FCC PART 15.249

TEST REPORT

For

Changzhou Smoothies Electronics Co., Ltd.

No. 91, Hanjiang West Road, Xinbei District, Changzhou, China

FCC ID: 2ANTI-T8SG

Report Type:	Product Type:
Original Report	MULTIPROTOCOL TX

Test Engineer:	Ada Yu
Report Number:	RSHA170908005-00A
Report Date:	2017-12-01
Reviewed By:	Oscar Ye RF Leader
Test Laboratory:	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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Changzhou Smoothies Electronics Co., Ltd.
Tested Model	T8SG
Product Type	MULTIPROTOCOL TX
Dimension	188 mm(L)×151mm(W)×86mm(H)
Power Supply	DC 7.4V from battery

All measurement and test data in this report was gathered from production sample serial number: 20170908006. (Assigned by BACL, Kunshan). The EUT was received on 2017-09-08.

Objective

This type approval report is prepared on behalf of Changzhou Smoothies Electronics Co., Ltd. in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

N/A

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 radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

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	4.88dB
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) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

Channel list for GFSK modulation:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2404.1	25	2440.1
2	2405.6	26	2441.6
3	2407.1	27	2443.1
4	2408.6	28	2444.6
5	2410.1	29	2446.1
6	2411.6	30	2447.6
7	2413.1	31	2449.1
8	2414.6	32	2450.6
9	2416.1	33	2452.1
10	2417.6	34	2453.6
11	2419.1	35	2455.1
12	2420.6	36	2456.6
13	2422.1	37	2458.1
14	2423.6	38	2459.6
15	2425.1	39	2461.1
16	2426.6	40	2462.6
17	2428.1	41	2464.1
18	2429.6	42	2465.6
19	2431.1	43	2467.1
20	2432.6	44	2468.6
21	2434.1	45	2470.1
22	2435.6	46	2471.6
23	2437.1	47	2473.1
24	2438.6	/	/

EUT was tested with Channel 1, 24 and 47.

EUT Exercise Software

No software was used during the test.

Support Equipment List and Details

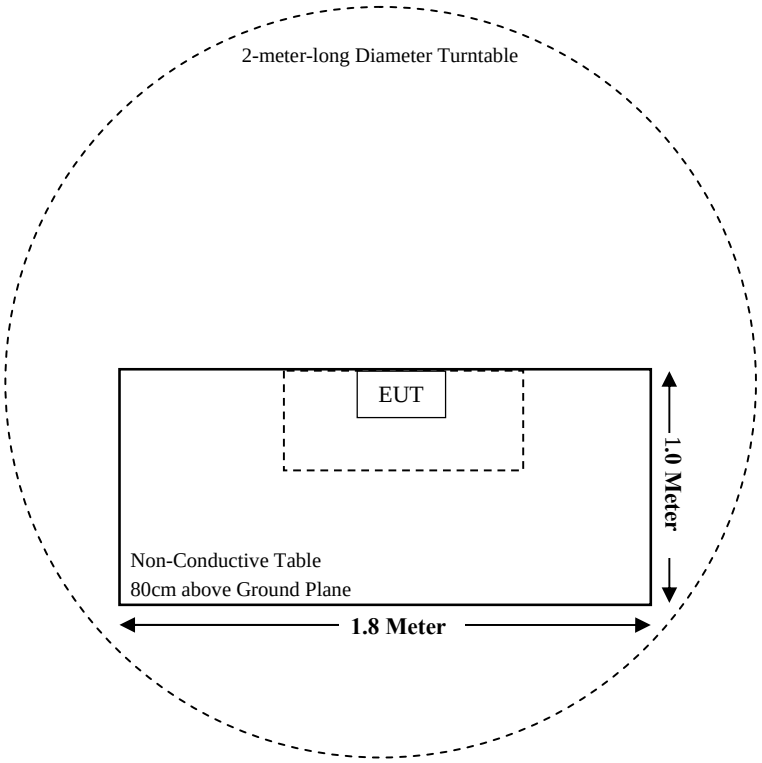
No support equipment was used during the test.

