TEST REPORT

For

GPON ONT

Model Number: ZXHN F6201B, ZXHN F6117A, ZXHN F6515N, ZXHN F6211B, ZXHN F6601P, ZXHN F6310SP

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection
Site Location	:	No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China
Tel	:	0086-755-86928965
Fax	:	0086-755-86009898-31396
Web	:	www.smq.com.cn
Email	:	emcrf@smq.com.cn

重 要 声 明

Important statement

1. 本院是深圳市人民政府依法设置的产品质量监督检验机构，系社会公益型非营利性技术机构，为各级政府执法部门进行监督管理提供技术支持和接受社会各界的委托检验。

SMQ is a legal non-profit technical institute established by Shenzhen Municipal Government to undertake the quality supervision and inspection of products, and to provide technical support to relevant supervision and administration and also conduct commission test from the society.

2. 本院保证检验的科学性、公正性和准确性，对检验的数据负责，并对委托单位所提供的样品和技术资料保密。

SMQ is committed to assuring the scientificness, impartiality and accuracy of all tests carried out, responsibility for test data gained, and keeping confidential of all test samples and technical documents provided.

3. 抽样按照本院程序文件《抽样程序》和相应产品的检验细则的规定执行。

The sampling should be carried out according to the "sampling procedure" defined in the Procedure Document and relevant testing specifications.

4. 报告/证书无主检、审核、批准人签字，或涂改，或未盖本院报告/证书专用章及骑缝章无效。未经本院许可，不得部分复印、摘用或篡改本报告/证书内容。复印证书/报告未重新加盖本院证书/报告专用章无效。

Any report/certificate having not been signed by relevant responsible engineer, reviewer or authorized approver, or having been altered without authorization, or without both the Dedicated Report/Certificate Seal and its across-page seal is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report/certificate is not permitted without the written authorization of SMQ. Any copy of certificates/reports without the Dedicated Report/Certificate Seal is deemed to be invalid.

5. 送样委托检验结果仅对来样有效：委托检验的样品、样品及委托方信息均由委托方提供，本院不对样品的代表性、真实性及信息的完整性和准确性负责。

The test results presented in the report apply only to the tested sample. The customer provides thier own information, the sample, and the sample information. Thus, SMQ assumes no responsibility for representativeness , authenticity of the sample and validity and accuracy of the information..

6. 未经检验机构同意，样品委托人不得擅自使用检验结果进行不当宣传。

Any use of SMQ test result for advertisement of the tested material or product must be approved in writing by SMQ.

7. 无 CMA 标志的报告/证书，仅作为科研、教学或内部质量控制之用。含粤字编号的 CAL 标志仅适用于产品标准和判定标准。

The non-CMA report/certificate issued by SMQ is only permitted to be used for research, teaching or internal quality control. CAL logo with symbol "Yue" is only relevant to product standards and reference of standards.

8. 委托方对报告/证书有异议的，应于报告发出之日起十五日内向本院提出。政府行政管理部门下达的监督检验任务，受检方对报告/证书有异议的，应按政府行政管理部门文件规定及国家相关法律、法规进行。

Any objection to report/certificate issued by SMQ should be submitted to SMQ within 15 days after the issuance of the test. The mandatory inspection assigned by government administrative departments shall be carried out in accordance with the documents and regulations of the government administrative department and relevant national laws and regulations if inspected parties raise any objection to the inspection.

9. 报告/证书更改后，发出的电子版报告/证书、报告/证书的扫描件及传真件将不被追回，委托方有义务将更改后的报告/证书提供给使用原报告/证书的相关方。

SMQ is not responsible for recalling the electronic version of the original report/certificate when any revision is made to them. The applicant assumes the responsibility of providing the revised version to any interested party who uses them.

10. 只申领电子报告时，相关内容和效力以电子报告为准；电子报告和纸质报告同时申领时，电子报告仅作为纸质报告的副本，相关内容和效力以同编号纸质报告为准。

The relevant content and effectiveness is subject to the electronic version of the original report which was only applied for.When an electronic report and a paper report are applied for at the same time, the electronic report is only a copy of the paper report, and the relevant content and effectiveness is subject to the paper report.

11. 检验报告二维码具浏览和下载完整报告功能，是应委托方要求所设，该二维码及其复制图能使任何人扫描获取完整的检验报告电子版，本报告持有人如需限制他人经该二维码获取检验报告内容，应自行遮盖或消除检验报告及其复制件所附二维码，我院对委托方选择检验报告二维码功能所致的信息泄露概不负责（适用于附二维码报告）。

The QR code has the function of browsing and downloading complete report. Setting this function or not is chosen by the customer. The QR code and its copy enable anyone to scan and obtain the complete electronic version of the test report. Thus, if the owner of this report needs to restrict others from obtaining the content of the test report through the QR code, he shall cover or remove the QR code attached to the test report and its copies by himself. SMQ assumes no responsibility for the information leakage caused by the customer's selection of the QR code function of the test report (This clause applies to reports with QR code attached) .

投诉及报告/证书真伪查询电话

Complaint hotline： 400-900-8999 按 5

Email：complaint@smq.com.cn

Revision History

No	Date	Remark
V1.0	2024-7-1	Initial issue

TEST REPORT DECLARATION

Applicant	:	ZTE Corporation
Address	:	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, NanshanDistrict, Shenzhen, Guangdong 518057, China
Manufacturer	:	ZTE Corporation
Address	:	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, NanshanDistrict, Shenzhen, Guangdong 518057, China
EUT Description	:	GPON ONT
Model No.	:	ZXHN F6201B, ZXHN F6117A, ZXHN F6515N, ZXHN F6211B, ZXHN F6601P, ZXHN F6310SP
Trade mark	:	ZTE
Serial Number	:	--------
Date of EUT Receive	:	2024-5-20
Test Standards:	:	ETSI EN 301 893 V2.1.1 (2017-05)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results, unless they depend on the manufacturer information.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	(陈司林 Chen SiLin)	Date:	2024-7-1
Checked by:	(万晓婧 Wan XiaoJing)	Date:	2024-7-1
Approved by:	(林斌 Lin Bin)	Date:	2024-7-1

TABLE OF CONTENTS

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Carrier frequencies	PASS
Occupied Channel Bandwidth	PASS
RF output power, Transmit Power Control (TPC) and Power Density	PASS
Transmitter unwanted emissions within the 5 GHz RLAN bands	PASS
Transmitter unwanted emissions in the spurious domain	PASS
Adaptivity (Channel Access Mechanism)	PASS
Receiver spurious emissions	PASS
Receiver Blocking	PASS
Dynamic Frequency Selection (DFS)	PASS
User Access Restrictions	PASS

Test Items	Test Results
Geo-location capability	N/A[1]

Remark: “N/A” means “Not applicable.”
1. The EUT does NOT support Geo-location capability.

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

The lab will not be liable for any loss or damage resulting for false, inaccurate, inappropriate or incomplete product information provided by the applicant/manufacturer.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

The Laboratory is registered to perform emission tests with VCCI, and the

registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3. Measurement Uncertainty

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.6] and [i.7], in particular in annex D of the ETSI TR 100 028-2 [i.7].

Table 2 Measurement Uncertainty

Test Items	Measurement Uncertainty
Radio frequency	±1 × 10^{-5}
RF Output Power	0.349 dB
Power timing	< 500ns
Power Spectral Density	0.372 dB
Occupied Channel Bandwidth	0.224 MHz
Transmitter unwanted emissions, conducted	1.39 dB
Radiated spurious emissions， valid between 30 MHz and 1 GHz	±4.8 dB
Radiated spurious emissions, valid between 1 GHz and 26.5 GHz	±4.4 dB
Temperature	±0.698℃

3. PRODUCT DESCRIPTION

3.1. EUT Description

Operate Frequency	:	Wi-Fi: 5180 MHz -5240 MHz, 5260 MHz -5320 MHz, 5500 MHz -5700 MHz
Nominal Channel Bandwidth(s):	:	20 MHz, 40 MHz, 80 MHz, 160MHz
Antenna Designation	:	Dipole
Modulation	:	802.11a: BPSK, QPSK, 16QAM, 64QAM 802.11n: BPSK, QPSK, 16QAM, 64QAM 802.11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM 802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Antenna Gain	:	ANT1: 5 dBi ANT2: 5 dBi ANT3: 3dBi Max Beamforming gain: 4.8 dBi
Number Of Transmission Chain	:	3
Max RF Output Power (EIRP)	:	5180 MHz -5320 MHz: 22.93 dBm 5500 MHz -5700 MHz: 29.95 dBm
Adaptive	:	☐Frame Based Equipment ☒Load Based Equipment
With regards to Adaptivity for Load Based Equipment	:	☐The Load Based Equipment operates as a Supervising Device ☒The Load Based Equipment operates as a Supervised Device ☐The Load Based Equipment can operate as a Supervising and as a Supervised Device
The Priority Classes implemented by the Load Based Equipment	:	☐Priority Class 4 (Highest priority) ☐Priority Class 3 ☒Priority Class 2 ☐Priority Class 1 (Lowest priority) ☐The Load Based Equipment operates as an Initiating Device ☒The Load Based Equipment operates as an Responding Device ☐The Load Based Equipment can operate as an Initiating Device and as a Responding Device
Type of Equipment	:	☒Stand-alone equipment ☐Combined equipment ☐Plug-in radio device

The DFS related operating mode(s) of the equipment: : ☒Master ☐Slave with radar detection ☐Slave without radar detection

TPC feature available : Yes

For equipment with Off-Channel CAC functionality: : ☐Yes ☒No

Remark: ZXHN F6117A, ZXHN F6515N, ZXHN F6211B, ZXHN F6601P, ZXHNF6310SP compared with ZXHN F6201B, only have different model number. All of the models'circuit theory, electrical design and the critical components are the same. ZXHN F6117A, ZXHN F6515N, ZXHN F6211B, ZXHN F6601P, ZXHN F6201B, ZXHNF6310SP has four configs, all of the configs use the same PCB, the differences are shown in the following table.

No.	**ZXHN F6117A/ZXHN F6515N/ZXHN F6211B/ZXHN F6601P/ZXHN F6201B/ZXHNF6310SP Config**	**Power Adapter**
1	WAN interface: GPON LAN interface: 4*GE+1*FXS+1*USB2.0+2x2 802.11ax@2.4GHz& 2x2 802.11ax@5GHz(two dual band external antennas with 5dBi gain)	12V, 1.5A or 12V, 1.0A
2	WAN interface: GPON LAN interface: 4*GE+1*FXS+2x2 802.11ax@2.4GHz& 2x2 802.11ax@5GHz(two dual band external antennas with 5dBi gain)	12V, 1.5A or 12V, 1.0A
3	WAN interface: GPON LAN interface: 4*GE+1*USB2.0+2x2 802.11ax@2.4GHz& 2x2 802.11ax@5GHz(two dual band external antennas with 5dBi gain)	12V, 1.5A or 12V, 1.0A
4	WAN interface: GPON LAN interface: 4*GE+2x2 802.11ax@2.4GHz& 2x2 802.11ax@5GHz(two dual band external antennas with 5dBi gain)	12V, 1.5A or 12V, 1.0A

Unless otherwise specified, config 1 was selected as representative model to perform all the tests.

