



MEASUREMENT REPORT

FCC PART 15.407/ WLAN 802.11a/n/ac

FCC ID: P27ME221
Applicant: Sercomm Corporation

Application Type: Class III Permissive Change
Product: Dual Band WiFi Mesh
Model No.: AME-4221SR
Brand Name: Airtel
FCC Classification: Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s): Part15 Subpart E (Section 15.407)
Test Procedure(s): ANSI C63.10-2013, KDB 789033 D02v02r01
KDB 662911 D01v02r01
Test Date: January 25 ~ April 01, 2021

Reviewed By:

oscar shi

Oscar Shi

Approved By:

Robin Wu

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02v02r01. Test results reported here in relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2101RSU064-U1	Rev. 01	Initial Report	04-13-2021	Valid

Note: Adding band U-NII-2A and U-NII-2C, requests a Class III Permissive Change for its application with FCC ID: P27ME221 granted on 10-26-2020 and 12-06-2020.

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1. General Information

1.1. Applicant

Sercomm Corporation

8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.

1.2. Manufacturer

Sercomm Corporation

8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.

1.3. Testing Facility

☒	Test Site – MRT Suzhou Laboratory		
	Laboratory Location (Suzhou – Wuzhong)		
	D8 Building, No.2 Tian’edang Rd., Wuzhong Economic Development Zone, Suzhou, China		
	Laboratory Location (Suzhou – SIP)		
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China		
	Laboratory Accreditations		
A2LA: 3628.01		CNAS: L10551	
FCC: CN1166		ISED: CN0001	
VCCI: R-20025, G-20034, C-20020, T-20020			
☐	Test Site – MRT Shenzhen Laboratory		
	Laboratory Location (Shenzhen)		
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China		
	Laboratory Accreditations		
	A2LA: 3628.02		CNAS: L10551
	FCC: CN1284		ISED: CN0105
☐	Test Site – MRT Taiwan Laboratory		
	Laboratory Location (Taiwan)		
	No. 38, Fuxing 2 nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)		
	Laboratory Accreditations		
	TAF: L3261-190725		
	FCC: 291082, TW3261		ISED: TW3261

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Dual Band WiFi Mesh
Model No.	AME-4221SR
Brand Name	Airtel
Serial No.	20210127Sample#01 (Conducted Sample) 20210127Sample#03 (Radiated Sample)
Hardware Version	6.0
Software Version	AME4221SR_R1.9
Wi-Fi Specification	802.11a/b/g/n/ac
Antenna Delivery	2*T _x + 2*R _x

2.2. Product Specification Subjective to this Report

Frequency Range	For 802.11a/n-HT20/ac-VHT20: 5260~5320MHz, 5500~5720MHz For 802.11n-HT40/ac-VHT40: 5270~5310MHz, 5510~5710MHz For 802.11ac-VHT80: 5290MHz, 5530MHz, 5610MHz, 5690MHz
Type of Modulation	802.11a/n/ac: OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps
Maximum Average Output Power	802.11a: 21.04dBm 802.11n-HT20: 20.99dBm 802.11n-HT40: 23.74dBm 802.11ac-VHT20: 20.82dBm 802.11ac-VHT40: 23.69dBm 802.11ac-VHT80:23.63dBm

Note: For other features of this EUT, test report will be issued separately.

2.3. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	T _X Paths	Max Antenna Gain (dBi)	Beamforming Directional Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
PIFA Antenna	2412 ~ 2462	2	3.30	6.31	3.30	6.31
	5250 ~ 5350	2	3.50	6.51	3.50	6.51
	5470~5725	2	3.40	6.41	3.40	6.41

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11a/b/g/n/ac mode and beamforming technology for 802.11n/ac.

Note 2: The EUT CDD and beamforming mode signals are correlated.

If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
Array Gain = $10 \log (N_{ANT} / N_{SS})$ dB = 3.01;
- For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB for $N_{ANT} \leq 4$;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 3: The antenna gain is declared by manufacture.

2.4. Working Frequencies for this Report

802.11a/n-HT20/ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
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
144	5720 MHz	--	--	--	--

802.11n-HT40/ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz	102	5510 MHz
110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	142	5710 MHz	--	--

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
58	5290 MHz	106	5530 MHz	122	5610 MHz
138	5690 MHz	--	--	--	--

2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11a (6Mbps)
	Mode 2: Transmit by 802.11n-HT20 (MCS0)
	Mode 3: Transmit by 802.11n-HT40 (MCS0)
	Mode 4: Transmit by 802.11ac-VHT20 (MCS0)
	Mode 5: Transmit by 802.11ac-VHT40 (MCS0)
	Mode 6: Transmit by 802.11ac-VHT80 (MCS0)

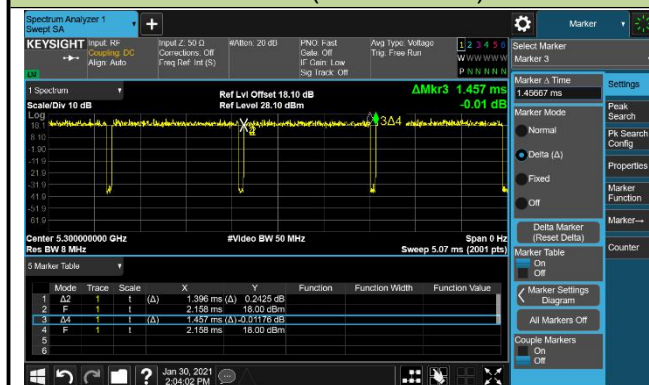
2.6. Duty Cycle

5GHz (NII) operation is possible in 20MHz, 40MHz and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

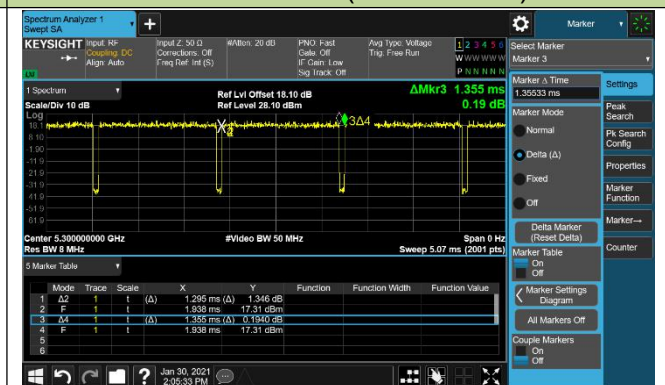
Test Mode	Duty Cycle
802.11a	95.81%
802.11n-HT20	95.57%
802.11n-HT40	91.25%
802.11ac-VHT20	91.77%
802.11ac-VHT40	85.05%
802.11ac-VHT80	75.76%

