ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPARTC REQUIREMENT

OF

SPORTS BLUETOOTH HEADSET

MODEL No.: BTH450
Serial Model: S9

FCC ID: 2AAOE14BTH450

REPORT NO: EN140620090E

ISSUE DATE: August 01, 2014

Prepared for

Shenzhen B&W Electronics Development Limited
4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China

Prepared by

NINGBO EMTEK CO., LTD.

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VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen B&W Electronics Development Limited 4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China
Manufacturer:	Shenzhen B&W Electronics Development Limited 4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China
Product Description:	SPORTS BLUETOOTH HEADSET
Brand Name:	N/A
Model Number:	BTH450
Serial Model:	S9 (The model : S9 is the same as the model : BTH450 in hardware aspect. The models are difference in packaging and marketing purpose only.)
File Number:	EN140620090E
Date of Test:	June 21, 2014 to August 01, 2014

We hereby certify that:

The above equipment was tested by NINGBO EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Approved By

Andy.wang/Manager
NINGBO EMTEK CO., LTD.

Table of Contents

1. General Information

1.1 Product Description

Shenzhen B&W Electronics Development Limited
Model: BTH450 (referred to as the EUT in this report) The EUT (SPORTS BLUETOOTH HEADSET) is a short range, lower power Device. It is designed by way of utilizing the GFSK, π/4-DQPSK and 8DPSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2402-2480MHz
B). Modulation: GFSK, π/4-DQPSK, 8DPSK
C). Number of Channel: 79
D). Channel Space: 1MHz
F). Antenna Type: Internal PCB antenna
G). Antenna Gain: 1dBi
H). Power Supply: DC 5V, Battery: DC 3.7V

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AAOE14BTH450 filing to comply with Section 15.247 of the FCC Part 15 Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description		
EMC Lab.	:	Accredited by CNAS, 2014.1.21 The certificate is valid until 2017.1.20 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005) The Certificate Registration Number is L6666. Accredited by FCC, June 18, 2014 The Certificate Registration Number is 463622.
Name of Firm	:	NINGBO EMTEK CO., LTD.
Site Location	:	1F Building 4, 1177#, Lingyun Road, Ningbo National Hi-Tech Zone, Ningbo, Zhejiang, China

Radiated emission item Sub-contracted in Shenzhen Emtek:

EMC Lab.		The Certificate Registration Number is 709623.
Name of Firm	:	SHENZHEN EMTEK CO., LTD.
Site Location	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.3 of ANSI C63.4-2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this sports Bluetooth headset (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.4 of ANSI C63.4-2009.

2.4 Limitation

(1) Channel Separation Test

FCC Part 15, Subpart C Section 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

Frequency Range (MHz)	Limit(kHz)
902-928	>25kHz
2400-2483.5	>25kHz
5725-5850	>25kHz

(2) 20dB Bandwidth

Frequency Range(MHz)	Quantity of Hopping Channel	Limit(kHz) 50	25	15	75
902-928		<250	>250	NA	NA
2400-2483.5		NA	NA	>1000	<1000

(3) Quantity of Hopping Channel

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	Limit(Quantity of Hopping Channel) 20dB bandwidth <250kHz	20dB bandwidth >250 kHz	20dB bandwidth <1MHz	20dB bandwidth >1M Hz
902-928	50	25	NA	NA
2400-2483.5	NA	NA	75	15
5725-5850	NA	NA	75	NA

(4) Time of Occupancy(Dwell Time)

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	LIMIT(rms) 20dB bandwidth <250kHz(50Channel)	20dB bandwidth >250kHz(25Channel)	20dB bandwidth <1MHz(75Channel)
902-928	400(20S)	400(10S)	NA
2400-2483.5	NA	NA	400(30S)
5725-5850	NA	NA	400(30S)

Note: The "()"is all channel's average time of occupancy.

(5) Maximum Peak Output Power

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	Quantity of Hopping Channel	LIMIT(W) 50	25	15	75
902-928		1(30dBm)	0.125(21dBm)	NA	NA
2400-2483.5		NA	NA	0.125(21dBm)	1(30dBm)
5725-5850		NA	NA	NA	1(30dBm)

(6) Band edge

FCC Part15, Subpart C Section 15.247, In any 100kHz bandwidth outside the frequency band in with the spread spectrum 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 the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

Operating Frequency Range(MHz)	Spurious emission frequency	Limit	
		Peak power ration to emission(dBc)	Emission level(dBuV/m)
902-928	<902	>20	NA
	>928	>20	NA
	960-1240	NA	54
2400-2483.5	<2400	>20	NA
	>2483.5-2500	NA	54
5725-5850	<5350-5460	NA	54
	<5725	>20	NA
	>5850	>20	NA

(7) Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

(8) Radiated Emission

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

Frequency (MHz)	Field strength μV/m	Distance(m)	Field strength at 3m dBμV/m
0.009~0.490	2400/F(KHz)	300	/
0.490~1.705	2400/F(KHz)	30	/
1.705~30.0	30	30	/
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB); Limit line=Specific limits(dBuV) + distance extrapolation factor.

2.5 Configuration of Tested System

2.6 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Sports Bluetooth Headset	N/A	BTH450	2AAOE14BTH450	N/A	EUT
2.	Laptop	Lenovo	ThinkPad Edge E435	N/A	EA05545184	/
3.	Mouse	Lenovo	M-UAE119	N/A	LZ10933003P	/

Note:

(1) Unless otherwise denoted as EUT in『Remark』column, device(s) used in tested system is a support equipment.

2.7 Description of Test Modes

The EUT (SPORTS BLUETOOTH HEADSET) has been tested under normal operating condition. This EUT is a FHSS system. Pre-scanned tests, were conducted to determine the final configuration from all possible combinations. We use blue test to control the EUT, Let EUT hopping on and transmit with highest power, all the modes GFSK, π/4-DQPSK, 8DQPSK have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test

Channel	Frequency(MHz)
Low channel	2402
Middle channel	2441
High channel	2480

3. Summary of Test Results

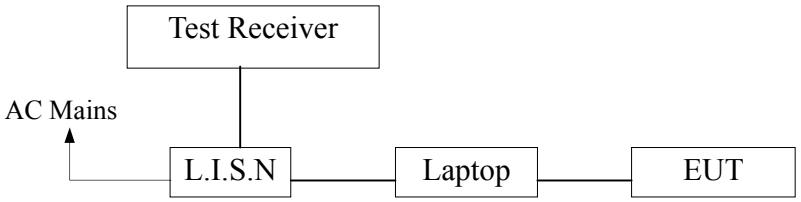
FCC Rules	Description Of Test	Result
FCC Part 15.247(a)(1)	Channel Separation Test	Compliant
FCC Part 15.247(a)(1)	20dB Bandwidth	Compliant
FCC Part 15.247(a)(1)	Quantity of Hopping Channel	Compliant
FCC Part 15.247(a)(1)	Time of Occupancy (Dwell Time)	Compliant
FCC Part 15.247(b)	Max Peak Output Power Test	Compliant
FCC Part 15.247(d)	Band Edge Test	Compliant
FCC Part 15.207	Conducted Emission	Compliant
FCC Part 15.247(d)&15.209	Radiated Emission	Compliant
FCC Part 15.247(d)	Antenna Port Emission	Compliant
FCC Part 15.203&15.247(b)	Antenna Requirement	Compliant

4. Conducted Emissions Test

4.1 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the three highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

4.2 Test SET-UP (Block Diagram of Configuration)



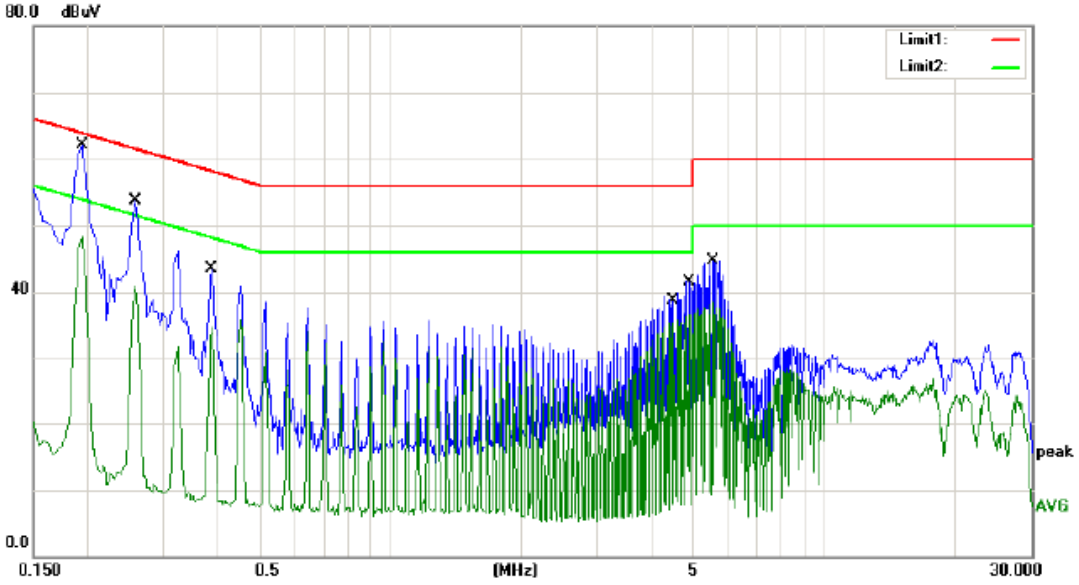
4.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Test Receiver	Rohde & Schwarz	ESCI	101108	08/02/2013	08/01/2014
L.I.S.N	Rohde & Schwarz	ENV216	101193	08/02/2013	08/01/2014
L.I.S.N	Schwarzbeck	NSLK 8126	8126-462	08/02/2013	08/01/2014
Pulse Limiter	MTS-systemtechnik	IMP-136	2611115-00 1-0033	08/02/2013	08/01/2014

4.4 Measurement Equipment Used

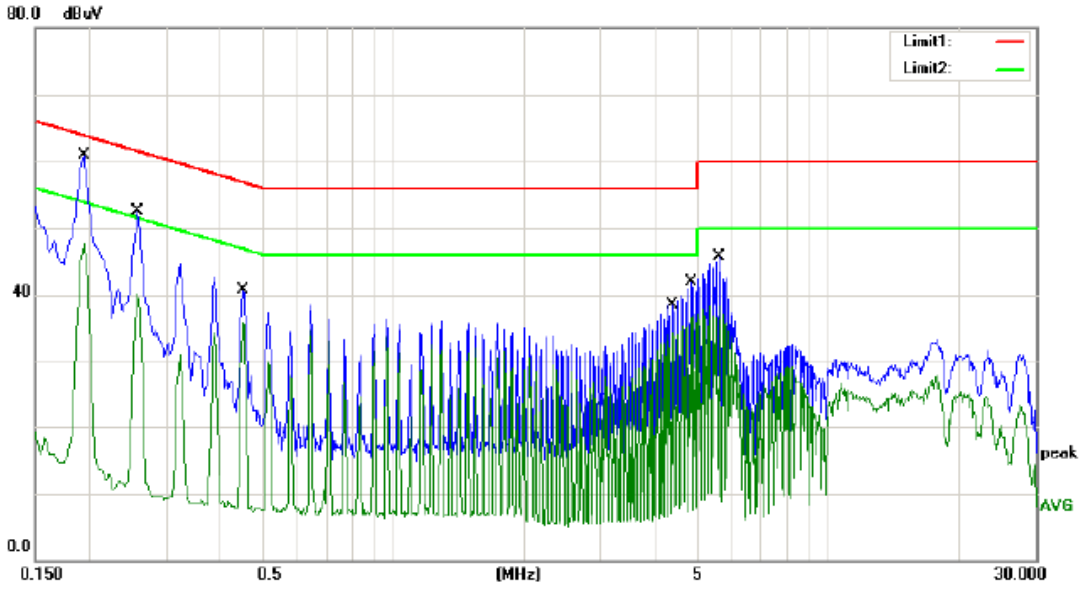
Pass.
Please refer to the following data.

Charging



Site site #1 Phase: N Temperature: 24
Limit: (CE)FCC PART 15_Class B Power: AC 120V/60Hz Humidity: 56 %
Mode: Charging
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1940	49.30	11.00	60.30	63.86	-3.56	QP	
2		0.1940	36.50	11.00	47.50	53.86	-6.36	AVG	
3		0.2580	42.80	11.00	53.80	61.50	-7.70	QP	
4		0.2580	29.80	11.00	40.80	51.50	-10.70	AVG	
5		0.3860	32.50	11.00	43.50	58.15	-14.65	QP	
6		0.3860	23.60	11.00	34.60	48.15	-13.55	AVG	
7		4.4940	27.70	11.00	38.70	56.00	-17.30	QP	
8		4.4940	24.20	11.00	35.20	46.00	-10.80	AVG	
9		4.9460	29.70	11.00	40.70	56.00	-15.30	QP	
10		4.9460	25.50	11.00	36.50	46.00	-9.50	AVG	
11		5.5240	14.10	11.00	25.10	60.00	-34.90	QP	
12		5.5240	27.40	11.00	38.40	50.00	-11.60	AVG	



Site site #1 Phase: *L1* Temperature: 24
Limit: (CE)FCC PART 15_Class B Power: AC 120V/60Hz Humidity: 56 %
Mode: Charging
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1940	48.10	11.00	59.10	63.86	-4.76	QP	
2		0.1940	35.80	11.00	46.80	53.86	-7.06	AVG	
3		0.2580	41.50	11.00	52.50	61.50	-9.00	QP	
4		0.2580	29.10	11.00	40.10	51.50	-11.40	AVG	
5		0.4500	29.60	11.00	40.60	56.88	-16.28	QP	
6		0.4500	24.90	11.00	35.90	46.88	-10.98	AVG	
7		4.3780	21.80	11.00	32.80	56.00	-23.20	QP	
8		4.3780	23.30	11.00	34.30	46.00	-11.70	AVG	
9		4.8300	30.90	11.00	41.90	56.00	-14.10	QP	
10		4.8300	25.40	11.00	36.40	46.00	-9.60	AVG	
11		5.6040	34.70	11.00	45.70	60.00	-14.30	QP	
12		5.6040	27.30	11.00	38.30	50.00	-11.70	AVG	

5. Radiated Emission Test

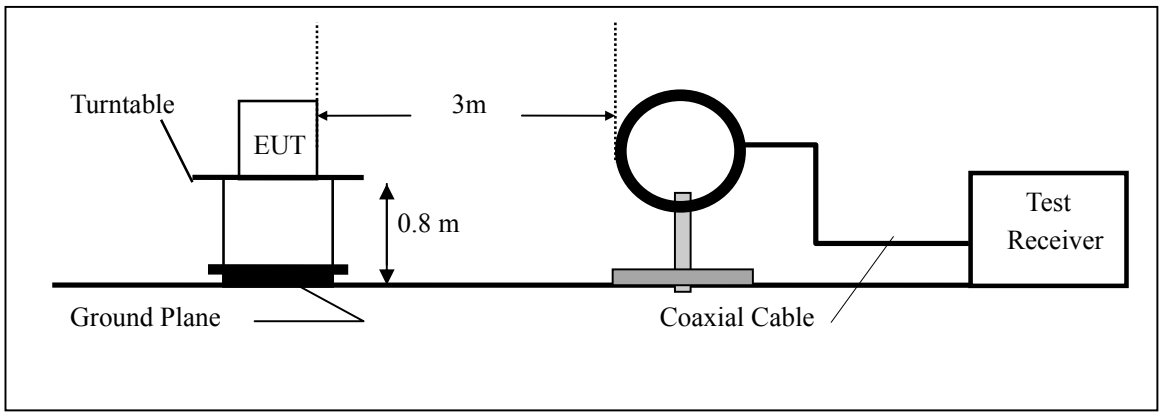
5.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

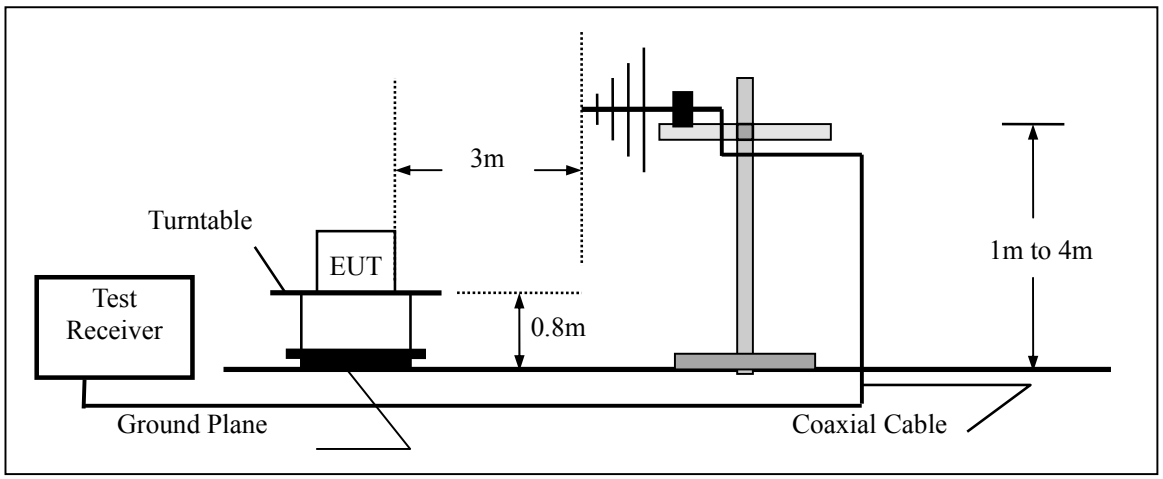
The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector (RBW=100kHz, VBW=300kHz) and all final readings of measurement from Test Receiver are Quasi-Peak values(Quasi Peak detector used with a bandwidth of 120 kHz).
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

5.2 Test SET-UP (Block Diagram of Configuration)

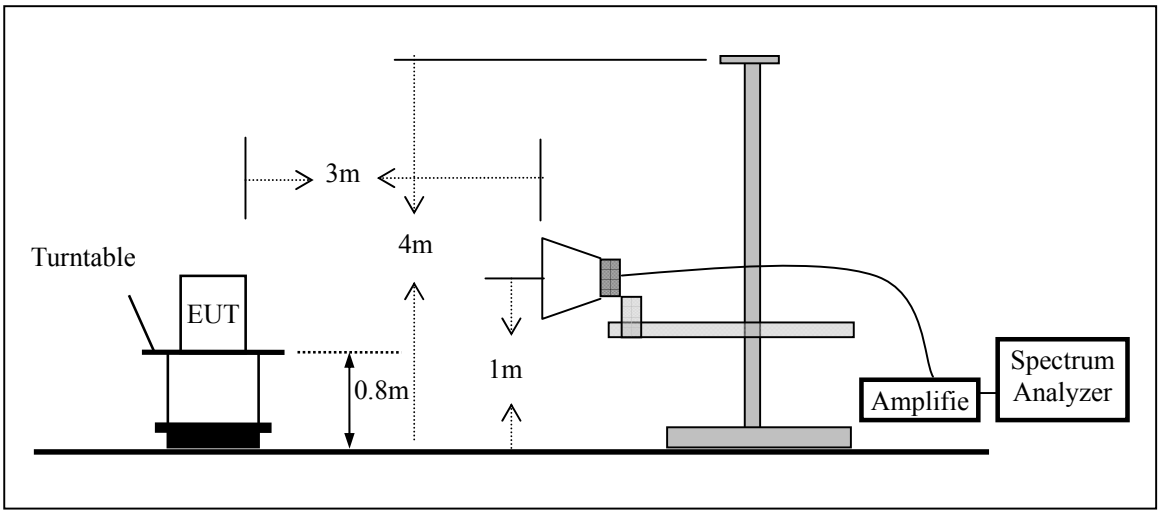
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



5.3 Measurement Equipment Used

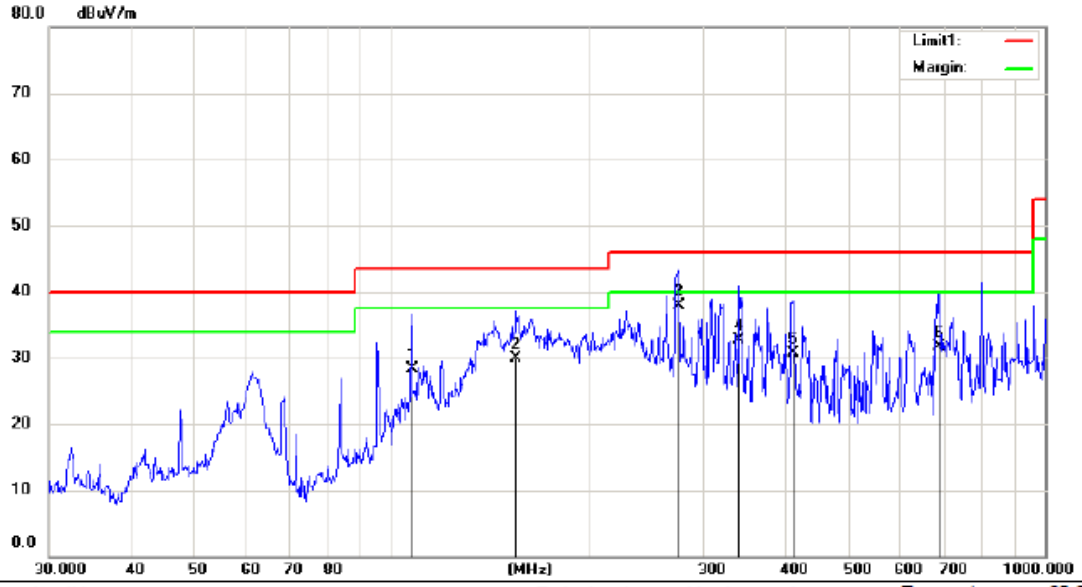
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/17/2014	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	05/17/2014	1 Year
3.	Pre-Amplifier	A.H.	PAM-0126	1415261	05/17/2014	1 Year
4.	Bilog Antenna	Schwarzbeck	VULB9163	142	05/17/2014	1 Year
5.	Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	05/17/2014	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/17/2014	1 Year
7.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/17/2014	1 Year
8.	Cable	Schwarzbeck	AK9513	ACRX1	05/17/2014	1 Year
9.	Cable	Rosenberger	N/A	FP2RX2	05/17/2014	1 Year
10.	Cable	Schwarzbeck	AK9513	CRPX1	05/17/2014	1 Year
11.	Cable	Schwarzbeck	AK9513	CRRX2	05/17/2014	1 Year

5.4 Measurement Result

(For range 9KHz~30MHz, The measured value is really too low to be recorded.)

Below 1000MHz:

Charging Mode:



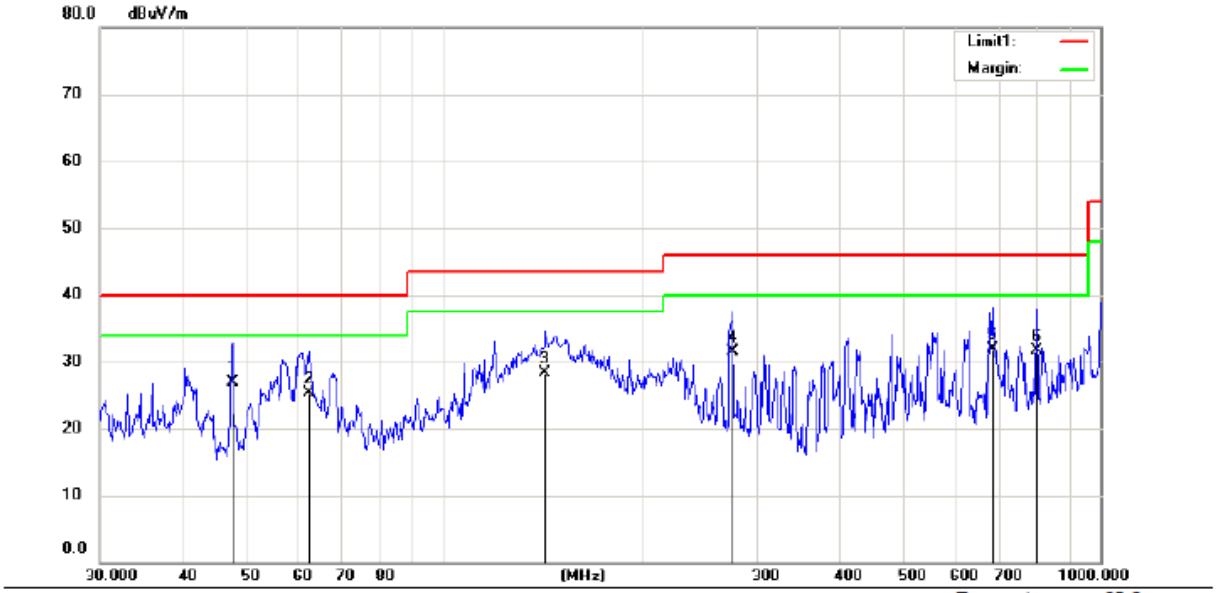
Site site #1 Polarization: *Horizontal* Temperature: 25 C

Limit: FCC 15.247 Power: AC 120V/60Hz Humidity: 54 %

Mode:Charging

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		107.5100	49.80	-21.40	28.40	43.50	-15.10	QP			
2		155.3643	54.47	-24.47	30.00	43.50	-13.50	QP			
3	*	275.1570	56.76	-18.76	38.00	46.00	-8.00	QP			
4		340.7816	49.40	-16.60	32.80	46.00	-13.20	QP			
5		411.8240	45.64	-14.94	30.70	46.00	-15.30	QP			
6		689.5644	41.34	-9.64	31.70	46.00	-14.30	QP			



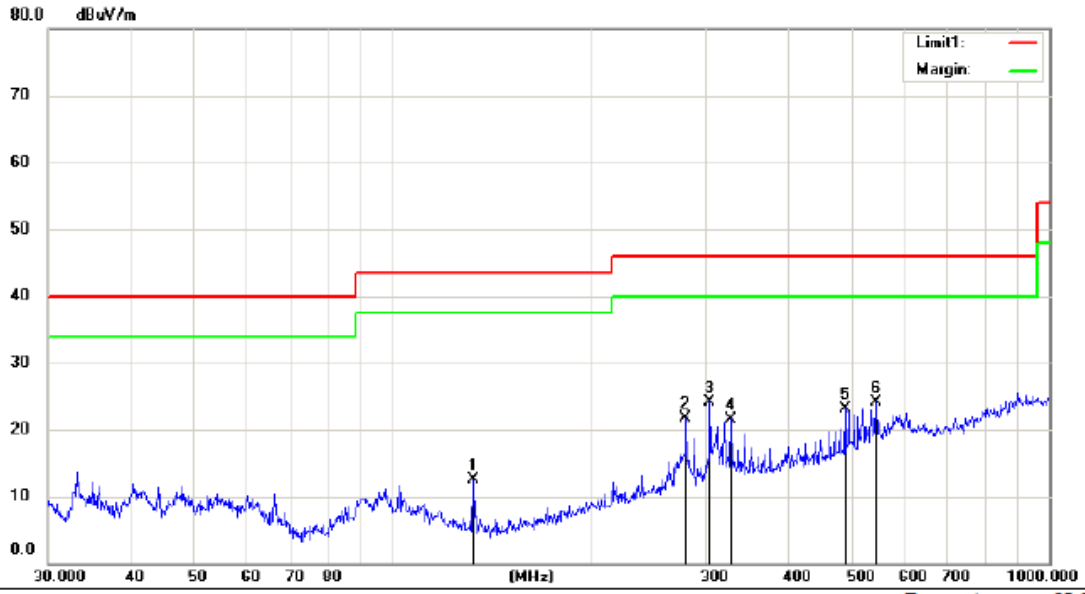
Site site #1
Limit: FCC 15.247
Mode:Charging
Note:

Polarization: *Vertical*
Power: AC 120V/50Hz

Temperature: 25 C
Humidity: 54 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	47.6586	47.83	-20.93	26.90	40.00	-13.10	QP			
2		62.2128	47.73	-22.33	25.40	40.00	-14.60	QP			
3		142.8243	53.40	-25.00	28.40	43.50	-15.10	QP			
4		276.1235	50.22	-18.72	31.50	46.00	-14.50	QP			
5		684.7454	41.66	-9.66	32.00	46.00	-14.00	QP			
6		801.7863	39.01	-7.21	31.80	46.00	-14.20	QP			

GFSK Mode: Low channel

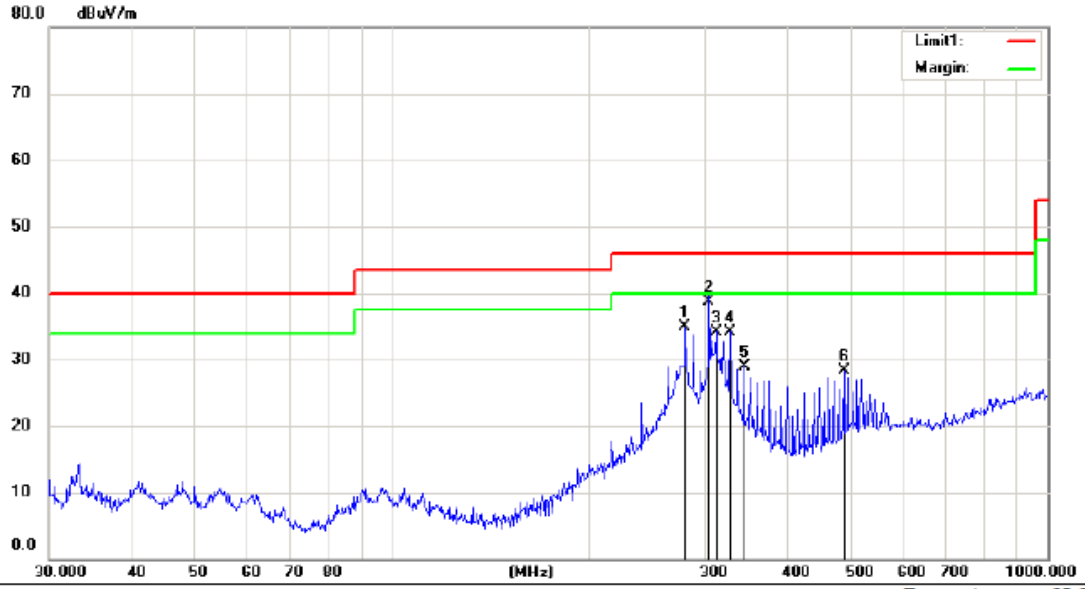


Site site #1
Limit: FCC 15.247
Mode:GFSK, LOW
Note:

Polarization: *Vertical*
Power: DC 3.7V

Temperature: 25 C
Humidity: 54 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		132.6850	37.23	-24.73	12.50	43.50	-31.00	QP			
2		280.0237	40.26	-18.56	21.70	46.00	-24.30	QP			
3	*	304.6100	42.06	-17.86	24.20	46.00	-21.80	QP			
4		327.8872	38.76	-17.16	21.60	46.00	-24.40	QP			
5		489.0268	36.24	-13.04	23.20	46.00	-22.80	QP			
6		545.1825	35.56	-11.46	24.10	46.00	-21.90	QP			



Site site #1
Limit: FCC 15.247
Mode:GFSK, LOW
Note:

Polarization: *Horizontal*
Power: DC 3.7V

Temperature: 25 C
Humidity: 54 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		280.0237	53.46	-18.56	34.90	46.00	-11.10	QP			
2	*	304.6100	56.56	-17.86	38.70	46.00	-7.30	QP			
3		312.1794	51.90	-17.70	34.20	46.00	-11.80	QP			
4		327.8873	51.36	-17.16	34.20	46.00	-11.80	QP			
5		344.3855	45.52	-16.52	29.00	46.00	-17.00	QP			
6		489.0270	41.34	-13.04	28.30	46.00	-17.70	QP			

Note: All the modulation modes were tested the data of the worst mode (GFSK, Low) are recorded in the following pages and all modulation methods do not exceed the limits.

