



# FCC PART 15C/IC RSS-210 TEST REPORT No. 2010TAR402

for

**TCT Mobile Limited**

**HSDPA/HSUPA/UMTS dual band / GSM four bands mobile phone**

**Model Name: Opal AWS**

**Marketing Name: OT-981A**

**With**

**FCC ID: RAD149**

**IC ID: 9238A-0001**

**Hardware Version: PIO**

**Software Version: V263**

**Issued Date: 2010-10-21**



**No. DGA-PL-114/01-02**

**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 TMC Beijing.

**Test Laboratory:**

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

Shouxiang Science Building, No 51, Xueyuan Road, Haidian District, Beijing, P.R.China 100191

Tel:+86(0)10-62304633-2678, Fax:+86(0)10-62304793 Email:welcome@emcite.com. www.emcite.com

*DAR accreditation (DIN EN ISO/IEC 17025): No. DGA-PL-114/01-02*

*FCC 2.948 Listed: No.733176*

*IC O.A.T.S listed: No.6629A-1*

## **CONTENTS**

<b>CONTENTS</b> .....	<b>2</b>
<b>1. TEST LABORATORY</b> .....	<b>3</b>
1.1. TESTING LOCATION.....	3
1.2. TESTING ENVIRONMENT.....	3
1.3. PROJECT DATA .....	3
1.4. SIGNATURE .....	3
<b>2. CLIENT INFORMATION</b> .....	<b>4</b>
2.1. APPLICANT INFORMATION.....	4
2.2. MANUFACTURER INFORMATION.....	4
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>5</b>
3.1. ABOUT EUT .....	5
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST.....	5
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST .....	5
<b>4. REFERENCE DOCUMENTS .....</b>	<b>6</b>
4.1. DOCUMENTS SUPPLIED BY APPLICANT .....	6
4.2. REFERENCE DOCUMENTS FOR TESTING.....	6
<b>5. LABORATORY ENVIRONMENT .....</b>	<b>7</b>
<b>6. SUMMARY OF TEST RESULTS.....</b>	<b>8</b>
6.1. SUMMARY OF TEST RESULTS .....	8
6.2. STATEMENTS.....	8
<b>7. TEST EQUIPMENTS UTILIZED.....</b>	<b>9</b>
<b>ANNEX A: MEASUREMENT RESULTS .....</b>	<b>10</b>
A.1. MEASUREMENT METHOD.....	10
A.2. PEAK OUTPUT POWER - CONDUCTED.....	11
A.3. FREQUENCY BAND EDGES - CONDUCTED.....	12
A.4. CONDUCTED EMISSION.....	19
A.5. RADIATED EMISSION.....	34
A.6. TIME OF OCCUPANCY (DWELL TIME).....	58
A.7. 20dB BANDWIDTH.....	68
A.8. CARRIER FREQUENCY SEPARATION.....	73
A.9. NUMBER OF HOPPING CHANNELS .....	75
A.10. AC POWERLINE CONDUCTED EMISSION .....	79

## 1. Test Laboratory

### 1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT  
Address: Shouxiang Science Building, No 51, Xueyuan Road, Haidian District,  
Beijing, P.R.China  
Postal Code: 100191  
Telephone: 00861062304633  
Fax: 00861062304793

### 1.2. Testing Environment

Normal Temperature: 15-35°C  
Extreme Temperature: -20/+55°C  
Relative Humidity: 20-75%

### 1.3. Project data

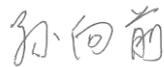
Project Leader: Zi Xiaogang  
Testing Start Date: 2010-09-17  
Testing End Date: 2010-09-29

### 1.4. Signature



---

**Zi Xiaogang**  
**(Prepared this test report)**



---

**Sun Xiangqian**  
**(Reviewed this test report)**



---

**Lu Bingsong**  
**Deputy Director of the laboratory**  
**(Approved this test report)**

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCT Mobile Limited  
5F, E building, No. 232, Liang Jing Road  
Address /Post: ZhangJiang High-Tech Park, Pudong Area  
Shanghai, P.R. China. 201203  
Contact: Gong Zhizhou  
Email zhizhou.gong@jrdcom.com  
Telephone: 0086-21-61460890  
Fax: 0086-21-61460602

### **2.2. Manufacturer Information**

Company Name: TCT Mobile Limited  
5F, E building, No. 232, Liang Jing Road  
Address /Post: ZhangJiang High-Tech Park, Pudong Area  
Shanghai, P.R. China. 201203  
Contact: Gong Zhizhou  
Email zhizhou.gong@jrdcom.com  
Telephone: 0086-21-61460890  
Fax: 0086-21-61460602

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

Description	HSDPA/HSUPA/UMTS dual band / GSM four bands mobile phone
Model Name	Opal AWS
Marketing Name	OT-981A
FCC ID	RAD149
IC ID	9238A-0001
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/ $\pi$ /4 DQPSK/8DPSK
Number of Channels	79
Power Supply	3.7V DC by Battery

#### 3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
N12	012432000011479	PIO	V263
N14	012432000010893	PIO	V263

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

#### 3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	SN
AE1	Battery	CAB3170000C1	/
AE2	Travel Adapter	CBA3170AG0C1	/
AE3	Travel Adapter	CBA3170AG0C2	/

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

## 4. Reference Documents

### 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

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

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, 2400–2483.5 MHz, and 5725–5850 MHz.	July 10, 2008 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003
FCC Public Notice DA 00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems	March 2000
RSS - Gen Issue 2	Spectrum Management and Telecommunications - Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment	2007-06
RSS - 210 Issue 7	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment	2007-06

## 5. LABORATORY 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

**Semi-anechoic chamber** (23 meters×17meters×10meters) 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
Normalised site attenuation (NSA)	< ±3.2 dB, 10 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

## 6. SUMMARY OF TEST RESULTS

### 6.1. Summary of Test Results

Abbreviations used in this clause:

- P** Pass, The EUT complies with the essential requirements in the standard.
- F** Fail, The EUT does not comply with the essential requirements in the standard
- NA** Not Applicable, The test was not applicable
- NP** Not Performed, The test was not performed by TMC

SUMMARY OF MEASUREMENT RESULTS	Sub-clause		Verdict
Peak Output Power - Conducted	15.247 (b)(1)	RSS-210 A8.4 (2)	<b>P</b>
Frequency Band Edges	15.247 (d)	RSS-210 A8.5	<b>P</b>
Conducted Emission	15.247 (d)	RSS-210 A8.5	<b>P</b>
Radiated Emission	15.247, 15.205, 15.209	RSS-210 A8.5	<b>P</b>
Time of Occupancy (Dwell Time)	15.247 (a) (1)(iii)	RSS-210 A8.1 (4)	<b>P</b>
20dB Bandwidth	15.247 (a)(1)	RSS-210 A8.1 (1)	<b>P</b>
Carrier Frequency Separation	15.247 (a)(1)	RSS-210 A8.1 (2)	<b>P</b>
Number of hopping channels	15.247 (a)(b)(iii)	RSS-210 A8.1 (4)	<b>P</b>
AC Powerline Conducted Emission	15.107, 15.207	RSS-Gen 7.2.2	<b>P</b>

Please refer to **ANNEX A** for detail.

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

### 6.2. Statements

TMC has evaluated the test cases requested by the applicant /manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2

## 7. Test Equipments Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Vector Signal Analyzer	FSU26	200030	Rohde & Schwarz	2011-06-18
2	Bluetooth Tester	CBT32	100649	Rohde & Schwarz	2011-02-03

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Test Receiver	ESI40	831564/002	Rohde & Schwarz	2011-02-11
2	EMI Antenna	VULB 9163	9163 301	Schwarzbeck	2011-04-29
3	EMI Antenna	3117	00034610	EMCO	2011-06-30
4	Dual-Ridge Waveguide Horn Antenna	3116	2663	EMCO	2011-03-01
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	EMCO	2011-03-01
6	Universal Radio Communication Tester	CMU200	105948	Rohde & Schwarz	2011-08-13
7	LISN	ESH2-Z5	829991/012	Rohde & Schwarz	2011-08-12
8	Pre-amplifier(18GHz)	/	1005277	Rohde & Schwarz	/
9	Pre-amplifier(26.5GHz)	/	1005277	Rohde & Schwarz	/

### Anechoic chamber

Fully anechoic chamber by Frankonia German.

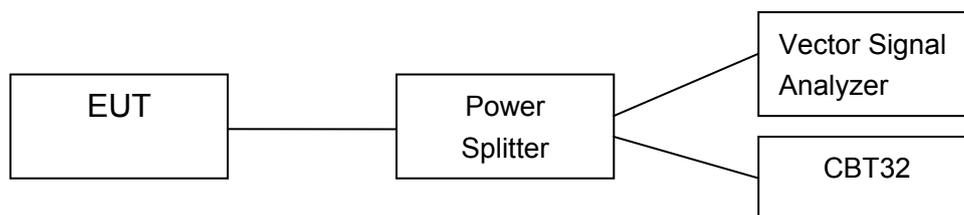
## ANNEX A: MEASUREMENT RESULTS

### A.1. Measurement Method

#### A.1.1. Conducted Measurements

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

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode (Transmitter, receiver or transmitter & receiver).
- 3). Set the EUT to the required channel.
- 4). Set the EUT hopping mode (hopping or hopping off).
- 5). Set the spectrum analyzer to start measurement.
- 6). Record the values. Vector Signal Analyzer



#### A.1.2. Radiated Emission Measurements

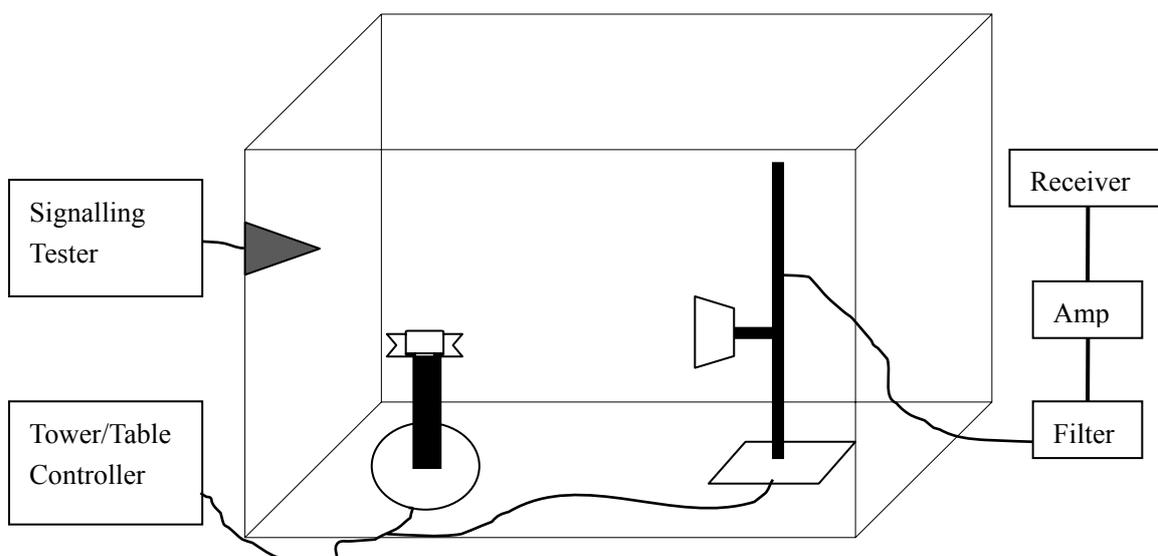
The measurement is made according to Public notice DA 00-705 and ANSI C63.4

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 1MHz;



**A.2. Peak Output Power - Conducted**  
**Measurement Limit:**

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

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

**Test Condition**

Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	1MHz	1MHz	5MHz	2.5ms

**Measurement Results:**

**For GFSK**

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	0.89	1.23	1.65	P

**For  $\pi/4$  DQPSK**

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	1.10	2.15	2.52	P

**For 8DPSK**

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	1.11	2.05	2.36	P

**Conclusion: PASS**

### A.3. Frequency Band Edges - Conducted

#### Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

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

#### Measurement Result:

##### For GFSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.1	-58.37	P
	Hopping ON	Fig.2	-58.75	P
78	Hopping OFF	Fig.3	-59.51	P
	Hopping ON	Fig.4	-61.27	P

##### For $\pi/4$ DQPSK

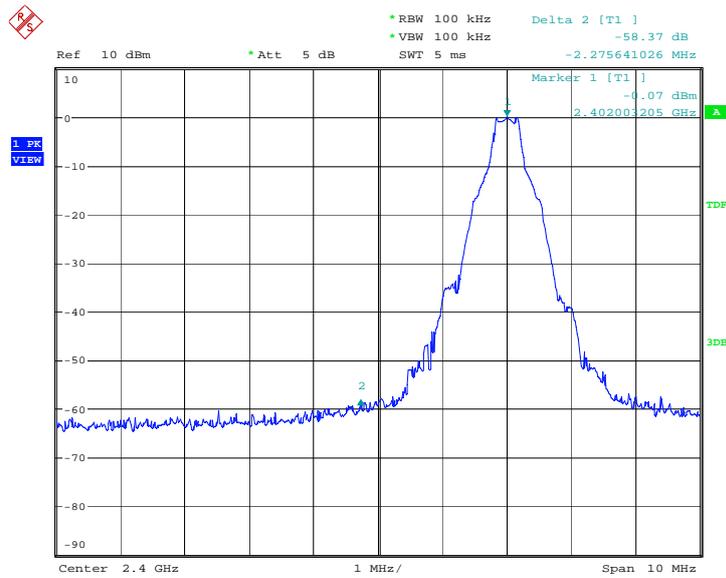
Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.5	-53.82	P
	Hopping ON	Fig.6	-55.15	P
78	Hopping OFF	Fig.7	-59.89	P
	Hopping ON	Fig.8	-57.67	P

##### For 8DPSK

Channel	Hopping	Band Edge Power ( dBc)		Conclusion
0	Hopping OFF	Fig.9	-54.10	P
	Hopping ON	Fig.10	-53.50	P
78	Hopping OFF	Fig.11	-59.09	P
	Hopping ON	Fig.12	-58.91	P

