

Full

TEST REPORT

No. ECIT-2012-0138-RF-BT

For

Client: CT Asia

Production: WCDMA/GSM (GPRS) Dual-Mode

Digital Mobile Phone

Model Name: DASH4.0

FCC ID: YHLBLUDASH40

Hardware Version: Q203_MAIN_PCB_V2.1

Software Version: Q203 PUBLIC_V0.5.5 S1026

Issued date: 2013-02-23

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

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East China Institute of Telecommunications No. ECIT-2012-0138-RF-BT

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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 the section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

The following deviation from, additions to, or exclusions from the test specifications have been made. See section 3.

1.2 Statements

The product name DASH4.0, supporting WCDMA/GSM/BT, manufactured by CT Asia is a new product for testing.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

1.3 Testing Laboratory information

1.3.1. Testing Location

Company Name: ECIT Shanghai, East China Institute of Telecommunications

Address: 7F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai,

P. R. China

Postal Code: 200001

Telephone: 00862163843300 Fax: 00862163843301

FCC Registration NO.: 489729

1.3.2. Testing Environment

Normal Temperature: $15-35^{\circ}$ C Extreme Temperature: N/A Relative Humidity: 20-75%

1.3.3. Project data

Project Leader: Liu Jianquan
Testing Start Date: 04,12,2012
Testing End Date: 23,02,2013

1.3.4. Signature

Wang daming

(Testing Engineer)

Yu naiping

(Reviewed this test report)

Zheng Zhongbin

Director of the laboratory

(Approved this test report)

1.4 Details of applicant or manufacturer

1.4.1. Applicant Information

Company Name: CT Asia

Address /Post: Unit 01, 15/F, Seaview Centre, 139-141 Hoi bun road,

Kwun Tong, Kowloon, Hongkong

Country: China

Telephone: 852-27931198

1.4.2. Manufacturer Information

Company Name: Shanghai Ragentek Communication Technology Co. ,Ltd.

Building D10-D11, No. 58-60, Lane 3188, Xiupu Road,

Address /Post: PuDong District, Shanghai,PRC

Country: China

Telephone: +86-21-60352628

2. Equipment Under Test (EUT) and Ancillary Equipment (AE)

2.1. About EUT

EUT Description WCDMA/GSM (GPRS) Dual-Mode

Digital Mobile Phone

Model name DASH4.0

Bluetooth Frequency 2402MHz-2480MHz
Bluetooth Channel Channel78

Bluetooth Modulation GMSK;π/4 DQPSK;8DPSK

Extreme Temperature N/A
Nominal Voltage 3.7V
Extreme High Voltage 4.2V
Extreme Low Voltage 3.5V

Note: Photographs of EUT are shown in ANNEX A of this test report.

2.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
No.1	86804801281772	Q203_MAIN_PC	Q203_PUBLIC_V0.5.	2012-12-04

B_V2.1 5_S1026

2.3. Internal Identification of AE used during the test

AE ID* Description SN

^{*}EUT ID: is used to identify the test sample in the lab internally.



No. ECIT-2012-0138-RF-BT

AE1 RF cable --AE2 --- ---



3. Reference Documents

3.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

<u> </u>	-	
Reference	Title	Version
	FCC CFR 47, Part 15, Subpart C:	
	15.205 Restricted bands of operation;	Ost 2000
FCC Part15	15.209 Radiated emission limits, general requirements;	Oct,2009
	15.247 Operation within the bands 902-928MHz,	Edition
	2400-2483.5MHz, and 5725-5850MHz.	
	Methods of Measurement of Radio-Noise Emissions from	
ANSI C63.4	Low-Voltage Electrical and Electronic Equipment in the	2009
	Range of 9KHz to 40GHz	
DA 00 70E	Filing and Measurement Guidelines for Frequency Hopping	March
DA 00-705	Spread Spectrum Systems	30,2000



4. Summary of Test Results

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

Measurement Items	Sub-clause of Part15C	Sub-claus e of IC	Verdict
Maximum Peak Output Power	15.247(a)	/	Р
Peak Power Spectral Density	15.247(d)	/	Р
Occupied 6dB Bandwidth	15.247(d)	/	Р
Band Edges Compliance	15.247(b)	/	Р
Transmitter Spurious Emission-Conducted	15.247	/	Р
Transmitter Spurious Emission-Radiated	15.247,15.209,	/	Р
AC Powerline Conducted Emission	15.107,15.207	/	Р

Please refer to part 5 for detail.

The measurements are according to Public notice DA 00-705 and ANSI C63.4.

Terms used in Verdict column

Р	Pass, the EUT complies with the essential requirements in the standard.		
NP	Not Perform, the test was not performed by ECIT.		
NA	Not Applicable, the test was not applicable.		
F	Fail, the EUT does not comply with the essential requirements in the standard.		

Test Conditions

Test Conditions			
Tnom	Normal temperature		
Tmin	Low Temperature		
Tmax	High Temperature		
Vnom	Normal Voltage		
Vmin	Low Voltage		
Vmax	High Voltage		
Hnom	Norm Humidity		
Anom	Norm Air Pressure		



For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	22 ℃
Voltage	Vnom	3.7V
Humidity	Hnom	32%
Air Pressure	Anom	1010hPa

Note:

- a. All the test data for each data were verified, but only the worst case was reported.
- b.The GFSK, $\pi/4$ DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for $\pi/4$ DQPSK, 3-DH1 for 8DPSK.
- c.The DC and low frequency voltages' measurement uncertainty is ±2%.

5. Test result

5.1. Peak Output Power-Conducted

Measurement Limit

Standard	Limit (dBm)
FCC Part 15.247(b)(1)	< 30

The measurement is according to Public notice DA 00-705 and ANSI C63.4.

Test Condition:

Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	3MHz	10MHz	5MHz	2.5ms

Measurement Results:

For GFSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted	3.87	3.80	3.57	D
Output Power (dBm)	Fig.1	Fig.2	Fig.3	r

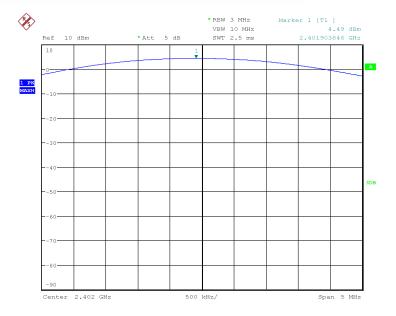
For $\pi/4$ DQPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	4.83	4.74	4.03	D
	Fig.4	Fig.5	Fig.6	F

For 8DPSK

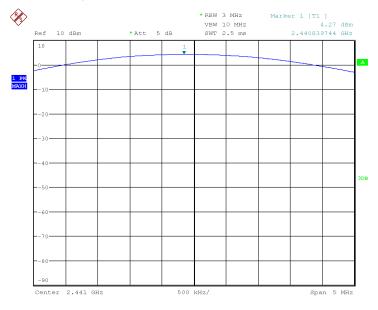
Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted	5.23	5.19	4.54	D
Output Power (dBm)	Fig.7	Fig.8	Fig.9	Г

Conclusion: PASS
Test graphs an below



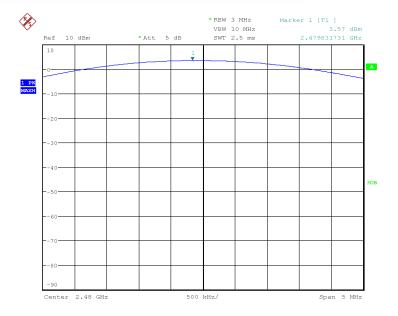
Date: 23.FEB.2013 09:56:52

Fig.1 Peak Conducted Output Power CH0, DH1



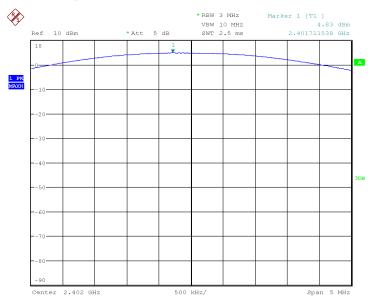
Date: 23.FEB.2013 09:58:08

Fig.2 Peak Conducted Output Power CH39, DH1



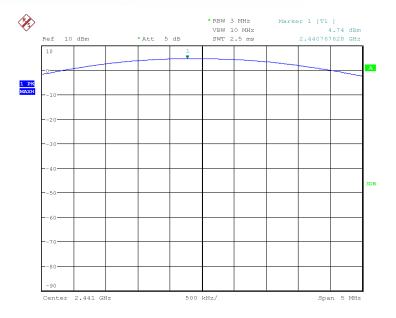
Date: 23.FEB.2013 09:58:50

Fig.3 Peak Conducted Output Power CH78, DH1



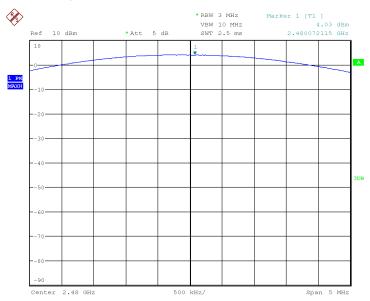
Date: 23.FEB.2013 09:59:53

Fig.4 Peak Conducted Output Power CH0, 2DH1



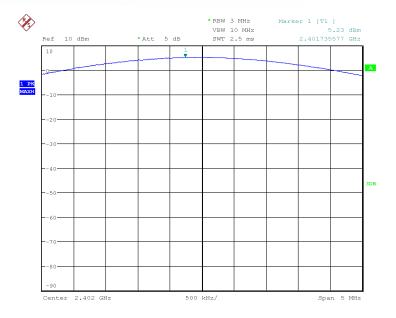
Date: 23.FEB.2013 10:01:13

Fig.5 Peak Conducted Output Power CH39, 2DH1



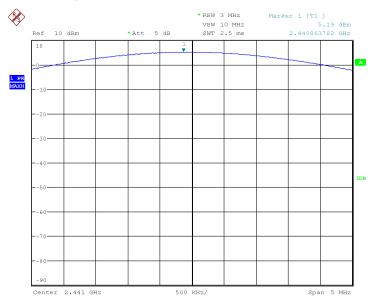
Date: 23.FEB.2013 10:02:11

Fig.6 Peak Conducted Output Power CH78, 2DH1



Date: 23.FEB.2013 10:03:17

Fig.7 Peak Conducted Output Power CH0, 3DH1



Date: 23.FEB.2013 10:04:06

Fig.8 Peak Conducted Output Power CH39, 3DH1

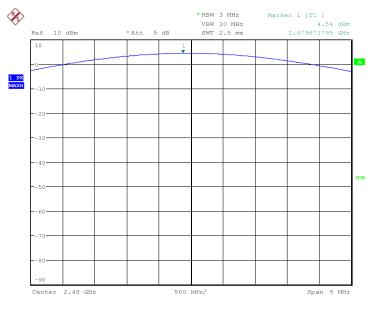


Fig.9 Peak Conducted Output Power CH78, 3DH1

5.2. Frequency Band Edges-Conducted

Date: 23.FEB.2013 10:04:39

Measurement Limit:

For GFSK

Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.10	-56.13	Р
	Hopping ON	Fig.11	-55.29	Р
78	Hopping OFF	Fig.12	-63.63	Р
	Hopping ON	Fig.13	-55.83	Р

For π/4 DQPSK

Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.14	-55.28	Р
0	Hopping ON	Fig.15	-55.53	Р
78	Hopping OFF	Fig.16	-63.26	Р
	Hopping ON	Fig.17	-55.30	Р

For 8DPSK



Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.18	-55.00	Р
	Hopping ON	Fig.19	-55.82	Р
78	Hopping OFF	Fig.20	-64.30	Р
	Hopping ON	Fig.21	-58.28	Р

