



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1**

CERTIFICATION TEST REPORT

For

Smidt-imex Bluetooth Speaker

MODEL NUMBER: SI-598

FCC ID: 2AJ7OSI598

REPORT NUMBER: 4787634311.1-7

ISSUE DATE: December 12, 2016

Prepared for

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Unit 5-7, 29/F Max Trade Centre, 23 Luk Hop Street, San Po Kong, Kowloon, Hong
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	12/12/2016	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	20dB Bandwidth	FCC 15.247 (a) (1)	Complied
2	Peak Conducted Output Power	FCC 15.247 (b) (1)	Complied
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1)	Complied
4	Number of Hopping Frequency	15.247 (a) (1) III	Complied
5	Time of Occupancy (Dwell Time)	15.247 (a) (1) III	Complied
6	Conducted Bandedge and Spurious	FCC 15.247 (d)	Complied
7	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205	Complied
8	Conducted Emission Test For AC Power Port	FCC 15.207	Complied
9	Antenna Requirement	FCC 15.203	Complied

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Smidt-imex Asia Ltd
Address: Unit 5-7, 29/F Max Trade Centre, 23 Luk Hop Street, San Po Kong, Kowloon, Hong Kong

Manufacturer Information

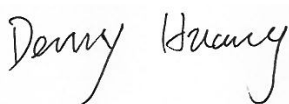
Company Name: Smidt-imex Asia Ltd
Address: Unit 5-7, 29/F Max Trade Centre, 23 Luk Hop Street, San Po Kong, Kowloon, Hong Kong

EUT Description

Product Name: Smidt-imex Bluetooth Speaker
Brand Name: Smidt-imex
Model Name: SI-598
FCC ID: 2AJ7OSI598
Date Tested: November 17, 2016 ~ November 22, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
ANSI C63.10-2013	PASS

Tested By:



Denny Huang
Engineer Project Associate
Approved By:



Stephen Guo
Laboratory Manager

Check By:



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Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

Test Location	Dongguan Dongdian Testing Service Co., Ltd
Address	No. 17, Zongbu Road 2, Songshan Lake Sci&Tech Park, Dongguan City, Guangdong Province, 523808, China
Accreditation Certificate	<p>Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until January 31, 2018.</p> <p>Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 270092, Renewal date March 11, 2015, valid time is until March 11, 2018.</p> <p>The 3m Alternate Test Site of Dongguan Dongdian Testing Service Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 10288A on April 23, 2015, valid time is until April 23, 2018.</p>

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB(10 MHz \leq f < 3.6GHz);
	1.38dB(3.6GHz \leq f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Dwell Time	0.6%
Conducted spurious emissions	0.86dB(10 MHz \leq f < 3.6GHz);
	1.40dB(3.6GHz \leq f < 8GHz)
	1.66dB(8GHz \leq f < 22GHz)
Uncertainty for radio frequency (RBW<20KHz)	3 \times 10 ⁻⁸
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-18GHz)	4.10dB(1-6GHz)
	4.40dB (6GHz-18Gz)
Uncertainty for Power line conduction emission test	3.32dB (150KHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Smidt-imex Bluetooth Speaker		
Model Name	SI-598		
Product Description (Bluetooth)	Operation Frequency	2402 MHz ~ 2480 MHz	
	Modulation Type		Data Rate
	GFSK		1Mbps
	π/4-DQPSK		2Mbps
Rated Power	DC 4.5V by Battery or DC 5V/1A by USB Port		
Hardware Version	PBT598EE		
Software Version	DL.PBT598_BK3254.28_Wireless speaker_WHH_V1.1_20161209_0ced.IMG		

Note: The EUT only support GFSK and π/4-DQPSK modulation, the 8DPSK modulation was removed by client through software.

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Bluetooth Mode	Frequency (MHz)	Channel Number	Max PK Conducted Power (dBm)
2400-2483.5	1	GFSK	2402-2480	0-78[79]	-6.490
2400-2483.5	1	π/4-DQPSK	2402-2480	0-78[79]	-6.180

5.3. PACKET TYPE CONFIGURATION

Test Mode	Packet Type	Setting
GFSK	DH1	27
	DH3	183
	DH5	339
π/4-DQPSK	2-DH1	54
	2-DH3	367
	2-DH5	679

5.4. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2422	40	2442	60	2462
01	2403	21	2423	41	2443	61	2463
02	2404	22	2424	42	2444	62	2464
03	2405	23	2425	43	2445	63	2465
04	2406	24	2426	44	2446	64	2466
05	2407	25	2427	45	2447	65	2467
06	2408	26	2428	46	2448	66	2468
07	2409	27	2429	47	2449	67	2469
08	2410	28	2430	48	2450	68	2470
09	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

5.5. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel Number	Test Channel
GFSK	CH 00, CH 39, CH 78	Low, Middle, High
π/4-DQPSK	CH 00, CH 39, CH 78	Low, Middle, High

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software Version		BK3256 RF Test_V1.3		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 39	CH 78
GFSK	1	3	3	3
π/4-DQPSK	1	3	3	3

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2402-2480	PCB Antenna	2.0

Test Mode	Transmit and Receive Mode	Description
GFSK	☒1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
π/4-DQPSK	☒1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.

5.8. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate (Mbps)
BR	FHSS	GFSK	1Mbit/s
EDR	FHSS	π/4-DQPSK	2Mbit/s

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	Power Adapter	N/A	BBK050100AU	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	AUX In	AUX	Unshielded	0.30	In bottom
2	USB In	USB	Unshielded	0.30	DC 5V, 1A

Note: The USB only use for supply power.

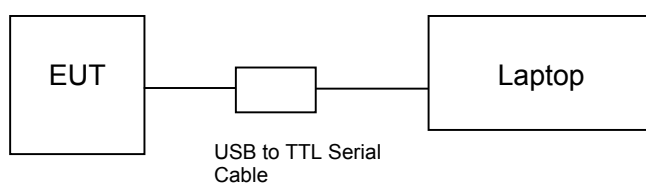
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in an engineer mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument (Conducted for RF Port)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	Spectrum Analyzer	Agilent	E4447A	MY50180031	2016/07/06	1 Year
Instrument (Radiated Tests)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESU8	100316	2016/10/16	1 Year
<input checked="" type="checkbox"/>	Spectrum analyzer	R&S	FSU26	1166.1660.26	2016/10/16	1 Year
<input checked="" type="checkbox"/>	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2016/10/27	1 Year
<input checked="" type="checkbox"/>	Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	2016/10/27	1 Year
<input checked="" type="checkbox"/>	Double Ridged Horn Antenna	R&S	HF907	100276	2016/10/12	1 Year
<input checked="" type="checkbox"/>	Pre-amplifier	A.H.	PAM-0118	360	2016/10/16	1 Year
<input checked="" type="checkbox"/>	RF Cable	HUBSER	CP-X2	W11.03	2016/10/16	1 Year
<input checked="" type="checkbox"/>	RF Cable	HUBSER	CP-X1	W12.02	2016/10/16	1 Year
<input checked="" type="checkbox"/>	MI Cable	HUBSER	C10-01-01-1M	1091629	2016/10/16	1 Year
<input checked="" type="checkbox"/>	Test software	Audix	E3	V 6.11111b	N/A	N/A
Instrument (Line Conducted Emission (AC Main))						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESU8	100316	2016/10/16	1 Year
<input checked="" type="checkbox"/>	LISN 1	R&S	ENV216	101109	2016/10/16	1 Year
<input checked="" type="checkbox"/>	LISN 2	R&S	ESH2-Z5	100309	2016/10/16	1 Year
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	101242	2016/10/16	1 Year
<input checked="" type="checkbox"/>	CE Cable 1	HUBSER	ESU8/RF2	W10.01	2016/10/16	1 Year
<input checked="" type="checkbox"/>	Test software	Audix	E3	V 6.11111b	N/A	N/A

6. MEASUREMENT METHODS

No.	Test Item	KDB Name
1	20 dB Bandwidth	FCC Public Notice DA 00-705
2	99% Bandwidth	ANSI C63.10-2013
3	Peak Output Power	FCC Public Notice DA 00-705
4	Power Spectral Density	FCC Public Notice DA 00-705
5	Out-of-band emissions in non-restricted bands	FCC Public Notice DA 00-705
6	Out-of-band emissions in restricted bands	FCC Public Notice DA 00-705
7	Band-edge	FCC Public Notice DA 00-705

7. ANTENNA PORT TEST RESULTS

7.1. 20 dB BANDWIDTH AND 99% BANDWIDTH

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Frequency Range (MHz)
FCC 15.247 (a) (1)	20dB Bandwidth	2400-2483.5
RSS-Gen Clause 4.4.1	99% Bandwidth	2400-2483.5

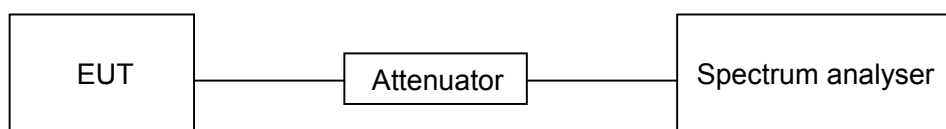
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$\geq 1\%$ of the 20 dB bandwidth
VBW	\geq RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



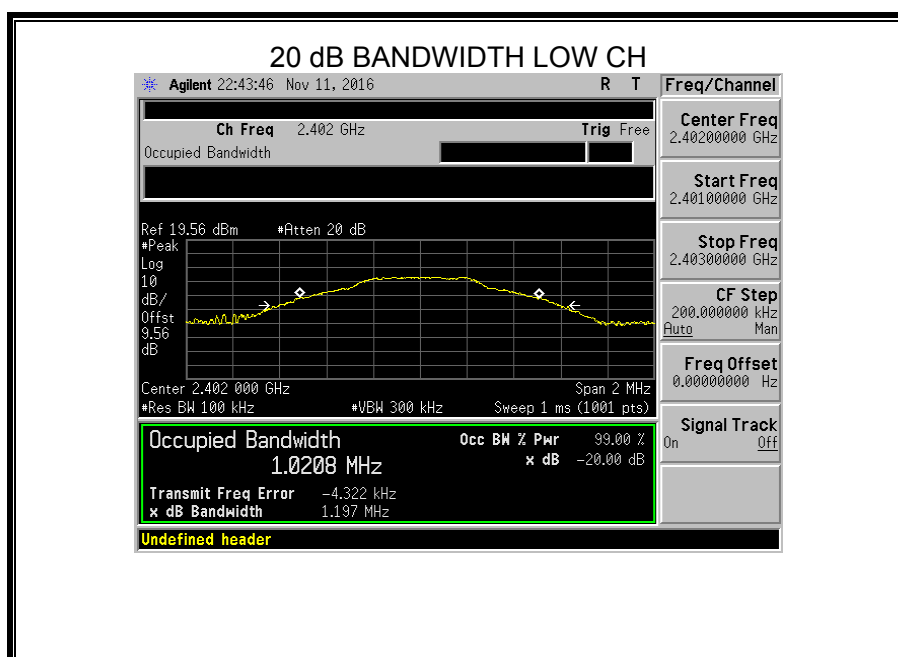
TEST CONDITIONS

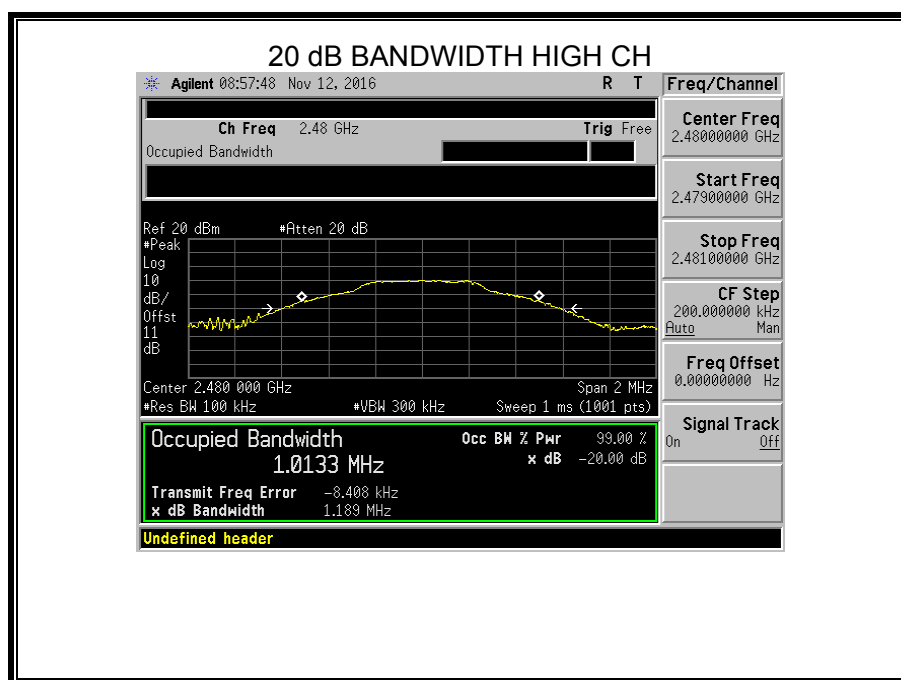
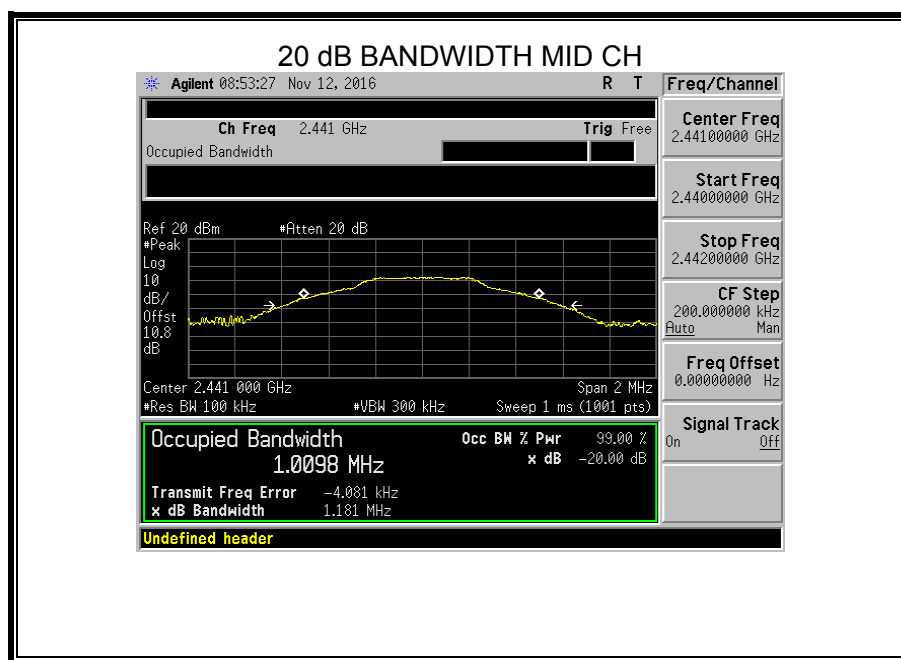
Temperature: 26.6°C
Relative Humidity: 58%
Test Voltage: DC 3.7V