Table 3 The working Frequency List(Bandwidth: 20MHz)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	44	5220
48	5240	52	5260	56	5280
60	5300	64	5320	100	5500
104	5520	108	5540	112	5560

116	5580	120	5600	124	5620
128	5640	132	5660	136	5680
140	5700	N/A	N/A	N/A	N/A

Table 4 The working Frequency List(Bandwidth: 40MHz)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230	54	5270
62	5310	102	5510	110	5550
118	5590	126	5630	134	5670

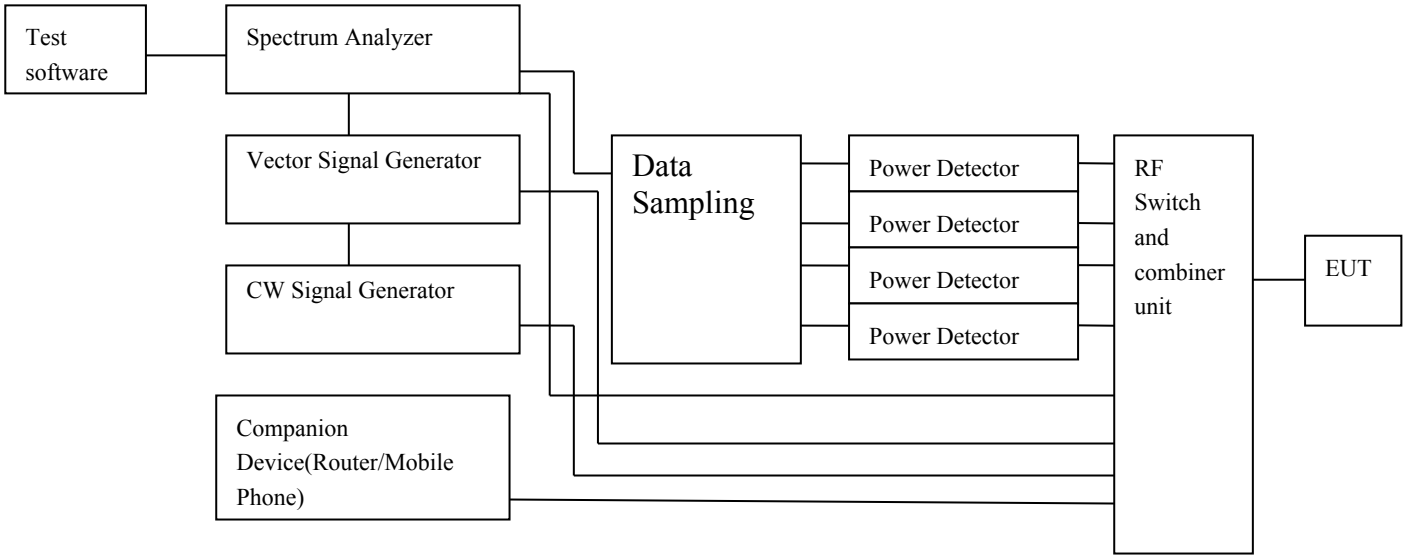
Table 5 The working Frequency List(Bandwidth: 80MHz)

Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	58	5290
106	5530	122	5610

Table 6 The working Frequency List(Bandwidth: 160MHz)

Channel	Frequency (MHz)	Channel	Frequency (MHz)
50	5250	114	5570

3.2. Test System Configuration



3.3. Operating Condition of EUT

Test mode 1: TX 802.11a
Test mode 2: TX 802.11n HT20
Test mode 3: TX 802.11n HT40
Test mode 4: TX 802.11ac VHT20
Test mode 5: TX 802.11ac VHT40
Test mode 6: TX 802.11ac VHT80
Test mode 7: TX 802.11ac VHT160
Test mode 8: TX 802.11ax HE20
Test mode 9: TX 802.11ax HE40
Test mode 10: TX 802.11ax HE80
Test mode 11: TX 802.11ax HE160
Test mode 12: RX 802.11a
Test mode 13: RX 802.11n HT20
Test mode 14: RX 802.11n HT40
Test mode 15: RX 802.11ac VHT20
Test mode 16: RX 802.11ac VHT40
Test mode 17: RX 802.11ac VHT80
Test mode 18: RX 802.11ac VHT160
Test mode 19: RX 802.11ax HE20
Test mode 20: RX 802.11ax HE40
Test mode 21: RX 802.11ax HE80
Test mode 22: RX 802.11ax HE160

Note:
1. The extreme test condition for voltage and temperature was declared by the manufacturer.

Preliminary tests were performed in different data rate and the worst case is decided as below,

802.11a
Pre-scan of output power was performed with 802.11a. The worst case is 802.11a 6Mbit/s.

802.11n HT20
Pre-scan of output power was performed with 802.11n HT20.The worst case is 802.11n HT20 at the lowest data rate.

802.11n HT40
Pre-scan of output power was performed with 802.11n HT40.The worst case is 802.11n HT40 at the lowest data rate.

802.11ac VHT20
Pre-scan of output power was performed with 802.11ac VHT20.The worst case is 802.11ac VHT20 at the lowest data rate.

802.11ac VHT40
Pre-scan of output power was performed with 802.11ac VHT40.The worst case is 802.11ac VHT40 at the lowest data rate.

802.11ac VHT80
Pre-scan of output power was performed with 802.11ac VHT80.The worst case is 802.11ac VHT80 at the lowest data rate.

802.11ac VHT160
Pre-scan of output power was performed with 802.11ac VHT160.The worst case is 802.11ac VHT160 at the lowest data rate.

802.11ax HE20
Pre-scan of output power was performed with 802.11ax HE20.The worst case is 802.11ax HE20 at the lowest data rate.

802.11ax HE40
Pre-scan of output power was performed with 802.11ax HE40.The worst case is 802.11ax HE40 at the lowest data rate.

802.11ax HE80
Pre-scan of output power was performed with 802.11ax HE80.The worst case is 802.11ax HE80 at the lowest data rate.

802.11ax HE160
Pre-scan of output power was performed with 802.11ax HE160.The worst case is 802.11ax HE160 at the lowest data rate.

802.11n/ac/ax can operates in or MIMO mode. So the 3TX emissions testing are considered as a worst case scenario and were tested at power levels, per transmit chain, greater than or equal to the maximum power in any 1TX mode.

802.11a was the worst case for the test items Spurious emissions and Receiver Blocking.

3.4. Support Equipment List

Table 7 Support Equipment list

Name	Model No	S/N	Manufacturer
Notebook	HSN-Q15C	5CD9361KR6	HP
Notebook	E460	SB12961	Lenovo
Wireless Network Card	AX200	--	Intel

3.5. Test Conditions

HT =40 °C
LT =0 °C
NV = DC 12 V by AC/DC adapter
Remark: “NT” means “Normal Temperature”
“LT” means “Low Temperature ”
“HT” means “High Temperature ”
“NV” means “Normal Voltage ”

3.6. Modifications

No modification was made.

4. CARRIER FREQUENCIES

4.1. Test Requirements

4.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

4.1.2. Test Limit

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range fc±20ppm.

4.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.2.2

4.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11818	Temperature & Humidity Chamber	ESPEC	EH-010U	2023-11-28	12Months
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB18161	Spectrum Analyzer	Rohde & Schwarz	FSV3030	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

4.4. Test Condition

Date of test: May.29,2024-Jun.3,2024
Normal Temperature: (25 ~ 26)℃
Relative Humidity: (37 ~ 48)%RH
Atmospheric Pressure: (100.1 ~ 100.4)kPa

4.5. Test Data

Please refer to the Annex A

5. OCCUPIED CHANNEL BANDWIDTH

5.1. Test Requirements

5.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

5.1.2. Test Limit

The Nominal Channel Bandwidth shall be at least 5 MHz at all times.

The Occupied Channel Bandwidth shall be between 80 % and 100 % of the declared Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

During an established communication, the device is allowed to operate temporarily with an Occupied Channel Bandwidth below 80 % of its Nominal Channel Bandwidth with a minimum of 4 MHz.

5.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.3.2

5.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB18161	Spectrum Analyzer	Rohde & Schwarz	FSV3030	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

5.4. Test Condition

Date of test: May.25,2024-Jun.3,2024
Temperature: (25 ~ 26)℃
Relative Humidity: (37 ~ 48)%RH
Atmospheric Pressure: (100.1 ~ 100.4)kPa

5.5. Test Data

Please refer to the Annex A

6. RF OUTPUT POWER, TRANSMIT POWER CONTROL (TPC) AND POWER DENSITY

6.1. Test Requirements

6.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

6.1.2. Test Limit

RF Output Power and Power density at the Highest Power Level:
TPC is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5 250 MHz.
For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in following table.
Devices are allowed to operate without TPC. See table for applicable limits in this case.

Table 8 Mean EIRP limits for RF Output Power and Power Density at the Highest Power Level

Frequency Range	Mean EIRP Limit [dBm]		Mean EIRP Density Limit [dBm/MHz]	
	with TPC	without TPC	with TPC	without TPC
5150 MHz to 5350 MHz	23	20/23 (see note 1)	10	7/10 (see note 2)
5470 MHz to 5725 MHz	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)
NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm. NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz. NOTE 3: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.				

RF Output Power at the Lowest Power Level of the TPC Range:

For devices using TPC, the RF output power during a transmission burst when configured to operate at the lowest stated power level of the TPC range shall not exceed the levels given in following table. For devices without TPC, the limits in table do not apply.

Table 9 Mean EIRP Limits for RF Output Power at the Lowest Power Level of the TPC Range

Frequency Range	Mean EIRP [dBm]
5250 MHz to 5350 MHz	17
5470 MHz to 5725 MHz	24 (see note)
Note: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5250 MHz to 5350 MHz.	

6.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.4

6.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11818	Temperature & Humidity Chamber	ESPEC	EH-010U	2023-11-28	12Months
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

6.4. Test Condition

Date of test: May.29,2024-Jun.3,2024
Normal Temperature: (25 ~ 26)℃
Relative Humidity: (37 ~ 48)%RH
Atmospheric Pressure: (100.1 ~ 100.4)kPa

6.5. Test Data

Please refer to the Annex A

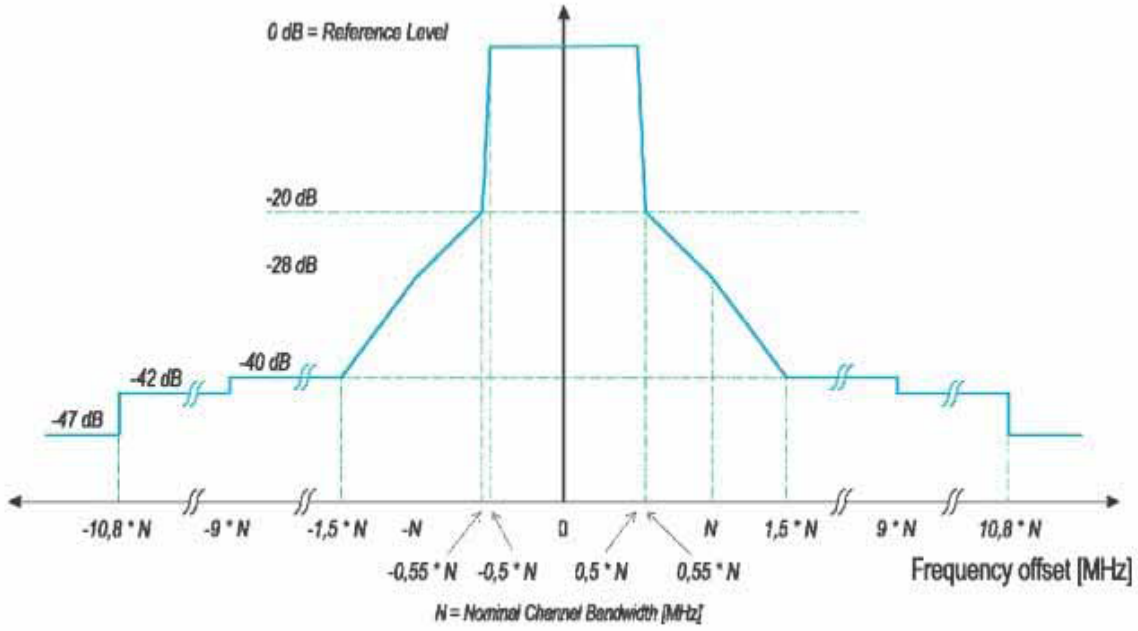
7. TRANSMITTER UNWANTED EMISSIONS WITHIN THE 5 GHZ RLAN BANDS

7.1. Test Requirements

7.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

7.1.2. Test Limit



NOTE: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal.

