

TEST REPORT

REPORT NUMBER: B15X50050-FCC-BT_Rev2

ON

Type of Equipment: Ilium X400 Smart Phone

Type of Designation: Ilium X400

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

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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 09, 2015

Signature

He Guili **Director**



Equipment: Ilium X400

REPORT NO.:B15X50050-FCC-BT_Rev2

FCC ID: ZC4X400

Report Date: 2015-04-09

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 C63.4-2014 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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Equipment: Ilium X400

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1.2 Testers

Name: Li Guoqing

Position: Engineer

Department: Department of EMC test

Date: 2015-04-09

Signature: 李国庆

Editor of this test report:

Name: Li Guoqing

Position: Engineer

Department: Department of EMC test

Date: 2015-04-09

Signature: 季国庆

Technical responsibility for area of testing:

Name: Zou Dongyi

Position: Manager

Department: Department of EMC test

Date: 2015-04-09

Signature:

都长城



Equipment: Ilium X400 REPORT NO.:B15X50050-FCC-BT_Rev2

1.3 Testing Laboratory information

	Location
T.O.T	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: -----



Equipment: Ilium X400

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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



Equipment: Ilium X400 REPORT NO.:B15X50050-FCC-BT_Rev2

2 Test Item

2.1 General Information

Manufacturer: Shenzhen fortuneship technology, LTD

Name: Ilium X400 Smart Phone

Model Number: Ilium X400

Serial Number: ---

Production Status: Production
Receipt date of test item: 2015-02-02

2.2 Outline of EUT

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

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	Туре	Serial No.	Remarks
А	Mobile phone	Shenzhen fortuneship technology, LTD	Ilium X400	1	None
В	Battery	None	None		None
С	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: no	one	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \



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4 Test Results

4.1 Peak power

Specifica	ations:	15.247 (b)(3)(i),(ii)and(iii)						
Date of 1	Гests	2015-03-30	2015-03-30					
Test con	ditions:	Ambient Ten	Ambient Temperature:15℃-35℃					
		Relative Hun	nidity:30%-60%	ó				
		Air pressure:	: 86-106kPa					
Operatio	n Mode	Fix channel transmit						
Test Res	ults:	Pass			0			
Test equ	ipment Used:					7		
Asset	Description	Manufacturer	Model Number	Serial Number	Cal Due	State		
Number	Description	Planulacturei Piouei Number Serial Number Cal Due State						
1	Spectrum Analyzer	R/S FSQ26 201137/026 2016-03-05 Normal						
2	Wireless Connectivity Test Set	R/S	CMW500	152395	2016-01-28	Normal		

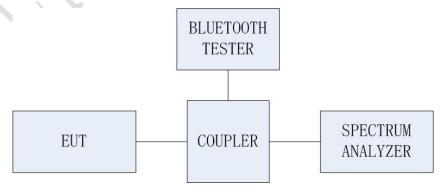
LIMIT

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 C63.10-2013.

Test Results:

GFSK:

channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Low: 0	2401.79808	3.24	30	Pass
Middle: 39	2440.66827	3.66	30	Pass
High: 78	2479.69712	4.27	30	pass

Pi/4 DQPSK:

channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Low: 0	2402.00000	2.48	30	Pass
Middle: 39	2441.01442	2.86	30	Pass
High: 78	2479.76923	3.55	30	pass

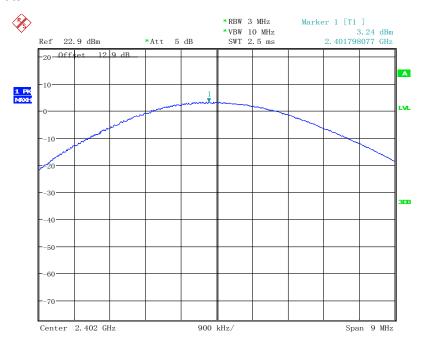
8DPSK:

channel Frequency (MHz)		Output Power (dBm)	Limit (dBm)	Result
Low: 0	2401.95673	2.64	30	Pass
Middle: 39	2440.99038	3.08	30	Pass
High: 78	2479.89904	3.75	30	pass



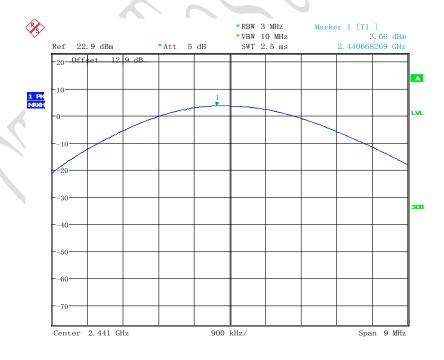
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Test plots:



Date: 30.MAR.2015 15:59:55

GFSK Channel 0



Date: 30.MAR.2015 15:59:28

GFSK Channel 39

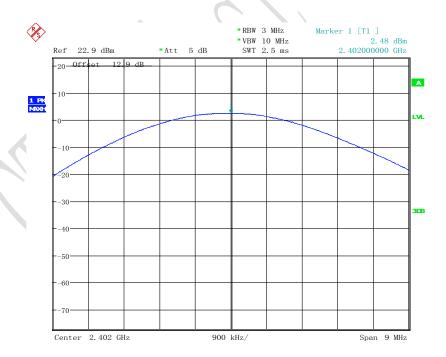


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Date: 30.MAR.2015 16:00:13

GFSK Channel 78

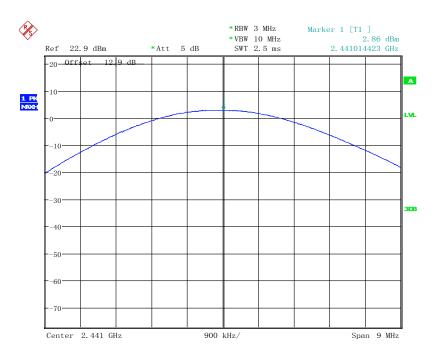


Date: 30.MAR.2015 16:02:51

Pi/4 DQPSK Channel 0

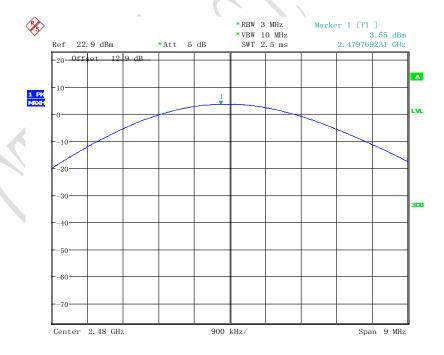


REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 30.MAR.2015 16:01:22

Pi/4 DQPSK Channel 39

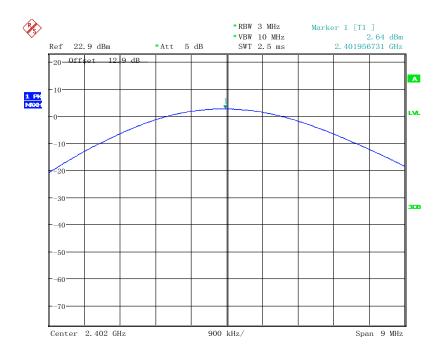


Date: 30.MAR.2015 16:01:01

Pi/4 DQPSK Channel 78

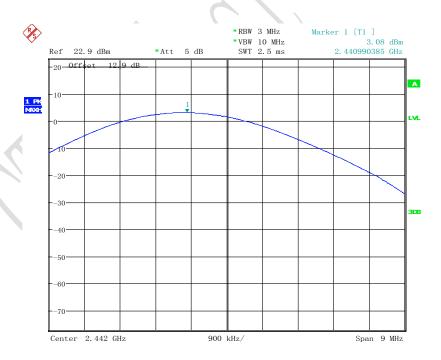


REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 30.MAR.2015 16:03:27

8DPSK Channel 0

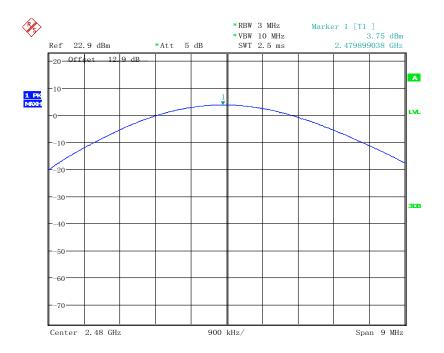


Date: 30.MAR.2015 16:03:57

8DPSK Channel 39



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Date: 30.MAR.2015 16:04:19

8DPSK Channel 78

EMI Test Receiver

Wireless Connectivity Test

Set



FCC Parts 15 subpart C, ANSI C63.10-2013, FCC DA 00-705 Equipment: Ilium X400

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2016-03-05

2016-01-28

Normal

Normal

100350

152395

4.2 Band edges

Specifica	tions:	15.247 (d)	15.247 (d)				
Date of 1	ests	2015-03-30~	2015-03-30~2015-04-09				
Test con	ditions:	Ambient Tem	Ambient Temperature:15°C-35°C				
		Relative Hum	Relative Humidity:30%-60%				
		Air pressure:	Air pressure: 86-106kPa				
Operatio	n Mode	Maximum tra	Maximum transmit				
Test Res	ults:	Pass	Pass				
Test equ	Test equipment Used:						
Asset	Description	Manufacturer	Model Number	Serial Number Cal Due State			

LIMIT

Number

2

Standard		Limited(dBuV/m)
ECC 47 CEP Post 15 247(d)		Peak	74
FCC 47 CFR Part 15.247(d)	~	Average	54

ESU40

CMW500

Test Setup:

The measurement is according to ANSI C63.10 clause11.13.

R/S

R/S

- Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.
- 2. Reference level offset: Corrected for gains and losses of test antenna factor, preamp gain and cable loss, so as to indicate field strength, in units of dB μ V/m at 3 m, directly on the instrument display. Alternatively, the reference level offset may be set to zero and calculations shall be provided showing the conversion of raw measured data to thefield strength in dB μ V/m at 3 m.
- 3. Reference level: As required to keep the signal from exceeding the maximum spectrum analyzer input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2..
- 4. Attenuation: Auto (at least 10 dB preferred).
- 5. Sweep time: Coupled.
- 6. Resolution bandwidth: Above 1 GHz: 1 MHz
- 7. Video bandwidth: VBW for Peak, Quasi-peak, or Average Detector Function: $3 \times RRW$
- 8. Detector (unless specified otherwise): Peak and average above 1 GHz
- 9. Trace: Max hold for final measurement; a combination of two traces, clear-write and max hold, is recommended for maximizing the emission.



