



TEST REPORT

No. 2013BT02092

For

Client : Shanghai SIMCom Wireless Solutions Co.,Ltd.

Production : GSM/GPRS(850/900/1800/1900MHz)+

BT Wireless Data Module

Model Name : SIM800

Hardware Version: V2.01

Software Version: SIM800 R13.08

FCC ID: UDV-201314

Issued date: 2014-01-13



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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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 SIM800 , supporting BT, manufactured by Shenyang Simcom Technology Ltd. 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: 86-21-63843300
Fax: 86-21-63843301
FCC Registration NO.: 489729

1.3.2. Testing Environment


Normal Temperature: 15-35°C
Extreme Temperature: N/A
Relative Humidity: 20-75%

1.3.3. Project data

Project Leader: Gong Yujuan
Testing Start Date: Dec 24, 2013
Testing End Date: Jan 09, 2014

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: Shanghai SIMCom Wireless Solutions Co.,Ltd.
Address /Post: Building A,SIM Technology Building,No.633,Jinzhong Road,Changning District,Shanghai R.R.China
Country: China

1.4.2. Manufacturer Information

Company Name: Shenyang Simcom Technology Ltd.
Address /Post: No.37, Shenbei Rd, Shenbei New Aear, Shenyang,P.R.China
Country: China

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

2.1. About EUT

EUT Description	GSM/GPRS(850/900/1800/1900MHz)+BT Wireless Data Module
Model name	SIM800
Bluetooth Frequency	2402MHz-2480MHz
Bluetooth Channel	Channel0-Channel78
Bluetooth Modulation	GMSK; $\pi/4$ DQPSK;8DPSK
Extreme Temperature	N/A
Nominal Voltage	3.8V
Extreme High Voltage	4.2V
Extreme Low Voltage	3.6V

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
N11	862951020007549	V2.01	SIM800 R13.08	2013-12-24

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

2.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	---	---



3. Reference Documents

3.1. Reference Documents for testing

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

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

4. Summary of Test Results

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

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

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

P	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

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 $\pm 2\%$.

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 Output Power (dBm)	7.01	7.02	7.03	P
	Fig.1	Fig.2	Fig.3	

For $\pi/4$ DQPSK

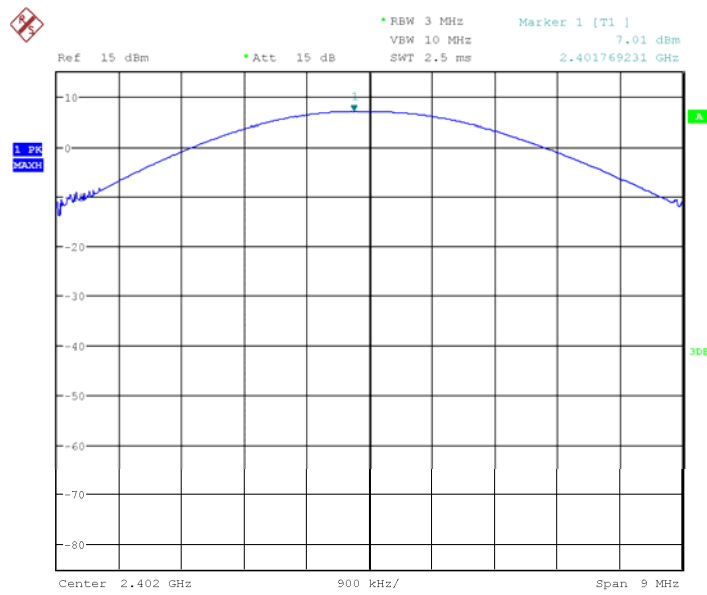
Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	5.88	5.87	5.94	P
	Fig.4	Fig.5	Fig.6	

For 8DPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	6.00	6.02	6.08	P
	Fig.7	Fig.8	Fig.9	

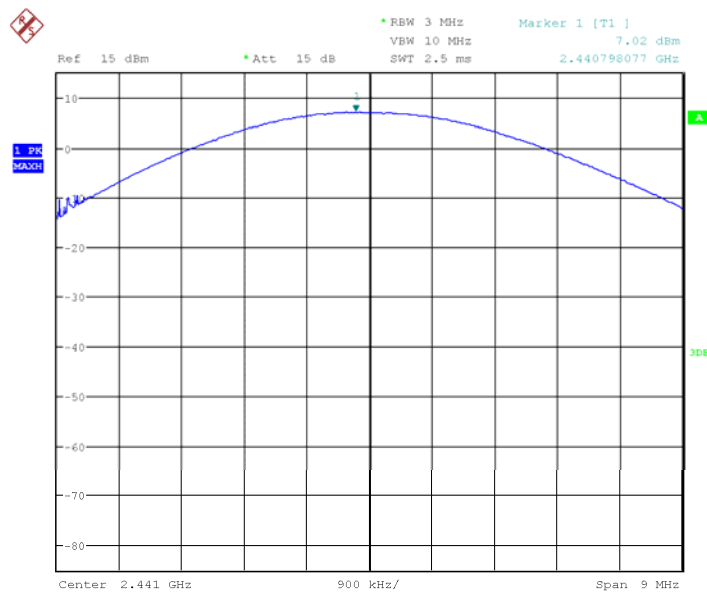
Conclusion: PASS

Test graphs an below



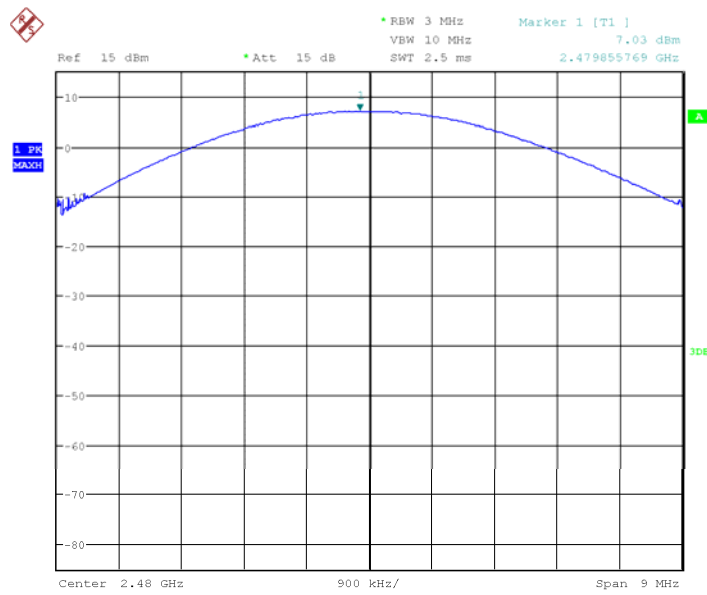
Date: 26.DEC.2013 11:36:46

Fig.1 Peak Conducted Output Power CH0, DH1



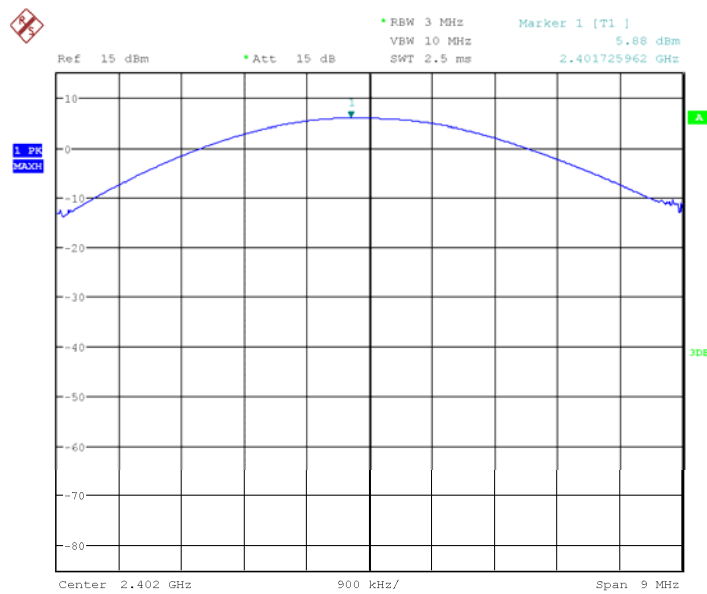
Date: 26.DEC.2013 13:00:28

Fig.2 Peak Conducted Output Power CH39, DH1



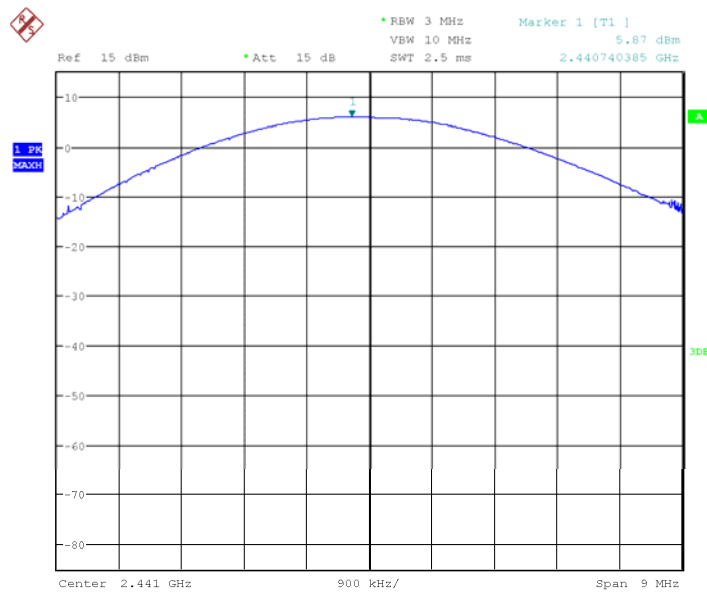
Date: 26.DEC.2013 13:01:04

Fig.3 Peak Conducted Output Power CH78, DH1



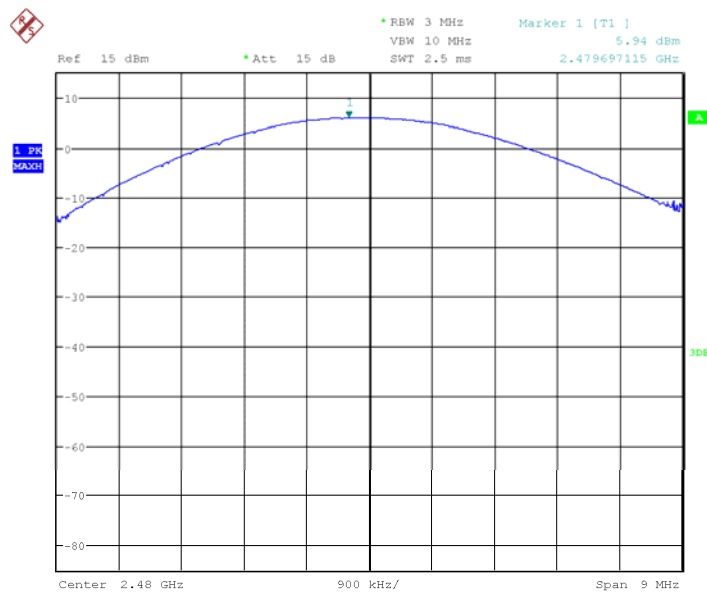
Date: 26.DEC.2013 13:02:16

Fig.4 Peak Conducted Output Power CH0, 2DH1



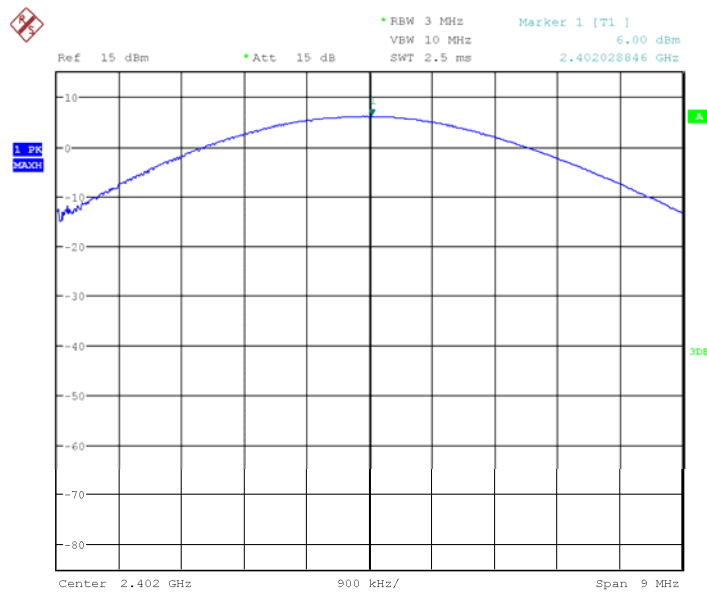
Date: 26.DEC.2013 13:02:41

Fig.5 Peak Conducted Output Power CH39, 2DH1



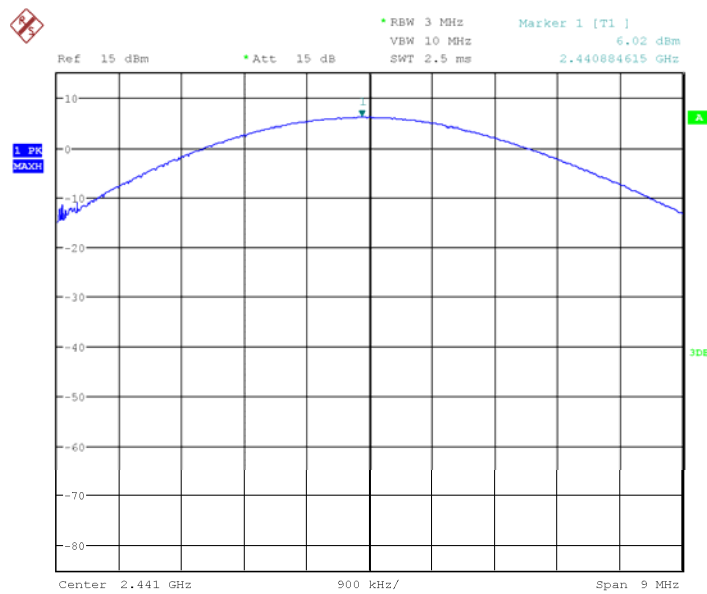
Date: 26.DEC.2013 13:03:06

Fig.6 Peak Conducted Output Power CH78, 2DH1



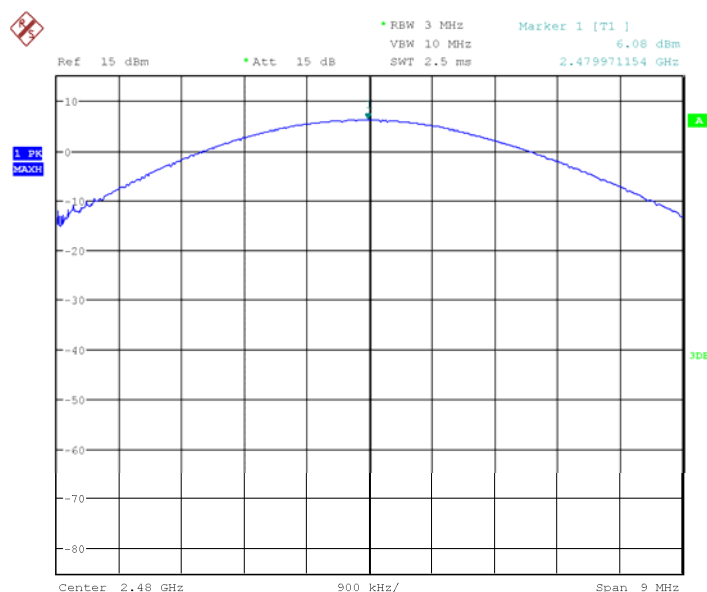
Date: 26.DEC.2013 13:04:30

Fig.7 Peak Conducted Output Power CH0, 3DH1



Date: 26.DEC.2013 13:04:52

Fig.8 Peak Conducted Output Power CH39, 3DH1



Date: 26.DEC.2013 13:05:17

Fig.9 Peak Conducted Output Power CH78, 3DH1

5.2. Frequency Band Edges-Conducted

Measurement result:

For GFSK

Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.10	-42.89	P
	Hopping ON	Fig.11	-42.89	P
78	Hopping OFF	Fig.12	-48.07	P
	Hopping ON	Fig.13	-48.07	P

For $\pi/4$ DQPSK

Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.14	-41.66	P
	Hopping ON	Fig.15	-41.69	P
78	Hopping OFF	Fig.16	-47.14	P
	Hopping ON	Fig.17	-47.14	P

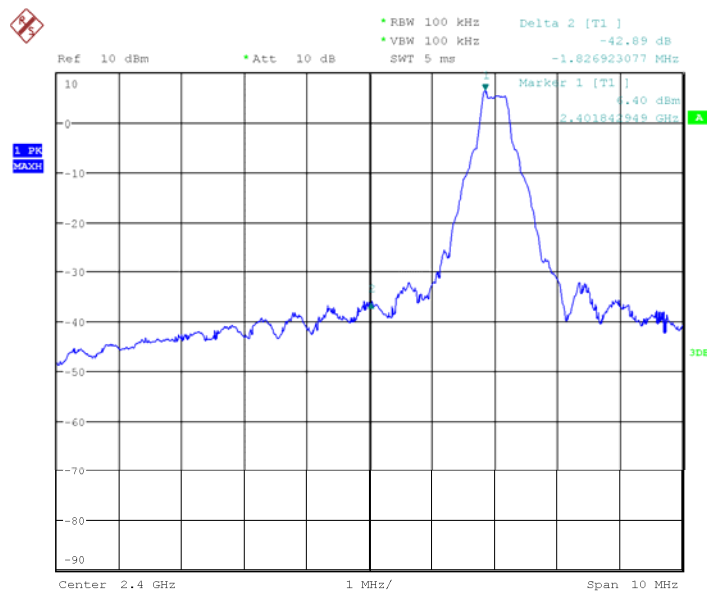
For 8DPSK



Channel	Hopping	Band Edge Power (dBc)		Conclusion
0	Hopping OFF	Fig.18	-41.75	P
	Hopping ON	Fig.19	-41.75	P
78	Hopping OFF	Fig.20	-47.25	P
	Hopping ON	Fig.21	-47.25	P

