



# FCC PART 15C TEST REPORT No.23T04Z80619-07

for

**TCL Communication Ltd.**

**GSM/UMTS/LTE mobile phone**

**T509A**

**FCC ID: 2ACCJB216**

with

**Hardware Version: 05**

**Software Version: BL3F**

**Issued Date: 2024-01-02**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

**Test Laboratory:**

**CTTL-Telecommunication Technology Labs, CAICT**

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: [ctl\\_terminals@caict.ac.cn](mailto:ctl_terminals@caict.ac.cn), website: [www.caict.ac.cn](http://www.caict.ac.cn)



## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
23T04Z80619-07	Rev.0	1st edition	2024-01-02

Note: the latest revision of the test report supersedes all previous version.

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## **1. Test Laboratory**

### **1.1. Introduction & Accreditation**

**Telecommunication Technology Labs, CAICT** is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

### **1.2. Testing Location**

Location 1:CTTL(Huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,  
P. R. China100191

Location 2:CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,  
100191, P. R. China

### **1.3. Testing Environment**

Normal Temperature: 15-35°C  
Relative Humidity: 20-75%

### **1.4. Project date**

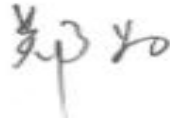
Testing Start Date: 2023-11-28  
Testing End Date: 2024-01-02

### **1.5. Signature**



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Yao Xingyu  
(Prepared this test report)



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Zheng Wei  
(Reviewed this test report)



---

Pang Shuai  
(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd.  
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science  
Park, Shatin, NT, Hong Kong  
City: Hong Kong  
Postal Code: /  
Country: China  
Telephone: 0086-755-3661 1621  
Fax: 0086-755-36612000-81722

### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd.  
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science  
Park, Shatin, NT, Hong Kong  
City: Hong Kong  
Postal Code: /  
Country: China  
Telephone: 0086-755-3661 1621  
Fax: 0086-755-36612000-81722

### **3. Equipment Under Test (EUT) and Ancillary Equipment (AE)**

#### **3.1. About EUT**

Description	GSM/UMTS/LTE mobile phone
Model name	T509A
FCC ID	2ACCJB216
With WLAN Function	Yes
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	11
Antenna	Integral Antenna
MAX Conducted Power	24.97dBm
Nominal Voltage	3.87V
Extreme High Voltage	4.45V
Extreme Low Voltage	3.6V

#### **3.2. Internal Identification of EUT**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>	<b>Date of receipt</b>
UT06a	359735330000819/ 359735330000934	05	BL3F	2023-11-28
UT13a	359735330001056/ 359735330001239	05	BL3F	2023-12-19

\*EUT ID: is used to identify the test sample in the lab internally.  
 UT06a is used for Conduction test, UT13a is used for Radiation test.

#### **3.3. Internal Identification of AE**

<b>AE ID*</b>	<b>Description</b>	<b>Model</b>	<b>Manufacture</b>
AE1	Battery	TLp049B8	HuiZhou GanFeng LiEnergy Battery Technology Co., Ltd.
AE2	Charger	CG10A0502000UU	Huizhou Juwei Electronics Co.,Ltd
AE3	USB Cable1	JWUB1686-M01R	Huizhou Juwei Electronics Co.,Ltd
AE4	USB Cable2	FKY-23-367	Qiyang Fukangyuan Electronic Technology Co., Ltd.

\*AE ID: is used to identify the test sample in the lab internally.



### **3.4. General Description**

The Equipment under Test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna and inbuilt battery.

It consists of normal options: travel charger, USB cable.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

### **3.5. Interpretation of the Test Environment**

For the test methods, the test environment uncertainty figures correspond to an expansion factor  $k=2$ .

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

## **4. Reference Documents**

### **4.1. Documents supplied by applicant**

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### **4.2. Reference Documents for testing**

The following documents listed in this section are referred for testing.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz.	2021
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices Federal Communications Commission Office of Engineering and Technology Laboratory Division GUIDANCE FOR COMPLIANCE MEASUREMENTS ON	2013
KDB 558074 D01	DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

## 5. LABORATORY ENVIRONMENT

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

## 6. Test Results

### 6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247 (b)	/	<b>P</b>
Peak Power Spectral Density	15.247 (e)	/	<b>P</b>
Occupied 6dB Bandwidth	15.247 (a)	/	<b>P</b>
Band Edges Compliance	15.247 (d)	/	<b>P</b>
Transmitter Spurious Emission - Conducted	15.247 (d)	/	<b>P</b>
Radiated Unwanted Emission	15.247, 15.205, 15.209	/	<b>P</b>
AC Powerline Conducted Emission	15.107, 15.207	/	<b>P</b>

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NP	Not Perform, The test was not performed by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

### 6.2. Statements

CTTL has evaluated the test cases as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.

This report only deals with the WLAN function among the features described in section 3.

### 6.3. Test Conditions

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	26°C
Voltage	3.87V
Humidity	44%

## 7. Test Facilities Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2024-07-04
2	LISN	ENV216	101200	R&S	13 Months	2024-06-05
3	Test Receiver	ESCI	100344	R&S	13 Months	2024-02-21
4	Attenuator	10dB/2W	/	Rosenberger	/	/
5	Shielding Room	S81	/	ETS-Lindgren	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103023	R&S	13 Months	2024-07-08
2	EMI Antenna	VULB 9163	01222	SCHWARZBECK	13 Months	2024-02-28
3	EMI Antenna	3115	6914	ETS-Lindgren	13 Months	2024-04-25
4	EMI Antenna	HF-H2-22	829324/007	Rohde & Schwarz	13 Months	2024-01-22
5	EMI Antenna	3116	2661	ETS-Lindgren	13 Months	2024-02-28

### Test Software

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V10.60.20	R&S
Conducted Emission	EMC32 V8.53.0	R&S

## 8. Measurement Uncertainty

### 8.1. Maximum Output Power

Measurement Uncertainty: 0.387dB,k=1.96

### 8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

### 8.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

### 8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

### 8.5. Transmitter Spurious Emission

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

### 8.6. Radiated Unwanted Emission

Frequency Range	Uncertainty(dB) k=2
9kHz-30MHz	4.92
$30\text{MHz} \leq f \leq 1\text{GHz}$	4.72
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.84
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.12

### 8.7. AC Power-line Conducted Emission

Measurement Uncertainty : 3.08dB,k=2

## **ANNEX A: Detailed Test Results**

### **A.1. Measurement Method**

#### **A.1.1. Conducted Measurements**

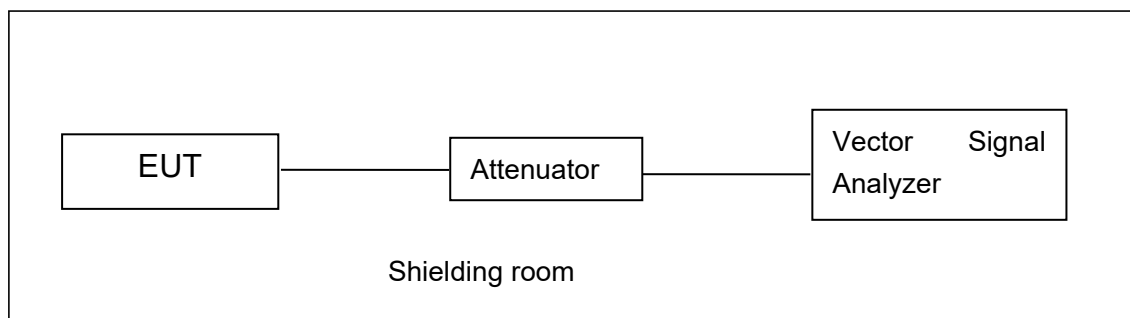
Connect the EUT to the test system as Fig.A.1.1.1 shows.

Set the EUT to the required work mode.

Set the EUT to the required channel.

Set the Vector Signal Analyzer and start measurement.

Record the values. Vector Signal Analyzer



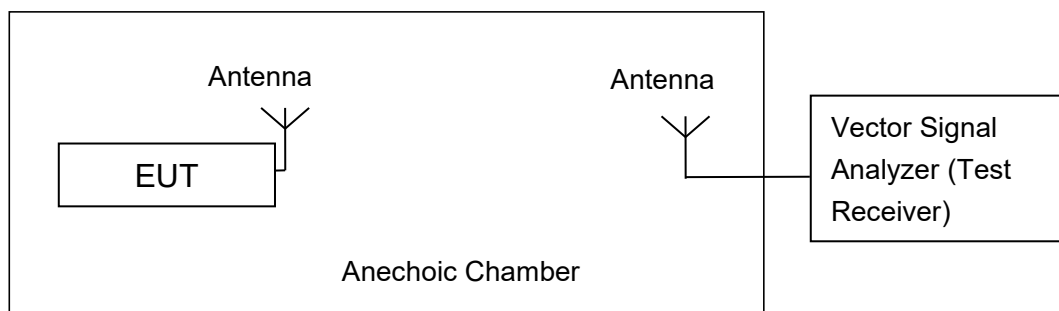
**Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements**

#### **A.1.2. Radiated Emission Measurements**

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 3MHz;



**Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements**

## **A.2. Maximum Output Power**

**Method of Measurement: See ANSI C63.10-2013-clause 11.9.1.3**

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

**Measurement Limit:**

Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

### **A.2.1 Antenna Gain**

Antenna gain is -1.5dBi and the value is supplied by the applicant or manufacturer.

### **A.2.2. Peak Output Power-conducted**

**EUT ID: UT06a**

**Measurement Results:**

#### **802.11b/g mode**

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	20.39	20.56	20.70
802.11g	6	24.55	24.97	22.81

The data rate 1Mbps and 6Mbps are selected as worst condition, and the following cases are performed with this condition.

#### **802.11n-HT20 mode**

Mode	Data Rate (Index)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n (20MHz)	MCS0	24.78	24.58	22.40

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

**802.11n-HT40 mode**

Mode	Data Rate (Index)	Test Result (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n (40MHz)	MCS0	23.93	24.06	20.86

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

The duty cycle of all mode are 100%

**Conclusion: Pass**

**A.3. Peak Power Spectral Density**

**Method of Measurement: See ANSI C63.10-2013-clause 11.10.2**

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to RBW = 3 kHz.
- Set the VBW = 10 kHz.
- 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.

**Measurement Limit:**

Standard	Limit
FCC CRF Part 15.247(e)	< 8 dBm/3 kHz

**EUT ID: UT06a**

**Measurement Results:**

**802.11b/g mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11b	1	Fig.A.3.1	-4.31	<b>P</b>
	6	Fig.A.3.2	-3.43	<b>P</b>
	11	Fig.A.3.3	-4.30	<b>P</b>
802.11g	1	Fig.A.3.4	-8.92	<b>P</b>
	6	Fig.A.3.5	-8.45	<b>P</b>
	11	Fig.A.3.6	-11.07	<b>P</b>

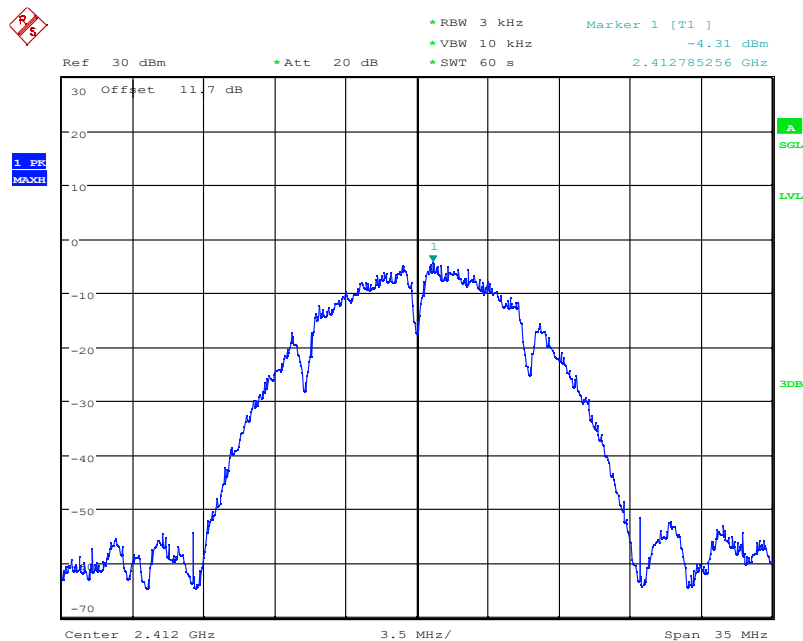
**802.11n-HT20 mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-9.58	P
	6	Fig.A.3.8	-8.81	P
	11	Fig.A.3.9	-12.19	P

**802.11n-HT40 mode**

Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion
802.11n (HT40)	3	Fig.A.3.10	-13.20	P
	6	Fig.A.3.11	-13.14	P
	9	Fig.A.3.12	-17.00	P

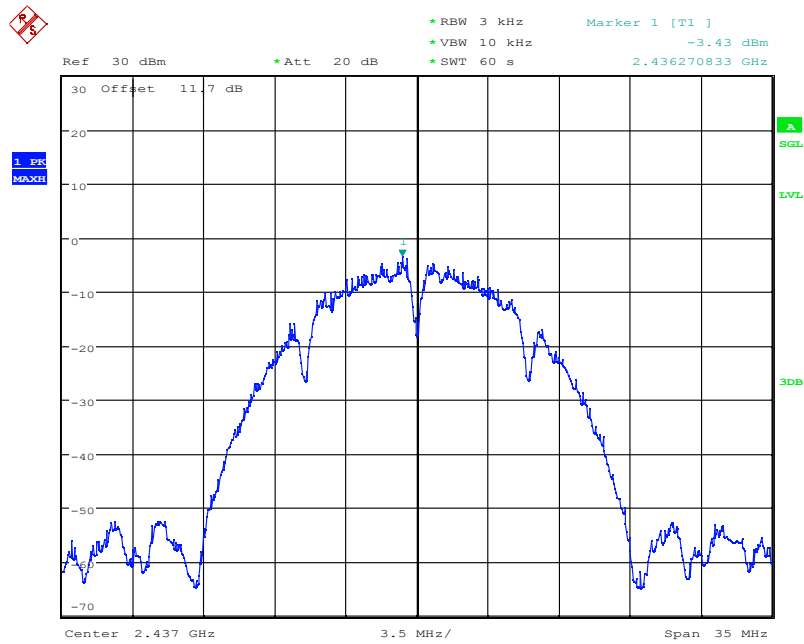
Test graphs as below:



Date: 21.DEC.2023 10:36:18

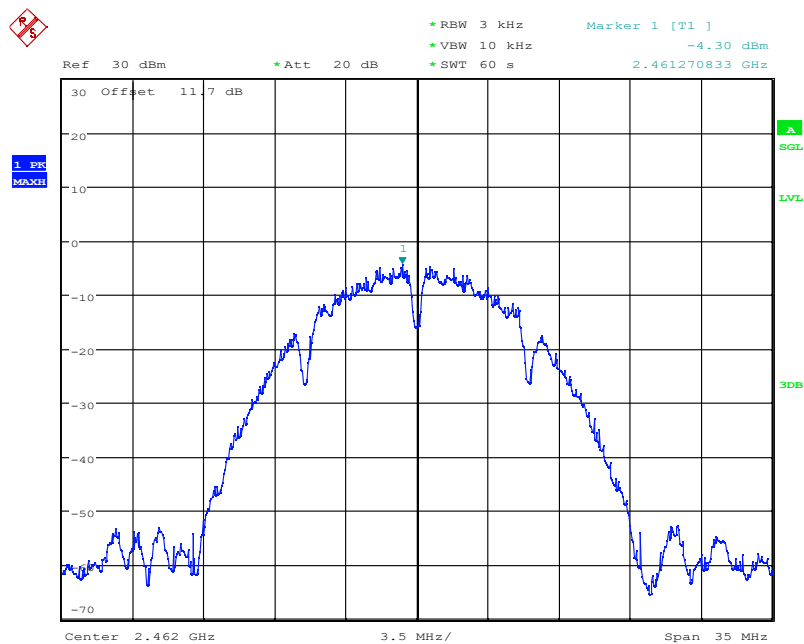
**Fig.A.3.1 Power Spectral Density(802.11b,Ch1)**





