FCC PART 15.247

TEST REPORT

For

Ackcio Pte. Ltd.

75 Ayer Rajah Crescent. #03-01/02. Singapore 139953.

FCC ID: 2AT8M-GW-V3X0

Report Type:	Product Type:
Original Report	Ackcio Gateway

Report Number:	RSZ200528007-00
Report Date:	2020-07-17
Reviewed By:	Jimmy Xiao RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Ackcio Gateway
Tested Model	BEAM-GW
Frequency Range	902.5-927.5MHz
Maximum Conducted Peak Output Power	14.72dBm
Antenna Specification	6dBi
Voltage Range	DC 12V
Date of Test	2020-06-05 to 2020-07-07
Sample serial number	RSZ200528007-RF-S1(Assigned by BACL, Shenzhen)
Received date	2020-05-28
Sample/EUT Status	Good condition

Objective

This report is prepared on behalf of Ackcio Pte. Ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

Part of system submission with FCC ID: 2ALPH-E70

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.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

Channel List

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	902.5	11	907.5	21	912.5	31	917.5	41	923
2	903	12	908	22	913	32	918	42	923.5
3	903.5	13	908.5	23	913.5	33	918.5	43	924
4	904	14	909	24	914	34	919	44	924.5
5	904.5	15	909.5	25	914.5	35	919.5	45	925
6	905	16	910	26	915	36	920	46	925.5
7	905.5	17	910.5	27	915.5	37	920.5	47	926
8	906	18	911	28	916	38	921	48	926.5
9	906.5	19	911.5	29	916.5	39	921.5	49	927
10	907	20	912	30	917	40	922.5	50	927.5

Channel 1, 25 and 50 were tested.

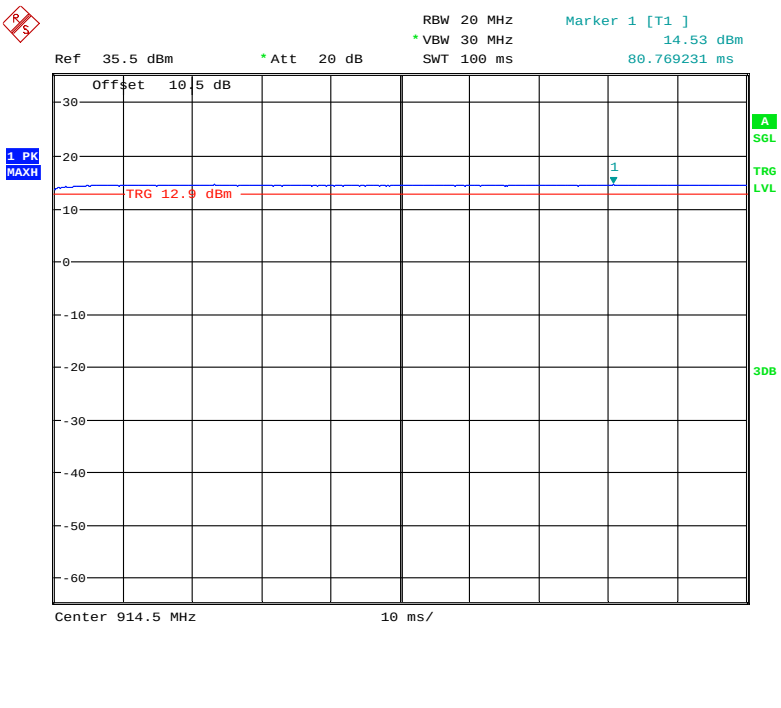
EUT Exercise Software

Software: XDS-GY005738-CC1310-Device Control panel and the power level is 18.

Equipment Modifications

No modification was made to the EUT tested.

Duty cycle



T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
100	100	100

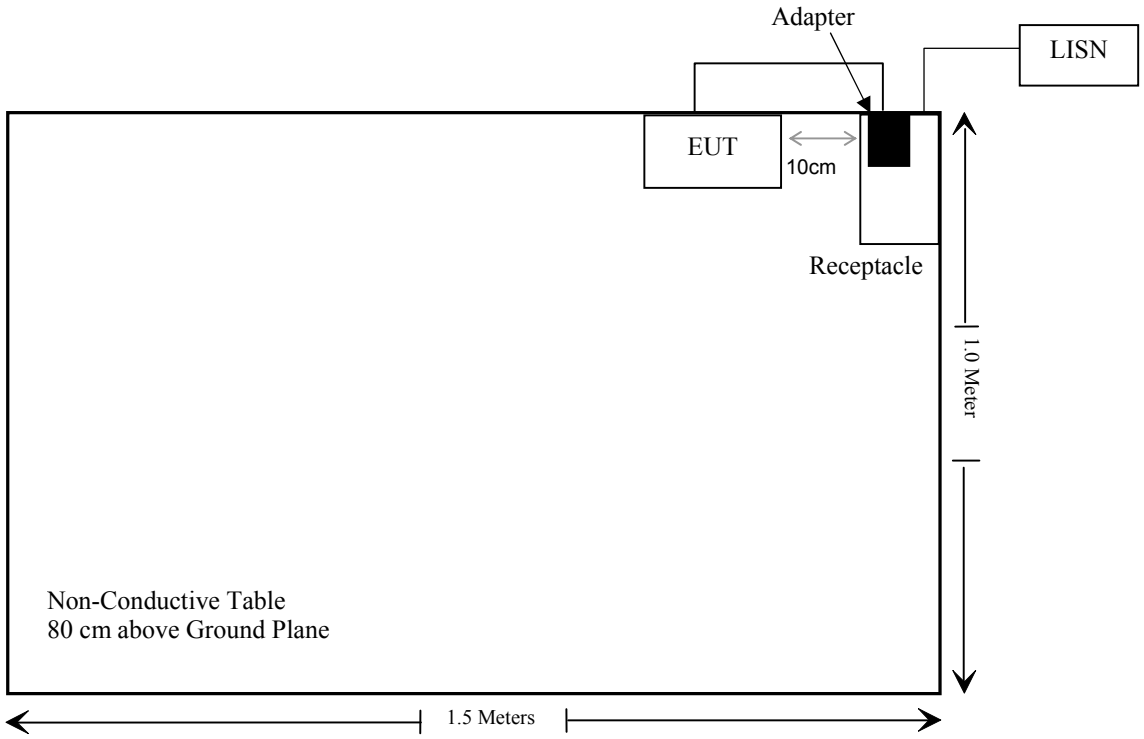
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Unknown	Adapter	1230	J2-1220