Duty Cycle (T = Transmission Duration)

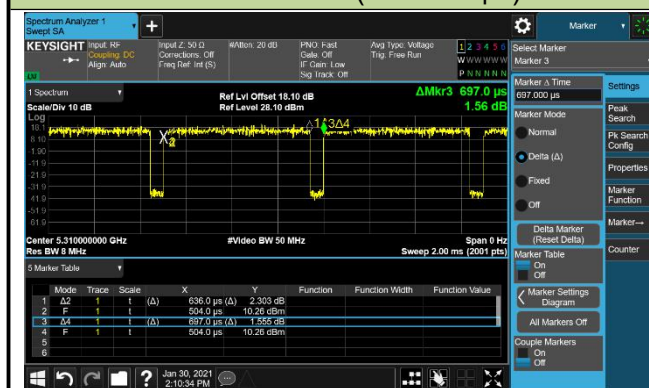
802.11a (T = 1.396ms)



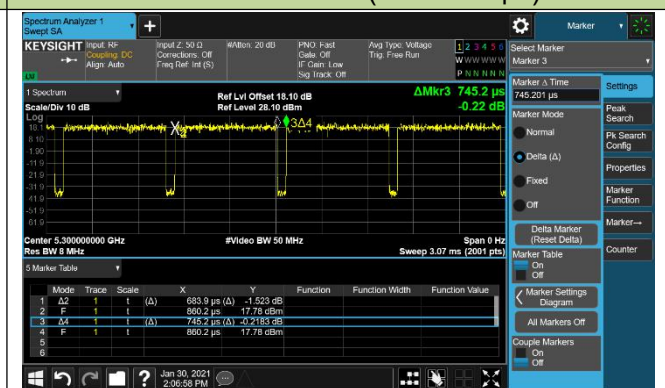
802.11n-HT20 (T = 1.295ms)

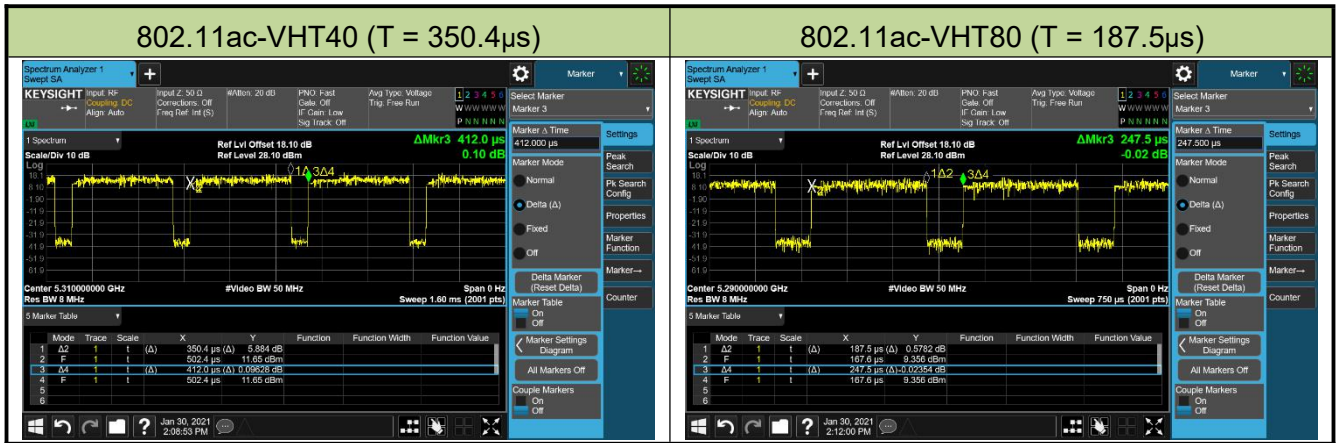


802.11n-HT40 (T = 636.0µs)



802.11ac-VHT20 (T = 683.9µs)





2.7. Description of Test Software

The test utility software used during testing was directive commands provided by manufacturer. Power parameter value refers to operation description.

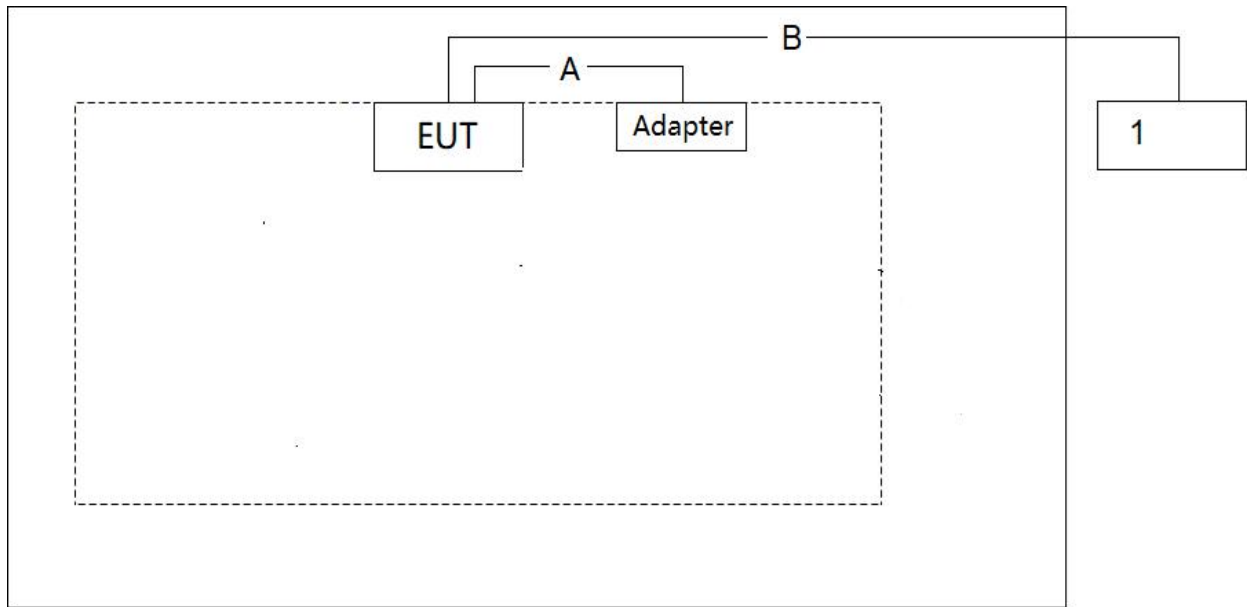
2.8. Test Environment Condition

Ambient Temperature	15°C~35°C
Relative Humidity	20%RH ~75%RH

2.9. Description of Test Configuration

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram



Signal Cable Type		Signal cable Description
A	Power Cable	Non-Shielded, 1.5m
B	LAN Cable	Non-Shielded, >1.5m

