

Product Name: Jupiter AI Kit	Report No: FCC022023-00372RF1
Product Model: SS23-QE-VA	Security Classification: Open
Version: V1.0	Total Page: 59

TIRT Testing Report

Prepared By:	Checked By:	Approved By:	
Stone Tang	Randy Lv	Daniel Chen	
Stone Tang	Randy Lv	Daniel chen	

RF TEST REPORT

FCC ID: 2A36J-SS23-QE-VA

According to

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

ANSI C63.10:2013

- Equipment : Jupiter AI Kit
Model No. : SS23-QE-VA
Trademark : N/A
Applicant : Yi Tunnel (Beijing)Technology Co., Ltd
Room1511, Block B, SOHO Shangdu North Tower, Dongdaqiao Road 8,
Chaoyang Disstrict, Beijing, China
- The test result referred exclusively to the presented test model /sample.
 - Without written approval of TIRT Inc. the test report shall not reproduced except in full.
 - Test date: 2023/02/13~2023/03/22

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen

Add: 101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street,
Pingshan District, Shenzhen, China

TEL: +86-0755-27087573

TABLE OF CONTENTS

Description	Page
1. Summary of Standards And Results	5
1.1. Description of Standards and Results	5
2. General Information	6
2.1. Description of Device (EUT)	6
2.2. Accessories of Device (EUT)	7
2.3. Tested Supporting System Details	7
2.4. Block Diagram of connection between EUT and simulators	7
2.5. Test Mode Description	8
2.6. Test Conditions	9
2.7. Test Facility	9
2.8. Measurement Uncertainty	9
2.9. Test Equipment List	10
3. Spurious Emission	12
3.1. Test Limits	12
3.2. Test Procedure	13
3.3. Test Setup	13
3.4. Test Results	14
4. Power line Conducted Emission	30
4.1. Test Limits	30
4.2. Test Procedure	30
4.3. Test Setup	30
4.4. Test Results	30
5. Conducted Maximum Output Power	33
5.1. Test limits	33
5.2. Test Procedure	33
5.3. Test Setup	33
5.4. Test Results	33
6. Peak Power Spectral Density	35
6.1. Test limits	35
6.2. Test Procedure	35
6.3. Test Setup	35
6.4. Test Results	36
7. Bandwidth	41
7.1. Test limits	41
7.2. Test Procedure	41
7.3. Test Setup	41
7.4. Test Results	41
8. Band Edge Check	51
8.1. Test limits	51
8.2. Test Procedure	51
8.3. Test Setup	51
8.4. Test Results	51
9. Antenna Requirement	57
9.1. Standard Requirement	57
9.2. Antenna Connected Construction	57
9.3. Results	57
10. Test setup photo	58
10.1. Photos of Radiated emission	58
10.2. Photos of Conducted Emission test	59

History of this test report

Original Report Issue Date: 2023.03.22

- No additional attachment
- Additional attachments were issued following record

Attachment No.	Issue Date	Description

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Conducted Emission	FCC Part 15: 15.207 ANSI C63.10	P
6dB Bandwidth	FCC PART 15:15.247(a)(2) ANSI C63.10	P
Output Power	FCC Part 15: 15.247(b)(3) ANSI C63.10	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10	P
Power Spectral Density	FCC PART 15:15.247(e) ANSI C63.10	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10	P
Antenna Requirement	FCC Part 15: 15.203	P
Note: 1. P is an abbreviation for Pass. 2. F is an abbreviation for Fail. 3. N/A is an abbreviation for Not Applicable. 4. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.		

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT Name : Jupiter AI Kit
Model No. : SS23-QE-VA
DIFF. : N/A
Power supply : DC 12V from adapter

2.4G WIFI :
Operation frequency : 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20
2422MHz~2452MHz for IEEE802.11n/HT40
Channel No. : 802.11b/802.11g /802.11n(HT20): 11CH
802.11(HT40): 7CH
Modulation type : IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n :OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Type : Dipole antenna, Maximum Gain is 3.78dBi.
Antenna information is provided by applicant.
Software version : V1.0
Hardware version : V1.0
Intend use environment : Residential, commercial and light industrial environment
Note : /

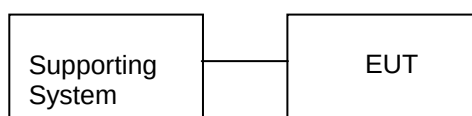
2.2. Accessories of Device (EUT)

Accessories : /
Manufacturer : /
Model : /
Ratings : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1	/	/	/	/	/

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Duty cycle :100%Keeping TX			
Mode	data rate (Mbps)(see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11 n/HT20	6.5	Low :CH1	2412
	6.5	Middle: CH6	2437
	6.5	High: CH11	2462
IEEE 802.11 n/HT40	13	Low :CH3	2422
	13	Middle: CH6	2437
	13	High: CH9	2452
Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test.			

Channel list:					
For IEEE 802.11b, g, n/HT20					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH1	2412	CH5	2432	CH9	2452
CH2	2417	CH6	2437	CH10	2457
CH3	2422	CH7	2442	CH11	2462
CH4	2427	CH8	2447		
For IEEE 802.11 n/HT40					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH1	2422	CH5	2442		
CH2	2427	CH6	2447		
CH3	2432	CH7	2452		
CH4	2437				

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

2.7. Test Facility

Company:	Beijing TIRT Technology Service Co.,Ltd Shenzhen
Address:	101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China
CNAS Registration Number:	CNAS L14158
A2LA Registration Number:	6049.01
FCC Designation Number:	CN1309
Test Firm Registration Number:	825524
Telephone:	+86-0755-27087573

2.8. Measurement Uncertainty

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	±142.12 KHz
RF power conducted	±0.74 dB
RF power radiated	±3.25dB
Spurious emissions, conducted	±1.78dB
Spurious emissions, radiated (9KHz~30MHz)	±2.56dB
Spurious emissions, radiated (30MHz~1GHz)	±4.6dB
Spurious emissions, radiated (Above 1GHz)	±4.9dB
Conduction Emissions(150kHz~30MHz)	±3.1 dB
Humidity	±4.6%
Temperature	±0.7℃
Time	±1.25%

2.9. Test Equipment List

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Receiver	Rohde&Schwarz	ESIB 40	YH-TIRT-SAC-966-20220911	2023/01/05	2024/01/06
Integral Antenna	Schwarzbeck	VULB 9163	01314	2022.12.11	2024.12.10
Integral Antenna	Rohde&Schwarz	HF907	RSM2991424	2022.12.11	2024.12.10
Preamplifier	Emtrace	RP01A	'02017	2023/01/05	2024/01/06
Preamplifier	Schwarzbeck	BBV9744	00143	2023/01/05	2024/01/06
Loop Antenna	ZHINAN	ZN30900A	12024	2023/01/05	2024/01/06
Exposure Level Tester	narda	ELT-400	N-0925	2023/01/05	2024/01/06
Horn Antenna	Schwarzbeck	BBHA9170	00956	2023/01/05	2024/01/06
RF Cable	/	LMR400UF-NMNM-7.0M	/	2023/01/05	2024/01/06
RF Cable	/	SFT2050PUR-NMNM-7.0M	/	2023/01/05	2024/01/06
EMI Receiver	Rohde&Schwarz	ESR7	1316.3003K07-102611-mk	2022/11/02	2023/11/01
LISN	Rohde&Schwarz	ENV216	3560.655.12-102915-Bp	2022/11/02	2023/11/01
ISN	Schwarzbeck	ENY81	1309.8510.03	2023/01/05	2024/01/06
ISN	Schwarzbeck	ENY81-CAT6	1309.8526.03-101976-kh	2023/01/05	2024/01/06
RF Cable	\	SFT2050PUR-NMNM-2.0M	\	2023/01/05	2024/01/06
CMW500	ROHDE&SCHWARZ	CMW500	120434	2023/01/05	2024/01/06
Spectrum analyzer	ROHDE&SCHWARZ	FSU26	200732	2023/01/05	2024/01/06
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	101722	2023/01/05	2024/01/06
vector Signal Generator	KEYSIGHT	N5182B	MY56200458	2023/01/05	2024/01/06
vector Signal Generator	HEWLETT PACKARD	83752A	3610A02458	2023/01/05	2024/01/06
Filter	HEWLETT PACKARD	JS0806-F	19K8060209	2023/01/05	2024/01/06

Wireless comprehensive tester	ANRISTU	MT8821C	SN6262170409	2023/01/05	2024/01/06
Wireless comprehensive tester	ANRISTU	MT8000A	SN6262166782	2023/01/05	2024/01/06

3. SPURIOUS EMISSION

3.1. Test Limits

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
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 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Note 1: The peak limit is 20 dB higher than the average limit			
Note 2: Peak limit applies (AVG limit + 20 dB) as well as RSS-247 Section 5.5			

3.2. Test Procedure

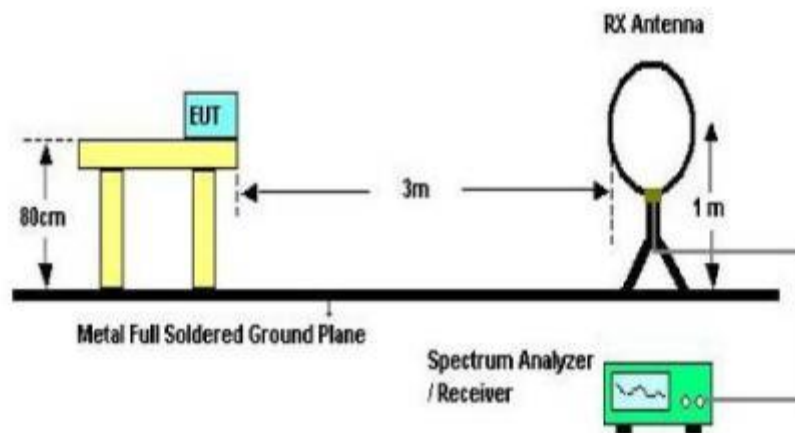
The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz. The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above 1GHz testing, the table was rotated 360 degrees to determine the position of the highest radiation. The Test antenna shall vary between 1m and 4m, both Horizontal and Vertical antenna are set of make measurement.

The initial step in collecting radiated emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Quasi Peak Detector mode premeasured

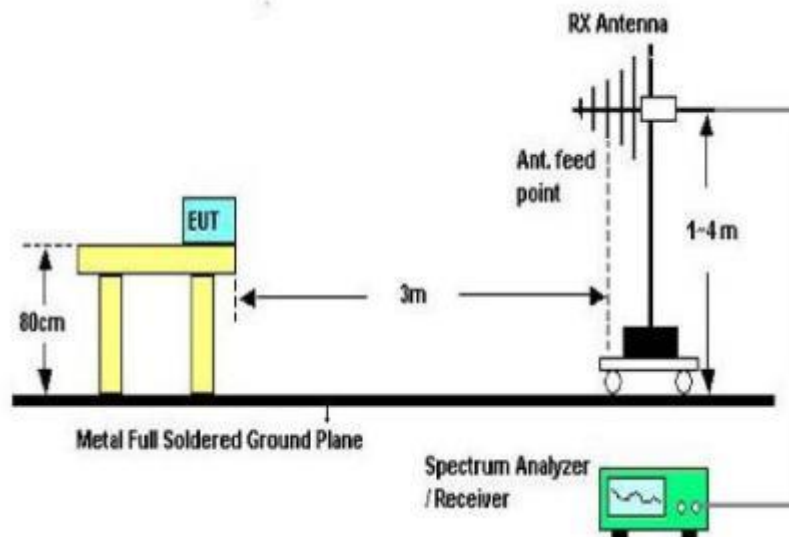
If Peak value comply with QP limit below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

For the actual test configuration, please see the test setup photo.

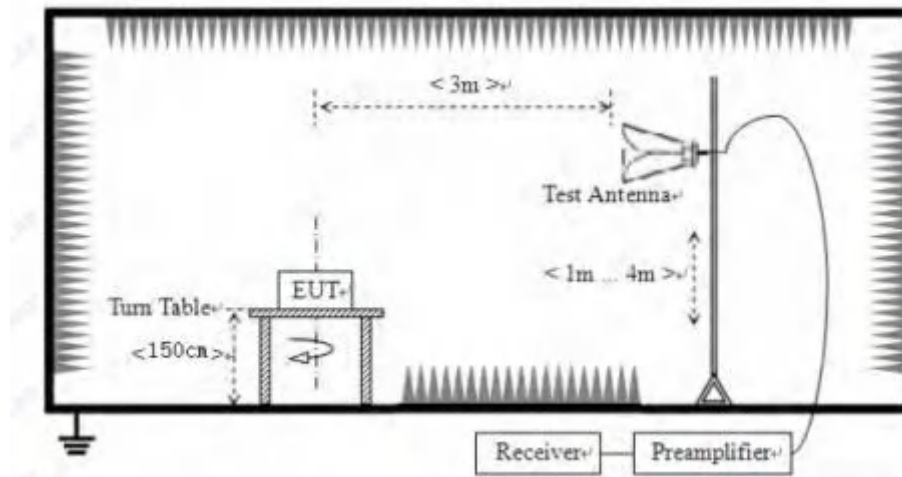
3.3. Test Setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.4. Test Results

Test Condition

Continual Transmitting in maximum power.

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHz~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

We have scanned the EUT from 9kHz up to the 10th harmonic of the fundamental.

Detailed information please see the following page.

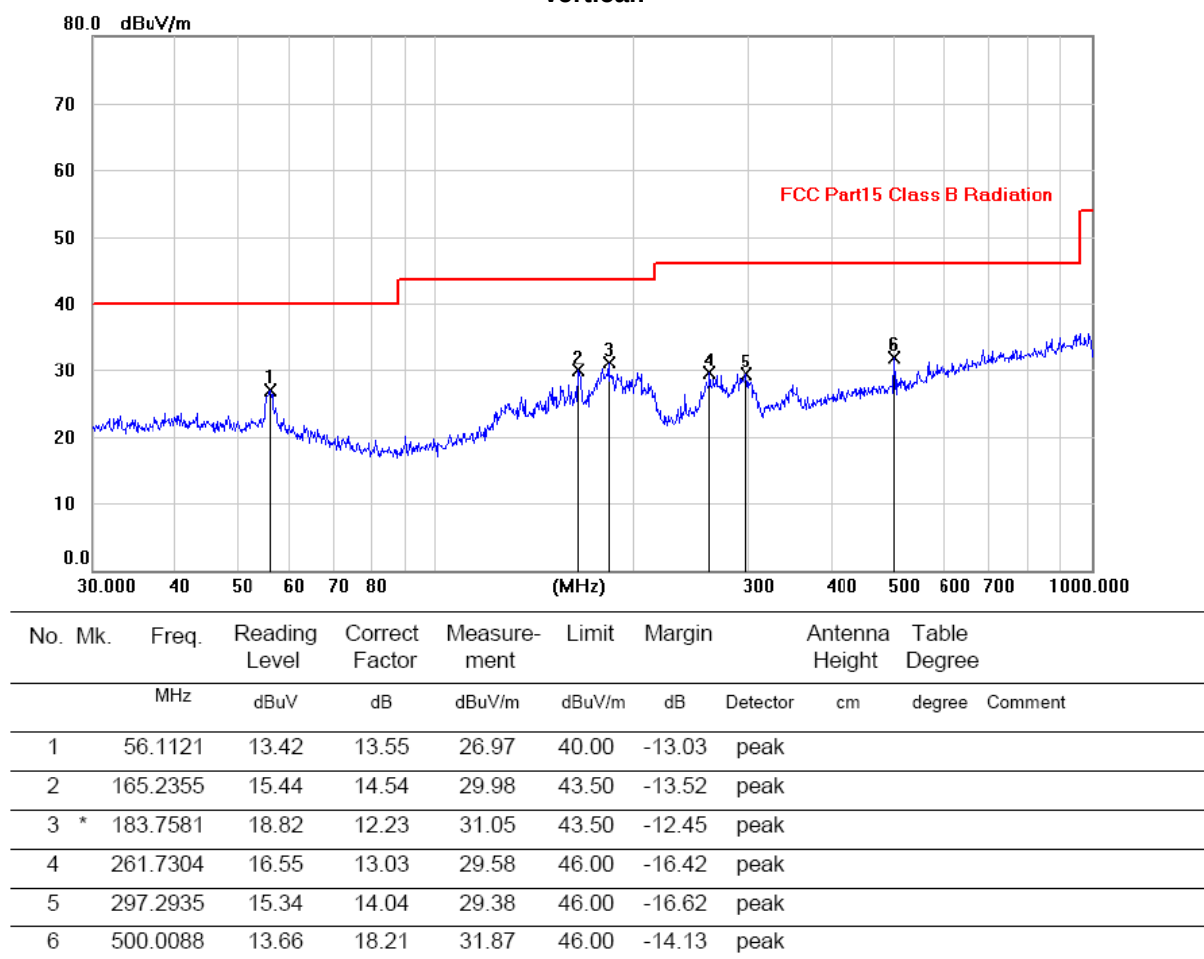
From 9KHz to 30MHz: Conclusion: PASS

Note: 1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

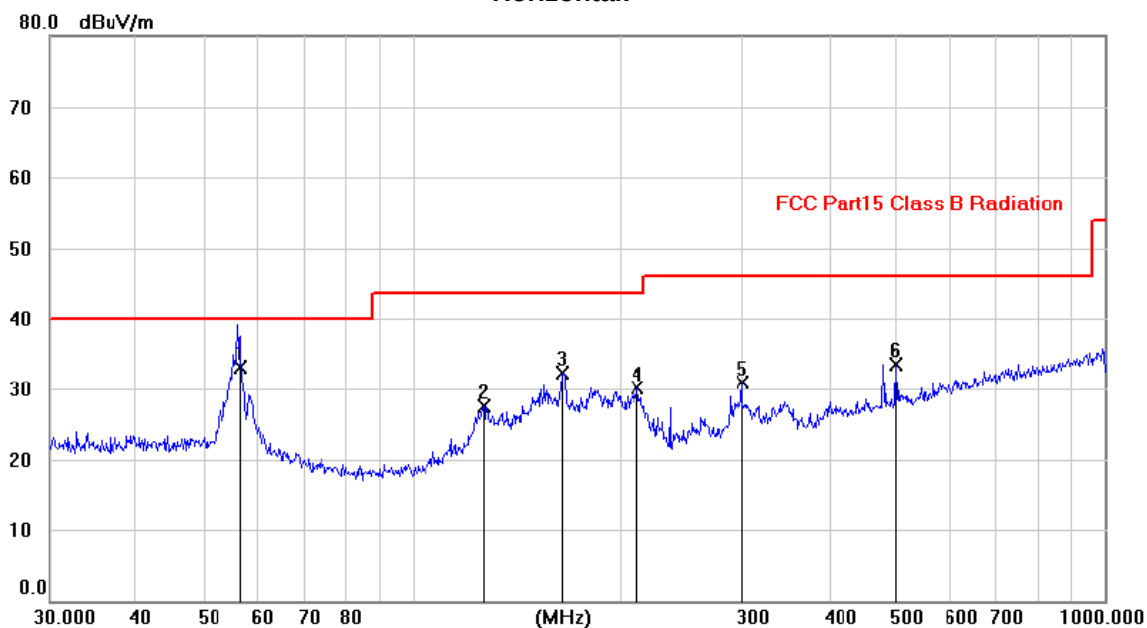
2.Only show the test data of the worst Channel in this report.

