TEST REPORT

REPORT NUMBER: B15X50034-FCC-BT_Rev1

ON

Type of Equipment: Ilium X100 Smart Phone
Type of Designation: Ilium X100
Manufacturer: Shenzhen fortuneship technology,LTD

ACCORDING TO

FCC Part 15, Subpart C, 2015:
15.205 Restricted bands of operation,
15.209 Radiated emission limits; general requirements,
15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.4-2014, Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

FCC Public Notice DA 00-705,March-2000, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

China Telecommunication Technology Labs.

Month date, year
APR, 14, 2015

Signature

He Guili
Director

FCC ID: ZC4X100

Report Date: 2015-04-14

Test Firm Name: China Telecommunication Technology Labs

Registration Number: 840587

Statement

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported tests were carried out on a sample equipment to demonstrate limited compliance with FCC Parts 15, subpart C. The sample tested was found to comply with the requirements defined in the applied rules.

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1 General Information

1.1 Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with FCC Parts 15, subpart C and ANSI C63.4-2003 and FCC DA 00-705.

The test results of this test report relate exclusively to the item(s) tested as specified in section 2.

The following deviation from, additions to, or exclusions from the test specifications have been made. See Annex C.

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1.2 Testers

Name: Li Guoqing

Position: Engineer

Department: Department of EMC test

Date: 2015-04-14

Signature: 李国庆

Editor of this test report:

Name: Li Guoqing

Position: Engineer

Department: Department of EMC test

Date: 2015-04-14

Signature: 李国庆

Technical responsibility for area of testing:

Name: Zou Dongyi

Position: Manager

Department: Department of EMC test

Date: 2015-04-14

Signature: 邹东毅

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1.3 Testing Laboratory information

1.3.1 Location

Name:	China Telecommunication Technology Labs.
Address:	No. 11, Yue Tan Nan Jie, Xi Cheng District BEIJING P. R. CHINA, 100083
Tel:	+86 10 68094053
Fax:	+86 10 68011404
Email:	emc@chinattl.com

1.3.2 Details of accreditation status

Accredited by:	China National Accreditation Service for Conformity Assessment (CNAS)
Registration number:	CNAL Registration No.L0570
Standard:	ISO/IEC 17025:2005

1.3.3 Test location, where different from section 1.3.1

Name:	------
Street:	------
City:	------
Country:	------
Telephone:	------
Fax:	------
Postcode:	------

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1.4 Details of applicant or manufacturer

1.4.1 Applicant

Name:	Coroporativo Lanix S.A. de C.V
Address:	Carrterera internacional Hermosillo-Nogales Km 8.5
Country:	Mexico
Telephone:	6621090811
Fax:	--
Contact:	Oscar Guzman
Telephone:	6621090811
Email:	Oguzman@lanix.ciim

1.4.2 Manufacturer (if different from applicant in section 1.4.1)

Name:	Shenzhen fortuneship technology.,LTD
Address:	6th Floor, Kingson Building, New Energ Innovation Industrial Park, No.1Chuangsheng Road, Nanshan District, Shenzhen, P.R.China

1.4.3 Manufactory (if different from applicant in section 1.4.1)

Name:	Shenzhen fortuneship technology.,LTD
Address:	6th Floor, Kingson Building, New Energ Innovation Industrial Park, No.1Chuangsheng Road, Nanshan District, Shenzhen, P.R.China

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2 Test Item

2.1 General Information

Manufacturer: Shenzhen fortuneship technology, LTD
Name: Ilium X100 Smart Phone
Model Number: Ilium X100
Serial Number: --
Production Status: Production
Receipt date of test item: 2015-01-14

2.2 Outline of EUT

E.U.T. is a GSM850/ PCS1900 Dual-band and UMTS/HSDPA/HSUPA FDD II/V bands Terminal Equipment with Bluetooth.

2.3 Modifications Incorporated in EUT

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

2.4 Equipment Configuration

Equipment configuration list:

Item	Generic Description	Manufacturer	Type	Serial No.	Remarks
A	Mobile phone	Shenzhen fortuneship technology.,LTD	Ilium X100	--	None
B	Battery	None	None	--	None
C	Adaptor	None	None	--	None

2.5 Other Information

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3 Summary of Test Results

A brief summary of the tests carried out is shown as following.

	Name of Test	Result
1、	Peak power	Pass
2、	Band edge (conducted)	Pass
3、	Frequency separation	Pass
4、	Number of hopping frequency	Pass
5、	Time of occupancy	Pass
6、	Spurious emission (conducted)	Pass
7、	Spurious emission (radiated)	Pass
8、	Power line Conducted Emissions	Pass
Note: none		

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4 Test Results

4.1 Peak power

Specifications:	15.247 (b)(3)(i),(ii)and(iii)
Date of Tests	2015-02-06
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	Fix channel transmit
Test Results:	Pass

Test equipment Used:

Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
CWY5329	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
CWY5344	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

LIMIT

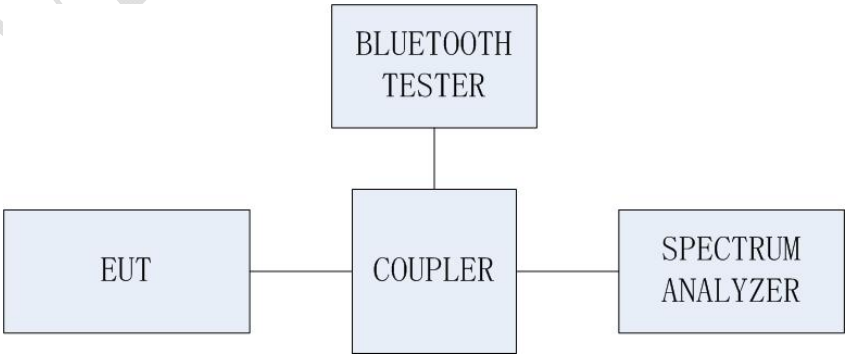
The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz: 1 watt.

2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Setup:

The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a coupler.



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Test procedure:

The transmitter output is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the peak detector mode. The RBW is set to 3MHz. The VBW is set to 3MHz.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

Test Results:

GFSK：

channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Low: 0	2401.13718	6.30	30	Pass
Middle: 39	2440.61539	6.36	30	Pass
High: 78	2480.01603	8.17	30	pass

Pi/4 DQPSK：

channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Low: 0	2401.96795	7.79	30	Pass
Middle: 39	2441.03205	7.77	30	Pass
High: 78	2480.04808	8.22	30	pass

8DPSK：

channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Low: 0	2401.95192	8.25	30	Pass
Middle: 39	2440.90385	8.20	30	Pass
High: 78	2480.00000	8.21	30	pass

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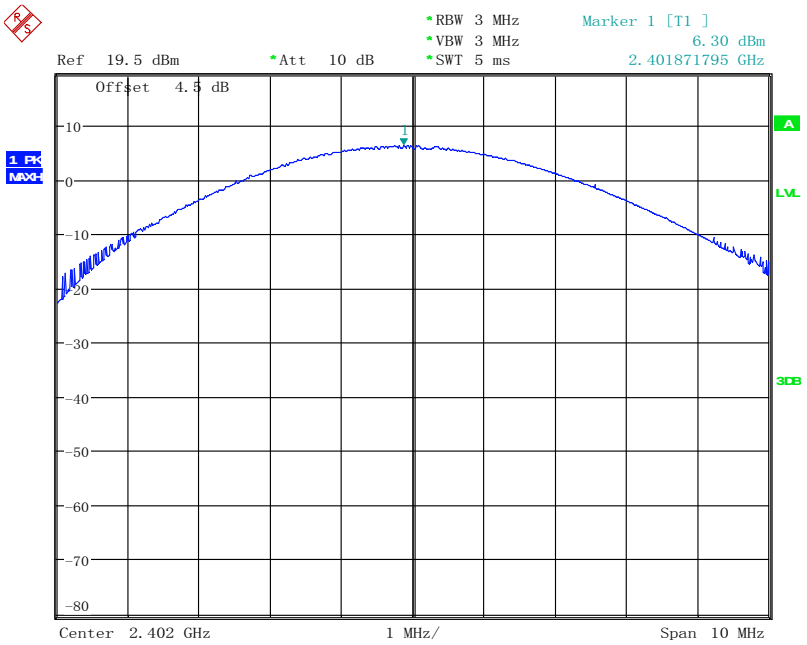
Test plots:



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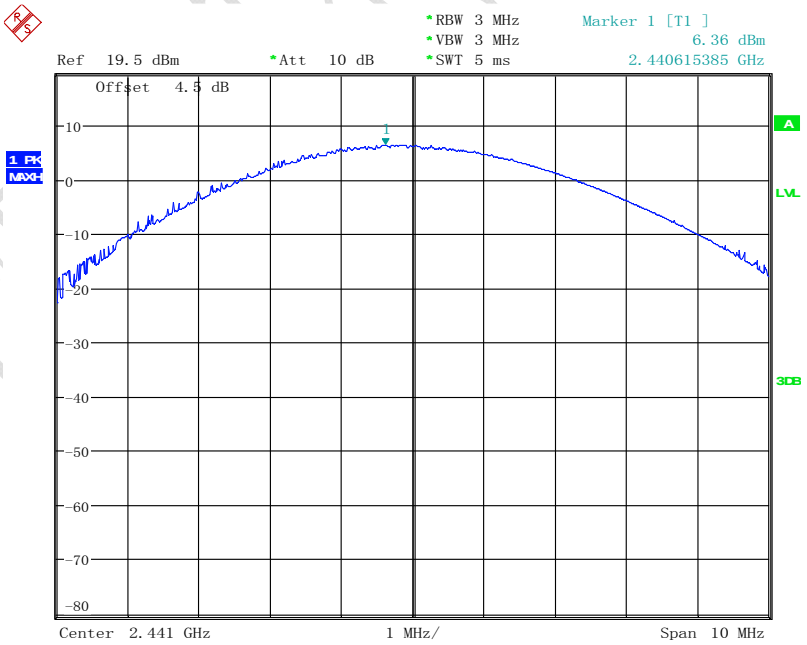
GFSK Channel 0



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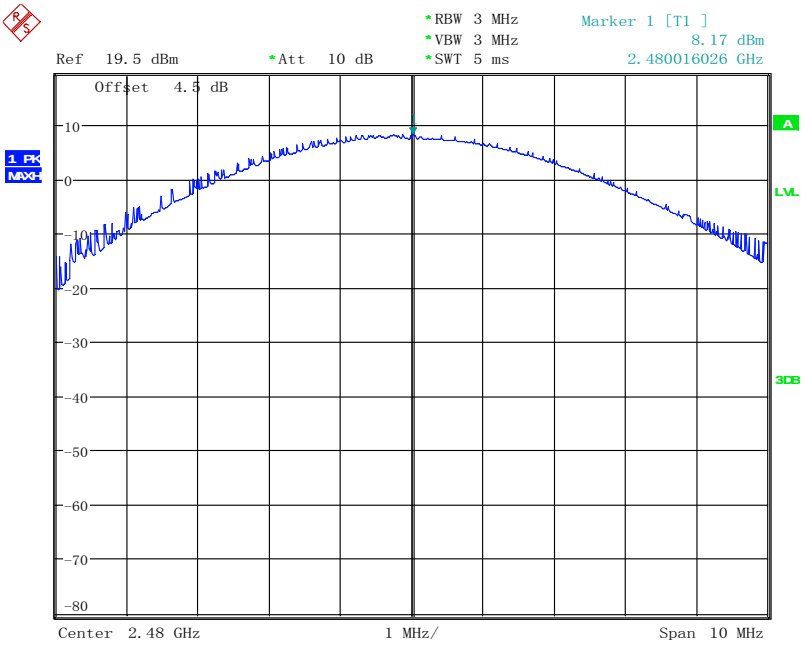
GFSK Channel 39



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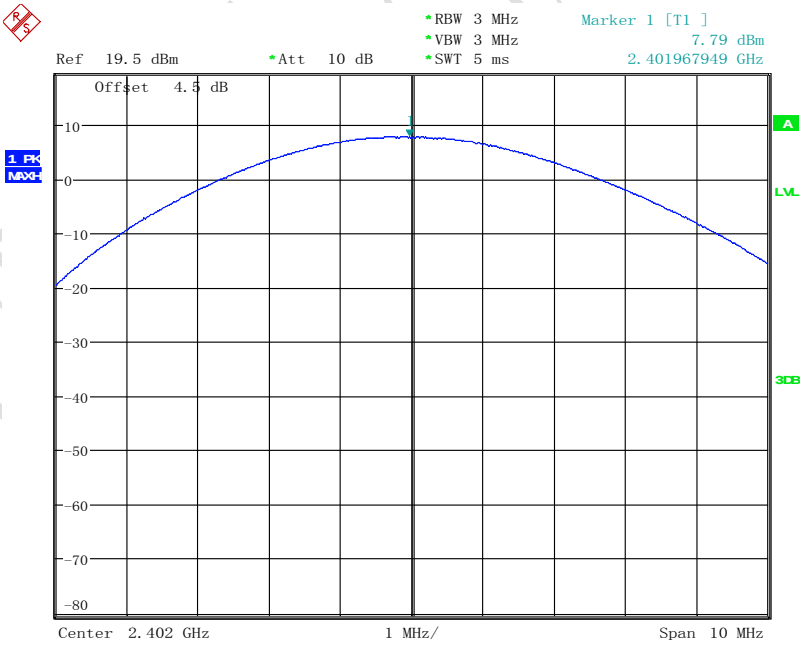
GFSK Channel 78



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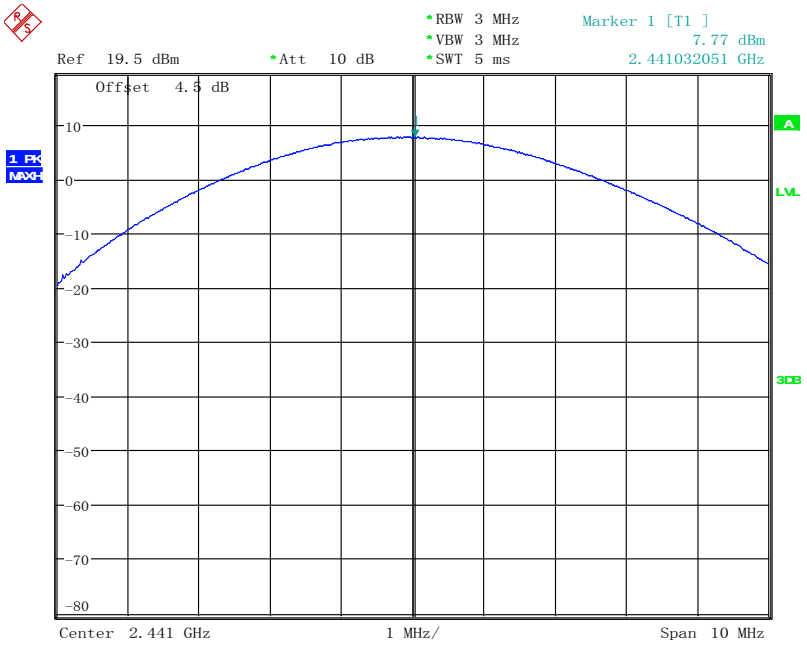
Pi/4 DQPSK Channel 0



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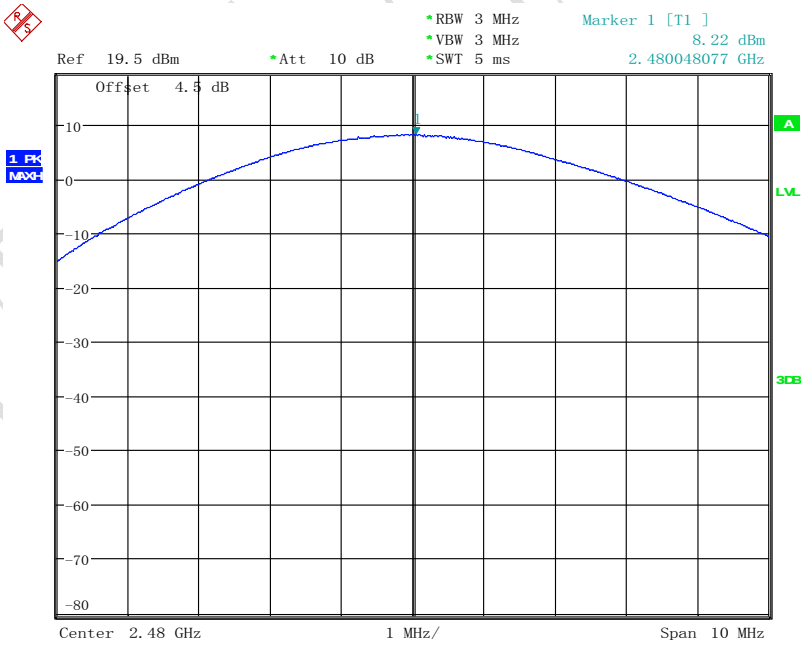
Pi/4 DQPSK Channel 39



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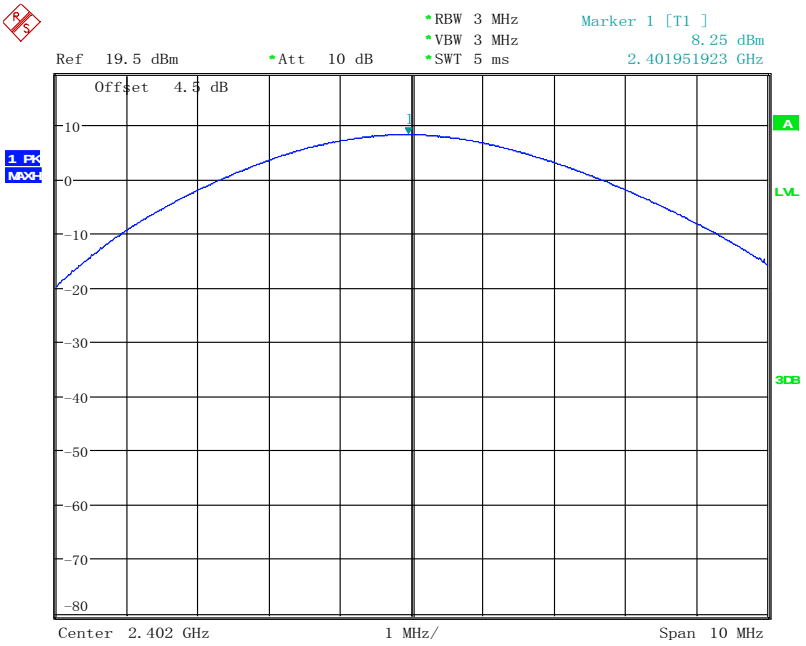
Pi/4 DQPSK Channel 78



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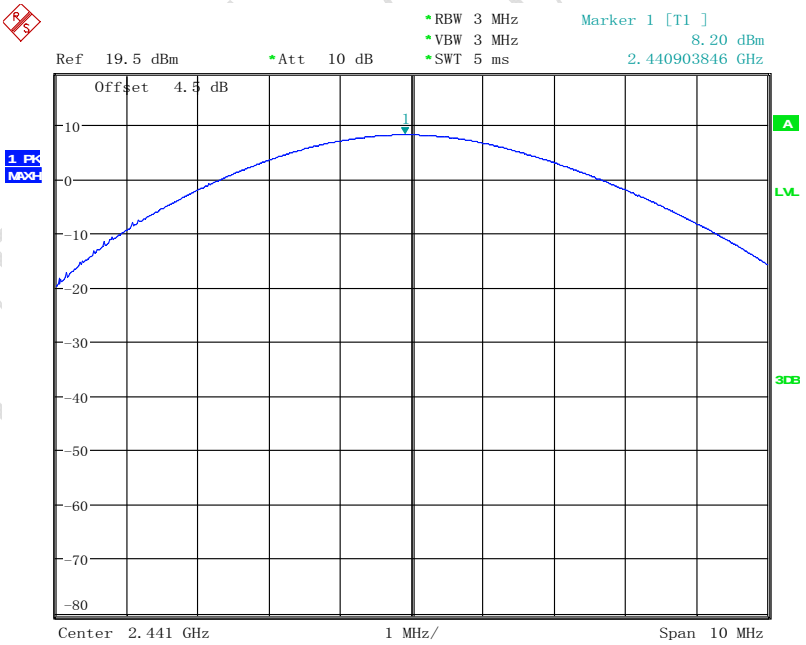
8DPSK Channel 0



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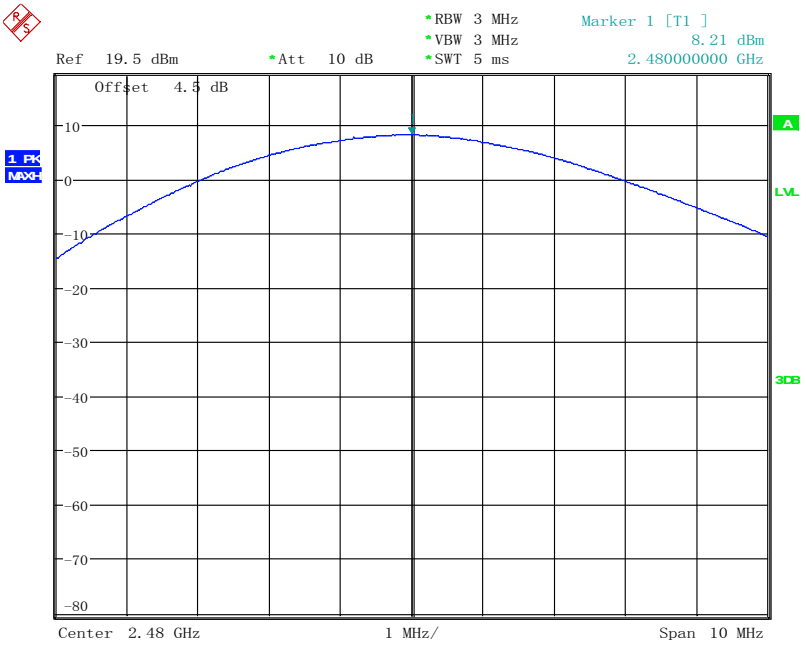
8DPSK Channel 39



Date: 6.FEB.2015 12:12:03

8DPSK Channel 78

4.2 Band edges (conducted)

Specifications:	15.247 (d)
Date of Tests	2015-02-06
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	Maximum transmit
Test Results:	Pass

Test equipment Used:

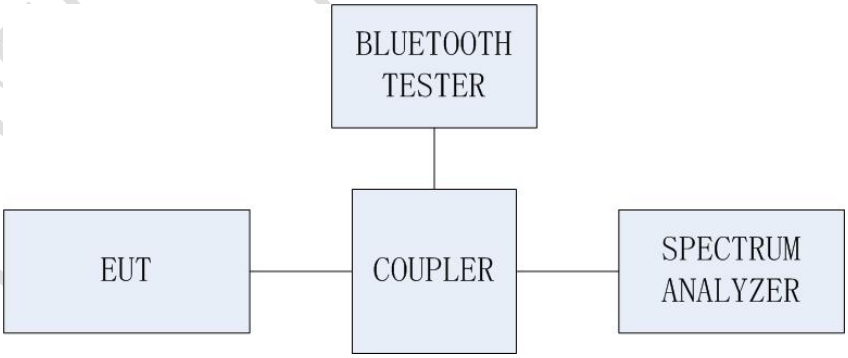
Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
CWY5329	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
CWY5344	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

LIMIT

According to §15.247(d), 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.

Test Setup:

The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a coupling.



