EN 300 440 V2.1.1
AS/NZS 4268:2017 A1

TEST REPORT

For

WiFi Module

MODEL NUMBER: VS19250

REPORT NUMBER: 4790425813-5

ISSUE DATE: June 1, 2022

Prepared for

ViewSonic Corporation
10 Pointe Dr., Suite 200, Brea, CA 92821, USA

Prepared for

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch
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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	06/01/2022	Initial Issue	

Note: This is a copy report base on 4790081439-13 which is issued by UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch on January 17, 2022. The customer wants to add a new applicant and change the model name but everything about the EUT remain unchanged, so we update the test report without any test. For other data, please refer to the original report.

Summary of Test Results			
Clause	Test Item	Limit/ Requirements	Results
TRANSMITTER PARAMETERS			
4.2.2	Equivalent isotropically radiated power (e.i.r.p.)	25mW/14dBm	Pass
4.2.3	Permitted range of operating frequencies	For all equipment the frequency range shall lie within the frequency band	Pass
4.2.4	Unwanted emissions in the spurious domain	Refer to ETSI EN 300 440 V2.1.1 clause 4.2.4.4 Table 3	Pass
4.2.5	Duty cycle	Refer to ETSI EN 300 440 V2.1.1 clause 4.2.5.4 Table 4	Pass
4.2.6	Additional requirements for FHSS equipment	FHSS modulation shall make use of at least 20 channels hopping over > 90 % of the assigned frequency band. The dwell time per channel shall not exceed 1 s.	Not Applicable (See Note 1)
RECEIVER PARAMETERS			
4.3.3	Adjacent channel selectivity	Refer to ETSI EN 300 440 V2.1.1 clause 4.3.3.4 Table 6.	Not Applicable (See Note 2)
4.3.4	Blocking or desensitization	Refer to ETSI EN 300 440 V2.1.1 clause 4.3.4.4 Table 7. Refer to ETSI EN 300 440 V2.2.1 clause 4.3.4.4 Table 6. Refer to EN301893 V2.1.1 Clause 4.2.8.4	Pass
4.3.5	Spurious radiations	The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.	Pass
Note:	1. The EUT is not a FHSS equipment. 2. The receiver category of the EUT is 2. 3. This test report is only published to and used by the applicant, and it is not for evidence purpose in China. 4. The measurement result for the sample received is <Pass> according to < EN 300 440 V2.1.1 > < EN 300 440 V2.2.1 > < AS/NZS 4268:2017 A1 > when <Accuracy Method> decision rule is applied. 5. All the testes were also assessed for the newest version ETSI 300 440 V2.2.1 (2018-07) and ETSI EN 300 440 V2.1.1 (2017-03), the final result is same as the above state. 6. The harmonized standard EN 300 440V2.1.1 was listed in OJ C 326 (September 14th,2018) with no superseding standard listed. The latest version EN 300 440 V2.2.1 has been investigated in the test report. EN 300 440 V2.1.1 is harmonized but does not offer presumption of conformity with respect to receiver performance for category 2 and 3 receivers. Receiver performance was therefore evaluated using the blocking test requirements under EN 301893 V2.1.1. Reassessment for receiver performance should be performed against EN 300 440 once harmonized for all receiver categories but additional testing may not be necessary if the blocking tests performed are considered equivalent to, or more stringent than, those in EN 300 440.		

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	ViewSonic Corporation
Address:	10 Pointe Dr., Suite 200, Brea, CA 92821, USA

Manufacturer Information

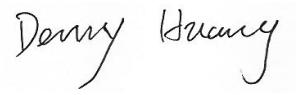
Company Name:	ViewSonic Corporation
Address:	10 Pointe Dr., Suite 200, Brea, CA 92821, USA

EUT Information

EUT Name:	WiFi Module
Model:	VS19250
Sample Received Date:	August 31, 2021
Sample Status:	Normal
Sample ID:	4175726
Date of Tested:	September 1, 2021 ~ December 24, 2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
ETSI EN 300 440 V2.1.1 (2017-03)	**PASS**
AS/NZS 4268:2017 A1	**PASS**

Prepared By:



Denny Huang
Project Engineer

Checked By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo
Laboratory Manager

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented in ETSI EN 300 440 V2.1.1 (2017-03), ETSI EN 300 440 V2.2.1 (2018-07) and AS/NZS 4268:2017 A1.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **ISED(Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011

Note: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency	3.5 x 10^(-7)
RF power, conducted	±2.5 dB
Radiated emission of transmitter, valid to 26,5 GHz	±6 dB
Radiated emission of transmitter, valid between 26,5 GHz and 66 GHz	±8 dB
Radiated emission of receiver, valid to 26,5 GHz	±6 dB
Radiated emission of receiver, valid between 26,5 GHz and 66 GHz	±8 dB
Temperature	±1 °C
Humidity	±5 %
Voltage (DC)	±1 %
Voltage (AC, < 10 kHz)	±2 %
NOTE: For radiated emissions above 26,5 GHz it may not be possible to achieve measurement uncertainties complying with the levels specified in this table. In these cases alone it is acceptable to employ the alternative interpretation procedure specified in clause 10.1.	

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the TR 100 028 [i.4] 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 case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	WiFi Module
Model Name	VS19250
Radio Technology	IEEE802.11a IEEE802.11n HT20/n HT40 IEEE802.11ac VHT20/ac VHT40 IEEE802.11ax HE20/ax HE40
Operation frequency	5745 ~ 5825 MHz
Modulation	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT40: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac VHT20: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac VHT40: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE802.11ax HE20:OFDMA(BPSK,QPSK,16QAM,64QAM,256QAM, 1024QAM) IEEE802.11ax HE40:OFDMA(BPSK,QPSK,16QAM,64QAM,256QAM, 1024QAM)
Rated Input	DC 5 V
Wireless Module	AIC8800D

5.2. RECEIVER CATEGORY

The product family of short range radio devices is divided into three receiver categories, each having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the choice of receiver category by the equipment provider.

EUT belong to	Receiver category	Relevant receiver clauses	Risk assessment of receiver performance
☐	1	Adjacent channel selectivity Blocking or desensitization Spurious radiations	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
☒	2	Blocking or desensitization Spurious radiations	Medium reliable SRD communication media e.g. causing Inconvenience to persons, which cannot simply be overcome by other means.
☐	3	Spurious radiations	Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).

5.3. MAXIMUM EIRP

Frequency Range (MHz)	Number of Transmit chains (NTX)	IEE Std. 802.11	Max EIRP (dBm)
5745-5825	1	a 20	13.14
5745-5825	1	ac VHT20	13.42
5755-5795	1	ac VHT40	12.91
5745-5825	1	ax HE20	13.08
5755-5795	1	ax HE40	12.71

5.4. CHANNEL LIST

(BW 20MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	/	/	/	/	/	/

(BW 40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	/	/	/	/

5.5. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
IEEE 802.11a	Low	5745MHz
	Middle	5785MHz
	High	5825MHz
IEEE 802.11n HT20	Low	5745MHz
	Middle	5785MHz
	High	5825MHz
IEEE 802.11n HT40	Low	5755MHz
	High	5795MHz
IEEE 802.11ac VHT20	Low	5745MHz
	Middle	5785MHz
	High	5825MHz
IEEE 802.11ac VHT40	Low	5755MHz
	High	5795MHz
IEEE 802.11ax HE20	Low	5745MHz
	Middle	5785MHz
	High	5825MHz
IEEE 802.11ax HE40	Low	5755MHz
	High	5795MHz

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter	
Test Software	SecureCRT

Mode	Rate	Channel	Soft set value
			ANT1
11a	6M	149	3
		157	4
		165	4
11n HT20	MCS0	149	Covered by 11ac VHT20
		157	Covered by 11ac VHT20
		165	Covered by 11ac VHT20
11n HT40	MCS0	151	Covered by 11ac VHT40
		159	Covered by 11ac VHT40
11ac VHT20	MCS0	149	3
		157	4
		165	4
11ac VHT40	MCS0	151	3
		159	4
11ax HE20	MCS0	149	3
		157	4
		165	4
11ax HE40	MCS0	151	3
		159	4

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna No.	Frequency Band	Antenna Type	Max Antenna Gain (dBi)
1	5180~5825	PCB	4.36

IEE Std. 802.11	Transmit and Receive Mode	Description
802.11a	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
802.11n HT20	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
802.11n HT40	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
802.11ac VHT20	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
802.11ac VHT40	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
802.11ax HE20	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
802.11ax HE40	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.

Note: The value of the antenna gain was declared by customer.

5.8. WORST-CASE CONFIGURATIONS

The EUT was tested in the following configuration(s):

Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0
802.11ac VHT20 mode: MCS0
802.11ac VHT40 mode: MCS0
802.11ax HE20 mode: MCS0
802.11ax HE40 mode: MCS0

802.11ac VHT20 and VHT40 mode are different from 802.11nHT20 and HT40 only in control messages and have the same power settings, so for these 4 modes, only 802.11ac VHT20 and 802.11ac VHT40 modes data are recorded in the report .

The measured additional path loss was included in any path loss calculations for all RF cable used during tested.

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	Lenovo	XIAOXIN 5000	/
2	Main Board	/	/	/
3	Serial to USB Board	/	/	/
3	AC Power Adapter	/	/	

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	Unshielded	1.0	/

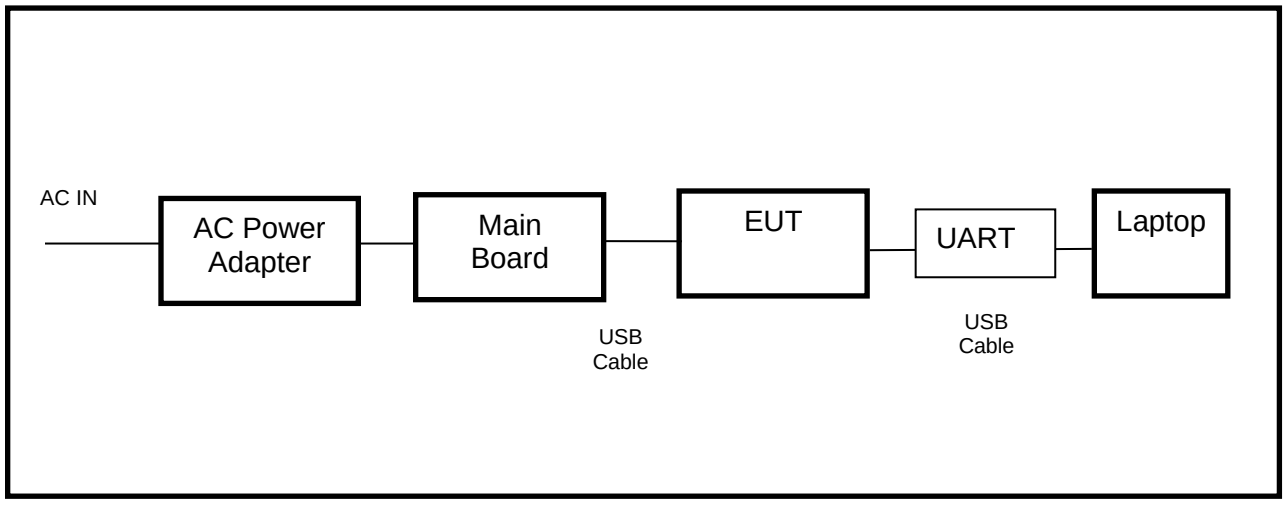
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
/	/	/	/	/

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Last time calibration information:

Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Wideband Radio Communication Tester	R&S	CMW500	155523	Nov.20,2020	Nov.19,2021
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Nov.20,2020	Nov.19,2021
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Nov.20,2020	Nov.19,2021
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Nov.20,2020	Nov.19,2021
Software					
Description	Manufacturer	Name		Version	
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System		2.6.77.0518	

RSE Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Spectrum Analyzer	R&S	FSV40	101117	Nov.20,2020	Nov.19,2021
Trilog broadband antenna	Schwarzbeck	VULB9163	01061	Feb.28,2020	Feb.28,2023
Horn Antenna	ETS-Lindgren	3117	00213191	Feb.28,2020	Feb.28,2023
Preamplifier	TDK	PA-02-001-3000	TRS-305-00067	Nov.12,2020	Nov.11,2021
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Nov.20,2020	Nov.19,2021
High Gain Horn Antenna	Schwarzbeck	BBHA-9170	697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00002	Nov.12,2020	Nov.11,2021
Preamplifier	TDK	PA-02-3	TRS-308-00002	Nov.12,2020	Nov.11,2021
Band Reject Filter	Wainwright	WRCJV12-5695-5725-5850-5880-40SS	4	Nov.12,2020	Nov.11,2021
Band Reject Filter	Wainwright	WRCJV20-5120-5150-5350-5380-60SS	2	Nov.12,2020	Nov.11,2021
Band Reject Filter	Wainwright	WRCJV20-5440-5470-5725-5755-60SS	1	Nov.12,2020	Nov.11,2021

Highpass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	4	Nov.12,2020	Nov.11,2021

Software			
Description	Manufacturer	Name	Version
For TDK RSE Test System	TDK	TDK Emission lab	V10.81

This time calibration information:

Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Oct.30, 2021	Oct.29, 2022
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Oct.30, 2021	Oct.29, 2022
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Oct.30, 2021	Oct.29, 2022
DC power supply	Keysight	E3642A	MY55159130	Oct.30, 2021	Oct.29, 2022
Temperature & Humidity Chamber	SANMOOD	SG-80-CC-2	2088	Nov.20,2020	Nov.19,2022

Software			
Description	Manufacturer	Name	Version
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System	2.6.77.0518

RSE Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Spectrum Analyzer	R&S	FSV40	101117	Oct.31, 2021	Oct.30, 2022
Trilog broadband antenna	Schwarzbeck	VULB9163	01061	Feb.28,2020	Feb.28,2023
Horn Antenna	ETS-Lindgren	3117	00213191	Feb.28,2020	Feb.28,2023
Preamplifier	TDK	PA-02-001-3000	TRS-305-00067	Oct.30, 2021	Oct.29, 2022
Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jun.23,2021	Jun.23,2022
High Gain Horn Antenna	Schwarzbeck	BBHA-9170	697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00002	Oct.31, 2021	Oct.30, 2022
Preamplifier	TDK	PA-02-3	TRS-308-00002	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCJV12-5695-5725-5850-5880-	4	Oct.31, 2021	Oct.30, 2022

		40SS			
Band Reject Filter	Wainwright	WRCJV20-5120-5150-5350-5380-60SS	2	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCJV20-5440-5470-5725-5755-60SS	1	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Oct.31, 2021	Oct.30, 2022
Notch Filter	Wainwright	WRCT5-901.6-902.3-902.5-903.2-40SS	1	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCD5-1746.4-1747 25-1747.55-1748.4-40SS	1	Oct.31, 2021	Oct.30, 2022
Highpass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	4	Oct.31, 2021	Oct.30, 2022
Highpass Filter	Wainwright	WHKX10-2700-3000-1800-40SS	24	Oct.31, 2021	Oct.30, 2022

Software			
Description	Manufacturer	Name	Version
For TDK RSE Test System	TDK	TDK Emission lab	V10.81

6. TEST RESULTS

6.1. NORMAL AND EXTREME CONDITIONS

LIMITS

None; for reporting purposes only.

RESULTS

	Normal Test Conditions	Extreme Test Conditions
Relative Humidity	45% ~ 55%	N/A
Atmospheric Pressure	100 kPa ~ 102 kPa	N/A
Temperature	T_{nom} (Normal Temperature): 22 °C ~ 28 °C	LT (Low Temperature): 0 °C
		HT (High Temperature): 40 °C
Supply Voltage	V_{nom} (Normal Voltage): DC 5 V	N/A
		N/A

6.2. DUTY CYCLE

LIMITS

None; for reporting purposes only.

