TEST REPORT

FCC ID: ZC8S321NETWORK

Applicant : Hemisphere GNSS Inc.

Address : 8515 E Anderson Dr, Scottsdale, AZ 85255, USA

Equipment under Test (EUT):

Name : GNSS Survey Receiver

Model : S321 Network, BRx6 Network

Standards : FCC PART 15, SUBPART C: 2014 (Section 15.247)
ANSI C63.10: 2013

Report No : T1851403 17
Date of Test : September 22- November 16, 2015
Date of Issue : November 16, 2015

Test Result : PASS

In the configuration tested, the EUT complied with the standards specified above
Authorized Signature

(Mark Zhu)
Manager

Contents

TEST REPORT VERIFICATION

Applicant	:	Hemisphere GNSS Inc.
Manufacturer	:	Hemisphere GNSS Inc.
EUT Description	:	GNSS Survey Receiver
(A) Model No.		: S321 Network , BRx6 Network
(B) Trademark		: N/A
(C) Ratings Supply		: DC 10.8V from internal battery or external battery
(D)Test Voltage		: DC 10.8V from internal battery

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C 2014, ANSI C63.4-2014

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C and RSS-247limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Eric Huang Test Engineer	
Approved by (name + signature)…....:	Simple Guan Project Manager	
Date of issue…… ……..:	November 16, 2015	

1. General Information

1.1. Description of Device (EUT)

EUT	:	GNSS Survey Receiver
Model No.	:	S321 Network , BRx6 Network
DIFF		Only differ in model number.
Trade mark	:	N/A
Power supply	:	DC 10.8V from internal battery or external battery
Adapter	:	Manufacturer: NIL Model No.: PSAA30R-150
Radio Technology	:	BT2.1+EDR
Operation frequency	:	2402-2480MHz
Modulation	:	GFSK, π/4 DQPSK, 8-DPSK
Antenna Type	:	Integrated Antenna, max gain 3.92 dBi.
Applicant	:	Hemisphere GNSS Inc.
Address	:	8515 E Anderson Dr, Scottsdale, AZ 85255, USA
Manufacturer	:	Hemisphere GNSS Inc.
Address	:	8515 E Anderson Dr, Scottsdale, AZ 85255, USA

1.2. Accessories of device (EUT)

Description	:	Adapter
Manufacturer	:	NIL
Model No.	:	PSAA30R-150
Input	:	AC 100-240V, 50-60Hz, 0.8A
Output	:	DC 15V, 2A

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd
Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road,
Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2. Summary of test

2.1. Summary of test result

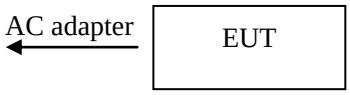
Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.4 :2009	PASS
Bandwidth	FCC Part 15: 15.215 ANSI C63.4 :2009	PASS
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.4 :2009	PASS
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2009	PASS
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2009	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.4 :2009	PASS
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.4 :2009	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.4 :2009	PASS
Antenna requirement	FCC Part 15: 15.203	PASS
Note: Test with engineer mode.		

2.2. Assistant equipment used for test

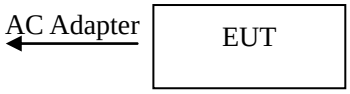
Description	:	Notebook
Manufacturer	:	ACER
Model No.	:	ZQT
Remark: FCC DOC approved		

2.3. Block Diagram

1, For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground. EUT was be set into BT test mode by engineer mode before test.



2, For Power Line Conducted Emissions Test: EUT was connected to notebook by 1.5m USB line



2.4. Test mode

The engineer mode was used to control EUT work in continuous TX mode, and select test channel, wireless mode.

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
π /4 DQPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
8- DPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

2.5. Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10-9	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2℃	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Cal. Due day	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2016.01.19	1Year
Spectrum analyzer	Agilent	E4407B	MY49510055	2016.01.19	1Year
Receiver	R&S	ESCI	101165	2016.01.19	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2017.01.21	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.21	2Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	2017.01.21	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2016.01.19	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2016.01.19	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2016.01.19	1 Year
Power Meter	Anritsu	ML2487A	6K00001491	2016.01.19	1Year
Power sensor	Anritsu	ML2491A	32516	2016.01.19	1Year
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2016.01.19	1Year
Pre-amplifier	Quietek	AP-180C	CHM-0602012	2016.01.19	1Year

3. Maximum Peak Output power

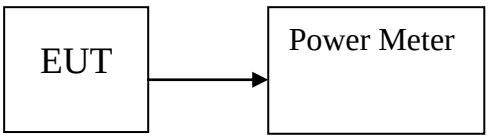
3.1. Limit

Please refer section 15.247.

3.2. Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

3.3. Test Setup



3.4. Test Result

EUT: GNSS Survey Receiver M/N: S321 Network					
Test date: 2015-11-11		Test site: RF site	Tested by: Peter		
Mode	Freq (MHz)	PK Output Power (dBm)	PK Output Power (mW)	Limit (dBm)	Margin (dB)
GFSK	2402	4.56	2.858	21	16.440
	2441	5.14	3.266	21	15.860
	2480	6.35	4.315	21	14.650
π /4 DQPSK,	2402	1.23	1.327	21	19.770
	2441	2.36	1.722	21	18.640
	2480	3.97	2.495	21	17.030
8- DPSK	2402	1.12	1.294	21	19.880
	2441	2.46	1.762	21	18.540
	2480	4.03	2.529	21	16.970
Conclusion: PASS					

4. Bandwidth

4.1. Limit

Please refer section 15.247.

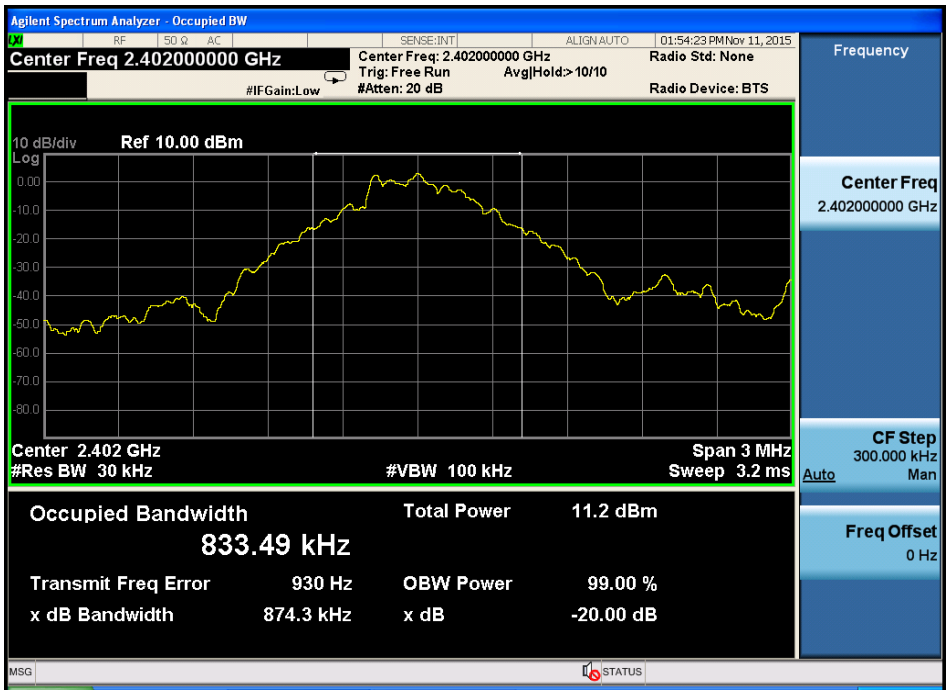
4.2. Test Procedure

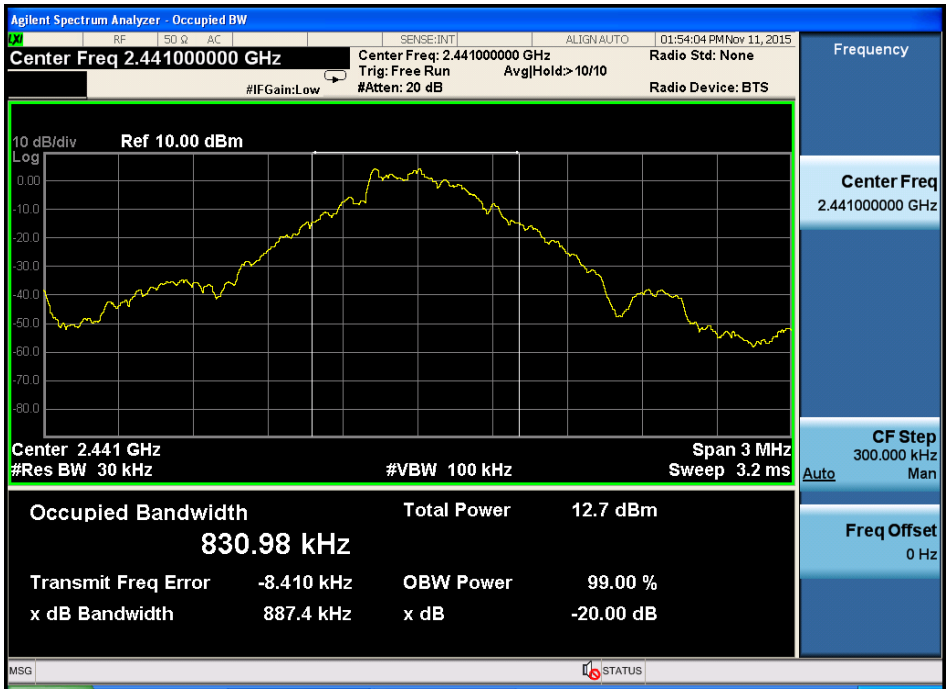
The transmitter output was coupled to a spectrum analyzer via antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 kHz RBW and 100 kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

EUT: GNSS Survey Receiver M/N: S321 Network				
Test date: 2015-11-11		Test site: RF site Tested by: Peter		
Mode	Freq (MHz)	20dB Bandwidth (KHz)	99% Bandwidth (kHz)	Conclusion
GFSK	2402	874.3	833.49	PASS
	2441	887.4	830.98	PASS
	2480	872.4	825.09	PASS
π /4 DQPSK	2402	1221	11571	PASS
	2441	1221	11566	PASS
	2480	1210	11549	PASS
8- DPSK	2402	1207	11460	PASS
	2441	1209	11400	PASS
	2480	1207	11443	PASS

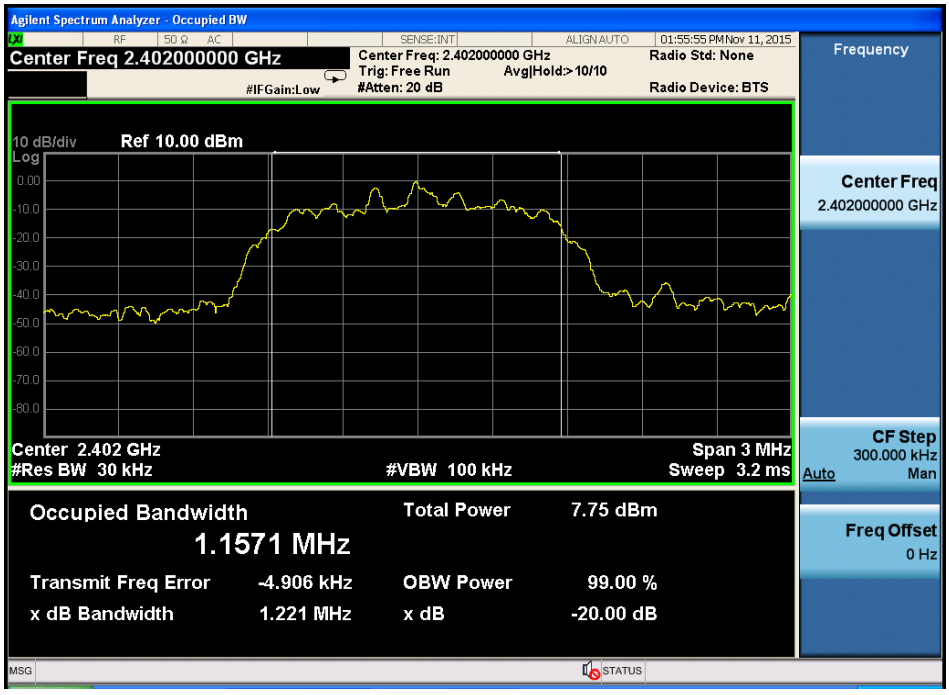
GFSK:

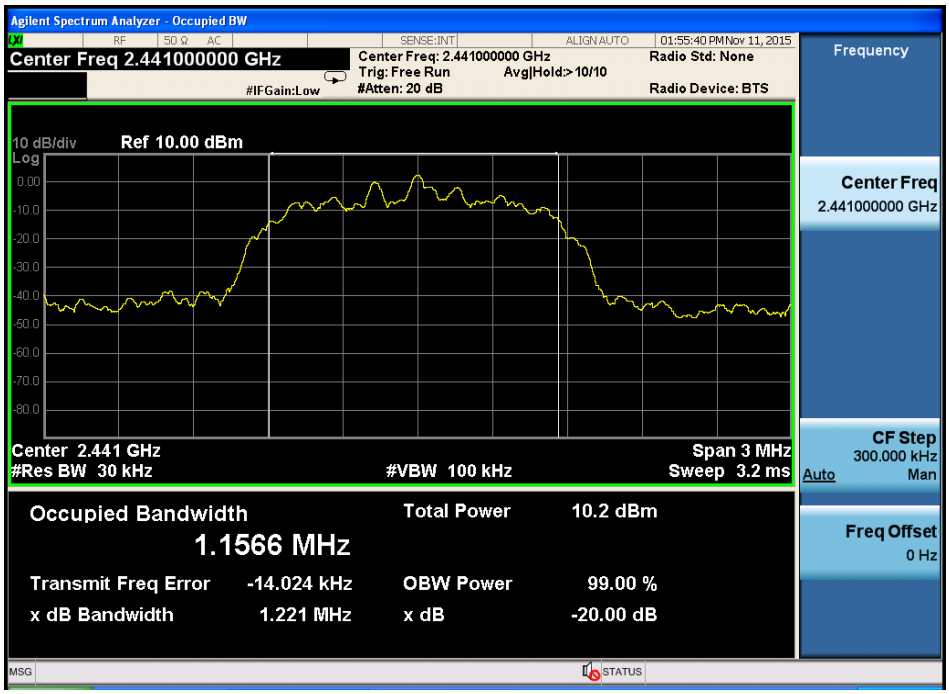

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.402000000 GHz
Center Freq: 2.402000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
01:54:23 PM Nov 11, 2015
Frequency
10 dB/div
Ref 10.00 dBm
Log
Center Freq
2.402000000 GHz
Center 2.402 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
833.49 kHz
Total Power
11.2 dBm
Transmit Freq Error
930 Hz
OBW Power
99.00 %
x dB Bandwidth
874.3 kHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS

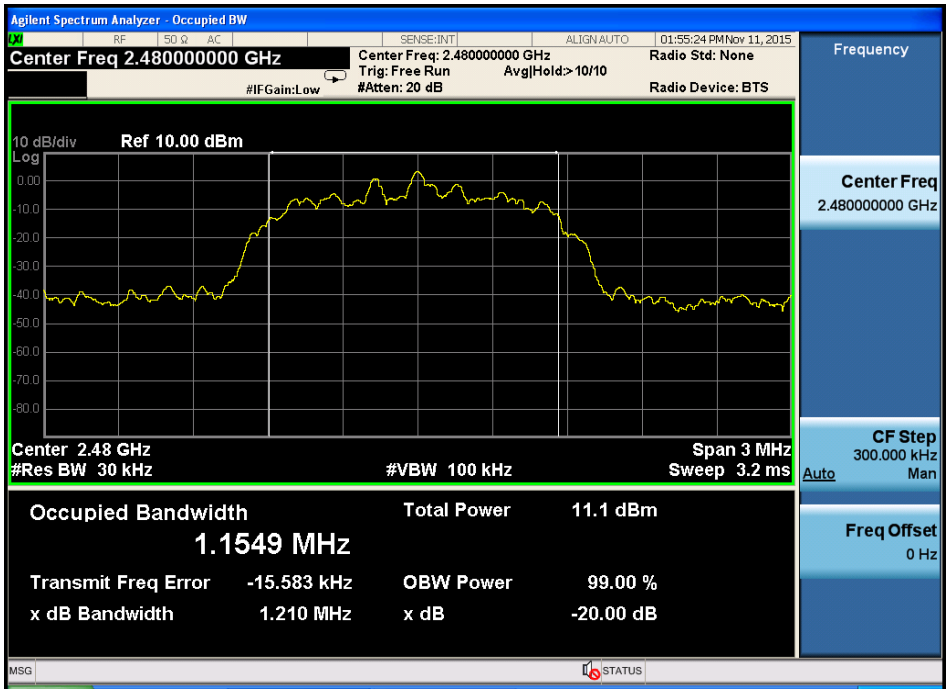

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.441000000 GHz
Center Freq: 2.441000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
01:54:04 PM Nov 11, 2015
Frequency
10 dB/div
Ref 10.00 dBm
Log
Center Freq
2.441000000 GHz
Center 2.441 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
830.98 kHz
Total Power
12.7 dBm
Transmit Freq Error
-8.410 kHz
OBW Power
99.00 %
x dB Bandwidth
887.4 kHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
01:54:37 PM Nov 11, 2015
Frequency
10 dB/div
Log
Ref 10.00 dBm
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
Occupied Bandwidth
825.09 kHz
Total Power
13.3 dBm
Transmit Freq Error
-11.206 kHz
OBW Power
99.00 %
x dB Bandwidth
872.4 kHz
x dB
-20.00 dB
Center Freq
2.480000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

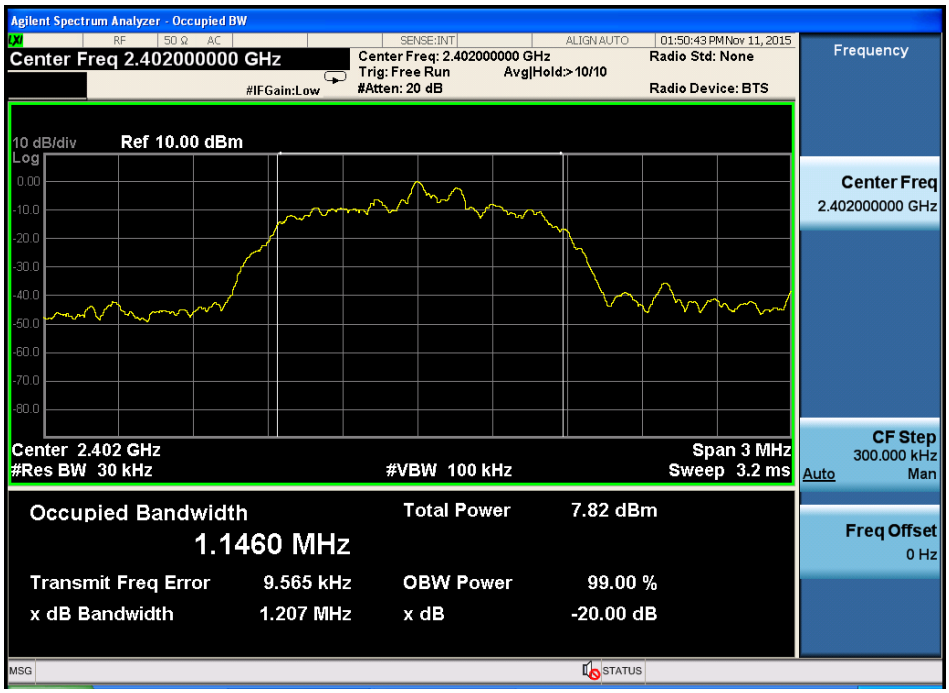
π /4 DQPSK:

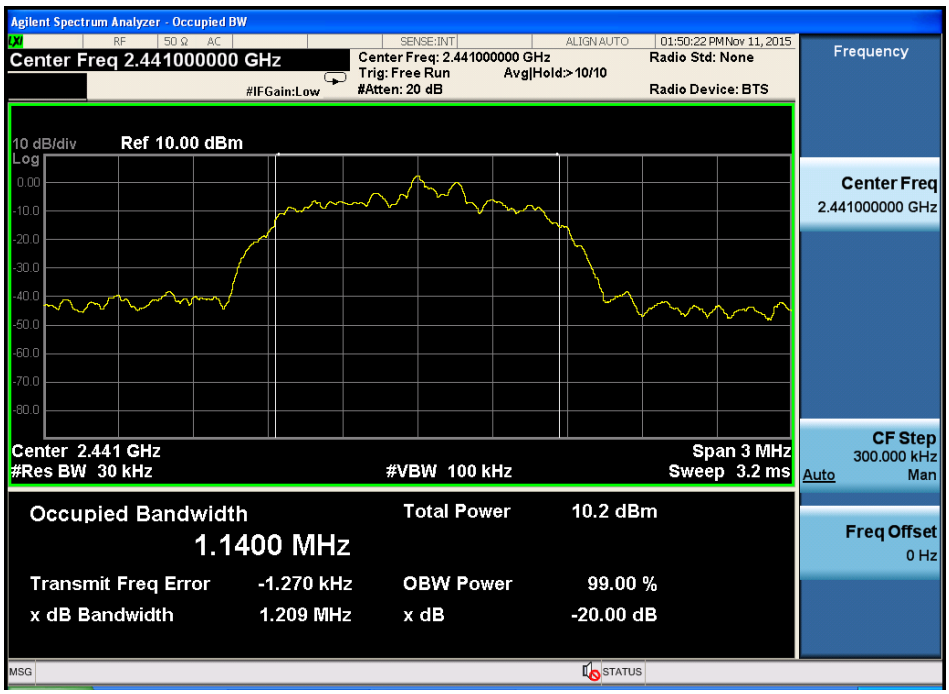

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.402000000 GHz
Center Freq: 2.402000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
01:55:55 PM Nov 11, 2015
Frequency
10 dB/div
Log
Ref 10.00 dBm
Center 2.402 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
Occupied Bandwidth
1.1571 MHz
Total Power
7.75 dBm
Transmit Freq Error
-4.906 kHz
OBW Power
99.00 %
x dB Bandwidth
1.221 MHz
x dB
-20.00 dB
Center Freq
2.402000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

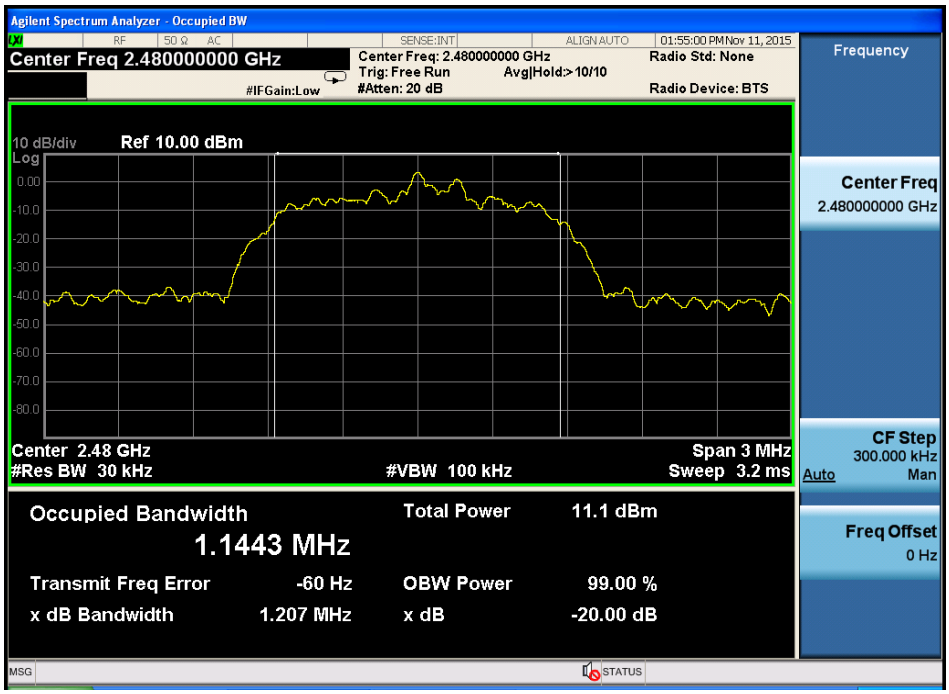

Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
01:55:40 PM Nov 11, 2015
Center Freq 2.441000000 GHz
Center Freq: 2.441000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 10.00 dBm
Log
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center Freq
2.441000000 GHz
Center 2.441 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1566 MHz
Total Power
10.2 dBm
Freq Offset
0 Hz
Transmit Freq Error
-14.024 kHz
OBW Power
99.00 %
x dB Bandwidth
1.221 MHz
x dB
-20.00 dB
MSG
STATUS


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
01:55:24 PM Nov 11, 2015
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 10.00 dBm
Log
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1549 MHz
Total Power
11.1 dBm
Freq Offset
0 Hz
Transmit Freq Error
-15.583 kHz
OBW Power
99.00 %
x dB Bandwidth
1.210 MHz
x dB
-20.00 dB
MSG
STATUS

8- DPSK:


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.402000000 GHz
Center Freq: 2.402000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
01:50:43 PM Nov 11, 2015
Frequency
10 dB/div
Ref 10.00 dBm
Log
Center Freq
2.402000000 GHz
Center 2.402 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1460 MHz
Total Power
7.82 dBm
Transmit Freq Error
9.565 kHz
OBW Power
99.00 %
x dB Bandwidth
1.207 MHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.441000000 GHz
Center Freq: 2.441000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
01:50:22 PM Nov 11, 2015
Frequency
10 dB/div
Ref 10.00 dBm
Log
Center Freq
2.441000000 GHz
Center 2.441 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1400 MHz
Total Power
10.2 dBm
Transmit Freq Error
-1.270 kHz
OBW Power
99.00 %
x dB Bandwidth
1.209 MHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
01:55:00 PM Nov 11, 2015
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1443 MHz
Total Power 11.1 dBm
Transmit Freq Error -60 Hz
OBW Power 99.00 %
x dB Bandwidth 1.207 MHz
x dB -20.00 dB
Freq Offset
0 Hz
MSG
STATUS

5. Carrier Frequency Separation

5.1. Limit

Frequency hopping systems shall have hopping 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

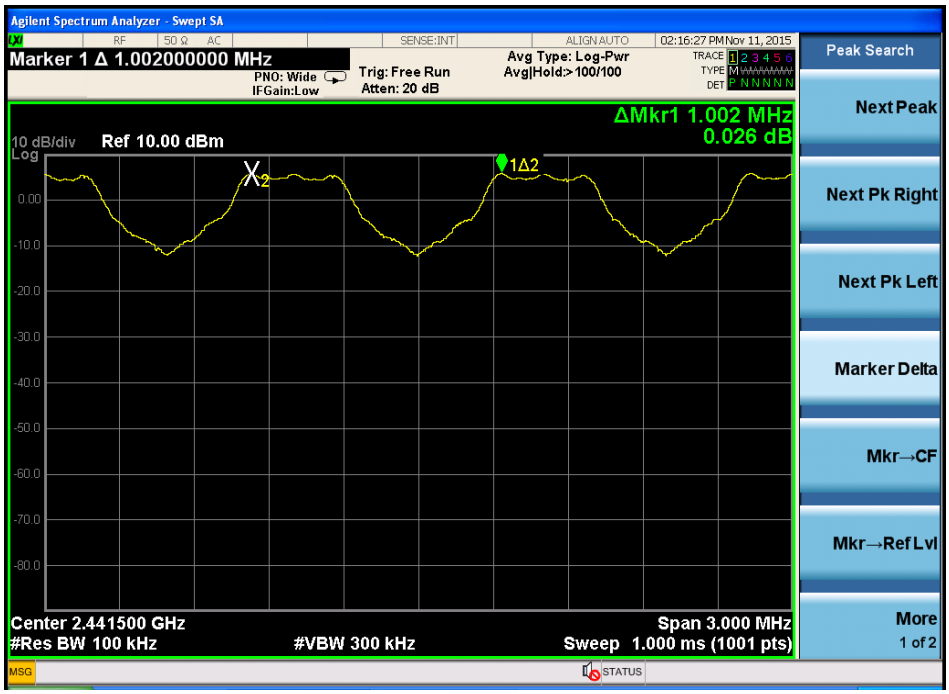
5.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via antenna. The carrier frequency was measured by spectrum analyzer with 30 kHz RBW and 100 kHz VBW.