RESULTS

7.1.1. GFSK MODE

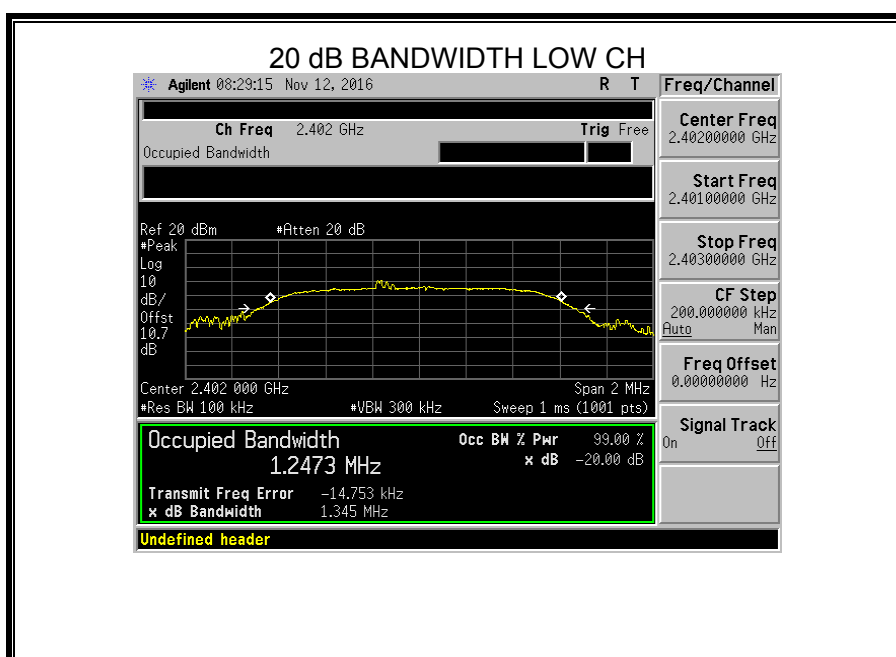
Channel	Frequency (MHz)	20dB bandwidth (MHz)	99% bandwidth (MHz)	Result
Low	2402	1.197	1.0208	Pass
Middle	2441	1.181	1.0098	Pass
High	2480	1.189	1.0133	Pass

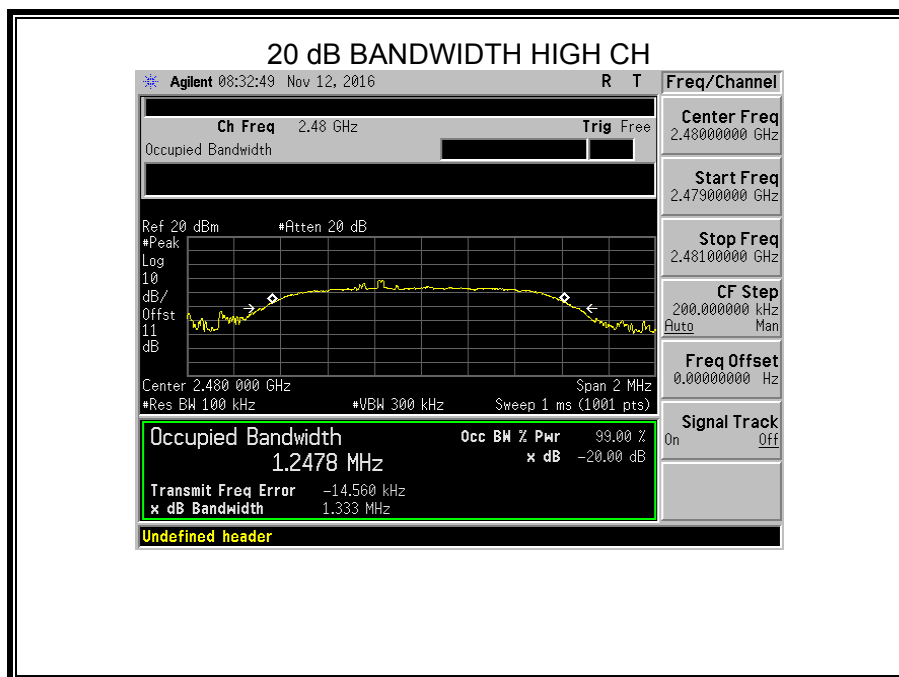
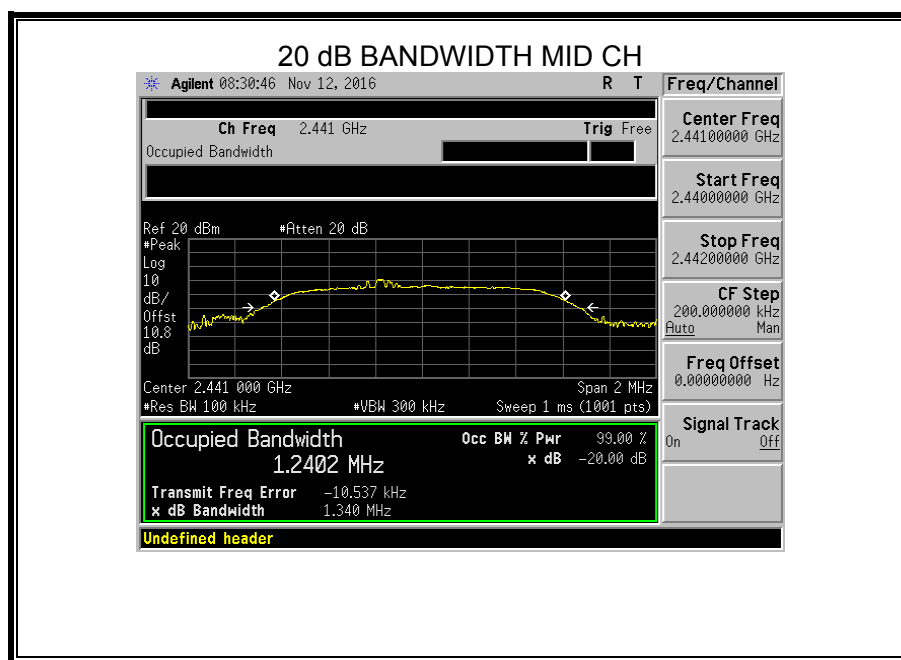




7.1.2. II/4-DQPSK MODE

Channel	Frequency (MHz)	20dB bandwidth (MHz)	99% bandwidth (MHz)	Result
Low	2402	1.345	1.2473	Pass
Middle	2441	1.340	1.2402	Pass
High	2480	1.333	1.2478	Pass





7.2. PEAK CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247 (b) (1)	Peak Conducted Output Power	1 watt or 30dBm	2400-2483.5

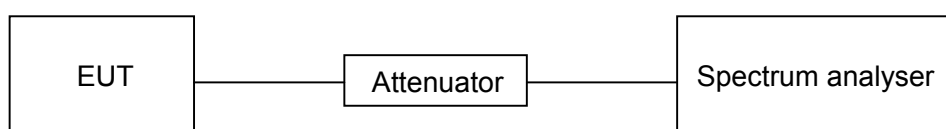
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	> the 20 dB bandwidth of the emission being measured (e.g. 1 MHz for BT)
VBW	≥RBW
Span	approximately 5 times the 20 dB bandwidth, centered on a hopping channel
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use peak marker function to determine the peak amplitude level.

TEST SETUP



TEST CONDITIONS

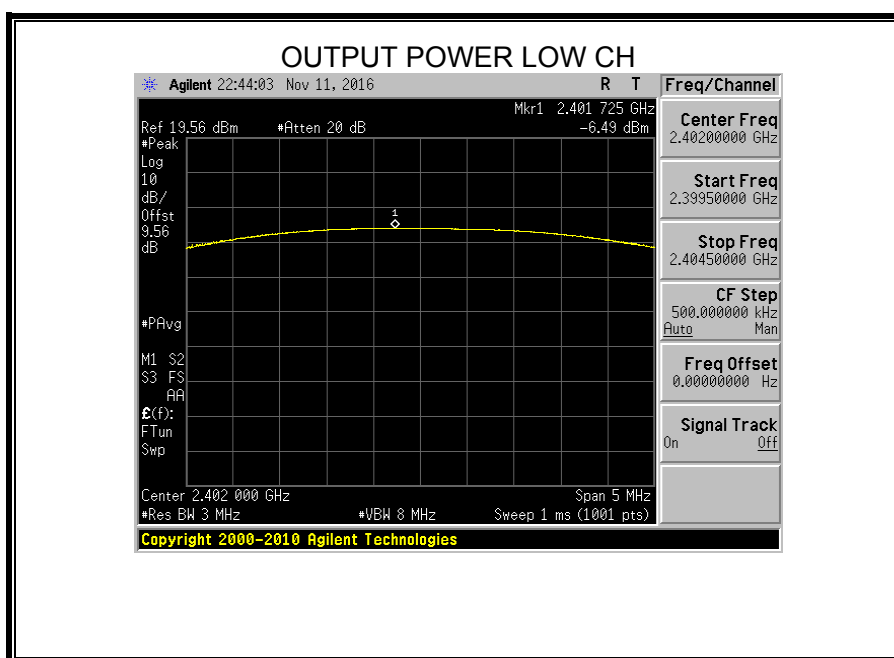
Temperature: 26.6°C
Relative Humidity: 58%
Test Voltage: DC 3.7V

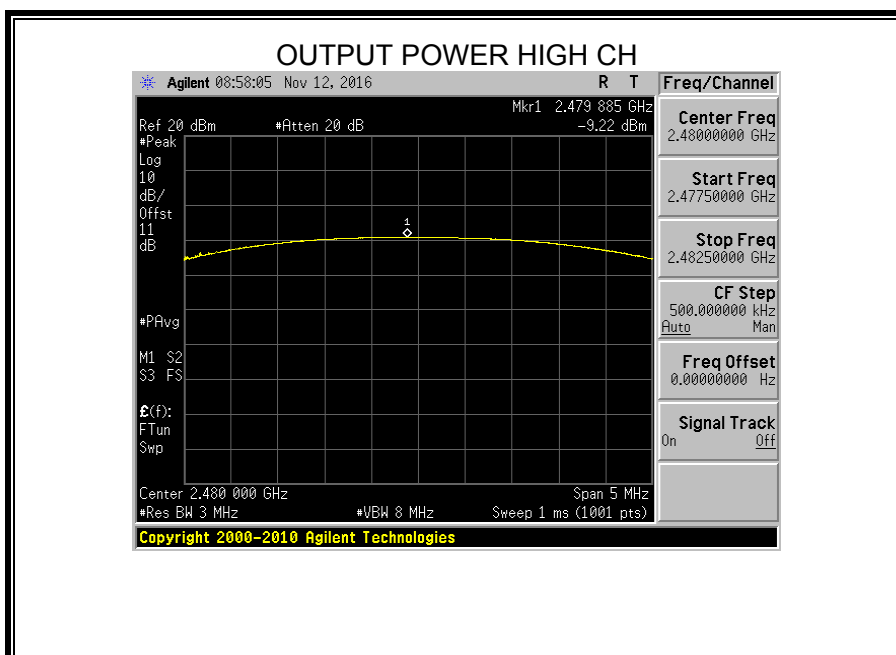
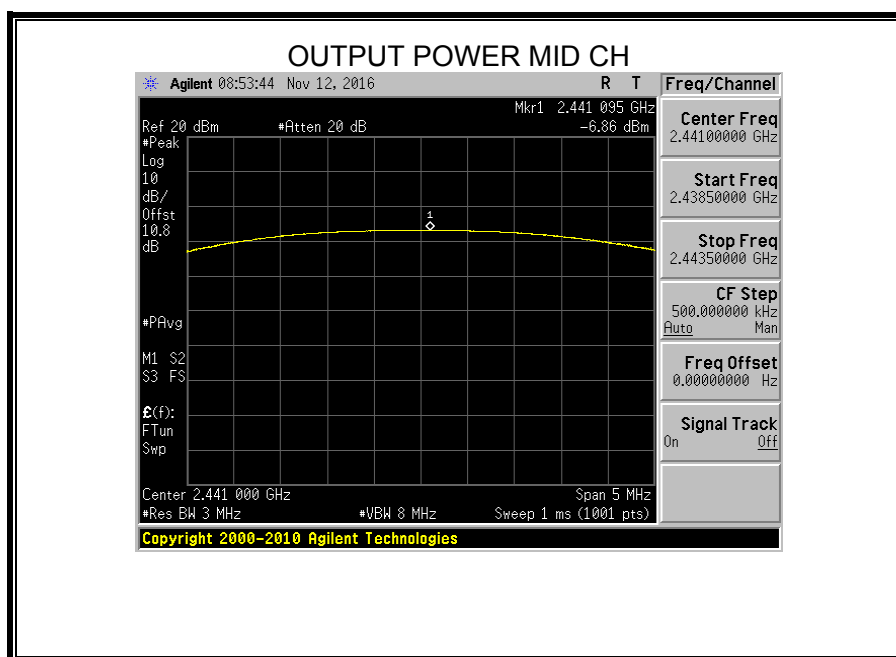
RESULTS

7.2.1. GFSK MODE

Channel	Frequency	Maximum Conducted Output Power(PK)	EIRP	Result
	(MHz)	(dBm)	(dBm)	
Low	2402	-6.490	-4.490	Pass
Middle	2441	-6.860	-4.860	Pass
High	2480	-9.220	-7.220	Pass

