



RF TEST REPORT

Certificate No. : TBC-C-202412-0109-1
Report No. : TBR-C-202412-0109-42
Applicant : NEO Smart Technology (GuangDong) Co., LTD
Equipment Under Test (EUT)
EUT Name : Water Valve
Model No. : NAS-WV07W
Series Model No. : NAS-WV07W6-2, NAS-WV08W, NAS-WV09W, NAS-WV10W, NAS-WV11W
Brand Name : NEO
Receipt Date : 2024-12-13
Test Date : 2024-12-13 to 2025-01-06
Issue Date : 2025-01-07
Standards : ETSI EN 301 893 V2.1.1:2017
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above. The EUT technically complies with the Council Directive 2014/53/EU relating to radio equipment.

Tested By : Rick.chen

Reviewed By : Wade.Lv

Approved By : Ivan Su



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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Revision History

Report No.	Version	Description	Issued Date
TBR-C-202412-0109-42	Rev.01	Initial issue of report	2025-01-07



1 General Information

1.1 Client Information

Applicant	:	NEO Smart Technology (GuangDong) Co., LTD
Address	:	Floor 7, 8, 9, 10, Building 28, No. 29, Licheng Industrial Avenue, Shuikou Street, Huicheng District, Huizhou City, China
Manufacturer	:	NEO Smart Technology (GuangDong) Co., LTD
Address	:	Floor 7, 8, 9, 10, Building 28, No. 29, Licheng Industrial Avenue, Shuikou Street, Huicheng District, Huizhou City, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Water Valve	
Model(s)	:	NAS-WV07W, NAS-WV07W6-2, NAS-WV08W, NAS-WV09W, NAS-WV10W, NAS-WV11W	
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is Appearance.	
Product Description	:	Operation Frequency:	5G WIFI Band 1: 5180MHz~5240MHz
		Modulation Type:	802.11a: OFDM (QPSK, BPSK, 16QAM) 802.11n: OFDM (QPSK, BPSK, 16QAM, 64QAM)
		Number of Channel:	Please see Note(3)
		Antenna Designation:	1.4dBi Copper tube antenna
Power Rating	:	Adapter(XSC-0502000AEUU) INPUT: 100-240V~50/60Hz 0.4A Max OUTPUT: 5.0V/2.0A 10.0W DC 3.6V Rechargeable Li-ion battery	
Software Version	:	----	
Hardware Version	:	NAS-WV07W6-V4-2024.06.18	
Remark: The antenna gain and adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab. The above antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.			

Note:

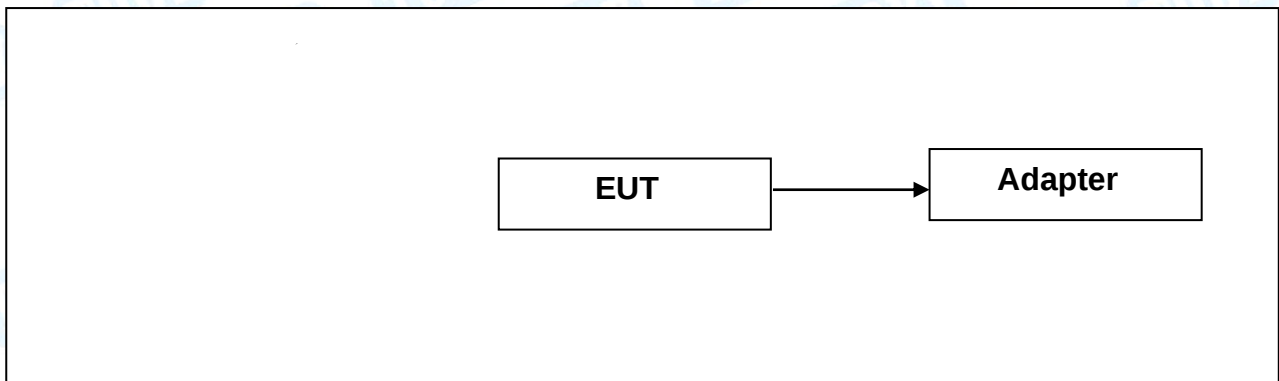
- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) This Test Report is ETSI EN 301 893 for RLAN function, under RED Directive Article 3.2.



(3) Channel List:

5G Band 5180~5240 MHz				
Frequency Band	Channel No.	Frequency	Channel No.	Frequency
Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz
	42	5210 MHz		
Remark: For 20 MHz Bandwidth, use channel 36, 40, 44, 48. For 40 MHz Bandwidth, use channel 38, 46. For 80 MHz Bandwidth, use channel 42.				

1.3 Block Diagram Showing the Configuration of System Tested



1.4 Description of Support Units

The EUT has been tested as an independent unit.



1.5 Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Test Channel	Parameters
802.11a	5180	103
	5200	103
	5240	103
802.11n(HT20)	5180	95
	5200	95
	5240	95
802.11n(HT40)	5190	95
	5230	95

The EUT system operated these modes were found to be the worst case during the pre-scanning test as Following:

For Radiated Test(Below 1GHz)
Transmit mode(802.11 a 5180MHz)
Receive mode(5180MHz)
For Radiated Test(Above 1GHz)
Transmit mode(802.11a 5180/5240MHz)
Receive mode(5180/5240MHz)
Note: the report only show the worst case data.

Normal Temperature(NT):	22°C~26°C
Relative Humidity:	25% to 65%
Air Pressure:	980-1020hPa
Extreme Temperature	Low Temperature (LT)=1°C High Temperature (HT)= +60°C
Normal Voltage of EUT (NV):	DC 5V
Extreme Voltage of the EUT:	Low Voltage(LV)=4.5V High Voltage(HV)=5.5V
Remark: The extreme temperature and extreme voltage of the EUT is declared by the manufacturer.	



1.6 Test Channel

Clause	Test Item	Test Channel		
		Lower sub-band (5150-5350MHz)		Higher sub-band 5470-5725MHz
		5150-5250 MHz	5250-5350MHz	
5.4.2	Centre Frequencies	C7 (See note 1)		C8 (See note 1)
5.4.3	Occupied Channel Bandwidth	C7		C8
5.4.4	Power, Power density	C1	C2	C3, C4
5.4.5	Transmitter unwanted emissions outside 5 GHz RLAN bands	C7 (See note 1)		C8 (See note 1)
5.4.6	Transmitter unwanted emissions within 5 GHz RLAN bands	C1	C2	C3, C4
5.4.7	Receiver spurious emissions	C7 (See note 1)		C8 (See note 1)
5.4.4	Transmit Power Control (TPC)	n.a. (See note 2)	C2 (See note 1)	C3, C4 (See note 1)
5.4.8	DFS	n.a. (See note 2)	C5	C6 (See note 3)
5.4.9	Adaptivity	C9		
5.4.10	Receiver Blocking	C7		C8
C1,C3:	The lowest declared channel for every declared nominal channel bandwidth within this band. For the power density testing, it is sufficient to only perform this test using the lowest nominal channel bandwidth.			
C2,C4:	The highest declared channel for every declared nominal channel bandwidth within this band. For the power density testing, it is sufficient to only perform this test using the lowest nominal channel bandwidth.			
C5,C6:	One channel out of the declared channels for this frequency range. If more than one nominal channel bandwidth has been declared for this sub-band, testing shall be performed using the lowest and highest nominal channel bandwidth.			
C7,C8:	One channel out of the declared channels for this sub-band. For <i>Occupied Channel Bandwidth</i> , testing shall be repeated for every declared <i>Nominal Channel Bandwidth</i> within this sub-band.			
C9	One channel (in case of single-channel testing) or a group of channels (in case of multi-channel testing) out of the declared channels.			
Note 1:	In case of more than one channel plan has been declared, testing of these specific requirements need only be performed using one of the declared channel plans.			
Note 2:	Testing is not required for nominal channel bandwidths that fall completely within the frequency range 5150MHz to 5250MHz.			
Note 3:	Where the declared channel plan includes channels whose nominal channel bandwidth falls completely or partly within the 5 600 MHz to 5 650 MHz band, the tests for the Channel Availability Check (and where implemented, for the Off-Channel CAC) shall be performed on one of these channels in addition to a channel within the band 5 470 MHz to 5 600 MHz or within the band 5 650 MHz to 5 725 MHz.			



1.7 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F., Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.



2 Information as required by EN 301 893 V2.1.1, clause 5.4.1

In accordance with EN 301 893, clause 5.4.1, the following information is provided by the supplier.

a) The Nominal Channel Bandwidth(s):

Nominal Channel Bandwidth 1: 20 MHz

Nominal Channel Bandwidth 2: 40 MHz

Nominal Channel Bandwidth 3:

The associated centre frequencies: in section 1.2(Note:3) of the test report.

b) For Load Based Equipment that supports multi-channel operation:

☐ The LBE equipment supports Option 1 as described in clause 4.2.7.3.2.3

☒ The LBE equipment supports Option 2 as described in clause 4.2.7.3.2.3

• The (maximum) number of channels used for multi-channel operation: 7

• These channels are adjacent channels: ☒ Yes ☐ No

• In case of non-adjacent channels, whether or not these channels are in different sub-bands:

☐ Yes ☒ No

• for LBE equipment implementing option 1 (see clause 4.2.7.3.2.3), the number of channels used for multichannel

operation when performing the test described in clause 5.4.9.3.2.3.1: N/A

In case of multi-channel operation, further information defining the channels used for these simultaneous transmissions may be required.

c) The different transmit operating modes (see clause 5.3.3.2) (tick all that apply):

☒ **Operating mode 1:** Single Antenna Equipment

☒ a) Equipment with only 1 antenna

☐ b) Equipment with diversity antennas but only 1 antenna active at any moment in time

☐ c) Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used

☐ **Operating mode 2:** Smart Antenna Systems - Multiple Antennas without beamforming

☐ a) Single spatial stream/Standard throughput

☐ b) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1

☐ c) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

☐ **Operating mode 3:** Smart Antenna Systems - Multiple Antennas with beamforming

☐ a) Single spatial stream/Standard throughput

☐ b) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1

☐ c) High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

d) In case of Smart Antenna Systems or multiple antenna systems:

• The number of Receive chains: 1

• The number of Transmit chains: 1

• Equal power distribution among the transmit chains: ☒ Yes ☐ No

• In case of beamforming, the maximum (additional) beamforming gain: dB

NOTE: Beamforming gain does not include the basic gain of a single antenna (assembly).



e) TPC feature available: ☐ Yes ☒ No

h) The DFS related operating mode(s) of the equipment:

- ☐ Master
- ☐ Slave with radar detection
- ☒ Slave without radar detection

i) User access restrictions (please check box below to confirm):

- ☒ the equipment is constructed to comply with the requirements contained in clause 4.10 in ETSI EN 301 893 V2.1.1.

j) For equipment with Off-Channel CAC functionality:

The equipment has an "Off-Channel CAC" function: ☐ Yes ☒ No

If yes, specify the "Off-Channel CAC Time"

- For channels outside the 5 600 MHz to 5 650 MHz range: _____ hours
- If applicable, for channels (partially) within the 5 600 MHz to 5 650 MHz range: _____ hours

k) The equipment can operate in ad-hoc mode:

- ☒ no ad-hoc operation
- ☐ ad-hoc operation in the frequency range 5 150 MHz to 5 250 MHz without DFS
- ☐ ad-hoc operation with DFS

l) Operating Frequency Range(s):

Range 1: ☐ 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz

Range 2: ☐ 5 470 MHz to 5 725 MHz

Range 3: ☒ 5 150 MHz to 5 250 MHz (ad-hoc without DFS)

Range 4: ☐ other, please specify: _____

If the equipment has more than one Operating Frequency Range, tick all that apply.

m) The extreme operating temperature and supply voltage range that apply to the equipment:

☐ -20 °C to +55 °C (Outdoor & Indoor usage)

☐ 0 °C to +35 °C (Indoor usage only)

☒ Other: 1°C to 60°C

The supply voltages of the stand-alone radio equipment or the supply voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the:

- ☒ stand-alone equipment
- ☐ combined (or host) equipment
- ☐ test jig



Supply Voltage

- ☐ AC mains State AC voltage: Minimum: ... Nominal: ... Maximum: ...
- ☒ DC State AC voltage Minimum: 100 ... Nominal: . 230.. Maximum: .240 ..
- In case of DC, indicate the type of power source:
- ☐ Internal Power Supply
- ☒ External Power Supply or AC/DC adapter
- ☒ Battery ☐ Nickel Cadmium
- ☐ Alkaline
- ☐ Nickel-Metal Hydride
- ☒ Lithium-Ion DC 3.6V
- ☐ Lead acid (Vehicle regulated)
- ☐ Other

n) The test sequence/test software used (see also ETSI EN 301 893 (V2.1.1), clause 5.3.1.2):

UI mptool

o) Type of Equipment:

- ☒ Stand-alone
- ☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
- ☐ Plug-in radio device (Equipment intended for a variety of host systems)
- ☐ Other _____

p) Adaptivity (Channel Access Mechanism):

- ☐ Frame Based Equipment
- ☒ Load Based Equipment

r) 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 Load Based Equipment makes use of note 1 in table 7 or note 1 in table 8 of

ETSI EN 301 893 V2.1.1

The Priority Classes implemented by the Load Based Equipment

- When operating as a Supervising Device
 - ☐ Priority Class 4 (Highest priority)
 - ☐ Priority Class 3
 - ☐ Priority Class 2
 - ☐ Priority Class 1 (Lowest priority)
 - When operating as a Supervised Device
 - ☐ 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



With regard to Energy Detection Threshold, the Load Based Equipment has implemented either option 1 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1 or option 2 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1:

☒ Option 1

☐ Option 2

Specify which protocol has been implemented: IEEE 802.11™ Other: _____

s) The equipment supports a geo-location capability as defined in clause 4.2.10 of ETSI EN 301 893 V2.1.1:

☐ Yes

☒ No



3 Test Results Summary

Harmonized Standard EN 301 893					
Requirement			Requirement Conditionality		Observations
No	Description	Reference: Clause No	U/C	Condition	
1	Carrier Frequencies	4.2.1	U		PASS
2	Nominal, and occupied, channel bandwidth	4.2.2	U		PASS
3	RF output power	4.2.3	U		PASS
4	Transmit Power Control (TPC)	4.2.3	C	1) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 2) Not required for devices that operate at a maximum mean e.i.r.p. of 20 dBm when operating in 5250 MHz to 5350 MHz or 27 dBm when operating in 5 470 MHz to 5 725 MHz.	N/A
5	Power Density	4.2.3	U		PASS
6	Transmitter unwanted emissions outside the 5 GHz RLAN bands	4.2.4.1	U		PASS
7	Transmitter unwanted emissions within the 5 GHz RLAN bands	4.2.4.2	U		PASS
8	Receiver spurious emissions	4.2.5	U		PASS
9	DFS: Channel Availability Check	4.2.6.2.2	C	1) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 2) Not required for Slave devices with a maximum transmit power of less than 200 mW e.i.r.p. 3) Not required at initial use of a channel for slave devices with a maximum transmit power of 200 mW e.i.r.p.	N/A
10	DFS: Off-Channel CAC – Radar Detection Threshold	4.2.6.2.3	C	1) Where implemented by the manufacturer. 2) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 3) Not required for slave devices with a maximum transmit power of less than 200 mW e.i.r.p. 4) Not required at initial use of a channel for Slave devices with a maximum transmit power of 200 mW e.i.r.p.	N/A
11	DFS: Off-Channel CAC – Detection Probability	4.2.6.2.3	C	1) Where implemented by the manufacturer. 2) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 3) Not required for slave devices with a maximum transmit power of less than 200 mW e.i.r.p. 4) Not required at initial use of a channel for Slave devices with a maximum transmit power of 200 mW e.i.r.p.	N/A
12	DFS: In service Monitoring	4.2.6.2.4	C	1) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 2) Not required for Slave devices with a maximum transmit power of less than 200 mW e.i.r.p.	N/A



