FCC Test Report

Product Name	:	Handheld Terminal
Brand Name	:	KEYENCE
Model No.	:	DX-W600
FCC ID	:	RF41539G
Applicant	:	Keyence Corporation
Address	:	1-3-14 Higashinakajima, Higashiyodagawa-ku Osaka 533-8555 Japan
Date of Receipt	:	May 23, 2022
Issued Date	:	Jul. 21, 2022
Report No.	:	2250673R-RFUSWL5V01-A
Report Version	:	V1.0

Testing Laboratory
3024

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
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.

Product Name	:	Handheld Terminal
Applicant	:	Keyence Corporation
Address	:	1-3-14 Higashinakajima, Higashiyodagawa-ku Osaka 533-8555 Japan
Manufacturer	:	KEYENCE CORPORATION
Address	:	1-3-14 Higashinakajima, Higashiyodagawa-ku Osaka 533-8555 Japan
Brand Name	:	KEYENCE
Model No.	:	DX-W600
FCC ID	:	RF41539G
EUT Voltage	:	DC 5V (host equipment) DC 3.8V (li-ion battery)
Testing Voltage	:	AC 120V/60Hz
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart E Section 15.407 ANSI C63.10: 2013
Laboratory Name	:	DEKRA Testing and Certification Co., Ltd. Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.
Test Result	:	Complied

Documented By : Amelia Wu

(Amelia Wu / Project Specialist)

Approved By : Rueyyan.Lin

(Rueyyan Lin / Supervisor)

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jul. 21, 2022

TABLE OF CONTENTS

1. General Information

1.1 EUT Description

Product Name	Handheld Terminal	
Brand Name	KEYENCE	
Model No.	DX-W600	
Frequency Range / Channel Number	IEEE 802.11a / IEEE 802.11n (20 MHz) / IEEE 802.11ac (20 MHz)	5180 ~ 5240 MHz / 4 Channels 5260 ~ 5320 MHz / 4 Channels 5500 ~ 5700 MHz / 11 Channels 5745 ~ 5825 MHz / 5 Channels
	IEEE 802.11n (40 MHz) / IEEE 802.11ac (40 MHz)	5190 ~ 5230 MHz / 2 Channels 5270 ~ 5310 MHz / 2 Channels 5510 ~ 5670 MHz / 5 Channels 5755 ~ 5795 MHz / 2 Channels
	IEEE 802.11ac (80 MHz)	5210 MHz / 1 Channel 5290 MHz / 1 Channel 5530 ~ 5610 MHz / 2 Channels 5775 MHz / 1 Channel
Type of Modulation	IEEE 802.11a/n/ac	OFDM
Data Rate	IEEE 802.11a	6, 9, 12, 18, 24, 36, 48, 54 Mbps
	IEEE 802.11n	Support a subset of the combination of GI, MCS 0 ~ MCS 15 and bandwidth defined in 802.11n
	IEEE 802.11ac	Support a subset of the combination of GI, MCS 0 ~ MCS 9 and bandwidth defined in 802.11ac
TPC Function	☐	With TPC Function
	☒	Without TPC Function
Weather Band (5600 ~ 5650 MHz)	☒	With 5600 ~ 5650 MHz
	☐	Without 5600 ~ 5650 MHz

Accessories Information				
No.	Equipment Name	Brand Name	Model No.	Rating
1	Li-ion Battery	KEYENCE	DX-BQ6	3.8Vdc (23.02Wh), 6060mAh

Antenna Information						
Ant.	Brand Name	Model No.	Type	Antenna Gain (dBi)	Maximum Antenna Gain (dBi)	Directional Gain (dBi)
0	ARISTOTLE ENTERPRISES INC.	RFA-25-F77-40-42	PIFA	-0.11	-0.11	-7.60
1	ARISTOTLE ENTERPRISES INC.	RFA-25-F77-40-42	PIFA	-10.23		

Directional Gain = 10log $[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{Ant}]$

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

Both Ant. 0 and Ant. 1 can be used as transmitting/receiving antennas, and them can transmit/receive signal simultaneously.

IEEE 802.11a & IEEE 802.11n/ac (20 MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz	48	5240 MHz
52	5260 MHz	56	5280 MHz	60	5300 MHz	64	5320 MHz
100	5500 MHz	104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz	128	5640 MHz
132	5660 MHz	136	5680 MHz	140	5700 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz	165	5825 MHz

IEEE 802.11n/ac (40 MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz	62	5310 MHz
102	5510 MHz	110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	151	5755 MHz	159	5795 MHz	-	-

IEEE 802.11ac (80 MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz	122	5610 MHz
155	5775 MHz	-	-	-	-	-	-

Note:

1. Regards to the frequency band operation; the lowest﹑middle and highest frequency of channel were selected to perform the test, and then shown on this report.
2. The above EUT information is declared by the manufacturer.

1.2 Test Mode

DEKRA has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

Test Mode	Mode 1: Transmit

Test Items	Test Mode	Modulation	Channel	Antenna	Result
AC Power Line Conducted Emission	Mode 1	11ac (40 MHz)	38	0+1	Pass
Emission Bandwidth	Mode 1	11a	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (20 MHz)	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (40 MHz)	38/46/54/62/102/110/134/151/159	0+1	Pass
		11ac (80 MHz)	42/58/106/122/155	0+1	Pass
Maximum Conducted Output Power	Mode 1	11a	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (20 MHz)	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (40 MHz)	38/46/54/62/102/134/151/159	0+1	Pass
		11ac (80 MHz)	42/58/106/122/155	0+1	Pass
Maximum Power Spectral Density	Mode 1	11a	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (20 MHz)	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (40 MHz)	38/46/54/62/102/134/151/159	0+1	Pass
		11ac (80 MHz)	42/58/106/122/155	0+1	Pass
Radiated Emission Below 1 GHz	Mode 1	11ac (40 MHz)	38	0+1	Pass
Radiated Emission Above 1 GHz	Mode 1	11a	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (20 MHz)	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (40 MHz)	38/46/54/62/102/110/134/151/159	0+1	Pass
		11ac (80 MHz)	42/58/106/122/155	0+1	Pass
Radiated Emission Band Edge	Mode 1	11a	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (20 MHz)	36/44/48/52/60/64/100/116/140/149/157/165	0+1	Pass
		11ac (40 MHz)	38/46/54/62/102/110/134/151/159	0+1	Pass
		11ac (80 MHz)	42/58/106/122/155	0+1	Pass

Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. The worst case of data rate for 802.11a is 6 Mbps, for 802.11ac (20 MHz)/802.11ac (40 MHz)/802.11ac (80 MHz) are MCS 0, Nss1.

3. For below 1 GHz radiated emission and AC Power Line Conducted Emission have performed all modes of operation were investigated and the worst-case emissions are reported.
4. The modulation and bandwidth are similar for 802.11n mode for HT20/HT40 and 802.11ac mode for VHT20/VHT40, therefore investigated worst case to representative mode in test report.
5. The EUT was performed at X axis, Y axis and Z axis position for radiated emission and band edge tests. The worst case was found at Z axis, so the measurement will follow this same test configuration.

1.3 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.

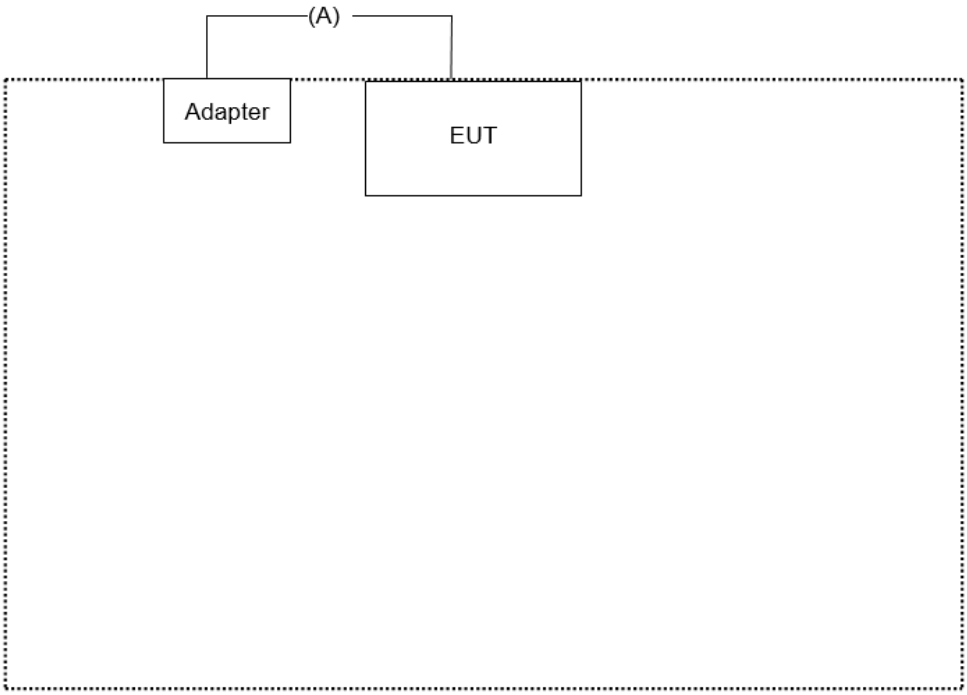
1.4 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system.

	Product	Manufacturer	Model No.	Serial No.
1	Adapter	ASUS	PA-1070-07	N/A

1.5 Configuration of tested System

Connection Diagram



	Signal Cable Type	Signal cable Description
A	USB cable	Shielded, 0.6m

1.6 EUT Operation of during Test

1	Set the EUT as shown.
2	Execute the control software MP tool (Version 0.0001.1020.2018)
3	Configure test mode, test channel and data rate.
4	Let the EUT start transmit continuously.
5	Verify that device is working properly

1.7 Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	AC Power Line Conducted Emission	23.9	Ling Chen	2022/06/07	HC-SR02
Humidity (%RH)		60			
Temperature (°C)	99% & 26dB & DTS Bandwidth	24.3	Scott Chang	2022/06/10 ~ 2022/06/11	HC-SR12
Humidity (%RH)		58			
Temperature (°C)	Maximum Conducted Output Power	24.3	Scott Chang	2022/06/10 ~ 2022/06/11	HC-SR12
Humidity (%RH)		58			
Temperature (°C)	Maximum Power Spectral Density	24.3	Scott Chang	2022/06/10 ~ 2022/06/11	HC-SR12
Humidity (%RH)		58			
Temperature (°C)	Radiated Emission	23.2 ~ 23.6	Ling Chen	2022/06/06 ~ 2022/06/08	HC-CB04
Humidity (%RH)		59 ~ 60			
Temperature (°C)	Radiated Emission Band Edge	23.2 ~ 24.2	Ling Chen Gray Liao	2022/06/02 ~ 2022/06/06	HC-CB04
Humidity (%RH)		59 ~ 60			

Note: Test site information refers to Laboratory Information.

