






Test Report No:  
2330881R-RFUSV03S-A

## TEST REPORT

### FCC Rules&Regulations

Product Name	Peplink Pepwave Wireless Product
Brand Name	 <b>PEPWAVE</b>
Model No.	UBR Plus UBR-PLUS-LTEA-US-T-PRM
FCC ID	U8G-P1AC200
Applicant's Name / Address	PISMO LABS TECHNOLOGY LIMITED A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong
Manufacturer's Name / Address	PISMO LABS TECHNOLOGY LIMITED A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong
Test Method Requested, Standard	FCC CFR Title 47 Part 15 Subpart E Section 15.407 ANSI C63.10-2013
Verdict Summary	IN COMPLIANCE
Documented By	 Amelia Wu
Approved By	 Rueyyan Lin
Date of Receipt	Mar. 24, 2023
Date of Issue	Jul. 19, 2023
Report Version	V1.0

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Test Setup Photograph: Please refer to the file: 2330881R-Test Setup Photograph

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## Competences and Guarantees

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DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

**IMPORTANT:** No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

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## General Conditions

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1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

## Revision History

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Version	Description	Issued Date
V0.1-Draft	Initial issue of report	Jul. 14, 2023

## Summary of Test Result

Report Clause	Test Items	Result (PASS/FAIL)	Remark
3	AC Power Line Conducted Emission	PASS	-
4	Emission Bandwidth	PASS	-
5	Maximum Conducted Output Power	PASS	-
6	Maximum Power Spectral Density	PASS	-
7	Transmitter Radiated Spurious Emission	PASS	-

### Comments and Explanations

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

## Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.


## 1. General Information

### 1.1. EUT Description

Frequency Range	5180 ~ 5250 MHz 5725 ~ 5850 MHz	
Operating Frequency / Channel Number	IEEE 802.11a	5180 ~ 5240 MHz / 4 Channels
	IEEE 802.11n/ac (20 MHz)	5745 ~ 5825 MHz / 5 Channels
	IEEE 802.11n/ac (40 MHz)	5190 ~ 5230 MHz / 2 Channels 5755 ~ 5795 MHz / 2 Channels
	IEEE 802.11ac (80 MHz)	5210 MHz / 1 Channel 5775 MHz / 1 Channel
Type of Modulation	IEEE 802.11a/n	OFDM-BPSK, QPSK, 16QAM, 64QAM
	IEEE 802.11ac	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM

Accessories Information				
No.	Equipment Name	Brand Name	Model No.	Rating
1	Adapter	DVE	DSA-24PFS-12 FUS 120200	INPUT: 100~240Vac, 50/60Hz, 0.8A OUTPUT: +12.0Vdc, 2.0A, 24.0W

The difference for each model is shown as below:

Brand Name		Model No.	Description
	PEPWAVE	UBR Plus	There is nothing different of two models, just for different marketing use.
		UBR-PLUS-LTEA-US-T-PRM	

From the above models, model: UBR Plus was selected as representative model for the test and its data was recorded in this report.

Antenna Information							
Ant.	Brand Name	Model No.	Type	Antenna Gain (dBi)		Directional Gain (dBi)	
				5GHz Band 1	5GHz Band 4	5GHz Band 1	5GHz Band 4
0	Master Wave	98614PRSX000	Omni-directional	4.10	4.54	7.11	7.55
1	Master Wave	98614PRSX000	Omni-directional	4.10	4.54	7.11	7.55

$$\text{Directional Gain} = 10 \log \left[ \frac{(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2}{N_{\text{Ant}}} \right]$$

#### For IEEE 802.11a/n/ac Mode: (2TX, 2RX)

All of the antenna No. can be used as transmitting/receiving antennas, and them can transmit/receive signal simultaneously.

## 1.2. EUT Information

EUT Voltage	Power Port		DC 10~30V	
			AC 120V/60Hz to DC 12V (power by adapter)	
	802.3at PoE		DC 50~57V	
Product Function	<input checked="" type="checkbox"/>	Indoor AP	<input checked="" type="checkbox"/>	Client
EUT Function	<input checked="" type="checkbox"/>	Point-to-multipoint	<input type="checkbox"/>	Point-to-point
Beamforming Function	<input type="checkbox"/>	With beamforming	<input checked="" type="checkbox"/>	Without beamforming

## 1.3. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15
- ◆ KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

- ◆ KDB 662911 D01 v02r01
- ◆ KDB 412172 D01 v01r01
- ◆ KDB 414788 D01 v01r01



#### 1.4. Testing Location Information

Testing Location Information		
Test Laboratory : DEKRA Testing and Certification Co., Ltd.		
1 (TAF: 3024)	ADD: No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. TEL: +886-3-582-8001 FAX: +886-3-582-8958	
2 (TAF: 3024)	ADD: No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. TEL: +886-3-582-8001 FAX: +886-3-582-8958	
Test site number for address 1 includes HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.		

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
AC Conduction Emission	HC-SR02	Iorg Tseng	26 / 56	2023/06/20
RF Conducted Emission	HC-SR12	Clemens Fang	21 / 65~67	2023/06/28~2023/06/29
Radiated Emission	HC-CB02	Ling Chen	24.1~26.5 / 58~65	2023/06/13~2023/06/19

#### 1.5. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Test Item	Uncertainty
AC Power Line Conducted Emission	± 2.34 dB
Emission Bandwidth	± 636.54 Hz
Maximum Conducted Output Power	± 1.16 dB
Maximum Power Spectral Density	± 2.47 dB
Radiated Emission	± 3.52 dB below 1 GHz ± 3.56 dB above 1 GHz
Radiated Emission Band Edge	± 3.56 dB

## 1.6. List of Test Equipment

### HC-SR02

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	9kHz-30MHz, 4line/100A	2022/12/19	2023/12/18
EMI Test Receiver	R&S	ESR3	102608	9 kHz - 3.6 GHz	2022/09/28	2023/09/27
Two-Line V-Network	R&S	ENV216	100096	9kHz-30MHz	2023/06/02	2024/06/01
Coaxial Cable(9 m)	Harbour	RG-400	HC-SR02	9 kHz-2500 MHz	2022/08/15	2023/08/14
EMI Testing System	AUDIX	e3 210616 dekra V9	HC-SR02	N/A	N/A	N/A

### HC-SR12

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	0.3-40 GHz	2022/11/02	2023/11/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	0.3-40 GHz	2022/11/02	2023/11/01
Pulse Power Sensor	Anritsu	MA2411B	1531044	0.3-40 GHz	2022/11/02	2023/11/01
Signal and Spectrum Analyzer	R&S	FSV40	101869	10Hz-40GHz	2022/07/13	2023/07/12

### HC-CB02

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	10 Hz-40 GHz	2022/09/29	2023/09/28
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1272	30 MHz-2 GHz	2023/04/13	2024/04/12
Double Ridged Horn Antenna	RF SPIN	DRH18-E	211211A18EN	1G-18GHz	2022/11/15	2023/11/14
Horn Antenna	Schwarzbeck	BBHA 9170	203	18G-40GHz	2023/02/13	2024/02/12
Pre-Amplifier	EMCI	EMC01820I	980365	30M-8 GHz,20 dB	2023/04/07	2024/04/06
Pre-Amplifier	EMEC	EM01G18GA	060741	1G-18 GHz,50 dB	2023/05/05	2024/05/04
Pre-Amplifier	DEKRA	AP-400C	201801231	18G-40 GHz,48 dB	2022/09/27	2023/09/26
EMI Test Receiver	R&S	ESR7	102260	10 Hz-7 GHz	2022/12/01	2023/11/30
Magnetic Loop Antenna	Teseq	HLA 6121	44287	0.01-30 MHz	2022/10/21	2023/10/20
Coaxial Cable(13m)	Suhner	SF104	HC-CB02	30M-18 GHz	2022/08/15	2023/08/14
Coaxial Cable(3m)	Suhner,Rosnol	SF102_UP0264	HC-CB02_1	18G-40 GHz 3 m	2022/08/14	2023/08/13
Radiated Software	AUDIX	e3 V9	HC-CB02_1	N/A	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

## 2. Test Configuration of EUT

### 2.1. Test Condition

EUT Operational Condition		
Testing Voltage	Adapter	AC 120V/60Hz to DC 12V
	802.3at PoE	AC 120V/60Hz to DC 56V

### 2.2. Test Channel Mode

Test Software Version	QSPR v5.0-00197
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#### <For Indoor AP and Client Band 4>

Modulation	Frequency (MHz)	Power Setting
802.11a	5180	18.5
	5220	25.0
	5240	22.0
	5745	10.0
	5785	10.0
	5825	9.0
802.11ac (20 MHz)	5180	18.5
	5220	25.0
	5240	22.0
	5745	10.0
	5785	9.5
	5825	9.0
802.11ac (40 MHz)	5190	16.0
	5230	21.0
	5755	10.0
	5795	9.5
802.11ac (80 MHz)	5210	16.0
	5775	8.5

## &lt;For Client Band 1&gt;

Modulation	Frequency (MHz)	Power Setting
802.11a	5180	18.5
	5220	19.5
	5240	19.5
802.11ac (20 MHz)	5180	18.5
	5220	19.5
	5240	19.5
802.11ac (40 MHz)	5190	16.0
	5230	21.0
802.11ac (80 MHz)	5210	16.0