External I/O Cable

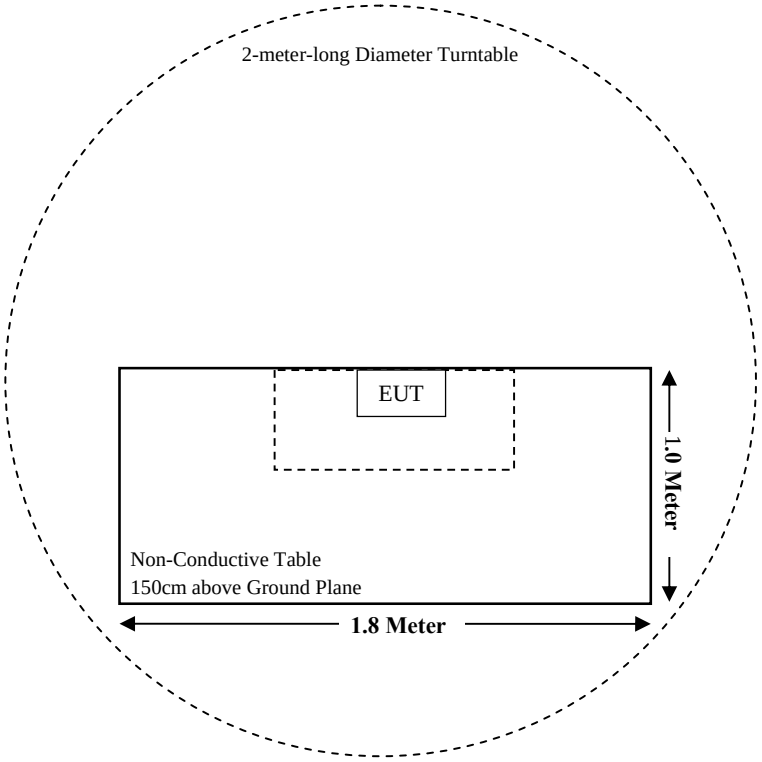
No external cable was used during the test.

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Not Applicable (See Note)
15.205, §15.209, §15.249	Radiated Emissions& Out of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Note: The EUT is a battery operated equipment.

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	2017-11-25	2018-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
SINOSCITE	Band Reject Filter	BSF2402-2480MN-0898	/	2017-08-05	2018-08-04
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Smoothies	RF Cable	N/A	N/A	/	/

*** 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§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, 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.

Antenna Connector Construction

The EUT has a RP-SMA connector to attach an external antenna arrangement, which the antenna gain is 2.0 dBi ,fulfill the requirement of this section, please refer to the EUT photos.

Result: Compliant.

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

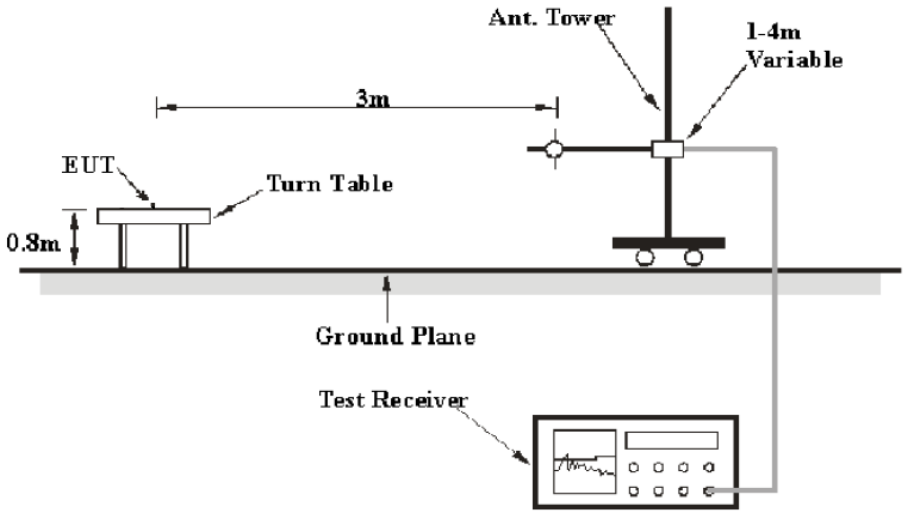
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

