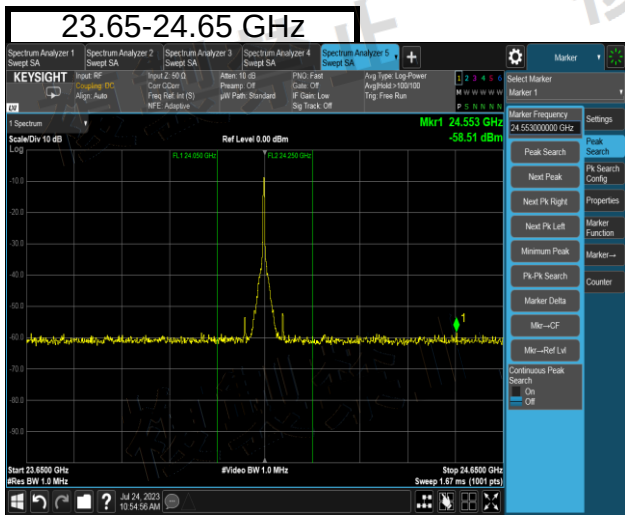


18-23.65 GHz



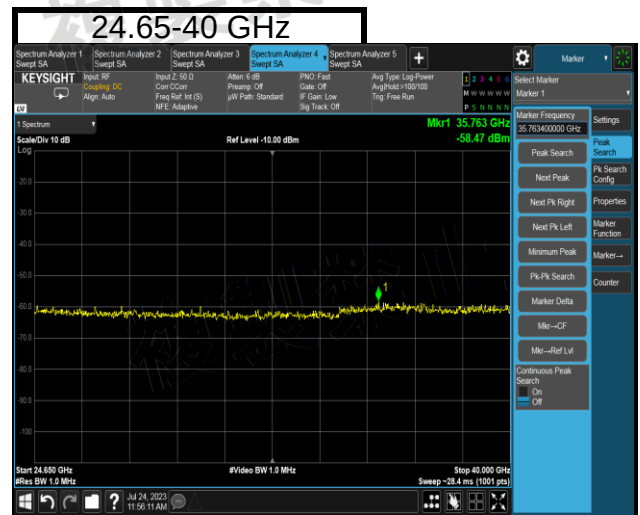
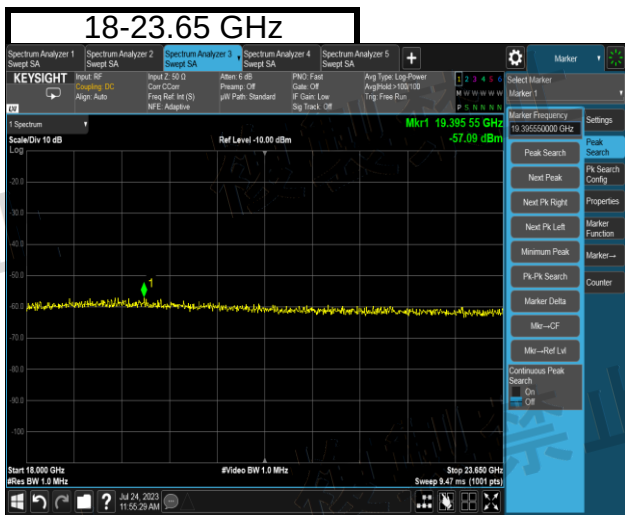
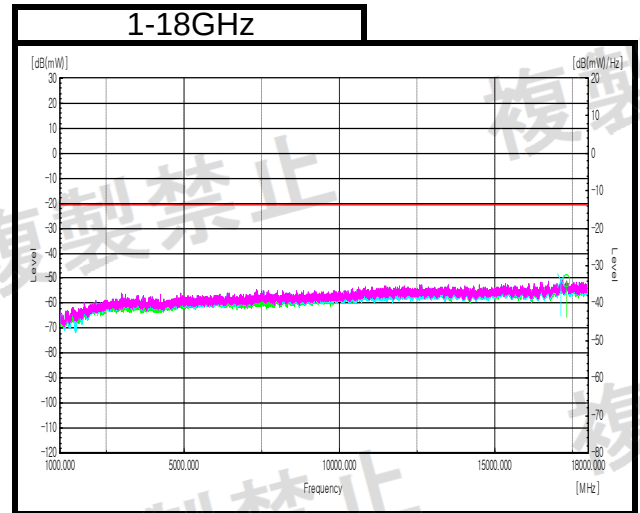
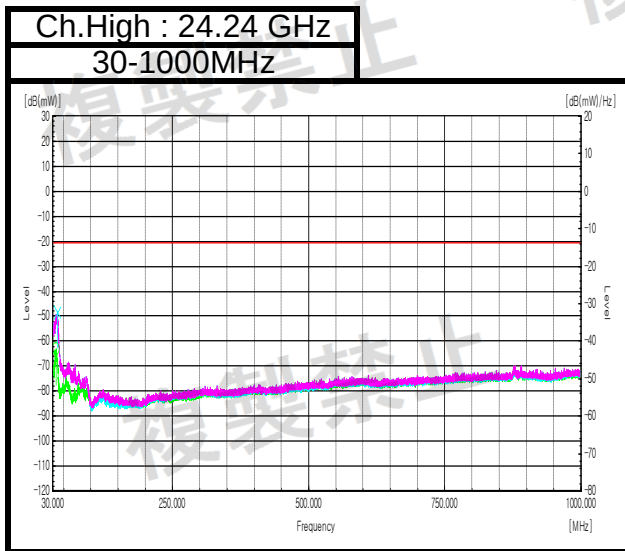
24.65-40 GHz

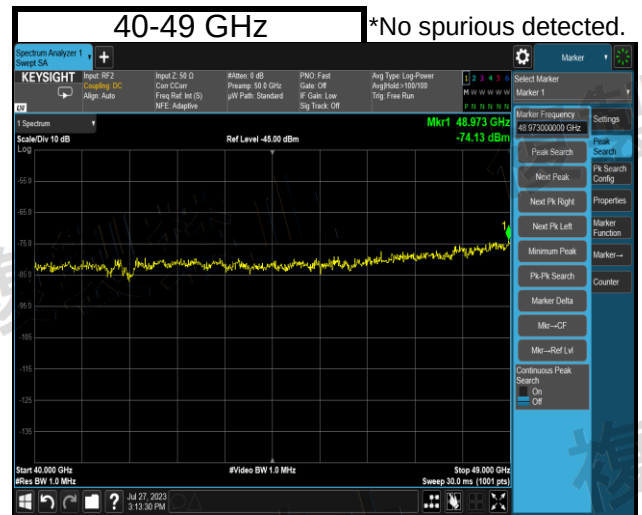
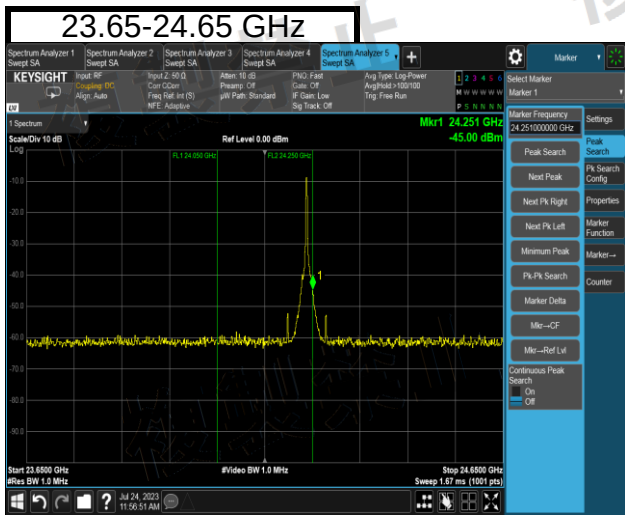