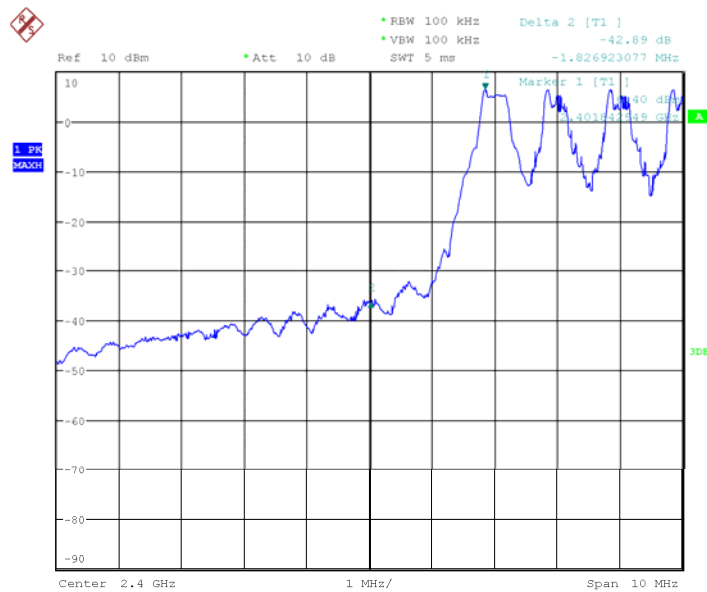
Conclusion: PASS

Test graphs an below



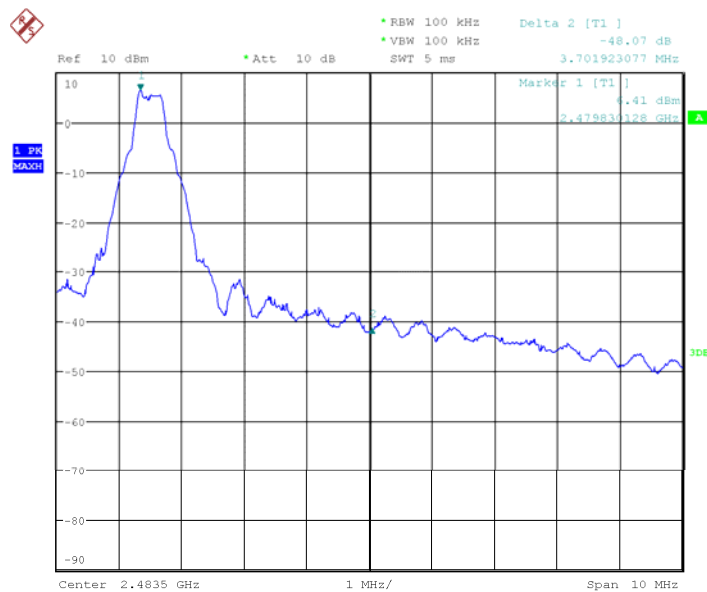
Date: 26.DEC.2013 13:07:22

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



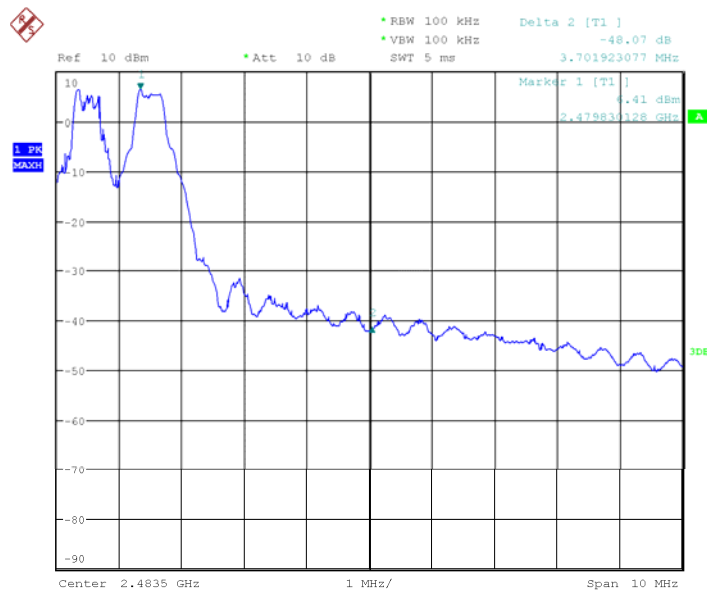
Date: 26.DEC.2013 13:09:59

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



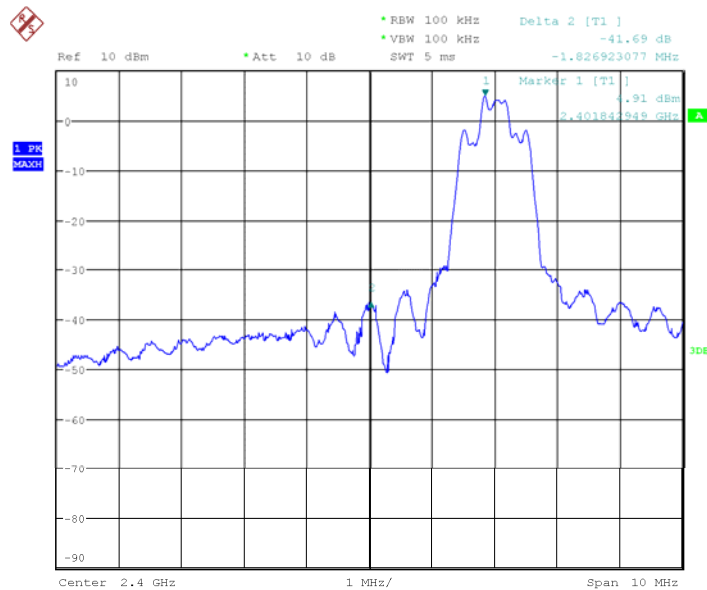
Date: 26.DEC.2013 13:11:40

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



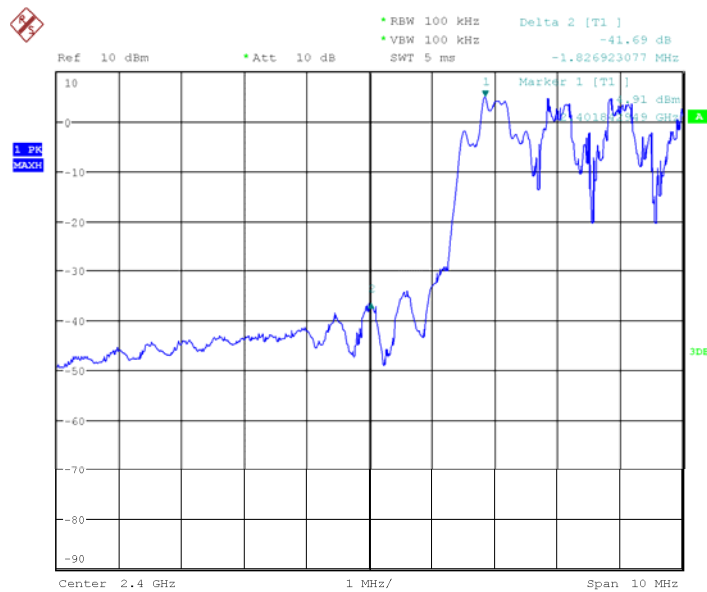
Date: 26.DEC.2013 13:14:33

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



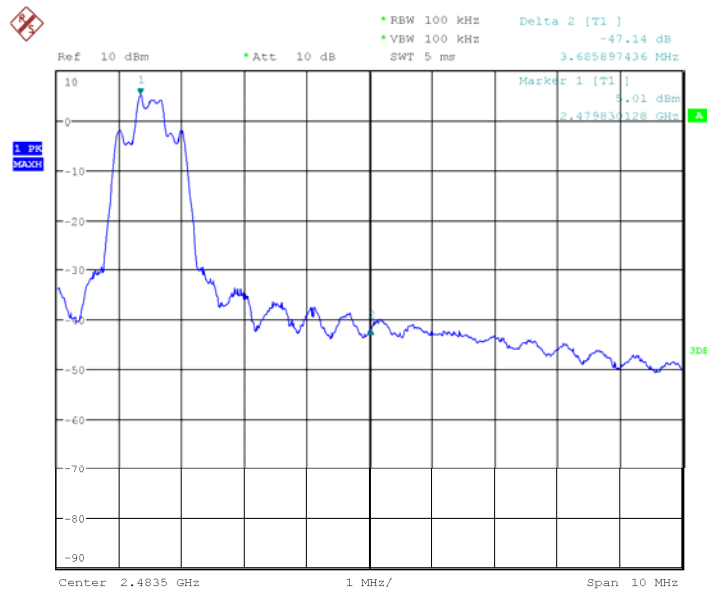
Date: 26.DEC.2013 13:16:48

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



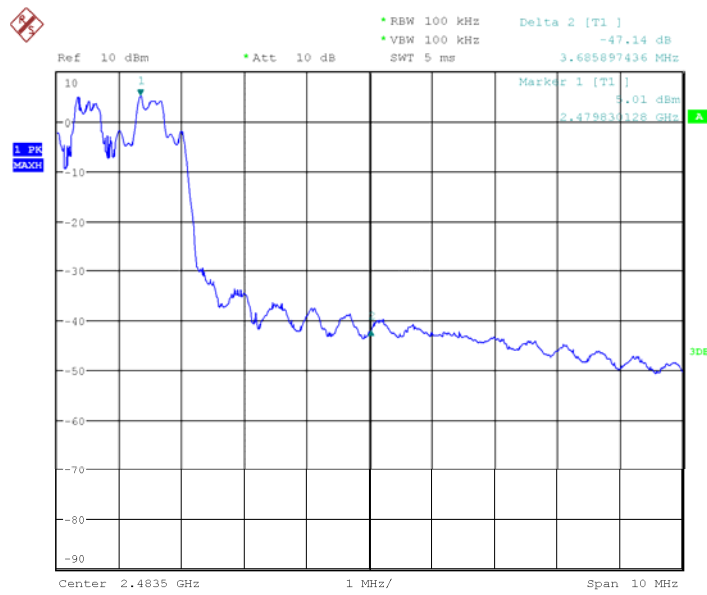
Date: 26.DEC.2013 13:48:57

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



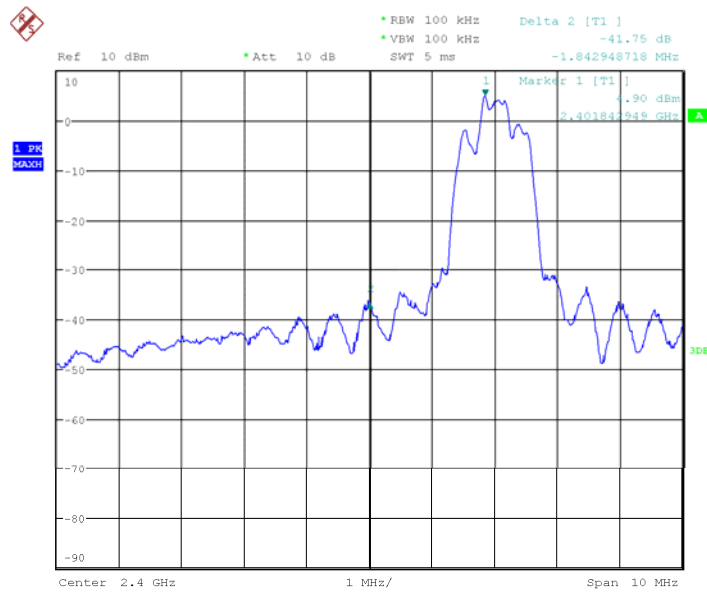
Date: 26.DEC.2013 13:50:18

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



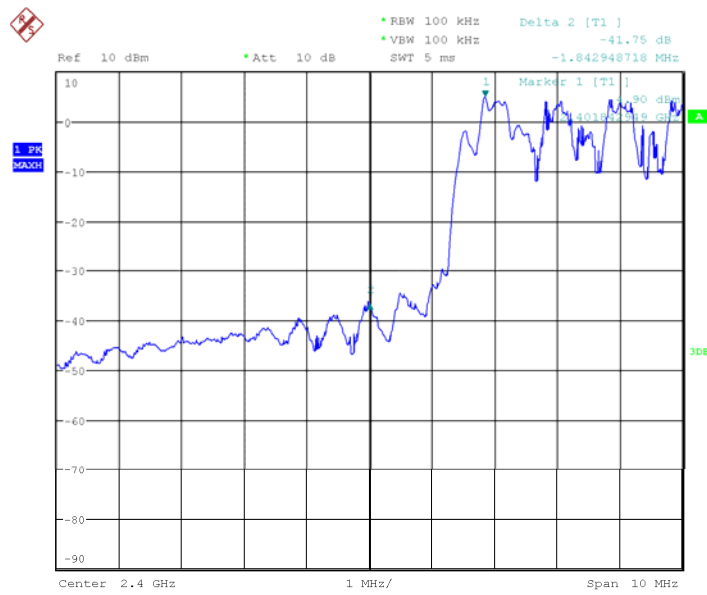
Date: 26.DEC.2013 13:55:09

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



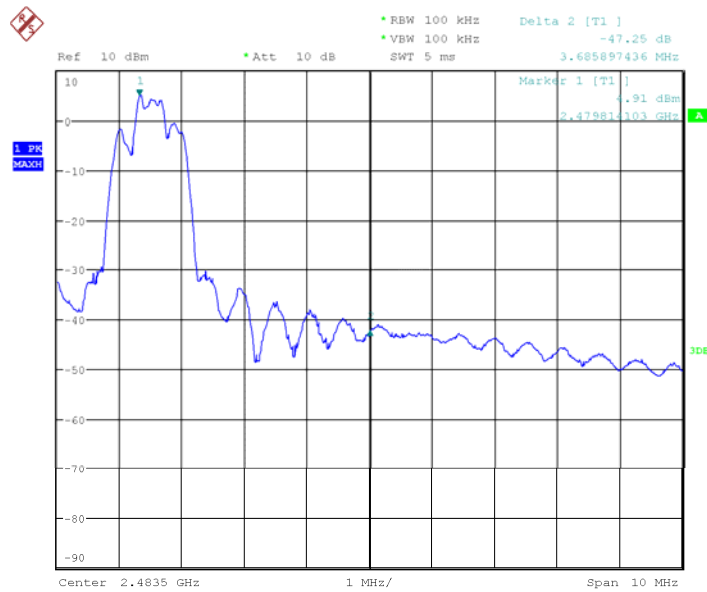
Date: 26.DEC.2013 13:57:06

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



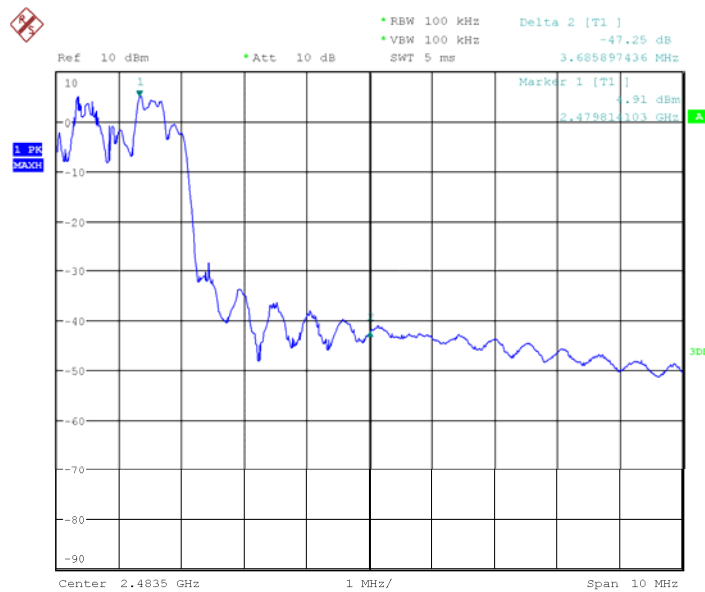
Date: 26.DEC.2013 14:02:53

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



Date: 26.DEC.2013 14:04:53

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



Date: 26.DEC.2013 14:08:03

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 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
Ch0 2402MHz	Center Freq.	Fig.22	P
	30MHz~26GHz	Fig.23	P
Ch39 2441MHz	Center Freq.	Fig.24	P
	30MHz~26GHz	Fig.25	P
Ch78 2480MHz	Center Freq.	Fig.26	P
	30MHz~26GHz	Fig.27	P

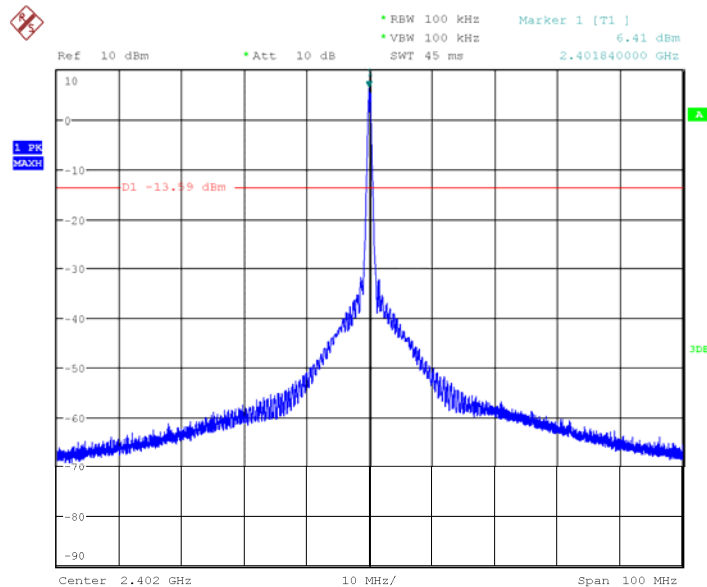
For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.28	P

	30MHz~26GHz	Fig.29	P
Ch39 2441MHz	Center Freq.	Fig.30	P
	30MHz~26GHz	Fig.31	P
Ch78 2480MHz	Center Freq.	Fig.32	P
	30MHz~26GHz	Fig.33	P

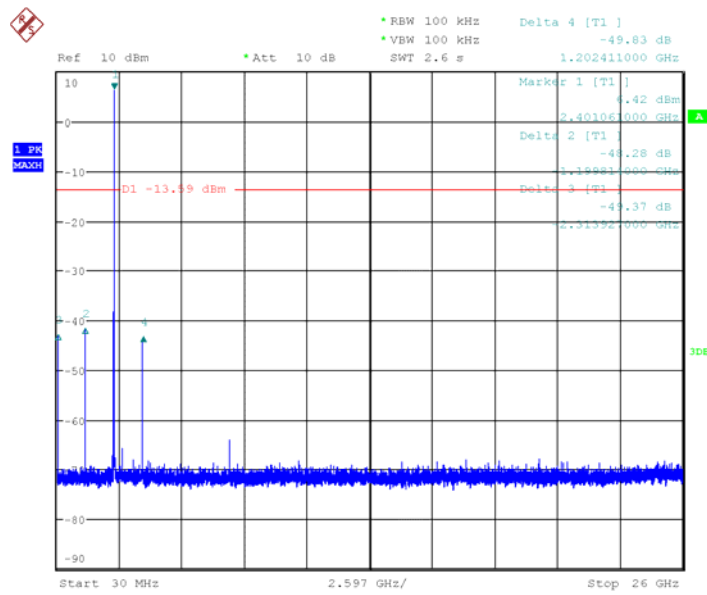
For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.34	P
	30MHz~26GHz	Fig.35	P
Ch39 2441MHz	Center Freq.	Fig.36	P
	30MHz~26GHz	Fig.37	P
Ch78 2480MHz	Center Freq.	Fig.38	P
	30MHz~26GHz	Fig.39	P