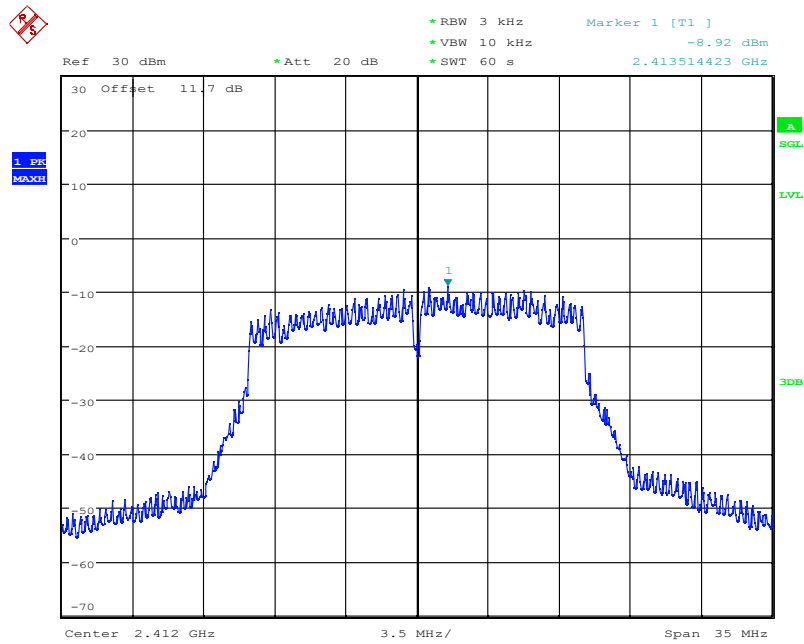
Date: 21.DEC.2023 10:28:30

**Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)**



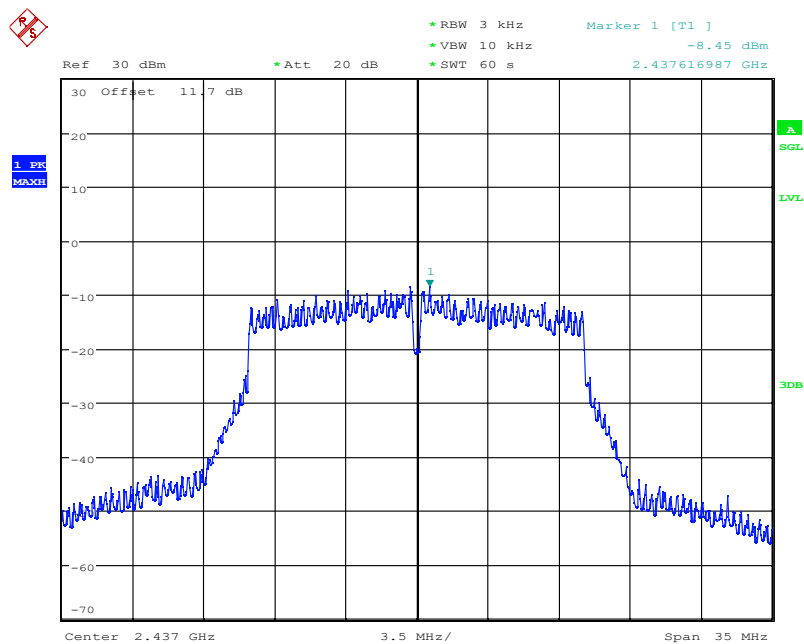
Date: 21.DEC.2023 10:32:49

**Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)**



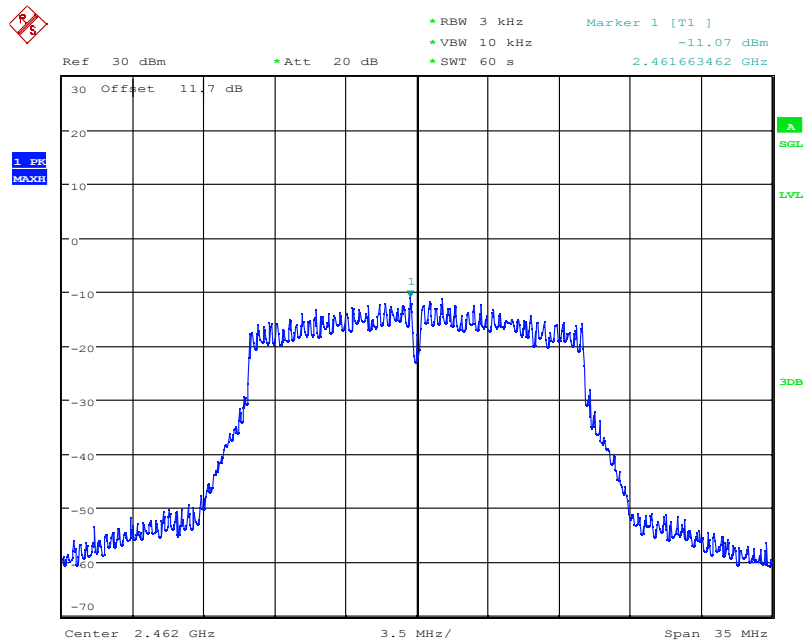
Date: 21.DEC.2023 10:43:17

**Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)**



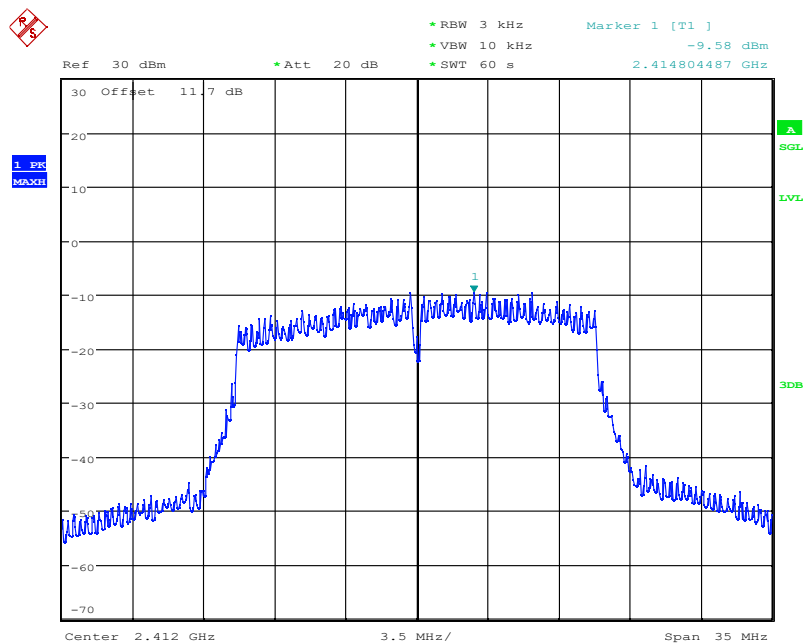
Date: 21.DEC.2023 10:48:01

**Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)**



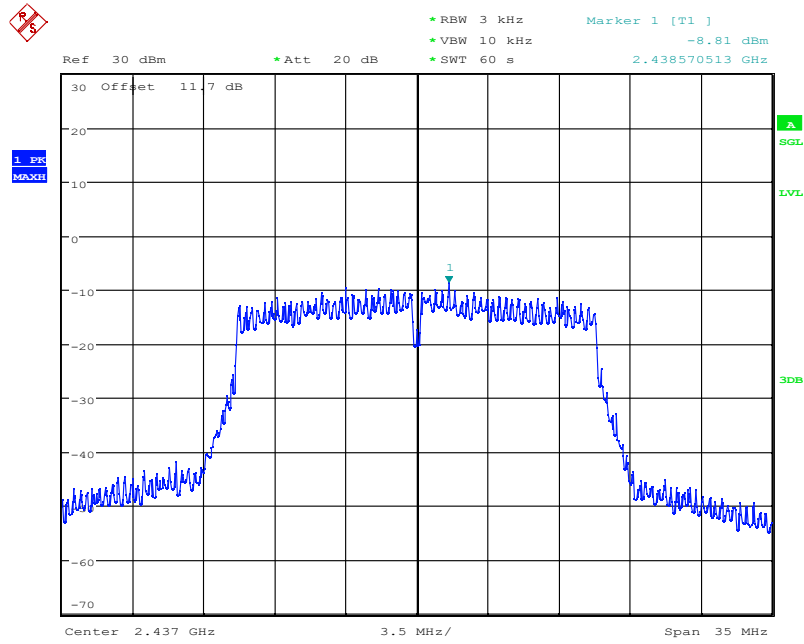
Date: 25.DEC.2023 14:51:56

**Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)**



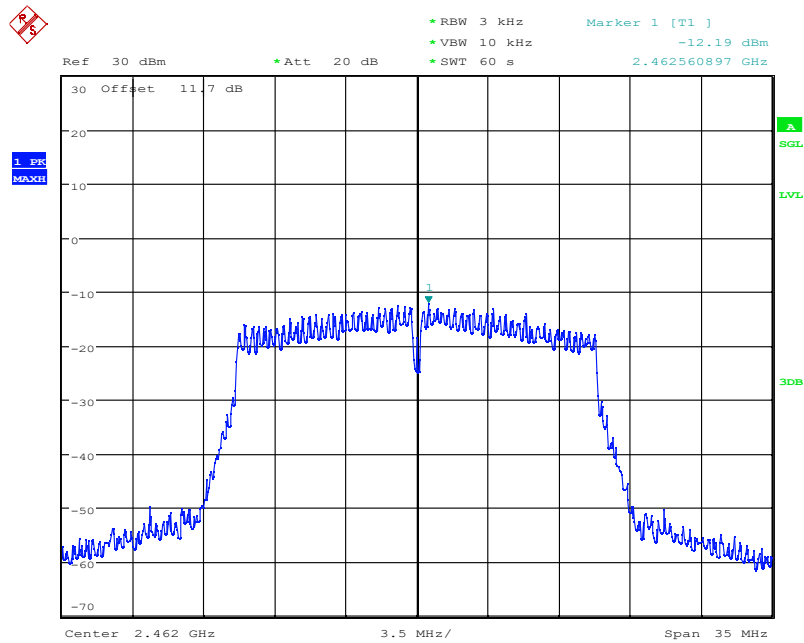
Date: 21.DEC.2023 13:52:40

**Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)**



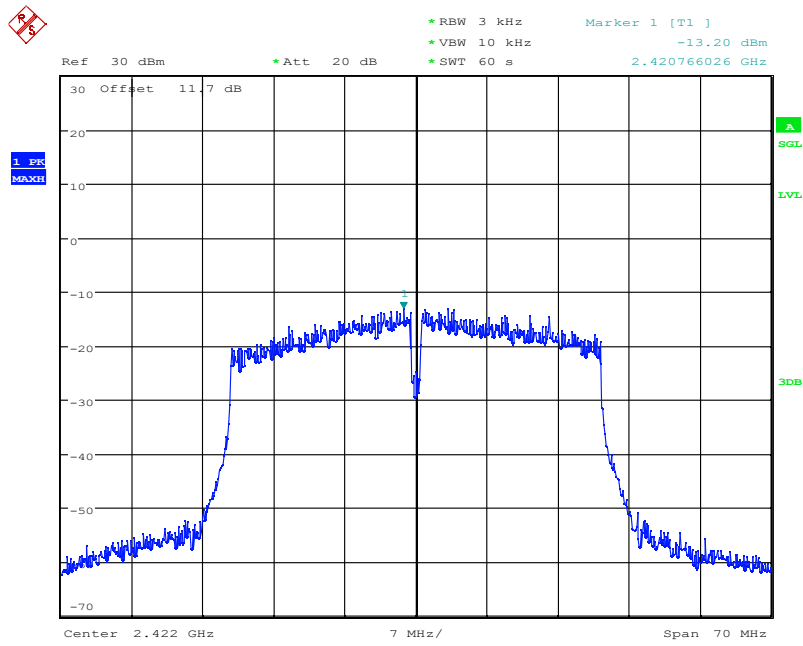
Date: 21.DEC.2023 13:59:05

**Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)**



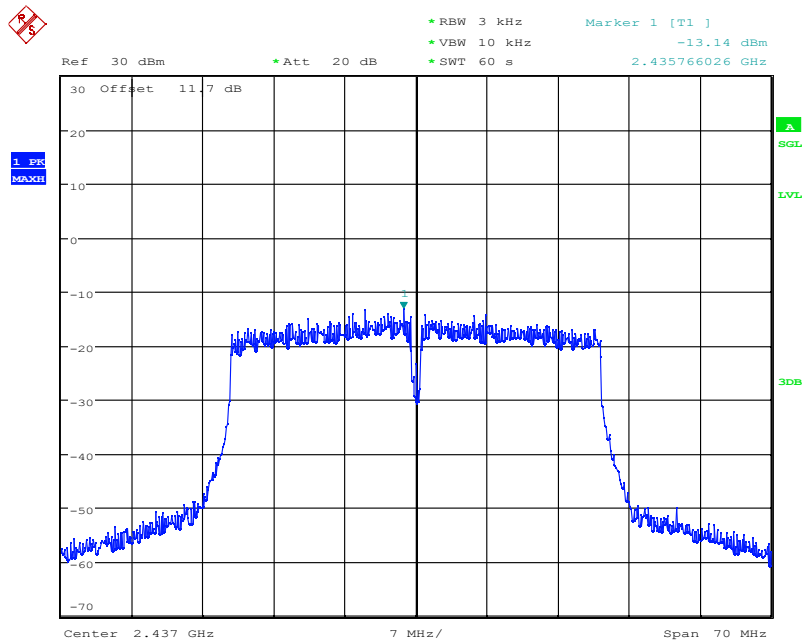
Date: 25.DEC.2023 14:56:10

**Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)**



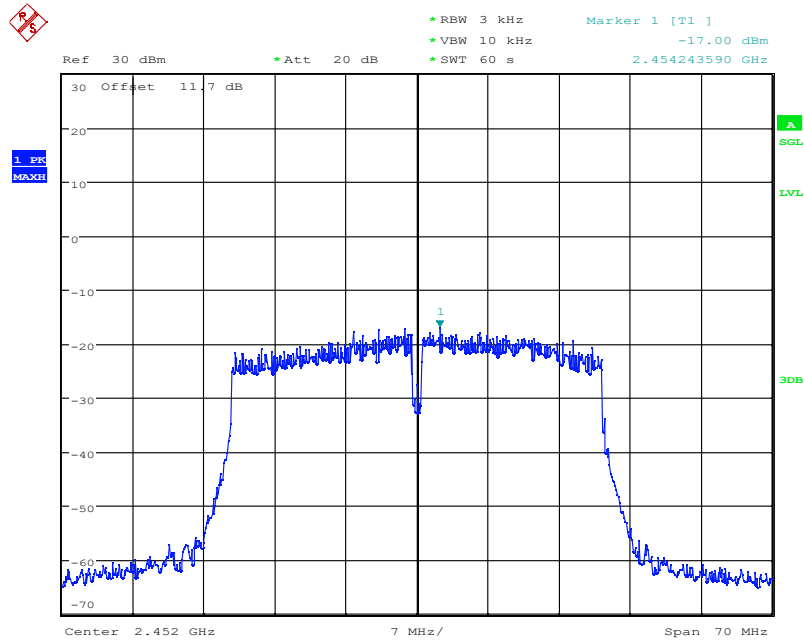
Date: 25.DEC.2023 15:10:58

**Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)**



Date: 25.DEC.2023 15:14:31

**Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)**



Date: 25.DEC.2023 15:07:18

**Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)**

**Conclusion: Pass**

#### **A.4. DTS 6-dB Signal Bandwidth**

**Method of Measurement: See ANSI C63.10-2013 section 11.8.1.**

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) = 300 kHz.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Measurement Limit:**

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	≥ 500

**EUT ID: UT06a**

**Measurement Result:**

**802.11b/g mode**

Mode	Channel	DTS Bandwidth ( MHz)		conclusion
		Fig.A.4.1	8.07	
802.11b	1	Fig.A.4.1	8.07	<b>P</b>
	6	Fig.A.4.2	8.07	<b>P</b>
	11	Fig.A.4.3	8.03	<b>P</b>
802.11g	1	Fig.A.4.4	16.14	<b>P</b>
	6	Fig.A.4.5	16.36	<b>P</b>
	11	Fig.A.4.6	16.04	<b>P</b>

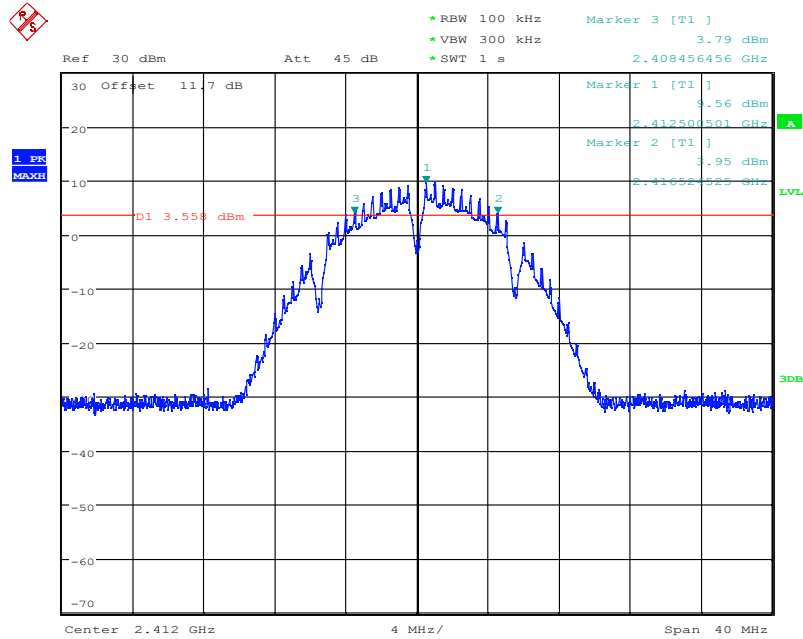
**802.11n-HT20 mode**

Mode	Channel	DTS Bandwidth ( MHz)		conclusion
		Fig.A.4.7	17.40	
802.11n (HT20)	1	Fig.A.4.7	17.40	<b>P</b>
	6	Fig.A.4.8	17.60	<b>P</b>
	11	Fig.A.4.9	17.56	<b>P</b>

**802.11n-HT40 mode**

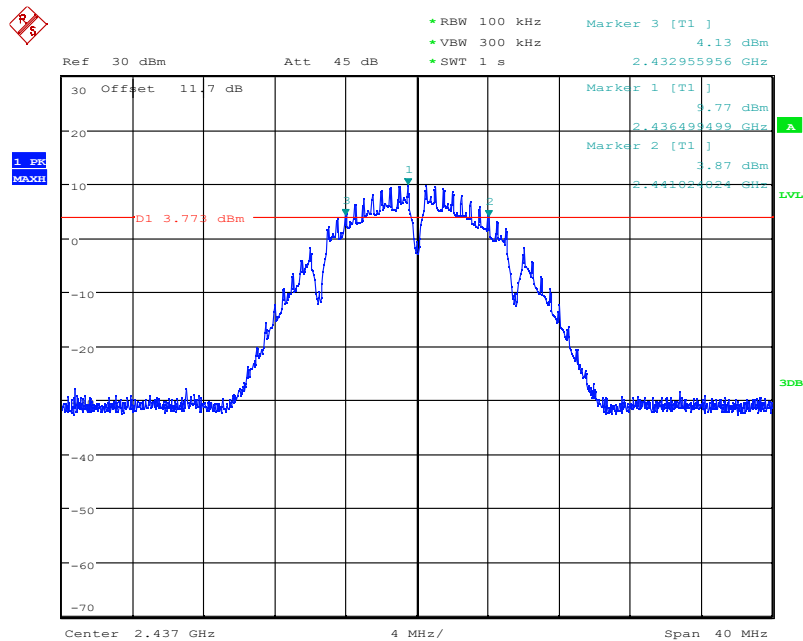
Mode	Channel	DTS Bandwidth ( MHz)		conclusion
		Fig.A.4.10	32.67	
802.11n (HT40)	3	Fig.A.4.10	32.67	<b>P</b>
	6	Fig.A.4.11	36.36	<b>P</b>
	9	Fig.A.4.12	36.08	<b>P</b>

Test graphs as below:



Date: 21.DEC.2023 10:21:47

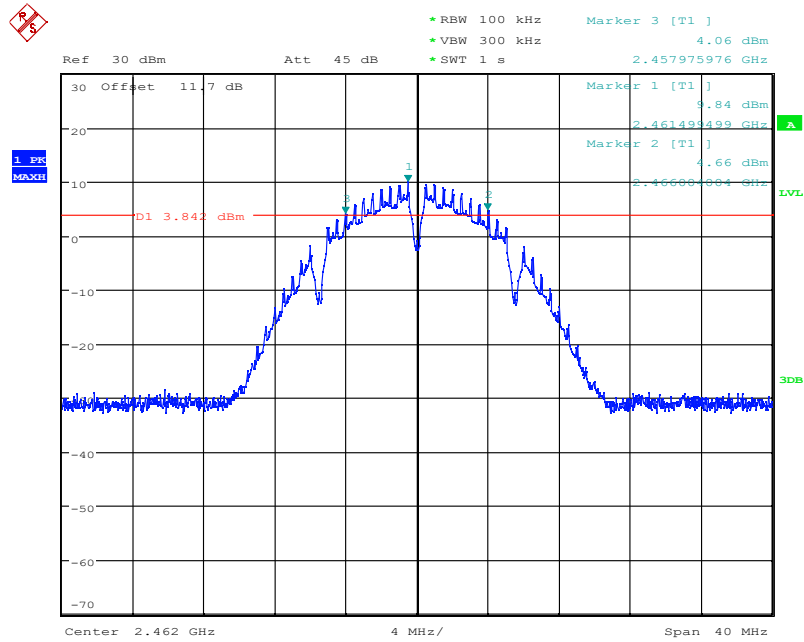
Fig.A.4.1 DTS Bandwidth(802.11b,Ch 1)



Date: 21.DEC.2023 10:27:13

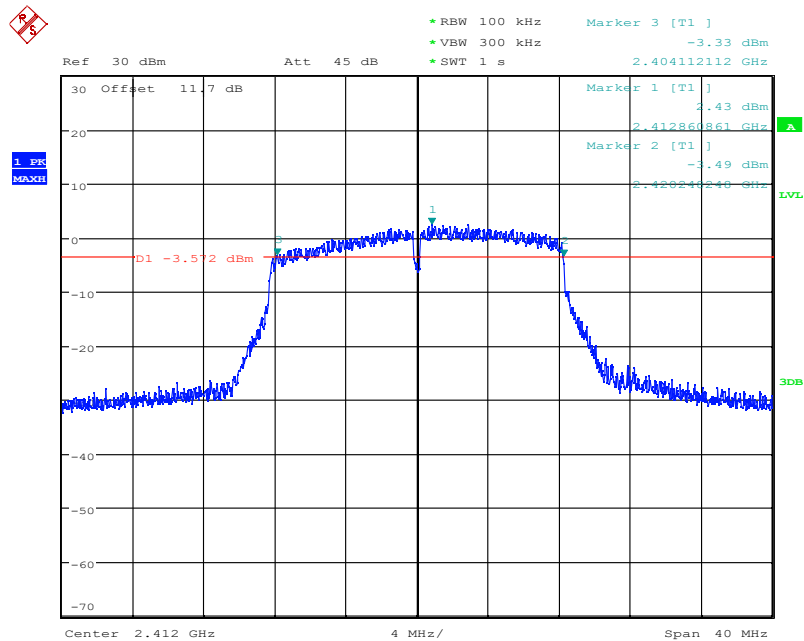
Fig.A.4.2 DTS Bandwidth (802.11b, Ch 6)