From 30MHz to 1000MHz: Conclusion: PASS

Vertical:



Horizontal:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Comment
1	*	56.5386	19.60	13.48	33.08	40.00	-6.92	QP		
2		127.0690	14.05	13.43	27.48	43.50	-16.02	peak		
3		165.2933	17.84	14.53	32.37	43.50	-11.13	peak		
4		211.7739	18.84	11.19	30.03	43.50	-13.47	peak		
5		299.9813	16.87	14.10	30.97	46.00	-15.03	peak		
6		500.0088	15.37	18.21	33.58	46.00	-12.42	peak		

Remark: All modes have been tested, and only worst data of B mode, Channel 2412MHz was listed in this report.

From 1G-25GHz

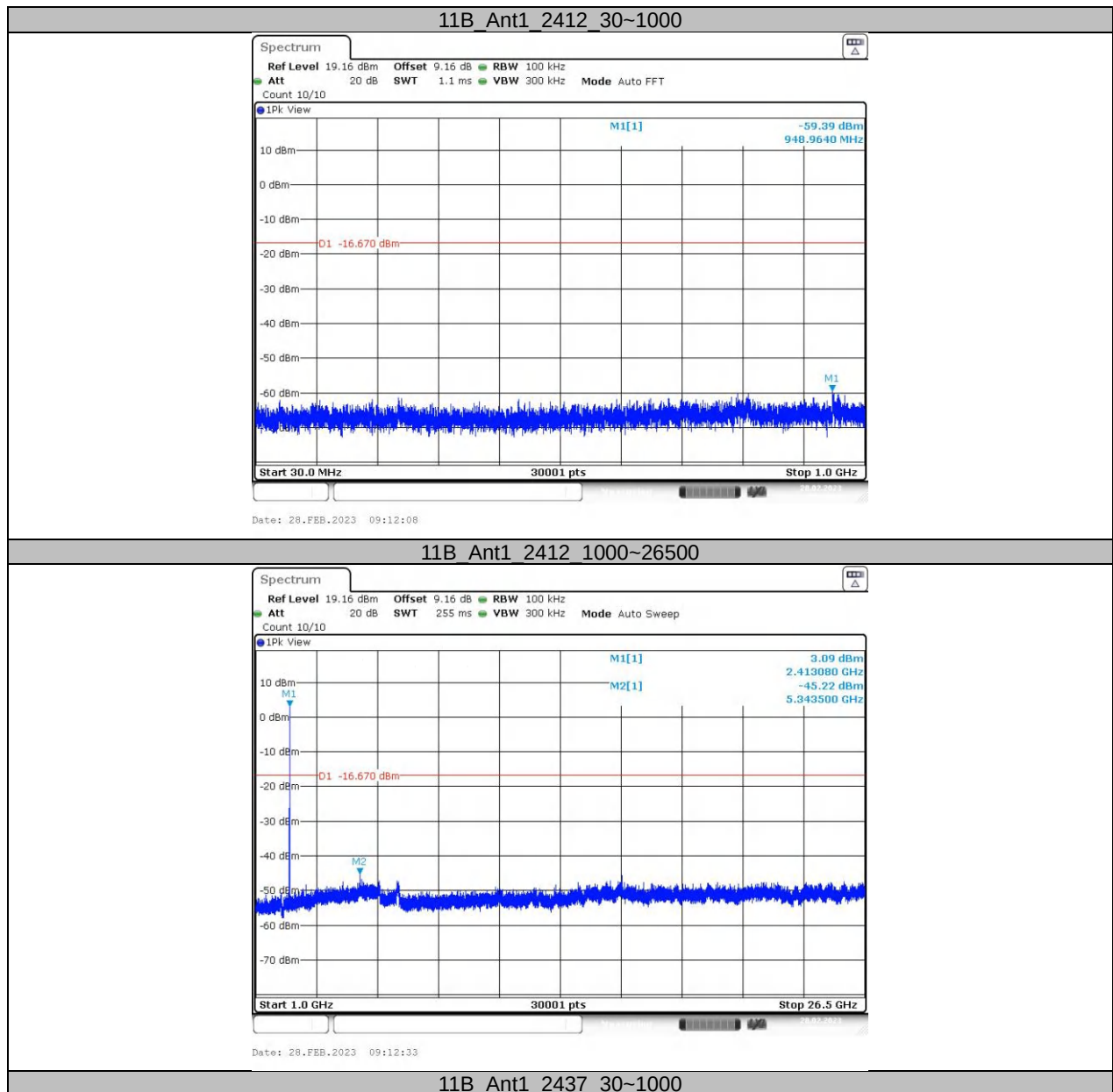
Test Mode: IEEE 802.11b TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	44.44	V	33.95	10.18	34.26	54.31	74	-19.69	PK
4824	37.01	V	33.95	10.18	34.26	46.88	54	-7.12	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	44.20	H	33.95	10.18	34.26	54.07	74	-19.93	PK
4824	37.37	H	33.95	10.18	34.26	47.24	54	-6.76	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	45.37	V	33.93	10.2	34.29	55.21	74	-18.79	PK
4874	31.20	V	33.93	10.2	34.29	41.04	54	-12.96	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	44.97	H	33.93	10.2	34.29	54.81	74	-19.19	PK
4874	32.93	H	33.93	10.2	34.29	42.77	54	-11.23	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	46.56	V	33.98	10.22	34.25	56.51	74	-17.49	PK
4924	36.20	V	33.98	10.22	34.25	46.15	54	-7.85	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	47.97	H	33.98	10.22	34.25	57.92	74	-16.08	PK
4924	33.00	H	33.98	10.22	34.25	42.95	54	-11.05	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
Note:									
1, Result = Read level + Antenna factor + cable loss-Amp factor									
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

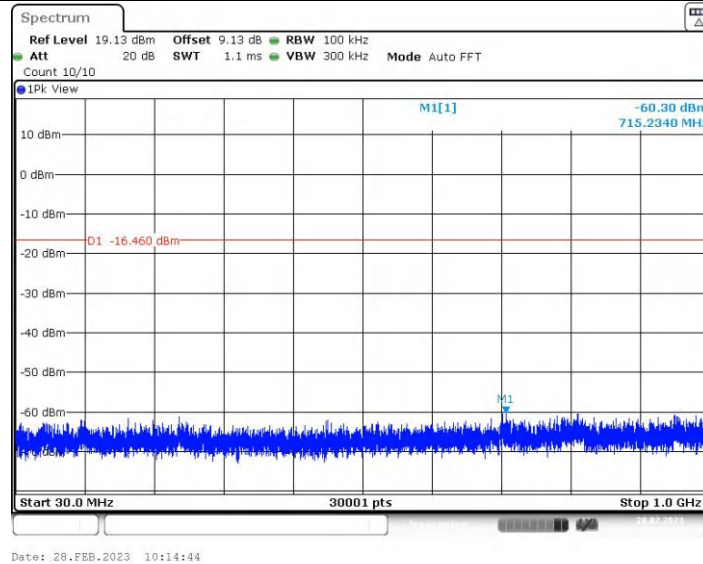
Test Mode: IEEE 802.11g TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	42.47	V	33.95	10.18	34.26	52.34	74	-21.66	PK
4824	37.27	V	33.95	10.18	34.26	47.14	54	-6.86	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	45.58	H	33.95	10.18	34.26	55.45	74	-18.55	PK
4824	35.92	H	33.95	10.18	34.26	45.79	54	-8.21	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	44.50	V	33.93	10.2	34.29	54.34	74	-19.66	PK
4874	34.54	V	33.93	10.2	34.29	44.38	54	-9.62	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	46.01	H	33.93	10.2	34.29	55.85	74	-18.15	PK
4874	35.65	H	33.93	10.2	34.29	45.49	54	-8.51	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	44.94	V	33.98	10.22	34.25	54.89	74	-19.11	PK
4924	37.04	V	33.98	10.22	34.25	46.99	54	-7.01	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.72	H	33.98	10.22	34.25	56.67	74	-17.33	PK
4924	35.79	H	33.98	10.22	34.25	45.74	54	-8.26	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
Note:									
1, Result = Read level + Antenna factor + cable loss-Amp factor									
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

Test Mode: IEEE 802.11n HT20 TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	45.88	V	33.95	10.18	34.26	55.75	74	-18.25	PK
4824	34.19	V	33.95	10.18	34.26	44.06	54	-9.94	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	44.39	H	33.95	10.18	34.26	54.26	74	-19.74	PK
4824	34.57	H	33.95	10.18	34.26	44.44	54	-9.56	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX Mid									
4874	44.64	V	33.93	10.2	34.29	54.48	74	-19.52	PK
4874	30.79	V	33.93	10.2	34.29	40.63	54	-13.37	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	44.65	H	33.93	10.2	34.29	54.49	74	-19.51	PK
4874	33.02	H	33.93	10.2	34.29	42.86	54	-11.14	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX High									
4924	46.98	V	33.98	10.22	34.25	56.93	74	-17.07	PK
4924	37.53	V	33.98	10.22	34.25	47.48	54	-6.52	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	47.25	H	33.98	10.22	34.25	57.20	74	-16.80	PK
4924	34.01	H	33.98	10.22	34.25	43.96	54	-10.04	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
Note:									
1, Result = Read level + Antenna factor + cable loss-Amp factor									
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

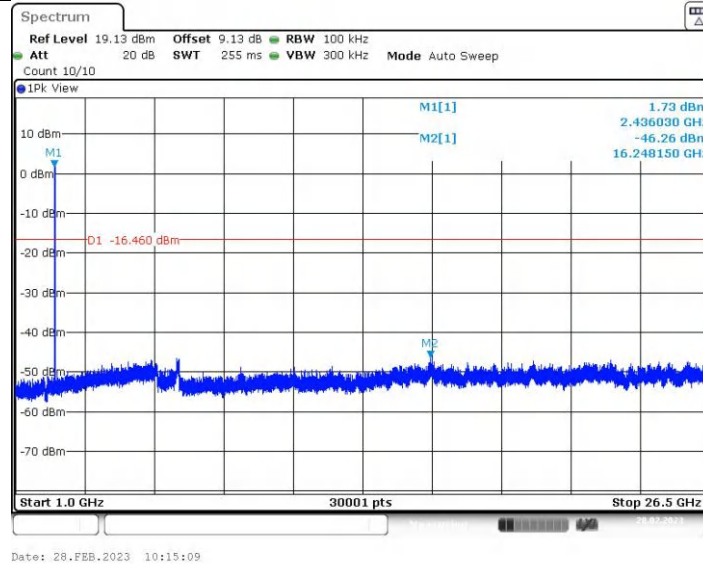
Test Mode: IEEE 802.11n HT40 TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4844	46.18	V	33.95	10.18	34.26	56.05	74	-17.95	PK
4844	36.77	V	33.95	10.18	34.26	46.64	54	-7.36	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
4844	46.30	H	33.95	10.18	34.26	56.17	74	-17.83	PK
4844	34.91	H	33.95	10.18	34.26	44.78	54	-9.22	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX Mid									
4874	45.60	V	33.93	10.2	34.29	55.44	74	-18.56	PK
4874	30.97	V	33.93	10.2	34.29	40.81	54	-13.19	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.36	H	33.93	10.2	34.29	57.20	74	-16.80	PK
4874	32.77	H	33.93	10.2	34.29	42.61	54	-11.39	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX High									
4904	45.78	V	33.98	10.22	34.25	55.73	74	-18.27	PK
4904	35.71	V	33.98	10.22	34.25	45.66	54	-8.34	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
4904	47.17	H	33.98	10.22	34.25	57.12	74	-16.88	PK
4904	32.68	H	33.98	10.22	34.25	42.63	54	-11.37	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
Note:									
1, Result = Read level + Antenna factor + cable loss-Amp factor									
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