Conclusion: PASS
Test graphs an below

Date: 8.DEC.2012 15:02:34

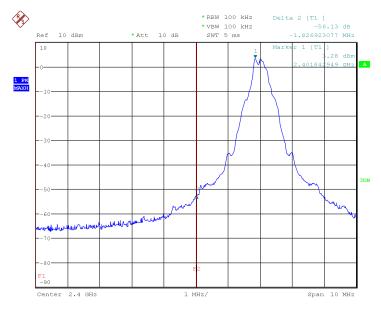
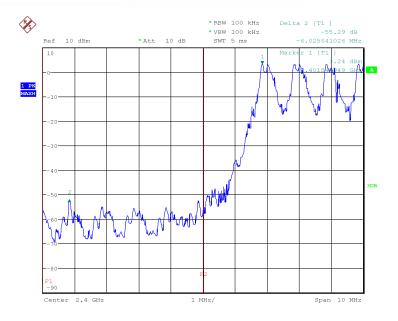
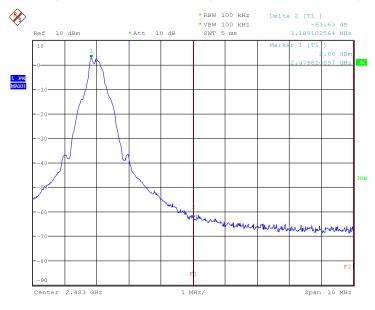


Fig.10 Frequency Band Edge: GFSK, Ch0, Hopping OFF



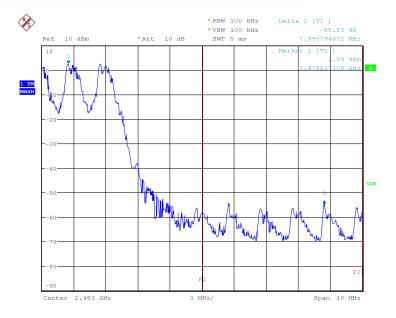
Date: 8.DEC.2012 15:04:24

Fig.11 Frequency Band Edge: GFSK, Ch0, Hopping ON



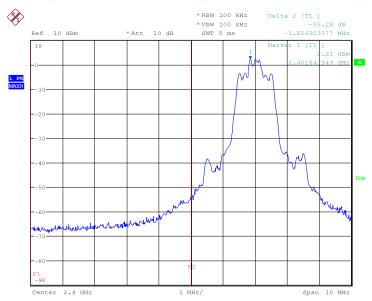
Date: 8.DEC.2012 15:36:19

Fig.12 Frequency Band Edge: GFSK, Ch78, Hopping OFF



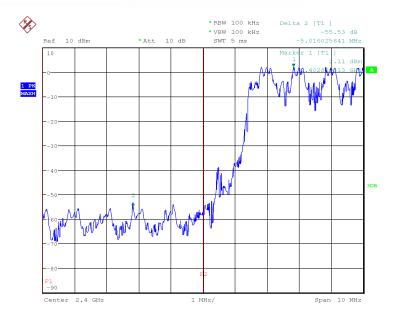
Date: 8.DEC.2012 15:39:00

Fig.13 Frequency Band Edge: GFSK, Ch78, Hopping ON



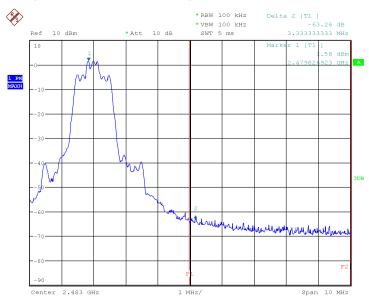
Date: 8.DEC.2012 15:09:36

Fig.14 Frequency Band Edge: $\pi/4$ DQPSK, Ch0, Hopping OFF



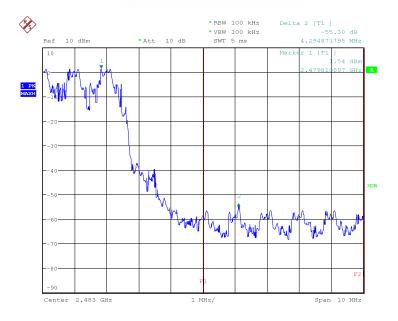
Date: 8.DEC.2012 15:23:20

Fig.15 Frequency Band Edge: $\pi/4$ DQPSK, Ch0, Hopping ON



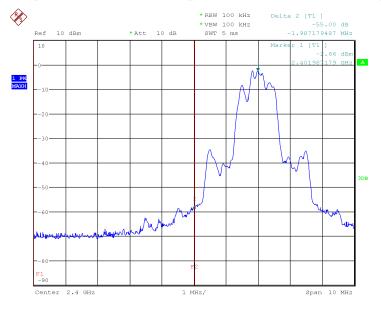
Date: 8.DEC.2012 15:40:10

Fig.16 Frequency Band Edge: $\pi/4$ DQPSK, Ch78, Hopping OFF



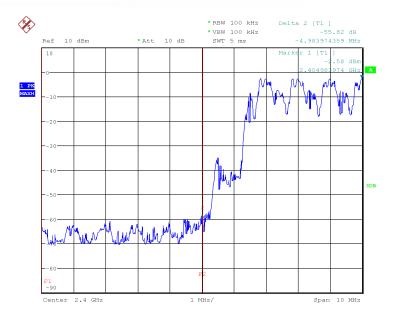
Date: 8.DEC.2012 15:44:09

Fig.17 Frequency Band Edge: $\pi/4$ DQPSK, Ch78, Hopping ON



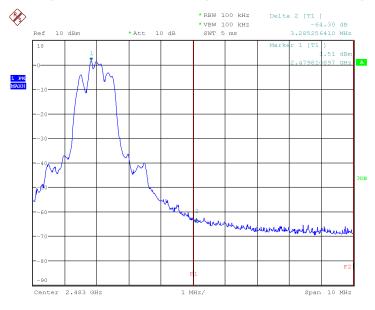
Date: 8.DEC.2012 15:26:07

Fig.18 Frequency Band Edge: 8DPSK, Ch0, Hopping OFF



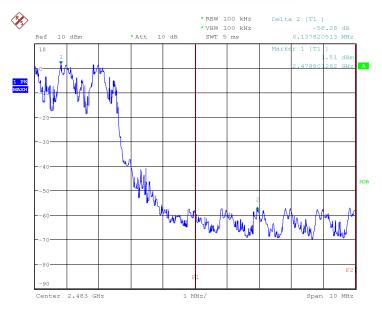
Date: 8.DEC.2012 15:29:12

Fig.19 Frequency Band Edge: 8DPSK, Ch0, Hopping ON



Date: 8.DEC.2012 15:45:19

Fig.20 Frequency Band Edge: 8DPSK, Ch78, Hopping OFF



Date: 8.DEC.2012 15:47:53

Fig.21 Frequency Band Edge: 8DPSK, Ch78, Hopping ON

5.3. Conducted Emission

Measurement Limit:

Standard	Limit	
FCC 47 CFR Part15.247 (d)	20dB below peak output power in 100KHz	
1 CC 47 CFR Fait15.247 (d)	bandwidth	

The measurement is according to Public notice DA 00-705 and ANSI C63.4

Measurement Results:

For GFSK

Channel	Frequency Range	Test Results	Conclusion
	Center Freq.	Fig.22	Р
	30MHz~1GHz	Fig.23	Р
Ch0 2402MHz	1GHz~3GHz	Fig.24	Р
	3GHz~10GHz	Fig.25	Р
	10GHz~26GHz	Fig.26	Р
Ch39 2441MHz	Center Freq.	Fig.27	Р
	30MHz~1GHz	Fig.28	Р
	1GHz~3GHz	Fig.29	Р
	3GHz~10GHz	Fig.30	Р



	10GHz~26GHz	Fig.31	Р
Ch78 2480MHz	Center Freq.	Fig.32	Р
	30MHz~1GHz	Fig.33	Р
	1GHz~3GHz	Fig.34	Р
	3GHz~10GHz	Fig.35	Р
	10GHz~26GHz	Fig.36	Р

For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
	Center Freq.	Fig.37	Р
	30MHz~1GHz	Fig.38	Р
Ch0 2402MHz	1GHz~3GHz	Fig.39	Р
	3GHz~10GHz	Fig.40	Р
	10GHz~26GHz	Fig.41	Р
	Center Freq.	Fig.42	Р
	30MHz~1GHz	Fig.43	Р
Ch39 2441MHz	1GHz~3GHz	Fig.44	Р
	3GHz~10GHz	Fig.45	Р
	10GHz~26GHz	Fig.46	Р
	Center Freq.	Fig.47	Р
	30MHz~1GHz	Fig.48	Р
Ch78 2480MHz	1GHz~3GHz	Fig.49	Р
	3GHz~10GHz	Fig.50	Р
	10GHz~26GHz	Fig.51	Р

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.52	Р
	30MHz~1GHz	Fig.53	Р
	1GHz~3GHz	Fig.54	Р



	3GHz~10GHz	Fig.55	Р
	10GHz~26GHz	Fig.56	Р
	Center Freq.	Fig.57	Р
	30MHz~1GHz	Fig.58	Р
Ch39 2441MHz	1GHz~3GHz	Fig.59	Р
	3GHz~10GHz	Fig.60	Р
	10GHz~26GHz	Fig.61	Р
Ch78 2480MHz	Center Freq.	Fig.62	Р
	30MHz~1GHz	Fig.63	Р
	1GHz~3GHz	Fig.64	Р
	3GHz~10GHz	Fig.65	Р
	10GHz~26GHz	Fig.66	Р

Conclusion: PASS Test graphs as below

Date: 10.DEC.2012 09:34:40

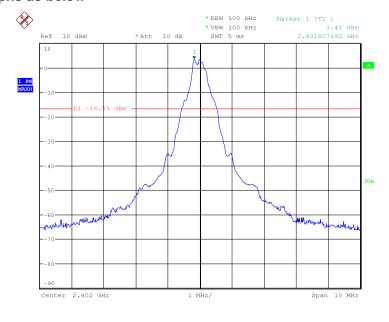
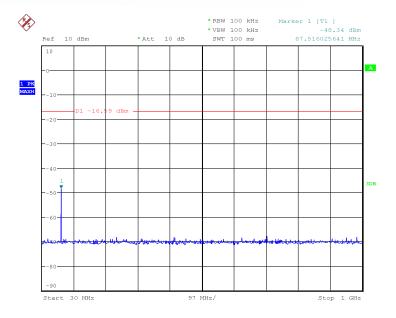
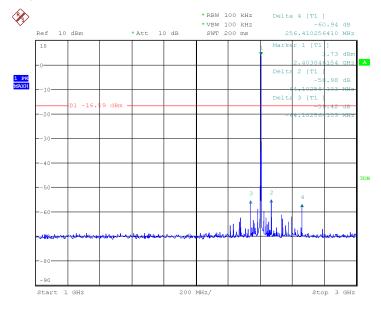


