FCC 47 CFR PART 15 SUBPART E
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

Communication Module

MODEL NUMBER: LBEE6ZZ1FD

FCC ID: VPYLB1FD
IC: 772C-LB1FD

REPORT NUMBER: 4788224831-4

ISSUE DATE: Feb. 10, 2018

Prepared for

Murata Manufacturing Co.,Ltd.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/11/2018	Initial Issue	

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Murata Manufacturing Co.,Ltd.
Address:	10-1,Higashikotari 1-chome,Nagaokakyo-shi,Kyoto 617-8555,Japan

Manufacturer Information

Company Name:	Murata Manufacturing Co.,Ltd.
Address:	10-1,Higashikotari 1-chome,Nagaokakyo-shi,Kyoto 617-8555,Japan

Factory Information

Company Name:	Murata Manufacturing Co.,Ltd.
Address:	10-1,Higashikotari 1-chome,Nagaokakyo-shi,Kyoto 617-8555,Japan

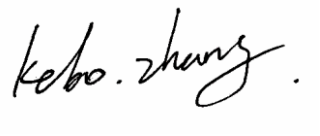
EUT Description

Product Name	Communication Module
Model Name	LBEE6ZZ1FD
Sample Number	1308669-001
Data of Receipt Sample	Dec .7, 2017
Date Tested	Dec .10, 2017 ~ Feb. 10, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
ISED RSS-247 Issue 2	Pass
ISED RSS-GEN Issue 4	Pass

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6/26db Bandwidth	FCC 15.407 (a)&(e) RSS-247 Clause 6.2	Note1
2	99% Bandwidth	RSS-Gen Clause 6.6	Note1
3	Maximum Conducted Output Power	FCC 15.407 (a) RSS-247 Clause 6.2	Note1
4	Power Spectral Density	FCC 15.407 (a) RSS-247 Clause 6.2	Note1
5	Antenna Conducted Spurious Emission	FCC 15.407 (b) RSS-247 Clause 6.2	Note1
6	Radiated Bandedge and Spurious Emission	FCC 15.407 (a) FCC 15.209 FCC 15.205 RSS-247 Clause 6.2 RSS-GEN Clause 8.9	PASS
7	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	NA
8	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Note1
9	Frequency Stability	FCC 15.407 (g)	Note1
Note1. For the test data, please refer to the report of the **FCC ID: VPYLB1FD** 2. "N/A" denotes test is not applicable in this Test Report 3:Duty cycle factor refer to the original report			

Tested By: Checked By:



Kebo Zhang
Engineer

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo

Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 DTS Meas Guidance v04, 789033 D02 General UNII Test Procedures New Rules v02r01 , 662911 D02 MIMO with Cross Polarized Antenna v01 , 414788 D01 Radiated Test Site v01 , ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATIO

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.

Note: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.2dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.04dB(1-6GHz)
	5.30dB (6GHz-18Gz)
	5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Product Name:	Communication Module
Model No.:	LBEE6ZZ1FD
Operating Frequency:	5180 ~ 5240MHz, 5260 ~5320MHz, 5500 ~ 5720MHz & 5745 ~ 5820MHz
Type of Modulation:	256QAM, 64QAM, 16QAM, QPSK, BPSK
Channel Number:	5180 ~ 5240MHz: 4 for 802.11a, 802.11n(HT20), 802.11ac(VHT20) 2 for 802.11n(HT40), 802.11ac(VHT40) 1 for 802.11ac(VHT80) 5260 ~5320MHz: 4 for 802.11a, 802.11n(HT20), 802.11ac(VHT20) 2 for 802.11n(HT40), 802.11ac(VHT40) 1 for 802.11ac(VHT80) 5500 ~5720MHz: 12 for 802.11a, 802.11n(HT20), 802.11ac(VHT20) 6 for 802.11n(HT40), 802.11ac(VHT40) 3 for 802.11ac(VHT80) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n(HT20), 802.11ac(VHT20) 2 for 802.11(HT40), 802.11ac(VHT40) 1 for 802.11ac(VHT80)
Channels Step:	Channels with 5MHz step
Sample Type:	Engineering Sample

5.2. MAXIMUM OUTPUT POWER

For the test data, please refer to the report of the FCC ID: VPYLB1FD

5.3. CHANNEL LIST

UNII-1 (For Bandwidth=20MHz)		UNII-1 (For Bandwidth=40MHz)		UNII-1 (For Bandwidth=80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

UNII-2A (For Bandwidth=20MHz)		UNII-2A (For Bandwidth=40MHz)		UNII-2A (For Bandwidth=80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

UNII-2C (For Bandwidth=20MHz)		UNII-2C (For Bandwidth=40MHz)		UNII-2C (For Bandwidth=80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	110	5510	106	5530
104	5520	118	5550	122	5610
108	5540	126	5590	138	5690
112	5560	134	5630		
116	5580	142	5670		
120	5600	110	5710		
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				
144	5720				

UNII-3 (For Bandwidth=20MHz)		UNII-3 (For Bandwidth=40MHz)		UNII-3 (For Bandwidth=80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	149	5755	155	5775
153	6765	157	5795		
157	5785				
161	5805				
165	5825				

5.4. TEST CHANNEL CONFIGURATION

Pretest Test Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX A Mode / CH52, CH56, CH64, (UNII-2A)
Mode 3	TX A Mode / CH100, CH120, CH144 (UNII-2C)
Mode 4	TX A Mode / CH149, CH157, CH165 (UNII-3)
Mode 5	TX AC20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 6	TX AC20 Mode / CH52, CH56, CH64, (UNII-2A)
Mode 7	TX AC20 Mode / CH100, CH120, CH144 (UNII-2C)
Mode 8	TX AC20 Mode / CH149, CH157, CH165 (UNII-3)
Mode 9	TX AC40 Mode / CH36, CH44 (UNII-1)
Mode 10	TX AC 40 Mode / CH52, CH60 (UNII-2A)
Mode 11	TX AC 40 Mode / CH100, CH116, CH140 (UNII-2C)
Mode 12	TX AC 40 Mode / CH149, CH157 (UNII-3)
Mode 13	TX AC80 Mode / CH36 (UNII-1)
Mode 14	TX AC80 Mode / CH52 (UNII-2A)
Mode 15	TX AC80 Mode / CH100, CH116, CH132 (UNII-2C)
Mode 16	TX AC80 Mode / CH149 (UNII-3)

Note: 802.11n20/40 is covered by 802.11ac20/40.

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worst Case Power Setting Parameter under UNII-1 and UNII-2A and UNII-2C and UNII-3 Band	
Test Software	Tera Term

Band	Mode	Rate	Channel	Soft set value	
				Antenna1	Antenna2
UNII-1	11a	6M	36	44	44
			40	44	44
			48	44	44
UNII-2A	11a		52	44	44
			56	44	44
			64	44	44
UNII-2C	11a		100	44	44
			120	44	44
			144	44	44
UNII-3	11a		149	44	44
			157	44	44
			165	44	44

Band	Mode	Rate	Channel	Soft set value	
				Antenna1	Antenna2
UNII-1	11n (20M)	MCS0	36	44	44
			40	44	44
			48	44	44
	11n(40M)		36	40	40
			44	40	40
UNII-2A	11n (20M)		52	44	44
			56	44	44
			64	44	44
	11n(40M)		52	40	40
			60	40	40
UNII-2C	11n (20M)	MCS0	100	44	44
			120	44	44
			144	44	44
	11n(40M)		100	44	44
			116	40	40
			140	40	40
UNII-3	11n (20M)		149	44	44
			157	44	44
			165	44	44
	11n(40M)		149	40	40
			157	40	40

Band	Mode	Rate	Channel	Soft set value	
				Antenna1	Antenna2
UNII-1	11ac (20M)	MCS0	36	44	44
			40	44	44
			48	44	44
	11ac (40M)		36	40	40
			44	40	40
	11ac (80M)		36	40	40
UNII-2A	11ac (20M)	MCS0	52	44	44
			56	44	44
			64	44	44
	11ac (40M)		52	40	40
			60	40	40
	11ac (80M)		52	40	40
UNII-2C	11ac (20M)	MCS0	100	44	44
			120	44	44
			144	44	44
	11ac (40M)		100	40	40
			116	40	40
			140	40	40
	11ac (80M)		100	40	40
			116	40	40
			132	40	40
UNII-3	11ac (20M)	MCS0	149	44	44
			157	44	44
			165	44	44
	11ac (40M)		149	40	40
			157	40	40
			165	40	40
	11ac (80M)		149	40	40

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna No.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
Antenna 1	5150-5250	PCB Antenna	-3.0
	5260-5350		-3.0
	5470-5725		-3.0
	5725-5850		-3.0
Antenna 2	5150-5250		-3.0
	5260-5350		-3.0
	5470-5725		-3.0
	5725-5850		-3.0

IEE Std. 802.11	Transmit and Receive Mode	Description
a	1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
n(MCS0-7)	2TX, 2RX	Antenna 1 and ntenna 2 can be used as transmitting/receiving antenna.
ac(MCS0-9)	2TX, 2RX	Antenna 1 and ntenna 2 can be used as transmitting/receiving antenna.
Note: 1. The EUT supports the diversity function for WLAN. 2. All the modes had been tested but only the worst data in the report.		