Test procedure:

The transmitter output is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the peak detector mode. The spectrum analyzer is set to:

1. Span = 10 MHz
2. RBW = 100 KHz
3. VBW = 300 KHz
4. Sweep = auto

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

GFSK

Hopping mode	Channel	Band-edge Freq.[MHz]	Delta dB	Results
Hopping OFF	0, Left band-edge	2399.88062	-41.11	Pass
Hopping ON	--, Left band-edge	2399.31651	-45.50	Pass
Hopping OFF	78, Right band-edge	2483.48959	-45.38	Pass
Hopping ON	--, Right band-edge	2483.50962	-45.48	Pass

Pi/4 DQPSK

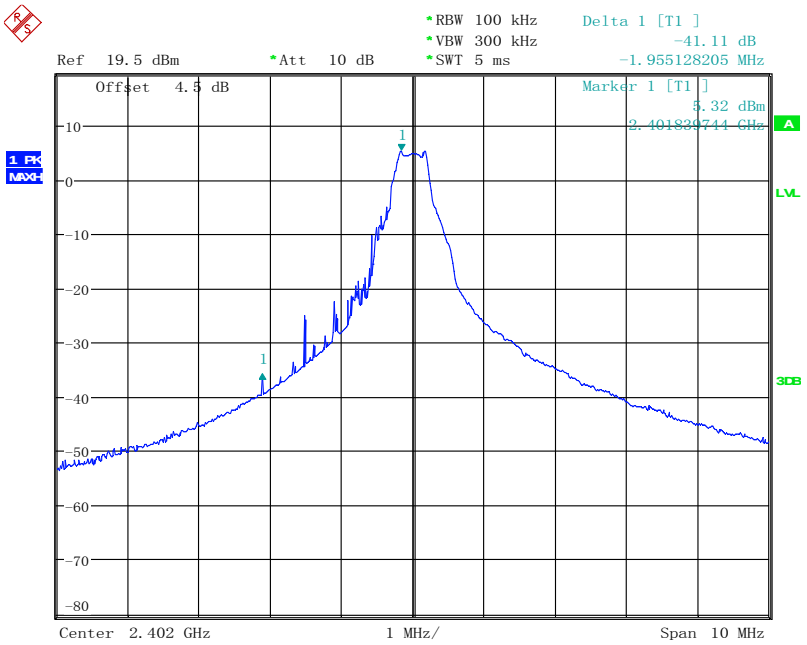
Hopping mode	Channel	Band-edge Freq.[MHz]	Delta dB	Results
Hopping OFF	0, Left band-edge	2399.99303	-44.59	Pass
Hopping ON	--, Left band-edge	2399.80449	-47.27	Pass
Hopping OFF	78, Right band-edge	2483.50962	-32.11	Pass
Hopping ON	--, Right band-edge	2483.52564	-35.14	Pass

8DPSK

Hopping mode	Channel	Band-edge Freq.[MHz]	Delta dB	Results
Hopping OFF	0, Left band-edge	2399.34103	-44.83	Pass
Hopping ON	--, Left band-edge	2399.66026	-48.48	Pass
Hopping OFF	78, Right band-edge	2483.52564	-31.97	Pass
Hopping ON	--, Right band-edge	2483.54167	-32.68	Pass

Test plots:

GFSK Channel 0, fixed mode, left band-edge



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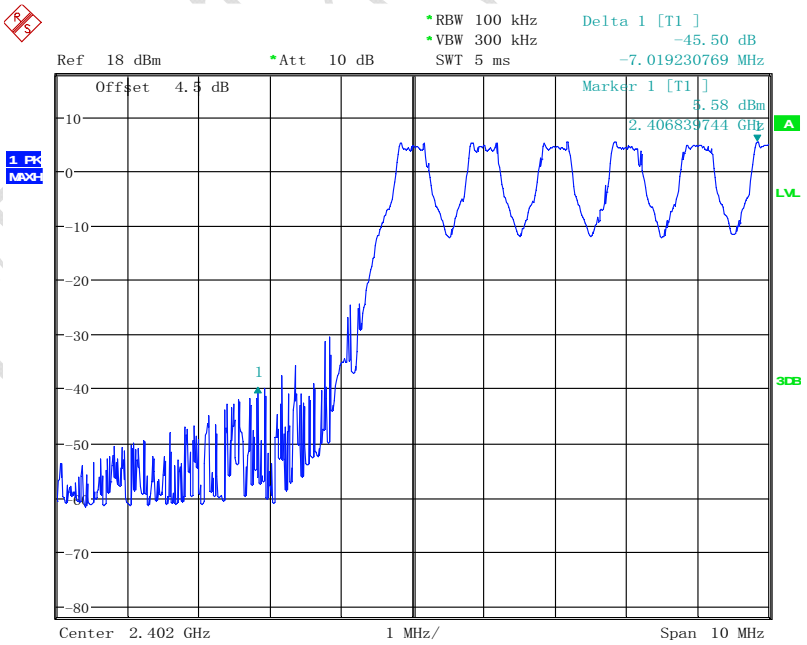
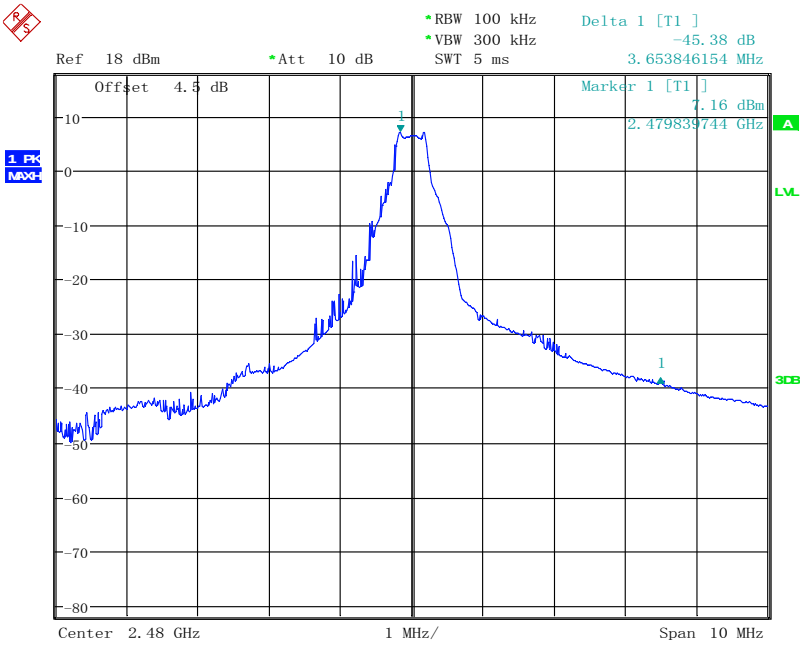
GFSK Hopping mode, left band-edge



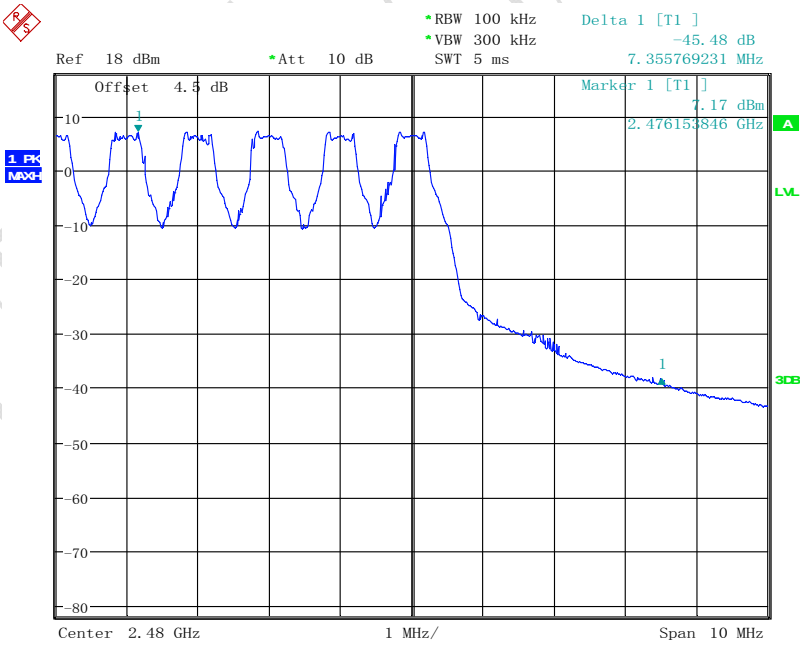
Date: 6.FEB.2015 12:38:09

GFSK Channel 78, fixed mode, right band-edge



Date: 6.FEB.2015 12:41:59

GFSK Hopping mode, right band-edge



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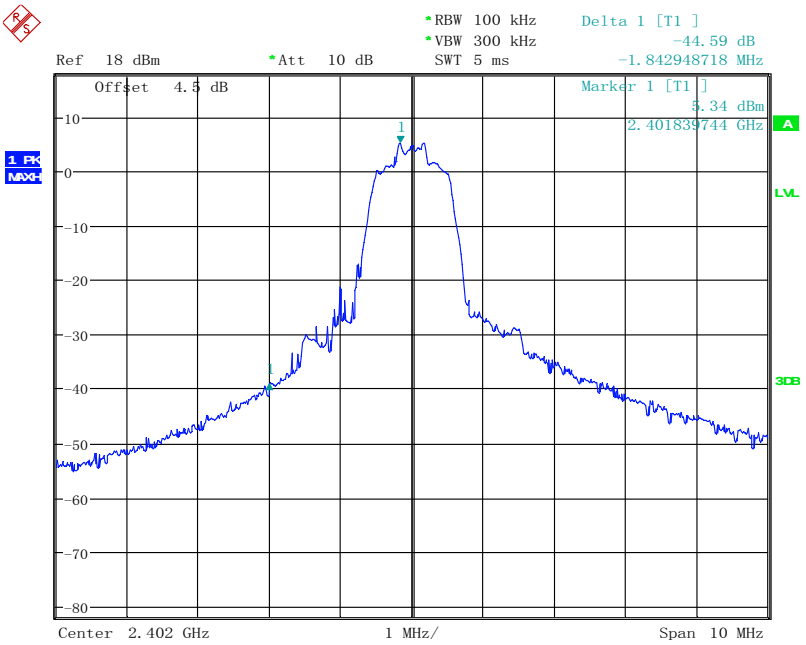
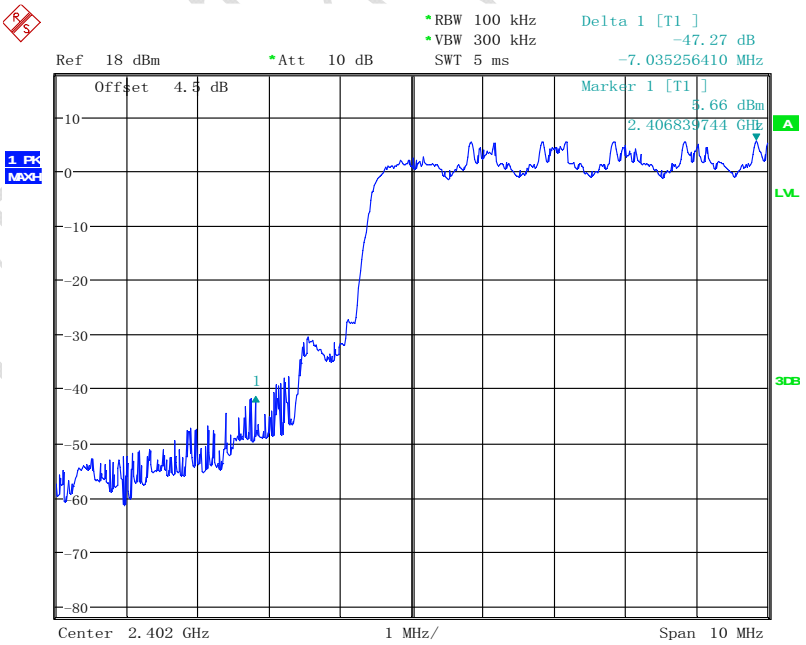
Pi/4 DQPSK Channel 0, fixed mode, left band-edge



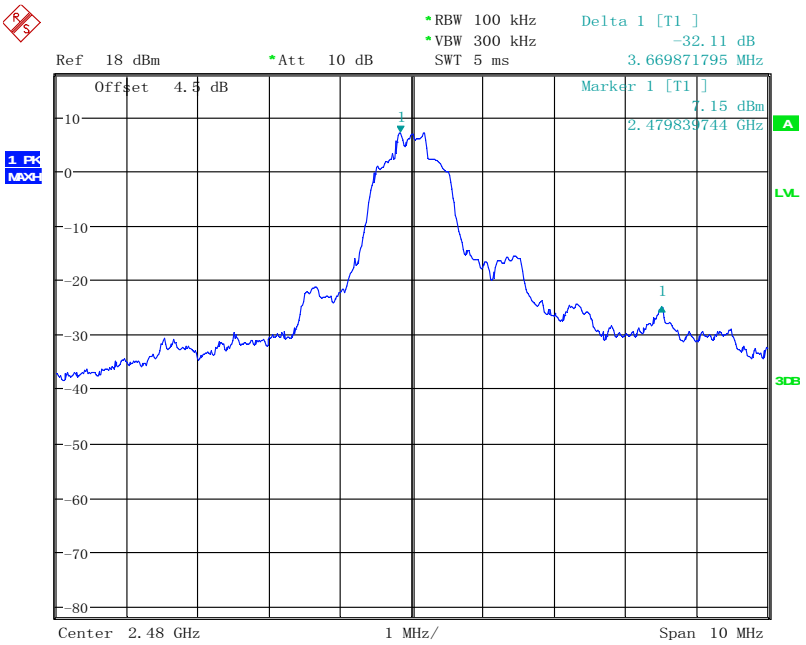
Date: 6.FEB.2015 12:58:51

Pi/4 DQPSK Hopping mode, left band-edge



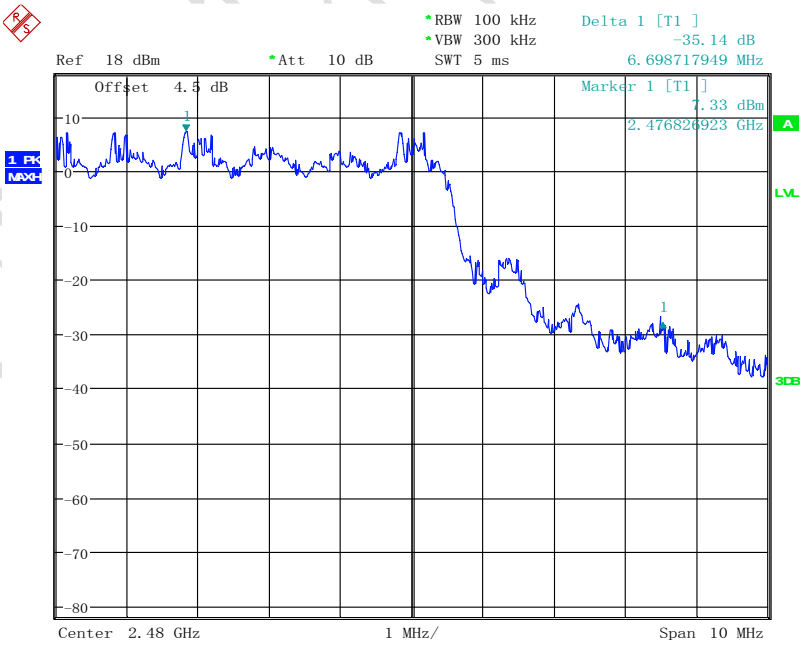
Date: 6.FEB.2015 12:57:31

Pi/4 DQPSK Channel 78, fixed mode, right band-edge



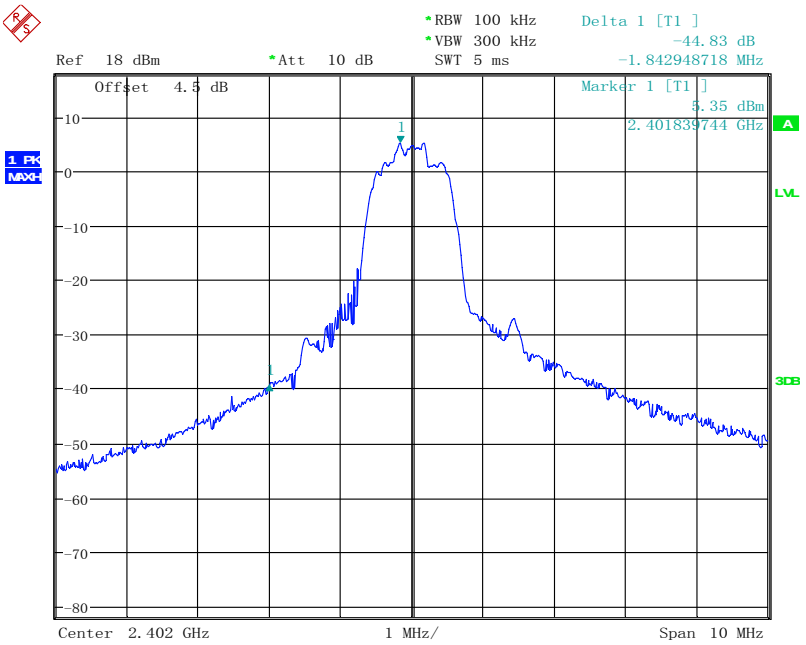
Date: 6.FEB.2015 12:49:02

Pi/4 DQPSK Hopping mode, right band-edge



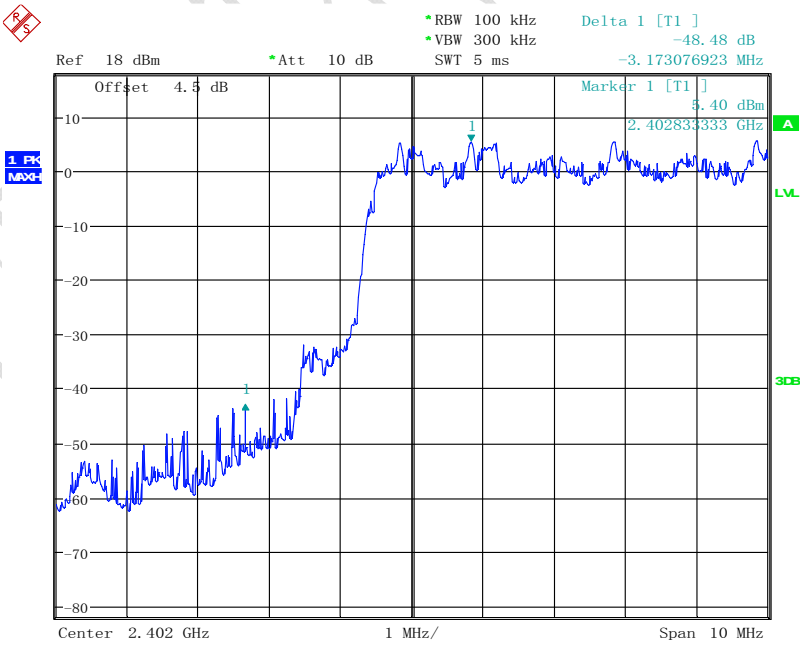
Date: 6.FEB.2015 12:52:08

8DPSK Channel 0, fixed mode, left band-edge



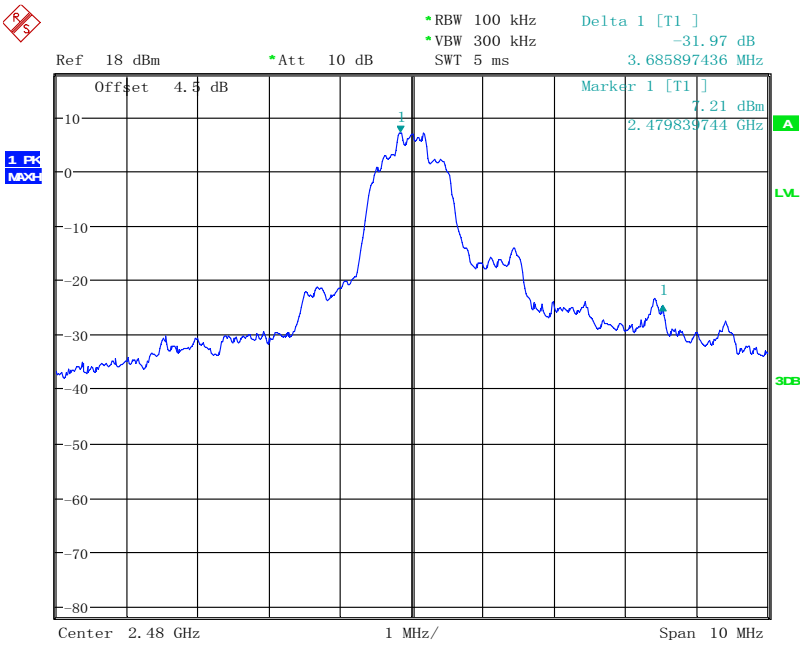
Date: 6.FEB.2015 13:00:20

8DPSK Hopping mode, left band-edge



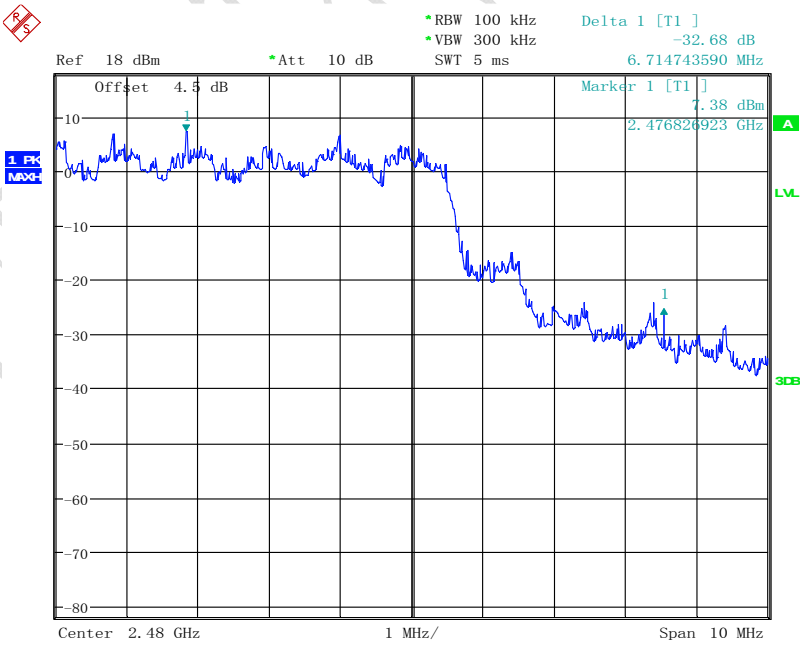
Date: 6.FEB.2015 13:01:42

8DPSK Channel 78, fixed mode, right band-edge



Date: 6.FEB.2015 13:03:38

8DPSK Hopping mode, right band-edge



Date: 6.FEB.2015 13:06:10

4.3 Frequency separation

Specifications:	15.247(a)(1)
Date of Test	2015-02-06
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	maximum transmit
Test Results:	Pass

Test equipment Used:

Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
CWY5329	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
CWY5344	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

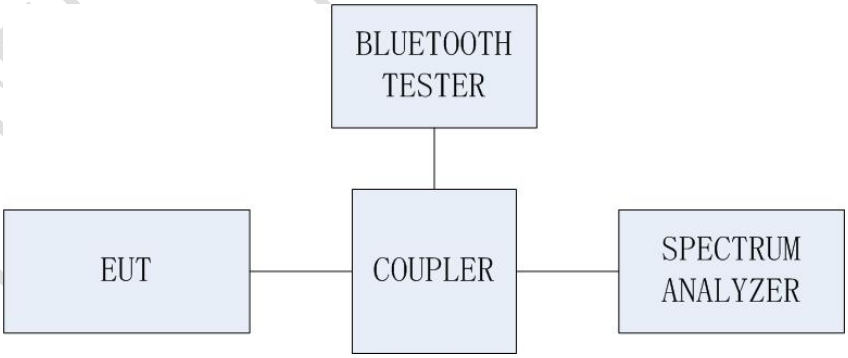
LIMIT

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

Note: it is for the power of less than 125 mw, and for others it is 20 dB bandwidth of the hopping channel.

Test Setup

The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a coupling.



TEST PROCEDURE

The spectrum analyzer is set to:

1. 20dBc Bandwidth: Span = 3 MHz, RBW=20 kHz, VBW=50 kHz, Sweep=auto.
2. Carrier Frequency Separation: Span = 3 MHz, RBW=100 kHz, VBW=300 kHz, Sweep=auto.

The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

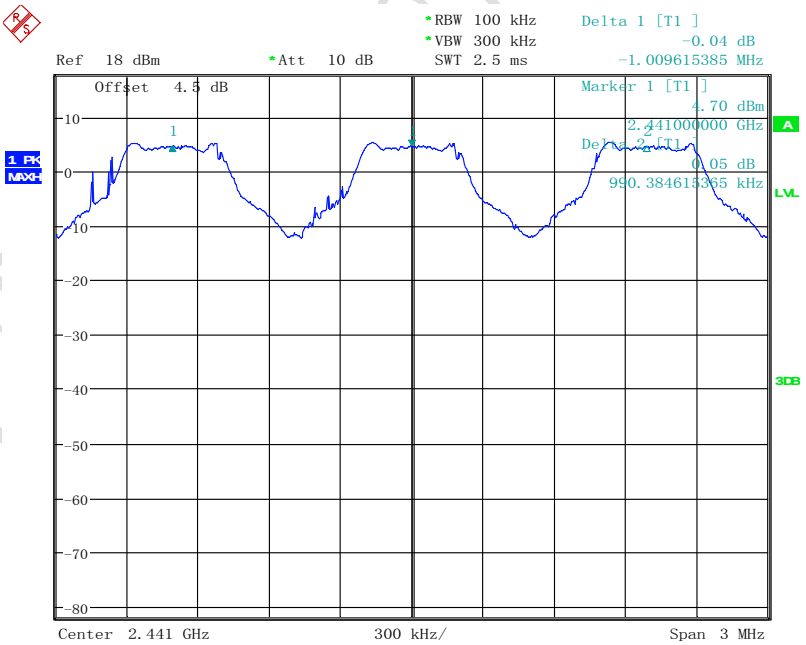
Test Result:

20dBc bandwidth

Channel separation	20dB Bandwidth (kHz)		Limit (kHz)	Result
GFSK				
990	Ch 0	754	>25	Pass
	Ch 39	701	>25	Pass
	Ch 78	750	>25	Pass
Pi/4 DQPSK				
995	Ch 0	1144	>25	Pass
	Ch 39	1144	>25	Pass
	Ch 78	1134	>25	Pass
8DPSK				
985	Ch 0	1126	>25	Pass
	Ch 39	1126	>25	Pass
	Ch 78	1216	>25	Pass

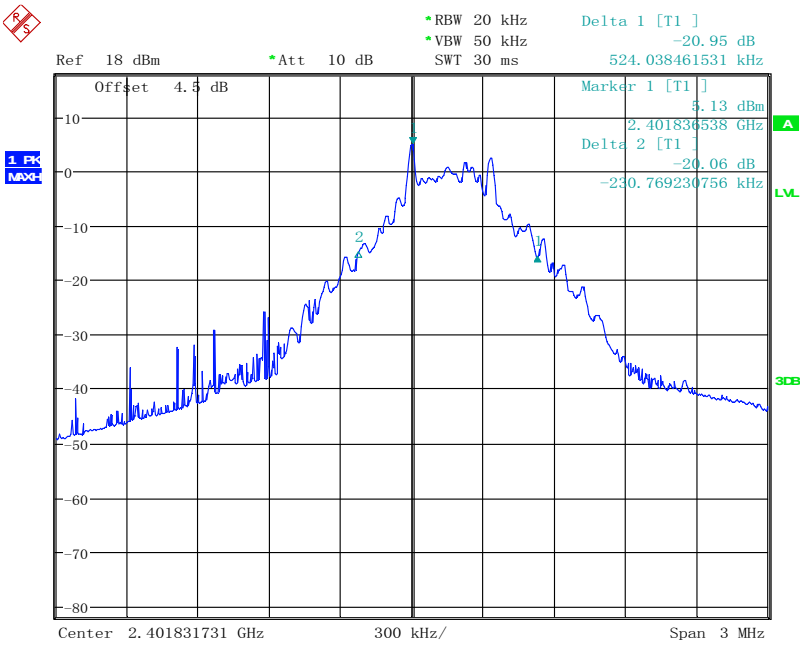
Test plots:

Channel Separation (GFSK)



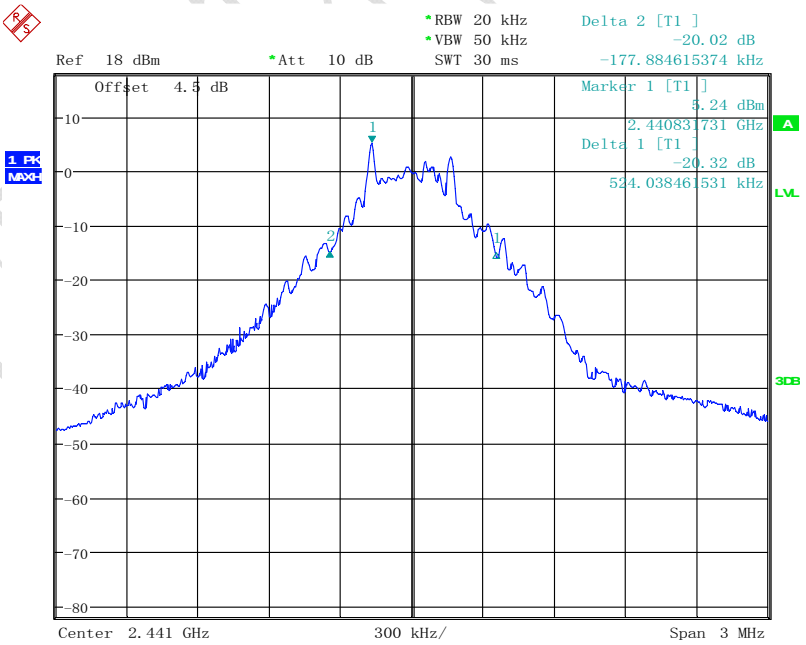
Date: 6.FEB.2015 14:11:20

20dB Bandwidth (GFSK Ch 0)