Above 1000MHz:

Frequency Range:	1GHz~25GHz	Test Date :	07/15/2014
Measured Distance:	3m	Temperature :	24 ℃
Test Result:	PASS	Humidity :	53%
Test By:	KK		

Charging Mode							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
1136.218	V	44.96	29.93	73.90	53.90	-28.94	-23.97
1376.602	V	42.94	24.80	73.90	53.90	-30.96	-29.10
1681.090	V	42.20	23.94	73.90	53.90	-31.70	-29.96
4173.077	V	44.45	30.82	73.90	53.90	-29.45	-23.08
--	V	--	--	--	--	--	--
1104.167	H	44.80	26.52	73.90	53.90	-29.10	-27.38
1168.269	H	44.55	28.16	73.90	53.90	-29.35	-25.74
1472.756	H	45.05	27.10	73.90	53.90	-28.85	-26.80
4253.205	H	45.37	32.37	73.90	53.90	-28.53	-21.53
--	H	--	--	--	--	--	--

GFSK Mode: Low channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4804.000	V	61.11	45.41	74.00	54.00	-12.89	-8.59
6557.692	V	47.84	31.80	74.00	54.00	-26.16	-22.20
7206.000	V	58.13	42.15	74.00	54.00	-15.87	-11.85
8028.846	V	50.72	34.55	74.00	54.00	-23.28	-19.45
8491.987	V	50.04	32.86	74.00	54.00	-23.96	-21.14
9935.897	V	50.90	33.53	74.00	54.00	-23.10	-20.47
3615.385	H	46.09	29.05	74.00	54.00	-27.91	-24.95
4804.000	H	60.75	40.00	74.00	54.00	-13.25	-14.00
7206.000	H	57.83	41.74	74.00	54.00	-16.17	-12.26
8028.846	H	50.84	34.54	74.00	54.00	-23.16	-19.46
9799.679	H	52.52	35.58	74.00	54.00	-21.48	-18.42
14594.551	H	53.06	35.47	74.00	54.00	-20.94	-18.53

GFSK Mode: Middle channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
3179.487	V	41.24	23.32	74.00	54.00	-32.76	-30.68
4882.000	V	62.54	45.71	74.00	54.00	-11.46	-8.29
5086.538	V	46.34	28.10	74.00	54.00	-27.66	-25.90
7323.000	V	60.86	40.75	74.00	54.00	-13.14	-13.25
9254.808	V	52.05	33.34	74.00	54.00	-21.95	-20.66
9908.654	V	52.22	34.64	74.00	54.00	-21.78	-19.36
3615.385	H	46.45	28.65	74.00	54.00	-27.55	-25.35
4882.000	H	61.92	43.90	74.00	54.00	-12.08	-10.10
6639.423	H	49.54	31.46	74.00	54.00	-24.46	-22.54
7323.000	H	56.41	40.94	74.00	54.00	-17.59	-13.06
7919.872	H	52.01	33.69	74.00	54.00	-21.99	-20.31
9881.410	H	51.55	33.25	74.00	54.00	-22.45	-20.75

GFSK Mode: High channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
3479.167	V	43.34	25.41	74.00	54.00	-30.66	-28.59
4960.000	V	61.56	45.57	74.00	54.00	-12.44	-8.43
7440.000	V	58.95	43.53	74.00	54.00	-15.05	-10.47
9799.679	V	51.81	33.97	74.00	54.00	-22.19	-20.03
11379.808	V	51.53	33.15	74.00	54.00	-22.47	-20.85
14403.846	V	53.00	34.77	74.00	54.00	-21.00	-19.23
4960.000	H	60.11	44.41	74.00	54.00	-13.89	-9.59
6557.692	H	47.84	31.80	74.00	54.00	-26.16	-22.20
7440.000	H	58.13	42.15	74.00	54.00	-15.87	-11.85
8028.846	H	50.72	34.55	74.00	54.00	-23.28	-19.45
8491.987	H	50.04	32.86	74.00	54.00	-23.96	-21.14
9935.897	H	50.90	33.53	74.00	54.00	-23.10	-20.47

π/4-DQPSK Mode: Low channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
3179.487	V	41.24	23.32	74.00	54.00	-32.76	-30.68
4804.000	V	58.54	43.71	74.00	54.00	-15.46	-10.29
5086.538	V	46.34	28.10	74.00	54.00	-27.66	-25.90
7206.000	V	54.86	34.75	74.00	54.00	-19.14	-19.25
9254.808	V	52.05	33.34	74.00	54.00	-21.95	-20.66
9908.654	V	52.22	34.64	74.00	54.00	-21.78	-19.36
3615.385	H	46.45	28.65	74.00	54.00	-27.55	-25.35
4804.000	H	61.92	42.33	74.00	54.00	-12.08	-11.67
6639.423	H	49.54	31.46	74.00	54.00	-24.46	-22.54
7206.000	H	53.41	39.94	74.00	54.00	-20.59	-14.06
7919.872	H	52.01	33.69	74.00	54.00	-21.99	-20.31
9881.410	H	51.55	33.25	74.00	54.00	-22.45	-20.75

π/4-DQPSK Mode: Middle channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4882.000	V	56.11	40.41	74.00	54.00	-17.89	-13.59
6557.692	V	47.84	31.80	74.00	54.00	-26.16	-22.20
7323.000	V	52.13	36.15	74.00	54.00	-21.87	-17.85
8028.846	V	50.72	34.55	74.00	54.00	-23.28	-19.45
8491.987	V	50.04	32.86	74.00	54.00	-23.96	-21.14
9935.897	V	50.90	33.53	74.00	54.00	-23.10	-20.47
3615.385	H	46.09	29.05	74.00	54.00	-27.91	-24.95
4882.000	H	58.75	40.00	74.00	54.00	-15.25	-14.00
7323.000	H	52.83	37.74	74.00	54.00	-21.17	-16.26
8028.846	H	50.84	34.54	74.00	54.00	-23.16	-19.46
9799.679	H	52.52	35.58	74.00	54.00	-21.48	-18.42
14594.551	H	53.06	35.47	74.00	54.00	-20.94	-18.53

π/4-DQPSK Mode: High channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
3615.385	V	45.73	27.55	74.00	54.00	-28.27	-26.45
4960.000	V	59.20	41.50	74.00	54.00	-14.80	-12.50
5958.333	V	47.16	28.87	74.00	54.00	-26.84	-25.13
7440.000	V	57.67	38.64	74.00	54.00	-16.33	-15.36
9336.538	V	51.92	34.14	74.00	54.00	-22.08	-19.86
9799.679	V	51.54	34.08	74.00	54.00	-22.46	-19.92
4960.000	H	61.06	42.31	74.00	54.00	-12.94	-11.69
6394.231	H	47.80	30.46	74.00	54.00	-26.20	-23.54
7440.000	H	55.69	38.15	74.00	54.00	-18.31	-15.85
8628.205	H	51.43	34.89	74.00	54.00	-22.57	-19.11
9990.385	H	50.80	33.01	74.00	54.00	-23.20	-20.99
14621.795	H	51.68	33.91	74.00	54.00	-22.32	-20.09

8DPSK Mode: Low channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4804.000	V	62.35	43.92	74.00	54.00	-11.65	-10.08
7206.000	V	57.80	38.29	74.00	54.00	-16.20	-15.71
11189.103	V	52.28	33.80	74.00	54.00	-21.72	-20.20
12823.718	V	53.32	34.16	74.00	54.00	-20.68	-19.84
14866.987	V	53.82	34.98	74.00	54.00	-20.18	-19.02
17264.423	V	53.02	33.86	74.00	54.00	-20.98	-20.14
4804.000	H	60.73	41.80	74.00	54.00	-13.27	-12.20
7206.000	H	55.35	37.08	74.00	54.00	-18.65	-16.92
9854.167	H	53.21	33.95	74.00	54.00	-20.79	-20.05
12987.179	H	53.16	34.50	74.00	54.00	-20.84	-19.50
14594.551	H	53.59	34.13	74.00	54.00	-20.41	-19.87
16556.090	H	52.57	33.58	74.00	54.00	-21.43	-20.42

8DPSK Mode: Middle channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4882.000	V	62.00	43.56	74.00	54.00	-12.00	-10.44
7323.000	V	56.58	39.73	74.00	54.00	-17.42	-14.27
10916.667	V	52.38	32.54	74.00	54.00	-21.62	-21.46
14540.064	V	53.20	34.65	74.00	54.00	-20.80	-19.35
16419.872	V	52.74	33.47	74.00	54.00	-21.26	-20.53
17972.756	V	53.62	34.59	74.00	54.00	-20.38	-19.41
4882.000	H	61.46	43.42	74.00	54.00	-12.54	-10.58
7323.000	H	57.71	40.03	74.00	54.00	-16.29	-13.97
12959.936	H	52.77	33.77	74.00	54.00	-21.23	-20.23
14512.821	H	54.13	34.83	74.00	54.00	-19.87	-19.17
16528.846	H	52.56	33.73	74.00	54.00	-21.44	-20.27
17972.756	H	52.60	34.59	74.00	54.00	-21.40	-19.41

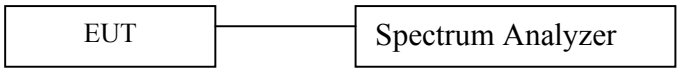
8DPSK Mode: High channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
1381.410	V	47.70	28.63	74.00	54.00	-26.30	-25.37
4960.000	V	60.17	40.90	74.00	54.00	-13.83	-13.10
7440.000	V	55.84	38.89	74.00	54.00	-18.16	-15.11
10508.013	V	51.61	32.82	74.00	54.00	-22.39	-21.18
13423.077	V	52.92	33.48	74.00	54.00	-21.08	-20.52
16746.795	V	52.01	32.75	74.00	54.00	-21.99	-21.25
4960.000	H	60.17	41.63	74.00	54.00	-13.83	-12.37
6584.936	H	50.75	31.56	74.00	54.00	-23.25	-22.44
7440.000	H	56.54	39.70	74.00	54.00	-17.46	-14.30
10072.115	H	52.46	33.93	74.00	54.00	-21.54	-20.07
14458.333	H	52.70	34.06	74.00	54.00	-21.30	-19.94
17972.756	H	51.69	33.69	74.00	54.00	-22.31	-20.31

6. Channel Separation Test

6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print out the test result from the spectrum by hard copy function.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/02/2013	08/01/2014

6.4 Measurement Results

The following table is the setting of spectrum analyzer.

Attenuation	Auto
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max hold

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	07/01/2014
Test By:	Jary	Temperature :	20 ℃
Test Result:	PASS	Humidity :	55 %

GFSK Mode:

Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 20dB Down BW(kHz)
Low Channel	2402	1000.00	846
Adjacency Channel	2403		
Middle channel	2441	1000.00	840
Adjacency Channel	2440		
High Channel	2480	1000.00	864
Adjacency Channel	2479		

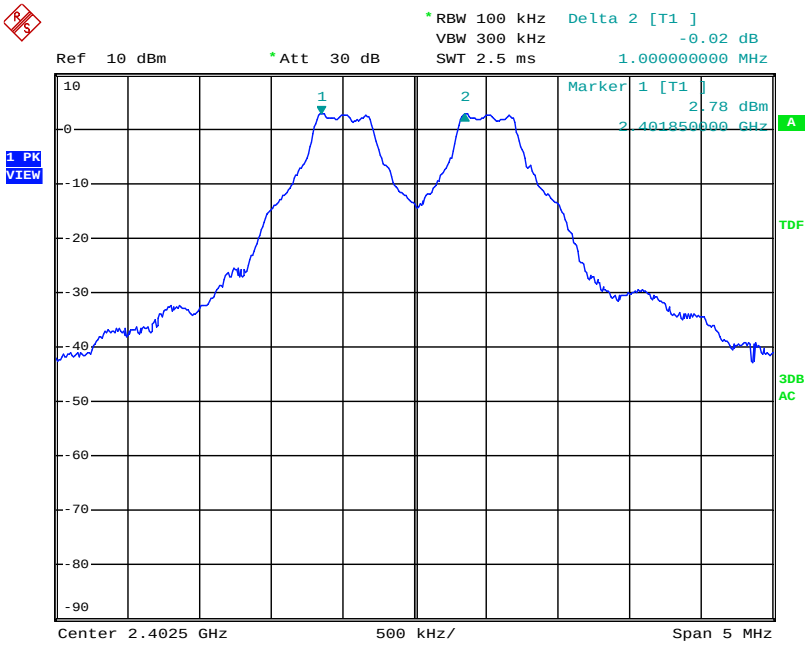
π/4-DQPSK Mode

Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW(kHz)
Low Channel	2402	1000.00	>816 kHz
Adjacency Channel	2403		
Middle channel	2441	1000.00	>816 kHz
Adjacency Channel	2440		
High Channel	2480	1000.00	>812 kHz
Adjacency Channel	2479		

8DPSK Mode:

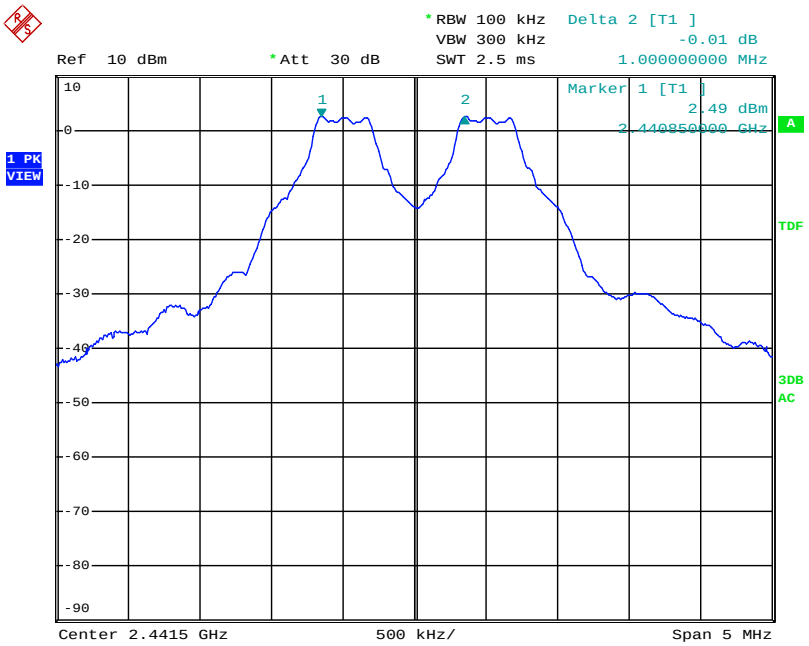
Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3 20dB Down BW(kHz)
Low Channel	2402	1000.00	>812 kHz
Adjacency Channel	2403		
Middle channel	2441	1000.00	>808 kHz
Adjacency Channel	2440		
High Channel	2480	1000.00	>808 kHz
Adjacency Channel	2479		

GFSK Mode: Low channel



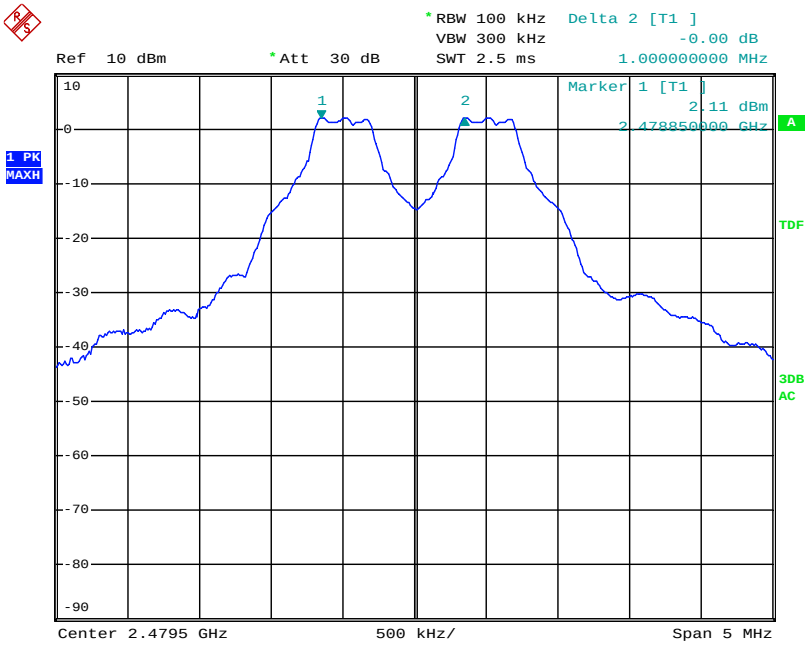
Date: 1.JUL.2014 08:48:47

GFSK Mode: Middle channel



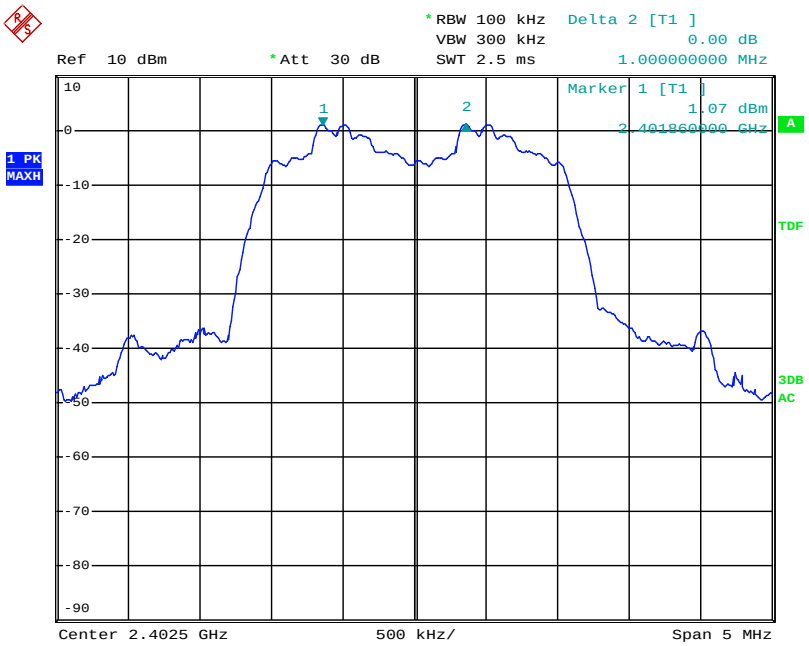
Date: 1.JUL.2014 08:53:42

GFSK Mode: High channel



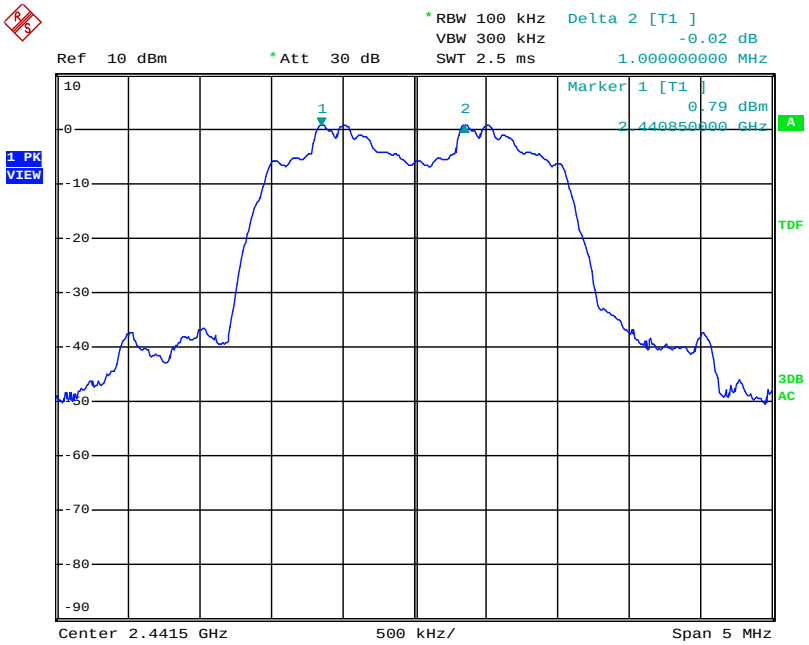
Date: 1.JUL.2014 08:56:55

π/4-DQPSK Mode: Low channel



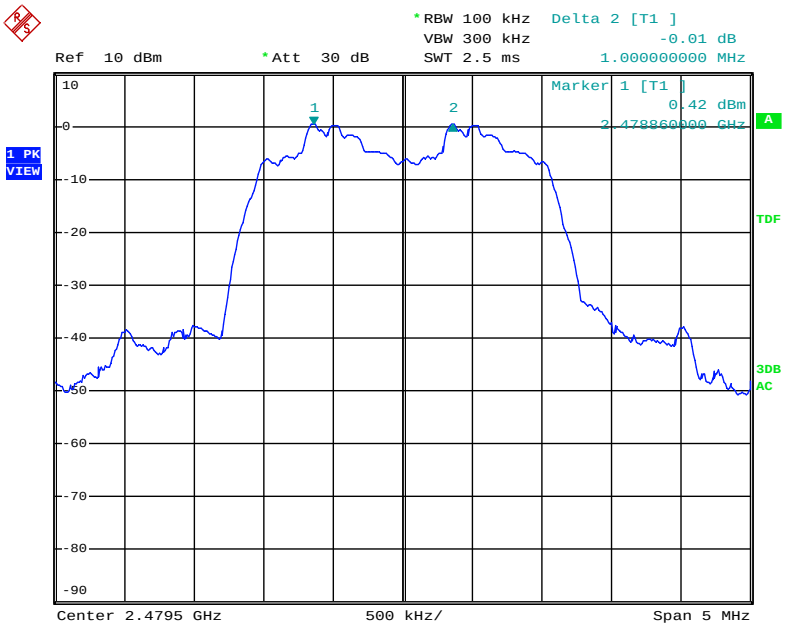
Date: 1.JUL.2014 09:00:49

π/4-DQPSK Mode: Middle channel



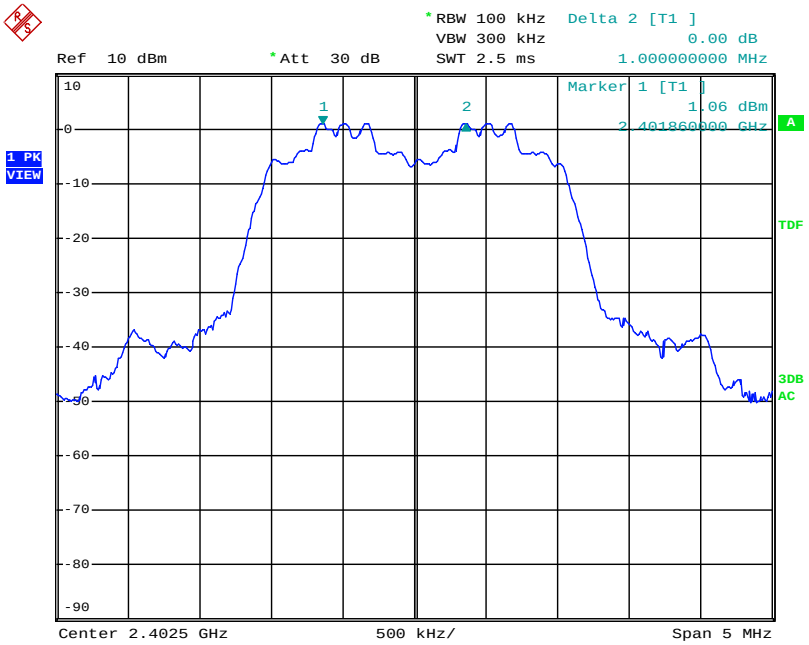
Date: 1.JUL.2014 09:03:12

π/4-DQPSK Mode: High channel



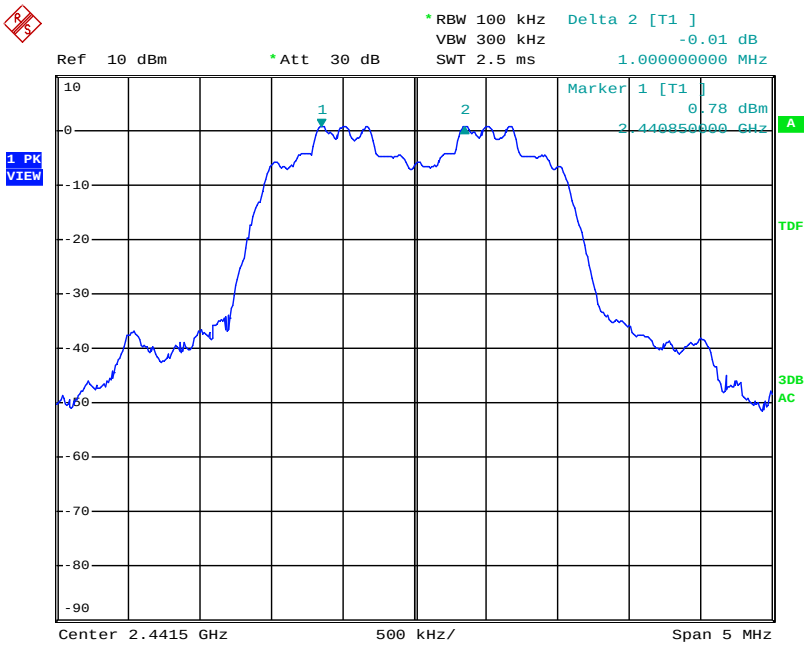
Date: 1.JUL.2014 09:04:43

8DPSK Mode: Low channel



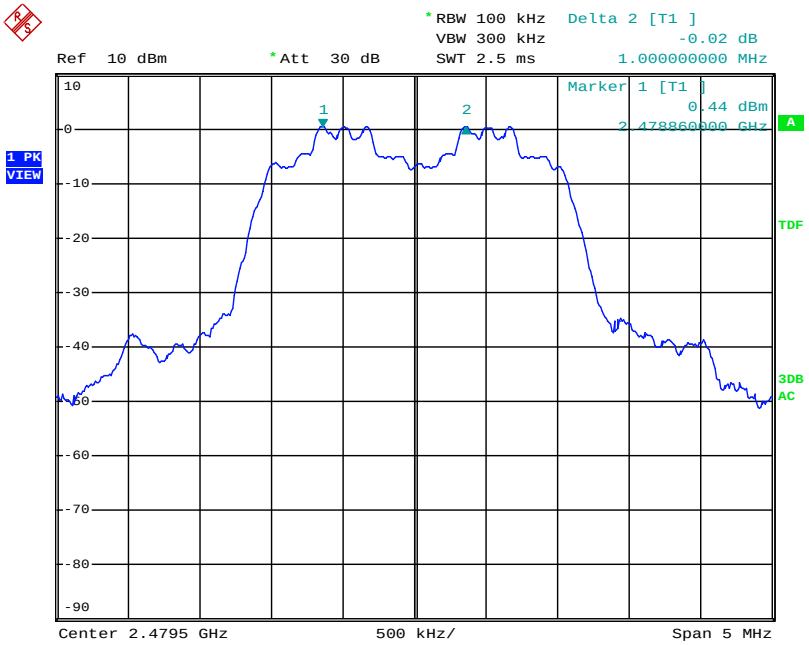
Date: 1.JUL.2014 09:10:54

8DPSK Mode: Middle channel



Date: 1.JUL.2014 09:08:52

8DPSK Mode: High channel



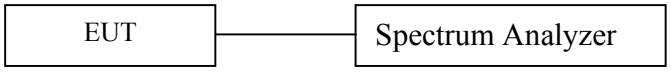
Date: 1.JUL.2014 09:07:20

7. Bandwidth Test

7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print out the test result from the spectrum by hard copy function.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/02/2013	08/01/2014

7.4 Measurement Results

The following table is the setting of spectrum analyzer.

Attenuation	Auto
SPAN	3MHz
RB	30KHz
VB	100KHz
Detector	Peak
Trace	Max hold

20dB Bandwidth test data Chart:
Refer to attached data chart.