*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	37.462	-50.10	32.21	0.70	19.42	-33.90	1.02	-10.68	2.00	0.017378	2.500	2.483
V	17105.490	-58.30	59.51	11.51	41.58	-43.97	18.94	13.91	2.00	0.007943	2.500	2.492
V	18751.450	-56.91	58.28	13.74	44.35	-44.07	19.98	11.25	2.00	0.003311	2.500	2.497
V	24553.000	-58.51	56.73	15.39	45.50	-38.79	22.86	12.45	2.00	0.007586	2.500	2.492
V	37007.000	-57.77	58.39	16.66	46.70	-34.08	29.60	13.93	2.00	0.006683	2.500	2.493



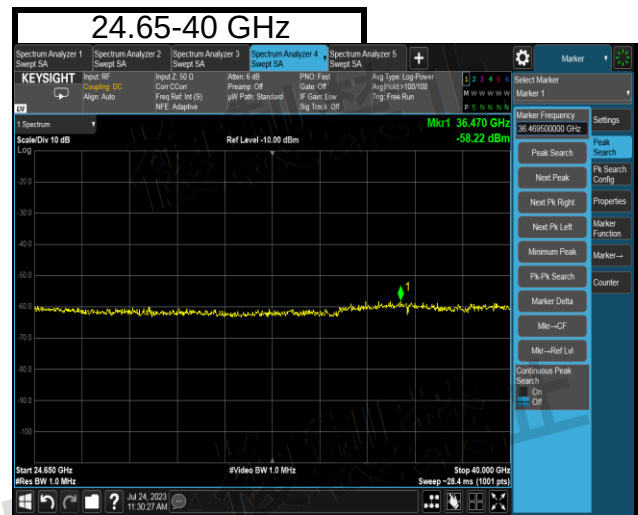
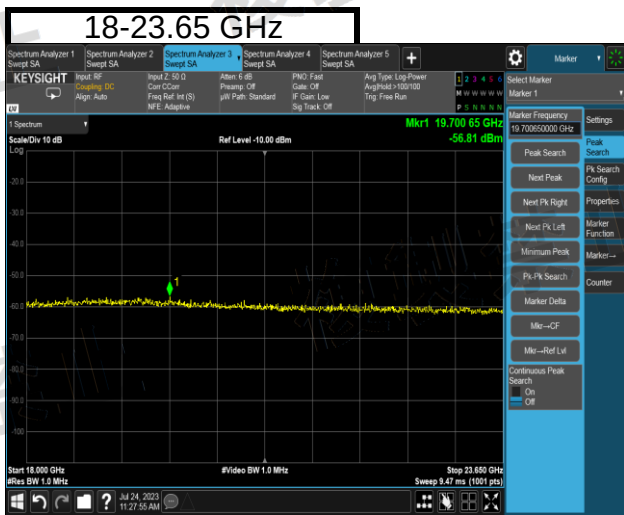
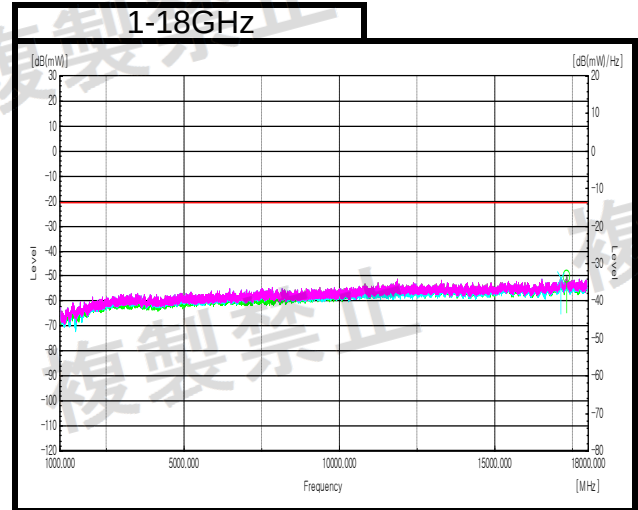
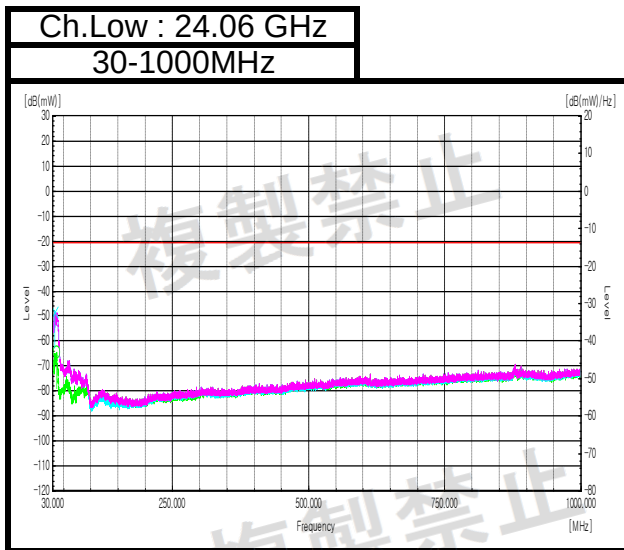


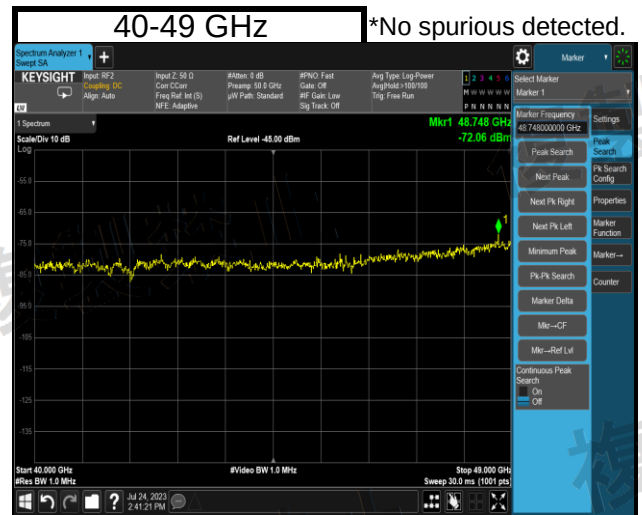
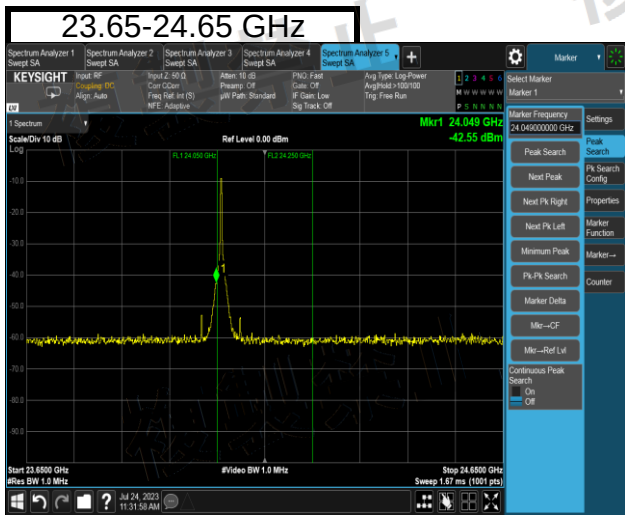
*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	38.407	-49.40	32.21	0.72	18.94	-35.61	1.02	-9.87	2.00	0.014125	2.500	2.486
H	17114.210	-57.80	59.52	11.49	41.54	-43.46	18.97	13.93	2.00	0.008913	2.500	2.491
V	19395.550	-57.09	58.31	13.62	44.50	-43.02	20.88	11.10	2.00	0.003311	2.500	2.497
V	24.251	-45.00	56.83	15.14	45.60	-25.52	22.80	12.40	2.00	0.161436	2.500	2.339
V	35763.000	-58.47	58.66	16.46	47.00	-37.89	23.29	13.18	2.00	0.010000	2.500	2.490

