FCC PART 15.247
TEST REPORT

For

FrSky Electronic Co., Ltd.

F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road, Wuxi, 214125, Jiangsu, China

FCC ID: XYFA7SDP

Report Type:	**Product Type:**
Original Report	Digital telemetry radio system

Test Engineer:	Chris Wang
Report Number:	RKS170719004-00A
Report Date:	2017-08-14
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	FrSky Electronic Co., Ltd.
Tested Model	A7
Product Type	Digital telemetry radio system
Dimension	191.0mm(L)×160.0 mm(W)×71.1 mm(H)
Power Supply	DC 7.2V from battery or DC 15V charging by adapter

Adapter Information:
Model: YNQX18T150100UL
Input: AC100-240 V 50/60Hz 1A
Output:15V, 1A

**All measurement and test data in this report was gathered from production sample serial number: 20170719003 (Assigned by the BACL. The EUT supplied by the applicant was received on 2017-07-19)*

Objective

This test report is prepared on behalf of FrSky Electronic Co., Ltd. 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		3.19 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
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.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel list For GFSK Modulation:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2404.55	25	2440.55
2	2406.05	…	…
…	…	…	…
23	2437.55	46	2472.05
24	2439.05	47	2473.55

EUT was tested with Channel 1, 24 and 47.

EUT Exercise Software

RF Test software: Channel_changer

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

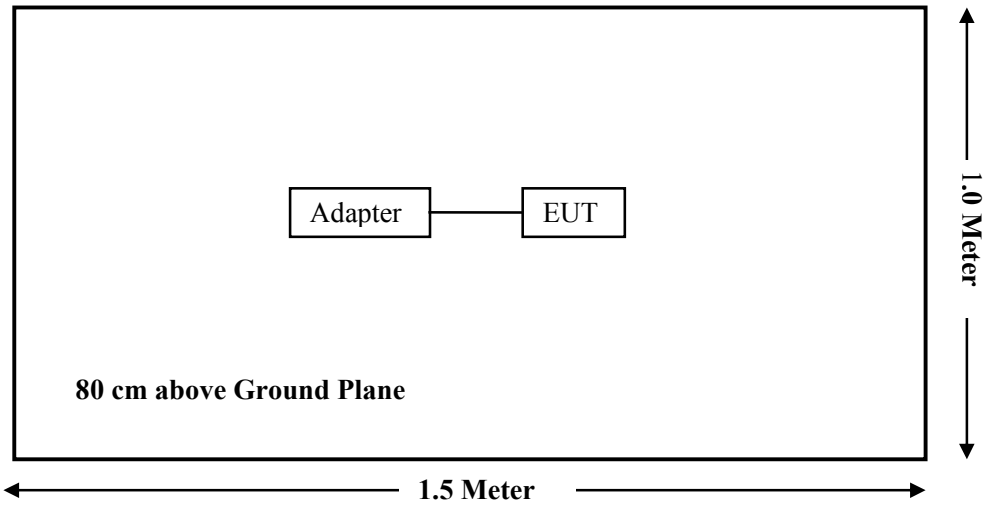
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

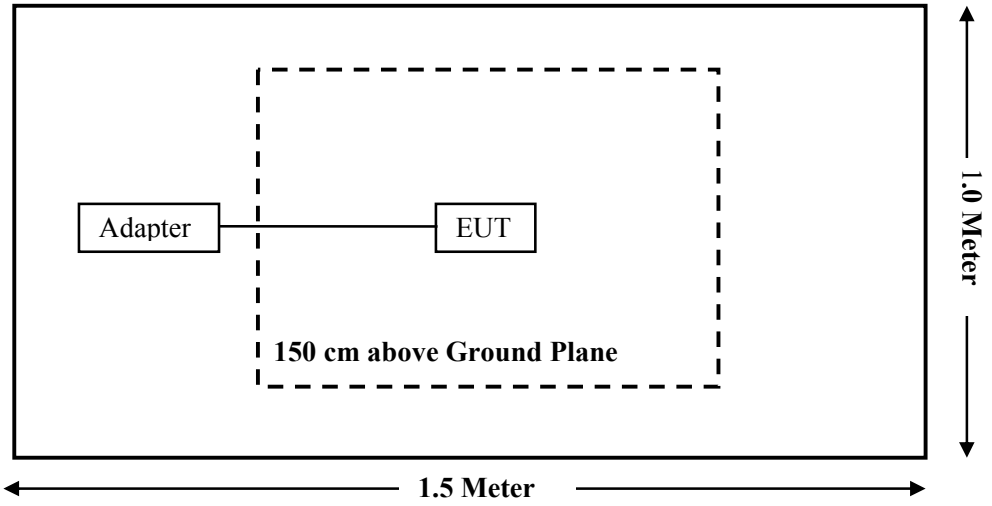
Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

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
§15.247 (i)§1.1307(b)(1) & §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					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
R&S	Auto test Software	EMC32	100361	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2017-07-04	2018-07-03
FrSky	RF Cable	/	/	2017-07-20	2018-07-19
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
Rohde & Schwarz	LISN	ENV216	3560655016	2016-11-25	2017-11-24
Rohde & Schwarz	CE Test software	EMC 32	100357	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2016-09-08	2017-09-07

*** 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 KDB447498 D01 General RF Exposure Guidance v06:

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:
[(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

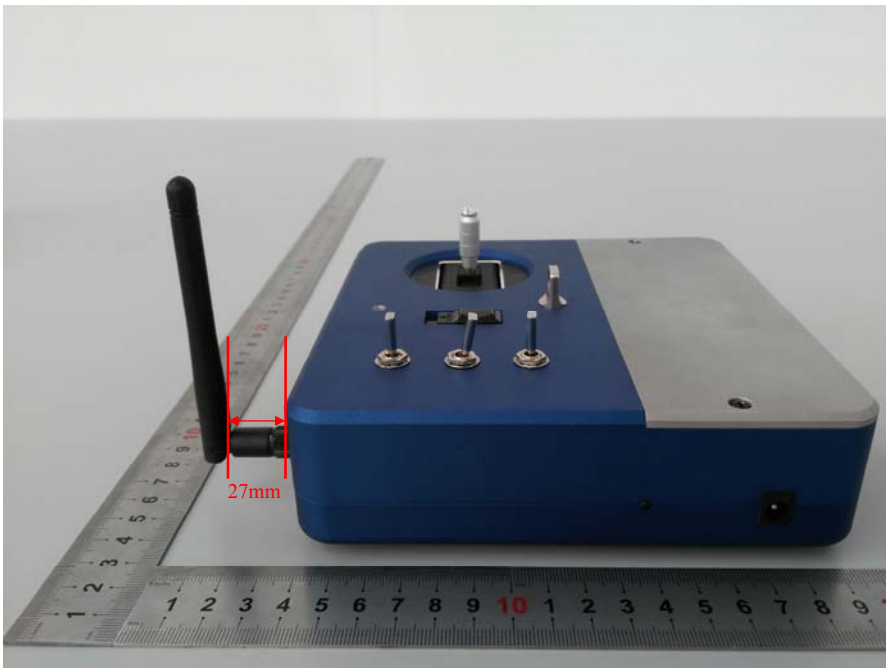
- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Measurement Result

