TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 15.247
TEST REPORT

For

SHANGHAI MERIT TECHNOLOGY CORP.

1058 TAOGAN RD., SHESHAN TOWN, SONGJIANG DISTRICT, SHANGHAI, China

FCC ID: XJ6MT-602-1

Report Type:	**Product Type:**
Original Report	6 CH 2.4GHz FHSS RADIO CONTROL SYSTEM

Test Engineer:	Chris Wang
Report Number:	RSHA180202002-00A
Report Date:	2018-03-29
Reviewed By:	Oscar Ye RF Leader
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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	SHANGHAI MERIT TECHNOLOGY CORP.
Tested Model	MT-602
Product Type	6 CH 2.4GHz FHSS RADIO CONTROL SYSTEM
Dimension	166mm(L)×204 mm(W)×83 mm(H)
Power Supply	DC 6.0V from batteries or DC 6.0V from adapter

**All measurement and test data in this report was gathered from production sample serial number: 20180202002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2018-02-02)*

Objective

This test report is prepared on behalf of SHANGHAI MERIT TECHNOLOGY CORP. in accordance with Part 2-Subpart J, 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, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s).

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 DA 00-705 March 30, 2000.

All emissions measurement was performed and Bay Area Compliance Laboratories 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		3.19dB
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) 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

Description of Test Configuration

Channel list for FHSS (GFSK) Modulation:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	27	2431
2	2406	28	2432
3	2407	29	2433
4	2408	30	2434
5	2409	31	2435
6	2410	32	2436
7	2411	33	2437
8	2412	34	2438
9	2413	35	2439
10	2414	36	2440
11	2415	37	2441
12	2416	38	2442
13	2417	39	2443
14	2418	40	2444
15	2419	41	2445
16	2420	42	2446
17	2421	43	2447
18	2422	44	2448
19	2423	45	2449
20	2424	46	2450
21	2425	47	2451
22	2426	48	2452
23	2427	49	2453
24	2428	50	2454
25	2429	51	2455
26	2430	/	/

EUT was tested with Channel 1, 26 and 51.

EUT Exercise Software

The EUT was tested in the engineering mode; EUT can be setup for fixed channel mode and hopping mode.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

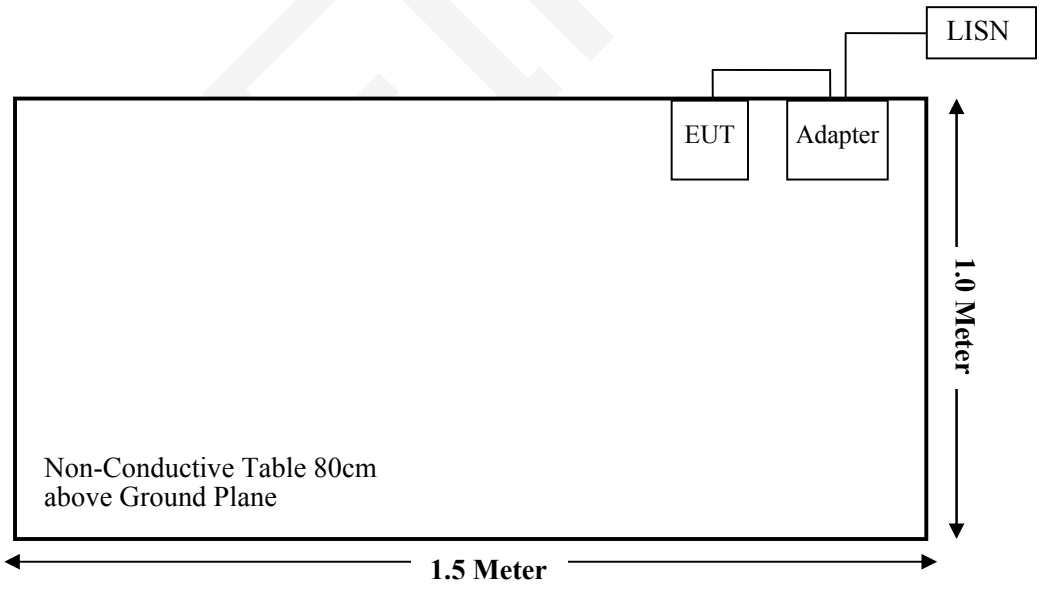
Manufacturer	Description	Model	Serial Number
MERIT	Adapter (DC6.0V; 60mA)	/	/

External I/O Cable

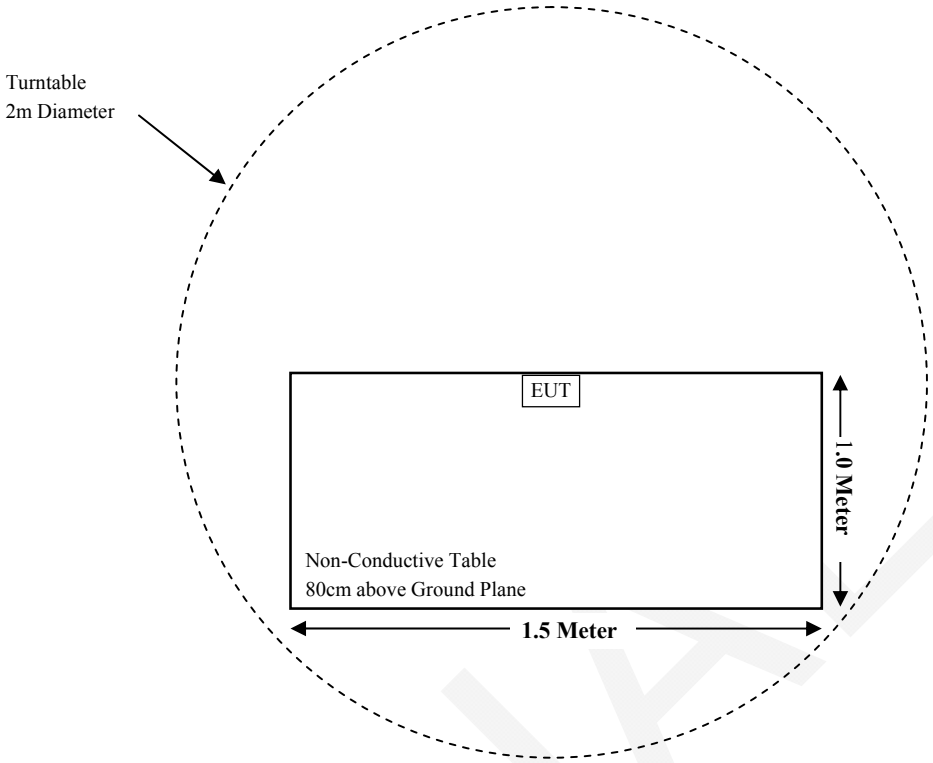
Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

Block Diagram of Test Setup

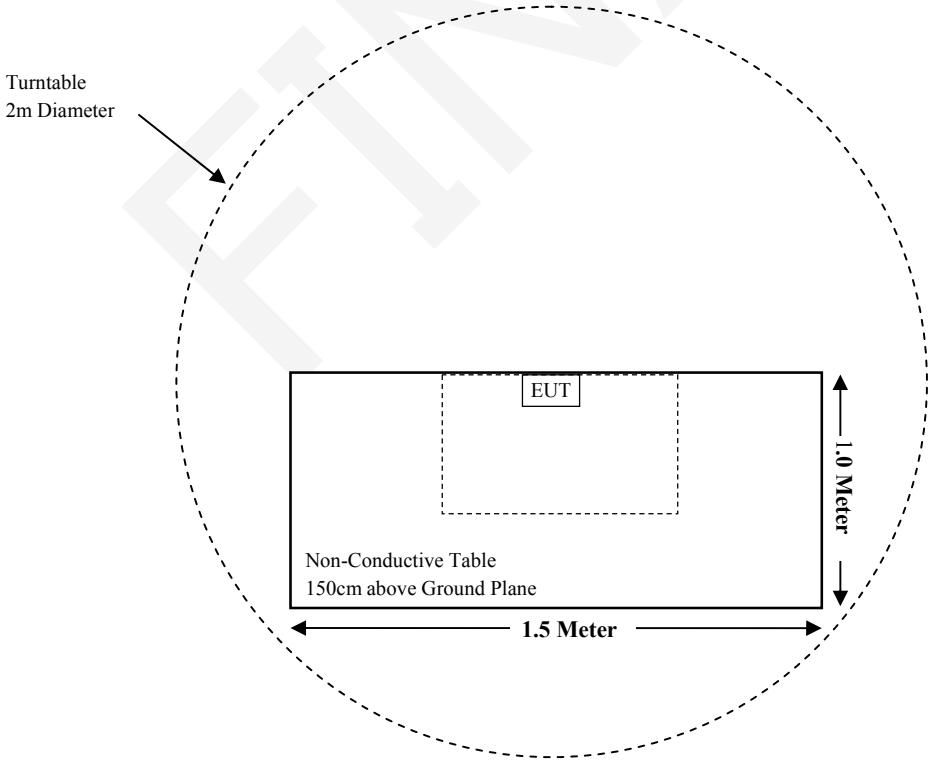
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i)§1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliance
§15.247(a)(1)	20 dB Emission Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band edges	Compliance