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-Shielding Un-Detachable DC Cable	2.0	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	Maximum Permissible Exposure(MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019/7/9	2020/7/8
Rohde & Schwarz	LISN	ENV216	101613	2020/1/22	2021/1/21
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8
Sonoma instrument	Pre-amplifier	310 N	186238	2020/4/20	2021/4/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/07/21
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
OuLiTong	Band Reject filter	902-928MHz	OE01902427	2020/04/20	2021/04/20
Ducommun Technolagies	Horn antenna	ARH-4223-02	1007726-021304	2017/12/6	2020/12/5
Ducommun Technolagies	Horn antenna	ARH-2823-02	1007726-021302	2017/12/6	2020/12/5
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2020/3/1	2021/3/1
Agilent	USB Wideband Power Sensor	U2021XA	MY54250003	2019/7/10	2020/7/9
WEINSCHEL	10dB Attenuator	5324	AU3842	2019/11/29	2020/11/28
Unknown	RF Cable	Unknown	2301 276	2019/11/29	2020/11/28

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

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 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

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm2)
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:

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

Mode	Frequency (MHz)	Antenna Gain		Max Tune Up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
915M Radio	902.5-927.5	6.0	3.98	15.0	31.62	20	0.025	0.602
GSM850	824-849	5.0	3.16	26.0	398.11	20	0.250	0.55
PCS1900	1850-1910	5.0	3.16	23.0	199.53	20	0.125	1.0
WCDMA Band 2	1850-1910	5.0	3.16	25.0	316.23	20	0.199	1.0
WCDMA Band 4	1710-1755	5.0	3.16	25.0	316.23	20	0.199	1.0
WCDMA Band 5	824-849	5.0	3.16	25.0	316.23	20	0.199	0.55
LTE Band 2	1850-1910	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 4	1710-1755	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 5	824-849	5.0	3.16	25.0	316.23	20	0.199	0.55
LTE Band 7	2500-2570	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 12	699-716	5.0	3.16	25.0	316.23	20	0.199	0.466
LTE Band 13	777-787	5.0	3.16	25.0	316.23	20	0.199	0.518
LTE Band 25	1850-1915	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 26	814-824&824-849	5.0	3.16	25.0	316.23	20	0.199	0.543
LTE Band 38	2570-2620	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 41	2496-2690	5.0	3.16	25.0	316.23	20	0.199	1.0

Note: 1. The tune up conducted power was declared by the applicant
2. The Sub-GHz Radio function can transmit at the same time with the GSM/WCDMA/LTE.
3. Please refer to the MPE report of the FCC ID: XMR201903EG25G for the GSM/WCDMA/LTE output power.

So the worst simultaneous transmitting consideration:

The ratio=$MPE_{\text{Sub-GHz Radio}}$ /limit + MPE_{GSM850}/limit=0.025/0.602+0.250/0.55
=0.496＜1.0

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Pass

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 compliance 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 one antenna which has a non-standard connector and the antenna gain is 6dBi, fulfill the requirement of this section. Please refer to the EUT photos.

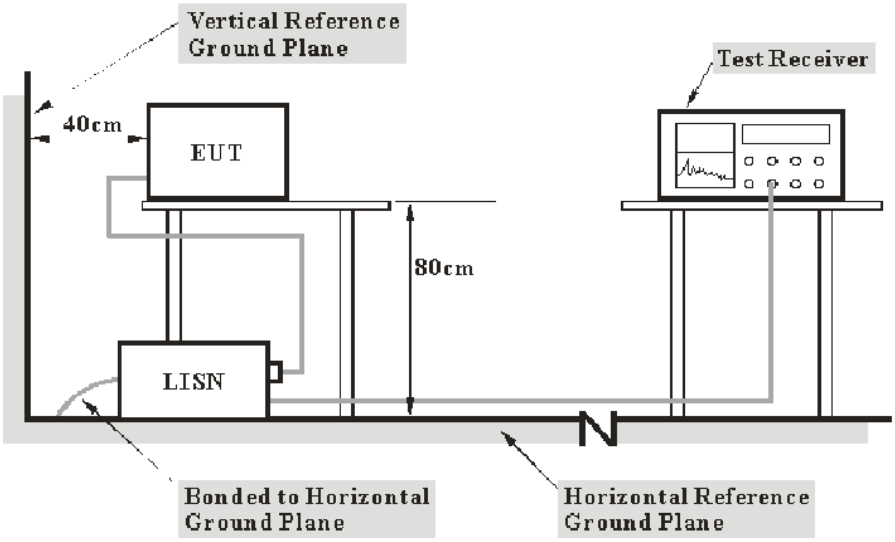
Result: Pass

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

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 measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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 adapter was connected to the outlet of the LISN.

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

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

Corrected Factor & Margin 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:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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

Margin = Limit – Corrected Amplitude

Test Data

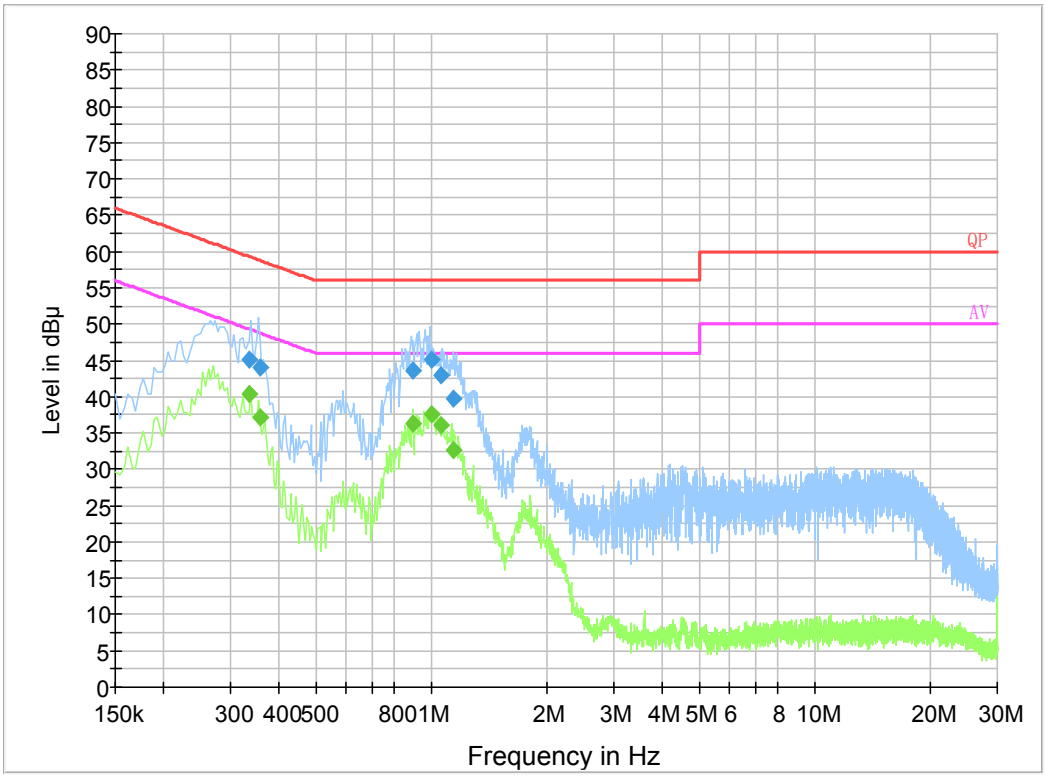
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2020-07-06.