Note: EIRP = Maximum Conducted Output Power (PK) + Antenna Gain

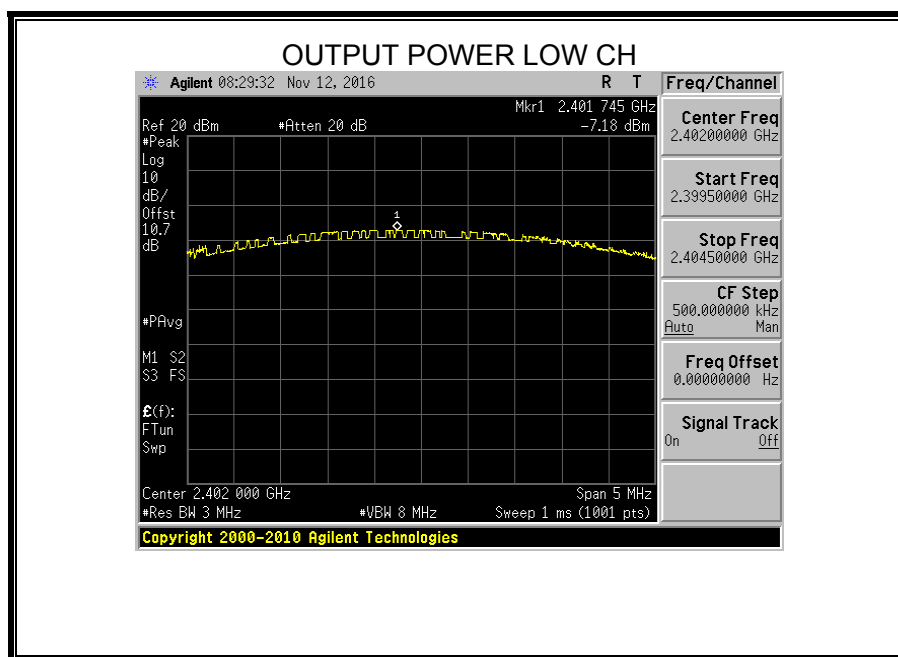


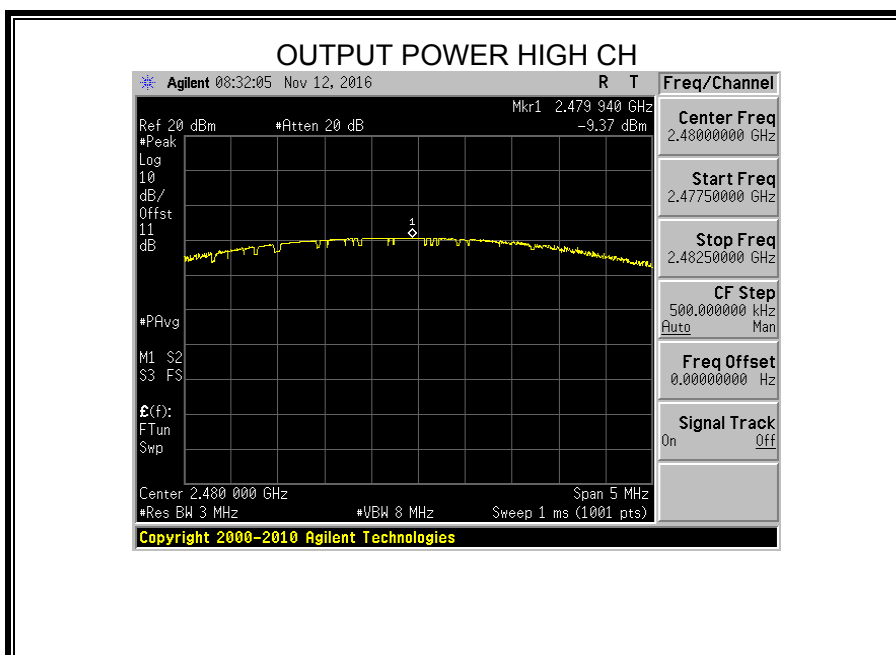
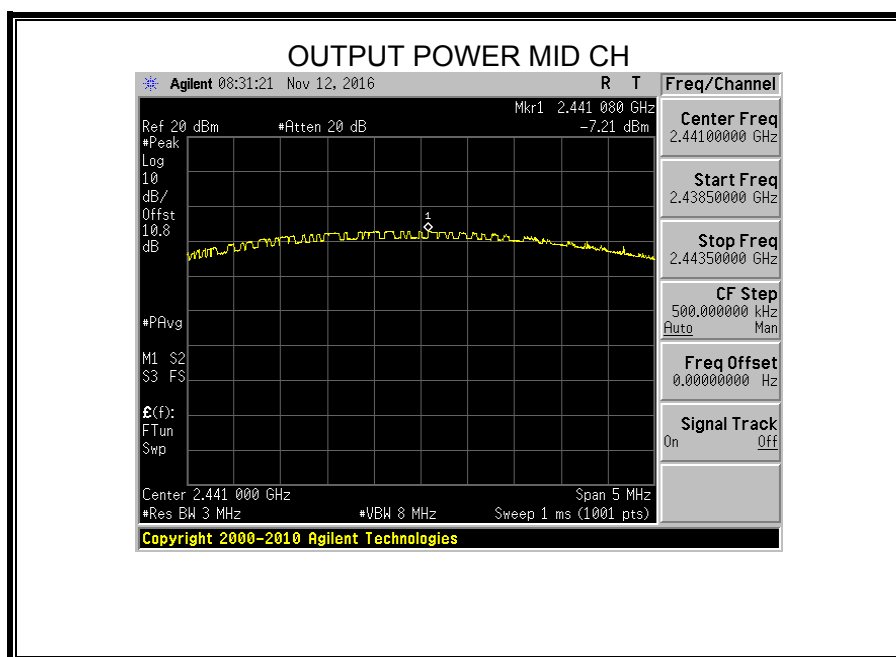


7.2.2. II/4-DQPSK MODE

Channel	Frequency	Maximum Conducted Output Power(PK)	EIRP	Result
	(MHz)	(dBm)	(dBm)	
Low	2402	-7.180	-5.180	Pass
Middle	2441	-7.210	-5.210	Pass
High	2480	-9.370	-7.370	Pass

Note: EIRP = Maximum Conducted Output Power (PK) + Antenna Gain





7.3. CARRIER HOPPING CHANNEL SEPARATION

LIMITS

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247 (a) (1)	Carrier Hopping Channel Separation	25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.	2400-2483.5

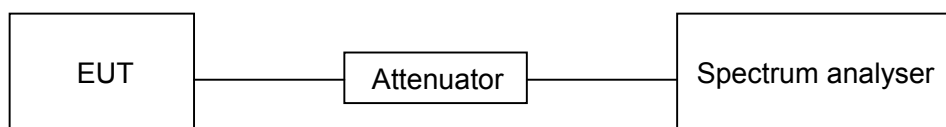
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
RBW	$\geq 1\%$ of the span
VBW	\geq RBW
Trace	Max hold
Sweep time	Auto couple

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

TEST SETUP



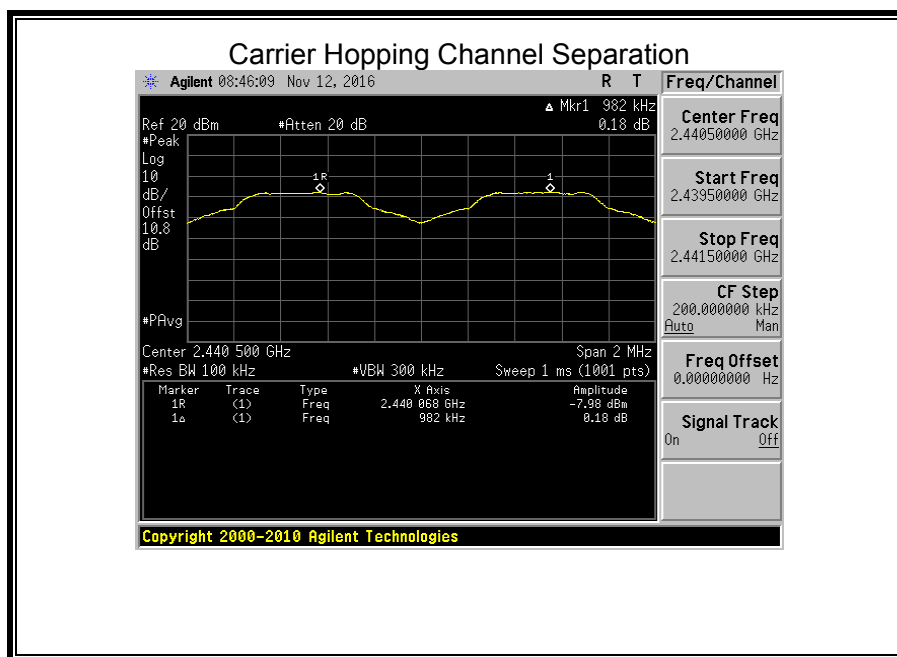
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: DC 3.7V

RESULTS

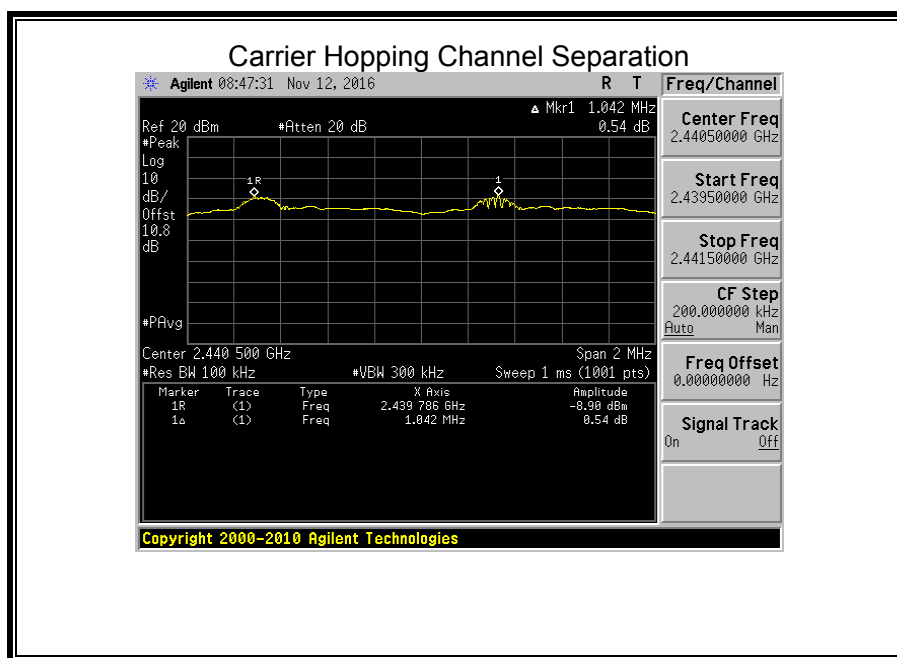
7.3.1. GFSK MODE

Channel	Carrier Hopping Channel Separation (MHz)	Limit (MHz)	Result
Middle	0.982	≥ two-thirds of the 20 dB Bandwidth Of The Hopping Channel	PASS



7.3.2. II/4-DQPSK MODE

Channel	Carrier Hopping Channel Separation (MHz)	Limit (MHz)	Result
Middle	1.042	≥ two-thirds of the 20 dB Bandwidth Of The Hopping Channel	PASS



7.4. NUMBER OF HOPPING FREQUENCY

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
15.247 (a) (1) III	Number of Hopping Frequency	at least 15 hopping channels

TEST PROCEDURE

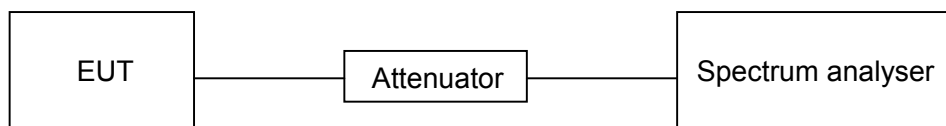
Connect the EUT to the spectrum analyser and use the following settings:

Detector	Peak
RBW	1% of the span
VBW	≥RBW
Span	The frequency band of operation
Trace	Max hold
Sweep time	Auto couple

Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer.

Count the quantity of peaks to get the number of hopping channels.