13	DFS: Channel shutdown	4.2.6.2.5	C	Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz.	N/A
14	DFS: Non-occupancy period	4.2.6.2.6	C	1) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 2) Not required for Slave devices with a maximum transmit power of less than 200 mW e.i.r.p.	N/A
15	DFS: Uniform spreading	4.2.6.2.7	C	1) Not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz. 2) Not required for slave devices.	N/A
16	Adaptivity	4.2.7	U		PASS
17	Receiver Blocking	4.2.8	U		PASS
18	User Access Restrictions	4.2.9	U		N/A
19	Geo-location capability	4.2.10	C	Where implemented by the manufacturer.	N/A

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement.
Description A textual reference to the requirement.
Clause Number Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).
Condition Explains the conditions when the requirement is or is not applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

4 Test Software

Test Item	Test Software	Manufacturer	Version No.
Radiation Emission	EZ-EMC	EZ	FA-03A2RE
Radiation Emission	EZ-EMC	EZ	FA-03A2RE+
RF Conducted Measurement	MTS-8310	MWRFTest	V2.0.0.0
RF Test System	JS1120-3	Tonscend	V3.2.22



5 Test Equipment and Test Site

Test Site				
No.	Test Site	Manufacturer	Specification	Used
TB-EMCSR001	Shielding Chamber #1	YIHENG	7.5*4.0*3.0 (m)	X
TB-EMCSR002	Shielding Chamber #2	YIHENG	8.0*4.0*3.0 (m)	√
TB-EMCCA001	3m Anechoic Chamber #A	ETS	9.0*6.0*6.0 (m)	X
TB-EMCCB002	3m Anechoic Chamber #B	YIHENG	9.0*6.0*6.0 (m)	√

Radiation Emission Test (B Site)					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 29, 2024	Aug. 28, 2025
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jun. 17, 2024	Jun. 16, 2025
EMI Test Receiver	Rohde & Schwarz	ESU-8	100472/008	Feb. 23, 2024	Feb. 22, 2025
Bilog Antenna	SCHWARZBECK	VULB 9168	1225	Nov. 13, 2023	Nov. 12, 2025
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2463	Jun. 14, 2024	Jun. 13, 2026
Horn Antenna	SCHWARZBECK	BBHA 9170	1118	Feb. 27, 2024	Feb. 26, 2026
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jun. 14, 2024	Jun. 13, 2026
HF Amplifier	Tonscend	TAP9E6343	AP21C806117	Aug. 29, 2024	Aug. 28, 2025
HF Amplifier	Tonscend	TAP051845	AP21C806141	Aug. 29, 2024	Aug. 28, 2025
HF Amplifier	Tonscend	TAP0184050	AP21C806129	Aug. 29, 2024	Aug. 28, 2025
Highpass Filter	CD	HPM-6.4/18G	---	N/A	N/A
Highpass Filter	CD	HPM-2.8/18G	---	N/A	N/A
Highpass Filter	XINBO	XBLBQ-HTA67(8-25G)	22052702-1	N/A	N/A
Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jun. 17, 2024	Jun. 16, 2025
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Aug. 29, 2024	Aug. 28, 2025
MXA Signal Analyzer	KEYSIGHT	N9020B	MY60110172	Aug. 29, 2024	Aug. 28, 2025
MXA Signal Analyzer	Agilent	N9020A	MY47380425	Aug. 29, 2024	Aug. 28, 2025
Vector Signal Generator	Agilent	N5182A	MY50141294	Aug. 29, 2024	Aug. 28, 2025
Analog Signal Generator	Agilent	N5181A	MY48180463	Aug. 29, 2024	Aug. 28, 2025
Vector Signal Generator	KEYSIGHT	N5182B	MY59101429	Aug. 29, 2024	Aug. 28, 2025
Analog Signal Generator	KEYSIGHT	N5173B	MY61252685	Aug. 29, 2024	Aug. 28, 2025
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Aug. 29, 2024	Aug. 28, 2025
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Aug. 29, 2024	Aug. 28, 2025
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Aug. 29, 2024	Aug. 28, 2025
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	N/A	N/A
RF Control Unit	Tonsced	JS0806-1	21C8060380	Aug. 29, 2024	Aug. 28, 2025
RF Control Unit	Tonsced	JS0806-2	21F8060439	N/A	N/A



Power Control Box	Tonsced	JS0806-4ADC	21C8060387	Aug. 29, 2024	Aug. 28, 2025
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	144382	Feb. 23, 2024	Feb. 22, 2025
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	168796	Jun. 14, 2024	Jun. 13, 2026
Temperature and Humidity Chamber	ZhengHang	ZH-QTH-1500	ZH2107264	Jun. 17, 2024	Jun. 16, 2025



6 Centre Frequencies

6.1 Test Standard and Limit

6.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.1

6.1.2 Test Limit

The Nominal Centre Frequencies (f_c) for a Nominal Channel Bandwidth of 20 MHz are defined by equation (1). See also figure 3.

$f_c = 5\,160 + (g \times 20)$ MHz, where $0 \leq g \leq 9$ or $16 \leq g \leq 27$ and where g shall be an integer. (1)

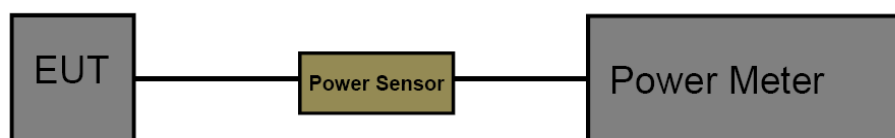
A maximum offset of the Nominal Centre Frequency of ± 200 kHz is permitted. Where the manufacturer decides to make use of this frequency offset, the manufacturer shall declare the actual centre frequencies used by the equipment. See clause 5.4.1, item a).

The actual centre frequency for any given channel shall be maintained within the range $f_c \pm 20$ ppm.

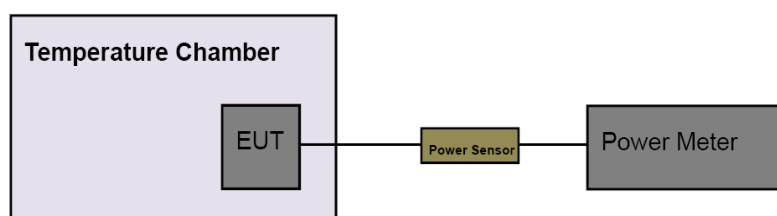
Equipment may have simultaneous transmissions on more than one Operating Channel with a Nominal Channel Bandwidth of 20 MHz.

6.2 Test Setup

Normal Condition



Extreme Condition



6.3 Test Procedure

Equipment operating without modulation

This test method requires that the UUT can be operated in an unmodulated test mode.

The UUT shall be connected to a suitable frequency measuring device (e.g. a frequency counter or a spectrum analyser) and operated in an unmodulated mode.

The result shall be recorded.

Equipment operating with modulation

This method is an alternative to the above method in case the UUT cannot be operated in an un-modulated mode.

The UUT shall be connected to spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the UUT.



The peak value of the power envelope shall be measured and noted. The span shall be reduced and the marker moved in a positive frequency increment until the upper, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f1.

The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f2.

The centre frequency is calculated as $(f1 + f2) / 2$.

6.4 Deviation From Test Standard

No deviation

6.5 EUT Operating Mode

These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.3).

The channels on which the conformance requirements in clause 4.2.1 shall be verified are defined in clause 5.3.2.

The UUT shall be configured to operate at a normal RF Output Power level. In addition, the UUT shall be configured to operate on a single channel.

For a UUT with antenna connector(s) and using dedicated external antenna(s), or for a UUT with integral antenna(s) but with a temporary antenna connector(s) provided, conducted measurements shall be used.

In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) the measurements shall be performed on only one of the active transmit chains.

For a UUT with integral antenna(s) and without a temporary antenna connector(s), radiated measurements shall be used.

6.6 Test Data

Please refer to the Appendix for RLAN.



7 Occupied Channel Bandwidth

7.1 Test Standard and Limit

7.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.2

7.1.2 Test Limit

The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.

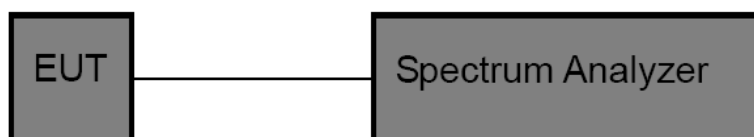
Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster).

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

The Occupied Channel Bandwidth might change with time/payload.

During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz.

7.2 Test Setup



7.3 Test Procedure

The measurement procedure shall be as follows:

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:
 - Centre Frequency: The centre frequency of the channel under test
 - Resolution Bandwidth: 100 kHz
 - Video Bandwidth: 300 kHz
 - Frequency Span: $2 \times$ Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel)
 - Sweep time: > 1 s; for larger Nominal Bandwidths, the sweep time may be increased until a value where the sweep time has no impact on the RMS value of the signal
 - Detector Mode: RMS
 - Trace Mode: Max Hold

Step 2:

- Wait for the trace to stabilize.

Step 3:

- Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
- Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

The measurement described in step 1 to step 3 above shall be repeated in case of simultaneous transmissions in non-adjacent channels.



7.4 Deviation From Test Standard

No deviation

7.5 EUT Operating Mode

The conformance requirements in clause 4.2.2 shall be verified only under normal operating conditions, and on those channels and channel bandwidths defined in clause 5.3.2.

The measurements shall be performed using normal operation of the equipment with the test signal applied (see clause 5.3.1.1).

The UUT shall be configured to operate at a typical RF power output level used for normal operation.

When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

For a UUT with antenna connector(s) and using dedicated external antenna(s), or for a UUT with integral antenna(s) but with a temporary antenna connector(s) provided, conducted measurements shall be used.

In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs).

For a UUT with integral antenna(s) and without a temporary antenna connector(s), radiated measurements shall be used.

7.6 Test Data

Please refer to the Appendix for RLAN.



8 RF Output Power

8.1 Test Standard and Limit

8.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.3

8.1.2 Test Limit

Table 2: Mean e.i.r.p. limits for RF output power and Power Density at the highest power level (P_H)

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	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 frequency range 5 250 MHz to 5 350 MHz.

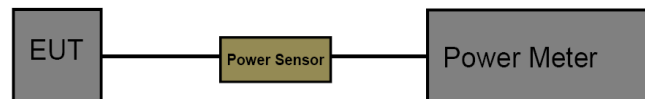
Table 3: Mean e.i.r.p. limits for RF Output Power at the lowest power level of the TPC range

Frequency range	Mean e.i.r.p. (dBm) limit for P_L
5 250 MHz to 5 350 MHz	17
5 470 MHz to 5 725 MHz	24 (see note)

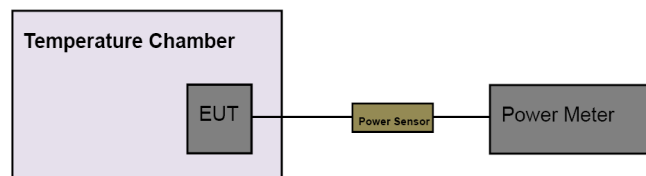
NOTE: Slave devices without a *Radar Interference Detection* function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.

8.2 Test Setup

Normal Condition



Extreme Condition



8.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.4.2.1.1&5.4.4.2.1.2

8.4 Deviation From Test Standard

No deviation

8.5 EUT Operating Mode

These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.3).

8.6 Test Data

Please refer to the Appendix for RLAN.



9 Transmit Power Control (TPC)

9.1 Test Standard and Limit

9.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.3

9.1.2 Test Limit

Transmit Power Control (TPC) is a mechanism to be used by the RLAN device to ensure a mitigation factor of at least 3 dB on the aggregate power from a large number of devices. This requires the RLAN device to have a TPC range from which the lowest value is at least 6 dB below the values for mean e.i.r.p. given in table 2 for devices with TPC.

Table 2: Mean e.i.r.p. limits for RF output power and Power Density at the highest power level (P_H)

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	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 frequency range 5 250 MHz to 5 350 MHz.

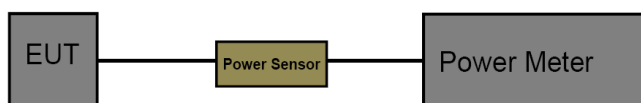
Table 3: Mean e.i.r.p. limits for RF Output Power at the lowest power level of the TPC range

Frequency range	Mean e.i.r.p. (dBm) limit for P_L
5 250 MHz to 5 350 MHz	17
5 470 MHz to 5 725 MHz	24 (see note)

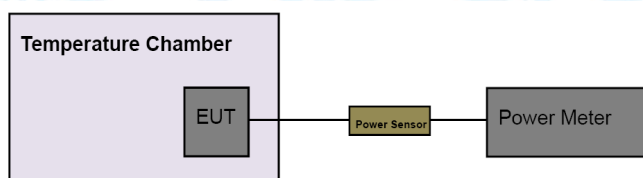
NOTE: Slave devices without a *Radar Interference Detection* function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.

9.2 Test Setup

Normal Condition



Extreme Condition



9.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.4.2.1.1&5.4.4.2.1.2



9.4 Deviation From Test Standard

No deviation

9.5 EUT Operating Mode

These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.3).

9.6 Test Data

The EUT without TPC function.



10 Power Density

10.1 Test Standard and Limit

10.1.1 Test Standard

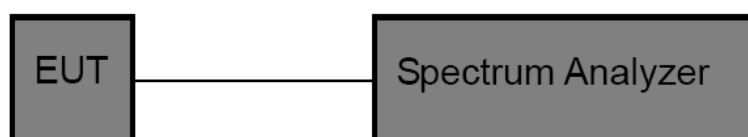
ETSI EN 301 893 V2.1.1:2017 clause 4.2.3

10.1.2 Test Limit

Table 2: Mean e.i.r.p. limits for RF output power and Power Density at the highest power level (P_H)

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	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 <i>Radar Interference Detection</i> function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.				

10.2 Test Setup



10.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.4.2.1.3

10.4 Deviation From Test Standard

No deviation

10.5 EUT Operating Mode

These measurements shall only be performed at normal test conditions (see clause 5.1.2).

The UUT shall be configured to operate at the lowest Nominal Channel Bandwidth with:

- the highest stated transmitter output power level of its TPC range; or
- the maximum stated transmitter output power level in case the equipment has no TPC feature

10.6 Test Data

Please refer to the Appendix for RLAN.