Conclusion: PASS
Test graphs as below


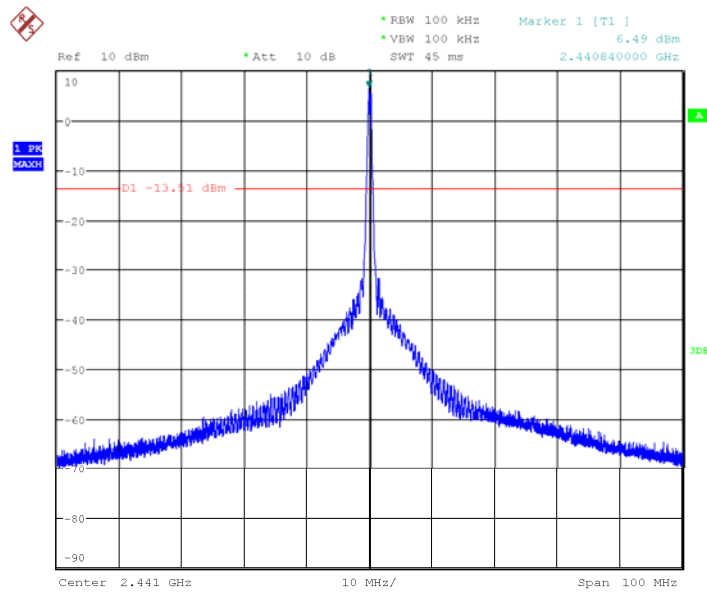
Date: 26.DEC.2013 15:05:45

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



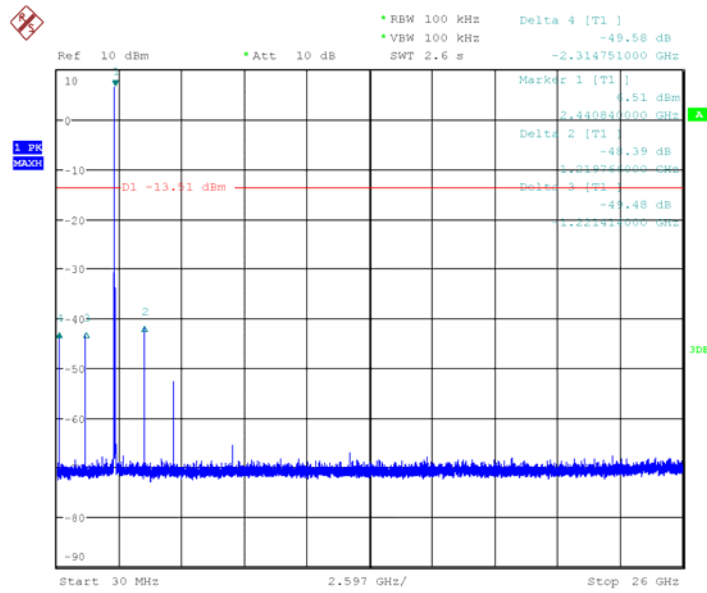
Date: 26.DEC.2013 15:06:18

Fig.23 Conducted spurious emission: GFSK, Ch0, 30MHz~26GHz



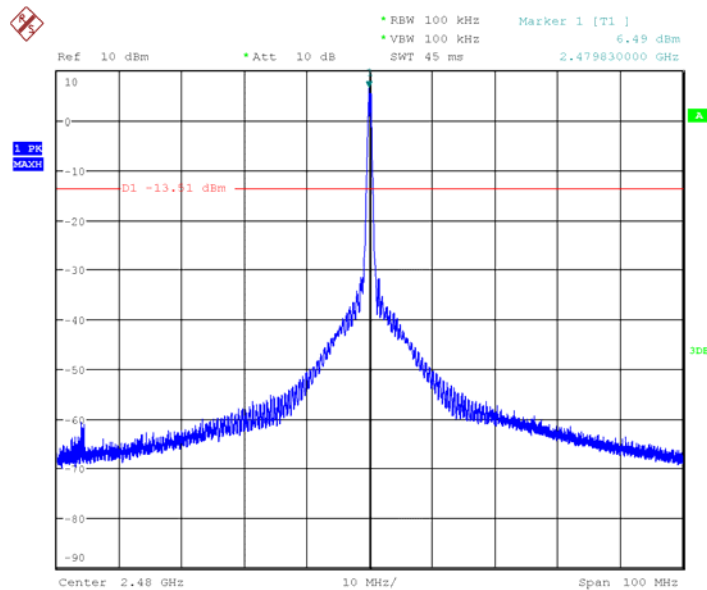
Date: 26.DEC.2013 15:24:50

Fig.24 Conducted spurious emission: GFSK, Ch39, 2441MHz



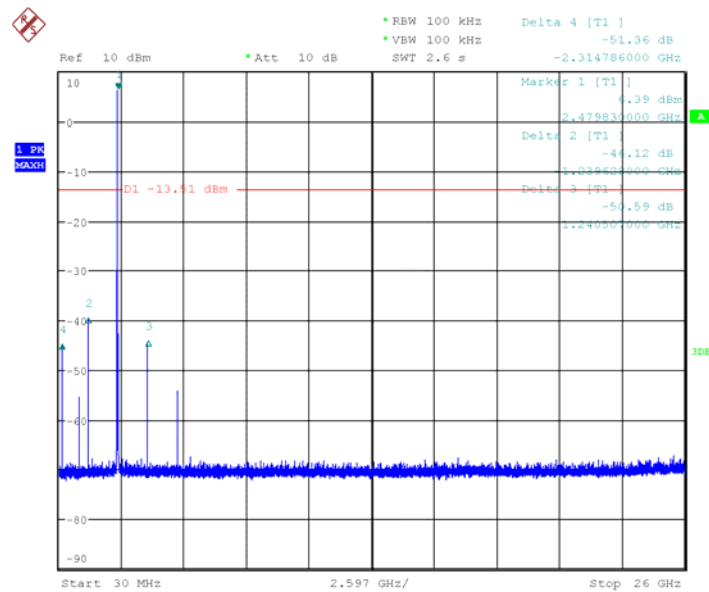
Date: 26.DEC.2013 15:26:40

Fig.25 Conducted spurious emission: GFSK, Ch39, 30MHz~26GHz



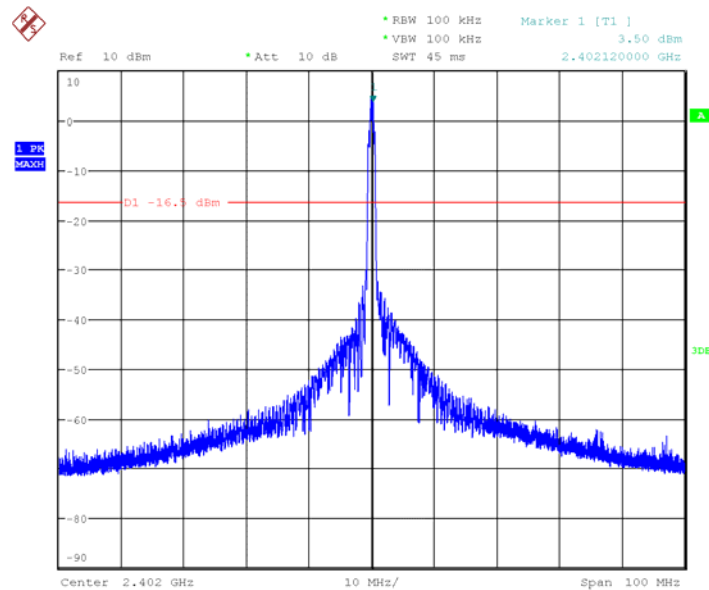
Date: 26.DEC.2013 15:55:44

Fig.26 Conducted spurious emission: GFSK, Ch78, 2480MHz



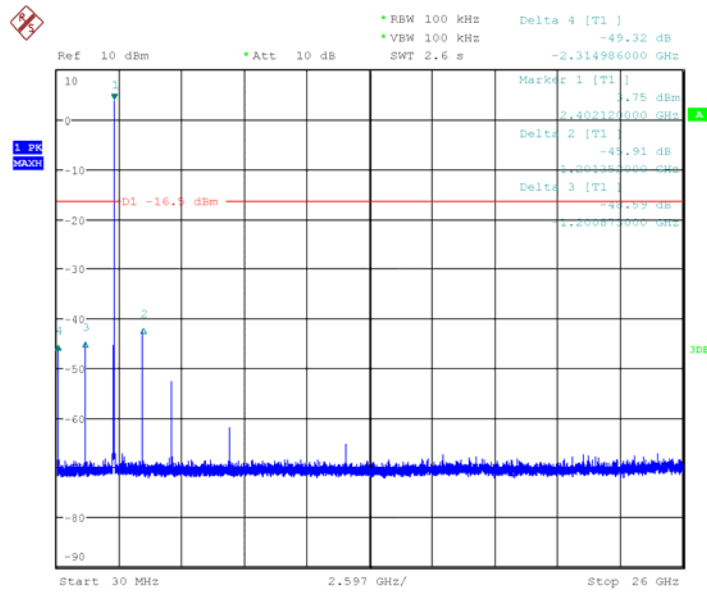
Date: 26.DEC.2013 15:58:50

Fig.27 Conducted spurious emission: GFSK, Ch78, 30MHz~26GHz



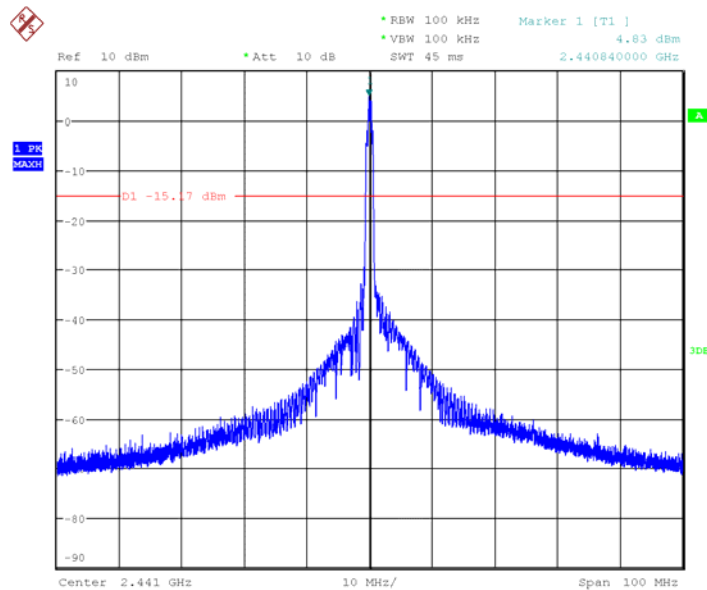
Date: 26.DEC.2013 16:02:16

Fig.28 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 2402MHz



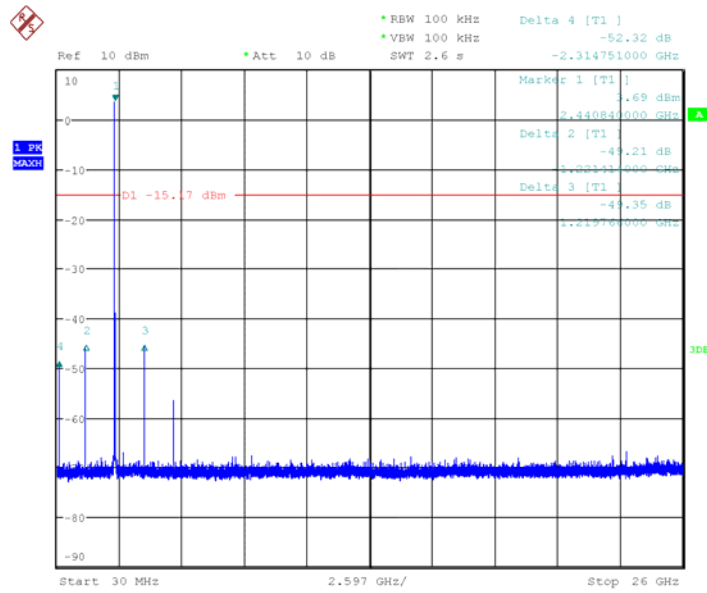
Date: 26.DEC.2013 16:04:48

Fig.29 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 30MHz~26GHz



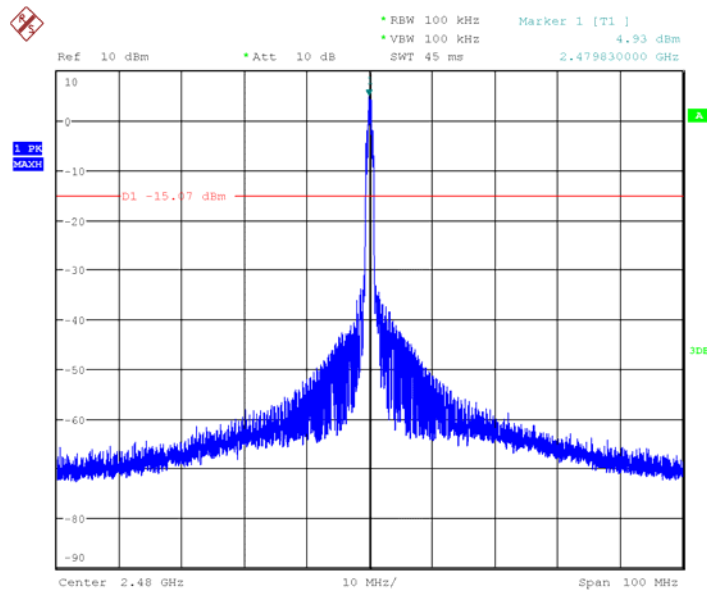
Date: 26.DEC.2013 16:09:11

Fig.30 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 2441MHz



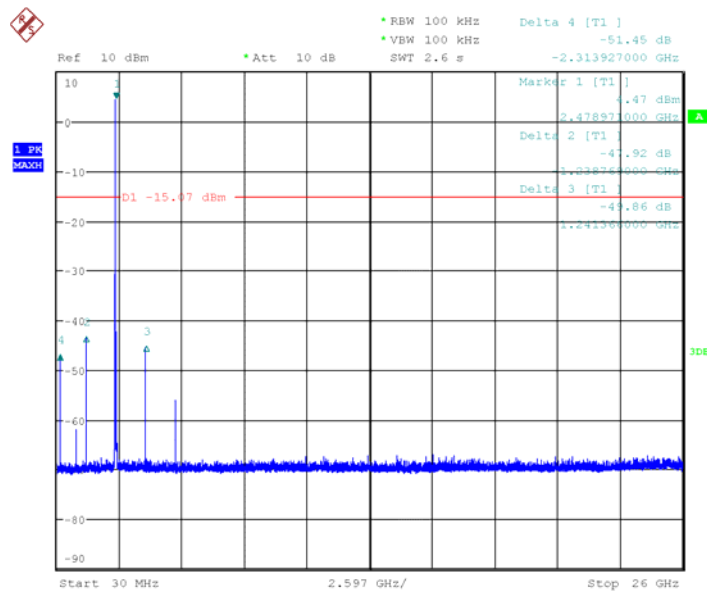
Date: 26.DEC.2013 16:10:39

Fig.31 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 30MHz~26GHz



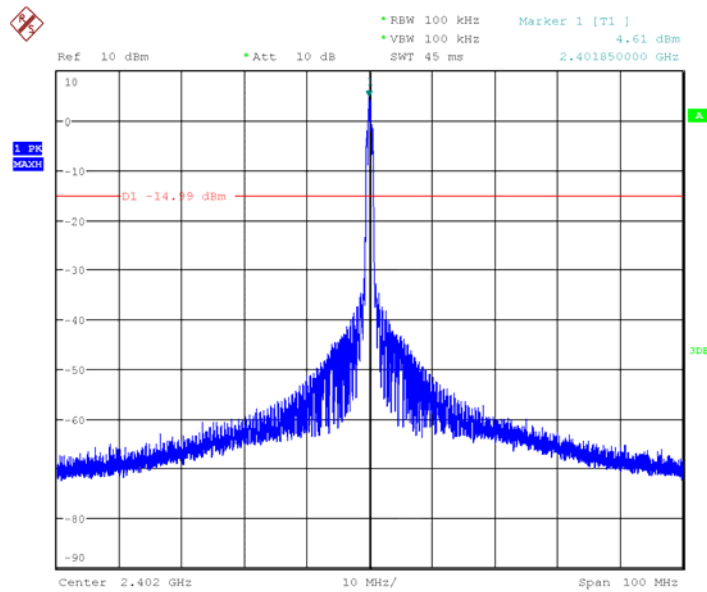
Date: 26.DEC.2013 16:13:20

Fig.32 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 2480MHz



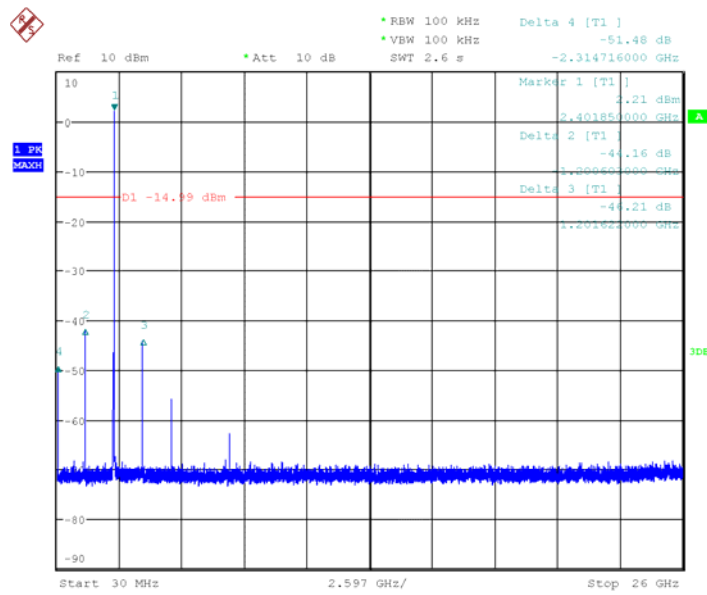
Date: 26.DEC.2013 16:31:01

Fig.33 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 30MHz~26GHz



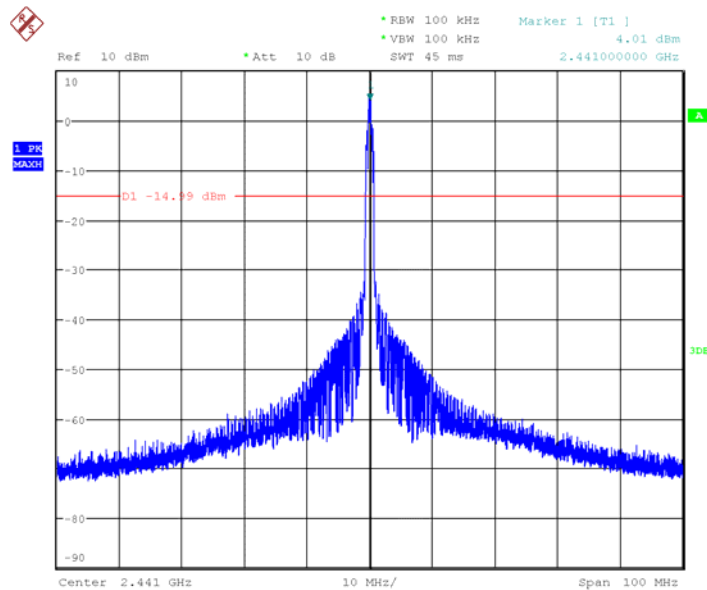
Date: 26.DEC.2013 17:38:01

Fig.34 Conducted spurious emission: 8DPSK, Ch0, 2402MHz



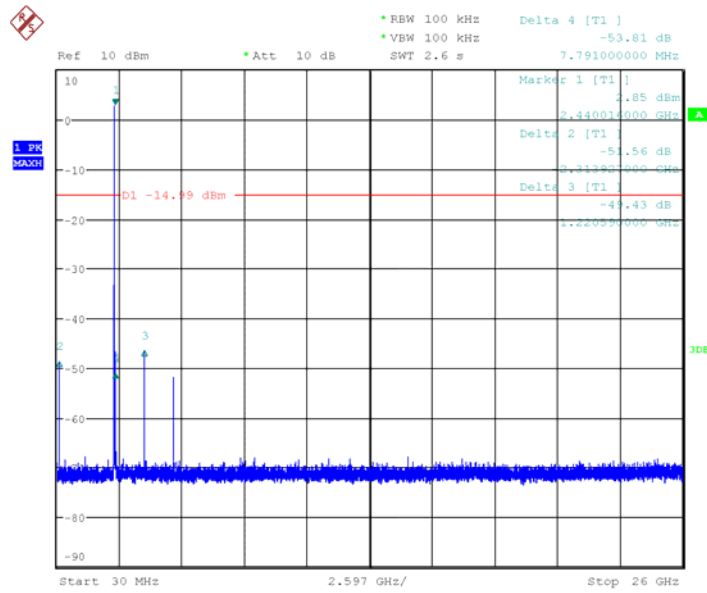
Date: 26.DEC.2013 17:38:49

Fig.35 Conducted spurious emission: 8DPSK, Ch0, 30MHz~26GHz



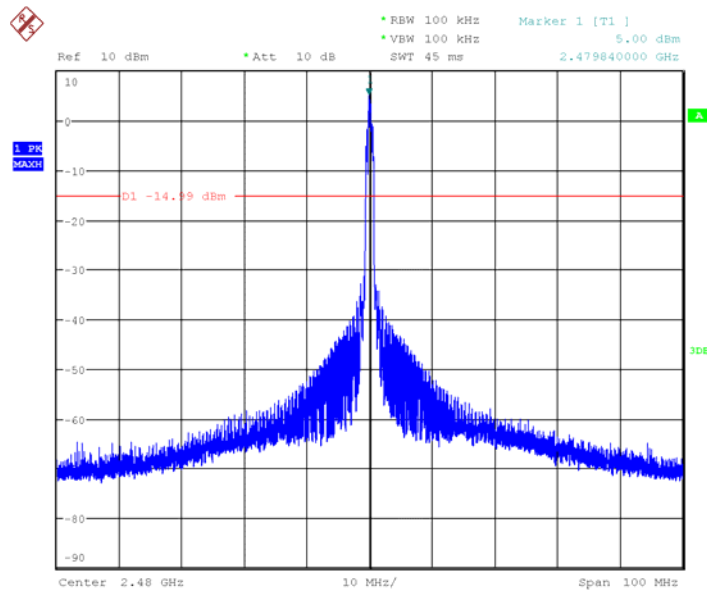
Date: 26.DEC.2013 17:40:32

Fig.36 Conducted spurious emission: 8DPSK, Ch39, 2441MHz



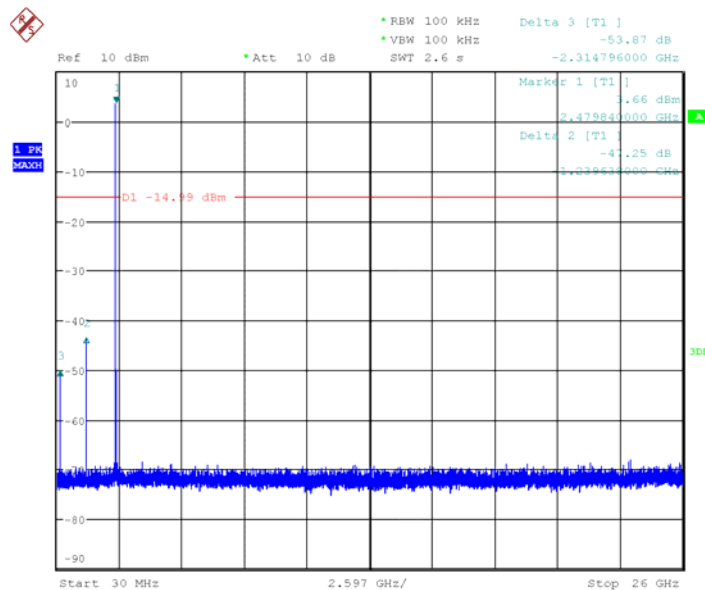
Date: 26.DEC.2013 17:41:12

Fig.37 Conducted spurious emission: 8DPSK, Ch39, 30MHz~26GHz



Date: 26.DEC.2013 17:42:27

Fig.38 Conducted spurious emission: 8DPSK, Ch78, 2480MHz



Date: 26.DEC.2013 17:42:47

Fig.39 Conducted spurious emission: 8DPSK, Ch78, 30MHz~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:

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

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.40	P