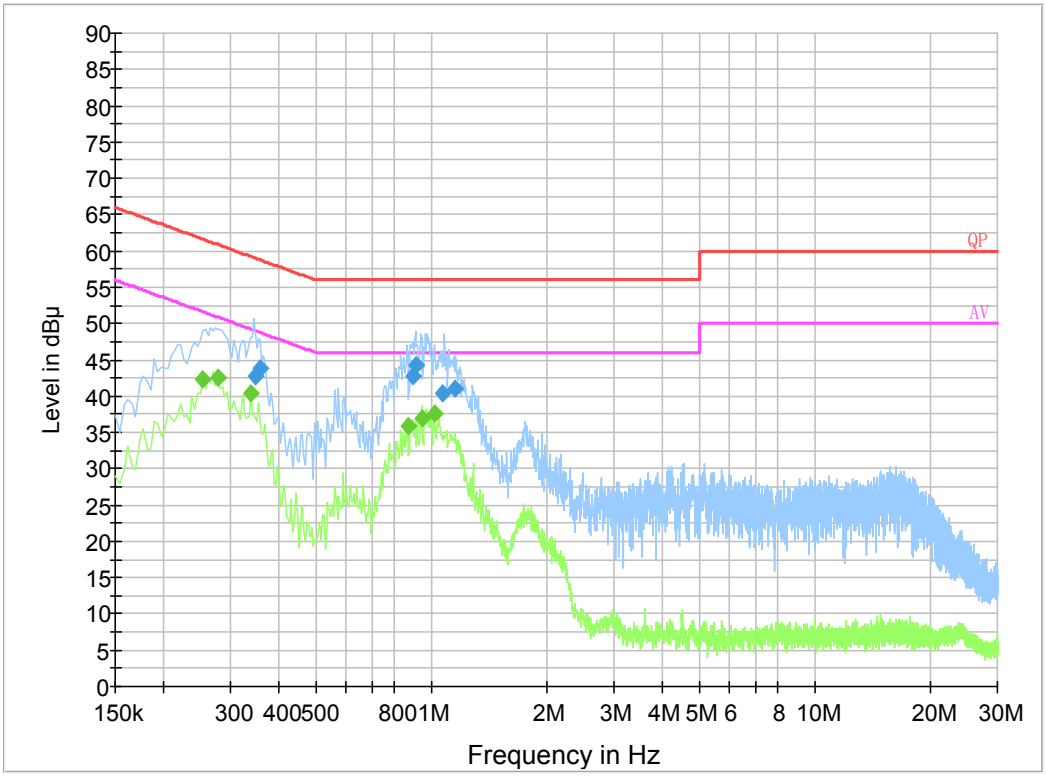
EUT operation mode: Transmitting (the worst case is Low channel)

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.336930	45.2	19.8	59.3	14.1	QP
0.356690	44.1	19.9	58.8	14.7	QP
0.892710	43.6	19.8	56.0	12.4	QP
0.999090	45.1	19.9	56.0	11.0	QP
1.061950	43.0	19.9	56.0	13.0	QP
1.144810	39.8	19.8	56.0	16.2	QP
0.336930	40.3	19.8	49.3	9.0	Ave.
0.356690	37.2	19.9	48.8	11.7	Ave.
0.892710	36.3	19.8	46.0	9.8	Ave.
0.999090	37.6	19.9	46.0	8.4	Ave.
1.061950	36.1	19.9	46.0	9.9	Ave.
1.144810	32.6	19.8	46.0	13.4	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.348810	42.8	19.9	59.0	16.1	QP
0.356690	43.8	19.9	58.8	15.0	QP
0.900410	42.8	19.7	56.0	13.2	QP
0.912350	44.2	19.7	56.0	11.8	QP
1.069710	40.4	19.8	56.0	15.6	QP
1.152630	40.9	19.8	56.0	15.1	QP
0.254000	42.3	19.8	51.6	9.4	Ave.
0.278000	42.6	19.7	50.9	8.2	Ave.
0.338000	40.3	19.8	49.3	8.9	Ave.
0.870000	35.8	19.7	46.0	10.2	Ave.
0.946000	37.0	19.8	46.0	9.0	Ave.
1.022000	37.5	19.8	46.0	8.5	Ave.

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

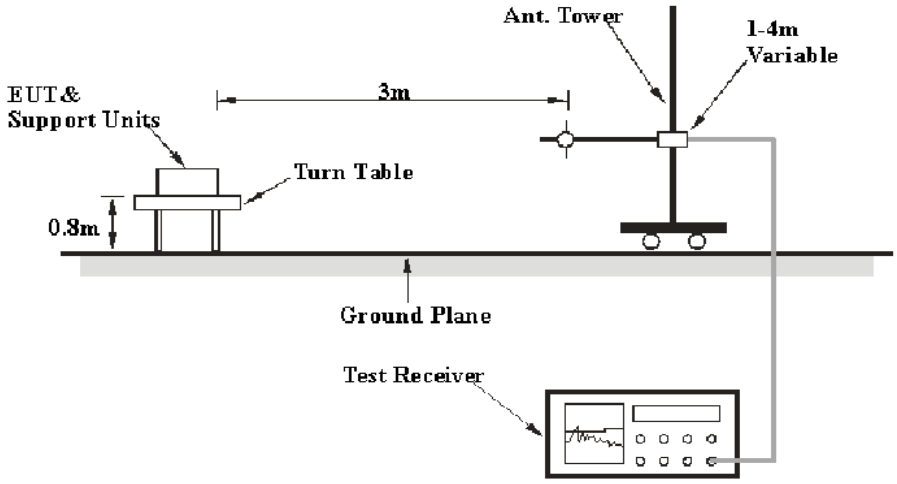
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