TEST SETUP



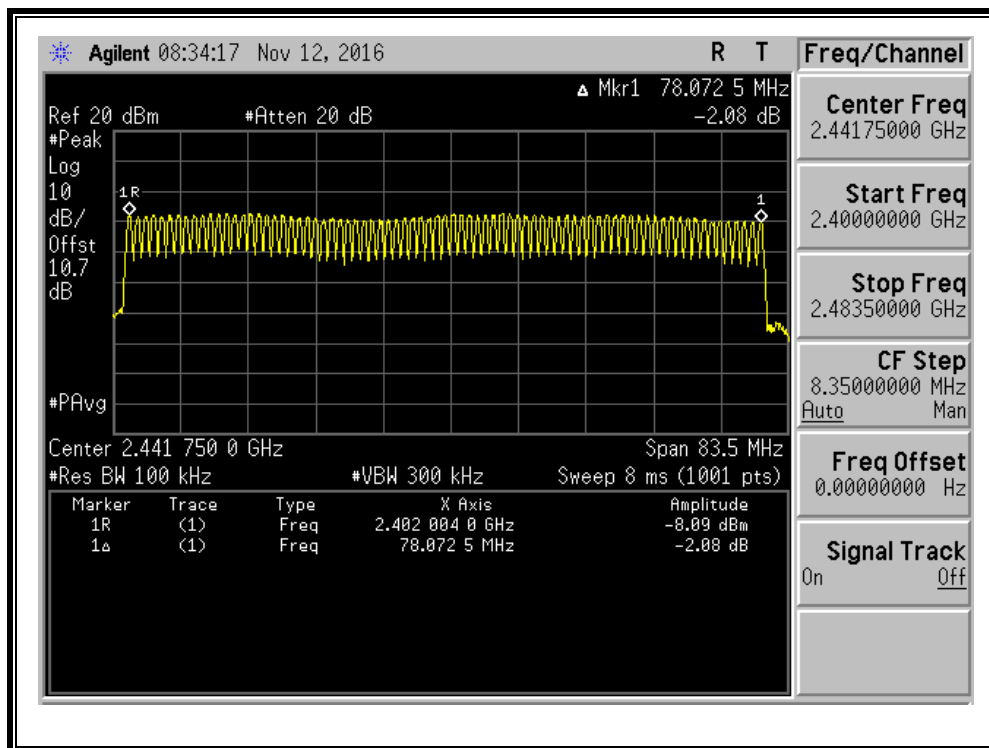
TEST CONDITIONS

Temperature: 26.6°C
Relative Humidity: 58%
Test Voltage: DC 3.7V

RESULTS

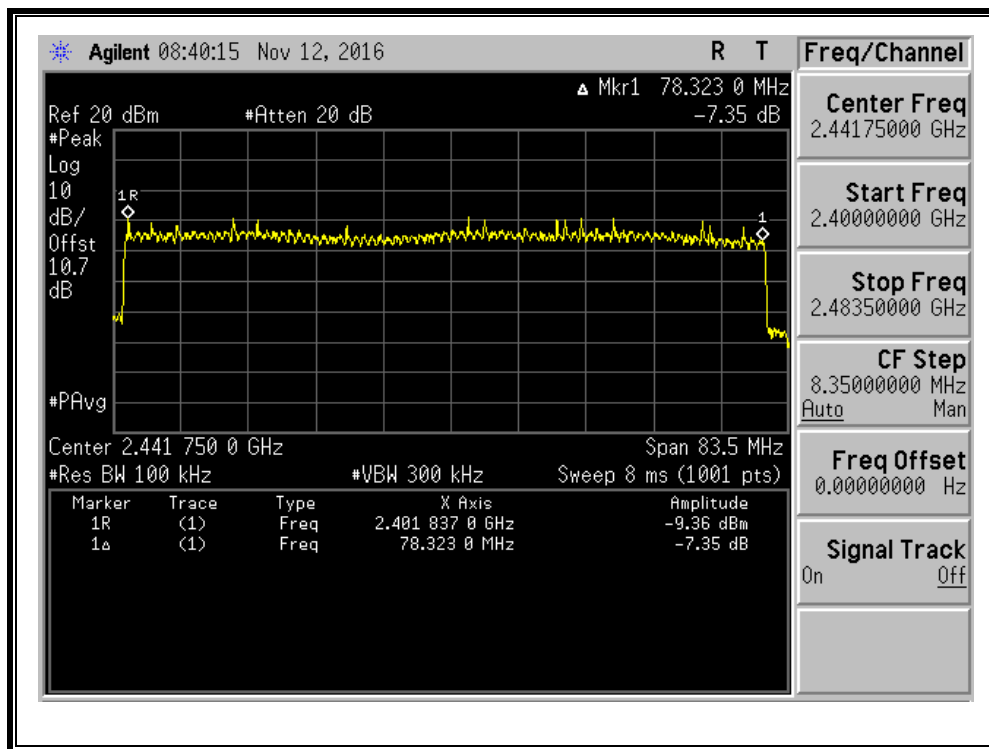
7.4.1. GFSK MODE

Hopping numbers	Limit	Results
79	>15	Pass



7.4.2. II/4-DQPSK MODE

Hopping numbers	Limit	Results
79	>15	Pass



7.5. TIME OF OCCUPANCY (DWELL TIME)

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
15.247 (a) (1) III	Time of Occupancy (Dwell Time)	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.

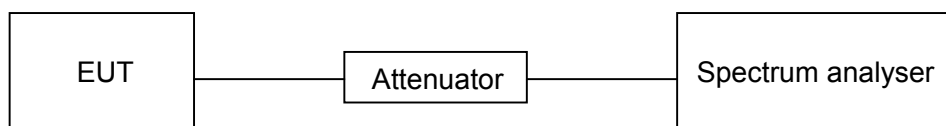
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	1 MHz
VBW	≥RBW
Span	zero span
Trace	Max hold
Sweep time	As necessary to capture the entire dwell time per hopping channel

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Set the EUT for DH5, DH3 and DH1 packet transmitting.
- Measure the maximum time duration of one single pulse.
A Period Time = (channel number)*0.4
DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)
DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)
DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

TEST SETUP



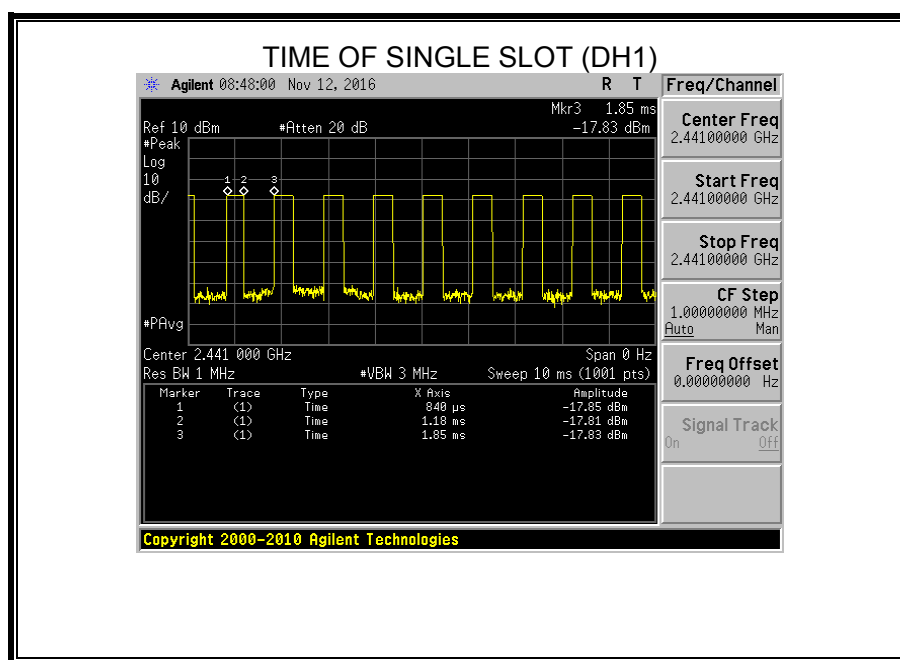
TEST CONDITIONS

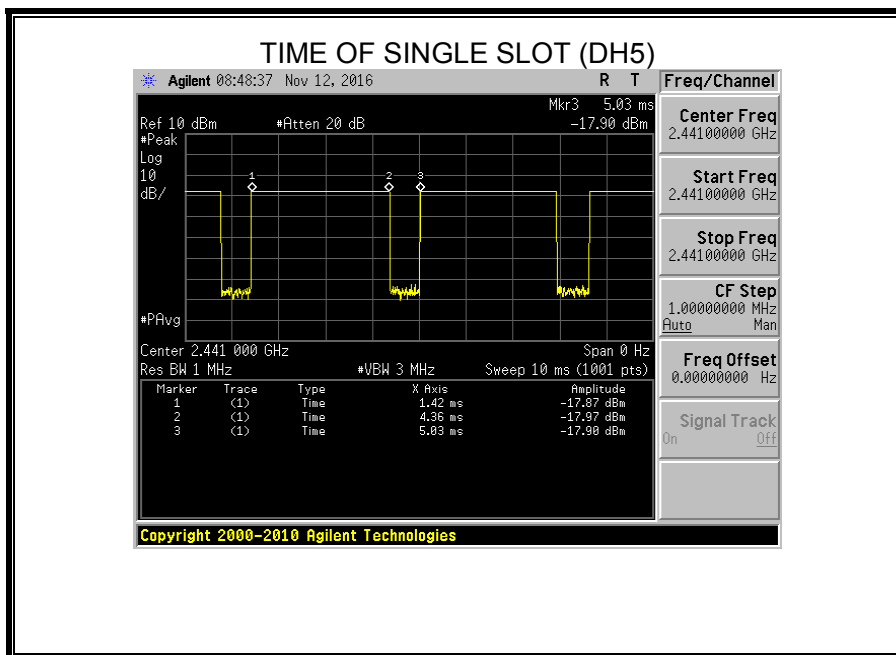
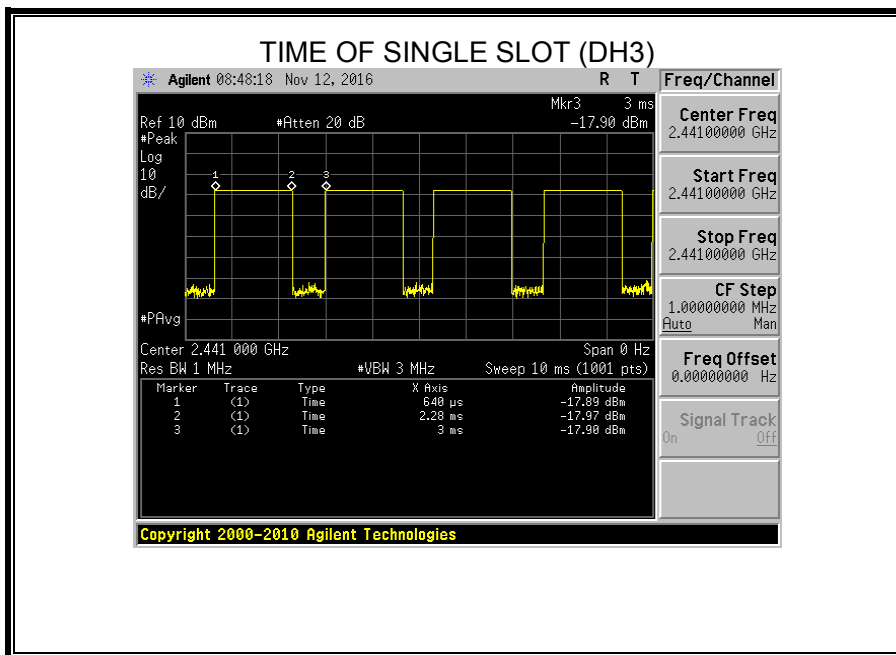
Temperature: 28°C
Relative Humidity: 60%
Test Voltage: DC 3.7V

RESULTS

7.5.1. GFSK MODE

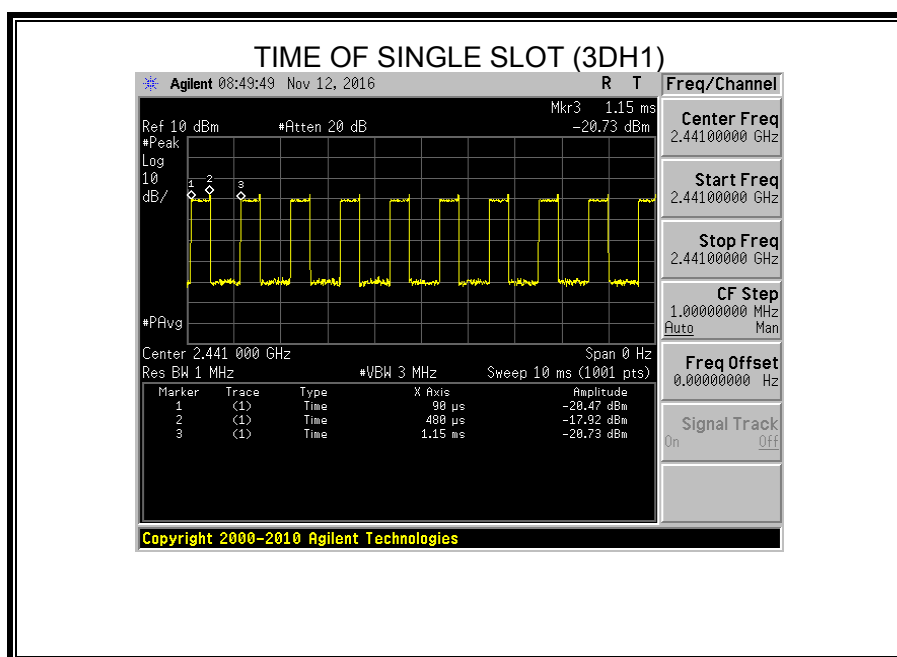
packet type	Time of Single Slot	Time of occupied in a period	Limit	Result
	[ms]	[s]	[s]	
DH1	0.34	0.109	≤ 0.4	Pass
DH3	1.64	0.262	≤ 0.4	Pass
DH5	2.94	0.314	≤ 0.4	Pass

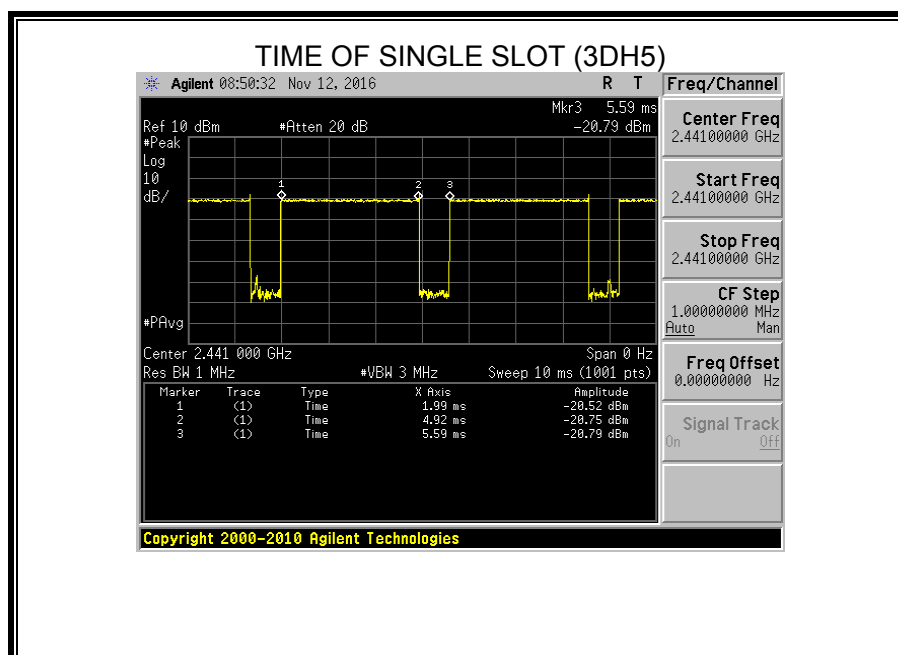
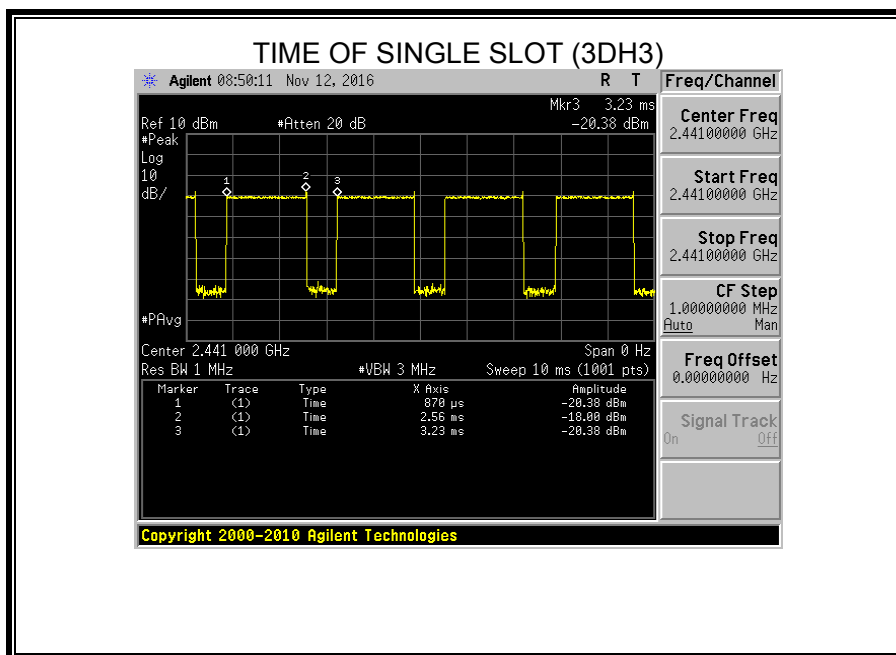