2.10. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.
1 Notebook	Lenovo	E495

3. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission (WZ-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/01/12
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Conducted Emission (SIP-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06621	1 year	2021/12/03

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/12
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/10/22
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/08/08
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/09/27
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/10/22
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/05/26
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2021/10/25
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2021/12/08
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Radiated Emission (SIP-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/10/22
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06645	1 year	2021/08/30
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2021/08/30
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2021/11/09
Thermal Hygrometer	testo	608-H1	MRTSUE06620	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-SIP-AC1	MRTSUE06554	1 year	2021/12/24

Radiated Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
MXA Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/09/26
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/10/22
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2021/08/30
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06648	1 year	2021/11/26
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06599	1 year	2021/11/26
Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2021/11/09
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2021/10/12
Thermal Hygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/24

Radiated Emission (SIP-AC3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/10/22
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06647	1 year	2021/08/08
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2021/09/13
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06598	1 year	2021/11/26
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2022/01/15
Preamplifier	EMCI	EMC184045SE	MRTSUE06641	1 year	2022/01/15
Thermal Hygrometer	testo	608-H1	MRTSUE06622	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2021/12/24

Conducted Test Equipment (WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022/01/07
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2021/10/22
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/08/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/08/08
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
Modulation Analyzer	HP	HP8901A	MRTSUE06098	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2021/10/22
Thermal Hygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26
Attenuator	MVE	6dB	MRTSUE06534	1 year	N/A
Attenuator	MVE	10dB	MRTSUE06543	1 year	N/A

Conducted Test Equipment (SIP-SR5)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
USB wideband power sensor	Agilent	U2021XA	MRTSUE06595	1 year	2021/09/26
USB wideband power sensor	Agilent	U2021XA	MRTSUE06596	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2022/02/23
Thermal Hygrometer	testo	622	MRTSUE06629	1 year	2021/11/25

Software	Version	Function
EMI Software	V3	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.28%

6. TEST RESULT

6.1. Summary

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 6.2
15.407(a) (2)	Maximum Conducted Output Power	U-NII-2: $\leq 250\text{mW}$ or $11 + 10\log_{10}B$		Pass	Section 6.3
15.407(h)(1)	Transmit Power Control	$\leq 24\text{dBm}$		N/A	Section 6.4
15.407(a) (2)	Power Spectral Density	U-NII-2: $\leq 11\text{dBm/MHz}$		Pass	Section 6.5
15.407(g)	Frequency Stability	N/A		Pass	Section 6.6
15.407(b)(2), (3)	Undesirable Emissions	$\leq -27\text{dBm/MHz}$ EIRP Detail see section 7.9	Radiated	Pass	Section 6.7 Section 6.8
15.205, 15.209 15.407(b)(2), (3)	General Field Strength (Restricted Bands and Radiated Emission)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass	
15.207	AC Conducted Emissions 150kHz-30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 6.9

Notes:

- The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst-case emissions.
- "N/A" means that the test item is not applicable, and the details refer to relevant section.

6.2. Emission Bandwidth Measurement

6.2.1. Test Limit

N/A

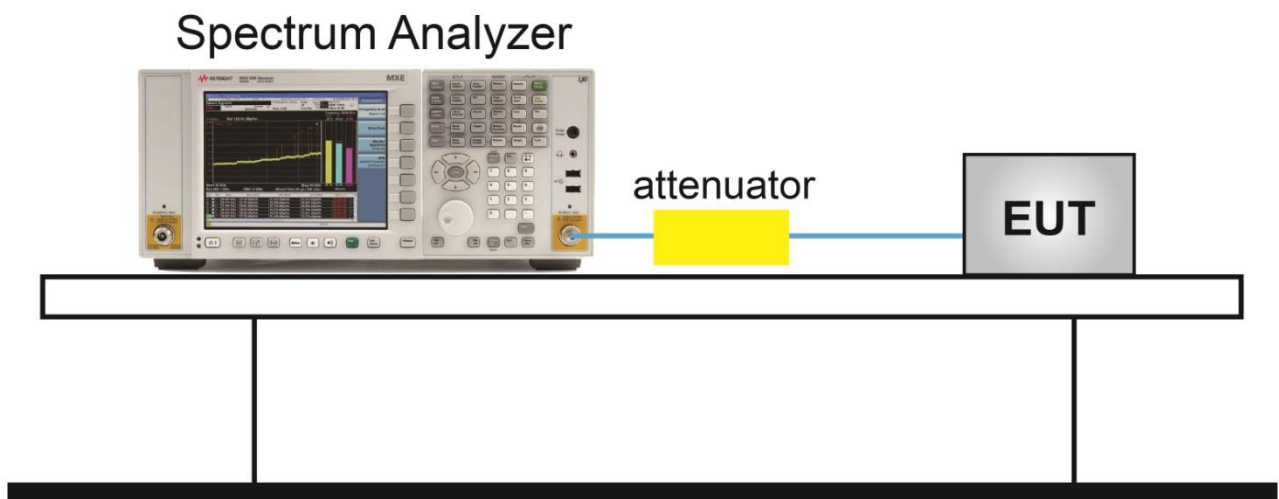
6.2.2. Test ProcedureUsed

KDB 789033 D02v02r01 -Section C.1

6.2.3. Test Setting

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6.2.4. Test Setup



6.2.5. Test Result

Test Site	SIP-SR5	Test Engineer	Chase Zhu
Test Date	2021/01/25		

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)
802.11a	6Mbps	52	5260	19.96
802.11a	6Mbps	60	5300	19.82
802.11a	6Mbps	64	5320	19.92
802.11a	6Mbps	100	5500	20.08
802.11a	6Mbps	116	5580	19.78
802.11a	6Mbps	140	5700	20.11
802.11a	6Mbps	144	5720	19.81
802.11n-HT20	MCS0	52	5260	20.14
802.11n-HT20	MCS0	60	5300	20.15
802.11n-HT20	MCS0	64	5320	20.00
802.11n-HT20	MCS0	100	5500	20.20
802.11n-HT20	MCS0	116	5580	20.11
802.11n-HT20	MCS0	140	5700	19.99
802.11n-HT20	MCS0	144	5720	20.11
802.11n-HT40	MCS0	54	5270	40.09
802.11n-HT40	MCS0	62	5310	40.13
802.11n-HT40	MCS0	102	5510	40.10
802.11n-HT40	MCS0	110	5550	39.93
802.11n-HT40	MCS0	134	5670	40.16
802.11n-HT40	MCS0	142	5710	40.22
802.11ac-VHT20	MCS0	52	5260	20.11
802.11ac-VHT20	MCS0	60	5300	20.16
802.11ac-VHT20	MCS0	64	5320	20.03
802.11ac-VHT20	MCS0	100	5500	20.18
802.11ac-VHT20	MCS0	116	5580	19.98
802.11ac-VHT20	MCS0	140	5700	20.17
802.11ac-VHT20	MCS0	144	5720	20.07