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	2017-11-12	2018-11-11
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
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	2017-12-22	2018-12-21
QuinStar	Amplifier	QLW-18405536-J0	15964001009	2017-12-22	2018-12-21
MICRO-TRONICS	Band Reject Filter	BRM50702	/	2017-08-05	2018-08-04
Narda	Attenuator/10dB	10dB	/	2017-08-15	2018-08-14
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	FSV40	101116	2017-07-22	2018-07-21
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Narda	Attenuator/2dB	2dB	/	/	/
MERIT	RF Cable	/	/	/	/
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2017-11-12	2018-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2017-11-12	2018-11-11
BACL	Auto test Software	BACL-EMC	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2018-01-10	2019-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2017-08-15	2018-08-14

*** 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§15.247 (I), §1.1310 &§2.1093 –RF EXPOSURE

Applicable Standard

According to§2.1093and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] · [√f (GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. f (GHz) is the RF channel transmit frequency in GHz.

2. Power and distance are rounded to the nearest mW and mm before calculation.

3. The result is rounded to one decimal place for comparison.

4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Measurement Result

For worst case:

Mode	Frequency Range (MHz)	Max Tune-up Conducted Power		Calculated Distance (mm)	Calculated Value	Threshold (10-g SAR)	SAR Test Exclusion
		(dBm)	(mW)				
FHSS	2405-2455	18.00	63.10	78	0.016	7.5	Yes

Conclusion: The device meets the exemption requirement.

Note: This is a handheld device.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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 use of a standard antenna jack or electrical connector is prohibited.

Antenna Information

The EUT has a dipole antenna, which the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

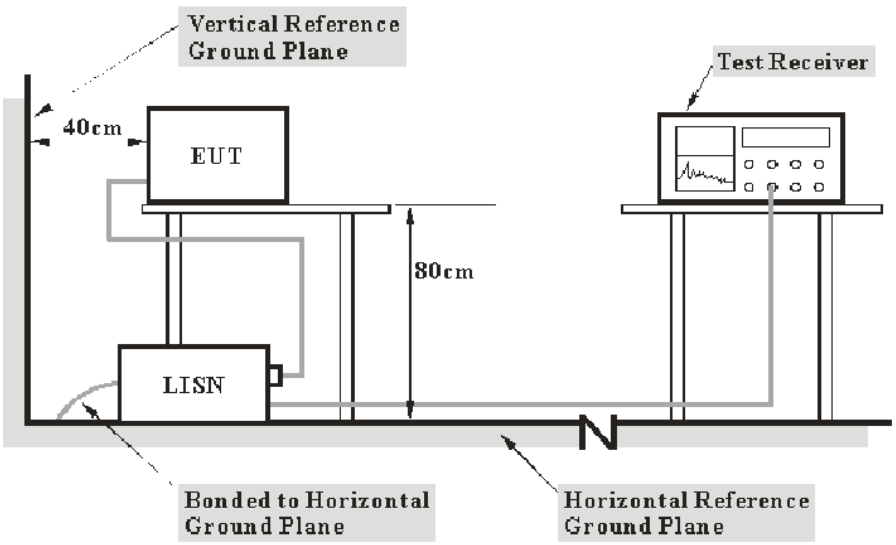
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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.

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 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:

Corrected Factor = LISN VDF + Cable Loss

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 – Reading

Test Results Summary

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

Test Data

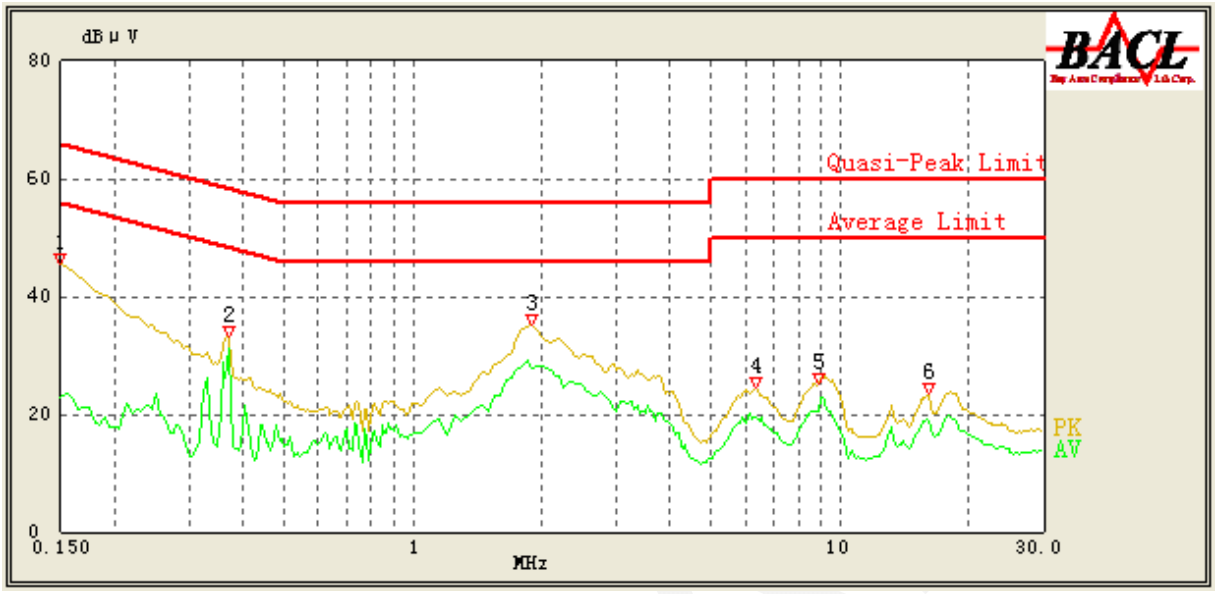
Environmental Conditions

Temperature:	21.2 ℃
Relative Humidity:	52 %
ATM Pressure:	101.1 kPa

The testing was performed by Max Min on 2018-03-29.