7.5.2. II/4-DQPSK MODE

packet type	Time of Single Slot	Time of occupied in a period	Limit	Result
	[ms]	[s]	[s]	
3DH1	0.39	0.125	≤ 0.4	Pass
3DH3	1.69	0.27	≤ 0.4	Pass
3DH5	2.93	0.313	≤ 0.4	Pass





7.6. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

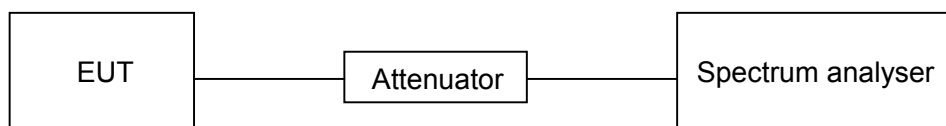
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100KHz
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100KHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

TEST SETUP

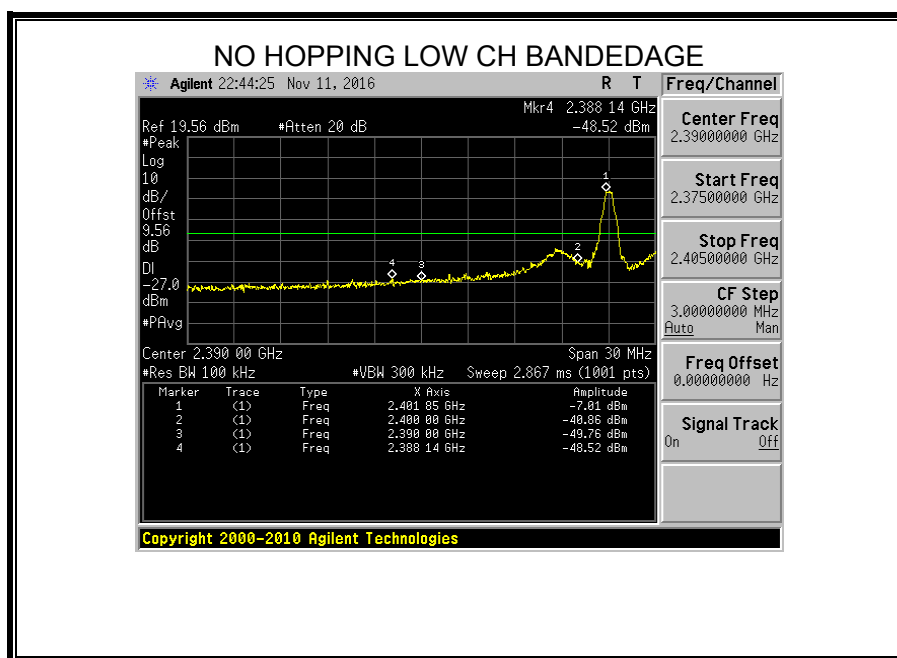


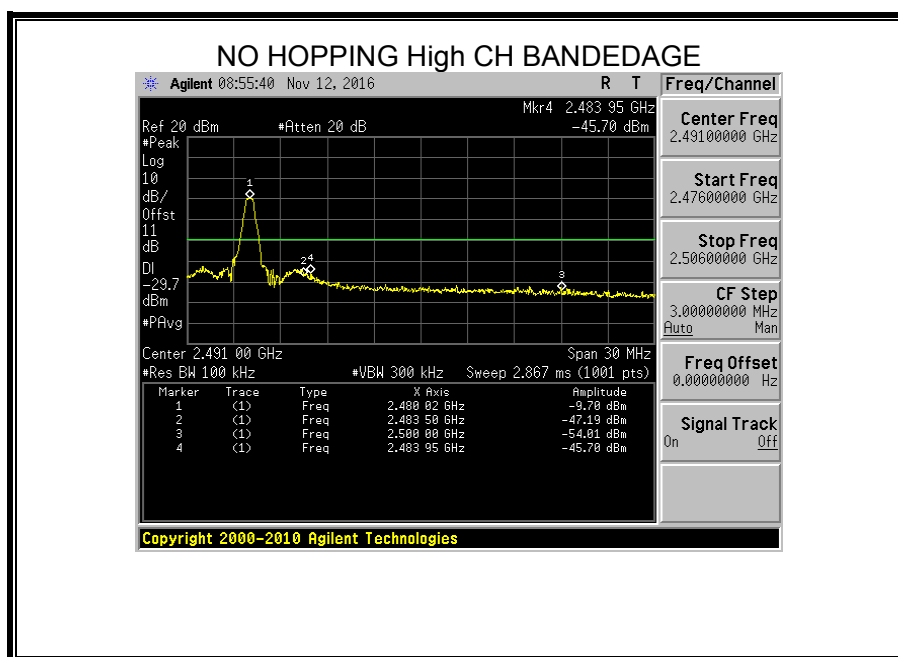
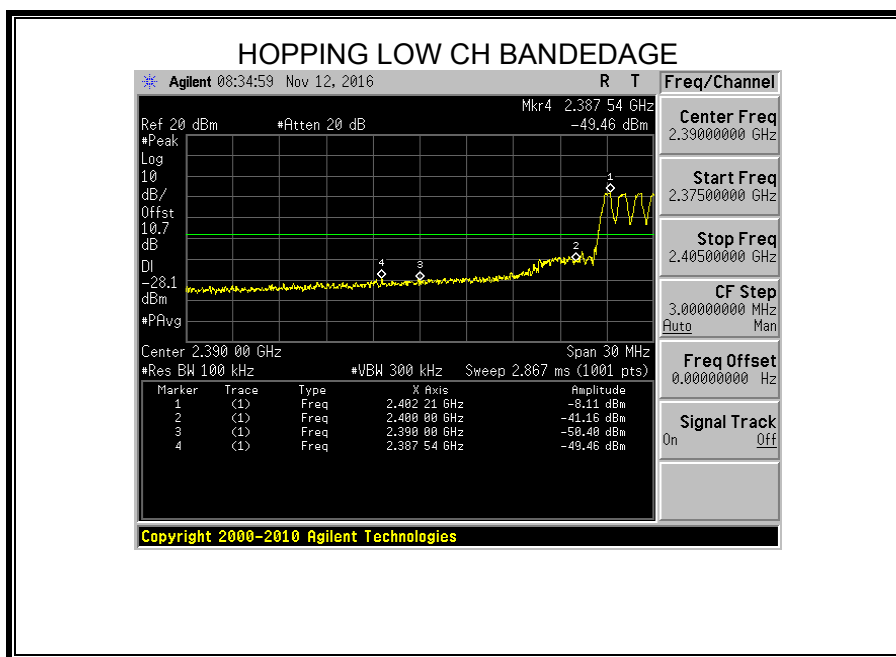
TEST CONDITIONS

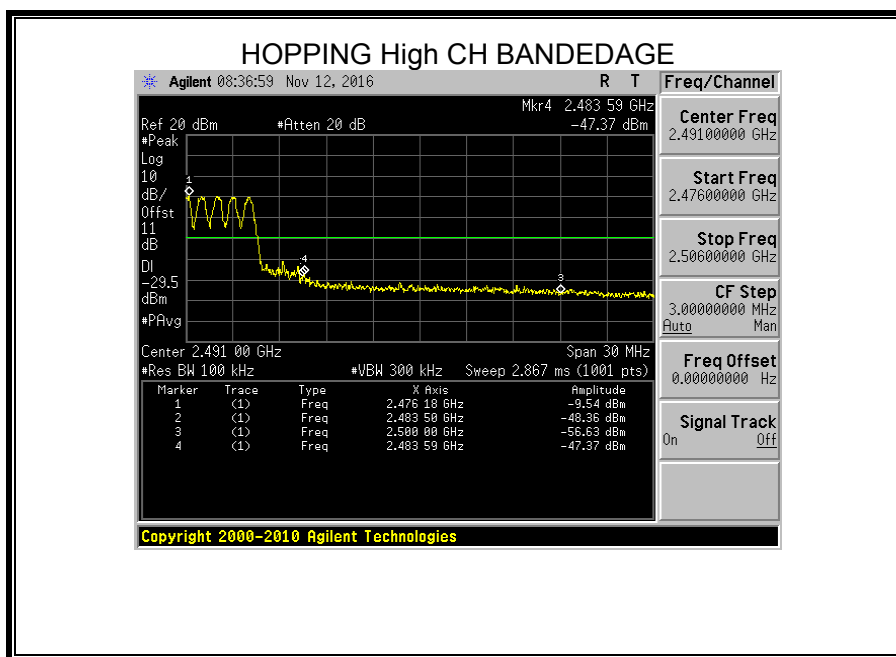
Temperature: 26.6°C
Relative Humidity: 58%
Test Voltage: AC 120V/60Hz

RESULTS

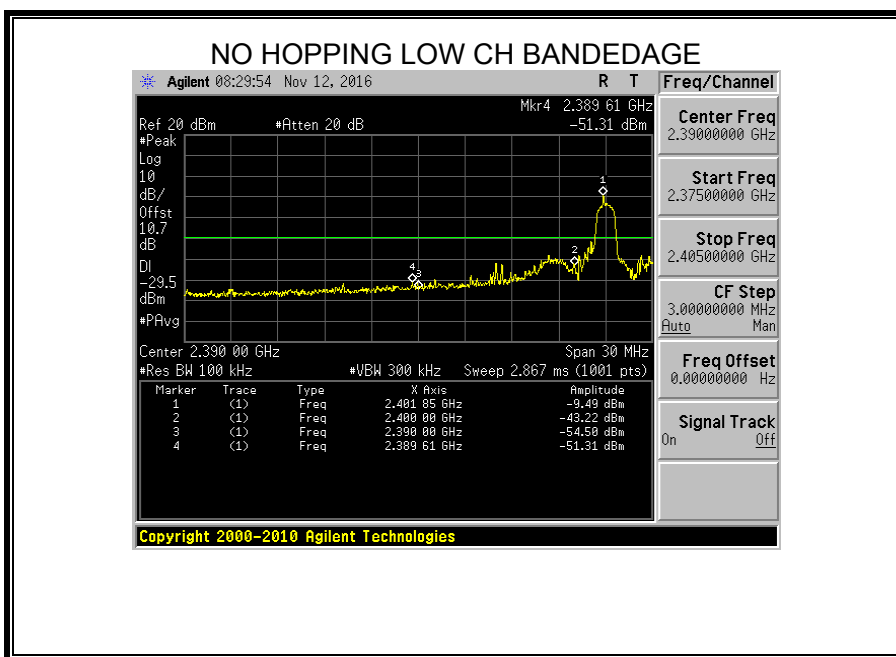
7.6.1. GFSK MODE

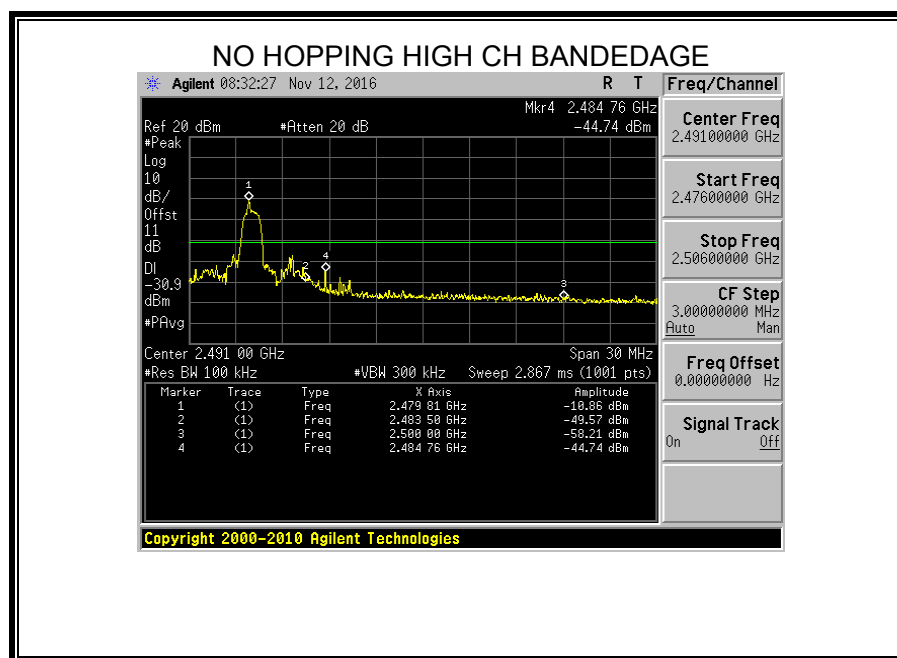
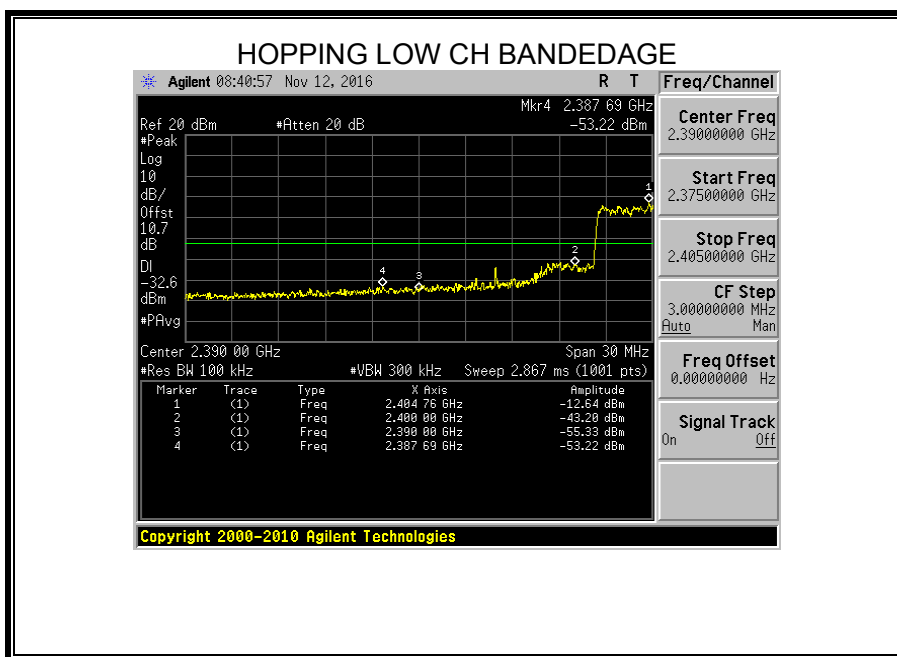


