

TEST REPORT

Application No.: SUCR2503000255AT
Applicant: Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant: Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China
Manufacturer: Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer: Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China
EUT Description: Wireless Data Terminal
Model No.: TFB1B
Trade Mark: SUNMI
FCC ID: 2AH25M3L
Standards: FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart E
Date of Receipt: March 28, 2025
Date of Test: May 23, 2025 to May 26, 2025
Date of Issue: June 11, 2025

Test Result :	PASS *
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* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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Version

<i>Revision Record</i>			
<i>Version</i>	<i>Description</i>	<i>Date</i>	<i>Remark</i>
01	Original	June 11, 2025	/

Authorized for issue by:			
Tested By			
		Hayley Zhang / Project Manager	
Approved By			
		Cloud Peng/Technical Manager	

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1 Test Summary

Test Item	Band ^[1]	FCC rules No.	Test Requirements	Test Result	Result
Antenna Requirement	--	15.203/15.407(a)	--	Clause 3.1	PASS
26dB Emission Bandwidth	Band I Band II-A Band II-C	15.407(a)(1) 15.407(a)(2) 15.407(a)(2)	No limit.	Clause 3.5	
6dB Emission Bandwidth	Band III	15.407(e)	≥ 500 kHz.	Clause 3.6	
99% Occupied Bandwidth	Band I Band II-A Band II-C Band III	KDB 789033 D02§ D	No limit.	Clause 3.7	
Duty Cycle	Band I Band II-A Band II-C Band III	--	No limit.	Clause 3.3	Reference report SUCR250100002105
Maximum Conducted Output Power	Band I Band II-A Band II-C Band III	15.407(a)(iv) 15.407(a)(2) 15.407(a)(3)	< 250mW <MIN{250mW,11dBm+10*lg(EBW)} < 1W	Clause 3.4	
Maximum Power Spectral Density	Band I Band II-A Band II-C Band III	15.407(a)(iv) 15.407(a)(2) 15.407(a)(3)	<11dBm/MHz <11dBm/MHz <30dBm/500KHz	Clause 3.8	
Radiated Spurious Emissions	Band I Band II-A Band II-C Band III	15.407(b) 15.205/15.209 15.407(b) 15.205/15.209 15.407(b) 15.205/15.209 15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (excl. 5.15- 5.35 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK). F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (excl. 5.25- 5.35 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK). F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (excl. 5.47- 5.725 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK). F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted:(PK)	Clause 3.9	Reference report SUCR250100002105 Reference report SUCR250100002105 PASS Reference report SUCR250100002105

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Test Item	Band ^[1]	FCC rules No.	Test Requirements	Test Result	Result
			All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. $F \geq 1 \text{ GHz}$ & in-restricted: §15.209 limit (AV&PK).		
Restricted bands around fundamental frequency	Band I Band II-A Band II-C Band III	15.407(b) 15.205/15.209	---	Clause 3.10	PASS
AC Power Line Conducted Emissions	Band I Band II-A Band II-C Band III	15.207	---	Clause 3.2	PASS
Dynamic Frequency Selection	Band II-A Band II-C	15.407	Channel Move Time:10 Seconds	Clause 3.11	Reference report SUCR250100002105
Frequency Stability	Band I Band II-A Band II-C Band III	15.407(g)	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual	N/A	N/A
<p>Note 1: Band I: 5150-5250MHz Band II-A: 5250-5350MHz Band II-C: 5470-5725MHz Band III: 5725-5850MHz</p>					

Remark:

This test report (Report No.: SUCR250300025505 issue on 2025/06/11) is based on the original test report (Report No.: SUCR250100002105 issue on 2025/06/09).

Review this report and original report, this report just changing the parts according to the declaration letter from client.

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report only the ac power line conducted emission and radiated spurious emissions based on the worst case of the original report with report number SUCR250100002105 issue on 2025/06/09 and other test data in this report are based on the previous report with report number SUCR250100002105 issue on 2025/06/09.

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2 General Information

2.1 Details of Client

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 505, No.388, Song Hu Road, Yang Pu District, Shanghai, China
Manufacturer:	Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer:	Room 505, No.388, Song Hu Road, Yang Pu District, Shanghai, China

2.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Ives Cheng, King-p Li

2.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

2.4 General Description of EUT

EUT Description:	Wireless Data Terminal	
Model No.:	TFB1B	
Trade Mark:	SUNMI	
Hardware Version:	V1.2	
Software Version:	T602AA_EVT_14.0_SUNMI_202503131820.00-00	
Power Supply:	3.87V from battery	
WLAN Mode Supported:	802.11a:	20 MHz channel bandwidth
	802.11n:	20 MHz / 40 MHz channel bandwidth
	802.11ac:	20 MHz / 40 MHz / 80 MHz channel bandwidth
	802.11ax:	20 MHz / 40 MHz / 80 MHz channel bandwidth
Operation Frequency:	5150MHz to 5250MHz 5250MHz to 5350MHz 5470MHz to 5725MHz 5725MHz to 5850MHz	
Modulation Type:	802.11a:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11n:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11ac:	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
	802.11ax:	OFDM/OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Channel Spacing:	20MHz:	802.11a/n(HT20)/ac(VHT20)/ax(HE20)
	40MHz:	802.11n(HT40)/ac(VHT40)/ax(HE40)
	80MHz:	802.11ac(VHT80)/ax(HE80)
Antenna Type:	FPC Antenna	
Antenna Gain:	5150MHz to 5250MHz: -6.54dBi(Ant3); 1.69dBi(Ant2) 5250MHz to 5350MHz: -6.54dBi(Ant3); 1.67dBi(Ant2) 5470MHz to 5725MHz: -7.16dBi(Ant3); 3.90dBi(Ant2) 5725MHz to 5850MHz: -7.65dBi(Ant3); 3.55dBi(Ant2)	
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.	
Smart System:	<input checked="" type="checkbox"/> SISO	802.11a
	<input checked="" type="checkbox"/> MIMO	802.11n/ac/ax: 2Tx & 2Rx
TPC Function:	<input checked="" type="checkbox"/> Support, <input type="checkbox"/> Not Support	
Remark:	1. As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.	

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2. The device does not support 802.11ax OFDMA Partial RU tones (26T, 52T, 106T, etc.)

3. In FCC 15.31, for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table, and the selected channel to perform the test as below:

Frequency range over which device operates	Number of Measurement Frequencies Required	Location of Measurement Frequency in Band of Operation
1 MHz or less	1	centre
1 MHz to 10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near centre

For UNII Band I:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac/ax 20MHz	The Lowest channel	5180
	The Middle channel	5200
	The Highest channel	5240
IEEE 802.11n/ac/ax 40MHz	The Lowest channel	5190
	The Highest channel	5230
IEEE 802.11ac/ax 80MHz	The Middle channel	5210

For UNII Band II-A:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac/ax 20MHz	The Lowest channel	5260
	The Middle channel	5280
	The Highest channel	5320
IEEE 802.11n/ac/ax 40MHz	The Lowest channel	5270
	The Highest channel	5310
IEEE 802.11ac/ax 80MHz	The Middle channel	5290

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For UNII Band II-C:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac/ax 20MHz	The Lowest channel	5500
	The Middle channel	5580
	The Highest channel	5700
IEEE 802.11n/ac/ax 40MHz	The Lowest channel	5510
	The Middle channel	5550
	The Highest channel	5670
IEEE 802.11ac/ax 80MHz	The Middle channel	5530

