TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 15.407

TEST REPORT

For

Wallys Communications Technologies Co.,Ltd

Room 2723, Le Jia building, Jia Rui Xiang No.8, Suzhou Industrial Park, Suzhou, P.R 215000
China

FCC ID: 2AG7VDR4029

Report Type:	Product Type:
CIIPC Report	WBX

Project Engineer:	Stone Zhang
Report Number:	RKSA201216002-00C
Report Date:	2021-01-09
Reviewed By:	Oscar Ye EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Wallys Communications Technologies Co.,Ltd
Tested Model:	WBX-XX-XX
Product Type	WBX
Power Supply	DC 24V
RF Function	5G Wi-Fi
Operating Band/Frequency:	Band 1:5150~5250MHz, Band 4: 5725~5850MHz
Channel Number:	Band 1: 7, Band 4: 8
Channel Separation:	802.11a/802.11ac20/n20: 20MHz; 802.11n40/802.11ac40: 40MHz, 802.11ac80: 80MHz
Modulation Type	OFDM
Antenna Type:	Omni Antenna
*Maximum Antenna Gain:	4.0 dBi

Note: The antenna gain was provided by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: RSHA201216002-1 (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-12-16.*

Objective

This type approval report is prepared on behalf of *Wallys Communications Technologies Co.,Ltd* in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

This is a CIIPC report base on the original report RSHA200217004-00B with FCC ID: 2AG7VDR4029 which was granted on 2020-07-29, the differences between the original device and the current one are as follows:

1. Updated the product type to “WBX”, and the tested model to “WBX-XX-XX”.

2. The product integrated into a host and add a 4G module, we performed co-location of conducted emissions, radiation spurious and MPE , for other item reference to the original report.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: 2AG7VDR4029

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Kunshan).

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01), the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

In **5150~5250 MHz** band, test channel list is as below,

802.11a/802.11ac20/n20 mode Channel 36, 40, 48 were tested.
802.11n40/802.11ac40 mode Channel 38, 46 were tested.
802.11ac80 mode Channel 42 was tested

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For **5725~5850** MHz band,

802.11a/802.11ac20/n20 mode Channel 149, 157, 165 were tested.
802.11n40/802.11ac40 mode Channel 151, 159 were tested.
802.11ac80 mode Channel 155 was tested.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	159	5795
151	5755	161	5805
153	5765	165	5825
155	5775	/	/
157	5785	/	/

EUT Exercise Software

RF test tool: QRCT

The worst case was performed under:

5150MHz-5250MHz Band:

Mode	Data rate	Channel	Power Setting	
			Chain 0	Chain 1
802.11a	6 Mbps	5180	12	12
		5200		
		5240		
802.11ac20	MCS0	5180	9	9
		5200		
		5240		
802.11n-HT20	MCS0	5180	9	9
		5200		
		5240		
802.11ac40	MCS0	5190	9	9
		5230		
802.11n-HT40	MCS0	5190	9	9
		5230		
802.11ac80	MCS0	5210	9	9

5725MHz-5850MHz Band:

Mode	Data rate	Channel	Power Setting	
			Chain 0	Chain 1
802.11a	6 Mbps	5745	13	13
		5785		
		5825		
802.11ac20	MCS0	5745	10	10
		5785		
		5825		
802.11n-HT20	MCS0	5745	10	10
		5785		
		5825		
802.11ac40	MCS0	5755	10	10
		5795		
802.11n-HT40	MCS0	5755	10	10
		5795		
802.11ac80	MCS0	5775	10	10

Support Equipment List and Details

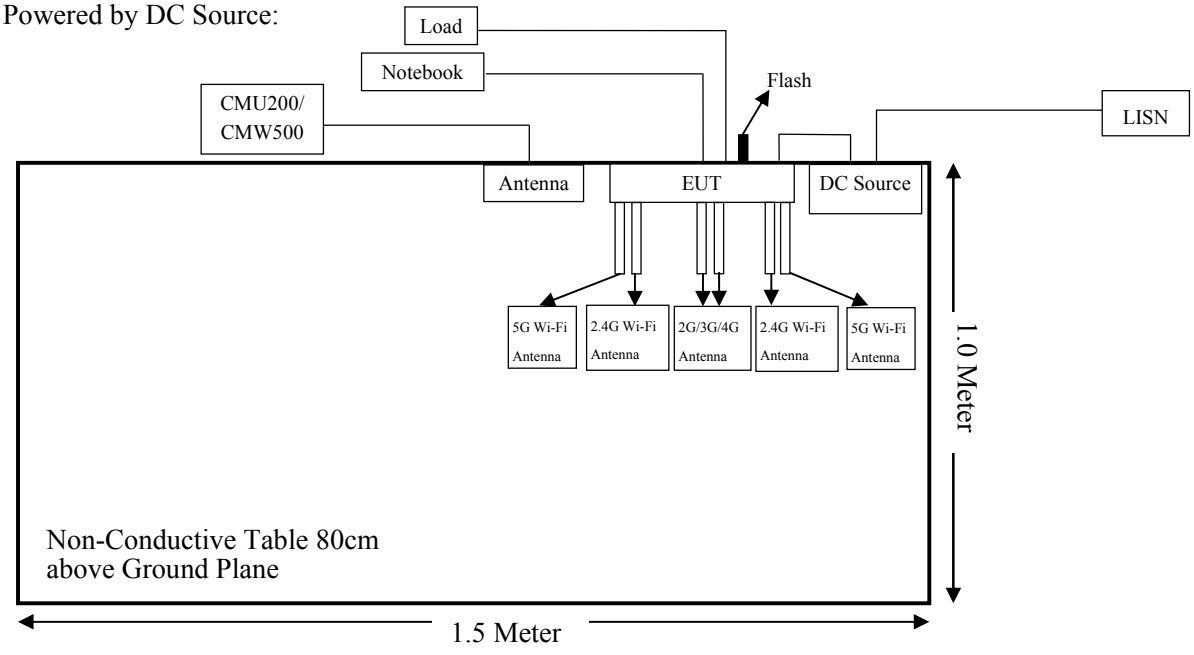
Manufacturer	Description	Model	Serial Number
BEST	DC Power Supply	PS-1502D+	DC001
BACL	Load	/	/
DELL	Notebook	E6410	3094742521
Kingston	Flash	32G	/
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478
Aihuaxin technology	Antenna	Unknown	Unknown
RUCKUS	POE	NPE-5818	/
RUCKUS	Adapter	PA1024-4HUB	/

