

RF TEST REPORT

FCC ID: 2BWVL-HL20W1

Test Report No.....: RF260324003-02-003

Product(s) Name.....: STREAMING PROJECTOR

Model(s).....: HL20W1, HL20W1-H1, HL20W1-H2, HL20W1-H3, HL20W1-H4,
HL20W1-H5, GL20W1, RY100, RY200, RY300, RY500, RY700, RY800,
FS217, AX20W1, PSP-01A

Trade Mark.....: N/A

Applicant.....: Shenzhen Roonwin Technology Co., Ltd

Address.....: Rm 402, North Tower, Huada Technology Building, Hi-Tech Zone,
Nanshan, Shenzhen, Guangdong, China

Receipt Date.....: 2026.03.30

Test Date.....: 2026.04.20 ~ 2026.05.11

Issued Date.....: 2026.05.13

Standards.....: 47 CFR FCC Part 15, Subpart C(Section 15.247);
ANSI C63.10:2020

Testing Laboratory.....: Shenzhen Haiyun Standard Technical Co., Ltd.

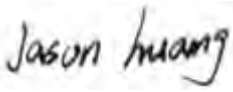
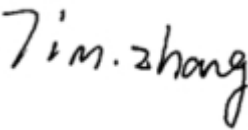
Prepared By:	Checked By:	Approved By:	
Jason Huang	Black Ding	Tim Zhang	
			

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History of this test report

Original Report Issue Date: 2026.05.13

☒ No additional attachment

☐ Additional attachments were issued following record

Attachment No.	Issue Date	Description

1. General Information

1.1 Applicant

Shenzhen Roonwin Technology Co., Ltd

Rm 402, North Tower, Huada Technology Building, Hi-Tech Zone, Nanshan, Shenzhen, Guangdong, China

1.2 Manufacturer

Shenzhen Roonwin Technology Co., Ltd

Rm 402, North Tower, Huada Technology Building, Hi-Tech Zone, Nanshan, Shenzhen, Guangdong, China

1.3 Basic Description of Equipment Under Test

Sample No.	POC260324003-S001	
Product name	STREAMING PROJECTOR	
Model name	HL20W1, HL20W1-H1, HL20W1-H2, HL20W1-H3, HL20W1-H4, HL20W1-H5, GL20W1, RY100, RY200, RY300, RY500, RY700, RY800, FS217, AX20W1, PSP-01A	
Test model	HL20W1	
Model difference	Only the model name is different.	
Hardware Version	ZJ. GLP1. RY 20W	
Software Version	V1.1.0	
Trade Mark	N/A	
Power supply	DC 12V from adapter & DC 5V from USB-C port & DC 11.1V from battery	
Adapter	Model: WEC-48WEAP-12000375BA Input: 100-240V~ 50/60Hz 1.5A Max Output: 12.0V==3.75A	
Operate temperature	0℃-40℃	
EUT Stage	○ Product Unit	● Final-Sample
Operating Band and Conducted Output Power (Max power)	2400MHz ~ 2483.5MHz	● IEEE 802.11ax40: 15.81dBm(0.038W)
Product Type	IEEE 802.11b/g/n: WLAN (SISO)	
Nominal Bandwidth	20MHz / 40MHz	
Antenna gain	1.87dBi	
Antenna type	FPC Antenna	
Modulation	DSSS, OFDM	
Data Rate (Mbps)	IEEE 802.11b mode: 1/2/5.5/11 IEEE 802.11g mode: 6/9/12/18/24/36/48/54 IEEE 802.11n mode: up to 150	

Eleven channels are provided for 802.11b, 802.11g, 802.11n (20MHz), 802.11ax (20MHz):

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400MHz ~ 2483.5 MHz	01	2412MHz	07	2442MHz
	02	2417MHz	08	2447MHz
	03	2422MHz	09	2452MHz
	04	2427MHz	10	2457MHz
	05	2432MHz	11	2462MHz
	06	2437MHz	/	/

Seven channels are provided for 802.11n (40MHz), 802.11ax (40MHz):

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400MHz ~ 2483.5 MHz	03	2422 MHz	07	2442MHz
	04	2427MHz	08	2447MHz
	05	2432MHz	09	2452MHz
	06	2437MHz	/	/

1.4 Transmit Operating Mode

Transmit Operating Mode						Transmit Multiple Antennas					
☒	Operating mode 1 (single antenna)					☒	1TX				
☐	Operating mode 2 (multiple antenna, no beam forming)					☐	2TX	☐	3TX	☐	4TX
☐	Operating mode 3 (multiple antenna, with beam forming)					☐	2TX	☐	3TX	☐	4TX
☒	802.11b	Operating mode	☒	1TX	☐	2TX	☐	3TX	☐	4TX	
☒	802.11g	Operating mode	☒	1TX	☐	2TX	☐	3TX	☐	4TX	
☒	802.11n(20MHz)	Operating mode	☒	1TX	☐	2TX	☐	3TX	☐	4TX	
☒	802.11n(40MHz)	Operating mode	☒	1TX	☐	2TX	☐	3TX	☐	4TX	

2. Summary of Test Results

2.1 Summary of Test Items

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Test item	FCC Clause	Results	Remarks
AC Power Conducted Emission	15.207	Pass	Meet the requirement of the limit
Radiated Emission and Band Edge Measurement	15.205/15.209 /15.247(d)	Pass	Meet the requirement of the limit
Spurious Emission at Antenna Port	15.247(d)	Pass	Meet the requirement of the limit
6dB Bandwidth	15.247(a)(2)	Pass	Meet the requirement of the limit
Maximum Conducted Power	15.247(b)	Pass	Meet the requirement of the limit
Power Spectral Density	15.247(e)	Pass	Meet the requirement of the limit
Antenna Requirements	15.203	Compliance	Note
Note: The EUT has one Interior antennas arrangement which was permanently attached.			

2.2 Application of Standard

47 CFR FCC Part 15, Subpart C (Section 15.247)

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2020

2.3 Test Instruments

No.	Name of Equipment	Manufacturer	Model Number	Serial Number	Inventory No.	Last Calibration	Due Calibration
Radiated Emission							
1	Test receiver	Rohde&Schwarz	ESU	100184	JLE011	2026/2/27	2027/2/26
2	Log periodic antenna	Schwarzbeck	VULB 9168	1151	JLE012	2025/4/12	2028/4/11
3	Low frequency amplifier	/	LNA 0920N	2014	JLE023	2026/2/27	2027/2/26
4	High frequency amplifier	Schwarzbeck	BBV 9718	9718-284	JLE024	2026/2/27	2027/2/26
5	Horn Antenna	SCHWARZBECK	BBHA 9120 D	02670	JLE028	2025/4/12	2028/4/11
6	Temp&Humidity Recorder	Meideshi	JR900	/	JLE021	2026/4/8	2027/4/7
7	Horn Antenna	SCHWARZBECK	BBHA 9170	9170#685	JLE029	2024/7/15	2027/7/14
8	Loop Antenna	SCHWARZBECK	FMZB1519B	00029	JLE030	2024/7/15	2027/7/14
9	Broadband preamplifier	Schwarzbeck	BBV9721	9721-019	JLE025	2026/2/27	2027/2/26
10	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2				
Conducted Emission							
1	LISN	Rohde&Schwarz	ENV216	100075	JLE002	2026/2/27	2027/2/26
2	ISN	Schwarzbeck	CATE 5 8158	#171	JLE003	2026/2/27	2027/2/26
3	ISN	Schwarzbeck	CAT 3 8158	00187	JLE032	2026/2/27	2027/2/26
4	Test receiver	Rohde&Schwarz	ESCI	100718	JLE010	2026/2/27	2027/2/26
5	Pulse limiter	Rohde&Schwarz	ESH3-Z2	102299	JLE047	2026/2/27	2027/2/26
6	Temp&Humidity Recorder	Meideshi	JR900	/	JLE020	2026/4/8	2027/4/7
7	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2				
RF Conducted Emissions							
1	MXA Signal Analyzer	Keysight	N9010A	MY51440158	JLE087	2025/9/15	2026/9/14
2	RF Control Unit	dsuoft	JS0806-2	21G8060449	JLE053	2026/2/27	2027/2/26
3	power supply unit	dsuoft	JS0806-4ADC	N/A	JLE055	2026/2/27	2027/2/26
4	VXG Signal Generator	Keysight	N5182B	MY59100855	JLE068	2026/4/11	2027/4/10
5	EXG Analog Signal Generator	Keysight	N5173B	MY59101282	JLE052	2026/2/27	2027/2/26
6	Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	1201.0002K5 0-116064-Dt	JLE054	2026/2/27	2027/2/26
7	Test software	dsuoft	JS1120-3 Ver.3.2.22.0				

2.4 Test Mode

Test Items	Mode	Data Rate	Channel
AC Power Conducted Emission	802.11AX40	MCS0	09
Radiated Emission and Band Edge Measurement	802.11B	1Mbps	01/06/11
	802.11G	6Mbps	01/06/11
	802.11N20	MCS0	01/06/11
	802.11N40	MCS0	03/06/09
	802.11AX20	MCS0	01/06/11
	802.11AX40	MCS0	03/06/09
Spurious Emission at Antenna Port	802.11B	1Mbps	01/06/11
	802.11G	6Mbps	01/06/11
	802.11N20	MCS0	01/06/11
	802.11N40	MCS0	03/06/09
	802.11AX20	MCS0	01/06/11
	802.11AX40	MCS0	03/06/09
6dB Bandwidth	802.11B	1Mbps	01/06/11
	802.11G	6Mbps	01/06/11
	802.11N20	MCS0	01/06/11
	802.11N40	MCS0	03/06/09
	802.11AX20	MCS0	01/06/11
	802.11AX40	MCS0	03/06/09
Maximum Conducted Power	802.11B	1Mbps	01/06/11
	802.11G	6Mbps	01/06/11
	802.11N20	MCS0	01/06/11
	802.11N40	MCS0	03/06/09
	802.11AX20	MCS0	01/06/11
	802.11AX40	MCS0	03/06/09
Power Spectral Density	802.11B	1Mbps	01/06/11
	802.11G	6Mbps	01/06/11
	802.11N20	MCS0	01/06/11
	802.11N40	MCS0	03/06/09
	802.11AX20	MCS0	01/06/11
	802.11AX40	MCS0	03/06/09

Note: For AC Power Conducted Emission and Radiated Emission below 1GHz, only worst case was recorded.

2.5 Test Condition

Applicable to	Environmental conditions	Input Power	Tested by
AC Power Conducted Emission	24.0°C, 57% RH	AC 120V/60Hz	Keith Huang
Radiated Emission and Band Edge Measurement	24.0°C, 54% RH	AC 120V/60Hz	Lemon He
Spurious Emission at Antenna Port	24.0°C, 54% RH	DC 11.1V	Elio Lin
6dB Bandwidth	23.4°C, 49% RH	DC 11.1V	Elio Lin
Maximum Conducted Power	23.4°C, 49% RH	DC 11.1V	Elio Lin
Power Spectral Density	23.4°C, 49% RH	DC 11.1V	Elio Lin

Note: EUT supply voltage AC 120V/60Hz.

The applicant declare the operating environment of EUT as below:

Normal conditions: DC 11.1V, 0~40°C

2.6 Duty Cycle of Test Signal

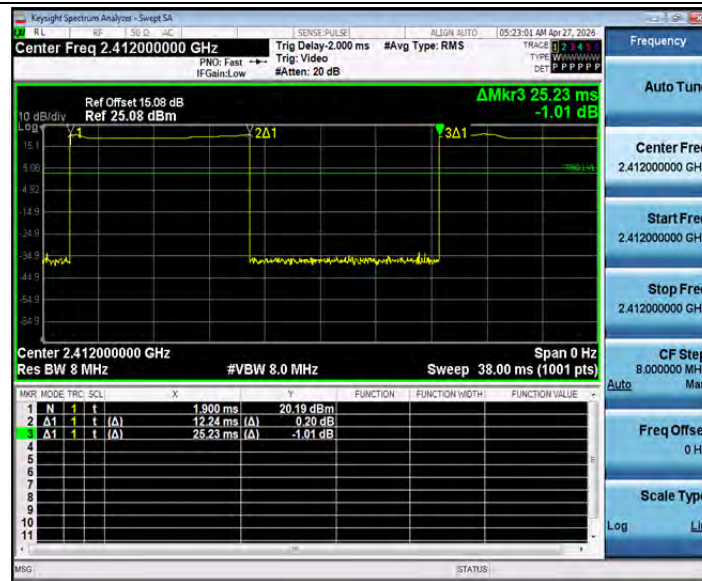
If duty cycle is $\geq 98\%$, duty factor is not required.

If duty cycle is $< 98\%$, duty factor shall be considered.

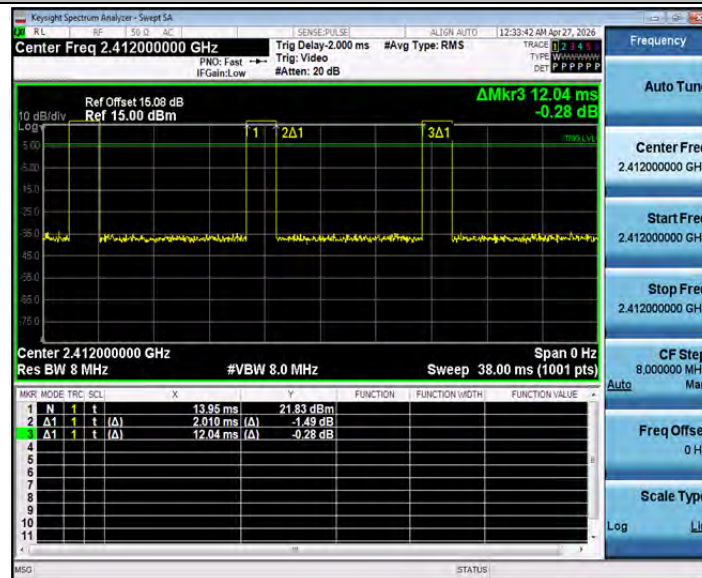
All the duty factor of other test mode have been considered.

Test Mode	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	2412	12.24	25.23	48.51
11G	2412	2.01	12.04	16.69
11N20	2412	1.90	12.88	14.75
11N40	2422	0.91	10.94	8.32
11AX20SISO	2412	1.45	11.48	12.63
11AX40SISO	2422	1.94	11.97	16.21

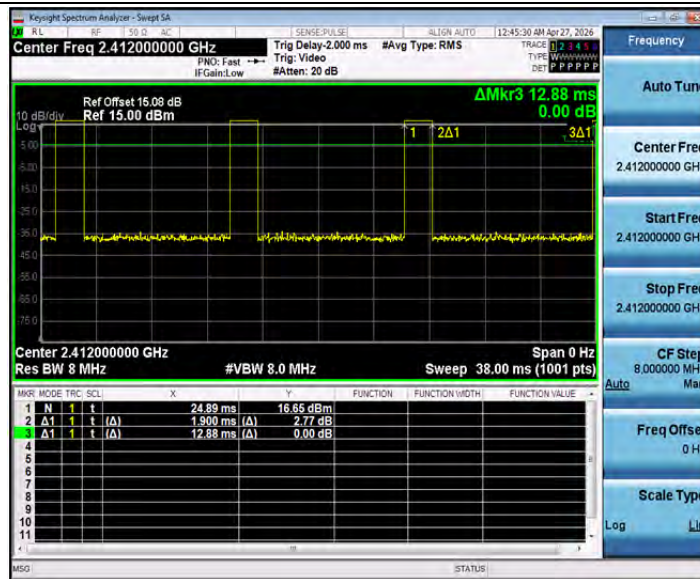
Test Graphs



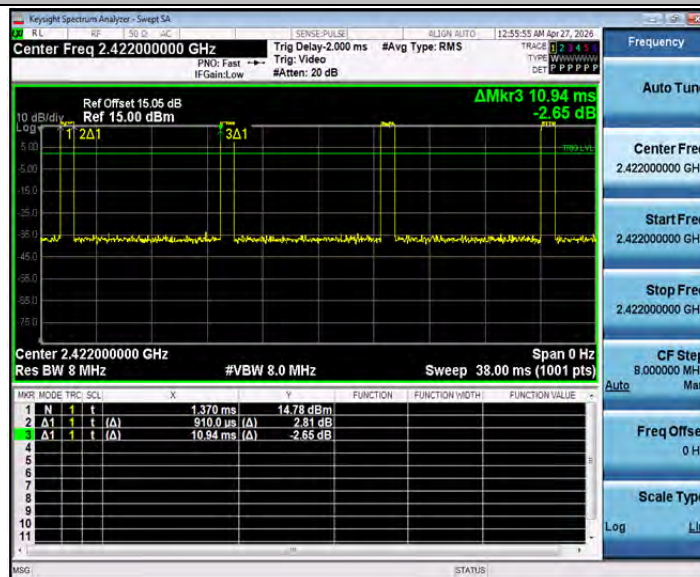
NTNV-11B-2412



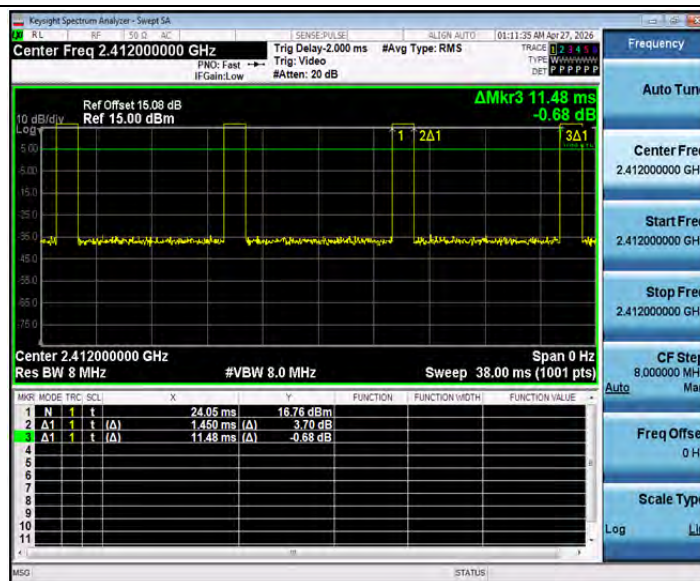
NTNV-11G-2412



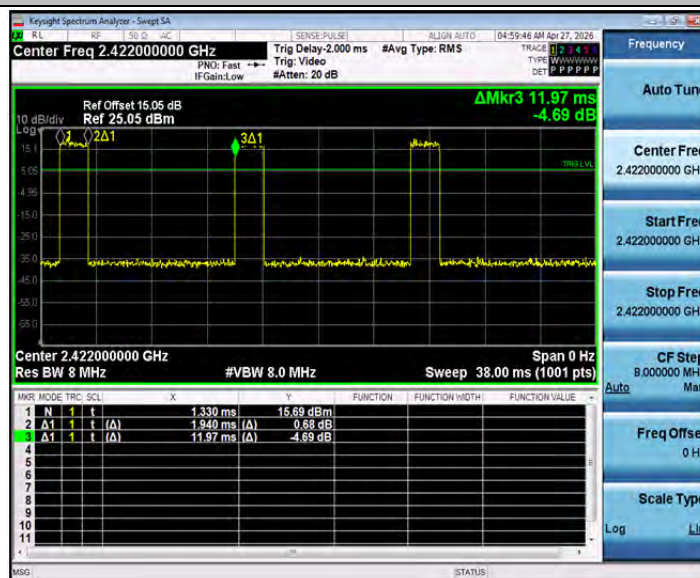
NTNV-11N20-2412



NTNV-11N40-2422



NTNV-11AX20- 2412



NTNV-11AX40SISO- 2422

2.7 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT.