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GFSK

Channel		Conclusion		
0	Peak	2338.412MHz	50.549	Dage
0	Average	2338.412MHz	40.456	Pass
70	Peak	2483.500MHz	40.398	Dage
78	Average	2483.500MHz	31.182	Pass

Pi/4 DQPSK

Channel		Conclusion		
0	Peak	2338.357MHz	50.798	Dage
0	Average	2338.346 MHz	40.750	Pass
70	Peak	2483.472 MHz	42.284	Pass
78	Average	2483.500 MHz	31.182	Pd55

8DPSK

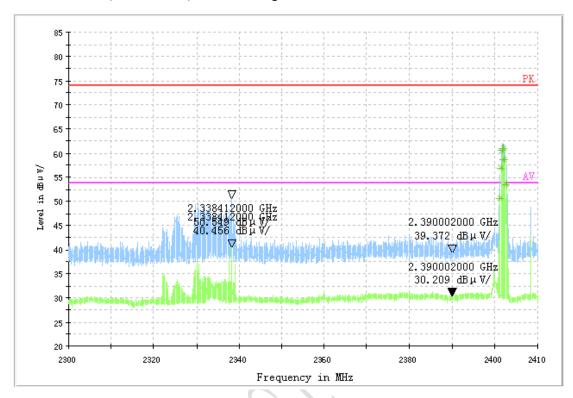
Channel	-	Conclusion		
0	Peak	2338.357 MHz	50.798	Dage
0	Average	2338.346 MHz	40.750	Pass
78	Peak	2483.540 MHz	42.128	Pass
/6	Average	2483.500 MHz	31.182	rass



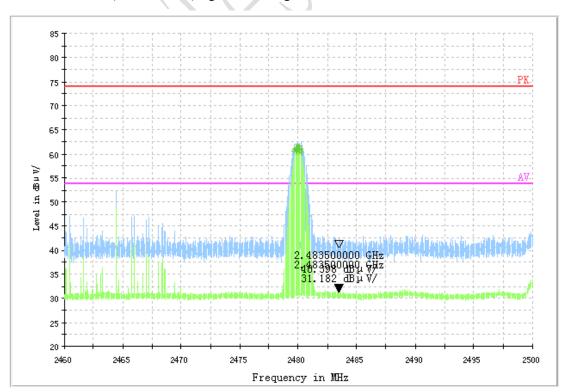
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Test plots:

GFSK Channel 0, fixed mode, left band-edge



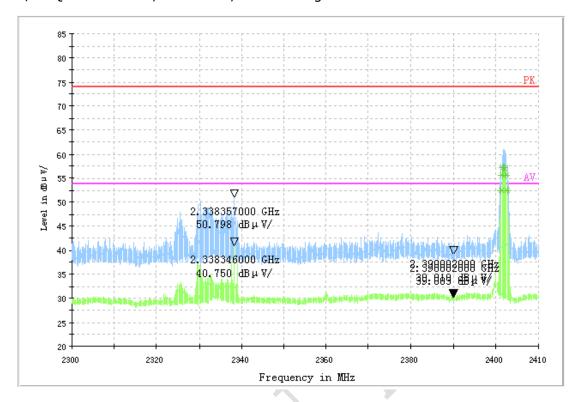
GFSK Channel 78, fixed mode, right band-edge



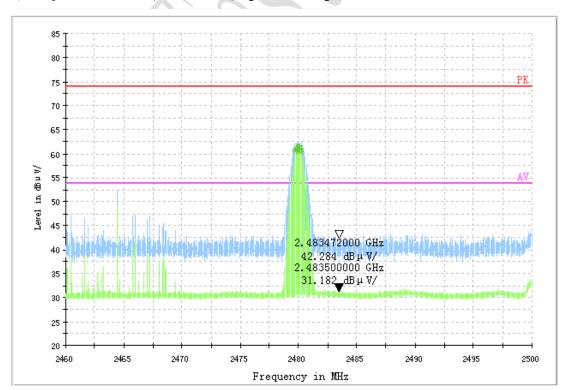


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Pi/4 DQPSK Channel 0, fixed mode, left band-edge



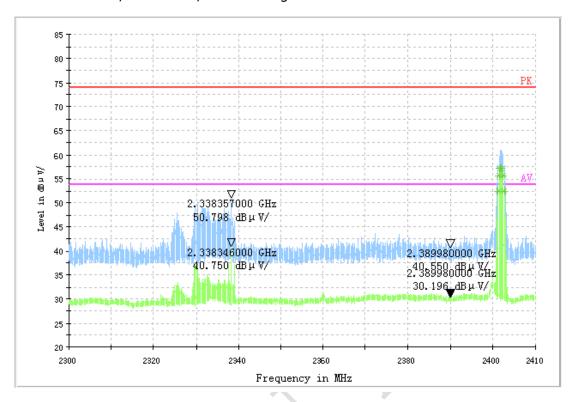
Pi/4 DQPSK Channel 78, fixed mode, right band-edge



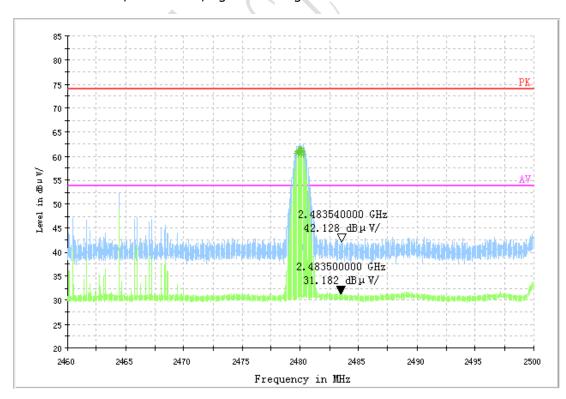


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8DPSK Channel 0, fixed mode, left band-edge



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





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4.3 Frequency separation

Specific	ations:	15.247(a)(1)				
Date of	Test	2015-02-12				
Test con	nditions:	Ambient Temperature:15℃-35℃				
		Relative Humidity:30%-60%				
		Air pressure: 86-106kPa				
Operation	on Mode	maximum transmit				
Test Res	sults:	Pass				
Test equ	ipment Used:				X	
Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
1	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
2	Wireless Connectivity Test Set	Agilent	N4010A	MY52070357	2015-03-05	Normal

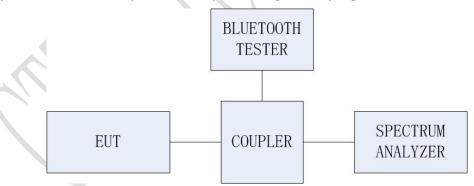
LIMIT

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 C63.10-2013.



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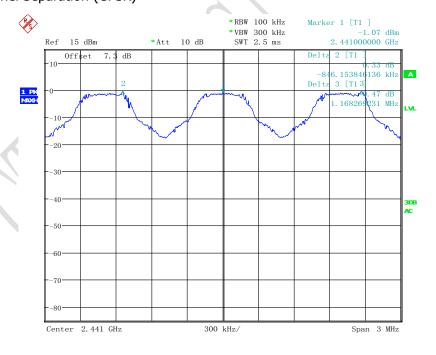
Test Result:

20dBc bandwidth

Channel separation	20dB Bandwidth (kHz)		Limit (kHz)	Result
GFSK				
	Ch 0	947	>25	Pass
846	Ch 39	875	>25	Pass
	Ch 78	875	>25	Pass
Pi/4 DQPSK				
	Ch 0	1224	>25	Pass
863	Ch 39	1268	>25	Pass
	Ch 78	1224	>25	Pass
8DPSK			101	
	Ch 0	1238	>25	Pass
1111	Ch 39	1238	>25	Pass
	Ch 78	1264	>25	Pass

Test plots:

Channel Separation (GFSK)

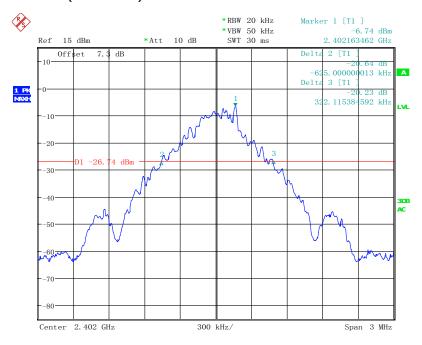


Date: 12.FEB.2015 18:06:38



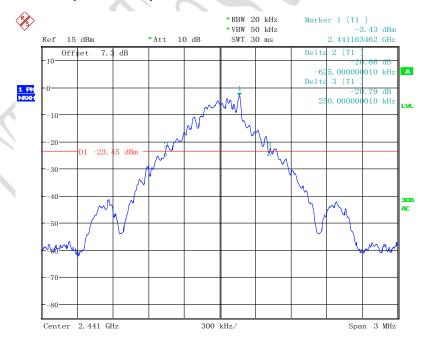
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20dB Bandwidth (GFSK Ch 0)



Date: 12.FEB.2015 17:59:29

20dB Bandwidth (GFSK Ch 39)

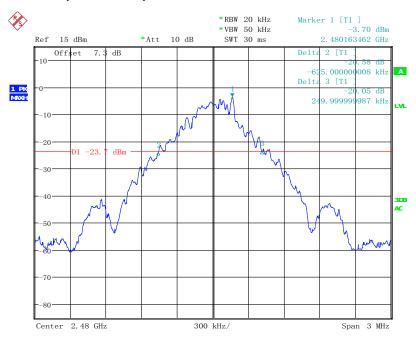


Date: 12.FEB.2015 18:01:05



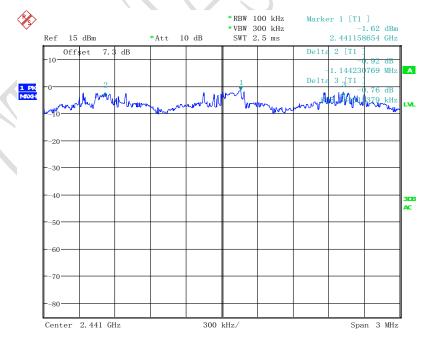
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20dB Bandwidth (GFSK Ch 78)