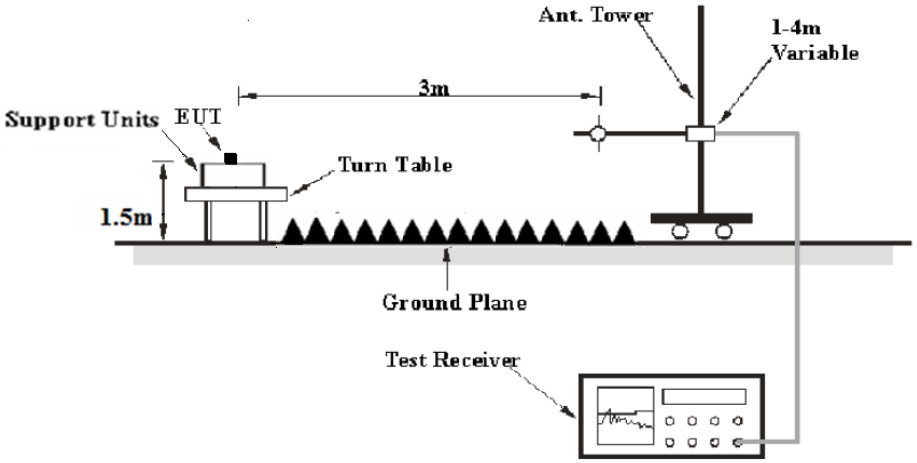
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

Test Equipment Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup were 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

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

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, 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 Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249.

Test Data

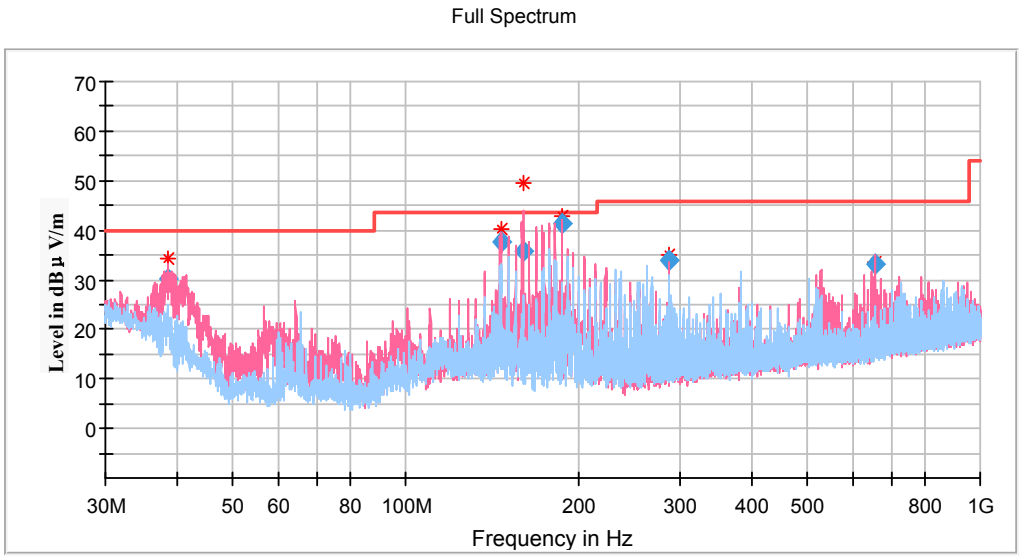
Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	52%
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2017-12-01.

Test Mode: Transmitting (Scan with X-Axis, Y-Axis and Z-Axis position, the worst case X-Axis was recorded)