Frequency Range (MHz)	Conducted Output Power		Minimum Test Separation Distances (mm)
	(dBm)	(mW)	
2404.55-2473.55	17.50	56.23	27

Note:

1. Minimum test separation distance is 27 mm, as following photo:



2. Turn up power 17±0.5dBm, which is declared by the manufacturer.

3. This is a handheld device.

Result: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√ f(GHz)]= 56.23/27* √2.47355= **3.3 <7.5**. So no SAR test is needed.

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 arrangement, which the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

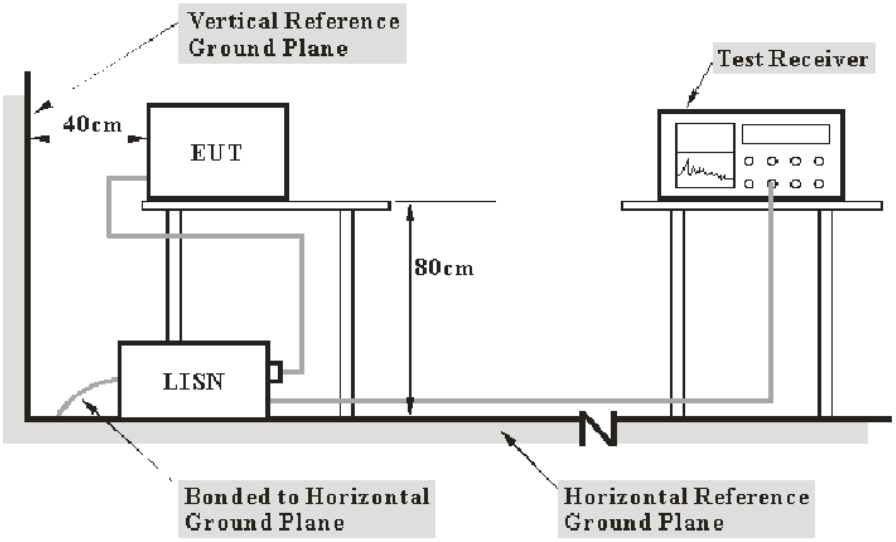
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(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.

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 Results Summary

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

Test Data

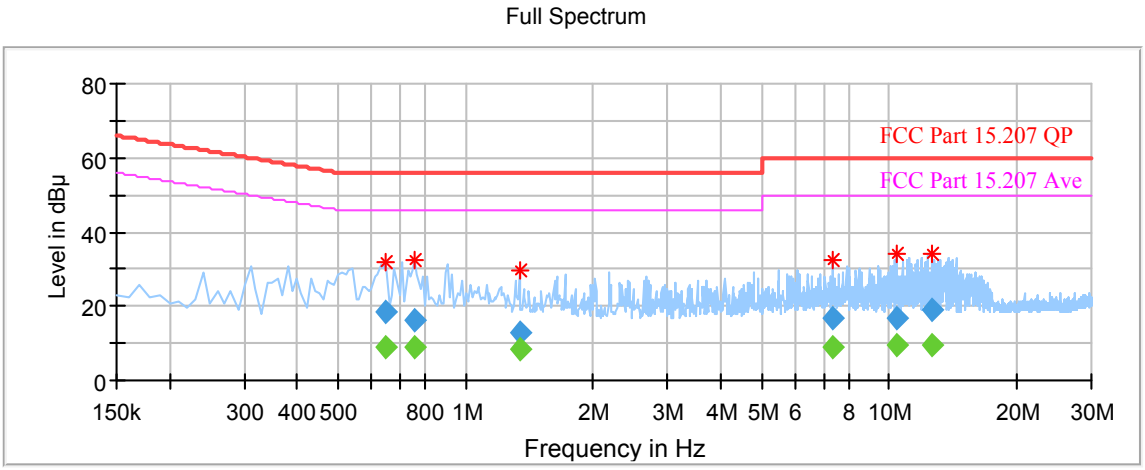
Environmental Conditions

Temperature:	24.8 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2017-07-22.

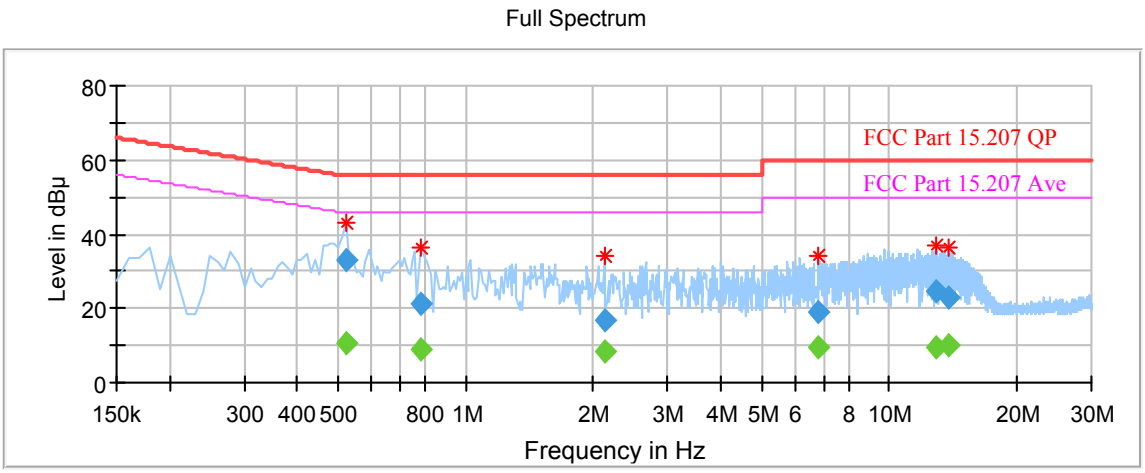
EUT operation mode: Transmitting in Low channel (Worst case)