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)
802.11ac-VHT40	MCS0	54	5270	40.08
802.11ac-VHT40	MCS0	62	5310	39.90
802.11ac-VHT40	MCS0	102	5510	40.11
802.11ac-VHT40	MCS0	110	5550	40.25
802.11ac-VHT40	MCS0	134	5670	40.36
802.11ac-VHT40	MCS0	142	5710	40.74
802.11ac-VHT80	MCS0	58	5290	80.58
802.11ac-VHT80	MCS0	106	5530	80.61
802.11ac-VHT80	MCS0	122	5610	80.98
802.11ac-VHT80	MCS0	138	5690	80.68

802.11a 26dB Bandwidth

Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)



Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)



Channel 144 (5720MHz)



802.11n-HT20 26dB Bandwidth

Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)



Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)



Channel 144 (5720MHz)



802.11n-HT40 26dB Bandwidth

Channel 54 (5270MHz)



Channel 62 (5310MHz)



Channel 102 (5510MHz)



Channel 110 (5550MHz)



Channel 134 (5670MHz)



Channel 142 (5710MHz)



802.11ac-VHT20 26dB Bandwidth

Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)



Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)



Channel 144 (5720MHz)

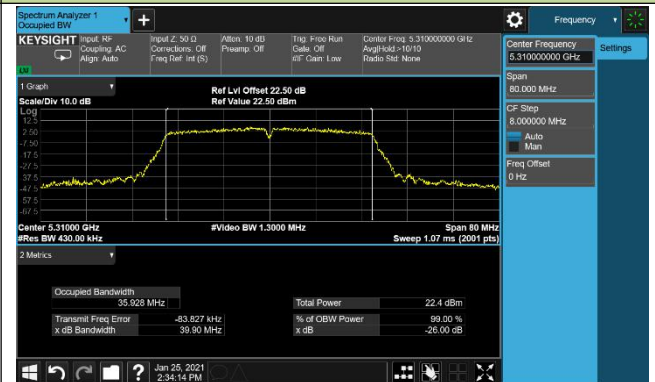


802.11ac-VHT40 26dB Bandwidth

Channel 54 (5270MHz)



Channel 62 (5310MHz)



Channel 102 (5510MHz)



Channel 110 (5550MHz)



Channel 134 (5670MHz)



Channel 142 (5710MHz)



802.11ac-VHT80 26dB Bandwidth

Channel 58 (5290MHz)



Channel 106 (5530MHz)



Channel 122 (5610MHz)



Channel 138(5690MHz)



6.3. Output Power Measurement

6.3.1. Test Limit

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 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

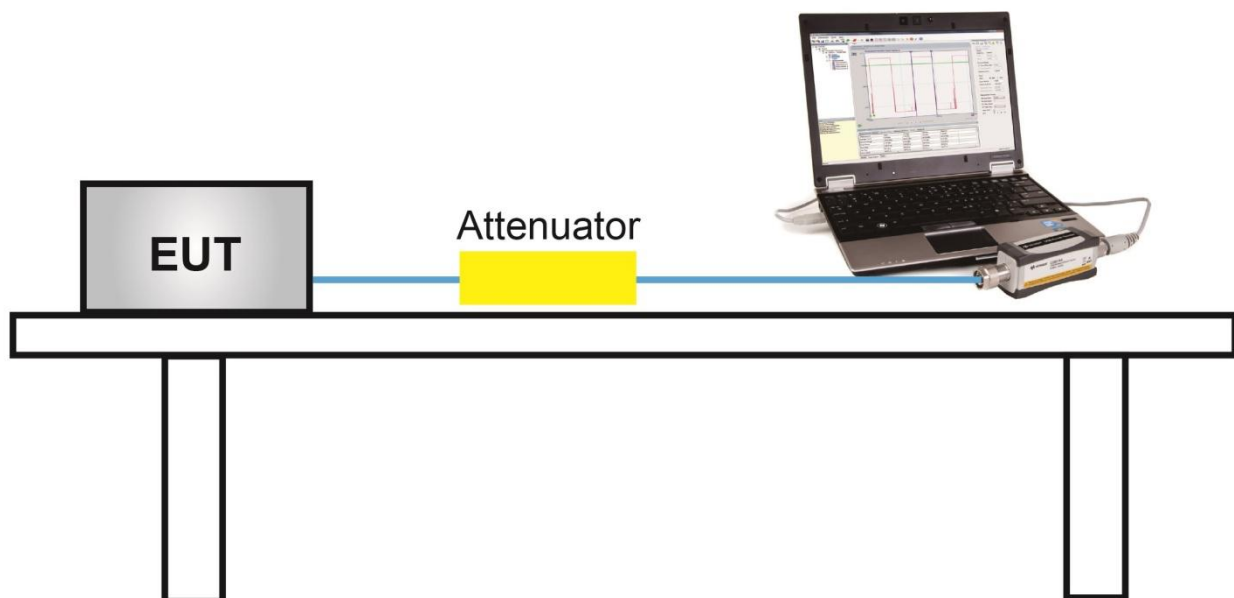
6.3.2. Test Procedure Used

KDB 789033D02v02r01- Section E)3) b) Method PM-G

6.3.3. Test Setting

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

6.3.4. Test Setup



6.3.5. Test Result

Output power test was verified over all data rates of each mode with Ant0 shown as below table, and then choose the maximum output power (gray marker) for final test of each channel.