USA	**:**	**FCC Registration Number: TW3024**
Canada		**CAB identifier : TW3024**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: 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.	

1.8 List of Test Equipment

HC-SR02

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2021/12/27	2022/12/26
EMI Test Receiver	R&S	ESR3	102608	2022/05/30	2023/05/29
LISN	R&S	ENV216	100092	2022/04/29	2023/04/28
Coaxial Cable(9 m)	Harbour	RG-400	HC-SR02	2021/08/15	2022/08/14
DEKRA Testing System	DEKRA	Version 2.0	HC-SR02	N/A	N/A

HC-SR12

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2021/11/12	2022/11/11
Pulse Power Sensor	Anritsu	MA2411B	1531043	2021/11/12	2022/11/11
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Pulse Power Sensor	Anritsu	MA2411B	1531044	2021/11/12	2022/11/11
Power Meter	Keysight	8990B	MY51000248	2022/05/06	2023/05/05
Power Sensor	Keysight	N1923A	MY57240005	2022/05/06	2023/05/05
Spectrum Analyzer	Keysight	N9030B	MY57140404	2022/05/03	2023/05/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2022/03/15	2023/03/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2022/05/08	2023/05/07
Signal & Spectrum Analyzer	R&S	FSV40	101049	2022/04/25	2023/04/24

HC-CB04

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2021/10/22	2022/10/21
Signal & Spectrum Analyzer	R&S	FSV40	101049	2022/04/25	2023/04/24
Signal and Spectrum Analyzer	R&S	FSVA40	101435	2022/05/30	2023/05/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1272	2022/05/19	2023/05/18
Horn Antenna	Schwarzbeck	BBHA 9120D	01640	2021/09/03	2022/09/02
Horn Antenna	Schwarzbeck	BBHA 9170	203	2022/02/23	2023/02/22
Pre-Amplifier	EMCI	EMC01820I	980365	2022/04/15	2023/04/14
Pre-Amplifier	EMEC	EM01G18GA	060835	2021/07/12	2022/07/11
Pre-Amplifier	DEKRA	AP-400C	201801231	2021/12/24	2022/12/23
Coaxial Cable(10m)	Suhner	SF102_SF104	HC-CB04	2021/08/09	2022/08/08
Coaxial Cable(3m)	Suhnerr,Rosnol	SF102_Rosnol	HC-CB04	2021/08/17	2022/08/18
EMI Test Receiver	R&S	ESR7	102260	2021/12/22	2022/12/21
Magnetic Loop Antenna	Teseq	HLA 6121	44287	2021/09/06	2022/09/05
Radiated Software	AUDIX	e3 V9	HC-CB04	N/A	N/A

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

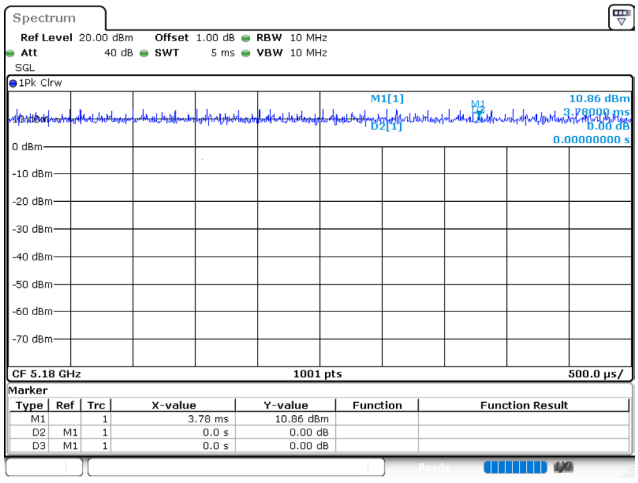
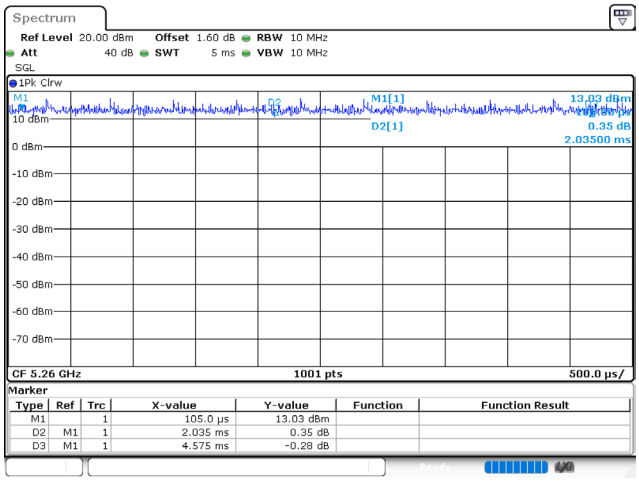
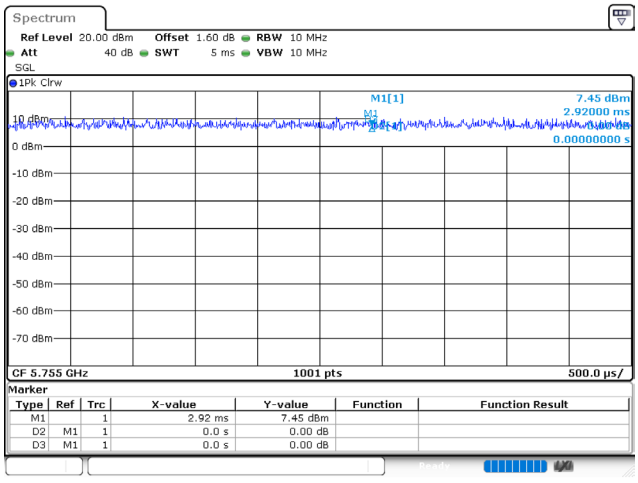
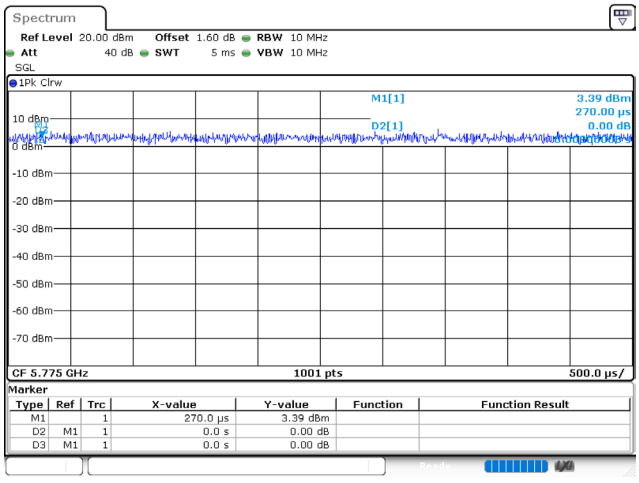
1.9 Measurement Uncertainty

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	± 2.10 dB
99% & 26dB & DTS Bandwidth	± 636.54 Hz
Maximum Conducted Output Power	± 1.16 dB
Maximum Power Spectral Density	± 1.60 dB
Radiated Emission	± 3.25 dB below 1 GHz ± 3.32 dB above 1 GHz
Radiated Emission Band Edge	± 3.32 dB above 1 GHz

1.10 Duty Cycle

Duty cycle of test signal is ≥ 98 %, duty factor is not required.

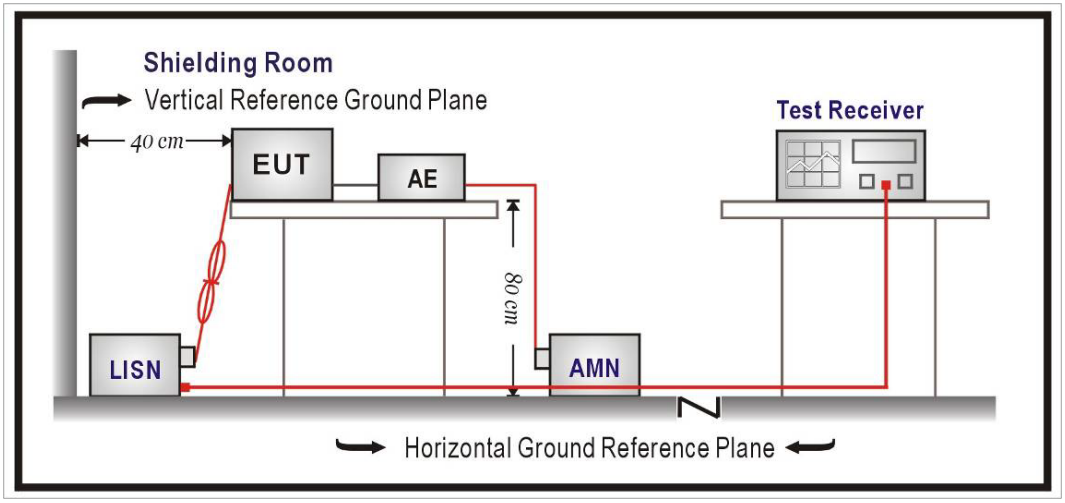
802.11a	802.11ac (20 MHz)
	
802.11ac (40 MHz)	**802.11ac (80 MHz)**
	

2. Antenna Requirements

According to FCC 47CFR 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

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.

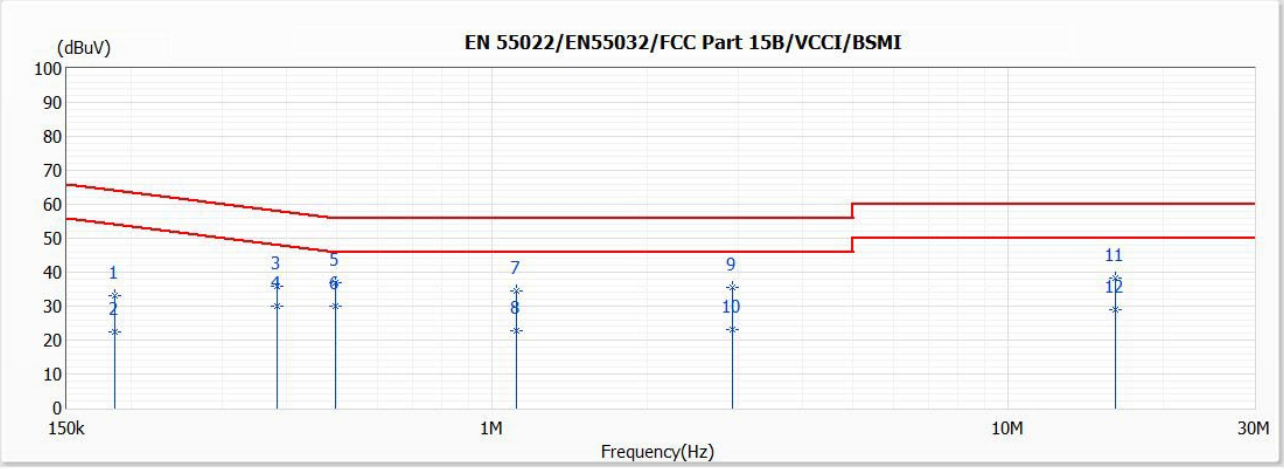
Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

3.4 Test Specification

According to FCC CFR Title 47 Part 15 Subpart E.