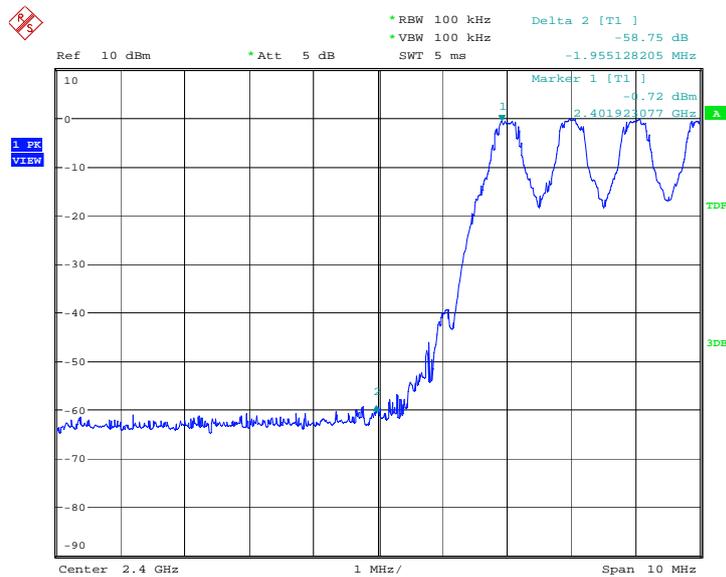
**Conclusion: PASS**

**Test graphs as below**



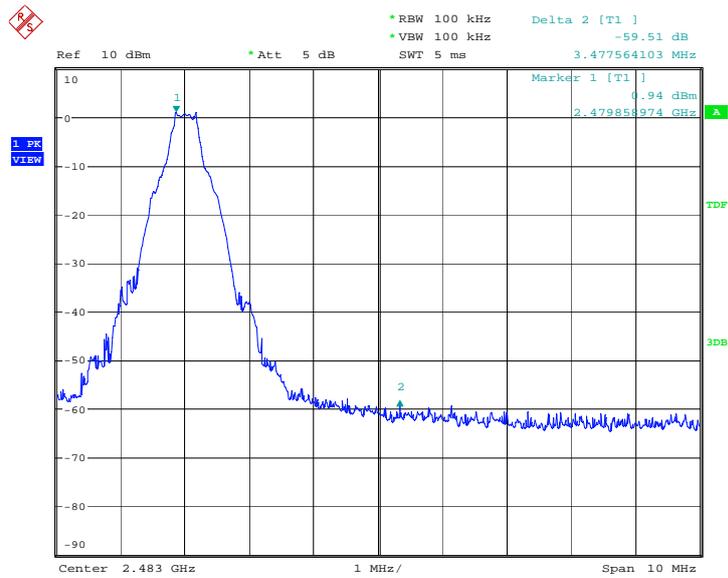
Date: 19.SEP.2010 03:28:32

Fig.1 Frequency Band Edges: GFSK, Channel 0, Hopping Off



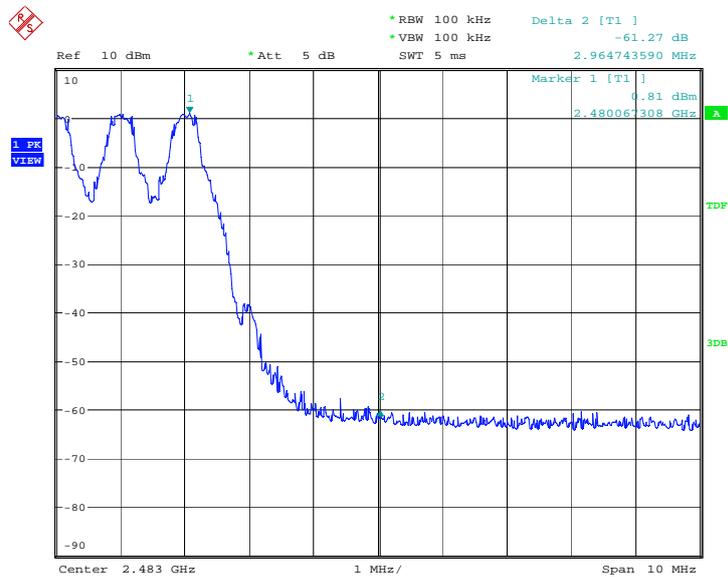
Date: 19.SEP.2010 03:30:51

Fig.2 Frequency Band Edges: GFSK, Channel 0, Hopping On



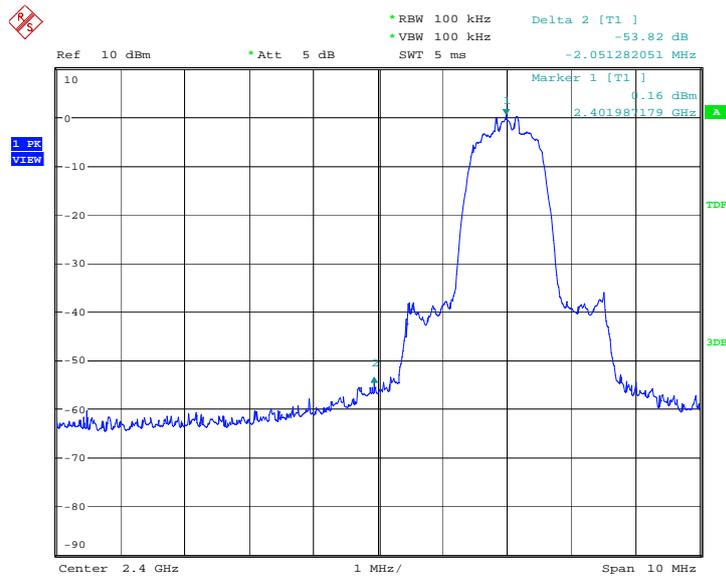
Date: 19.SEP.2010 03:28:49

Fig.3 Frequency Band Edges: GFSK, Channel 78, Hopping Off



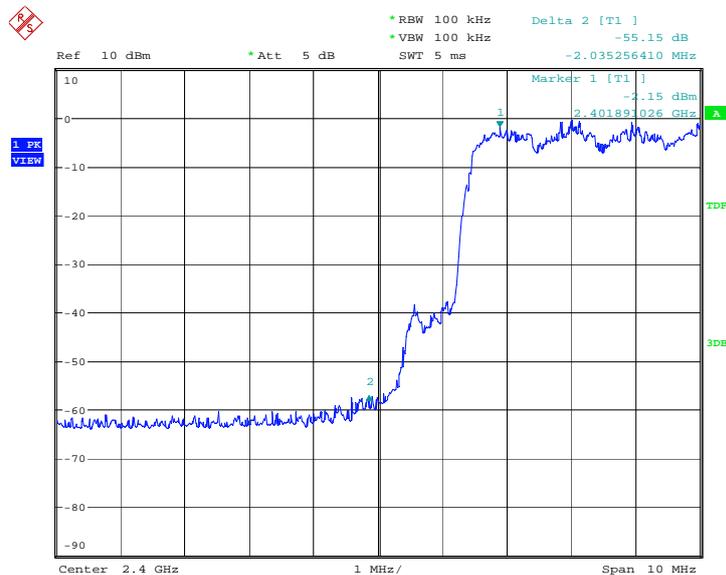
Date: 19.SEP.2010 03:32:54

Fig.4 Frequency Band Edges: GFSK, Channel 78, Hopping On



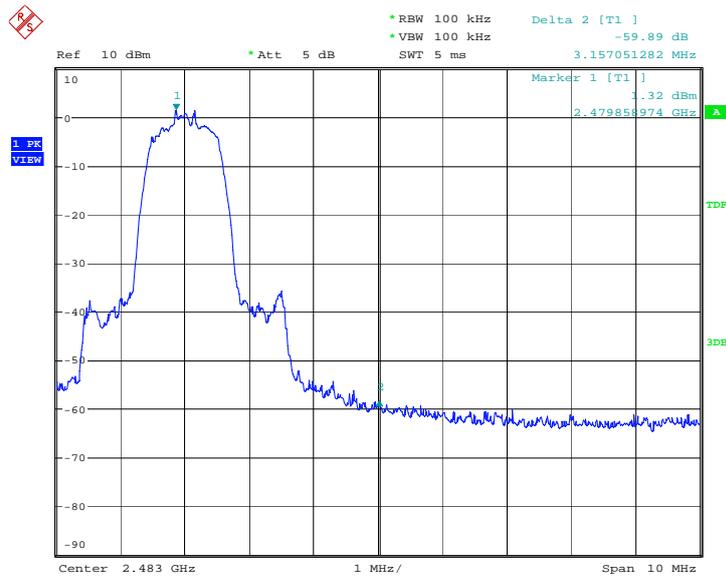
Date: 19.SEP.2010 03:49:02

Fig.5 Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping Off



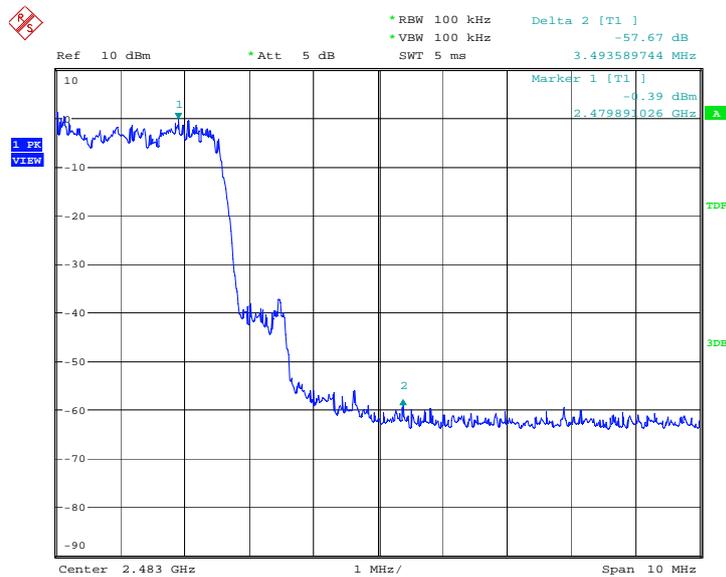
Date: 19.SEP.2010 03:51:22

Fig.6 Frequency Band Edges:  $\pi/4$  DQPSK, Channel 0, Hopping On



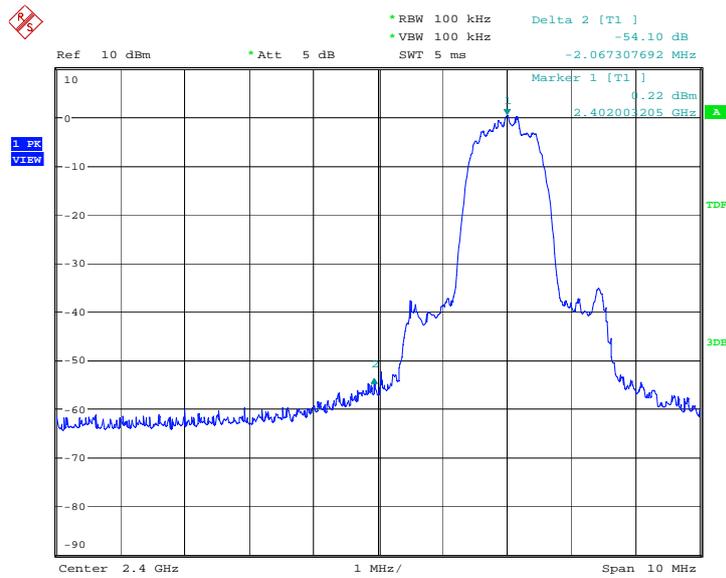
Date: 19.SEP.2010 03:49:19

Fig.7 Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping Off



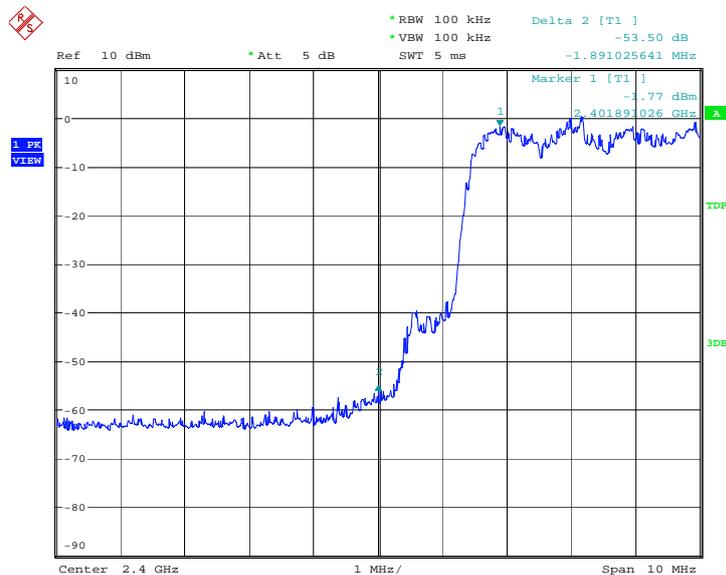
Date: 19.SEP.2010 03:53:24

Fig.8 Frequency Band Edges:  $\pi/4$  DQPSK, Channel 78, Hopping On



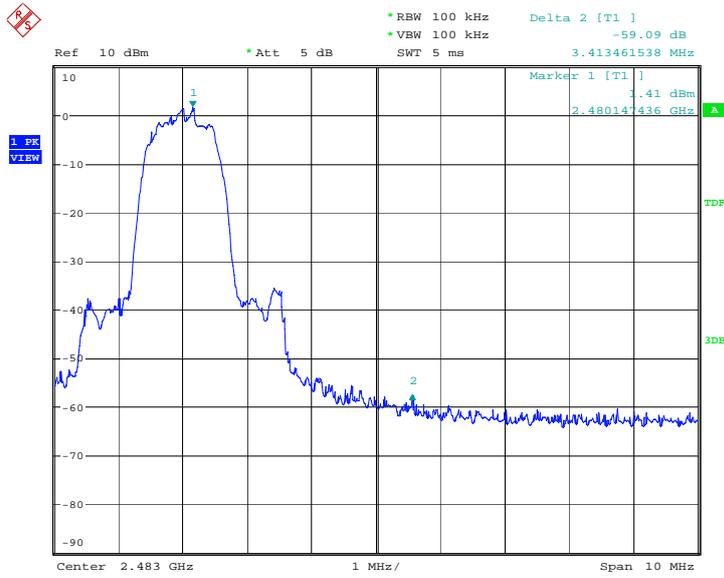
Date: 19.SEP.2010 04:09:29

Fig.9 Frequency Band Edges: 8DPSK, Channel 0, Hopping Off



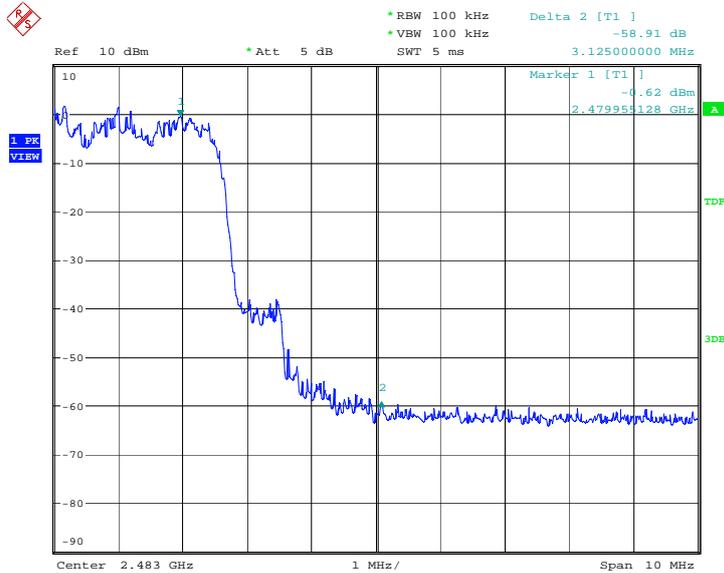
Date: 19.SEP.2010 04:11:49

Fig.10 Frequency Band Edges: 8DPSK, Channel 0, Hopping On



Date: 19.SEP.2010 04:09:46

Fig.11 Frequency Band Edges: 8DPSK, Channel 78, Hopping Off



Date: 19.SEP.2010 04:13:51

Fig.12 Frequency Band Edges: 8DPSK, Channel 78, Hopping On

#### A.4. Conducted Emission

##### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

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

##### Measurement Results:

###### For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	Center Frequency	Fig.13	P
	30 MHz ~ 1 GHz	Fig.14	P
	1 GHz ~ 26 GHz	Fig.15	P
Ch 39 2441 MHz	Center Frequency	Fig.16	P
	30 MHz ~ 1 GHz	Fig.17	P
	1 GHz ~ 26 GHz	Fig.18	P
Ch 78 2480 MHz	Center Frequency	Fig.19	P
	30 MHz ~ 1 GHz	Fig.20	P
	1 GHz ~ 26 GHz	Fig.21	P

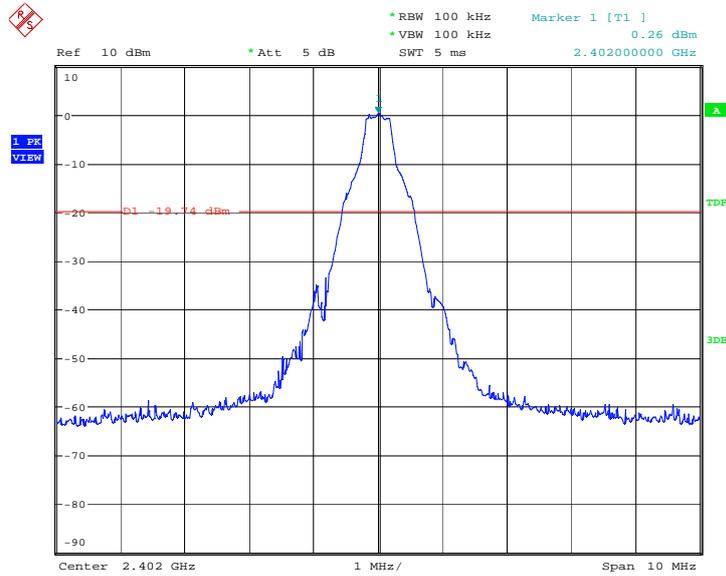
###### For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	Center Frequency	Fig.22	P
	30 MHz ~ 1 GHz	Fig.23	P
	1 GHz ~ 26 GHz	Fig.24	P
Ch 39 2441 MHz	Center Frequency	Fig.25	P
	30 MHz ~ 1 GHz	Fig.26	P
	1 GHz ~ 26 GHz	Fig.27	P
Ch 78 2480 MHz	Center Frequency	Fig.28	P
	30 MHz ~ 1 GHz	Fig.29	P
	1 GHz ~ 26 GHz	Fig.30	P

###### For 8DPSK

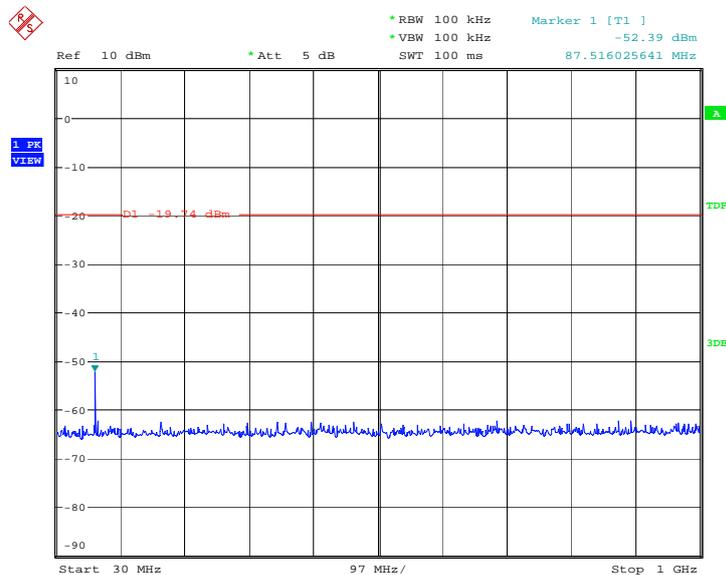
Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	Center Frequency	Fig.31	P
	30 MHz ~ 1 GHz	Fig.32	P
	1 GHz ~ 26 GHz	Fig.33	P
Ch 39 2441 MHz	Center Frequency	Fig.34	P
	30 MHz ~ 1 GHz	Fig.35	P
	1 GHz ~ 26 GHz	Fig.36	P
Ch 78 2480 MHz	Center Frequency	Fig.37	P
	30 MHz ~ 1 GHz	Fig.38	P
	1 GHz ~ 26 GHz	Fig.39	P