Date: 12.FEB.2015 18:02:00

Channel Separation (Pi/4 DQPSK)

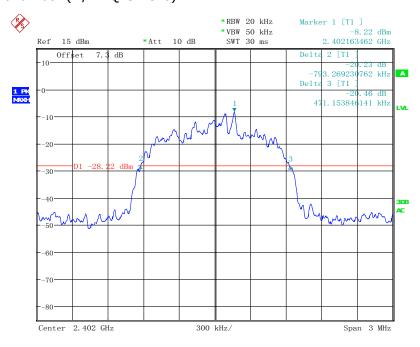


Date: 12.FEB.2015 18:19:58



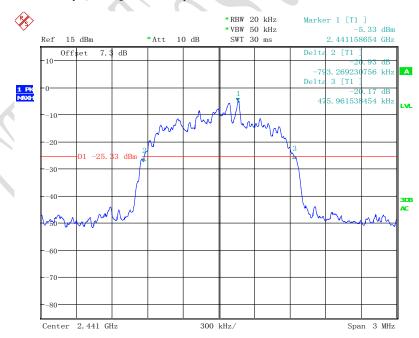
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20dB Bandwidth (Pi/4 DQPSK Ch0)



Date: 12.FEB.2015 18:08:16

20dB Bandwidth (Pi/4 DQPSK Ch39)

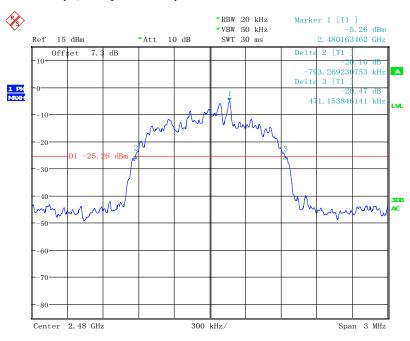


Date: 12.FEB.2015 18:09:22



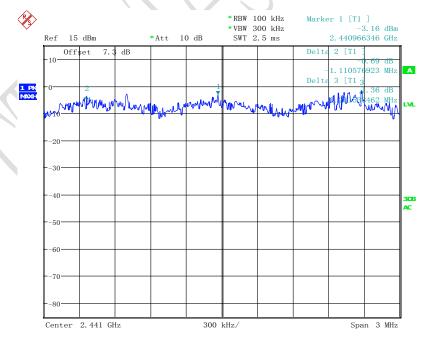
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20dB Bandwidth (Pi/4 DQPSK Ch78)



Date: 12.FEB.2015 18:10:41

Channel Separation (8DPSK)

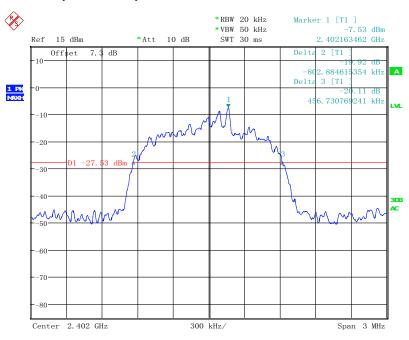


Date: 12.FEB.2015 18:21:52



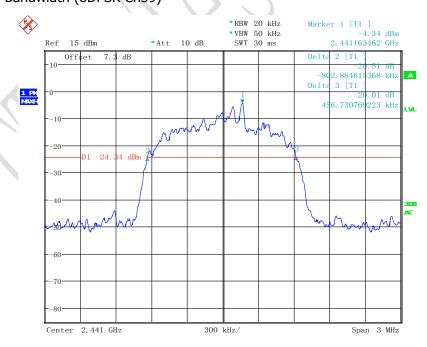
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20dB Bandwidth (8DPSK Ch0)



Date: 12.FEB.2015 18:24:53

20dB Bandwidth (8DPSK Ch39)

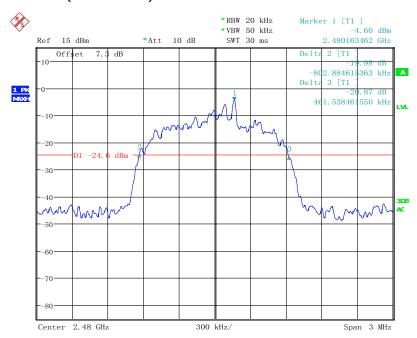


Date: 12.FEB.2015 18:22:55



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20dB Bandwidth (8DPSK Ch78)



Date: 12.FEB.2015 18:23:53



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4.4 Number of hopping frequency

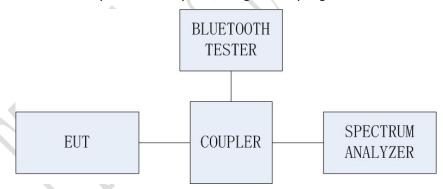
Specifica	ntions:	15.247(a)(1)(ii)			
Date of 1	Test	2015-02-11				
Test con	ditions:	Ambient Temperature:15℃-35℃				
		Relative Humidity:30%-60%				
		Air pressure: 86-106kPa				
Operatio	n Mode	hopping				
Test Res	ults:	Pass				
Test equ	ipment Used:				X	
Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State
1	EMI Test Receiver	R/S	ESU40	100350	2015-03-07	Normal
2	Wireless Connectivity Test	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 C63.10-2013.



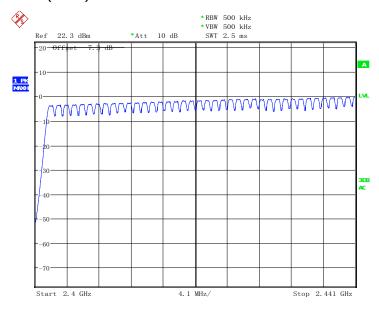
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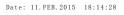
Test Result:

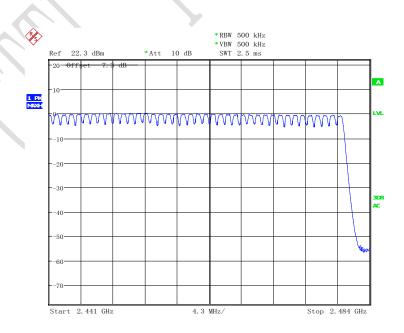
Modulation	No. OF channels	Limit (No. of Ch)	Result
GFSK	79	>75	Pass
Pi/4 DQPSK	79	>75	Pass
8DPSK	79	>75	Pass

Test plot:

Channel Number (GFSK)





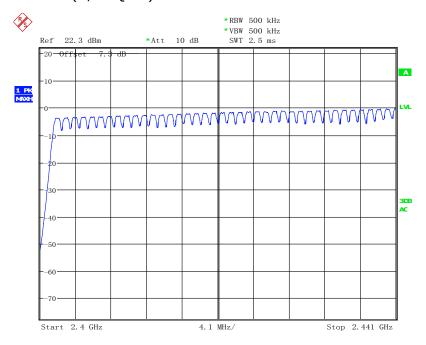


Date: 11.FEB.2015 18:15:11

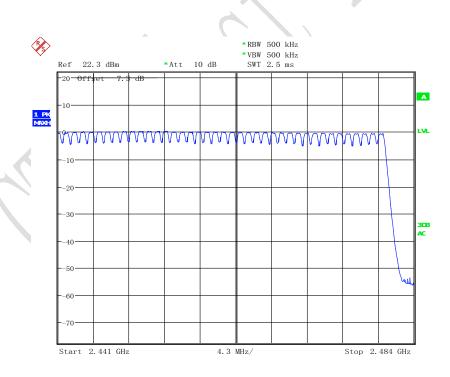


REPORT NO.:B15X50050-FCC-BT_Rev2

Channel Number (Pi/4 DQPSK)



Date: 11.FEB.2015 18:17:12

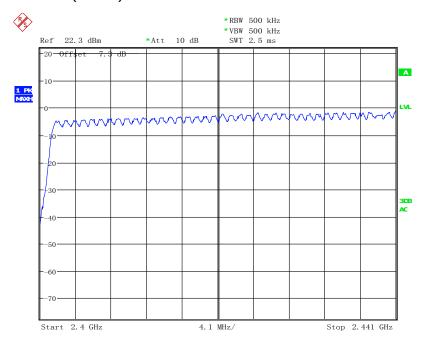


Date: 11.FEB.2015 18:16:26



REPORT NO.:B15X50050-FCC-BT_Rev2

Channel Number (8DPSK)



Date: 11.FEB.2015 18:22:04



Date: 11.FEB.2015 18:26:02



REPORT NO.:B15X50050-FCC-BT_Rev2

4.5 Time of occupancy

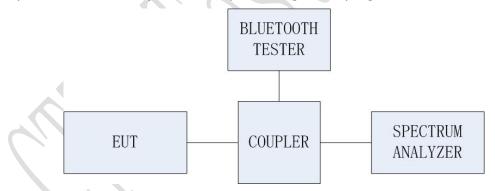
Crocific	otiona	15.247(a)(1)(iii)				
Specific	ations:	15.2 4 /(a)(1)	(111)			
Date of	Test	2015-02-06				
Test con	ditions:	Ambient Temperature:15°C-35°C				
		Relative Humidity:30%-60%				
		Air pressure: 86-106kPa				
Operation	on Mode	Fix channel				
Test Res	sults:	Pass				
Test equ	ipment Used:				X	
Number	Description	Manufacturer Model Number Serial Number Cal Due State				State
1	EMI Test Receiver	R/S ESU40 100350 2015-03-07 Norm			Normal	
2	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 C63.10-2013.