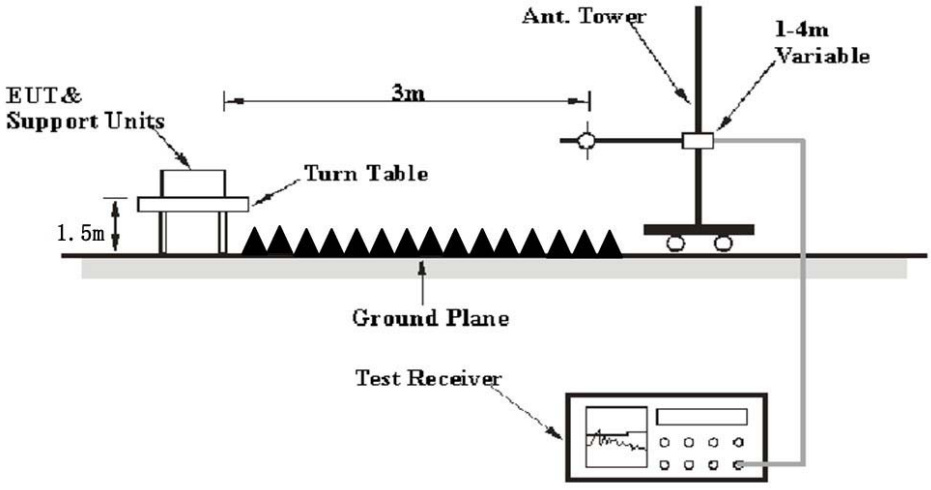
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 27GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

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-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor 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 – Corrected Amplitude

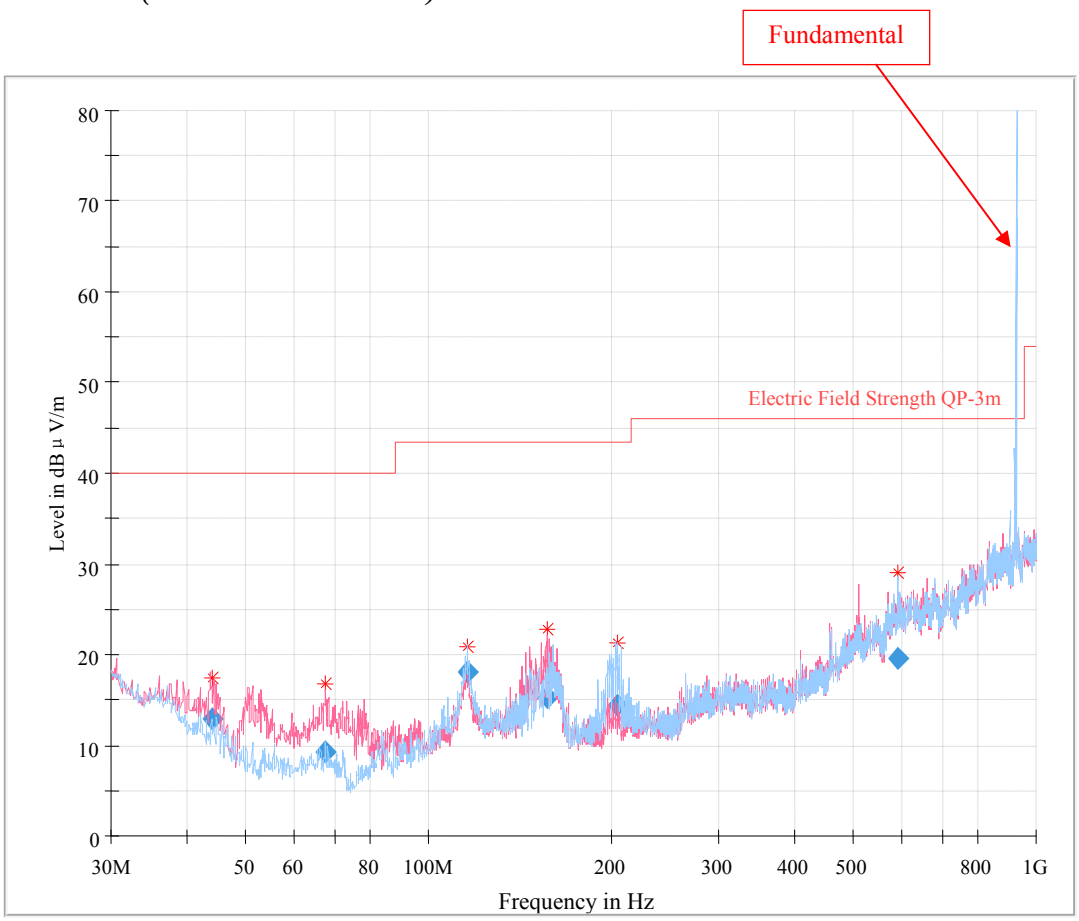
Test Data

Environmental Conditions

Temperature:	23~26 ℃
Relative Humidity:	51~60 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Charlie Cha on 2020-06-17 for below 1GHz and Leo Huang from 2020-06-30 to 2020-07-07 for above 1G.
EUT operation mode: Transmitting

30 MHz~1 GHz: *(Low channel worst case)*



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
44.167500	12.98	108.0	V	220.0	-16.7	40.00	27.02
67.548000	9.34	219.0	V	292.0	-20.5	40.00	30.66
115.860750	18.14	284.0	H	302.0	-14.8	43.50	25.36
157.215375	15.36	102.0	V	249.0	-14.4	43.50	28.14
204.828500	14.32	196.0	H	86.0	-13.9	43.50	29.18
593.698000	19.66	110.0	H	333.0	-1.9	46.00	26.34

1 GHz - 27 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
Low Channel (902.5MHz)									
1805.00	42.86	PK	298	1.6	H	-1.65	41.21	74	32.79
1805.00	27.48	Ave.	298	1.6	H	-1.65	25.83	54	28.17
1805.00	44.28	PK	176	1.4	V	-1.65	42.63	74	31.37
1805.00	28.80	Ave.	176	1.4	V	-1.65	27.15	54	26.85
Middle Channel (914.5MHz)									
1829.00	43.89	PK	78	2.3	H	-1.55	42.34	74	31.66
1829.00	28.23	Ave.	78	2.3	H	-1.55	26.68	54	27.32
1829.00	45.91	PK	6	1.9	V	-1.55	44.36	74	29.64
1829.00	28.27	Ave.	6	1.9	V	-1.55	26.72	54	27.28
High Channel (927.5MHz)									
1855.00	42.73	PK	359	1.4	H	-1.16	41.57	74	32.43
1855.00	28.32	Ave.	359	1.4	H	-1.16	27.16	54	26.84
1855.00	44.81	PK	116	1.7	V	-1.16	43.65	74	30.35
1855.00	30.80	Ave.	116	1.7	V	-1.16	29.64	54	24.36

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude
The other spurious emission which is 20dB to the limit was not recorded.