3.5 Test Result of AC Power Line Conducted Emission

Test Mode	Mode 1: Transmit	Phase	Line
Test Condition	802.11ac (40 MHz) / Ant. 0 + Ant. 1 / 5190 MHz		

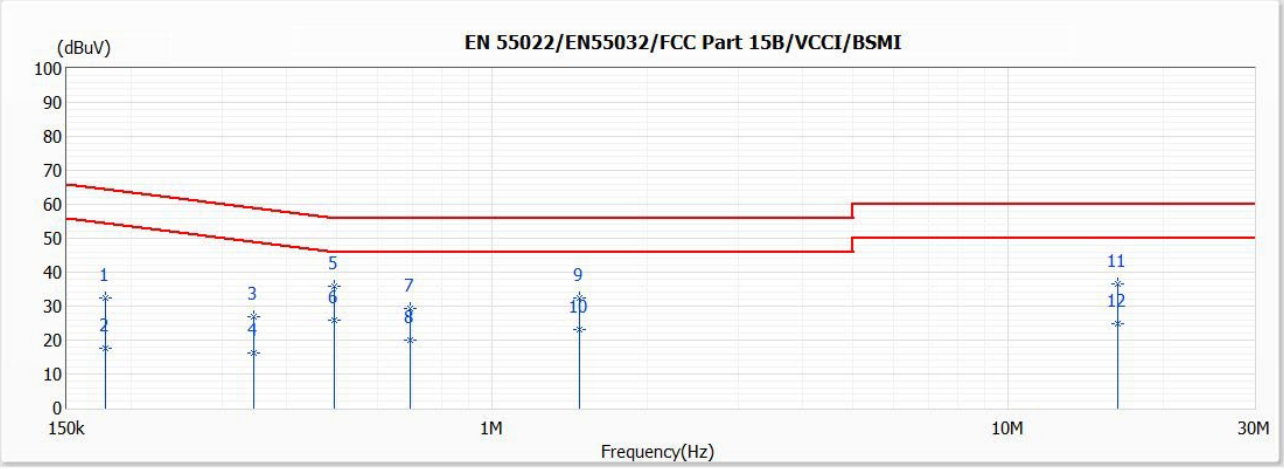


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.186	33.02	64.20	-31.18	23.40	9.62	QP
2	0.186	22.47	54.20	-31.73	12.85	9.62	AV
3	0.382	35.72	58.23	-22.51	26.08	9.64	QP
4	0.382	30.03	48.23	-18.20	20.39	9.64	AV
5	0.498	37.00	56.03	-19.03	27.35	9.65	QP
*6	0.498	29.98	46.03	-16.05	20.33	9.65	AV
7	1.117	34.48	56.00	-21.52	24.77	9.71	QP
8	1.117	22.62	46.00	-23.38	12.91	9.71	AV
9	2.928	35.64	56.00	-20.36	25.84	9.80	QP
10	2.928	23.13	46.00	-22.87	13.33	9.80	AV
11	16.100	38.21	60.00	-21.79	27.97	10.24	QP
12	16.100	29.08	50.00	-20.92	18.84	10.24	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: Transmit	Phase	Neutral
Test Condition	802.11ac (40 MHz) / Ant. 0 + Ant. 1 / 5190 MHz		



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.178	32.27	64.57	-32.30	22.66	9.61	QP
2	0.178	17.43	54.57	-37.14	7.82	9.61	AV
3	0.345	27.01	59.07	-32.06	17.37	9.64	QP
4	0.345	16.34	49.07	-32.73	6.70	9.64	AV
*5	0.493	35.77	56.11	-20.34	26.12	9.65	QP
6	0.493	25.74	46.11	-20.37	16.09	9.65	AV
7	0.693	29.19	56.00	-26.81	19.52	9.67	QP
8	0.693	19.91	46.00	-26.09	10.24	9.67	AV
9	1.476	32.51	56.00	-23.49	22.79	9.72	QP
10	1.476	22.94	46.00	-23.06	13.22	9.72	AV
11	16.272	36.63	60.00	-23.37	26.26	10.37	QP
12	16.272	24.98	50.00	-25.02	14.61	10.37	AV

Remark:

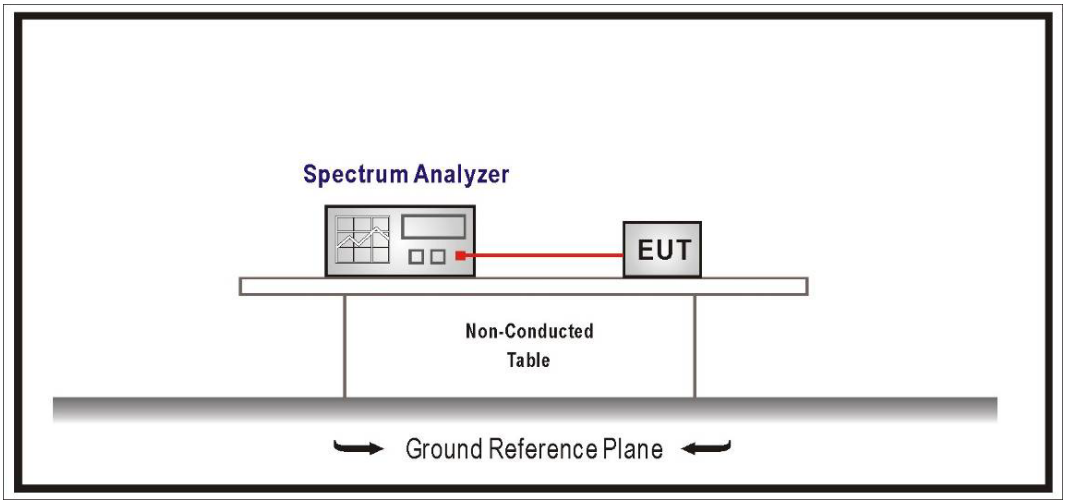
1. "*" means this data is the worst emission level.

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 ≧ 500kHz

4.3 Test Procedure

99% & 26dB Bandwidth :

The EUT was tested according to U-NII test procedure of KDB 789033.D02 V02r01

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

DTS Bandwidth :

Set RBW = 100kHz, VBW≧3xRBW, Sweep time=Auto, Set Peak detector.

4.4 Test Specification

According to FCC CFR Title 47 Part 15 Subpart E.

4.5 Test Result of Emission Bandwidth

Modulation	Channel	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)
			Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth
802.11a	36	5180	16.383	16.463	18.861	18.541	-
	44	5220	16.423	16.463	18.781	18.581	-
	48	5240	16.503	16.543	18.901	18.621	-
	52	5260	16.623	16.543	19.060	18.861	-
	60	5300	16.543	16.543	18.941	18.701	-
	64	5320	16.853	16.543	18.861	18.741	-
	100	5500	16.583	16.503	19.100	18.821	-
	116	5580	16.554	16.503	19.100	18.741	-
	140	5700	16.503	16.503	19.100	18.621	-

Modulation	Channel	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
			Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% Bandwidth	DTS Bandwidth
802.11a	149	5745	16.623	16.543	16.463	16.383	-	≧0.50
	157	5785	16.583	16.543	16.463	16.383	-	≧0.50
	165	5825	16.623	16.583	16.463	16.383	-	≧0.50

Modulation	Channel	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)	36	5180	17.702	17.662	19.940	19.940	-
	44	5220	17.702	17.662	20.059	19.980	-
	48	5240	17.702	17.662	19.980	19.940	-
	52	5260	17.662	17.662	20.020	19.980	-
	60	5300	17.662	17.662	20.590	19.940	-
	64	5320	17.662	17.662	20.020	19.940	-
	100	5500	17.662	17.622	20.020	19.980	-
	116	5580	17.702	17.662	20.059	19.940	-
	140	5700	17.702	17.702	20.020	19.940	-

Modulation	Channel	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)	149	5745	17.702	17.702	17.622	17.622		≧0.50
	157	5785	17.702	17.702	17.622	17.622	-	≧0.50
	165	5825	17.702	17.662	17.622	17.622	-	≧0.50