11 Transmitter Unwanted Emissions within 5 GHz RLAN Bands

11.1 Test Standard and Limit

11.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.4

11.1.2 Test Limit

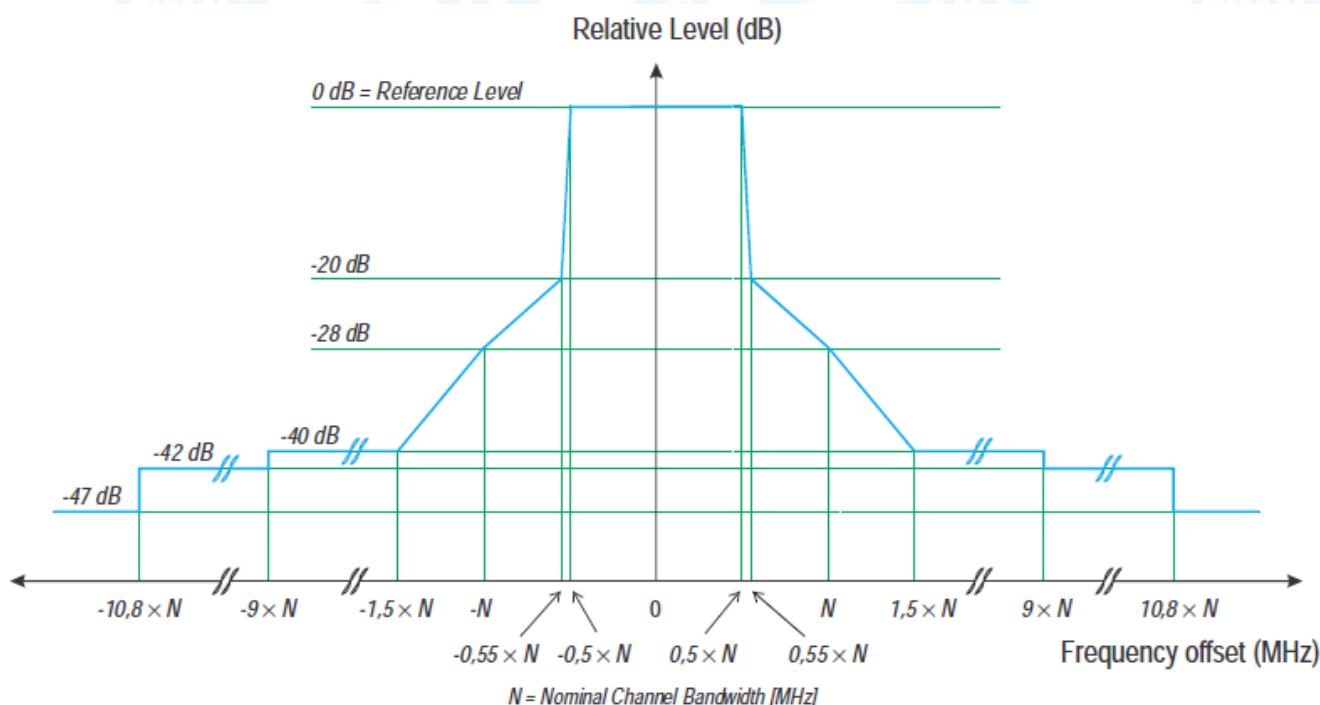


Figure 1: Transmit spectral power mask

The mean Power Density (measured with a 1 MHz measurement bandwidth) of the transmitter unwanted emissions within the 5 GHz RLAN bands shall not exceed the limits of the mask provided in figure 1 or an absolute level of -30 dBm/MHz, whichever is greater. The limits in figure 1 are relative to the maximum Power Density of the RLAN device when measured with a reference bandwidth of 1 MHz.

The mask is only applicable within the band of operation. Beyond the band edges the requirements of clause 4.2.4.1 apply.

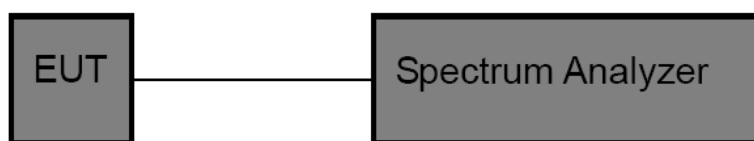
In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet the limits provided in figure 1.

For transmitter unwanted emissions within the 5 GHz RLAN bands, simultaneous transmissions in adjacent channels may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels used simultaneously.

For simultaneous transmissions in multiple non-adjacent channels, the overall transmit spectral power mask is constructed in the following manner. First, a mask as provided in figure 1 is applied to each of the channels. Then, for each frequency point, the greatest value from the spectral masks of all the channels assessed shall be taken as the overall spectral mask requirement at that frequency.



11.2 Test Setup



11.3 Test Procedure

Option 1: For equipment with continuous transmission capability

The UUT shall be configured for continuous transmit mode (duty cycle equal to 100 %). If this is not possible, then option 2 shall be used.

Step 1: Determination of the reference average power level.

- Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 30 kHz
- Detector mode: Peak
- Trace mode: Video Average
- Sweep Time: Coupled
- Centre Frequency: Centre frequency of the channel being tested
- Span: 2 × Nominal Channel Bandwidth

- Use the marker to find the highest average power level of the power envelope of the UUT. This level shall be used as the reference level for the relative measurements.

Step 2: Determination of the relative average power levels.

- Adjust the frequency range of the spectrum analyser to allow the measurement to be performed within the sub-bands 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz. No other parameter of the spectrum analyser should be changed.
- Compare the relative power envelope of the UUT with the limits defined in clause 4.2.4.2.2.

Option 2: For equipment without continuous transmission capability

This method shall be used if the UUT is not capable of operating in a continuous transmit mode (duty cycle less than 100 %). In addition, this option can also be used as an alternative to option 1 for systems operating in a continuous transmit mode.

Step 1: Determination of the reference average power level.

- Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 30 kHz
- Detector mode: RMS
- Trace Mode: Max Hold
- Sweep time: ≥ 1 min
- Centre Frequency: Centre frequency of the channel being tested
- Span: 2 × Nominal Channel Bandwidth

- Use the marker to find the highest average power level of the power envelope of the UUT. This level shall be used as the reference level for the relative measurements.

Step 2: Determination of the relative average power levels.

- Adjust the frequency range of the spectrum analyser to allow the measurement to be performed within the sub-bands 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz. No other parameter of the spectrum analyser should be changed.
- Compare the relative power envelope of the UUT with the limits defined in clause 4.2.4.2.2.



11.4 Deviation From Test Standard

No deviation

11.5 EUT Operating Mode

The conformance requirements in clause 4.2.4.2 shall be verified only under normal operating conditions, and when operating on those channels and channel bandwidths defined in clause 5.3.2.

The equipment shall be configured to operate under its worst case situation with respect to unwanted emissions within the 5 GHz RLAN bands.

For UUT without an integral antenna and for a UUT with an integral antenna but with a temporary antenna connector(s), conducted measurements should be performed. Alternatively, if UUT has an integral antenna(s), but no temporary antenna connector(s), radiated measurements may be used.

In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) operating in a mode with more than one transmit chain being active simultaneously, measurements shall only be performed on one of the transmit chains (antenna outputs).

11.6 Test Data

Please refer to the Appendix for RLAN.



12 Adaptivity (Channel Access Mechanism)

12.1 Test Standard and Limit

12.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.7

12.1.2 Test Limit

Channel Access Mechanism		
Requirements	Frame Based Equipment	Load Based Equipment
Minimum Clear Channel Assessment (CCA) Time	9 μs	9 μs
Maximum Channel Occupancy (COT) Time	95 % of the Fixed Frame Period (Note 1)	2 ~ 10 ms(see table 1 & 2)
Minimum Idle Period	5% COT, with a min of 100 μs	27μs
Extended CCA check	N/A	N/A
Short Control Signalling Transmissions	Maximum duty cycle of 5 % within an observation period of 50 ms	
Note 1: The Fixed Frame Periods supported by the equipment shall be declared by the manufacturer and shall be within the range of 1 ms to 10 ms.		

Table 1: Priority Class dependent Channel Access parameters for Supervising Devices

Class #	p_0	CW_{min}	CW_{max}	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	1 023	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 μ s. 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 $CW \times 2 + 1$ 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 minimum values. Greater values are allowed.				

Table 2: Priority Class dependent Channel Access parameters for Supervised Devices

Class #	p_0	CW_{min}	CW_{max}	Maximum Channel Occupancy Time (COT)
4	2	3	7	2 ms
3	2	7	15	4 ms
2	3	15	1 023	6 ms (see note 1)
1	7	15	1 023	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 μ s. 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 minimum values. Greater values are allowed.				



Table 3: Classification of Idle Periods dependent Priority Class for Supervising Devices

Class #	Idle Periods Classification
4	If the UUT is a <i>Supervised Device</i>, bin B_n is defined as: $B_n = \begin{cases} [0, 32[\mu\text{s}, n = 0 \\ [32 + 9 \times (n - 1), 32 + 9 \times n[\mu\text{s}, 1 \leq n \leq 3 \\ [59, \infty[\mu\text{s}, n = 4 \end{cases}$ If the UUT is a <i>Supervising Device</i>, bin B_n is defined as: $B_n = \begin{cases} [0, 23[\mu\text{s}, n = 0 \\ [23 + 9 \times (n - 1), 23 + 9 \times n[\mu\text{s}, 1 \leq n \leq 3 \\ [50, \infty[\mu\text{s}, n = 4 \end{cases}$
3	If the UUT is a <i>Supervised Device</i>, bin B_n is defined as: $B_n = \begin{cases} [0, 32[\mu\text{s}, n = 0 \\ [32 + 9 \times (n - 1), 32 + 9 \times n[\mu\text{s}, 1 \leq n \leq 7 \\ [95, \infty[\mu\text{s}, n = 8 \end{cases}$ If the UUT is a <i>Supervising Device</i>, bin B_n is defined as: $B_n = \begin{cases} [0, 23[\mu\text{s}, n = 0 \\ [23 + 9 \times (n - 1), 23 + 9 \times n[\mu\text{s}, 1 \leq n \leq 7 \\ [86, \infty[\mu\text{s}, n = 8 \end{cases}$
2	If the UUT is a <i>Supervising Device</i> making use of note 2 in table 7 in clause 4.2.7.3.2.4, bin B_n is defined as: $B_n = \begin{cases} [0, 41[\mu\text{s}, n = 0 \\ [41 + 9 \times (n - 1), 41 + 9 \times n[\mu\text{s}, 1 \leq n \leq 31 \\ [320, \infty[\mu\text{s}, n = 32 \end{cases}$ If the UUT is a <i>Supervised Device</i> or if the UUT is a <i>Supervising Device</i> not making use of note 2 in table 7 in clause 4.2.7.3.2.4, bin B_n is defined as: $B_n = \begin{cases} [0, 41[\mu\text{s}, n = 0 \\ [41 + 9 \times (n - 1), 41 + 9 \times n[\mu\text{s}, 1 \leq n \leq 15 \\ [176, \infty[\mu\text{s}, n = 16 \end{cases}$
1	$B_n = \begin{cases} [0, 77[\mu\text{s}, n = 0 \\ [77 + 9 \times (n - 1), 77 + 9 \times n[\mu\text{s}, 1 \leq n \leq 15 \\ [212, \infty[\mu\text{s}, n = 16 \end{cases}$



Table 4: Classification of Idle Periods dependent Priority Class for Supervised Devices

Class #	Idle Periods Classification
4	$B_n = \begin{cases} [0, 32[\text{ } \mu\text{s}, n = 0 \\ [32 + 9 \times (n - 1), 32 + 9 \times n[\text{ } \mu\text{s}, 1 \leq n \leq 3 \\ [59, \infty[\text{ } \mu\text{s}, n = 4 \end{cases}$
3	$B_n = \begin{cases} [0, 32[\text{ } \mu\text{s}, n = 0 \\ [32 + 9 \times (n - 1), 32 + 9 \times n[\text{ } \mu\text{s}, 1 \leq n \leq 3 \\ [59, \infty[\text{ } \mu\text{s}, n = 4 \end{cases}$
2	$B_n = \begin{cases} [0, 41[\text{ } \mu\text{s}, n = 0 \\ [41 + 9 \times (n - 1), 41 + 9 \times n[\text{ } \mu\text{s}, 1 \leq n \leq 15 \\ [176, \infty[\text{ } \mu\text{s}, n = 16 \end{cases}$
1	$B_n = \begin{cases} [0, 77[\text{ } \mu\text{s}, n = 0 \\ [77 + 9 \times (n - 1), 77 + 9 \times n[\text{ } \mu\text{s}, 1 \leq n \leq 15 \\ [212, \infty[\text{ } \mu\text{s}, n = 16 \end{cases}$



Table 5: Idle Periods probability dependent Priority Class

Class #	Idle Periods probability
4	$p(n) \leq \begin{cases} 0,05, & n = 0 \\ 0,05 + n \times 0,25, & 1 \leq n \leq 3 \\ 1, & n > 3 \end{cases}$
3	$p(n) \leq \begin{cases} 0,05, & n = 0 \\ 0,18, & n = 1 \\ 0,18 + (n - 1) \times 0,125, & 2 \leq n \leq 6 \\ 1, & n > 6 \end{cases}$
2	$p(n) \leq \begin{cases} 0,05, & n = 0 \\ 0,12, & n = 1 \\ 0,12 + (n - 1) \times 0,03125, & 2 \leq n \leq 29 \\ 1, & n > 29 \end{cases}$ (use of note 2 in table 1) $p(n) \leq \begin{cases} 0,05, & n = 0 \\ 0,12, & n = 1 \\ 0,12 + (n - 1) \times 0,0625, & 2 \leq n \leq 15 \\ 1, & n > 15 \end{cases}$ (not use of note 2 in table 1) $p(n) \leq \begin{cases} 0,05, & n = 0 \\ 0,12, & n = 1 \\ 0,12 + (n - 1) \times 0,0625, & 2 \leq n \leq 15 \\ 1, & n > 15 \end{cases}$ (use of note 1 in table 1 & table 2)
1	$p(n) \leq \begin{cases} 0,05, & n = 0 \\ 0,12, & n = 1 \\ 0,12 + (n - 1) \times 0,0625, & 2 \leq n \leq 15 \\ 1, & n > 15 \end{cases}$
1. E define the total number of Idle Periods observed. Then E is the sum of events in all bins: $E = \sum_{n=0}^k H(B_n)$ 2. p(n) define the probability that idle periods of duration less than the upper limit specified for bin B_n occurred, p(n) = p (Idle Period < upper limit of bin B_n) $p(n) = \frac{\sum_{i=0}^n H(B_i)}{E}$	



12.2 Test Setup

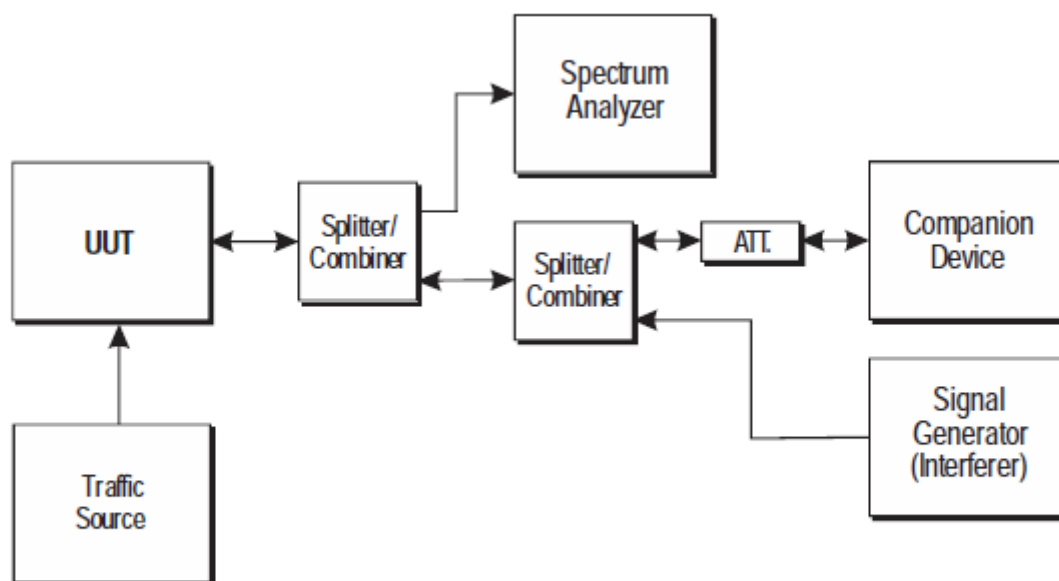


Figure 14: Example Test Set-up for verifying the adaptivity of an equipment

12.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.9

12.4 Deviation From Test Standard

No deviation

12.5 EUT Operating Mode

The manufacturer shall declare if the UUT is an Initiating Device and/or a Responding Device (see also clause 5.4.1, item q)).