5.3. Test Result

EUT: GNSS Survey Receiver M/N: S321 Network				
Test date: 2015-11-11		Test site: RF site	Tested by: Peter	
Mode/Channel	Channel separation (KHz)	20dB Bandwidth (KHz)	Limit (KHz) 2/3 20dB bandwidth	Conclusion
GFSK	1002	887.400	591.600	PASS
π /4 DQPSK	1005	1221.000	814.000	PASS
8- DPSK	1002	1209.000	806.000	PASS

GFSK



π /4 DQPSK

8- DPSK


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:14:20 PM Nov 11, 2015
Marker 1 Δ 1.002000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
ΔMkr1 1.002 MHz
0.035 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 2.441500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

6. Number of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

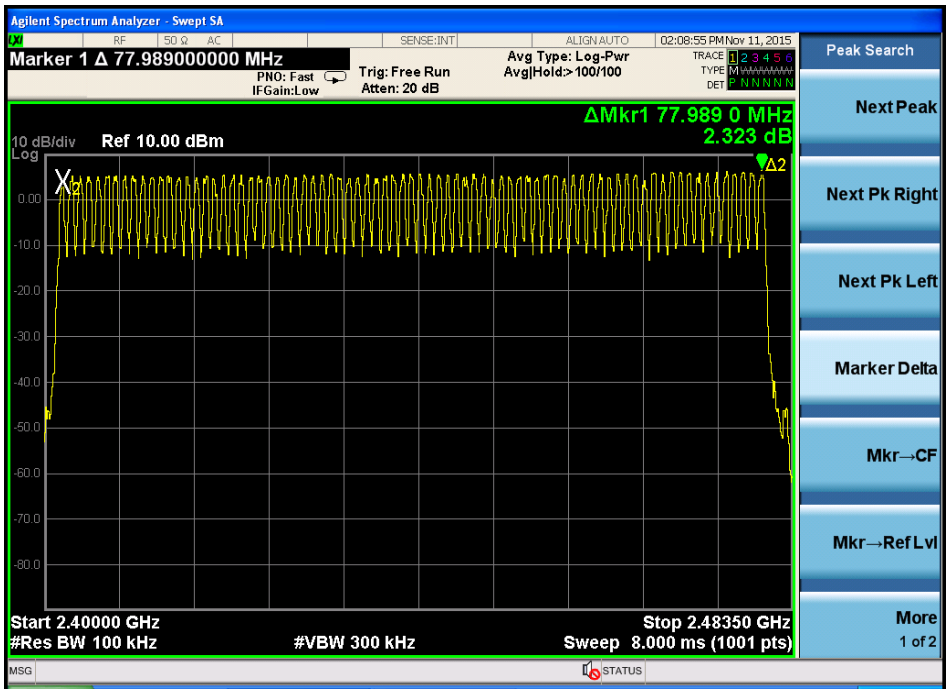
6.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via antenna. The number of hopping channel was measured by spectrum analyzer with 300 kHz RBW and 1MHz VBW.

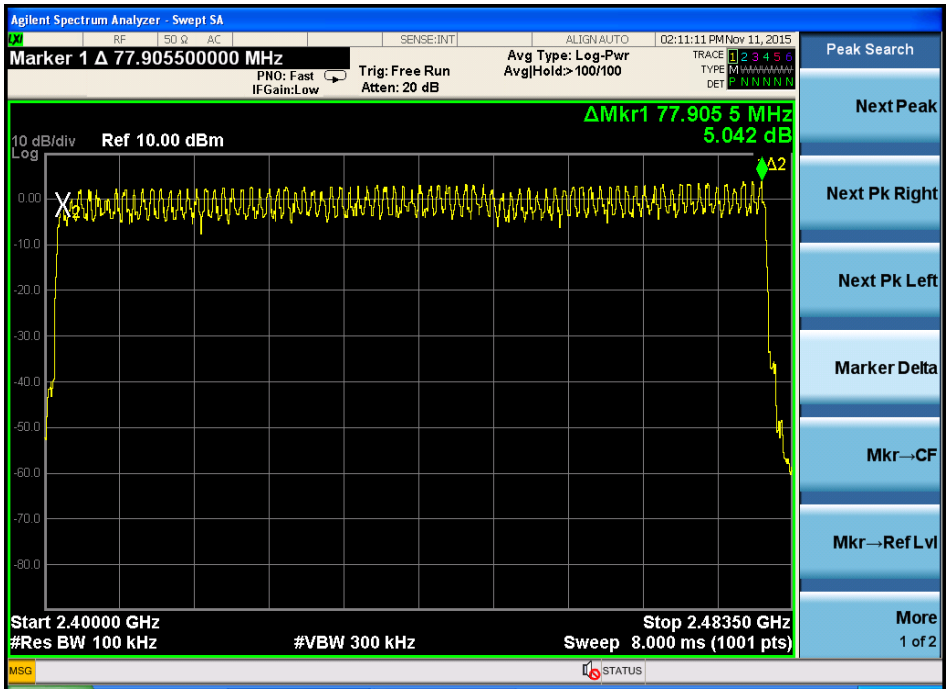
6.3. Test Result

EUT: GNSS Survey Receiver M/N: S321 Network			
Test date: 2015-11-11	Test site: RF site	Tested by: Peter	
Mode	Number of hopping channel	Limit	Conclusion
GFSK	79	>15	PASS
π /4 DQPSK	79	>15	PASS
8- DPSK	79	>15	PASS

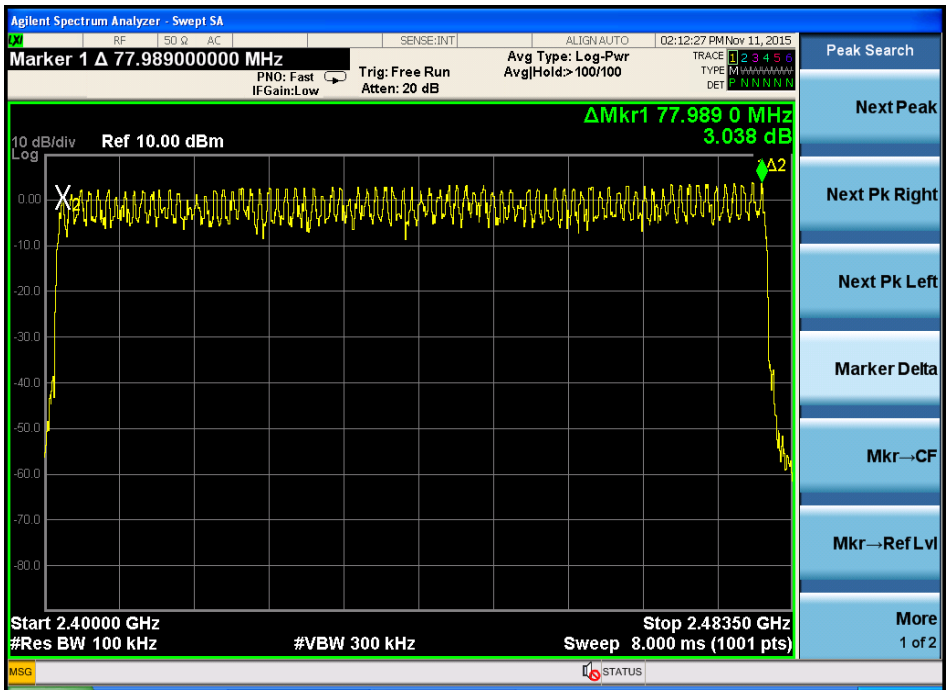
GFSK



π /4 DQPSK



8- DPSK


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 77.989000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
02:12:27 PM Nov 11, 2015
ΔMkr1 77.989 0 MHz
3.038 dB
10 dB/div
Log
Ref 10.00 dBm
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

7. Dwell Time

7.1. Test limit

Please refer section15.247.

7.2. Test Procedure

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured was complete.

7.3. Test Results

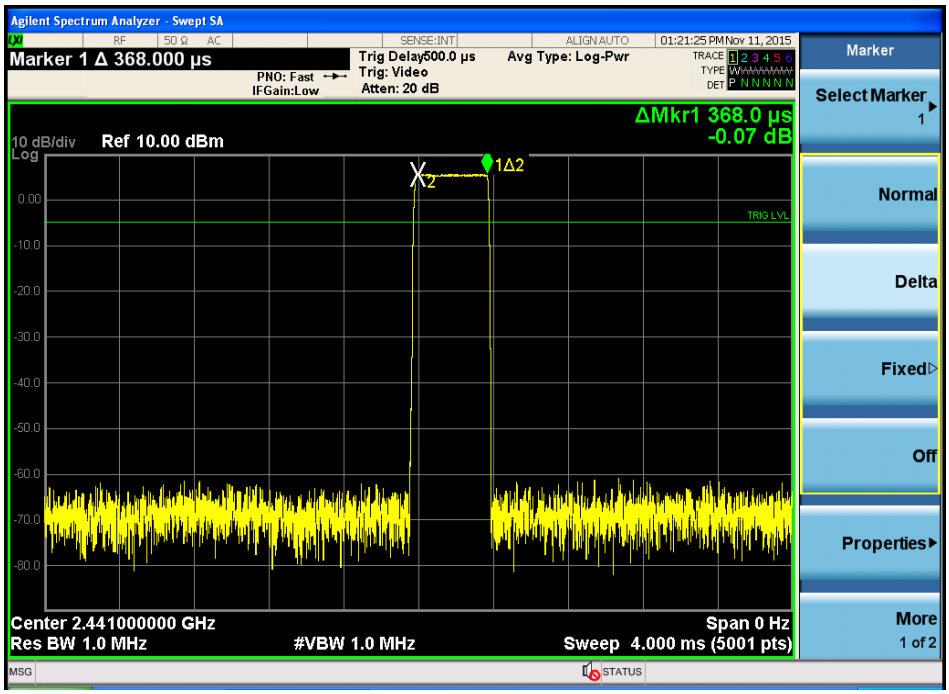
PASS.

Detailed information please see the following page.

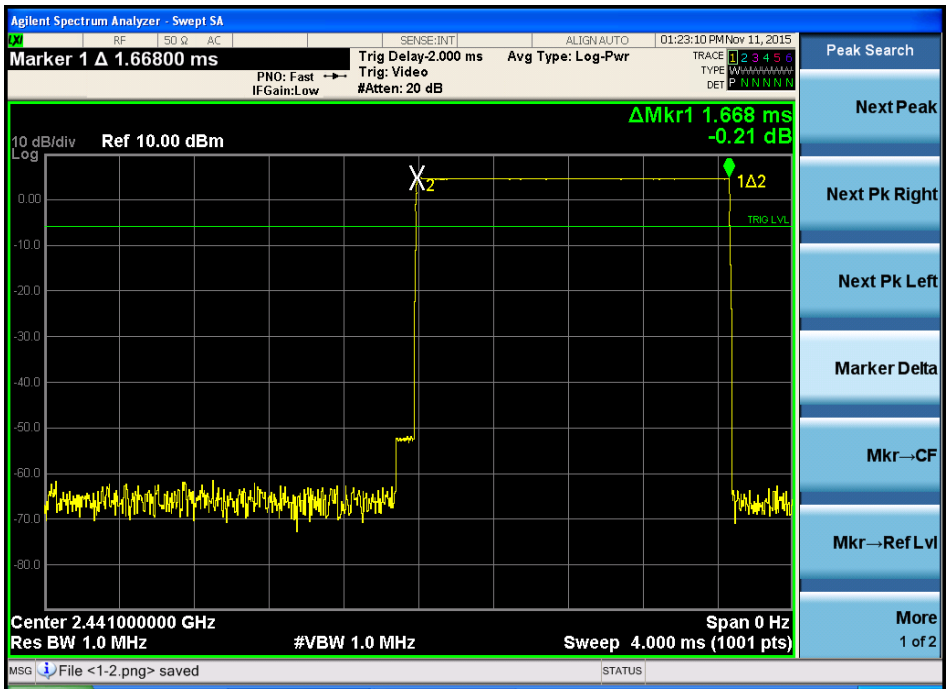
EUT: GNSS Survey Receiver M/N: S321 Network						
Test date: 2015-11-11		Test site: RF site Tested by: Peter				
Mode	Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Conclusion
GFSK	DH1	2441	0.368	0.236	<0.4	PASS
	DH3	2441	1.668	0.356	<0.4	PASS
	DH5	2441	2.873	0.368	<0.4	PASS
π /4 DQPSK	DH1	2441	0.3976	0.254	<0.4	PASS
	DH3	2441	1.668	0.356	<0.4	PASS
	DH5	2441	2.898	0.371	<0.4	PASS
8- DPSK	DH1	2441	0.3968	0.254	<0.4	PASS
	DH3	2441	1.668	0.356	<0.4	PASS
	DH5	2441	2.897	0.371	<0.4	PASS
Note: A period time = 0.4 (s) * 79 = 31.6(s) DH1 time slot = Pulse Duration * (1600/(1*79)) * A period time DH3 time slot = Pulse Duration * (1600/(3*79)) * A period time DH5 time slot = Pulse Duration * (1600/(5*79)) * A period time						