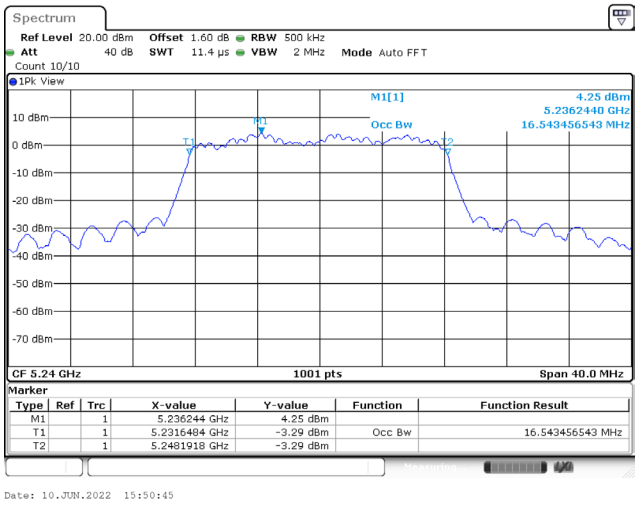
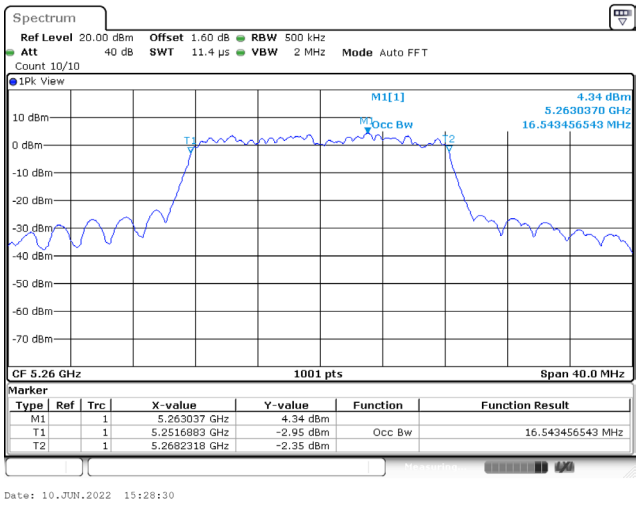
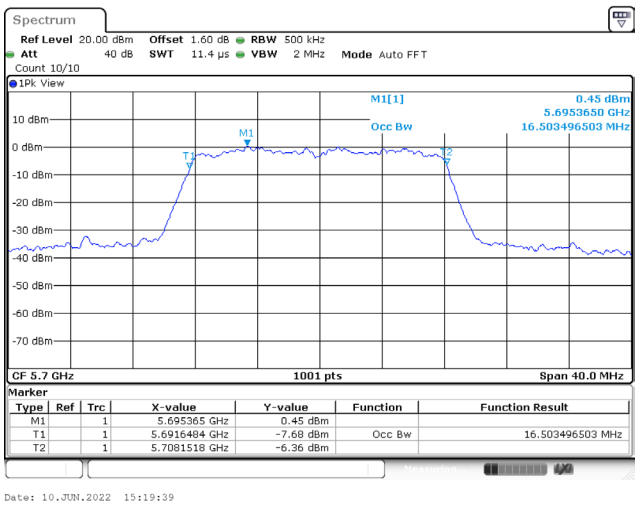
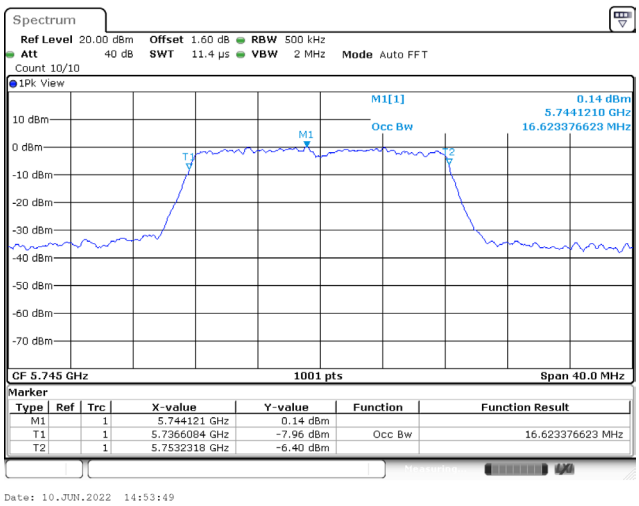
Modulation	Channel	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		Limit (MHz)
			Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% & 26dB Bandwidth
802.11ac (40 MHz)	38	5190	36.123	36.123	42.437	41.718	-
	46	5230	36.123	36.123	41.718	41.238	-
	54	5270	36.123	36.123	41.318	41.158	-
	62	5310	36.203	36.123	41.478	41.398	-
	102	5510	36.203	36.203	41.318	41.558	-
	110	5550	36.123	36.203	41.398	41.798	-
	134	5670	36.283	36.283	41.558	41.718	-

Modulation	Channel	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)	151	5755	36.283	36.123	36.363	36.363	-	≧0.50
	159	5795	36.203	36.123	36.363	36.363	-	≧0.50

Modulation	Channel	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)	42	5210	74.805	74.645	81.518	79.600	-
	58	5290	74.645	74.645	81.838	79.600	-
	106	5530	74.805	74.805	81.678	80.559	-
	122	5610	74.645	74.805	79.760	80.719	-

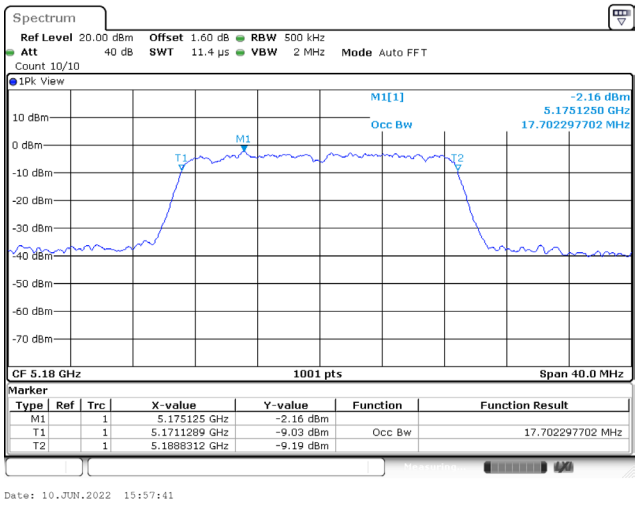
Modulation	Channel	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
			Ant. 0	Ant. 1	Ant. 0	Ant. 1	99% Bandwidth	DTS Bandwidth
802.11ac (80 MHz)	155	5755	74.965	74.805	75.604	74.326	-	≧0.50

For 99% Bandwidth:

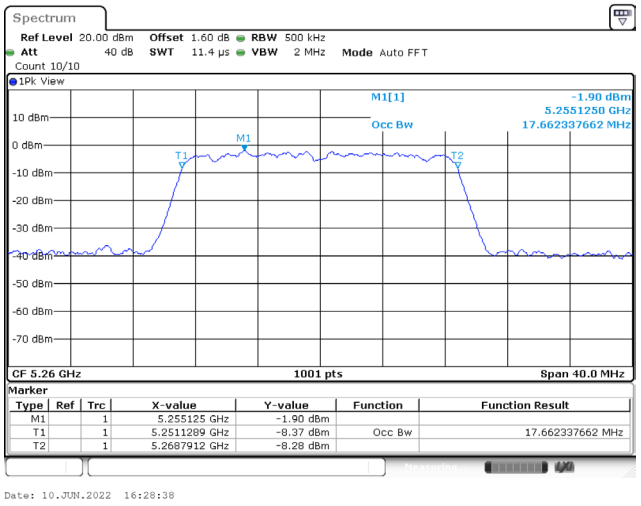
Spectrum plot of worst value	
802.11a / Ant. 1 / 5240 MHz (U-NII-1)	802.11a / Ant. 1 / 5260 MHz (U-NII-2A)
	
802.11a / Ant. 0 / 5700 MHz (U-NII-2C)	802.11a / Ant. 0 / 5745 MHz (U-NII-3)
	

Spectrum plot of worst value

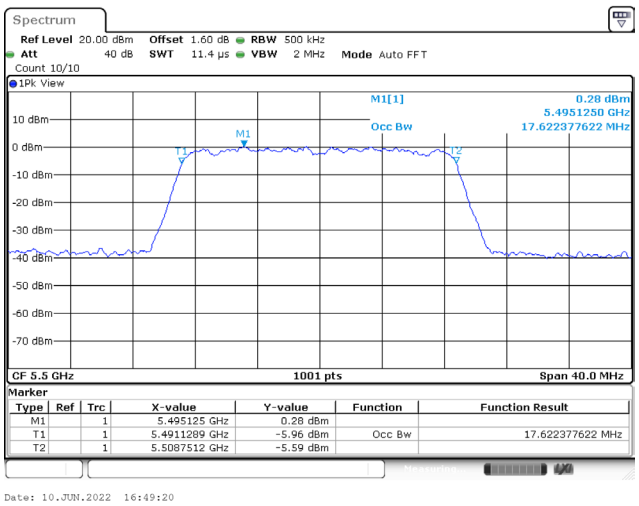
802.11ac (20 MHz) / Ant. 0 / 5180 MHz (U-NII-1)



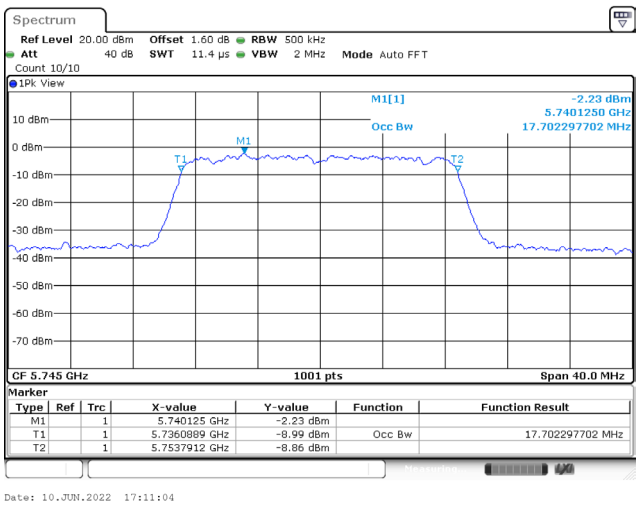
802.11ac (20 MHz) / Ant. 0 / 5260 MHz (U-NII-2A)



802.11ac (20 MHz) / Ant. 1 / 5500 MHz (U-NII-2C)

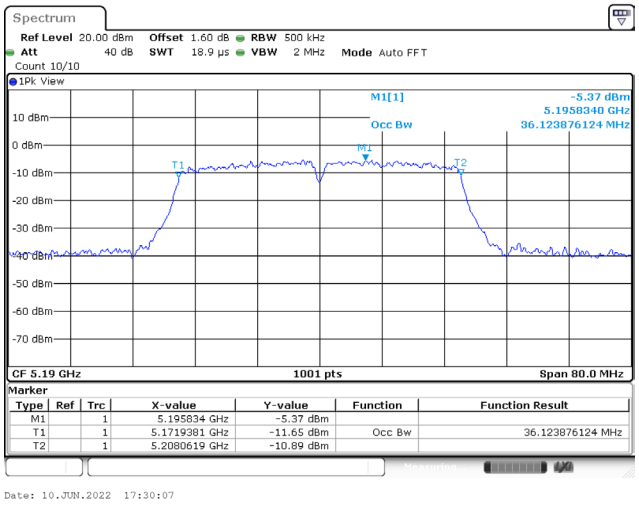


802.11ac (20 MHz) / Ant. 0 / 5745 MHz (U-NII-3)