Conducted RF Spurious Emission

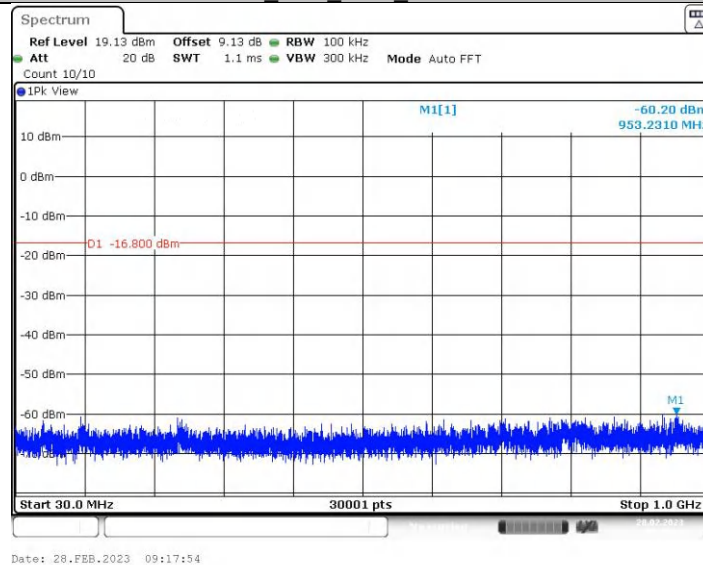




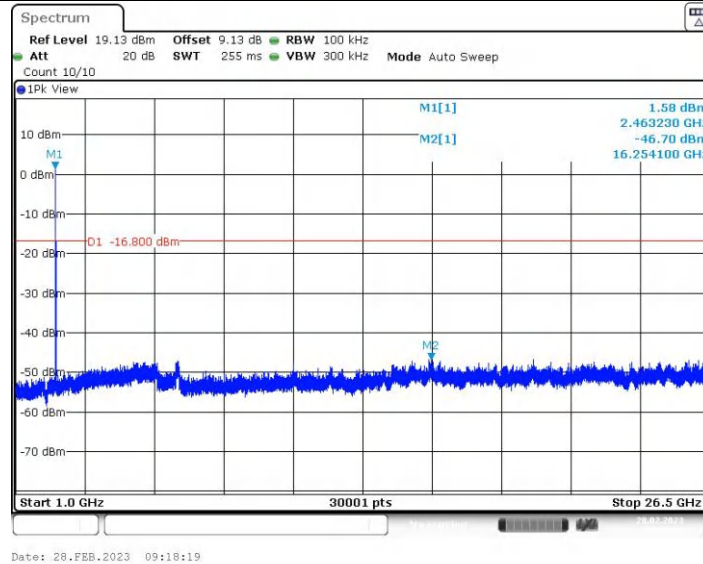
11B_Ant1_2437_1000~26500



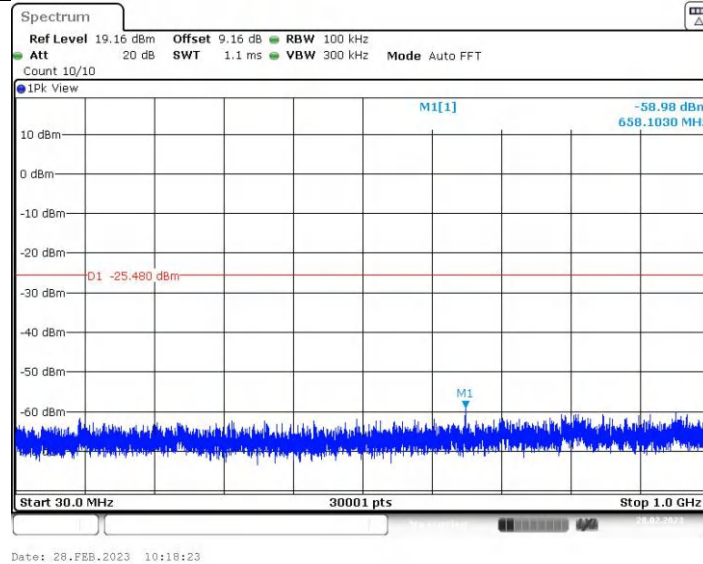
11B_Ant1_2462_30~1000



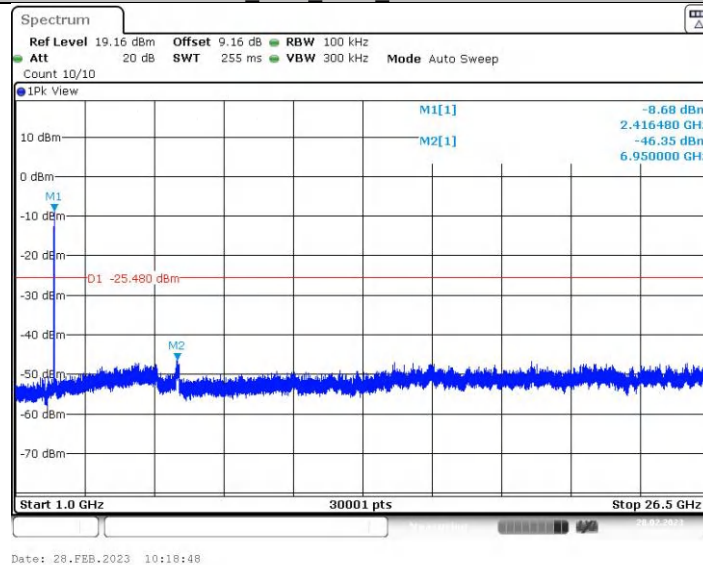
11B_Ant1_2462_1000~26500



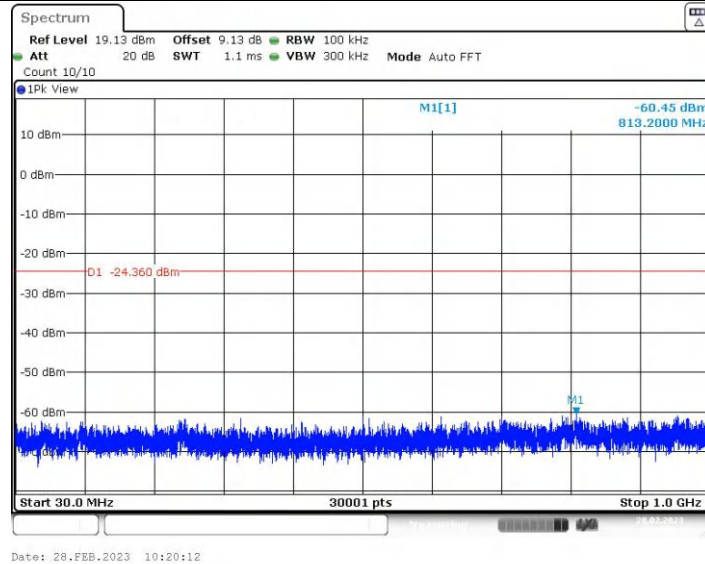
11G_Ant1_2412_30~1000



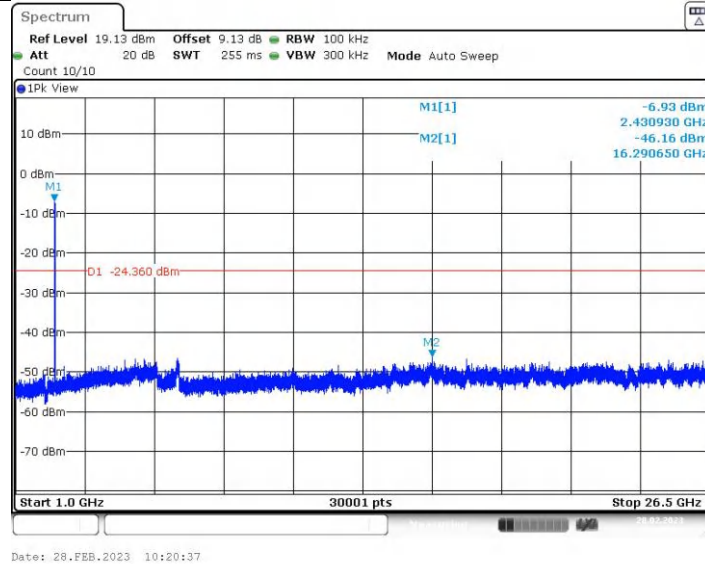
11G_Ant1_2412_1000~26500



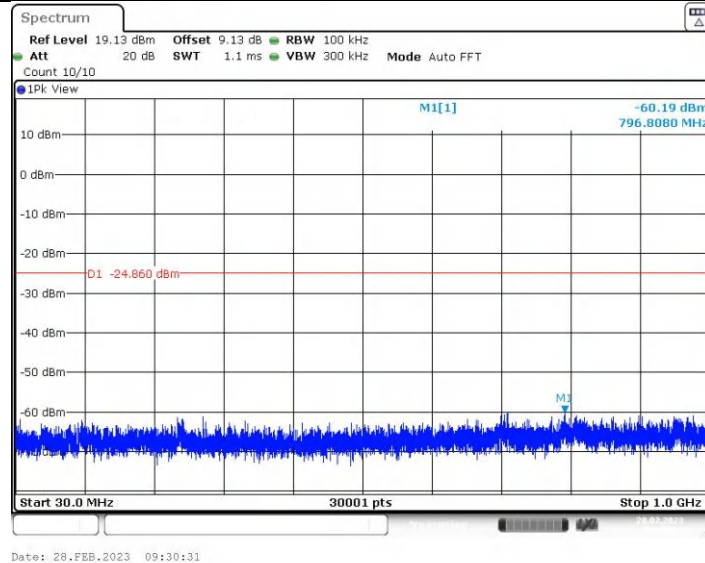
11G_Ant1_2437_30~1000



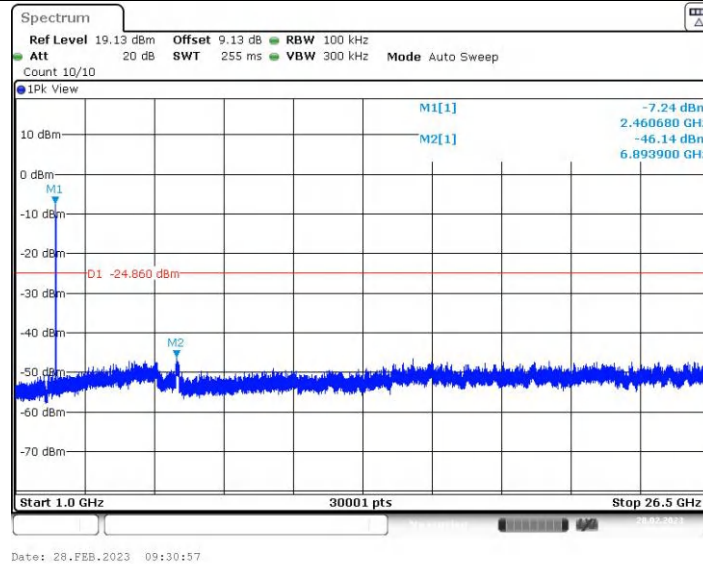
11G_Ant1_2437_1000-26500



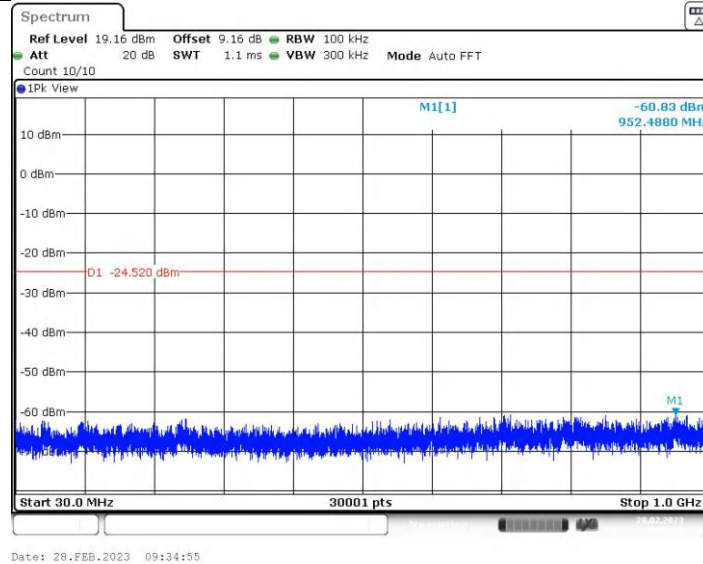
11G_Ant1_2462_30-1000



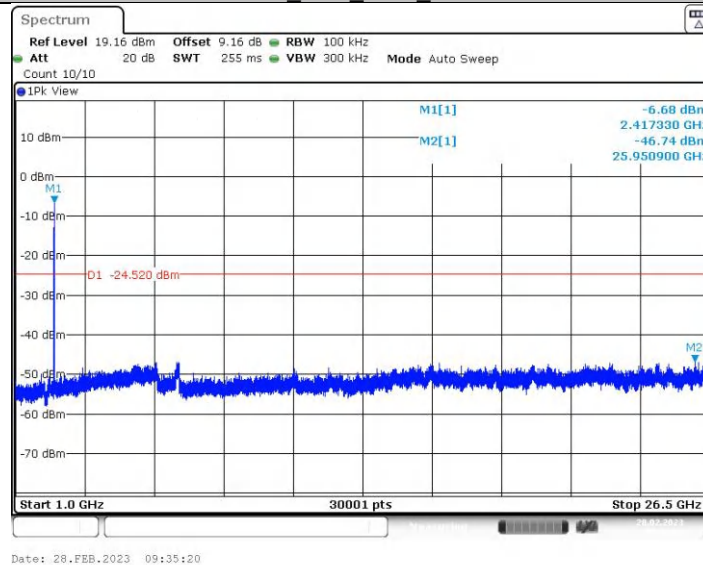
11G_Ant1_2462_1000-26500



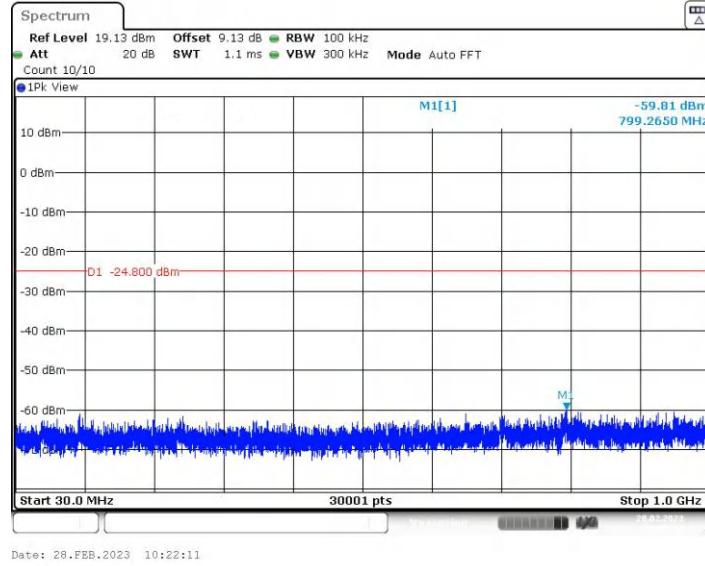
11N20SISO Ant1 2412 30~1000



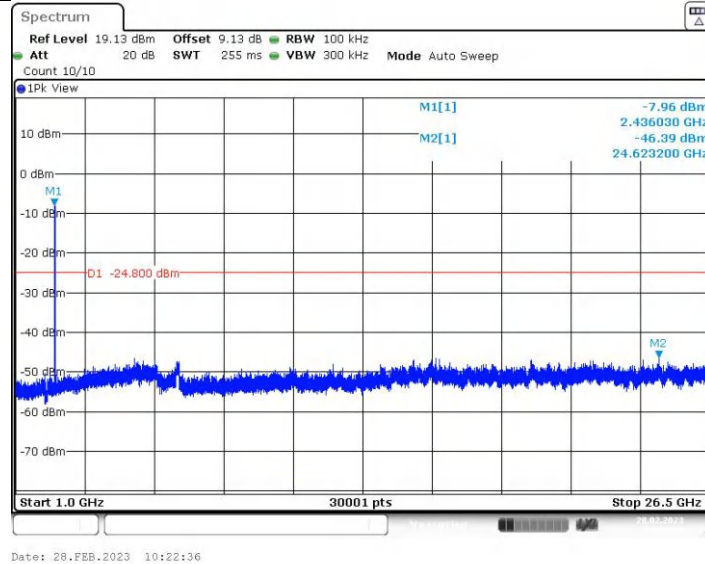
11N20SISO Ant1 2412 1000~26500



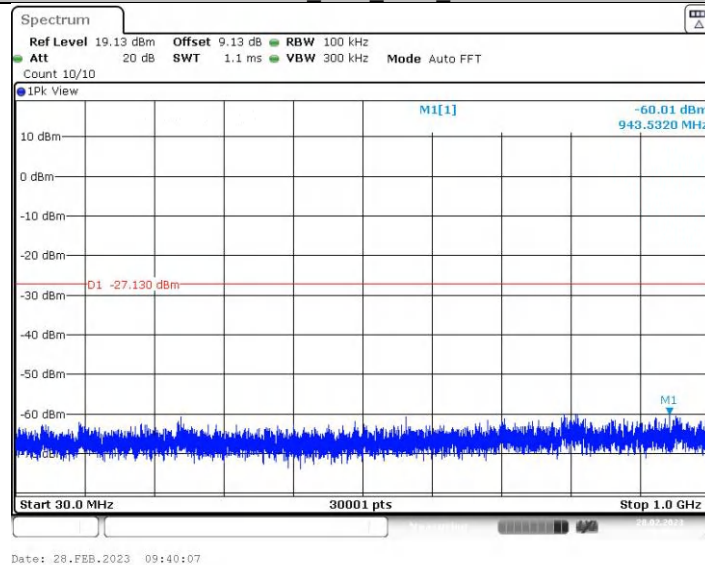
11N20SISO Ant1 2437 30~1000



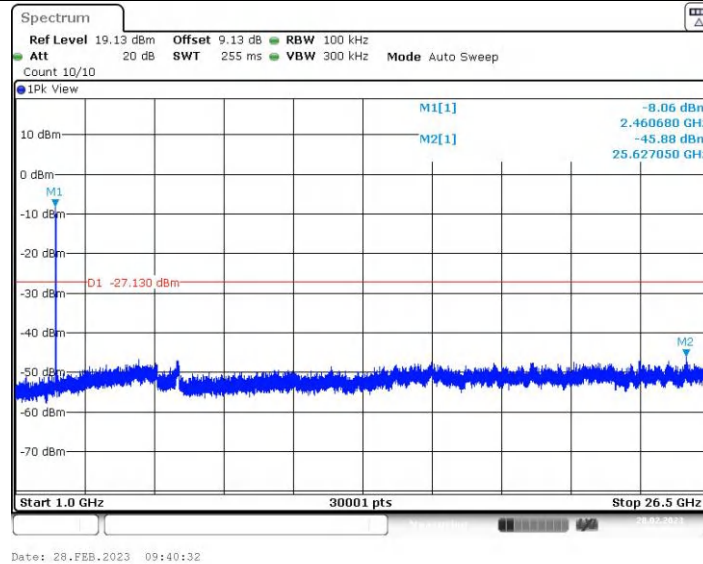
11N20SISO_Ant1_2437_1000~26500



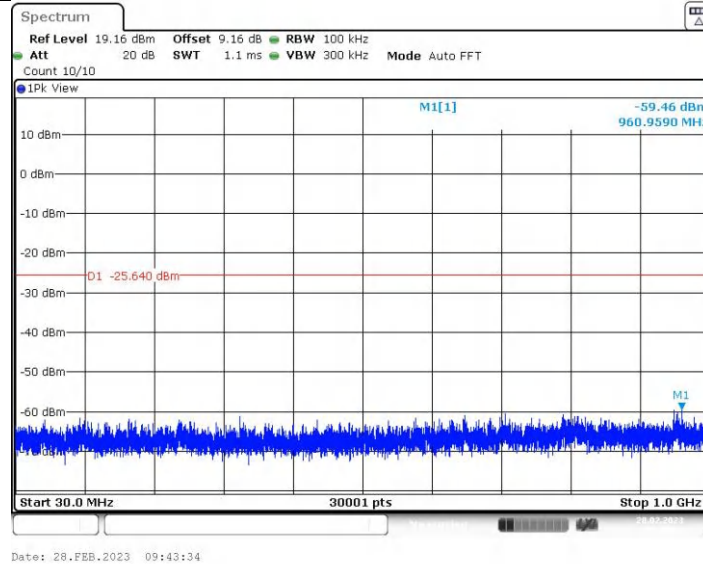
11N20SISO_Ant1_2462_30~1000



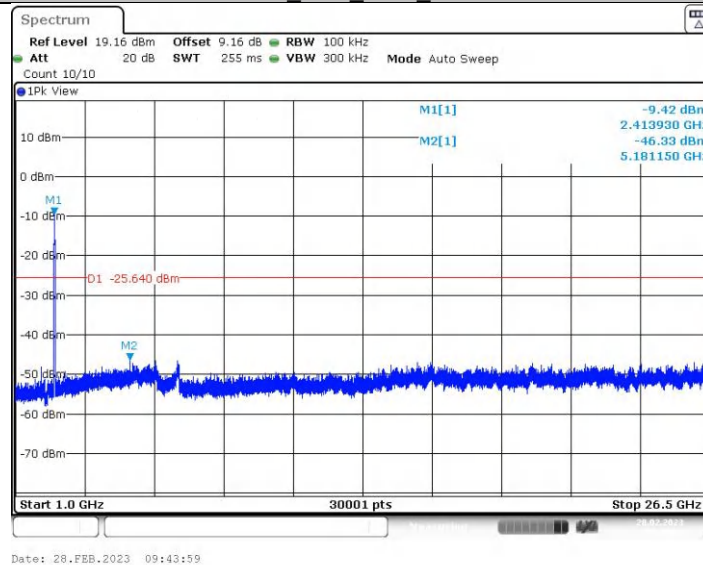
11N20SISO_Ant1_2462_1000~26500



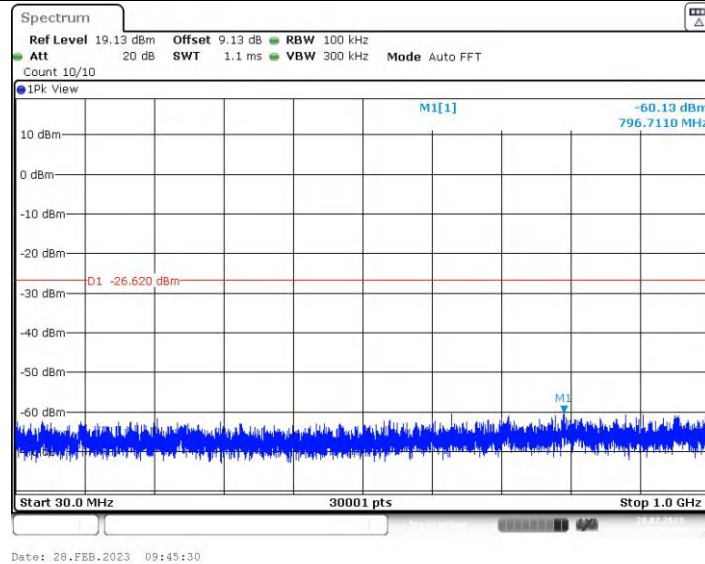
11N40SISO Ant1 2422 30~1000



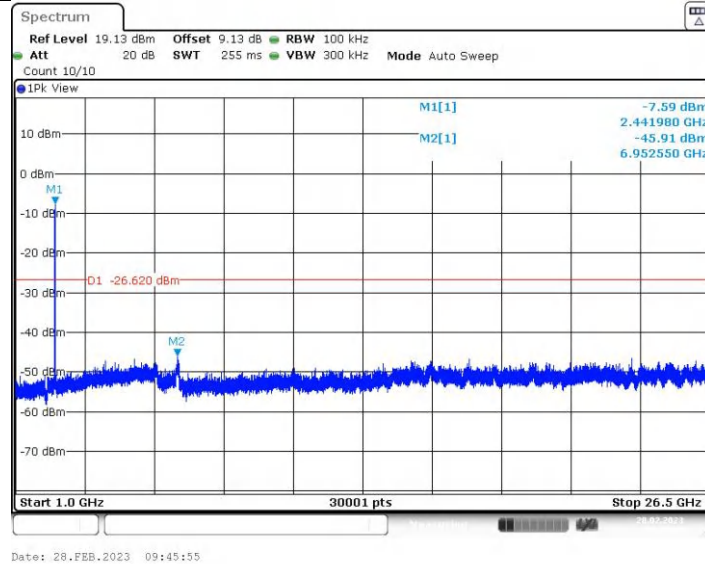
11N40SISO Ant1 2422 1000~26500



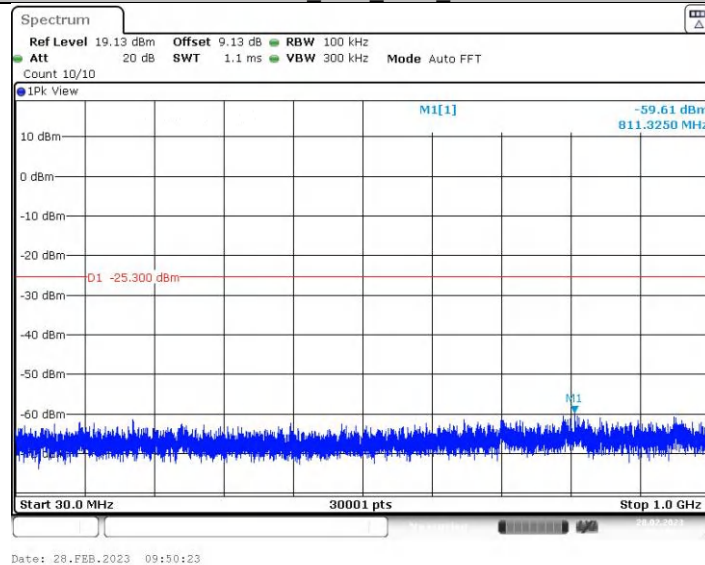
11N40SISO Ant1 2437 30~1000



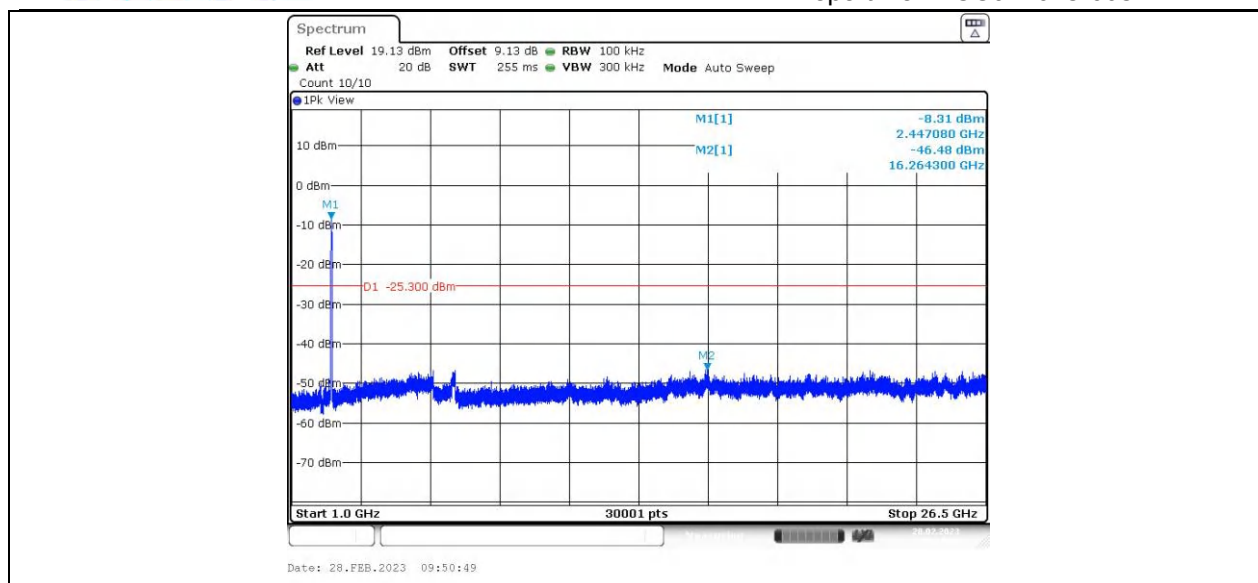
11N40SISO_Ant1_2437_1000~26500



11N40SISO_Ant1_2452_30~1000



11N40SISO_Ant1_2452_1000~26500



4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

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

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

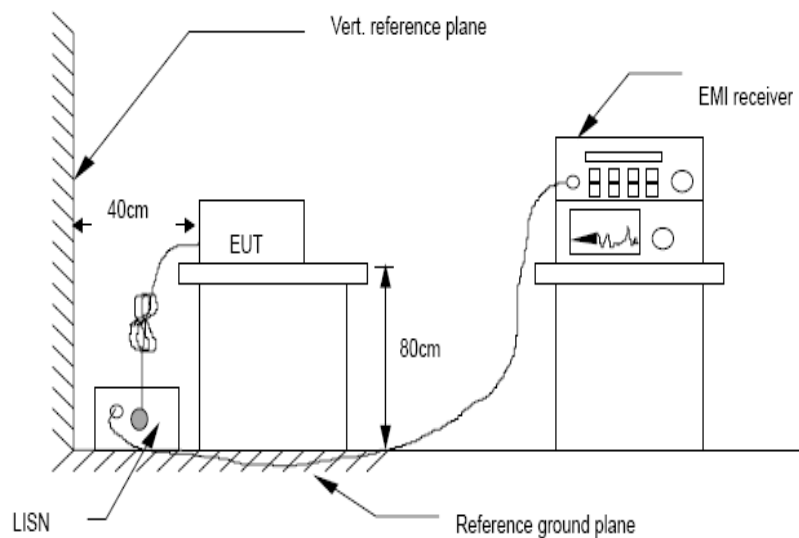
3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9 kHz.

4.3. Test Setup

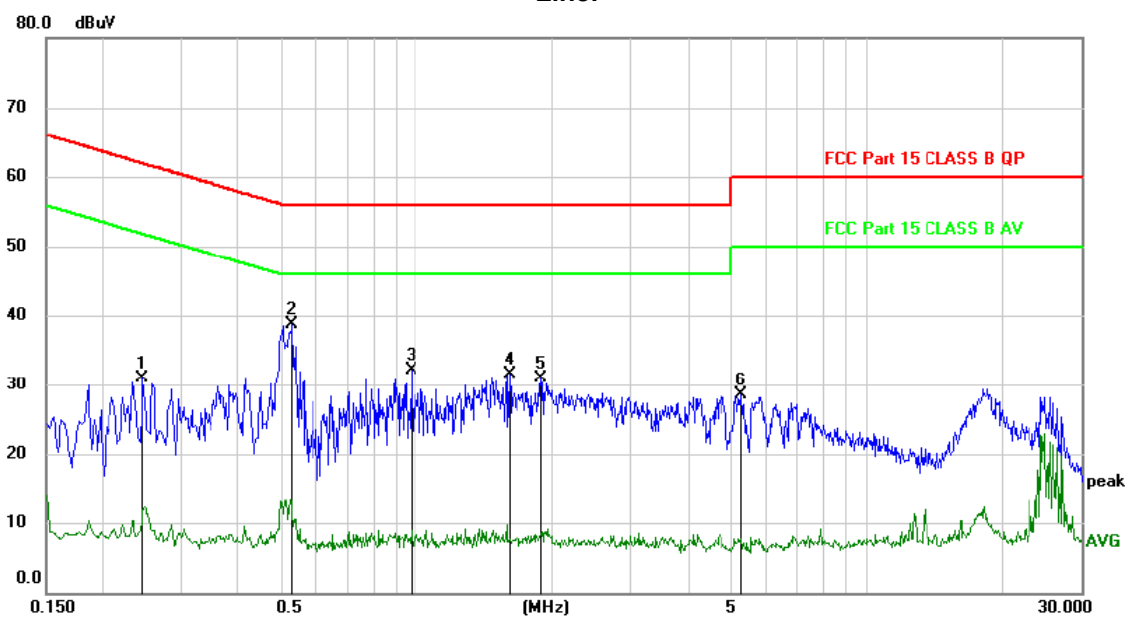


4.4. Test Results

PASS. (See below detailed test data)

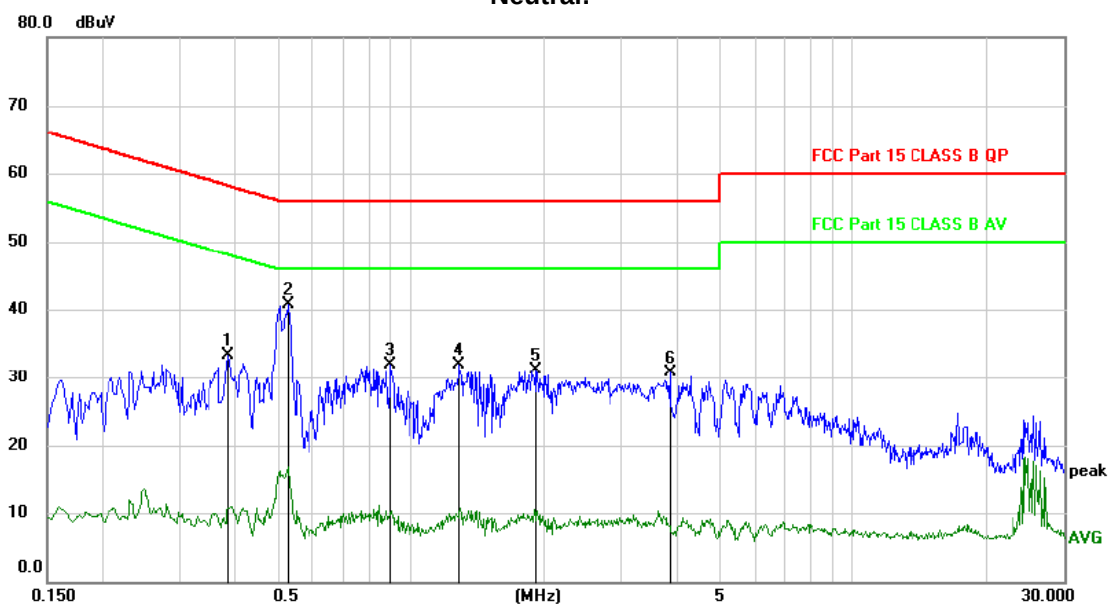
Note: If peak Result comply with AV limit, QP and AV Result is deemed to comply with AV limit

Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2460	21.03	9.97	31.00	61.89	-30.89	peak	
2	*	0.5280	28.71	9.95	38.66	56.00	-17.34	peak	
3		0.9720	22.18	9.93	32.11	56.00	-23.89	peak	
4		1.6080	21.55	9.90	31.45	56.00	-24.55	peak	
5		1.8960	21.12	9.88	31.00	56.00	-25.00	peak	
6		5.2500	18.44	10.05	28.49	60.00	-31.51	peak	

Neutral:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.3870	23.39	9.94	33.33	58.13	-24.80	peak	
2	*	0.5250	30.83	9.95	40.78	56.00	-15.22	peak	