**Conclusion: PASS**  
**Test graphs as below**



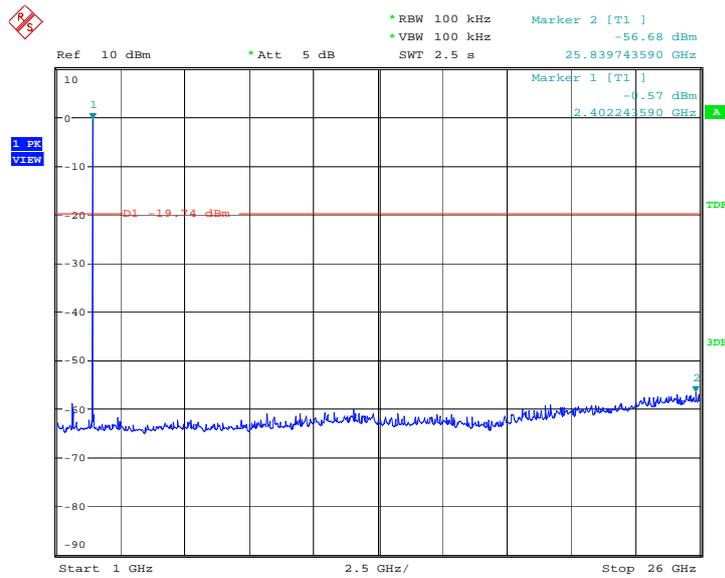
Date: 19.SEP.2010 03:33:13

Fig.13 Conducted spurious emission: GFSK, Channel 0,2402MHz



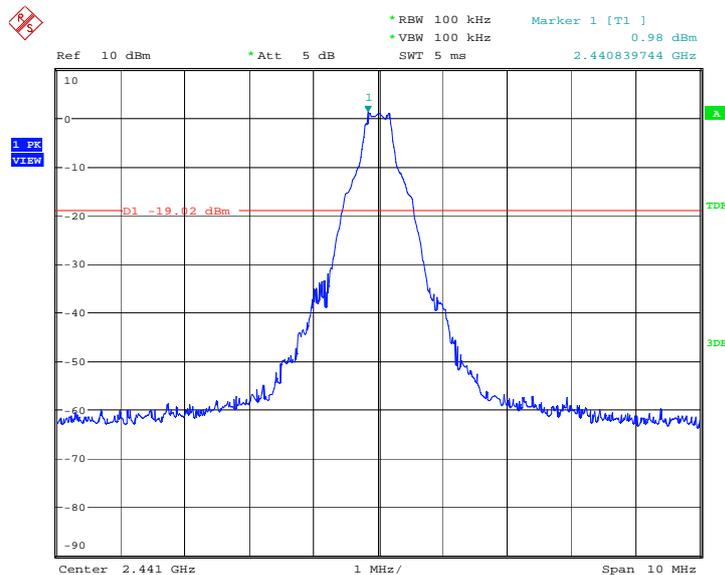
Date: 19.SEP.2010 03:33:30

Fig.14 Conducted spurious emission: GFSK, Channel 0, 30MHz - 1GHz



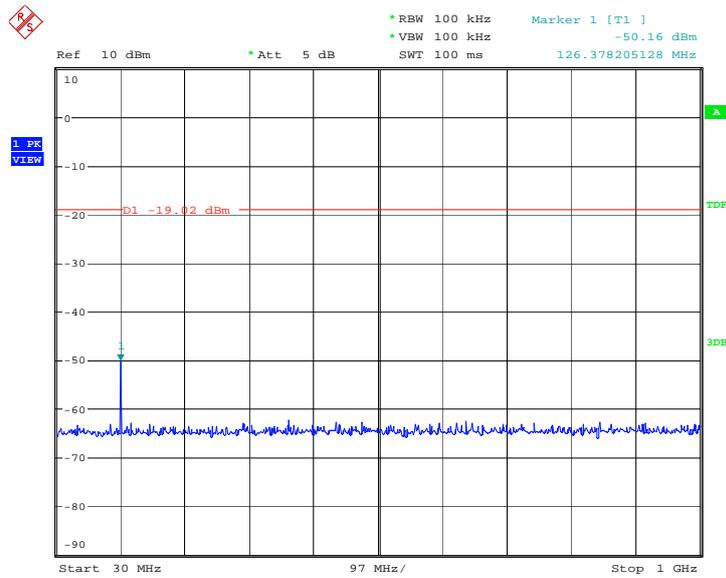
Date: 19.SEP.2010 03:34:01

Fig.15 Conducted spurious emission: GFSK, Channel 0,1GHz - 26GHz



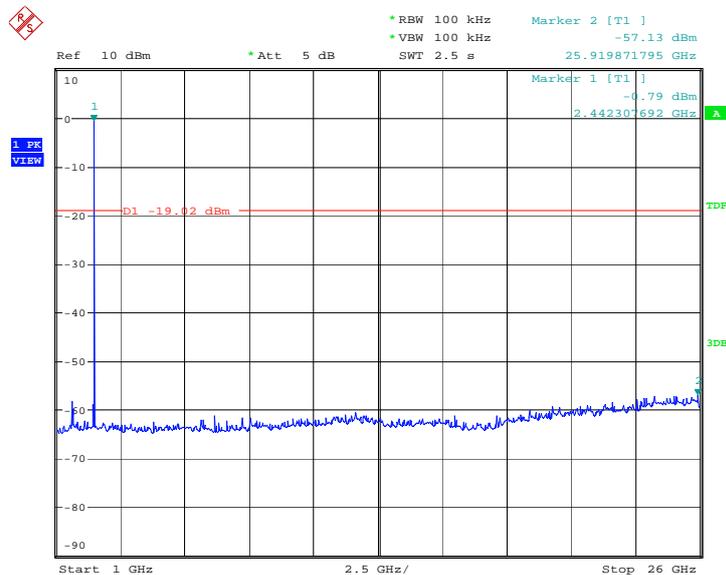
Date: 19.SEP.2010 03:34:18

Fig.16 Conducted spurious emission: GFSK, Channel 39, 2441MHz



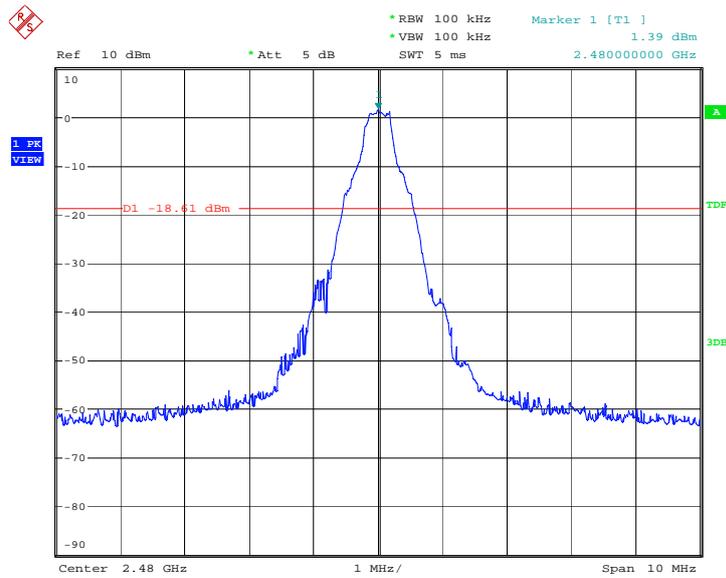
Date: 19.SEP.2010 03:34:35

Fig.17 Conducted spurious emission: GFSK, Channel 39, 30MHz - 1GHz



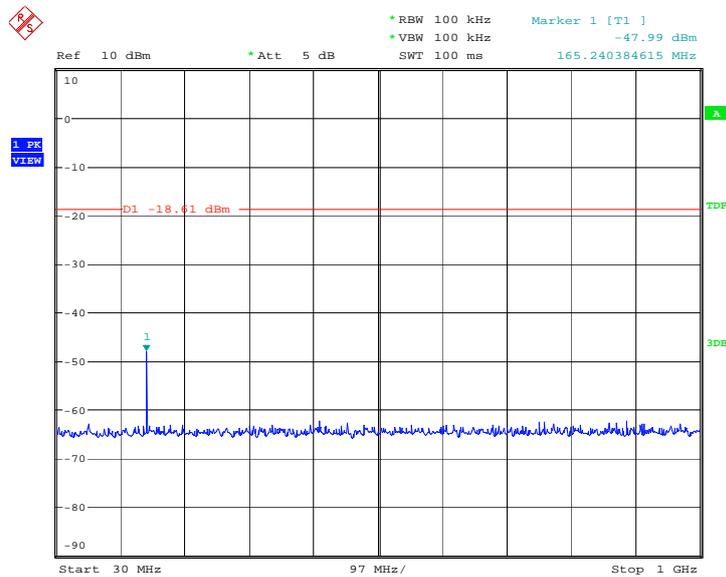
Date: 19.SEP.2010 03:35:06

Fig.18 Conducted spurious emission: GFSK, Channel 39, 1GHz - 26GHz



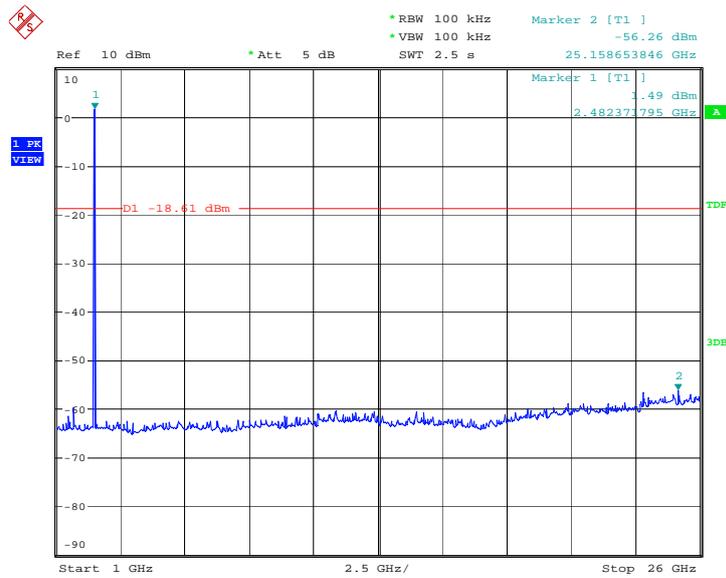
Date: 19.SEP.2010 03:35:23

Fig.19 Conducted spurious emission: GFSK, Channel 78, 2480MHz



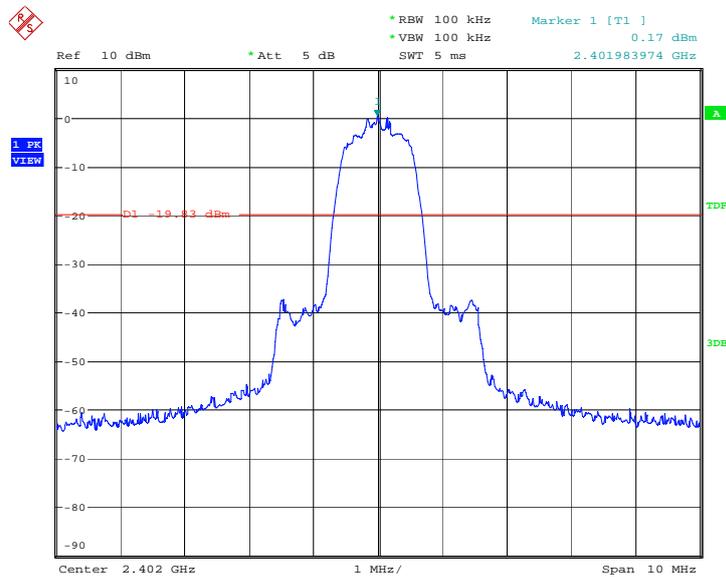
Date: 19.SEP.2010 03:35:40

Fig.20 Conducted spurious emission: GFSK, Channel 78, 30MHz - 1GHz



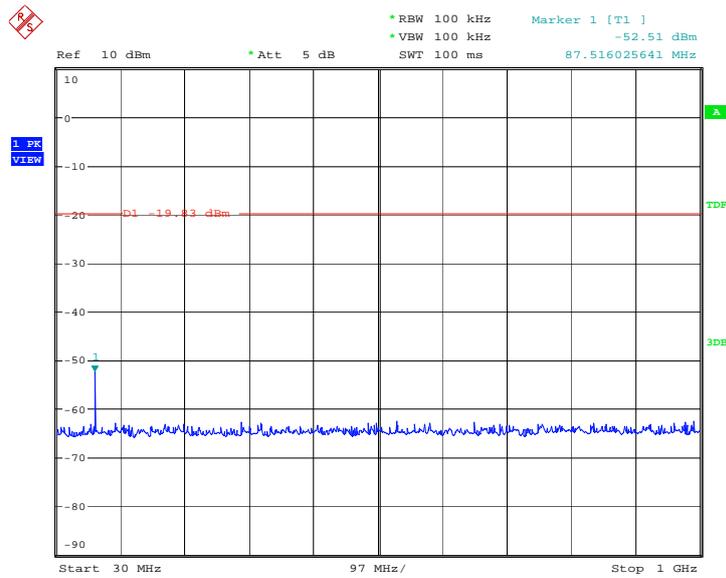
Date: 19.SEP.2010 03:36:12

Fig.21 Conducted spurious emission: GFSK, Channel 78, 1GHz - 26GHz



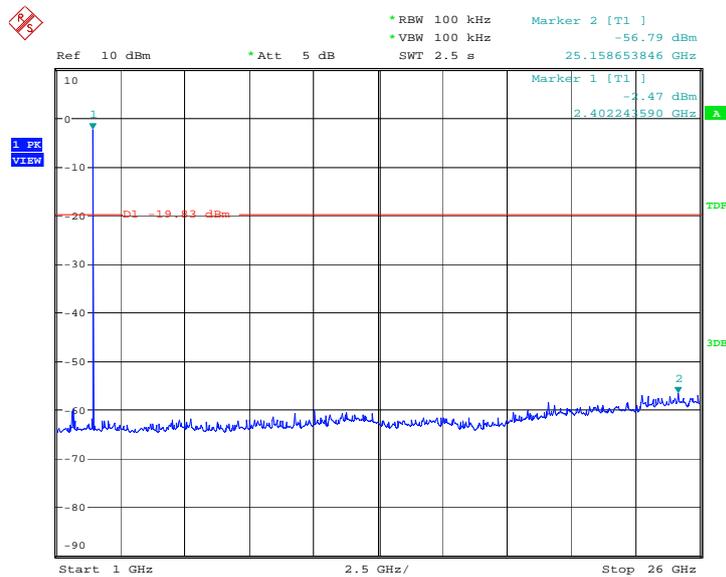
Date: 19.SEP.2010 03:53:43

Fig.22 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0,2402MHz



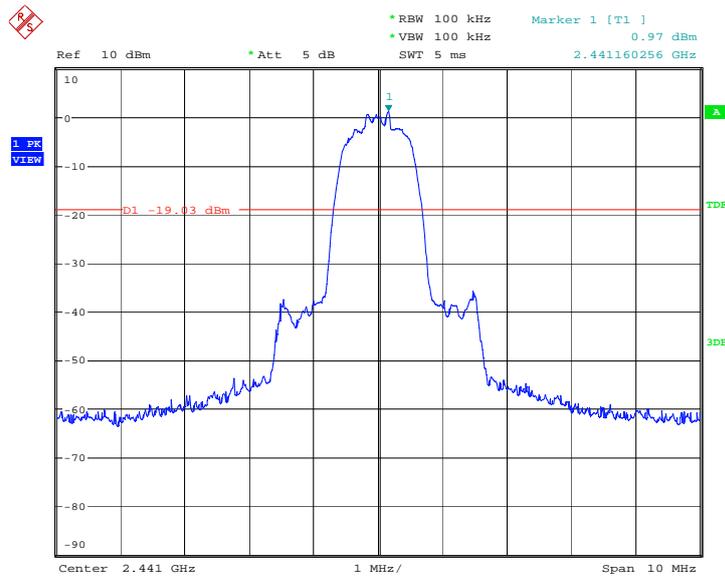
Date: 19.SEP.2010 03:53:59

Fig.23 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 30MHz - 1GHz



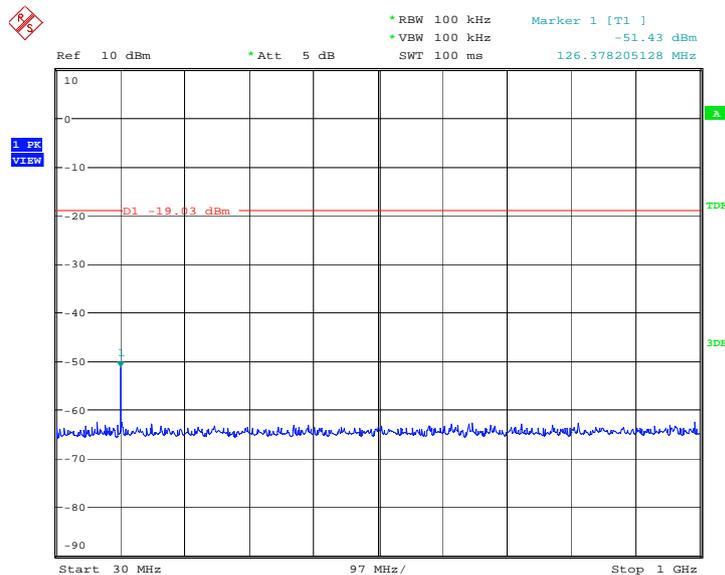
Date: 19.SEP.2010 03:54:31

Fig.24 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 0, 1GHz - 26GHz



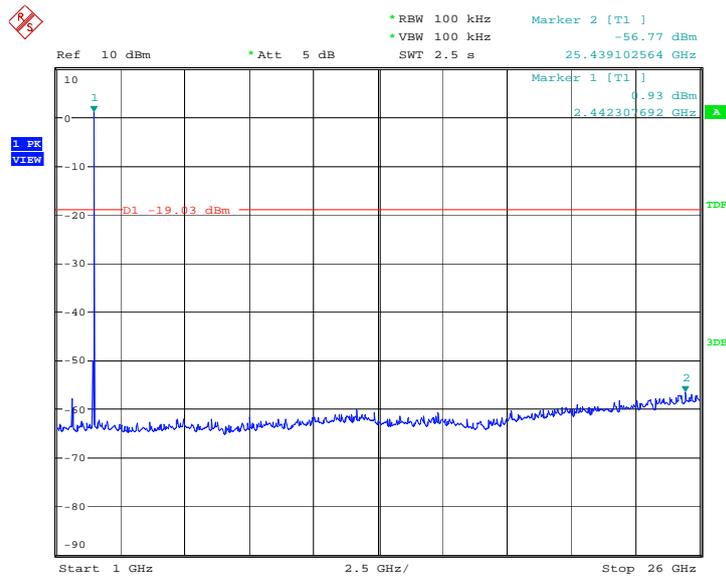
Date: 19.SEP.2010 03:54:48

Fig.25 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 2441MHz



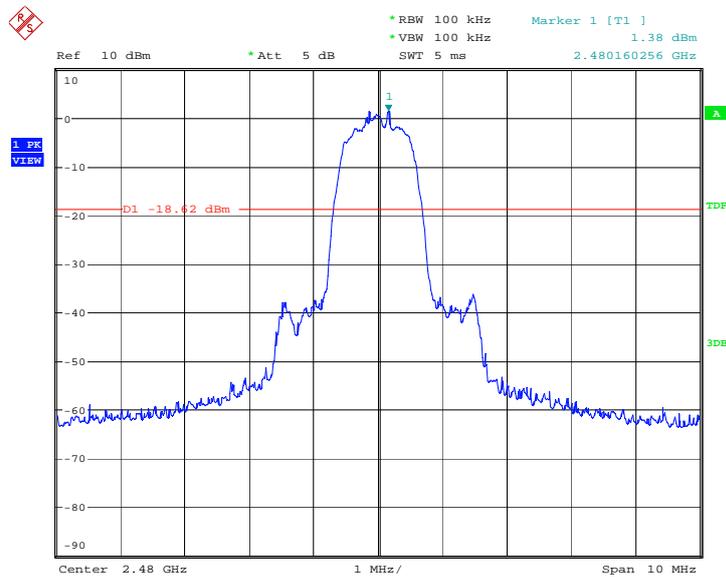
Date: 19.SEP.2010 03:55:04

Fig.26 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 30MHz - 1GHz



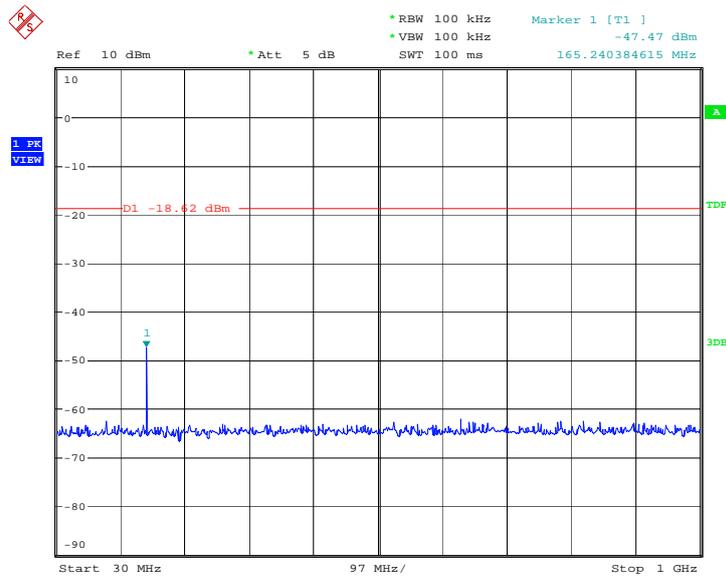
Date: 19.SEP.2010 03:55:36

Fig.27 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 39, 1GHz – 26GHz



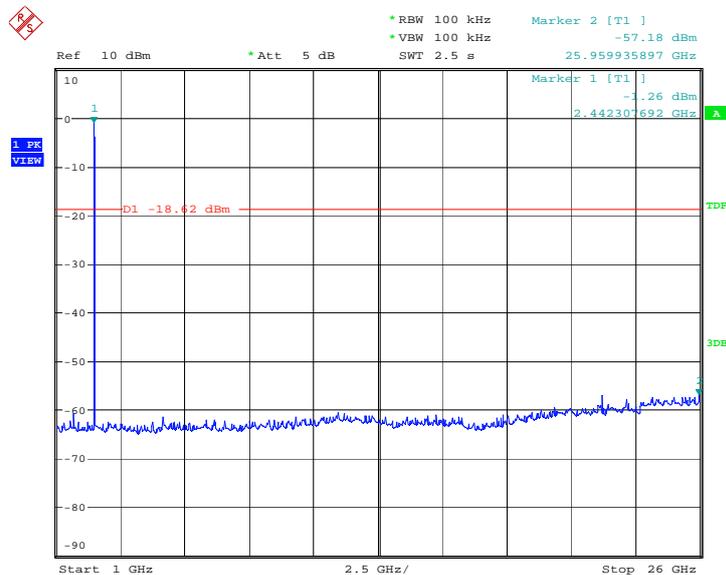
Date: 19.SEP.2010 03:55:52

Fig.28 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 2480MHz



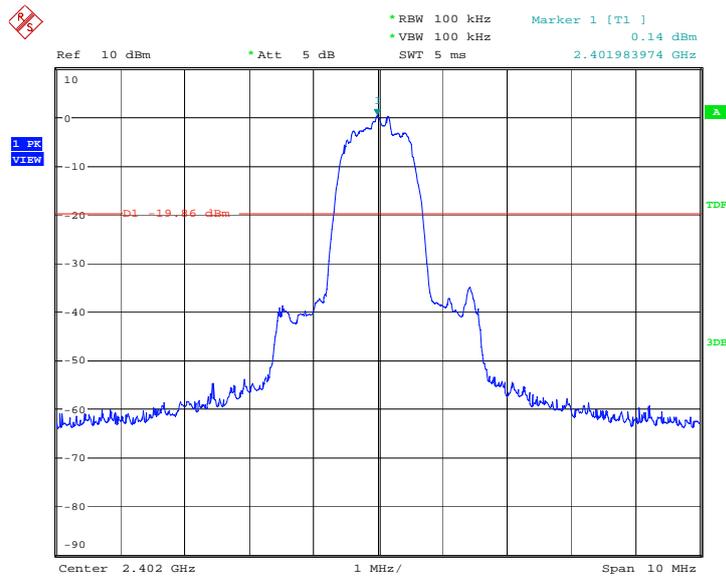
Date: 19.SEP.2010 03:56:09

Fig.29 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 30MHz - 1GHz



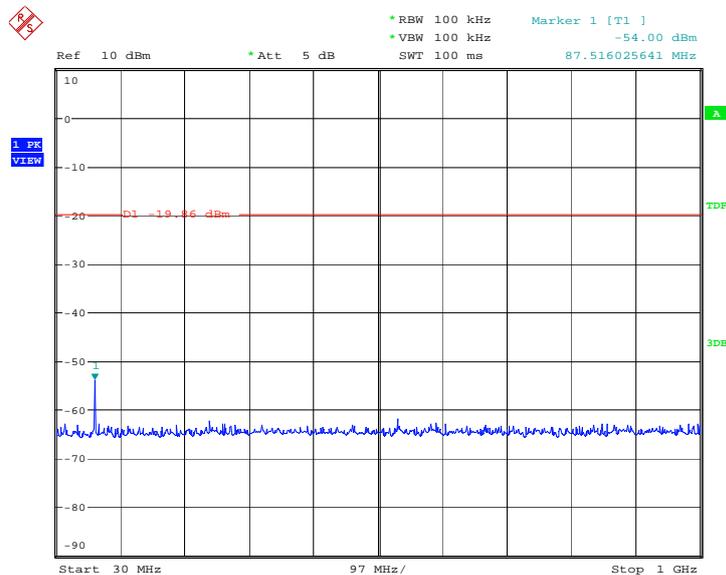
Date: 19.SEP.2010 03:56:41

Fig.30 Conducted spurious emission:  $\pi/4$  DQPSK, Channel 78, 1GHz - 26GHz



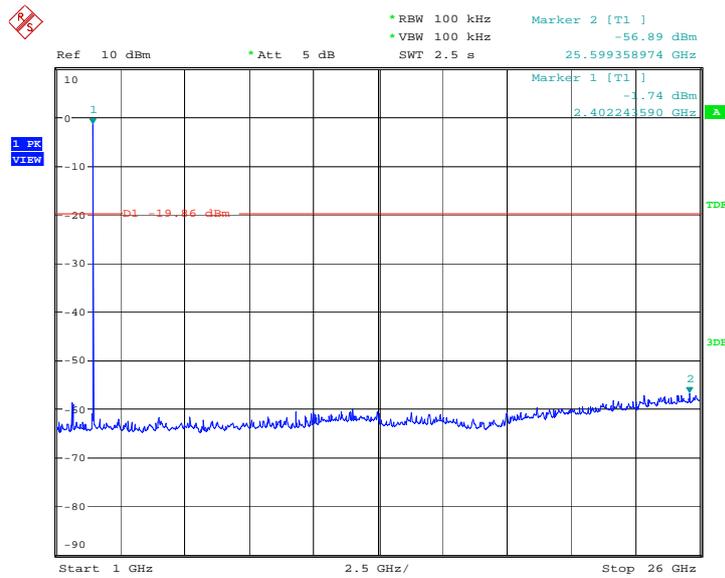
Date: 19.SEP.2010 04:14:10

Fig.31 Conducted spurious emission: 8DPSK, Channel 0,2402MHz



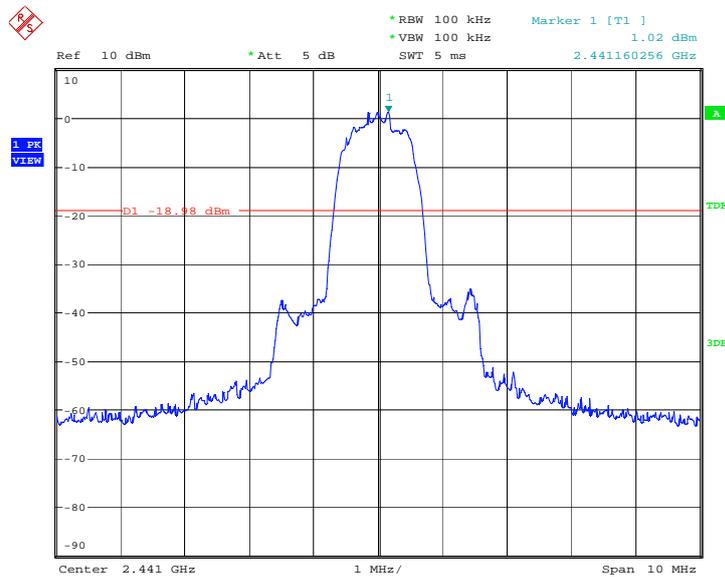
Date: 19.SEP.2010 04:14:27

Fig.32 Conducted spurious emission: 8DPSK, Channel 0, 30MHz - 1GHz



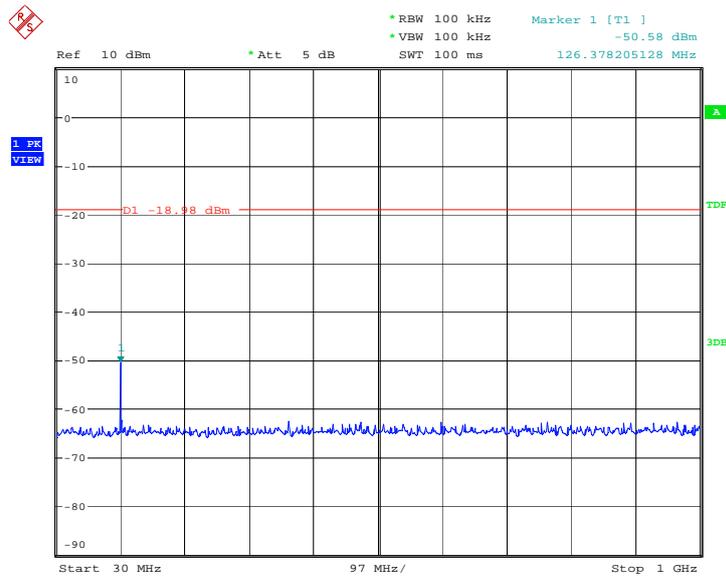
Date: 19.SEP.2010 04:14:58

Fig.33 Conducted spurious emission: 8DPSK, Channel 0,1GHz - 26GHz



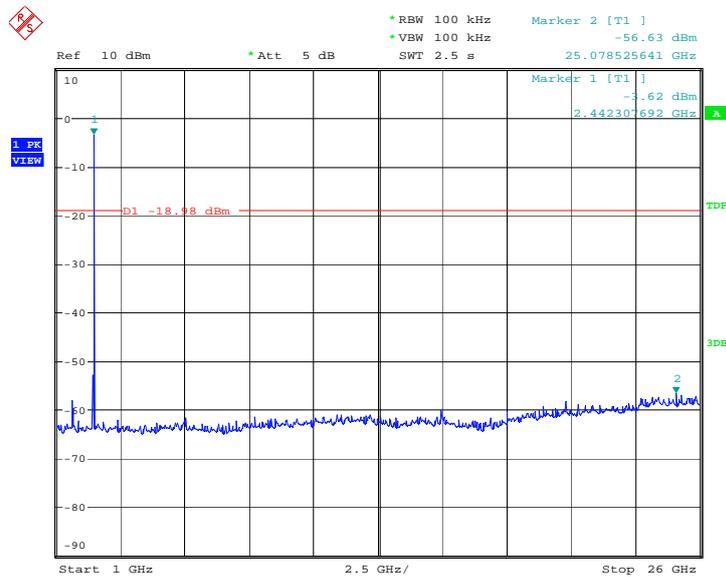
Date: 19.SEP.2010 04:15:15

Fig.34 Conducted spurious emission: 8DPSK, Channel 39, 2441MHz



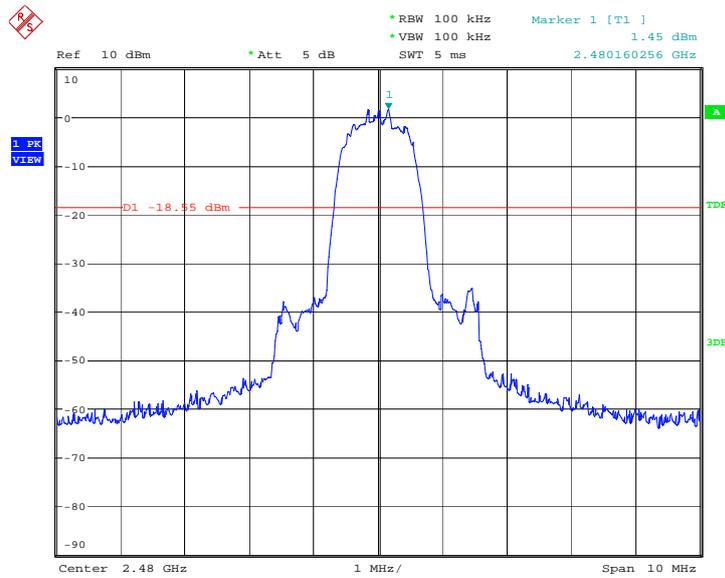
Date: 19.SEP.2010 04:15:31

Fig.35 Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz



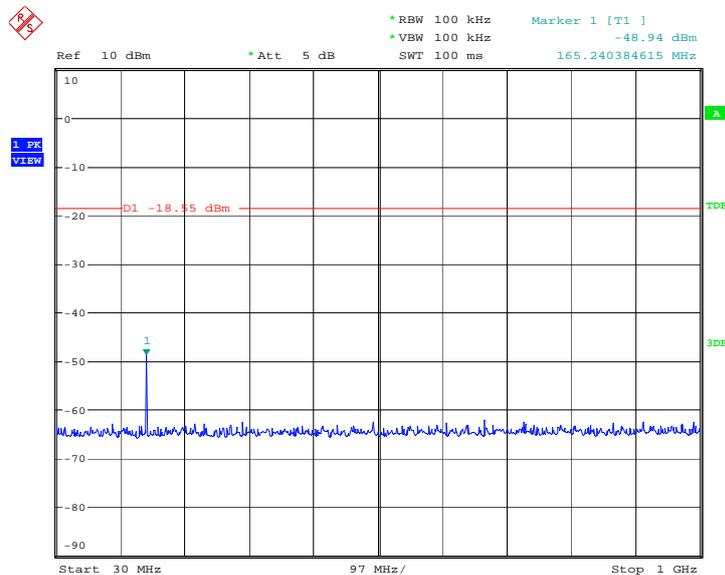
Date: 19.SEP.2010 04:16:03

Fig.36 Conducted spurious emission: 8DPSK, Channel 39, 1GHz – 26GHz



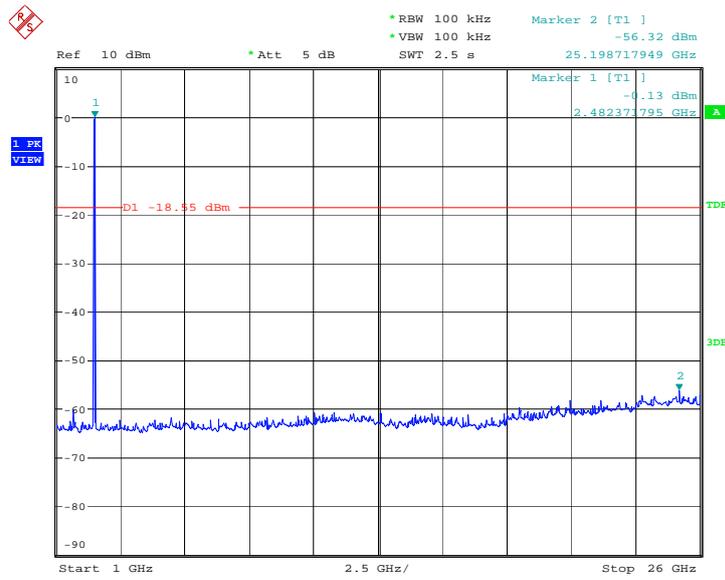
Date: 19.SEP.2010 04:16:20

Fig.37 Conducted spurious emission: 8DPSK, Channel 78, 2480MHz



Date: 19.SEP.2010 04:16:36

Fig.38 Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz



Date: 19.SEP.2010 04:17:08

Fig.39 Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 26GHz

## A.5. 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 made 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

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 the  $A_{Rpl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable los.