7. Test chart

7.2 Unwanted(Spurious) emission strength (-10% voltage)

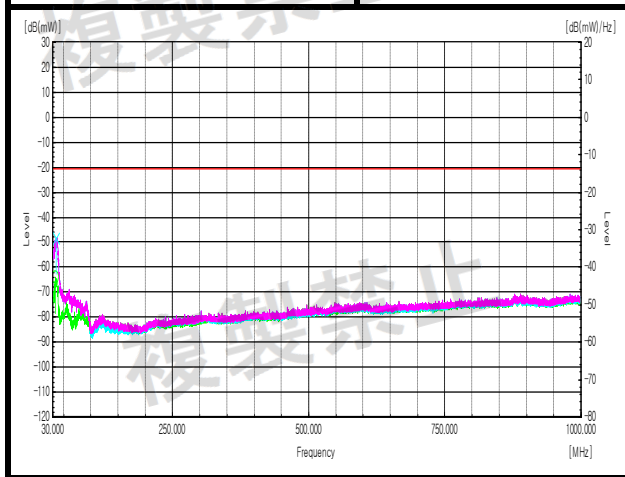




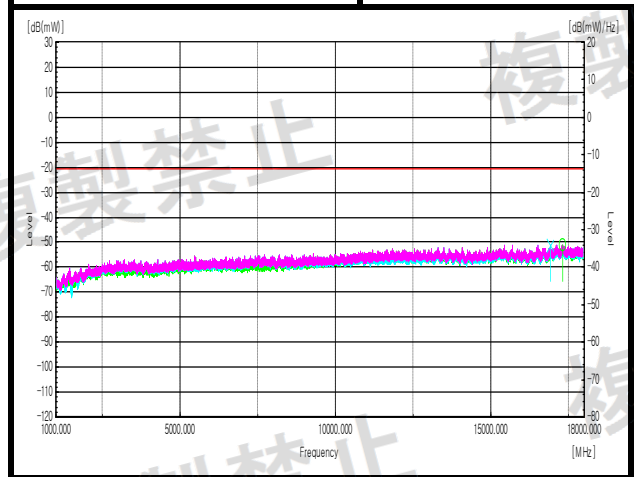
*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	33.980	-53.60	32.21	0.67	21.01	-32.27	1.01	-13.22	2.00	0.014125	2.500	2.486
H	17302.530	-57.40	59.65	11.41	41.09	-43.57	18.93	14.20	2.00	0.009333	2.500	2.491
V	19700.650	-56.81	58.20	13.64	44.70	-40.07	23.53	11.30	2.00	0.003715	2.500	2.496
V	24049.000	-42.55	56.93	14.85	45.65	-23.32	22.58	12.45	2.00	0.285102	2.500	2.215
V	36470.000	-58.22	58.96	16.59	46.93	-38.74	23.63	12.72	2.00	0.006839	2.500	2.493

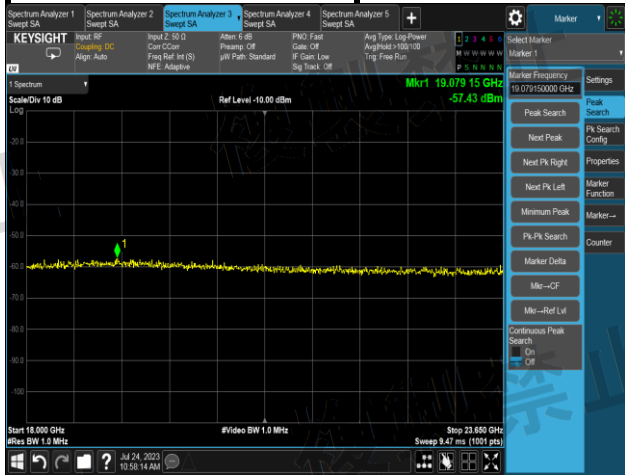
Ch.Middle : 24.15 GHz
30-1000MHz



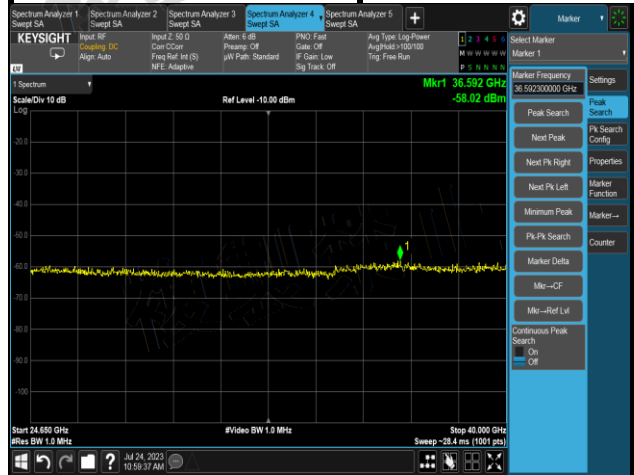
1-18GHz

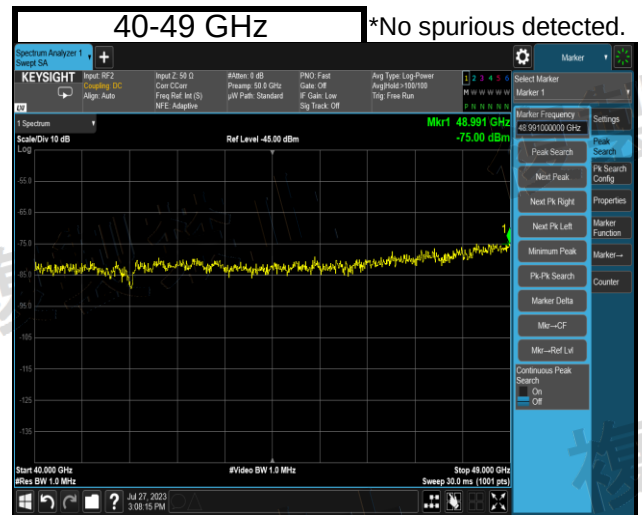
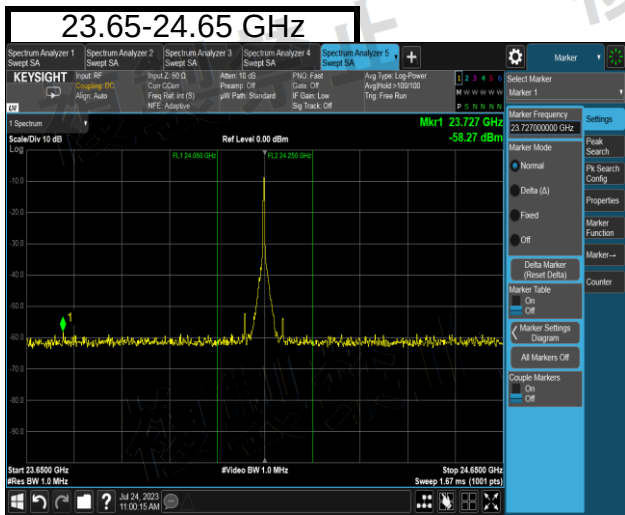