GFSK

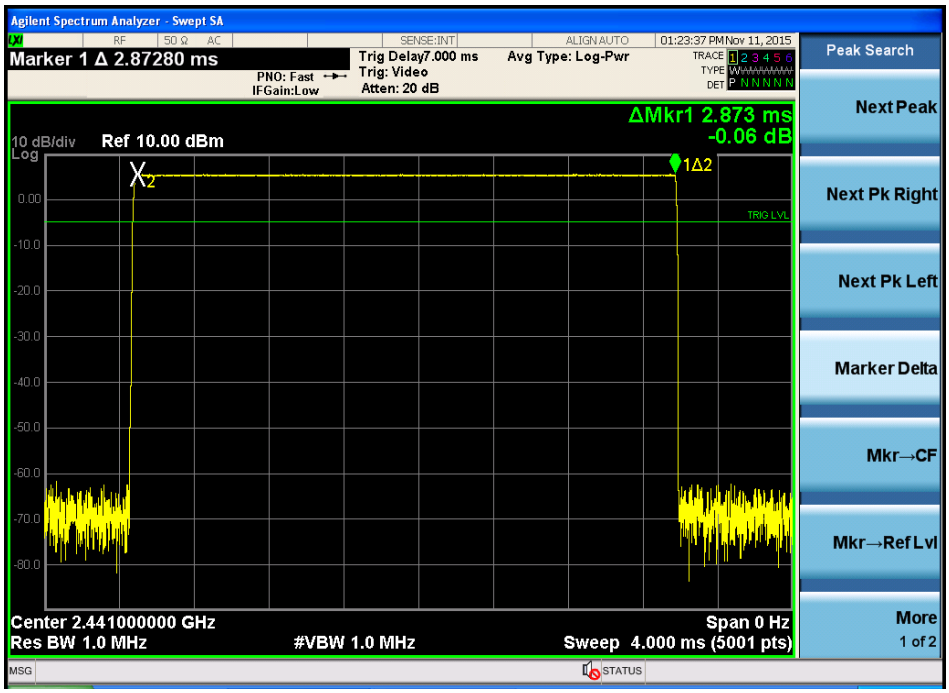
DH1:


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 368.000 µs
PNO: Fast
IFGain:Low
Trig Delay500.0 µs
Trig: Video
Atten: 20 dB
Avg Type: Log-Pwr
01:21:25 PM Nov 11, 2015
ΔMkr1 368.0 µs
-0.07 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (5001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

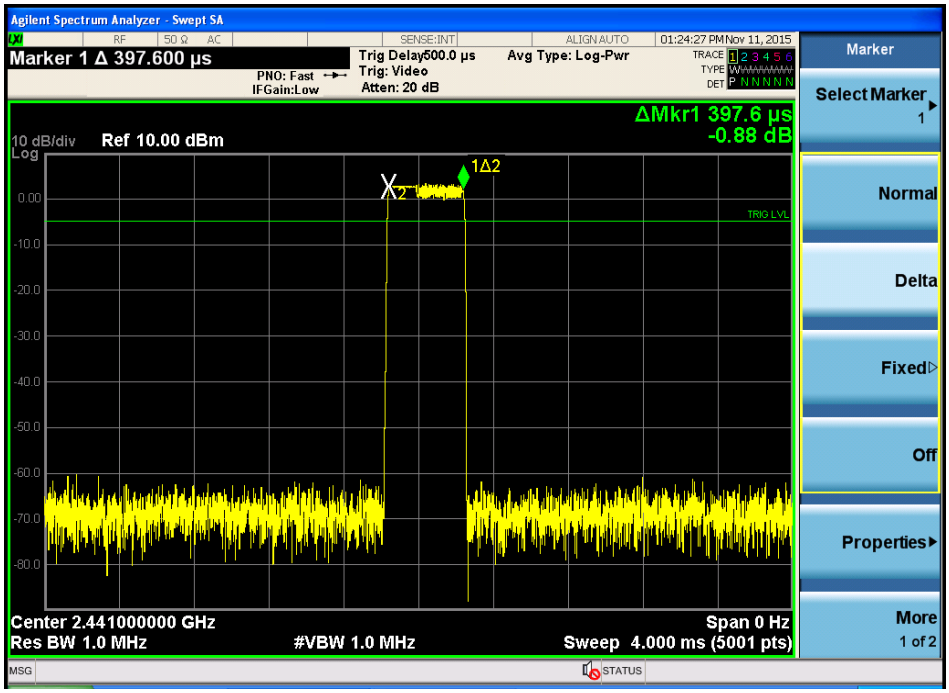
DH3:


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 1.66800 ms
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Atten: 20 dB
Avg Type: Log-Pwr
01:23:10 PM Nov 11, 2015
ΔMkr1 1.668 ms
-0.21 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
File <1-2.png> saved
STATUS

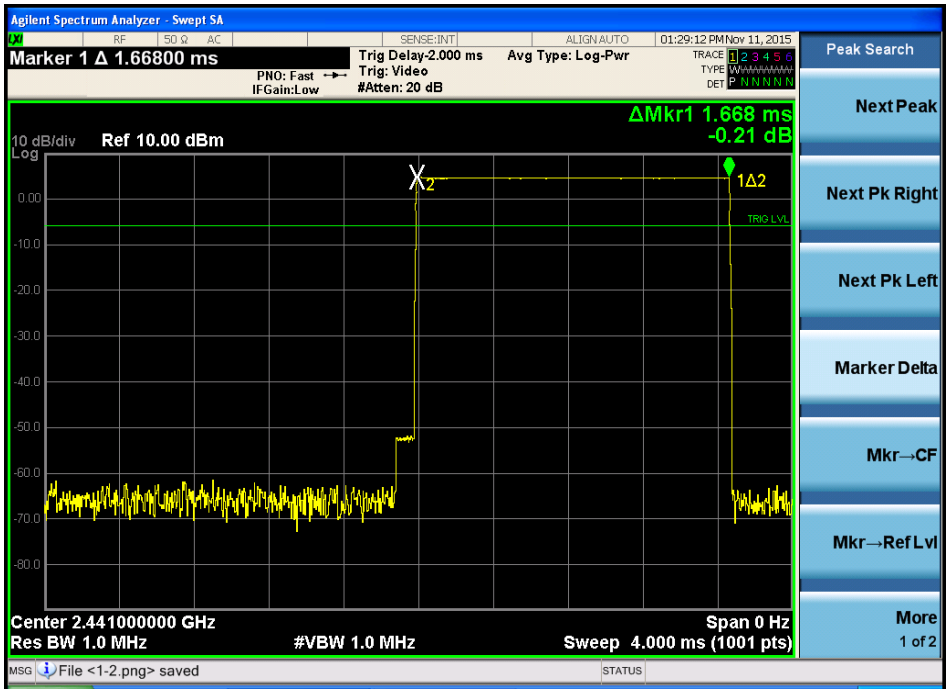
DH5



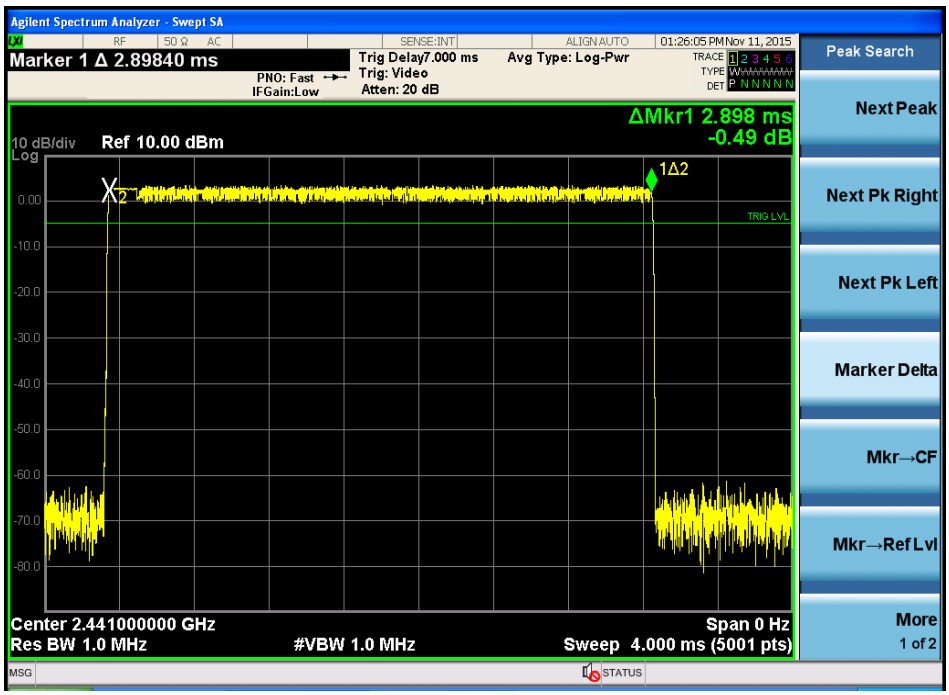
π/4 DQPSK
DH1



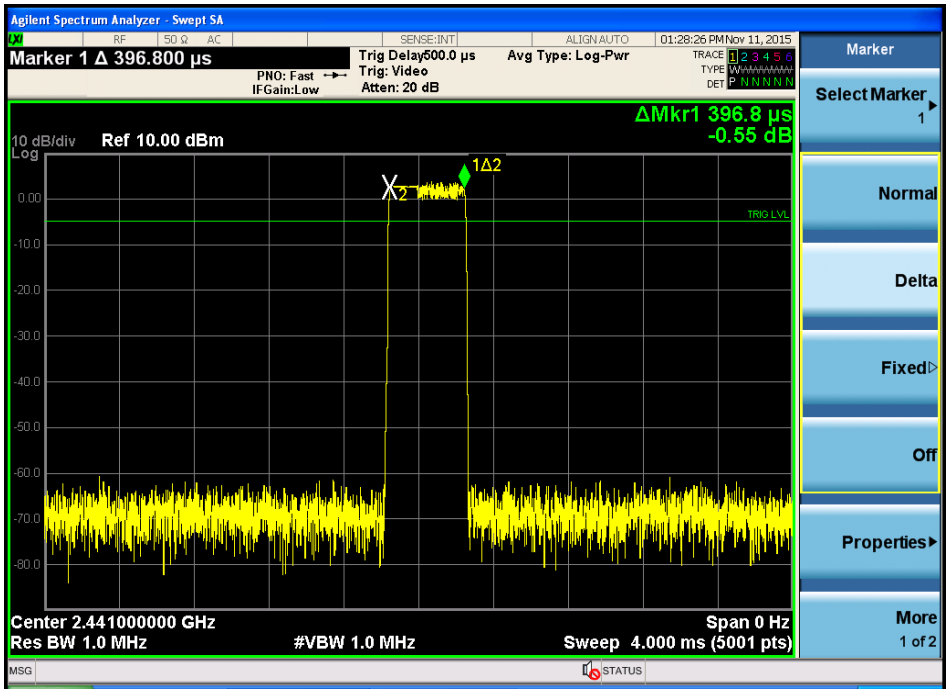
DH3

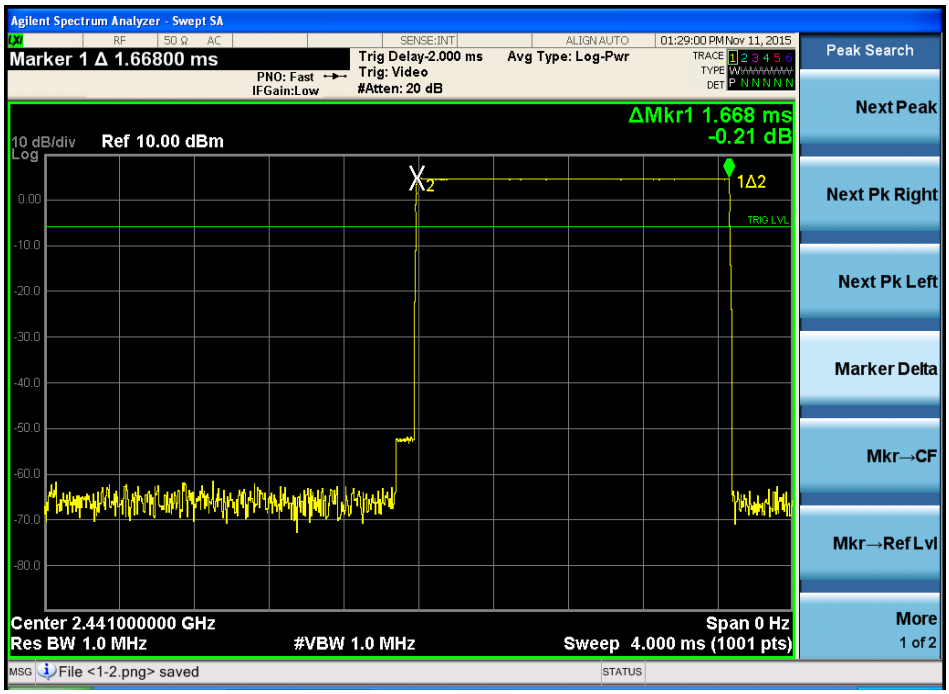

Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 1.66800 ms
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Atten: 20 dB
Avg Type: Log-Pwr
01:29:12 PM Nov 11, 2015
ΔMkr1 1.668 ms
-0.21 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
File <1-2.png> saved