**Reference Data:****<For Indoor AP and Client Band 4>**

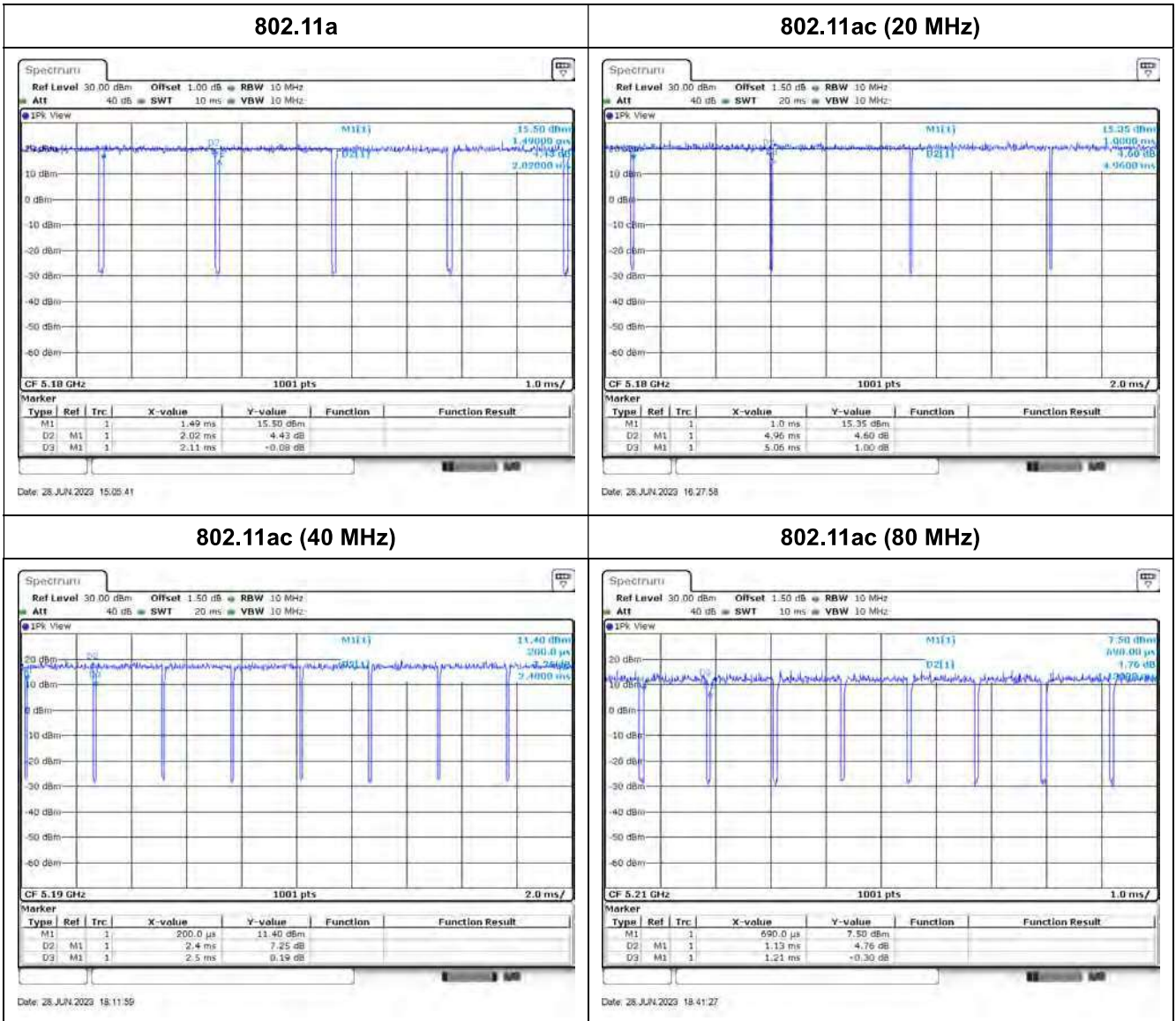
Modulation	Frequency (MHz)	Power Setting
802.11n (20 MHz)	5180	18.5
	5220	25.0
	5240	22.0
	5745	10.0
	5785	9.5
	5825	9.0
802.11n (40 MHz)	5190	16.0
	5230	21.0
	5755	10.0
	5795	9.5

**<For Client Band 1>**

Modulation	Frequency (MHz)	Power Setting
802.11n (20 MHz)	5180	19.5
	5220	19.5
	5240	16.0
802.11n (40 MHz)	5190	21.0
	5230	19.5

### 2.3. Duty Cycle

Modulation	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.020	2.110	95.73	0.189	0.495
802.11ac (20 MHz)	4.960	5.060	98.02	0.087	0.010
802.11ac (40 MHz)	2.400	2.500	96.00	0.177	0.417
802.11ac (80 MHz)	1.130	1.210	93.39	0.297	0.885



## 2.4. The Worst Case Measurement Configuration

Tests Item	AC Power Line Conducted Emission
Test Condition	AC power line conducted measurement for line and neutral
Operating Mode	Transmit
1	EUT + Adapter
2	EUT + 802.3at PoE

Tests Item	Emission Bandwidth Maximum Conducted Output Power Maximum Power Spectral Density
Test Condition	Conducted measurement at transmit chains

Tests Item	Transmitter Radiated Spurious Emission
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Transmit
1	EUT + Adapter
2	EUT + 802.3at PoE
Operating Mode > 1GHz	Transmit

Tests Item	Simultaneous Transmission Analysis - Radiated Emission Co-location
Test Condition	Radiated measurement
Operating Mode	Transmit
1	WiFi 2.4 GHz + WiFi 5 GHz + WWAN module 1: LTE + WWAN module 2: LTE
2	WiFi 2.4 GHz + WiFi 5 GHz + WWAN module 1: LTE + WWAN module 2: WCDMA
3	WiFi 2.4 GHz + WiFi 5 GHz + WWAN module 1: WCDMA + WWAN module 2: WCDMA
Refer to Appendix A for Radiated Emission Co-location.	



Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	Transmit
1	WiFi 2.4 GHz + WiFi 5 GHz + WWAN module 1: LTE + WWAN module 2: LTE
2	WiFi 2.4 GHz + WiFi 5 GHz + WWAN module 1: LTE + WWAN module 2: WCDMA
3	WiFi 2.4 GHz + WiFi 5 GHz + WWAN module 1: WCDMA + WWAN module 2: WCDMA
Refer to DEKRA Test Report No.: 2330881R-RFUSV17S-A for Co-location RF Exposure Evaluation.	

**Note:**

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. For radiated emission below 1 GHz and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
3. The modulation and bandwidth are similar for 802.11n mode for HT20/HT40 and 802.11ac mode for VHT20/VHT40/VHT80, therefore investigated worst case to representative mode in test report.
4. The EUT contains two of the same WWAN module (brand name: AirPrime, model: EM7411, FCC ID: N7NEM74B).
5. There are two modes of EUT, one is power by adapter, and the other is power by 802.3at PoE.
  - (1) For AC power line conducted emission and radiated emission below 1 GHz tests: Both power by adapter, and power by 802.3at PoE were to test and record in this test report.
  - (2) For other test: The powered does not affect the test result, so only power by adapter was tested and recorded in this report.
6. Since the product supports Client and Indoor AP, the test is evaluated to meet the Client and Indoor AP limit respectively. Radiated emission and radiated emission band edge uses the Indoor AP limit performed test.