30MHz-1G

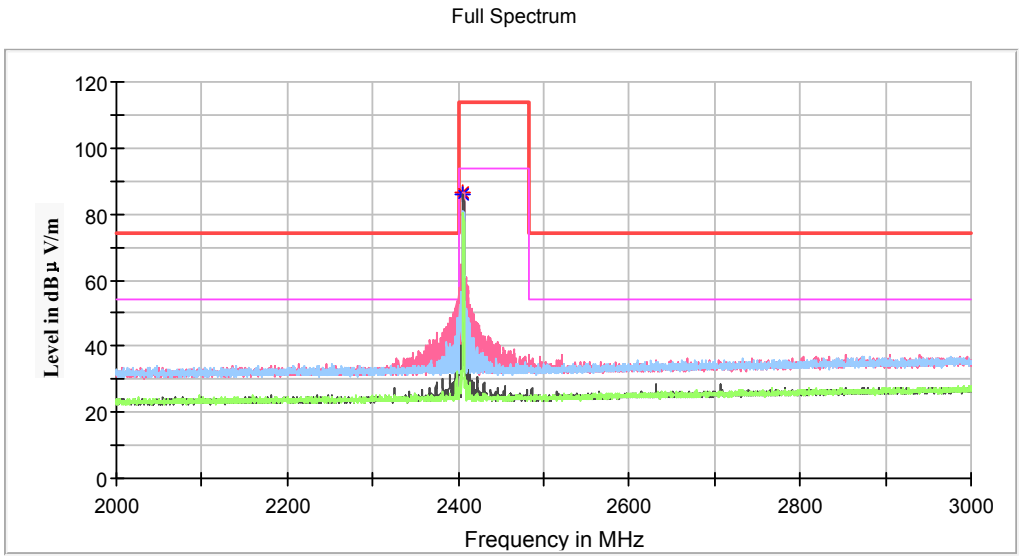


Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)				
38.454666	30.37	100.0	V	200.0	225.0	40.00	9.63
146.294600	37.53	100.0	V	100.0	181.0	43.50	5.97
159.787934	35.72	100.0	V	100.0	22.0	43.50	7.78
186.875934	41.32	200.0	V	100.0	0.0	43.50	2.18
288.010534	33.96	200.0	V	200.0	53.0	46.00	12.04
658.362366	33.15	200.0	V	100.0	8.0	46.00	12.85

Note:
1. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
   Corrected Amplitude = Corrected Factor + Reading
   Margin = Limit - Corrected. Amplitude
2. The other spurious emission which is 20dB to the limit was not recorded.
3. It is performed with the 2.4-2.4835GHz band reject filter for spurious emission test

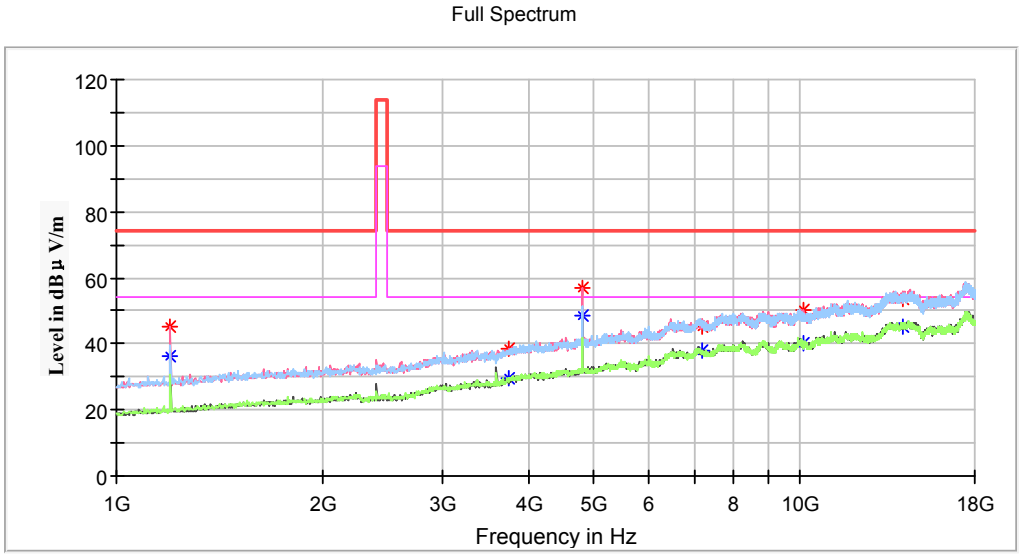
1G-25G:

Low Channel: 2404.1MHz, fundamental test



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
2404.100000	86.50	---	250.0	V	163.0	-7.4	114.00	27.50
2404.100000	---	85.92	250.0	V	163.0	-7.4	94.00	8.08