Figure 1: Transmit spectral power mask

7.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.3.2

7.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period

SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB18161	Spectrum Analyzer	Rohde & Schwarz	FSV3030	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

7.4. Test Condition

Date of test: May.29,2024-Jun.3,2024
Temperature: (25 ~ 26)℃
Relative Humidity: (37 ~ 48)%RH
Atmospheric Pressure: (100.1 ~ 100.4)kPa

7.5. Test Data

Please refer to the Annex A

8. TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5 GHZ RLAN BANDS

8.1. Test Requirements

8.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

8.1.2. Test Limit

Table 10 Transmitter unwanted emission limits outside the 5 GHz RLAN bands Limit

Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87.5 MHz	-36 dBm	100 kHz
87.5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 5.15 GHz	-30 dBm	1 MHz
5.35 GHz to 5.47 GHz	-30 dBm	1 MHz
5.725 GHz to 26 GHz	-30 dBm	1 MHz

8.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.5.2

8.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB18161	Spectrum Analyzer	Rohde & Schwarz	FSV3030	2024-04-22	12Months
SB3435	Horn Antenna	ROHDE&SCHWARZ	HF906	2023-11-21	12Months

SB8501/09	Test Receiver	ROHDE&SCHWARZ	ESU40	2024-01-17	12Months
SB8501/11	Horn Antenna	ETS-Lindgren	3160-09	2023-02-22	36Months
SB8501/16	Low Noise Amplifier	ROHDE&SCHWARZ	SCU-26	2024-01-16	12Months
SB9054/08	Broadband Antenna	SCHWARZBECK	VULB 9163	2023-12-27	12Months
SB9058/03	Low Noise Amplifier	ROHDE&SCHWARZ	SCU18	2024-01-16	12Months
SB9555/02	Anechoic chamber	Albatross	/	2023-08-15	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

8.4. Test Condition

Date of test: May.29,2024-Jun.4,2024
Temperature: (20 ~ 26)℃
Relative Humidity: (37 ~ 51)%RH
Atmospheric Pressure: (100.1 ~ 100.5)kPa

8.5. Test Data

REMARK: Conducted spurious emission please refer to the Annex A
Note: Emissions not reported below are too low against the prescribed limits. "/" means the test data is too low against the limit.

Table 11 Radiated spurious emission Test Data

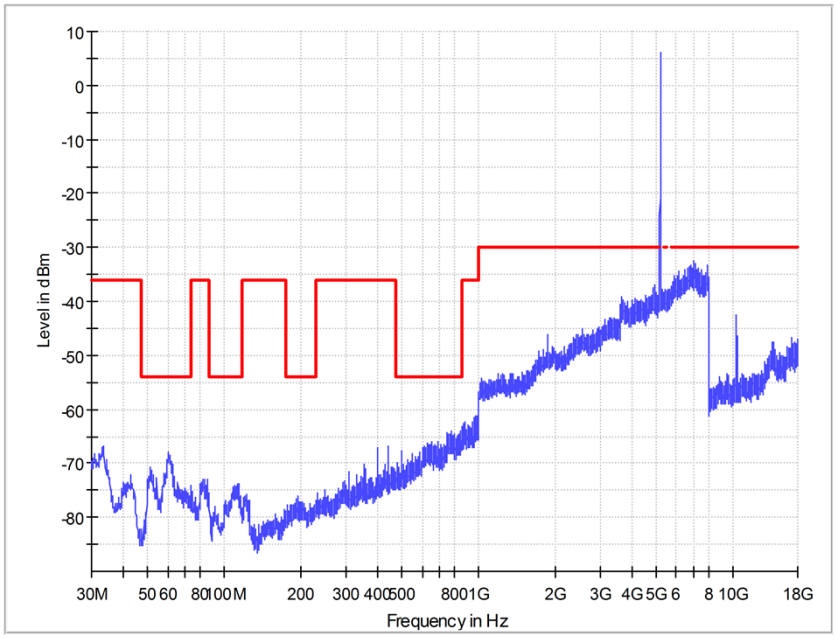
Test Mode: 11a CH36 TX						
Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity (Horizontal/ Vertical)	Antenna Height (cm)	Turntable Angle(deg)
/	/	/	/	/	/	/

Table 12 Radiated spurious emission Test Data

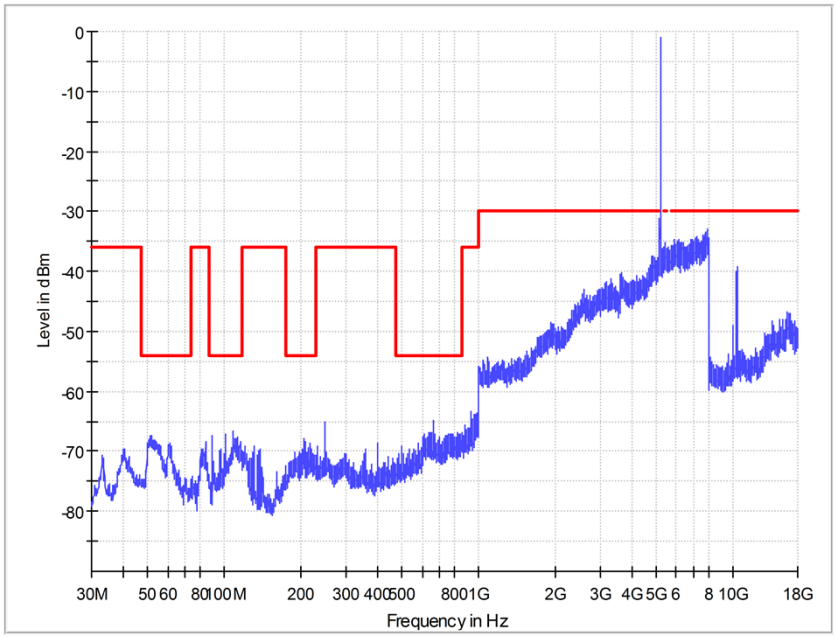
Test Mode: 11a CH100 TX						
Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity (Horizontal/ Vertical)	Antenna Height (cm)	Turntable Angle(deg)
11001.196	-32.2	-30.0	2.2	H	150	324

Test Mode: 11a CH36 TX

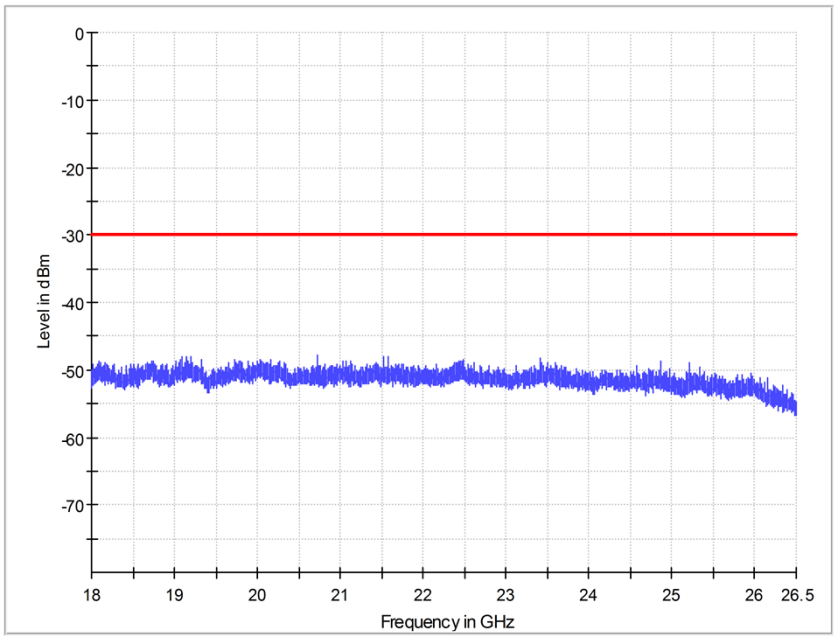
11a CH36 TX 30 MHz~ 18 GHz V:



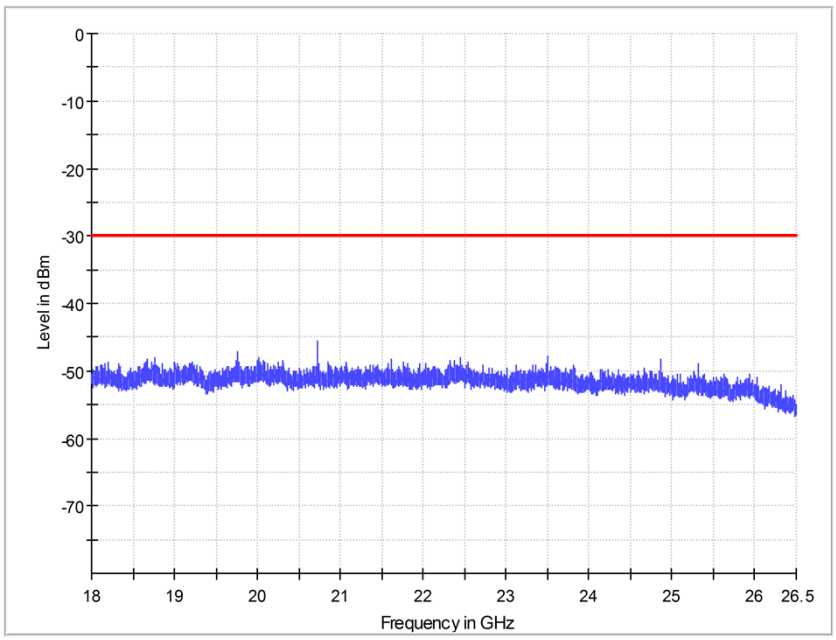
11a CH36 TX 30 MHz~ 18 GHz H:



11a CH36 TX 18 GHz~ 26.5 GHz H:

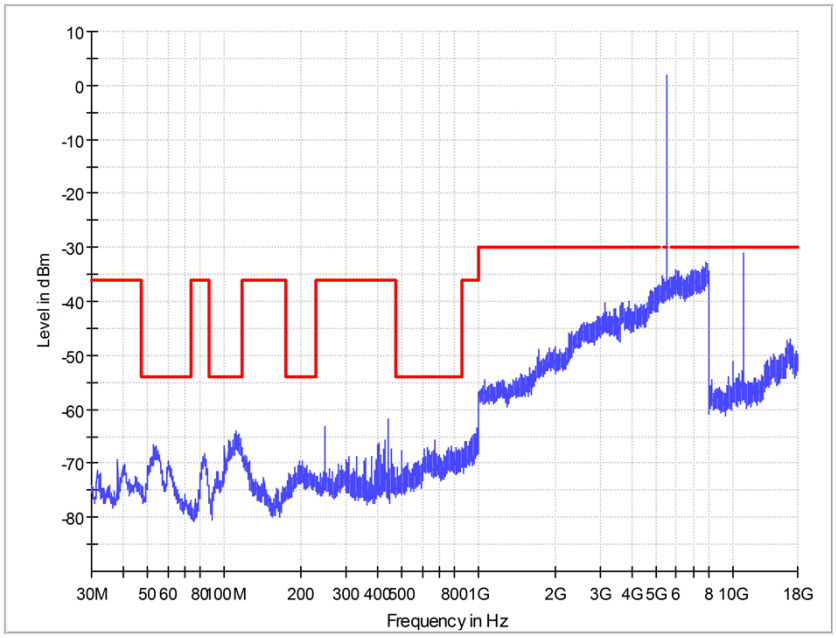


11a CH36 TX 18 GHz~ 26.5 GHz V:

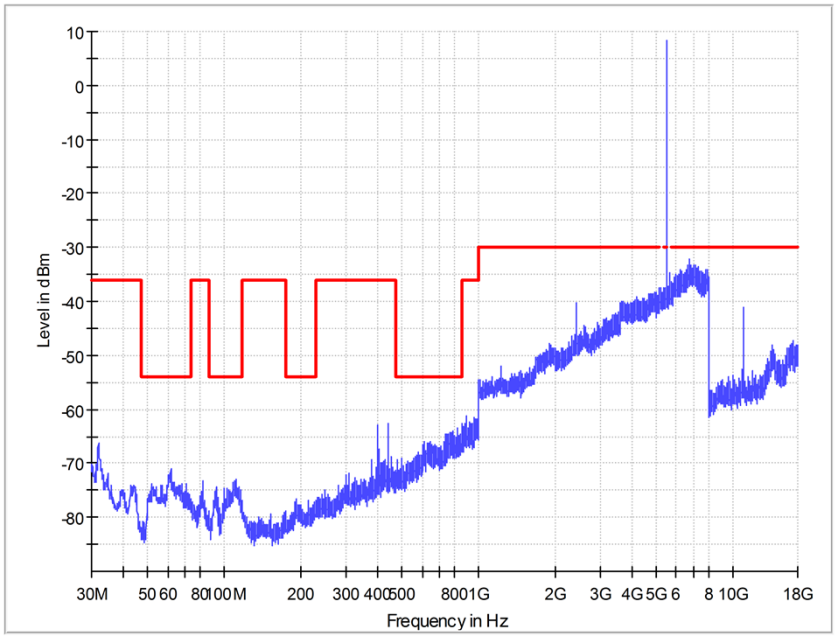


Test Mode: 11a CH100 TX

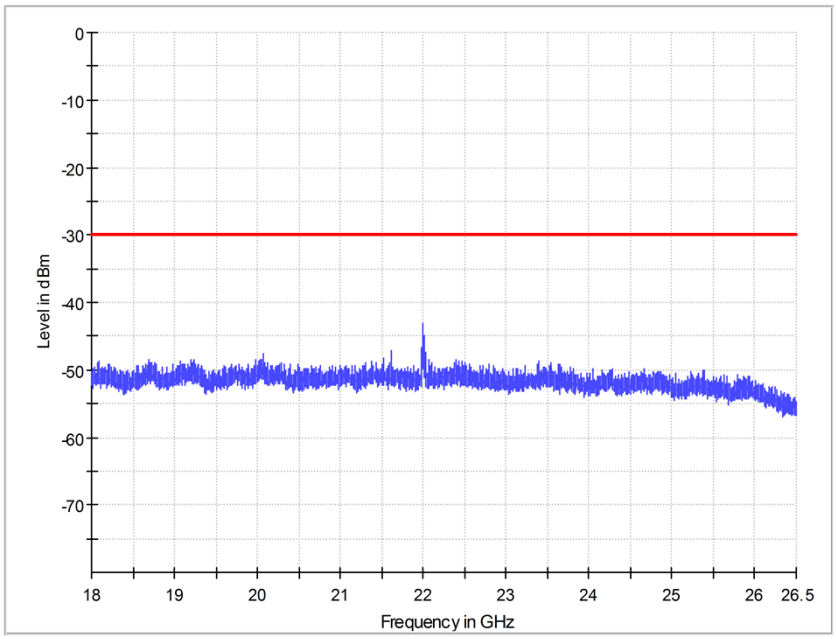
11a CH100 TX 30 MHz~ 18 GHz H:



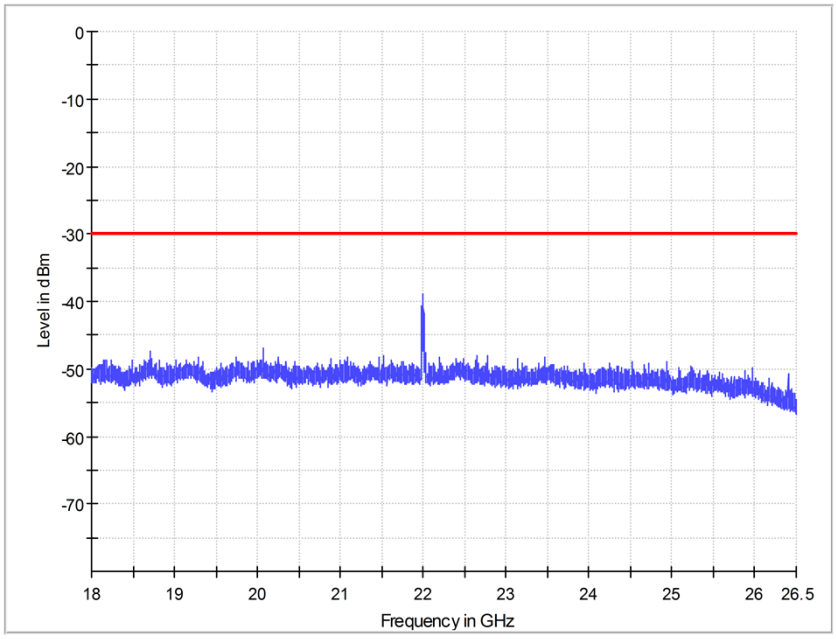
11a CH100 TX 30 MHz~ 18 GHz V:



11a CH100 TX 18 GHz~ 26.5 GHz H:



11a CH100 TX 18 GHz~ 26.5 GHz V:



9. ADAPTIVITY

9.1. Test Requirements

9.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

9.1.2. Test Limit

Load Based Equipment (LBE)

Each transmission belongs to a single Channel Occupancy Time (COT). A Channel Occupancy Time (COT) consists of one or more transmissions of an Initiating Device and zero or more transmissions of one or more Responding Devices.

If a Channel Occupancy consists of more than one transmission the transmissions may be separated by gaps. The Channel Occupancy Time is the total duration of all transmissions and all gaps of 25 µs duration or less within a Channel Occupancy and shall not exceed the maximum Channel Occupancy Time in table 7 and table 8. The duration from the start of the first transmission within a Channel Occupancy until the end of the last transmission in that same Channel Occupancy shall not exceed 20 ms. The Initiating Device may have data to be transmitted in different Priority Classes and therefore the Channel Access Mechanism is allowed to operate different Channel Access Engines as described in clause 4.2.7.3.2.6 simultaneously (one for each implemented Priority Class).

Table 13: Priority Class dependent Channel Access parameters for Supervised Devices

Class #	p0	CWmin	CWmax	Maximum Channel Occupancy Time (COT)
4	2	3	7	2 ms
3	2	7	15	4 ms
2	3	15	1023	6 ms(see note 1)
1	7	15	1023	6 ms(see note 1)

NOTE 1: The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 µs. The maximum duration (Channel Occupancy) before including any such pause shall be 6 ms. Pause duration is not included in the channel occupancy time.

NOTE 2: The values for p_0, CW_{min}, CW_{max} are minimumvalues. Greater values are allowed.

Table 14: Priority Class dependent Channel Access parameters for Supervising Devices

Class #	p0	CWmin	CWmax	Maximum Channel Occupancy Time (COT)
4	1	3	7	2 ms
3	1	7	15	4 ms
2	3	15	63	6 ms(see note 1 and note 2)
1	7	15	1023	6 ms(see note 1)

NOTE 1: The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 µs. The maximum duration (Channel Occupancy) before including any such pause shall be 6 ms. Pause duration is not included in the channel occupancy time.

NOTE 2: The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 10 ms by extending CW to CW × 2 + 1 when selecting the random number q for any backoff(s) that precede the Channel Occupancy that may exceed 6 ms or which follow the Channel Occupancy that exceeded 6 ms. The choice between preceding or following a Channel Occupancy shall remain unchanged during the operation time of the device.

NOTE 3: The values for p_0, CW_{min}, CW_{max} are minimumvalues. Greater values are allowed.

The ED Threshold level depends on the type of equipment:

Option 1: For equipment that for its operation in the 5 GHz bands is conforming to IEEE 802.11™ac-2013 [10], clause 22, or to IEEE 802.11™-2012 [9], clause 18 or clause 20, or any combination of these clauses, the Energy Detect Threshold (ED Threshold) is independent of the equipment's maximum transmit power (PH).

The Energy Detect Threshold (ED Threshold) shall be: TL = -75 dBm/MHz

Option 2: For equipment conforming to one or more of the clauses listed in Option 1,

and to at least one other operating mode, and for equipment conforming to none of the clauses listed in Option 1, the Energy Detect Threshold (ED Threshold) shall be proportional to the equipment's maximum transmit power (PH). Assuming a 0 dBi receive antenna the Energy Detect Threshold (ED Threshold) shall be:

TL = Min (-75 dBm/MHz, Max (-85 dBm/MHz, -85 dBm/MHz + (23 dBm - PH)))

Equipment shall consider a channel to be occupied as long as other RLAN transmissions are detected at a level greater than the TL.

Short Control Signalling Transmissions

The use of Short Control Signalling Transmissions is constrained as follows:

within an observation period of 50 ms, the number of Short Control Signalling Transmissions by the equipment shall be equal to or less than 50; and

the total duration of the equipment's Short Control Signalling Transmissions shall be less than 2 500 µs within said observation period.

9.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) 5.4.9.2&5.4.9.3

9.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB11873/02	Vector Signal Generator	Rohde & Schwarz	SMBV100A	2024-04-22	12Months
SB9060	Signal Analyzer	Rohde & Schwarz	FSQ40	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

9.4. Test Condition

Date of test: Jun.7,2024-Jun.11,2024
Temperature: (25 ~ 26)℃
Relative Humidity: (41 ~ 47)%RH
Atmospheric Pressure: (100.3 ~ 100.4)kPa

9.5. Test Data

Please refer to the Annex A

10. RECEIVER SPURIOUS EMISSIONS

10.1. Test Requirements

10.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

10.1.2. Test Limit

Table 15 Spurious radiated emission limits

Frequency range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26 GHz	-47 dBm	1 MHz

10.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.7.2

10.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB18161	Spectrum Analyzer	Rohde & Schwarz	FSV3030	2024-04-22	12Months
SB3435	Horn Antenna	ROHDE&SCHWARZ	HF906	2023-11-21	12Months
SB8501/09	Test Receiver	ROHDE&SCHWARZ	ESU40	2024-01-17	12Months
SB8501/11	Horn Antenna	ETS-Lindgren	3160-09	2023-02-22	36Months
SB8501/16	Low Noise Amplifier	ROHDE&SCHWARZ	SCU-26	2024-01-16	12Months
SB9054/08	Broadband Antenna	SCHWARZBECK	VULB 9163	2023-12-27	12Months
SB9058/03	Low Noise Amplifier	ROHDE&SCHWARZ	SCU18	2024-01-16	12Months
SB9555/02	Anechoic chamber	Albatross	/	2023-08-15	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

10.4. Test Condition

Date of test: May.29,2024-Jun.4,2024
Temperature: (20 ~ 26)℃
Relative Humidity: (37 ~ 51)%RH
Atmospheric Pressure: (100.1 ~ 100.5)kPa

10.5. Test Data

REMARK: Conducted spurious emission please refer to the Annex A
Note: Emissions not reported below are too low against the prescribed limits. "/" means the test data is too low against the limit.

