Accreditation
N°1-1633
Scope available on
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Template : May 28th, 2024

TEST REPORT

N°: **21490906-798426-D(FILE#7873522)** Version: **01**

Subject	**Radio spectrum tests according to the standards: FCC CFR 47 Part 15.247 & ANSI C63.10 RSS-247 & RSS-Gen**
Issued to	**INGENICO** 9 Avenue de la gare - Rovaltain TGV BP25156 26958 – VALENCE CEDEX 9 FRANCE
Apparatus under test	
Product	**Payment terminal**
Trade mark	**INGENICO**
Manufacturer	**INGENICO**
Family range	**AXIUM**
Model under test	**AXIUM RX9000**
Serial number	**2419MR900209 / 2419MR900267**
FCCID	**XKB-RX9CLWBT**
IC	**2586D-RX9CLWBT**
Conclusion	See Test Program chapter
Test date	May 13, 2024 to June 07, 2024
Test location	LCIE Grenoble
FCC Test site	FR0008 - 918017 (MOI)
ISED Test site	6500A (MOI)
Sample receipt date	May 10, 2024
Composition of document	74 pages
Document issued on	August 12, 2024

Written by :
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Approved by :
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PUBLICATION HISTORY

Version	Date	Author	Modification
01	August 12, 2024	Akram HAKKARI	Creation of the document

Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.

SUMMARY

1. TEST PROGRAM

References

- **47 CFR Part 15.247 (2023)**
- **RSS 247 Issue 3**
- **RSS Gen Issue 5**
- **KDB 558074 D01 DTS Meas Guidance v05r02**
- **KDB 662911 D01 Multiple Transmitter Output v02r01**
- **ANSI C63.10 (2013)**

Radio requirement:

Clause - Test Description		Test result - Comments
Occupied Bandwidth	***ISED***	**PASS**
6dB Bandwidth	***FCC & ISED***	**PASS**
Maximum Conducted Output Power	***FCC & ISED***	**PASS**
Power Spectral Density	***FCC & ISED***	**PASS**
Unwanted Emissions in Non-Restricted Frequency Bands	***FCC & ISED***	**PASS**
Unwanted Emissions in Restricted Frequency Bands	***FCC & ISED***	**PASS**
Receiver Radiated Emissions	***ISED***	**PASS(2)**
This table is a summary of test report, see conclusion of each clause of this test report for detail.		

(1) Limited program
(2) Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

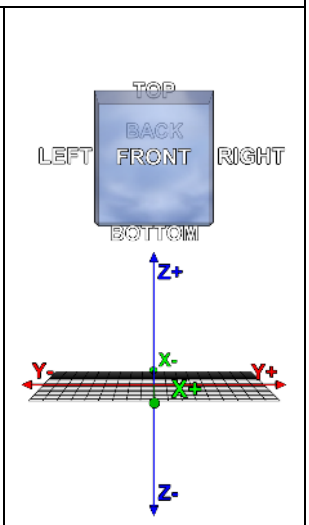
PASS: EUT complies with standard's requirement
FAIL: EUT does not comply with standard's requirement
NA: Not Applicable
NP: Test Not Performed

2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

Model under test:	**AXIUM RX9000**
Serial Number:	**2419MR900209 / 2419MR900267**



Dimensions:	16cm x 20cm x 2.5cm (Length x Width x Height)
Type:	Table-Top

Power supply:

Name	Type	Rating	Reference / Sn	Comments
Supply1	DC	8-14 VDC	NC	-
Supply2	PoE	12.95W max	NC	-

NC: Not communicated by provider

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Comments
Supply1	240 VAC – 50Hz	1.5	NC	No	-
Supply2	PoE	1.5	NC	Yes	-
Access1	COMBOX	2.2	No	NC	-

NC: Not communicated by provider

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop	DELL	-	-
Router	Asus RT-AC68U	E8IMGO001278	-

NC: Not communicated by provider

Equipment information (declaration of provider):

WiFi				
Chipset / RF Module	FCS950U			
Frequency band:	[2400 – 2483.5] MHz			
Standard:	☑ 802.11b	☑ 802.11g	☑ 802.11n HT20	☑ 802.11n HT40
Spectrum Modulation:	DSSS	OFDM		
Number of Channel:	11 max (see channel plan)			
Spacing channel:	5MHz			
Channel bandwidth:	20MHz & 40MHz			
Antenna Type:	Internal			
Antenna connector:	Temporary for tests			
Antenna requirements §15.203	The transmitter uses an integral antenna and it permanently connected			
Transmit chains:	1			
Beamforming gain:	No			
Receiver chains	1			
Ad-Hoc mode:	No			

CHANNEL PLAN			
802.11b / 802.11g / 802.11n HT20		802.11n HT40	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
Cmin: 1	**2412**	**Cmin: 3**	**2422**
2	2417	4	2427
3	2422	5	2432
4	2427	**Cmid: 6**	**2437**
5	2432	7	2442
Cmid: 6	**2437**	8	2447
7	2442	**Cmax: 9**	**2452**
8	2447		
9	2452		
10	2457		
Cmax: 11	**2462**		

DATA RATE			
802.11b			
Available for EUT	**Data Rate (Mbps)**	**Modulation Type**	**Modulation Worst Case**
☑	1	DBPSK	☑
	2	DQPSK	☐
	5.5	DQPSK	☐
	11	CCK	☐
802.11g			
Available for EUT	**Data Rate (Mbps)**	**Modulation Type**	**Modulation Worst Case**
☑	6	BPSK	☑
	9	BPSK	☐
	12	QPSK	☐
	18	QPSK	☐
	24	16-QAM	☐
	36	16-QAM	☐
	48	64-QAM	☐
	54	64-QAM	☐

DATA RATE									
802.11n HT20									
Available for EUT	MCS Index	Spatial streams	Modulation				Data Rate (Mbps)		Worst Case Modulation
							(GI = 800ns)	(GI = 400ns)	
	0	1	BPSK				6.5	7.2	☑
	1	1	QPSK				13	14.4	☐
	2	1	QPSK				19.5	21.7	☐
	3	1	16-QAM				26	28.9	☐
☑	4	1	16-QAM				39	43.3	☐
	5	1	64-QAM				52	57.8	☐
	6	1	64-QAM				58.5	65	☐
	7	1	64-QAM				65	72.2	☐
	32	1	BPSK	-	-	-	-	-	☐
	8	2	BPSK				13	14.4	☐
	9	2	QPSK				26	28.9	☐
	10	2	QPSK				39	43.3	☐
	11	2	16-QAM				52	57.8	☐
	12	2	16-QAM				78	86.7	☐
	13	2	64-QAM				104	115.6	☐
☐	14	2	64-QAM				117	130.3	☐
	15	2	64-QAM				130	144.4	☐
	33	2	16-QAM	QPSK	-	-	39	43.3	☐
	34	2	64-QAM	QPSK	-	-	52	57.8	☐
	35	2	64-QAM	16-QAM	-	-	65	72.2	☐
	36	2	16-QAM	QPSK	-	-	58.5	65	☐
	37	2	64-QAM	QPSK	-	-	78	86.7	☐
	38	2	64-QAM	16-QAM	-	-	97.5	108.3	☐
	16	3	BPSK				19.5	21.7	☐
	17	3	QPSK				39	43.3	☐
	18	3	QPSK				58.5	65	☐
	19	3	16-QAM				78	86.7	☐
	20	3	16-QAM				117	130	☐
	21	3	64-QAM				156	173.3	☐
	22	3	64-QAM				175.5	195	☐
	23	3	64-QAM				195	216.7	☐
	39	3	16-QAM	QPSK	QPSK	-	52	57.8	☐
	40	3	16-QAM	16-QAM	QPSK	-	65	72.2	☐
☐	41	3	64-QAM	QPSK	QPSK	-	65	72.2	☐
	42	3	64-QAM	16-QAM	QPSK	-	78	86.7	☐
	43	3	64-QAM	16-QAM	16-QAM	-	91	101.1	☐
	44	3	64-QAM	64-QAM	QPSK	-	91	101.1	☐
	45	3	64-QAM	64-QAM	16-QAM	-	104	115.6	☐
	46	3	16-QAM	QPSK	QPSK	-	78	86.7	☐
	47	3	16-QAM	16-QAM	QPSK	-	97.5	108.3	☐
	48	3	64-QAM	QPSK	QPSK	-	97.5	108.3	☐
	49	3	64-QAM	16-QAM	QPSK	-	117	130	☐
	50	3	64-QAM	16-QAM	16-QAM	-	136.5	151.7	☐
	51	3	64-QAM	64-QAM	QPSK	-	136.5	151.7	☐
	52	3	64-QAM	64-QAM	16-QAM	-	156	173.3	☐
	24	4	BPSK				26	28.9	☐
	25	4	QPSK				52	57.8	☐
	26	4	QPSK				78	86.7	☐
	27	4	16-QAM				104	115.6	☐
	28	4	16-QAM				156	173.3	☐
	29	4	64-QAM				208	231.1	☐
	30	4	64-QAM				234	260	☐
	31	4	64-QAM				260	288.9	☐
	53	4	16-QAM	QPSK	QPSK	QPSK	65	72.2	☐
	54	4	16-QAM	16-QAM	QPSK	QPSK	78	86.7	☐
	55	4	16-QAM	16-QAM	16-QAM	QPSK	91	101.1	☐
	56	4	64-QAM	QPSK	QPSK	QPSK	78	86.7	☐
	57	4	64-QAM	16-QAM	QPSK	QPSK	91	101.1	☐
	58	4	64-QAM	16-QAM	16-QAM	QPSK	104	115.6	☐
☐	59	4	64-QAM	16-QAM	16-QAM	16-QAM	117	130	☐
	60	4	64-QAM	QPSK	QPSK	QPSK	104	115.6	☐
	61	4	64-QAM	16-QAM	16-QAM	QPSK	117	130	☐
	62	4	64-QAM	16-QAM	16-QAM	16-QAM	130	144.4	☐
	63	4	64-QAM	64-QAM	64-QAM	QPSK	130	144.4	☐
	64	4	64-QAM	64-QAM	64-QAM	16-QAM	143	158.9	☐
	65	4	16-QAM	QPSK	QPSK	QPSK	97.5	108.3	☐
	66	4	16-QAM	16-QAM	QPSK	QPSK	117	130	☐
	67	4	16-QAM	16-QAM	16-QAM	QPSK	136.5	151.7	☐
	68	4	64-QAM	QPSK	QPSK	QPSK	117	130	☐
	69	4	64-QAM	16-QAM	QPSK	QPSK	136.5	151.7	☐
	70	4	64-QAM	16-QAM	16-QAM	QPSK	156	173.3	☐
	71	4	64-QAM	16-QAM	16-QAM	16-QAM	175.5	195	☐
	72	4	64-QAM	64-QAM	QPSK	QPSK	156	173.3	☐
	73	4	64-QAM	64-QAM	16-QAM	QPSK	175.5	195	☐
	74	4	64-QAM	64-QAM	16-QAM	16-QAM	195	216.7	☐

	75	4	64-QAM	64-QAM	64-QAM	QPSK	195	216.7	☐
	76	4	64-QAM	64-QAM	64-QAM	16-QAM	214.5	238.3	☐

DATA RATE									
802.11n HT40									
Available for EUT	MCS Index	Spatial streams	Modulation				Data Rate (Mbps)		Worst Case Modulation
							(GI = 800ns)	(GI = 400ns)	
	0	1	BPSK				13	15	☑
	1	1	QPSK				27	30	☐
	2	1	QPSK				40.5	45	☐
	3	1	16-QAM				54	60	☐
☑	4	1	16-QAM				81	90	☐
	5	1	64-QAM				108	120	☐
	6	1	64-QAM				121.5	135	☐
	7	1	64-QAM				135	150	☐
	32	1	BPSK	-	-	-	6.0	6.7	☐
	8	2	BPSK				27	30	☐
	9	2	QPSK				54	60	☐
	10	2	QPSK				81	90	☐
	11	2	16-QAM				108	120	☐
	12	2	16-QAM				162	180	☐
	13	2	64-QAM				216	240	☐
☐	14	2	64-QAM				243	270	☐
	15	2	64-QAM				270	300	☐
	33	2	16-QAM	QPSK	-	-	81	90.0	☐
	34	2	64-QAM	QPSK	-	-	108	120	☐
	35	2	64-QAM	16-QAM	-	-	135	150	☐
	36	2	16-QAM	QPSK	-	-	121.5	135	☐
	37	2	64-QAM	QPSK	-	-	162	180	☐
	38	2	64-QAM	16-QAM	-	-	202.5	225	☐
	16	3	BPSK				40.5	45	☐
	17	3	QPSK				81	90	☐
	18	3	QPSK				121.5	135	☐
	19	3	16-QAM				162	180	☐
	20	3	16-QAM				243	270	☐
	21	3	64-QAM				324	360	☐
	22	3	64-QAM				364.5	405	☐
	23	3	64-QAM				405	450	☐
	39	3	16-QAM	QPSK	QPSK	-	108	120	☐
	40	3	16-QAM	16-QAM	QPSK	-	135	150	☐
☐	41	3	64-QAM	QPSK	QPSK	-	135	150	☐
	42	3	64-QAM	16-QAM	QPSK	-	162	180	☐
	43	3	64-QAM	16-QAM	16-QAM	-	189	210	☐
	44	3	64-QAM	64-QAM	QPSK	-	189	210	☐
	45	3	64-QAM	64-QAM	16-QAM	-	216	240	☐
	46	3	16-QAM	QPSK	QPSK	-	162	180	☐
	47	3	16-QAM	16-QAM	QPSK	-	202.5	225	☐
	48	3	64-QAM	QPSK	QPSK	-	202.5	225	☐
	49	3	64-QAM	16-QAM	QPSK	-	243	270	☐
	50	3	64-QAM	16-QAM	16-QAM	-	283.5	315	☐
	51	3	64-QAM	64-QAM	QPSK	-	283.5	315	☐
	52	3	64-QAM	64-QAM	16-QAM	-	324	360	☐
	24	4	BPSK				54	60	☐
	25	4	QPSK				108	120	☐
	26	4	QPSK				162	180	☐
	27	4	16-QAM				216	240	☐
	28	4	16-QAM				324	360	☐
	29	4	64-QAM				432	480	☐
	30	4	64-QAM				486	540	☐
	31	4	64-QAM				540	600	☐
	53	4	16-QAM	QPSK	QPSK	QPSK	135	150	☐
	54	4	16-QAM	16-QAM	QPSK	QPSK	162	180	☐
	55	4	16-QAM	16-QAM	16-QAM	QPSK	189	210	☐
	56	4	64-QAM	QPSK	QPSK	QPSK	162	180	☐
	57	4	64-QAM	16-QAM	QPSK	QPSK	189	210	☐
	58	4	64-QAM	16-QAM	16-QAM	QPSK	216	240	☐
☐	59	4	64-QAM	16-QAM	16-QAM	16-QAM	243	270	☐
	60	4	64-QAM	QPSK	QPSK	QPSK	216	240	☐
	61	4	64-QAM	16-QAM	16-QAM	QPSK	243	270	☐
	62	4	64-QAM	16-QAM	16-QAM	16-QAM	270	300	☐
	63	4	64-QAM	64-QAM	64-QAM	QPSK	270	300	☐
	64	4	64-QAM	64-QAM	64-QAM	16-QAM	297	330	☐
	65	4	16-QAM	QPSK	QPSK	QPSK	202.5	225	☐
	66	4	16-QAM	16-QAM	QPSK	QPSK	243	270	☐
	67	4	16-QAM	16-QAM	16-QAM	QPSK	283.5	315	☐
	68	4	64-QAM	QPSK	QPSK	QPSK	243	270	☐
	69	4	64-QAM	16-QAM	QPSK	QPSK	283.5	315	☐
	70	4	64-QAM	16-QAM	16-QAM	QPSK	324	360	☐
	71	4	64-QAM	16-QAM	16-QAM	16-QAM	364.5	405	☐
	72	4	64-QAM	64-QAM	QPSK	QPSK	324	360	☐
	73	4	64-QAM	64-QAM	16-QAM	QPSK	364.5	405	☐

	74	4	64-QAM	64-QAM	16-QAM	16-QAM	405	450	☐
	75	4	64-QAM	64-QAM	64-QAM	QPSK	405	450	☐
	76	4	64-QAM	64-QAM	64-QAM	16-QAM	445.5	495	☐

Antenna Characteristic			
Antenna reference	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
M830520	1.1	[2400 – 2483.5] MHz	50

Hardware information				
Highest internal frequency (PLL, Quartz, Clock, Microprocessor…):		**$F_{Highest}$:**	**1800**	**MHz**
Firmware (if applicable):		**V:**	NA	
Software (if applicable):		**V:**	NA	
Equipment intended:	Mobile			
Type of equipment:	Stand-alone			
Equipment sample:	Production model			
Duty cycle:	Continuous operation			
Operating temperature range:	T_{min}:	-10 °C		
	T_{nom}:	20°C		
	T_{max}:	45 °C		
Operating voltage:	V_{min} (85% Vnom):	204 VAC		
	V_{nom}:	240VAC		
	V_{max} (115% Vnom):	276 VAC		

NC: Not communicated by provider

2.2. RUNNING MODE

Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power.
Test mode 2	Permanent reception

Test	Running mode
Occupied Bandwidth	Test mode 1
6dB Bandwidth	Test mode 1
Maximum Conducted Output Power	Test mode 1
Power Spectral Density	Test mode 1
Conducted Spurious Emission at the Band Edge	Test mode 1
Unwanted Emissions in Non-Restricted Frequency Bands	Test mode 1
Unwanted Emissions in Restricted Frequency Bands	Test mode 1
Receiver Radiated Emissions	Test mode 2 (1)

(1) Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

2.3. EQUIPMENT LABELLING

Label

2.4. EQUIPMENT MODIFICATIONS DURING THE TESTS

None

2.5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where:
FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain

Example:
Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m
The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.

2.6. TEST DISTANCE EXTRAPOLATION – FCC/ISED

The field strength is extrapolated to the new measurement distance using formula from FCC Part15.31 (f) and §6.5-6.6 RSS-GEN:

Below 30MHz,

$$FS_{\text{limit}} = FS_{\max} - 40\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

Above 30MHz,

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

Where:
FS_{limit} is the calculation of field strength at the limit distance, expressed in dBµV/m
FS_{max} is the measured field strength, expressed in dBµV/m
$d_{measure}$ is the distance of the measurement point from the EUT
d_{limit} is the reference limit distance

2.7. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period.

2.8. METHOD TO DETERMINATE THE SPURIOUS RADIATED EMISSION

The Normalized Site Attenuation (NSA) is added to the maximum values observed during the azimuth search in order to obtain the spurious radiated emission. For spurious above -6dB from the limit found with the NSA, the Substitution Method is applied.
The substitution antenna replaces the equipment under test (EUT) for Effective Radiated Power (ERP) or Effective Isotropically Radiated Power (EIRP) measurement following the standard. Power is measured for a high level and calculated for the same level of radiated field strength obtained on the measuring antenna and EUT.

3. DUTY CYCLE

3.1. *TEST CONDITIONS*

Date of test	:	May 31, 2024
Test performed by	:	Akram HAKKARI
Relative humidity (%)	:	34
Ambient temperature (°C)	:	21

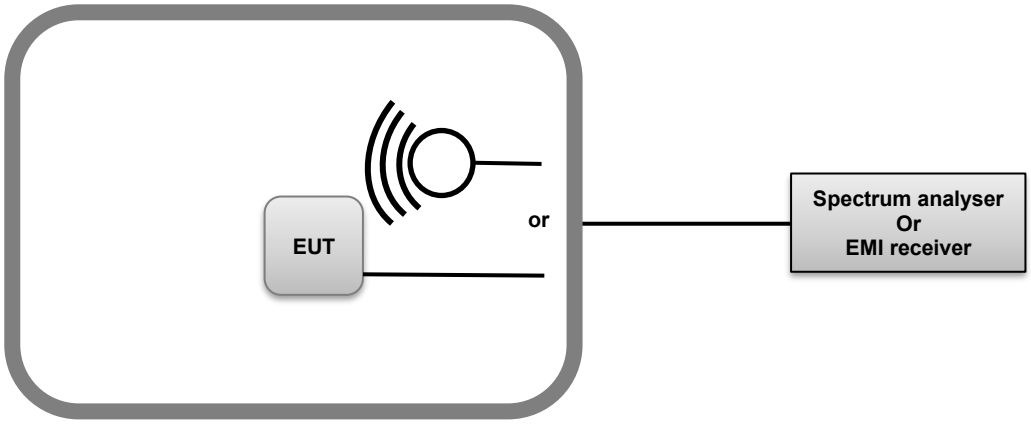
3.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency.
The captured power is measured and recorded.