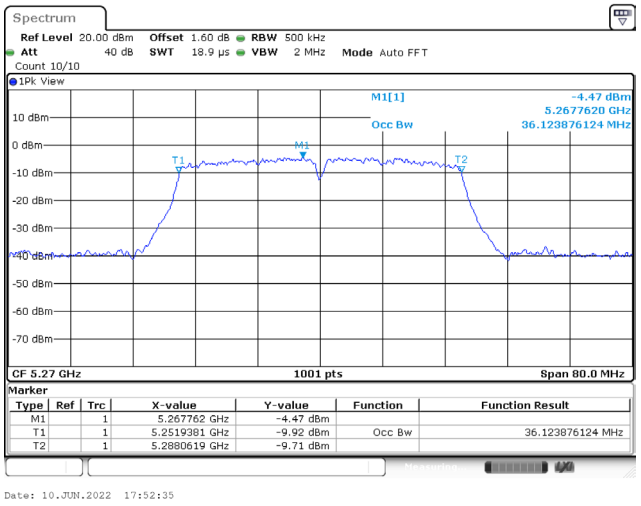


Spectrum plot of worst value

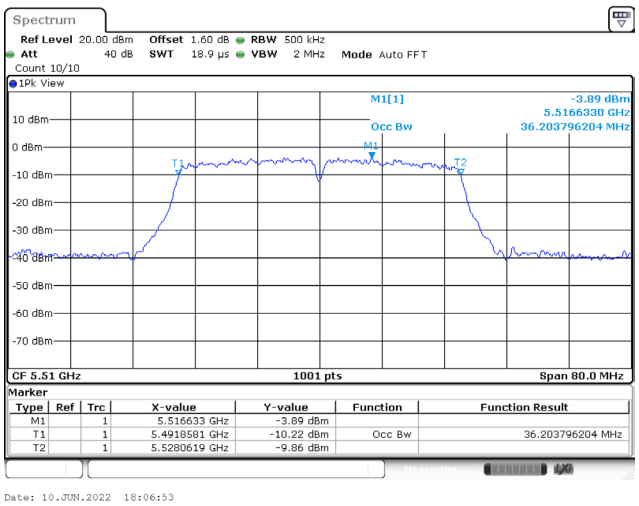
802.11ac (40 MHz) / Ant. 0 / 5190 MHz (U-NII-1)



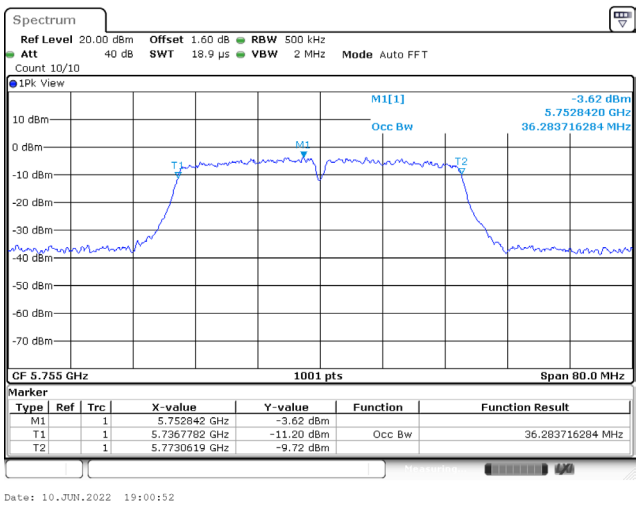
802.11ac (40 MHz) / Ant. 0 / 5270 MHz (U-NII-2A)



802.11ac (40 MHz) / Ant. 0 / 5510 MHz (U-NII-2C)

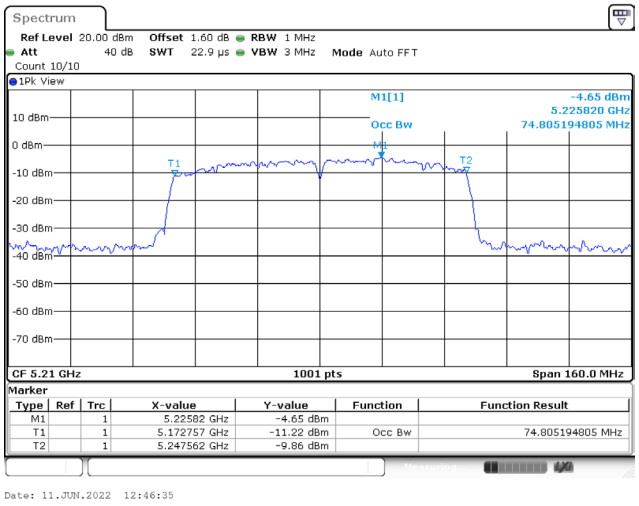


802.11ac (40 MHz) / Ant. 0 / 5755 MHz (U-NII-3)

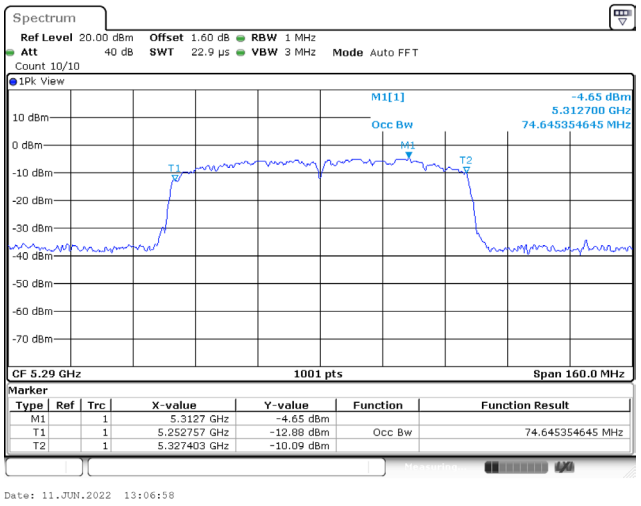


Spectrum plot of worst value

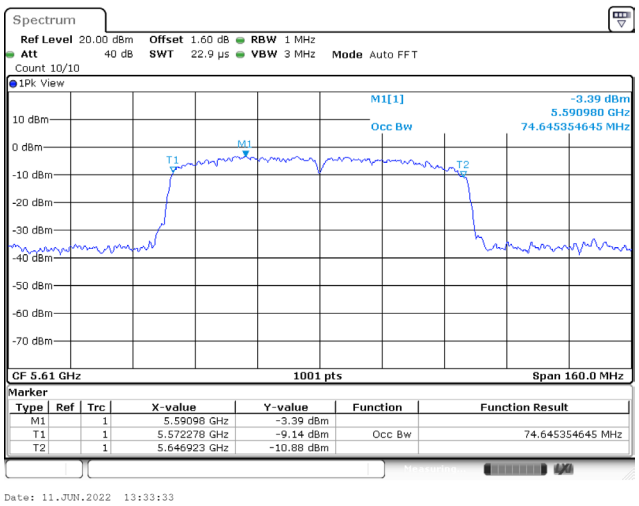
802.11ac (80 MHz) / Ant. 0 / 5210 MHz (U-NII-1)



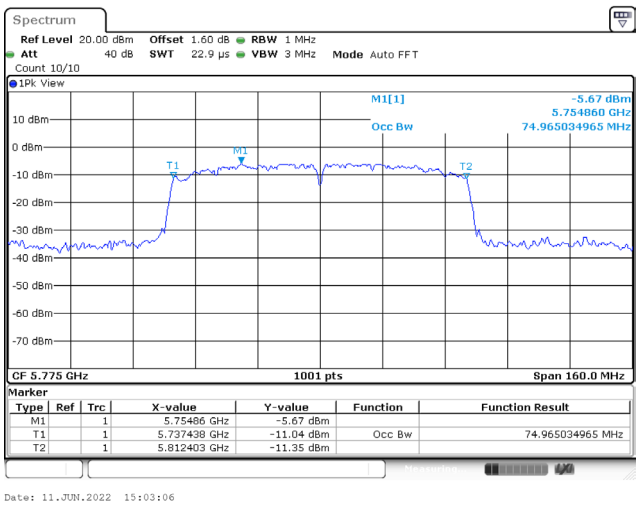
802.11ac (80 MHz) / Ant. 0 / 5290 MHz (U-NII-2A)



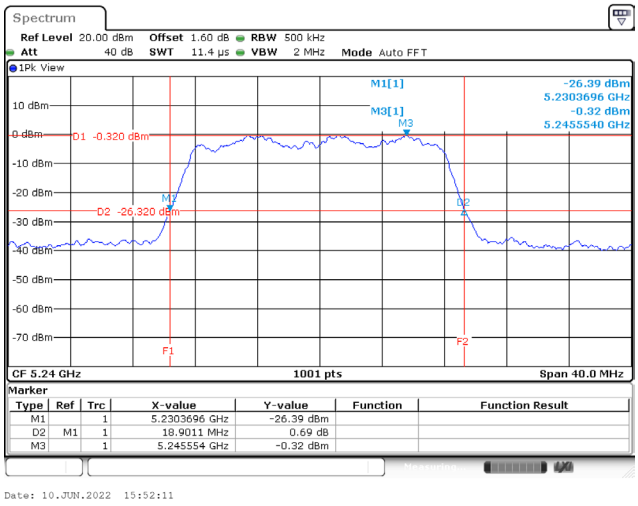
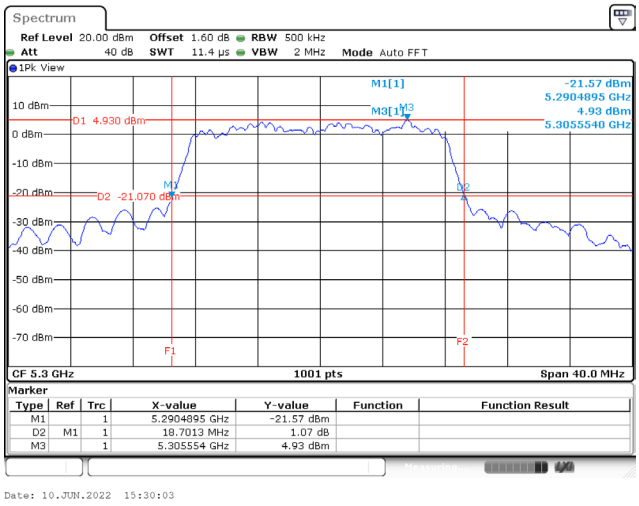
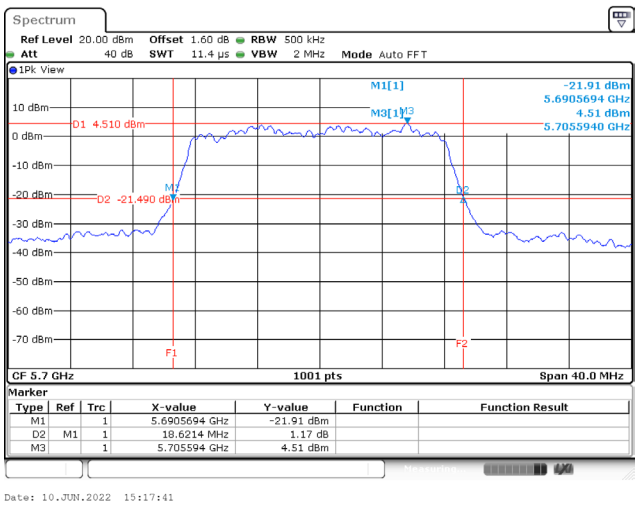
802.11ac (80 MHz) / Ant. 0 / 5610 MHz (U-NII-2C)