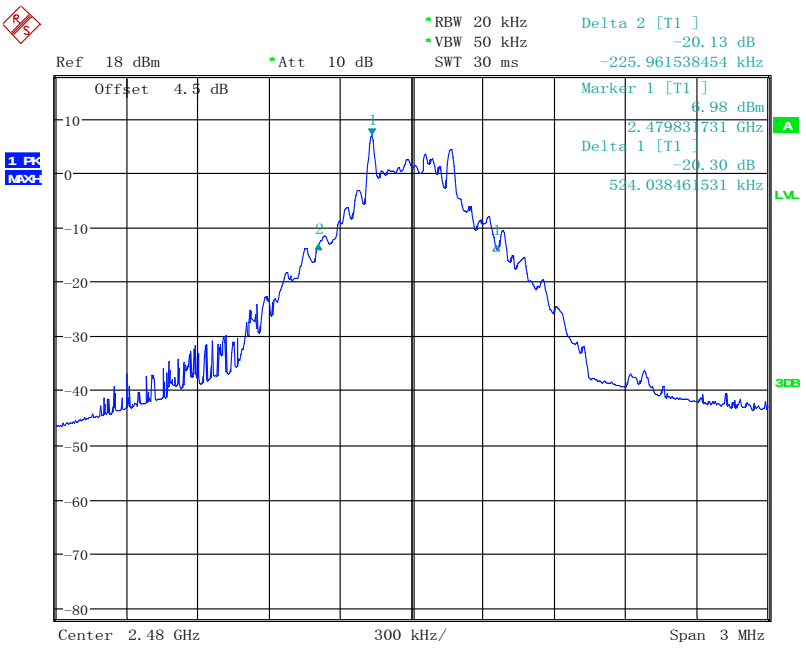
Date: 6.FEB.2015 14:02:21

20dB Bandwidth (GFSK Ch 39)



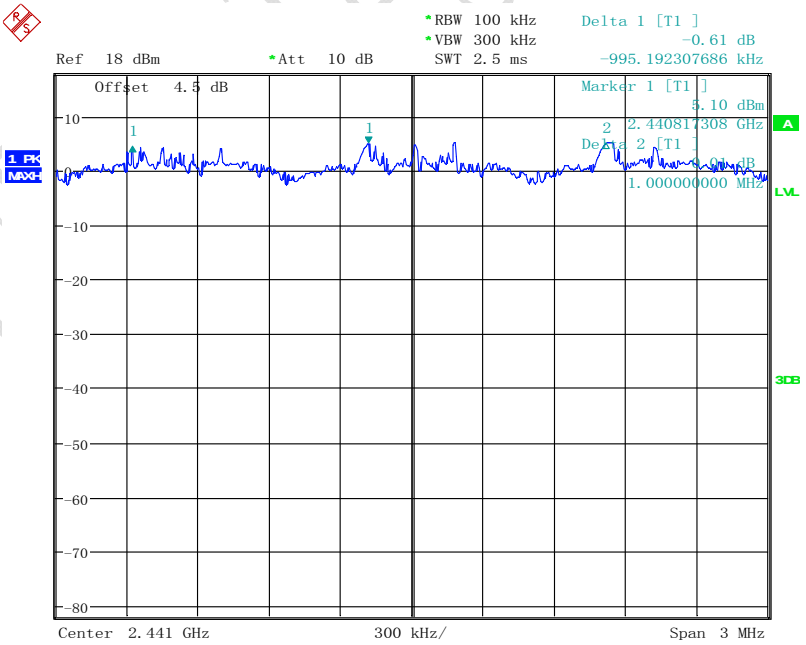
Date: 6.FEB.2015 14:03:32

20dB Bandwidth (GFSK Ch 78)



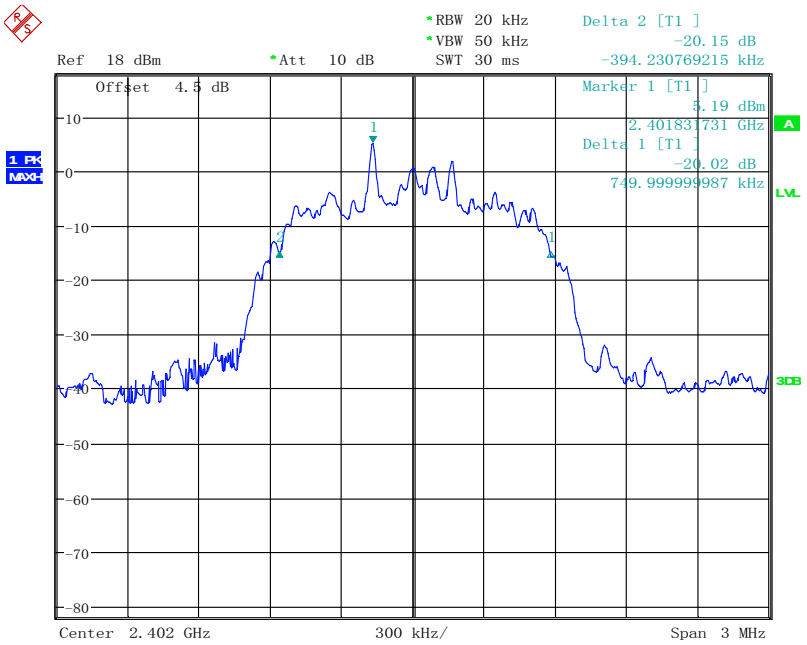
Date: 6.FEB.2015 14:05:16

Channel Separation (Pi/4 DQPSK)



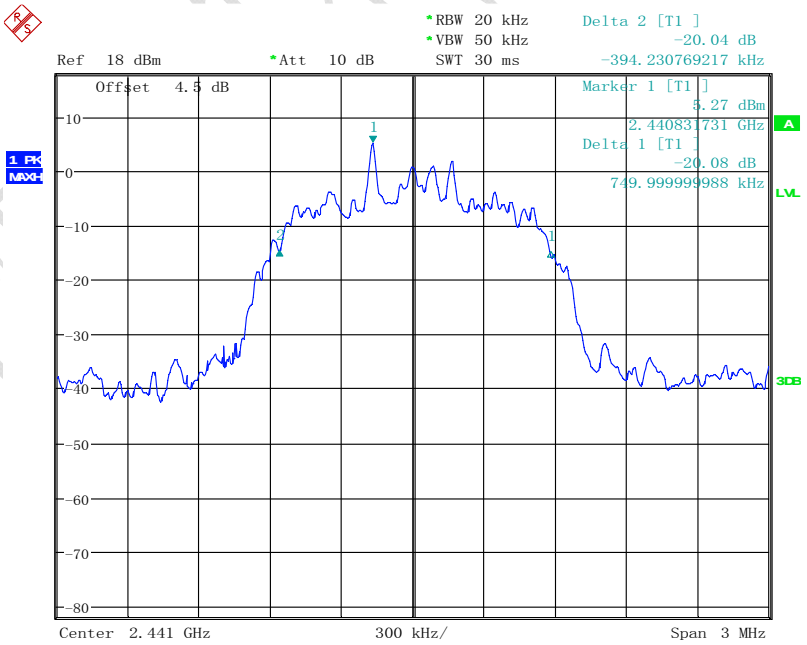
Date: 6.FEB.2015 14:22:29

20dB Bandwidth (Pi/4 DQPSK Ch0)



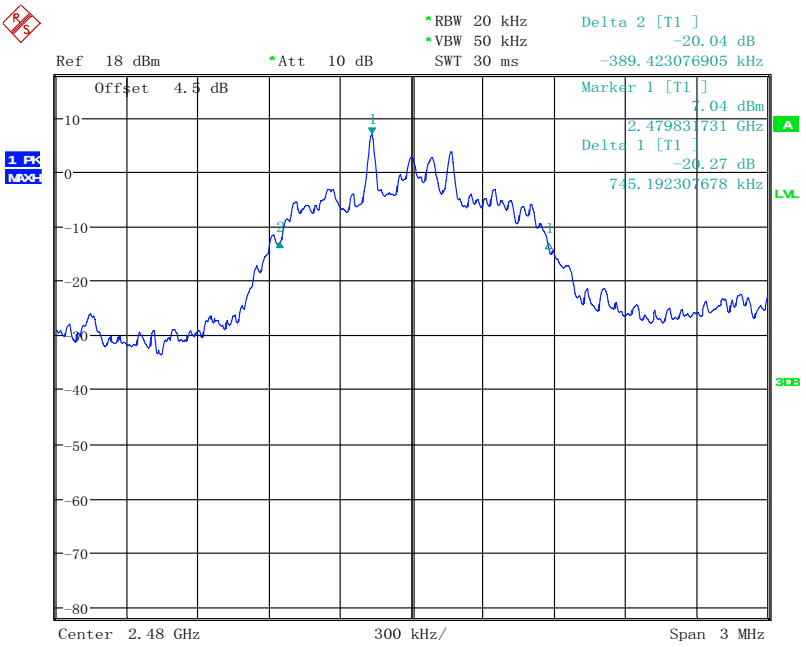
Date: 6.FEB.2015 14:15:40

20dB Bandwidth (Pi/4 DQPSK Ch39)



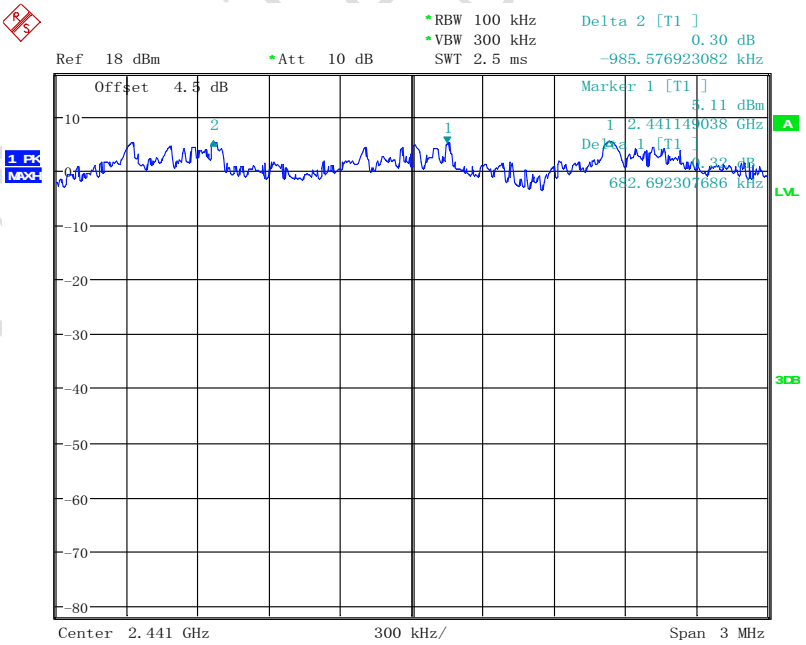
Date: 6.FEB.2015 14:14:47

20dB Bandwidth (Pi/4 DQPSK Ch78)



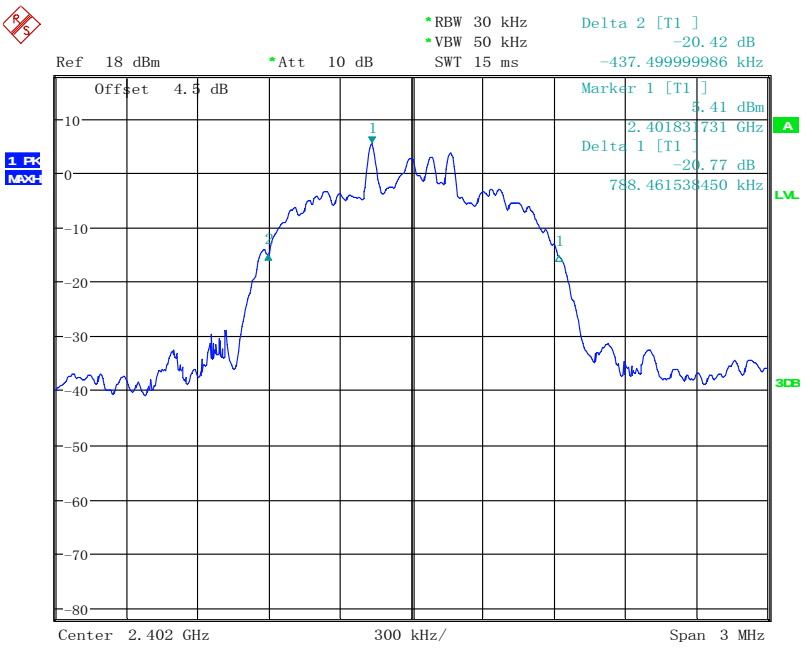
Date: 6.FEB.2015 14:16:33

Channel Separation (8DPSK)



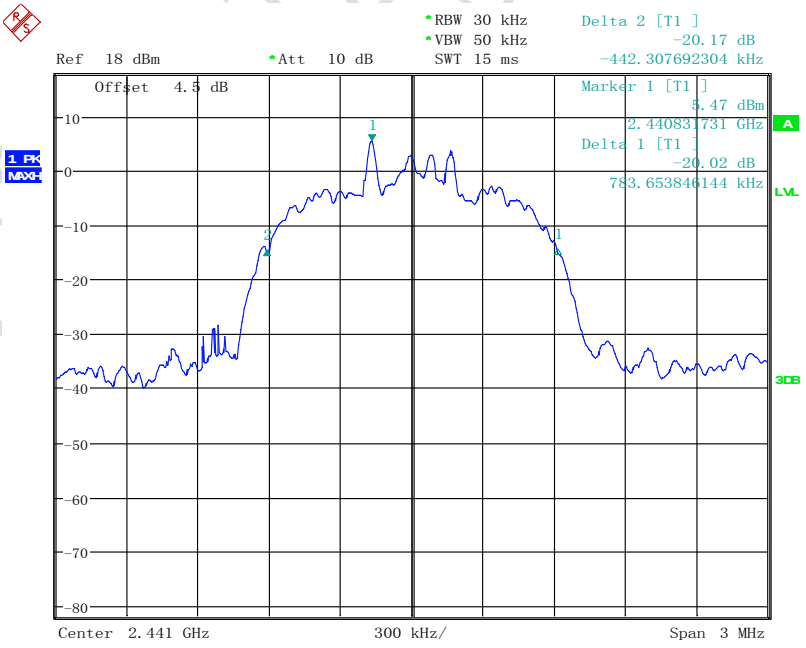
Date: 6.FEB.2015 14:27:09

20dB Bandwidth (8DPSK Ch0)



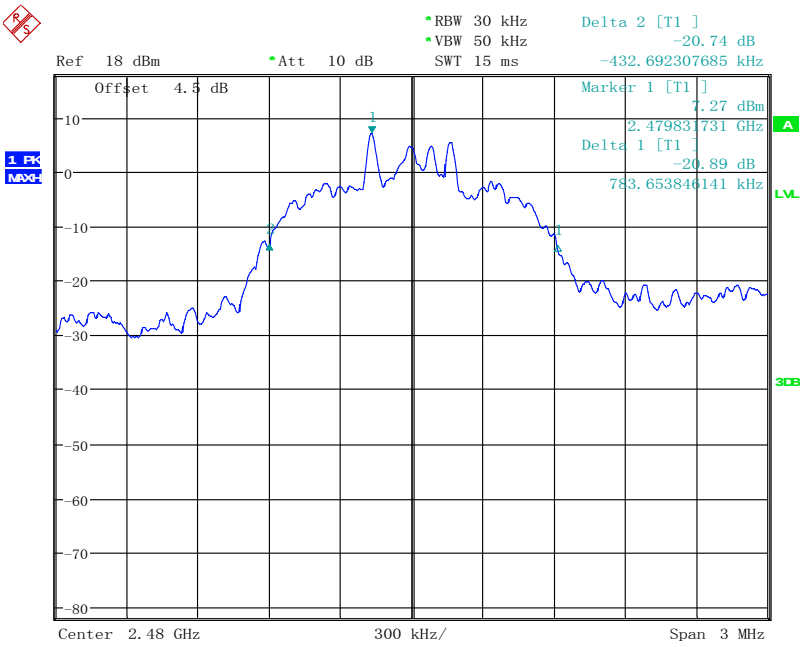
Date: 6.FEB.2015 14:28:47

20dB Bandwidth (8DPSK Ch39)



Date: 6.FEB.2015 14:29:31

20dB Bandwidth (8DPSK Ch78)



Date: 6.FEB.2015 14:30:32

4.4 Number of hopping frequency

Specifications:	15.247(a)(1)(ii)
Date of Test	2015-02-06
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	hopping
Test Results:	Pass

Test equipment Used:

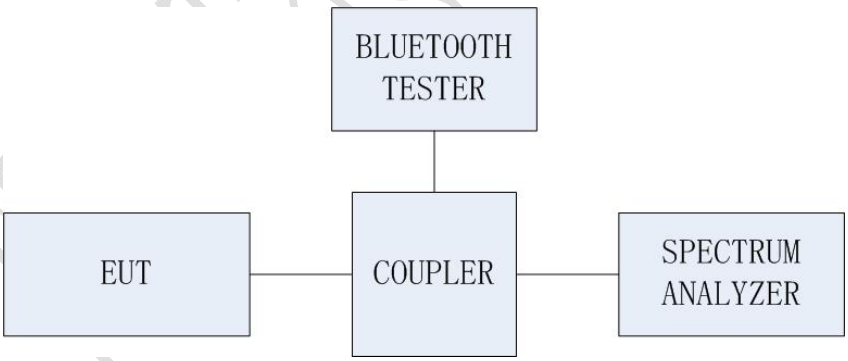
Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
CWY5329	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
CWY5344	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

LIMIT

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400 MHz - 2483.5 MHz bands shall use at least 15 hopping frequencies.

Test Setup

The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a coupling.



TEST PROCEDURE

The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer was set to:

1. Span = the frequency band of operation, i.e. 2400-2441MHz and 2441-2484 MHz
2. RBW = 500 KHz
3. VBW = 500 KHz
4. Sweep = auto

The trace was allowed to stabilize.

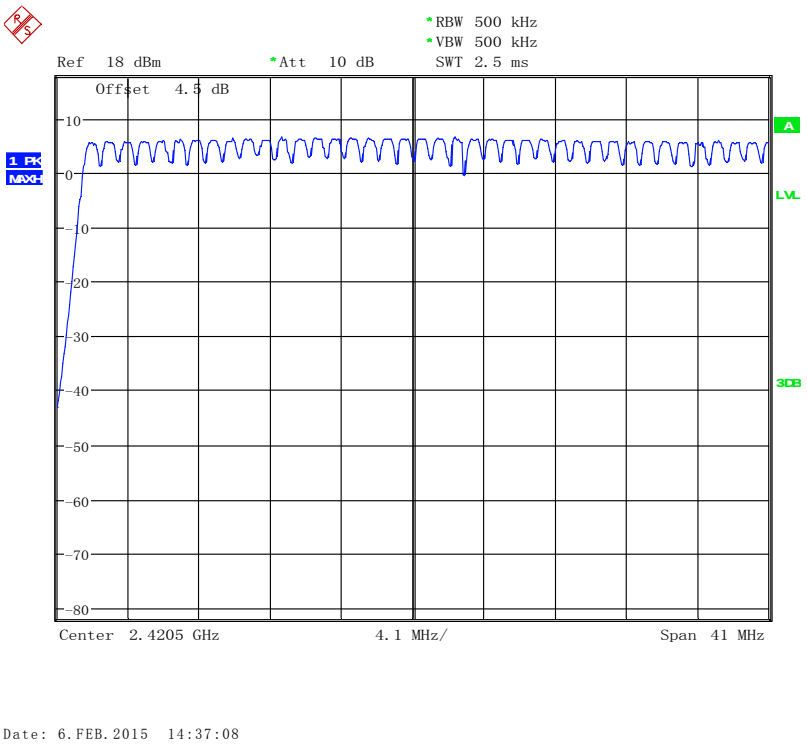
The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

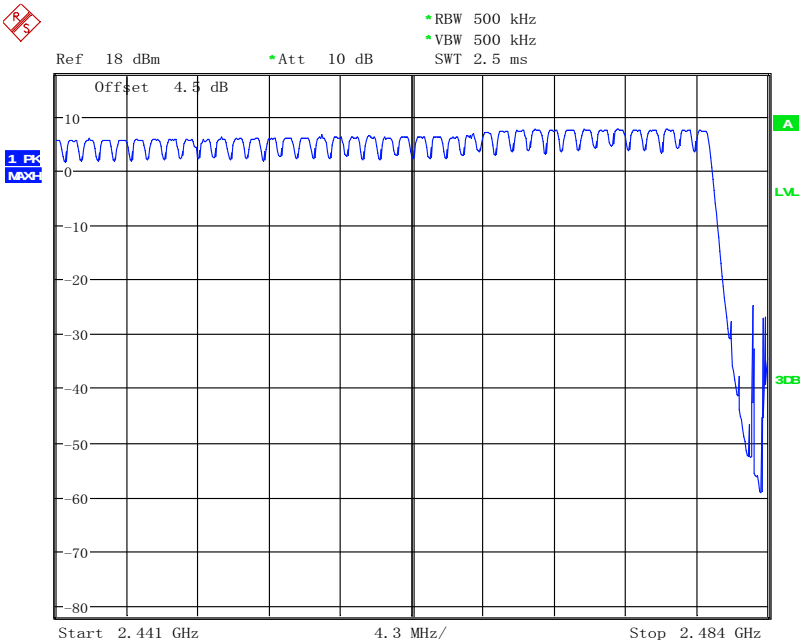
Test Result:

Modulation	No. OF channels	Limit (No. of Ch)	Result
GFSK	79	>75	Pass
Pi/4 DQPSK	79	>75	Pass
8DPSK	79	>75	Pass

Test plot:

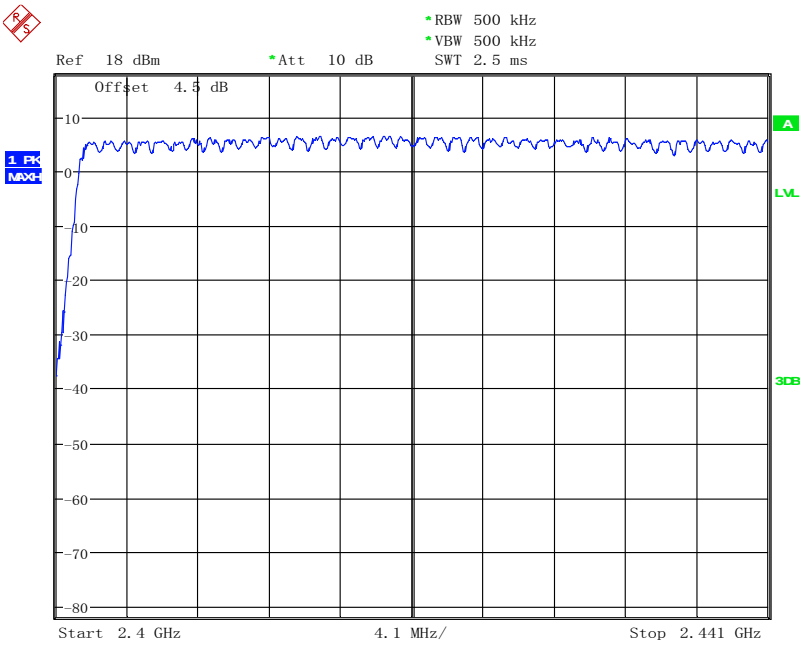
Channel Number(GFSK)





Date: 6.FEB.2015 14:37:44

Channel Number(Pi/4 DQPSK)



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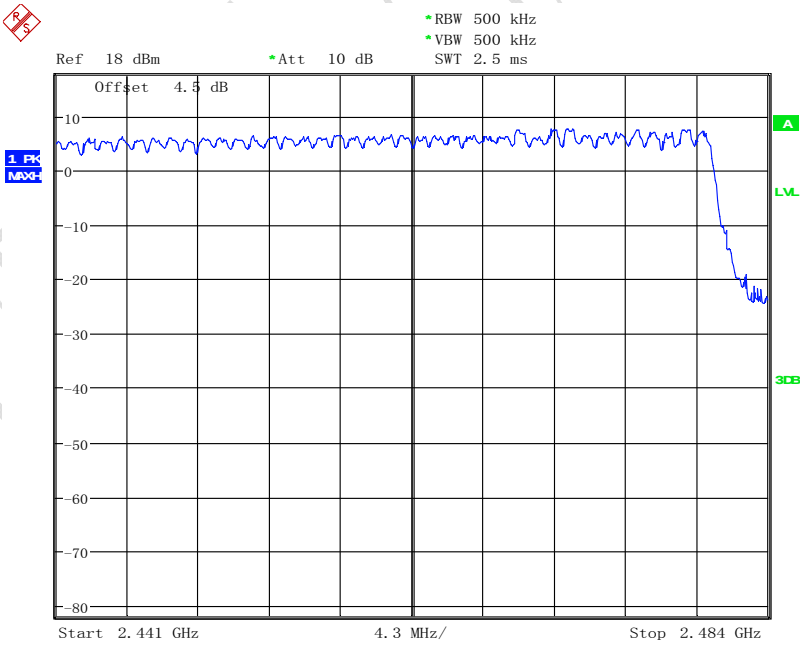
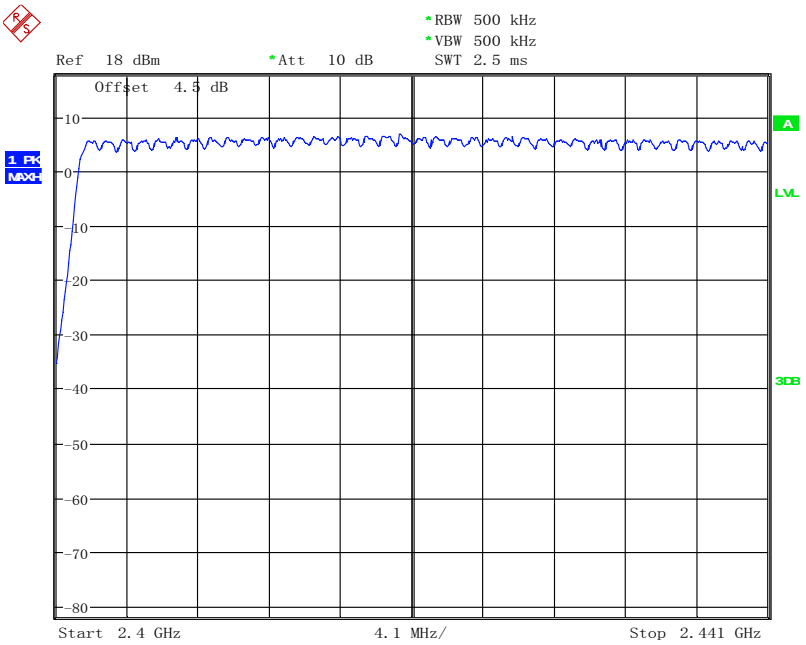


Date: 6.FEB.2015 14:35:47

Channel Number(8DPSK)



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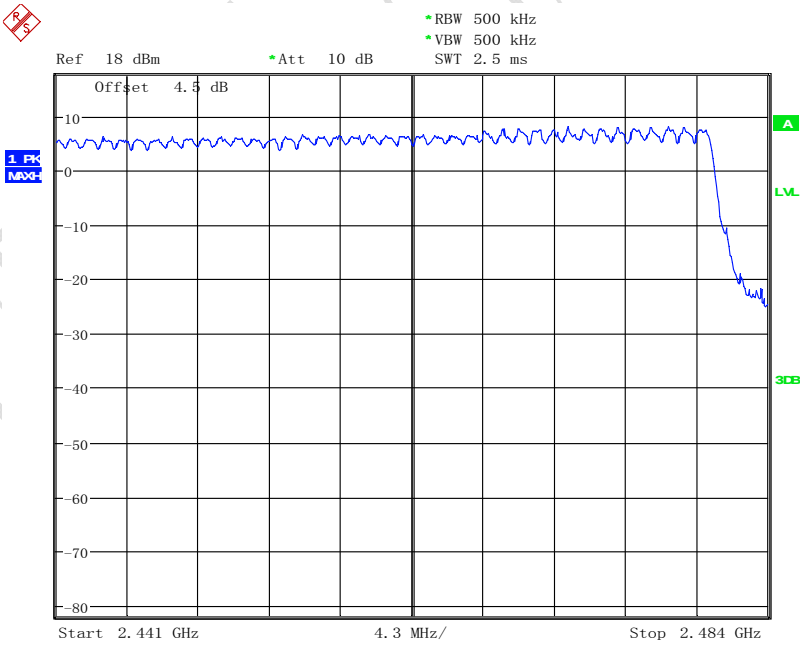


Date: 6.FEB.2015 14:34:21

4.5 Time of occupancy

Specifications:	15.247(a)(1)(iii)
Date of Test	2015-02-06
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	Fix channel
Test Results:	Pass

Test equipment Used:

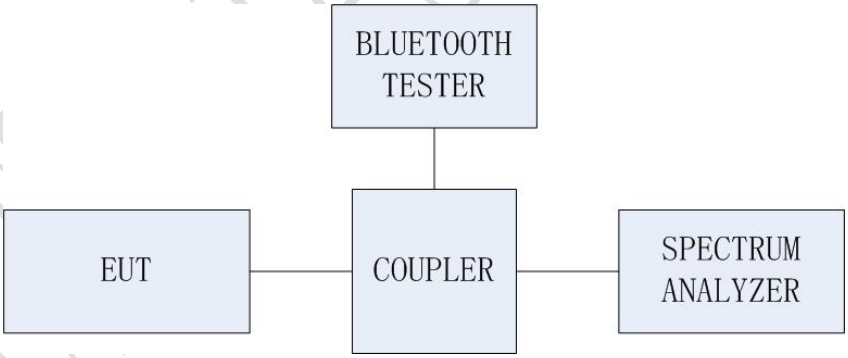
Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
CWY5329	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
CWY5344	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz - 2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

Test Setup

The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a coupling.