External I/O Cable

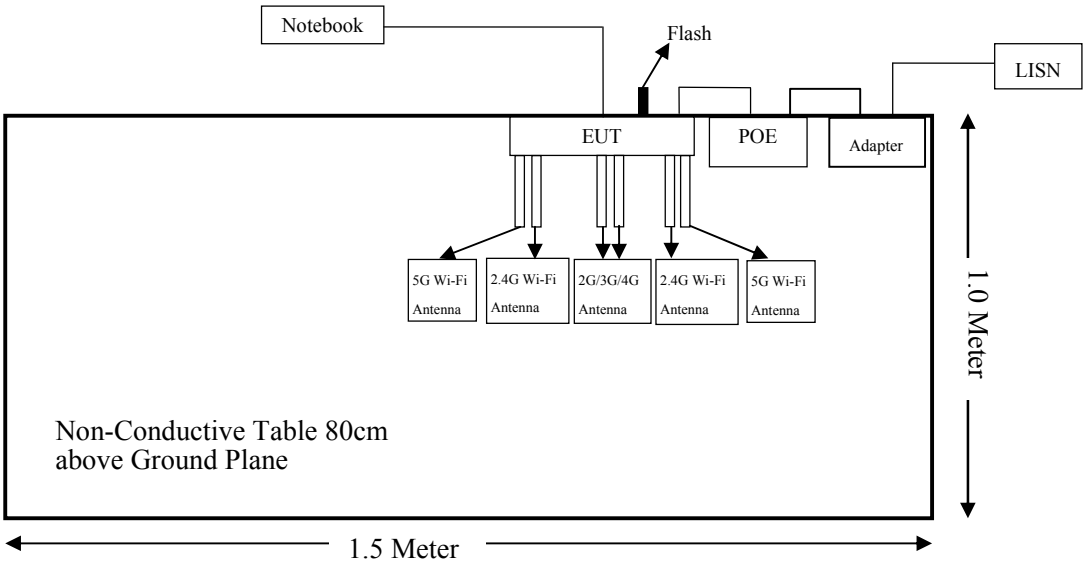
Cable Description	Length (m)	From Port	To
Power Cable	1.0	EUT	DC Source
Power Cable	1.0	DC Source	LISN/AC Source
RJ45	0.8	EUT	POE
RJ45	5.0	EUT	Notebook

Block Diagram of Test Setup

For Conducted Emissions:
Powered by DC Source:

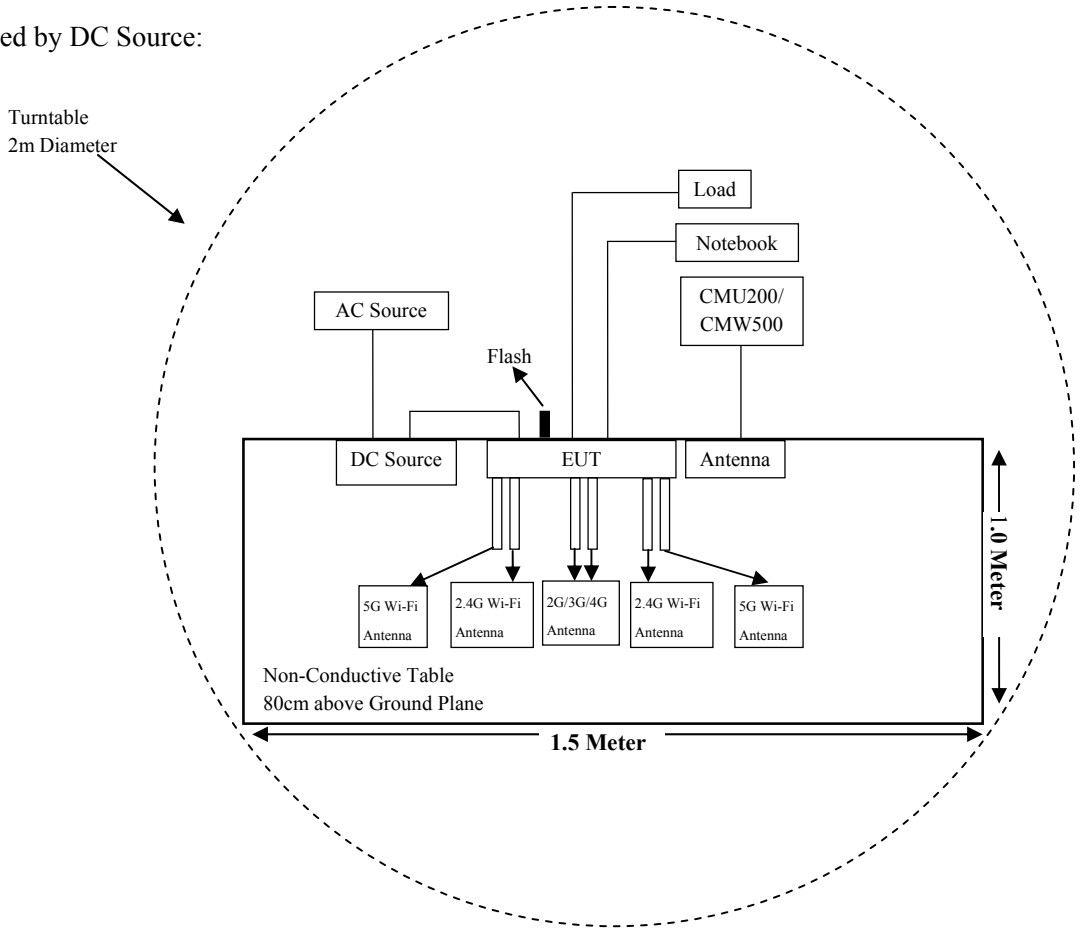


Powered by POE:

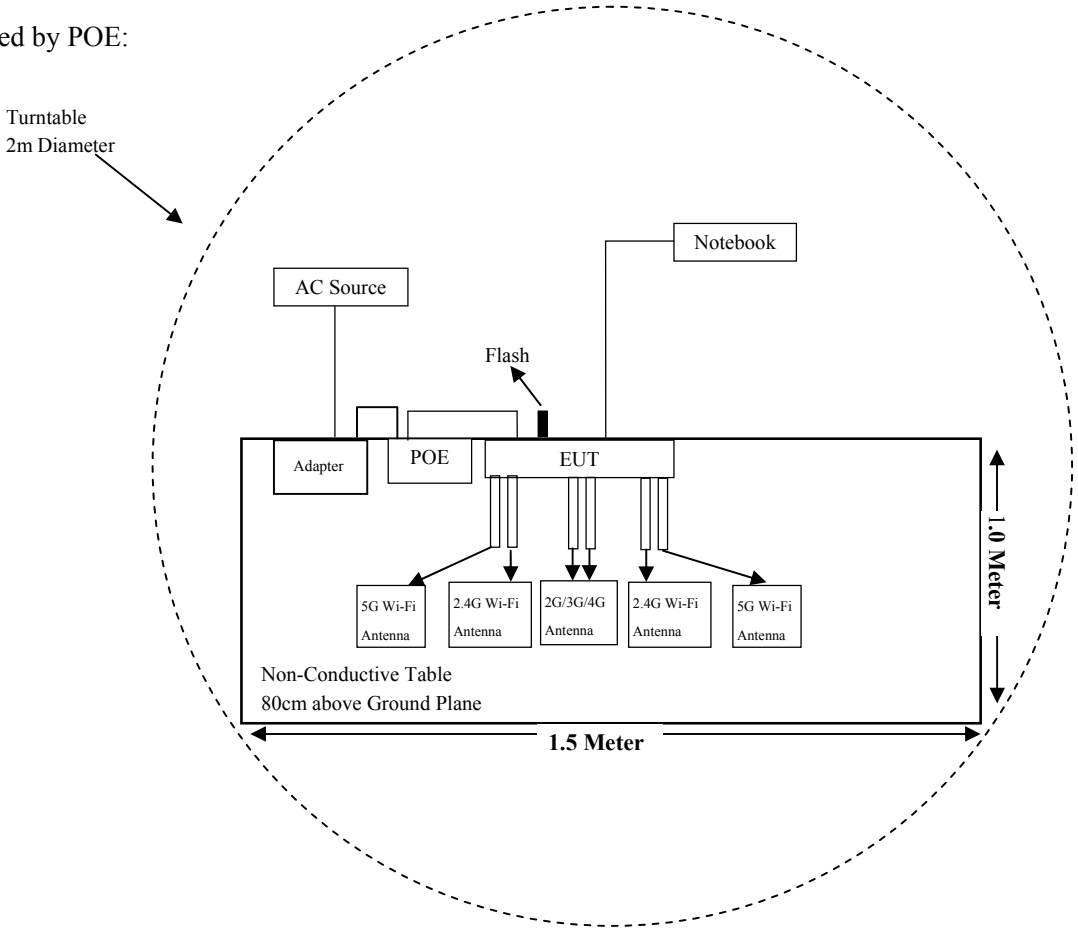


For Radiated Emissions(Below 1GHz):

Powered by DC Source:

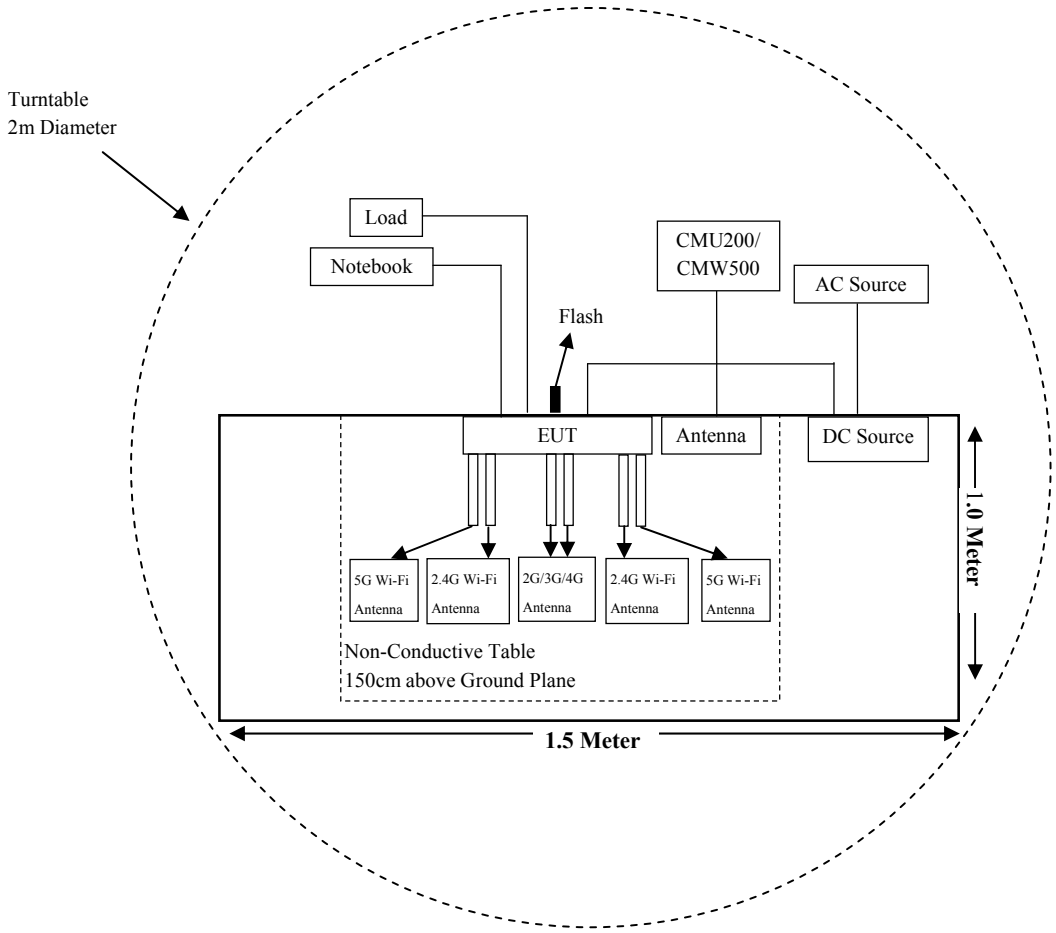


Powered by POE:



For Radiated Emissions(Above 1GHz):

Powered by DC Source:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
FCC §15.207 & §15.407(b) (8)	AC Power Line Conducted Emissions	Compliant
§15.205 & §15.209 & §15.407(b) ((1)(4) (8)(9)	Undesirable Emission & Restricted Bands	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-12-14	2021-12-13
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2020-08-05	2023-08-04
Sonoma Instrunent	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2020-04-01	2021-03-31
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2020-07-15	2023-07-14
ETS-LINDGREN	Horn Antenna	3116	2516	2020-01-17	2023-01-16
A.H.Systems, inc	Amplifier	PAM-0118P	512	2020-02-20	2021-02-19
SELECTOR	Amplifier	EM18G40G	060726	2020-03-22	2021-03-21
MICRO-TRONICS	Band Reject Filter	BRC50703	G094	2020-08-05	2021-08-04
MICRO-TRONICS	Band Reject Filter	BRC50705	G085	2020-08-05	2021-08-04
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-12-12	2021-12-11
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
Conducted Emission Test					
ROHDE&SCHWARZ	EMI Test receiver	ESR	1316.3003K03-101746-zn	2020-07-28	2021-07-27
Rohde & Schwarz	LISN	ENV216	101115	2020-11-27	2021-11-26
Audix	Test Software	e3	V9	N/A	N/A
Rohde & Schwarz	Pulse limiter	ESH3-Z2	100552	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-15	015	2020-08-15	2021-08-14

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/		f/1500	30
1500-100,000	/		1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

2.4G Wi-Fi & 5G Wi-Fi & LTE:

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412~2462	4.0	2.51	26.50	446.68	30	0.0991	1.0
802.11g		4.0	2.51	26.00	398.11	30	0.0883	1.0
802.11n-HT20		4.0	2.51	27.00	501.19	30	**0.1112**	**1.0**
802.11n-HT40	2422~2452	4.0	2.51	26.00	398.11	30	0.0883	1.0
802.11a	5150~5250	4.0	2.51	17.00	50.12	30	**0.0111**	**1.0**
	5725~5850	4.0	2.51	17.00	50.12	30	0.0111	1.0
802.11ac20	5150~5250	4.0	2.51	17.00	50.12	30	0.0111	1.0
	5725~5850	4.0	2.51	16.50	44.67	30	0.0099	1.0
802.11n20	5150~5250	4.0	2.51	17.00	50.12	30	0.0111	1.0
	5725~5850	4.0	2.51	17.00	50.12	30	0.0111	1.0
802.11ac40	5150~5250	4.0	2.51	17.00	50.12	30	0.0111	1.0
	5725~5850	4.0	2.51	17.00	50.12	30	0.0111	1.0
802.11n40	5150~5250	4.0	2.51	17.00	50.12	30	0.0111	1.0
	5725~5850	4.0	2.51	17.00	50.12	30	0.0111	1.0
802.11ac80	5210	4.0	2.51	17.00	50.12	30	0.0111	1.0
	5775	4.0	2.51	17.00	50.12	30	0.0111	1.0
LTE Band 2	1850~1910	2.3	1.70	22.50	177.83	30	0.0267	1.0
LTE Band 4	1710~1755	2.0	1.58	22.50	177.83	30	0.0249	1.0
LTE Band 5	824~849	1.5	1.41	23.50	223.87	30	0.0279	0.55
LTE Band 7	2500~2570	2.7	1.86	23.00	199.53	30	0.0328	1.0
LTE Band 12	699~716	1.3	1.35	23.50	223.87	30	0.0267	0.47
LTE Band 13	777~787	1.35	1.36	24.00	251.19	30	**0.0303**	**0.52**
LTE Band 25	1850~1915	2.3	1.70	24.00	251.19	30	0.0377	1.0
LTE Band 26	814~849	1.5	1.41	23.50	223.87	30	0.0280	0.55
LTE Band 41	2496~2690	2.7	1.86	23.50	223.87	30	0.0369	1.0
LTE Band 66	1710~1780	2.0	1.58	24.00	251.19	30	0.0352	1.0

GSM:

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
GSM 850	824~849	1.5	1.41	26.74	472.06	30	0.0590	0.55
GSM 1900	1850~1910	2.3	1.70	24.50	281.84	30	0.0423	1.00

Note:
1. Antenna Gain (numeric): 1.5 dBi (1.41) for GSM 850
   Antenna Gain (numeric): 2.3 dBi (1.70 for GSM 1900
GPRS 850: Tune-up maximum output power with 1 slot is 35.0 dBm, 2 slots is 32.5 dBm, 3 slots is 31.0 dBm, 4 slots is 29.5 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 26.74 dBm.
EGPRS 850: Tune-up maximum output power with 1 slot is 31.5 dBm, 2 slots is 30.5 dBm, 3 slots is 28.5 dBm, 4 slots is 27.5 dBm so the tune-up time based Ave. power compared to sloted Ave. power is 24.5 dBm.
GPRS 1900: Tune-up maximum output power with 1 slot is 30.5 dBm, 2 slots is 28.5 dBm, 3 slots is 26.5 dBm, 4 slots is 24.0 dBm so the tune-up time based Ave. power compared to sloted Ave. power is 22.5 dBm.
EGPRS 1900: Tune-up maximum output power with 1 slot is 29.0 dBm, 2 slots is 27.5 dBm, 3 slots is 26.0 dBm, 4 slots is 24.5 dBm so the tune-up time based Ave. power compared to sloted Ave. power is 21.74 dBm.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

WCDMA:

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Band Ⅱ	1850~1910	2.3	1.70	23.00	199.53	30	0.0300	1.00
Band Ⅳ	1710-1755	2.0	1.58	23.50	223.87	30	0.0314	1.00
Band Ⅴ	824-849	1.5	1.41	23.50	223.87	30	0.0280	0.55

Note:
1. For the above tune up power were declared by the manufacturer.
2. The LTE module FCC ID: 2AJYU-8PYA003
3. 2.4G Wi-Fi, 5G Wi-Fi and LTE can transmit simultaneously, The worst condition is as below:

$$\sum_i \frac{S_i}{S_{Limit\_i}}$$ =0.1112/1.0+0.0111/1.0+0.059/0.55=0.1112+0.0111+0.107=0.2293<1.0

Result: The device meets FCC MPE at 30cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine Compliant with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two Omni antennas for Wi-Fi; Antenna uses a unique type of connector to attach to the EUT.

Function	Antenna connector	Model number	manufacturer	Max. Antenna Gain
5G Wi-Fi	RP-SMA	DPA1319500SBAB501	Wallystech	4.0dBi

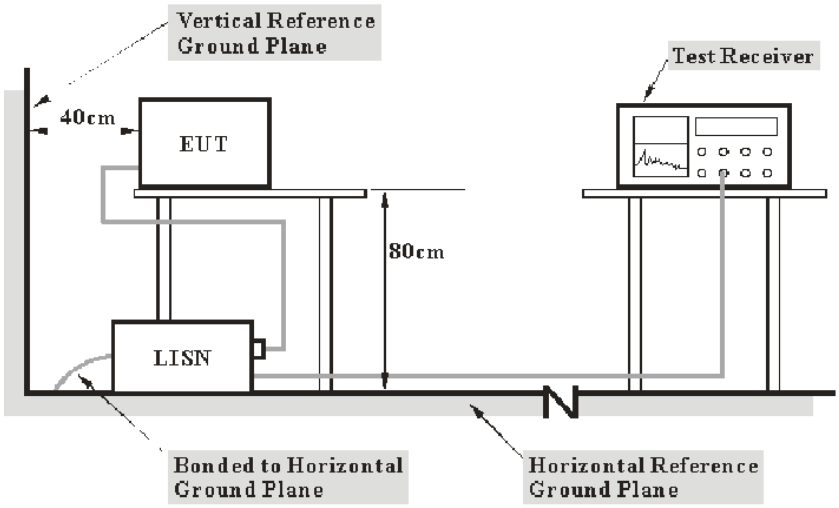
Result: Compliant.