Test Mode	Bandwidth	Channel No.	Frequency (MHz)	Data Rate/ MCS	Average Power (dBm)
802.11a	20	36	5260	6Mbps	17.63
				24Mbps	17.55
				54Mbps	17.41
802.11n	20	36	5260	MCS0	17.68
				MCS4	17.59
				MCS7	17.45
802.11n	40	38	5270	MCS0	20.60
				MCS4	20.44
				MCS7	20.33
802.11ac	20	36	5260	MCS0	17.71
				MCS4	17.60
				MCS8	17.48
802.11ac	40	38	5270	MCS0	20.42
				MCS4	20.29
				MCS9	20.20
802.11ac	80	42	5290	MCS0	17.09
				MCS4	17.01
				MCS9	16.89

Test Site	SIP-SR5	Test Engineer	Chase Zhu
Test Date	2021/01/25~2021/01/27	Test Mode	CDD Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Average Power (dBm)	Limit (dBm)	Result
				Ant 0	Ant 1			
11a	6Mbps	52	5260	17.63	17.45	20.55	≤23.98	Pass
11a	6Mbps	60	5300	17.76	17.39	20.59	≤23.97	Pass
11a	6Mbps	64	5320	17.67	17.49	20.59	≤23.98	Pass
11a	6Mbps	100	5500	17.85	18.20	21.04	≤23.98	Pass
11a	6Mbps	116	5580	17.22	17.56	20.40	≤23.96	Pass
11a	6Mbps	140	5700	17.31	17.80	20.57	≤23.98	Pass
11a	6Mbps	144	5720	17.80	18.10	20.96	≤23.97	Pass
11n-HT20	MCS0	52	5260	17.68	17.44	20.57	≤23.98	Pass
11n-HT20	MCS0	60	5300	17.65	17.45	20.56	≤23.98	Pass
11n-HT20	MCS0	64	5320	18.01	17.85	20.94	≤23.98	Pass
11n-HT20	MCS0	100	5500	17.71	18.24	20.99	≤23.98	Pass
11n-HT20	MCS0	116	5580	17.64	18.05	20.86	≤23.98	Pass
11n-HT20	MCS0	140	5700	17.67	18.10	20.90	≤23.98	Pass
11n-HT20	MCS0	144	5720	17.65	18.06	20.87	≤23.98	Pass
11n-HT40	MCS0	54	5270	20.60	20.28	23.45	≤23.98	Pass
11n-HT40	MCS0	62	5310	20.64	20.27	23.47	≤23.98	Pass
11n-HT40	MCS0	102	5510	20.28	21.14	23.74	≤23.98	Pass
11n-HT40	MCS0	110	5550	21.11	20.22	23.70	≤23.98	Pass
11n-HT40	MCS0	134	5670	20.35	20.98	23.69	≤23.98	Pass
11n-HT40	MCS0	142	5710	21.07	19.51	23.37	≤23.98	Pass
11ac-VHT20	MCS0	52	5260	17.71	17.61	20.67	≤23.98	Pass
11ac-VHT20	MCS0	60	5300	17.45	17.29	20.38	≤23.98	Pass
11ac-VHT20	MCS0	64	5320	17.90	17.72	20.82	≤23.98	Pass
11ac-VHT20	MCS0	100	5500	17.40	18.05	20.75	≤23.98	Pass
11ac-VHT20	MCS0	116	5580	17.36	17.51	20.45	≤23.98	Pass
11ac-VHT20	MCS0	140	5700	17.37	17.73	20.56	≤23.98	Pass
11ac-VHT20	MCS0	144	5720	17.30	17.37	20.35	≤23.98	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Average Power (dBm)	Limit (dBm)	Result
				Ant 0	Ant 1			
11ac-VHT40	MCS0	54	5270	20.42	20.48	23.46	≤23.98	Pass
11ac-VHT40	MCS0	62	5310	21.06	20.27	23.69	≤23.98	Pass
11ac-VHT40	MCS0	102	5510	20.20	20.92	23.59	≤23.98	Pass
11ac-VHT40	MCS0	110	5550	18.59	17.85	21.25	≤23.98	Pass
11ac-VHT40	MCS0	134	5670	20.25	20.78	23.53	≤23.98	Pass
11ac-VHT40	MCS0	142	5710	20.83	19.83	23.37	≤23.98	Pass
11ac-VHT80	MCS0	58	5290	17.09	17.78	20.46	≤23.98	Pass
11ac-VHT80	MCS0	106	5530	17.06	19.06	21.18	≤23.98	Pass
11ac-VHT80	MCS0	122	5610	19.72	20.96	23.39	≤23.98	Pass
11ac-VHT80	MCS0	138	5690	20.24	20.96	23.63	≤23.98	Pass

Note 1: The Total Average Power (dBm) = $10 \cdot \log \{10^{(\text{Ant 0 Average Power} / 10)} + 10^{(\text{Ant 1 Average Power} / 10)}\}$.

Note 2: The limit is lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

Test Site	SIP-SR5	Test Engineer	Chase Zhu
Test Date	2021/01/25~2021/01/27	Test Mode	Beamforming Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Average Power (dBm)	Limit (dBm)	Result
				Ant 0	Ant 1			
11n-HT20	MCS0	52	5260	17.68	17.44	20.57	≤23.47	Pass
11n-HT20	MCS0	60	5300	17.65	17.45	20.56	≤23.47	Pass
11n-HT20	MCS0	64	5320	18.01	17.85	20.94	≤23.47	Pass
11n-HT20	MCS0	100	5500	17.71	18.24	20.99	≤23.57	Pass
11n-HT20	MCS0	116	5580	17.64	18.05	20.86	≤23.57	Pass
11n-HT20	MCS0	140	5700	17.67	18.10	20.90	≤23.57	Pass
11n-HT20	MCS0	144	5720	17.65	18.06	20.87	≤23.57	Pass
11n-HT40	MCS0	54	5270	20.60	20.28	23.45	≤23.47	Pass
11n-HT40	MCS0	62	5310	20.64	20.27	23.47	≤23.47	Pass
11n-HT40	MCS0	102	5510	20.02	20.81	23.44	≤23.57	Pass
11n-HT40	MCS0	110	5550	20.77	20.11	23.46	≤23.57	Pass
11n-HT40	MCS0	134	5670	20.22	20.84	23.55	≤23.57	Pass
11n-HT40	MCS0	142	5710	21.07	19.51	23.37	≤23.57	Pass
11ac-VHT20	MCS0	52	5260	17.71	17.61	20.67	≤23.47	Pass
11ac-VHT20	MCS0	60	5300	17.45	17.29	20.38	≤23.47	Pass
11ac-VHT20	MCS0	64	5320	17.90	17.72	20.82	≤23.47	Pass
11ac-VHT20	MCS0	100	5500	17.40	18.05	20.75	≤23.57	Pass
11ac-VHT20	MCS0	116	5580	17.36	17.51	20.45	≤23.57	Pass
11ac-VHT20	MCS0	140	5700	17.37	17.73	20.56	≤23.57	Pass
11ac-VHT20	MCS0	144	5720	17.30	17.37	20.35	≤23.57	Pass
11ac-VHT40	MCS0	54	5270	20.42	20.48	23.46	≤23.47	Pass
11ac-VHT40	MCS0	62	5310	20.47	19.69	23.11	≤23.47	Pass
11ac-VHT40	MCS0	102	5510	19.86	21.10	23.53	≤23.57	Pass
11ac-VHT40	MCS0	110	5550	18.59	17.85	21.25	≤23.57	Pass
11ac-VHT40	MCS0	134	5670	20.25	20.78	23.53	≤23.57	Pass
11ac-VHT40	MCS0	142	5710	20.83	19.83	23.37	≤23.57	Pass
11ac-VHT80	MCS0	58	5290	17.09	17.78	20.46	≤23.47	Pass
11ac-VHT80	MCS0	106	5530	17.06	19.06	21.18	≤23.57	Pass
11ac-VHT80	MCS0	122	5610	19.72	20.96	23.39	≤23.57	Pass
11ac-VHT80	MCS0	138	5690	20.10	20.74	23.44	≤23.57	Pass