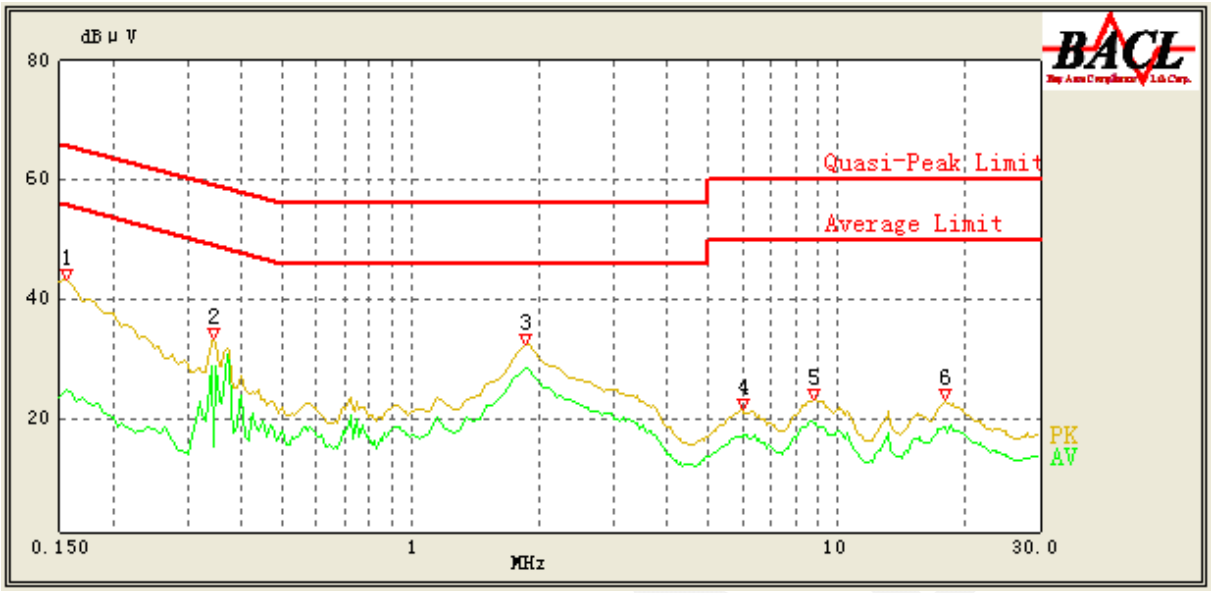
EUT operation mode: Charging

AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Comment
0.150	45.59	QP	9.000	L1	16.06	66.00	20.41	Compliance
0.150	22.94	AV	9.000	L1	16.06	56.00	33.06	Compliance
0.370	33.16	QP	9.000	L1	16.05	59.71	26.55	Compliance
0.370	31.06	AV	9.000	L1	16.05	49.71	18.65	Compliance
1.900	35.09	QP	9.000	L1	15.85	56.00	20.91	Compliance
1.900	27.86	AV	9.000	L1	15.85	46.00	18.14	Compliance
6.350	24.54	QP	9.000	L1	15.94	60.00	35.46	Compliance
6.350	19.59	AV	9.000	L1	15.94	50.00	30.41	Compliance
8.900	25.24	QP	9.000	L1	16.03	60.00	34.76	Compliance
8.900	20.58	AV	9.000	L1	16.03	50.00	29.42	Compliance
16.150	23.57	QP	9.000	L1	16.26	60.00	36.43	Compliance
16.200	18.96	AV	9.000	L1	16.27	50.00	31.04	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	Reading (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Comment
0.155	43.34	QP	9.000	N	16.06	65.86	22.52	Compliance
0.155	24.72	AV	9.000	N	16.06	55.86	31.14	Compliance
0.345	33.44	QP	9.000	N	16.08	60.43	26.99	Compliance
0.345	15.39	AV	9.000	N	16.08	50.43	35.04	Compliance
1.850	32.59	QP	9.000	N	15.91	56.00	23.41	Compliance
1.850	28.41	AV	9.000	N	15.91	46.00	17.59	Compliance
6.000	21.55	QP	9.000	N	15.90	60.00	38.45	Compliance
6.000	17.11	AV	9.000	N	15.90	50.00	32.89	Compliance
8.850	23.13	QP	9.000	N	15.96	60.00	36.87	Compliance
8.850	19.34	AV	9.000	N	15.96	50.00	30.66	Compliance
17.950	23.08	QP	9.000	N	16.10	60.00	36.92	Compliance
17.900	18.74	AV	9.000	N	16.10	50.00	31.26	Compliance

Note:
1. Corrected Factor =LISN VDF (Voltage Division Factor) + Cable Loss
   Margin = Limit – Reading

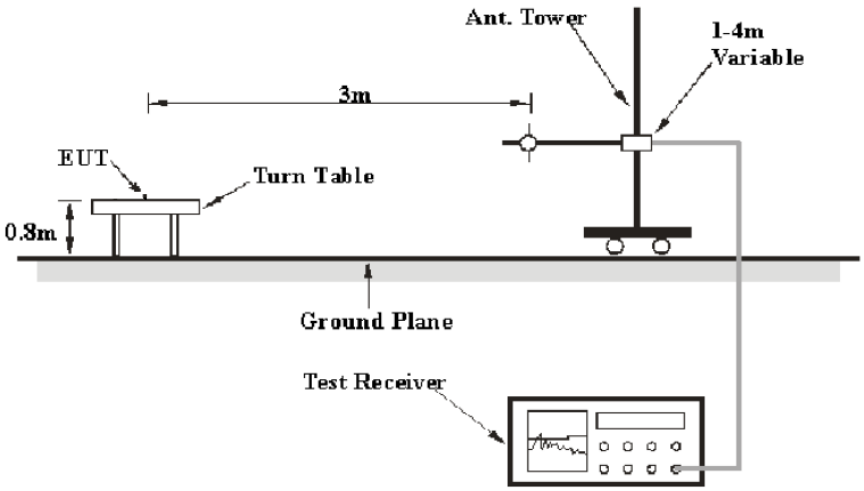
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

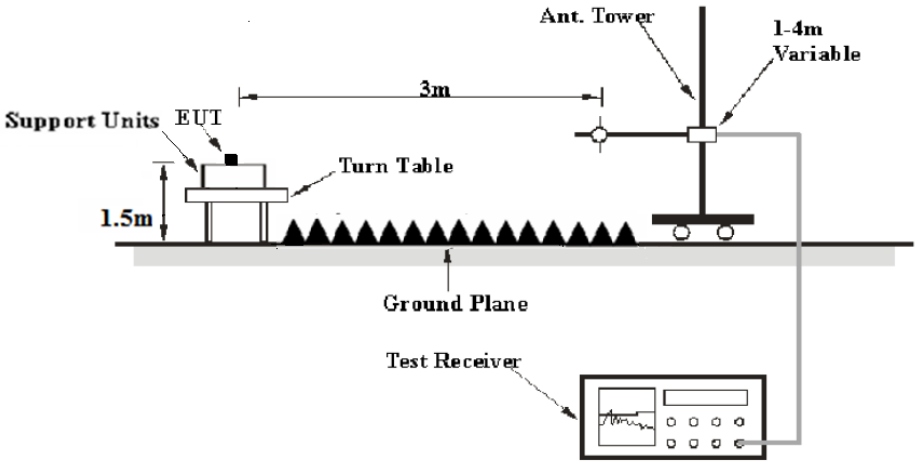
FCC §15.205; §15.209; §15.247(d)

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, 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 25 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

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

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and 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 recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data

Environmental Conditions

Temperature:	24.2 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

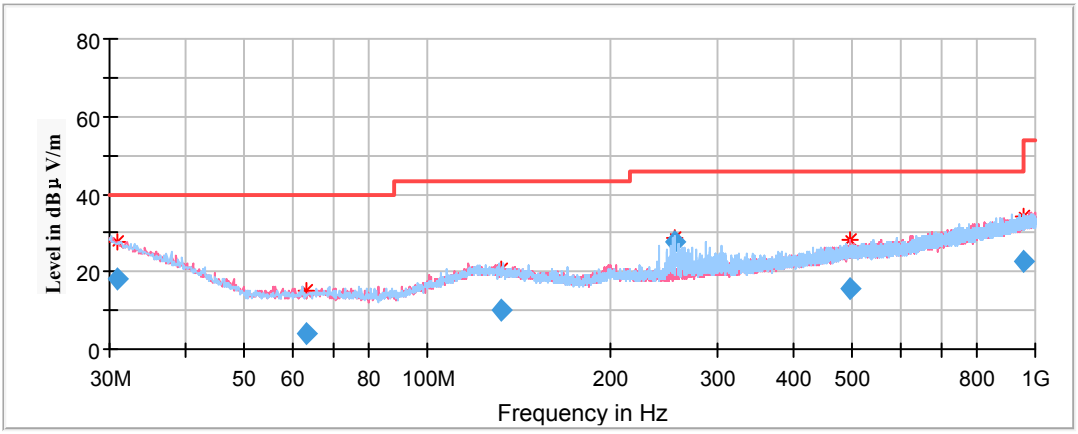
The testing was performed by Chris Wang on 2018-03-09.

EUT operation mode: Transmitting

Spurious Emission Test:

30MHz-1GHz:

Pre-Scan with low, middle and high channels in the X,Y and Z axes of orientation, the worst case ***low channel in X-axis of orientation*** *was recorded*



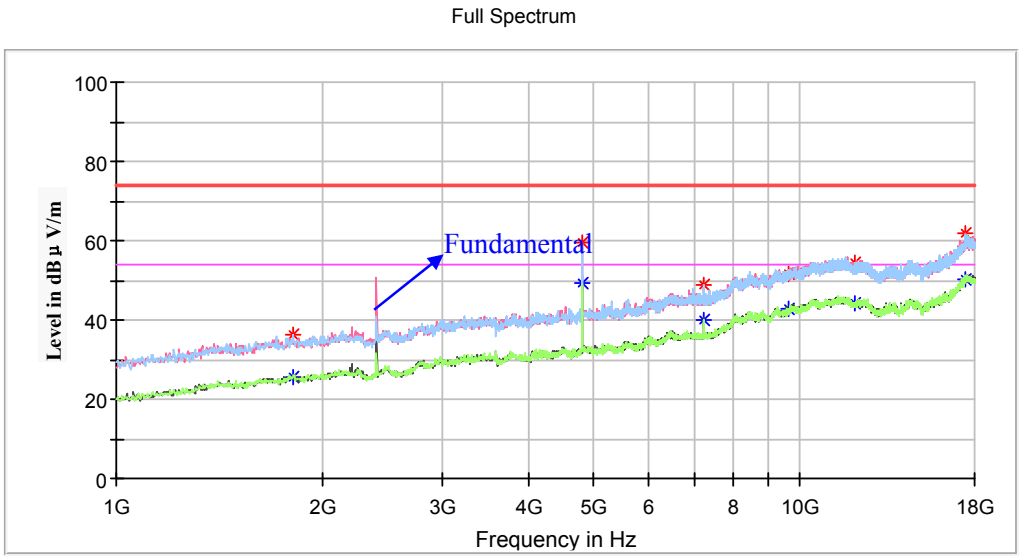
Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)				
30.925701	18.02	101.0	H	153.0	-5.0	40.00	21.98
63.112300	4.03	101.0	H	246.0	-18.2	40.00	35.97
131.822600	10.12	101.0	H	359.0	-12.1	43.50	33.38
256.013900	27.71	101.0	H	75.0	-12.4	46.00	18.29
496.455550	15.83	199.0	V	262.0	-6.2	46.00	30.17
955.784050	22.56	101.0	H	64.0	1.3	46.00	23.44