Test Procedure:
ANSI C63.10 § 11.6

- Zero-span mode
- RBW ≥ OBW if possible; otherwise, set RBW to the largest available value
- VBW ≥ RBW
- Detector = Peak
- Trace mode = Max Hold.
- Sweep time > 3 * Period time anticipated
- Sweep = Single
- Trigger Video



Test setup of Duty Cycle

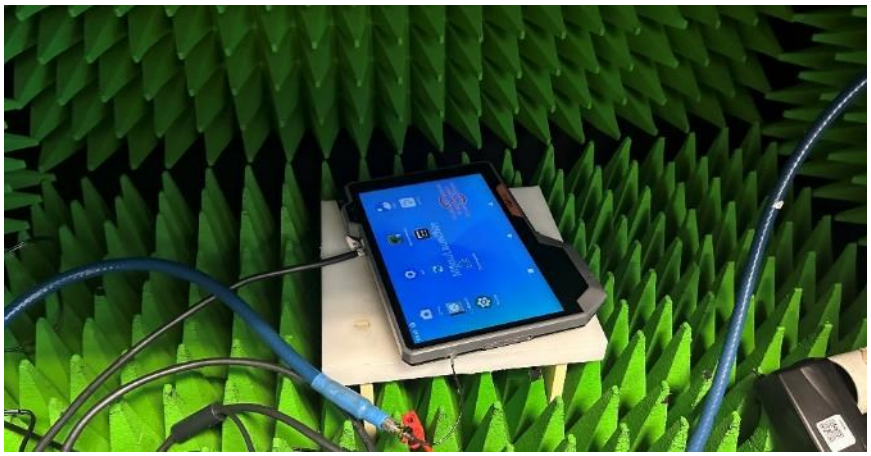


Photo of Duty Cycle

3.3. *LIMIT*

None

3.4. TEST EQUIPMENT LIST

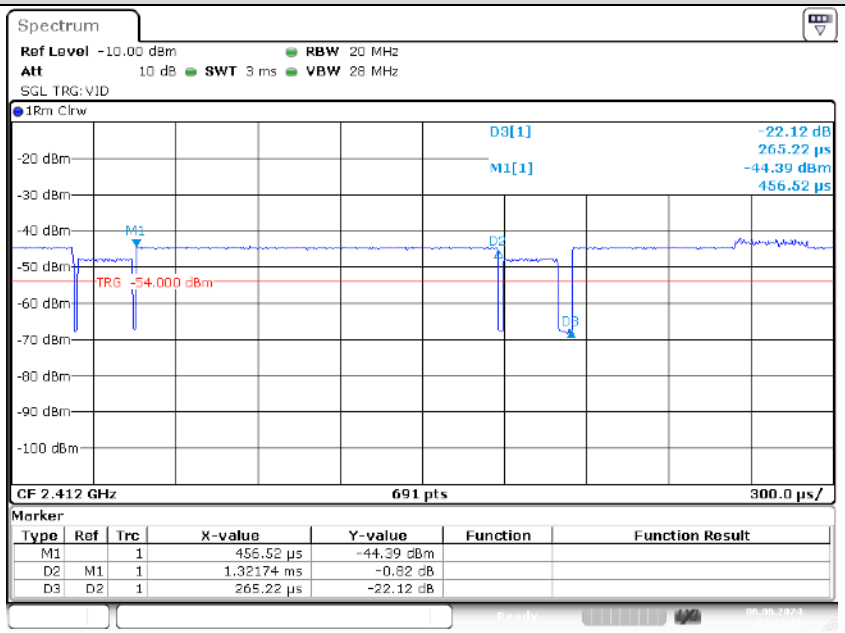
TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122268	07/23	07/25
Cable Measure	_	36G	A5329604	02/24	02/25
Full Anechoic Room	SIEPEL	_	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
SMK 1.2m (Ampl <-> chamber)	HUBER-SUHNER	SUCOFLEX 102	A5330062	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/26
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

3.6. *RESULTS*

Duty Cycle			
Cmin			
WiFi - 802.11b 1MBits/s			



Test Period (ms)	Total Time ON (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
1.58	1.32	83	0.8
*Duty Cycle (%) = (Total Time ON / Test Period) * 100*		*Duty Factor (dB) = 10*log(100 / Duty Cycle(%))*	
Therefore, for average measurements a correction factor of 0.8 dB is use in all tests.			

4. OCCUPIED BANDWIDTH

4.1. *TEST CONDITIONS*

Date of test	:	May 31, 2024
Test performed by	:	Akram HAKKARI
Relative humidity (%)	:	33
Ambient temperature (°C)	:	21

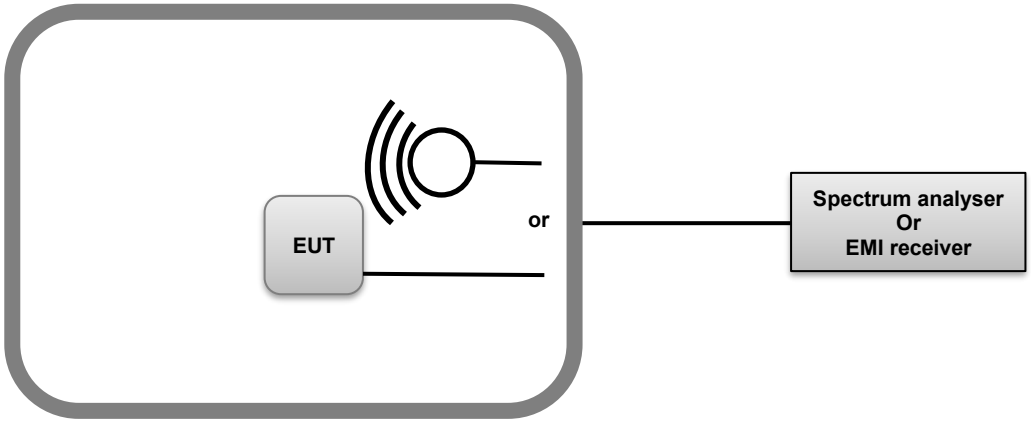
4.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure:
ANSI C63.10 § 6.9.2 and RSS-Gen Issue 5 § 6.7

- RBW used in the range of 1% to 5% of the anticipated emission bandwidth
- Set the video bandwidth (VBW) ≥ 3 x RBW.
- Detector = Peak.
- Trace mode = Max Hold.
- Sweep = Auto couple.
- Allow the trace to stabilize.
- OBW 99% function of spectrum analyzer used



Test setup of Occupied Bandwidth

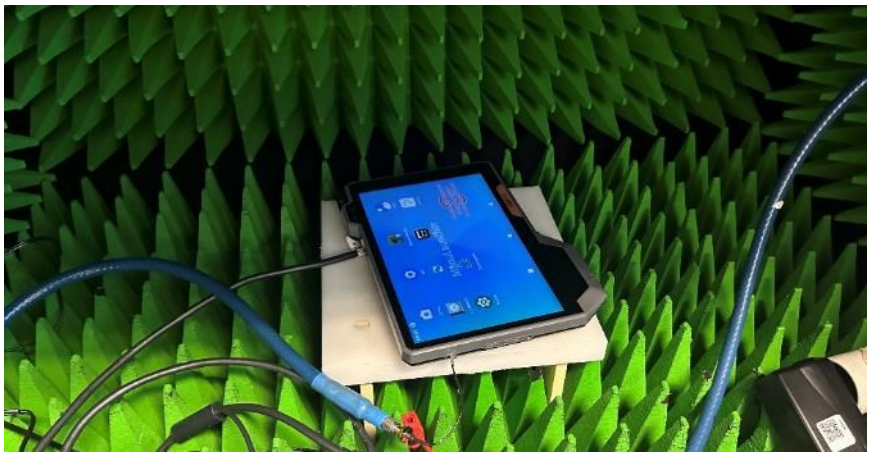


Photo of Occupied bandwidth

4.3. *LIMIT*

None

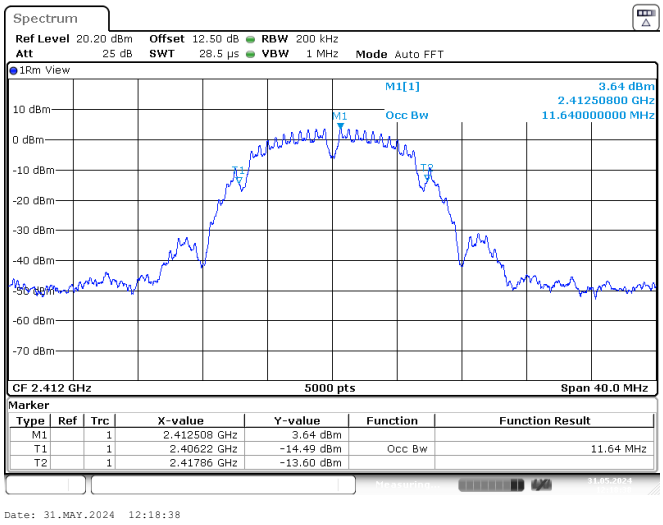
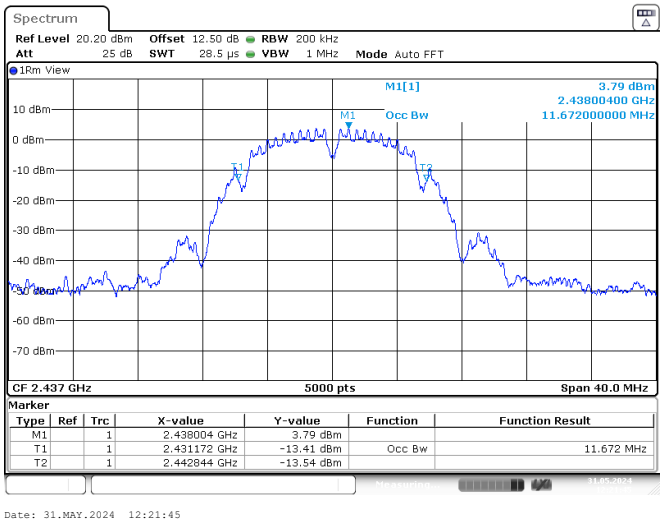
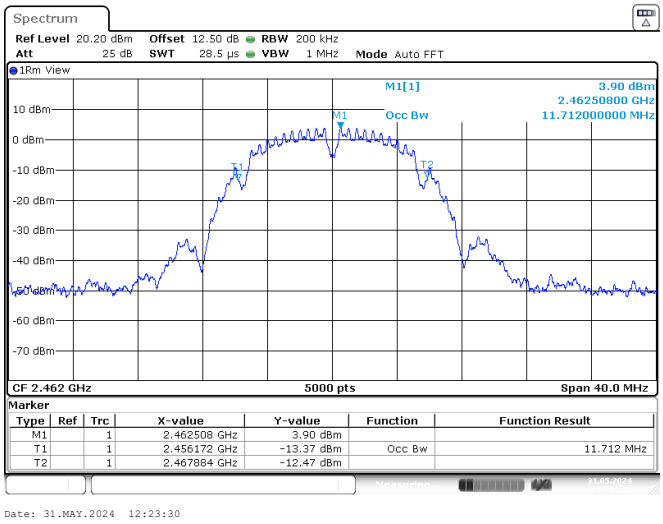
4.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122268	07/23	07/25
Cable Measure	_	36G	A5329604	02/24	02/25
Full Anechoic Room	SIEPEL	_	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
SMK 1.2m (Ampl <-> chamber)	HUBER-SUHNER	SUCOFLEX 102	A5330062	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/26
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25

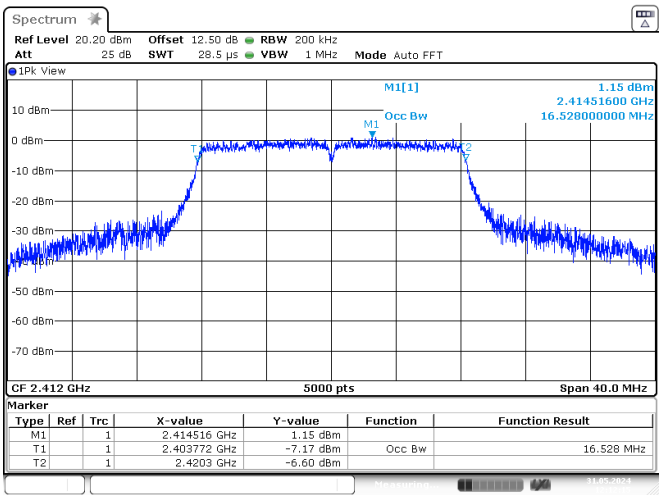
4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

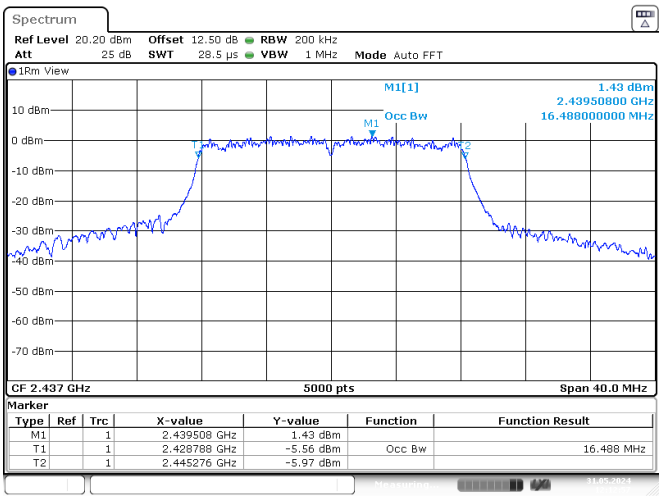
None

4.6. *RESULTS*

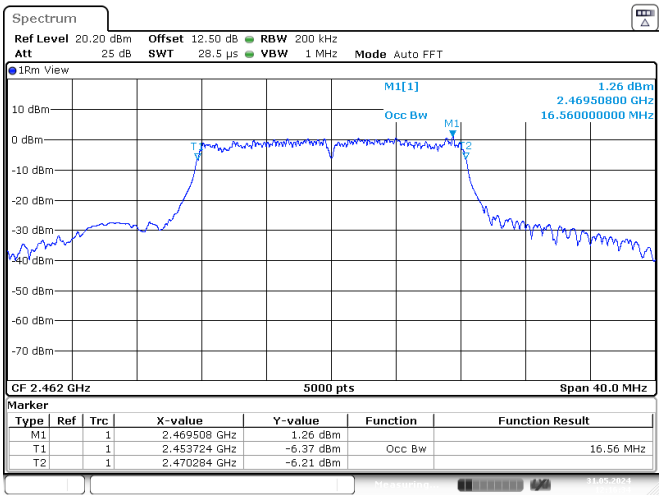
Occupied Bandwidth	
Cmin	**Cmid**
	
Cmax	**Configuration: WiFi - 802.11b 1MBits/s**
	**Channel** / **Occupied Bandwidth (MHz)**
	Cmin / 11.64
	Cmid / 11.67
	Cmax / 11.71

Occupied Bandwidth	
Cmin	**Cmid**





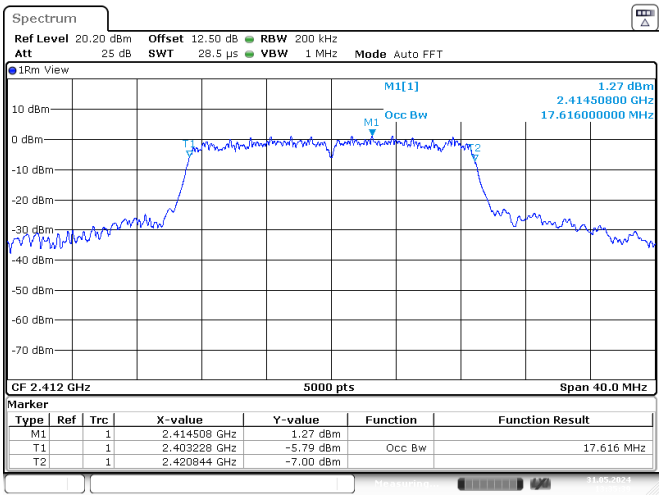
Cmax



Configuration: WiFi - 802.11g 6MBits/s	
Channel	**Occupied Bandwidth (MHz)**
Cmin	16.52
Cmid	16.48
Cmax	16.56

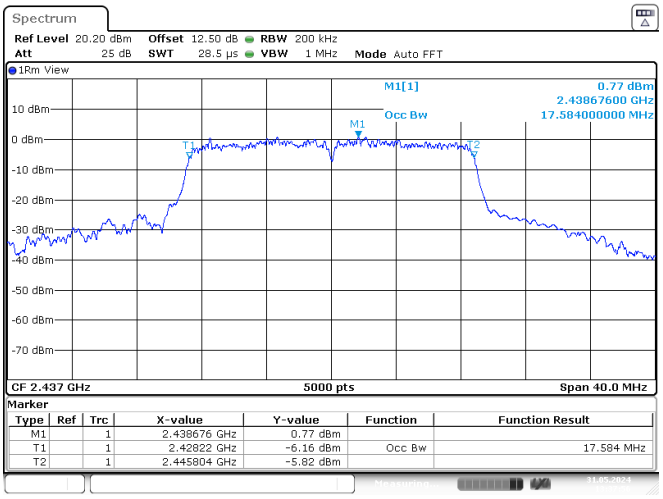
Occupied Bandwidth

Cmin



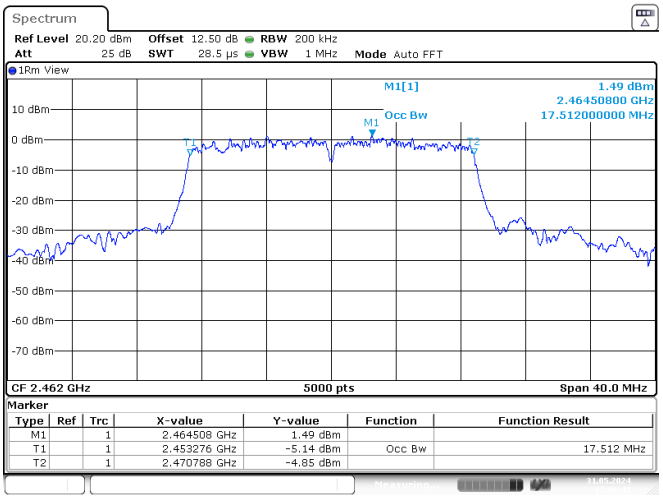
Date: 31.MAY.2024 13:35:39

Cmid



Date: 31.MAY.2024 13:37:57

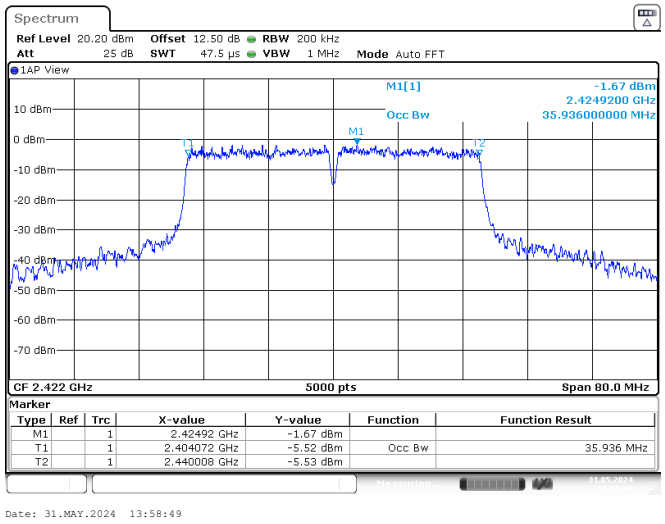
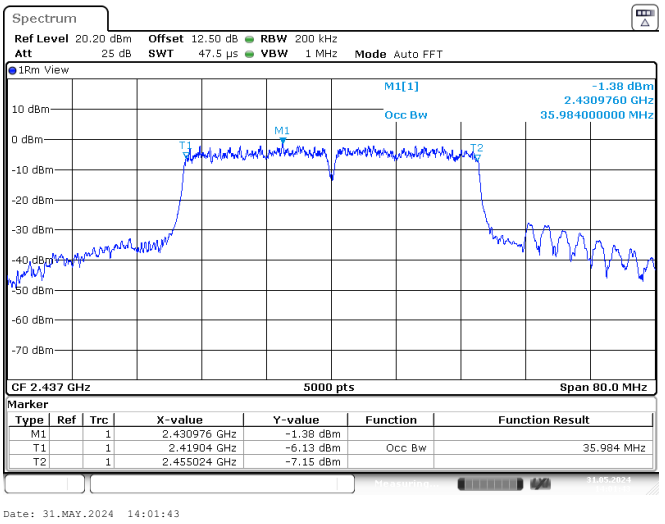
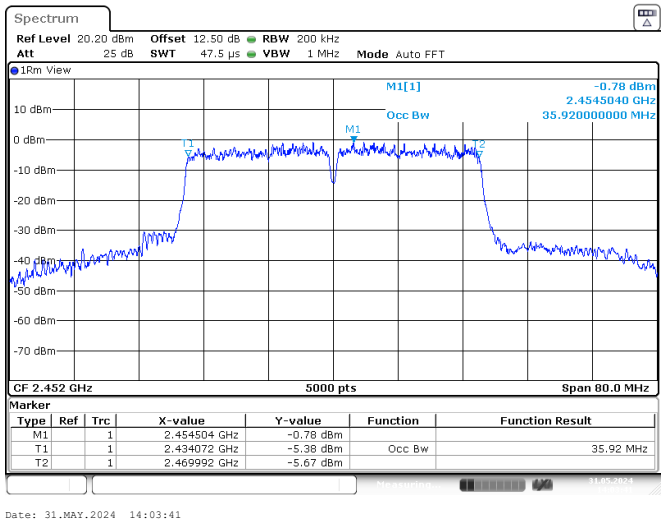
Cmax



Date: 31.MAY.2024 13:39:42

Configuration: WiFi - 802.11n HT20 MCS0

Channel	Occupied Bandwidth (MHz)
Cmin	17.61
Cmid	17.58
Cmax	17.51

Occupied Bandwidth	
Cmin	**Cmid**
	
Cmax	**Configuration: WiFi - 802.11n HT40 MCS0**
	

Channel	Occupied Bandwidth (MHz)
Cmin	35.93
Cmid	35.98
Cmax	35.92

4.7. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **AXIUM RX9000**, Sn: **2419MR900209 / 2419MR900267**, in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN** limits.