Co-location Transmitting (Worst case)

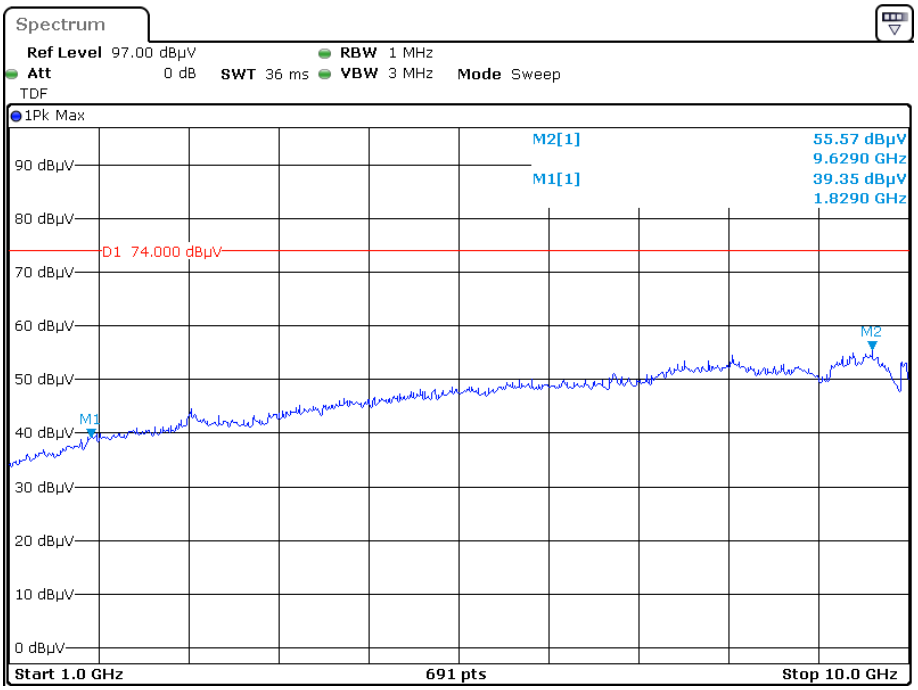
Sub-GHz Radio: 902.5MHz + PCS1900: 1880MHz

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
874.53	35.36	QP	219	1.1	H	3.60	38.96	46	7.04
874.53	36.76	QP	219	1.1	V	3.60	40.36	46	5.64
1805	59.98	PK	303	1.9	V	-2.05	57.93	74	16.07
1805	49.67	Ave.	303	1.9	V	-2.05	47.62	54	6.38
3760	56.93	PK	257	1.9	V	2.83	59.76	74	14.24
3760	44.87	Ave.	257	1.9	V	2.83	47.70	54	6.30

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude
All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

