FCC Radio Test Report

FCC ID: WKM-M5D

This report concerns: Original Grant

Project No.	:	2404G109
Equipment	:	1) wireless 2) wireless USB 3) wireless USB-C 4) wireless mouse
Brand Name	:	matias
Test Model	:	M5D
Series Model	:	M5Dxxx-xx (where x can be any letter or nothing)
Applicant	:	Matias Corporation
Address	:	221 Narinia Crescent, Newmarket, Ontario, L3X 2E1, Canada
Manufacturer	:	Matias Corporation
Address	:	221 Narinia Crescent, Newmarket, Ontario, L3X 2E1, Canada
Factory 1	:	Dongguan WahMee Plastic Hardware Technology Co. Ltd.
Address	:	No. 3, 5 Street, Shengqiangang, Huangjiang Town, Dongguan City, Guangdong Province, China. Post Code: 523750
Factory 2	:	ShenZhen A-Lion Electronics Co., Ltd.
Address	:	No.46,Xinhe Road,Longgang District,Shenzhen
Date of Receipt	:	Apr. 25, 2024
Date of Test	:	Apr. 28, 2024 ~ May 14, 2024
Issued Date	:	Jul. 16, 2024
Report Version	:	R00
Test Sample	:	Engineering Sample No.: SSL2024042571 for conducted, SSL2024042572 for radiated.
Standard(s)	:	FCC CFR Title 47, Part 15, Subpart C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Prepared by : Evan Yang

Approved by : Welly Zhou

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. BTL assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.
Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

Table of Contents Page

Table of Contents Page

REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-1-2404G109	R00	Original Report.	Jul. 16, 2024	Valid

1. APPLICABLE STANDARDS

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:
ANSI C63.10-2013
The following reference test guidance is not within the scope of accreditation of A2LA:
KDB 558074 D01 15.247 Meas Guidance v05r02

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC CFR Title 47, Part 15, Subpart C				
Standard(s) Section	**Test Item**	**Test Result**	**Judgment**	**Remark**
15.207	AC Power Line Conducted Emissions	APPENDIX A	N/A	------
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS	------
15.247(a)(2)	Bandwidth	APPENDIX E	PASS	------
15.247(b)(3)	Maximum Output Power	APPENDIX F	PASS	------
15.247(d)	Conducted Spurious Emission	APPENDIX G	PASS	------
15.247(e)	Power Spectral Density	APPENDIX H	PASS	------
15.203	Antenna Requirement	------	PASS	**Note(2)**

Note:
(1) “N/A” denotes test is not applicable to this device.
(2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Dalang, Dongguan City, Guangdong People's Republic of China
BTL's Registration Number for FCC: 747969
BTL's Designation Number for FCC: CN1377

2.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95.45% confidence level (based on a coverage factor (k=2))
The BTL measurement uncertainty as below table:

A. Radiated emissions Measurement:

Test Site	Method	Measurement Frequency Range	*U*,(dB)
DG-CB02 (3m)	CISPR	9kHz ~ 30MHz	2.36

Test Site	Method	Measurement Frequency Range	Ant. H / V	*U*,(dB)
DG-CB03 (3m)	CISPR	30MHz ~ 200MHz	V	4.40
		30MHz ~ 200MHz	H	3.62
		200MHz ~ 1,000MHz	V	4.58
		200MHz ~ 1,000MHz	H	3.98
		1GHz ~ 6GHz	-	4.08
		6GHz ~ 18GHz	-	4.62

Test Site	Method	Measurement Frequency Range	Ant. H / V	*U*,(dB)
DG-CB03 (1m)	CISPR	18 ~ 26.5 GHz	-	3.36

B. Other Measurement:

Test Item	Uncertainty
Bandwidth	0.90 %
Maximum Output Power	1.3 dB
Conducted Spurious Emission	1.9 dB
Power Spectral Density	1.4 dB
Temperature	0.8 °C
Humidity	2.2 %

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

2.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By	Test Date
Radiated Emissions -9 kHz to 30 MHz	24°C	59%	DC 1.6V	Hayden Chen	May 08, 2024
Radiated Emissions -30 MHz to 1000 MHz	21°C	56%	DC 1.6V	Chen Mo	Apr. 30, 2024
Radiated Emissions -Above 1000 MHz	21°C	56%	DC 1.6V	Chen Mo	Apr. 30, 2024
	25°C	51%	DC 1.6V	Allen Tong	May 14, 2024
Bandwidth	25°C	56%	DC 1.6V	Jensen Zhou	May 05, 2024
Maximum Output Power	25°C	56%	DC 1.6V	Jensen Zhou	May 05, 2024
Conducted Spurious Emission	25°C	56%	DC 1.6V	Jensen Zhou	May 05, 2024
Power Spectral Density	25°C	56%	DC 1.6V	Jensen Zhou	May 05, 2024

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	1) wireless 2) wireless USB 3) wireless USB-C 4) wireless mouse
Brand Name	matias
Test Model	M5D
Series Model	M5Dxxx-xx (where x can be any letter or nothing)
Model Difference(s)	Only differ in colour, box and model name.
Hardware Version	M5D
Firmware Version	checksum: 4108
Power Source	Battery supplied.
Power Rating	DC 1.6V 30mA
Operation Band	2400 MHz ~ 2483.5 MHz
Operation Frequency	2408 MHz ~ 2474 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	2Mbps
Max. Output Power	2Mbps: -9.80 dBm (0.0001 W)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2408	13	2432	25	2456
02	2410	14	2434	26	2458
03	2412	15	2436	27	2460
04	2414	16	2438	28	2462
05	2416	17	2440	29	2464
06	2418	18	2442	30	2466
07	2420	19	2444	31	2468
08	2422	20	2446	32	2470
09	2424	21	2448	33	2472
10	2426	22	2450	34	2474
11	2428	23	2452	-	-
12	2430	24	2454	-	-

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	PCBANT006	PCB	N/A	5

3.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode_2Mbps Channel 01/17/34
Mode 2	TX Mode_2Mbps Channel 01

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	TX Mode_2Mbps Channel 01

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	TX Mode_2Mbps Channel 01/17/34

Conducted test	
Final Test Mode	Description
Mode 1	TX Mode_2Mbps Channel 01/17/34

Note:

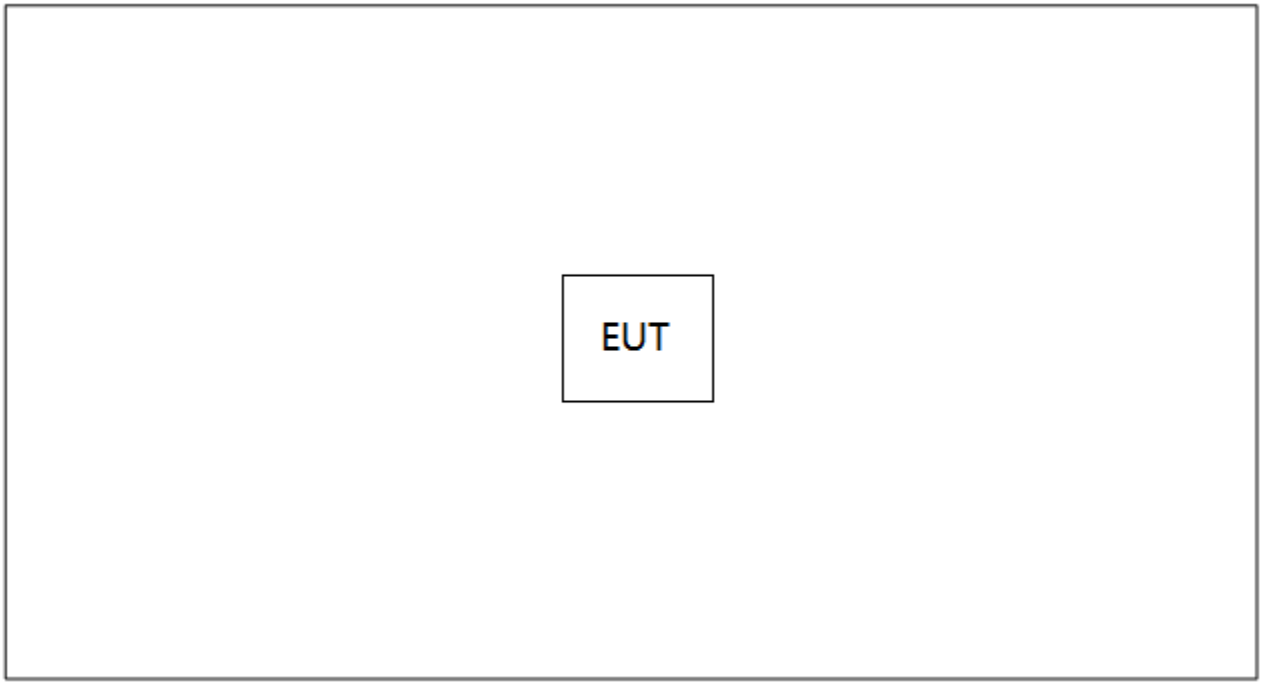
(1) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Horizontal) is recorded.
(2) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.
(3) For radiated emission 18-26.5GHz test, only tested the worst case and recorded.

3.3 PARAMETERS OF TEST SOFTWARE

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software Version	N/A		
Frequency (MHz)	2408	2440	2474
2Mbps	Default	Default	Default

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
-	-	-	-	-

3.6 CUSTOMER INFORMATION DESCRIPTION

1) The antenna gain is provided by the manufacturer.
2) Except for AC power line conducted emissions and radiated emissions, the results of all test items include cable losses. Part of the cable losses (1dB) are provided by the manufacturer, while the other parts of the cable losses are provided by the testing laboratory.

4. RADIATED EMISSIONS

4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	Band edge/ Harmonic at 3m (dBμV/m)		Harmonic at 1m (dBμV/m)	
	Peak	Average	Peak	Average
Above 1000	74	54	83.5 (Note 4)	63.5 (Note 4)

Note:

(1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

(4)

$$FS_{\text{limit}} = FS_{\max} - 20\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

20log ($d_{limit}/d_{measure}$)=20log (3/1)=9.5 dB.

4.2 TEST PROCEDURE

a. 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)
b. The measuring distance of 3 m or 1m 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)
c. 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.
d. 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.

The following table is the setting of the receiver:

Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

Spectrum Parameters	Setting
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3 MHz for PK value 1 MHz / 1/T Hz for AVG value

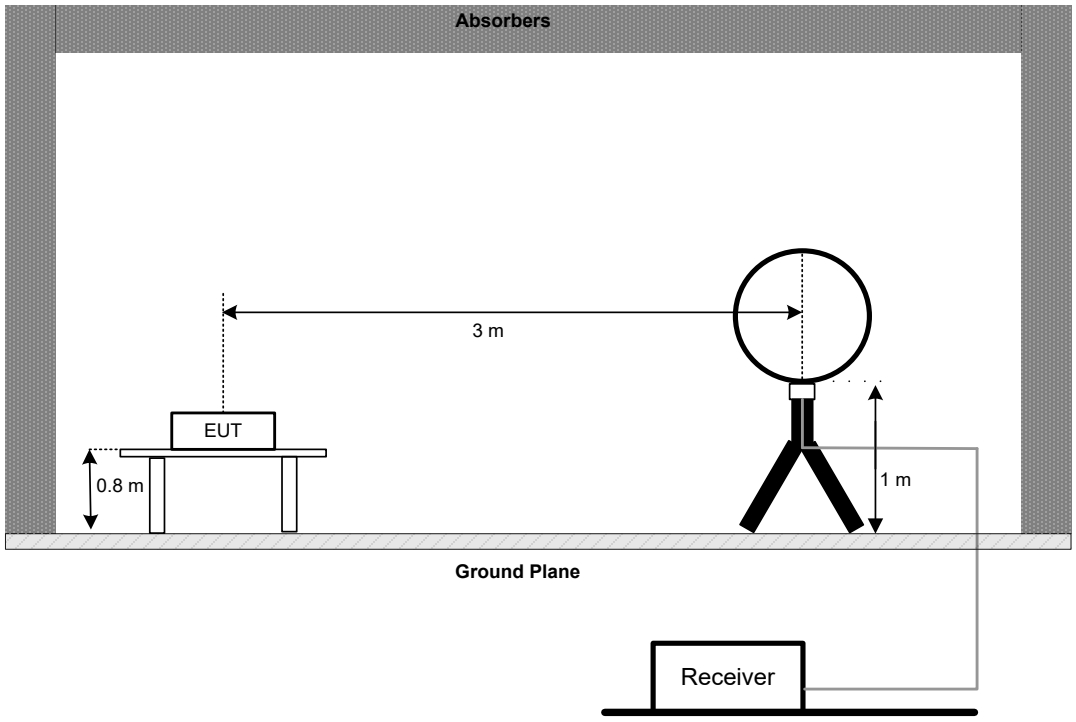
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector
Start ~ Stop Frequency	1 GHz~26.5 GHz for PK/AVG detector