Fig.22 Conducted spurious emission: GFSK, Ch0, 2402MHz



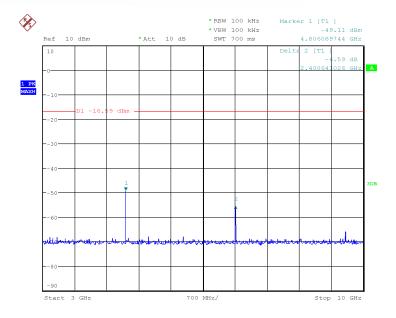
Date: 10.DEC.2012 09:37:55

Fig.23 Conducted spurious emission: GFSK, Ch0, 30MHz~1GHz



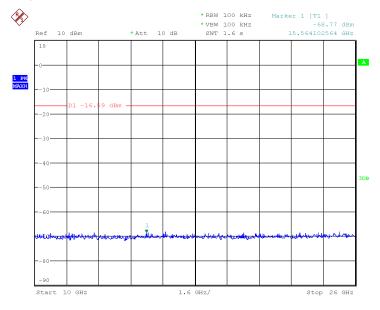
Date: 10.DEC.2012 09:38:44

Fig.24 Conducted spurious emission: GFSK, Ch0, 1GHz~3GHz



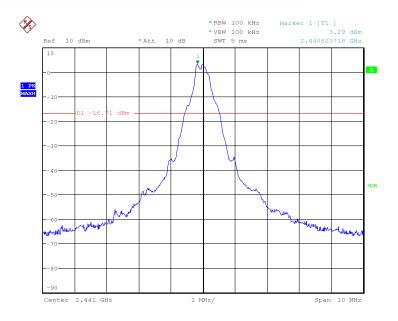
Date: 10.DEC.2012 09:39:38

Fig.25 Conducted spurious emission: GFSK, Ch0, 3GHz~10GHz



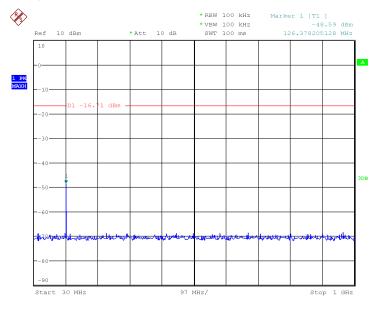
Date: 10.DEC.2012 09:40:10

Fig.26 Conducted spurious emission: GFSK, Ch0, 10GHz~26GHz



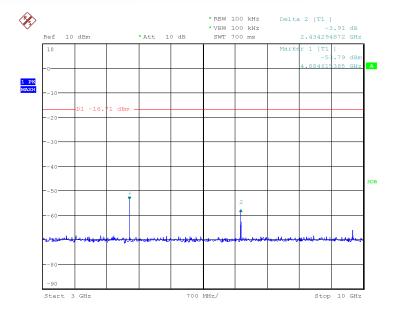
Date: 10.DEC.2012 09:43:49

Fig.27 Conducted spurious emission: GFSK, Ch39, 2441MHz



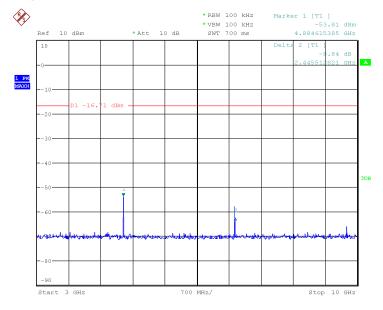
Date: 10.DEC.2012 09:44:24

Fig.28 Conducted spurious emission: GFSK, Ch39, 30MHz~1GHz



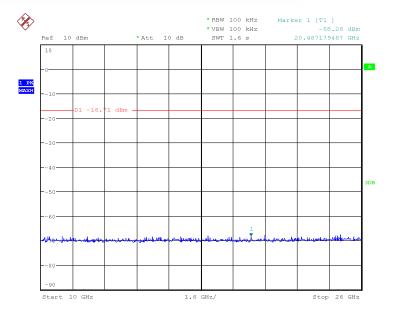
Date: 10.DEC.2012 09:45:53

Fig.29 Conducted spurious emission: GFSK, Ch39, 1GHz~3GHz



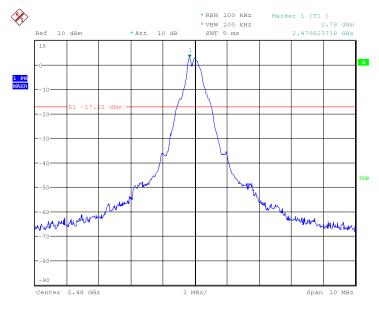
Date: 10.DEC.2012 09:45:37

Fig.30 Conducted spurious emission: GFSK, Ch39, 3GHz~10GHz



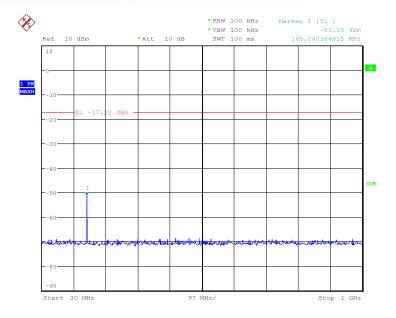
Date: 10.DEC.2012 09:46:55

Fig.31 Conducted spurious emission: GFSK, Ch39, 10GHz~26GHz



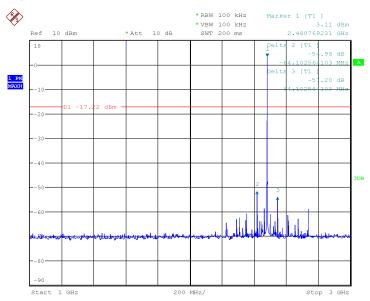
Date: 10.DEC.2012 09:48:16

Fig.32 Conducted spurious emission: GFSK, Ch78, 2480MHz



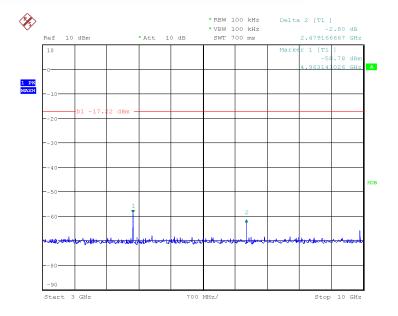
Date: 10.DEC.2012 09:48:44

Fig.33 Conducted spurious emission: GFSK, Ch78, 30MHz~1GHz



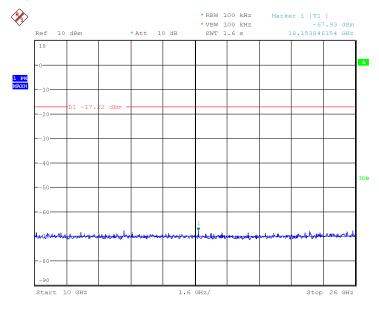
Date: 10.DEC.2012 09:49:15

Fig.34 Conducted spurious emission: GFSK, Ch78, 1GHz~3GHz



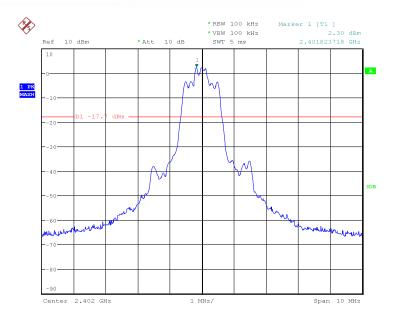
Date: 10.DEC.2012 09:49:46

Fig.35 Conducted spurious emission: GFSK, Ch78, 3GHz~10GHz



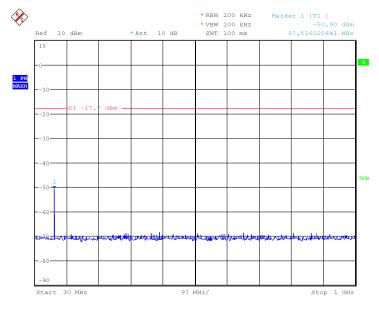
Date: 10.DEC.2012 09:50:27

Fig.36 Conducted spurious emission: GFSK, Ch78, 10GHz~26GHz



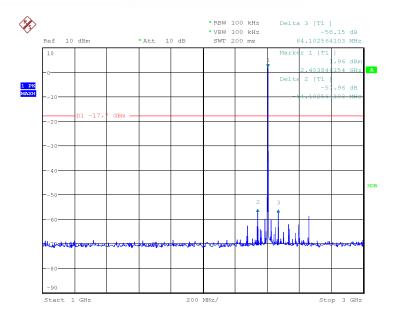
Date: 10.DEC.2012 09:52:17

Fig.37 Conducted spurious emission: π/4 DQPSK, Ch0, 2402MHz



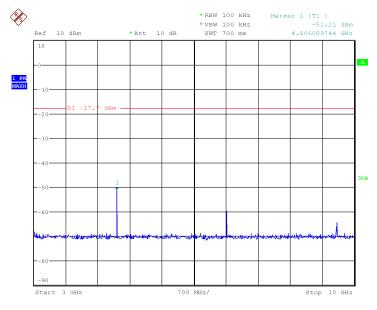
Date: 10.DEC.2012 09:52:43

Fig.38 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz



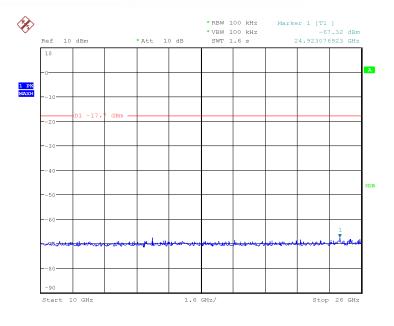
Date: 10.DEC.2012 09:53:07

Fig.39 Conducted spurious emission: π/4 DQPSK, Ch0, 1GHz~3GHz



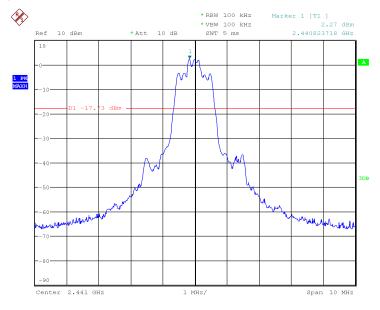
Date: 10.DEC.2012 09:53:48

Fig.40 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 3GHz~10GHz



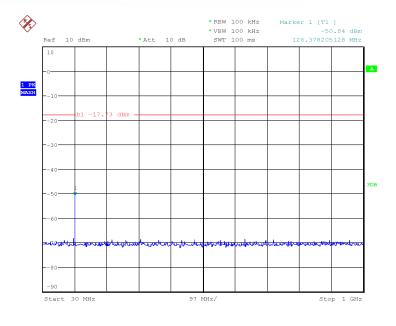
Date: 10.DEC.2012 09:54:30

Fig.41 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 10GHz~26GHz



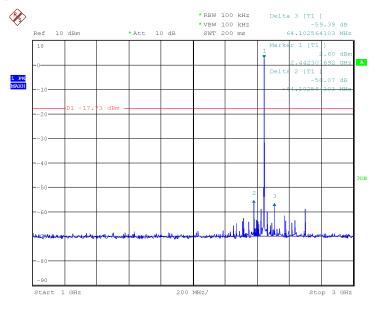
Date: 10.DEC.2012 09:55:41

Fig.42 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 2441MHz



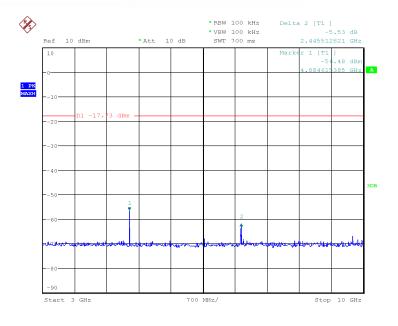
Date: 10.DEC.2012 09:56:10

Fig.43 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 30MHz~1GHz



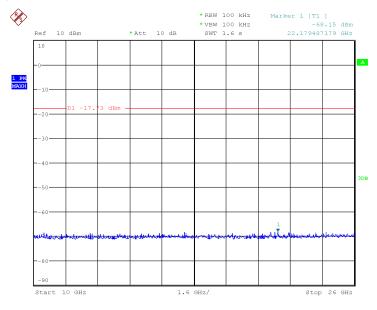
Date: 10.DEC.2012 09:56:54

Fig.44 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 1GHz~3GHz