1GHz-18GHz:

*Pre-Scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded*

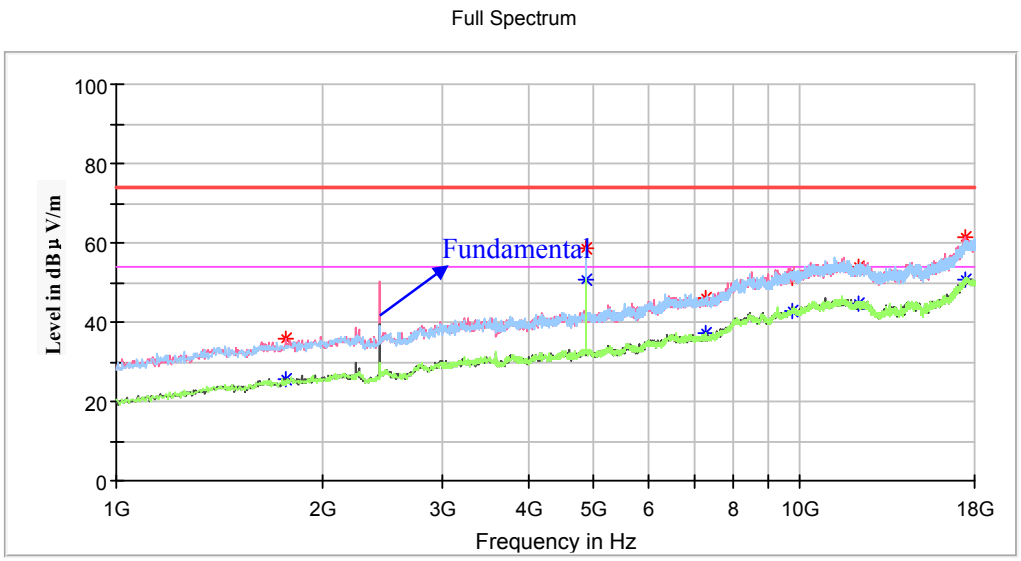
Note:
1. This test was performed with the 2.4-2.4835GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
   Corrected Amplitude = Corrected Factor + Reading
   Margin = Limit - Corrected. Amplitude

Low Channel: 2405 MHz



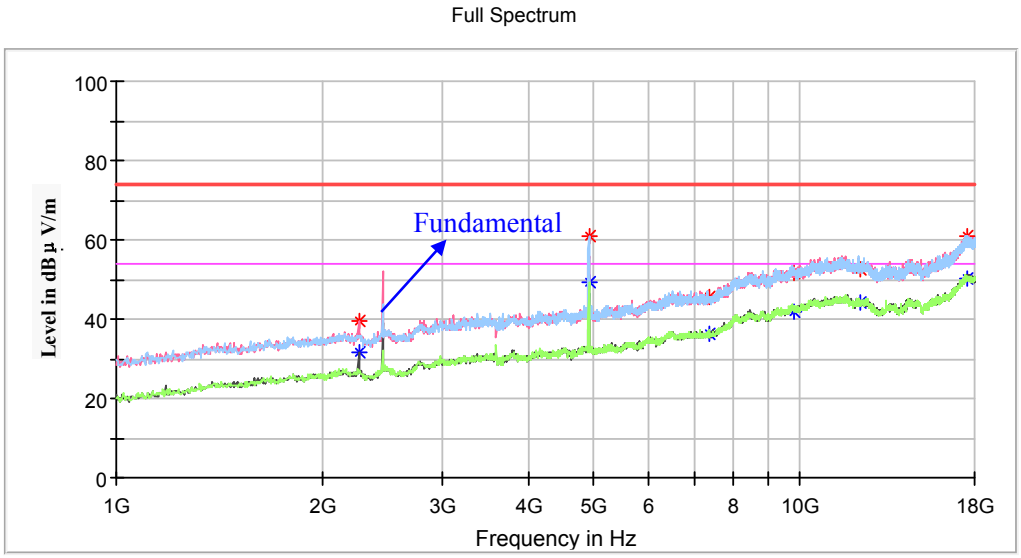
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1812.600000	---	25.53	200.0	H	275.0	-6.7	54.00	28.47
1812.600000	36.13	---	200.0	H	275.0	-6.7	74.00	37.87
4810.000000	---	49.09	100.0	H	308.0	2.5	54.00	4.91
4810.000000	59.44	---	100.0	H	308.0	2.5	74.00	14.56
7215.000000	48.85	---	150.0	H	80.0	9.8	74.00	25.15
7215.000000	---	39.97	150.0	H	80.0	9.8	54.00	14.03
9622.400000	51.84	---	250.0	H	116.0	14.9	74.00	22.16
9622.400000	---	42.77	250.0	H	116.0	14.9	54.00	11.23
12022.800000	54.35	---	200.0	H	38.0	16.5	74.00	19.65
12022.800000	---	44.32	200.0	H	38.0	16.5	54.00	9.68
17503.600000	61.82	---	100.0	V	63.0	23.7	74.00	12.18
17503.600000	---	50.15	100.0	V	63.0	23.7	54.00	3.85

Middle Channel: 2430MHz



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)				
1768.400000	35.85	---	150.0	V	116.0	-6.9	74.00	38.15
1768.400000	---	25.59	150.0	V	116.0	-6.9	54.00	28.41
4860.000000	58.72	---	100.0	H	7.0	2.6	74.00	15.28
4860.000000	---	50.63	100.0	H	7.0	2.6	54.00	3.37
7290.000000	45.99	---	200.0	H	110.0	9.9	74.00	28.01
7290.000000	---	37.01	200.0	H	110.0	9.9	54.00	16.99
9721.000000	51.15	---	150.0	H	313.0	14.9	74.00	22.85
9721.000000	---	42.61	150.0	H	313.0	14.9	54.00	11.39
12152.000000	53.92	---	250.0	H	125.0	16.7	74.00	20.08
12152.000000	---	44.55	250.0	H	125.0	16.7	54.00	9.45
17496.800000	---	50.78	150.0	V	348.0	23.7	54.00	3.22
17496.800000	61.21	---	150.0	V	348.0	23.7	74.00	12.79

High Channel: 2455MHz

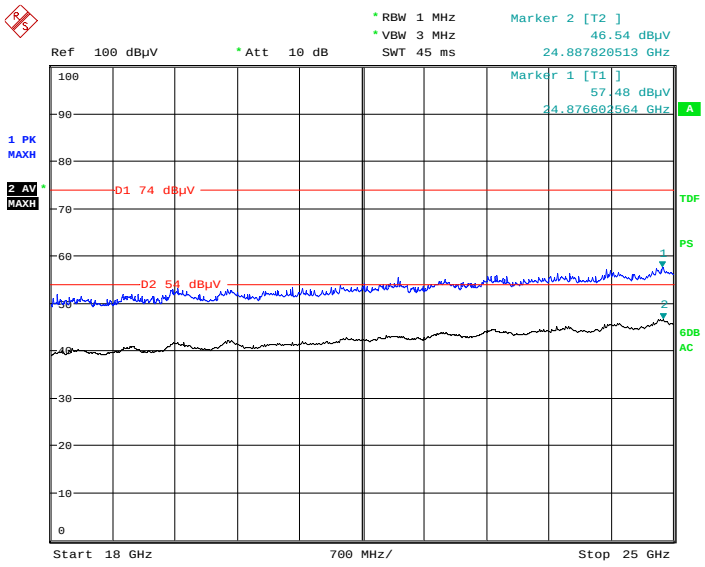


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
2261.400000	---	31.59	150.0	V	102.0	-5.3	54.00	22.41
2261.400000	39.74	---	150.0	V	102.0	-5.3	74.00	34.26
4910.000000	60.71	---	250.0	H	180.0	2.7	74.00	13.29
4910.000000	---	49.42	250.0	H	180.0	2.7	54.00	4.58
7365.000000	---	36.47	150.0	H	117.0	10.0	54.00	17.53
7365.000000	45.54	---	150.0	H	117.0	10.0	74.00	28.46
9819.600000	51.70	---	200.0	H	196.0	14.9	74.00	22.30
9819.600000	---	41.95	200.0	H	196.0	14.9	54.00	12.05
12274.400000	---	44.02	150.0	H	164.0	16.9	54.00	9.98
12274.400000	52.61	---	150.0	H	164.0	16.9	74.00	21.39
17575.000000	---	50.38	200.0	H	341.0	23.7	54.00	3.62
17575.000000	61.15	---	200.0	H	341.0	23.7	74.00	12.85