TEST PROCEDURE

The spectrum analyzer is set to:

1. Span = zero span
2. RBW = 1 MHz
3. VBW = 3 MHz
4. Sweep = as necessary to capture the entire dwell time per channel

The marker-delta function was used to determine the dwell time.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

Test Result:

GFSK DH1:

0.4856*(1600/2)/79*31.6=155ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
0.4856	155	31.6	PASS

GFSK DH3:

1.739*(1600/4)/79*31.6=278ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
1.739	278	31.6	PASS

GFSK DH5:

2.997*(1600/6)/79*31.6=320ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
2.997	320	31.6	PASS

Pi/4 DQPSK DH1:

0.4808*(1600/2)/79*31.6=154ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
0.4808	154	31.6	PASS

Pi/4 DQPSK DH3:

1.739*(1600/4)/79*31.6=278ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
1.739	278	31.6	PASS

Pi/4 DQPSK DH5:

1.731*(1600/6)/79*31.6=185ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
1.731	185	31.6	PASS

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8DPSK DH1:

0.4808*(1600/2)/79*31.6=154ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
0.4808	154	31.6	PASS

8DPSK DH3:

1.716*(1600/4)/79*31.6=275ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
1.716	275	31.6	PASS

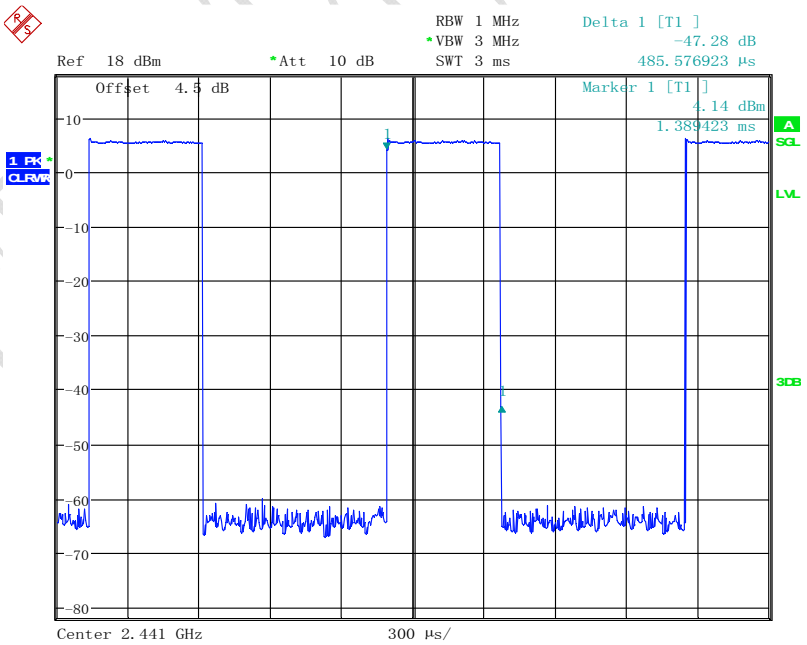
8DPSK DH5:

2.981*(1600/6)/79*31.6=318ms

Pulse time[ms]	Total dwell[ms]	Period time[s]	result
2.981	318	31.6	PASS

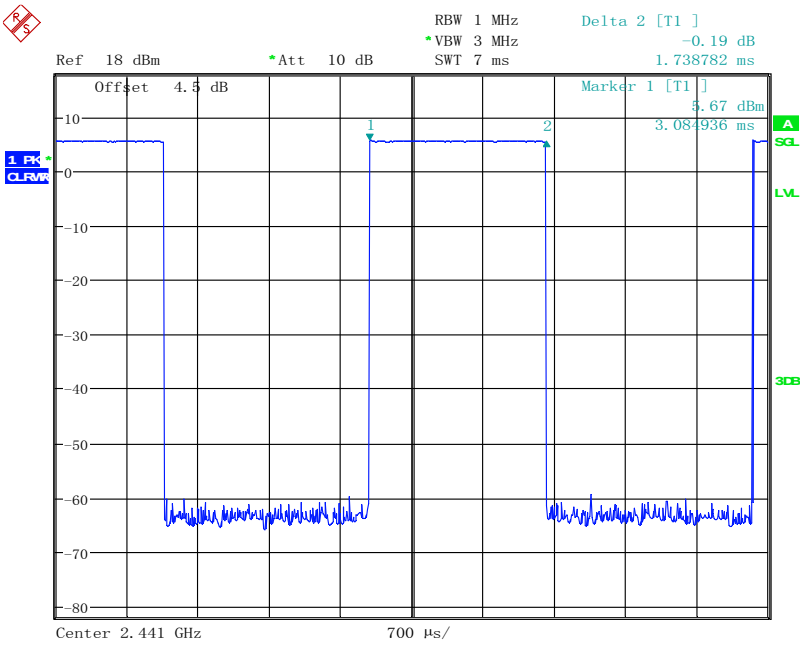
Test data:

GFSK DH1



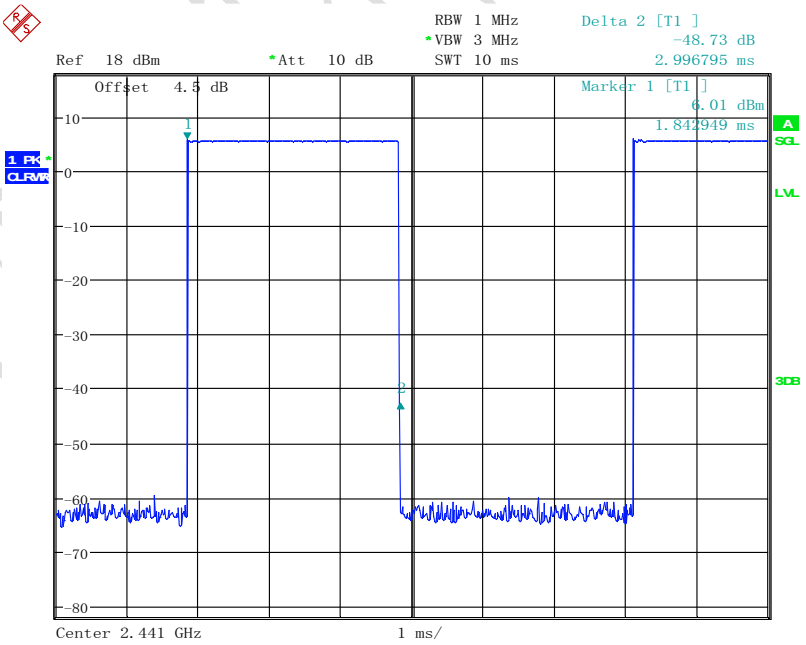
Date: 6.FEB.2015 14:43:14

GFSK DH3



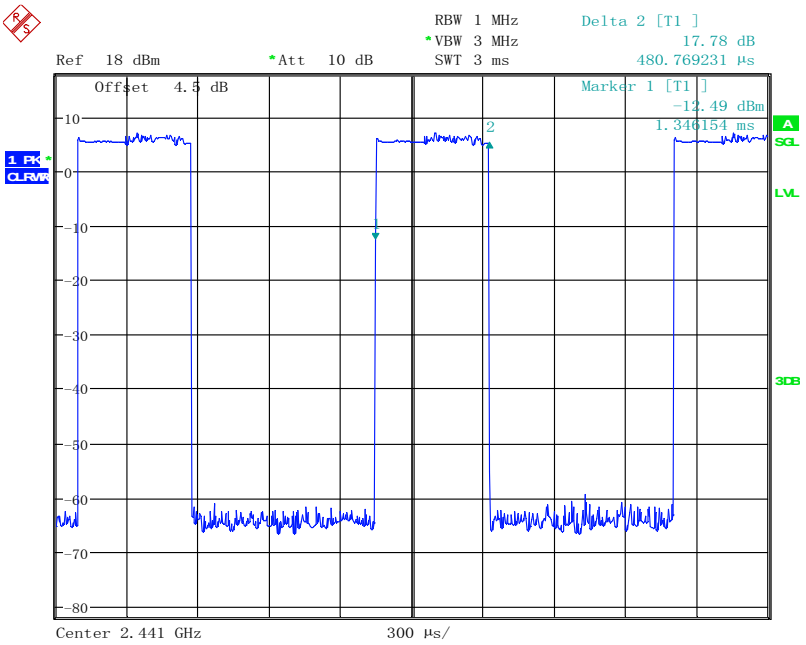
Date: 6.FEB.2015 14:44:33

GFSK DH5



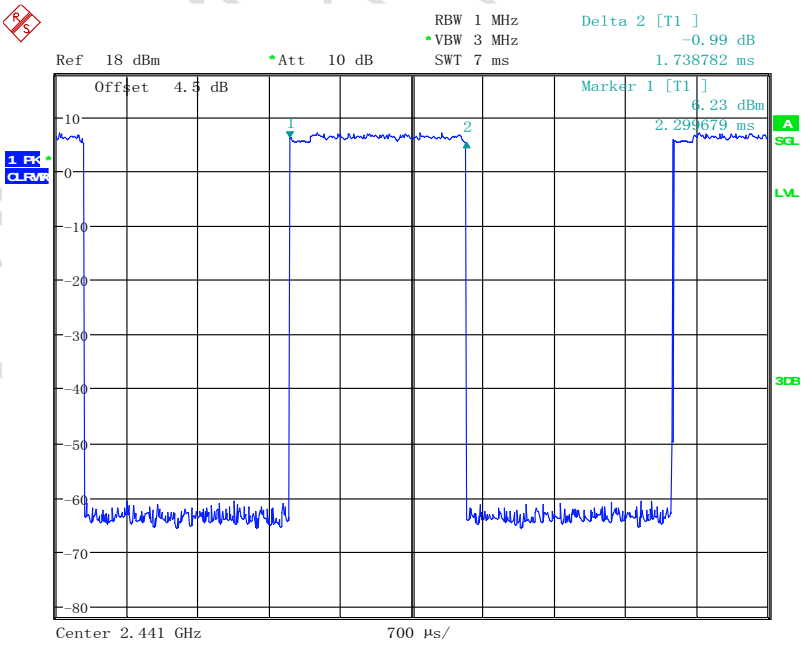
Date: 6.FEB.2015 14:45:47

Pi/4 DQPSK 2DH1



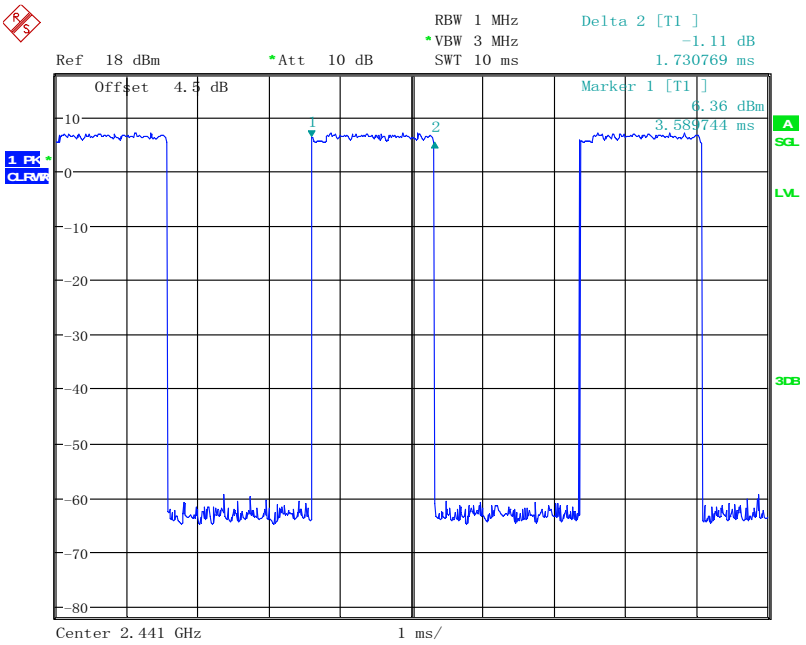
Date: 6.FEB.2015 14:47:26

Pi/4 DQPSK 2DH3



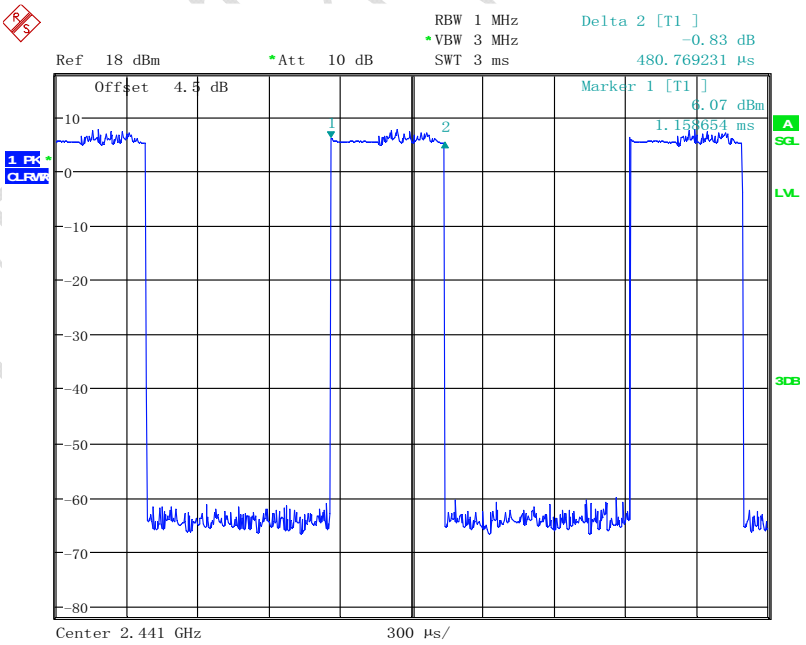
Date: 6.FEB.2015 14:48:09

Pi/4 DQPSK 2DH5



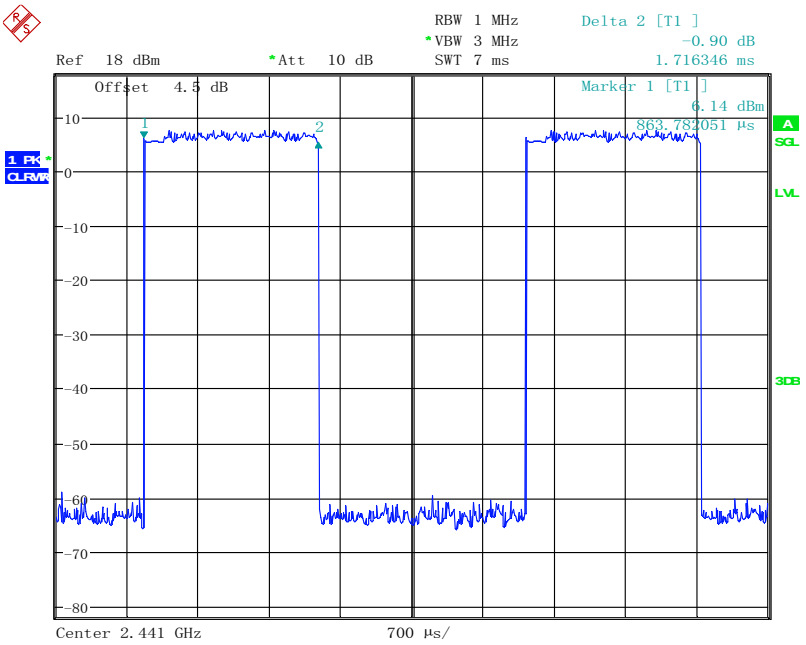
Date: 6.FEB.2015 14:48:56

8DPSK 3DH1



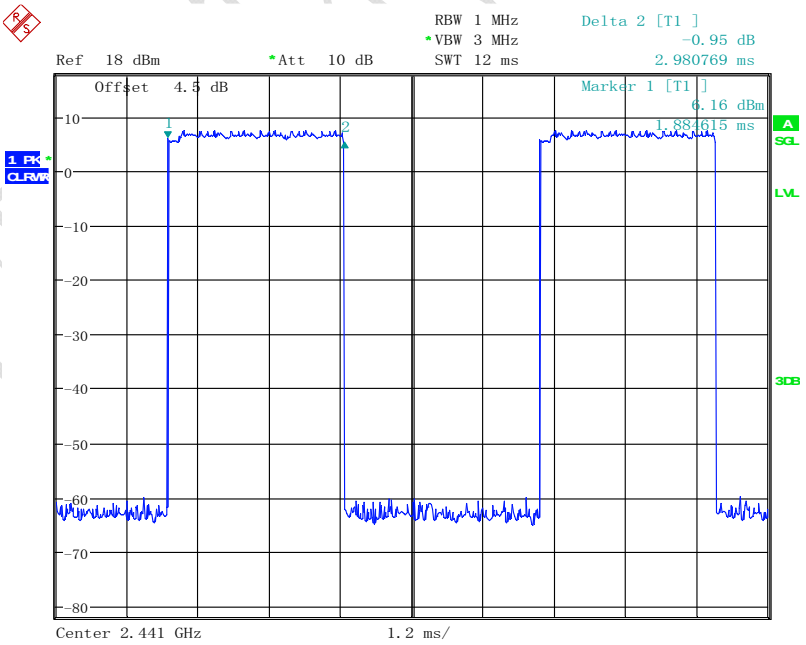
Date: 6.FEB.2015 14:50:38

8DPSK 3DH3



Date: 6.FEB.2015 14:51:56

8DPSK 3DH5



Date: 6.FEB.2015 14:52:39

4.6 Spurious Measurement (Conducted)

Specifications:	15.209(a) and 15.205(a)
Date of Test	2015-02-08
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	Fix channel transmit
Test Results:	Pass

Test equipment Used:

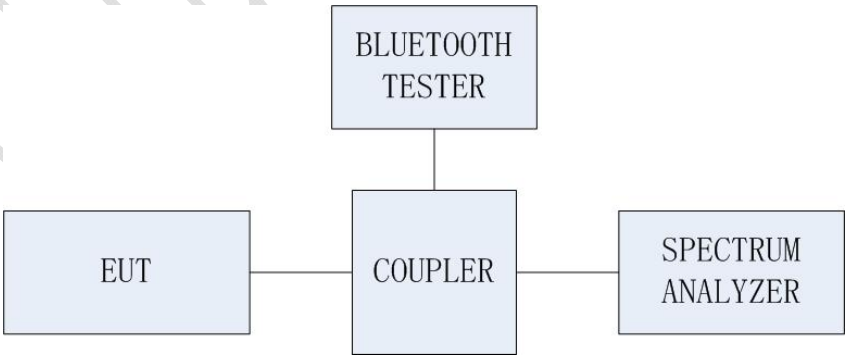
Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
CWY5329	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
CWY5344	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

LIMIT

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. 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) (see Section 15.205(c)).

Test Setup

The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a coupling.



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site. The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 300 KHz.

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

Test Result:

GFSK

Channel	Frequency Range	Results
0	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass
39	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass
78	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass

Pi/4 DQPSK

Channel	Frequency Range	Results
0	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass
39	Center Frequency	Pass

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	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass
78	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass

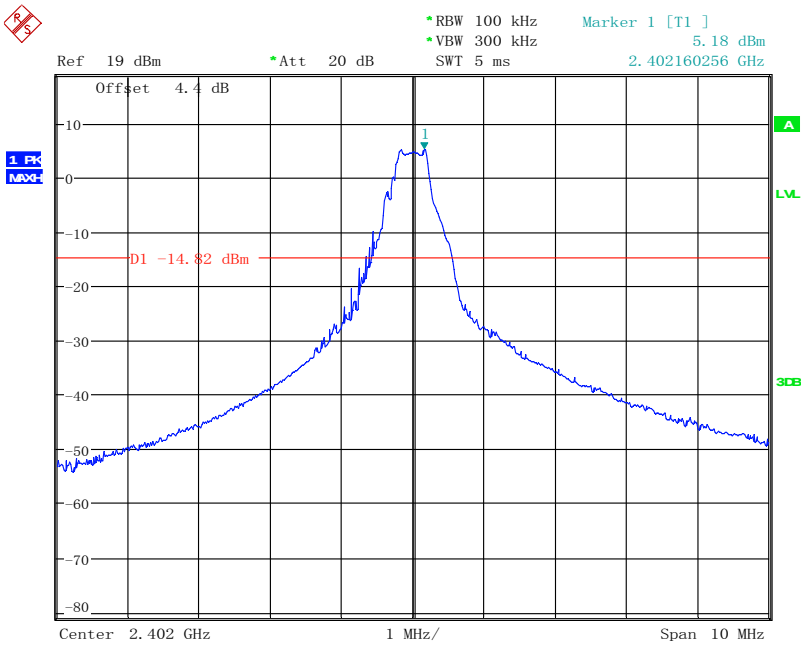
8DPSK

Channel	Frequency Range	Results
0	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass
39	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass
78	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
	1 GHz - 3 GHz	Pass
	3 GHz - 10 GHz	Pass
	10 GHz - 26.5 GHz	Pass

CTTL Test Report

Test plots:

GFSK Channel 0



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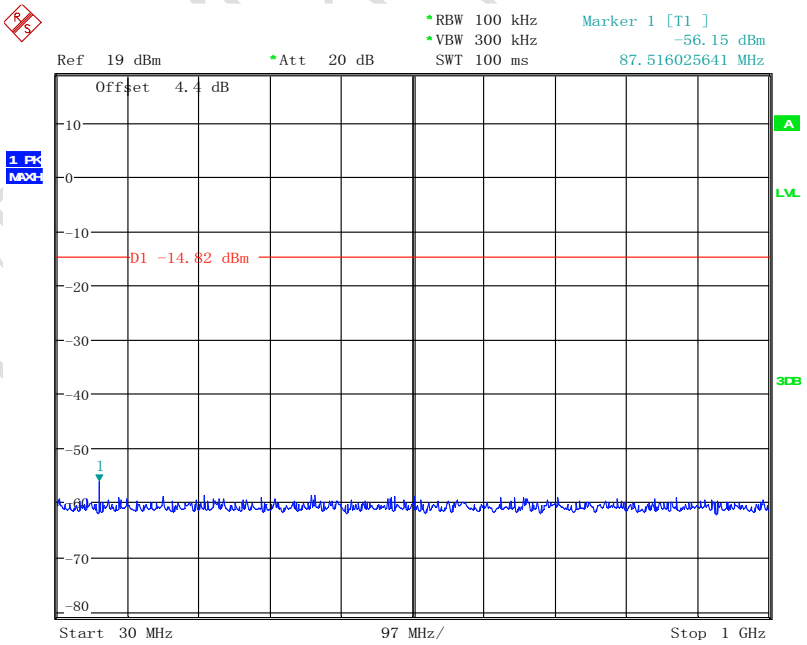
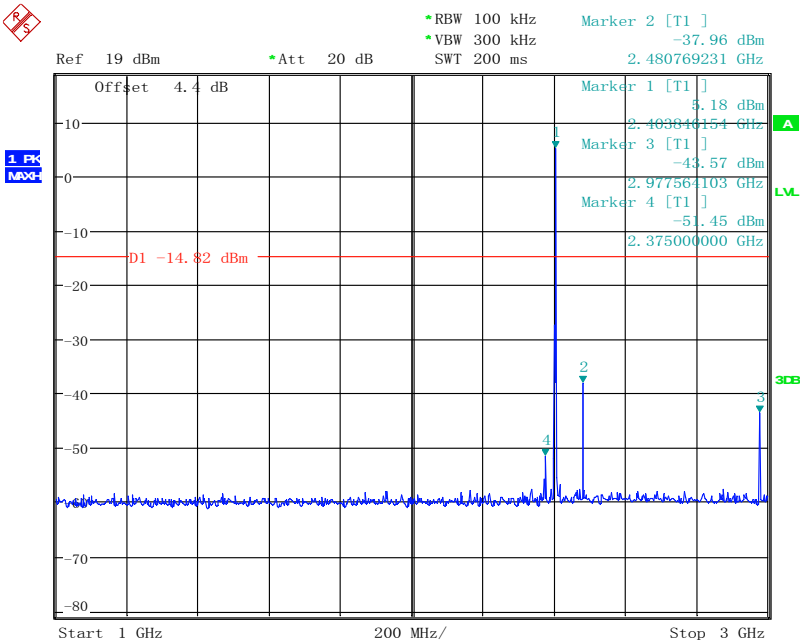