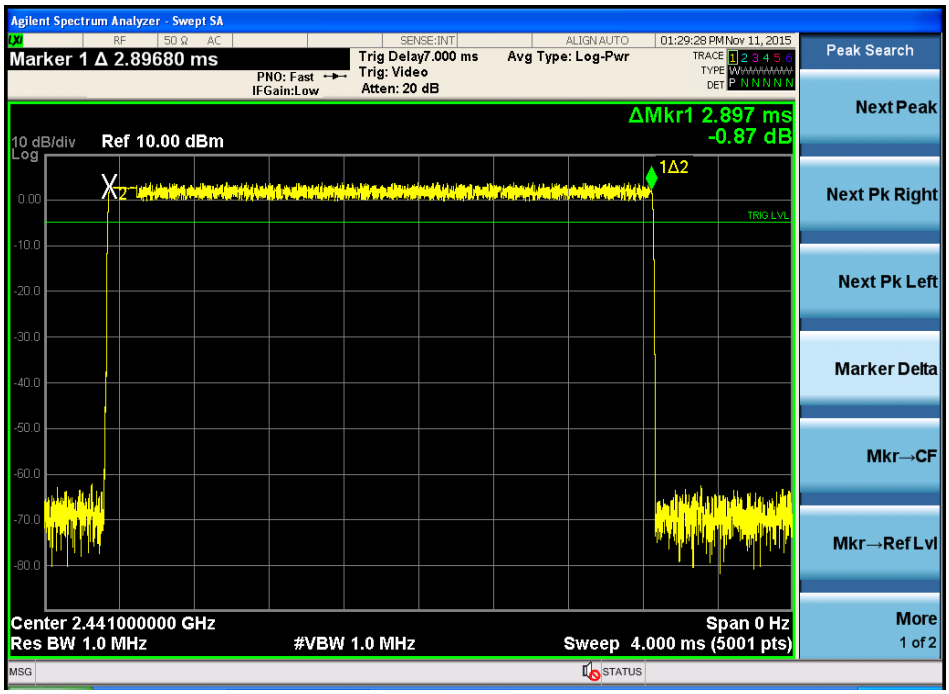
DH5


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 2.89840 ms
PNO: Fast
IFGain:Low
Trig Delay7.000 ms
Trig: Video
Atten: 20 dB
Avg Type: Log-Pwr
01:26:05 PM Nov 11, 2015
ΔMkr1 2.898 ms
-0.49 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (5001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

8- DPSK:


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 396.800 µs
PNO: Fast
IFGain:Low
Trig Delay500.0 µs
Trig: Video
Atten: 20 dB
Avg Type: Log-Pwr
01:28:26 PM Nov 11, 2015
ΔMkr1 396.8 µs
-0.55 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (5001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 1.66800 ms
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Atten: 20 dB
Avg Type: Log-Pwr
01:29:00 PM Nov 11, 2015
ΔMkr1 1.668 ms
-0.21 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
File <1-2.png> saved
STATUS


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
01:29:28 PM Nov 11, 2015
Marker 1 Δ 2.89680 ms
PNO: Fast
IFGain:Low
Trig Delay7.000 ms
Trig: Video
Atten: 20 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE WWWWW
DET P N N N N
ΔMkr1 2.897 ms
-0.87 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
TRIG LVL
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (5001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

8. Radiated emissions

8.1. Limit

All the emissions appearing within FCC PART 15 restricted frequency bands shall not exceed the limits shown in FCC PART 15, all the other emissions shall be at least 20 dB below the fundamental emissions, or comply with FCC PART 15 limits.

FCC PART 15 Restricted frequency band

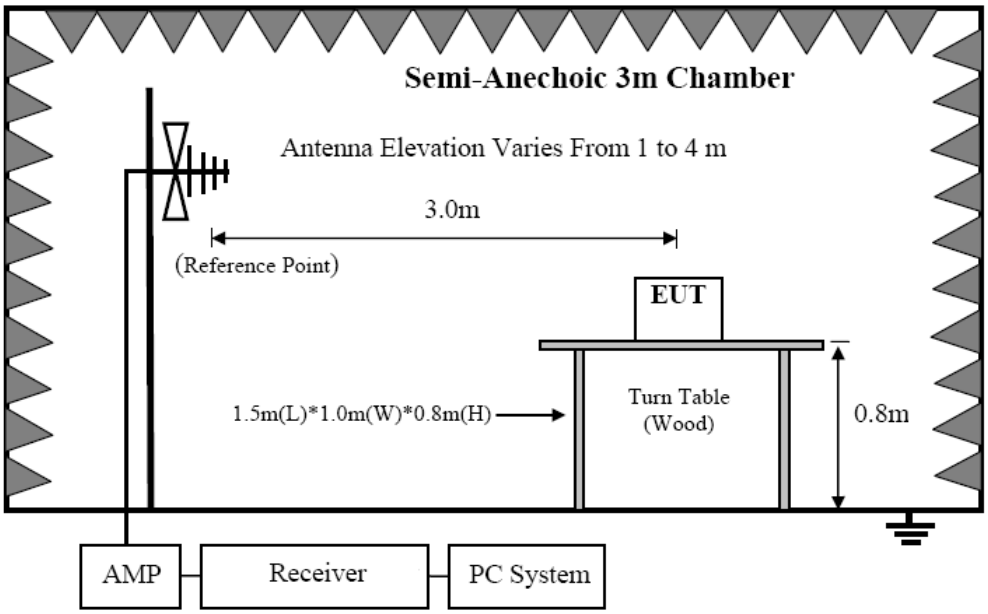
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

FCC PART 15 Limit

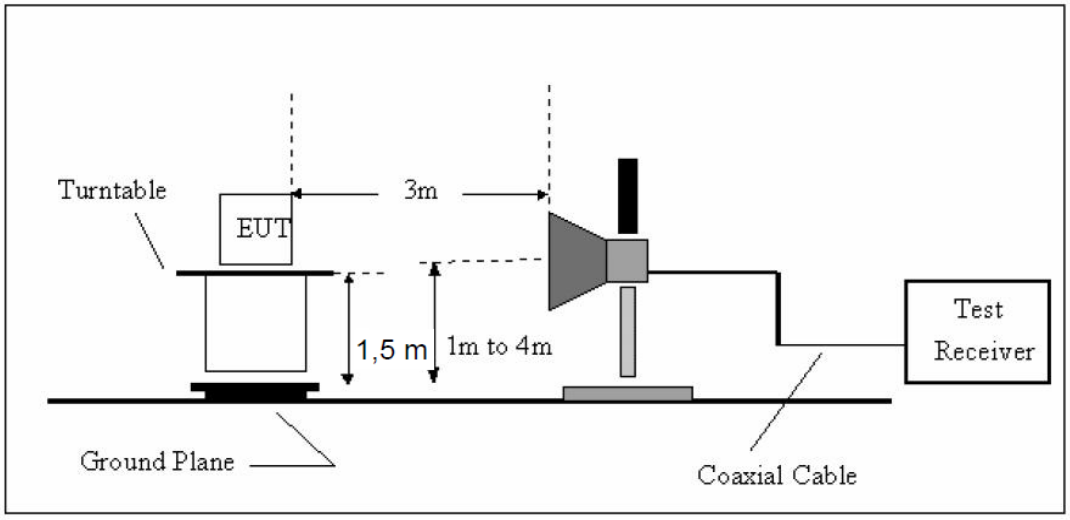
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2. Block Diagram of Test setup

8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



8.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz testing, and 150 cm for above 1GHz testing.
(2) Setup EUT and simulator as shown in section 1.4 and 6.1
(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
(a) Change work frequency or channel of device if practicable.
(b) Change modulation type of device if practicable.
(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produce highest emissions
(4) Spectrum frequency from 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated
(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on Radiated Emission test.
(6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

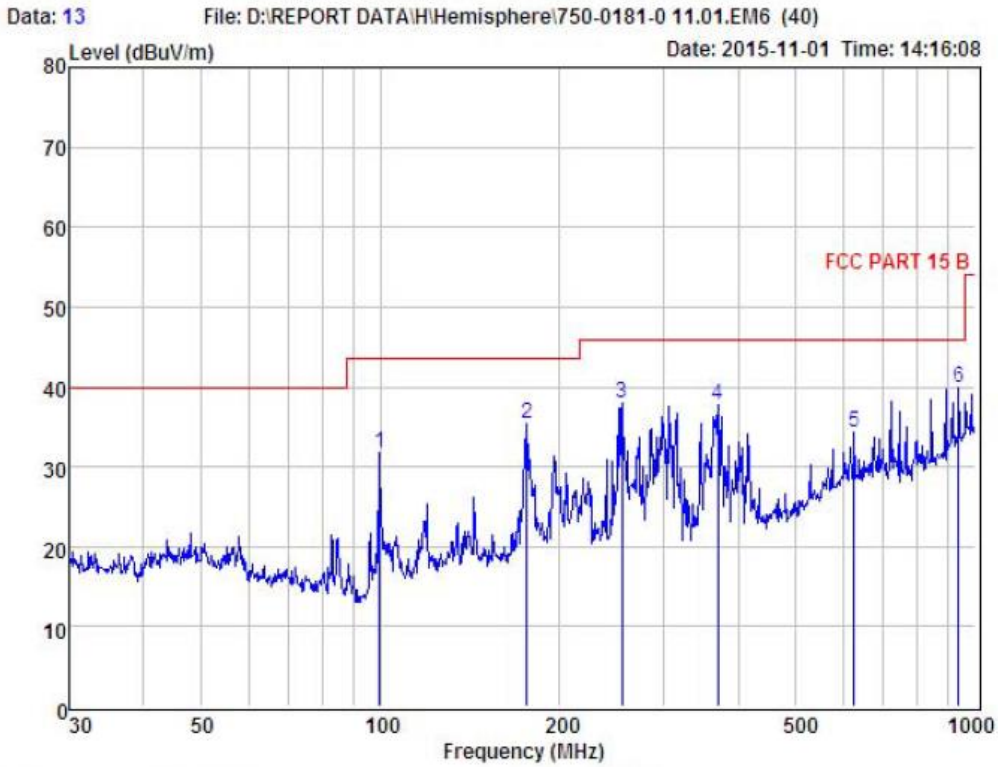
8.4. Test Result

We have scanned the 10th harmonic from 9 kHz to the EUT.
Detailed information please see the following page.

From 9 kHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

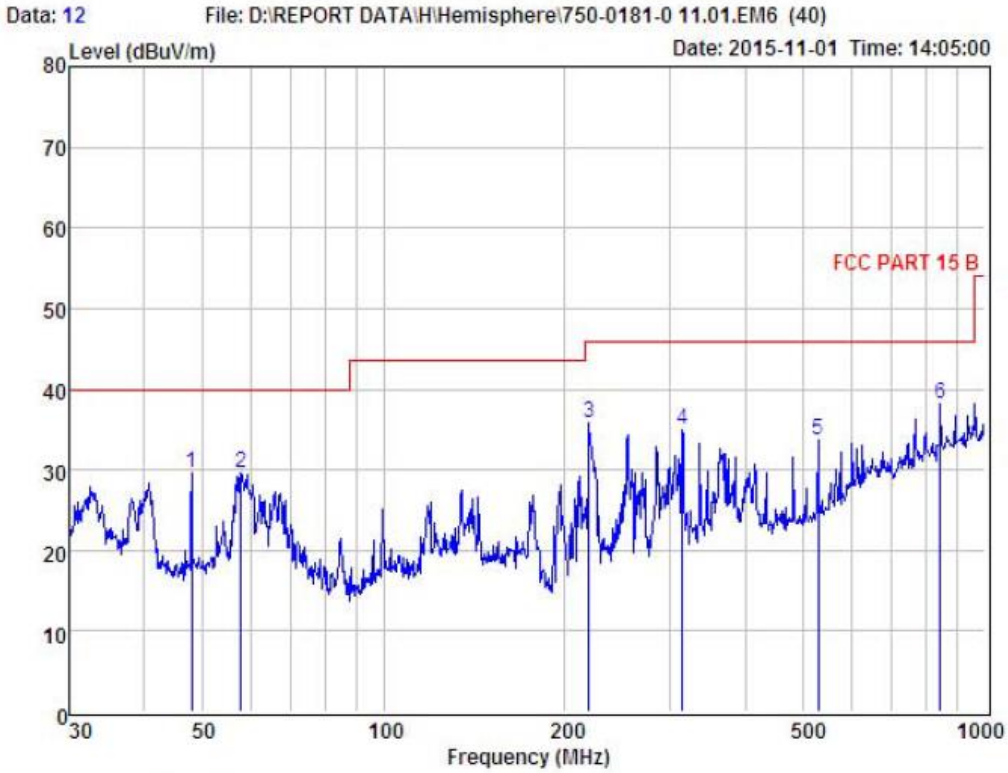
From 30MHz to 1000MHz: Conclusion: PASS



Condition : FCC PART 15 B 3m POL: HORIZONTAL
EUT : S321 GNSS Smart Antenna
Model No : 750-0181-0
Test Mode : BT mode
Power : DC 5V From PC AC 120V/60Hz
Test Engineer :
Remark :
Temp : 24.2℃
Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	99.88	51.35	10.15	30.15	0.46	31.81	43.50	-11.69	Peak
2	176.27	51.60	12.28	29.04	0.59	35.43	43.50	-8.07	Peak
3	254.73	53.97	11.69	28.22	0.55	37.99	46.00	-8.01	Peak
4	369.40	50.24	14.20	27.51	0.77	37.70	46.00	-8.30	Peak
5	625.08	40.21	18.80	25.81	1.11	34.31	46.00	-11.69	Peak
6	938.83	41.77	22.06	24.99	0.98	39.82	46.00	-6.18	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



Condition : FCC PART 15 B 3m POL: VERTICAL
EUT : S321 GNSS Smart Antenna
Model No : 750-0181-0
Test Mode : BT mode
Power :
Test Engineer :
Remark :
Temp : 24.2℃
Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	47.99	46.26	13.59	30.25	0.09	29.69	40.00	-10.31	Peak
2	58.00	47.25	12.91	30.89	0.23	29.50	40.00	-10.50	Peak
3	219.84	52.89	10.64	28.44	0.67	35.76	46.00	-10.24	Peak
4	314.38	49.05	13.19	27.92	0.55	34.87	46.00	-11.13	Peak
5	528.25	42.84	17.03	27.20	1.07	33.74	46.00	-12.26	Peak
6	842.13	40.30	20.98	24.84	1.69	38.13	46.00	-7.87	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Remark: All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz was listed in this report.