18-23.65 GHz



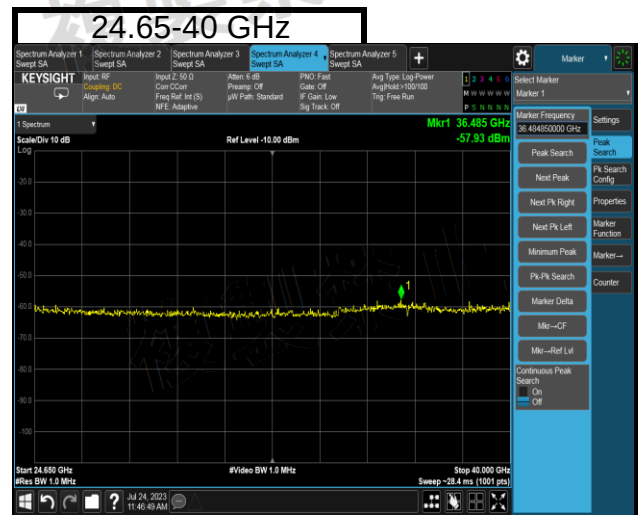
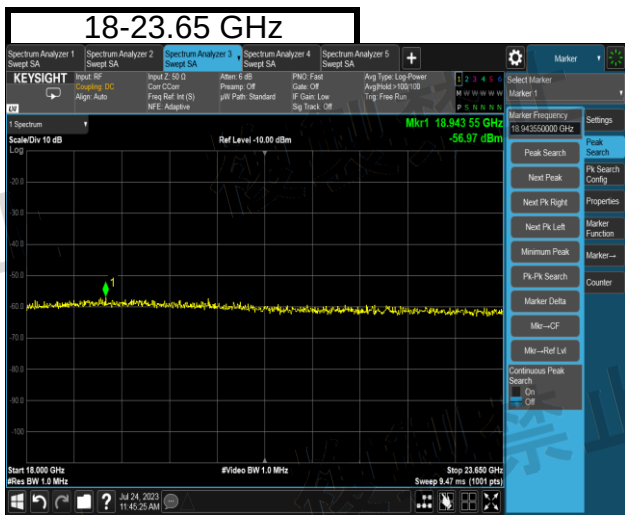
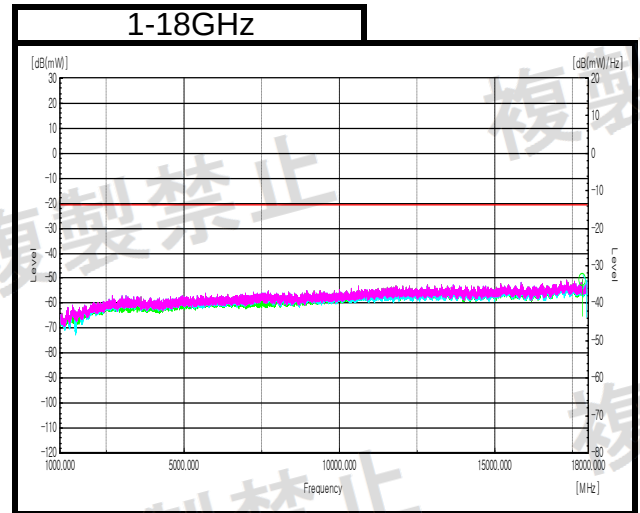
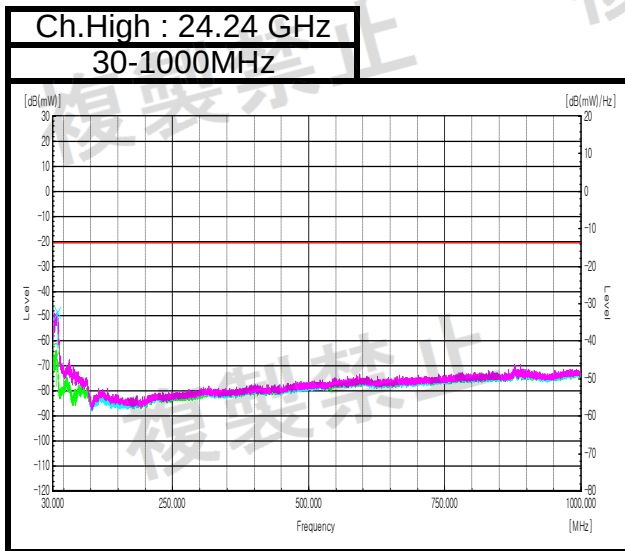
24.65-40 GHz

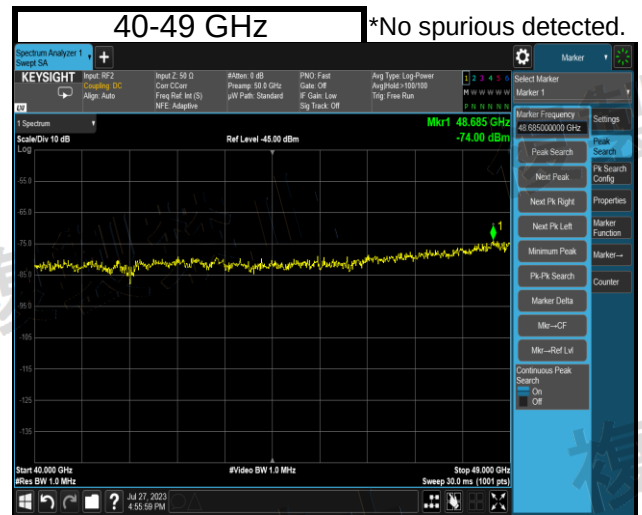
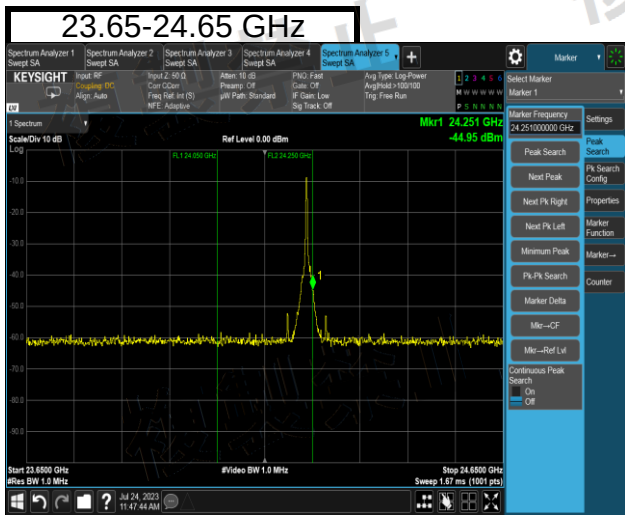




*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	36.069	-52.90	32.21	0.68	19.89	-33.89	1.03	-11.38	2.00	0.014791	2.500	2.485
V	16902.350	-57.60	59.41	11.78	41.90	-43.39	18.91	13.30	2.00	0.007943	2.500	2.492
V	19079.150	-57.43	58.47	14.03	44.40	-44.32	20.40	11.02	2.00	0.002692	2.500	2.497
V	23727.000	-58.27	56.73	14.91	45.70	-39.17	22.07	11.98	2.00	0.007482	2.500	2.493
V	36592.000	-58.02	58.86	17.11	46.81	-35.77	26.74	12.88	2.00	0.006871	2.500	2.493