Table 16 Radiated spurious emission Test Data

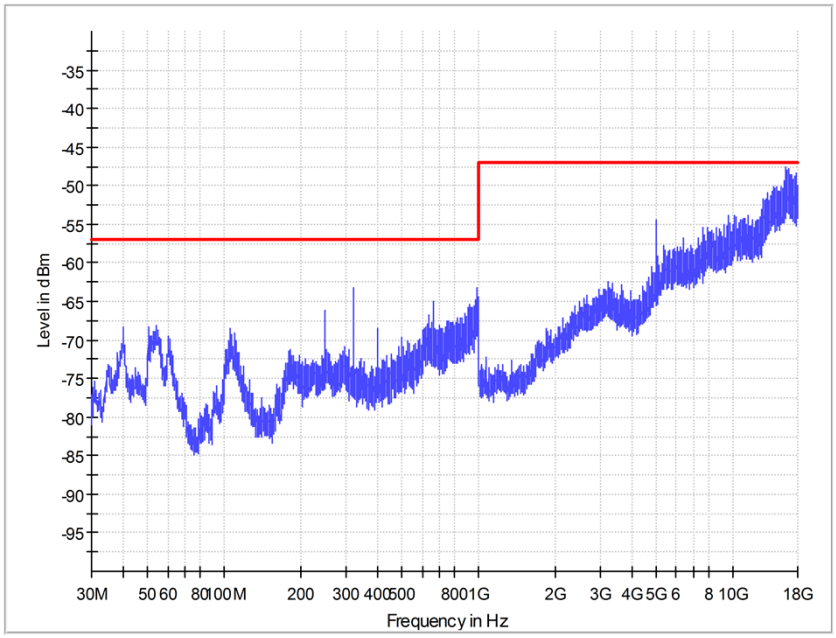
Test Mode: 11a CH36 RX						
Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity (Horizontal/ Vertical)	Antenna Height (cm)	Turntable Angle(deg)
/	/	/	/	/	/	/

Table 17 Radiated spurious emission Test Data

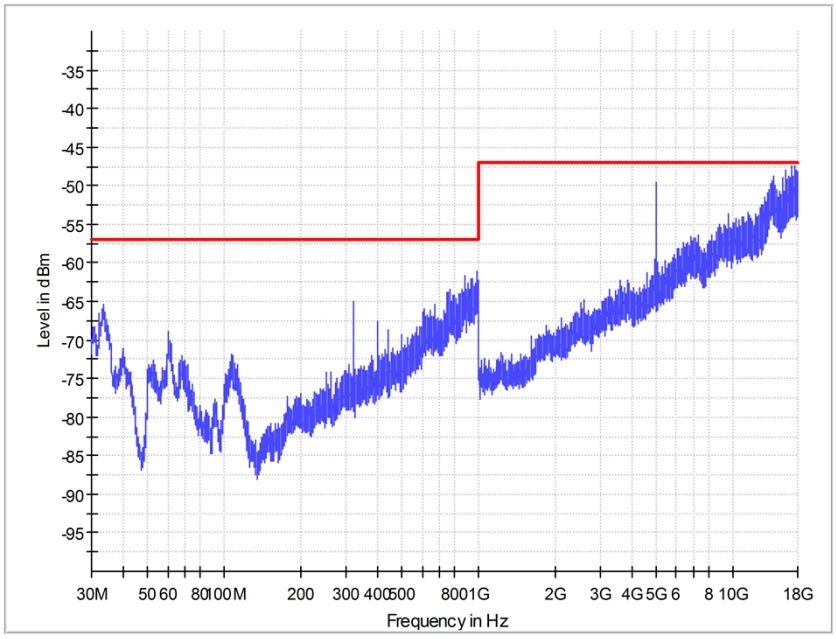
Test Mode: 11a CH100 RX						
Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dB)	Polarity (Horizontal/ Vertical)	Antenna Height (cm)	Turntable Angle(deg)
/	/	/	/	/	/	/

Test Mode: 11a CH36 RX

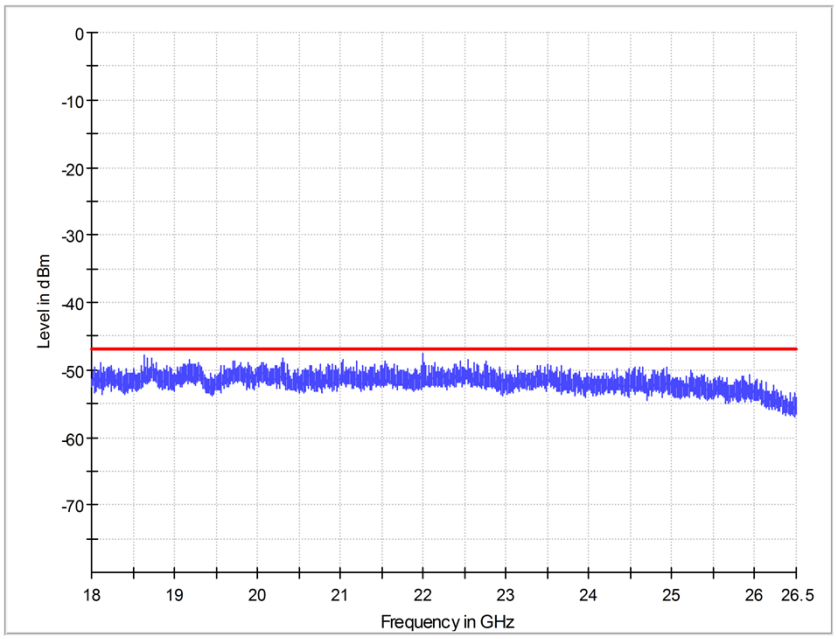
11a CH36 RX 30 MHz~ 18 GHz H:



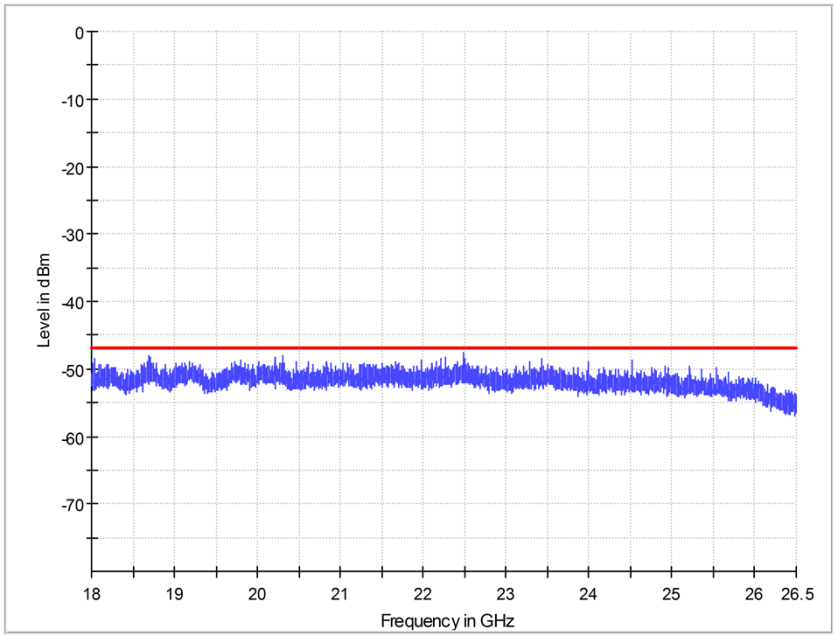
11a CH36 RX 30 MHz~ 18 GHz V:



11a CH36 RX 18 GHz~ 26.5 GHz H:

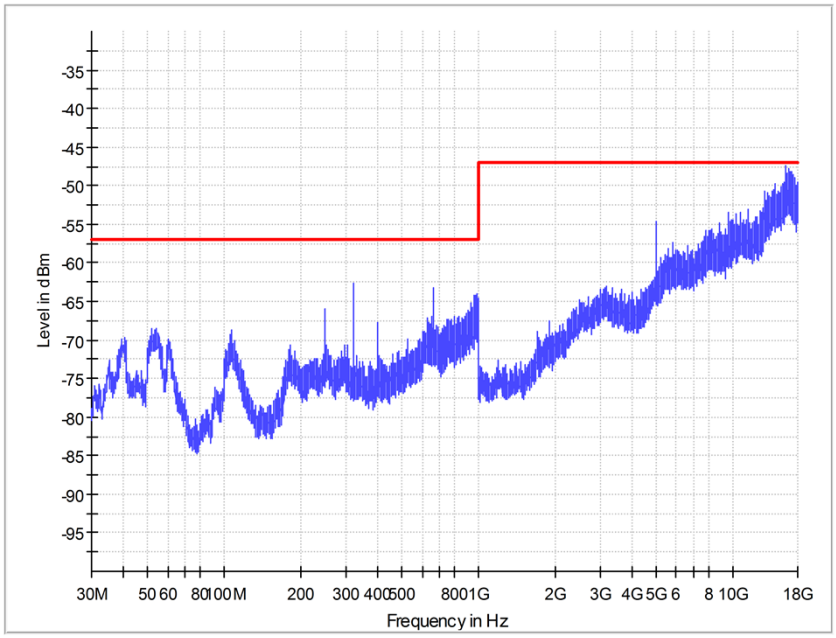


11a CH36 RX 18 GHz~ 26.5 GHz V:

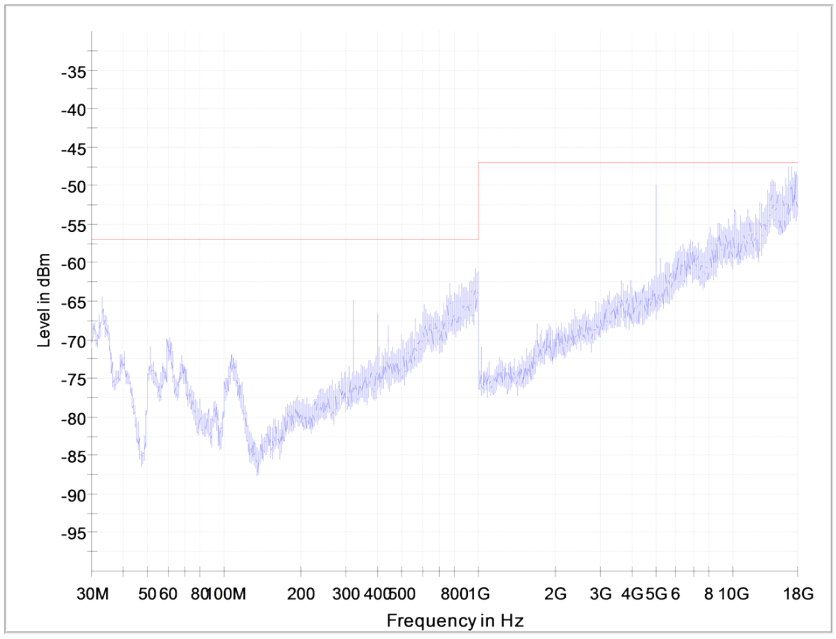


Test Mode: 11a CH100 RX

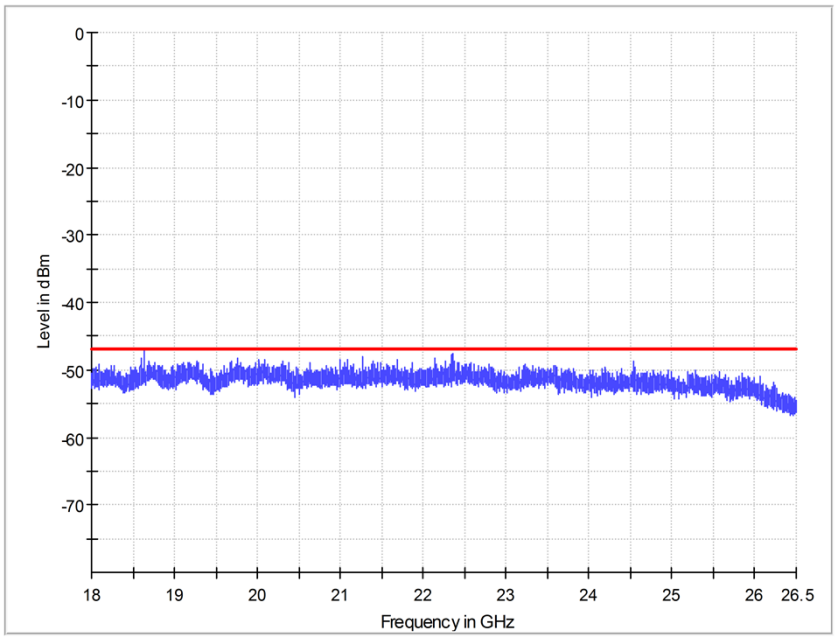
11a CH100 RX 30 MHz~ 18 GHz H:



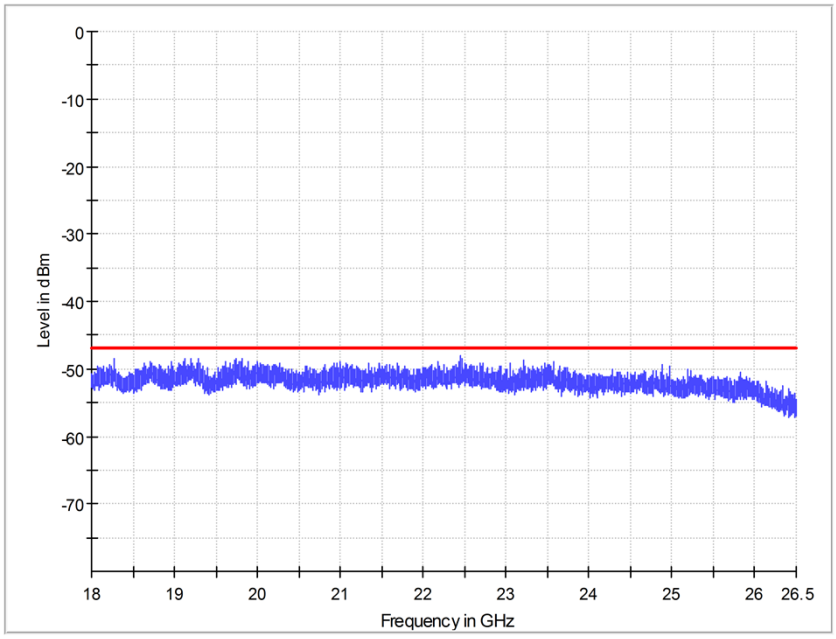
11a CH100 RX 30 MHz~ 18 GHz V:



11a CH100 RX 18 GHz~ 26.5 GHz H:



11a CH100 RX 18 GHz~ 26.5 GHz V:



11. BLOCKING

11.1. Test Requirements

11.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

11.1.2. Test Limit

Table 18: Receiver Blocking parameters

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.				