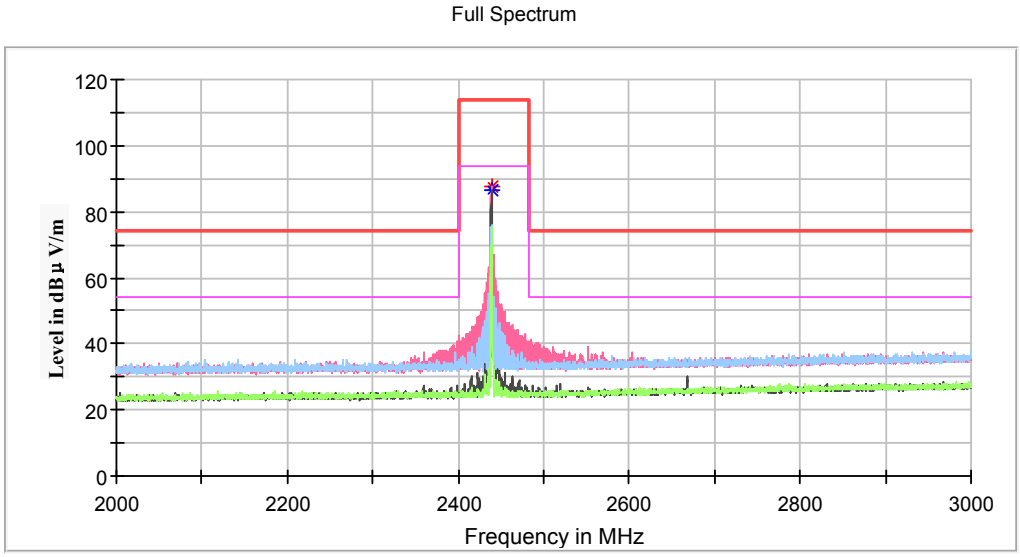
Low Channel: 2404.1MHz, spurious emission test



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1200.600000	45.16	---	200.0	V	295.0	-12.1	74.00	28.84
1200.600000	---	36.18	200.0	V	295.0	-12.1	54.00	17.82
3747.200000	38.79	---	150.0	V	7.0	-3.1	74.00	35.21
3747.200000	---	29.33	150.0	V	7.0	-3.1	54.00	24.67
4808.200000	56.90	---	150.0	V	177.0	-0.6	74.00	17.10
4808.200000	---	48.76	150.0	V	177.0	-0.6	54.00	5.24
7212.300000	---	37.91	250.0	H	247.0	6.3	54.00	16.09
7212.300000	44.93	---	250.0	H	247.0	6.3	74.00	29.07
10081.400000	50.19	---	200.0	V	101.0	9.2	74.00	23.81
10081.400000	---	40.34	200.0	V	101.0	9.2	54.00	13.66
14117.200000	53.44	---	250.0	H	36.0	16.7	74.00	20.56
14117.200000	---	45.45	250.0	H	36.0	16.7	54.00	8.55

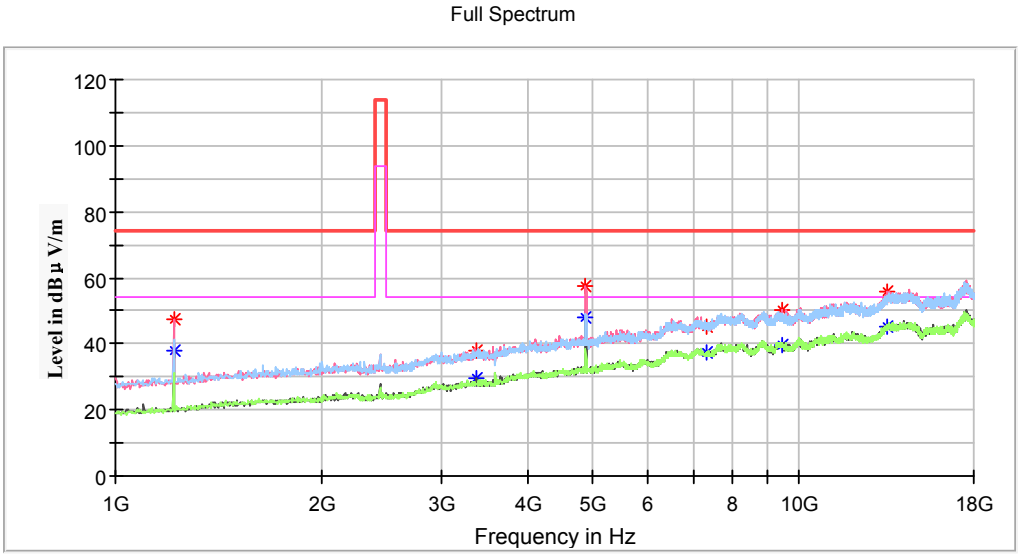
Note:
The emission in 18-25GHz which is 20dB below the limit was not recorded.