For UNII Band III:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac/ax 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825
IEEE 802.11n/ac/ax 40MHz	The Lowest channel	5755
	The Highest channel	5795
IEEE 802.11ac/ax 80MHz	The Middle channel	5775

2.5 Test Environment and Mode

Environment Parameter	101 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	3.87

Remark:
NV: Normal Voltage
NT: Normal Temperature

2.6 Description of Support Units

Description	Manufacturer	Model No.	FCC ID
Router	ASUS	GT-AXE11000	MSQ-RTAXJF00

2.7 Worst-case configuration and mode

Low data rate was used to test on antenna port conducted tests and radiated spurious emissions since it has the highest maximum power. Following are the worst-case data rates set for test:

Modulation Type	SISO - Data Rate	CDD/MIMO - Data Rate
802.11a	6 Mbps	/
802.11n (HT 20)	/	MCS0 (13 Mbps)
802.11n (HT 40)	/	MCS0 (27 Mbps)
802.11ac (VHT 20)	/	MCS0 (13 Mbps)
802.11ac (VHT 40)	/	MCS0 (27 Mbps)
802.11ac (VHT 80)	/	MCS0 (58.5 Mbps)
802.11ax (HE 20)	/	MCS0 (16 Mbps)
802.11ax (HE 40)	/	MCS0 (32 Mbps)
802.11ax (HE 80)	/	MCS0 (68 Mbps)

3 Equipment List

CE Test System					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2025/01/15	2026/01/14
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2025/02/13	2026/02/12
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2025/05/08	2026/05/07
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2025/05/08	2026/05/07
Measurement Software	Tonscend	JS32-CE 4.0.0.2	SUWI-02-09-05	NCR	NCR

RSE Test Equipment					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2023/06/03	2026/06/02
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2025/02/13	2026/02/12
Signal Analyzer	ROHDE &SCHWARZ	FSW43	SUWI-01-02-04	2025/01/20	2026/01/19
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-07	2024/11/21	2025/11/20
Test receiver	ROHDE &SCHWARZ	ESR7	SUWI-01-10-01	2025/01/15	2026/01/14
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9168	SUWI-01-11-04	2024/08/22	2026/08/21
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2025/05/07	2027/05/06
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2025/05/07	2027/05/06
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2025/05/07	2027/05/06
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2025/01/16	2026/01/15
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2025/01/16	2026/01/15
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2025/01/20	2026/01/19
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-09-04	NCR	NCR

Remark: NCR=No Calibration Requirement.

4 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 2.90dB (150kHz to 30MHz)
2	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.8dB (30M -1GHz)
		± 4.8dB (1GHz to 18GHz)
		± 4.80dB (Above 18GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{cisp/ETSI}$ (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15 Section 15.203
The antenna is FPC Antenna and no consideration of replacement. The best case gain of the antenna is 5150MHz to 5250MHz: -6.54dBi(Ant3); 1.69dBi(Ant2) 5250MHz to 5350MHz: -6.54dBi(Ant3); 1.67dBi(Ant2) 5470MHz to 5725MHz: -7.16dBi(Ant3); 3.90dBi(Ant2) 5725MHz to 5850MHz: -7.65dBi(Ant3); 3.55dBi(Ant2)	
<i>Note:</i>	
<i>The antenna gain are derived from the gain information report provided by the manufacturer.</i>	
<i>Remark:</i>	
<i>As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</i>	

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Cyclic Delay Diversity (CDD) System:

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

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

- For power spectral density (PSD) measurements on all devices,
 $Array Gain = 10 \log(N_{ANT}/N_{SS}) = 1 \text{ dB}$.
- For power measurements on IEEE 802.11 devices:
 $Array Gain = 0 \text{ dB (i.e., no array gain) for } N_{ANT} \leq 4$;

For power, the directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain.

For PSD, the directional gain calculation is following F2)f)ii) of KDB 662911 D01 v02r01.

The Power and PSD limit should be modified if the directional gain of eut is over 6dbi.

The EUT supports CDD System.

All antennas have Unequal antenna gain:

Operation Frequency	ANT Gain0 (dBi)	ANT Gain1 (dBi)	Directional gain For Power (dBi)	Directional gain For PSD (dBi)	Power Limit Reduction (dBm)	PSD Limit Reduction (dBm)
5150MHz to 5250MHz	1.69	-6.54	1.69	1.53	0	0
5250MHz to 5350MHz	1.67	-6.54	1.67	1.51	0	0
5470MHz to 5725MHz	3.90	-7.16	3.90	3.03	0	0
5725MHz to 5850MHz	3.55	-7.65	3.55	2.65	0	0

5150MHz to 5250MHz:

Power Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

5250MHz to 5350MHz:

Power Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

5470MHz to 5725MHz:

Power Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

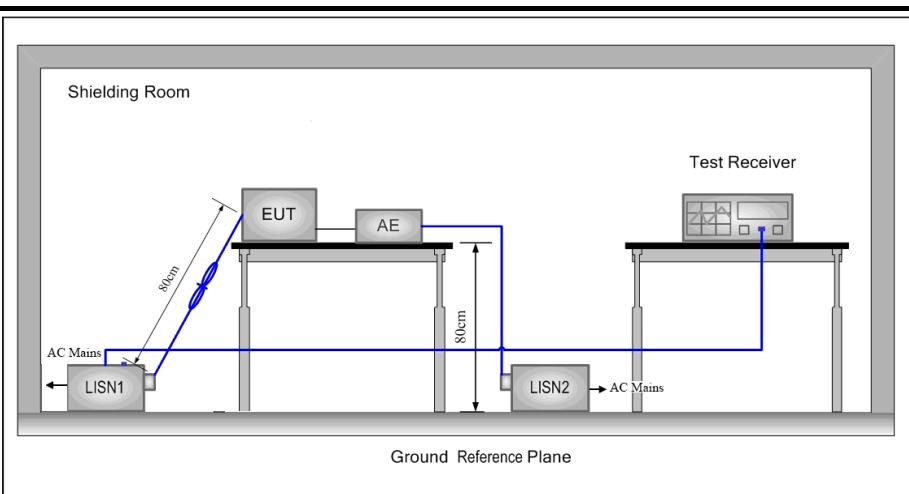
5725MHz to 5850MHz:

Power Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain < 6dBi) = 0

5.2 AC Power Line Conducted Emissions

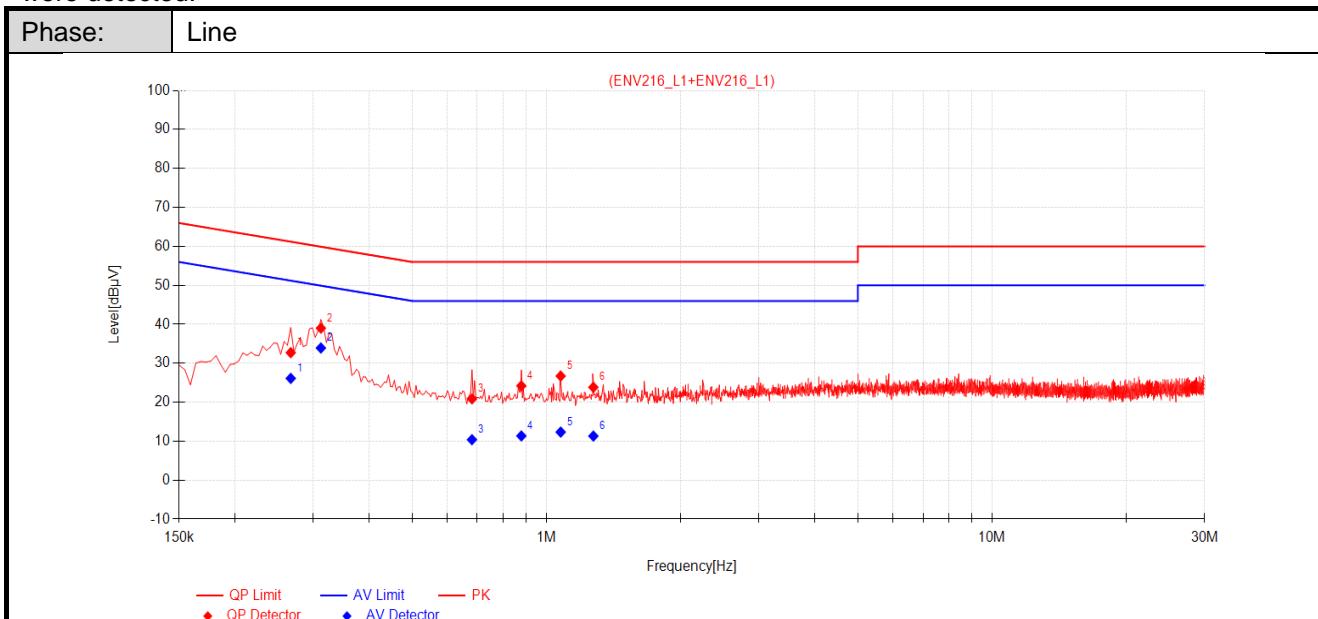
Test Requirement:	47 CFR Part 15 Section 15.207		
Test Method:	ANSI C63.10: 2013 Section 6.2		
Test Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency range (MHz)		Limit (dBuV)
			Quasi-peak
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none">1) The mains terminal disturbance voltage test was conducted in a shielded room.2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.		

Test Setup:	
Test Mode:	BT Link + WIFI 2.4G Link + WIFI 5G/6E Link
Instruments Used:	Refer to section 3 for details.
Test Results:	Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

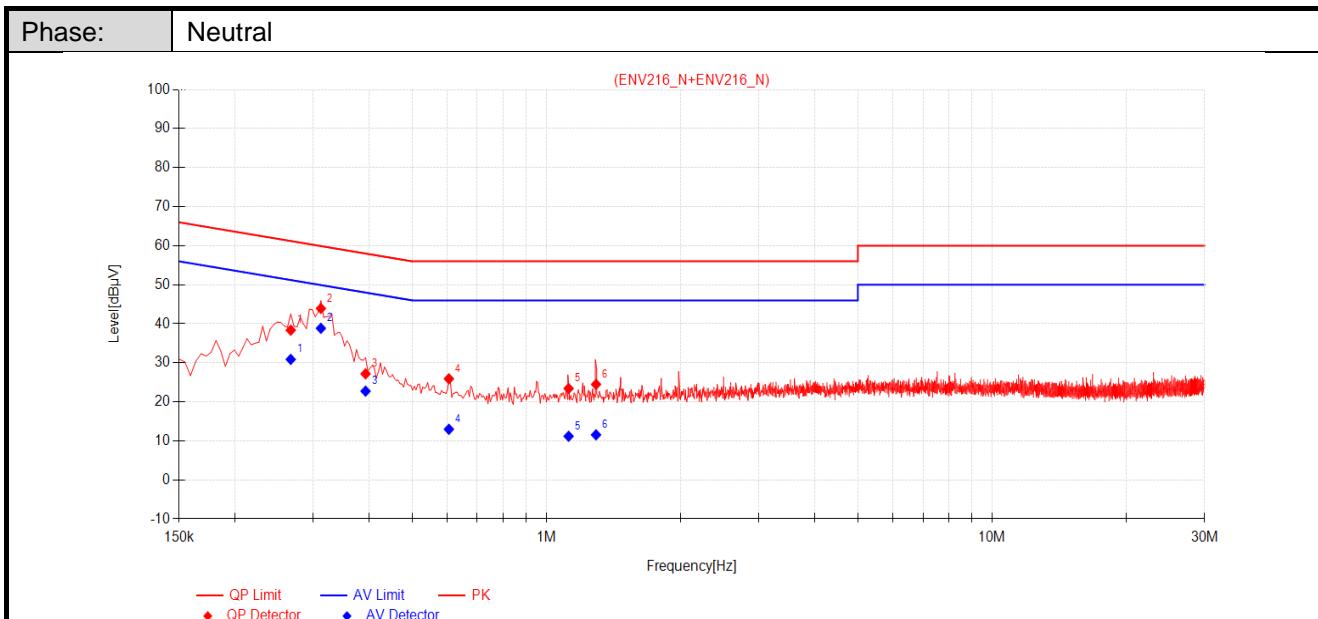
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.2670	10.06	22.66	32.72	61.21	28.49	16.06	26.12	51.21	25.09	PASS
2	0.3120	10.07	28.94	39.01	59.92	20.91	23.85	33.92	49.92	16.00	PASS
3	0.6810	10.07	10.79	20.86	56.00	35.14	0.32	10.39	46.00	35.61	PASS
4	0.8790	10.00	14.20	24.20	56.00	31.80	1.35	11.35	46.00	34.65	PASS
5	1.0770	9.94	16.78	26.72	56.00	29.28	2.40	12.34	46.00	33.66	PASS
6	1.2750	9.92	13.93	23.85	56.00	32.15	1.40	11.32	46.00	34.68	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value =Reading[dBμV] + Factor(Lisn factor[dB] + cable loss[dB]).
3. Margin = Limit[dBμV] – Value[dBμV]

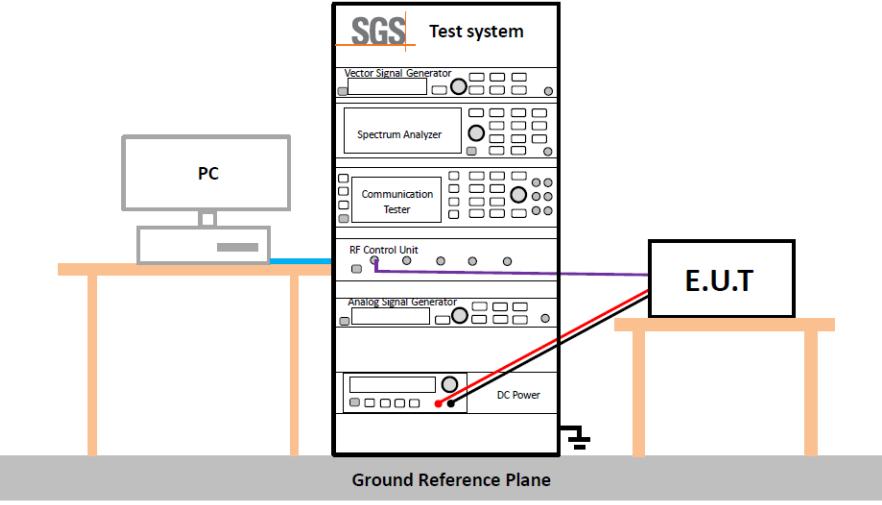


Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.2670	10.07	28.29	38.36	61.21	22.85	20.80	30.87	51.21	20.34	PASS
2	0.3120	10.07	33.85	43.92	59.92	16.00	28.77	38.84	49.92	11.08	PASS
3	0.3930	10.07	17.10	27.17	58.00	30.83	12.67	22.74	48.00	25.26	PASS
4	0.6045	10.07	15.84	25.91	56.00	30.09	2.90	12.97	46.00	33.03	PASS
5	1.1220	9.95	13.47	23.42	56.00	32.58	1.23	11.18	46.00	34.82	PASS
6	1.2930	9.94	14.54	24.48	56.00	31.52	1.61	11.55	46.00	34.45	PASS