The manufacturer shall declare the Fixed Frame Period(s) implemented by the Frame Based Equipment (see also clause 5.4.1, item q)).

All measurements shall have temporal resolution of less than or equal to 1 μ s.

The measurement equipment shall be able to observe the UUT behaviour for a duration of at least 250 ms at the aforementioned temporal resolution. If the data is recorded in segments then the Fixed Frame Periods shall be extracted from each data segment. The combined set of all Fixed Frame Periods shall be analysed as described in clause 5.4.9.2.2.4.

12.6 Test Data

Please refer to the Appendix for RLAN.



13 Receiver Blocking

13.1 Test Standard and Limit

13.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.8

13.1.2 Test Limit

The minimum performance criterion shall be a PER of less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1, item t)).

While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.

Table 9: 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)	
P _{min} + 6 dB	5 100	-53	-59	Continuous Wave
P _{min} + 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.

13.2 Test Setup

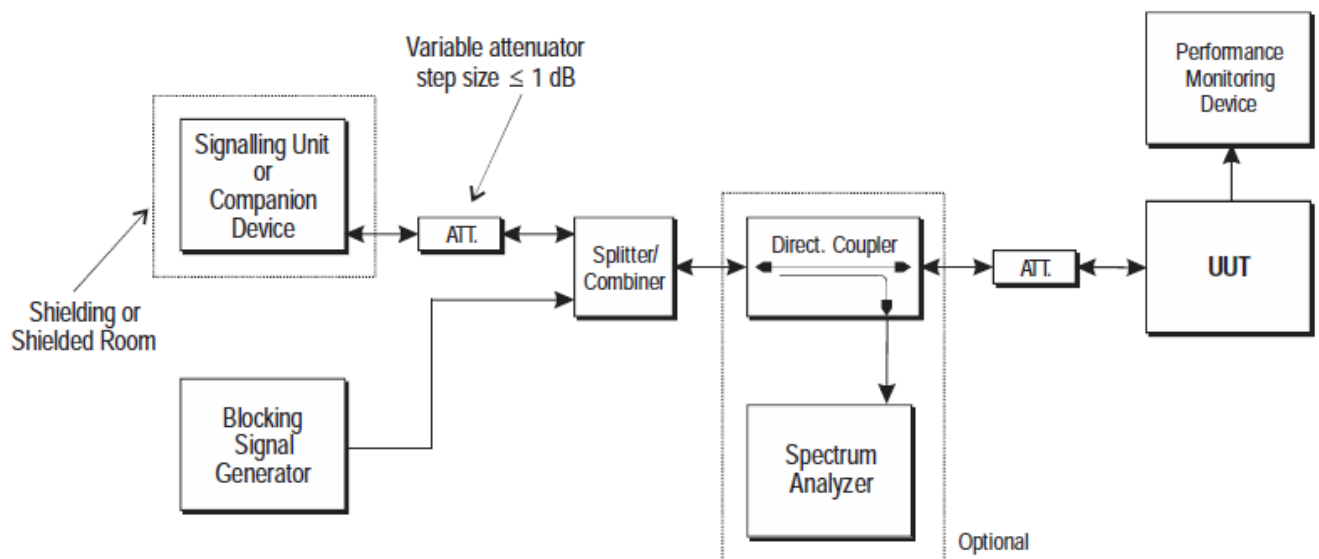


Figure 18: Test Set-up for receiver blocking



13.3 Test Procedure

The steps below define the procedure to verify the receiver blocking requirement as described in clause 4.2.8.

Step 1:

- The UUT shall be set to the first operating frequency to be tested (see clause 5.3.2).

Step 2:

- The blocking signal generator is set to the first frequency as defined in table 9.

Step 3:

- With the blocking signal generator switched off a communication link is set up between the UUT and the associated companion device using the test setup shown in figure 18. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.2.8.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min} .
- This signal level (P_{min}) is increased by 6 dB resulting in a new level ($P_{min} + 6$ dB) of the wanted signal at the UUT receiver input.

Step 4:

- The level of the blocking signal at the UUT input is set to the level provided in table 9. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.2.8.3 are met.
- If the performance criteria as specified in clause 4.2.8.3 are met, the level of the blocking signal at the UUT may be further increased (e.g. in steps of 1 dB) until the level whereby the performance criteria as specified in clause 4.2.8.3 are no longer met. The highest level at which the performance criteria are met is recorded in the test report.

Step 5:

- Repeat step 4 for each remaining combination of frequency and level as specified in table 9. Direct. Coupler Splitter/ UUT Combiner Performance

Step 6:

- Repeat step 2 to step 5 with the UUT operating at the other operating frequencies at which the blocking test has to be performed. See clause 5.3.2.

13.4 Deviation From Test Standard

No deviation

13.5 EUT Operating Mode

These measurements shall only be performed at normal test conditions.

13.6 Test Data

Please refer to the Appendix for RLAN.



14 User Access Restrictions

14.1 Test Standard and Limit

14.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.9

14.1.2 Requirement

The equipment shall be so constructed that settings (hardware and/or software) related to DFS shall not be accessible to the user if changing those settings result in the equipment no longer being compliant with the DFS requirements in clause 4.2.6.

The above requirement includes the prevention of indirect access to any setting that impacts DFS. The following is a non-exhaustive list of examples of such indirect access.

EXAMPLE 1: The equipment should not allow the user to change the country of operation and/or the operating frequency band if that results in the equipment no longer being compliant with the DFS requirements.

EXAMPLE 2: The equipment should 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).

14.2 Deviation From Test Standard

No deviation

14.3 Test Data

The EUT without DFS, there is no requirement.



15 Dynamic Frequency Selection(DFS)

15.1 Test Standard and Limit

15.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.7

15.1.2 Test Limit

Table D.1 to table D.5 contain the values and limits for the DFS specific parameters referred to in clause 4.2.6 and clause 5.4.8.

Figure D.1 shows a single burst for a radar test signal using a constant PRF which is representative for the radar test signal 1 to signal 3 from table D.4. Figure D.2 shows multiple bursts of these same test signals.

Figure D.2 shows the general structure of a single burst radar test signal using a constant PRF. This structure is representative for the radar test signal 1 to signal 3 from table D.4.

Figure D.3 shows a single burst of a pulse based staggered PRF radar test signal. Figure D.4 shows a single burst of a packet based staggered PRF radar test signal which is representative for the radar test signal 5 and signal 6 from table D.4. Figure D.5 shows multiple bursts of these same test signals.

Table D.1: DFS requirement values

Parameter	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 <i>Channel Availability Check Time</i> 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 <i>Off-Channel CAC Time</i> shall be within the range 1 hour to 24 hours.	

Table D.2: 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 Radar Detection 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 Radar Detection 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 D.3: Parameters of the reference DFS test signal

Pulse width W (μs)	Pulse repetition frequency PRF (PPS)	Pulses per burst (PPB)
1	700	18

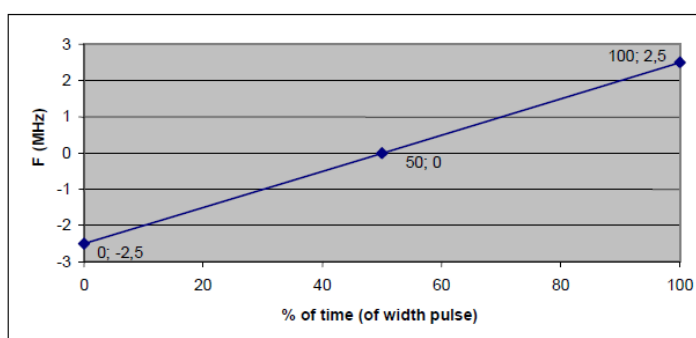


Table D.4: Parameters of radar test signals

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	1 000	1	10 (see note 6)
2	0,5	15	200	1 600	1	15 (see note 6)
3	0,5	15	2 300	4 000	1	25
4	20	30	2 000	4 000	1	20
5	0,5	2	300	400	2/3	10 (see note 6)
6	0,5	2	400	1 200	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 $\pm 2,5$ 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 D.5: Detection probability

Parameter	Detection Probability (P_d)	
	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.



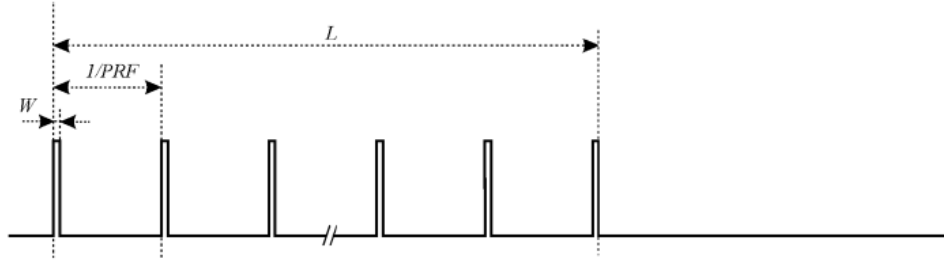


Figure D.1: General structure of a single burst/constant PRF based radar test signal

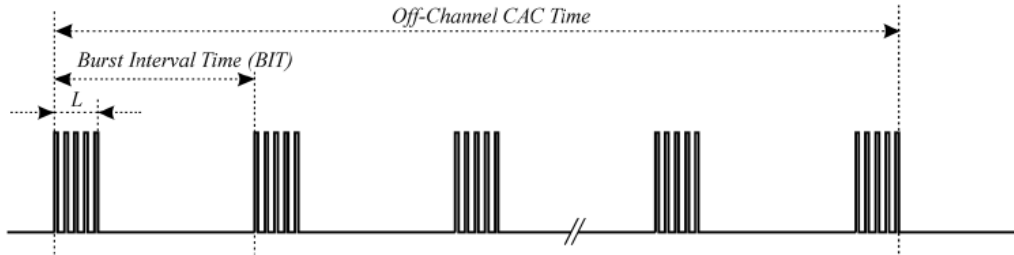


Figure D.2: General structure of a multiple burst/constant PRF based radar test signal

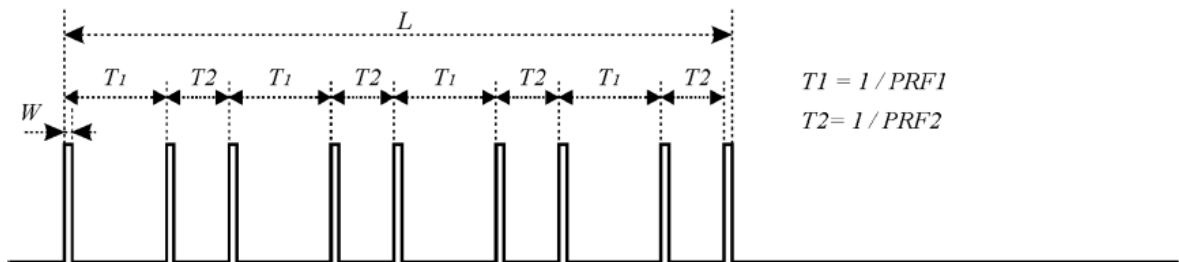


Figure D.3: General structure of a single burst/single pulse based staggered PRF radar test signal

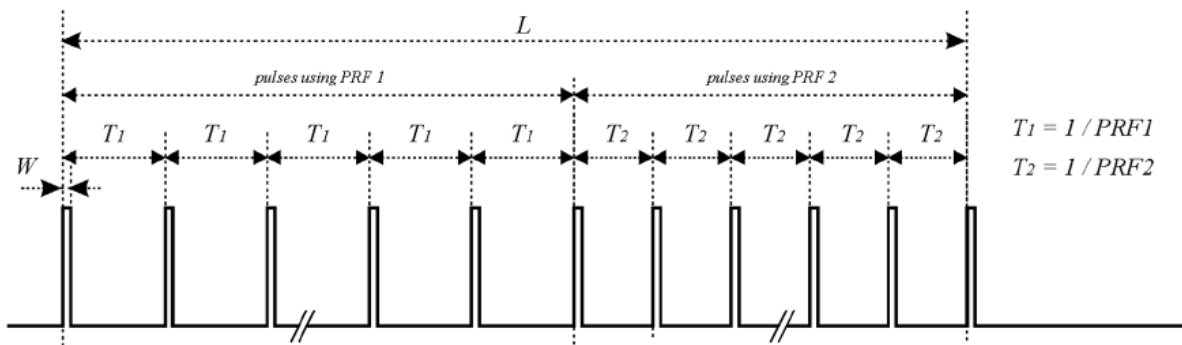


Figure D.4: General structure of a single burst/packet based staggered PRF radar test signal

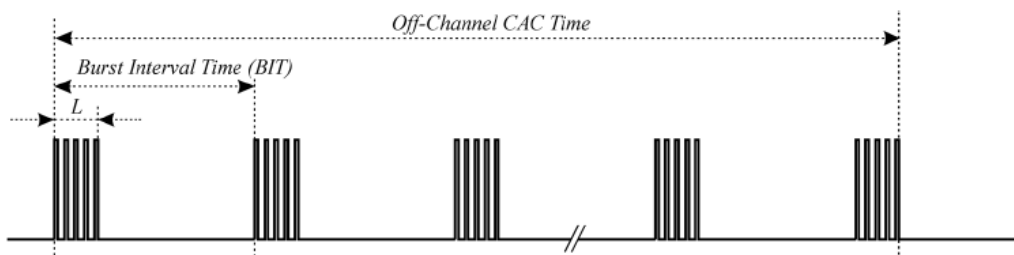


Figure D.5: General structure of a multiple burst/packet based staggered PRF based radar test signal



15.2 Test Setup

Set-up A

Set-up A is a set-up whereby the UUT is an RLAN device operating in master mode. Radar test signals are injected into the UUT. This set-up also contains an RLAN device operating in slave mode which is associated with the UUT.