The measurement results are obtained as described below:

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

### For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	30 MHz ~ 1 GHz	Fig.40	P
	1 GHz ~ 4 GHz	Fig.41	P
	4 GHz ~ 18 GHz	Fig.42	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.43	P
	1 GHz ~ 4 GHz	Fig.44	P
	4 GHz ~ 18 GHz	Fig.45	P

Ch 78 2480 MHz	30 MHz ~ 1 GHz	Fig.46	P
	1 GHz ~ 4 GHz	Fig.47	P
	4 GHz ~ 18 GHz	Fig.48	P
Power		Fig.49	P
For all channels	18 GHz ~ 26 GHz	Fig.50	P

**Forπ/4 DQPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	30 MHz ~ 1 GHz	Fig.51	P
	1 GHz ~ 4 GHz	Fig.52	P
	4 GHz ~ 18 GHz	Fig.53	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.54	P
	1 GHz ~ 4 GHz	Fig.55	P
	4 GHz ~ 18 GHz	Fig.56	P
Ch 78 2480 MHz	30 MHz ~ 1 GHz	Fig.57	P
	1 GHz ~ 4 GHz	Fig.58	P
	4 GHz ~ 18 GHz	Fig.59	P
Power		Fig.60	P
For all channels	18 GHz ~ 26 GHz	Fig.61	P

**For 8DPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	30 MHz ~ 1 GHz	Fig.62	P
	1 GHz ~ 4 GHz	Fig.63	P
	4 GHz ~ 18 GHz	Fig.64	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.65	P
	1 GHz ~ 4 GHz	Fig.66	P
	4 GHz ~ 18 GHz	Fig.67	P
Ch 78 2480 MHz	30 MHz ~ 1 GHz	Fig.68	P
	1 GHz ~ 4 GHz	Fig.69	P
	4 GHz ~ 18 GHz	Fig.70	P
Power		Fig.71	P
For all channels	18 GHz ~ 26 GHz	Fig.72	P

**For all channels**

<b>Idle</b>	30 MHz ~ 1 GHz	Fig.73	P
	1 GHz ~ 4 GHz	Fig.74	P
	4 GHz ~ 18 GHz	Fig.75	P
	18 GHz ~ 26 GHz	Fig.76	P

**GFSK Ch 0**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3464.93	50.46	11.9	38.56	HORIZONTAL
3545.09	50.39	14.3	36.09	HORIZONTAL
2442.886	50.3	8.6	41.7	HORIZONTAL
3468.938	50.25	11.9	38.35	HORIZONTAL
3567.134	50.19	14.2	35.99	HORIZONTAL
3695.391	50.15	14.2	35.95	HORIZONTAL

**GFSK Ch 39**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3703.407	50.78	14.3	36.48	HORIZONTAL
3701.403	50.54	14.3	36.24	HORIZONTAL
3511.022	50.38	14.4	35.98	HORIZONTAL
3693.387	50.36	14.2	36.16	HORIZONTAL
3785.571	50.31	14.2	36.11	HORIZONTAL
3883.768	50.23	14.4	35.83	HORIZONTAL

**GFSK Ch 78**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3484.97	50.85	12.2	38.65	VERTICAL
3635.271	50.83	14.1	36.73	VERTICAL
3611.222	50.75	14	36.75	HORIZONTAL
3863.727	50.72	14.2	36.52	VERTICAL
3837.675	50.69	14	36.69	VERTICAL
3603.206	50.67	14	36.67	HORIZONTAL

**$\pi/4$  DQPSK Ch 0**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3855.711	50.46	14.1	36.36	HORIZONTAL
3841.683	50.41	14	36.41	HORIZONTAL
3989.98	50.33	14.6	35.73	HORIZONTAL
3843.687	50.28	14	36.28	HORIZONTAL
3691.383	50.24	14.2	36.04	HORIZONTAL
3498.998	50.19	12.3	37.89	HORIZONTAL

**$\pi/4$  DQPSK Ch 39**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3458.918	50.55	11.8	38.75	HORIZONTAL
3711.423	50.54	14.5	36.04	HORIZONTAL
3863.727	50.5	14.2	36.3	HORIZONTAL
3797.595	50.43	14.1	36.33	HORIZONTAL
3603.206	50.38	14	36.38	HORIZONTAL
3577.154	50.24	14.2	36.04	HORIZONTAL

**$\pi/4$  DQPSK Ch 78**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3869.739	51.11	14.2	36.91	HORIZONTAL
3681.363	50.6	14.2	36.4	HORIZONTAL
2402.806	50.49	8.8	41.69	HORIZONTAL
3657.315	50.36	14.1	36.26	HORIZONTAL
3963.928	50.29	14.4	35.89	HORIZONTAL
3565.13	50.14	14.2	35.94	HORIZONTAL

**8DPSK Ch 0**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3803.607	51.02	14.2	36.82	HORIZONTAL
3997.996	50.79	14.2	36.59	HORIZONTAL
3837.675	50.36	14	36.36	HORIZONTAL
3701.403	50.34	14.3	36.04	HORIZONTAL
3807.615	50.29	14.2	36.09	HORIZONTAL
3689.379	50.28	14.2	36.08	HORIZONTAL

**8DPSK Ch 39**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2402.806	50.52	8.8	41.72	HORIZONTAL
3681.363	50.51	14.2	36.31	HORIZONTAL
3715.431	50.38	14.5	35.88	HORIZONTAL
3725.451	50.37	14.4	35.97	HORIZONTAL
3883.768	50.31	14.4	35.91	HORIZONTAL
3791.583	50.29	14.1	36.19	HORIZONTAL

**8DPSK Ch 78**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3503.006	50.39	14.5	35.89	HORIZONTAL
3511.022	50.32	14.4	35.92	HORIZONTAL
3703.407	50.27	14.3	35.97	HORIZONTAL
3424.85	50.21	11.9	38.31	HORIZONTAL
3354.709	50.1	12.1	38	HORIZONTAL
3869.739	49.97	14.2	35.77	HORIZONTAL

**Idle**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3837.675	50.52	14	36.52	HORIZONTAL
3535.07	50.51	14.3	36.21	HORIZONTAL
3811.623	50.32	14.1	36.22	HORIZONTAL
3873.747	50.28	14.4	35.88	HORIZONTAL
3705.411	50.22	14.3	35.92	HORIZONTAL
3707.415	50.19	14.3	35.89	HORIZONTAL

**Conclusion: PASS**

**Test graphs as below:**

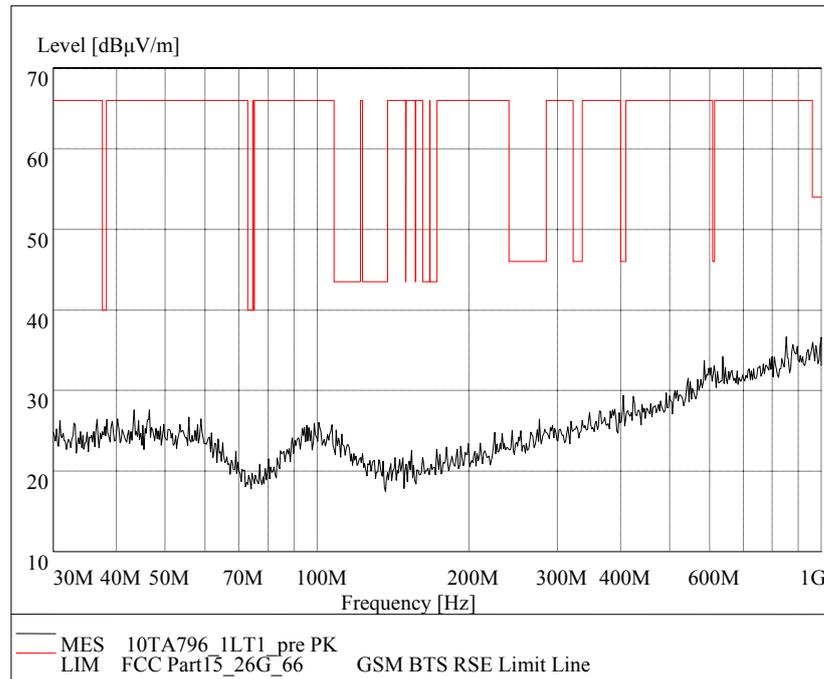


Fig.40 Radiated emission: GFSK, Channel 0, 30 MHz - 1 GHz

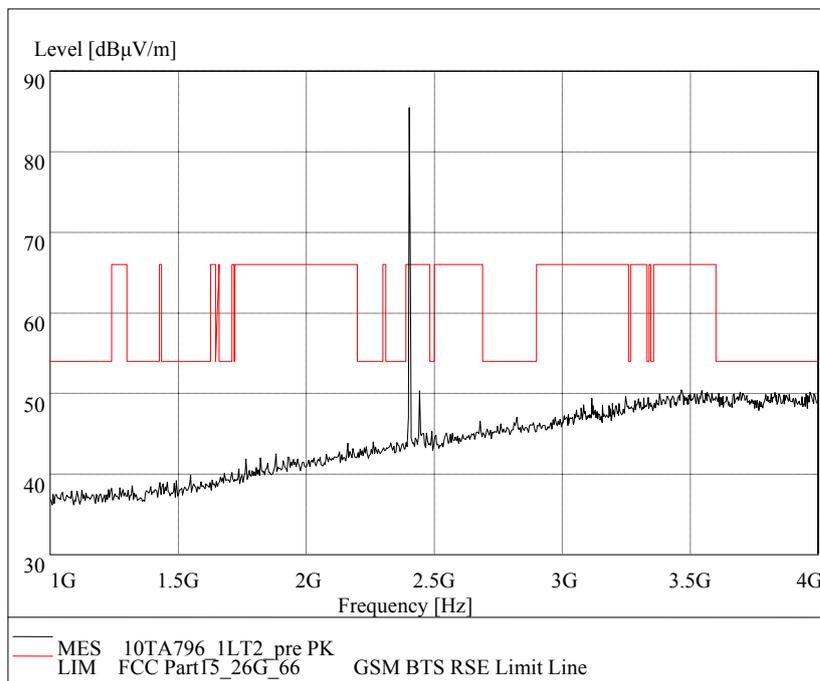


Fig.41 Radiated emission: GFSK, Channel 0, 1 GHz - 4 GHz

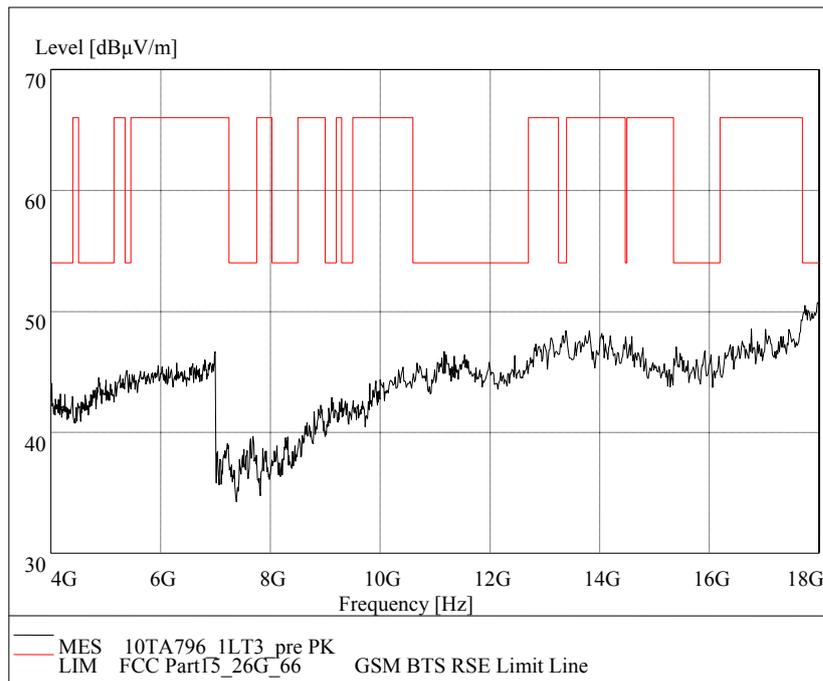


Fig.42 Radiated emission: GFSK, Channel 0, 4 GHz - 18 GHz

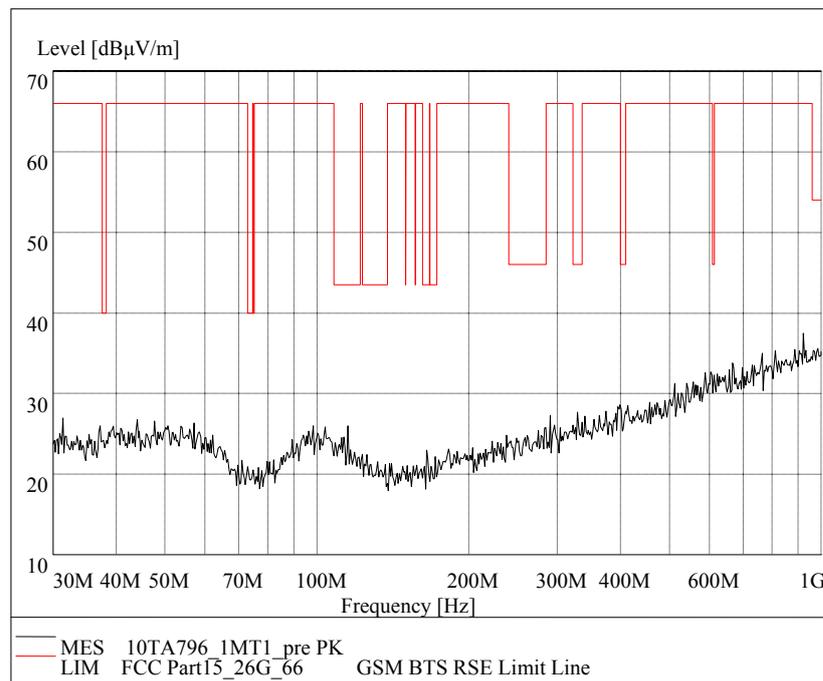


Fig.43 Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz

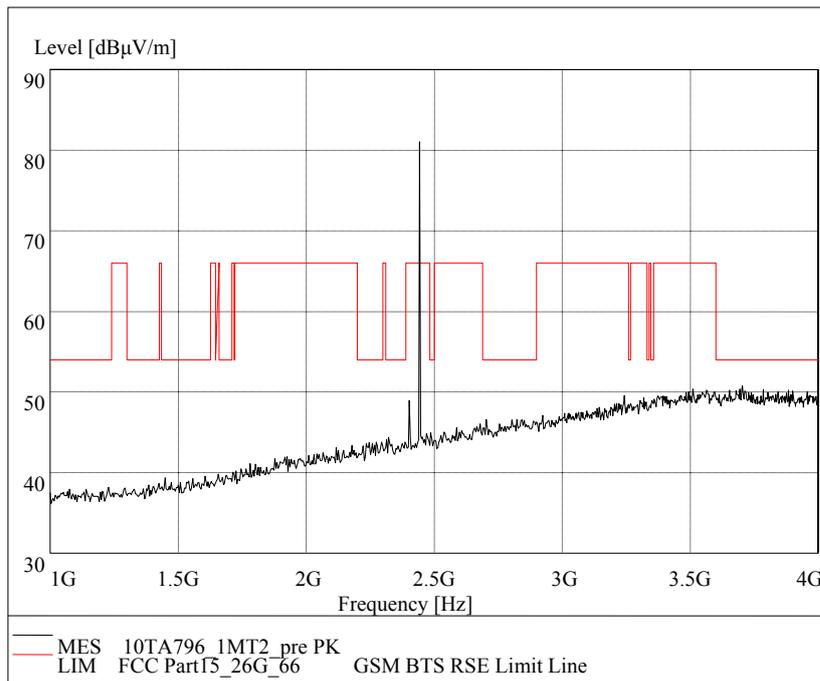


Fig.44 Radiated emission: GFSK, Channel 39, 1 GHz - 4 GHz

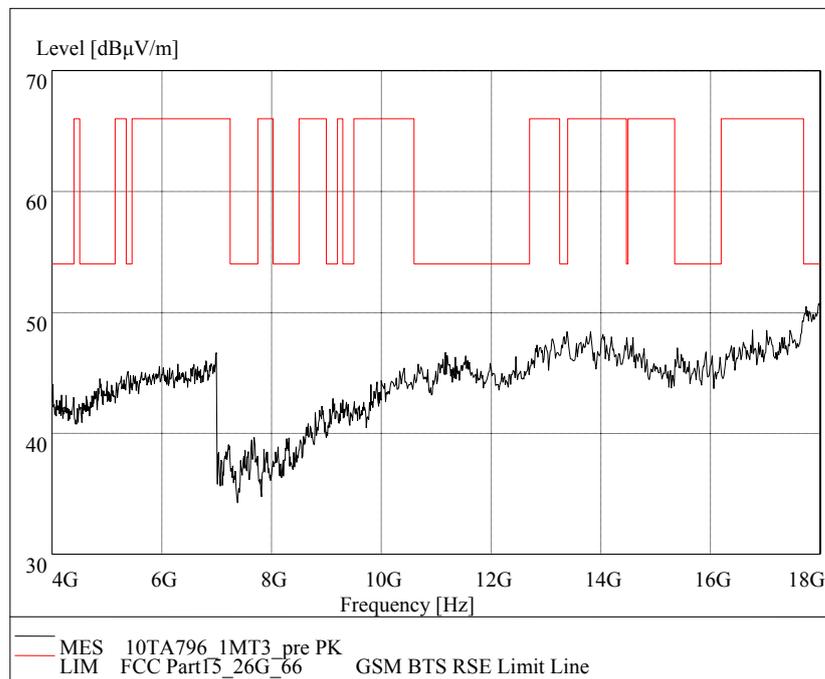


Fig.45 Radiated emission: GFSK, Channel 39, 4 GHz - 18 GHz

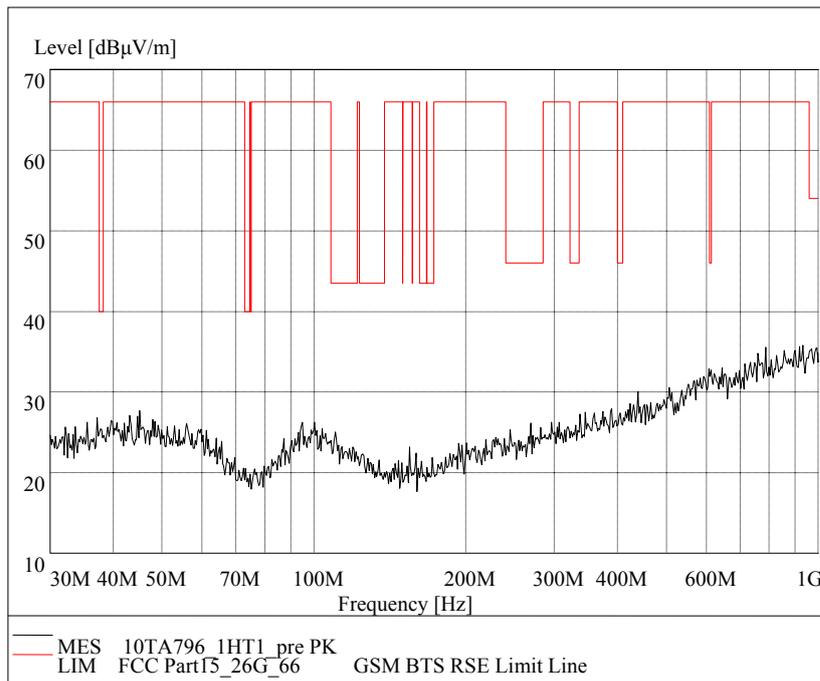


Fig.46 Radiated emission: GFSK, Channel 78, 30 MHz - 1 GHz

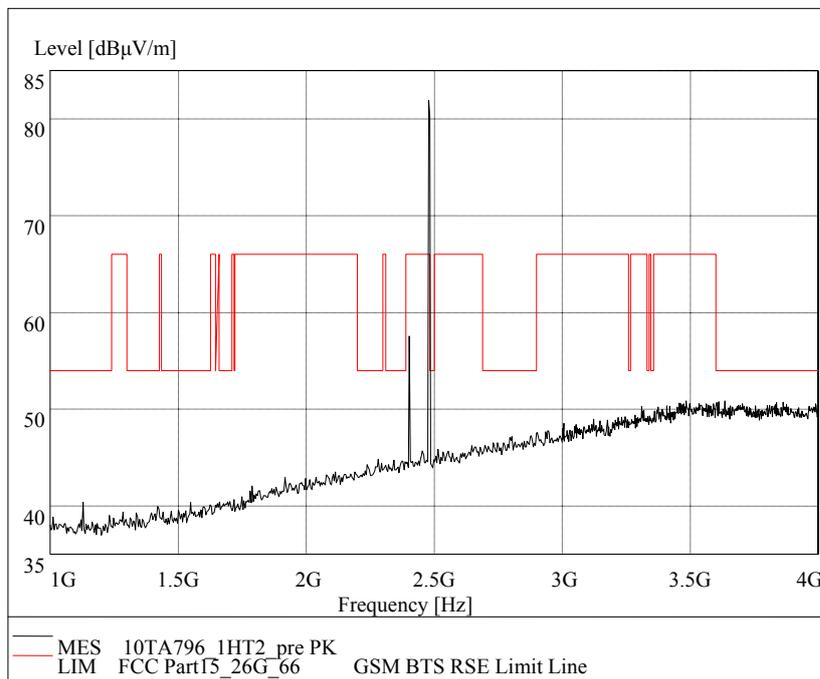


Fig.47 Radiated emission: GFSK, Channel 78, 1 GHz - 4 GHz

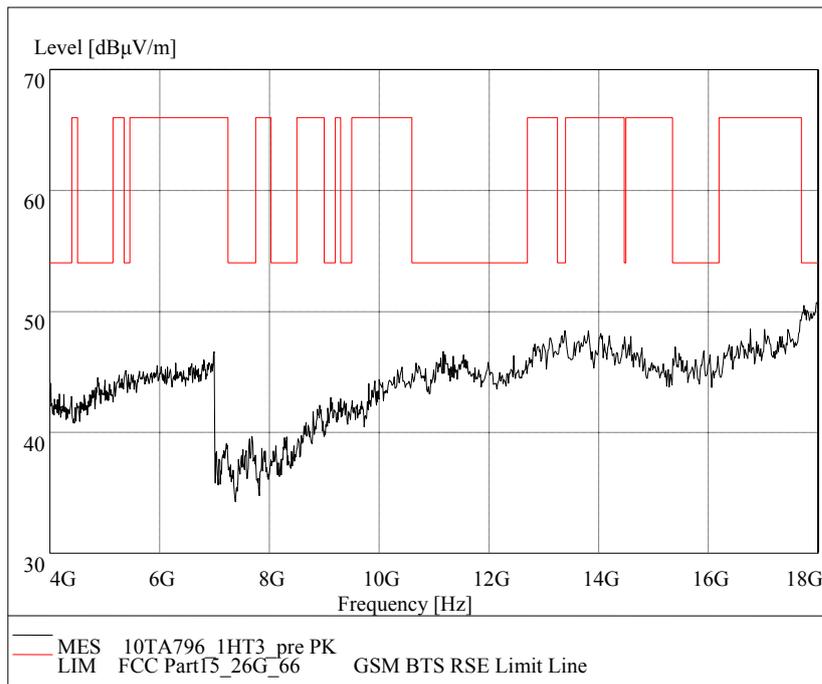
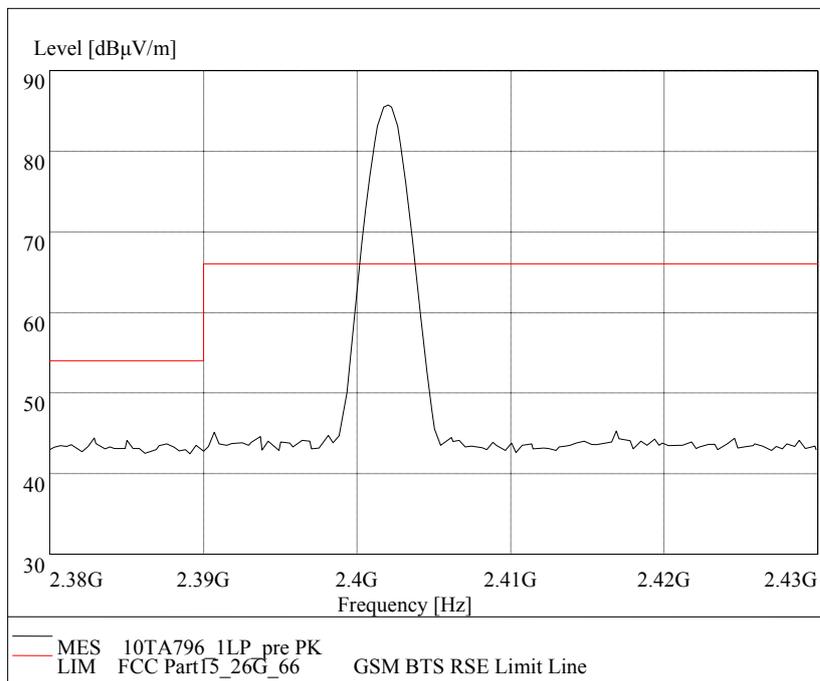