5. 6dB BANDWIDTH

5.1. *TEST CONDITIONS*

Date of test	:	May 31, 2024
Test performed by	:	Akram HAKKARI
Relative humidity (%)	:	34
Ambient temperature (°C)	:	21

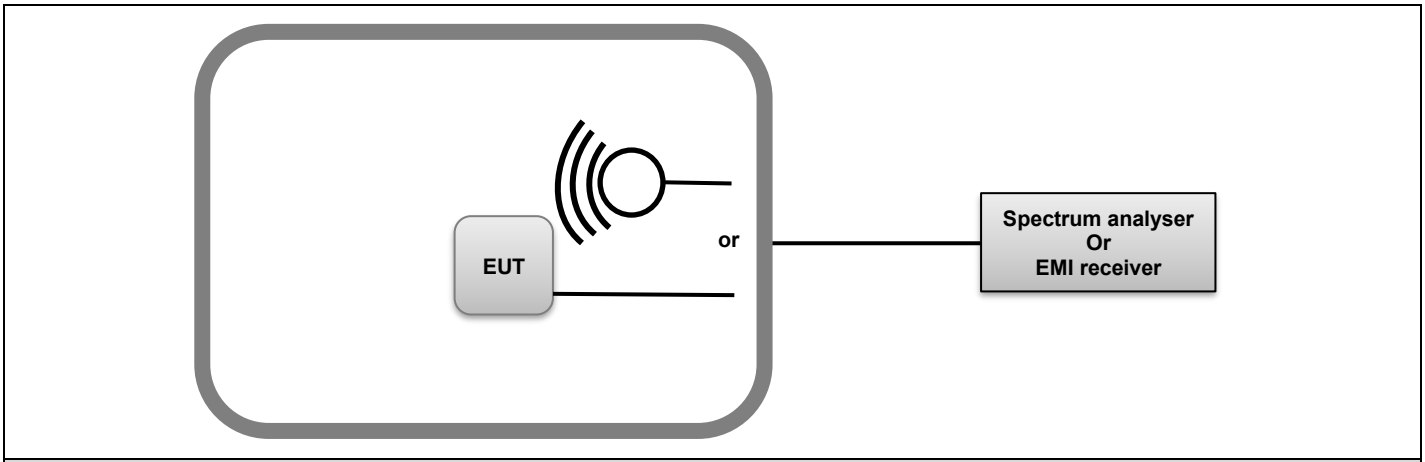
5.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure:
KDB 558074 D01 DTS Meas Guidance v05r02 § 8.2

- Set resolution bandwidth (RBW) = 100kHz.
- Set the video bandwidth (VBW) ≥ 3 x RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.



Test setup of 6dB Bandwidth

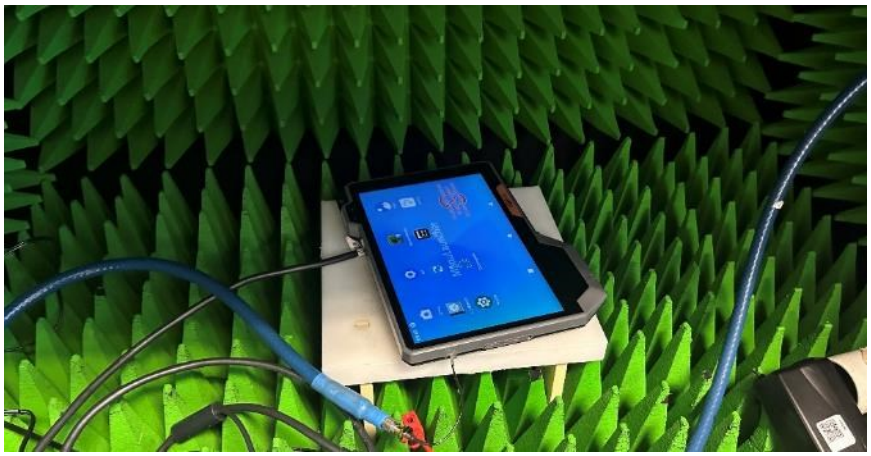


Photo of 6dB bandwidth

5.3. *LIMIT*

Frequency range	6dB bandwidth
902.000 -928MHz 2400MHz to 2483.5MHz 5725-5850 MHz	≥500kHz

5.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122268	07/23	07/25
Cable Measure	_	36G	A5329604	02/24	02/25
Full Anechoic Room	SIEPEL	_	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
SMK 1.2m (Ampl <-> chamber)	HUBER-SUHNER	SUCOFLEX 102	A5330062	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/26
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25

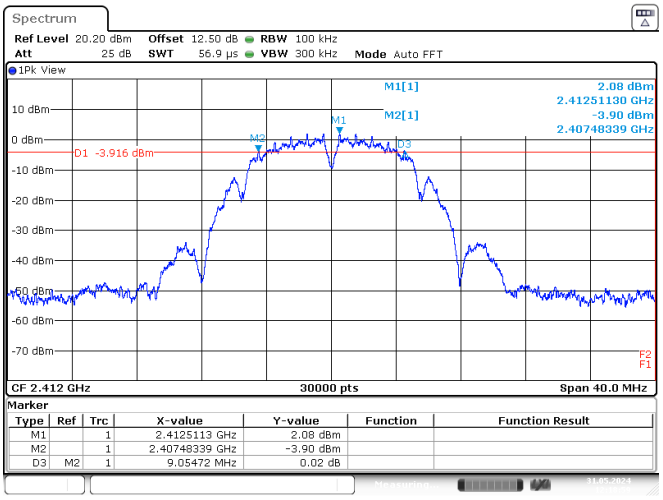
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

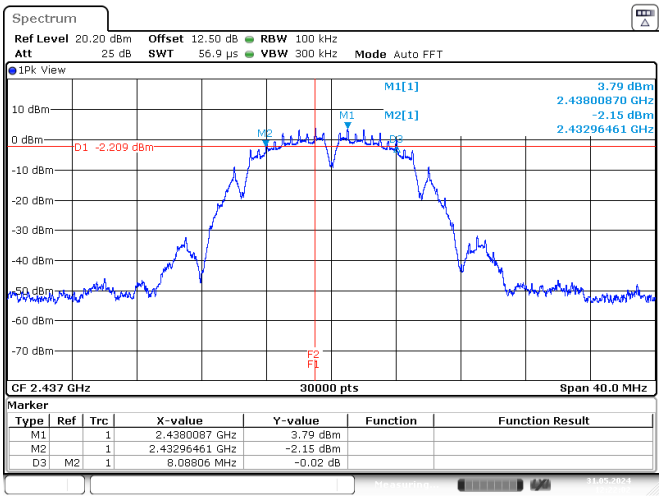
5.6. *RESULTS*

6dB Bandwidth

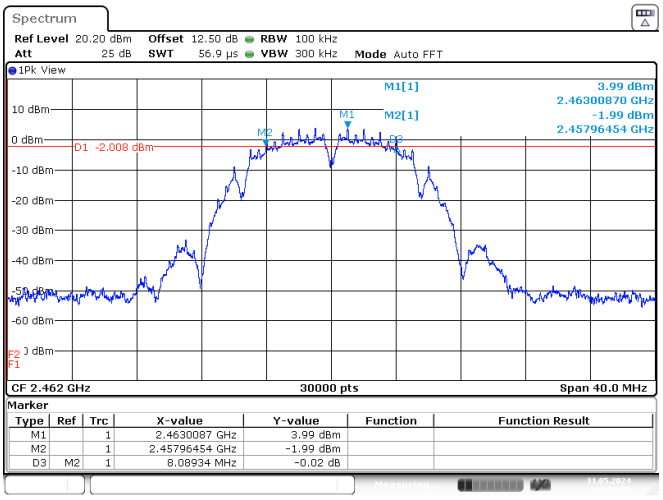
Cmin



Cmid



Cmax

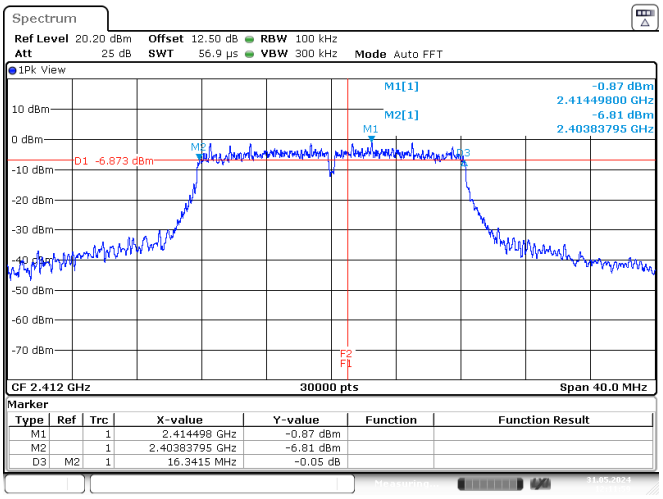


Configuration: WiFi - 802.11b 1MBits/s

Channel	6dB Bandwidth (MHz)	Limit (MHz)
Cmin	9.05472	> 0.5
Cmid	8.088064	> 0.5
Cmax	8.089344	> 0.5

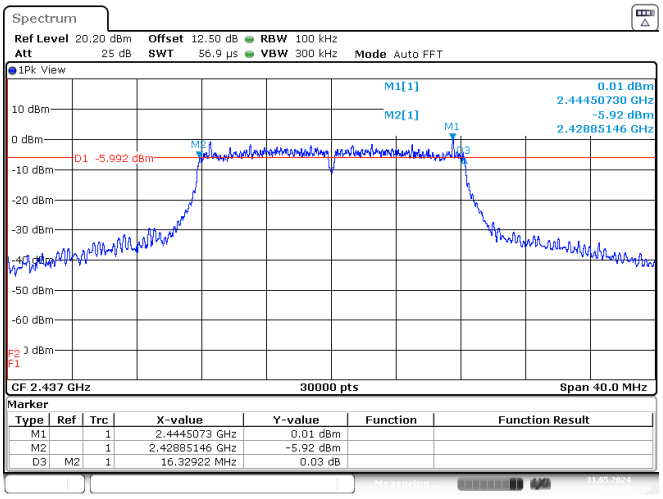
6dB Bandwidth

Cmin



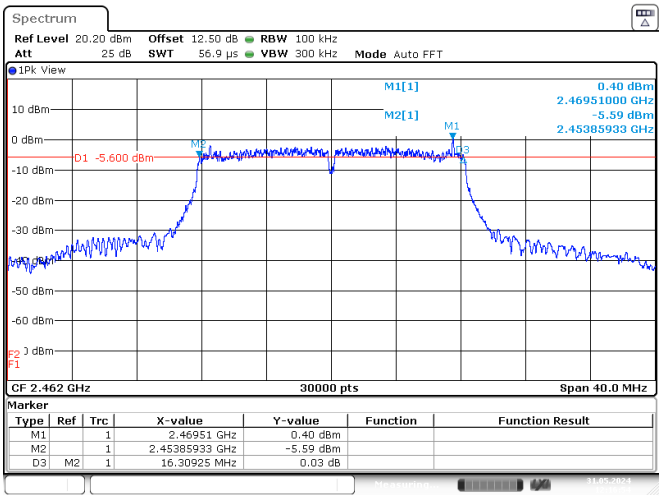
Date: 31.MAY.2024 12:11:59

Cmid



Date: 31.MAY.2024 12:13:38

Cmax



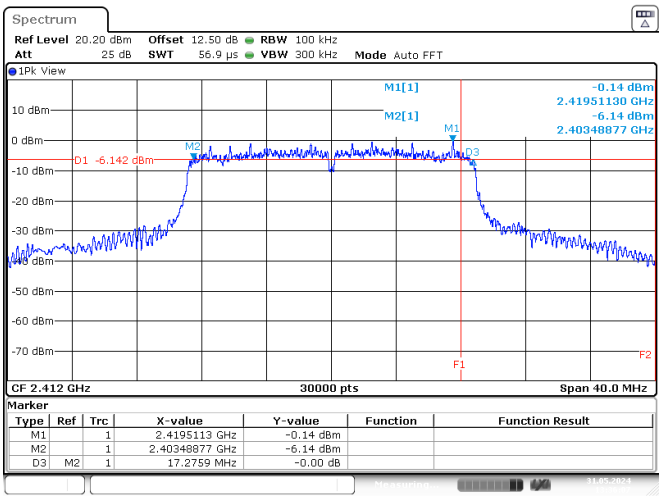
Date: 31.MAY.2024 12:16:54

Configuration: WiFi - 802.11g 6MBits/s

Channel	6dB Bandwidth (MHz)	Limit (MHz)
Cmin	16.341504	> 0.5
Cmid	16.329216	> 0.5
Cmax	16.309248	> 0.5

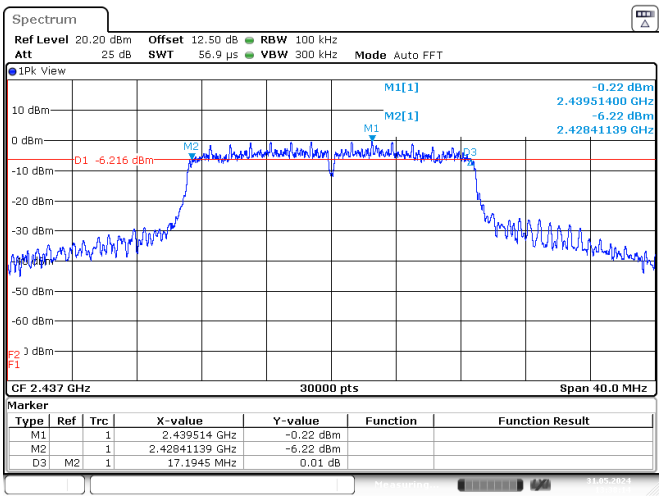
6dB Bandwidth

Cmin



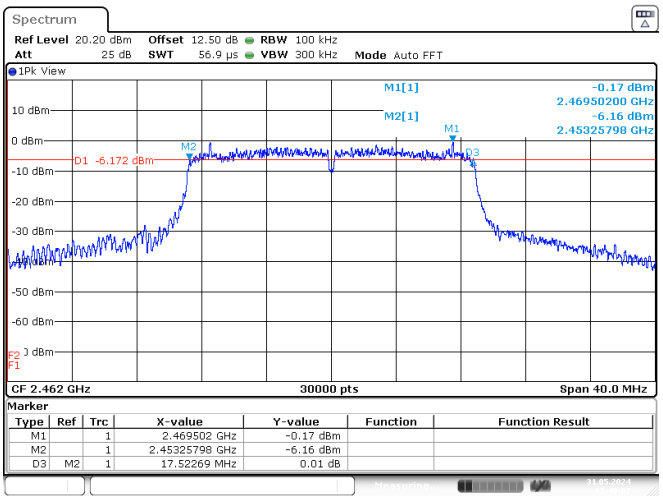
Date: 31.MAY.2024 13:36:07

Cmid



Date: 31.MAY.2024 13:38:15

Cmax



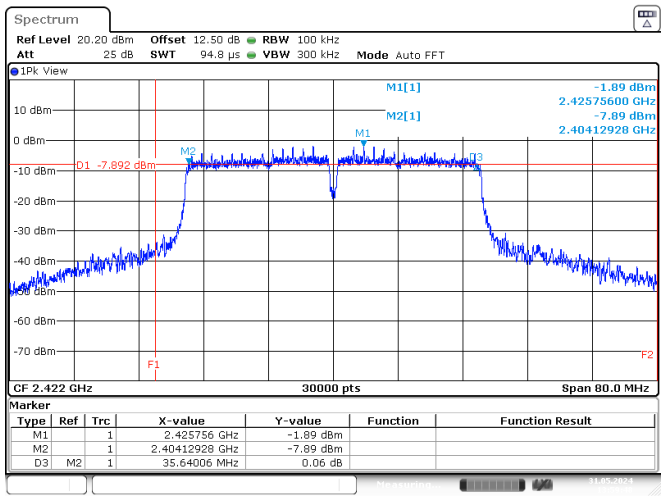
Date: 31.MAY.2024 13:40:07

Configuration: WiFi - 802.11n HT20 MCS0

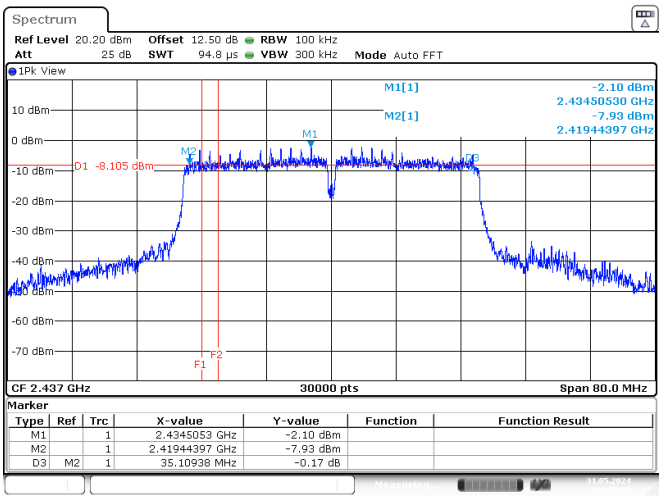
Channel	6dB Bandwidth (MHz)	Limit (MHz)
Cmin	17.275904	> 0.5
Cmid	17.194496	> 0.5
Cmax	17.522688	> 0.5

6dB Bandwidth

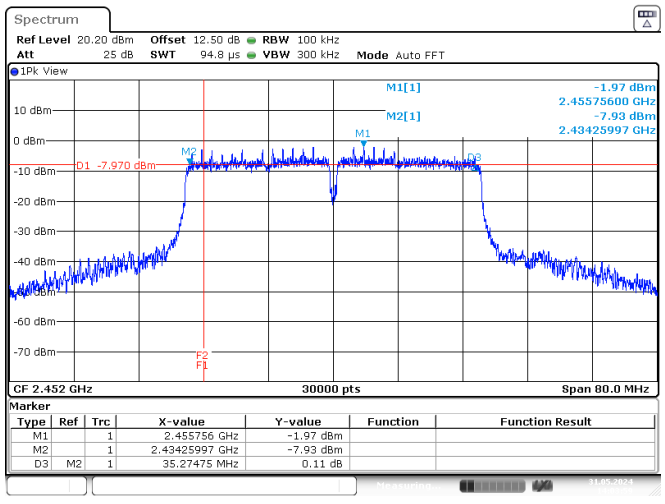
Cmin



Cmid



Cmax



Configuration: WiFi - 802.11n HT40 MCS0

Channel	6dB Bandwidth (MHz)	Limit (MHz)
Cmin	35.640064	> 0.5
Cmid	35.109376	> 0.5
Cmax	35.274752	> 0.5

5.7. CONCLUSION

6dB Bandwidth measurement performed on the sample of the product **AXIUM RX9000**, Sn: **2419MR900209 / 2419MR900267**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

6. MAXIMUM CONDUCTED OUTPUT POWER

6.1. *TEST CONDITIONS*

Date of test	:	May 31, 2024
Test performed by	:	Akram HAKKARI
Relative humidity (%)	:	33
Ambient temperature (°C)	:	22

6.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure used: KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.1

KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.1

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- Set the RBW ≥ DTS bandwidth.
- Set VBW ≥ 3 x RBW.
- Set span ≥ 3 x RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.2

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- Set the RBW = 1 MHz.
- Set the VBW ≥ 3 x RBW
- Set the span ≥ 1.5 x DTS bandwidth.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges

KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.2.2(Method AVGSA-1)

Subclause 11.9.2.2 of ANSI C63.10 is applicable, Method AVGSA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep.

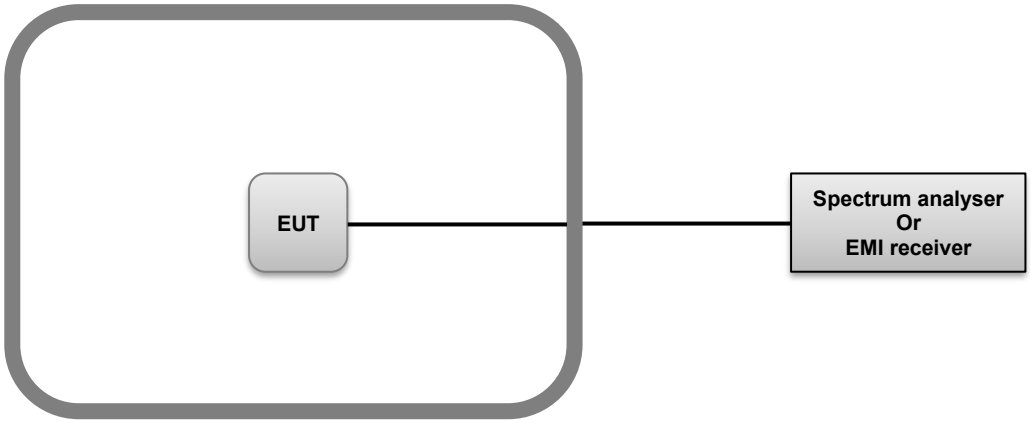
- a) Set span to at least 1.5 times the OBW.
- b) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- c) Set VBW ≥ [3 × RBW].
- d) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- g) If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
- h) Trace average at least 100 traces in power averaging (rms) mode.
- i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.2.2(Method AVGSA-2)

Subclause 11.9.2.2 of ANSI C63.10 is applicable.

Method AVGSA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction. The procedure for this method is as follows:

- a) Measure the duty cycle D of the transmitter output signal as described in 11.6.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- d) Set VBW ≥ [3 × RBW].
- e) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
- f) Sweep time = auto.
- g) Detector = RMS (i.e., power averaging), if available. Otherwise, use the sample detector mode.
- h) Do not use sweep triggering. Allow the sweep to "free run."
- i) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.
- j) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- k) Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.