Date: 8.FEB.2015 10:51:43



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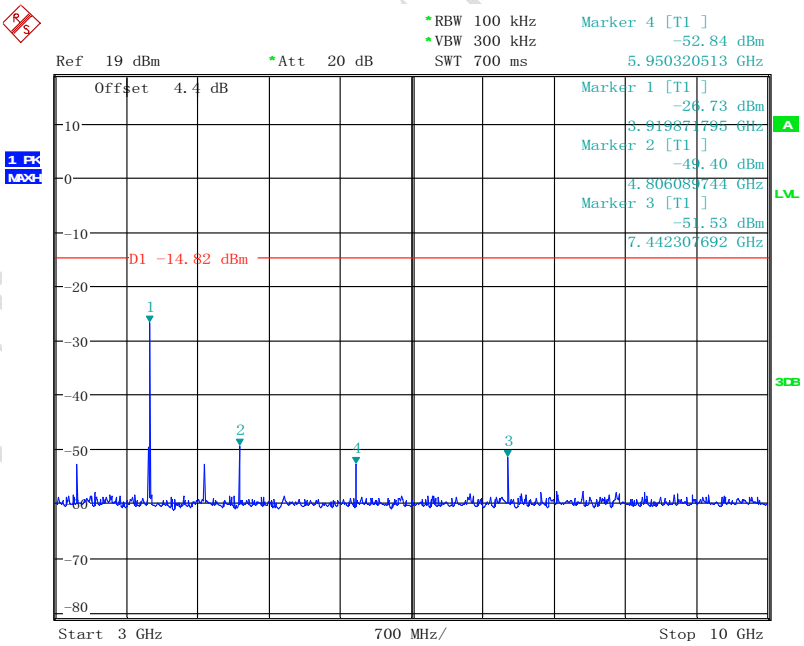

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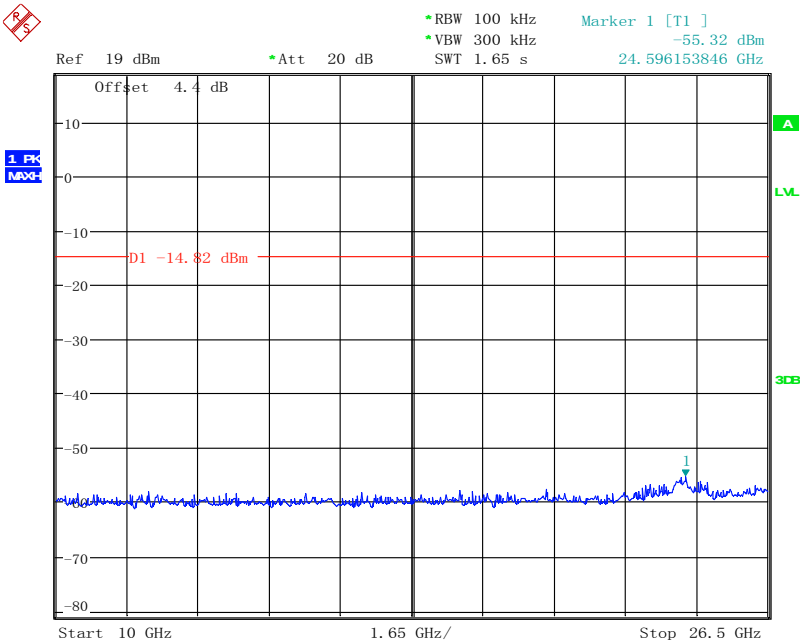
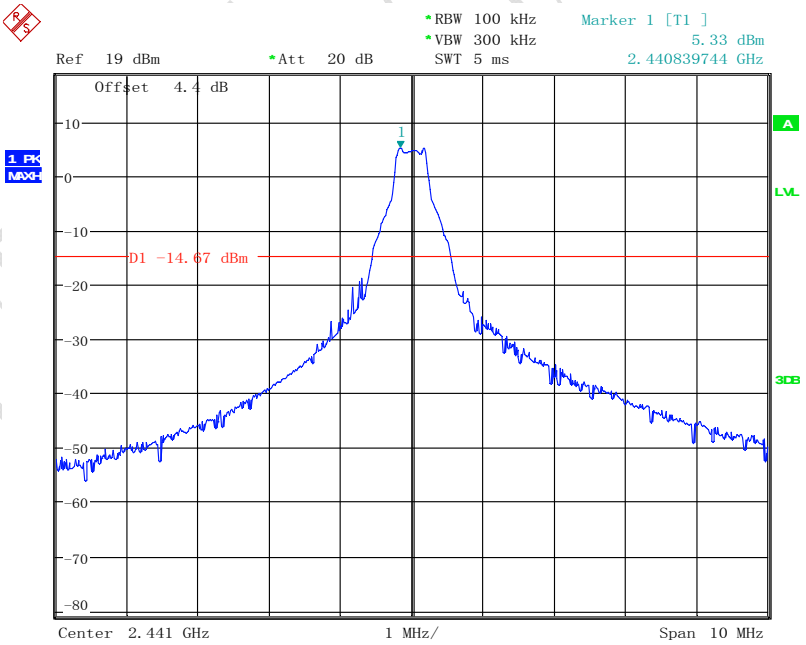


Date: 8.FEB.2015 10:53:28

GFSK Channel 39



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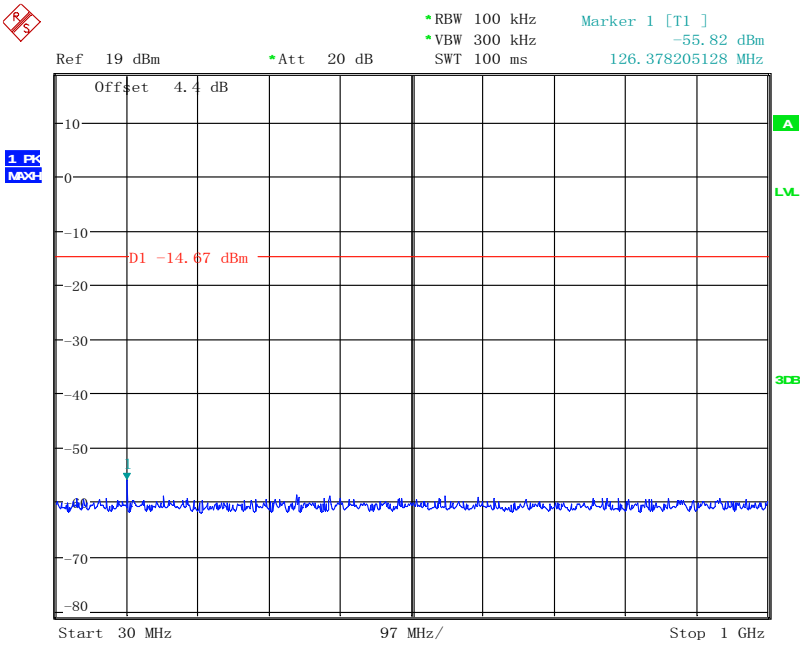

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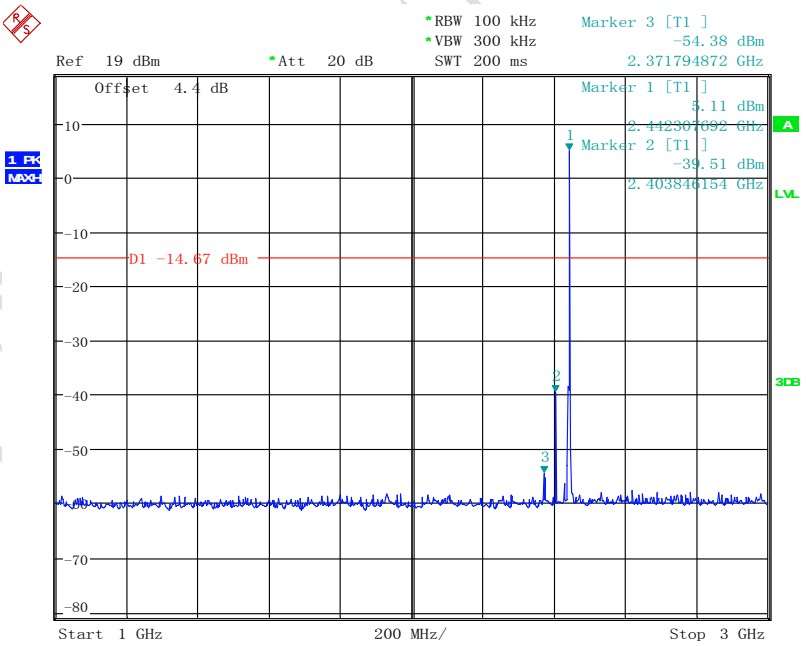

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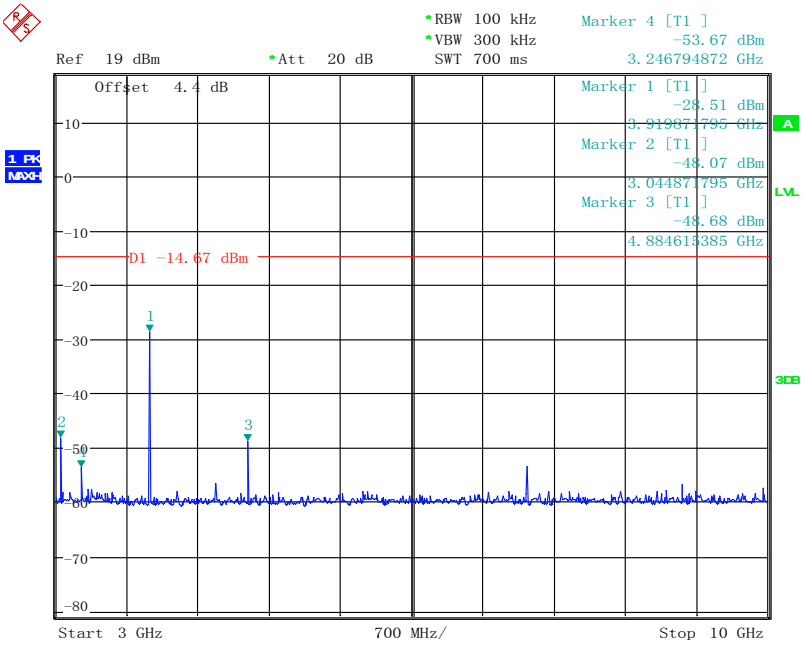

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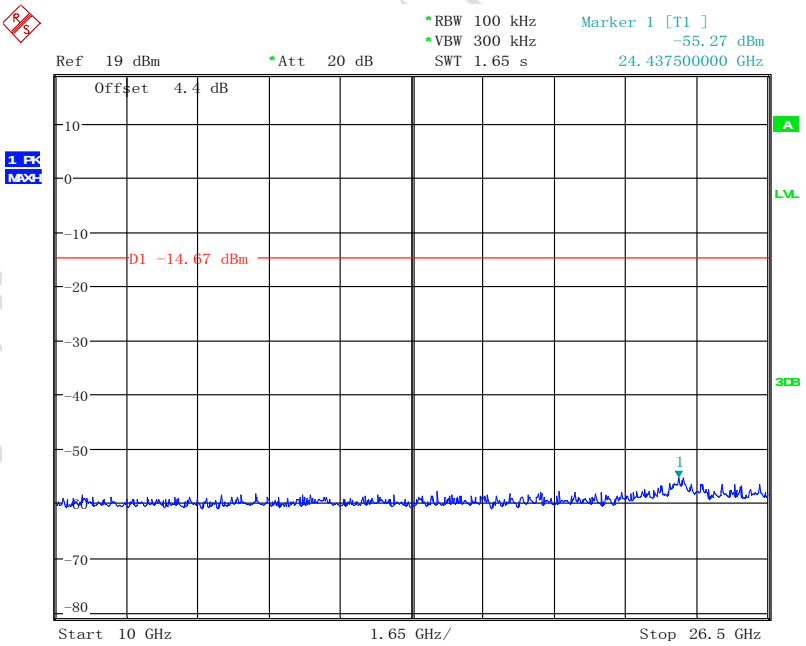

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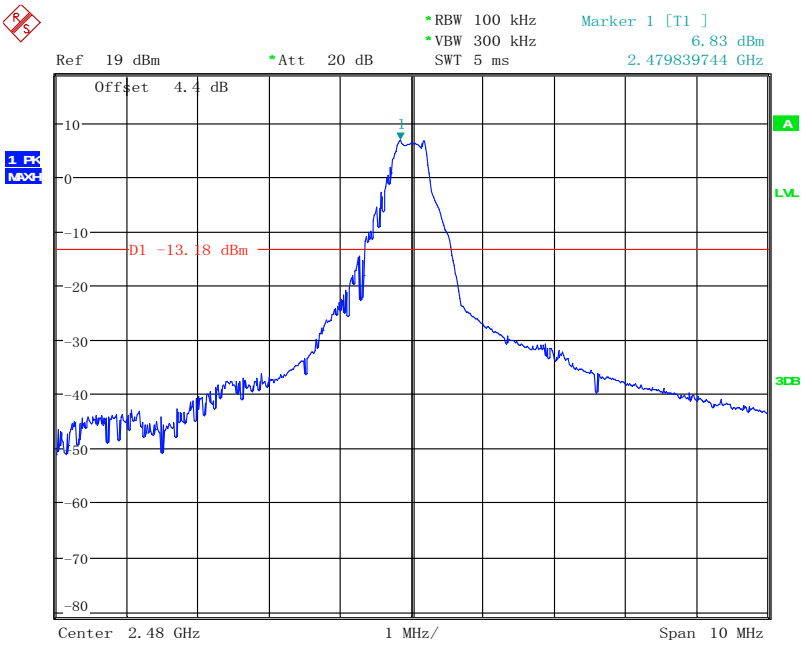
GFSK Channel 78



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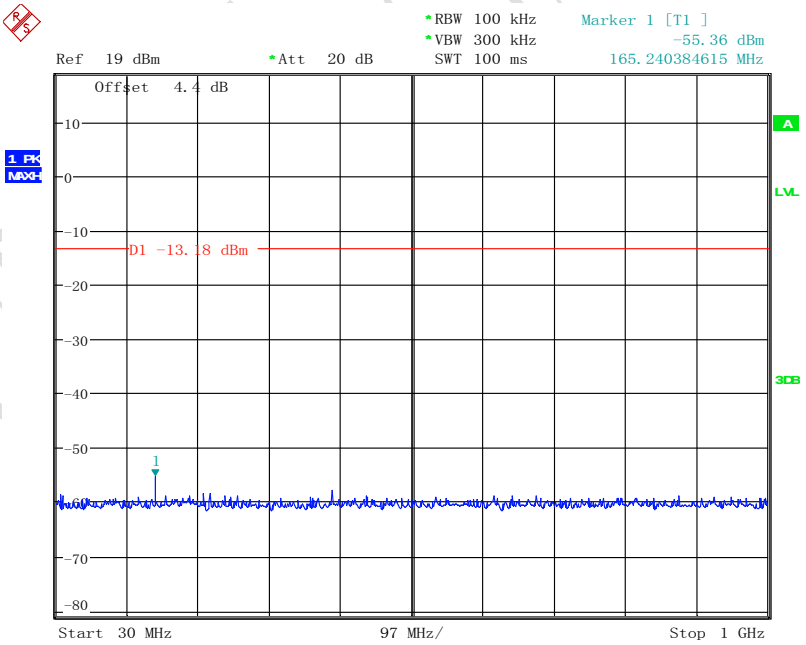

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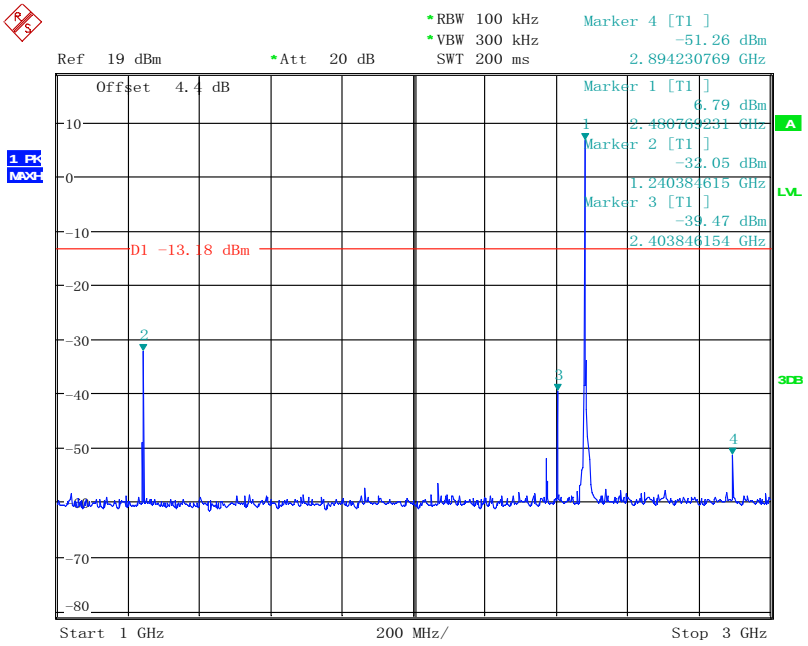

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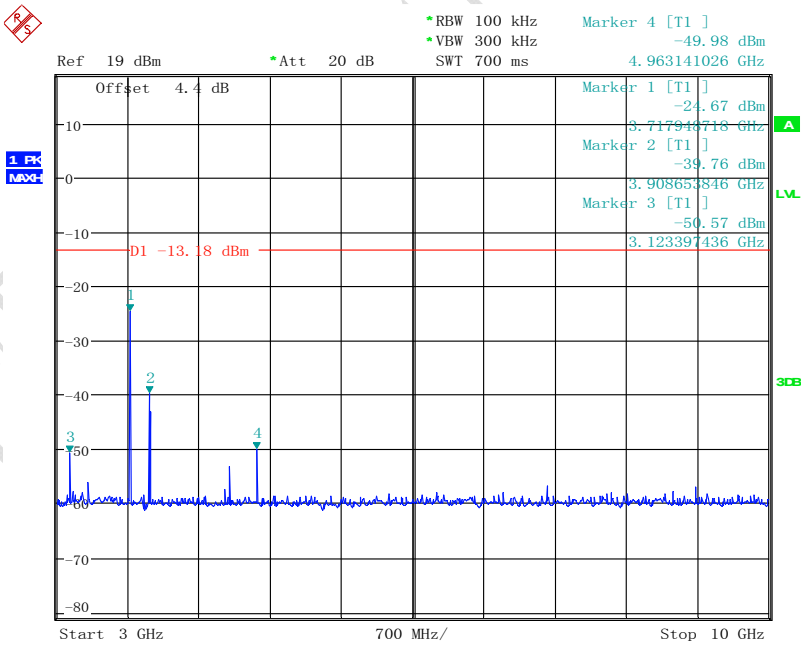

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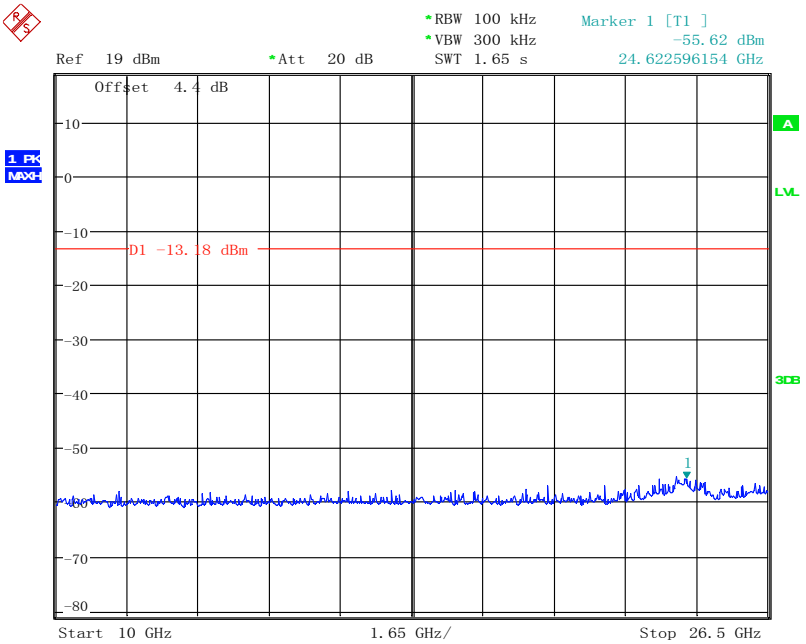

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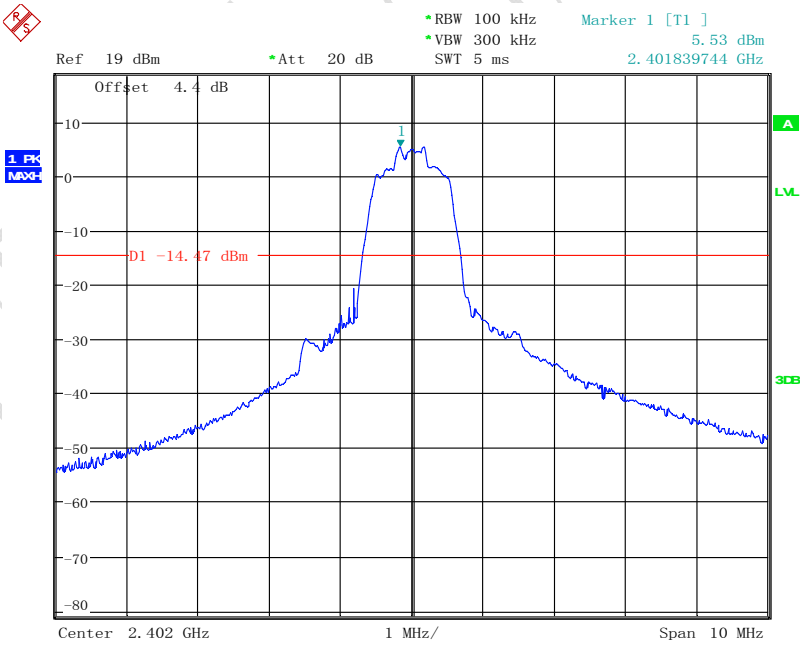
Pi/4 DQPSK Channel 0



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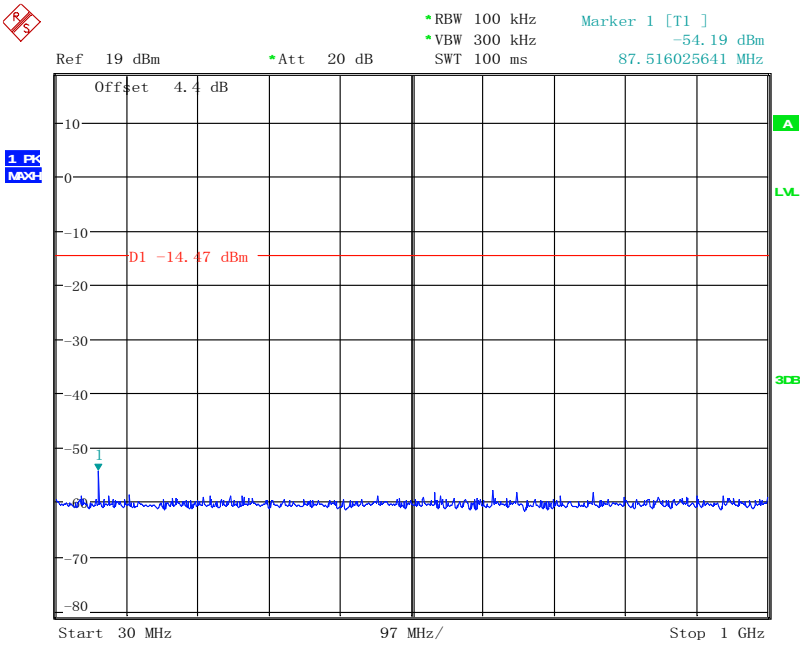

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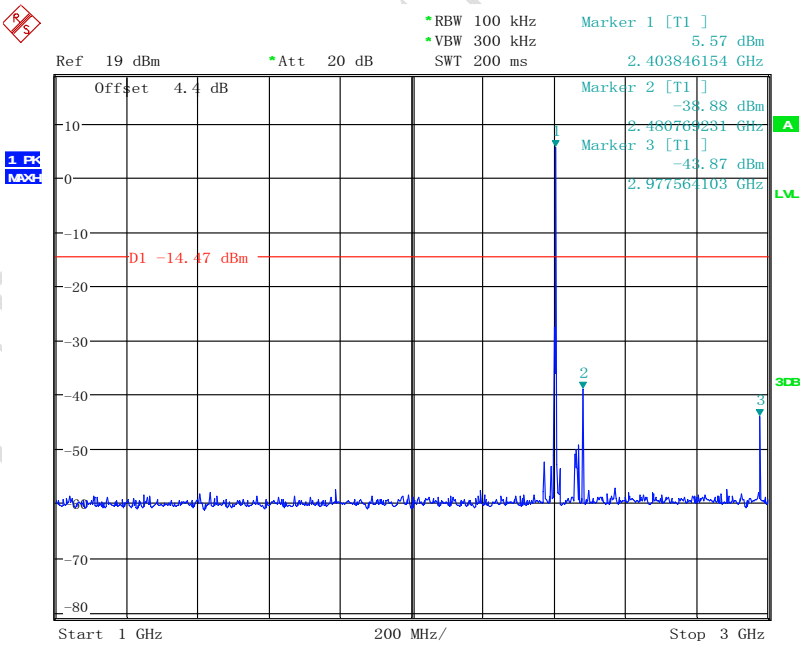

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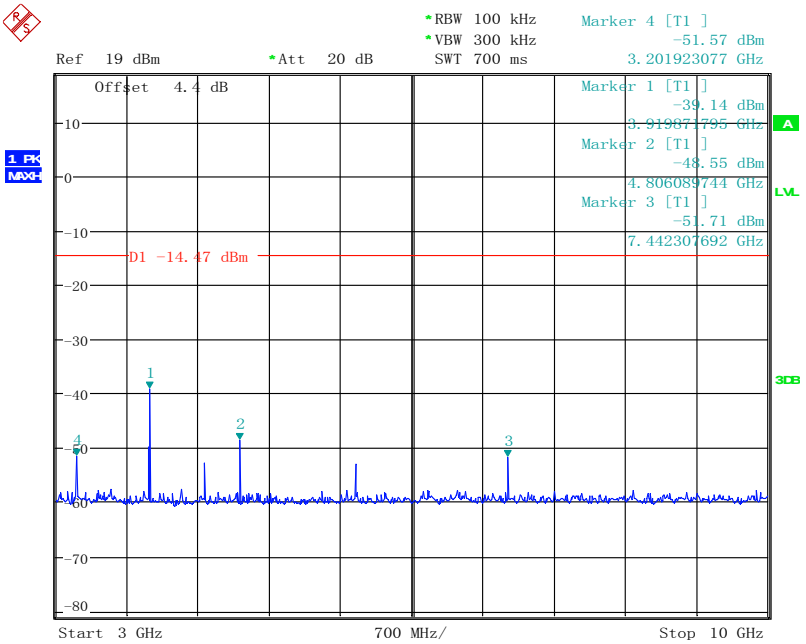