Fig.48 Radiated emission: GFSK, Channel 78, 4 GHz - 18 GHz



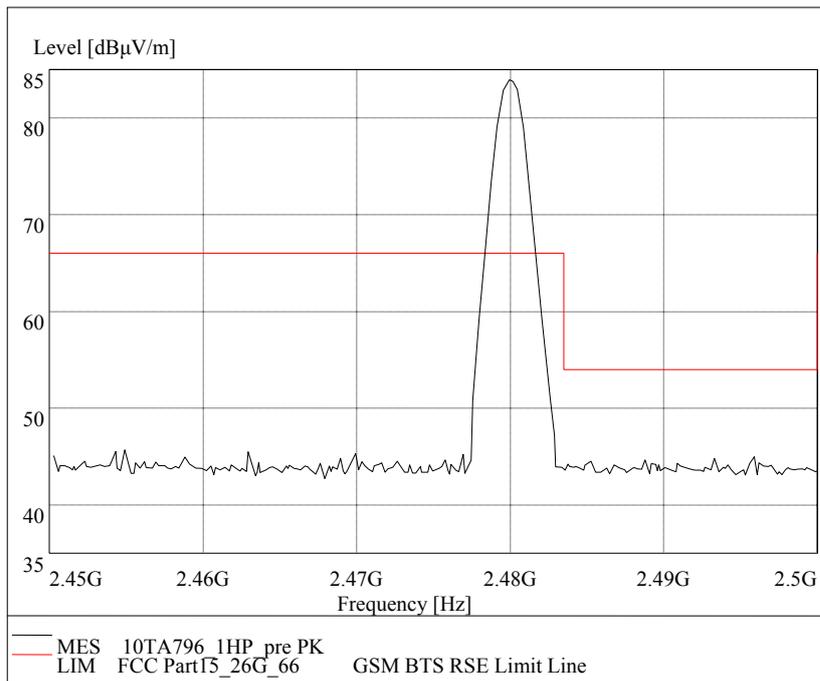


Fig.49 Radiated emission (Power): GFSK

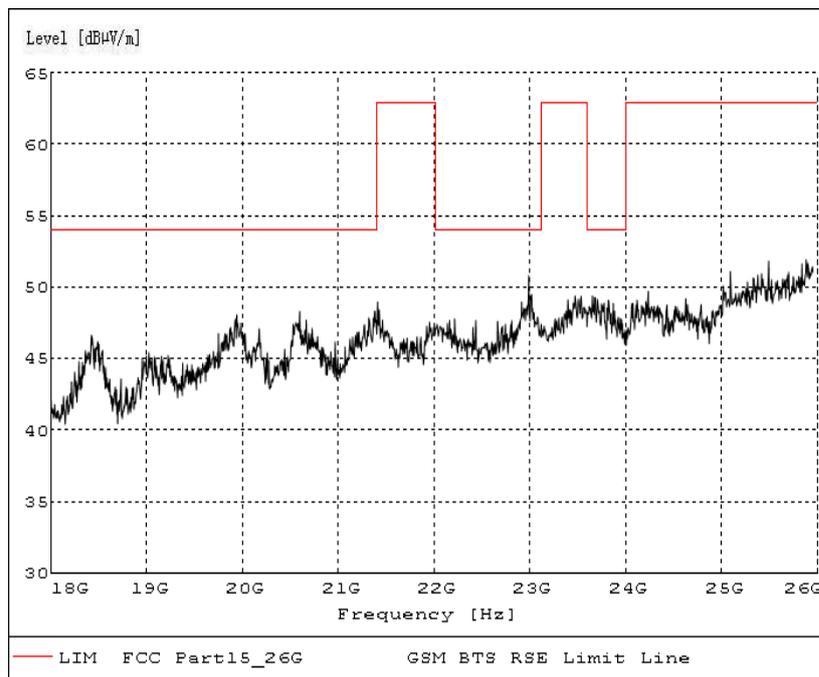


Fig.50 Radiated emission: GFSK, 18 GHz - 26 GHz

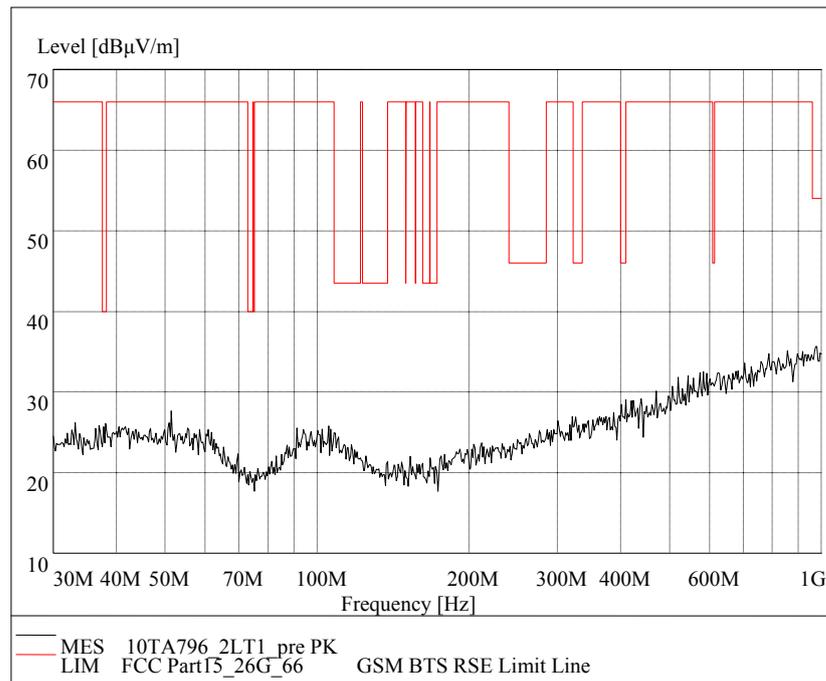


Fig.51 Radiated emission:  $\pi/4$  DQPSK, Channel 0, 30 MHz - 1 GHz

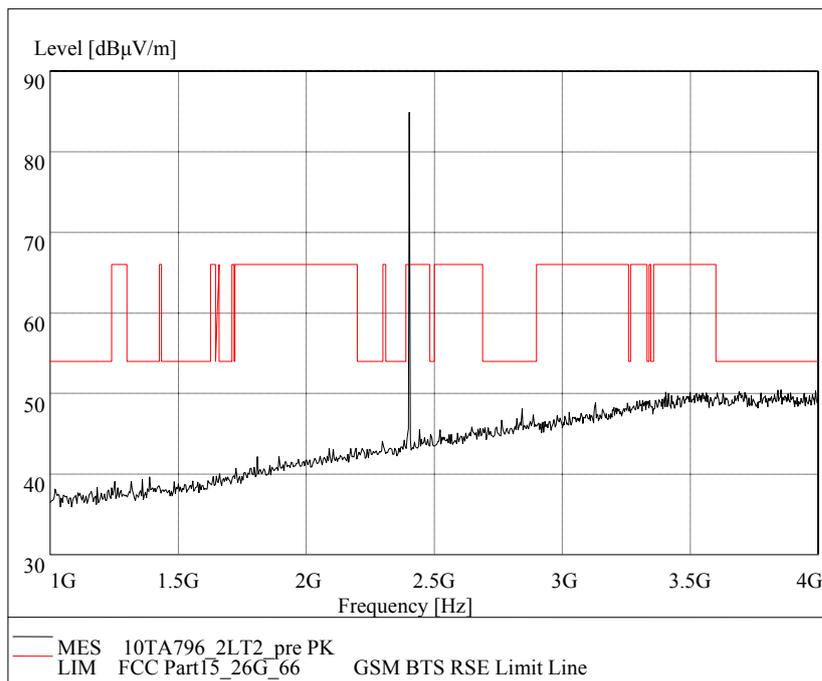


Fig.52 Radiated emission:  $\pi/4$  DQPSK, Channel 0, 1 GHz - 4 GHz

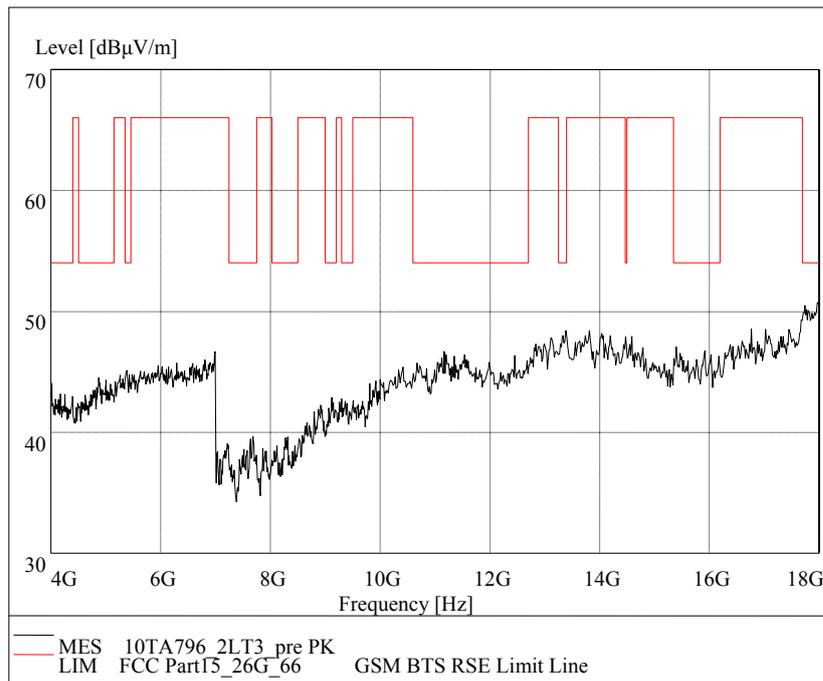


Fig.53 Radiated emission:  $\pi/4$  DQPSK, Channel 0, 4 GHz - 18 GHz

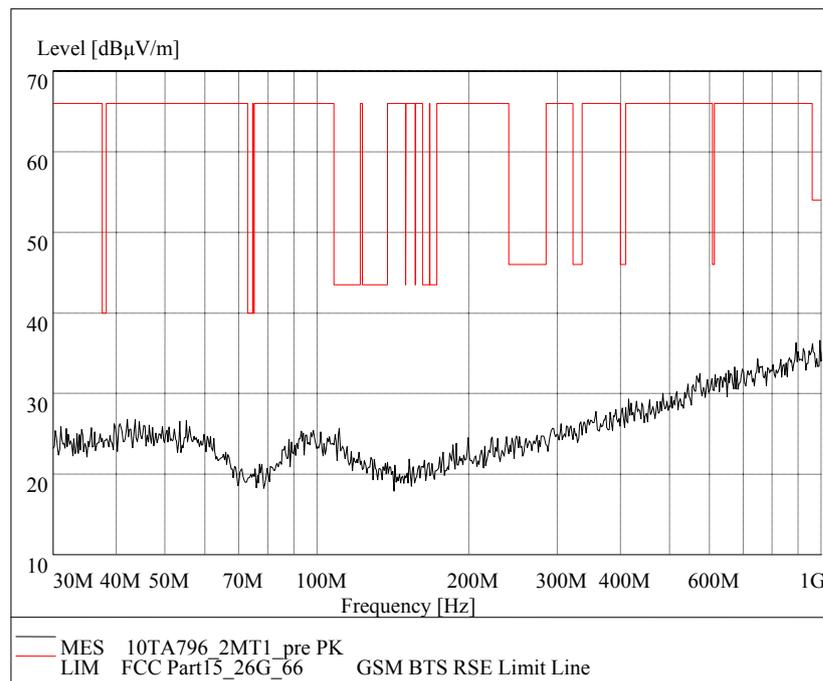


Fig.54 Radiated emission:  $\pi/4$  DQPSK, Channel 39, 30 MHz - 1 GHz

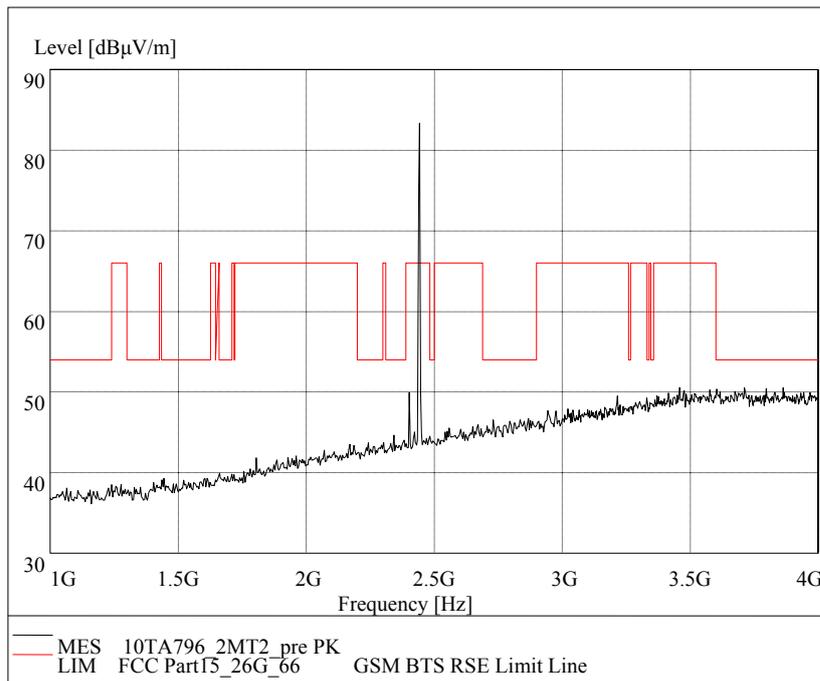


Fig.55 Radiated emission:  $\pi/4$  DQPSK, Channel 39, 1 GHz - 4 GHz

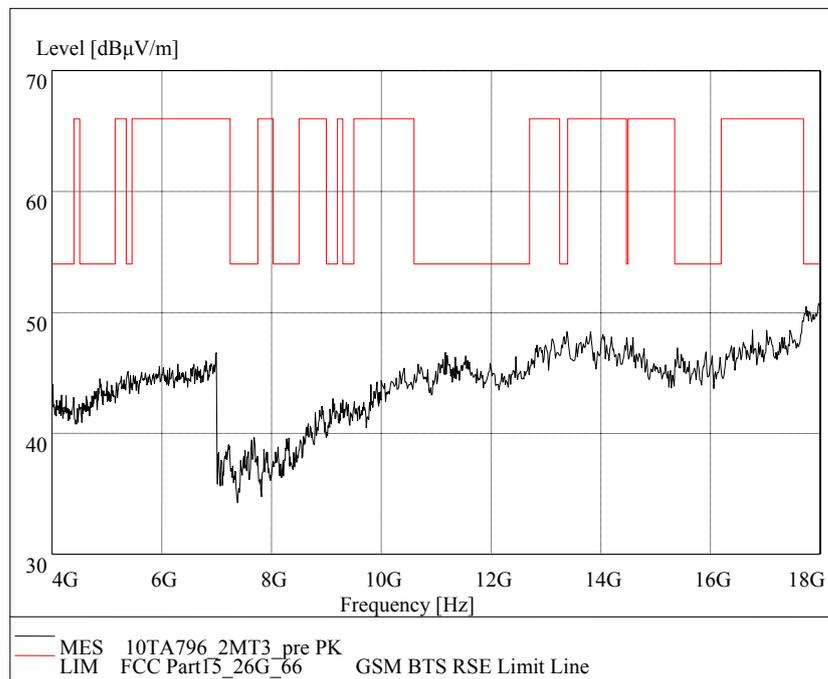


Fig.56 Radiated emission:  $\pi/4$  DQPSK, Channel 39, 4 GHz - 18 GHz

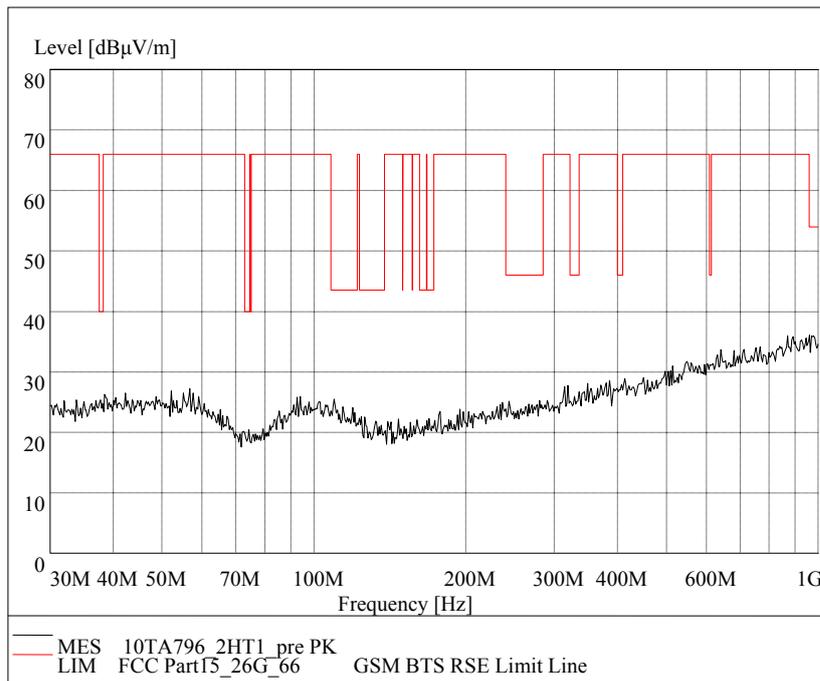


Fig.57 Radiated emission:  $\pi/4$  DQPSK, Channel 78, 30 MHz - 1 GHz

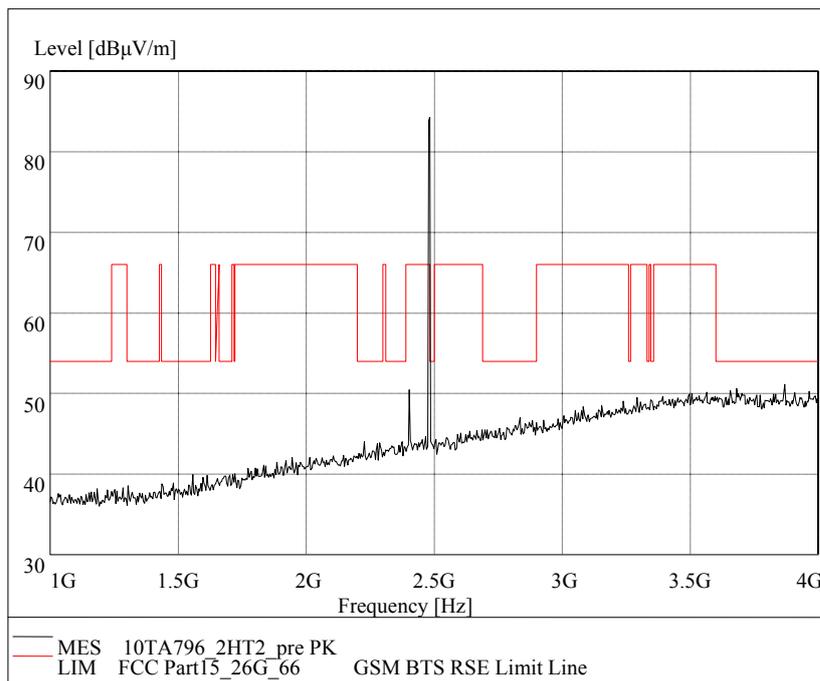


Fig.58 Radiated emission:  $\pi/4$  DQPSK, Channel 78, 1 GHz - 4 GHz

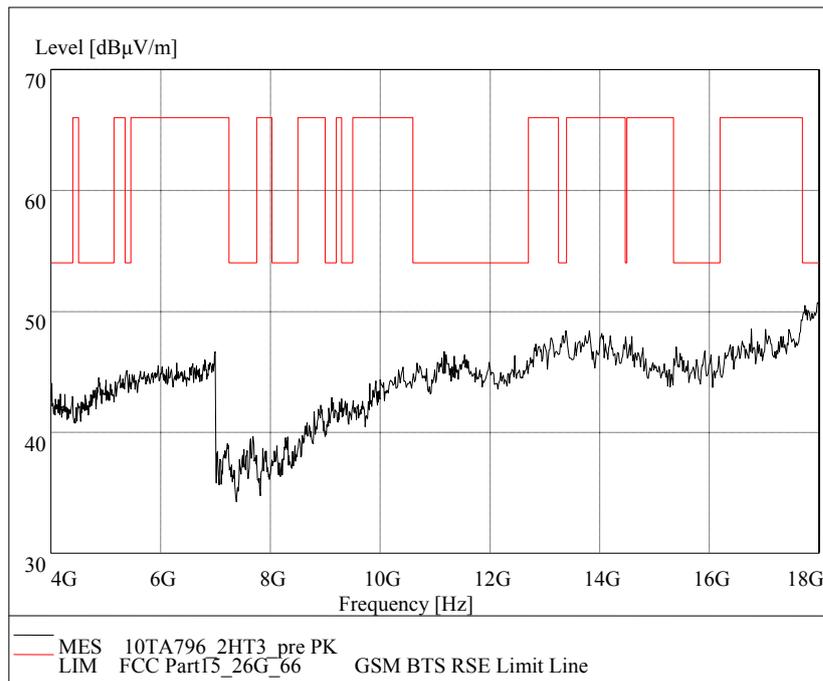
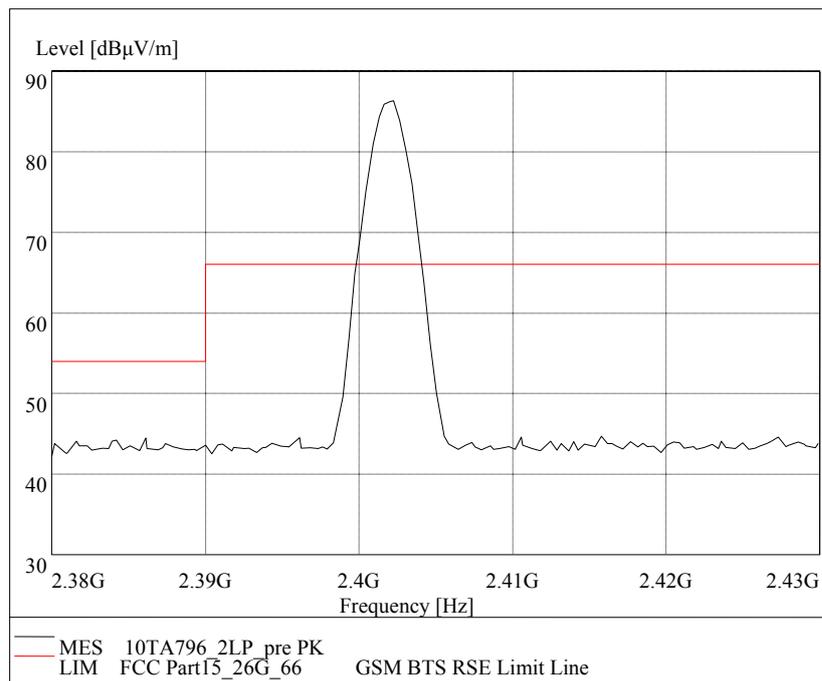