Test Result:



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GFSK DH1:

0.3702*(1600/2)/79*31.6=118ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
0.3702	118	31.6	PASS

GFSK DH3:

1.638*(1600/4)/79*31.6=262ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
1.638	262	31.6	PASS

GFSK DH5:

2.856*(1600/6)/79*31.6=305ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	1//
2.856	305	31.6	PASS

Pi/4 DQPSK 2DH1:

0.3750*(1600/2)/79*31.6=120ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
0.3750	120	31.6	PASS

Pi/4 DQPSK 2DH3:

1.627*(1600/4)/79*31.6=260ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
1.627	260	31.6	PASS

Pi/4 DQPSK 2DH5:

2.853*(1600/6)/79*31.6=304ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
2.853	304	31.6	PASS



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8DPSK 3DH1:

0.3702*(1600/2)/79*31.6=118ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
0.3702	118	31.6	PASS

8DPSK 3DH3:

1.638*(1600/4)/79*31.6=262ms

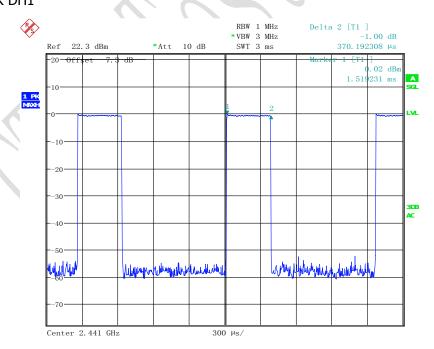
Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
1.638	262	31.6	PASS

8DPSK 3DH5:

2.888*(1600/6)/79*31.6=308ms

Pulse	Total	Period	result
time[ms]	dwell[ms]	time[s]	
2.888	308	31.6	PASS

Test data: GFSK DH1

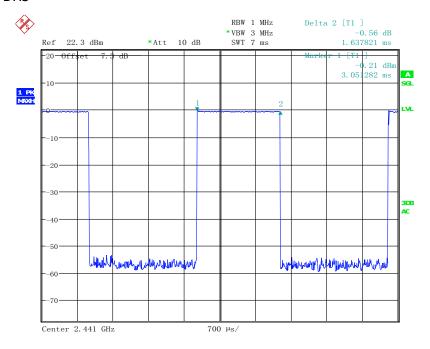


Date: 11.FEB.2015 18:57:01



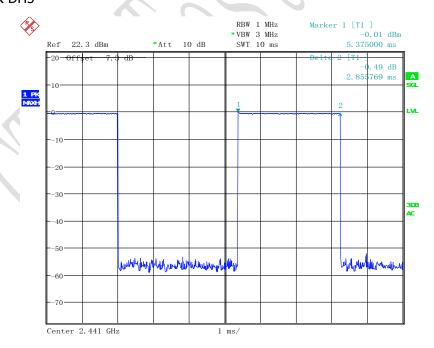
REPORT NO.:B15X50050-FCC-BT_Rev2

GFSK DH3



Date: 11.FEB.2015 18:58:03

GFSK DH5

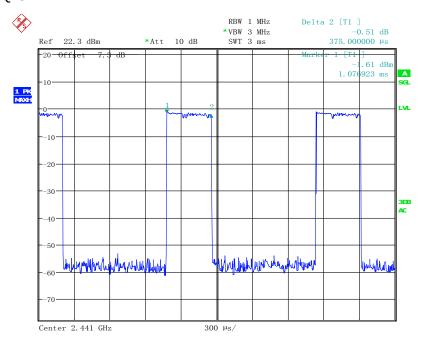


Date: 11.FEB.2015 18:58:50



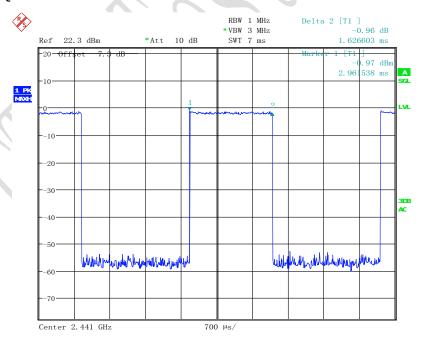
REPORT NO.:B15X50050-FCC-BT_Rev2

Pi/4 DQPSK 2DH1



Date: 11.FEB.2015 18:53:21

Pi/4 DQPSK 2DH3

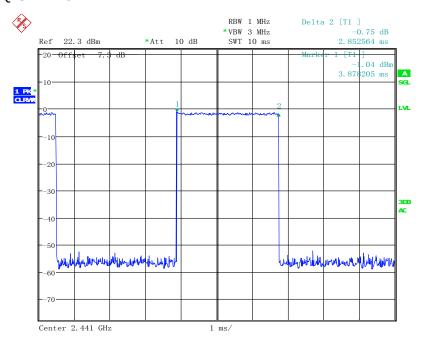


Date: 11.FEB.2015 18:52:29



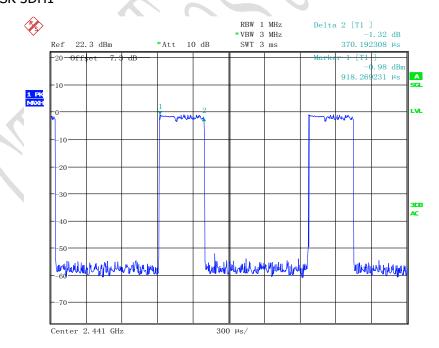
REPORT NO.:B15X50050-FCC-BT_Rev2

Pi/4 DQPSK 2DH5



Date: 11.FEB.2015 18:51:31

8DPSK 3DH1

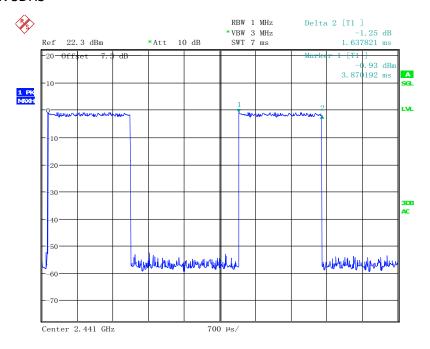


Date: 11.FEB.2015 18:54:04



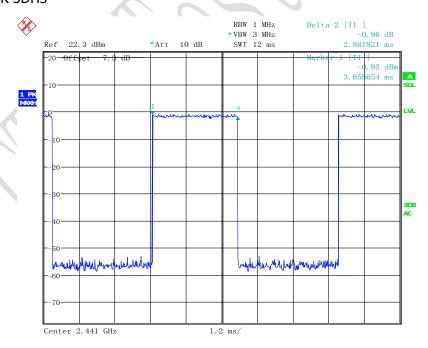
REPORT NO.:B15X50050-FCC-BT_Rev2

8DPSK 3DH3



Date: 11.FEB.2015 18:54:48

8DPSK 3DH5



Date: 11.FEB.2015 18:55:19



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4.6 Spurious Measurement (Conducted)

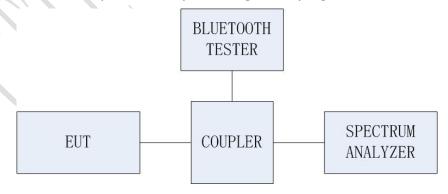
Specific	ations:	15.209(a) ar	15.209(a) and 15.205(a)				
Date of	Test	2015-02-12					
Test con	nditions:	Ambient Temperature:15℃-35℃					
		Relative Humidity:30%-60%					
		Air pressure: 86-106kPa					
Operation	on Mode	Fix channel transmit					
Test Res	sults:	Pass					
Test equ	ipment Used:				X		
Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State	
1	EMI Test Receiver	R/S ESU40 100350 2015-03-07				Normal	
2	Wireless Connectivity Test Set	Agilent N4010A MY52070357 2015-03-				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



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channels.

The measurement is made according to Public notice FCC Public Notice DA 00-705, March 2000, and ANSI C63.10-2013.

Test Result:

GFSK

Channel	Frequency Range	Results		
	Center Frequency	Pass		
	30 MHz - 1 GHz	Pass		
0	1 GHz - 3 GHz	Pass		
	3 GHz - 10 GHz	Pass		
	10 GHz - 26.5 GHz	Pass		
	Center Frequency	Pass		
	30 MHz - 1 GHz	Pass		
39	1 GHz - 3 GHz	Pass		
	3 GHz - 10 GHz	Pass		
	10 GHz - 26.5 GHz	Pass		
	Center Frequency	Pass		
	30 MHz - 1 GHz	Pass		
78	1 GHz - 3 GHz	Pass		
	3 GHz - 10 GHz	Pass		
411	10 GHz - 26.5 GHz	Pass		

Pi/4 DQPSK

Channel	Frequency Range	Results
	Center Frequency	Pass
	30 MHz - 1 GHz	Pass
0	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