Test setup of Maximum Conducted Output Power

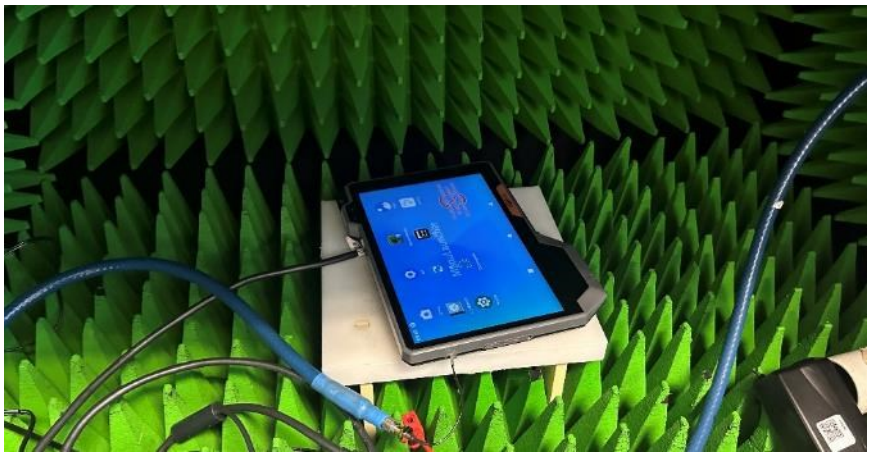


Photo of Maximum Conducted Output Power

6.3. *LIMIT*

Frequency range	Maximum Conducted Output Power
902.000 -928MHz 2400MHz to 2483.5MHz 5725-5850 MHz	≤30dBm*

*Remark: Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

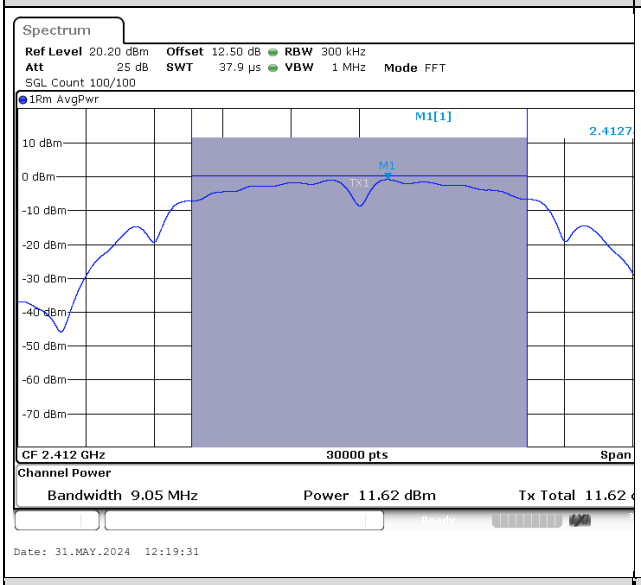
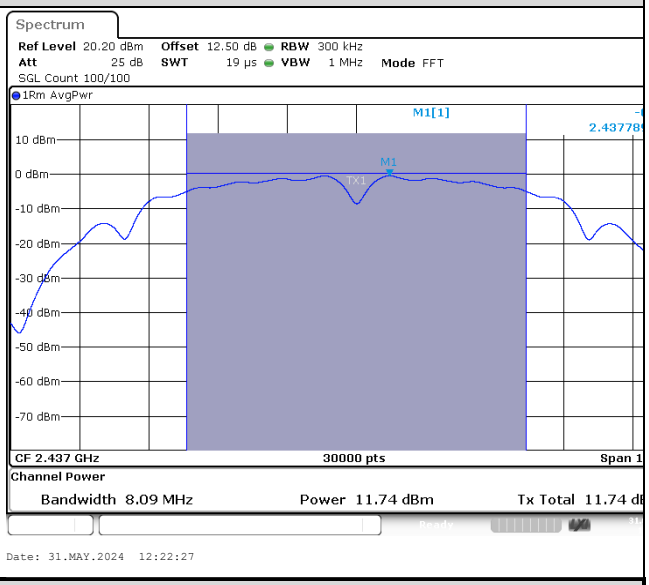
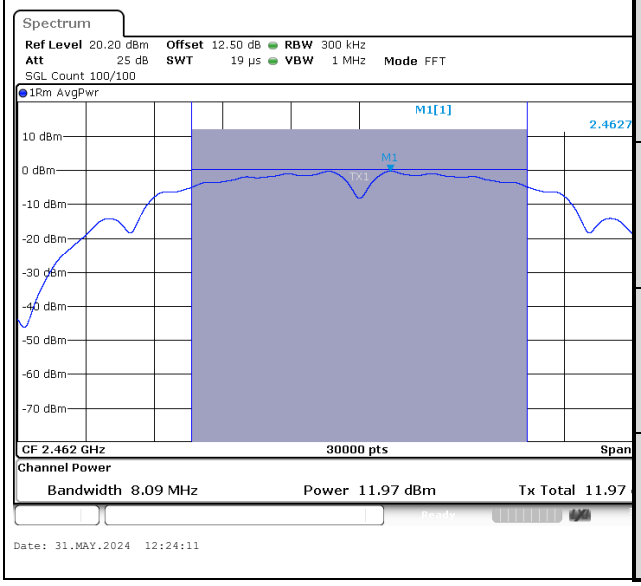
6.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122268	07/23	07/25
Cable Measure	_	36G	A5329604	02/24	02/25
Full Anechoic Room	SIEPEL	_	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
SMK 1.2m (Ampl <-> chamber)	HUBER-SUHNER	SUCOFLEX 102	A5330062	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/26
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25

6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

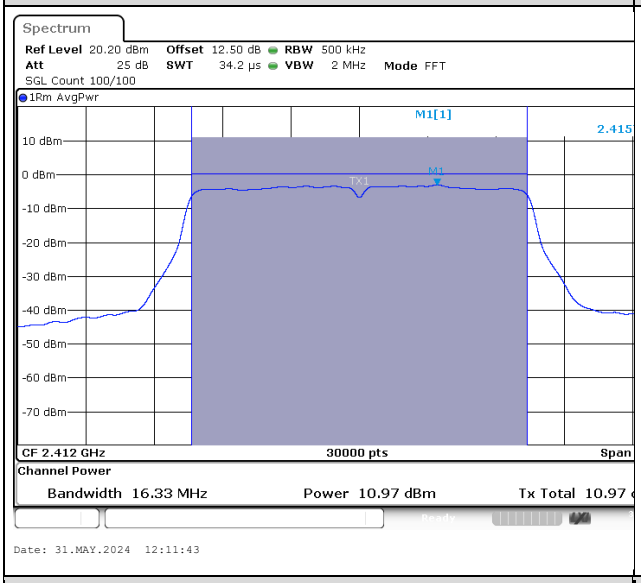
None

6.6. RESULTS

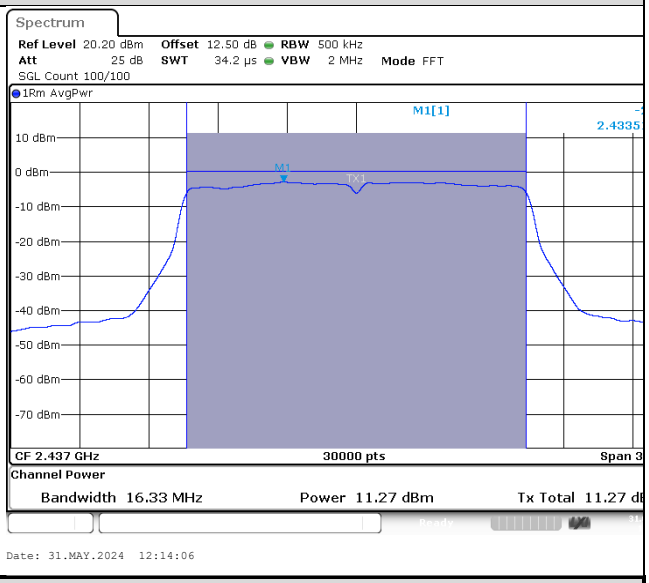
Maximum Conducted Output Power						
Cmin						
						
Cmid						
						
Cmax						
						
Configuration: WiFi - 802.11b 1MBits/s						
Channel	**Offset Cable+Att (dB)**	**Antenna Gain (dBi)**	**Duty Cycle Factor (dB)**	**Conducted Power (dBm)**	**Limit (dBm)**	
Cmin	12.3	1.1	0.8	11.62	**30**	
Cmid	12.3	1.1	0.8	11.74	**30**	
Cmax	12.3	1.1	0.8	11.97	**30**	

Maximum Conducted Output Power

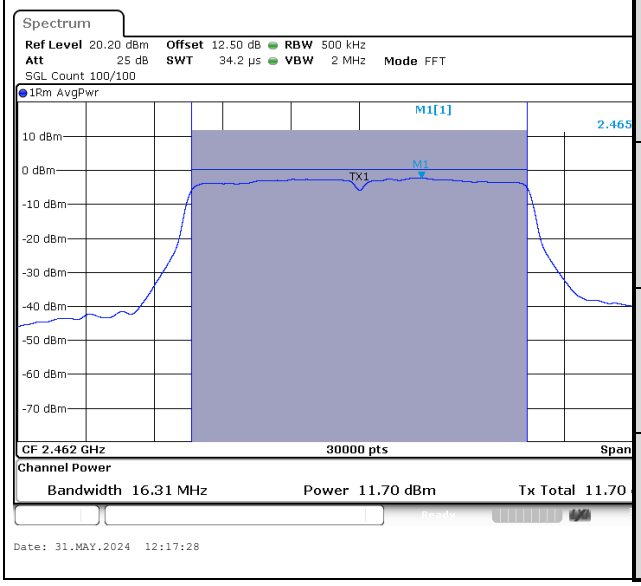
Cmin



Cmid



Cmax

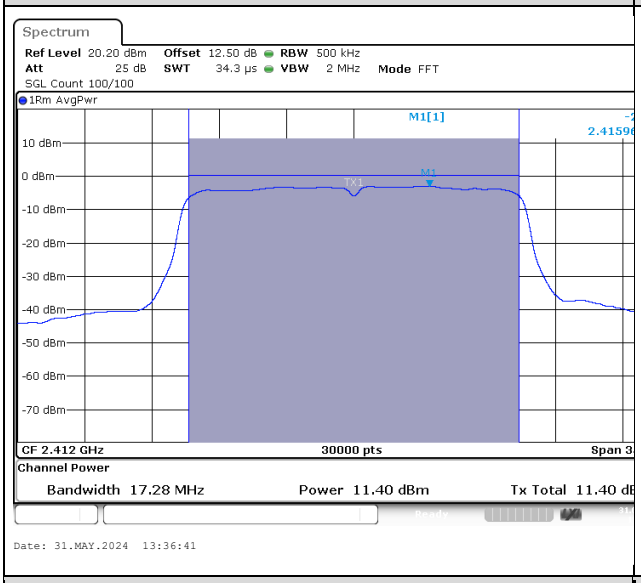


Configuration: WiFi - 802.11g 6MBits/s

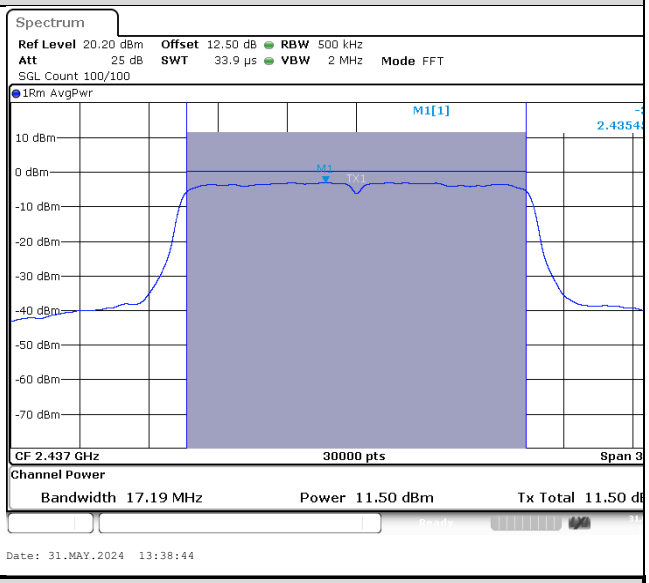
Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Conducted Power (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	10.97	**30**
Cmid	12.3	1.1	0.8	11.27	**30**
Cmax	12.3	1.1	0.8	11.7	**30**

Maximum Conducted Output Power

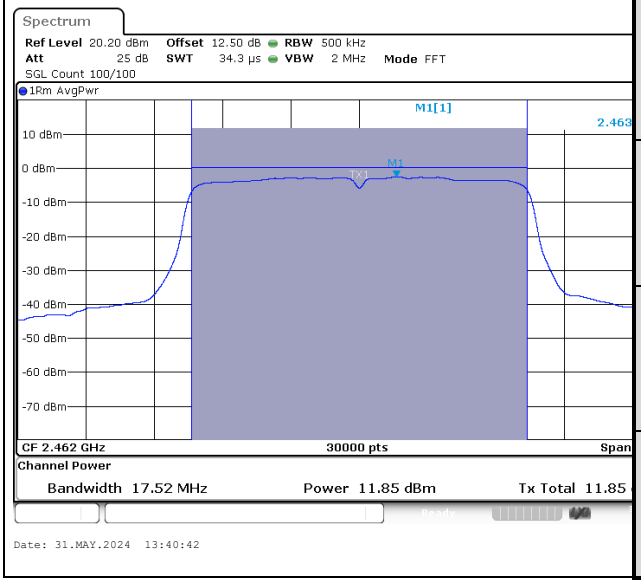
Cmin



Cmid



Cmax

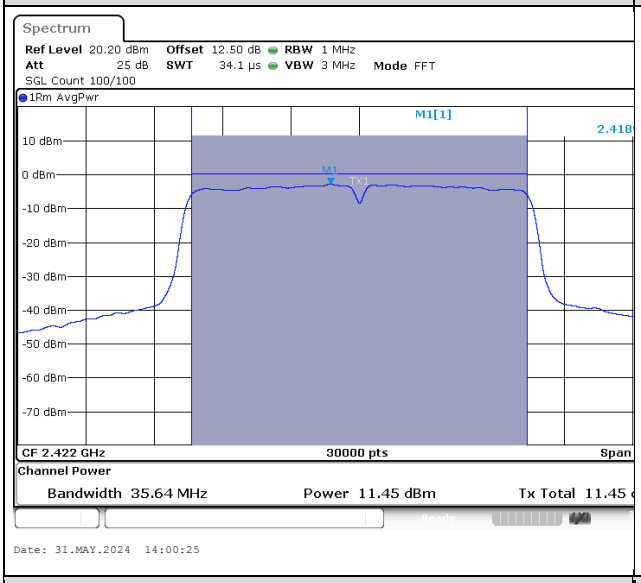


Configuration: WiFi - 802.11n HT20 MCS0

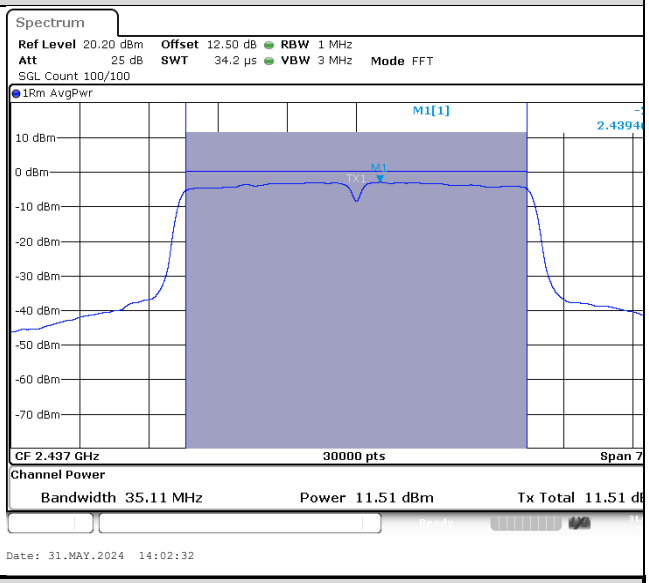
Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Conducted Power (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	11.4	**30**
Cmid	12.3	1.1	0.8	11.5	**30**
Cmax	12.3	1.1	0.8	11.85	**30**

Maximum Conducted Output Power

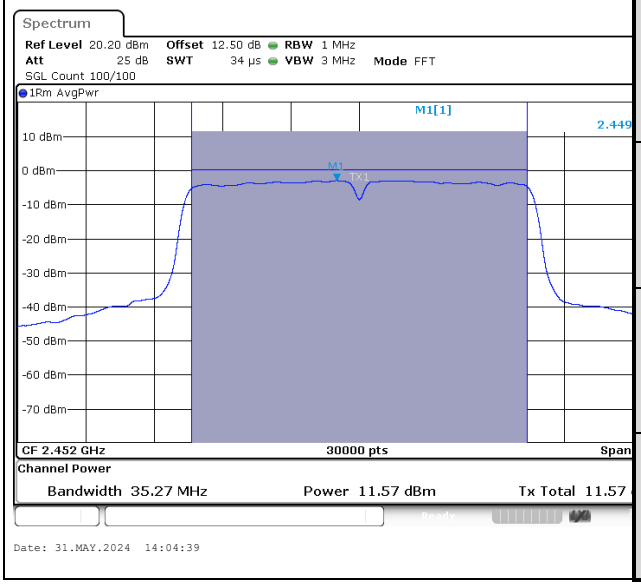
Cmin



Cmid



Cmax



Configuration: WiFi - 802.11n HT40 MCS0

Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Conducted Power (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	11.45	**30**
Cmid	12.3	1.1	0.8	11.51	**30**
Cmax	12.3	1.1	0.8	11.57	**30**

6.7. CONCLUSION

Maximum Output Conducted Power measurement performed on the sample of the product **AXIUM RX9000**, Sn: **2419MR900209 / 2419MR900267**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

7. POWER SPECTRAL DENSITY

7.1. TEST CONDITIONS

Date of test	:	May 31, 2024
Test performed by	:	Akram HAKKARI
Relative humidity (%)	:	34
Ambient temperature (°C)	:	21

7.2. TEST SETUP

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure used: KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)

KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)

Subclause 11.10 of ANSI C63.10 is applicable

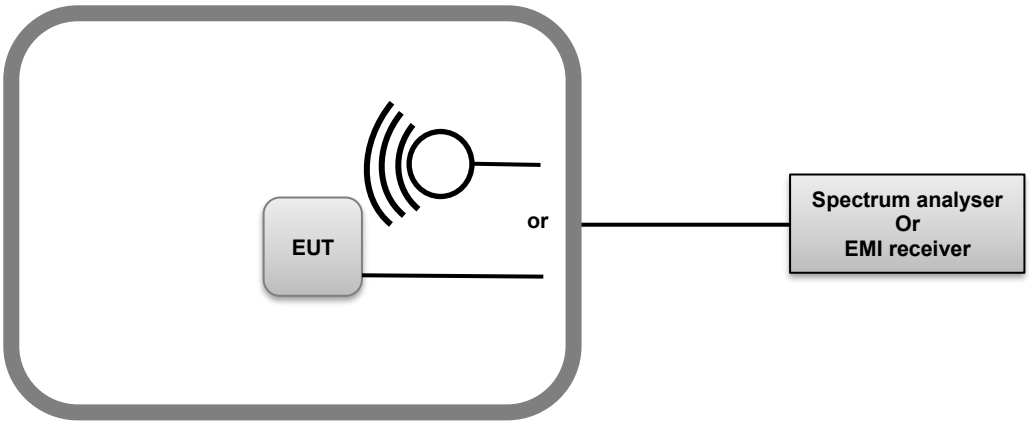
- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: 3 kHz.
- Set the VBW ≥ 3 x RBW.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method AVGPSD-1)

Subclause 11.10 of ANSI C63.10 is applicable

Method AVGPSD-1 uses trace averaging with EUT transmitting at full power throughout each sweep. The following procedure may be used when the maximum (average) conducted output power was used to determine compliance to the fundamental output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has a power averaging (rms) detector, then it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously (D ≥ 98%), or else sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter OFF time to be considered):

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
- d) Set VBW ≥ [3 × RBW].
- e) Detector = power averaging (rms) or sample detector (when rms not available).
- f) Ensure that the number of measurement points in the sweep ≥ [2 × span / RBW].
- g) Sweep time = auto couple.
- h) Employ trace averaging (rms) mode over a minimum of 100 traces.
- i) Use the peak marker function to determine the maximum amplitude level.
- j) If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).