	1GHz~3GHz	Fig.41	P
	3GHz~18GHz	Fig.42	P
Power	2.38GHz~2.4GHz	Fig.43	P
Power	2.45GHz~2.5GHz	Fig.44	P
All channels	18GHz~26GHz	Fig.45	P

For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.46	P
	1GHz~3GHz	Fig.47	P
	3GHz~18GHz	Fig.48	P

Power	2.38GHz~2.4GHz	Fig.49	P
Power	2.45GHz~2.5GHz	Fig.50	P
All channels	18GHz~26GHz	Fig.51	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.52	P
	1GHz~3GHz	Fig.53	P
	3GHz~18GHz	Fig.54	P
Power	2.38GHz~2.4GHz	Fig.55	P
Power	2.45GHz~2.5GHz	Fig.56	P
All channels	18GHz~26GHz	Fig.57	P

GFSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
48.002248	36.3	0.61	35.69	V
72.024712	35.8	0.86	34.94	V
96.0007	42.2	1.91	40.29	V
119.99368	35	3.27	31.73	V

GFSK Ch0 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1200.89	38.9	12.82	26.08	V
1298.5176	33.3	12.64	20.66	V

GFSK Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3603.164467	46.6	7.1	39.5	V
4803.9434	47.9	11.93	35.97	V

 $\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
47.996392	35.6	0.61	34.99	V
72.016412	35.3	0.86	34.44	V
96.010348	41.7	1.91	39.79	V

 $\pi/4$ DQPSK Ch0 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1200.8792	36.5	12.82	23.68	V
1244.7908	28.7	12.64	16.06	V

 $\pi/4$ DQPSK Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3602.9404	48.2	7.1	41.1	V
4803.976467	47.8	10.73	37.07	V

8DPSK 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
48.011644	35.3	0.61	34.69	V
72.005108	36.6	0.86	35.74	V
96.00164	42.2	1.91	40.29	V

8DPSK 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1200.898	39.7	12.82	26.88	V
1297.0404	32.8	12.64	20.16	V

8DPSK 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3603.099533	48.2	7.1	41.1	V
7469.987267	44.2	8.72	35.48	V

All Ch 18GHz~26.5GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
19525.786000	49.0	6.97	42.03	V
20684.980000	47.7	6.97	40.73	H
22119.789000	45.3	3.05	42.05	V
23627.899000	43.8	3.05	40.75	H
24606.319000	43.4	3.05	40.35	V
25244.558000	43.6	3.05	40.55	H

Conclusion: PASS

Test graphs as below:

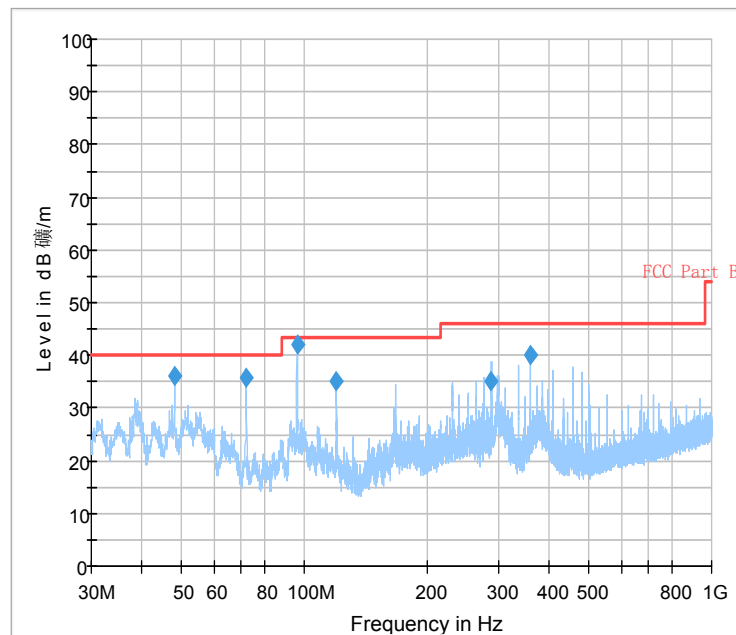


Fig.40 Radiated emission: GFSK, Ch0, 30MHz~1GHz

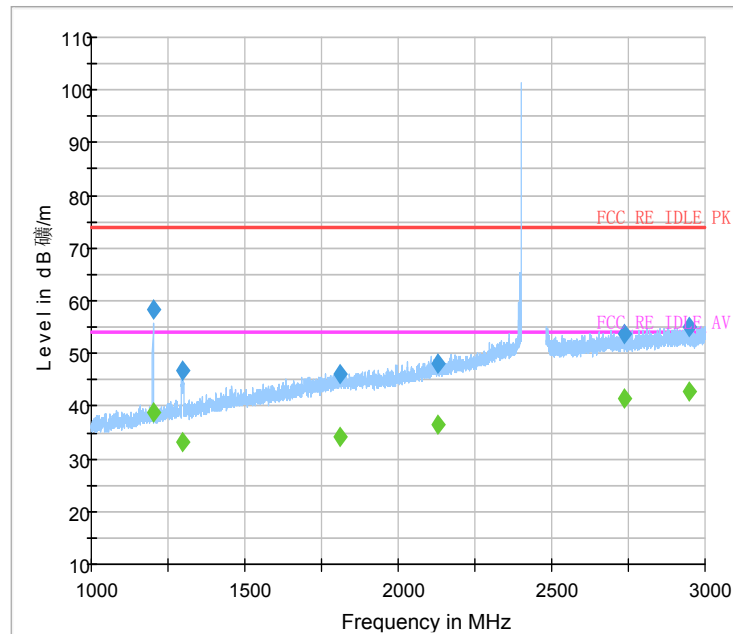


Fig.41 Radiated emission: GFSK, Ch0, 1GHz~3GHz

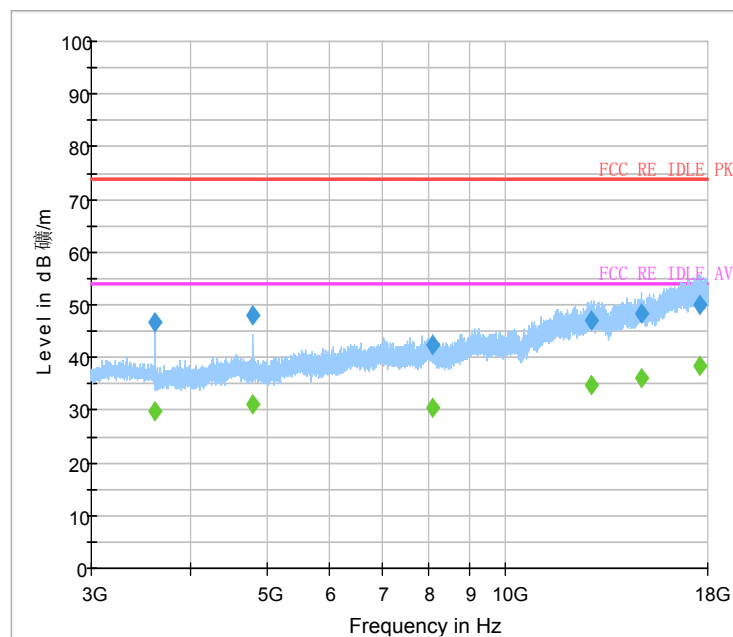


Fig.42 Radiated emission: GFSK, Ch0, 3GHz~18GHz

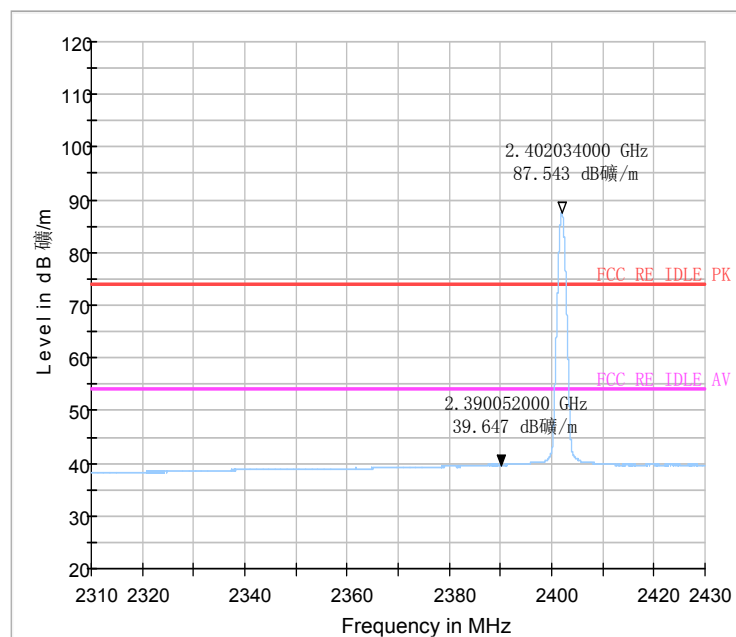
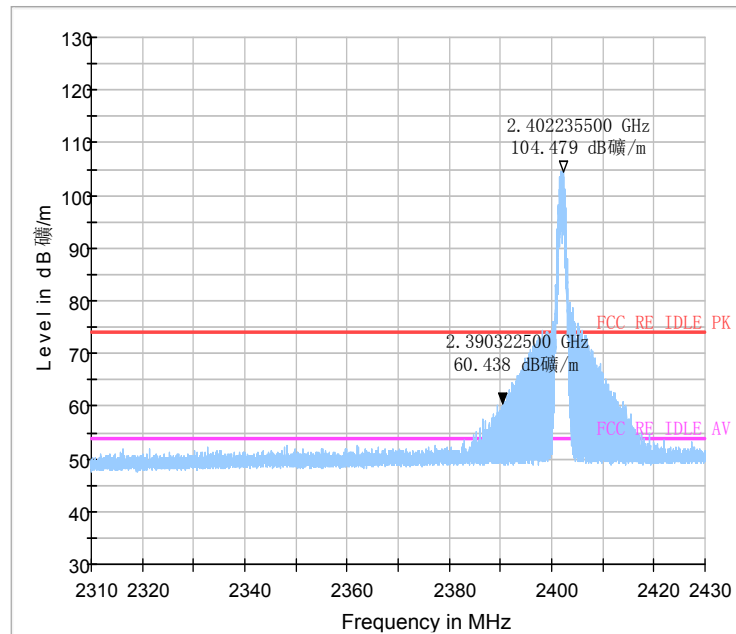


Fig.43 Radiated emission (Power): GFSK, low channel

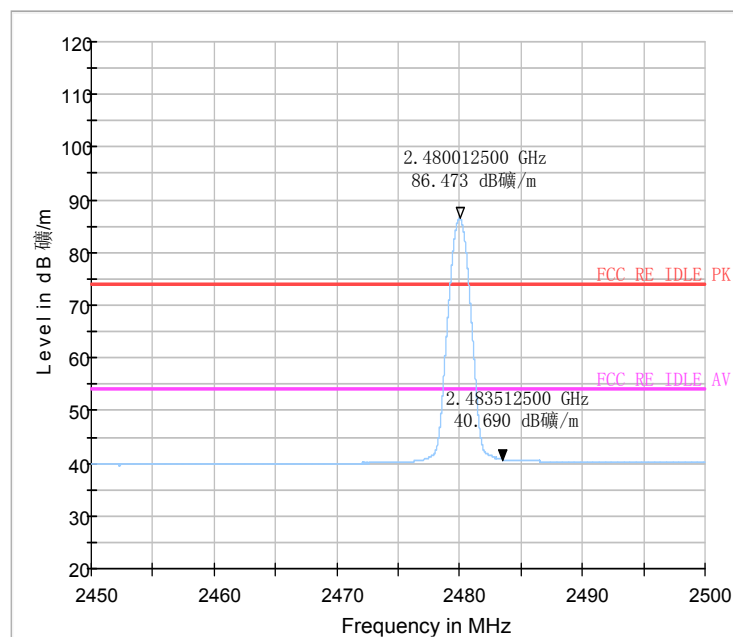
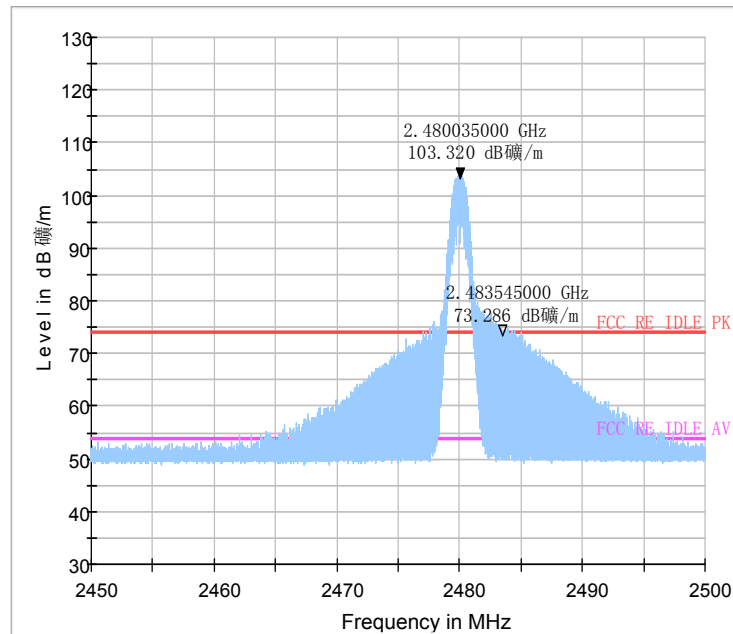