FCC §15.407 (b) (8) §15.207 (a) – AC POWER LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a), §15.407(b) (8)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the DC Source/POE was connected to the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Over Limit Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Corrected Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7 dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dBμV) + Factor (dB) - Limit (dBμV)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

Temperature:	24.9 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

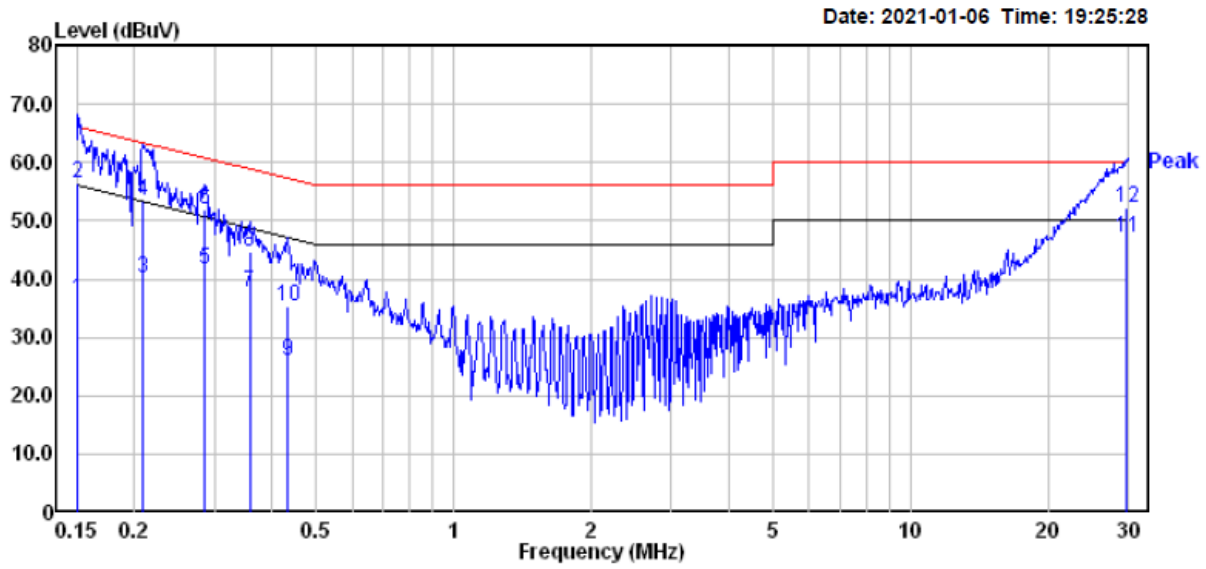
The testing was performed by Stone Zhang on 2021-01-06.

Transmitting simultaneously test:

Powered by DC source:

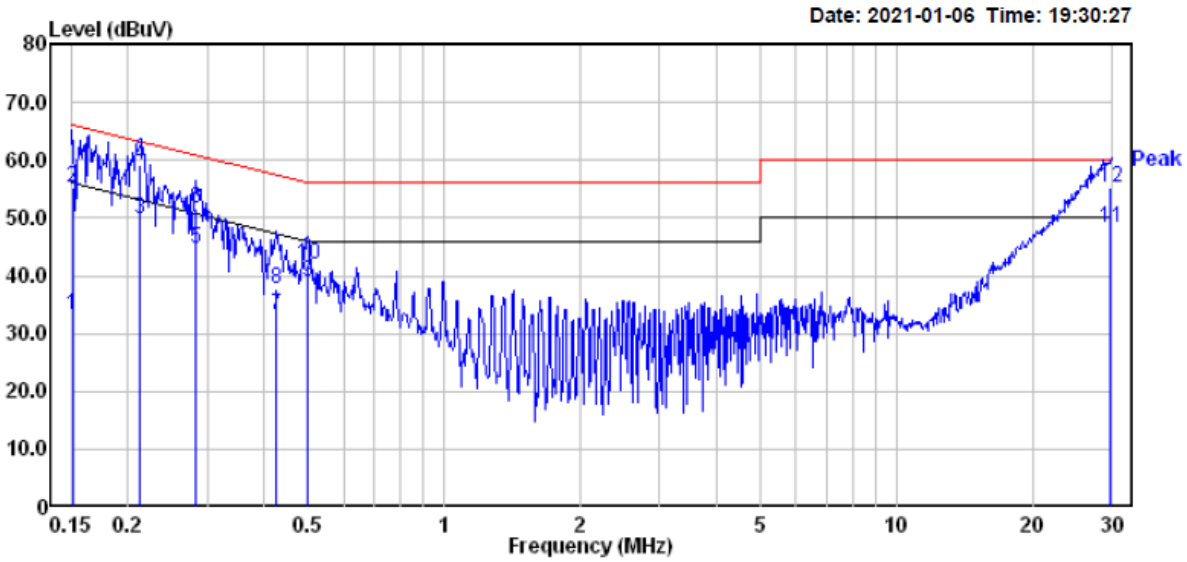
***(The worst case 2.4G Wi-Fi 802.11 n-HT20 high channel, 5G Wi-Fi Band4 802.11ac20 high channel and GSM 850 transmitting simultaneously** was recorded)*

AC 120V/60 Hz, Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	16.80	19.82	36.62	56.00	-19.38	Average
2	0.150	36.70	19.82	56.52	66.00	-9.48	QP
3	0.209	20.40	19.82	40.22	53.23	-13.01	Average
4	0.209	33.60	19.82	53.42	63.23	-9.81	QP
5	0.285	21.80	19.82	41.62	50.68	-9.06	Average
6	0.285	32.10	19.82	51.92	60.68	-8.76	QP
7	0.358	18.00	19.80	37.80	48.78	-10.98	Average
8	0.358	24.80	19.80	44.60	58.78	-14.18	QP
9	0.433	6.30	19.75	26.05	47.20	-21.15	Average
10	0.433	15.50	19.75	35.25	57.20	-21.95	QP
11	29.841	27.30	19.78	47.08	50.00	-2.92	Average
12	29.841	32.30	19.78	52.08	60.00	-7.92	QP