3		0.8970	22.01	9.97	31.98	56.00	-24.02	peak	
4		1.2839	22.01	9.89	31.90	56.00	-24.10	peak	
5		1.9260	21.25	9.89	31.14	56.00	-24.86	peak	
6		3.8400	20.79	9.96	30.75	56.00	-25.25	peak	

Note: All modes and channels have been tested and only the B mode 2412MHz mode with the worst data is listed.

5. CONDUCTED MAXIMUM OUTPUT POWER

5.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247.

Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1 W(30dBm)

5.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

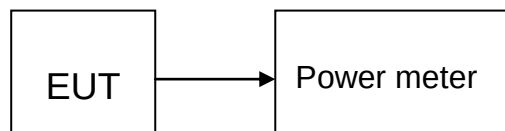
5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Connected the EUT's antenna port to peak power meter by 20dB attenuator.

5.2.3 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.3. Test Setup



5.4. Test Results

PASS

Detailed information please see the following page.

Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Result
IEEE 802.11 b	CH1: 2412	15.25	30	PASS
	CH6: 2437	14.18	30	PASS
	CH11: 2462	14.89	30	PASS
IEEE 802.11 g	CH1: 2412	15.72	30	PASS
	CH6: 2437	15.32	30	PASS
	CH11: 2462	14.81	30	PASS
IEEE 802.11 n/HT20	CH1: 2412	15.79	30	PASS
	CH6: 2437	15.86	30	PASS
	CH11: 2462	15.91	30	PASS
IEEE 802.11 n/HT40	CH3: 2422	15.07	30	PASS
	CH6: 2437	15.34	30	PASS
	CH9: 2452	15.23	30	PASS

6. PEAK POWER SPECTRAL DENSITY

6.1. Test limits

6.1.1 Please refer RSS-247 & FCC PART 15: 15.247.

6.1.2 For direct sequence systems, the peak 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 transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

6.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

6.2.1 Place the EUT on the table and set it in transmitting mode.

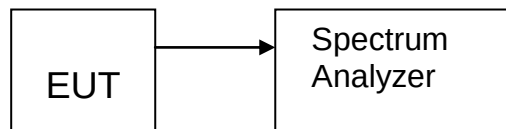
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as $RBW = 3\text{kHz}$ (Set the RBW to: $3\text{ kHz} \leq RBW \leq 100\text{ kHz}$), $VBW = 10\text{kHz}$ (Set the $VBW \geq 3 \times RBW$), $\text{span} \geq 1.5 \times \text{DTS bandwidth}$, detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

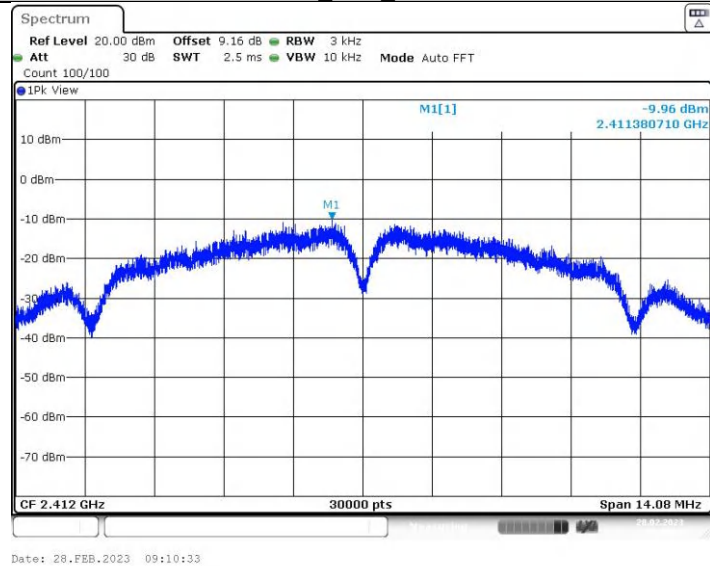
6.3. Test Setup



6.4. Test Results

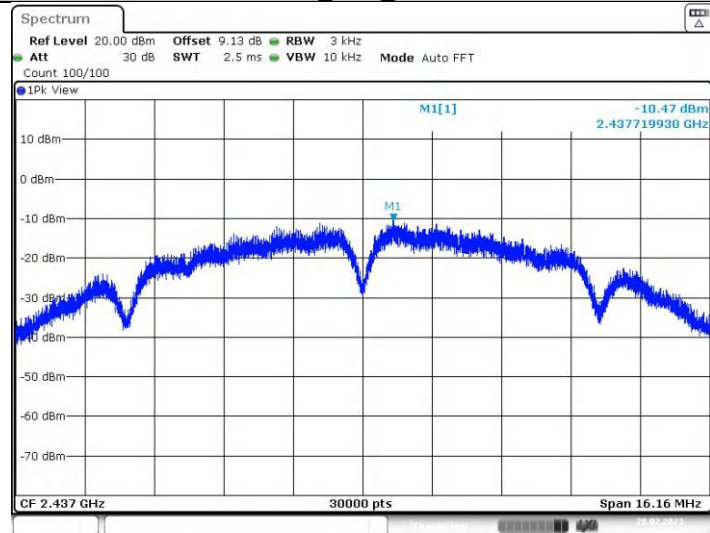
Test Mode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-9.96	≤8.00	PASS
		2437	-10.47	≤8.00	PASS
		2462	-11.14	≤8.00	PASS
11G	Ant1	2412	-19.7	≤8.00	PASS
		2437	-18.12	≤8.00	PASS
		2462	-18.54	≤8.00	PASS
11N20SISO	Ant1	2412	-17.31	≤8.00	PASS
		2437	-17.42	≤8.00	PASS
		2462	-17.51	≤8.00	PASS
11N40SISO	Ant1	2422	-20.09	≤8.00	PASS
		2437	-21.37	≤8.00	PASS
		2452	-19.04	≤8.00	PASS