Fig.59 Radiated emission:  $\pi/4$  DQPSK, Channel 78, 4 GHz - 18 GHz



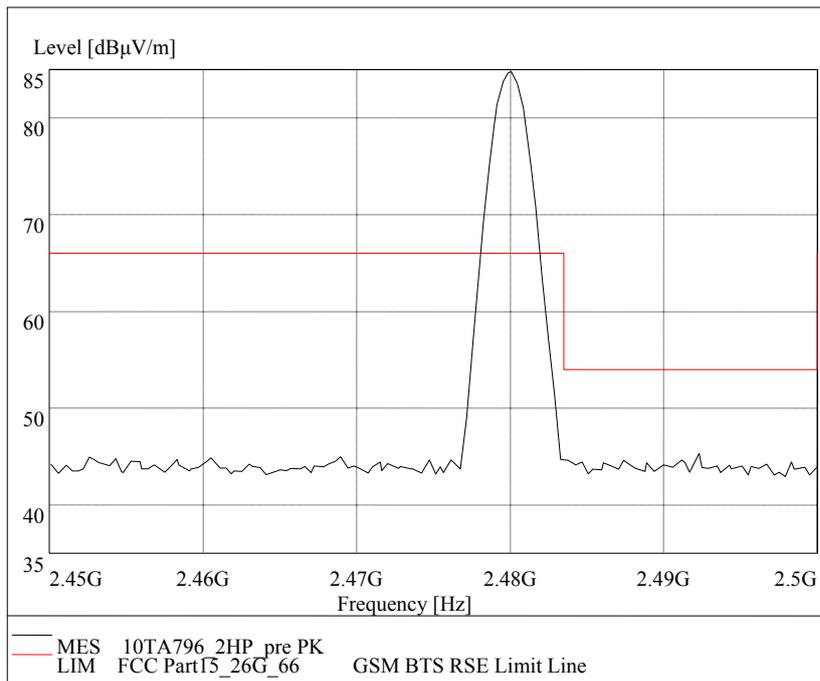


Fig.60 Radiated emission (Power):  $\pi/4$  DQPSK

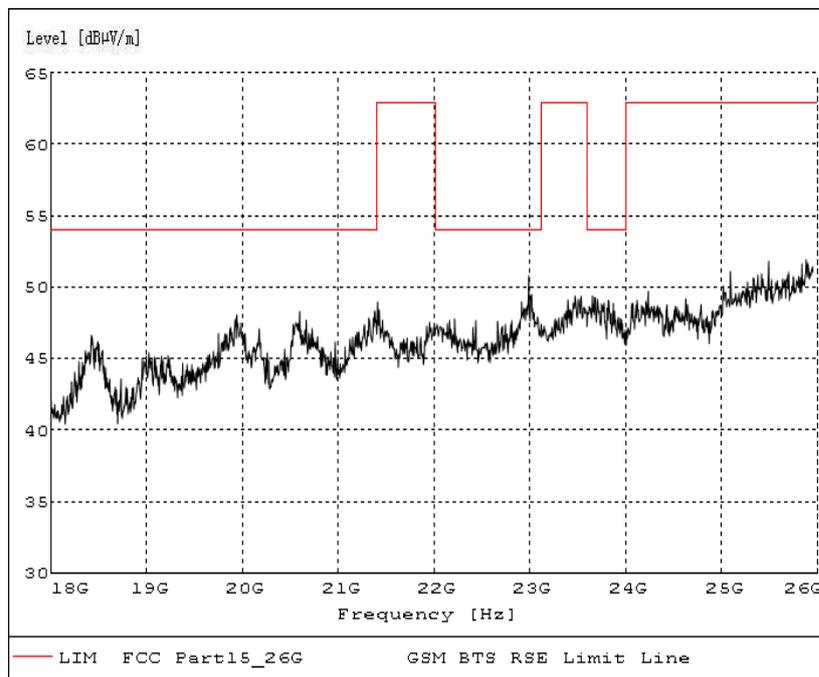


Fig.61 Radiated emission:  $\pi/4$  DQPSK, 18 GHz - 26 GHz

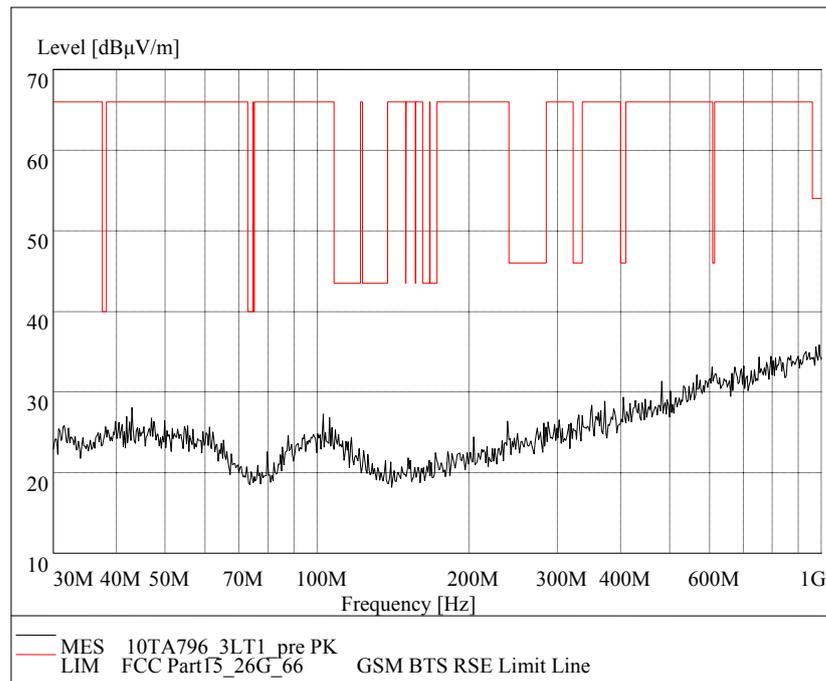


Fig.62 Radiated emission: 8DPSK, Channel 0, 30 MHz - 1 GHz

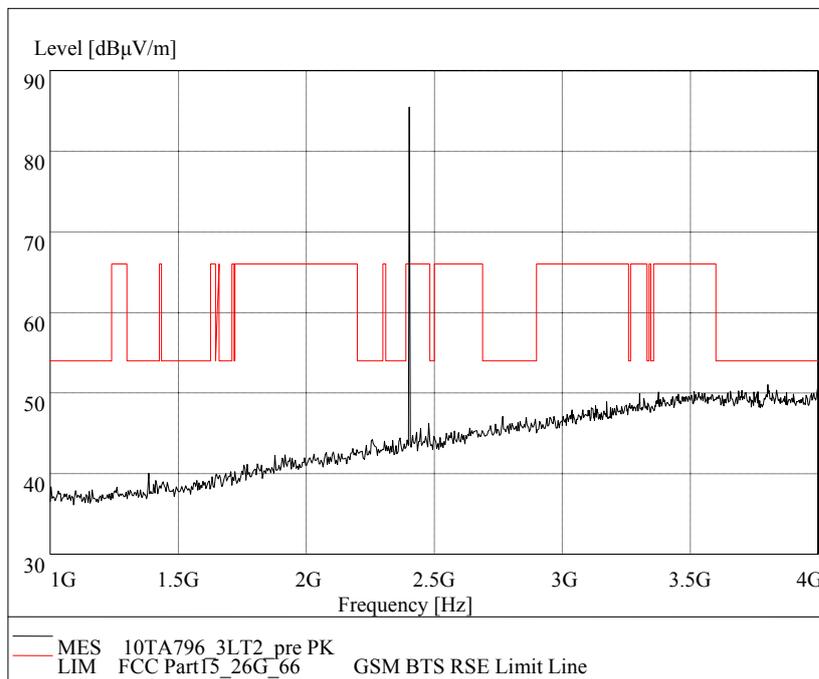


Fig.63 Radiated emission: 8DPSK, Channel 0, 1 GHz - 4 GHz

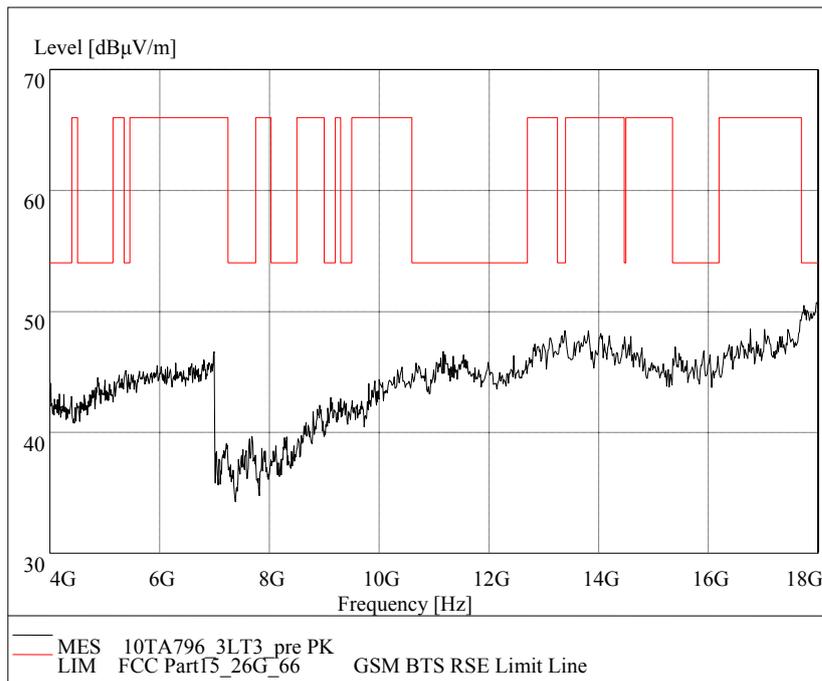


Fig.64 Radiated emission: 8DPSK, Channel 0, 4 GHz - 18 GHz

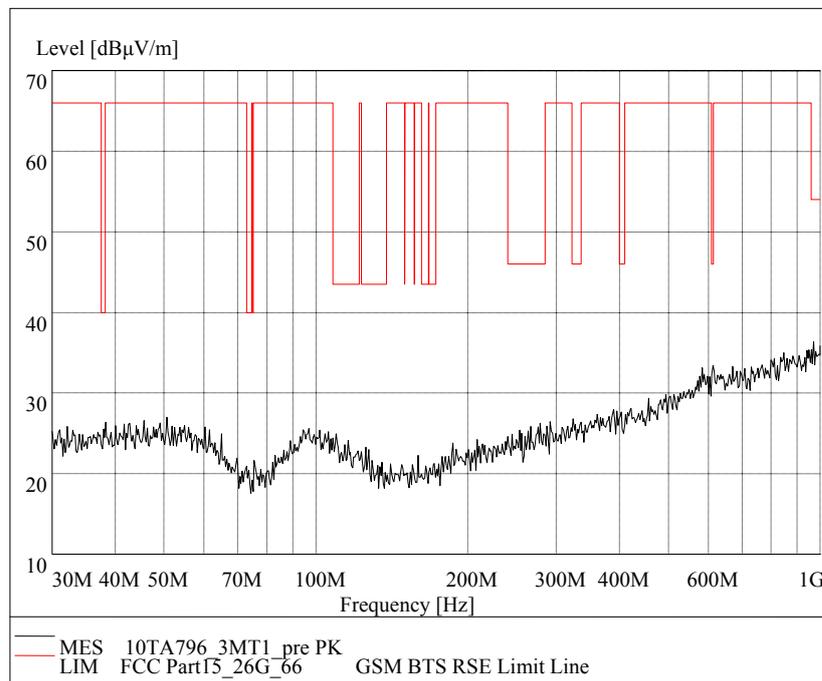


Fig.65 Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

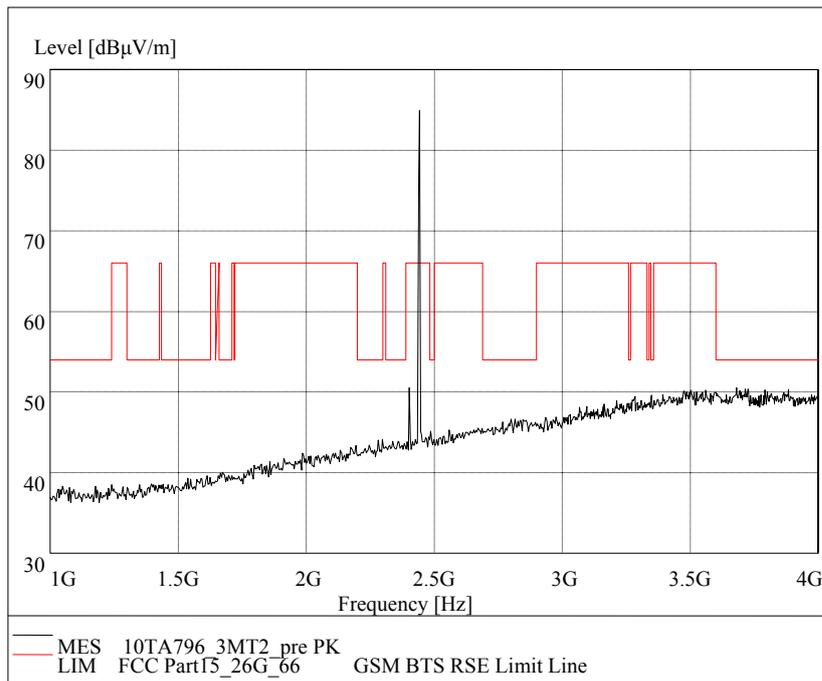


Fig.66 Radiated emission: 8DPSK, Channel 39, 1 GHz - 4 GHz

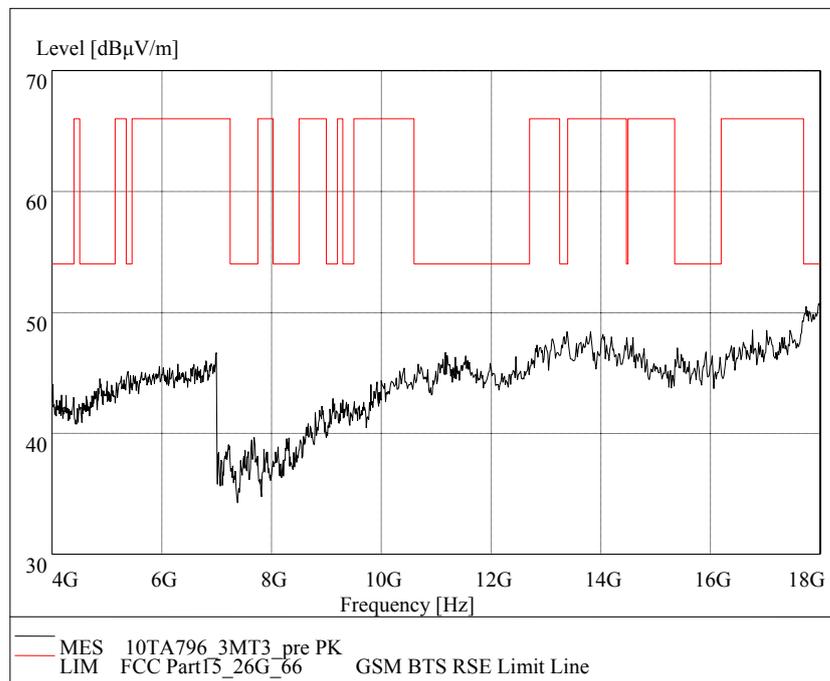


Fig.67 Radiated emission: 8DPSK, Channel 39, 4 GHz - 18 GHz

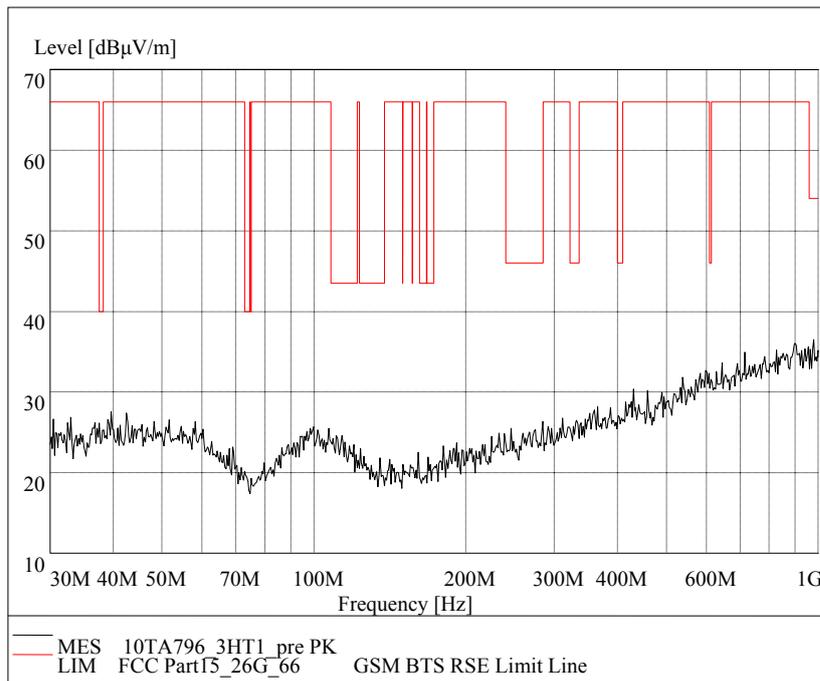


Fig.68 Radiated emission: 8DPSK, Channel 78, 30 MHz - 1 GHz

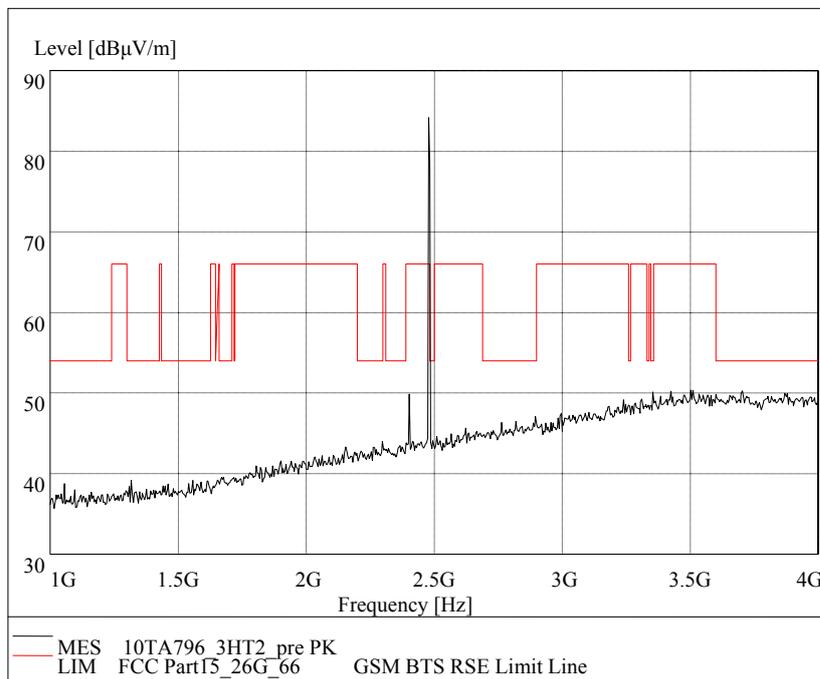


Fig.69 Radiated emission: 8DPSK, Channel 78, 1 GHz - 4 GHz

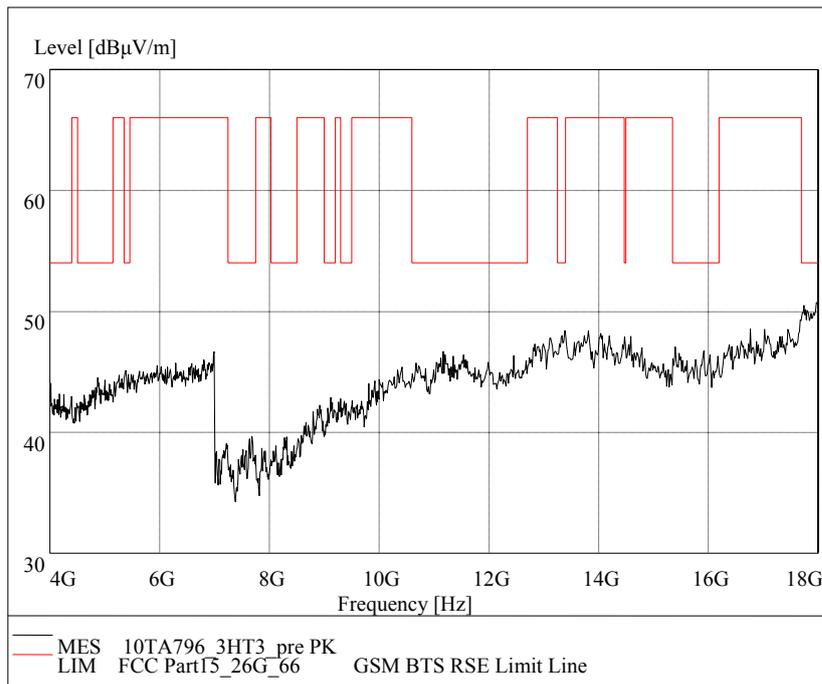
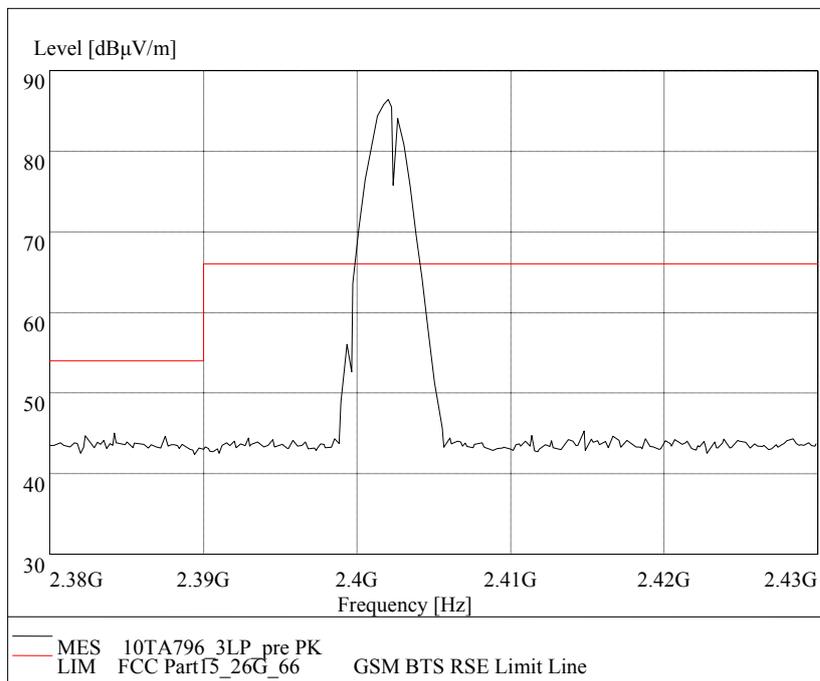