## 2.5. Tested System Details

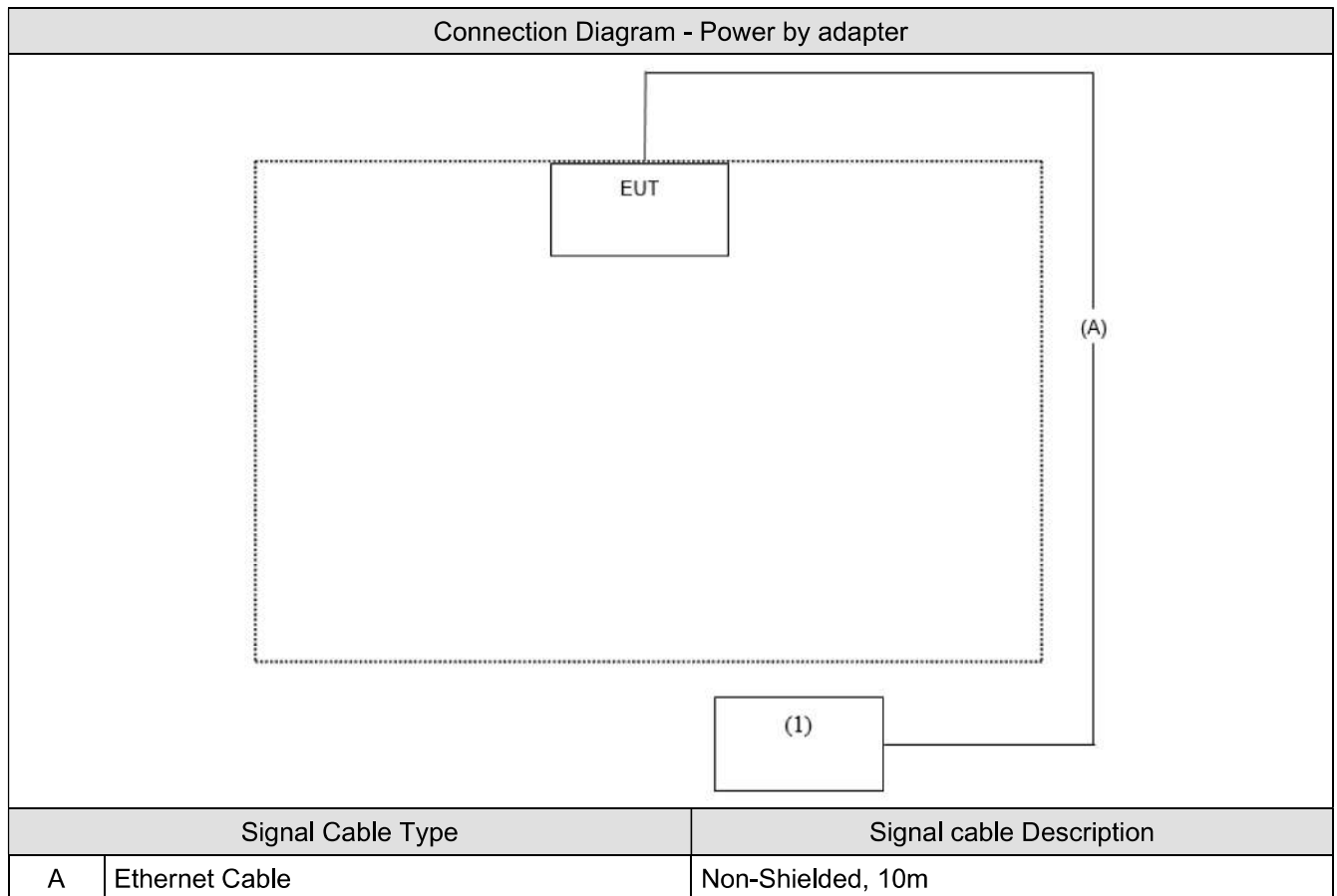
### <Power by adapter>

No.	Equipment	Brand Name	Model No.	Serial No.
1	Notebook	Lenovo	Lenovo Ideapad 110 15IBR	PF0MEEB0

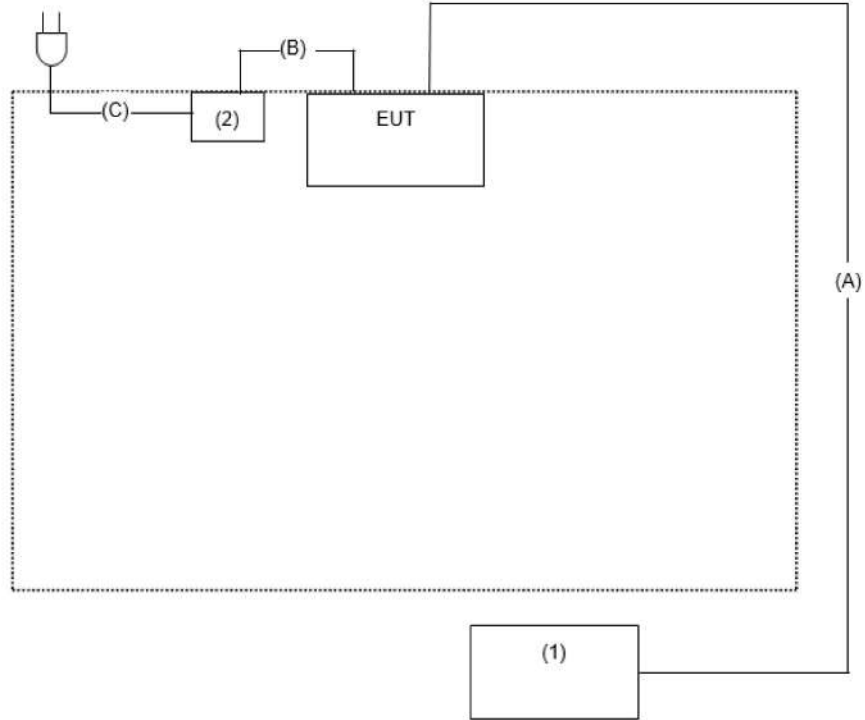
### <Power by 802.3at PoE>

No.	Equipment	Brand Name	Model No.	Serial No.
1	Notebook	Lenovo	Lenovo Ideapad 110 15IBR	PF0MEEB0
2	802.3at PoE	Billion	BP035-560054QAX	N/A

## 2.6. Configuration of tested System



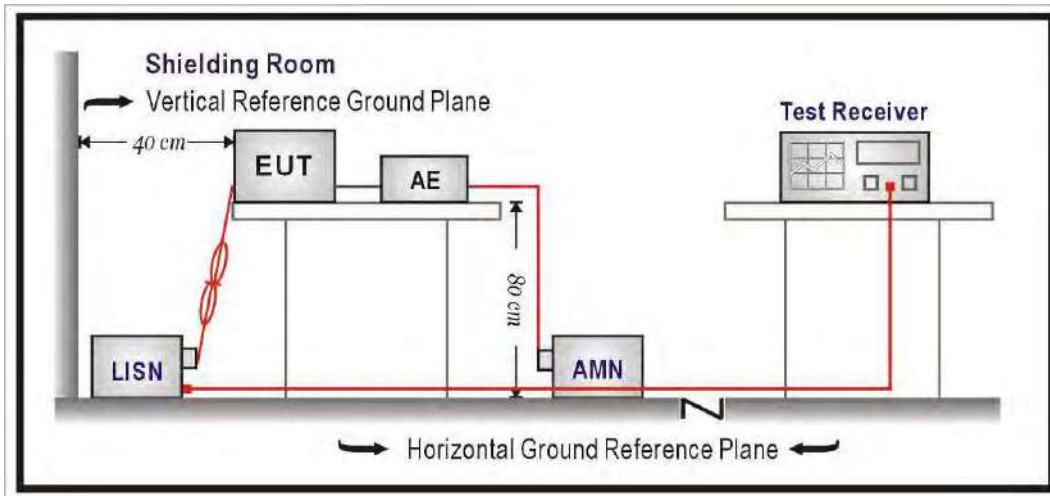
Connection Diagram - Power by 802.03at PoE



Signal Cable Type		Signal cable Description
A	Ethernet Cable	Non-Shielded, 10m
B	Ethernet Cable	Non-Shielded, 2.5m
C	Power Cable	Non-Shielded, 1.8m

### 3. AC Power Line Conducted Emission

#### 3.1. Test Setup



#### 3.2. Test Limit

Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remark: In the above table, the tighter limit applies at the band edges.

#### 3.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

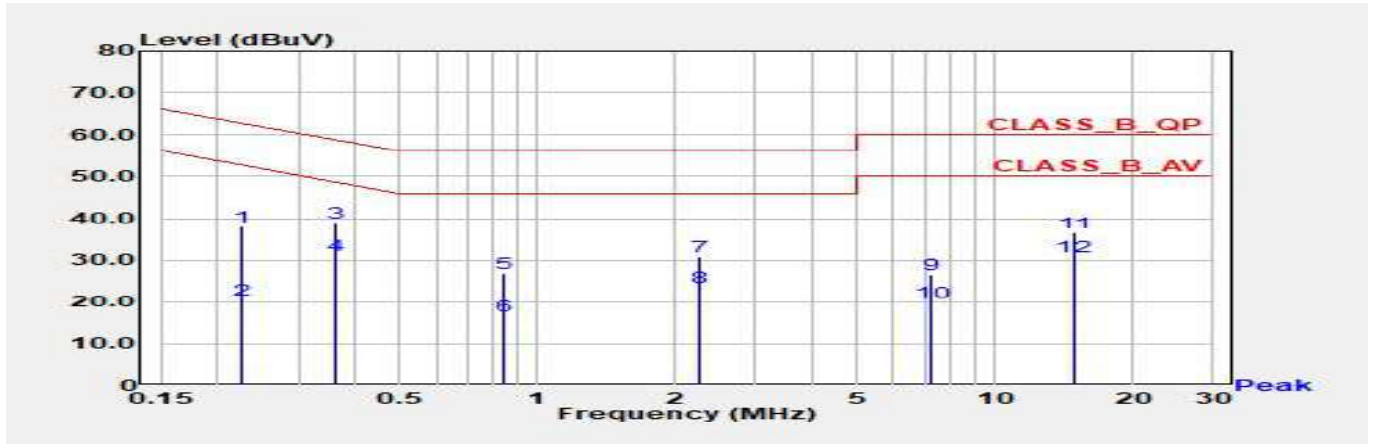
Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

### 3.4. Test Result of AC Power Line Conducted Emission

Test Mode	Mode 1: EUT + Adapter	Phase	Line
Test Condition	802.11ac (20 MHz) / Ant. 0 + Ant. 1 / 5220 MHz		