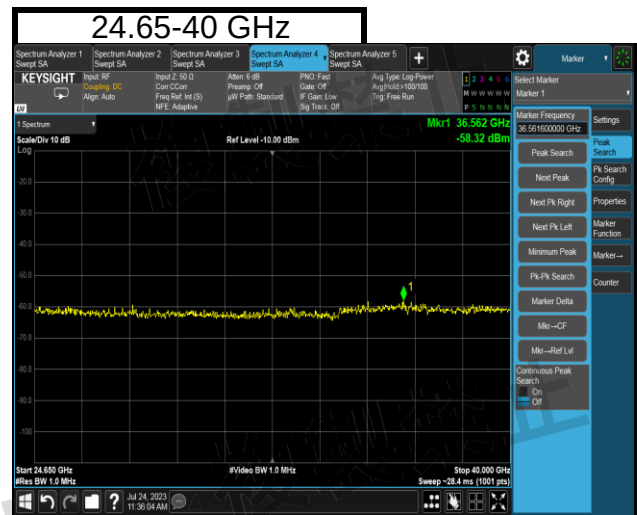
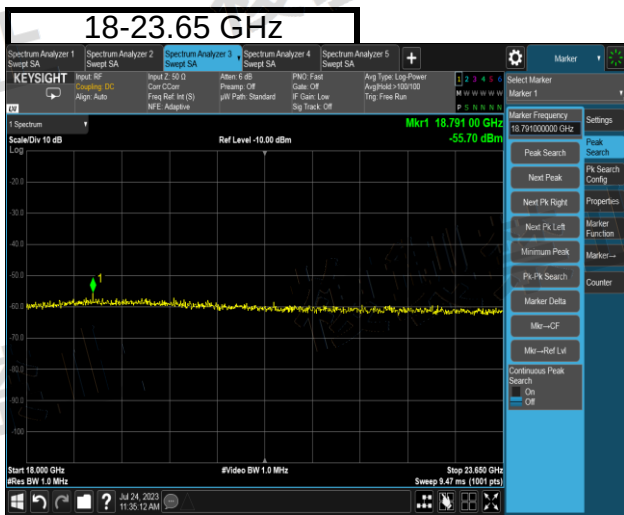
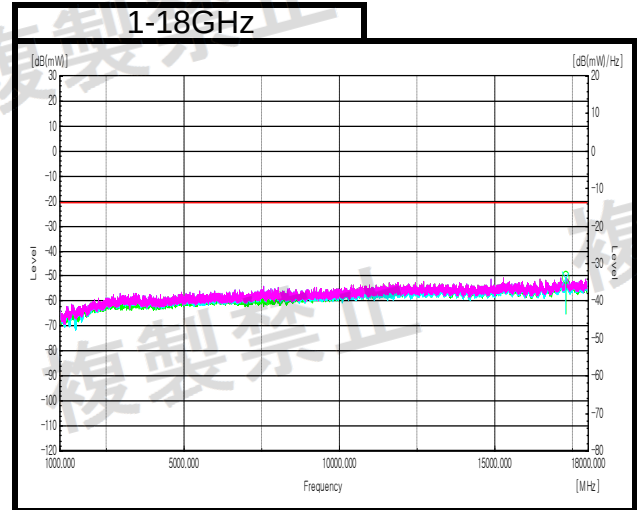
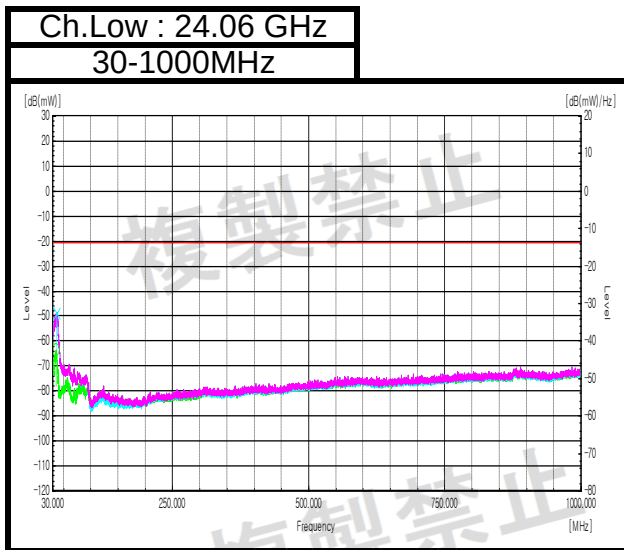


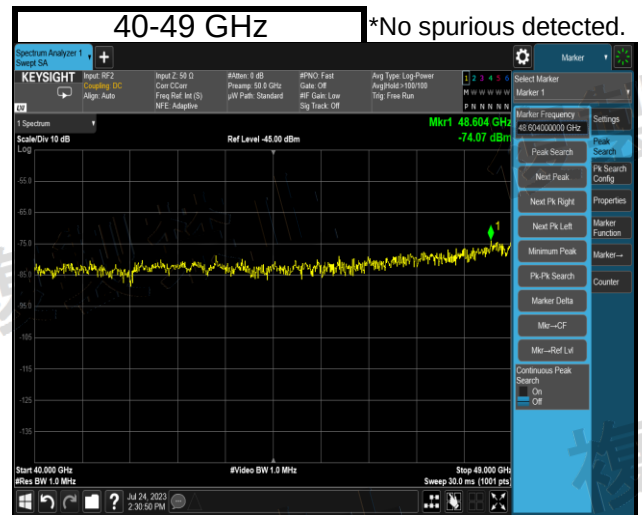
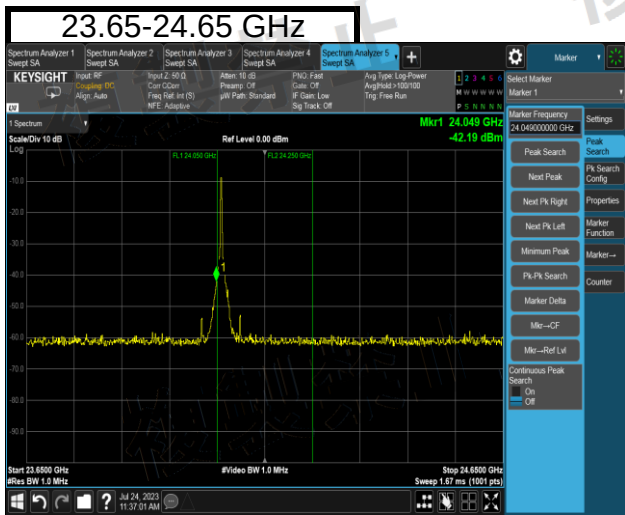
*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	37.860	-50.00	32.21	0.71	19.18	-34.85	1.02	-10.33	2.00	0.015136	2.500	2.485
H	17809.940	-57.40	59.41	11.71	41.74	-43.11	19.49	14.00	2.00	0.008710	2.500	2.491
V	18943.550	-56.97	58.46	13.74	44.40	-44.31	20.05	11.10	2.00	0.002979	2.500	2.497
V	24251.000	-44.95	56.83	15.14	45.60	-25.47	22.80	12.40	2.00	0.163305	2.500	2.337
V	36485.000	-57.93	58.96	16.65	46.92	-35.48	26.59	12.66	2.00	0.007228	2.500	2.493

7. Test chart

7.2 Unwanted(Spurious) emission strength (+10% voltage)

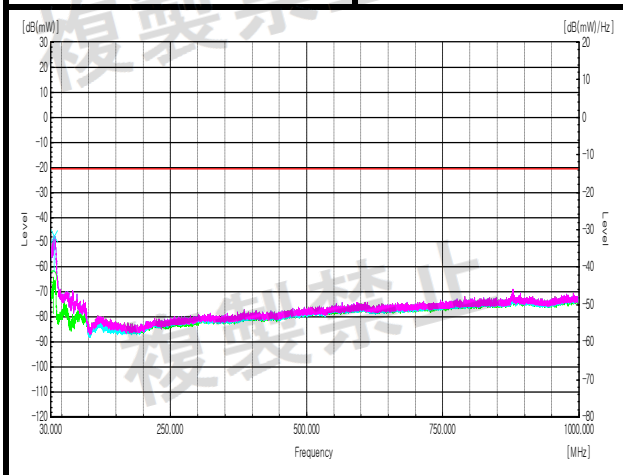




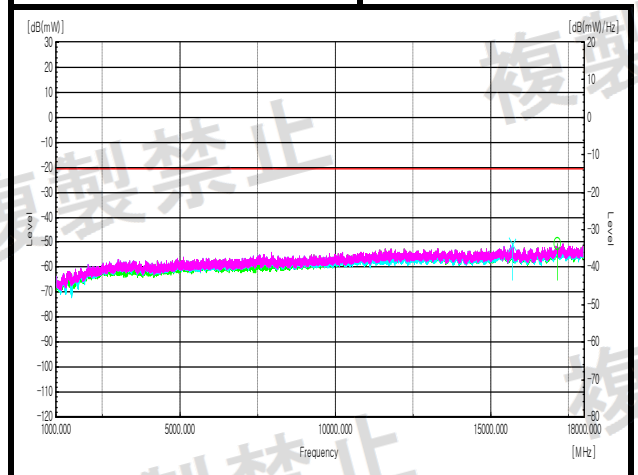
*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	37.412	-51.20	32.21	0.70	19.45	-34.85	1.02	-10.73	2.00	0.013804	2.500	2.486
V	17257.190	-57.20	59.61	11.37	41.19	-43.85	19.05	14.20	2.00	0.008511	2.500	2.491
V	18791.000	-55.70	58.31	13.62	44.39	-42.87	20.01	11.21	2.00	0.004295	2.500	2.496
V	24049.000	-42.19	56.93	14.85	45.65	-22.96	22.58	12.45	2.00	0.309742	2.500	2.190
V	36562.000	-58.32	58.90	16.98	46.84	-36.01	26.68	12.79	2.00	0.006457	2.500	2.494