AC 120V/60 Hz, Neutral



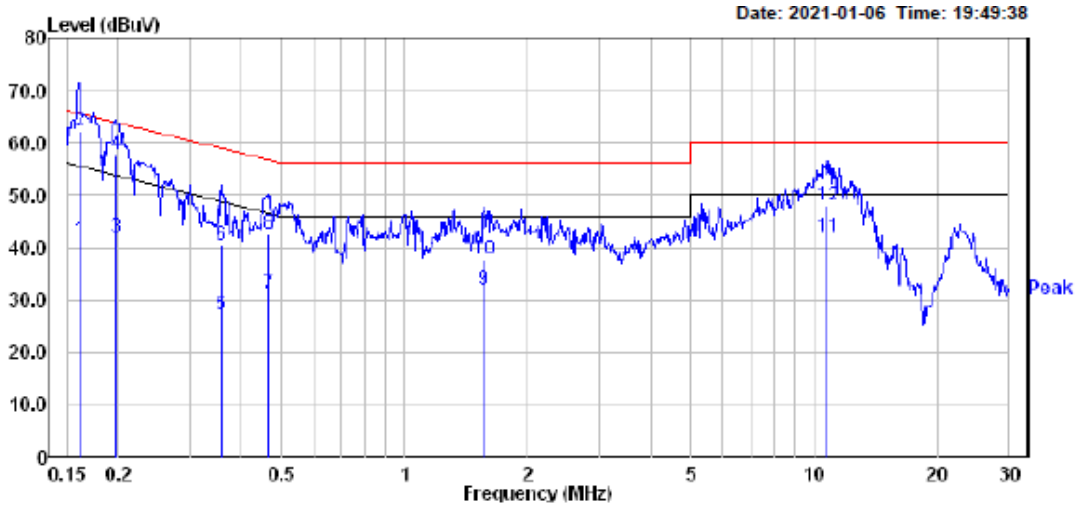
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.151	13.40	19.82	33.22	55.96	-22.74	Average
2	0.151	35.50	19.82	55.32	65.96	-10.64	QP
3	0.213	30.10	19.82	49.92	53.10	-3.18	Average
4	0.213	39.40	19.82	59.22	63.10	-3.88	QP
5	0.283	25.00	19.82	44.82	50.72	-5.90	Average
6	0.283	31.90	19.82	51.72	60.72	-9.00	QP
7	0.424	13.39	19.75	33.14	47.37	-14.23	Average
8	0.424	17.89	19.75	37.64	57.37	-19.73	QP
9	0.499	19.20	19.76	38.96	46.01	-7.05	Average
10	0.499	22.10	19.76	41.86	56.01	-14.15	QP
11	29.841	28.50	19.78	48.28	50.00	-1.72	Average
12	29.841	35.60	19.78	55.38	60.00	-4.62	QP

Note:
1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

Powered by POE:

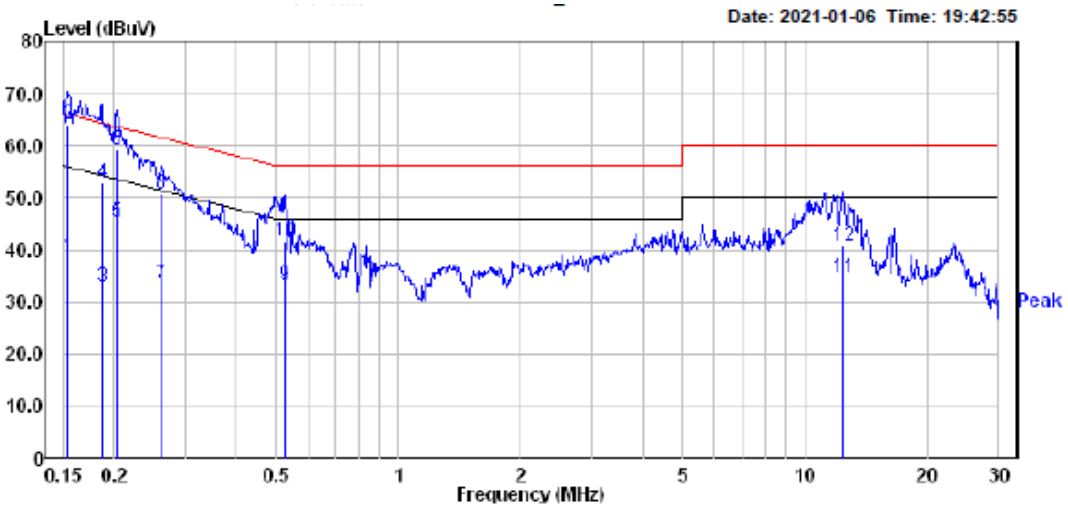
***(The worst case 2.4G Wi-Fi 802.11 n-HT20 high channel, 5G Wi-Fi Band4 802.11ac20 high channel and GSM 850 transmitting simultaneously** was recorded)*

AC 120V/60 Hz Line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.161	21.60	19.83	41.43	55.43	-14.00	Average
2	0.161	42.40	19.83	62.23	65.43	-3.20	QP
3	0.199	22.00	19.82	41.82	53.67	-11.85	Average
4	0.199	37.70	19.82	57.52	63.67	-6.15	QP
5	0.358	7.50	19.80	27.30	48.78	-21.48	Average
6	0.358	20.70	19.80	40.50	58.78	-18.28	QP
7	0.466	11.40	19.75	31.15	46.58	-15.43	Average
8	0.466	22.70	19.75	42.45	56.58	-14.13	QP
9	1.560	12.29	19.85	32.14	46.00	-13.86	Average
10	1.560	17.89	19.85	37.74	56.00	-18.26	QP
11	10.790	22.40	19.57	41.97	50.00	-8.03	Average
12	10.790	28.30	19.57	47.87	60.00	-12.13	QP

AC 120V/60 Hz Neutral:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.154	18.90	19.82	38.72	55.78	-17.06	Average
2	0.154	44.30	19.82	64.12	65.78	-1.66	QP
3	0.187	13.21	19.82	33.03	54.15	-21.12	Average
4	0.187	32.91	19.82	52.73	64.15	-11.42	QP
5	0.204	25.40	19.82	45.22	53.45	-8.23	Average
6	0.204	39.50	19.82	59.32	63.45	-4.13	QP
7	0.262	13.70	19.82	33.52	51.38	-17.86	Average
8	0.262	30.90	19.82	50.72	61.38	-10.66	QP
9	0.527	13.41	19.75	33.16	46.00	-12.84	Average
10	0.527	21.91	19.75	41.66	56.00	-14.34	QP
11	12.384	15.09	19.60	34.69	50.00	-15.31	Average
12	12.384	21.09	19.60	40.69	60.00	-19.31	QP

Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Attenuator (dB)
2) Over Limit (dB) = Read level (dBµV) + Factor (dB) - Limit (dBµV)

§15.205 & §15.209 & §15.407(B)(1)(4) (8)(9) – UNDESIRABLE EMISSION & RESTRICTED BANDS

Applicable Standard

FCC §15.407 (b)(1)(4) (8) (9); §15.209; §15.205;

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27dBm/MHz

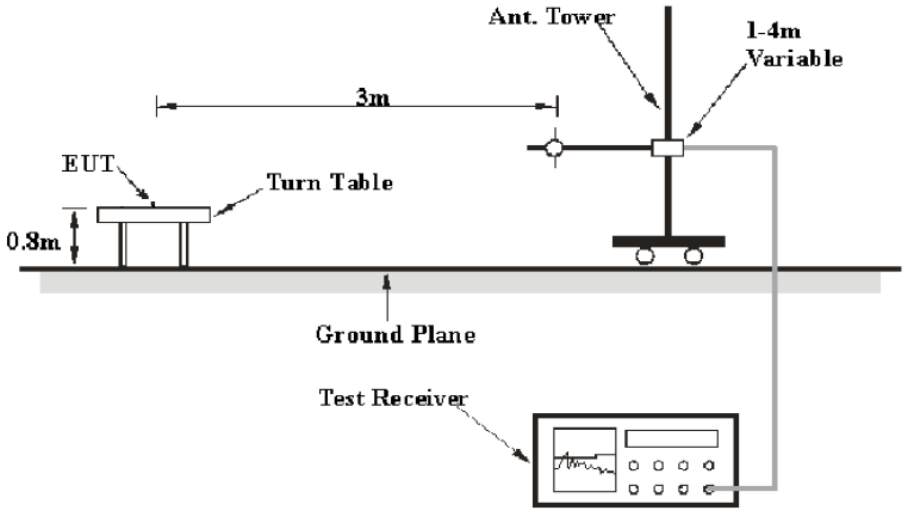
For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to 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.