18GHz-25GHz:

*Pre-Scan with low, middle and high channels in the X,Y and Z axes of orientation, the worst case **low channel in X-axis of orientation** was recorded*

Horizontal



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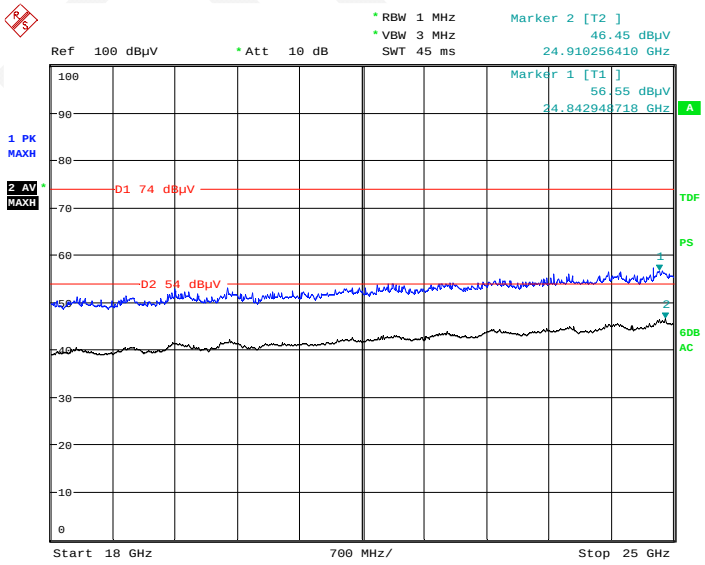
Vertical



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Fundamental Test & Restricted Bands Emissions:

*Pre-Scan in the X, Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded*

Note:
1. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
   Corrected Amplitude = Corrected Factor + Reading
   Margin = Limit - Corrected. Amplitude

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)				
Low Channel: 2405MHz								
2390.000000	---	35.07	200.0	H	151.0	-4.9	54.00	18.93
2390.000000	58.46	---	200.0	H	151.0	-4.9	74.00	15.54
2405.000000	---	105.90	150.0	H	196.0	-4.9	/	/
2405.000000	108.74	---	150.0	H	196.0	-4.9	/	/
Middle Channel: 2430MHz								
2430.000000	---	105.92	200.0	H	325.0	-4.8	/	/
2430.000000	108.37	---	200.0	H	325.0	-4.8	/	/
High Channel: 2455MHz								
2455.000000	---	106.57	200.0	H	60.0	-4.8	/	/
2455.000000	109.02	---	200.0	H	69.0	-4.8	/	/
2483.500000	---	28.63	150.0	H	194.0	-4.7	54.00	25.37
2483.500000	49.15	---	150.0	H	194.0	-4.7	74.00	24.85

FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Set the EUT in transmitting mode, maxhold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace.
3. Measure the channel separation.

Test Data

Environmental Conditions

Temperature:	24.2 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2018-03-05.

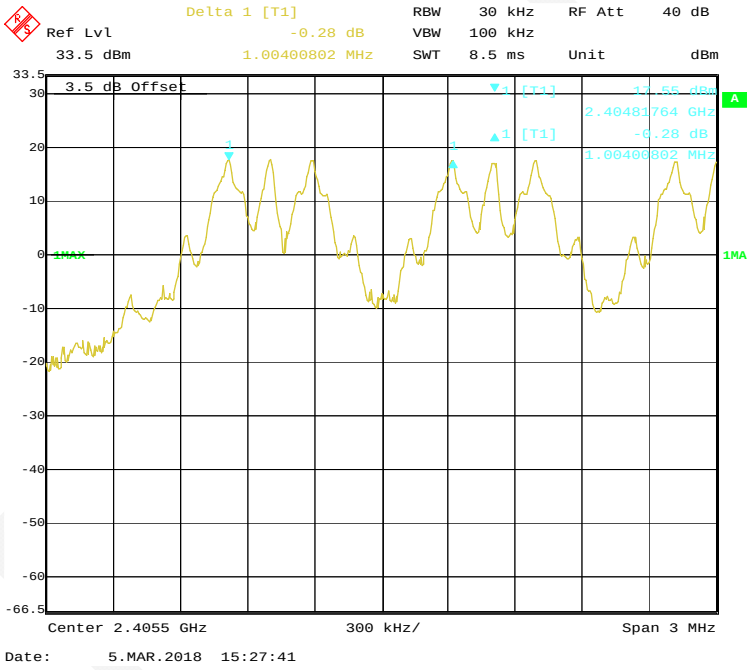
EUT operation mode: Hopping

Test Result: Compliance.

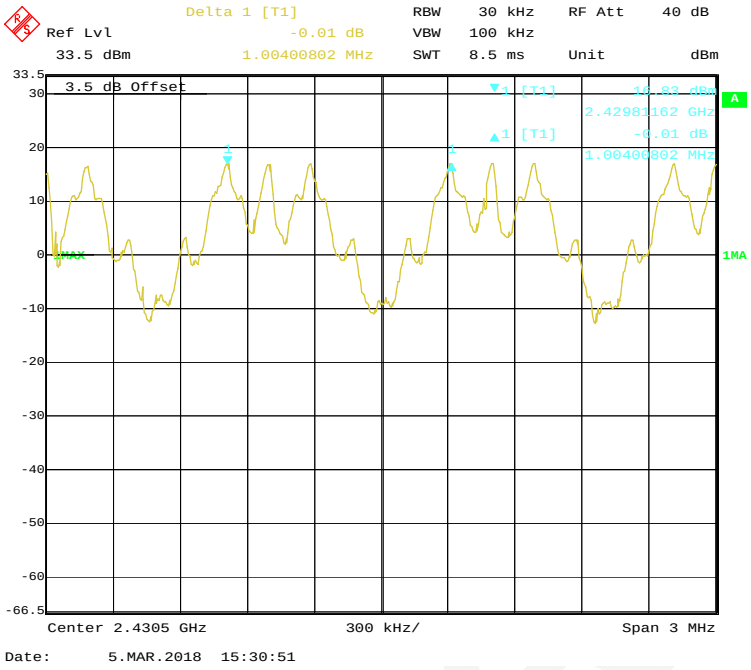
Modulation	Channel	Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
GFSK	Low	2405.0	1004.008	525.050	Pass
	Adjacent	2406.0			
	Middle	2430.0	1004.008	525.050	Pass
	Adjacent	2431.0			
	Adjacent	2454.0	1004.008	525.050	Pass
	High	2455.0			

The limit = 20dB Bandwidth*2/3

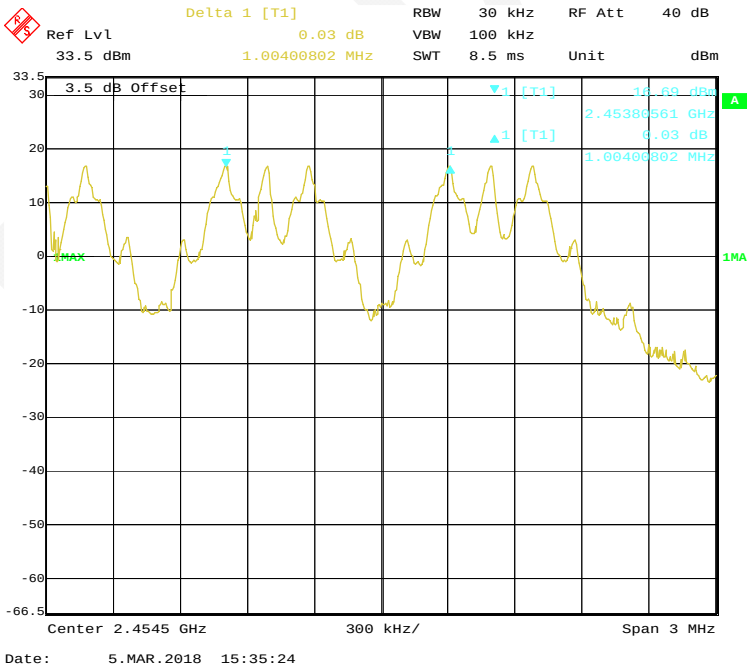
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