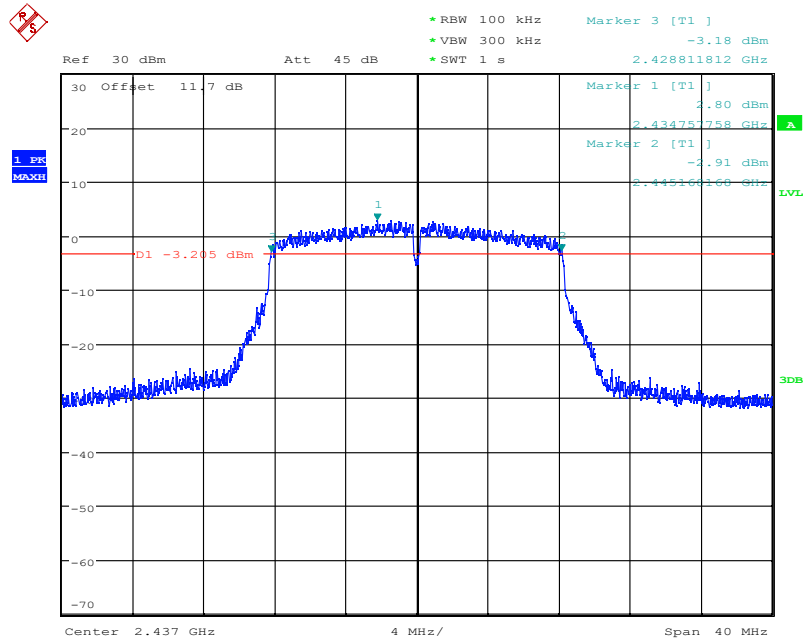
Date: 21.DEC.2023 10:31:13

**Fig.A.4.3 DTS Bandwidth (802.11b, Ch 11)**



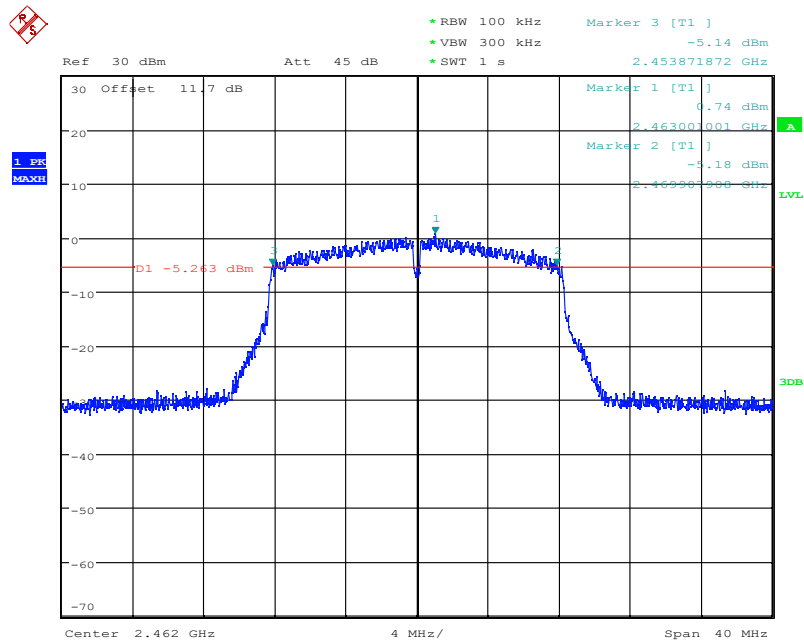
Date: 21.DEC.2023 10:41:41

**Fig.A.4.4 DTS Bandwidth (802.11g, Ch 1)**



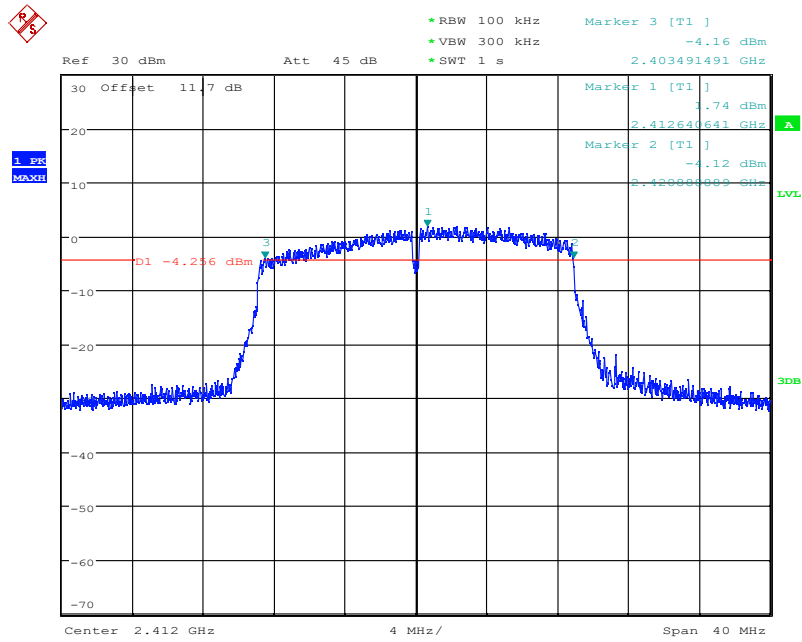
Date: 21.DEC.2023 10:46:45

**Fig.A.4.5 DTS Bandwidth (802.11g, Ch 6)**



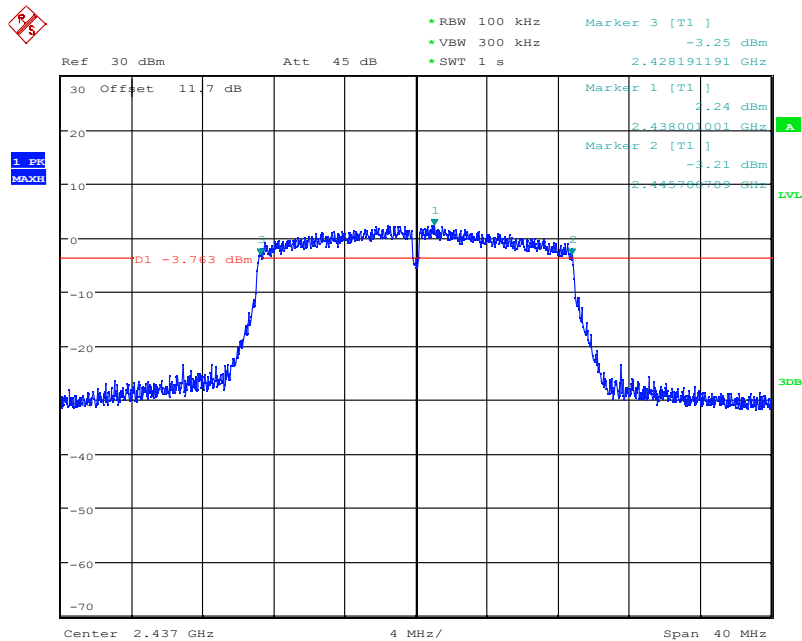
Date: 25.DEC.2023 14:50:20

**Fig.A.4.6 DTS Bandwidth (802.11g, Ch 11)**



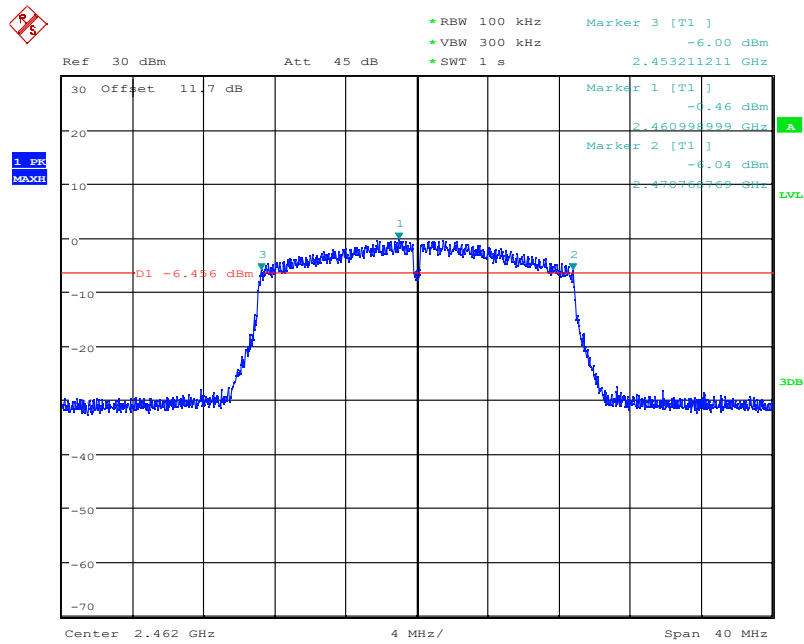
Date: 1.JAN.2024 13:13:56

**Fig.A.4.7 DTS Bandwidth (802.11n-20MHz, Ch 1)**



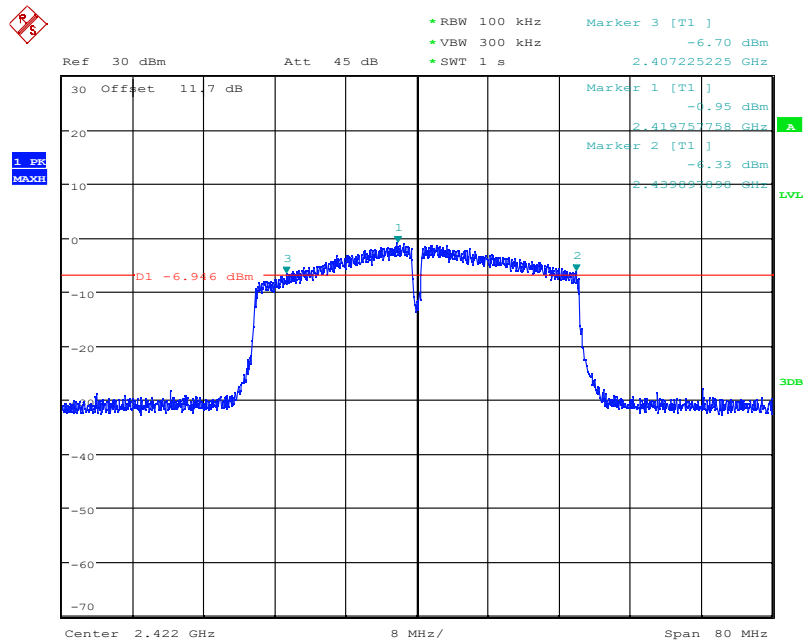
Date: 21.DEC.2023 13:57:48

**Fig.A.4.8 DTS Bandwidth (802.11n-HT20, Ch 6)**



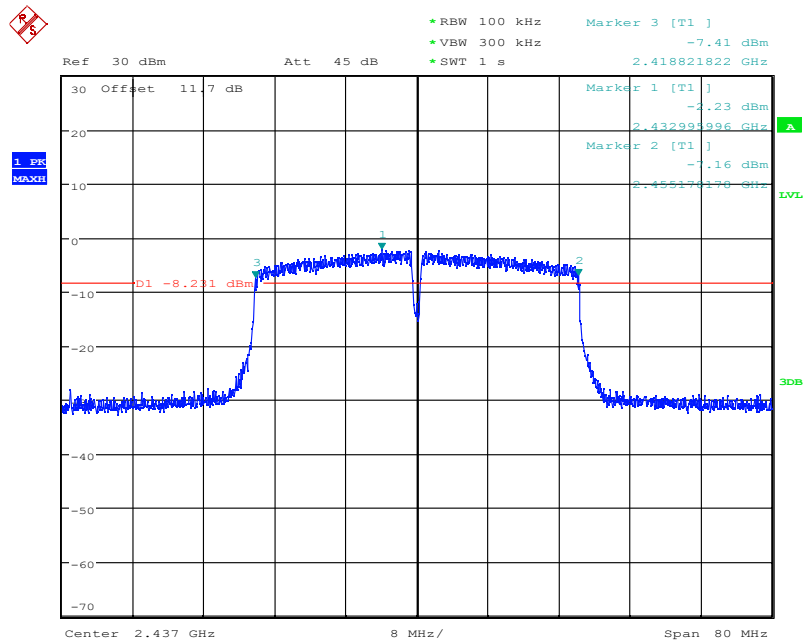
Date: 25.DEC.2023 14:54:34

**Fig.A.4.9 DTS Bandwidth (802.11n-HT20, Ch 11)**



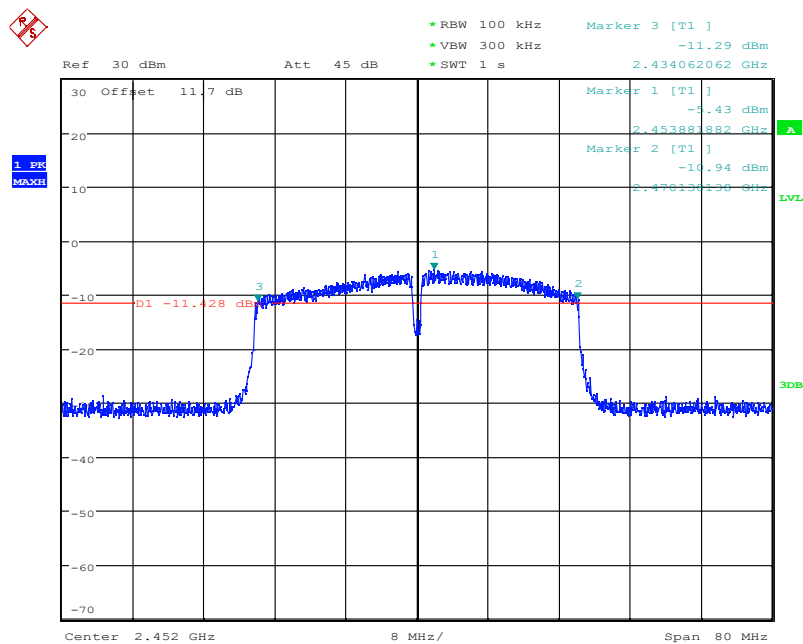
Date: 25.DEC.2023 15:09:22

**Fig.A.4.10 DTS Bandwidth (802.11n-40MHz, Ch 3)**



Date: 25.DEC.2023 15:13:04

**Fig.A.4.11 DTS Bandwidth (802.11n-HT40, Ch 6)**



Date: 25.DEC.2023 15:05:33

**Fig.A.4.12 DTS Bandwidth (802.11n-HT40, Ch 9)**

**Conclusion: Pass**

## **A.5. Band Edges Compliance**

### **Method of Measurement: See ANSI C63.10-2013-clause 6.10.4**

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below.

- a) Set Span = 100MHz
- b) Sweep Time: coupled
- c) Set the RBW= 100 kHz
- c) Set the VBW= 300 kHz
- d) Detector: Peak
- e) Trace: Max hold

### **Measurement Limit:**

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

**EUT ID: UT06a**

### **Measurement Result:**

#### **802.11b/g mode**

Mode	Channel	Test Results	Conclusion
802.11b	1	Fig.A.5.1	<b>P</b>
	11	Fig.A.5.2	<b>P</b>
802.11g	1	Fig.A.5.3	<b>P</b>
	11	Fig.A.5.4	<b>P</b>

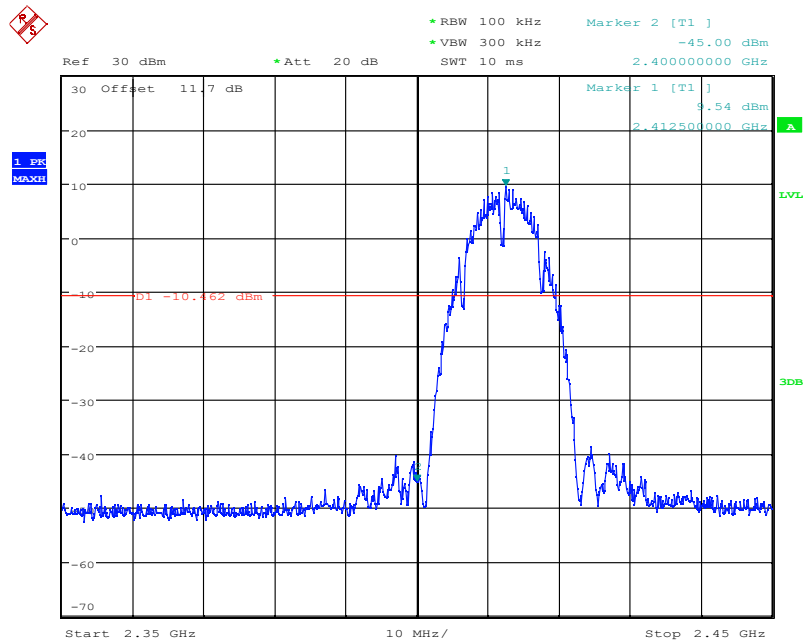
#### **802.11n-HT20 mode**

Mode	Channel	Test Results	Conclusion
802.11n (HT20)	1	Fig.A.5.5	<b>P</b>
	11	Fig.A.5.6	<b>P</b>

#### **802.11n-HT40 mode**

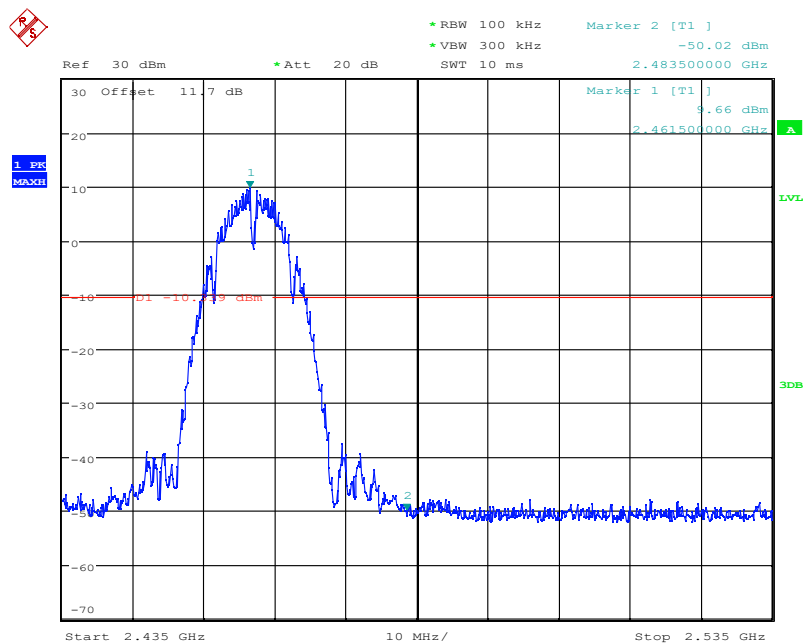
Mode	Channel	Test Results	Conclusion
802.11n (HT40)	3	Fig.A.5.7	<b>P</b>
	9	Fig.A.5.8	<b>P</b>

**Test graphs as below:**



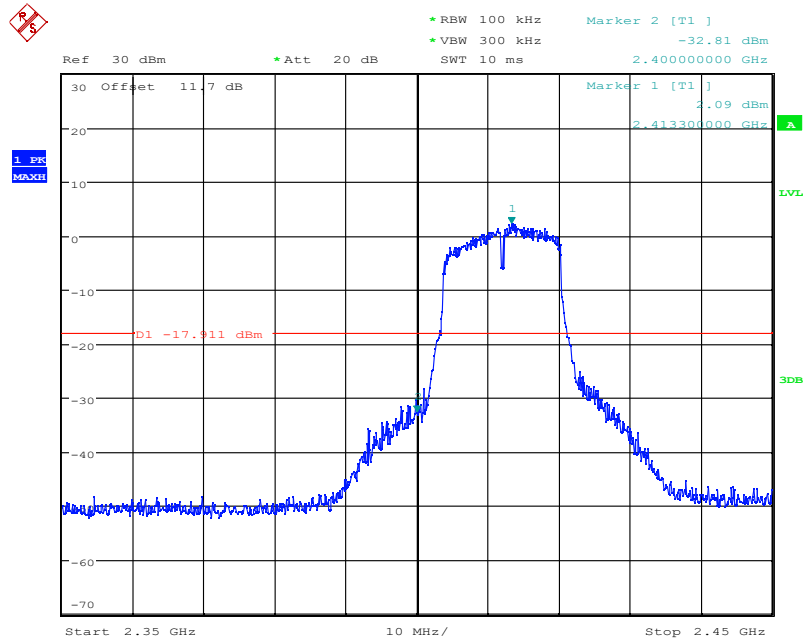
Date: 21.DEC.2023 10:22:06

Fig.A.5.1 Band Edges (802.11b, Ch 1)



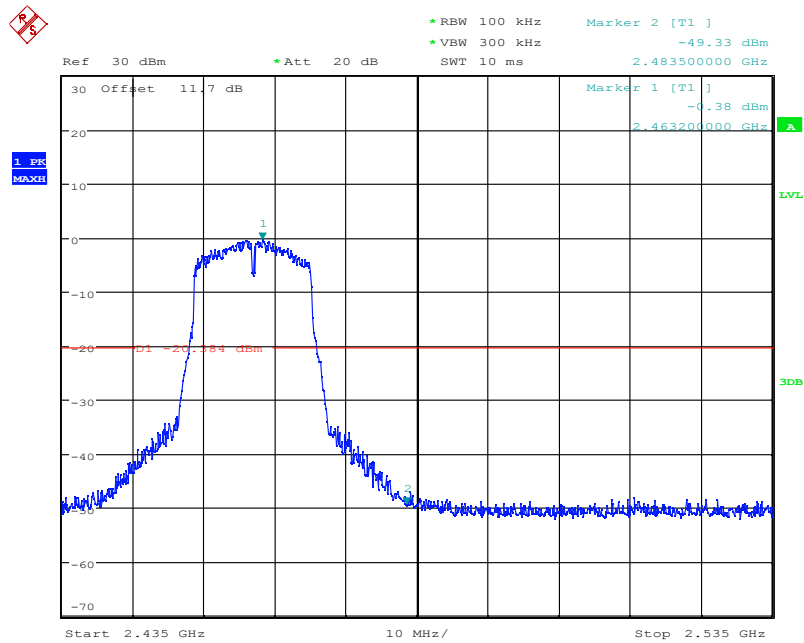
Date: 21.DEC.2023 10:31:33

Fig.A.5.2 Band Edges (802.11b, Ch 11)



Date: 21.DEC.2023 10:42:00

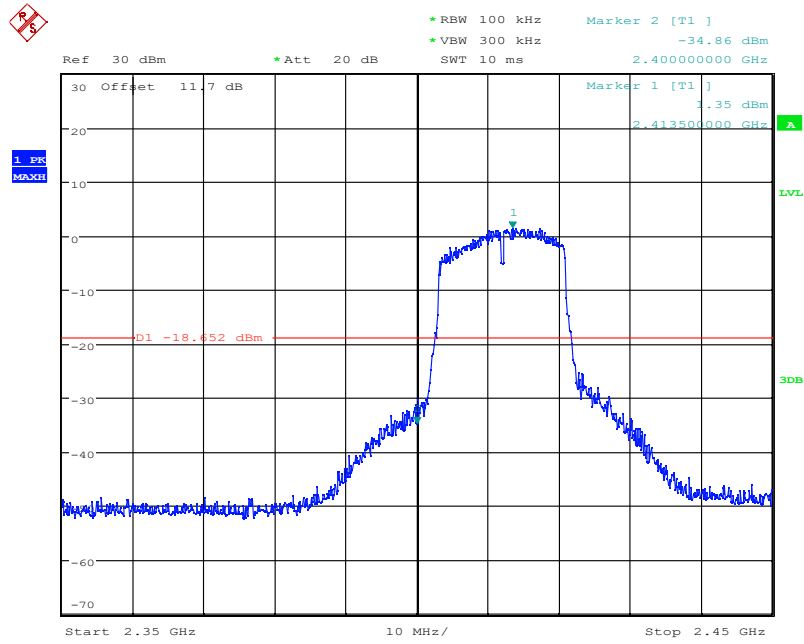
**Fig.A.5.3 Band Edges (802.11g, Ch 1)**



Date: 25.DEC.2023 14:50:40

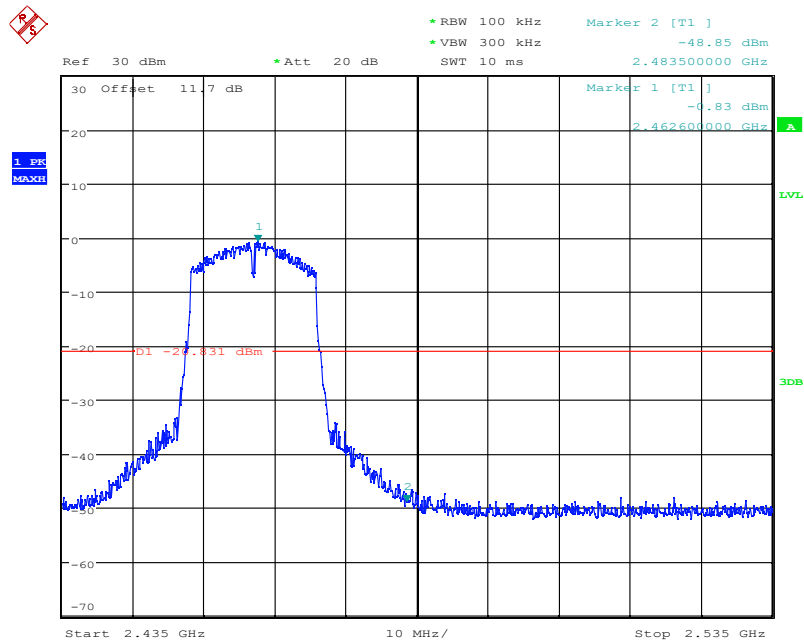
**Fig.A.5.4 Band Edges (802.11g, Ch 11)**