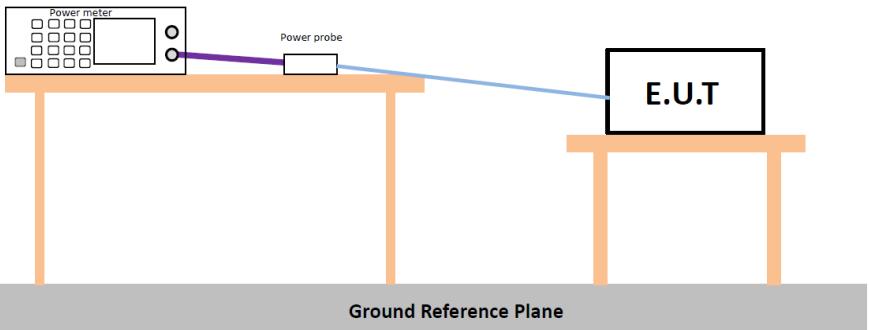
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value =Reading[dBμV] + Factor(List factor[dB] + cable loss[dB]).
3. Margin = Limit[dBμV] – Value[dBμV]

5.3 Duty Cycle

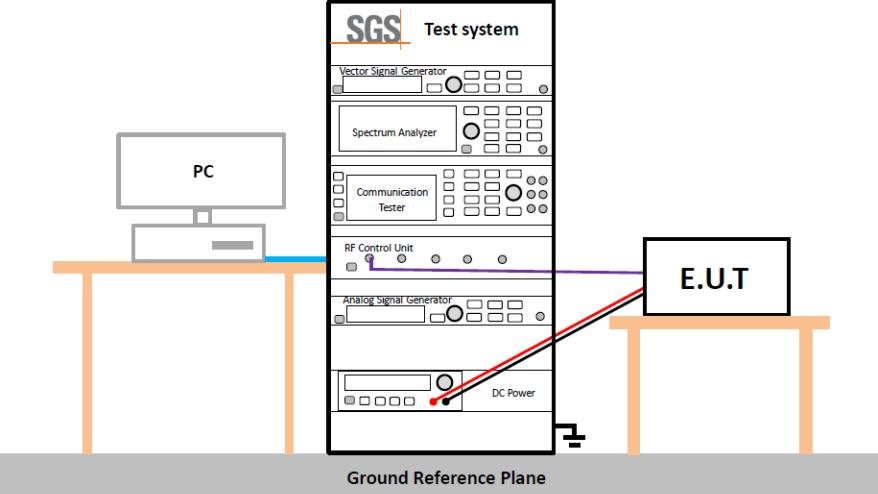
Test Requirement:	ANSI C63.10 :2013 Section 12.2
Test Method:	ANSI C63.10 :2013 Section 12.2
Test Setup:	
Instruments Used:	Refer to section 3 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For report purpose
The detailed test data see: Reference report SUCR250100002105	

5.4 Conducted Output Power

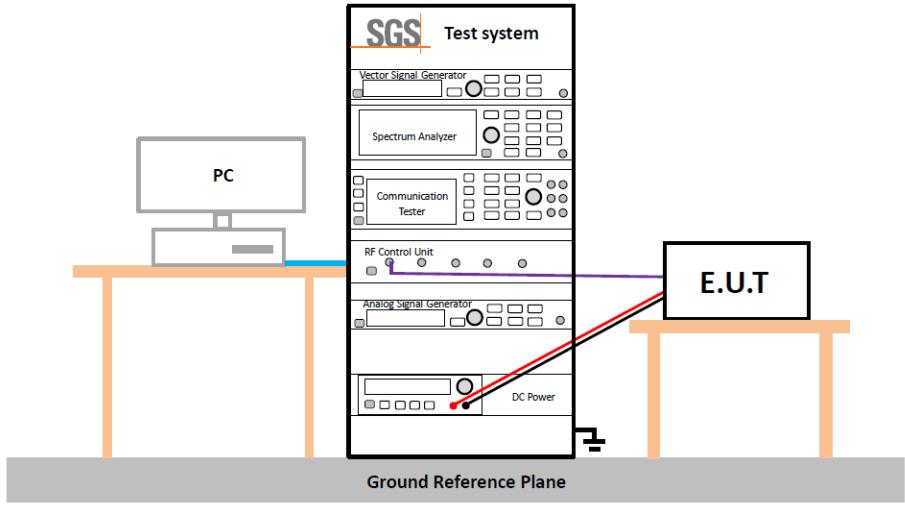
Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10 :2013 Section 12.3.3.2	
Test Setup:	 <p>The diagram illustrates the test setup for conducted output power. A power meter is connected to a power probe, which is then connected to the E.U.T (Equipment Under Test). The E.U.T is mounted on a stand with four legs. The entire setup is positioned above a ground reference plane, represented by a grey horizontal bar at the bottom.</p> <p>* Test with power meter (Detector function: Average) Method PM-G is measurement using a gated RF average power meter. 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. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.</p>	
Test Instruments:	Refer to section 3 for details.	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Refer to section 3.7 for details.	
Limit:	Frequency Band	Limit
	5150-5250MHz	Not exceed 250mW(23.98dBm)
	5250-5350MHz	The lesser of 250mW(23.98dBm) or $11 + 10\log B$
	5470-5725MHz	The lesser of 250mW(23.98dBm) or $11 + 10\log B$
	5725-5850MHz	Not exceed 1W(30dBm)
	*Where B is the 26dB emission bandwidth in MHz	
Test Results:	Pass	

The detailed test data see: **Reference report SUCR250100002105**

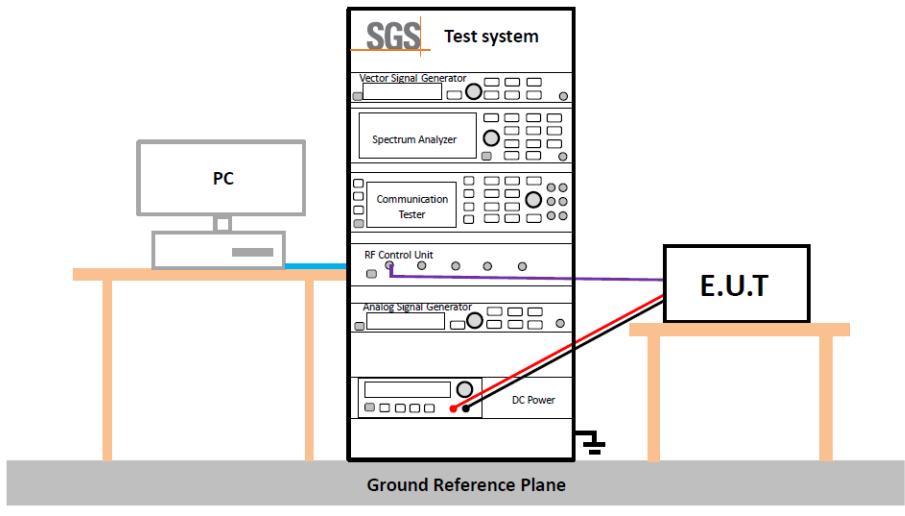
5.5 26dB Emission Bandwidth

Test Requirement:	47 CFR Part 15 Section 15.407(a), KDB 789033 D02& C
Test Method:	ANSI C63.10: 2013 Section 12.4.1
Test Setup:	
Instruments Used:	Refer to section 3 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For Report Purpose
The detailed test data see: Reference report SUCR250100002105	