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

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 102\text{kHz}$
RF power conducted	$\pm 0.243\text{dB}$
Power Spectral Density	$\pm 0.743\text{dB}$
Conducted Spurious Emission	$\pm 1.328\text{dB}$
Conducted emission(9kHz~30MHz) AC main	$\pm 2.68\text{dB}$
Radiated emission(9kHz~30MHz)	$\pm 3.50\text{dB}$
Radiated emission (30MHz~1GHz)	$\pm 4.20\text{dB}$
Radiated emission (1GHz~18GHz)	$\pm 5.10\text{dB}$
Radiated emission (18GHz~40GHz)	$\pm 5.26\text{dB}$

2.8 Test Location

Company:	Shenzhen Haiyun Standard Technical Co., Ltd.
Address:	No. 110-113, 115, 116, Block B, Jinyuan Business Building, Bao'an District, Shenzhen, China
CNAS Registration Number:	CNAS L18252
CAB identifier	CN0145
A2LA Certificate Number	6823.01

2.9 Description of Support Units

No.	Equipment	Model	Manufacturer	Series No
1	Notebook	L450	Think	/
2	USB Disk1	/	Kingston	/

3. Test Procedure And Results

3.1 AC Power Line Conducted Emission

3.1.1 Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

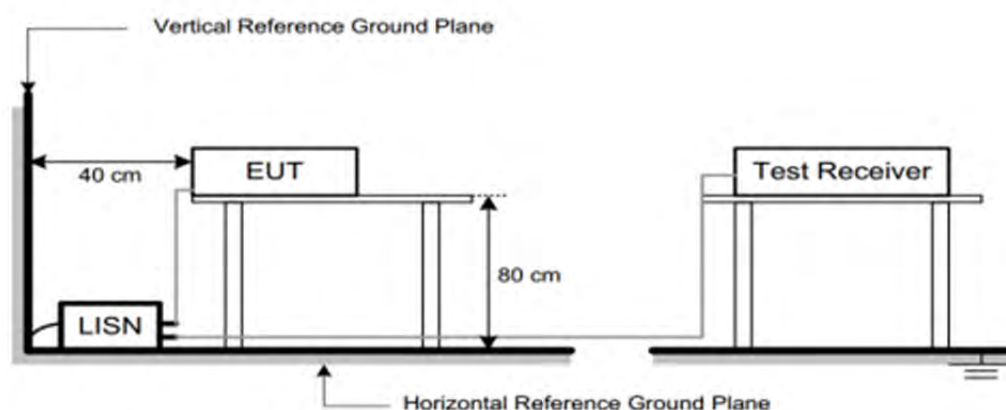
3.1.2 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☐ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme

Note: ● : Test ○ : No Test

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

3.1.3 Test Setup



3.1.4 Test Result

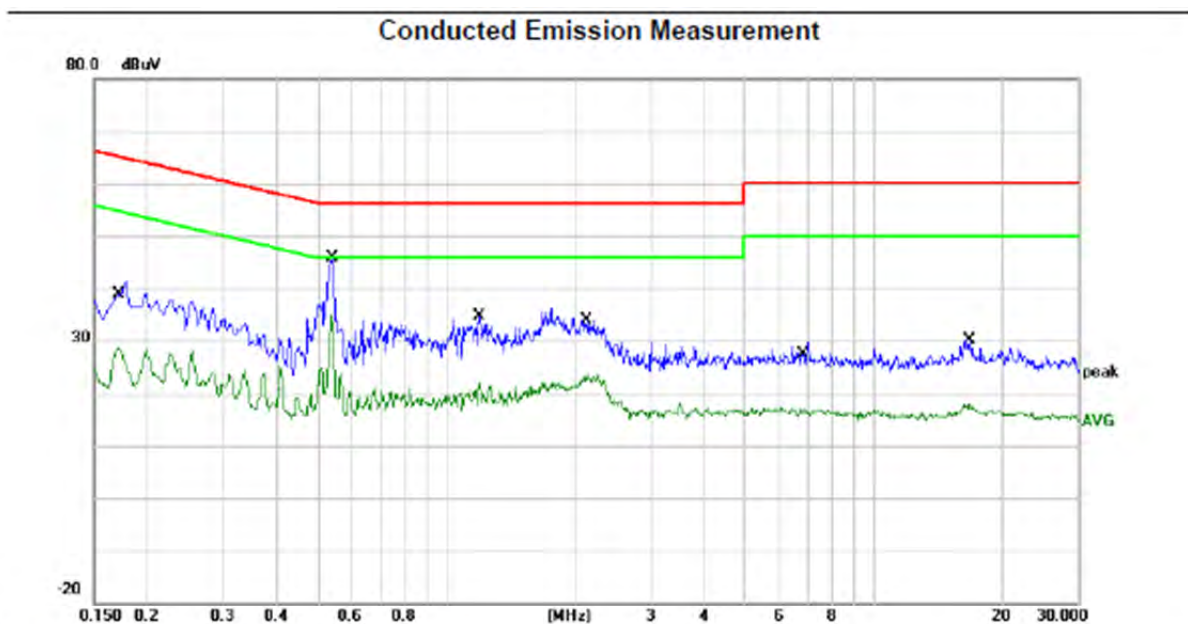
Note:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Measurement = Reading + Correct Factor.
3. Over = Measurement – Limit

We only recorded the data of the worst mode. Please see the following:

150kHz~30MHz	Worst Case Operating Mode: 11AX40 Channel 09
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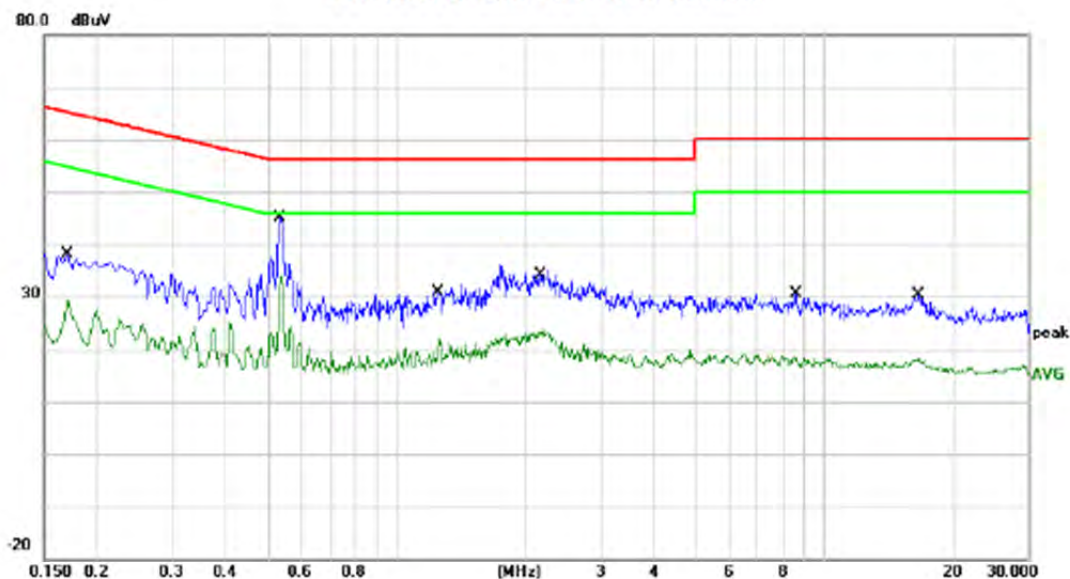
Line



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1700	18.95	19.64	38.59	64.96	-26.37	QP	
2		0.1700	9.11	19.64	28.75	54.96	-26.21	AVG	
3 *		0.5420	22.53	19.37	41.90	56.00	-14.10	QP	
4		0.5420	11.67	19.37	31.04	46.00	-14.96	AVG	
5		1.1940	15.31	19.33	34.64	56.00	-21.36	QP	
6		1.1940	2.61	19.33	21.94	46.00	-24.06	AVG	
7		2.1460	6.82	19.33	26.15	56.00	-29.85	QP	
8		2.1460	1.39	19.33	20.72	46.00	-25.28	AVG	
9		6.8780	6.55	19.45	26.00	60.00	-34.00	QP	
10		6.8780	-2.45	19.45	17.00	50.00	-33.00	AVG	
11		16.6900	2.86	19.42	22.28	60.00	-37.72	QP	
12		16.6900	-3.15	19.42	16.27	50.00	-33.73	AVG	

Neutral

Conducted Emission Measurement



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1700	18.44	19.58	38.02	64.96	-26.94	QP	
2		0.1700	9.72	19.58	29.30	54.96	-25.66	AVG	
3		0.5380	22.53	19.61	42.14	56.00	-13.86	QP	
4 *		0.5380	13.49	19.61	33.10	46.00	-12.90	AVG	
5		1.2660	11.10	19.56	30.66	56.00	-25.34	QP	
6		1.2660	2.35	19.56	21.91	46.00	-24.09	AVG	
7		2.1860	10.38	19.61	29.99	56.00	-26.01	QP	
8		2.1860	4.42	19.61	24.03	46.00	-21.97	AVG	
9		8.5820	10.69	19.47	30.16	60.00	-29.84	QP	
10		8.5820	-0.79	19.47	18.68	50.00	-31.32	AVG	
11		16.7500	4.20	19.45	23.65	60.00	-36.35	QP	
12		16.7500	-2.30	19.45	17.15	50.00	-32.85	AVG	

3.2 Radiated Emission and Band Edge

3.2.1 Limit

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency (MHz)	Distance Meters(m)	Field Strength Limit	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 – 0.49	300	$2400/\text{F}(\text{kHz})$	-
0.490 – 1.705	30	$24000/\text{F}(\text{kHz})$	-
1.705 – 30	30	30	-
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Note: (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

3.2.2 Test Procedure

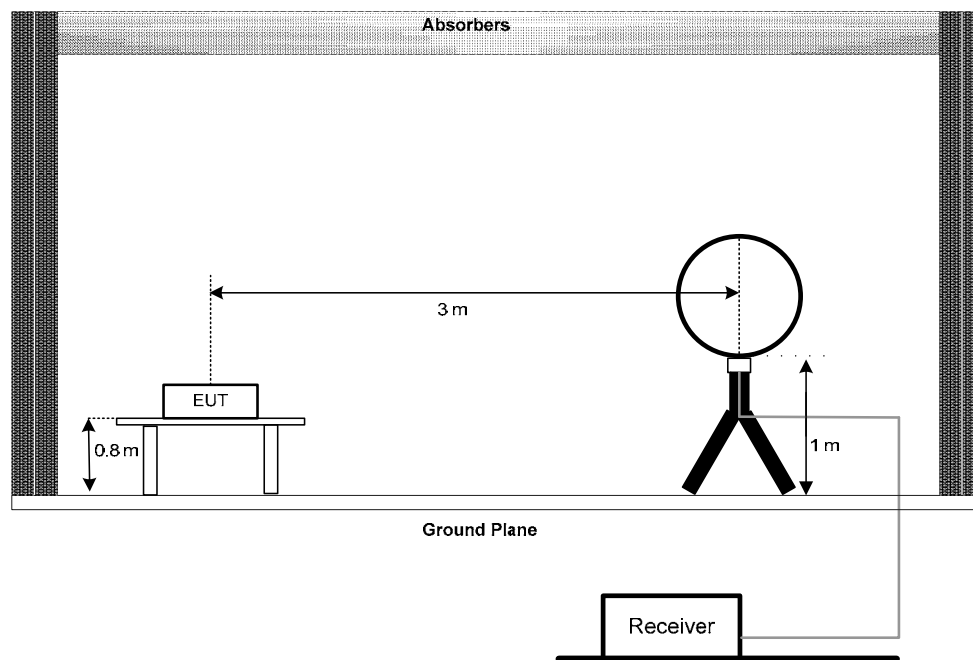
Test Method	
☐ Conducted Measurement	☒ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- The measuring distance of 3 m or 1.5m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).

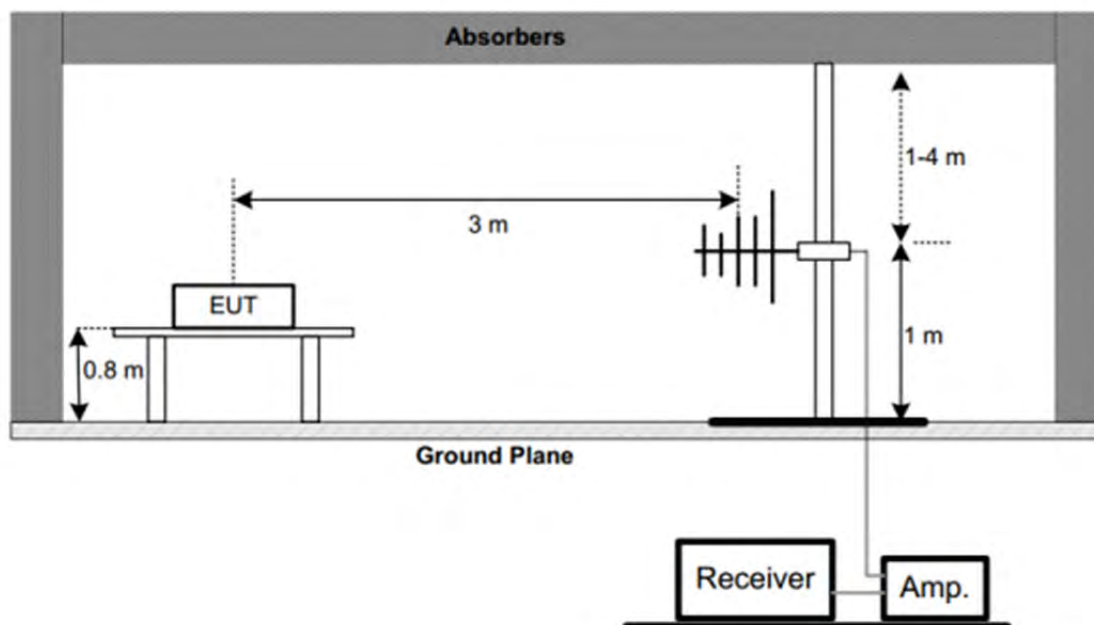
- e) The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f) The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g) All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- h) All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i) For the actual test configuration, please refer to the related Item -EUT Test Photos.

3.2.3 Test Setup

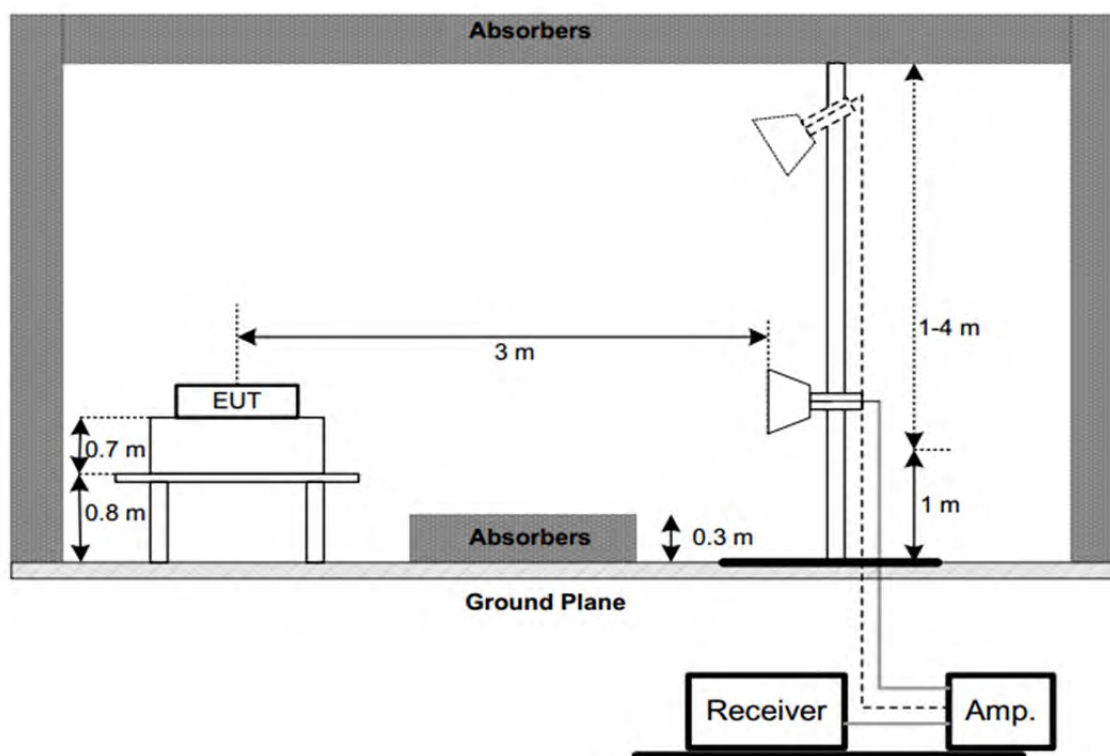
(A) Radiated Emission Test Set-Up Frequency Below 30 MHz



(B) Radiated Emission Test Set-Up Frequency 30 MHz-1000 MHz



(C) Radiated Emission Test Set-Up Frequency Above 1 GHz



3.2.4 Test Result

1) Radiated emission: 9kHz-30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not recorded in this report.