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.650000	---	8.84	9.000	L1	10.0	37.16	46.00	Compliance
0.650000	18.41	---	9.000	L1	10.0	37.59	56.00	Compliance
0.760000	---	9.05	9.000	L1	9.9	36.95	46.00	Compliance
0.760000	16.29	---	9.000	L1	9.9	39.71	56.00	Compliance
1.340000	---	8.46	9.000	L1	9.9	37.54	46.00	Compliance
1.340000	12.69	---	9.000	L1	9.9	43.31	56.00	Compliance
7.350000	---	8.70	9.000	L1	10.0	41.30	50.00	Compliance
7.350000	16.66	---	9.000	L1	10.0	43.34	60.00	Compliance
10.410000	---	9.24	9.000	L1	10.1	40.76	50.00	Compliance
10.410000	16.60	---	9.000	L1	10.1	43.40	60.00	Compliance
12.660000	---	9.45	9.000	L1	10.0	40.55	50.00	Compliance
12.660000	18.87	---	9.000	L1	10.0	41.13	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.520000	---	10.86	9.000	N	10.1	35.14	46.00	Compliance
0.520000	33.10	---	9.000	N	10.1	22.90	56.00	Compliance
0.780000	---	9.22	9.000	N	10.0	36.78	46.00	Compliance
0.780000	21.41	---	9.000	N	10.0	34.59	56.00	Compliance
2.130000	---	8.28	9.000	N	9.9	37.72	46.00	Compliance
2.130000	16.94	---	9.000	N	9.9	39.06	56.00	Compliance
6.780000	---	9.70	9.000	N	9.9	40.30	50.00	Compliance
6.780000	19.29	---	9.000	N	9.9	40.71	60.00	Compliance
12.970000	---	9.44	9.000	N	10.0	40.56	50.00	Compliance
12.970000	24.58	---	9.000	N	10.0	35.42	60.00	Compliance
13.820000	---	9.89	9.000	N	10.0	40.11	50.00	Compliance
13.820000	22.73	---	9.000	N	10.0	37.27	60.00	Compliance

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

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

Applicable Standard

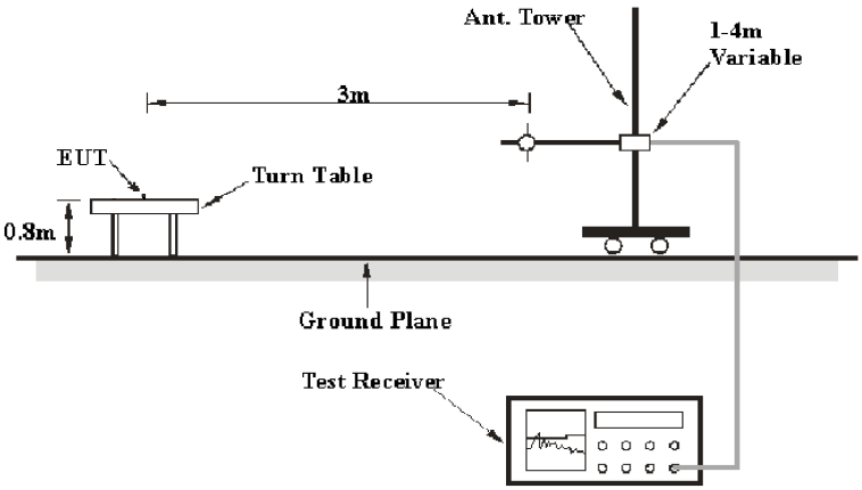
FCC §15.205; §15.209; §15.247(d)

Measurement Uncertainty

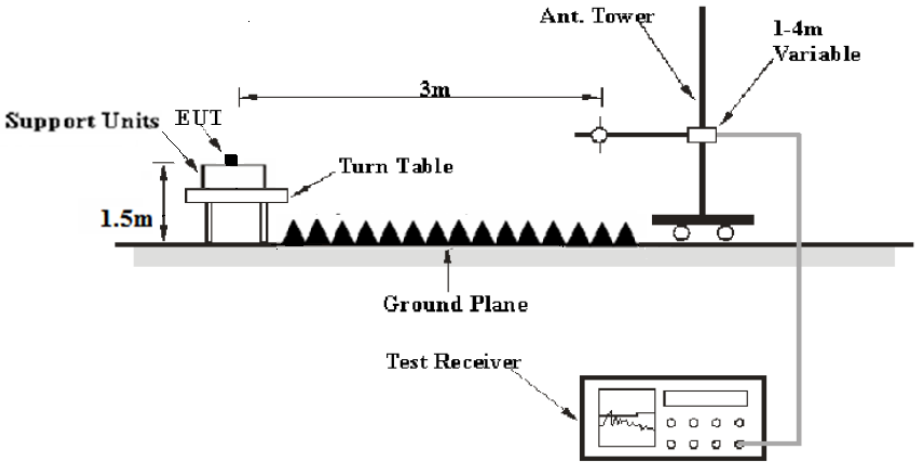
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

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 & Spectrum Analyzer 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

Frequency Range	RBW	Video B/W	Detector
1GHz – 25GHz	1MHz	3 MHz	PK
	1MHz	10 Hz	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:	23.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-07-23.