11.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) 5.4.10.2

11.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB11873/02	Vector Signal Generator	Rohde & Schwarz	SMBV100A	2024-04-22	12Months
SB13989	Wireless Connectivity Tester	Rohde & Schwarz	CMW270	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

11.4. Test Condition

Date of test: Jun.11,2024
Temperature: 26℃
Relative Humidity: 47%RH
Atmospheric Pressure: (100.3 ~ 100.5)kPa

11.5. Test Data

Please refer to the Annex A

12. DYNAMIC FREQUENCY SELECTION (DFS)

12.1. Test Requirements

12.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

12.1.2. Test Limit

The following table lists the DFS related technical requirements and their applicability for every operational mode. If the RLAN device is capable of operating in more than one operational mode then every operating mode shall be assessed separately.

Table 19: Applicability of DFS requirements

Requirement	Operational Mode		
	Master	Slave (without radar detection)	Slave (with radar detection)
Channel Availability Check	Required	Not required	Required (see note 2)
Off-Channel CAC (see note 1)	Required	Not required	Required (see note 2)
In-Service Monitoring	Required	Not required	Required
Channel Shutdown	Required	Required	Required
Non-Occupancy Period	Required	Not required	Required
Uniform Spreading	Required	Not required	Not required
NOTE 1: Where implemented by the manufacturer. NOTE 2: A slave with radar detection is not required to perform a CAC or Off-Channel CAC at initial use of the channel but only after the slave has detected a radar signal on the Operating Channel by In-Service Monitoring and the Non-Occupancy Period resulting from this detection has elapsed.			

The radar detection requirements specified in clause 4.2.6.2.2 to clause 4.2.6.2.4 assume that the centre frequencies of the radar signals fall within the central 80 % of the Occupied Channel Bandwidth of the RLAN (see clause 4.2.2).

Table 20: DFS requirement values

DFS requirement valuesParameter	Value
Channel Availability Check Time	60 s (see note 1)
Minimum Off-Channel CAC Time	6 minutes (see note 2)
Maximum Off-Channel CAC Time	4 hours (see note 2)
Channel Move Time	10 s

Channel Closing Transmission Time	1 s
Non-Occupancy Period	30 minutes
NOTE 1: For channels whose nominal bandwidth falls completely or partly within the band 5 600 MHz to 5 650 MHz, the Channel Availability Check Time shall be 10 minutes. NOTE 2: For channels whose nominal bandwidth falls completely or partly within the band 5 600 MHz to 5 650 MHz, the Off-Channel CAC Time shall be within the range 1 hour to 24 hours.	

Table 21: Radar Detection Threshold Levels

e.i.r.p. Spectral Density (dBm/MHz)	Value (see note 1 and note 2)
10	-62 dBm
NOTE 1: This is the level at the input of the receiver of an RLAN device with a maximum e.i.r.p. density of 10 dBm/MHz and assuming a 0 dBi receive antenna. For devices employing different e.i.r.p. spectral density and/or a different receive antenna gain G (dBi) the DFS threshold level at the receiver input follows the following relationship: DFS Detection Threshold (dBm) = -62 + 10 - e.i.r.p. Spectral Density (dBm/MHz) + G (dBi); however the DFS threshold level shall not be less than -64 dBm assuming a 0 dBi receive antenna gain. NOTE 2: Slave devices with a maximum e.i.r.p. of less than 23 dBm do not have to implement radar detection unless these devices are used in fixed outdoor point to point or fixed outdoor point to multipoint applications (see clause 4.2.6.1.3).	

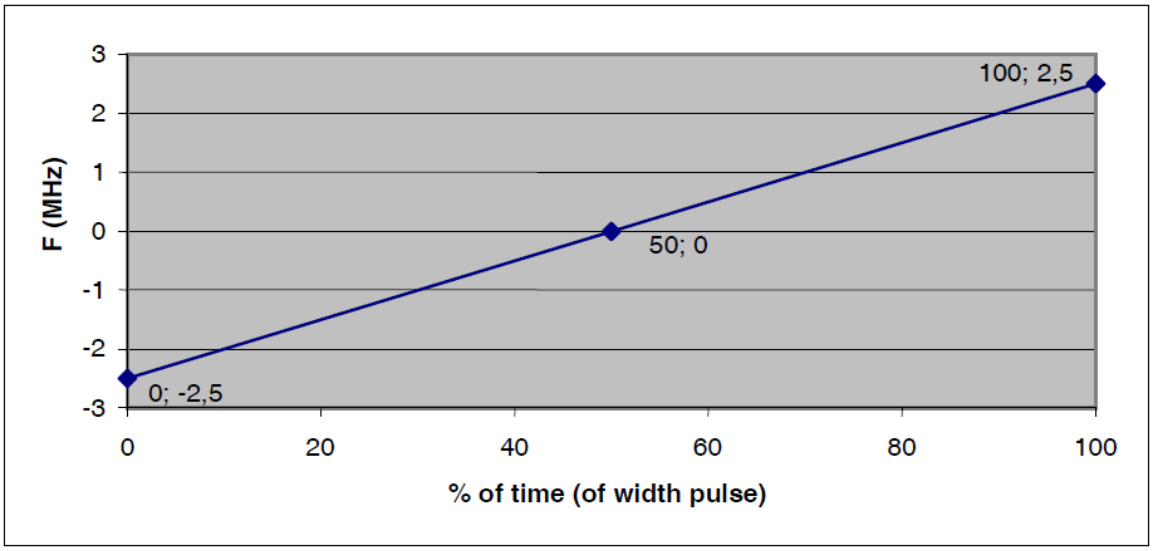
Table 22: Parameters of the reference DFS test signal

Pulse width W [µs]	Pulse repetition frequency PRF [PPS]	Pulses per burst [PPB]
1	700	18

Table 23: Parameters of radar test signals

Radar test signal # (see note 1 to note 3)	Pulse width W [µs]		Pulse repetition frequency PRF (PPS)		Number of different PRFs	Pulses per burst for each PRF (PPB) (see note 5)
	Min	Max	Min	Max		
1	0.5	5	200	1000	1	10(see note 6)
2	0.5	15	200	1600	1	15(see note 6)
3	0.5	15	2300	4000	1	25
4	20	30	2000	4000	1	20
5	0.5	2	300	400	2/3	10(see note 6)
6	0.5	2	400	1200	2/3	15(see note 6)
NOTE 1: Radar test signals #1 to #4 are constant PRF based signals. See figure D.1. These radar test signals are intended to simulate also radars using a packet based Staggered PRF. See figure D.2. NOTE 2: Radar test signal #4 is a modulated radar test signal. The modulation to be used is a chirp modulation with a ±2,5 MHz frequency deviation which is described						

below.



NOTE 3: Radar test signals #5 and #6 are single pulse based Staggered PRF radar test signals using 2 or 3 different PRF values. For radar test signal #5, the difference between the PRF values chosen shall be between 20 PPS and 50 PPS. For radar test signal #6, the difference between the PRF values chosen shall be between 80 PPS and 400 PPS. See figure D.3.
NOTE 4: Apart for the Off-Channel CAC testing, the radar test signals above shall only contain a single burst of pulses. See figure D.1, figure D.3 and figure D.4.
For the Off-Channel CAC testing, repetitive bursts shall be used for the total duration of the test.See figure D.2 and figure D.5. See also clause 4.2.6.2.3, clause 5.4.8.2.1.4.2 and clause 5.4.8.2.1.4.3.
NOTE 5: The total number of pulses in a burst is equal to the number of pulses for a single PRF multiplied by the number of different PRFs used.
NOTE 6: For the CAC and Off-Channel CAC requirements, the minimum number of pulses (for each PRF) for any of the radar test signals to be detected in the band 5 600 MHz to 5 650 MHz shall be 18.

Table 24: Detection probability

Parameter	Detection Probability (Pd)	
	Channels whose nominal bandwidth falls partly or completely within the 5 600 MHz to 5 650 MHz band	Other channels
CAC, Off-Channel CAC	99,99 %	60 %
In-Service Monitoring	60 %	60 %
NOTE: P_d gives the probability of detection per simulated radar burst and represents a minimum level of detection performance under defined conditions. Therefore P_d does not represent the overall detection probability for any particular radar under real life conditions.		

12.2. Test Procedure

Refer to EN 301 893 V2.1.1 (2017-05) Clause 5.4.8

12.3. Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB11873/01	Power sensor, Power Meter	Rohde & Schwarz	OSP120+OSP-B157	2024-04-22	12Months
SB11873/02	Vector Signal Generator	Rohde & Schwarz	SMBV100A	2024-04-22	12Months
SB9060	Signal Analyzer	Rohde & Schwarz	FSQ40	2024-04-22	12Months
SB11873/03	Test software	Tonscend	JS1120-3	---	---

12.4. Test Condition

Date of test: Jun.7,2024-Jun.25,2024
Temperature: (25 ~ 27)℃
Relative Humidity: (36 ~ 55)%RH
Atmospheric Pressure: (100 ~ 100.4)kPa

12.5. Test Data

Please refer to the Annex B

13. USER ACCESS RESTRICTIONS

13.1. Test Requirements

13.1.1. Test Standard

ETSI EN 301 893 V2.1.1 (2017-05)

13.1.2. Test Limit

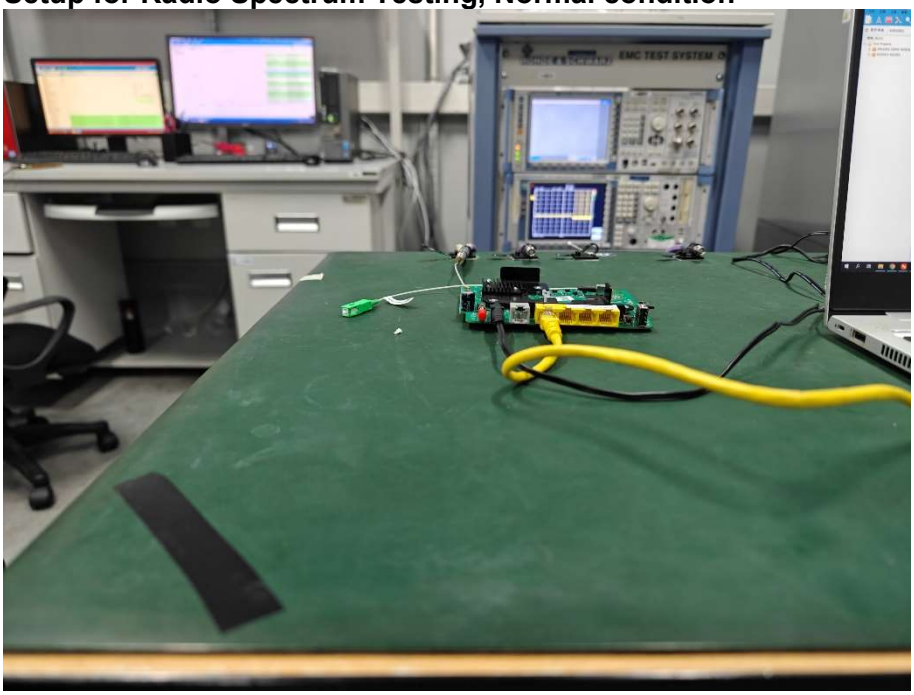
13.1.3. DFS controls (hardware or software) related to radar detection shall not be accessible to the user so that the DFS requirements described in clauses 4.2.6 can neither be disabled nor altered.