Middle Channel: 2438.6MHz, fundamental test



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
2438.600000	87.45	---	250.0	V	278.0	-7.3	114.00	26.55
2438.600000	---	86.76	250.0	V	278.0	-7.3	94.00	7.24

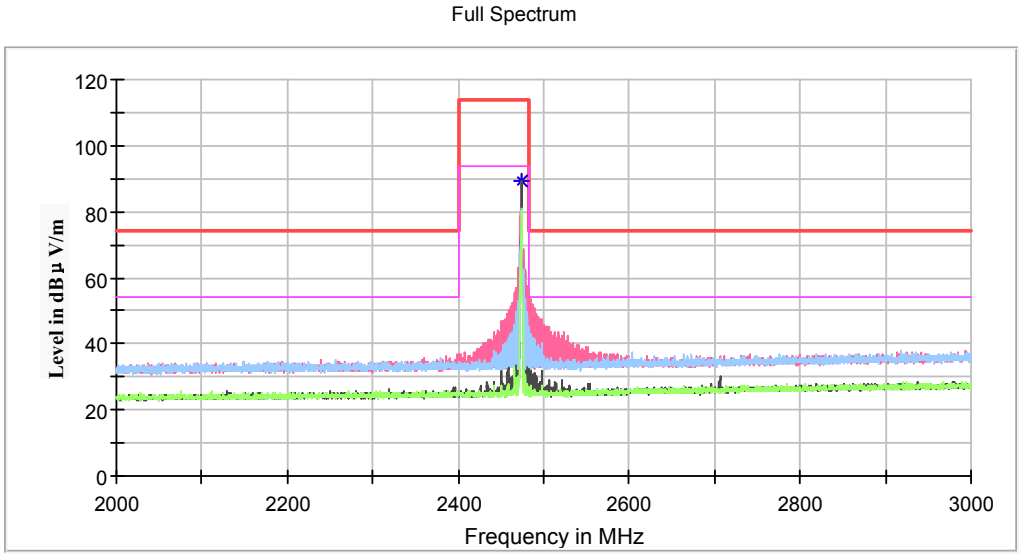
Middle Channel: 2438.6MHz, spurious emission test



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1217.600000	---	38.06	200.0	V	16.0	-12.0	54.00	15.94
1217.600000	47.43	---	200.0	V	16.0	-12.0	74.00	26.57
3369.800000	37.96	---	150.0	V	294.0	-4.1	74.00	36.04
3369.800000	---	29.49	150.0	V	294.0	-4.1	54.00	24.51
4877.200000	57.59	---	200.0	V	353.0	-0.4	74.00	16.41
4877.200000	---	48.13	200.0	V	353.0	-0.4	54.00	5.87
7315.800000	45.00	---	200.0	H	145.0	6.6	74.00	29.00
7315.800000	---	37.60	200.0	H	145.0	6.6	54.00	16.40
9455.800000	---	39.63	100.0	V	302.0	8.6	54.00	14.37
9455.800000	50.09	---	100.0	V	302.0	8.6	74.00	23.91
13484.800000	---	45.26	250.0	V	23.0	17.2	54.00	8.74
13484.800000	56.00	---	250.0	V	23.0	17.2	74.00	18.00