TEST ENVIRONMENT

Temperature	26.9 °C	Relative Humidity	53.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

6.2.1. 802.11a 20 MODE

DUT Frequency (MHz)	Duty Cycle (%)
5745.00	93.89%

6.2.2. 802.11ac VHT20 MODE

DUT Frequency (MHz)	Duty Cycle (%)
5745.00	89.80%

6.2.3. 802.11ac VHT40 MODE

DUT Frequency (MHz)	Duty Cycle (%)
5755.00	89.64%

6.2.4. 802.11ax HE20 MODE

DUT Frequency (MHz)	Duty Cycle (%)
5745.00	80.09%

6.2.5. 802.11ax HE40 MODE

DUT Frequency (MHz)	Duty Cycle (%)
5755.00	88.85%

6.3. EFFECTIVE RADIATED POWER

LIMITS

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.2.4

Maximum radiated peak power (e.i.r.p.)		
Frequency Bands	Power	Application
2400 MHz to 2483.5 MHz	10 mW e.i.r.p.	Non-specific short range devices
2400 MHz to 2483.5 MHz	25 mW e.i.r.p.	Radio determination devices
(a) 2446 MHz to 2454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices
(b) 2446 MHz to 2454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices
5725 MHz to 5875 MHz	25 mW e.i.r.p.	Non-specific short range devices
9200 MHz to 9500 MHz	25 mW e.i.r.p.	Radio determination devices
9500 MHz to 9975 MHz	25 mW e.i.r.p.	Radio determination devices
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices

TEST PROCEDURE

Refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.2.3

Measurement	
☒Conducted measurement	☐Radiated measurement

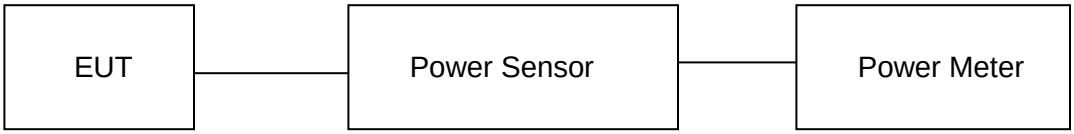
The test procedure shall be as follows:
Step 1:
• using a suitable means, the output of the transmitter shall be coupled to a matched diode detector;
• the output of the diode detector shall be connected to the vertical channel of an oscilloscope;
• the combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the envelope peaks and the duty cycle of the transmitter output signal;
• the observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, (0 < x < 1) and recorded.

Step 2:
• the average output power of the transmitter shall be determined using a wideband, calibrated RF power meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall b recorded as "A" (in dBm);
• the e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:
- P = A + G + 10 log (1/x);

- P shall not exceed the value specified in clause 4.2.2.4.
The measurement shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range.
These frequencies shall be recorded. FHSS equipment shall be made to hop continuously to each of these three
frequencies separately.

TEST SETUP

Conducted measurement



TEST ENVIRONMENT

Temperature	26.9 °C	Relative Humidity	53.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Test Conditions: NTNV

Mode	Freq(MHz)	Conducted Power		E.i.r.p	E.i.r.p Limit
		SISIO(dBm)	Total(dBm)	(dBm)	(dBm)
802.11a	5745	8.51	/	12.87	14.00
	5785	8.78	/	13.14	14.00
	5825	7.51	/	11.87	14.00
802.11ac VHT20	5745	8.78	/	13.14	14.00
	5785	9.06	/	13.42	14.00
	5825	7.86	/	12.22	14.00
802.11ac VHT40	5755	8.26	/	12.62	14.00
	5795	8.55	/	12.91	14.00
802.11ax HE20	5745	8.32	/	12.68	14.00
	5785	8.72	/	13.08	14.00
	5825	7.32	/	11.68	14.00
802.11ax HE40	5755	8.22	/	12.58	14.00
	5795	8.35	/	12.71	14.00

Note: For the test conditions, please refer to the section 6.2.

Test Conditions: LTNV

Mode	Freq(MHz)	Conducted Power		E.i.r.p	E.i.r.p Limit
		SISIO(dBm)	Total(dBm)	(dBm)	(dBm)
802.11a	5745	8.40	/	12.76	14.00
	5785	8.56	/	12.92	14.00
	5825	7.45	/	11.81	14.00
802.11ac VHT20	5745	8.67	/	13.03	14.00
	5785	8.89	/	13.25	14.00
	5825	7.70	/	12.06	14.00
802.11ac VHT40	5755	8.12	/	12.48	14.00
	5795	8.33	/	12.69	14.00
802.11ax HE20	5745	8.20	/	12.56	14.00
	5785	8.50	/	12.86	14.00
	5825	7.12	/	11.48	14.00
802.11ax HE40	5755	8.10	/	12.46	14.00
	5795	8.20	/	12.56	14.00

Note: For the test conditions, please refer to the section 6.2.

Test Conditions: HTNV

Mode	Freq(MHz)	Conducted Power		E.i.r.p	E.i.r.p Limit
		SISIO(dBm)	Total(dBm)	(dBm)	(dBm)
802.11a	5745	8.34	/	12.70	14.00
	5785	8.55	/	12.91	14.00
	5825	7.34	/	11.70	14.00
802.11ac VHT20	5745	8.57	/	12.93	14.00
	5785	8.98	/	13.34	14.00
	5825	7.50	/	11.86	14.00
802.11ac VHT40	5755	8.10	/	12.46	14.00
	5795	8.40	/	12.76	14.00
802.11ax HE20	5745	8.21	/	12.57	14.00
	5785	8.40	/	12.76	14.00
	5825	7.12	/	11.48	14.00
802.11ax HE40	5755	8.08	/	12.44	14.00
	5795	8.23	/	12.59	14.00

Note: For the test conditions, please refer to the section 6.1.

Note: All the modes had been tested, but only the worst data were recorded in the report.

6.4. PERMITTED RANGE OF OPERATING FREQUENCIES

LIMIT

The width of the power spectrum envelope is f_H -f_L for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of fL and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band given by clause 4.2.2.4, table 2. For non-harmonized frequency bands the available frequency range may differ between national administrations.

TEST PROCEDURE

Refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.3.3

The permitted range of operating frequencies includes all frequencies on which the equipment may operate within an assigned frequency band. The operating frequency range shall be declared by the manufacturer.

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope in accordance with clause 4.2.2.4, table 2.

FH is the highest frequency of the power envelope, it is the frequency furthest above the frequency of maximum power where the output power envelope drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

FL is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

The occupied bandwidths and OCW of the transmitter shall be declared. Where differing modes of emission are available, all modes and their associated bandwidths shall be stated.

The range of frequencies, determined by clause 4.2.3, shall be specified in the test report.

The measurement procedure shall be as follows:

a) put the spectrum analyser in video averaging mode with a minimum of 50 sweeps selected;

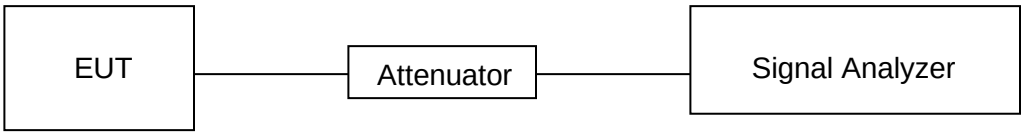
b) select the lowest operating frequency of the equipment under test and activate the transmitter with modulation applied. The RF emission of the equipment shall be displayed on the spectrum analyser;

c) using the marker of the spectrum analyser, find the lowest frequency below the operating frequency at which the spectral power density drops below the level given in clause 4.2.3. This frequency shall be recorded in the test report;

d) select the highest operating frequency of the equipment under test and find the highest frequency at which the spectral power density drops below the value given in clause 4.2.3. This frequency shall be recorded in the test report;

e) the difference between the frequencies measured in steps c) and d) is the operating frequency range. It shall be recorded in the test report.
This measurement shall be repeated for each frequency range declared by the manufacturer.

TEST SETUP



TEST ENVIRONMENT

Temperature	26.9 °C	Relative Humidity	53.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

OPERATING FREQUENCY RANGE RESULTS

802.11a 20					
TEST CONDITIONS				Frequency range (MHz)	
				f_L CH(Low)	f_H CH(High)
T nom (°C)	NT	V nom (V)	NV	5735.88	5834.08
T min (°C)	LT	V max (V)	HV	5735.83	5834.02
		V min (V)	LV	5735.80	5834.06
T max (°C)	HT	V max (V)	HV	5735.75	5834.01
		V min (V)	LV	5735.71	5834.04
Indoor Use Limits				f_L > 5725 MHz	f_H < 5875 MHz
Result				**Complies**	

802.11ac VHT20					
TEST CONDITIONS				Frequency range (MHz)	
				f_L CH(Low)	f_H CH(High)
T nom (°C)	NT	V nom (V)	NV	5734.56	5834.48
T min (°C)	LT	V max (V)	HV	5734.50	5834.40
		V min (V)	LV	5734.48	5834.42
T max (°C)	HT	V max (V)	HV	5734.52	5834.45
		V min (V)	LV	5734.40	5834.41
Indoor Use Limits				f_L > 5725 MHz	f_H < 5875 MHz
Result				**Complies**	

802.11ac VHT40					
TEST CONDITIONS				Frequency range (MHz)	
				f_L CH(Low)	f_H CH(High)
T nom (°C)	NT	V nom (V)	NV	5736.08	5813.56
T min (°C)	LT	V max (V)	HV	5736.02	5813.52
		V min (V)	LV	5736.05	5813.50
T max (°C)	HT	V max (V)	HV	5736.03	5813.44
		V min (V)	LV	5736.01	5813.42
Indoor Use Limits				f_L > 5725 MHz	f_H < 5875 MHz
Result				**Complies**	

802.11ax HE20					
TEST CONDITIONS				Frequency range (MHz)	
				f_L CH(Low)	f_H CH(High)
T nom (°C)	NT	V nom (V)	NV	5734.96	5834.84
T min (°C)	LT	V max (V)	HV	5734.90	5834.80
		V min (V)	LV	5734.87	5834.77
T max (°C)	HT	V max (V)	HV	5734.86	5834.73
		V min (V)	LV	5734.92	5834.72
Indoor Use Limits				f_L > 5725 MHz	f_H < 5875 MHz
Result				**Complies**	

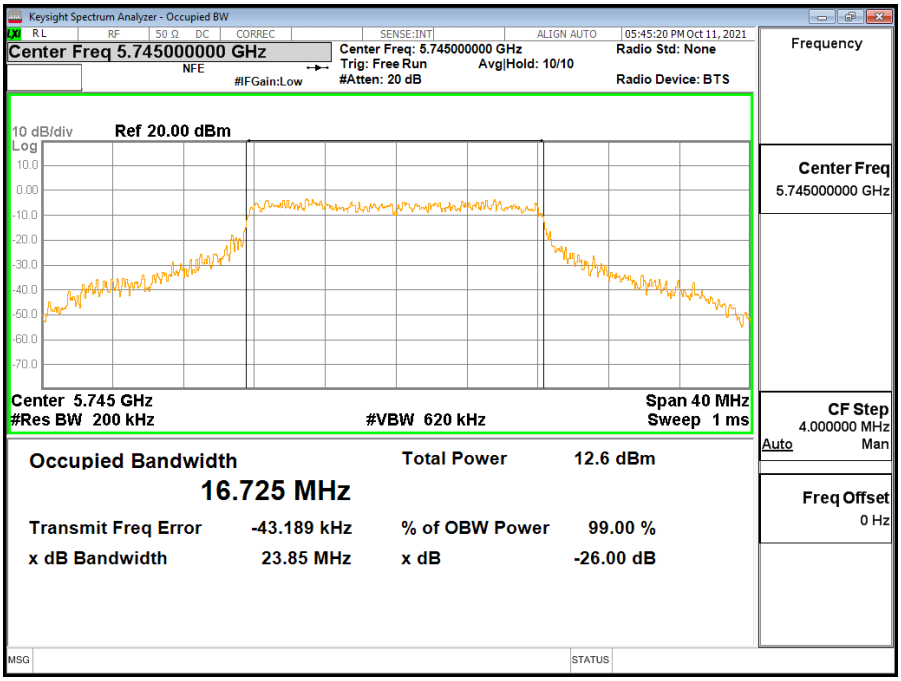
802.11ax HE40					
TEST CONDITIONS				Frequency range (MHz)	
				f_L CH(Low)	f_H CH(High)
T nom (°C)	NT	V nom (V)	NV	5735.44	5814.20
T min (°C)	LT	V max (V)	HV	5735.40	5814.17
		V min (V)	LV	5735.33	5814.18
T max (°C)	HT	V max (V)	HV	5735.38	5814.11
		V min (V)	LV	5735.42	5814.10
Indoor Use Limits				f_L > 5725 MHz	f_H < 5875 MHz
Result				**Complies**	

Note: All the modes had been tested, but only the worst data were recorded in the report.

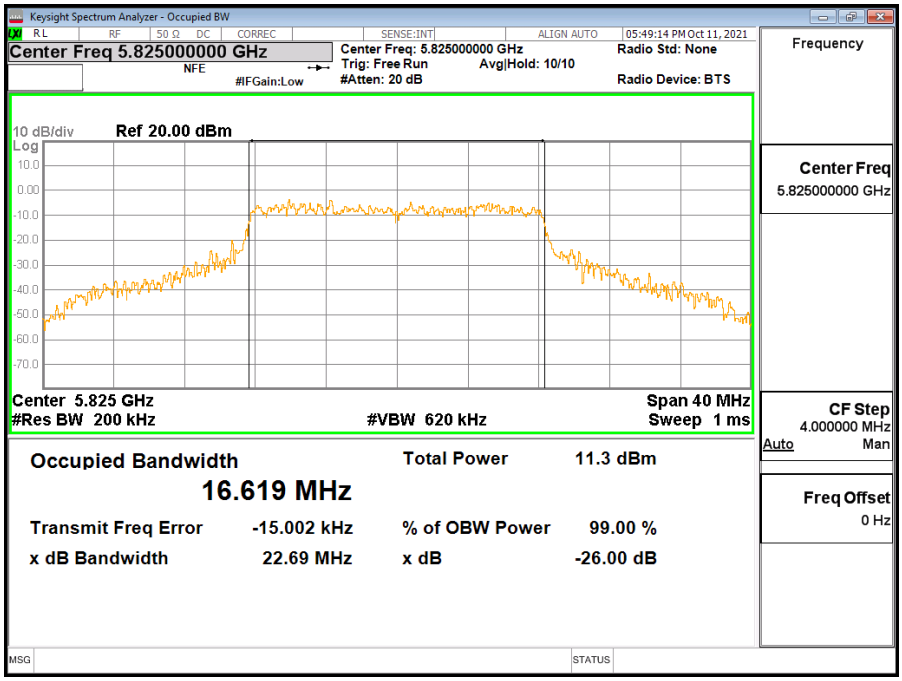
OCCUPIED BANDWIDTH RESULTS

802.11a 20			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Limit	Result
5745	16.725	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS
5825	16.619	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS

Channel	Low Channel

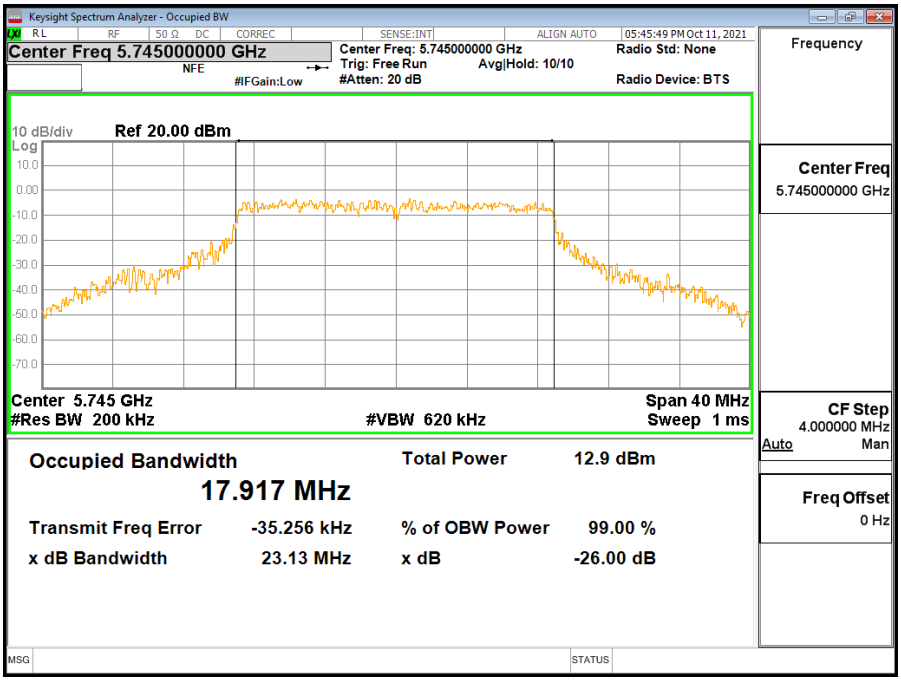


Channel	High Channel

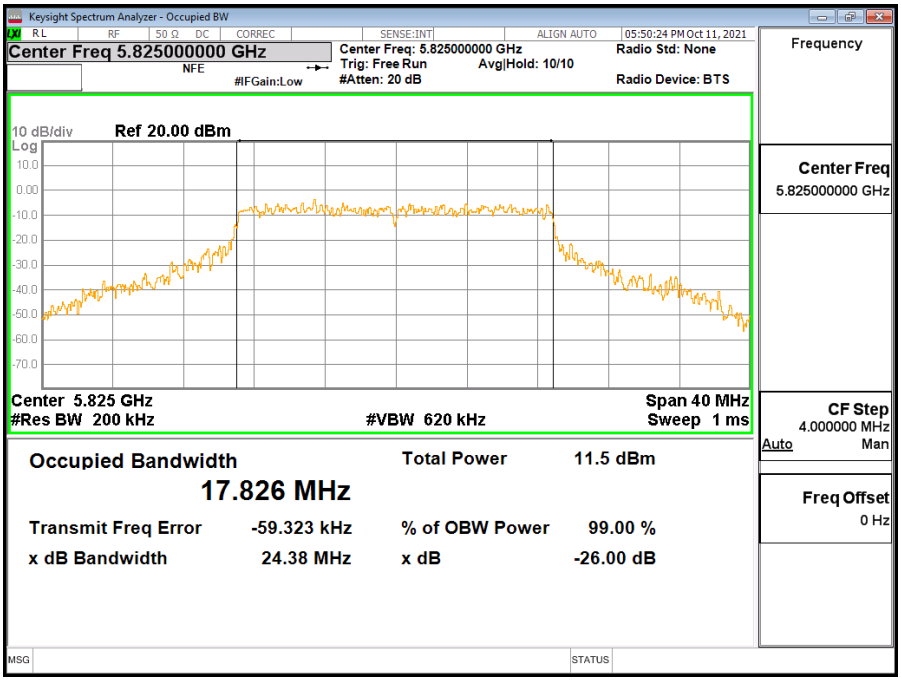


802.11ac VHT20			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Limit	Result
5745	17.917	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS
5825	17.826	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS

Channel	Low Channel

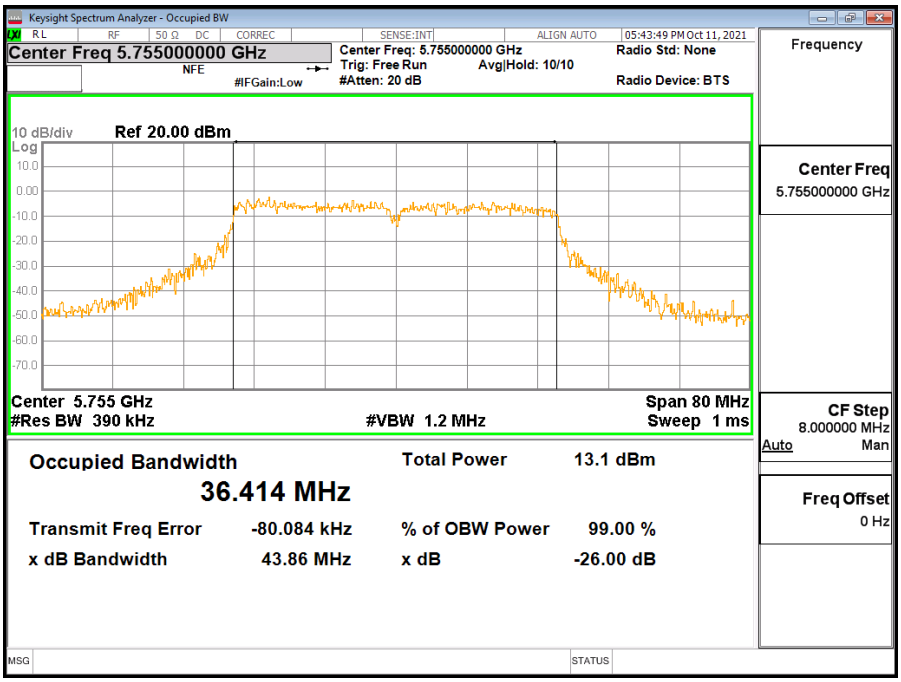


Channel	High Channel

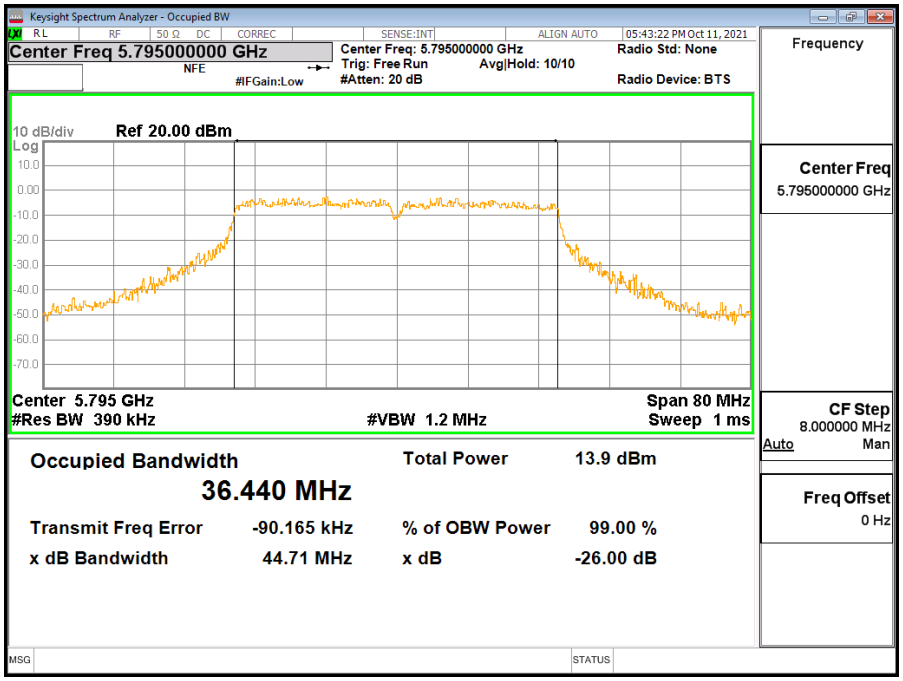


802.11ac VHT40			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Limit	Result
5755	36.414	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS
5795	36.440	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS

Channel	Low Channel

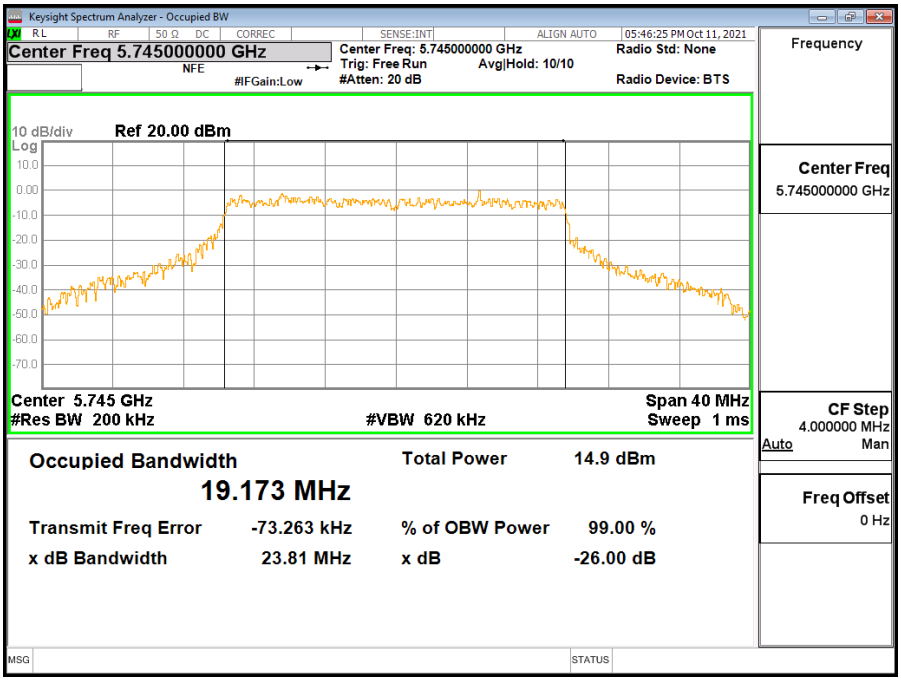


Channel	High Channel

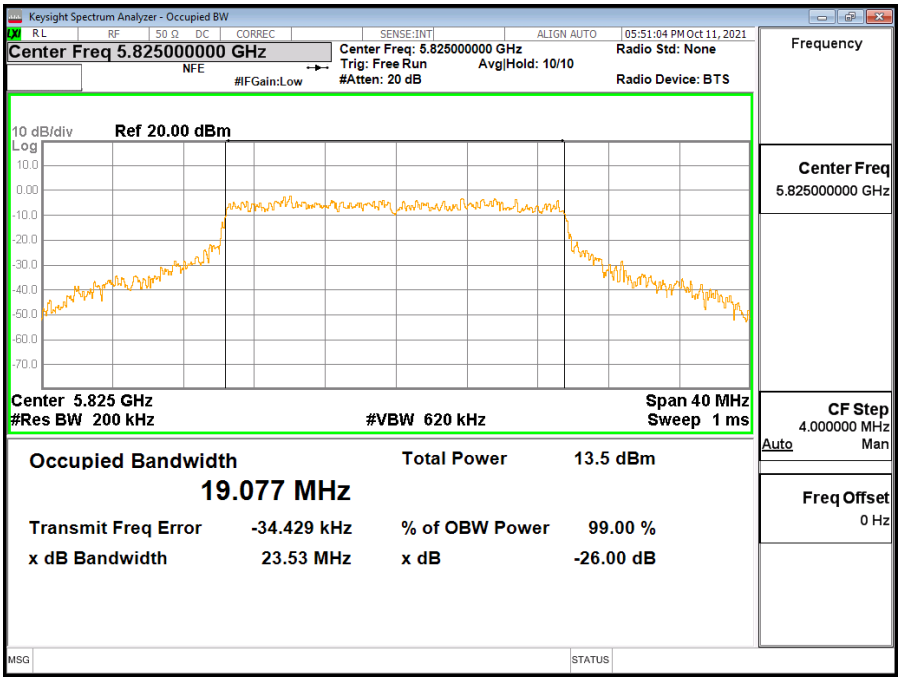


802.11ax HE20			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Limit	Result
5745	19.173	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS
5825	19.077	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS

Channel	Low Channel

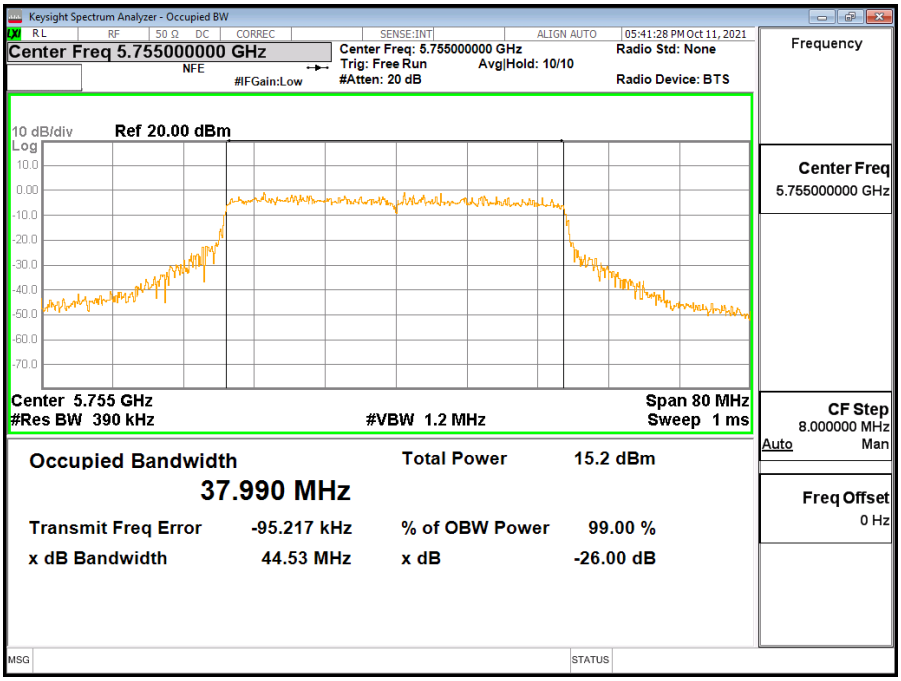


Channel	High Channel

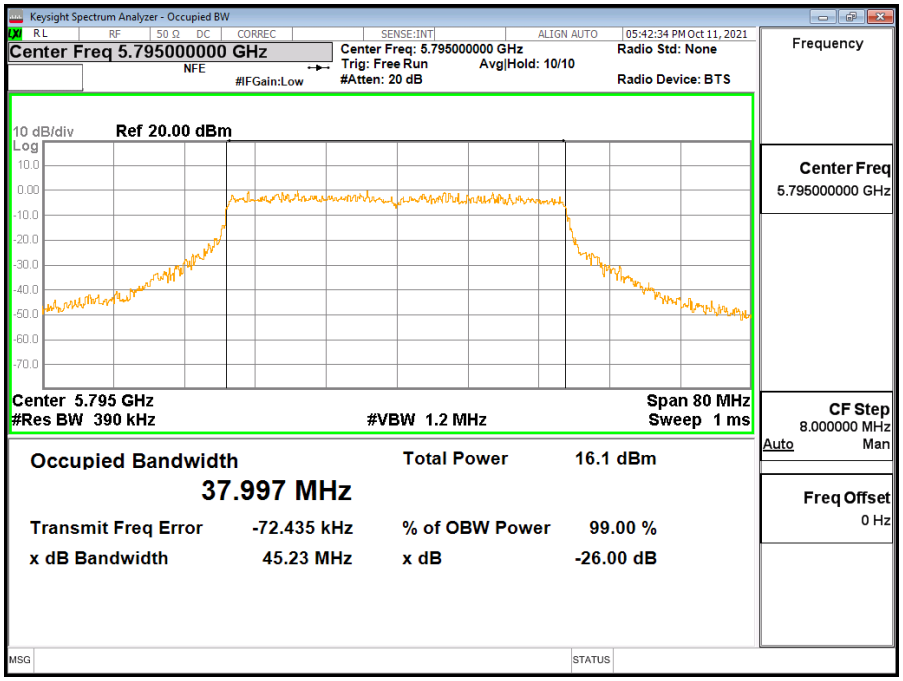


802.11ax HE40			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Limit	Result
5755	37.990	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS
5795	37.997	Within The Assigned Frequency Band 5725 MHz ~ 5875 MHz	PASS

Channel	Low Channel



Channel	High Channel



Note: All the modes had been tested, but only the worst data were recorded in the report.

6.5. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

LIMIT

Transmitter Unwanted Emissions In The Spurious Domain		
Frequency Range	Maximum Power Limit (E.R.P.(≤1 GHz) E.I.R.P.(> 1 GHz))	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87.5 MHz	-36dBm	100 kHz
87.5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-54dBm	100 kHz
230 MHz to 470 MHz	-36dBm	100 kHz
470 MHz to 862 MHz	-54dBm	100 kHz
862 MHz to 1 GHz	-36dBm	100 kHz
1 GHz ~ 26 GHz	-30dBm	1 MHz

TEST PROCEDURE

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.4.3.3

Measurement	
☒Conducted measurement	☒Radiated measurement

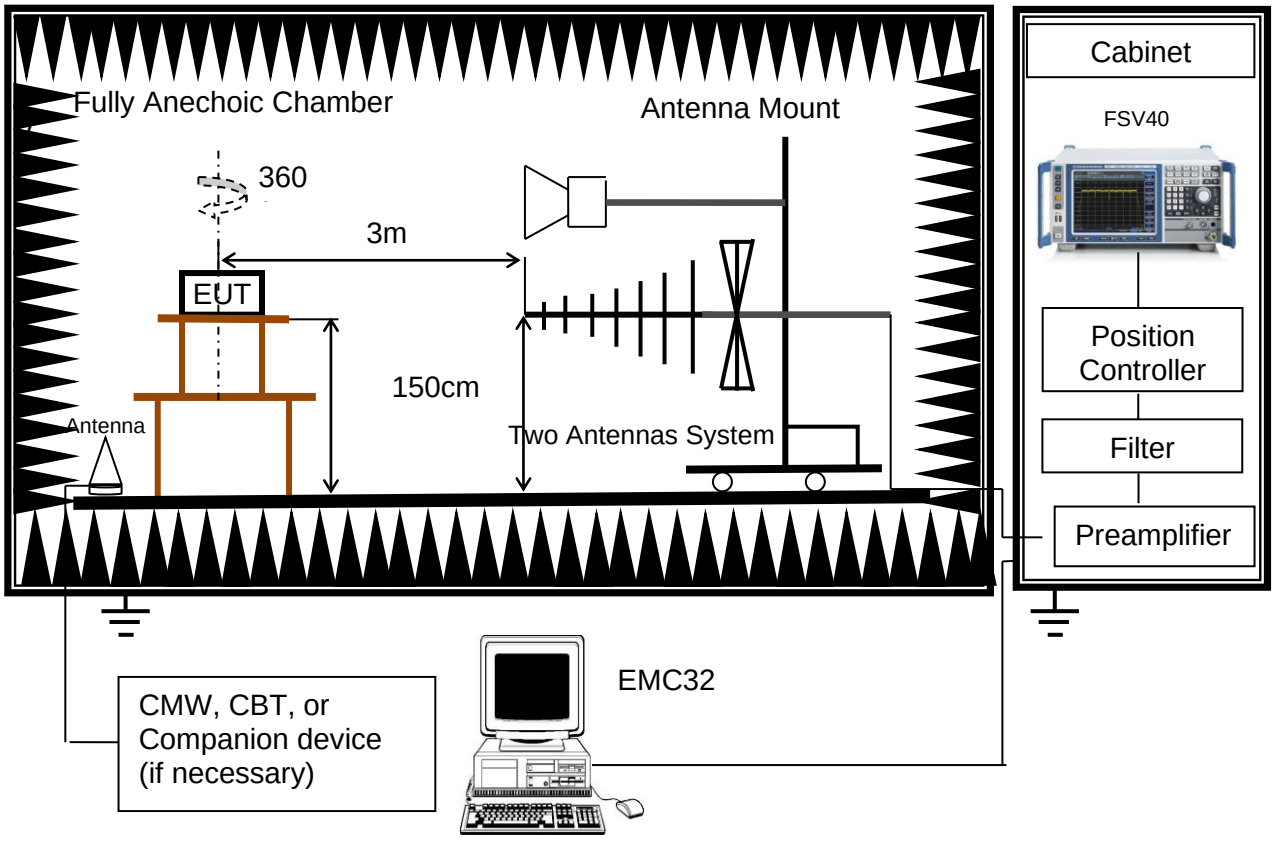
For UUT without an integral antenna and for a UUT with an integral antenna but with a temporary antenna connector(s), one of the following options shall be used:

- The level of unwanted emissions shall be measured as their effective radiated power when radiated by cabinet and antenna.