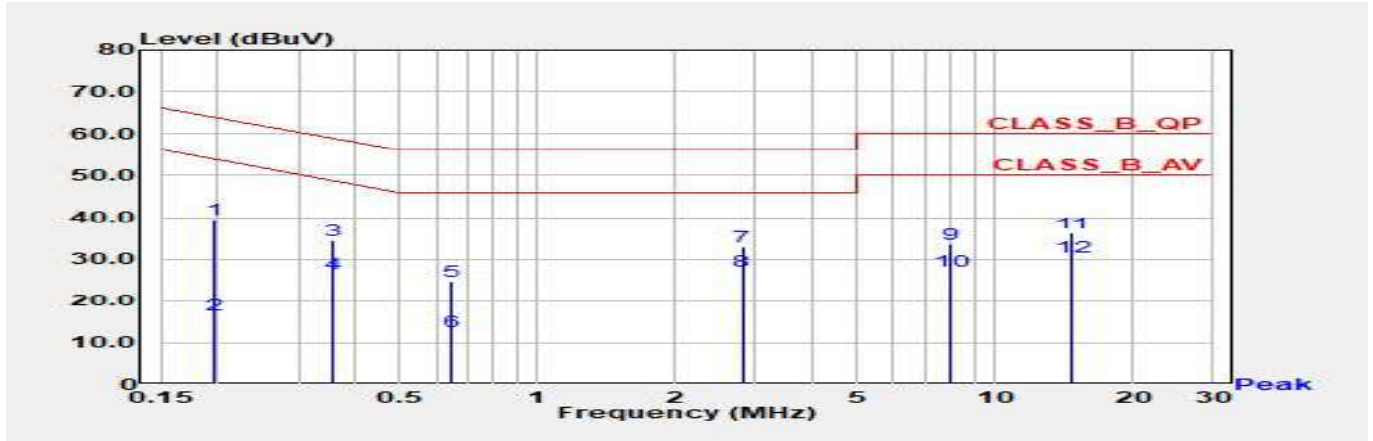


No	Frequency (MHz)	Emission Level (dBUV)	Limit (dBUV)	Margin (dB)	Reading Level (dBUV)	Correct Factor (dB)	Detector Type
1	0.224	37.99	62.66	-24.67	28.12	9.88	QP
2	0.224	20.62	52.66	-32.04	10.75	9.88	AV
*3	0.359	38.88	58.75	-19.86	29.00	9.88	QP
*4	0.359	31.17	48.75	-17.57	21.29	9.88	AV
5	0.845	26.94	56.00	-29.06	17.02	9.92	QP
6	0.845	16.69	46.00	-29.31	6.77	9.92	AV
7	2.267	30.68	56.00	-25.32	20.69	9.99	QP
8	2.267	23.63	46.00	-22.37	13.64	9.99	AV
9	7.258	26.55	60.00	-33.45	16.38	10.18	QP
10	7.258	19.97	50.00	-30.03	9.79	10.18	AV
11	14.822	36.53	60.00	-23.47	26.18	10.35	QP
12	14.822	30.87	50.00	-19.13	20.52	10.35	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

Test Mode	Mode 1: EUT + Adapter	Phase	Neutral
Test Condition	802.11ac (20 MHz) / Ant. 0 + Ant. 1 / 5220 MHz		

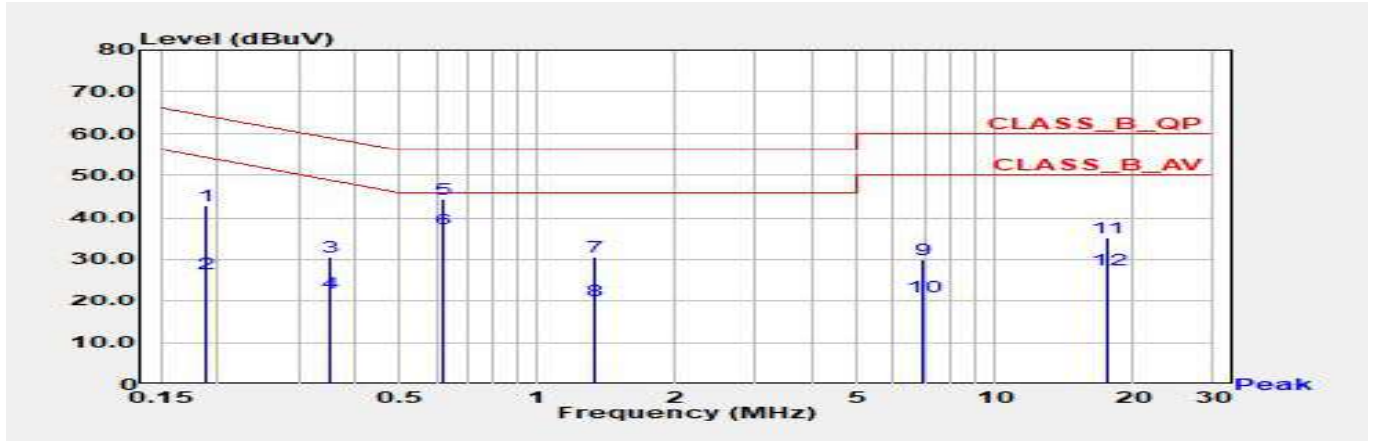


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.197	39.63	63.73	-24.10	29.78	9.85	QP
2	0.197	16.54	53.73	-37.19	6.69	9.85	AV
3	0.355	34.52	58.85	-24.33	24.65	9.87	QP
4	0.355	26.63	48.85	-22.22	16.76	9.87	AV
5	0.645	24.64	56.00	-31.36	14.75	9.89	QP
6	0.645	12.77	46.00	-33.23	2.87	9.89	AV
*7	2.800	32.79	56.00	-23.21	22.79	10.00	QP
*8	2.800	27.19	46.00	-18.81	17.19	10.00	AV
9	8.025	33.39	60.00	-26.61	23.24	10.16	QP
10	8.025	27.08	50.00	-22.92	16.92	10.16	AV
11	14.667	36.21	60.00	-23.79	25.96	10.26	QP
12	14.667	30.56	50.00	-19.44	20.31	10.26	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level – Limit

Test Mode	Mode 2: EUT + 802.3at PoE	Phase	Line
Test Condition	802.11ac (20 MHz) / Ant. 0 + Ant. 1 / 5220 MHz		

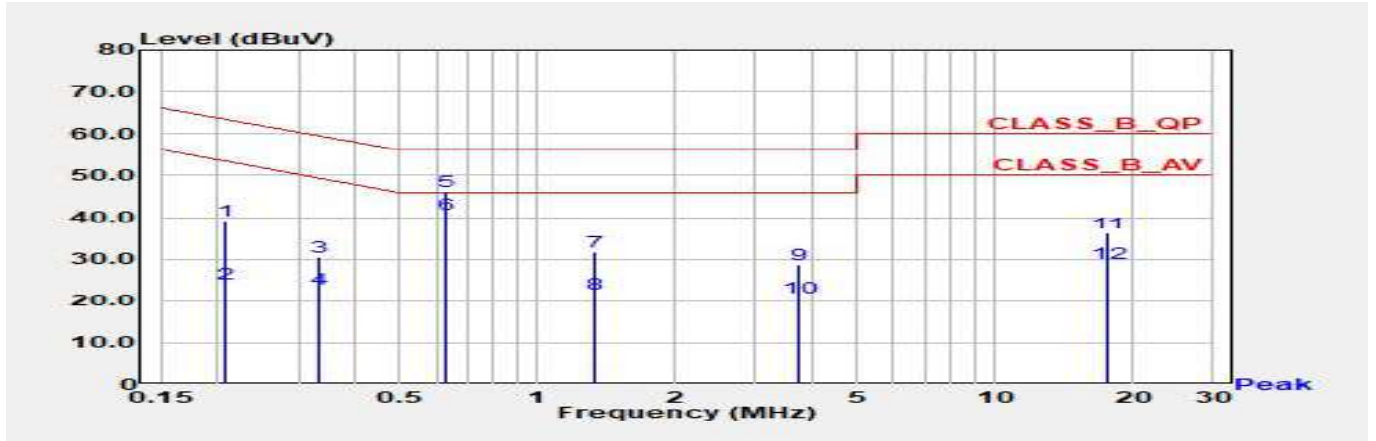


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.188	42.84	64.11	-21.27	32.98	9.87	QP
2	0.188	26.51	54.11	-27.61	16.64	9.87	AV
3	0.350	30.42	58.96	-28.54	20.54	9.88	QP
4	0.350	21.90	48.96	-27.06	12.02	9.88	AV
*5	0.622	44.46	56.00	-11.54	34.56	9.90	QP
*6	0.622	37.14	46.00	-8.86	27.24	9.90	AV
7	1.324	30.45	56.00	-25.55	20.51	9.95	QP
8	1.324	20.20	46.00	-25.80	10.25	9.95	AV
9	6.947	30.00	60.00	-30.00	19.83	10.17	QP
10	6.947	21.08	50.00	-28.92	10.91	10.17	AV
11	17.637	34.94	60.00	-25.06	24.55	10.39	QP
12	17.637	27.60	50.00	-22.40	17.21	10.39	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit

Test Mode	Mode 2: EUT + 802.3at PoE	Phase	Neutral
Test Condition	802.11ac (20 MHz) / Ant. 0 + Ant. 1 / 5220 MHz		



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.206	39.27	63.36	-24.08	29.42	9.85	QP
2	0.206	24.05	53.36	-29.31	14.19	9.85	AV
3	0.334	30.42	59.34	-28.92	20.55	9.87	QP
4	0.334	22.79	49.34	-26.55	12.93	9.87	AV
*5	0.627	46.27	56.00	-9.73	36.38	9.89	QP
*6	0.627	40.65	46.00	-5.35	30.76	9.89	AV
7	1.331	31.70	56.00	-24.30	21.77	9.94	QP
8	1.331	21.84	46.00	-24.16	11.90	9.94	AV
9	3.703	28.74	56.00	-27.26	18.70	10.03	QP
10	3.703	20.75	46.00	-25.25	10.72	10.03	AV
11	17.646	36.18	60.00	-23.82	25.89	10.28	QP
12	17.646	29.02	50.00	-20.98	18.74	10.28	AV

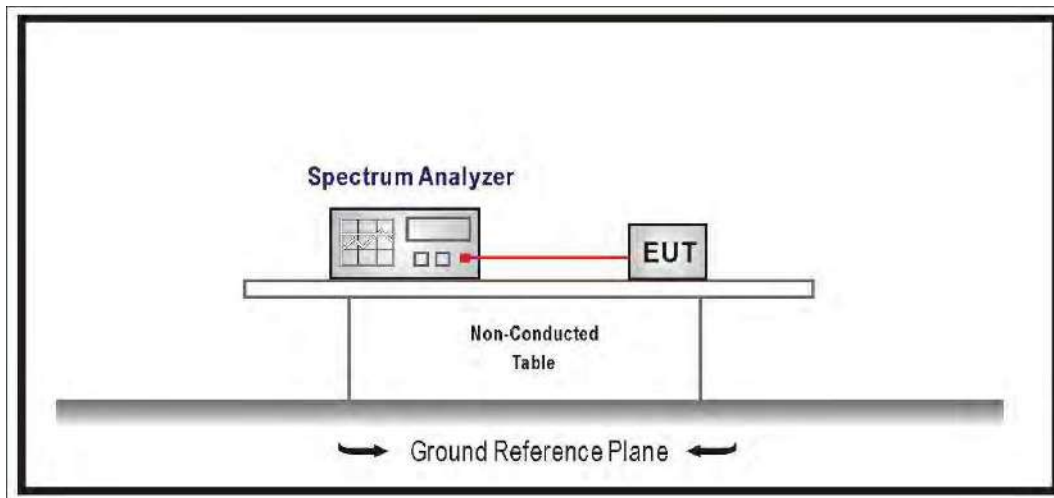
Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit



## 4. Emission Bandwidth

### 4.1. Test Setup



### 4.2. Test Limit

99% & 26dB Bandwidth : No Required

6dB Bandwidth  $\geq$  500kHz

### 4.3. Test Procedure

99% & 26dB Bandwidth :

The EUT was tested according to U-NII test procedure of KDB 789033.

Set RBW 1% of the emission bandwidth, VBW equal to 3 times the RBW.

DTS Bandwidth :

Set RBW = 100kHz, VBW  $\geq$  3xRBW, Sweep time=Auto, Set Peak detector.

#### 4.4. Test Result of Emission Bandwidth

##### <For Indoor AP and Client Band 4>

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth	
802.11a	5180	16.663	16.543	19.540	19.460	-	
	5220	26.853	30.169	44.036	45.235	-	
	5240	16.943	19.620	27.052	35.964	-	
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% Bandwidth	DTS Bandwidth
802.11a	5745	16.703	16.543	16.343	16.303	-	≥ 0.50
	5785	16.663	16.583	16.343	16.303	-	≥ 0.50
	5825	16.623	16.543	16.303	16.303	-	≥ 0.50

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth	
802.11ac (20 MHz)	5180	17.822	17.782	20.819	20.619	-	
	5220	26.933	30.249	45.414	48.951	-	
	5240	18.101	19.860	28.731	38.561	-	
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% Bandwidth	DTS Bandwidth
802.11ac (20 MHz)	5745	17.822	17.742	17.582	17.582	-	≥ 0.50
	5785	17.862	17.782	17.582	17.582	-	≥ 0.50
	5825	17.822	17.742	17.582	17.542	-	≥ 0.50

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth	
802.11ac (40 MHz)	5190	35.964	36.043	39.560	39.081	-	
	5230	36.283	36.603	39.321	71.848	-	
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% Bandwidth	DTS Bandwidth
802.11ac (40 MHz)	5755	35.964	36.043	35.325	35.405	-	≥ 0.50
	5795	36.043	35.964	35.085	35.325	-	≥ 0.50

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth	
802.11ac (80 MHz)	5210	75.604	75.924	83.280	82.480	-	
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% Bandwidth	DTS Bandwidth
802.11ac (80 MHz)	5755	75.764	75.764	76.240	75.120	-	$\geq 0.50$

## &lt;For Client Band 1&gt;

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth
802.11a	5180	16.663	16.543	19.540	19.460	-
	5220	16.743	16.703	20.180	20.380	-
	5240	16.663	16.703	20.020	22.018	-

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth
802.11ac (20 MHz)	5180	17.822	17.782	20.819	20.619	-
	5220	17.902	17.782	21.099	23.137	-
	5240	17.942	17.862	20.939	21.499	-

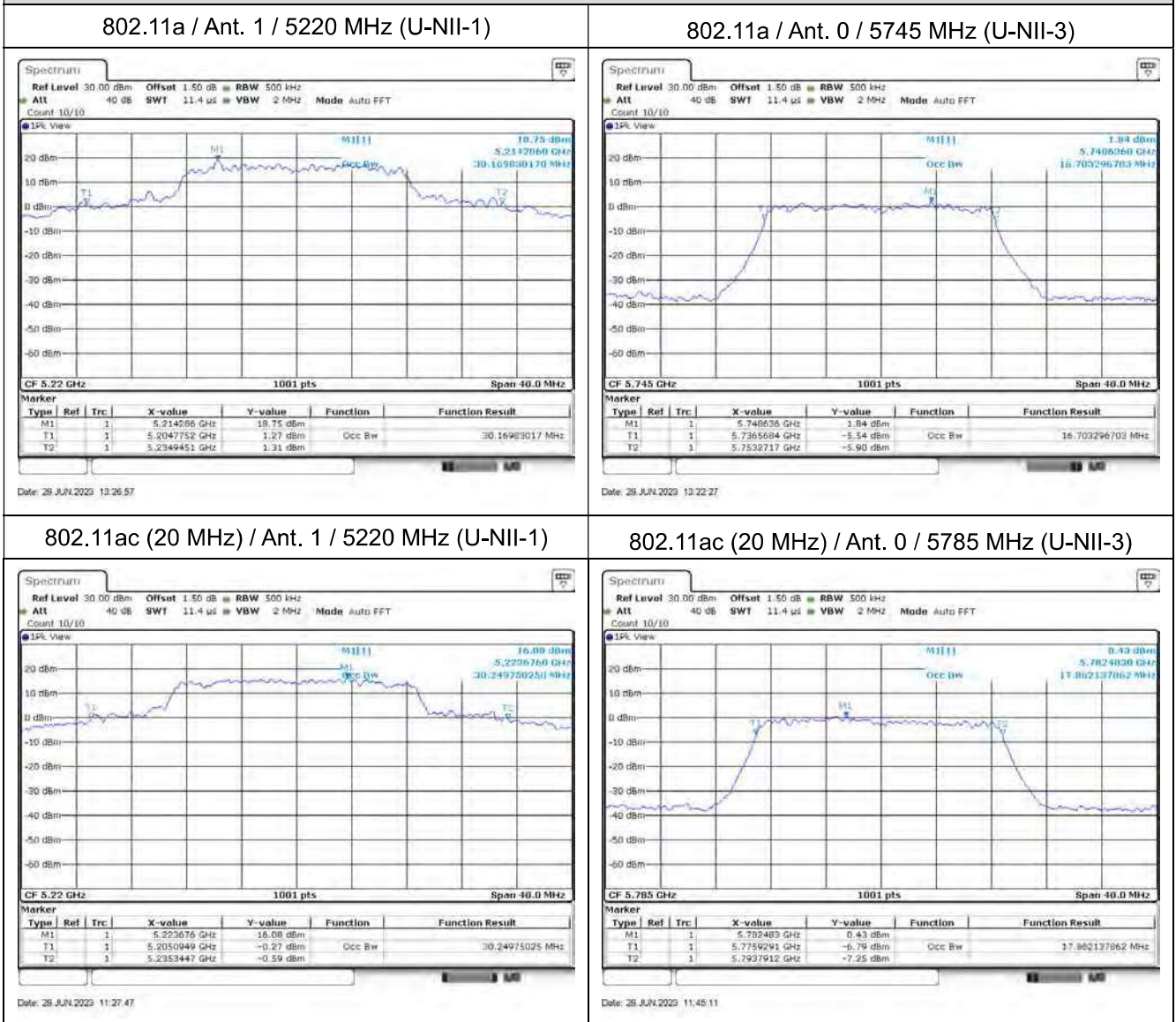
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth
802.11ac (40 MHz)	5190	35.964	36.043	39.560	39.081	-
	5230	36.283	36.603	39.321	71.848	-