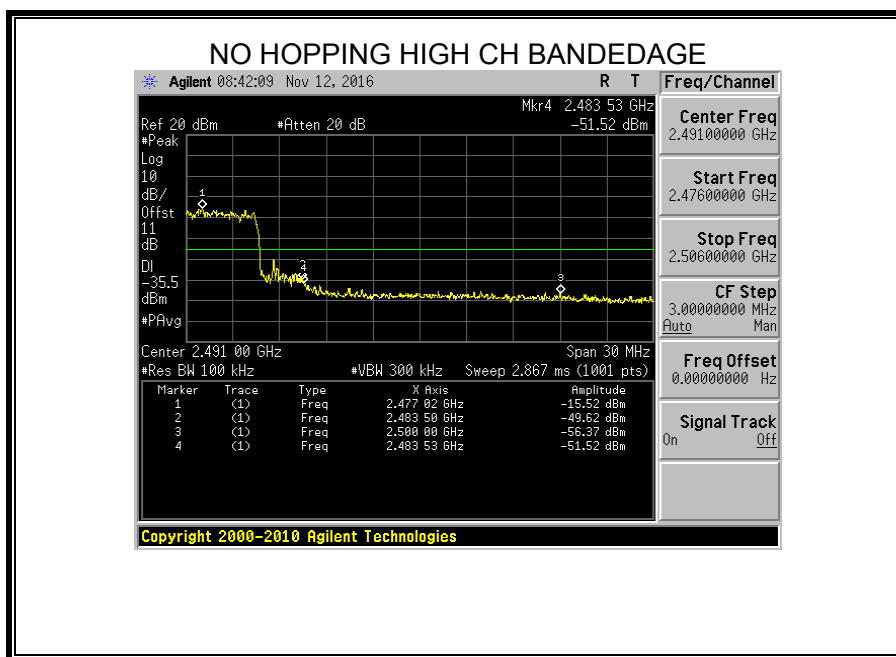




7.6.2. $\Pi/4$ -DQPSK MODE







8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

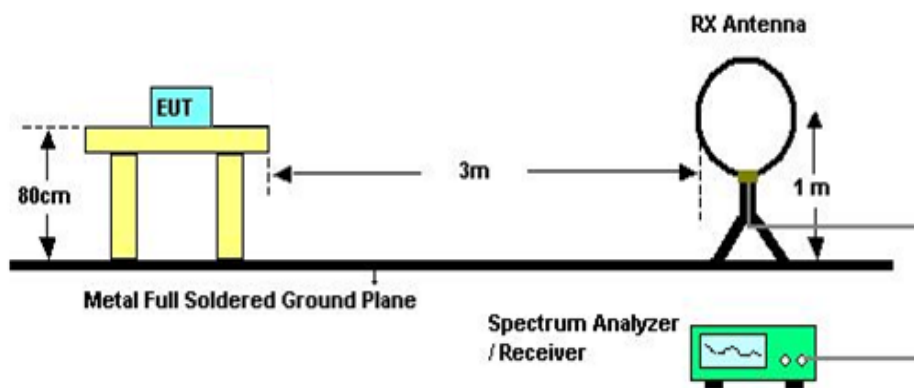
Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

TEST CONDITIONS

Temperature: 22.2°C
Relative Humidity: 61.2%
Test Voltage: AC 120V/60Hz

TEST SETUP AND PROCEDURE

Below 30MHz

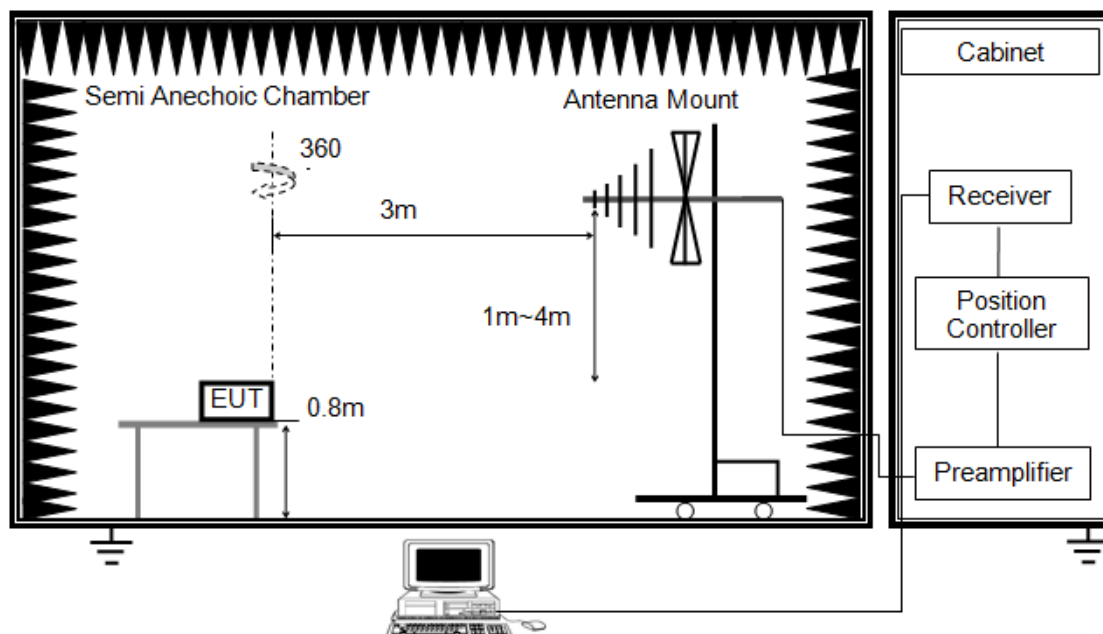


The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to Appendix III Internal Photographs.

Below 1G



The setting of the spectrum analyser

RBW	120KHz
VBW	300KHz
Sweep	Auto
Detector	QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to Appendix III Internal Photographs.

The diagram illustrates the experimental setup for measuring the proposed antenna. It is housed within a **Semi Anechoic Chamber**, which is represented by a rectangular box with sawtooth-shaped absorbers on its walls, floor, and ceiling. Inside the chamber, the **EUT** (Equipment Under Test) is placed on a stand at a height of **1.5m**. A **360°** rotation mechanism is indicated around the EUT. The **Antenna Mount** is positioned at a distance of **3m** from the EUT. The antenna is mounted on a vertical pole at a height of **1m~4m** from the ground. A **Receiver** is connected to the antenna mount. The receiver is part of a system housed in a **Cabinet**, which also contains a **Position Controller** and a **Preamplifier**. A **Computer** is connected to the system, likely for data acquisition and control. The ground plane is indicated by a ground symbol at the bottom left.

RBW	1MHz
VBW	3MHz
Sweep	Auto
Detector	Peak and CISPR Average
Trace	Max hold

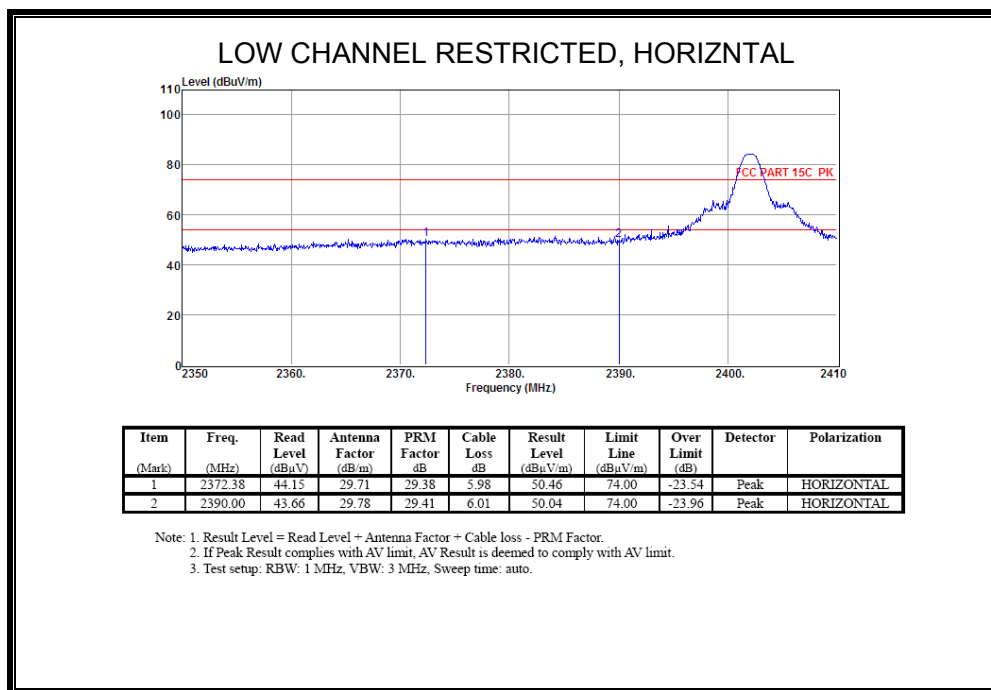
- ## TEST CONDITIONS

Temperature: 22.2°C
Relative Humidity: 61%
Test Voltage: DC 3.7V

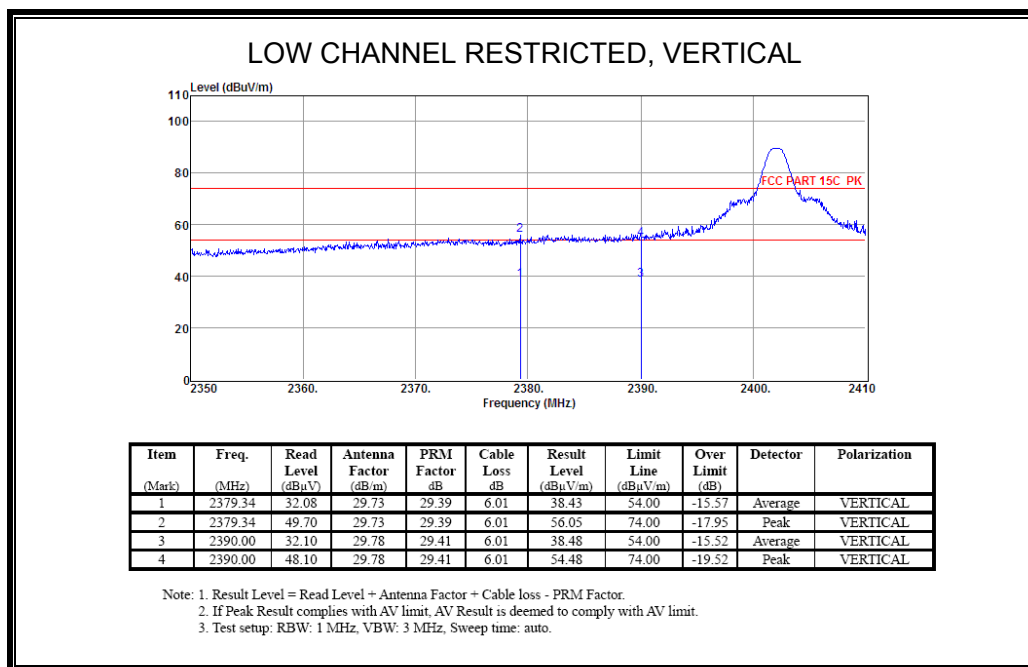
8.2. RESTRICTED BANDEDGE

8.2.1. GFSK MODE

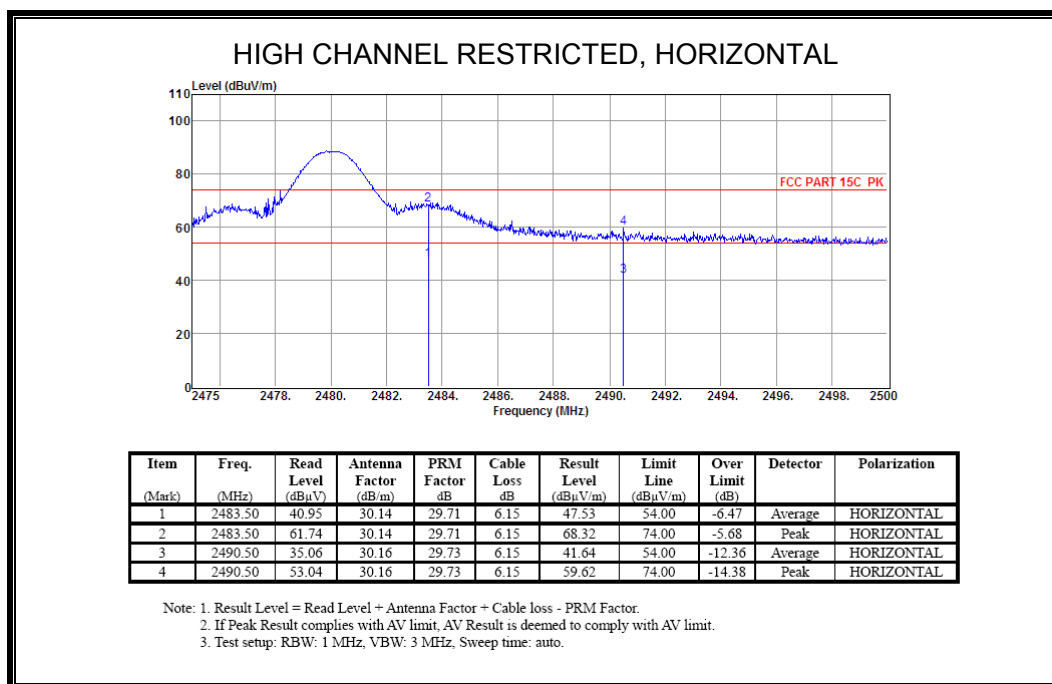
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