The setting of the Receiver

RBW	100K(＜1GHz) / 1M(＞1GHz)
VBW	300K(＜1GHz) / 3M(＞1GHz)

TEST SETUP



1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

2. The equipment was configured to operate under its worst case situation with respect to output power.

3. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

TEST ENVIRONMENT

For Conducted

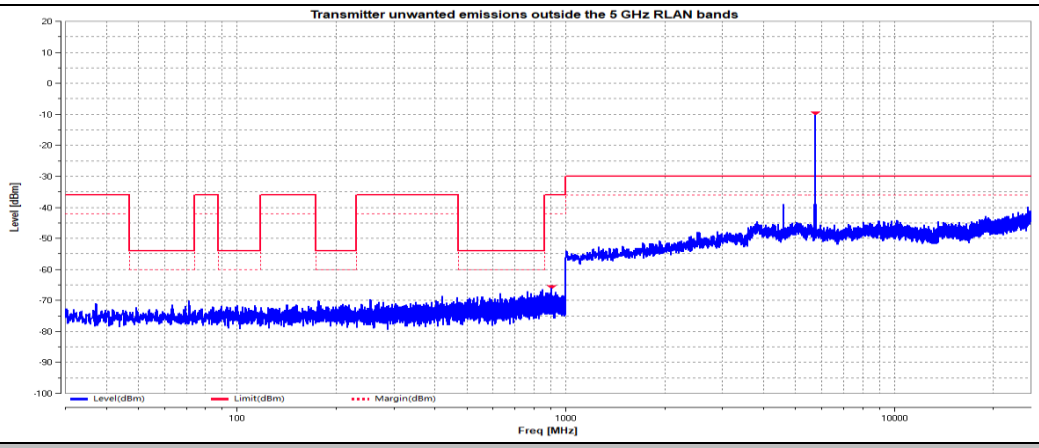
Temperature	26.9 °C	Relative Humidity	53.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

For Radiated

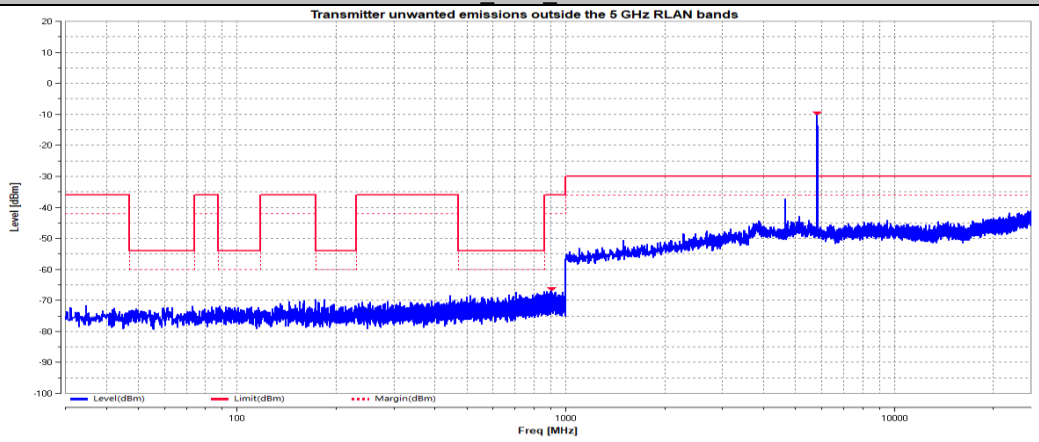
Temperature	24.5 °C	Relative Humidity	65 %
Atmosphere Pressure	101kPa	Test Voltage	DC 5 V