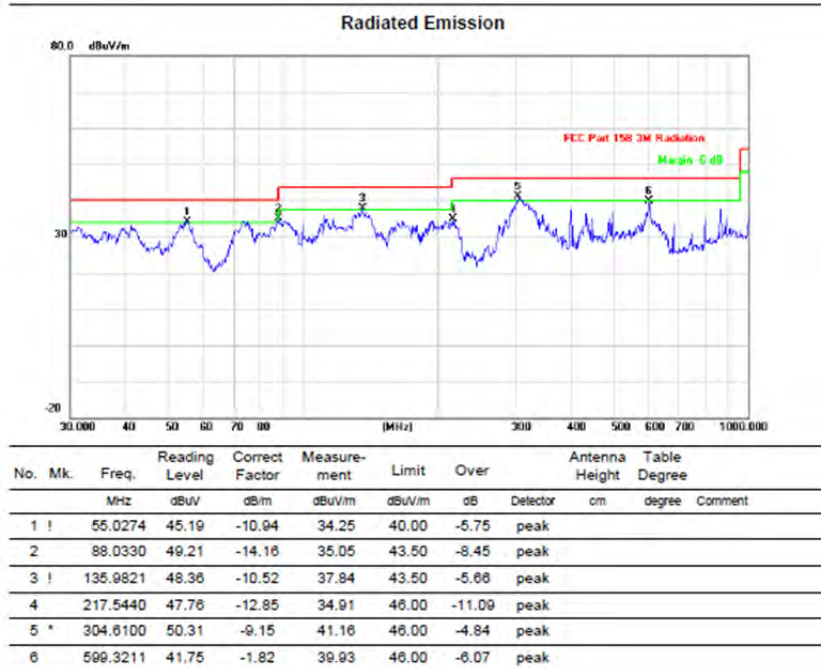
2) Radiated emission: 30MHz-1GHz

Note:

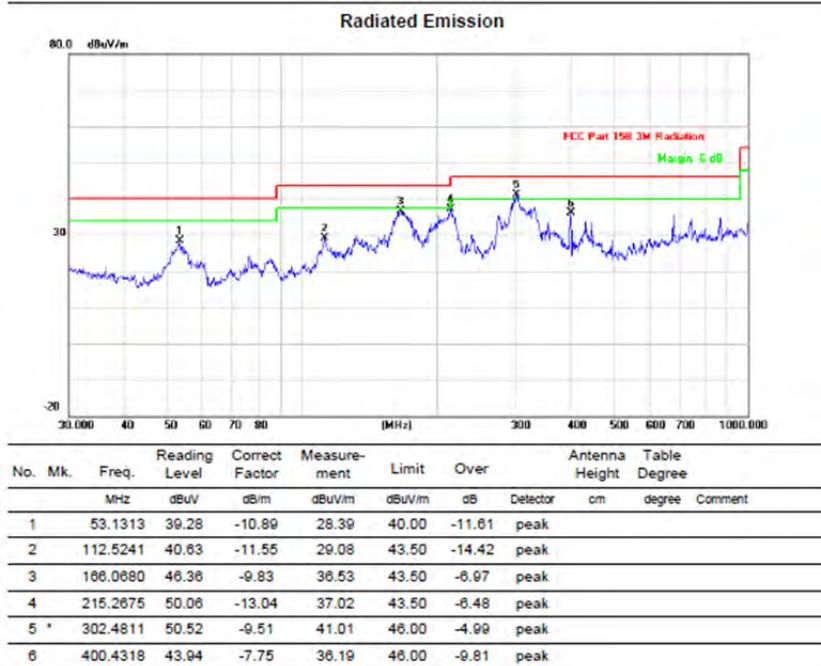
1. Measurement = Reading + Correct Factor.
2. Over = Measurement – Limit

We only recorded the data of the worst mode. Please see the following:

VERTICAL



HORIZONTAL



3) Radiated emission: Above 1GHz

Frequency (MHz)	Read Level (dBμV)	Polarization	Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
11B TX CH01							
4824.00	51.55	H	-4.12	47.43	74.00	26.57	peak
2310.00	50.39	H	-1.98	48.41	74.00	25.59	peak
2390.00	52.06	H	-1.58	50.48	74.00	23.52	peak
4824.00	52.13	V	-4.12	48.01	74.00	25.99	peak
2310.00	49.23	V	-1.98	47.25	74.00	26.75	peak
2390.00	50.48	V	-1.58	48.90	74.00	25.10	peak
11B TX CH06							
4874.00	51.38	H	-4.04	47.34	74.00	26.66	peak
4874.00	52.28	V	-4.04	48.24	74.00	25.76	peak
11B TX CH11							
4924.00	51.68	H	-3.82	47.86	74.00	26.14	peak
2483.50	50.40	H	-0.62	49.78	74.00	24.22	peak
2500.00	49.57	H	-0.45	49.12	74.00	24.88	peak
4924.00	51.65	V	-3.82	47.83	74.00	26.17	peak
2483.50	49.81	V	-0.62	49.19	74.00	24.81	peak
2500.00	50.06	V	-0.45	49.61	74.00	24.39	peak
11G TX CH01							
4824.00	52.24	H	-4.12	48.12	74.00	25.88	peak
2310.00	50.69	H	-1.98	48.71	74.00	25.29	peak
2390.00	51.10	H	-1.58	49.52	74.00	24.48	peak
4824.00	51.37	V	-4.12	47.25	74.00	26.75	peak
2310.00	50.64	V	-1.98	48.66	74.00	25.34	peak
2390.00	51.10	V	-1.58	49.52	74.00	24.48	peak
11G TX CH06							
4874.00	50.86	H	-4.04	46.82	74.00	27.18	peak
4874.00	51.47	V	-4.04	47.43	74.00	26.57	peak
11G TX CH11							
4924.00	51.68	H	-3.82	47.86	74.00	26.14	peak
2483.50	50.58	H	-0.62	49.96	74.00	24.04	peak
2500.00	49.61	H	-0.45	49.16	74.00	24.84	peak
4924.00	51.67	V	-3.82	47.85	74.00	26.15	peak
2483.50	50.20	V	-0.62	49.58	74.00	24.42	peak
2500.00	50.12	V	-0.45	49.67	74.00	24.33	peak

11N20 TX CH01							
4824.00	52.46	H	-4.12	48.34	74.00	25.66	peak
2310.00	50.56	H	-1.98	48.58	74.00	25.42	peak
2390.00	52.71	H	-1.58	51.13	74.00	22.87	peak
4824.00	52.36	V	-4.12	48.24	74.00	25.76	peak
2310.00	51.39	V	-1.98	49.41	74.00	24.59	peak
2390.00	51.19	V	-1.58	49.61	74.00	24.39	peak
11N20 TX CH06							
4874.00	52.47	H	-4.04	48.43	74.00	25.57	peak
4874.00	51.42	V	-4.04	47.38	74.00	26.62	peak
11N20 TX CH11							
4924.00	51.35	H	-3.82	47.53	74.00	26.47	peak
2483.50	51.03	H	-0.62	50.41	74.00	23.59	peak
2500.00	49.25	H	-0.45	48.80	74.00	25.20	peak
4924.00	51.45	V	-3.82	47.63	74.00	26.37	peak
2483.50	50.82	V	-0.62	50.20	74.00	23.80	peak
2500.00	48.98	V	-0.45	48.53	74.00	25.47	peak
11N40 TX CH03							
4844.00	51.74	H	-4.31	47.43	74.00	26.57	peak
2310.00	50.81	H	-1.98	48.83	74.00	25.17	peak
2390.00	50.84	H	-1.58	49.26	74.00	24.74	peak
4844.00	51.13	V	-4.31	46.82	74.00	27.18	peak
2310.00	50.62	V	-1.98	48.64	74.00	25.36	peak
2390.00	52.16	V	-1.58	50.58	74.00	23.42	peak
11N40 TX CH06							
4874.00	49.41	H	-4.04	45.37	74.00	28.63	peak
4874.00	50.42	V	-4.04	46.38	74.00	27.62	peak
11N40 TX CH09							
4904.00	51.38	H	-3.73	47.65	74.00	26.35	peak
2483.50	49.98	H	-0.62	49.36	74.00	24.64	peak
2500.00	49.43	H	-0.45	48.98	74.00	25.02	peak
4904.00	51.85	V	-3.73	48.12	74.00	25.88	peak
2483.50	49.91	V	-0.62	49.29	74.00	24.71	peak
2500.00	49.46	V	-0.45	49.01	74.00	24.99	peak

11AX20 TX CH01							
4824.00	50.95	H	-4.12	46.83	74.00	27.17	peak
2310.00	50.42	H	-1.98	48.44	74.00	25.56	peak
2390.00	50.95	H	-1.58	49.37	74.00	24.63	peak
4824.00	52.25	V	-4.12	48.13	74.00	25.87	peak
2310.00	50.69	V	-1.98	48.71	74.00	25.29	peak
2390.00	50.67	V	-1.58	49.09	74.00	24.91	peak
11AX20 TX CH06							
4874.00	51.42	H	-4.04	47.38	74.00	26.62	peak
4874.00	52.36	V	-4.04	48.32	74.00	25.68	peak
11AX20 TX CH11							
4924.00	49.80	H	-3.82	45.98	74.00	28.02	peak
2483.50	50.65	H	-0.62	50.03	74.00	23.97	peak
2500.00	50.43	H	-0.45	49.98	74.00	24.02	peak
4924.00	50.65	V	-3.82	46.83	74.00	27.17	peak
2483.50	50.56	V	-0.62	49.94	74.00	24.06	peak
2500.00	49.72	V	-0.45	49.27	74.00	24.73	peak
11AX40 TX CH03							
4844.00	51.68	H	-4.31	47.37	74	26.63	peak
2310.00	51.92	H	-1.98	49.94	74	24.06	peak
2390.00	51.46	H	-1.58	49.88	74	24.12	peak
4844.00	51.25	V	-4.31	46.94	74	27.06	peak
2310.00	48.75	V	-1.98	46.77	74	27.23	peak
2390.00	51.45	V	-1.58	49.87	74	24.13	peak
11AX40 TX CH06							
4874.00	51.22	H	-4.04	47.18	74.00	26.82	peak
4874.00	50.91	V	-4.04	46.87	74.00	27.13	peak
11AX40 TX CH09							
4904.00	50.70	H	-3.73	46.97	74.00	27.03	peak
2483.50	50.74	H	-0.62	50.12	74.00	23.88	peak
2500.00	49.44	H	-0.45	48.99	74.00	25.01	peak
4904.00	52.09	V	-3.73	48.36	74.00	25.64	peak
2483.50	49.92	V	-0.62	49.30	74.00	24.70	peak
2500.00	48.72	V	-0.45	48.27	74.00	25.73	peak

Note: 1. The other emission levels were very low against the limit.
2. Measurement = Reading Level+ Correct Factor, Margin = Limit- Measurement

3.3 Spurious Emission at Antenna Port

3.3.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

3.3.2 Test Procedure

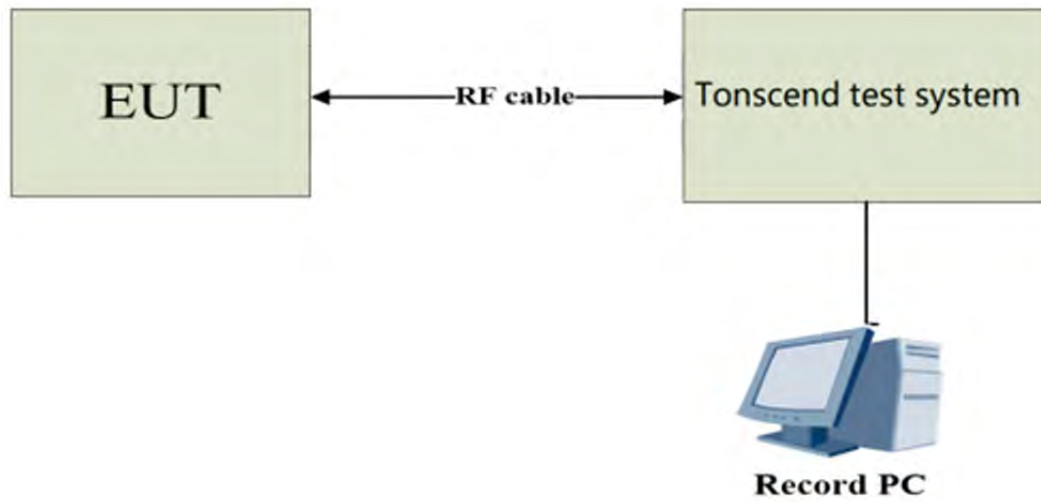
Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

a) The EUT was directly connected to the tonscond test system and antenna output port as show in the block diagram below.

b) Spectrum Setting as below:

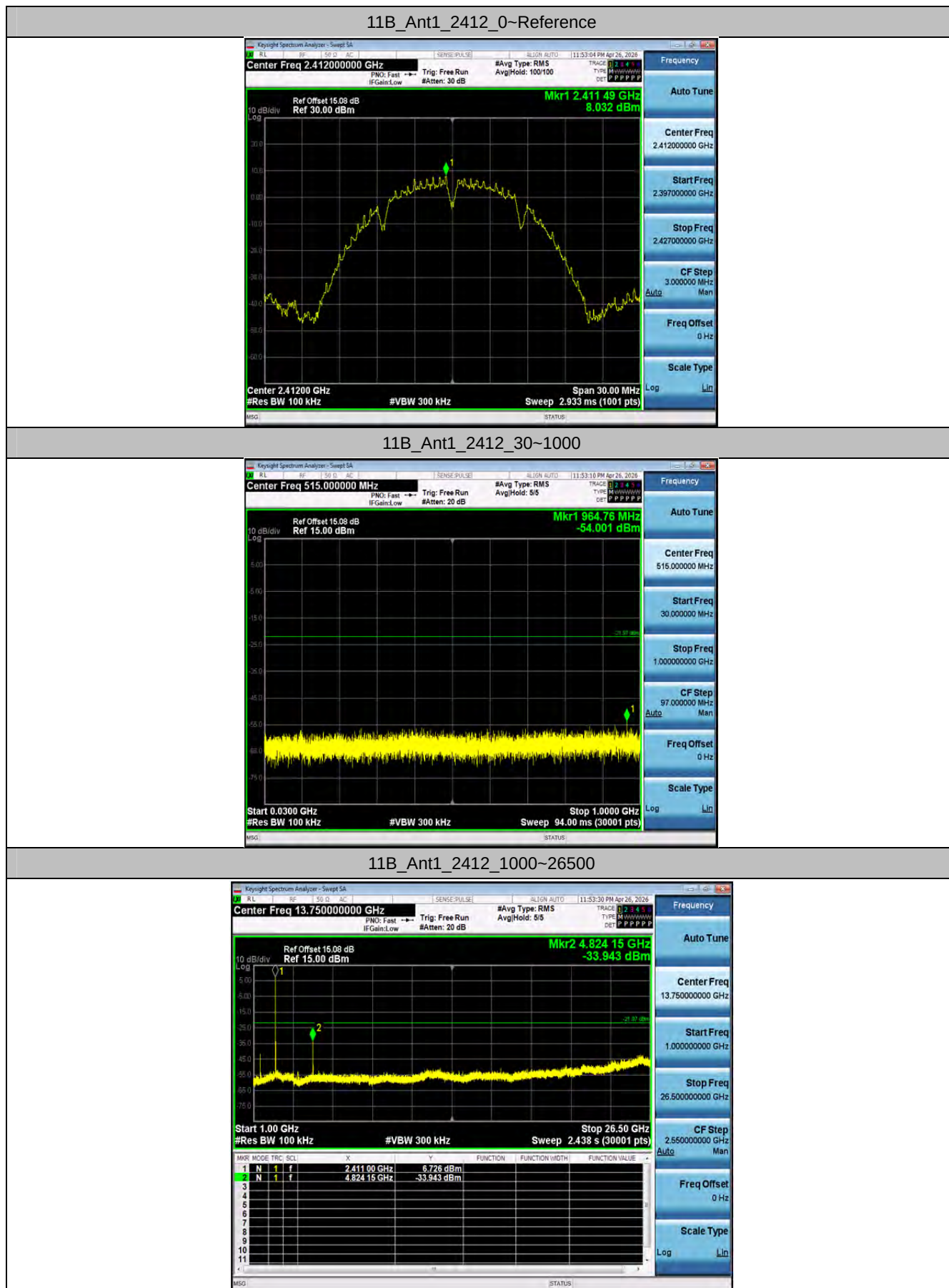
Centre Frequency	The centre frequency of the channel under test
Spectrum Parameters	Setting
Start Frequency	30 MHz
Stop Frequency	26.5 GHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