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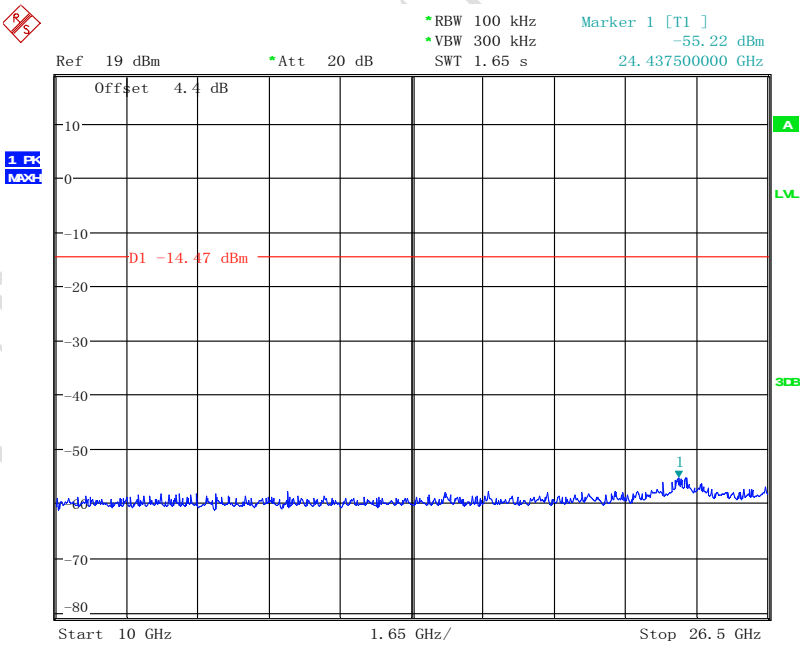

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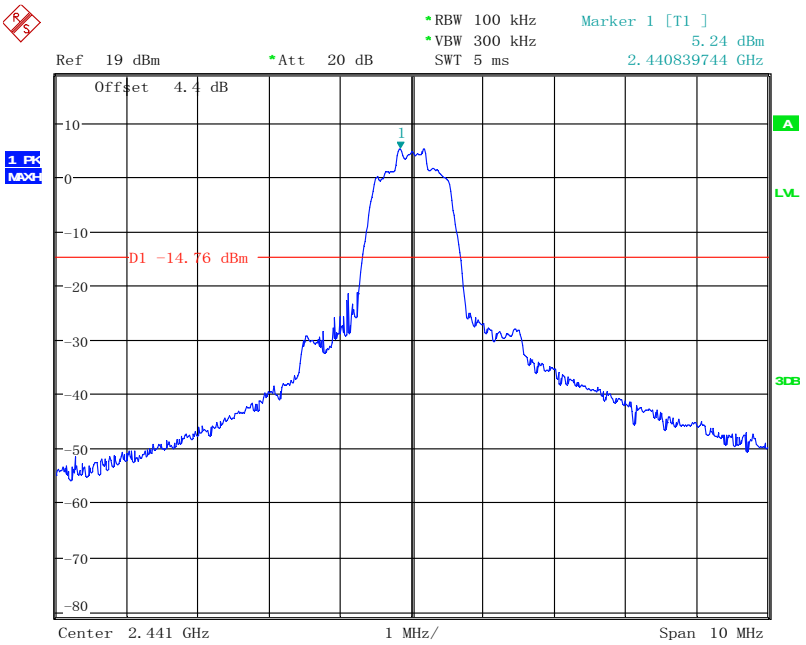
Pi/4 DQPSK Channel 39



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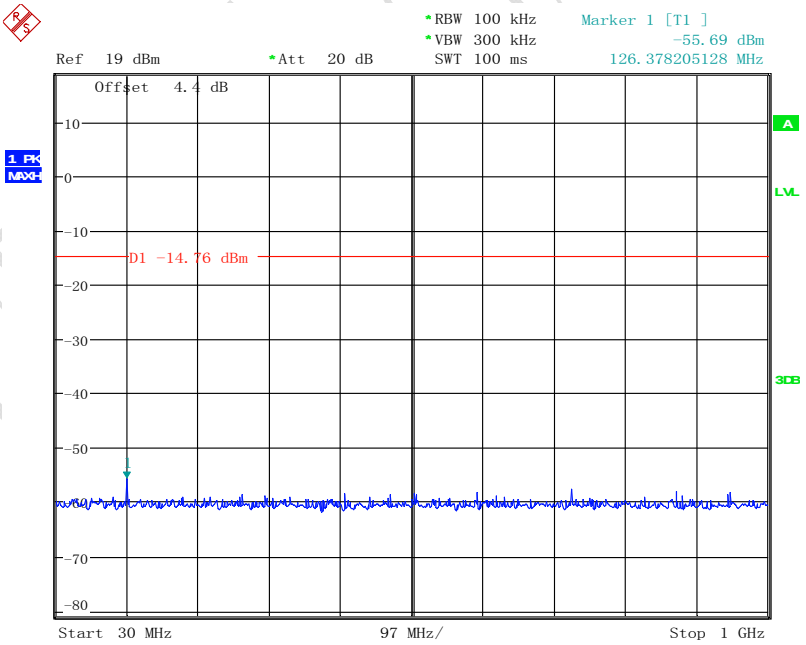

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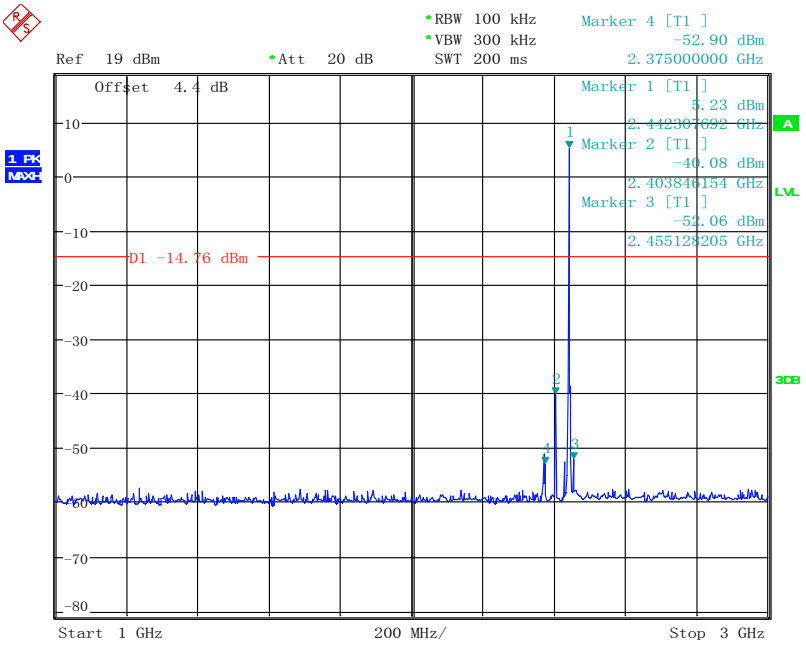

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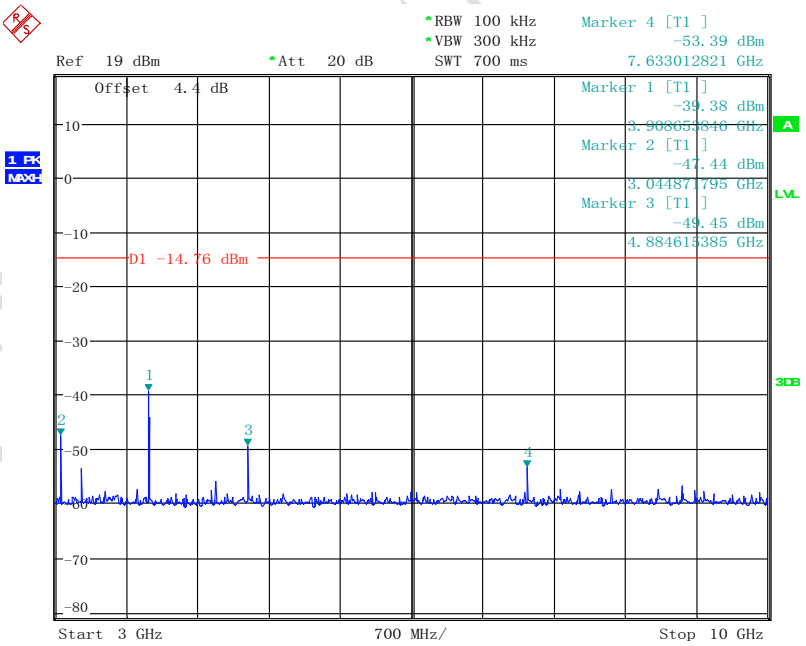

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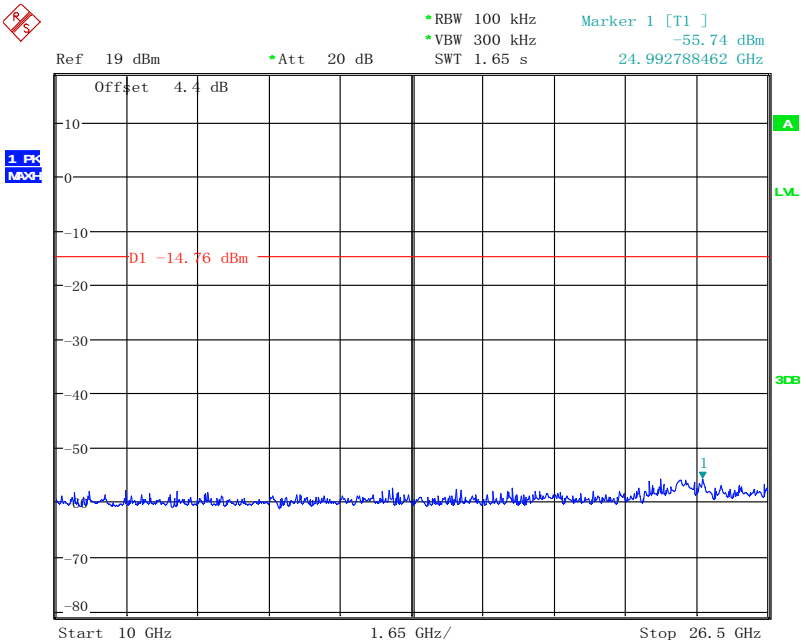

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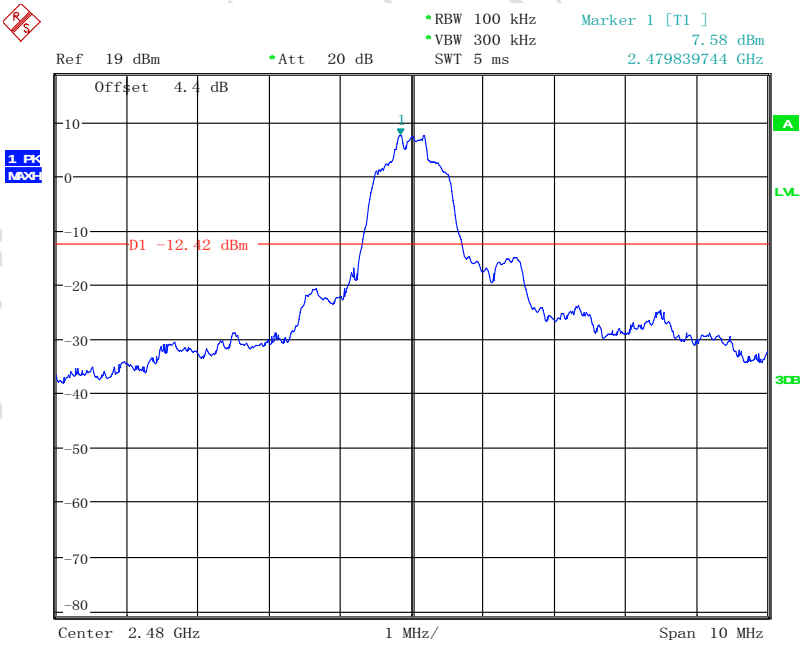
Pi/4 DQPSK Channel 78



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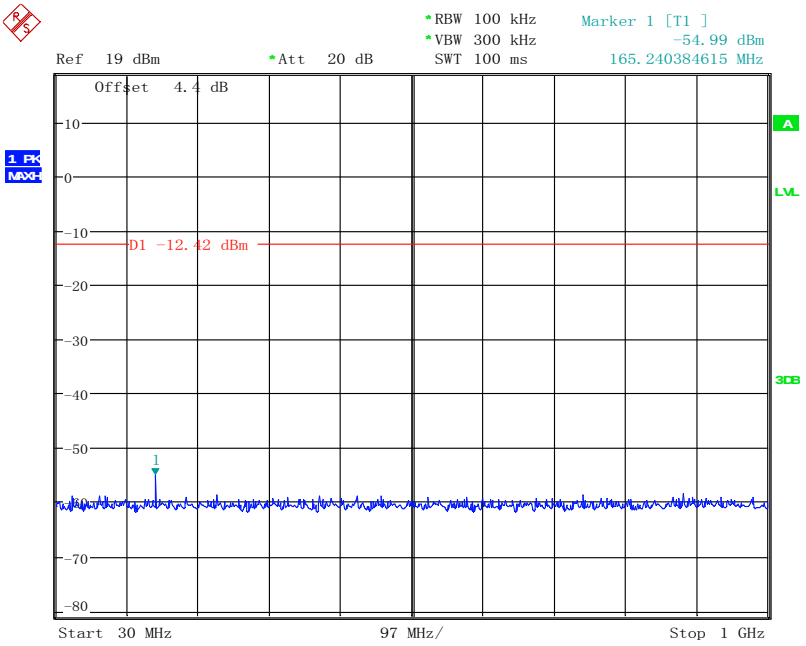

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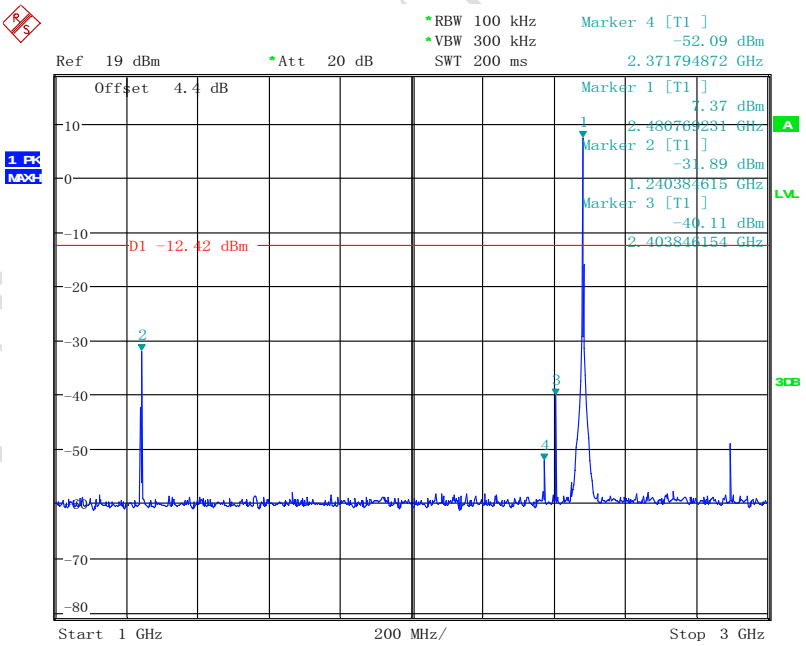

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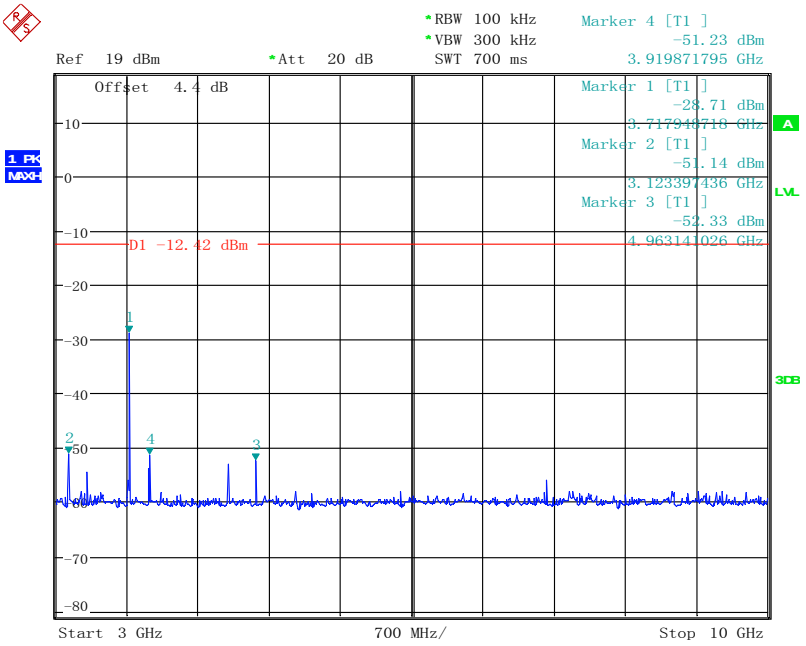

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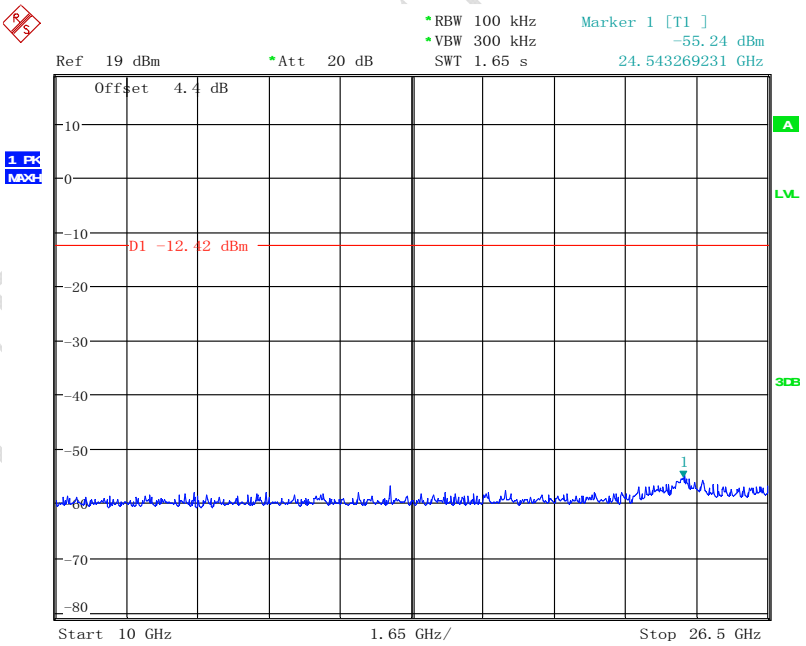

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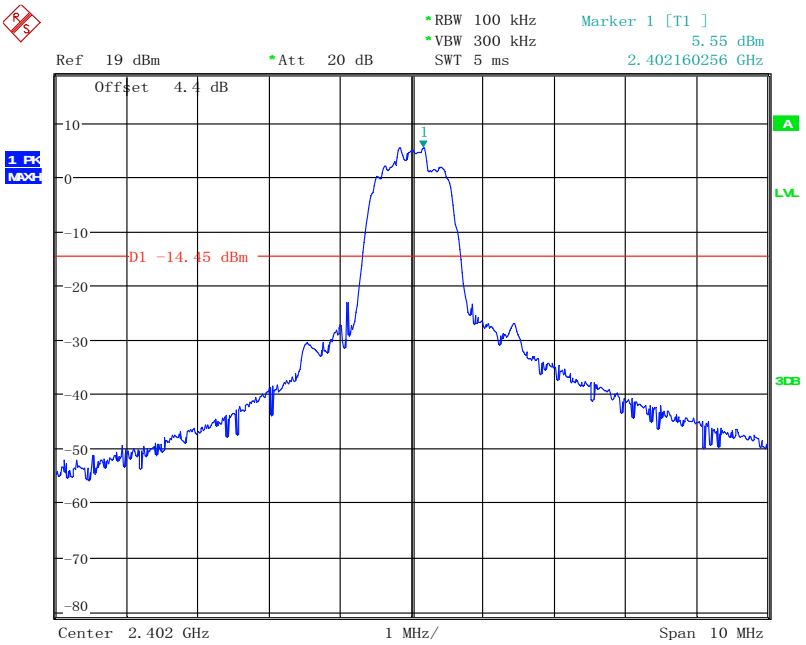
8DPSK Channel 0



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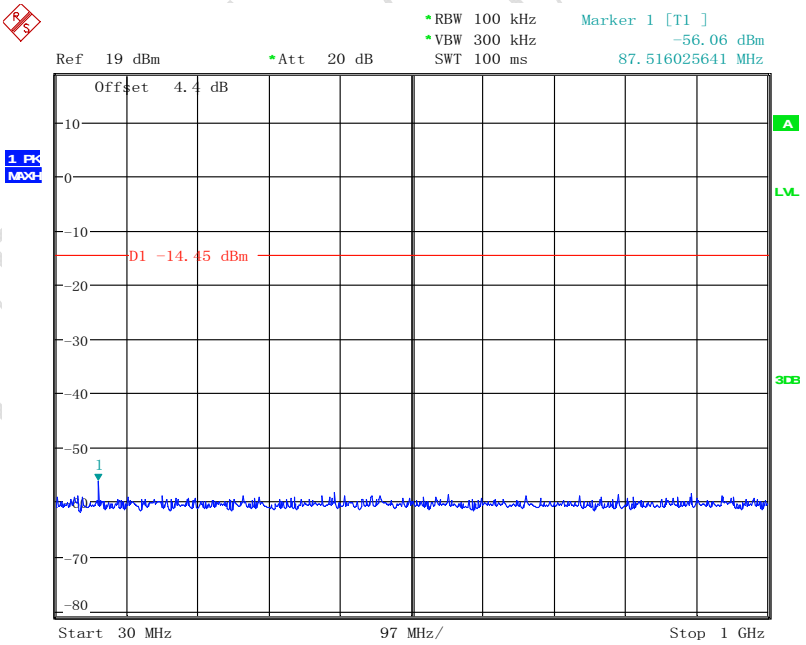

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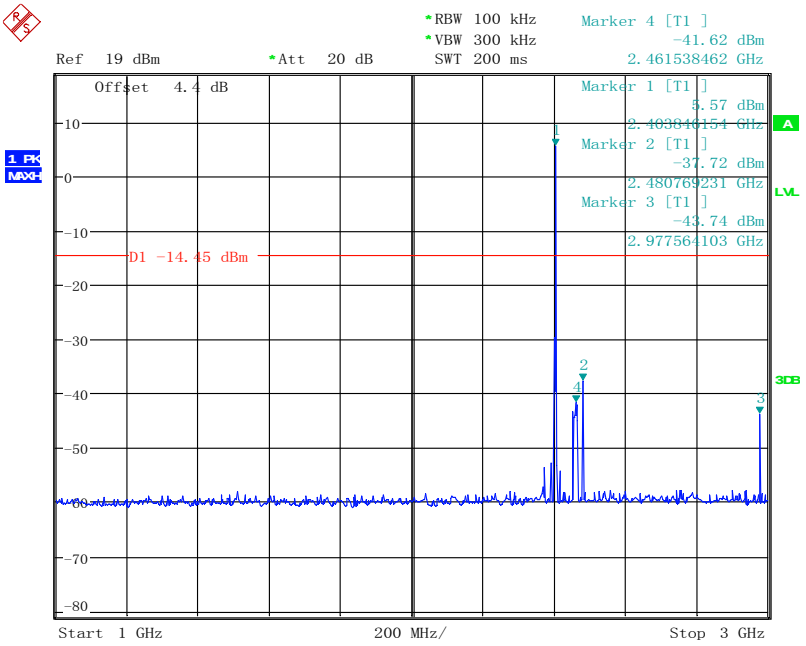

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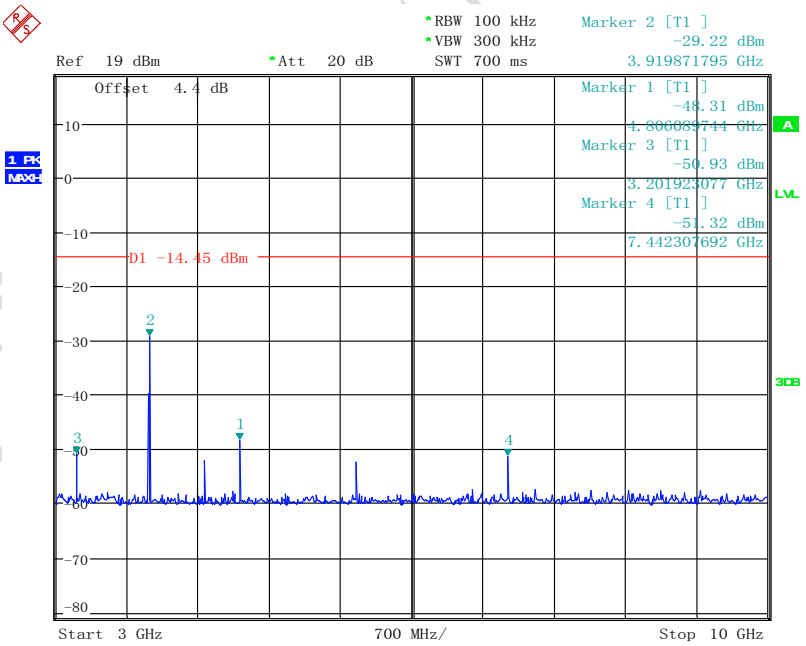

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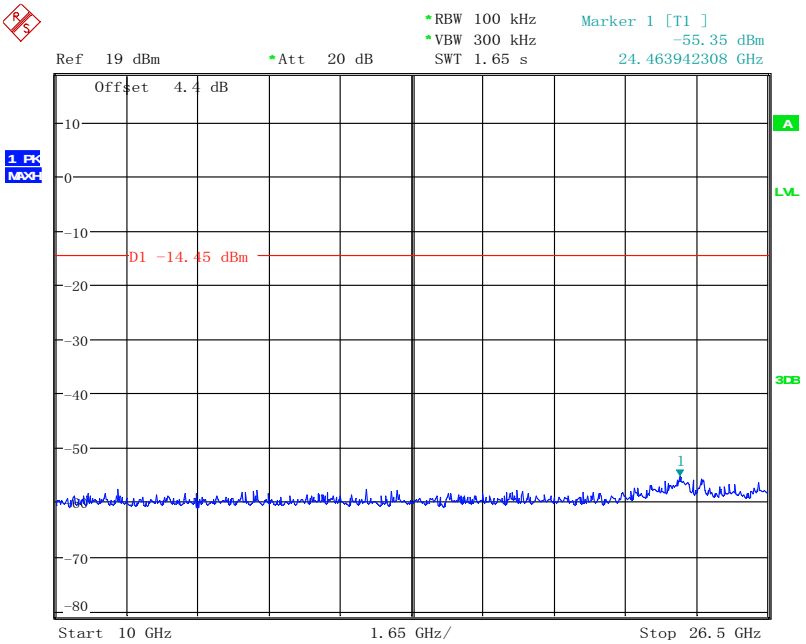