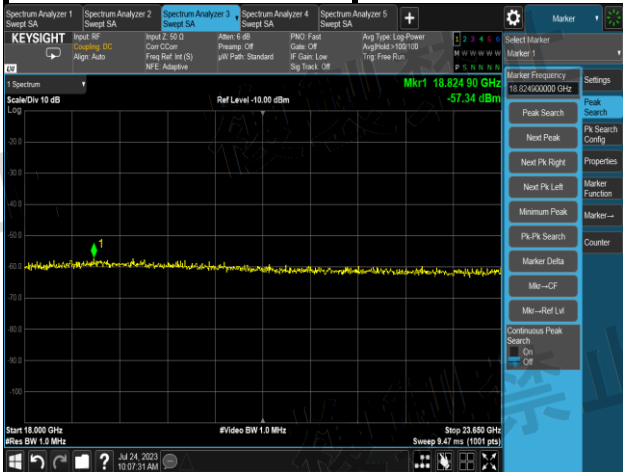
Ch.Middle : 24.15 GHz
30-1000MHz



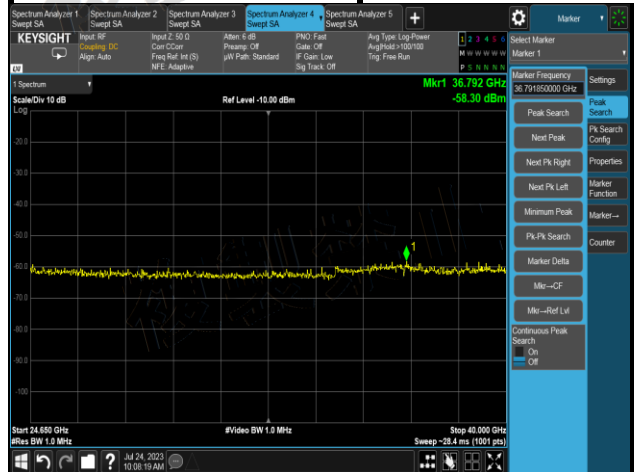
1-18GHz

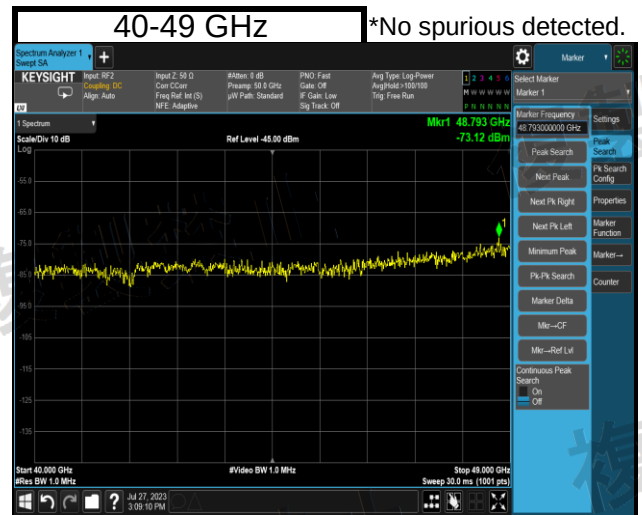
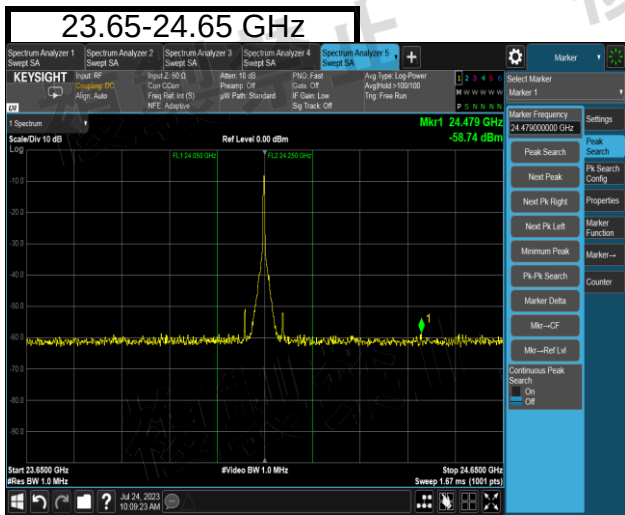


18-23.65 GHz



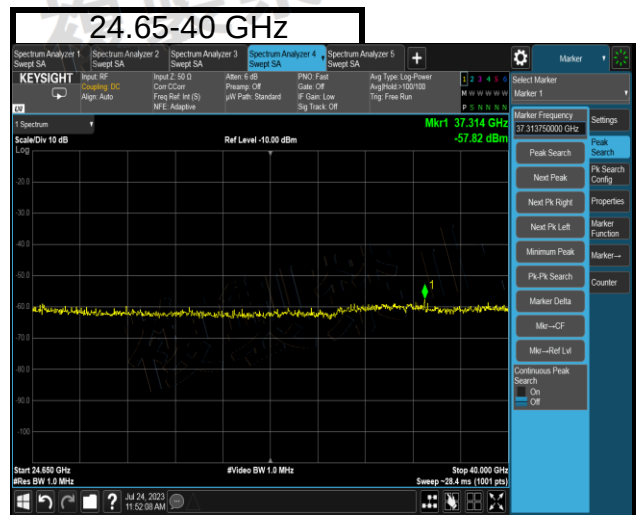
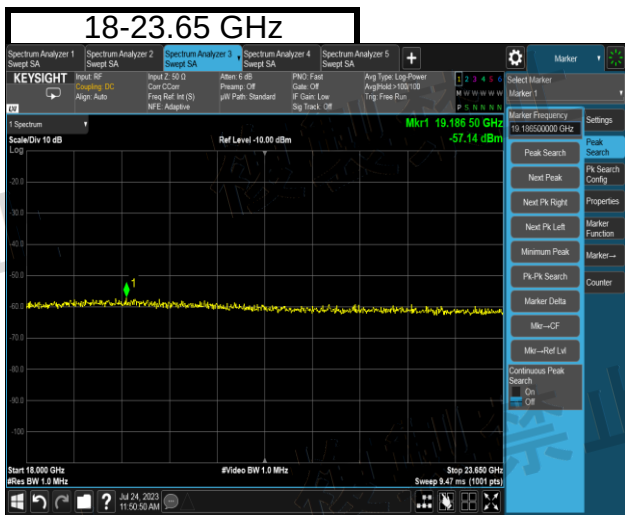
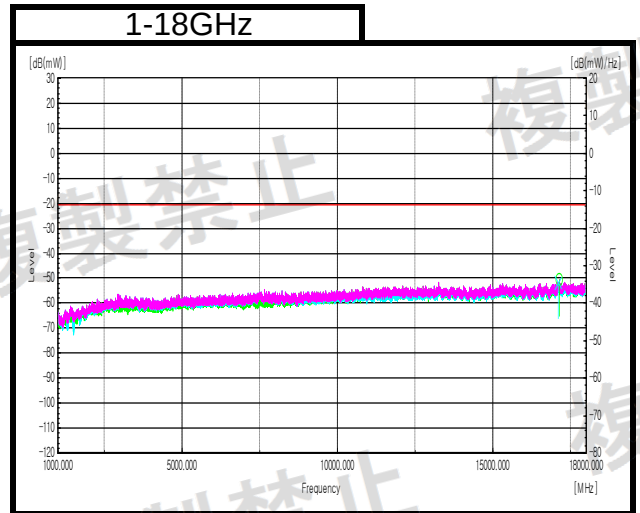
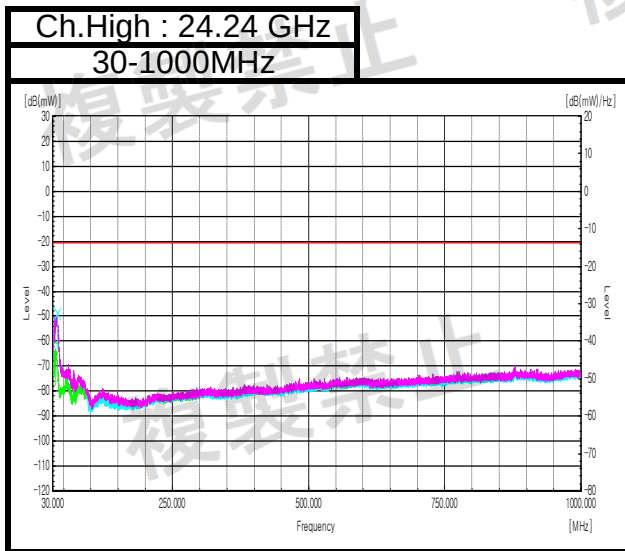
24.65-40 GHz