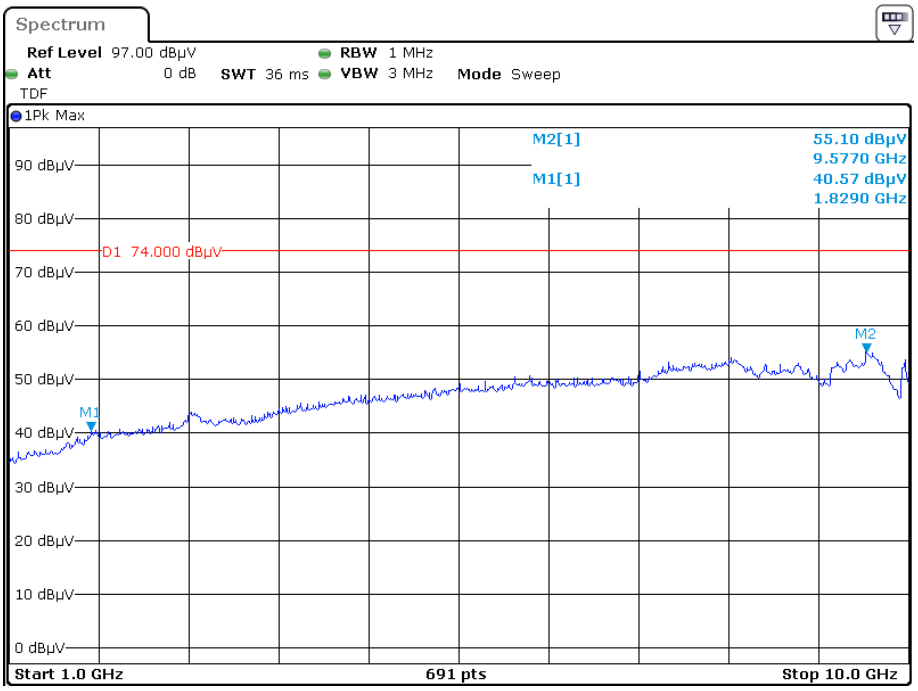
Pre-scan with middle channel Peak

Horizontal



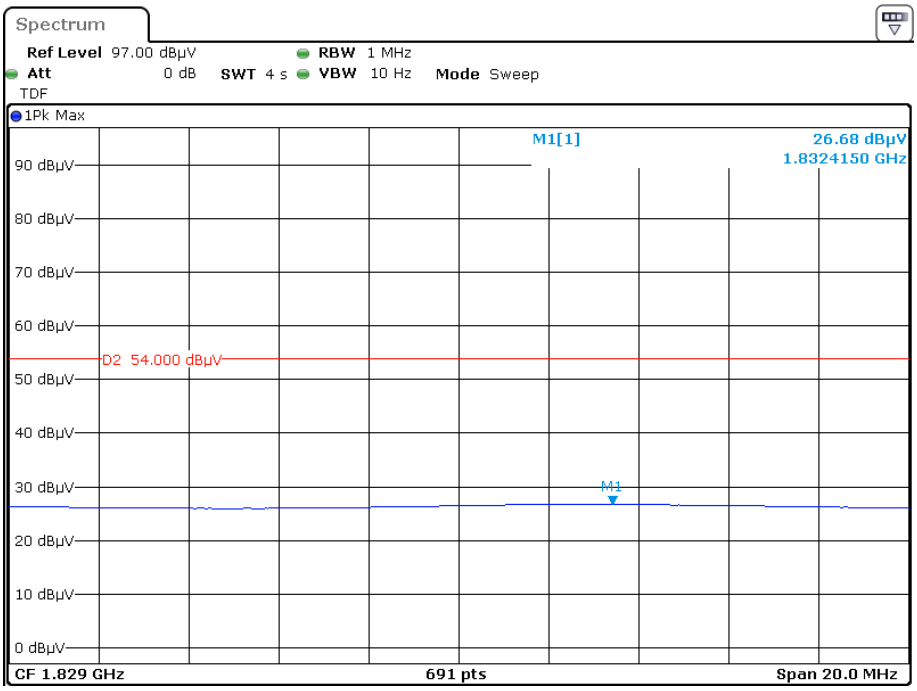
Date: 30.JUN.2020 05:32:14

Vertical



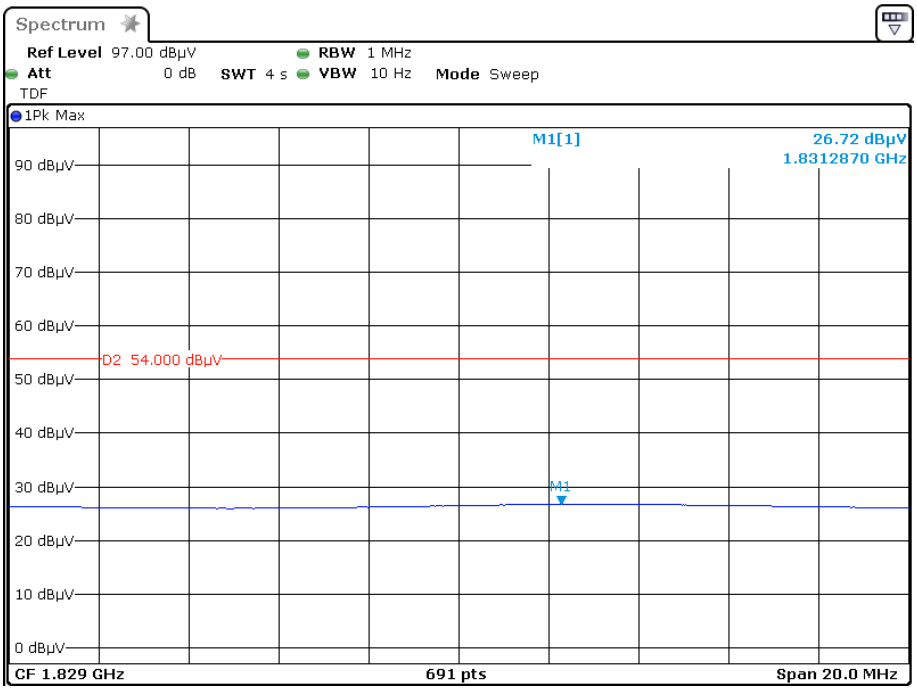
Date: 30.JUN.2020 05:40:06

Pre-scan for Average
Horizontal



Date: 30.JUN.2020 05:36:19

Vertical



Date: 30.JUN.2020 05:43:12

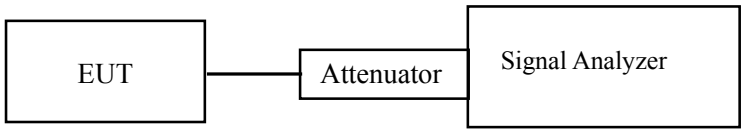
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Gavin Guo on 2020-06-05.

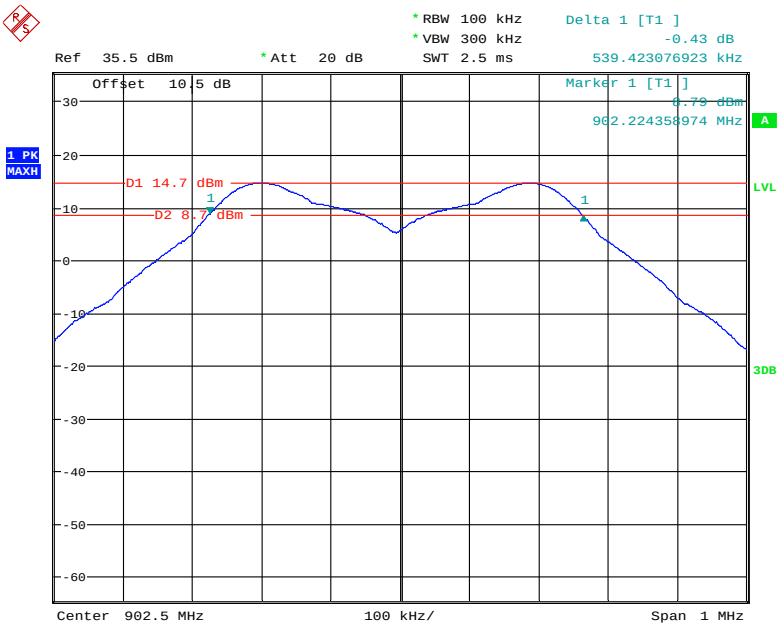
EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following table and plots.