5.7.TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage :	VL	N/A
	VN	DC 3.6V
	VH	N/A

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.8. WORST-CASE CONFIGURATIONS

IEE Std. 802.11	Modulation Technology	Modulation Type	Data Rate (Mbps)	Worst Case (Mbps)
a	OFDM	BPSK, QPSK, 16QAM, 64QAM	54/48/36/24/18/12/9/6	6

802.11n HT20/HT40							
Antenna	MCS	Modulation	HT20 Data Rate(Mbps)		HT40 Data Rate(Mbps)		Worst Case (Mbps)
			GI=800ns	GI=400ns	GI=800ns	GI=400ns	
2x2	8	BPSK	13	14.4	27	30	MCS8
	9	QPSK	26	28.9	54	60	MCS8
	10	QPSK	39	43.3	81	90	MCS8
	11	16-QAM	52	57.8	108	120	MCS8
	12	16-QAM	78	86.7	162	180	MCS8
	13	64-QAM	104	115.6	216	240	MCS8
	14	64-QAM	117	130	243	270	MCS8
	15	64-QAM	130	144.4	270	300	MCS8

802.11ac HT20/HT40/HT80									
Antenna	MCS	Modulation	HT20 Data Rate (Mbps)		HT40 Data Rate (Mbps)		HT80 Data Rate (Mbps)		Worst Case (Mbps)
			GI=800ns	GI=400ns	GI=800ns	GI=400ns	GI=800ns	GI=400ns	
2x2	0	BPSK	13	14.4	27	30	58.5	65	MCS0
	1	QPSK	26	28.9	54	60	117	130	MCS0
	2	QPSK	39	43.3	81	90	175.5	195	MCS0
	3	16-QAM	52	57.8	108	120	234	260	MCS0
	4	16-QAM	78	86.7	162	180	351	390	MCS0
	5	64-QAM	104	115.6	216	240	468	520	MCS0
	6	64-QAM	117	130.3	243	270	526.5	585	MCS0
	7	64-QAM	130	144.4	270	300	585	650	MCS0
	8	256-QAM	156	173.3	324	360	702	780	MCS0
	9	256-QAM	N/A	N/A	360	400	780	866.7	MCS0

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	PC	ThinkPad	T410	N/A
2	Debug	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	PCIEX	N/A	N/A	0.1	N/A

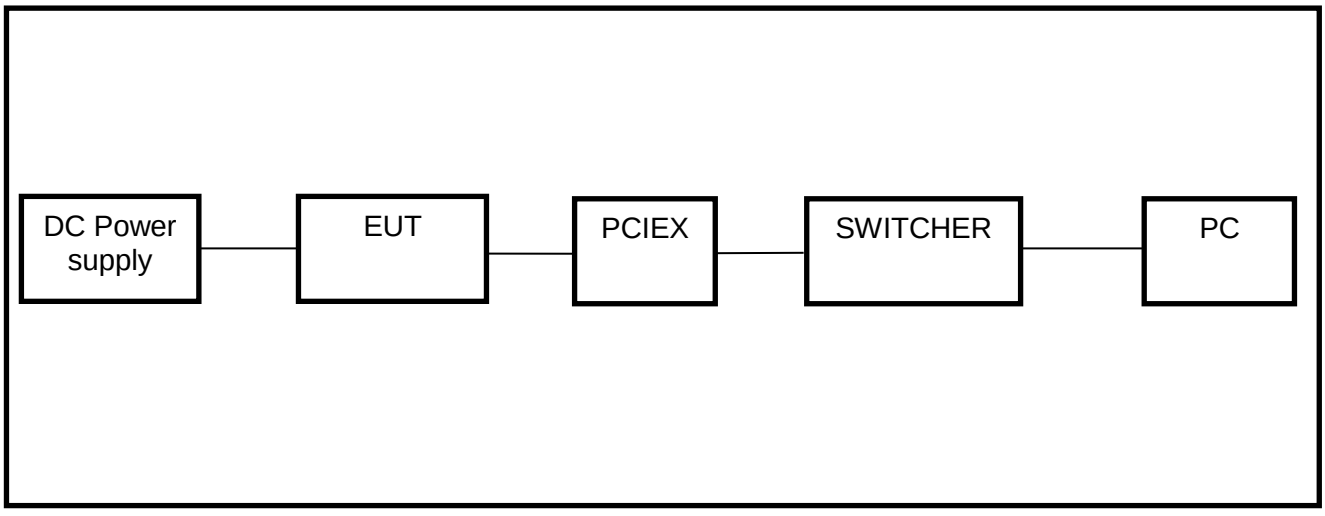
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TEST



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

	Conducted Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	101961	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
☑	Two-Line V-Network	R&S	ENV216	101983	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
☑	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Feb.10, 2017	Dec.12, 2017	Dec.11, 2018

	Software			
Used	Description	Manufacturer	Name	Version
☑	Test Software for Conducted disturbance	UL	Antenna port	Ver. 7.2

	Radiated Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Feb.24, 2017	Dec.12, 2017	Dec.11, 2018
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	N/A	Jan.09, 2016	Jan.08, 2016
☑	Preamplifier	HP	8447D	2944A09099	Feb.13, 2017	Dec.12, 2017	Dec.11, 2018
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
☑	Horn Antenna	TDK	HRN-0118	130939	N/A	Jan. 09, 2016	Jan. 08, 2019
☑	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	N/A	Jan.06, 2016	Jan.05, 2019
☑	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan.14, 2017	Dec.12, 2017	Dec.11, 2018
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
☑	Loop antenna	Schwarzbeck	1519B	00008	N/A	Mar. 26, 2016	Mar. 25, 2019

	Software			
Used	Description	Manufacturer	Name	Version
☑	Test Software for Radiated disturbance	Farad	EZ-EMC	Ver. UL-3A1

	Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
☑	Power Meter	Keysight	N9031A	MY55416024	Feb.13, 2017	Dec.12, 2017	Dec.11, 2018
☑	Power Sensor	Keysight	N9323A	MY55440013	Feb.13, 2017	Dec.12, 2017	Dec.11, 2018

6. RADIATED TEST RESULTS

LIMITS

Please refer to FCC §15.205, §15.209 and §15.407(b) (4)

Please refer to RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

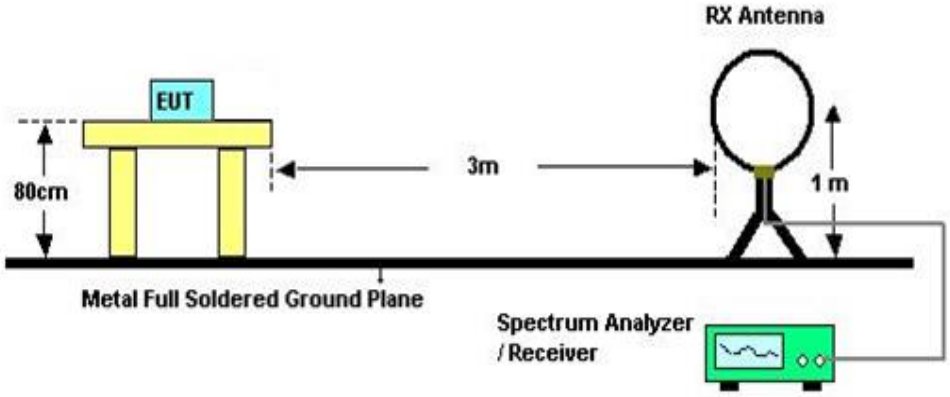
LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1GHz)			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

Limits of unwanted emission out of the restricted bands

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1GHz)		
Frequency Range (MHz) 30 - 88	EIRP Limit	Field Strength Limit (dBuV/m) at 3 m
5150~5250 MHz	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz		
5470~5725 MHz		
5725~5850 MHz	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
Note: *1 beyond 75 MHz or more above of the band edge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

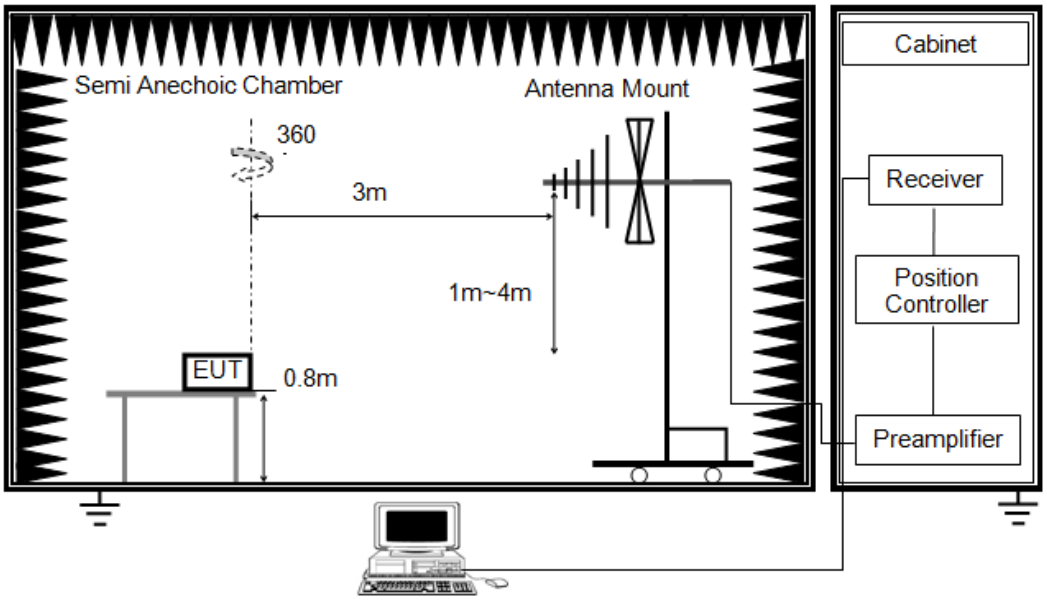
3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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