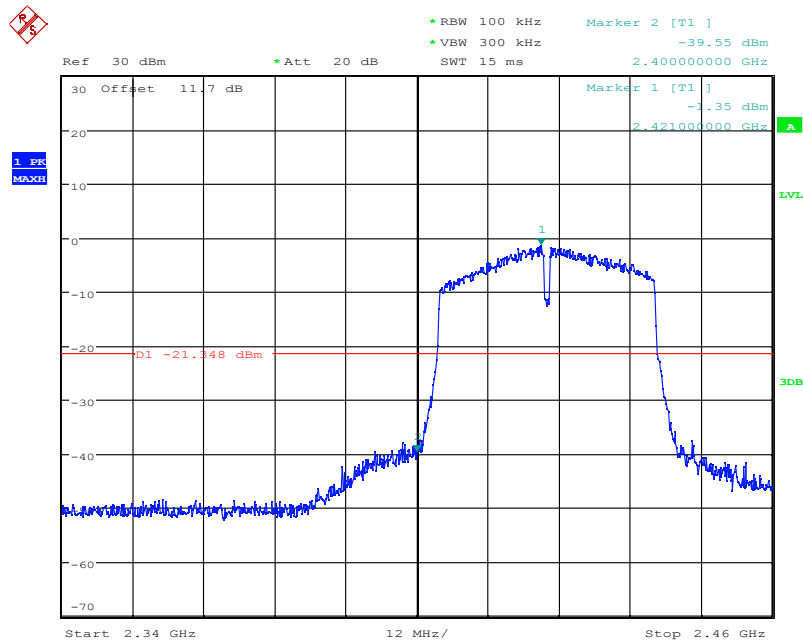
Date: 21.DEC.2023 13:51:24

**Fig.A.5.5 Band Edges (802.11n-HT20, Ch 1)**



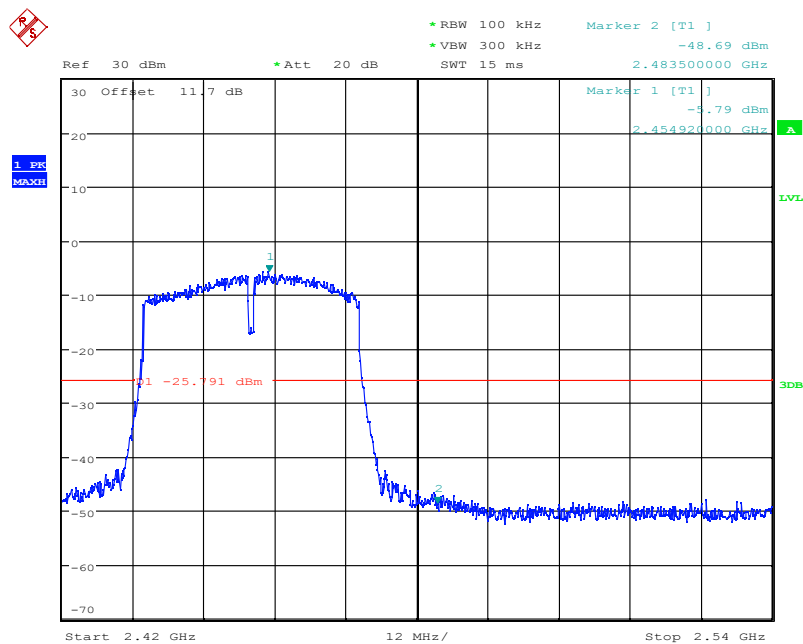
Date: 25.DEC.2023 14:54:54

**Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)**



Date: 25.DEC.2023 15:09:42

**Fig.A.5.7 Band Edges (802.11n-HT40, Ch 3)**



Date: 25.DEC.2023 15:05:52

**Fig.A.5.8 Band Edges (802.11n-HT40, Ch 9)**

**Conclusion: Pass**

## **A.6. Transmitter Spurious Emission**

### **A.6.1 Transmitter Spurious Emission – Conducted**

#### **Method of Measurement: See ANSI C63.10-2013-clause 11.11**

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency
- b) Set the span to  $\geq 1.5$  times the DTS bandwidth
- c) Set the RBW= 100 kHz
- d) Set the VBW= 300 kHz
- e) Detector = Peak
- f) Sweep time = auto couple
- g) Trace mode = max hold
- h) Allow trace to fully stabilize
- i) Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW = 300 kHz.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

#### **Measurement Limit:**

<b>Standard</b>	<b>Limit</b>
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

**EUT ID: UT06a**

**Measurement Results:**

**802.11b mode**

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.412 GHz	Fig.A.6.1.1	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.2	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.3	<b>P</b>
	6	2.437 GHz	Fig.A.6.1.4	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.5	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.6	<b>P</b>
	11	2.462 GHz	Fig.A.6.1.7	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.8	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.9	<b>P</b>

**802.11g mode**

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11g	1	2.412 GHz	Fig.A.6.1.10	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.11	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.12	<b>P</b>
	6	2.437 GHz	Fig.A.6.1.13	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.14	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.15	<b>P</b>
	11	2.462 GHz	Fig.A.6.1.16	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.17	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.18	<b>P</b>

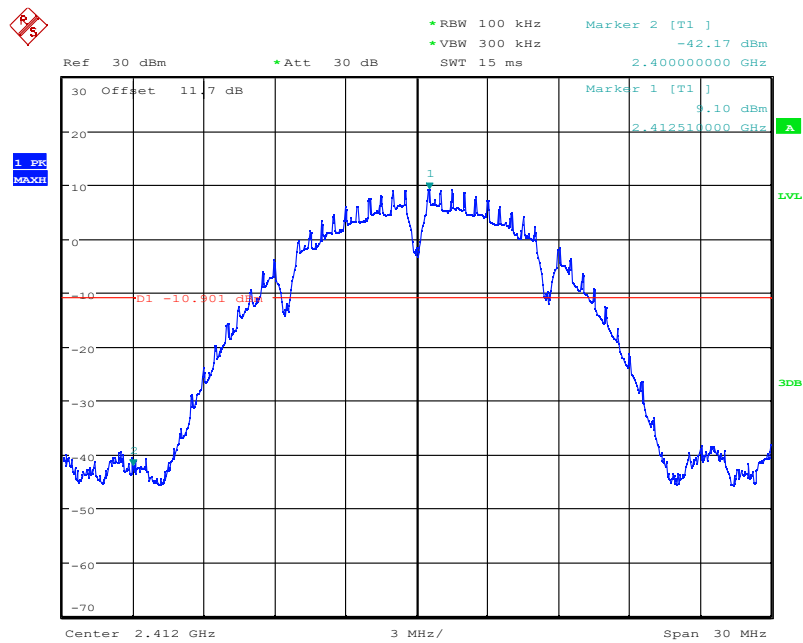
**802.11n-HT20 mode**

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.412 GHz	Fig.A.6.1.19	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.20	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.21	<b>P</b>
	6	2.437 GHz	Fig.A.6.1.22	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.23	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.24	<b>P</b>
	11	2.462 GHz	Fig.A.6.1.25	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.26	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.27	<b>P</b>

**802.11n-HT40 mode**

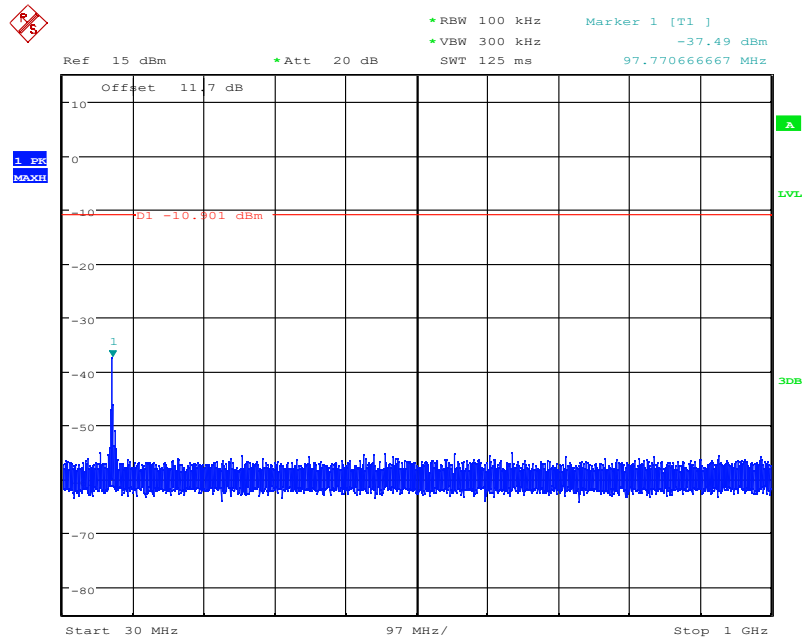
MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	3	2.422 GHz	Fig.A.6.1.28	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.29	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.30	<b>P</b>
	6	2.437 GHz	Fig.A.6.1.31	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.32	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.33	<b>P</b>
	9	2.452 GHz	Fig.A.6.1.34	<b>P</b>
		30 MHz ~ 1 GHz	Fig.A.6.1.35	<b>P</b>
		1 GHz ~ 26.5 GHz	Fig.A.6.1.36	<b>P</b>

Test graphs as below:



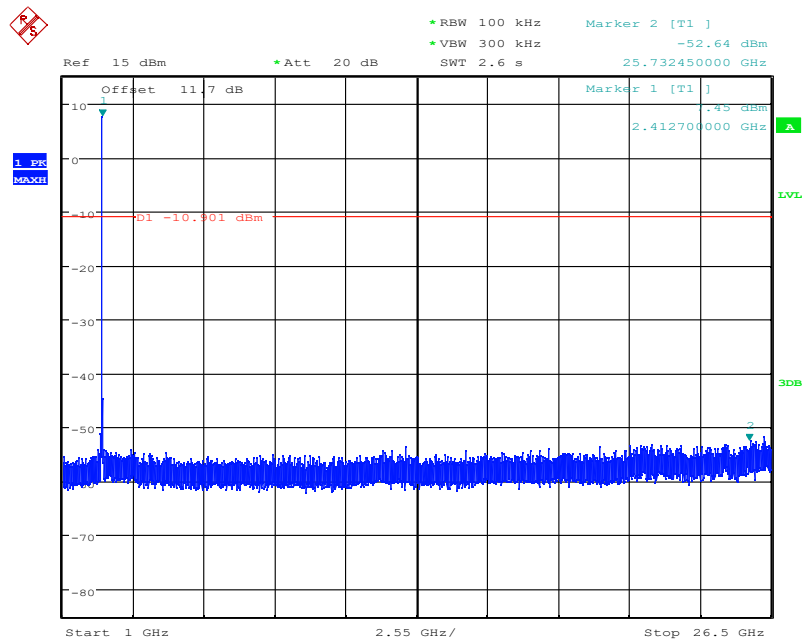
Date: 21.DEC.2023 10:23:51

**Fig.A.6.1.1 Transmitter Spurious Emission - Conducted (802.11b, Ch1, Center Frequency)**



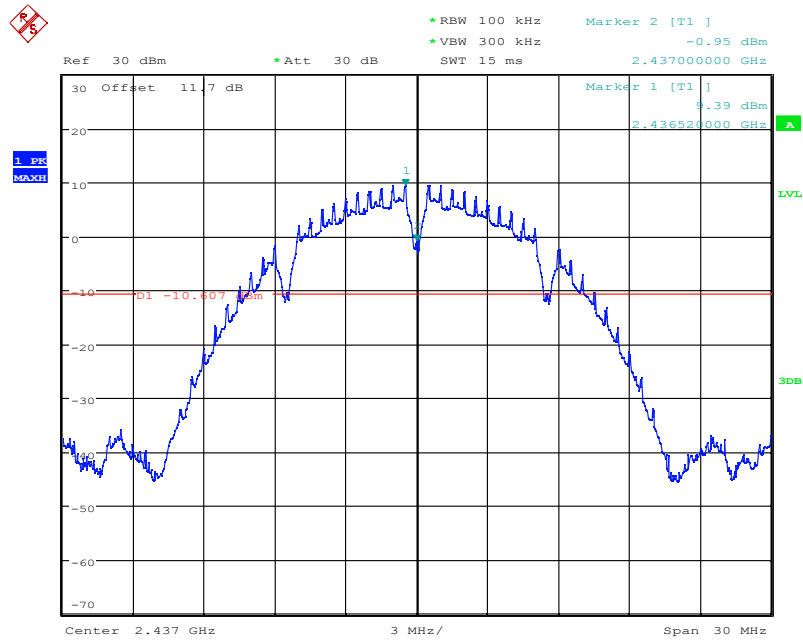
Date: 21.DEC.2023 10:24:15

**Fig.A.6.1.2 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 30 MHz-1 GHz)**



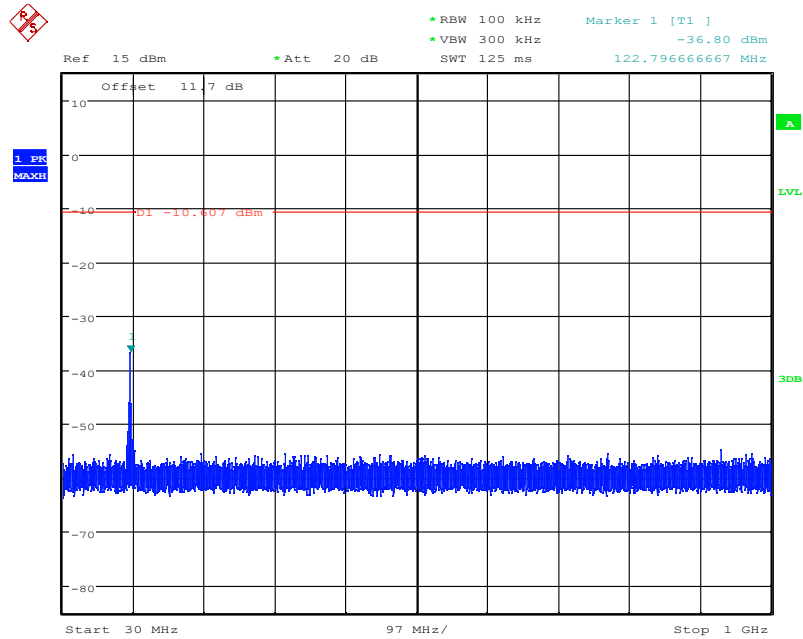
Date: 21.DEC.2023 10:24:39

**Fig.A.6.1.3 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 1 GHz-26 GHz)**



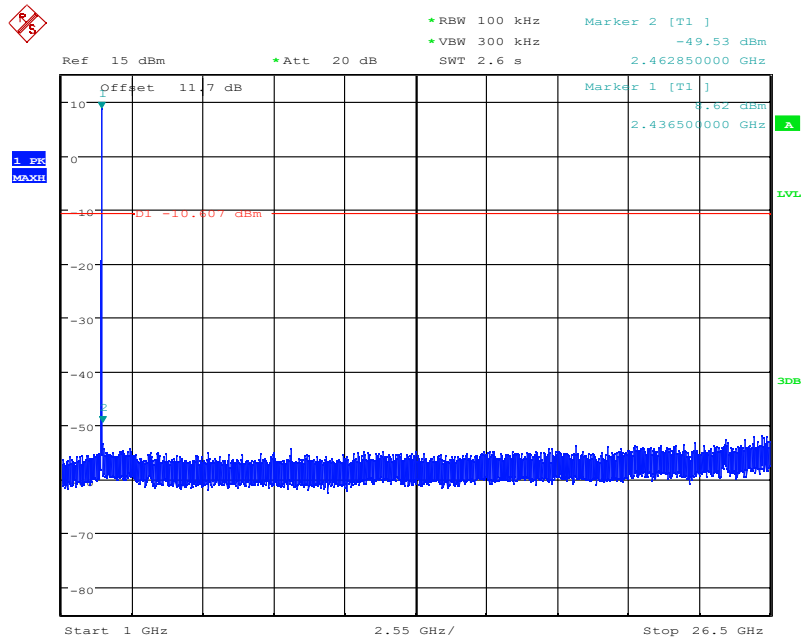
Date: 21.DEC.2023 10:28:58

**Fig.A.6.1.4 Transmitter Spurious Emission - Conducted (802.11b, Ch6, Center Frequency)**



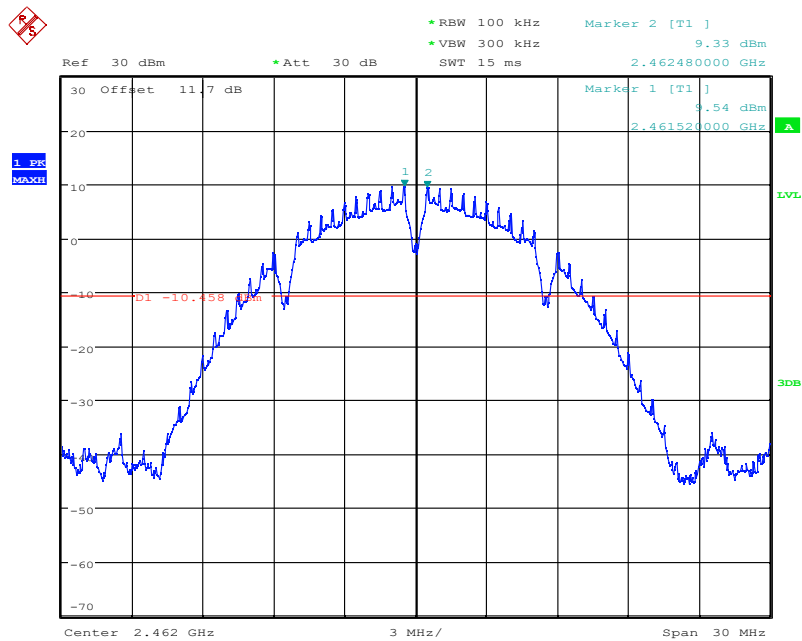
Date: 21.DEC.2023 10:29:22

**Fig.A.6.1.5 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 30 MHz-1 GHz)**



Date: 21.DEC.2023 10:29:46

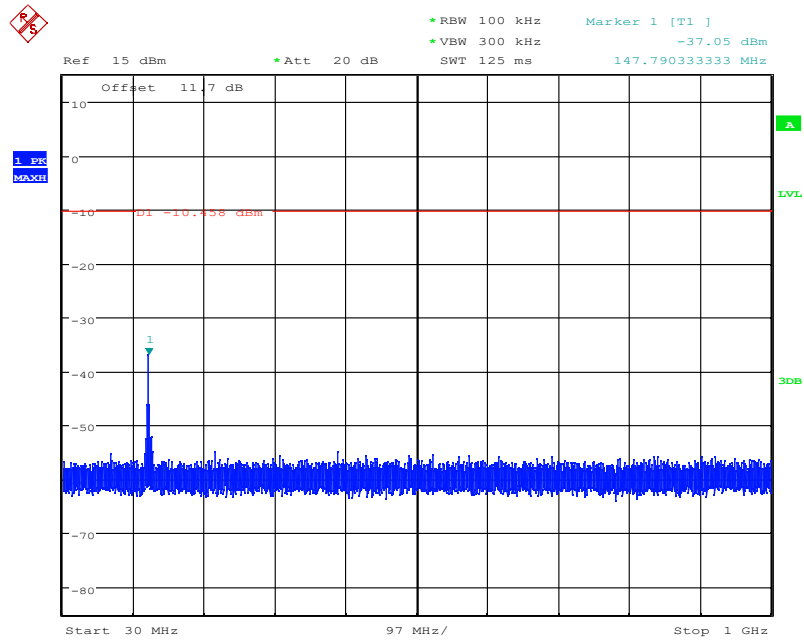
**Fig.A.6.1.6 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 1 GHz-26 GHz)**



Date: 21.DEC.2023 10:33:17

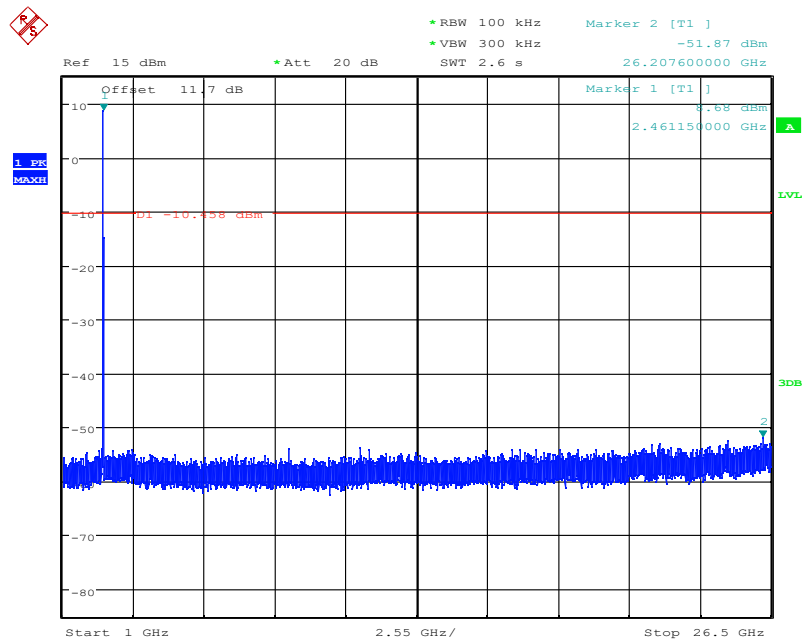
**Fig.A.6.1.7 Transmitter Spurious Emission - Conducted (802.11b, Ch11, Center Frequency)**