EUT operation mode: Transmitting(Scan with X-Axis, Y-Axis and Z-Axis position, the worst case was recorded)

30MH -25 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 (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Low Channel (2404.55 MHz)									
162.30	30.02	QP	225	212	V	-1.18	28.84	43.5	14.66
2404.55	117.56	PK	75	198	V	-6.18	111.38	/	/
2404.55	94.65	Ave	75	198	V	-6.18	88.47	/	/
2404.55	117.40	PK	334	249	H	-6.18	111.22	/	/
2404.55	91.63	Ave	334	249	H	-6.18	85.45	/	/
2390.00	51.73	PK	214	172	V	-6.22	45.51	74.00	28.49
2390.00	31.67	Ave	214	172	V	-6.22	25.45	54.00	28.55
2400.00	63.91	PK	91	153	V	-6.19	57.72	74.00	16.28
2400.00	41.32	Ave	91	153	V	-6.19	35.13	54.00	18.87
1302.60	57.07	PK	250	206	V	-10.64	46.43	74.00	27.57
1302.60	34.83	Ave	250	206	V	-10.64	24.19	54.00	29.81
4811.00	57.53	PK	180	228	H	1.63	59.16	74.00	14.84
4811.00	44.49	Ave	180	228	H	1.63	46.12	54.00	7.88
7216.50	59.77	PK	172	149	V	7.56	67.33	74.00	6.67
7216.50	41.68	Ave	172	149	V	7.56	49.24	54.00	4.76
Middle Channel (2439.05 MHz)									
162.30	29.89	QP	261	146	V	-1.18	28.71	43.5	14.79
2439.05	117.69	PK	307	115	V	-6.10	111.59	/	/
2439.05	87.62	Ave	307	115	V	-6.10	81.52	/	/
2439.05	117.32	PK	173	136	H	-6.10	111.22	/	/
2439.05	84.85	Ave	173	136	H	-6.10	78.75	/	/
1302.60	56.88	PK	75	200	V	-10.64	46.24	74.00	27.76
1302.60	34.79	Ave	75	200	V	-10.64	24.15	54.00	29.85
3062.66	42.61	PK	118	153	H	-3.08	39.53	74.00	34.47
3062.66	30.02	Ave	118	153	H	-3.08	26.94	54.00	27.06
4878.00	58.78	PK	108	241	V	1.79	60.57	74.00	13.43
4878.00	46.53	Ave	108	241	V	1.79	48.32	54.00	5.68
6032.06	41.96	PK	224	114	H	4.19	46.15	74.00	27.85
6032.06	27.54	Ave	224	114	H	4.19	31.73	54.00	22.27
7317.00	57.86	PK	160	224	V	7.67	65.53	74.00	8.47
7317.00	40.69	Ave	160	224	V	7.67	48.36	54.00	5.64

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 (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
High Channel (2473.55 MHz)									
162.30	30.09	QP	72	226	V	-1.18	28.91	43.5	14.59
2473.55	117.61	PK	159	206	V	-6.03	111.58	/	/
2473.55	87.40	Ave	159	206	V	-6.03	81.37	/	/
2473.55	117.53	PK	338	134	H	-6.03	111.50	/	/
2473.55	84.73	Ave	338	134	H	-6.03	78.70	/	/
2483.50	56.48	PK	170	198	V	-6.01	50.47	74.00	23.53
2483.50	41.42	Ave	170	198	V	-6.01	35.41	54.00	18.59
1302.60	56.22	PK	200	102	V	-10.64	45.58	74.00	28.42
1302.60	34.94	Ave	200	102	V	-10.64	24.30	54.00	29.70
4947.00	59.44	PK	202	174	V	1.94	61.38	74.00	12.62
4947.00	47.59	Ave	202	174	V	1.94	49.53	54.00	4.47
6032.06	42.07	PK	158	179	H	4.19	46.26	74.00	27.74
6032.06	27.58	Ave	158	179	H	4.19	31.77	54.00	22.23
7420.50	55.06	PK	179	173	V	7.77	62.83	74.00	11.17
7420.50	40.06	Ave	179	173	V	7.77	47.83	54.00	6.17

Note: The fundermental test is without Amplifier

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:	24.3 ℃
Relative Humidity:	49%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-07-20.

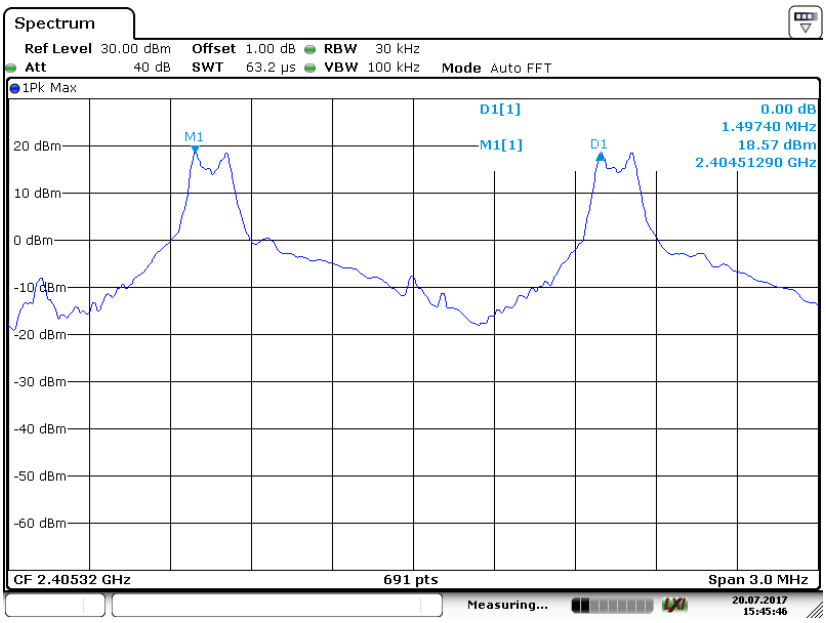
EUT operation mode: Transmitting

Test Result: Compliance.

Modulation	Channel	Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
GFSK	Low	2404.55	1497.40	103.20	Pass
	Adjacent	2406.05			
	Middle	2439.05	1502.20	103.20	Pass
	Adjacent	2440.55			
	Adjacent	2472.05	1502.20	102.27	Pass
	High	2473.55			

The limit =20dB Bandwidth*2/3

Low Channel



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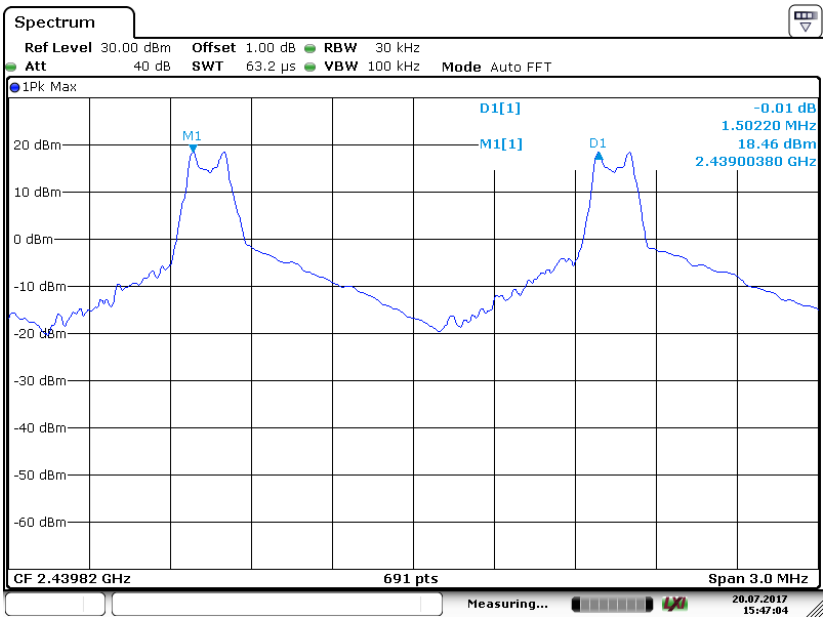
Middle Channel