As per FCC §15.35(d):Unless otherwise specified, on any frenquency or frequencies above 1000MHz,the radiated emission limits are based on the use of measurement instrunmentation employing an average detector function. Unless otherwise specified, measurements above 1000MHz shall be performed using a minimum resolution bandwidth of 1MHz.

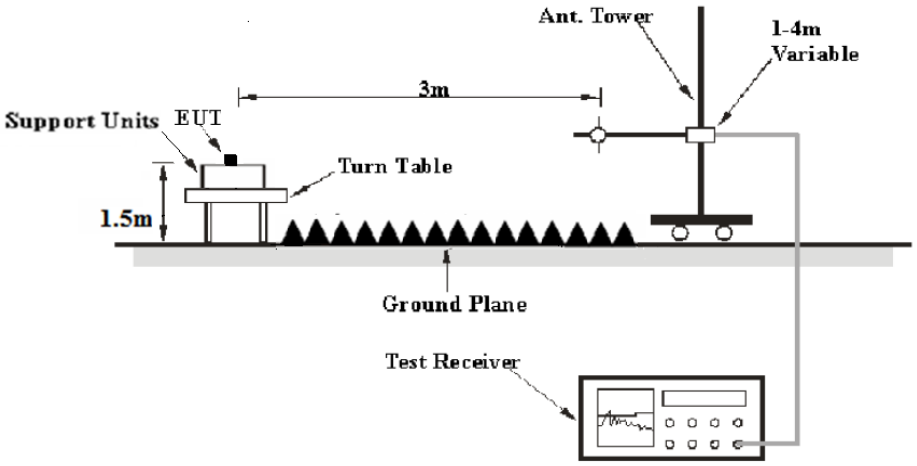
According to 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP [dBm] + 95.2, for d = 3 meters.

EUT Setup

Below 1 GHz:



1 GHz-40GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	Ave.

Test Procedure

During the radiated emission test, the DC source/POE was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Extrapolation result

Test Data

Environmental Conditions

Temperature:	24.7~24.9℃
Relative Humidity:	48~51 %
ATM Pressure:	101.1~101.3 kPa

The testing was performed by Stone Zhang from 2020-12-25 to 2020-12-28.

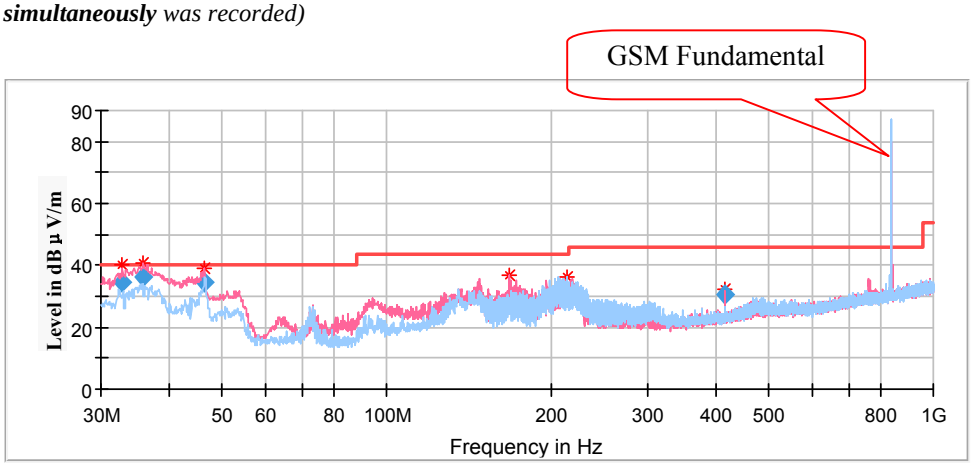
Test Mode: Transmitting

Transmitting simultaneously test:

Powered by DC Source:

30MHz-1GHz:

***(The worst case 2.4G Wi-Fi 802.11 n-HT20 high channel, 5G Wi-Fi Band4 802.11ac20 high channel and GSM 850 transmitting simultaneously** was recorded)*

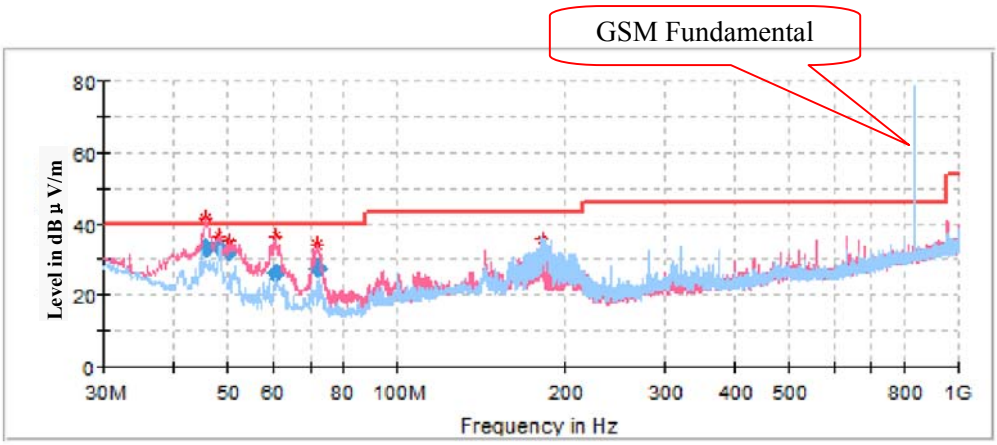


Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	Quasi Peak (dBµV/m)	Height (cm)	Polar (H/V)				
32.822950	34.34	100.0	V	260.0	-6.5	40.00	5.66
35.898300	36.32	100.0	V	332.0	-8.5	40.00	3.68
46.367850	34.76	100.0	V	57.0	-15.5	40.00	5.24
168.390450	28.82	100.0	V	190.0	-13.1	43.50	14.68
214.440450	30.83	100.0	H	302.0	-12.9	43.50	12.67
415.161150	30.45	100.0	V	160.0	-8.2	46.00	15.55