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)
		Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth
802.11ac (80 MHz)	5210	75.604	75.924	83.280	82.480	-

For 99% Bandwidth:

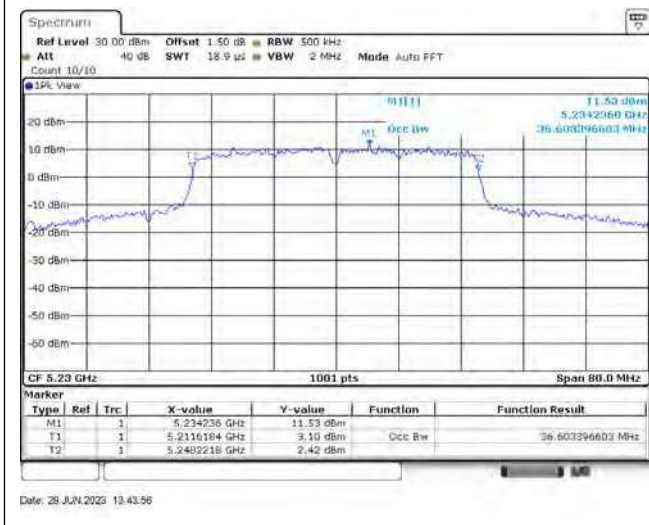
<For Indoor AP and Client Band 4>

Spectrum plot of worst value

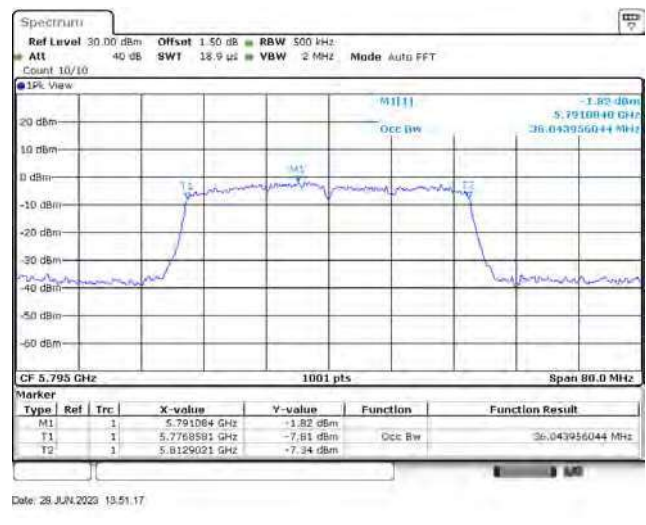


**Spectrum plot of worst value**

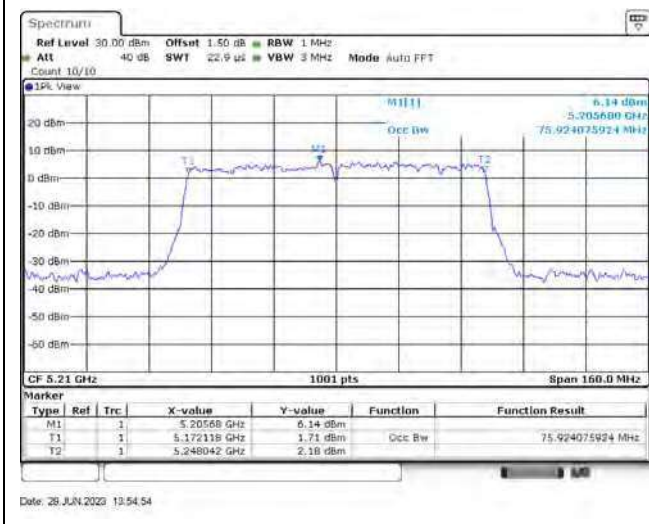
802.11ac (40 MHz) / Ant. 1 / 5230 MHz (U-NII-1)



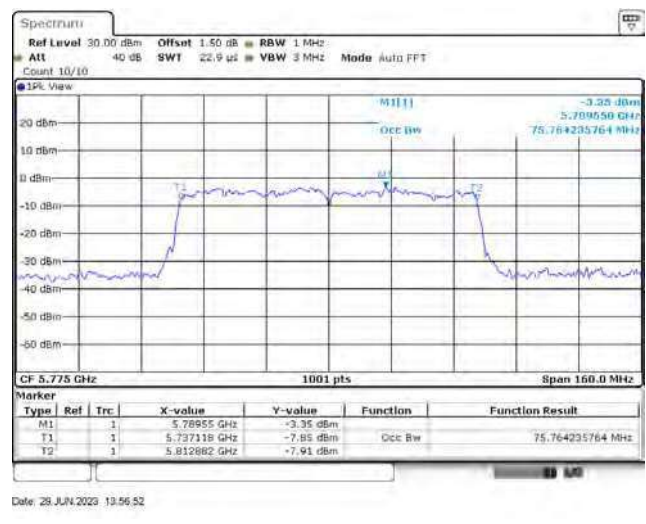
802.11ac (40 MHz) / Ant. 0 / 5795 MHz (U-NII-3)



802.11ac (80 MHz) / Ant. 1 / 5210 MHz (U-NII-1)



802.11ac (80 MHz) / Ant. 0 / 5775 MHz (U-NII-3)





<For Client Band 1>

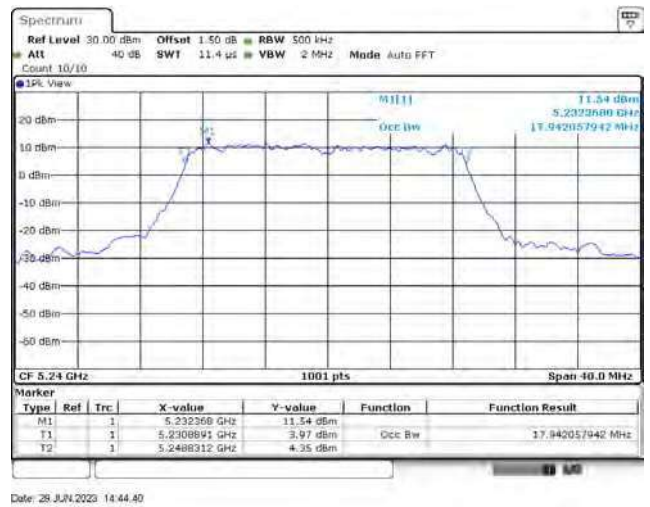
Spectrum plot of worst value

802.11a / Ant.0 / 5220 MHz (U-NII-1)



Date: 28 JUN 2023 14:23:11

802.11ac (20 MHz) / Ant. 0 / 5240 MHz (U-NII-1)



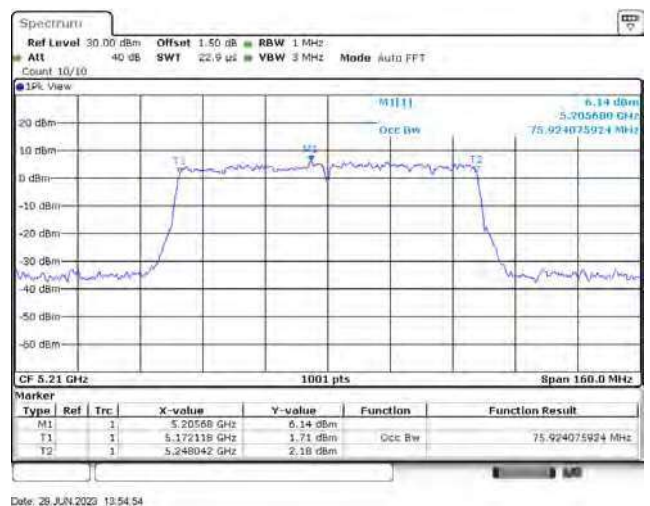
Date: 28 JUN 2023 14:44:40

802.11ac (40 MHz) / Ant. 1 / 5230 MHz (U-NII-1)



Date: 28 JUN 2023 13:43:56

802.11ac (80 MHz) / Ant. 1 / 5210 MHz (U-NII-1)