Spectrum Detector:	PK	Test Date:	07/01/2014
Test By:	Jary	Temperature:	20 ℃
Test Result:	N/A	Humidity:	55 %

GFSK Mode:

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	846
Middle channel	2441	840
High channel	2480	864

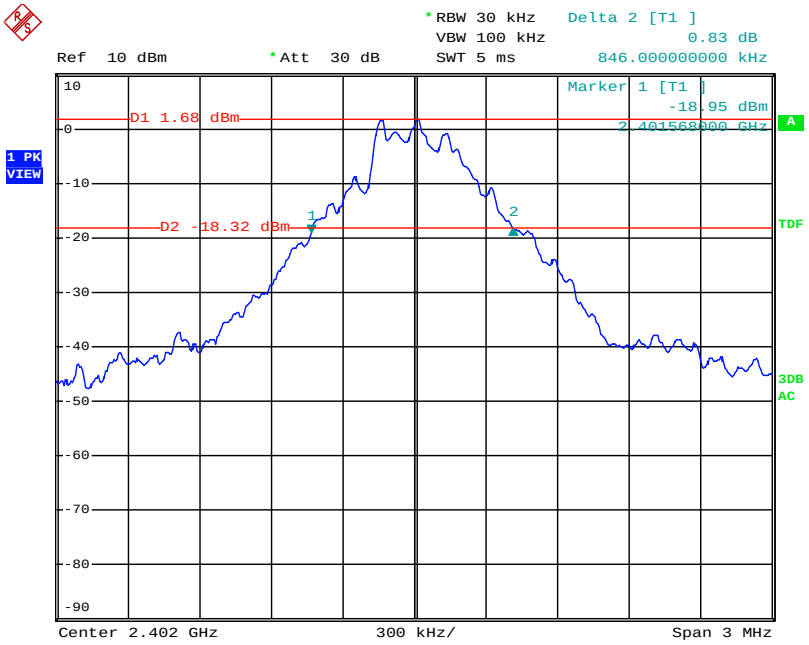
π/4-DQPSK Mode:

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	1224
Middle channel	2441	1224
High channel	2480	1218

8DPSK Mode:

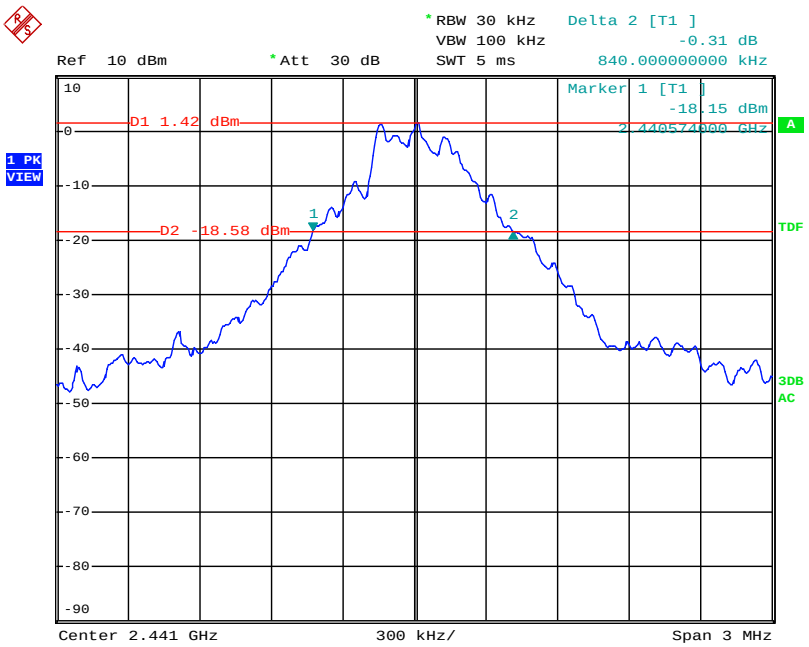
Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	1218
Middle channel	2441	1212
High channel	2480	1212

GFSK Mode: Low channel



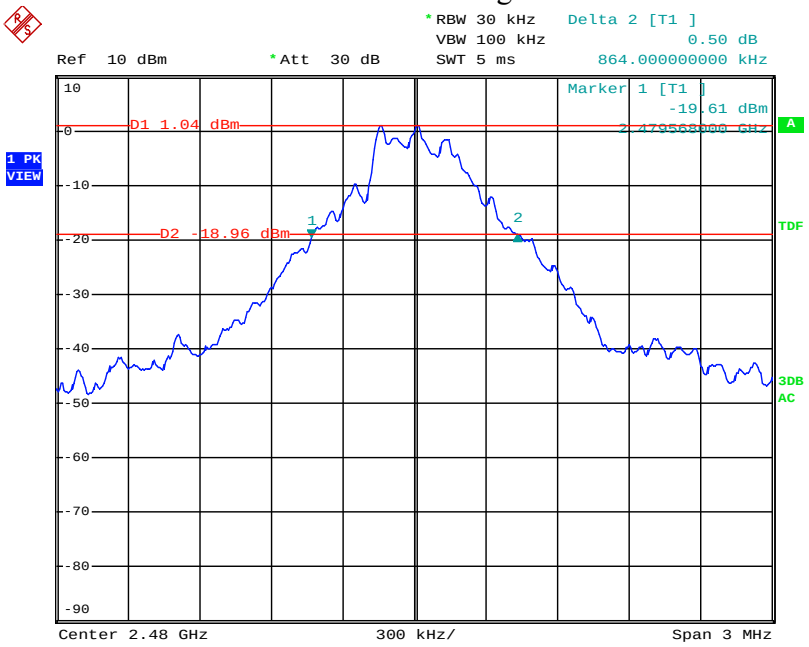
Date: 1.JUL.2014 09:20:44

GFSK Mode: Middle channel



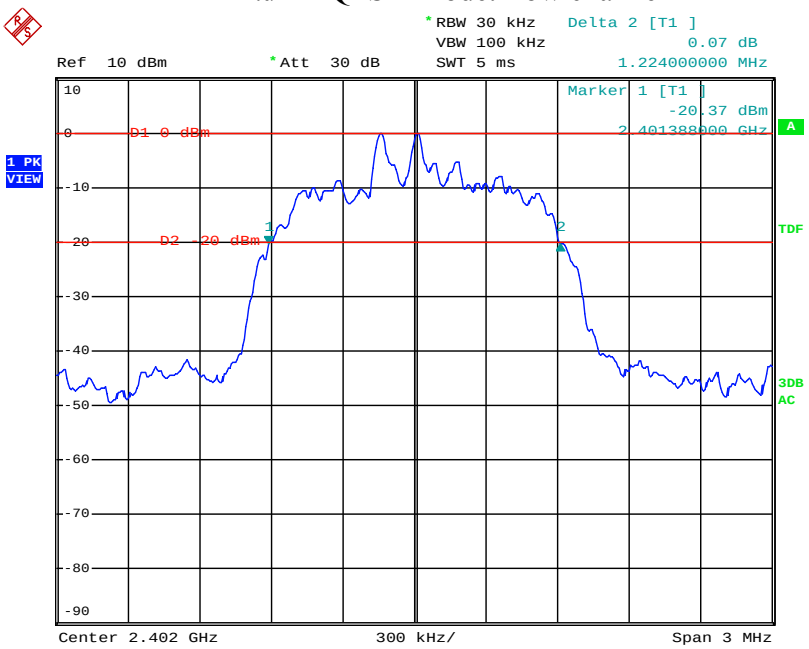
Date: 1.JUL.2014 09:18:43

GFSK Mode: High channel



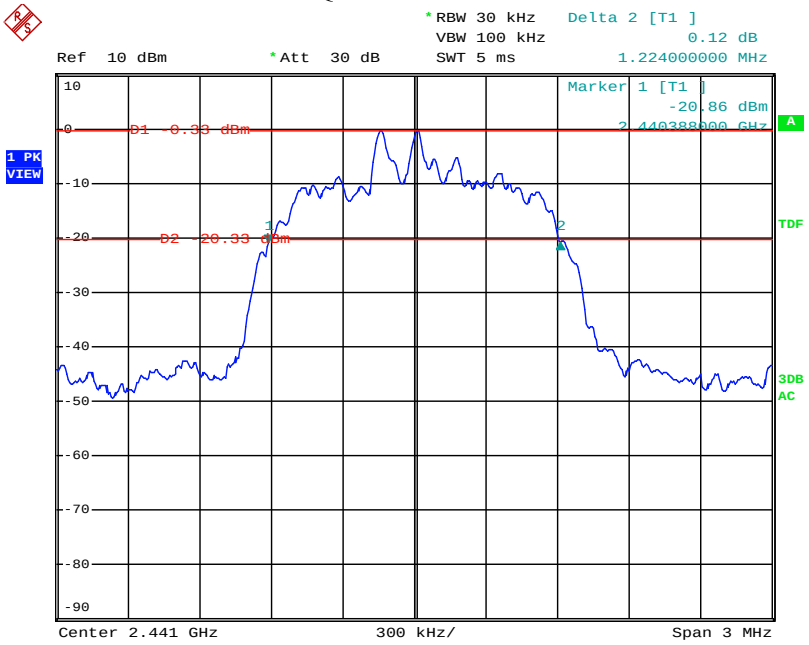
Date: 1.JUL.2014 09:22:52

π/4-DQPSK Mode: Low channel



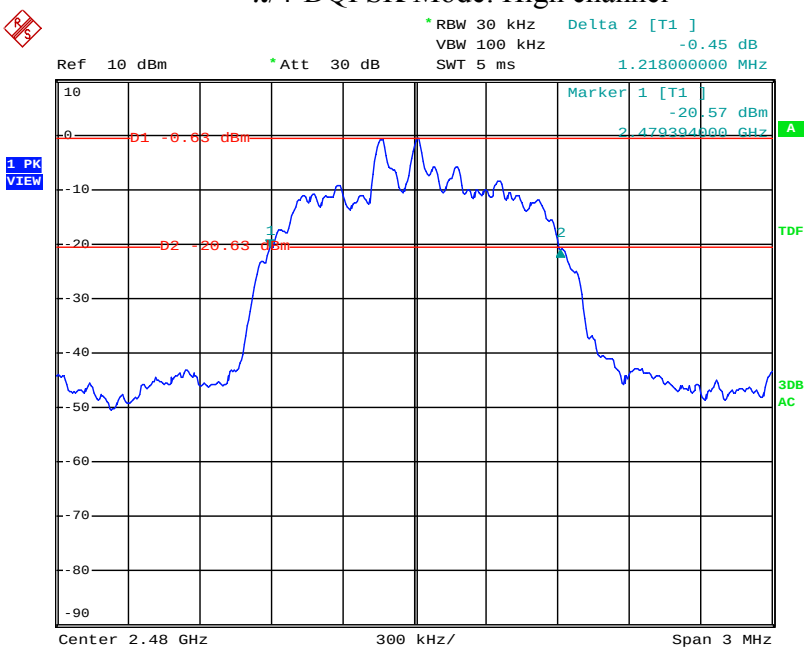
Date: 1.JUL.2014 09:29:43

π/4-DQPSK Mode: Middle channel



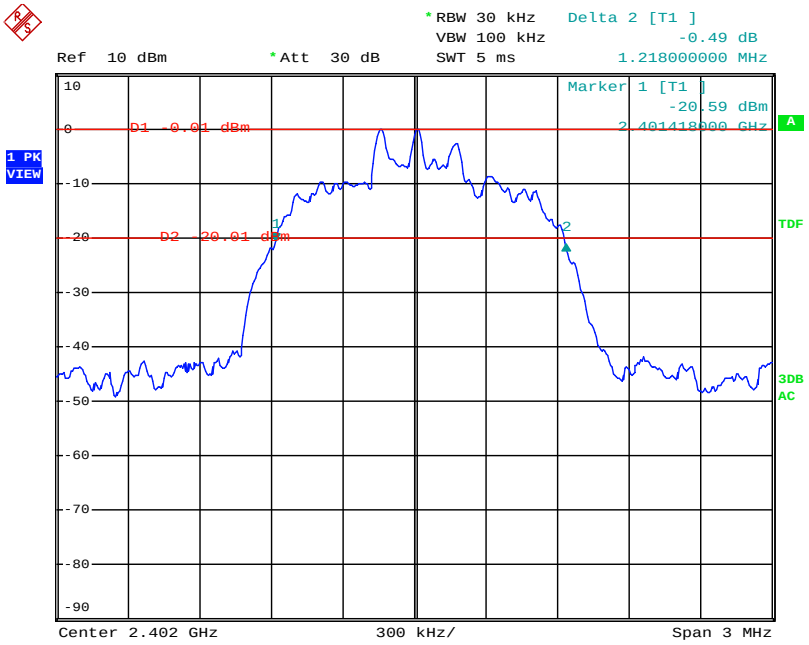
Date: 1.JUL.2014 09:27:47

π/4-DQPSK Mode: High channel



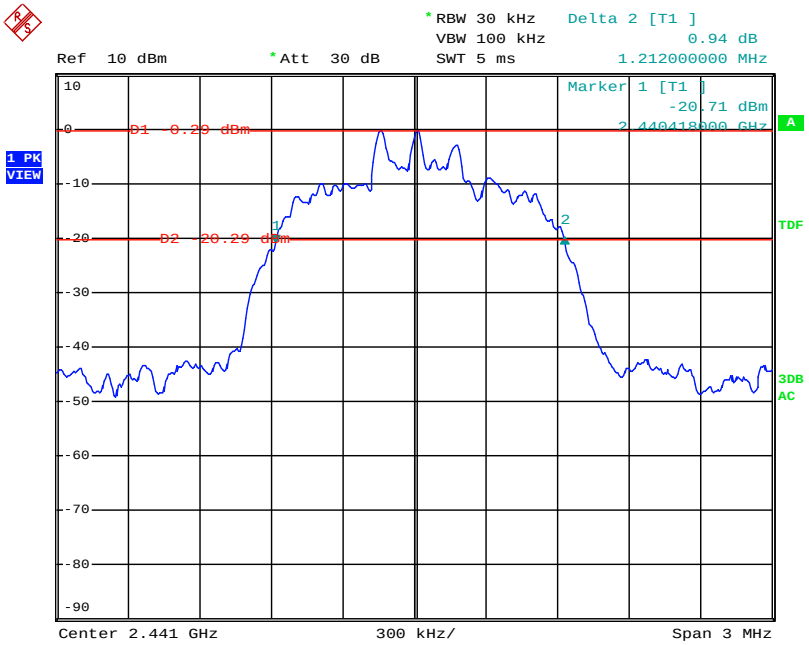
Date: 1.JUL.2014 09:25:43

8DPSK Mode: Low channel



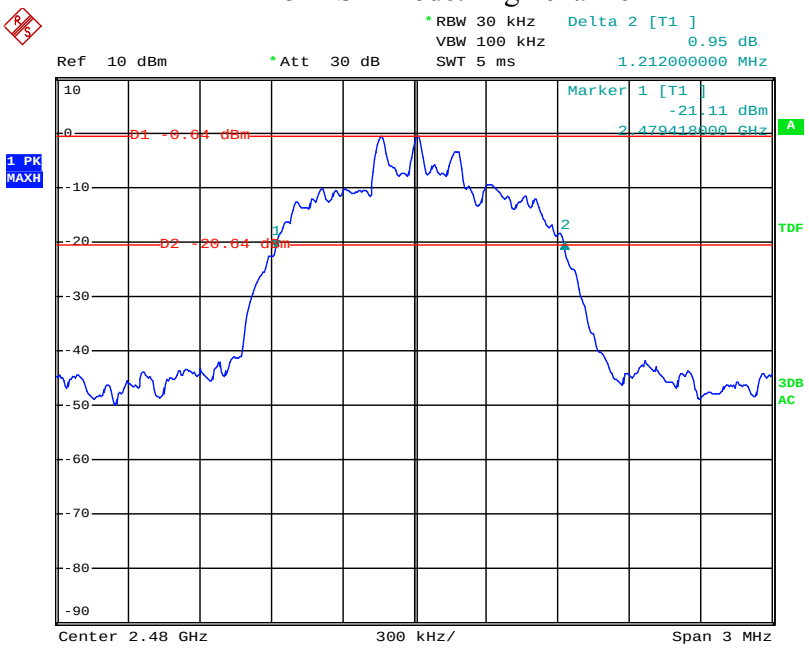
Date: 1.JUL.2014 09:31:35

8DPSK Mode: Middle channel



Date: 1.JUL.2014 09:33:38

8DPSK Mode: High channel

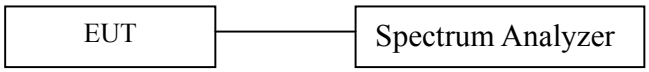


8. Quantity of Hopping Channel Test

8.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print out the test result from the spectrum by hard copy function.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/02/2013	08/01/2014

8.4 Measurement Results

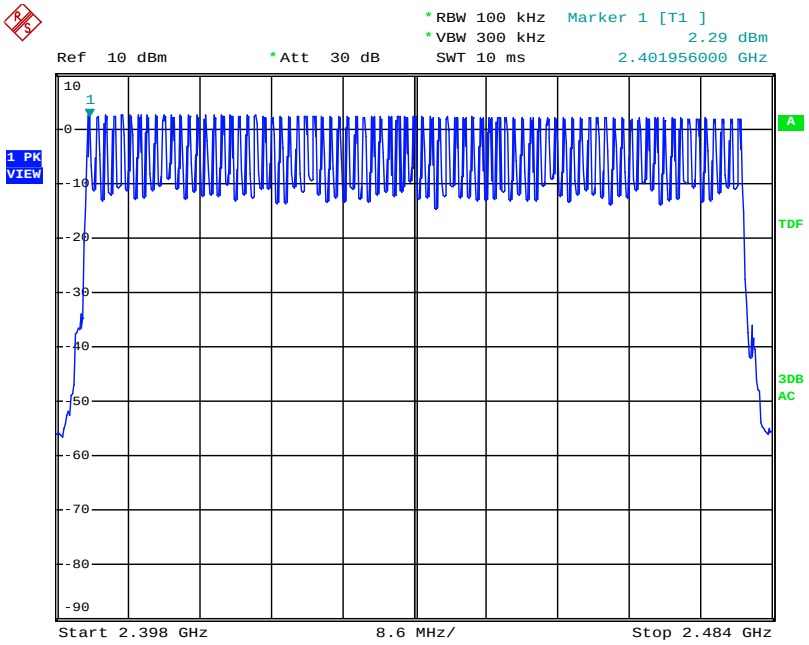
Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	07/02/2014
Test By:	Jary	Temperature :	22 ℃
Test Result:	PASS	Humidity :	56 %

GFSK Mode, π/4-DQPSK Mode, 8DPSK Mode:

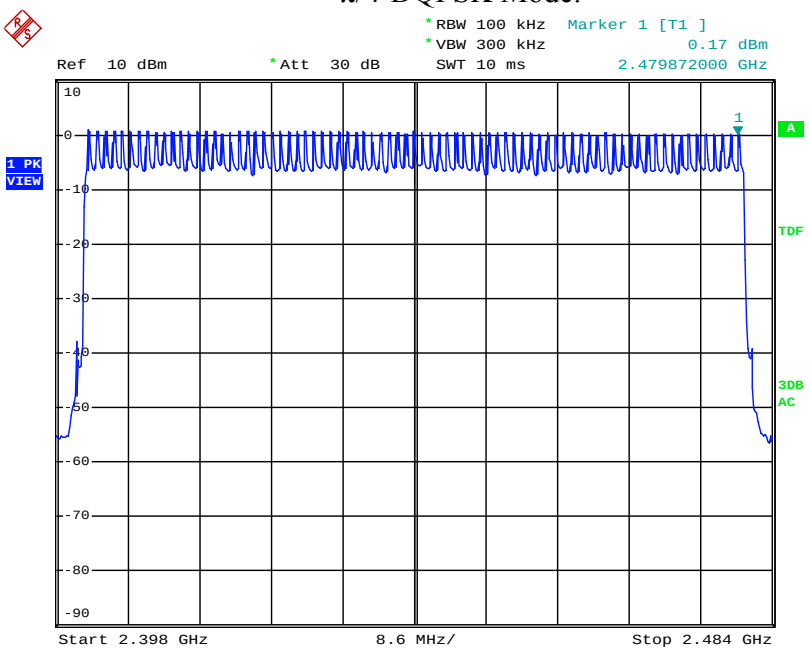
Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel limit
2402-2480	79	>15

GFSK Mode:



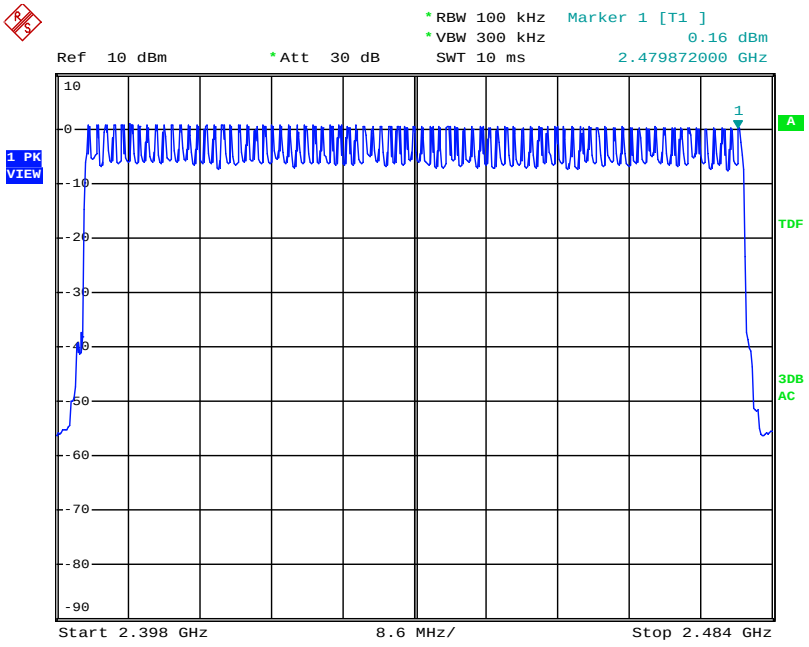
Date: 2.JUL.2014 03:04:18

π/4-DQPSK Mode:



Date: 2.JUL.2014 03:09:06

8DPSK Mode:



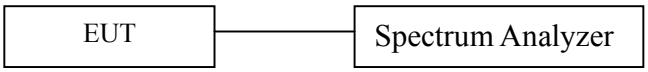
Date: 2.JUL.2014 02:59:39

9. Time of Occupancy (Dwell Time) Test

9.1 Measurement Procedure

a. Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

9.2 Test SET-UP (Block Diagram of Configuration)



9.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/02/2013	08/01/2014

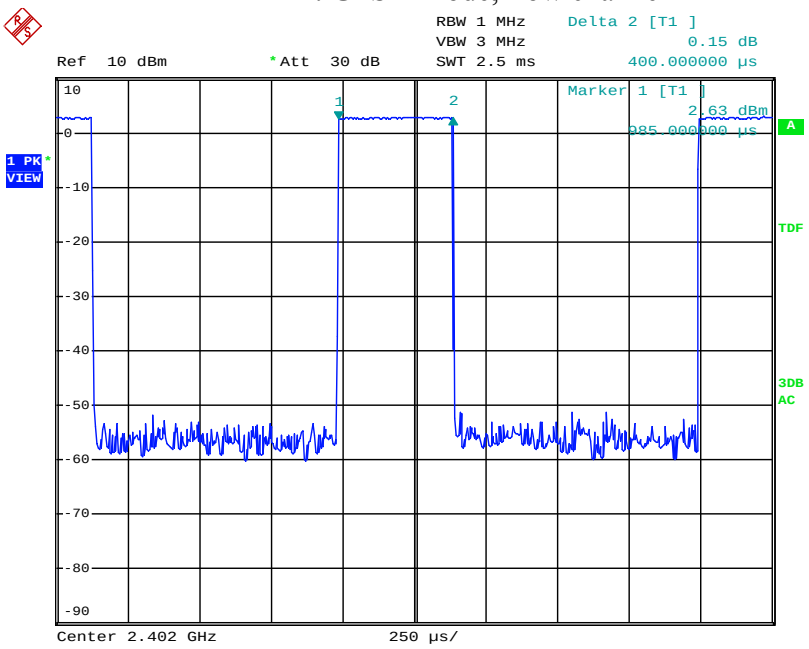
9.4 Measurement Results

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	07/01/2013
Test By:	Jary	Temperature :	20 ℃
Test Result:	PASS	Humidity :	55 %

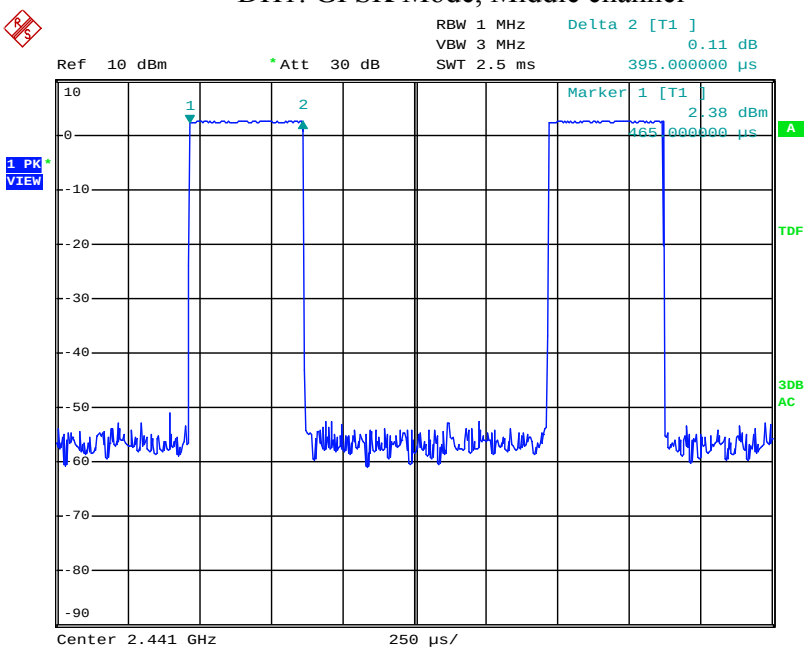
Mode	Channel	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
GFSK Mode					
DH1	Low channel	0.400	128.0	400	Pass
	Middle channel	0.395	126.4	400	Pass
	High channel	0.400	128.0	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH3	Low channel	1.660	265.6	400	Pass
	Middle channel	1.660	265.6	400	Pass
	High channel	1.650	264.0	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH5	Low channel	2.920	311.5	400	Pass
	Middle channel	2.900	309.3	400	Pass
	High channel	2.920	311.5	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				
π/4-DQPSK Mode					
2DH1	Low channel	0.405	129.6	400	Pass
	Middle channel	0.405	129.6	400	Pass
	High channel	0.410	131.2	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
2DH3	Low channel	1.660	265.6	400	Pass
	Middle channel	1.660	265.6	400	Pass
	High channel	1.650	264.0	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
2DH5	Low channel	2.920	311.5	400	Pass
	Middle channel	2.920	311.5	400	Pass
	High channel	2.920	311.5	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				
8DPSK Mode					
3DH1	Low channel	0.410	131.2	400	Pass
	Middle channel	0.410	131.2	400	Pass
	High channel	0.410	131.2	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
3DH3	Low channel	1.650	264.0	400	Pass
	Middle channel	1.660	265.6	400	Pass
	High channel	1.650	264.0	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
3DH5	Low channel	2.910	310.4	400	Pass
	Middle channel	2.910	310.4	400	Pass
	High channel	2.910	310.4	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