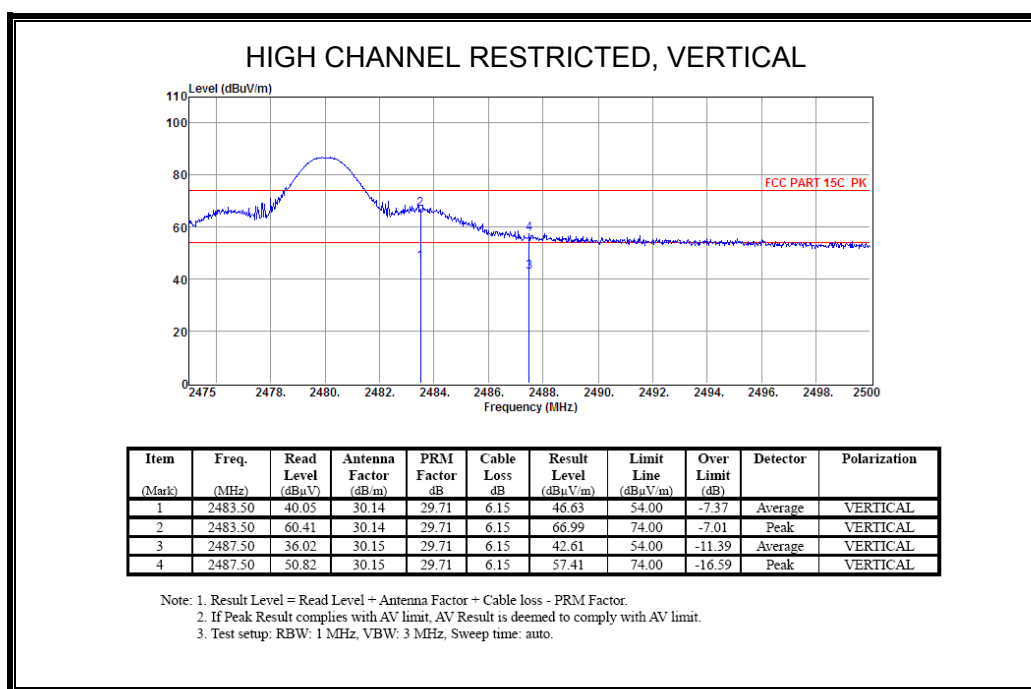
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



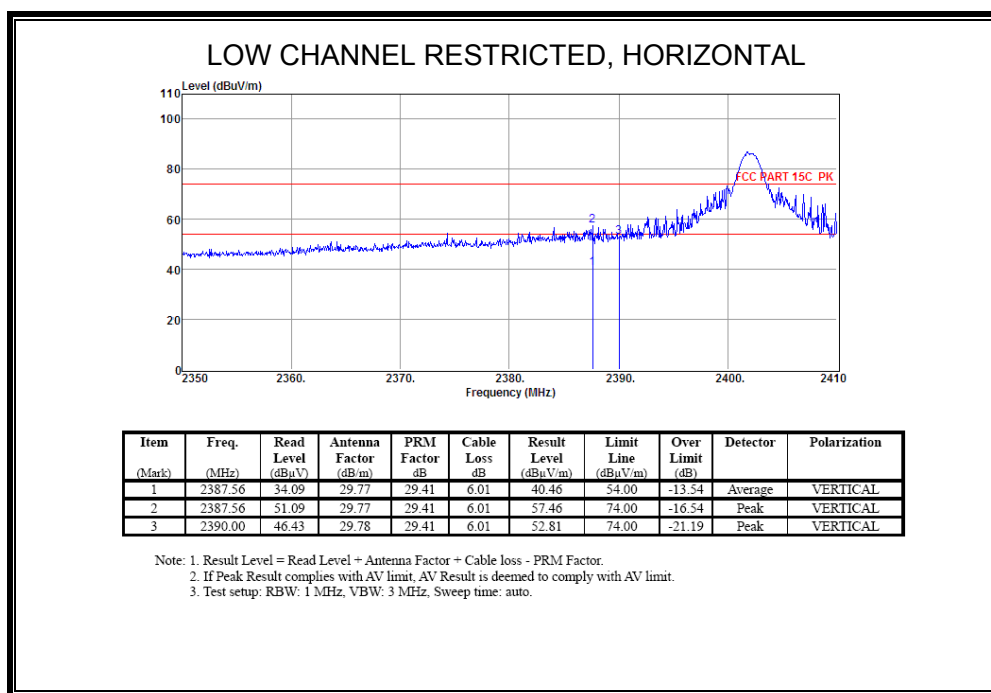
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



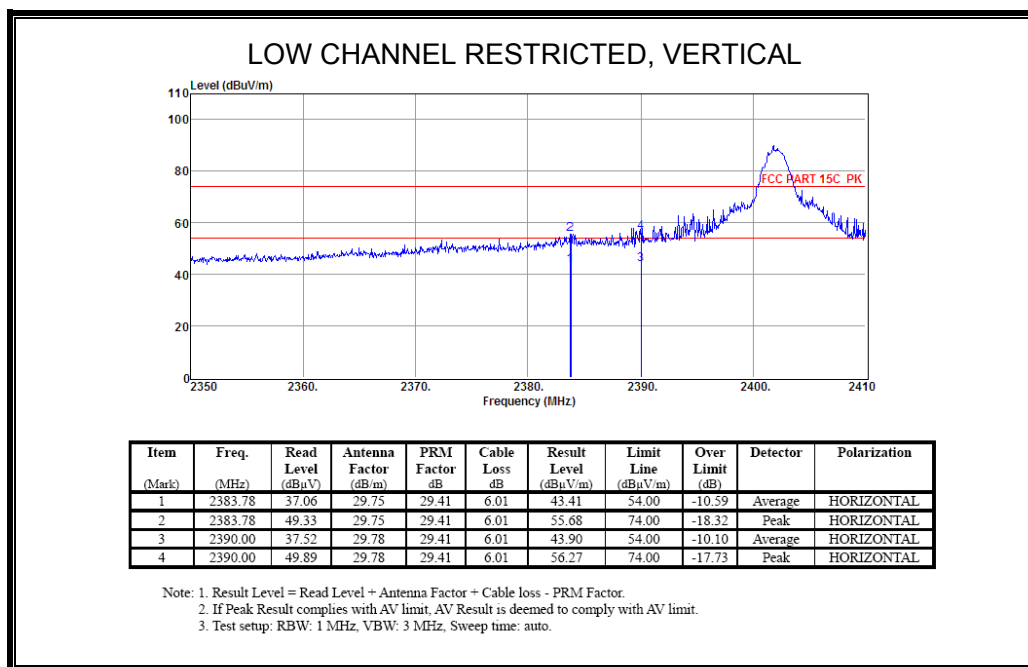
Note: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8.2.2. II/4-DQPSK MODE

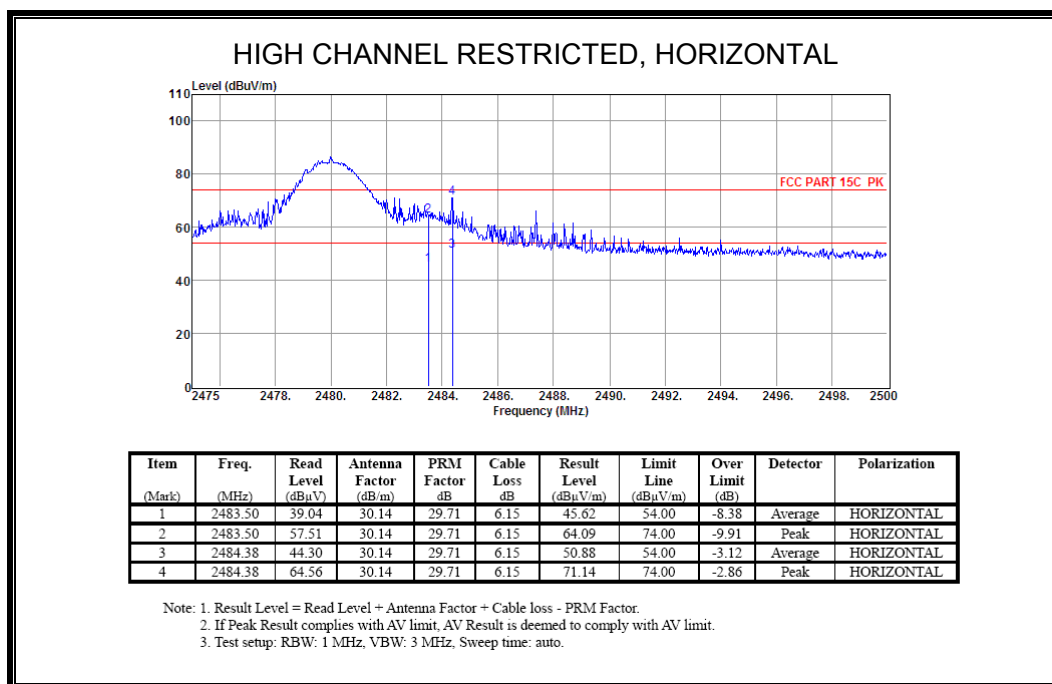
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



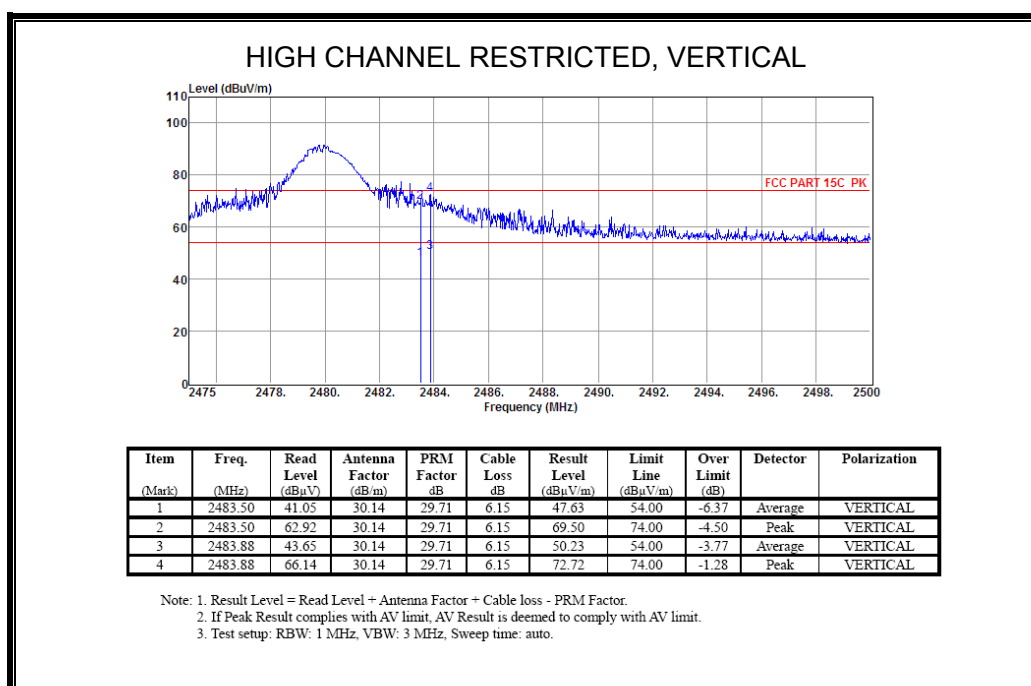
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Note: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8.3. SPURIOUS EMISSIONS (1~25GHz)