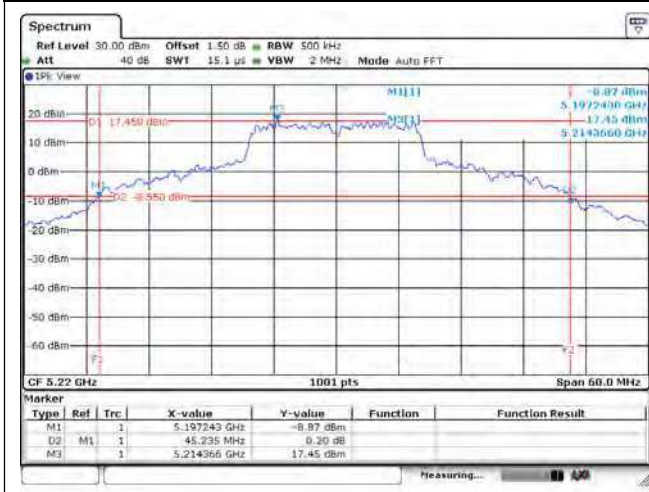


Date: 28 JUN 2023 13:54:54

**For 26dB Bandwidth:**  
**<For Indoor AP Band 1>**

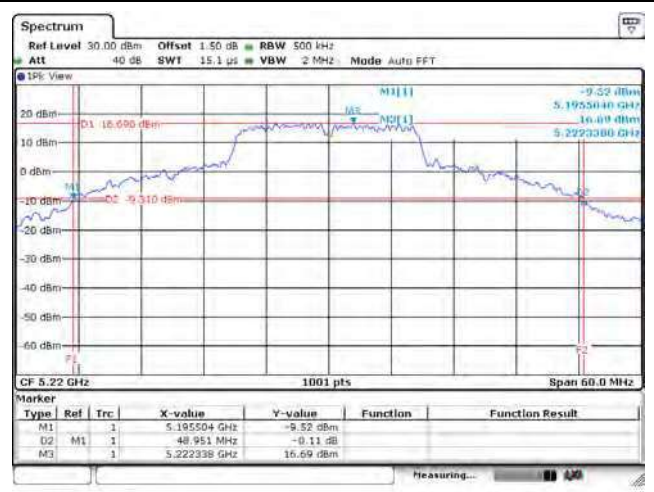
**Spectrum plot of worst value**

802.11a / Ant. 1 / 5220 MHz (U-NII-1)



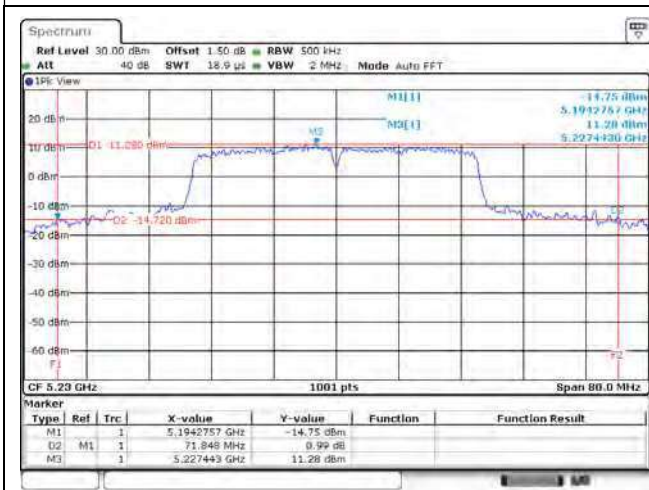
Date: 28 JUN 2023 13:33:27

802.11ac (20 MHz) / Ant. 1 / 5220 MHz (U-NII-1)



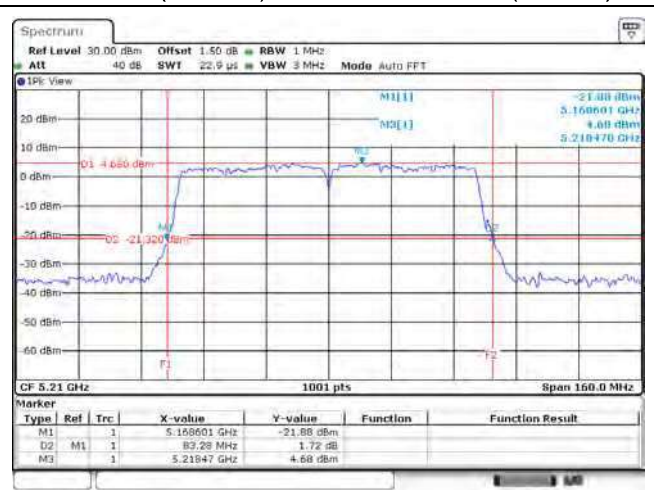
Date: 28 JUN 2023 11:37:35

802.11ac (40 MHz) / Ant. 1 / 5230 MHz (U-NII-1)



Date: 28 JUN 2023 13:44:18

802.11ac (80 MHz) / Ant. 0 / 5210 MHz (U-NII-1)



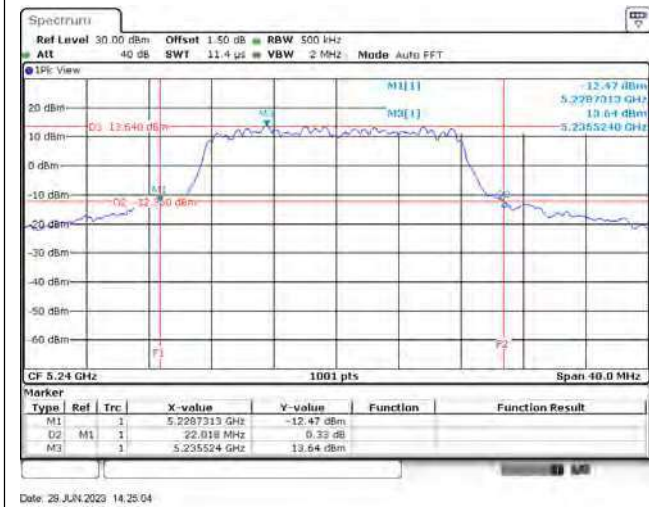
Date: 28 JUN 2023 13:55:27



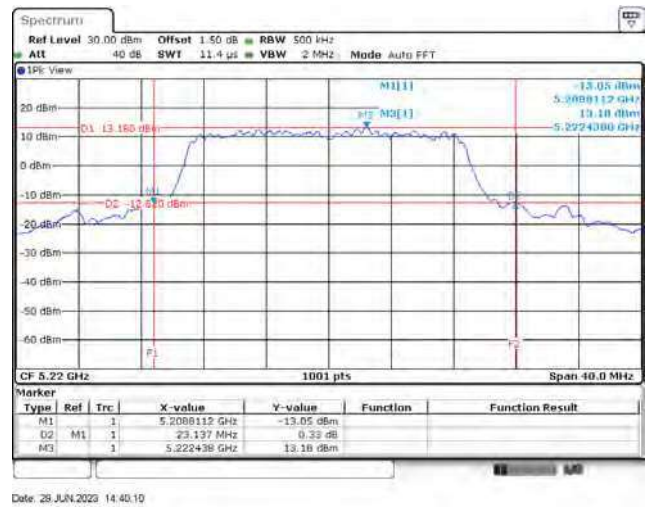
<For Client Band 1>

Spectrum plot of worst value

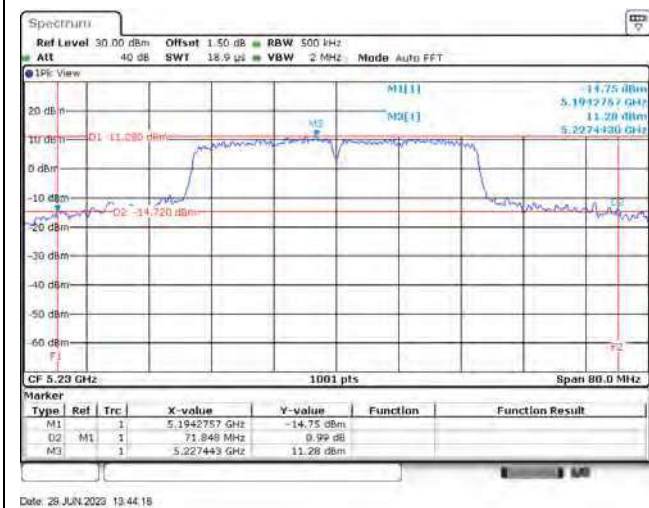
802.11a / Ant. 1 / 5240 MHz (U-NII-1)



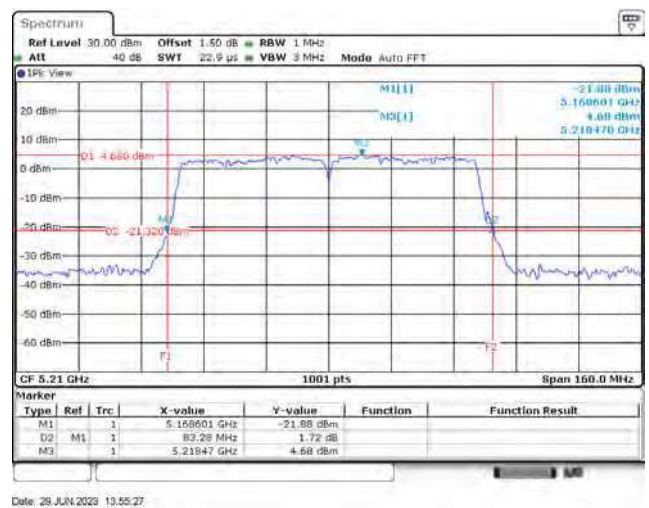
802.11ac (20 MHz) / Ant. 1 / 5220 MHz (U-NII-1)



802.11ac (40 MHz) / Ant. 1 / 5230 MHz (U-NII-1)