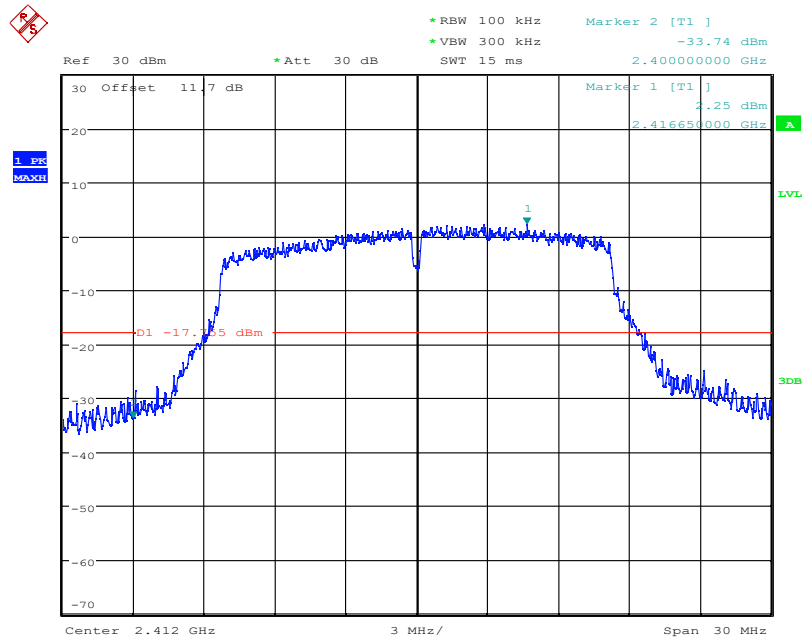
Date: 21.DEC.2023 10:33:42

**Fig.A.6.1.8 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 30 MHz-1 GHz)**



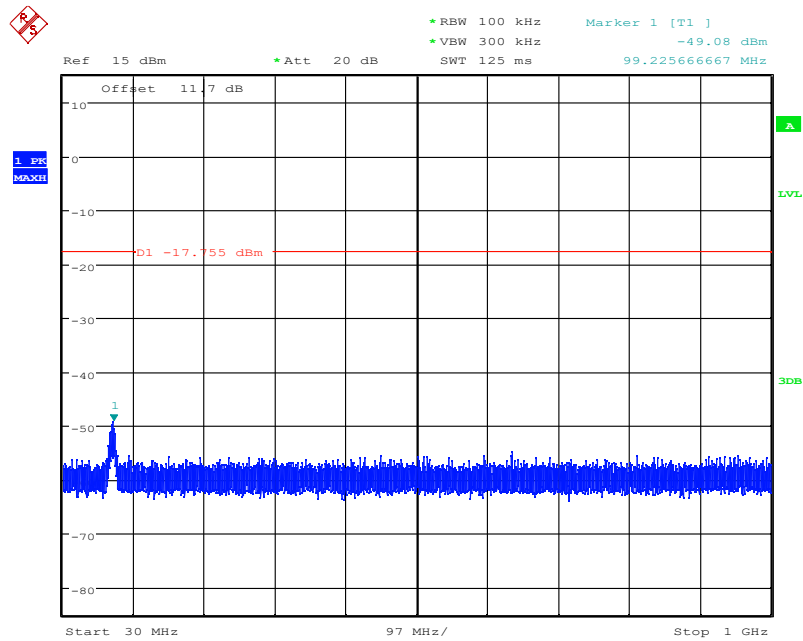
Date: 21.DEC.2023 10:34:05

**Fig.A.6.1.9 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 20 GHz-26 GHz)**



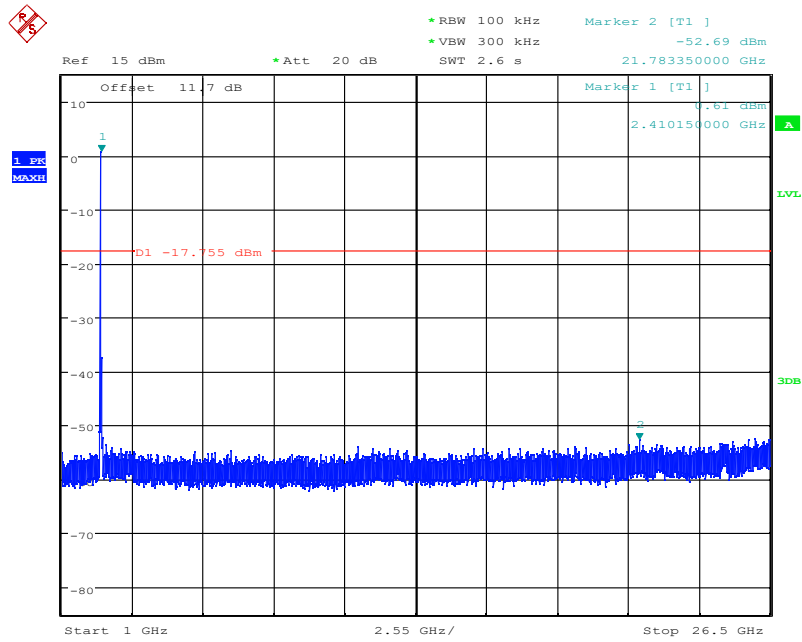
Date: 21.DEC.2023 10:43:45

**Fig.A.6.1.10 Transmitter Spurious Emission - Conducted (802.11g, Ch1, Center Frequency)**



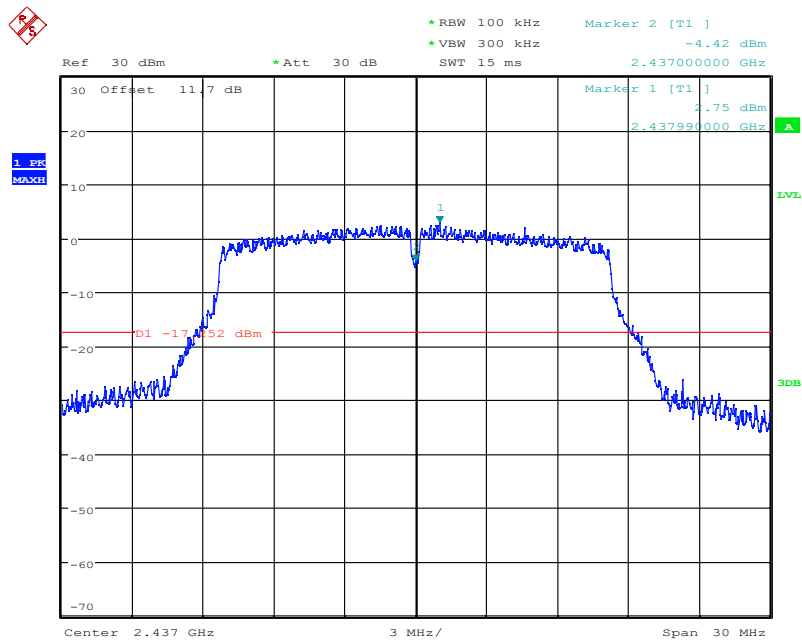
Date: 21.DEC.2023 10:44:10

**Fig.A.6.1.11 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 30 MHz-1 GHz)**



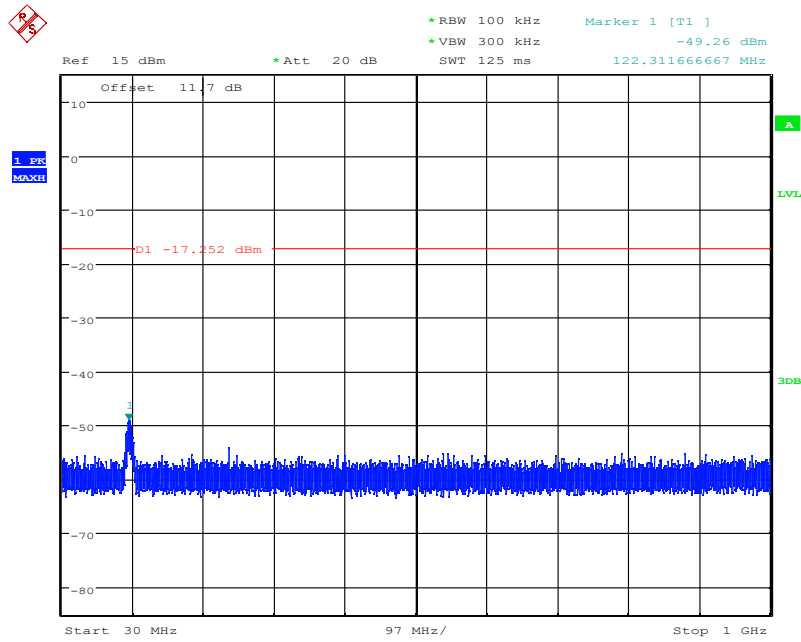
Date: 21.DEC.2023 10:44:33

**Fig.A.6.1.12 Transmitter Spurious Emission - Conducted (802.11g, Ch1, 1 GHz-26 GHz)**



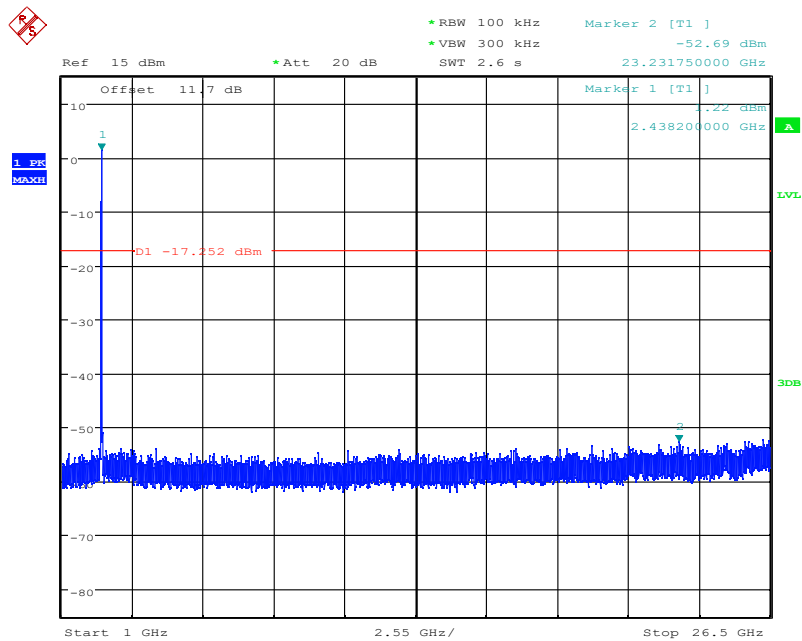
Date: 21.DEC.2023 10:48:29

**Fig.A.6.1.13 Transmitter Spurious Emission - Conducted (802.11g, Ch6, Center Frequency)**



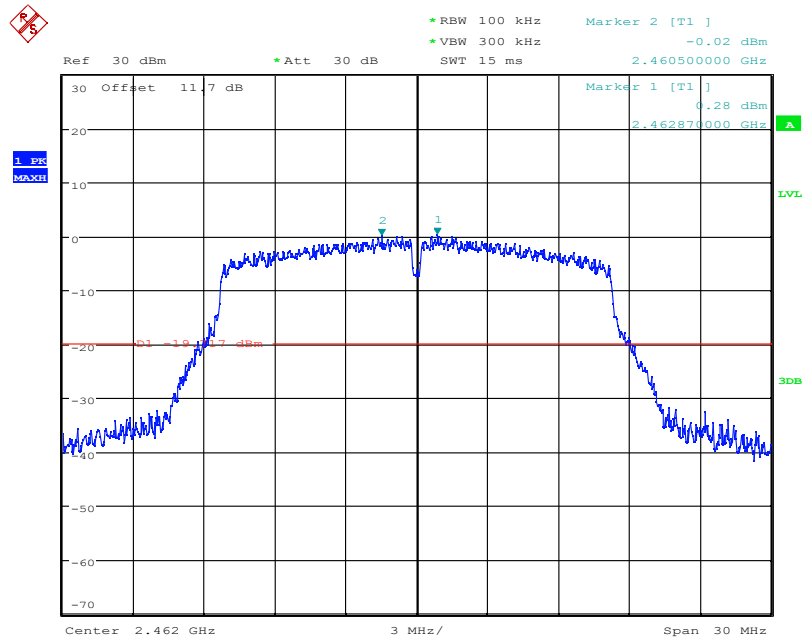
Date: 21.DEC.2023 10:48:54

**Fig.A.6.1.14 Transmitter Spurious Emission - Conducted (802.11g, Ch6, 30 MHz-1 GHz)**



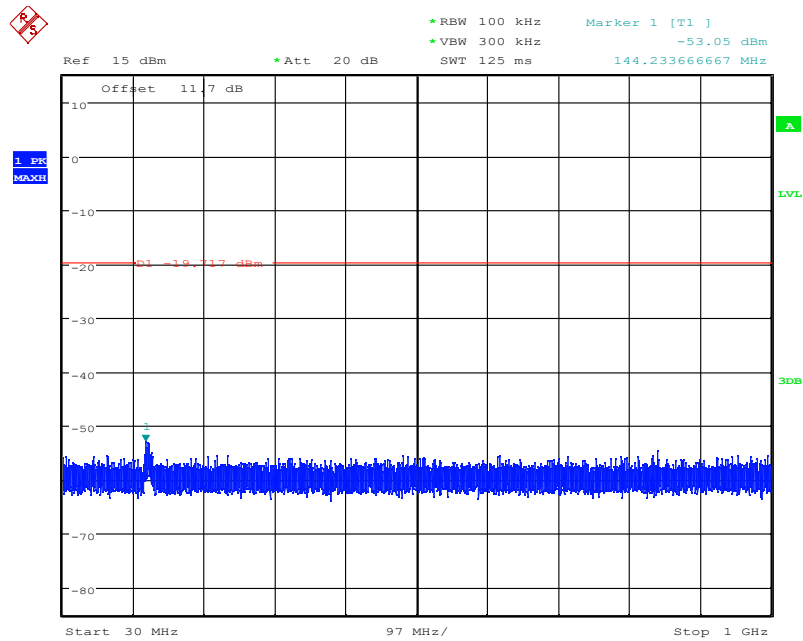
Date: 21.DEC.2023 10:49:17

**Fig.A.6.1.15 Transmitter Spurious Emission - Conducted (802.11g, Ch6, 1 GHz-26 GHz)**



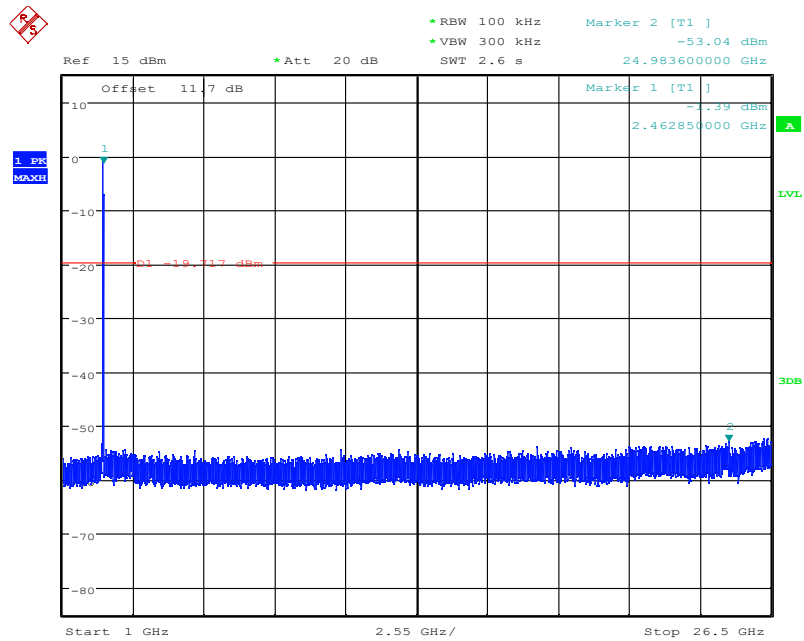
Date: 25.DEC.2023 14:52:25

**Fig.A.6.1.16 Transmitter Spurious Emission - Conducted (802.11g, Ch11, Center Frequency)**



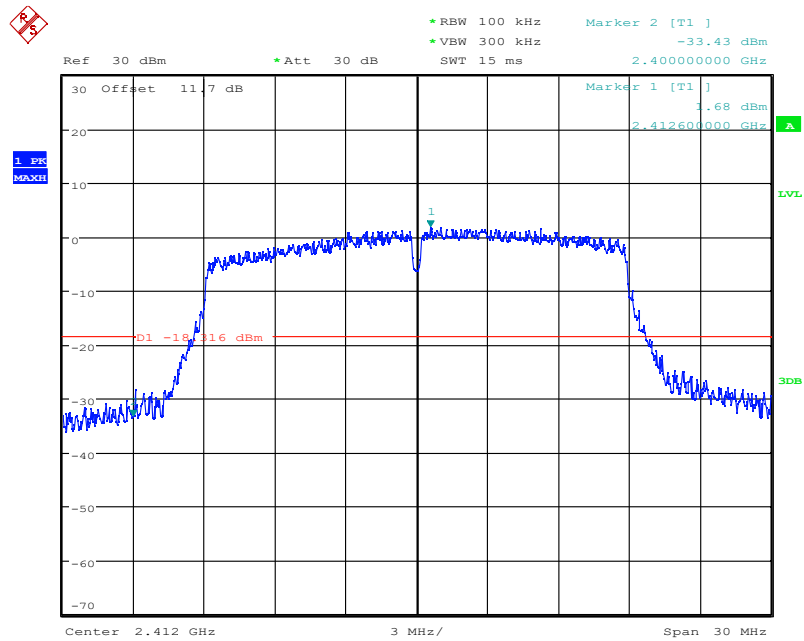
Date: 25.DEC.2023 14:52:49

**Fig.A.6.1.17 Transmitter Spurious Emission - Conducted (802.11g, Ch11, 30 MHz-1 GHz)**



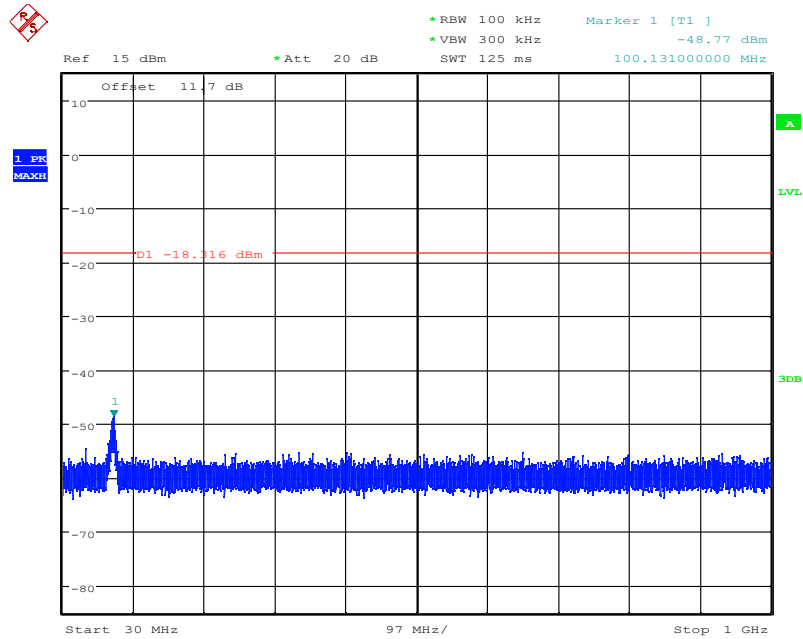
Date: 25.DEC.2023 14:53:12

**Fig.A.6.1.18 Transmitter Spurious Emission - Conducted (802.11g, Ch11, 1 GHz-26 GHz)**



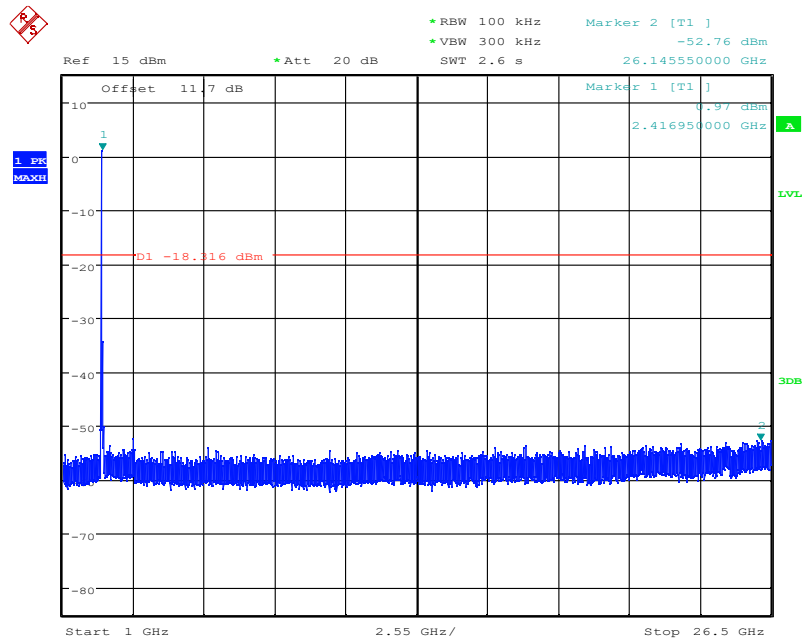
Date: 21.DEC.2023 13:53:09

**Fig.A.6.1.19 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch1, Center Frequency)**



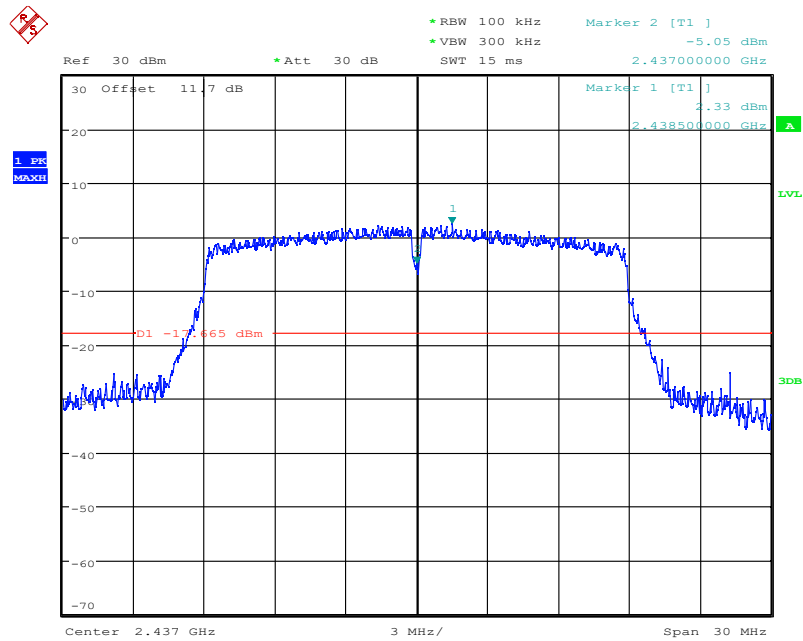
Date: 21.DEC.2023 13:53:33

**Fig.A.6.1.20 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch1, 30 MHz-1 GHz)**



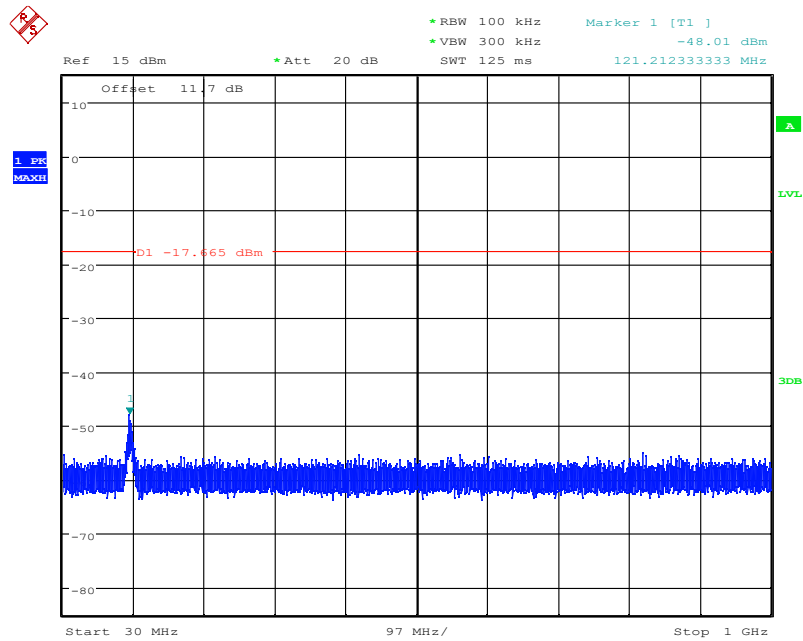
Date: 21.DEC.2023 13:53:57

**Fig.A.6.1.21 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch1, 1 GHz-26 GHz)**



Date: 21.DEC.2023 13:59:33

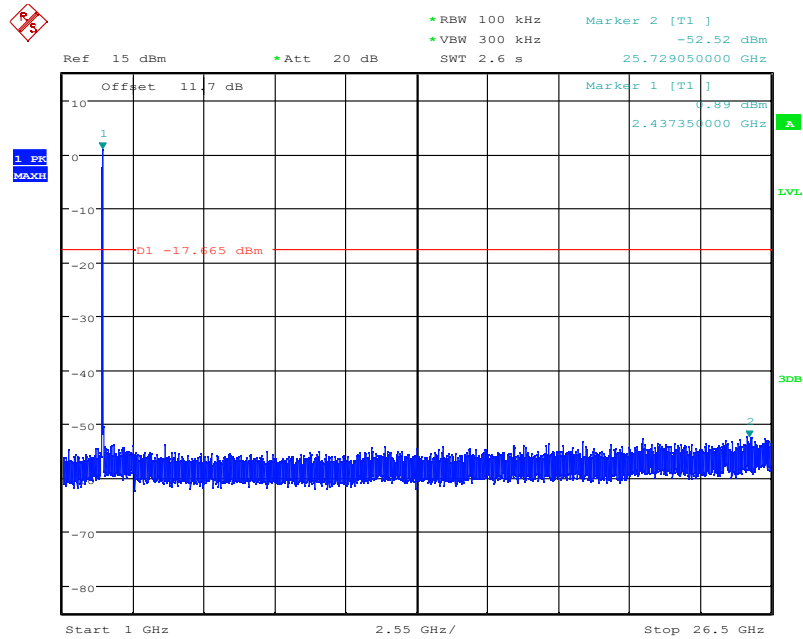
**Fig.A.6.1.22 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch6, Center Frequency)**



Date: 21.DEC.2023 13:59:58

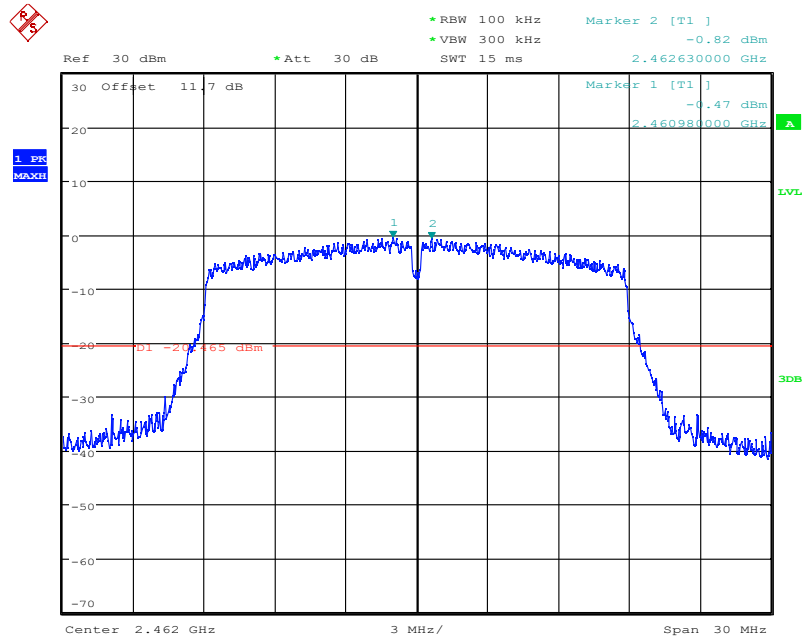
**Fig.A.6.1.23 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch6, 30 MHz-1 GHz)**