Figure 5 shows an example for *Set-up A*. The set-up used shall be documented in the test report.

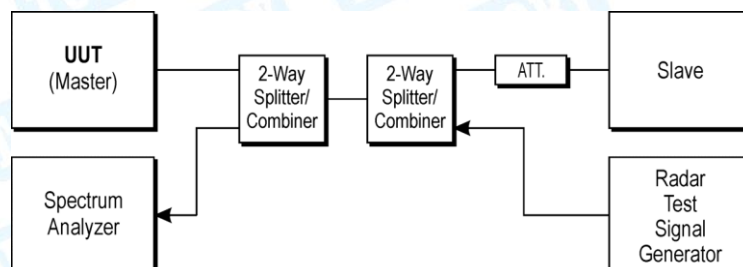


Figure 5: Set-up A

Set-up B

Set-up B is a set-up whereby the UUT is an RLAN device operating in slave mode, with or without Radar Interference Detection function. This set-up also contains an RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device.

Figure 6 shows an example for *Set-up B*. The set-up used shall be documented in the test report.

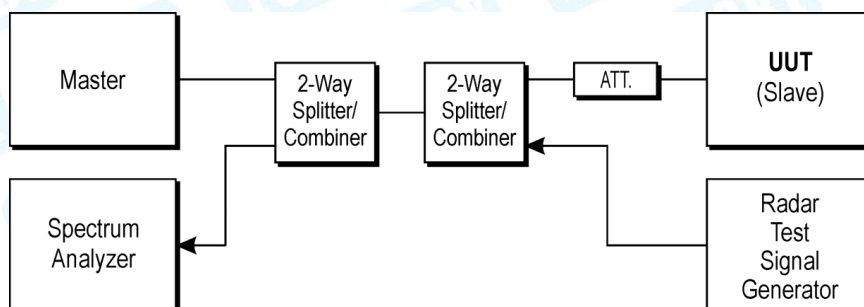


Figure 6: Set-up B

Set-up C

The UUT is an RLAN device operating in slave mode with Radar Interference Detection function. Radar test signals are injected into the slave device. This set-up also contains an RLAN device operating in master mode. The UUT (slave device) is associated with the master device.

Figure 7 shows an example for *Set-up C*. The set-up used shall be documented in the test report.

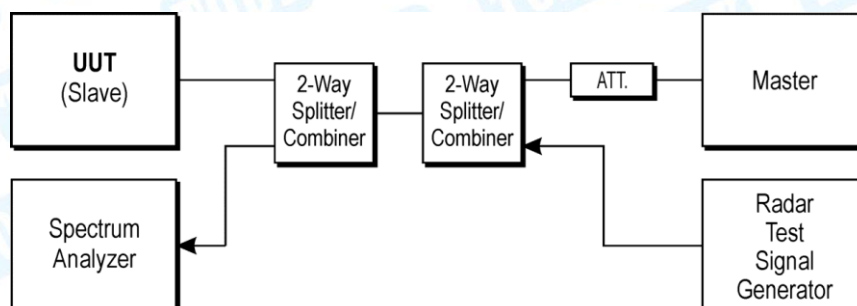


Figure 7: Set-up C



15.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.8.2

15.5 Applicability

Table 6 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 6: Applicability of DFS requirements

Requirement	DFS Operational mode		
	Master	Slave without radar detection (see table D.2, note 2)	Slave with radar detection (see table D.2, note 2)
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.			

15.6 Deviation From Test Standard

No deviation

15.7 EUT Operating Mode

These measurements shall only be performed at normal test conditions.

15.8 Test Data

N/A.



16 Transmitter Unwanted Emissions Outside the 5GHz RLAN Bands

16.1 Test Standard and Limit

16.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.4

16.1.2 Test Limit

The level of transmitter unwanted emissions outside the 5 GHz RLAN bands shall not exceed the limits given in table 4.

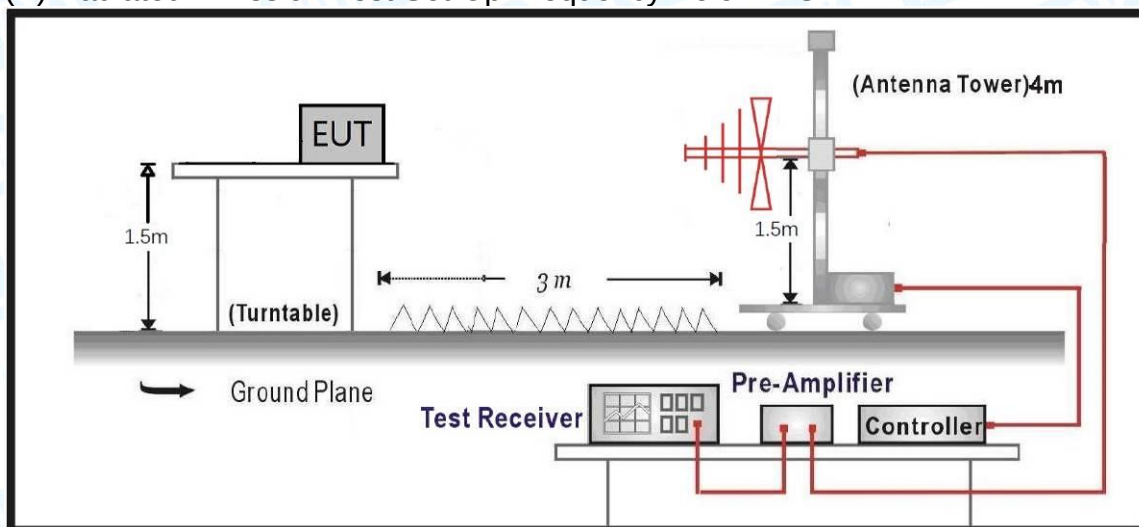
In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Transmitter unwanted emission limits outside the 5 GHz RLAN bands

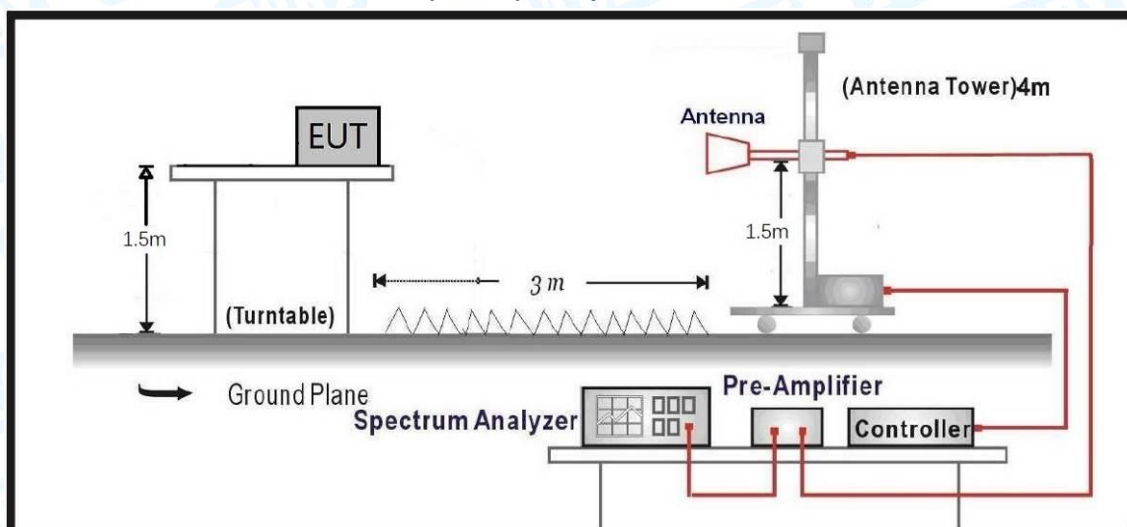
Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-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

16.2 Test Setup

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz.



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz.



16.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.5.2

16.4 Deviation From Test Standard

No deviation

16.5 EUT Operating Mode

The conformance requirements in clause 4.2.4.1 shall be verified only under normal operating conditions, and when operating on those channels defined in clause 5.3.2.

The equipment shall be configured to operate under its worst case situation with respect to unwanted emissions outside the 5 GHz RLAN bands.

If possible, the UUT shall be set to continuous transmit (duty cycle = 1) for the duration of this test.

If continuous transmit is not possible, the UUT should be configured to operate at its maximum duty cycle.

The level of transmitter unwanted emissions shall be measured as, either:

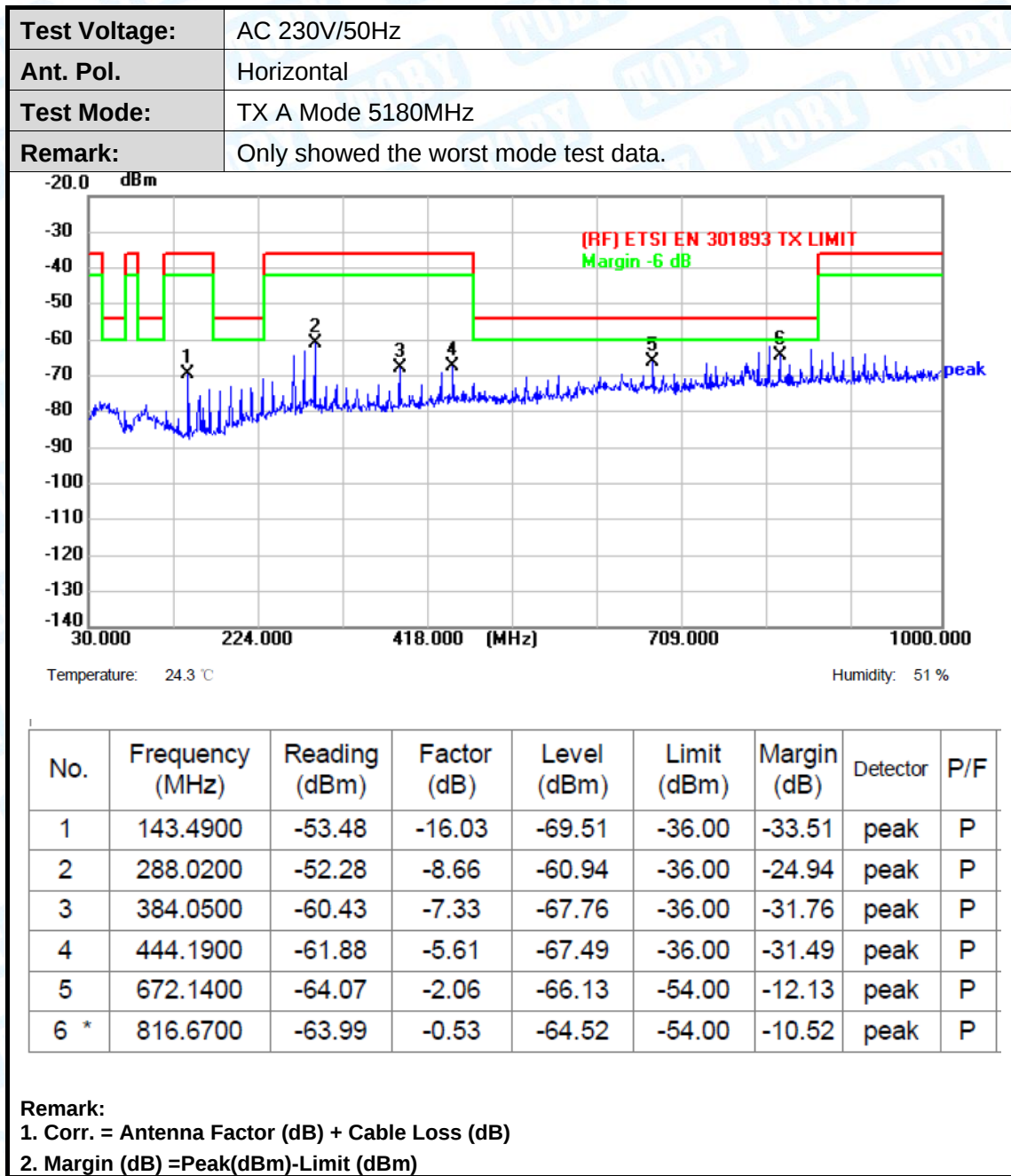
- their power in a specified load (conducted emissions) and their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.4.1.2) when radiated by the cabinet or structure of the equipment (cabinet radiation); or
- their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.4.1.2) when radiated by cabinet and antenna.

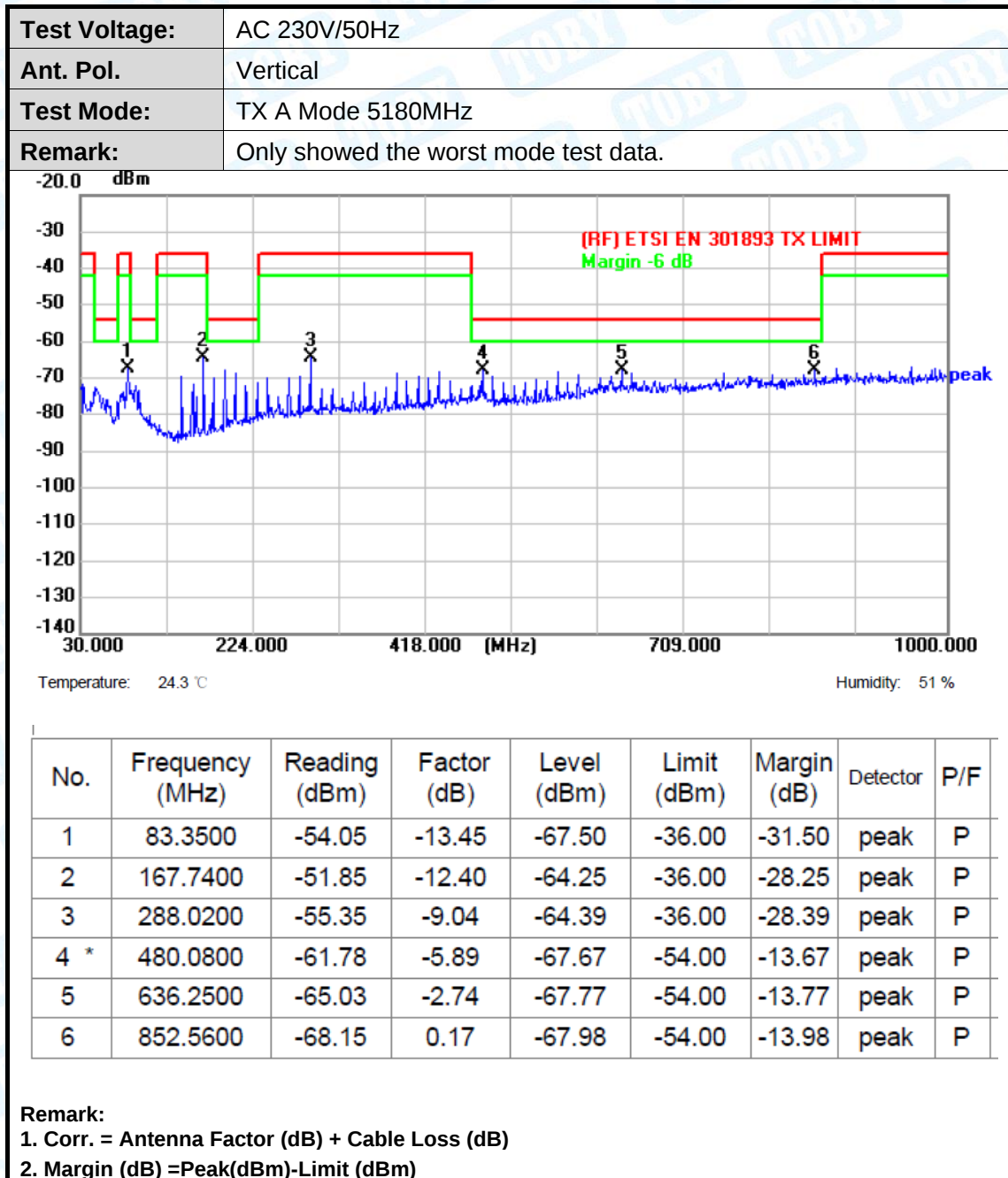
16.6 Test Data

Please refer to the following pages.