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 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 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

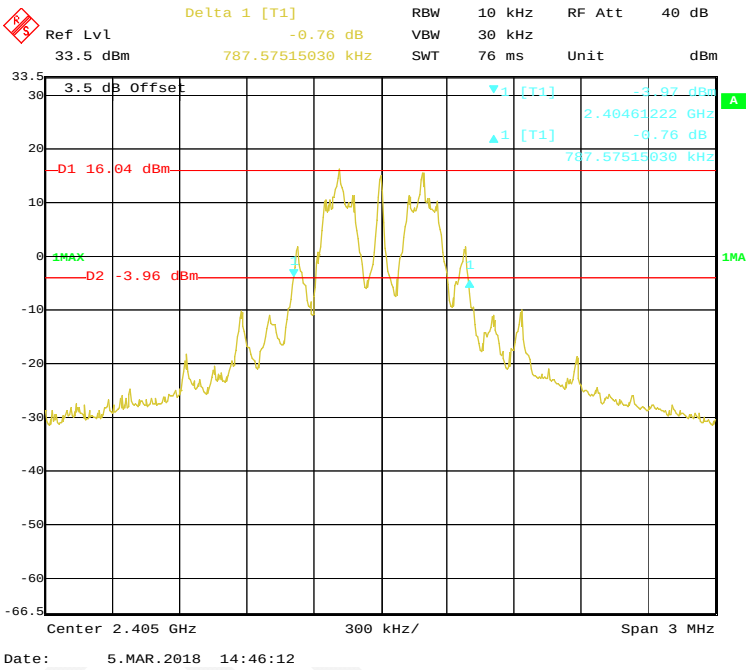
The testing was performed by Chris Wang on 2018-03-05.

EUT operation mode: Transmitting

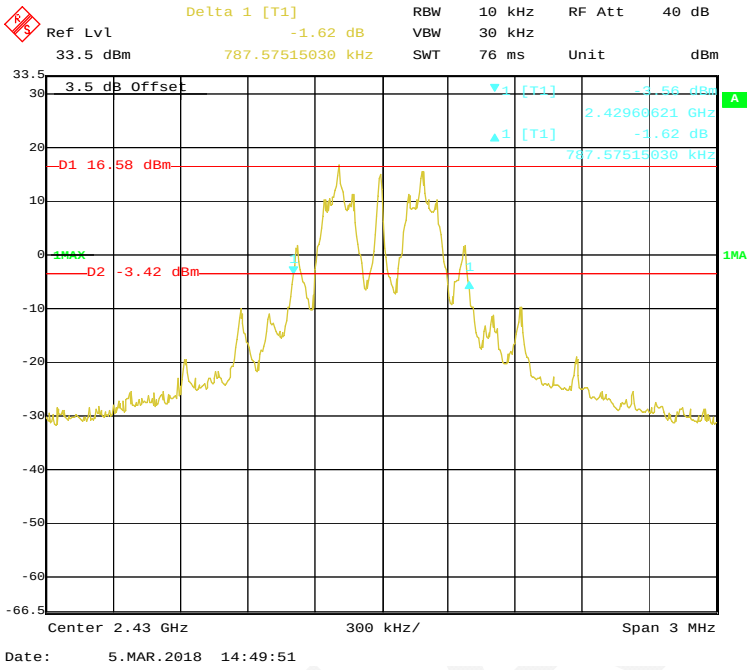
Test Result: Compliance.

Modulation	Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)
GFSK	Low	2405	787.575
	Middle	2430	787.575
	High	2455	787.575

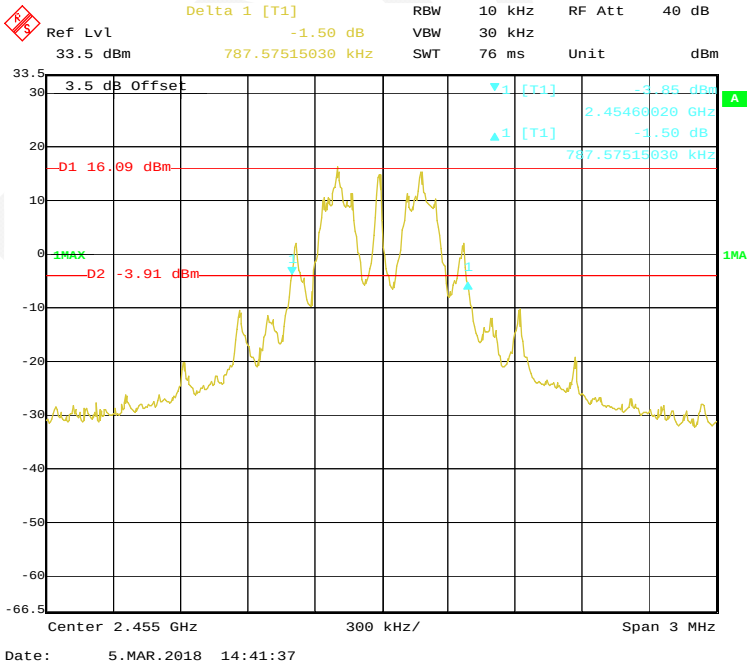
Low Channel



Middle Channel



High Channel



FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Set the EUT in hopping mode from first channel to last.

3. By using the max-hold function record the quantity of the channel.

Test Data

Environmental Conditions

Temperature:	24.2 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

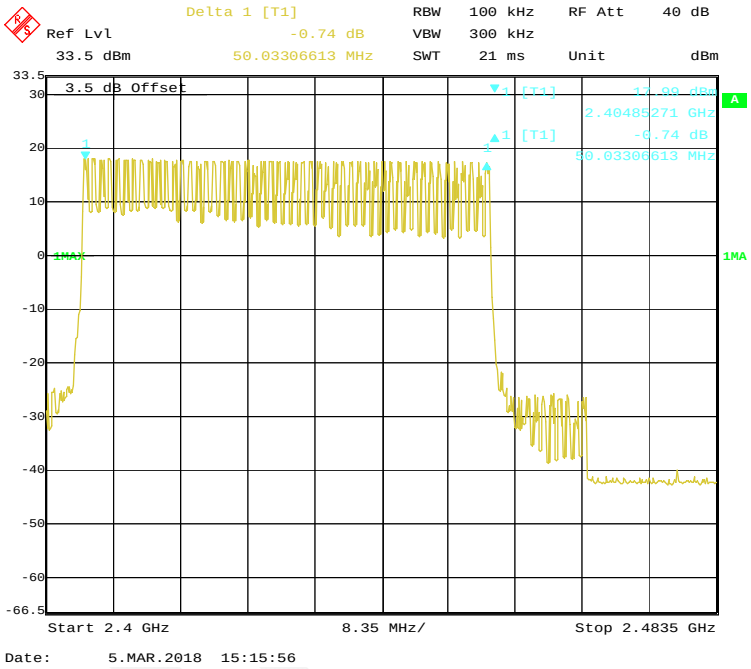
The testing was performed by Chris Wang on 2018-03-05.

EUT operation mode: Hopping

Test Result: Compliance.