4.3 DEVIATION FROM TEST STANDARD

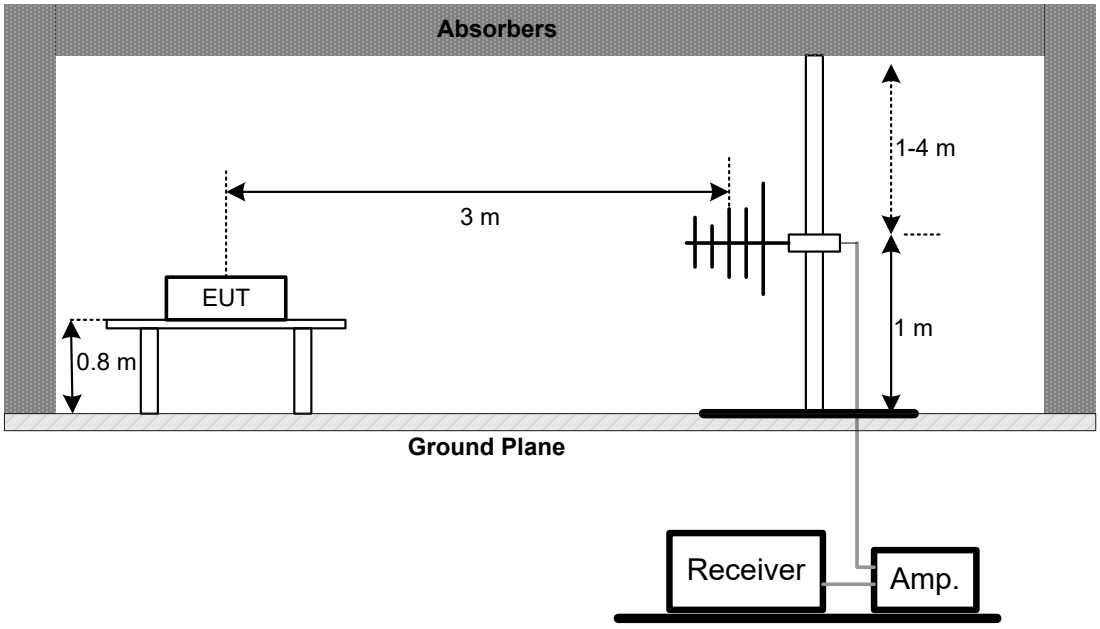
No deviation.

4.4 TEST SETUP

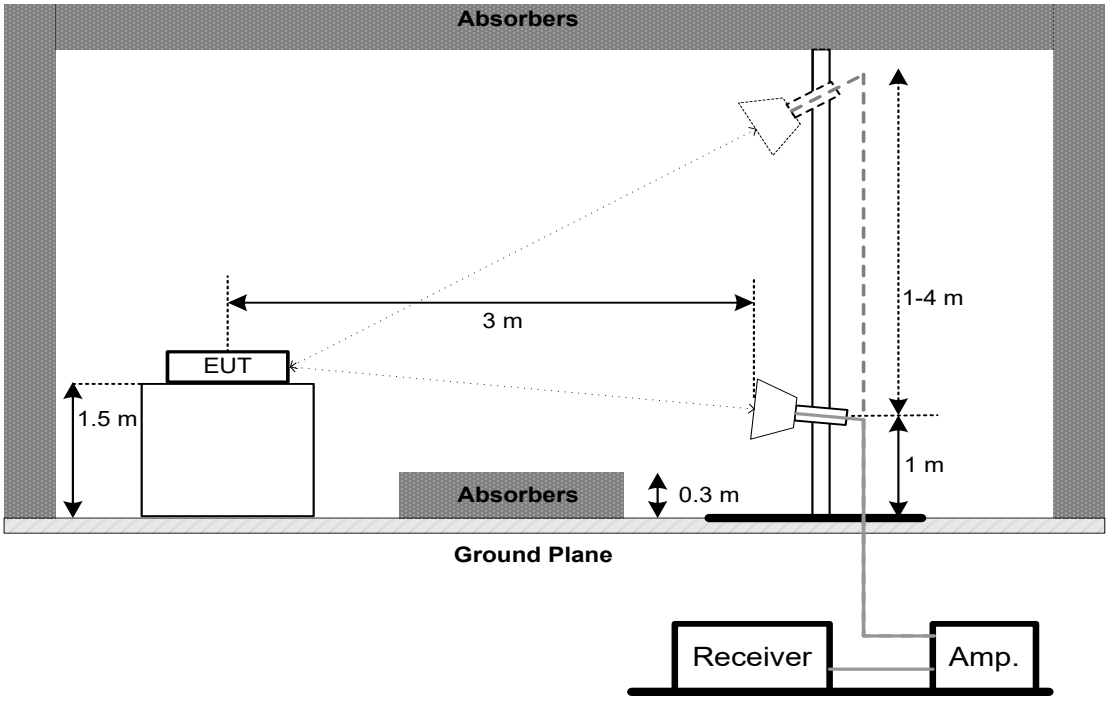
9 kHz to 30 MHz



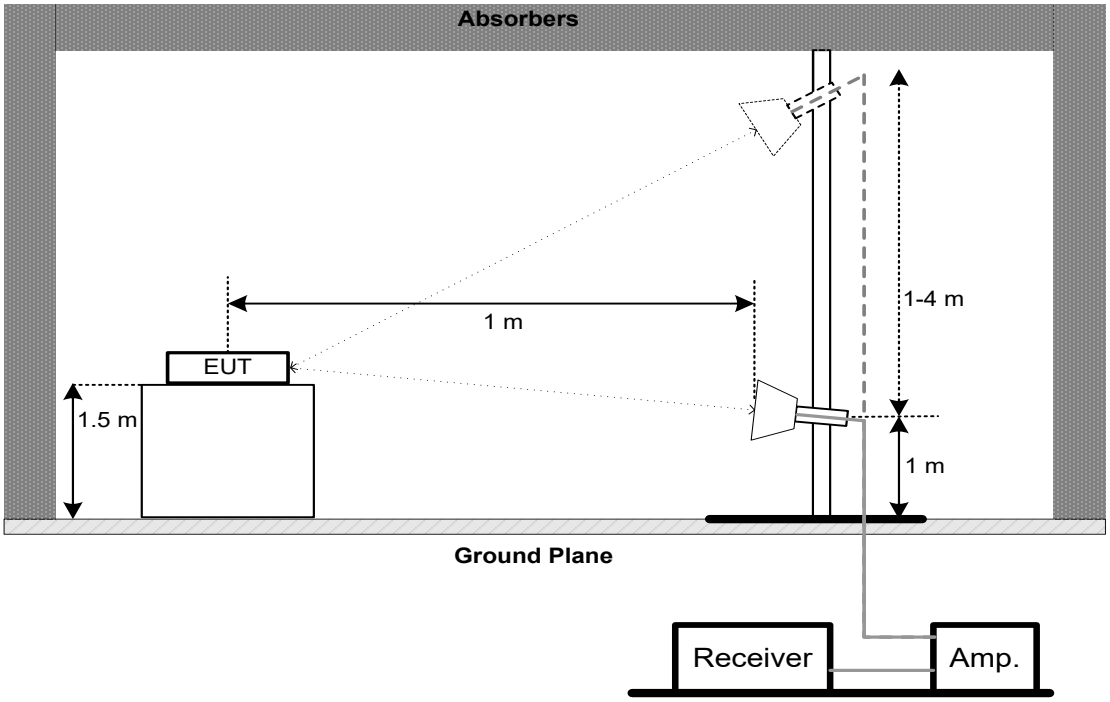
30 MHz to 1 GHz



Above 1 GHz
Band edge & Harmonic(1 GHz to 18 GHz)



Above 1 GHz
Harmonic(18 GHz to 26.5 GHz)



4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT - 9 kHz TO 30 MHz

Please refer to the APPENDIX A.

Remark:

(1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
(2) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.7 TEST RESULT - 30 MHz TO 1000 MHz

Please refer to the APPENDIX B.

4.8 TEST RESULT - ABOVE 1000 MHz

Please refer to the APPENDIX C.

Remark:

(1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5. BANDWIDTH

5.1 LIMIT

Section	Test Item	Limit
FCC 15.247(a)(2)	6 dB Bandwidth	>= 500 kHz
	99% Emission Bandwidth	-

5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. The following table is the setting of the spectrum analyzer:

For 6 dB Bandwidth:

Spectrum Parameters	Setting
Span Frequency	> Measurement Bandwidth
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

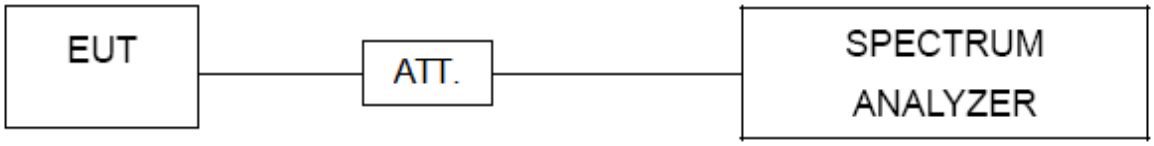
For 99% Emission Bandwidth:

Spectrum Parameters	Setting
Span Frequency	Between 1.5 times and 5.0 times the OBW
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6 TEST RESULTS

Please refer to the APPENDIX D.

6. MAXIMUM OUTPUT POWER

6.1 LIMIT

Section	Test Item	Limit
FCC 15.247(b)(3)	Maximum Output Power	1.0000 watt or 30.00 dBm

6.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

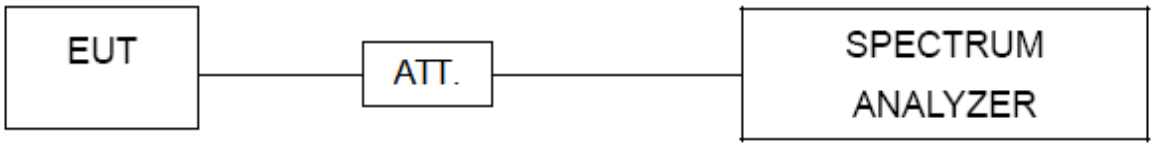
b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	≥ 3×RBW
RBW	3 MHz
VBW	3 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6 TEST RESULTS

Please refer to the APPENDIX E.

7. CONDUCTED SPURIOUS EMISSION

7.1 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.

7.2 TEST PROCEDURE

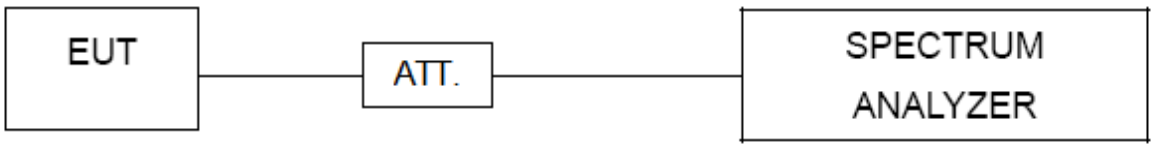
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. The following table is the setting of the spectrum analyzer:

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

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6 TEST RESULTS

Please refer to the APPENDIX F.

8. POWER SPECTRAL DENSITY

8.1 LIMIT

Section	Test Item	Limit
FCC 15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

8.2 TEST PROCEDURE

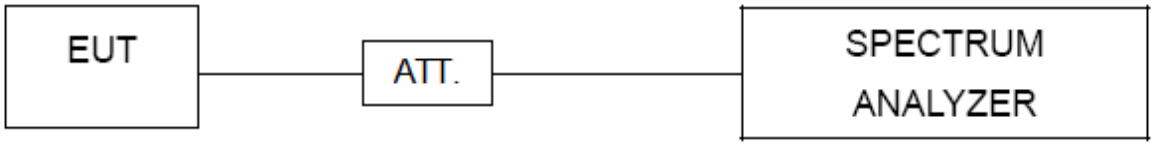
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	2 MHz (1 Mbps) / 4 MHz (2 Mbps)
RBW	3 kHz
VBW	10 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.6 TEST RESULTS

Please refer to the APPENDIX G.