DH1: GFSK Mode, Low channel



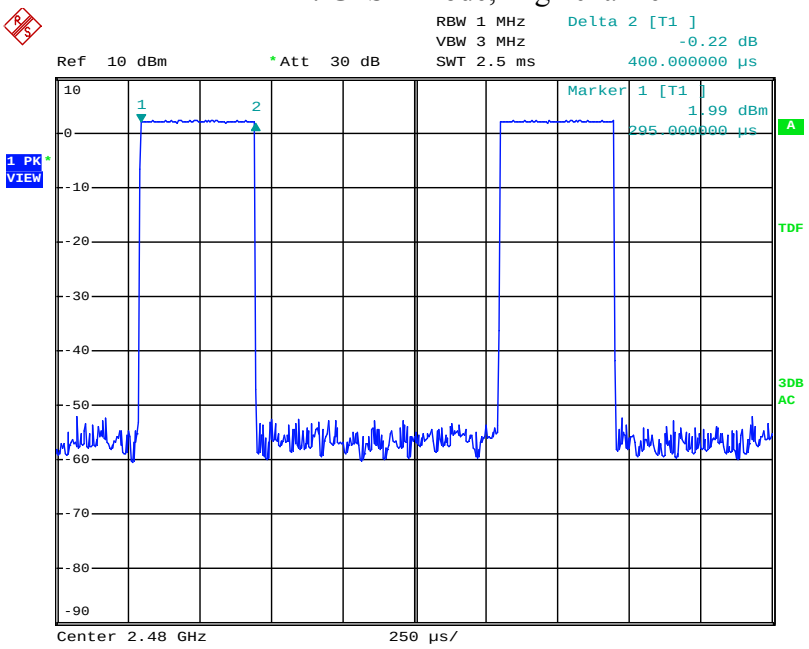
Date: 1.JUL.2014 09:37:45

DH1: GFSK Mode, Middle channel



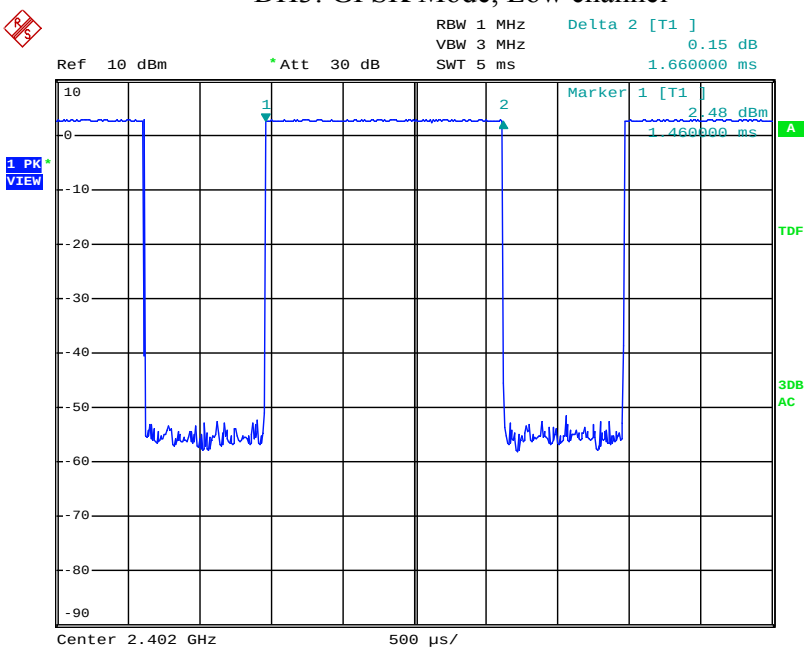
Date: 1.JUL.2014 09:39:05

DH1: GFSK Mode, High channel



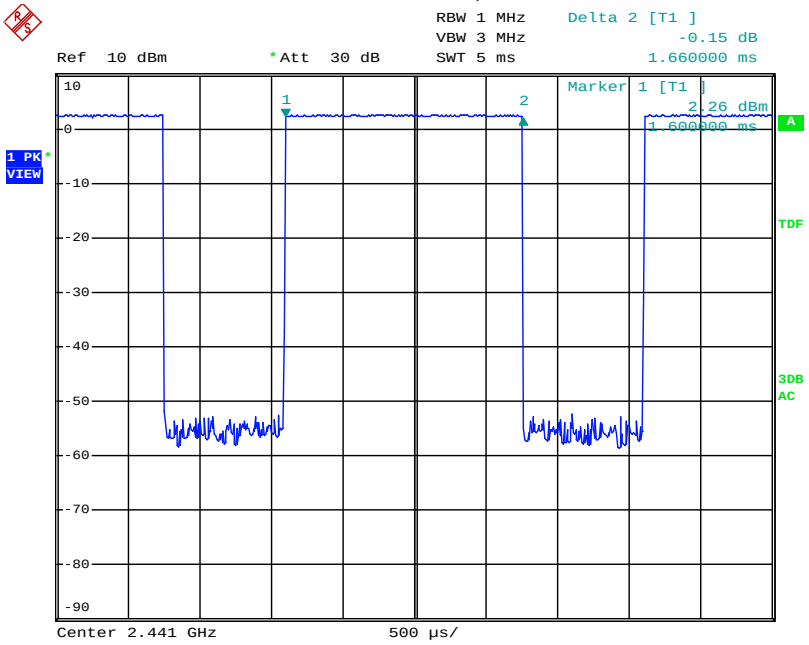
Date: 1.JUL.2014 09:40:10

DH3: GFSK Mode, Low channel



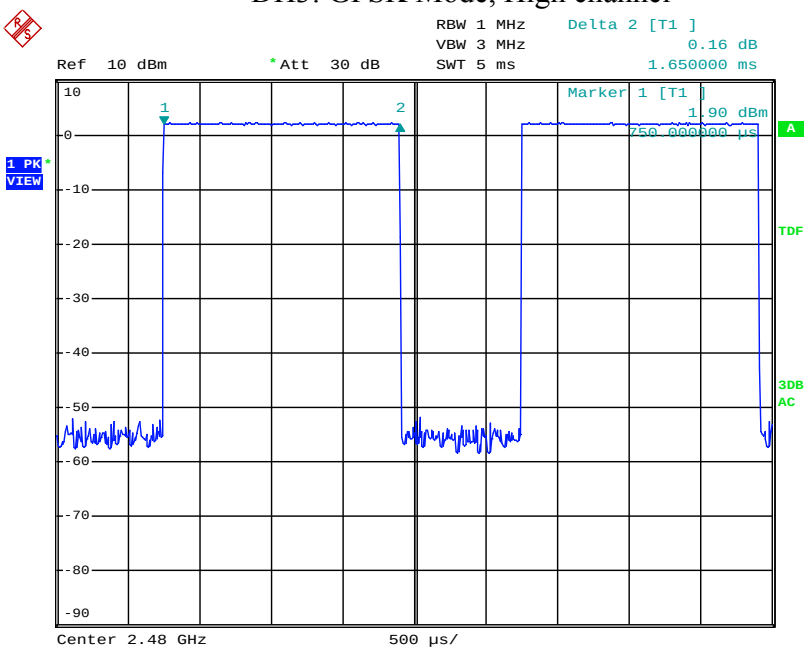
Date: 1.JUL.2014 09:42:58

DH3: GFSK Mode, Middle channel



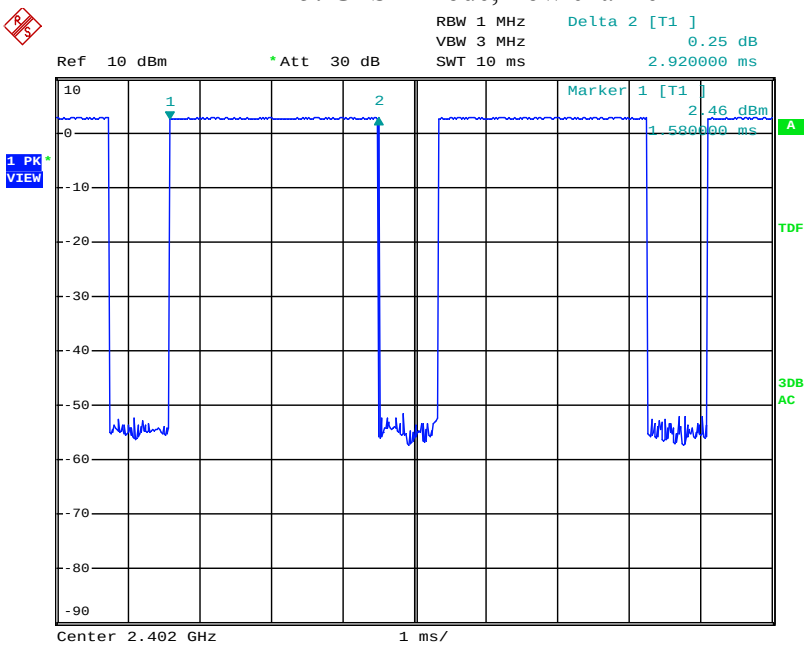
Date: 1.JUL.2014 09:42:07

DH3: GFSK Mode, High channel



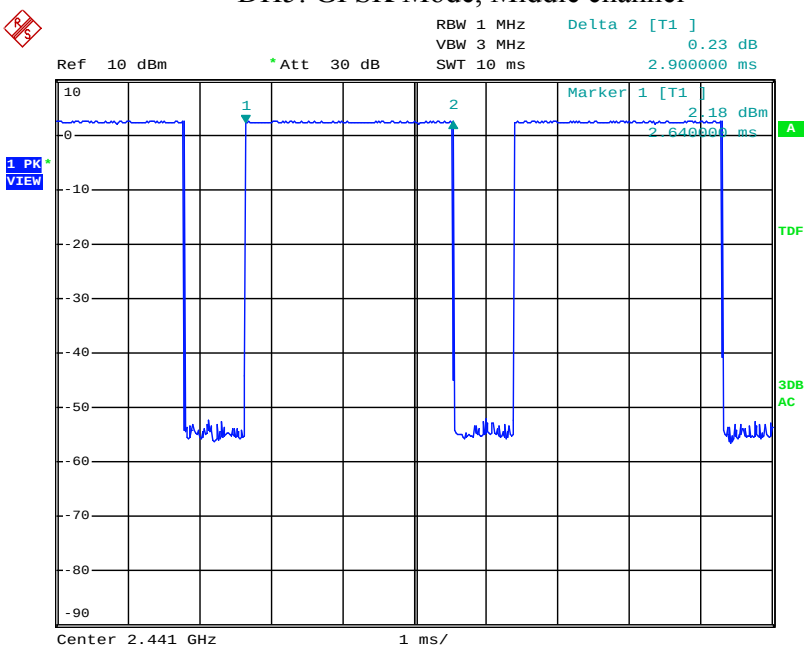
Date: 1.JUL.2014 09:41:16

DH5: GFSK Mode, Low channel



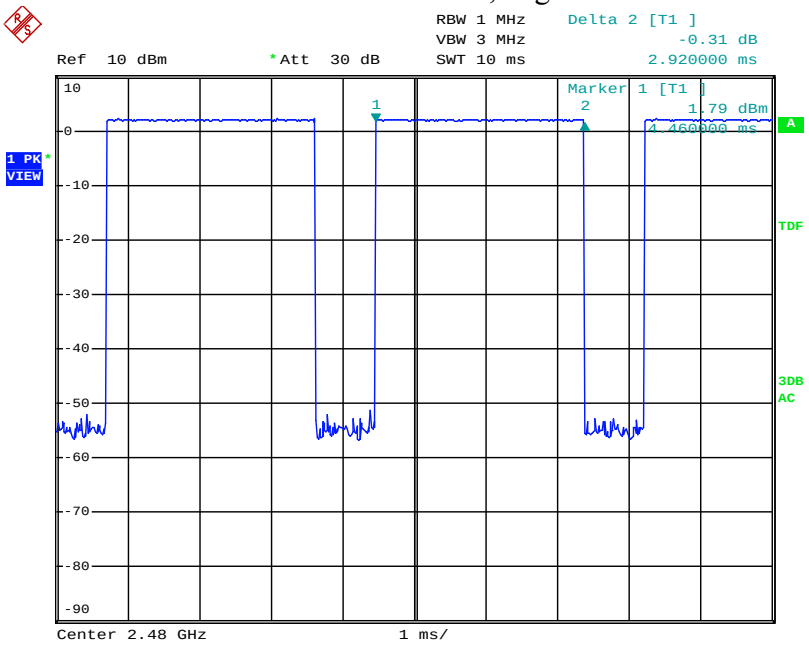
Date: 1.JUL.2014 09:45:03

DH5: GFSK Mode, Middle channel



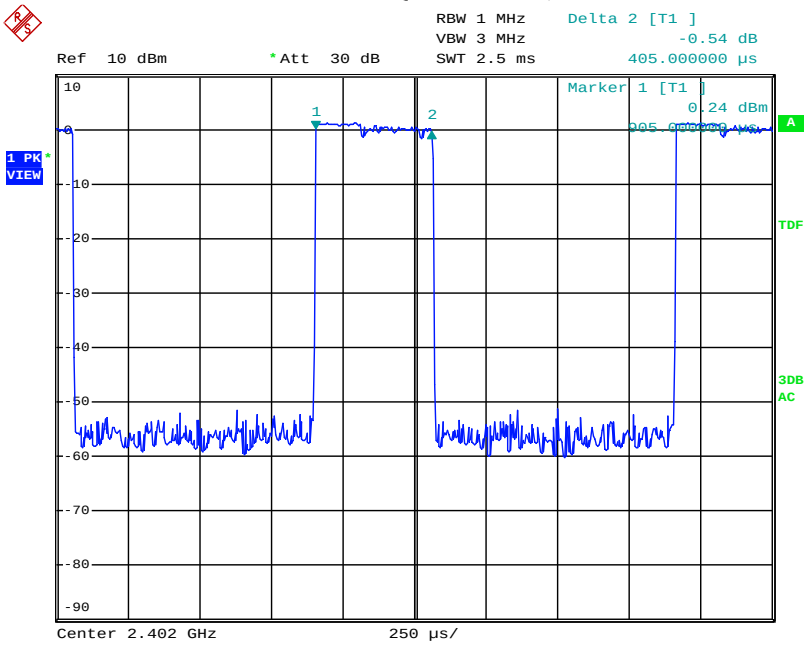
Date: 1.JUL.2014 09:45:55

DH5: GFSK Mode, High channel



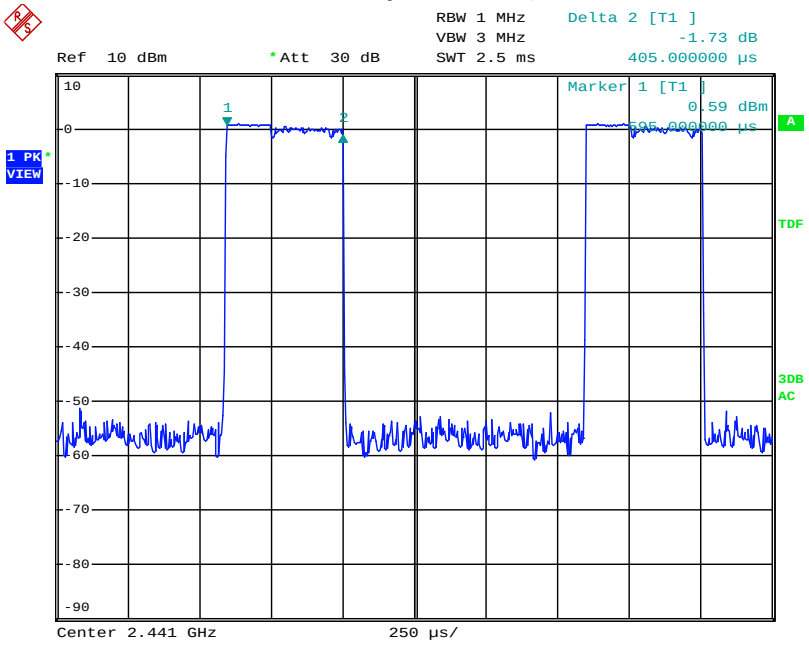
Date: 1.JUL.2014 09:46:50

2DH1: π/4-DQPSK Mode, Low channel



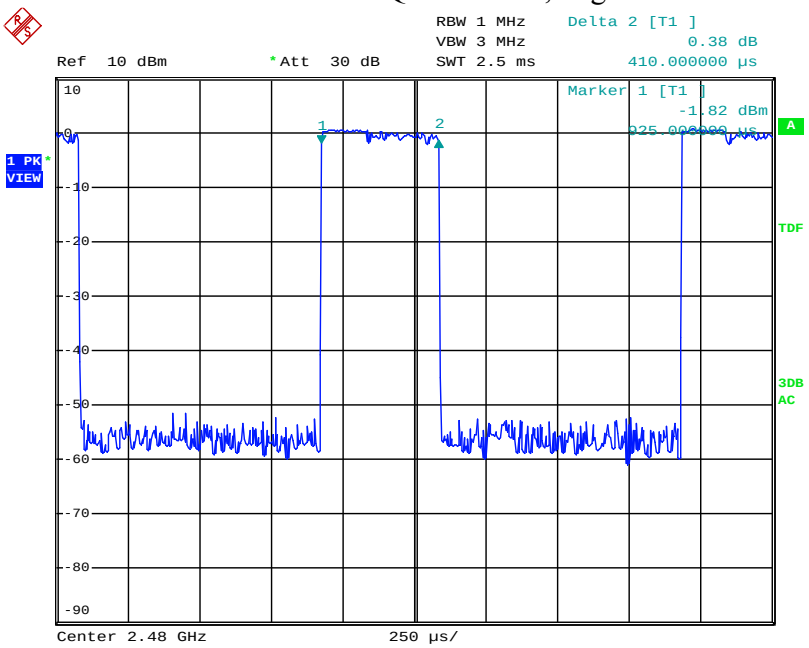
Date: 1.JUL.2014 09:48:31

2DH1: π /4-DQPSK Mode, Middle channel



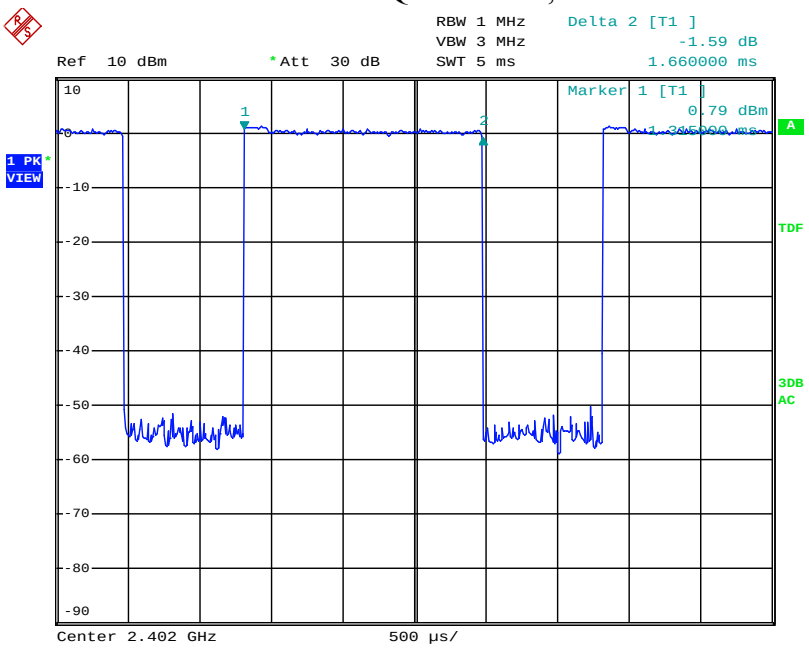
Date: 1.JUL.2014 09:49:23

2DH1: π /4-DQPSK Mode, High channel



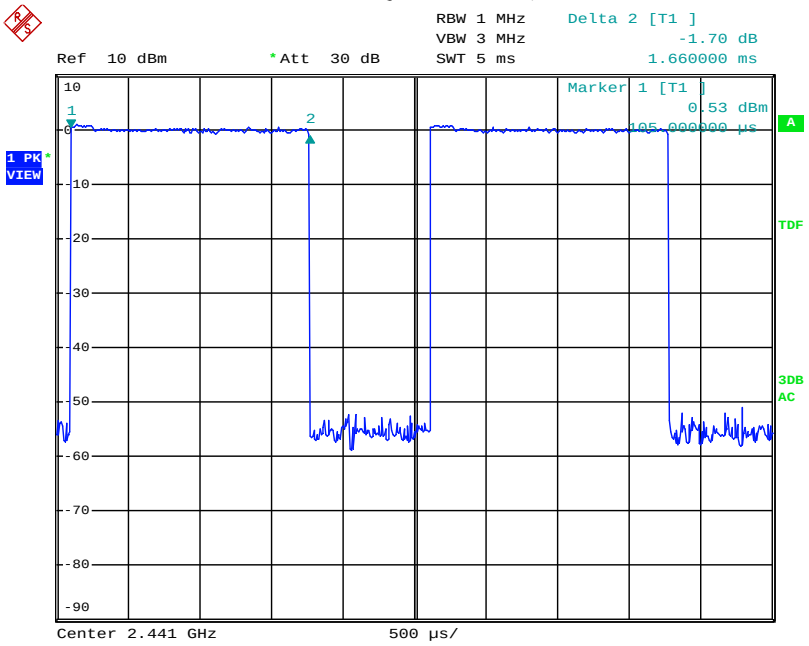
Date: 1.JUL.2014 09:50:51

2DH3: π /4-DQPSK Mode, Low channel



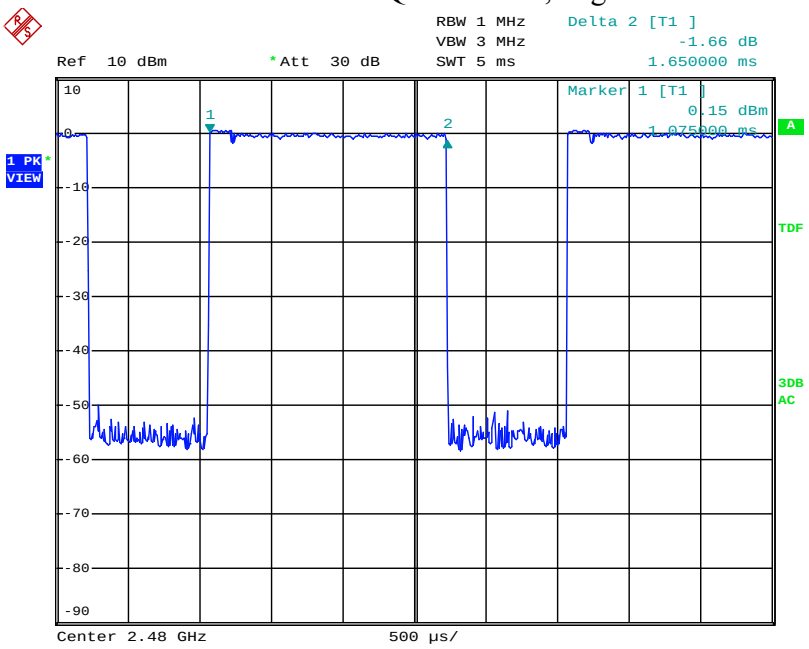
Date: 1.JUL.2014 09:54:14

2DH3: π /4-DQPSK Mode, Middle channel



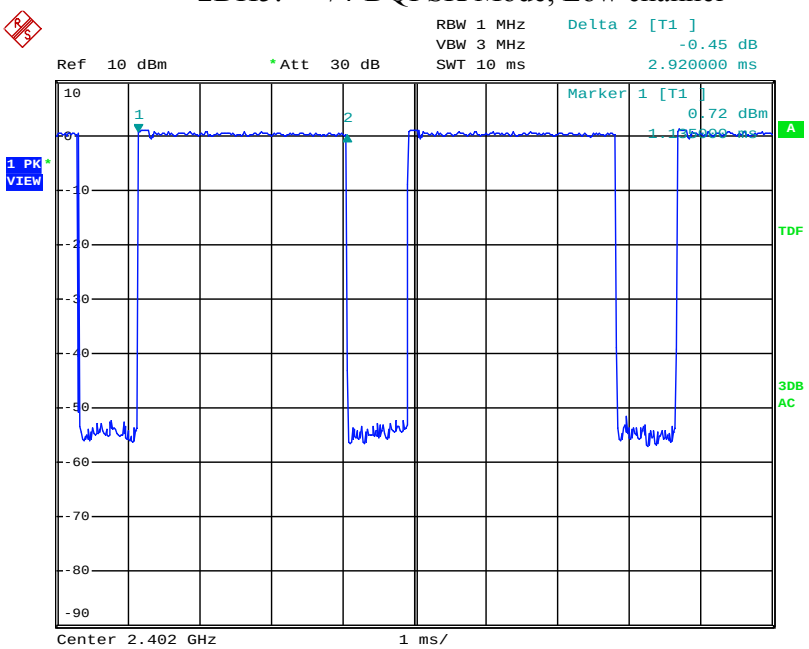
Date: 1.JUL.2014 09:53:17

2DH3: π/4-DQPSK Mode, High channel



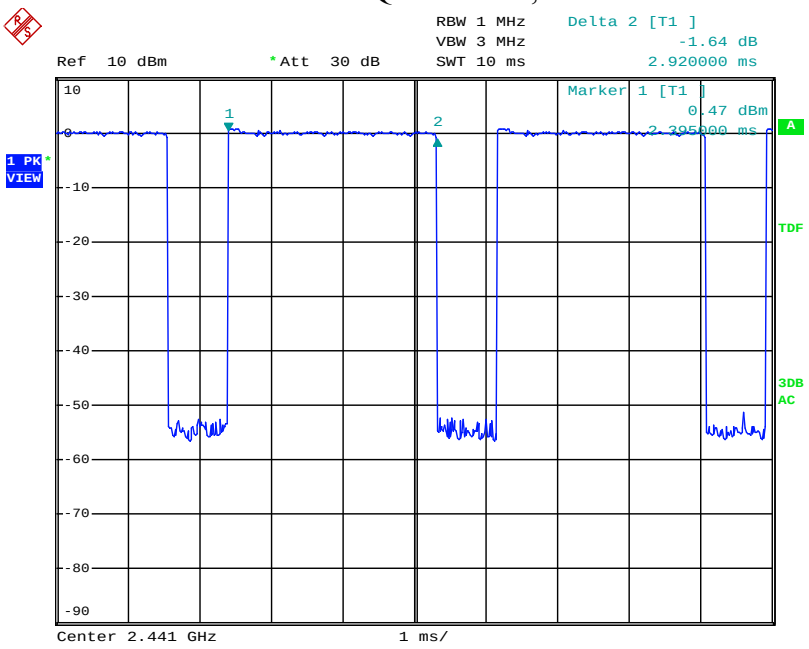
Date: 1.JUL.2014 09:52:01

2DH5: π/4-DQPSK Mode, Low channel



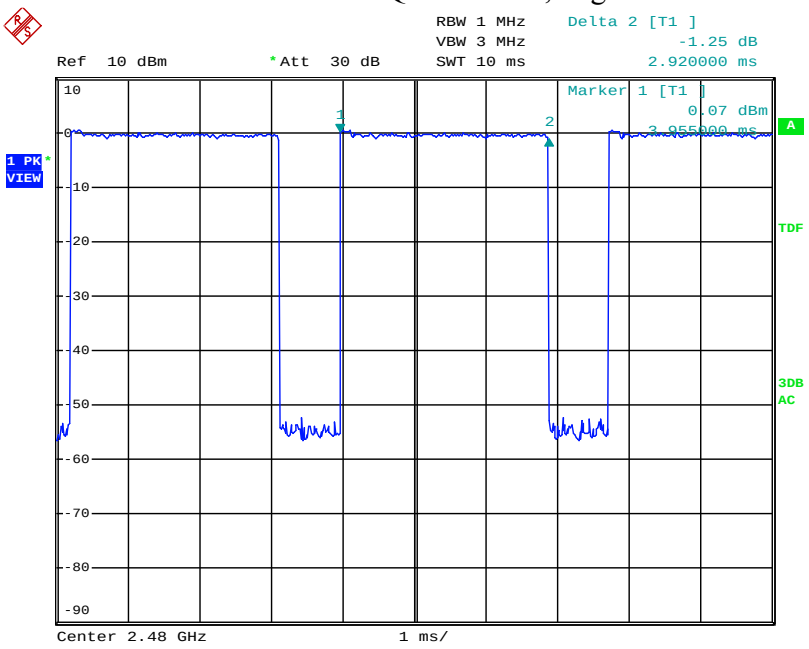
Date: 1.JUL.2014 09:55:36

2DH5: π/4-DQPSK Mode, Middle channel



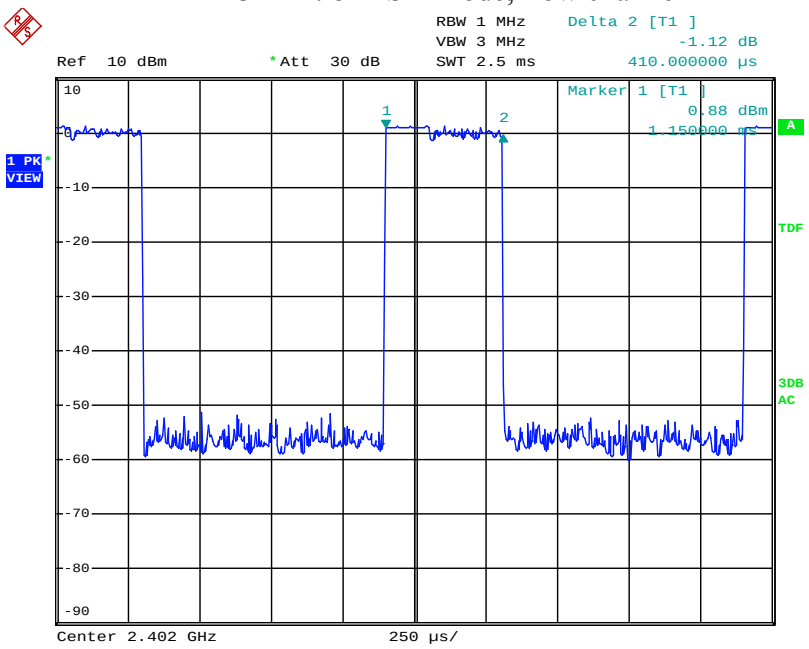
Date: 1.JUL.2014 09:56:13

2DH5: π/4-DQPSK Mode, High channel



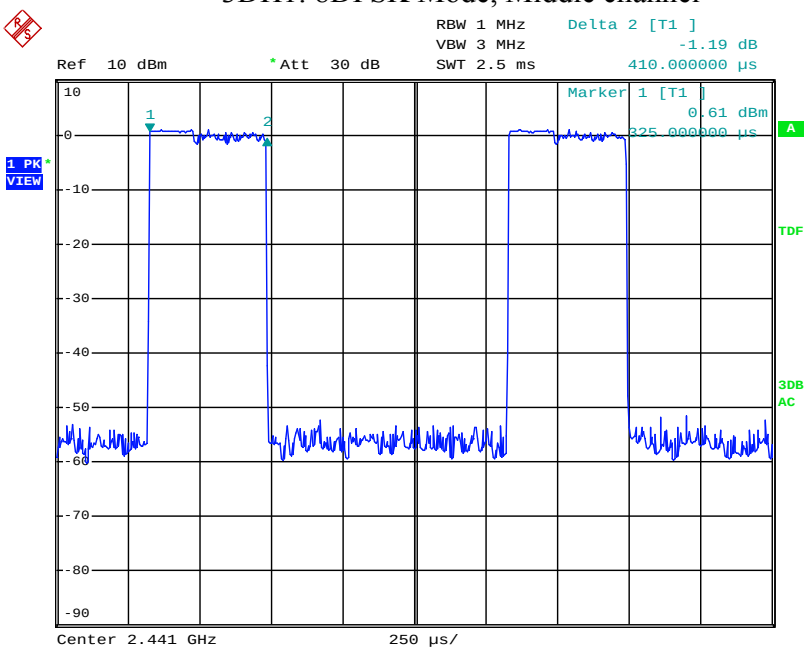
Date: 1.JUL.2014 09:56:52

3DH1: 8DPSK Mode, Low channel



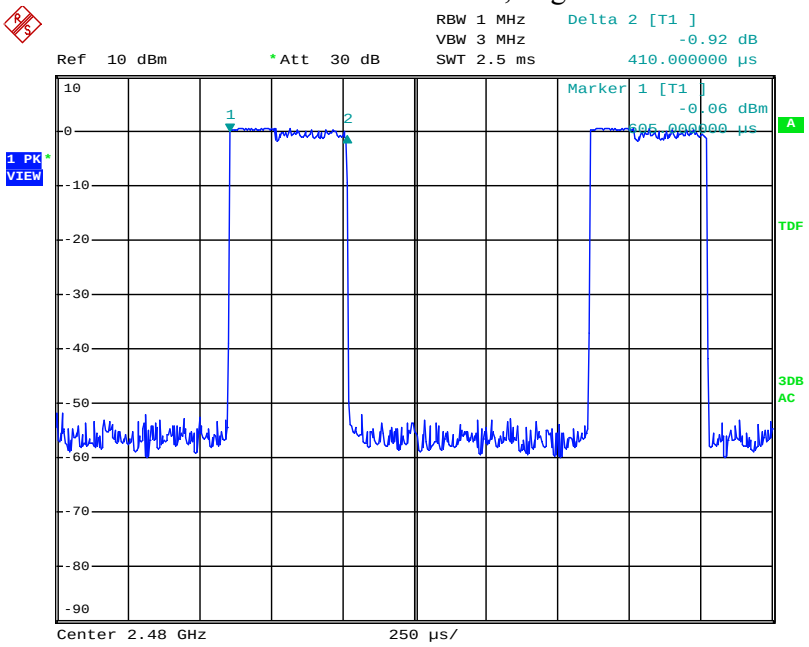
Date: 1.JUL.2014 09:58:18

3DH1: 8DPSK Mode, Middle channel



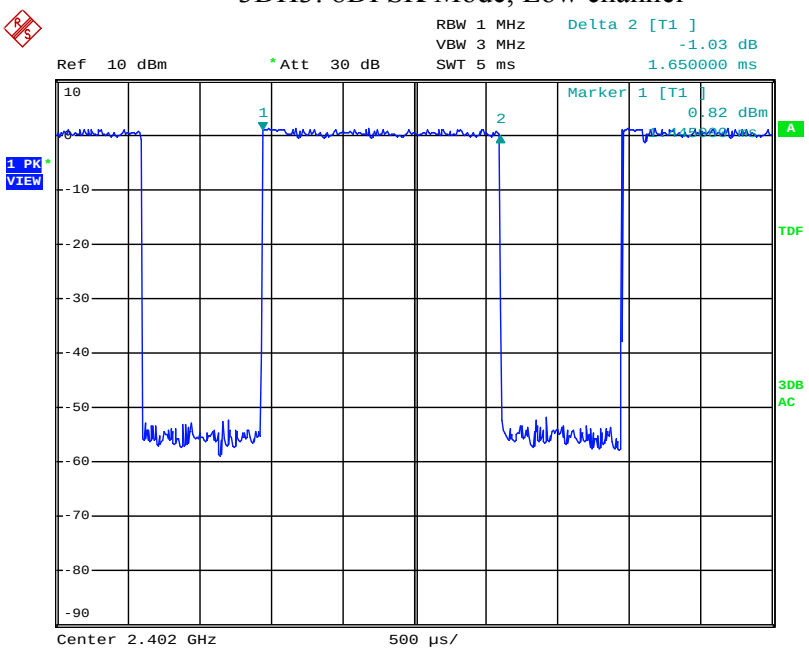
Date: 1.JUL.2014 09:59:03

3DH1: 8DPSK Mode, High channel



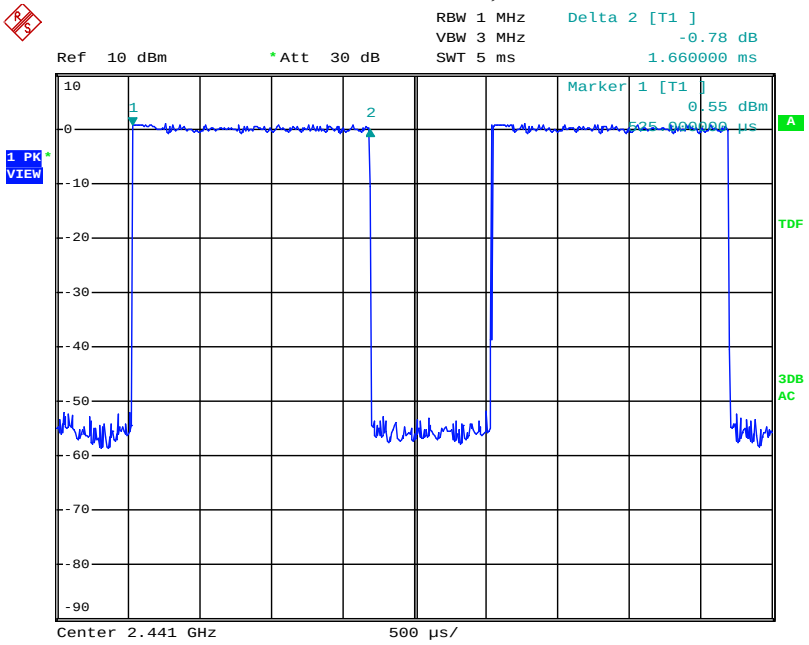
Date: 1.JUL.2014 10:01:35

3DH3: 8DPSK Mode, Low channel



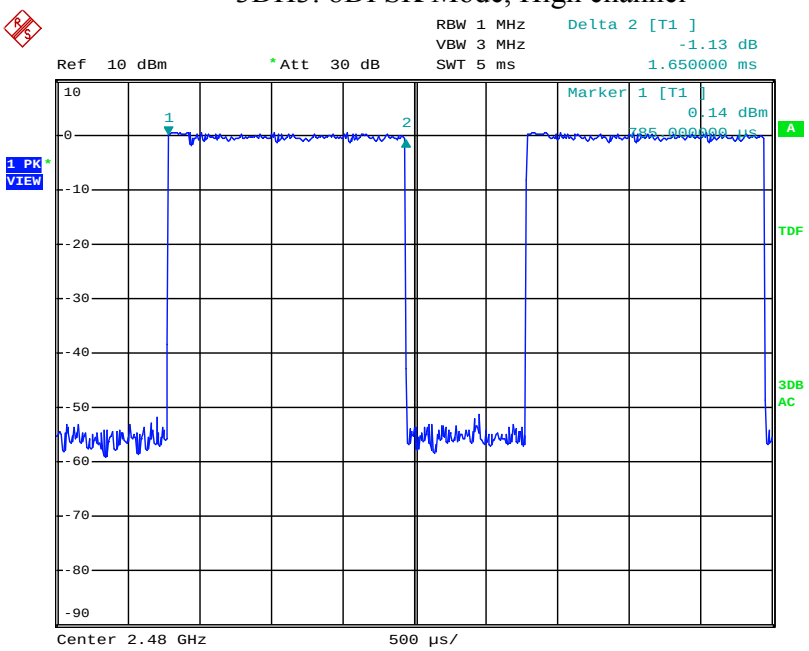
Date: 1.JUL.2014 10:04:24

3DH3: 8DPSK Mode, Middle channel



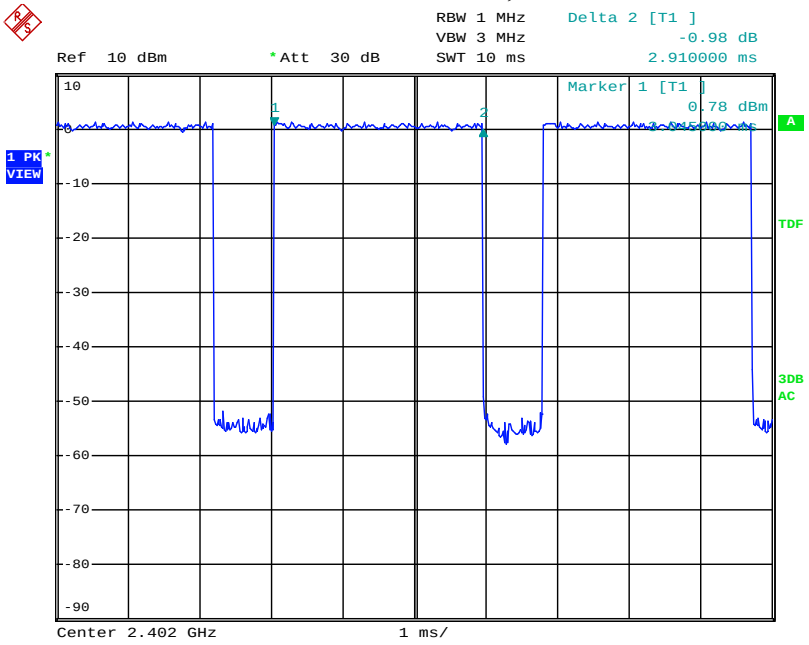
Date: 1.JUL.2014 10:03:40

3DH3: 8DPSK Mode, High channel



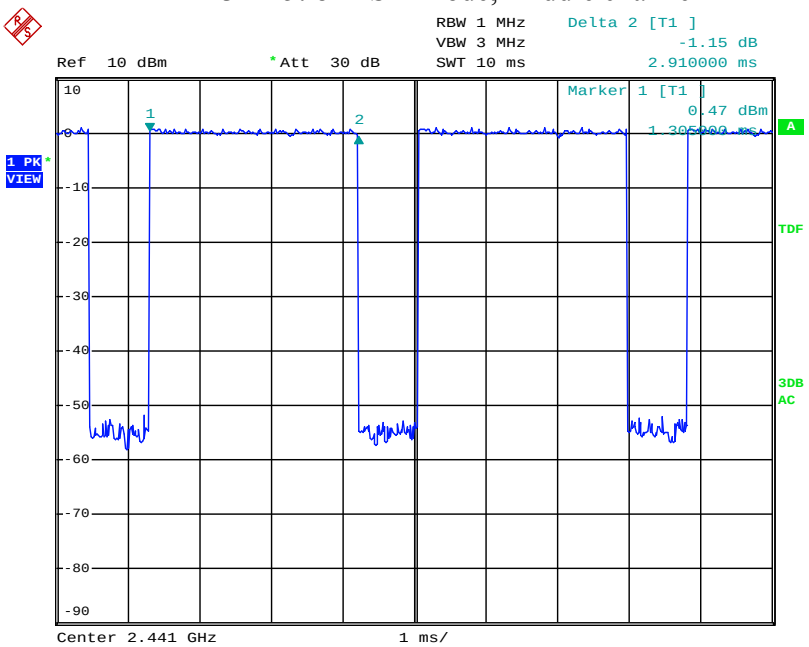
Date: 1.JUL.2014 10:03:00

3DH5: 8DPSK Mode, Low channel



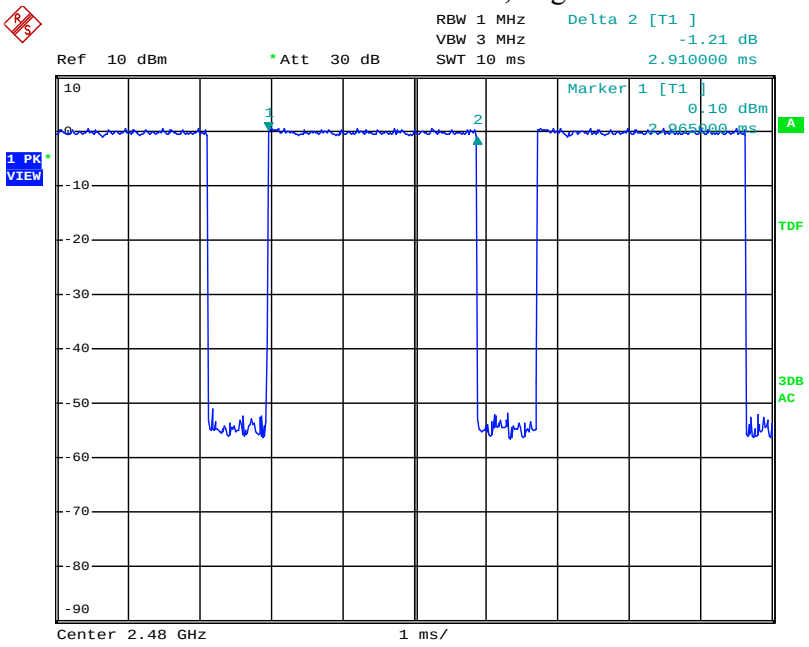
Date: 1.JUL.2014 10:05:36

3DH5: 8DPSK Mode, Middle channel



Date: 1.JUL.2014 10:06:26

3DH5: 8DPSK Mode, High channel