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

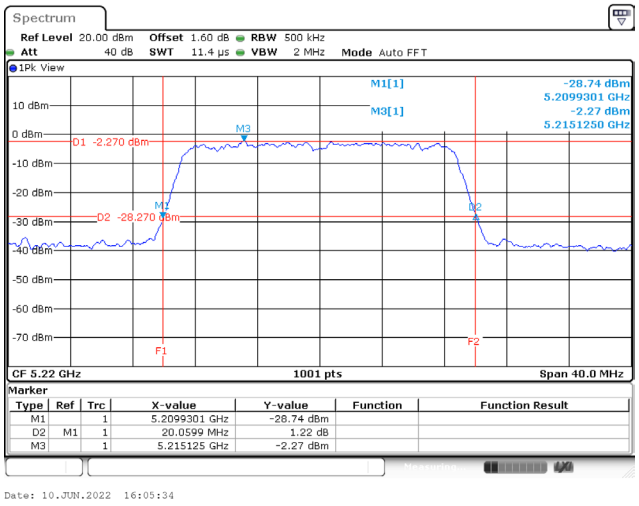


For 26dB Bandwidth:

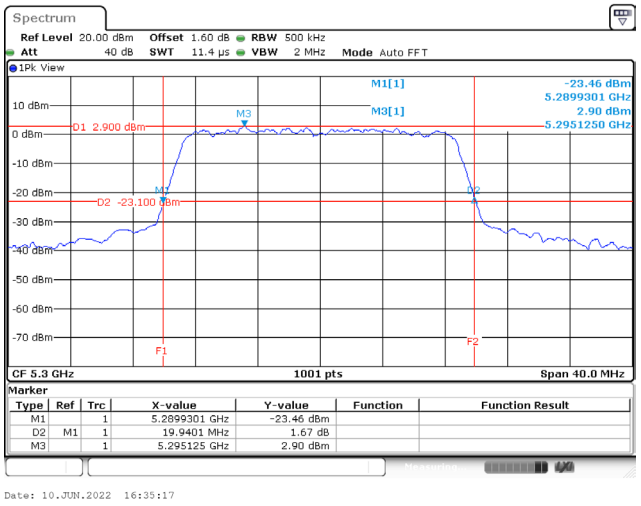
Spectrum plot of worst value	
802.11a / Ant. 0 / 5240 MHz (U-NII-1)	802.11a / Ant. 1 / 5300 MHz (U-NII-2A)
	
802.11a / Ant. 1 / 5700 MHz (U-NII-2C)	
	

Spectrum plot of worst value

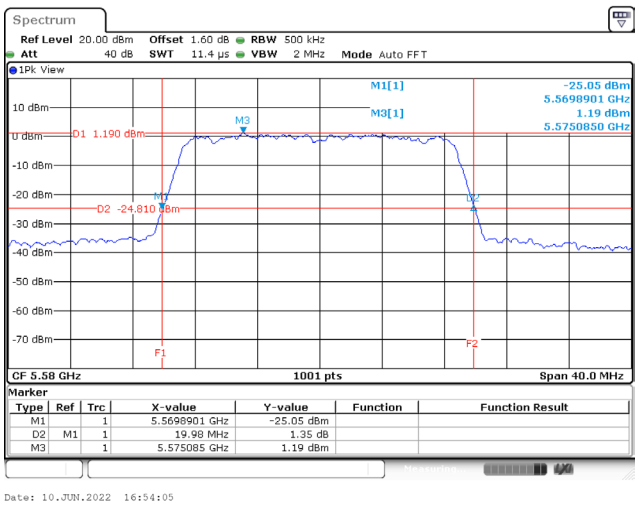
802.11ac (20 MHz) / Ant. 0 / 5220 MHz (U-NII-1)



802.11ac (20 MHz) / Ant. 1/ 5300MHz (U-NII-2A)

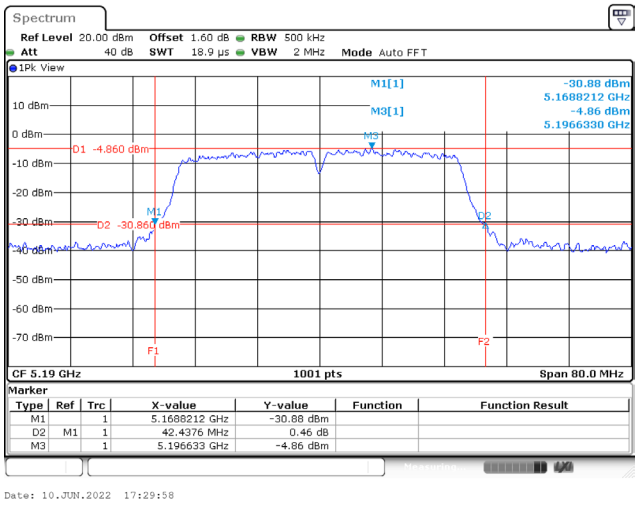


802.11ac (20 MHz) / Ant. 1 / 5580 MHz (U-NII-2C)

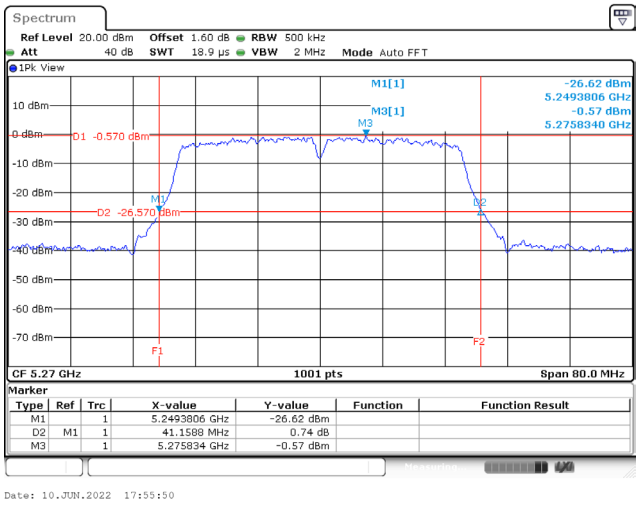


Spectrum plot of worst value

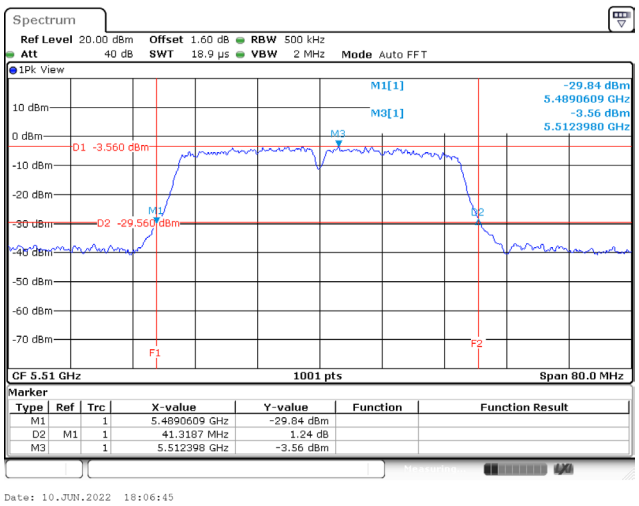
802.11ac (40 MHz) / Ant. 0 / 5190 MHz (U-NII-1)



802.11ac (40 MHz) / Ant. 1 / 5270 MHz (U-NII-2A)

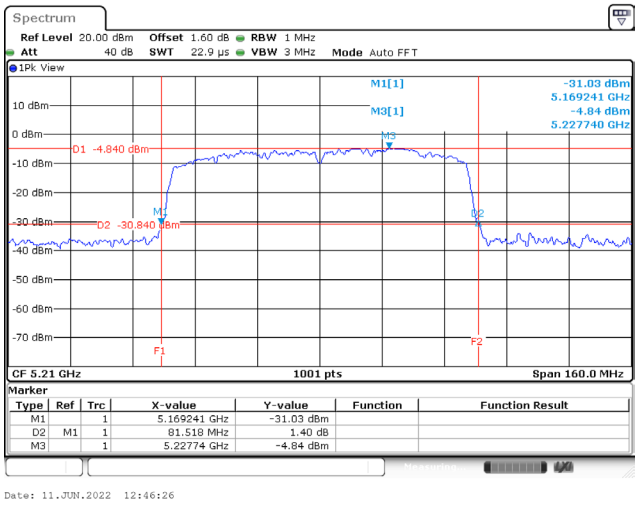


802.11ac (40 MHz) / Ant. 0 / 5510 MHz (U-NII-2C)

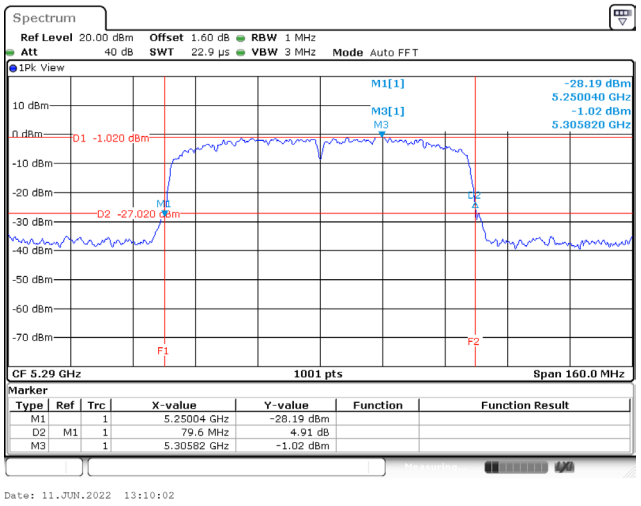


Spectrum plot of worst value

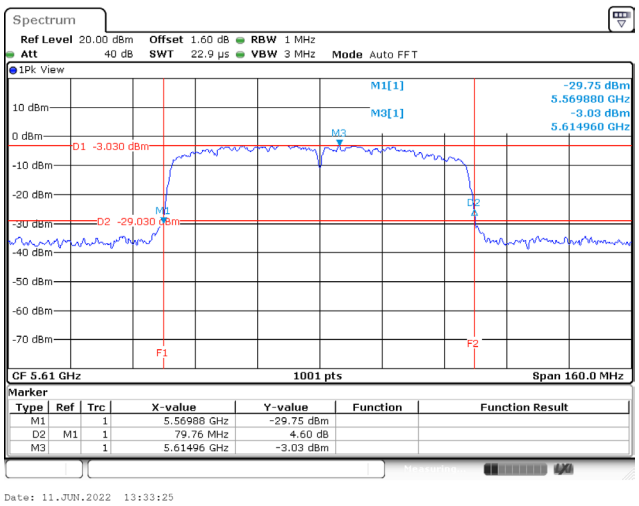
802.11ac (80 MHz) / Ant. 0 / 5210 MHz (U-NII-1)