Test setup of Power Spectral Density

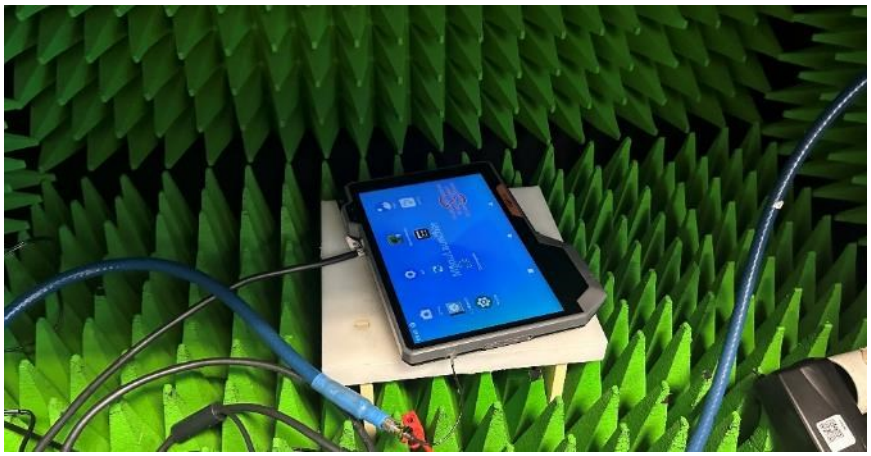


Photo of Power Spectral Density

7.3. *LIMIT*

Frequency range	Power Spectral Density
902.000 -928MHz 2400MHz to 2483.5MHz 5725-5850 MHz	≤8dBm / 3kHz *

*Remark: Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

7.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122268	07/23	07/25
Cable Measure	_	36G	A5329604	02/24	02/25
Full Anechoic Room	SIEPEL	_	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
SMK 1.2m (Ampl <-> chamber)	HUBER-SUHNER	SUCOFLEX 102	A5330062	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/26
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25

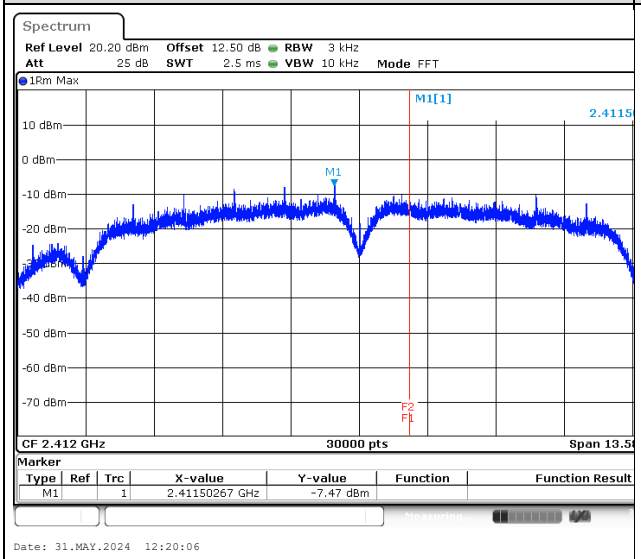
7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

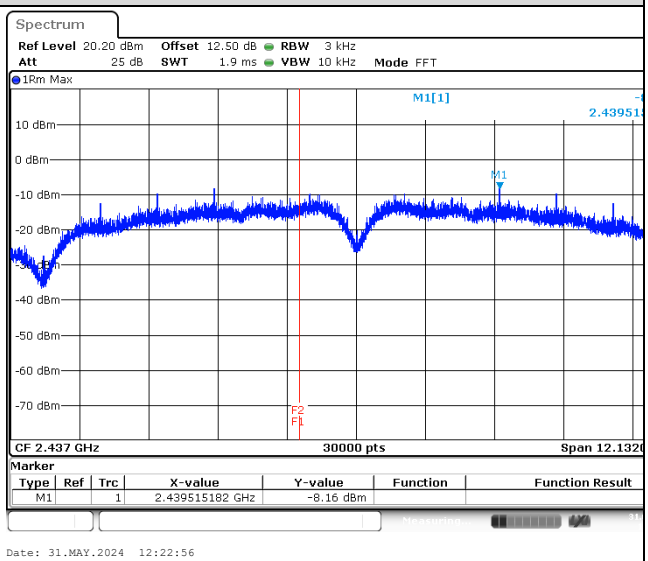
7.6. RESULTS

Power Spectral Density

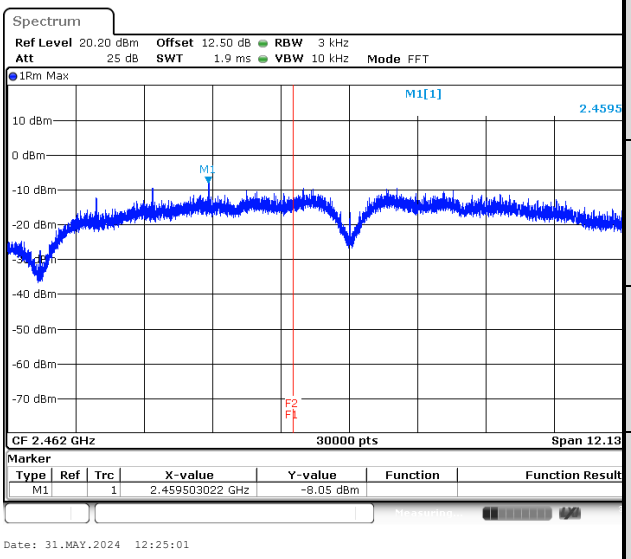
Cmin



Cmid

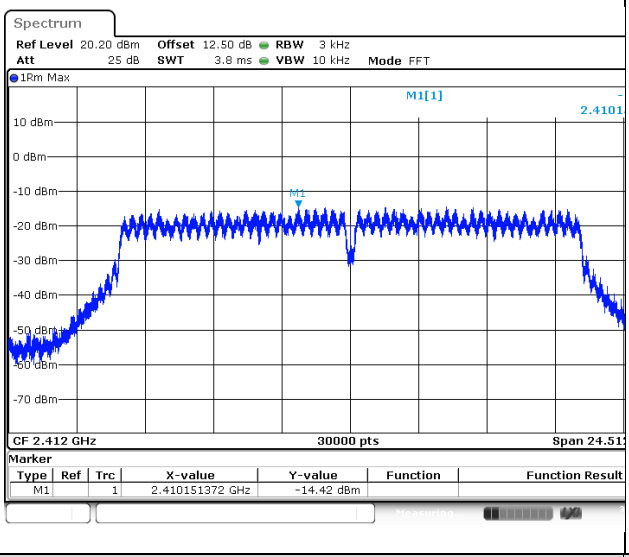
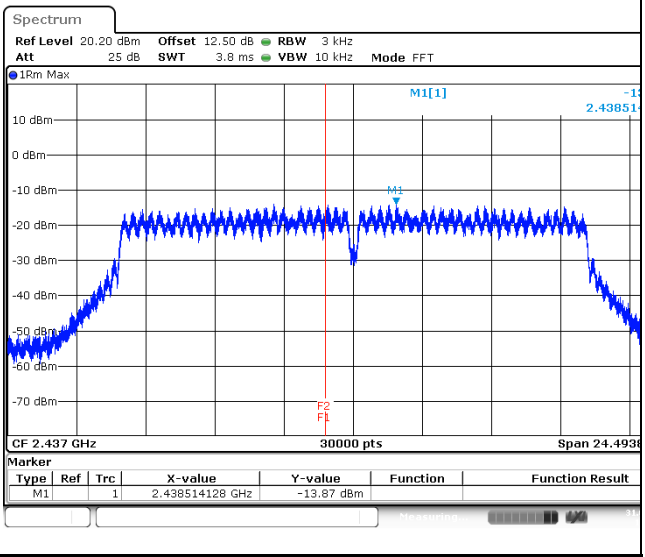
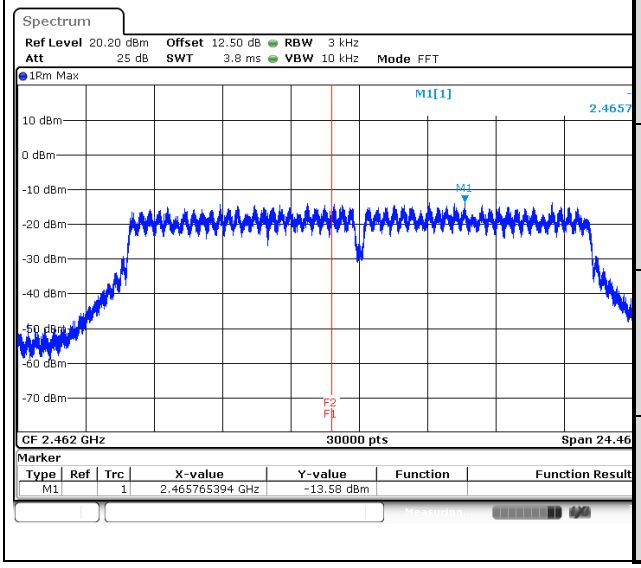


Cmax



Configuration: WiFi - 802.11b 1MBits/s

Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Power Spectral Density (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	-7.47	**≤ 8**
Cmid	12.3	1.1	0.8	-8.16	**≤ 8**
Cmax	12.3	1.1	0.8	-8.05	**≤ 8**

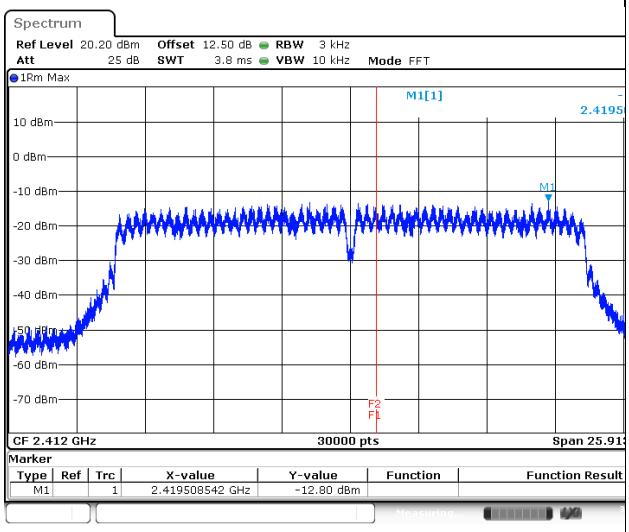
Power Spectral Density	
Cmin	**Cmid**
	
Cmax	
	

Configuration: WiFi - 802.11g 6MBits/s

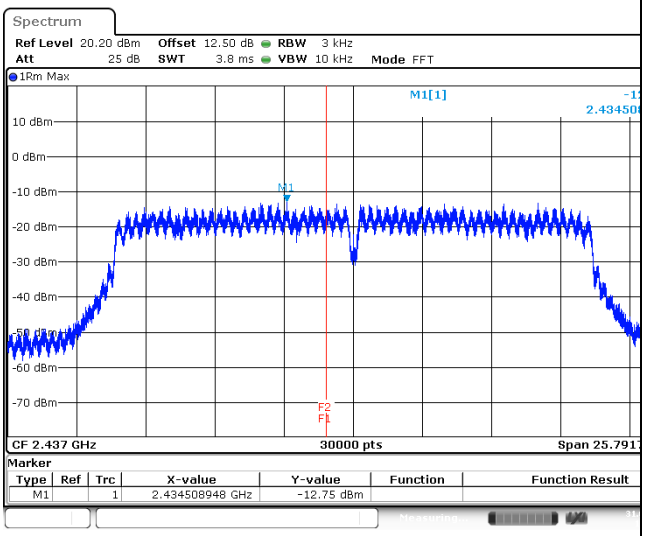
Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Power Spectral Density (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	-14.42	**≤ 8**
Cmid	12.3	1.1	0.8	-13.87	**≤ 8**
Cmax	12.3	1.1	0.8	-12.58	**≤ 8**

Power Spectral Density

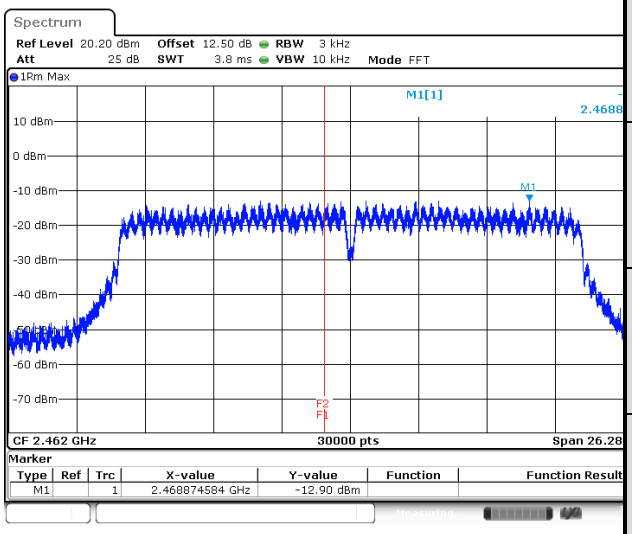
Cmin



Cmid



Cmax

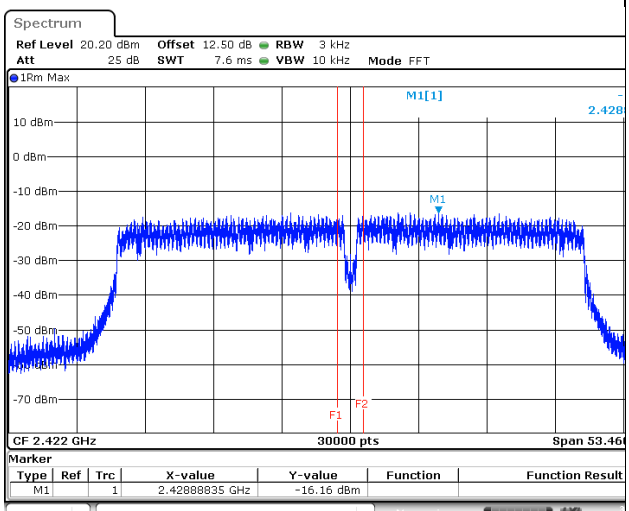


Configuration: WiFi - 802.11n HT20 MCS0

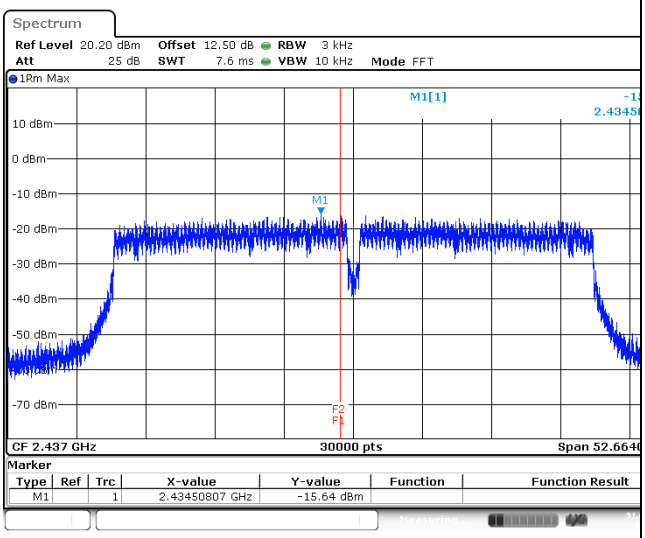
Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Power Spectral Density (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	-12.8	**≤ 8**
Cmid	12.3	1.1	0.8	-12.75	**≤ 8**
Cmax	12.3	1.1	0.8	-12.9	**≤ 8**

Power Spectral Density

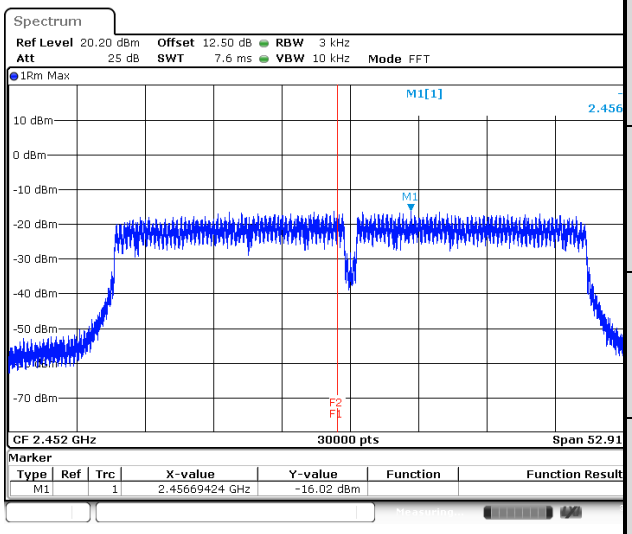
Cmin



Cmid



Cmax



Configuration: WiFi - 802.11n HT40 MCS0

Channel	Offset Cable+Att (dB)	Antenna Gain (dBi)	Duty Cycle Factor (dB)	Power Spectral Density (dBm)	Limit (dBm)
Cmin	12.3	1.1	0.8	-16.16	**≤ 8**
Cmid	12.3	1.1	0.8	-15.64	**≤ 8**
Cmax	12.3	1.1	0.8	-16.02	**≤ 8**

7.7. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **AXIUM RX9000**, Sn: **2419MR900209 / 2419MR900267**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

8. UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

8.1. TEST CONDITIONS

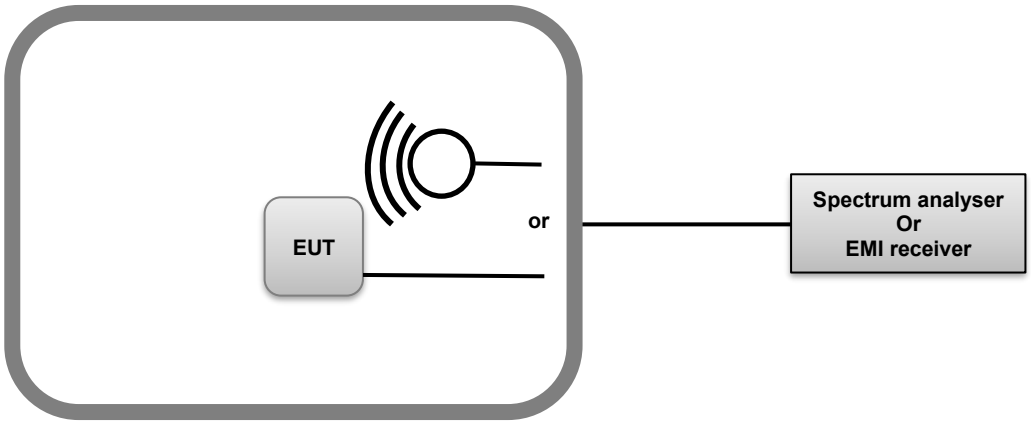
Date of test	:	May 31, 2024
Test performed by	:	Akram HAKKARI
Relative humidity (%)	:	34
Ambient temperature (°C)	:	21

8.2. *TEST SETUP*

The Equipment Under Test is installed in an anechoic chamber.
Measurement is performed with a spectrum analyzer in conducted method.

The EUT is turned ON, the captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Test Procedure:
KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test setup of Unwanted emissions in non-restricted frequency bands

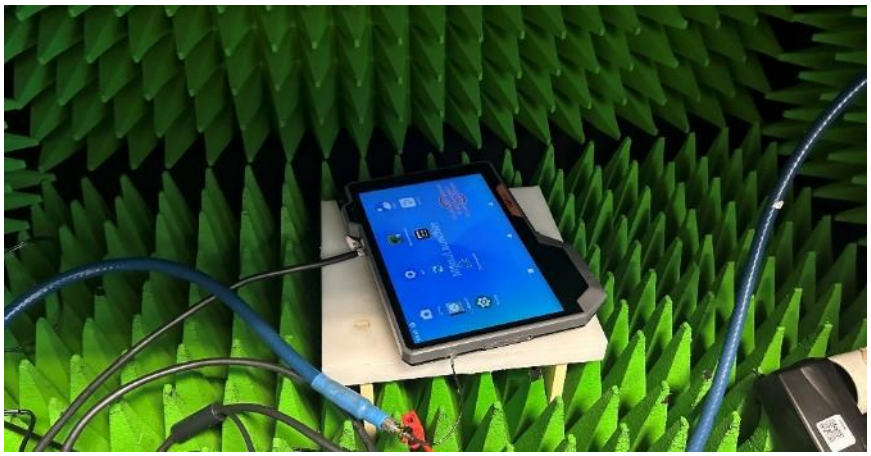


Photo of Unwanted emissions in non-restricted frequency bands

8.3. *LIMIT*

All Spurious Emissions must be at least 20dB below the Fundamental Radiator Level at the Band Edge of operating frequency band and in non-restricted bands.