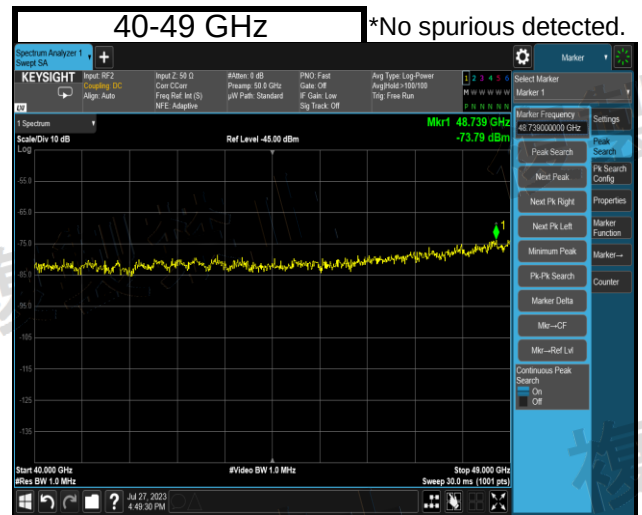
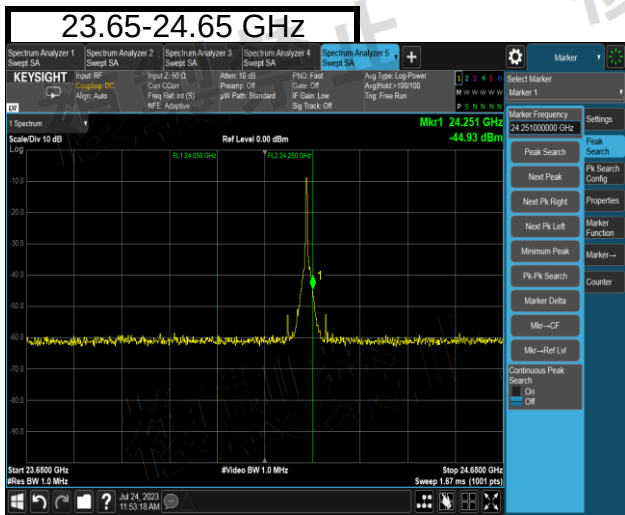




*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	35.721	-52.50	32.21	0.67	20.10	-32.76	1.03	-11.71	2.00	0.017783	2.500	2.482
V	15679.160	-54.80	60.35	11.50	40.96	-44.64	18.10	14.14	2.00	0.008710	2.500	2.491
V	18824.900	-57.34	58.35	13.61	44.40	-44.55	20.01	11.18	2.00	0.002897	2.500	2.497
V	24479.000	-58.74	56.71	15.47	45.52	-38.85	22.99	12.38	2.00	0.007145	2.500	2.493
V	36792.000	-58.30	58.63	16.62	46.72	-34.53	28.76	13.18	2.00	0.006152	2.500	2.494



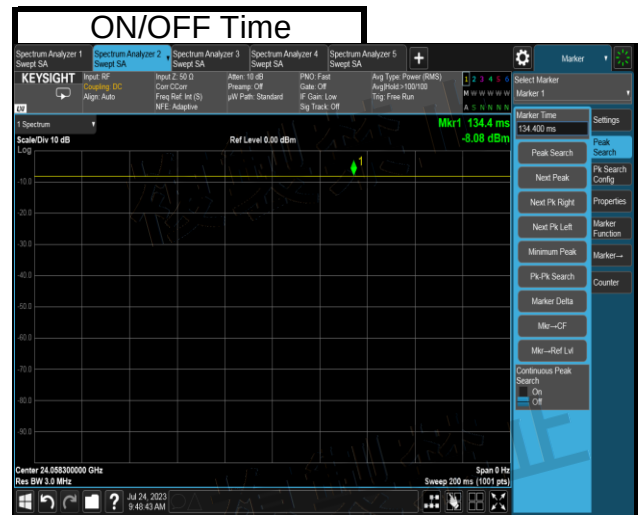
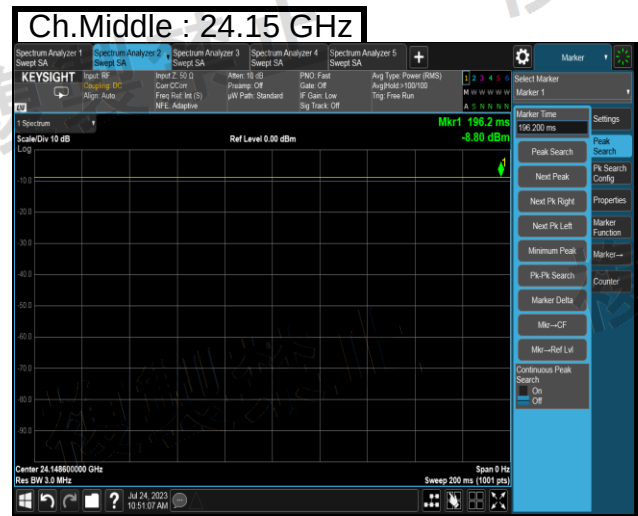
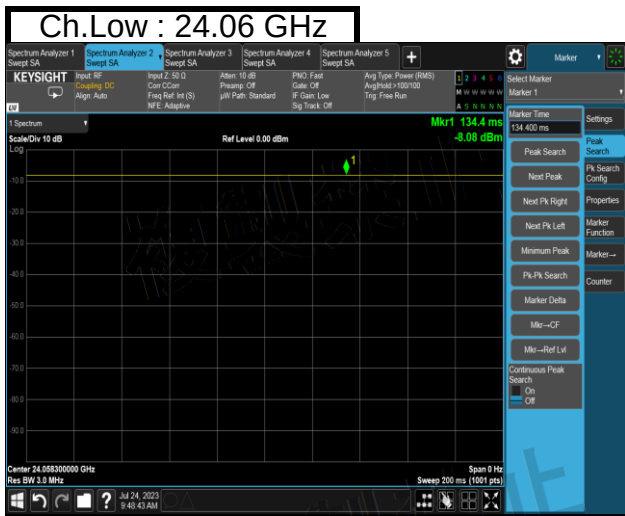


*NTNV Substitution Data

H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [μW]	Limit [μW]	Margin [μW]
			Amplifier [dB]	RX Cable Loss[dB]	RX Antenna Factor [dB]							
V	38.258	-50.10	32.21	0.72	19.00	-35.89	1.02	-9.99	2.00	0.012882	2.500	2.487
H	17136.880	-57.80	59.53	11.45	41.45	-43.84	19.03	13.97	2.00	0.008128	2.500	2.492
V	19186.500	-57.14	58.42	13.93	44.40	-43.64	20.49	10.91	2.00	0.003006	2.500	2.497
V	24251.000	-44.93	56.83	15.14	45.60	-25.45	22.80	12.40	2.00	0.164059	2.500	2.336
V	37314.000	-57.82	58.30	16.89	46.70	-36.21	26.72	14.81	2.00	0.009727	2.500	2.490

7. Test chart

7.3 RF output power tolerance (Rated voltage)



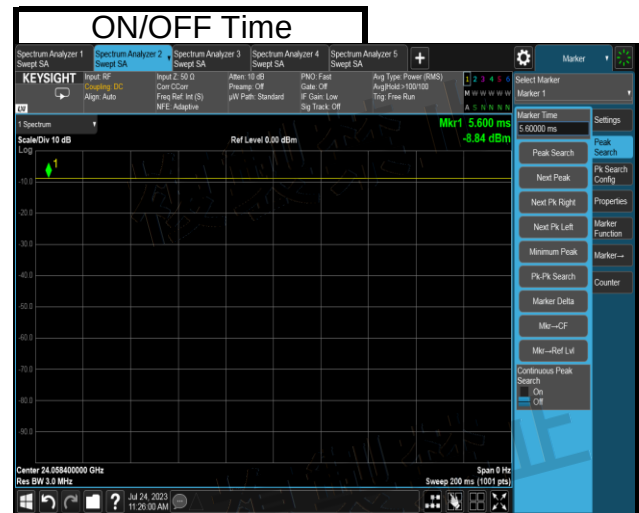
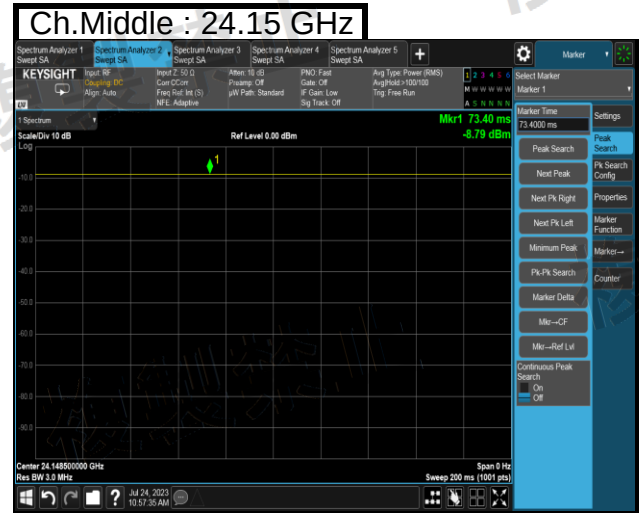
Ch.Low : 24.06 GHz			Rx Factor [dB]			SG	Cable loss	Subs Ant.	EUT Ant.	Result
H/V	Frequency [MHz]	SA Reading [dBm]	Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]	Reading [dBm]	[dB]	Gain [dBi]	Gain [dBi]	
V	24058.300	-8.08	56.93	14.83	45.64	11.13	22.57	12.46	2.00	0.797994687

Ch.Middle : 24.15 GHz			Rx Factor [dB]			SG	Cable loss	Subs Ant.	EUT Ant.	Result
H/V	Frequency [MHz]	SA Reading [dBm]	Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]	Reading [dBm]	[dB]	Gain [dBi]	Gain [dBi]	
V	24148.600	-8.80	56.88	14.99	45.60	10.46	22.62	12.50	2.00	0.682338694

Ch.High : 24.24 GHz			Rx Factor [dB]			SG	Cable loss	Subs Ant.	EUT Ant.	Result
H/V	Frequency [MHz]	SA Reading [dBm]	Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]	Reading [dBm]	[dB]	Gain [dBi]	Gain [dBi]	
V	24238.300	-8.64	56.84	15.16	45.60	10.89	22.77	12.42	2.00	0.714496326

7. Test chart

7.3 RF output power tolerance (-10% voltage)



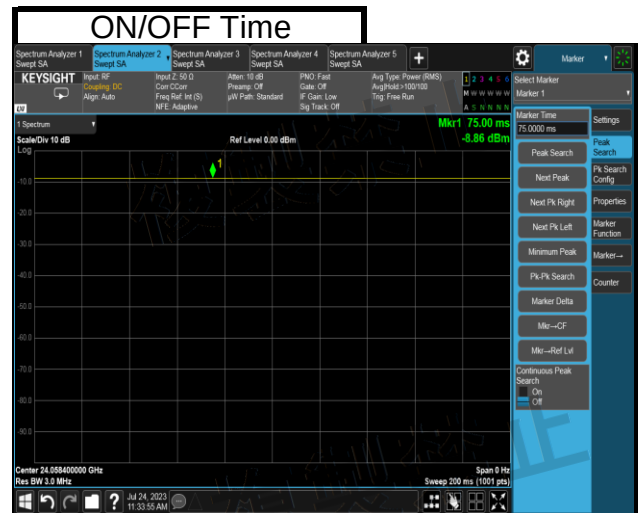
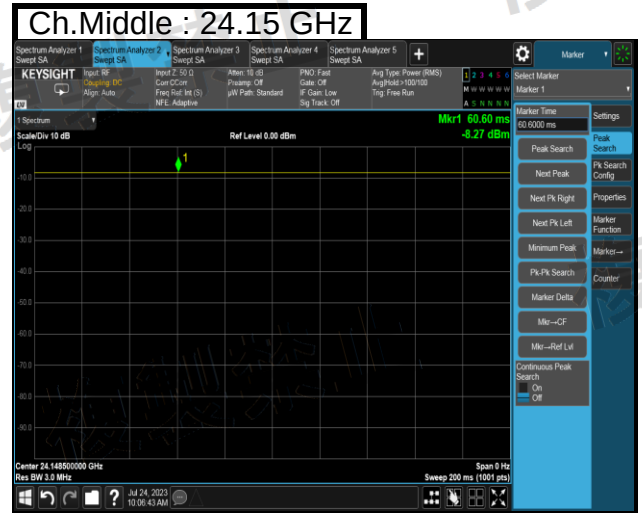
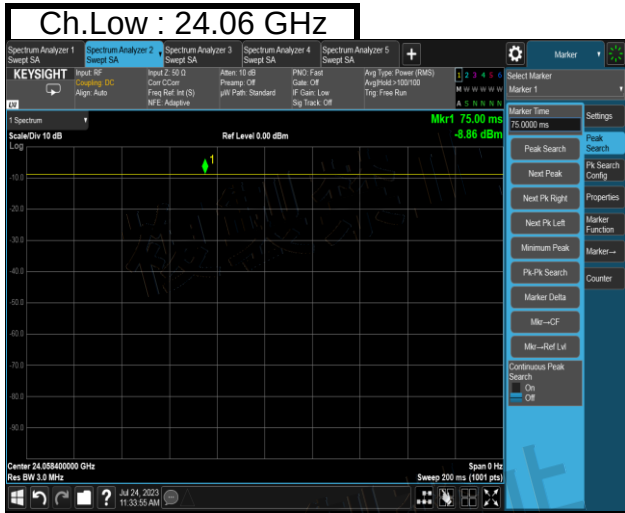
H/V		Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [mW]
				Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]					
V		24058.400	-8.84	56.93	14.83	45.64	10.37	22.57	12.46	2.00	0.669884609

H/V		Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [mW]
				Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]					
V		24148.500	-8.79	56.88	14.99	45.60	10.47	22.62	12.50	2.00	0.683911647

H/V		Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [mW]
				Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]					
V		24238.500	-8.65	56.84	15.16	45.60	10.88	22.77	12.42	2.00	0.71285303

7. Test chart

7.3 RF output power tolerance (+10% voltage)



Ch.Low : 24.06 GHz										
H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [mW]
			Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]					
V	24058.400	-8.86	56.93	14.83	45.64	10.35	22.57	12.46	2.00	0.666806769

Ch.Middle : 24.15 GHz										
H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [mW]
			Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]					
V	24148.500	-8.27	56.88	14.99	45.60	10.99	22.62	12.50	2.00	0.770903469

Ch.High : 24.24 GHz										
H/V	Frequency [MHz]	SA Reading [dBm]	Rx Factor [dB]			SG Reading [dBm]	Cable loss [dB]	Subs Ant. Gain [dBi]	EUT Ant. Gain [dBi]	Result [mW]
			Amplifier [dB]	RX Cable Loss [dB]	RX Antenna Factor [dB]					
V	24238.500	-8.67	56.84	15.16	45.60	10.86	22.77	12.42	2.00	0.709577768

8. Laboratory description

1. Location

Name: Eurofins KCTL Co., Ltd
65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Telephone Number: +82 31 285 0894
Facsimile Number: +82 505 299 8311

2. Accreditation and Registration

1) FCC

Site Designation No.: KR0040
Site Registration No.: 687132

2) VCCI

Registration No.: R-20080, G-20078, C-20059, T20056

3) Industry Canada

Registration No.: 8035A
Test Site No.: 8035A-2

4) KOLAS

Registration No.: KT231