5.6 6dB Emission Bandwidth

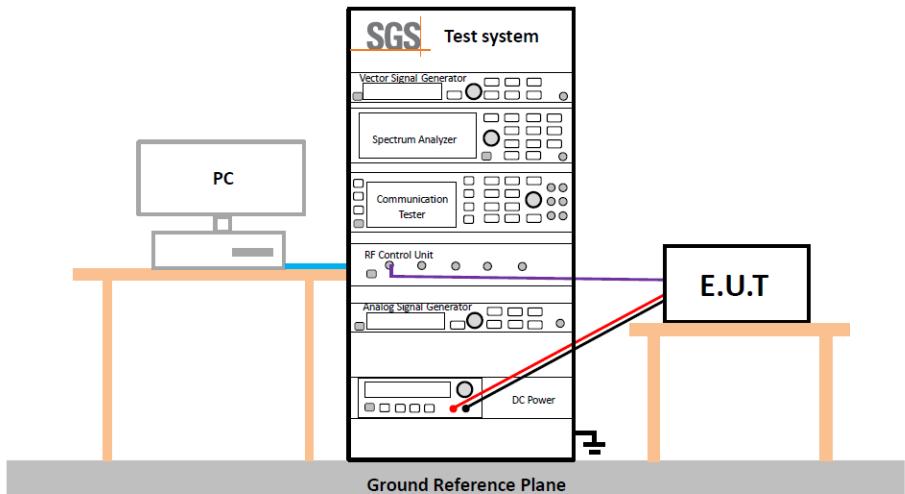
Test Requirement:	47 CFR Part 15 Section 15.407(e)	
Test Method:	ANSI C63.10: 2013 Section 12.4.1	
Test Setup:		
Test Instruments:	Refer to section 3 for details.	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Refer to section 3.7 for details.	
Limit:	Frequency Band	Limit
	5725-5850MHz	At least 500kHz
Test Results:	Pass	
The detailed test data see: Reference report SUCR250100002105		

5.7 99% Occupied Bandwidth

Test Requirement:	KDB 789033 D02§ D
Test Method:	ANSI C63.10: 2013 Section 12.4.2
Test Setup:	
Instruments Used:	Refer to section 3 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For Report Purpose

The detailed test data see: **Reference report SUCR250100002105**

5.8 Power Spectral Density

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10: 2013 Section 12.5 KDB 789033 D02 v02r01, Section F.	
Test Setup:		
Instruments Used:	Refer to section 3 for details.	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Refer to section 3.7 for details.	
Limit:	Frequency Band	Limit
	5150-5250MHz	The power spectral density less than 11dBm/1MHz
	5250-5350MHz	The power spectral density less than 11dBm/1MHz
	5470-5725MHz	The power spectral density less than 11dBm/1MHz
	5725-5850MHz	The power spectral density less than <30dBm/500KHz
Test Results:	Pass	
The detailed test data see: Reference report SUCR250100002105		

5.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15 Section 15.205 and 15.209
Test Method:	ANSI C63.10: 2013 Section 6.4 / 6.5 / 6.6
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)
Test frequency:	9kHz ~ 40GHz(or 10 Harmonic)

Test Setup:

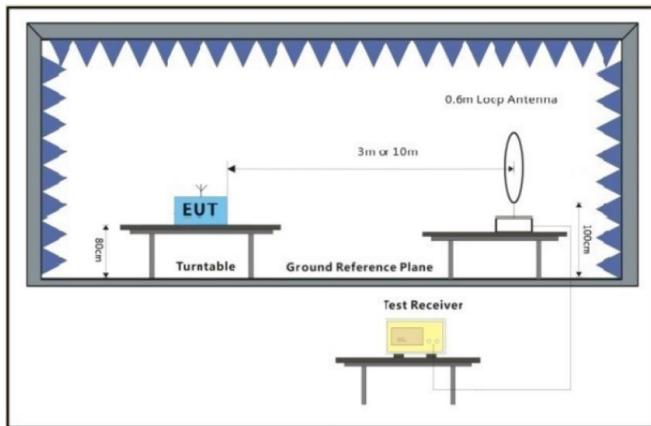


Figure 1. 9kHz to 30MHz

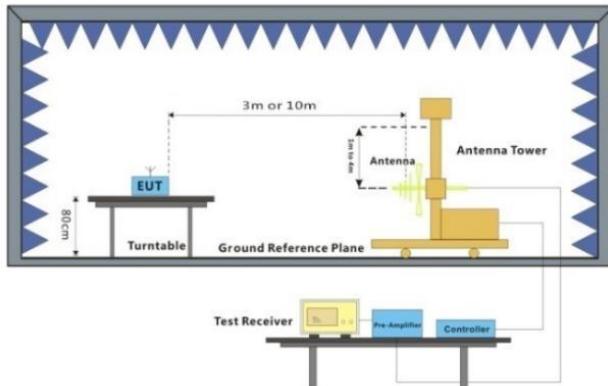


Figure 1. 30MHz to 1GHz

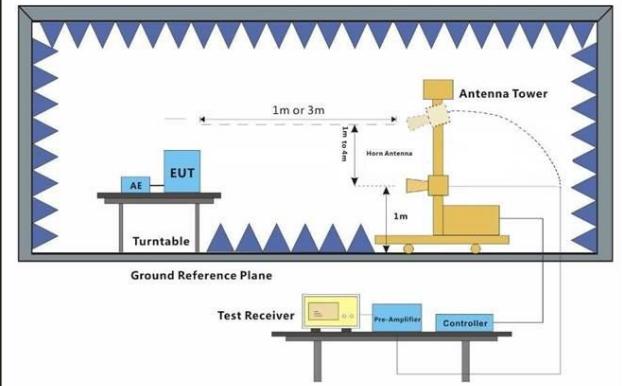


Figure 2. Above 1 GHz

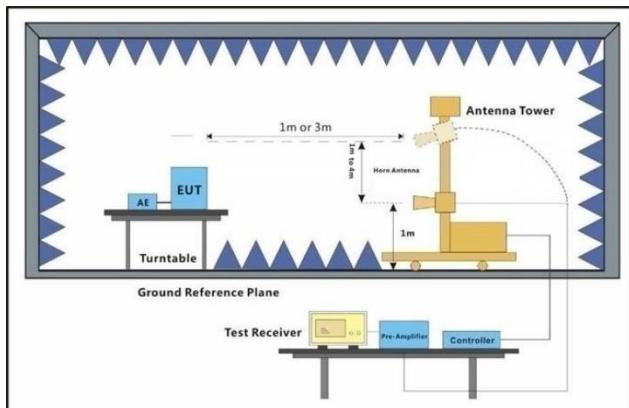
Test Procedure:	<ol style="list-style-type: none"> For below 1GHz test, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. For above 1GHz test, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. (Distance from antenna to EUT is 1m for measurements >18GHz). The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the
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	<p>rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <ul style="list-style-type: none">f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.g. Test the EUT in the outermost channels.h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.i. Repeat above procedures until all frequencies measured was complete.j. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reportedk. The disturbance above 18GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed.l. At a measurement distance of 1 meter the limit line was increased by $20 \times \log(3/1) = 9.54$ dB.
Test Configuration:	<p>Measurements below 30MHz</p> <ul style="list-style-type: none">• RBW = 10 kHz• VBW = 30 kHz• Detector = Peak & Average & Quasi-peak• Trace mode = max hold <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none">• RBW = 120 kHz• VBW = 300 kHz• Detector = Quasi-peak• Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none">• RBW = 1 MHz• VBW \geq 3 MHz• Detector = Peak• Sweep time = auto• Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none">• RBW = 1 MHz• VBW = 10Hz, when duty cycle is no less than 98 percent.• VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.
Final Test Mode:	<p>Refer to section 3.7 for details.</p> <p>For below 1GHz part, through pre-scan all channels, but only the worst case is recorded in the report.</p>
Instruments Used:	Refer to section 3 for details.
Test Results:	Pass
The detailed test data see: Appendix	

5.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15 Section 15.407(b)		
Test Method:	ANSI C63.10: 2013 Section 12.7		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test Setup:



Test Procedure:	<ol style="list-style-type: none">The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel.Test the EUT in the outermost channels.The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.Repeat above procedures until all frequencies measured was complete.
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Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none">• RBW = 120 kHz• VBW = 300 kHz• Detector = Quasi-peak• Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none">• RBW = 1 MHz• VBW \geq 3 MHz• Detector = Peak• Sweep time = auto• Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none">• RBW = 1 MHz• VBW = 10Hz, when duty cycle is no less than 98 percent.• VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.
Final Test Mode:	Refer to section 3.7 for details.
Instruments Used:	Refer to section 3 for details.
Test Results:	Pass
The detailed test data see: Appendix	

5.11 Dynamic Frequency Selection

5.11.1 DFS Overview

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required
Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

5.11.2 DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP \geq 200 milliwatt	-64 dBm
EIRP $<$ 200 milliwatt and power spectral density $<$ 10 dBm/MHz	-62 dBm
EIRP $<$ 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

5.11.3 RADAR TEST WAVEFORMS

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\lceil \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\rceil$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4. For example, the following table indicates how to compute the aggregate of percentage of successful detections.

Radar Type	Number of Trials	Number of Successful Detections	Minimum Percentage of Successful Detection
1	35	29	82.9%
2	30	18	60%
3	30	27	90%
4	50	44	88%
Aggregate $(82.9\% + 60\% + 90\% + 88\%)/4 = 80.2\%$			

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

5.11.4 Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

The detailed test data see: **Reference report SUCR250100002105**

6 Photographs - Setup Photos

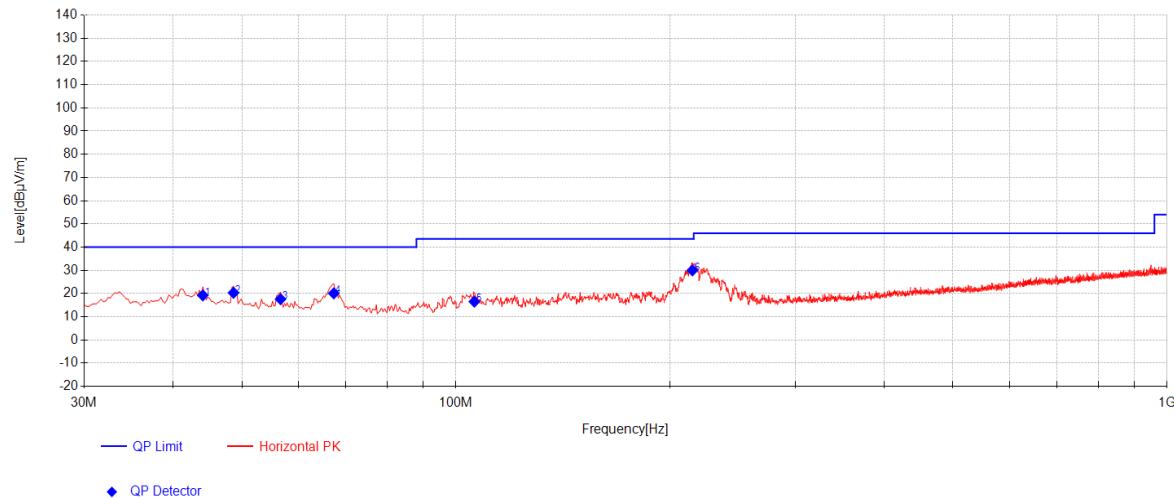
Refer to Appendix A.2 BT&WLAN&NFC Setup Photos.

7 Appendix

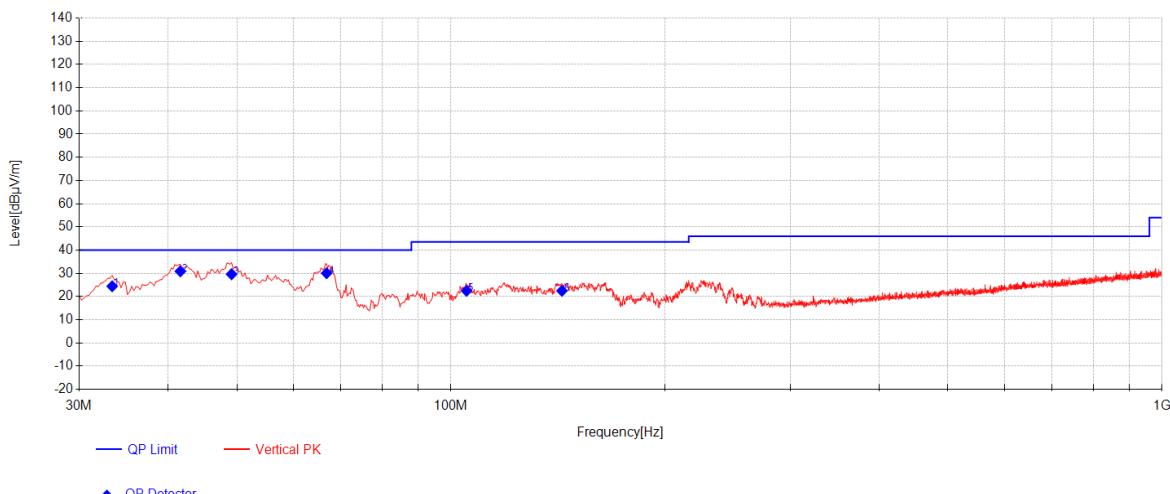
Radiated Spurious Emissions

Radiated emission below 1GHz

Worst case Mode: 11a ANT 1_Channel 100



Final Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	Factor [dB]	AF [dB/m]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Polarity
1	44.065	34.21	-33.79	18.81	19.23	40.00	20.77	Horizontal
2	48.6725	35.23	-33.71	18.80	20.32	40.00	19.68	Horizontal
3	56.675	33.05	-33.60	18.13	17.58	40.00	22.42	Horizontal
4	67.345	36.54	-33.46	17.00	20.08	40.00	19.92	Horizontal
5	106.145	34.15	-33.04	15.43	16.54	43.50	26.96	Horizontal
6	215.0275	46.53	-32.15	15.60	29.98	43.50	13.52	Horizontal