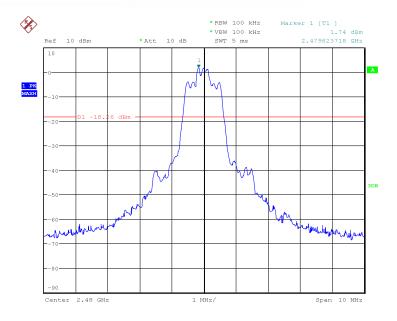
Date: 10.DEC.2012 09:57:25

Fig.45 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 3GHz~10GHz



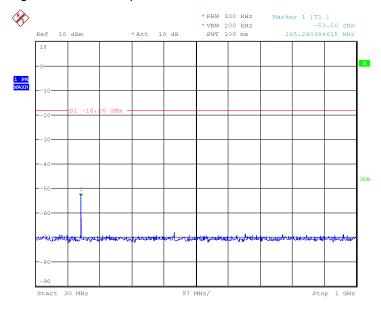
Date: 10.DEC.2012 09:57:53

Fig.46 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 10GHz~26GHz



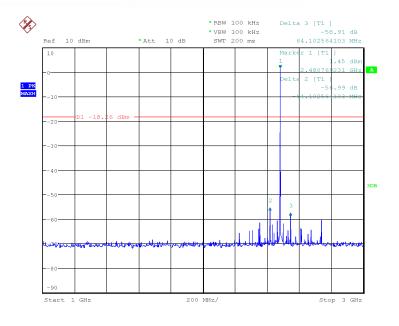
Date: 10.DEC.2012 09:59:49

Fig.47 Conducted spurious emission: π/4 DQPSK, Ch78, 2480MHz



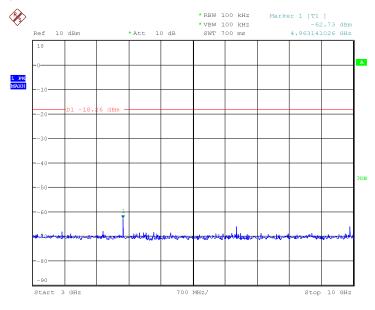
Date: 10.DEC.2012 10:03:37

Fig.48 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 30MHz~1GHz



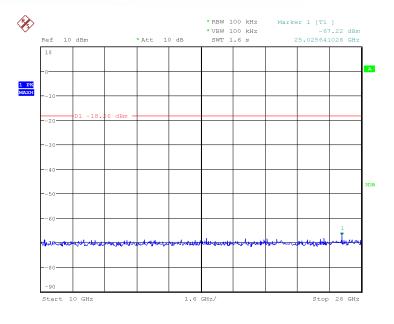
Date: 10.DEC.2012 10:03:58

Fig.49 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 1GHz~3GHz



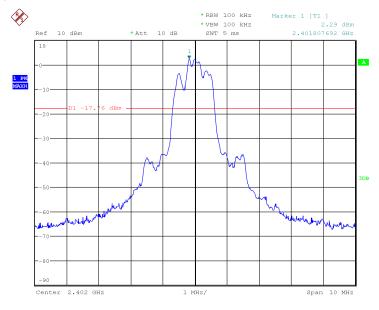
Date: 10.DEC.2012 10:04:33

Fig.50 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 3GHz~10GHz



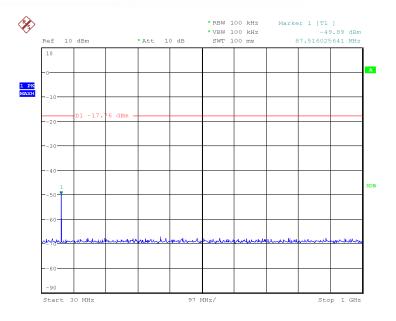
Date: 10.DEC.2012 10:04:57

Fig.51 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 10GHz~26GHz



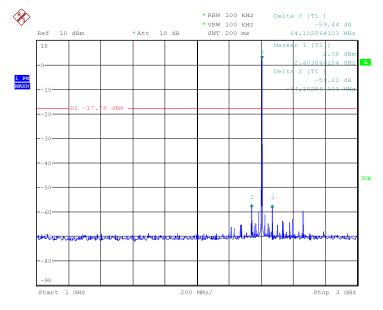
Date: 10.DEC.2012 10:09:56

Fig.52 Conducted spurious emission: 8DPSK, Ch0, 2402MHz



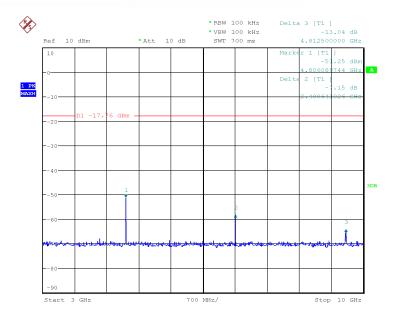
Date: 10.DEC.2012 10:22:25

Fig.53 Conducted spurious emission: 8DPSK, Ch0, 30MHz~1GHz



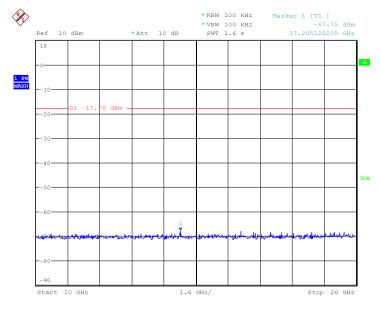
Date: 10.DEC.2012 10:22:44

Fig.54 Conducted spurious emission: 8DPSK, Ch0, 1GHz~3GHz



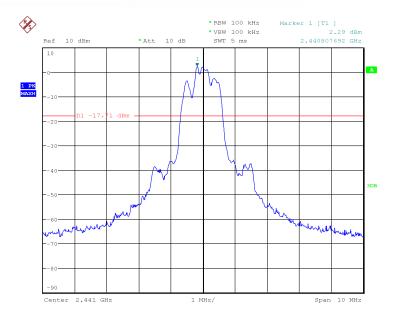
Date: 10.DEC.2012 10:23:25

Fig.55 Conducted spurious emission: 8DPSK, Ch0, 3GHz~10GHz



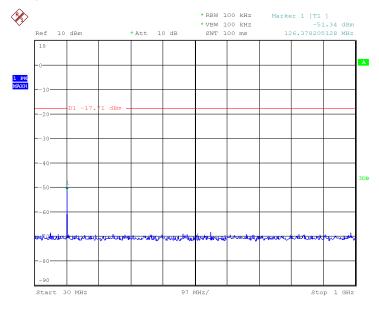
Date: 10.DEC.2012 10:23:51

Fig.56 Conducted spurious emission: 8DPSK, Ch0, 10GHz~26GHz



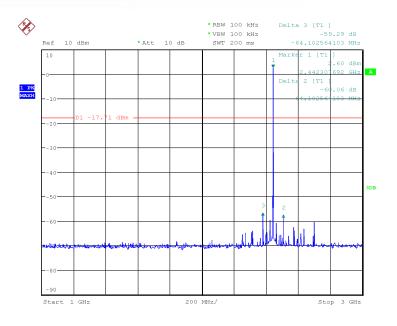
Date: 10.DEC.2012 10:35:49

Fig.57 Conducted spurious emission: 8DPSK, Ch39, 2441MHz



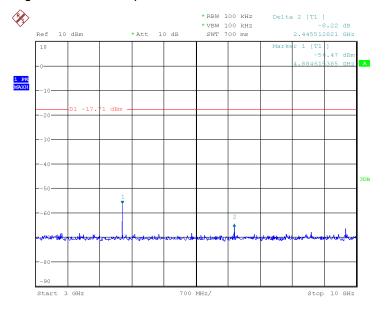
Date: 10.DEC.2012 10:36:13

Fig.58 Conducted spurious emission: 8DPSK, Ch39, 30MHz~1GHz



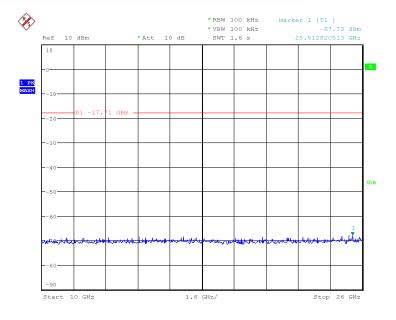
Date: 10.DEC.2012 10:36:45

Fig.59 Conducted spurious emission: 8DPSK, Ch39, 1GHz~3GHz



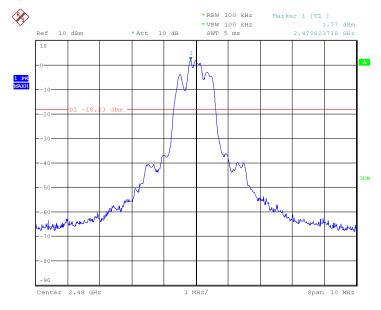
Date: 10.DEC.2012 10:41:21

Fig.60 Conducted spurious emission: 8DPSK, Ch39, 3GHz~10GHz



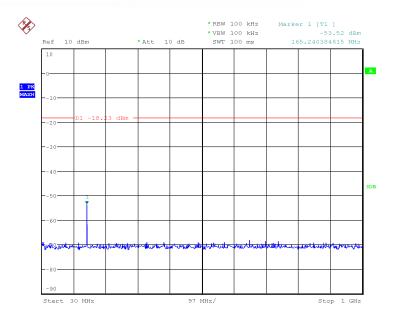
Date: 10.DEC.2012 10:41:47

Fig.61 Conducted spurious emission: 8DPSK, Ch39, 10GHz~26GHz



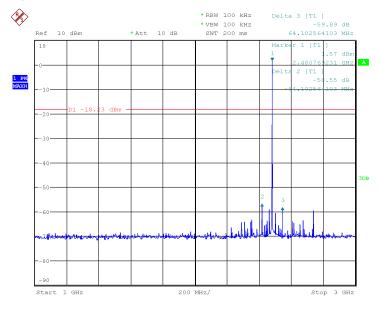
Date: 10.DEC.2012 10:46:35

Fig.62 Conducted spurious emission: 8DPSK, Ch78, 2480MHz



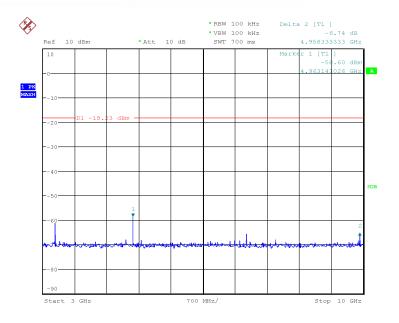
Date: 10.DEC.2012 10:46:57

Fig.63 Conducted spurious emission: 8DPSK, Ch78, 30MHz~1GHz



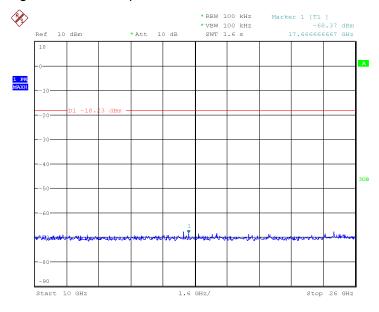
Date: 10.DEC.2012 10:47:25

Fig.64 Conducted spurious emission: 8DPSK, Ch78, 1GHz~3GHz



Date: 10.DEC.2012 10:47:55

Fig.65 Conducted spurious emission: 8DPSK, Ch78, 3GHz~10GHz



Date: 10.DEC.2012 10:48:17

Fig.66 Conducted spurious emission: 8DPSK, Ch78, 10GHz~26GHz

5.4. Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see 15.205(c)).