Fig.44 Radiated emission (Power): GFSK, high channel

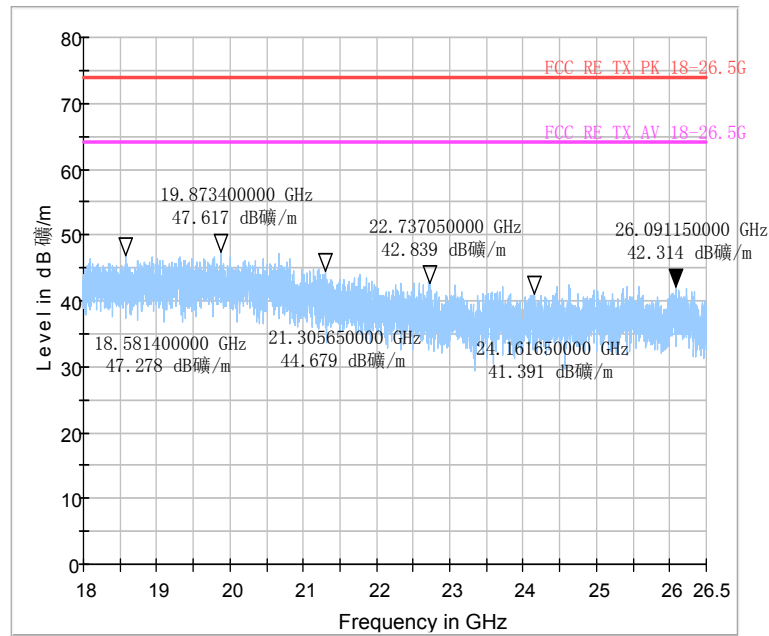


Fig.45 Radiated emission: GFSK, 18 GHz - 26 GHz

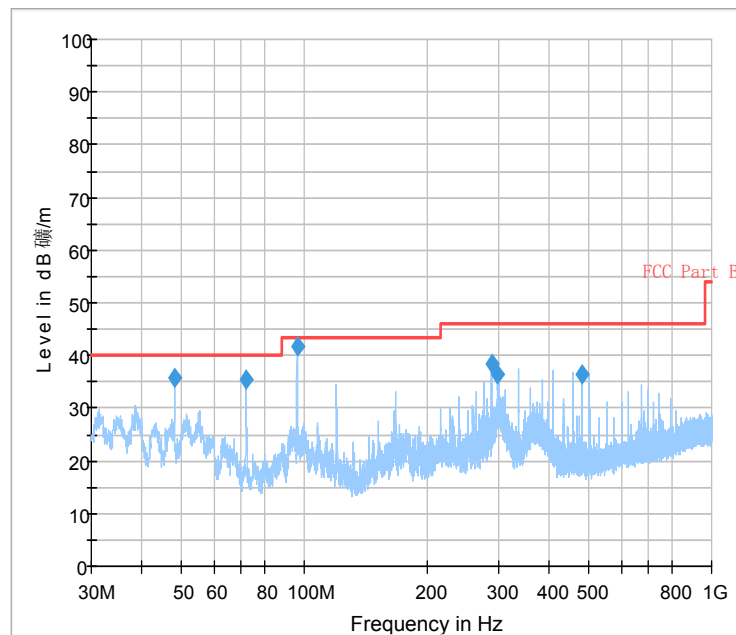


Fig.46 Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz

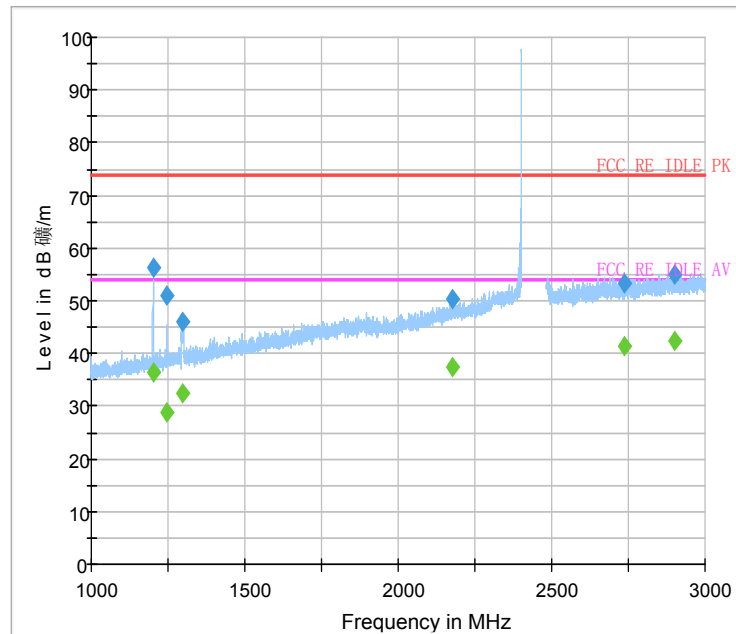


Fig.47 Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz

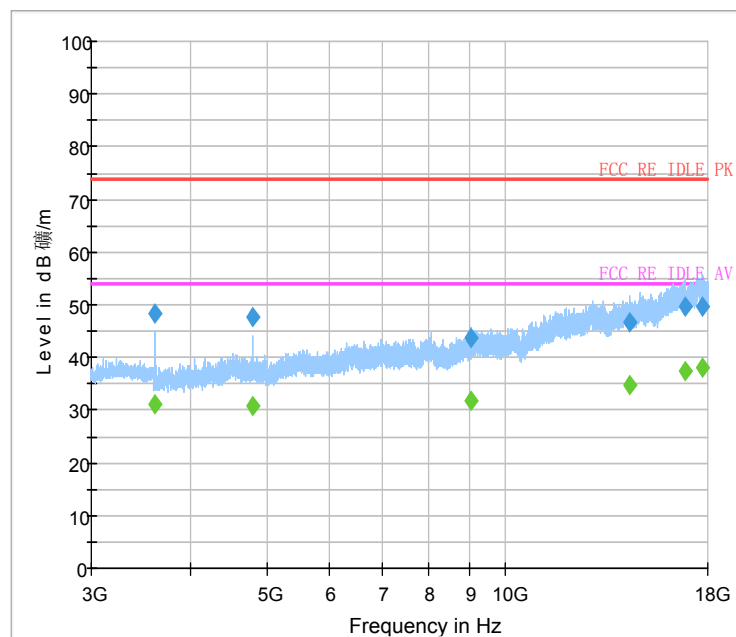


Fig.48 Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz

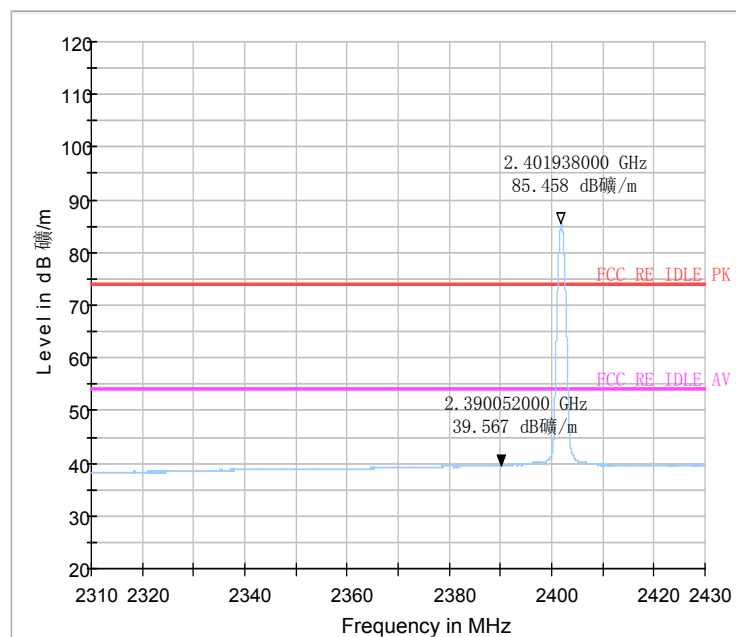
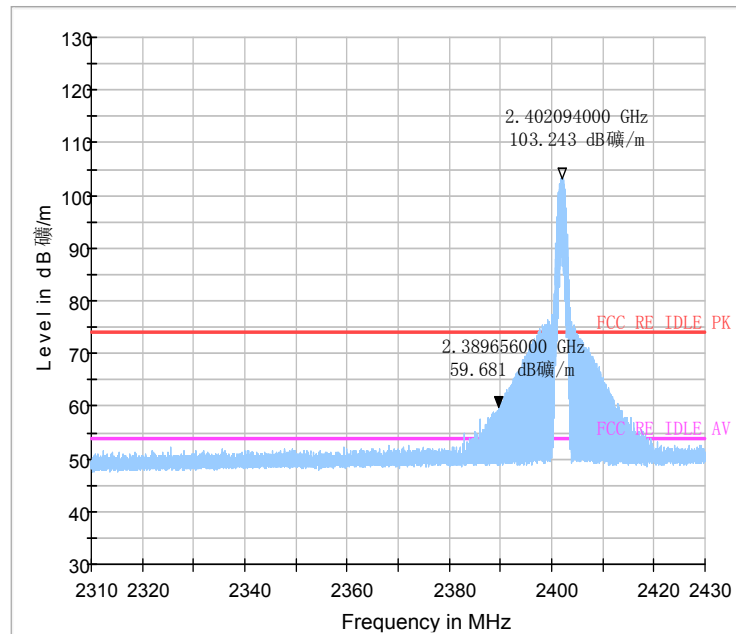


Fig.49 Radiated emission (Power): GFSK, low channel

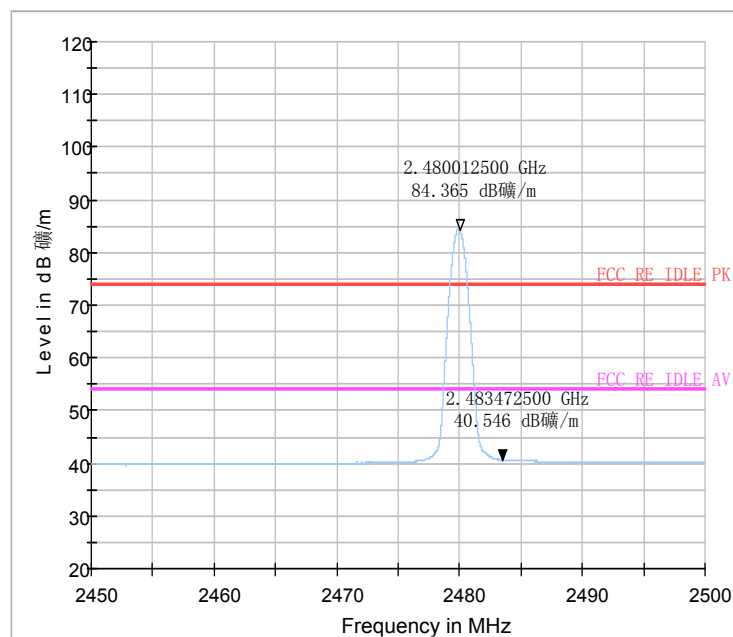
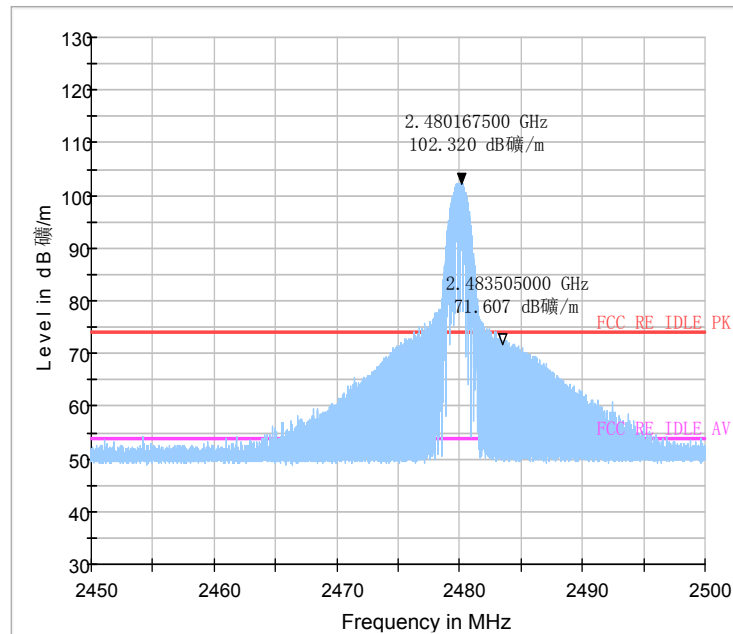


Fig.50 Radiated emission (Power): GFSK, high channel

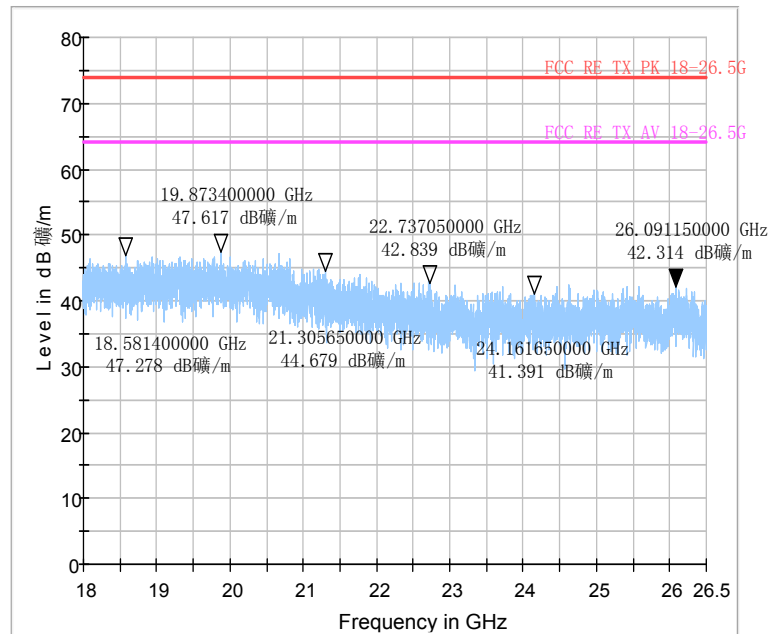


Fig.51 Radiated emission: GFSK, 18 GHz - 26 GHz

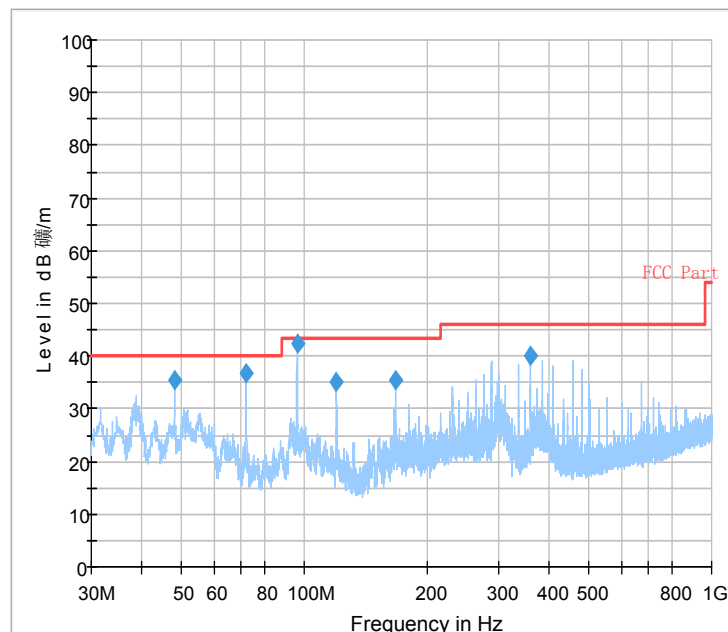


Fig.52 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

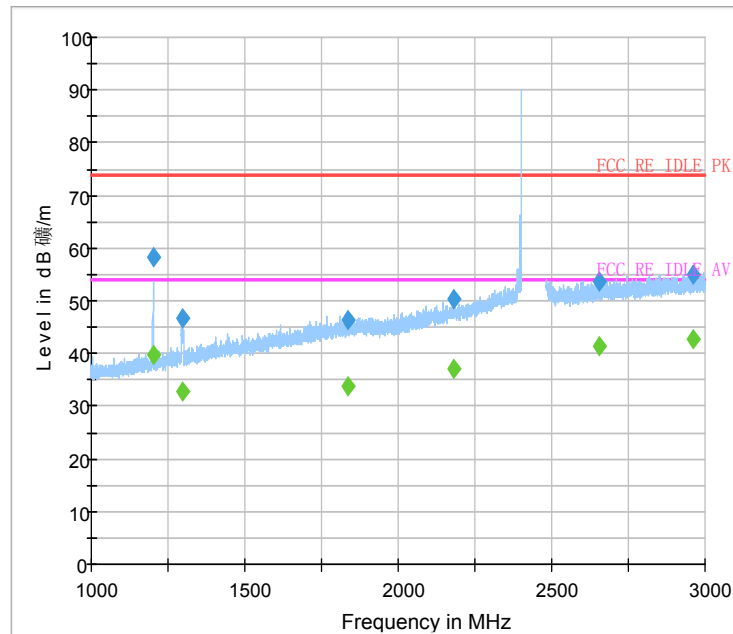


Fig.53 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

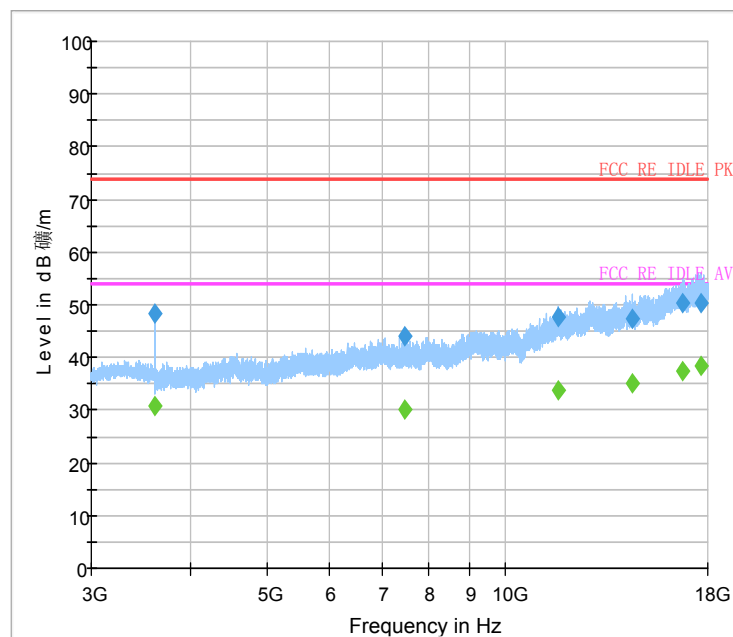


Fig.54 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz

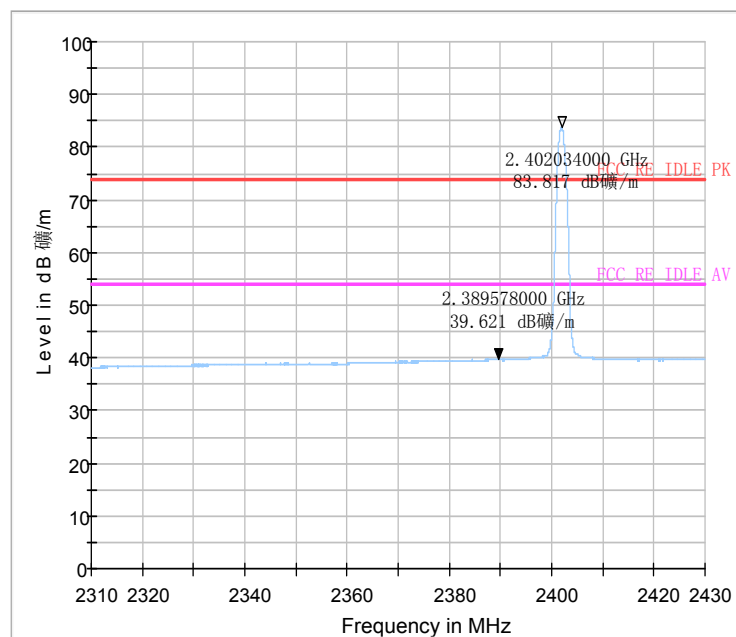
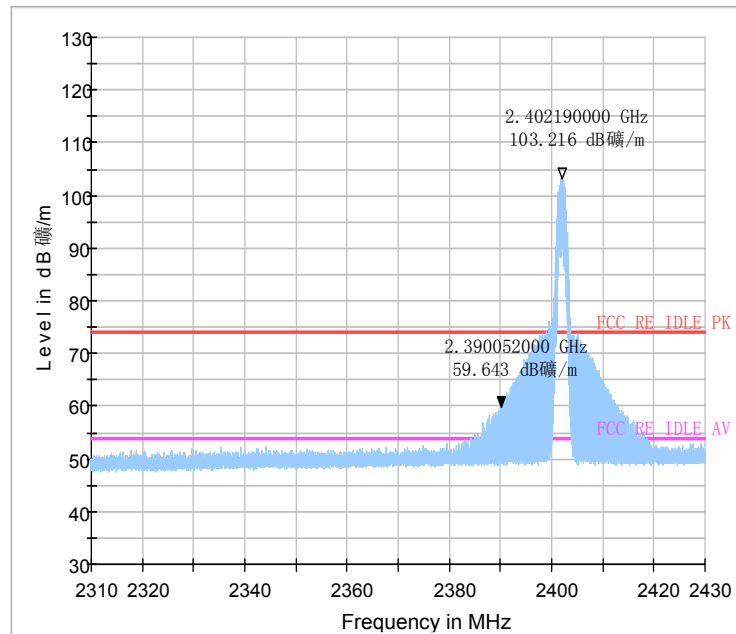