8.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Attenuator 10dB	AEROFLEX	_	A7122268	07/23	07/25
Cable Measure	_	36G	A5329604	02/24	02/25
Full Anechoic Room	SIEPEL	_	D3044024		
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
SMK 1.2m (Ampl <-> chamber)	HUBER-SUHNER	SUCOFLEX 102	A5330062	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/26
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25

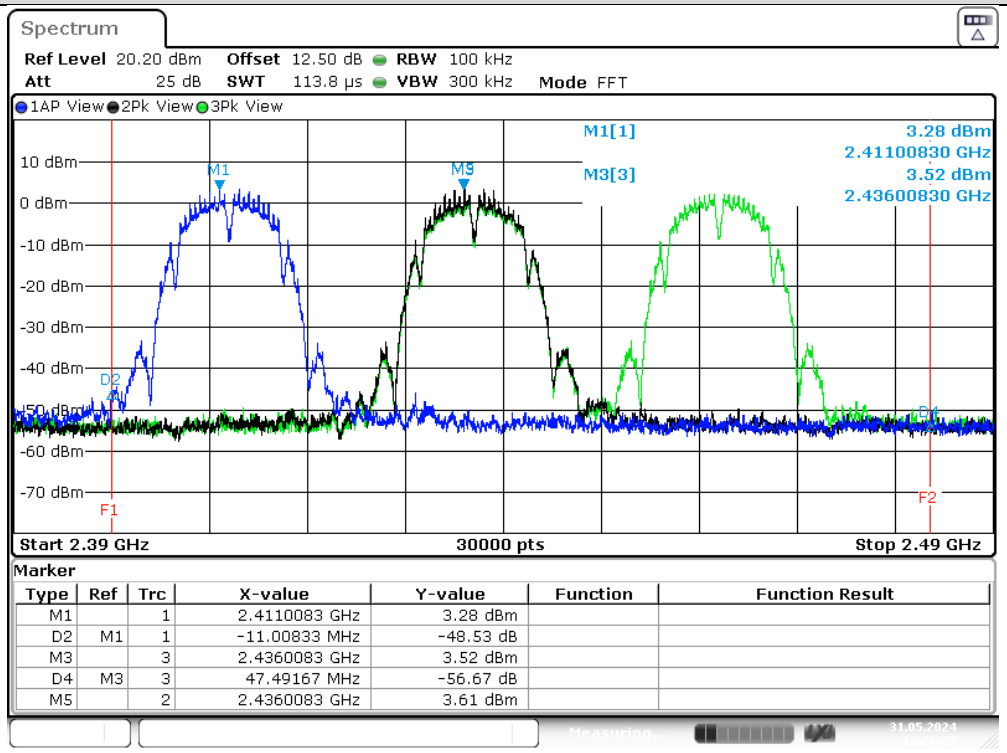
8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

8.6. RESULTS

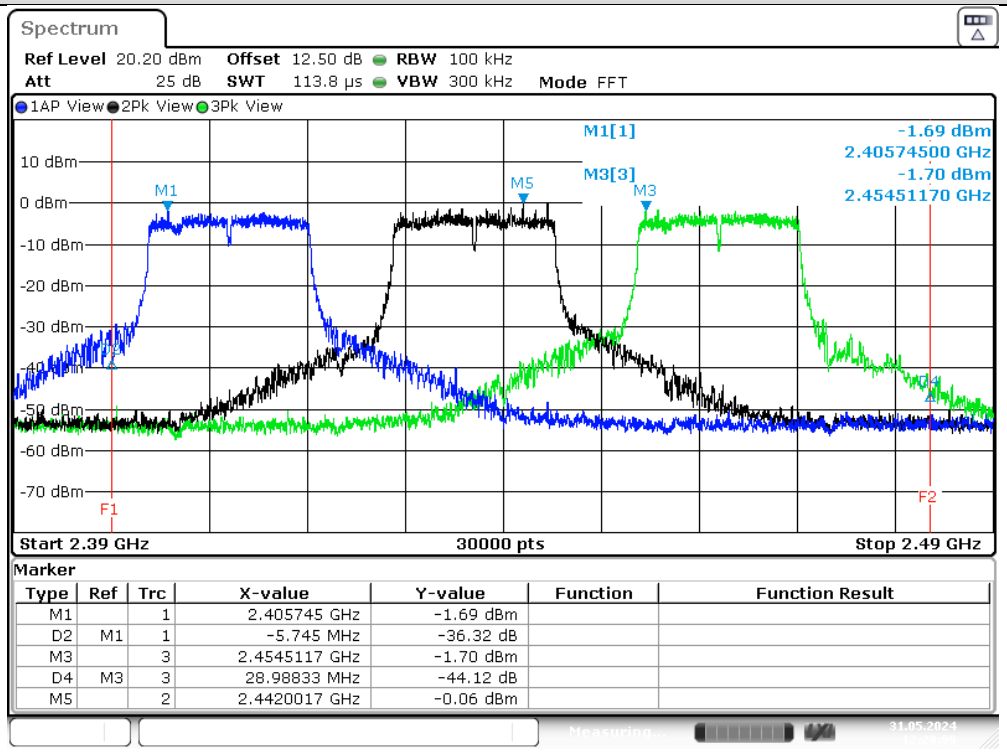
8.6.1. Operational frequency band

Unwanted emissions in non-restricted bands at the band edge
Configuration: WiFi - 802.11b 1MBits/s
Cmin / Cmid / Cmax
Delta limit (dBc) determination
Tx1



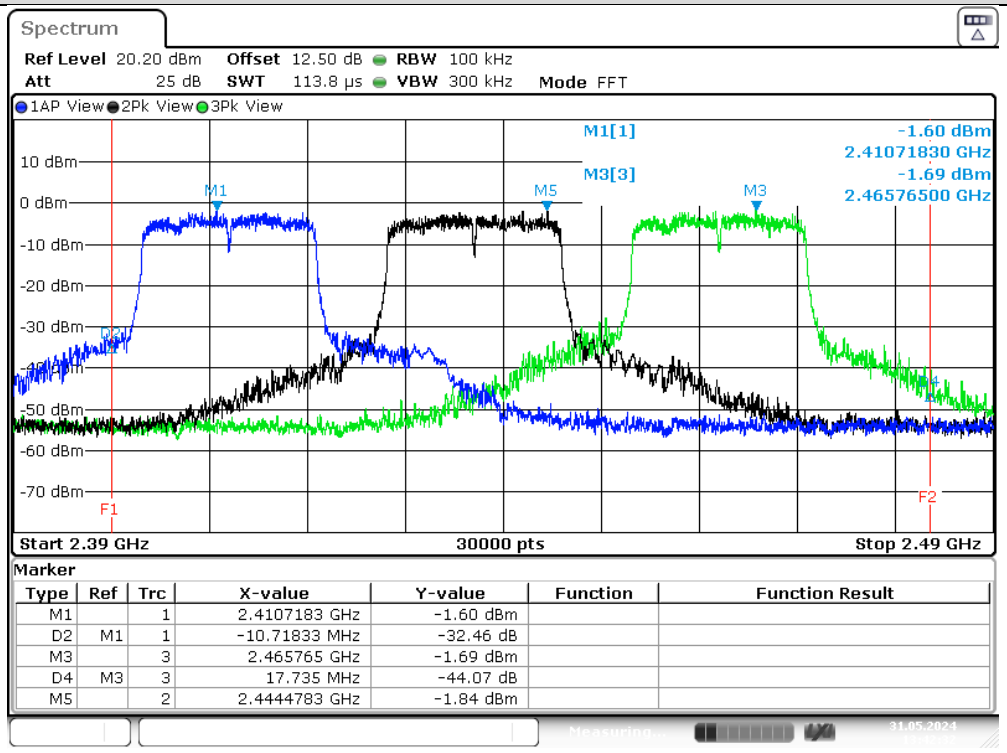
Frequency (MHz)	Level (dBc)	Limit (dBc)
C_{min}	-48.53	**-20**
C_{max}	-56.67	**-20**

Unwanted emissions in non-restricted bands at the band edge
Configuration: WiFi - 802.11g 6MBits/s
Cmin / Cmid / Cmax
Delta limit (dBc) determination
Tx1



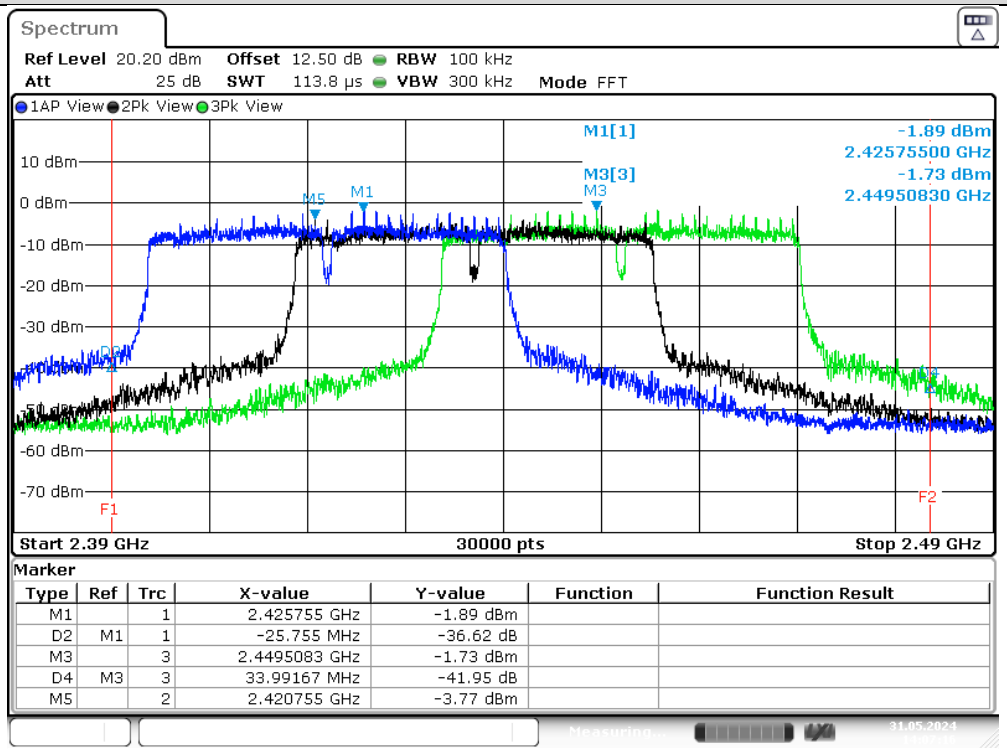
Frequency (MHz)	Level (dBc)	Limit (dBc)
C_{min}	-36.32	**-20**
C_{max}	-44.12	**-20**

Unwanted emissions in non-restricted bands at the band edge
Configuration: WiFi - 802.11n HT20 MCS0
Cmin / Cmid / Cmax
Delta limit (dBc) determination
Tx1



Frequency (MHz)	Level (dBc)	Limit (dBc)
C_{min}	-32.46	**-20**
C_{max}	-44.07	**-20**

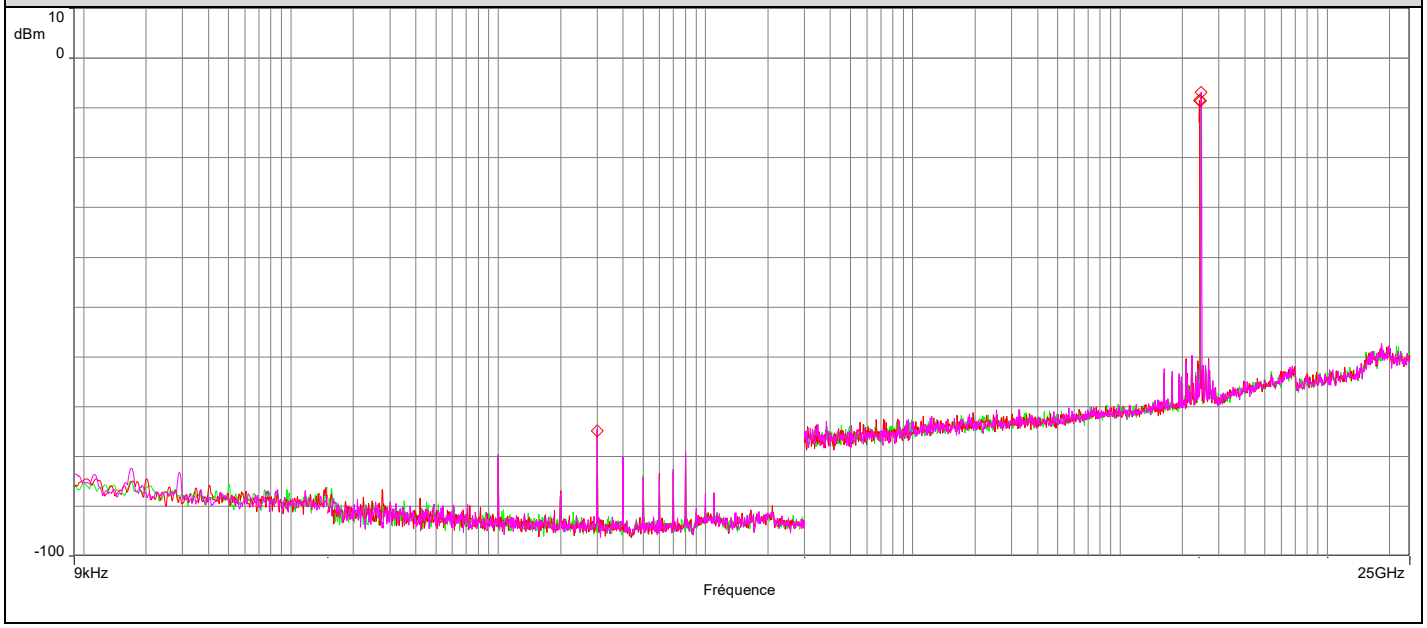
Unwanted emissions in non-restricted bands at the band edge
Configuration: WiFi - 802.11n HT40 MCS0
Cmin / Cmid / Cmax
Delta limit (dBc) determination
Tx1



Frequency (MHz)	Level (dBc)	Limit (dBc)
C_{min}	-36.62	**-20**
C_{max}	-41.95	**-20**

8.6.2. Non restricted band

Unwanted emissions in non-restricted bands at the band edge
Configuration: WiFi - 802.11b 1MBits/s
Cmin / Cmid / Cmax



Frequency (MHz)	Level (dBm)	Level (dBc)	Limit (dBc)
2.99	-83.2	-74.78	-20
2412.41	-8.42		
18275.5	-57.3	-48.88	-20

8.7. CONCLUSION

Unwanted emissions in non-restricted bands and at the band edge measurement performed on the sample of the product **AXIUM RX9000**, Sn: **2419MR900209 / 2419MR900267**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

9. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

9.1. *TEST CONDITIONS*

Date of test : May 21, 2024
Test performed by : Akram HAKKARI
Relative humidity (%) : 34
Ambient temperature (°C) : 22

9.2. *TEST SETUP*

Test procedure:
ANSI C63.10 & FCC Part 15 subpart C

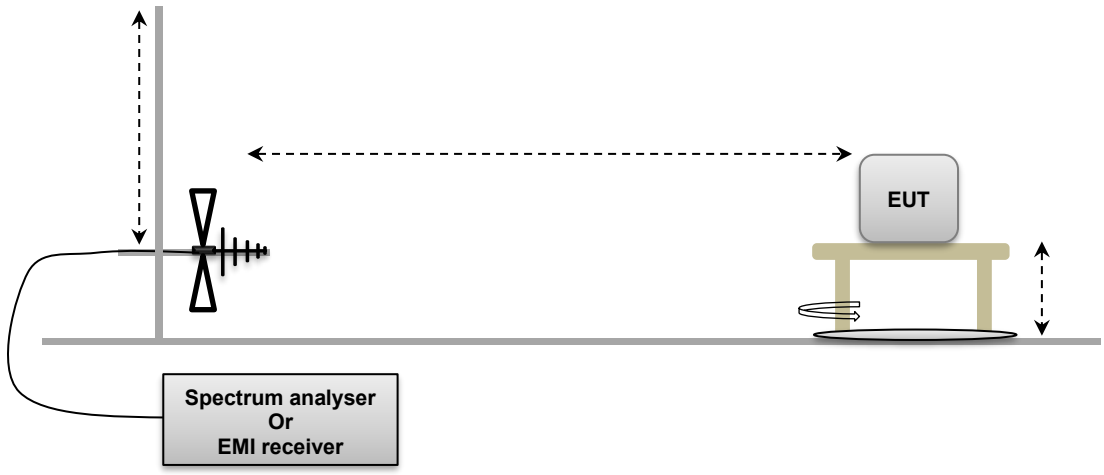
Following frequency ranges, test setup parameters are different and specified in this table:

Frequency range:	**9kHz to 30MHz**	
Test:	**Pre-Characterization**	**Qualification**
Antenna Polarization:	Parallel, Perpendicular and Ground parallel	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	1m
Antenna Type:	Loop	
RBW Filter:	200Hz below 150kHz / 9kHz above 150kHz	
Maximization:	Turntable rotation of 360 degrees range and all axis of EUT used in normal configuration	
EUT height:	1.5m	0.8m
Test site:	Full Anechoic Chamber	Open Aera Test Site
Distance EUT - Antenna:	3m	10m
Detector:	Peak	QPeak

Frequency range:	**30MHz to 1GHz**	
Test:	**Pre-Characterization**	**Qualification**
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Varied from 1m to 4m
Antenna Type:	Bi-Log	
RBW Filter:	120kHz	
Maximization:	Turntable rotation of 360 degrees range and all axis of EUT used in normal configuration	
EUT height:	1.5m	0.8m
Test site:	Full Anechoic Chamber	Open Aera Test Site
Distance EUT - Antenna:	3m	10m
Detector:	Peak	QPeak

Frequency range:	1GHz to 14GHz	
Test:	**Pre-Characterization**	**Qualification**
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Centered on EUT (§6.6.5 ANSI C63-10)
Antenna Type:	Horn	
RBW Filter:	1MHz	
Maximization:	Turntable rotation of 360 degrees range and all axis of EUT used in normal configuration	
EUT height:	1.5m	1.5m
Test site:	Full Anechoic Chamber	Full Anechoic Chamber
Distance EUT - Antenna:	3m	3m
Detector:	Peak & Average	Peak & Average

Frequency range:	14GHz to 25GHz	
Test:	**Pre-Characterization**	**Qualification**
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Centered on EUT (§6.6.5 ANSI C63-10)
Antenna Type:	Horn	
RBW Filter:	1MHz	
Maximization:	Turntable rotation of 360 degrees range and all axis of EUT used in normal configuration	
EUT height:	1.5m	1.5m
Test site:	Full Anechoic Chamber	Full Anechoic Chamber
Distance EUT - Antenna:	1m	1m
Detector:	Peak & Average	Peak & Average



Test setup of Unwanted Emissions in Restricted Frequency Bands

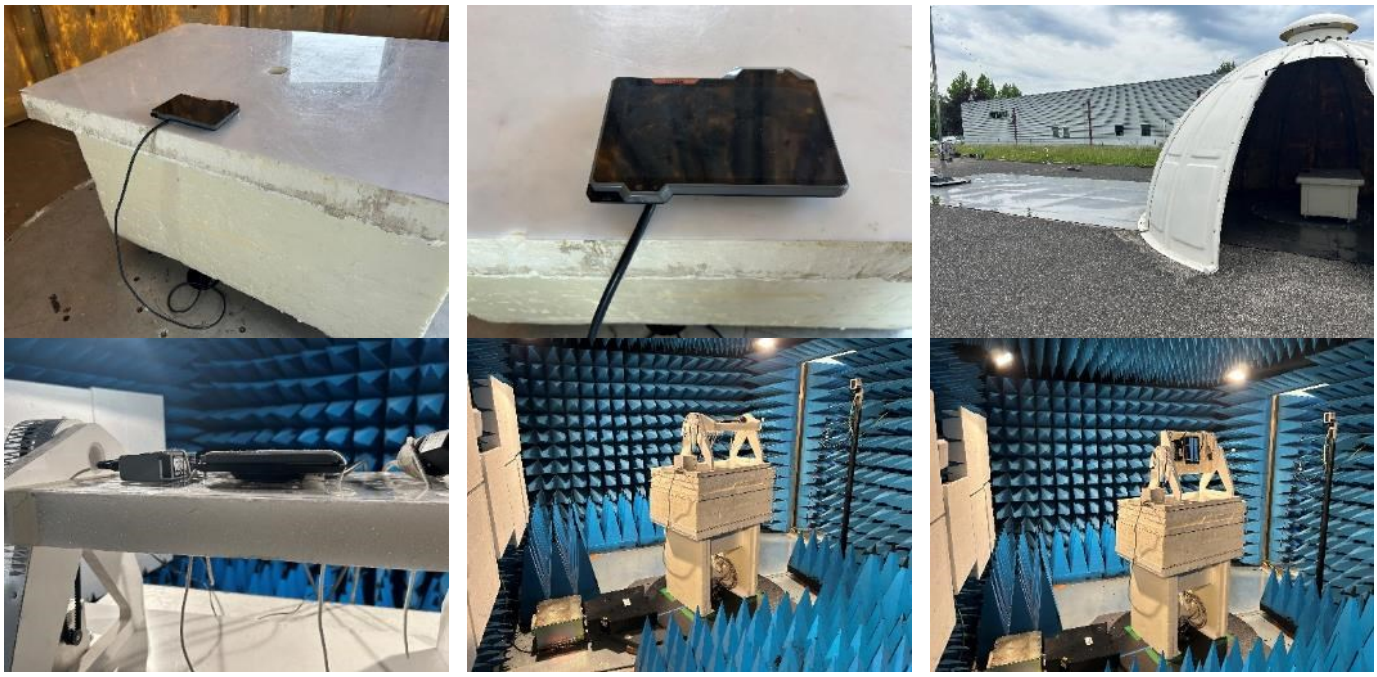


Photo of Unwanted Emissions in Restricted Frequency Bands

9.3. *LIMIT*

Measure at 300m		
Frequency range	**Level**	**Detector**
9kHz-490kHz	67.6dBµV/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	**Level**	**Detector**
490kHz-1.705MHz	87.6dBµV/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dBµV/m	QPeak
Measure at 10m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	29.5dBµV/m	QPeak
88MHz to 216MHz	33dBµV/m	QPeak
216MHz to 960MHz	35.5BµV/m	QPeak
960MHz to 1000MHz	43.5dBµV/m	QPeak
Above 1000MHz	63.5dBµV/m	Peak
	43.5dBµV/m	Average
Measure at 3m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	40dBµV/m	QPeak
88MHz to 216MHz	43.5dBµV/m	QPeak
216MHz to 960MHz	46BµV/m	QPeak
960MHz to 1000MHz	54dBµV/m	QPeak
Above 1000MHz	74dBµV/m	Peak
	54dBµV/m	Average

9.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Amplifier 10MHz - 18GHz	LCIE SUD EST	_	A7102082	05/22	05/24
Antenna Bi-log	AH System	SAS-521-7	C2040180	05/23	05/25
Antenna horn 18GHz	EMCO	3115	C2042029	03/22	03/25
BAT EMC	NEXIO	v3.21.0.32	L1000115		
CABLE	TELEDYNE	R82-0404-0.5M	A5330010	03/22	03/25
Cable 0.75m	-	18GHz	A5329900	08/22	08/24
Cable SMA 40cm	WITHWAVE	W101-SM1-0.4M	A5329979	10/23	10/26
Comb EMR HF	YORK	CGE01	A3169114		
CONTROLLER	INNCO	CO3000	D3044034		
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	08/22	08/25
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	08/22	08/25
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	03/23	03/25
Rehausse Table C3	LCIE	_	F2000511		
Rehausse Table C3	LCIE	_	F2000507		
Semi-Anechoic chamber #3 (BF)	SIEPEL	_	D3044017_BF	04/22	04/25
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	_	D3044017_VSWR	04/22	04/25
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/23	09/25
Table C3	LCIE	_	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
TILT	INNCO	TILT	D3044033		
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		