11B_Ant1_2412



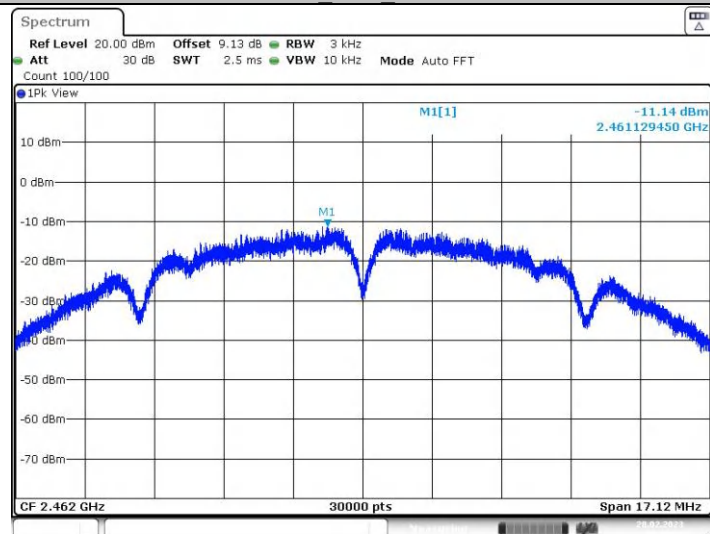
Date: 28.FEB.2023 09:10:33

11B_Ant1_2437



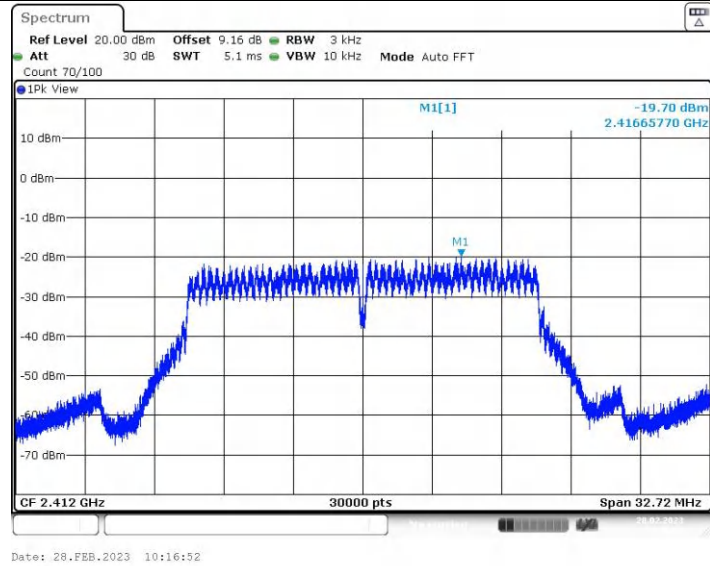
Date: 28.FEB.2023 10:14:26

11B_Ant1_2462

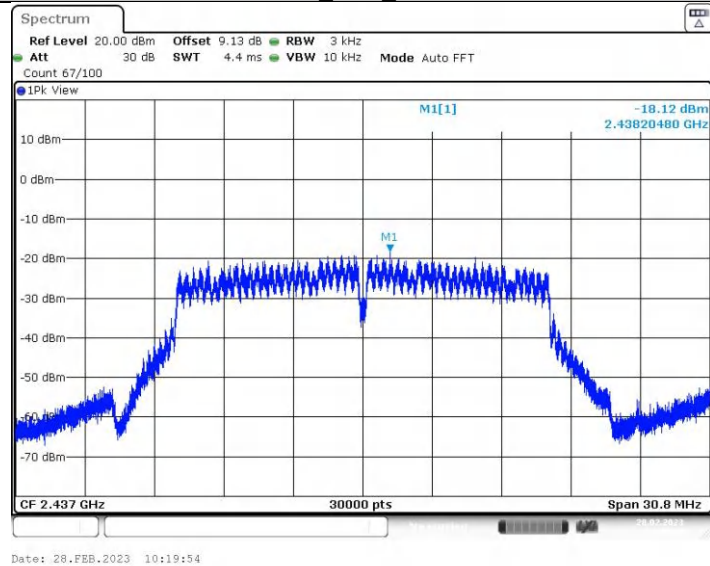


Date: 28.FEB.2023 09:16:21

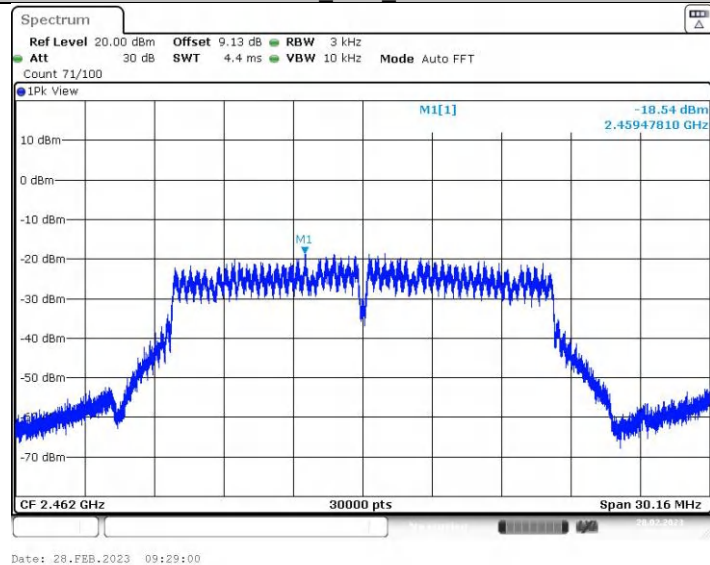
11G_Ant1_2412



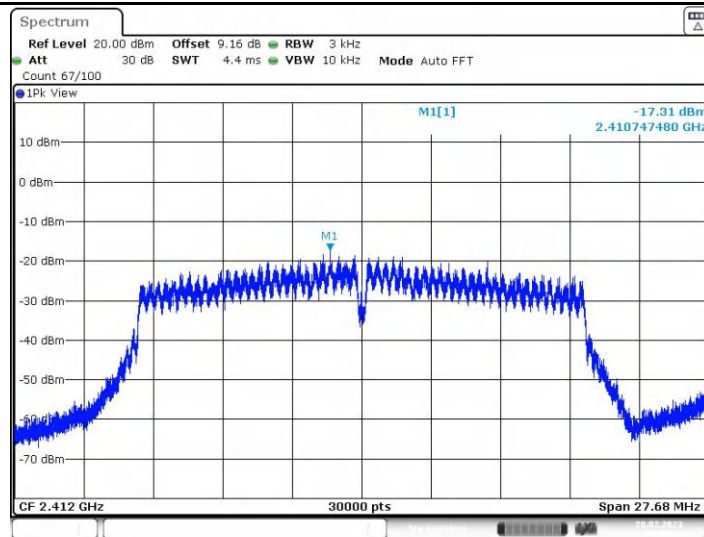
11G_Ant1_2437



11G_Ant1_2462

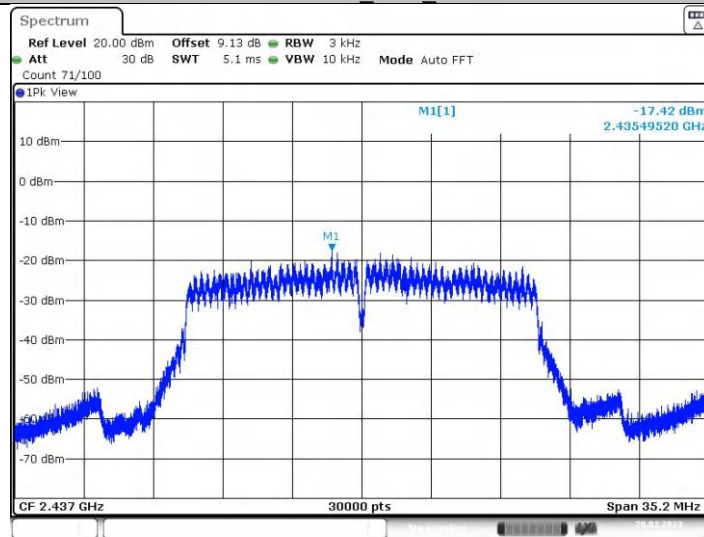


11N20SISO_Ant1_2412



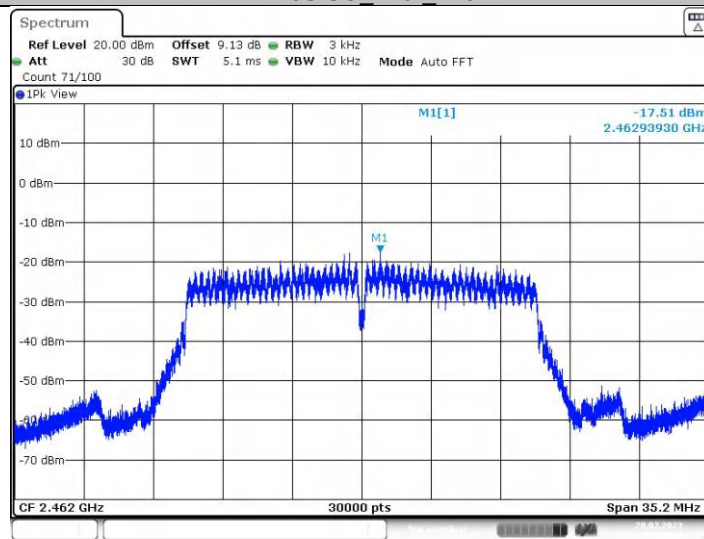
Date: 28.FEB.2023 09:33:23

11N20SISO_Ant1_2437



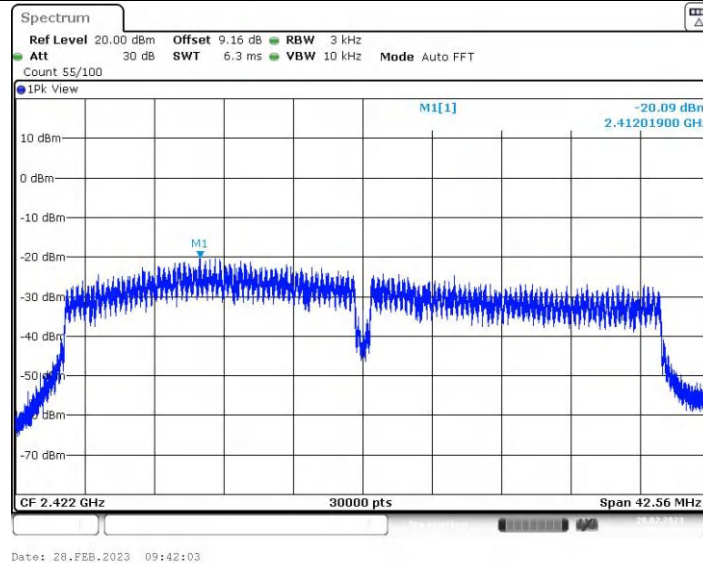
Date: 28.FEB.2023 10:21:53

11N20SISO_Ant1_2462

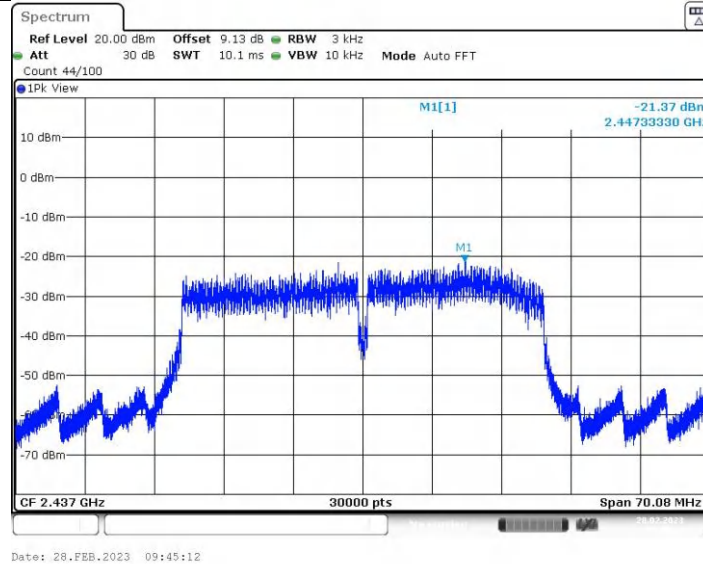


Date: 28.FEB.2023 09:38:34

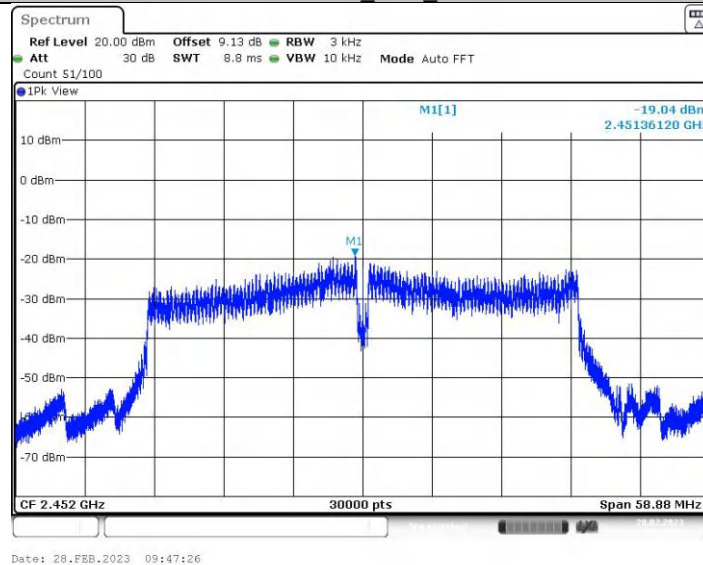
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



7. BANDWIDTH

7.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247

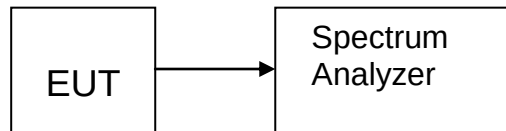
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

- a) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver set RBW = 100kHz, VBW $\geq$ 3*RBW =300kHz,, Peak Detector, Sweep time set auto, detail see the test plot.

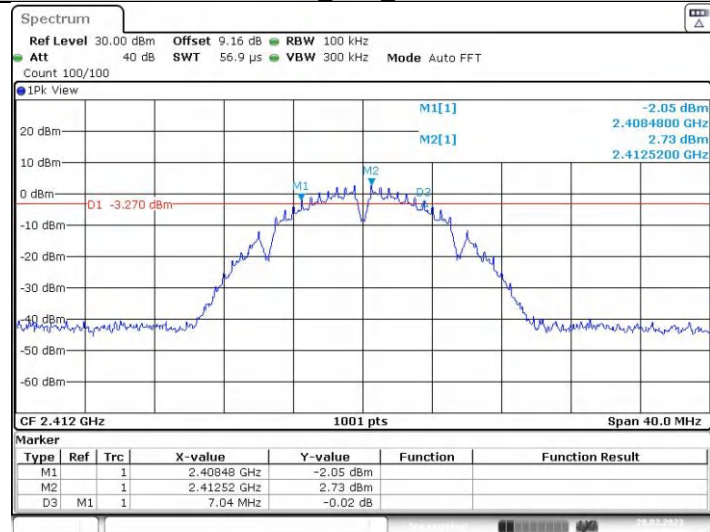
7.3. Test Setup



7.4. Test Results

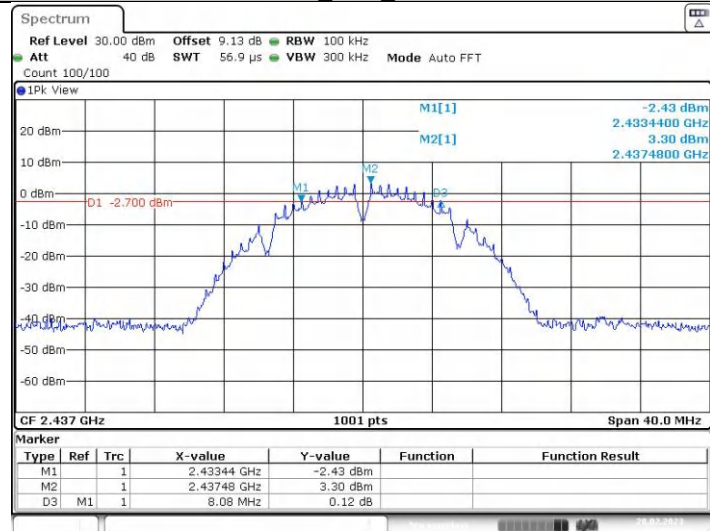
Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	7.04	2408.48	2415.52	0.5	PASS
		2437	8.08	2433.44	2441.52	0.5	PASS
		2462	8.56	2457.48	2466.04	0.5	PASS
11G	Ant1	2412	16.36	2403.84	2420.20	0.5	PASS
		2437	15.40	2429.12	2444.52	0.5	PASS
		2462	15.08	2454.44	2469.52	0.5	PASS
11N20SISO	Ant1	2412	13.84	2404.44	2418.28	0.5	PASS
		2437	17.60	2428.20	2445.80	0.5	PASS
		2462	17.60	2453.20	2470.80	0.5	PASS
11N40SISO	Ant1	2422	21.28	2406.96	2428.24	0.5	PASS
		2437	35.04	2419.48	2454.52	0.5	PASS
		2452	29.44	2440.72	2470.16	0.5	PASS