Fig.55 Radiated emission (Power): GFSK, low channel

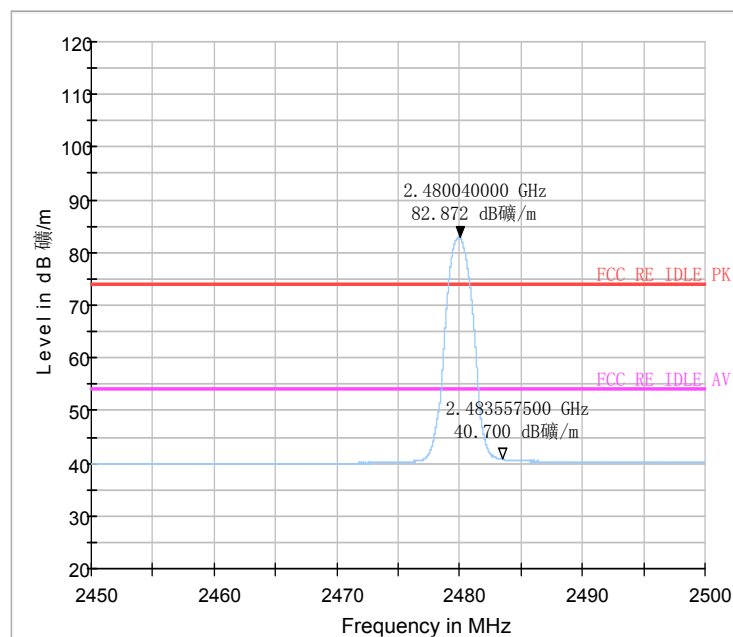
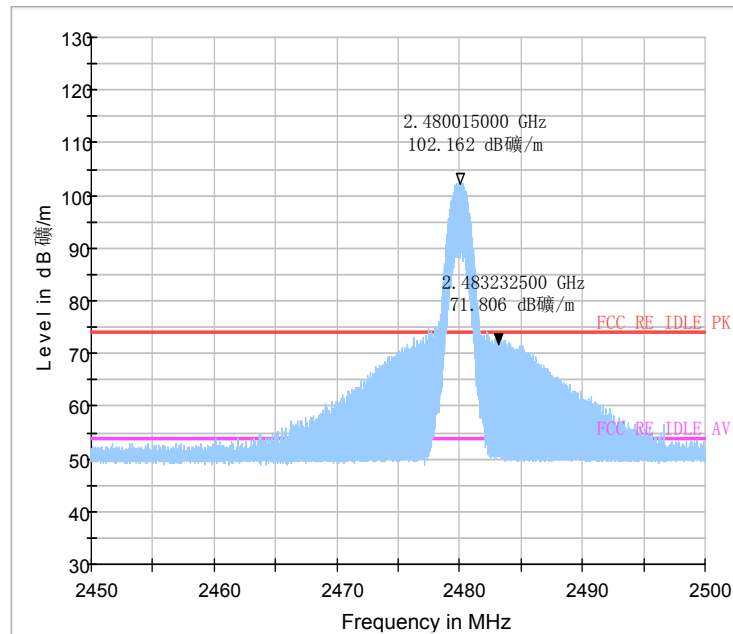


Fig.56 Radiated emission (Power): GFSK, high channel

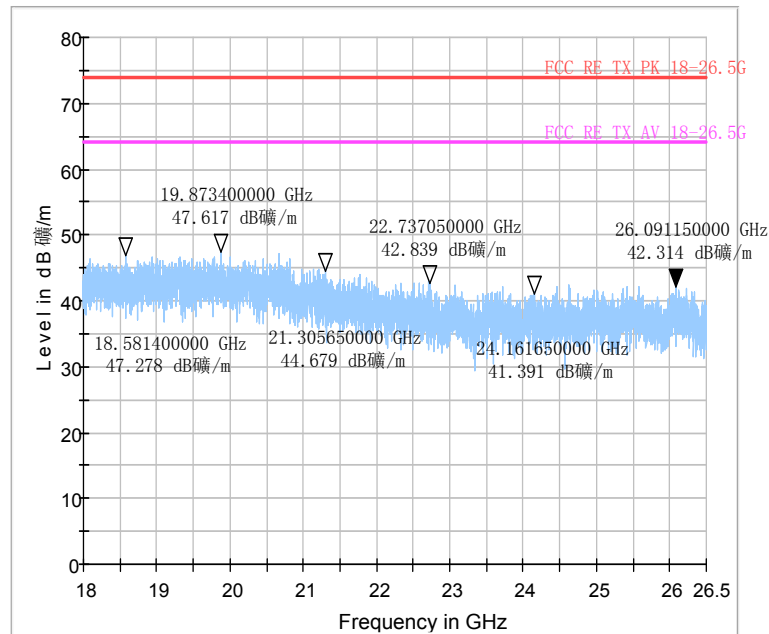


Fig.57 Radiated emission: GFSK, 18 GHz - 26 GHz

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
39	DH1	Fig.58	121.6	P
		Fig.59		
	DH3	Fig.60	264.1	P
		Fig.61		
	DH5	Fig.62	308.3	P
		Fig.63		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	2DH1	Fig.64	124.7	P

	2DH3	Fig.65	264.0	P
		Fig.66		
	2DH5	Fig.67	308.3	P
		Fig.68		
		Fig.69		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	3DH1	Fig.70	125.2	P
		Fig.71		
	3DH3	Fig.72	264.2	P
		Fig.73		
	3DH5	Fig.74	308.4	P
		Fig.75		

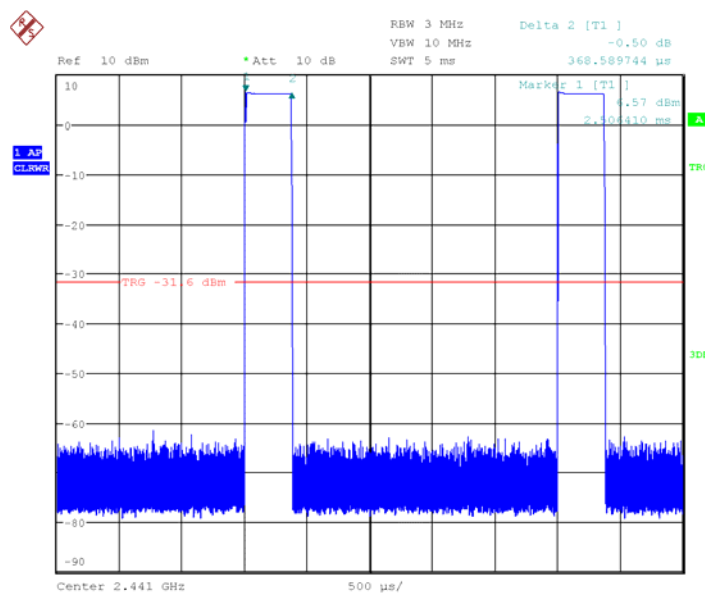
Note: the dwell time is Calculated of the sum of test time about 31.5 seconds.

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= $2.9*(1600/6)/79*31.5=308.3\text{ms}$.

Conclusion: PASS

Test graphs as below:



Date: 30.DEC.2013 10:11:20

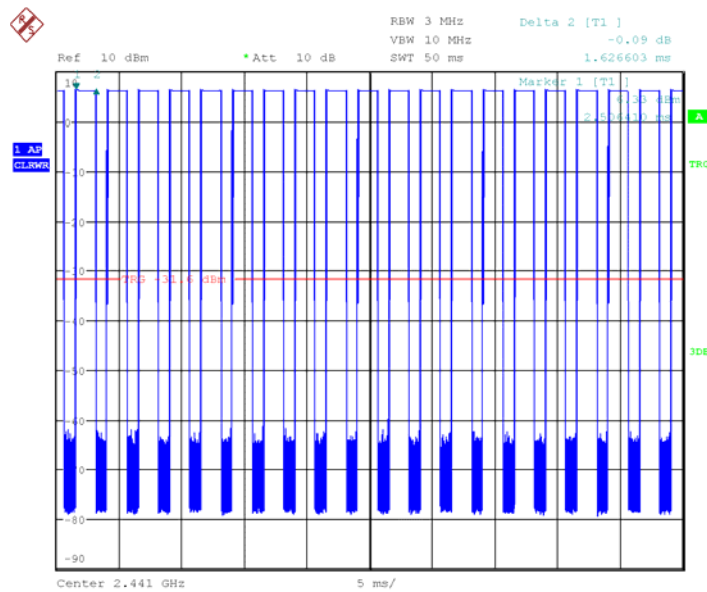
Fig.58 Time of occupancy (Dwell Time): Ch39, Packet DH1



Fig.59 Number of Transmissions Measurement: Ch39, Packet DH1

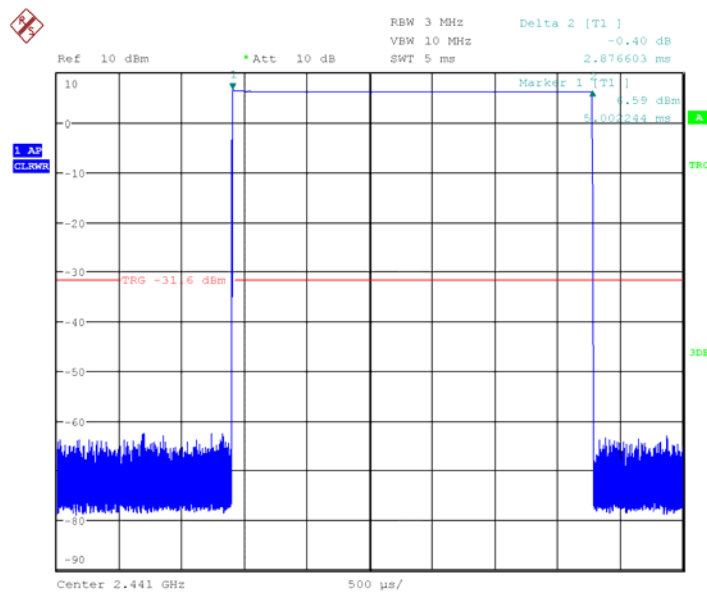


Fig.60 Time of occupancy (Dwell Time): Ch39, Packet DH3



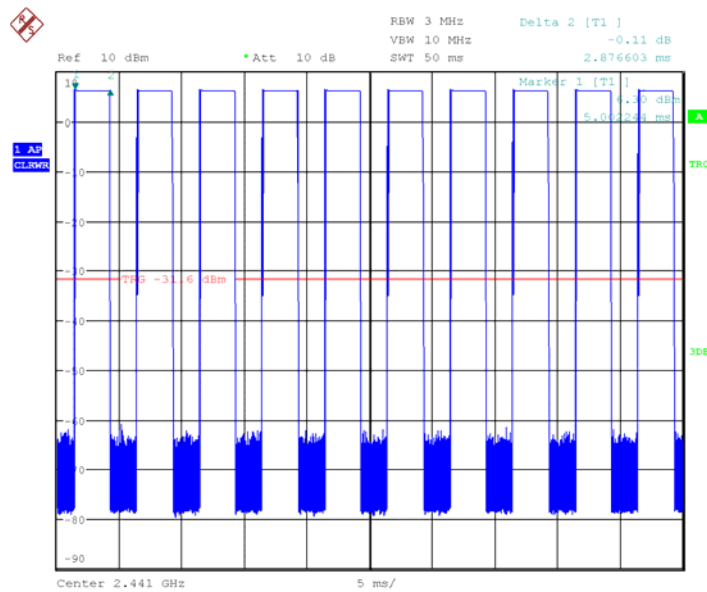
Date: 30.DEC.2013 10:13:20

Fig.61 Number of Transmissions Measurement: Ch39, Packet DH3



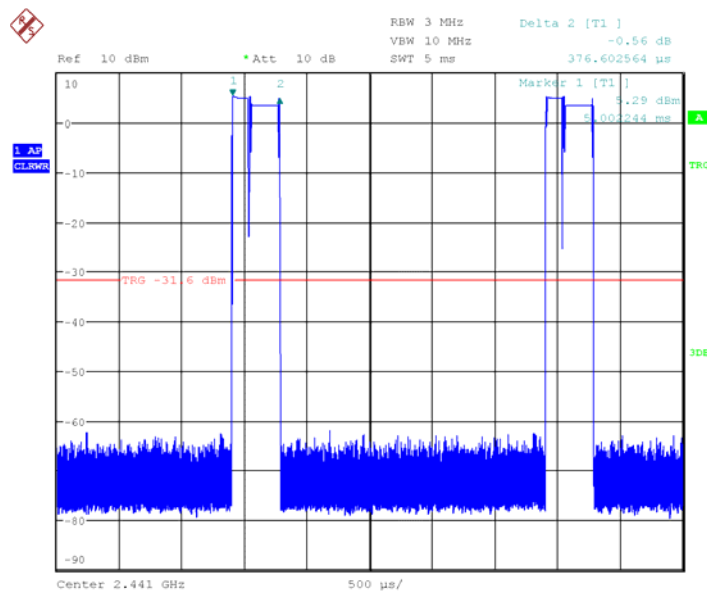
Date: 30.DEC.2013 10:14:03

Fig.62 Time of occupancy (Dwell Time): Ch39,Packet DH5



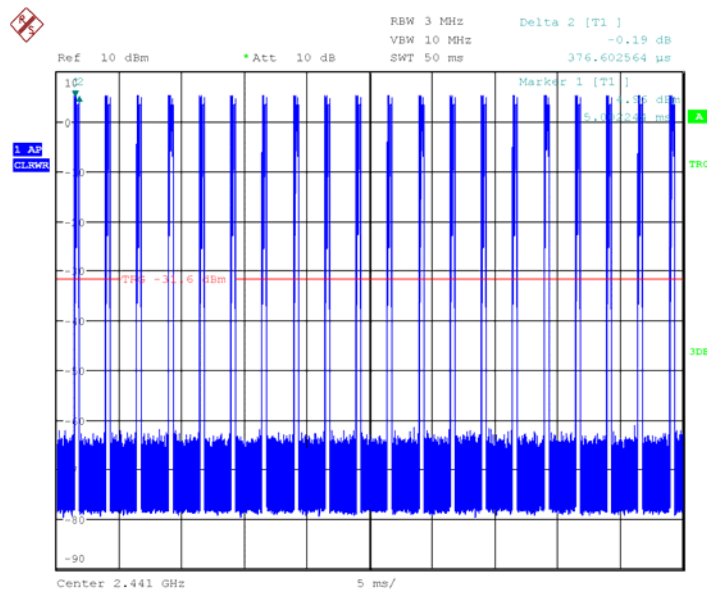
Date: 30.DEC.2013 10:14:11

Fig.63 Number of Transmissions Measurement: Ch39, Packet DH5



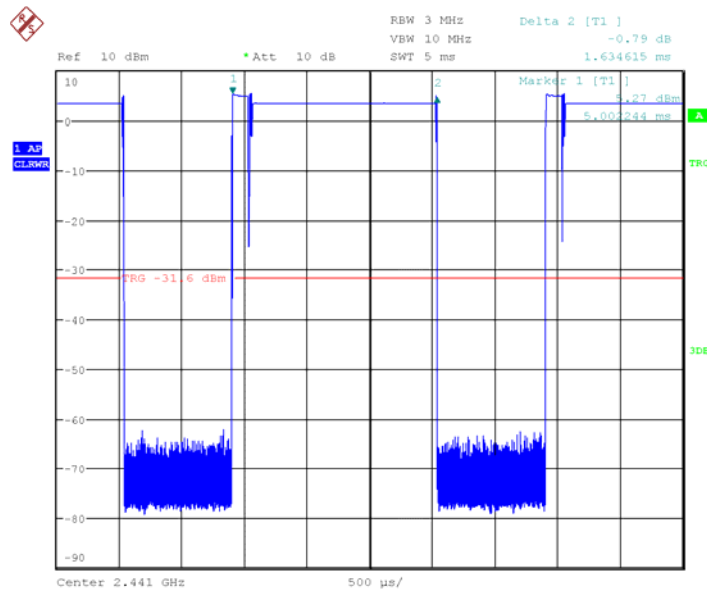
Date: 30.DEC.2013 10:15:47

Fig.64 Time of occupancy (Dwell Time): Ch39,Packet 2-DH1



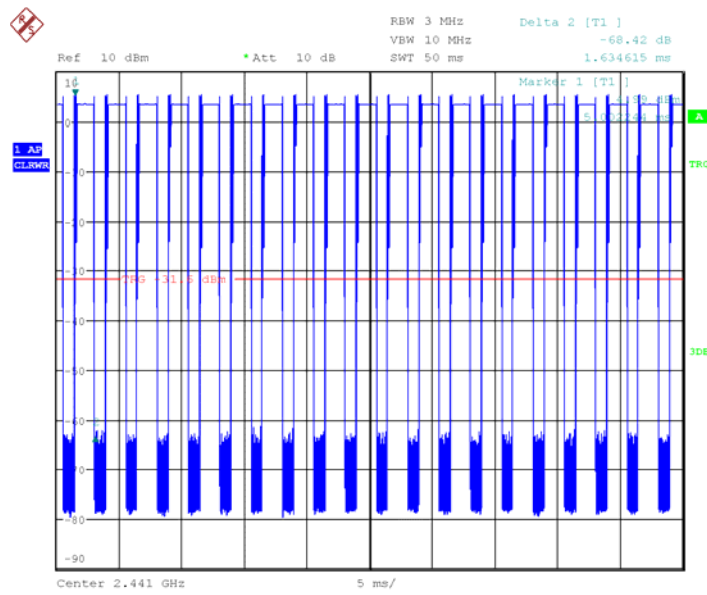
Date: 30.DEC.2013 10:15:54

Fig.65 Number of Transmissions Measurement: Ch39, Packet 2-DH1



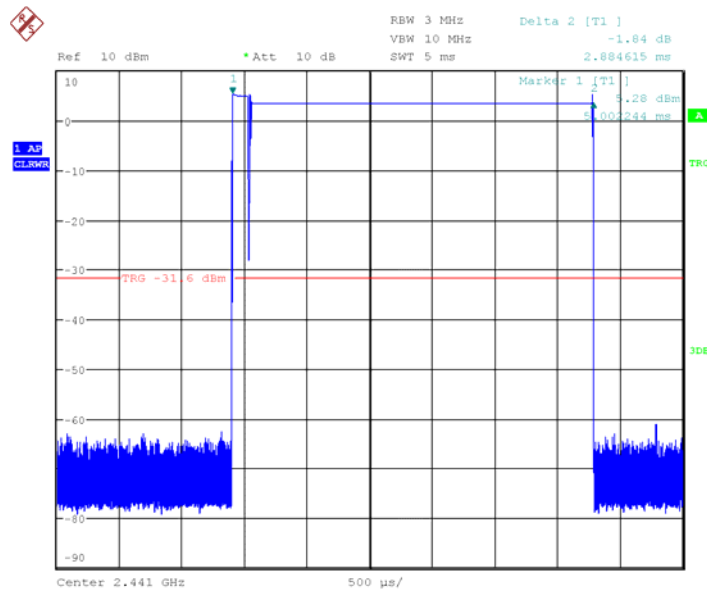
Date: 30.DEC.2013 10:16:29

Fig.66 Time of occupancy (Dwell Time): Ch39,Packet 2-DH3



Date: 30.DEC.2013 10:16:35

Fig.67 Number of Transmissions Measurement: Ch39, Packet 2-DH3



Date: 30.DEC.2013 10:17:14

Fig.68 Time of occupancy (Dwell Time): Ch39,Packet 2-DH5



Fig.69 Number of Transmissions Measurement: Ch39, Packet 2-DH5



Fig.70 Time of occupancy (Dwell Time): Ch39,Packet 3-DH1



Fig.71 Number of Transmissions Measurement: Ch39, Packet 3-DH1



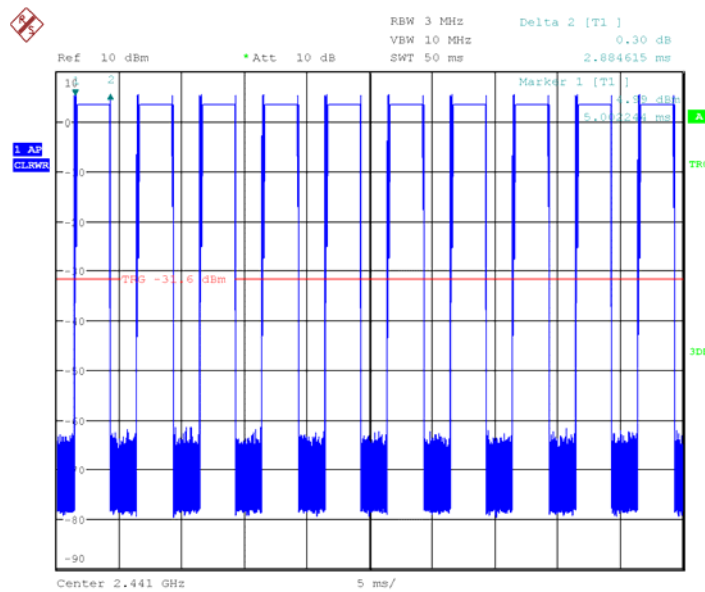
Fig.72 Time of occupancy (Dwell Time): Ch39,Packet 3-DH3