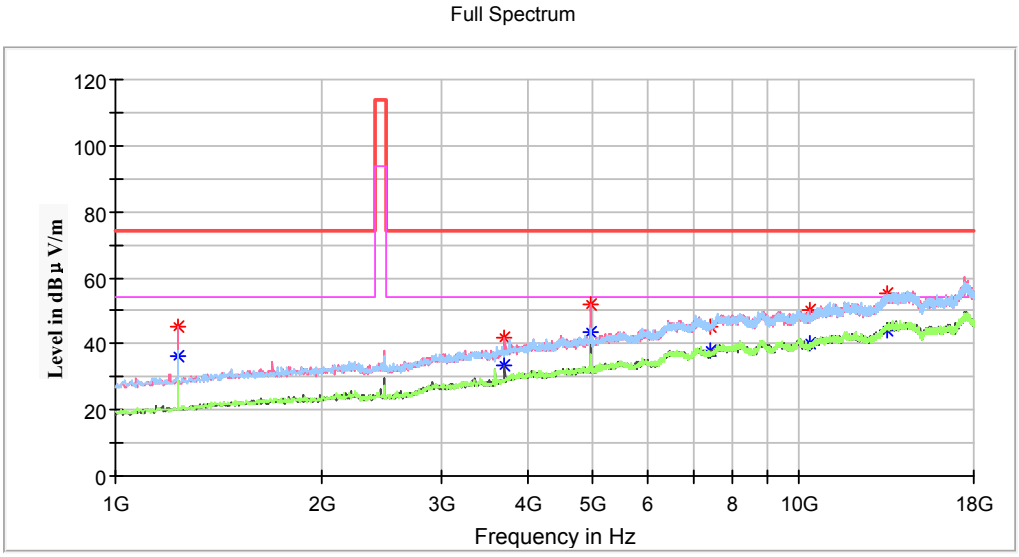
Note:
The emission in 18-25GHz which is 20dB below the limit was not recorded.

High Channel: 2473.1MHz, fundamental test



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
2473.100000	89.46	---	250.0	V	311.0	-7.2	114.00	24.54
2473.100000	---	89.28	250.0	V	311.0	-7.2	94.00	4.72

High Channel: 2473.1MHz, spurious emission test



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1234.600000	---	36.16	250.0	V	228.0	-11.9	54.00	17.84
1234.600000	45.41	---	250.0	V	228.0	-11.9	74.00	28.59
3709.800000	---	33.64	200.0	V	199.0	-3.2	54.00	20.36
3709.800000	41.80	---	200.0	V	199.0	-3.2	74.00	32.20
4946.200000	---	43.69	150.0	V	276.0	-0.3	54.00	10.31
4946.200000	52.16	---	150.0	V	276.0	-0.3	74.00	21.84
7419.300000	44.93	---	200.0	V	114.0	6.9	74.00	29.07
7419.300000	---	37.78	200.0	V	114.0	6.9	54.00	16.22
10377.200000	---	40.30	150.0	V	244.0	9.6	54.00	13.70
10377.200000	50.39	---	150.0	V	244.0	9.6	74.00	23.61
13464.400000	---	44.32	200.0	V	22.0	17.2	54.00	9.68
13464.400000	55.21	---	200.0	V	22.0	17.2	74.00	18.79

Note:
The emission in 18-25GHz which is 20dB below the limit was not recorded.

FCC §15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

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 on the test table without connection to measurement instrument. Turn on the EUT. 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 20 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:	24.2°C
Relative Humidity:	51 %
ATM Pressure:	101.2kPa

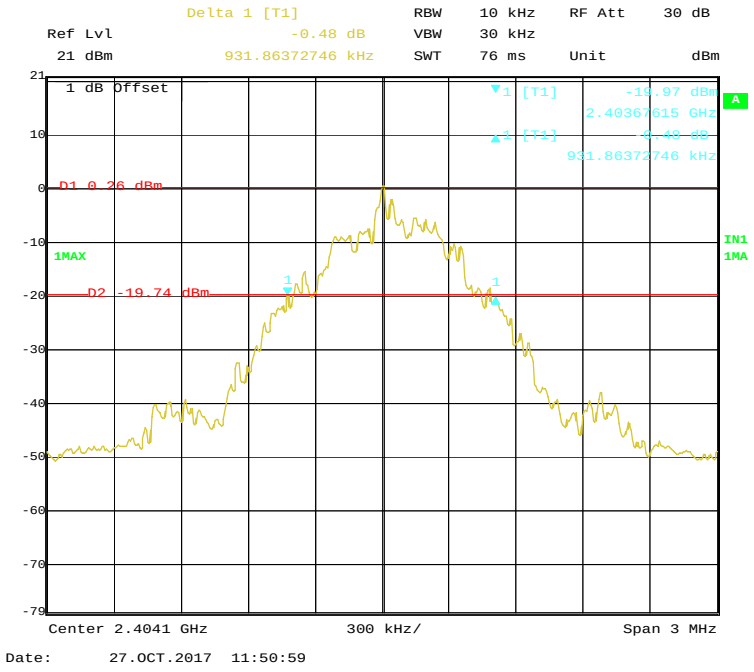
The testing was performed by Ada Yu on 2017-10-27.

