APPLICATION FOR CERTIFICATION

On Behalf of

Elitegroup Computer Systems Co., Ltd.

Intelligent Gateway

Models No.: GWS-QX.

FCC ID : WL6GWS-QX

Brand: ECS

Prepared for : Elitegroup Computer Systems Co., Ltd.
No. 239, Sec. 2, TiDing Blvd,
Taipei, Taiwan 11493

Prepared By : AUDIX Technology Corporation
EMC Department
No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan

Tel : (02) 2609-9301, 2609-2133
Fax: (02) 2609-9303

File Number	:	C1M1409210
Report Number	:	EM-F140585
Date of Test	:	2014. 09. 24 ~ 10. 27
Date of Report	:	2014. 10. 31

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TEST REPORT CERTIFICATION

Applicant	:	Elitegroup Computer Systems Co., Ltd.
Manufacturer	:	Golden Elite Technology (SHENZHEN) CO., LTD.
EUT Description	:	Intelligent Gateway
FCC ID	:	**WL6GWS-QX**

(A) Model No.	:	GWS-QX.
(B) Serial No.	:	N/A
(C) Brand	:	ECS
(D) Power Supply	:	DC 24V
(E) Test Voltage	:	AC 120V, 60Hz (Via AC Adapter)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C, Oct 2013
(FCC CFR 47 Part 15C, §15.205, §15.207, §15.209 and §15.247)
ANSI C63.4/2003
FCC Public Notice DA 00-705, Mar. 2000

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 Subpart C limits.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC Part 15 standard.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test: 2014. 09. 24 ~ 10. 27 Date of Report: 2014. 10. 31

Producer: Tina Huang
(Tina Huang/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. DESCRIPTION OF REVISION HISTORY

Edition No.	Date of Revision	Revision Summary	Report Number
0	2014. 10. 31	Original Report.	EM-F140585

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product	Intelligent Gateway
Model Number	GWS-QX. (The dots "." in the model name cab be 0 to 9, A to Z, a to z, "-", "_", "\", "/" or blank, for marketing use only.) The model GWS-QX is test in this report
Serial Number	N/A
Brand Name	ECS
Applicant	Elitegroup Computer Systems Co., Ltd. No. 239, Sec. 2., TiDing Blvd., Taipei, Taiwan 11493
Manufacturer	Golden Elite Technology (SHENZHEN) CO., LTD. No.1, Nan-Huan Rd., ShaJing, BaoAn, Shenzhen, China
FCC ID	WL6GWS-QX
Fundamental Range	802.11b/g/n-HT20: 2412MHz ~ 2462MHz 802.11n-HT40: 2422MHz ~ 2452MHz Bluetooth and BLE: 2402MHz ~ 2480MHz
Frequency Channel	802.11b/g/n-HT20: 11 channels 802.11n-HT40: 7 channels Bluetooth: 79 channels BLE: 40 channels
Radio Technology	802.11b: DSSS Modulation (DBPSK/DQPSK/CCK) 802.11g: OFDM Modulation (BPSK/QPSK/16QAM/64QAM) 802.11n: OFDM Modulation (BPSK/QPSK/16QAM/64QAM) Bluetooth: FHSS (GFSK,π/4DQPSK, 8-DPSK) BLE: GFSK
Data Transfer Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps BT: 1/2/3Mbps BLE: 1Mbps
Antenna Type	Type: External Dipole Antenna + RF Cable Assembly, VSO, M/N 13-130-764090
Antenna Gain	3.1dBi
Date of Receipt of Sample	2014. 09. 19
Date of Test	2014. 09. 24 ~ 10. 27
Note: This EUT has 2.4GHz (WLAN, Bluetooth and BLE) function. See below for related test reports based on radio functionality. 1. The 2.4GHz (WLAN and BLE) function has been test in other report of EM-F140584. 2. The Bluetooth function has tested in other report of EM-F140585.	

2.2. Description of Key Component Lists

Item	Supplier	Model / Type	Character
CPU	Intel	Quark SoC X1021	400MHz
Memory	---	---	DDR3 1G (512MB x 2)
Storage	---	---	Mirco SD 8GB up to 32G
Wi-Fi +BT Combo Module	AzureWave (REALTEK)	AW-NB159H (RTL8723BE)	Wi-Fi with Bluetooth 4.0/3.0 + HS Combo Half Mini Card
AC Adapter	Asian Power Devices Inc.	DA-120B24	Input: AC 100-240V, 47-63Hz, 2.0A Output: DC 24V, 5A
	DC Power Cord: Non-Shielded, Undetachable, 1.8m AC Power Cord: Non-Shielded, Detachable, 1.8m (3pin)		
RS-232 Cable	Shielded, Detachable, 1.6m		

Remark: For a more detailed features description, please refer to the manufacturer's specifications or the user manual.

2.3. Tested Supporting System Details

2.3.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	Approval
1.	PC System	Acer	Veriton M2630G	N/A	By DoC
2.	LCD Monitor	LG	22LK330	N/A	By DoC
		ASUS	VE228N	N/A	By DoC
3.	USB Keyboard	Agilent	K120	N/A	By DoC
		Lenovo	KU-0225	0904414	By DoC
4.	USB Mouse	Acer	Mini N5	N/A	By DoC
		Lenovo	MO28UOL	4413524	By DoC

2.3.2. Used Cable Lists

Cable Description Of The Above Support Units	
1.	Power Cord: Non-Shielded, Detachable, 1.8m (3 Pin)
2.	D-Sub Cable: Shielded, Detachable, 1.8m Bonded two ferrite cores Power Cord: Non-Shielded, Detachable, 1.8m
3.	USB Cable: Shielded, Undetachable, 1.8m
4.	USB Cable: Shielded, Undetachable, 1.8m

2.4. Description of Test Facility

Name of Firm	:	**AUDIX Technology Corporation** **EMC Department** No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility (C8/AC)	:	**No. 8 Shielded Room** **Semi-Anechoic Chamber** No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan May 11, 2012 File on Federal Communication Commission Registration Number: 90993
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

2.5. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.43dB
Radiation Test (Distance: 3m)	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB
	Above 1GHz	± 5.02dB

Remark **:** Uncertainty = $ku_c(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz
Carrier Frequency Separation	± 0.2kHz
Time Of Occupancy	± 0.03sec
Maximum peak Output power	± 0.52dBm
Emission Limitations	± 0.13dB
Band Edges	± 0.13dB

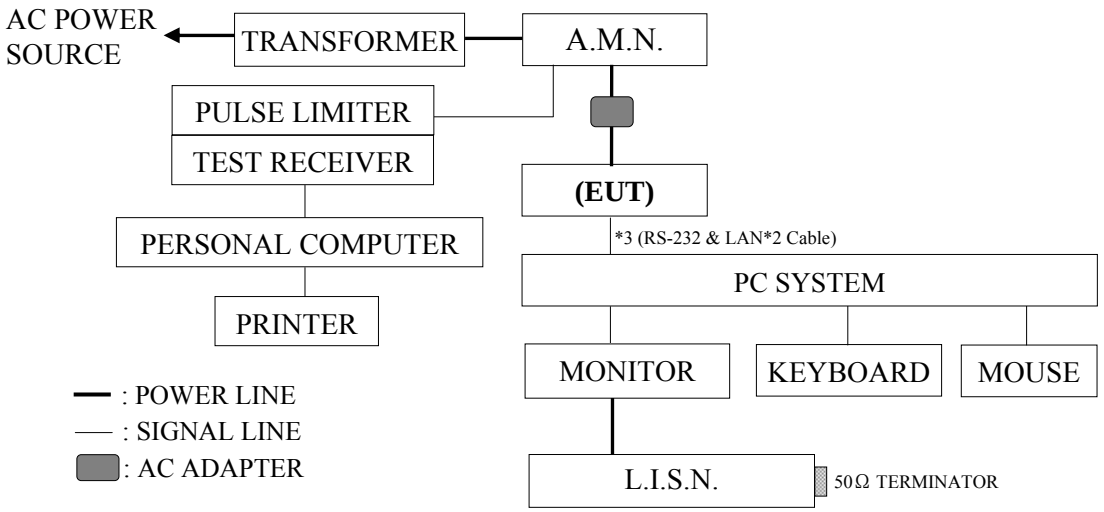
3. POWERLINE CONDUCTED EMISSION MEASUREMENT

3.1. Test Equipments

The following Test equipments were used during the powerline conducted emission measurement: (No. 8 Shielded Room)

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2014. 02. 19	1 Year
2.	A.M.N.	R&S	ESH2-Z5	100366	2014. 06. 21	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2013. 12. 26	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2014. 01. 18	1 Year

3.2. Block Diagram of Test Setup



EUT: INTELLIGENT GATEWAY

3.3. Powerline Conducted Emission Limit (§15.207)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

Remark1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

3.4. Operating Condition of EUT

3.4.1. Setup the EUT and simulator as shown on 3.2.

3.4.2. Turn on the power of all equipment.

3.4.3. Set to EUT (Intelligent Gateway) on transmitting and receiving during all testing.

3.5. Test Procedure

The EUT link to docking power adapter through docking was placed on the table which was above the ground by 80cm and adapter's power cord connected to the AC mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.)
Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to FCC ANSI C63.4-2003 during conducted measurement.

The bandwidth of the R&S Test Receiver ESR3 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

3.6. Powerline Conducted Emission Measurement Results

PASSED.
(All the emissions not reported below are too low against the prescribed limits.)

EUT was performed during this section testing and all the test results are attached in next pages.

EUT：Intelligent Gateway M/N：GWS-QX

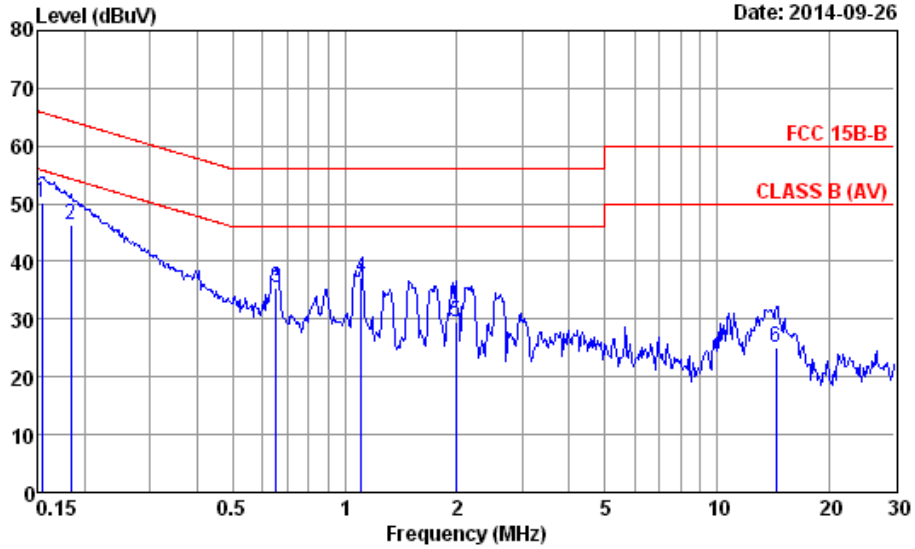
Test Date：2014. 09. 26 Temperature：26℃ Humidity：64%

The details are as follows：

Mode	Reference Test Data	
	Neutral	Line
1.	# 2	# 1

AUDIX TECHNOLOGY Corp. EMC Department
No.53-11, Dingfu, Linkou Dist.,New Taipei City
24442, Taiwan R.O.C.
Tel:+886-2-26092133 Fax:+886-2-26099303
Email:emc@audixtech.com

Data: 2 File: D:\test data\REPORT\2014\C1M1409XXX\C1M1409210-C-D(rf).EM6 (4)



Site no. : No.8 Shielded Room
Condition : ESH2-Z5 366
Limit : FCC 15B-B
Env. / Ins. : 26°C / 64% ESR3 (1774)
EUT : GWS-QX
Power Rating : 120Vac/60Hz
Test Mode : OPERATING

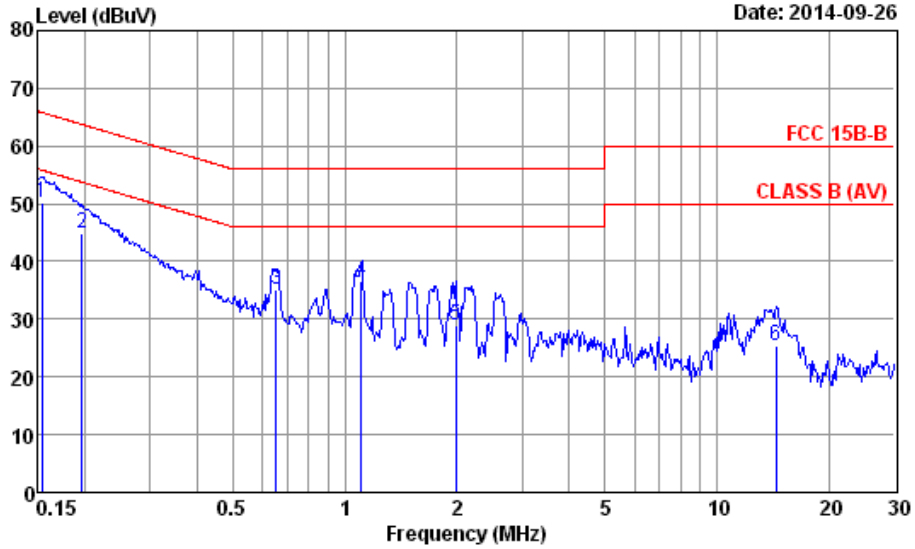
Data no. : 2
Phase : NEUTRAL
Engineer : John

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.153	0.21	0.02	9.85	40.04	50.12	65.82	15.70	QP
2	0.183	0.21	0.03	9.85	36.36	46.45	64.33	17.88	QP
3	0.654	0.23	0.04	9.85	25.32	35.44	56.00	20.56	QP
4	1.106	0.23	0.04	9.86	27.11	37.24	56.00	18.76	QP
5	1.991	0.25	0.06	9.84	19.29	29.44	56.00	26.56	QP
6	14.364	0.64	0.17	9.91	14.45	25.17	60.00	34.83	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

AUDIX TECHNOLOGY Corp. EMC Department
No.53-11, Dingfu, Linkou Dist.,New Taipei City
24442, Taiwan R.O.C.
Tel:+886-2-26092133 Fax:+886-2-26099303
Email:emc@audixtech.com

Data: 1 File: D:\test data\REPORT\2014\C1M1409XXX\C1M1409210-C-D(rf).EM6 (4)



Site no. : No.8 Shielded Room
Condition : ESH2-Z5 366
Limit : FCC 15B-B
Env. / Ins. : 26°C / 64% ESR3 (1774)
EUT : GWS-QX
Power Rating : 120Vac/60Hz
Test Mode : OPERATING

Data no. : 1
Phase : LINE
Engineer : John

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.153	0.18	0.02	9.85	40.00	50.05	65.82	15.77	QP
2	0.197	0.18	0.03	9.85	34.96	45.02	63.76	18.74	QP
3	0.654	0.20	0.04	9.85	25.09	35.18	56.00	20.82	QP
4	1.106	0.21	0.04	9.86	26.63	36.74	56.00	19.26	QP
5	1.991	0.24	0.06	9.84	18.82	28.96	56.00	27.04	QP
6	14.364	0.56	0.17	9.91	14.61	25.25	60.00	34.75	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipments

The following Test equipments were used during the radiated emission measurement:

4.1.1. For Frequency Range 30MHz~1000MHz (at Semi-Anechoic Chamber)

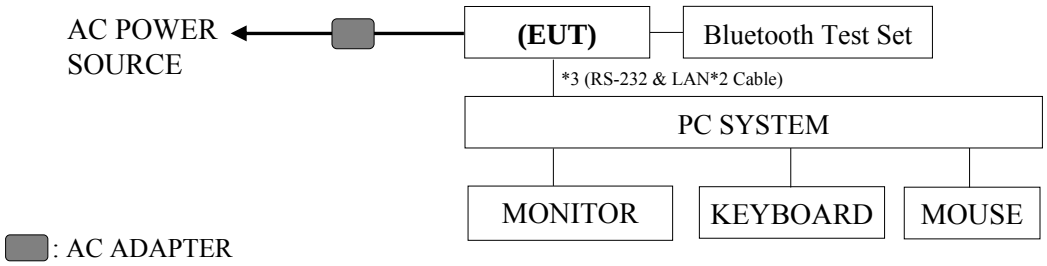
Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2014. 09. 15	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2014. 02. 18	1 Year
4.	Bilog Antenna	CHASE	CBL6112D	33821	2014. 08. 02	1 Year
5.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	2014. 03. 18	1 Year

4.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2014. 09. 15	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2014. 02. 18	1 Year
4.	2.4GHz Notch Filter	K&L	7NSL10-2441. 5E130.5-00	1	2014. 06. 12	1 Year
5.	3G High Pass Filter	Microware Circuits	H3G018G1	484796	2014. 06. 12	1 Year
6.	Horn Antenna	EMCO	3115	9609-4927	2014. 06. 16	1 Year
7.	Horn Antenna	EMCO	3116	2653	2014. 10. 10	1 Year
8.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	2014. 03. 18	1 Year

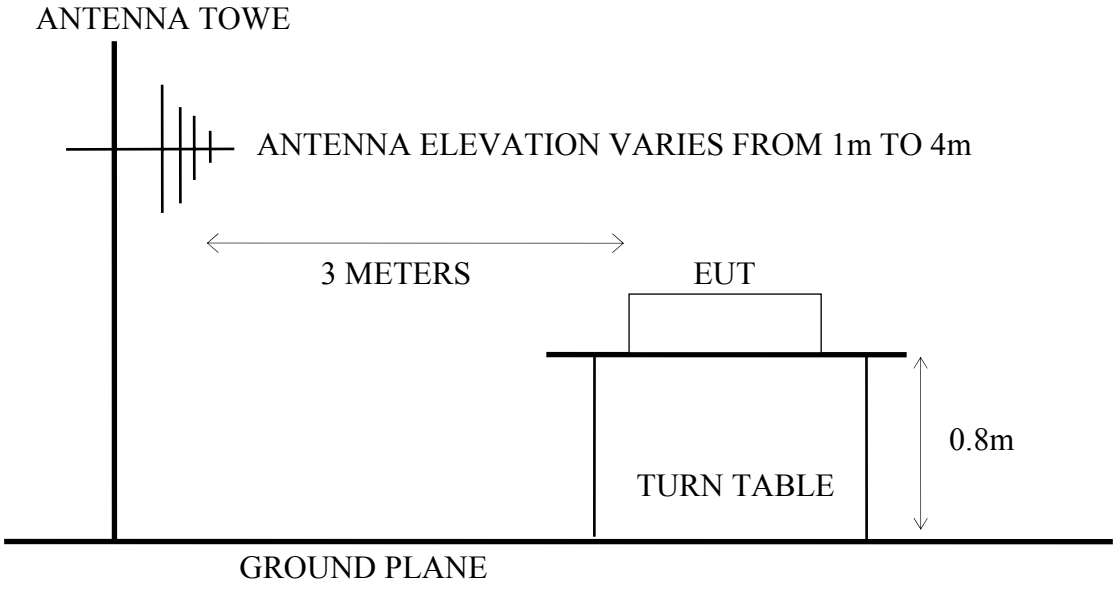
4.2. Test Setup

4.2.1. Block Diagram of connection between EUT and simulators

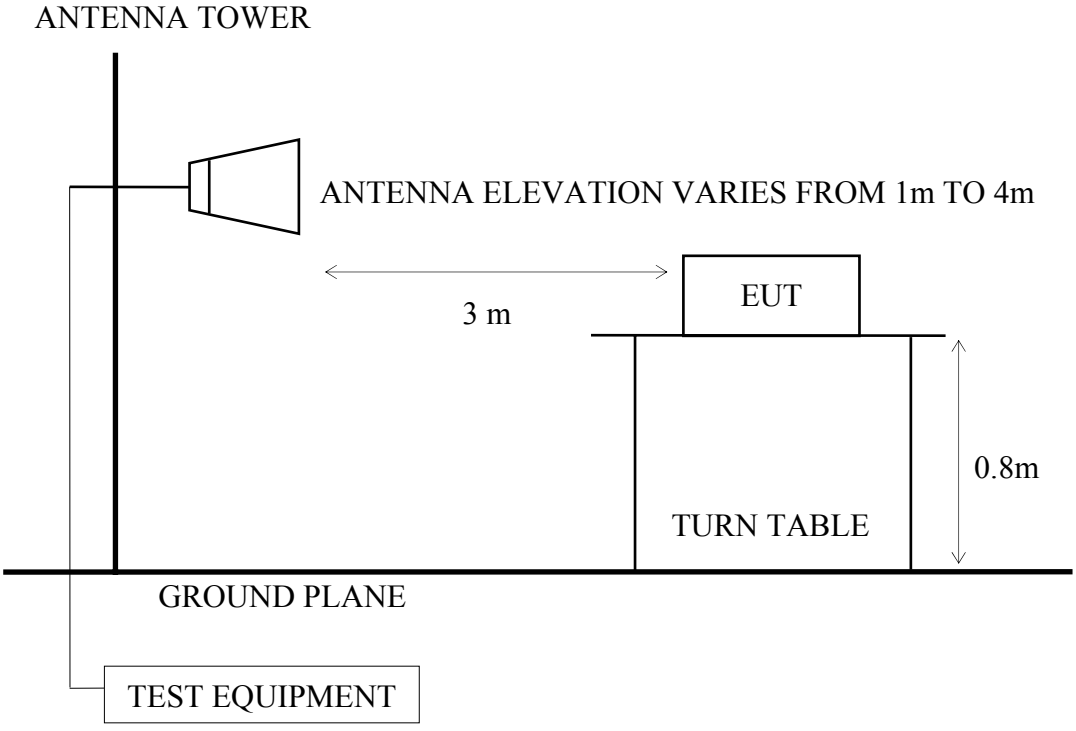


EUT: INTELLIGENT GATEWAY

4.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000MHz



4.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for above 1GHz



4.3. Radiated Emission Limits (§15.209)

Frequency MHz	Distance Meters	Field Strengths Limits	
		μV/m	dBμV/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark： (1) Emission level (dBμV/m) = 20 log Emission level (μV/m)
(2) The tighter limit applies at the edge between two frequency bands.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).
(5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

4.4. Operating Condition of EUT

4.4.1. Set up the EUT (Intelligent Gateway) and simulator as shown on 4.2.1.

4.4.2. To turn on the power of all equipments.

4.4.3. The EUT was set the PC System using test program “Teraterm”.

4.4.4. The EUT set to continuously transmit signals at 2402MHz, 2441MHz and 2480MHz during all test time.

4.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna could be moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antennas such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

The bandwidth of the R&S Test Receiver ESCS30 was set at 120kHz. (For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The resolution bandwidth of test spectrum analyzer is 1MHz and the video bandwidth is 10Hz for average detection (AV) at frequency above 1GHz.

The frequency range from 30MHz to 25GHz (Up to 10^{th} harmonics from fundamental frequency) was checked. 30MHz to 1000MHz was measured with Quasi-Peak detector.

Pursuant to ANSI 63.4: 4.2, peak detector is an alternate option for frequency from 30MHz to 1000MHz.

Above 1GHz was measured with peak and average detector. For frequency from 1000Hz o 25000Hz, we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist.

Pursuant to ANSI C63.4 8.3.1.2, when peak value complies with the average limit, we didn't perform measurement in average detector.

4.6. Radiated Emission Measurement Results

PASSED. (All the emissions not reported below are too low against the prescribed limits.)

EUT：Intelligent Gateway M/N：GWS-QX

Test Date：2014. 10. 31 Temperature：26℃ Humidity：43%

For Frequency Range 30MHz-1000MHz:
[Note: We performed testing of the highest data rate.]

The EUT was tested in restricted bands and all the test results are listed in section 4.6.1.

No.	Test Mode and Frequency		Reference Test Data No.	
			Horizontal	Vertical
1.	Transmitting	2402MHz (CH0)	# 2	# 1
2.		2441MHz (CH39)	# 2	# 1
3.		2480MHz (CH78)	# 2	# 1

Type of modulation: 8-DPSK.
All above final readings were measured with Peak detector.

For Frequency Range above 1GHz:
The emissions (up to 25GHz) not reported are too low to be measured.

For Restricted Bands:

The EUT was tested in restricted bands and all the test results are listed in section 4.6.1.2. (The restricted bands defined in part 15.205(a))

No.	Type of modulation	Test Mode and Frequency		Reference Test Data No.	
				Horizontal	Vertical
1.	8-DPSK	Transmitting	2402MHz (CH0)	# 3, # 4	# 1, # 2
2.			2480MHz (CH78)	# 7, # 8	# 5, # 6
3.	GFSK	Transmitting	2402MHz (CH0)	# 3, # 4	# 1, # 2
4.			2480MHz (CH78)	# 7, # 8	# 5, # 6

4.6.1. Frequency Range 30MHz-1000MHz Measurement Result

Transmit, Frequency: 2402MHz (8-DPSK)

Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
Limit : 30M-1G
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	76.56	7.16	2.95	28.58	38.69	40.00	1.31	Peak
2	120.21	12.28	3.37	22.08	37.73	43.50	5.77	Peak
3	240.49	11.86	4.27	24.81	40.94	46.00	5.06	Peak
4	359.80	14.64	5.28	16.81	36.73	46.00	9.27	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
Limit : 30M-1G
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	69.77	6.63	2.90	28.65	38.18	40.00	1.82	Peak
2	180.35	9.12	3.84	26.85	39.81	43.50	3.69	Peak
3	299.66	13.12	4.65	15.16	32.93	46.00	13.07	Peak
4	559.62	17.79	6.48	10.25	34.52	46.00	11.48	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Transmit, Frequency: 2441MHz (8-DPSK)

Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
Limit : 30M-1G
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	120.21	12.28	3.37	23.29	38.94	43.50	4.56	Peak
2	240.49	11.86	4.27	24.60	40.73	46.00	5.27	Peak
3	299.66	13.12	4.65	17.95	35.72	46.00	10.28	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
Limit : 30M-1G
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	127.00	11.89	3.43	26.36	41.68	43.50	1.82	Peak
2	180.35	9.12	3.84	26.46	39.42	43.50	4.08	Peak
3	240.49	11.86	4.27	18.69	34.82	46.00	11.18	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Transmit, Frequency: 2480MHz (8-DPSK)

Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
Limit : 30M-1G
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	72.68	6.85	2.92	28.49	38.26	40.00	1.74	Peak
2	240.49	11.86	4.27	24.92	41.05	46.00	4.95	Peak
3	359.80	14.64	5.28	17.02	36.94	46.00	9.06	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
Limit : 30M-1G
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	93.05	9.67	3.17	27.80	40.64	43.50	2.86	Peak
2	180.35	9.12	3.84	26.35	39.31	43.50	4.19	Peak
3	299.66	13.12	4.65	14.97	32.74	46.00	13.26	Peak

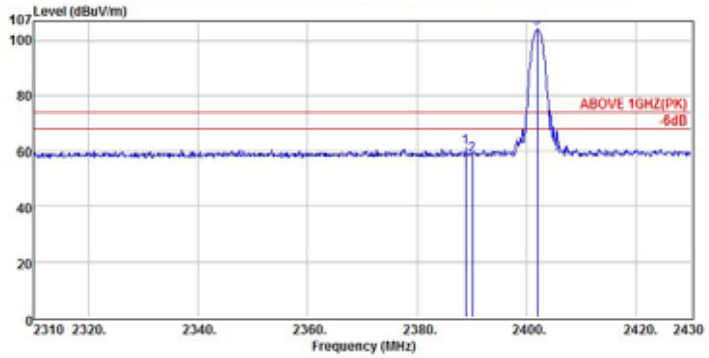
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

4.6.2. Restricted Bands Measurement Results

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

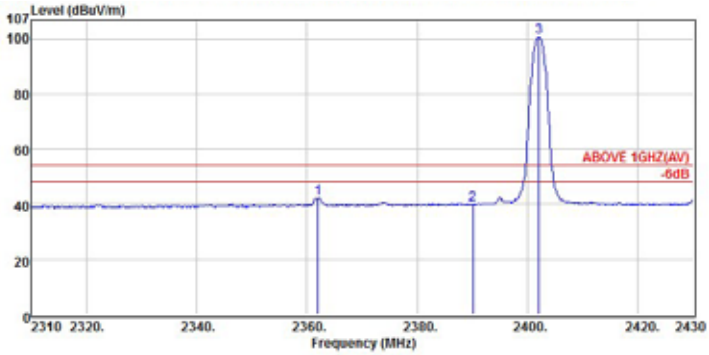
Test Mode： Transmit, Channel: 0, Frequency: 2402MHz, 8-DPSK



Site no. : Audix NO.1 Chamber Data no. : 3
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz 8DPSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2388.84	28.20	5.24	27.72	61.16	74.00	12.84	Peak
2	2390.04	28.20	5.24	25.22	58.66	74.00	15.34	Peak
3	2401.92	28.21	5.26	70.67	104.14	74.00	-30.14	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 4
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz 8DPSK

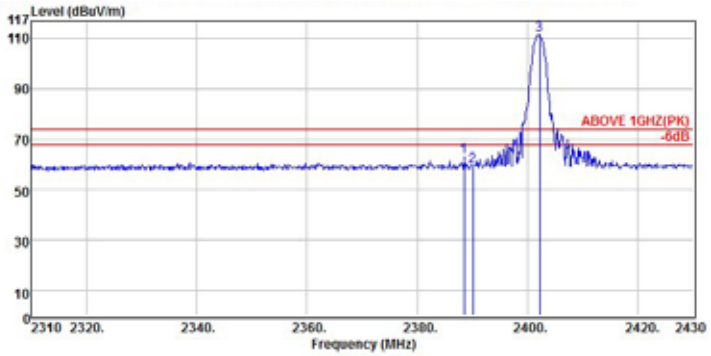
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2361.96	28.17	5.20	8.78	42.15	54.00	11.85	Average
2	2390.04	28.20	5.24	6.43	39.87	54.00	14.13	Average
3	2402.04	28.21	5.26	67.24	100.71	54.00	-46.71	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

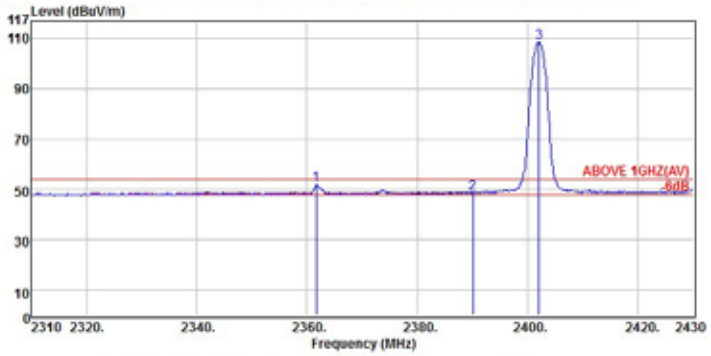
Test Mode： Transmit, Channel: 0, Frequency: 2402MHz, 8-DPSK



Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz 8DPSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2388.48	28.20	5.24	29.44	62.88	74.00	11.12	Peak
2	2390.04	28.20	5.24	25.56	59.00	74.00	15.00	Peak
3	2402.16	28.21	5.26	77.93	111.40	74.00	-37.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz 8DPSK

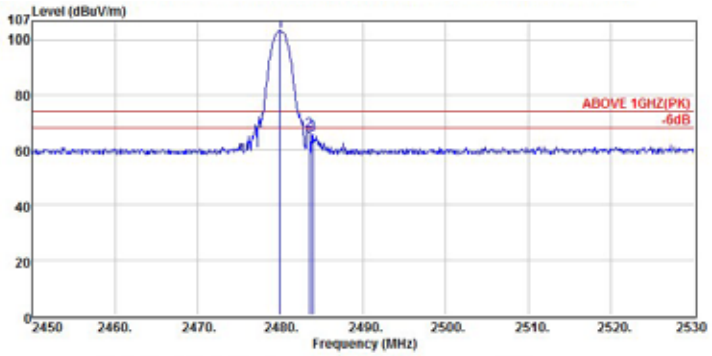
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2361.72	28.17	5.20	18.27	51.64	54.00	2.36	Average
2	2390.04	28.20	5.24	14.97	48.41	54.00	5.59	Average
3	2402.04	28.21	5.26	74.81	108.28	54.00	-54.28	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

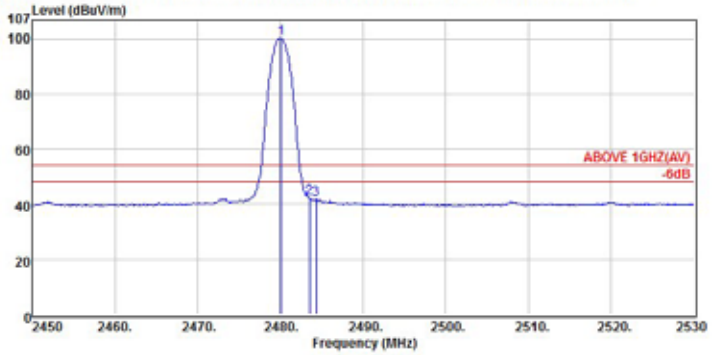
Test Mode： Transmit, Channel: 78, Frequency: 2480MHz, 8-DPSK



Site no. : Audix NO.1 Chamber Data no. : 7
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz 8DPSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.00	28.28	5.36	69.74	103.38	74.00	-29.38	Peak
2	2483.52	28.29	5.37	33.34	67.00	74.00	7.00	Peak
3	2483.92	28.29	5.37	31.88	65.54	74.00	8.46	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 8
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz 8DPSK

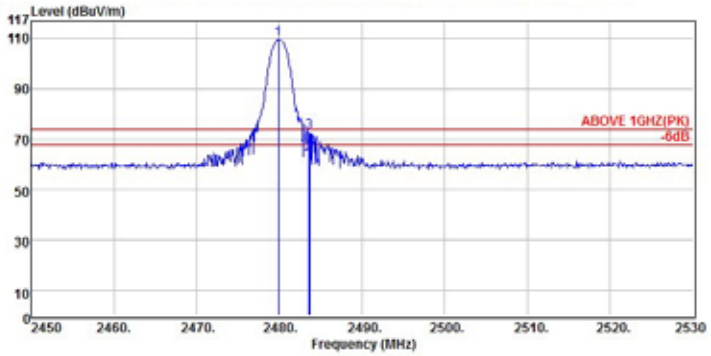
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.08	28.28	5.36	66.60	100.24	54.00	-46.24	Average
2	2483.52	28.29	5.37	8.58	42.24	54.00	11.76	Average
3	2484.32	28.29	5.37	8.02	41.68	54.00	12.32	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

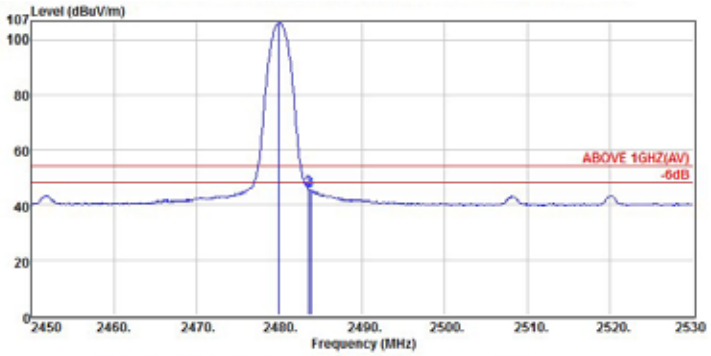
Test Mode： Transmit, Channel: 78, Frequency: 2480MHz, 8-DPSK



Site no. : Audix NO.1 Chamber Data no. : 5
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz 8DPSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2479.92	28.28	5.36	75.89	109.53	74.00	-35.53	Peak
2	2483.52	28.29	5.37	30.31	63.97	74.00	10.03	Peak
3	2483.68	28.29	5.37	39.14	72.80	74.00	1.20	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 6
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz 8DPSK

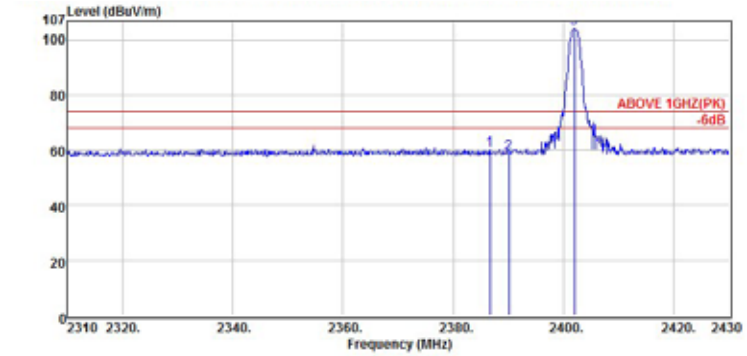
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.00	28.28	5.36	72.49	106.13	54.00	-52.13	Average
2	2483.52	28.29	5.37	12.25	45.91	54.00	8.09	Average
3	2483.76	28.29	5.37	11.80	45.46	54.00	8.54	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

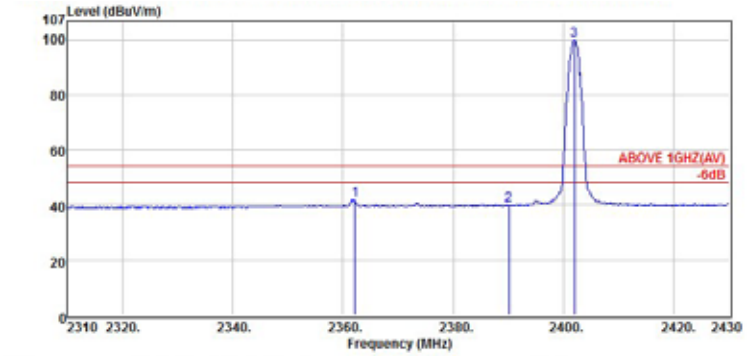
Test Mode： Transmit, Channel: 0, Frequency: 2402MHz, GFSK



Site no. : Audix NO.1 Chamber Data no. : 3
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz GFSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2386.68	28.20	5.23	26.67	60.10	74.00	13.90	Peak
2	2390.04	28.20	5.24	25.28	58.72	74.00	15.28	Peak
3	2401.92	28.21	5.26	70.65	104.12	74.00	-30.12	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 4
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz GFSK

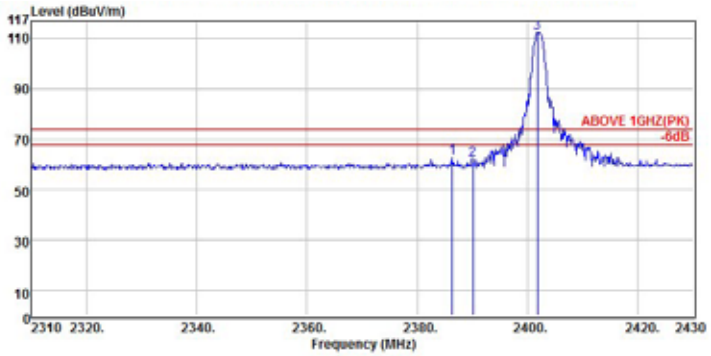
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2362.20	28.17	5.20	8.44	41.81	54.00	12.19	Average
2	2390.04	28.20	5.24	6.33	39.77	54.00	14.23	Average
3	2401.92	28.21	5.26	66.35	99.82	54.00	-45.82	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

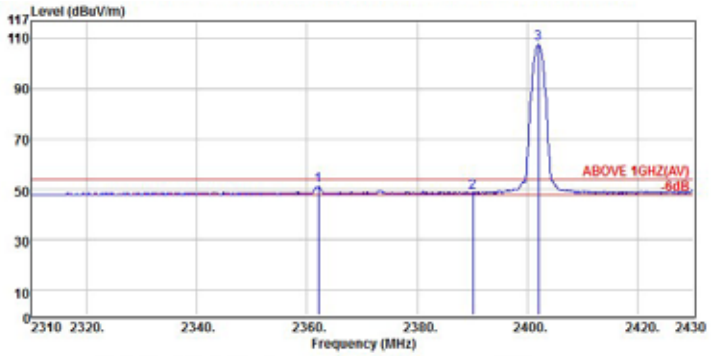
Test Mode： Transmit, Channel: 0, Frequency: 2402MHz, GFSK



Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX.
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz GFSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2386.32	28.20	5.23	29.00	62.43	74.00	11.57	Peak
2	2390.04	28.20	5.24	28.44	61.88	74.00	12.12	Peak
3	2401.80	28.21	5.25	78.58	112.04	74.00	-38.04	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 26*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2402MHz GFSK

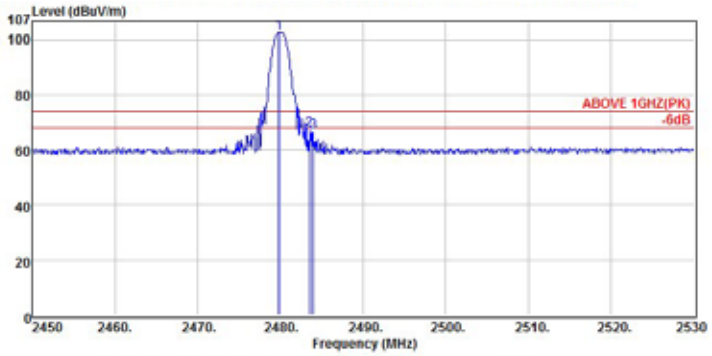
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2362.08	28.17	5.20	17.91	51.28	54.00	2.72	Average
2	2390.04	28.20	5.24	15.36	48.80	54.00	5.20	Average
3	2401.92	28.21	5.26	74.19	107.66	54.00	-53.66	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

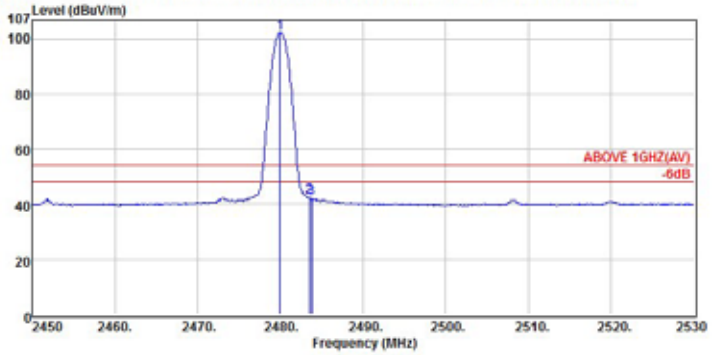
Test Mode： Transmit, Channel: 78, Frequency: 2480MHz, GFSK



Site no. : Audix NO.1 Chamber Data no. : 7
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz GFSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2479.84	28.28	5.36	69.17	102.81	74.00	-28.81	Peak
2	2483.52	28.29	5.37	33.55	67.21	74.00	6.79	Peak
3	2484.00	28.29	5.37	32.82	66.48	74.00	7.52	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 8
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz GFSK

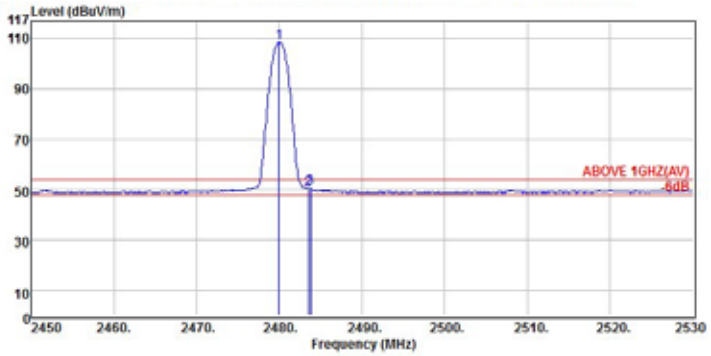
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.00	28.28	5.36	68.66	102.30	54.00	-48.30	Average
2	2483.52	28.29	5.37	8.73	42.39	54.00	11.61	Average
3	2483.76	28.29	5.37	8.37	42.03	54.00	11.97	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 10. 31 Temperature： 26℃

EUT： Intelligent Gateway Humidity： 43%

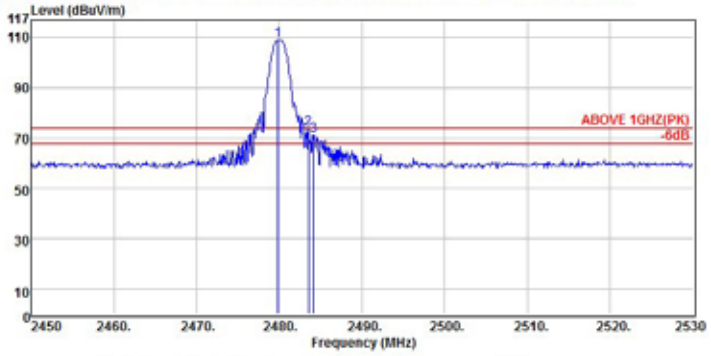
Test Mode： Transmit, Channel: 78, Frequency: 2480MHz, GFSK



Site no. : Audix NO.1 Chamber Data no. : 5
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz GFSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.00	28.28	5.36	74.87	108.51	54.00	-54.51	Average
2	2483.52	28.29	5.37	16.54	50.20	54.00	3.80	Average
3	2483.76	28.29	5.37	16.63	50.29	54.00	3.71	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 Chamber Data no. : 6
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 28*C / 43% N9010A Engineer : Sam
EUT : GWS-QX.
Power Rating : AC 120V/60Hz
Test Mode : Tx2480MHz GFSK

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2479.84	28.28	5.36	75.30	108.94	74.00	-34.94	Peak
2	2483.52	28.29	5.37	39.73	73.39	74.00	0.61	Peak
3	2484.16	28.29	5.37	37.44	71.10	74.00	2.90	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
2. The emission levels that are 20dB below the official limit are not reported.

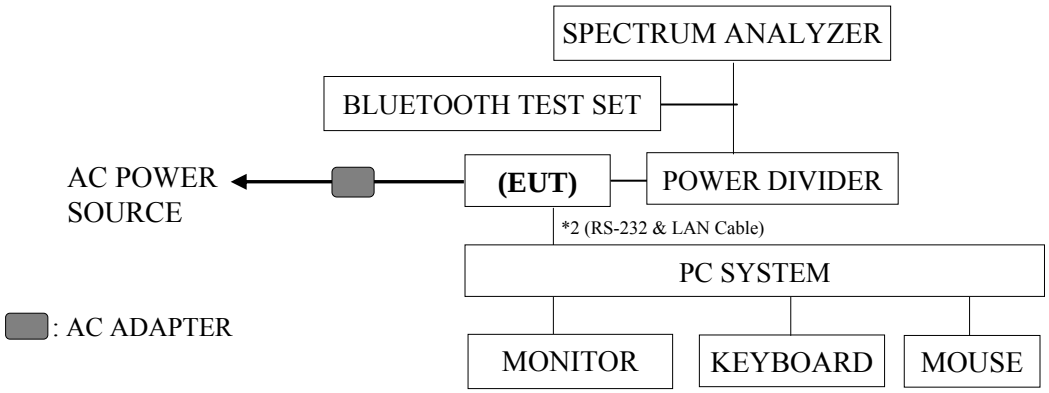
5. 20dB BANDWIDTH MEASUREMENT

5.1. Test Equipments

The following Test equipments were used during the 20dB bandwidth measurement:

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	R&S	FSV30	101181	2014. 03. 14	1 Year
2.	Bluetooth Test Set	Anritsu	MT8852B	6K00005697	2014. 03. 18	1 Year
3.	Power Divider	Anritsu	K240C	19728	2014. 01. 04	1 Year

5.2. Block Diagram of Test Setup



EUT: INTELLIGENT GATEWAY

5.3. Specification Limits [§15.247(a)(1)]

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

5.4. Operating Condition of EUT

The test program "Teraterm" for Bluetooth was used to enable the EUT to transmit data at different channel frequency individually.

5.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The RBW of the fundamental frequency was measure by spectrum analyzer 1% of the 20dB bandwidth and the setting equal to RBW and VBW is equal to RBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.
The measurement guideline was according to FCC Public Notice DA 00-705.

5.6. Test Results

PASSED. All the test results are attached in next pages.

[Note: We performed testing of the highest and lowest data rate.]

Test Date : 2014. 10. 07 Temperature : 24℃ Humidity : 58%

5.6.1. Type of Modulation: 8-DPSK

No.	Channel	Test Frequency	**20dB Bandwidth**	**2/3 (20dB Bandwidth)**
1.	0	2402MHz	**1.2537 MHz**	**0.836MHz**
2.	39	2441MHz	**1.2537 MHz**	**0.836MHz**
3.	78	2480MHz	**1.2537 MHz**	**0.836MHz**

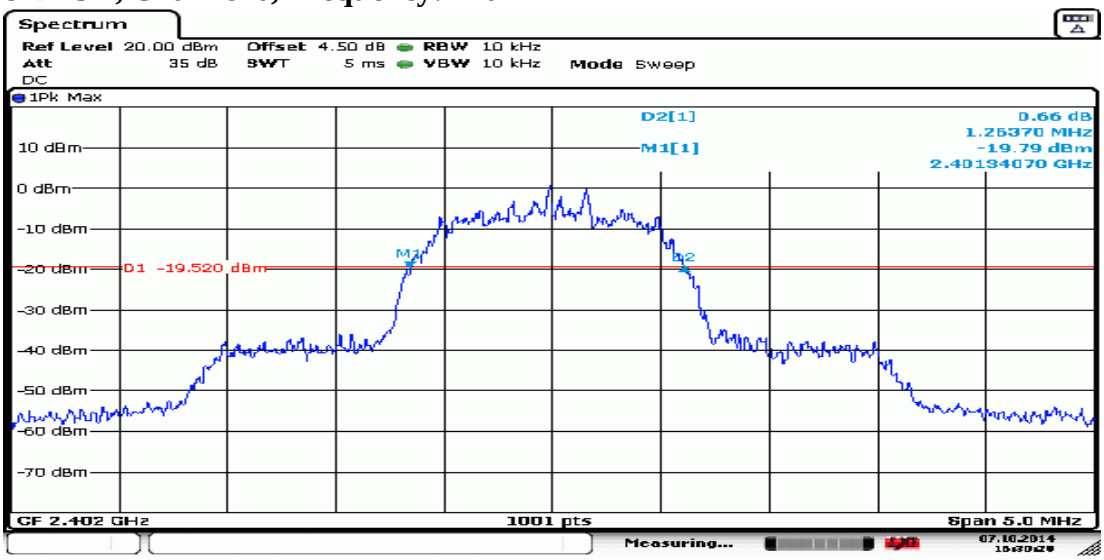
The maximum two-thirds of the 20dB bandwidth shall be at maximum **0.836MHz.**

5.6.2. Type of Modulation: GFSK

No.	Channel	Test Frequency	**20dB Bandwidth**	**2/3 (20dB Bandwidth)**
1.	0	2402MHz	**932.10 kHz**	**621.4kHz**
2.	39	2441MHz	**935.10 kHz**	**621.4kHz**
3.	78	2480MHz	**935.10 kHz**	**621.4kHz**

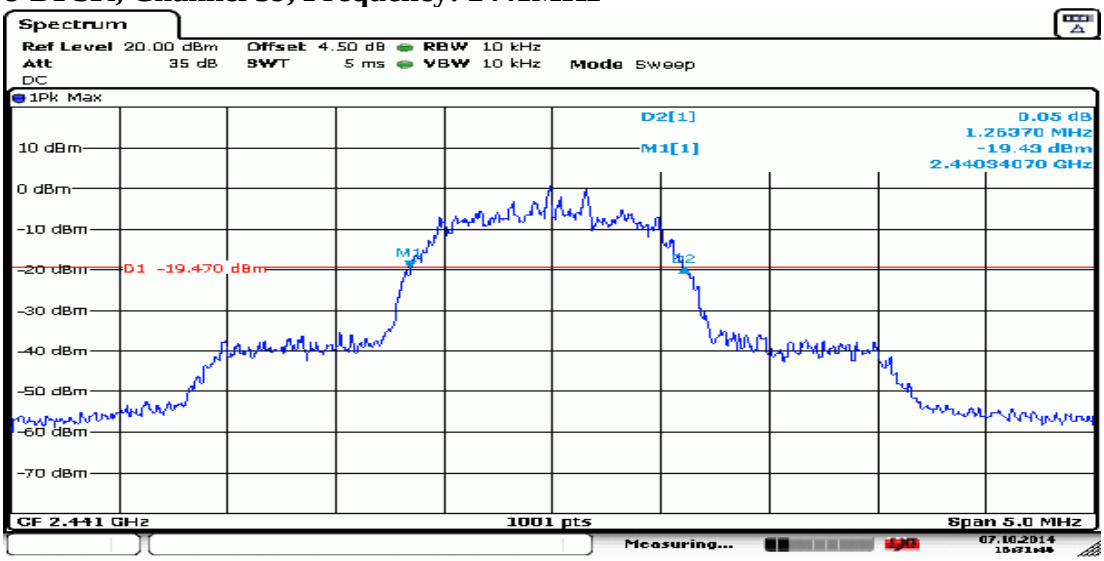
The maximum two-thirds of the 20dB bandwidth shall be at maximum **621.4Hz.**

8-DPSK, Channel 0, Frequency: 2402MHz



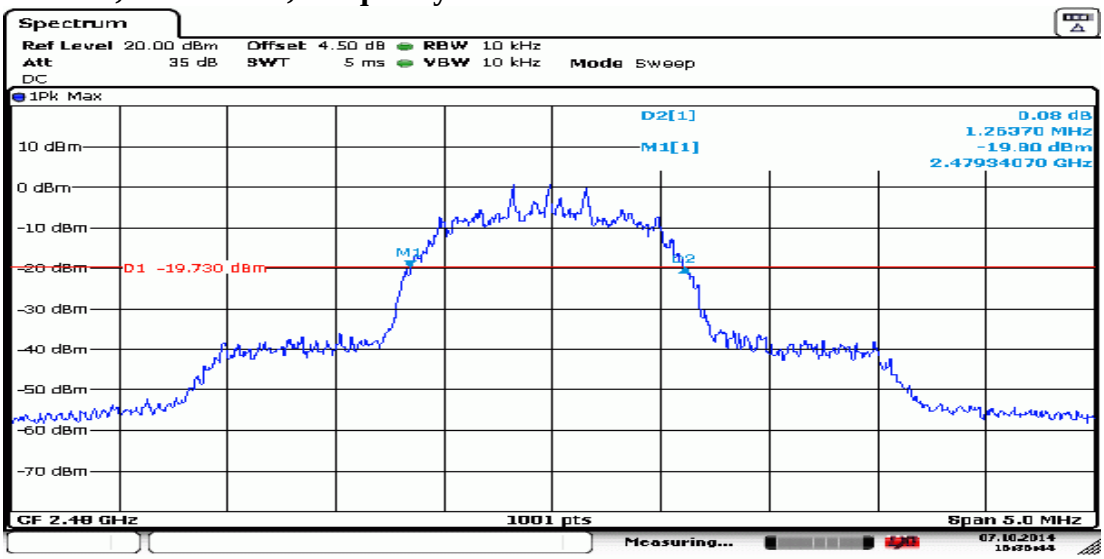
Date: 7.OCT.2014 16:30:20

8-DPSK, Channel 39, Frequency: 2441MHz



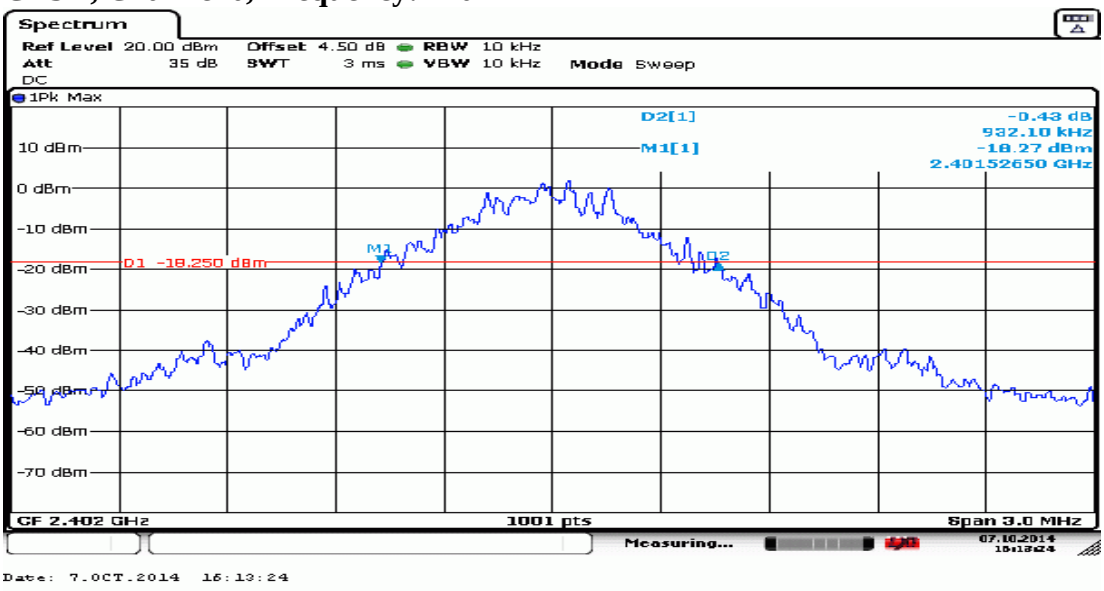
Date: 7.OCT.2014 16:31:46

8-DPSK, Channel 78, Frequency: 2480MHz

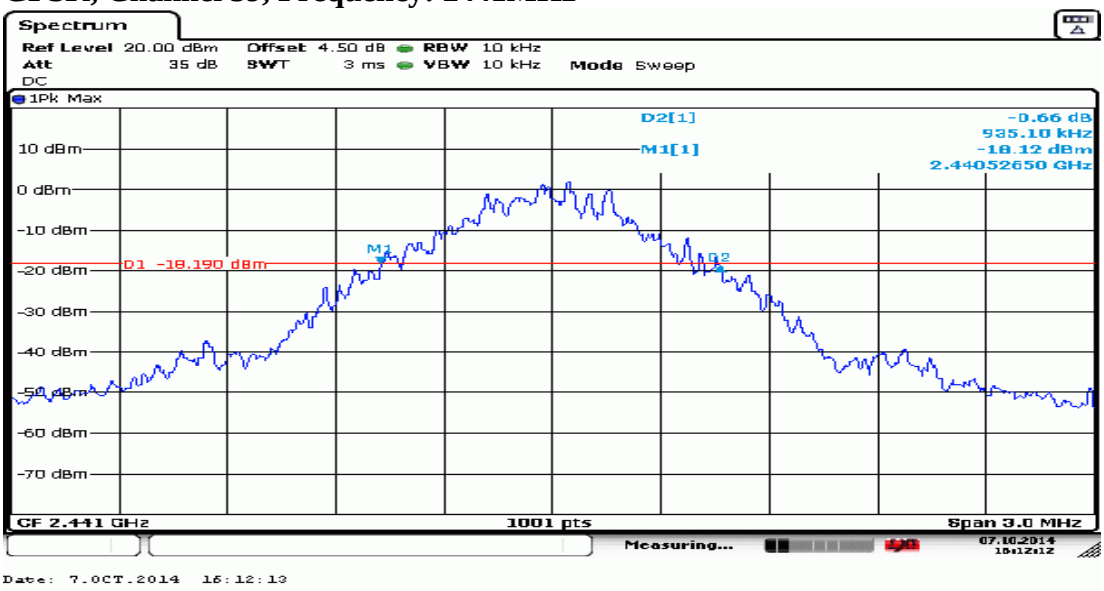


Date: 7.OCT.2014 16:35:44

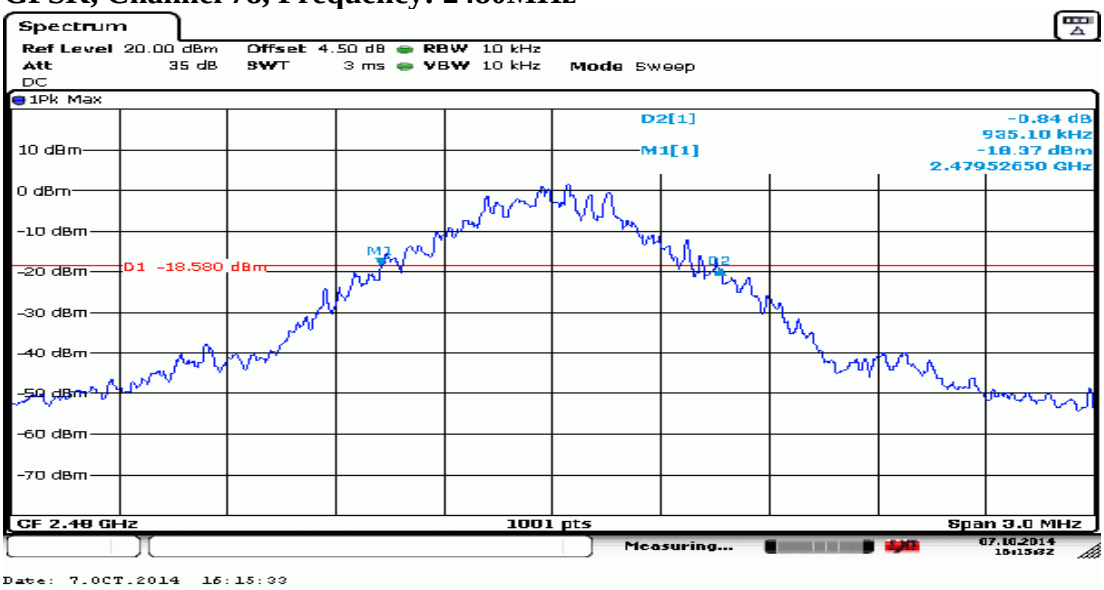
GFSK, Channel 0, Frequency: 2402MHz



GFSK, Channel 39, Frequency: 2441MHz



GFSK, Channel 78, Frequency: 2480MHz



6. CARRIER FREQUENCY SEPARATION MEASUREMENT

6.1. Test Equipment

The following Test Equipment was used during the carrier frequency separation measurement:

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	R&S	FSV30	101181	2014. 03. 14	1 Year

6.2. Block Diagram of Test Setup

The same as section 5.2.

6.3. Specification Limits [§15.247(a)(1)]

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

6.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 5.4.

6.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The channel separation was measure by spectrum analyzer with RBW equal to 1% of the span. The video bandwidth not to be smaller than resolution bandwidth, the peak was mark on adjacent bandwidth, the between of peak is carrier frequency separation.
The measurement guideline was according to FCC Public Notice DA 00-705.

6.6. Test Results

PASSED. All the test results are attached in next pages.

[Note: We performed testing of the highest and lowest data rate.]

Test Date : 2014. 10. 27 Temperature : 24℃ Humidity : 58%

6.6.1. Type of Modulation: 8-DPSK

1. 2402MHz adjacent channel of carrier frequency separation: 0.981MHz。
2. 2441MHz adjacent channel of right carrier frequency separation: 0.828MHz。
3. 2441MHz adjacent channel of left carrier frequency separation: 1.008MHz。
4. 2480MHz adjacent channel of carrier frequency separation: 1.164MHz。

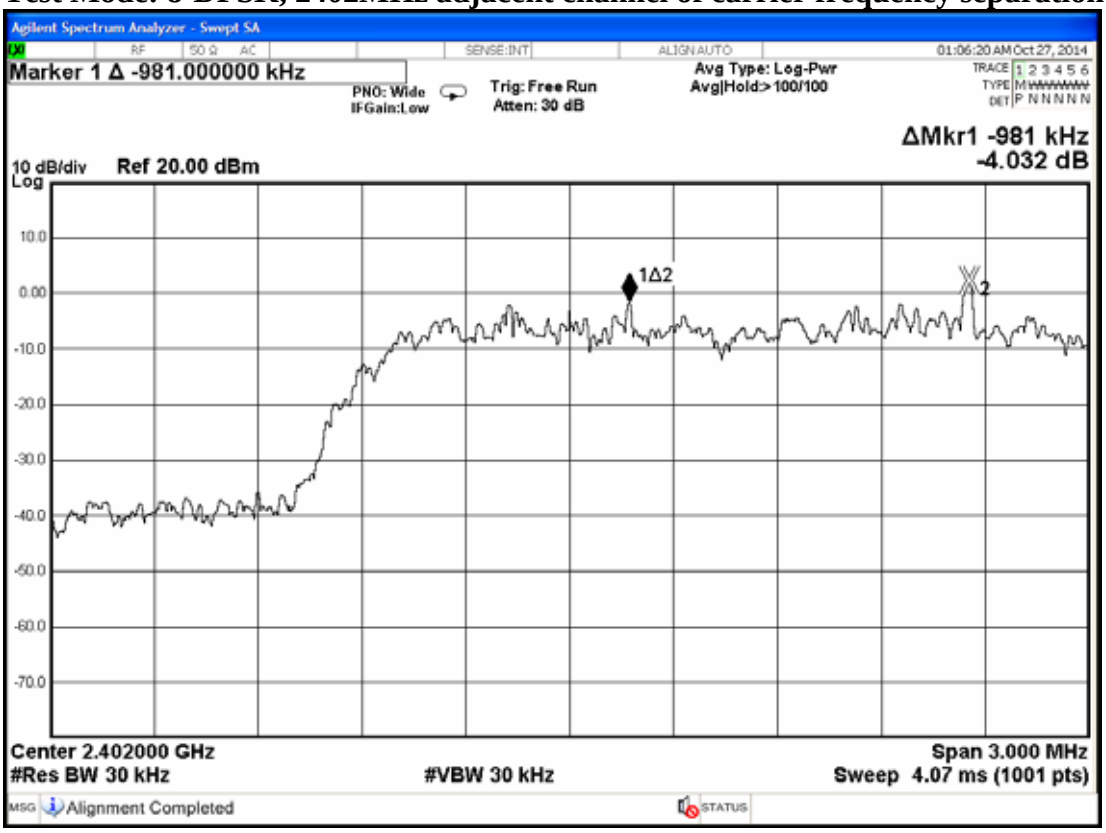
[Above values have met the requirement as specified in section 4.3: frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.]

6.6.2. Type of Modulation: GFSK

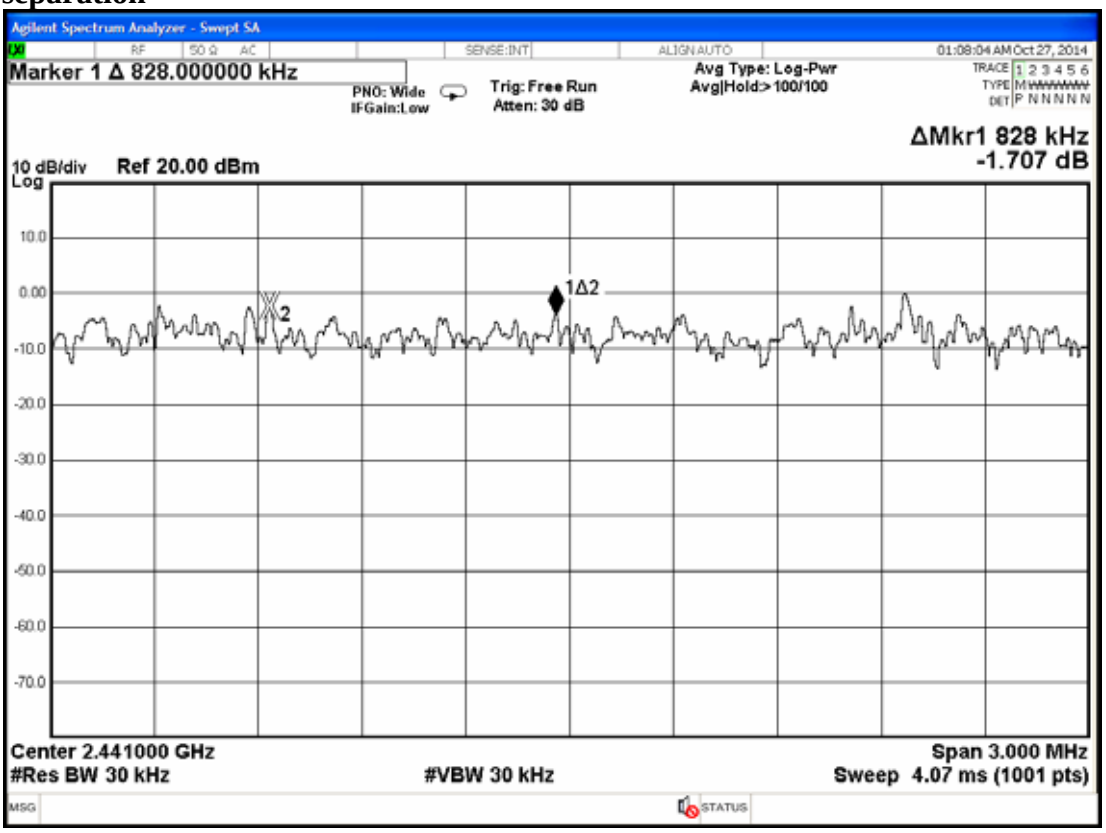
1. 2402MHz adjacent channel of carrier frequency separation: 1.005MHz。
2. 2441MHz adjacent channel of right carrier frequency separation: 1.110MHz。
3. 2441MHz adjacent channel of left carrier frequency separation: 0.819MHz。
4. 2480MHz adjacent channel of carrier frequency separation: 0.990MHz。

[Above values have met the requirement as specified in section 4.3: 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.]

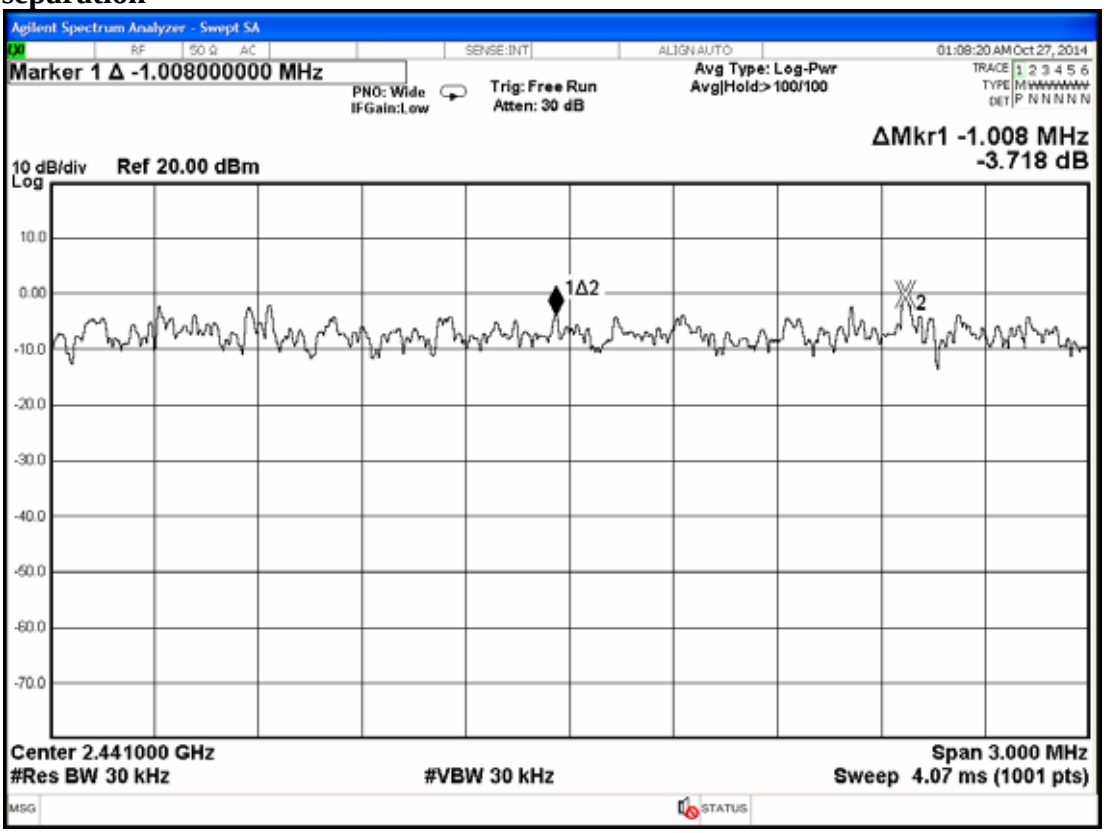
Test Mode: 8-DPSK, 2402MHz adjacent channel of carrier frequency separation



Test Mode: 8-DPSK, 2441MHz adjacent channel of right carrier frequency separation



Test Mode: 8-DPSK, 2441MHz adjacent channel of left carrier frequency separation



Test Mode: 8-DPSK, 2480MHz adjacent channel of carrier frequency separation

Test Mode: GFSK, 2402MHz adjacent channel of carrier frequency separation

Test Mode: GFSK, 2441MHz adjacent channel of right carrier frequency separation

Test Mode: GFSK, 2441MHz adjacent channel of left carrier frequency separation

Test Mode: GFSK, 2480MHz adjacent channel of carrier frequency separation

7. TIME OF OCCUPANCY MEASUREMENT

7.1. Test Equipment

The following Test Equipment was used during the time of occupancy measurement:

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	R&S	FSV30	101181	2014. 03. 14	1 Year

7.2. Block Diagram of Test Setup

The same as section 5.2.

7.3. Specification Limits [§15.247(a)(1)(iii)]

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by number of hopping channels employed.

7.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 5.4.

7.5. Test Procedure

The EUT was connected to the notebook. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 1MHz RBW and 1MHz VBW. VBW≥RBW ; Span=zero span.
Centred on a hopping channel sweep=as necessary to capture the entire dwell time per hopping channel ; Detector function=peak ; Trace=Max hold
The measurement guideline was according to FCC Public Notice DA 00-705.

7.6. Test Results

PASSED. All the test results are attached in next pages.

[Note: We performed testing of the highest and lowest data rate.]

Test Date : 2014. 10. 07 Temperature : 24℃ Humidity : 58%

7.6.1. Type of Modulation：8-DPSK, Test Frequency：2402MHz

Observation Period: 79channels*0.4 seconds = 31.6 seconds

3DH1 : For each **5** seconds of **49** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

49 channels***31.6** seconds**÷5** seconds * **0.4**ms = **123.872**ms (<400ms)

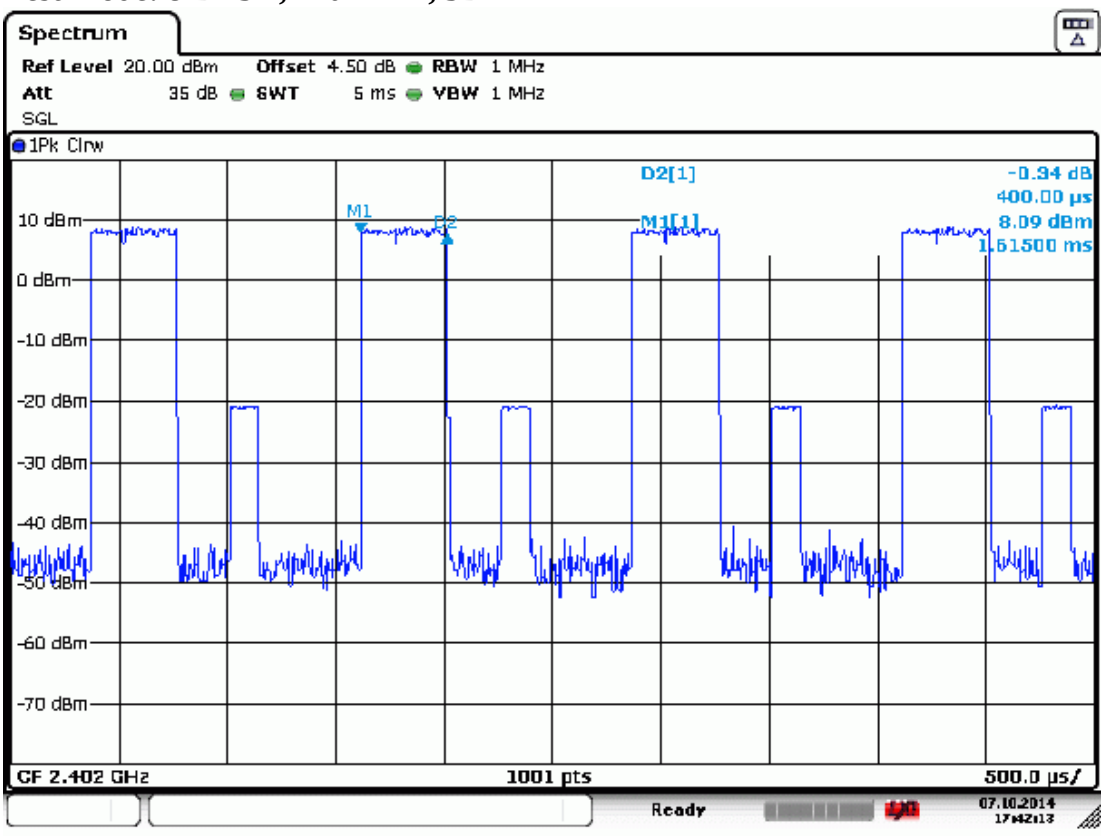
3DH3 : For each **5** seconds of **21** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

21 channels***31.6** seconds**÷5** seconds * **1.65**ms = **218.988**ms (<400ms)

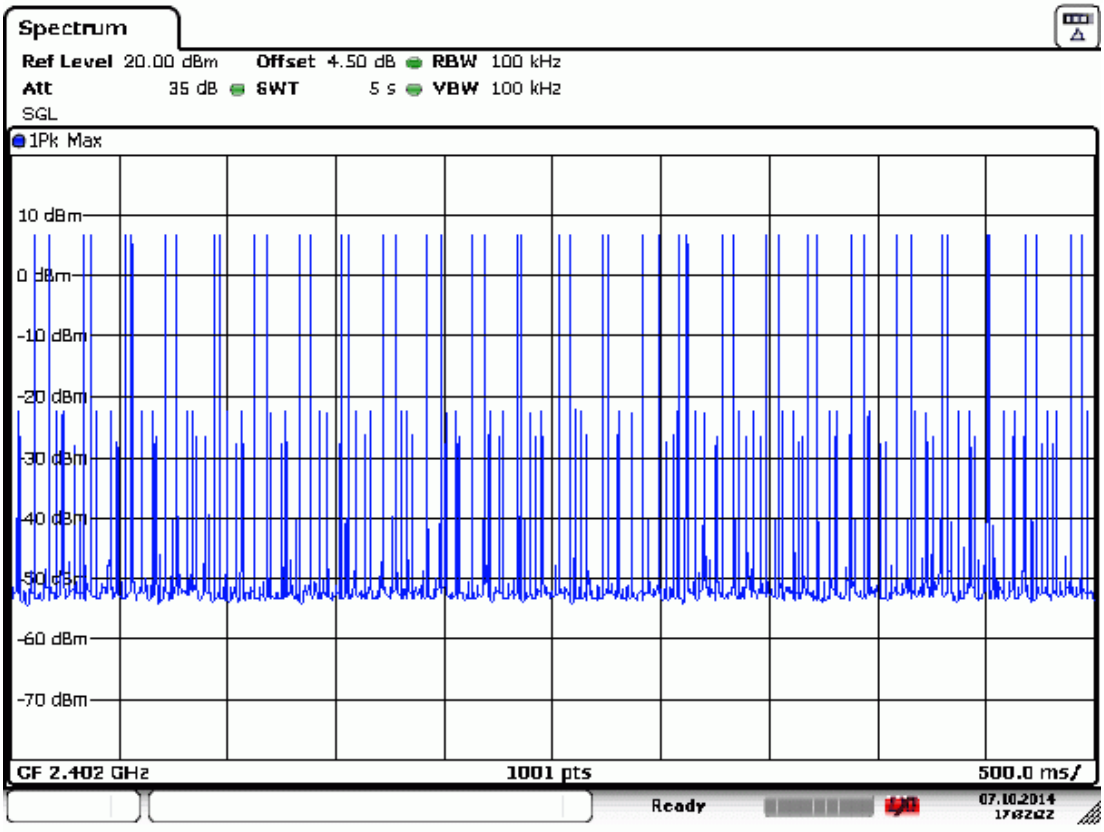
3DH5 : For each **5** seconds of **16** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

16 channels***31.6** seconds**÷5** seconds * **2.90**ms = **293.248**ms (<400ms)

Test Mode: 8-DPSK, 2402MHz, 3DH1

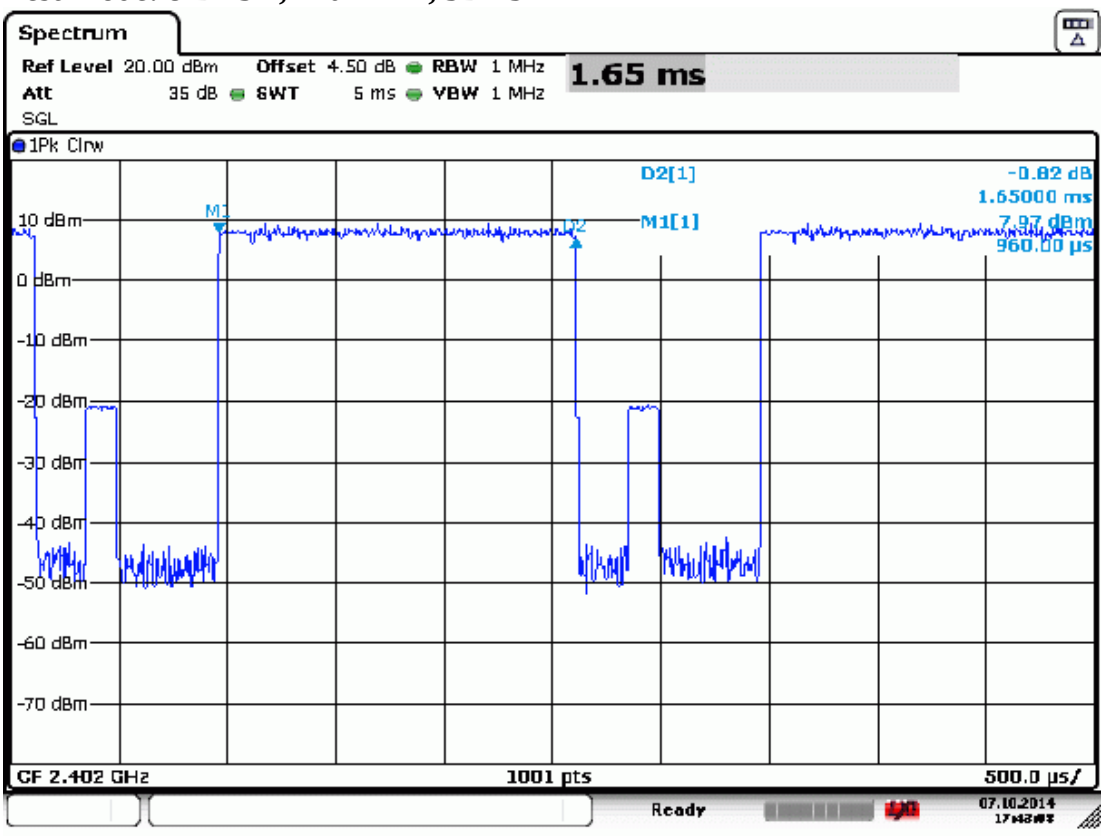


Date: 7.OCT.2014 17:42:14

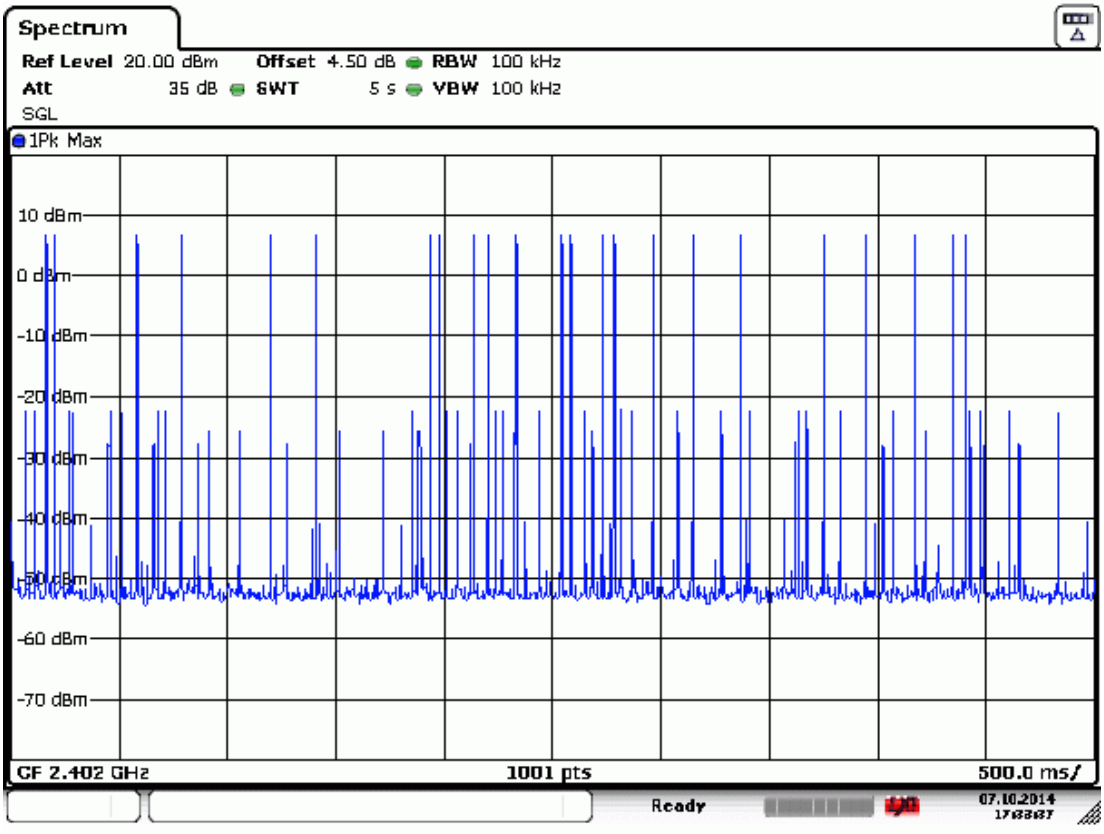


Date: 7.OCT.2014 17:32:23

Test Mode: 8-DPSK, 2404MHz, 3DH3

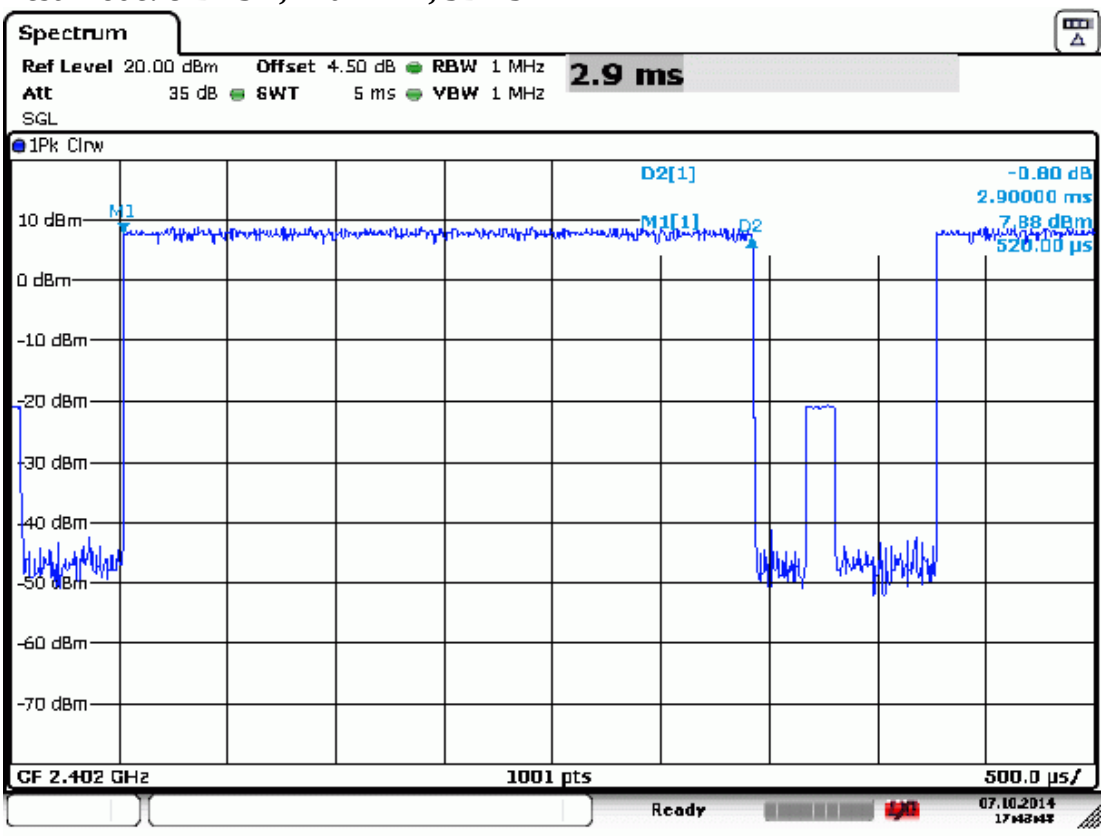


Date: 7.OCT.2014 17:43:09

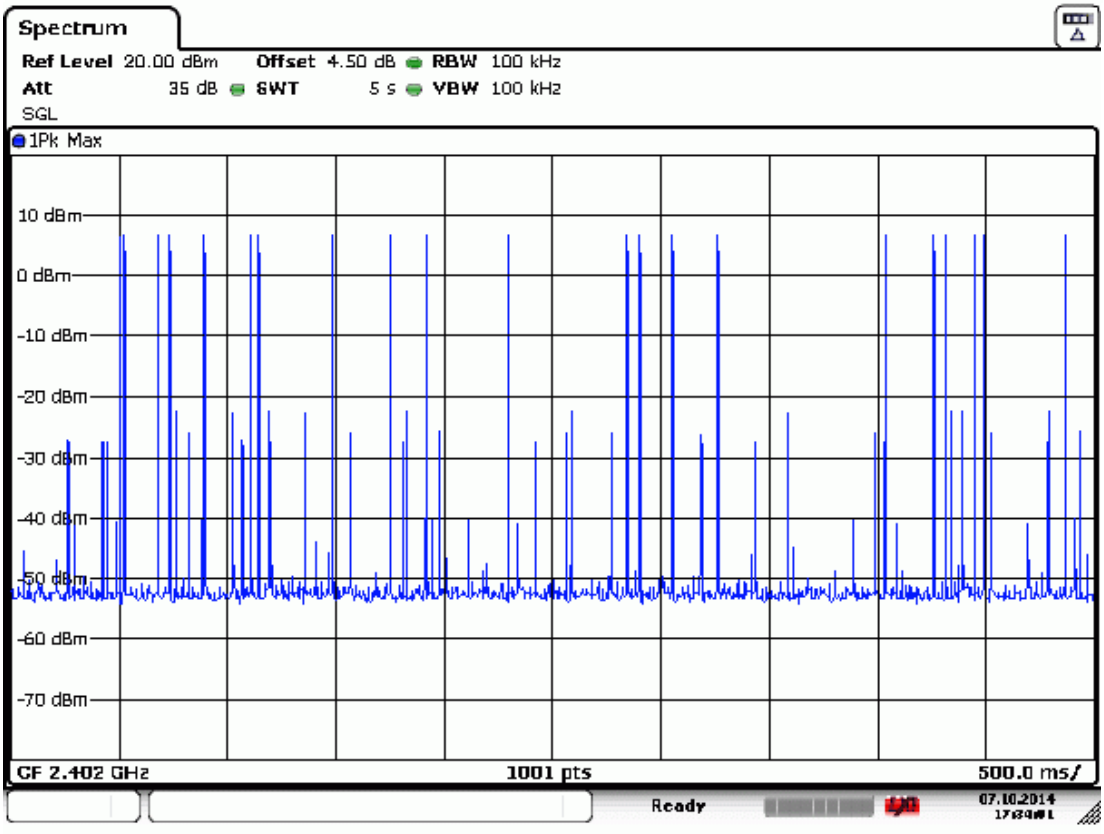


Date: 7.OCT.2014 17:33:37

Test Mode: 8-DPSK, 2402MHz, 3DH5



Date: 7.OCT.2014 17:43:49



Date: 7.OCT.2014 17:34:02

7.6.2. Type of Modulation：8-DPSK, Test Frequency：2441MHz

Observation Period: 79channels*0.4 seconds = 31.6 seconds

3DH1 : For each **5** seconds of **51** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

51 channels***31.6** seconds**÷5** seconds * **0.4**ms = **128.928**ms (<400ms)

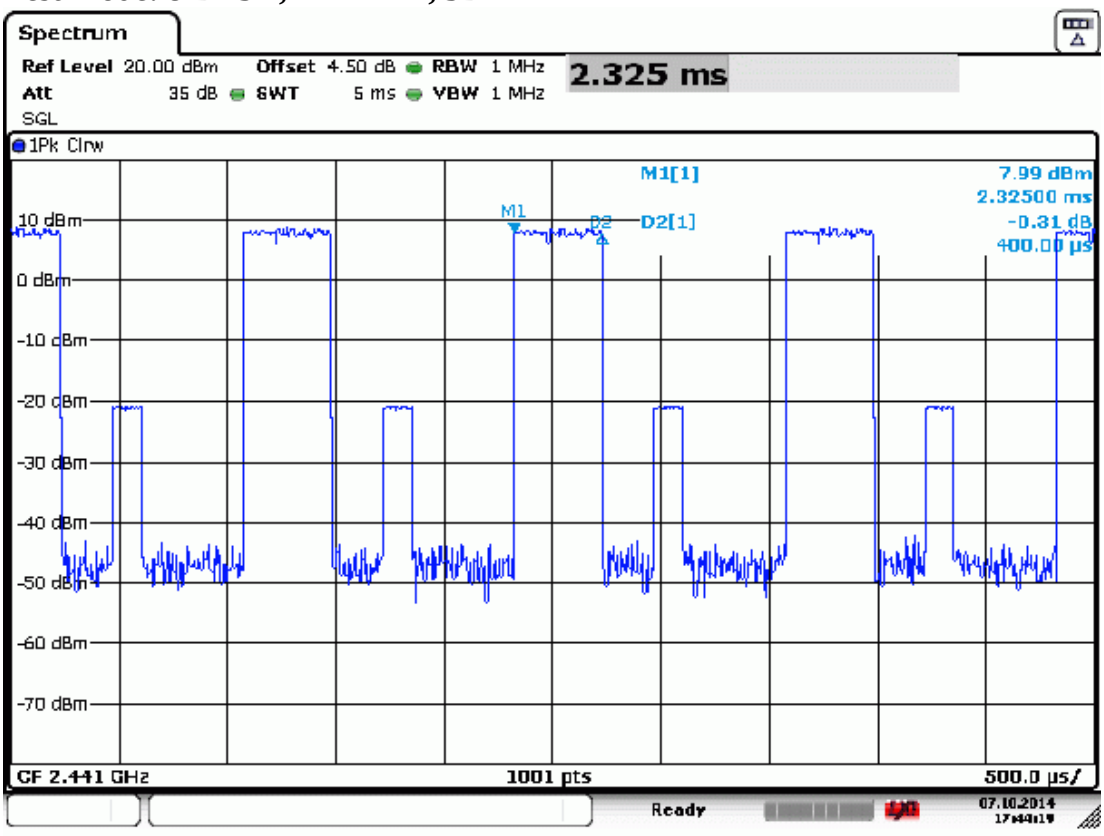
3DH3 : For each **5** seconds of **23** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

23 channels***31.6** seconds**÷5** seconds * **1.65**ms = **239.844**ms (<400ms)

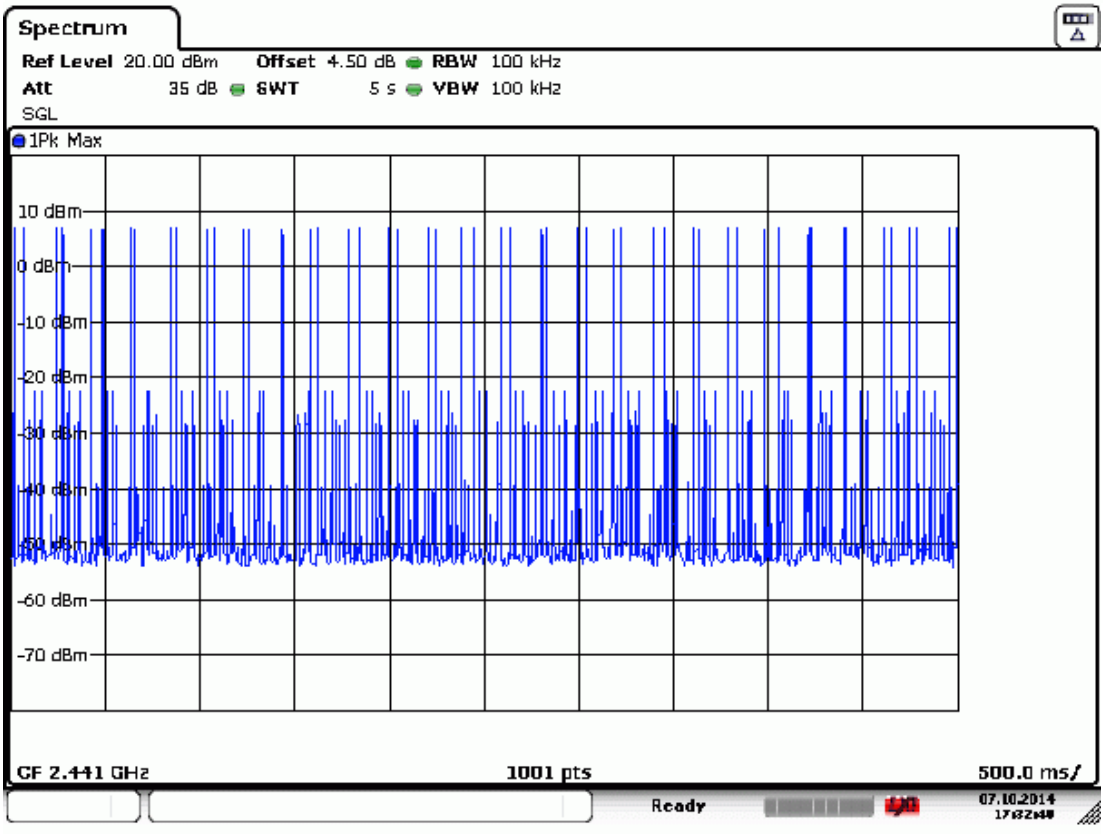
3DH5 : For each **5** seconds of **19** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

19 channels***31.6** seconds**÷5** seconds * **2.90**ms = **348.232**ms (<400ms)

Test Mode: 8-DPSK, 2441MHz, 3DH1

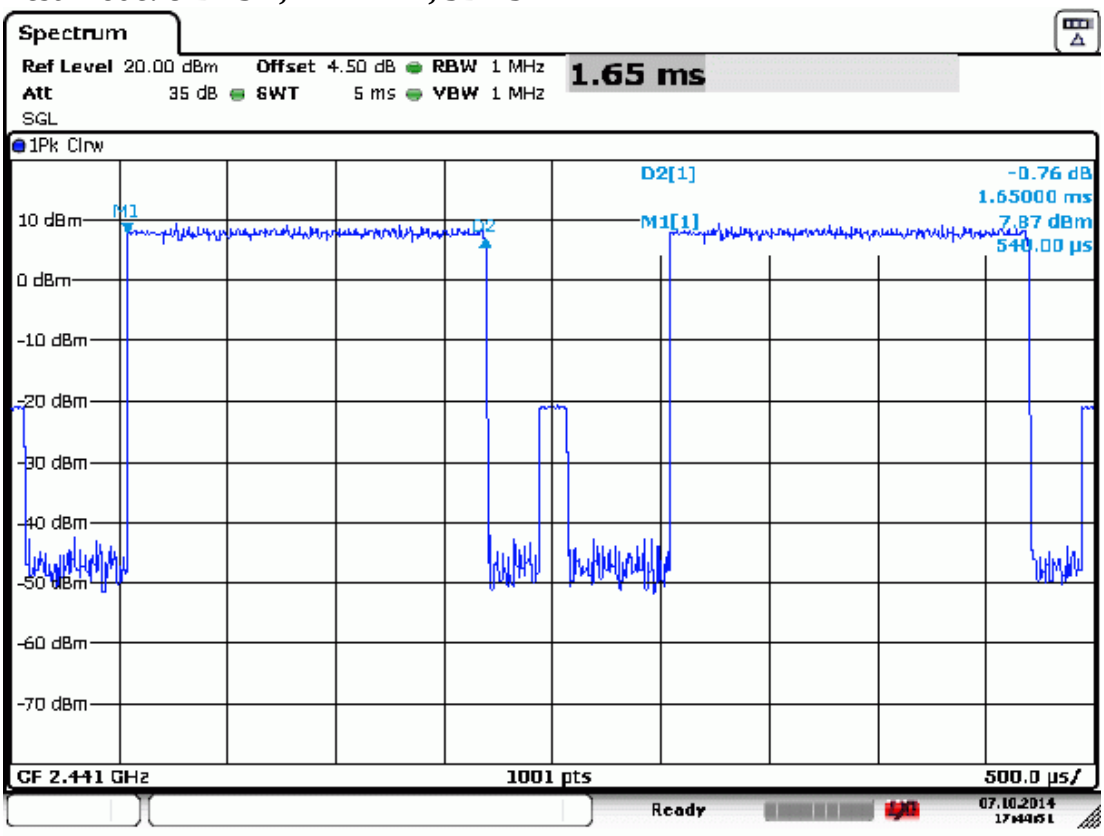


Date: 7.OCT.2014 17:44:19

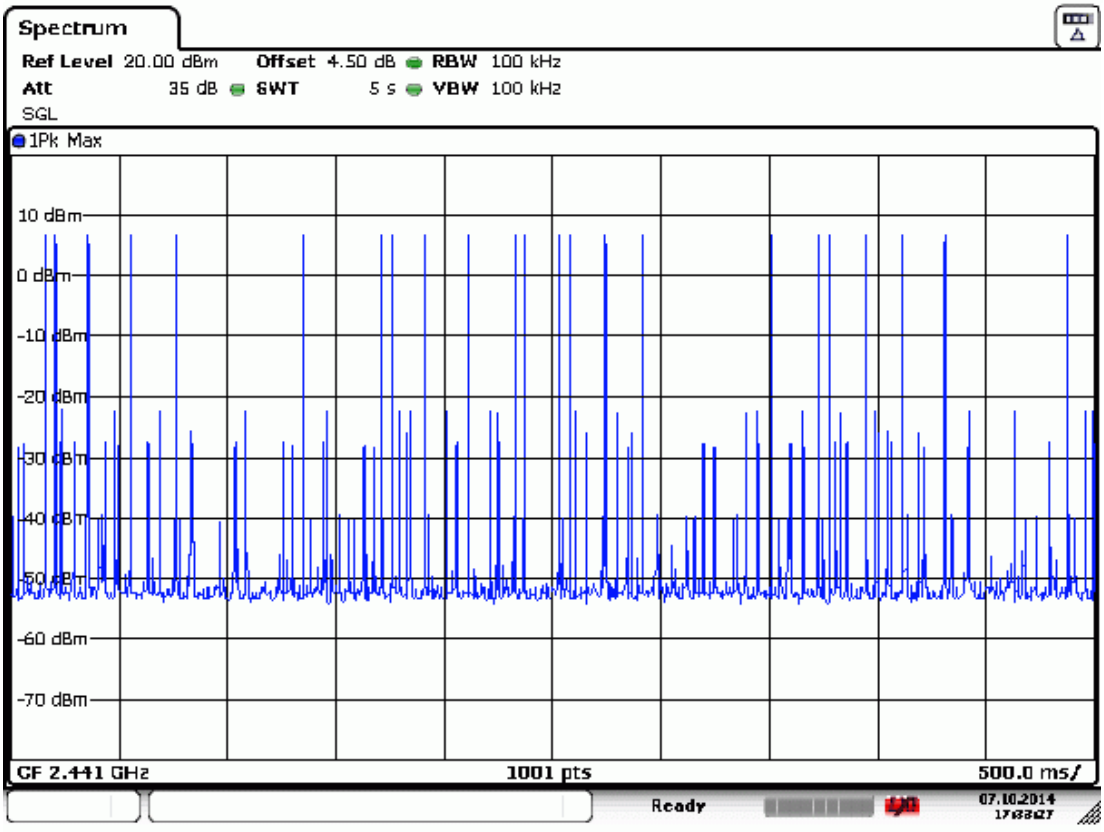


Date: 7.OCT.2014 17:32:41

Test Mode: 8-DPSK, 2441MHz, 3DH3

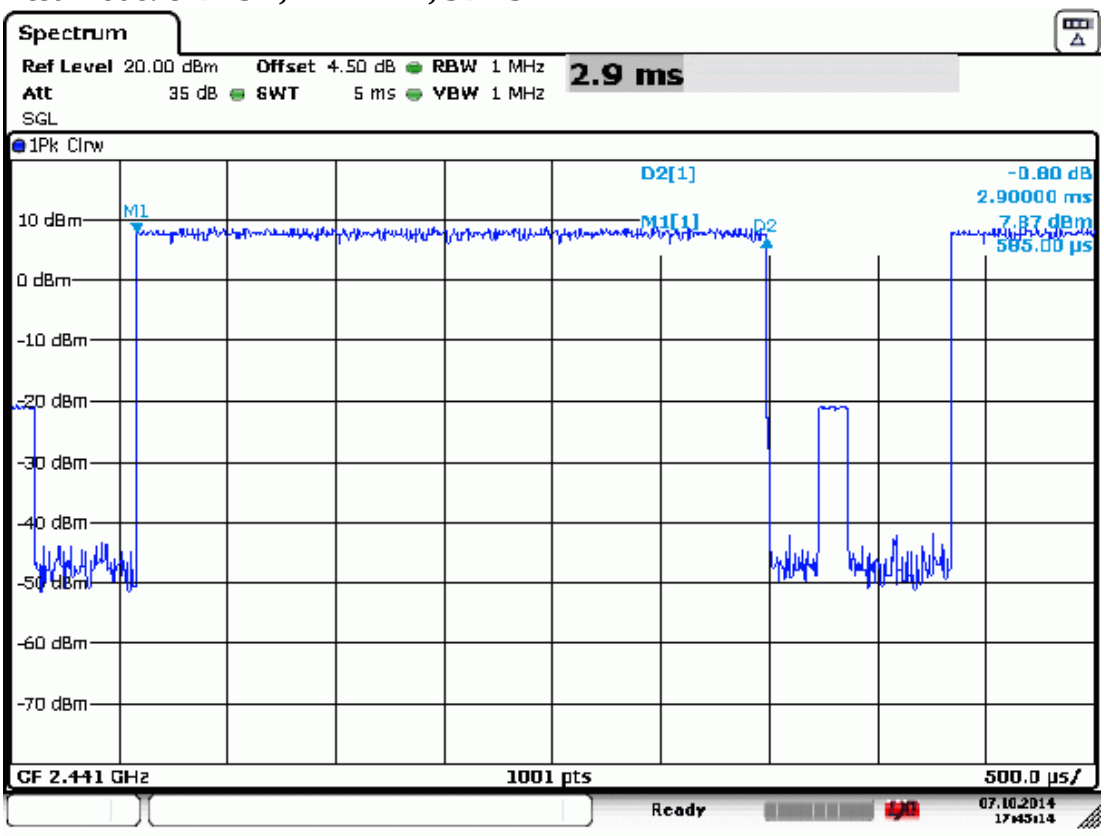


Date: 7.OCT.2014 17:44:51

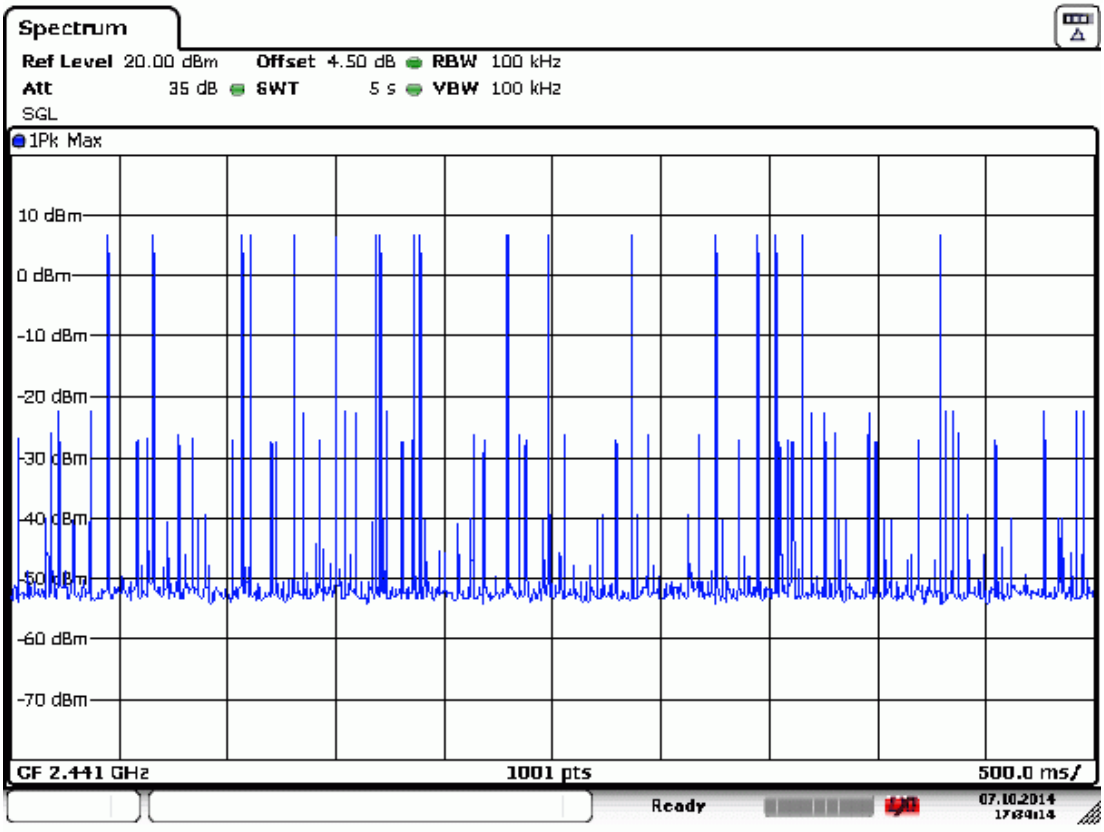


Date: 7.OCT.2014 17:33:27

Test Mode: 8-DPSK, 2441MHz, 3DH5



Date: 7.OCT.2014 17:45:15



Date: 7.OCT.2014 17:34:14

7.6.3. Type of Modulation：8-DPSK, Test Frequency：2480MHz

Observation Period: 79channels*0.4 seconds = 31.6 seconds

3DH1 : For each **5** seconds of **49** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

49 channels***31.6** seconds**÷5** seconds* **0.4**ms = **123.872**ms (<400ms)

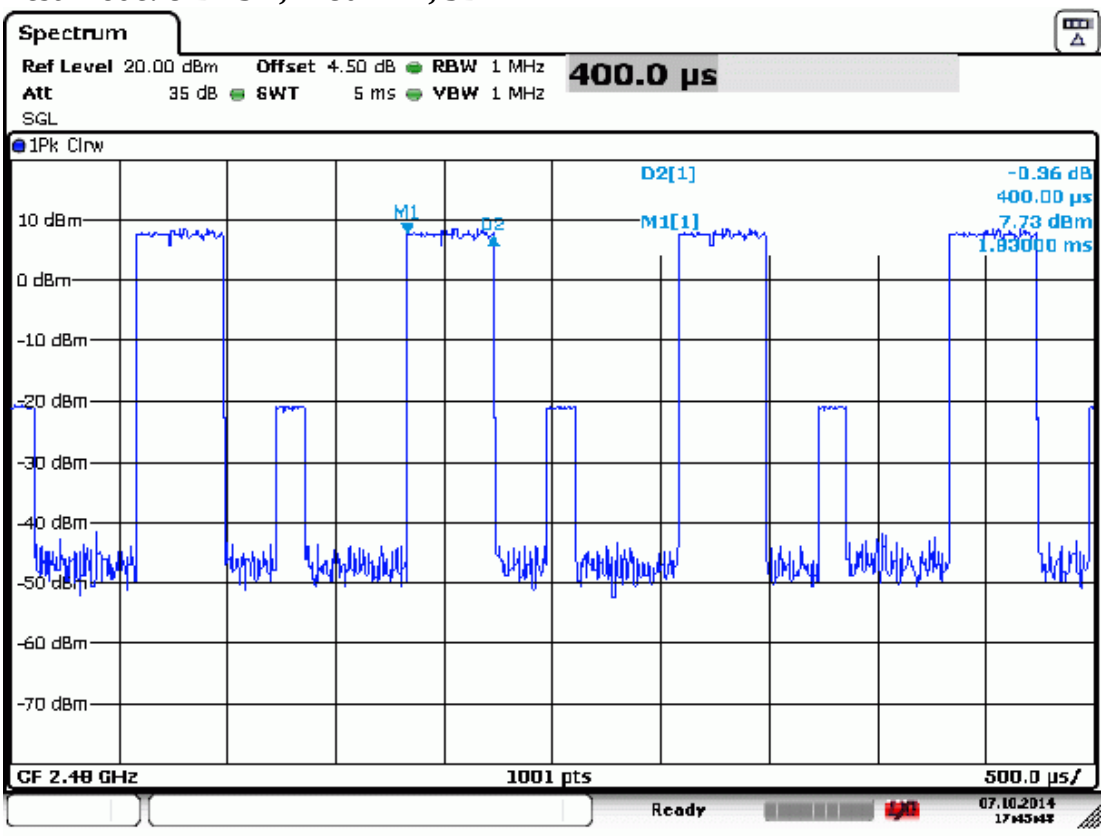
3DH3 : For each **5** seconds of **19** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

19 channels***31.6** seconds**÷5** seconds* **1.635**ms = **196.331**ms (<400ms)

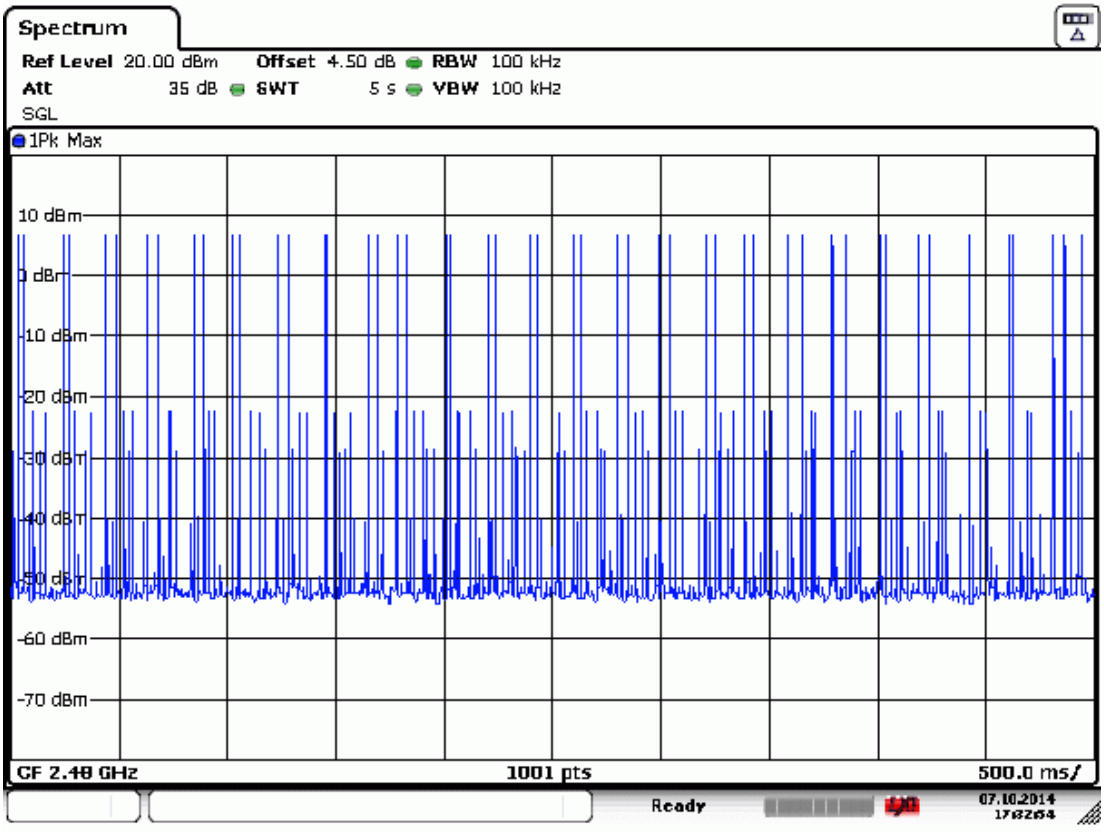
3DH5 : For each **5** seconds of **17** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

17 channels***31.6** seconds**÷5** seconds* **2.90**ms = **311.576**ms (<400ms)

Test Mode: 8-DPSK, 2480MHz, 3DH1

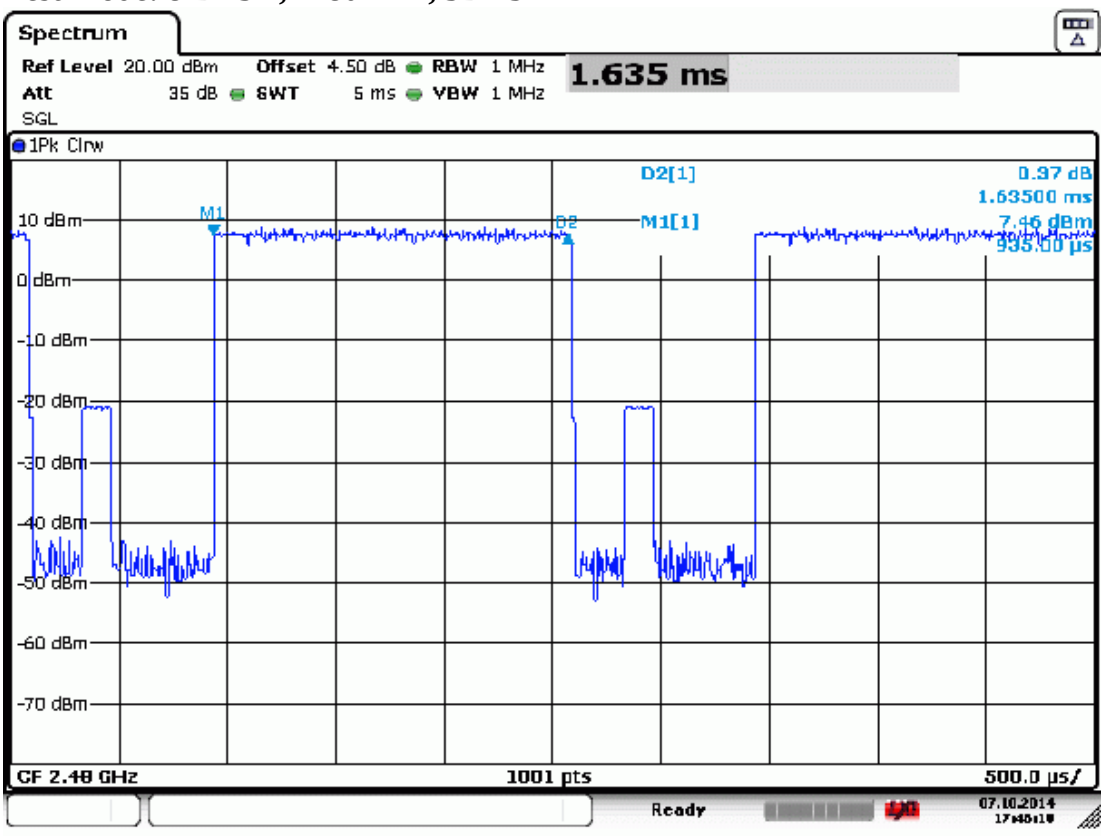


Date: 7.OCT.2014 17:45:48

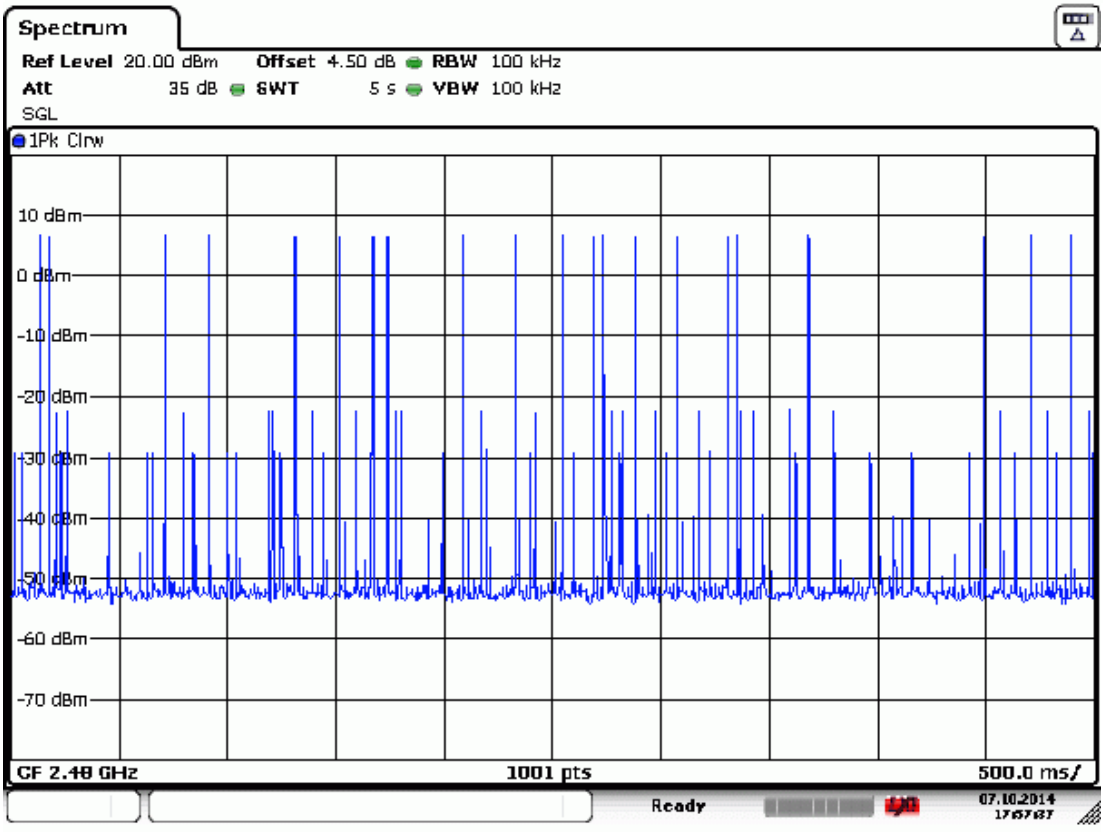


Date: 7.OCT.2014 17:32:54

Test Mode: 8-DPSK, 2480MHz, 3DH3

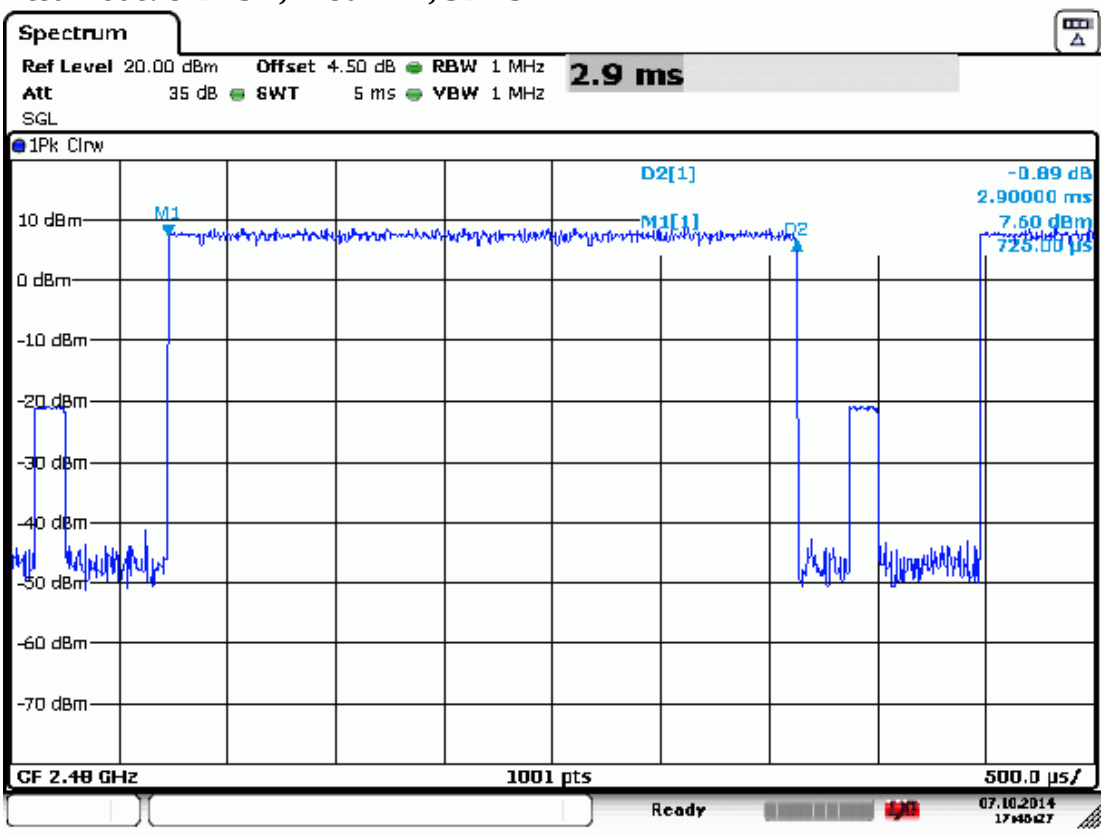


Date: 7.OCT.2014 17:46:11

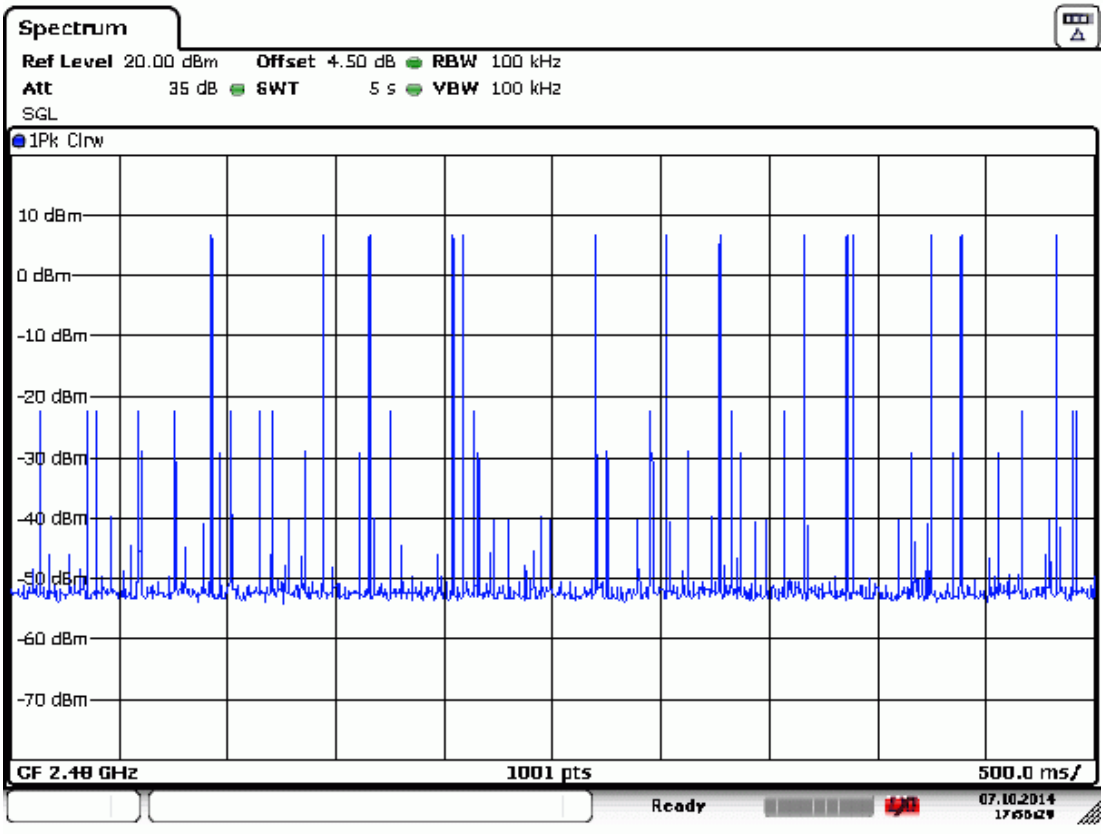


Date: 7.OCT.2014 17:57:37

Test Mode: 8-DPSK, 2480MHz, 3DH5



Date: 7.OCT.2014 17:46:27



Date: 7.OCT.2014 17:55:30

7.6.4. Type of Modulation：GFSK, Test Frequency：2402MHz

Observation Period: 79channels*0.4 seconds = 31.6 seconds

DH1 : For each **5** seconds of **49** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

49 channels***31.6** seconds**÷5** seconds * **0.39**ms = **120.775**ms (<400ms)

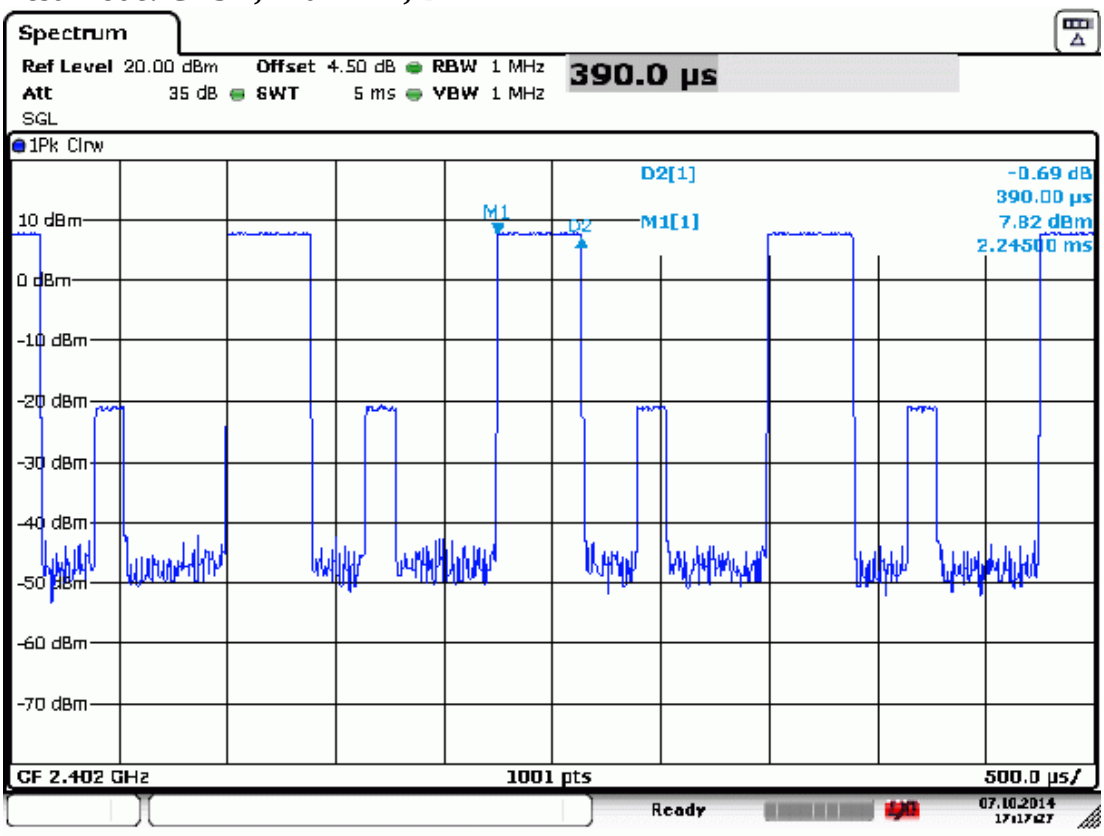
DH3 : For each **5** seconds of **20** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

20 channels***31.6** seconds**÷5** seconds * **1.64**ms = **207.296**ms (<400ms)

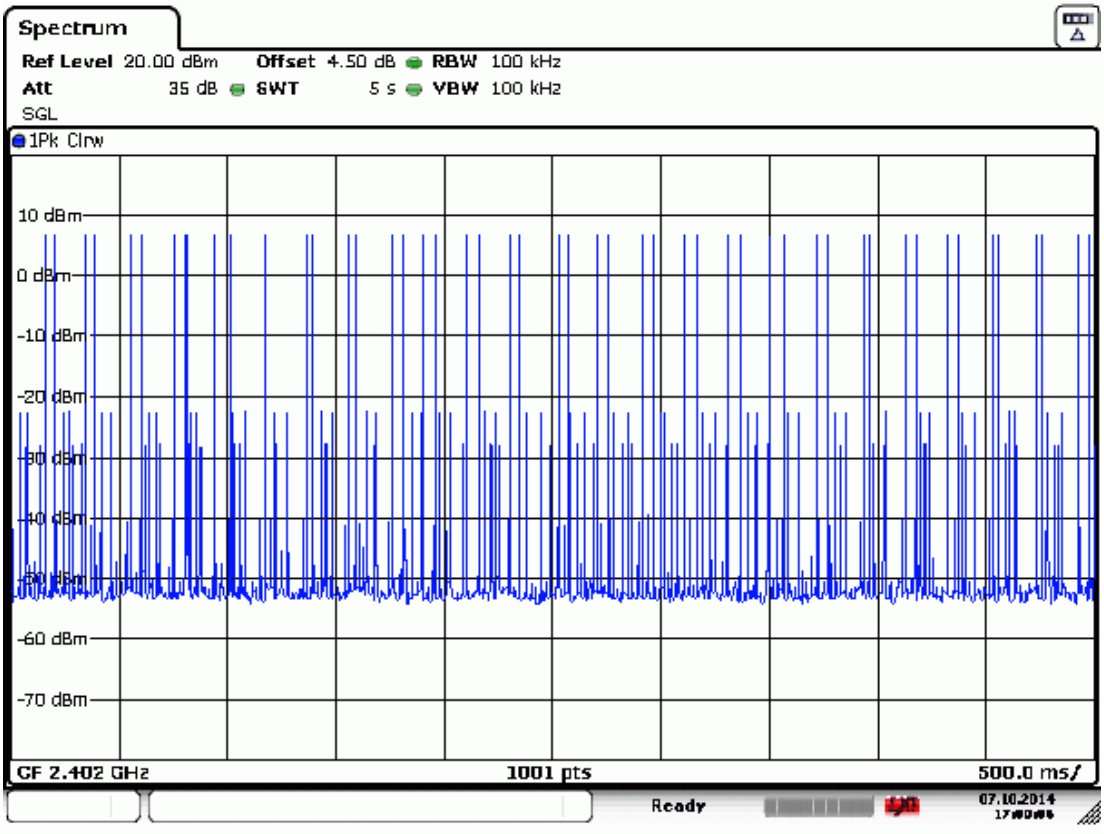
DH5 : For each **5** seconds of **19** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

19 channels***31.6** seconds**÷5** seconds * **2.89**ms = **347.031**ms (<400ms)

Test Mode: GFSK, 2402MHz, DH1

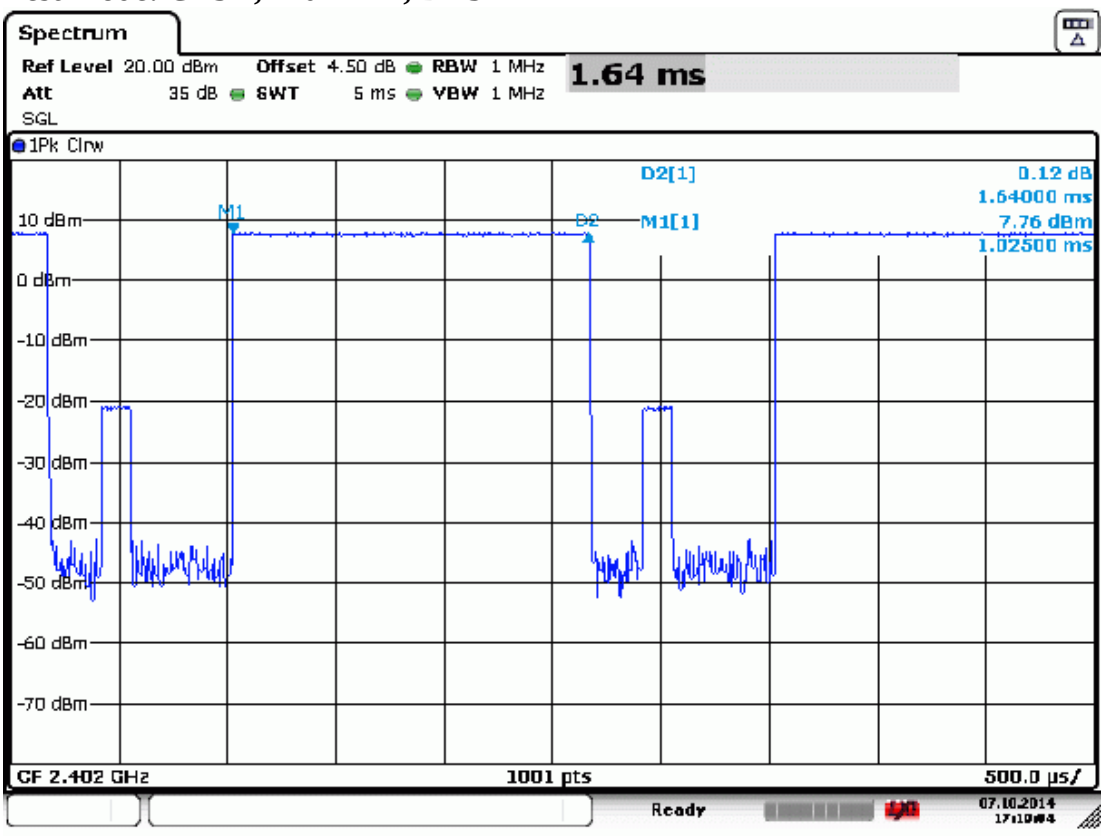


Date: 7.OCT.2014 17:17:27

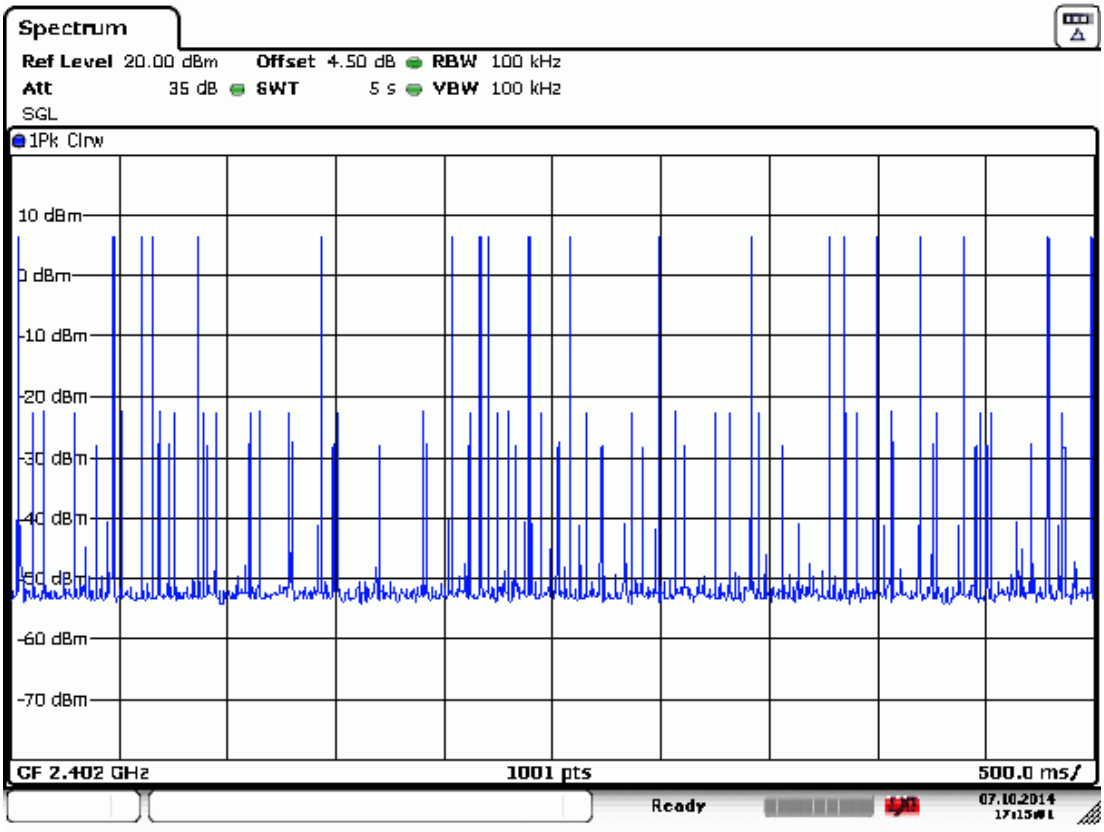


Date: 7.OCT.2014 17:09:07

Test Mode: GFSK, 2402MHz, DH3

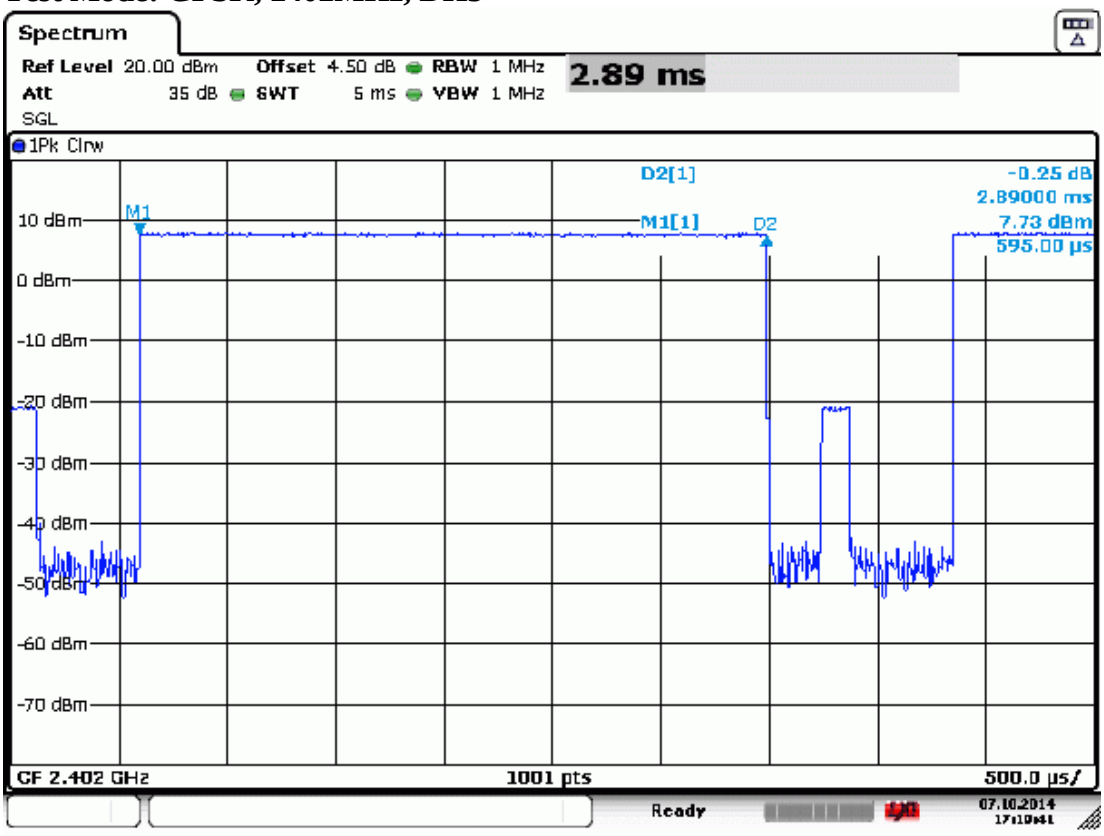


Date: 7.OCT.2014 17:19:04

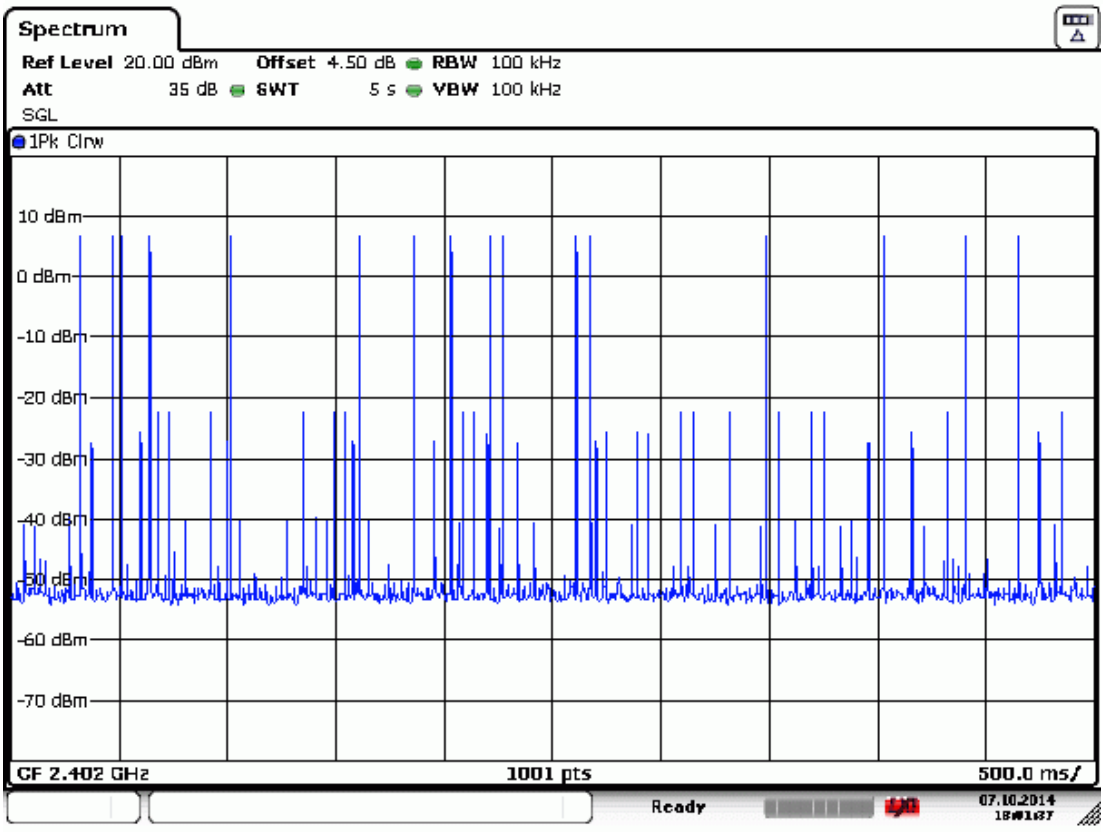


Date: 7.OCT.2014 17:15:02

Test Mode: GFSK, 2402MHz, DH5



Date: 7.OCT.2014 17:19:41



Date: 7.OCT.2014 18:01:37

7.6.5. Type of Modulation：GFSK, Test Frequency：2441MHz

Observation Period: 79channels*0.4 seconds = 31.6 seconds

DH1 : For each **5** seconds of **50** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

50 channels***31.6** seconds**÷5** seconds * **0.39**ms = **123.240**ms (<400ms)

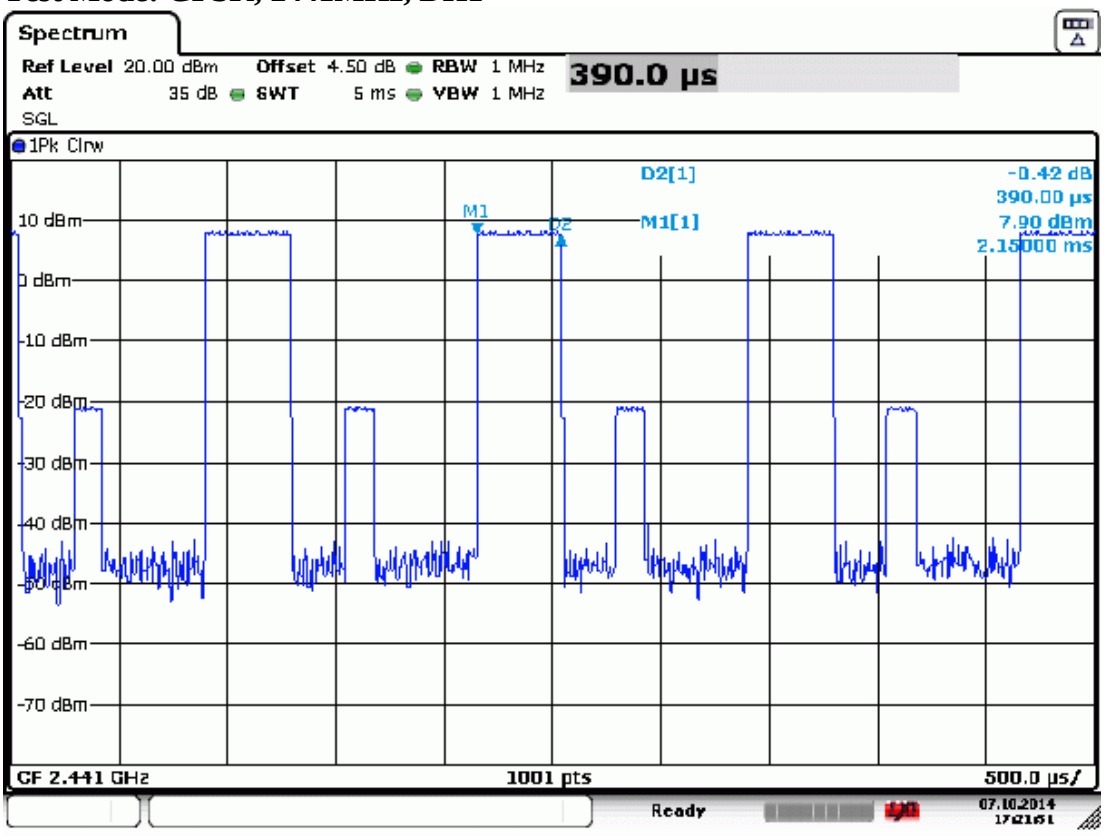
DH3 : For each **5** seconds of **23** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

23 channels***31.6** seconds**÷5** seconds * **1.645**ms = **239.117**ms (<400ms)

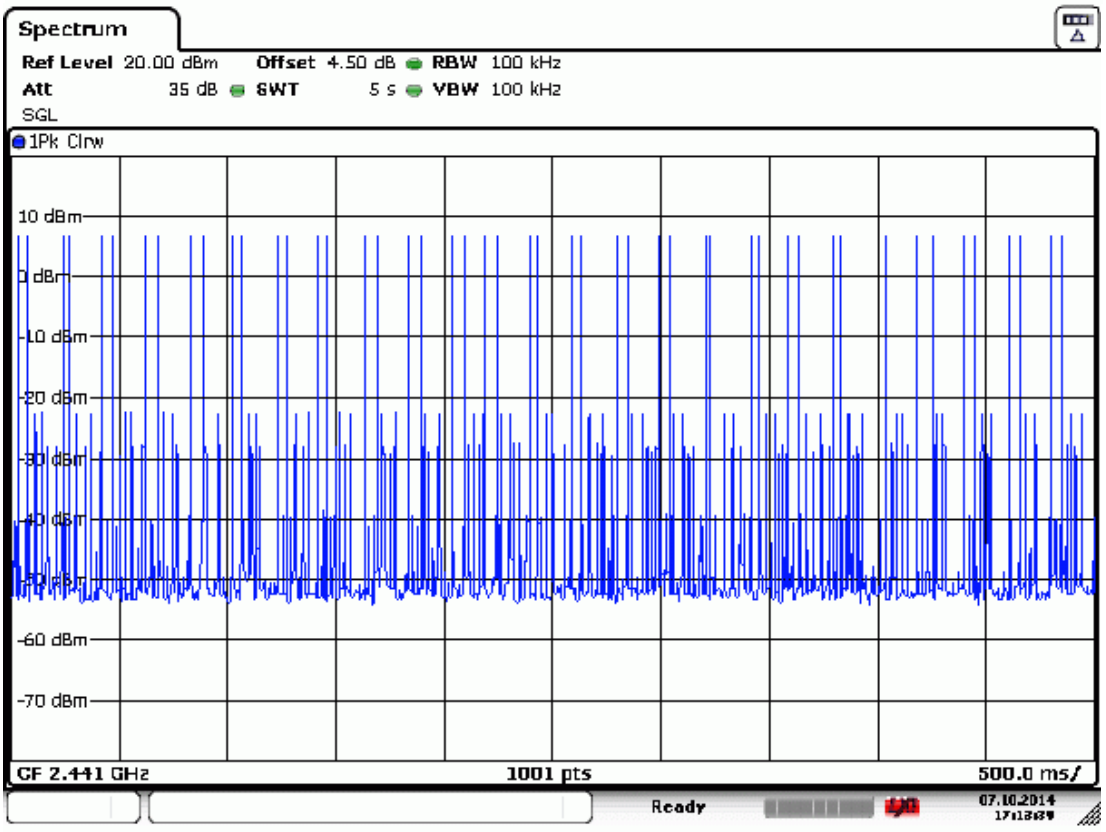
DH5 : For each **5** seconds of **20** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

20 channels***31.6** seconds**÷5** seconds * **2.895**ms = **365.928**ms (<400ms)

Test Mode: GFSK, 2441MHz, DH1

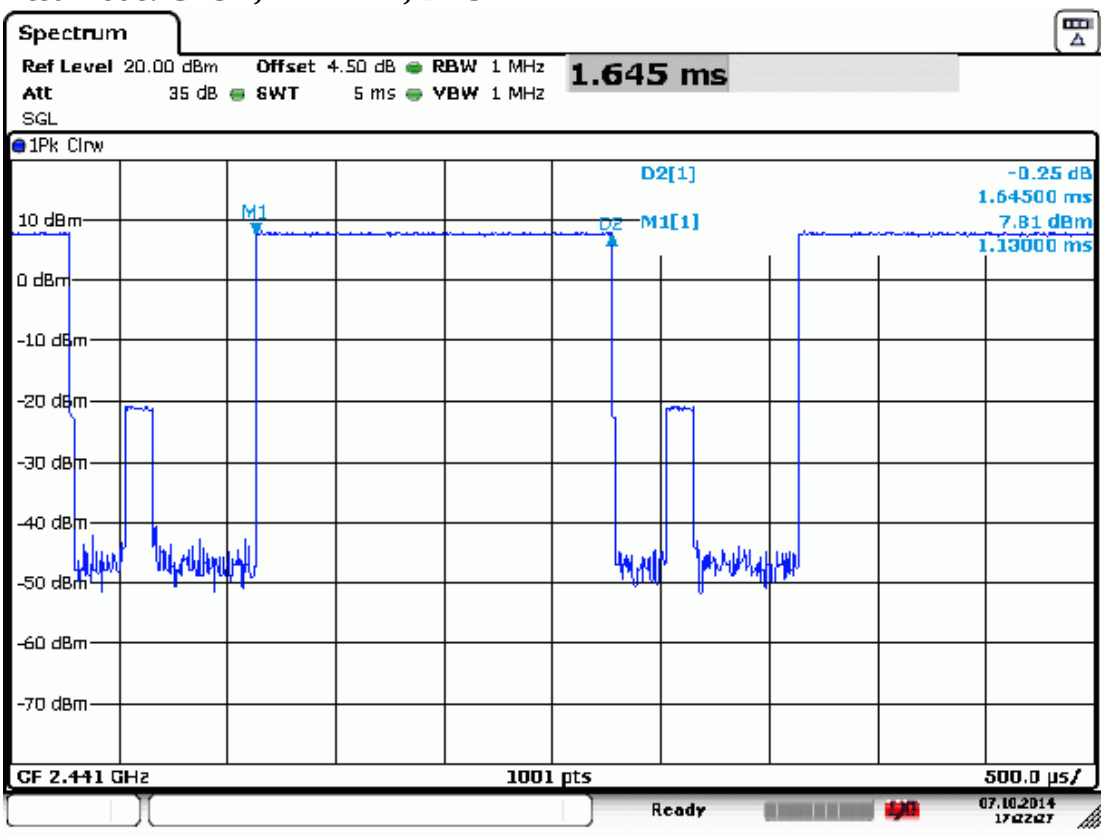


Date: 7.OCT.2014 17:21:52

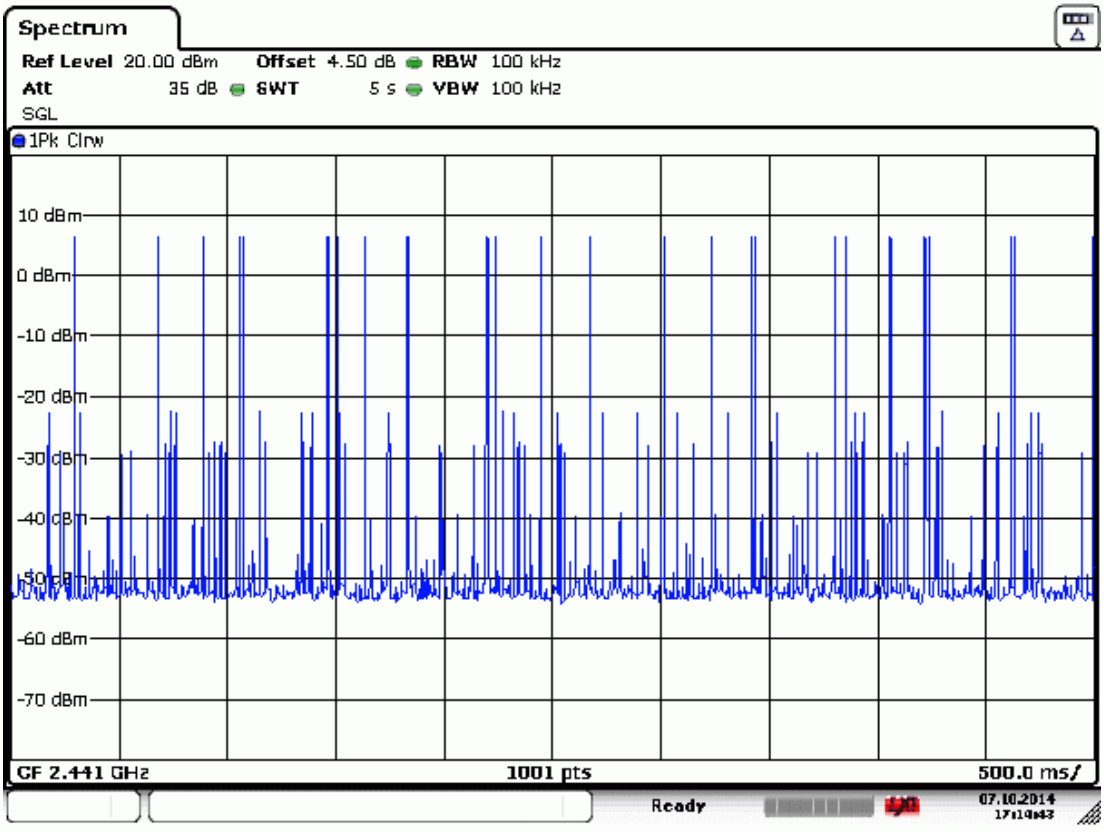


Date: 7.OCT.2014 17:13:40

Test Mode: GFSK, 2441MHz, DH3

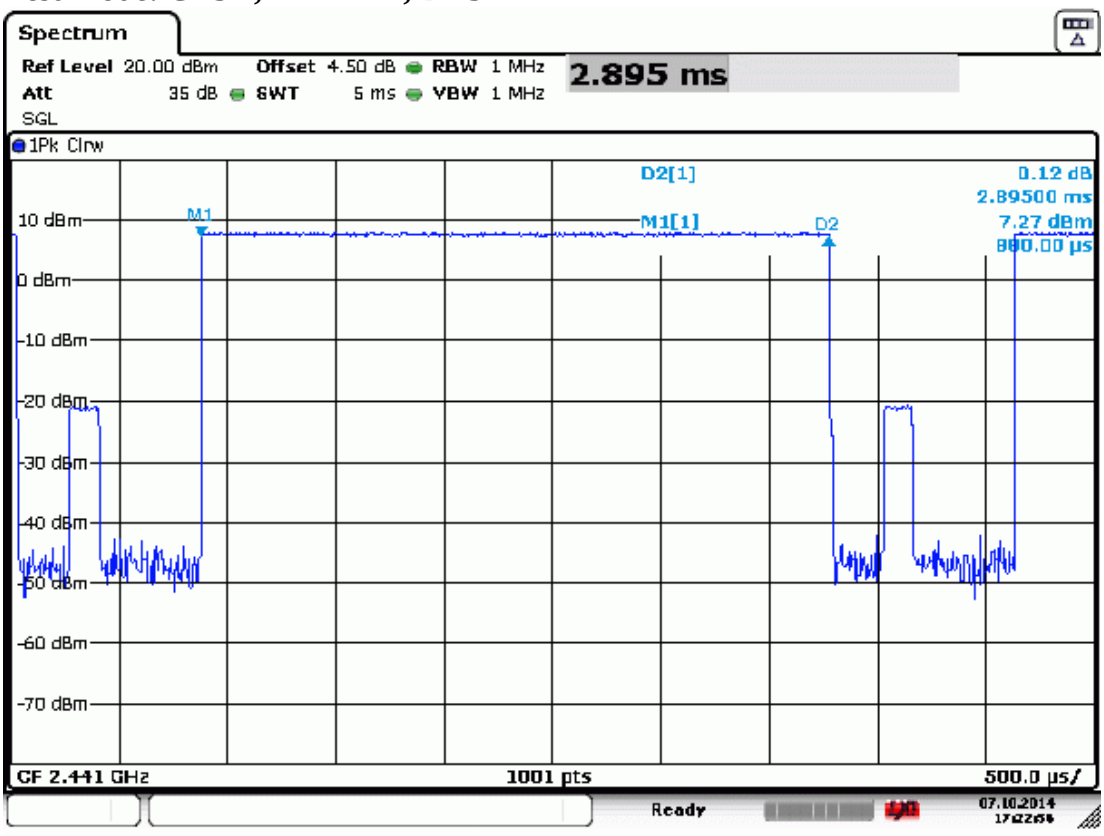


Date: 7.OCT.2014 17:22:28

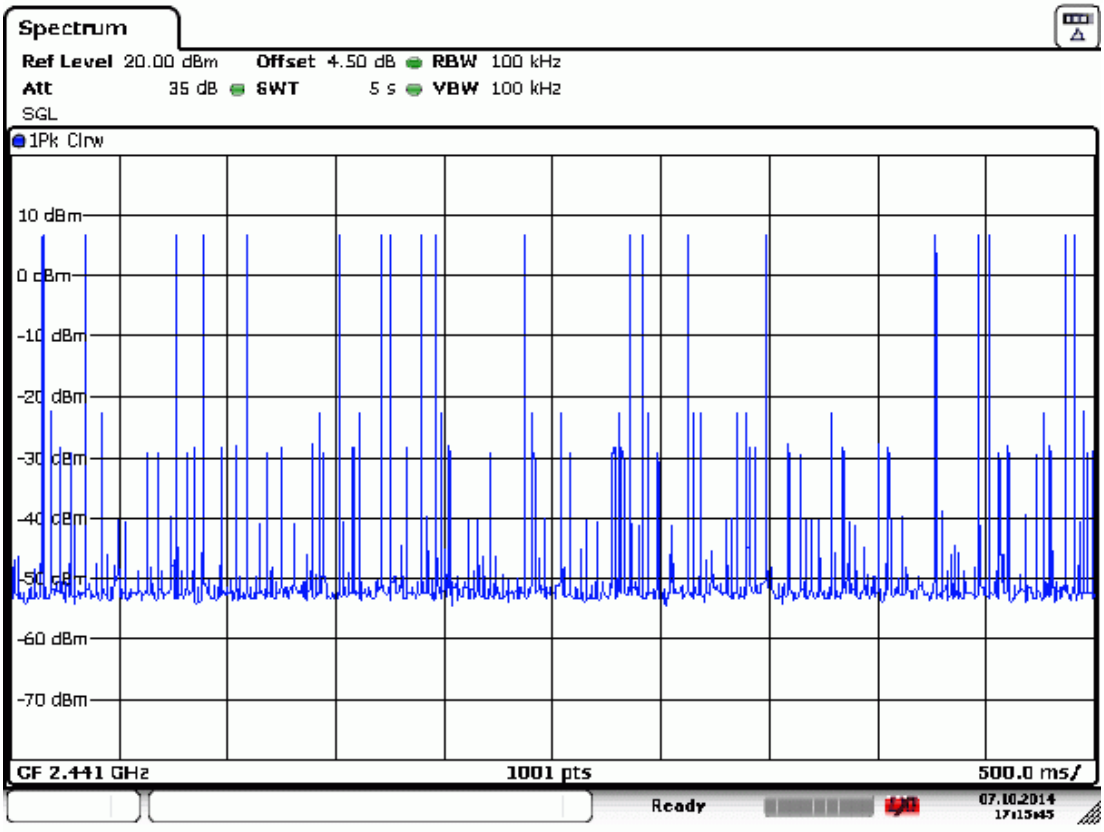


Date: 7.OCT.2014 17:14:43

Test Mode: GFSK, 2441MHz, DH5



Date: 7.OCT.2014 17:22:56



Date: 7.OCT.2014 17:15:46

7.6.6. Type of Modulation：GFSK, Test Frequency：2480MHz

Observation Period: 79channels*0.4 seconds = 31.6 seconds

DH1 : For each **5** seconds of **50** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

50 channels***31.6** seconds**÷5** seconds * **0.39**ms = **123.240**ms (<400ms)

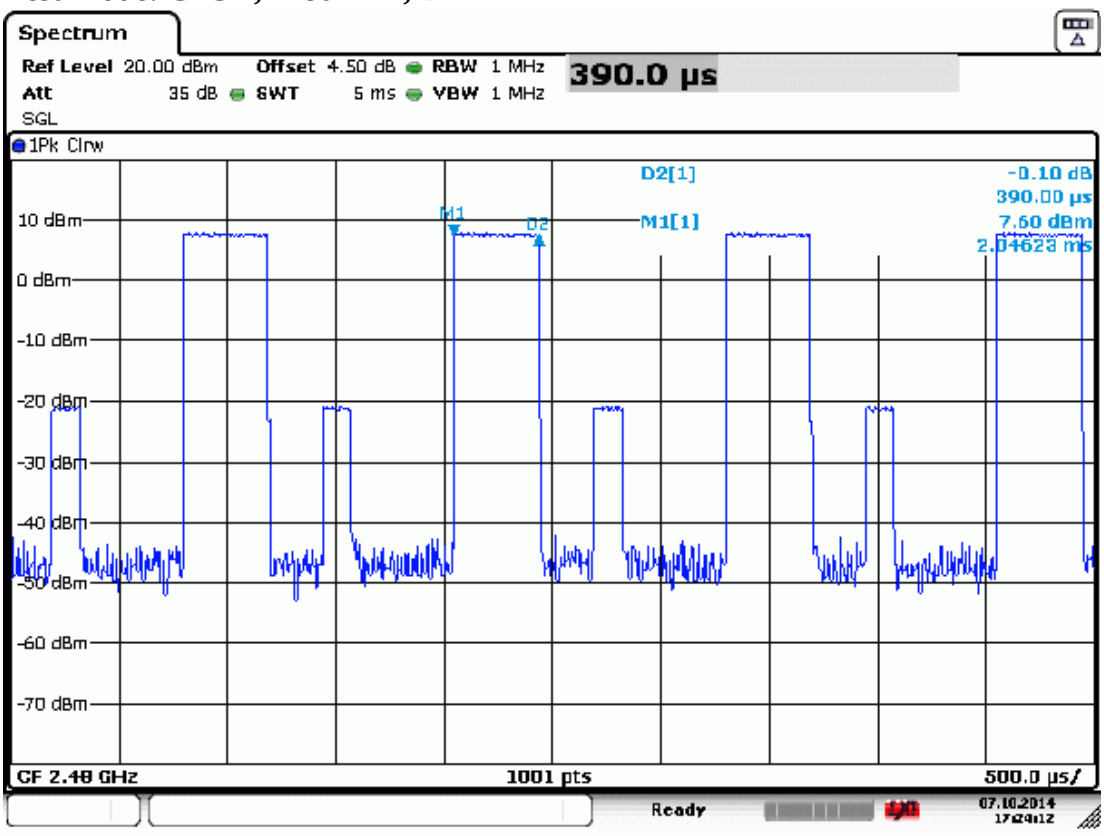
DH3 : For each **5** seconds of **21** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

21 channels***31.6** seconds**÷5** seconds * **1.645**ms = **218.324**ms (<400ms)

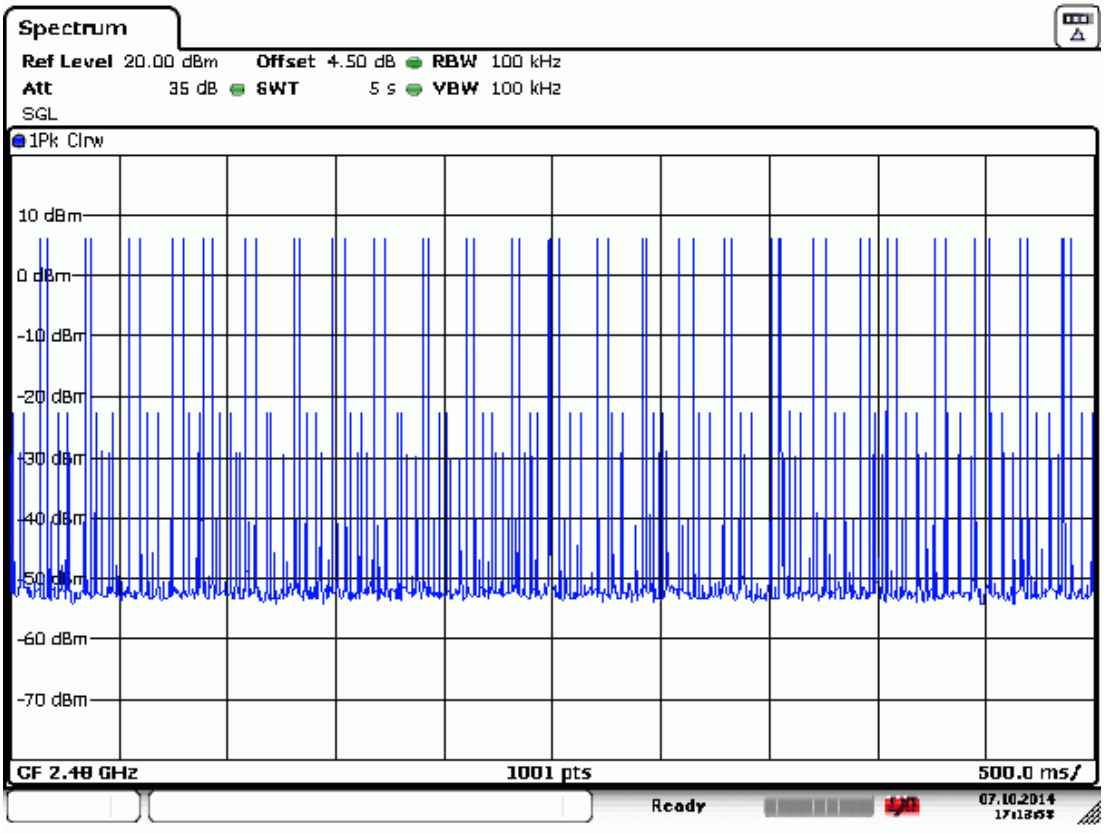
DH5 : For each **5** seconds of **14** channels appearance, the longest time of occupancy for each of **31.6** seconds is:

14 channels***31.6** seconds**÷5** seconds * **2.89**ms = **255.707**ms (<400ms)

Test Mode: GFSK, 2480MHz, DH1

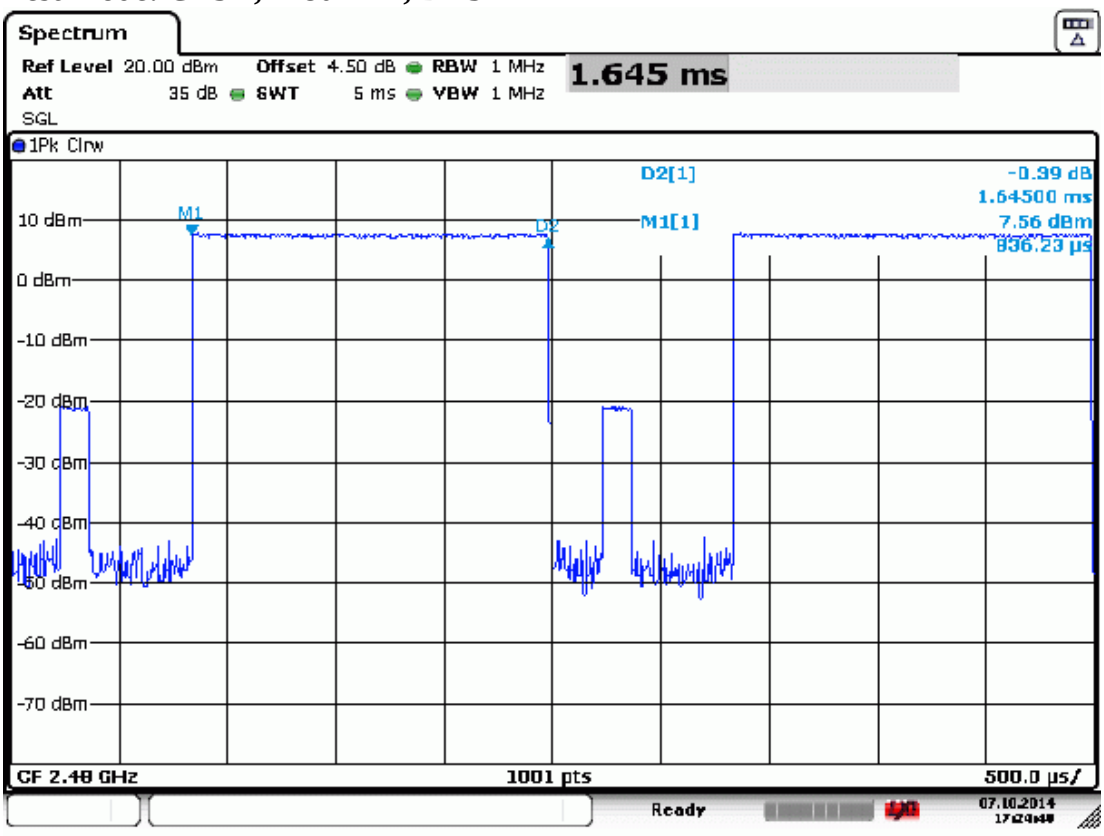


Date: 7.OCT.2014 17:24:13

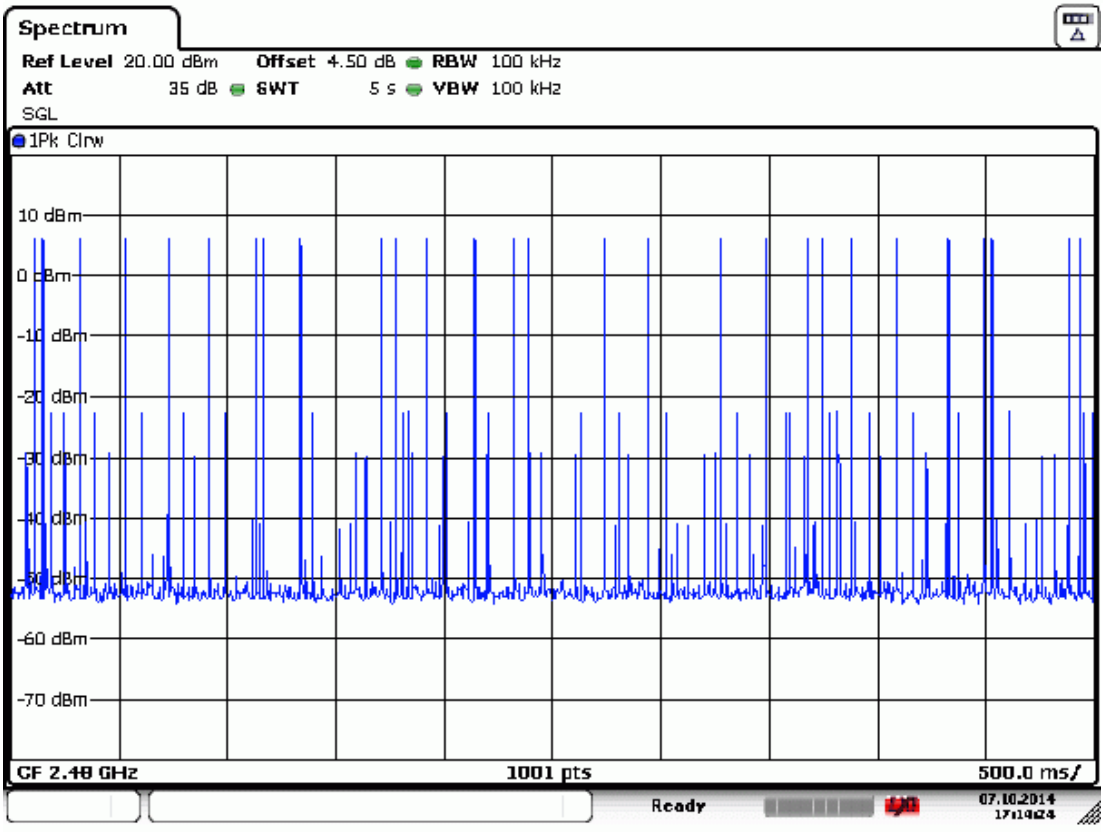


Date: 7.OCT.2014 17:13:59

Test Mode: GFSK, 2480MHz, DH3

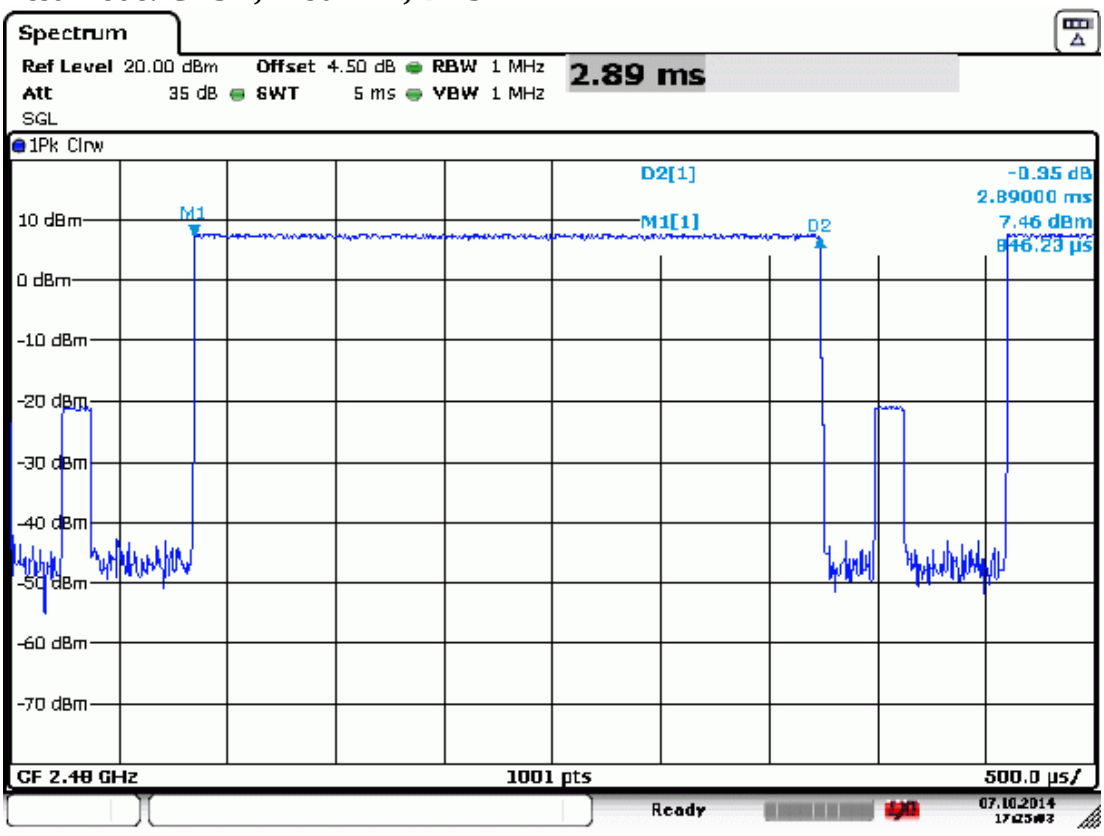


Date: 7.OCT.2014 17:24:40

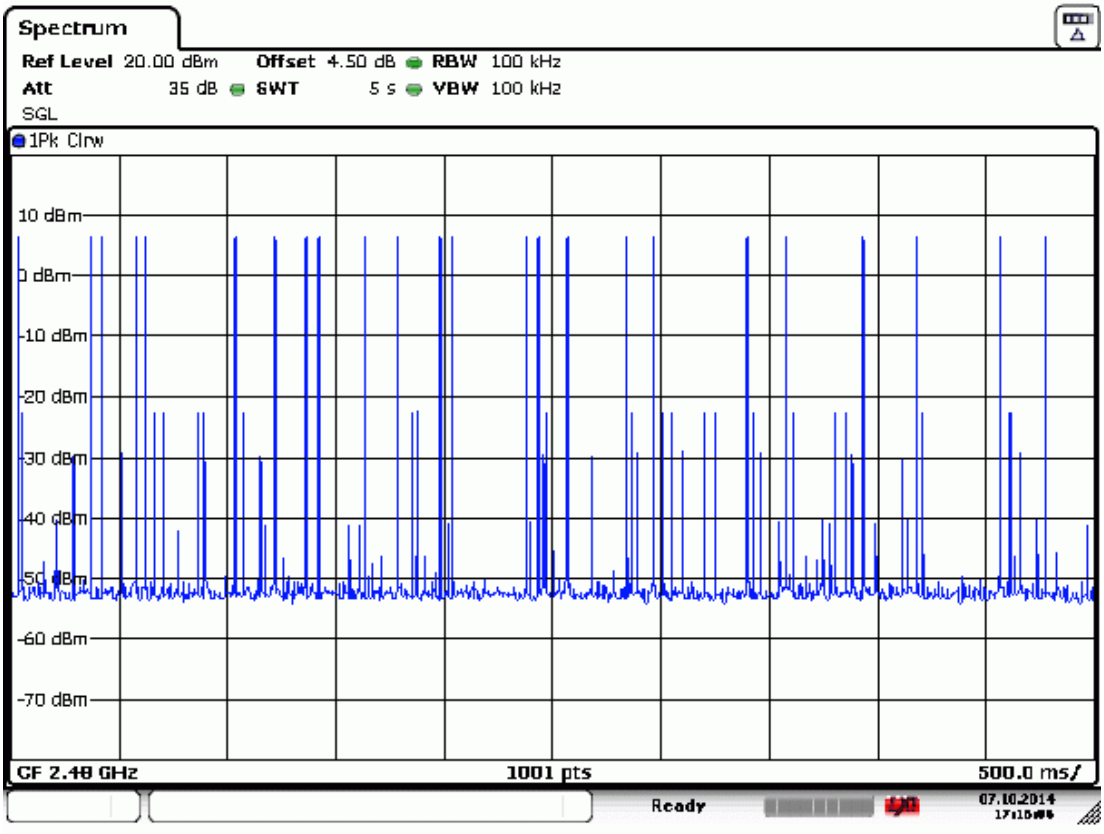


Date: 7.OCT.2014 17:14:25

Test Mode: GFSK, 2480MHz, DH5



Date: 7.OCT.2014 17:25:03



Date: 7.OCT.2014 17:15:07

8. NUMBER OF HOPPING CHANNELS MEASUREMENT

8.1. Test Equipment

The following test equipment was used during the number of hopping channels measurement:

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	R&S	FSV30	101181	2014. 03. 14	1 Year

8.2. Block Diagram of Test Setup

The same as section 5.2.

8.3. Specification Limits [§15.247(a)(1)(iii)]

Frequency hopping systems which use fewer than 20 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

8.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 5.4.

8.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. Sweep=Auto ; Detector function=peak ; Trace=Max hold
The measurement guideline was according to FCC Public Notice DA 00-705.

8.6. Test Results

PASSED. All the test results are attached in next page.

[Note: We performed testing of the highest and lowest data rate.]

Test Date : 2014. 10. 07 Temperature : 24℃ Humidity : 58%

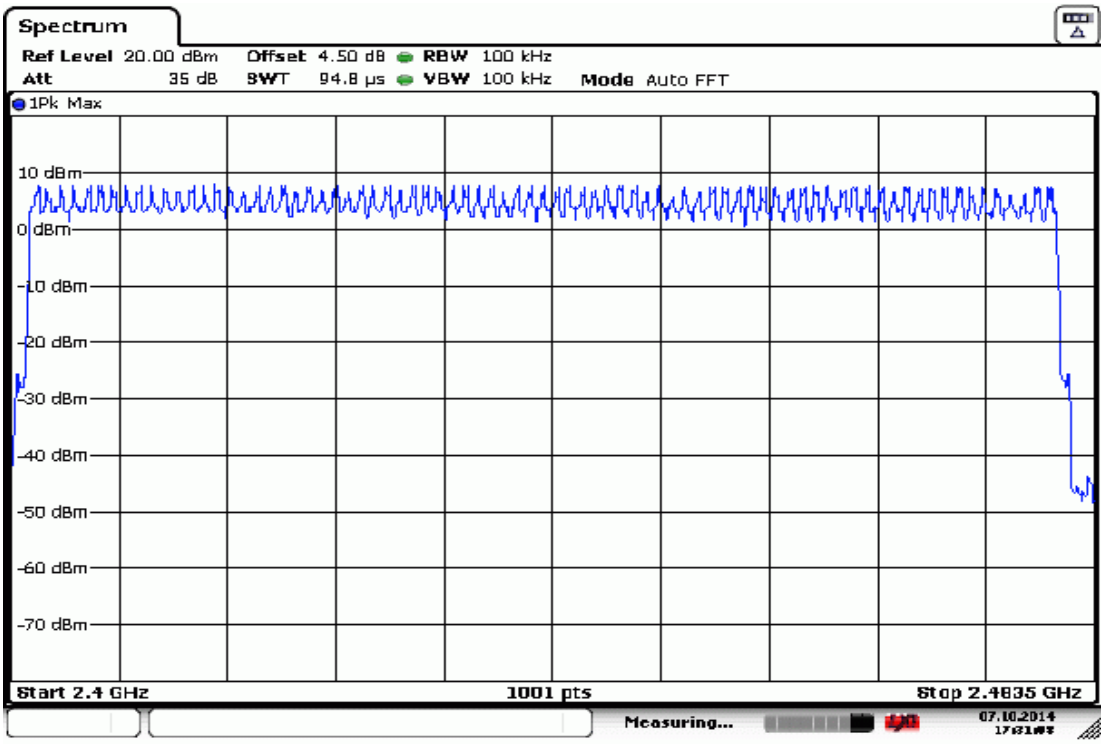
8.6.1.Type of Modulation: 8-DPSK

The number hopping channel is 79.

8.6.2.Type of Modulation: GFSK

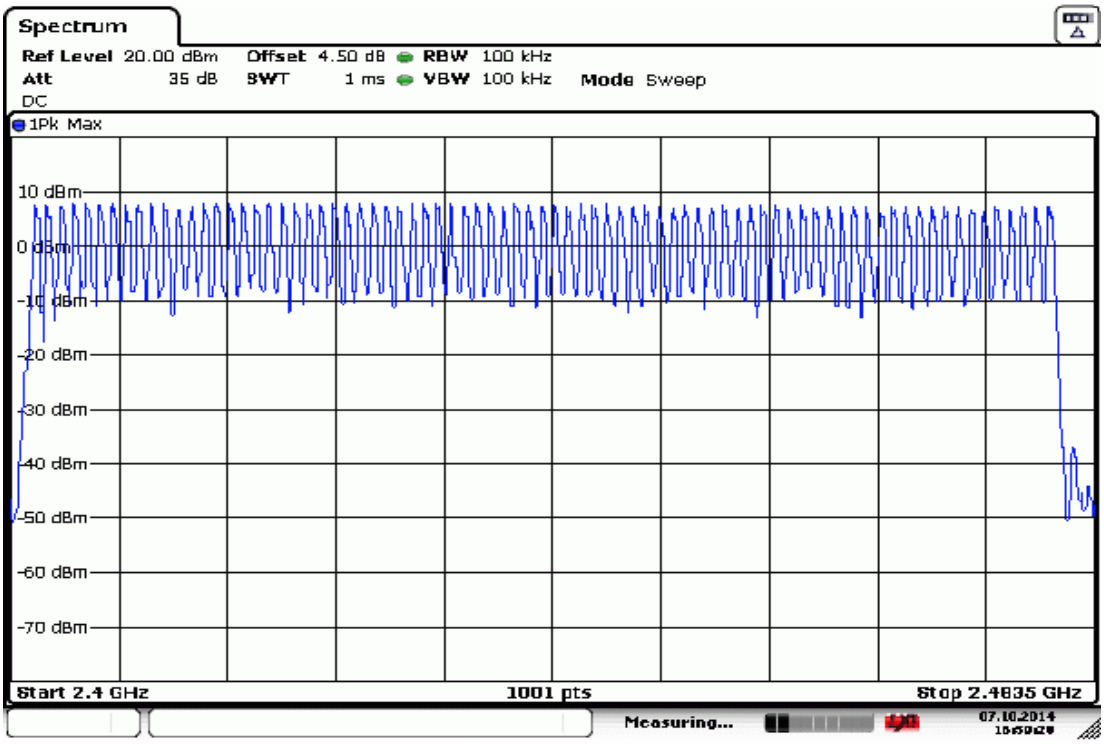
The number hopping channel is 79.

Test Mode: 8-DPSK



Date: 7.OCT.2014 17:31:09

Test Mode: GFSK



Date: 7.OCT.2014 16:59:21

9. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

9.1. Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	R&S	FSV30	101181	2014. 03. 14	1 Year

9.2. Block Diagram of Test Setup

The same as section 5.2.

9.3. Specification Limits [§15.247(b)-(1)]

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

9.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in 5.4.

9.5. Test Procedure

The transmitter output was connected to the spectrum analyzer.
Span can encompass the waveform
RBW>EBW
VBW≧RBW
Sweep=5MHz
The measurement guideline was according to FCC Public Notice DA 00-705.

9.6. Test Results

PASSED. All the test results are listed below

.

[Note: We performed testing of the highest and lowest data rate.]

Test Date : 2014. 10. 07 Temperature : 24℃ Humidity : 58%

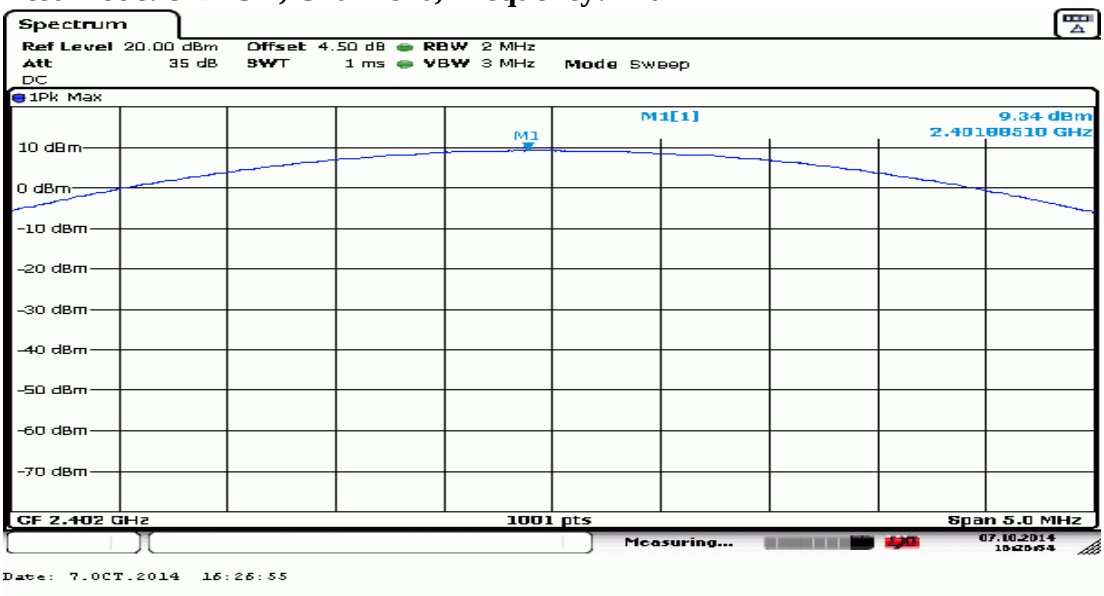
9.6.1.Type of Modulation: 8-DPSK

No.	Channel	Test Frequency	**Peak Output Power**	Limit
1.	0	2402MHz	**9.34 dBm**	21dBm
2.	39	2441MHz	**9.16 dBm**	21dBm
3.	78	2480MHz	**8.88 dBm**	21dBm

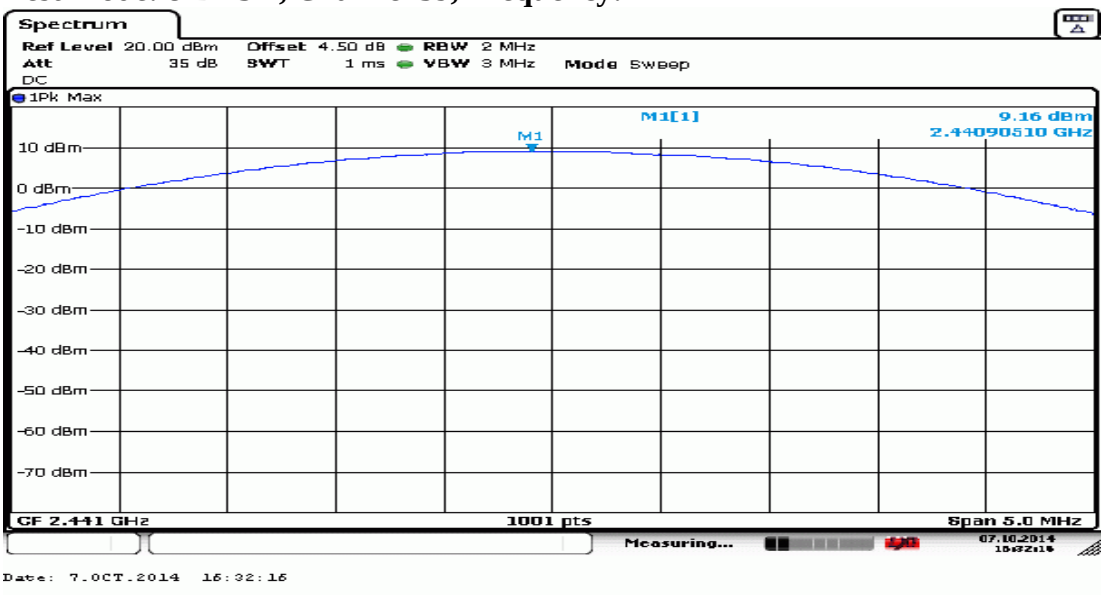
9.6.2.Type of Modulation: GFSK

No.	Channel	Test Frequency	**Peak Output Power**	Limit
1.	0	2402MHz	**8.31 dBm**	21dBm
2.	39	2441MHz	**8.09 dBm**	21dBm
3.	78	2480MHz	**8.08 dBm**	21dBm

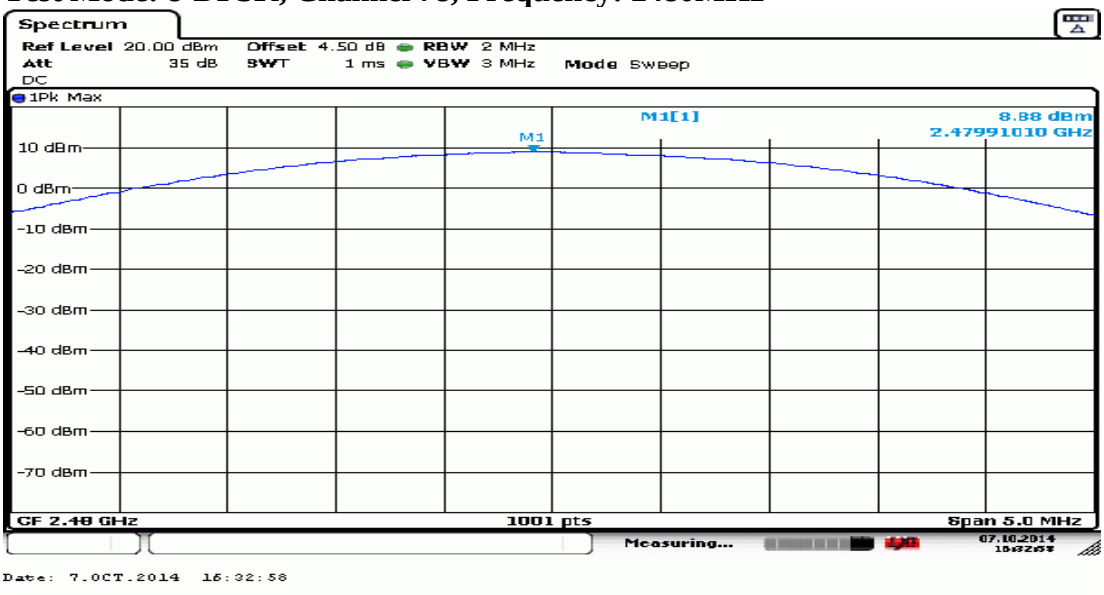
Test Mode: 8-DPSK, Channel 0, Frequency: 2402MHz



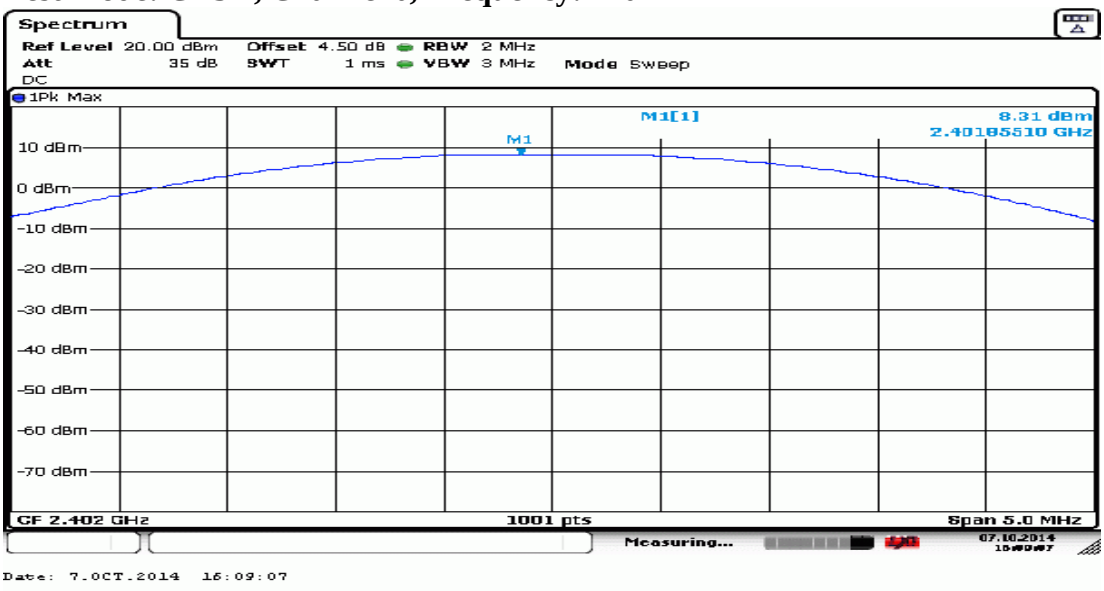
Test Mode: 8-DPSK, Channel 39, Frequency: 2441MHz



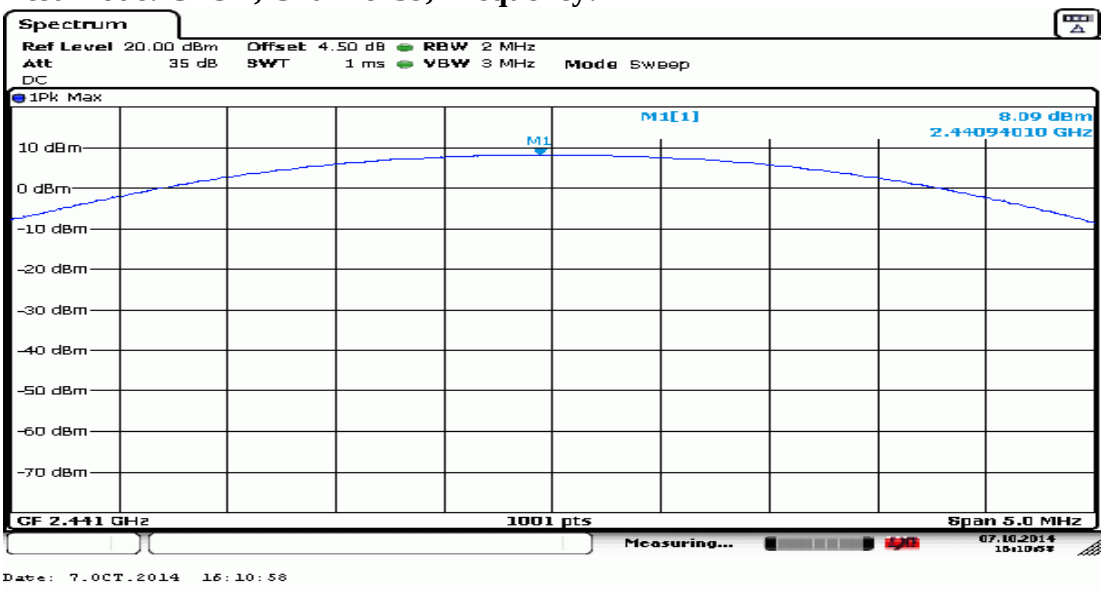
Test Mode: 8-DPSK, Channel 78, Frequency: 2480MHz



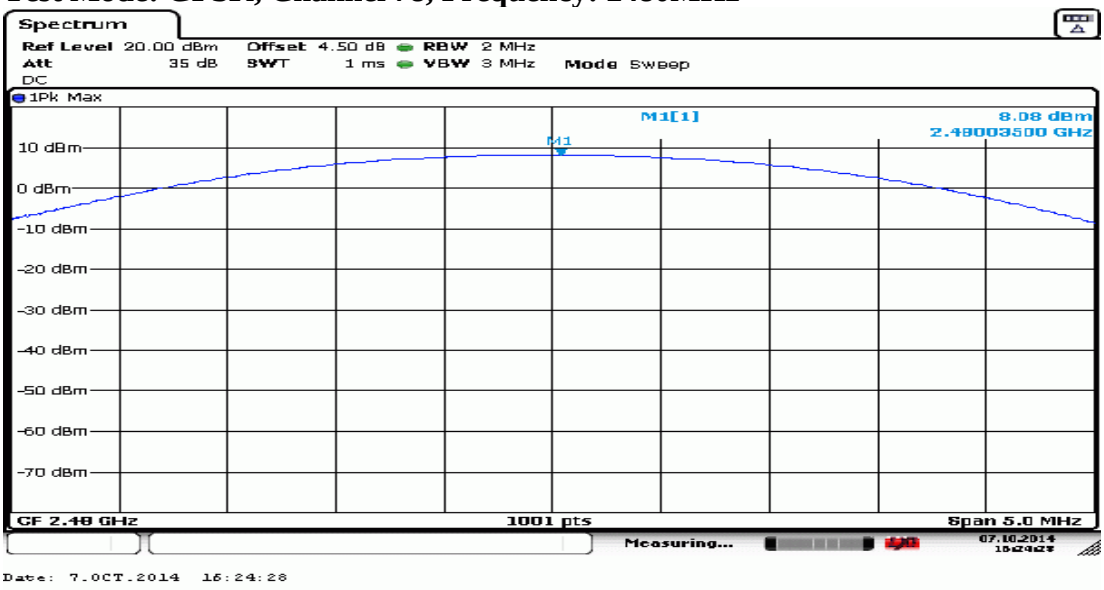
Test Mode: GFSK, Channel 0, Frequency: 2402MHz



Test Mode: GFSK, Channel 39, Frequency: 2441MHz



Test Mode: GFSK, Channel 78, Frequency: 2480MHz



10. EMISSION LIMITATIONS MEASUREMENT

10.1. Test Equipment

The following test equipment was used during the emission limitations test：

Item	Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2014. 09. 19	1 Year

10.2. Block Diagram of Test Setup

The same as section 5.2.

10.3. Specification Limits [§15.247(c)]

10.3.1. In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(※This test result attaching to §3.6.3)

10.3.2. The reference level for determining limit of emission limitations is according to the value measured indicated in plots at section 9.6.

10.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 5.4.

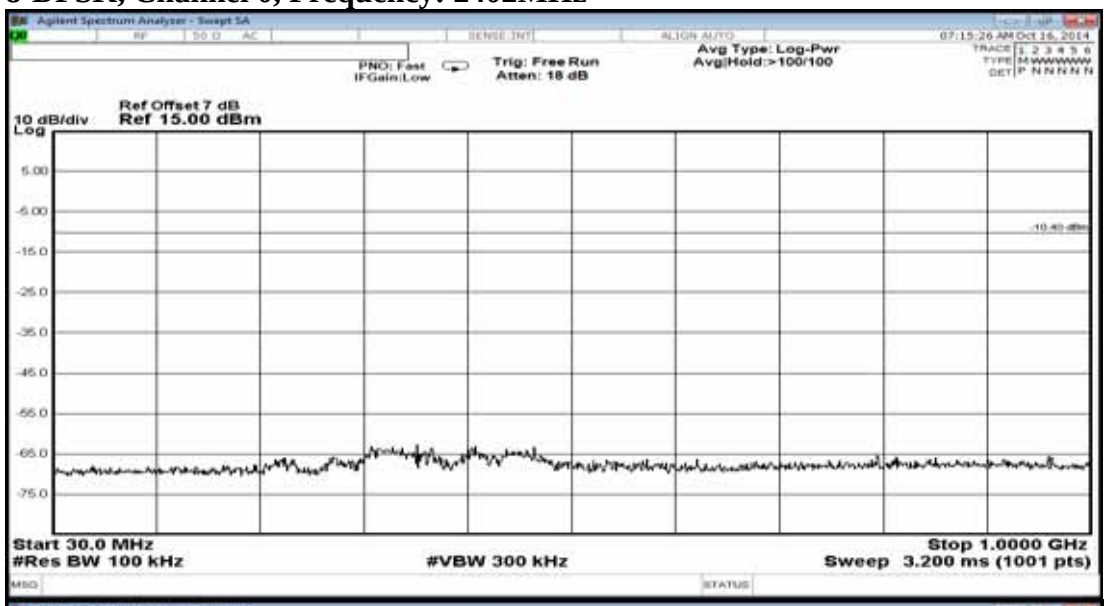
10.5. Test Procedure

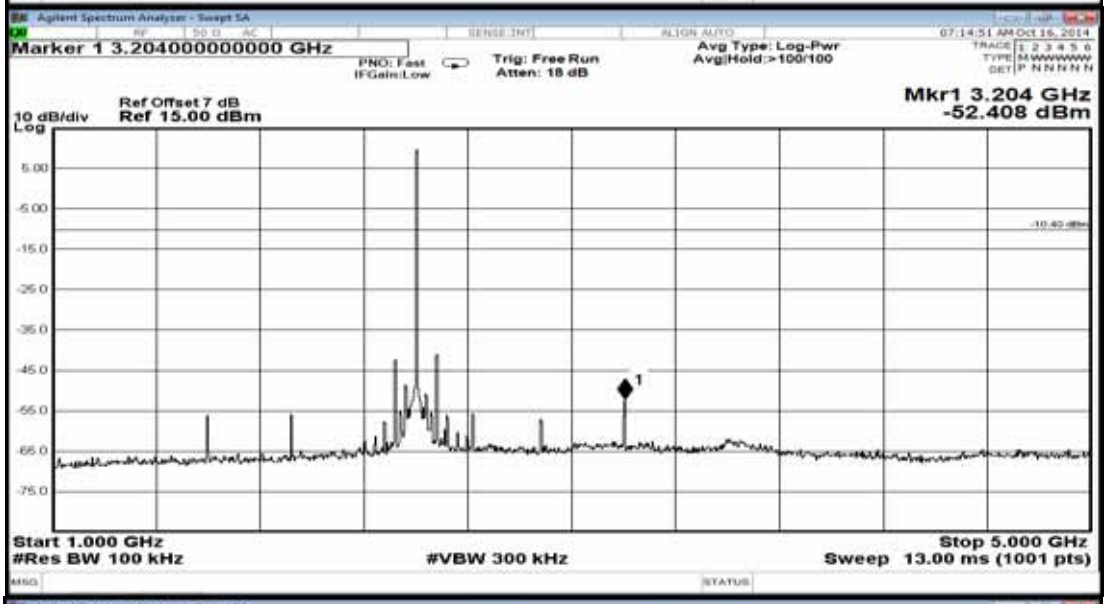
The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.
The measurement guideline was according to FCC Public Notice DA 00-705.

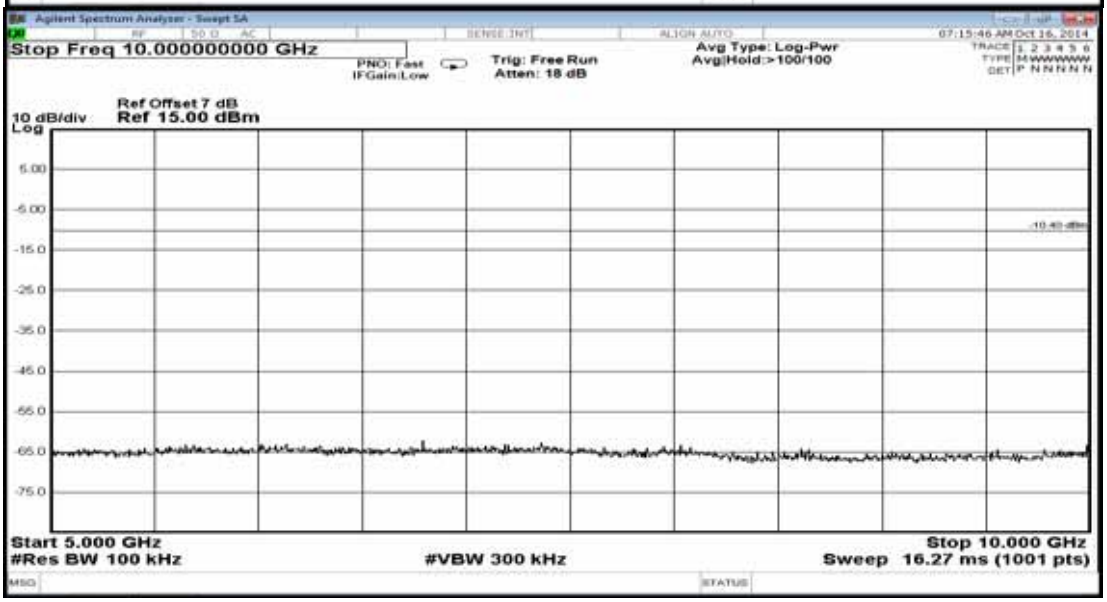
10.6. Test Results

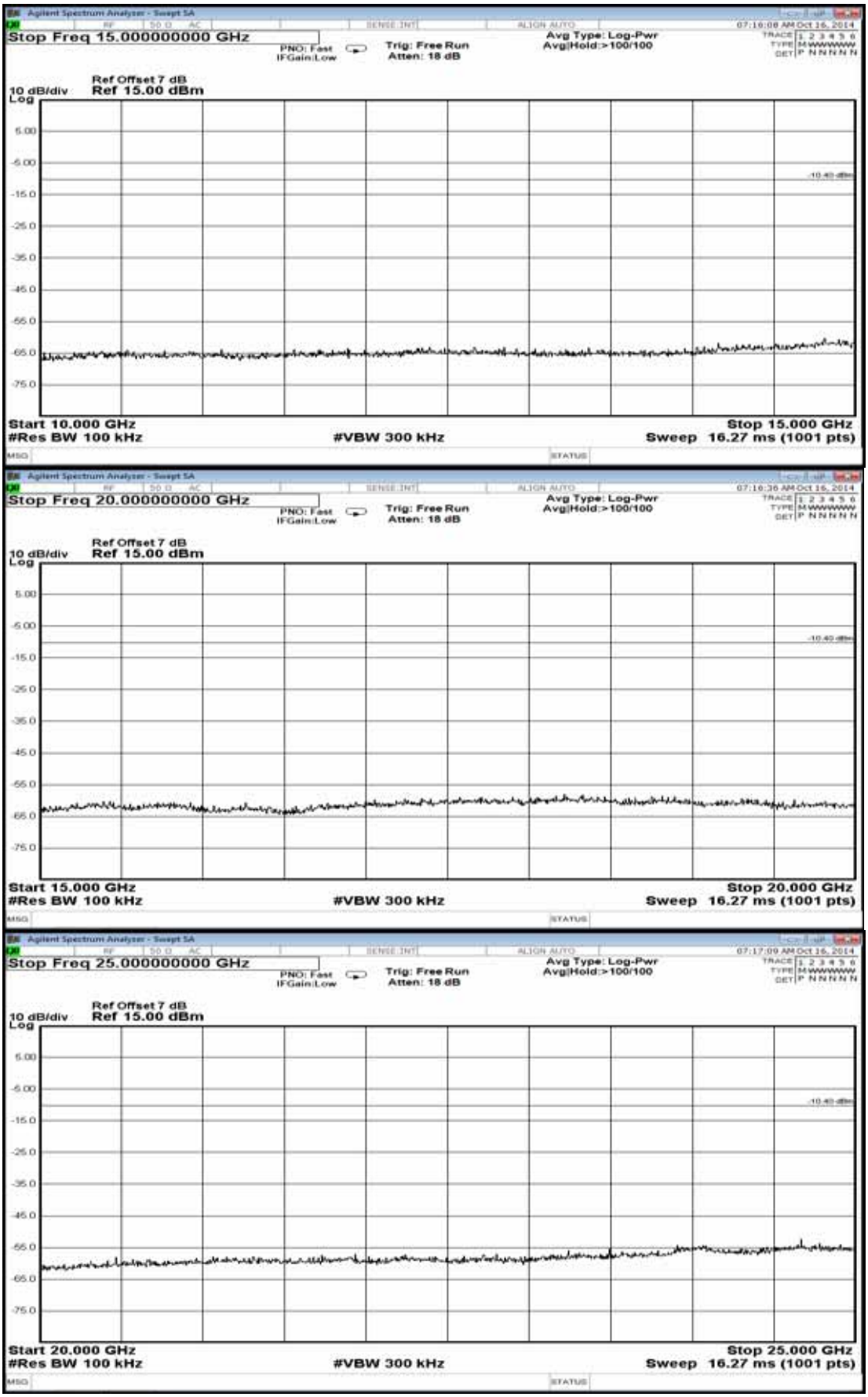
PASSED. The testing data was attached in the next pages.
Test Date : 2014. 10. 16 Temperature : 23℃ Humidity : 60%

8-DPSK, Channel 0, Frequency: 2402MHz

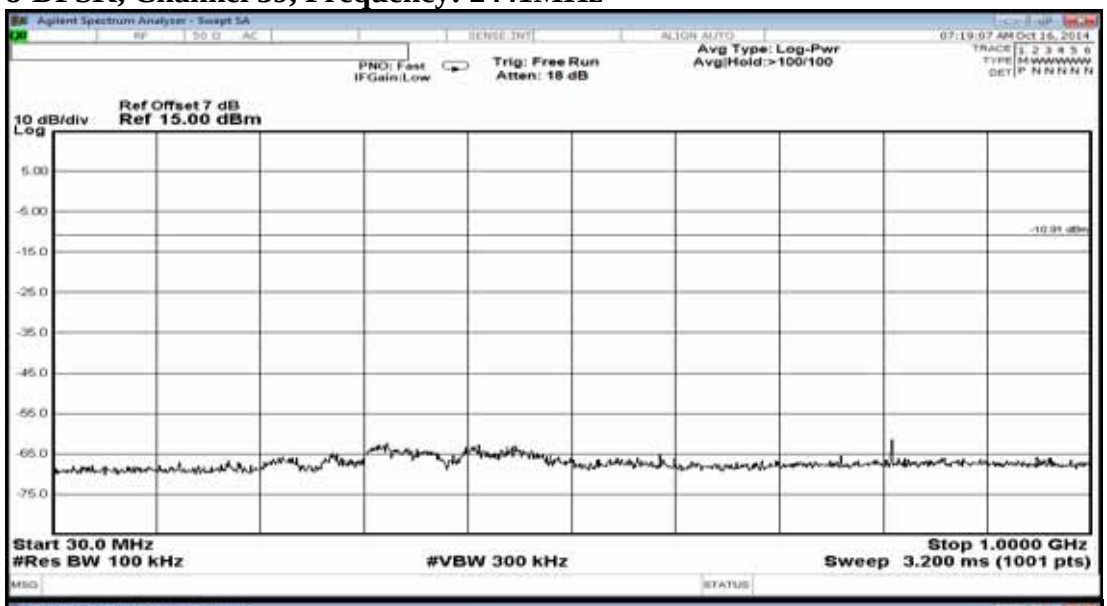


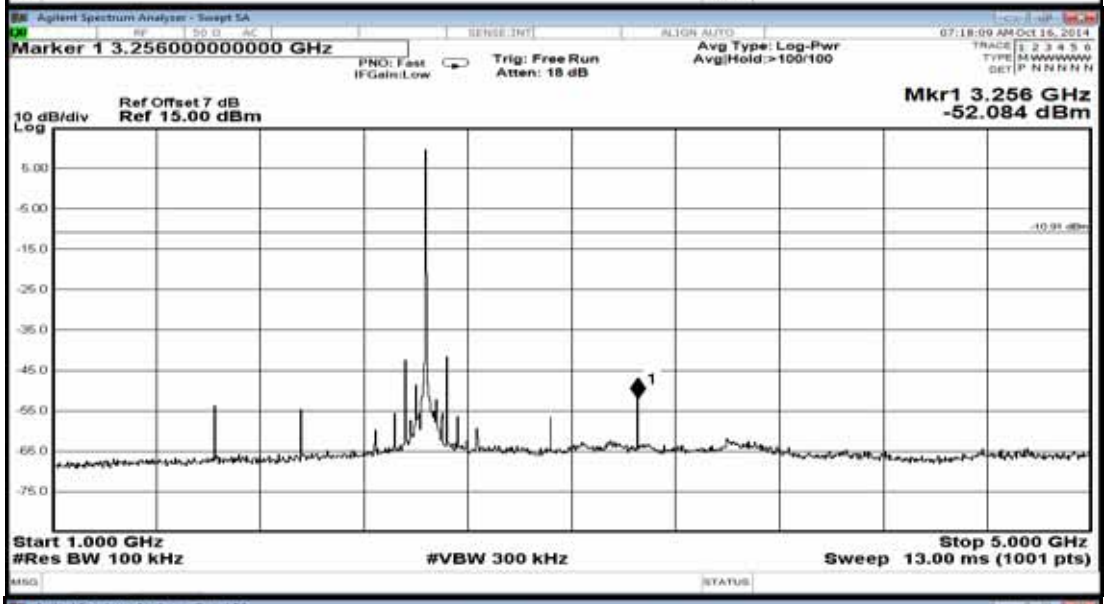


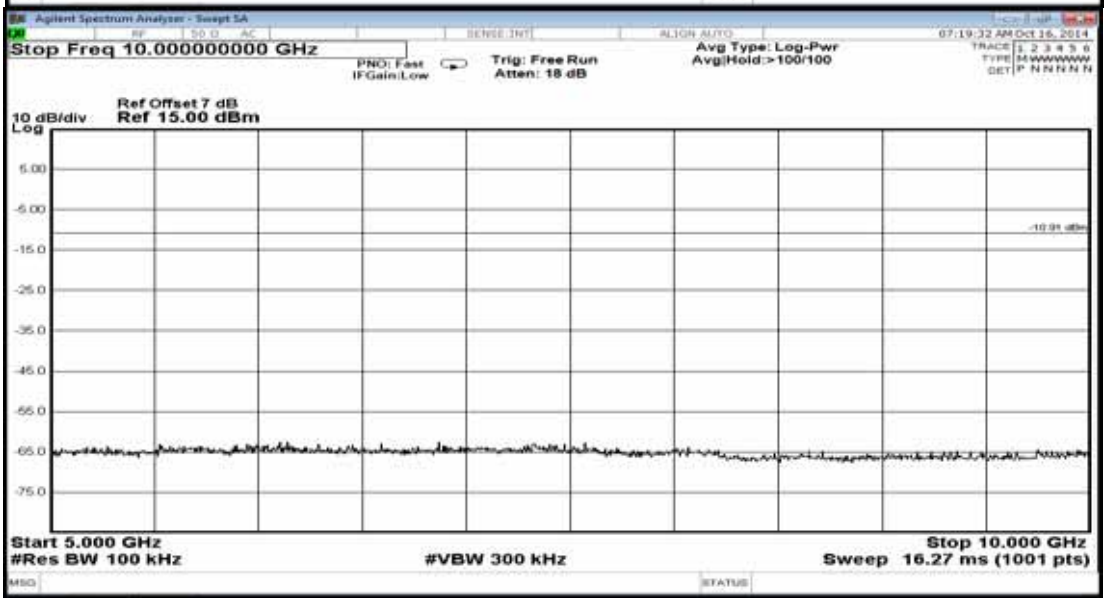


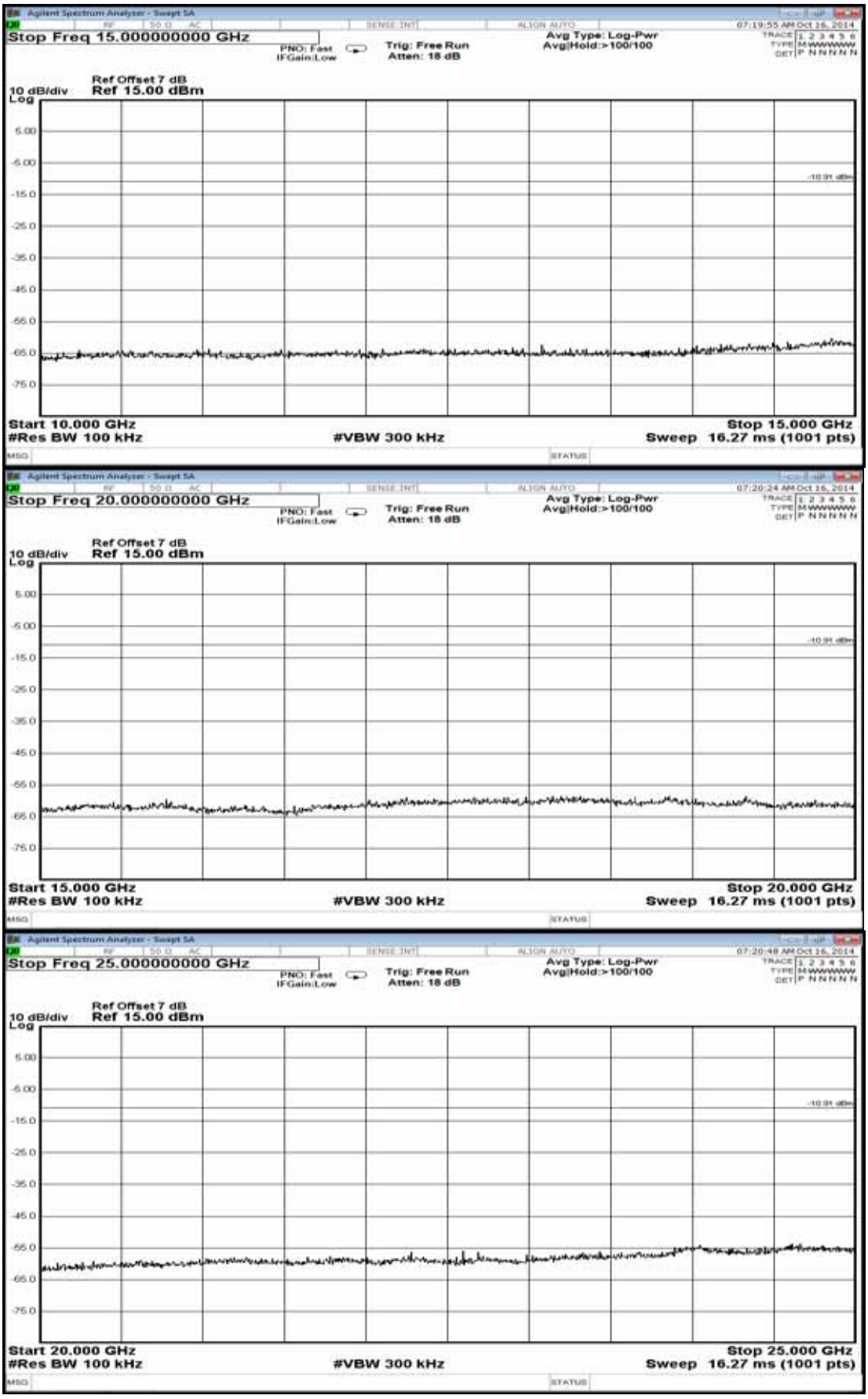

Agilent Spectrum Analyzer - Swept SA
Stop Freq 15.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:16:08 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:16:36 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 20.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 25.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:17:09 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 20.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 16.27 ms (1001 pts)

8-DPSK, Channel 39, Frequency: 2441MHz





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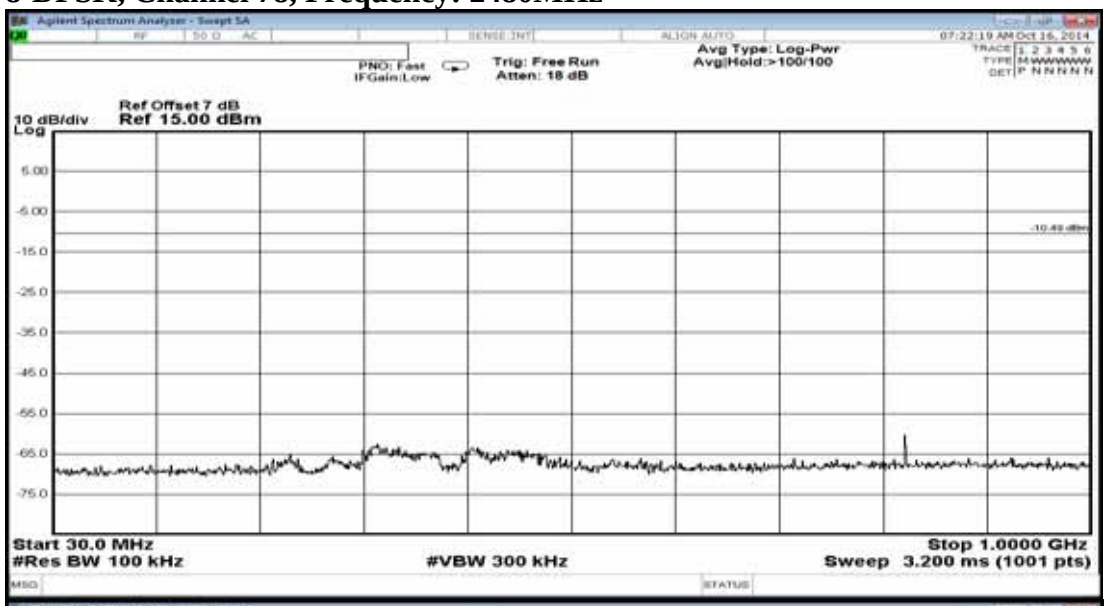
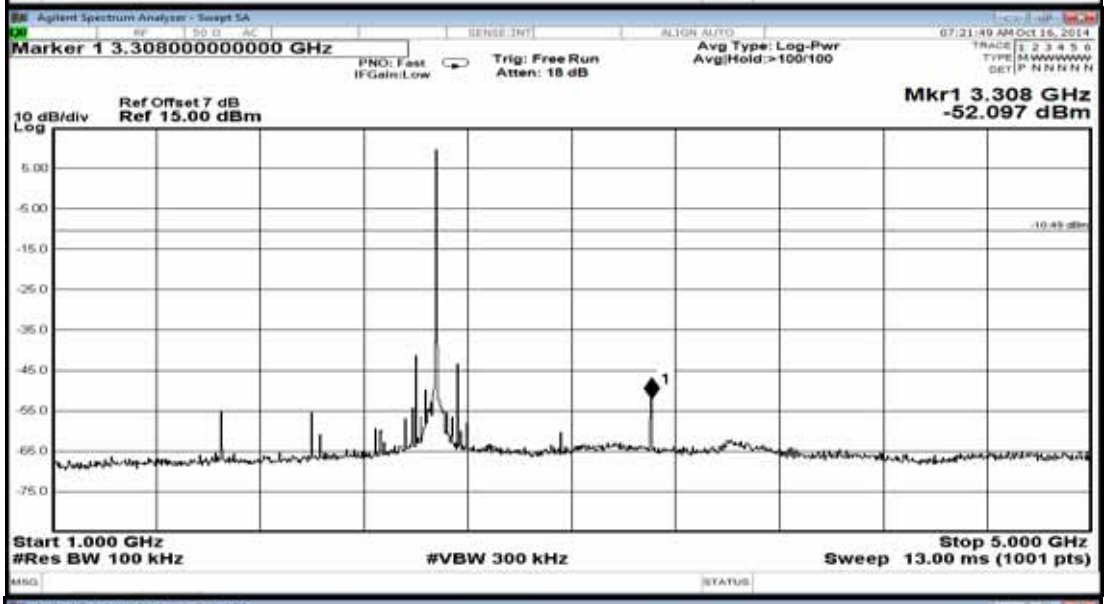
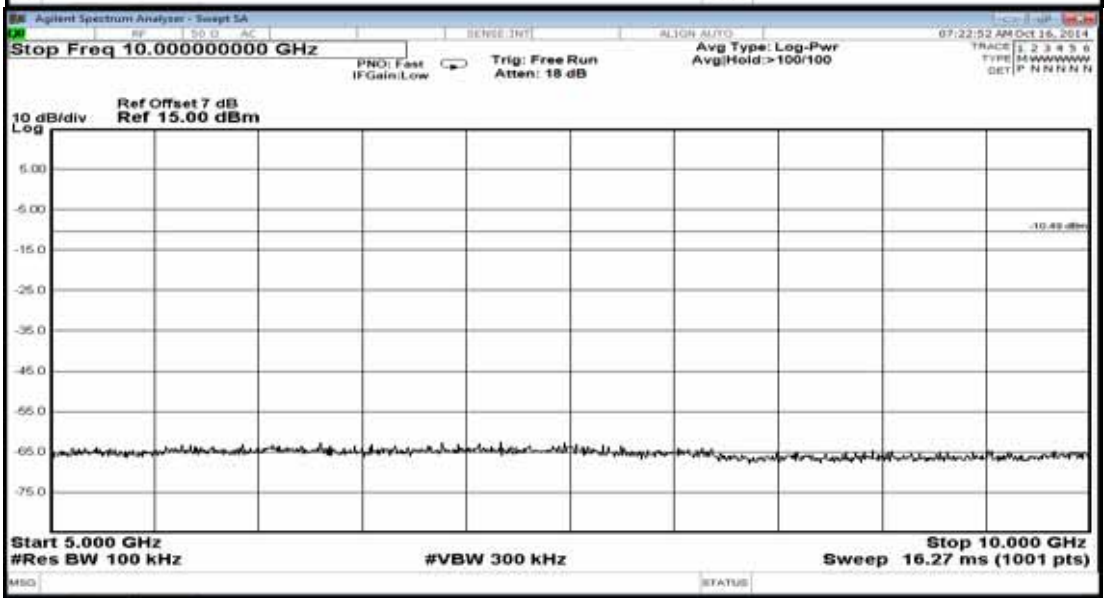
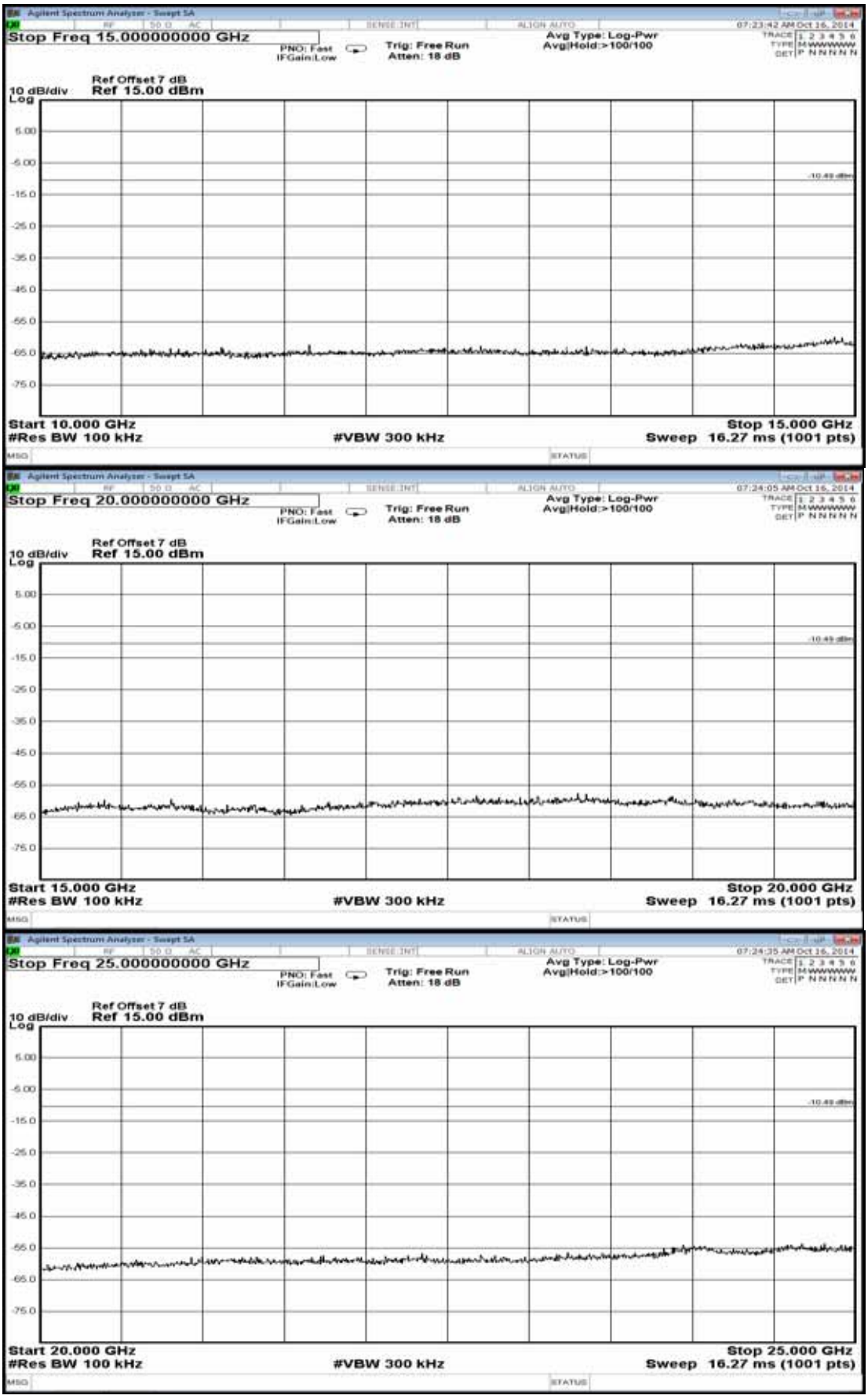
Stop Freq 15.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:19:55 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:20:24 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 20.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 25.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:20:48 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 20.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 16.27 ms (1001 pts)

8-DPSK, Channel 78, Frequency: 2480MHz

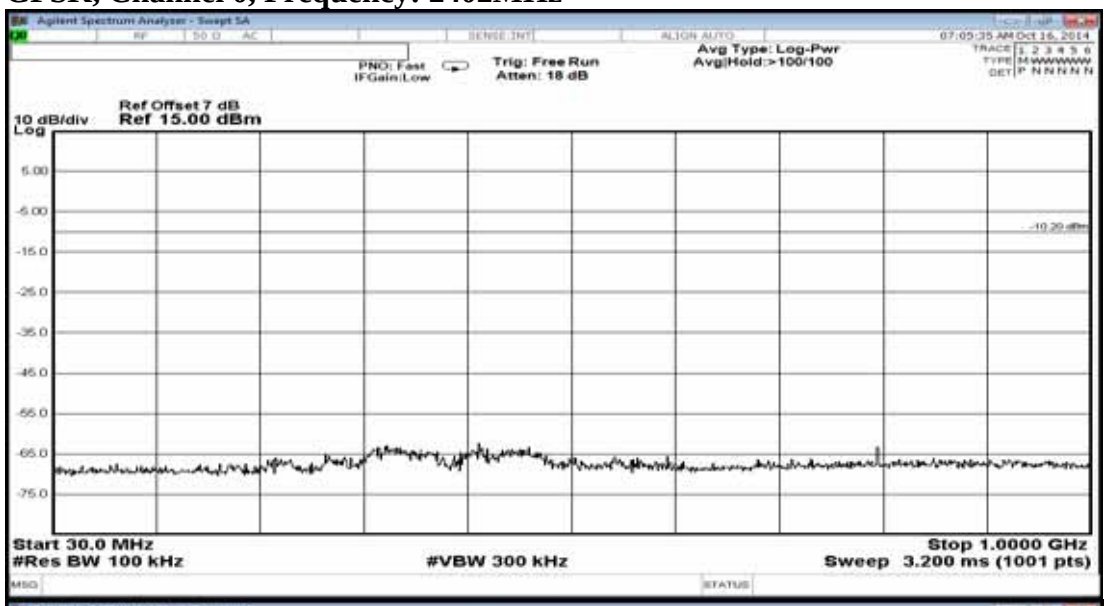


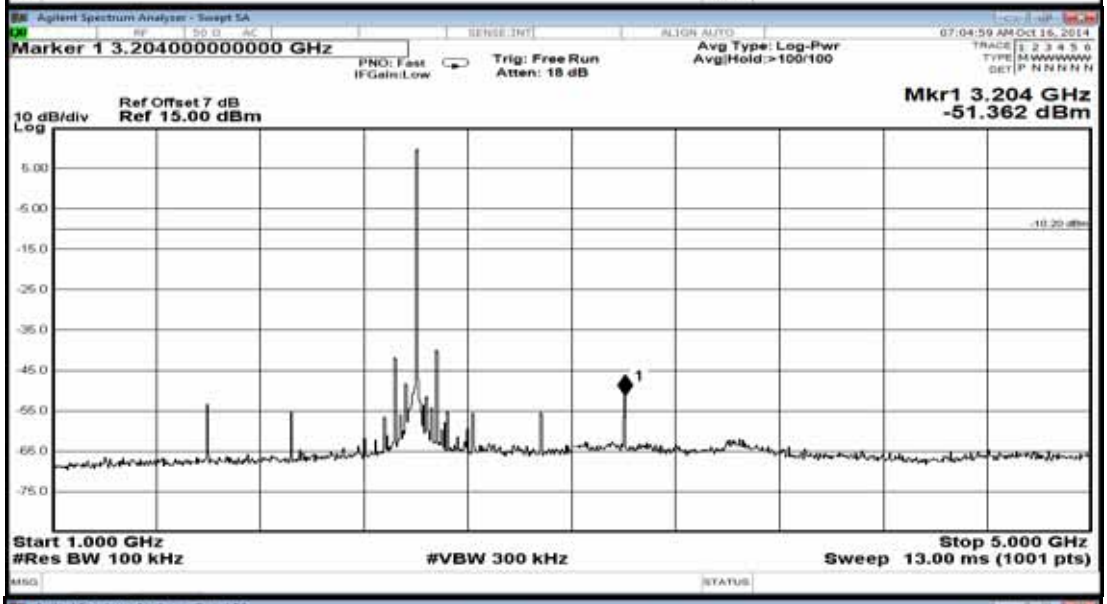


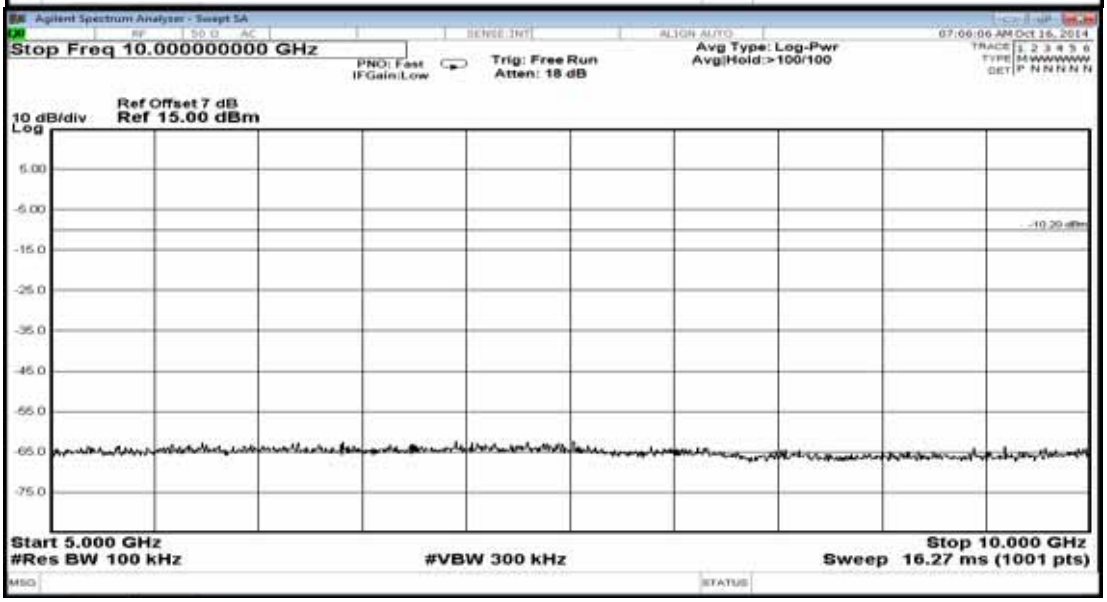


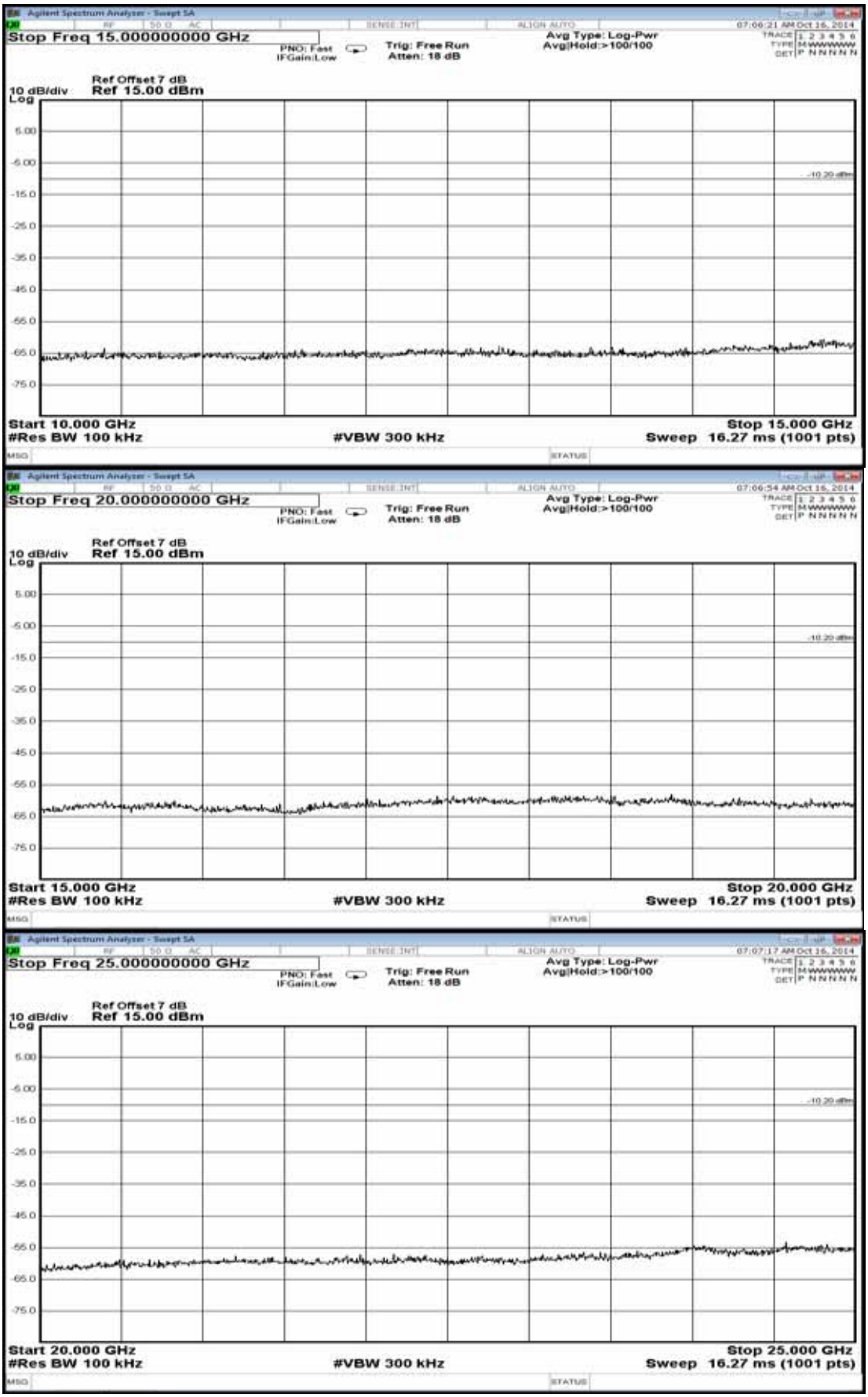

Agilent Spectrum Analyzer - Swept SA
Stop Freq 15.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:23:42 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:24:05 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 20.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 25.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:24:35 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 20.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 16.27 ms (1001 pts)

GFSK, Channel 0, Frequency: 2402MHz

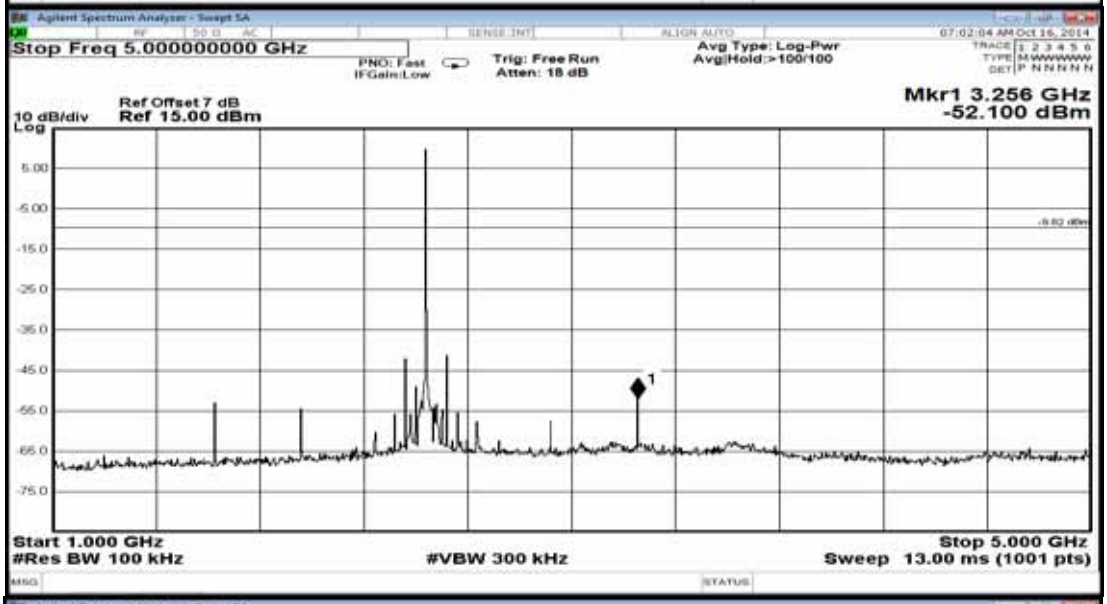


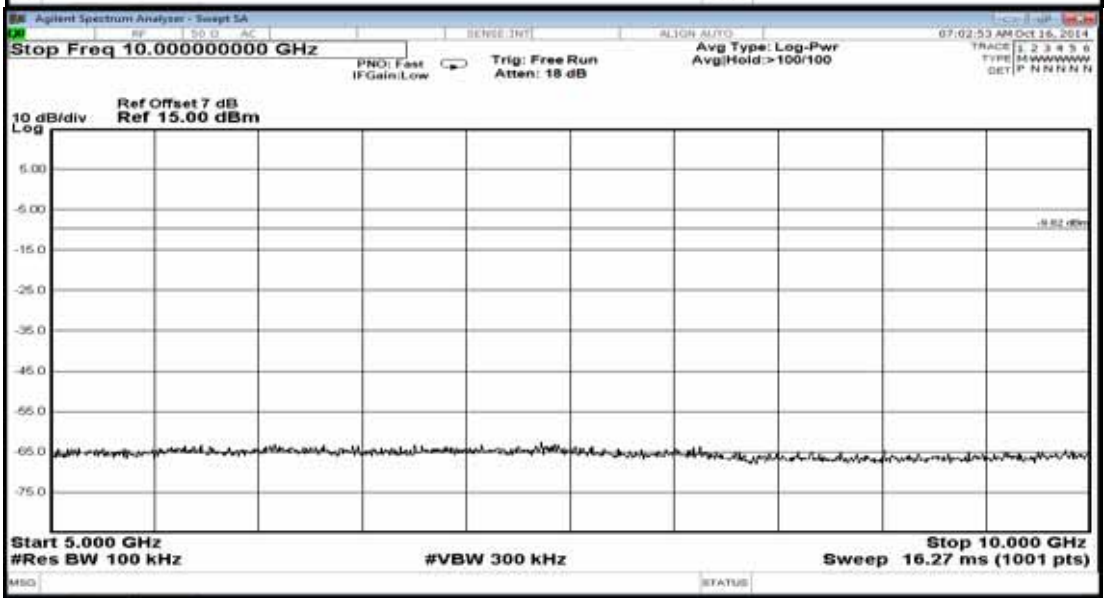


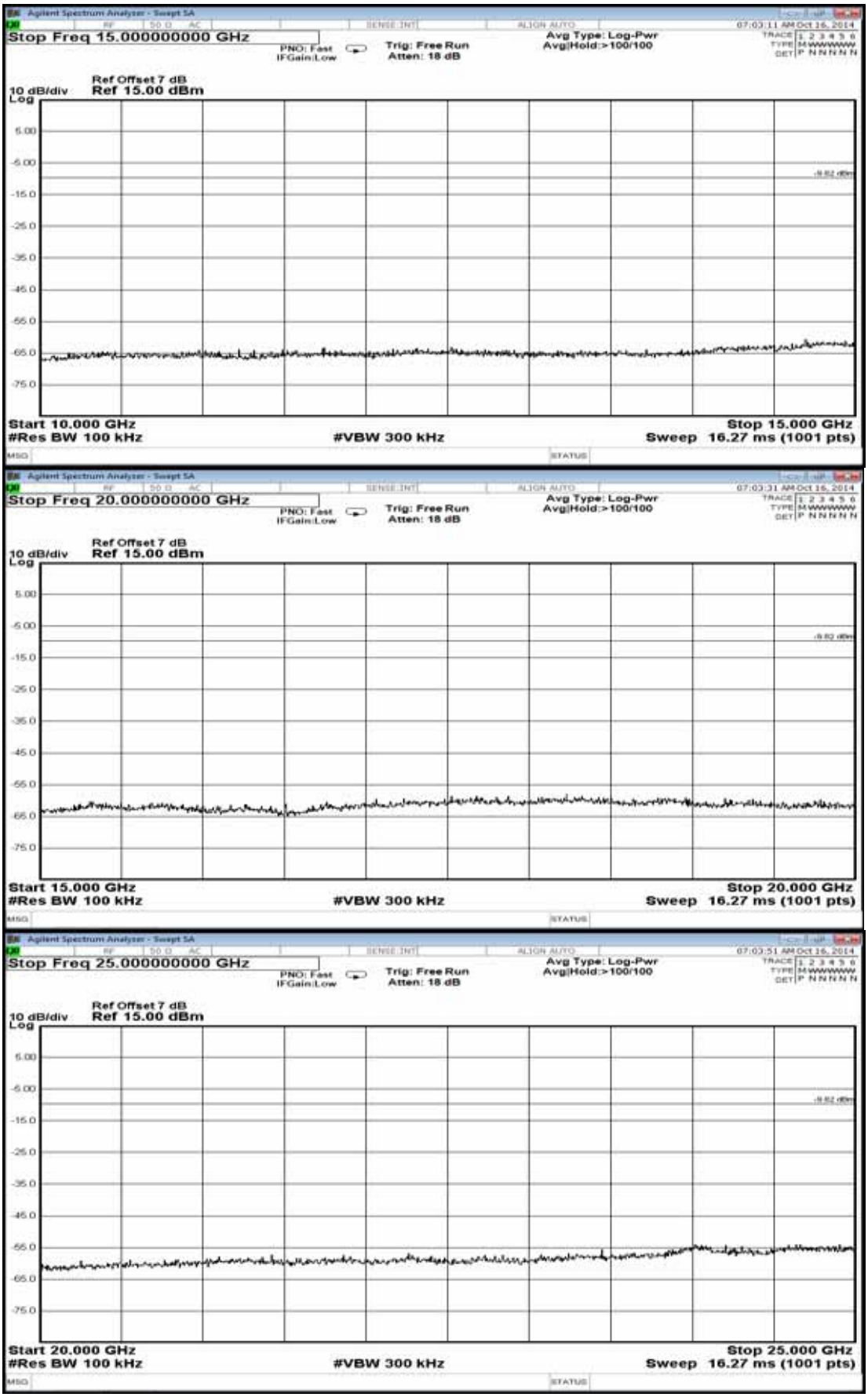



Agilent Spectrum Analyzer - Swept SA
Stop Freq 15.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:06:21 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:06:54 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 20.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 25.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:07:17 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 20.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 16.27 ms (1001 pts)

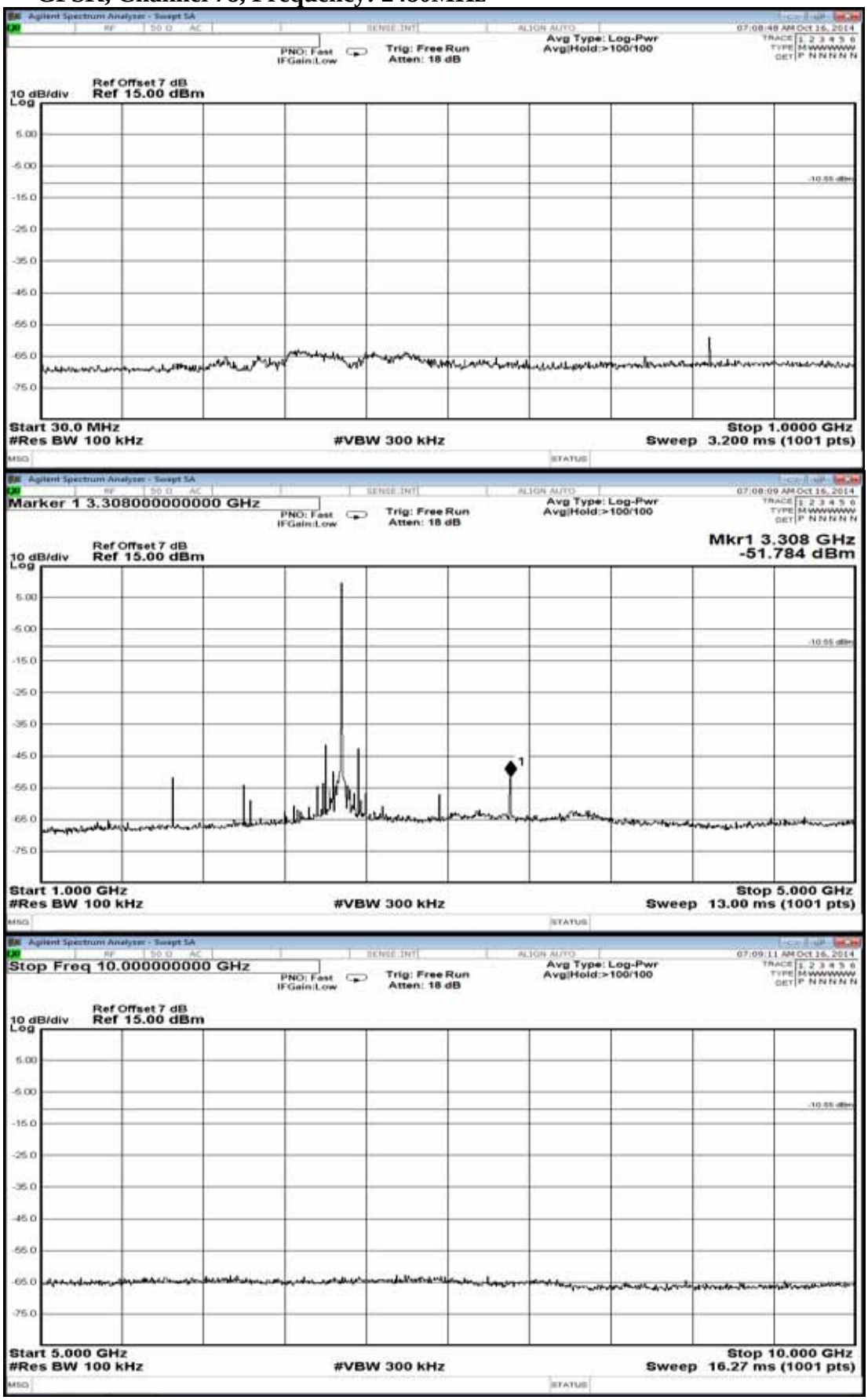
GFSK, Channel 39, Frequency: 2441MHz

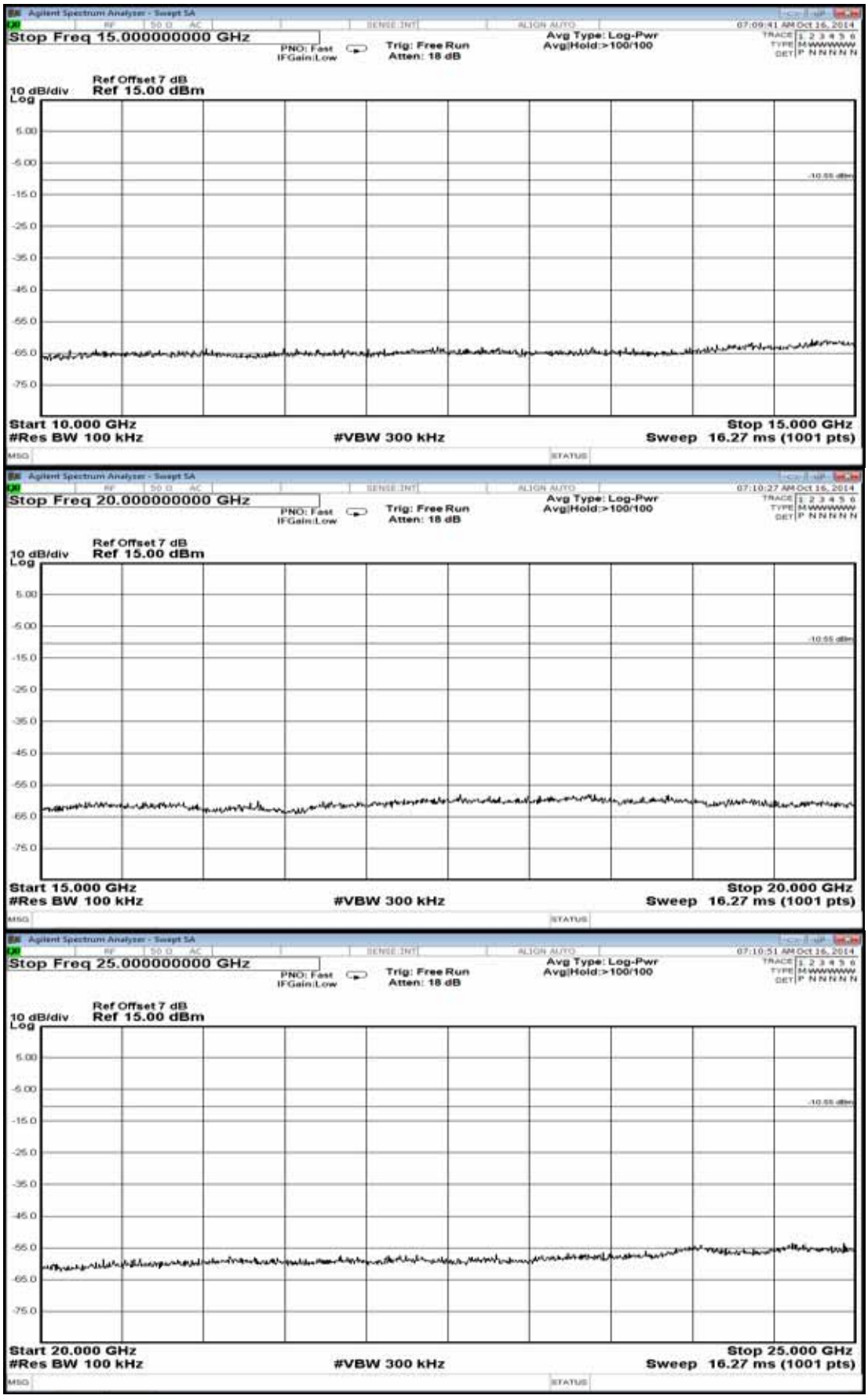





Agilent Spectrum Analyzer - Swept SA
Stop Freq 15.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:03:11 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:03:31 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 20.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 25.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:03:51 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Start 20.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 16.27 ms (1001 pts)

GFSK, Channel 78, Frequency: 2480MHz




Agilent Spectrum Analyzer - Swept SA
Stop Freq 15.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:09:41 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:10:27 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 20.000 GHz
Sweep 16.27 ms (1001 pts)
Agilent Spectrum Analyzer - Swept SA
Stop Freq 25.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
07:10:51 AM Oct 16, 2014
Ref Offset 7 dB
10 dB/div
Log
Ref 15.00 dBm
Start 20.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 16.27 ms (1001 pts)

11. BAND EDGES MEASUREMENT

11.1. Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
1.	R&S	FSV30	101181	2014. 03. 14	1 Year

11.2. Block Diagram of Test Setup

The same as section 5.2.

11.3. Specification Limits [§15.247(c)]

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)). (※This test result attaching to §3.6.3)

11.4. Operating Condition of EUT

Same as carrier frequency separation measurement which was listed in section 4.4.

11.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.
The measurement guideline was according to FCC Public Notice DA 00-705.

11.6.Test Results

PASSED. The testing data was attached in the next pages.

[Note: We performed testing of the highest and lowest data rate.]

Test Date : 2014. 10. 07 Temperature : 24℃ Humidity : 58%

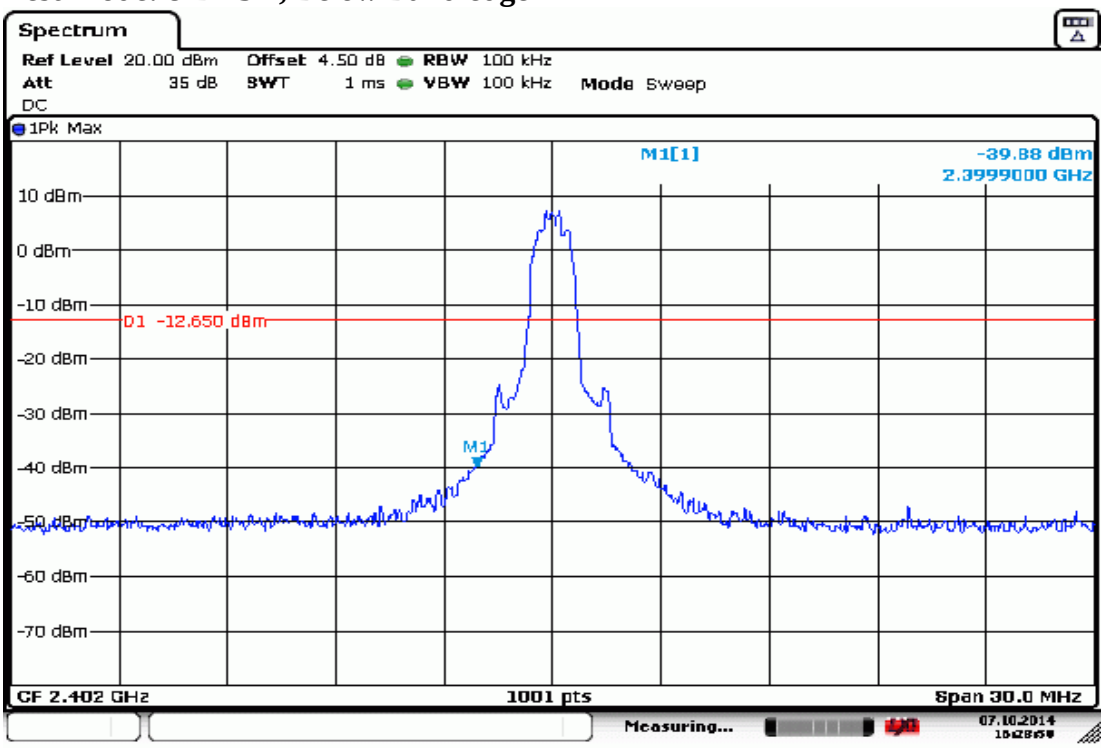
11.6.1. Type of Modulation: 8-DPSK

1. Below Band edge : The highest emission level is -39.88dBm on 2.39990GHz。
2. Upper Band edge: The highest emission level is -45.66dBm on 2.48350GHz。

11.6.2. Type of Modulation: GFSK

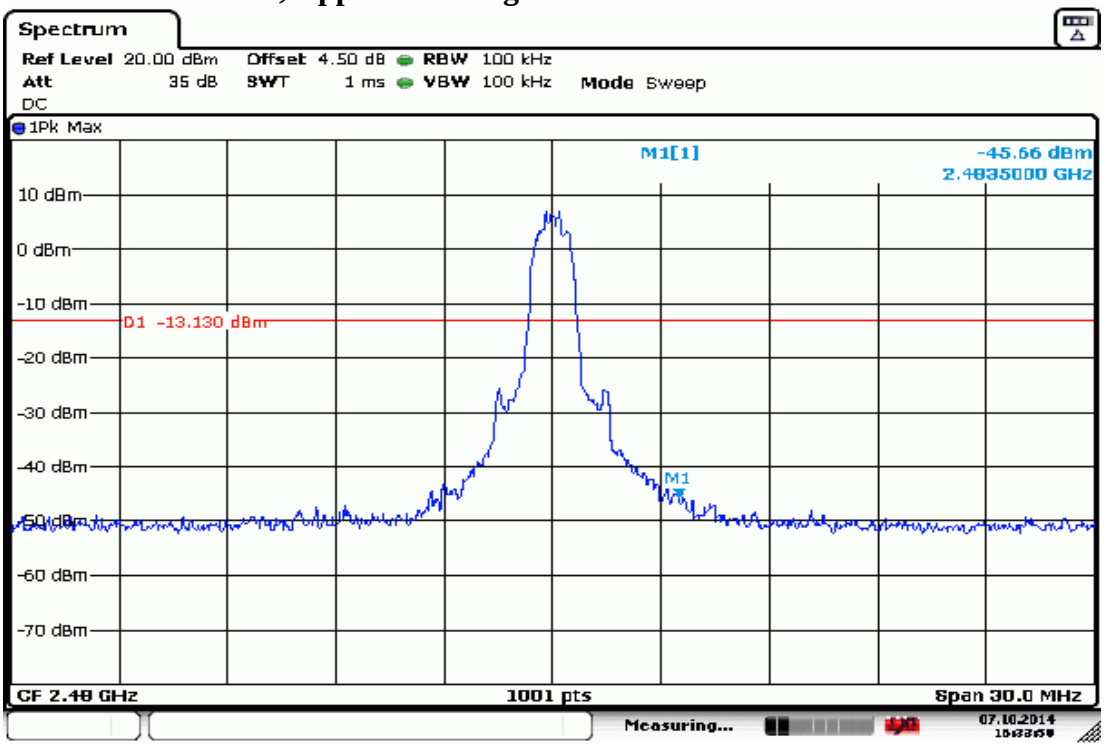
1. Below Band edge : The highest emission level is -39.30dBm on 2.39990GHz。
2. Upper Band edge: The highest emission level is -44.64dBm on 2.48350GHz。

Test Mode: 8-DPSK, Below Band edge



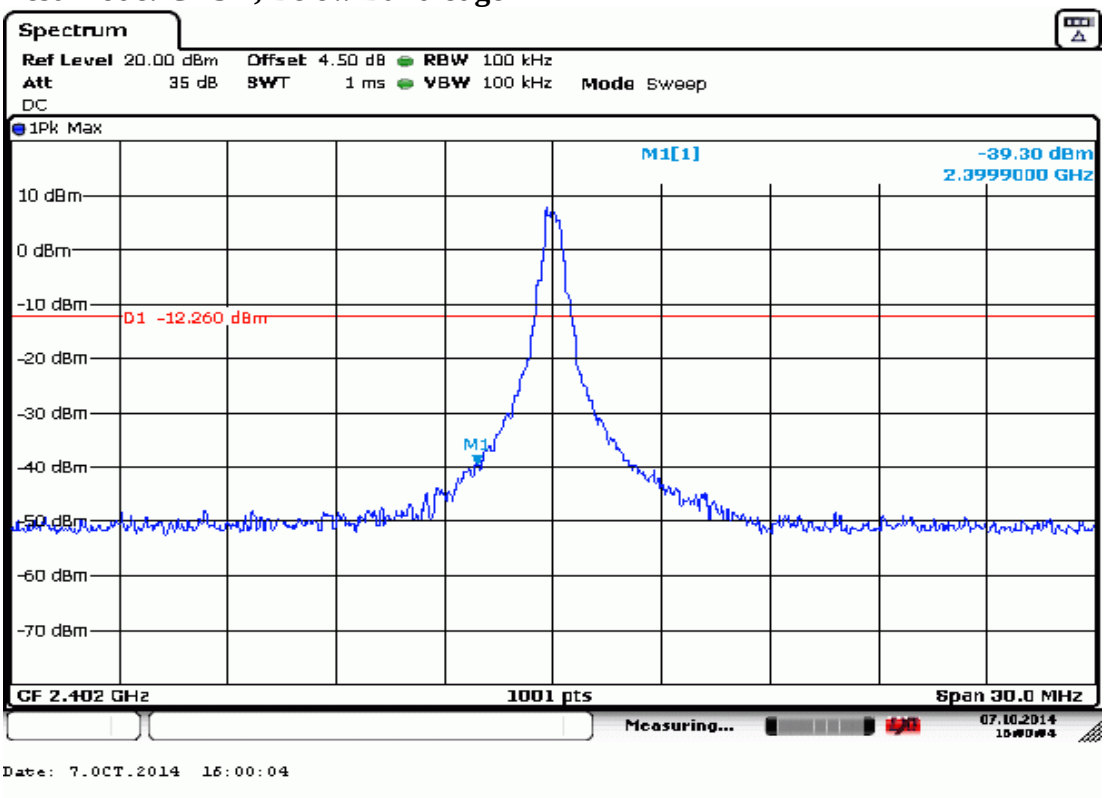
Date: 7.OCT.2014 16:28:51

Test Mode: 8-DPSK, Upper Band edge



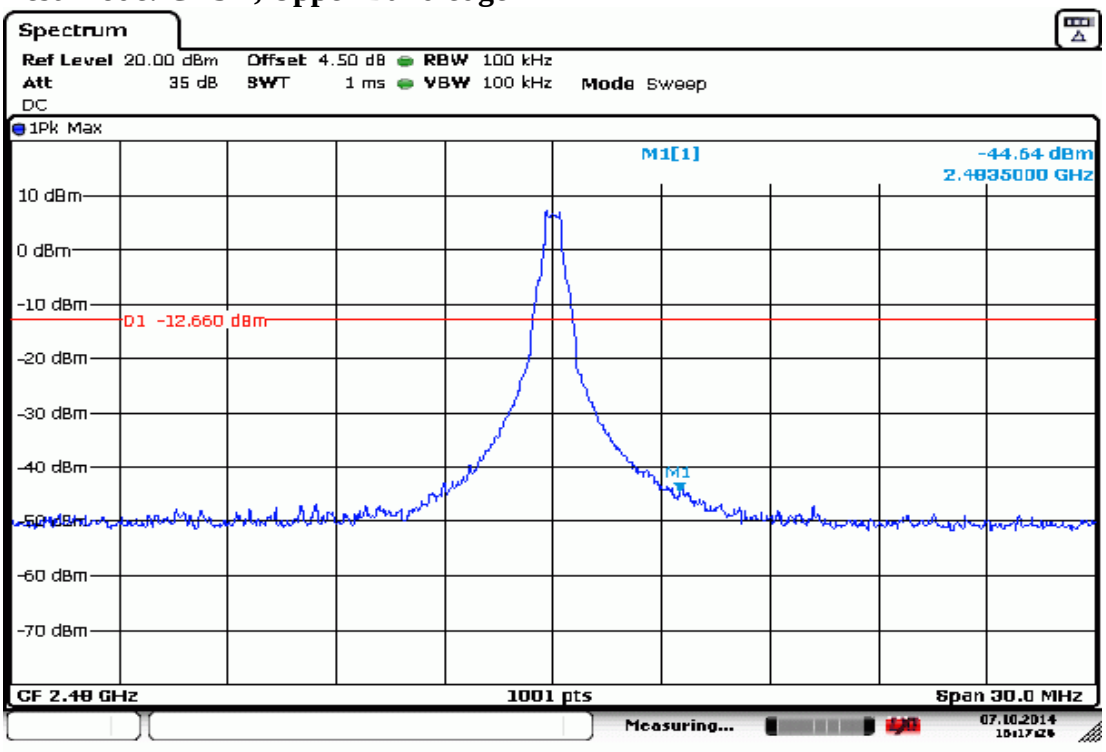
Date: 7.OCT.2014 16:33:50

Test Mode: GFSK, Below Band edge



Date: 7.OCT.2014 16:00:04

Test Mode: GFSK, Upper Band edge



Date: 7.OCT.2014 16:17:26

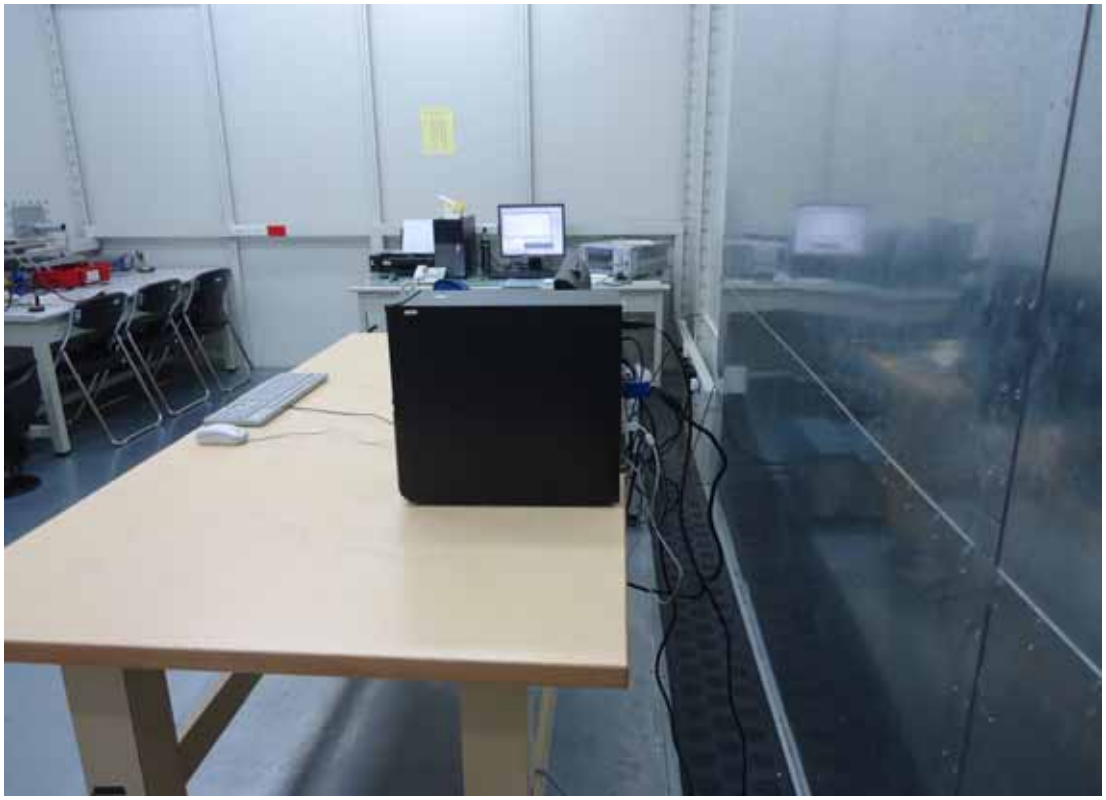
12. DEVIATION TO TEST SPECIFICATIONS

【NONE】

13. PHOTOGRAPHS

13.1. Photos of Conducted Disturbance Measurement

FRONT VIEW OF CONDUCTED MEASUREMENT



BACK VIEW OF CONDUCTED MEASUREMENT

13.2. Photos of Radiated Emission Measurement at Semi-Anechoic Chamber

13.2.1. Frequency Range 30MHz-1GHz

13.2.2. Frequency Range Above 1GHz

13.3.Photo of Section RF Conducted Measurement