Below 1 G

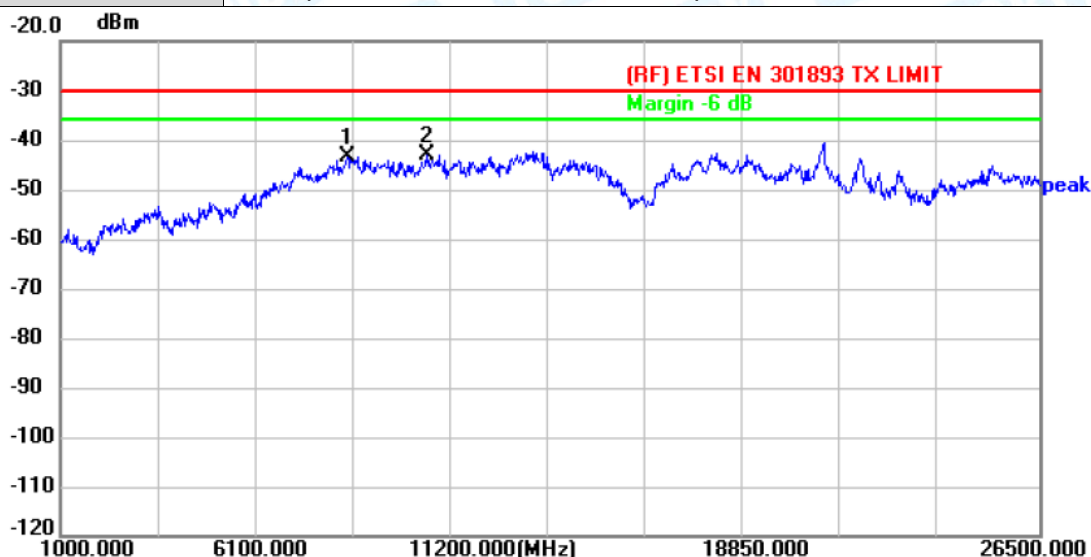




Above 1 GHz

Only showed the worst mode test data.

Test Voltage:	AC 230V/50Hz
Ant. Pol.	Horizontal
Test Mode:	TX 802.11a Mode 5180MHz
Remark:	No report for the emission which the prescribed limit.



Temperature: 24.3 °C

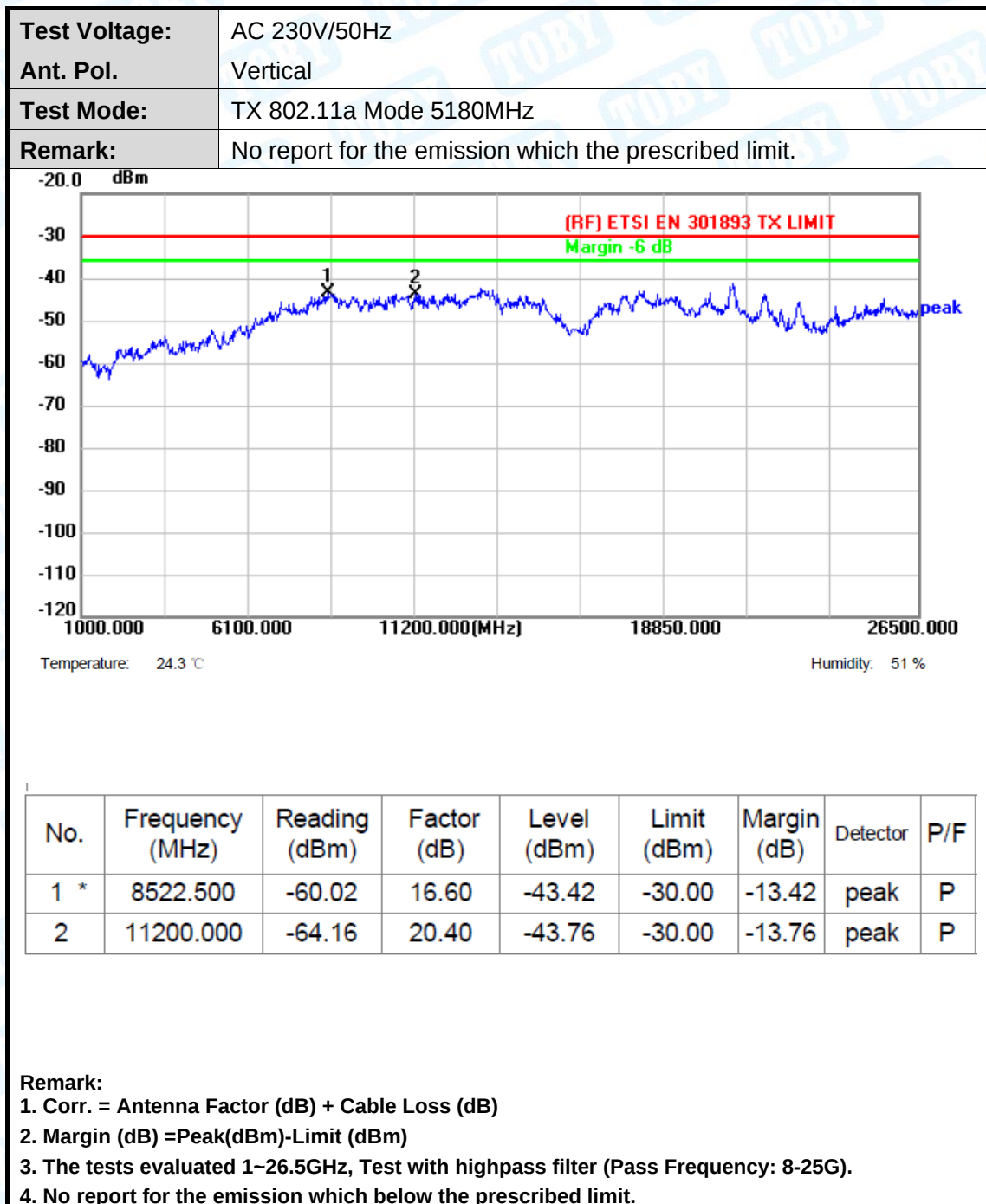
Humidity: 51 %

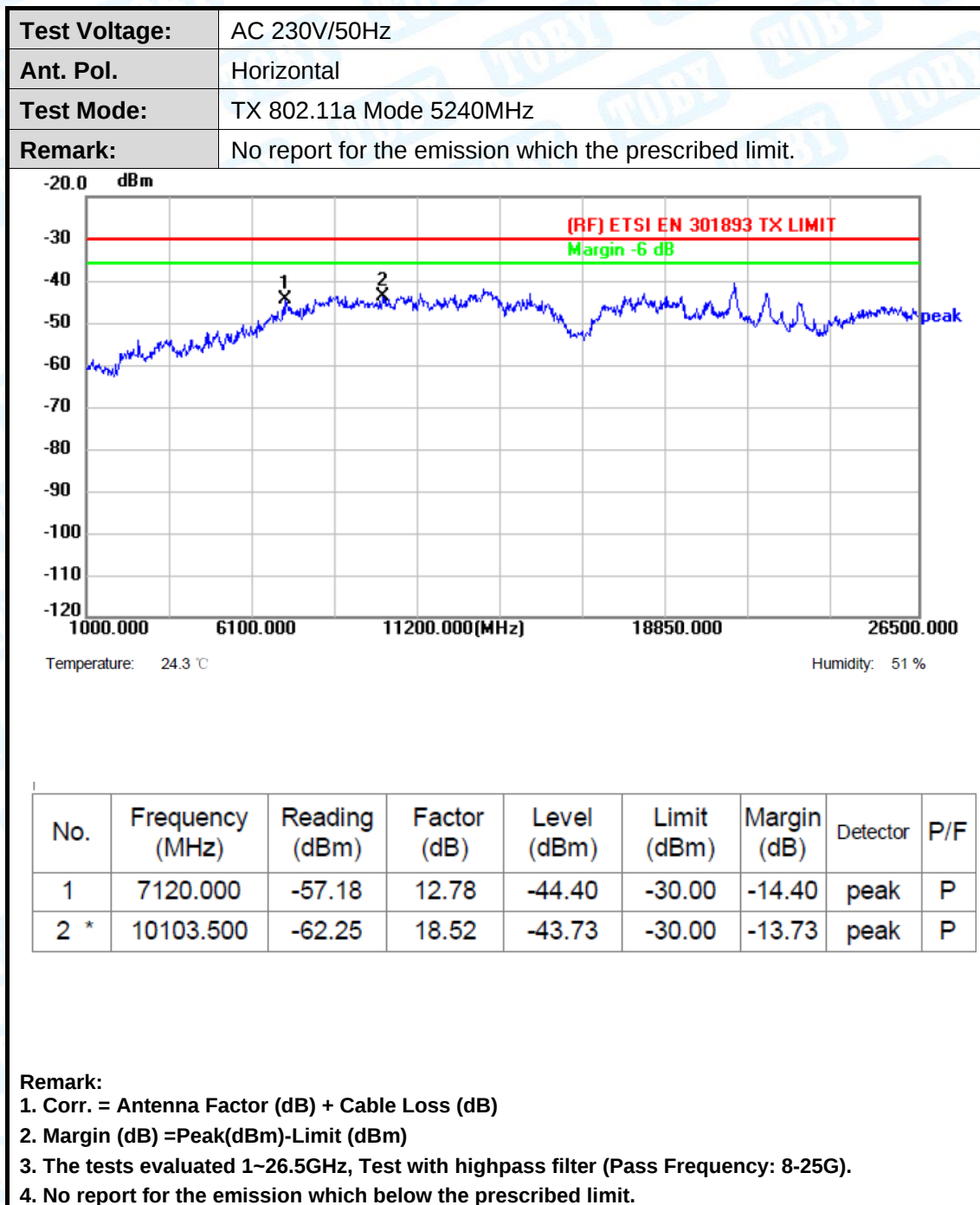
No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	8497.000	-59.93	16.52	-43.41	-30.00	-13.41	peak	P
2 *	10537.000	-61.74	18.73	-43.01	-30.00	-13.01	peak	P

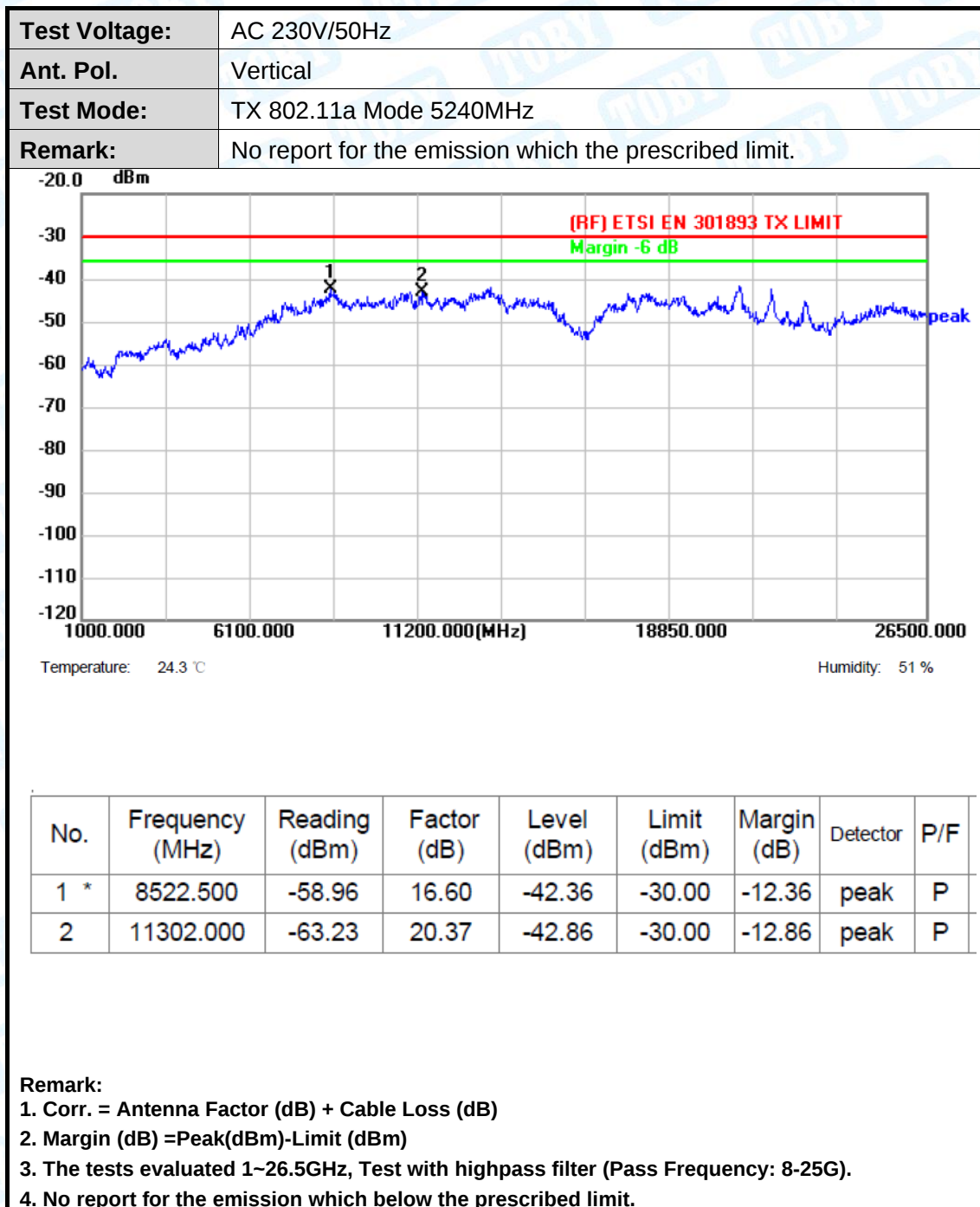
Remark:

1. Corr. = Antenna Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Peak(dBm) - Limit (dBm)
3. The tests evaluated 1~26.5GHz, Test with highpass filter (Pass Frequency: 8-25G).
4. No report for the emission which below the prescribed limit.









17 Receiver Spurious Emissions

17.1 Test Standard and Limit

17.1.1 Test Standard

ETSI EN 301 893 V2.1.1:2017 clause 4.2.4

17.1.2 Test Limit

The spurious emissions of the receiver shall not exceed the limits given in table 5.