Modulation	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
GFSK	2400-2483.5	51	⩾15

Number of Hopping Channels



FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Test Data

Environmental Conditions

Temperature:	24.2 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

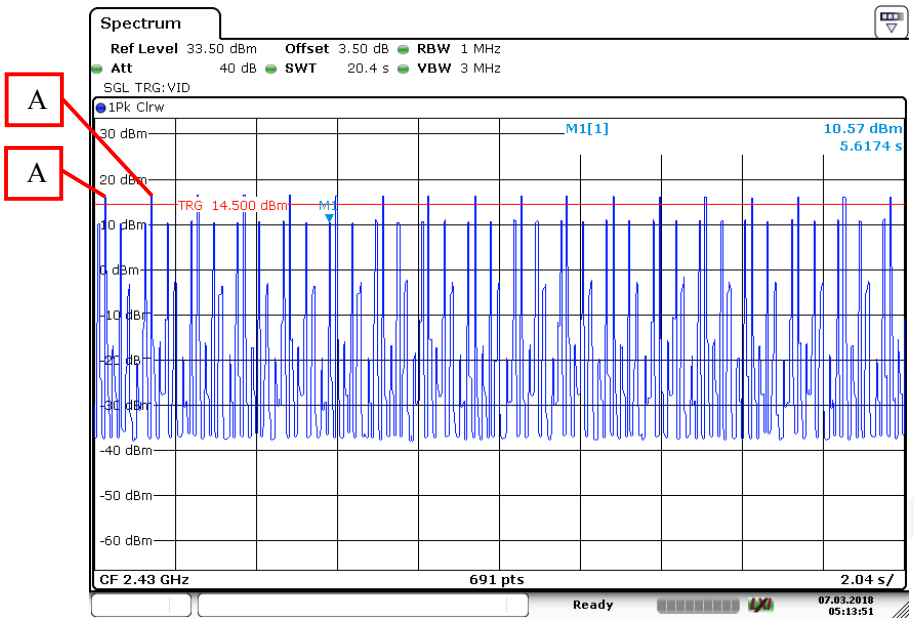
The testing was performed by Chris Wang on 2018-03-07.

EUT operation mode: Hopping

Test Result: Compliance.

Modulation	Channel	Pulse Width (ms)	Pulse Number	Dwell Time (s)	Limit (s)	Result
GFSK	Middle	0.843	18*5	0.076	≤0.4	Pass
	Note: Dwell time = Pulse time*N Observed time = 0.4s* hopping number= 0.4s*51=20.4s					

Number of Pulses



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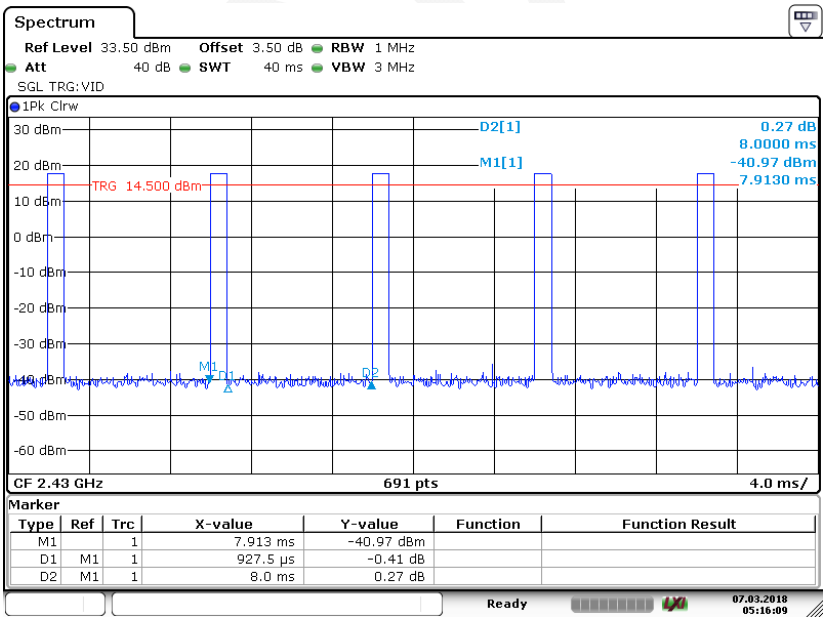
Zoom in A



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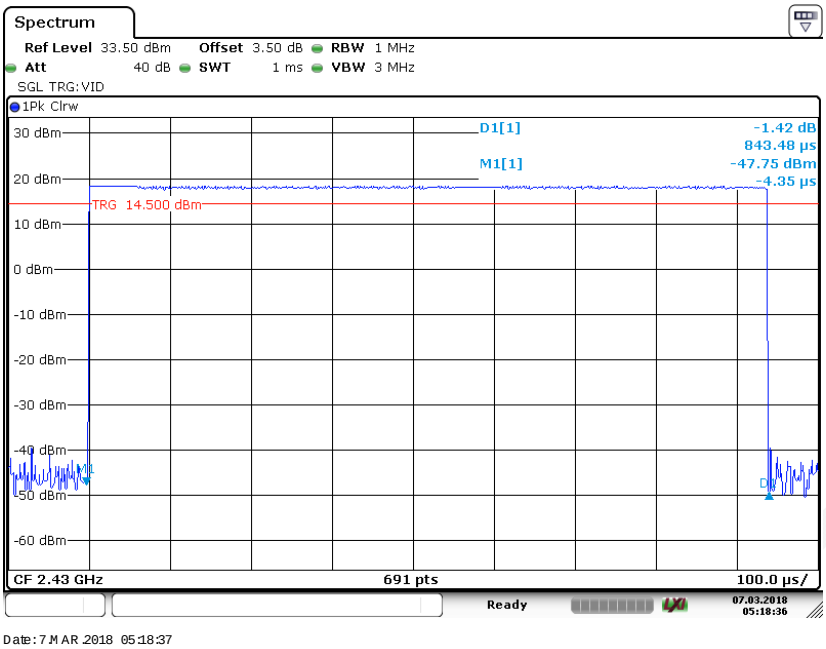
Single Pulse



FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

1. Place the EUT on a bench and set 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:	24.2 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

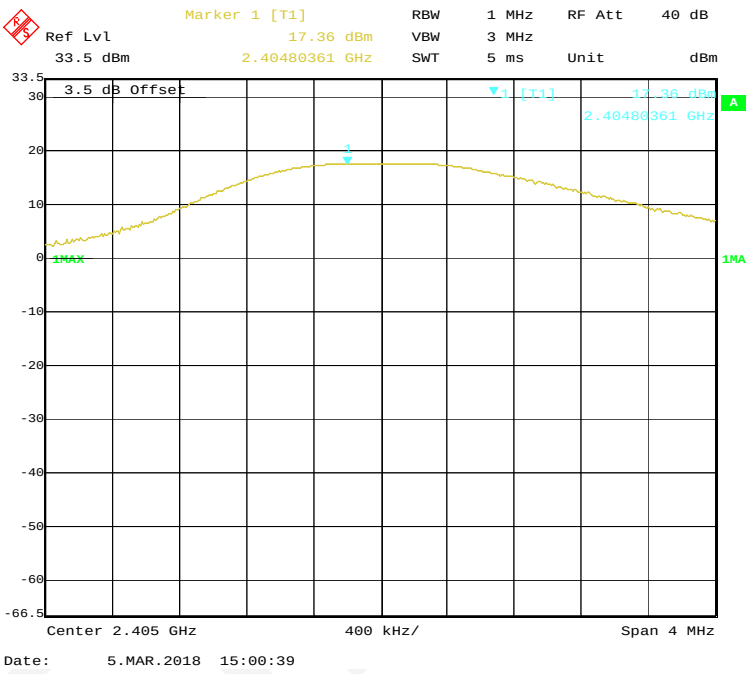
The testing was performed by Chris Wang on 2018-03-05.

EUT operation mode: Transmitting

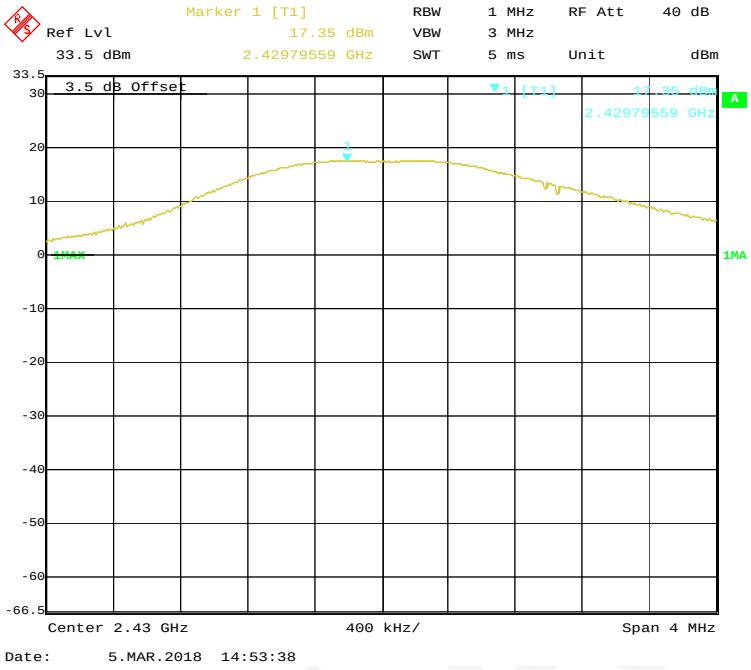
Test Result: Compliance.