Final Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	Factor [dB]	AF [dB/m]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Polarity
1	33.395	40.26	-33.97	18.14	24.43	40.00	15.57	Vertical
2	41.64	45.99	-33.83	18.74	30.89	40.00	9.11	Vertical
3	49.1575	44.57	-33.70	18.77	29.63	40.00	10.37	Vertical
4	66.86	46.38	-33.46	17.13	30.05	40.00	9.95	Vertical
5	105.175	40.05	-33.06	15.48	22.48	43.50	21.02	Vertical
6	143.2475	36.54	-32.74	18.68	22.47	43.50	21.03	Vertical

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier gain. The basic equation with a sample calculation is as follows:

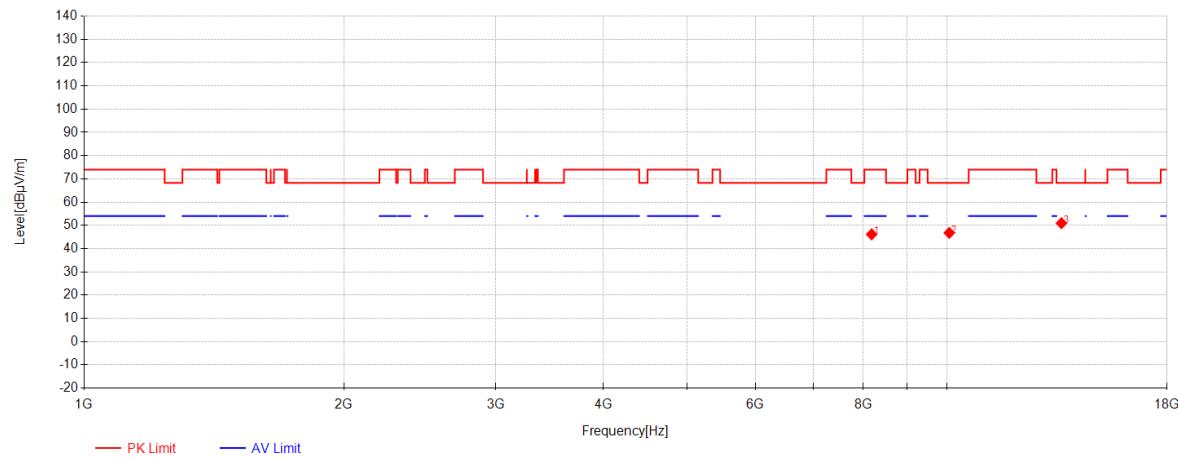
Value = Reading(dB μ V) + AF(dB/m) + Factor(dB):

AF = Antenna Factor(dB/m)

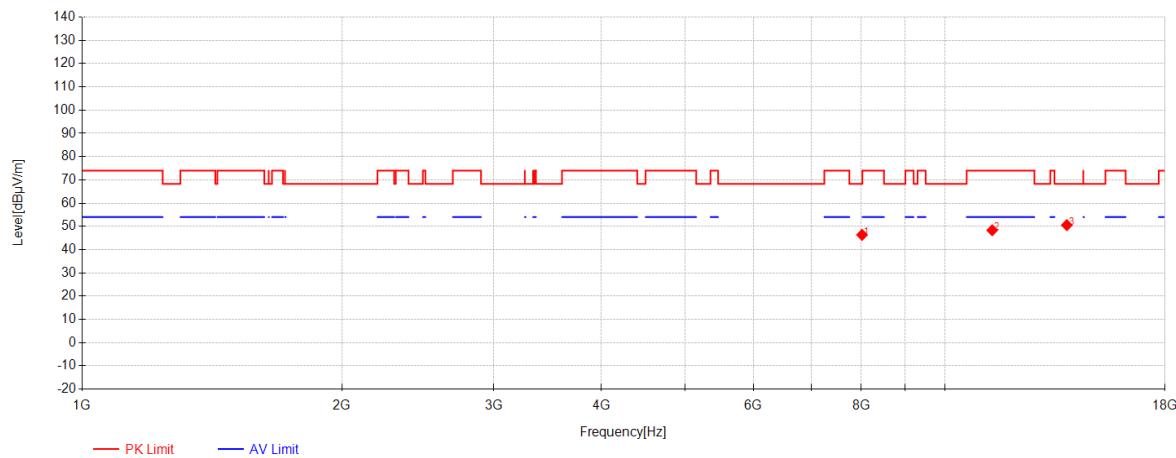
Factor = Cable Factor(dB) - Preamplifier gain(dB)

Margin = Limit(dB μ V/m) - Value(dB μ V/m)

- 2) All channels have been tested, but only the worst case data displayed in this report.

Transmitter emission Above 1GHz**802.11a ANT1_Channel 100**

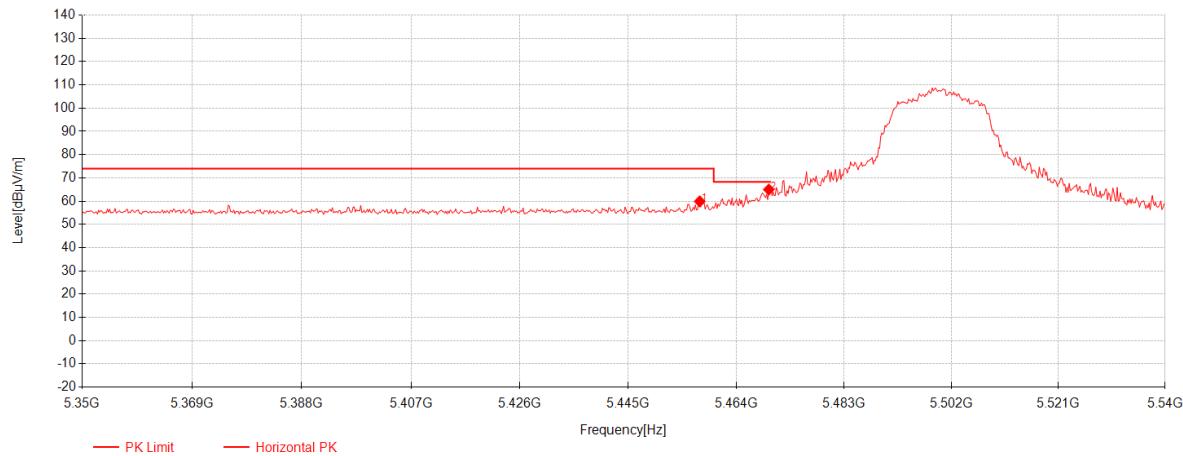
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	8180.9167	45.23	37.19	-36.28	46.14	74.00	27.86	Horizontal
2	10065.383	41.13	37.93	-32.28	46.79	68.30	21.51	Horizontal
3	13576.716	39.04	40.00	-28.09	50.95	68.30	17.35	Horizontal