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

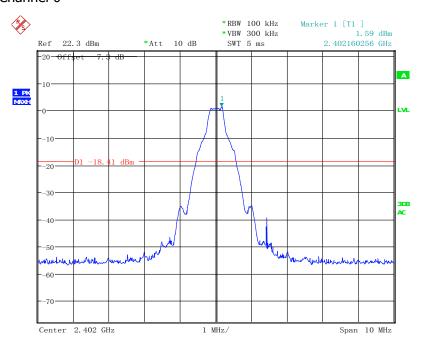
8DPSK

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

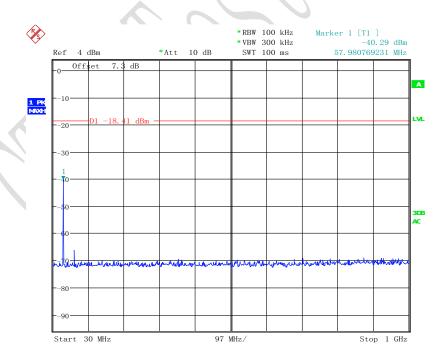


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Test plots: GFSK Channel 0



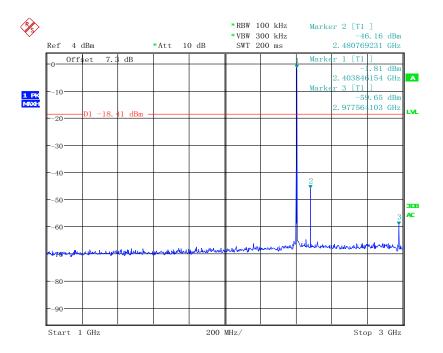
Date: 12.FEB.2015 10:51:31



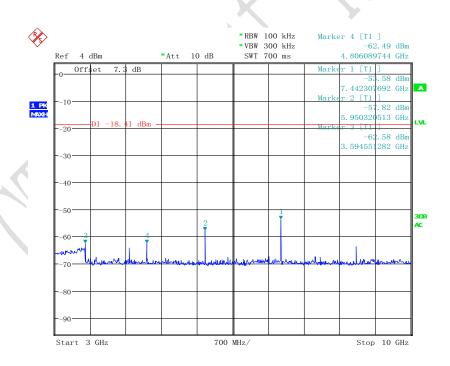
Date: 12.FEB.2015 10:52:44



REPORT NO.:B15X50050-FCC-BT_Rev2



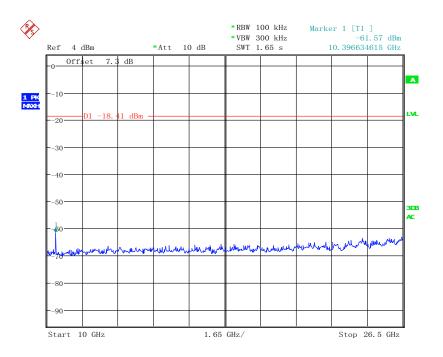
Date: 12.FEB.2015 10:53:33



Date: 12.FEB.2015 10:55:02

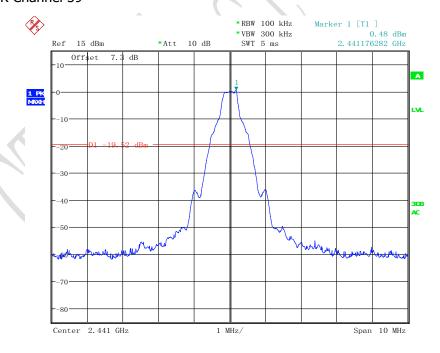


REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 10:56:05

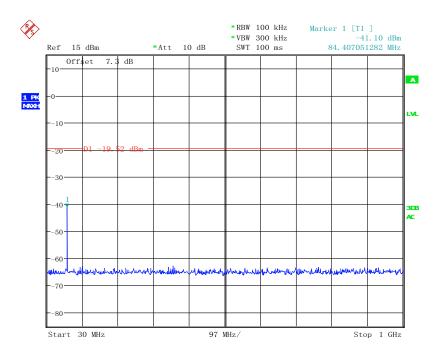
GFSK Channel 39



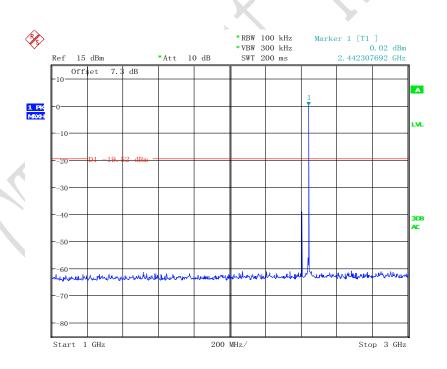
Date: 12.FEB.2015 10:58:58



REPORT NO.:B15X50050-FCC-BT_Rev2



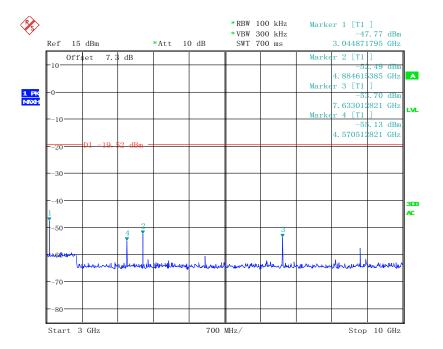
Date: 12.FEB.2015 11:03:07



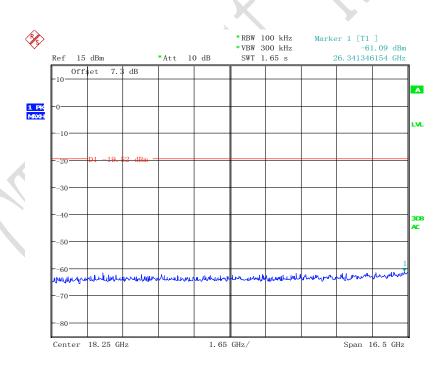
Date: 12.FEB.2015 11:03:37



REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:04:32

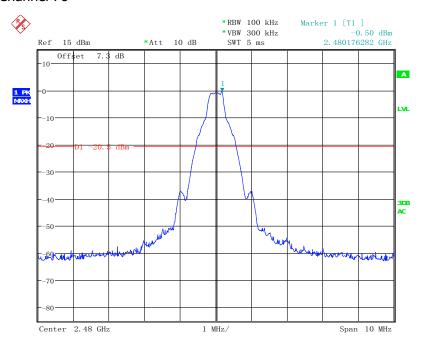


Date: 12.FEB.2015 11:05:16

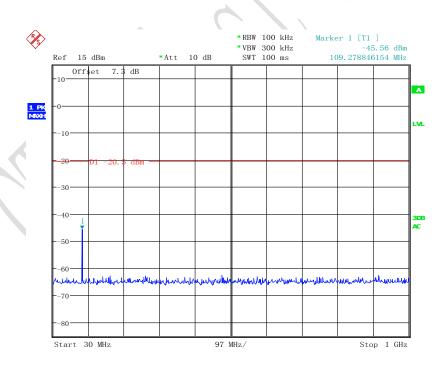


REPORT NO.:B15X50050-FCC-BT_Rev2

GFSK Channel 78



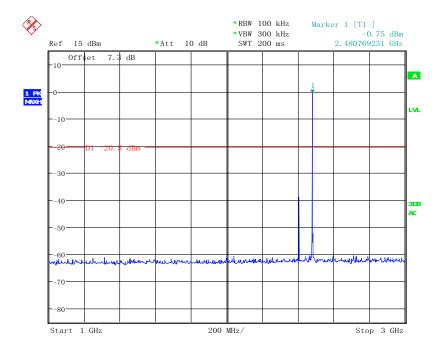
Date: 12.FEB.2015 11:07:40



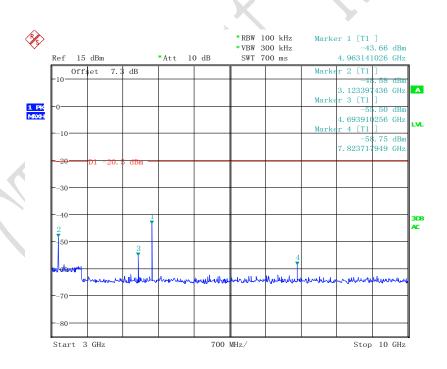
Date: 12.FEB.2015 11:08:12



REPORT NO.:B15X50050-FCC-BT_Rev2



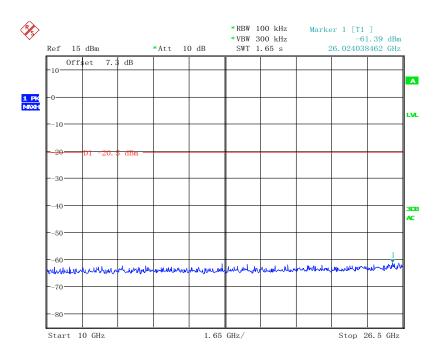
Date: 12.FEB.2015 11:09:24



Date: 12.FEB.2015 11:10:42

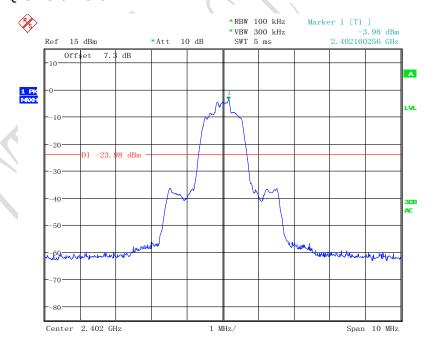


REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:11:43

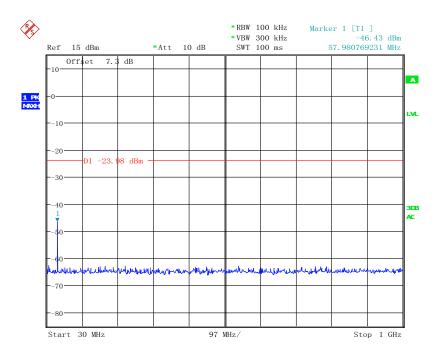
Pi/4 DQPSK Channel 0



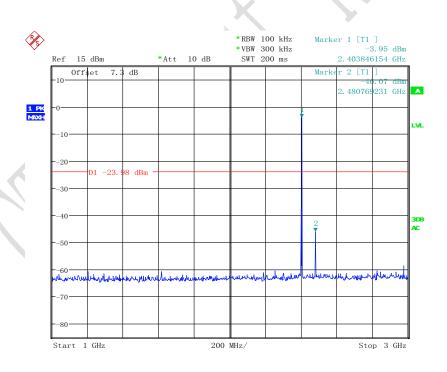
Date: 12.FEB.2015 11:16:36



REPORT NO.:B15X50050-FCC-BT_Rev2



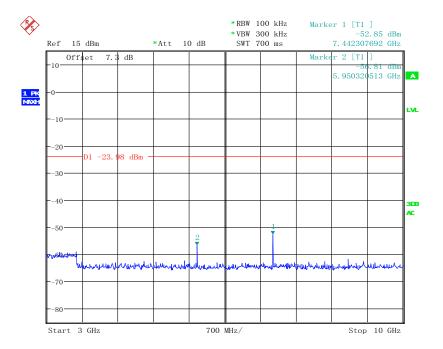
Date: 12.FEB.2015 11:17:23



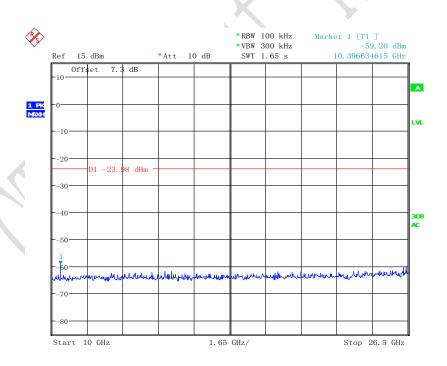
Date: 12.FEB.2015 11:17:49



REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:18:24

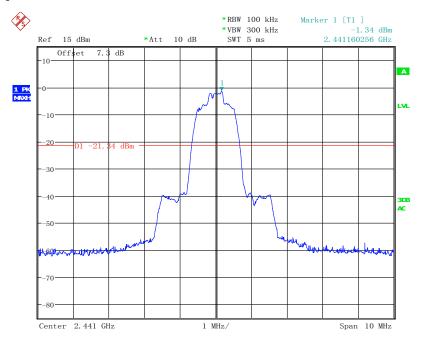


Date: 12.FEB.2015 11:18:57

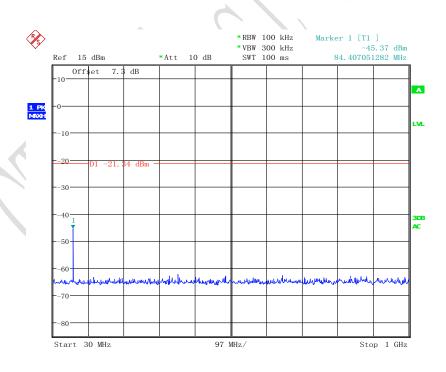


REPORT NO.:B15X50050-FCC-BT_Rev2

Pi/4 DQPSK Channel 39



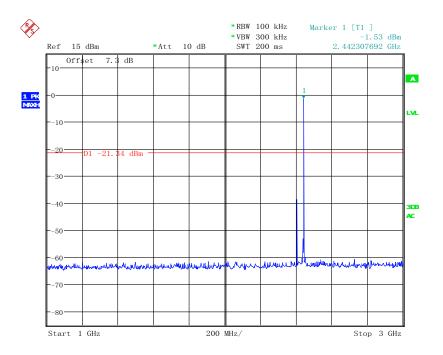
Date: 12.FEB.2015 11:20:01



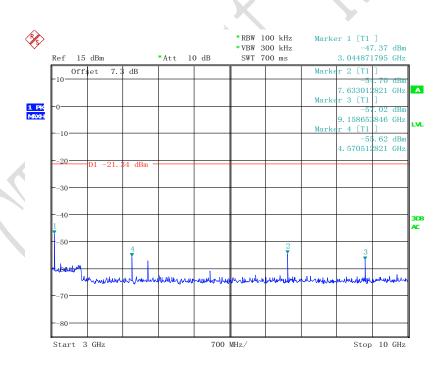
Date: 12.FEB.2015 11:20:24



REPORT NO.:B15X50050-FCC-BT_Rev2



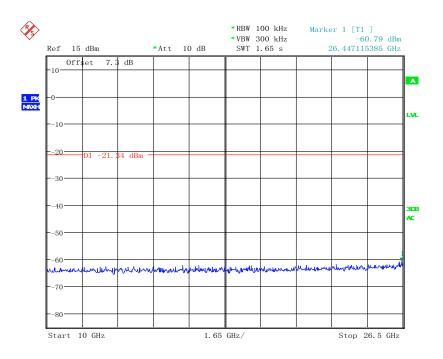
Date: 12.FEB.2015 11:20:51



Date: 12.FEB.2015 11:21:28

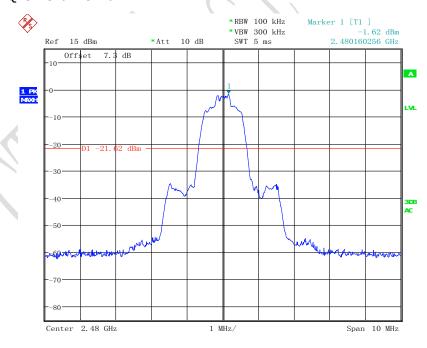


REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:22:00