The measurement is according to Public notice DA 00-705 and ANSI C63.4 **Limit in restricted band:**

Frequency of emission (MHz)	Field strength (uV/m)	Field strength (dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

Test condition:

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a nonconducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.4-2009 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/1MHz	15
4000~18000	1MHz/1MHz	40
18000~26500	1MHz/1MHz	20

Measurement Results:

A "reference path loss" is established and A_{Rpi} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss. The measurement results are obtained as described below:

Result= $P_{Mea} + A_{Rpi}$

For GFSK

Channel	Frequency Range	Test Results	Conclusion
	30MH~1GHz	Fig.67	Р
Ch0 2402MHz	1GHz~3GHz	Fig.68	Р
	3GHz~18GHz	Fig.69	Р
Power	2.38GHz~2.4GHz	Fig.70	Р
Power	2.45GHz~2.5GHz	Fig.71	Р
All channels	18GHz~26GHz	Fig.72	Р

For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion	
	30MH~1GHz	Fig.73	Р	
Ch0 2402MHz	1GHz~3GHz	Fig.74	Р	
	3GHz~18GHz	Fig.75	Р	
Power	2.38GHz~2.4GHz	Fig.76	Р	
Power	2.45GHz~2.5GHz Fig.77		2.45GHz~2.5GHz Fig.77	Р
All channels	18GHz~26GHz	Fig.78	Р	

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
	30MH~1GHz	Fig.79	Р
Ch0 2402MHz	1GHz~3GHz	Fig.80	Р
	3GHz~18GHz	Fig.81	Р
Power	2.38GHz~2.4GHz	Fig.82	Р
Power	2.45GHz~2.5GHz	Fig.83	Р
All channels	18GHz~26GHz	Fig.84	Р

GFSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.61	30.1	0.61	29.49	V
67.79	26.9	1.26	25.64	V



134.38	26.9	2.28	24.62	Н
898	20.8	7.28	13.52	V

GFSK Ch0 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1866.58	33.3	13.45	19.85	V
2910.88	41.6	16.96	24.64	Н

GFSK Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5431.24	30.3	7.57	22.73	Н
16716.82	37.6	14.33	23.27	Н

π/4 DQPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.643660	30.9	0.73	30.17	V
67.997120	26.5	1.26	25.24	V
952.931440	21.4	7.15	14.25	Н

π/4 DQPSK Ch0 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2179.804000	36.4	14.13	22.27	V
2886.252000	41.8	16.58	25.22	Н

π/4 DQPSK Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
7067.719000	30.2	8.72	21.48	V
17499.232000	38.9	15.29	23.61	Н

8DPSK 30MHz-1GHz

Frequency(MHz) Result(dBu)	//m) ARpl (dB)	PMea(dBuV/m) Polarity	
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No. ECIT-2012-0138-RF-BT

34.603080	31.3	0.73	30.57	V
71.792140	21.9	1.30	20.60	V
98.073640	14.6	1.59	13.01	Н

8DPSK 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2147.878000	35.6	13.88	21.72	Н
2886.956000	41.8	16.58	25.22	Н

8DPSK 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5997.265000	28.7	7.09	19.91	V
17524.851000	39.0	15.29	23.71	Н

All Ch 18GHz~26.5GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
19625.786000	49.0	6.97	42.03	Н
20684.980000	47.7	6.97	40.73	Н
22119.789000	45.3	3.05	42.05	Н
23627.899000	43.8	3.05	40.75	Н
24606.319000	43.4	3.05	40.35	Н
25644.558000	43.6	3.05	40.55	Н

Conclusion: PASS
Test graphs as below:

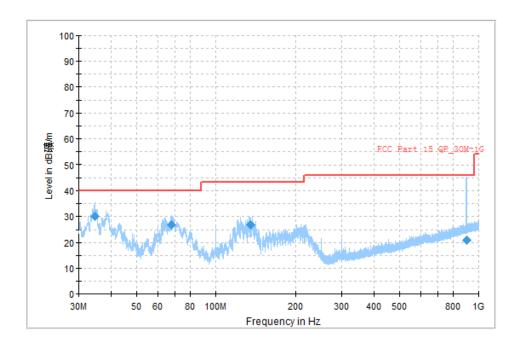


Fig.67 Radiated emission: GFSK, Ch0, 30MHz~1GHz

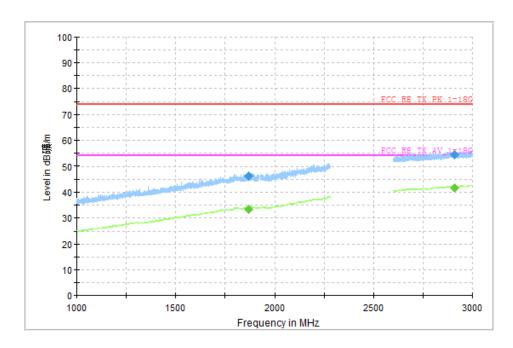


Fig.68 Radiated emission: GFSK, Ch0, 1GHz~3GHz

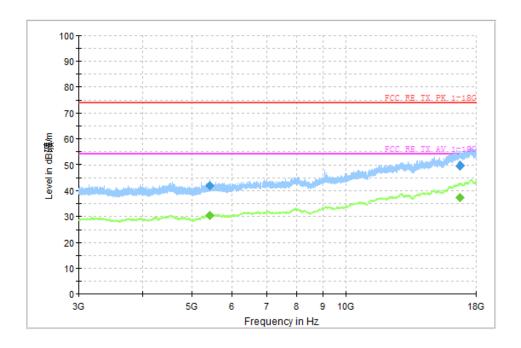


Fig.69 Radiated emission: GFSK, Ch0, 3GHz~18GHz

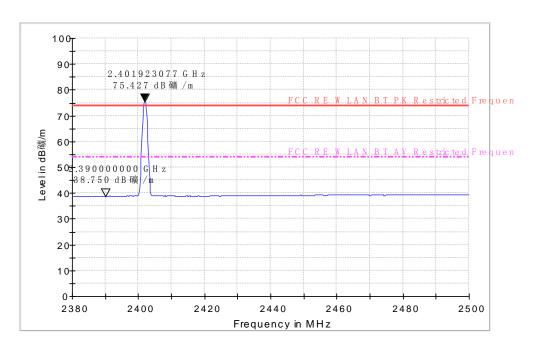


Fig.70 Radiated emission (Power): GFSK, low channel

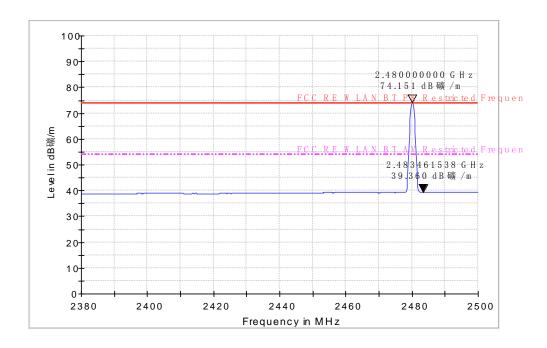


Fig.71 Radiated emission (Power): GFSK, high channel

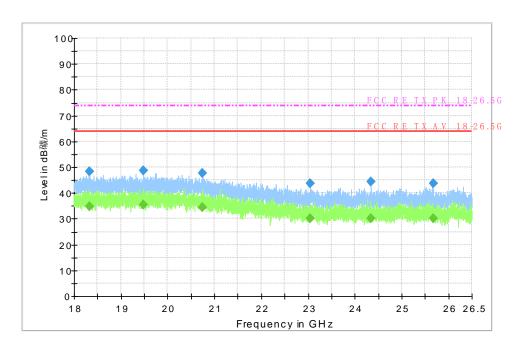


Fig.72 Radiated emission: GFSK, 18 GHz - 26 GHz

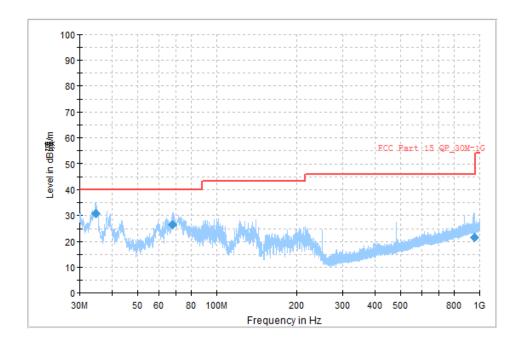


Fig.73 Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz

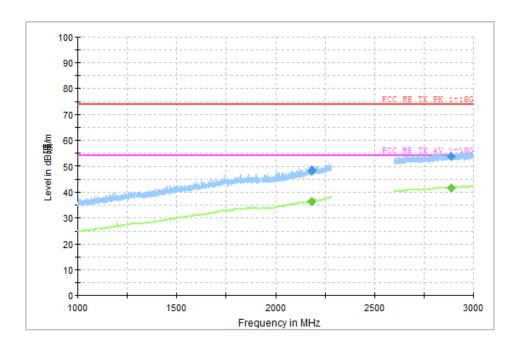


Fig.74 Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz

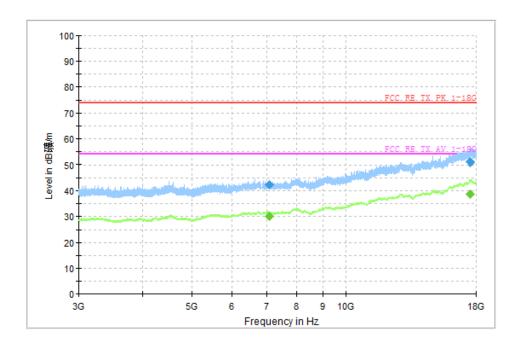


Fig.75 Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz

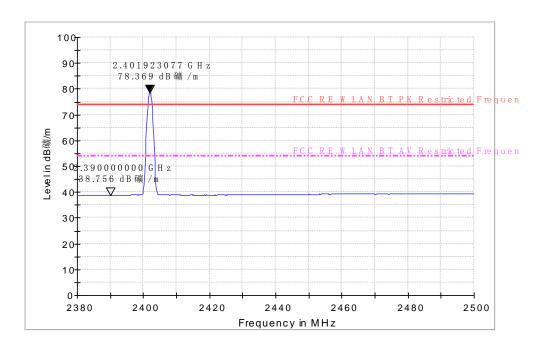


Fig.76 Radiated emission (Power): GFSK, low channel

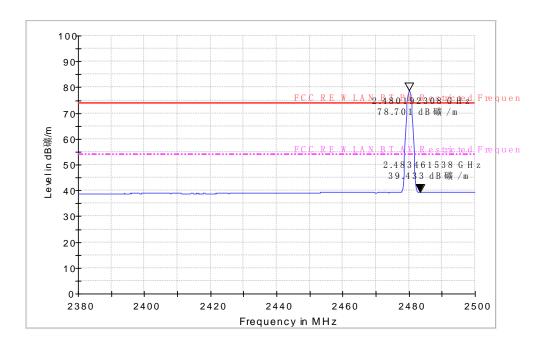


Fig.77 Radiated emission (Power): GFSK, high channel

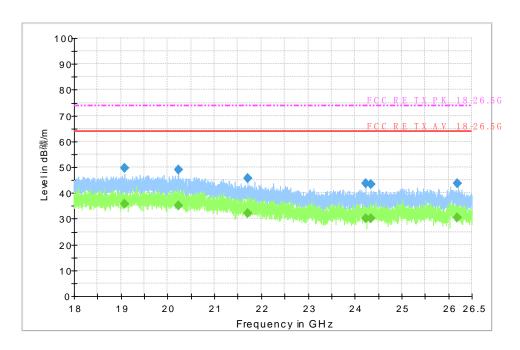


Fig.78 Radiated emission: GFSK, 18 GHz - 26 GHz

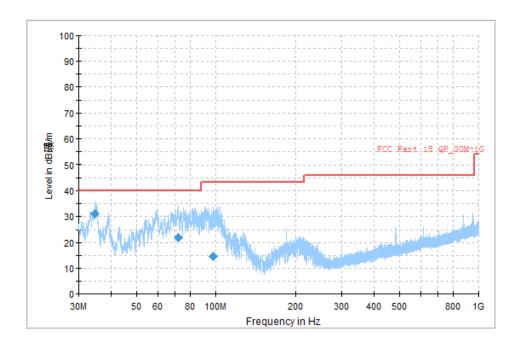


Fig.79 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

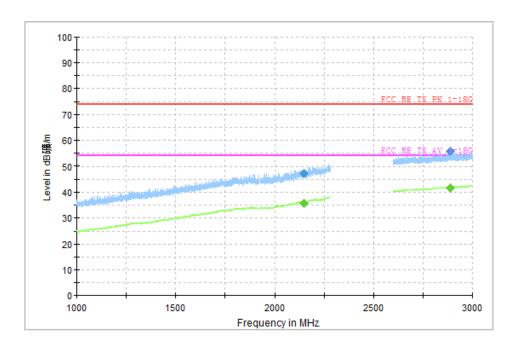


Fig.80 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

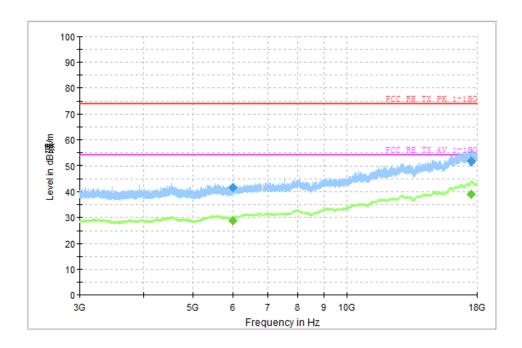


Fig.81 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz

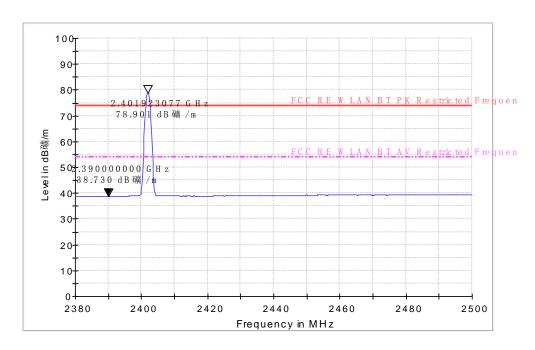


Fig.82 Radiated emission (Power): GFSK, low channel

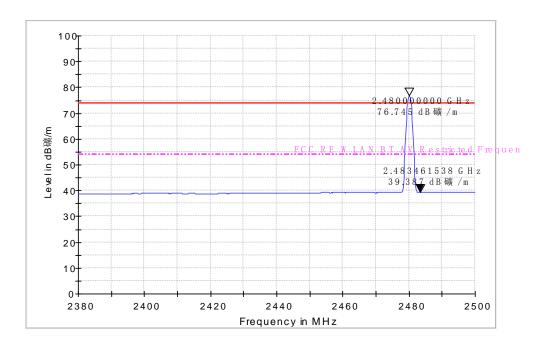


Fig.83 Radiated emission (Power): GFSK, high channel

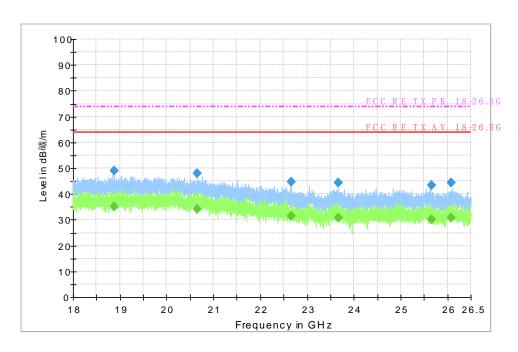


Fig.84 Radiated emission: GFSK, 18 GHz - 26 GHz

5.5. Time Of Occupancy (Dwell Time)

Measurement Limit:

Standard	Limit (ms)
FCC 47CFR Part 15.247 (a) (1) (iii)	< 400

The measurement is according to Public notice DA 00-705 and ANSI C63.4

Measurement Result:

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
	DU1	Fig.85	121.6	Р
	DH1	Fig.86		
20	DUI.	Fig.87	004.0	D
39	DH3	Fig.88	264.0	Р
	DH5	Fig.89	- 308.3	Р
		Fig.90		

For π/4 DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
	204	Fig.91	125.1	Р
	2DH1	Fig.92		
20	39 2DH3	Fig.93	- 264.0	Р
39		Fig.94		
	2DH5	Fig.95	308.3	Р
		Fig.96		

For 8DPSK

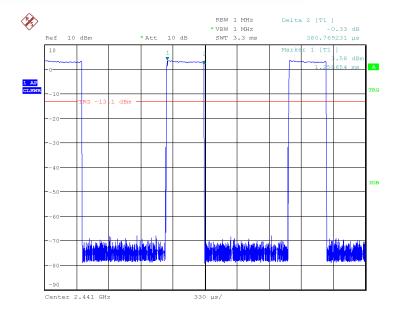
TOTODI OIL				
Channel	Packet	Dwell Time (ms)		Conclusion
	3DH1	Fig.97	- 125.1	Р
		Fig.98		
39	3DH3	Fig.99	264.0	Р
39	3003	Fig.100	204.0	F
3	3DH5	Fig.101	- 308.3	Р
		Fig.102		

Note: the dwell time is Calculated of the sum of test time about 31.5 seconds.

Equation: dwell time = pusletime *(1600/N)/79*T. N is the number of timeslot; T is the time about 31.5s.

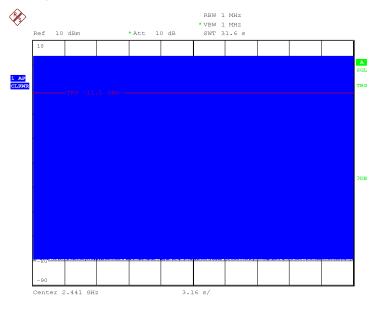
The time of DH5=2.9*(1600/6)/79*31.5=308.3ms.

Conclusion: PASS
Test graphs as below:



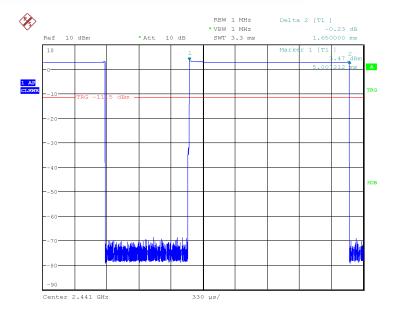
Date: 10.DEC.2012 13:20:55

Fig.85 Time of occupancy (Dwell Time): Ch39, Packet DH1



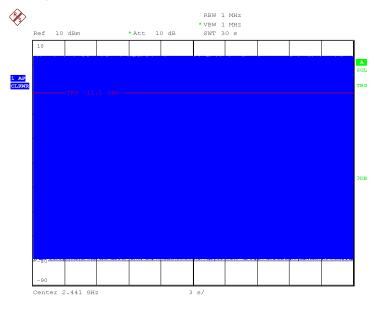
Date: 10.DEC.2012 13:31:10

Fig.86 Number of Transmissions Measurement: Ch39, Packet DH1



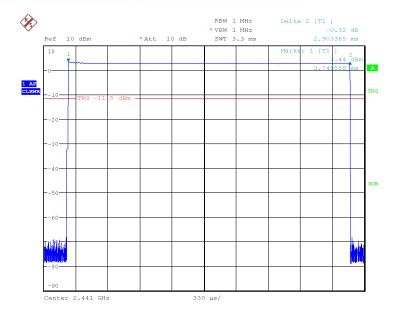
Date: 10.DEC.2012 13:36:42

Fig.87 Time of occupancy (Dwell Time): Ch39, Packet DH3



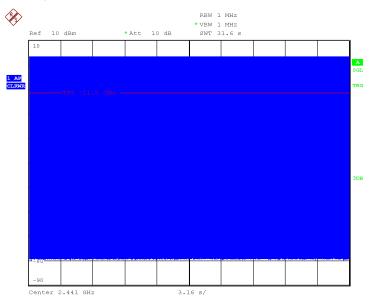
Date: 10.DEC.2012 13:40:45

Fig.88 Number of Transmissions Measurement: Ch39, Packet DH3



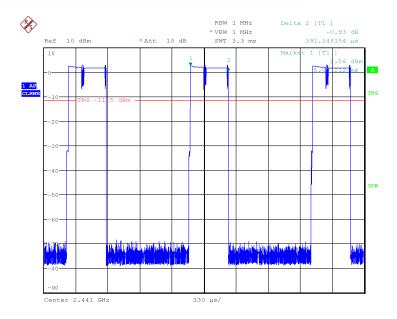
Date: 10.DEC.2012 13:43:40

Fig.89 Time of occupancy (Dwell Time): Ch39,Packet DH5



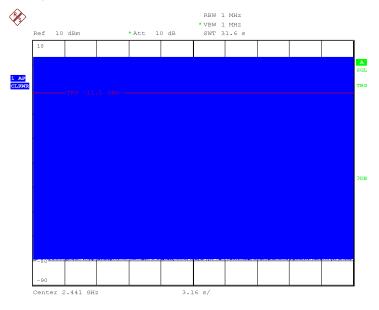
Date: 10.DEC.2012 13:48:37

Fig.90 Number of Transmissions Measurement: Ch39, Packet DH5



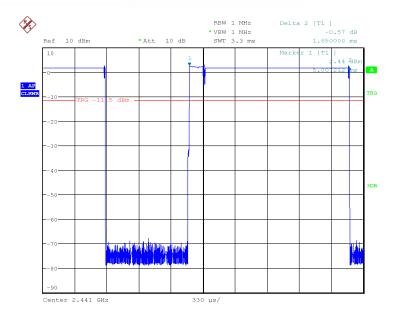
Date: 10.DEC.2012 13:54:10

Fig.91 Time of occupancy (Dwell Time): Ch39, Packet 2-DH1



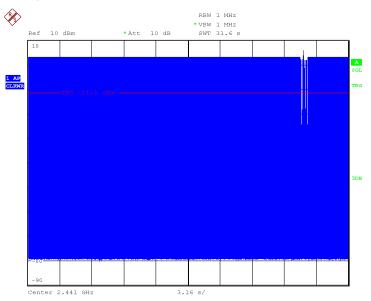
Date: 10.DEC.2012 13:55:31

Fig.92 Number of Transmissions Measurement: Ch39, Packet 2-DH1



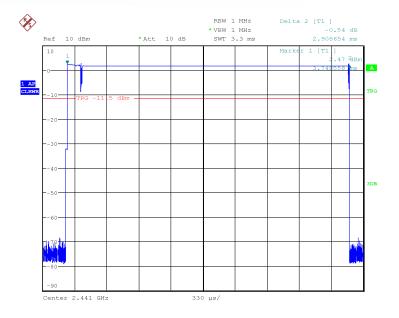
Date: 10.DEC.2012 13:57:13

Fig.93 Time of occupancy (Dwell Time): Ch39,Packet 2-DH3



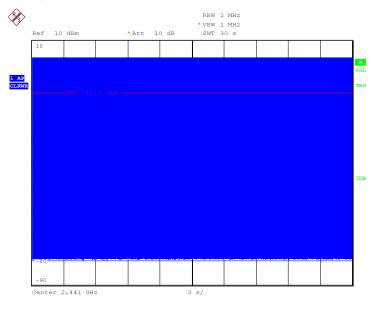
Date: 10.DEC.2012 13:58:23

Fig.94 Number of Transmissions Measurement: Ch39, Packet 2-DH3



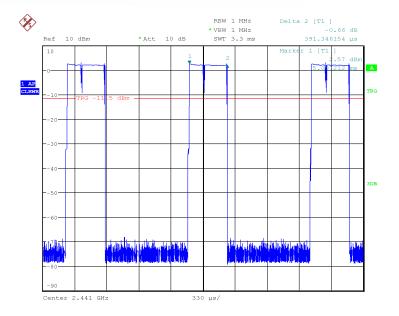
Date: 10.DEC.2012 13:59:39

Fig.95 Time of occupancy (Dwell Time): Ch39, Packet 2-DH5



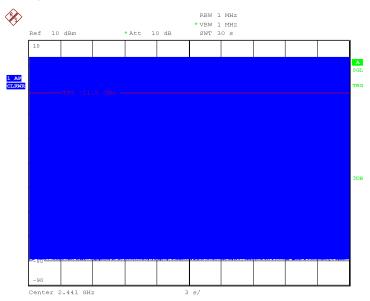
Date: 10.DEC.2012 14:00:49

Fig.96 Number of Transmissions Measurement: Ch39, Packet 2-DH5



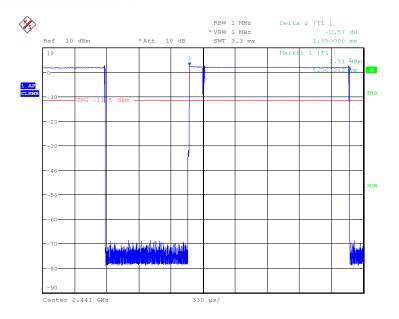
Date: 10.DEC.2012 14:02:04

Fig.97 Time of occupancy (Dwell Time): Ch39,Packet 3-DH1



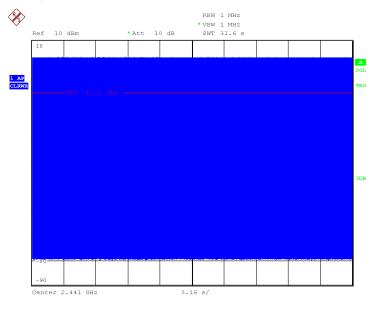
Date: 10.DEC.2012 14:03:25

Fig.98 Number of Transmissions Measurement: Ch39, Packet 3-DH1



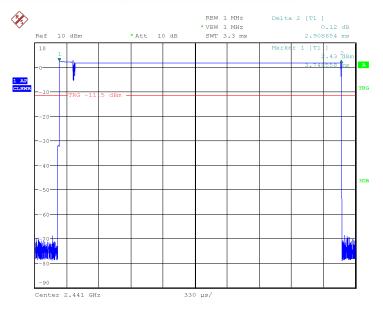
Date: 10.DEC.2012 14:04:09

Fig.99 Time of occupancy (Dwell Time): Ch39, Packet 3-DH3



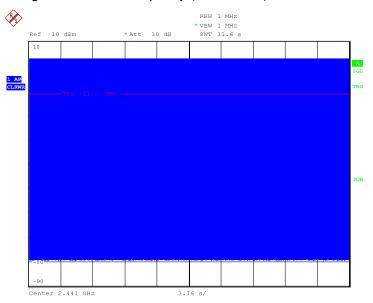
Date: 10.DEC.2012 14:05:00

Fig.100 Number of Transmissions Measurement: Ch39, Packet 3-DH3



Date: 10.DEC.2012 14:05:49

Fig.101 Time of occupancy (Dwell Time): Ch39,Packet 3-DH5



Date: 10.DEC.2012 14:06:35

Fig.102 Number of Transmissions Measurement: Ch39, Packet 3-DH5

5.6. 20dB Bandwidth

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a) (1)	N/A

The measurement is according to Public notice DA 00-705 and ANSI C63.4.

Measurement Result:



For GFSK

Channel	20dB Band	Conclusion	
0	Fig.103	951.92	Р
39	Fig.104	956.72	Р
78	Fig.105	951.92	Р

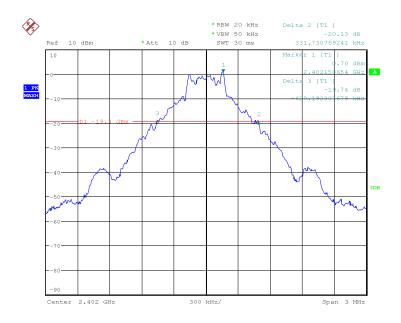
For $\pi/4$ DQPSK

Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.106	1235.57	Р
39	Fig.107	1240.39	Р
78	Fig.108	1201.91	Р

For 8DPSK

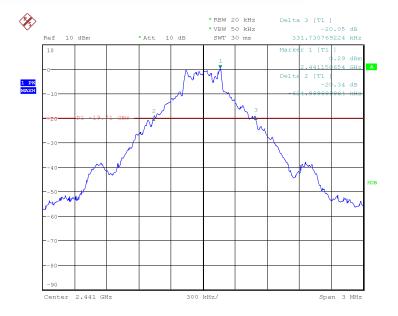
Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.109	1269.23	Р
39	Fig.110	1269.04	Р
78	Fig.111	1269.04	Р

Conclusion: PASS
Test graphs as below:



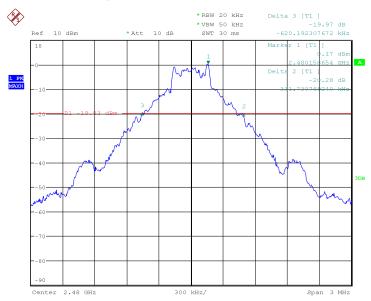
Date: 23.FEB.2013 10:49:28

Fig.103 20dB Bandwidth: GFSK, Ch0



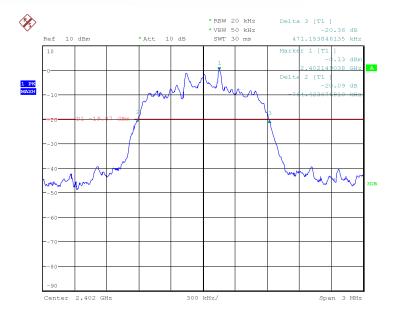
Date: 23.FEB.2013 10:54:28

Fig.104 20dB Bandwidth: GFSK, Ch39



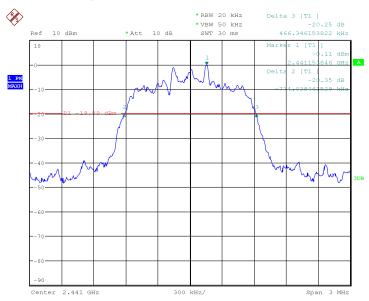
Date: 23.FEB.2013 10:56:40

Fig.105 20dB Bandwidth: GFSK, Ch78



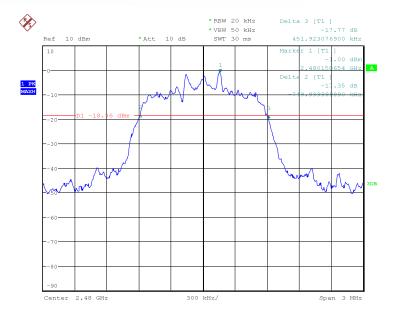
Date: 23.FEB.2013 10:59:09

Fig.106 20dB Bandwidth: π/4 DQPSK, Ch0



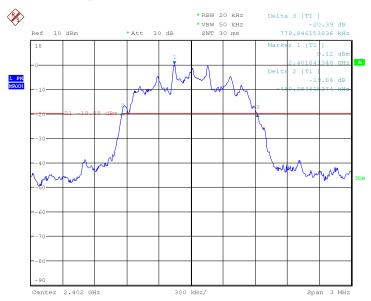
Date: 23.FEB.2013 11:01:14

Fig.107 20dB Bandwidth: π/4 DQPSK, Ch39



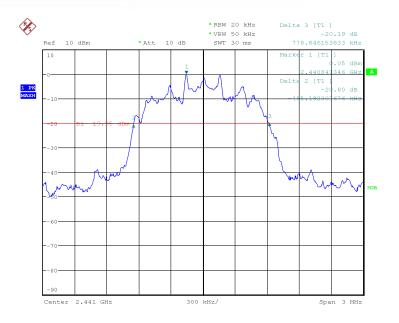
Date: 23.FEB.2013 11:03:08

Fig.108 20dB Bandwidth: π/4 DQPSK, Ch78



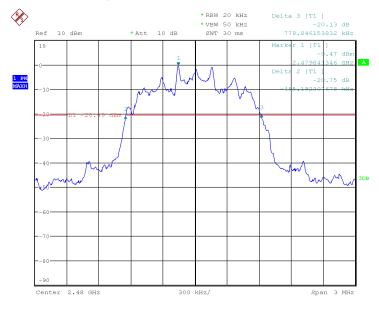
Date: 23.FEB.2013 11:05:17

Fig.109 20dB Bandwidth: 8DPSK, Ch0



Date: 23.FEB.2013 11:07:40

Fig.110 20dB Bandwidth: 8DPSK, Ch39



Date: 23.FEB.2013 11:10:52

Fig.111 20dB Bandwidth: 8DPSK, Ch78

5.7. Carrier Frequency Separation

Measurement Limit:

Standard	Limit (KHz)	
FCC 47 CFR Part 15.247 (a) (1)	Over 25KHz or (2/3)*20dB bandwidth	

The measurement is according to Public notice DA 00-705 and ANSI C63.4.

Measurement Result:



For GFSK

Channel	Carrier separation (KHz)		Conclusion
39	Fig.112	1004.81	Р

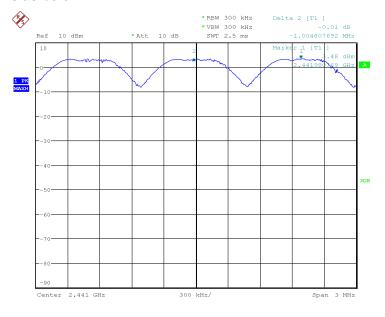
For $\pi/4$ DQPSK

Channel	Carrier separation (KHz)		Conclusion
39	Fig.113	Fig.113 985.58	

For 8DPSK

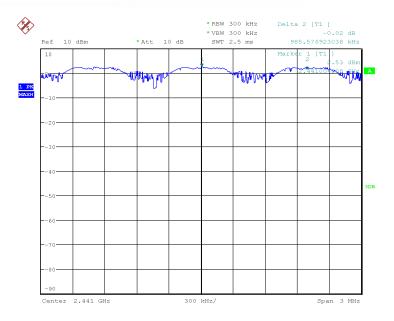
Channel	Carrier separation (KHz)		Conclusion
39	Fig.114	990.38	Р

Conclusion: PASS
Test graphs as below:



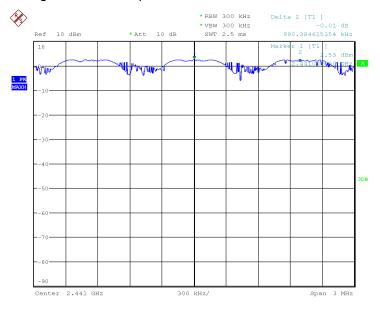
Date: 10.DEC.2012 14:29:35

Fig.112 Carrier separation measurement: GFSK, Ch39



Date: 10.DEC.2012 14:32:59

Fig.113 Carrier separation measurement: π/4 DQPSK, Ch39



Date: 10.DEC.2012 14:36:15

Fig.114 Carrier separation measurement: 8DPSK, Ch39

5.8. Number Of Hopping Channels

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a)(1)(iii)	At least 15 non-overlapping channels

The measurement is according to Public notice DA 00-705 and ANSI C63.4.