Note 1:

The Total Average Power (dBm) = $10 \cdot \log \{10^{(\text{Ant 0 Average Power} / 10)} + 10^{(\text{Ant 1 Average Power} / 10)}\}$.

Note 2:

Note 2: The limit is lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For 5250~5350MHz: The Limit is 23.98- (6.51-6) =23.47dBm.

For 5470~5725MHz: The Limit is 23.98- (6.41-6) =23.57dBm.

6.4. Transmit Power Control

6.4.1. Test Limit

The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.

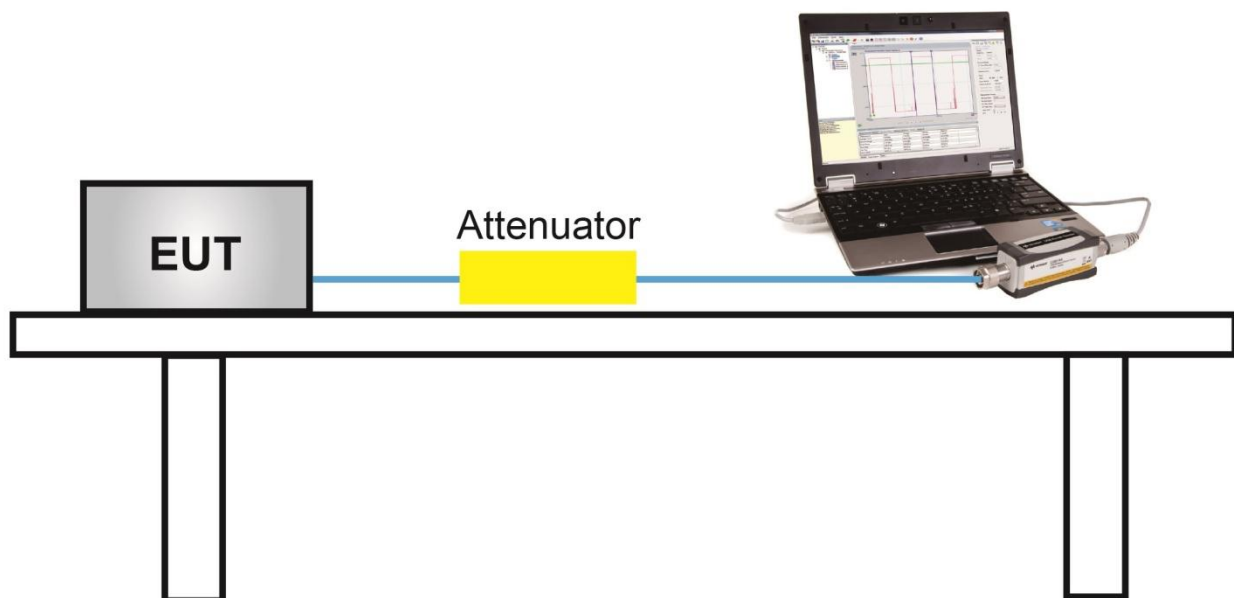
6.4.2. Test Procedure Used

ANSI C63.10-2013- Section 12.3.3.2 Method PM-G

6.4.3. Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.4.4. Test Setup



6.4.5. Test Result

Manufacturer declared that device support TPC mechanism in the operation description.

6.5. Power Spectral Density Measurement

6.5.1. Test Limit

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

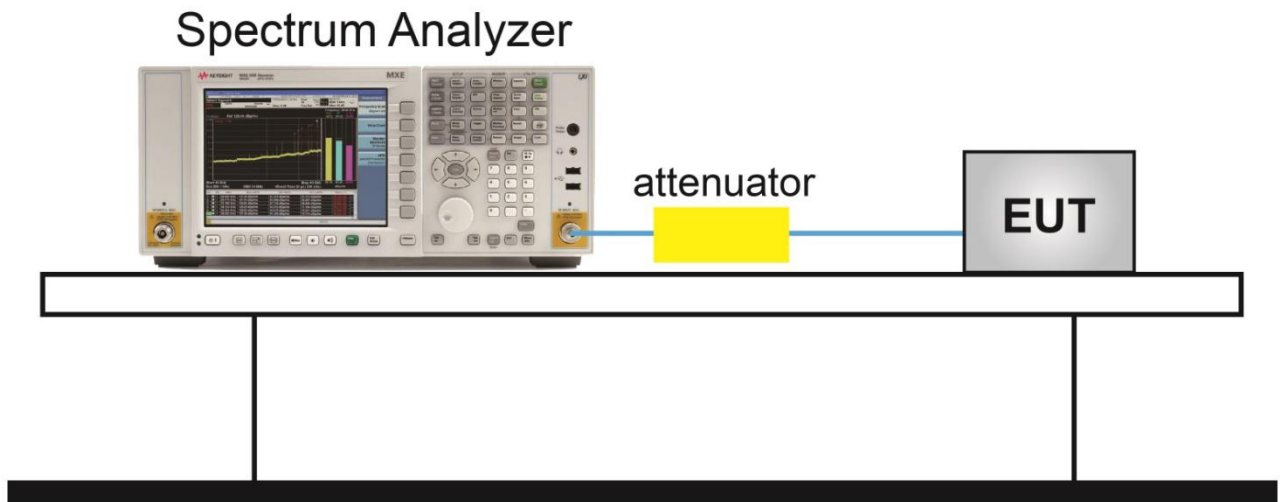
6.5.2. Test Procedure Used

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6.5.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz
If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 510kHz
4. VBW = 3MHz
5. Number of sweep points $\geq 2 \times (\text{span} / \text{RBW})$
6. Detector = Power averaging (Average)
7. Trace average at least 100 traces in power averaging (rms) mode
8. Sweep time = Auto
9. Trigger = Free run
10. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
11. Add $10 \cdot \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add $10 \cdot \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