13.2. Statement

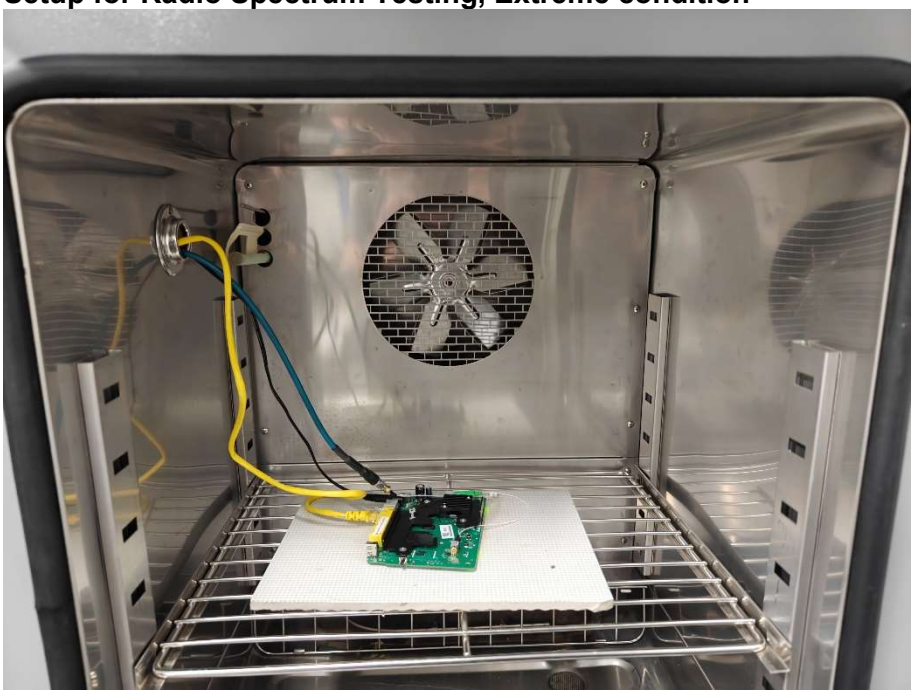
The DUT is a master device which has no user interface for user to change the country of operation and/or the operating frequency band.
The equipment does not accept software and/or firmware which results in the equipment no longer being compliant with the DFS requirements, e.g.:
software and/or firmware provided by the manufacturer but intended for other regulatory regimes;
modified software and/or firmware where the software and/or firmware is available as open source code;
previous versions of the software and/or firmware (downgrade).

14. TEST SETUP PHOTOS

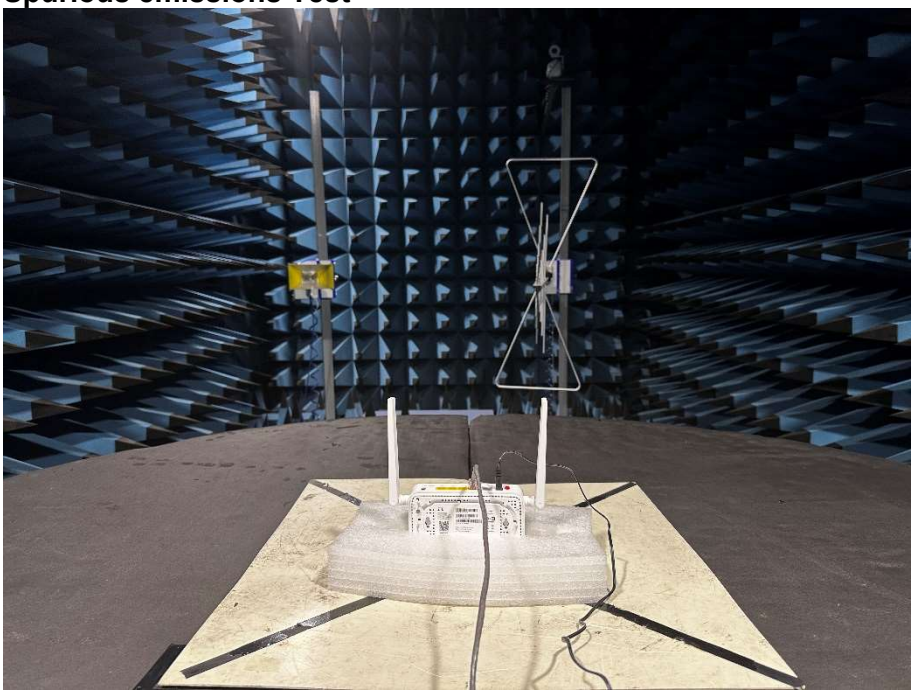
Setup for Radio Spectrum Testing, Normal condition