11B_Ant1_2412



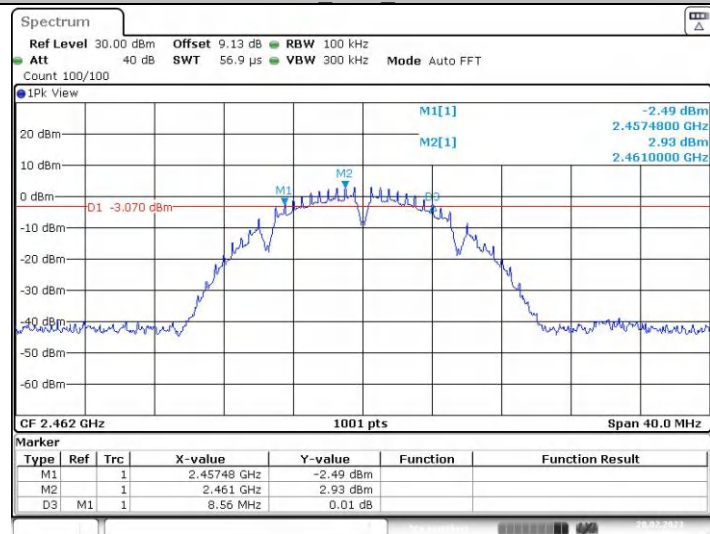
Date: 28.FEB.2023 09:10:05

11B_Ant1_2437



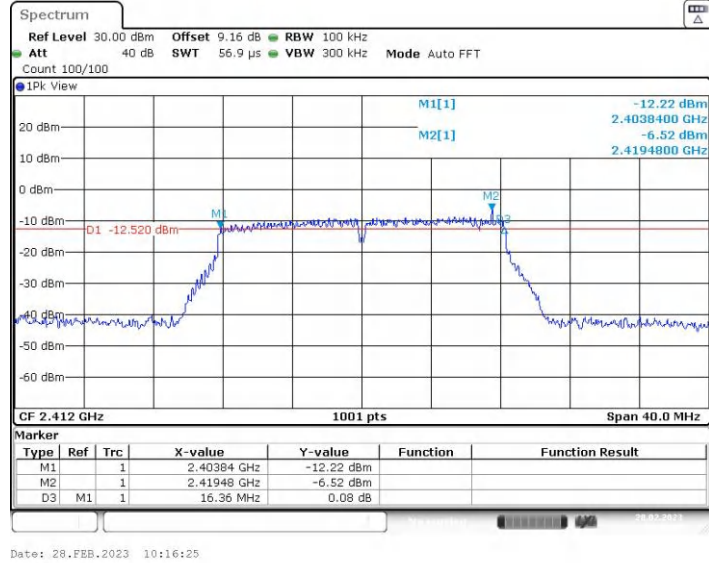
Date: 28.FEB.2023 10:14:00

11B_Ant1_2462

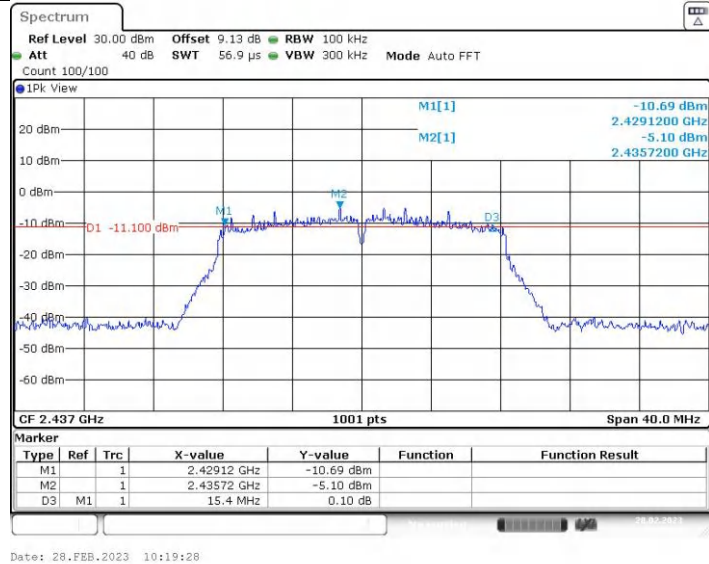


Date: 28.FEB.2023 09:15:55

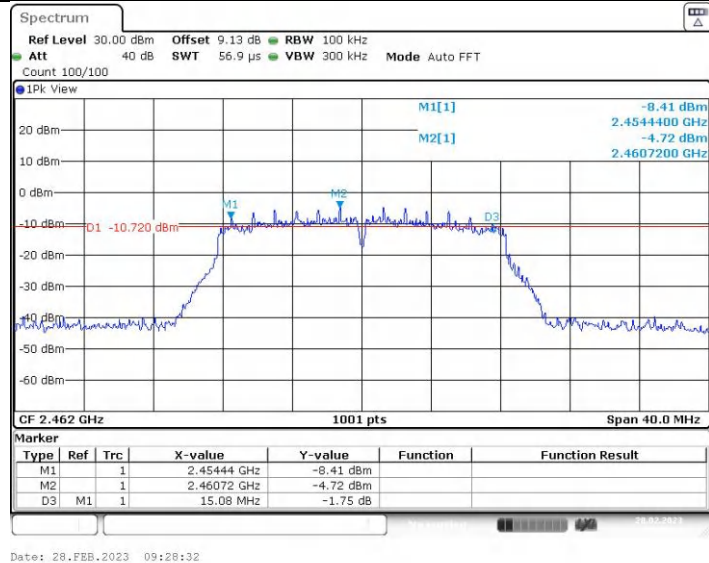
11G_Ant1_2412



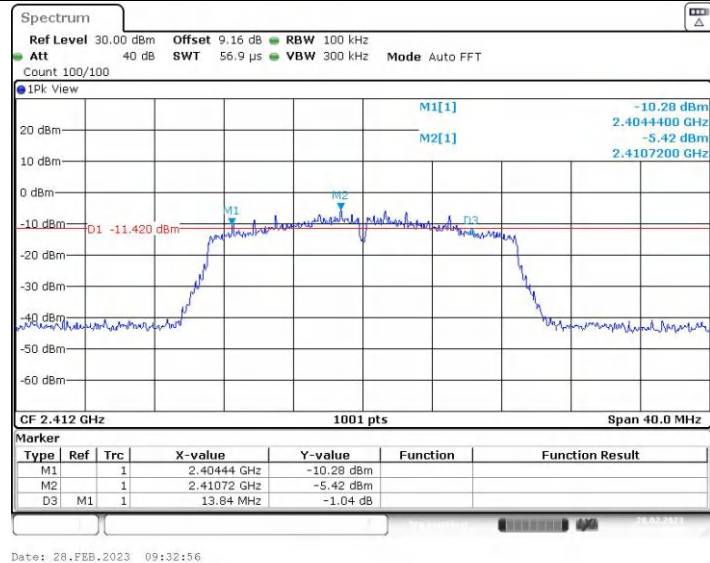
11G_Ant1_2437



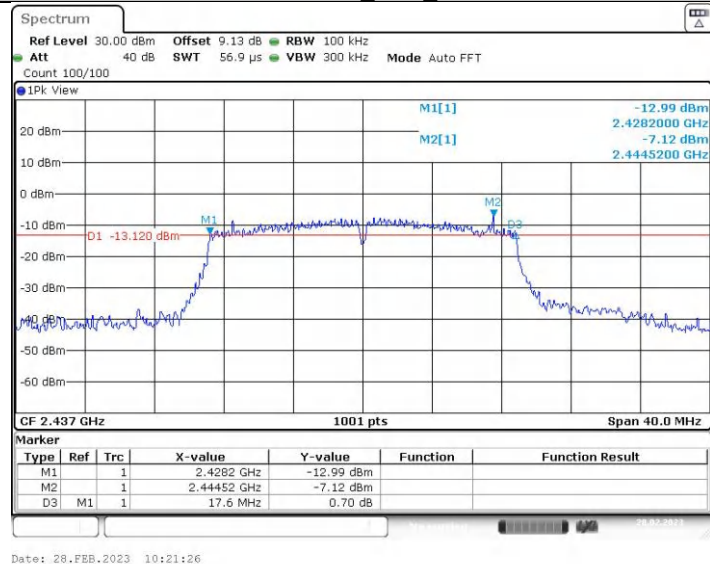
11G_Ant1_2462



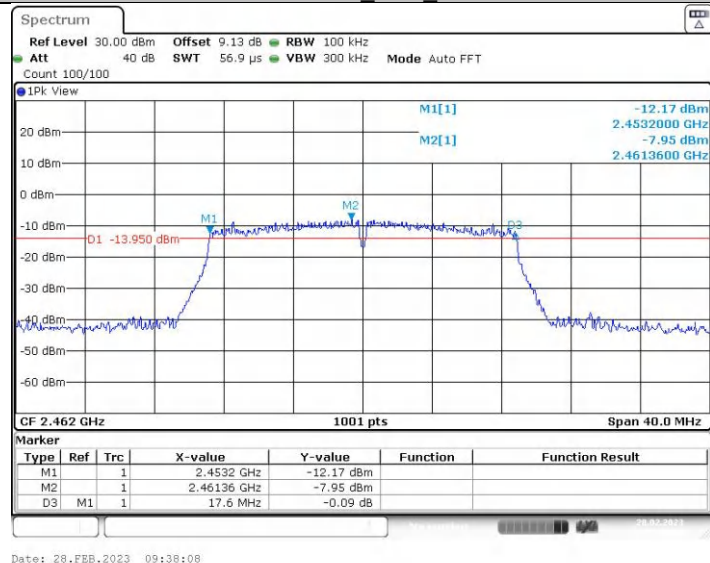
11N20SISO_Ant1_2412



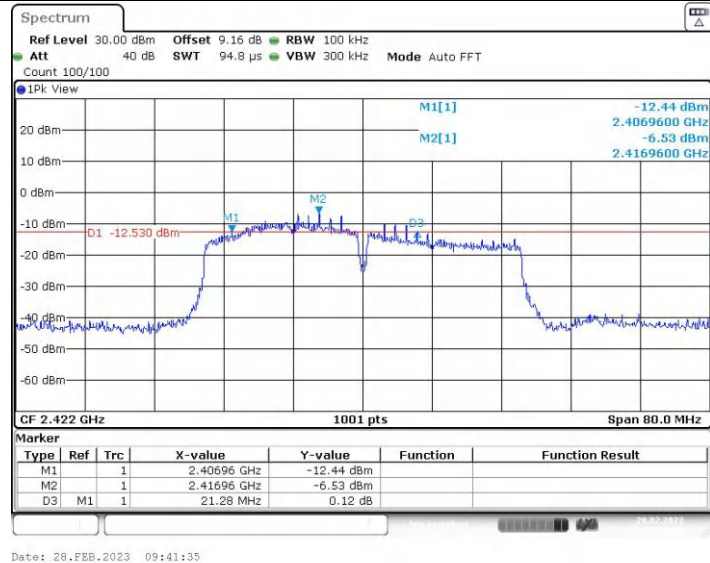
11N20SISO_Ant1_2437



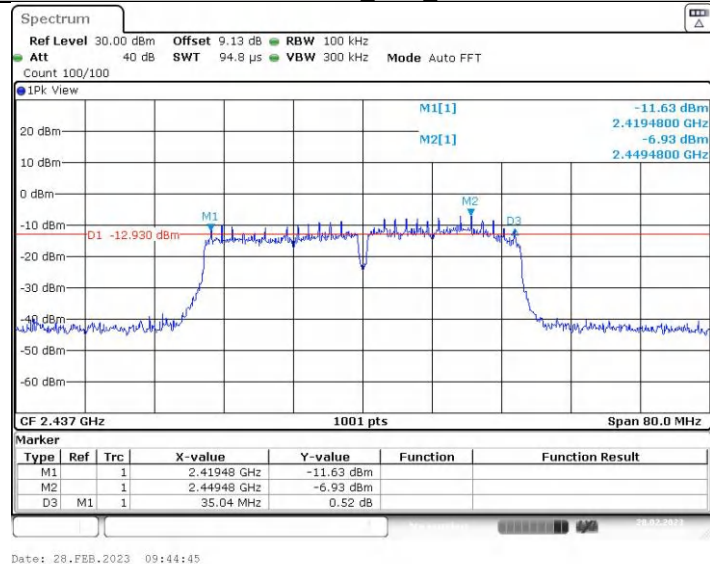
11N20SISO_Ant1_2462



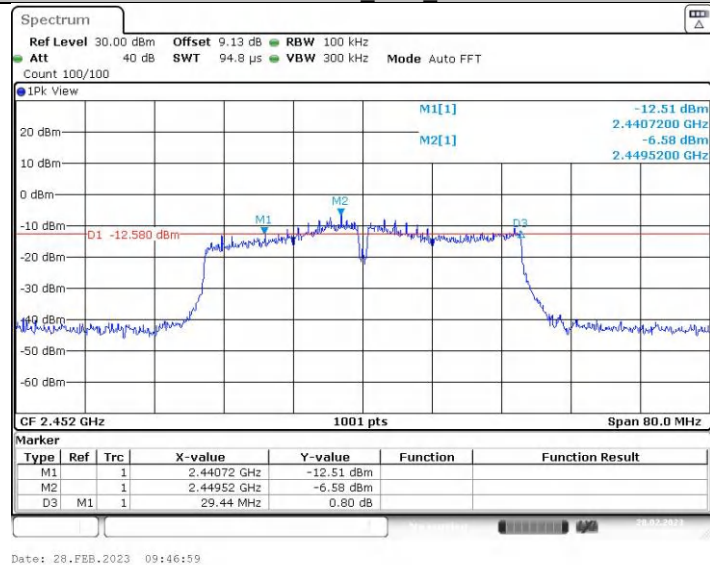
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



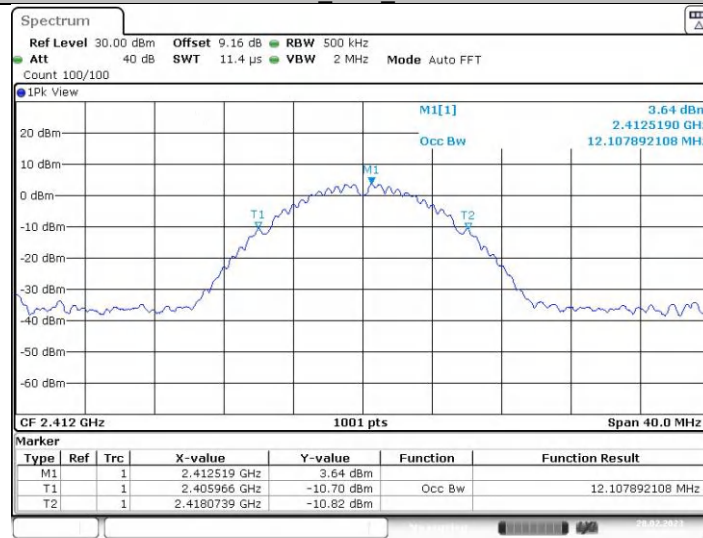
11N40SISO_Ant1_2452



Occupied Channel Bandwidth

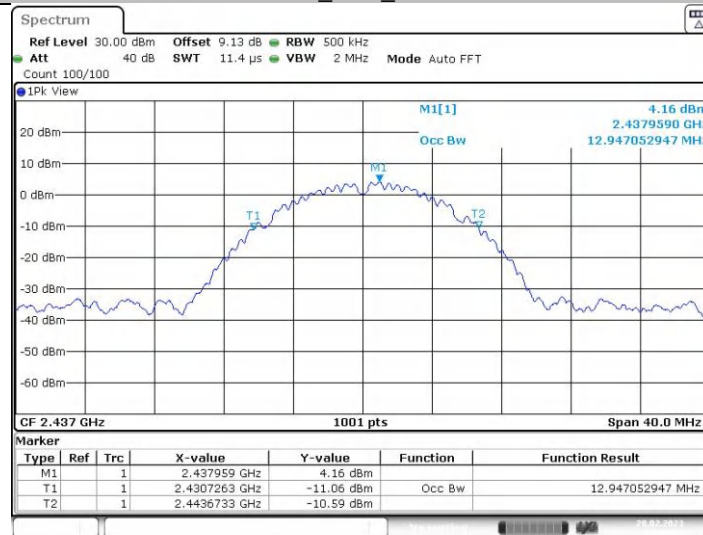
Test Mode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	12.108	2405.9660	2418.0739	---	---
		2437	12.947	2430.7263	2443.6733	---	---
		2462	13.307	2455.2468	2468.5534	---	---
11G	Ant1	2412	17.383	2403.5285	2420.9111	---	---
		2437	16.703	2428.6883	2445.3916	---	---
		2462	16.903	2453.6883	2470.5914	---	---
11N20SISO	Ant1	2412	17.902	2403.1289	2421.0310	---	---
		2437	17.862	2428.0889	2445.9510	---	---
		2462	18.302	2452.6893	2470.9910	---	---
11N40SISO	Ant1	2422	35.964	2404.0180	2439.9820	---	---
		2437	36.523	2418.3786	2454.9021	---	---
		2452	36.444	2433.9381	2470.3816	---	---