802.11a ANT1_Channel 100

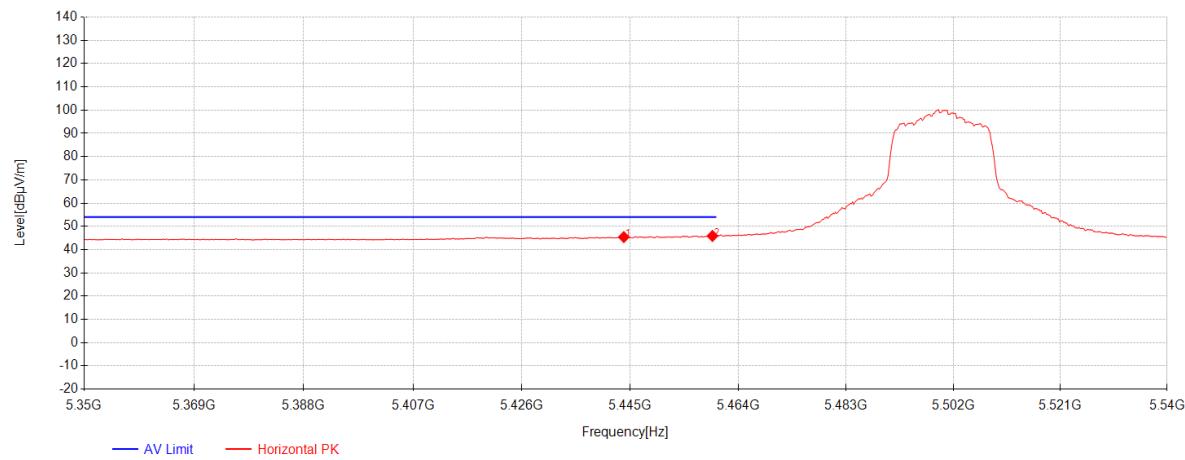
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	8016.85	46.02	37.11	-36.77	46.36	68.30	21.94	Vertical
2	11347.633	40.13	38.40	-30.20	48.33	74.00	25.67	Vertical
3	13848.5	39.20	40.19	-28.85	50.55	68.30	17.75	Vertical

Remark:

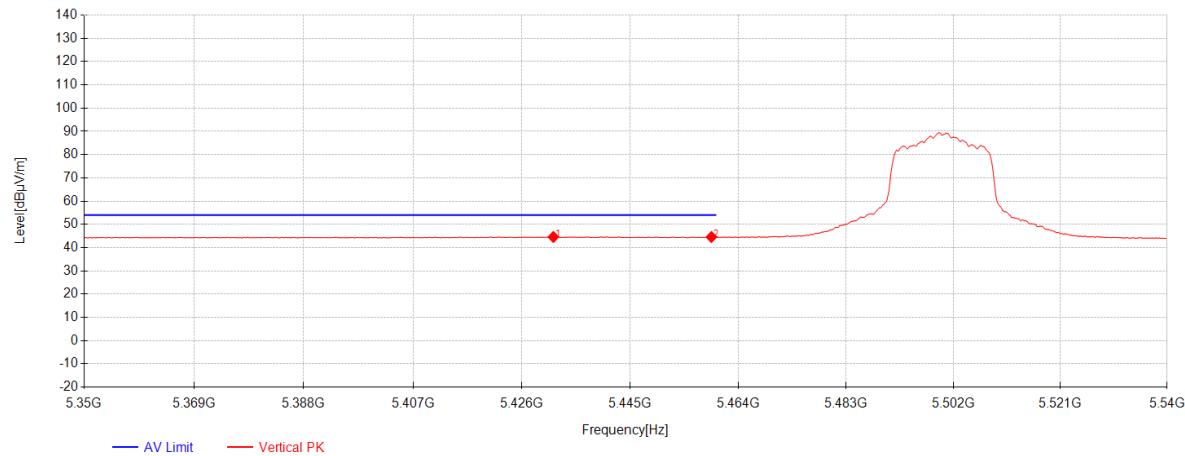
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier gain. The basic equation with a sample calculation is as follows:
Level = Reading(dB μ V) + AF(dB/m) + Factor(dB):
AF = Antenna Factor(dB/m)
Factor = Cable Factor(dB) - Preamplifier gain(dB)
Margin = Limit(dB μ V/m) – Level(dB μ V/m)
- 2) All channels have been tested, but only the worst case data displayed in this report.
- 3) Both peak and average measured complies with the limit line, so test result is "PASS"

Restricted bands around fundamental frequency**802.11a ANT1_Channel 100**

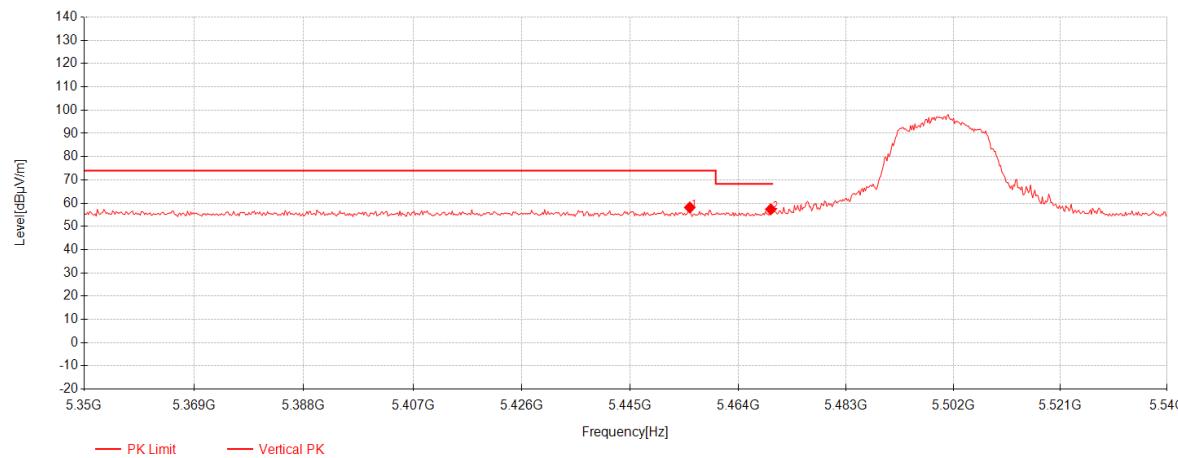
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5457.54	42.29	33.11	-15.49	59.91	74.00	14.09	Horizontal
2	5469.7	47.30	33.11	-15.42	64.98	68.30	3.32	Horizontal

802.11a ANT1_Channel 100

Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	5443.86	27.86	33.11	-15.57	45.40	54.00	8.60	Horizontal
2	5459.44	28.25	33.11	-15.48	45.88	54.00	8.12	Horizontal

802.11a ANT1_Channel 100

Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	5431.51	27.11	33.11	-15.64	44.58	54.00	9.42	Vertical
2	5459.25	26.95	33.11	-15.48	44.58	54.00	9.42	Vertical

802.11a ANT1_Channel 100

Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	5455.45	40.53	33.11	-15.50	58.13	74.00	15.87	Vertical
2	5469.7	39.67	33.11	-15.42	57.35	68.30	10.95	Vertical

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier gain. The basic equation with a sample calculation is as follows:

Level = Reading(dBμV) + AF(dB/m) + Factor(dB):

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier gain(dB)

Margin = Limit(dBμV/m) – Level(dBμV/m)

- 2) Both peak and average measured complies with the limit line, so test result is "PASS"

---End of Report---