Measurement Result:



For GFSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.115	70	Р
40~78	Fig.116	79	Р

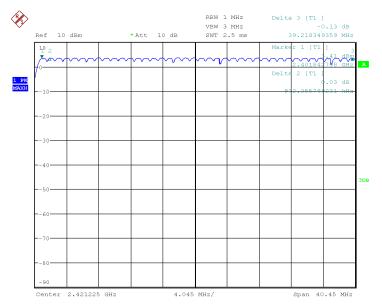
For $\pi/4$ DQPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.117	70	Р
40~78	Fig.118	79	Р

For 8DPSK

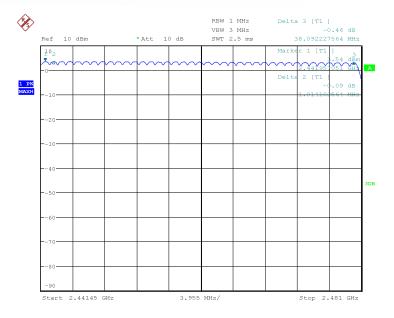
Channel	Number of hopping channels		Conclusion
0~39	Fig.119	79	Р
40~78	Fig.120	79	Р

Conclusion: PASS
Test graphs as below:



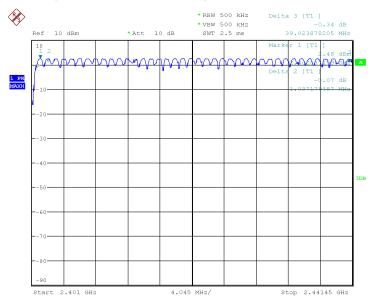
Date: 10.DEC.2012 17:03:51

Fig.115 Number of hopping frequency: GFSK, Ch0~39



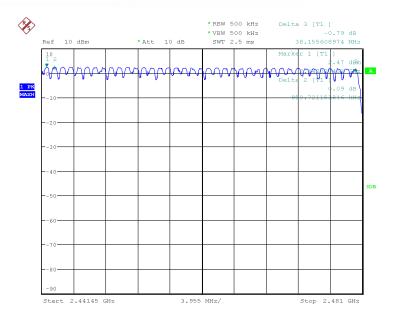
Date: 10.DEC.2012 17:11:14

Fig.116 Number of hopping frequency: GFSK, Ch40~78



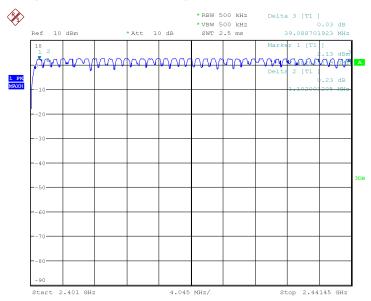
Date: 10.DEC.2012 17:17:58

Fig.117 Number of hopping frequency: $\pi/4$ DQPSK, Ch0~39



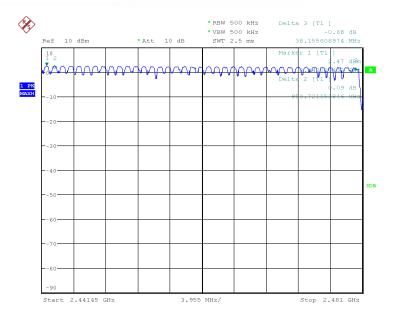
Date: 10.DEC.2012 17:19:11

Fig.118 Number of hopping frequency: $\pi/4$ DQPSK, Ch40~78



Date: 10.DEC.2012 17:22:26

Fig.119 Number of hopping frequency: 8DPSK, Ch0~39



Date: 10.DEC.2012 17:20:24

Fig.120 Number of hopping frequency: 8DPSK, Ch40~78

5.9. AC Powerline Conducted Emission

Test Condition

Voltage (V)	Frequency (Hz)	
120V	60	

Measurement Result and Limit:

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBuV)	Result (dBuV)	Conclusion
0.15 to 0.5	66 to 56	With Charger	
0.5 to 5	56	Fig 121	D
5 to 30	60	Fig.121	r

NOTE: The limit decrease linearly with the logarithm of the frequency in the range $0.15\,$ MHz to 0.5MHz.

Bluetooth (Average Limit)

Frequency range (MHz)	Average Limit (dBuV)	Result (dBuV)	Conclusion
0.15 to 0.5	66 to 56	With Charger	
0.5 to 5	56	Fig.122	Р



NOTE: The limit decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

The measurement is according to Public notice DA 00-705 and ANSI C63.4.

Conclusion: PASS
Test graphs as below:

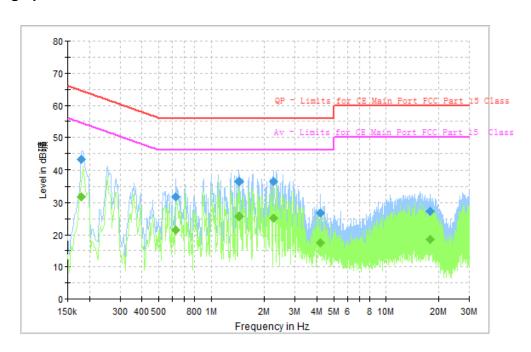


Fig.121 AC powerline Conducted Emission

Final Result1

Freque ncy (MHz)	QuasiP eak (dBuV)	Meas. Time (ms)	Bandw idth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit(d BuV)
0.1798 50	43.1	1000.0	9.000	On	L1	10.2	21.4	64.5
0.6238 69	31.8	1000.0	9.000	On	L1	10.1	24.2	56.0
1.4447 44	36.6	1000.0	9.000	On	L1	9.9	19.4	56.0
2.2544 25	36.6	1000.0	9.000	On	L1	9.8	19.4	56.0
4.1834 81	26.8	1000.0	9.000	On	L1	9.8	29.2	56.0
17.892 094	27.3	1000.0	9.000	On	L1	9.9	32.7	60.0

Final Result2



Freque ncy (MHz)	Averag e (dBuV)	Meas. Time (ms)	Bandw idth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit(d BuV)
0.1798 50	31.8	1000.0	9.000	On	L1	10.2	22.7	54.5
0.6238 69	21.5	1000.0	9.000	On	L1	10.1	24.5	46.0
1.4447 44	25.8	1000.0	9.000	On	L1	9.9	20.2	46.0
2.2544 25	25.1	1000.0	9.000	On	L1	9.8	20.9	46.0
4.1834 81	17.4	1000.0	9.000	On	L1	9.8	28.6	46.0
17.892 094	18.6	1000.0	9.000	On	L1	9.9	31.4	50.0

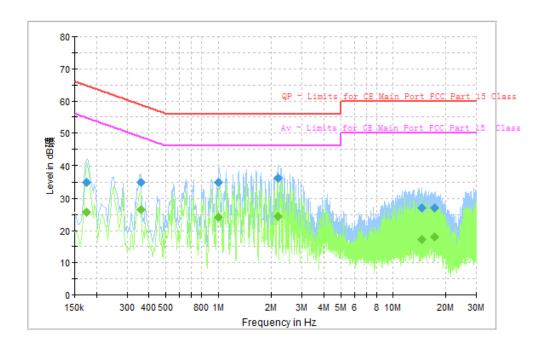


Fig.122 AC powerline Conducted Emission



Final Result1

Freque ncy (MHz)	QuasiP eak (dBuV)	Meas. Time (ms)	Bandw idth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.1761 19	35.0	1000.0	9.000	On	N	10.2	29.7	64.7
0.3589 50	34.9	1000.0	9.000	On	L1	10.1	23.9	58.8
1.0081 88	35.0	1000.0	9.000	On	L1	9.9	21.0	56.0
2.1798 00	36.3	1000.0	9.000	On	L1	9.8	19.7	56.0
14.556 356	26.9	1000.0	9.000	On	L1	9.9	33.1	60.0
17.242 856	27.0	1000.0	9.000	On	L1	9.9	33.0	60.0

Final Result2

Freque ncy (MHz)	Averag e (dBuV)	Meas. Time (ms)	Bandw idth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit(d BuV)
0.1761 19	25.6	1000.0	9.000	On	N	10.2	29.1	54.7
0.3589 50	26.5	1000.0	9.000	On	L1	10.1	22.3	48.8
1.0081 88	24.2	1000.0	9.000	On	L1	9.9	21.8	46.0
2.1798 00	24.4	1000.0	9.000	On	L1	9.8	21.6	46.0
14.556 356	17.3	1000.0	9.000	On	L1	9.9	32.7	50.0
17.242 856	17.9	1000.0	9.000	On	L1	9.9	32.1	50.0



6. Test Equipments and Ancillaries Used For Tests

The test equipments and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial	Manufacture	Calibration
NO.	Equipment	Wiodei	Number	r	Due date
1	Vector Signal	FSQ26	101096	Rohde&Schw	2013-10-17
ı	Analyzer	1 3020	101096	arz	2013-10-17
2	DC Power	ZUP60-14	LOC-220Z00	TDL-Lambda	2013-11-30
2	Supply	20190-14	6	TDL-Lambda	2013-11-30
2	Bluetooth	CBT32	100705	Rohde&Schw	2013-10-16
3	Tester	CD132	100785	arz	2013-10-16

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Universal Radio Communicati on Tester	CMU200	123102	R&S	2013-09-10
2	Test Receiver	ESU40	100307	R&S	2013-11-07
3	Trilog Antenna	VULB9163	19-162515	Schwarzbeck	2014-11-11
4	Double Ridged Guide Antenna	ETS-3117	00135885	ETS	2014-04-29
5	Double Ridged Guide Antenna	ETS-3117	00135890	ETS	2014-04-28
6	Test receiver	ESCI	101235	R&S	2013-11-07



7	2-Line V-Network	ENV216	101380	R&S	2013-11-07
8	Biconical VHF-UHF broad band antenna	SWB-VUBA9 117	9117-266	SCHWARZBE CK	2013/11/11
9	Horn antenna(18.0 -26.5GHz)	3160_09	LM6321	ETS-LINDGR EN	2013/11/22
10	Signal conditioning unit(0.1-18G Hz)	SCU18	10155	R/S	2013/11/03
11	Signal conditioning unit(0.1-18G Hz)	SCU18	10146	R/S	2013/11/03
12	Horn antenna(18.0 -26.5GHz)	3160_09	00086671	ETS-LINDGR EN	2013/06/15
13	Amplifier	AFS4-001026 50-42-8P-4	1405286	MITEQ	2013/06/09
14	Amplifier	SCV26	10025	R&S	2013/11/09

Anechoic chamber

Fully anechoic chamber by Frankonia German.

7. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 30 °C
-------------	----------------------------

Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz



Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

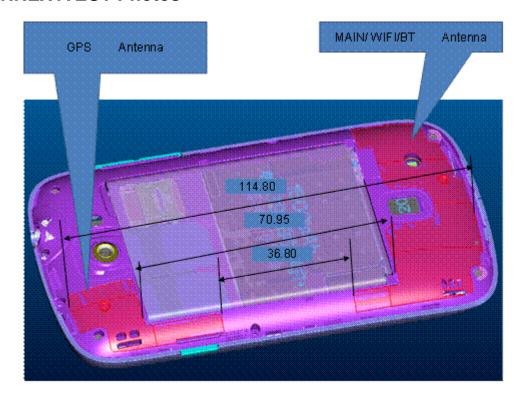
Fully-anechoic chamber1 (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Fully-anechoic chamber2 (Tapered Section: 8.75 meters×3.66 meters, Rectangular Section: 7.32 meters×3.97 meters×3.66 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C , Max. = 30 °C	
Relative humidity	Min. = 35 %, Max. = 60 %	
Shielding effectiveness	> 110 dB	
Electrical insulation	> 10 kΩ	
Ground system resistance	< 0.5 Ω	
Uniformity of field strength	Between 0 and 6 dB, from 30MHz to	

ANNEX A EUT Photos



ANNEX B Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

********END OF REPORT********