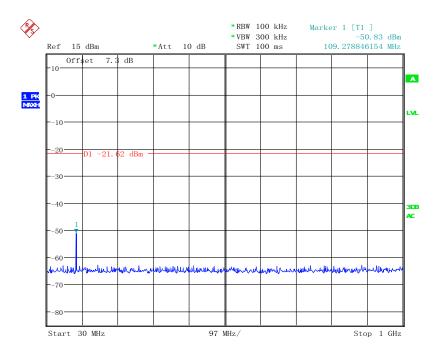
Pi/4 DQPSK Channel 78



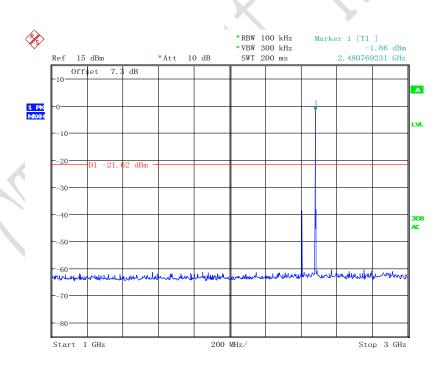
Date: 12.FEB.2015 11:23:49



REPORT NO.:B15X50050-FCC-BT_Rev2



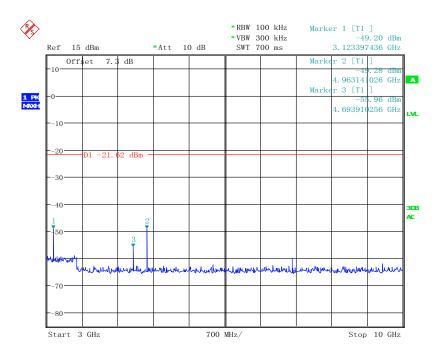
Date: 12.FEB.2015 11:24:14



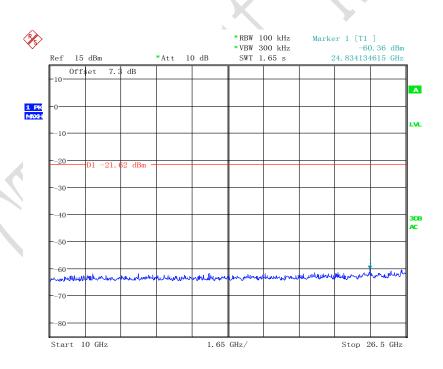
Date: 12.FEB.2015 11:24:41



REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:25:16

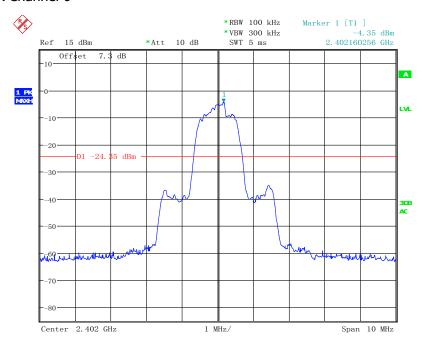


Date: 12.FEB.2015 11:26:15

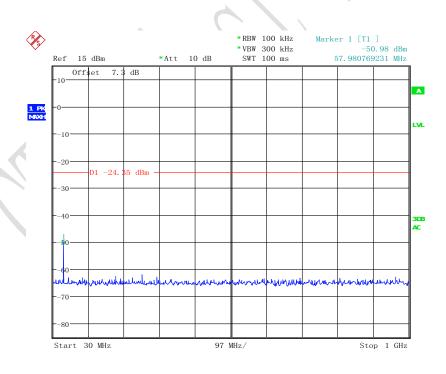


REPORT NO.:B15X50050-FCC-BT_Rev2

8DPSK Channel 0



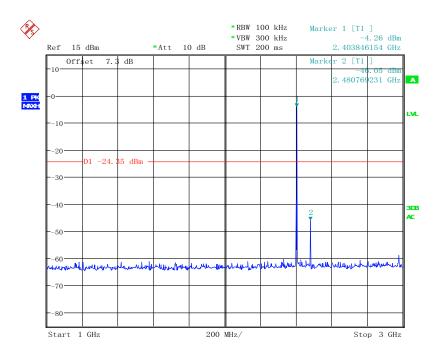
Date: 12.FEB.2015 11:29:20



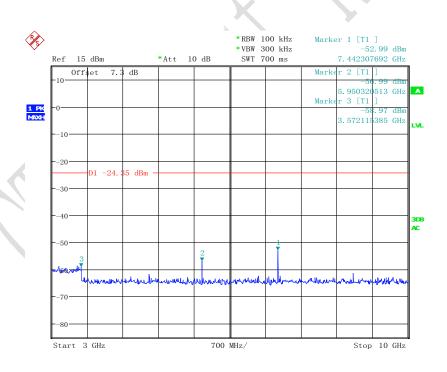
Date: 12.FEB.2015 11:29:44



REPORT NO.:B15X50050-FCC-BT_Rev2



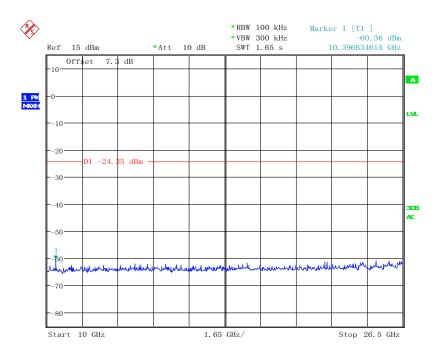
Date: 12.FEB.2015 11:30:12



Date: 12.FEB.2015 11:30:48

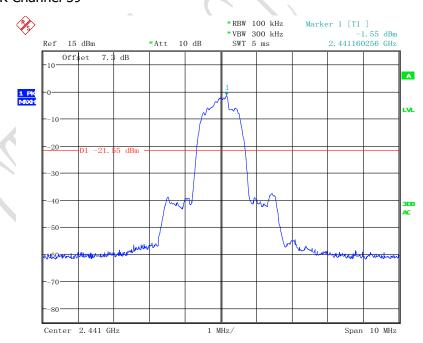


REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:31:22

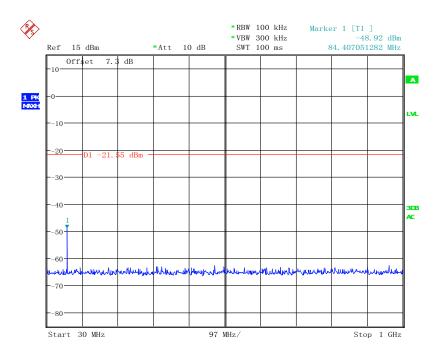
8DPSK Channel 39



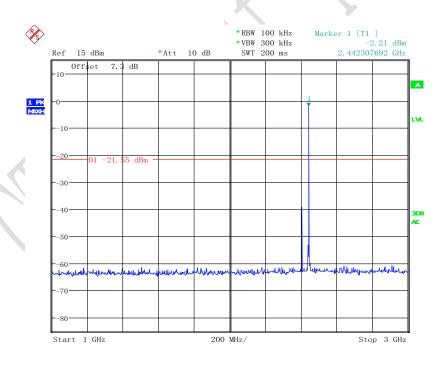
Date: 12.FEB.2015 11:32:32



REPORT NO.:B15X50050-FCC-BT_Rev2



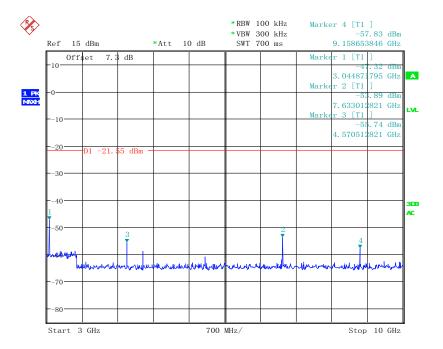
Date: 12.FEB.2015 11:32:49



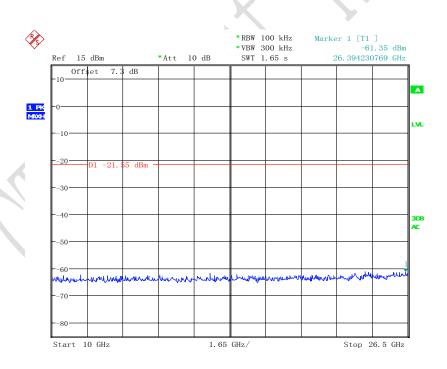
Date: 12.FEB.2015 11:33:13



REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:33:46

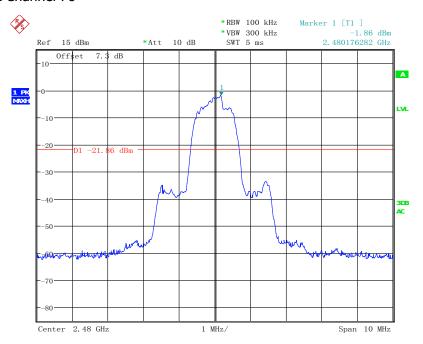


Date: 12.FEB.2015 11:34:20

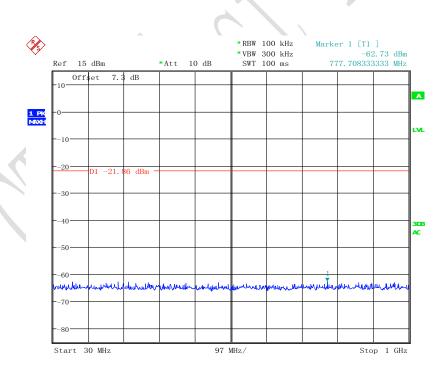


REPORT NO.:B15X50050-FCC-BT_Rev2

8DPSK Channel 78



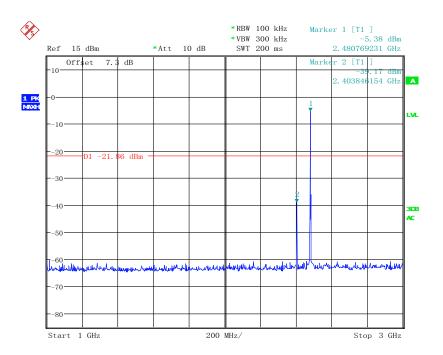
Date: 12.FEB.2015 11:35:34



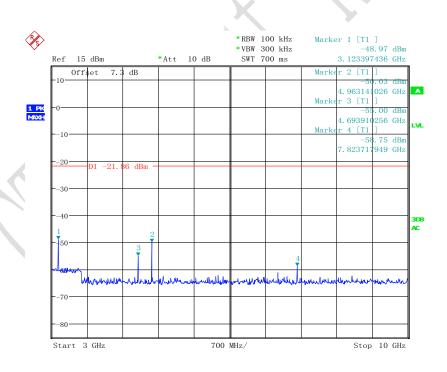
Date: 12.FEB.2015 11:35:57



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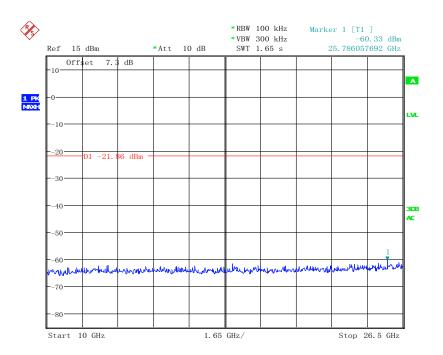
Date: 12.FEB.2015 11:36:20



Date: 12.FEB.2015 11:36:59



REPORT NO.:B15X50050-FCC-BT_Rev2



Date: 12.FEB.2015 11:37:22



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4.7 Radiated Emission Measurement

Specific	ations:	15.209(a) and 15.205(a)					
Date of	Test	2015-02-28					
Test cor	nditions:	Ambient To	emperature:15°C-	-35℃			
		Relative H	umidity:30%-60%	6			
			re: 86-106kPa				
Operation	on Mode	Fix channel transmit					
Test Res		Pass					
Test equipment Used:							
Number	Description	Manufacture r	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	40	2015-08-20	Normal	
3	Wireless Connectivity Test Set	Agilent N4010A MY52070357 2015-03-05 Norm				Normal	
4	Ultra Broadband Antenna	R/S	VULB 9163 vulb9163—544 2015-12-13		2015-12-13	Normal	
5	Double-Ridged Horn	R/S	HF907	100357	2015-12-13	Normal	

Limit:

Antenna