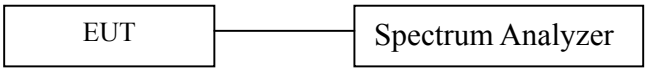
Date: 1.JUL.2014 10:07:13

10. Maximum Peak Output Power Test

10.1 Measurement Procedure

a. Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
d. Measure the captured power within the band and recording the plot.
e. Repeat above procedures until all frequencies required were complete.

10.2 Test SET-UP (Block Diagram of Configuration)



10.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/02/2013	08/01/2014

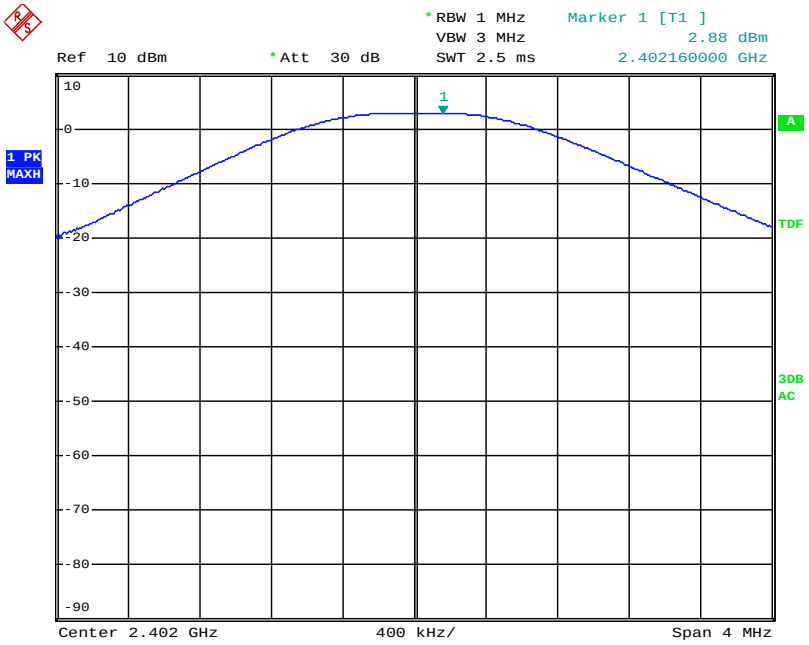
10.4 Measurement Results

Refer to attached data chart.

Spectrum Detector: PK Temperature : 20 ℃
Test By: Jary Humidity : 55 %
Test Result: PASS

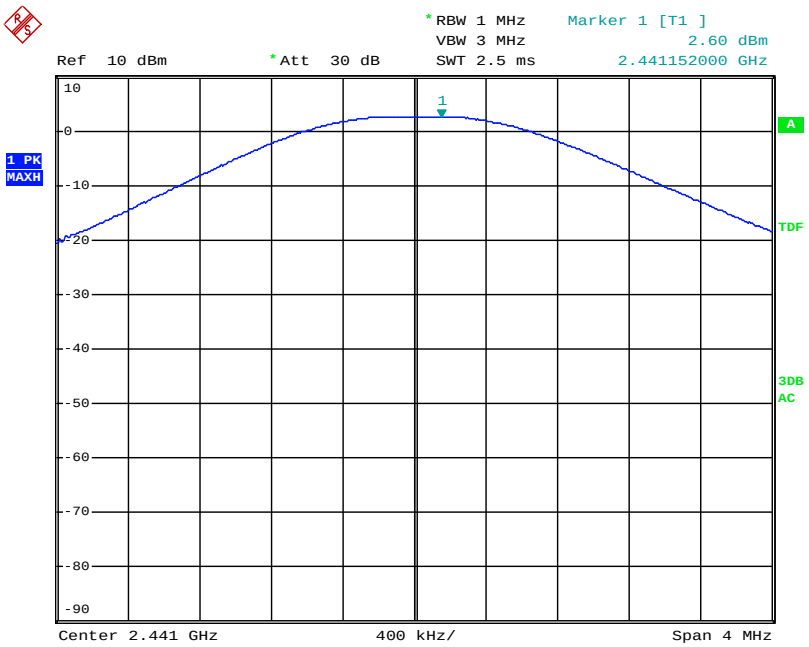
GFSK Mode					
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(mW)	Pass/Fail
Low channel	2402.00	2.88	1.94	1000	PASS
Middle channel	2441.00	2.60	1.82	1000	PASS
High channel	2480.00	2.22	1.67	1000	PASS
π/4-DQPSK Mode					
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(mW)	Pass/Fail
Low channel	2402.00	1.37	1.37	125	PASS
Middle channel	2441.00	1.10	1.29	125	PASS
High channel	2480.00	0.70	1.17	125	PASS
8DPSK Mode					
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(mW)	Pass/Fail
Low channel	2402.00	1.80	1.51	125	PASS
Middle channel	2441.00	1.50	1.41	125	PASS
High channel	2480.00	1.10	1.29	125	PASS

GFSK Mode: Low channel



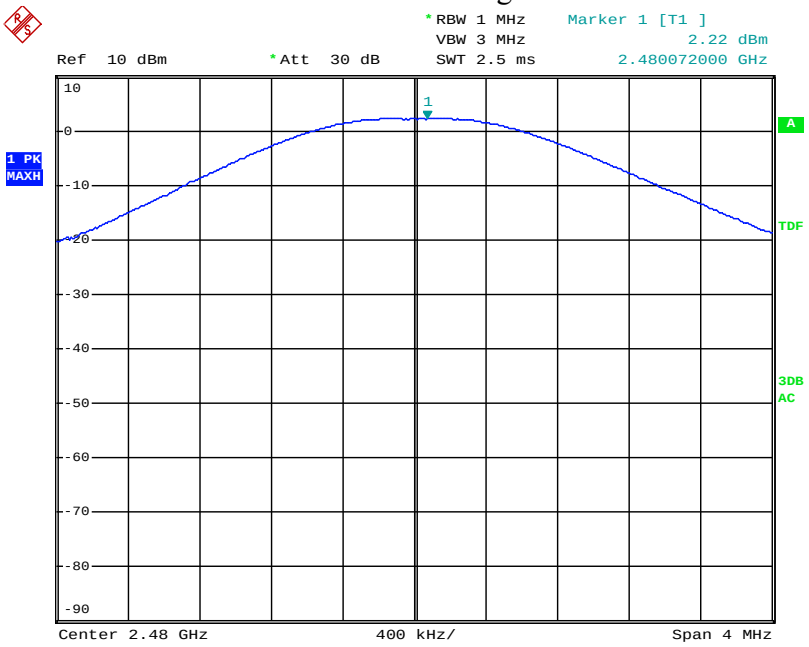
Date: 1.JUL.2014 10:08:47

GFSK Mode: Middle channel



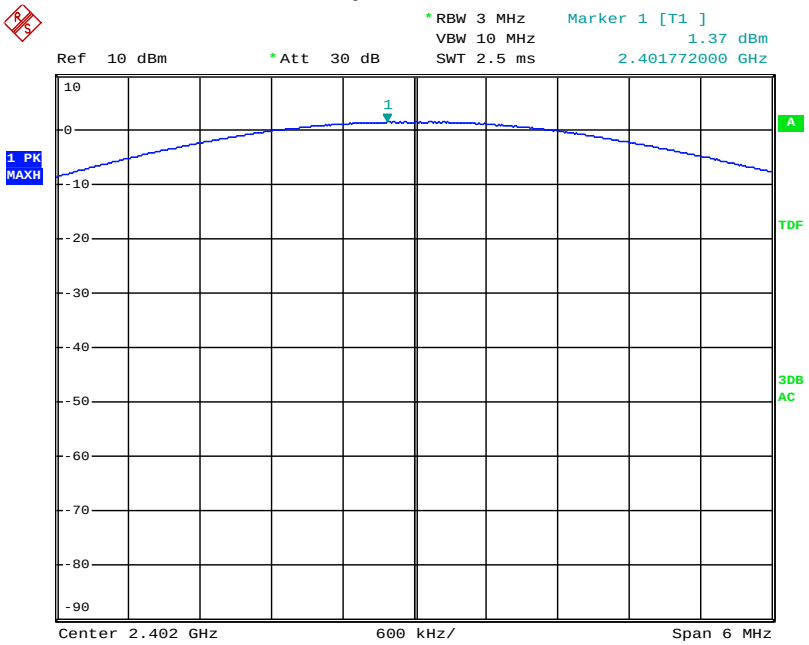
Date: 1.JUL.2014 10:09:24

GFSK Mode: High channel



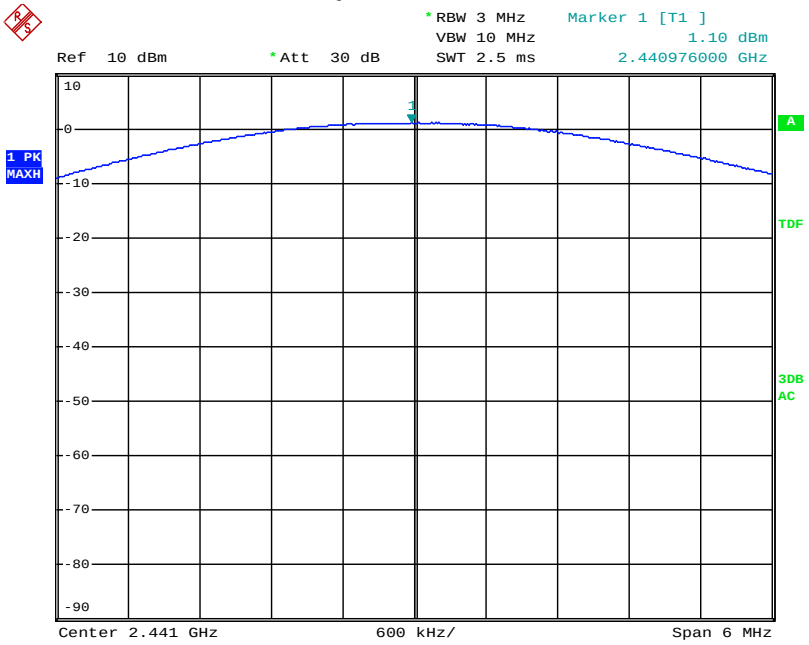
Date: 1.JUL.2014 10:10:00

π /4-DQPSK Mode: Low channel



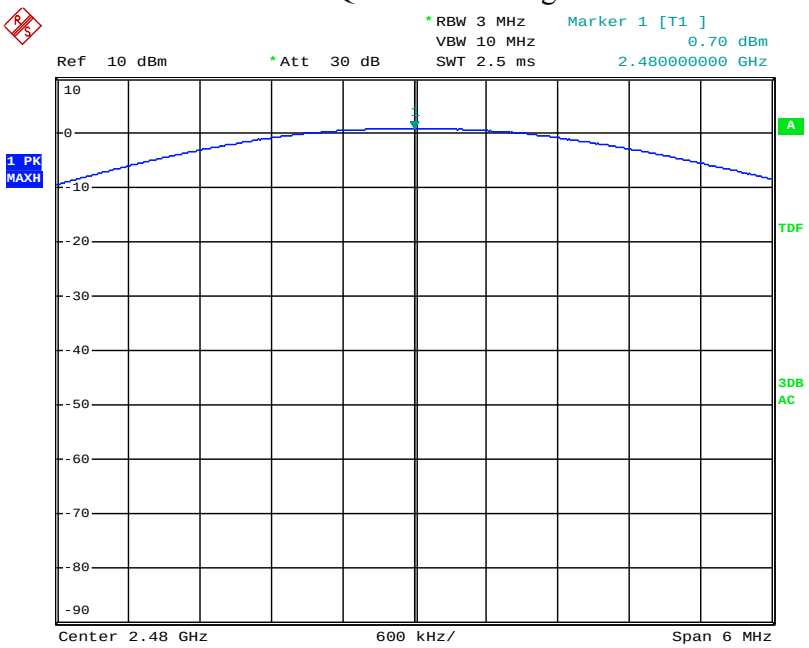
Date: 1.JUL.2014 10:12:36

π /4-DQPSK Mode: Middle channel



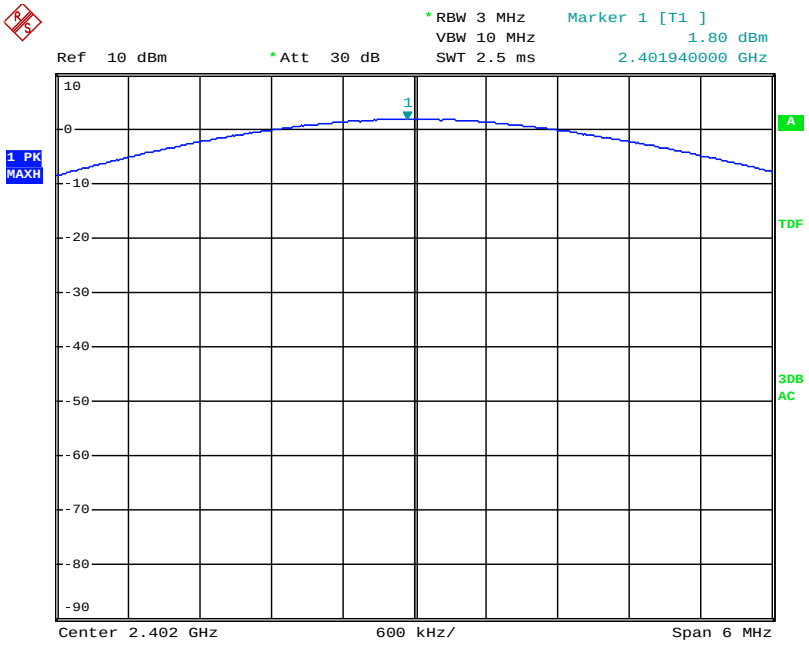
Date: 1.JUL.2014 10:11:57

π /4-DQPSK Mode: High channel



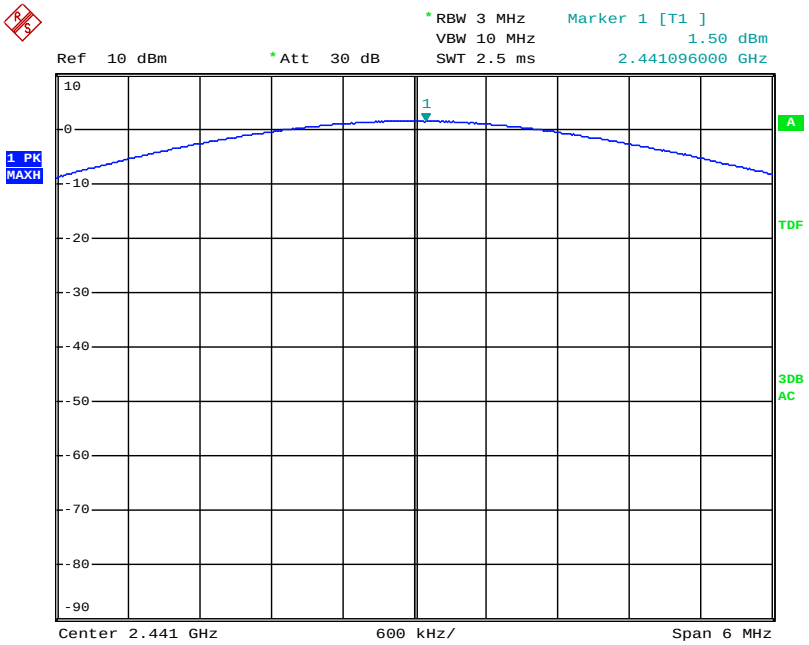
Date: 1.JUL.2014 10:11:09

8DPSK Mode: Low channel



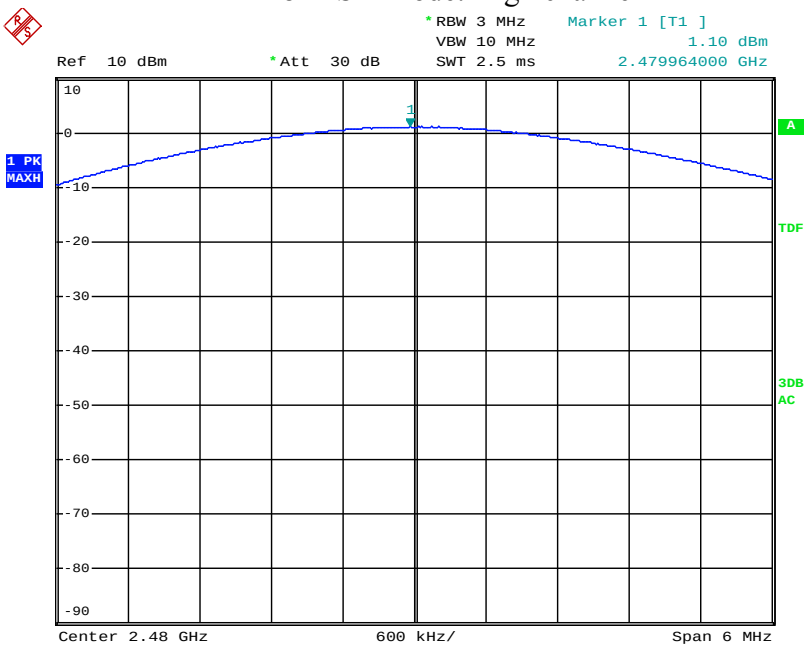
Date: 1.JUL.2014 10:13:24

8DPSK Mode: Middle channel



Date: 1.JUL.2014 10:13:55

8DPSK Mode: High channel



Date: 1.JUL.2014 10:14:33

11. Band Edge Test

11.1 Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Measurement Procedure

(A) Conducted method:

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: RBW = 100kHz, VBW = 300kHz.

(B) Radiated method:

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

(Peak: RBW=1MHz, VBW=1MHz, Sweep=Auto
Average: RBW=1MHz, VBW=10Hz, Sweep=Auto)

11.3 Measurement Equipment Used

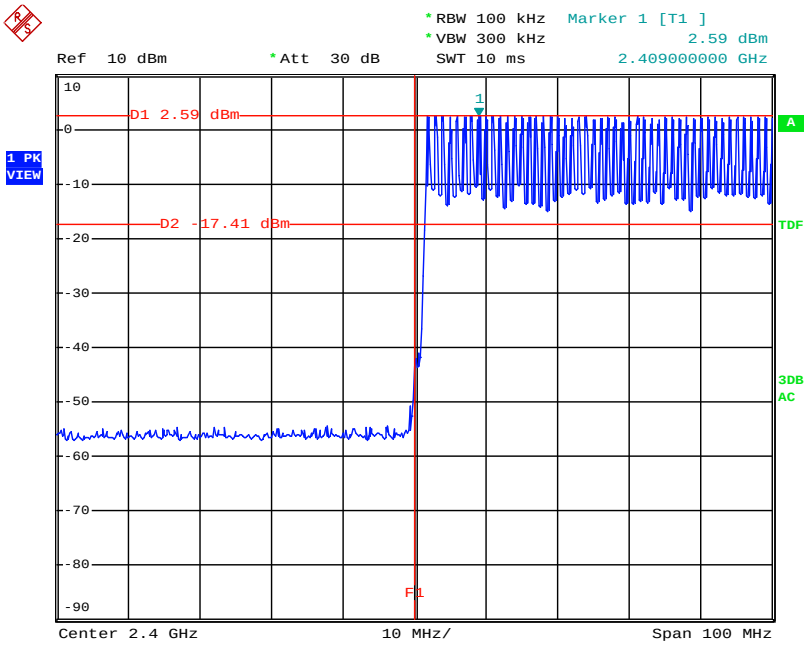
Conducted method: Same as 6.3 Channel Separation Measurement.
Radiated method: Same as 5.3 Radiated Emission Measurement.