11B_Ant1_2412



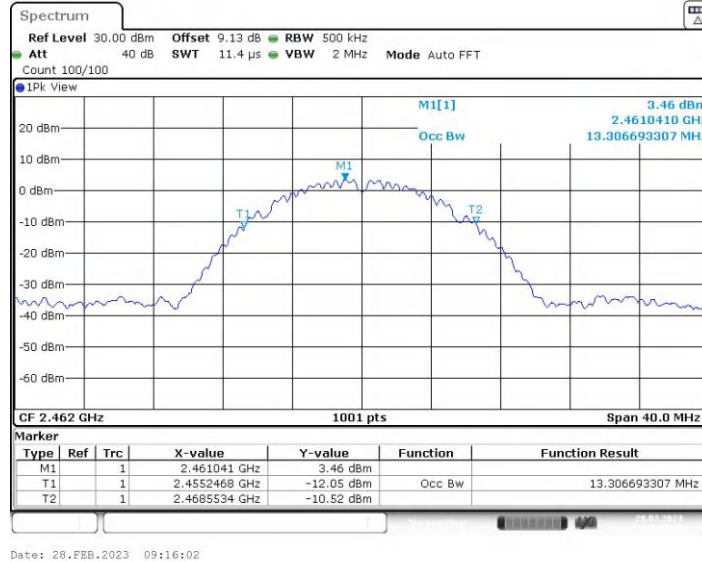
Date: 28.FEB.2023 09:10:13

11B_Ant1_2437

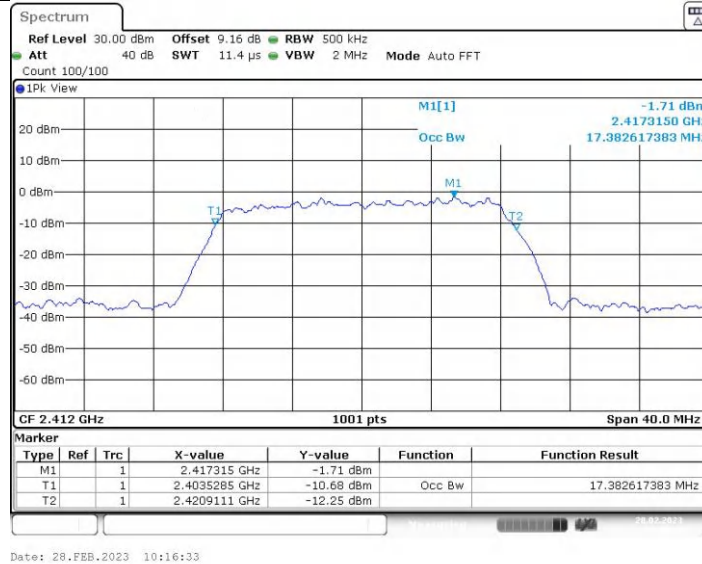


Date: 28.FEB.2023 10:14:08

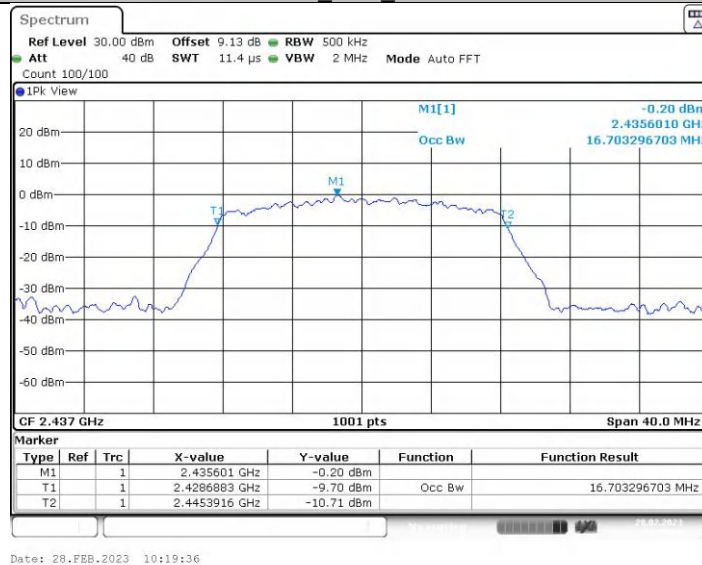
11B_Ant1_2462



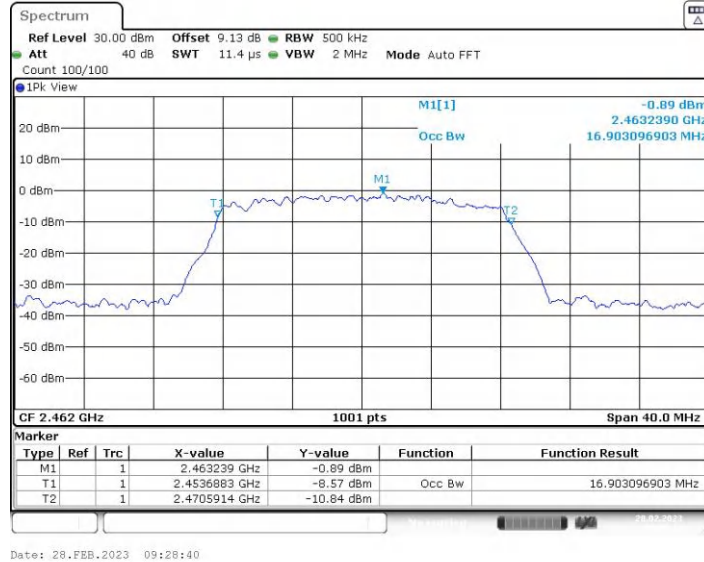
11G_Ant1_2412



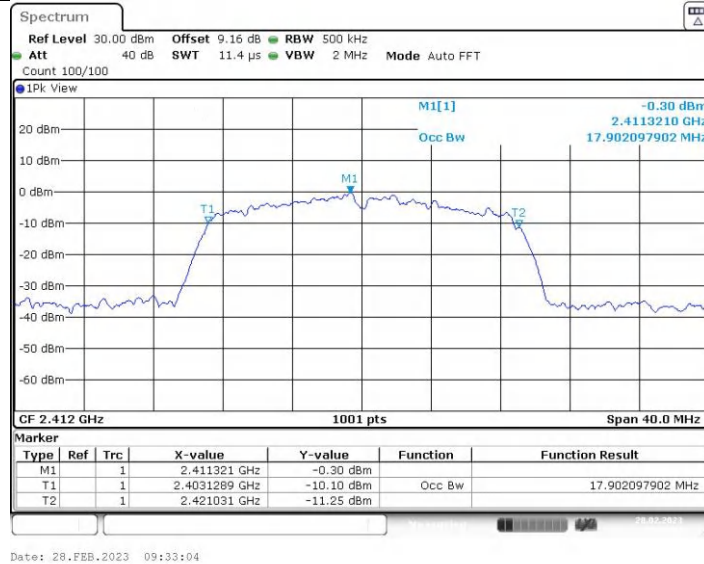
11G_Ant1_2437



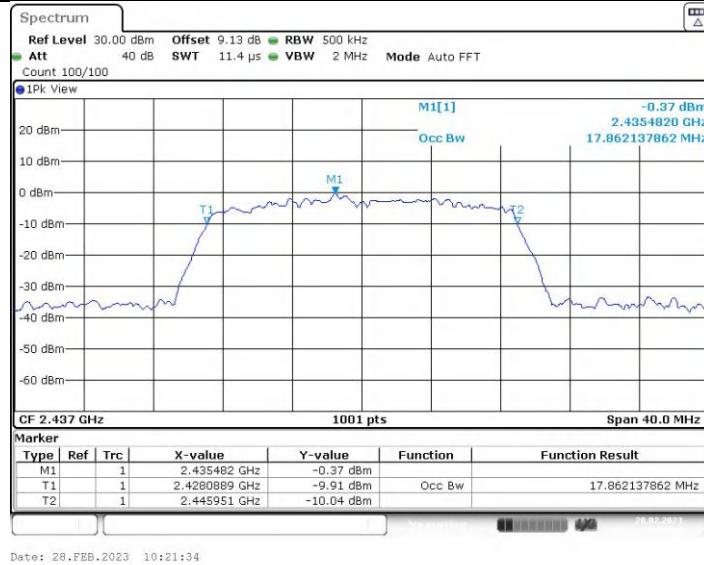
11G_Ant1_2462



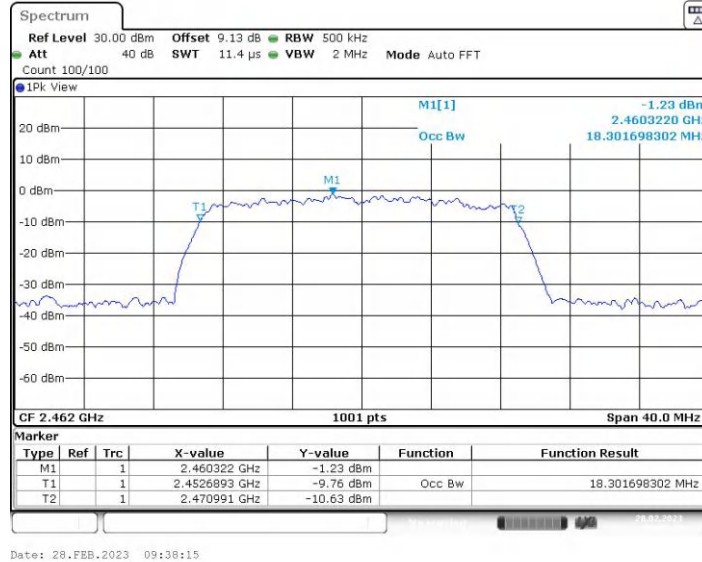
11N20SISO_Ant1_2412



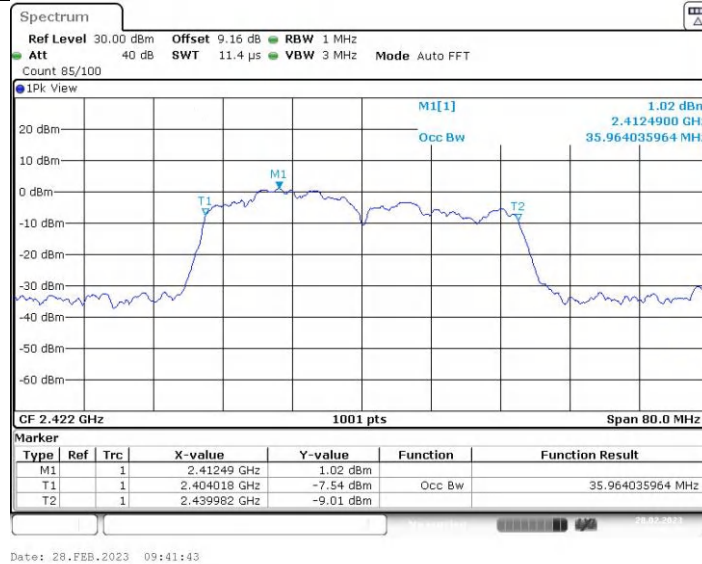
11N20SISO_Ant1_2437



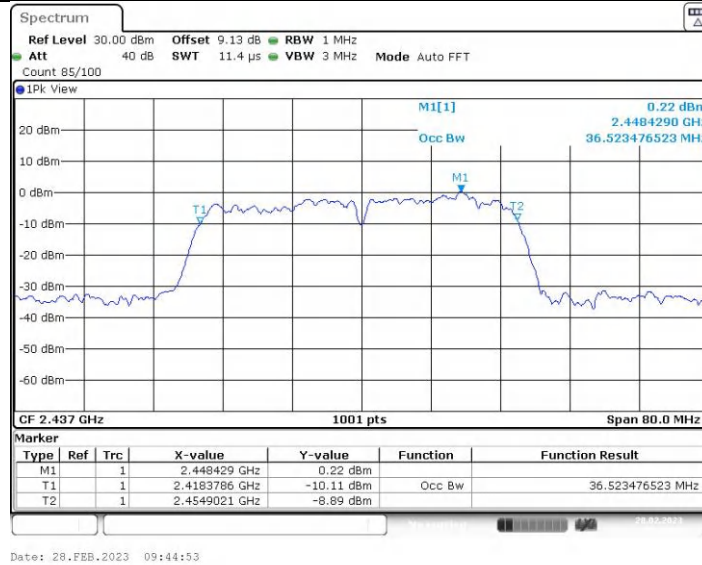
11N20SISO_Ant1_2462



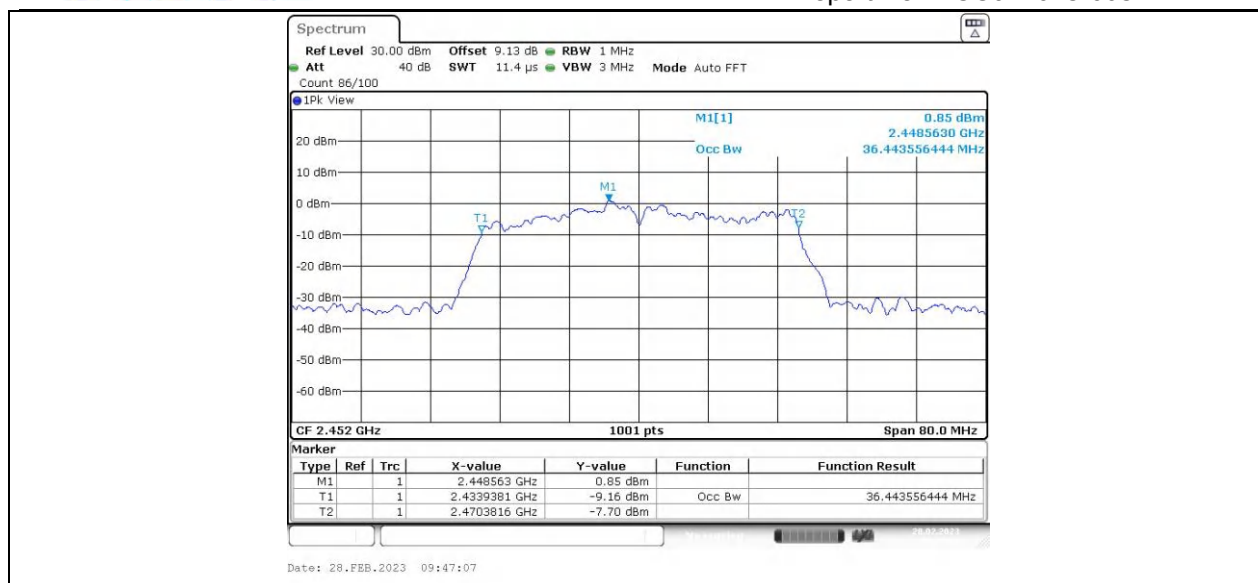
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



8. BAND EDGE CHECK

8.1. Test limits

Please refer RSS-GEN & FCC PART 15: 15.247

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits and RSS-GEN limits.

8.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

8.2.1 Put the EUT on a 1.5m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

8.2.2 Check the spurious emissions out of band.

8.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value, RBW 1MHz, VBW 10Hz, RMS detector for AV value.

8.3. Test Setup

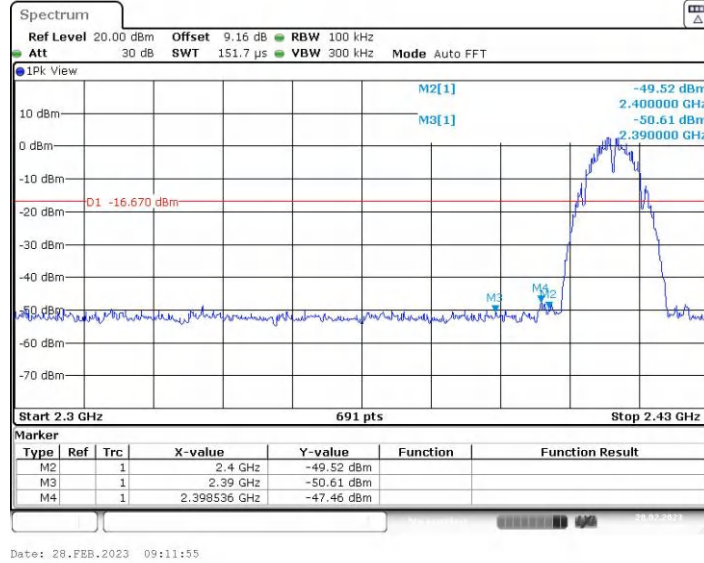
Same as 5.2.2.

8.4. Test Results

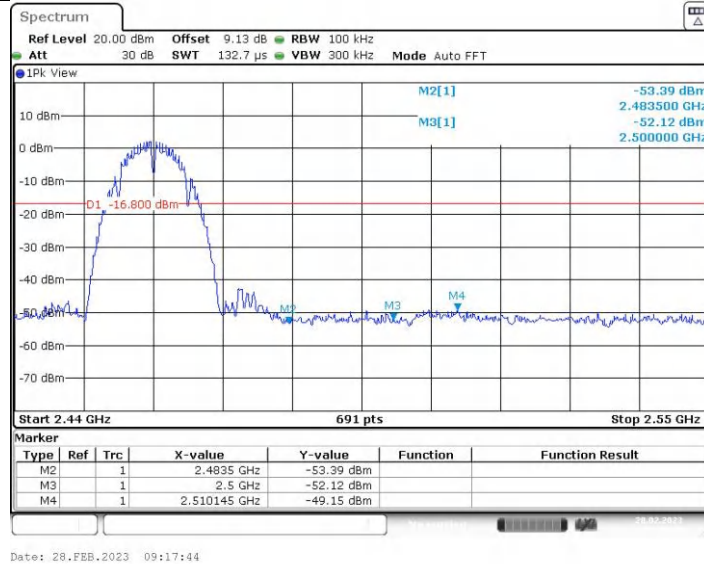
PASS.

Detailed information please see the following page.