9. MEASUREMENT INSTRUMENTS LIST

Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Active Loop Antenna	Schwarzbeck	FMZB 1513-60B	1513-60 B-034	Mar. 30, 2025
2	EMI Test Receiver	Keysight	N9038A	MY56400060	Dec. 22, 2024
3	Cable	RW	LMR-400(30MHz-1 GHz)(10m+2.5m+0.8M)	N/A	May 06, 2025
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
5	1266 Chamber room	ETS	12*6*6	N/A	May 21, 2024

Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	1462	Dec. 13, 2024
2	Attenuator	EMC INSTRUMENT	EMCI-N-6-06	AT-06009	Dec. 13, 2024
3	Preamplifier	EMC INSTRUMENT	EMC001330	980863	Apr. 07, 2025
4	Cable	RegalWay	LMR400-NMNM-12.5m	N/A	Jul. 04, 2024
5	Cable	RegalWay	LMR400-NMNM-3m	N/A	Jul. 04, 2024
6	Cable	RegalWay	LMR400-NMNM-0.5m	N/A	Jul. 04, 2024
7	Receiver	Agilent	N9038A	MY52130039	Dec. 22, 2024
8	Positioning Controller	MF	MF-7802	N/A	N/A
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
10	966 Chamber room	CM	9*6*6	N/A	May 17, 2024

Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Receiver	Agilent	N9038A	MY52130039	Dec. 22, 2024
2	Preamplifier	EMC INSTRUMENT	EMC118A45SE	981001	Nov. 17, 2024
3	EXA Spectrum Analyzer	Keysight	N9010A	MY55150209	Jun. 16, 2024
4	Double Ridged Guide Antenna	ETS	3115	75789	May 31, 2024
5	Cable	RegalWay	RWLP50-4.0A-SMSM-12.5M	N/A	Feb. 19, 2025
6	Cable	RegalWay	RWLP50-4.0A-NMRASM-2.5M	N/A	Aug. 08, 2024
7	Cable	RegalWay	RWLP50-4.0A-NMRASMRA-0.8M	N/A	Aug. 08, 2024
8	Low Noise Amplifier	CONNPHY	CLN-18G40G-4330-K	619413	Jul. 06, 2024
9	Cable	RegalWay	RWLP50-2.6A-2.92M2.92M-1.1M	N/A	Jul. 26, 2024
10	Cable	Tonscend	HF160-KMKM-3M	N/A	Jul. 26, 2024
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170(3m)	9170-319	Jun. 20, 2024
12	966 Chamber room	CM	9*6*6	N/A	May 17, 2024
13	Attenuator	Talent Microwave	TA10A2-S-18	N/A	N/A
14	Positioning Controller	MF	MF-7802	N/A	N/A
15	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
16	Filter	STI	STI15-9912	N/A	Jun. 16, 2024

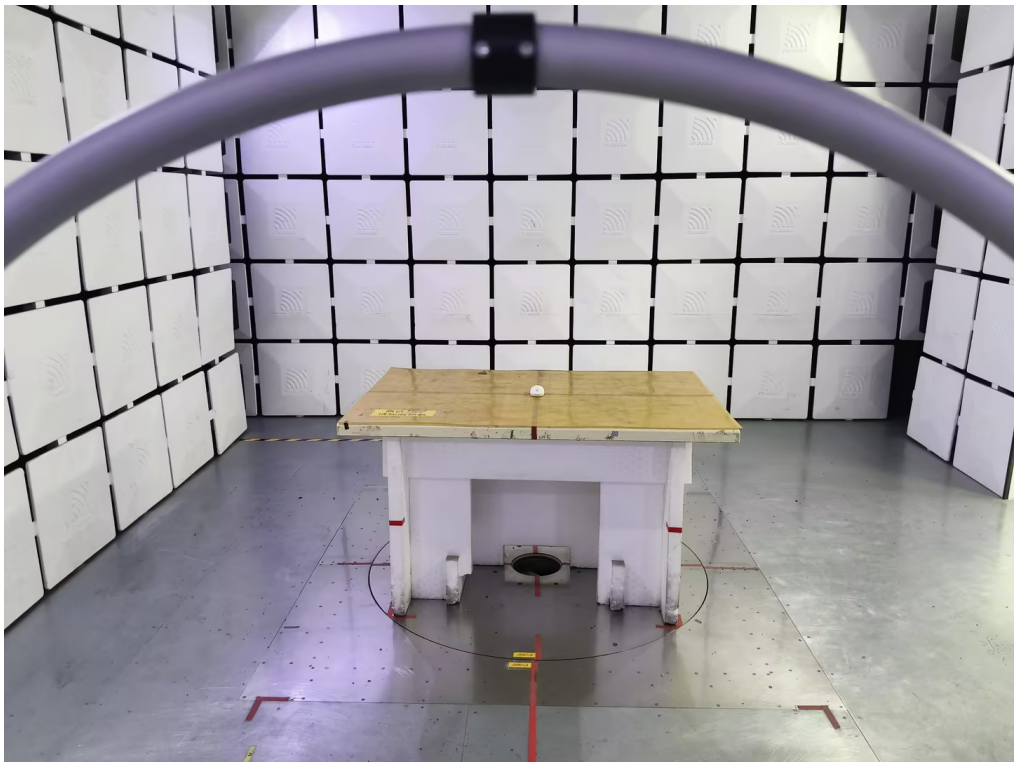
Bandwidth & Maximum Output Power & Power Spectral Density & Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP38	100852	Jun. 16, 2024
2	Measurement Software	BTL	BTL Conducted Test	N/A	N/A
3	DC Block	N/A	N/A	N/A	N/A
4	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A

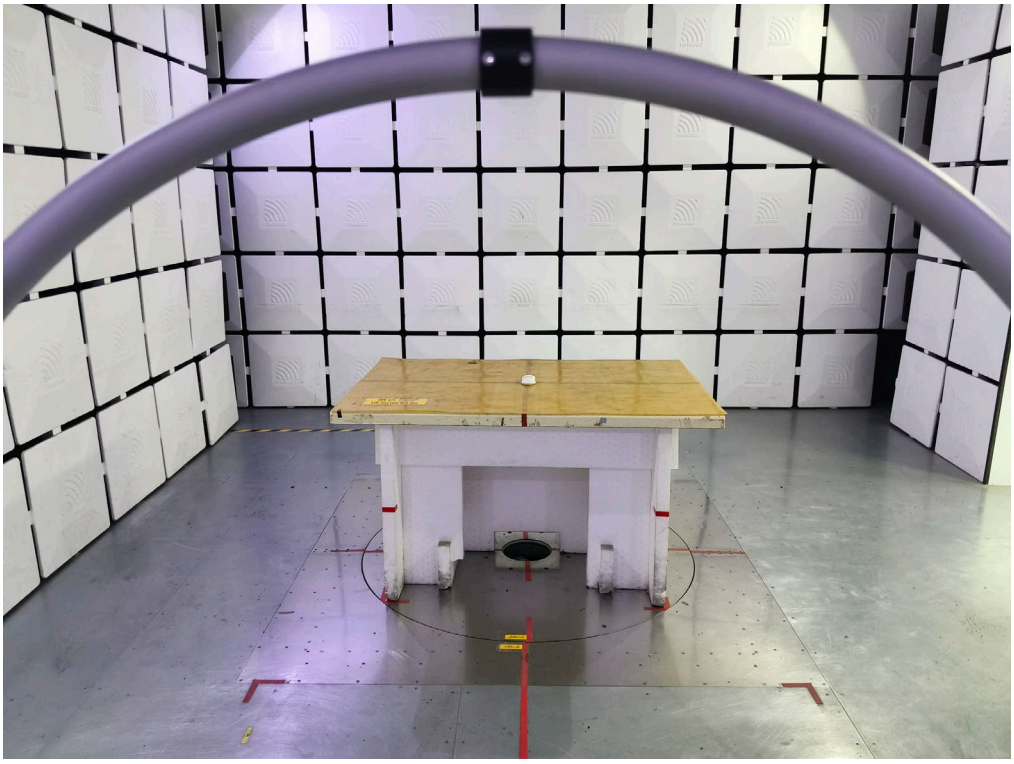
Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