11.4 Measurement Results

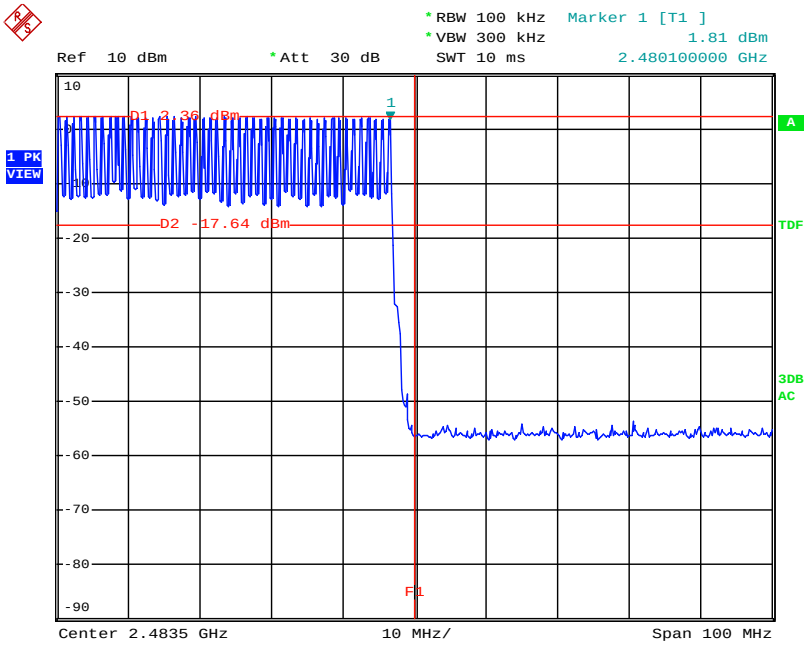
Pass
Refer to attached data chart.

(A) Conducted Measurement
For Hopping Mode:

GFSK

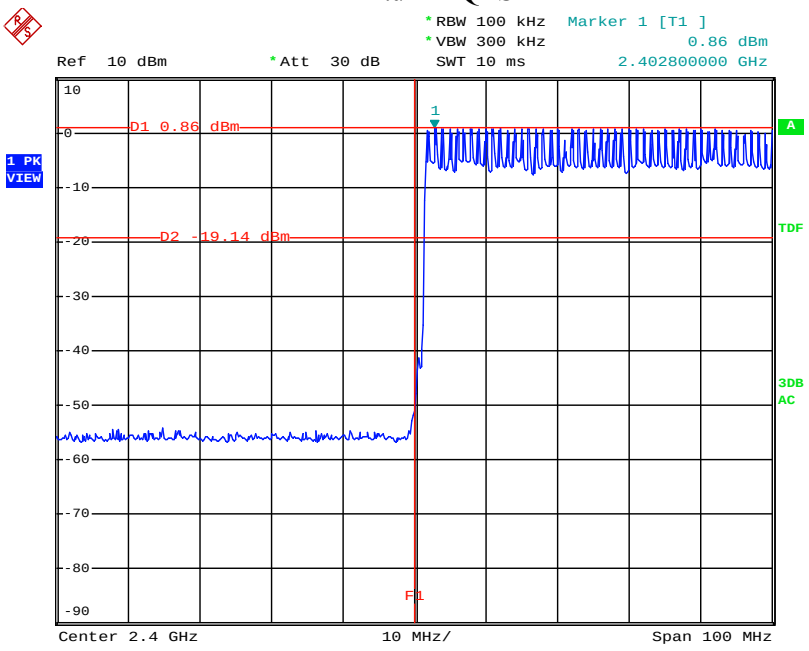


Date: 2.JUL.2014 02:29:20

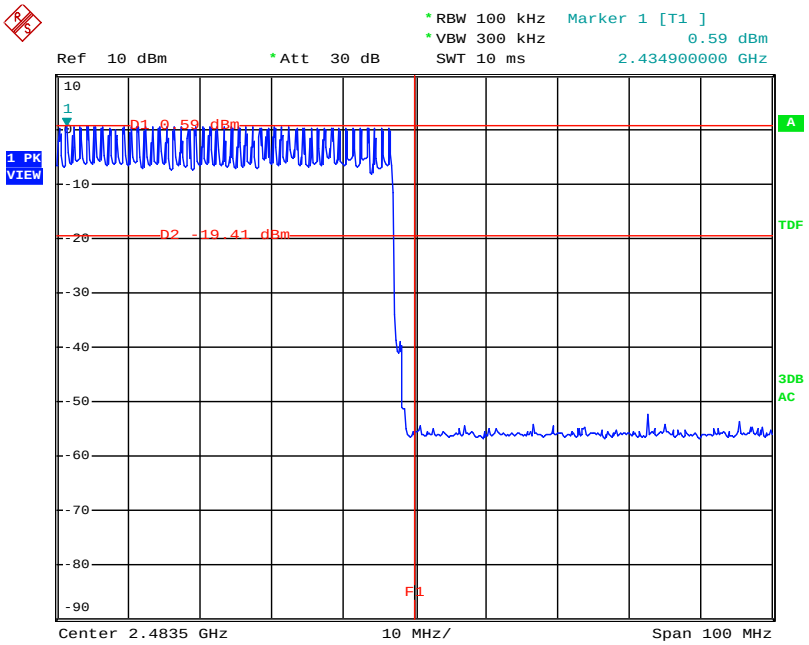


Date: 2.JUL.2014 02:46:34

π/4-DQPSK

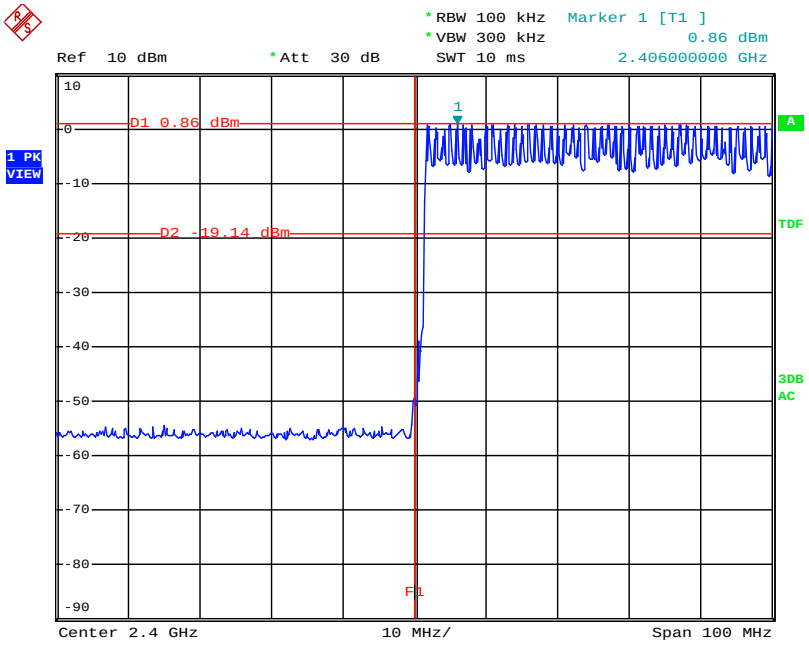


Date: 2.JUL.2014 02:33:35

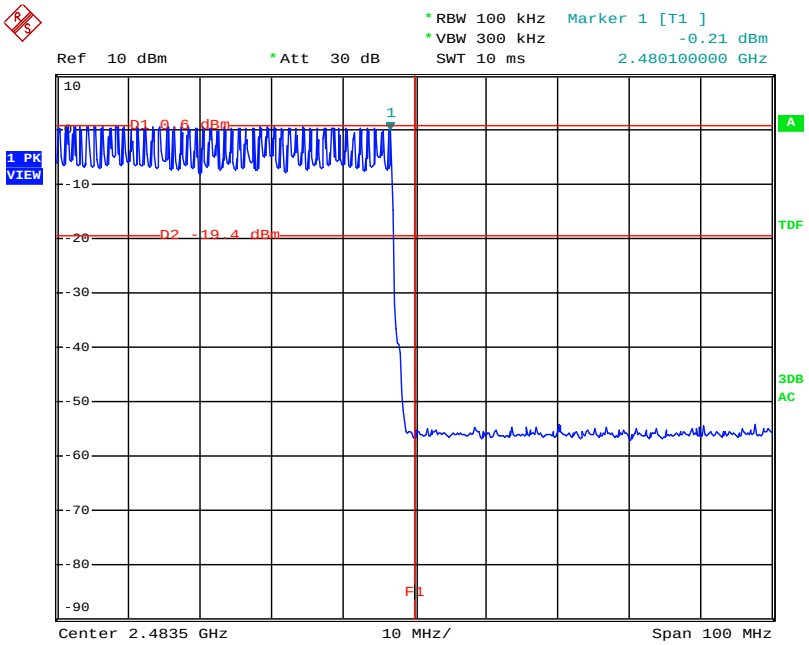


Date: 2.JUL.2014 02:41:40

8DPSK



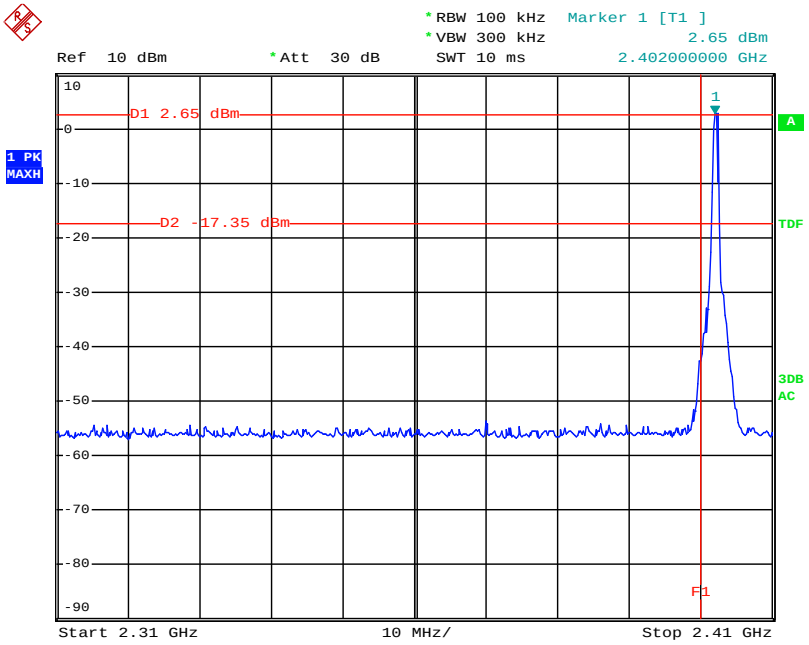
Date: 2.JUL.2014 02:25:46



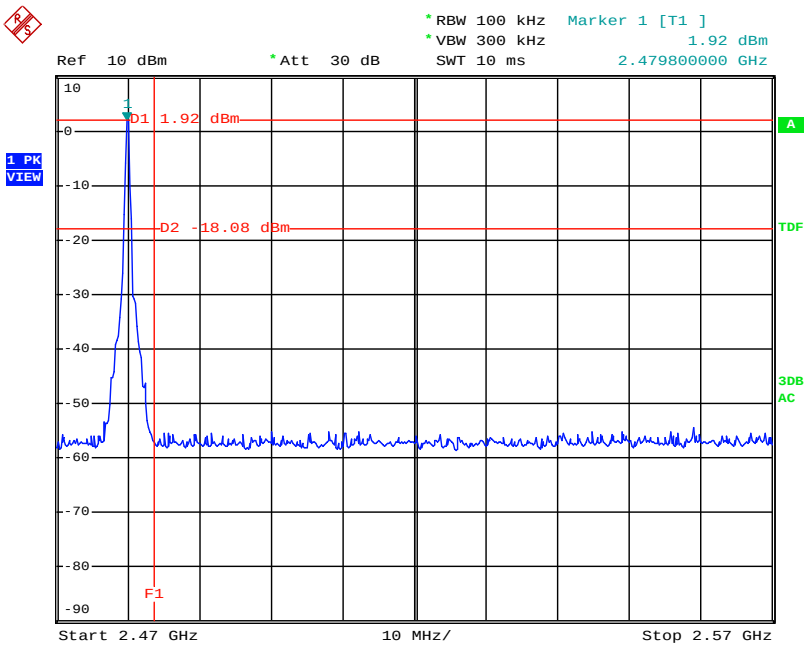
Date: 2.JUL.2014 02:52:30

For Non-Hopping Mode

GFSK

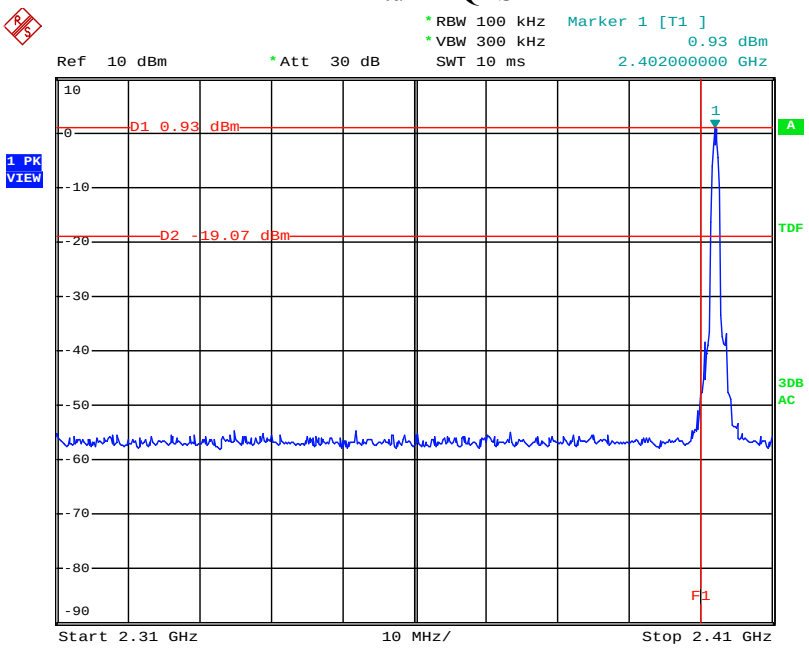


Date: 2.JUL.2014 01:54:33

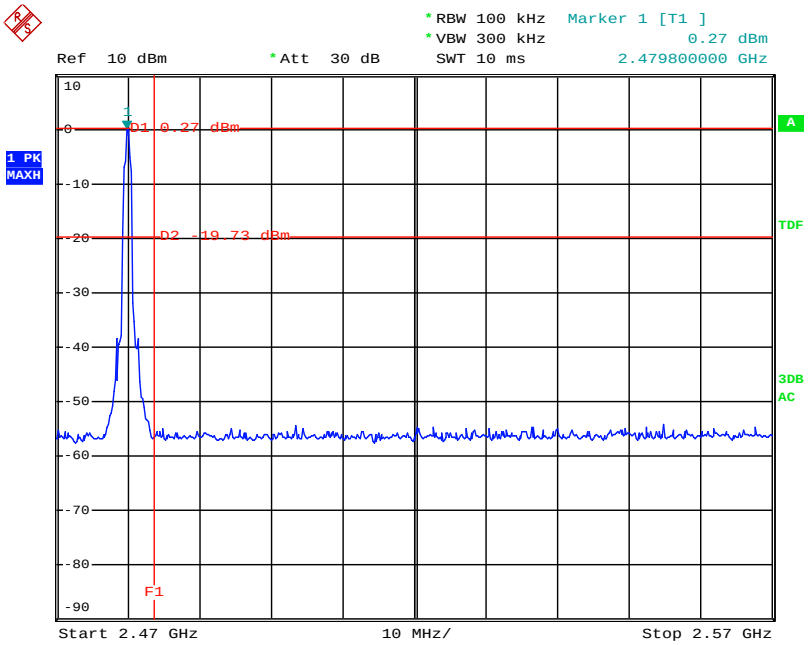


Date: 2.JUL.2014 02:05:59

π/4-DQPSK

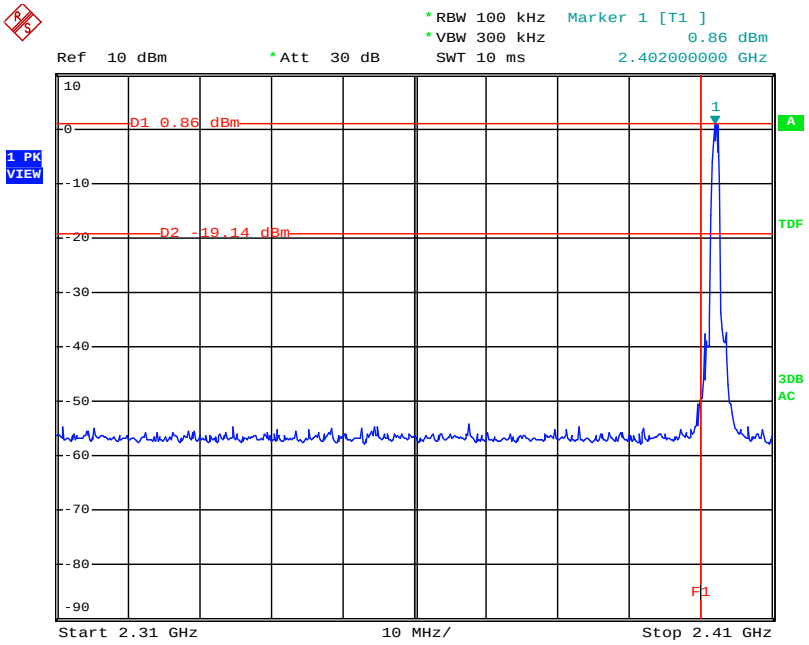


Date: 2.JUL.2014 01:58:38

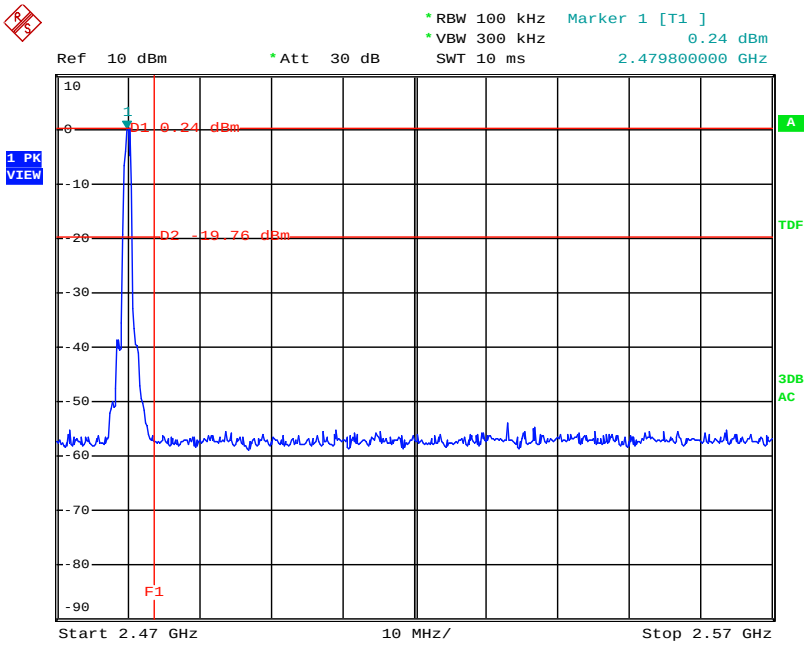


Date: 2.JUL.2014 02:12:15

8DPSK



Date: 2.JUL.2014 02:00:09



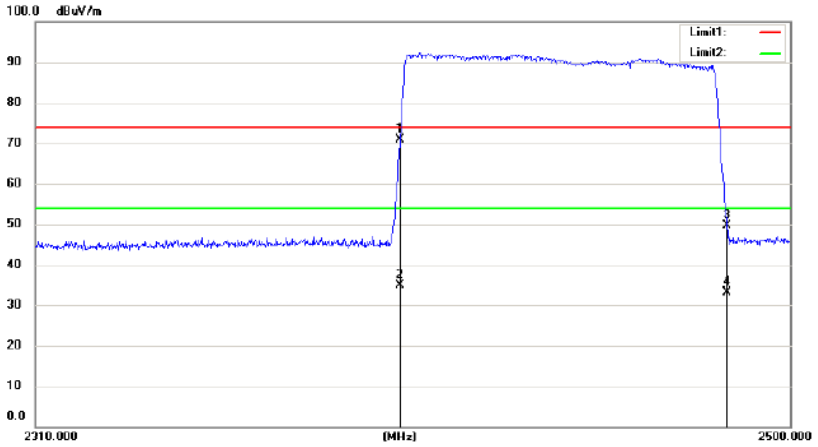
Date: 2.JUL.2014 02:10:52

(B) Radiated Measurement

For Hopping Mode:

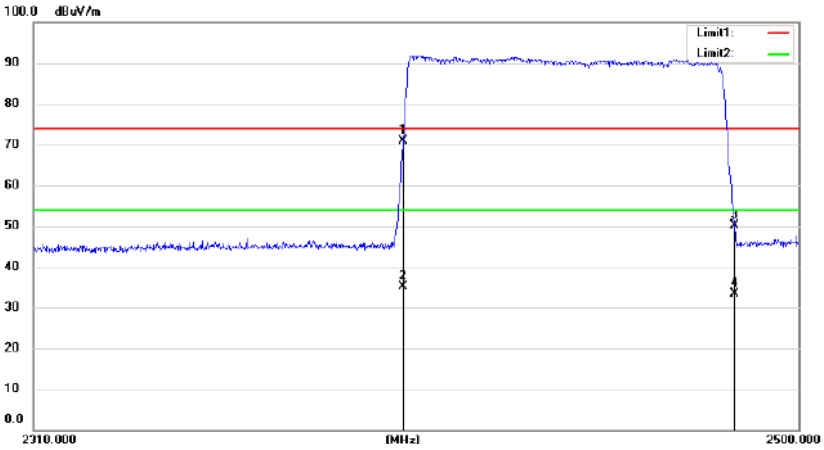
GFSK

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	59.56	11.33	70.89	73.90	-3.01	peak			
2		2400.000	23.47	11.33	34.80	53.90	-19.10	AVG			
3		2483.500	37.57	12.13	49.70	73.90	-24.20	peak			
4		2483.500	21.12	12.13	33.25	53.90	-20.65	AVG			

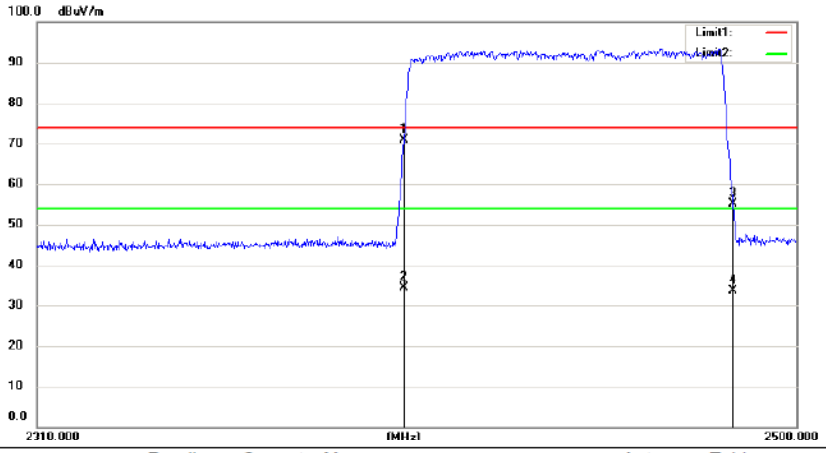
Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	59.43	11.33	70.76	73.90	-3.14	peak			
2		2400.000	23.68	11.33	35.01	53.90	-18.89	AVG			
3		2483.500	37.91	12.13	50.04	73.90	-23.86	peak			
4		2483.500	21.33	12.13	33.46	53.90	-20.44	AVG			

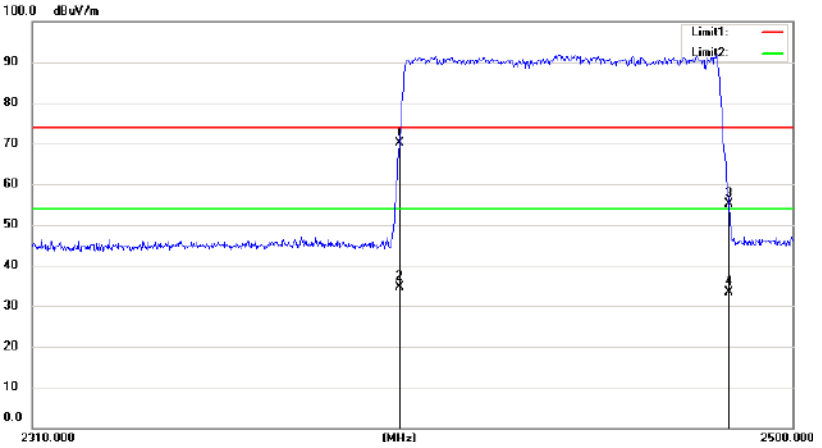
π/4-DQPSK

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	59.44	11.33	70.77	73.90	-3.13	peak			
2		2400.000	23.03	11.33	34.36	53.90	-19.54	AVG			
3		2483.500	42.95	12.13	55.08	73.90	-18.82	peak			
4		2483.500	21.41	12.13	33.54	53.90	-20.36	AVG			

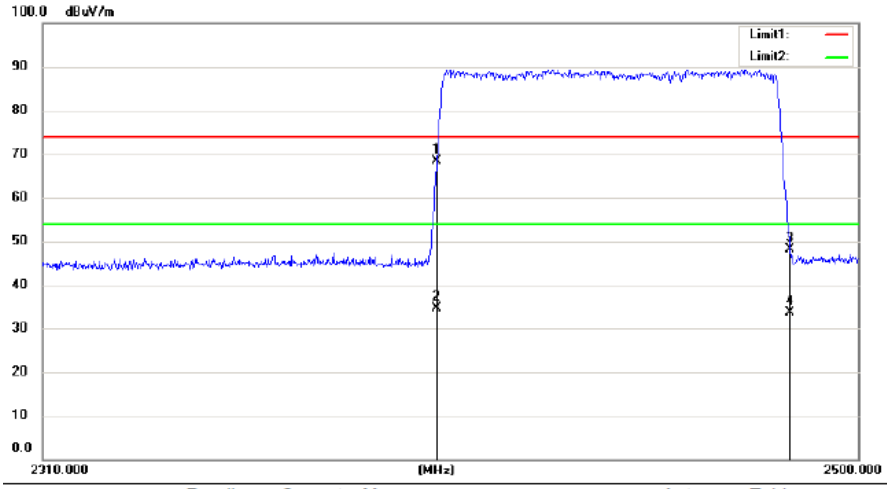
Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	58.69	11.33	70.02	73.90	-3.88	peak			
2		2400.000	23.20	11.33	34.53	53.90	-19.37	AVG			
3		2483.500	42.91	12.13	55.04	73.90	-18.86	peak			
4		2483.500	21.16	12.13	33.29	53.90	-20.61	AVG			

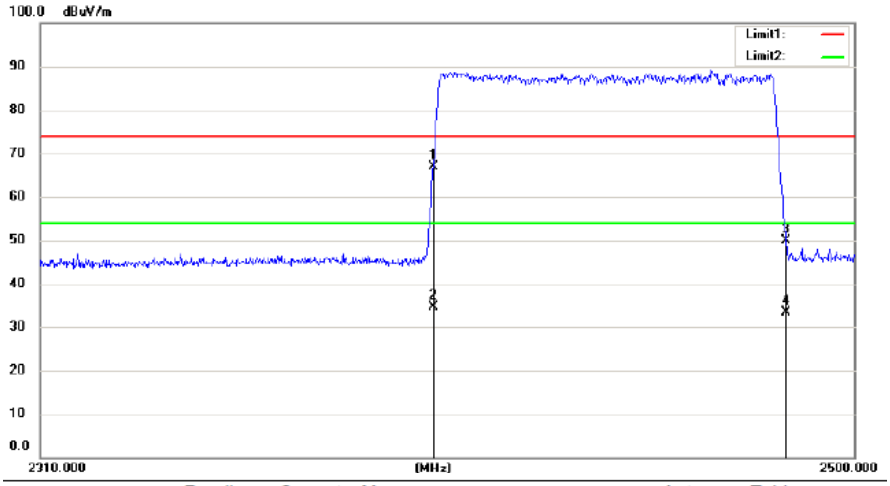
8DPSK

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	56.98	11.33	68.31	73.90	-5.59	peak			
2		2400.000	23.24	11.33	34.57	53.90	-19.33	AVG			
3		2483.500	35.98	12.13	48.11	73.90	-25.79	peak			
4		2483.500	21.47	12.13	33.60	53.90	-20.30	AVG			

Horizontal:

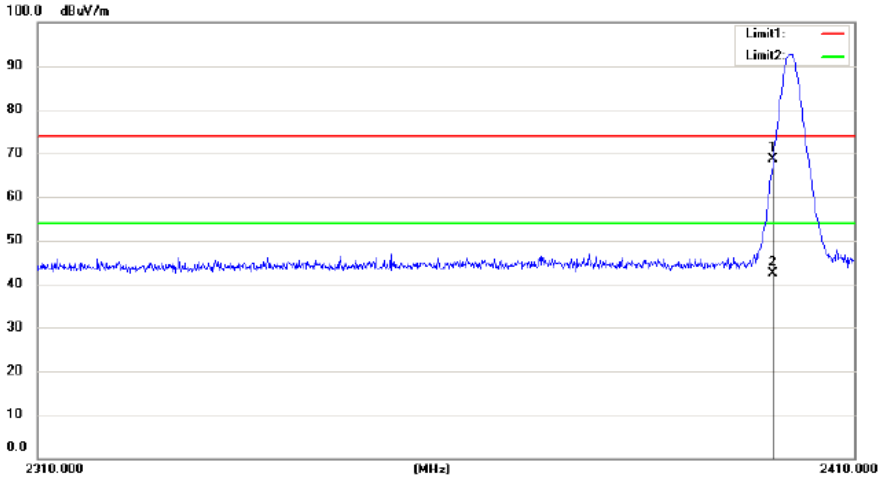


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	55.48	11.33	66.81	73.90	-7.09	peak			
2		2400.000	23.35	11.33	34.68	53.90	-19.22	AVG			
3		2483.500	37.74	12.13	49.87	73.90	-24.03	peak			
4		2483.500	21.30	12.13	33.43	53.90	-20.47	AVG			

For Non-Hopping Mode:

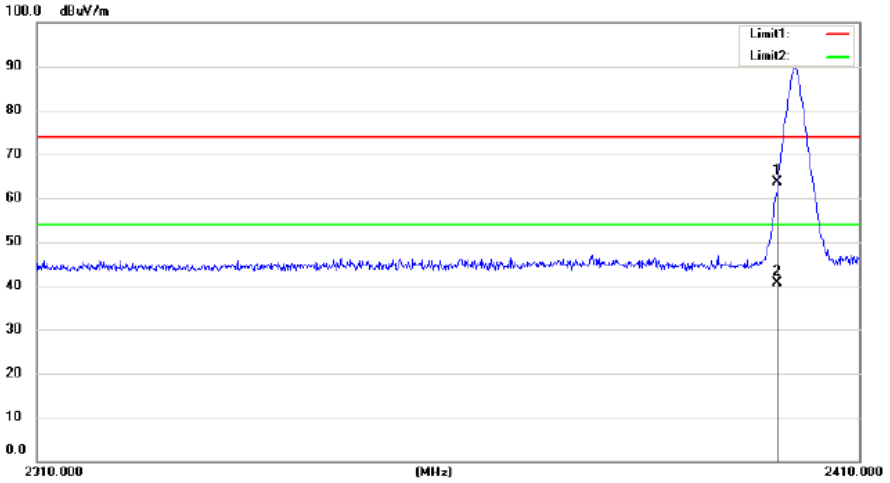
GFSK

Low Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	57.29	11.33	68.62	73.90	-5.28	peak			
2		2400.000	31.05	11.33	42.38	53.90	-11.52	AVG			

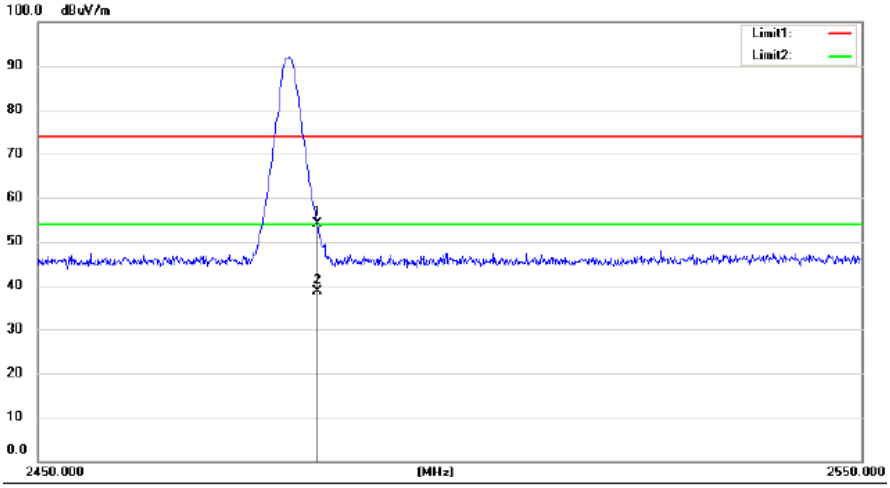
Low Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	52.38	11.33	63.71	73.90	-10.19	peak			
2		2400.000	29.42	11.33	40.75	53.90	-13.15	AVG			

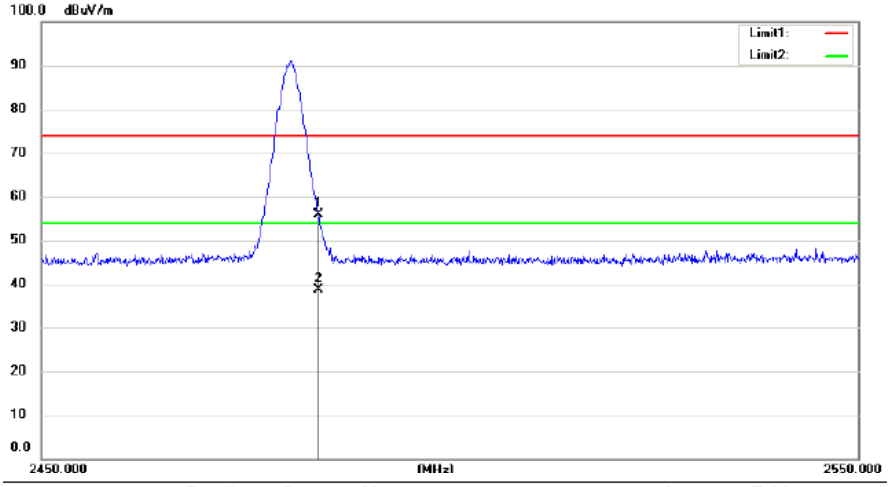
GFSK

High Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	41.90	12.13	54.03	73.90	-19.87	peak			
2	*	2483.500	26.43	12.13	38.56	53.90	-15.34	AVG			

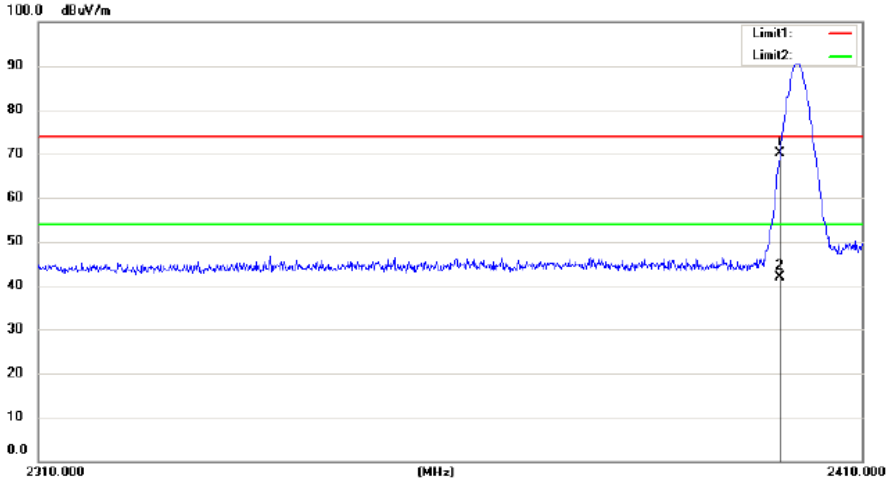
High Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	43.78	12.13	55.91	73.90	-17.99	peak			
2	*	2483.500	26.60	12.13	38.73	53.90	-15.17	AVG			

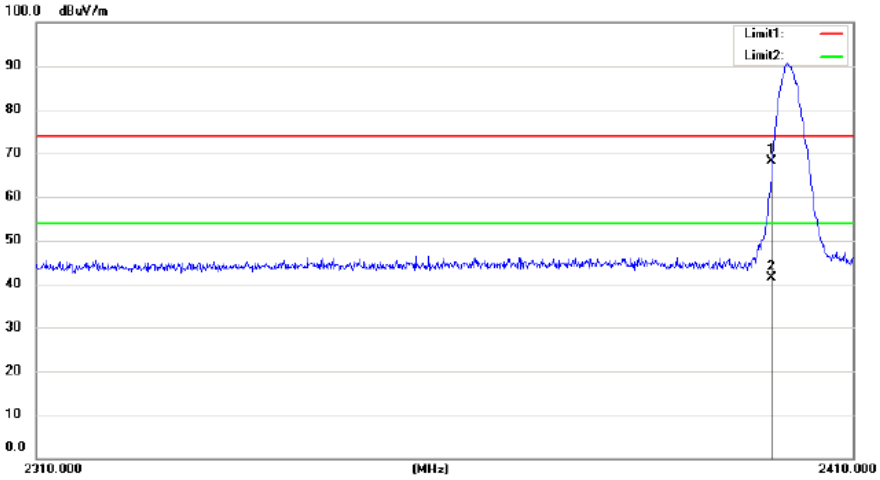
π/4-DQPSK

Low Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	58.83	11.33	70.16	73.90	-3.74	peak			
2		2400.000	30.56	11.33	41.89	53.90	-12.01	AVG			

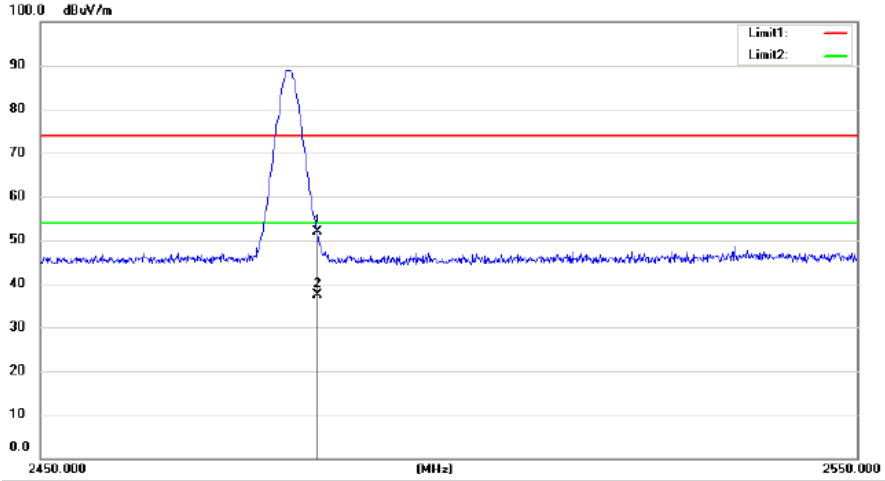
Low Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	56.74	11.33	68.07	73.90	-5.83	peak			
2		2400.000	30.13	11.33	41.46	53.90	-12.44	AVG			

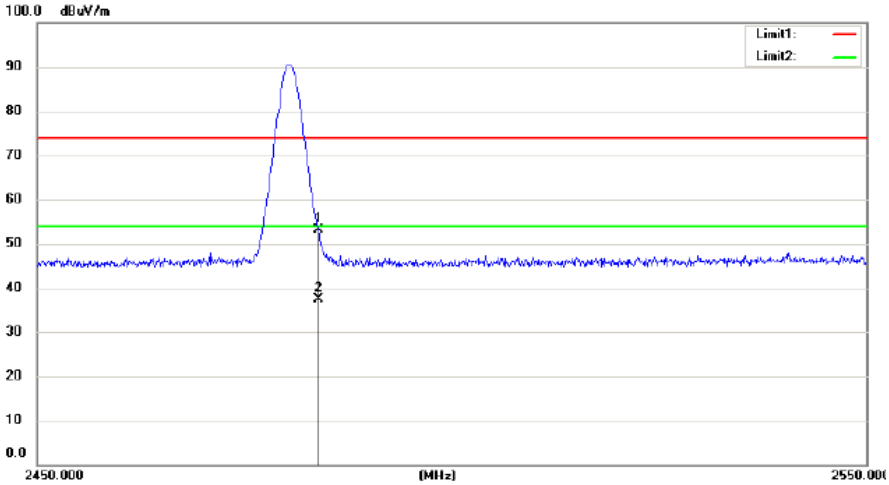
π/4-DQPSK

High Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	39.72	12.13	51.85	73.90	-22.05	peak			
2	*	2483.500	25.32	12.13	37.45	53.90	-16.45	AVG			

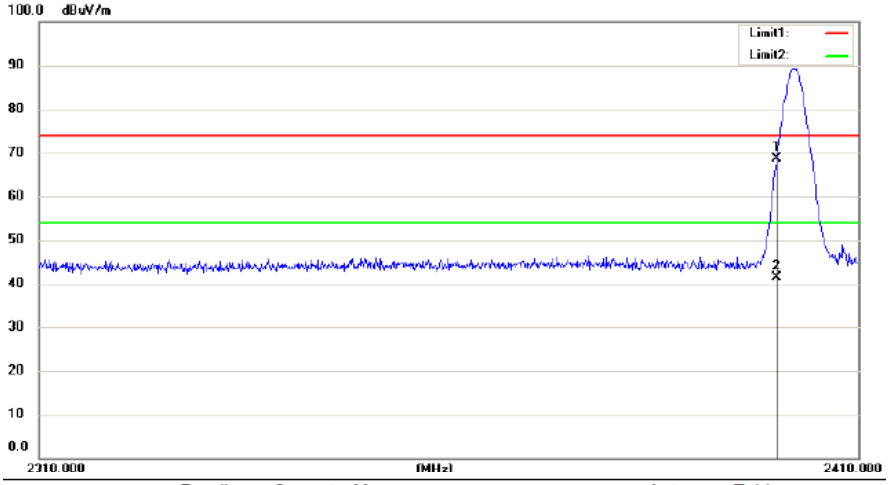
High Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	40.88	12.13	53.01	73.90	-20.89	peak			
2	*	2483.500	25.21	12.13	37.34	53.90	-16.56	AVG			

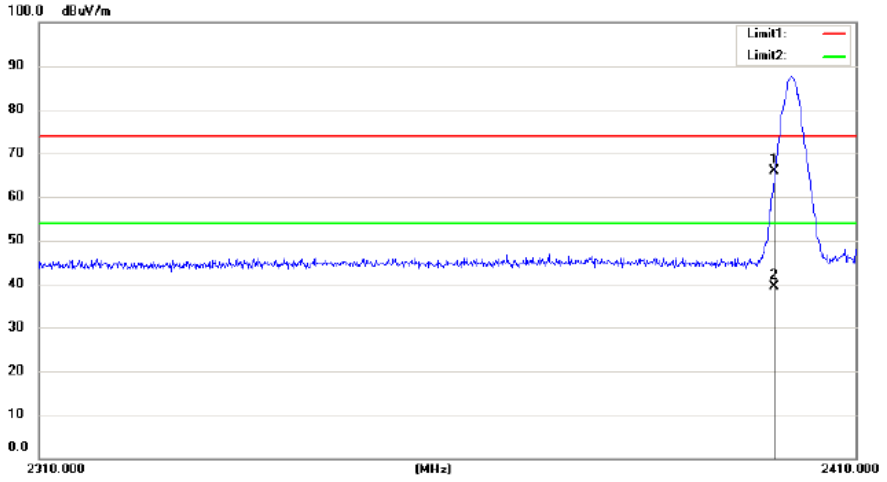
8DPSK

Low Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	57.27	11.33	68.60	73.90	-5.30	peak			
2		2400.000	30.09	11.33	41.42	53.90	-12.48	AVG			

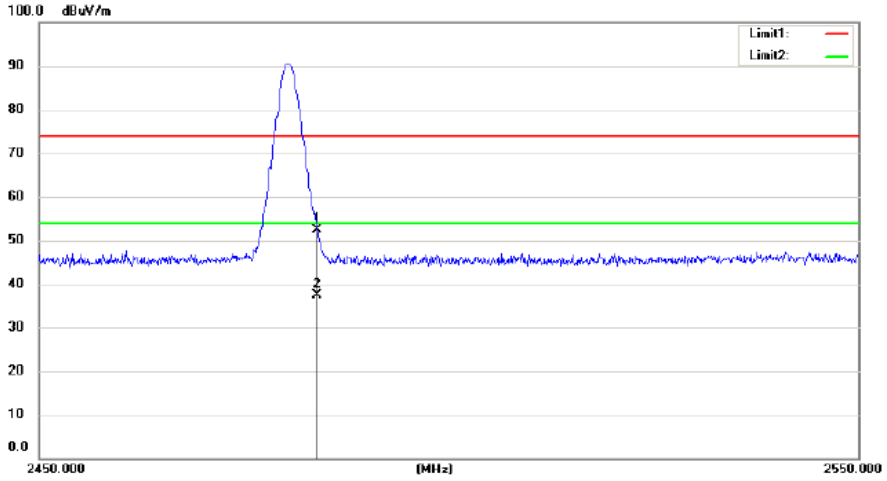
Low Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	2400.000	54.43	11.33	65.76	73.90	-8.14	peak			
2		2400.000	28.01	11.33	39.34	53.90	-14.56	AVG			

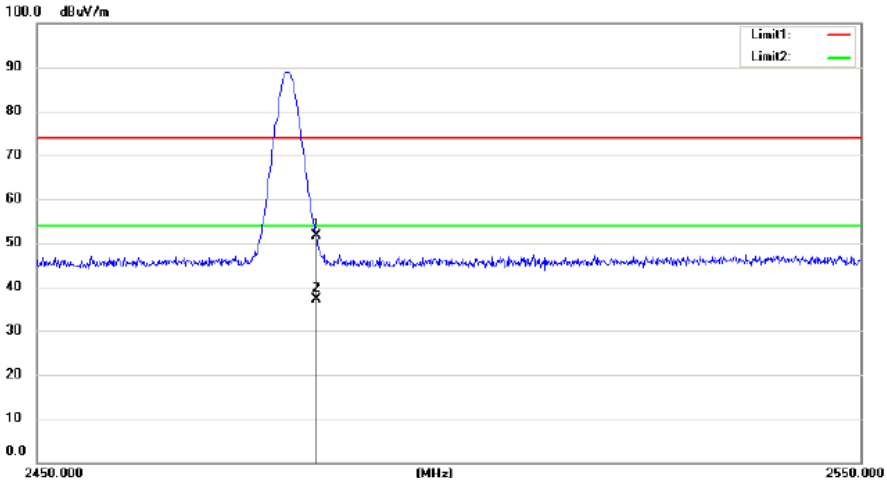
8DPSK

High Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	40.35	12.13	52.48	73.90	-21.42	peak			
2	*	2483.500	25.31	12.13	37.44	53.90	-16.46	AVG			

High Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.500	39.49	12.13	51.62	73.90	-22.28	peak			
2	*	2483.500	25.01	12.13	37.14	53.90	-16.76	AVG			

12. Antenna Port Emission

12.1 Test Equipment

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	MY45107013	05/29/2014	05/28/2015

12.2 Measuring Instruments and setting

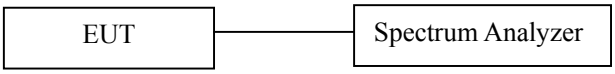
The following table is the setting of spectrum analyzer.

Attenuation	Auto
RB	100kHz
VB	300kHz
Detector	Peak
Trace	Max hold

12.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels, the limit was determined by attenuation 20dB of the RF peak power output.

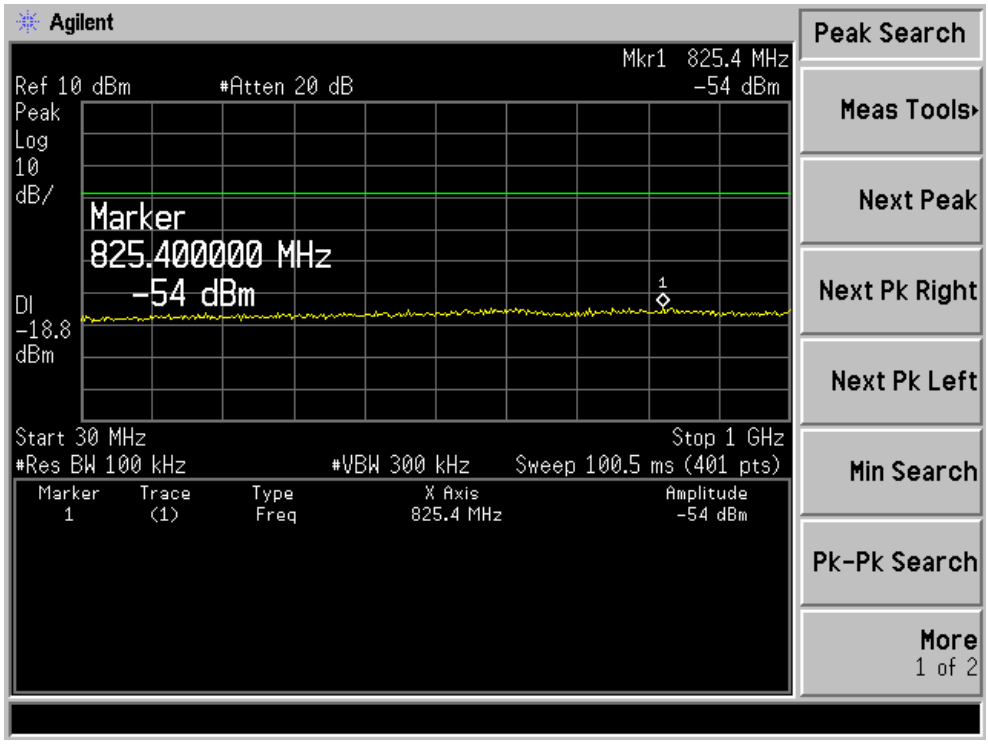
12.4 Block Diagram of Test setup

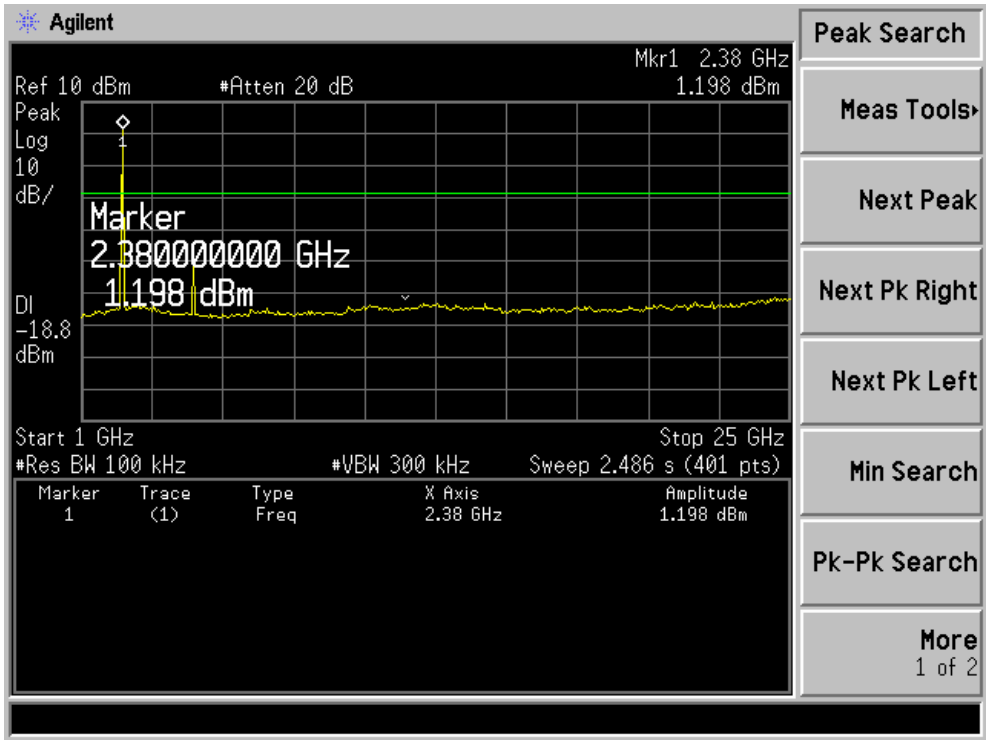


12.5 Test Result

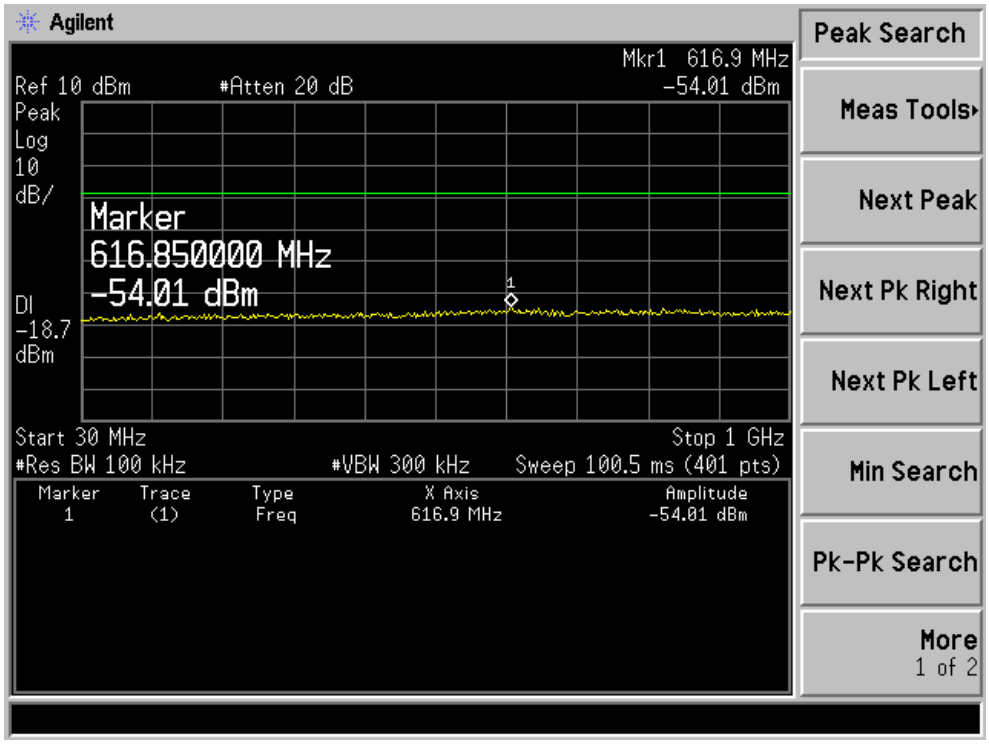
PASS.