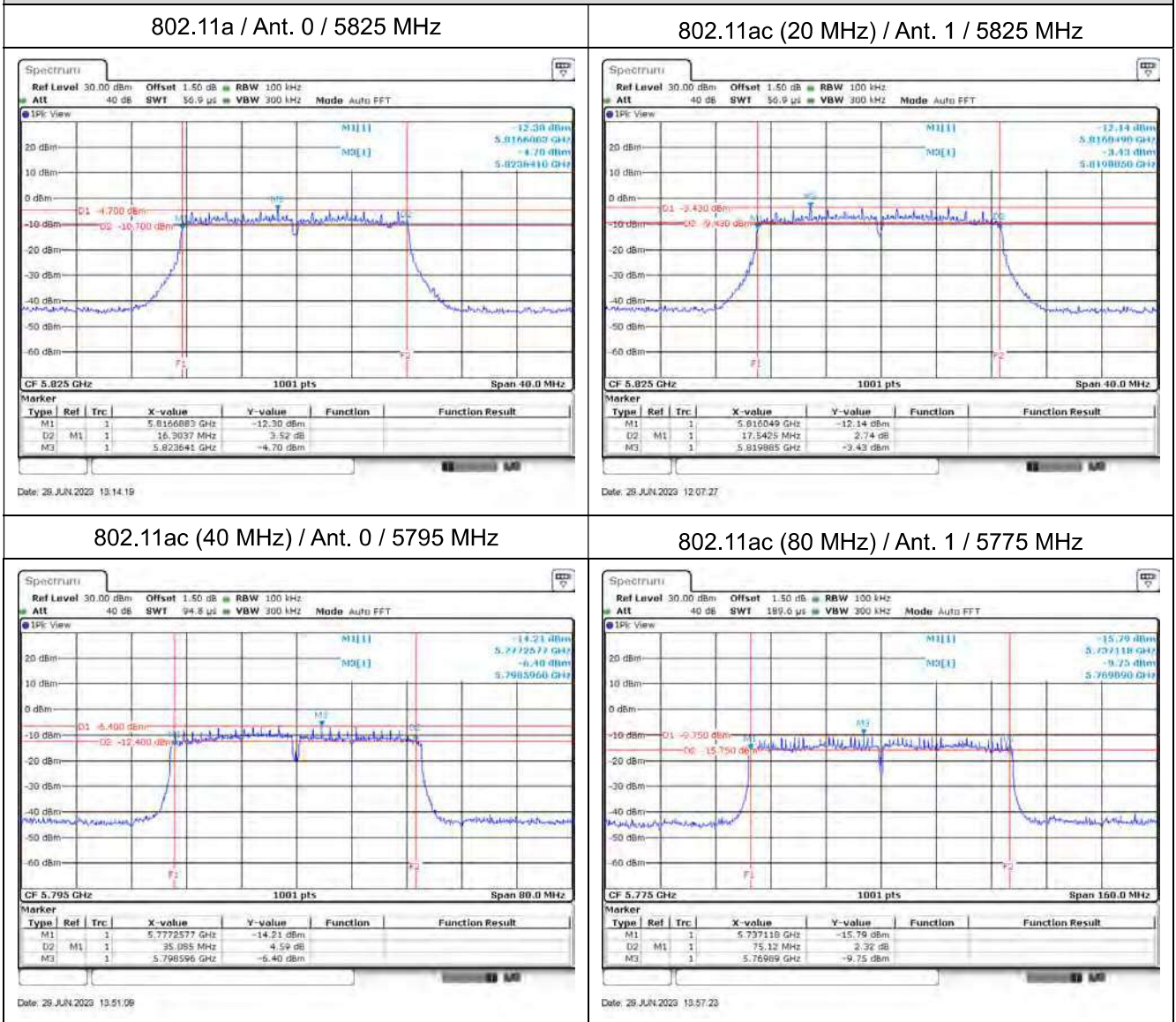
802.11ac (80 MHz) / Ant. 0 / 5210 MHz (U-NII-1)



**For DTS Bandwidth:**

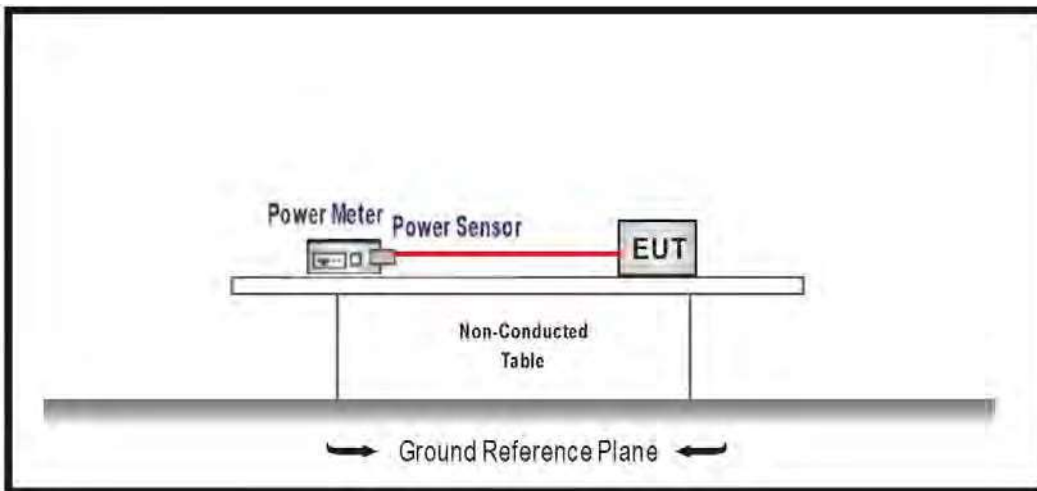
**<For Indoor AP and Client Band 4>**

**Spectrum plot of worst value**



## 5. Maximum Conducted Output Power

### 5.1. Test Setup



### 5.2. Test Limit

1. For an outdoor access point and an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 5.3. Test Procedure

The EUT was setup to ANSI C63.10: 2013; tested to U-NII test procedure of KDB 789033.

## 5.4. Test Result of Maximum Conducted Output Power

### <For Indoor AP and Client Band 4>

Modulation	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Limit (dBm)	Result
		Ant. 0	Ant. 1	Total		
802.11a	5180	17.26	18.34	20.84	≤30.00	Pass
	5220	23.24	23.47	26.37	≤30.00	Pass
	5240	20.86	21.37	24.13	≤30.00	Pass
	5745	8.76	9.57	12.19	≤30.00	Pass
	5785	8.94	9.74	12.37	≤30.00	Pass
	5825	8.28	8.78	11.55	≤30.00	Pass
802.11ac (20 MHz)	5180	17.03	18.24	20.69	≤30.00	Pass
	5220	23.17	23.54	26.37	≤30.00	Pass
	5240	20.74	21.34	24.06	≤30.00	Pass
	5745	8.75	9.62	12.22	≤30.00	Pass
	5785	8.48	9.07	11.80	≤30.00	Pass
	5825	8.17	8.86	11.54	≤30.00	Pass
802.11ac (40 MHz)	5190	14.91	16.05	18.53	≤30.00	Pass
	5230	20.16	20.85	23.53	≤30.00	Pass
	5755	8.81	9.55	12.21	≤30.00	Pass
	5795	8.62	9.03	11.84	≤30.00	Pass
802.11ac (80 MHz)	5210	14.88	15.97	18.47	≤30.00	Pass
	5775	7.47	8.12	10.82	≤30.00	Pass

### <For Client Band 1>

Modulation	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Limit (dBm)	Result
		Ant. 0	Ant. 1	Total		
802.11a	5180	17.26	18.34	20.84	≤24.00	Pass
	5220	18.44	19.25	21.87	≤24.00	Pass
	5240	18.56	19.32	21.97	≤24.00	Pass
802.11ac (20 MHz)	5180	17.03	18.24	20.69	≤24.00	Pass
	5220	18.41	19.29	21.88	≤24.00	Pass
	5240	18.57	19.26	21.94	≤24.00	Pass
802.11ac (40 MHz)	5190	14.91	16.05	18.53	≤24.00	Pass
	5230	20.16	20.85	23.53	≤24.00	Pass
802.11ac (80 MHz)	5210	14.88	15.97	18.47	≤24.00	Pass

**Reference Data:****<For Indoor AP and Client Band 4>**

Modulation	Frequency (MHz)	Maximum Conducted Output Power (dBm)		
		Ant. 0	Ant. 1	Total
802.11n (20 MHz)	5180	16.92	18.09	20.55
	5220	23.04	23.36	26.21
	5240	20.58	21.21	23.92
	5745	8.63	9.45	12.07
	5785	8.33	8.96	11.67
	5825	8.00	8.71	11.38
802.11n (40 MHz)	5190	14.80	15.89	18.39
	5230	20.01	20.72	23.39
	5755	8.67	9.43	12.08
	5795	8.51	8.88	11.71

**<For Client Band 1>**

Modulation	Frequency (MHz)	Maximum Conducted Output Power (dBm)		
		Ant. 0	Ant. 1	Total
802.11n (20 MHz)	5180	16.91	18.07	20.54
	5220	18.26	19.18	21.75
	5240	18.40	19.11	21.78
802.11n (40 MHz)	5190	14.80	15.91	18.40
	5230	20.02	20.70	23.38