1GHz—25GHz Radiated emission Test result									
EUT: GNSS Survey Receiver M/N: S321 Network									
Power: DC 10.8V from battery									
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter									
Test mode: GFSK Tx CH1 2402MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804	40.94	33.95	10.18	34.26	50.81	74	23.19	PK
2	4804	31.56	33.95	10.18	34.26	41.43	54	12.57	AV
3	7206	/							
4	9608	/							
5	12010	/							
Antenna Polarity: Horizontal									
1	4804	41.83	33.95	10.18	34.26	51.7	74	22.3	PK
2	4804	30.77	33.95	10.18	34.26	40.64	54	13.36	AV
3	7206	/							
4	9608	/							
5	12010	/							
Note: 1, Measuring frequency from 1GHz to 25GHz 2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: GNSS Survey Receiver M/N: S321 Network									
Power: DC 10.8V from battery									
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter									
Test mode: GFSK Tx CH40 2441MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882	41.59	33.93	10.2	34.29	51.43	74	22.57	PK
2	4882	31.39	33.93	10.2	34.29	41.23	54	12.77	AV
3	7323	/							
4	9764	/							
5	12205	/							
Antenna Polarity: Horizontal									
1	4882	41.42	33.93	10.2	34.29	51.26	74	22.74	PK
2	4882	30.97	33.93	10.2	34.29	40.81	54	13.19	AV
3	7323	/							
4	9764	/							
5	12205	/							

Note:
1, Measuring frequency from 1GHz to 25GHz
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

1GHz—25GHz Radiated emissison Test result									
EUT: GNSS Survey Receiver M/N: S321 Network									
Power: DC 10.8V from battery									
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter									
Test mode: GFSK Tx CH79 2480MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960	41.87	33.98	10.22	34.25	51.82	74	22.18	PK
2	4960	31.09	33.98	10.22	34.25	41.04	54	12.96	AV
3	7440	/							
4	9920	/							
5	12400	/							
Antenna Polarity: Horizontal									
1	4960	41.81	33.98	10.22	34.25	51.76	74	22.24	PK
2	4960	31.07	33.98	10.22	34.25	41.02	54	12.98	AV
3	7440	/							
4	9920	/							
5	12400	/							
Note: 1, Measuring frequency from 1GHz to 25GHz 2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: GNSS Survey Receiver M/N: S321 Network									
Power: DC 10.8V from battery									
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter									
Test mode: π/4 DQPSK Tx CH1 2402MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804	41.48	33.95	10.18	34.26	51.35	74	22.65	PK
2	4804	30.97	33.95	10.18	34.26	40.84	54	13.16	AV
3	7206	/							
4	9608	/							
5	12010	/							
Antenna Polarity: Horizontal									
1	4804	41.5	33.95	10.18	34.26	51.37	74	22.63	PK
2	4804	31.25	33.95	10.18	34.26	41.12	54	12.88	AV
3	7206	/							
4	9608	/							
5	12010	/							

Note:
1, Measuring frequency from 1GHz to 25GHz
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

1GHz—25GHz Radiated emissison Test result									
EUT: GNSS Survey Receiver M/N: S321 Network									
Power: DC 10.8V from battery									
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter									
Test mode: π/4 DQPSK Tx CH40 2441MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882	41.6	33.93	10.2	34.29	51.44	74	22.56	PK
2	4882	31.18	33.93	10.2	34.29	41.02	54	12.98	AV
3	7323	/							
4	9764	/							
5	12205	/							
Antenna Polarity: Horizontal									
1	4882	41.6	33.93	10.2	34.29	51.44	74	22.56	PK
2	4882	30.97	33.93	10.2	34.29	40.81	54	13.19	AV
3	7323	/							
4	9764	/							
5	12205	/							
Note: 1, Measuring frequency from 1GHz to 25GHz 2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: GNSS Survey Receiver M/N: S321 Network									
Power: DC 10.8V from battery									
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter									
Test mode: π/4 DQPSK Tx CH79 2480MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960	41.5	33.98	10.22	34.25	51.45	74	22.55	PK
2	4960	31.35	33.98	10.22	34.25	41.3	54	12.7	AV
3	7440	/							
4	9920	/							
5	12400	/							
Antenna Polarity: Horizontal									
1	4960	41.88	33.98	10.22	34.25	51.83	74	22.17	PK
2	4960	31.45	33.98	10.22	34.25	41.4	54	12.6	AV
3	7440	/							
4	9920	/							
5	12400	/							

Note:
1, Measuring frequency from 1GHz to 25GHz
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

1GHz—25GHz Radiated emissison Test result									
EUT: Bluetooth earphone M/N: MDS-800X									
Power: DC 5.0V From notebook									
Test date: 2015-01-07 Test site: 3m Chamber Tested by: Peter									
Test mode: 8- DQPSK Tx CH1 2402MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804	41.49	33.95	10.18	34.26	51.36	74	22.64	PK
2	4804	30.88	33.95	10.18	34.26	40.75	54	13.25	AV
3	7206	/							
4	9608	/							
5	12010	/							
Antenna Polarity: Horizontal									
1	4804	41.17	33.95	10.18	34.26	51.04	74	22.96	PK
2	4804	30.54	33.95	10.18	34.26	40.41	54	13.59	AV
3	7206	/							
4	9608	/							
5	12010	/							

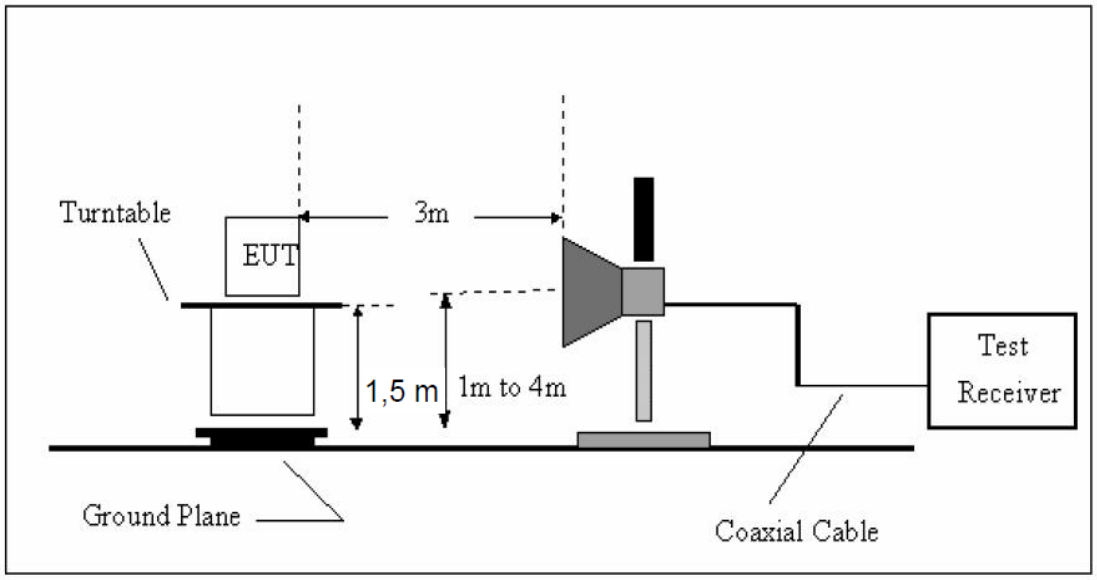
Note:
1, Measuring frequency from 1GHz to 25GHz
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

1GHz—25GHz Radiated emissison Test result									
EUT: Bluetooth earphone M/N: MDS-800X									
Power: DC 5.0V From notebook									
Test date: 2015-01-07 Test site: 3m Chamber Tested by: Peter									
Test mode: 8- DQPSK Tx CH40 2441MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882	41.3	33.93	10.2	34.29	51.14	74	22.86	PK
2	4882	30.97	33.93	10.2	34.29	40.81	54	13.19	AV
3	7323	/							
4	9764	/							
5	12205	/							
Antenna Polarity: Horizontal									
1	4882	41.48	33.93	10.2	34.29	51.32	74	22.68	PK
2	4882	31.09	33.93	10.2	34.29	40.93	54	13.07	AV
3	7323	/							
4	9764	/							
5	12205	/							
Note: 1, Measuring frequency from 1GHz to 25GHz 2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: Bluetooth earphone M/N: MDS-800X									
Power: DC 5.0V From notebook									
Test date: 2015-01-07 Test site: 3m Chamber Tested by: Peter									
Test mode: 8- DQPSK Tx CH79 2480MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960	41.28	33.98	10.22	34.25	51.23	74	22.77	PK
2	4960	32.5	33.98	10.22	34.25	42.45	54	11.55	AV
3	7440	/							
4	9920	/							
5	12400	/							
Antenna Polarity: Horizontal									
1	4960	41.6	33.98	10.22	34.25	51.55	74	22.45	PK
2	4960	30.97	33.98	10.22	34.25	40.92	54	13.08	AV
3	7440	/							
4	9920	/							
5	12400	/							
Note: 1, Measuring frequency from 1GHz to 25GHz 2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

9. Band Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in FCC PART 15, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with FCC PART 15 limits.

9.3. Test Procedure

All restriction band and non- restriction band have been tested ， only worse case is reported.

9.4. Test Result

PASS. (See below detailed test data)

Radiated Method

GFSK (CH Low)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	42.48	27.62	3.92	34.97	39.05	74	34.95	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
2400	41.81	27.62	3.94	34.97	38.4	74	35.6	**PK**
2400	--	27.62	3.94	34.97	--	54	--	AV
Antenna Polarity: Horizontal								
2390	41.97	27.62	3.92	34.97	38.54	74	35.46	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
2400	42.18	27.62	3.94	34.97	38.77	74	35.23	**PK**
2400	--	27.62	3.94	34.97	--	54	--	AV

Note:

1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK

3, Result = Read level + Antenna factor + cable loss-Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

GFSK (CH High)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	41.81	27.89	4	34.97	38.73	74	35.27	**PK**
2483.5		--	--	--	--	54	--	AV
Antenna Polarity: Horizontal								
2483.5	42.01	27.89	4	34.97	38.93	74	35.07	**PK**
2483.5		--	--	--	--	54	--	AV
Note: 1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

GFSK (Hopping Low)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	40.82	27.62	3.92	34.97	37.39	74	36.61	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
Antenna Polarity: Horizontal								
2390	41.77	27.62	3.92	34.97	38.34	74	35.66	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

GFSK (Hopping High)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	41.29	27.89	4	34.97	38.21	74	35.79	**PK**
2483.5		--	--	--	--	54	--	AV
Antenna Polarity: Horizontal								
2483.5	41.51	27.89	4	34.97	38.43	74	35.57	**PK**
2483.5		--	--	--	--	54	--	AV
Note: 1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

π/4 DQPSK (CH Low)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	41.59	27.62	3.92	34.97	38.16	74	35.84	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
Antenna Polarity: Horizontal								
2390	41.91	27.62	3.92	34.97	38.48	74	35.52	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

π /4 DQPSK (CH High)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	41.03	27.89	4	34.97	37.95	74	36.05	PK
2483.5		--	--	--	--	54	--	AV
Antenna Polarity: Horizontal								
2483.5	41.44	27.89	4	34.97	38.36	74	35.64	PK
2483.5		--	--	--	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

π /4 DQPSK (Hopping Low)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode:								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	41.59	27.62	3.92	34.97	38.16	74	35.84	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
Antenna Polarity: Horizontal								
2390	41.55	27.62	3.92	34.97	38.12	74	35.88	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

π /4 DQPSK (Hopping High)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	40.84	27.89	4	34.97	37.76	74	36.24	PK
2483.5		--	--	--	--	54	--	AV
Antenna Polarity: Horizontal								
2483.5	42.09	27.89	4	34.97	39.01	74	34.99	PK
2483.5		--	--	--	--	54	--	AV
Note: 1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK 2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK 3, Result = Read level + Antenna factor + cable loss-Amp factor 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

8- DPSK (CH Low)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	41.77	27.62	3.92	34.97	38.34	74	35.66	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
Antenna Polarity: Horizontal								
2390	41.98	27.62	3.92	34.97	38.55	74	35.45	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

8- DPSK (CH High)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	40.82	27.89	4	34.97	37.74	74	36.26	**PK**
2483.5		--	--	--	--	54	--	AV
Antenna Polarity: Horizontal								
2483.5	42.17	27.89	4	34.97	39.09	74	34.91	**PK**
2483.5		--	--	--	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

8- DPSK (Hopping Low)

Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	41.49	27.62	3.92	34.97	38.06	74	35.94	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV
Antenna Polarity: Horizontal								
2390	42.02	27.62	3.92	34.97	38.59	74	35.41	**PK**
2390	--	27.62	3.92	34.97	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

8- DPSK (Hopping High)