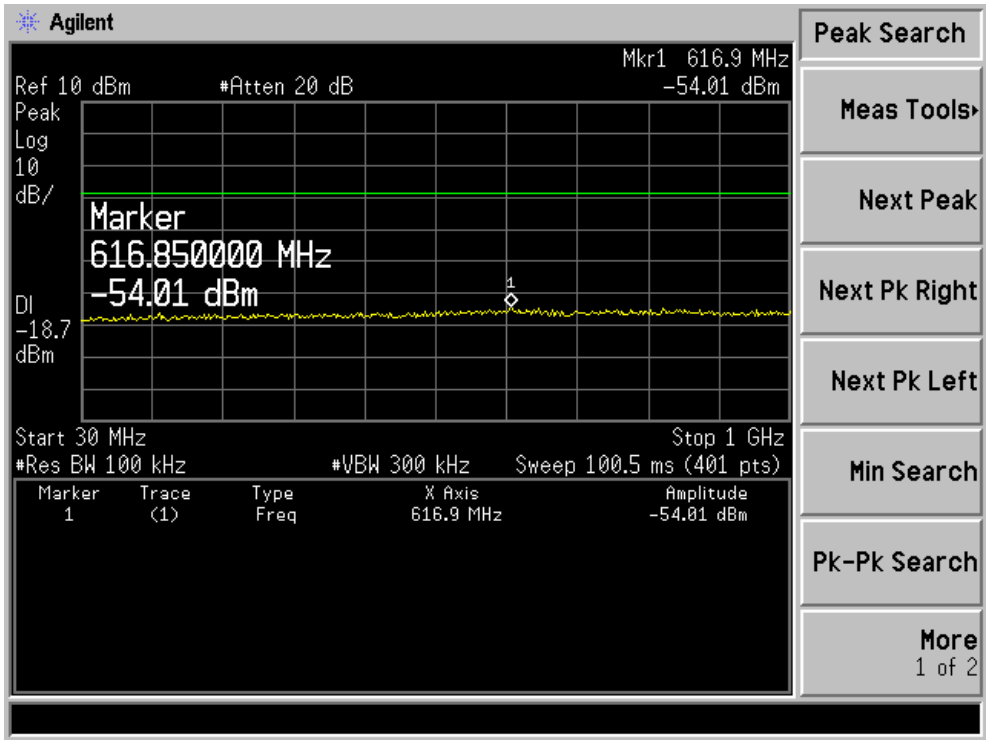
GFSK Mode: Low channel



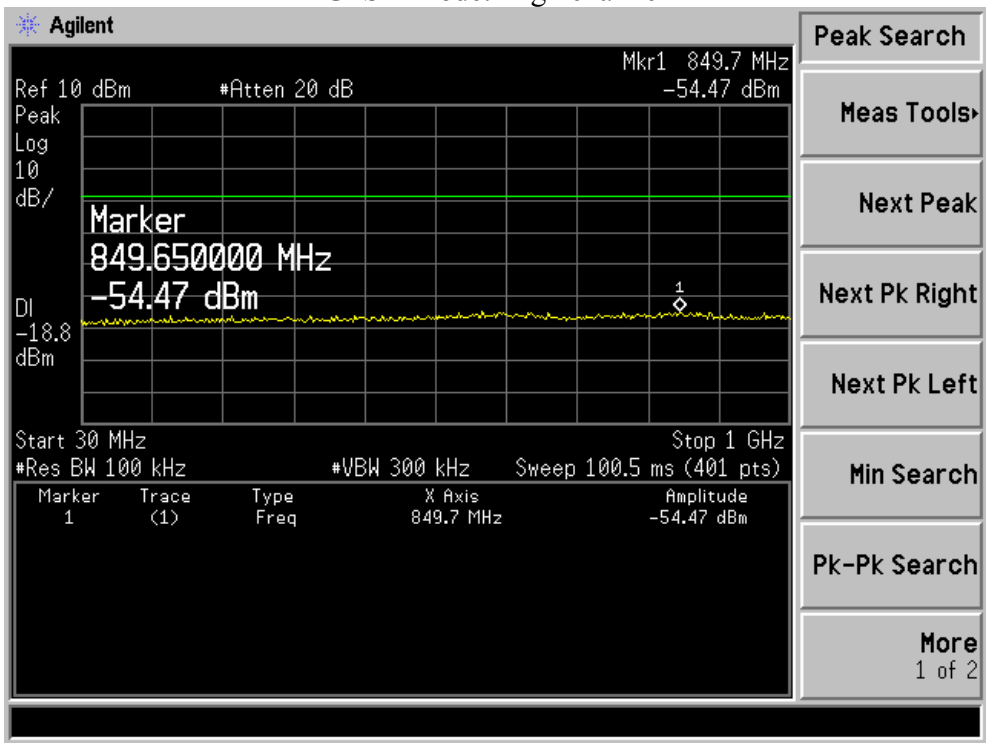


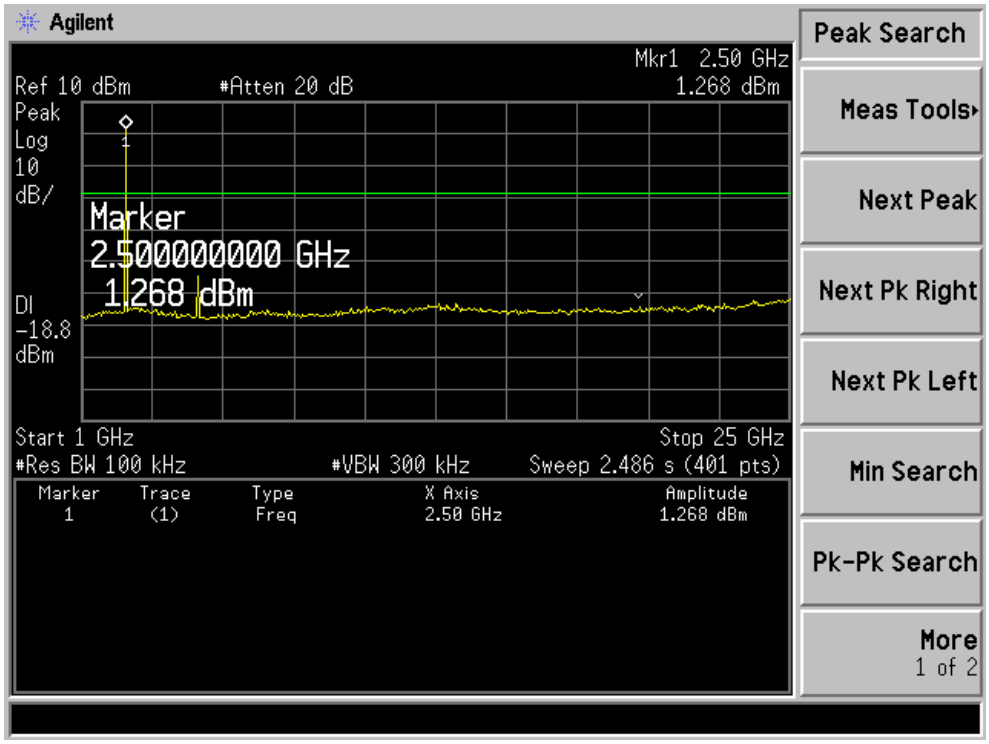
GFSK Mode: Middle channel



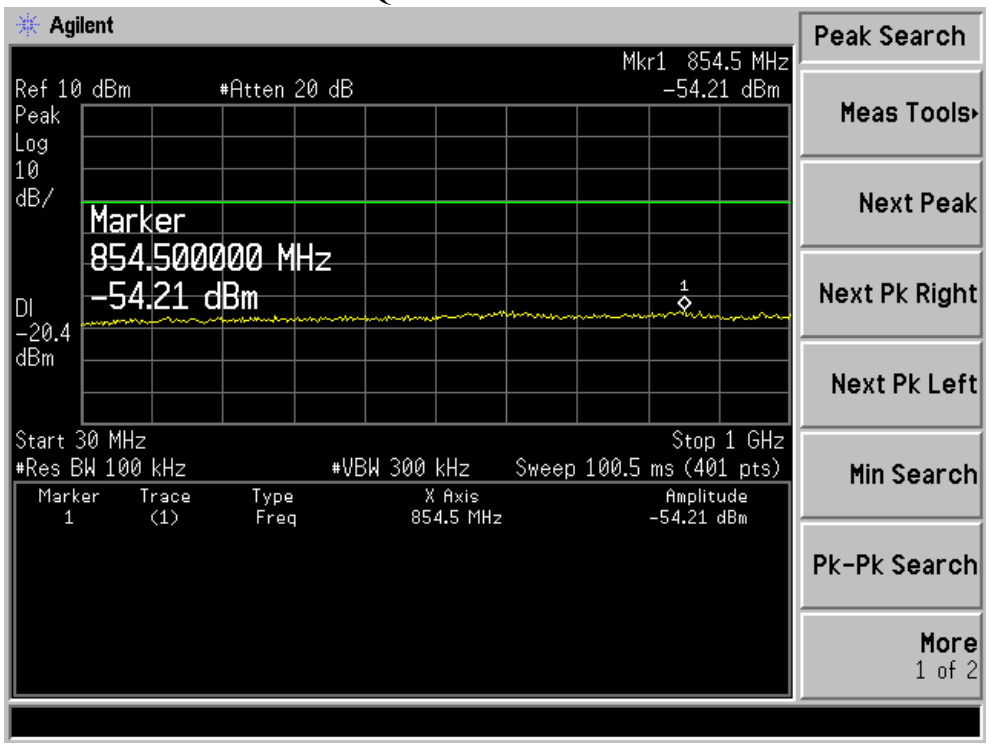


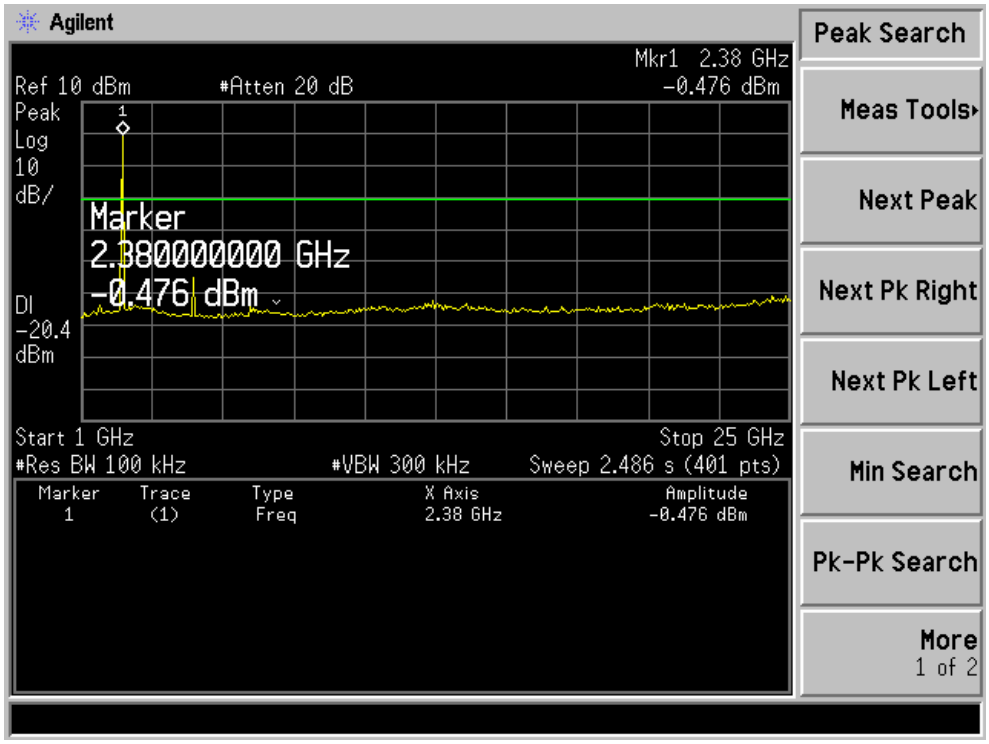
GFSK Mode: High channel



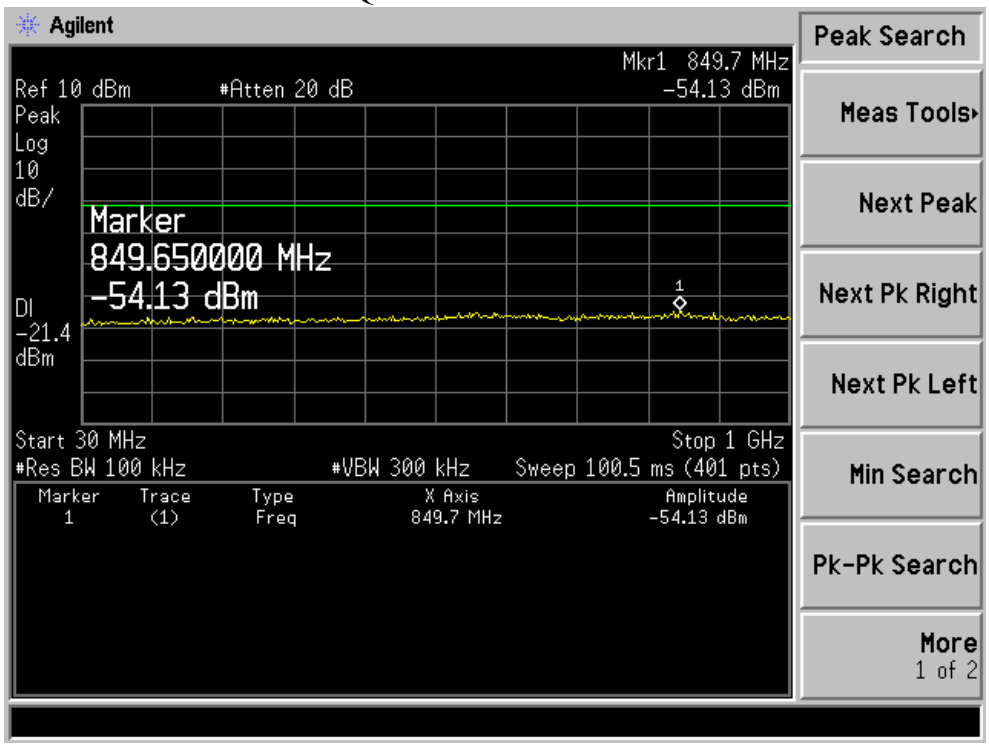


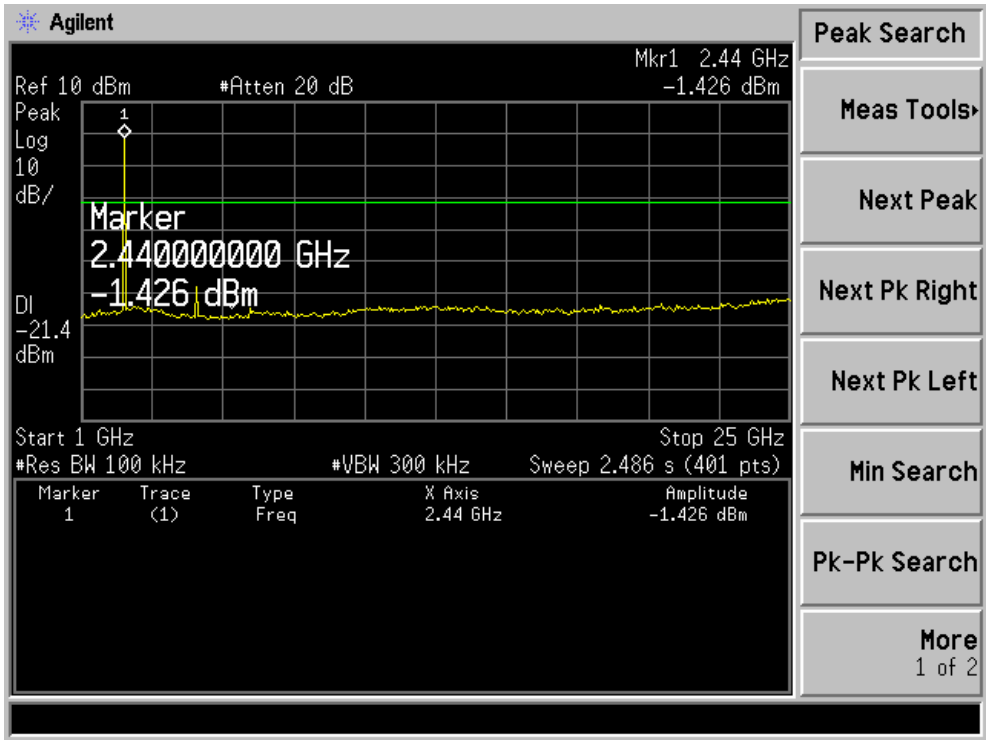
π /4-DQPSK Mode: Low channel



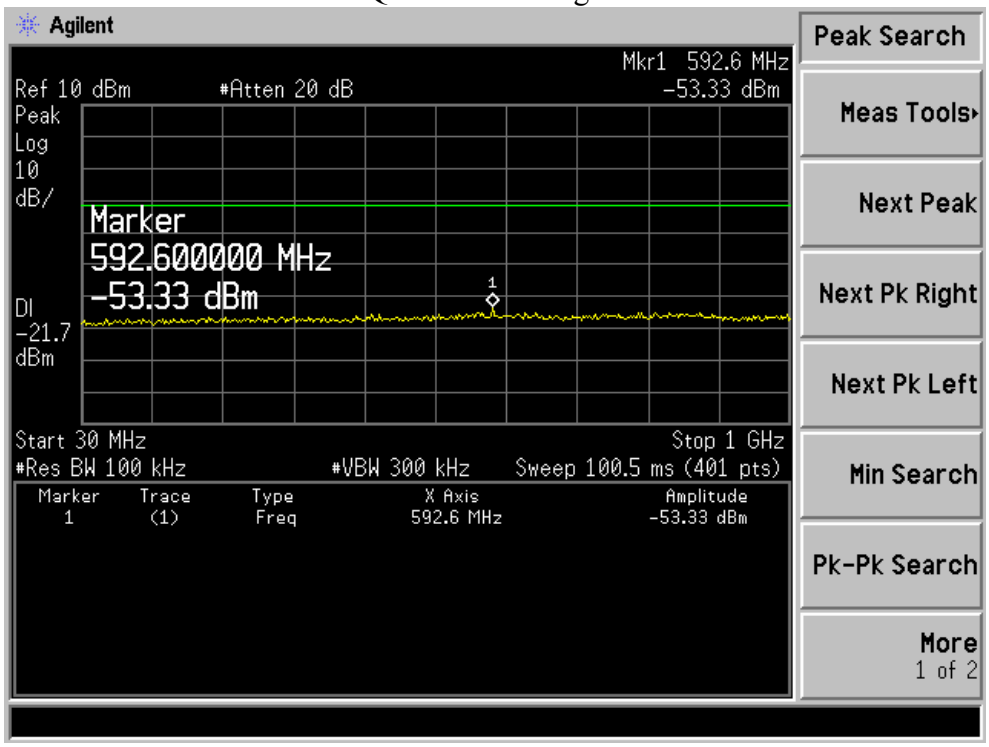


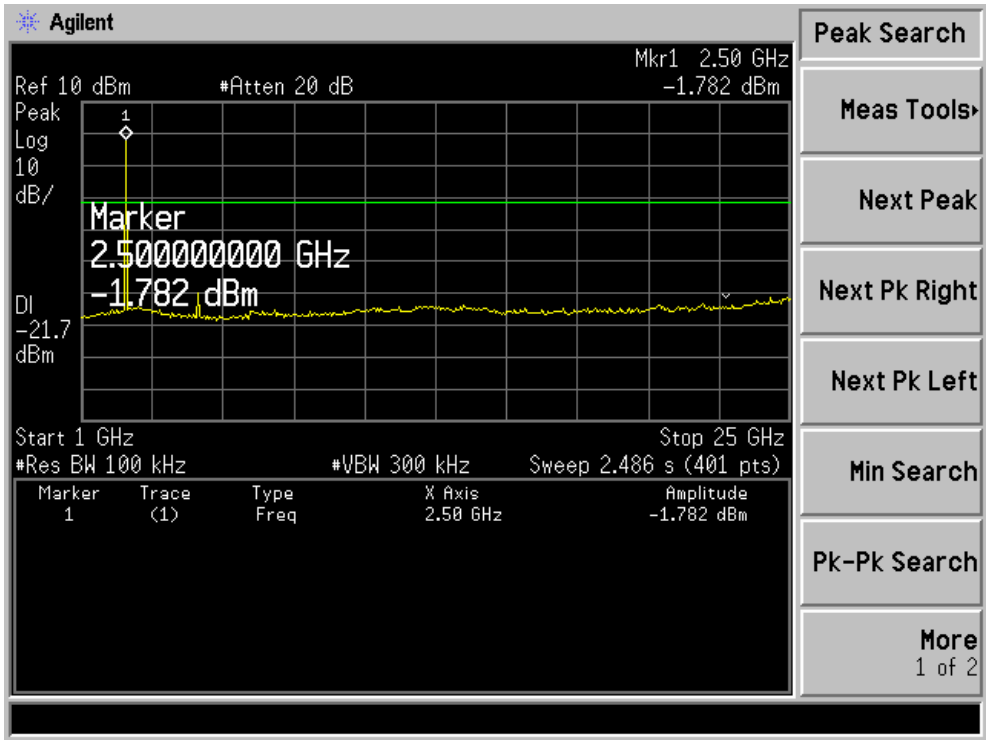
π /4 DQPSK Mode: Middle channel



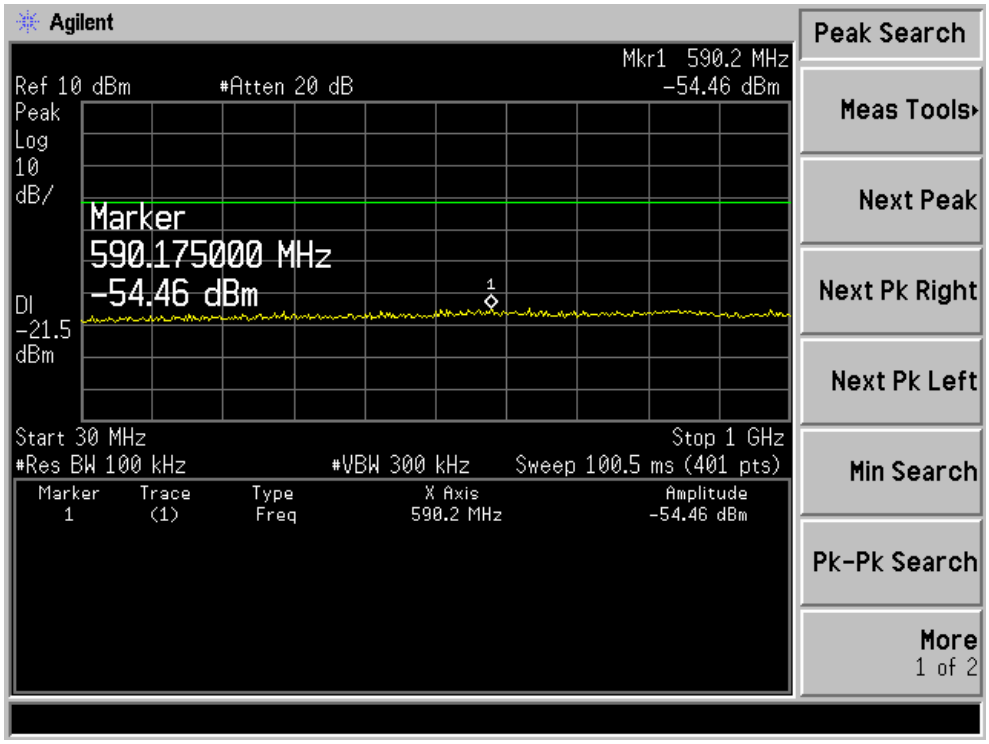


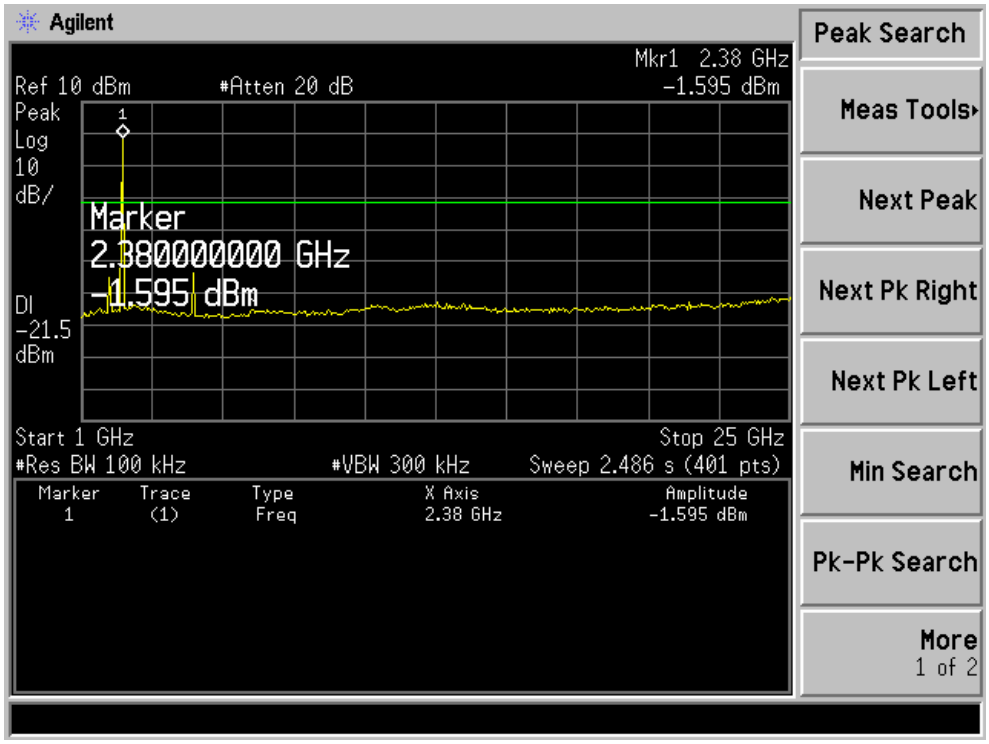
π /4 DQPSK Mode: High channel



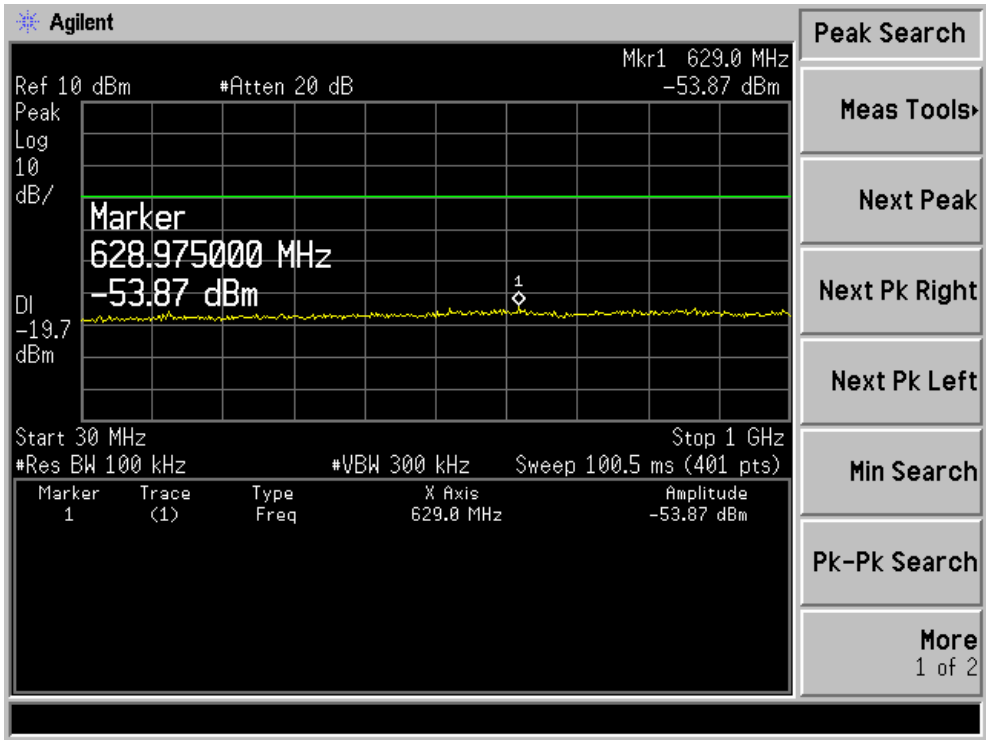


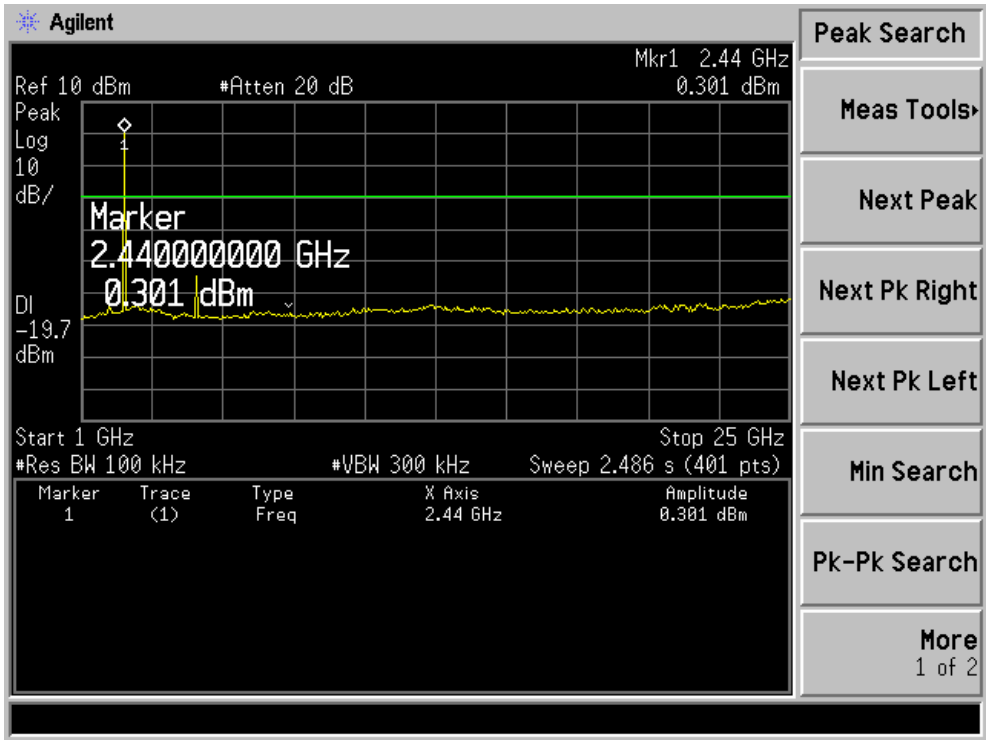
8DPSK Mode: Low channel



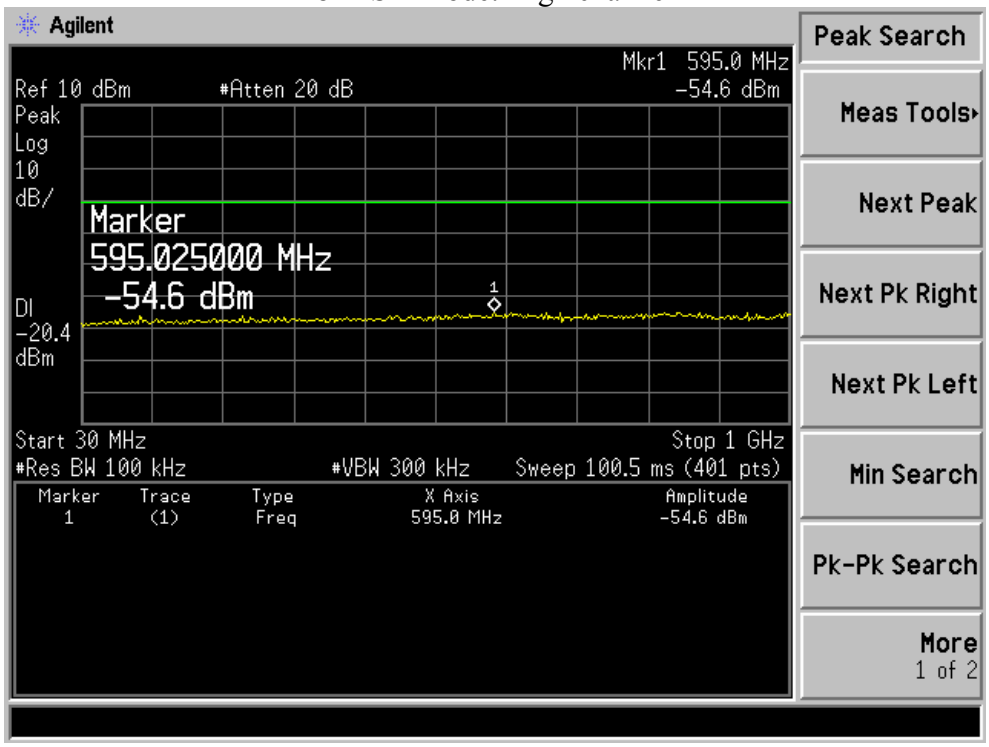


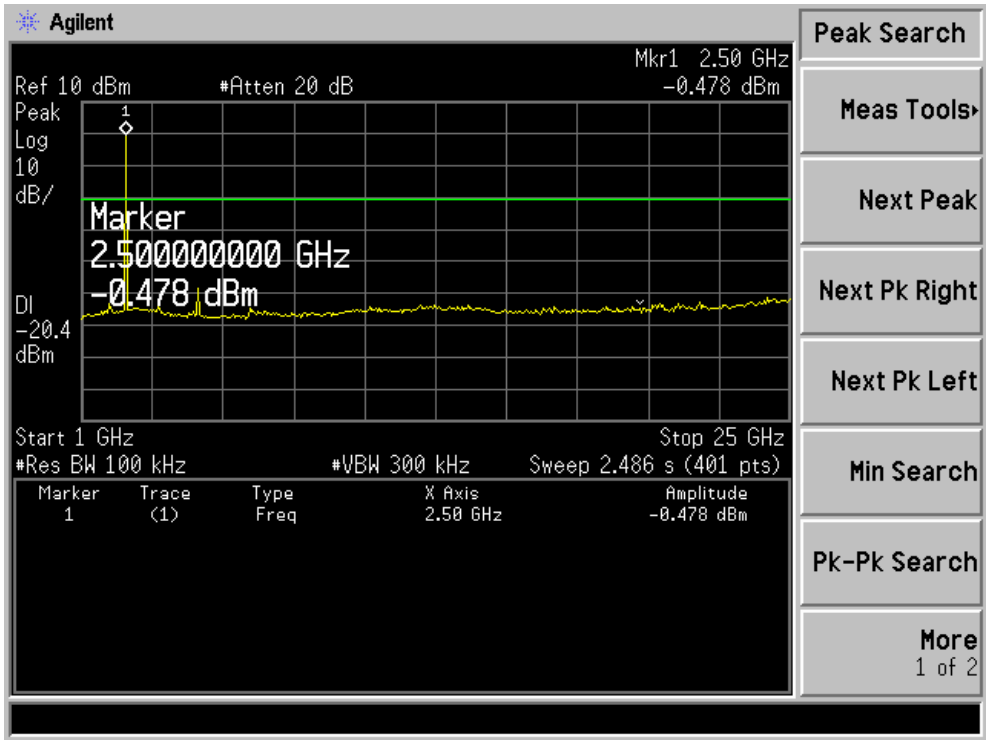
8DPSK Mode: Middle channel





8DPSK Mode: High channel





13. Antenna Application

13.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.240.

FCC part 15C section 15.247 requirements:
Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

13.2 Result

The EUT's antenna integrated on PCB, The antenna's gain is 1 dBi and meets the requirement