6.5.4. Test Setup



6.5.5. Test Result

Test Site	SIP-SR5	Test Engineer	Chase Zhu
Test Date	2021/02/04~2021/03/16	Test Mode	CDD Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ MHz)		Duty Cycle (%)	Final PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
				Ant 0	Ant 1				
11a	6Mbps	52	5260	6.90	6.72	95.81	10.01	≤10.49	Pass
11a	6Mbps	60	5300	6.86	6.92	95.81	10.08	≤10.49	Pass
11a	6Mbps	64	5320	7.18	6.96	95.81	10.27	≤10.49	Pass
11a	6Mbps	100	5500	6.96	6.96	95.81	10.16	≤10.59	Pass
11a	6Mbps	116	5580	6.69	7.13	95.81	10.11	≤10.59	Pass
11a	6Mbps	140	5700	6.85	7.35	95.81	10.30	≤10.59	Pass
11a	6Mbps	144	5720	7.16	7.06	95.81	10.30	≤10.59	Pass
11n-HT20	MCS0	52	5260	6.74	6.83	95.57	9.99	≤10.49	Pass
11n-HT20	MCS0	60	5300	7.33	6.73	95.57	10.25	≤10.49	Pass
11n-HT20	MCS0	64	5320	6.92	6.98	95.57	10.16	≤10.49	Pass
11n-HT20	MCS0	100	5500	7.10	7.13	95.57	10.32	≤10.59	Pass
11n-HT20	MCS0	116	5580	6.96	7.45	95.57	10.42	≤10.59	Pass
11n-HT20	MCS0	140	5700	6.72	7.20	95.57	10.17	≤10.59	Pass
11n-HT20	MCS0	144	5720	6.84	7.33	95.57	10.30	≤10.59	Pass
11n-HT40	MCS0	54	5270	6.09	6.58	91.25	9.75	≤10.49	Pass
11n-HT40	MCS0	62	5310	6.13	6.11	91.25	9.52	≤10.49	Pass
11n-HT40	MCS0	102	5510	5.16	6.59	91.25	9.34	≤10.59	Pass
11n-HT40	MCS0	110	5550	5.55	5.70	91.25	9.03	≤10.59	Pass
11n-HT40	MCS0	134	5670	4.75	6.26	91.25	8.98	≤10.59	Pass
11n-HT40	MCS0	142	5710	5.40	4.98	91.25	8.60	≤10.59	Pass
11ac-VHT20	MCS0	52	5260	6.90	6.98	91.77	10.33	≤10.49	Pass
11ac-VHT20	MCS0	60	5300	6.81	6.89	91.77	10.23	≤10.49	Pass
11ac-VHT20	MCS0	64	5320	6.76	6.88	91.77	10.20	≤10.49	Pass
11ac-VHT20	MCS0	100	5500	6.89	7.06	91.77	10.36	≤10.59	Pass
11ac-VHT20	MCS0	116	5580	6.77	7.29	91.77	10.42	≤10.59	Pass
11ac-VHT20	MCS0	140	5700	6.90	7.04	91.77	10.35	≤10.59	Pass
11ac-VHT20	MCS0	144	5720	6.97	7.08	91.77	10.40	≤10.59	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ MHz)		Duty Cycle (%)	Final PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
				Ant 0	Ant 1				
11ac-VHT40	MCS0	54	5270	5.54	5.92	85.05	9.45	≤10.49	Pass
11ac-VHT40	MCS0	62	5310	6.01	5.71	85.05	9.58	≤10.49	Pass
11ac-VHT40	MCS0	102	5510	4.66	6.21	85.05	9.22	≤10.59	Pass
11ac-VHT40	MCS0	110	5550	3.65	3.46	85.05	7.27	≤10.59	Pass
11ac-VHT40	MCS0	134	5670	4.91	6.21	85.05	9.32	≤10.59	Pass
11ac-VHT40	MCS0	142	5710	5.13	4.90	85.05	8.73	≤10.59	Pass
11ac-VHT80	MCS0	58	5290	-0.18	0.98	75.76	4.65	≤10.49	Pass
11ac-VHT80	MCS0	106	5530	-0.18	1.71	75.76	5.09	≤10.59	Pass
11ac-VHT80	MCS0	122	5610	0.99	2.41	75.76	5.97	≤10.59	Pass
11ac-VHT80	MCS0	138	5690	1.10	2.42	75.76	6.03	≤10.59	Pass

Note:

When EUT duty cycle ≥ 98%, Final PSD (dBm / MHz) = $10 \cdot \log \{10^{(\text{Ant 0 AVGPSD}/10)} + 10^{(\text{Ant 1 AVGPSD}/10)}\}$.

When EUT duty cycle < 98%, Final PSD (dBm / MHz) = $10 \cdot \log \{10^{(\text{Ant 0 AVGPSD}/10)} + 10^{(\text{Ant 1 AVGPSD}/10)}\} + 10 \cdot \log (1/\text{Duty cycle})$.

For 5250~5350MHz: The Limit is 11- (6.51-6) =10.49dBm/Mhz.

For 5470~5725MHz: The Limit is 11- (6.41-6) =10.59dBm/MHz.