Fig.73 Number of Transmissions Measurement: Ch39, Packet 3-DH3



Fig.74 Time of occupancy (Dwell Time): Ch39,Packet 3-DH5



Date: 30.DEC.2013 10:20:32

Fig.75 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 Bandwidth (KHz)		Conclusion
0	Fig.76	673.08	P
39	Fig.77	673.08	P
78	Fig.78	682.69	P

For $\pi/4$ DQPSK

Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.79	1091.35	P
39	Fig.80	1091.35	P
78	Fig.81	1146.16	P

For 8DPSK

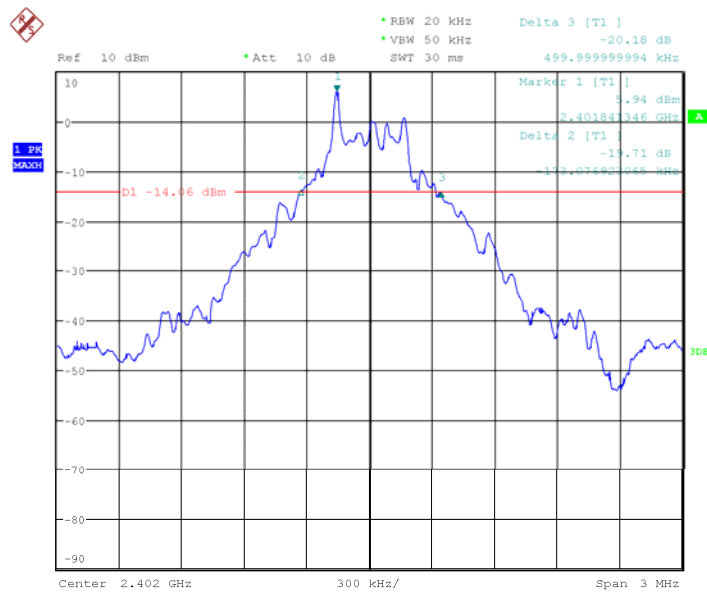
Channel	20dB Bandwidth (KHz)	Conclusion
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0	Fig.82	1139.43	P
39	Fig.83	1134.62	P
78	Fig.84	1139.43	P

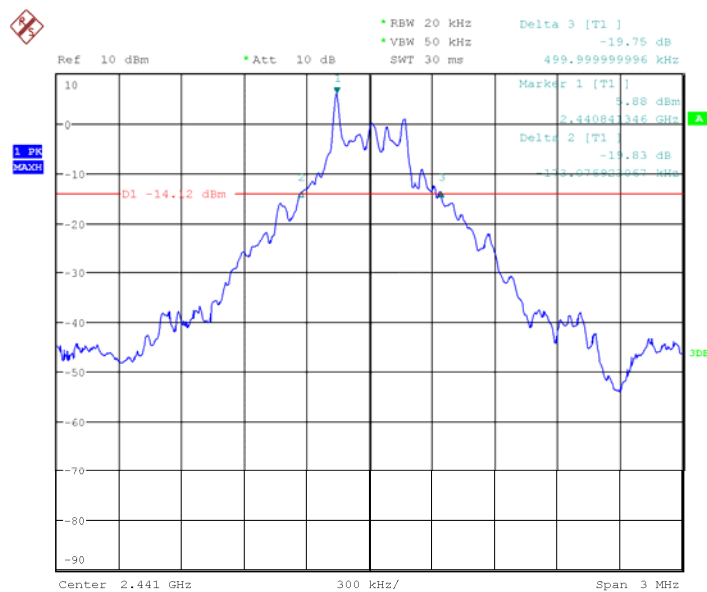
Conclusion: PASS

Test graphs as below:



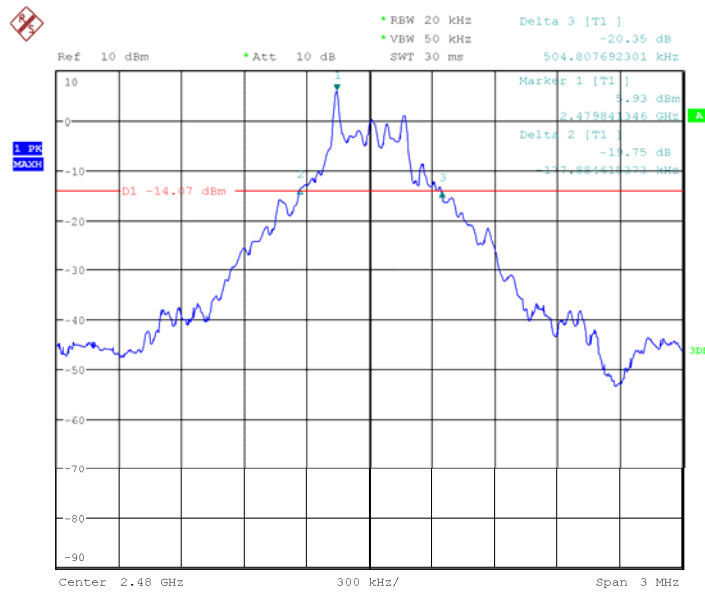
Date: 30.DEC.2013 10:23:01

Fig.76 20dB Bandwidth: GFSK, Ch0



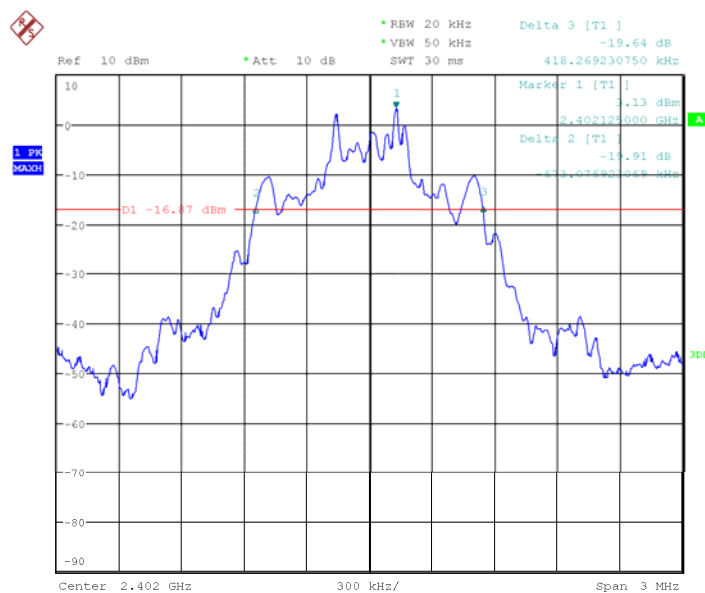
Date: 30.DEC.2013 10:24:10

Fig.77 20dB Bandwidth: GFSK, Ch39



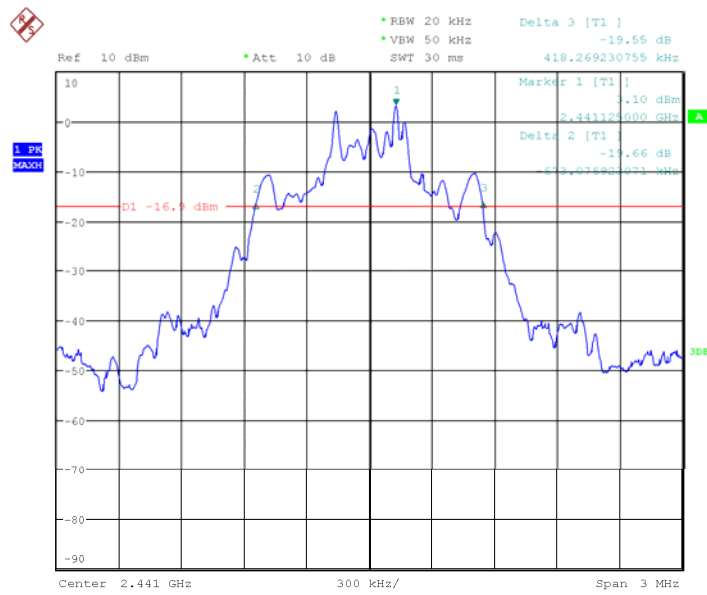
Date: 30.DEC.2013 10:25:39

Fig.78 20dB Bandwidth: GFSK, Ch78



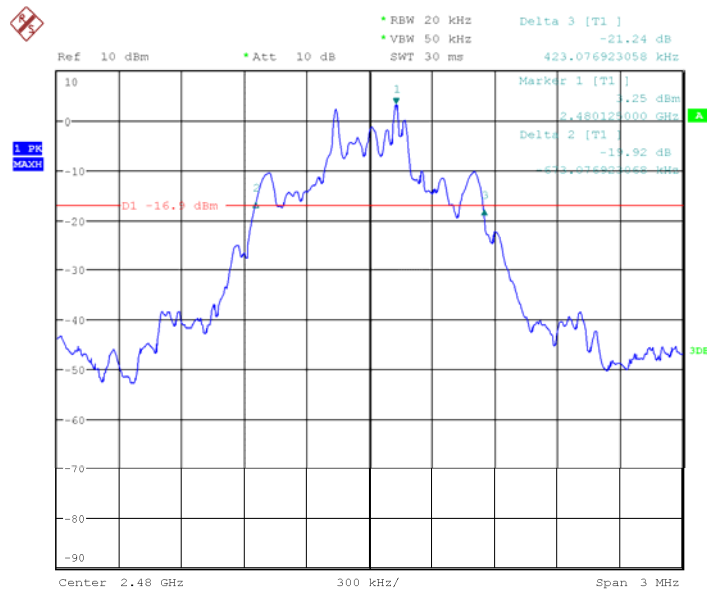
Date: 30.DEC.2013 10:26:38

Fig.79 20dB Bandwidth: $\pi/4$ DQPSK, Ch0



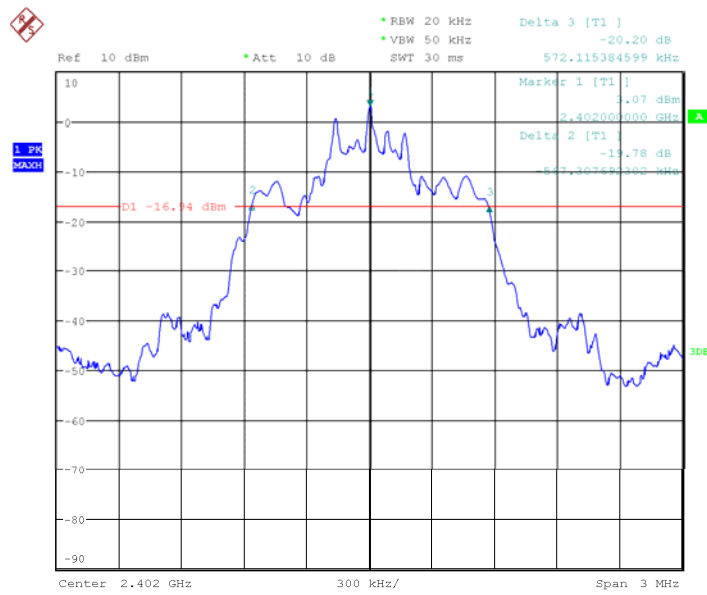
Date: 30.DEC.2013 10:30:13

Fig.80 20dB Bandwidth: $\pi/4$ DQPSK, Ch39



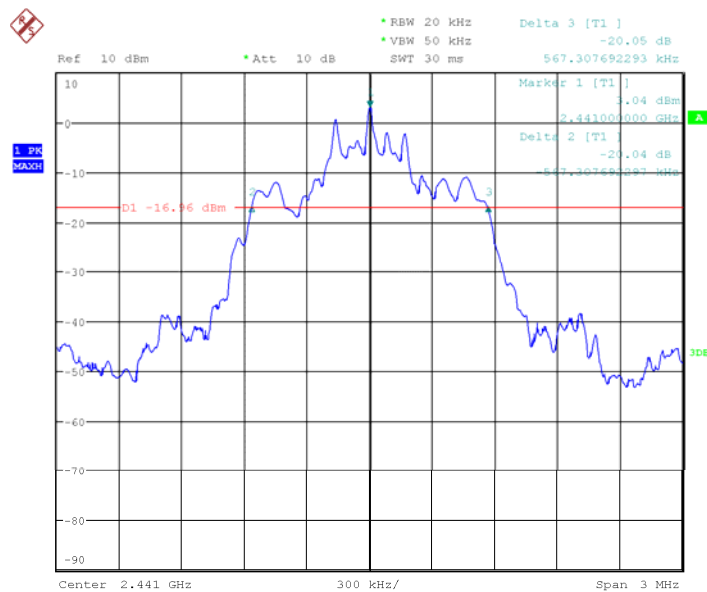
Date: 30.DEC.2013 10:32:54

Fig.81 20dB Bandwidth: $\pi/4$ DQPSK, Ch78



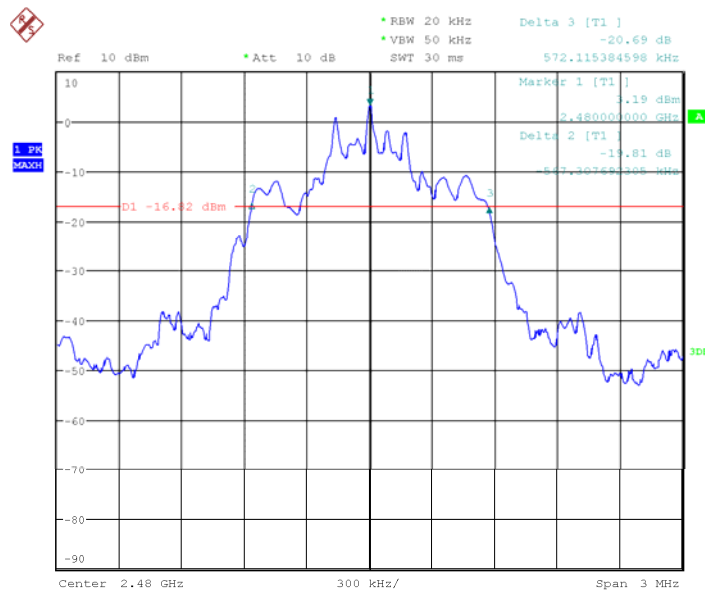
Date: 30.DEC.2013 10:34:35

Fig.82 20dB Bandwidth: 8DPSK, Ch0



Date: 30.DEC.2013 10:35:45

Fig.83 20dB Bandwidth: 8DPSK, Ch39



Date: 30.DEC.2013 10:36:48

Fig.84 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.85	1004.81
		P

For $\pi/4$ DQPSK

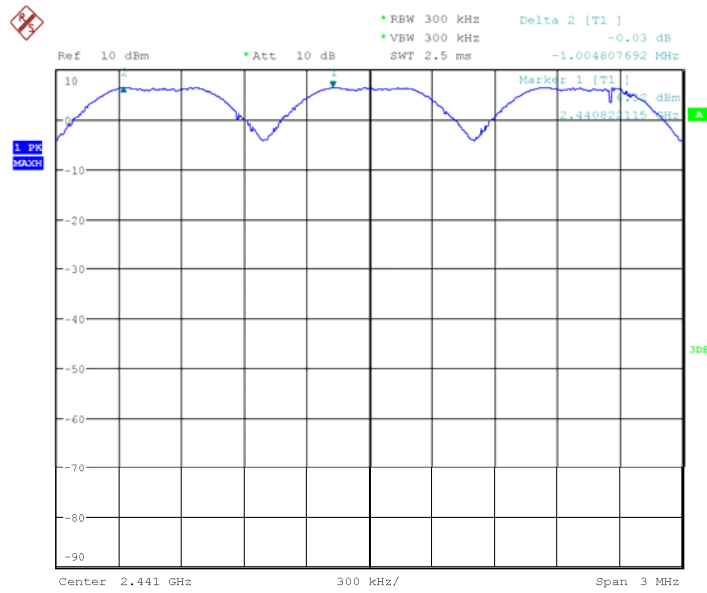
Channel	Carrier separation (KHz)	Conclusion
39	Fig.86	980.77
		P

For 8DPSK

Channel	Carrier separation (KHz)	Conclusion
39	Fig.87	1004.81
		P

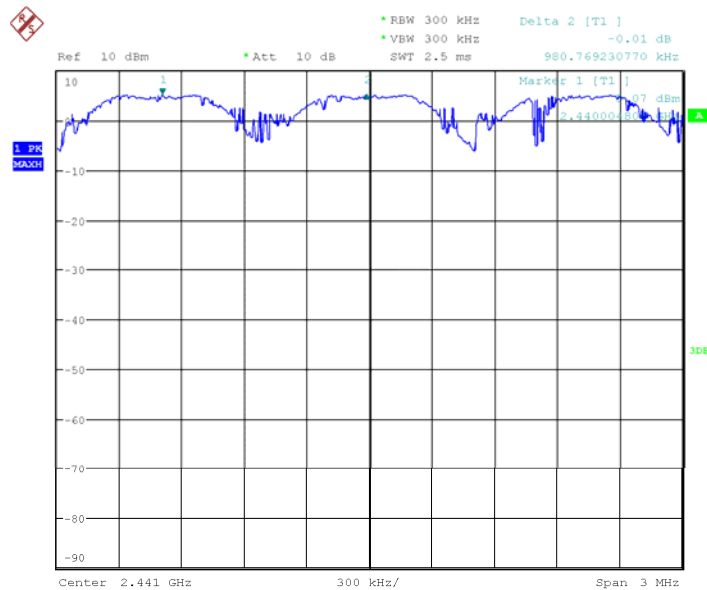
Conclusion: PASS

Test graphs as below:



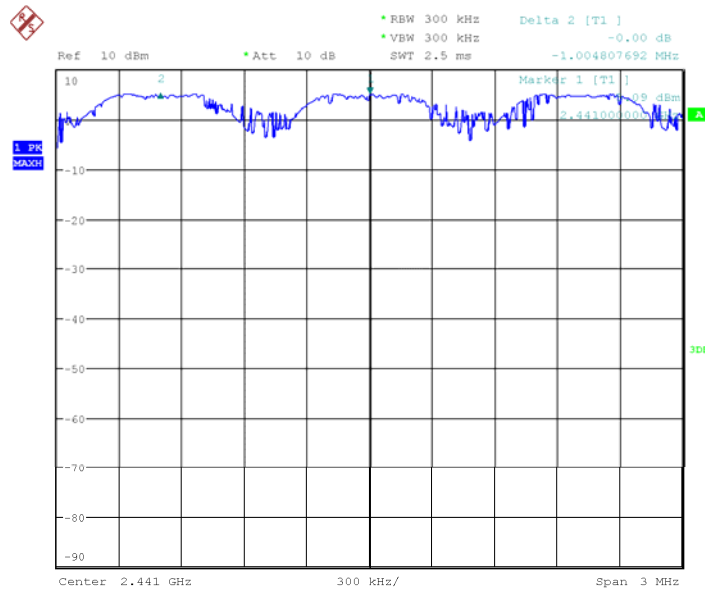
Date: 30.DEC.2013 10:59:38

Fig.85 Carrier separation measurement: GFSK, Ch39



Date: 30.DEC.2013 11:01:49

Fig.86 Carrier separation measurement: $\pi/4$ DQPSK, Ch39



Date: 30.DEC.2013 11:04:06

Fig.87 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.88	79	P
40~78	Fig.89		P

For $\pi/4$ DQPSK

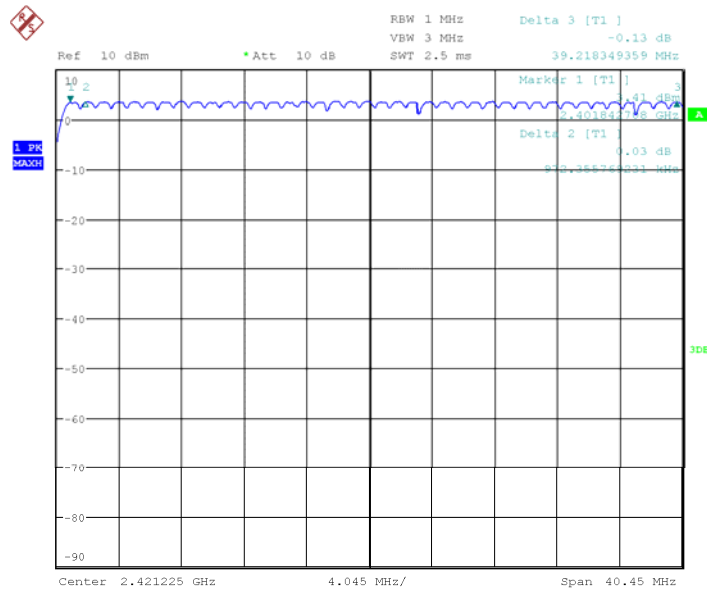
Channel	Number of hopping channels		Conclusion
0~39	Fig.90	79	P
40~78	Fig.91		P

For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.92	79	P
40~78	Fig.93		P

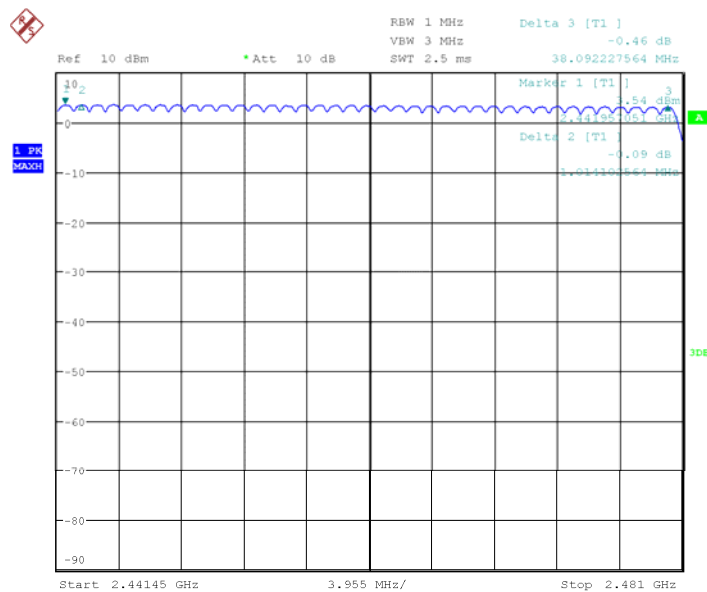
Conclusion: PASS

Test graphs as below:



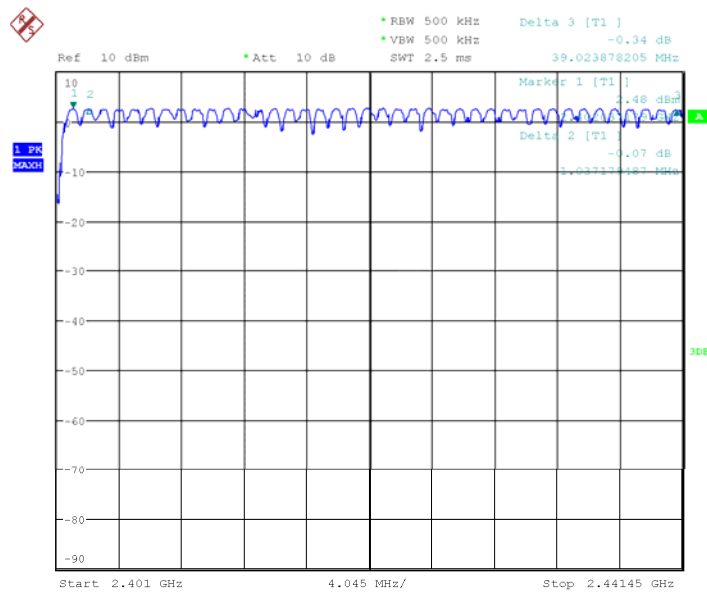
Date: 10.DEC.2012 17:03:51

Fig.88 Number of hopping frequency: GFSK, Ch0~39



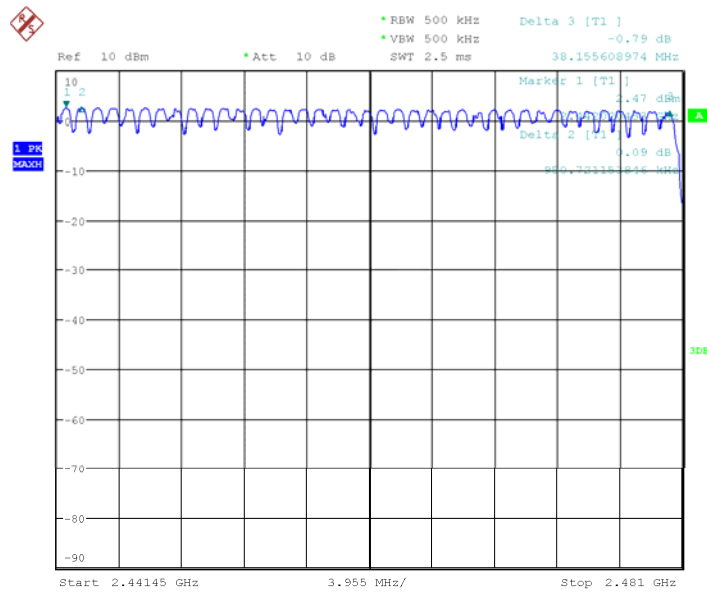
Date: 10.DEC.2012 17:11:14

Fig.89 Number of hopping frequency: GFSK, Ch40~78



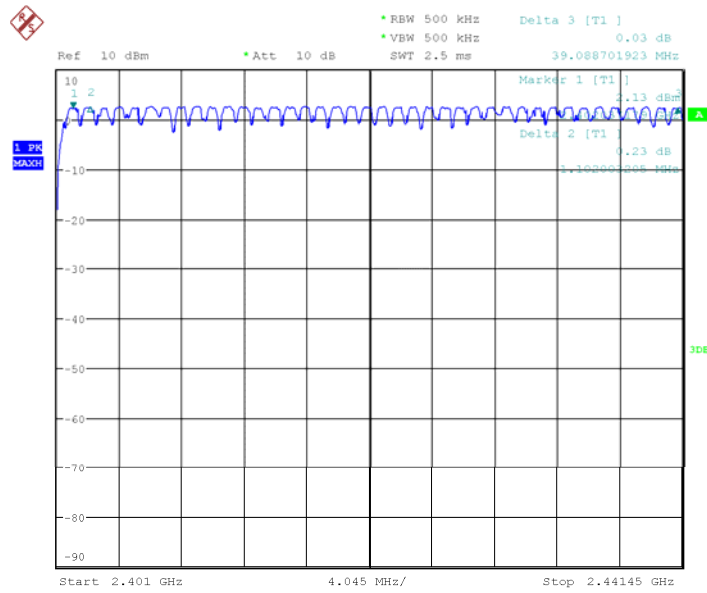
Date: 10.DEC.2012 17:17:58

Fig.90 Number of hopping frequency: $\pi/4$ DQPSK, Ch0~39



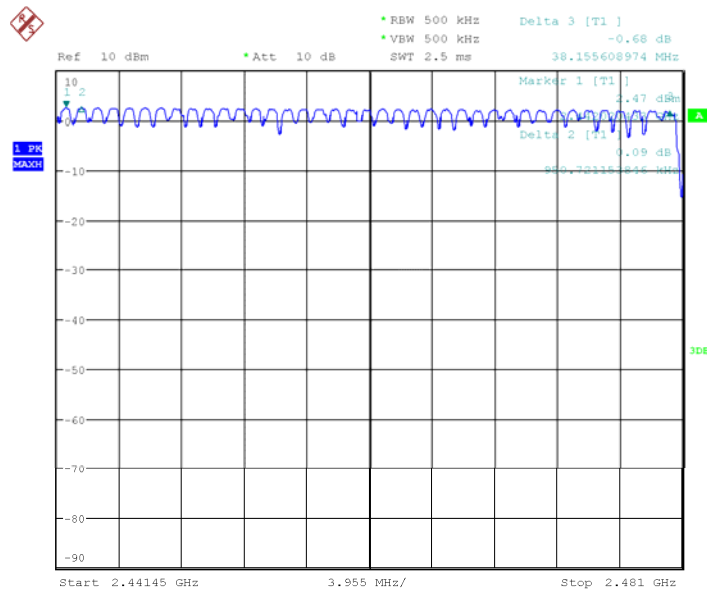
Date: 10.DEC.2012 17:19:11

Fig.91 Number of hopping frequency: $\pi/4$ DQPSK, Ch40~78



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

Fig.92 Number of hopping frequency: 8DPSK, Ch0~39



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

Fig.93 Number of hopping frequency: 8DPSK, Ch40~78

5.9. AC Powerline Conducted Emission(§ 15.209)

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.112	P
5 to 30	60		

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.113	P
5 to 30	60		

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:

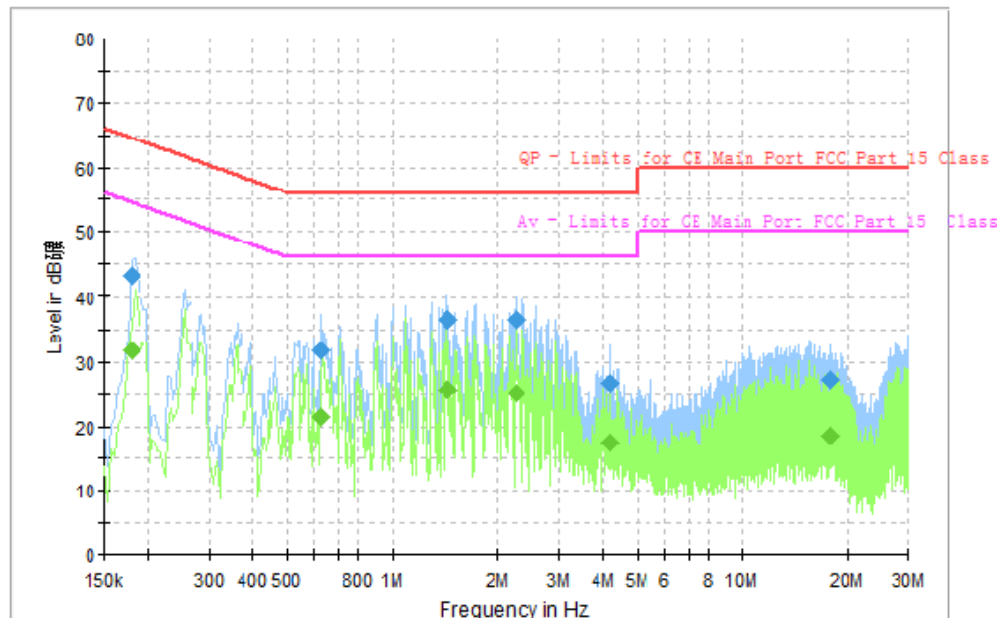


Fig.112 AC powerline Conducted Emission

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	43.0	1000.0	9.000	On	L1	10.2	21.4	64.5
0.6238 69	31.7	1000.0	9.000	On	L1	10.1	24.2	56.0
1.4447 44	36.5	1000.0	9.000	On	L1	9.9	19.4	56.0
2.2544 25	36.7	1000.0	9.000	On	L1	9.8	19.4	56.0
4.1834 81	26.7	1000.0	9.000	On	L1	9.8	29.2	56.0
17.892 094	27.2	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	31.7	1000.0	9.000	On	L1	10.2	22.7	54.5
0.6238 69	21.4	1000.0	9.000	On	L1	10.1	24.5	46.0
1.4447 44	25.7	1000.0	9.000	On	L1	9.9	20.2	46.0
2.2544 25	25.2	1000.0	9.000	On	L1	9.8	20.9	46.0
4.1834 81	17.3	1000.0	9.000	On	L1	9.8	28.6	46.0
17.892 094	18.5	1000.0	9.000	On	L1	9.9	31.4	50.0

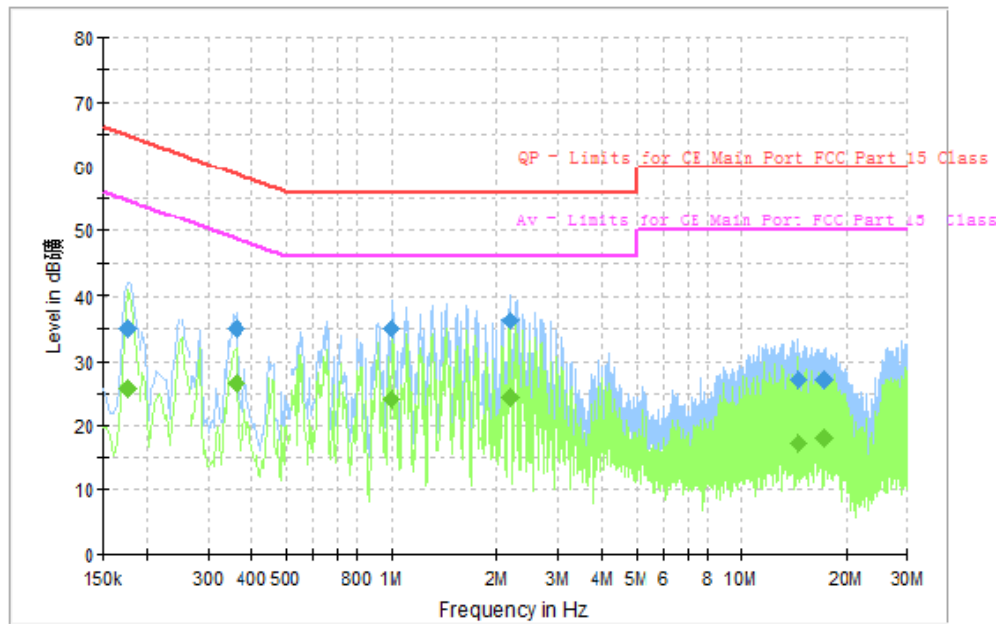


Fig.113 AC powerline Conducted Emission

Final Result1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.176119	35.2	1000.0	9.000	On	N	10.2	29.7	64.7
0.358950	34.8	1000.0	9.000	On	L1	10.1	23.9	58.8
1.008188	35.1	1000.0	9.000	On	L1	9.9	21.0	56.0
2.179800	36.2	1000.0	9.000	On	L1	9.8	19.7	56.0
14.556356	26.8	1000.0	9.000	On	L1	9.9	33.1	60.0
17.242856	27.1	1000.0	9.000	On	L1	9.9	33.0	60.0

**Final Result2**

Frequ 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	26.7	1000.0	9.000	On	L1	10.1	22.3	48.8
1.0081 88	24.3	1000.0	9.000	On	L1	9.9	21.8	46.0
2.1798 00	24.5	1000.0	9.000	On	L1	9.8	21.6	46.0
14.556 356	17.2	1000.0	9.000	On	L1	9.9	32.7	50.0
17.242 856	17.8	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 Number	Manufacturer	Calibration Due date
1	Vector Signal Analyzer	FSQ26	101096	Rohde&Schwarz	2014-08-30
2	DC Power Supply	ZUP60-14	LOC-220Z006	TDL-Lambda	2014-08-30
3	Bluetooth Tester	CBT32	100785	Rohde&Schwarz	2014-08-30

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Universal Radio Communication Tester	CMU200	123102	R&S	2014-08-30
2	Test Receiver	ESCI	101235	R&S	2014-08-30
3	Test Receiver	ESU40	100307	R&S	2014-10-29
4	Trilog Antenna	VULB9163	19-162515	Schwarzbeck	2014-11-11
5	Double Ridged Guide Antenna	ETS-3117	135885	ETS	2014-04-28
6	2-Line V-Network	ENV216	101380	R&S	2014-10-30



7	Single Phase Harmonic & Flicker	DPA500N	V112610998 8	EM Test	2014-10-28
8	Multifunction AC/DC Power Source	Netwave7	V112610998 9	EM Test	2014-10-28
9	Ultra Compact Simulator	UCS 500N7	V112610998 3	EM Test	2014-07-22
10	Motorized Variac	MV 2616	V112610998 7	EM Test	2014-07-22
11	Telecom Surge Module	TSurge7	V090210458 2	EM Test	2014-07-22
12	Audio Analyzer	UPV	101950	R&S	2014-08-30
13	Power Meter	NRP2	101804	R&S	2014-08-30
14	Signal Generator	SMB 100A	105563	R&S	2014-08-30
15	ESD Test Simulator	Dito	V112610998 2	EM Test	2014-10-31

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×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 40000MHz



ANNEX A Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

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