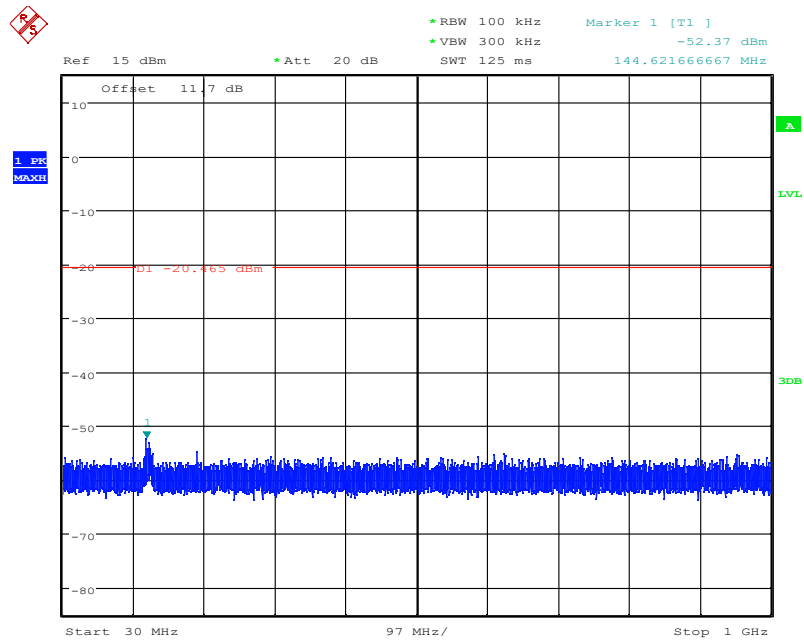
Date: 21.DEC.2023 14:00:21

**Fig.A.6.1.24 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch6, 1 GHz-26 GHz)**



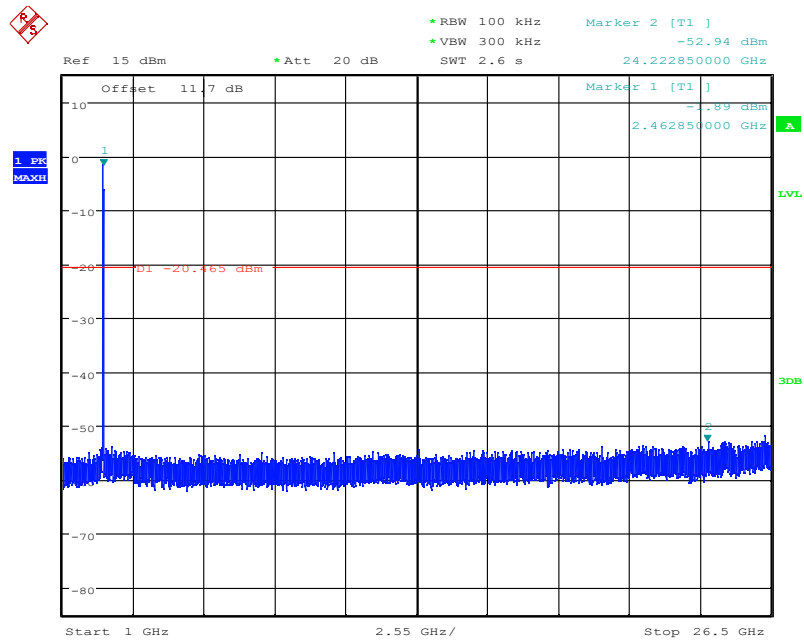
Date: 25.DEC.2023 14:56:39

**Fig.A.6.1.25 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, Center Frequency)**



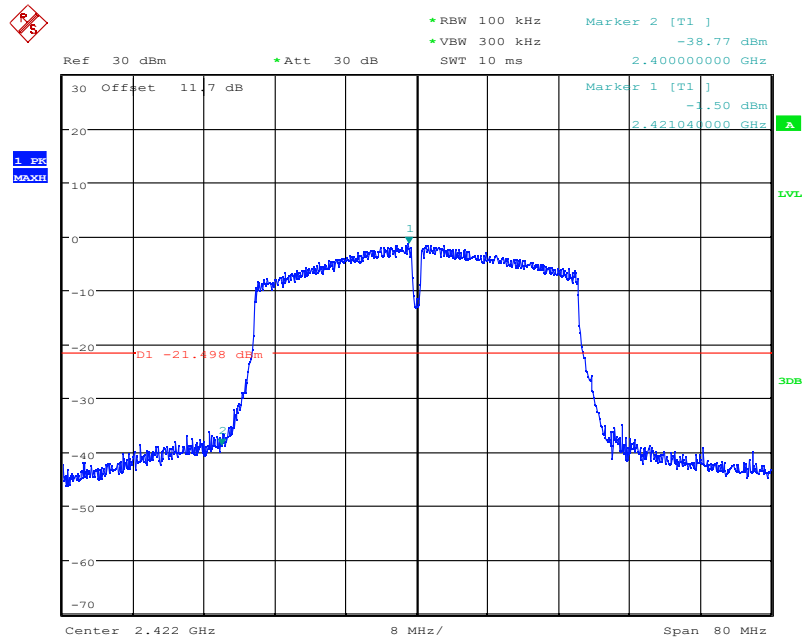
Date: 25.DEC.2023 14:57:03

**Fig.A.6.1.26 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 30 MHz-1 GHz)**



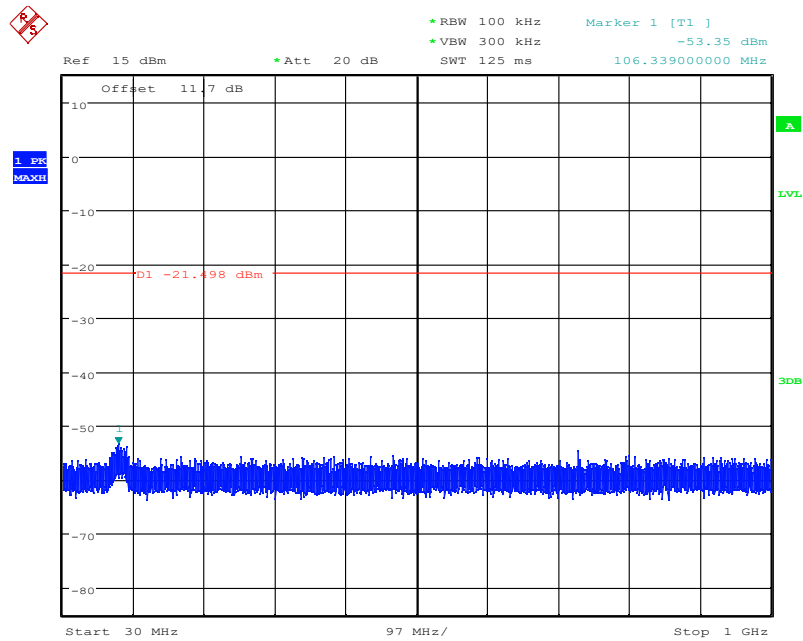
Date: 25.DEC.2023 14:57:27

**Fig.A.6.1.27 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 1 GHz-26 GHz)**



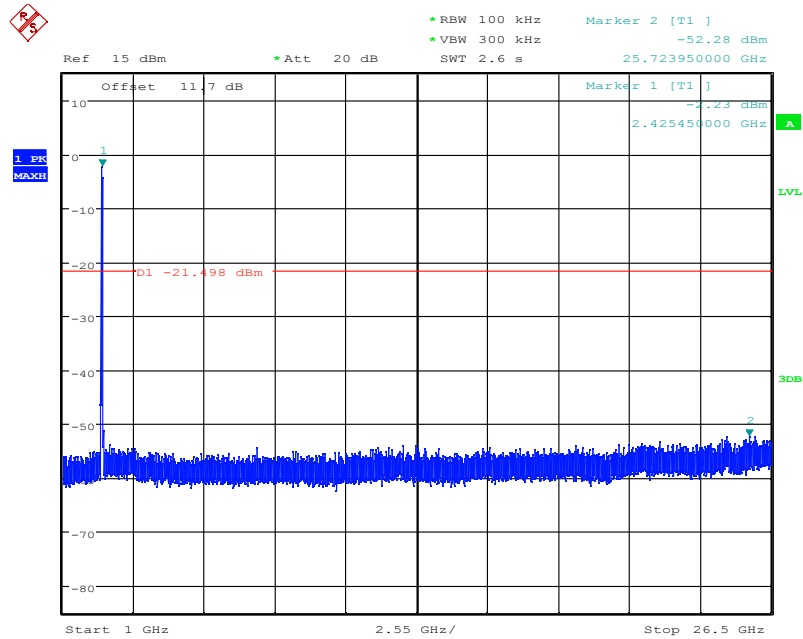
Date: 25.DEC.2023 15:11:27

**Fig.A.6.1.28 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch3, Center Frequency)**



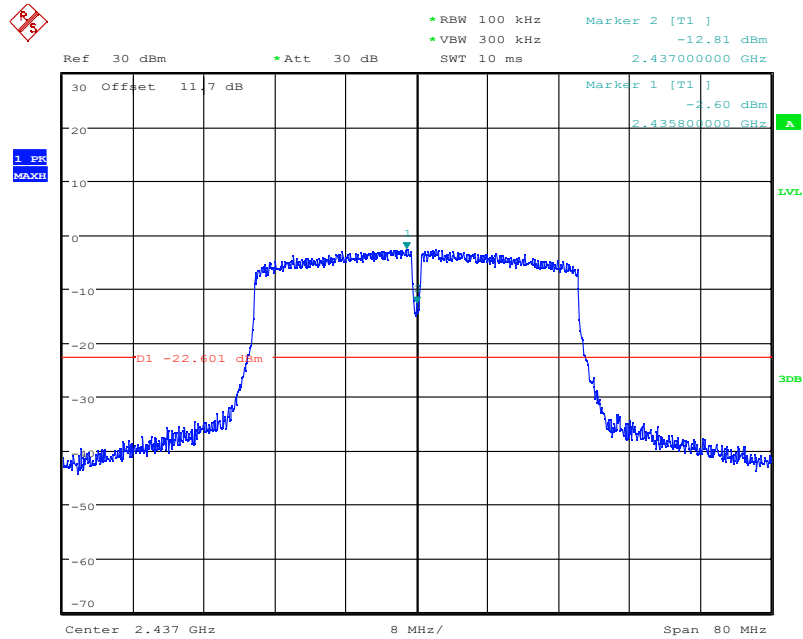
Date: 25.DEC.2023 15:11:51

**Fig.A.6.1.29 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch3, 30 MHz-1 GHz)**



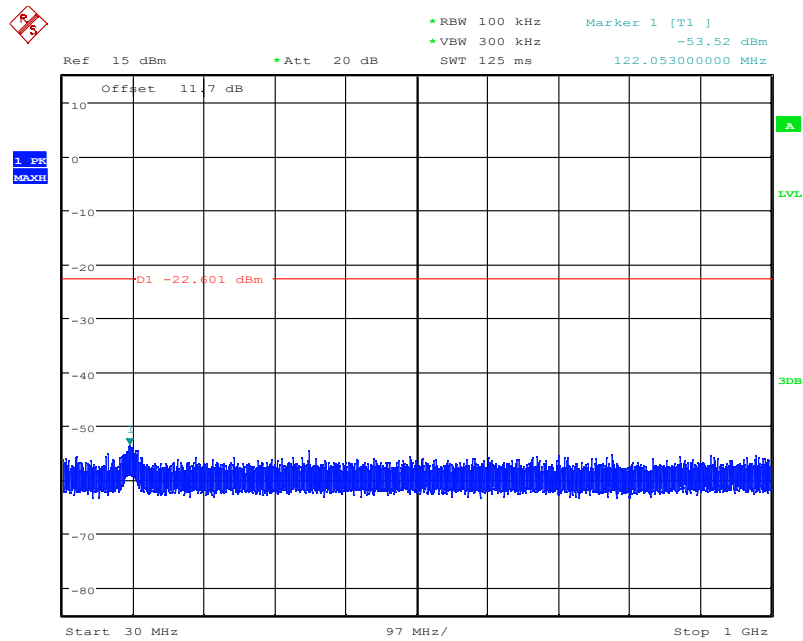
Date: 25.DEC.2023 15:12:15

**Fig.A.6.1.30 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch3, 1 GHz-26.5 GHz)**



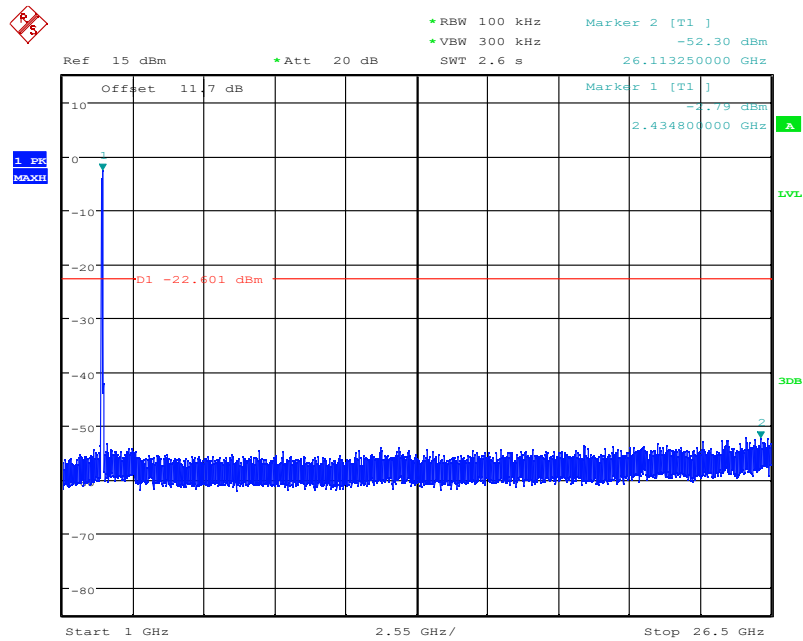
Date: 25.DEC.2023 15:15:03

**Fig.A.6.1.31 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch6, Center Frequency)**



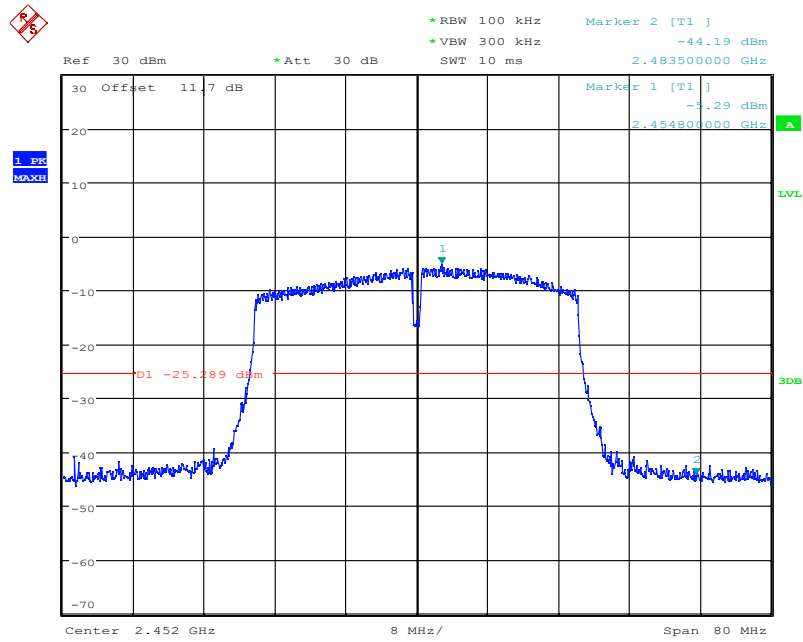
Date: 25.DEC.2023 15:15:28

**Fig.A.6.1.32 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch6, 30 MHz-1 GHz)**



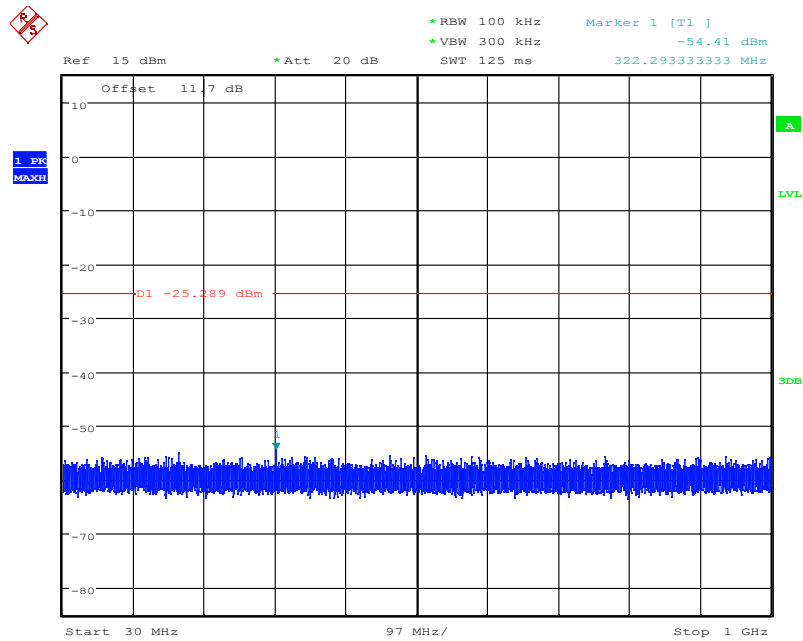
Date: 25.DEC.2023 15:15:51

**Fig.A.6.1.33 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch6, 1 GHz-26.5 GHz)**



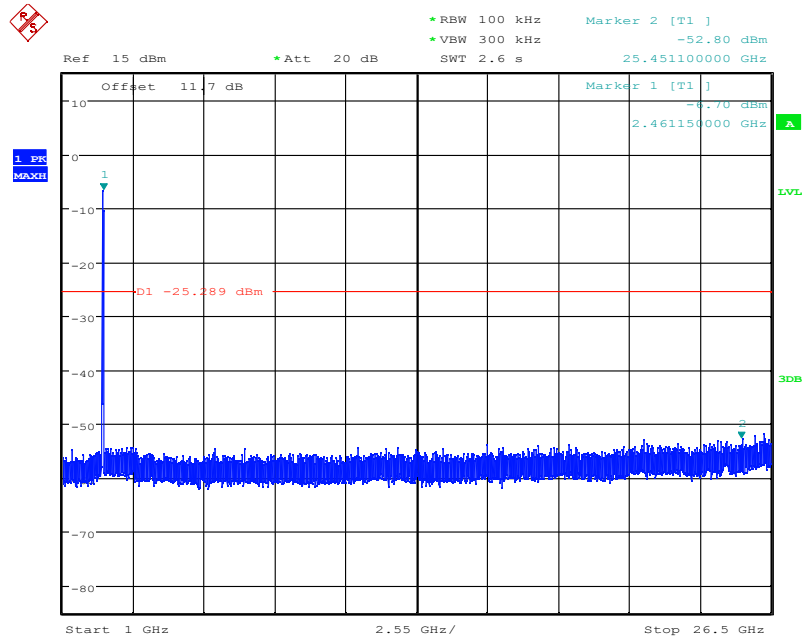
Date: 25.DEC.2023 15:07:51

**Fig.A.6.1.34 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch9, Center Frequency)**



Date: 25.DEC.2023 15:08:15

**Fig.A.6.1.35 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch9, 30 MHz-1 GHz)**



Date: 25.DEC.2023 15:08:39

**Fig.A.6.1.36 Transmitter Spurious Emission - Conducted (802.11n-HT40, Ch9, 1 GHz-26.5 GHz)**

**Conclusion: Pass**

## A.7. Radiated Unwanted Emission

### Limits

Measurement Limit

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

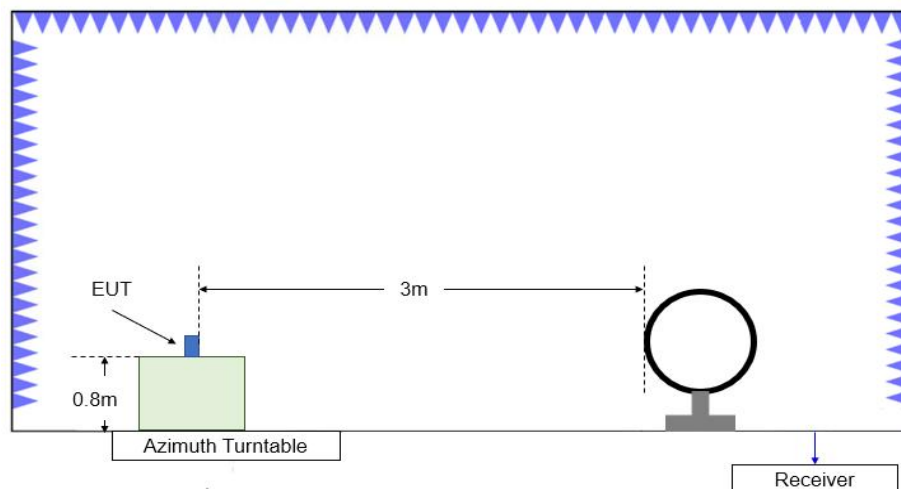
Limit in restricted band

Frequency (MHz)	Field strength( $\mu\text{V}/\text{m}$ )	Measurement distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	Field strength (dB $\mu\text{V}/\text{m}$ )	Measurement distance (m)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

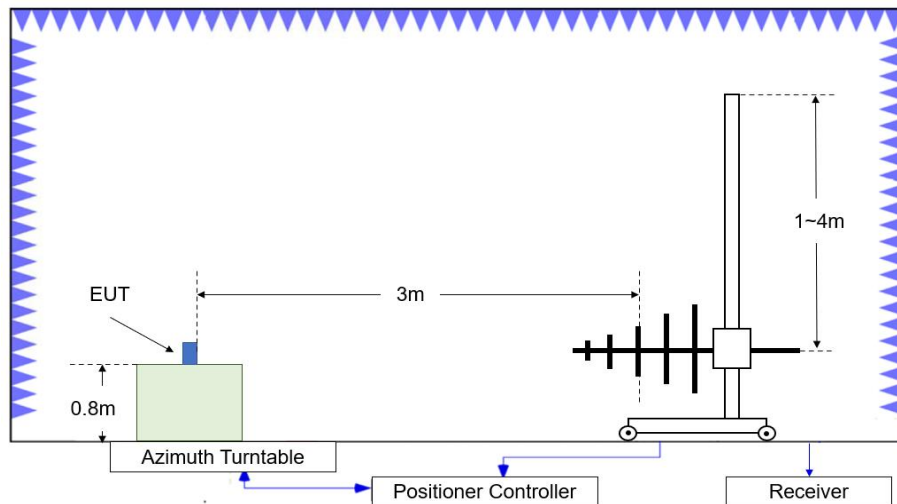
Note: When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor.

### Test setup

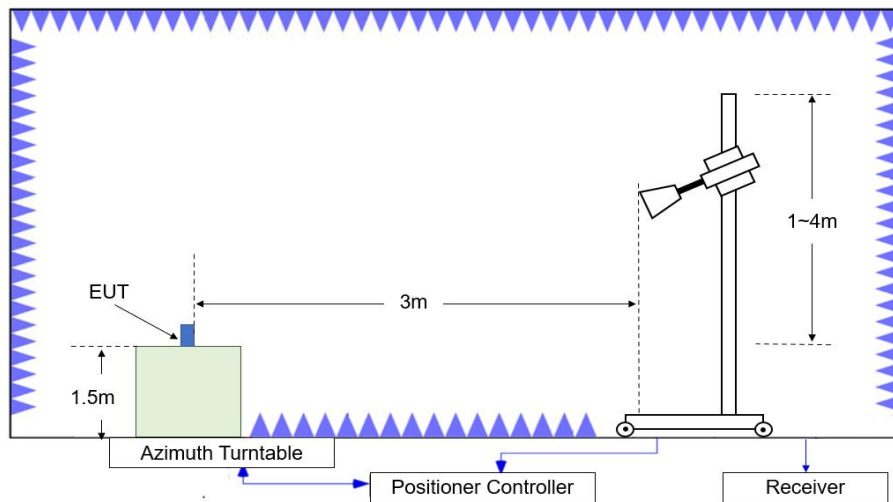


**Test Site Diagram (9kHz-30MHz)**





**Test Site Diagram (30MHz-1GHz)**



**Test Site Diagram (1GHz-40GHz)**

**Test Procedures**

Radiated unwanted emissions from the EUT were measured according to ANSI C63.10.

**Test setting**

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100kHz/300kHz	5
1000-3000	1MHz/3MHz	15
3000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

**Sample Calculation**

A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

$P_{Mea}$  is the field strength recorded from the instrument.

The measurement results are obtained as described below:

Result= $P_{\text{Mea}}+A_{\text{Rpl}}-P_{\text{Mea}}+\text{Cable Loss}+\text{Antenna Factor}$

**Test note**

1. The EUT is operating at its maximum duty cycle and its maximum power control level.
2. Investigation has been done on all modes and modulations/data rates. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.
3. Spurious emissions for all channels were investigated and almost the same below 1GHz. According to FCC 47 CFR §15.31, emission levels are not report much lower than the limit by over 20dB
4. Measurement frequencies were performed from 9 kHz to the 10<sup>th</sup> harmonic of highest fundamental frequency or 40GHz, whichever is lower.

### Test Result

#### Peak

#### 802.11b

#### Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17981.500	51.20	-29.40	46.00	34.60	74.00	22.80	V
4824.000	48.08	-37.70	33.00	52.78	74.00	25.92	H
12541.000	47.56	-31.20	39.20	39.56	74.00	26.44	H
14711.000	47.47	-30.20	41.40	36.37	74.00	26.53	H
8261.500	43.48	-34.70	37.00	41.18	74.00	30.52	V
2333.900	54.87	-19.60	28.20	46.27	74.00	19.13	V

#### Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
4874.000	55.71	-37.50	33.40	59.81	74.00	18.29	V
17064.500	50.36	-29.40	41.10	38.66	74.00	23.64	V
14778.500	47.91	-30.40	41.20	37.11	74.00	26.09	V
12539.000	47.19	-31.20	39.20	39.19	74.00	26.81	V
9964.500	43.74	-34.10	38.00	39.94	74.00	30.26	V
7450.000	42.48	-35.50	36.50	41.48	74.00	31.52	V

#### Ch11

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17943.500	50.98	-29.40	46.00	34.38	74.00	23.02	H
14870.500	48.00	-30.10	40.90	37.20	74.00	26.00	V
12557.000	46.99	-31.20	39.20	38.99	74.00	27.01	H
9743.000	43.12	-34.50	37.80	39.82	74.00	30.88	H
4923.500	42.36	-37.60	33.30	46.66	74.00	31.64	V
2485.900	55.72	-19.70	28.20	47.22	74.00	18.28	H

**802.11g**

## Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17980.000	50.56	-29.40	46.00	33.96	74.00	23.44	H
14827.000	47.63	-30.00	41.00	36.63	74.00	26.37	V
12820.000	47.51	-31.50	39.80	39.21	74.00	26.49	V
4818.500	46.36	-37.70	33.00	51.06	74.00	27.64	H
9611.500	43.40	-34.30	37.60	40.10	74.00	30.60	V
2389.800	62.22	-19.80	28.20	53.82	74.00	11.78	V

## Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
4863.500	50.75	-37.50	33.40	54.85	74.00	23.25	H
17988.500	50.13	-29.40	46.00	33.53	74.00	23.87	V
14742.500	47.97	-30.20	41.40	36.87	74.00	26.03	V
12837.500	47.03	-31.90	39.90	39.03	74.00	26.97	H
9776.000	43.83	-33.80	38.00	39.63	74.00	30.17	H
7972.000	41.69	-35.40	36.90	40.19	74.00	32.31	H

## Ch11

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17939.500	50.72	-29.40	46.00	34.12	74.00	23.28	V
14759.500	47.66	-30.40	41.20	36.86	74.00	26.34	V
12814.000	46.64	-31.50	39.80	38.34	74.00	27.36	H
9753.000	43.11	-33.80	38.00	38.91	74.00	30.89	V
7970.000	42.37	-35.40	36.80	40.97	74.00	31.63	H
2486.100	63.62	-19.70	28.20	55.12	74.00	10.38	H