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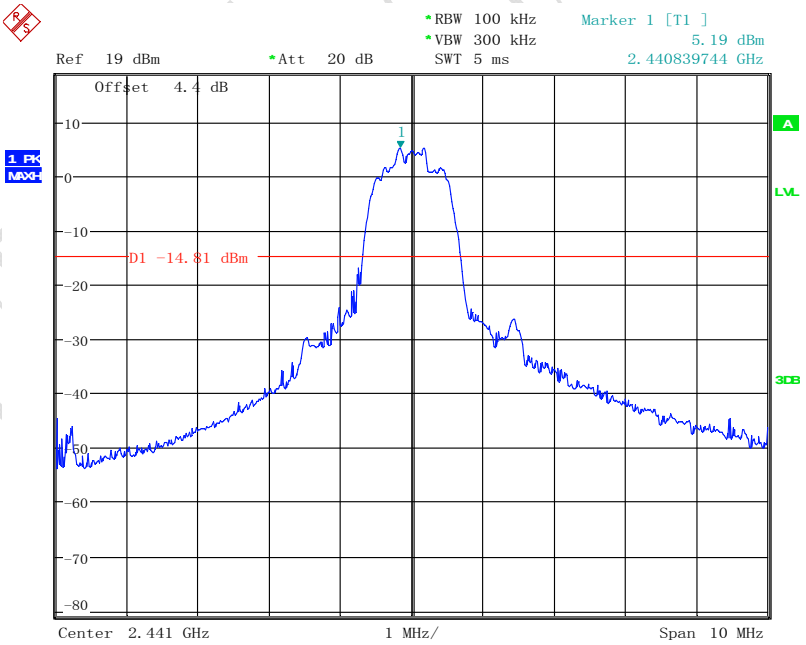
8DPSK Channel 39



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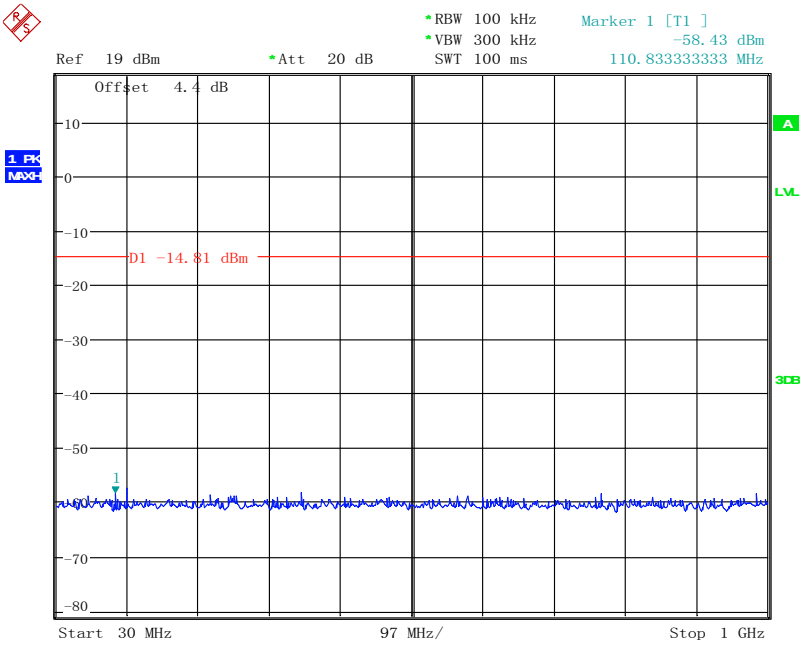

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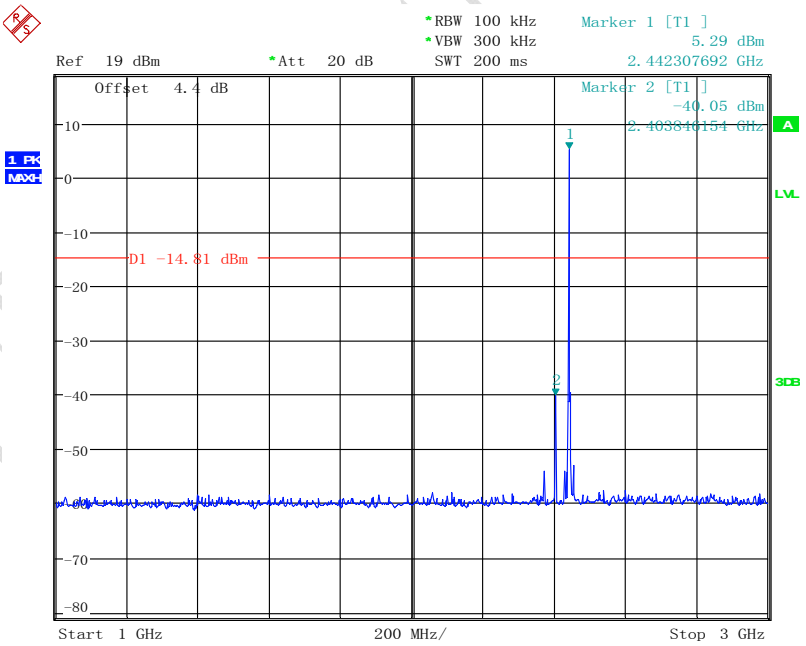

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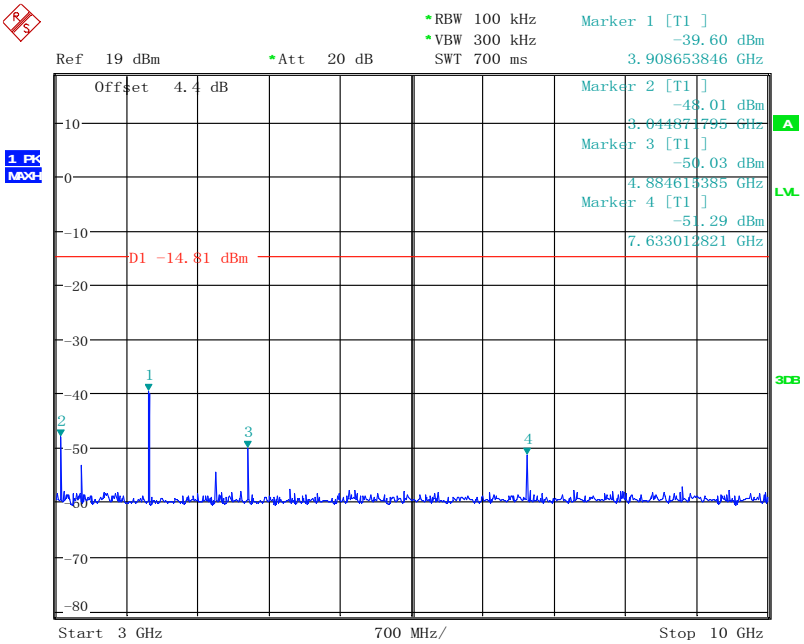

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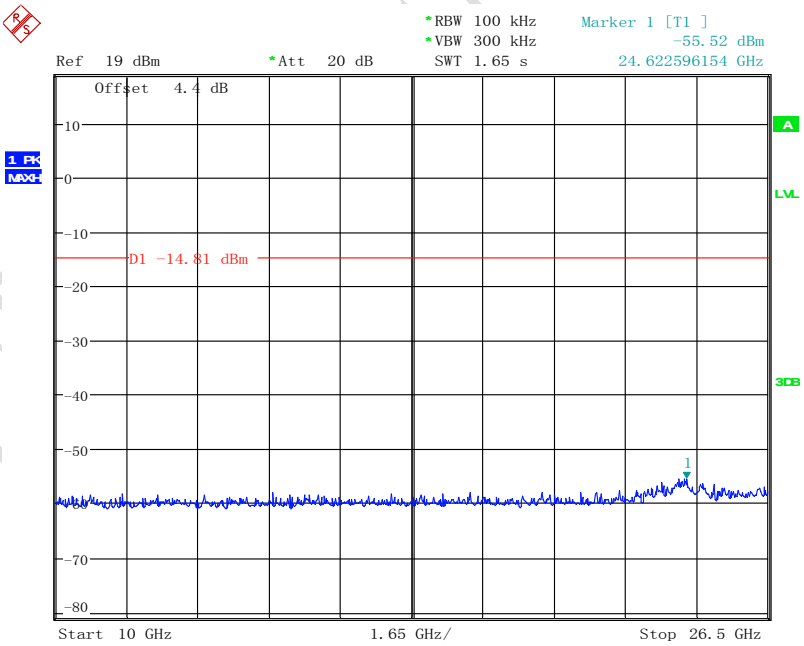

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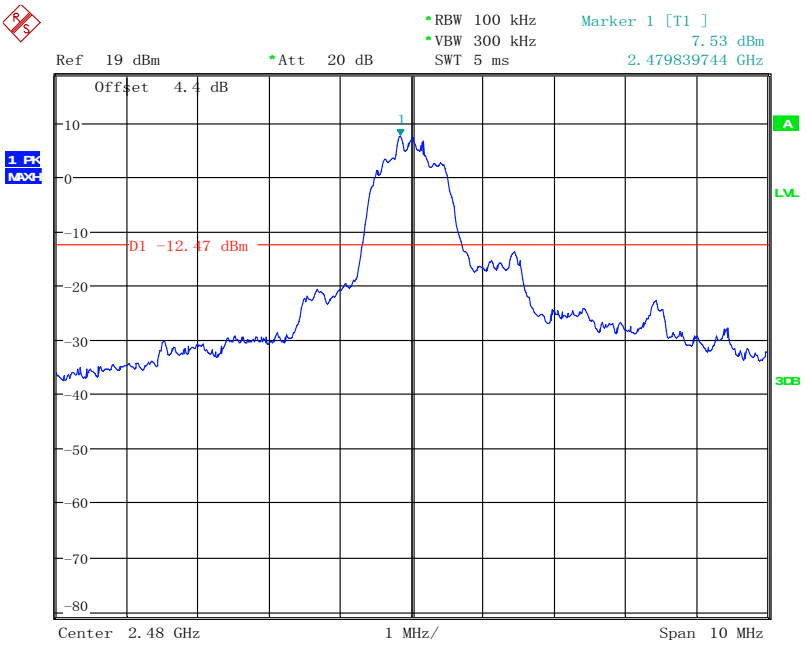
8DPSK Channel 78



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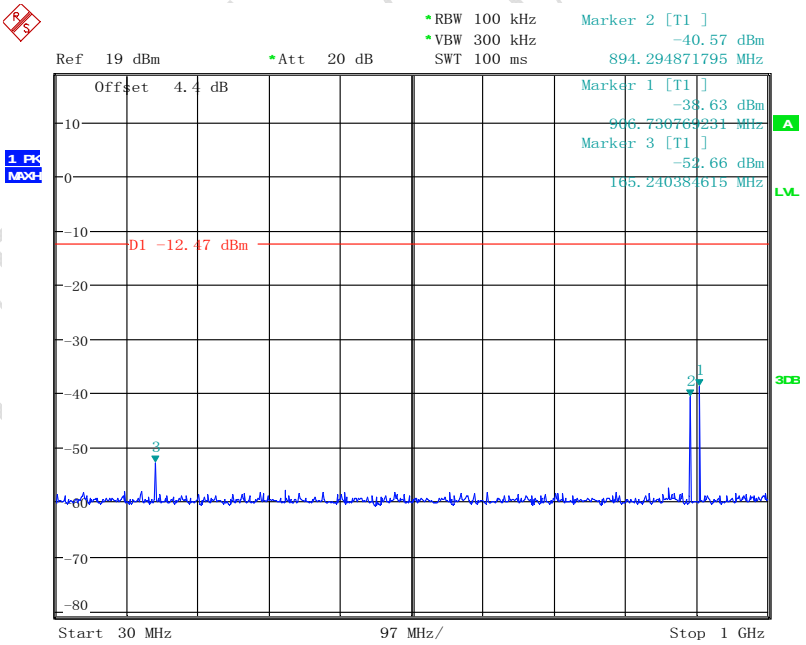

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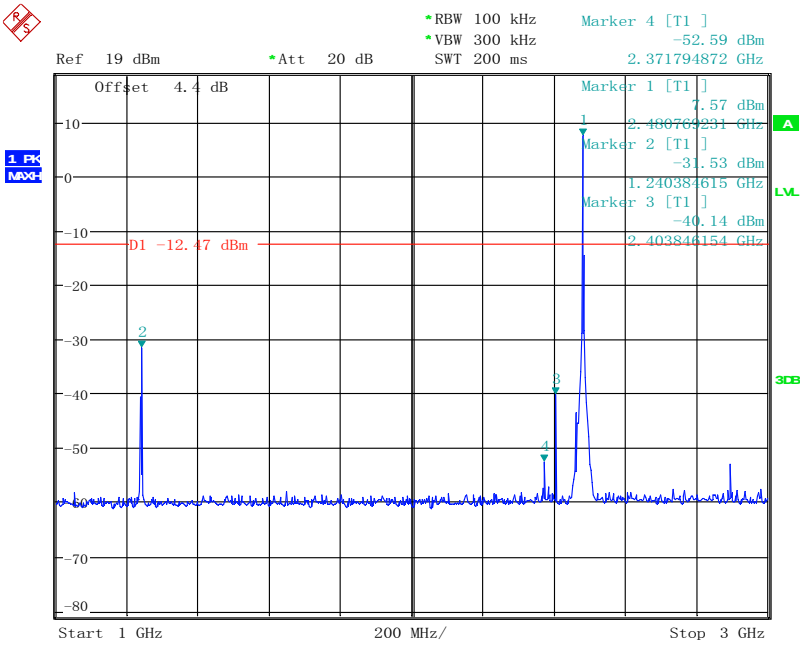

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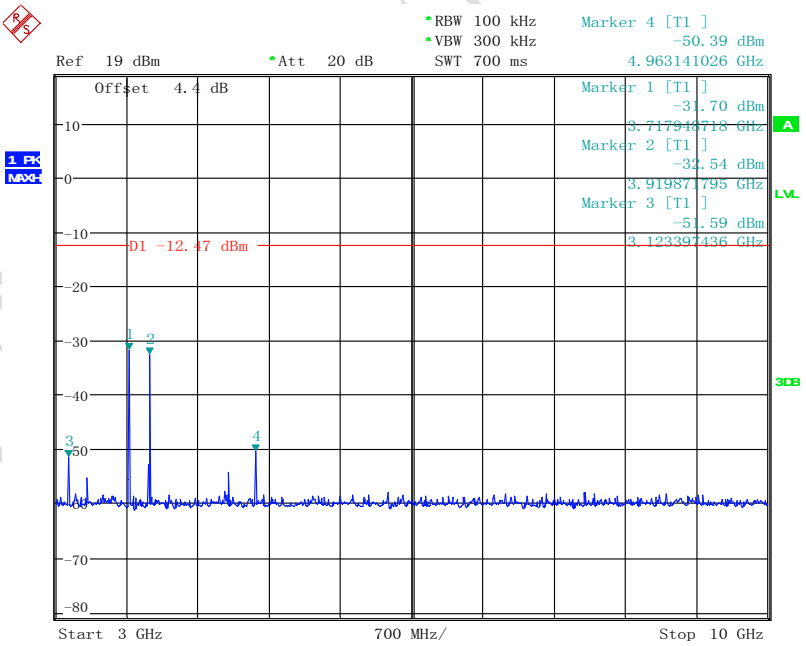

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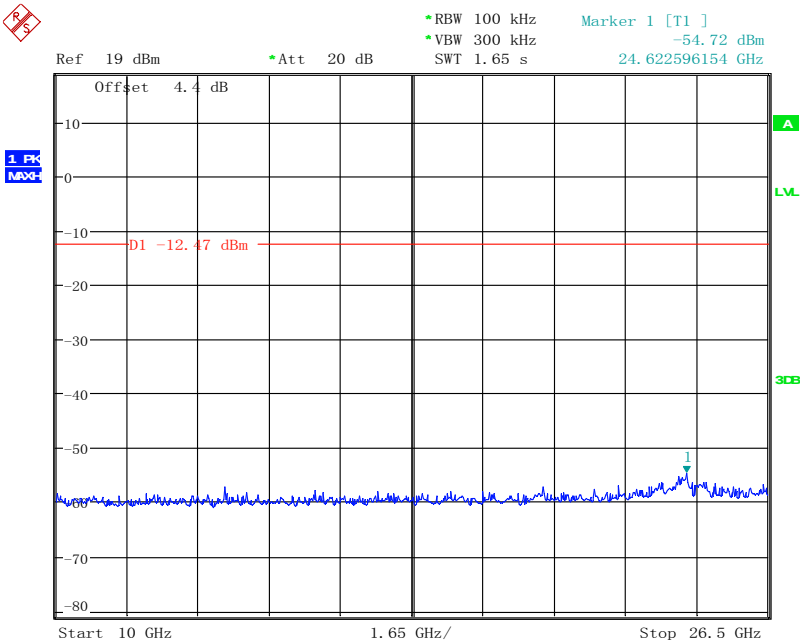


Date: 8.FEB.2015 11:24:48

4.7 Radiated Emission Measurement

Specifications:	15.209(a) and 15.205(a)
Date of Test	2015-02-11
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	Fix channel transmit
Test Results:	Pass

Test equipment Used:

Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
1	EMI Test Receiver	R&S	ESU26	100367	2015-03-07	Normal
2	Fully-Anechoic Chamber	ETS	FACT3-2	--	2015-08-20	Normal
3	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal
4	Ultra Broadband Antenna	R/S	VULB 9163	vulb9163－544	2015-12-13	Normal
5	Double-Ridged Horn Antenna	R/S	HF907	100357	2015-12-13	Normal

Limit:

1. 20dBc in any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed

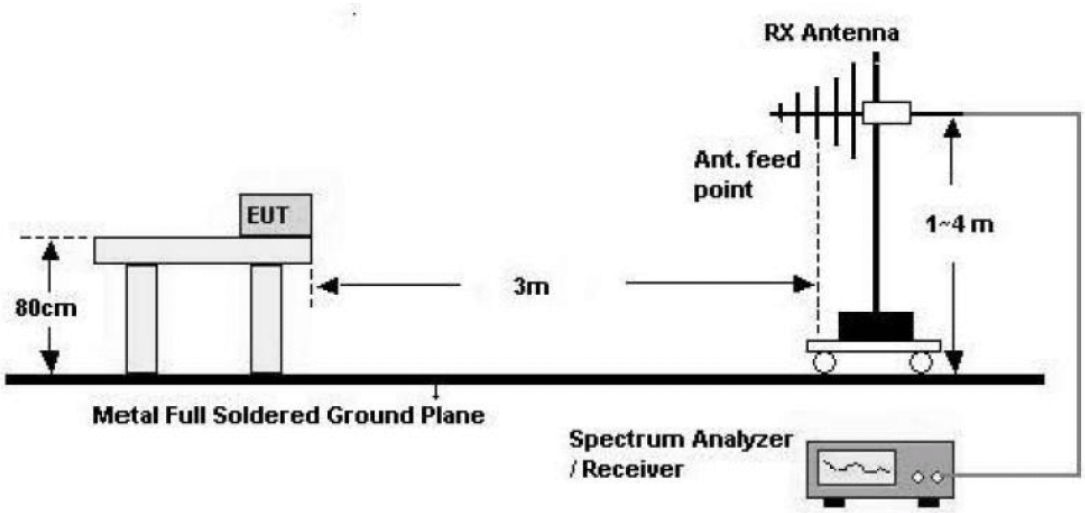
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Setup

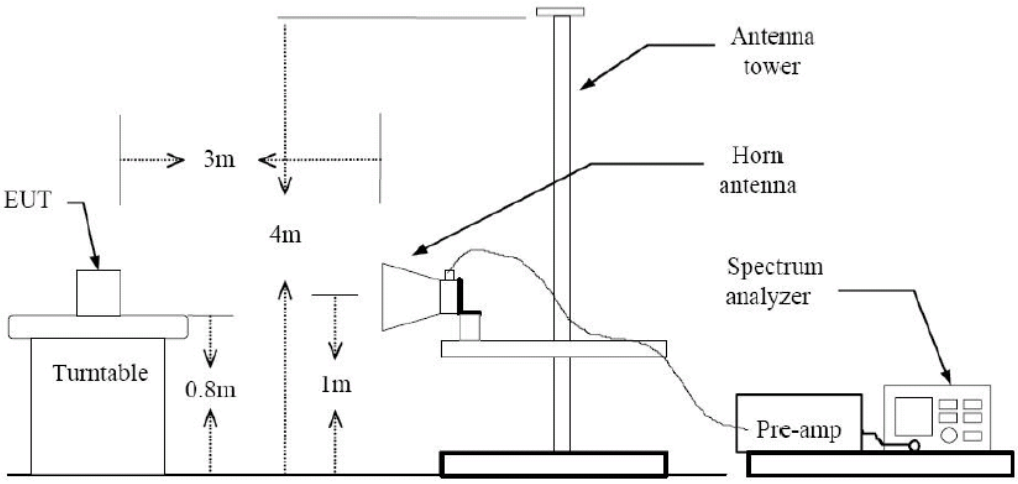
The EUT was placed in an anechoic chamber. The BLUETOOTH TESTER was used to set the TX channel and power level. The transmitter output is connected to Spectrum analyzer through a Bilog antenna (for frequency 30MHz-1GHz) or a horn antenna (for frequency above 1GHz).

30MHz-1GHz:

CTTL Test Report



Above 1GHz:



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees on EUT's x, y and z axis to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

Test Settings:

Frequency Range (MHz)	RBW/VBW	Sweep time (s)
30 - 1000	100kHz/300kHz	5
1000 - 4000	1MHz/3MHz	15
4000 - 18000	1MHz/3MHz	40
18000 - 26500	1MHz/3MHz	20

Note: Considering the GFSK modulation with packet type DH5 has the maximum transmission power, so only this mode is tested.

Test result:

Channel	Frequency Range	Results
Channel 0	30MHz - 1GHz	Pass
	1 GHz - 3GHz	Pass
	3 GHz - 18 GHz	Pass
Channel 39	30MHz - 1GHz	Pass
	1 GHz - 3GHz	Pass
	3 GHz - 18 GHz	Pass
Channel 78	30MHz - 1GHz	Pass
	1 GHz - 3GHz	Pass
	3 GHz - 18 GHz	Pass
All channels	18GHz-26.5GHz	Pass

Note*: these tests demonstrate the radiated band-edge test results

Channel 0:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
42.240000	13.4	120.000	99.0	V	172.0	26.6	40.0
46.096000	16.2	120.000	185.0	V	-2.0	23.8	40.0
55.020000	14.5	120.000	99.0	V	277.0	25.5	40.0
85.396000	13.7	120.000	183.0	H	187.0	26.3	40.0
85.563000	12.8	120.000	183.0	H	-8.0	27.2	40.0
997.072000	17.1	120.000	383.0	H	-8.0	36.9	54.0

Channel 39:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)

CTTL Test Report

42.819000	13.8	120.000	99.0	V	269.0	26.2	40.0
45.911000	17.5	120.000	99.0	V	97.0	22.5	40.0
55.511000	16.4	120.000	99.0	V	97.0	23.6	40.0
85.384000	13.8	120.000	199.0	H	262.0	26.2	40.0
86.251000	11.9	120.000	200.0	H	82.0	28.1	40.0
149.795000	15.5	120.000	99.0	H	97.0	28.0	43.5

Channel 78:

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
42.337000	12.5	120.000	99.0	V	268.0	27.5	40.0
46.099000	18.7	120.000	99.0	V	-2.0	21.3	40.0
53.483000	16.3	120.000	99.0	V	97.0	23.7	40.0
85.393000	12.8	120.000	200.0	H	-2.0	27.2	40.0
86.251000	11.9	120.000	183.0	H	270.0	28.1	40.0
187.528000	15.0	120.000	99.0	H	97.0	28.5	43.5

Notes:

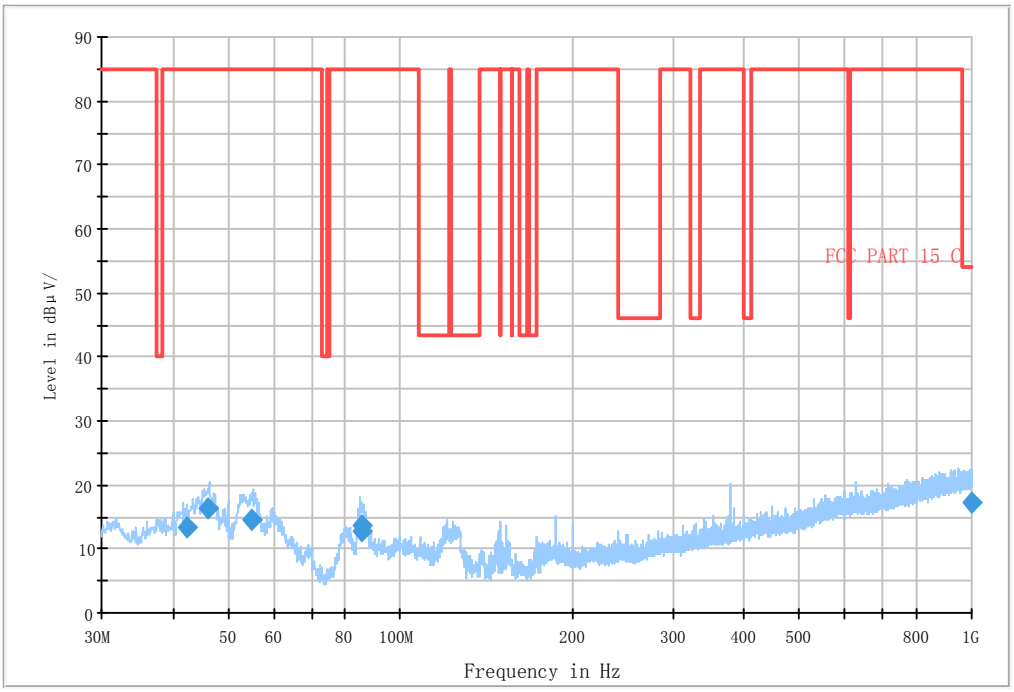
1. Radiated emissions were measured with an instrument using Quasi-peak detector mode in frequency range from 30 MHz to 1000MHz, and with peak detector mode in frequency range from 1GHz - 26.5 GHz.