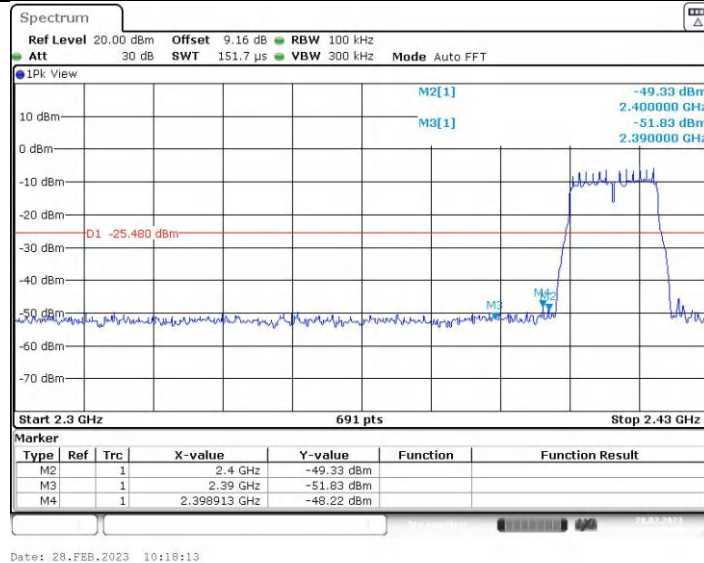
11B Ant1 Low 2412



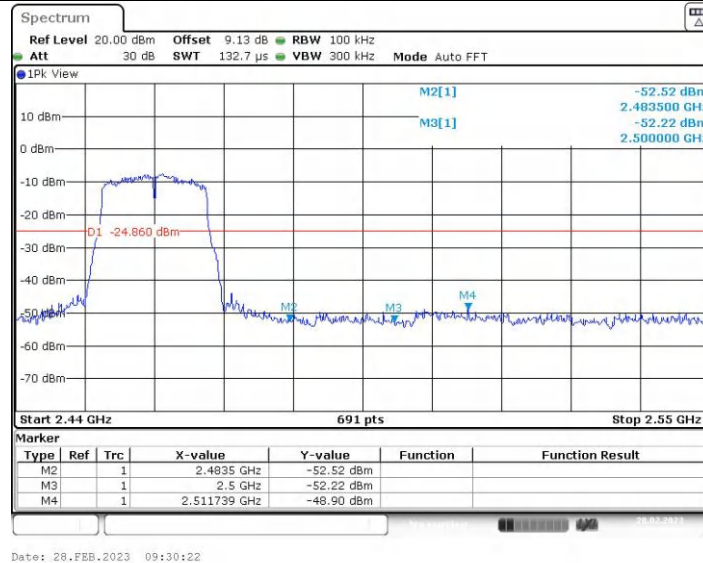
11B Ant1 High 2462



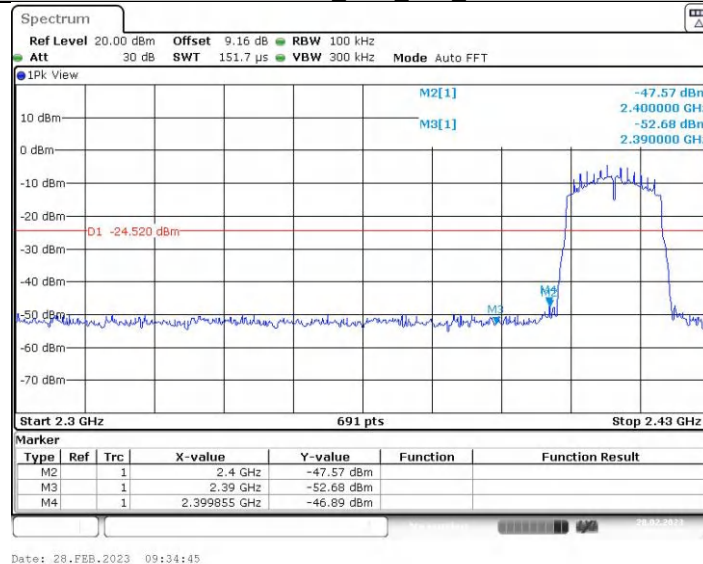
11G Ant1 Low 2412



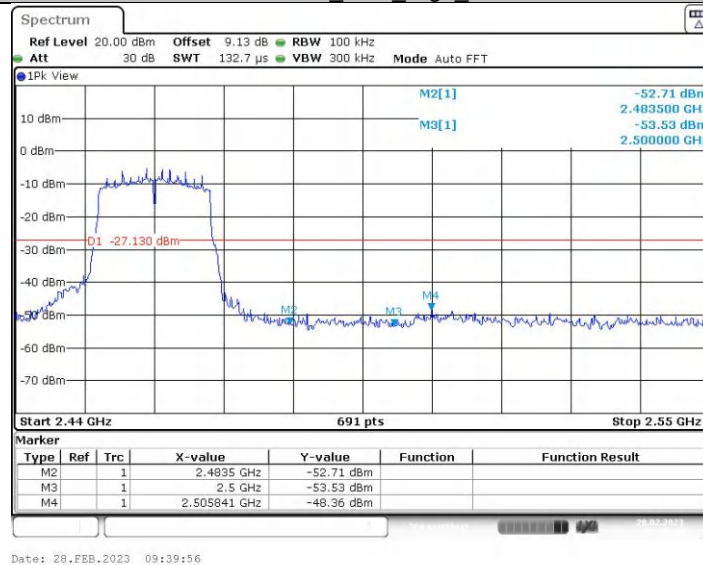
11G_Ant1_High_2462



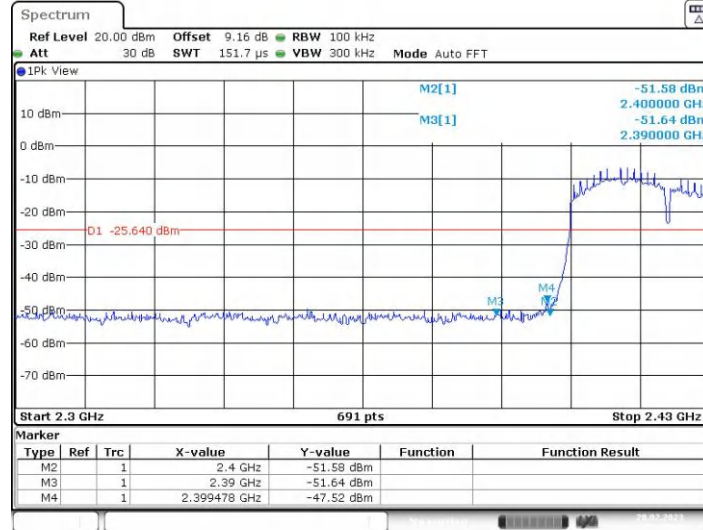
11N20SISO_Ant1_Low_2412



11N20SISO_Ant1_High_2462

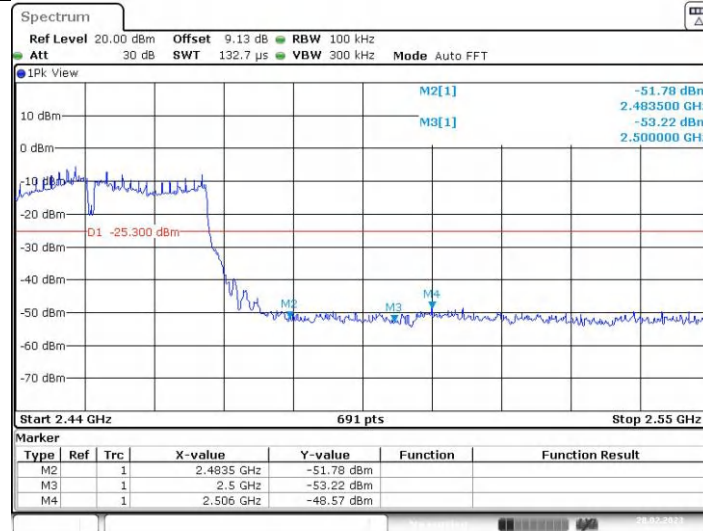


11N40SISO_Ant1_Low_2422



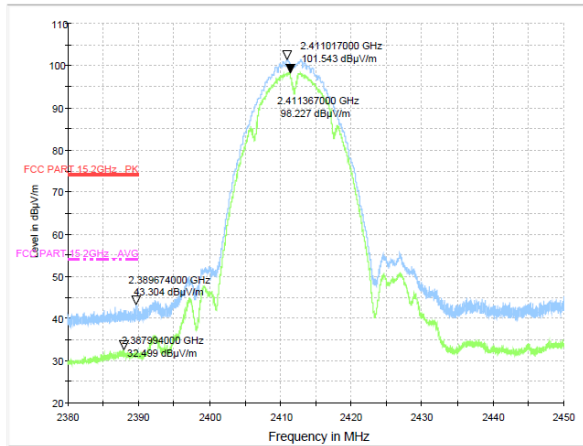
Date: 28.FEB.2023 09:43:25

11N40SISO_Ant1_High_2452

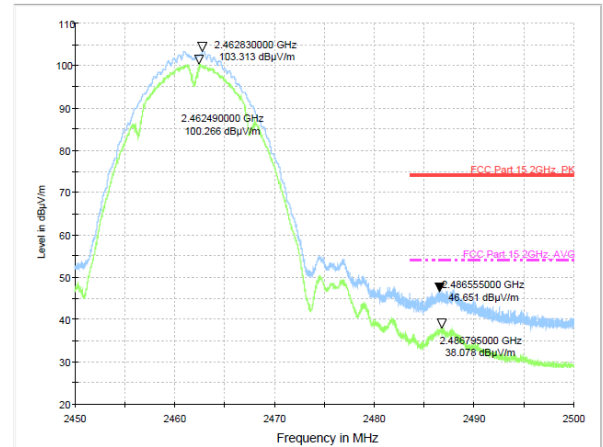


Date: 28.FEB.2023 09:50:14

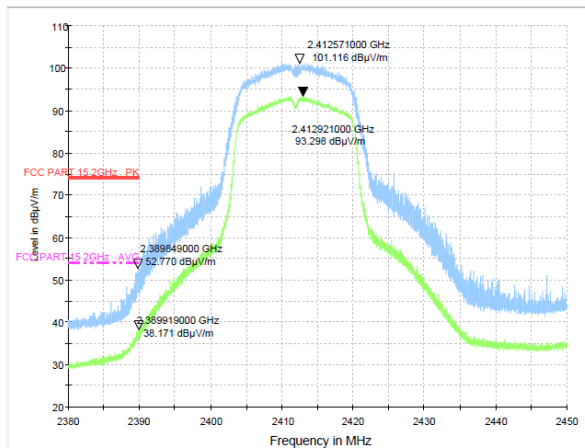
Test Mode: IEEE 802.11b-Low



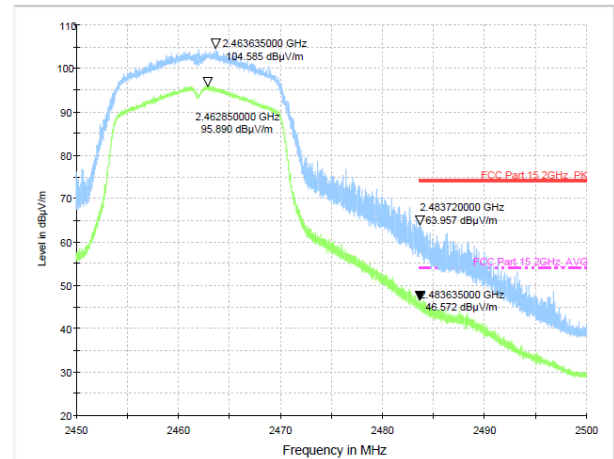
Test Mode: IEEE 802.11b-High



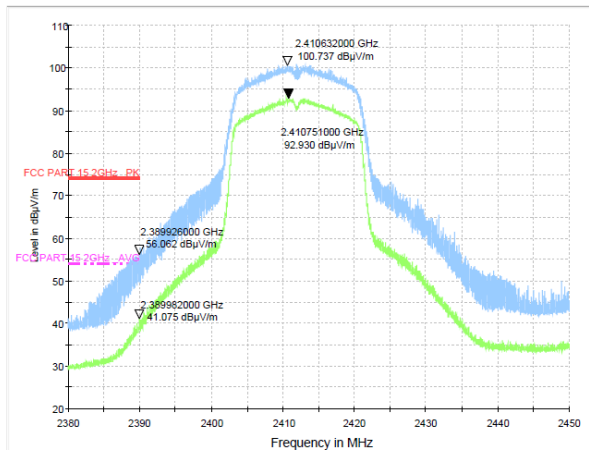
Test Mode: IEEE 802.11g-Low



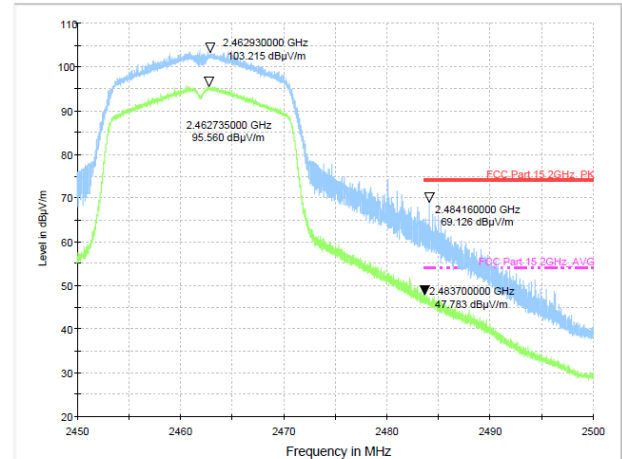
Test Mode: IEEE 802.11g-High



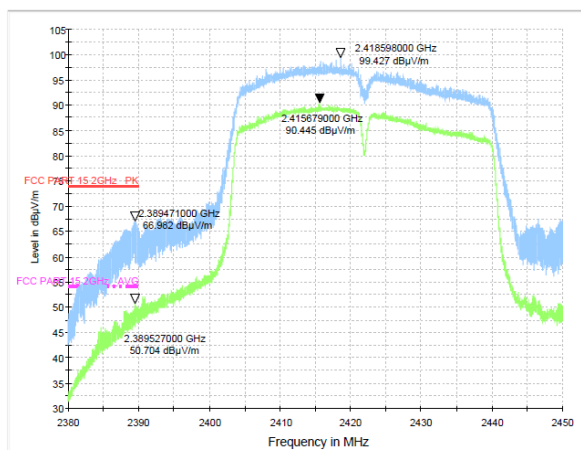
Test Mode: IEEE 802.11n20-Low



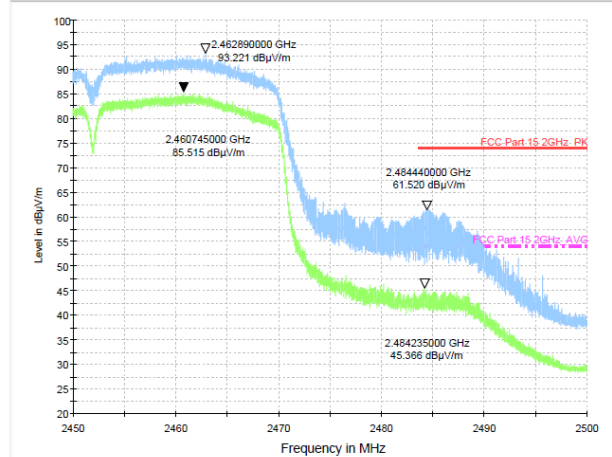
Test Mode: IEEE 802.11n20-High



Test Mode: IEEE 802.11n40-Low



Test Mode: IEEE 802.11n40-High



9. ANTENNA REQUIREMENT

9.1. Standard Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2. Antenna Connected Construction

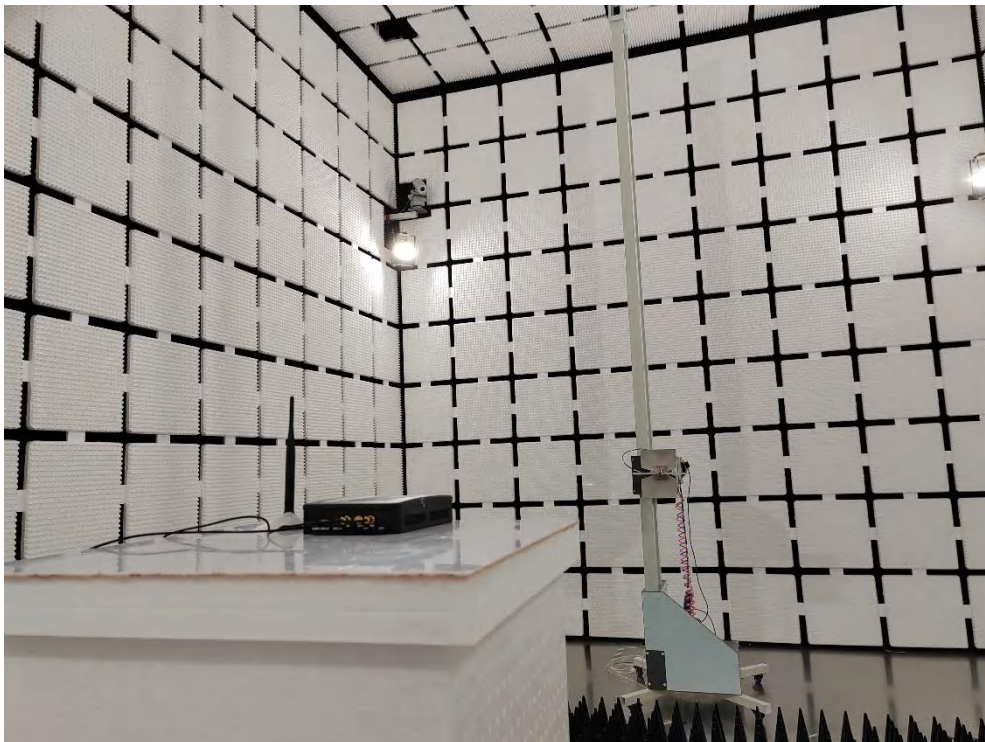
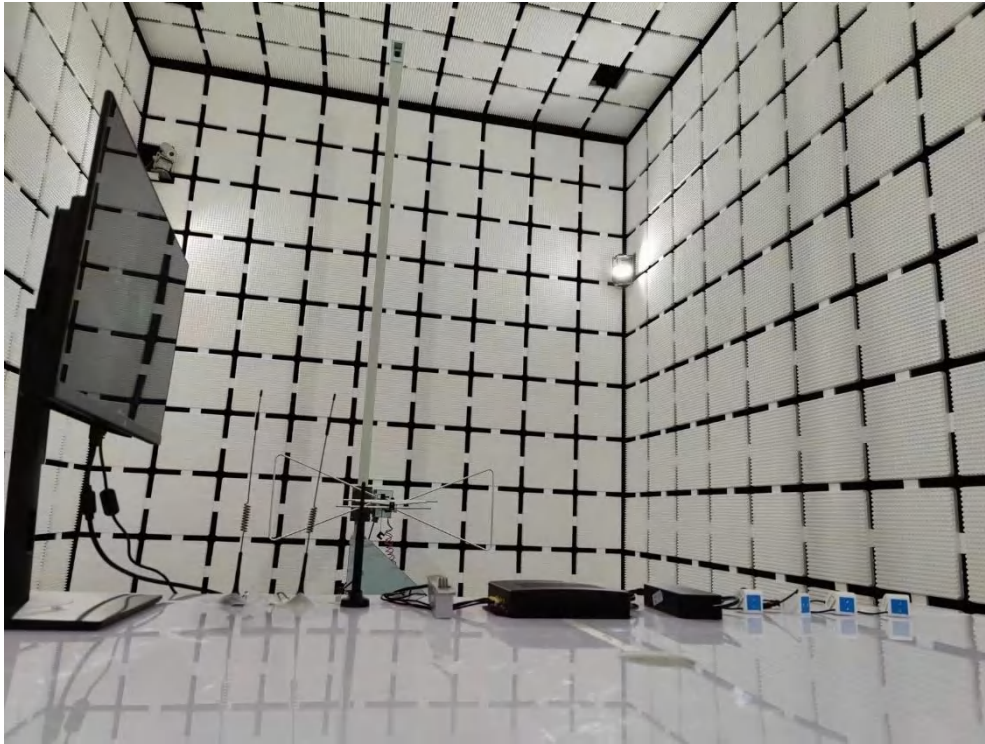
The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

9.3. Results

The EUT antenna is dipole antenna. It complies with the standard requirement.

10. TEST SETUP PHOTO

10.1. Photos of Radiated emission



10.2.Photos of Conducted Emission test

-----END OF REPORT-----