Modulation	Channel	Frequency (MHz)	Output Power		Limit (mW)
			(dBm)	(mW)	
GFSK	Low	2405	17.36	54.45	125
	Middle	2430	17.35	54.33	125
	High	2455	17.28	53.46	125

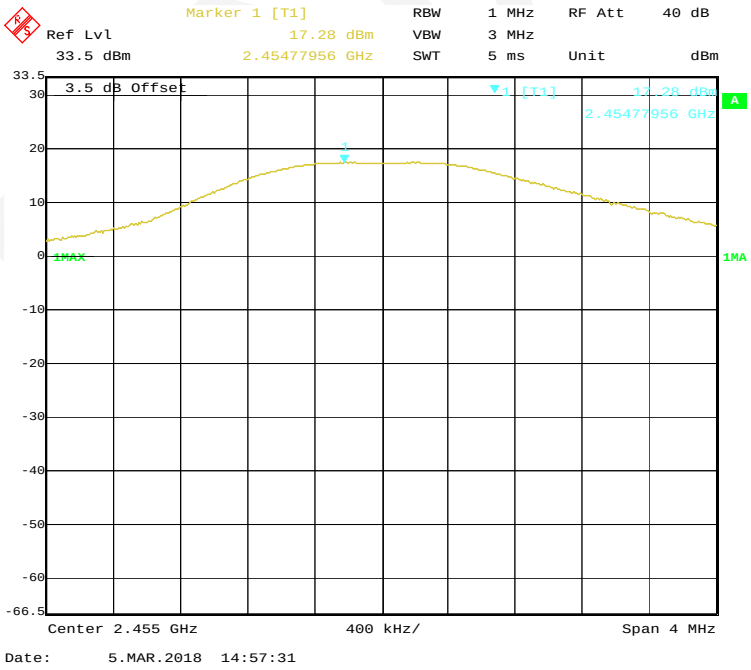
Low Channel



Middle Channel



High Channel



FCC §15.247(d) - BAND EDGES TESTING

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. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 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

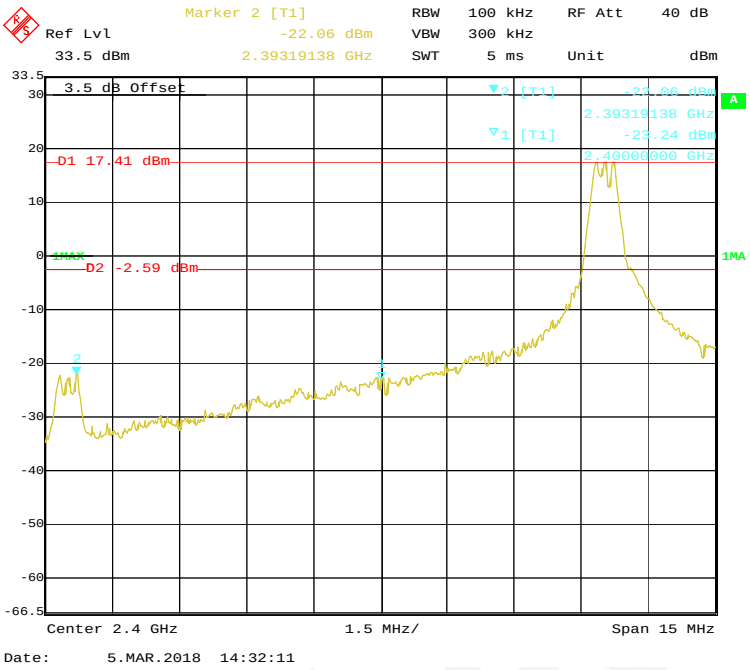
Temperature:	24.2 ℃
Relative Humidity:	50%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2018-03-05.

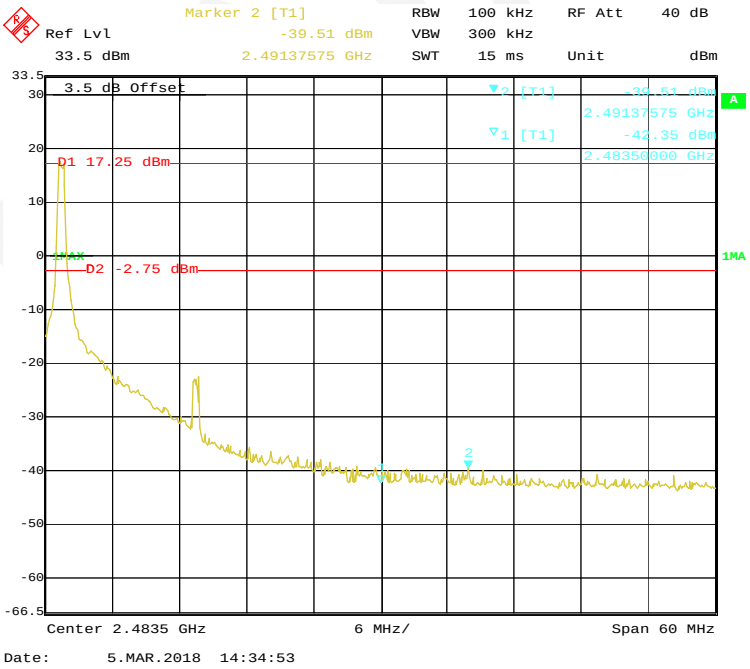
EUT operation mode: Transmitting & Hopping

Test Result: Compliance.

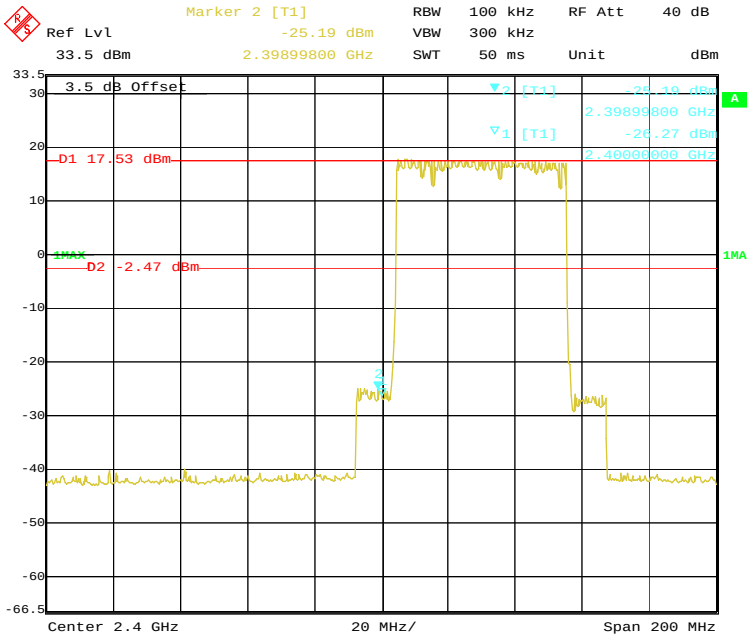
Left Side



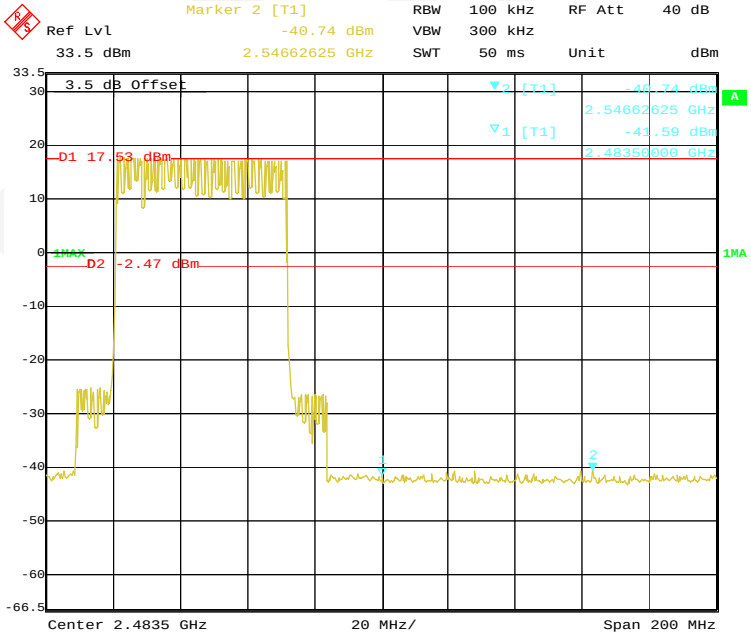
Right Side



Left Side-Hopping



Right Side-Hopping



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