RESULTS

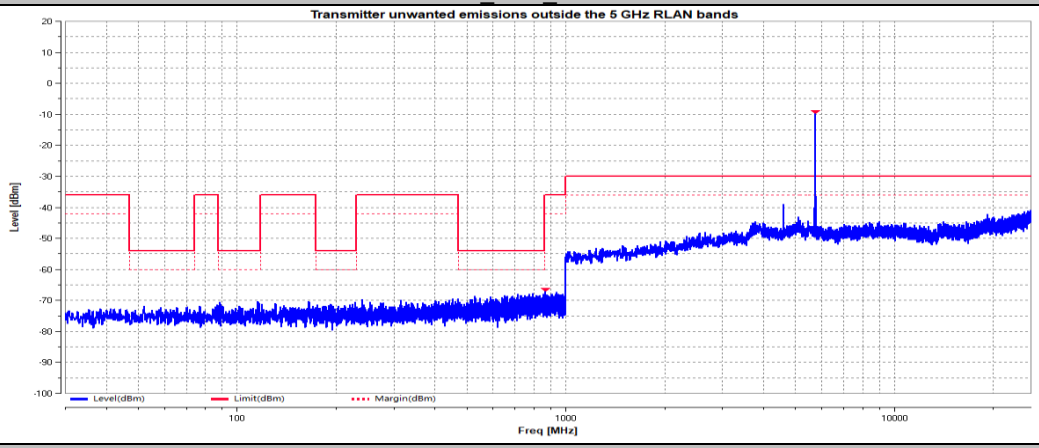
6.5.1. Conducted Test Graphs-Pre-scan



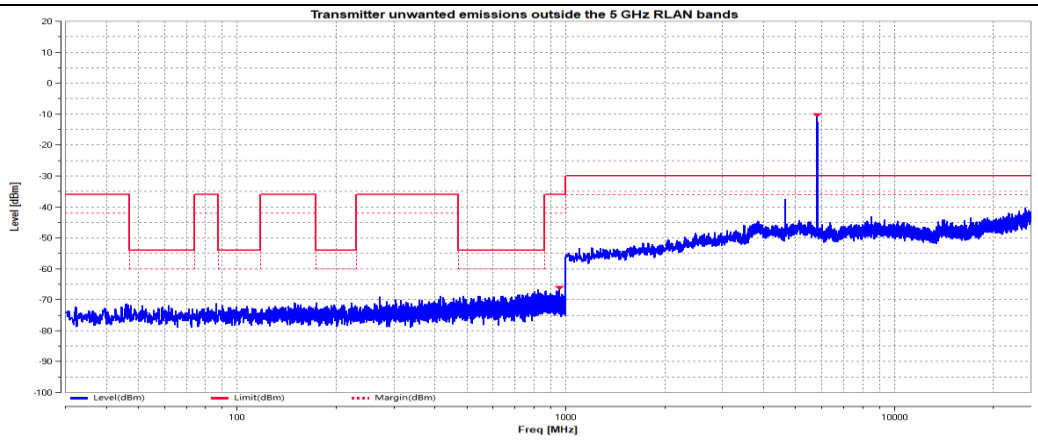
11A_Ant1_5745



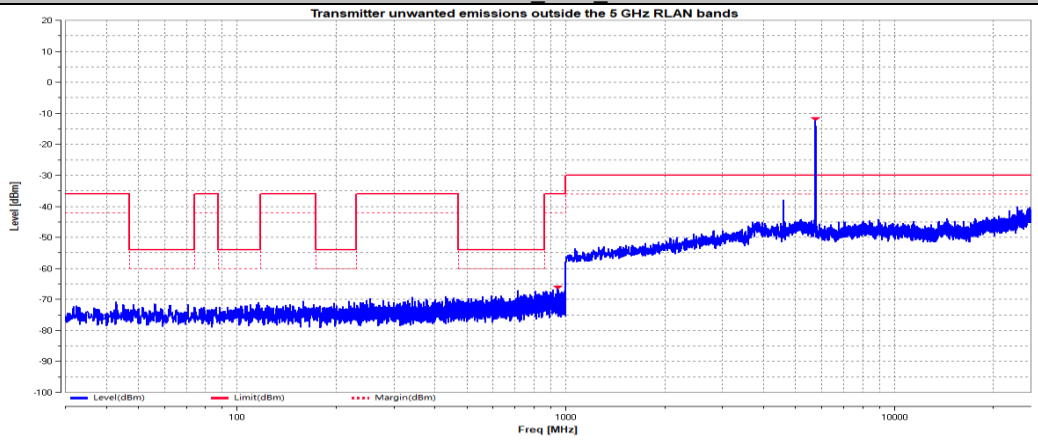
11A_Ant1_5825



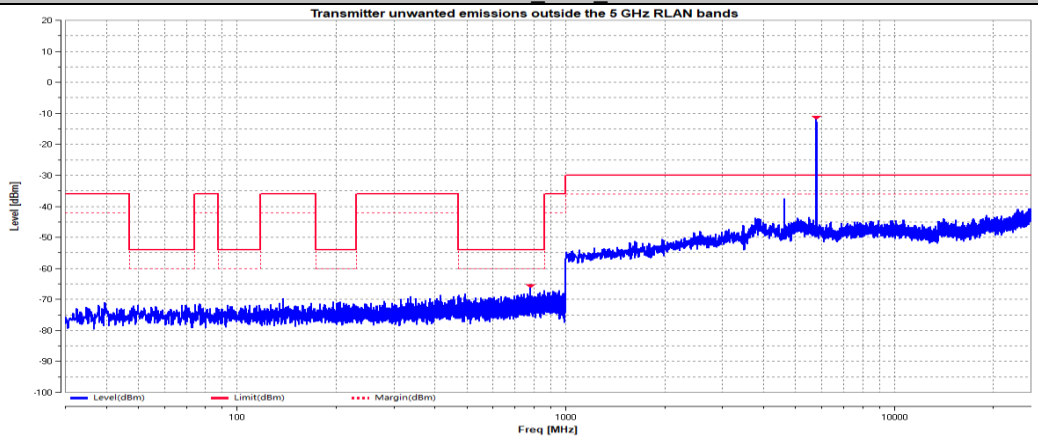
11AC20SISO_Ant1_5745



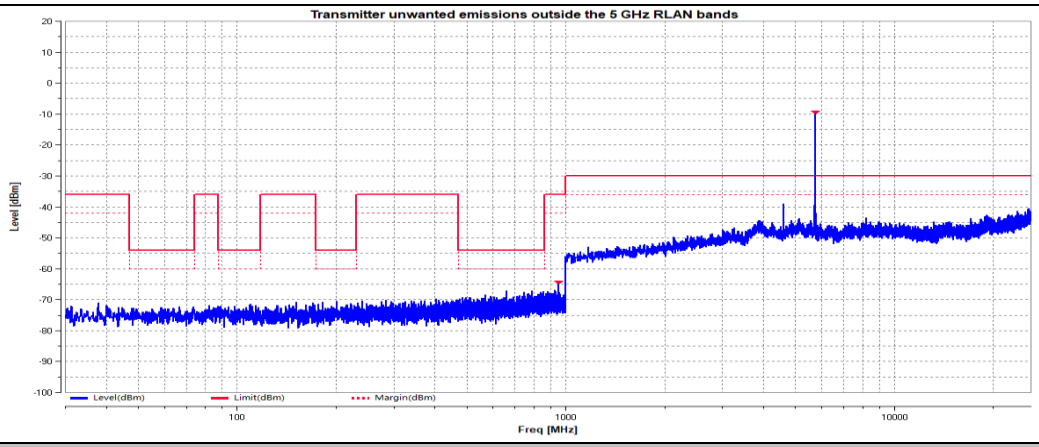
11AC20SISO_Ant1_5825



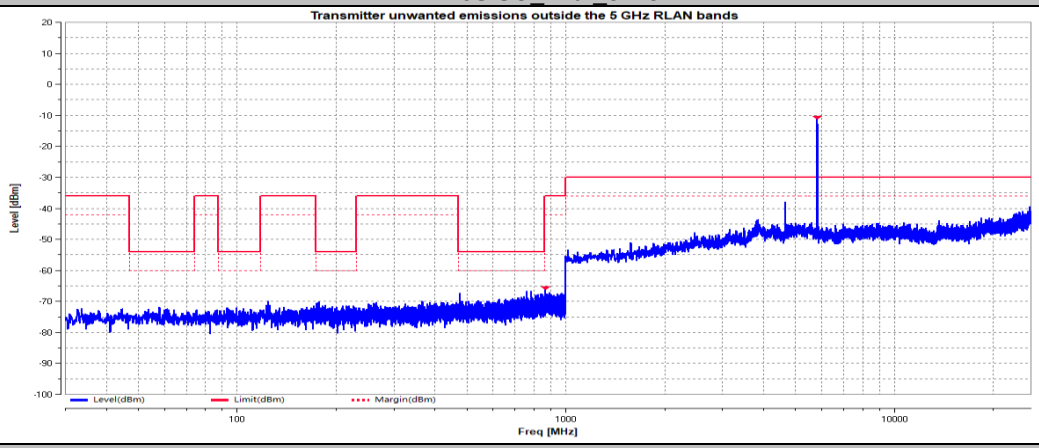
11AC40SISO_Ant1_5755



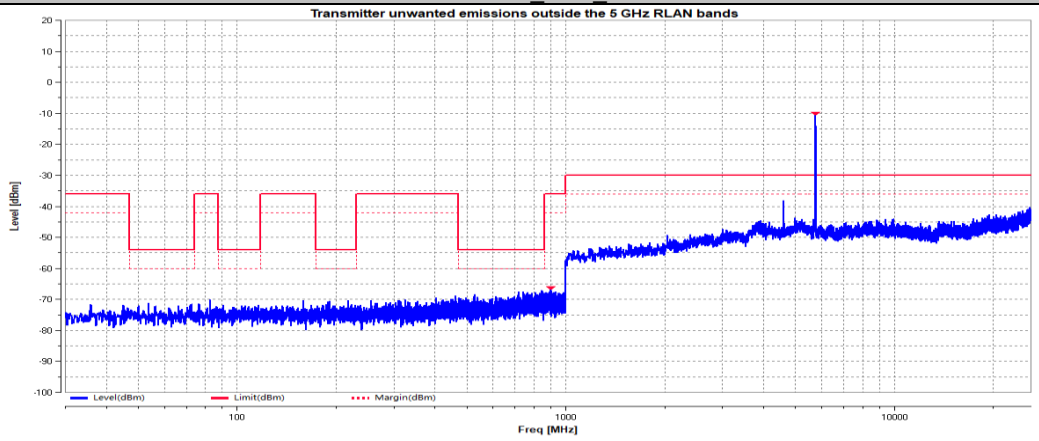
11AC40SISO_Ant1_5795



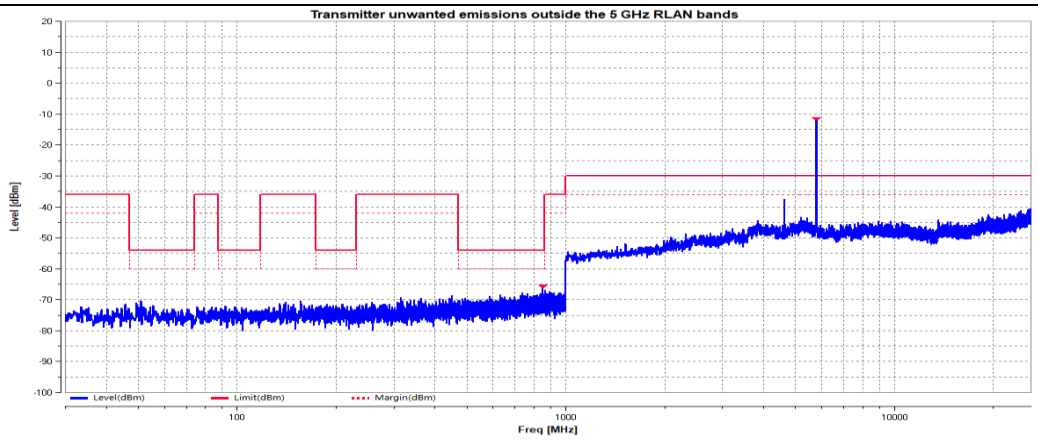
11AX20SISO_Ant1_5745



11AX20SISO_Ant1_5825



11AX40SISO_Ant1_5755

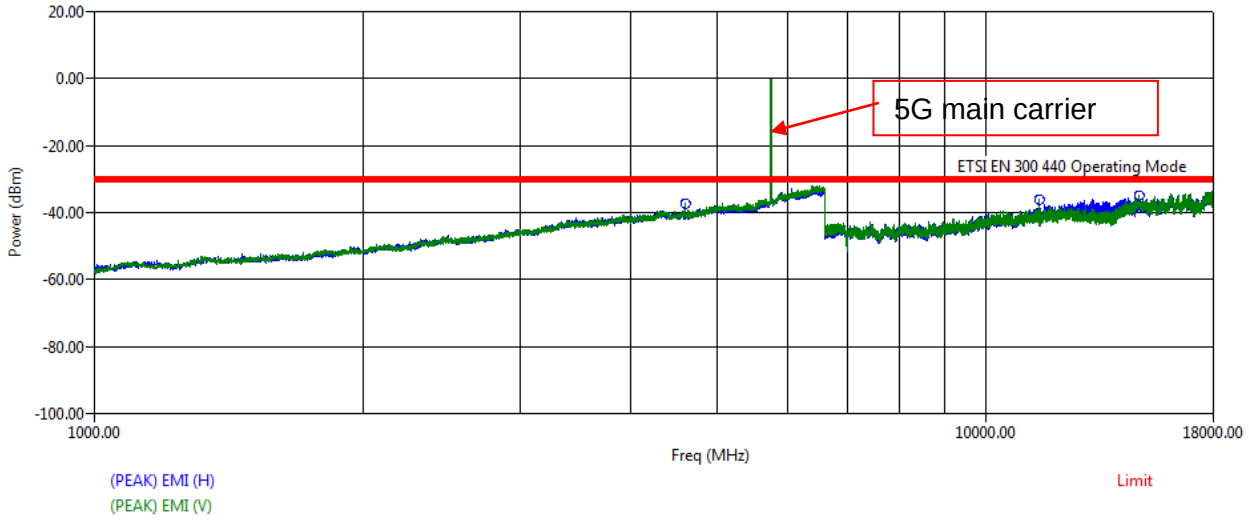


11AX40SISO_Ant1_5795

Note: All the modes had been tested, but only the worst data were recorded in the report.

6.5.2. Radiated Test Result

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	Low Channel	Test Mode:	802.11a



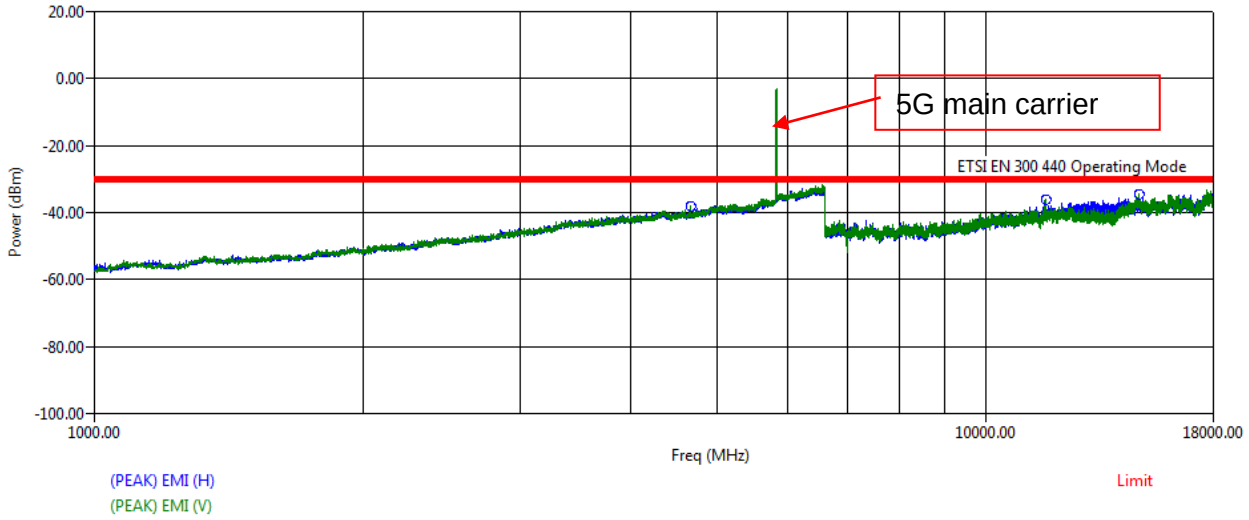
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4596.00	12.87	-95.27	34.20	9.33	0.00	-38.87	-30.00	-8.87
11493.50	44.58	-59.11	0.00	16.27	42.20	-40.46	-30.00	-10.46
14845.50	42.68	-59.42	0.00	19.43	41.44	-38.76	-30.00	-8.76

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4596.00	14.28	-94.83	34.20	9.33	0.00	-37.02	-30.00	-7.02
11493.50	49.40	-59.67	0.00	16.27	42.20	-36.20	-30.00	-6.20
14845.50	45.36	-58.05	0.00	19.43	41.44	-34.71	-30.00	-4.71

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	High Channel	Test Mode:	802.11a



Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4660.00	13.01	-95.47	34.27	9.21	0.00	-38.98	-30.00	-8.98
11654.50	45.71	-58.83	0.00	16.63	42.20	-38.69	-30.00	-8.69
14855.00	43.09	-59.62	0.00	19.55	41.44	-38.43	-30.00	-8.43

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4660.00	13.72	-95.34	34.27	9.21	0.00	-38.14	-30.00	-8.14
11654.50	49.41	-59.79	0.00	16.63	42.20	-35.95	-30.00	-5.95
14855.00	45.94	-58.31	0.00	19.55	41.44	-34.26	-30.00	-4.26

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	Low Channel	Test Mode:	802.11ac VHT20

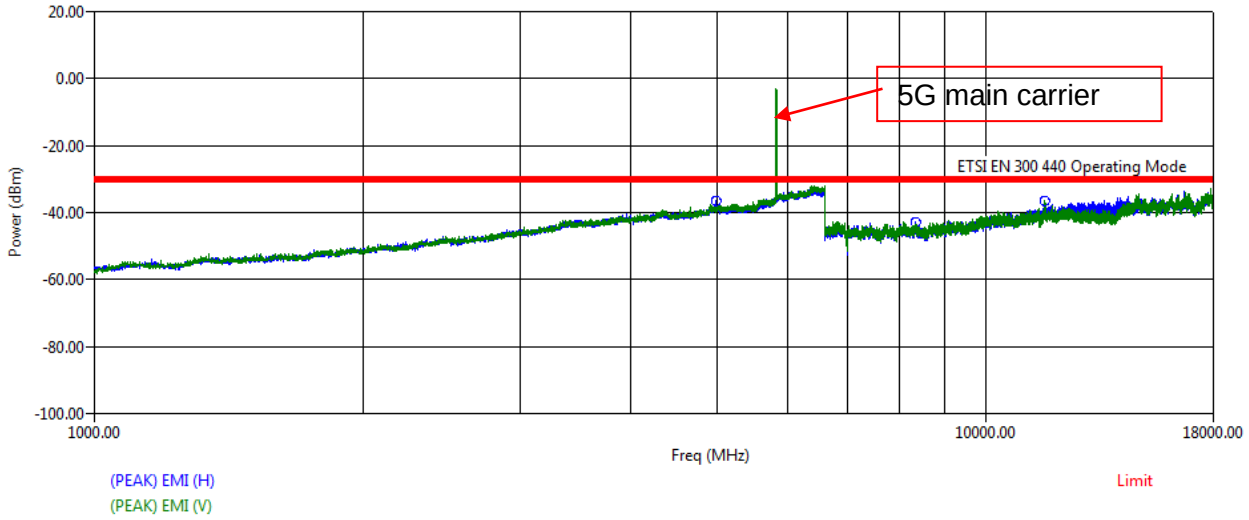
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
1248.50	7.25	-96.08	27.70	4.70	0.00	-56.43	-30.00	-26.43
11484.50	42.75	-58.57	0.00	16.29	42.20	-41.74	-30.00	-11.74
14847.00	43.63	-59.44	0.00	19.45	41.44	-37.81	-30.00	-7.81

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
1248.50	9.44	-95.72	27.70	4.70	0.00	-53.88	-30.00	-23.88
11484.50	48.20	-59.12	0.00	16.29	42.20	-36.83	-30.00	-6.83
14847.00	45.63	-58.06	0.00	19.45	41.44	-34.43	-30.00	-4.43

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	High Channel	Test Mode:	802.11ac VHT20



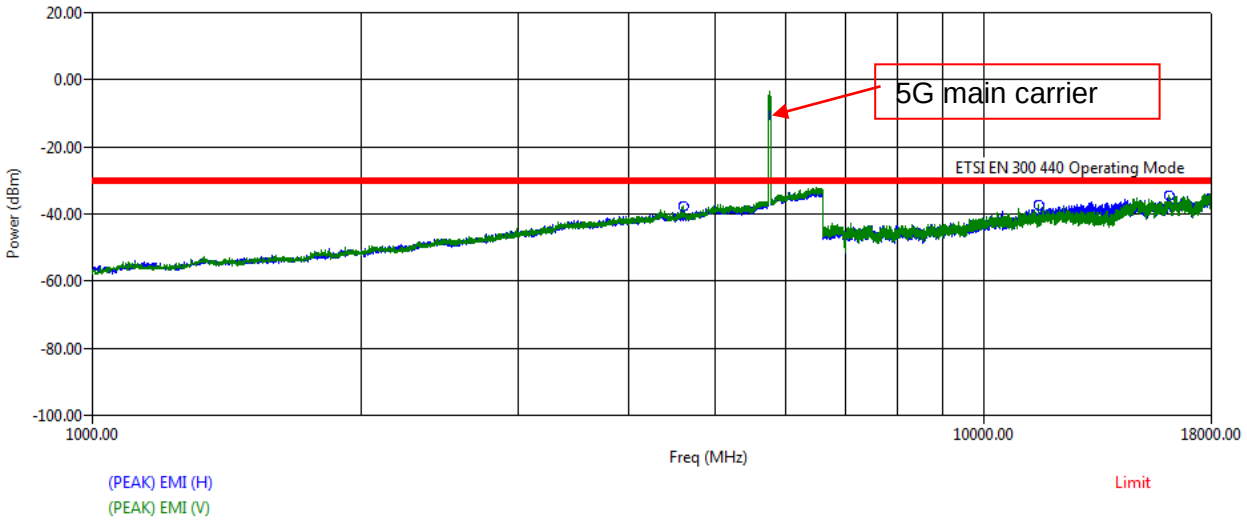
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4971.50	13.93	-94.69	34.57	9.62	0.00	-36.56	-30.00	-6.56
8347.50	46.85	-61.73	0.00	14.06	41.88	-42.69	-30.00	-12.69
11649.50	45.31	-58.83	0.00	16.64	42.20	-39.09	-30.00	-9.09

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4971.50	11.84	-95.43	34.57	9.62	0.00	-39.40	-30.00	-9.40
8347.50	43.55	-61.26	0.00	14.06	41.88	-45.53	-30.00	-15.53
11649.50	48.99	-59.79	0.00	16.64	42.20	-36.36	-30.00	-6.36

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	Low Channel	Test Mode:	802.11ac VHT40



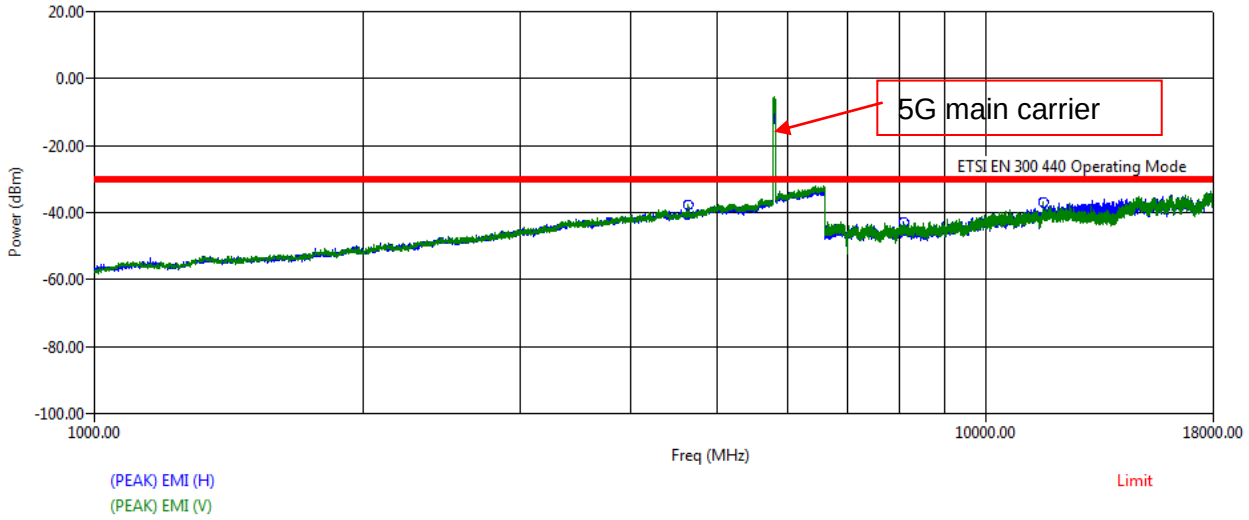
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4604.00	13.20	-95.42	34.21	9.33	0.00	-38.68	-30.00	-8.68
11510.00	44.84	-59.47	0.00	16.30	42.20	-40.53	-30.00	-10.53
16134.00	44.97	-61.76	0.00	20.56	41.47	-37.70	-30.00	-7.70

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4604.00	13.74	-94.87	34.21	9.33	0.00	-37.59	-30.00	-7.59
11510.00	48.70	-60.07	0.00	16.30	42.20	-37.27	-30.00	-7.27
16134.00	48.10	-61.48	0.00	20.56	41.47	-34.30	-30.00	-4.30

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	High Channel	Test Mode:	802.11ac VHT40

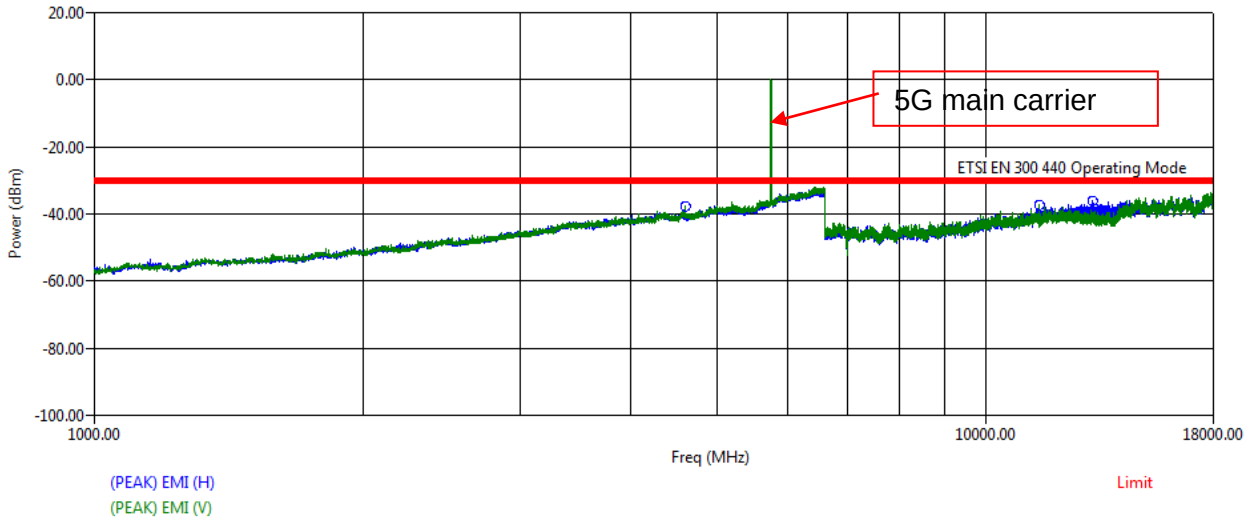


Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4636.00	14.30	-95.49	34.24	9.26	0.00	-37.69	-30.00	-7.69
8087.50	46.66	-61.25	0.00	13.72	41.82	-42.69	-30.00	-12.69
11585.00	45.36	-59.25	0.00	16.66	42.20	-39.43	-30.00	-9.43