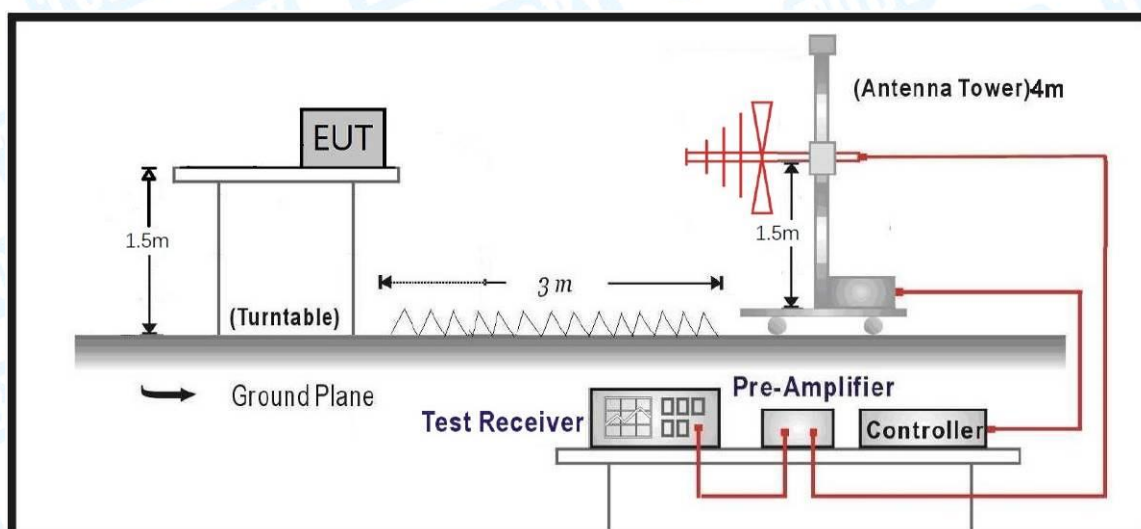
In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 5: 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

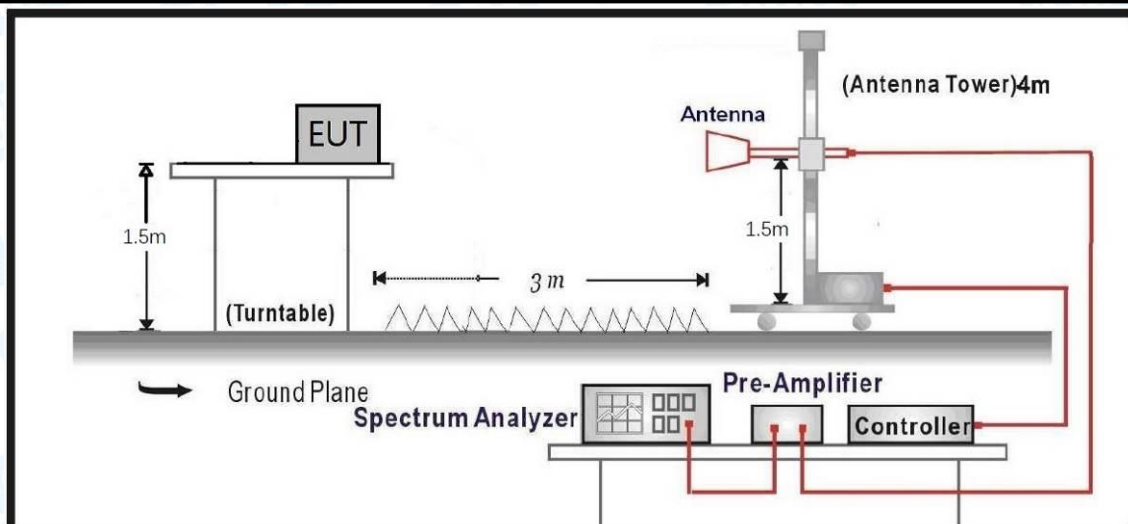
17.2 Test Setup

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz.



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz.





17.3 Test Procedure

Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.7.2

17.4 Deviation From Test Standard

No deviation

17.5 EUT Operating Mode

The conformance requirements in clause 4.2.5 shall be verified only under normal operating conditions, and when operating on those channels defined in clause 5.3.2.

For equipment having different operating modes (see clause 5.3.3.2) the measurements described in the present clause may not need to be repeated for all the operating modes.

The level of receiver spurious emissions shall be measured as, either:

- their power in a specified load (conducted emissions) and their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.5.2) when radiated by the cabinet or structure of the equipment (cabinet radiation); or
- their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.5.2) when radiated by cabinet and antenna.

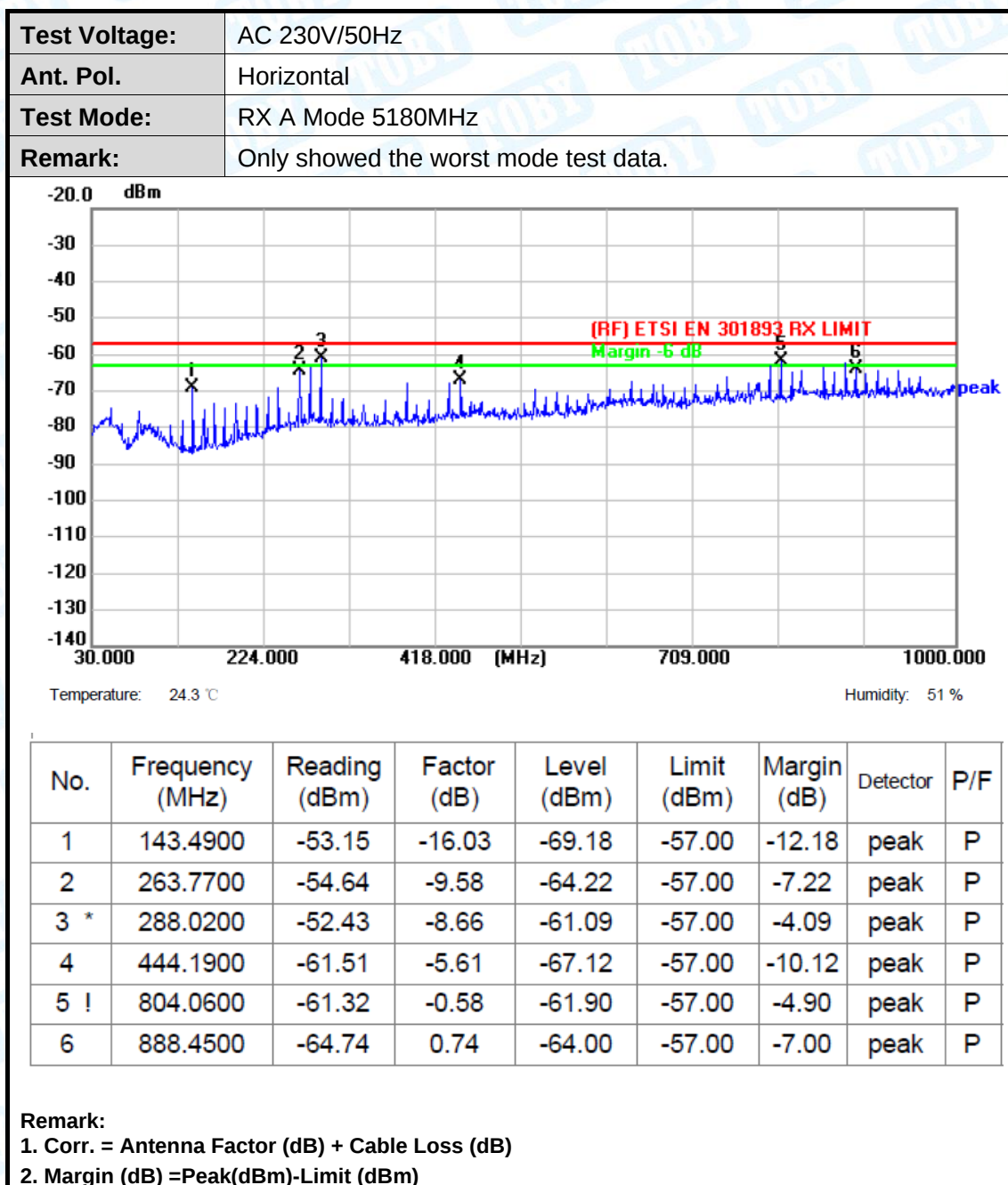
The test method in clause 5.4.7.2 below assumes, that for the duration of the test, the UUT is configured into a continuous receive mode, or is operated in a mode where no transmissions occur.

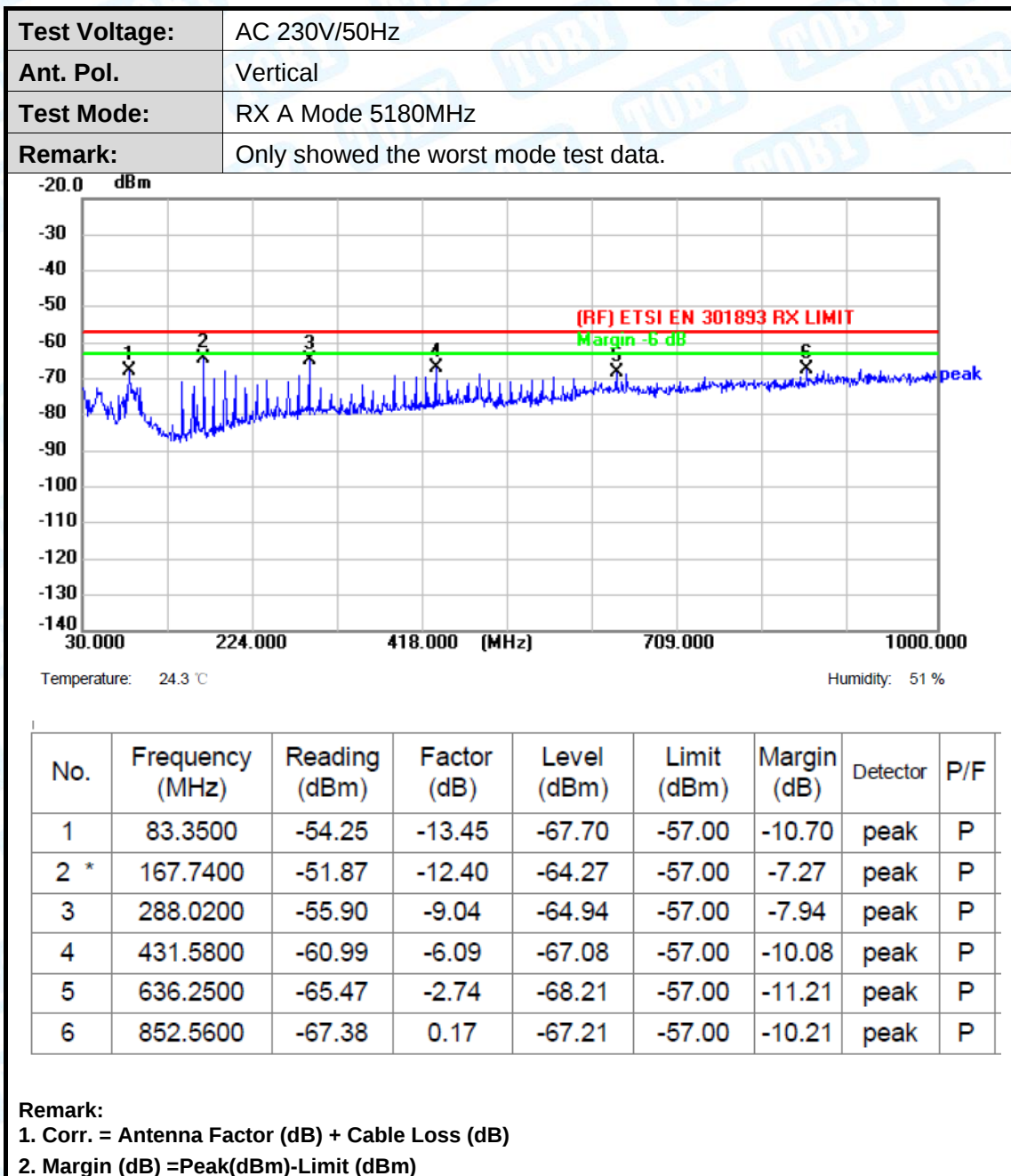
17.6 Test Data

Please refer to the following pages.



Below 1 G

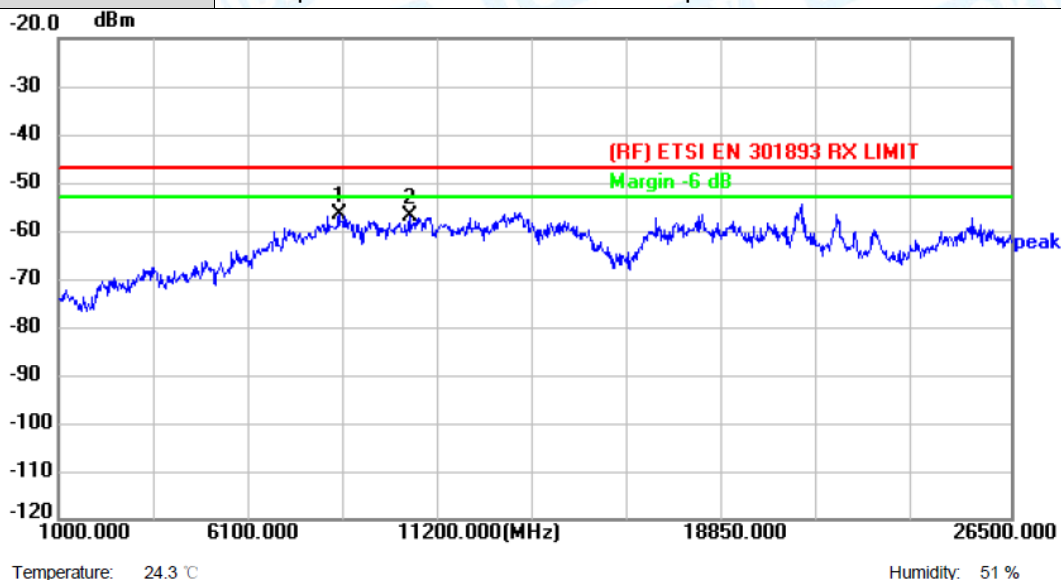




Above 1 GHz

Only showed the worst mode test data.

Test Voltage:	AC 230V/50Hz
Ant. Pol.	Horizontal
Test Mode:	RX 5180MHz
Remark:	No report for the emission which the prescribed limit.