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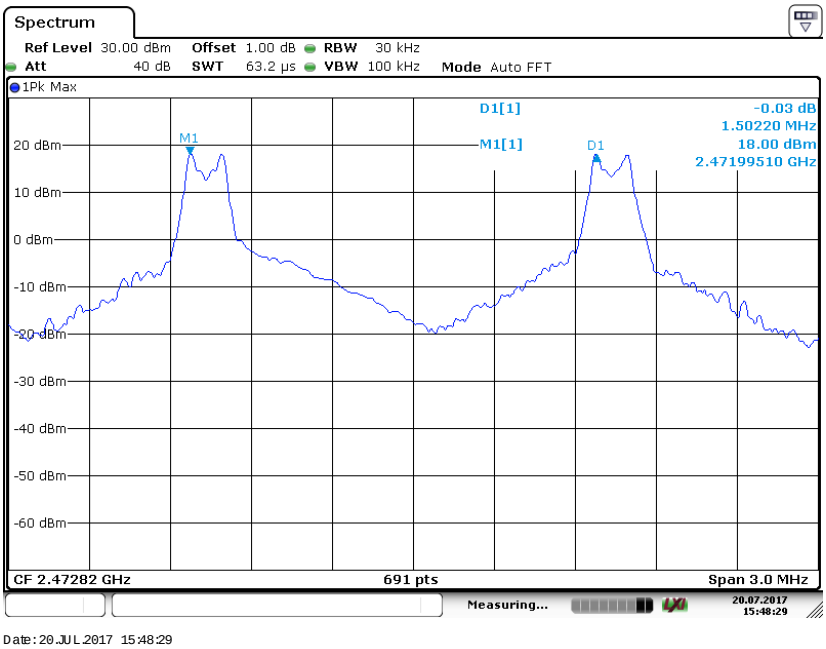
High Channel



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:	24.1 ℃
Relative Humidity:	51%
ATM Pressure:	101.3 kPa

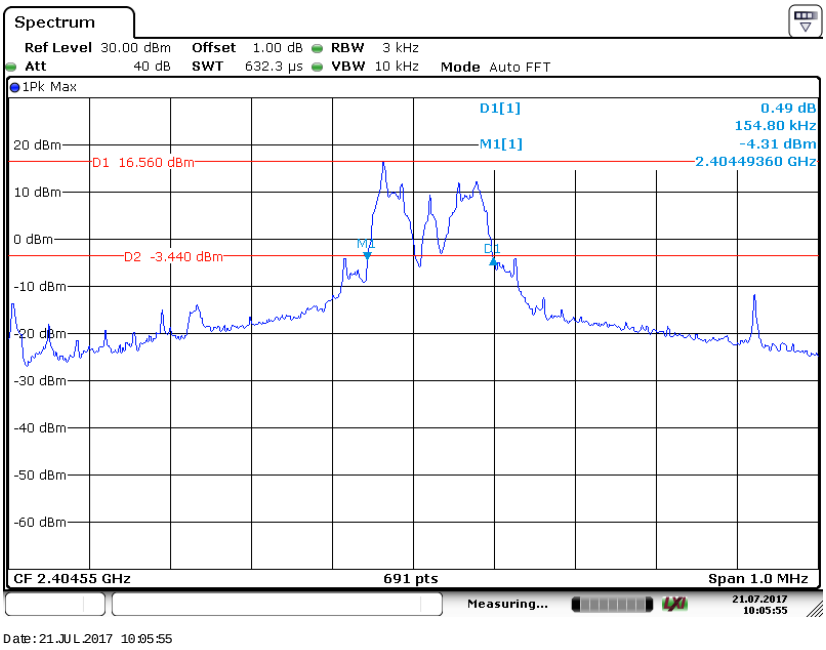
The testing was performed by Chris Wang on 2017-07-21.

EUT operation mode: Transmitting

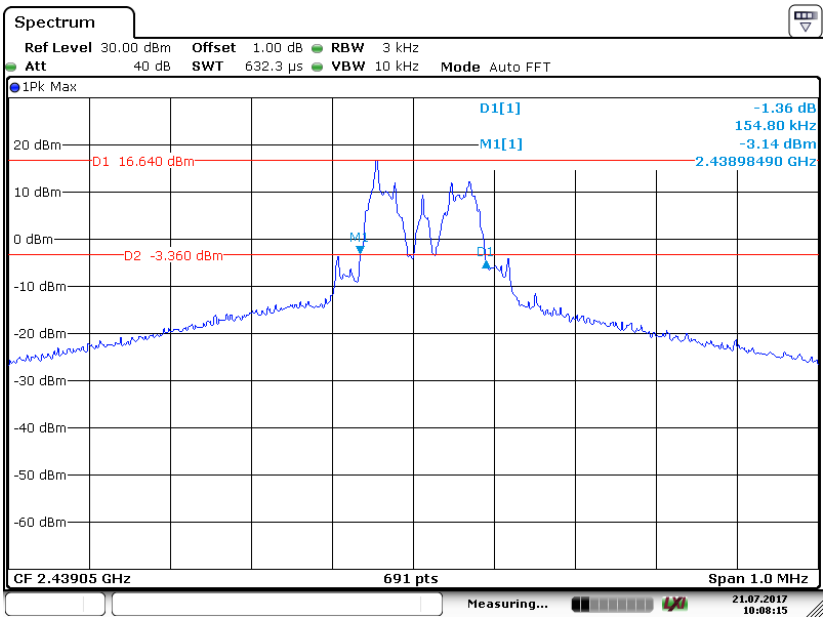
Test Result: Compliance.