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4636.00	14.02	-95.20	34.24	9.26	0.00	-37.68	-30.00	-7.68
8087.50	43.80	-60.80	0.00	13.72	41.82	-45.11	-30.00	-15.11
11585.00	48.65	-60.09	0.00	16.66	42.20	-36.97	-30.00	-6.97

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	Low Channel	Test Mode:	802.11ax HE20



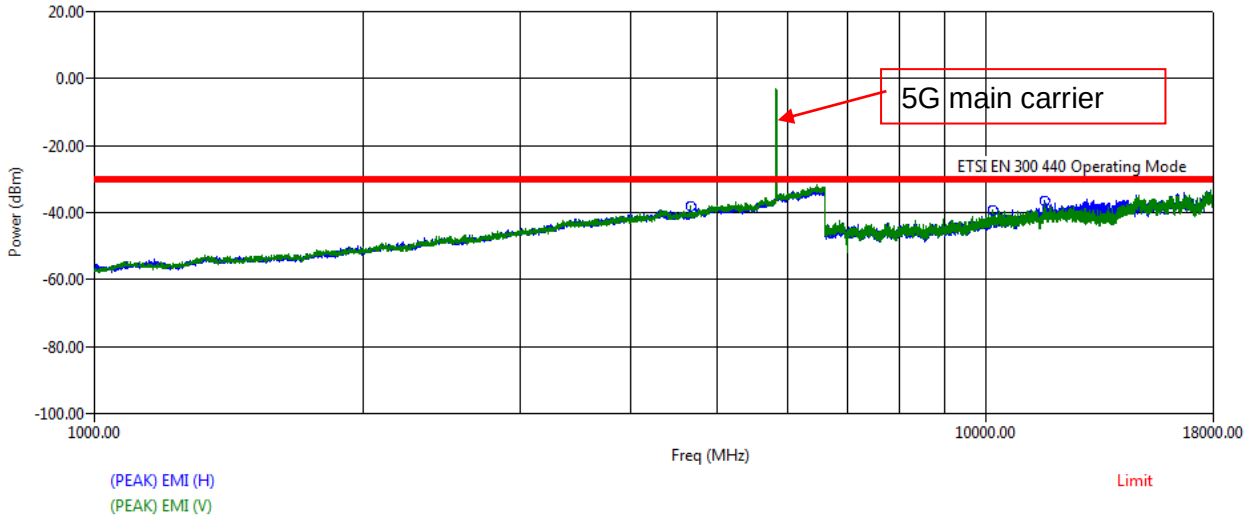
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4596.00	12.13	-95.27	34.20	9.33	0.00	-39.61	-30.00	-9.61
11491.50	45.20	-58.99	0.00	16.27	42.20	-39.71	-30.00	-9.71
13181.00	45.30	-57.46	0.00	17.75	41.71	-36.13	-30.00	-6.13

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4596.00	13.78	-94.83	34.20	9.33	0.00	-37.53	-30.00	-7.53
11491.50	48.09	-59.55	0.00	16.27	42.20	-37.38	-30.00	-7.38
13181.00	41.95	-59.91	0.00	17.75	41.71	-41.92	-30.00	-11.92

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	High Channel	Test Mode:	802.11ax HE20



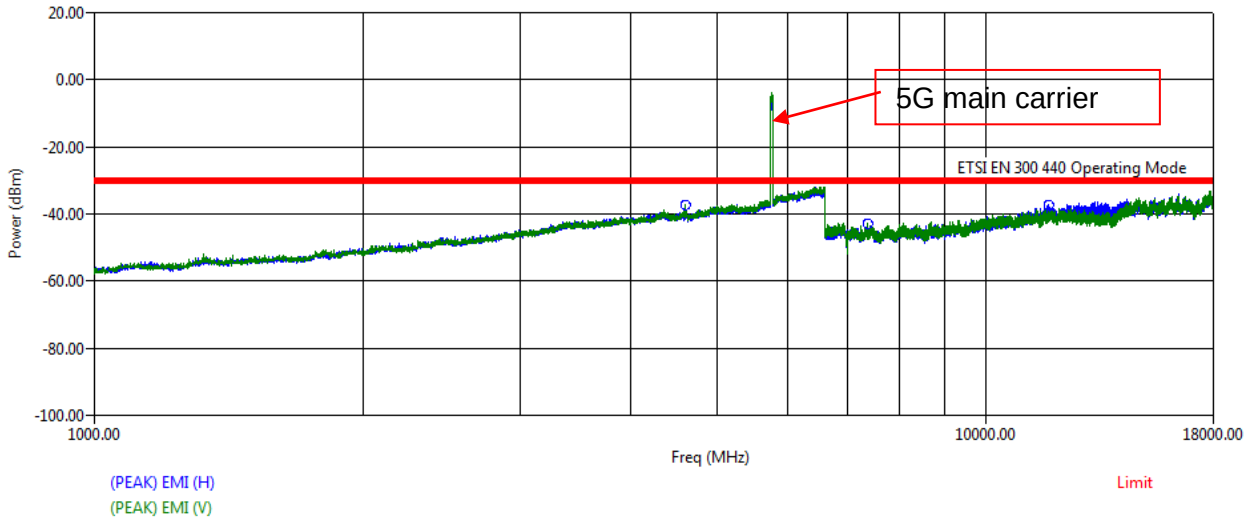
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4660.00	12.89	-95.47	34.27	9.21	0.00	-39.10	-30.00	-9.10
10165.00	45.86	-60.60	0.00	15.46	42.20	-41.47	-30.00	-11.47
11646.50	48.08	-58.86	0.00	16.65	42.20	-36.32	-30.00	-6.32

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4660.00	13.78	-95.34	34.27	9.21	0.00	-38.09	-30.00	-8.09
10165.00	47.79	-60.28	0.00	15.46	42.20	-39.23	-30.00	-9.23
11646.50	47.27	-59.81	0.00	16.65	42.20	-38.09	-30.00	-8.09

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	Low Channel	Test Mode:	802.11ax HE40



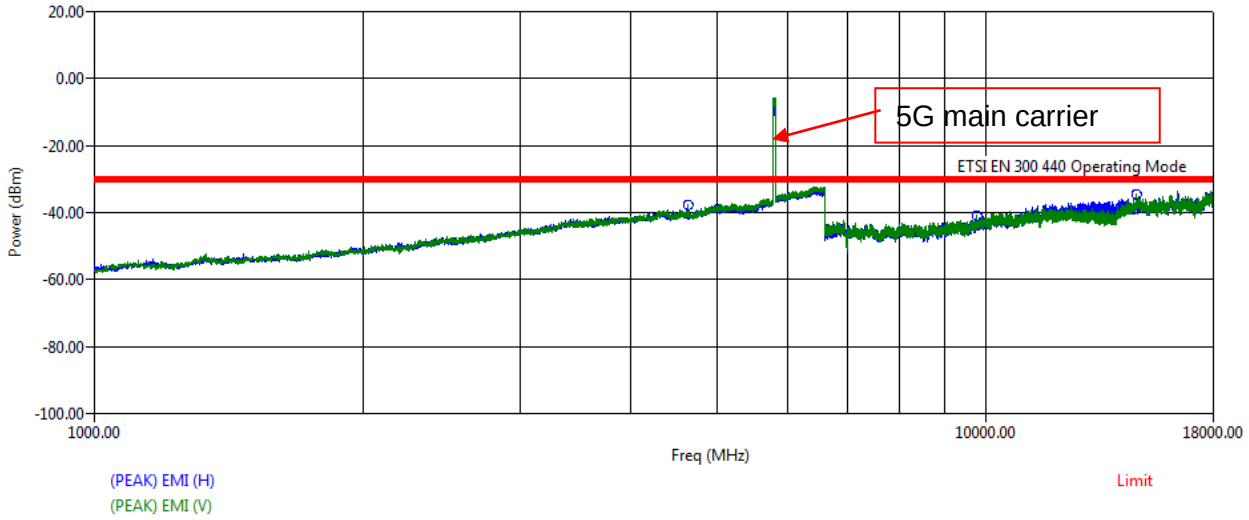
Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4604.00	13.47	-95.42	34.21	9.33	0.00	-38.41	-30.00	-8.41
7355.00	45.16	-62.40	0.00	13.45	42.07	-45.85	-30.00	-15.85
11772.00	46.35	-58.30	0.00	17.03	42.20	-37.13	-30.00	-7.13

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4604.00	14.16	-94.87	34.21	9.33	0.00	-37.17	-30.00	-7.17
7355.00	48.02	-62.24	0.00	13.45	42.07	-42.84	-30.00	-12.84
11772.00	43.63	-59.16	0.00	17.03	42.20	-40.70	-30.00	-10.70

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: 5G main carrier has been recorded in the plot.

Unwanted emissions in the spurious domain above 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	High Channel	Test Mode:	802.11ax HE40

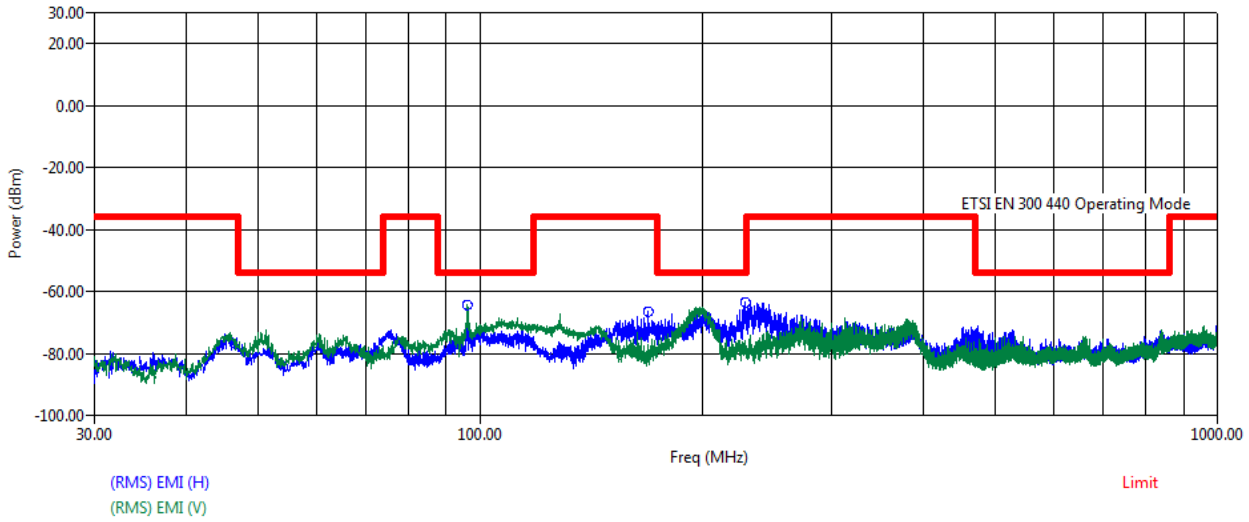


Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Cable (H) (dB)	Preamp (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
4636.00	13.47	-95.49	34.24	9.26	0.00	-38.51	-30.00	-8.51
9761.50	42.45	-60.06	0.00	14.95	42.16	-44.81	-30.00	-14.81
14750.50	41.92	-57.84	0.00	18.95	41.44	-38.41	-30.00	-8.41

Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Cable (V) (dB)	Preamp (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
4636.00	13.91	-95.20	34.24	9.26	0.00	-37.78	-30.00	-7.78
9761.50	45.96	-59.70	0.00	14.95	42.16	-40.95	-30.00	-10.95
14750.50	44.92	-56.98	0.00	18.95	41.44	-34.54	-30.00	-4.54

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Unwanted emissions in the spurious domain below 1 GHz worse case			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	Low Channel	Test Mode:	802.11a

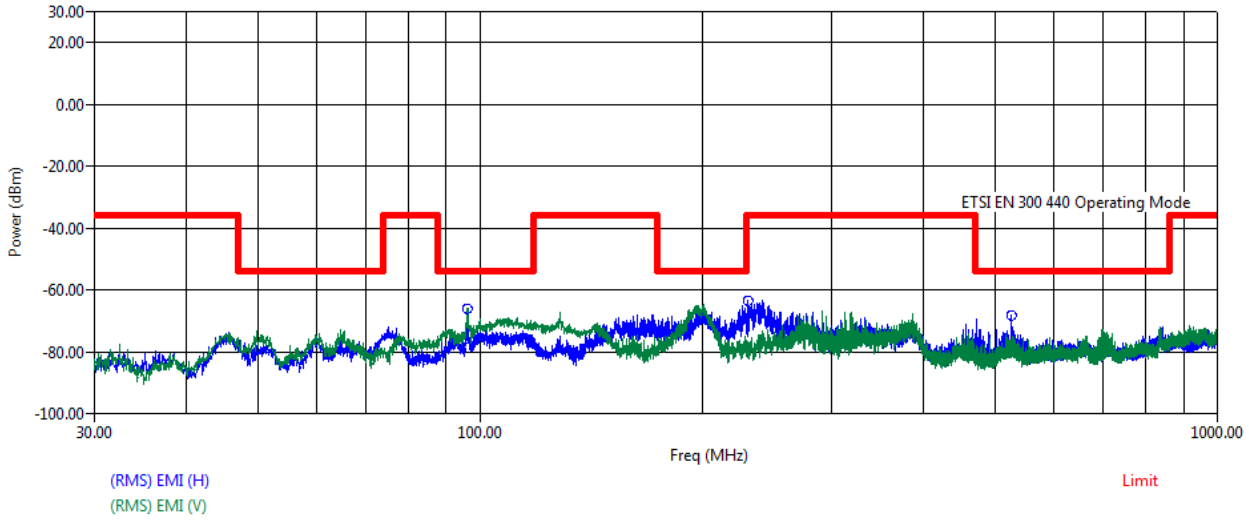


Freq (MHz)	(RMS) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Preamp (H) (dB)	Cable (H) (dB)	(RMS) EMI (H) (dBm)	Limit (dBm)	(RMS) Margin (H) (dB)
96.20	59.16	-97.70	10.37	42.75	1.40	-69.52	-54.00	-15.52
169.00	62.99	-97.40	8.51	42.57	1.88	-66.60	-36.00	-30.60
228.45	62.71	-97.44	11.89	42.54	2.10	-63.28	-54.00	-9.28

Freq (MHz)	(RMS) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Preamp (V) (dB)	Cable (V) (dB)	(RMS) EMI (V) (dBm)	Limit (dBm)	(RMS) Margin (V) (dB)
96.20	64.24	-97.65	10.37	42.75	1.40	-64.38	-54.00	-10.38
169.00	53.41	-98.47	8.51	42.57	1.88	-77.24	-36.00	-41.24
228.45	51.43	-98.99	11.89	42.54	2.10	-76.11	-54.00	-22.11

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Unwanted emissions in the spurious domain below 1 GHz worse case			
Measurement Method	Radiated	Polar:	Horizontal/Vertical
Test Channel:	High Channel	Test Mode:	802.11a



Freq (MHz)	(RMS) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Preamp (H) (dB)	Cable (H) (dB)	(RMS) EMI (H) (dBm)	Limit (dBm)	(RMS) Margin (H) (dB)
96.20	59.13	-97.70	10.37	42.75	1.40	-69.54	-54.00	-15.54
230.30	63.00	-97.82	11.96	42.55	2.11	-63.29	-36.00	-27.29
526.20	51.31	-97.68	17.58	42.77	3.24	-68.31	-54.00	-14.31

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI – Limit

Note: All the modes had been tested, but only the worst data were recorded in the report.