9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

9.6. RESULTS

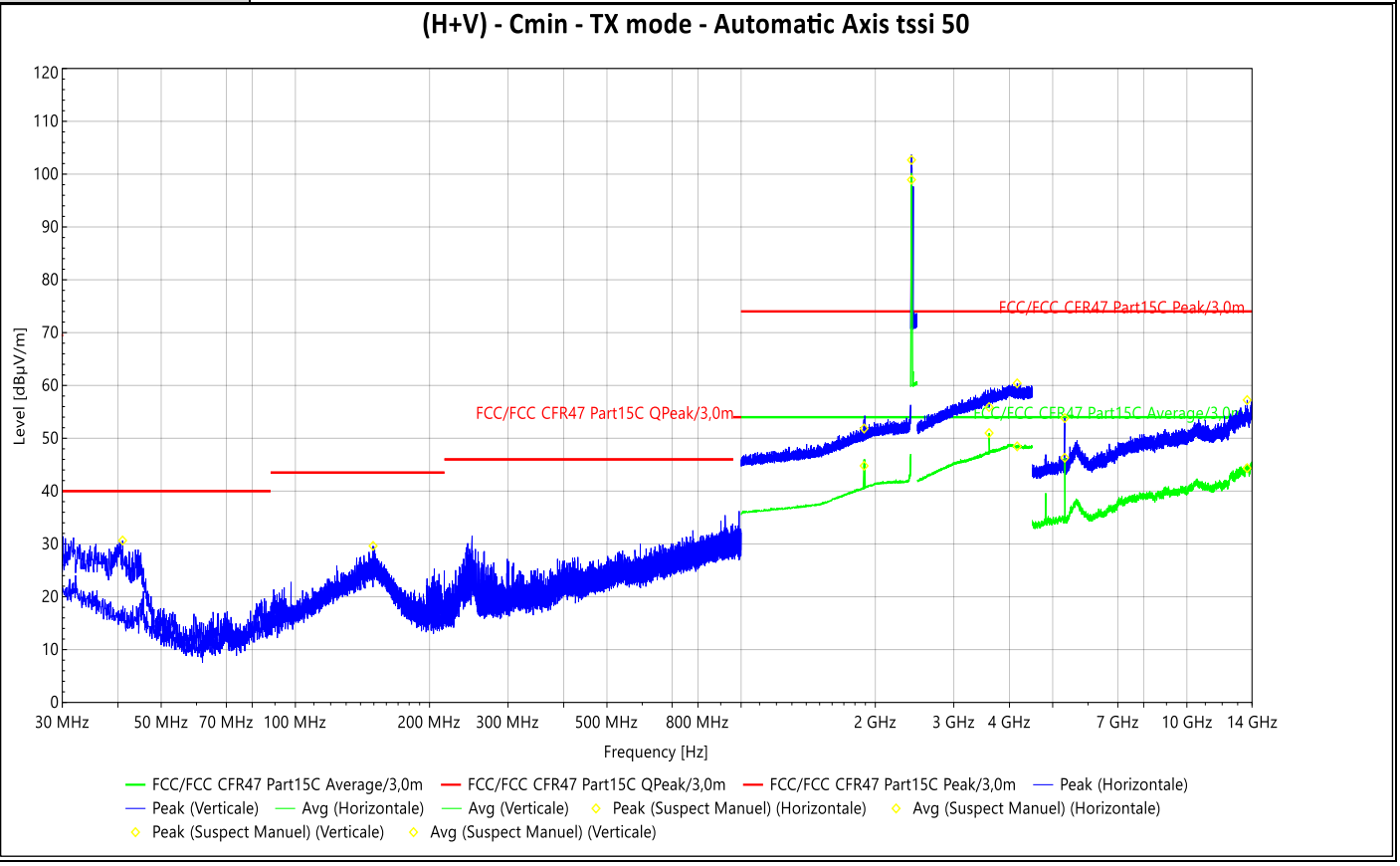
For all following measurements, worst case is presented with different configurations and modulations of EUT.

9.6.1. 30MHz to 14GHz

Graphs – Pre characterization:

Graph identifier		Polarization	Mode	Channel	EUT position	Comments
Emr#	1	H/V	TX	Cmin	Axis XY/Z	Supply 1
Emr#	2	H/V	TX	Cmid	Axis XY/Z	Supply 1
Emr#	3	H/V	TX	Cmax	Axis XY/Z	Supply 1
Emr#	4	H/V	TX	Cmin	Axis XY/Z	Supply 2
Emr#	5	H/V	TX	Cmid	Axis XY/Z	Supply 2
Emr#	6	H/V	TX	Cmax	Axis XY/Z	Supply 2

Radiated Emissions	
Graph name:	Emr#1
Frequency range:	30 MHz to 14 GHz

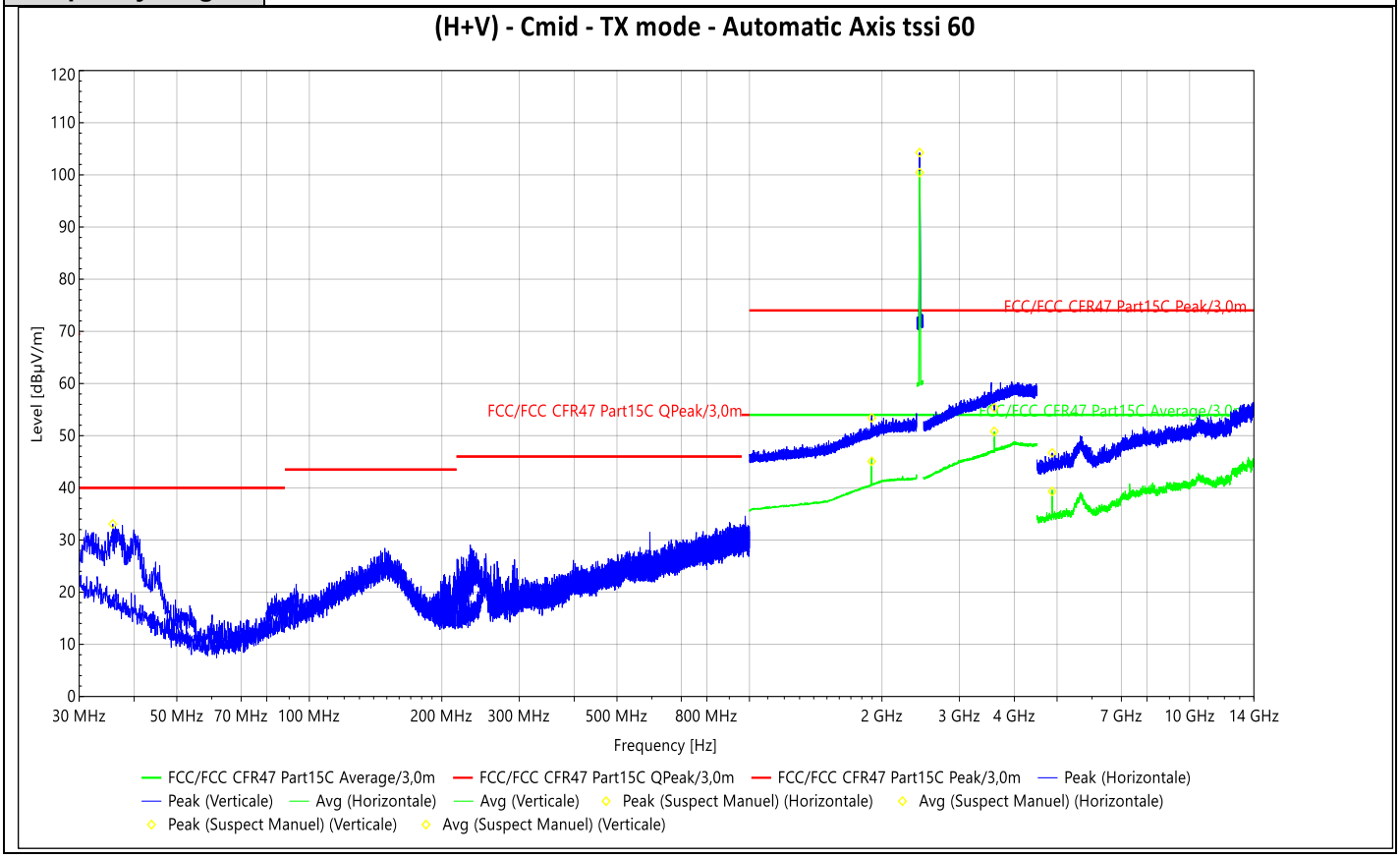


Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.QP (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
5.32175 GHz	53.82	74.00	46.31	54.00		79	H	-17.53
13.6523 GHz	57.24	74.00	44.35	54.00		0	V	-5.56
2.41106375 GHz*	102.68	74.00	98.93	54.00		255	H	35.72
149.406999 MHz	29.62				43.50	114	H	24.18
1.88725 GHz	51.85	74.00	44.79	54.00		262	H	34.67
3.599834399 GHz	55.90	74.00	50.99	54.00		262	H	40.39
4.1616313 GHz	60.40	74.00	48.47	54.00		42	V	41.58
40.961 MHz	30.65				40.00	314	V	16.22

*Carrier frequency
No significant frequency observed

Radiated Emissions	
Graph name:	Emr#2
Frequency range:	30 MHz to 14 GHz

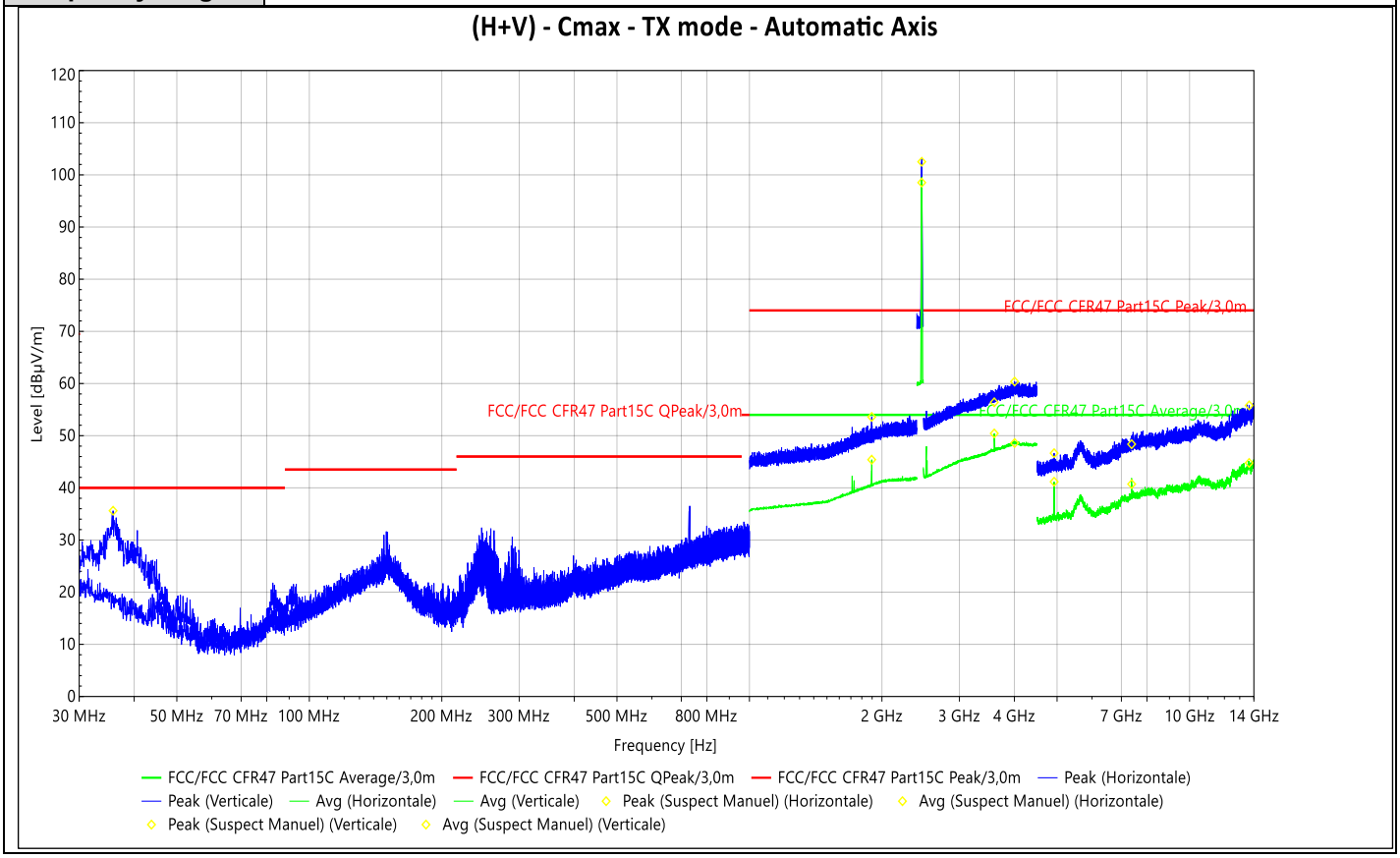


Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.QP (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
2.436072 GHz*	104.28	74.00	100.45	54.00	-	292	H	35.77
4.87335 GHz	46.71	74.00	39.32	54.00	-	205	V	-18.48
3.599834399 GHz	55.35	74.00	50.83	54.00	-	6	V	40.39
1.89565 GHz	53.41	74.00	45.09	54.00	-	268	V	34.73
35.7715 MHz	33.07	-	-	-	40.00	65	V	18.93

*Carrier frequency
No significant frequency observed

Radiated Emissions	
Graph name:	Emr#3
Frequency range:	30 MHz to 14 GHz

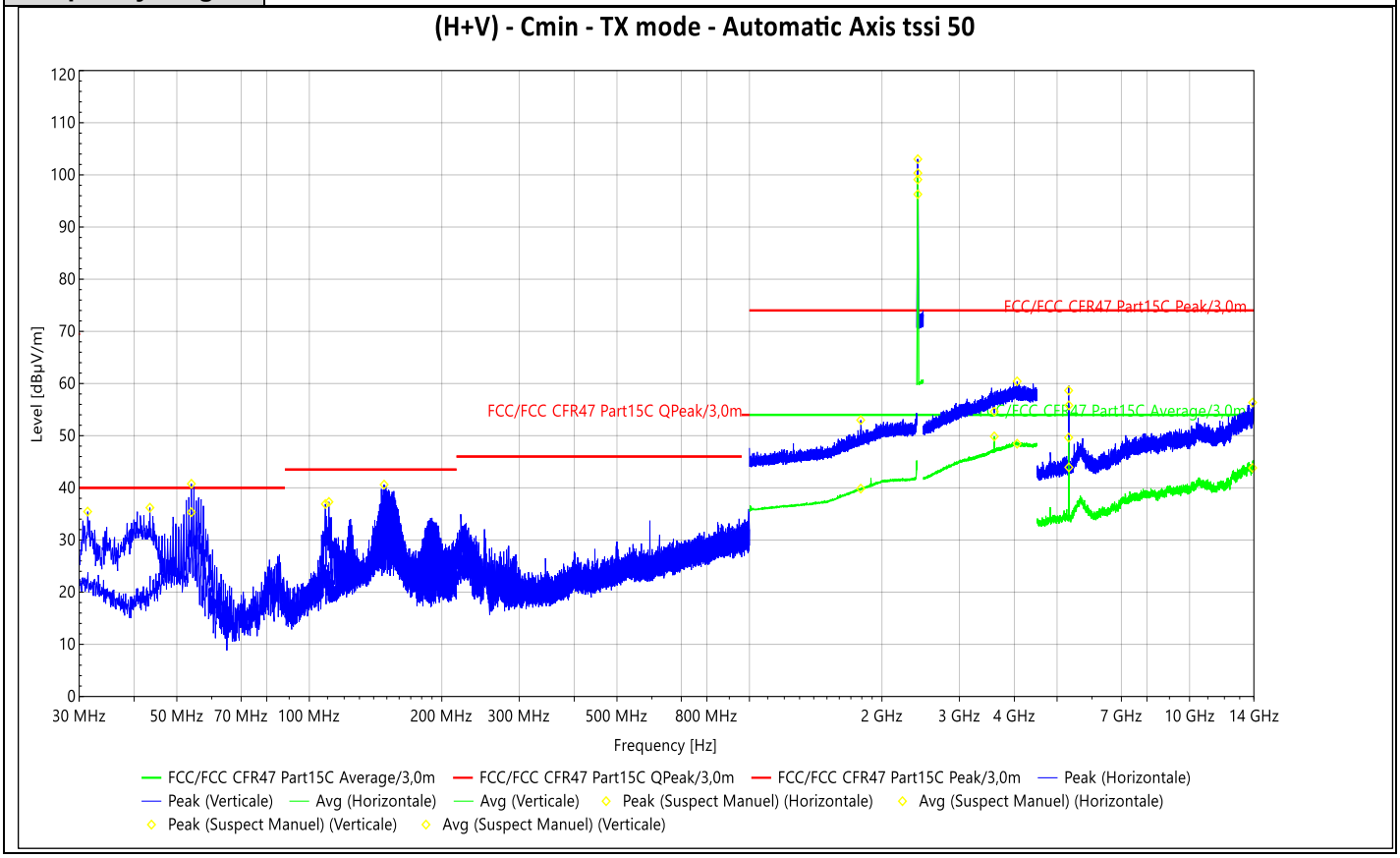


Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.QP (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
2.462959 GHz*	102.51	74.00	98.52	54.00		253	H	35.78
4.003941 GHz	60.38	74.00	48.60	54.00		97	H	41.73
13.6599 GHz	55.80	74.00	44.78	54.00		94	H	-5.52
4.9237 GHz	46.65	74.00	41.17	54.00		221	V	-18.37
7.3861 GHz	48.37	74.00	40.72	54.00		185	V	-12.91
3.599834399 GHz	56.40	74.00	50.43	54.00		34	V	40.39
1.89565 GHz	53.58	74.00	45.40	54.00		19	V	34.73
35.82 MHz	35.61				40.00	300	V	18.90

*Carrier frequency
Significant frequency observed

Radiated Emissions	
Graph name:	Emr#4
Frequency range:	30 MHz to 14 GHz

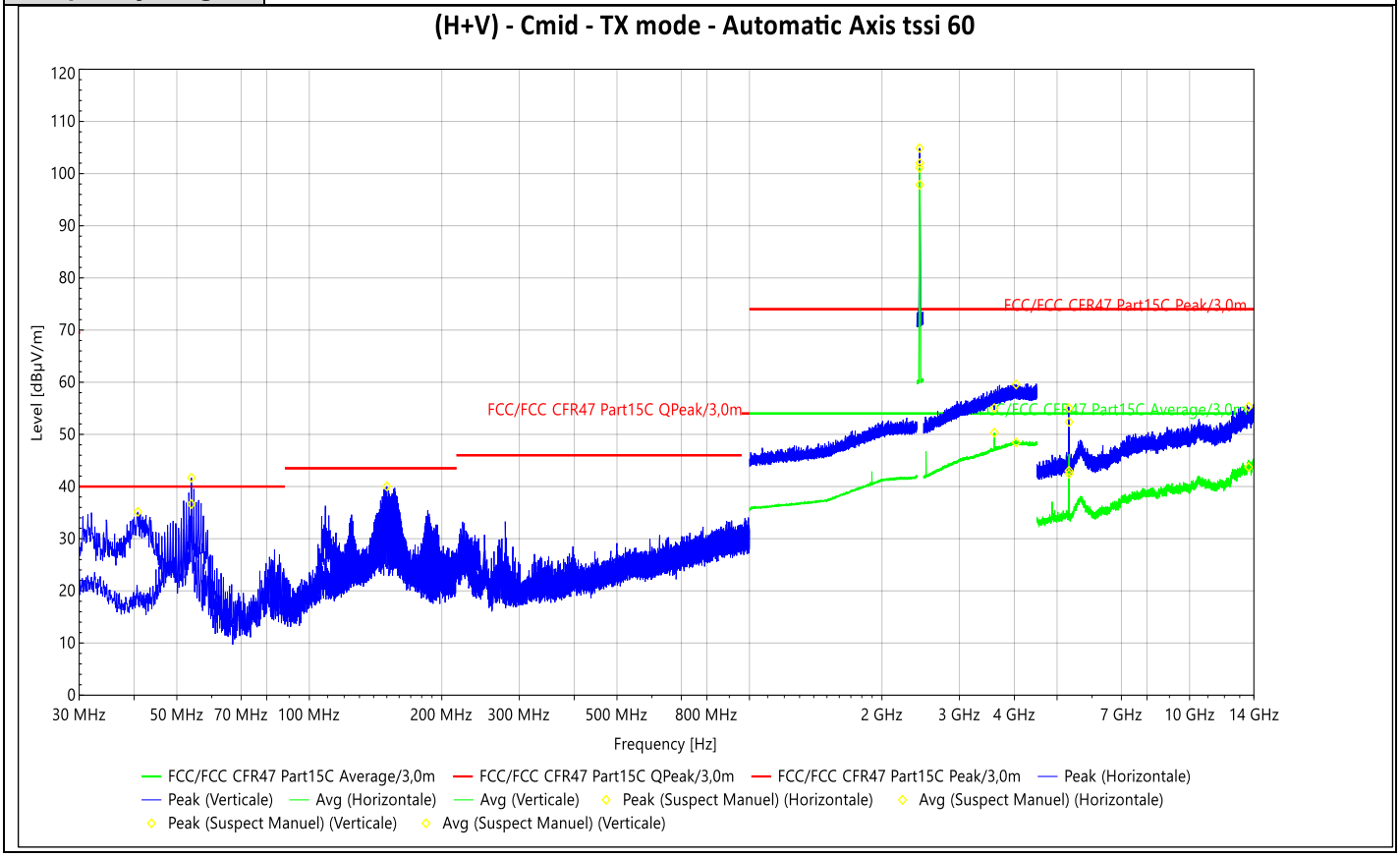


Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.QP (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
2.4129425 GHz*	103.01	74.00	99.10	54.00		166	H	35.72
5.31225 GHz	58.66	74.00	49.64	54.00		23	H	-17.57
13.90975 GHz	56.35	74.00	43.83	54.00		206	H	-4.50
5.31795 GHz	55.81	74.00	43.93	54.00		0	V	-17.54
53.959 MHz	35.33				40.00	0	H	11.04
108.764 MHz	36.90				43.50	135	H	18.37
110.801 MHz	37.30				43.50	319	H	18.79
1.789949999 GHz	52.98	74.00	39.85	54.00		94	H	34.03
3.599834399 GHz	54.62	74.00	49.86	54.00		74	H	40.39
4.0567733 GHz	60.42	74.00	48.46	54.00		87	H	41.68
2.4129425 GHz*	100.34	74.00	96.28	54.00		154	V	35.72
31.358 MHz	35.45				40.00	216	V	21.25
43.4345 MHz	36.20				40.00	146	V	14.98
53.959 MHz	40.78				40.00	84	V	11.04
147.9035 MHz	40.62				43.50	0	V	24.10