1. 20dBc in any 100 kHz 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

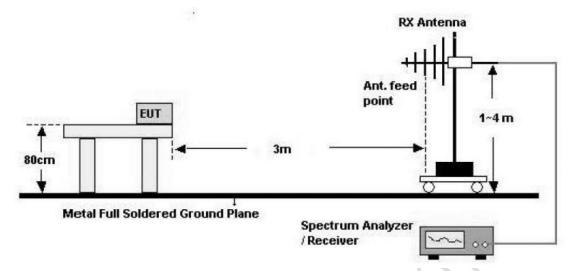
Test Setup

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).

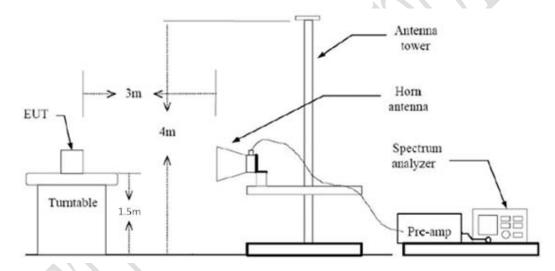
30MHz-1GHz:



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Above 1GHz:



TEST PROCEDURE

- 1. The EUT is placed on a turntable.
- 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 C63.4-2014.



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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
	30MHz – 1GHz	Pass
Channel 0	1 GHz – 3GHz	Pass
	2.38GHz-2.45GHz*	Pass
	3 GHz – 18 GHz	Pass
	30MHz – 1GHz	Pass
	1 GHz – 3GHz	Pass
Channel 39	2.4GHz-2.48GHz*	Pass
	3 GHz – 18 GHz	Pass
A.	30MHz – 1GHz	Pass
Channel 70	1 GHz – 3GHz	Pass
Channel 78	2.45GHz-2.5GHz*	Pass
	3 GHz – 18 GHz	Pass
All channels	18GHz-26.5GHz	Pass

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

Channel 0:

Criainiei (٠.						
Frequency	QuasiPeak	Bandwidth	Height	Polarization	Azimuth	Margin	Limit
(MHz)	(dB µ V/m)	(kHz)	(cm)		(deg)	(dB)	(dB µ V/m)
45.620000	27.7	120.000	115.0	V	187.0	12.3	40.0
176.10000	13.1	120.000	183.0	Н	262.0	30.4	4 3.5
178.20100	12.9	120.000	183.0	Н	262.0	30.6	4 3.5
187.54600	19.0	120.000	183.0	Н	97.0	24.5	43.5
188.57700	17.3	120.000	99.0	Н	97.0	26.2	43.5
288.02000	23.5	120.000	99.0	Н	262.0	22.5	46.0



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Channel 39:

Frequency	QuasiPeak	Bandwidth	Height	Polarization	Azimuth	Margin	Limit
(MHz)	(dB µ V/m)	(kHz)	(cm)		(deg)	(dB)	(dB µ V/m)
45.614000	30.3	120.000	99.0	V	269.0	9.7	40.0
178.60700	14.1	120.000	183.0	Н	269.0	29.4	43.5
182.01400	18.7	120.000	116.0	Н	97.0	14.8	43.5
183.55400	18.0	120.000	183.0	Н	97.0	15.5	43.5
187.15200	18.0	120.000	183.0	Н	97.0	15.5	43.5
187.51300	18.2	120.000	99.0	Н	97.0	15.3	43.5

Channel 78:

Frequency	QuasiPeak	Bandwidth	Height	Polarization	Azimuth	Margin	Limit
(MHz)	(dB µ V/m)	(kHz)	(cm)		(deg)	(dB)	(dB µ V/m)
42.040000	13.8	120.000	99.0	V	277.0	26.2	40.0
42.434000	14.5	120.000	99.0	V	-1.0	25.5	40.0
45.626000	30.1	120.000	99.0	V	277.0	9.9	40.0
178.21300	14.2	120.000	216.0	H	97.0	29.3	43.5
184.43000	17.5	120.000	116.0	H	97.0	26.0	43.5
187.51000	19.1	120.000	183.0	Н	90.0	14.4	43.5

Notes:

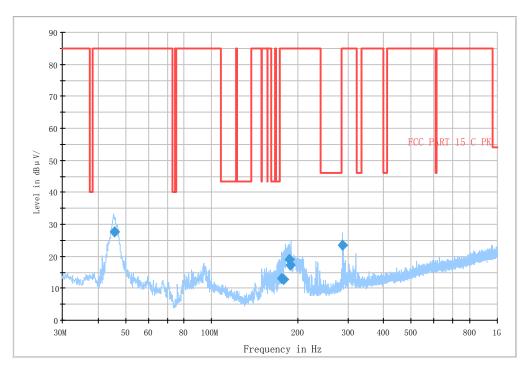
- 1. Radiated emissions were measured with an instrument using Quasi-peak detector mode in frequency range from 30 MHz to 1000MHz, and with peak detector mode in frequency range from 1GHz 26.5 GHz.
- 2 Total dBuV/m = Reading dBuV/m Cable Loss dB + Antenna Gain dB.