6.6. RECEIVER SPURIOUS RADIATIONS

LIMITS

Receiver Spurious Emissions		
Frequency Range	Maximum Power Limit (E.R.P.(≤1 GHz) E.I.R.P.(> 1 GHz))	Measurement Bandwidth
30 MHz ~ 1 GHz	-57dBm	100kHz
1 GHz ~ 26 GHz	-47dBm	1MHz

TEST PROCEDURE

ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.3.5.3

Please refer to clause 6.4 UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN and TEST SETUP

TEST ENVIRONMENT

For Conducted

Temperature	26.9 °C	Relative Humidity	53.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

For Radiated

Temperature	24.5 °C	Relative Humidity	65 %
Atmosphere Pressure	101kPa	Test Voltage	DC 5 V

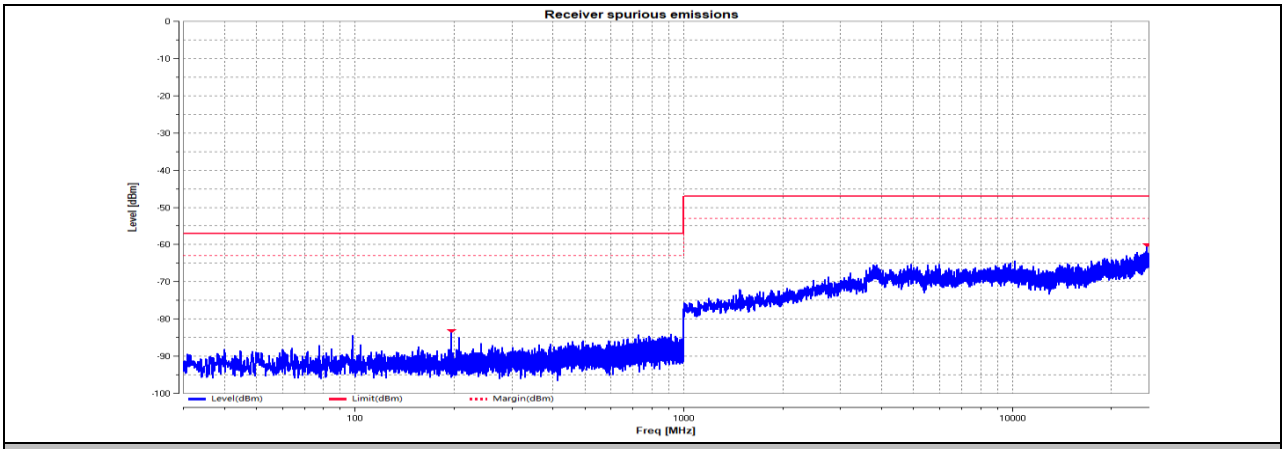
RESULTS

6.6.1. Conducted Test Result-Pre-scan

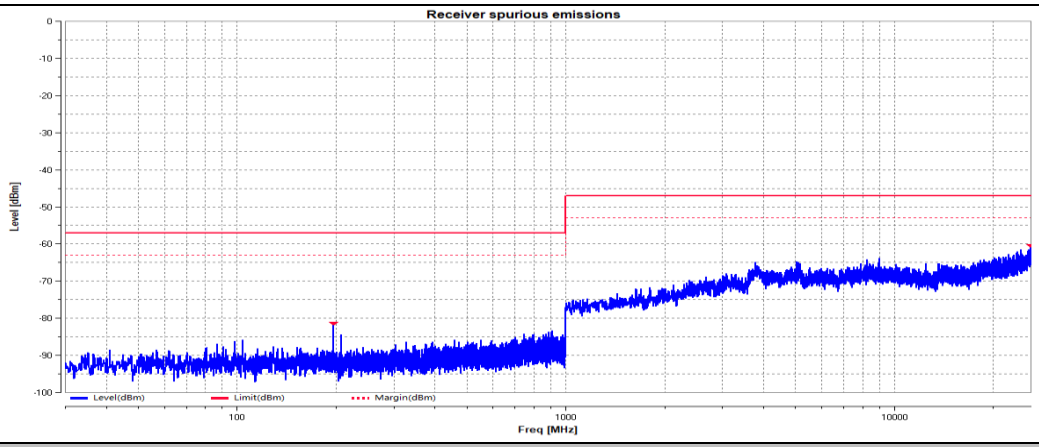
Test Mode	Antenna	Channel	Freq. [MHz]	Level[dBm]	Limit[dBm]	Verdict
11A	Ant1	5745	196.48	-83.7	-57.00	PASS
			25681.25	-60.63	-47.00	PASS
		5825	196.48	-81.94	-57.00	PASS
			25937.5	-60.96	-47.00	PASS
11AC20SISO	Ant1	5745	196.48	-83.36	-57.00	PASS
			25906.25	-60.88	-47.00	PASS
		5825	971.87	-83.59	-57.00	PASS
			25868.75	-60.11	-47.00	PASS
11AC40SISO	Ant1	5755	196.48	-82.59	-57.00	PASS
			20803.13	-60.73	-47.00	PASS
		5795	910.88	-83.18	-57.00	PASS
			25700	-61.48	-47.00	PASS
11AX20SISO	Ant1	5745	196.48	-82.66	-57.00	PASS
			25712.5	-59.61	-47.00	PASS
		5825	826.61	-83.06	-57.00	PASS
			25562.5	-60.61	-47.00	PASS
11AX40SISO	Ant1	5755	196.48	-82.35	-57.00	PASS
			25828.13	-60.35	-47.00	PASS
		5795	196.48	-82.94	-57.00	PASS
			25668.75	-61.13	-47.00	PASS

Note: All the modes had been tested, but only the worst data were recorded in the report.