3.3.3 Test Setup



3.3.4 The Result

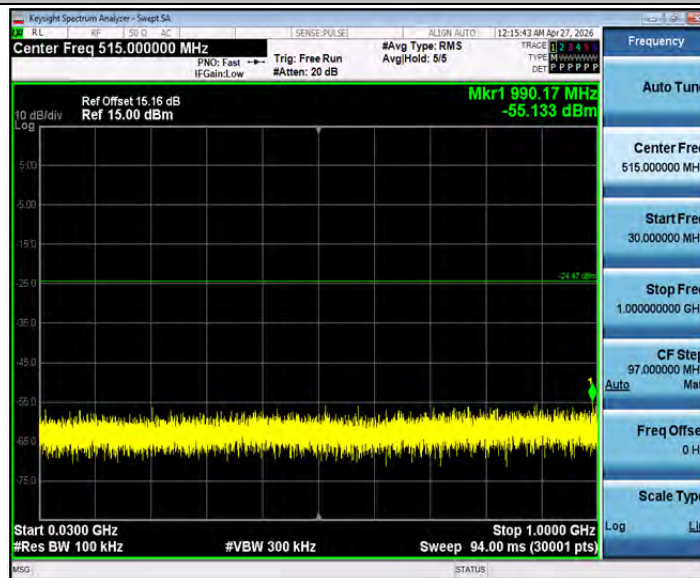
Conducted Spurious Emission



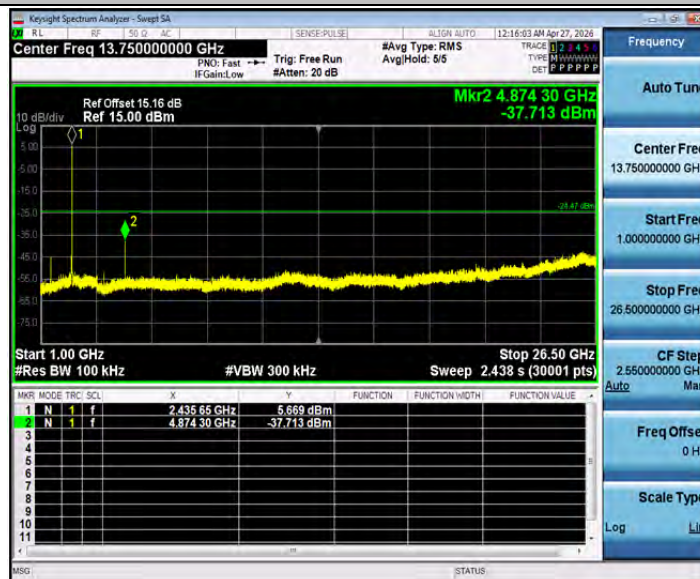
11B_Ant1_2437_0~Reference



11B_Ant1_2437_30~1000



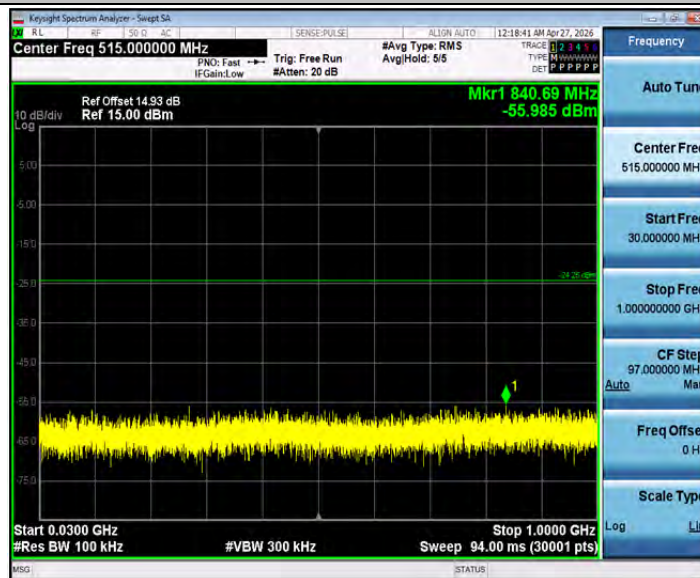
11B_Ant1_2437_1000~26500



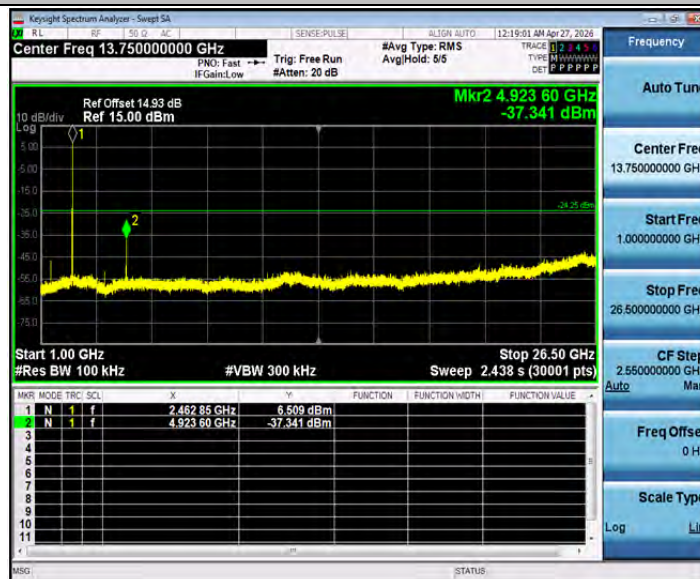
11B_Ant1_2462_0~Reference



11B_Ant1_2462_30~1000



11B_Ant1_2462_1000~26500



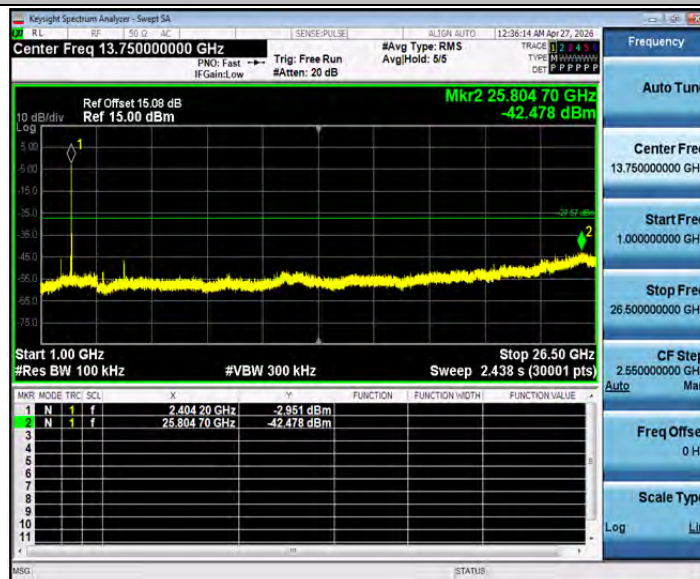
11G_Ant1_2412_0~Reference



11G_Ant1_2412_30~1000



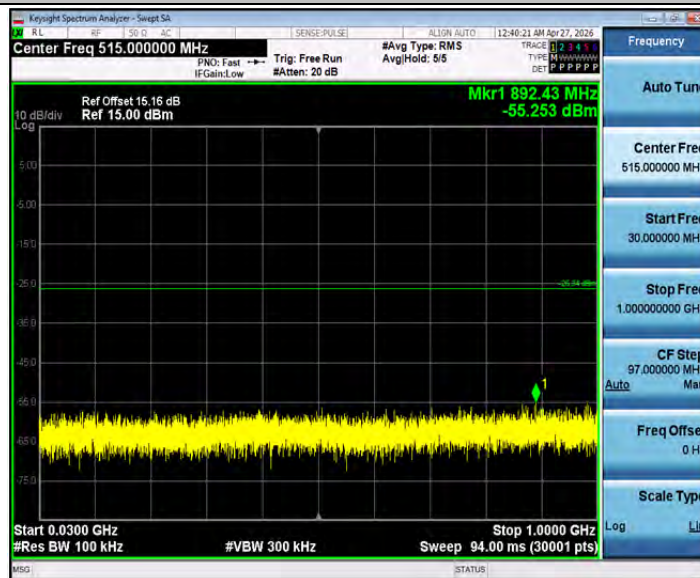
11G_Ant1_2412_1000~26500



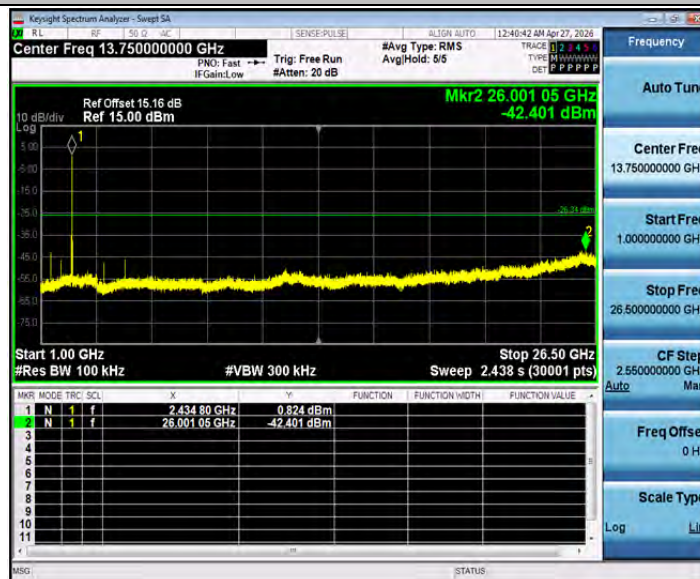
11G_Ant1_2437_0~Reference



11G_Ant1_2437_30~1000



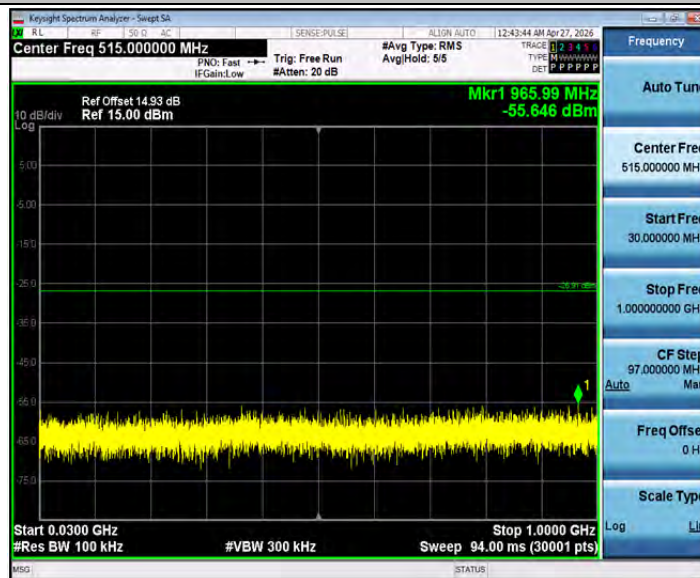
11G_Ant1_2437_1000~26500



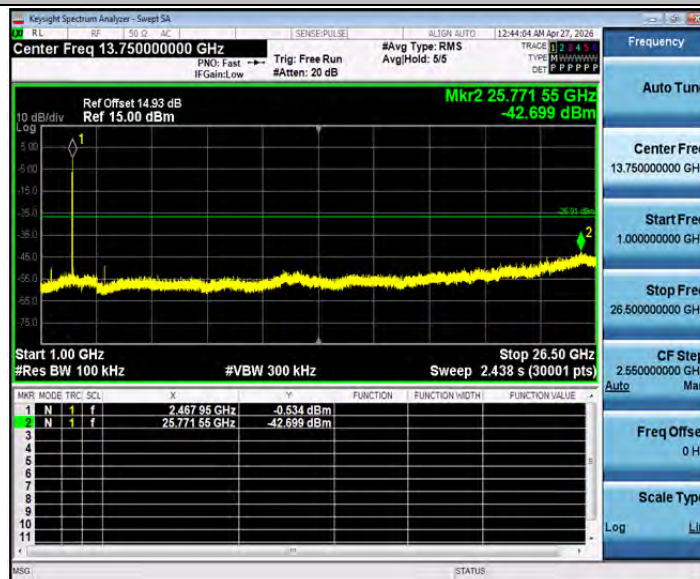
11G_Ant1_2462_0~Reference



11G_Ant1_2462_30~1000



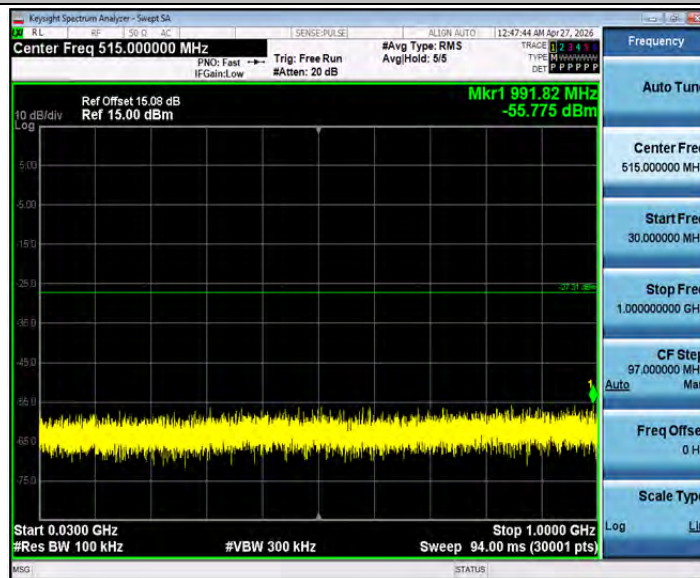
11G_Ant1_2462_1000~26500



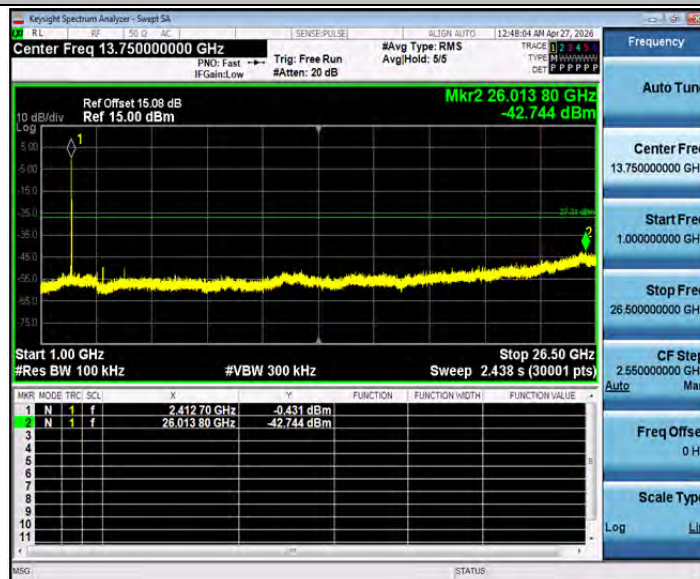
11N20SISO_Ant1_2412_0~Reference



11N20SISO_Ant1_2412_30~1000



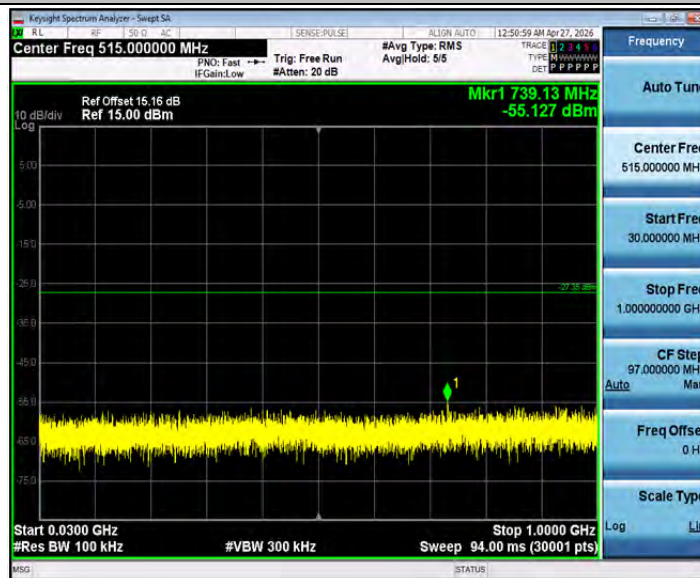
11N20SISO_Ant1_2412_1000~26500



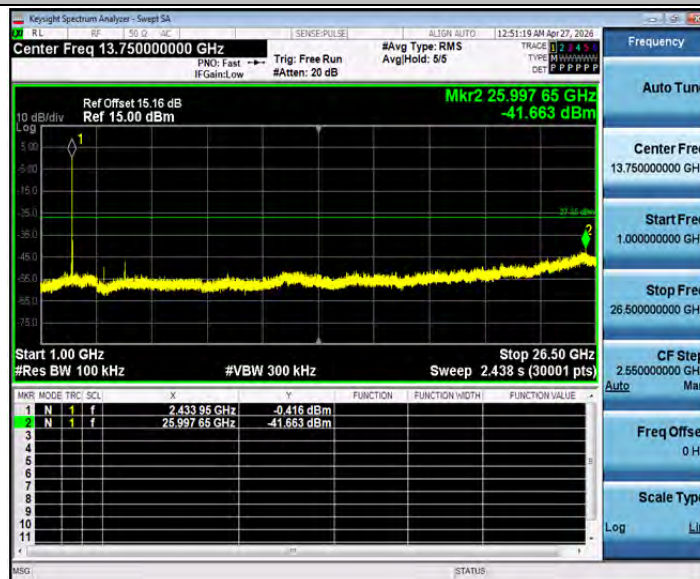
11N20SISO_Ant1_2437_0~Reference



11N20SISO_Ant1_2437_30~1000



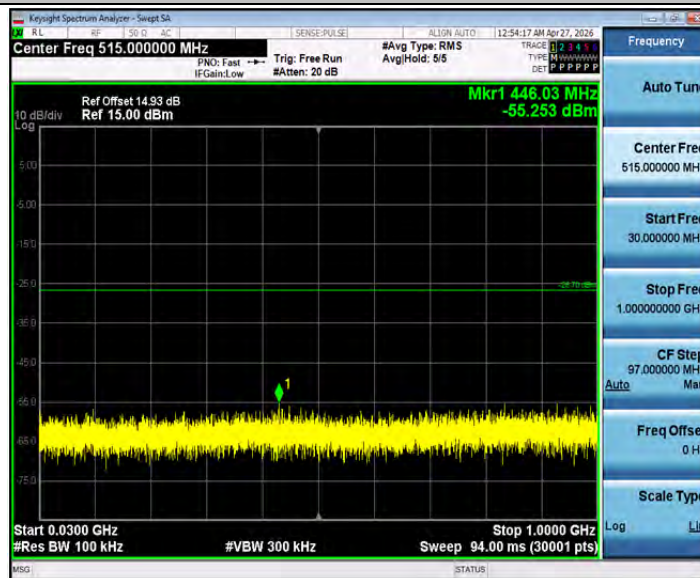
11N20SISO_Ant1_2437_1000~26500



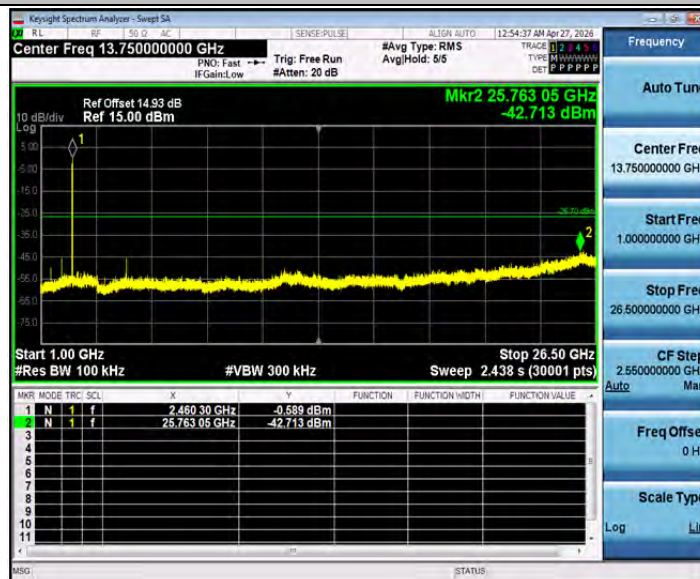
11N20SISO_Ant1_2462_0~Reference



11N20SISO_Ant1_2462_30~1000



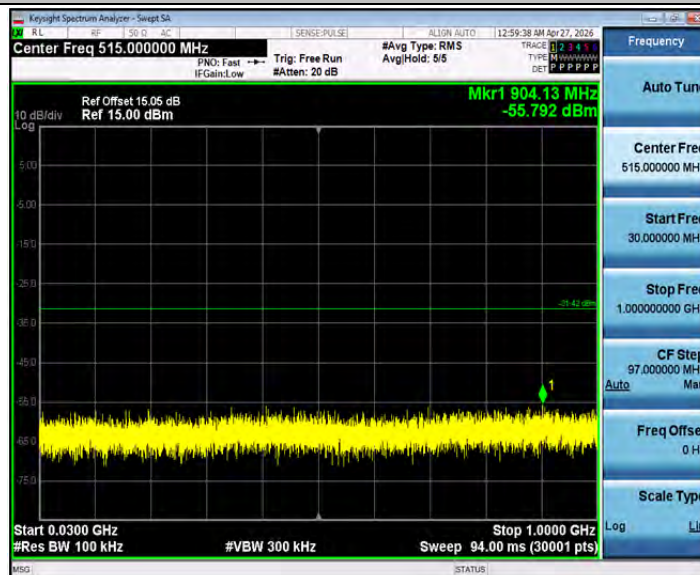
11N20SISO_Ant1_2462_1000~26500



11N40SISO_Ant1_2422_0~Reference



11N40SISO_Ant1_2422_30~1000



11N40SISO_Ant1_2422_1000~26500



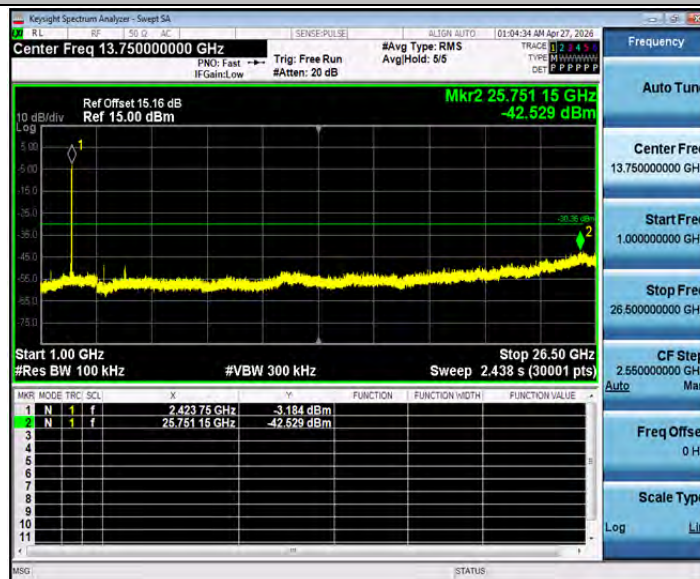
11N40SISO_Ant1_2437_0~Reference



11N40SISO_Ant1_2437_30~1000



11N40SISO_Ant1_2437_1000~26500



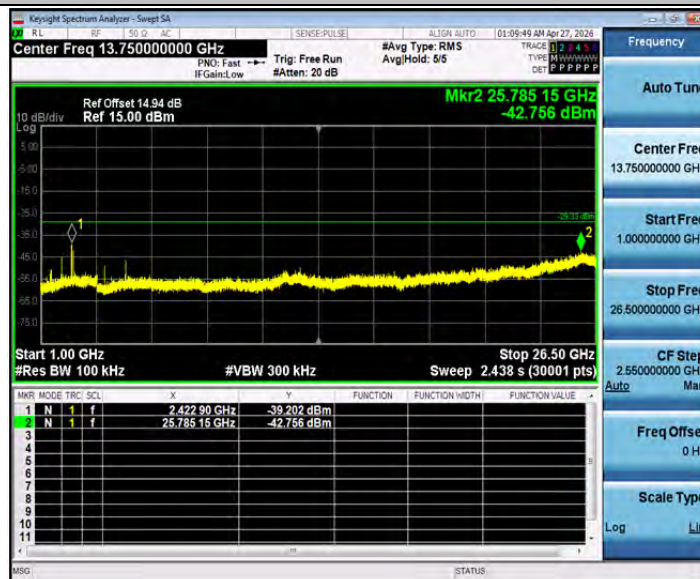
11N40SISO_Ant1_2452_0~Reference



11N40SISO_Ant1_2452_30~1000



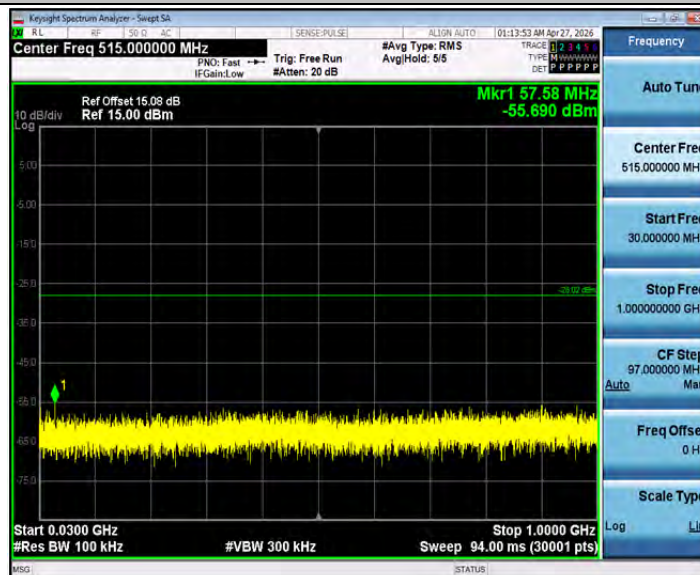
11N40SISO_Ant1_2452_1000~26500



11AX20SISO_Ant1_2412_0~Reference



11AX20SISO_Ant1_2412_30~1000



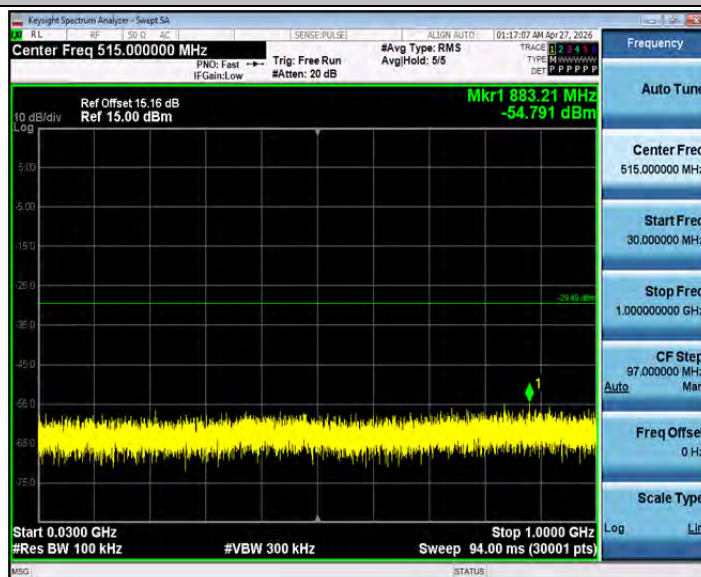
11AX20SISO_Ant1_2412_1000~26500



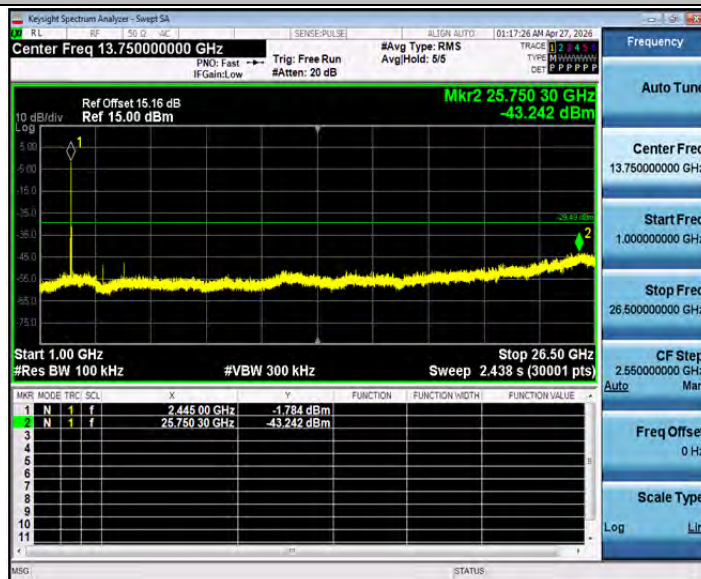
11AX20SISO_Ant1_2437_0~Reference



11AX20SISO_Ant1_2437_30~1000