Powered by POE:

30MHz-1GHz:

(The worst case 2.4G Wi-Fi 802.11 n-HT20 high channel, 5G Wi-Fi Band4 802.11ac20 high channel and GSM 850 transmitting simultaneously** was recorded**)

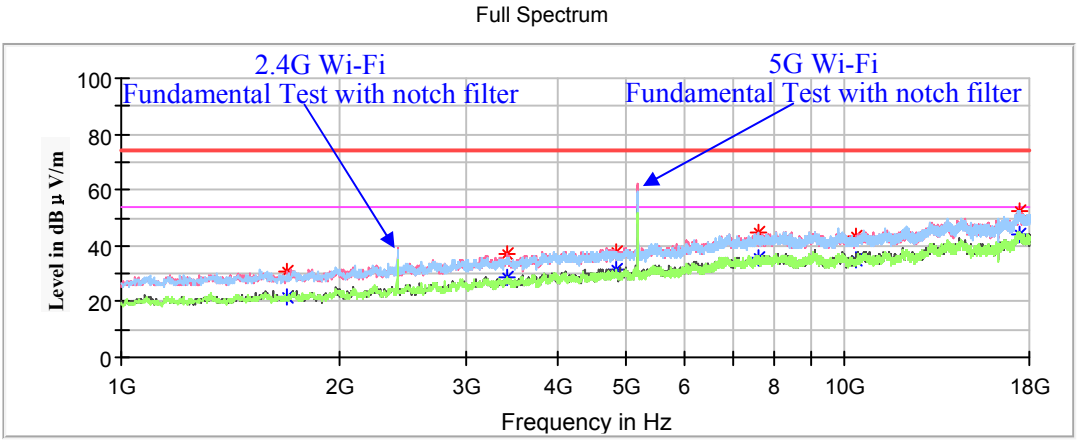


Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	Quasi Peak (dBµV/m)	Height (cm)	Polar (H/V)				
45.765600	33.05	200.0	V	28.0	-14.5	40.00	6.95
48.014800	33.83	100.0	V	76.0	-15.9	40.00	6.17
50.124250	32.03	100.0	V	15.0	-17.2	40.00	11.47
60.794200	26.32	200.0	V	333.0	-17.0	40.00	13.68
72.327750	27.79	100.0	V	2.0	-16.3	40.00	12.21
182.558050	31.37	100.0	H	73.0	-12.2	43.50	12.13

Powered by DC Source:

1GHz-18GHz:

***(The worst case 2.4G Wi-Fi 802.11 n-HT20 high channel, 5G Wi-Fi Band4 802.11ac20 high channel and GSM 850 transmitting simultaneously** was recorded)*

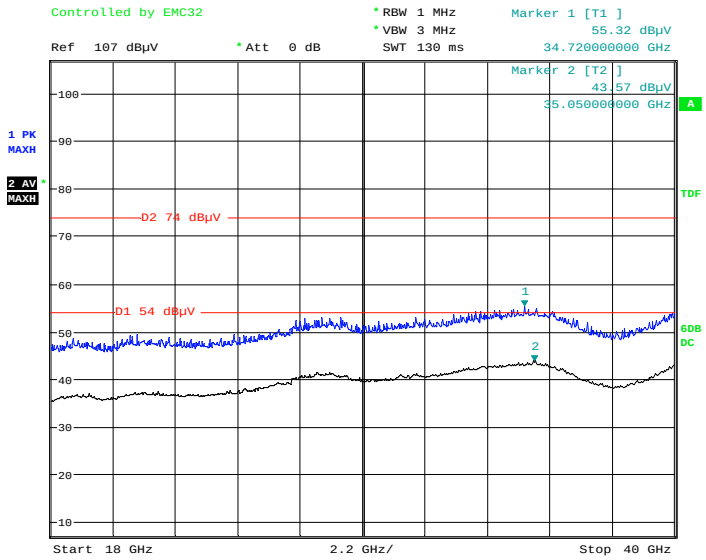


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)				
1691.900000	---	21.55	150.0	H	349.0	-15.6	54.00	32.45
1691.900000	30.87	---	150.0	H	349.0	-15.6	74.00	43.13
3417.400000	---	28.47	150.0	V	102.0	-9.0	54.00	25.53
3417.400000	36.83	---	150.0	V	102.0	-9.0	74.00	37.17
4828.400000	---	31.80	200.0	H	77.0	-5.5	54.00	22.20
4828.400000	37.79	---	200.0	H	77.0	-5.5	74.00	36.21
7577.300000	---	35.44	150.0	V	5.0	1.2	54.00	18.56
7577.300000	44.95	---	150.0	V	5.0	1.2	74.00	29.05
10382.300000	---	34.77	200.0	V	281.0	2.2	54.00	19.23
10382.300000	43.69	---	200.0	V	281.0	2.2	74.00	30.31
17462.800000	---	43.76	200.0	H	319.0	8.8	54.00	10.24
17462.800000	52.68	---	200.0	H	319.0	8.8	74.00	21.32

18GHz-40GHz:

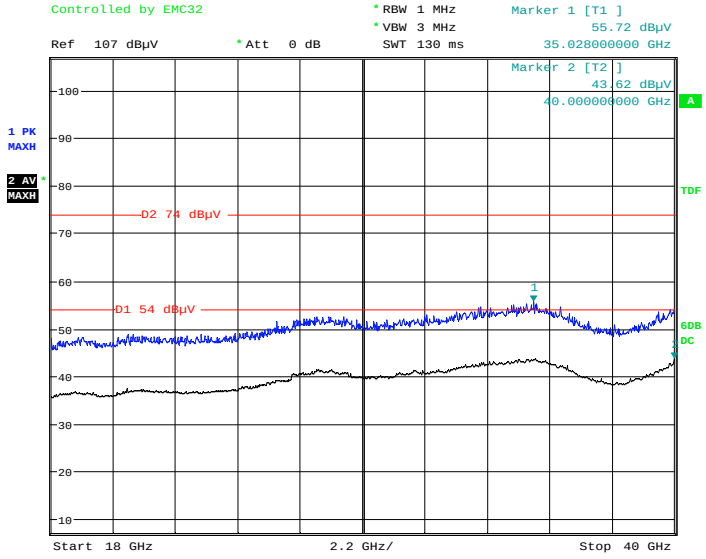
***(The worst case 2.4G Wi-Fi 802.11 n-HT20 high channel, 5G Wi-Fi Band4 802.11ac20 high channel and GSM 850 transmitting simultaneously** was recorded)*

Horizontal



Date: 28.DEC.2020 13:26:43

Vertical



Date: 28.DEC.2020 13:28:13

Declarations

1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

5: This report cannot be reproduced except in full, without prior written approval of the Company.

6: This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

******* END OF REPORT *******