Modulation	Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)
GFSK	Low	2404.55	154.80
	Middle	2439.05	154.80
	High	2473.55	153.40

Low Channel



Middle Channel



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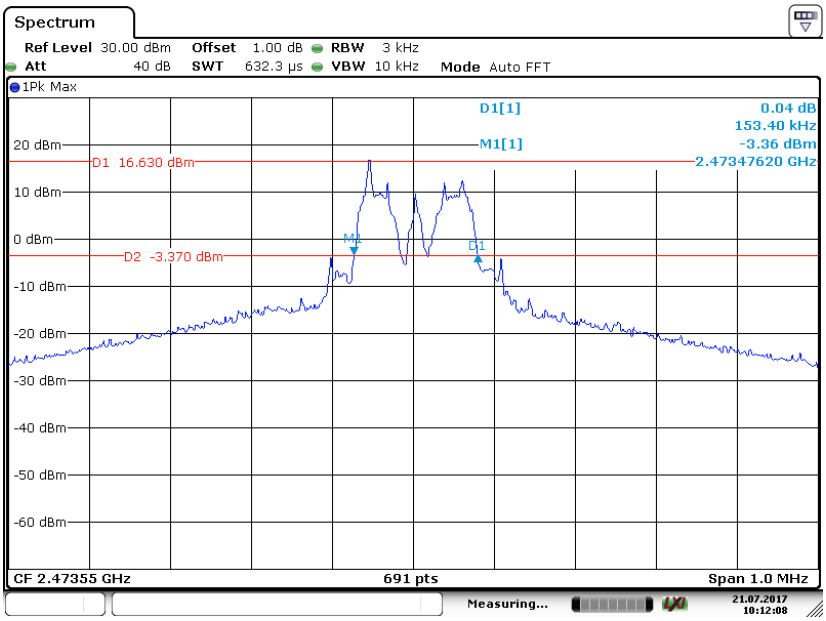
High Channel



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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:	101.0 kPa

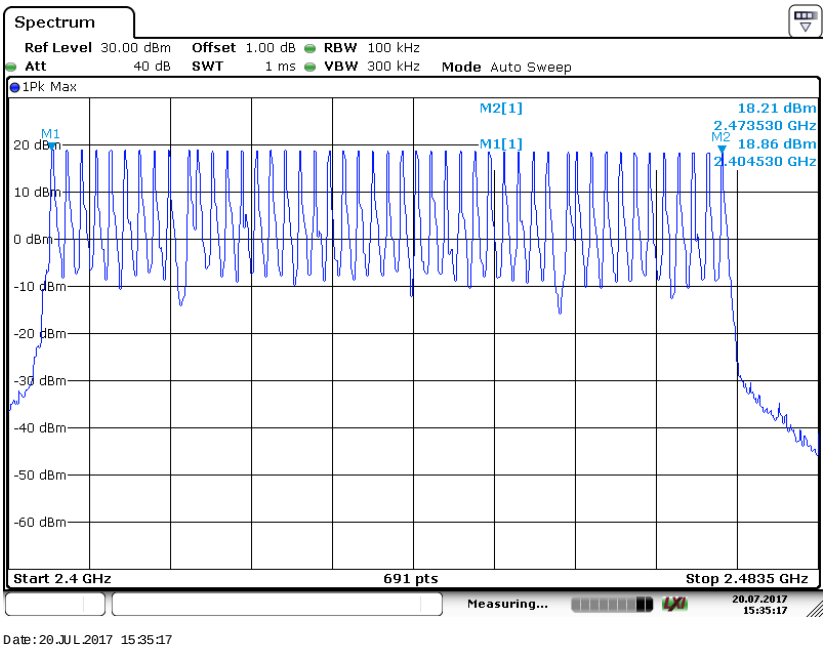
The testing was performed by Chris Wang on 2017-07-20.

EUT operation mode: Transmitting

Test Result: Compliance.

Modulation	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
GFSK	2404.55-2473.55	47	≥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:	101.0 kPa

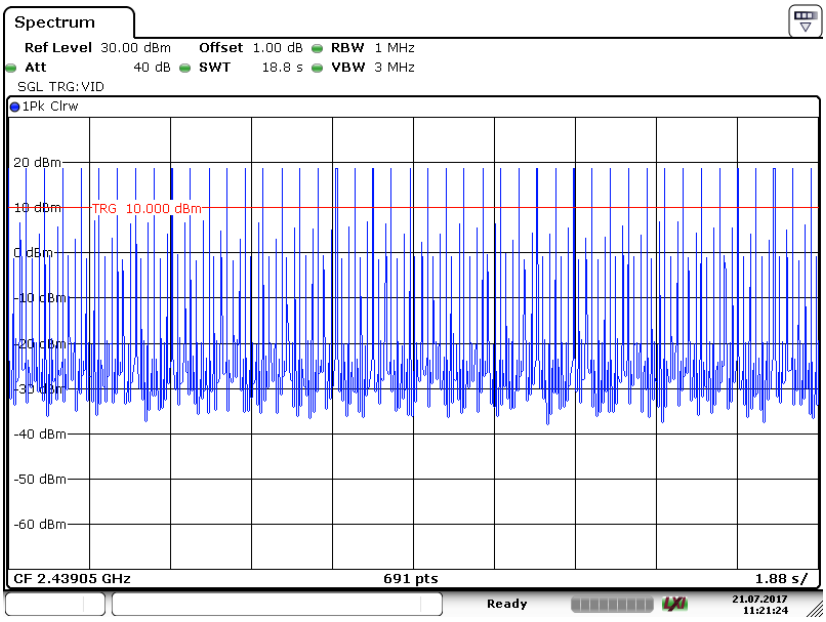
The testing was performed by Chris Wang on 2017-07-21.

EUT operation mode: Transmitting

Test Result: Compliance.