**802.11n-HT20**

## Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17977.500	50.43	-29.40	46.00	33.83	74.00	23.57	V
12537.500	48.23	-31.20	39.20	40.23	74.00	25.77	V
14708.500	47.27	-30.20	41.40	36.17	74.00	26.73	V
4821.500	46.83	-37.70	33.00	51.53	74.00	27.17	H
9887.000	43.57	-33.90	37.90	39.57	74.00	30.43	V
2389.900	64.63	-19.80	28.20	56.23	74.00	9.37	V

## Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17979.500	50.42	-29.40	46.00	33.82	74.00	23.58	V
4871.500	49.87	-37.50	33.40	53.97	74.00	24.13	V
14742.500	47.94	-30.20	41.40	36.84	74.00	26.06	V
12562.000	47.15	-31.20	39.20	39.15	74.00	26.85	H
8517.500	43.43	-34.30	37.40	40.33	74.00	30.57	V
7985.500	41.29	-35.40	36.90	39.79	74.00	32.71	V

## Ch11

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17978.500	50.48	-29.40	46.00	33.88	74.00	23.52	H
14669.000	47.42	-30.00	41.50	35.92	74.00	26.58	H
12563.000	47.24	-31.20	39.20	39.24	74.00	26.76	V
8333.500	44.05	-35.00	37.20	41.85	74.00	29.95	H
7529.000	41.68	-35.50	36.30	40.88	74.00	32.32	H
2485.200	63.86	-19.70	28.20	55.36	74.00	10.14	H

**802.11n-HT40**

## Ch3

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.000	50.21	-29.40	46.00	33.61	74.00	23.79	H
14775.500	48.55	-30.40	41.20	37.75	74.00	25.45	H
12581.000	46.64	-32.20	39.30	39.54	74.00	27.36	V
9164.500	43.68	-34.70	37.70	40.68	74.00	30.32	V
7987.000	42.12	-35.40	36.90	40.62	74.00	31.88	H
2389.000	64.18	-19.80	28.20	55.78	74.00	9.82	V

## Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17973.500	50.94	-29.40	46.00	34.34	74.00	23.06	V
14750.500	47.57	-30.20	41.40	36.47	74.00	26.43	V
12534.500	47.52	-31.20	39.20	39.52	74.00	26.48	V
9202.500	42.62	-34.70	37.70	39.62	74.00	31.38	H
4878.000	42.54	-37.50	33.40	46.64	74.00	31.46	V
7923.000	42.03	-35.40	36.80	40.63	74.00	31.97	V

## Ch9

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17976.000	50.36	-29.40	46.00	33.76	74.00	23.64	H
14744.500	47.82	-30.20	41.40	36.72	74.00	26.18	H
12783.000	46.67	-31.50	39.80	38.37	74.00	27.33	V
9137.000	42.82	-34.30	37.70	39.42	74.00	31.18	H
4907.000	41.35	-37.60	33.30	45.65	74.00	32.65	V
2485.300	67.38	-19.70	28.20	58.88	74.00	6.62	V

**Average**  
**802.11b**

Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
4823.500	45.03	-37.70	33.00	49.73	54.00	8.97	H
17949.500	41.57	-29.40	46.00	24.97	54.00	12.43	V
14711.000	38.23	-30.20	41.40	27.13	54.00	15.77	H
12536.000	37.90	-31.20	39.20	29.90	54.00	16.10	H
8347.000	33.59	-35.00	37.20	31.39	54.00	20.41	V
2387.100	45.37	-19.80	28.20	36.97	54.00	8.63	H

Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
4873.500	53.46	-37.50	33.40	57.56	54.00	0.54	V
17947.000	41.56	-29.40	46.00	24.96	54.00	12.44	V
14668.500	38.22	-30.00	41.50	26.72	54.00	15.78	V
12557.500	37.99	-31.20	39.20	29.99	54.00	16.01	V
9161.000	33.77	-34.70	37.70	30.77	54.00	20.23	V
7983.000	32.49	-35.40	36.90	30.99	54.00	21.51	V

Ch11

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17979.000	41.29	-29.40	46.00	24.69	54.00	12.71	V
12560.000	38.13	-31.20	39.20	30.13	54.00	15.87	H
14788.000	38.00	-30.40	41.20	27.20	54.00	16.00	V
4923.500	37.86	-37.60	33.30	42.16	54.00	16.14	H
9121.500	33.46	-34.30	37.70	30.06	54.00	20.54	H
2486.600	46.28	-19.70	28.20	37.78	54.00	7.72	H

**802.11g**

## Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17979.000	41.67	-29.40	46.00	25.07	54.00	12.33	H
14709.500	37.97	-30.20	41.40	26.87	54.00	16.03	V
12789.500	37.72	-31.50	39.80	29.42	54.00	16.28	H
4822.000	36.12	-37.70	33.00	40.82	54.00	17.88	V
9732.000	33.73	-34.50	37.80	30.43	54.00	20.27	H
2390.000	49.80	-19.80	28.20	41.40	54.00	4.20	H

## Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17948.000	41.20	-29.40	46.00	24.60	54.00	12.80	V
4869.500	39.22	-37.50	33.40	43.32	54.00	14.78	V
14787.000	38.15	-30.40	41.20	27.35	54.00	15.85	V
12558.500	37.90	-31.20	39.20	29.90	54.00	16.10	H
8242.500	33.72	-34.70	37.00	31.42	54.00	20.28	H
7983.500	32.63	-35.40	36.90	31.13	54.00	21.37	V

## Ch11

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17980.500	41.71	-29.40	46.00	25.11	54.00	12.29	H
14786.000	38.16	-30.40	41.20	27.36	54.00	15.84	V
12563.000	37.70	-31.20	39.20	29.70	54.00	16.30	H
9140.500	33.40	-34.30	37.70	30.00	54.00	20.60	H
7971.500	32.36	-35.40	36.90	30.86	54.00	21.64	V
2485.100	50.45	-19.70	28.20	41.95	54.00	3.55	V



**802.11n-HT20**

## Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17978.000	41.12	-29.40	46.00	24.52	54.00	12.88	V
14781.500	38.08	-30.40	41.20	27.28	54.00	15.92	H
12535.500	37.62	-31.20	39.20	29.62	54.00	16.38	V
4823.000	35.64	-37.70	33.00	40.34	54.00	18.36	H
9134.500	33.47	-34.30	37.70	30.07	54.00	20.53	V
2389.900	51.48	-19.80	28.20	43.08	54.00	2.52	V

## Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17983.500	41.56	-29.40	46.00	24.96	54.00	12.44	H
4867.500	39.27	-37.50	33.40	43.37	54.00	14.73	V
14741.500	38.46	-30.20	41.40	27.36	54.00	15.54	H
12560.500	37.66	-31.20	39.20	29.66	54.00	16.34	H
9102.000	33.42	-34.60	37.70	30.32	54.00	20.58	H
7987.500	32.11	-35.40	36.90	30.61	54.00	21.89	H

## Ch11

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17971.500	41.21	-29.40	46.00	24.61	54.00	12.79	H
14781.500	38.03	-30.40	41.20	27.23	54.00	15.97	H
12564.000	37.73	-31.20	39.20	29.73	54.00	16.27	V
9157.000	33.54	-34.30	37.70	30.14	54.00	20.46	H
7986.000	32.37	-35.40	36.90	30.87	54.00	21.63	V
2485.200	50.41	-19.70	28.20	41.91	54.00	3.59	H

**802.11n-HT40**

## Ch3

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17947.500	41.16	-29.40	46.00	24.56	54.00	12.84	V
14743.000	38.02	-30.20	41.40	26.92	54.00	15.98	H
12561.500	37.74	-31.20	39.20	29.74	54.00	16.26	H
9170.000	33.38	-34.70	37.70	30.38	54.00	20.62	H
8000.000	32.05	-35.40	36.90	30.55	54.00	21.95	H
2389.000	49.83	-19.80	28.20	41.43	54.00	4.17	V

## Ch6

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17978.000	41.16	-29.40	46.00	24.56	54.00	12.84	V
14782.500	38.48	-30.40	41.20	27.68	54.00	15.52	V
12538.000	37.44	-31.20	39.20	29.44	54.00	16.56	H
9171.500	33.45	-34.70	37.70	30.45	54.00	20.55	H
4874.500	32.14	-37.50	33.40	36.24	54.00	21.86	V
7989.000	31.93	-35.40	36.90	30.43	54.00	22.07	H