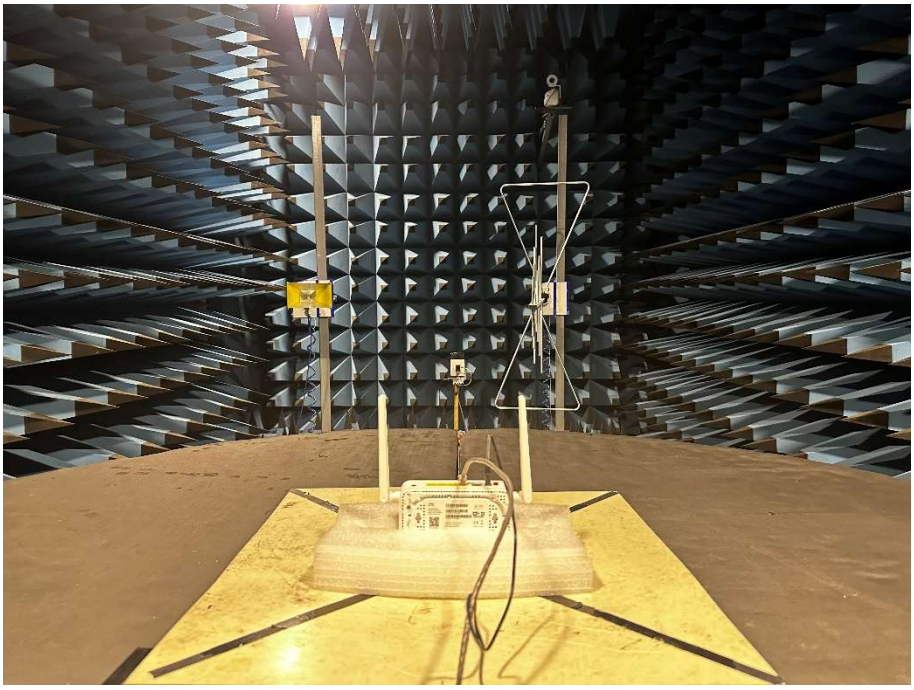


Setup for Radio Spectrum Testing, Extreme condition



Spurious emissions Test





15. EUT PHOTOS

Photo 1 Appearance of EUT

Photo 2 Appearance of EUT

Photo 3 Appearance of EUT

Photo 4 Appearance of EUT

Photo 5 Appearance of EUT

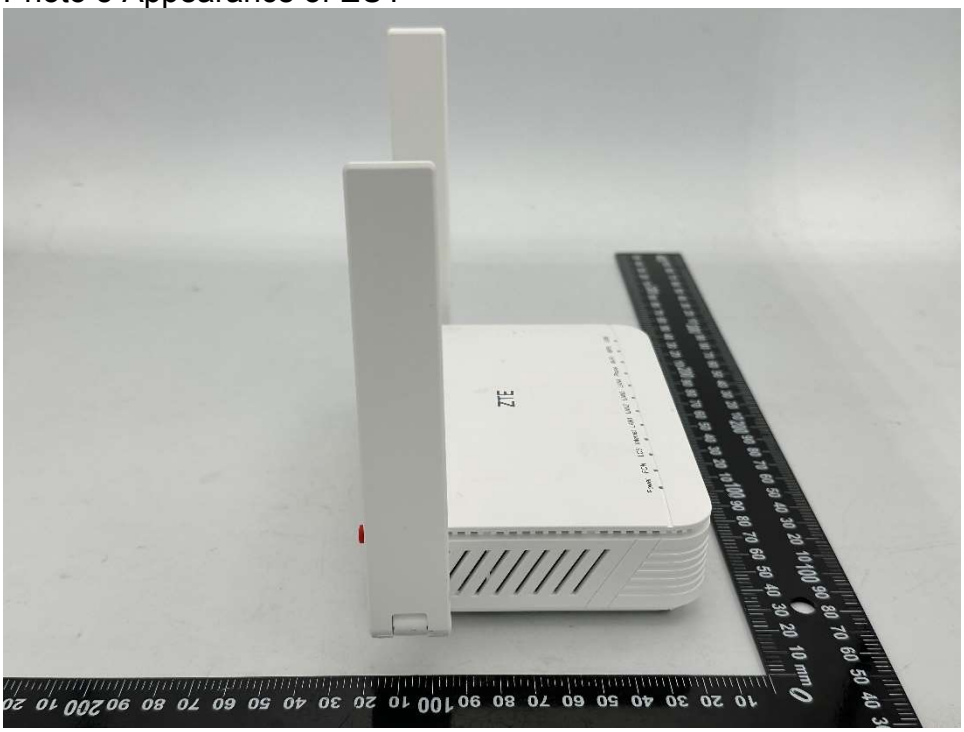


Photo 6 Appearance of EUT

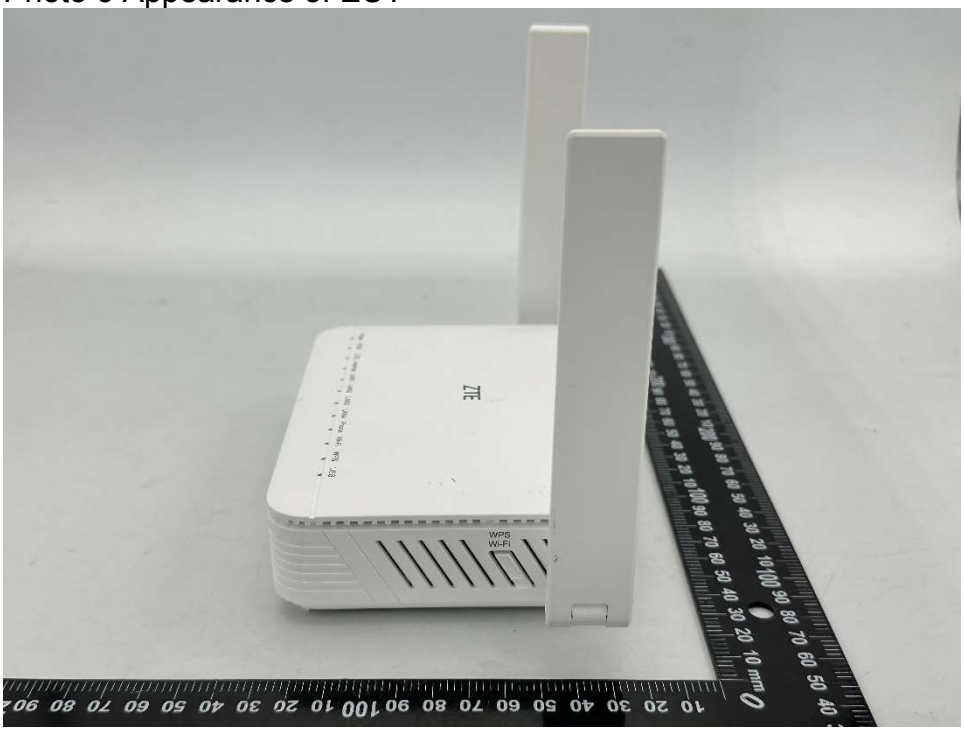


Photo 7 Inside of EUT

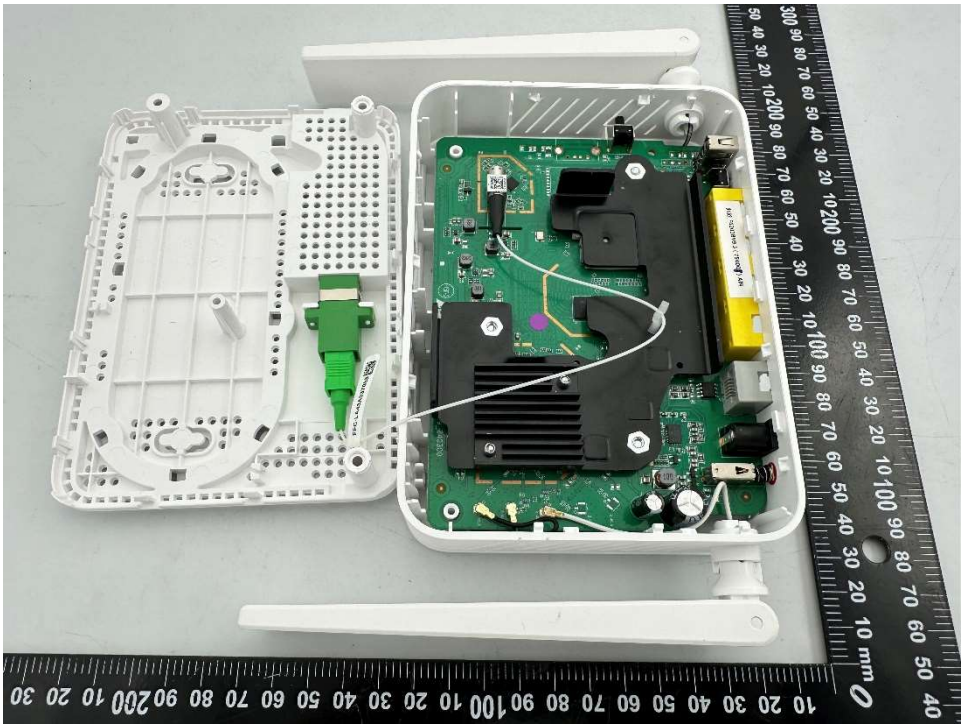


Photo 8 Inside of EUT

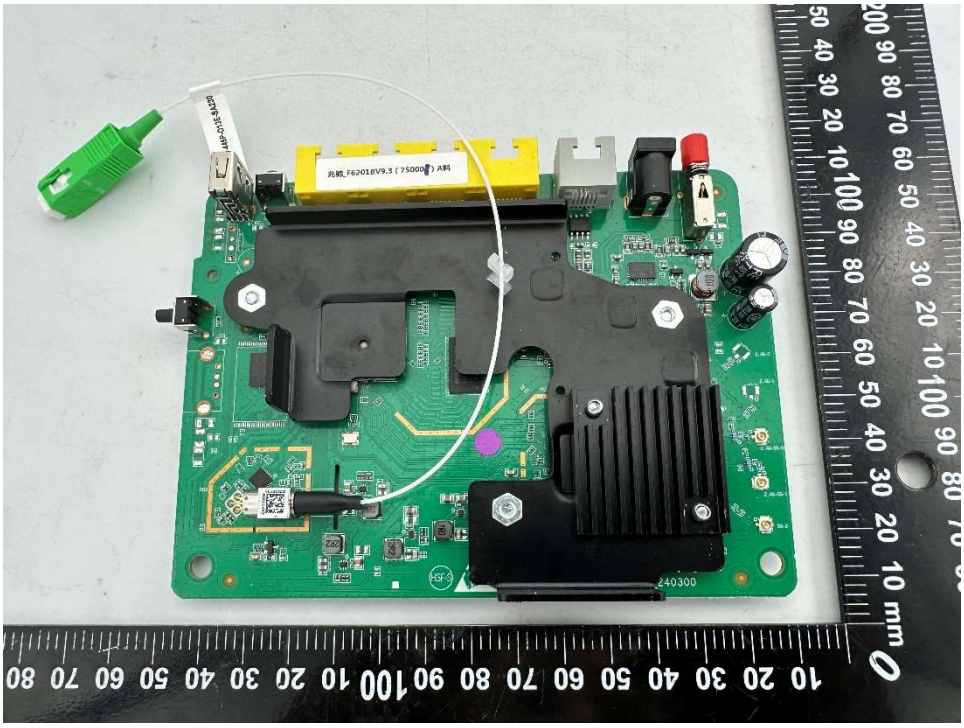


Photo 9 Inside of EUT

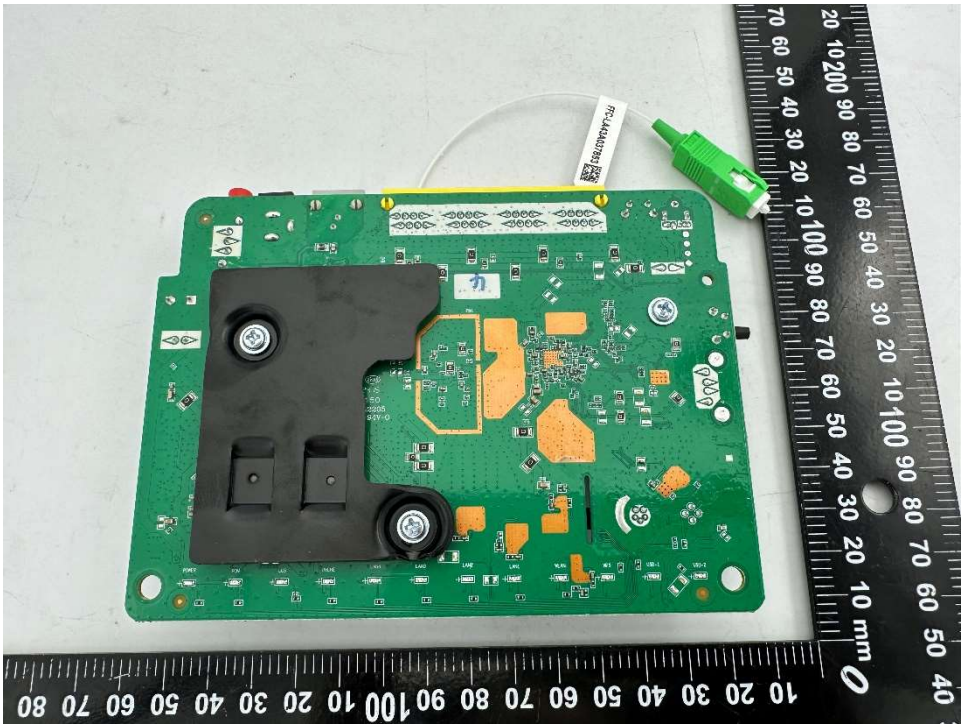


Photo 10 Inside of EUT

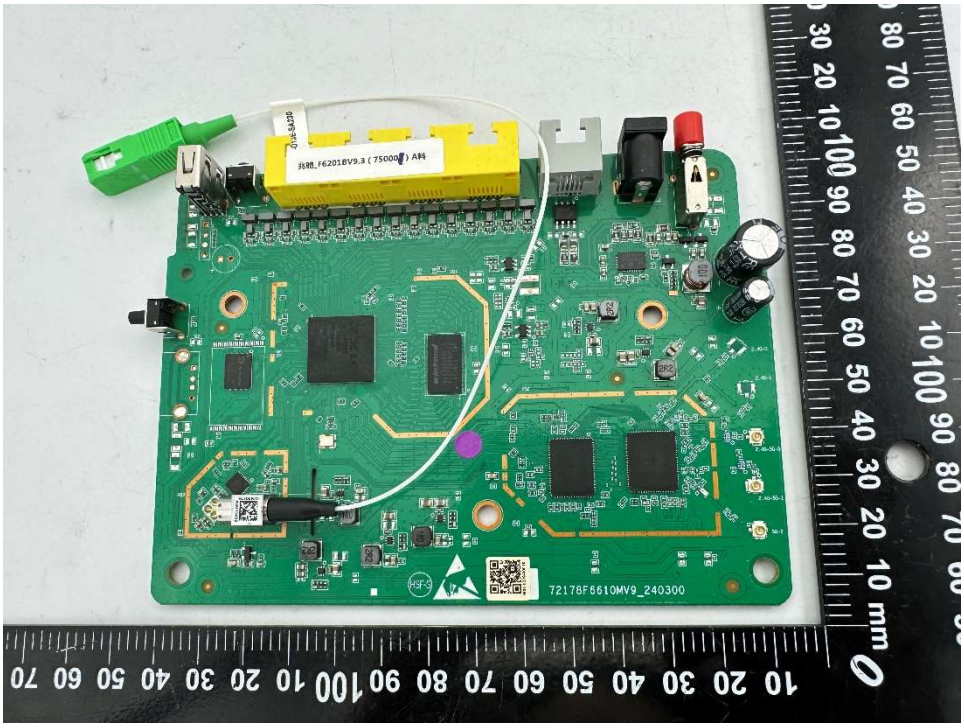
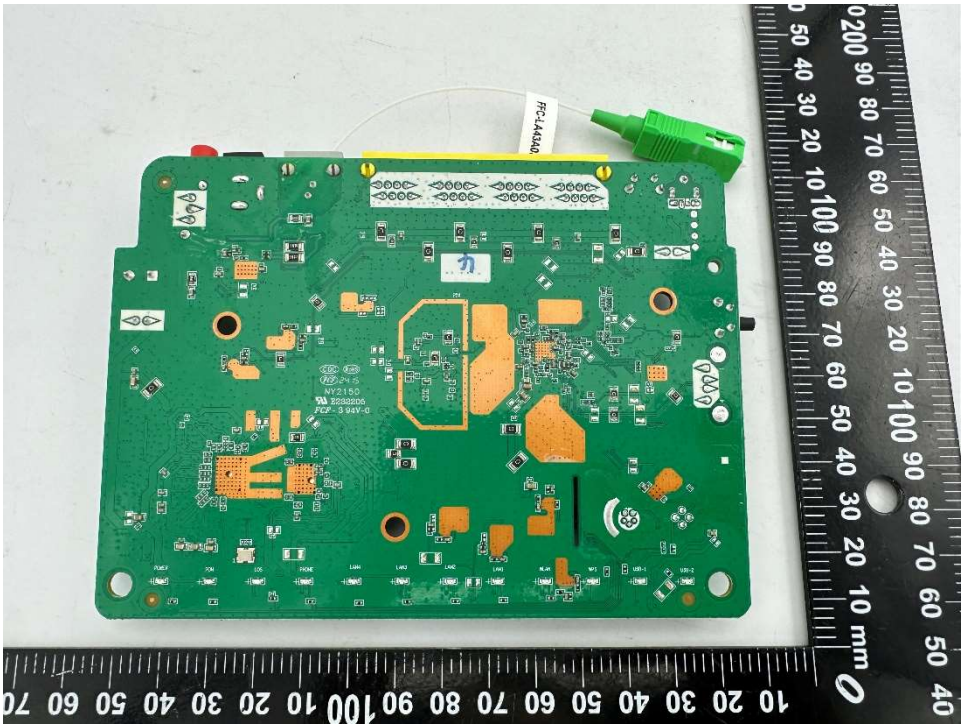


Photo 11 Inside of EUT



----------End of Report----------