8.3.1. GFSK MODE

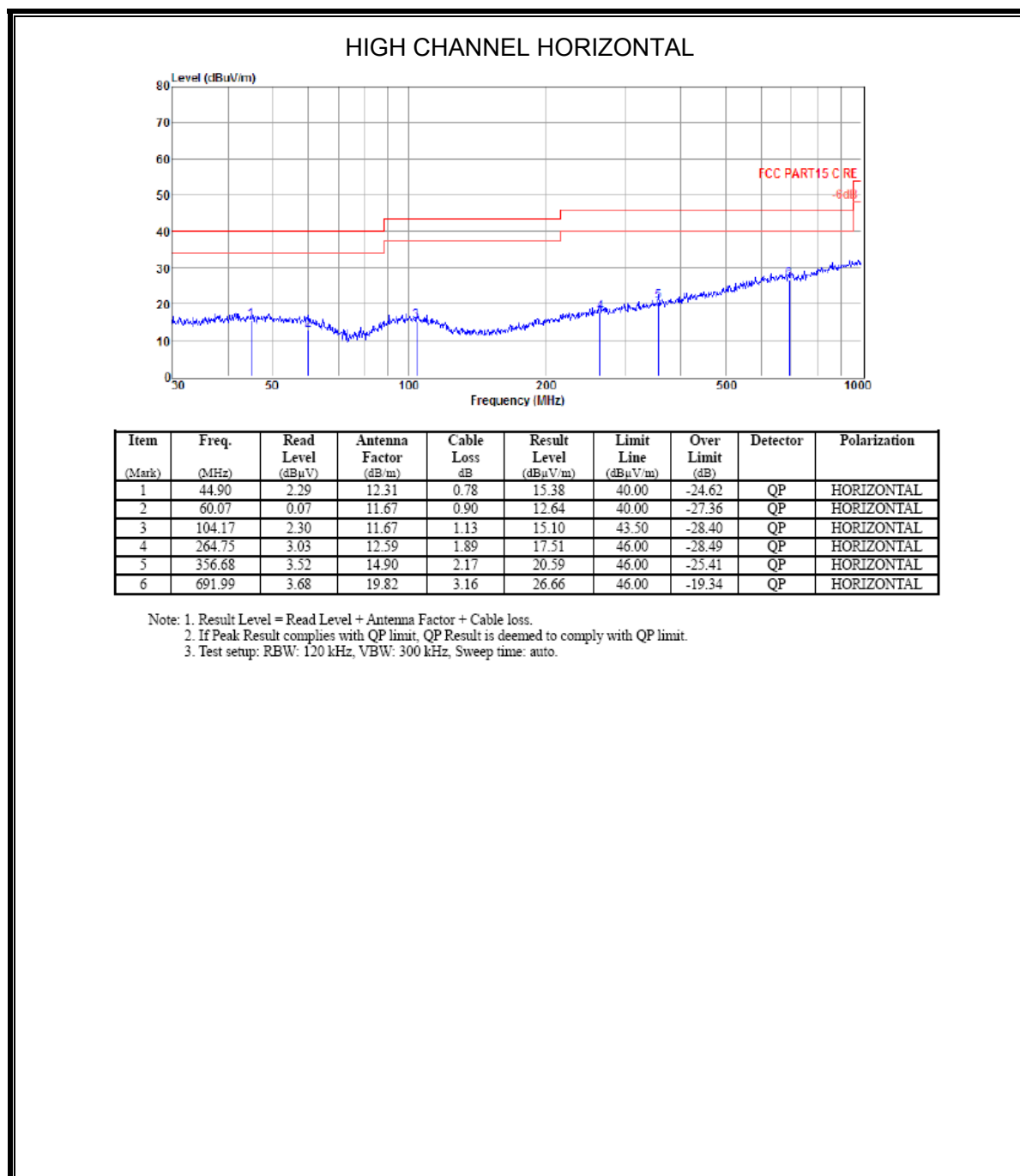
HARMONICS AND SPURIOUS EMISSIONS

Freq (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2402MHz									
1861.00	42.81	27.47	29.01	5.34	46.61	74.00	-27.39	Peak	VERTICAL
2295.00	41.34	29.39	29.25	5.89	47.37	74.00	-26.63	Peak	VERTICAL
3324.00	40.85	31.83	29.90	7.11	49.89	74.00	-24.11	Peak	VERTICAL
4804.00	36.29	33.74	29.32	8.48	49.19	74.00	-24.81	Peak	VERTICAL
7206.00	33.57	36.37	30.49	10.60	50.05	74.00	-23.95	Peak	VERTICAL
1329.00	43.45	24.73	29.37	4.49	43.30	74.00	-30.70	Peak	HORIZONTAL
3324.00	39.82	31.83	29.90	7.11	48.86	74.00	-25.14	Peak	HORIZONTAL
4804.00	33.40	33.74	29.32	8.48	46.30	74.00	-27.70	Peak	HORIZONTAL
6047.00	34.68	35.08	29.23	9.71	50.24	74.00	-23.76	Peak	HORIZONTAL
6929.00	34.78	36.14	30.34	10.37	50.95	74.00	-23.05	Peak	HORIZONTAL
7206.00	32.20	36.37	30.49	10.60	48.68	74.00	-25.32	Peak	HORIZONTAL
GFSK Tx mode 2441MHz									
1329.00	42.96	24.73	29.37	4.49	42.81	74.00	-31.19	Peak	VERTICAL
3324.00	39.91	31.83	29.90	7.11	48.95	74.00	-25.05	Peak	VERTICAL
4024.00	34.96	33.42	29.04	7.63	46.97	74.00	-27.03	Peak	VERTICAL
4882.00	36.69	33.72	29.33	8.56	49.64	74.00	-24.36	Peak	VERTICAL
6425.00	33.42	35.68	29.70	9.90	49.30	74.00	-24.70	Peak	VERTICAL
7323.00	31.30	36.46	30.59	10.71	47.88	74.00	-26.12	Peak	VERTICAL
1861.00	41.01	27.47	29.01	5.34	44.81	74.00	-29.19	Peak	HORIZONTAL
3471.00	37.24	31.89	29.59	7.26	46.80	74.00	-27.20	Peak	HORIZONTAL
4297.00	34.24	33.64	29.11	7.92	46.69	74.00	-27.31	Peak	HORIZONTAL
4882.00	35.26	33.72	29.33	8.56	48.21	74.00	-25.79	Peak	HORIZONTAL
5641.00	33.84	34.79	29.23	9.32	48.72	74.00	-25.28	Peak	HORIZONTAL
7323.00	34.07	36.46	30.59	10.71	50.65	74.00	-23.35	Peak	HORIZONTAL
GFSK Tx mode 2480MHz									
1329.00	45.48	24.73	29.37	4.49	45.33	74.00	-28.67	Peak	VERTICAL
2372.00	39.51	29.71	29.38	5.98	45.82	74.00	-28.18	Peak	VERTICAL
3464.00	37.74	31.89	29.62	7.26	47.27	74.00	-26.73	Peak	VERTICAL
4960.00	36.46	33.71	29.34	8.63	49.46	74.00	-24.54	Peak	VERTICAL
6320.00	34.30	35.52	29.51	9.85	50.16	74.00	-23.84	Peak	VERTICAL
7440.00	31.32	36.55	30.70	10.80	47.97	74.00	-26.03	Peak	VERTICAL
3324.00	38.24	31.83	29.90	7.11	47.28	74.00	-26.72	Peak	HORIZONTAL
4437.00	35.55	33.75	29.17	8.08	48.21	74.00	-25.79	Peak	HORIZONTAL
4960.00	34.81	33.71	29.34	8.63	47.81	74.00	-26.19	Peak	HORIZONTAL
6033.00	34.16	35.05	29.22	9.70	49.69	74.00	-24.31	Peak	HORIZONTAL
6747.00	33.77	36.00	30.20	10.19	49.76	74.00	-24.24	Peak	HORIZONTAL
7440.00	32.82	36.55	30.70	10.80	49.47	74.00	-24.53	Peak	HORIZONTAL
Result: Pass									
Note1: 1.30MHz~18GHz: (Scan with GFSK, $\pi/4$ QPSK, 8-DPSK, the worst case is GFSK Mode)									
2. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.									
Note2: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.									

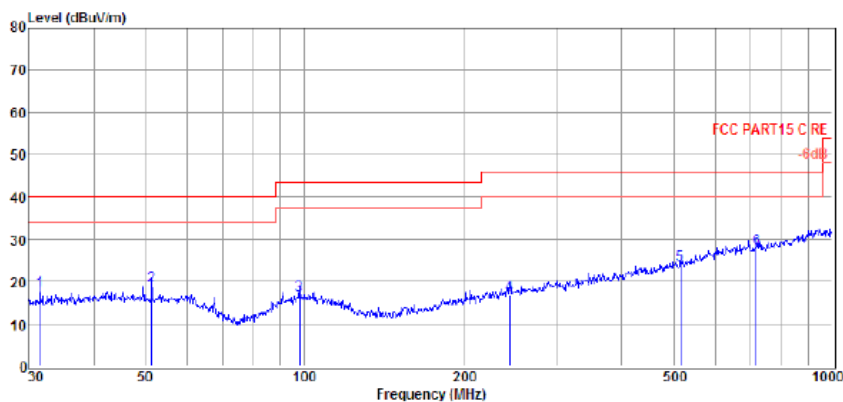
8.4. SPURIOUS EMISSIONS 30M ~ 1 GHz

8.4.1. GFSK MODE

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



HIGH CHANNEL VERTICAL



Item (Mark)	Freq. (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	31.62	5.83	11.34	0.64	17.81	40.00	-22.19	QP	VERTICAL
2	51.30	6.29	11.80	0.78	18.87	40.00	-21.13	QP	VERTICAL
3	97.80	3.76	11.83	1.13	16.72	43.50	-26.78	QP	VERTICAL
4	245.09	2.72	12.30	1.82	16.84	46.00	-29.16	QP	VERTICAL
5	515.44	3.71	17.55	2.72	23.98	46.00	-22.02	QP	VERTICAL
6	719.20	4.90	19.79	3.19	27.88	46.00	-18.12	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Note: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8.5. SPURIOUS EMISSIONS BELOW 30M

Note 1: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Note 2: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

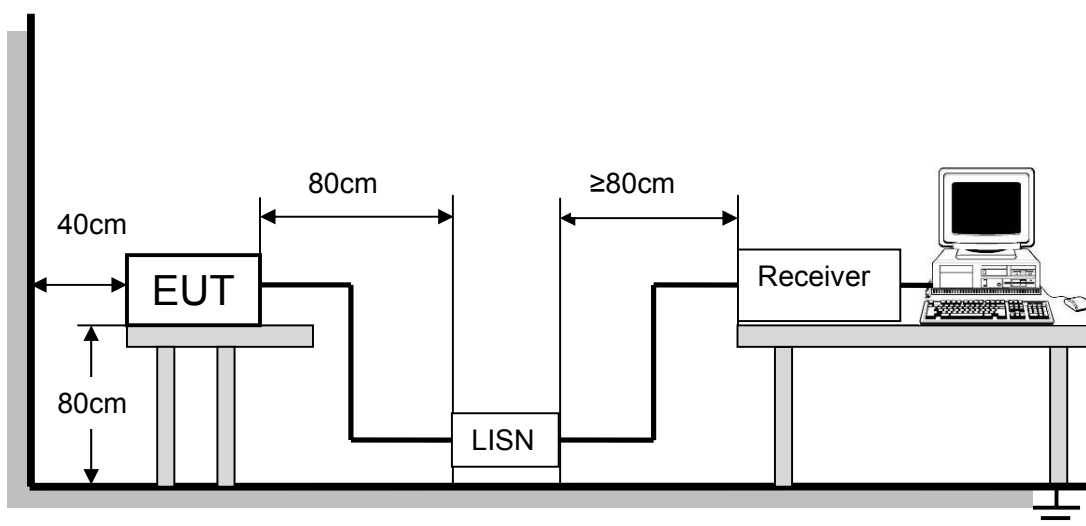
9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE

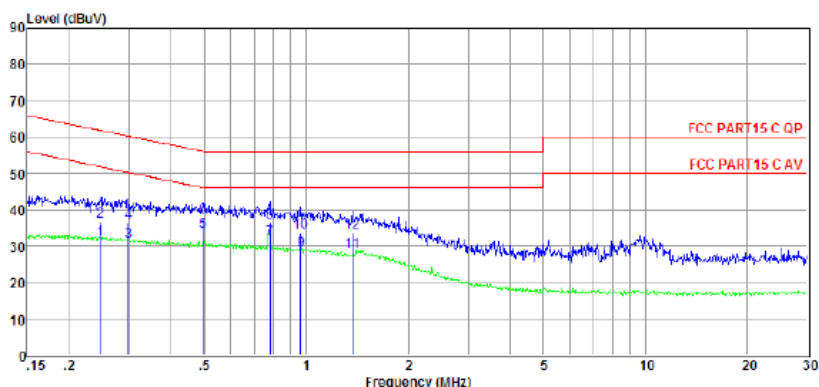


The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2014. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST RESULTS (WORST-CASE CONFIGURATION)

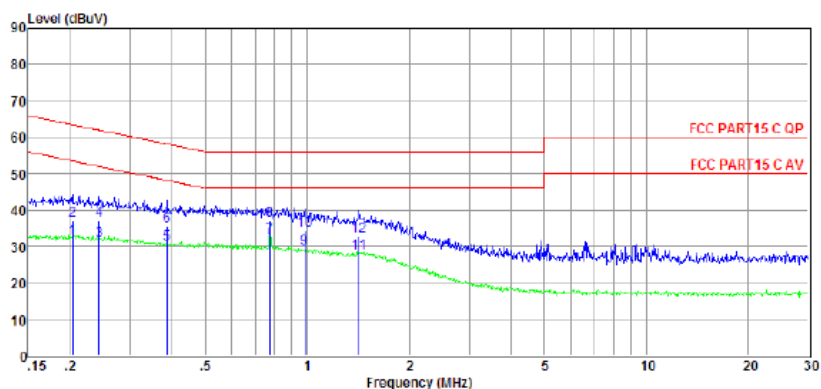
EUT:	Smidt-imet Bluetooth Speaker	Model Name:	SI-598
Temperature:	26.0°C	Relative Humidity:	43.0 %
Pressure:	1012 hPa	Test Voltage:	AC 120V/60Hz
Test Mode:	GFSK Mode	Phase :	L1



Item (Mark)	Freq. (MHz)	Read Level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Detector	Phase
1	0.247	12.47	9.61	0.02	9.86	31.96	51.86	-19.90	Average	LINE
2	0.247	17.31	9.61	0.02	9.86	36.80	61.86	-25.06	QP	LINE
3	0.299	11.68	9.61	0.02	9.86	31.17	50.28	-19.11	Average	LINE
4	0.299	17.00	9.61	0.02	9.86	36.49	60.28	-23.79	QP	LINE
5	0.497	14.40	9.61	0.02	9.86	33.89	46.05	-12.16	Average	LINE
6	0.497	18.61	9.61	0.02	9.86	38.10	56.05	-17.95	QP	LINE
7	0.779	12.35	9.61	0.03	9.86	31.85	46.00	-14.15	Average	LINE
8	0.779	16.98	9.61	0.03	9.86	36.48	56.00	-19.52	QP	LINE
9	0.963	9.37	9.61	0.03	9.86	28.87	46.00	-17.13	Average	LINE
10	0.963	14.15	9.61	0.03	9.86	33.65	56.00	-22.35	QP	LINE
11	1.367	9.06	9.62	0.03	9.86	28.57	46.00	-17.43	Average	LINE
12	1.367	14.09	9.62	0.03	9.86	33.60	56.00	-22.40	QP	LINE

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz). 9 kHz (150 kHz—30 MHz).

EUT:	Smidt-imet Bluetooth Speaker	Model Name:	SI-598
Temperature:	26.0°C	Relative Humidity:	43.0 %
Pressure:	1012 hPa	Test Voltage:	AC 120V/60Hz
Test Mode:	GFSK Mode	Phase :	N



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.203	12.57	9.61	0.02	9.86	32.06	53.49	-21.43	Average	NEUTRAL
2	0.203	17.54	9.61	0.02	9.86	37.03	63.49	-26.46	QP	NEUTRAL
3	0.243	12.12	9.61	0.02	9.86	31.61	52.00	-20.39	Average	NEUTRAL
4	0.243	17.53	9.61	0.02	9.86	37.02	62.00	-24.98	QP	NEUTRAL
5	0.385	11.00	9.61	0.02	9.86	30.49	48.17	-17.68	Average	NEUTRAL
6	0.385	16.06	9.61	0.02	9.86	35.55	58.17	-22.62	QP	NEUTRAL
7	0.775	12.94	9.61	0.03	9.86	32.44	46.00	-13.56	Average	NEUTRAL
8	0.775	17.56	9.61	0.03	9.86	37.06	56.00	-18.94	QP	NEUTRAL
9	0.984	9.76	9.61	0.03	9.86	29.26	46.00	-16.74	Average	NEUTRAL
10	0.984	14.95	9.61	0.03	9.86	34.45	56.00	-21.55	QP	NEUTRAL
11	1.426	8.54	9.62	0.03	9.86	28.05	46.00	-17.95	Average	NEUTRAL
12	1.426	13.28	9.62	0.03	9.86	32.79	56.00	-23.21	QP	NEUTRAL

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

ANTENNA CONNECTOR

EUT has a PCB antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT