FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**TRE1306014302 R/C:77515**
FCC ID.....:	**2AAMSMJ97XXX**
Compiled by (position+printed name+signature)..:	File administrators Jerome Luo
Supervised by (position+printed name+signature)..:	Test Engineer Yuchao Wang
Approved by (position+printed name+signature)..:	Manager Wenliang Li
Date of issue.....:	July 18, 2013
Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address .....:	Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Applicant's name.....:	**SHENZHEN NST INDUSTRY AND TRADE CO.,LTD**
Address .....:	2/F,Bldg B,HongMen Technical Garden II,Jihua Road,.Buji Town,Longgang District,Shenzhen P.R.China
Test specification:	
Standard .....:	**FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz**
TRF Originator.....:	Shenzhen Huatongwei International Inspection CO., Ltd
Master TRF.....:	Dated 2006-06

Test item description .....:	Tablet PC
Trade Mark .....:	ULTRATAB™
Model/Type reference.....:	MJ97XXX
Listed Models .....:	MX70XXX, MX78XXX,MX80XXX,MJ90XXX, M70XXX,MJ10XXX, MG11XXX, MG13XXX,CMXXXX,M78XXX,M80XXX, M80XXX,M90XXX,M97XXX, M11XXX, M10XXX
Manufacturer .....:	**HK YITOA TECHNOLOGY CO., LIMITED**
Modulation Type .....:	GFSK,8DPSK,π/4DQPSK
Operation Frequency.....:	From 2402MHz to 2480MHz
Rating .....:	DC 5.0V
Result.....:	**Positive**

T E S T R E P O R T

Test Report No. :	**TRE1306014302**	July 18, 2013 Date of issue

Equipment under Test	:	Tablet PC
Model /Type	:	MJ97XXX
Listed Models	:	MX70XXX, MX78XXX,MX80XXX,MJ90XXX, M70XXX, MJ10XXX,MG11XXX, MG13XXX,CMXXXX,M78XXX, M80XXX, M80XXX,M90XXX,M97XXX,M11XXX, M10XXX
Applicant	:	**SHENZHEN NST INDUSTRY AND TRADE CO.,LTD**
Address	:	2/F,Bldg B,HongMen Technical Garden II,Jihua Road,.Buji Town,Longgang District,Shenzhen P.R.China
Manufacturer	:	**HK YITOA TECHNOLOGY CO., LIMITED**
Address	:	UNIT 04，7/F BRIGHT WAY TOWER NO 33 MONG KOK RD KL

Test Result according to the standards on page 4:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	June 20, 2013
Testing commenced on	:	June 20, 2012
Testing concluded on	:	July 18, 2012

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	●	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		○	Other (specified in blank below)		

DC 5.0V

2.3. Short description of the Equipment under Test (EUT)

2.4GHz (MID (M/N:MJ97XXX))

For more details, refer to the user's manual of

the EUT. Serial number: Prototype

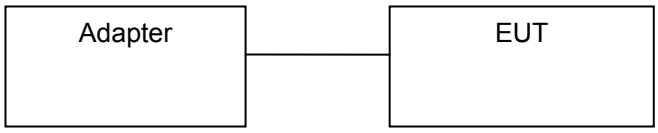
2.4. EUT operation mode

The EUT has been tested under typical operating condition. There are EDR (Enhanced Data Rate) and BDR (Basic Data Rate)mode.The Applicant provides communication tools software to control the EUT for staying in continous transmitting and receiving mode for testing. There are 79 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel .

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	**2402**	40	2442
1	2403	41	2443
2	2404	42	2444
3	2405	43	2445
4	2406	44	2446
5	2407	45	2447
6	2408	46	2448
7	2409	47	2449
8	2410	48	2450
9	2411	49	2451
10	2412	50	2452
11	2413	51	2453
12	2414	52	2454
13	2415	53	2455
14	2416	54	2456
15	2417	55	2457
16	2418	56	2458
17	2419	57	2459

18	2420	58	2460
19	2421	59	2461
20	2422	60	2462
21	2423	61	2463
22	2424	62	2464
23	2425	63	2465
24	2426	64	2466
25	2427	65	2467
26	2428	66	2468
27	2429	67	2469
28	2430	68	2470
29	2431	69	2471
30	2432	70	2472
31	2433	71	2473
32	2434	72	2474
33	2435	73	2475
34	2436	74	2476
35	2437	75	2477
36	2438	76	2478
37	2439	77	2479
38	2440	**78**	**2480**
39	**2441**		

2.5. Block Diagram of Test Setup



● AC Adapter MODEL:JY-05200
INPUT:100-240V～50/60Hz 0.3A Max
OUTPUT: 5.0V DC 2.0A
Power Cable: 120cm
◇ Shielded ◆ Unshielded

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AAMSMJ97XXX** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. NOTE

1. The EUT is a 802.11b/g/n Table PC with WLAN and Bluetooth function,The functions of the EUT listed as below:

	Test Standards	Reference Report
WLAN 802.11b/g/n	FCC Part 15 Subpart C	TRE1306014301
Bluetooth	FCC Part 15 Subpart C	TRE1306014302
USB Port	FCC Part 15 Subpart B	TRE1306014303
MPE REPORT	FCC Per 47 CFR 2.1093(d)	TRE1306014304

2. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
EUT	√	—	—	—

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Mar. 01, 2012. Valid time is until Feb 28, 2015.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept. 30, 2013.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date Jun. 01, 2012, valid time is until Jun. 01, 2015.

IC-Registration No.: 5377A

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Jan. 25, 2011, valid time is until Jan. 24, 2014.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2010. Valid time is until Dec. 23, 2013.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups

according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2013.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

FCC PART 15 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(1)(i)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(b)	Pseudorandom Frequency Hopping Sequence	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency& Time of Occupancy	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS
FCC Part1.1307 (b)	MPE Evaluation	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.6. Equipments Used during the Test

AC Power Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2012/10/27
2	EMI Test Receiver	Rohde&Schwarz	ESCI3	100038	2012/10/27
3	Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2012/10/27
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	2012/10/27

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2012/10/27
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2012/10/27
3	EMI TEST OFTWARE	Audix	E3	N/A	2012/10/27
4	TURNTABLE	ETS	2088	2149	2012/10/27
5	ANTENNA MAST	ETS	2075	2346	2012/10/27
6	EMI TEST OFTWARE	Rohde&Schwarz	ESK1	N/A	2012/10/27
7	HORN ANTENNA	ShwarzBeck	9120D	1011	2012/10/27
8	Amplifer	Sonoma	310N	E009-13	2012/10/27
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2012/10/27
10	High pass filter	Compliance Direction systems	BSU-6	34202	2012/10/27
11	HORN ANTENNA	ShwarzBeck	9120D	1012	2012/10/27
12	Amplifer	Compliance Direction systems	PAP1-4060	120	2012/10/27
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2012/10/27
14	TURNTABLE	MATURO	TT2.0	----	2012/10/27
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	2012/10/27

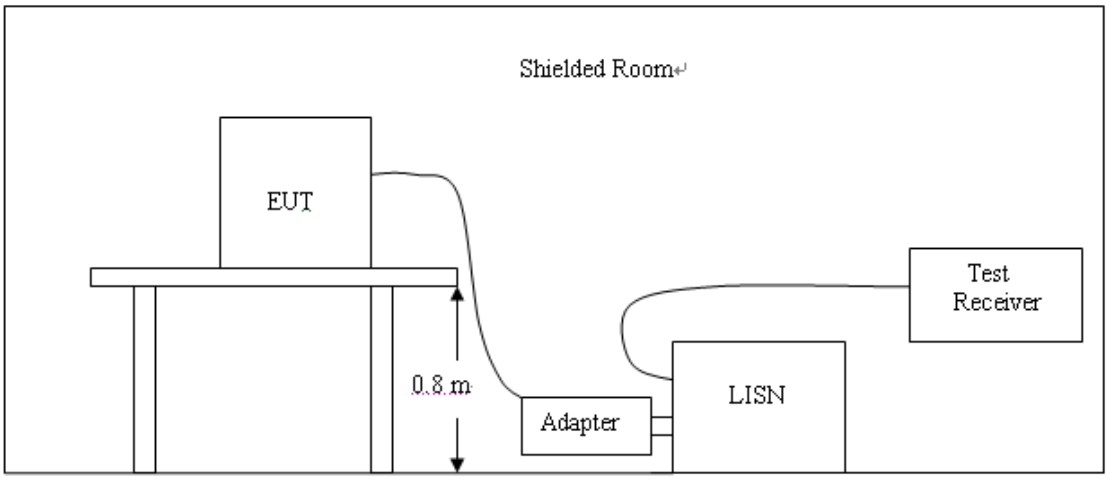
Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Power Sensor	Rohde&Schwarz	NRP-Z21	102638	2012/10/27
2	Power Sensor	Rohde&Schwarz	NRP-Z21	102639	2012/10/27
3	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2012/10/27

The Cal.Interval was one year

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2 Support equipment, if needed, was placed as per ANSI C63.10-2009
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

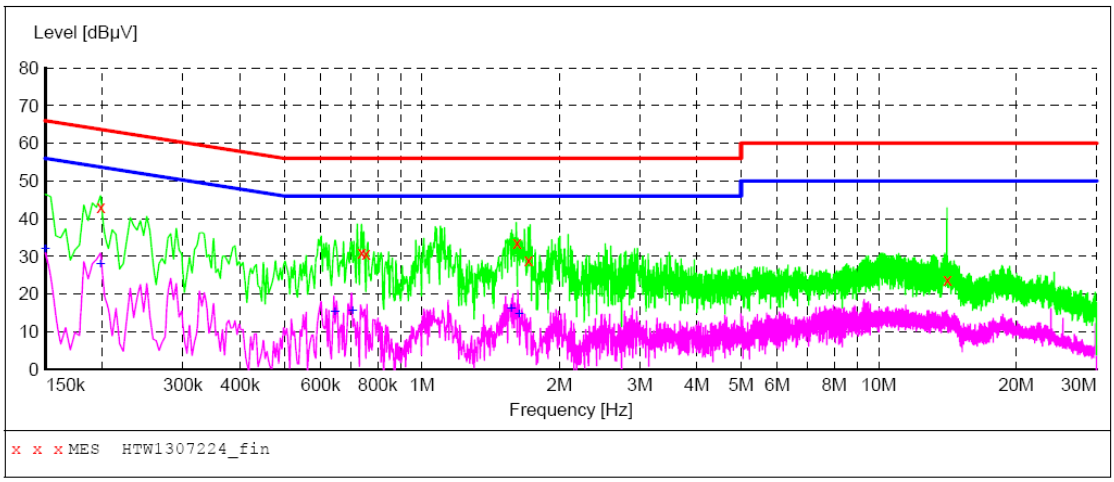
* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

Note:We tested Conducted Emission of GFSK, π/4 DQPSK and 8DPSK mode from 0.15KHz to 30MHz and We recorded the worst case data at GFSK mode.

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "HTW1307224_fin"

7/16/2013 9:11AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.198000	43.00	11.9	64	20.7	QP	N	GND
0.738000	31.00	10.4	56	25.0	QP	N	GND
0.754000	30.60	10.4	56	25.4	QP	N	GND
1.614000	33.70	10.5	56	22.3	QP	N	GND
1.710000	29.10	10.5	56	26.9	QP	N	GND
14.138000	23.90	10.8	60	36.1	QP	N	GND

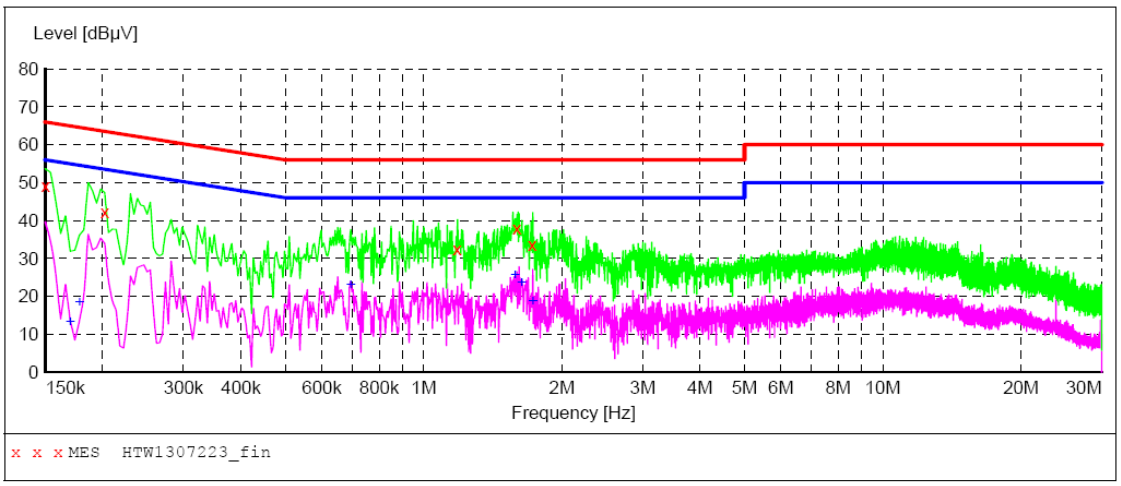
MEASUREMENT RESULT: "HTW1307224_fin2"

7/16/2013 9:11AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	32.00	12.7	56	24.0	AV	N	GND
0.198000	27.80	11.9	54	25.9	AV	N	GND
0.646000	15.20	10.4	46	30.8	AV	N	GND
0.706000	15.40	10.4	46	30.6	AV	N	GND
1.570000	15.90	10.5	46	30.1	AV	N	GND
1.634000	14.50	10.5	46	31.5	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "HTW1307223_fin"

7/16/2013 9:07AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	49.10	12.7	66	16.9	QP	L1	GND
0.202000	42.10	11.8	64	21.4	QP	L1	GND
1.182000	32.50	10.6	56	23.5	QP	L1	GND
1.594000	37.80	10.5	56	18.2	QP	L1	GND
1.722000	33.70	10.5	56	22.3	QP	L1	GND

MEASUREMENT RESULT: "HTW1307223_fin2"

7/16/2013 9:07AM

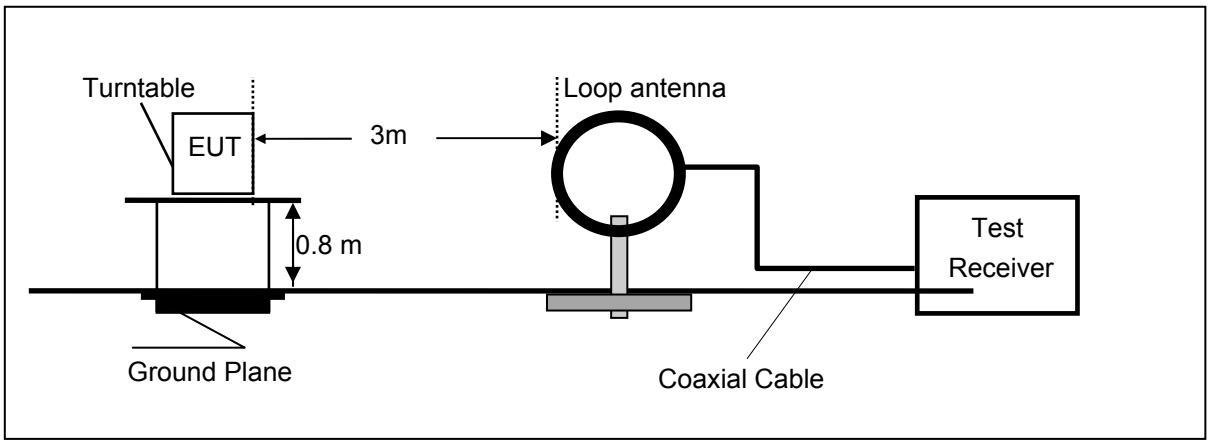
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.170000	13.20	12.4	55	41.8	AV	L1	GND
0.178000	18.40	12.2	55	36.2	AV	L1	GND
0.694000	22.90	10.4	46	23.1	AV	L1	GND
1.582000	25.50	10.5	46	20.5	AV	L1	GND
1.638000	23.60	10.5	46	22.4	AV	L1	GND
1.730000	18.60	10.5	46	27.4	AV	L1	GND

4.2. Radiated Emission

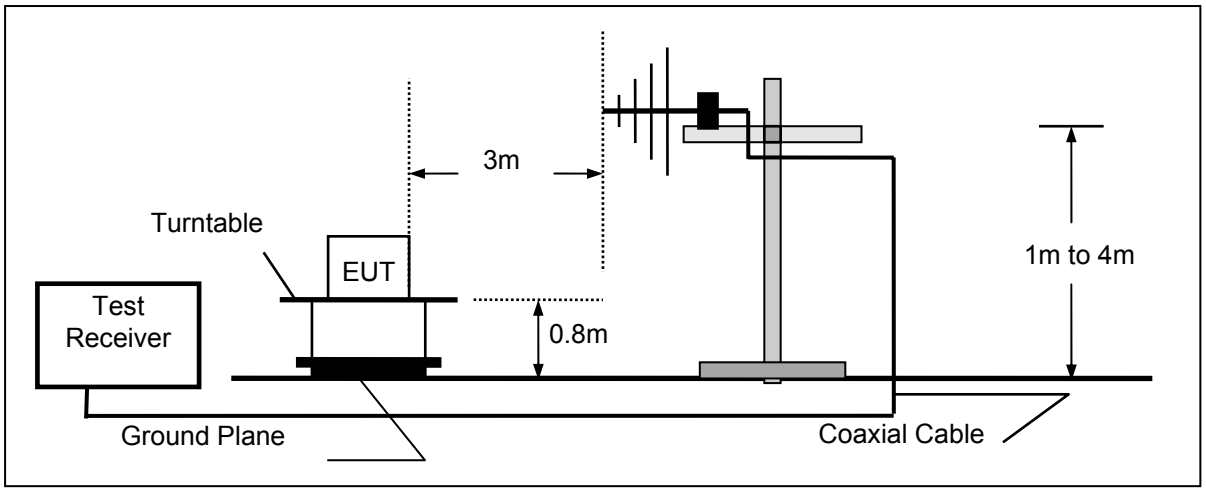
TEST CONFIGURATION

Radiated Emission Test Set-Up

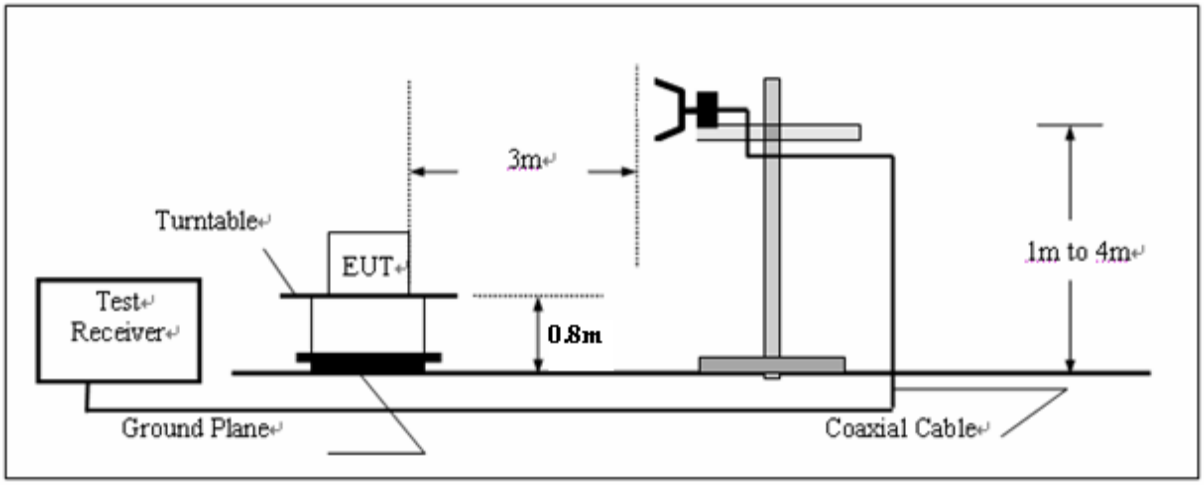
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
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 measurements have been completed.
5. The EUT minimum operation frequency was 223.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

Note:We measured Radiated Emission at GFSK, π/4 DQPSK and 8DPSK mode from 9KHz to 25GHz and recorded worst case at GFSK mode.

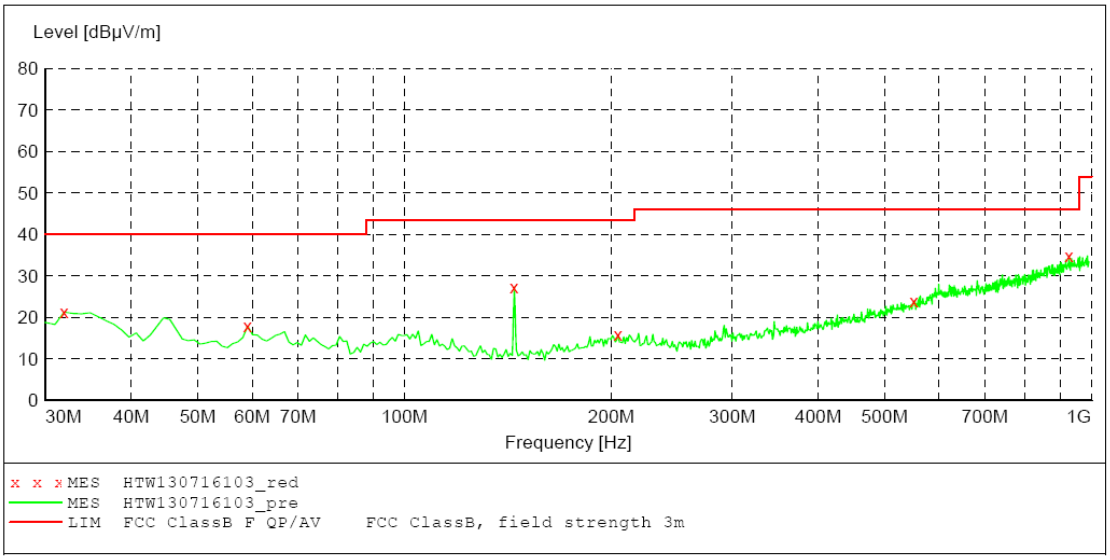
For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
0.63	47.92	71.21	23.29	QP	PASS
1.62	43.62	63.05	19.43	QP	PASS
16.52	41.54	69.54	28.00	QP	PASS
27.09	42.00	69.54	29.54	QP	PASS

For 30MHz to 1000MHz

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	VULB9163



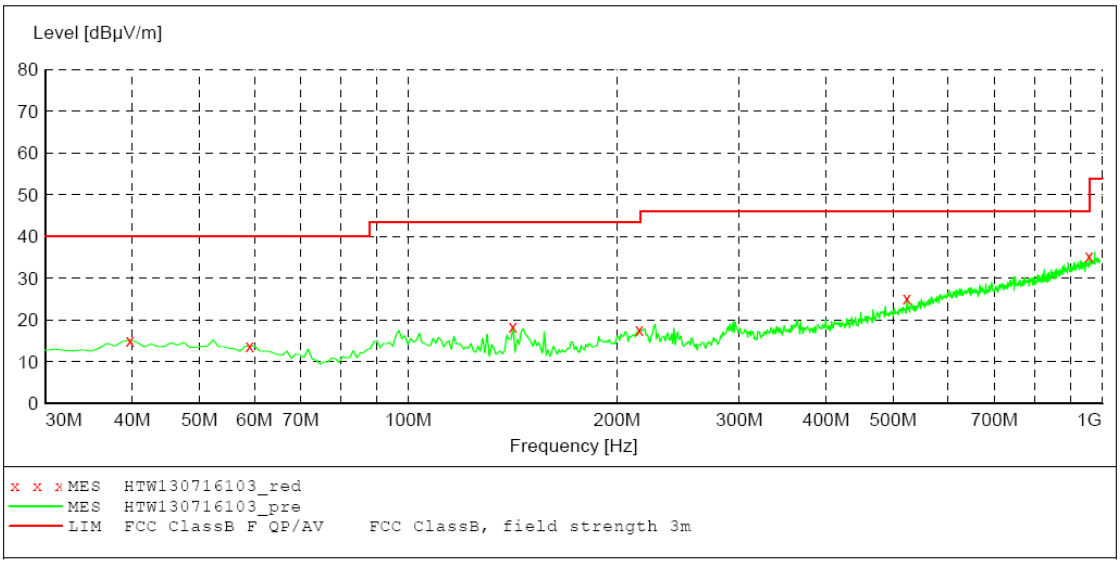
MEASUREMENT RESULT: "HTW130716103_red"

7/16/2013 9:51AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	21.30	-16.3	40.0	18.7	PK	100.0	76.00	VERTICAL
59.100000	17.90	-15.6	40.0	22.1	PK	100.0	14.00	VERTICAL
144.460000	27.40	-18.4	43.5	16.1	PK	100.0	14.00	VERTICAL
204.600000	15.80	-14.7	43.5	27.7	PK	100.0	86.00	VERTICAL
551.860000	24.00	-5.4	46.0	22.0	PK	100.0	57.00	VERTICAL
927.250000	34.90	3.1	46.0	11.1	PK	100.0	188.00	VERTICAL

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	VULB9163



MEASUREMENT RESULT: "HTW130716103_red"

7/16/2013 9:48AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
39.700000	15.20	-15.1	40.0	24.8	PK	300.0	12.00	HORIZONTAL
59.100000	13.80	-15.6	40.0	26.2	PK	300.0	20.00	HORIZONTAL
141.550000	18.50	-18.5	43.5	25.0	PK	300.0	334.00	HORIZONTAL
215.270000	17.60	-15.0	43.5	25.9	PK	100.0	154.00	HORIZONTAL
523.730000	25.20	-6.3	46.0	20.8	PK	100.0	267.00	HORIZONTAL
958.290000	35.50	3.5	46.0	10.5	PK	300.0	360.00	HORIZONTAL

For 1GHz to 25GHz

Low Channel @ Channel 00 @ 2402 MHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4804.00	50.80	PK	54.00	3.20	1.00 H	256	48.72	31.58	7.00	36.5	2.08
2	7206.00	52.34	PK	54.00	1.66	1.00 H	136	41.68	37.06	8.90	35.3	10.66

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4804.00	51.44	PK	54.00	2.56	1.00 V	339	49.36	31.58	7.00	36.5	2.08
2	7206.00	50.91	PK	54.00	3.09	1.00 V	340	40.25	37.06	8.90	35.3	10.66

Middle Channel @ Channel 39 @ 2441 MHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4882.00	51.53	PK	54.00	2.47	1.00 H	202	49.39	31.04	7.60	36.5	2.14
2	7323.00	51.82	PK	54.00	2.18	1.00 H	355	40.68	37.84	8.60	35.3	11.14

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4882.00	52.40	PK	54.00	1.60	1.00 V	97	50.26	31.04	7.60	36.5	2.14
2	7323.00	52.80	PK	54.00	1.20	1.00 V	288	41.66	37.84	8.60	35.3	11.14

High Channel @ Channel 78 @ 2480 MHz

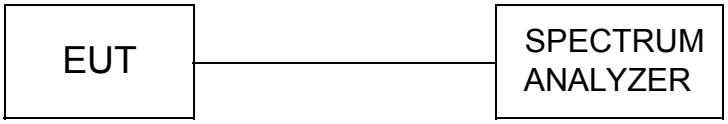
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4960.00	50.04	PK	54.00	3.96	1.00 H	198	47.61	31.63	7.00	36.2	2.43
2	7340.00	52.08	PK	54.00	1.92	1.00 H	90	40.48	38.40	8.50	35.3	11.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4960.00	53.35	PK	54.00	0.65	1.00 V	96	50.92	31.63	7.00	-36.2	2.43
2	7340.00	51.80	PK	54.00	2.20	1.00 V	35	40.20	38.40	8.50	-35.3	11.60

REMARKS:
1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) -Pre-amplifier Factor
3. The other emission levels were very low against the limit.
4. Margin value = Limit value- Emission level.
5. The average measurement was not performed when the peak measured data under the limit of average detection.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

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

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

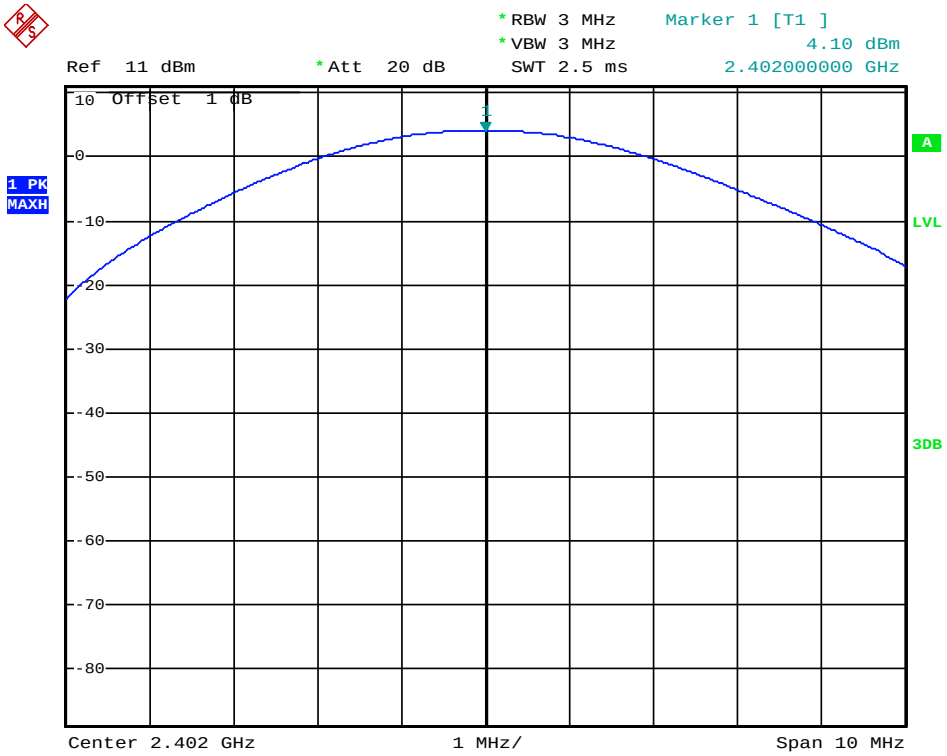
4.3.1 GFSK Test Mode

A. Test Verdict

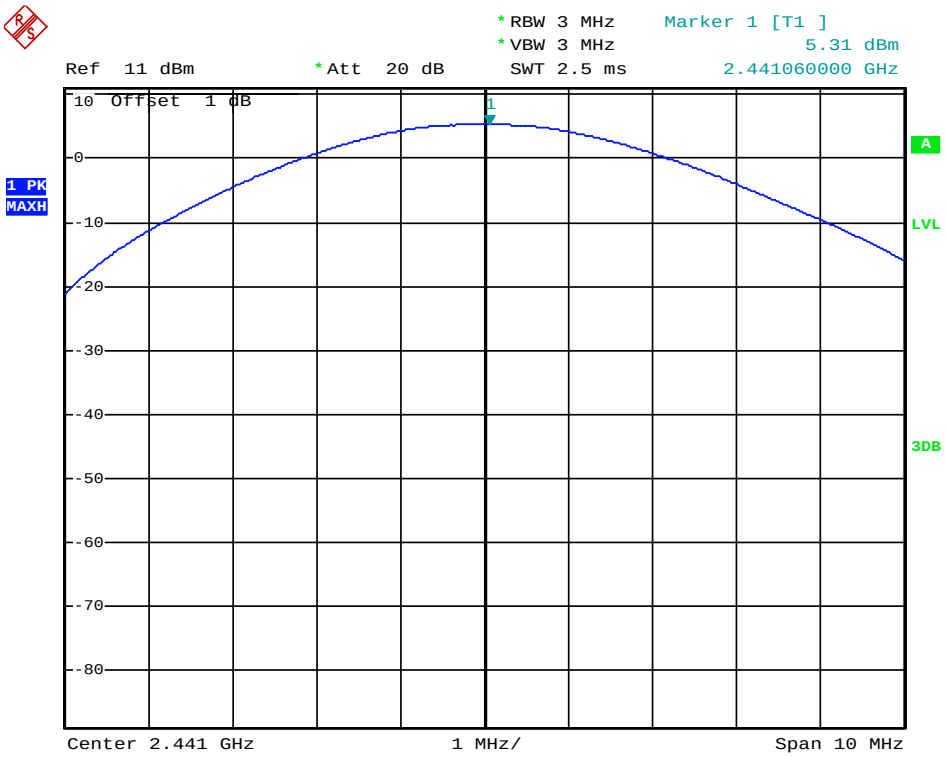
Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Refer to Plot	Limits (dBm)	Verdict
00	2402	4.10	Plot 4.3.1 A	30	PASS
39	2441	5.31	Plot 4.3.1 B	30	PASS
78	2480	6.20	Plot 4.3.1 C	30	PASS

Note: 1.The test results including the cable lose.

B. Test Plots

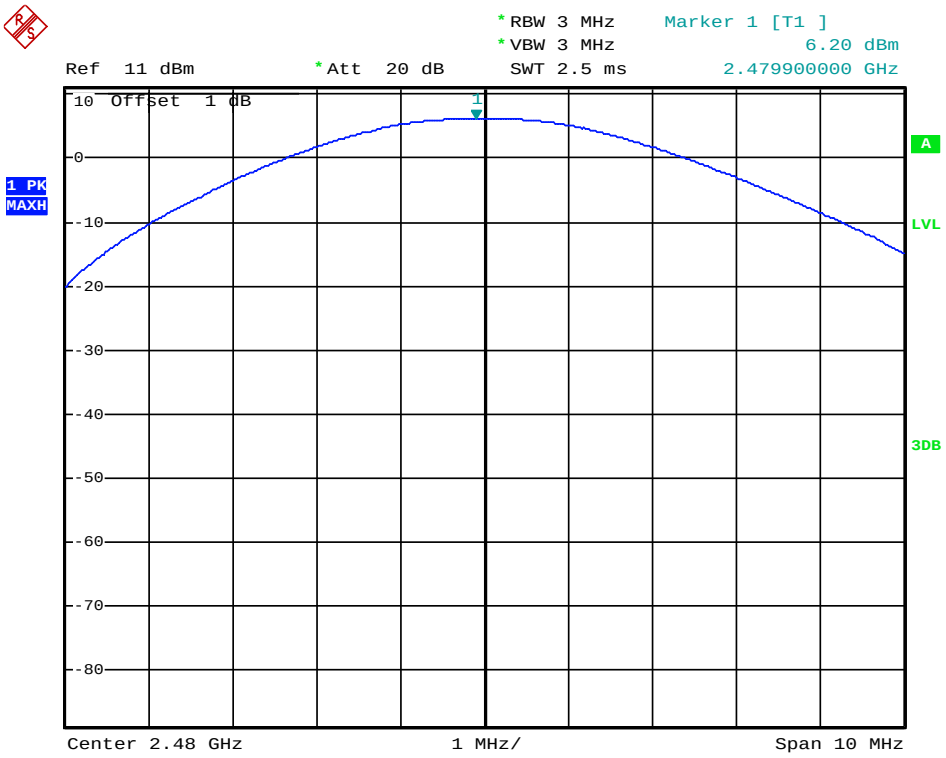


(Plot 4.3.1 A: Channel 00: 2402MHz @ GFSK)



Date: 16.JUL.2013 20:22:36

(Plot 4.3.1 B: Channel 39: 2441MHz @ GFSK)



Date: 16.JUL.2013 20:23:13

(Plot 4.3.1 C: Channel 78: 2480MHz @ GFSK)

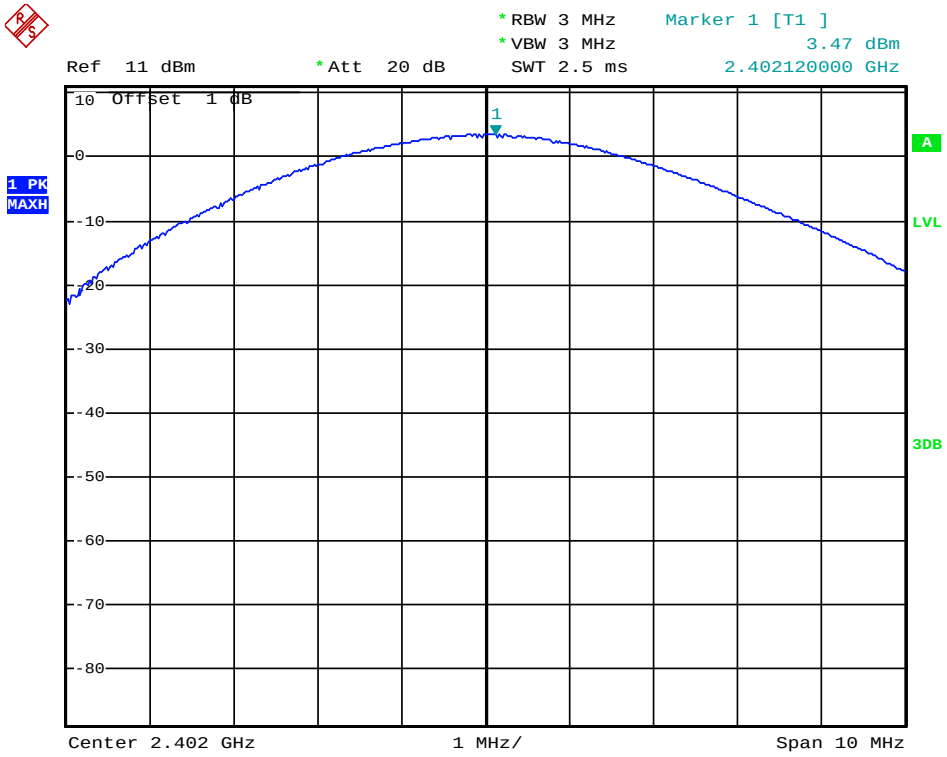
4.3.2 8DPSK Test Mode

A. Test Verdict

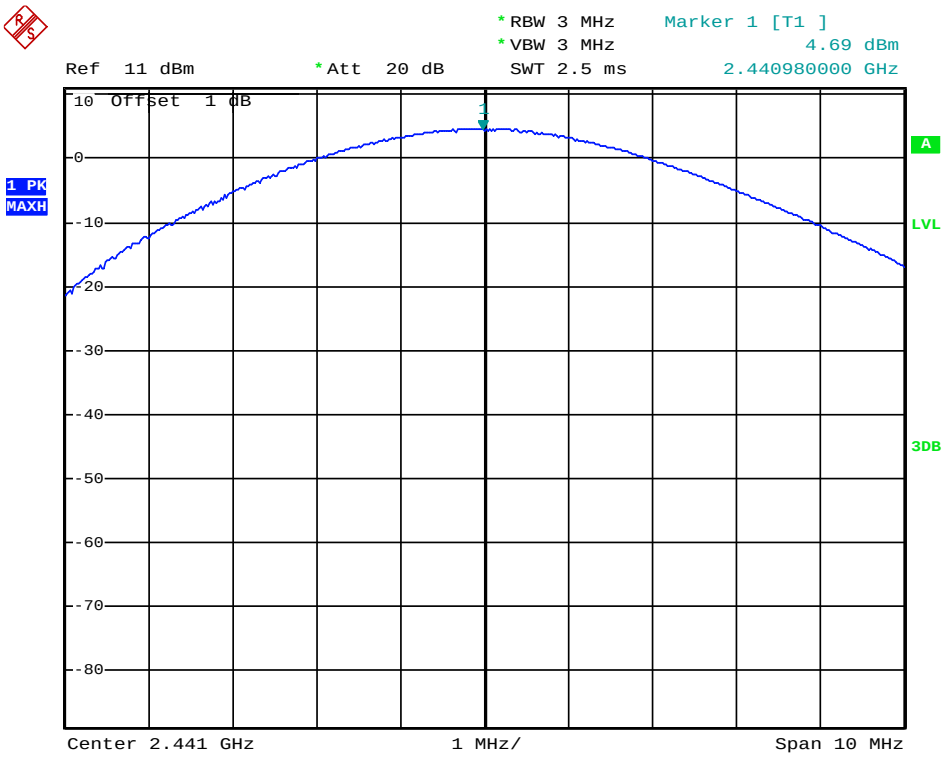
Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Refer to Plot	Limits (dBm)	Result
00	2402	3.47	Plot 4.3.2 A	30	PASS
39	2441	4.69	Plot 4.3.2 B	30	PASS
78	2480	5.59	Plot 4.3.2 C	30	PASS

Note: 1.The test results including the cable lose.

B. Test Plots

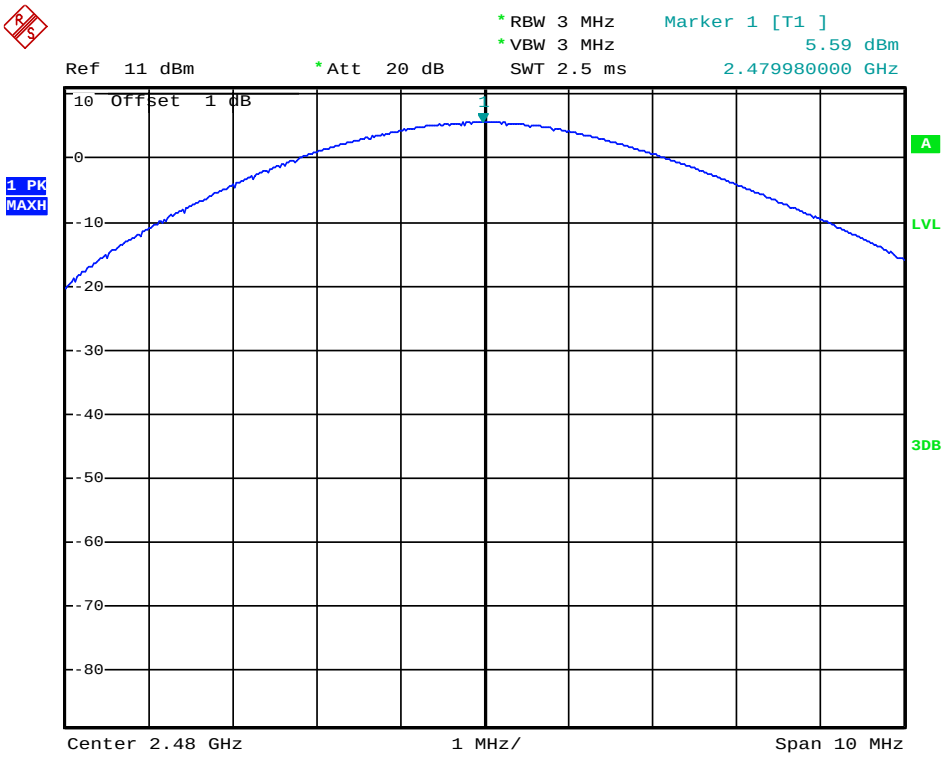


(Plot 4.3.2 A: Channel 00: 2402MHz @ 8DPSK)



Date: 16.JUL.2013 20:26:32

(Plot 4.3.2 B: Channel 39: 2441MHz @ 8DPSK)



Date: 16.JUL.2013 20:27:01

(Plot 4.3.2 C: Channel 78: 2480MHz @ 8DPSK)

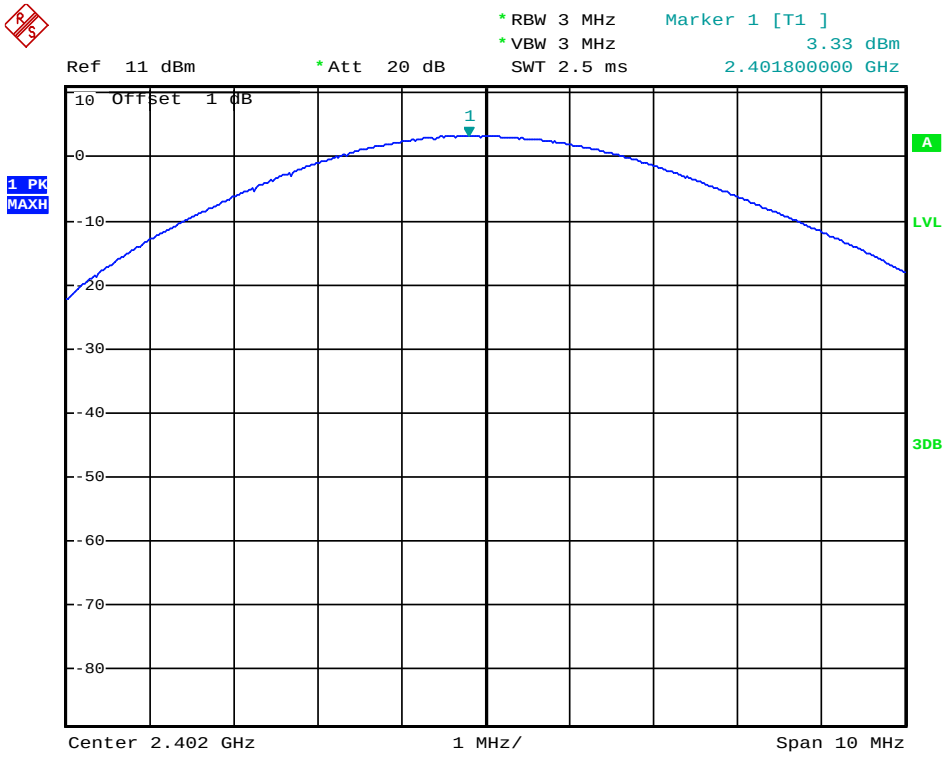
4.3.3 π/4DQPSKTest Mode

A. Test Verdict

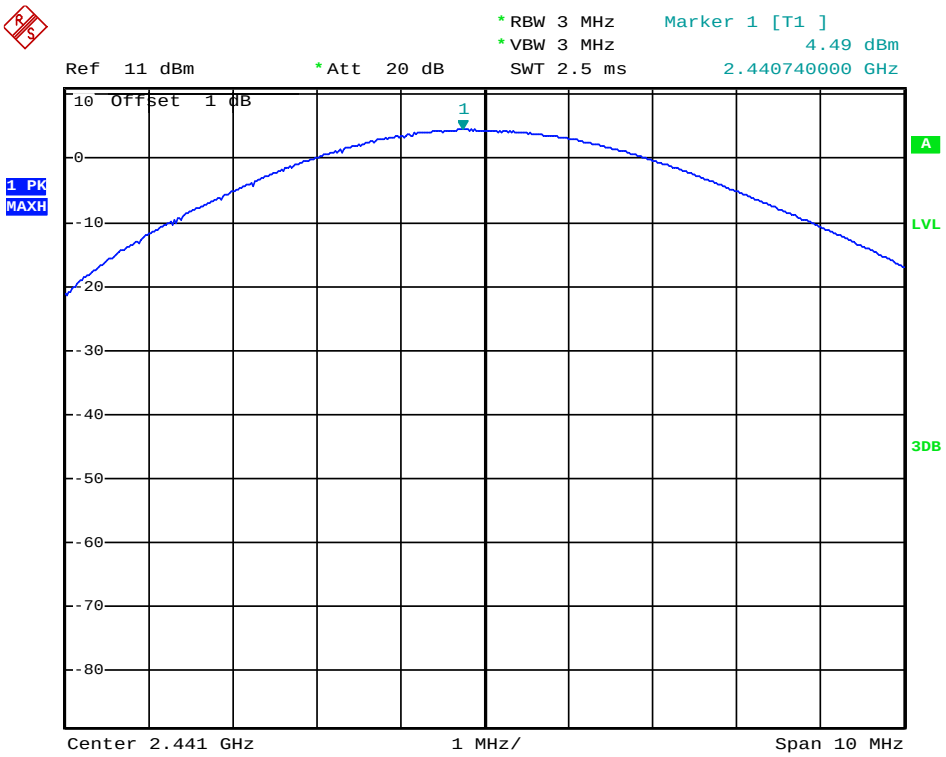
Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Refer to Plot	Limits (dBm)	Result
00	2402	3.33	Plot 4.3.3 A	30	PASS
39	2441	4.49	Plot 4.3.3 B	30	PASS
78	2480	5.42	Plot 4.3.3 C	30	PASS

Note: 1.The test results including the cable lose.

B. Test Plots

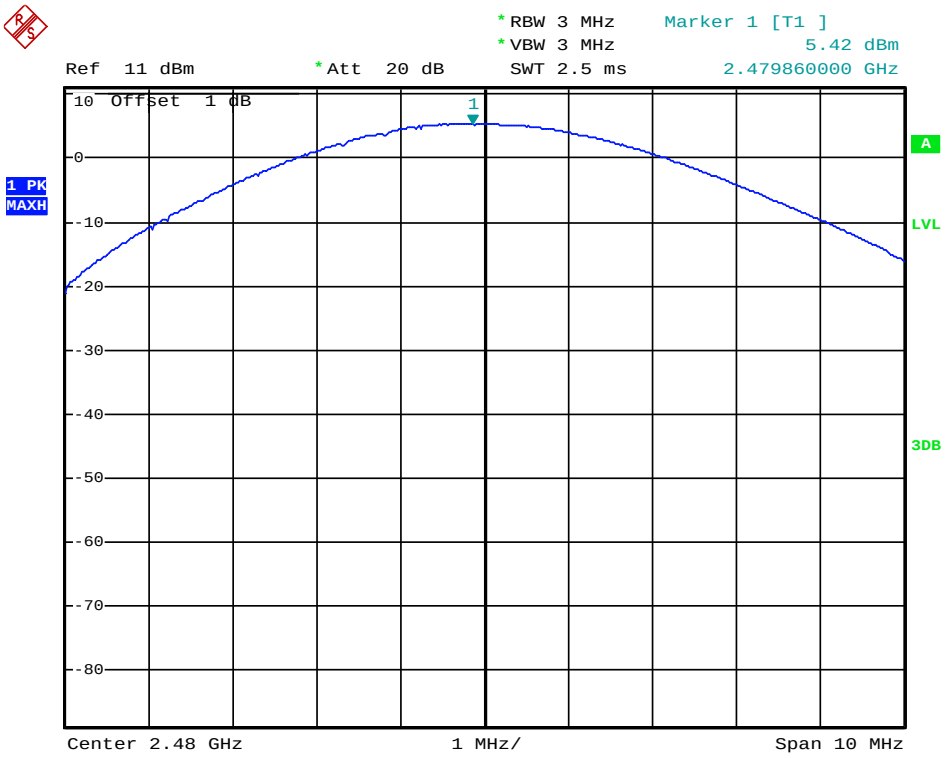


(Plot 4.3.3 A: Channel 00: 2402MHz @ π/4DQPSK)



Date: 16.JUL.2013 20:24:40

(Plot 4.3.3 B: Channel 39: 2441MHz @π/4DQPSK)

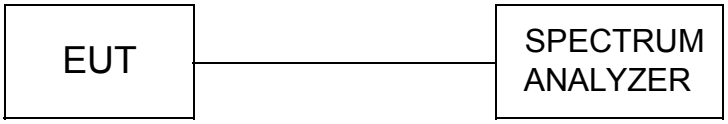


Date: 16.JUL.2013 20:25:14

(Plot 4.3.3 C: Channel 78: 2480MHz @π/4DQPSK)

4.4. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwith.

TEST RESULTS

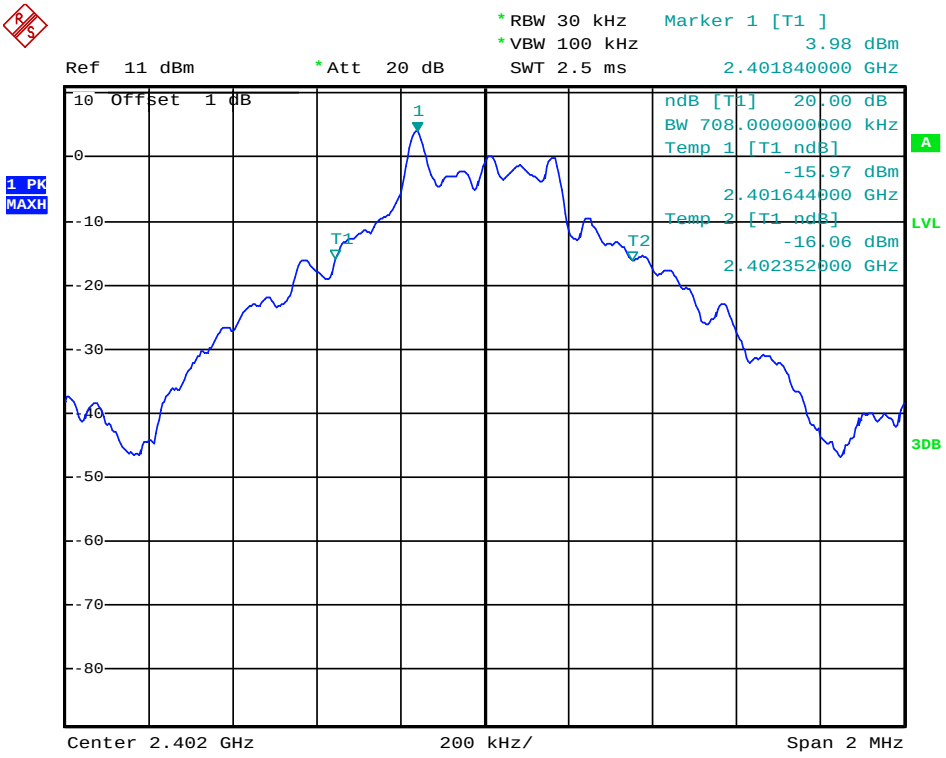
4.4.1 GFSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	0.7080	Plot 4.4.1 A	/	PASS
39	2441	0.7040	Plot 4.4.1 B	/	PASS
78	2480	0.7040	Plot 4.4.1 C	/	PASS

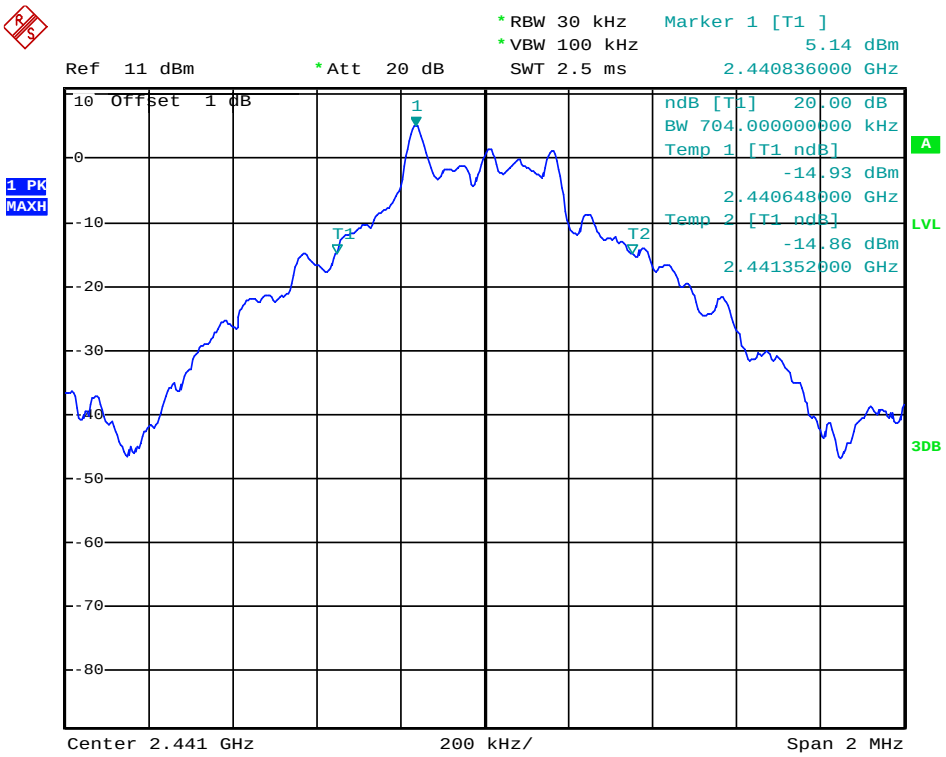
Note: 1.The test results including the cable lose.

B. Test Plots



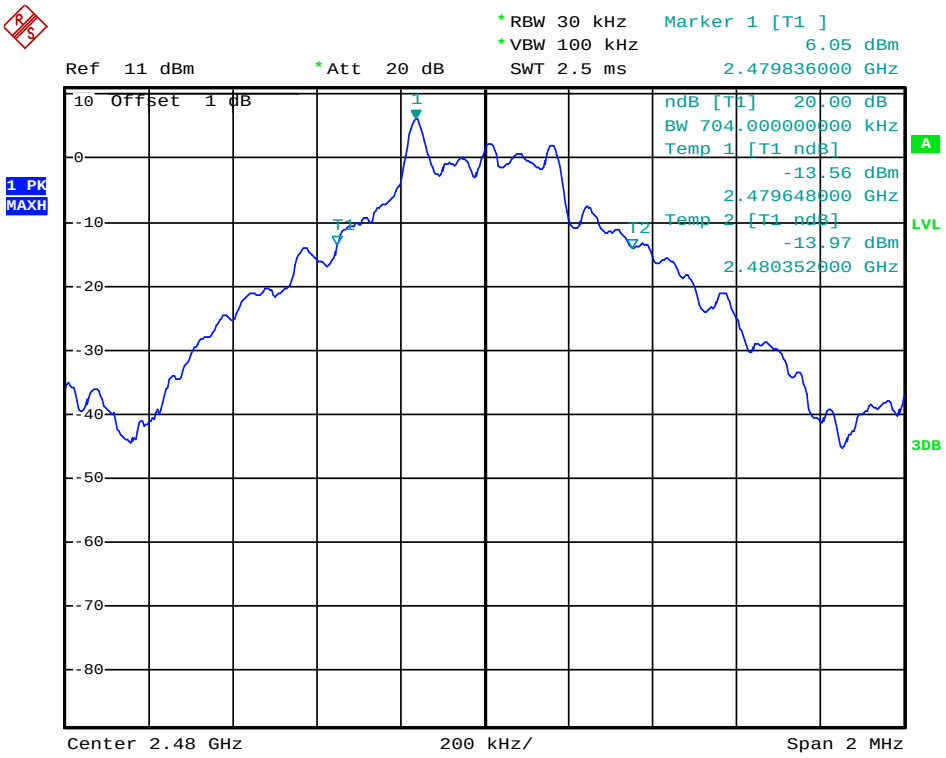
Date: 16.JUL.2013 20:30:13

(Plot 4.4.1 A: Channel 00: 2402MHz @ GFSK)



Date: 16.JUL.2013 20:30:44

(Plot 4.4.1 B: Channel 39: 2441MHz @ GFSK)



Date: 16.JUL.2013 20:31:59

(Plot 4.4.1 C: Channel 78: 2480MHz @ GFSK)

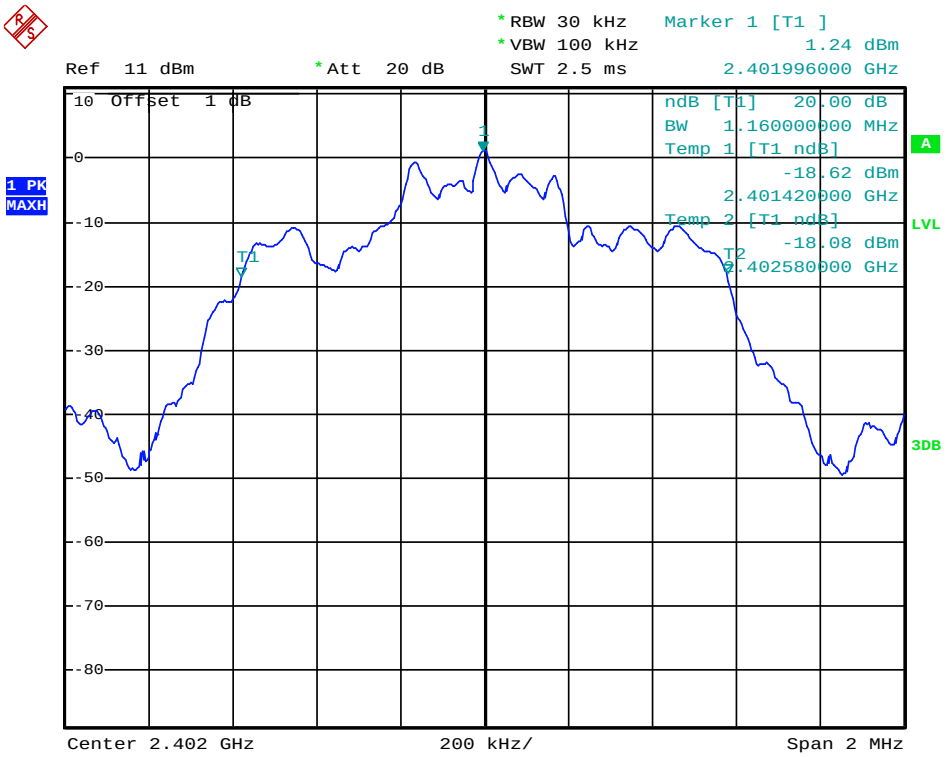
4.4.2 8DPSK Test Mode

A. Test Verdict

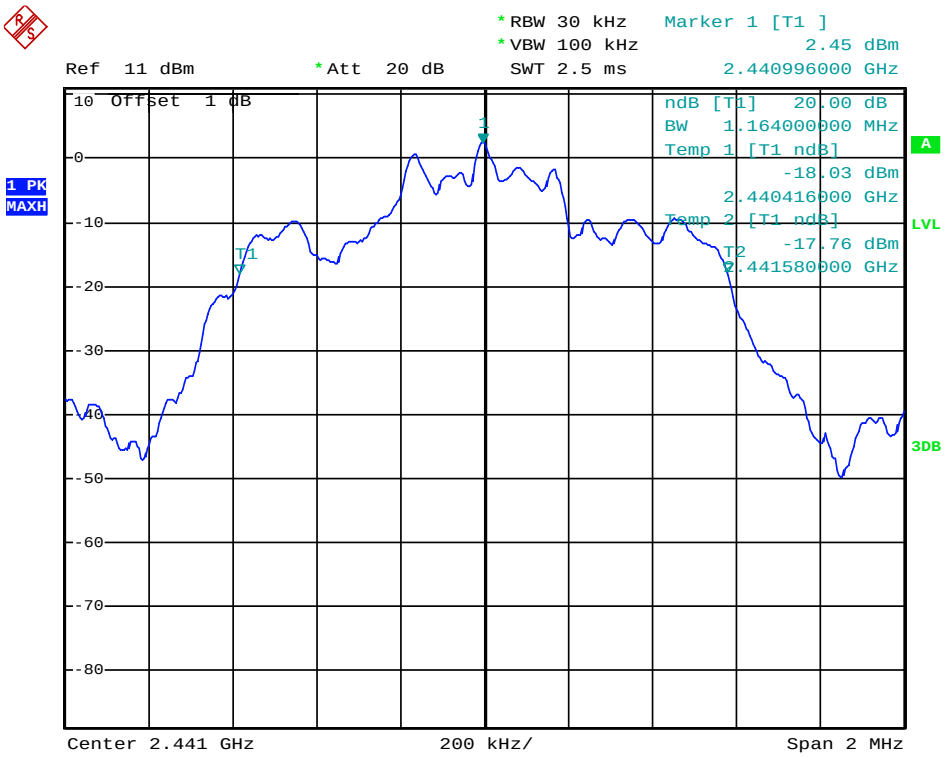
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.1600	Plot 4.4.2 A	/	PASS
39	2441	1.1640	Plot 4.4.2 B	/	PASS
78	2480	1.1640	Plot 4.4.2 C	/	PASS

Note: 1.The test results including the cable lose.

B. Test Plots

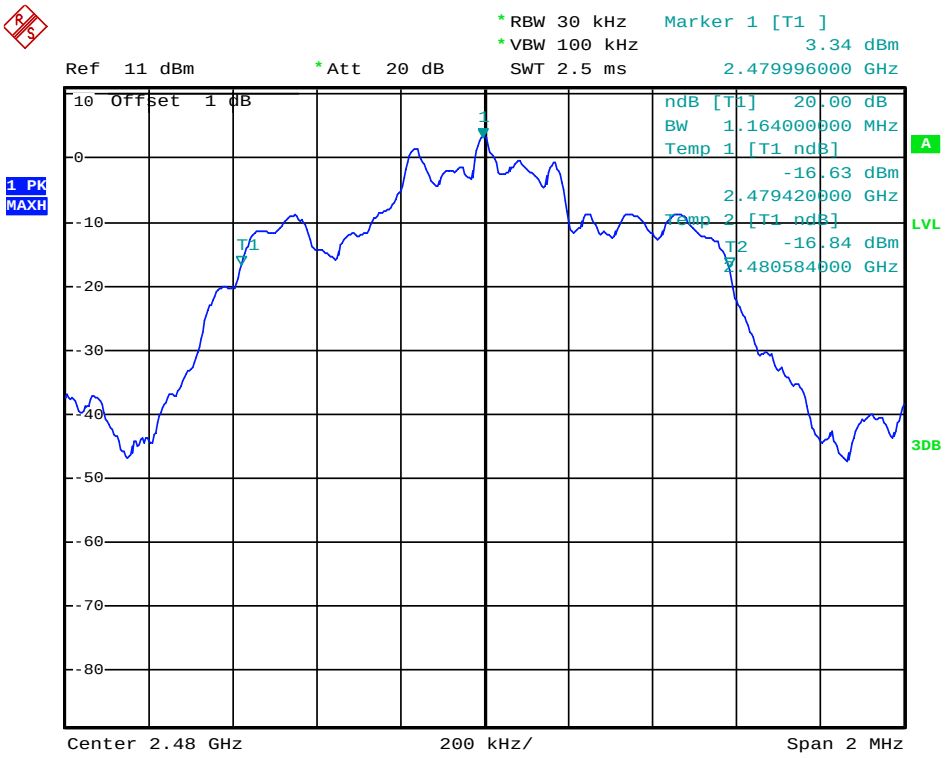


(Plot 4.4.2 A: Channel 00: 2402MHz @ 8DPSK)



Date: 16.JUL.2013 20:37:30

(Plot 4.4.2 B: Channel 39: 2441MHz @ 8DPSK)



Date: 16.JUL.2013 20:38:01

(Plot 4.4.2 C: Channel 78: 2480MHz @ 8DPSK)

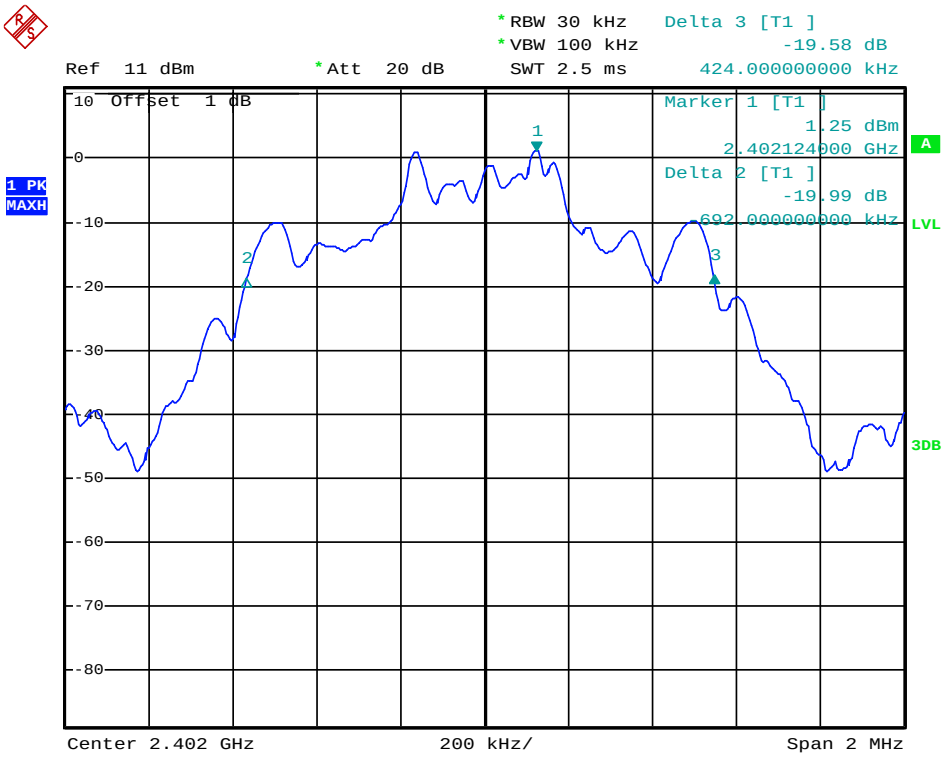
4.4.3 π/4DQPSKTest Mode

A. Test Verdict

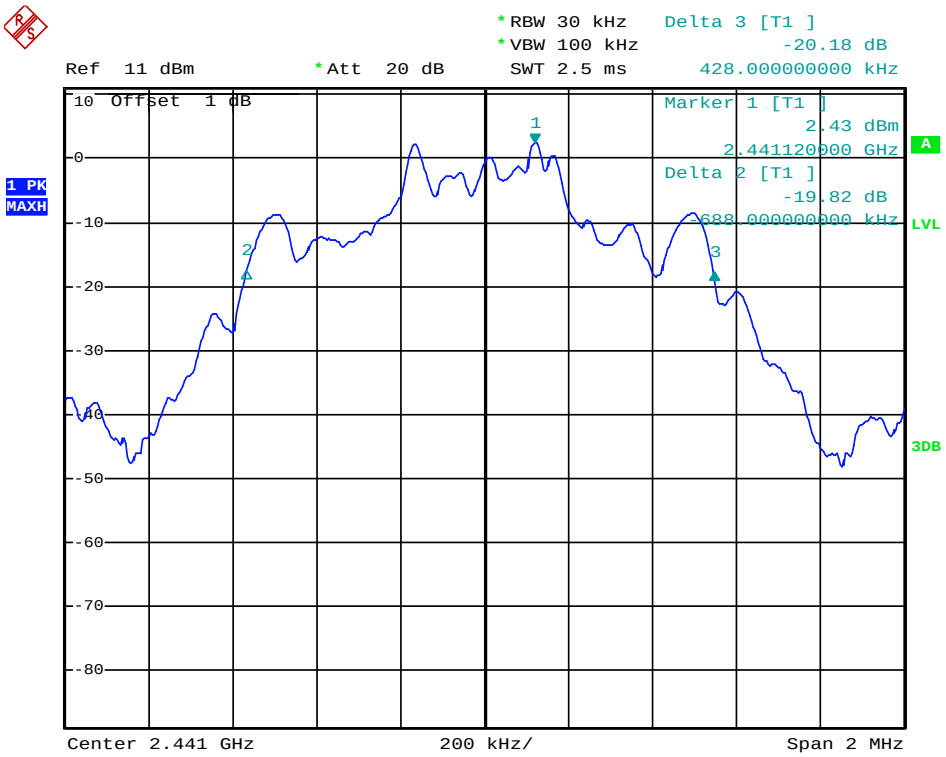
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.160	Plot 4.4.3 A	/	PASS
39	2441	1.160	Plot 4.4.3 B	/	PASS
78	2480	1.120	Plot 4.4.3 C	/	PASS

Note: 1.The test results including the cable lose.

B. Test Plots

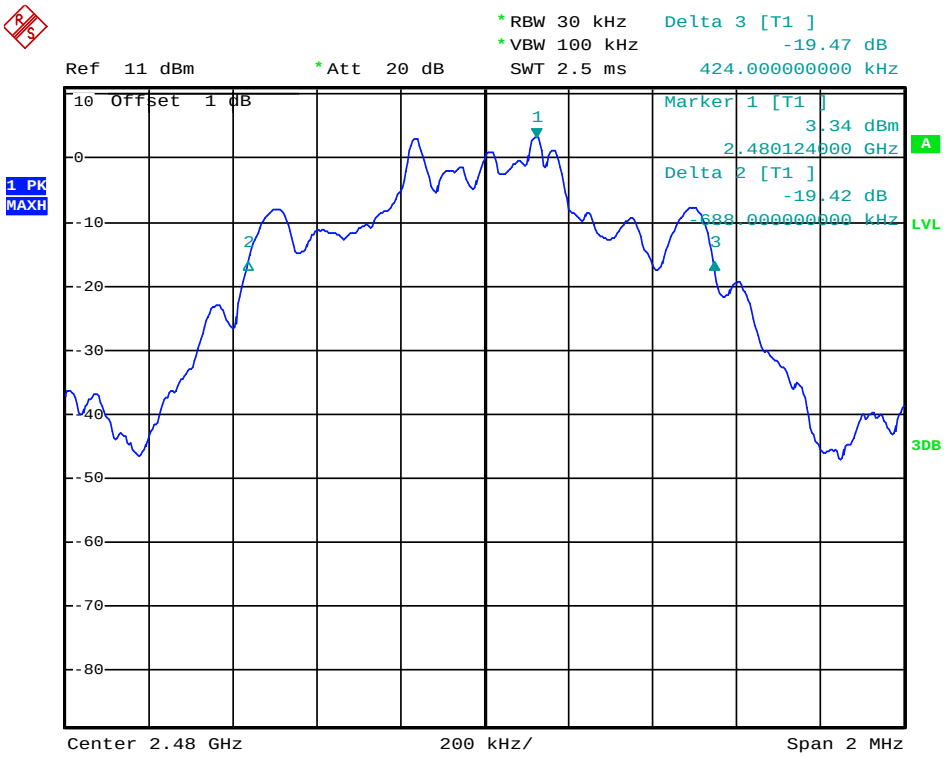


(Plot 4.4.3 A: Channel 00: 2402MHz @ π/4DQPSK)



Date: 16.JUL.2013 20:35:08

(Plot 4.4.3 B: Channel 39: 2441MHz @π/4DQPSK)



Date: 16.JUL.2013 20:35:53

(Plot 4.4.3 C: Channel 78: 2480MHz @π/4DQPSK)

4.5. Band Edge

Applicable Standard

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

TEST PROCEDURE

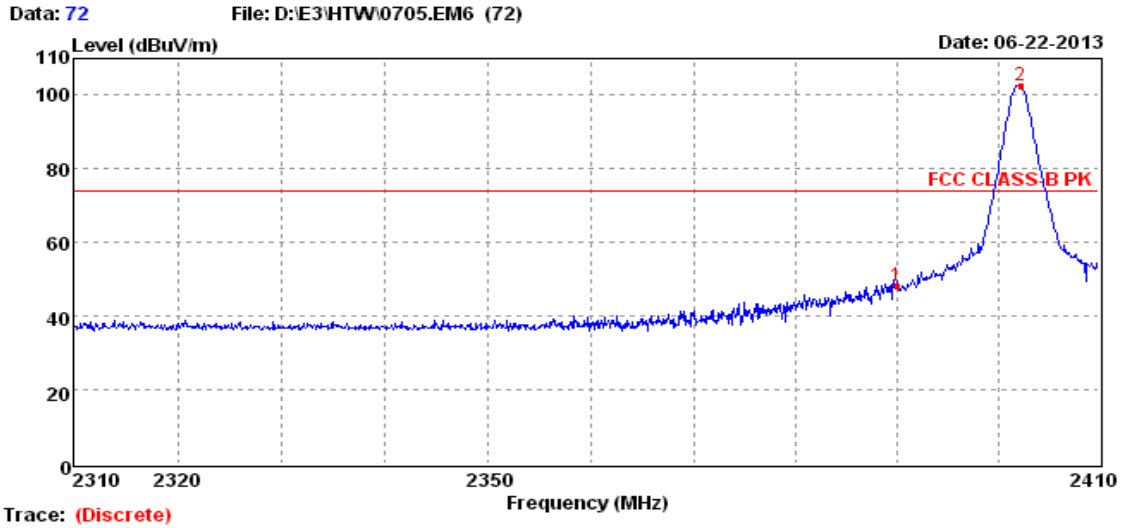
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

TEST RESULTS

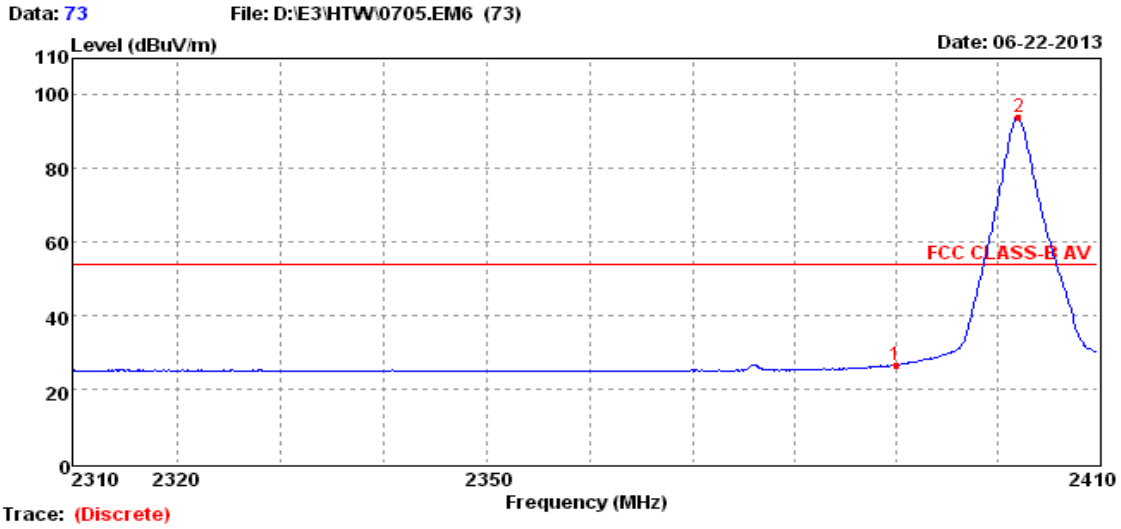
Remark: we measured all conditions(DH1,DH3,DH5) and recorded worst case at DH5

4.5.1 For Radiated Bandedge Measurement

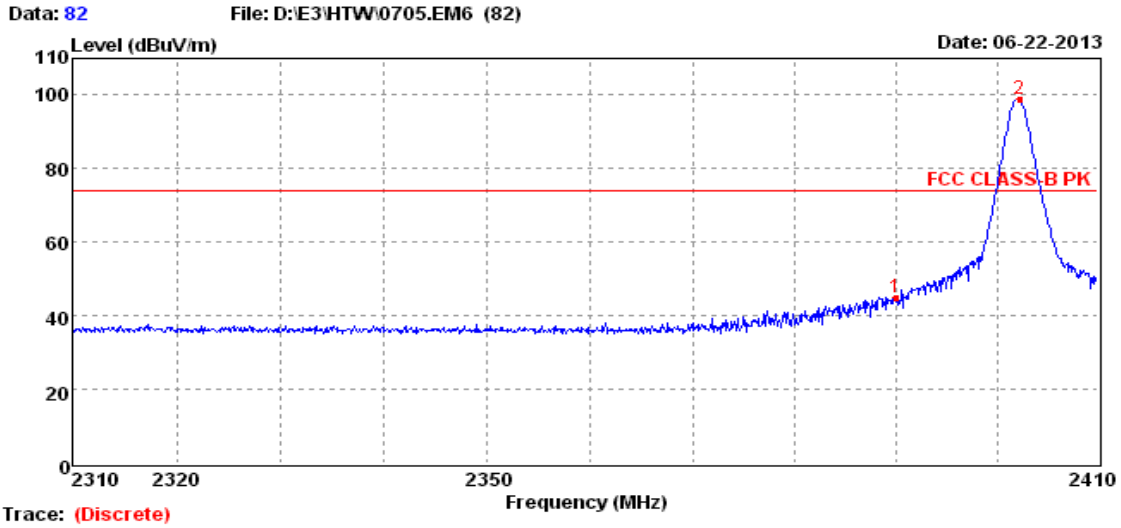
4.5.1.1 GFSK Test Mode



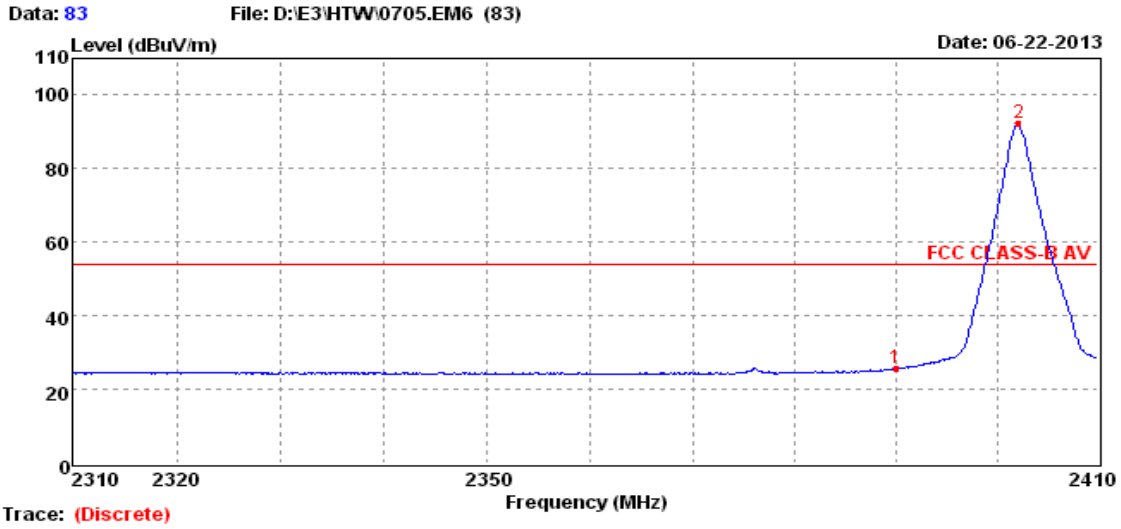
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	48.22	-5.31	53.53	74.00	25.78	HORIZONTAL	Peak
2	2402.25	102.77	-5.31	108.08	74.00	-28.77	HORIZONTAL	Peak



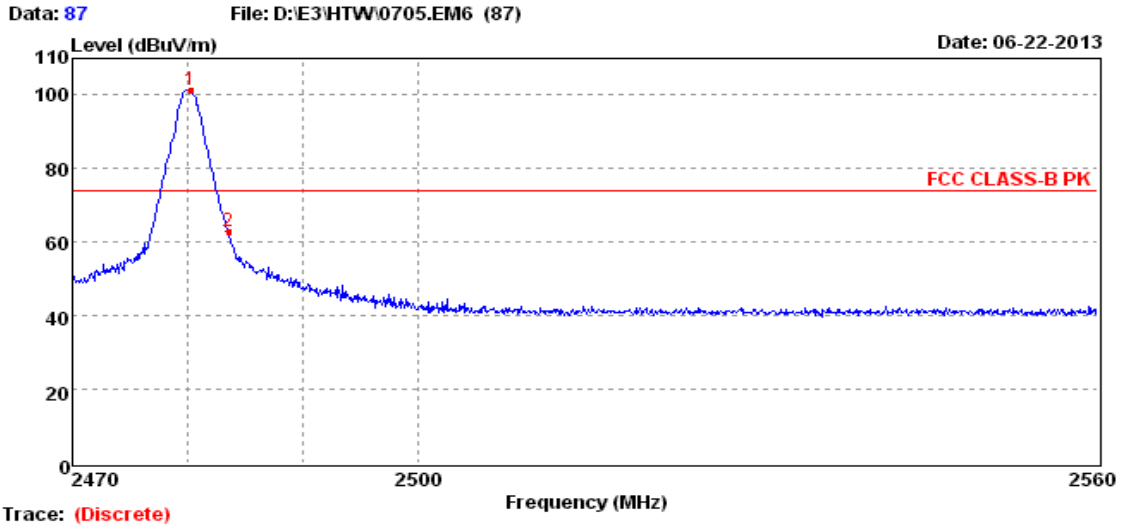
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	26.77	-5.31	32.08	54.00	27.23	HORIZONTAL	Average
2	2402.15	94.05	-5.31	99.36	54.00	-40.05	HORIZONTAL	Average



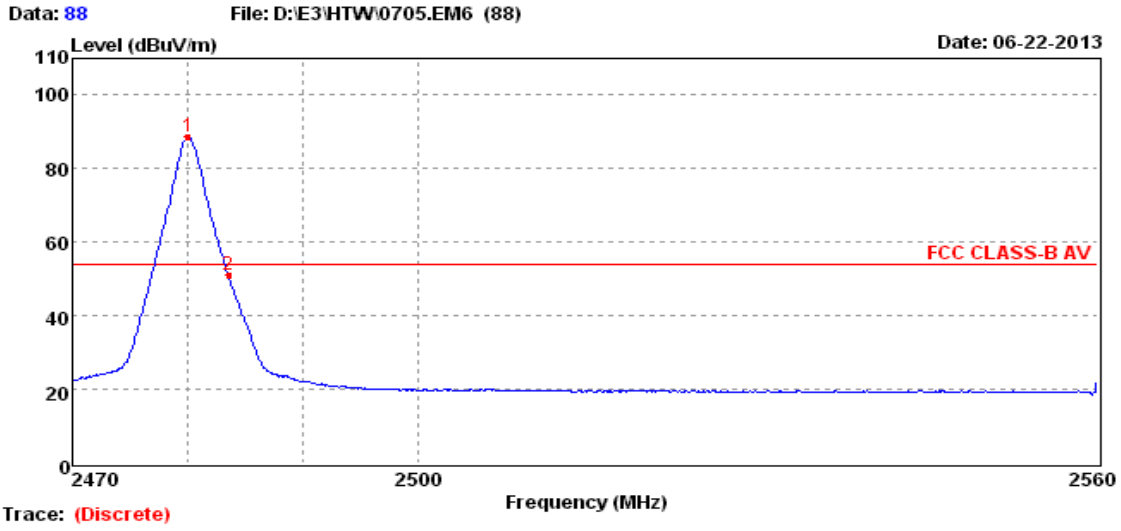
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	44.93	-5.31	50.24	74.00	29.07	VERTICAL	Peak
2	2402.25	98.85	-5.31	104.16	74.00	-24.85	VERTICAL	Peak



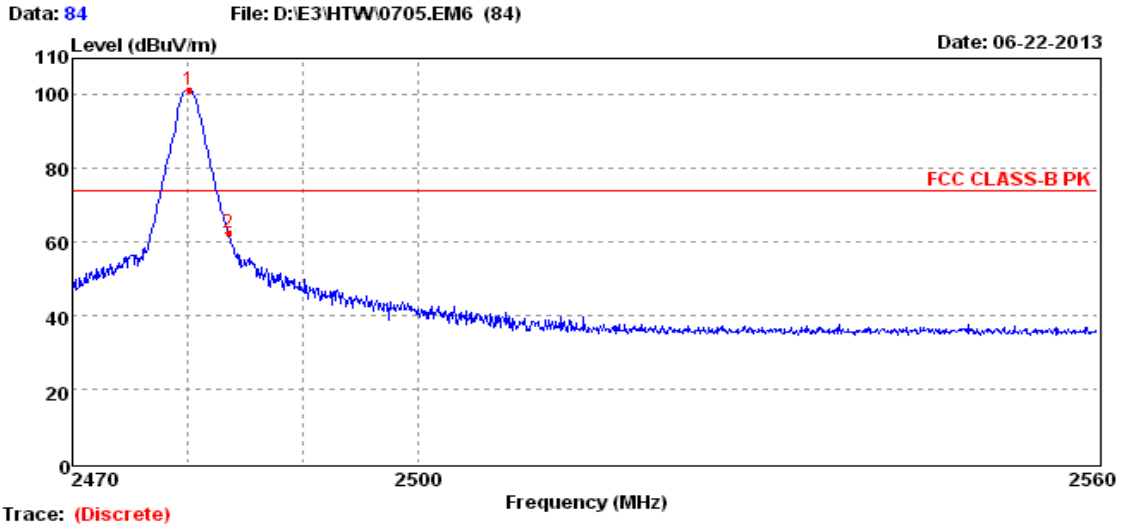
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	25.72	-5.31	31.03	54.00	28.28	VERTICAL	Average
2	2402.15	92.28	-5.31	97.59	54.00	-38.28	VERTICAL	Average



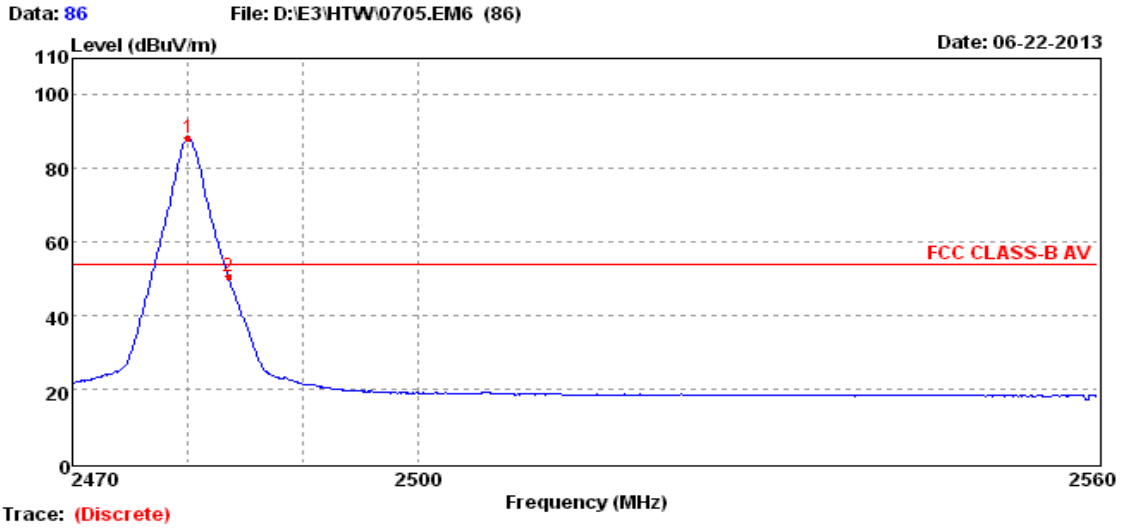
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2480.19	101.38	-5.22	106.60	74.00	-27.38	HORIZONTAL	Peak
2	2483.50	62.81	-5.22	68.03	74.00	11.19	HORIZONTAL	Peak



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2480.01	88.55	-5.22	93.77	54.00	-34.55	HORIZONTAL	Average
2	2483.50	51.20	-5.22	56.42	54.00	2.80	HORIZONTAL	Average

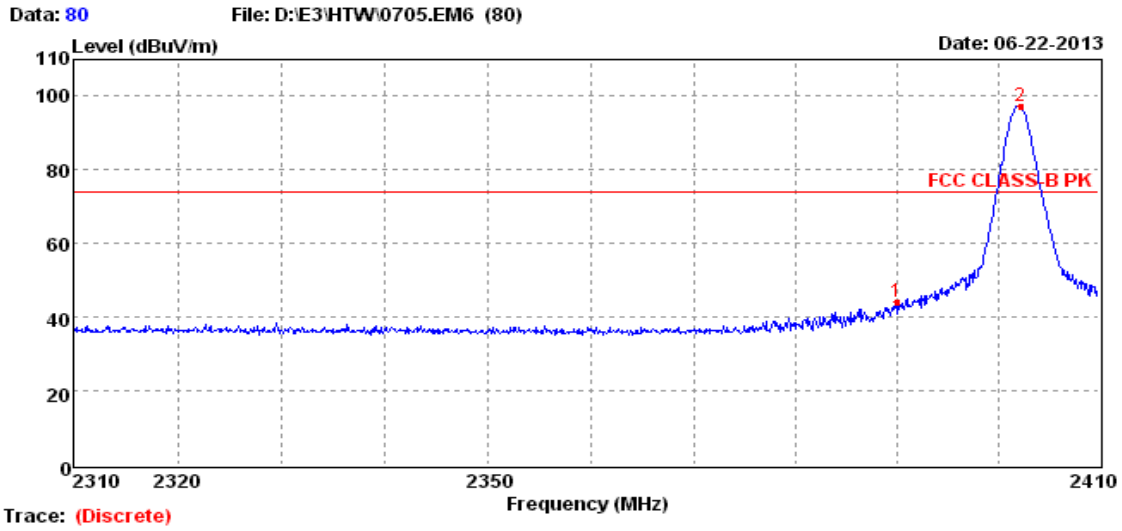


Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2480.10	101.50	-5.22	106.72	74.00	-27.50	VERTICAL	Peak
2	2483.50	62.45	-5.22	67.67	74.00	11.55	VERTICAL	Peak

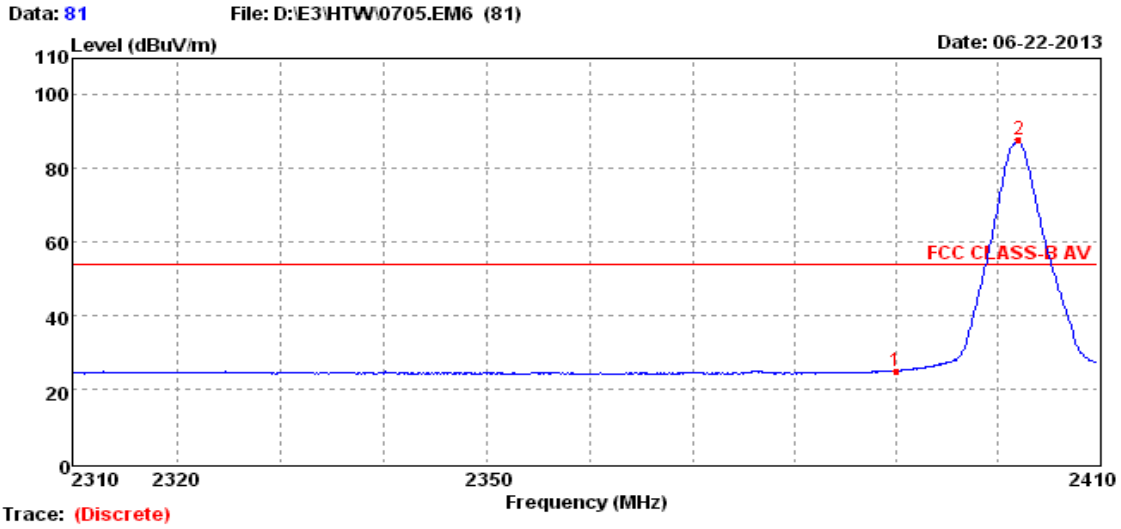


Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2480.01	88.13	-5.22	93.35	54.00	-34.13	VERTICAL	Average
2	2483.50	50.65	-5.22	55.87	54.00	3.35	VERTICAL	Average

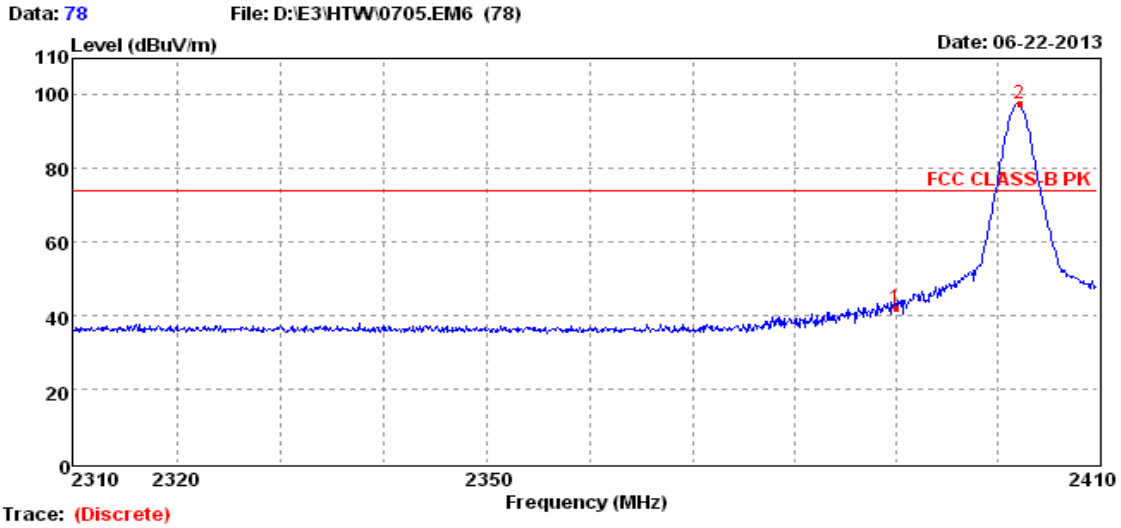
4.5.1.2 8DPSK Test Mode



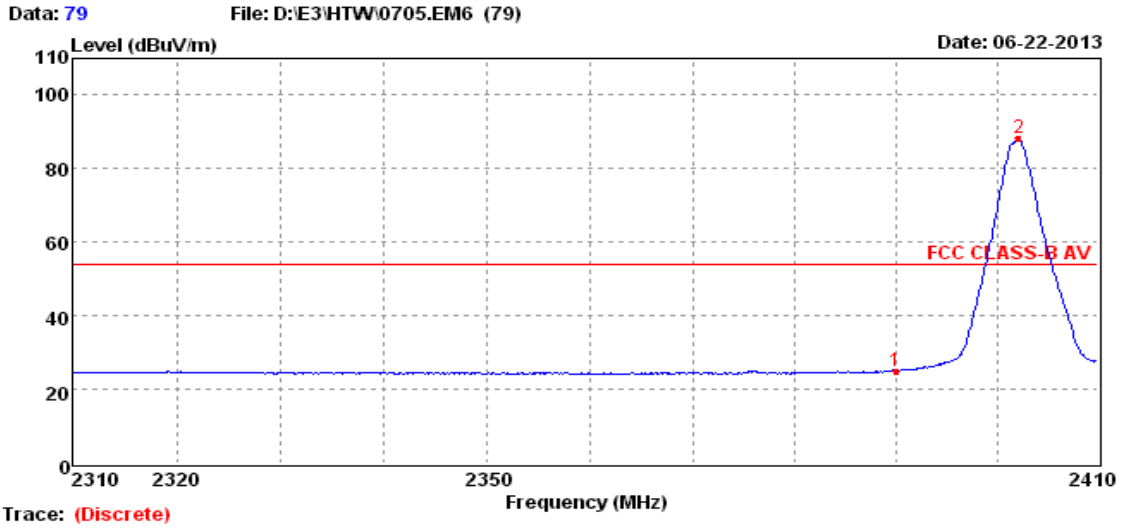
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	43.98	-5.31	49.29	74.00	30.02	HORIZONTAL	Peak
2	2402.25	97.53	-5.31	102.84	74.00	-23.53	HORIZONTAL	Peak



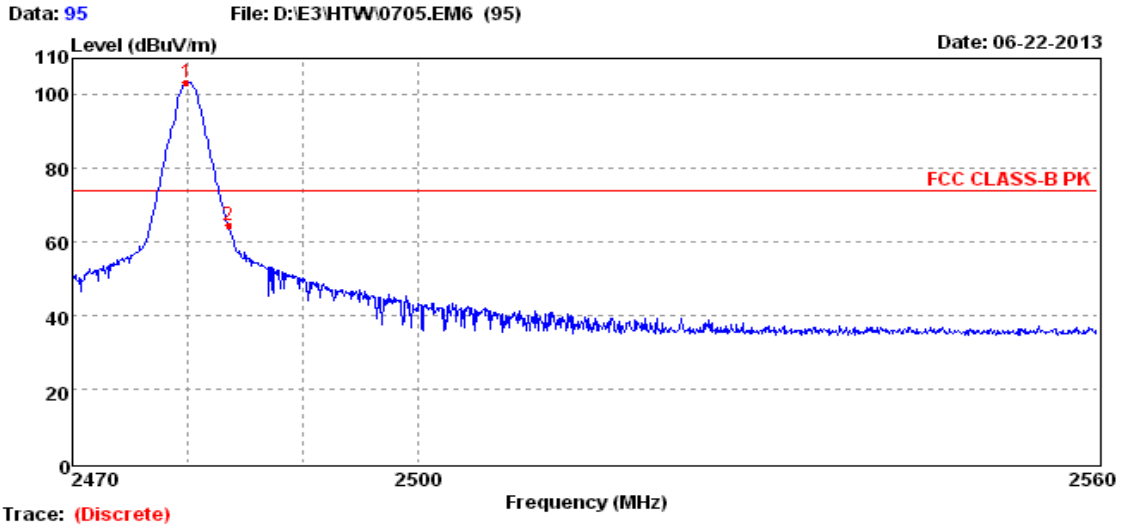
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	25.08	-5.31	30.39	54.00	28.92	HORIZONTAL	Average
2	2402.15	87.81	-5.31	93.12	54.00	-33.81	HORIZONTAL	Average



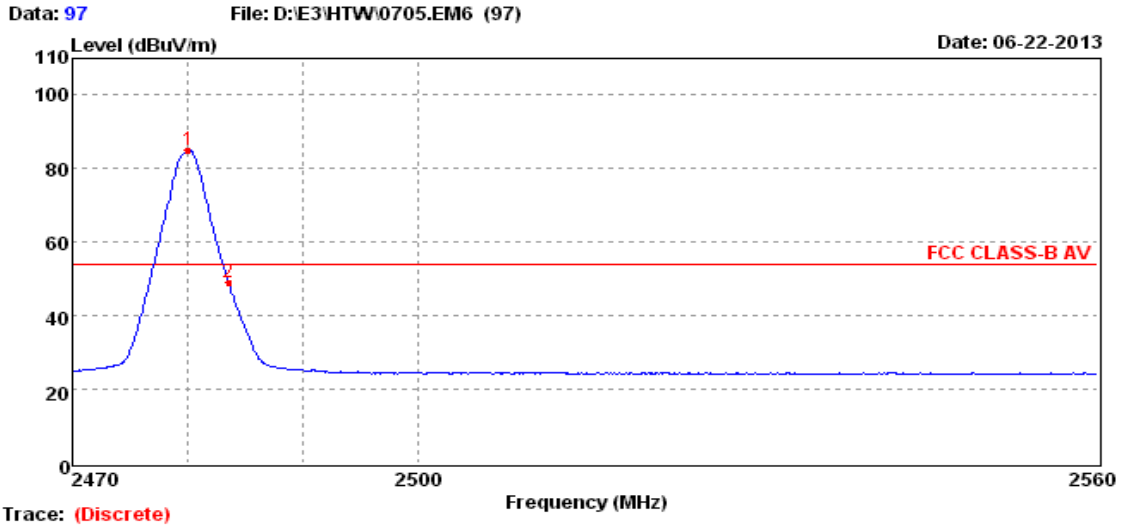
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	42.12	-5.31	47.43	74.00	31.88	VERTICAL	Peak
2	2402.25	97.56	-5.31	102.87	74.00	-23.56	VERTICAL	Peak



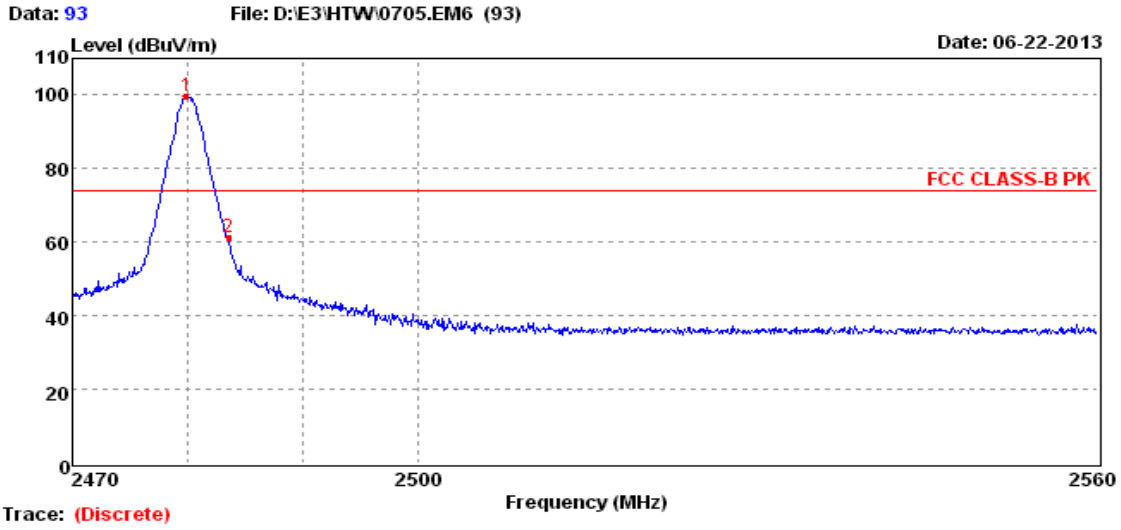
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	25.06	-5.31	30.37	54.00	28.94	VERTICAL	Average
2	2402.15	88.33	-5.31	93.64	54.00	-34.33	VERTICAL	Average



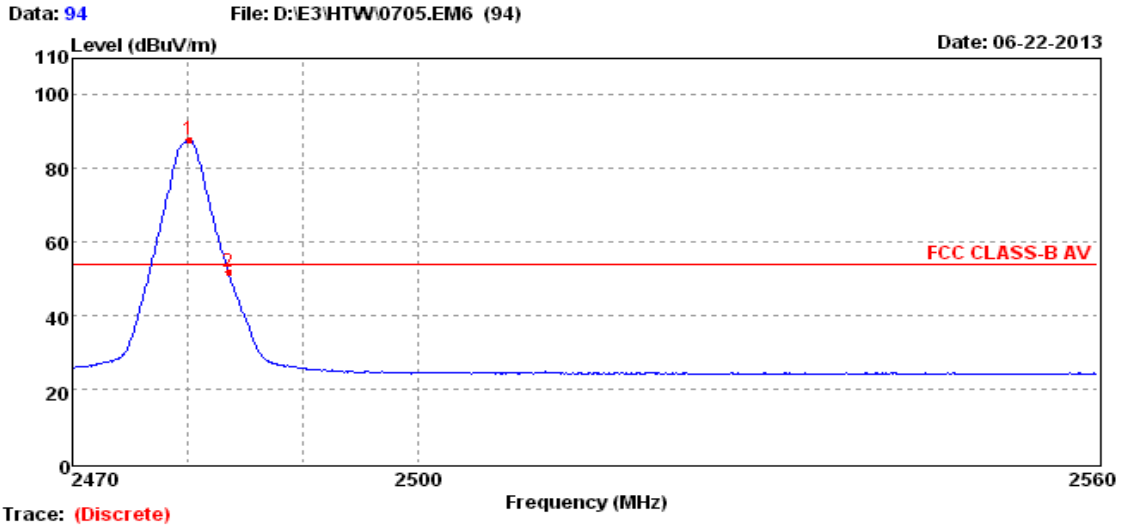
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2479.83	103.50	-5.22	108.72	74.00	-29.50	HORIZONTAL	Peak
2	2483.50	64.45	-5.22	69.67	74.00	9.55	HORIZONTAL	Peak



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2480.01	85.16	-5.22	90.38	54.00	-31.16	HORIZONTAL	Average
2	2483.50	49.01	-5.22	54.23	54.00	4.99	HORIZONTAL	Average

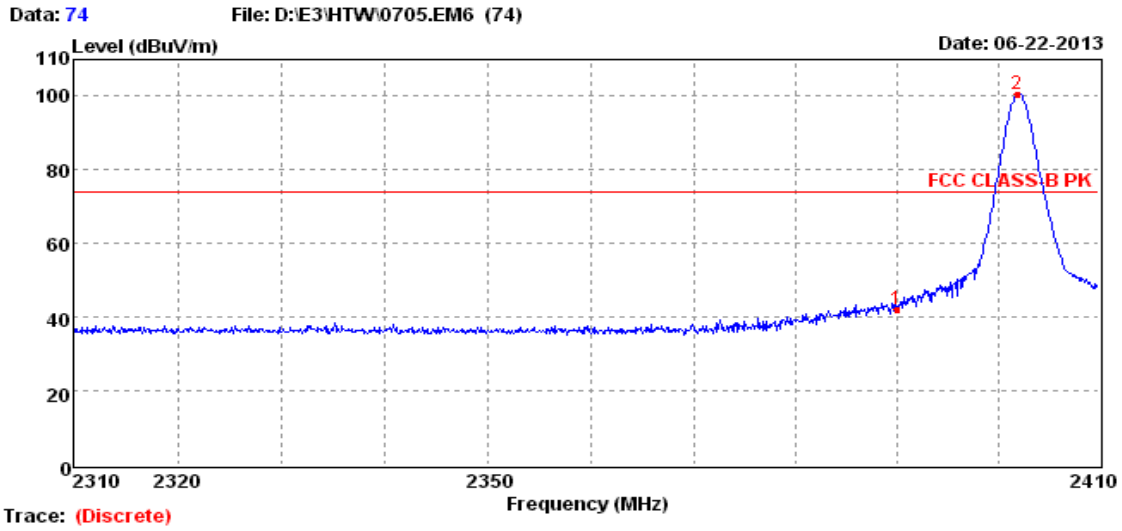


Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2479.83	99.57	-5.22	104.79	74.00	-25.57	VERTICAL	Peak
2	2483.47	61.33	-5.22	66.55	74.00	12.67	VERTICAL	Peak

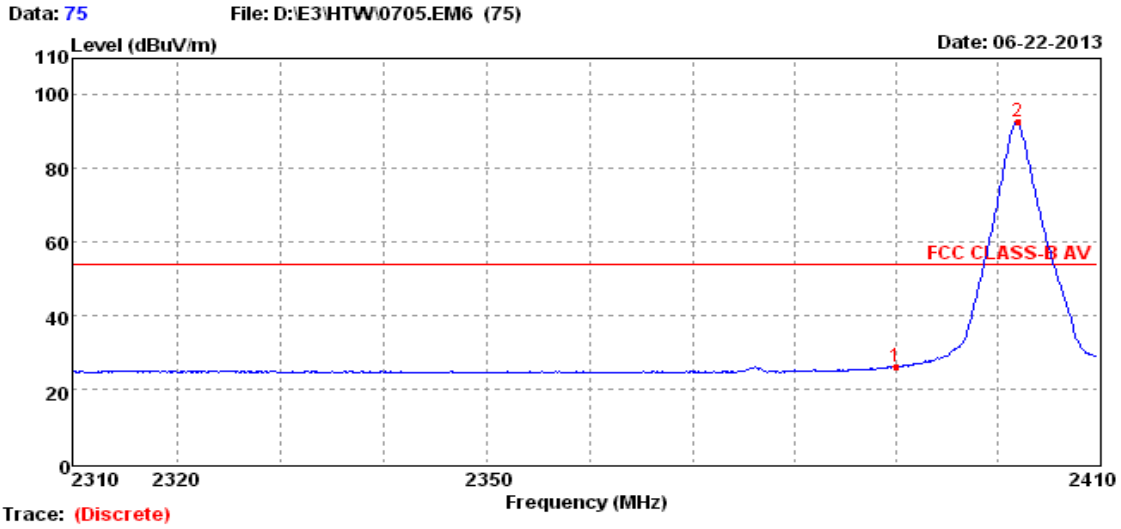


Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2480.10	87.98	-5.22	93.20	54.00	-33.98	VERTICAL	Average
2	2483.50	52.01	-5.22	57.23	54.00	1.99	VERTICAL	Average

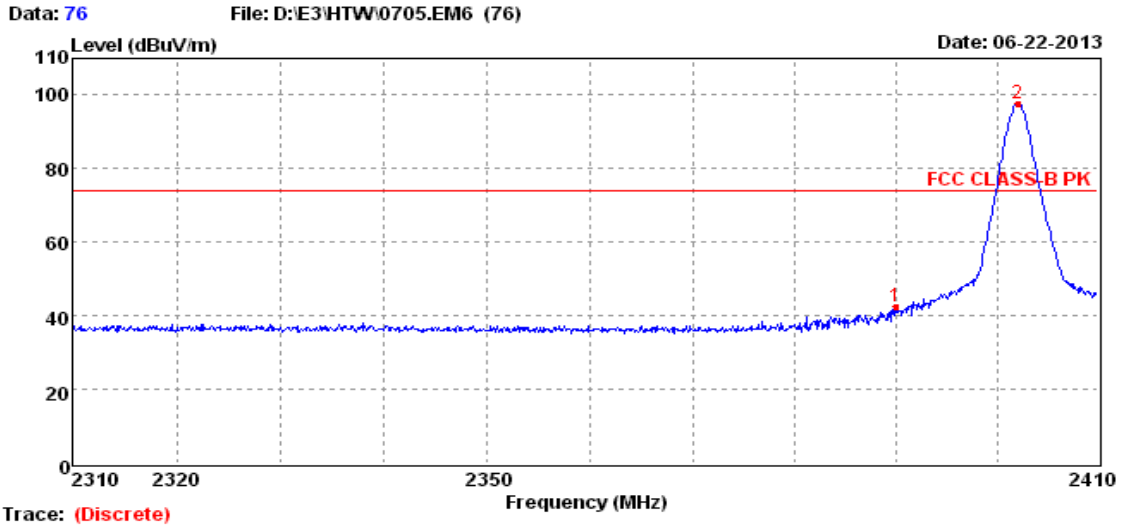
4.5.1.3 π/4DQPSK Test Mode



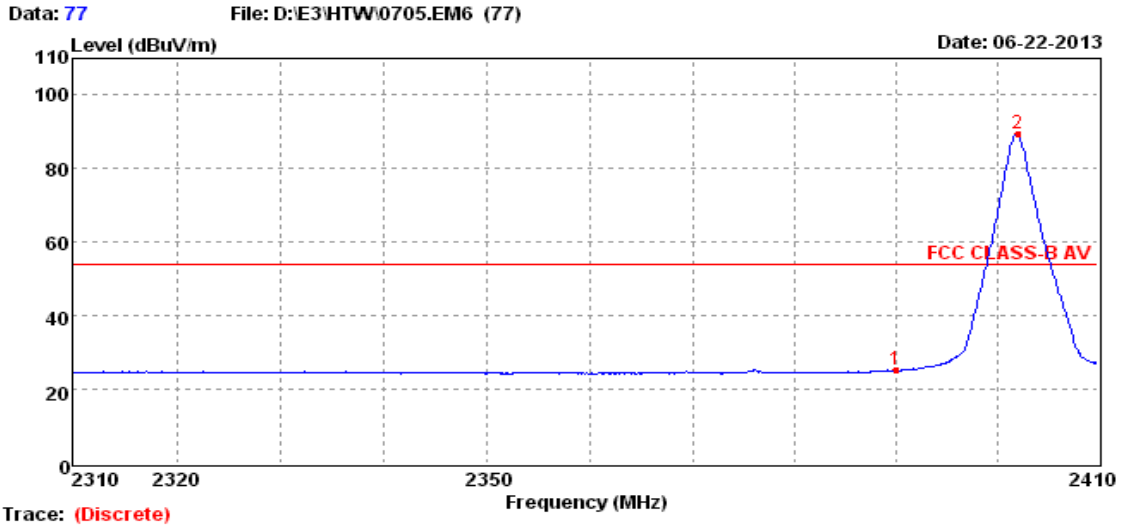
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	42.12	-5.31	47.43	74.00	31.88	HORIZONTAL	Peak
2	2401.95	100.68	-5.31	105.99	74.00	-26.68	HORIZONTAL	Peak



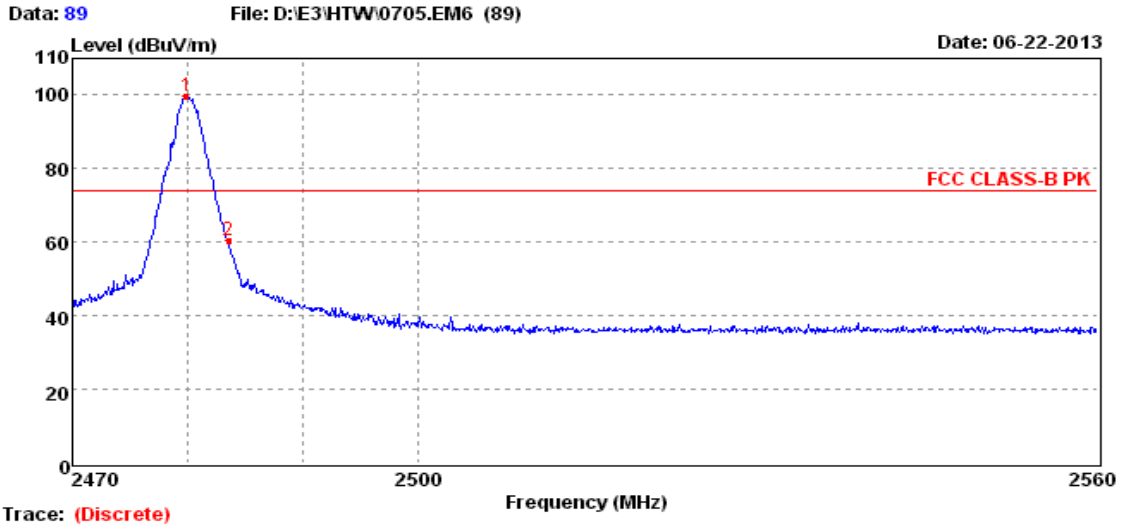
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	26.03	-5.31	31.34	54.00	27.97	HORIZONTAL	Average
2	2402.05	92.70	-5.31	98.01	54.00	-38.70	HORIZONTAL	Average



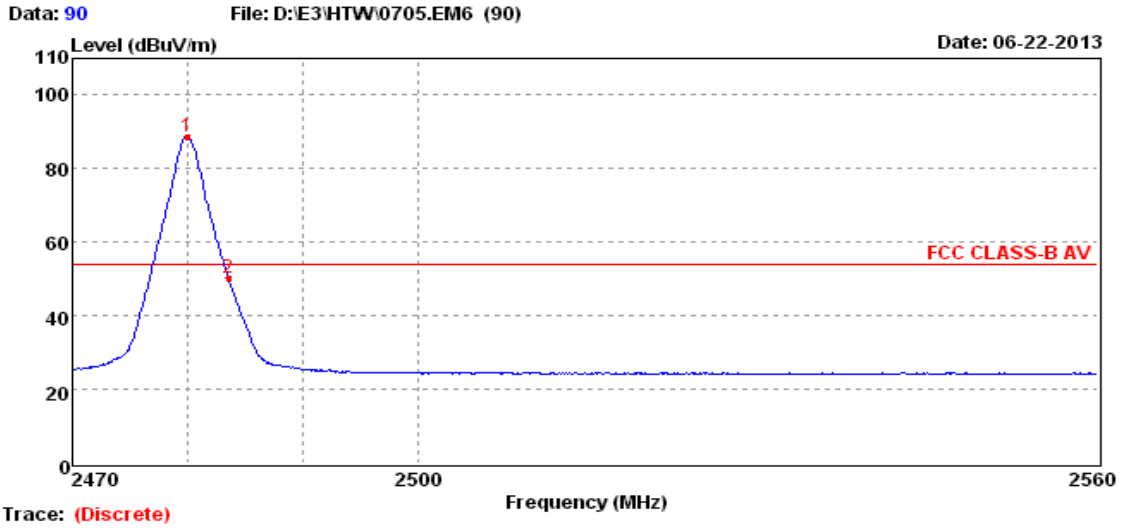
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	42.34	-5.31	47.65	74.00	31.66	VERTICAL	Peak
2	2402.05	97.87	-5.31	103.18	74.00	-23.87	VERTICAL	Peak



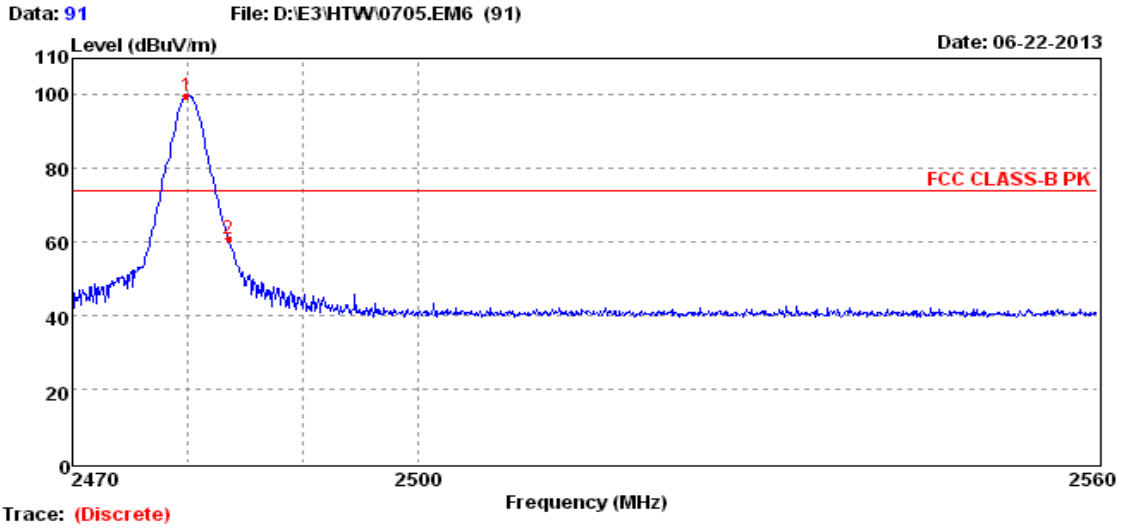
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2390.00	25.18	-5.31	30.49	54.00	28.82	VERTICAL	Average
2	2402.05	89.58	-5.31	94.89	54.00	-35.58	VERTICAL	Average



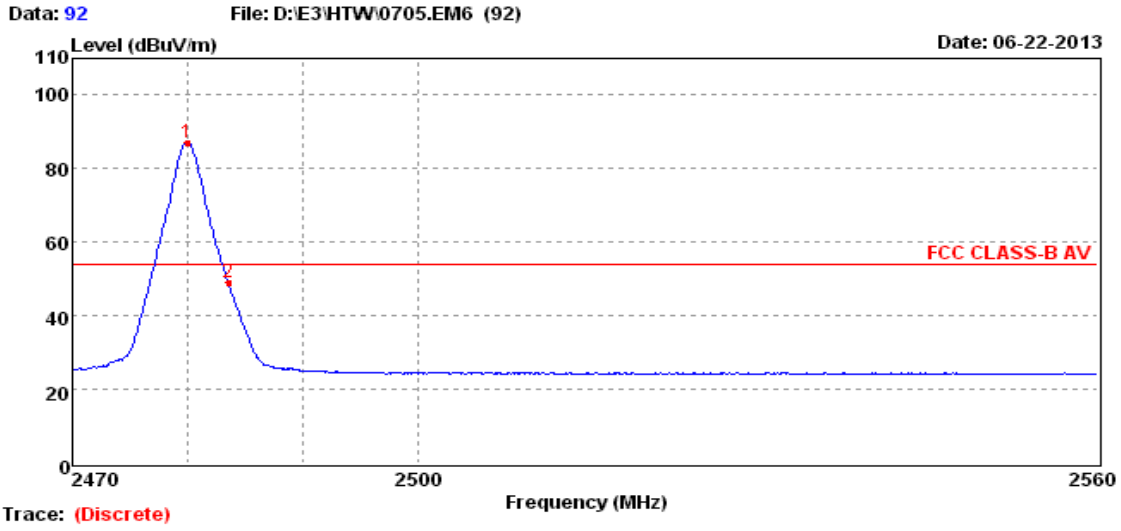
Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2479.83	99.68	-5.22	104.90	74.00	-25.68	HORIZONTAL	Peak
2	2483.50	60.49	-5.22	65.71	74.00	13.51	HORIZONTAL	Peak



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2479.92	88.73	-5.22	93.95	54.00	-34.73	HORIZONTAL	Average
2	2483.50	50.44	-5.22	55.66	54.00	3.56	HORIZONTAL	Average



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2479.83	99.64	-5.22	104.86	74.00	-25.64	VERTICAL	Peak
2	2483.47	61.04	-5.22	66.26	74.00	12.96	VERTICAL	Peak



Mark	Frequency MHz	Level dBuV/m	Factor dB	Reading dBuV/m	Limit dBuV/m	Margin dB	Polarization	Det.
1	2479.92	87.21	-5.22	92.43	54.00	-33.21	VERTICAL	Average
2	2483.50	48.89	-5.22	54.11	54.00	5.11	VERTICAL	Average

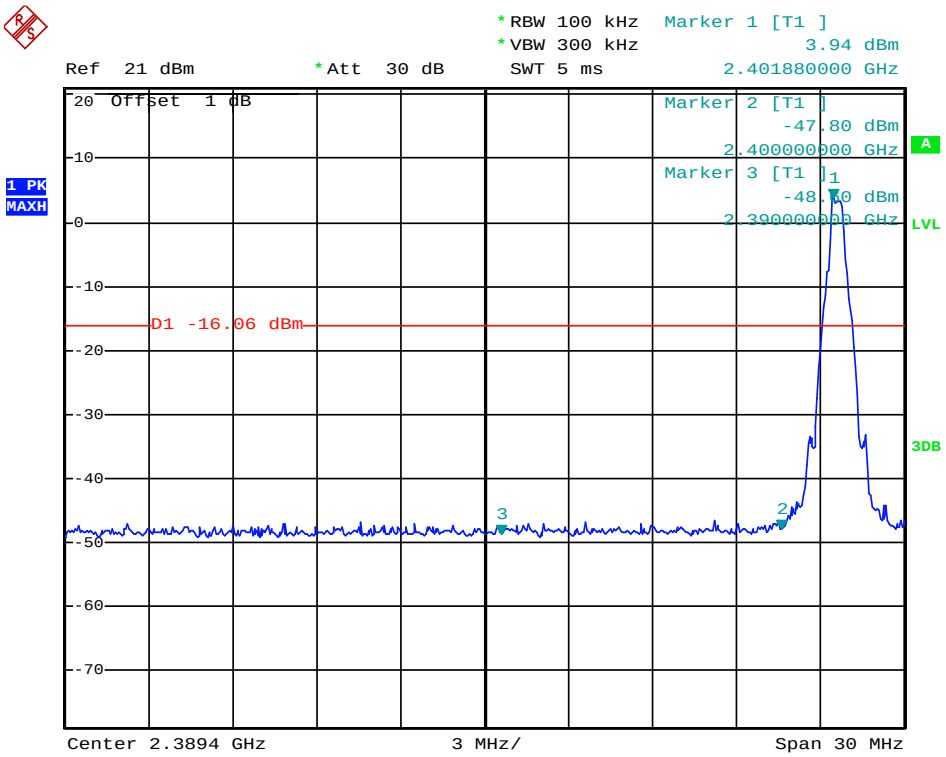
4.5.2 For Radiated Bandedge Measurement

4.5.2.1 GFSK Test Mode

A. Test Verdict

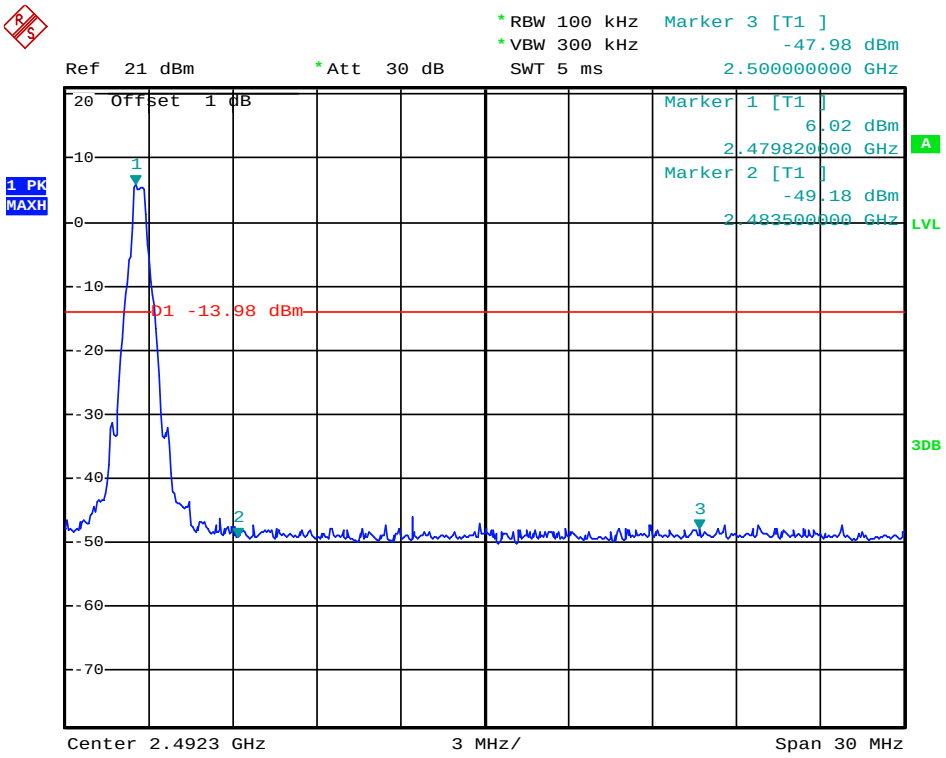
Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
2400.00	51.74	Peak	20	Plot 4.5.2.1 A	PASS
2483.50	55.20	Peak	20	Plot 4.5.2.1 B	PASS

B. Test Plots



Date: 16.JUL.2013 21:25:07

(Plot 4.5.2.1 A: Channel 00: 2402MHz @ GFSK)



Date: 16.JUL.2013 21:27:59

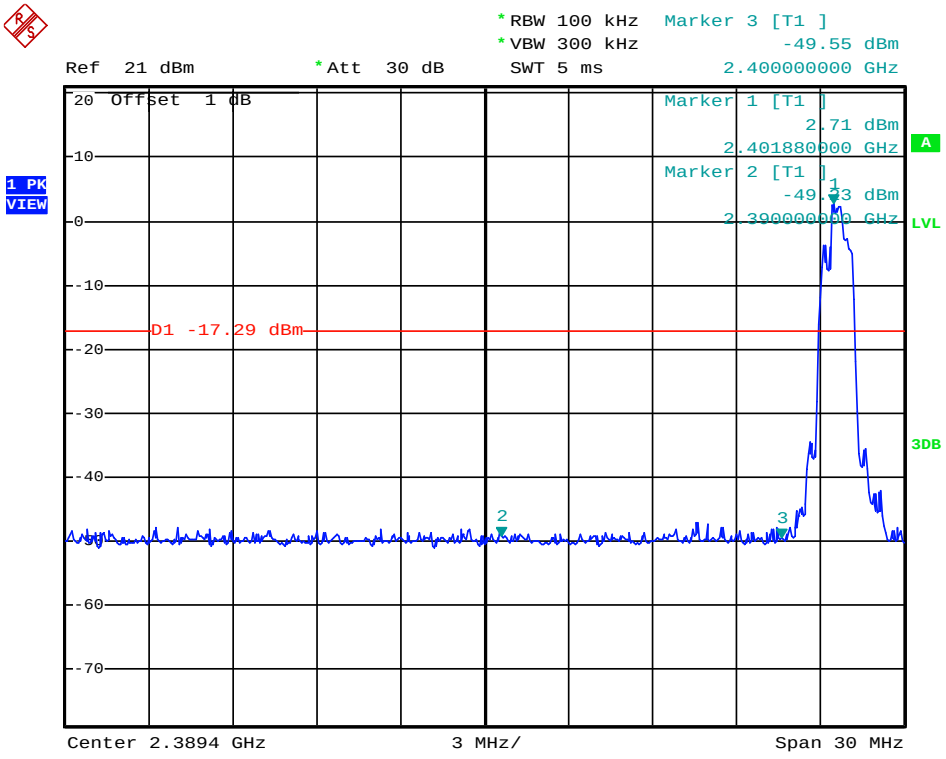
(Plot 4.5.2.1 B: Channel 78: 2480MHz @ GFSK)

4.5.2.2 8DPSK Test Mode

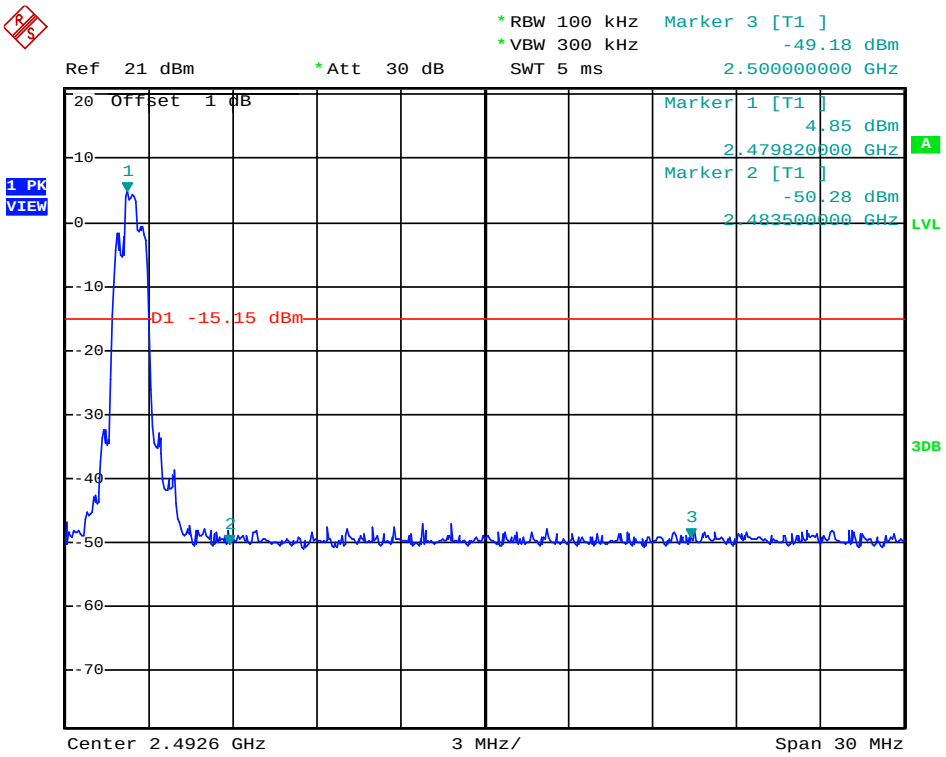
A. Test Verdict

Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
2400.00	52.26	Peak	20	Plot 4.5.2.2 A	PASS
2483.50	55.13	Peak	20	Plot 4.5.2.2 B	PASS

B. Test Plots



(Plot 4.5.2.2 A: Channel 00: 2402MHz @ 8DPSK)



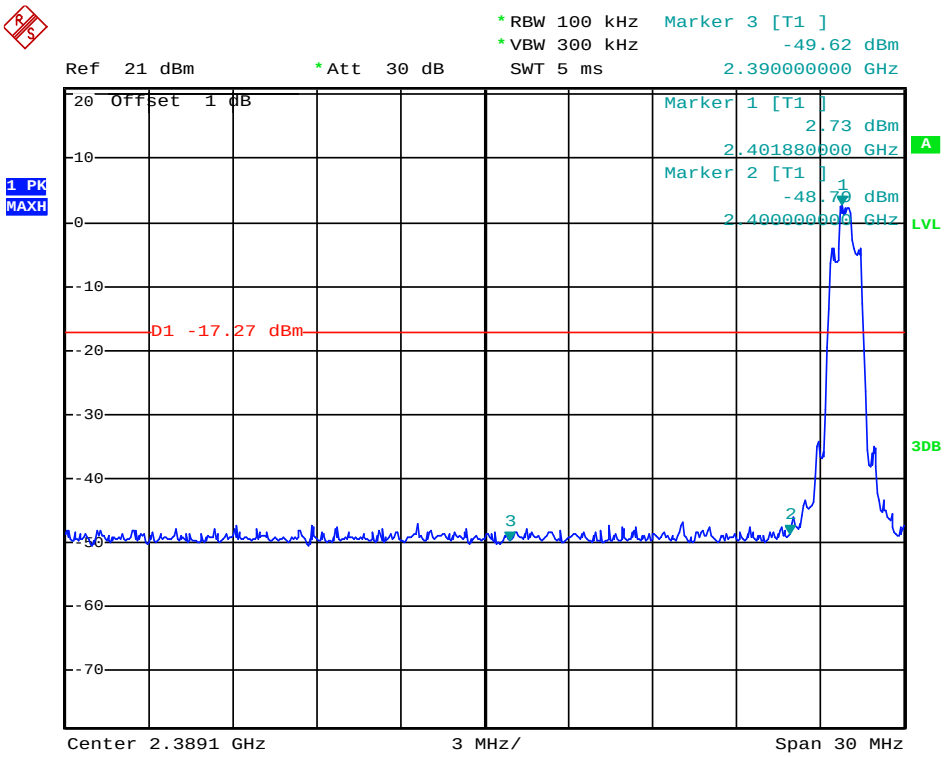
(Plot 4.5.2.2 B: Channel 78: 2480MHz @ 8DPSK)

4.5.2.4 π/4DQPSK Test Mode

A. Test Verdict

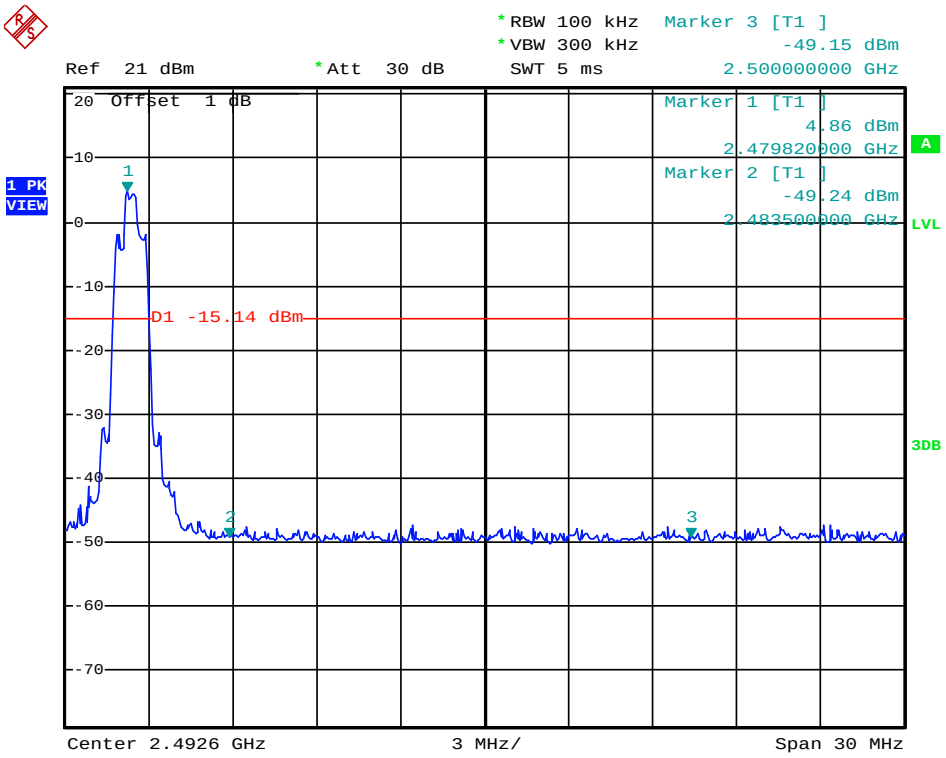
Frequency (MHz)	Delta Peak to Band emission (dBc)	Detector	Limit (dBc)	Refer to Plot	Verdict
2400.00	52.35	Peak	20	Plot 4.5.2.3 A	PASS
2483.50	54.01	Peak	20	Plot 4.5.2.3 B	PASS

B. Test Plots



Date: 16.JUL.2013 21:29:58

(Plot 4.5.2.3 A: Channel 00: 2402MHz @ π/4DQPSK)

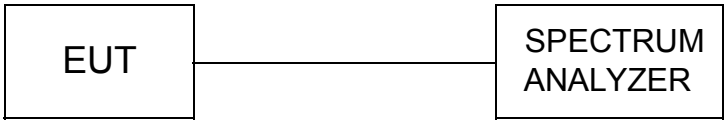


Date: 16.JUL.2013 21:31:56

(Plot 4.5.2.3 B: Channel 78: 2480MHz @ π/4DQPSK)

4.6. Frequency Separation

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with30 KHz RBW and 100KHz VBW.

LIMIT

According to 15.247(a)(1),frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

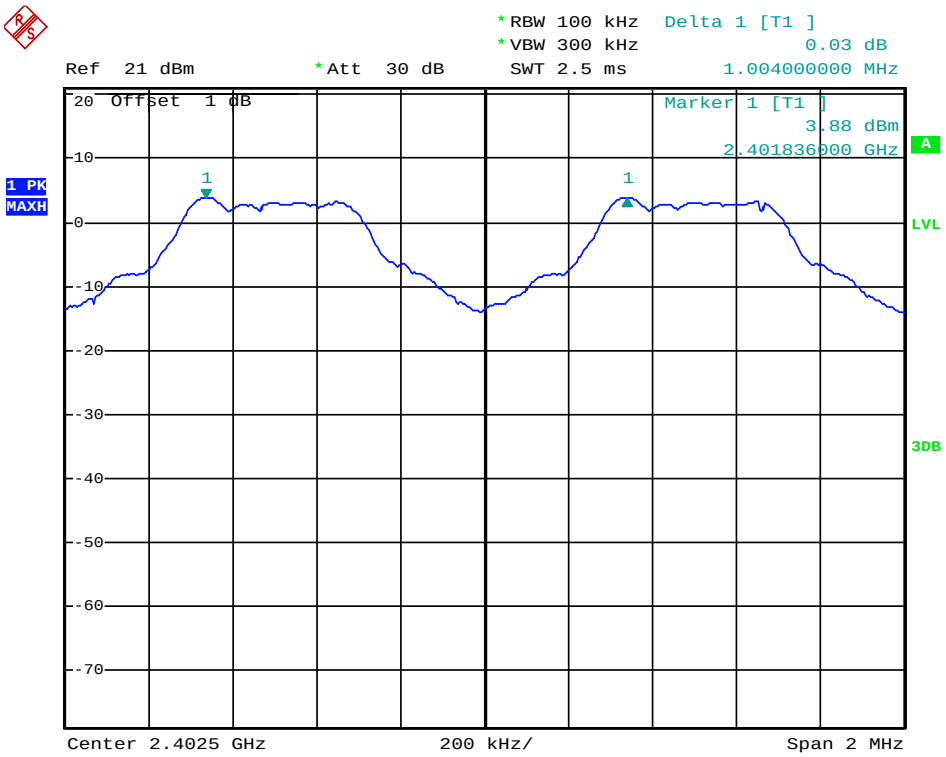
TEST RESULTS

4.6.1 GFSK Test Mode

A. Test Verdict

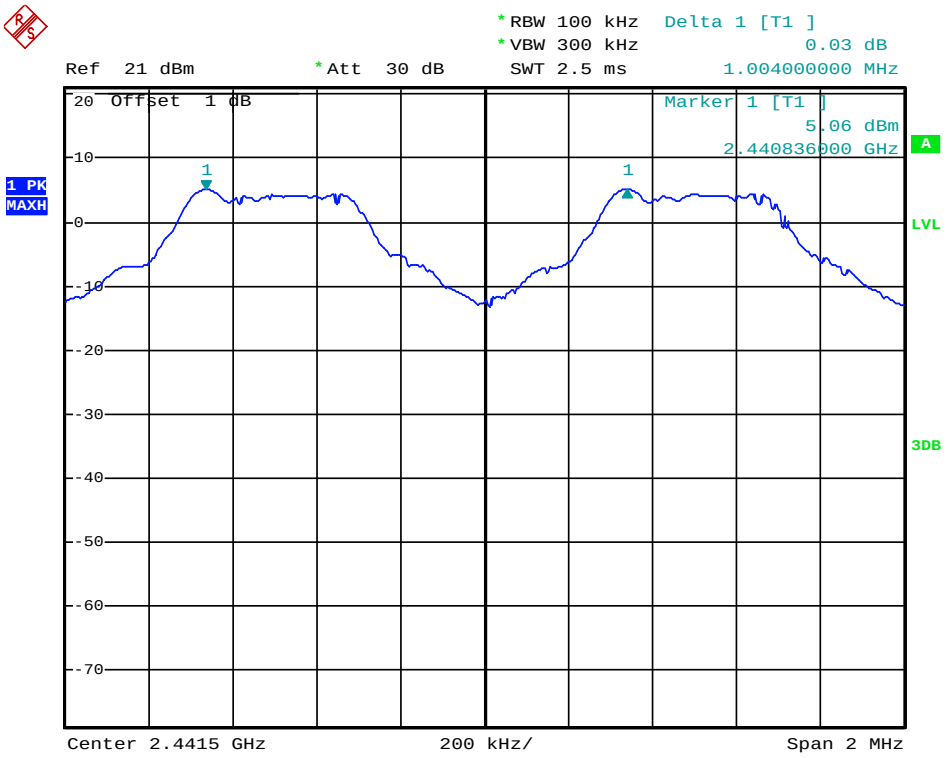
Channel	Frequency (MHz)	Channel Separation (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.004	Plot 4.6.1 A	25KHz or 2/3*20dB bandwidth	PASS
01	2403				
38	2440	1.004	Plot 4.6.1 B	25KHz or 2/3*20dB bandwidth	PASS
39	2441				
77	2479	1.004	Plot 4.6.1 C	25KHz or 2/3*20dB bandwidth	PASS
78	2480				

B. Test Plots



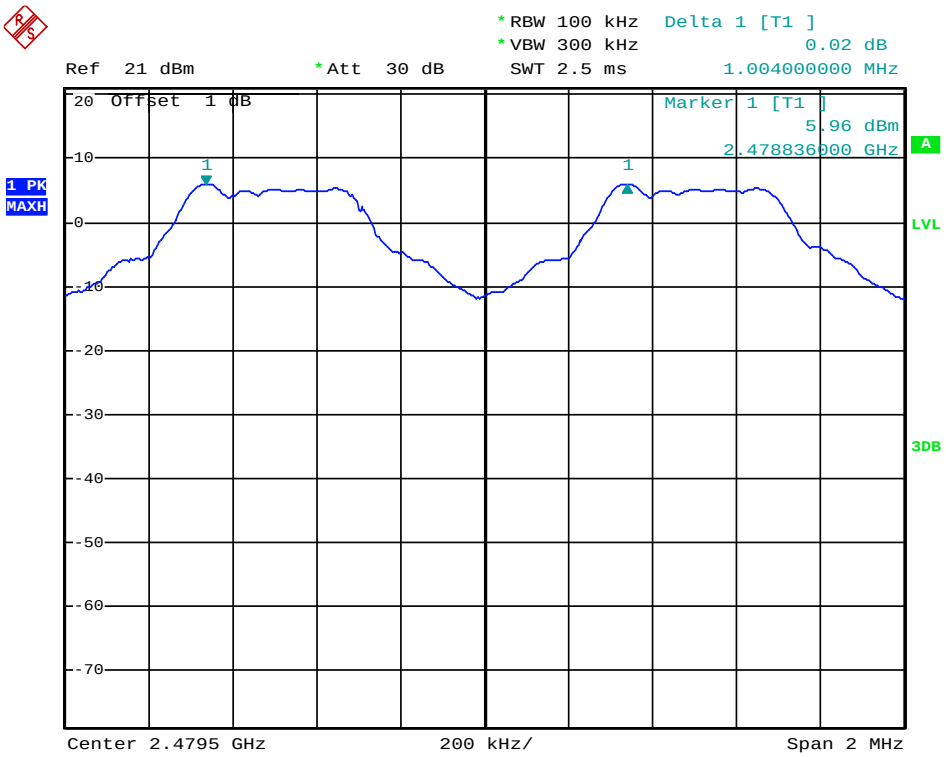
Date: 16.JUL.2013 20:40:47

(Plot 4.6.1 A: Channel 00: 2402MHz @ GFSK)



Date: 16.JUL.2013 20:41:32

(Plot 4.6.1 B: Channel 39: 2441MHz @ GFSK)



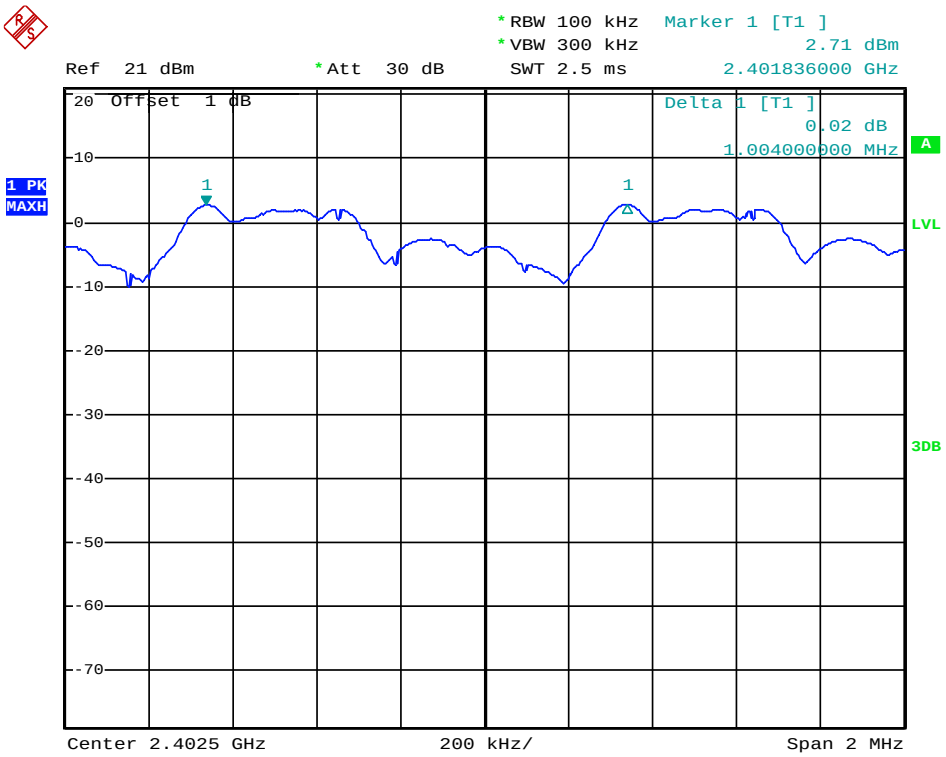
(Plot 4.6.1 C: Channel 78: 2480MHz @ GFSK)

4.6.2 8DPSK Test Mode

A. Test Verdict

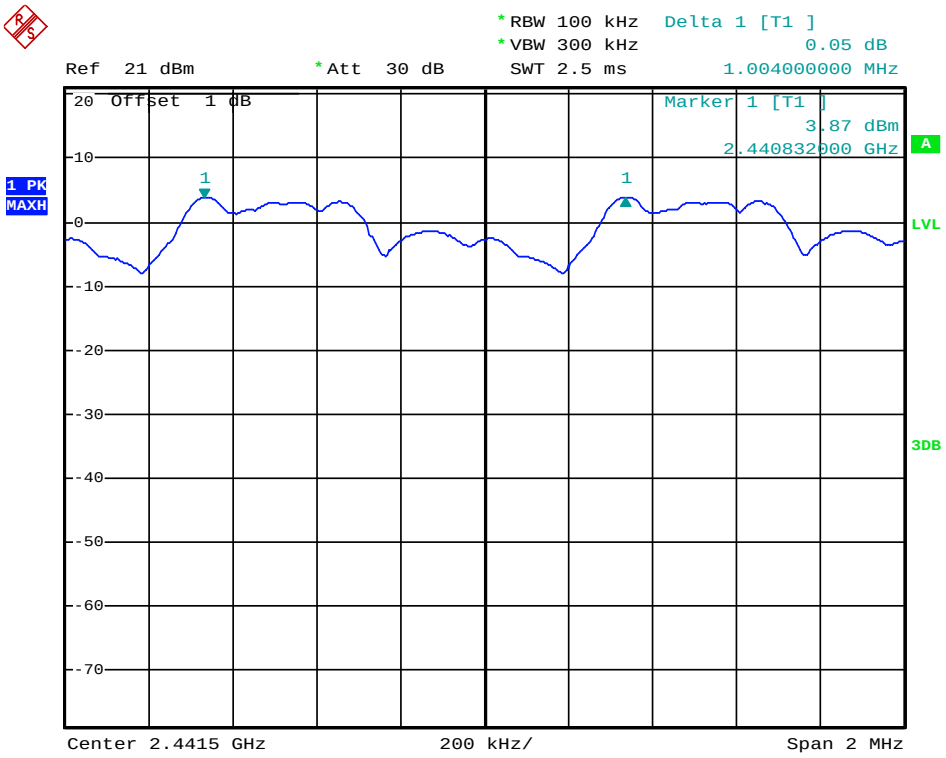
Channel	Frequency (MHz)	Channel Separation (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.004	Plot 4.6.2 A	25KHz or 2/3*20dB bandwidth	PASS
01	2403				
38	2440	1.004	Plot 4.6.2 B	25KHz or 2/3*20dB bandwidth	PASS
39	2441				
77	2479	1.004	Plot 4.6.2 C	25KHz or 2/3*20dB bandwidth	PASS
78	2480				

B. Test Plots



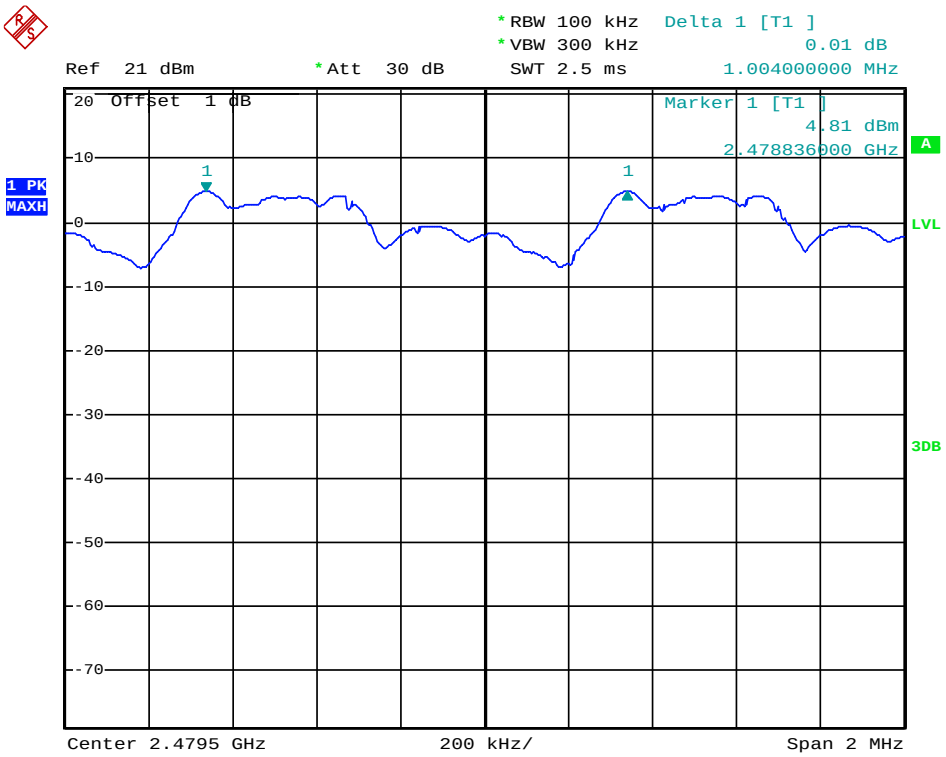
Date: 16.JUL.2013 20:48:31

(Plot 4.6.2 A: Channel 00: 2402MHz @ 8DPSK)



Date: 16.JUL.2013 20:49:36

(Plot 4.6.2 B: Channel 39: 2441MHz @ 8DPSK)



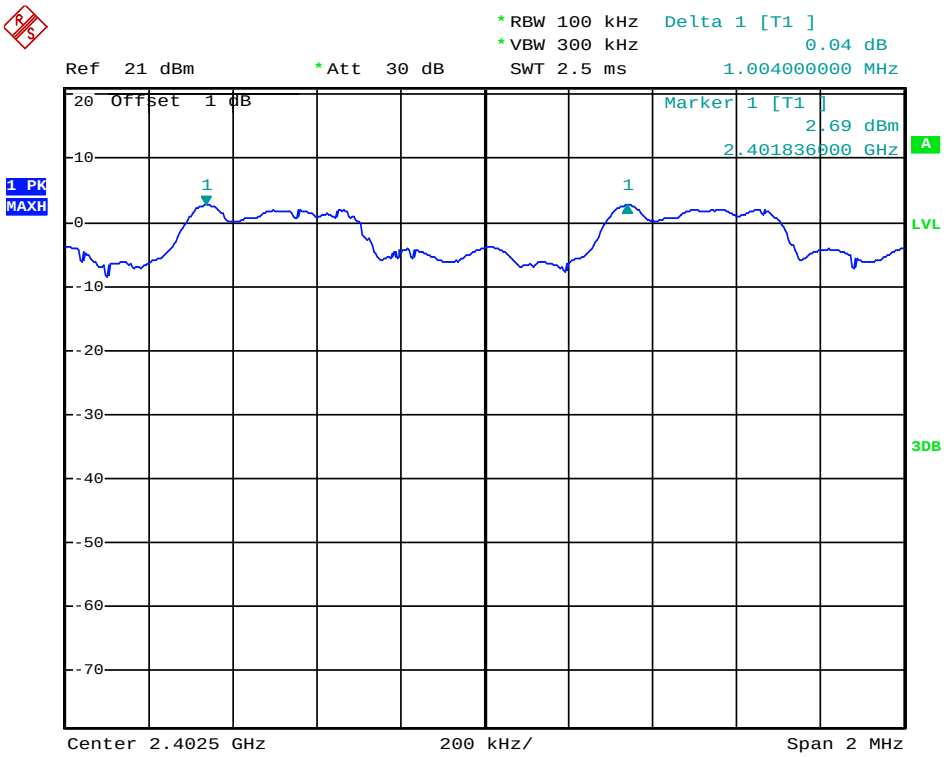
(Plot 4.6.2 C: Channel 78: 2480MHz @ 8DPSK)

4.6.3 π/4DQPSK Test Mode

A. Test Verdict

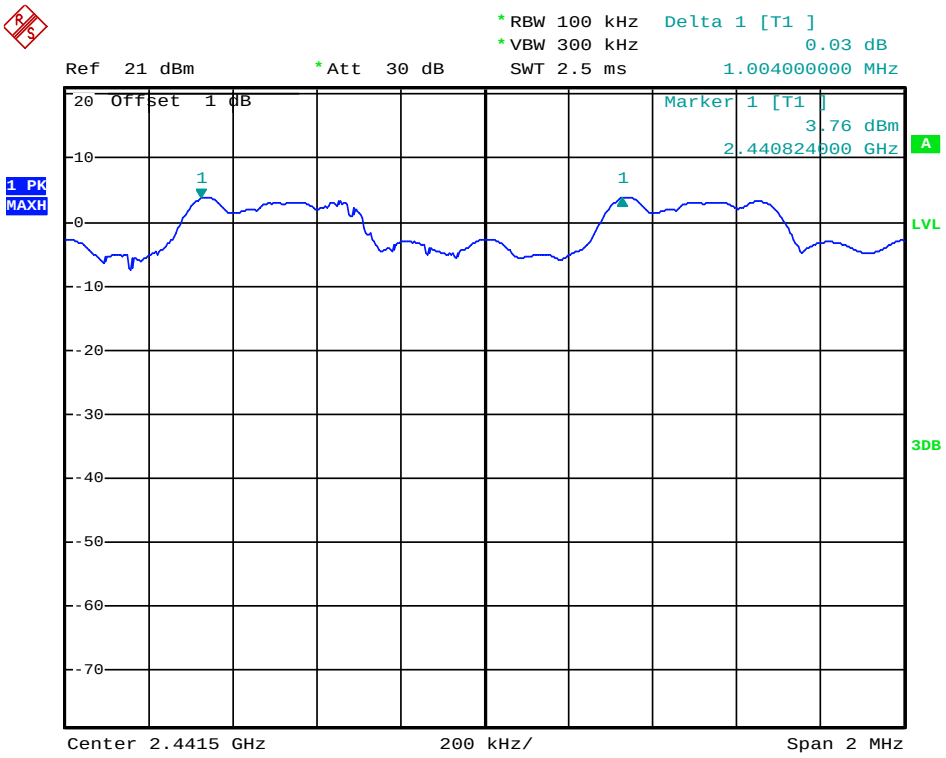
Channel	Frequency (MHz)	Channel Separation (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.004	Plot 4.6.3 A	25KHz or 2/3*20dB bandwidth	PASS
01	2403				
38	2440	1.004	Plot 4.6.3 B	25KHz or 2/3*20dB bandwidth	PASS
39	2441				
77	2479	1.004	Plot 4.6.3 C	25KHz or 2/3*20dB bandwidth	PASS
78	2480				

B. Test Plots



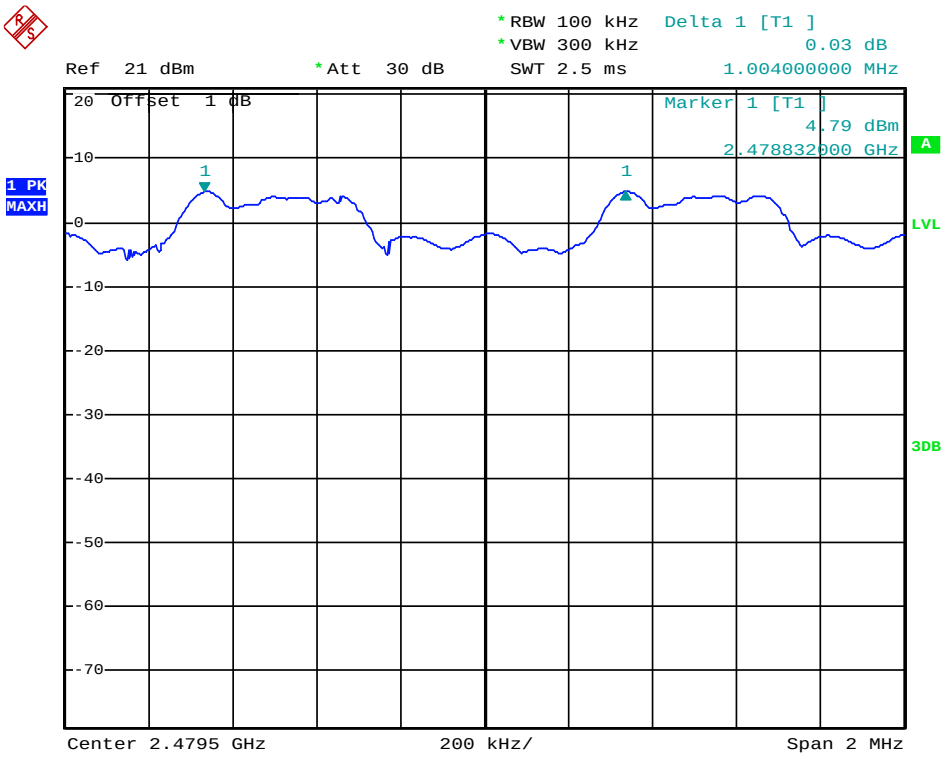
Date: 16.JUL.2013 20:44:24

(Plot 4.6.3 A: Channel 00: 2402MHz @ π/4DQPSK)



Date: 16.JUL.2013 20:45:47

(Plot 4.6.3 B: Channel 39: 2441MHz @ π/4DQPSK)

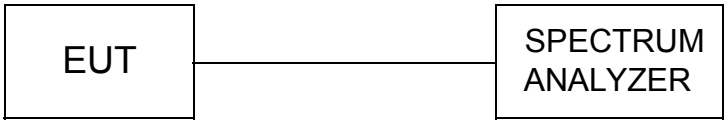


Date: 16.JUL.2013 20:47:04

(Plot 4.6.3 C: Channel 78: 2480MHz @ π/4DQPSK)

4.7. Number of hopping frequency

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator.Set spectrum analyzer start 2400MHz to 2483.5MHz with 30 KHz RBW and 100KHz VBW.

LIMIT

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

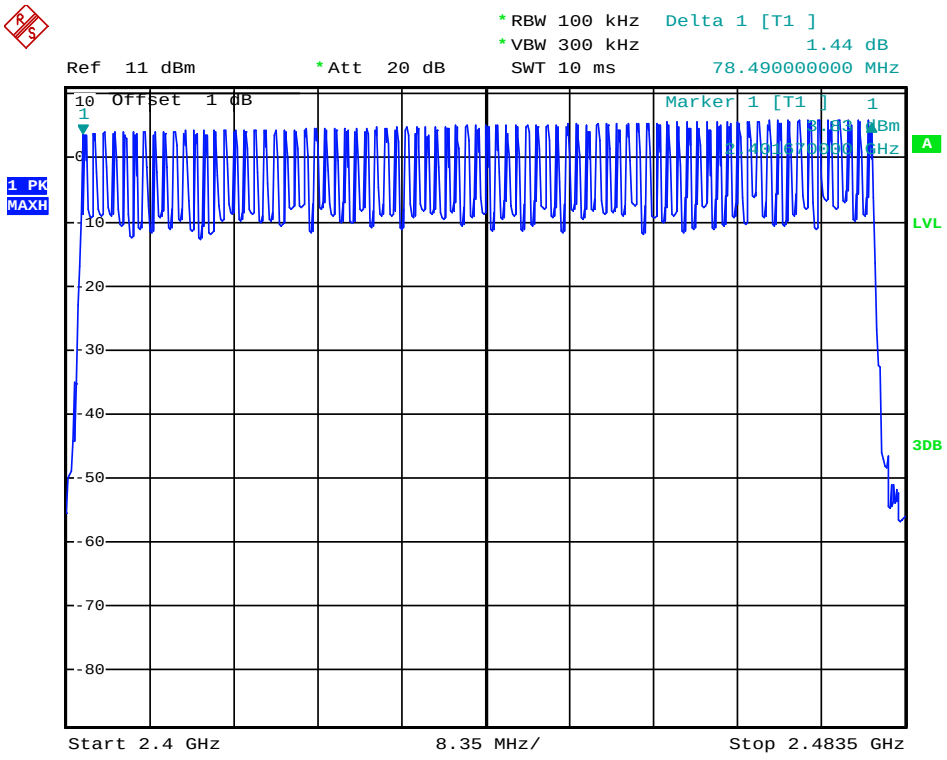
TEST RESULTS

4.7.1 GFSK Test Mode

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
2400-2483.5	79	Plot 4.7.1 A	≥15	PASS

B. Test Plots



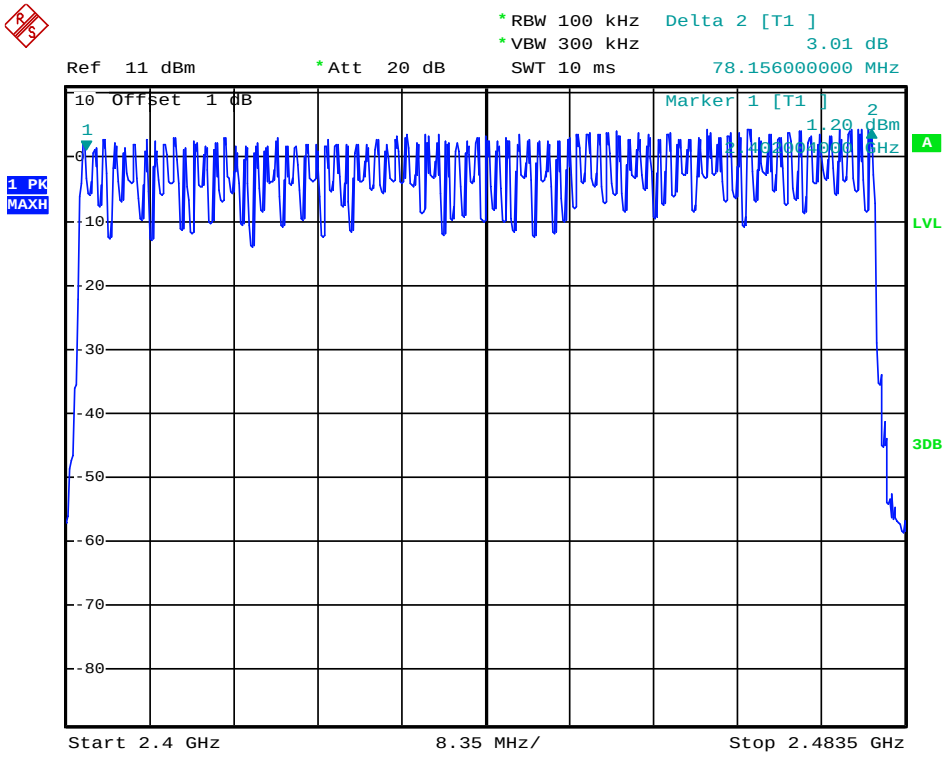
(Plot 4.7.1 A: @ GFSK)

4.7.2 8DPSKTest Mode

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
2400-2483.5	79	Plot 4.7.2 A	≥15	PASS

B. Test Plots



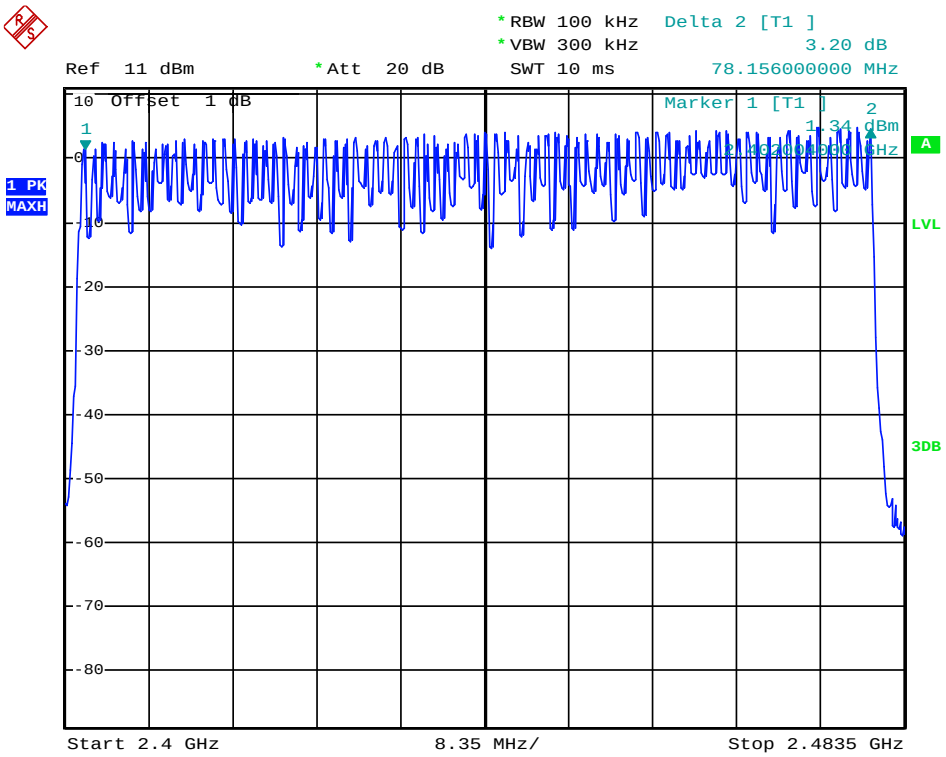
(Plot 4.7.2 A: @ 8DPSK)

4.7.3 π/4DQPSKTest Mode

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
2400-2483.5	79	Plot 4.7.3 A	≥15	PASS

B. Test Plots

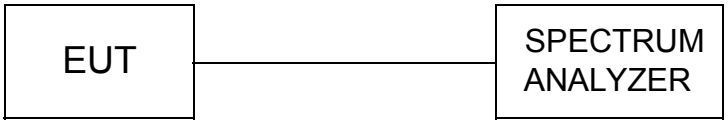


Date: 16.JUL.2013 20:13:45

(Plot 4.7.3 A: @ π/4DQPSK)

4.8. Time Of Occupancy(Dwell Time)

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 3MHz VBW,Span 0Hz.

LIMIT

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

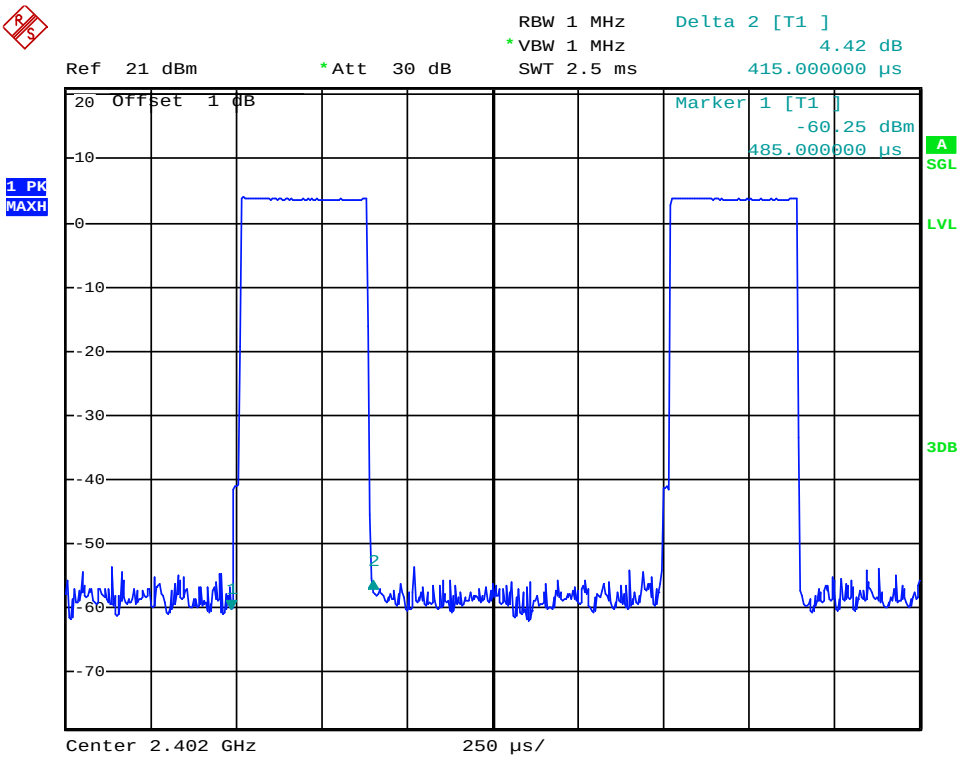
TEST RESULTS

4.8.1 GFSK Test Mode

A. Test Verdict

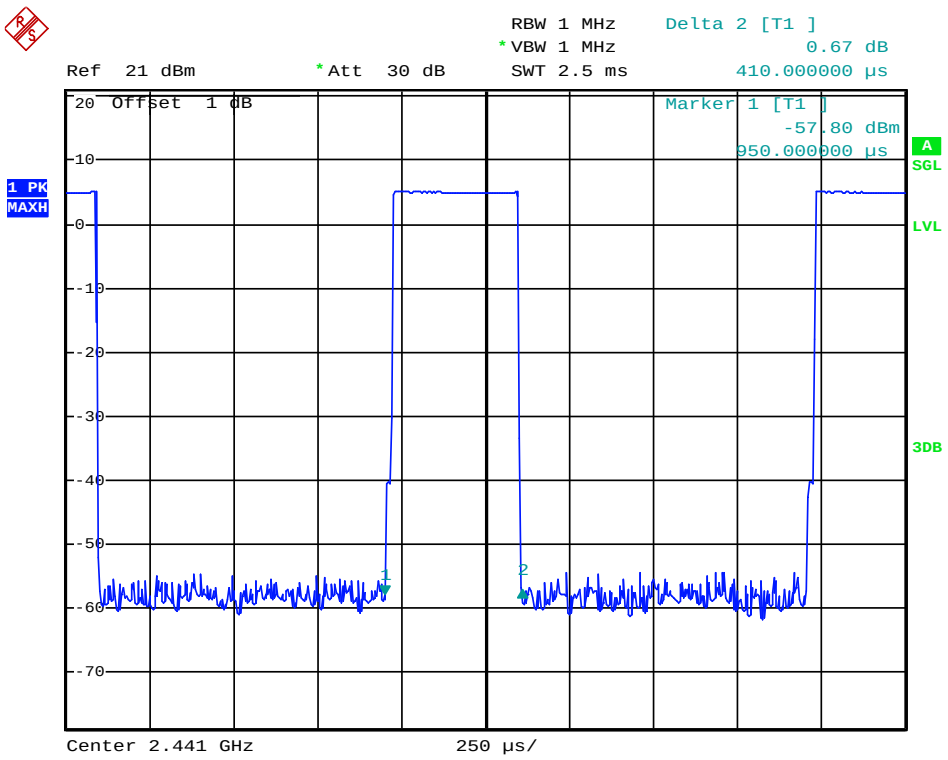
Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Refer to Plot	Verdict
DH 1	2402	0.415	0.1328	0.4	Plot 4.8.1 A1	PASS
	2441	0.410	0.1312	0.4	Plot 4.8.1 A2	PASS
	2480	0.415	0.1328	0.4	Plot 4.8.1 A3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second					
DH 3	2402	1.680	0.2688	0.4	Plot 4.8.1 B1	PASS
	2441	1.695	0.2712	0.4	Plot 4.8.1 B2	PASS
	2480	1.680	0.2688	0.4	Plot 4.8.1 B3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second					
DH 5	2402	2.960	0.3157	0.4	Plot 4.8.1 C1	PASS
	2441	2.960	0.3157	0.4	Plot 4.8.1 C2	PASS
	2480	2.930	0.3157	0.4	Plot 4.8.1 C3	PASS
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second					

B. Test Plots



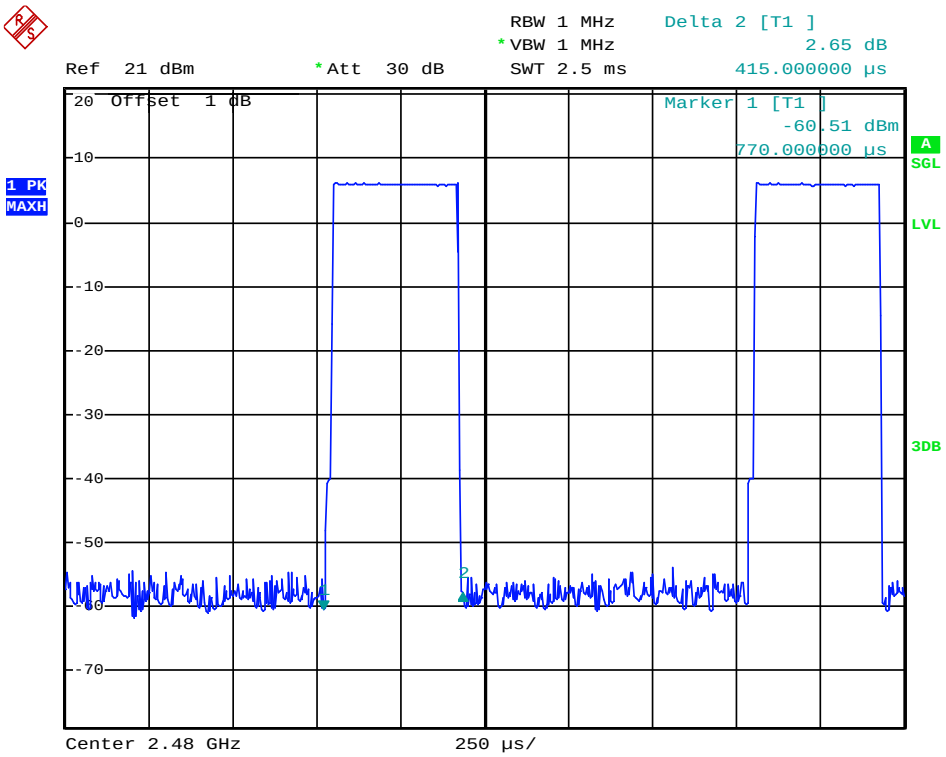
Date: 16.JUL.2013 20:53:56

(Plot 4.8.1.A1: Channel 00: 2402MHz @ GFSK @ DH1)



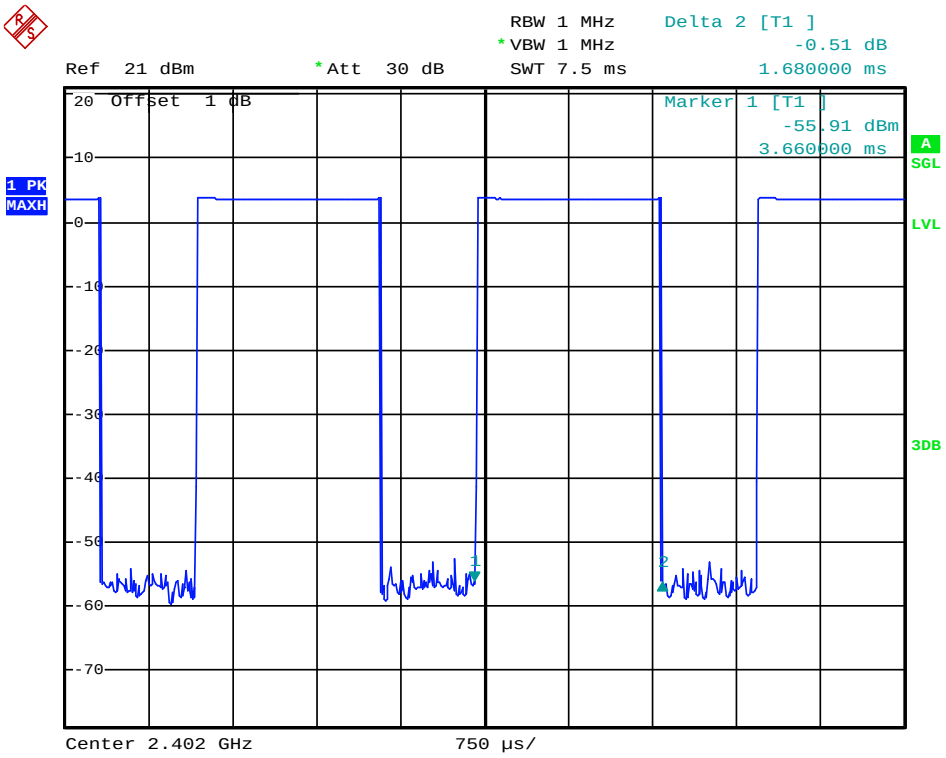
Date: 16.JUL.2013 20:54:45

(Plot 4.8.1.A2: Channel 39: 2441MHz @ GFSK @ DH1)



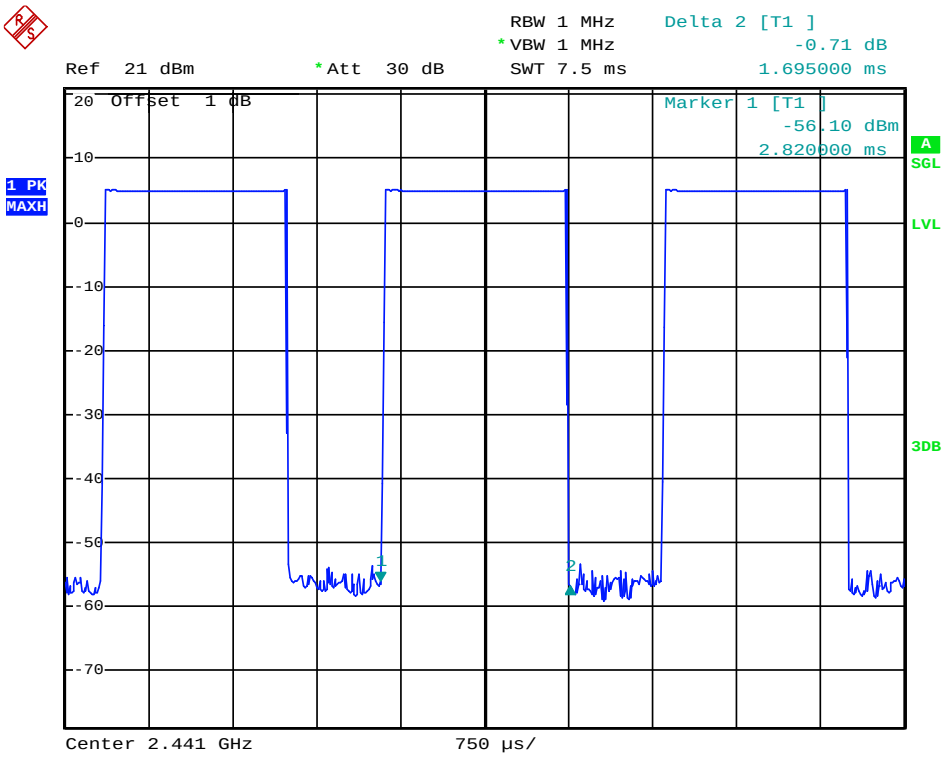
Date: 16.JUL.2013 20:55:30

(Plot 4.8.1.A3: Channel 78: 2480MHz @ GFSK @ DH1)



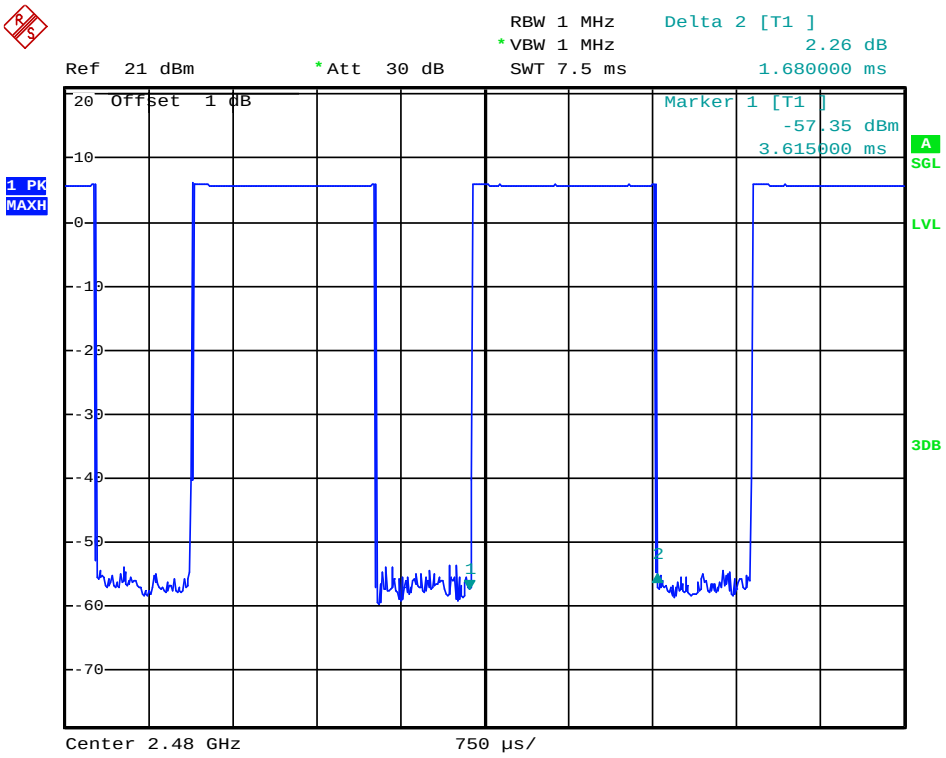
Date: 16.JUL.2013 21:03:36

(Plot 4.8.1.B1: Channel 00: 2402MHz @ GFSK @ DH3)



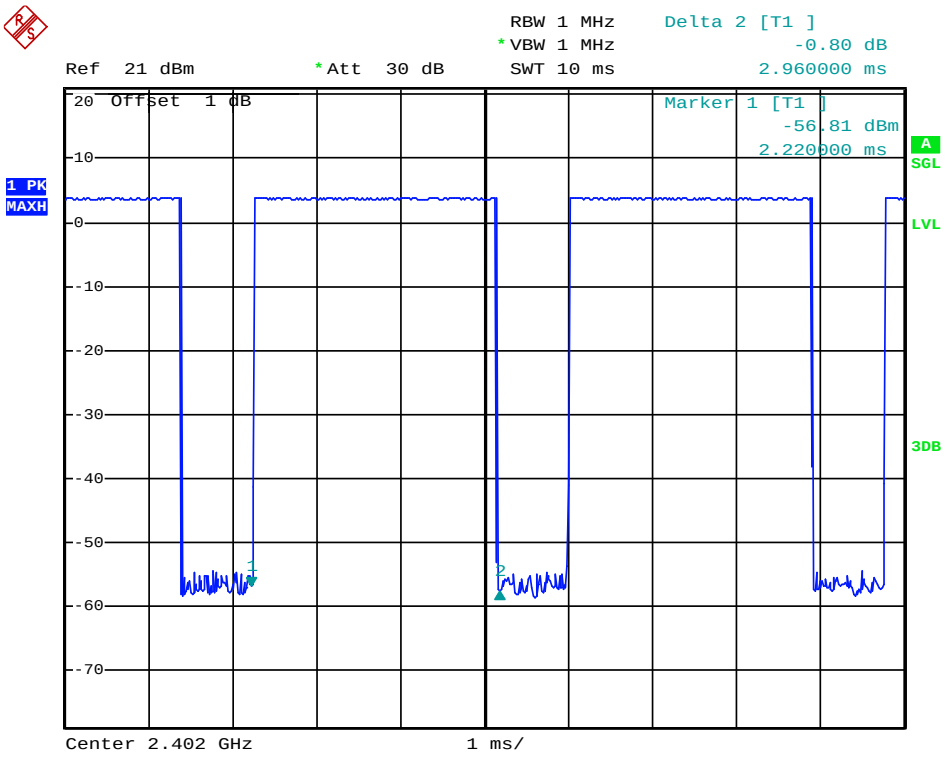
Date: 16.JUL.2013 21:04:17

(Plot 4.8.1.B2: Channel 39: 2441MHz @ GFSK @ DH3)



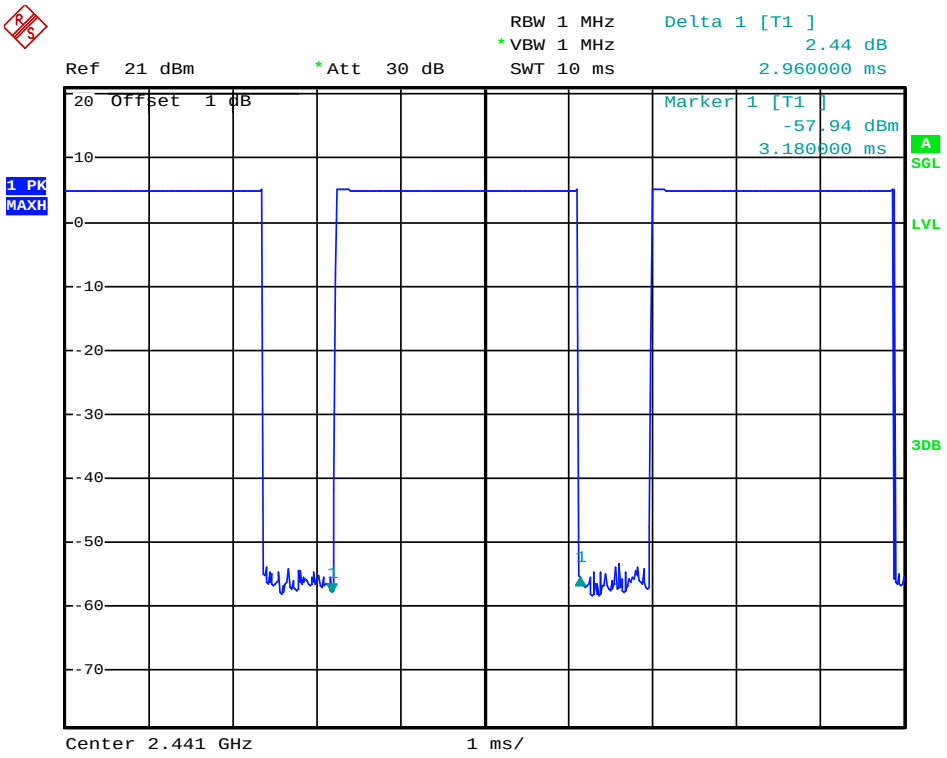
Date: 16.JUL.2013 21:05:00

(Plot 4.8.1.B3: Channel 78: 2480MHz @ GFSK @ DH3)



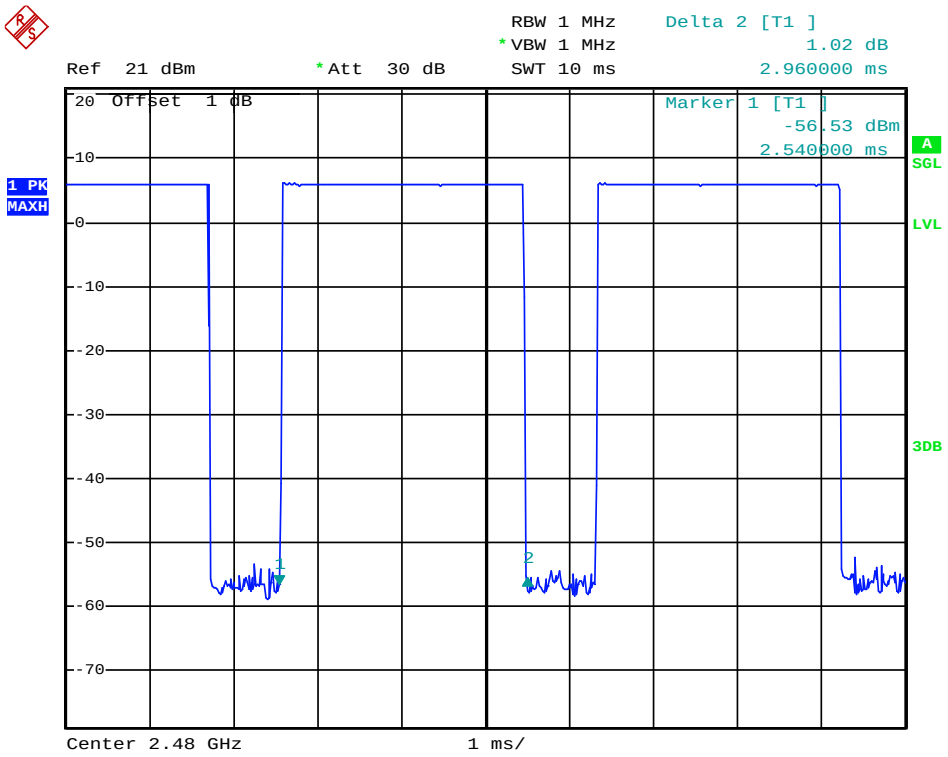
Date: 16.JUL.2013 21:10:30

(Plot 4.8.1.C1: Channel 00: 2402MHz @ GFSK @ DH5)



Date: 16.JUL.2013 21:11:05

(Plot 4.8.1.C2: Channel 39: 2441MHz @ GFSK @ DH5)



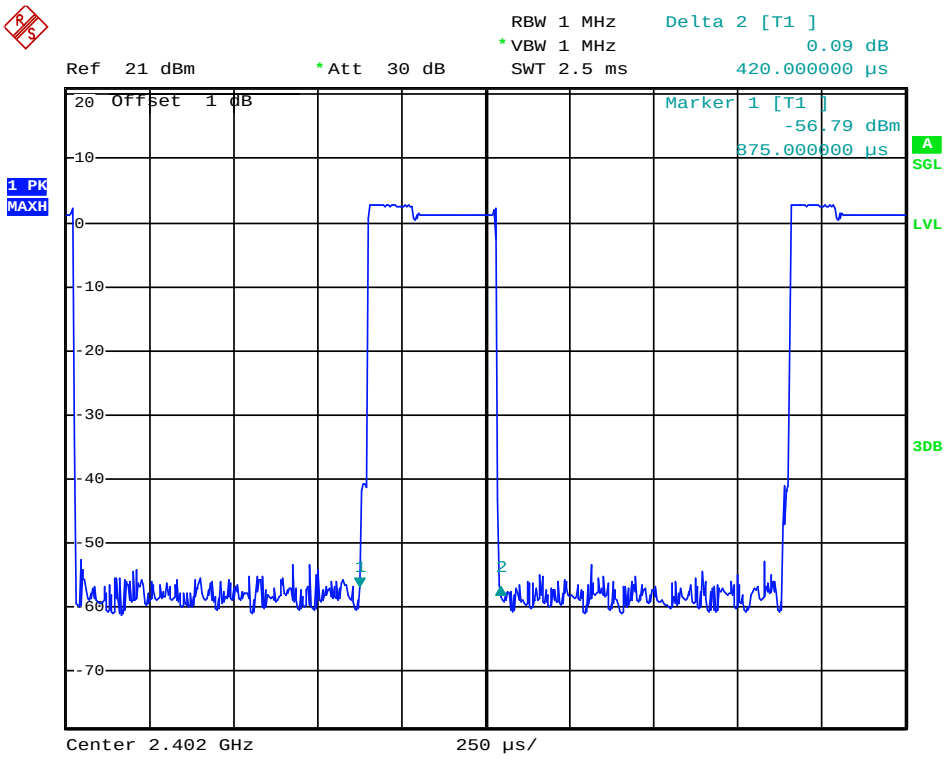
(Plot 4.8.1.C3: Channel 78: 2480MHz @ GFSK @ DH5)

4.8.2 8DPSK Test Mode

A. Test Verdict

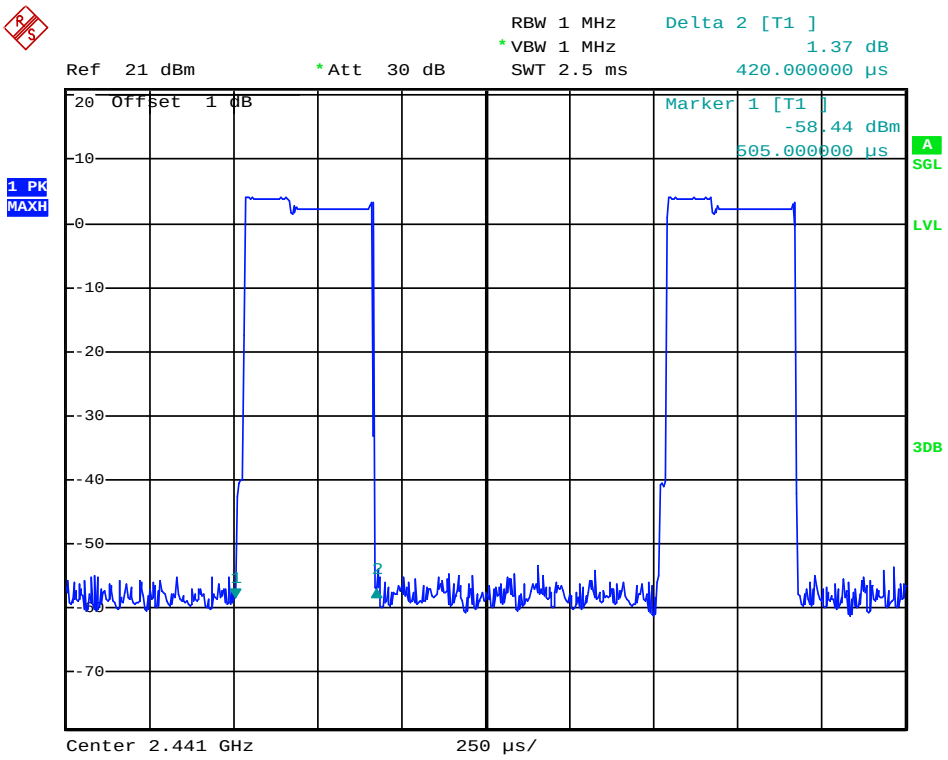
Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Refer to Plot	Verdict
DH 1	2402	0.420	0.1344	0.4	Plot 4.8.2 A1	PASS
	2441	0.420	0.1344	0.4	Plot 4.8.2 A2	PASS
	2480	0.420	0.1344	0.4	Plot 4.8.2 A3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second					
DH 3	2402	1.680	0.2688	0.4	Plot 4.8.2 B1	PASS
	2441	1.680	0.2688	0.4	Plot 4.8.2 B2	PASS
	2480	1.695	0.2712	0.4	Plot 4.8.2 B3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second					
DH 5	2402	2.960	0.3157	0.4	Plot 4.8.2 C1	PASS
	2441	2.960	0.3157	0.4	Plot 4.8.2 C2	PASS
	2480	2.960	0.3157	0.4	Plot 4.8.2 C3	PASS
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second					

B. Test Plots



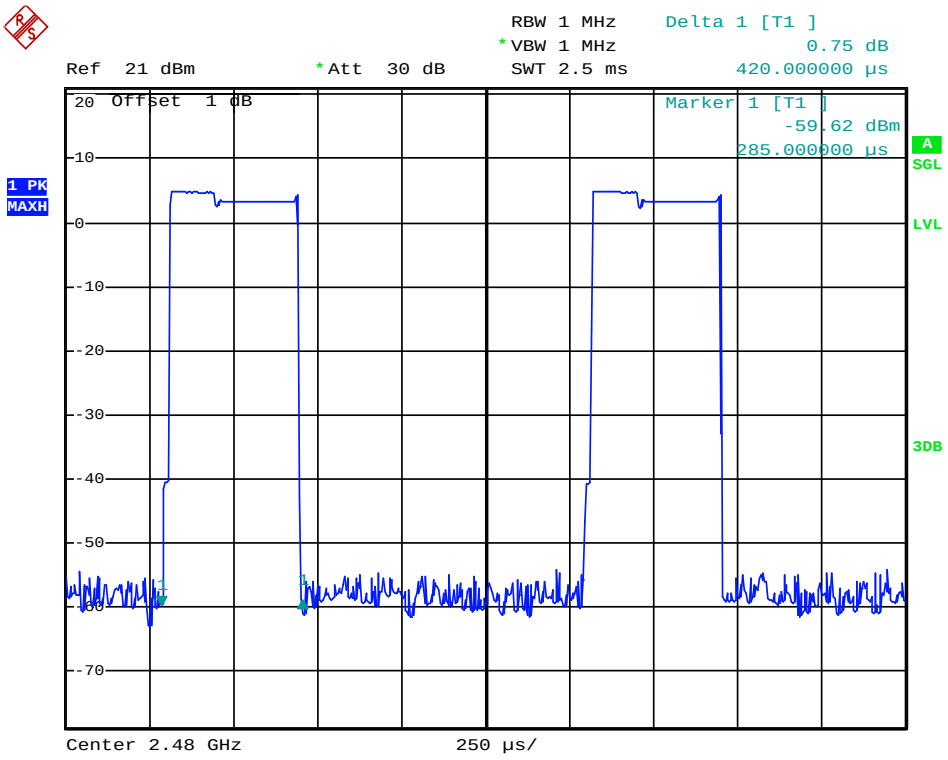
Date: 16.JUL.2013 21:00:12

(Plot 4.8.2.A1: Channel 00: 2402MHz @ 8DPSK @ DH1)



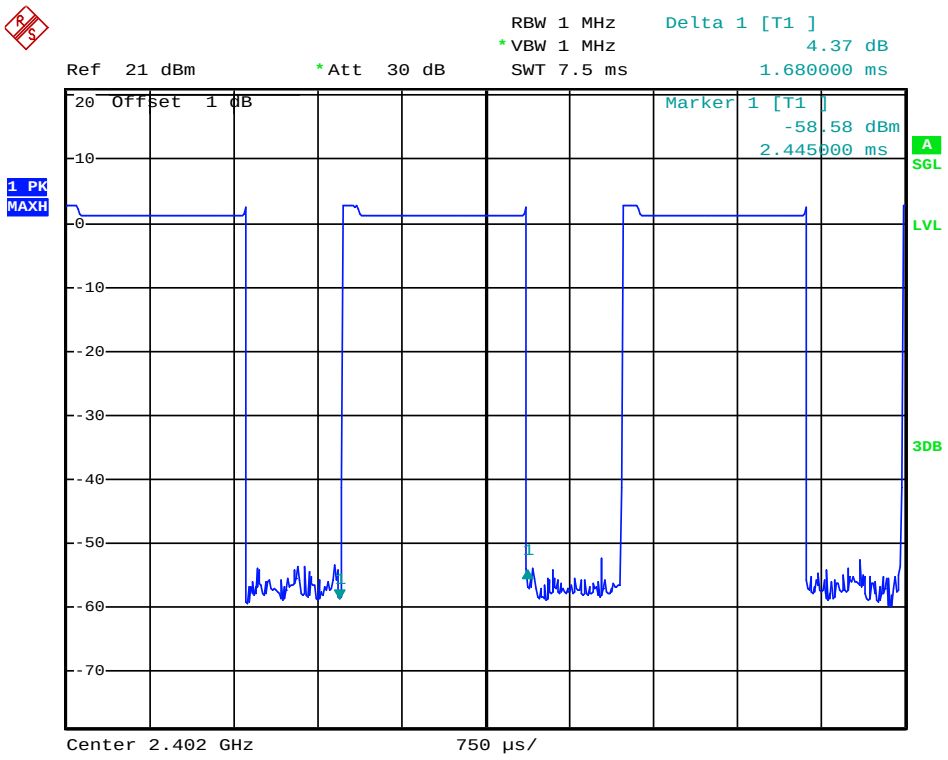
Date: 16.JUL.2013 21:01:09

(Plot 4.8.2.A2: Channel 39: 2441MHz @ 8DPSK @ DH1)



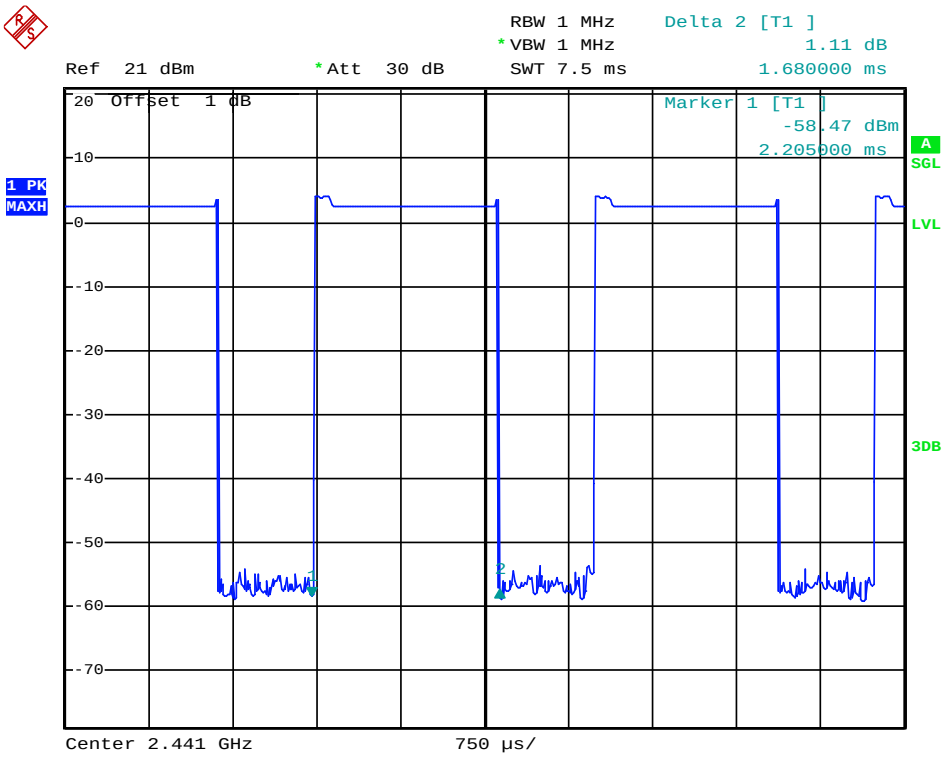
Date: 16.JUL.2013 21:02:19

(Plot 4.8.2.A3: Channel 78: 2480MHz @ 8DPSK @ DH1)



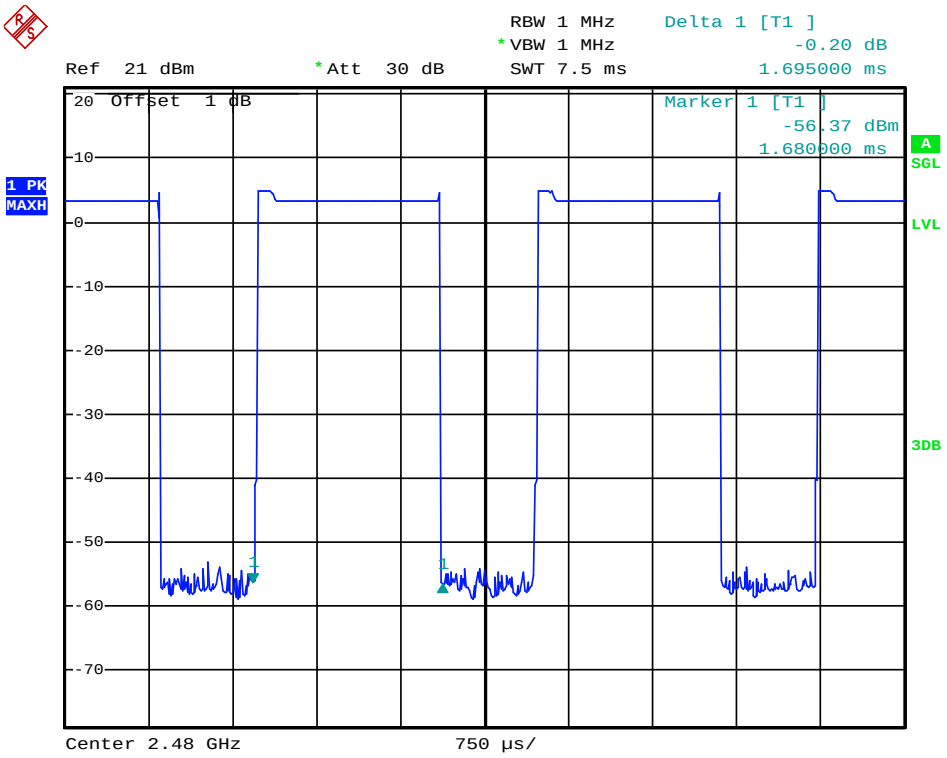
Date: 16.JUL.2013 21:07:59

(Plot 4.8.2.B1: Channel 00: 2402MHz @ 8DPSK @ DH3)



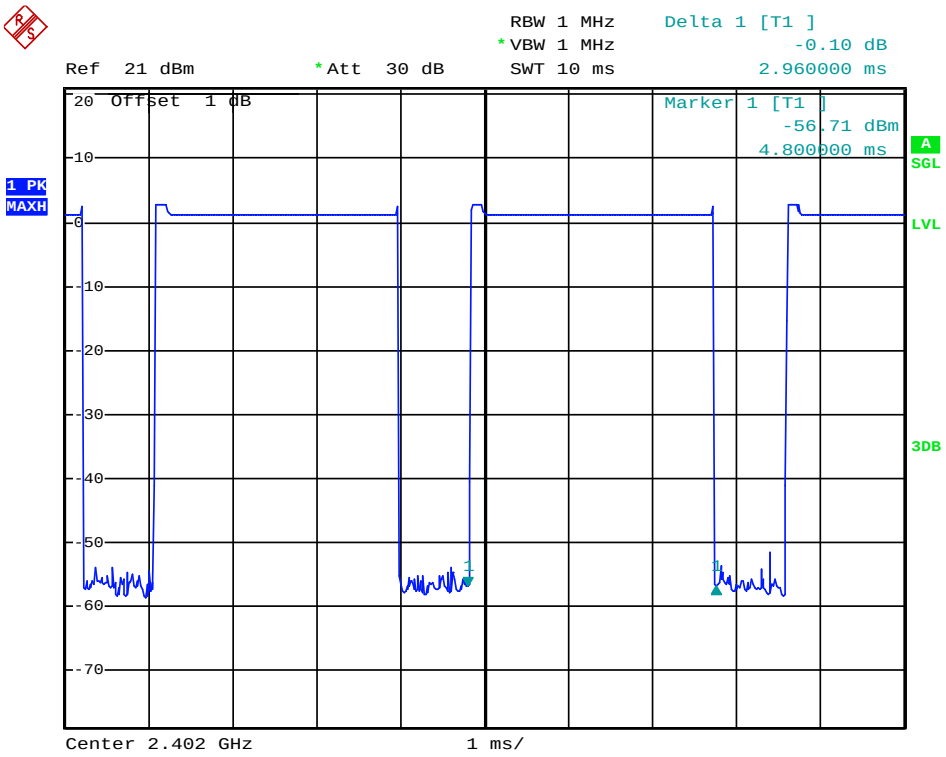
Date: 16.JUL.2013 21:08:39

(Plot 4.8.2.B2: Channel 39: 2441MHz @ 8DPSK @ DH3)



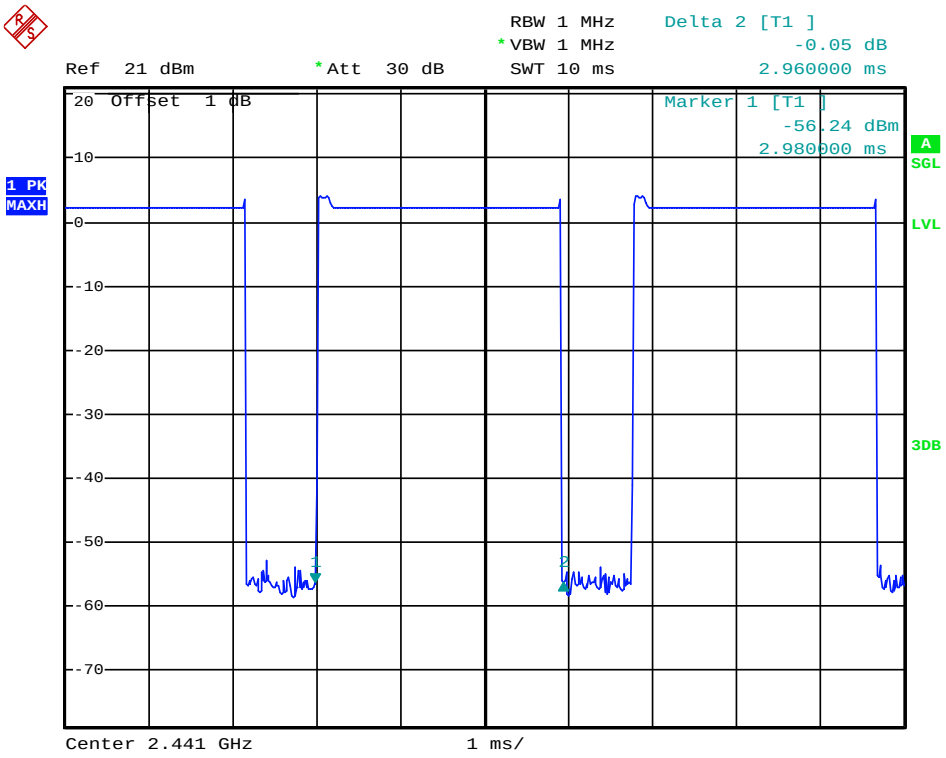
Date: 16.JUL.2013 21:09:17

(Plot 4.8.2.B3: Channel 78: 2480MHz @ 8DPSK @ DH3)



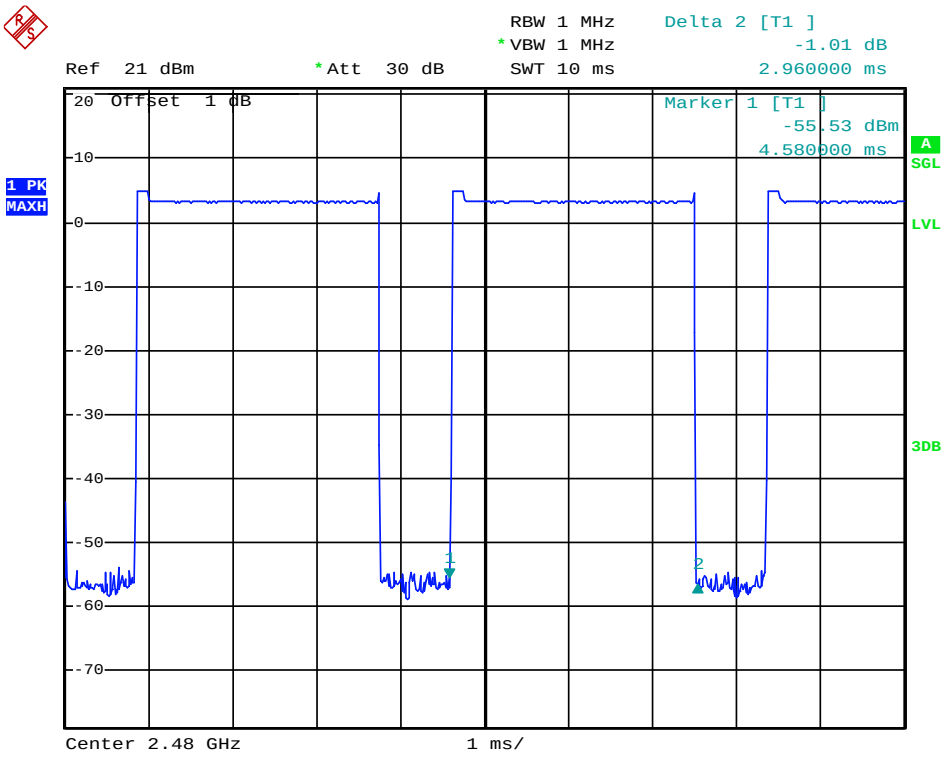
Date: 16.JUL.2013 21:14:29

(Plot 4.8.2.C1: Channel 00: 2402MHz @ 8DPSK @ DH5)



Date: 16.JUL.2013 21:15:02

(Plot 4.8.2.C2: Channel 39: 2441MHz @ 8DPSK @ DH5)



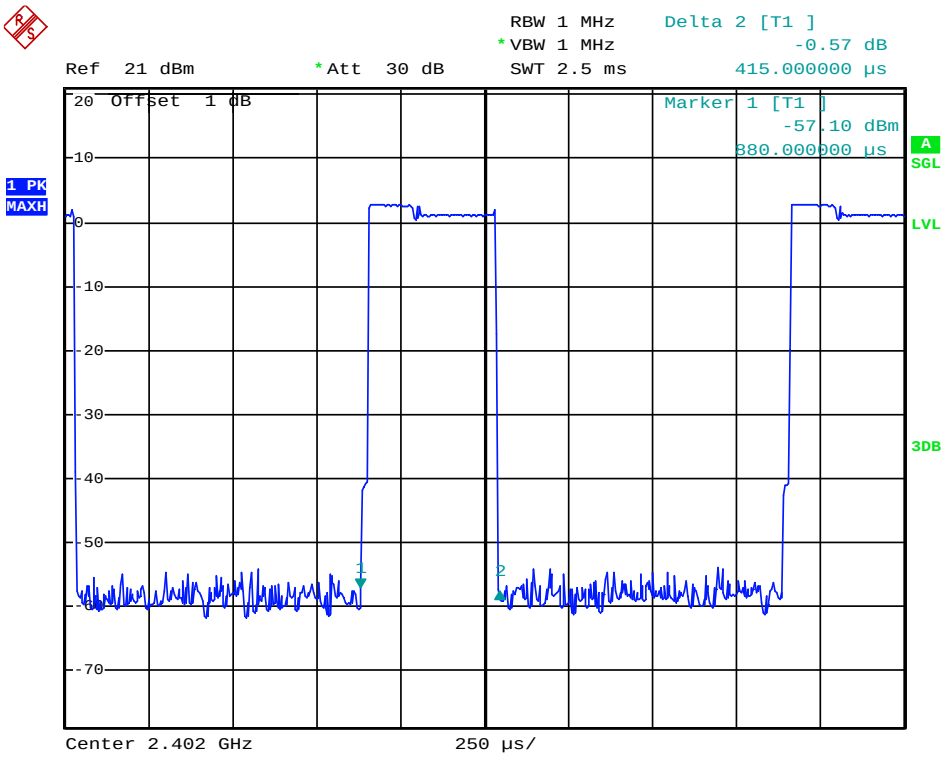
(Plot 4.8.2.C3: Channel 78: 2480MHz @ 8DPSK @ DH5)

4.8.3 π/4DQPSK Test Mode

A. Test Verdict

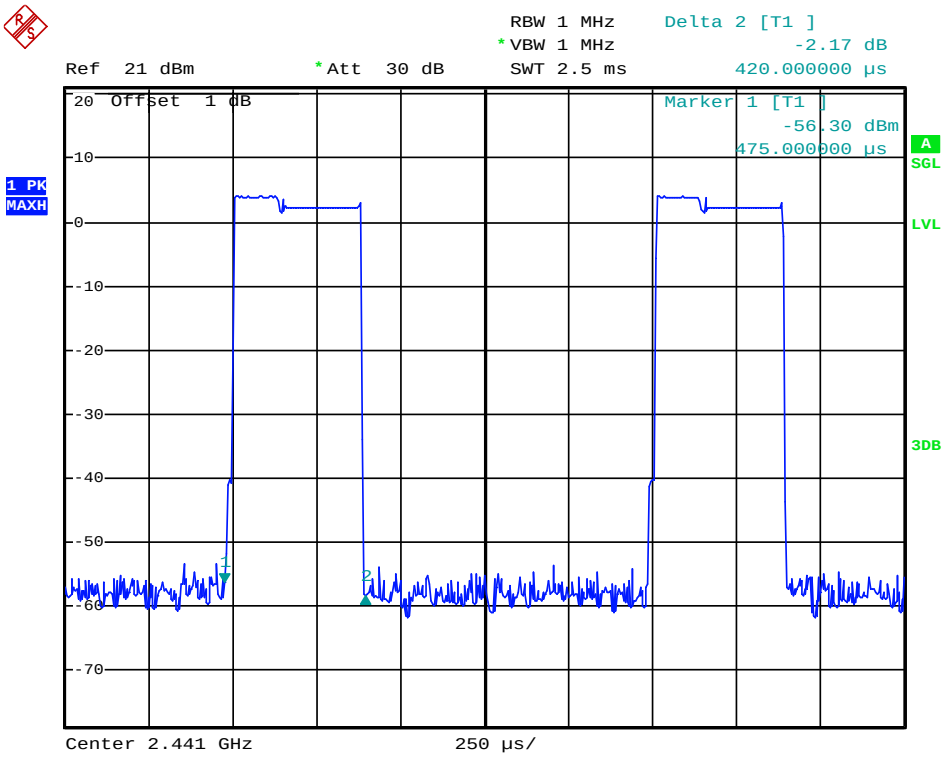
Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Refer to Plot	Verdict
DH 1	2402	0.415	0.1328	0.4	Plot 4.8.3 A1	PASS
	2441	0.420	0.1344	0.4	Plot 4.8.3 A2	PASS
	2480	0.420	0.1344	0.4	Plot 4.8.3 A3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second					
DH 3	2402	1.695	0.2712	0.4	Plot 4.8.3 B1	PASS
	2441	1.695	0.2712	0.4	Plot 4.8.3 B2	PASS
	2480	1.695	0.2712	0.4	Plot 4.8.3 B3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second					
DH 5	2402	2.960	0.3157	0.4	Plot 4.8.3 C1	PASS
	2441	2.960	0.3157	0.4	Plot 4.8.3 C2	PASS
	2480	2.960	0.3157	0.4	Plot 4.8.3 C3	PASS
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second					

B. Test Plots



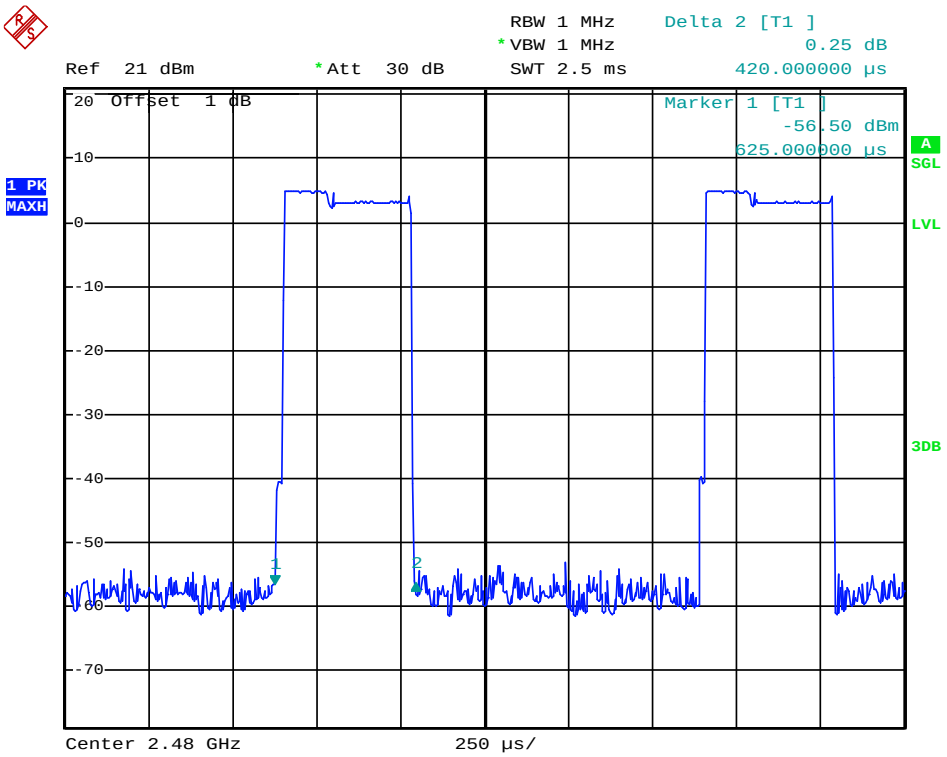
Date: 16.JUL.2013 20:56:36

(Plot 4.8.3.A1: Channel 00: 2402MHz @ π/4DQPSK @ DH1)



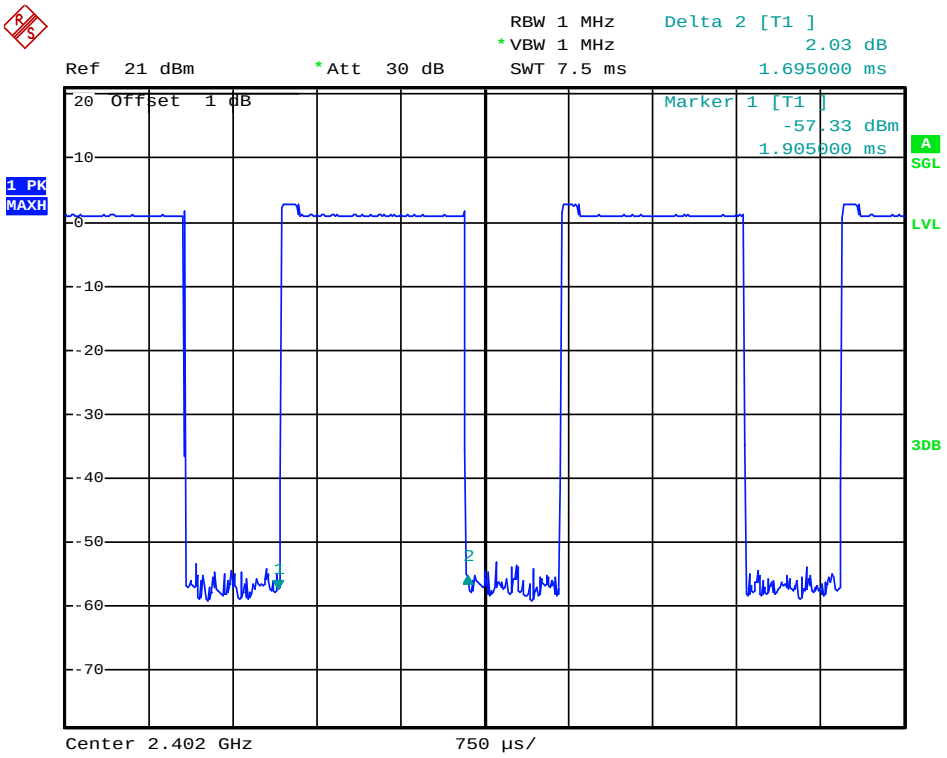
Date: 16.JUL.2013 20:58:04

(Plot 4.8.3.A2: Channel 39: 2441MHz @ π/4DQPSK @ DH1)



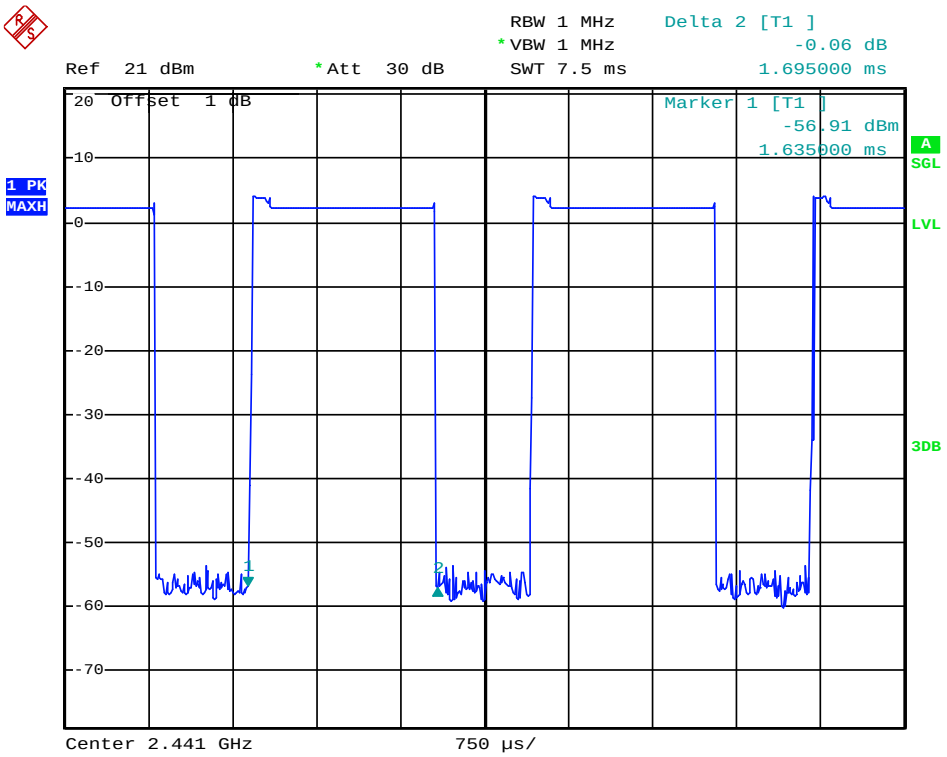
Date: 16.JUL.2013 20:59:12

(Plot 4.8.3.A3: Channel 78: 2480MHz @ π/4DQPSK @ DH1)



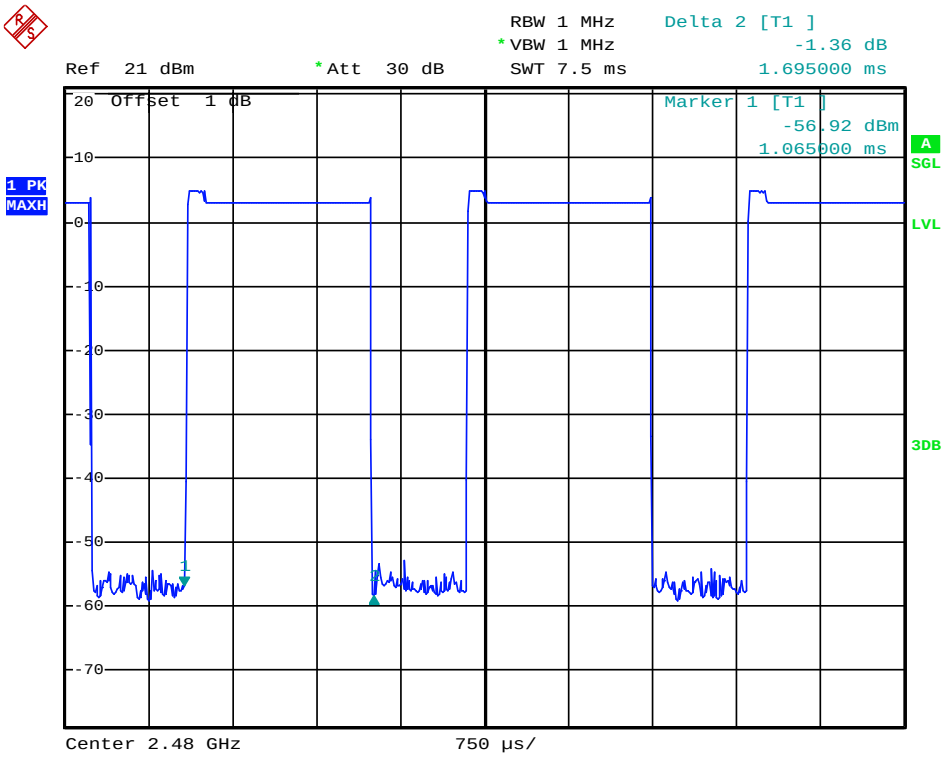
Date: 16.JUL.2013 21:05:56

(Plot 4.8.3.B1: Channel 00: 2402MHz @ π/4DQPSK @ DH3)



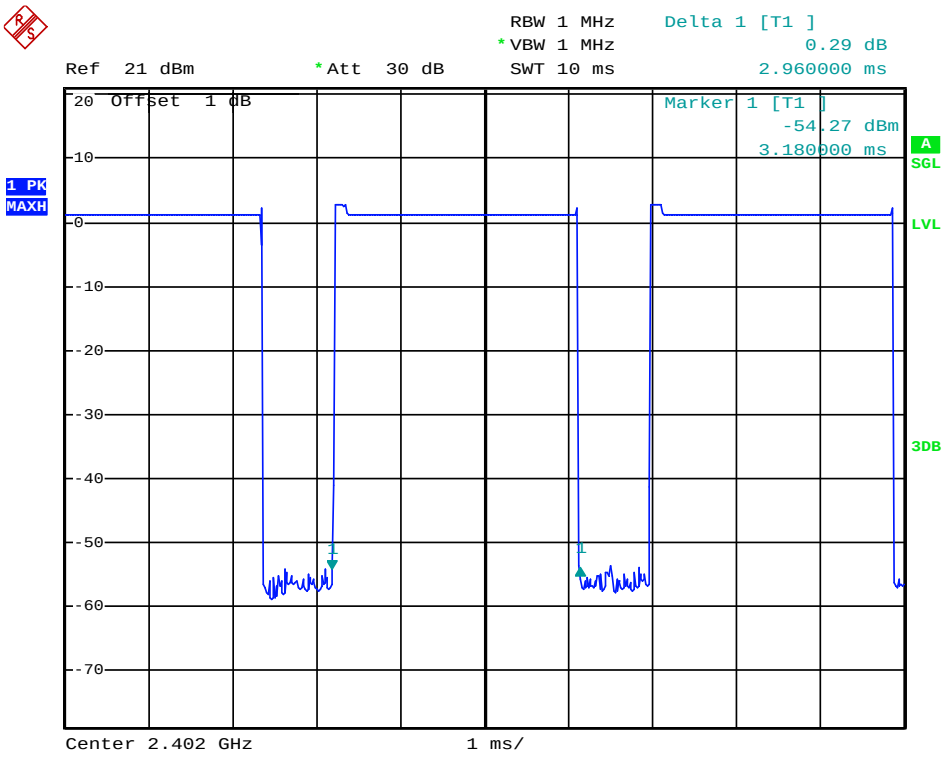
Date: 16.JUL.2013 21:06:28

(Plot 4.8.3.B2: Channel 39: 2441MHz @ π/4DQPSK @ DH3)



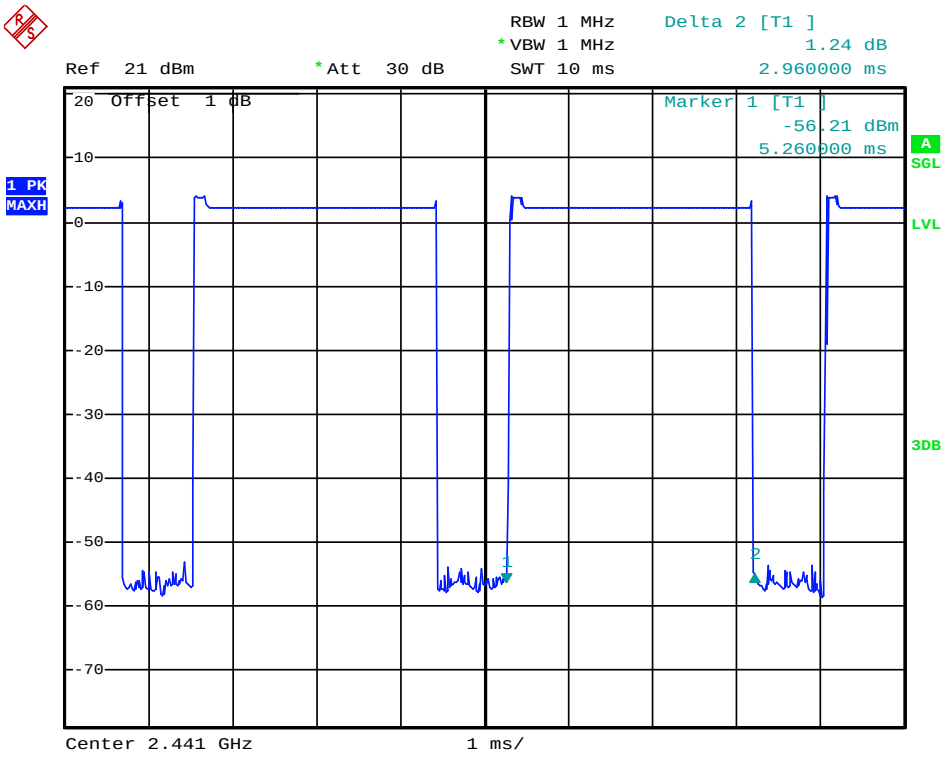
Date: 16.JUL.2013 21:07:04

(Plot 4.8.3.B3: Channel 78: 2480MHz @ π/4DQPSK @ DH3)



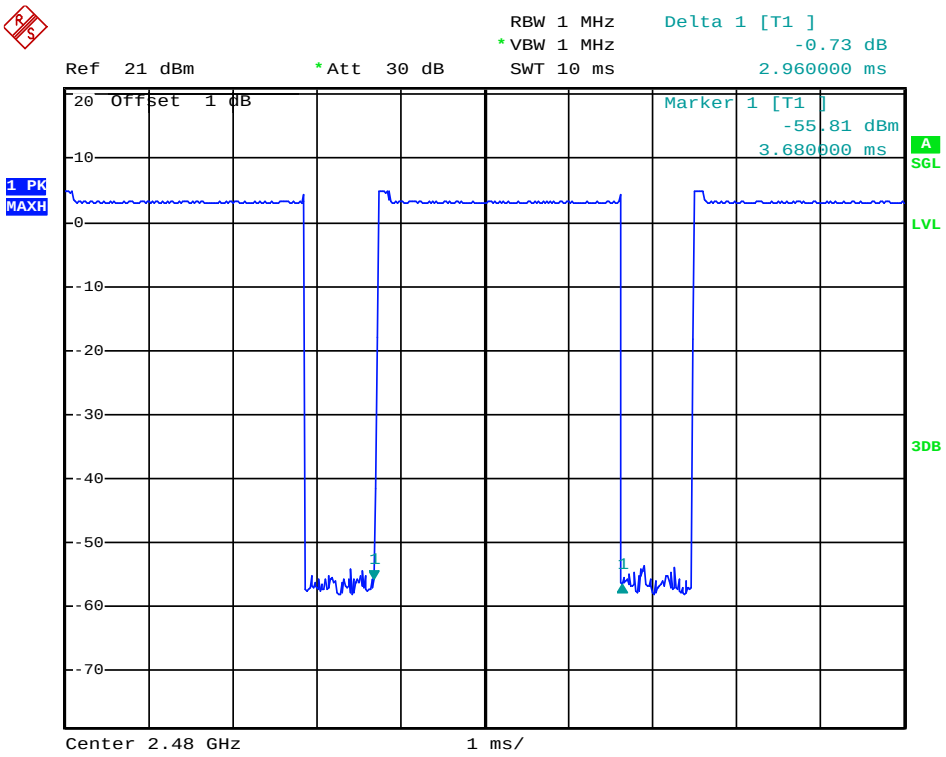
Date: 16.JUL.2013 21:12:30

(Plot 4.8.3.C1: Channel 00: 2402MHz @ π/4DQPSK @ DH5)



Date: 16.JUL.2013 21:13:01

(Plot 4.8.3.C2: Channel 39: 2441MHz @ π/4DQPSK @ DH5)



Date: 16.JUL.2013 21:13:34

(Plot 4.8.3.C3: Channel 78: 2480MHz @ π/4DQPSK @ DH5)

4.9. Pseudorandom Frequency Hopping Sequence

TEST APPLICABLE

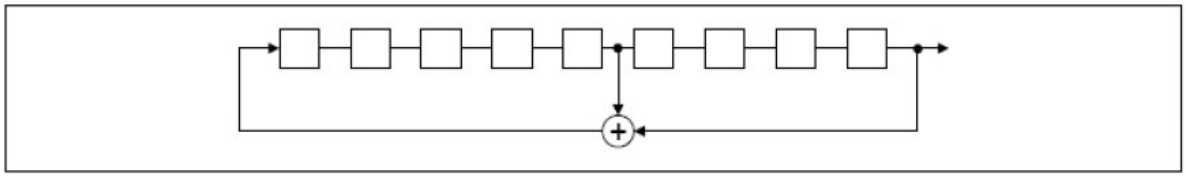
For 47 CFR Part 15C section 15.247 (a)(1) requirement:

Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to chan-nel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence Requirement

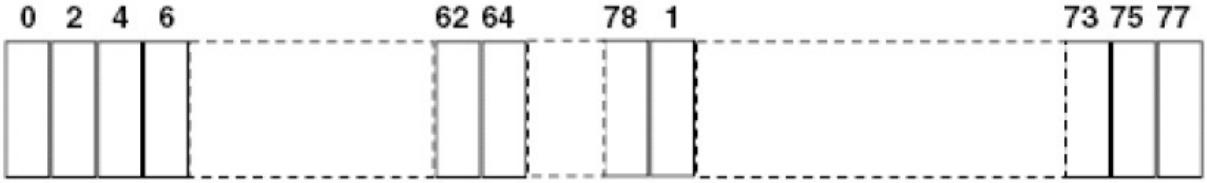
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage.And the result is fed back to the input of the frist stage.The sequence begins with the frist one of 9 consecutive ones,for example:the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

4.10. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

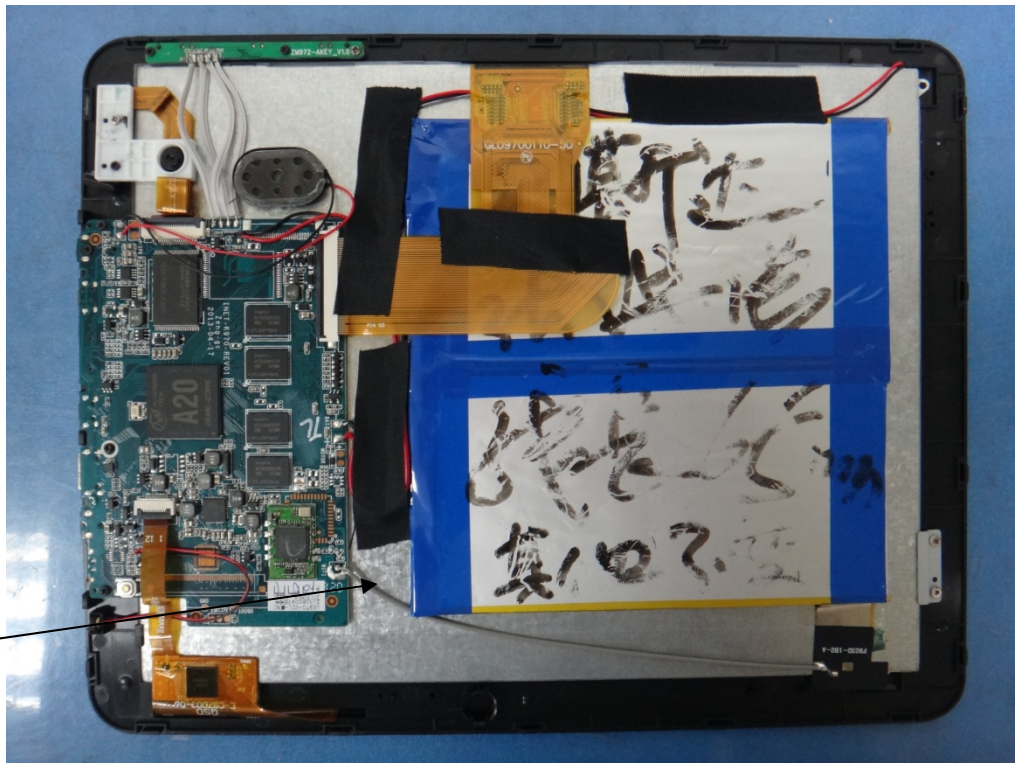
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

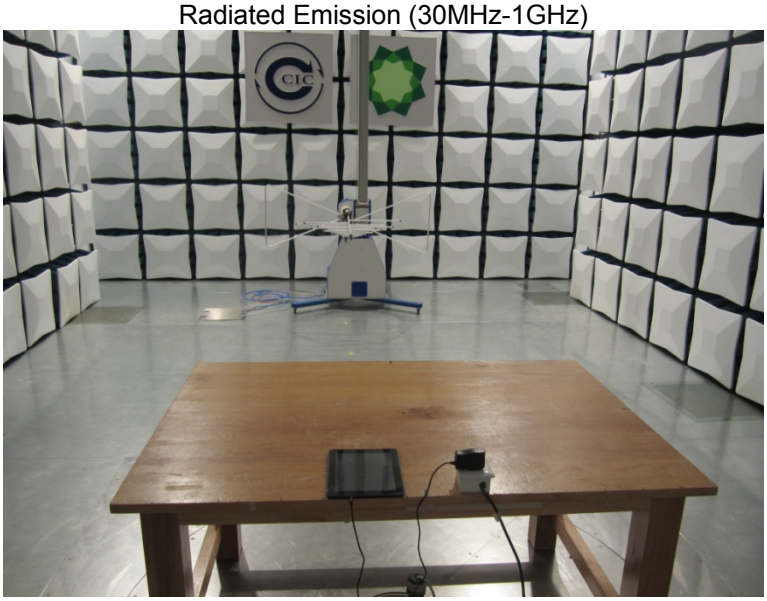
Antenna Connected Construction

The WLAN and Bluetooth were use a same single antenna and the Gain of antenna was 2.0 dBi.

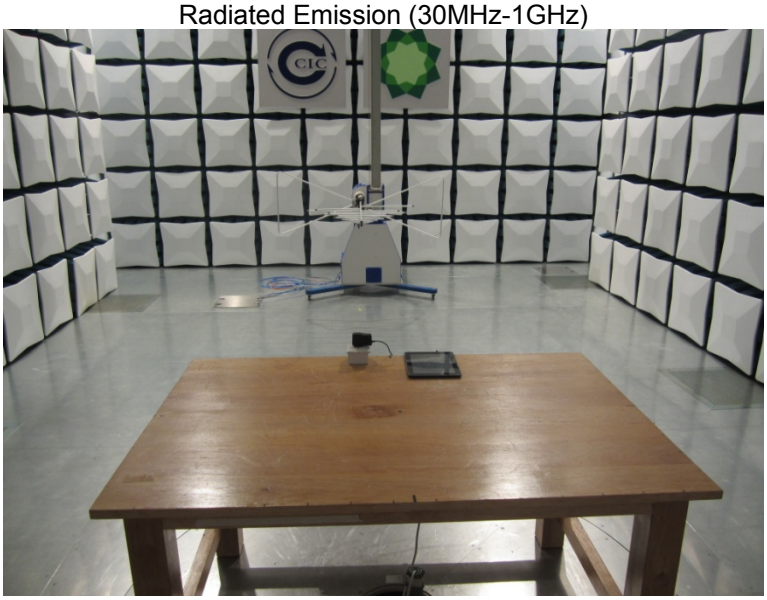


5. Test Setup Photos of the EUT

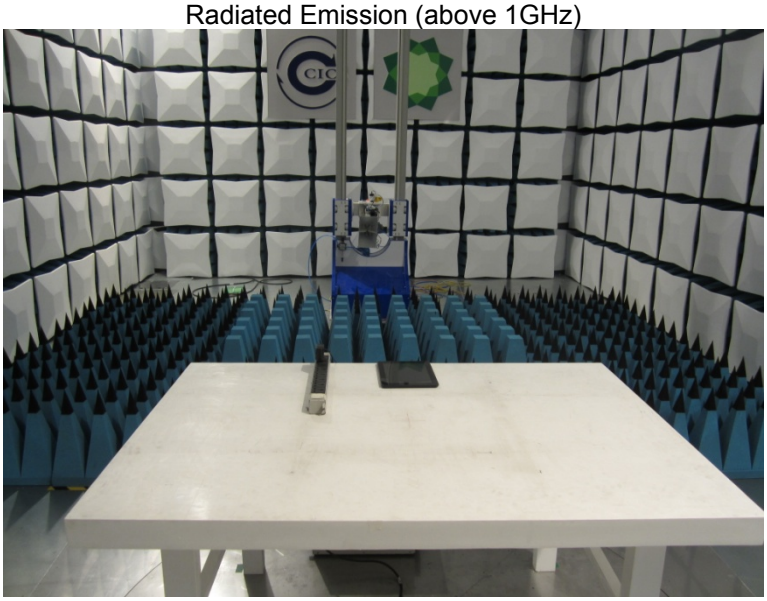
Radiated Emission (30MHz-1GHz)



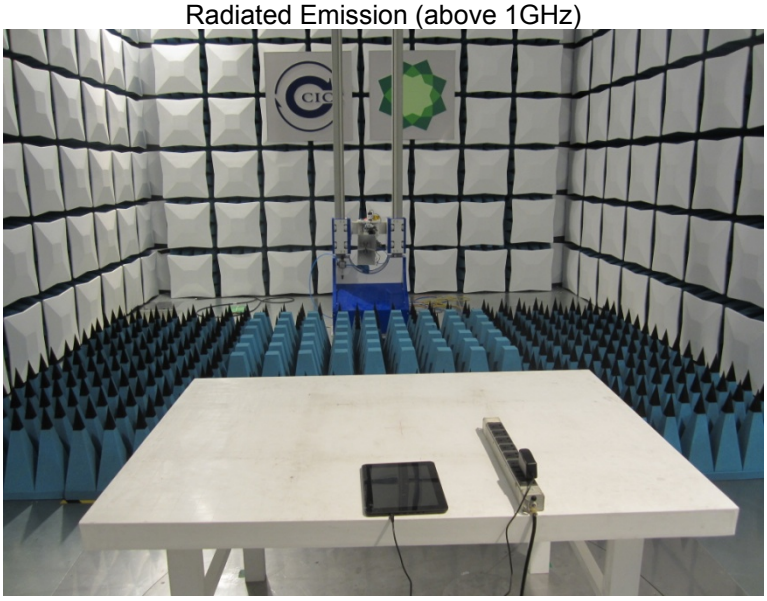
Radiated Emission (30MHz-1GHz)



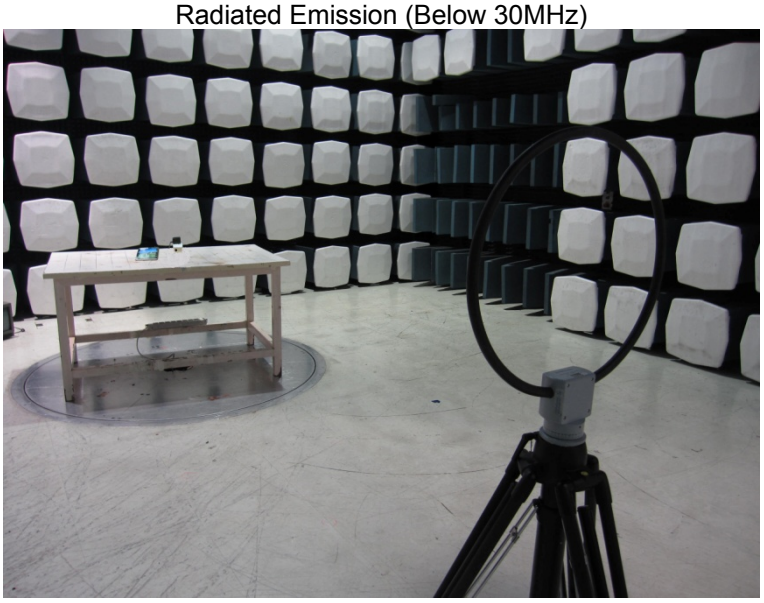
Radiated Emission (above 1GHz)



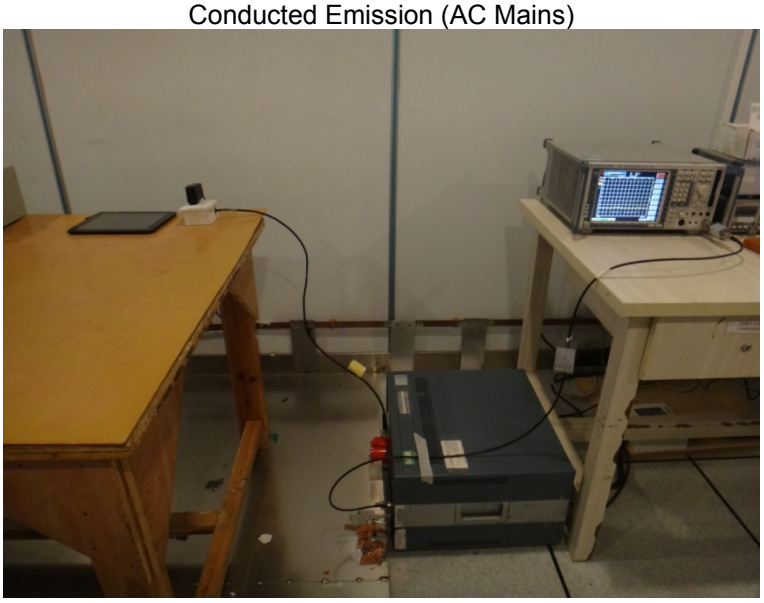
Radiated Emission (above 1GHz)



Radiated Emission (Below 30MHz)



Conducted Emission (AC Mains)



.....End of Report.....