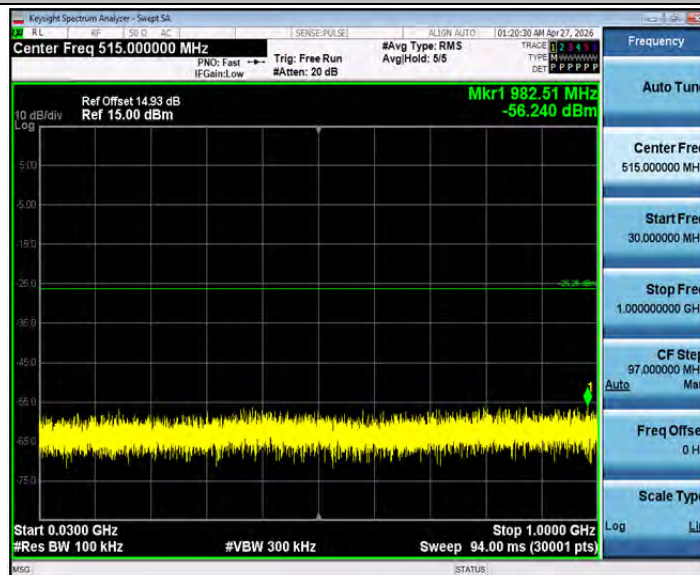
11AX20SISO_Ant1_2437_1000~26500



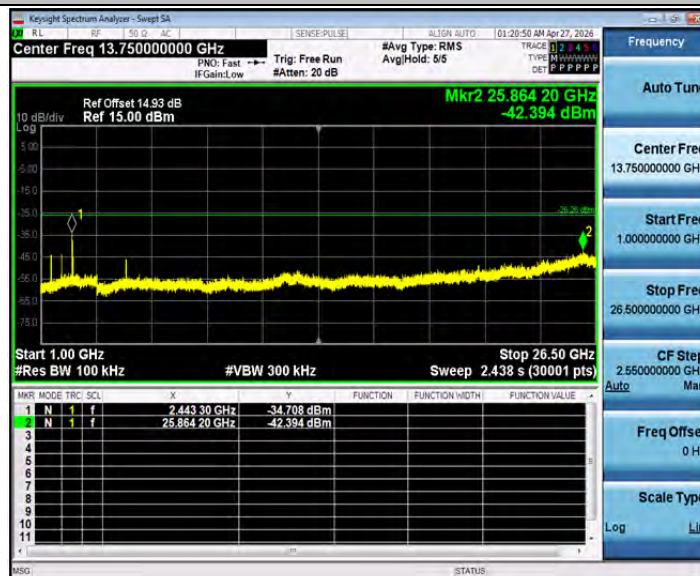
11AX20SISO_Ant1_2462_0~Reference



11AX20SISO_Ant1_2462_30~1000



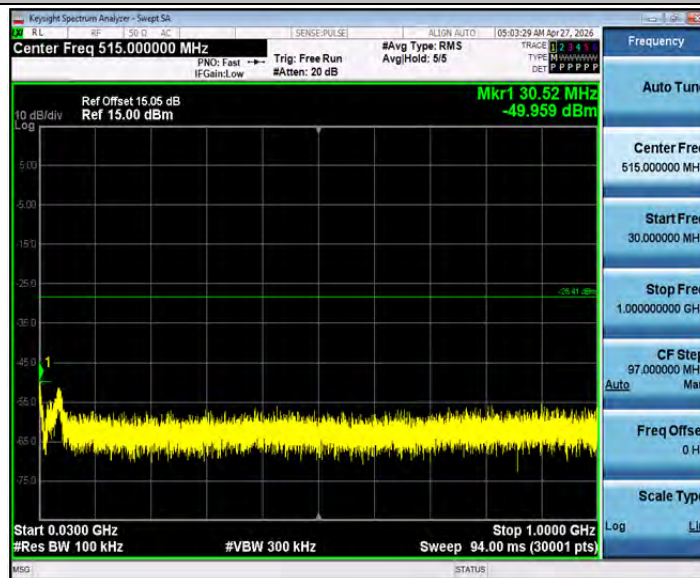
11AX20SISO_Ant1_2462_1000~26500



11AX40SISO_Ant1_2422_0~Reference



11AX40SISO_Ant1_2422_30~1000



11AX40SISO_Ant1_2422_1000~26500



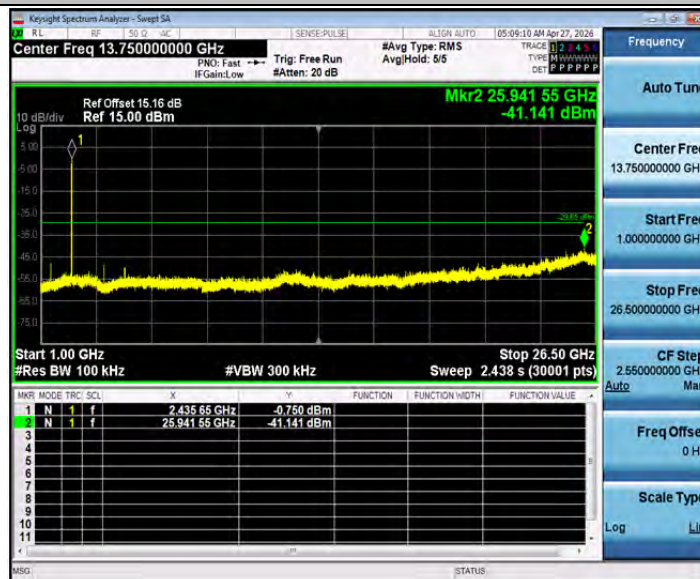
11AX40SISO_Ant1_2437_0~Reference



11AX40SISO_Ant1_2437_30~1000



11AX40SISO_Ant1_2437_1000~26500



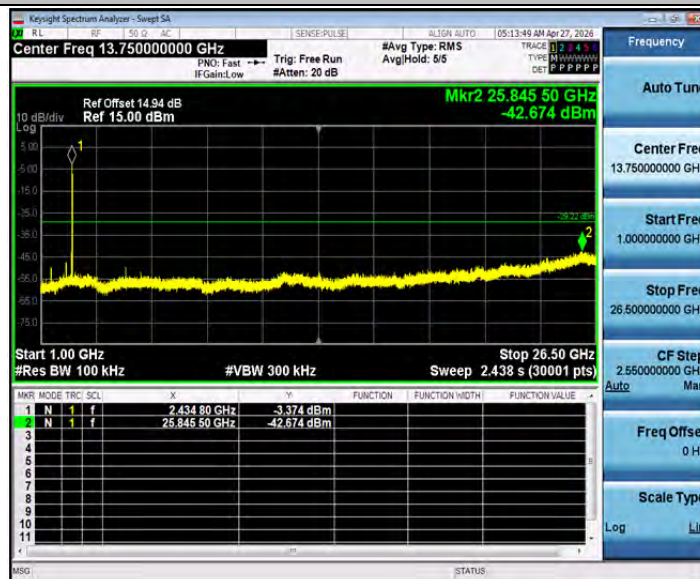
11AX40SISO_Ant1_2452_0~Reference



11AX40SISO_Ant1_2452_30~1000



11AX40SISO_Ant1_2452_1000~26500

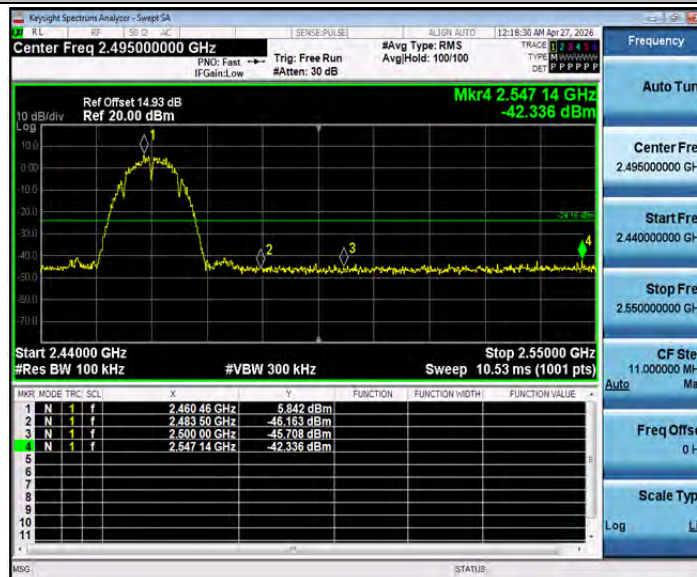


Band edge

11B_Ant1_Low_2412



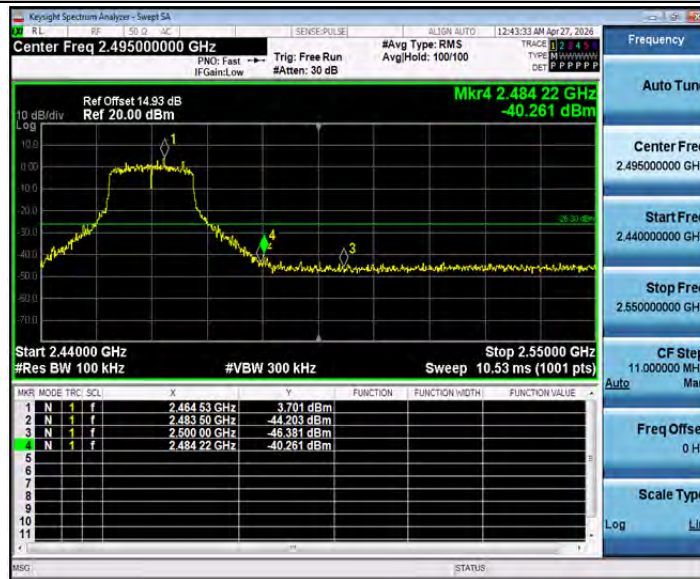
11B_Ant1_High_2462



11G_Ant1_Low_2412



11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412



11N20SISO_Ant1_High_2462



11N40SISO_Ant1_Low_2422



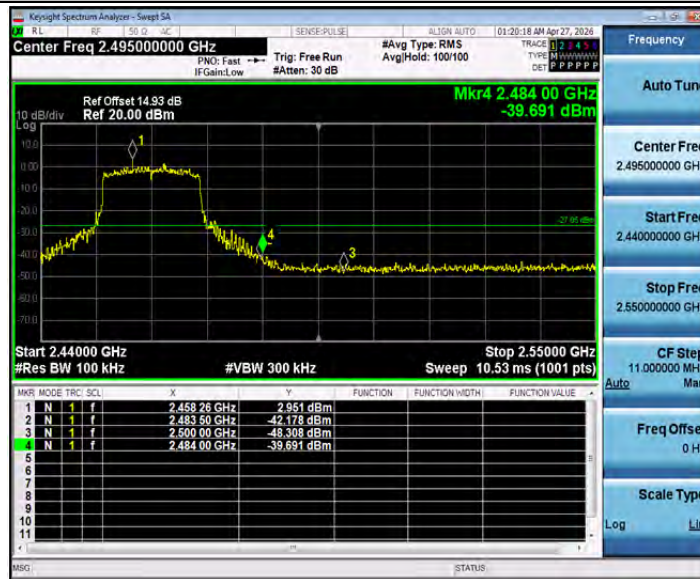
11N40SISO_Ant1_High_2452



11AX20SISO_Ant1_Low_2412



11AX20SISO_Ant1_High_2462



11AX40SISO_Ant1_Low_2422



11AX40SISO_Ant1_High_2452



3.4 6dB Bandwidth

3.4.1 Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

3.4.2 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

a) The EUT was connected to the tonscend test system, and the spectrum analyser is set as follow:

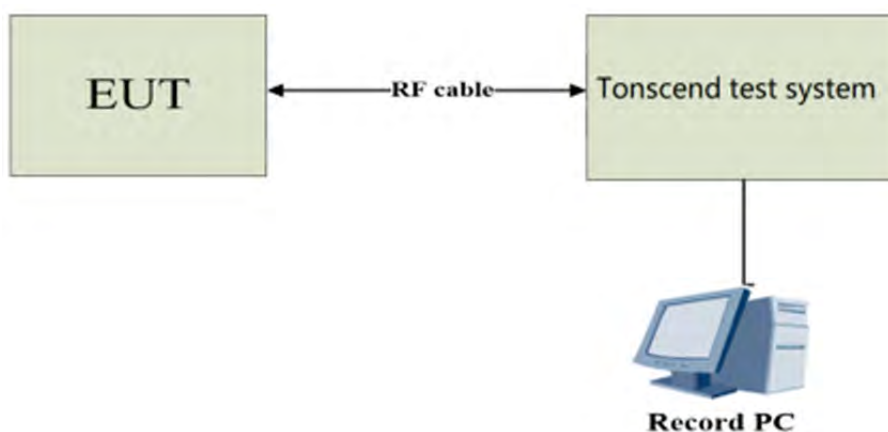
Centre Frequency	The centre frequency of the channel under test
RBW	1%~5% OBW but not less than 100 kHz.
VBW	≥ 3 RBW
Frequency span	2x Nominal Channel Bandwidth
Detector Mode	Peak
Trace Mode	Max Hold
Sweep Time	Auto Couple

b) Wait for the trace to stabilize then find the peak value of the trace and place the analyser marker on this peak.

c) Use the -6dB bandwidth function of the spectrum analyser to measure the 6dB Bandwidth of the EUT. This value shall be recorded.

d) Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

3.4.3 Test Setup

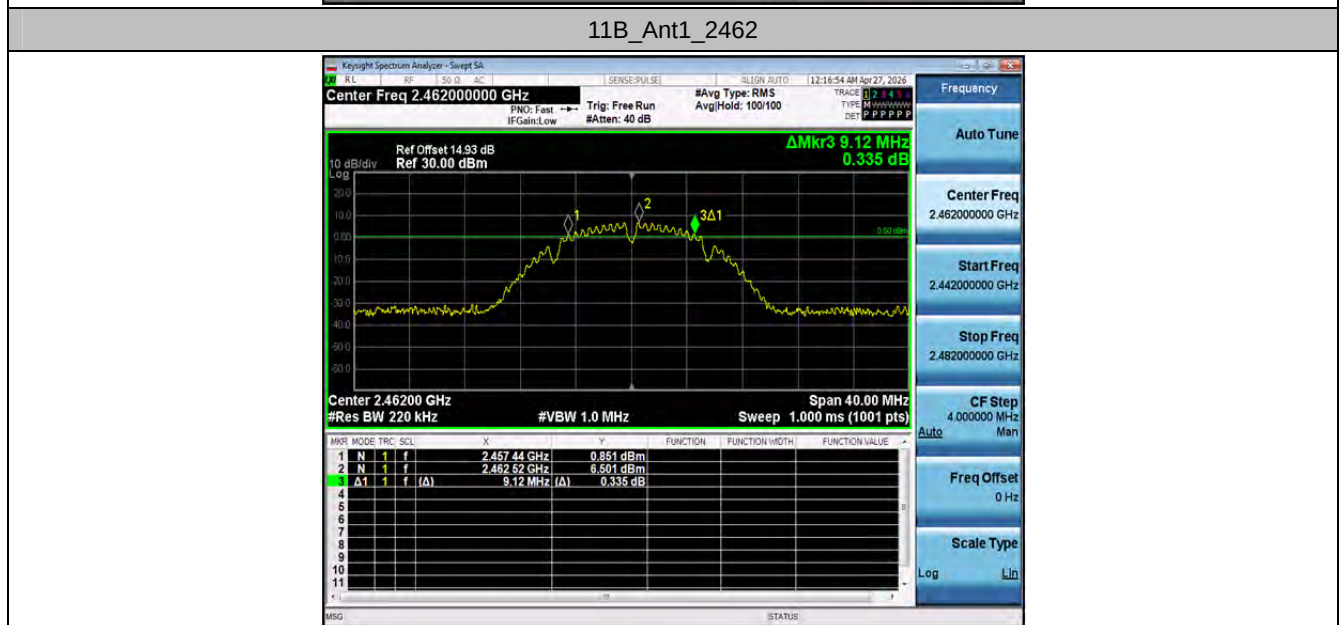
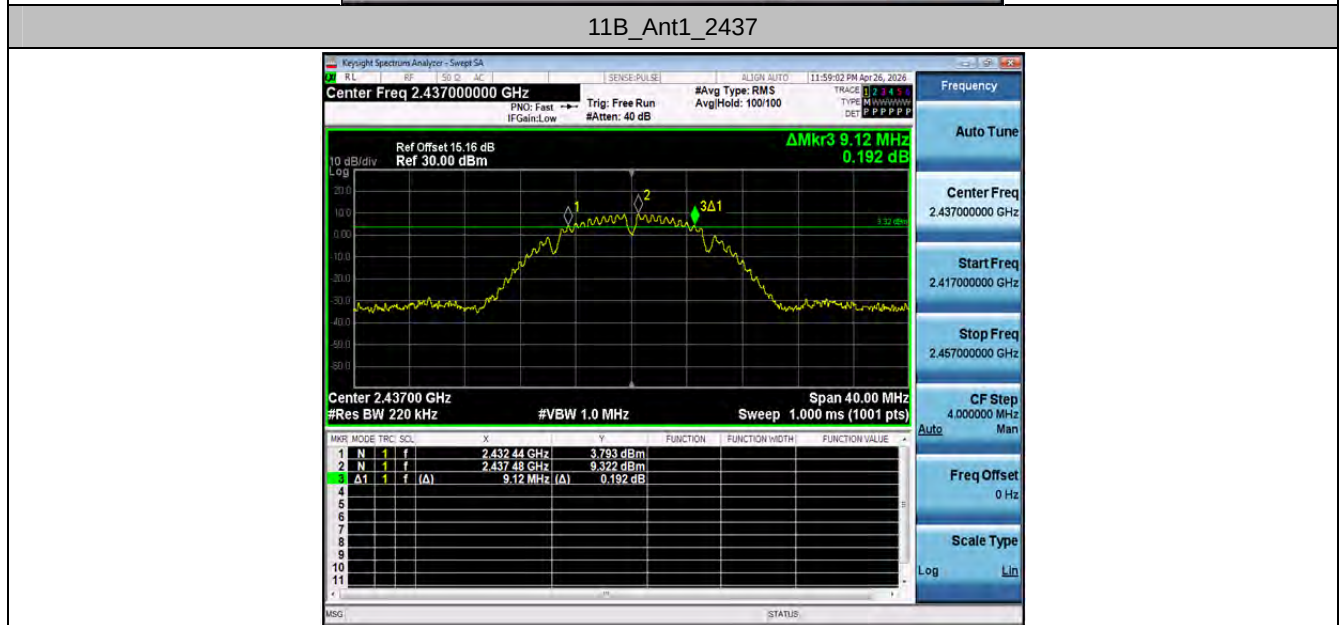
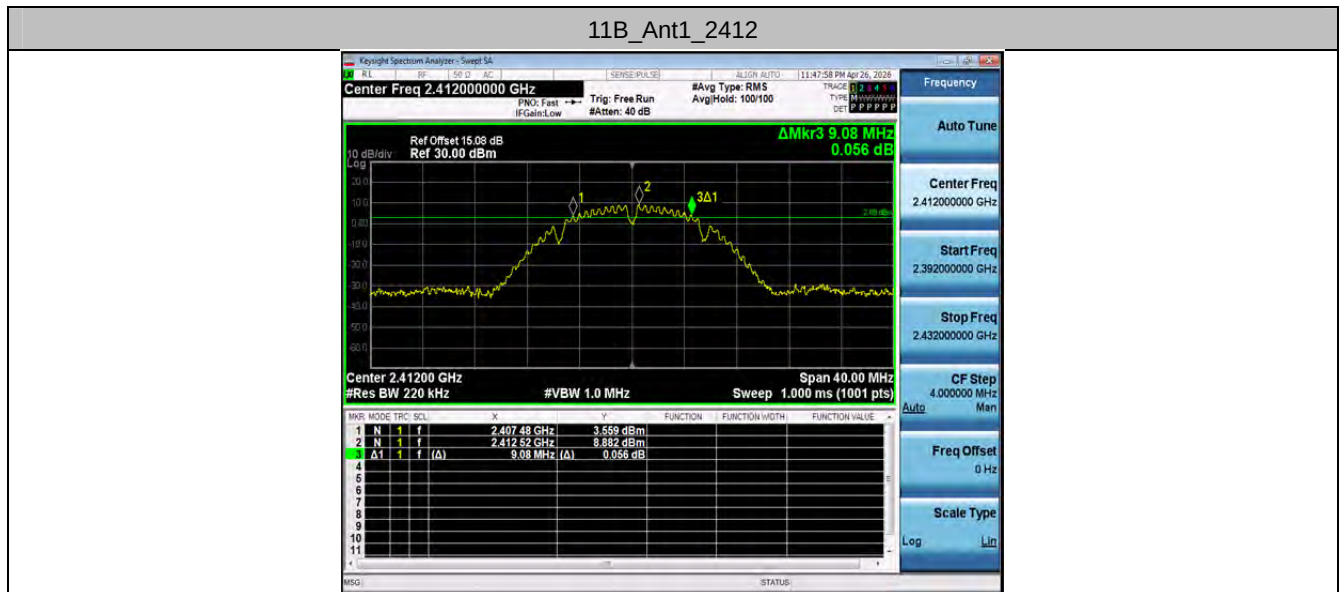


3.4.4 Test Result

DTS Bandwidth

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.080	2407.480	2416.560	0.5	PASS
		2437	9.120	2432.440	2441.560	0.5	PASS
		2462	9.120	2457.440	2466.560	0.5	PASS
11G	Ant1	2412	16.360	2403.800	2420.160	0.5	PASS
		2437	16.320	2428.800	2445.120	0.5	PASS
		2462	16.240	2453.880	2470.120	0.5	PASS
11N20SISO	Ant1	2412	17.320	2403.360	2420.680	0.5	PASS
		2437	17.360	2428.280	2445.640	0.5	PASS
		2462	17.640	2453.160	2470.800	0.5	PASS
11N40SISO	Ant1	2422	36.000	2404.080	2440.080	0.5	PASS
		2437	35.920	2418.840	2454.760	0.5	PASS
		2452	35.520	2434.240	2469.760	0.5	PASS
11AX20SISO	Ant1	2412	18.520	2402.960	2421.480	0.5	PASS
		2437	18.520	2427.560	2446.080	0.5	PASS
		2462	18.720	2452.680	2471.400	0.5	PASS
11AX40SISO	Ant1	2422	37.120	2403.360	2440.480	0.5	PASS
		2437	36.800	2418.840	2455.640	0.5	PASS
		2452	36.320	2434.240	2470.560	0.5	PASS

Test Graphs



11G_Ant1_2412



11G_Ant1_2437



11G_Ant1_2462



11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



11AX20SISO_Ant1_2412



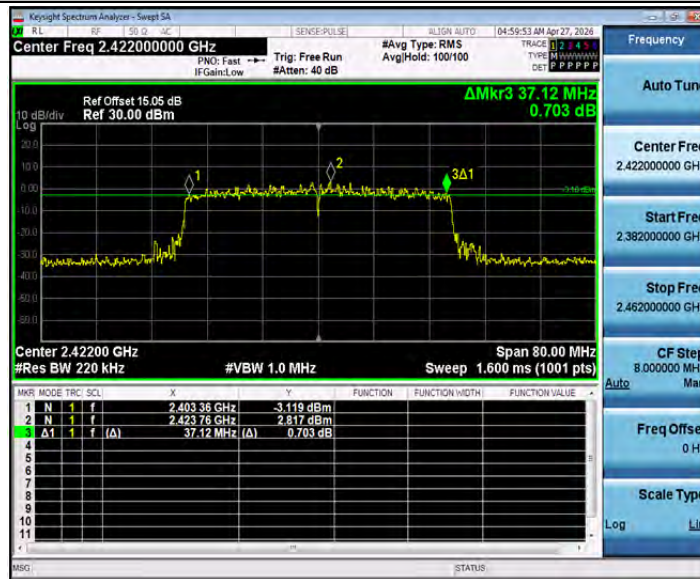
11AX20SISO_Ant1_2437



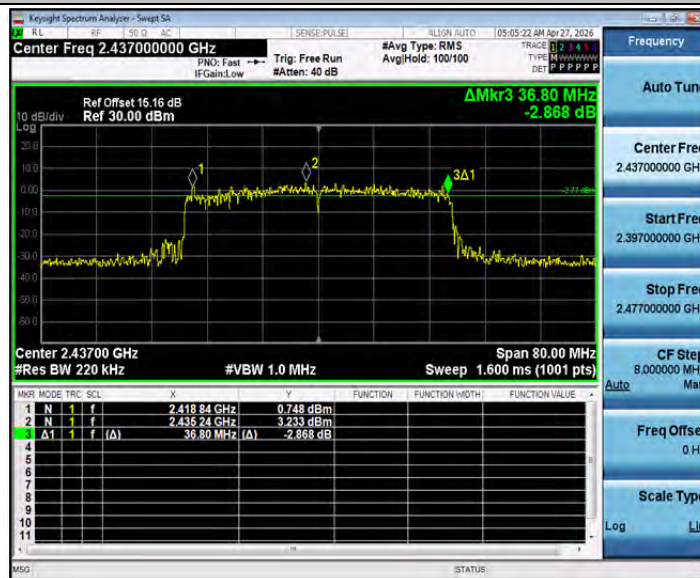
11AX20SISO_Ant1_2462



11AX40SISO_Ant1_2422



11AX40SISO_Ant1_2437



11AX40SISO_Ant1_2452

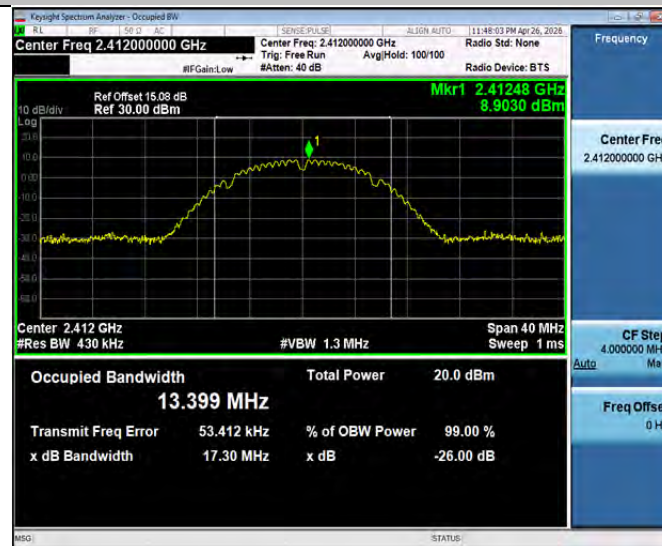


Occupied Channel Bandwidth

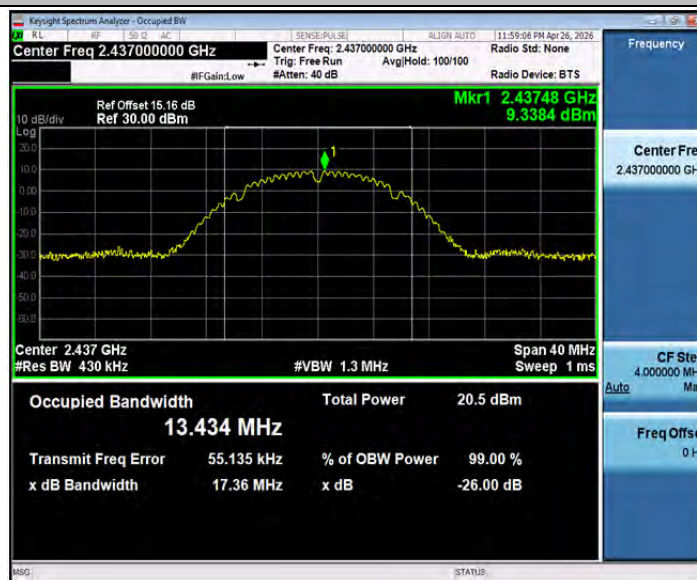
TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.399	2405.3539	2418.7529	---	---
		2437	13.434	2430.3381	2443.7721	---	---
		2462	13.328	2455.3846	2468.7126	---	---
11G	Ant1	2412	17.069	2403.5054	2420.5744	---	---
		2437	17.041	2428.4378	2445.4788	---	---
		2462	17.120	2453.4100	2470.5300	---	---
11N20SISO	Ant1	2412	18.109	2402.9833	2421.0923	---	---
		2437	18.158	2427.8464	2446.0044	---	---
		2462	18.147	2452.8698	2471.0168	---	---
11N40SISO	Ant1	2422	36.454	2403.7603	2440.2143	---	---
		2437	36.494	2418.7220	2455.2160	---	---
		2452	36.389	2433.8412	2470.2302	---	---
11AX20SISO	Ant1	2412	19.067	2402.4434	2421.5104	---	---
		2437	19.074	2427.4694	2446.5434	---	---
		2462	19.109	2452.4223	2471.5313	---	---
11AX40SISO	Ant1	2422	38.009	2402.9786	2440.9876	---	---
		2437	37.766	2418.1501	2455.9161	---	---
		2452	37.817	2433.0646	2470.8816	---	---

Test Graphs

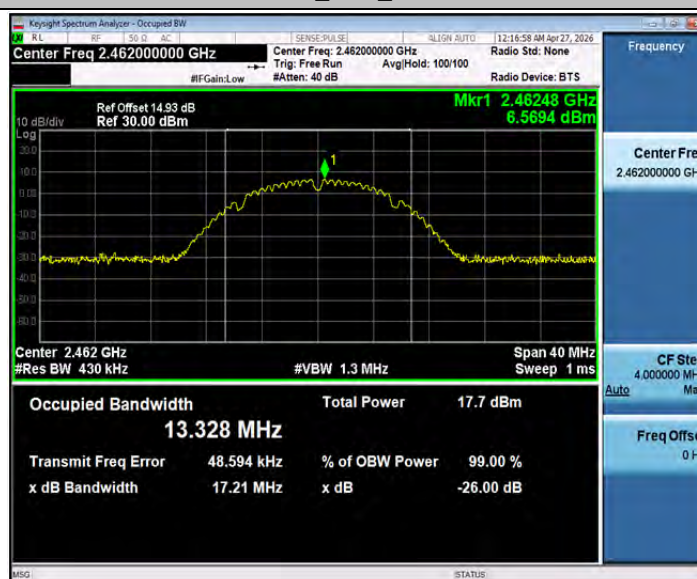
11B_Ant1_2412



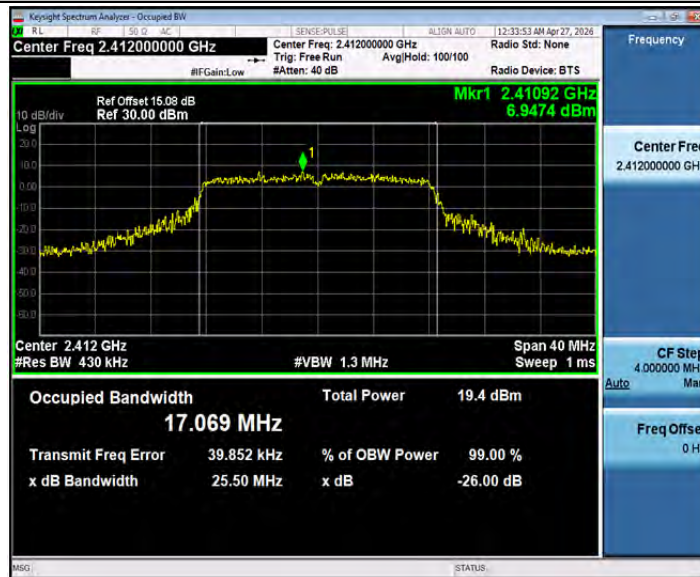
11B_Ant1_2437



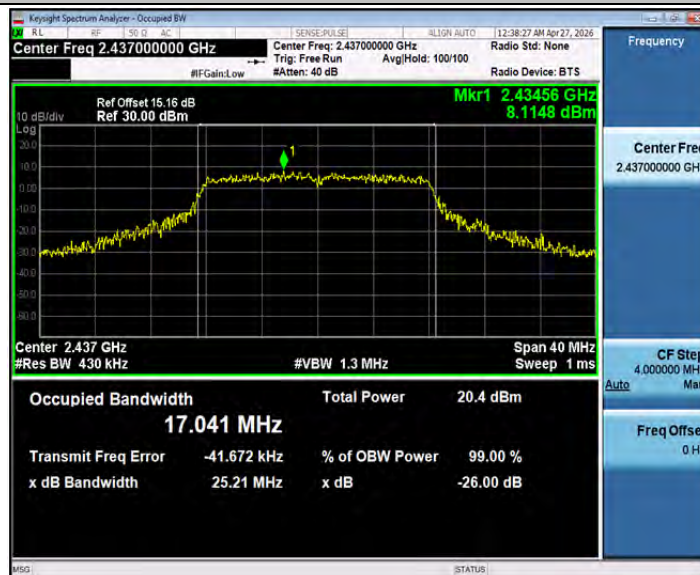
11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437



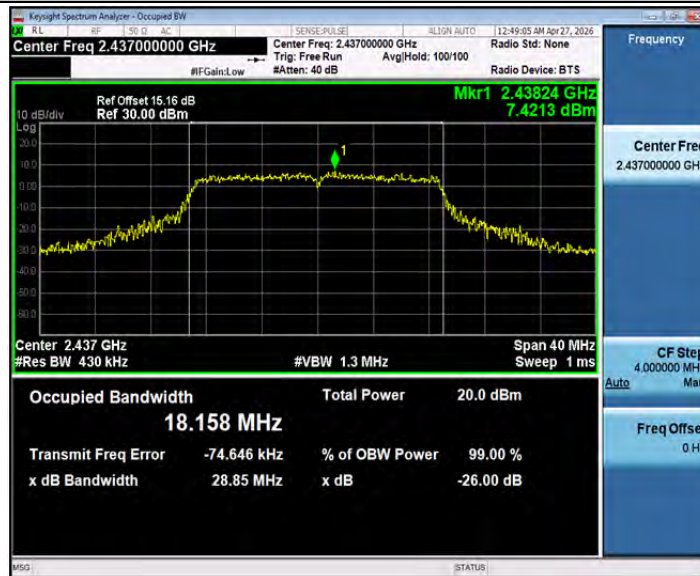
11G_Ant1_2462



11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



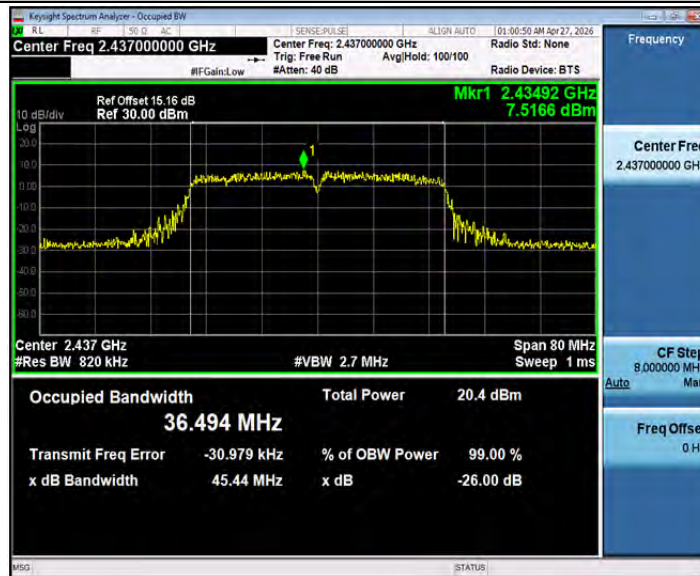
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11N40SISO_Ant1_2422



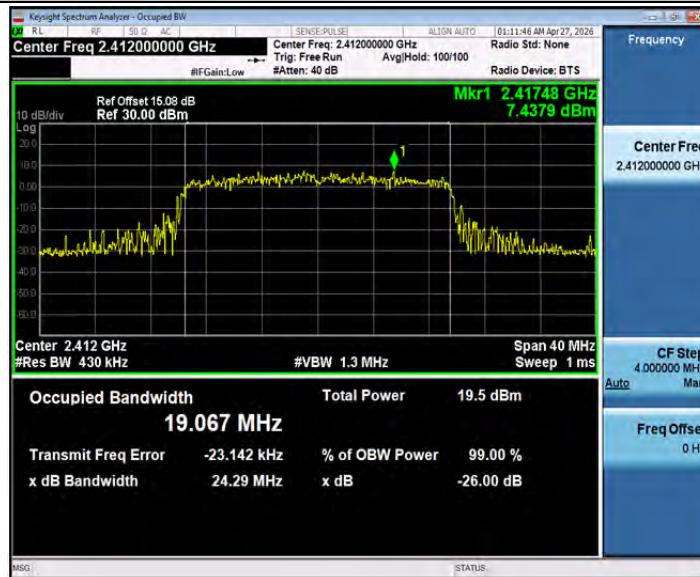
11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



11AX20SISO_Ant1_2412



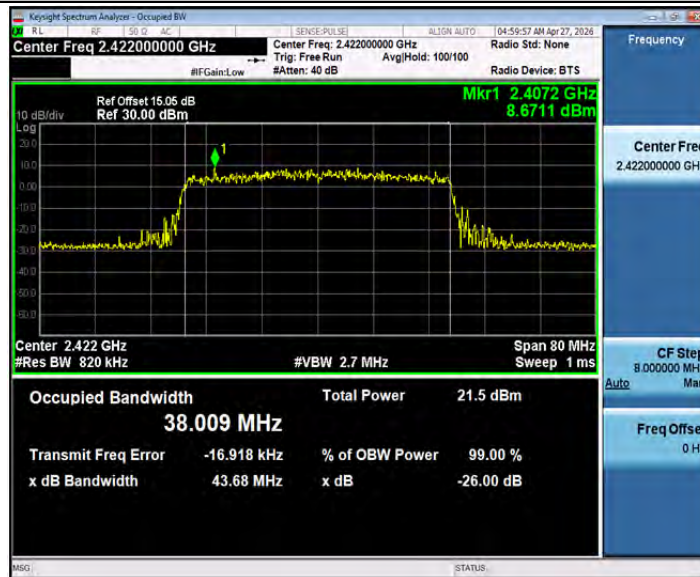
11AX20SISO_Ant1_2437



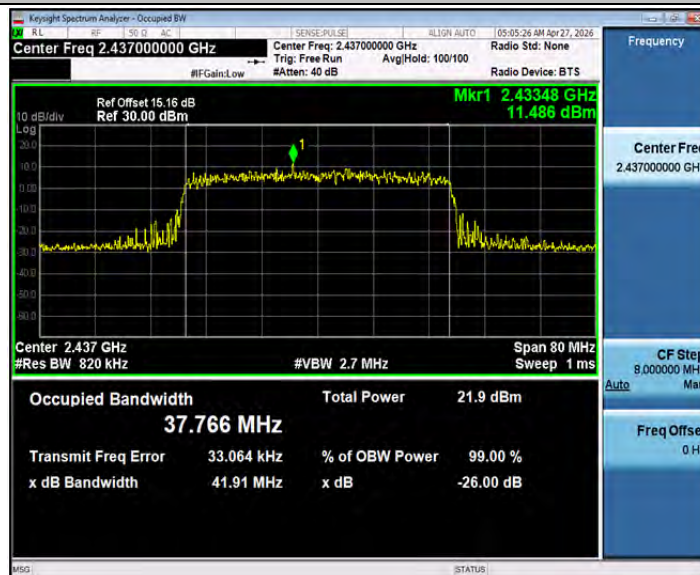
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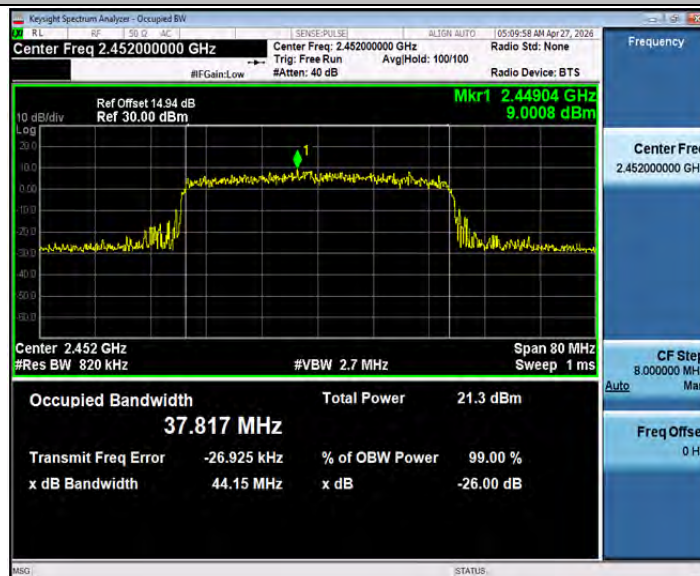
11AX40SISO_Ant1_2422



11AX40SISO_Ant1_2437



11AX40SISO_Ant1_2452



3.5 Maximum conducted output power

3.5.1 Limit

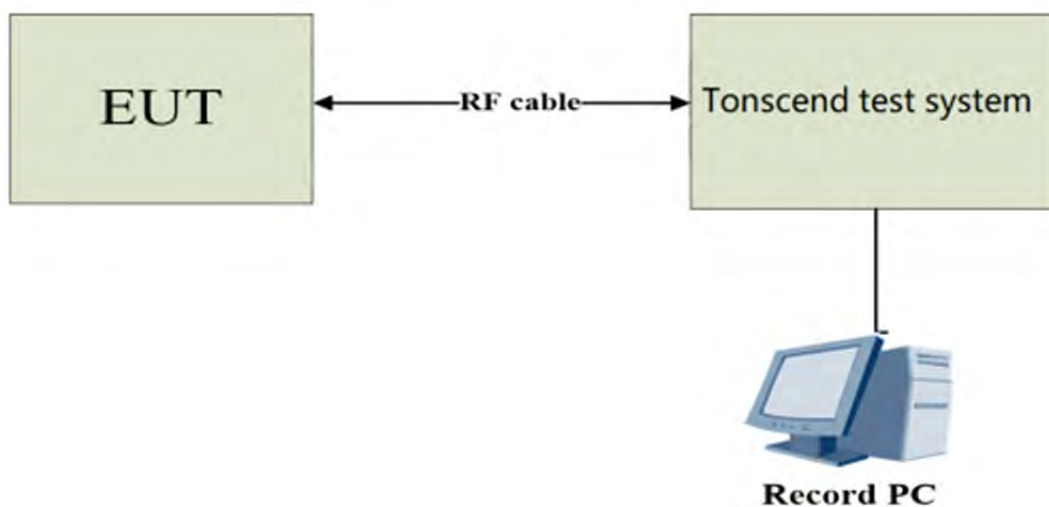
For systems using digital modulation in the 2400~2483.5MHz, The Maximum output Power shall not exceed 1W(30dBm)

3.5.2 Test Procedure

Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

- The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- The maximum conducted output power was performed in accordance with method 11.9.2.3.1 (for method AVGPM)of ANSI C63.10-2020 and FCC KDB 662911 D01 v02r01 Multiple Transmitter Output.

3.5.3 Test Setup



3.5.4 Table of Parameters of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Test Software Version	UART FF		
Frequency (MHz)	2412	2437	2462
IEEE 802.11b	Default	Default	Default
IEEE 802.11g	Default	Default	Default
IEEE 802.11n20	Default	Default	Default
Frequency (MHz)	2422	2437	2452
IEEE 802.11n40	Default	Default	Default

3.5.5 The Result

TestMode	Antenna	Frequency[MHz]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	12.11	≤30.00	PASS
		2437	14.25	≤30.00	PASS
		2462	15.76	≤30.00	PASS
11G	Ant1	2412	14.12	≤30.00	PASS
		2437	15.03	≤30.00	PASS
		2462	15.51	≤30.00	PASS
11N20SISO	Ant1	2412	14.50	≤30.00	PASS
		2437	15.41	≤30.00	PASS
		2462	14.79	≤30.00	PASS
11N40SISO	Ant1	2422	13.00	≤30.00	PASS
		2437	15.05	≤30.00	PASS
		2452	13.97	≤30.00	PASS
11AX20SISO	Ant1	2412	13.91	≤30.00	PASS
		2437	15.52	≤30.00	PASS
		2462	15.52	≤30.00	PASS
11AX40SISO	Ant1	2422	13.13	≤30.00	PASS
		2437	15.07	≤30.00	PASS
		2452	15.81	≤30.00	PASS

Note: The duty cycle factor is compensated in the average conducted output power.