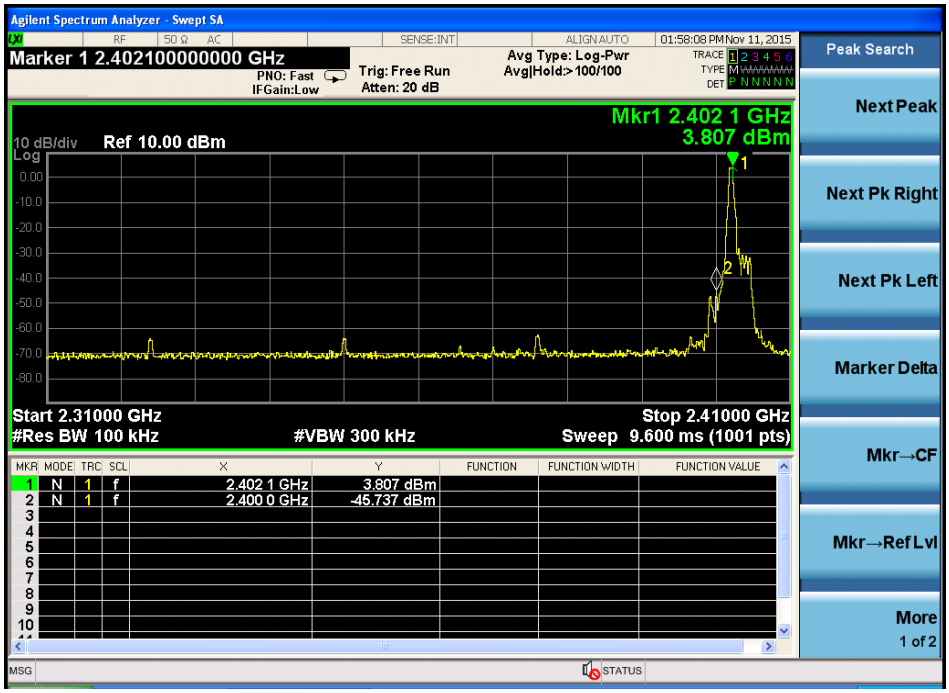
Band Edge Test result								
EUT: GNSS Survey Receiver M/N: S321 Network								
Power: DC 10.8V from battery								
Test date: 2015-11-11 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss (dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	40.91	27.89	4	34.97	37.83	74	36.17	PK
2483.5		--	--	--	--	54	--	AV
Antenna Polarity: Horizontal								
2483.5	41.62	27.89	4	34.97	38.54	74	35.46	PK
2483.5		--	--	--	--	54	--	AV

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK
3, Result = Read level + Antenna factor + cable loss-Amp factor
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

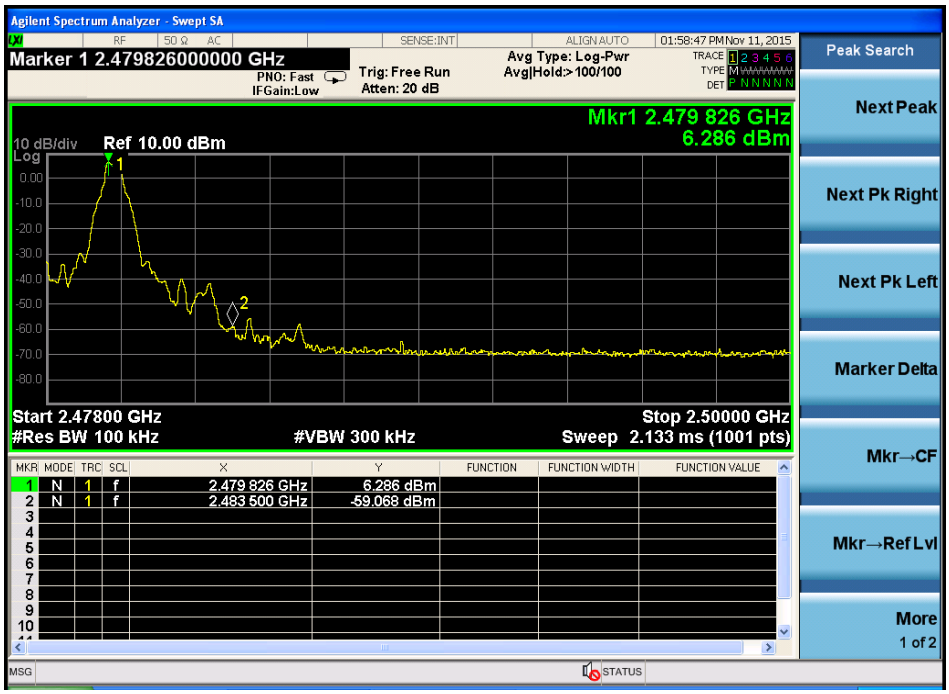
Conducted Method

GFSK

CH Low:



CH High:



Hopping

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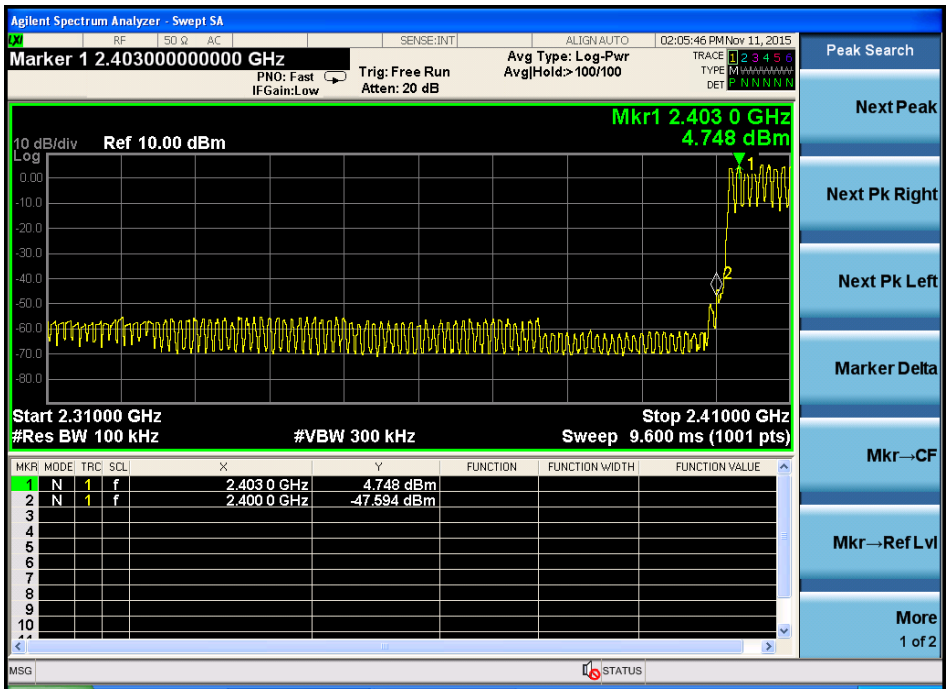

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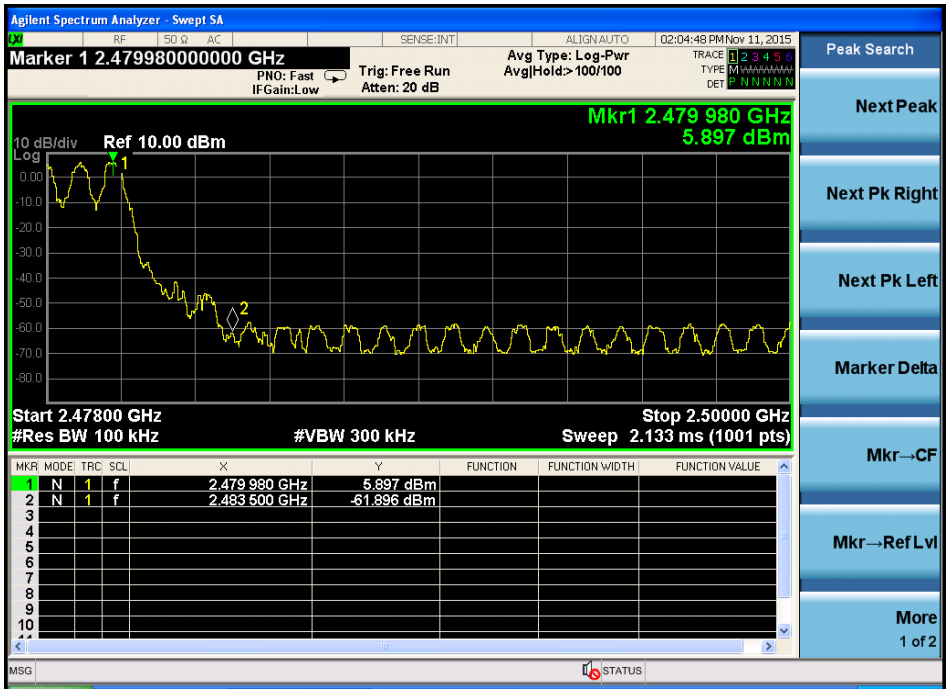

π /4 DQPSK

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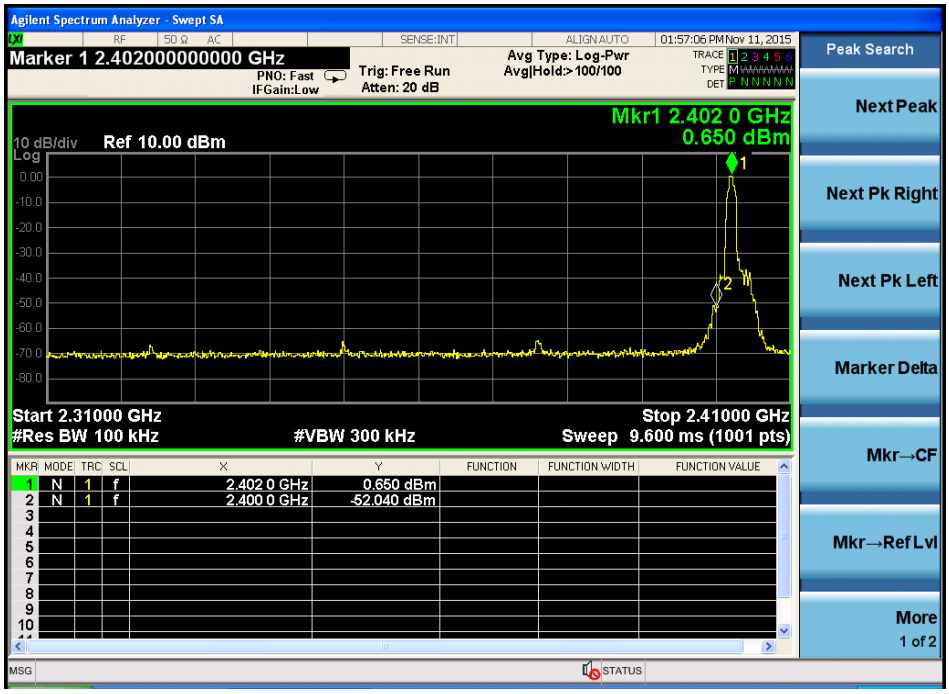

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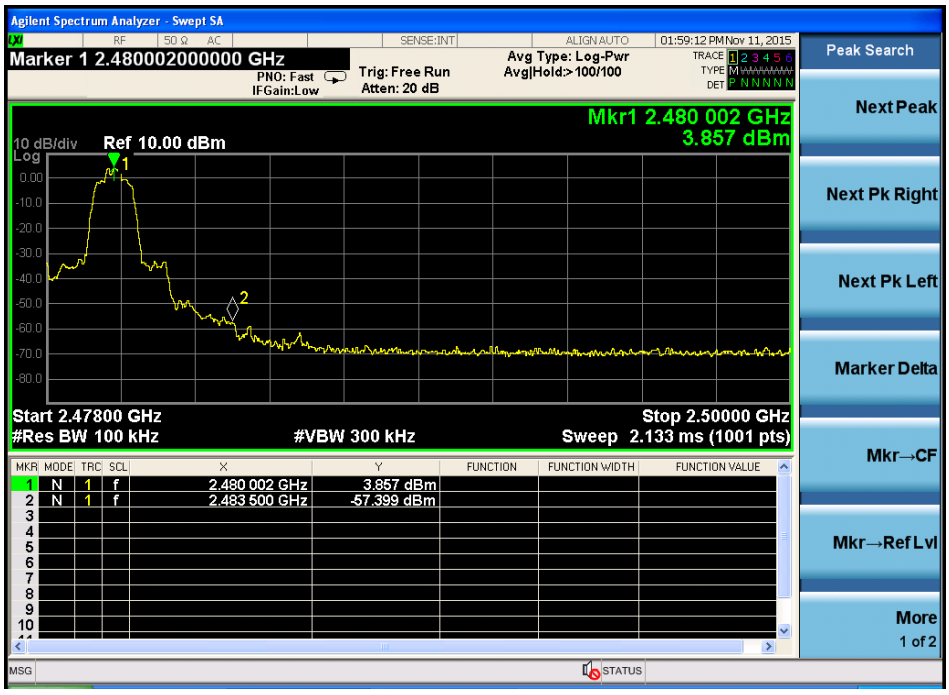

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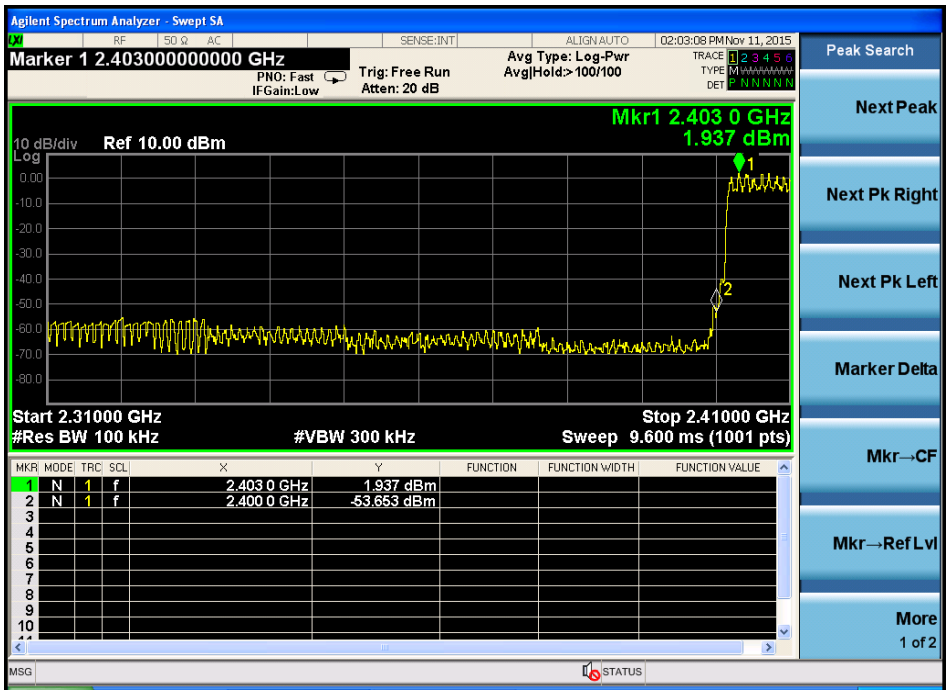