Below 1G



The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

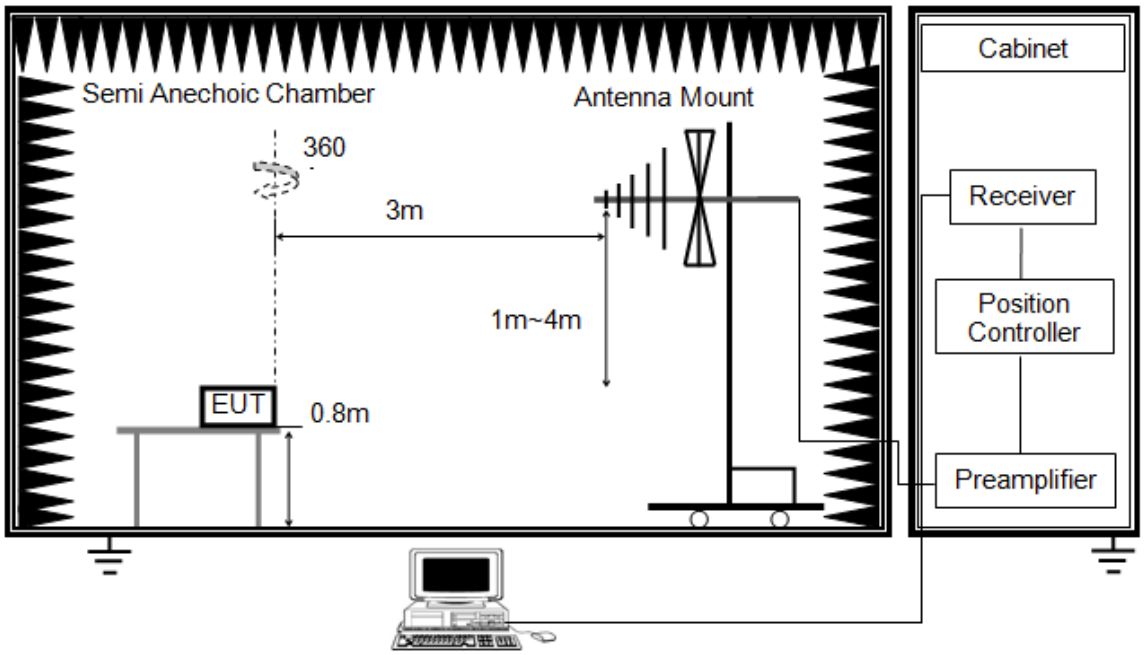
3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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

Below 1G



The setting of the spectrum analyser

RBW	1M
VBW	PEAK: 3M AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5m above ground.

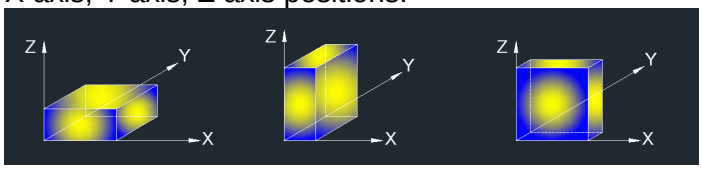
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector. For the Duty Cycle please refer to the report of the FCC ID: VPYLB1FD.

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

X axis, Y axis, Z axis positions:



Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

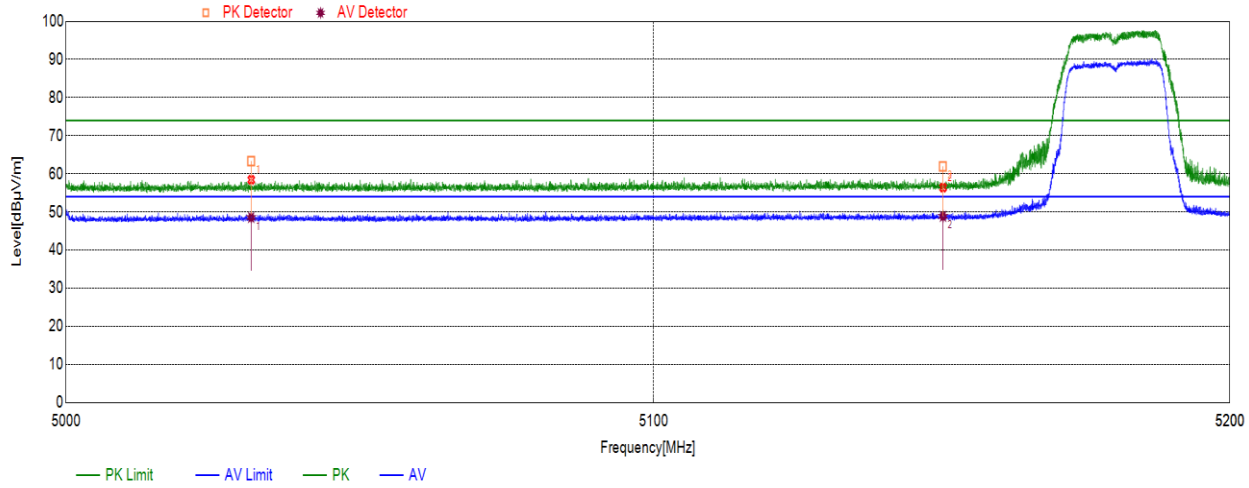
6.1. RADIATED BANDEDGE

6.1.1. UNII-1 BAND

1. 802.11a

Test Graphs (Worse Case: Antenna 2):

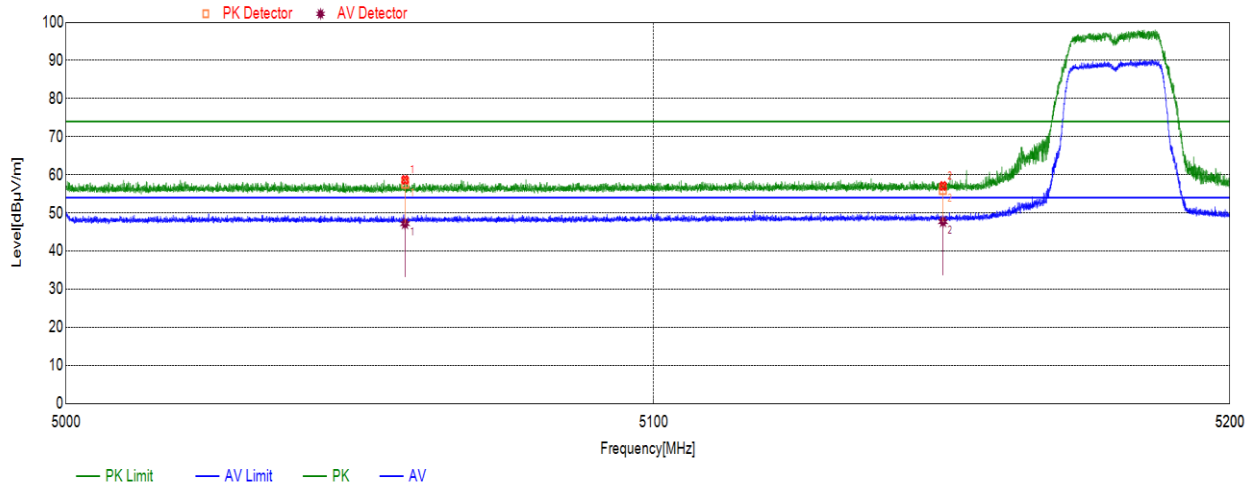
Test Mode	Channel	Polarization	Verdict
11a	LCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5031.3107	63.34	N/A	N/A	74.00	-10.66	peak
	5031.3107	48.55	0.35	48.90	54.00	-5.10	average
2	5150.0000	61.94	N/A	N/A	74.00	-12.06	peak
	5150.0000	48.85	0.35	49.20	54.00	-4.80	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

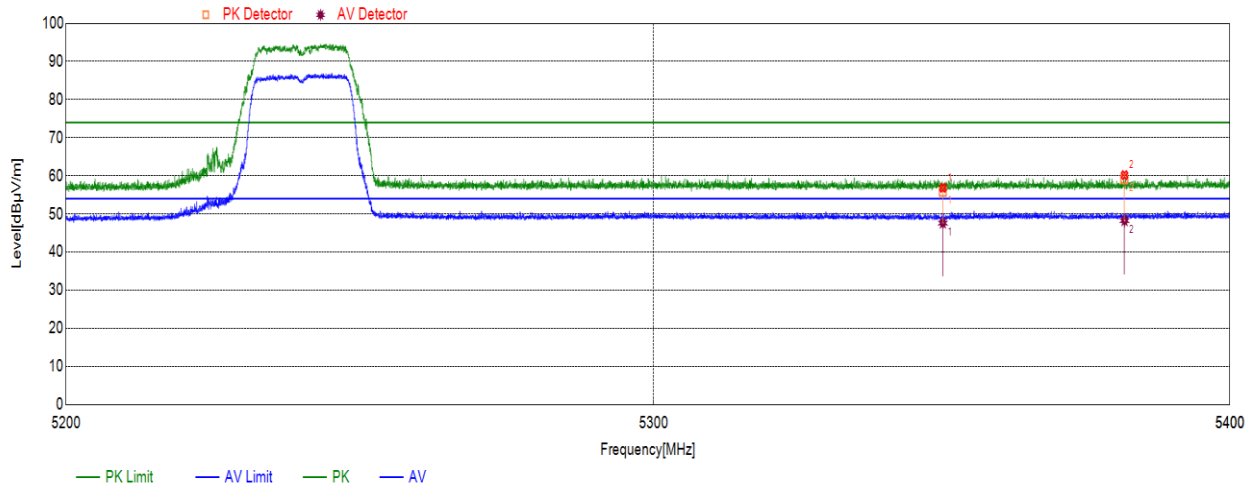
Test Mode	Channel	Polarization	Verdict
11a	LCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5057.4657	57.65	N/A	N/A	74.00	-16.35	peak
	5057.4657	47.20	0.35	47.55	54.00	-6.45	average
2	5150.000	56.04	N/A	N/A	74.00	-17.96	peak
	5150.000	47.72	0.35	48.07	54.00	-5.93	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

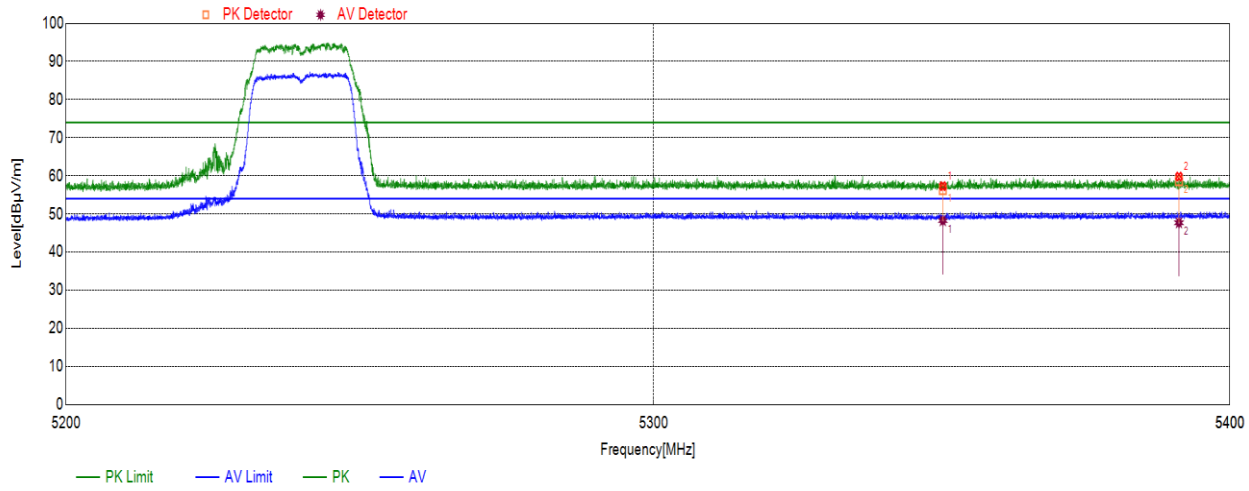
Test Mode	Channel	Polarization	Verdict
11a	HCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	55.82	N/A	N/A	74.00	-18.18	peak
	5350.000	47.60	0.35	47.95	54.00	-6.05	average
2	5381.6182	59.18	N/A	N/A	74.00	-14.82	peak
	5381.6182	48.24	0.35	48.59	54.00	-5.41	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

Test Mode	Channel	Polarization	Verdict
11a	HCH	Horizontal	PASS



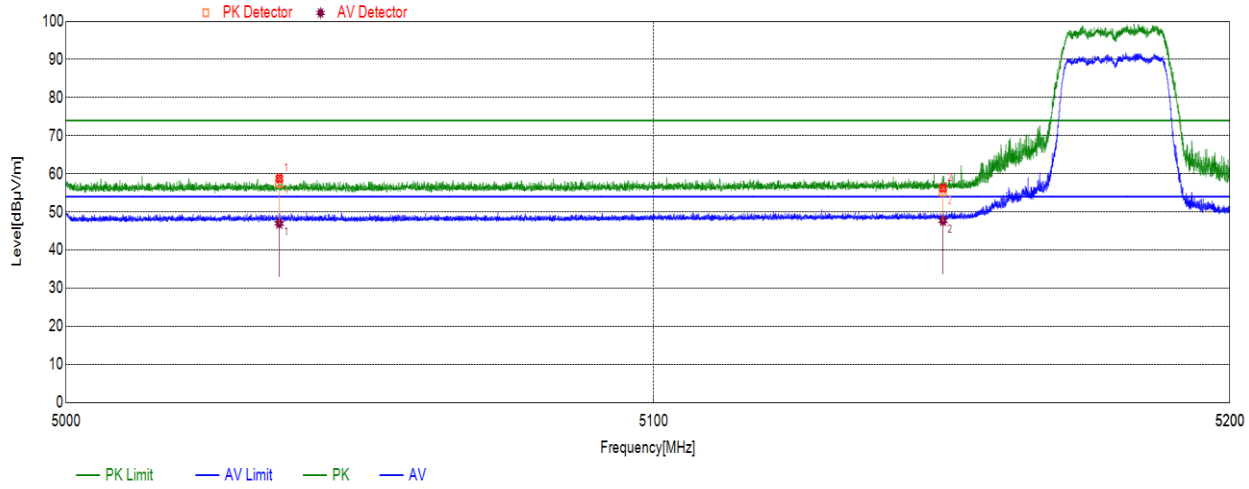
No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	56.27	N/A	N/A	74.00	-17.73	peak
	5350.000	48.25	0.35	48.60	54.00	-5.40	average
2	5391.1191	58.73	N/A	N/A	74.00	-15.27	peak
	5391.1191	47.69	0.35	48.04	54.00	-5.96	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

2. 802.11ac HT20

Test Graphs (Worst Case: Antenna1+ Antenna 2):

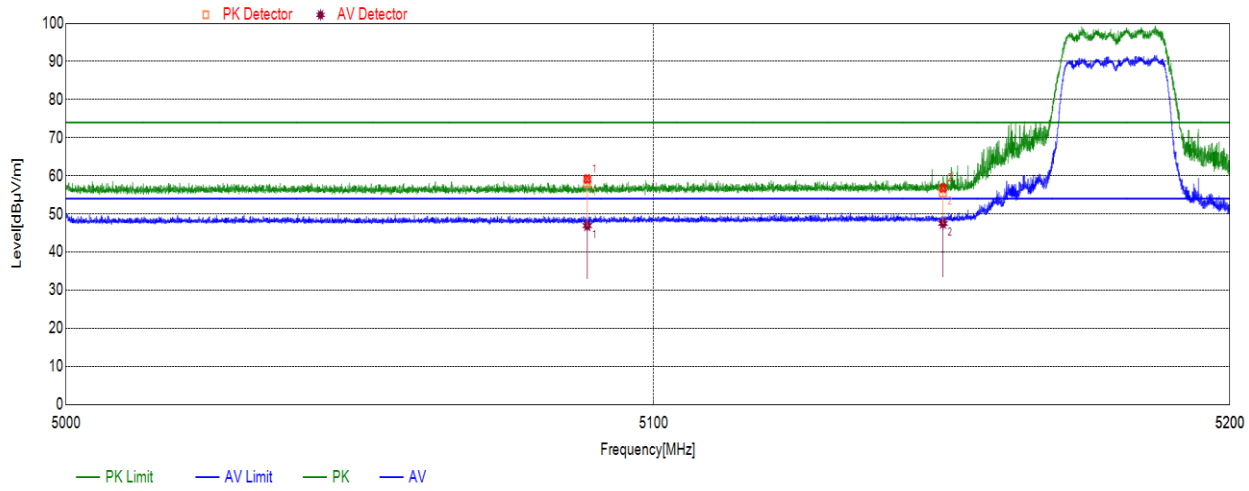
Test Mode	Channel	Polarization	Verdict
11ac HT20	LCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5036.0836	57.73	N/A	N/A	74.00	-16.27	peak
	5036.0836	46.99	0.39	47.38	54.00	-6.62	average
2	5150.000	55.27	N/A	N/A	74.00	-18.73	peak
	5150.000	47.71	0.39	48.10	54.00	-5.90	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 which is shown in this test report.

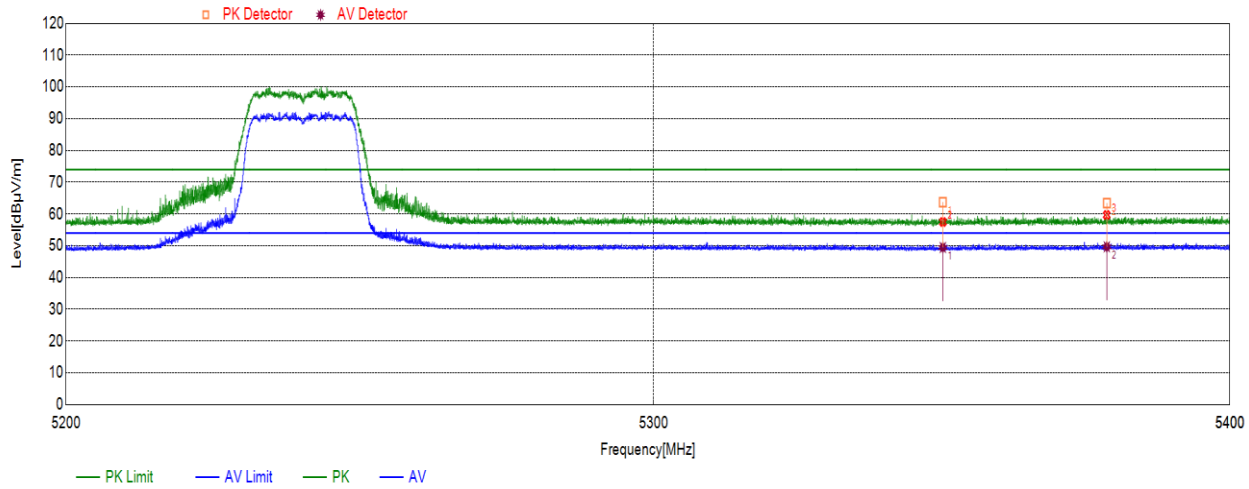
Test Mode	Channel	Polarization	Verdict
11ac HT20	LCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5088.6289	58.11	N/A	N/A	74.00	-15.89	peak
	5088.6289	46.93	0.39	47.32	54.00	-6.68	average
2	5150.000	55.71	N/A	N/A	74.00	-18.29	peak
	5150.000	47.52	0.39	47.91	54.00	-6.09	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 which is shown in this test report.

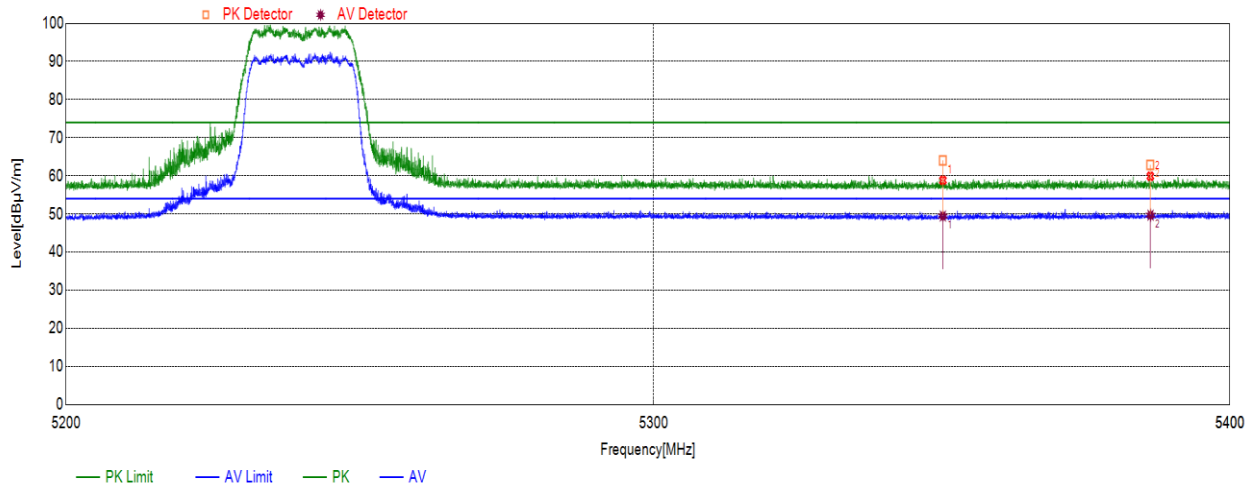
Test Mode	Channel	Polarization	Verdict
11ac HT20	HCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	63.80	N/A	N/A	74.00	-10.20	peak
	5350.0000	49.45	0.39	49.84	54.00	-4.16	average
2	5378.5187	63.35	N/A	N/A	74.00	-10.65	peak
	5378.5187	49.66	0.39	50.05	54.00	-3.95	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 which is shown in this test report.

Test Mode	Channel	Polarization	Verdict
11ac HT20	HCH	Horizontal	PASS



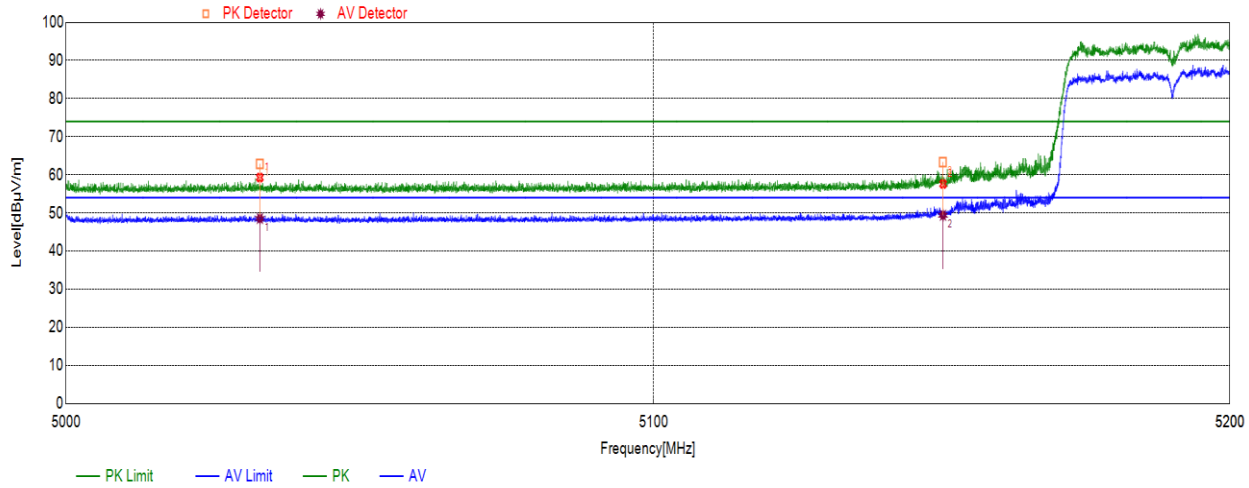
No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	63.97	N/A	N/A	74.00	-10.03	peak
	5350.0000	49.45	0.39	49.84	54.00	-4.16	average
2	5386.1583	62.82	N/A	N/A	74.00	-11.18	peak
	5386.1583	49.68	0.39	50.07	54.00	-3.93	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 which is shown in this test report.

3. 802.11ac HT40

Test Graphs(Worst Case: Antenna 1+Antenna 2):

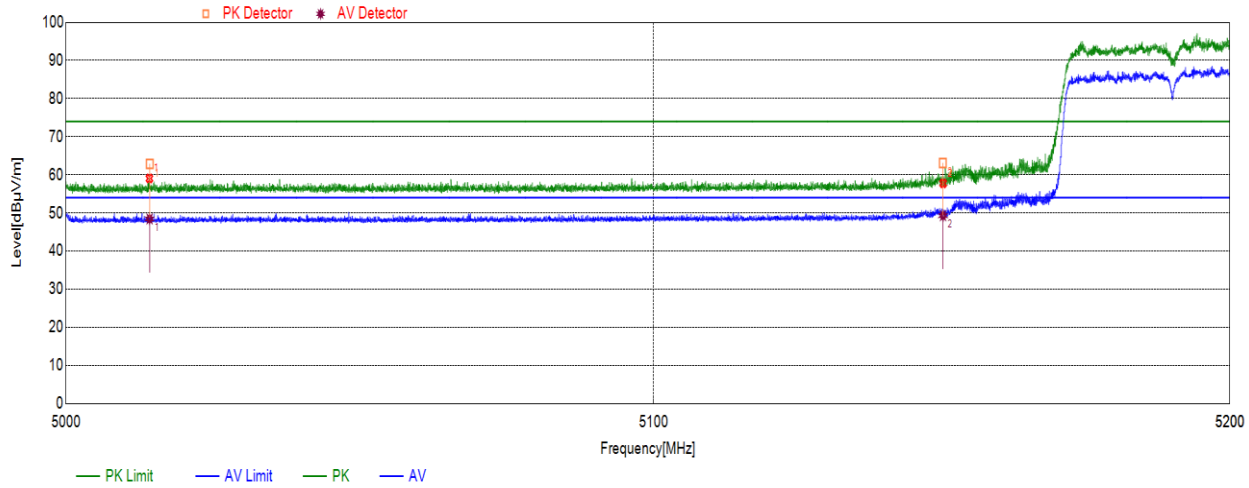
Test Mode	Channel	Polarization	Verdict
11ac HT40	LCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5032.7929	62.94	N/A	N/A	74.00	-11.06	peak
	5032.7929	48.55	0.77	49.32	54.00	-4.68	average
2	5150.0000	63.26	N/A	N/A	74.00	-10.74	peak
	5150.0000	49.39	0.77	50.16	54.00	-3.84	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

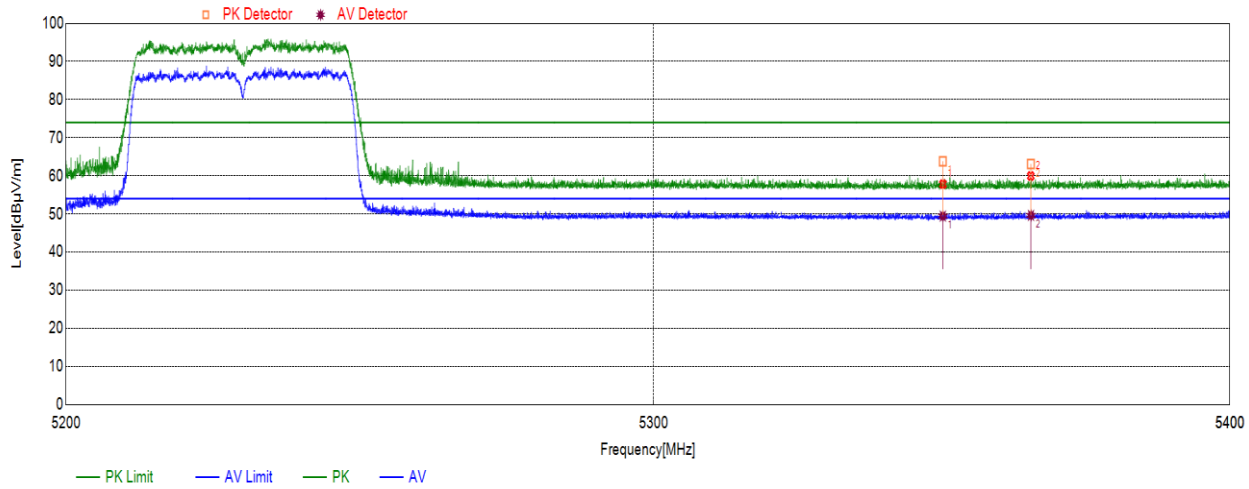
Test Mode	Channel	Polarization	Verdict
11ac HT40	LCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5014.1134	62.78	N/A	N/A	74.00	-11.22	peak
	5014.1134	48.44	0.77	49.21	54.00	-4.79	average
2	5150.0000	63.06	N/A	N/A	74.00	-10.94	peak
	5150.0000	49.29	0.77	50.06	54.00	-3.94	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

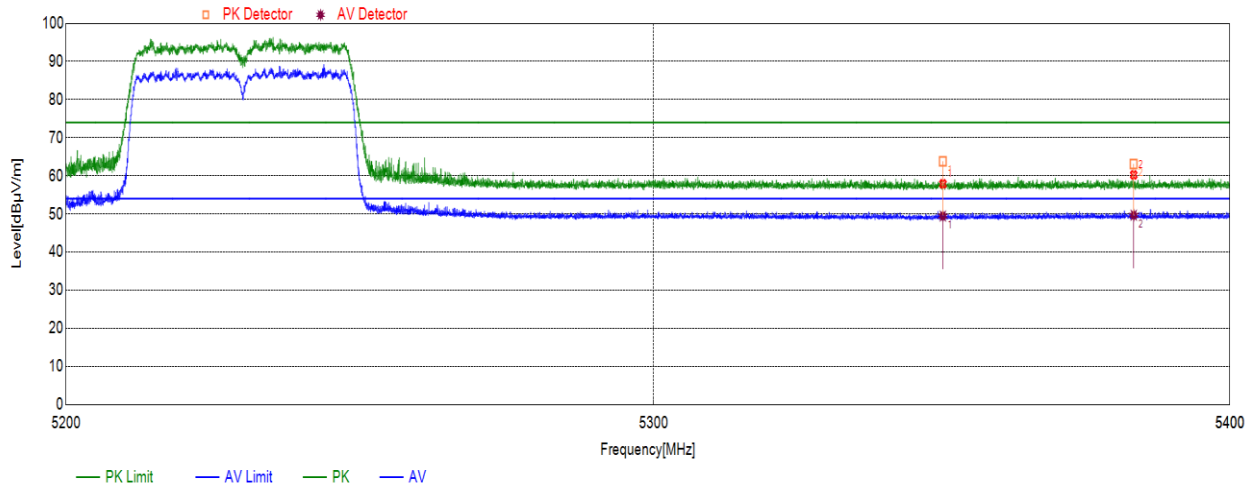
Test Mode	Channel	Polarization	Verdict
11ac HT40	HCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	63.86	N/A	N/A	74.00	-10.14	peak
	5350.0000	49.44	0.77	50.21	54.00	-3.79	average
2	5365.3143	63.01	N/A	N/A	74.00	-10.99	peak
	5365.3143	49.63	0.77	50.40	54.00	-3.60	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

Test Mode	Channel	Polarization	Verdict
11acHT40	HCH	Horizontal	PASS



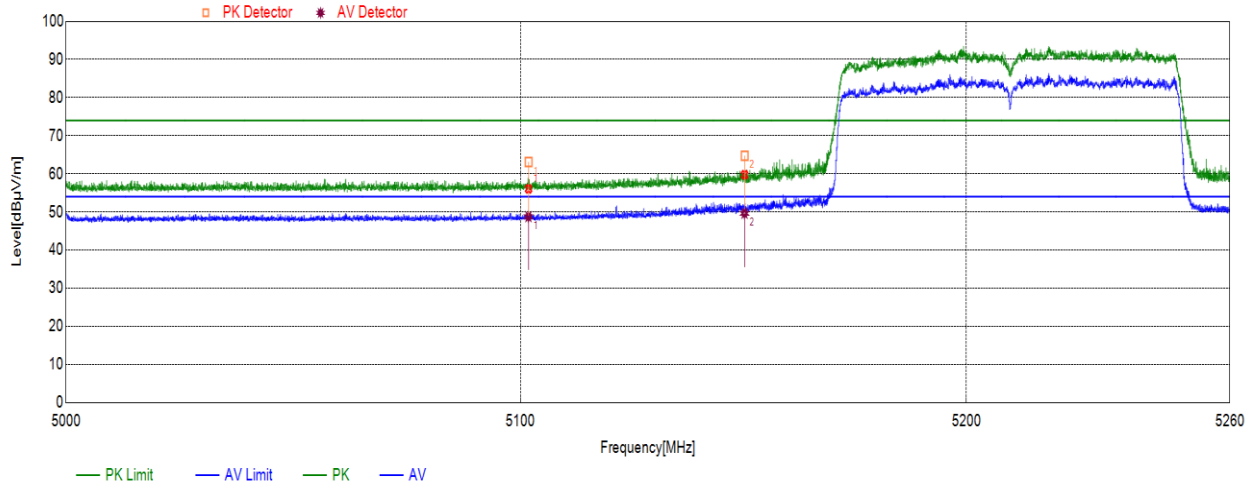
No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	63.82	N/A	N/A	74.00	-10.18	peak
	5350.0000	49.46	0.77	50.23	54.00	-3.77	average
2	5383.2231	63.02	N/A	N/A	74.00	-10.98	peak
	5383.2231	49.67	0.77	50.44	54.00	-3.56	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

4. 802.11ac HT80

Test Graphs(Worst Case: Antenna 1+Antenna 2):

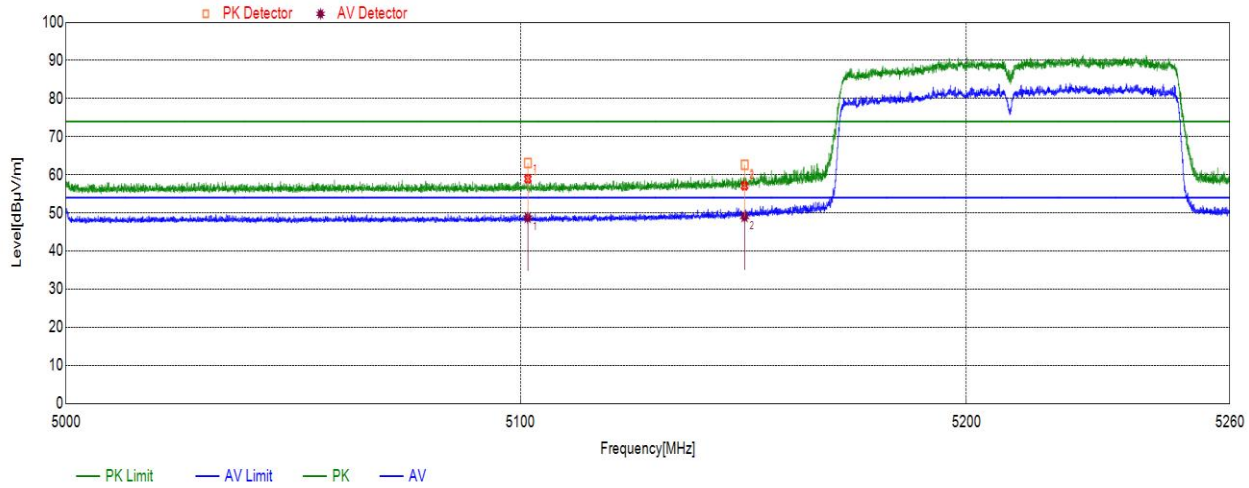
Test Mode	Channel	Polarization	Verdict
11ac HT80	LCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5101.7500	62.96	N/A	N/A	74.00	-11.04	peak
	5101.7500	48.76	1.3	50.06	54.00	-3.94	average
2	5150.0000	64.71	N/A	N/A	74.00	-9.29	peak
	5150.0000	49.63	1.3	50.93	54.00	-3.07	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

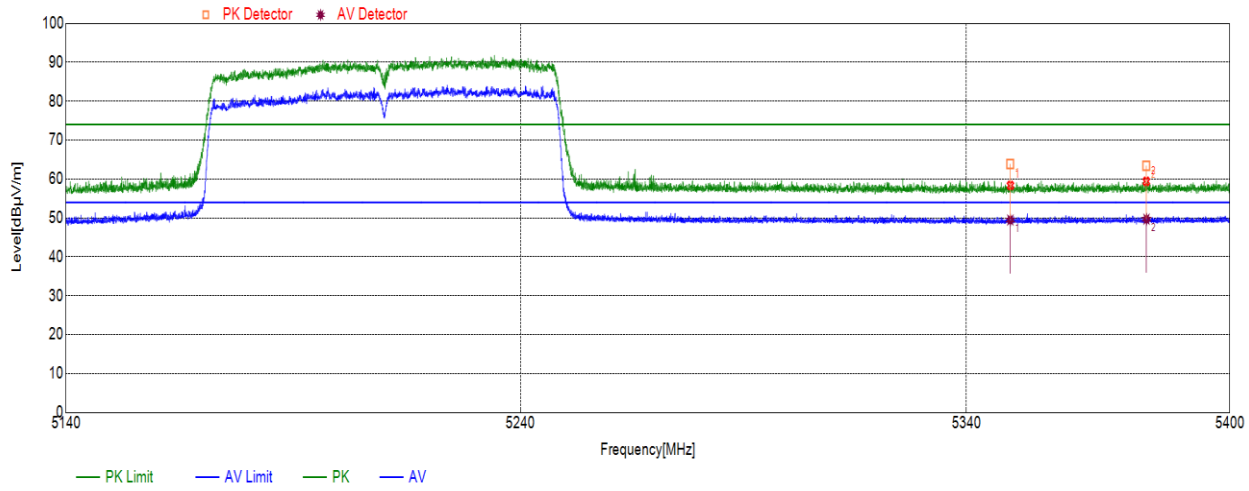
Test Mode	Channel	Polarization	Verdict
11ac HT80	LCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5101.5784	62.98	N/A	N/A	74.00	-11.02	peak
	5101.5784	48.77	1.3	50.07	54.00	-3.93	average
2	5150.0000	62.56	N/A	N/A	74.00	-11.44	peak
	5150.0000	48.77	1.3	50.07	54.00	-3.93	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

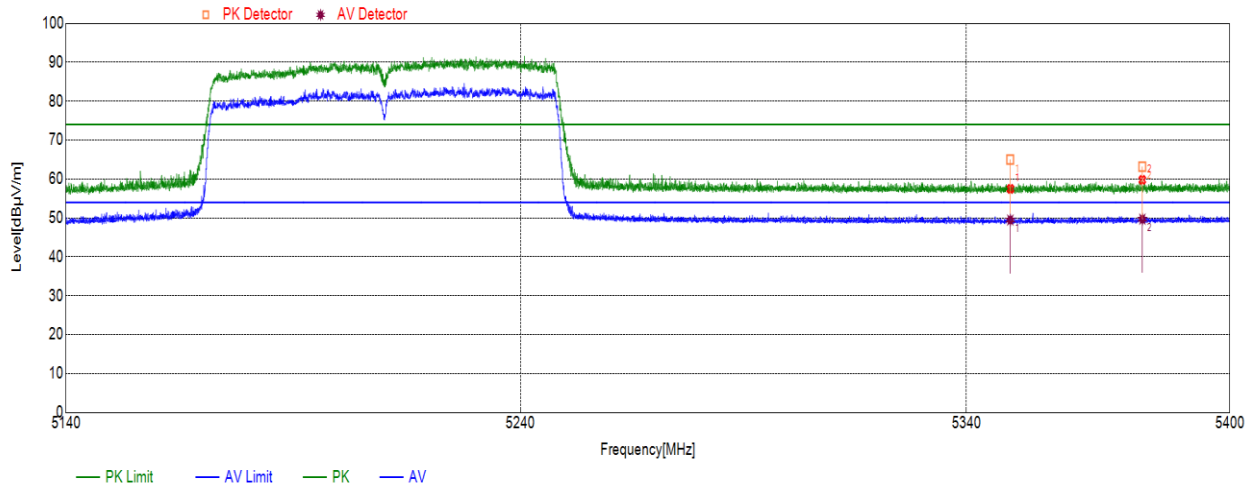
Test Mode	Channel	Polarization	Verdict
11ac HT80	HCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	63.84	N/A	N/A	74.00	-10.16	peak
	5350.0000	49.46	1.3	50.76	54.00	-3.24	average
2	5380.9767	63.44	N/A	N/A	74.00	-10.56	peak
	5380.9767	49.67	1.3	50.97	54.00	-3.03	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

Test Mode	Channel	Polarization	Verdict
11acHT80	HCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	64.88	N/A	N/A	74.00	-9.12	peak
	5350.0000	49.46	1.3	50.76	54.00	-3.24	average
2	5380.0443	63.20	N/A	N/A	74.00	-10.80	peak
	5380.0443	49.68	1.3	50.98	54.00	-3.02	average

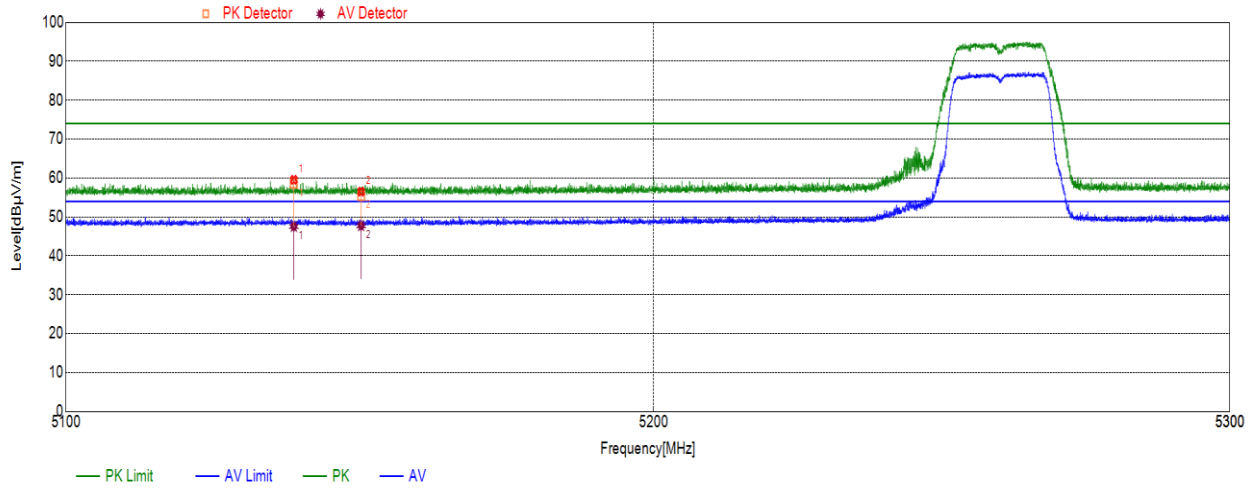
Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 is shown in this test report.

6.1.1. UNII-2A BAND

1. 802.11a

Test Graphs(Worse Case: Antenna 2):

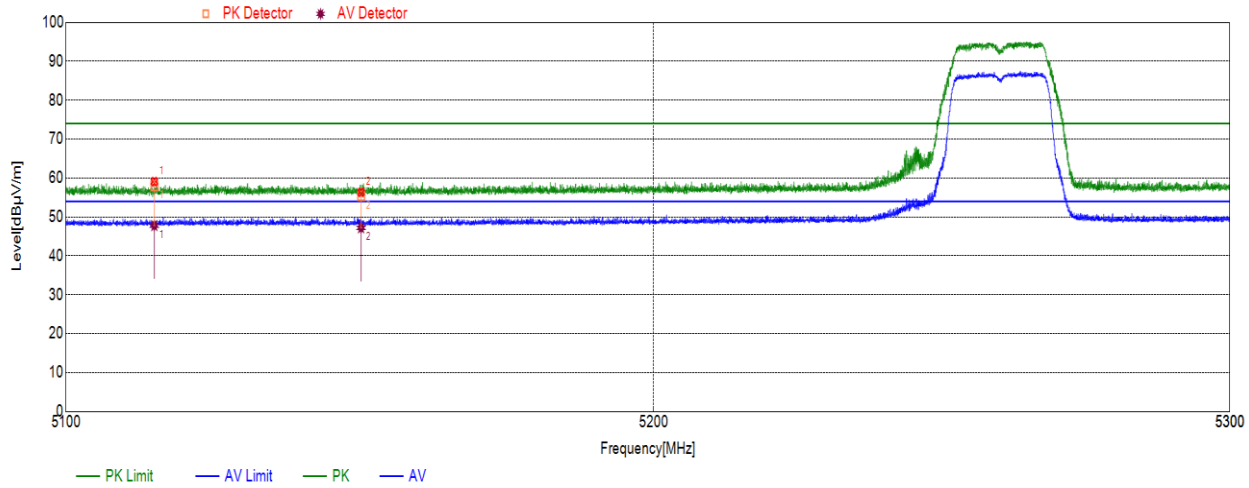
Test Mode	Channel	Polarization	Verdict
11a	LCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5138.5639	58.47	N/A	N/A	74.00	-15.53	peak
	5138.5639	47.53	0.35	47.88	54.00	-6.12	average
2	5150.000	55.48	N/A	N/A	74.00	-18.52	peak
	5150.000	47.74	0.35	48.09	54.00	-5.91	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

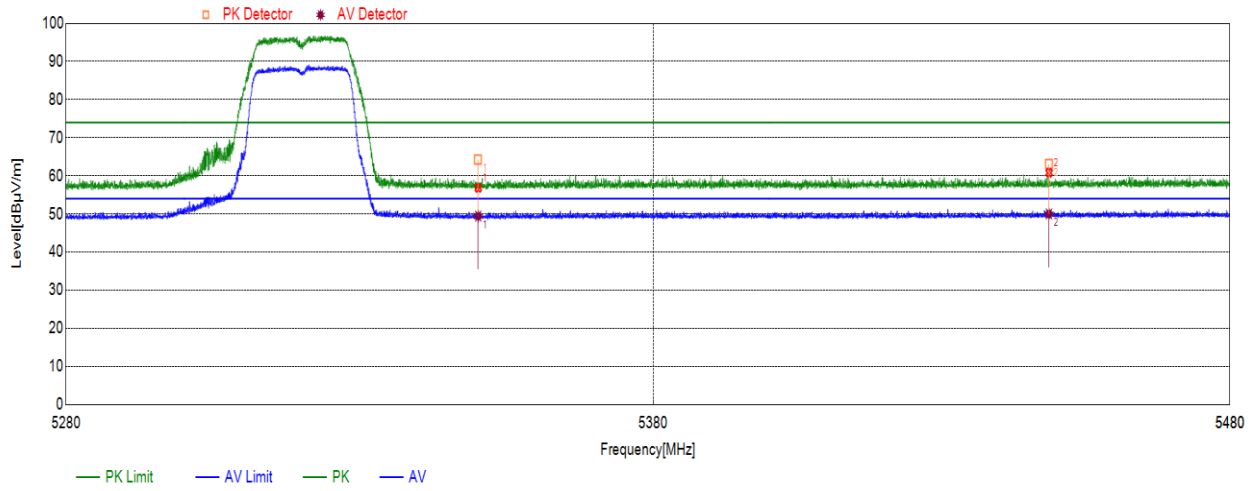
Test Mode	Channel	Polarization	Verdict
11a	LCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5114.9215	57.97	N/A	N/A	74.00	-16.03	peak
	5114.9215	47.77	0.35	48.12	54.00	-5.88	average
2	5150.000	55.30	N/A	N/A	74.00	-18.70	peak
	5150.000	47.20	0.35	47.55	54.00	-6.45	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

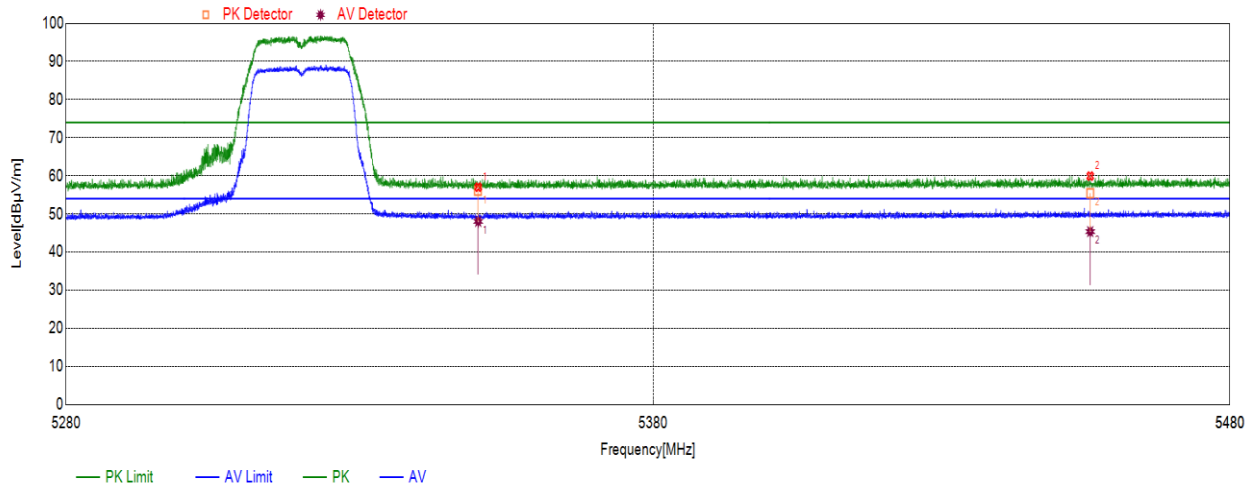
Test Mode	Channel	Polarization	Verdict
11a	HCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.0000	64.19	N/A	N/A	74.00	-9.81	peak
	5350.0000	49.44	0.35	49.79	54.00	-4.21	average
2	5448.4529	63.08	N/A	N/A	74.00	-10.92	peak
	5448.4529	50.01	0.35	50.36	54.00	-3.64	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

Test Mode	Channel	Polarization	Verdict
11a	HCH	Horizontal	PASS



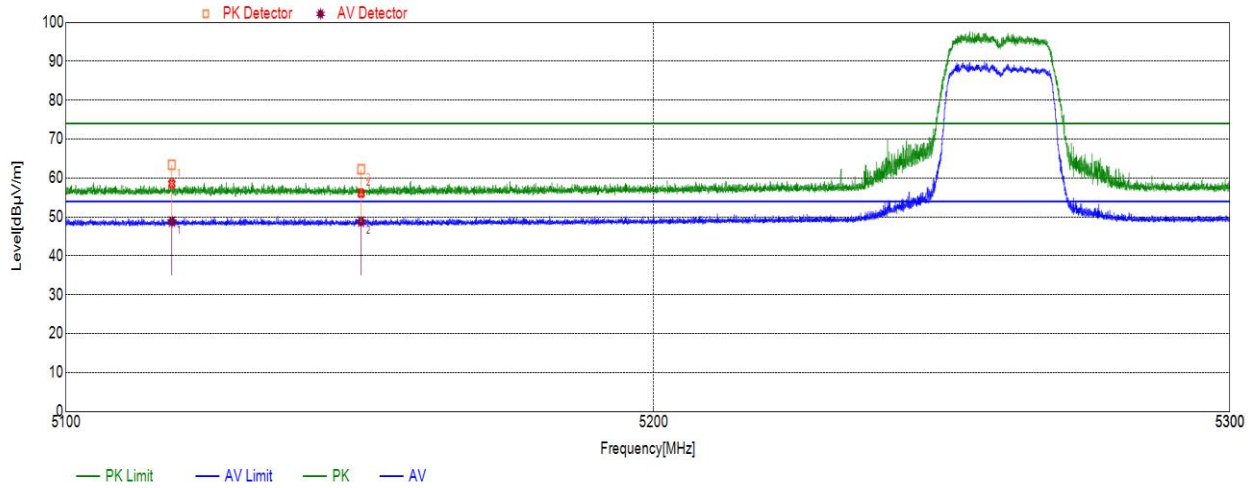
No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5350.000	55.97	N/A	N/A	74.00	-18.03	peak
	5350.000	48.04	0.35	48.39	54.00	-5.61	average
2	5455.6376	55.40	N/A	N/A	74.00	-18.60	peak
	5455.6376	45.38	0.35	45.73	54.00	-8.27	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2, find the antenna 2 which is worse case, so only the data of the antenna 2 is shown in this test report.

2. 802.11ac HT20

Test Graphs(Worst Case: Antenna1+ Antenna 2):

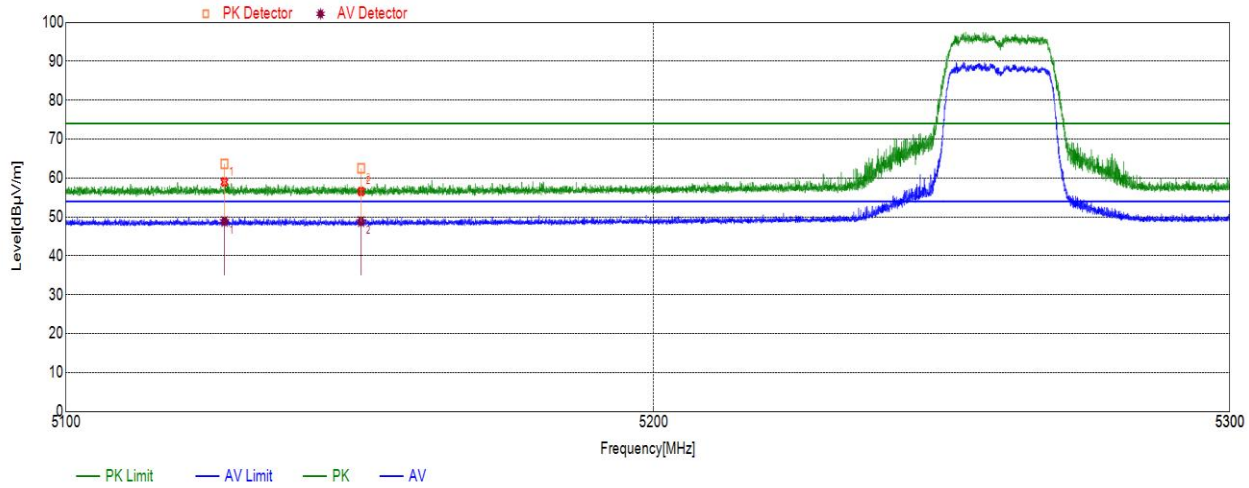
Test Mode	Channel	Polarization	Verdict
11ac HT20	LCH	Horizontal	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5117.8982	63.32	N/A	N/A	74.00	-10.68	peak
	5117.8982	48.79	0.39	49.18	54.00	-4.82	average
2	5150.0000	62.23	N/A	N/A	74.00	-11.77	peak
	5150.0000	48.76	0.39	49.15	54.00	-4.85	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 which is shown in this test report.

Test Mode	Channel	Polarization	Verdict
11ac HT20	LCH	Vertical	PASS



No.	Frequency (MHz)	Result (dBuV/m)	Duty factor	Final AV Value	Limit (dBuV/m)	Margin (dB)	Remark
1	5126.8035	63.60	N/A	N/A	74.00	-10.40	peak
	5126.8035	48.84	0.39	49.23	54.00	-4.77	average
2	5150.0000	62.37	N/A	N/A	74.00	-11.63	peak
	5150.0000	48.80	0.39	49.19	54.00	-4.81	average

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. Through pre-testing the antenna 1 and antenna 2 and antenna 1+antenna 2, find the antenna1+antenna 2 which is the worst case, so only the data of the antenna 1+antenna 2 which is shown in this test report.