Test Result: Compliant.

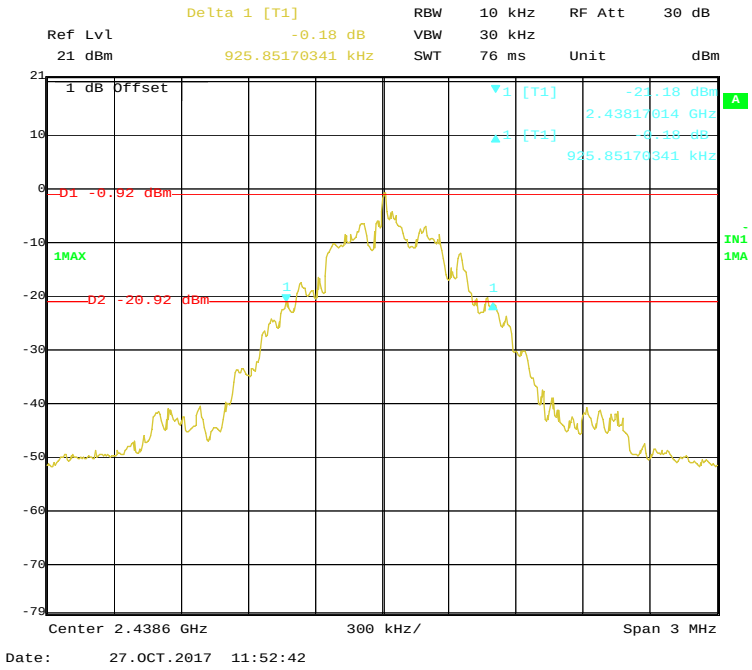
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2404.10	0.932
Middle	2438.60	0.926
High	2473.10	0.908

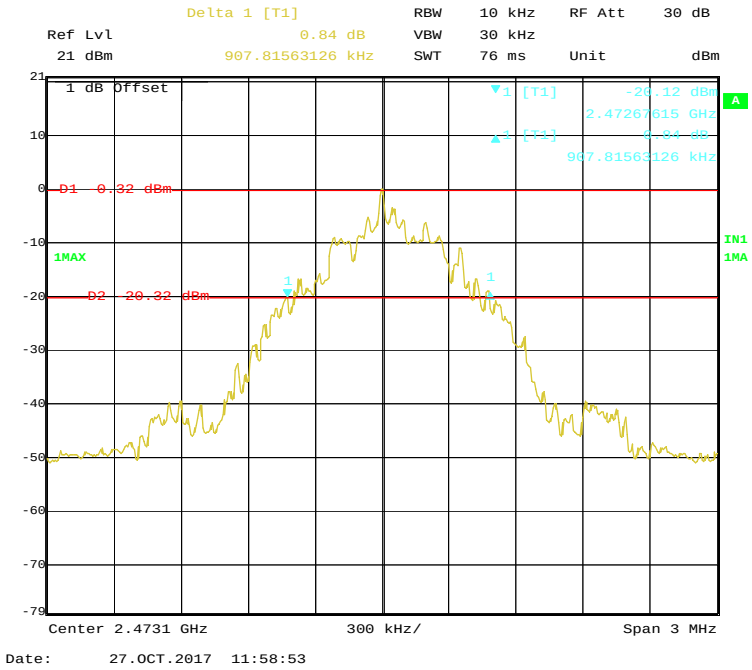
Low Channel



Middle Channel



High Channel



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