Test Site	SIP-SR5	Test Engineer	Chase Zhu
Test Date	2021/01/27~2021/02/24	Test Mode	Beamforming Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ MHz)		Duty Cycle (%)	Final PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
				Ant 0	Ant 1				
11n-HT20	MCS0	52	5260	6.74	6.83	95.57	9.99	≤10.49	Pass
11n-HT20	MCS0	60	5300	7.33	6.73	95.57	10.25	≤10.49	Pass
11n-HT20	MCS0	64	5320	6.92	6.98	95.57	10.16	≤10.49	Pass
11n-HT20	MCS0	100	5500	7.10	7.13	95.57	10.32	≤10.59	Pass
11n-HT20	MCS0	116	5580	6.96	7.45	95.57	10.42	≤10.59	Pass
11n-HT20	MCS0	140	5700	6.72	7.20	95.57	10.17	≤10.59	Pass
11n-HT20	MCS0	144	5720	6.84	7.33	95.57	10.30	≤10.59	Pass
11n-HT40	MCS0	54	5270	6.09	6.58	91.25	9.75	≤10.49	Pass
11n-HT40	MCS0	62	5310	6.13	6.11	91.25	9.52	≤10.49	Pass
11n-HT40	MCS0	102	5510	5.16	6.59	91.25	9.34	≤10.59	Pass
11n-HT40	MCS0	110	5550	5.55	5.70	91.25	9.03	≤10.59	Pass
11n-HT40	MCS0	134	5670	4.75	6.26	91.25	8.98	≤10.59	Pass
11n-HT40	MCS0	142	5710	5.40	4.98	91.25	8.60	≤10.59	Pass
11ac-VHT20	MCS0	52	5260	6.90	6.98	91.77	10.33	≤10.49	Pass
11ac-VHT20	MCS0	60	5300	6.81	6.89	91.77	10.23	≤10.49	Pass
11ac-VHT20	MCS0	64	5320	6.76	6.88	91.77	10.20	≤10.49	Pass
11ac-VHT20	MCS0	100	5500	6.89	7.06	91.77	10.36	≤10.59	Pass
11ac-VHT20	MCS0	116	5580	6.77	7.29	91.77	10.42	≤10.59	Pass
11ac-VHT20	MCS0	140	5700	6.90	7.04	91.77	10.35	≤10.59	Pass
11ac-VHT20	MCS0	144	5720	6.97	7.08	91.77	10.40	≤10.59	Pass
11ac-VHT40	MCS0	54	5270	5.54	5.92	85.05	9.45	≤10.49	Pass
11ac-VHT40	MCS0	62	5310	6.01	5.71	85.05	9.58	≤10.49	Pass
11ac-VHT40	MCS0	102	5510	4.66	6.21	85.05	9.22	≤10.59	Pass
11ac-VHT40	MCS0	110	5550	3.65	3.46	85.05	7.27	≤10.59	Pass
11ac-VHT40	MCS0	134	5670	4.91	6.21	85.05	9.32	≤10.59	Pass
11ac-VHT40	MCS0	142	5710	5.13	4.90	85.05	8.73	≤10.59	Pass
11ac-VHT80	MCS0	58	5290	-0.18	0.98	75.76	4.65	≤10.49	Pass
11ac-VHT80	MCS0	106	5530	-0.18	1.71	75.76	5.09	≤10.59	Pass
11ac-VHT80	MCS0	122	5610	0.99	2.41	75.76	5.97	≤10.59	Pass
11ac-VHT80	MCS0	138	5690	1.10	2.42	75.76	6.03	≤10.59	Pass

Note 1: When EUT duty cycle ≥ 98%, Final PSD (dBm / MHz) = $10 \cdot \log \{10^{(\text{Ant 0 AVGPSD}/10)} + 10^{(\text{Ant 1 AVGPSD}/10)}\}$.

When EUT duty cycle < 98%, Final PSD (dBm / MHz) = $10 \cdot \log \{10^{(\text{Ant 0 AVGPSD}/10)} + 10^{(\text{Ant 1 AVGPSD}/10)}\} + 10 \cdot \log (1/\text{Duty cycle})$.

For 5250~5350MHz: The Limit is $11 - (6.51 - 6) = 10.49\text{dBm/MHz}$.

For 5470~5725MHz: The Limit is $11 - (6.41 - 6) = 10.59\text{dBm/MHz}$.

802.11a Power Spectral Density – CDD Mode Ant 0

Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)



Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)



Channel 144 (5720MHz)



802.11n-HT20 Power Spectral Density –CDD Mode Ant 0

Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)



Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)



Channel 144 (5720MHz)



802.11n-HT40 Power Spectral Density – CDD Mode Ant 0

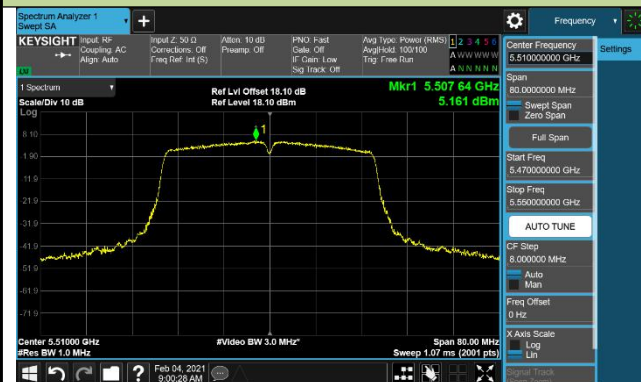
Channel 54 (5270MHz)



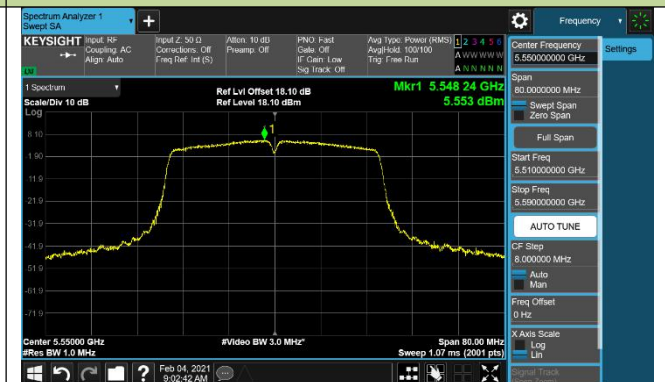
Channel 62 (5310MHz)



Channel 102 (5510MHz)



Channel 110 (5550MHz)



Channel 134 (5670MHz)



Channel 142 (5710MHz)



802.11ac-VHT20 Power Spectral Density – CDD Mode Ant 0

Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)



Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)

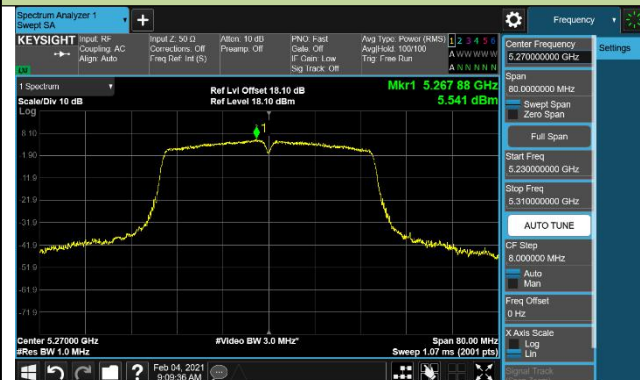


Channel 144 (5720MHz)



802.11ac-VHT40 Power Spectral Density – CDD Mode Ant 0

Channel 54 (5270MHz)



Channel 62 (5310MHz)



Channel 102 (5510MHz)



Channel 110 (5550MHz)



Channel 134 (5670MHz)



Channel 142 (5710MHz)