Modulation	Channel	Pulse Width (ms)	Pulse Number	Dwell Time (s)	Limit (s)	Result
GFSK	Middle	4.80	45	0.216	≤0.4	Pass
	Note: Dwell time = Pulse time*N Observed time = 0.4s* hopping number= 0.4s*47=18.8s					

Number of pusles



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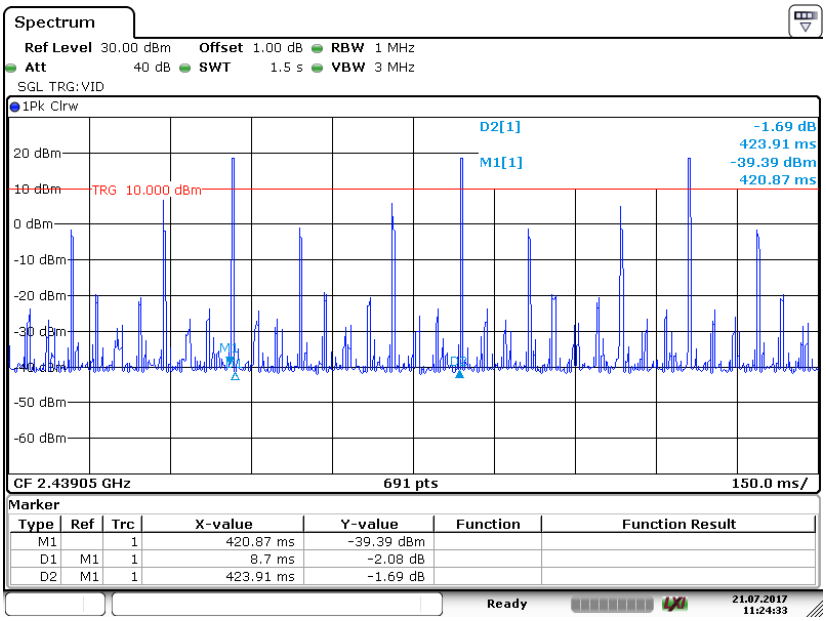
Zoom in



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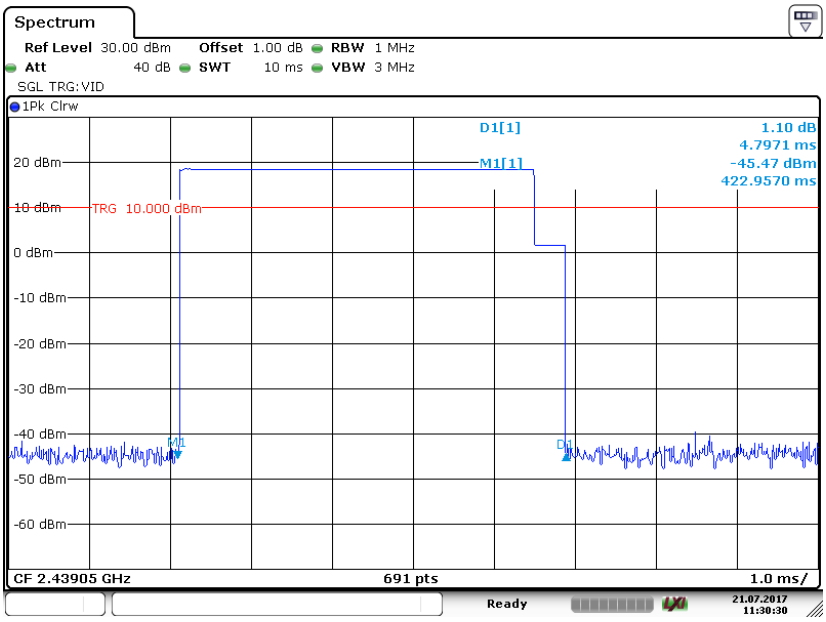
Single Pusle



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:	24.1 ℃
Relative Humidity:	51%
ATM Pressure:	101.3 kPa

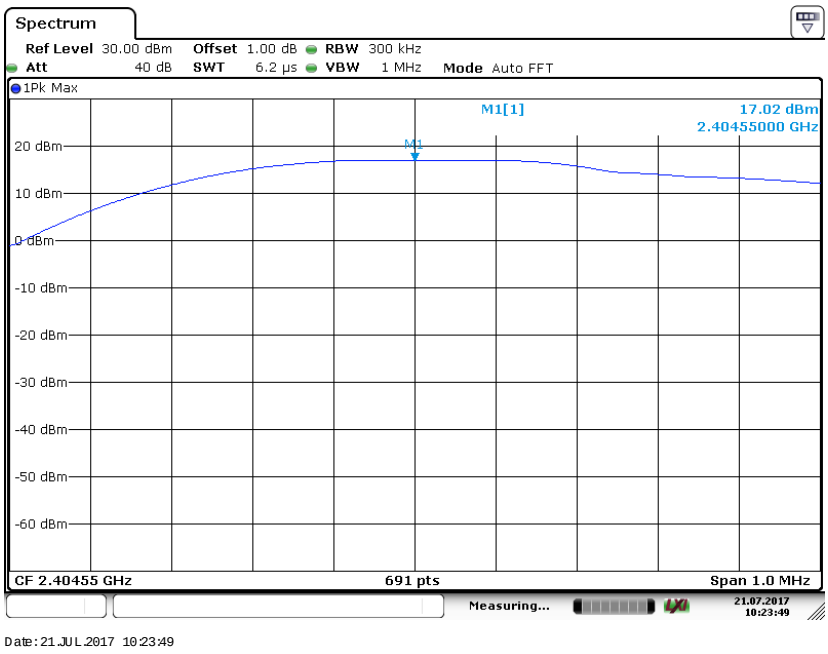
The testing was performed by Chris Wang on 2017-07-21.

EUT operation mode: Transmitting

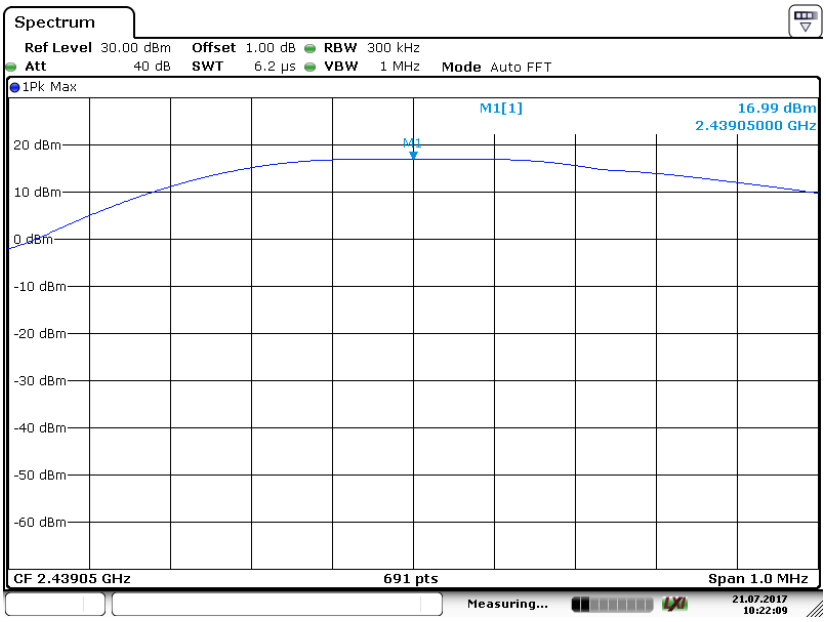
Test Result: Compliance.