*Carrier frequency
Significant frequency observed

Radiated Emissions	
Graph name:	Emr#5
Frequency range:	30 MHz to 14 GHz

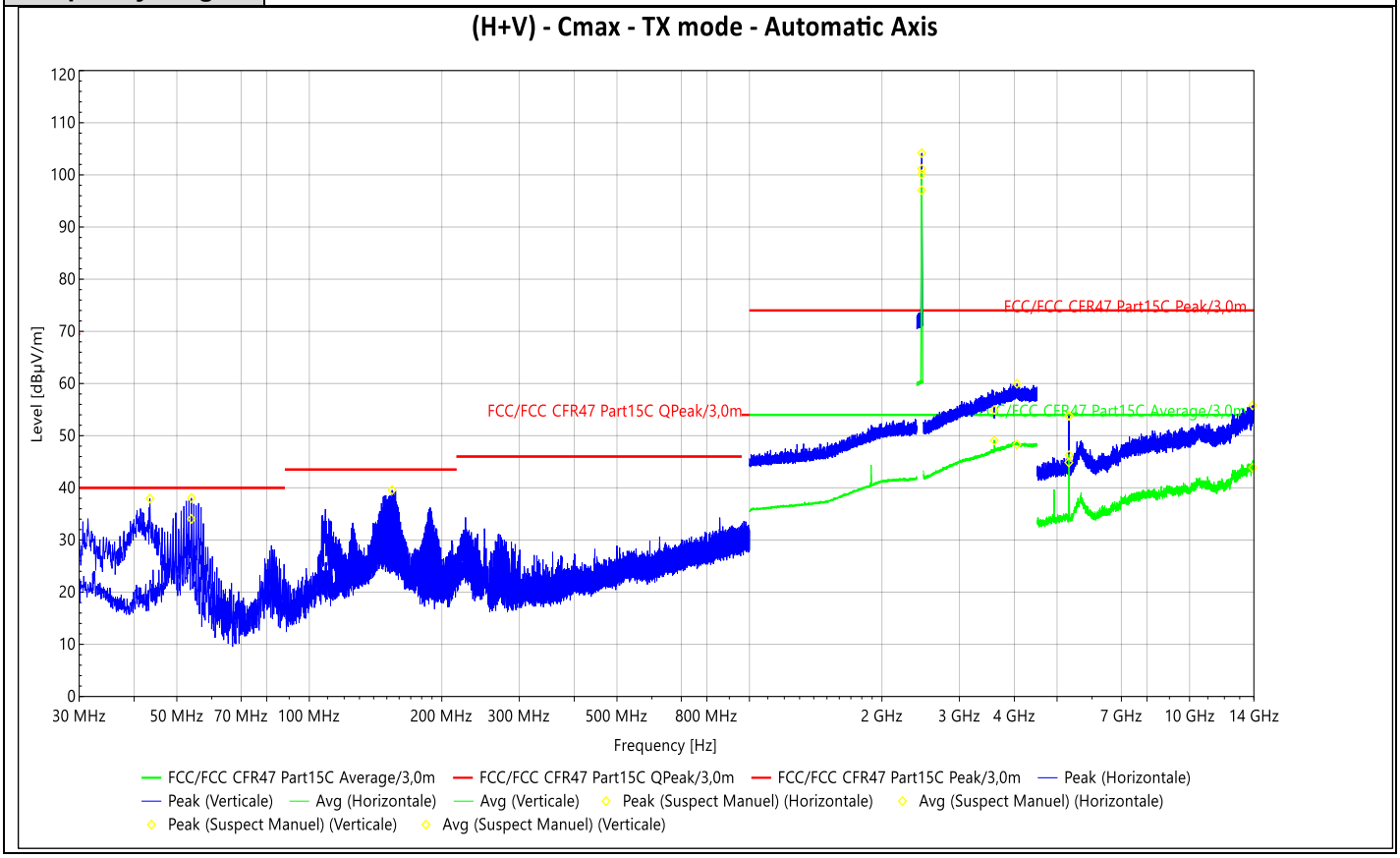


Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.QP (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
2.43603025 GHz*	104.88	74.00	101.10	54.00		178	H	35.77
5.32175 GHz	55.08	74.00	43.02	54.00		237	H	-17.53
5.3227 GHz	52.37	74.00	42.44	54.00		124	V	-17.52
13.6219 GHz	55.31	74.00	43.74	54.00		124	V	-5.74
53.959 MHz	36.64				40.00	0	H	11.04
3.599834399 GHz	55.04	74.00	50.32	54.00		141	H	40.39
4.036205 GHz	59.57	74.00	48.45	54.00		328	V	41.71
2.437909 GHz*	102.00	74.00	97.86	54.00		19	V	35.77
40.766999 MHz	35.15				40.00	313	V	16.32
53.959 MHz	41.69				40.00	107	V	11.04
150.0375 MHz	40.04				43.50	142	V	24.13

*Carrier frequency
Significant frequency observed

Radiated Emissions	
Graph name:	Emr#8
Frequency range:	30 MHz to 14 GHz



Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Lim.QP (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
2.462959 GHz*	104.18	74.00	100.13	54.00		167	H	35.78
53.959 MHz	34.05				40.00	19	H	11.04
5.317 GHz	53.82	74.00	44.87	54.00		96	H	-17.55
5.32365 GHz	53.83	74.00	46.26	54.00		84	V	-17.52
13.910699999 GHz	55.82	74.00	43.87	54.00		233	V	-4.49
3.599834399 GHz	54.94	74.00	49.07	54.00		152	V	40.39
4.051127099 GHz	59.98	74.00	48.32	54.00		0	V	41.69
2.46291725 GHz*	101.16	74.00	97.06	54.00		22	V	35.78
43.4345 MHz	37.96				40.00	355	V	14.98
53.959 MHz	38.05				40.00	358	V	11.04
154.2085 MHz	39.57				43.50	163	V	24.05

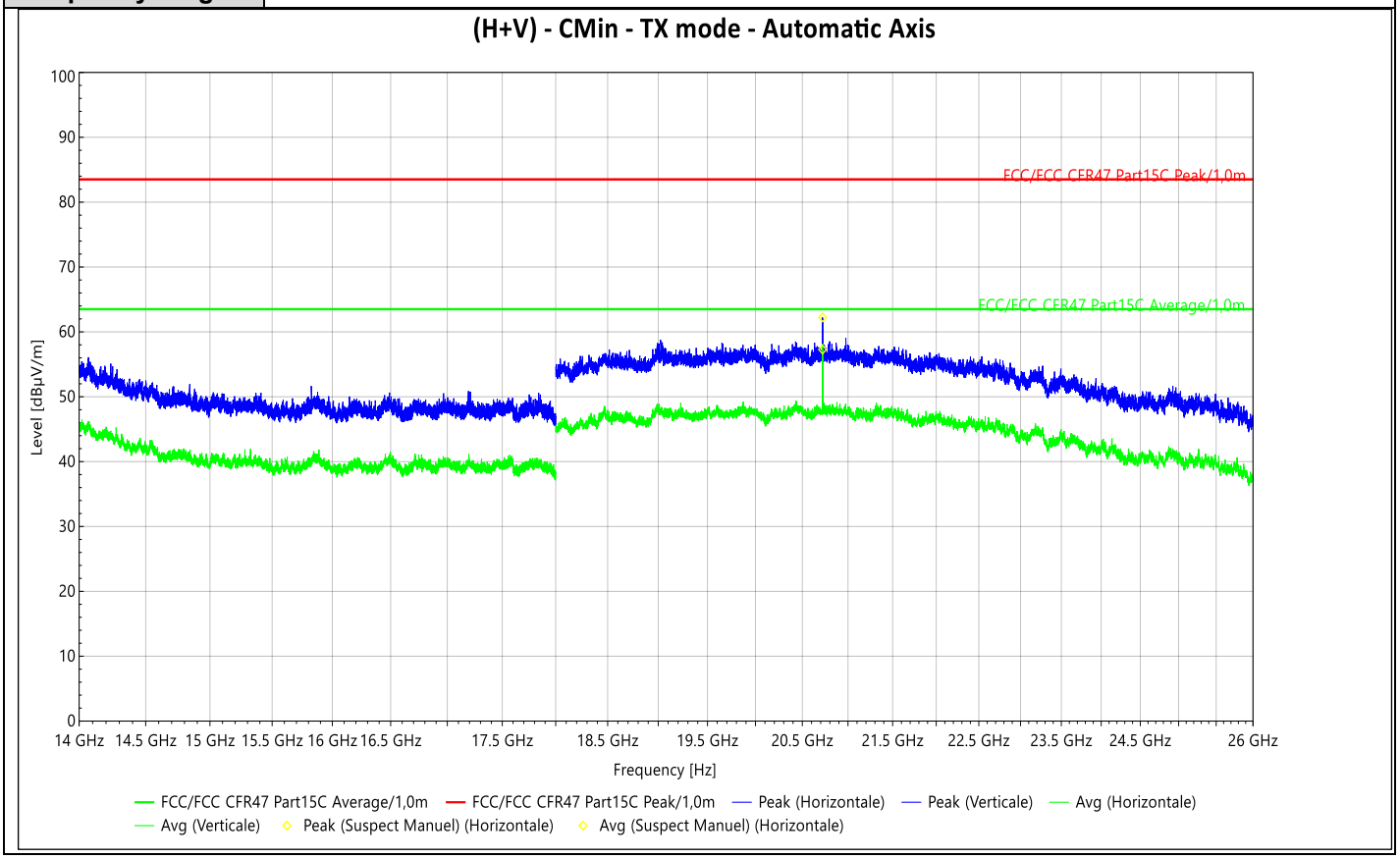
*Carrier frequency
Significant frequency observed

9.6.2. 14GHz to 25GHz

Graphs – Pre characterization:

Graph identifier		Polarization	Mode	Channel	EUT position	Comments
Emr#	7	H/V	TX	Cmin	Axis XY/Z	See the following results
Emr#	8	H/V	TX	Cmin	Axis XY/Z	See the following results
Emr#	9	H/V	TX	Cmid	Axis XY/Z	See the following results

Radiated Emissions	
Graph name:	Emr#7
Frequency range:	14 GHz to 26 GHz

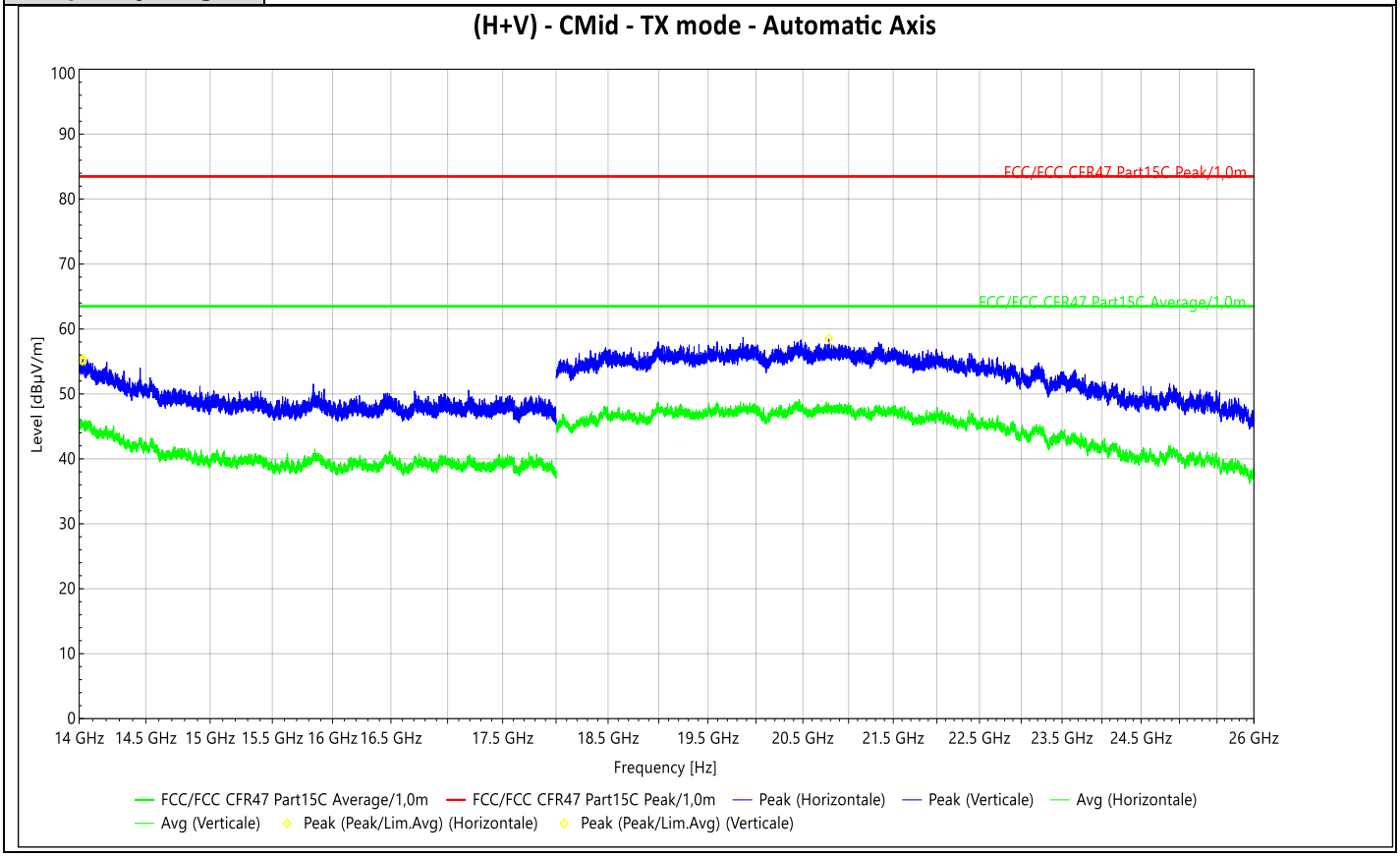


Pre-Characterization:

Frequency	PK Level (dBµV/m)	Lim.PK (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Angle (°)	Polar.	Correct. (dB)
20.72 GHz	62.23	83.50	57.28	63.50	75	H	2.51

No significant frequency observed

Radiated Emissions	
Graph name:	Emr#8
Frequency range:	14 GHz to 26 GHz

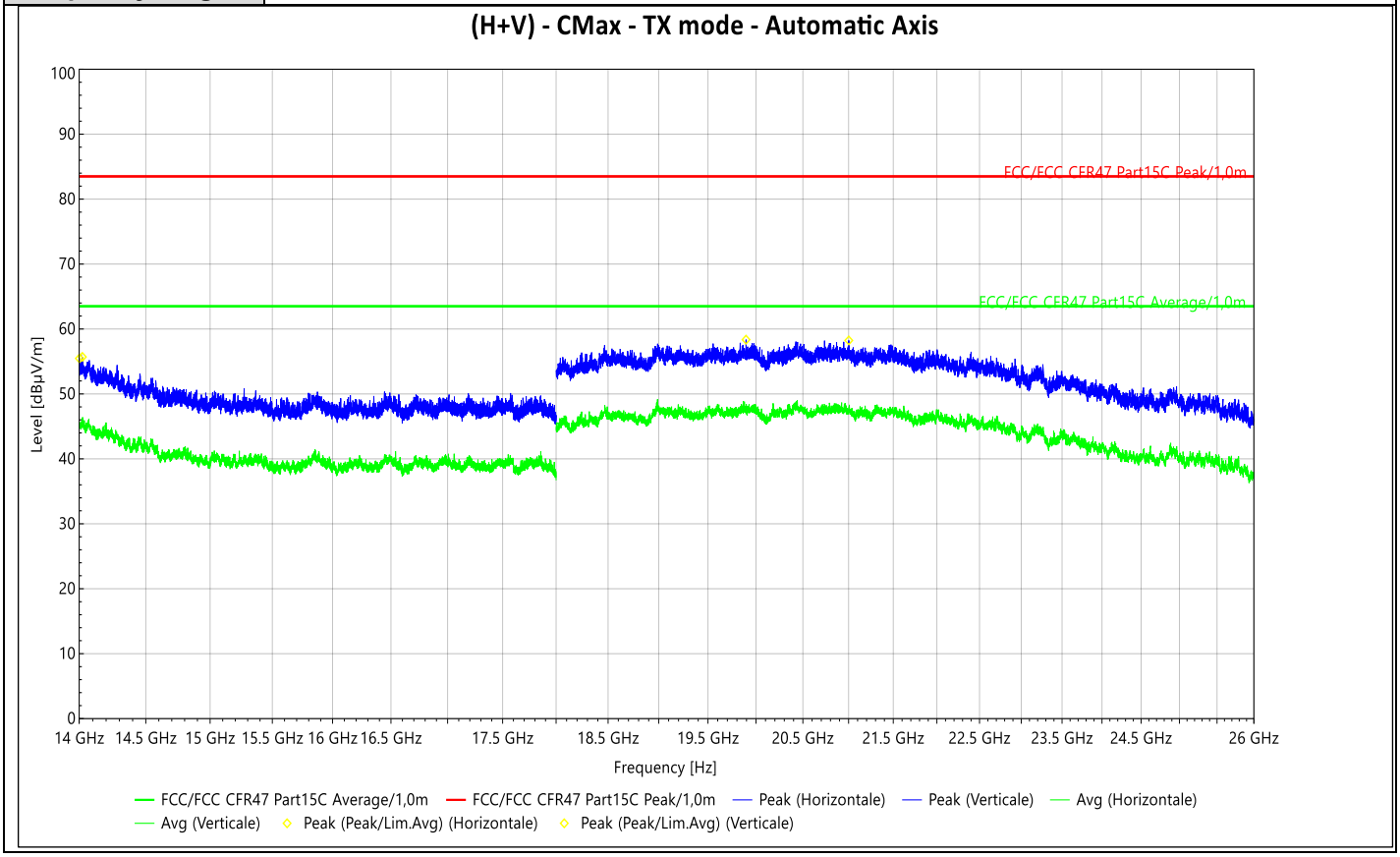


Pre-Characterization:

Frequency	PK Level (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Angle (°)	Polar.	Tilt (°)	Correct. (dB)
14.027 GHz	55.35	63.50	-8.15	0	H	60.00	3.47
14.0235 GHz	55.08	63.50	-8.42	52	V	89.80	3.49
20.782 GHz	58.48	63.50	-5.02	165	V	119.20	2.57

No significant frequency observed

Radiated Emissions	
Graph name:	Emr#9
Frequency range:	14 GHz to 26 GHz



Pre-Characterization:

Frequency	PK Level (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Angle (°)	Polar.	Tilt (°)	Correct. (dB)
14.0235 GHz	55.70	63.50	-7.80	214	H	60.20	3.49
19.895 GHz	58.36	63.50	-5.14	104	H	119.00	3.51
14.0015 GHz	55.47	63.50	-8.03	0	V	89.90	3.62
21.002 GHz	58.24	63.50	-5.26	0	V	29.60	3.12

No significant frequency observed

Final measurement:

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
40.3305	23.3	QP	13.9	37.2	40.0	-2.8
56.0445	23.7	QP	10.4	34.1	40.0	-5.9
112.7895	24.3	QP	12.7	37.0	43.5	-6.5
31.9885	23.0	QP	13.9	36.9	40.0	-3.1
60.2155	23.6	QP	9.1	32.7	40.0	-7.3
150.668	23.4	QP	18.9	42.3	43.5	-1.2
183.5995	23.9	QP	16.3	40.2	43.5	-3.3
58.8575	23.2	QP	9.5	32.7	40.0	-7.3
141.5985	22.8	QP	17.5	40.3	43.5	-3.2

9.7. CONCLUSION

Unwanted emissions in non-restricted bands measurement performed on the sample of the product **AXIUM RX9000**, Sn: **2419MR900209 / 2419MR900267**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247** limits.

10. UNCERTAINTIES CHART

Kind of measurement	*Wide uncertainty laboratory*
Occupied Channel Bandwidth	±2.8 %
Humidity	±3.2 %
Power Spectral Density, Conducted	±1.7 dB
Radio frequency	±0.3 ppm
RF power, conducted	±1.2 dB
RF power, radiated (Full anechoic chamber above 1GHz)	±3.7 dB
RF power, radiated (Semi anechoic chamber & open test site)	±5.6 dB
Spurious emission, conducted	±2.3 dB
Spurious emission, radiated (Full anechoic chamber above 1GHz)	±3.8 dB
Spurious emission, radiated (Semi anechoic chamber & open test site)	±5.7 dB
Temperature	±0.75 °C
Time	±2.3 %
Voltage	±1.7 %

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the standard. The conformity of the sample is directly established by the applicable limit values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report.