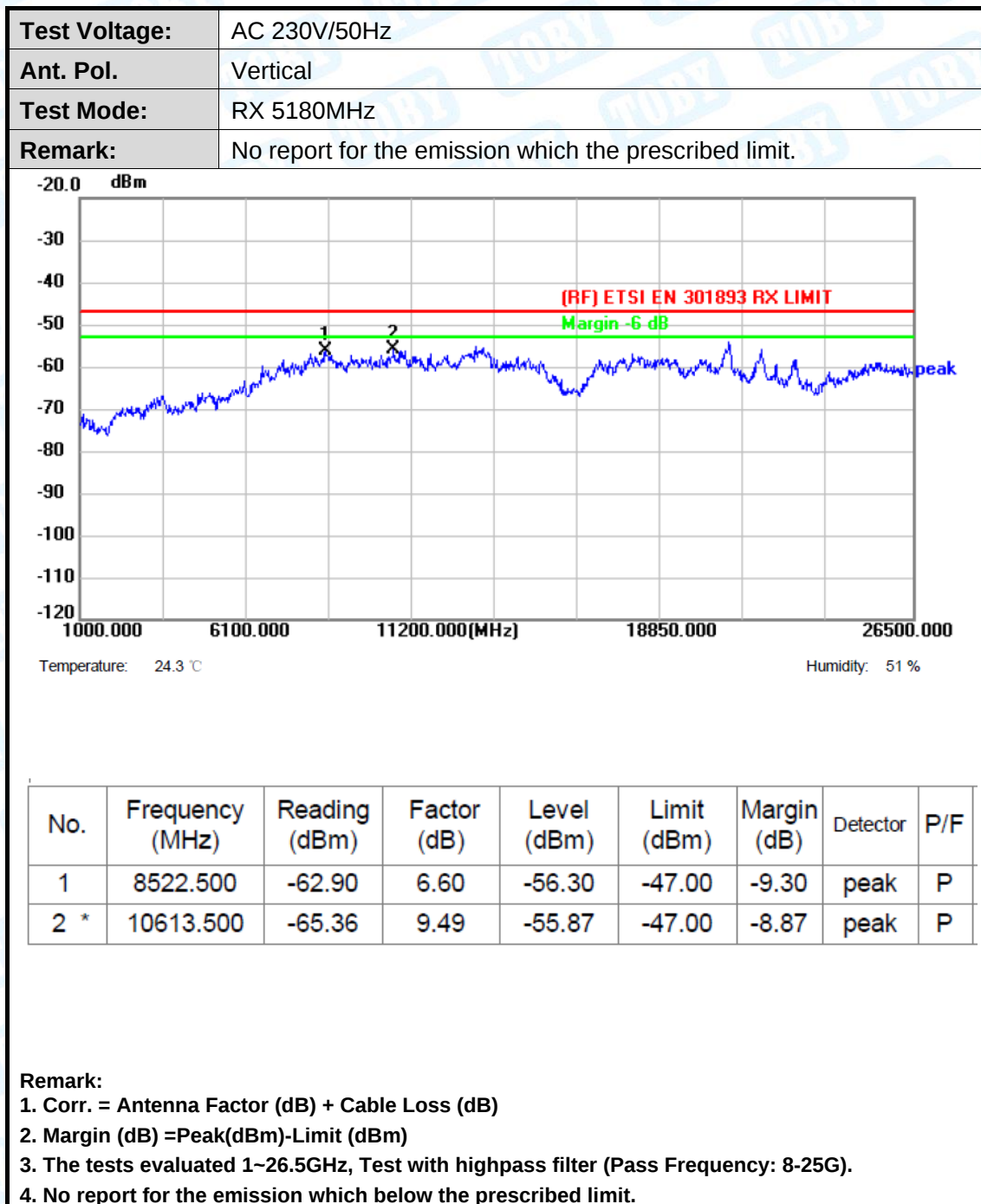


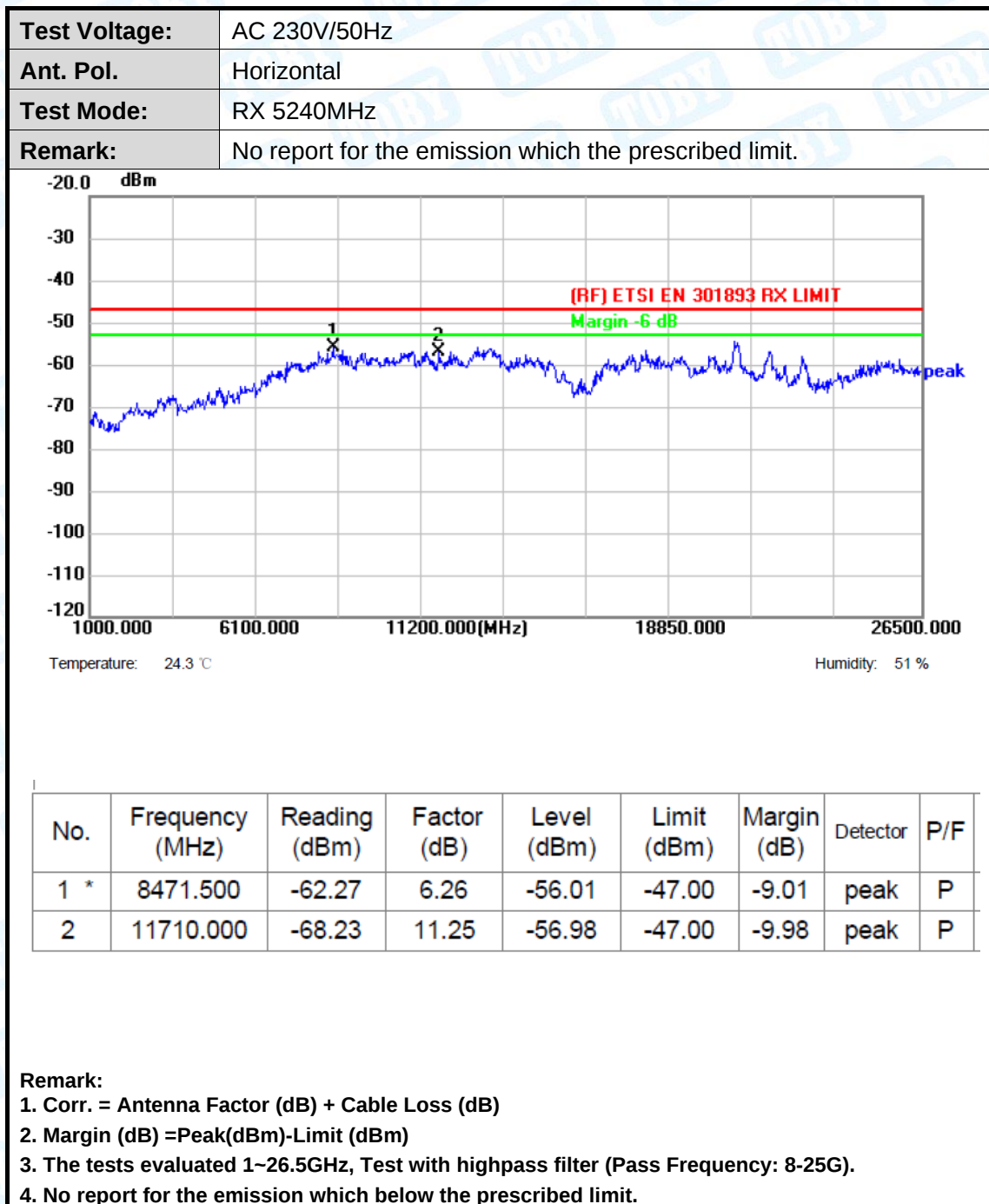
No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1 *	8522.500	-63.24	6.53	-56.71	-47.00	-9.71	peak	P
2	10409.500	-65.98	8.87	-57.11	-47.00	-10.11	peak	P

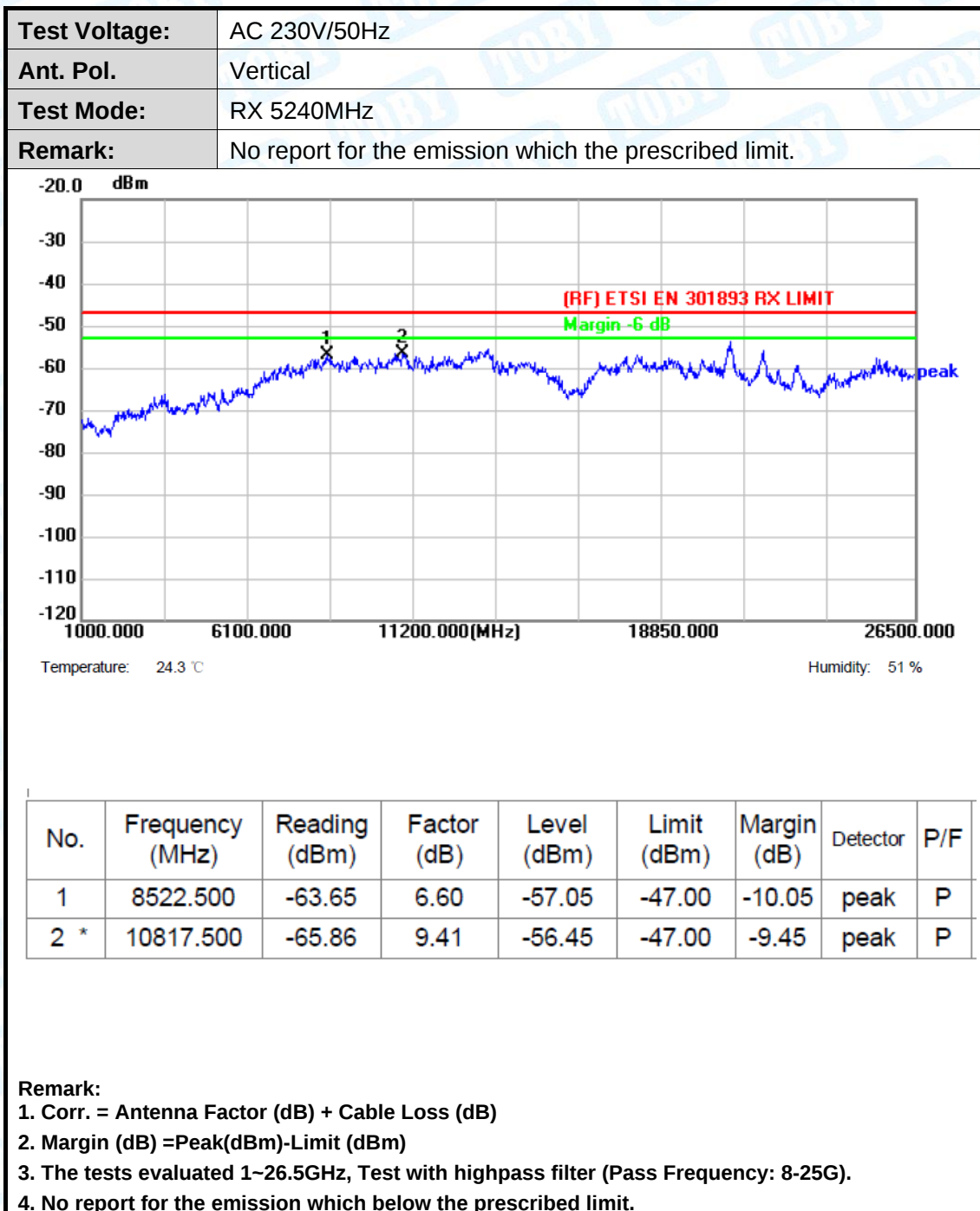
Remark:

1. Corr. = Antenna Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Peak(dBm) - Limit (dBm)
3. The tests evaluated 1~26.5GHz, Test with highpass filter (Pass Frequency: 8-25G).
4. No report for the emission which below the prescribed limit.



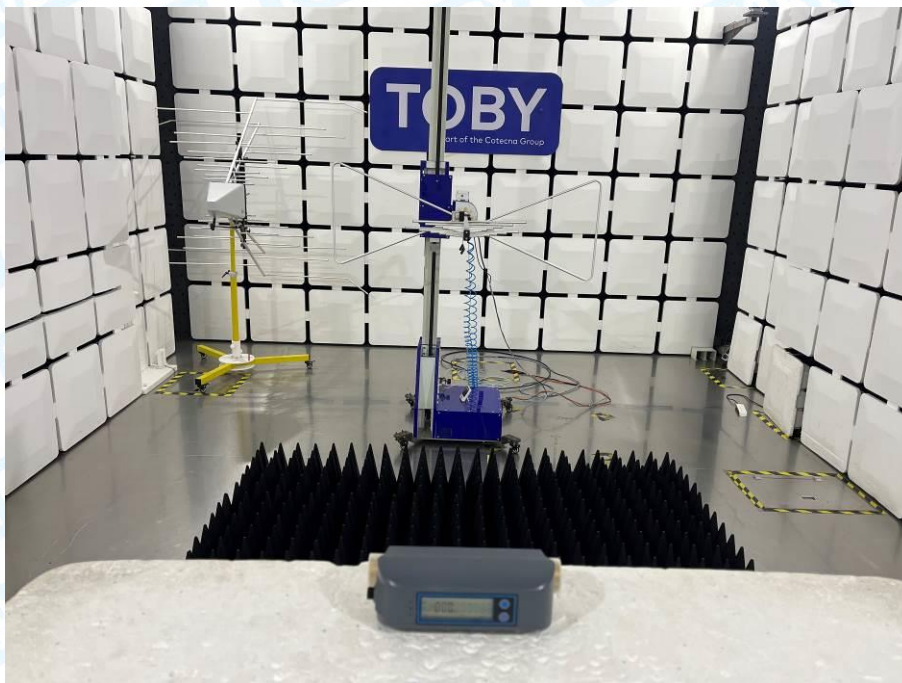




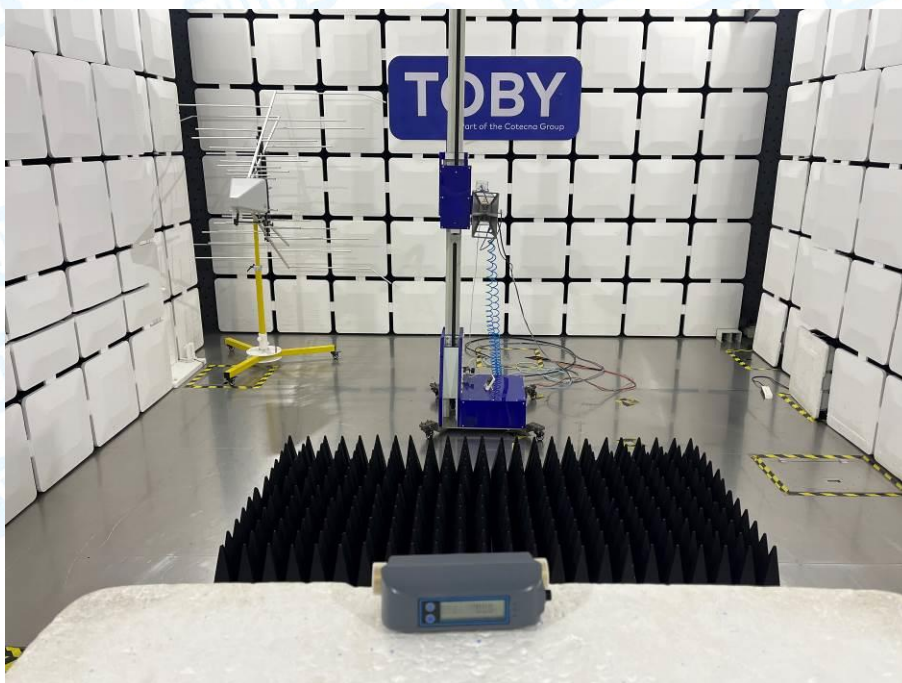


18 Photographs--Test Setup

Radiated Spurious Emission (Below 1 GHz)



Radiated Spurious Emission (Above 1 GHz)



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