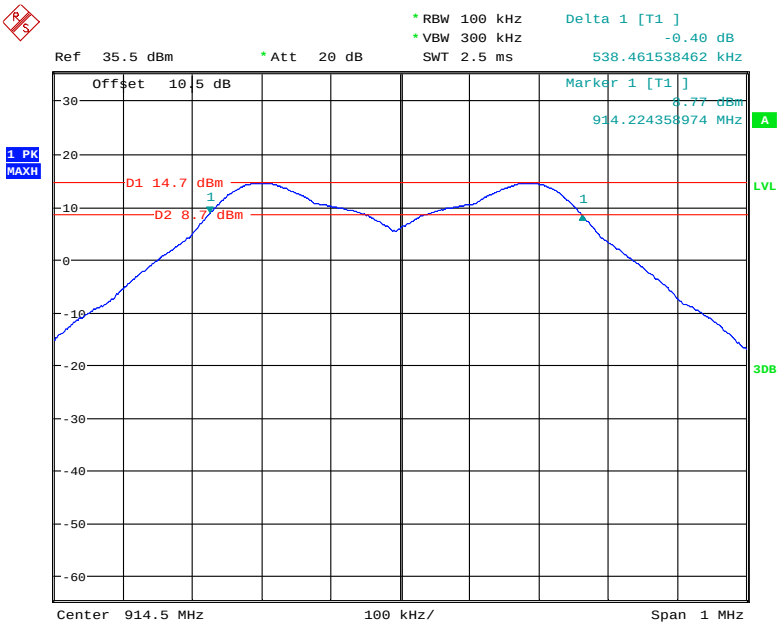
Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
902.5	0.539	0.5
914.5	0.538	0.5
927.5	0.537	0.5

Low Channel



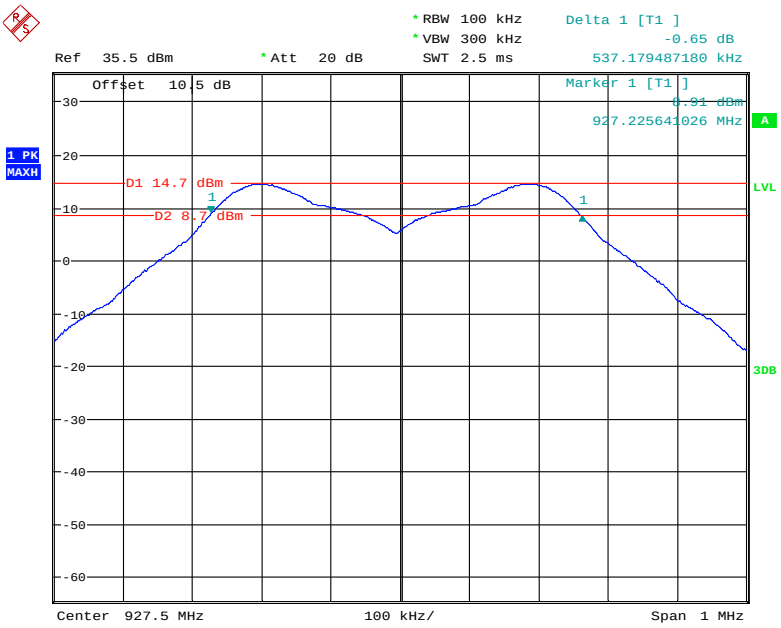
Date: 5.JUN.2020 15:44:00

Middle Channel



Date: 5.JUN.2020 15:46:00

High Channel



Date: 5.JUN.2020 15:47:34

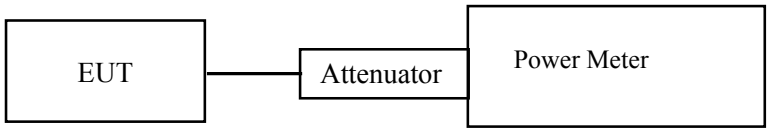
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	54 %
ATM Pressure:	101.0 kPa

The testing was performed by Gavin Guo on 2020-06-05.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following table and plots.

Frequency (MHz)	Max Peak Output Power (dBm)	Limit (dBm)
902.5	14.72	<=30
914.5	14.56	<=30
927.5	14.37	<=30

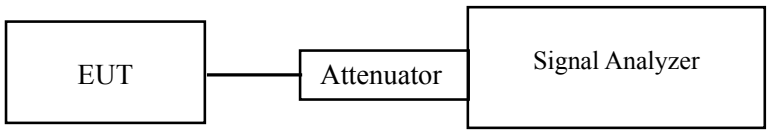
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

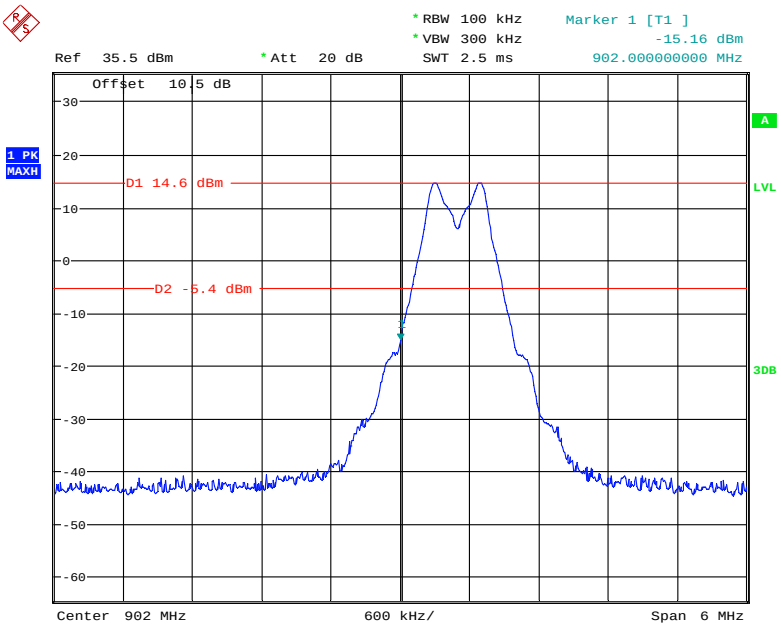
The testing was performed by Gavin Guo on 2020-06-05.

EUT operation mode: Transmitting

Test Result: Pass

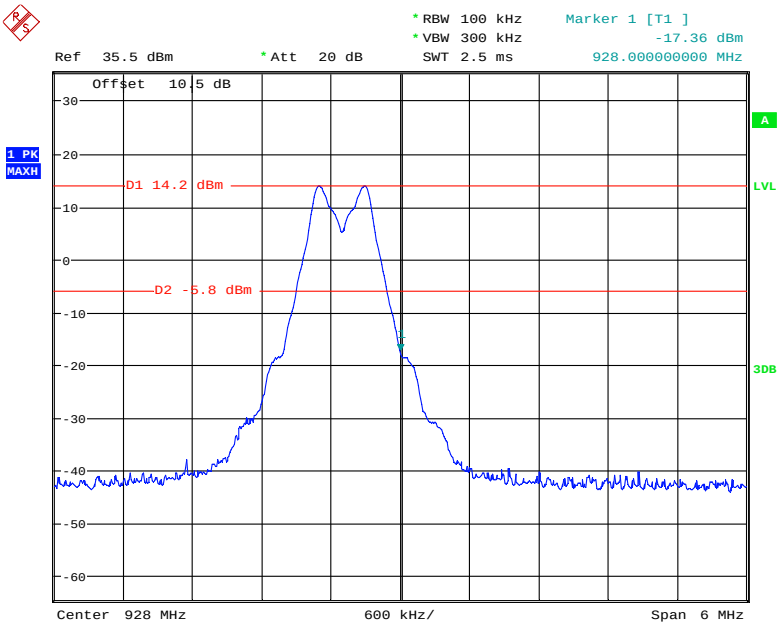
Please refer to the following plots.