## Ch9

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17977.500	41.39	-29.40	46.00	24.79	54.00	12.61	V
14779.500	37.91	-30.40	41.20	27.11	54.00	16.09	H
12561.000	37.28	-31.20	39.20	29.28	54.00	16.72	H
9167.000	33.29	-34.70	37.70	30.29	54.00	20.71	H
4903.000	31.94	-37.60	33.30	36.24	54.00	22.06	V
2485.100	52.44	-19.70	28.20	43.94	54.00	1.56	V

## Band edge compliance

### 802.11b mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.31GHz~2.43GHz---L	Fig.A.7.1	<b>P</b>
	11	2.45GHz~2.50GHz---H	Fig.A.7.2	<b>P</b>

### 802.11g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11g	1	2.31GHz~2.43GHz---L	Fig.A.7.3	<b>P</b>
	11	2.45GHz~2.50GHz---H	Fig.A.7.4	<b>P</b>

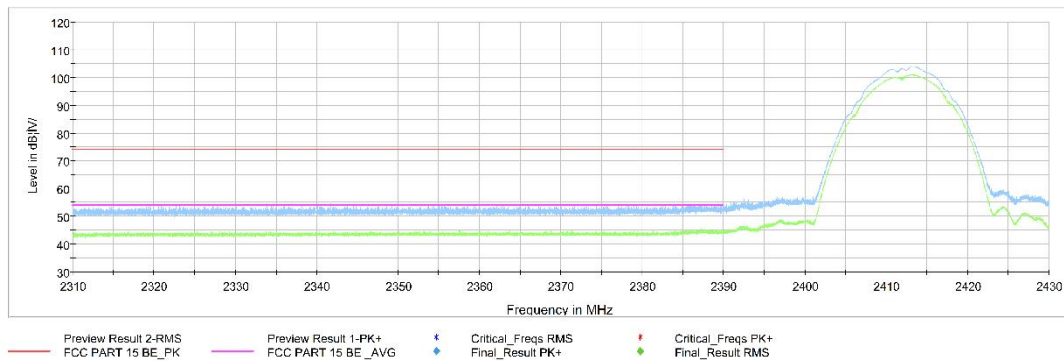
### 802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.31GHz~2.43GHz---L	Fig.A.7.5	<b>P</b>
	11	2.45GHz~2.50GHz---H	Fig.A.7.6	<b>P</b>

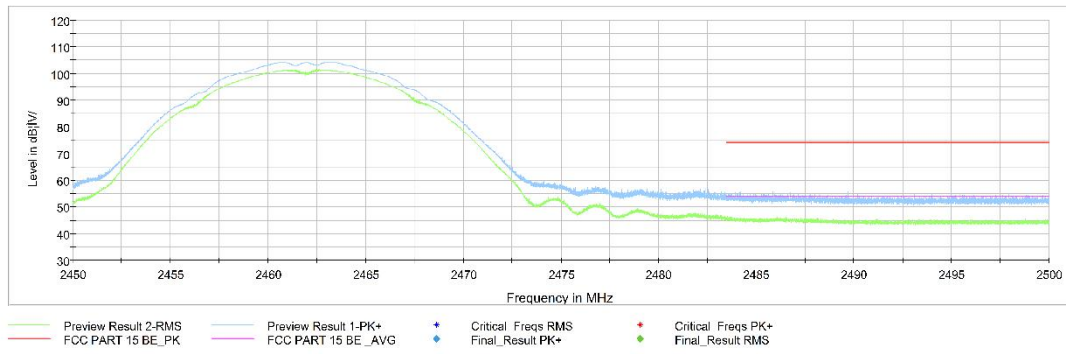
### 802.11n-HT40 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	3	2.31GHz~2.43GHz---L	Fig.A.7.7	<b>P</b>
	9	2.45GHz~2.50GHz---H	Fig.A.7.8	<b>P</b>

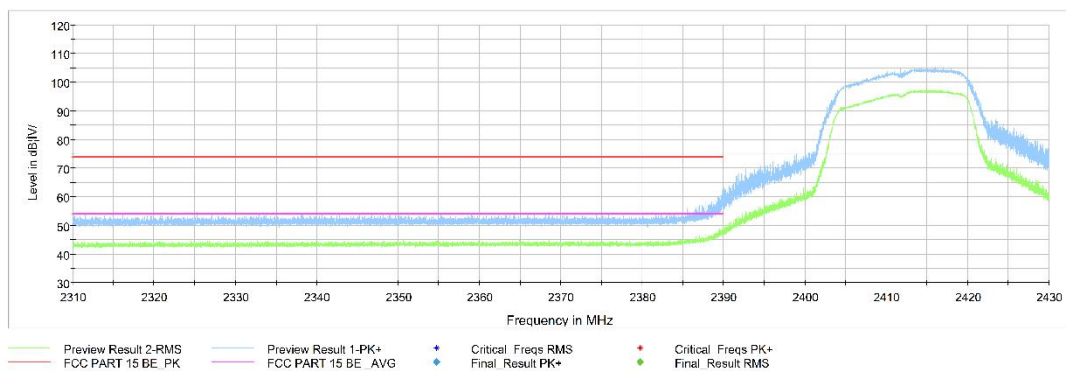
Test graphs as below:



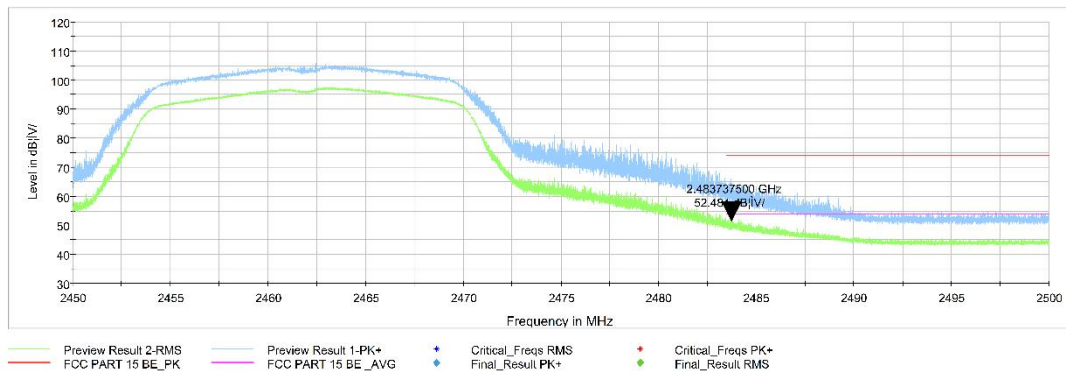
**Fig.A.7.1 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch1, 2.31 GHz – 2.43GHz**



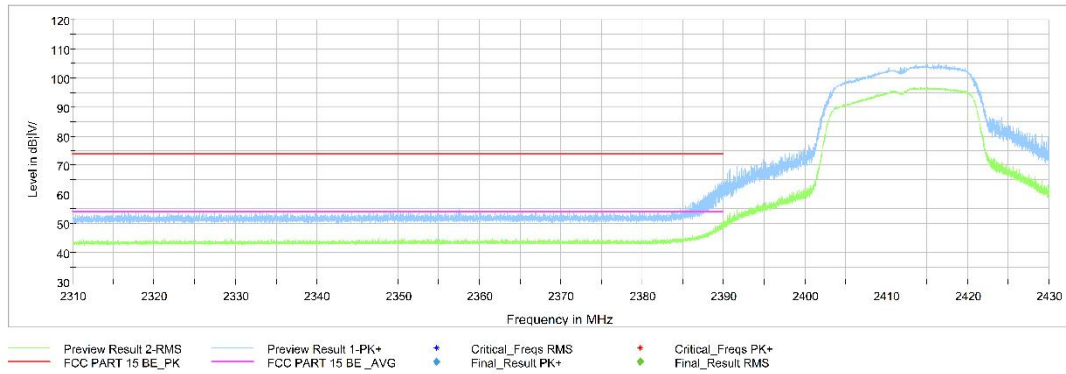
**Fig.A.7.2 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch11, 2.45 GHz - 2.50GHz**



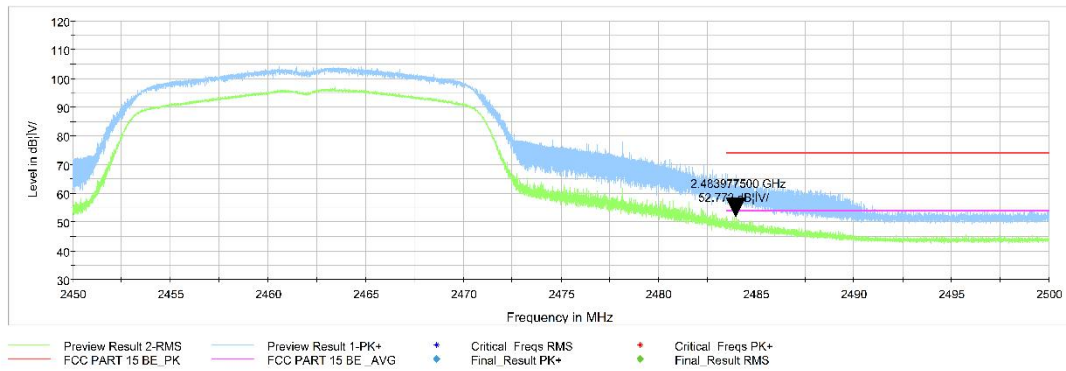
**Fig.A.7.3 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch1, 2.31 GHz - 2.43GHz**



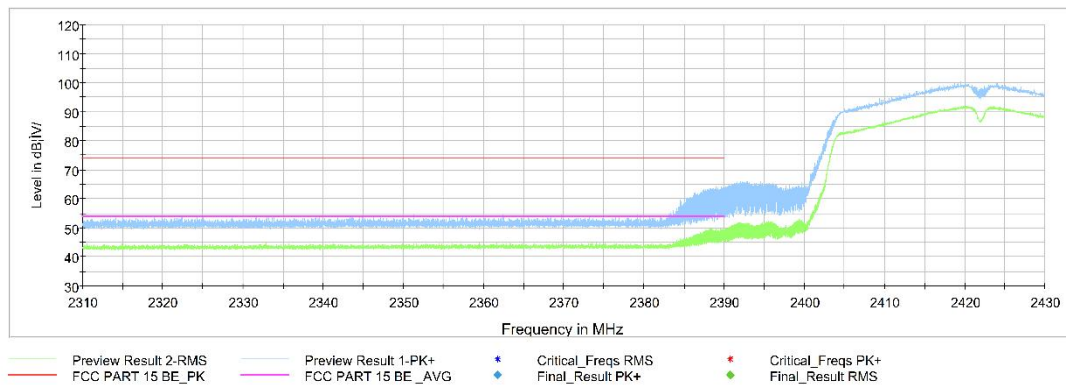
**Fig.A.7.4 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch11, 2.45 GHz - 2.50GHz**



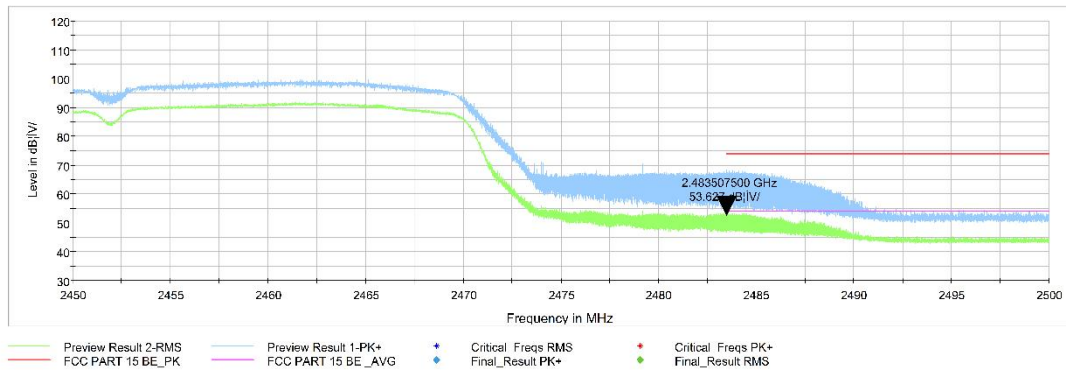
**Fig.A.7.5 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch1, 2.31 GHz - 2.43GHz**



**Fig.A.7.6 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch11, 2.45 GHz - 2.50GHz**



**Fig.A.7.7 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT40, ch3, 2.31 GHz - 2.43GHz**



**Fig.A.7.8 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT40, ch9, 2.45 GHz - 2.50GHz**

## **A.8. AC Power-line Conducted Emission**

### **Summary**

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section

### **Method of Measurement:**

See Clause 6.2 of ANSI C63.10 specifically.

See Clause 4 and Clause 5 of ANSI C63.10 generally.

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver: Quasi-Peak / Average Detector.

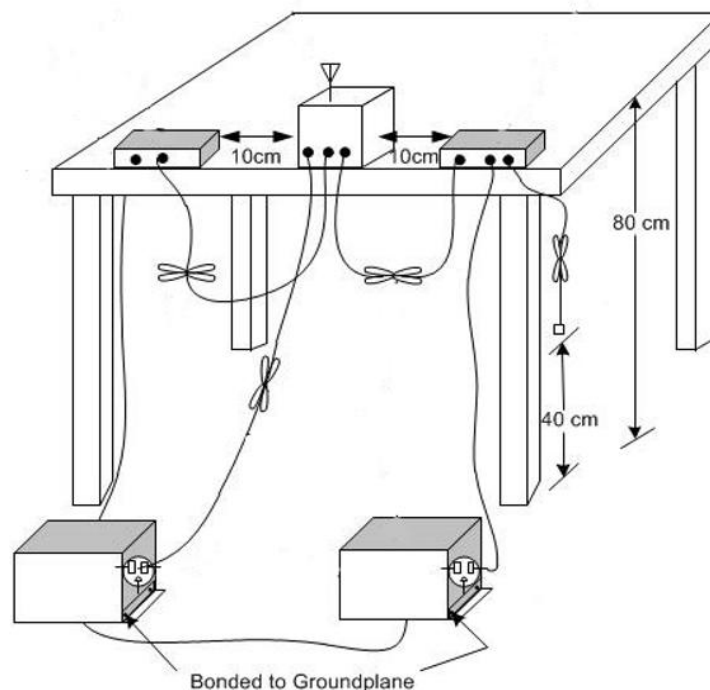
The measurement bandwidth is:

Frequency of Emission (MHz)	RBW/IF bandwidth
0.15-30	9kHz

### **Test Condition:**

Voltage (V)	Frequency (Hz)
120	60

### **Test setup**



**Measurement Result and limit:**

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		With charger		
		802.11b	Idle	
0.15 to 0.5	66 to 56	Fig.A.8.1	Fig.A.8.2	<b>P</b>
0.5 to 5	56			
5 to 30	60			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

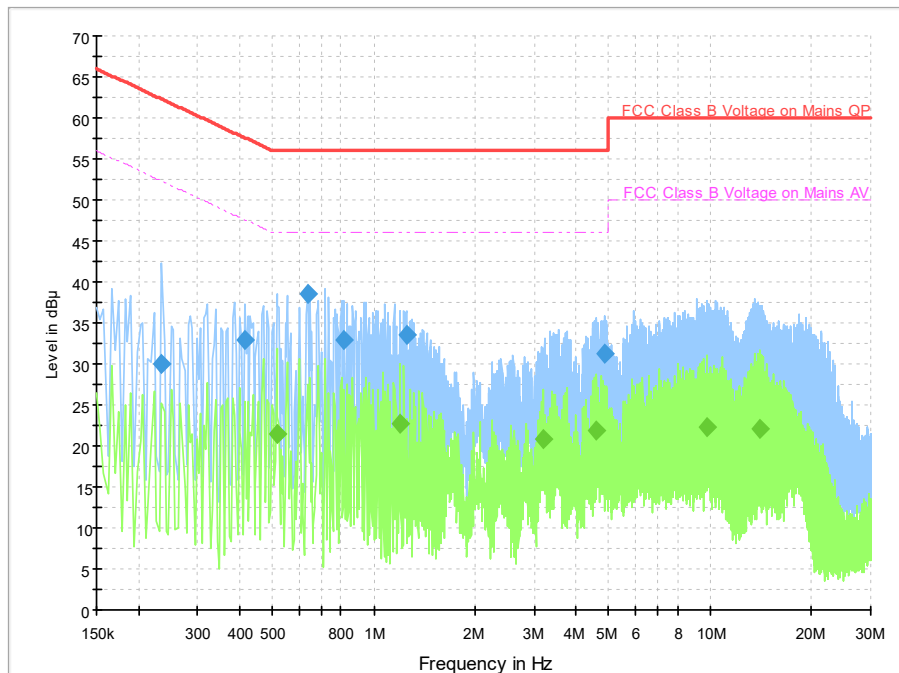
WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		With charger		
		802.11b	Idle	
0.15 to 0.5	56 to 46	Fig.A.8.1	Fig.A.8.2	<b>P</b>
0.5 to 5	46			
5 to 30	50			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

**Conclusion: Pass**
**Test graphs as below:**





**Fig.A.8.1 AC Powerline Conducted Emission-802.11b**

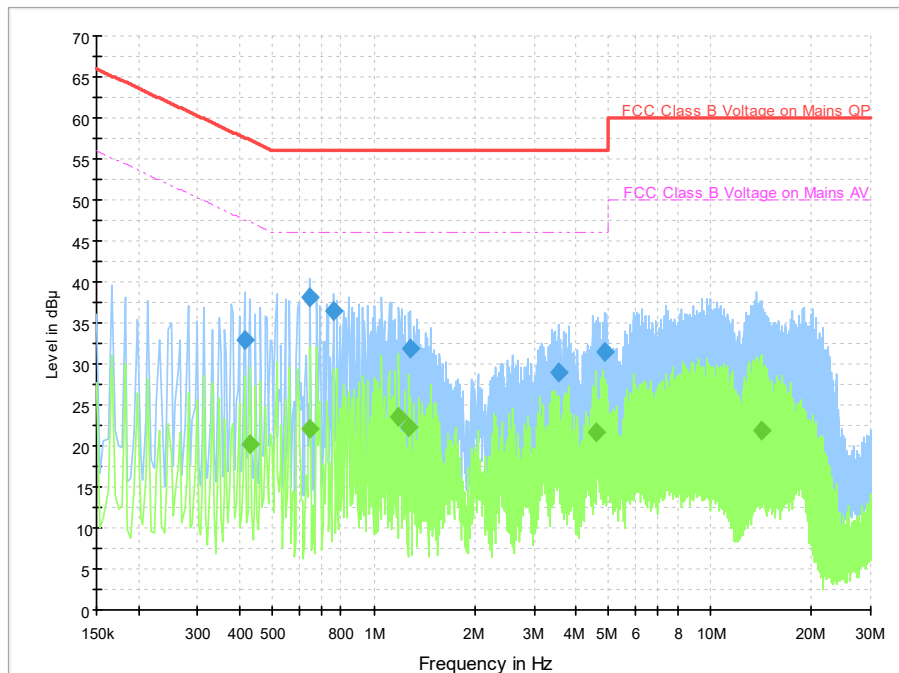
Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.234000	30.0	2000.0	9.000	On	N	19.7	32.3	62.3	
0.414000	32.8	2000.0	9.000	On	N	19.7	24.7	57.6	
0.638000	38.5	2000.0	9.000	On	L1	19.7	17.5	56.0	
0.818000	32.9	2000.0	9.000	On	L1	19.7	23.1	56.0	
1.250000	33.6	2000.0	9.000	On	L1	19.6	22.4	56.0	
4.854000	31.3	2000.0	9.000	On	L1	19.6	24.7	56.0	

**Final Result 2**

Frequency (MHz)	CAverage (dB $\mu$ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.514000	21.5	2000.0	9.000	On	N	19.7	24.5	46.0	
1.198000	22.7	2000.0	9.000	On	L1	19.6	23.3	46.0	
3.182000	20.8	2000.0	9.000	On	L1	19.6	25.2	46.0	
4.606000	21.8	2000.0	9.000	On	L1	19.6	24.2	46.0	
9.802000	22.3	2000.0	9.000	On	L1	19.7	27.7	50.0	
14.062000	22.1	2000.0	9.000	On	L1	19.7	27.9	50.0	



**Fig.A.8.2 AC Powerline Conducted Emission-Idle**

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.414000	32.9	2000.0	9.000	On	N	19.7	24.6	57.6	
0.646000	38.1	2000.0	9.000	On	L1	19.7	17.9	56.0	
0.762000	36.4	2000.0	9.000	On	L1	19.7	19.6	56.0	
1.290000	32.0	2000.0	9.000	On	L1	19.7	24.0	56.0	
3.542000	28.9	2000.0	9.000	On	L1	19.6	27.1	56.0	
4.878000	31.4	2000.0	9.000	On	L1	19.6	24.6	56.0	

**Final Result 2**

Frequency (MHz)	CAverage (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.430000	20.3	2000.0	9.000	On	L1	19.7	27.0	47.3	
0.646000	22.2	2000.0	9.000	On	L1	19.7	23.8	46.0	
1.190000	23.5	2000.0	9.000	On	L1	19.6	22.5	46.0	
1.274000	22.3	2000.0	9.000	On	L1	19.7	23.7	46.0	
4.558000	21.6	2000.0	9.000	On	L1	19.6	24.4	46.0	
14.190000	21.9	2000.0	9.000	On	L1	19.7	28.1	50.0	

## ANNEX B: EUT parameters

Disclaimer: The antenna gain and worse case provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

## ANNEX C: Accreditation Certificate



**Accredited Laboratory**

A2LA has accredited

**TELECOMMUNICATION TECHNOLOGY LABS, CAICT**  
*Beijing, People's Republic of China*

for technical competence in the field of  
**Electrical Testing**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 26<sup>th</sup> day of June 2023.



Mr. Trace McInturf, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 7049.01  
Valid to July 31, 2024

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

**\*\*\*END OF REPORT\*\*\***