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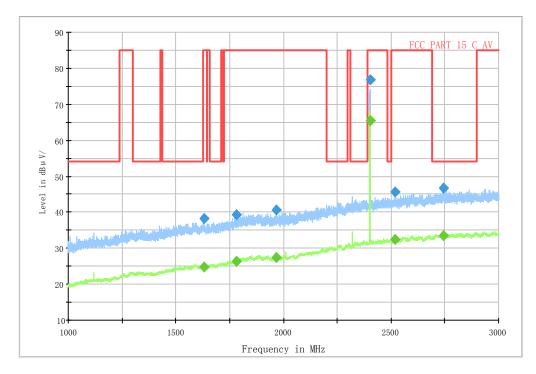
Test Plots:





GFSK DH5 Channel 0 30MHz-1GHz

RE 1GHz-3GHz H

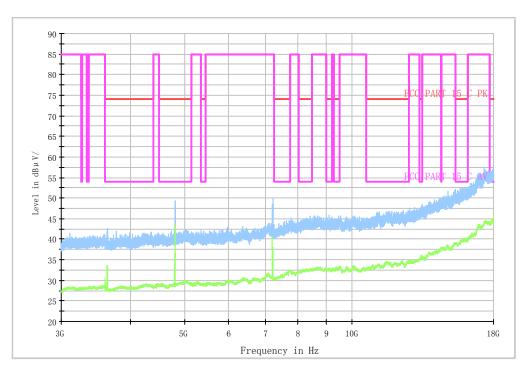


GFSK DH5 Channel 0 1-3GHz



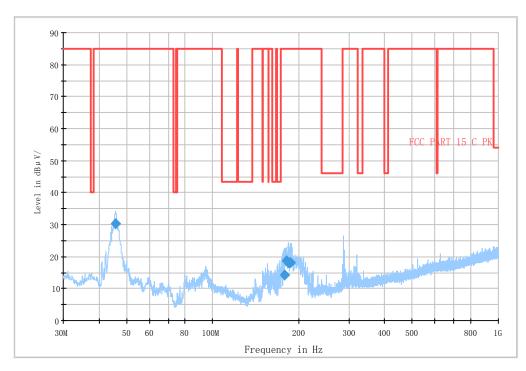
REPORT NO.:B15X50050-FCC-BT_Rev2

RE 3GHz-18GHz



GFSK DH5 Channel 0 3G-18GHz

RE 30MHz-1GHz H

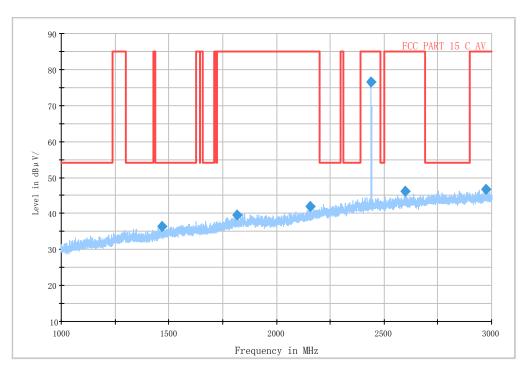


GFSK DH5 Channel 39 30MHz-1GHz



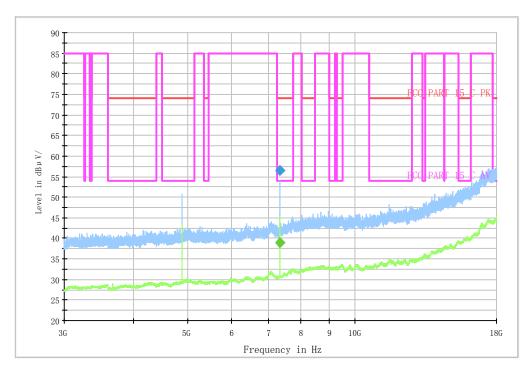
REPORT NO.:B15X50050-FCC-BT_Rev2

RE 1GHz-3GHz H



GFSK DH5 Channel 39 1-3GHz

RE 3GHz-18GHz

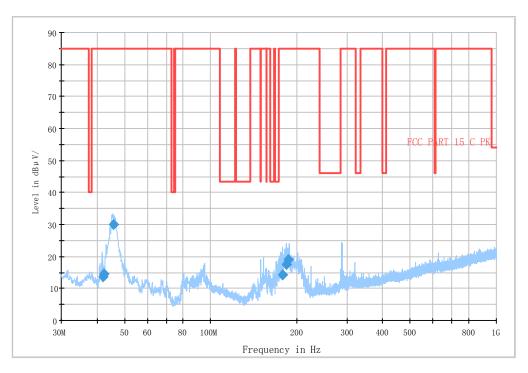


GFSK DH5 Channel 39 3-18GHz



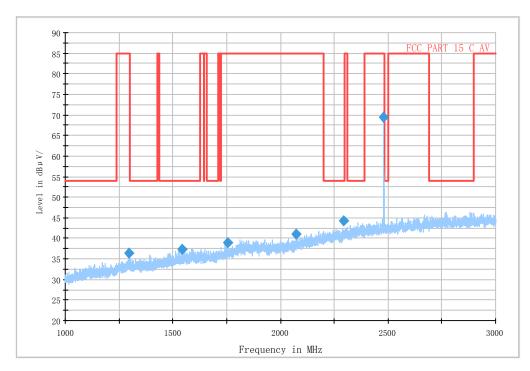
REPORT NO.:B15X50050-FCC-BT_Rev2

RE 30MHz-1GHz H



GFSK DH5 Channel 78 30MHz-1GHz

RE 1GHz-3GHz H

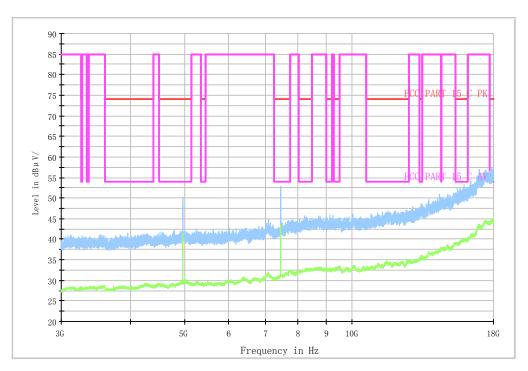


GFSK DH5 Channel 78 1-3GHz

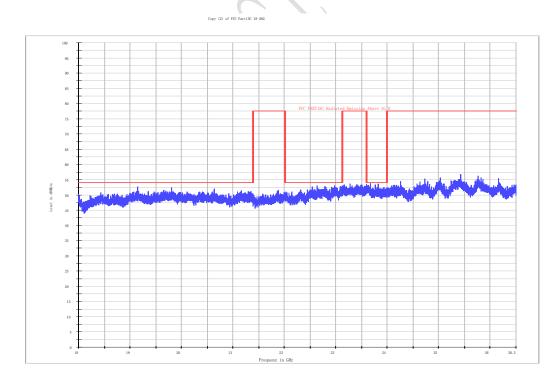


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RE 3GHz-18GHz



GFSK DH5 Channel 39 3-18GHz



GFSK DH5 all channels

Test photo

See the Pic1- Pic6 in document" Ilium X400_Wifi_BT_Test Setup Photos_Rev2".



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4.8 Power line Conducted Emissions

Specific	ations:	ANSI C63.4 voltage mains test					
Date of	Test	2015-02-13					
Test cor	nditions:	Ambient Temperature:15℃-35℃					
		Relative Humidity:30%-60%					
		Air pressure: 86-106kPa					
Operation	on Mode	Hopping	g				
Test Results:		Pass					
Test equ	uipment Used:				X		
Number	Description	Manufacturer	Model Number	Serial Number	Cal Due	State	
1	EMI Test Receiver	R/S	ESIB26	100211	2016-01-12	Normal	
2	Artificial Mains Network	R/S	ESH2-Z5	837480/002	2016-01-08	Normal	
3	Shielding Room	ETS		19003	2015-11-16	Normal	
4	BLUETOOTH TESTED	D/S	CRT	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 design and livership the Legenthus of the frequency in the upper 0.15					

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

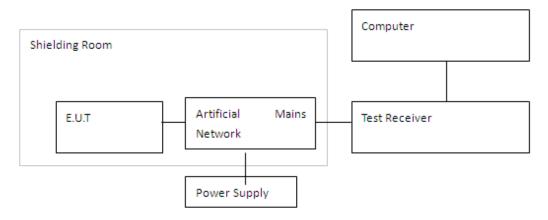
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

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).



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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 C63.4-2014.

Test Result:

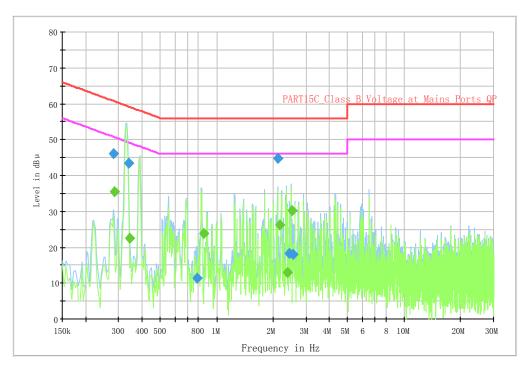
Line L&N					
Detector (QP)	Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Line	PE
QP	0.283100	46.0	60.7	N	FLO
QP	0.340800	43.4	59.2	N	FLO
QP	0.787088	11.3	56.0	L	FLO
QP	2.118369	44.7	56.0	L	FLO
QP	2.427169	18.3	56.0	L	FLO
QP	2.558419	18.0	56.0	L	FLO

Line L&N					
Detector	Frequency	Level	Limit	Line	PE
(AV)	(MHz)	(dBµV)	(dBµV)	Line	
AV	0.342800	35.5	50.7	L	FLO
AV	0.853088	22.6	49.1	N	FLO
AV	2.172369	23.8	46.0	L	FLO
AV	2.393169	26.3	46.0	L	FLO
AV	2.516419	13.0	46.0	L	FLO
AV	0.342800	30.3	46.0	L	FLO



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



Line L &Line N

Test photo

See the Pic7 in document" Ilium X400_Wifi_BT_Test Setup Photos_Rev2".



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Annex A External Photos

See the document "Ilium X400- External Photos".

Annex B Internal Photos

See the document "Ilium X400-Internal Photos".

ANNEX C Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