Modulation	Channel	Frequency (MHz)	Output Power		Limit (mW)
			(dBm)	(mW)	
GFSK	Low	2404.55	17.02	50.35	125
	Middle	2439.05	16.99	50.00	125
	High	2473.55	16.90	48.98	125

Low Channel



Middle Channel



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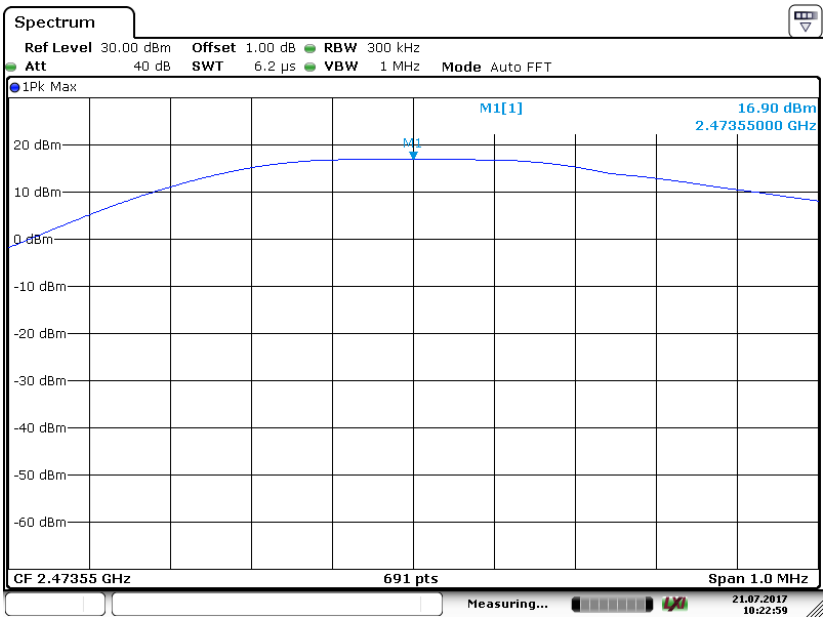
High Channel



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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

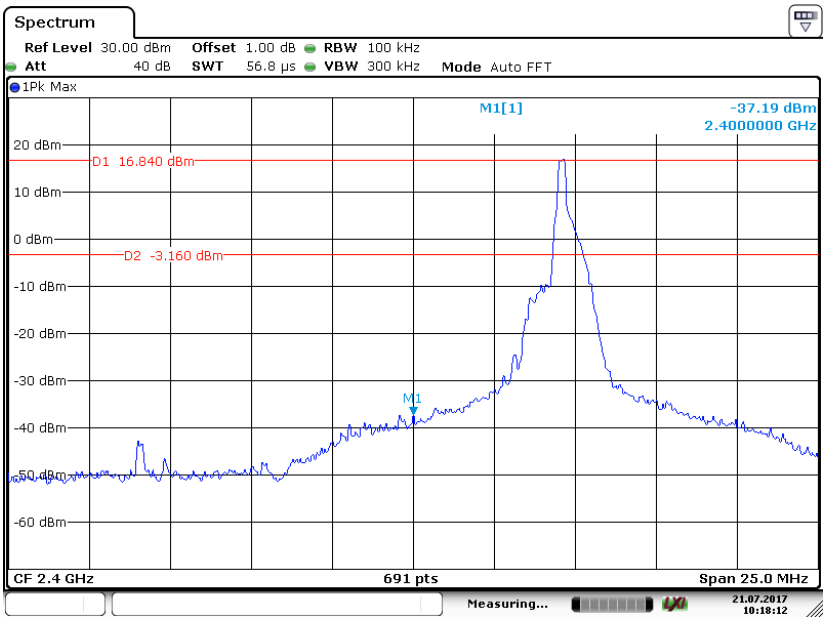
Temperature:	24.1 ℃
Relative Humidity:	51%
ATM Pressure:	101.3 kPa

The testing was performed by Chris Wang on 2017-07-21.

EUT operation mode: Transmitting

Test Result: Compliance.

Left Side



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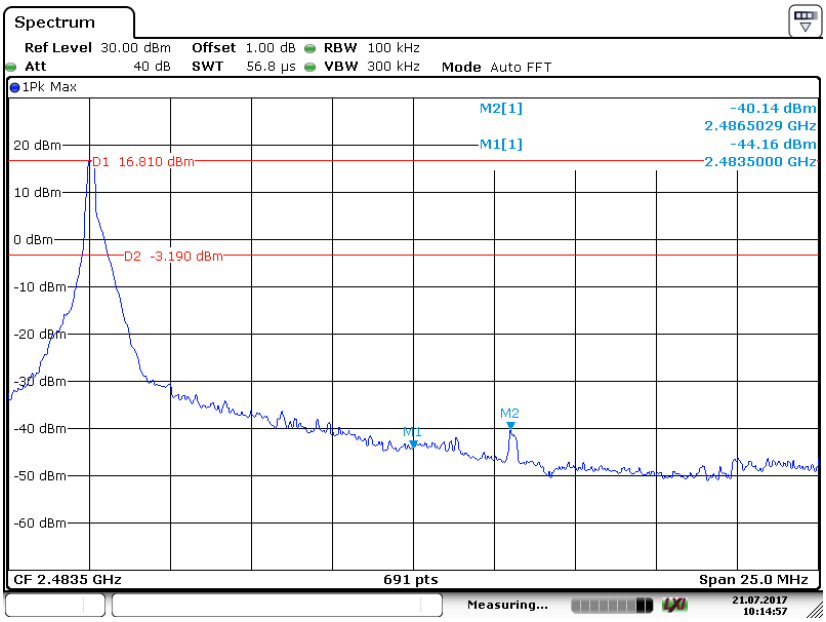
Right Side



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