Low Channel



Date: 5.JUN.2020 15:50:44

High Channel



Date: 5.JUN.2020 15:49:24

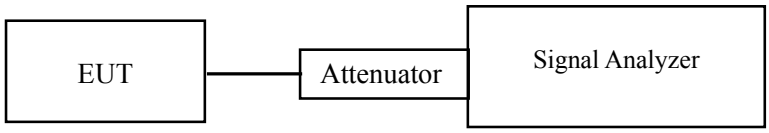
FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

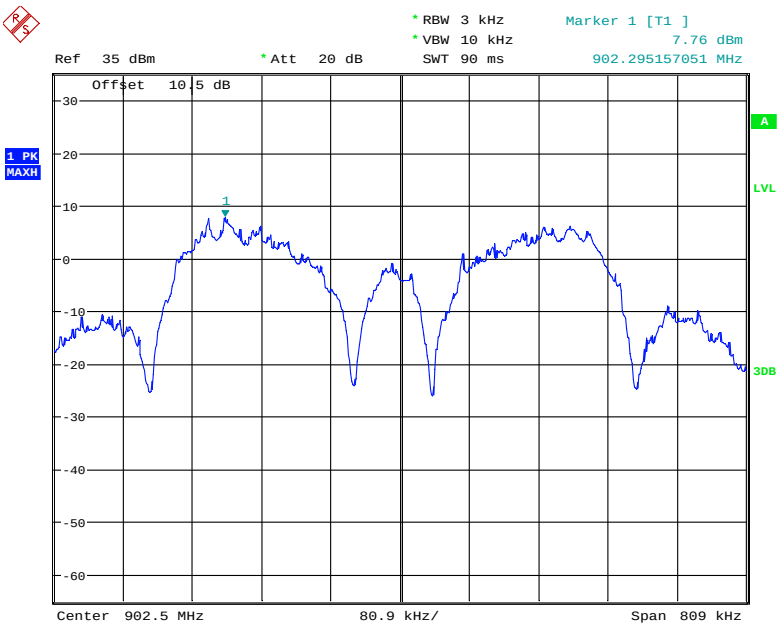
The testing was performed by Gavin Guo on 2020-06-05.

EUT operation mode: Transmitting

Test Result: Pass

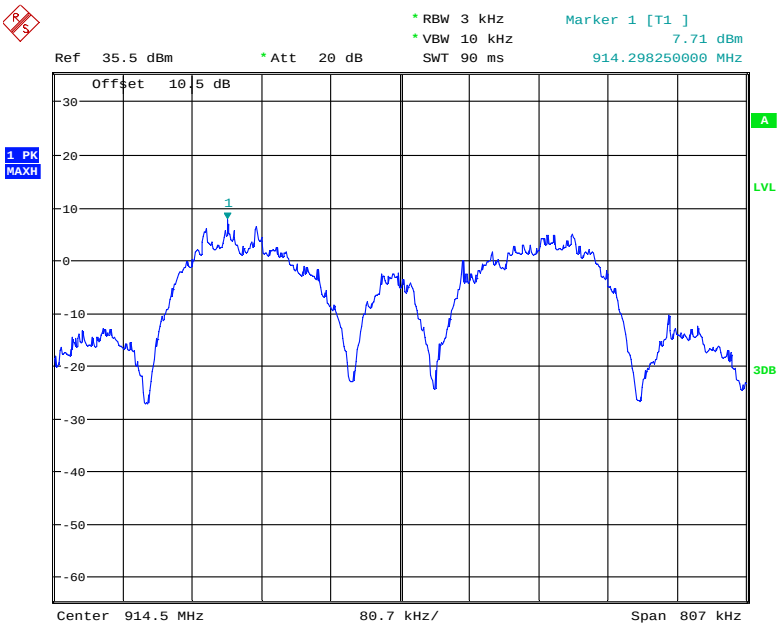
Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
902.5	7.76	<=8
914.5	7.71	<=8
927.5	7.54	<=8

Low Channel



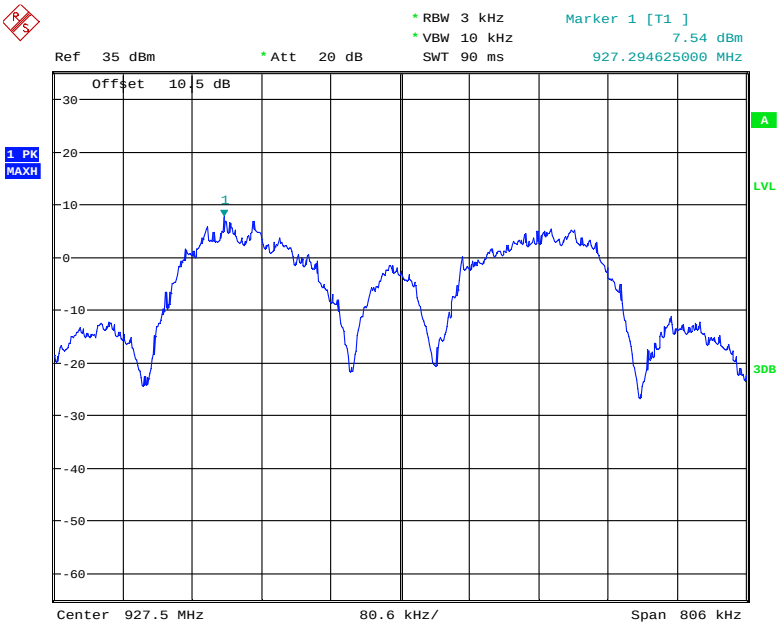
Date: 5.JUN.2020 16:58:28

Middle Channel



Date: 5.JUN.2020 15:57:41

High Channel



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