2 Total dBuV/m = Reading dBuV/m - Cable Loss dB + Antenna Gain dB.

CTTL Test Report

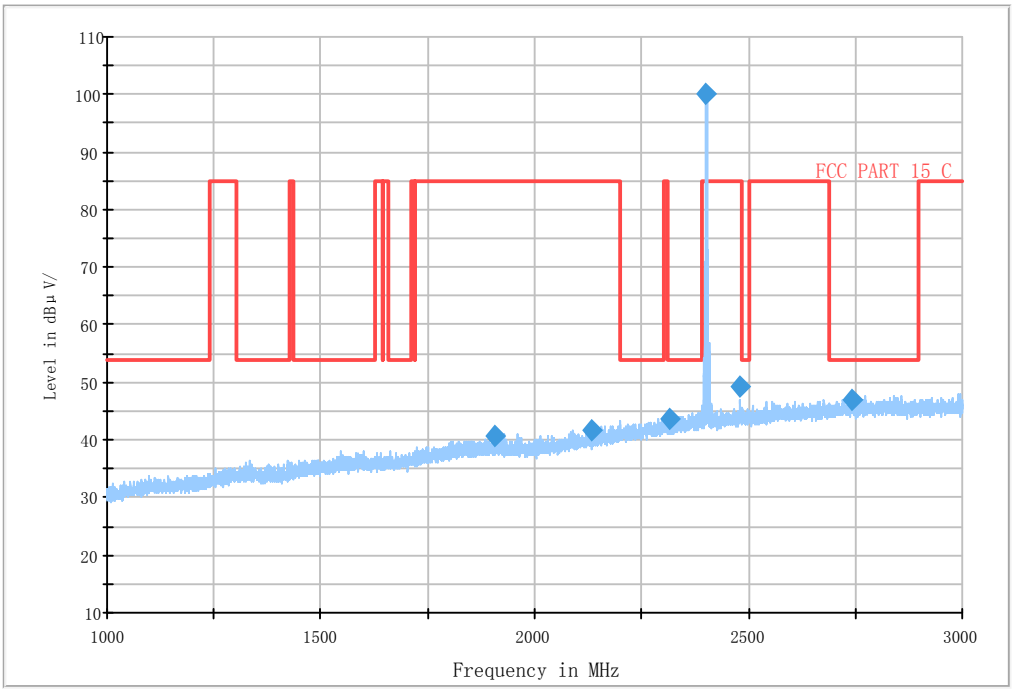
Test Plots:

RE 30MHz-1GHz H



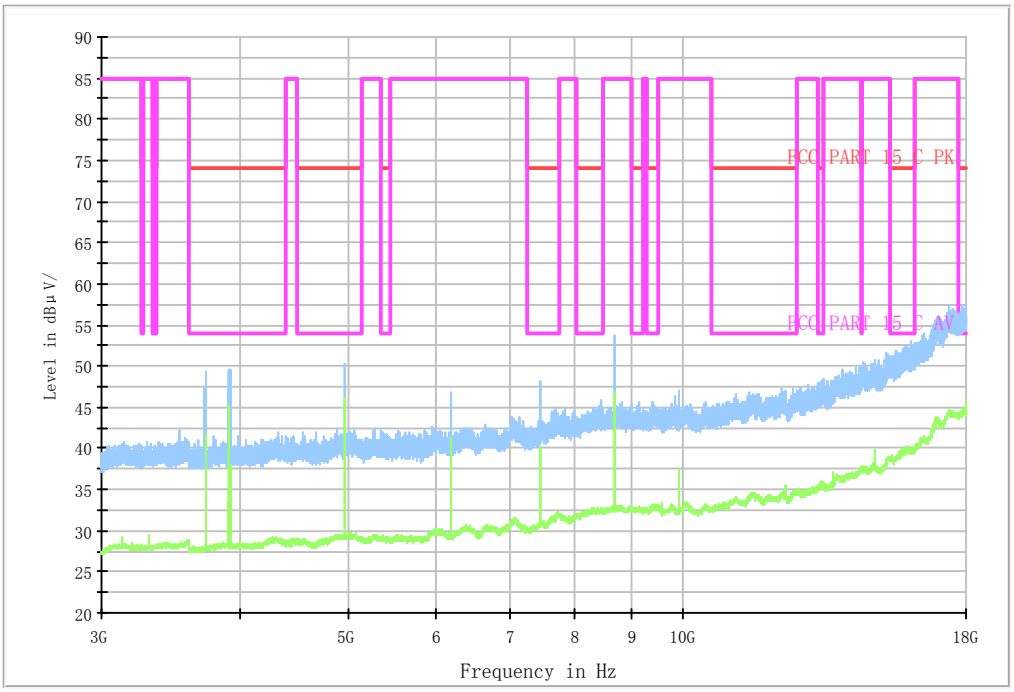
GFSK DH5 Channel 0 30MHz-1GHz

RE 1GHz-3GHz



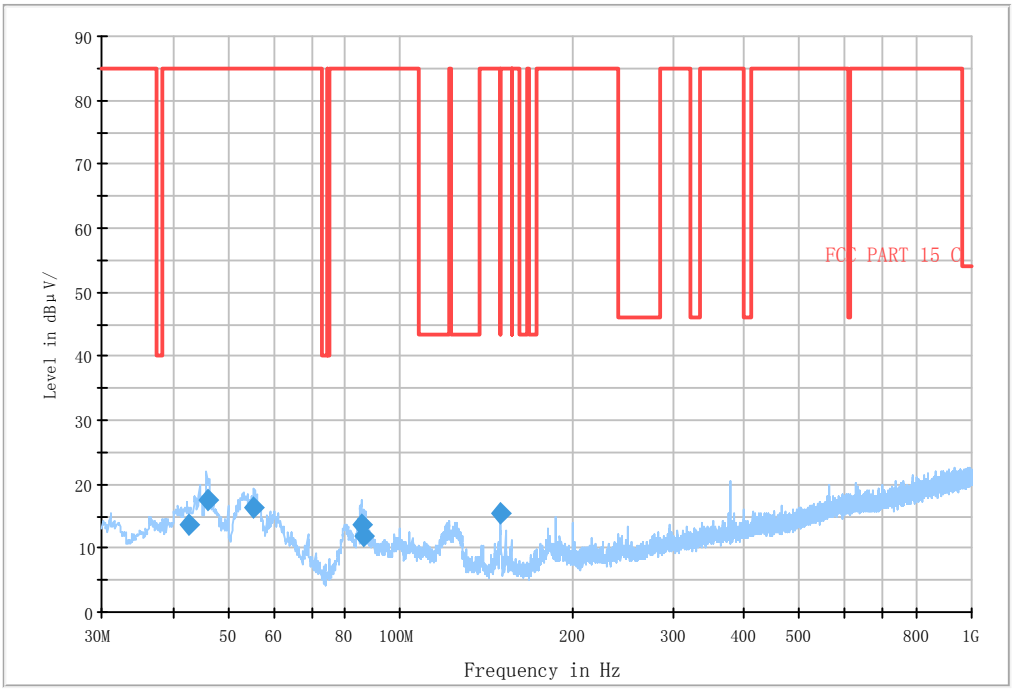
GFSK DH5 Channel 0 1-3GHz

RE 3GHz-18GHz



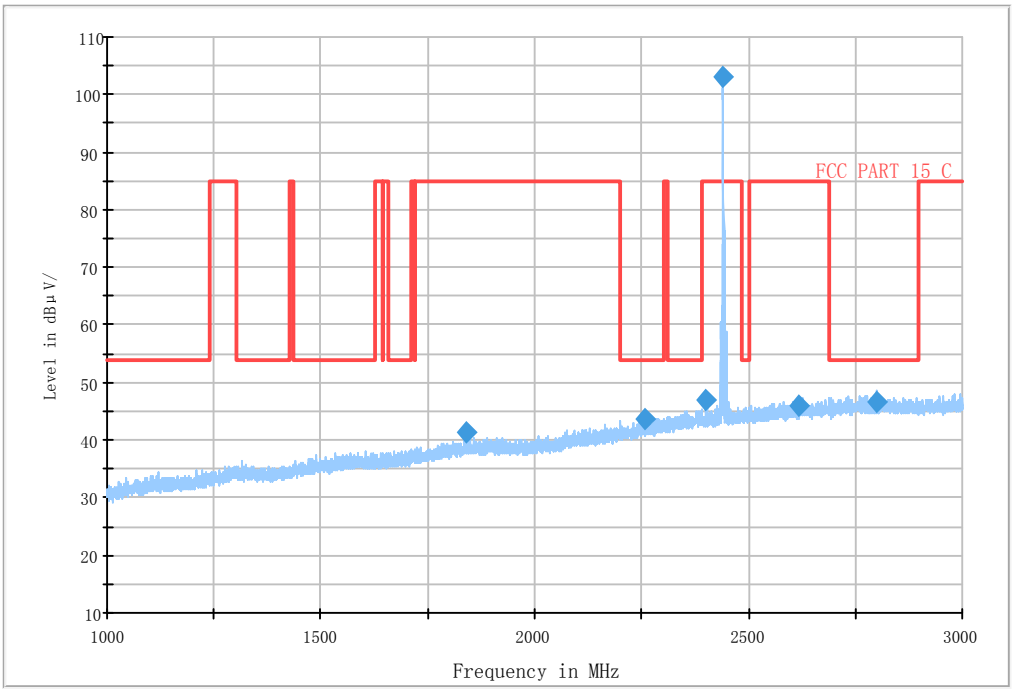
GFSK DH5 Channel 0 3G-18GHz

RE 30MHz-1GHz H



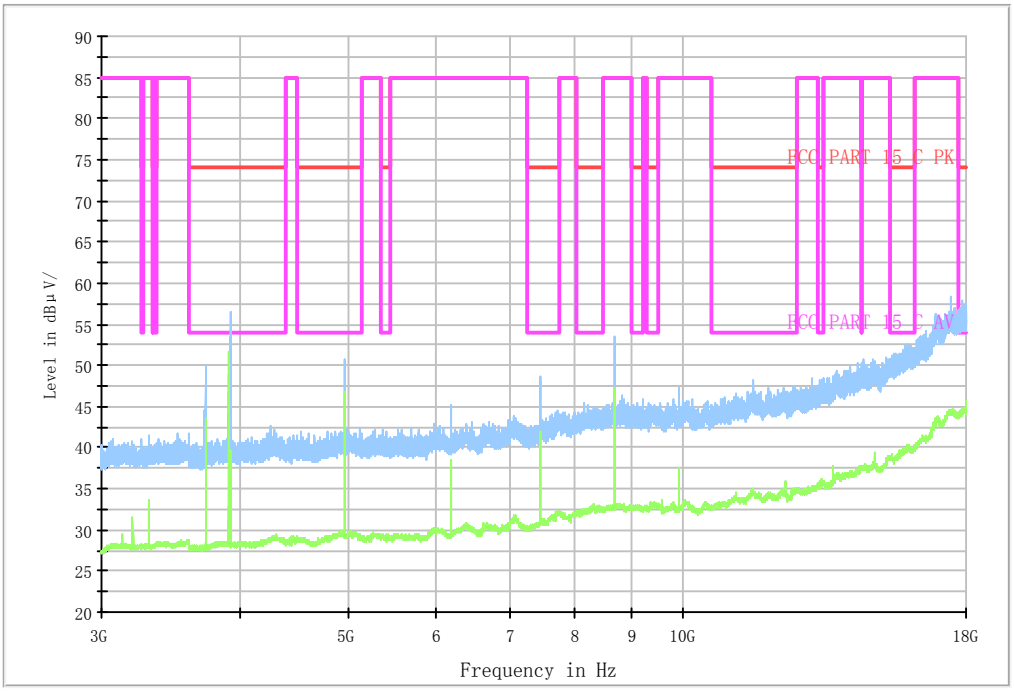
GFSK DH5 Channel 39 30MHz-1GHz

RE 1GHz-3GHz



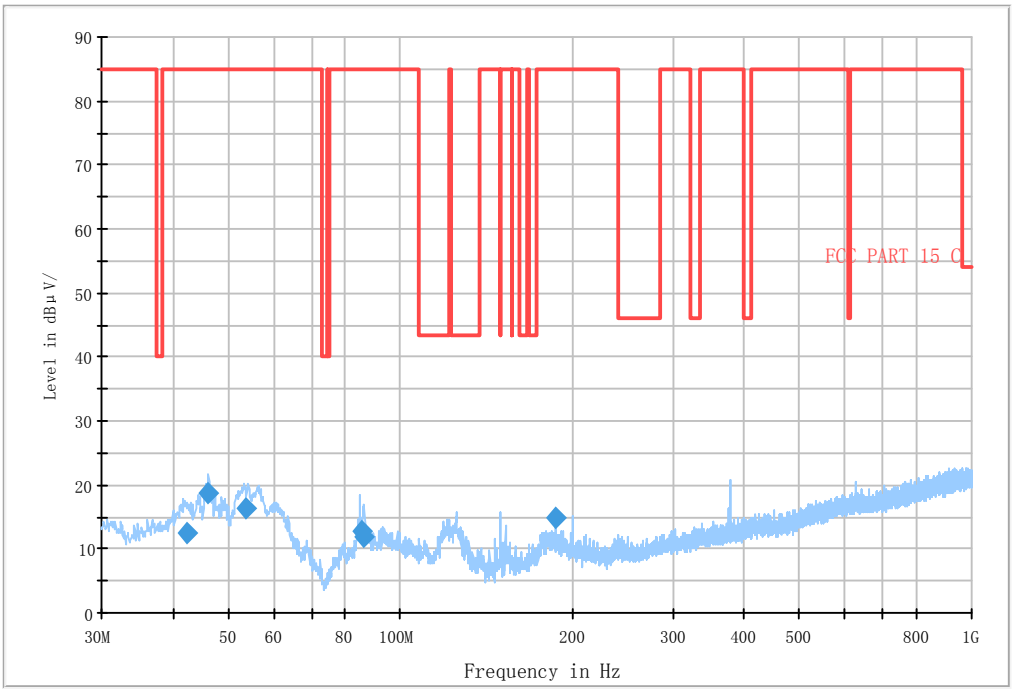
GFSK DH5 Channel 39 1-3GHz

RE 3GHz-18GHz



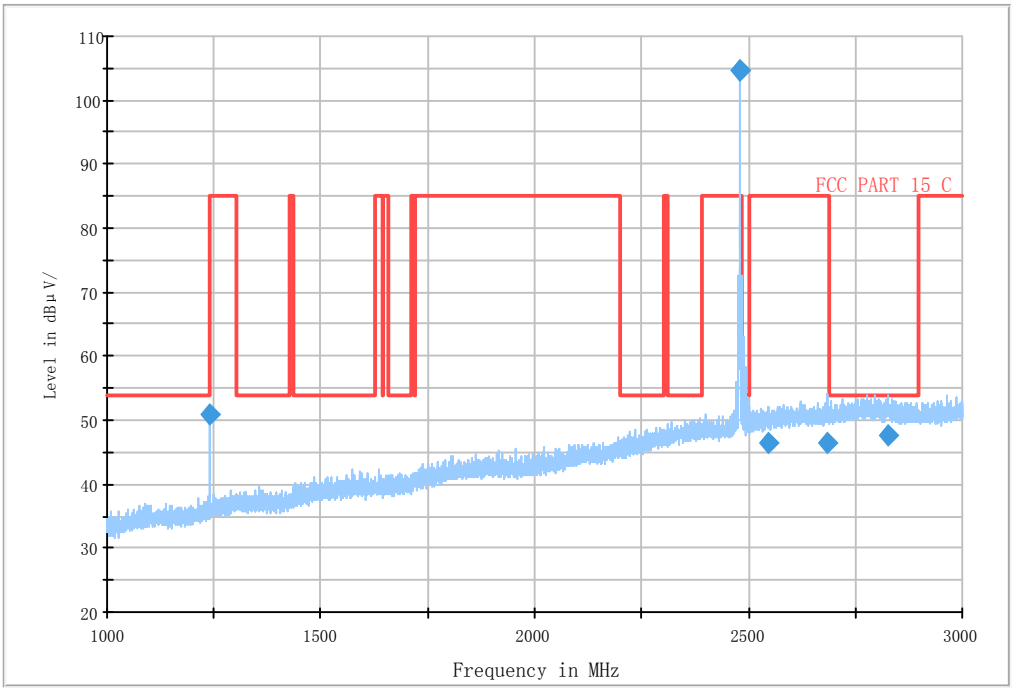
GFSK DH5 Channel 39 3-18GHz

RE 30MHz-1GHz H



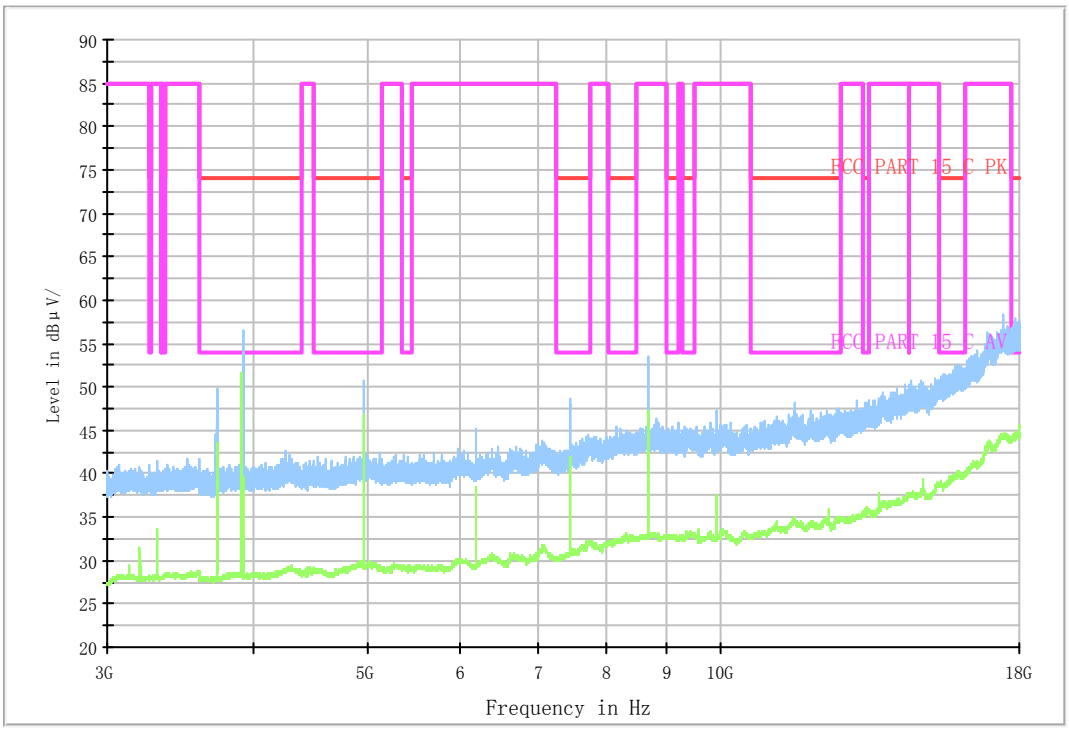
GFSK DH5 Channel 78 30MHz-1GHz

RE 1GHz-3GHz

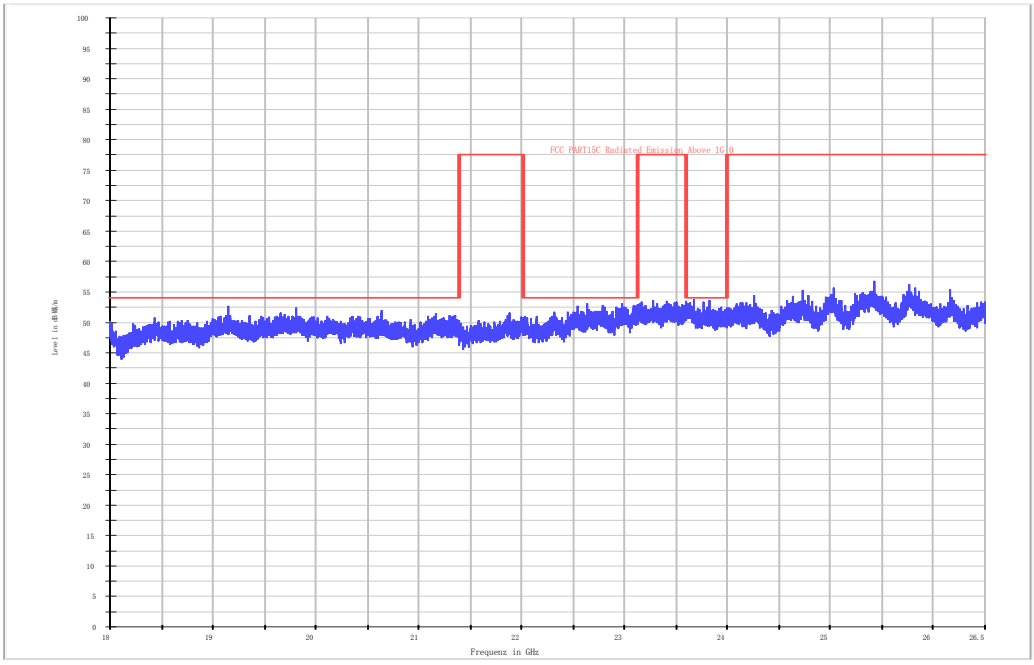


GFSK DH5 Channel 78 1-3GHz

RE 3GHz-18GHz



GFSK DH5 Channel 39 3-18GHz



GFSK DH5 all channels

Test photo

See the Pic1- Pic 3 in document" Ilium X100_Wifi_BT Test Setup Photos_Rev1"

4.8 Power line Conducted Emissions

Specifications:	ANSI C63.4 voltage mains test
Date of Test	2015-02-13
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Operation Mode	Hopping
Test Results:	Pass

Test equipment Used:

Asset Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
7805	EMI Test Receiver	R/S	ESIB26	100211	2016-01-12	Normal
7330	Artificial Mains Network	R/S	ESH2-Z5	837480/002	2016-01-08	Normal
714	Shielding Room	ETS	--	19003	2015-11-16	Normal
7330	BLUETOOTH TESTER	R/S	CBT	100657	2016-01-28	Normal

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Limits of the conducted disturbance at the AC mains ports:

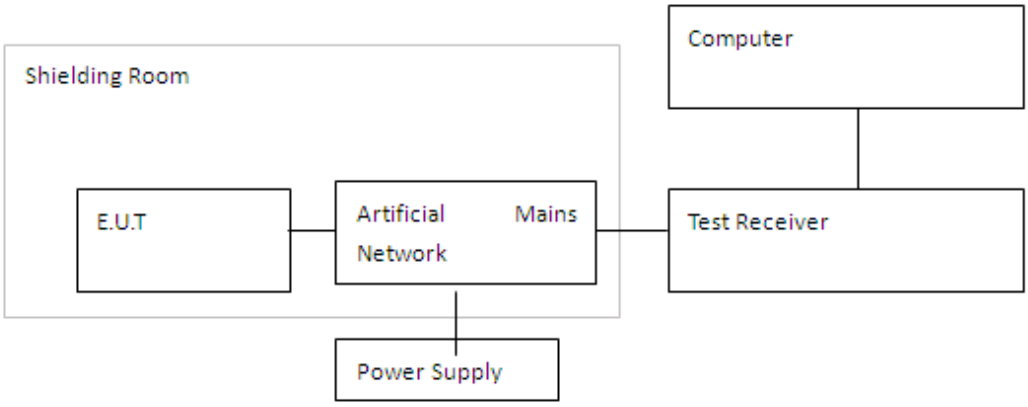
Frequency range	Limit(Quasi-peak)	Limit(Average)
0.15 MHz to 0.5 MHz	66 dBμV - 56 dBμV	56 dBμV - 46 dBμV
>0.5 MHz to 5MHz	56 dBμV	46 dBμV
>5 MHz to 30 MHz	60 dBμV	50 dBμV
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Setup

The EUT was placed in a shielding room. The BLUETOOTH TESTER was used to set the TX channel and power level. The ac adapter output is connected to Receiver through an AMN (Artificial Mains Network).

CTTL Test Report



TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors - Quasi Peak and Average Detector.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.4-2003.

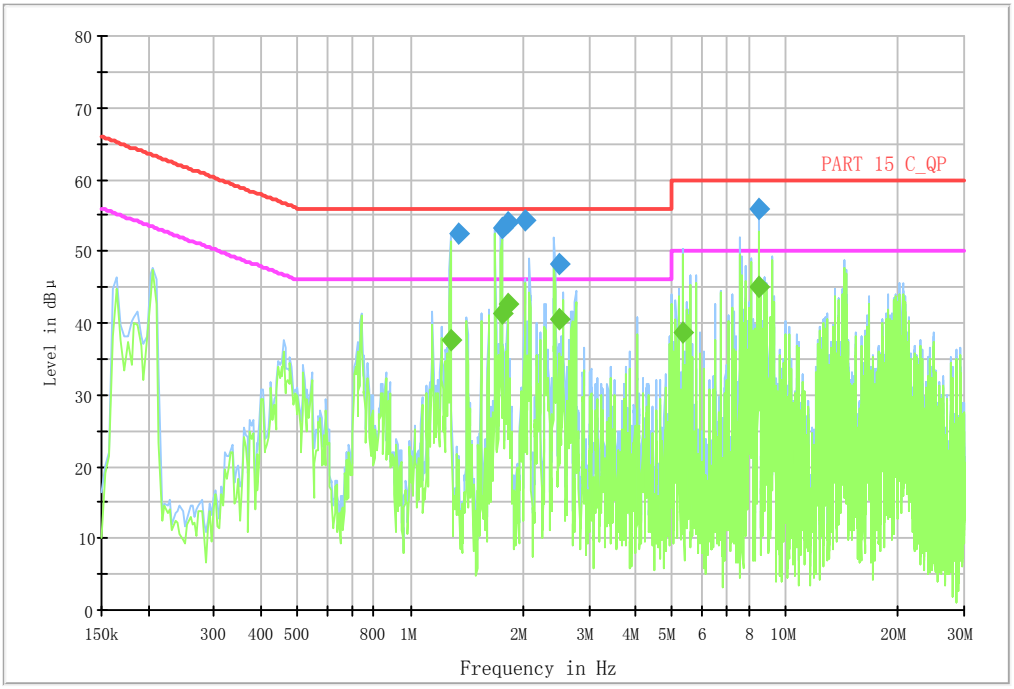
Test Result:

Line L&N					
Detector (QP)	Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Line	PE
QP	1.346838	52.4	56.0	L	FLO
QP	1.751544	53.4	56.0	L	FLO
QP	1.818706	54.1	56.0	L	FLO
QP	2.020788	54.2	56.0	L	FLO
QP	2.492331	48.3	56.0	L	FLO
QP	8.487344	56.0	60.0	L	FLO

Line L&N					
Detector (AV)	Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Line	PE
AV	1.278838	37.7	46.0	L	FLO
AV	1.751544	41.3	46.0	L	FLO
AV	1.818706	42.6	46.0	L	FLO
AV	2.492331	40.5	46.0	L	FLO
AV	5.321512	38.8	50.0	L	FLO
AV	8.487344	45.0	50.0	L	FLO

CTTL Test Report

CISPR N&L1 Voltage 150k to 30MHz-Class B



Line L &Line N

Test photo

See the Pic4 in document" Ilium X100_Wifi_BT Test Setup Photos_Rev1".

CTTL Test

Annex A External Photos

See the document"Ilium X100-External Photos".

Annex B Internal Photos

See the document"Ilium X100-Internal Photos".

ANNEX C Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

The End of this Report

CTTL Test Report