3.6 Power Spectral Density

3.6.1 Limit

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

3.6.2 Test Procedure

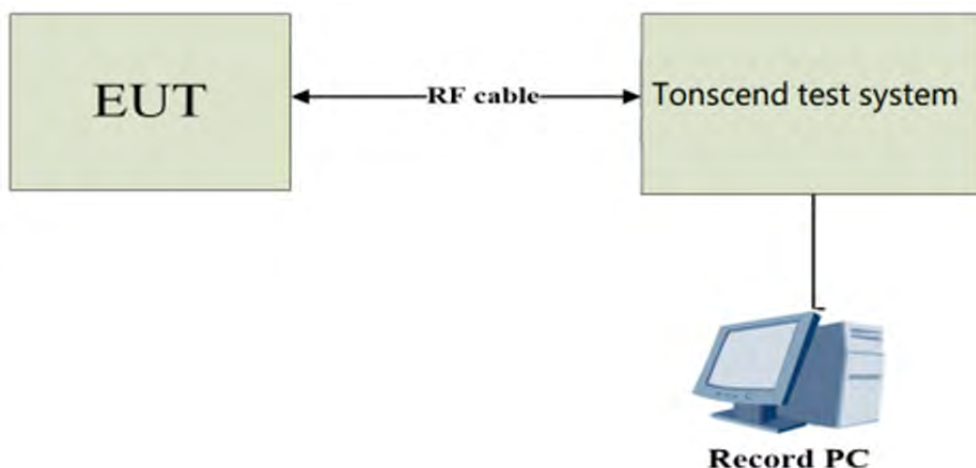
Test Method	
☒ Conducted Measurement	☐ Radiated Measurement
Test Channels	
☒ Lowest, Middle and Highest Channel	☐ Lowest and Highest Channel
Environmental conditions	
☒ Normal	☐ Normal and Extreme
Note: ☒ : Test ☐ : No Test	

a) The EUT was directly connected to the tonscond test system and antenna output port as show in the block diagram below.

b) Spectrum analyser settings as following:

Spectrum Parameters	Setting
Span Frequency	2 times the OBW bandwidth
RBW	3 kHz
VBW	10 kHz
Detector	RMS
Trace	RMS
Sweep Time	Auto

3.6.3 Test Setup



3.6.4 The Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-13.92	≤8.00	PASS
		2437	-15.02	≤8.00	PASS
		2462	-13.33	≤8.00	PASS
11G	Ant1	2412	-16.59	≤8.00	PASS
		2437	-17.30	≤8.00	PASS
		2462	-14.91	≤8.00	PASS
11N20SISO	Ant1	2412	-13.09	≤8.00	PASS
		2437	-14.12	≤8.00	PASS
		2462	-13.40	≤8.00	PASS
11N40SISO	Ant1	2422	-12.51	≤8.00	PASS
		2437	-12.39	≤8.00	PASS
		2452	-15.06	≤8.00	PASS
11AX20SISO	Ant1	2412	-15.72	≤8.00	PASS
		2437	-15.62	≤8.00	PASS
		2462	-16.29	≤8.00	PASS
11AX40SISO	Ant1	2422	-19.66	≤8.00	PASS
		2437	-17.75	≤8.00	PASS
		2452	-17.53	≤8.00	PASS

Note: The duty cycle factor has been included in the test diagram.

Test Graphs

11B_Ant1_2412



11B_Ant1_2437



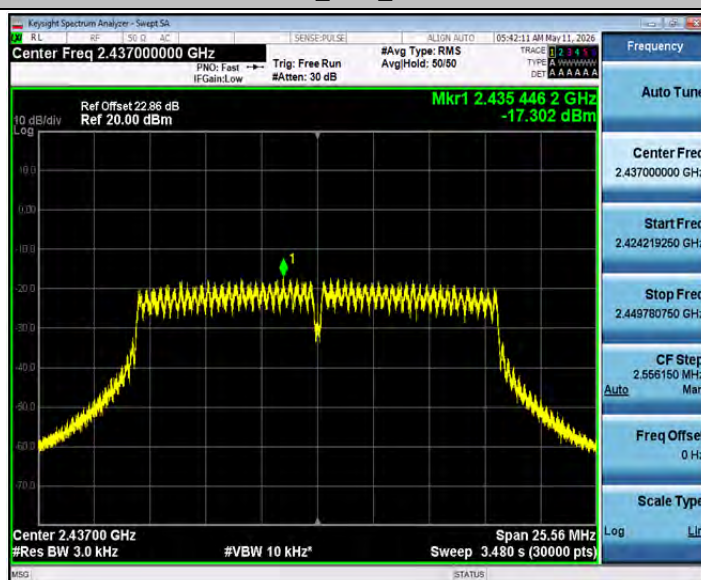
11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437



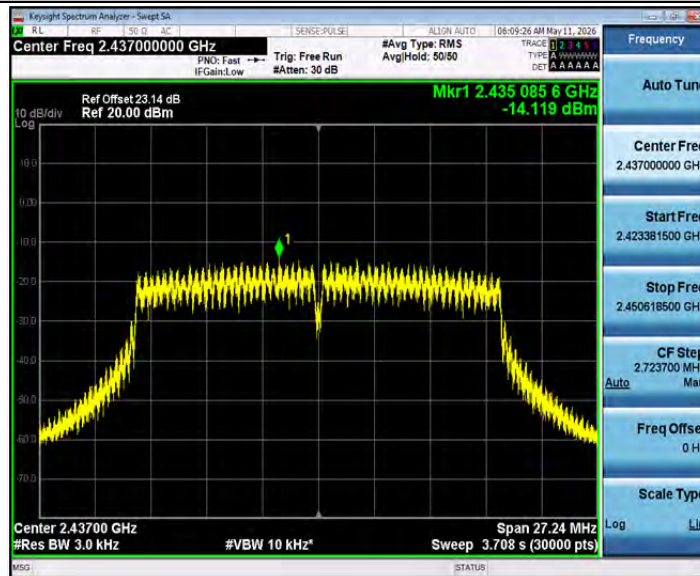
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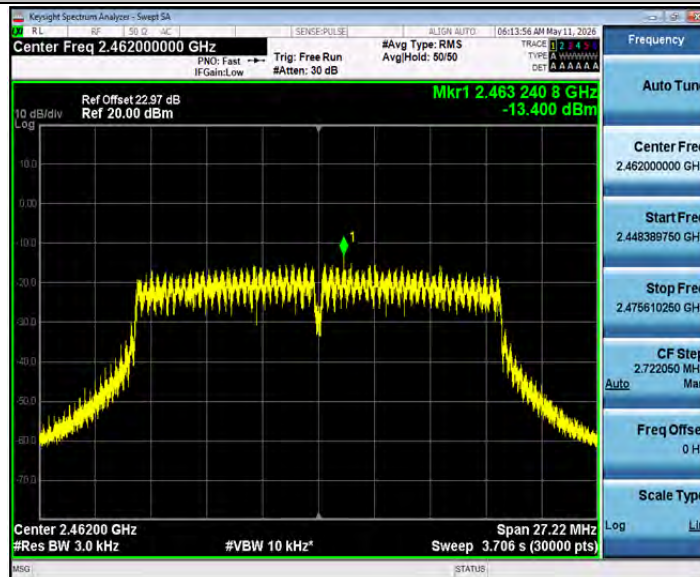
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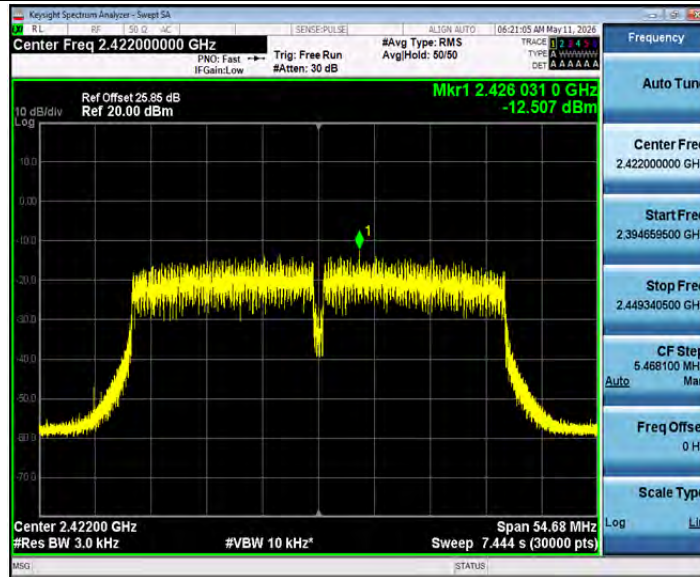
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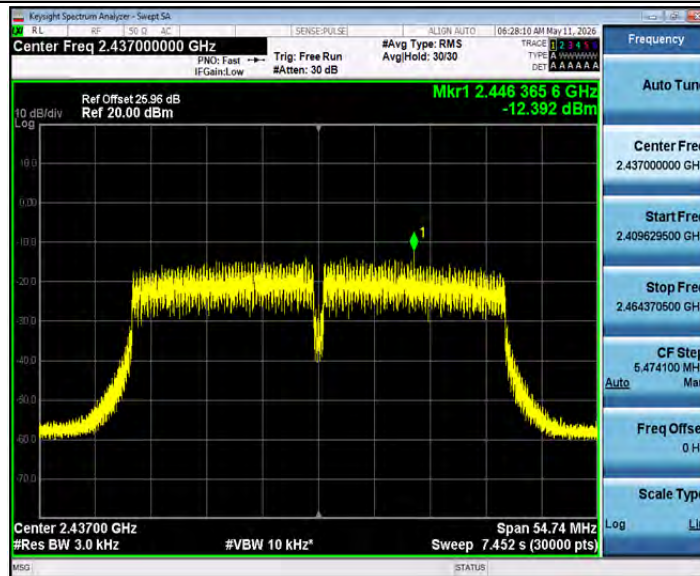
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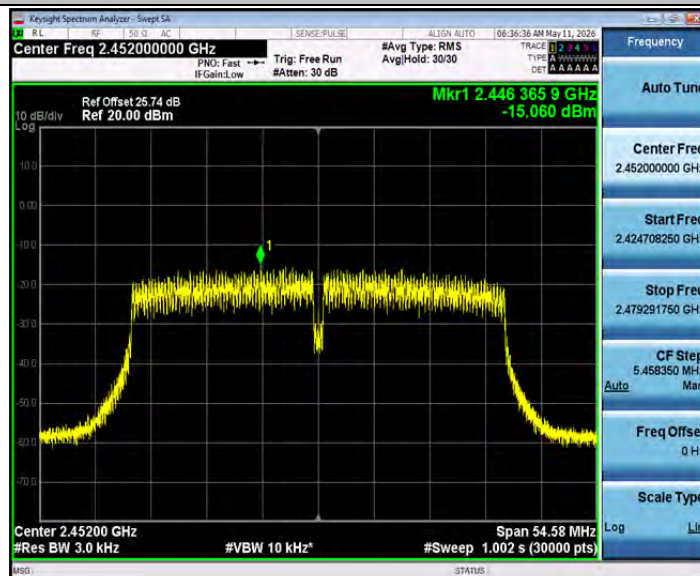
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



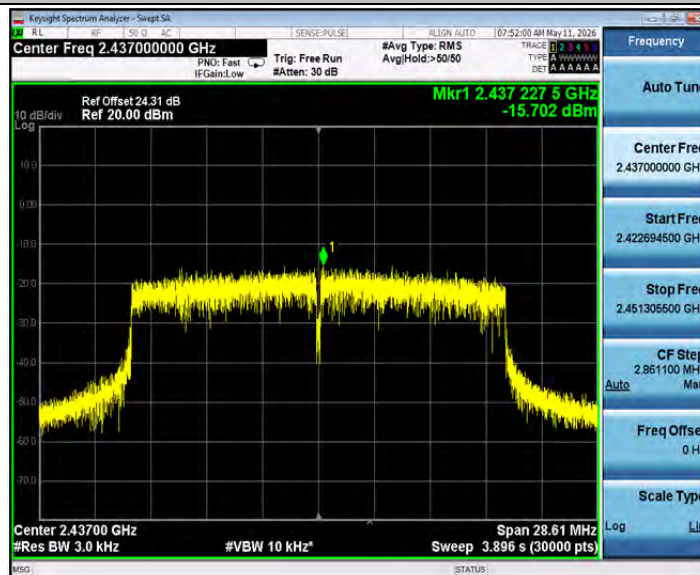
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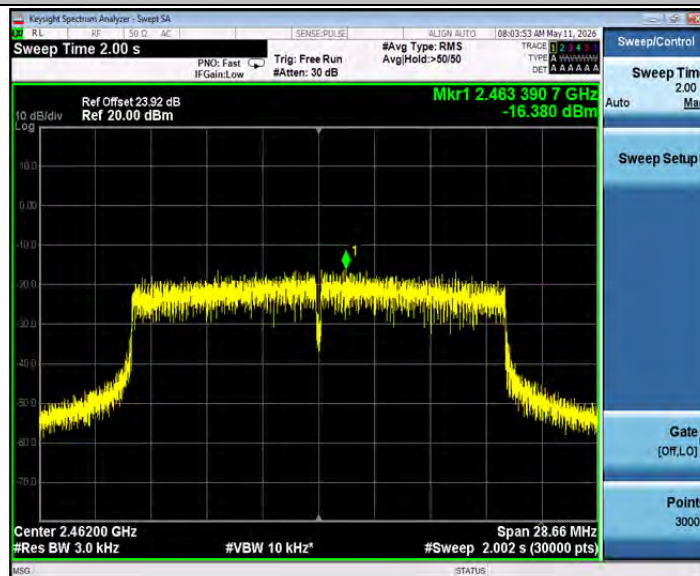
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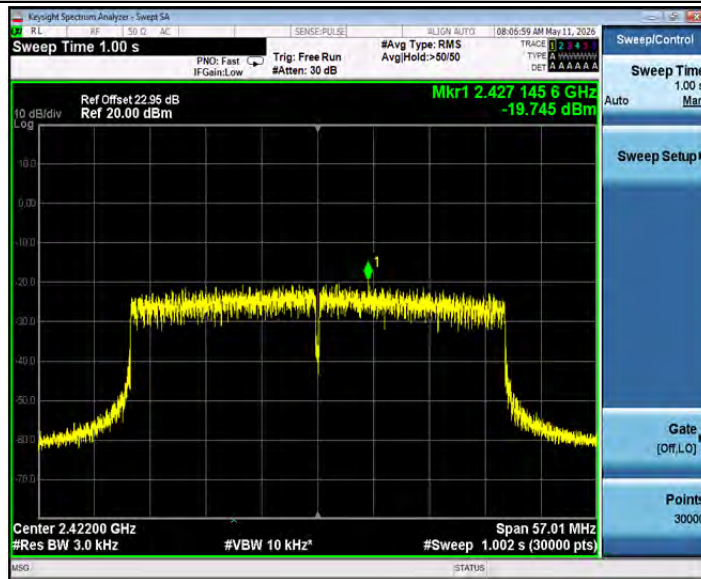
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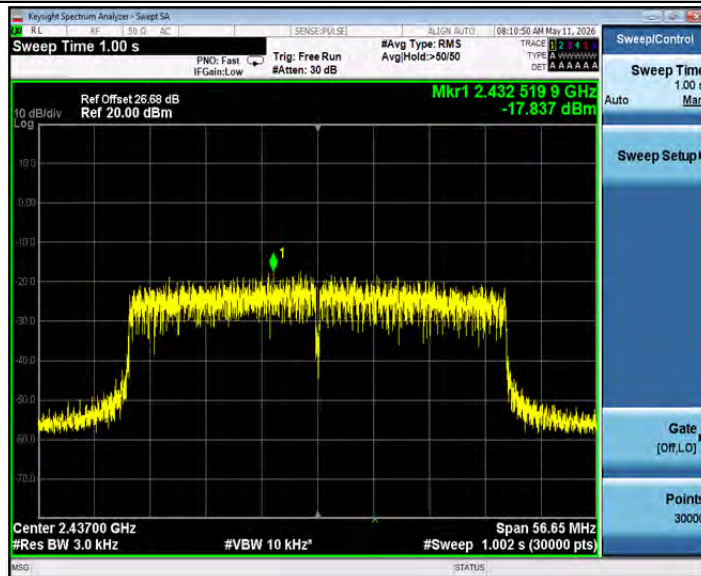
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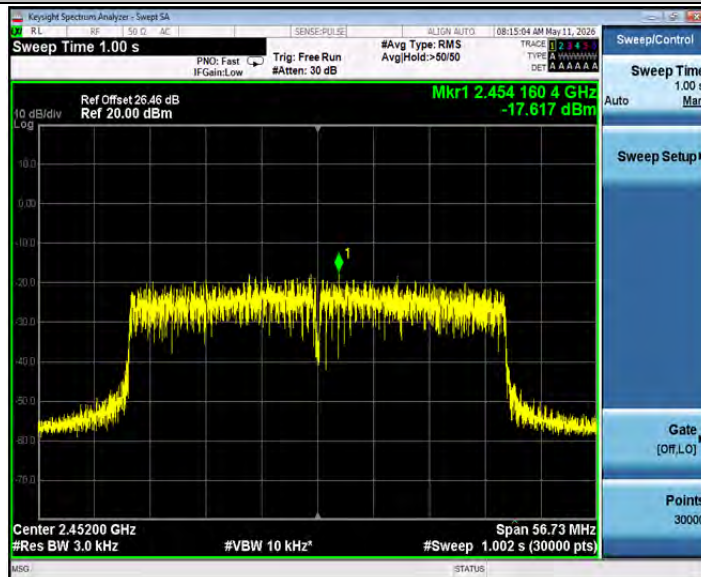
11AX40SISO_Ant1_2422



11AX40SISO_Ant1_2437



11AX40SISO_Ant1_2452



Statement

1. The report is invalid without the official seal or special seal of Shenzhen Haiyun Standard Technical Co., Ltd. (hereinafter referred to as the unit).
2. The report is invalid without the signature of the approver.
3. The report is invalid if altered arbitrarily.
4. The report shall not be partially copied without the written approval of the unit.
5. The reported test results are only valid for the tested samples.
6. If there is any objection to the test report, it shall be submitted to the test unit within 15 days from the date of receiving the report, and the overdue shall not be accepted.

Shenzhen Haiyun Standard Technical Co., Ltd.

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End of Test Report