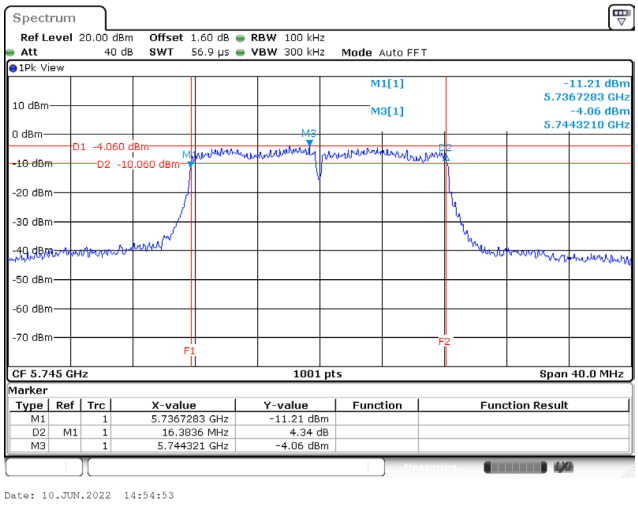
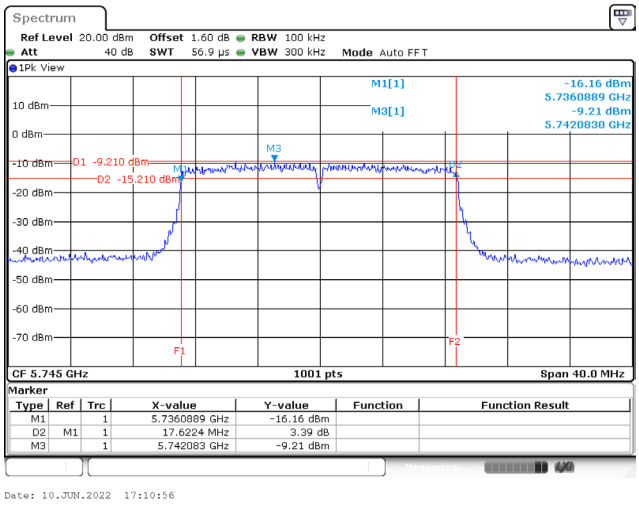
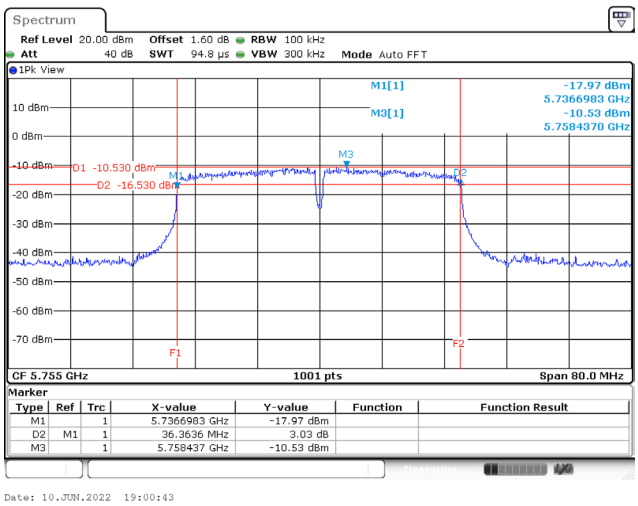
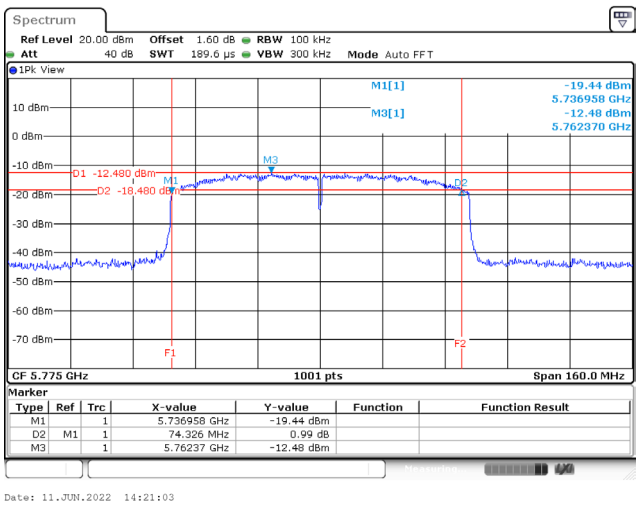
802.11ac (80 MHz) / Ant. 1 / 5290 MHz (U-NII-2A)



802.11ac (80 MHz) / Ant. 0 / 5610 MHz (U-NII-2C)

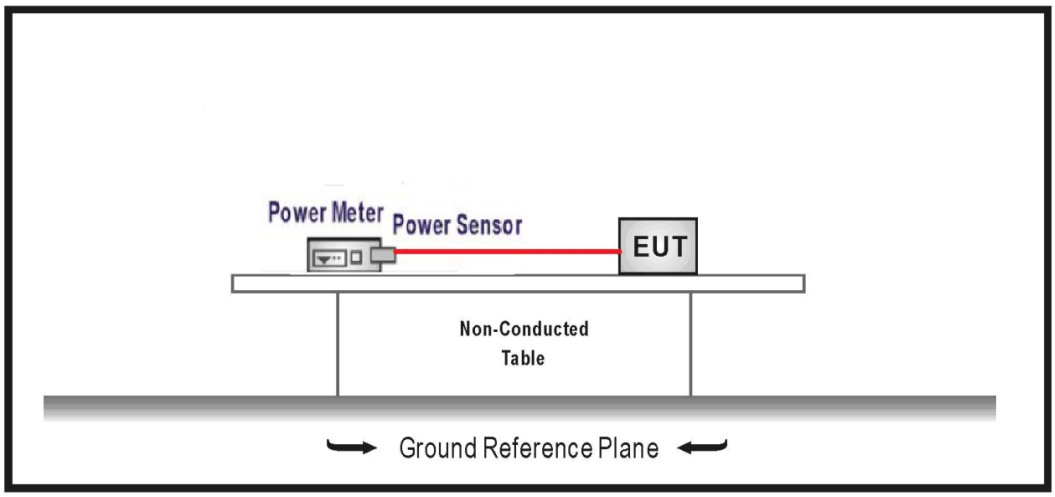


For DTS Bandwidth:

Spectrum plot of worst value	
802.11a / Ant. 1 / 5745 MHz	802.11ac (20 MHz) / Ant. 0 / 5745 MHz
	
802.11ac (40 MHz) / Ant. 0 / 5755 MHz	802.11ac (80 MHz) / Ant. 1 / 5775 MHz
	

5. Maximum Conducted Output Power

5.1 Test Setup



5.2 Test Limit

1. For the band 5.15 ~ 5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that 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. 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 band 5.25 ~ 5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
3. For the band 5.725 ~ 5.850 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that 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 789033 D02 V02r01 for compliance to FCC CFR Title 47 Part 15 Subpart E.

5.4 Test Result of Maximum Conducted Output Power

Modulation	Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Limit (dBm)	Result
			Ant. 0	Ant. 1	Total		
802.11a	36	5180	7.280	10.710	12.335	≦30.00	Pass
	44	5220	7.090	10.760	12.312	≦30.00	Pass
	48	5240	7.120	10.980	12.476	≦30.00	Pass
	52	5260	7.040	10.950	12.431	≦23.75	Pass
	60	5300	7.290	10.780	12.387	≦23.71	Pass
	64	5320	7.460	10.670	12.365	≦23.72	Pass
	100	5500	9.010	9.680	12.368	≦23.74	Pass
	116	5580	8.570	10.130	12.430	≦23.72	Pass
	140	5700	8.750	9.830	12.334	≦23.70	Pass
	149	5745	8.510	10.270	12.489	≦30.00	Pass
	157	5785	8.220	10.190	12.326	≦30.00	Pass
	165	5825	7.620	10.530	12.325	≦30.00	Pass
802.11ac (20 MHz)	36	5180	7.950	10.580	12.471	≦30.00	Pass
	44	5220	7.750	10.640	12.441	≦30.00	Pass
	48	5240	7.470	10.650	12.355	≦30.00	Pass
	52	5260	7.410	10.620	12.315	≦24.00	Pass
	60	5300	7.220	10.880	12.435	≦23.99	Pass
	64	5320	7.370	10.780	12.412	≦23.99	Pass
	100	5500	8.780	9.774	12.316	≦24.00	Pass
	116	5580	8.840	9.870	12.396	≦23.99	Pass
	140	5700	8.940	9.660	12.325	≦23.99	Pass
	149	5745	8.810	10.040	12.479	≦30.00	Pass
	157	5785	8.770	10.010	12.444	≦30.00	Pass
	165	5825	8.040	10.170	12.245	≦30.00	Pass

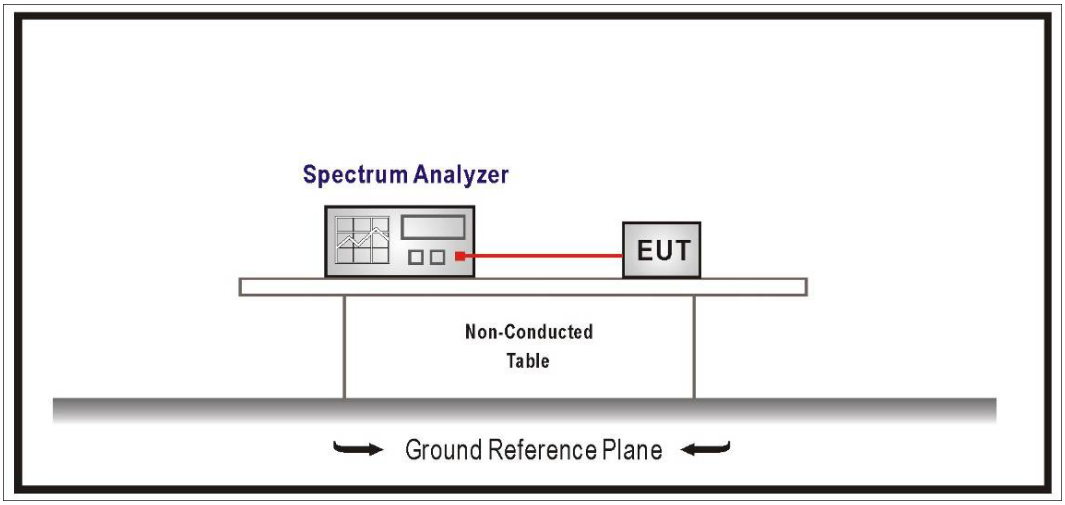
Note:

1. 802.11a, 5260 MHz limit=11+10*log(B) or 24dBm;11+10*log(18.861)=23.75dBm<24dBm, so limit=23.75dBm.
2. 802.11a, 5300 MHz limit=11+10*log(B) or 24dBm;11+10*log(18.701)=23.71dBm<24dBm, so limit=23.71dBm.
3. 802.11a, 5320 MHz limit=11+10*log(B) or 24dBm;11+10*log(18.741)=23.72dBm<24dBm, so limit=23.72dBm.
4. 802.11a, 5500 MHz limit=11+10*log(B) or 24dBm;11+10*log(18.821)=23.74dBm<24dBm, so limit=23.74dBm.
5. 802.11a, 5580 MHz limit=11+10*log(B) or 24dBm;11+10*log(18.741)=23.72dBm<24dBm, so limit=23.72dBm.
6. 802.11a, 5700 MHz limit=11+10*log(B) or 24dBm;11+10*log(18.621)=23.70dBm<24dBm, so limit=23.70dBm.
7. 802.11ac (20 MHz), 5300 MHz limit=11+10*log(B) or 24dBm;11+10*log(19.940)=23.99dBm<24dBm, so limit =23.99dBm.
8. 802.11ac (20 MHz), 5320 MHz limit=11+10*log(B) or 24dBm;11+10*log(19.940)=23.99dBm<24dBm, so limit =23.99dBm.
9. 802.11ac (20 MHz), 5580 MHz limit=11+10*log(B) or 24dBm;11+10*log(19.940)=23.99dBm<24dBm, so limit =23.99dBm.
10. 802.11ac (20 MHz), 5700 MHz limit=11+10*log(B) or 24dBm;11+10*log(19.940)=23.99dBm<24dBm, so limit =23.99dBm.

Modulation	Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Limit (dBm)	Result
			Ant. 0	Ant. 1	Total		
802.11ac (40 MHz)	38	5190	7.620	10.480	12.292	≦30.00	Pass
	46	5230	7.680	10.720	12.471	≦30.00	Pass
	54	5270	7.260	10.660	12.295	≦24.00	Pass
	62	5310	7.270	10.570	12.236	≦24.00	Pass
	102	5510	9.190	9.420	12.317	≦24.00	Pass
	110	5550	8.920	9.540	12.251	≦24.00	Pass
	134	5670	9.210	9.680	12.462	≦24.00	Pass
	151	5755	8.620	9.960	12.352	≦30.00	Pass
	159	5795	8.380	9.890	12.211	≦30.00	Pass
802.11ac (80 MHz)	42	5210	7.560	10.630	12.371	≦30.00	Pass
	58	5290	7.250	10.640	12.278	≦24.00	Pass
	106	5530	9.040	9.630	12.355	≦24.00	Pass
	122	5610	9.130	9.510	12.334	≦24.00	Pass
	155	5775	8.710	9.880	12.345	≦30.00	Pass

6. Maximum Power Spectral Density

6.1 Test Setup



6.2 Test Limit

1. For the band 5.15 ~ 5.25 GHz, the peak power spectral density shall not exceed 17 dBm in any 1 MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
2. For client devices in the 5.15 ~ 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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 5.25 ~ 5.35 GHz ,5470 ~ 5600 MHz and 5650 ~ 5725 MHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
4. For the band 5.725 ~ 5.850 GHz, the peak power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

6.3 Test Procedure

The EUT was setup to ANSI C63.10: 2013; tested to U-NII test procedure of KDB 789033.D02 V02r01 for compliance to FCC CFR Title 47 Part 15 Subpart E requirements.

For Band1 : Set RBW=1 MHz, VBW=3 MHz with RMS detector. The PPSD is the highest level found across the emission in any 1-MHz band after 100 sweeps of averaging.

For Band4 : Set RBW=500 kHz, VBW=1.5 MHz with RMS detector. The PPSD is the highest level found across the emission in any 500 kHz band after 100 sweeps of averaging.

6.4 Test Result of Maximum Power Spectral Density

Modulation	Channel	Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
			Ant. 0	Ant. 1	Total		
802.11a	36	5180	-4.900	-4.410	-1.638	≦17.00	Pass
	44	5220	-3.930	-0.800	0.921	≦17.00	Pass
	48	5240	-4.280	-0.570	0.970	≦17.00	Pass
	52	5260	-6.800	-0.720	0.237	≦11.00	Pass
	60	5300	-3.820	-1.030	0.806	≦11.00	Pass
	64	5320	-3.900	-3.670	-0.773	≦11.00	Pass
	100	5500	-6.920	-4.060	-2.248	≦11.00	Pass
	116	5580	-6.930	-2.170	-0.918	≦11.00	Pass
	140	5700	-3.970	-1.560	0.410	≦11.00	Pass
	149	5745	-6.620	-4.140	-2.195	≦30.00	Pass
	157	5785	-7.040	-4.710	-2.710	≦30.00	Pass
	165	5825	-7.460	-5.370	-3.280	≦30.00	Pass
802.11ac (20 MHz)	36	5180	-6.700	-2.440	-1.057	≦17.00	Pass
	44	5220	-6.210	-2.880	-1.223	≦17.00	Pass
	48	5240	-6.200	-3.350	-1.535	≦17.00	Pass
	52	5260	-6.450	-2.120	-0.756	≦11.00	Pass
	60	5300	-8.110	-1.840	-0.920	≦11.00	Pass
	64	5320	-6.050	-2.500	-0.912	≦11.00	Pass
	100	5500	-5.200	-4.170	-1.644	≦11.00	Pass
	116	5580	-5.830	-3.380	-1.424	≦11.00	Pass
	140	5700	-6.470	-2.470	-1.015	≦11.00	Pass
	149	5745	-9.590	-5.100	-3.779	≦30.00	Pass
	157	5785	-9.790	-5.360	-4.023	≦30.00	Pass
	165	5825	-11.570	-5.990	-4.929	≦30.00	Pass

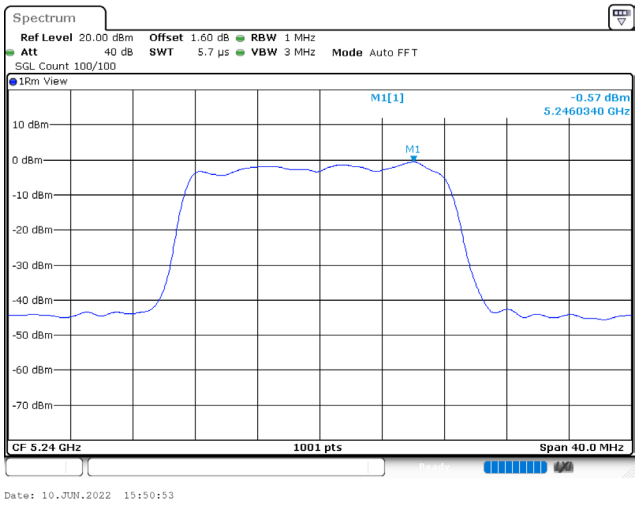
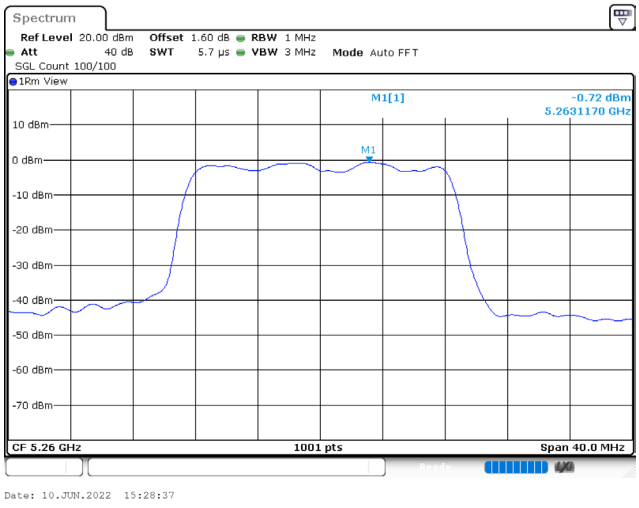
Note:

1. Total power spectral density = power spectral density + duty factor, and the duty factor refer to section 1.10.
2. Directional Gain = 10log $[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{Ant}]$ = -7.60dBi <6dBi, so the limit doesn't reduce.

Modulation	Channel	Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
			Ant. 0	Ant. 1	Total		
802.11ac (40 MHz)	38	5190	-9.510	-5.410	-3.983	≦17.00	Pass
	46	5230	-7.730	-4.160	-2.578	≦17.00	Pass
	54	5270	-7.830	-4.320	-2.719	≦11.00	Pass
	62	5310	-8.520	-5.270	-3.588	≦11.00	Pass
	102	5510	-7.920	-5.800	-3.722	≦11.00	Pass
	110	5550	-8.420	-6.100	-4.097	≦11.00	Pass
	134	5670	-8.960	-5.240	-3.703	≦11.00	Pass
	151	5755	-10.360	-7.390	-5.616	≦30.00	Pass
	159	5795	-11.650	-9.350	-7.339	≦30.00	Pass
802.11ac (80 MHz)	42	5210	-12.250	-7.570	-6.298	≦17.00	Pass
	58	5290	-12.640	-8.340	-6.968	≦11.00	Pass
	106	5530	-10.200	-10.000	-7.089	≦11.00	Pass
	122	5610	-10.550	-9.790	-7.143	≦11.00	Pass
	155	5775	-16.280	-12.470	-10.960	≦30.00	Pass

Note:

1. Total power spectral density = power spectral density + duty factor, and the duty factor refer to section 1.10.
2. Directional Gain = 10log $[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{Ant}]$ = -7.60dBi <6dBi, so the limit doesn't reduce.

Spectrum plot of worst value	
802.11a / Ant. 1 / 5240 MHz (U-NII-1)	802.11a / Ant. 1 / 5260 MHz (U-NII-2A)
	
802.11a / Ant. 1 / 5700 MHz (U-NII-2C)	802.11a / Ant. 1 / 5745 MHz (U-NII-3)