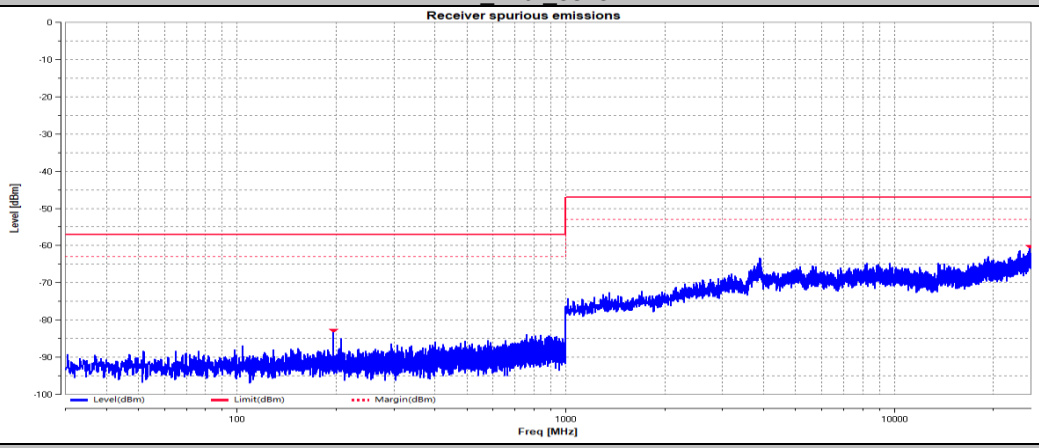
6.6.2. Conducted Test Graphs-Pre-scan



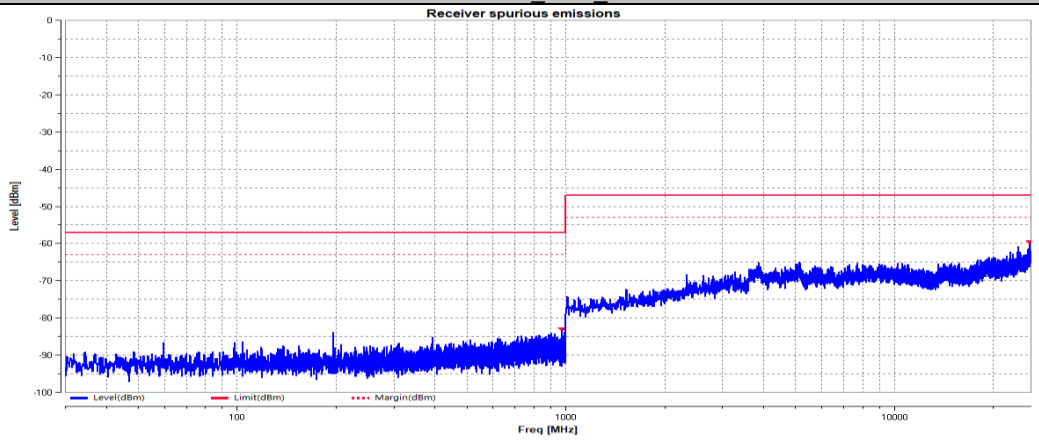
11A_Ant1_5745



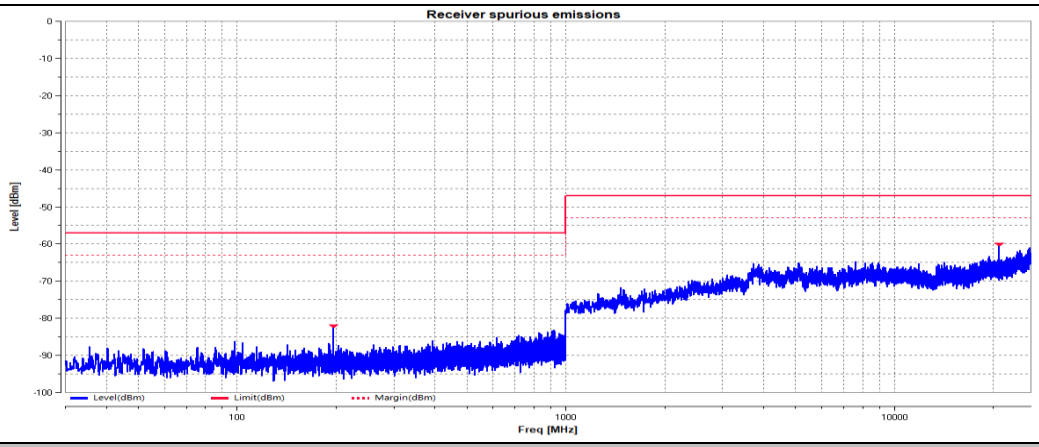
11A_Ant1_5825



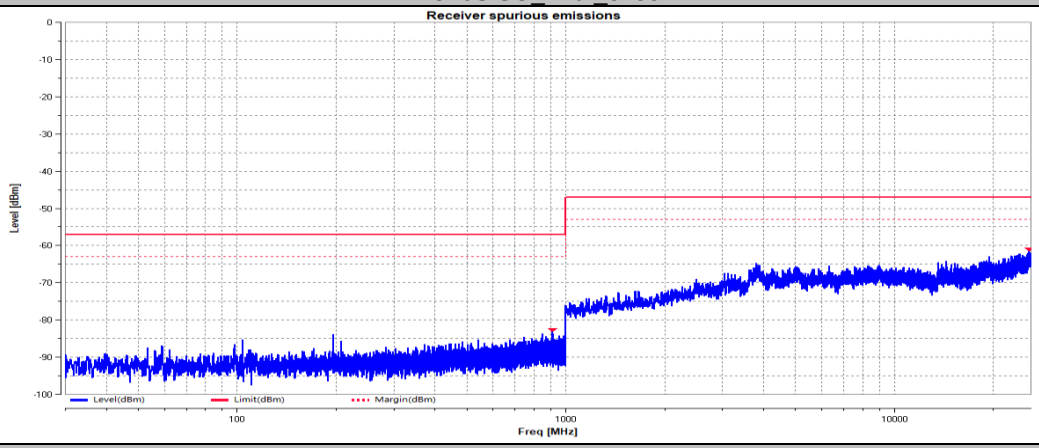
11AC20SISO_Ant1_5745



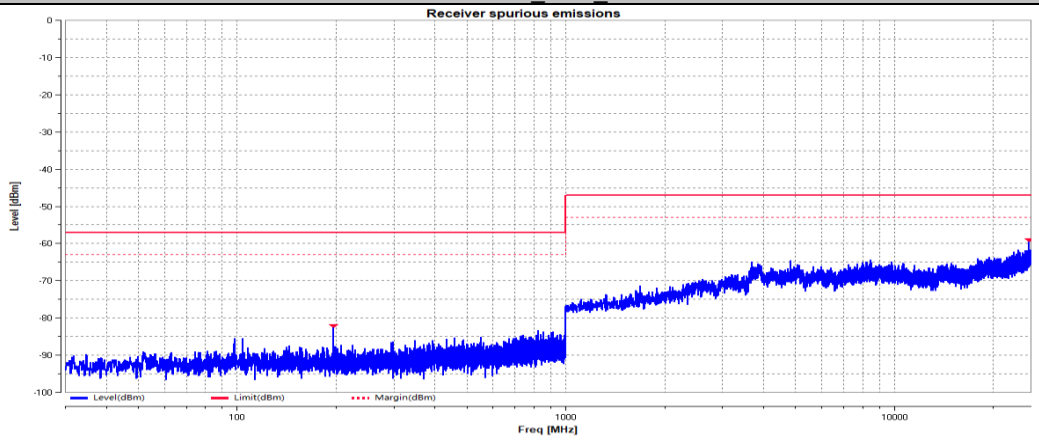
11AC20SISO_Ant1_5825



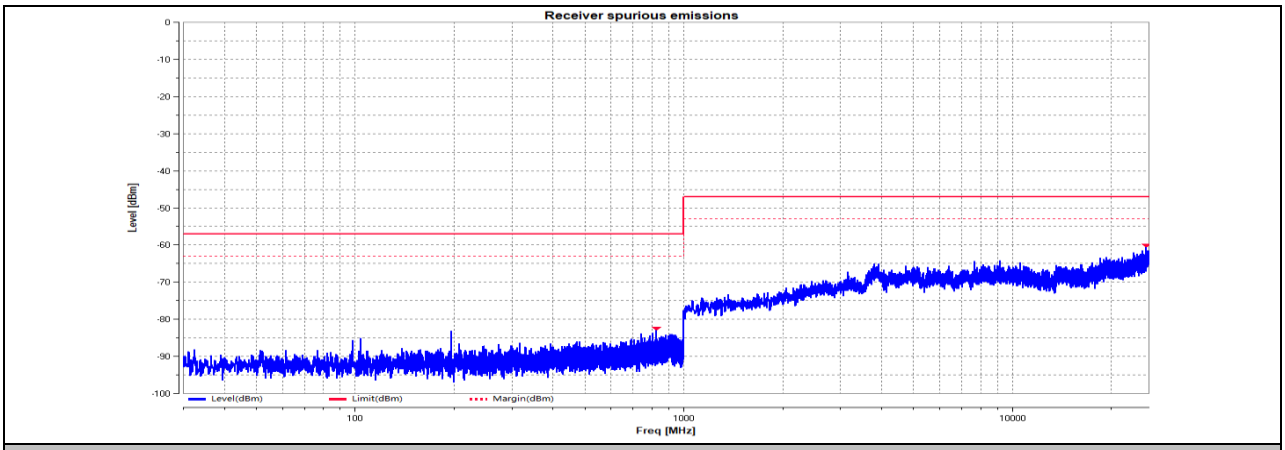
11AC40SISO_Ant1_5755



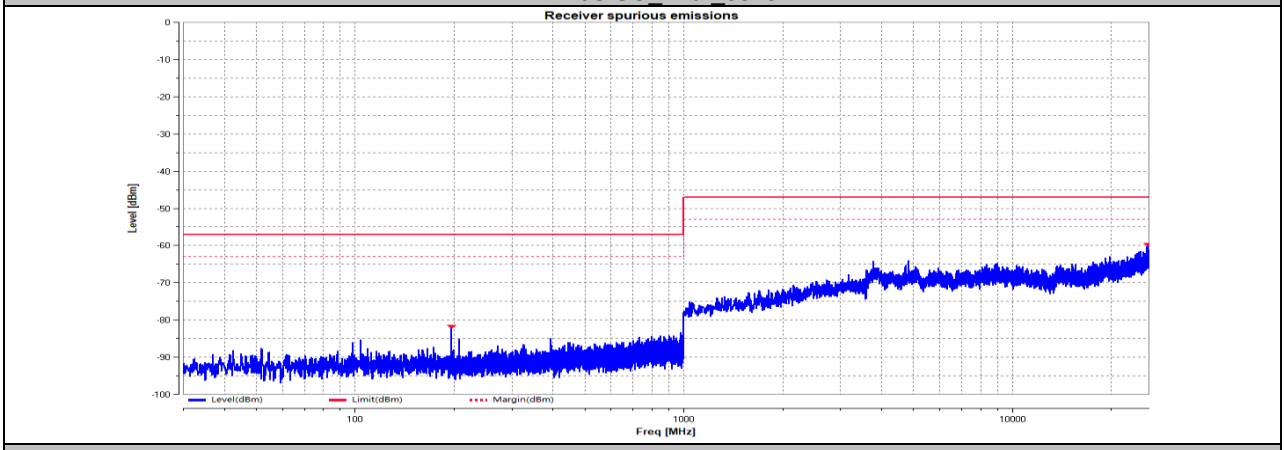
11AC40SISO_Ant1_5795



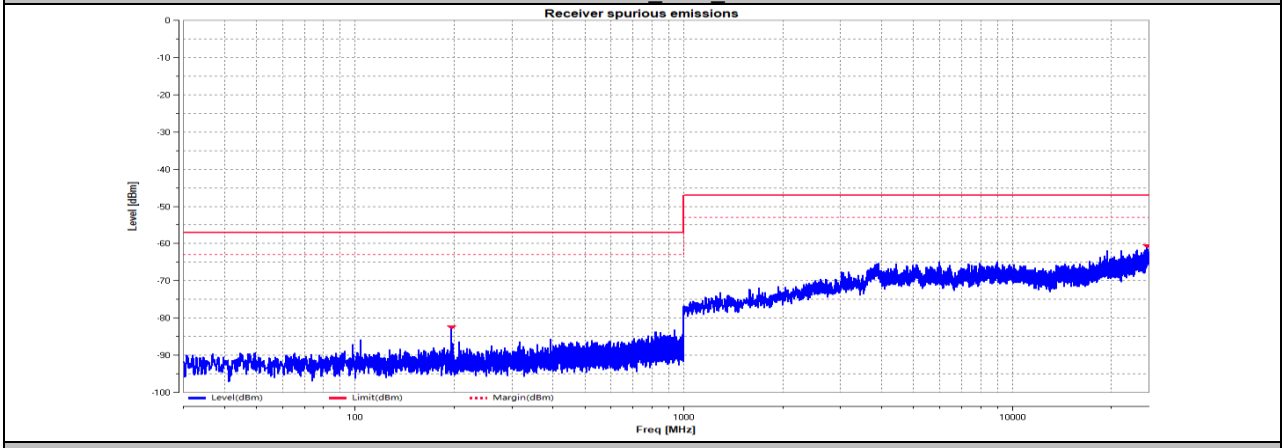
11AX20SISO_Ant1_5745



11AX20SISO_Ant1_5825



11AX40SISO_Ant1_5755

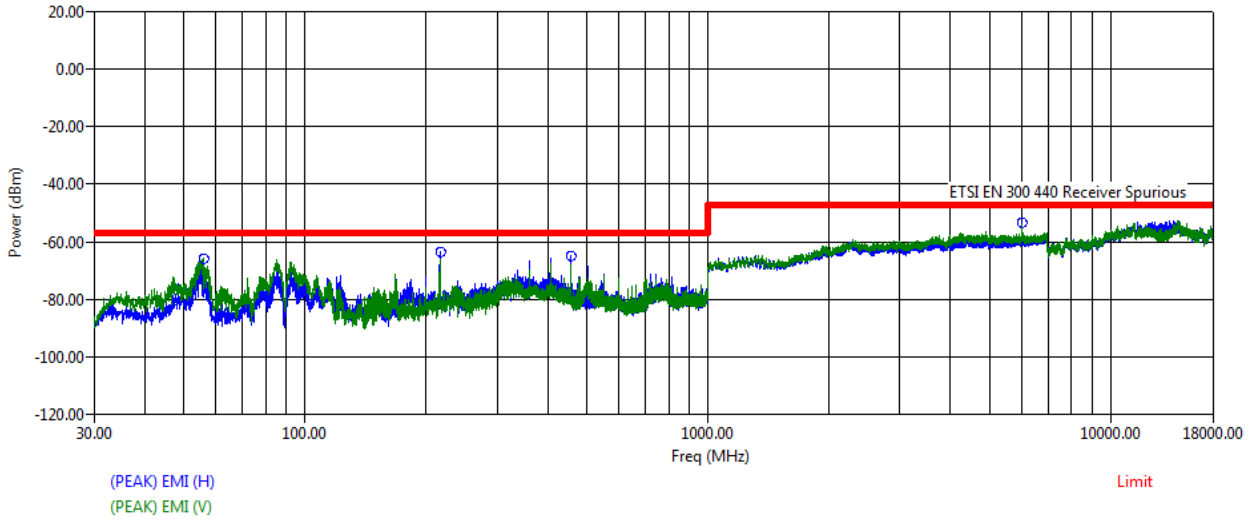


11AX40SISO_Ant1_5795

Note: All the modes had been tested, but only the worst data were recorded in the report.

6.6.3. Radiated Test Result

Receiver spurious emissions above 1 GHz worse case			
Pressure:	101kPa	Measurement Method	Radiated
Test Mode:	802.11a	Channel	Low Channel

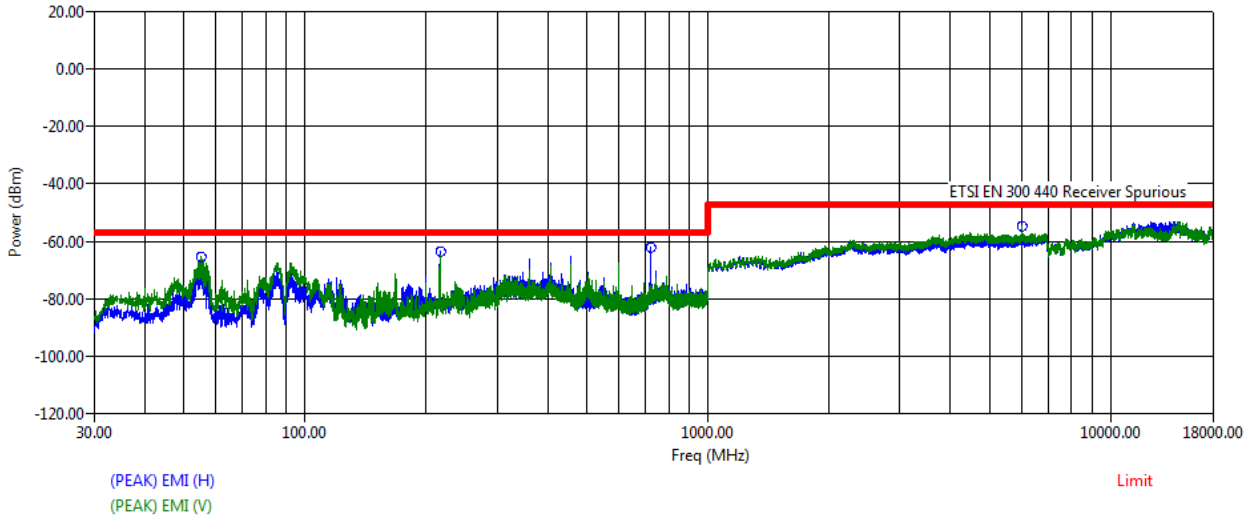


Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Preamp (V) (dB)	Cable (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
55.85	56.94	-80.94	0.00	42.65	0.93	-65.71	-57.00	-8.71
216.00	60.87	-86.68	0.00	42.53	2.00	-66.34	-57.00	-9.34
456.00	54.28	-82.50	0.00	42.77	2.92	-68.08	-57.00	-11.08
6019.50	41.58	-58.69	0.00	48.10	10.68	-54.53	-47.00	-7.53

Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Preamp (H) (dB)	Cable (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
55.85	50.49	-83.73	0.00	42.65	0.93	-74.95	-57.00	-17.95
216.00	63.51	-86.39	0.00	42.53	2.00	-63.41	-57.00	-6.41
456.00	57.28	-82.44	0.00	42.77	2.92	-65.00	-57.00	-8.00
6019.50	44.34	-60.11	0.00	48.10	10.68	-53.19	-47.00	-6.19

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI - Limit

Receiver spurious emissions above 1 GHz worse case			
Pressure:	101kPa	Measurement Method	Radiated
Test Mode:	802.11a	Channel	High Channel



Freq (MHz)	(PEAK) Trace (V) (dBuV)	ERP Factor (V) (dB)	Transducer (V) (dB)	Preamp (V) (dB)	Cable (V) (dB)	(PEAK) EMI (V) (dBm)	Limit (dBm)	(PEAK) Margin (V) (dB)
55.10	57.19	-80.87	0.00	42.65	0.93	-65.40	-57.00	-8.40
216.00	62.34	-86.68	0.00	42.53	2.00	-64.87	-57.00	-7.87
720.15	39.33	-79.23	0.00	42.57	3.65	-78.82	-57.00	-21.82
6019.00	41.39	-58.70	0.00	48.10	10.68	-54.73	-47.00	-7.73

Freq (MHz)	(PEAK) Trace (H) (dBuV)	ERP Factor (H) (dB)	Transducer (H) (dB)	Preamp (H) (dB)	Cable (H) (dB)	(PEAK) EMI (H) (dBm)	Limit (dBm)	(PEAK) Margin (H) (dB)
55.10	53.36	-83.63	0.00	42.65	0.93	-72.00	-57.00	-15.00
216.00	63.44	-86.39	0.00	42.53	2.00	-63.48	-57.00	-6.48
720.15	56.78	-79.89	0.00	42.57	3.65	-62.03	-57.00	-5.03
6019.00	42.65	-60.12	0.00	48.10	10.68	-54.90	-47.00	-7.90

Note: EMI=Trace + Cable(Loss) + ERP Factor + Transducer
Margin=EMI - Limit

Note: 1. All test mode has been tested, but only the worst case data recorded in the report.
2. The low frequency, which started from 18 GHz to 26GHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Note: All the modes had been tested, but only the worst data were recorded in the report.

6.7. RECEIVER BLOCKING

Test Method 1

LIMITS

Receiver Blocking Parameters

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)	
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.				

The minimum performance criterion shall be a PER less than or equal to 10 %.

TEST PROTOCOL

Please refer to ETSI EN 301 893 V2.1.1 (2017-05) Clause 5.4.10.2

Measurement	
☒Conducted measurement	☐Radiated measurement

TEST PROCEDURE

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 Pmin.

• This signal level (Pmin) is increased by 6 dB resulting in a new level (Pmin + 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 Monitoring Device Optional ATT. Spectrum Analyzer Signalling Unit or Companion Device Variable attenuator step size ≤ 1 dB Shielding or Shielded Room Blocking Signal Generator.

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.

TEST SETUP

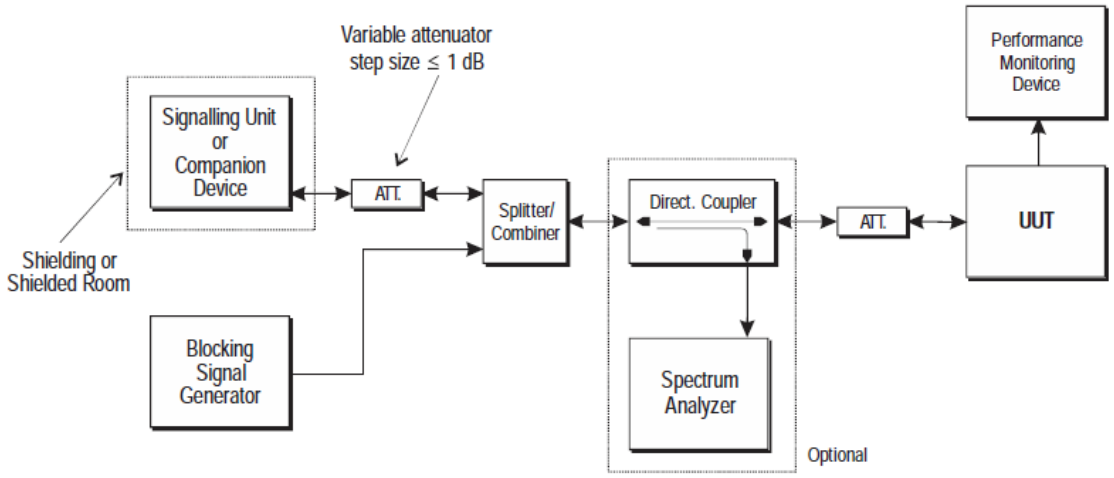


Figure 18: Test Set-up for receiver blocking

Test Method 2

LIMITS

Table 6: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:
- f is the frequency in GHz;
- BW is the occupied bandwidth in MHz.

The factor k is limited within the following:
- -40 dB < k < 0 dB.

The measured blocking level shall be stated in the test report.

TEST PROTOCOL

Please refer to ETSI EN 300 440 V2.2.1 (2018-07)Clause 4.3.4.3

Measurement	
☒Conducted measurement	☐Radiated measurement

TEST PROCEDURE

This measurement shall be conducted under normal conditions.
Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:
a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
b) directly to the receiver permanent or temporary antenna connector.
The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal.

Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the occupied bandwidth above upper band edge of occupied bandwidth.

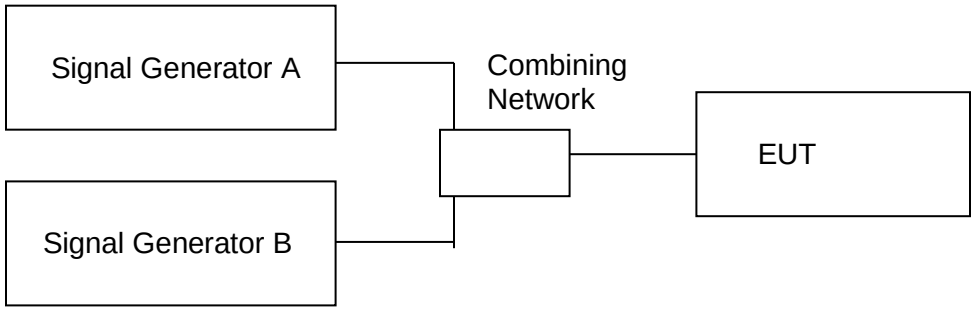
Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.
Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

The measurement shall be repeated with the test frequency for signal generator B at approximately 10 times, 20 times and 50 times of the occupied bandwidth below the lower band edge of the occupied bandwidth.

The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag. to the declared sensitivity of the receiver +3 dB.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.7°C	Relative Humidity	62.8 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Test Method 1

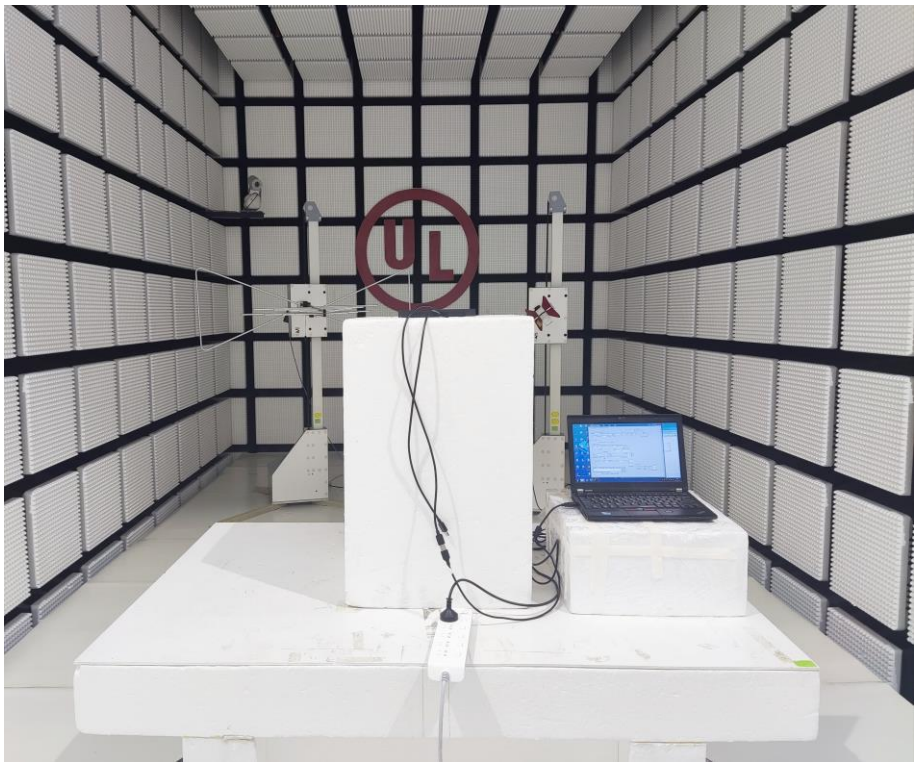
Test Mode	Antenna	Channel	Pmin [dBm]	Wanted signal [dBm]	Freq. [MHz]	CW [dBm]	PER [%]	Limit [%]	Verdict
11A	Ant1	5180	-91	-83	4900	-54.64	8.22%	<=10	PASS
			-91	-83	5000	-48.64	8.57%	<=10	PASS
			-91	-83	5100	-48.64	8.21%	<=10	PASS
			-91	-83	5975	-48.64	8.67%	<=10	PASS
		5500	-90	-84	4900	-54.64	8.91%	<=10	PASS
			-90	-84	5000	-48.64	8.44%	<=10	PASS
			-90	-84	5100	-48.64	8.21%	<=10	PASS
			-90	-84	5975	-48.64	8.54%	<=10	PASS

Test Method 2

Test Mode	Antenna	EUT Channel	Signal Generator Frequency	Signal B Generator Power	Performance Criteria	Limit (dBm)	Result
		(MHz)	(MHz)	(dBm)			
11A	Ant1	5745	5579	-34	PER=0.01%	-72	PASS
			5413	-36	PER=0.01%	-72	PASS
			4914	-35	PER=0.01%	-72	PASS
		5825	5992	-36	PER=0.01%	-72	PASS
			6159	-36	PER=0.01%	-72	PASS
			6659	-37	PER=0.01%	-72	PASS

Note: All the modes had been tested, but only the worst data were recorded in the report.

RADIATED SPURIOUS EMISSIONS TEST PHOTOS



END OF REPORT