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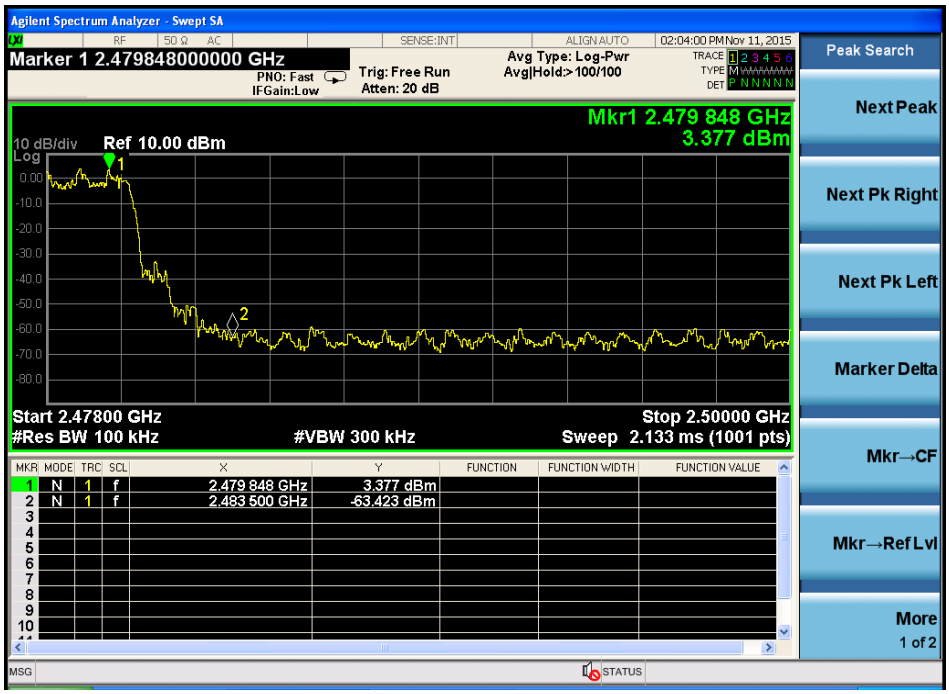
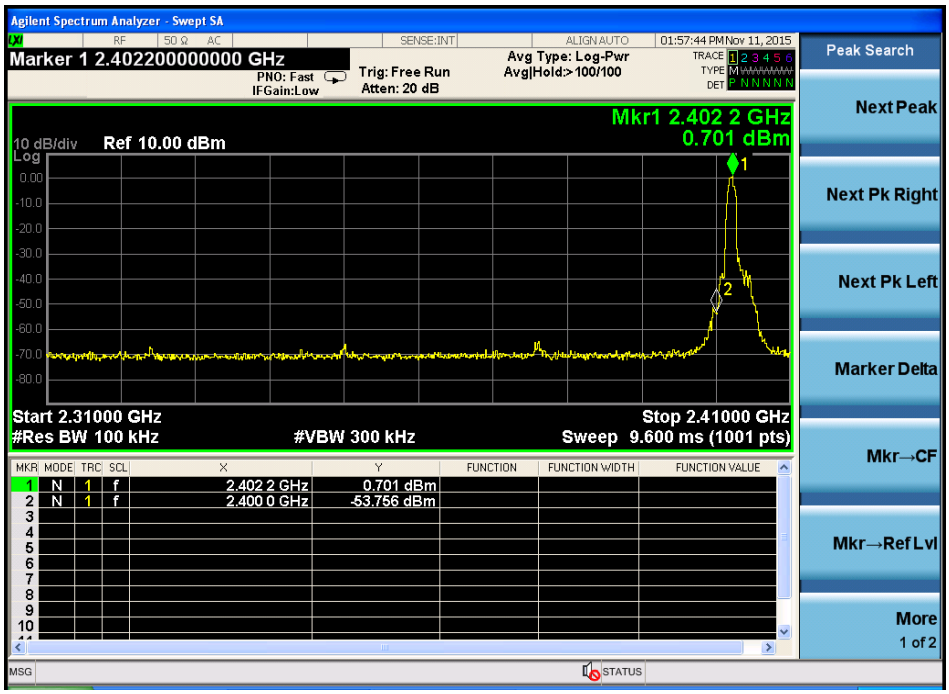


8- DPSK:

CH Low:



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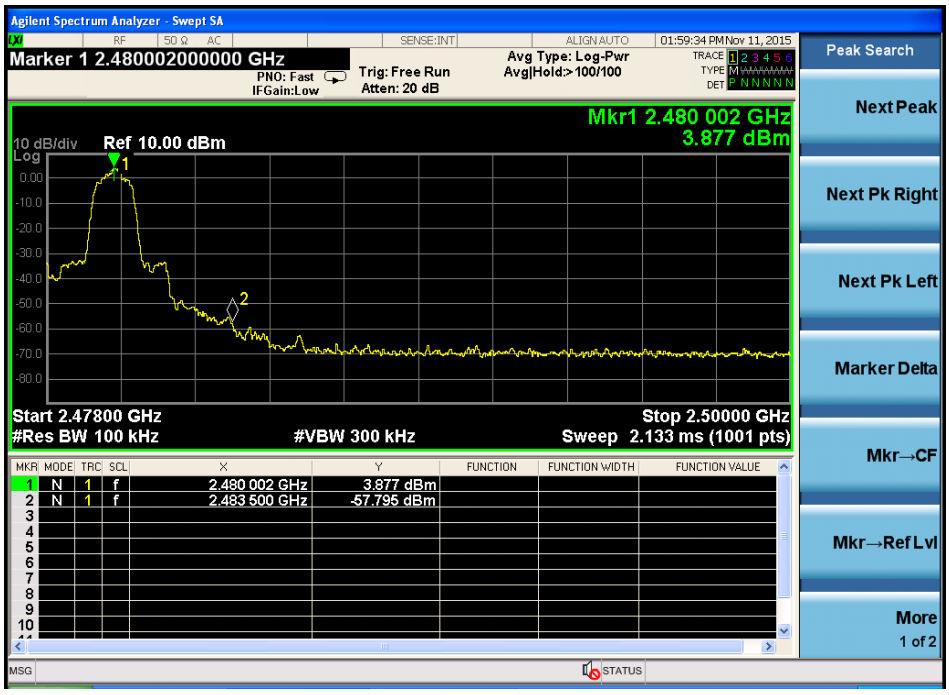

Hopping

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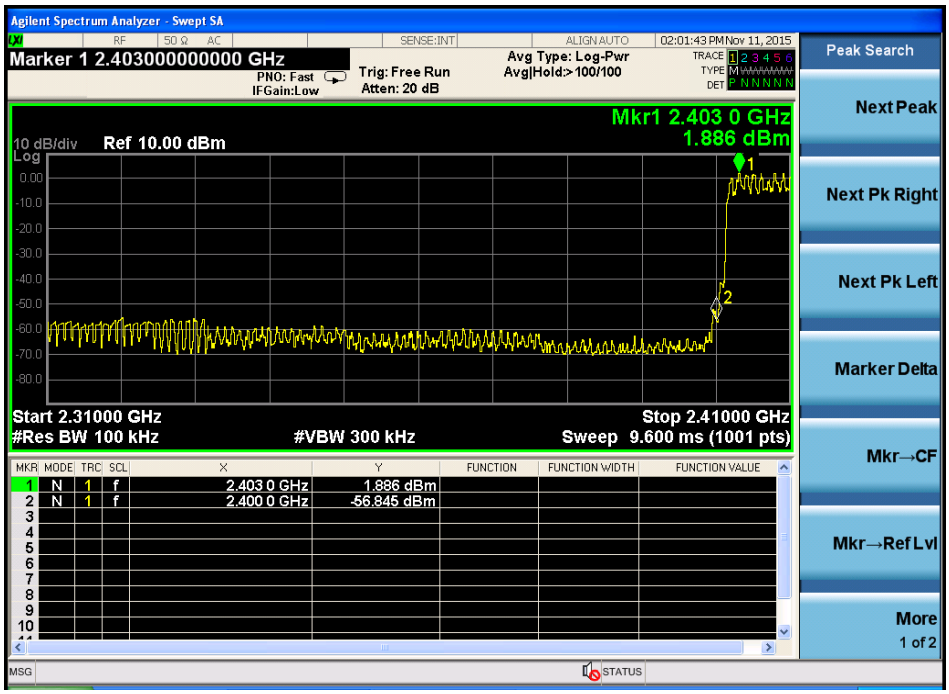

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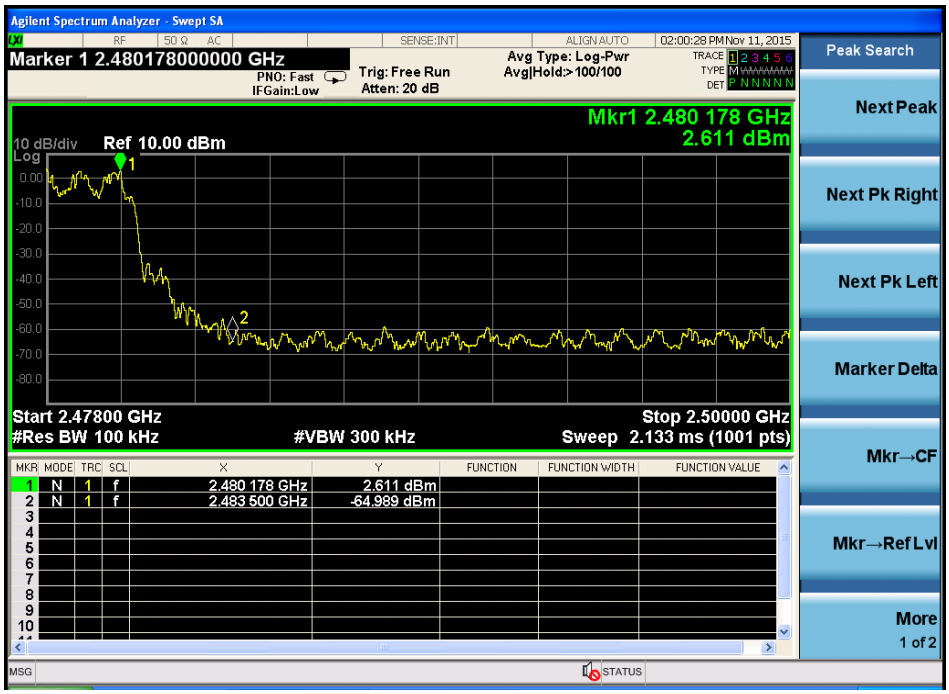
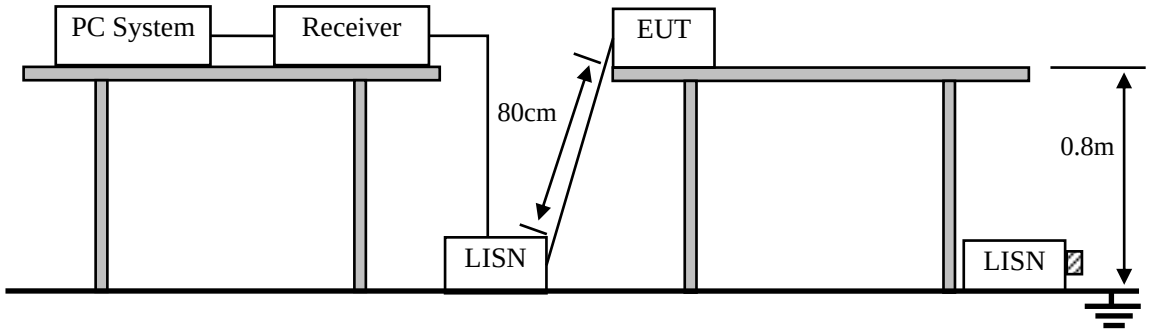


10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



:50Ω Terminator

10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

10.3. Test Procedure

(1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
(2) Setup the EUT and simulator as shown in 10.1
(3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on conducted Emission test.
(4) The bandwidth of test receiver is set at 10 kHz.
(5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

Not apply to battery operated product.

11. Antenna Requirements

11.1. Limit

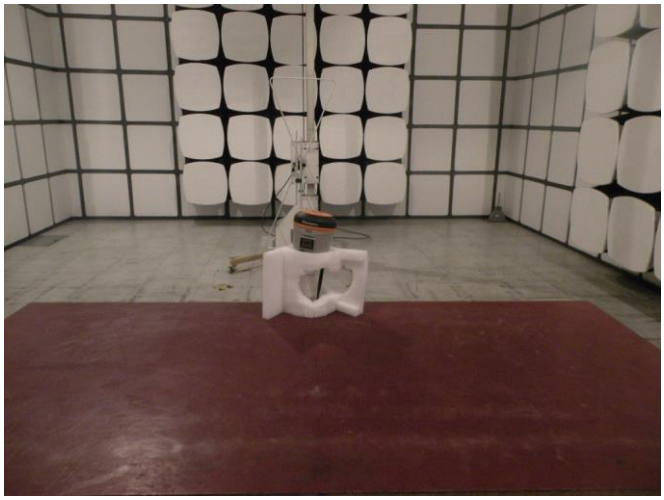
For intentional device, according to FCC PART 15, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC PART 15, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

The antennas used for this product are PCB Antenna for Bluetooth, the maximum peak gain of the transmit antenna is only 3.92 dBi .

12. Test setup photo

Photographs-Radiated Emission Test Setup in Chamber



---------END OF THE REPORT-------