10. EUT TEST PHOTO

Radiated Emissions Test Photos

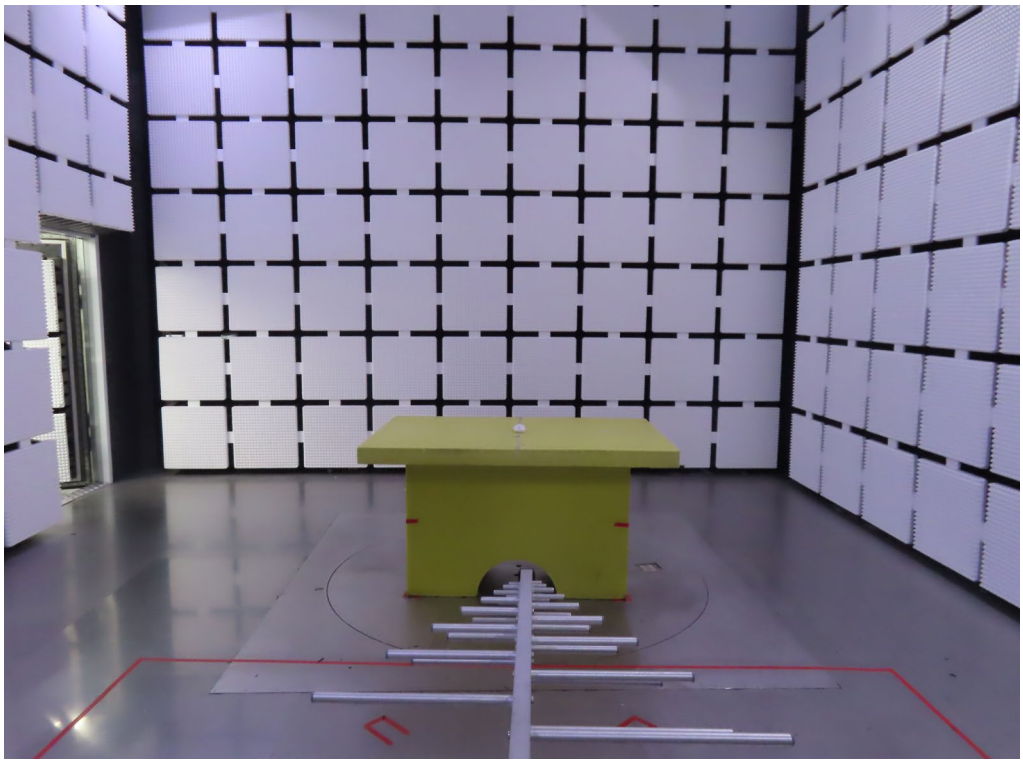
9 kHz to 30 MHz

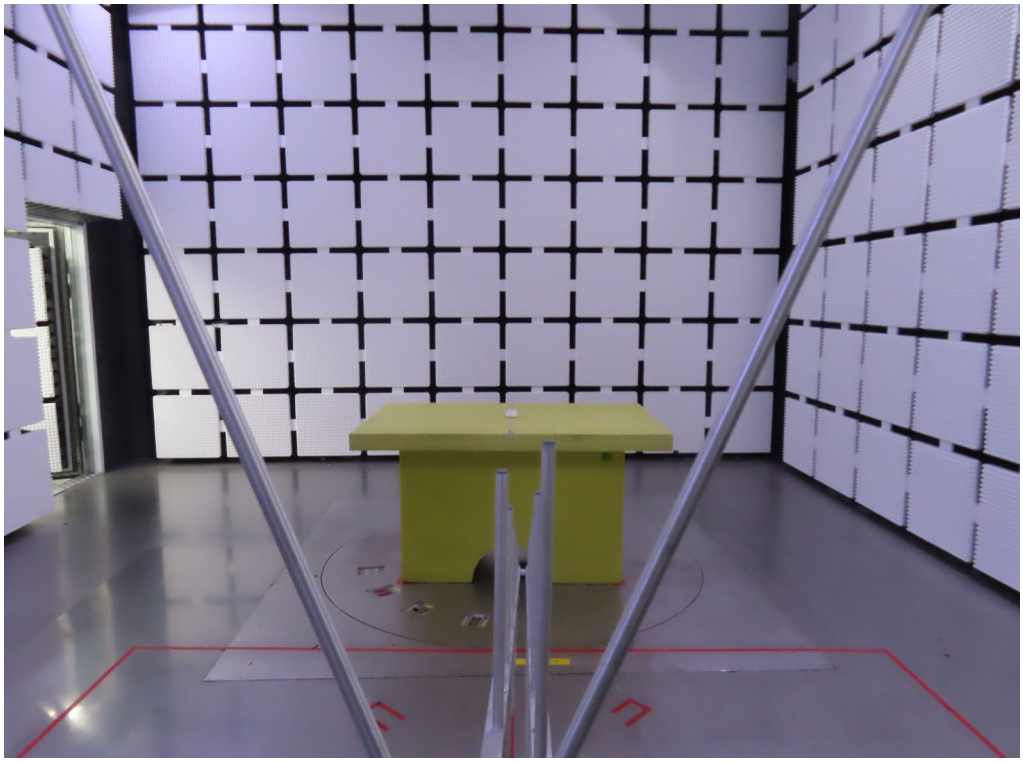




Radiated Emissions Test Photos

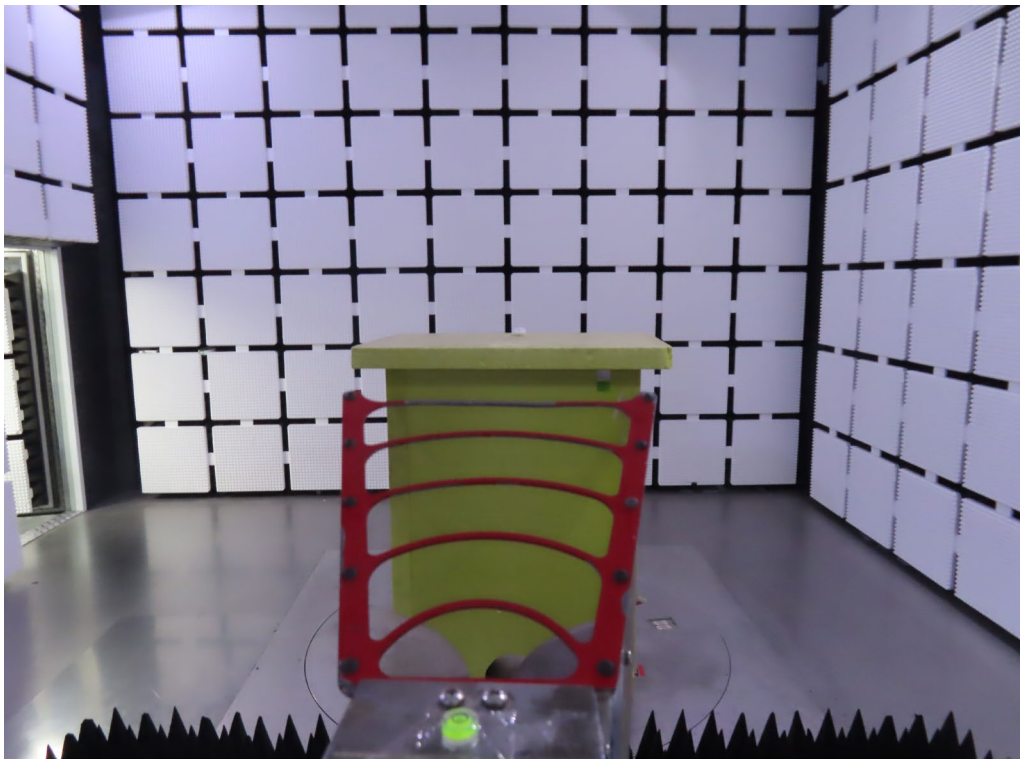
30 MHz to 1000 MHz

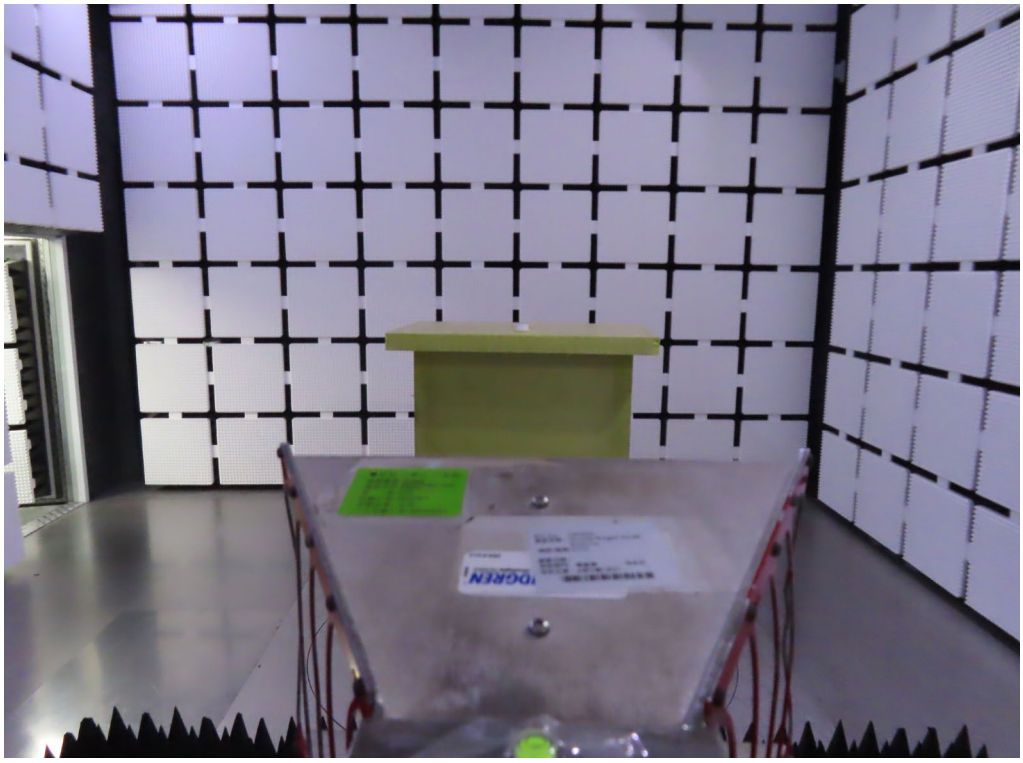




Radiated Emissions Test Photos

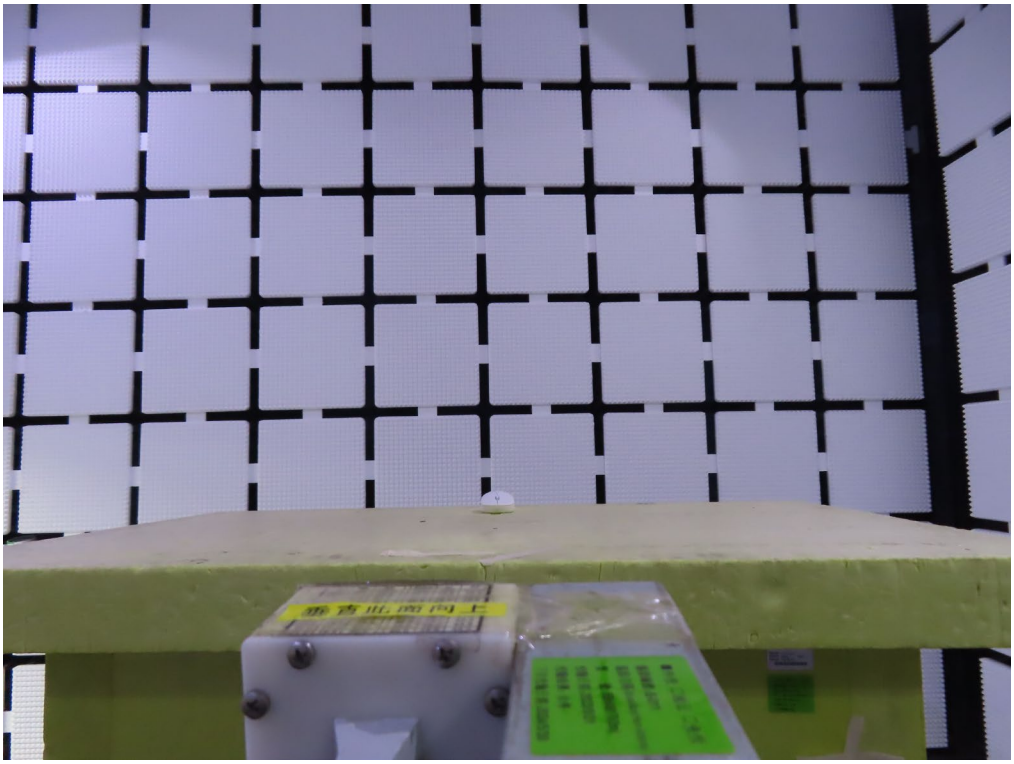
Band Edge & Harmonic(1 GHz to 18 GHz)

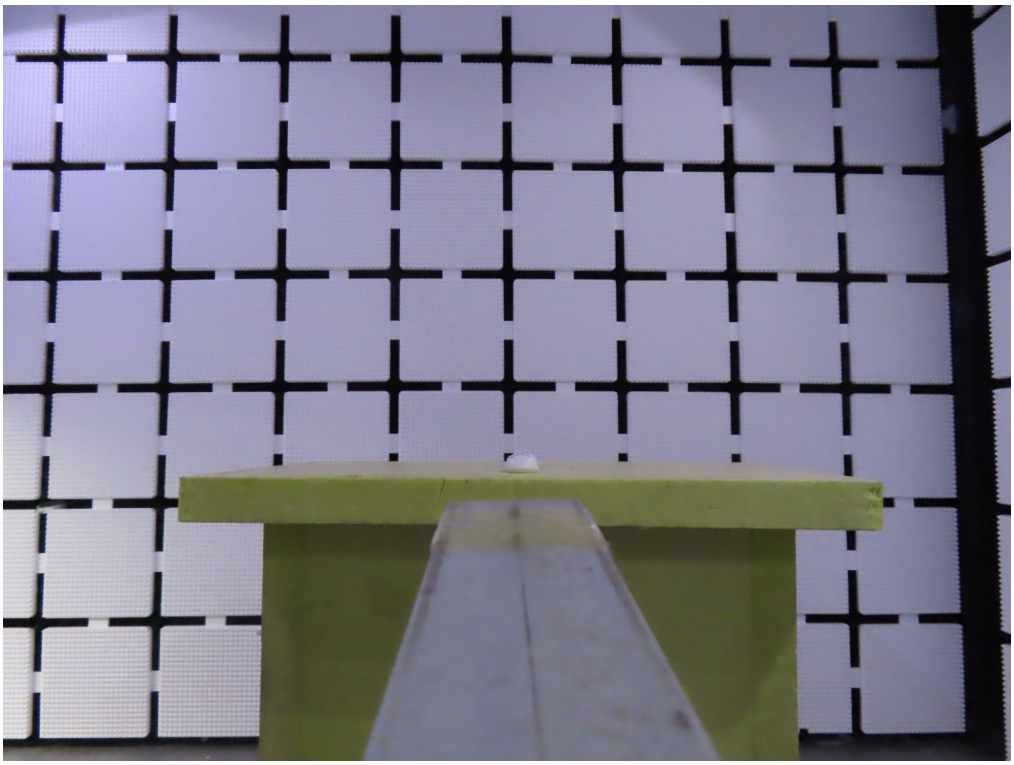




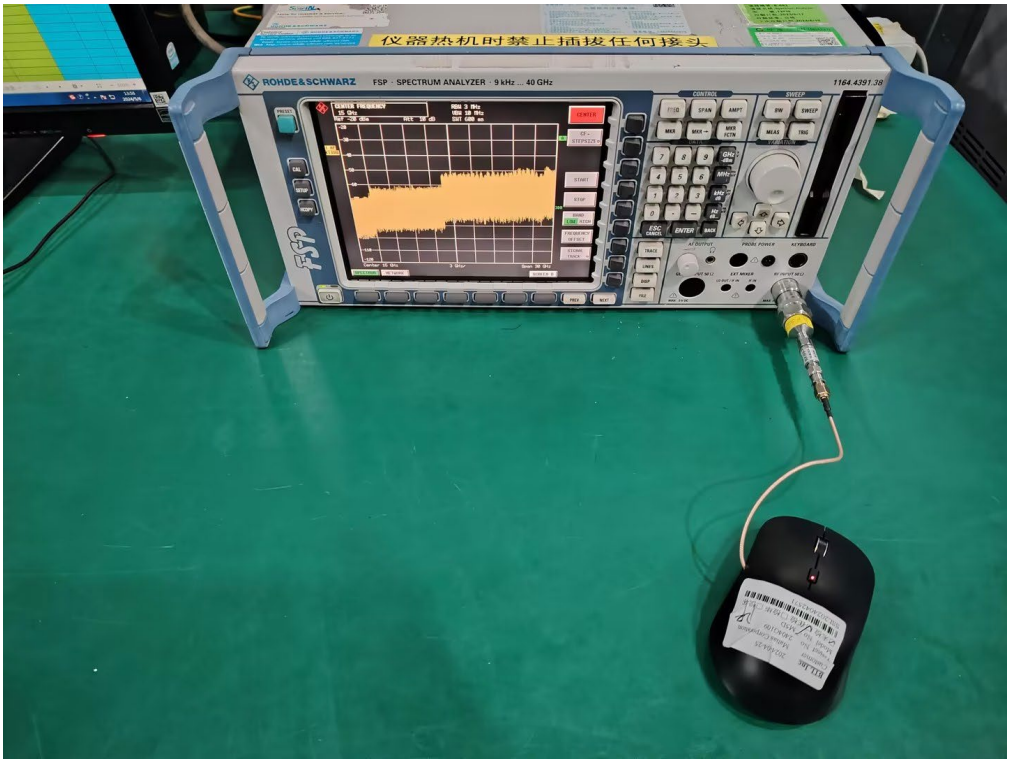
Radiated Emissions Test Photos

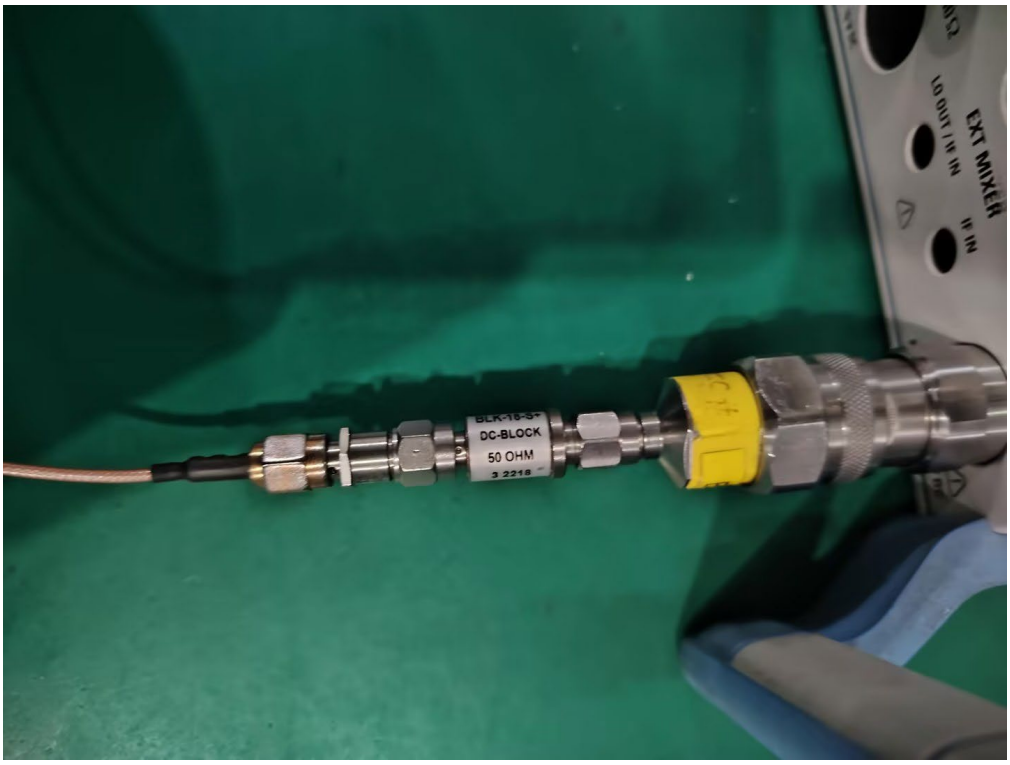
Harmonic(18 GHz to 26.5 GHz)





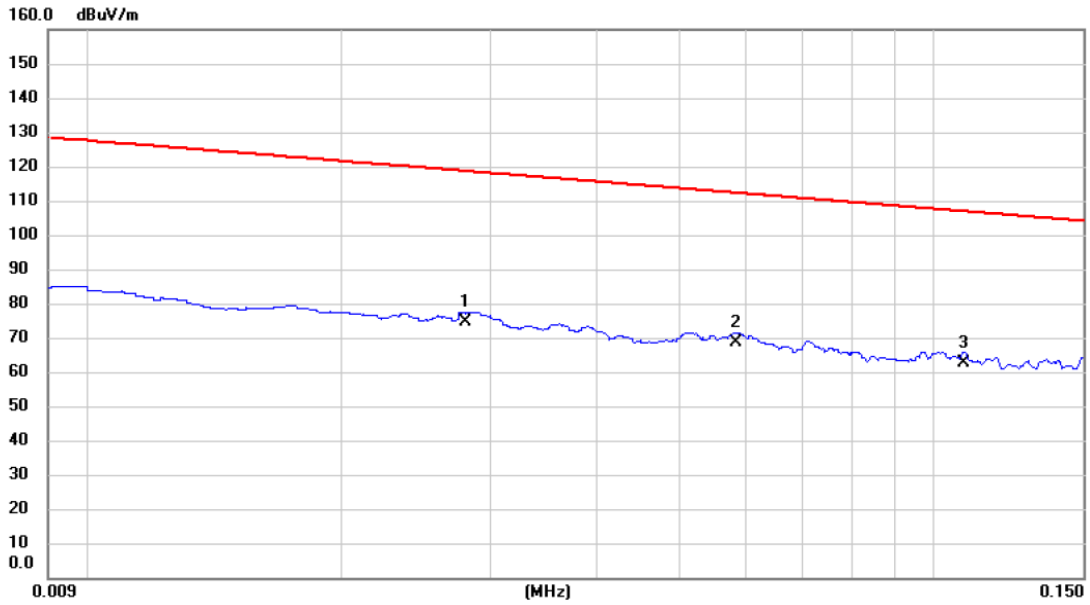
Conducted Test Photos





APPENDIX A - RADIATED EMISSION - 9 KHZ TO 30 MHZ

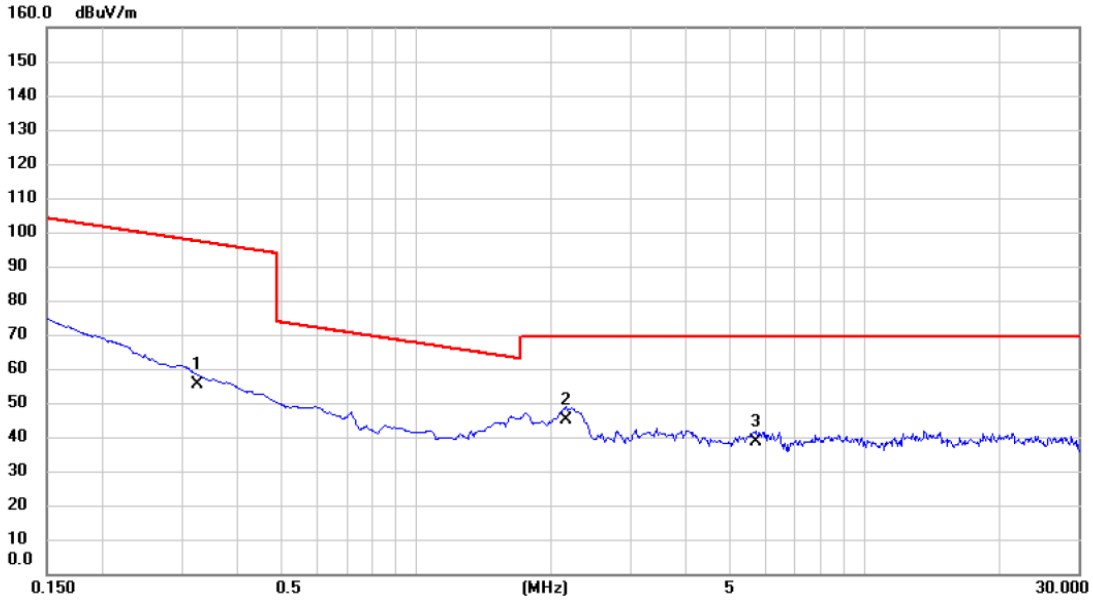
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0280	53.42	21.17	74.59	118.66	-44.07	AVG	
2	*	0.0585	47.27	21.30	68.57	112.26	-43.69	AVG	
3		0.1086	41.36	21.44	62.80	106.89	-44.09	QP	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

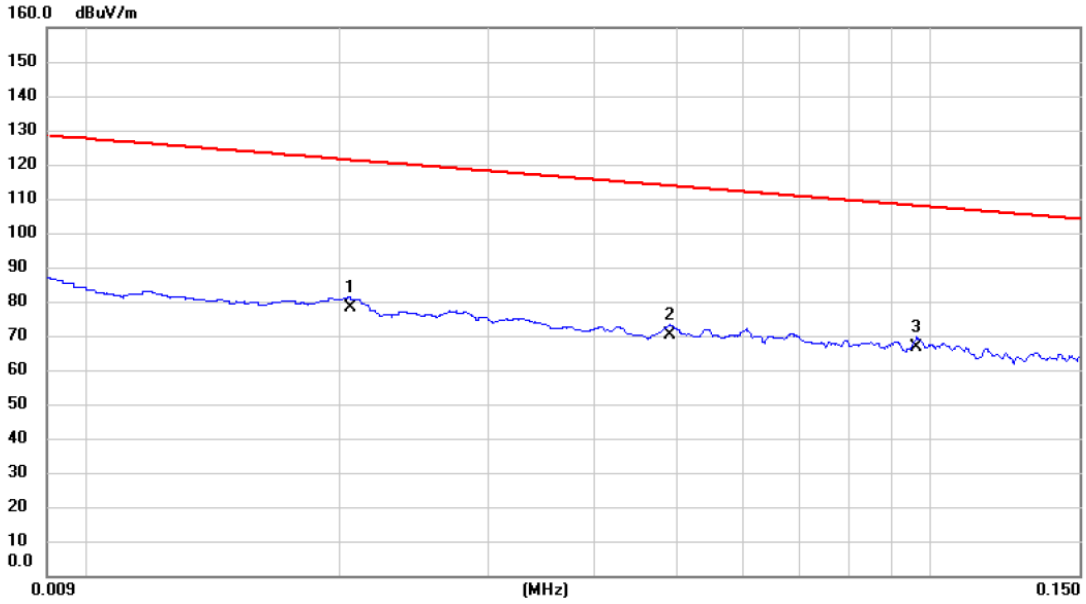
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.3251	34.16	21.18	55.34	97.36	-42.02	AVG	
2	*	2.1648	23.64	21.36	45.00	69.54	-24.54	QP	
3		5.7320	17.02	21.64	38.66	69.54	-30.88	QP	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

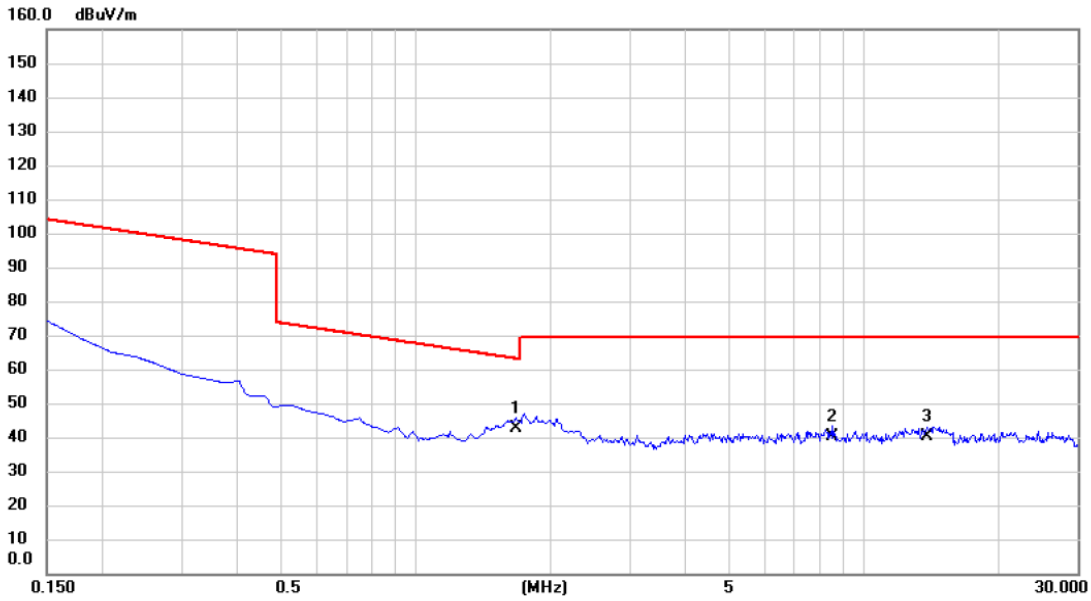
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0206	57.31	21.06	78.37	121.33	-42.96	AVG	
2		0.0492	48.91	21.30	70.21	113.77	-43.56	AVG	
3	*	0.0961	45.25	21.43	66.68	107.95	-41.27	QP	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Ant 90°

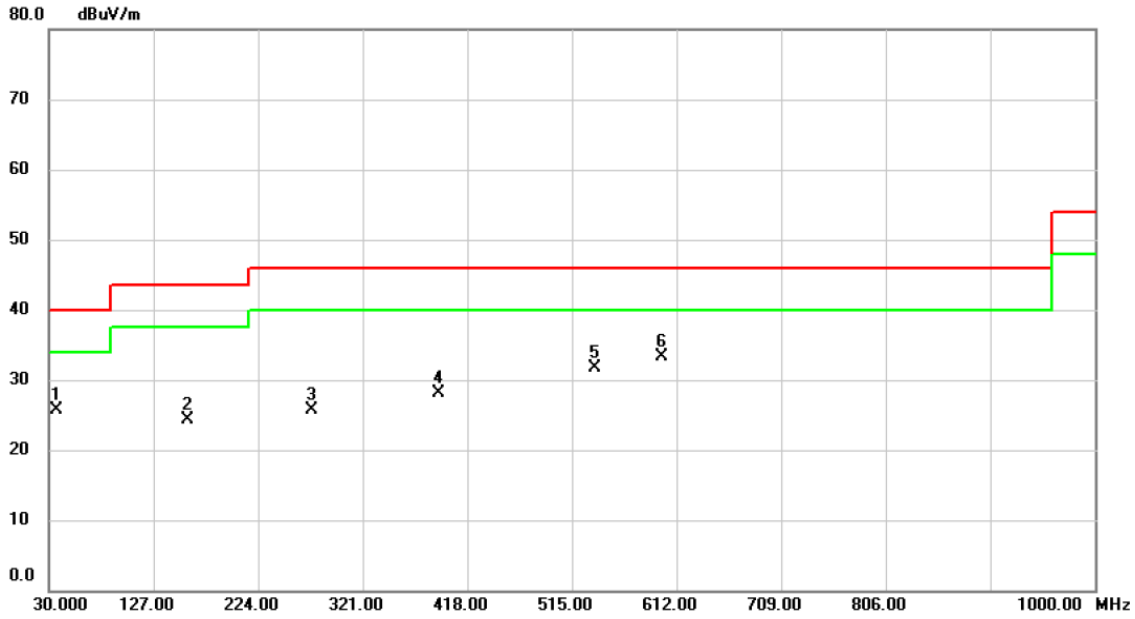


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	1.6720	21.44	21.33	42.77	63.14	-20.37	QP	
2		8.5230	18.41	21.85	40.26	69.54	-29.28	QP	
3		13.8810	18.01	22.15	40.16	69.54	-29.38	QP	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

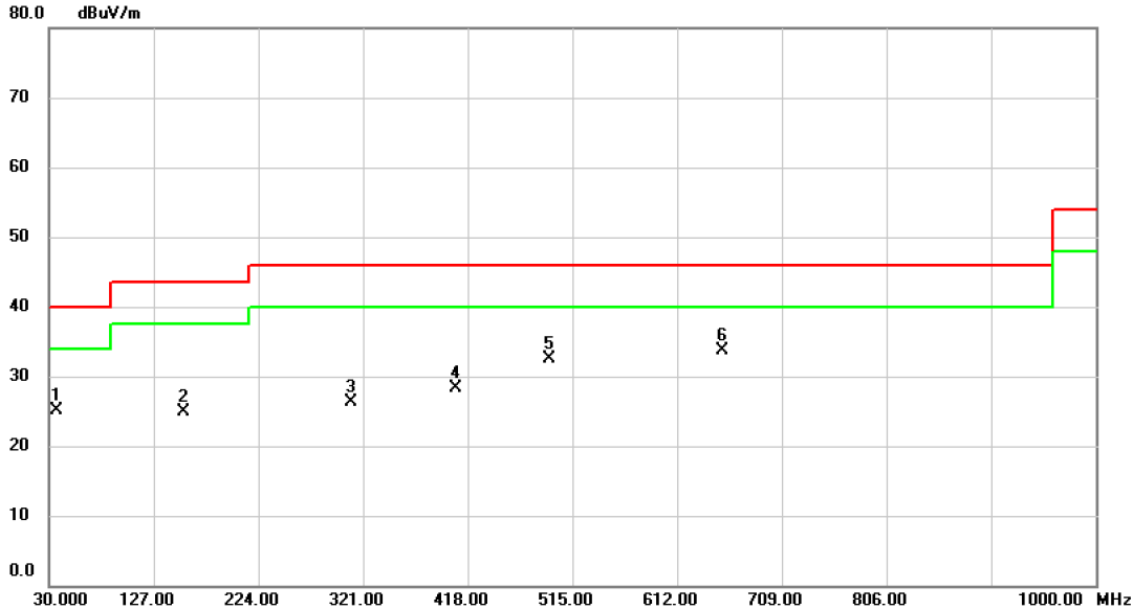
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		36.790	37.77	-12.16	25.61	40.00	-14.39	peak	
2		158.040	35.20	-10.90	24.30	43.50	-19.20	peak	
3		273.955	36.92	-11.28	25.64	46.00	-20.36	peak	
4		391.810	36.18	-8.14	28.04	46.00	-17.96	peak	
5		535.855	36.97	-5.23	31.74	46.00	-14.26	peak	
6	*	597.935	36.94	-3.64	33.30	46.00	-12.70	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Horizontal

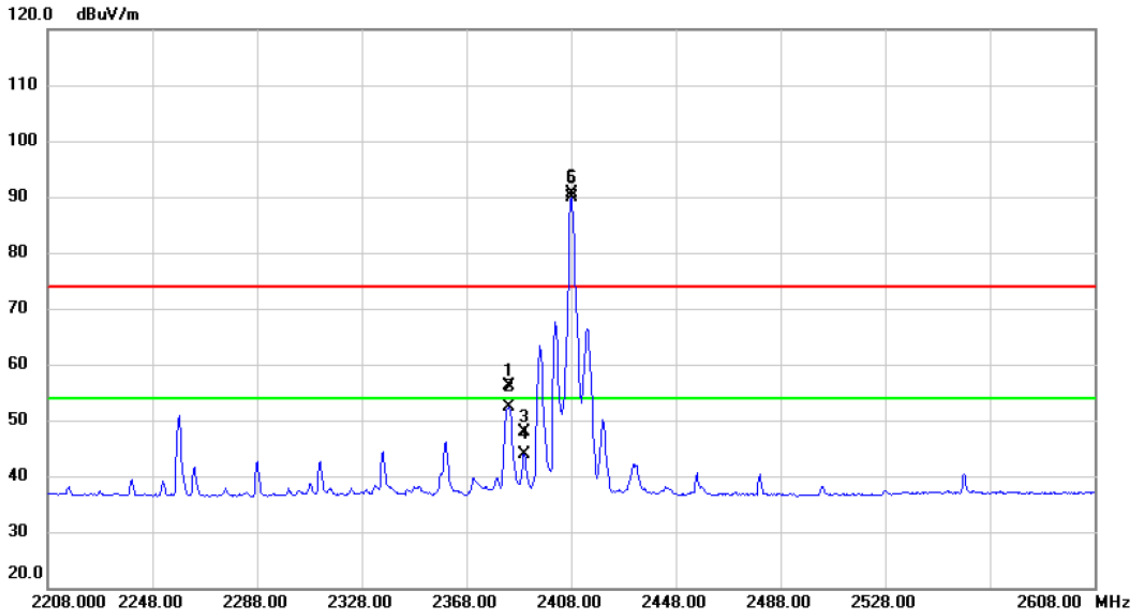


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		36.790	37.34	-12.16	25.18	40.00	-14.82	peak	
2		154.645	36.00	-11.01	24.99	43.50	-18.51	peak	
3		309.845	36.58	-10.29	26.29	46.00	-19.71	peak	
4		406.845	36.14	-7.81	28.33	46.00	-17.67	peak	
5		493.660	38.44	-6.03	32.41	46.00	-13.59	peak	
6	*	653.710	36.59	-2.79	33.80	46.00	-12.20	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX C - RADIATED EMISSION - ABOVE 1000 MHZ

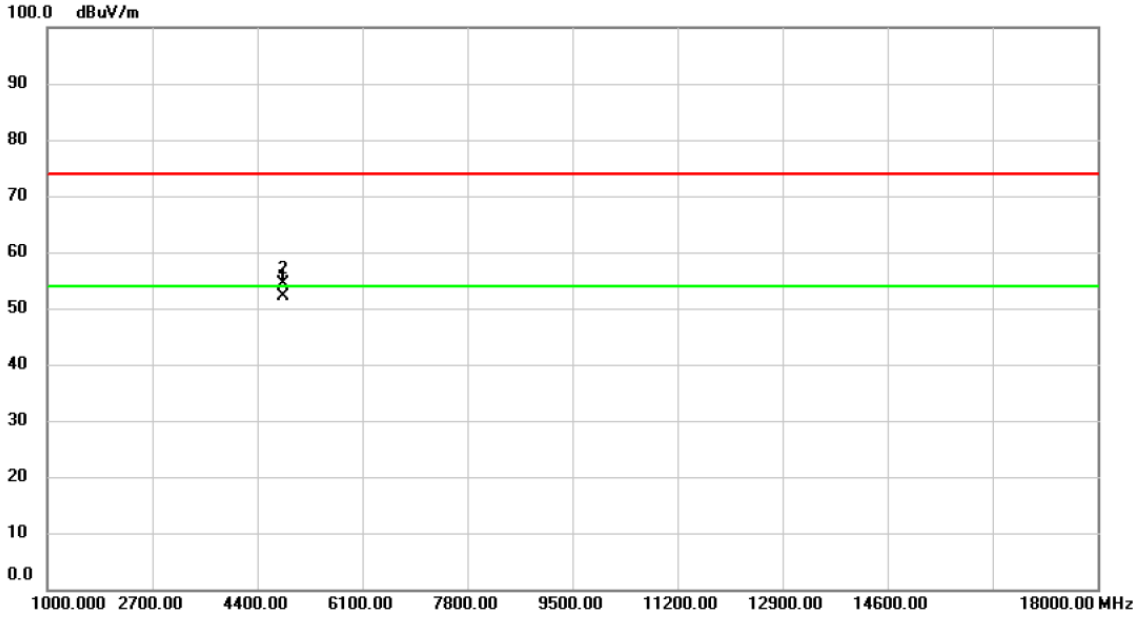
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2384.400	47.58	8.50	56.08	74.00	-17.92	peak	
2		2384.400	43.89	8.50	52.39	54.00	-1.61	AVG	
3		2390.000	39.35	8.51	47.86	74.00	-26.14	peak	
4		2390.000	35.43	8.51	43.94	54.00	-10.06	AVG	
5	X	2408.200	82.19	8.50	90.69	74.00	16.69	peak	No Limit
6	*	2408.200	81.42	8.50	89.92	54.00	35.92	AVG	No Limit

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

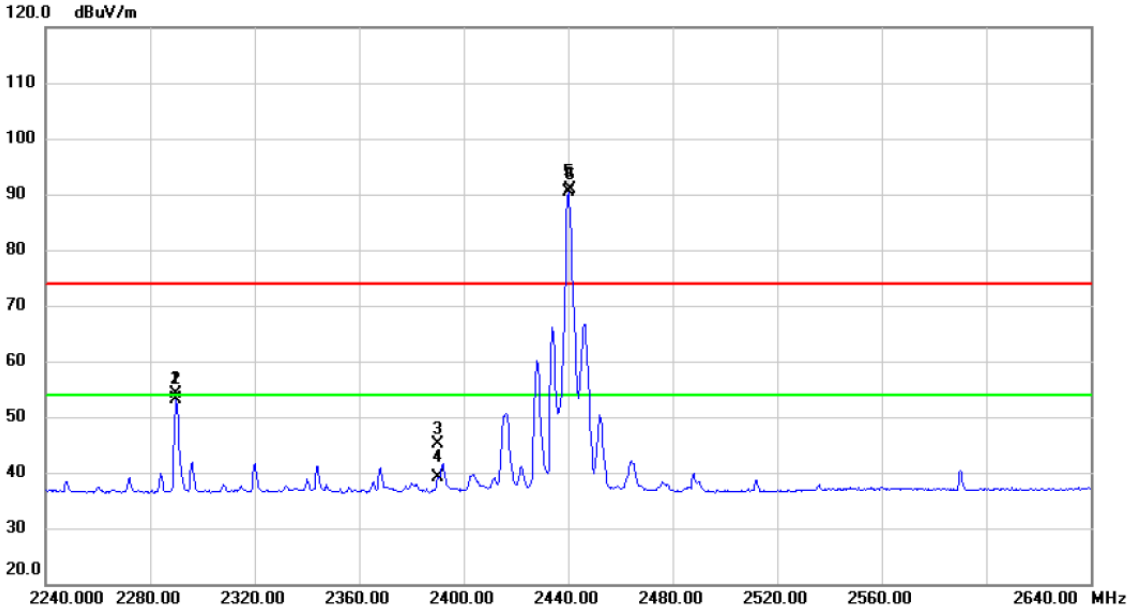
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4816.575	49.60	2.44	52.04	54.00	-1.96	AVG	
2		4816.700	51.96	2.44	54.40	74.00	-19.60	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

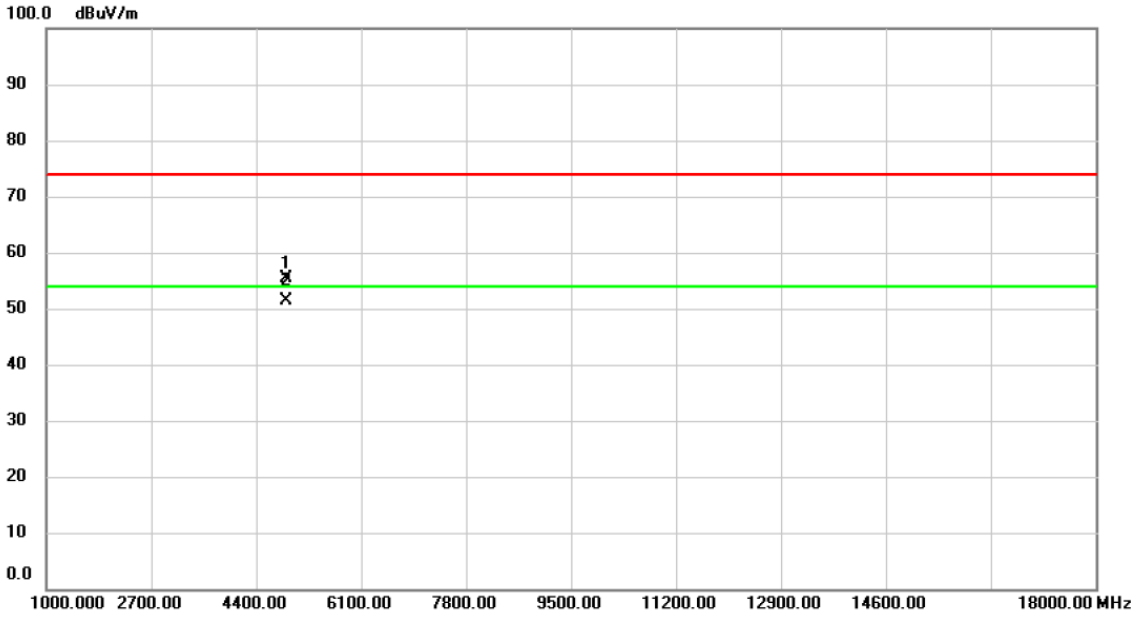
Test Mode	TX 2440 MHz _CH17_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2290.000	45.51	8.55	54.06	74.00	-19.94	peak	
2		2290.000	44.52	8.55	53.07	54.00	-0.93	AVG	
3		2390.000	36.53	8.51	45.04	74.00	-28.96	peak	
4		2390.000	30.67	8.51	39.18	54.00	-14.82	AVG	
5	*	2440.000	81.77	8.50	90.27	54.00	36.27	AVG	No Limit
6	X	2440.600	82.46	8.50	90.96	74.00	16.96	peak	No Limit

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

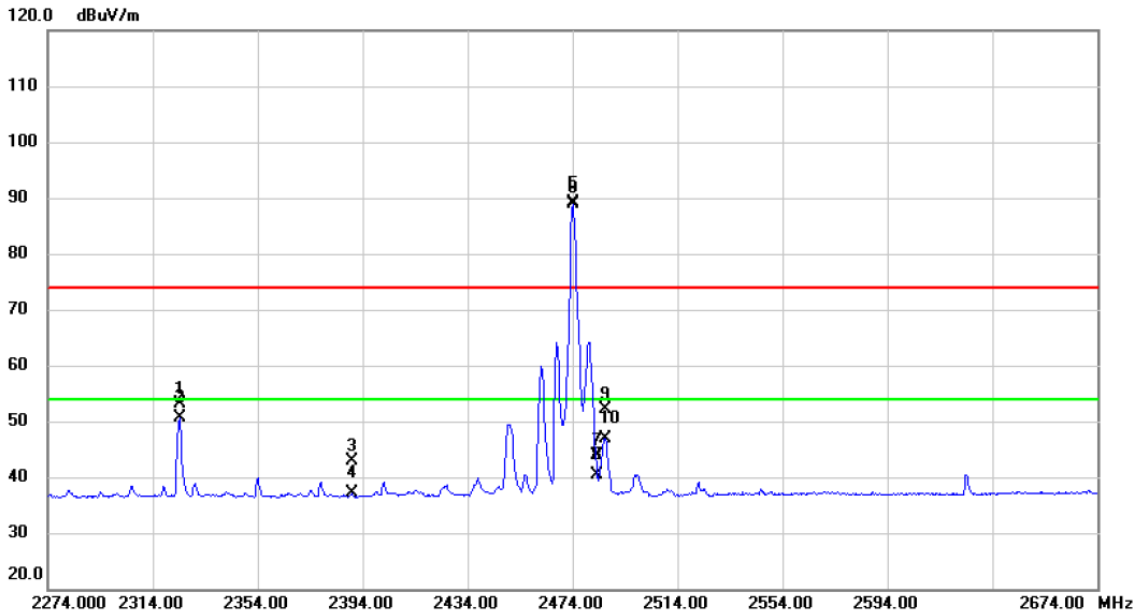
Test Mode	TX 2440 MHz _CH17_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4879.710	52.67	2.59	55.26	74.00	-18.74	peak	
2	*	4880.520	48.77	2.59	51.36	54.00	-2.64	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

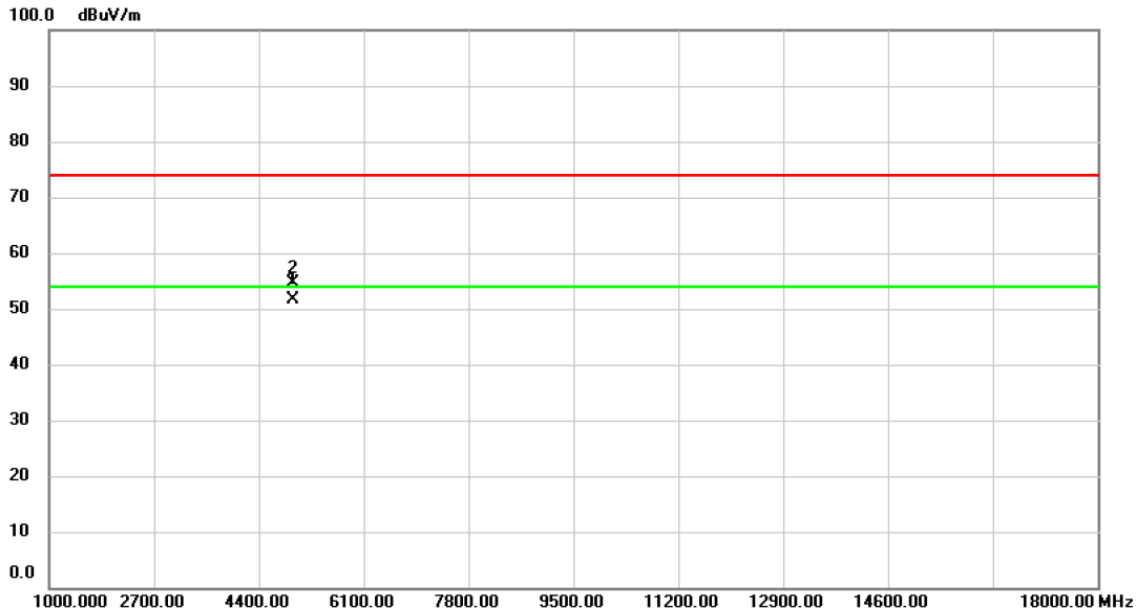
Test Mode	TX 2474 MHz _CH34_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2324.200	44.50	8.53	53.03	74.00	-20.97	peak	
2		2324.200	42.03	8.53	50.56	54.00	-3.44	AVG	
3		2390.000	34.45	8.51	42.96	74.00	-31.04	peak	
4		2390.000	28.51	8.51	37.02	54.00	-16.98	AVG	
5	*	2474.200	80.30	8.48	88.78	54.00	34.78	AVG	No Limit
6	X	2474.400	80.55	8.48	89.03	74.00	15.03	peak	No Limit
7		2483.500	35.30	8.47	43.77	74.00	-30.23	peak	
8		2483.500	31.84	8.47	40.31	54.00	-13.69	AVG	
9		2486.400	43.62	8.47	52.09	74.00	-21.91	peak	
10		2486.400	38.53	8.47	47.00	54.00	-7.00	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

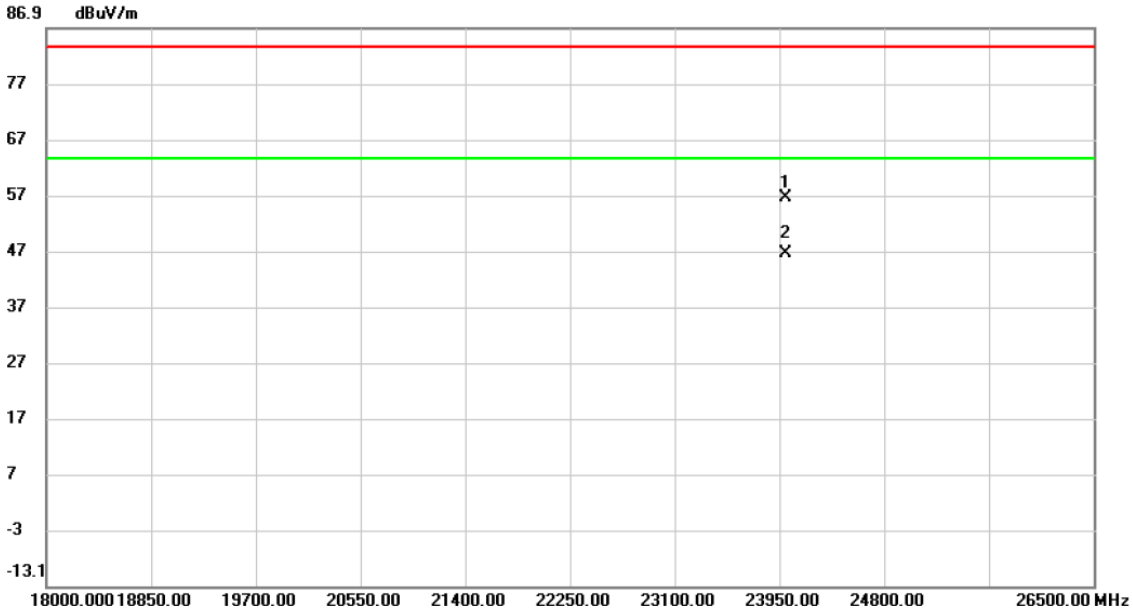
Test Mode	TX 2474 MHz _CH34_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	4948.520	48.92	2.75	51.67	54.00	-2.33	AVG	
2		4948.850	51.94	2.75	54.69	74.00	-19.31	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

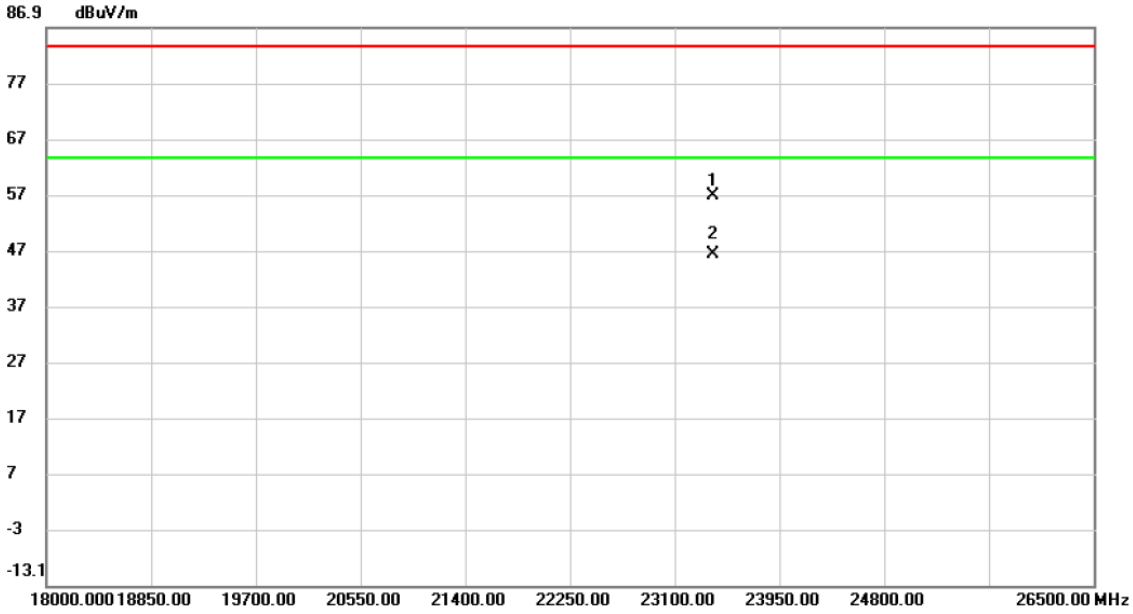
Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		24001.000	49.12	7.49	56.61	83.50	-26.89	peak	
2	*	24001.000	39.10	7.49	46.59	63.50	-16.91	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2408 MHz _CH01_2Mbps	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		23414.500	48.63	8.03	56.66	83.50	-26.84	peak	
2	*	23414.500	38.35	8.03	46.38	63.50	-17.12	AVG	

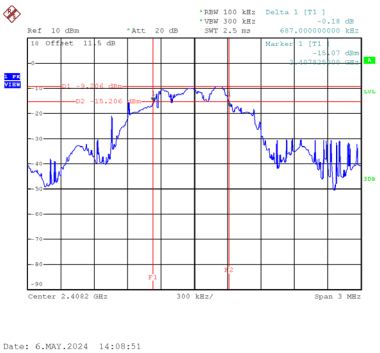
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D - BANDWIDTH

Test Mode	TX Mode _2Mbps

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
01	2408	0.687	1.158	0.5	Pass
17	2440	0.693	1.212	0.5	Pass
34	2474	0.699	1.164	0.5	Pass

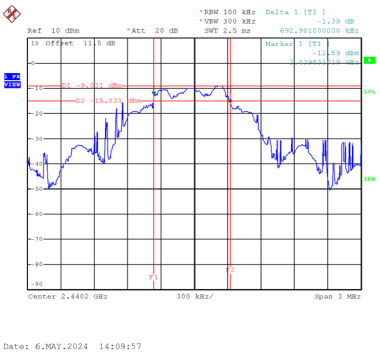
CH01



Date: 6.MAY.2024 14:08:51

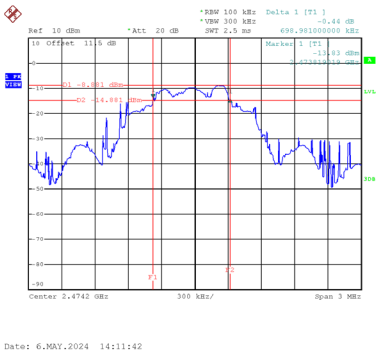
CH17

6 dB Bandwidth



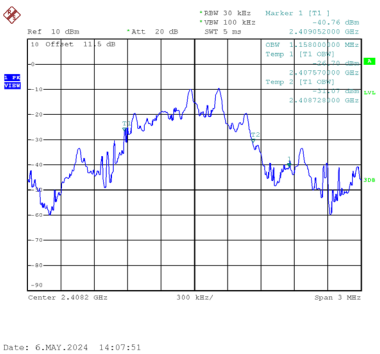
Date: 6.MAY.2024 14:09:57

CH34

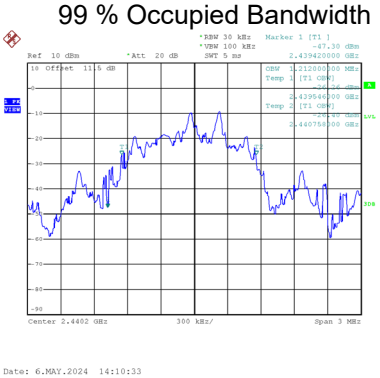


Date: 6.MAY.2024 14:11:42

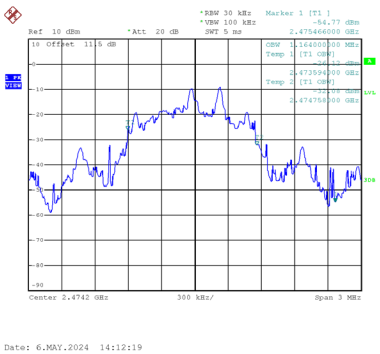
99 % Occupied Bandwidth



Date: 6.MAY.2024 14:07:51



Date: 6.MAY.2024 14:10:33



Date: 6.MAY.2024 14:12:19

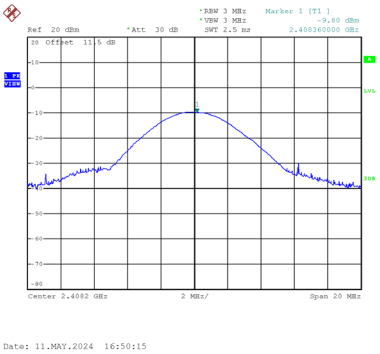
APPENDIX E - MAXIMUM OUTPUT POWER

Test Mode	TX Mode _2Mbps

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2408	-9.80	0.0001	30.00	1.0000	Pass
2440	-9.95	0.0001	30.00	1.0000	Pass
2474	-9.82	0.0001	30.00	1.0000	Pass

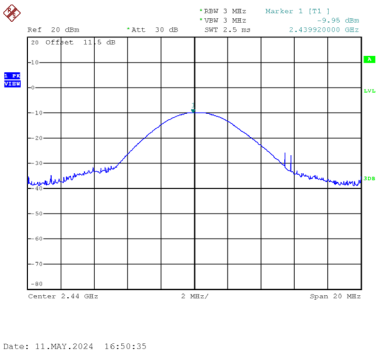
Note: Output power = Measure result + Cable loss

CH01



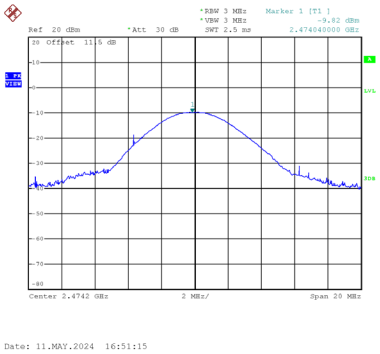
Date: 11.MAY.2024 16:50:15

CH17



Date: 11.MAY.2024 16:50:35

CH34

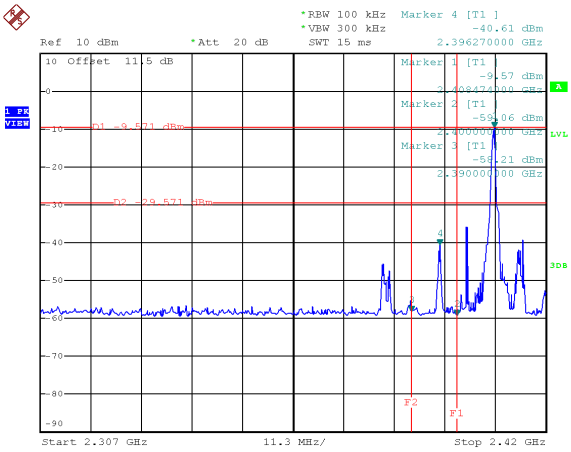


Date: 11.MAY.2024 16:51:15

APPENDIX F - CONDUCTED SPURIOUS EMISSION

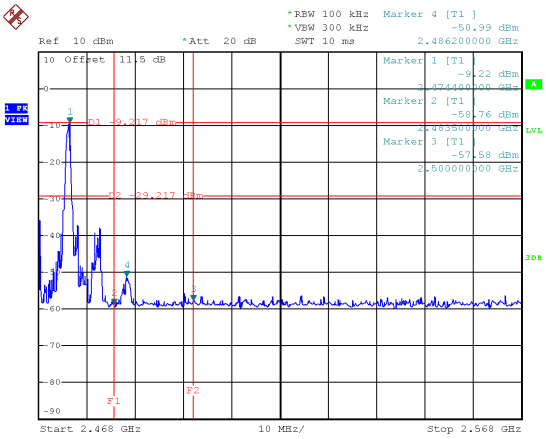
Test Mode	TX Mode _2Mbps

Bandedge CH01 (Lower)



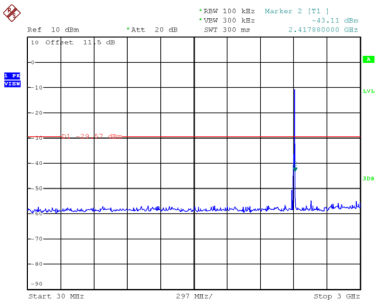
Date: 6.MAY.2024 16:11:02

Bandedge CH34 (Upper)

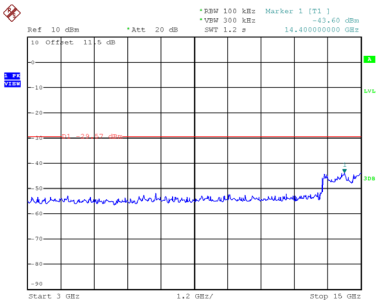


Date: 6.MAY.2024 15:54:36

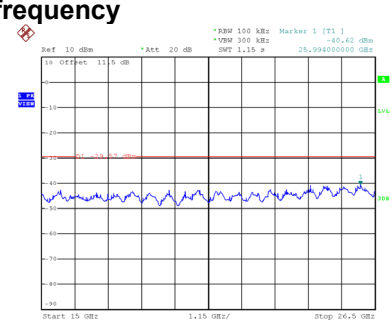
CH01 – 10th Harmonic of the fundamental frequency



Date: 6.MAY.2024 16:13:04

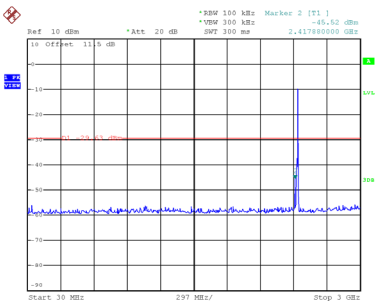


Date: 6.MAY.2024 16:13:41

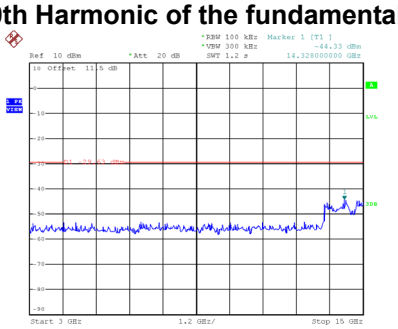


Date: 6.MAY.2024 16:14:17

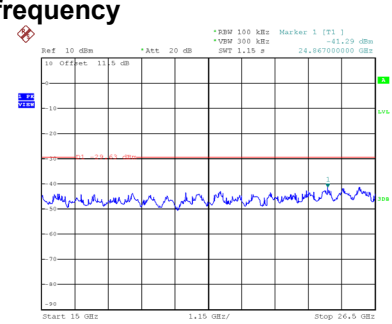
CH17 – 10th Harmonic of the fundamental frequency



Date: 6.MAY.2024 16:15:58

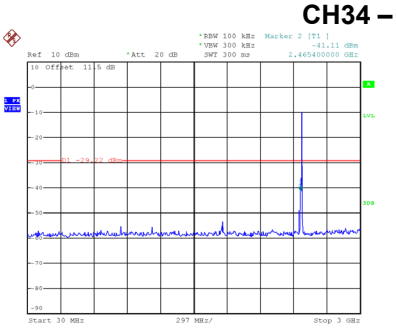


Date: 6.MAY.2024 16:16:05

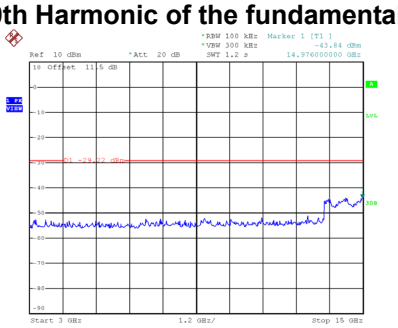


Date: 6.MAY.2024 16:16:11

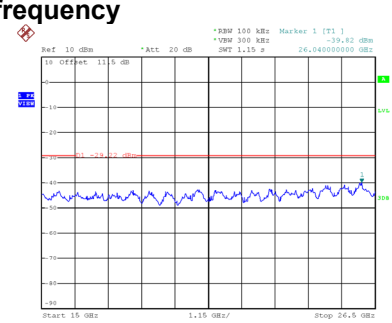
CH34 – 10th Harmonic of the fundamental frequency



Date: 6.MAY.2024 15:55:20



Date: 6.MAY.2024 15:55:57



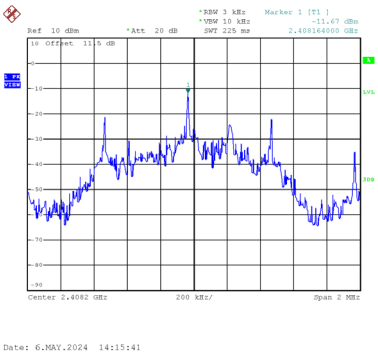
Date: 6.MAY.2024 15:56:35

APPENDIX G - POWER SPECTRAL DENSITY

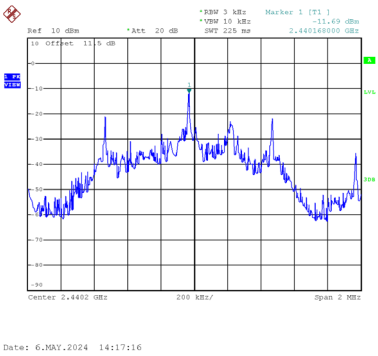
Test Mode	TX Mode _2Mbps

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
01	2408	-11.67	8.00	Pass
17	2440	-11.69	8.00	Pass
34	2474	-11.62	8.00	Pass

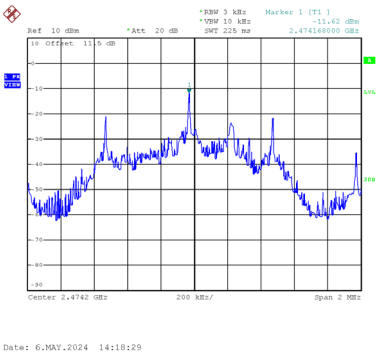
CH01



CH17



CH34



End of Test Report