Fig.70 Radiated emission: 8DPSK, Channel 78, 4 GHz - 18 GHz



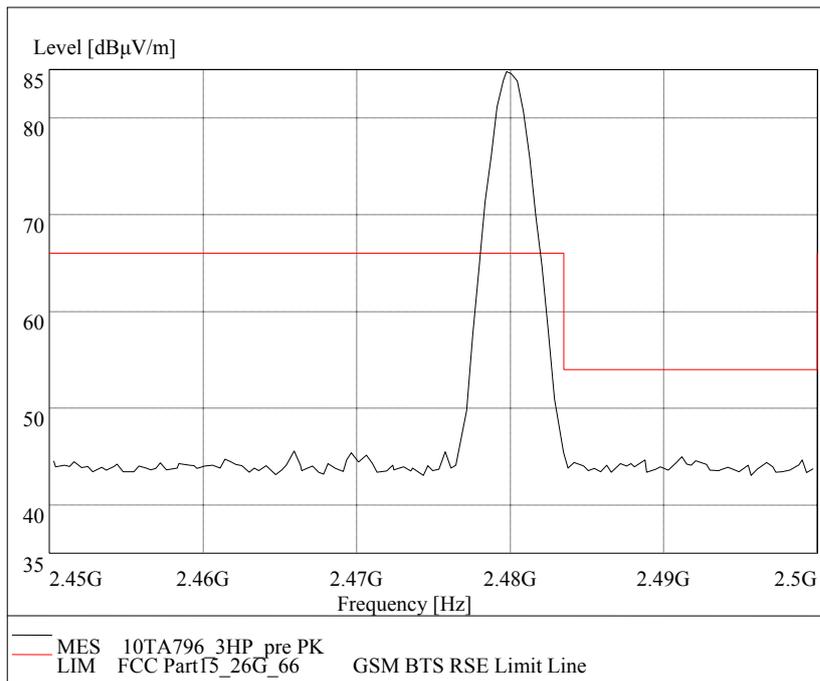


Fig.71 Radiated emission (Power): 8DPSK

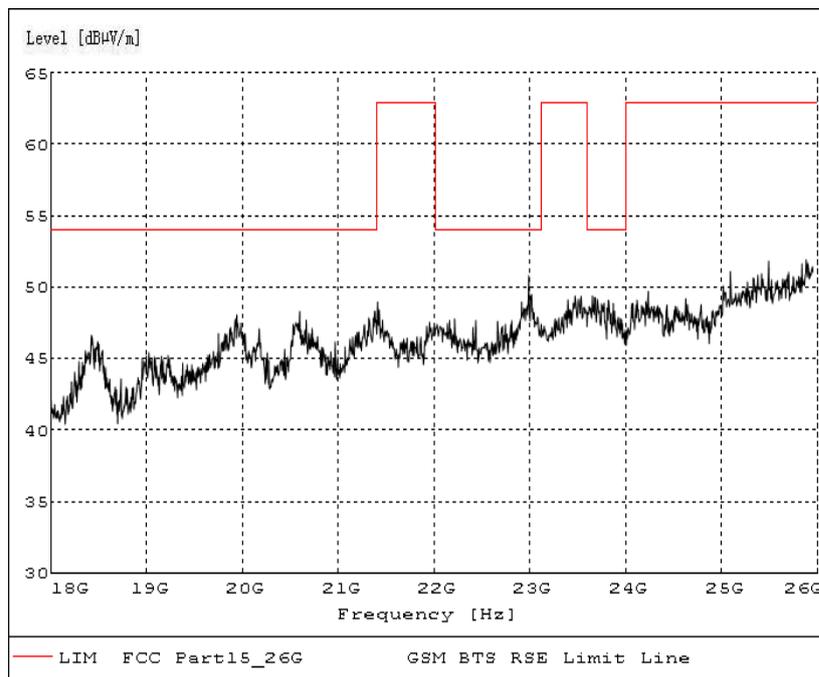


Fig.72 Radiated emission: 8DPSK, 18 GHz - 26 GHz

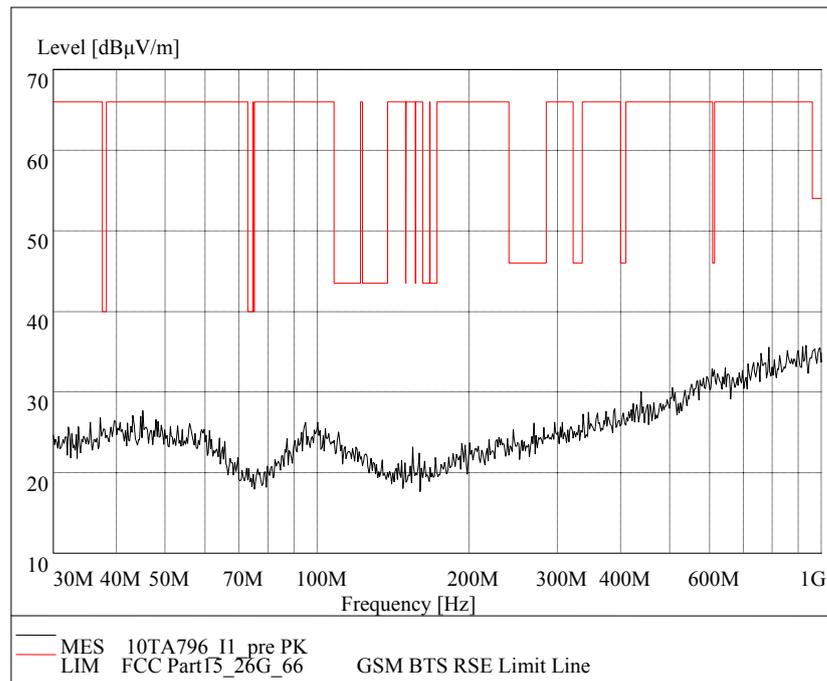


Fig.73 Idle: 30MHz - 1GHz

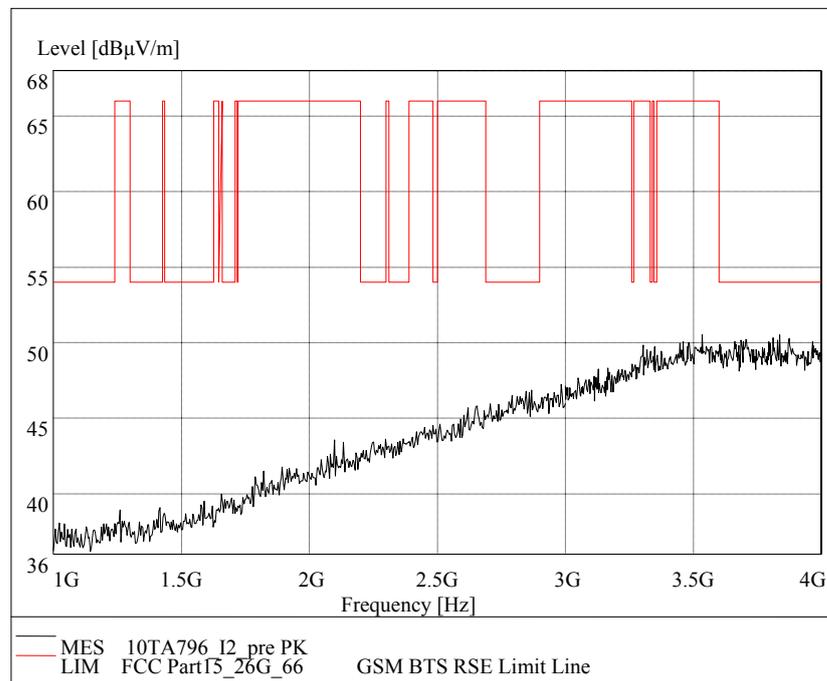


Fig.74 Idle: 1GHz - 4GHz

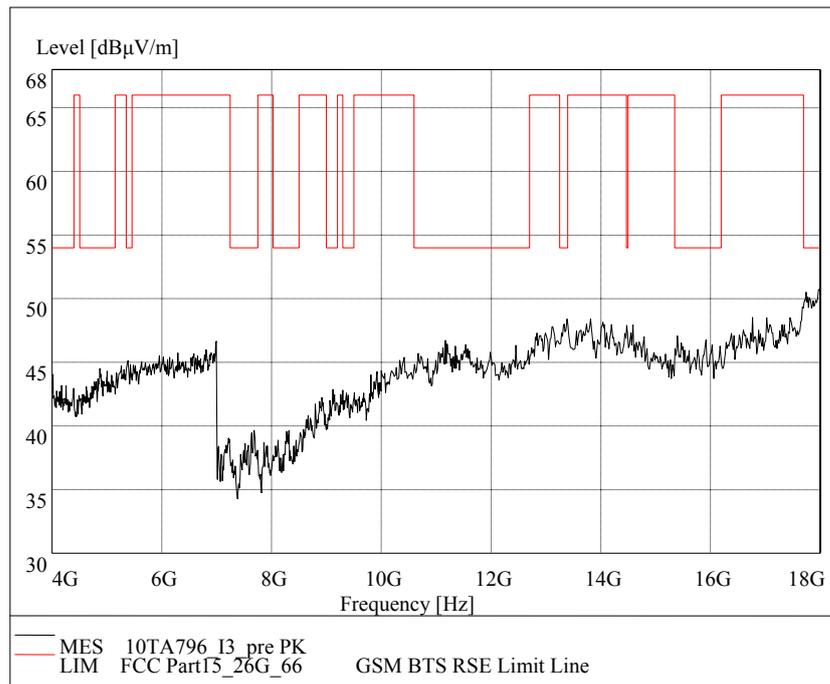


Fig.75 Idle: 4GHz - 18GHz

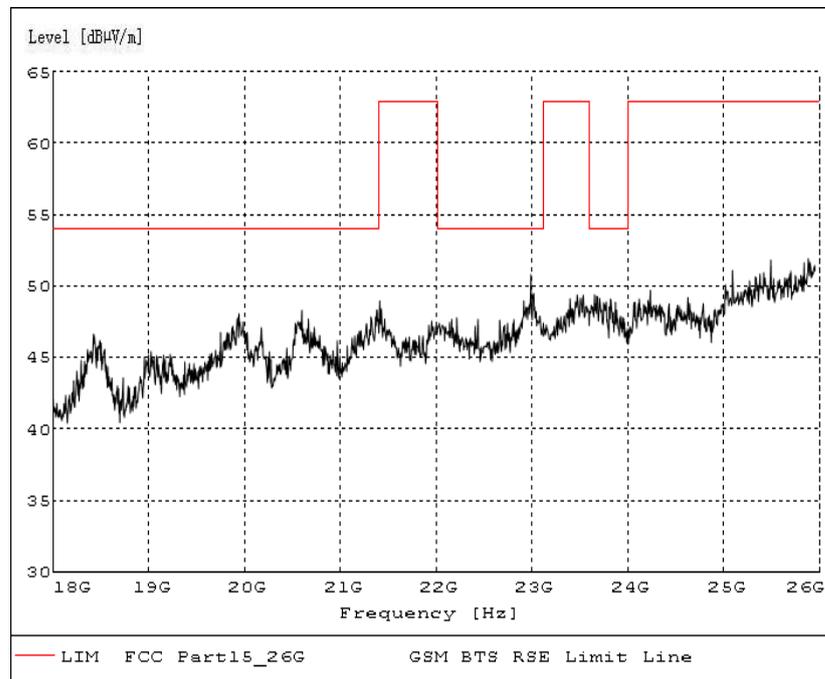


Fig.76 Idle: 18GHz - 26GHz

### A.6. Time of Occupancy (Dwell Time)

#### Measurement Limit:

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

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

#### Measurement Result:

##### For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.77	108.87	P
		Fig.78		
	DH3	Fig.79	198.00	P
		Fig.80		
	DH5	Fig.81	206.51	P
		Fig.82		

##### For $\pi/4$ DQPSK

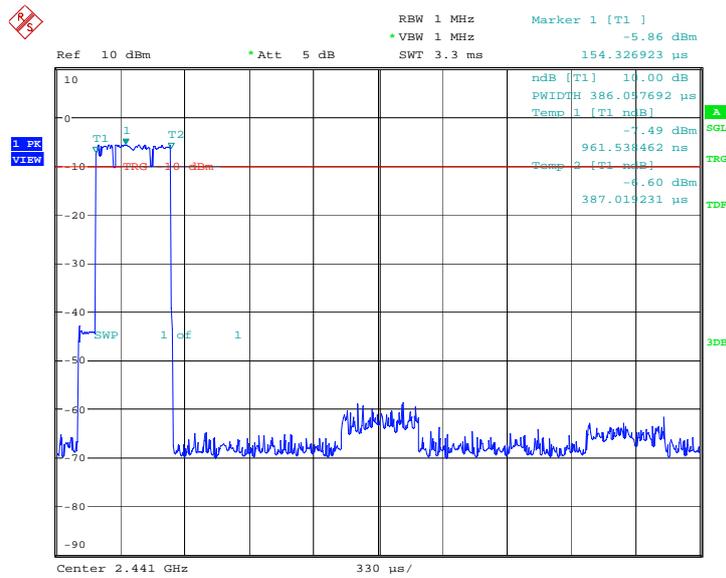
Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.83	109.58	P
		Fig.84		
	DH3	Fig.85	173.81	P
		Fig.86		
	DH5	Fig.87	180.34	P
		Fig.88		

##### For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.89	109.58	P
		Fig.90		
	DH3	Fig.91	181.50	P
		Fig.92		
	DH5	Fig.93	191.97	P
		Fig.94		

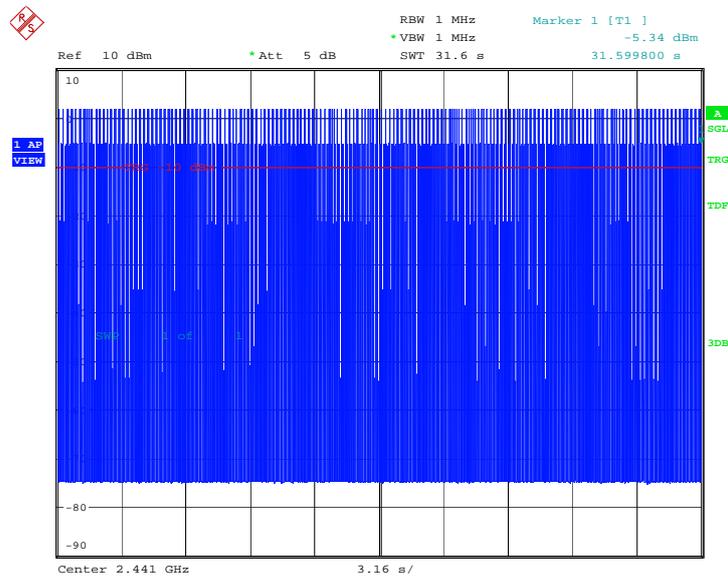
**Conclusion: PASS**

Test graphs as below:



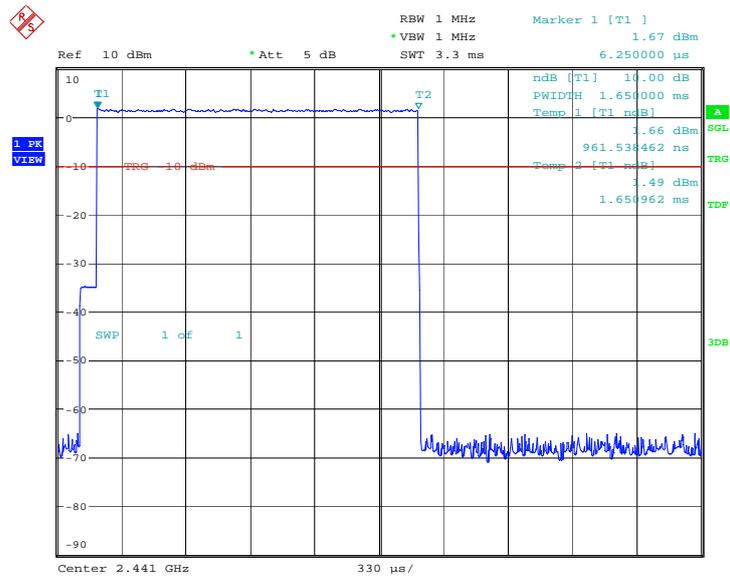
Date: 19.SEP.2010 03:37:37

Fig.77 Time of occupancy (Dwell Time): Channel 39, Packet DH1



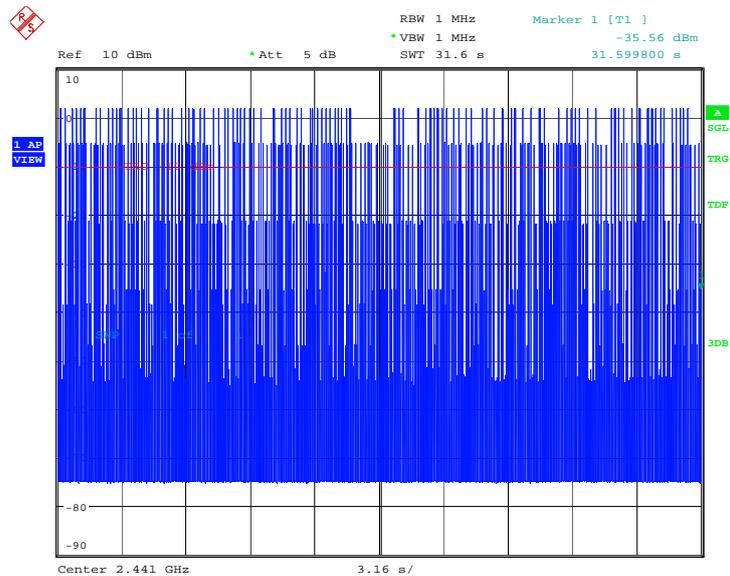
Date: 19.SEP.2010 03:37:26

Fig.78 Number of Transmissions Measurement:Channel 39,Packet DH1



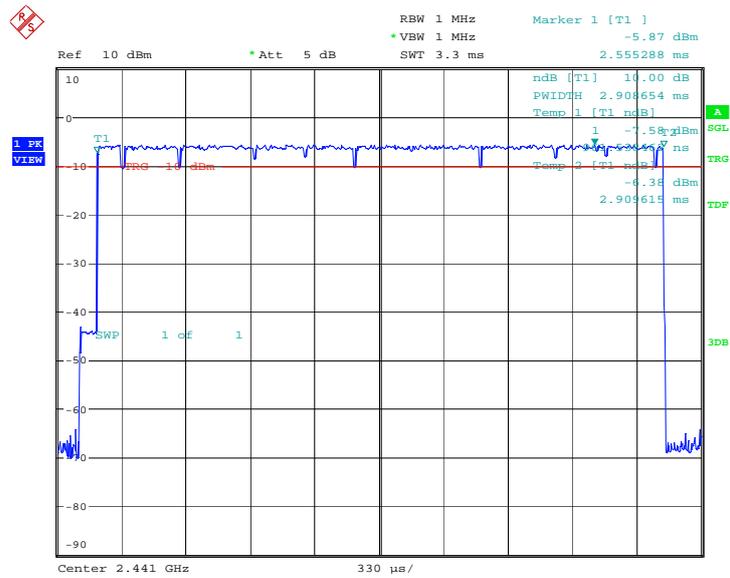
Date: 19.SEP.2010 03:38:57

Fig.79 Time of occupancy (Dwell Time): Channel 39, Packet DH3



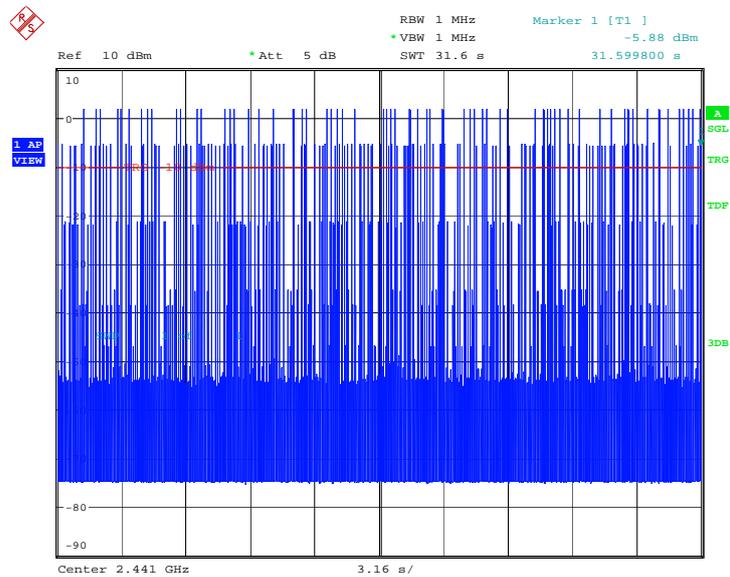
Date: 19.SEP.2010 03:38:46

Fig.80 Number of Transmissions Measurement:Channel 39,Packet DH3



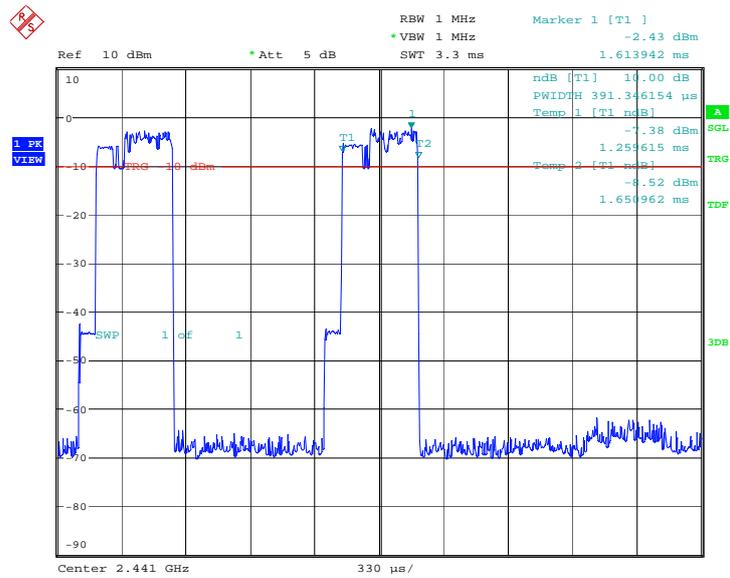
Date: 19.SEP.2010 03:40:15

Fig.81 Time of occupancy (Dwell Time): Channel 39, Packet DH5



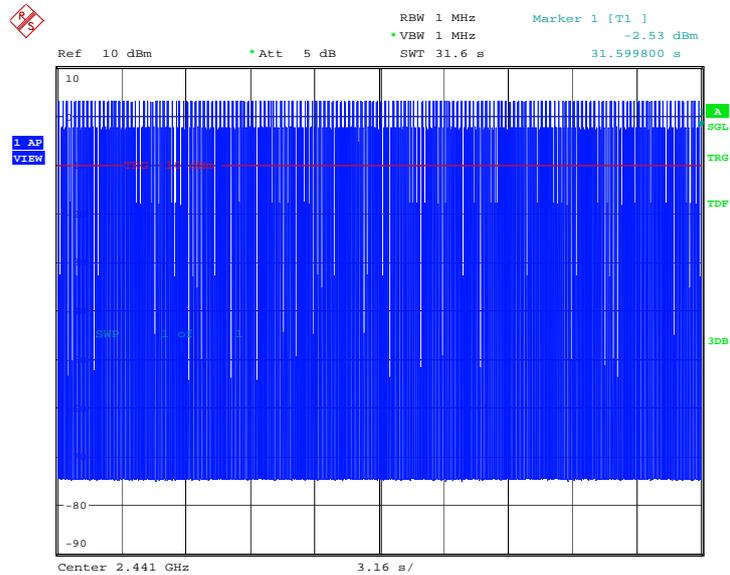
Date: 19.SEP.2010 03:40:03

Fig.82 Number of Transmissions Measurement:Channel 39,Packet DH5



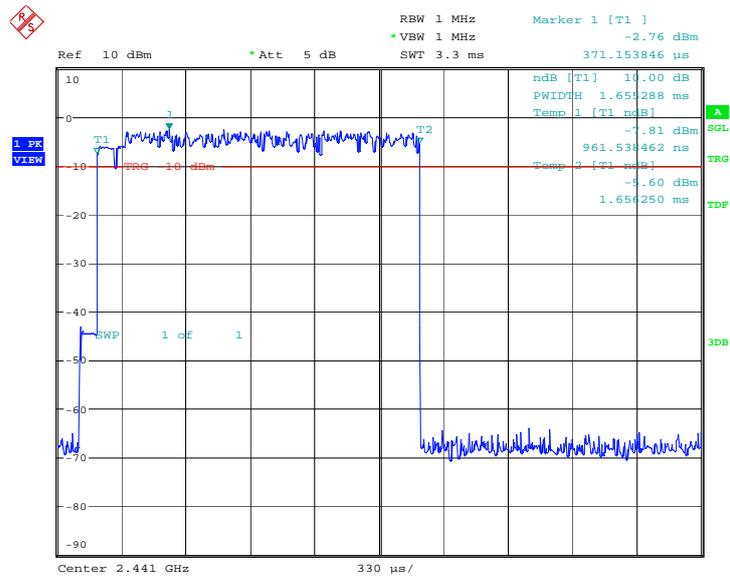
Date: 19.SEP.2010 03:58:07

Fig.83 Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1



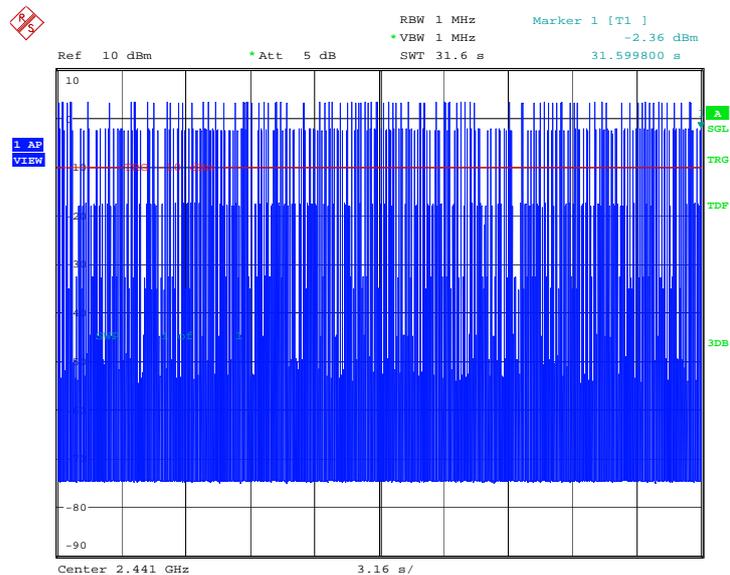
Date: 19.SEP.2010 03:57:55

Fig.84 Number of Transmissions Measurement:Channel 39,Packet 2-DH1



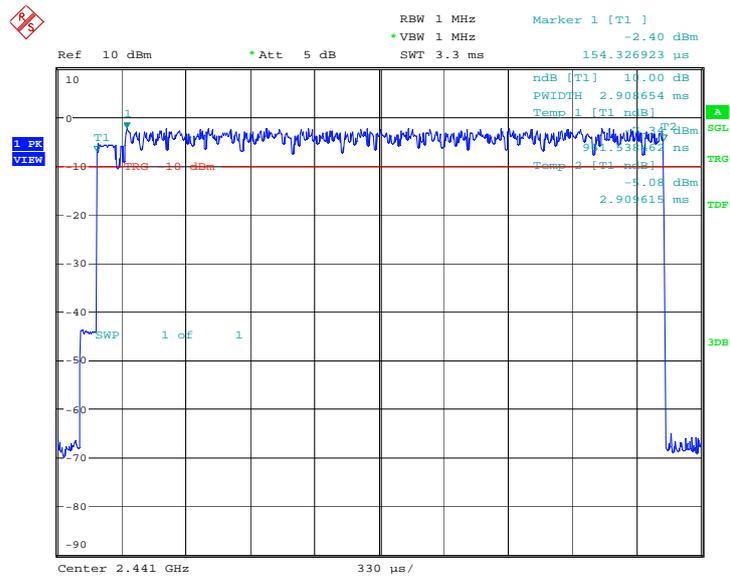
Date: 19.SEP.2010 03:59:26

Fig.85 Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3



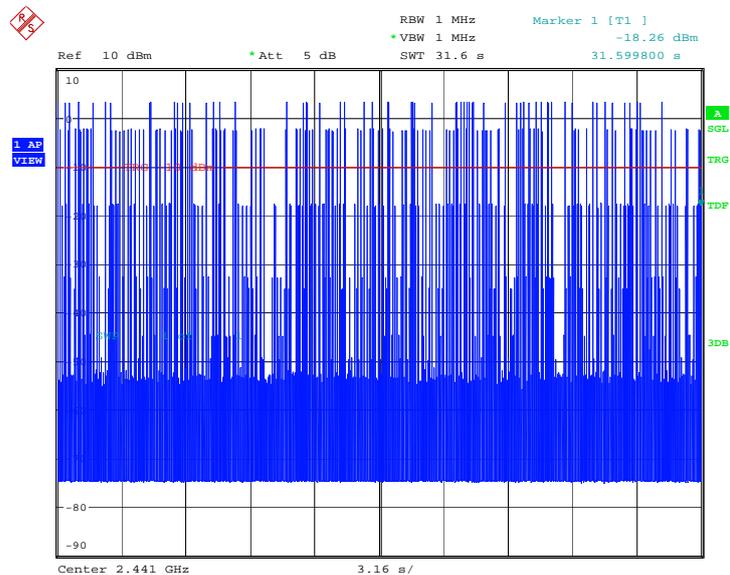
Date: 19.SEP.2010 03:59:14

Fig.86 Number of Transmissions Measurement:Channel 39,Packet 2-DH3



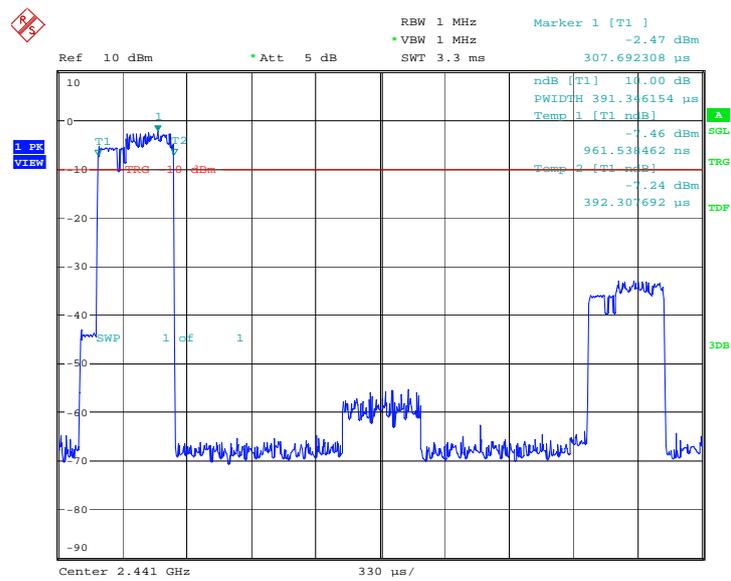
Date: 19.SEP.2010 04:00:44

Fig.87 Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5



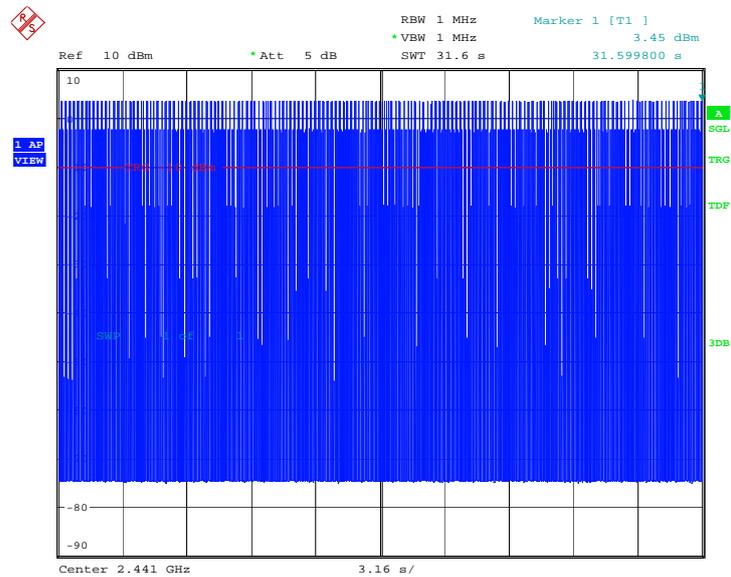
Date: 19.SEP.2010 04:00:32

Fig.88 Number of Transmissions Measurement:Channel 39,Packet 2-DH5



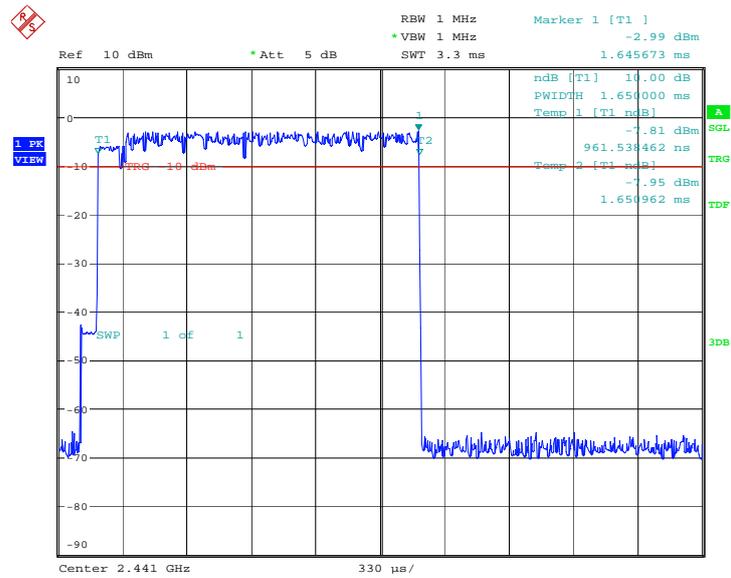
Date: 19.SEP.2010 04:18:34

Fig.89 Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1



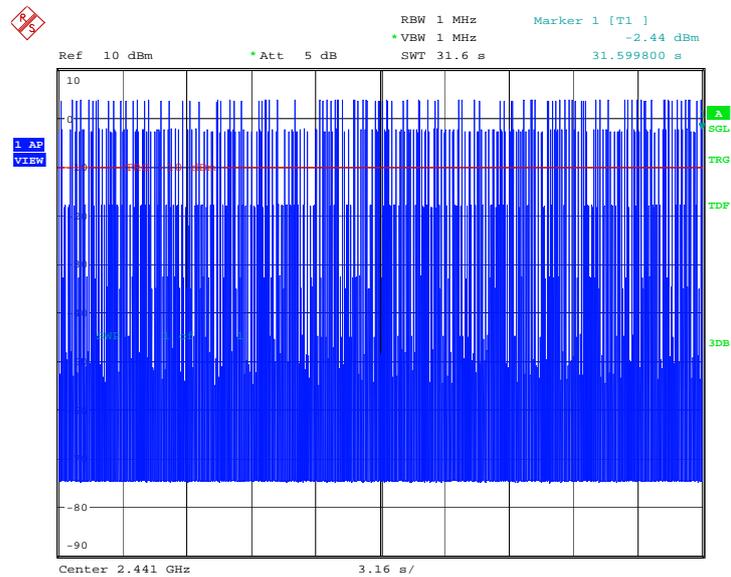
Date: 19.SEP.2010 04:18:22

Fig.90 Number of Transmissions Measurement:Channel 39,Packet 3-DH1



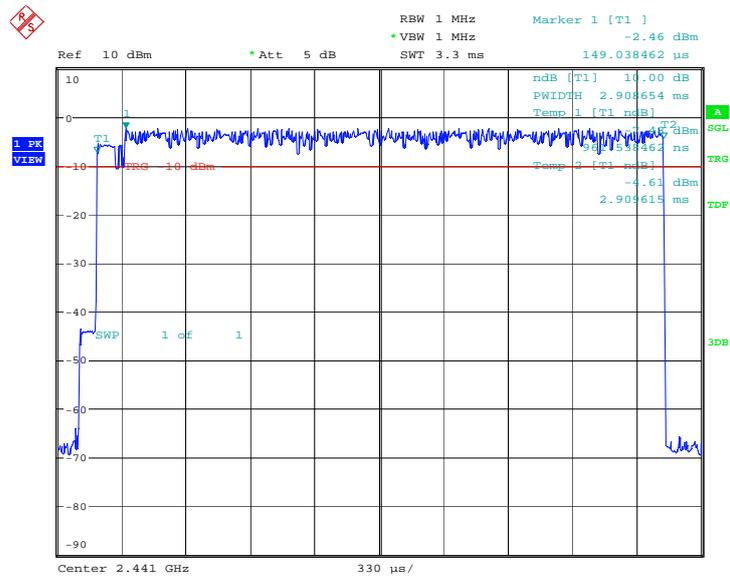
Date: 19.SEP.2010 04:19:54

Fig.91 Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3



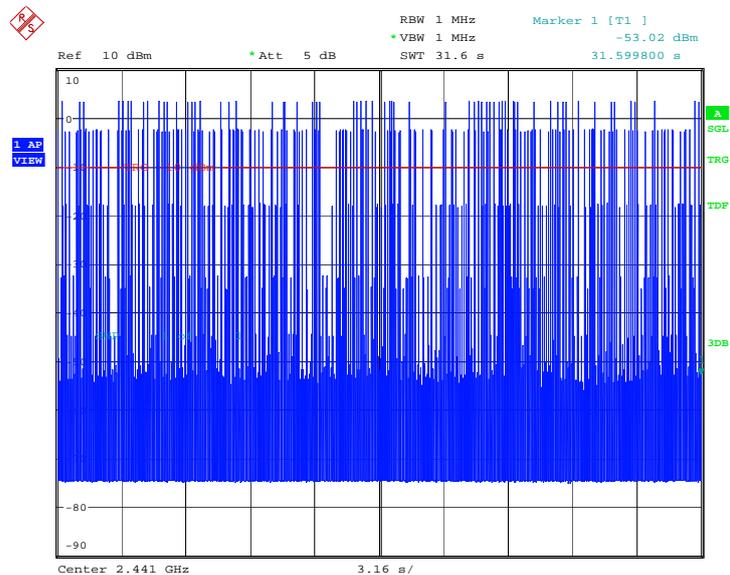
Date: 19.SEP.2010 04:19:42

Fig.92 Number of Transmissions Measurement:Channel 39,Packet 3-DH3



Date: 19.SEP.2010 04:21:12

Fig.93 Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5



Date: 19.SEP.2010 04:21:00

Fig.94 Number of Transmissions Measurement:Channel 39,Packet 3-DH5

### A.7. 20dB Bandwidth

#### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)(1)	NA *

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

\* Comment: This test case is not required according to the latest FCC 47 CFR Part 15.247. But the test results are necessary for “carrier frequency separation” test case, in Annex A.8.

#### Measurement Results:

##### For GFSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.95	865.38	NA
39	Fig.96	865.38	NA
78	Fig.97	865.38	NA

##### Forπ/4 DQPSK

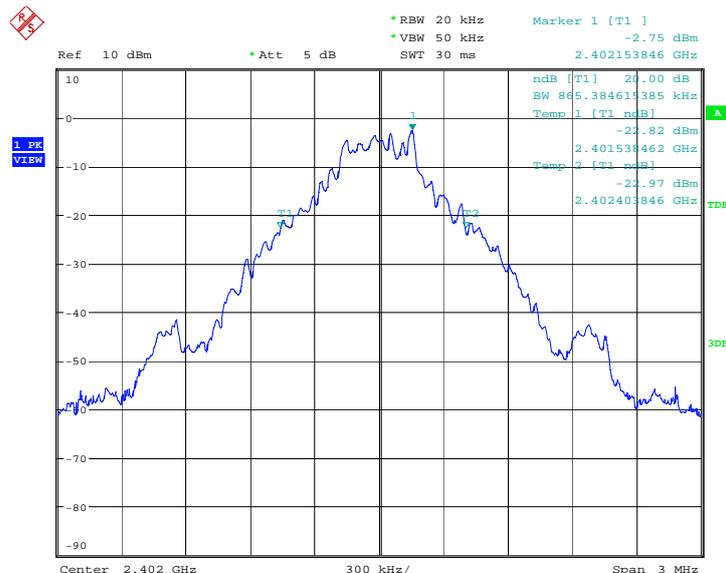
Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.98	1293.27	NA
39	Fig.99	1293.27	NA
78	Fig.100	1298.08	NA

##### For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.101	1274.04	NA
39	Fig.102	1269.23	NA
78	Fig.103	1274.04	NA

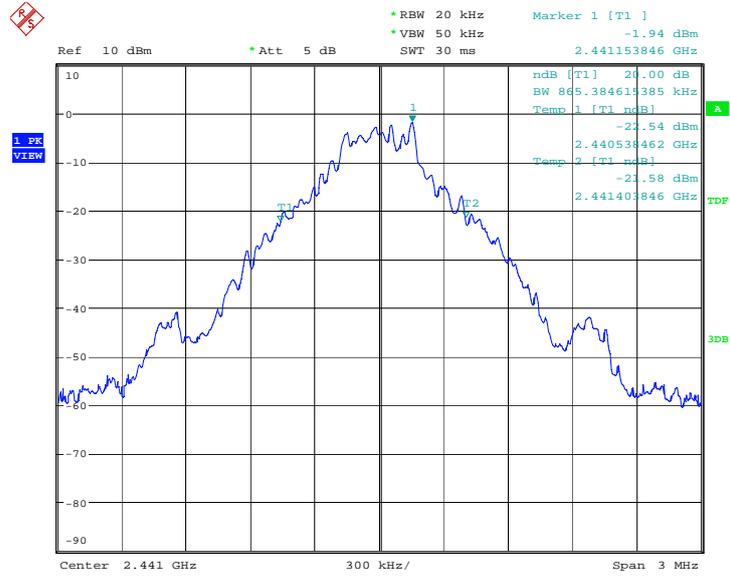
**Conclusion: NA**

Test graphs as below:



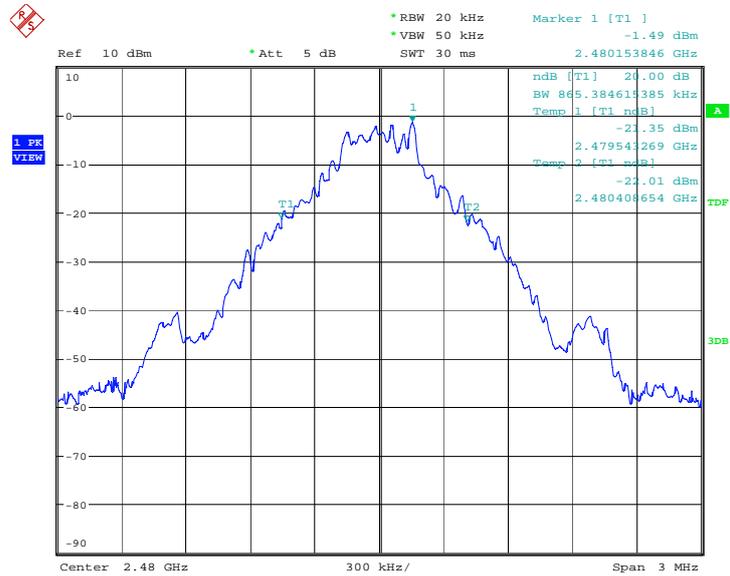
Date: 19.SEP.2010 03:40:49

Fig.95 20dB Bandwidth: GFSK, Channel 0



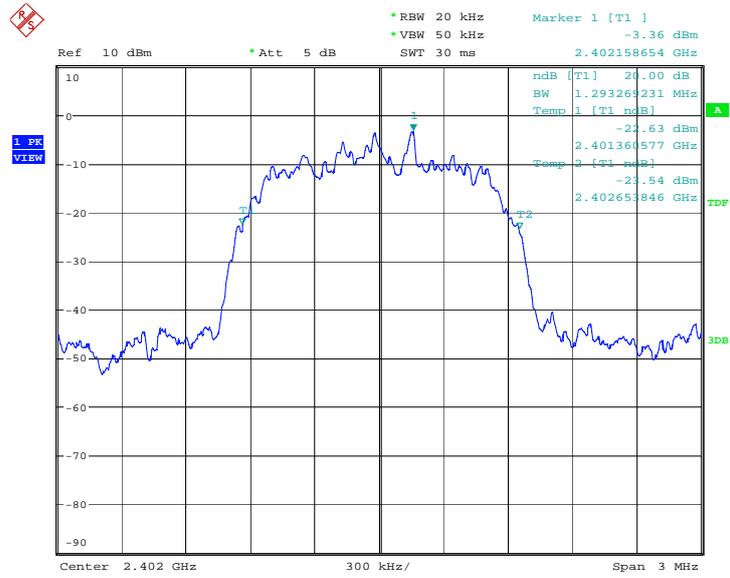
Date: 19.SEP.2010 03:41:21

Fig.96 20dB Bandwidth: GFSK, Channel 39



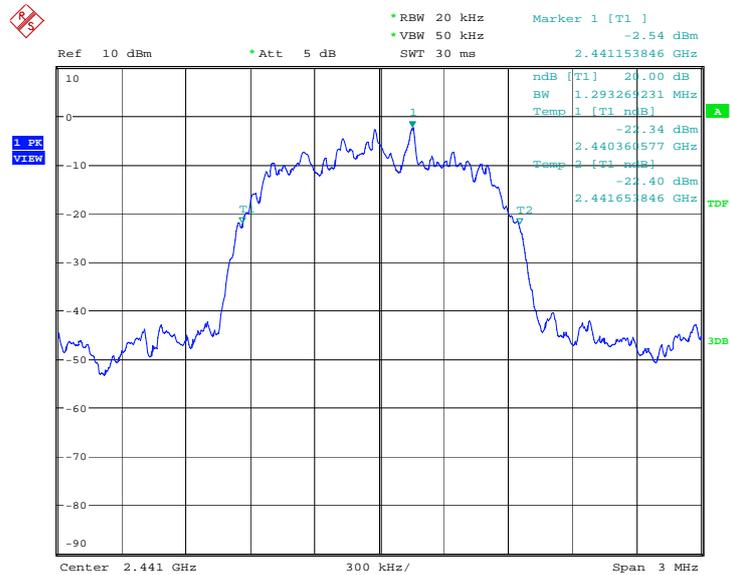
Date: 19.SEP.2010 03:41:53

Fig.97 20dB Bandwidth: GFSK, Channel 78



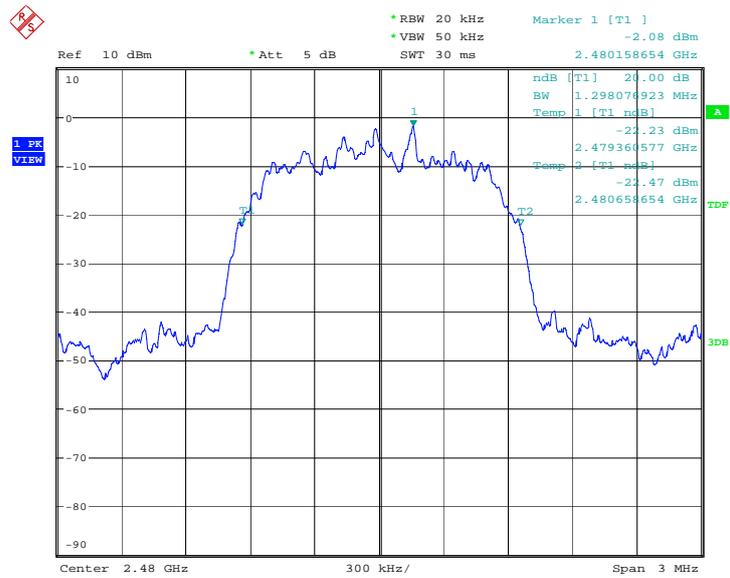
Date: 19.SEP.2010 04:01:18

Fig.98 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 0



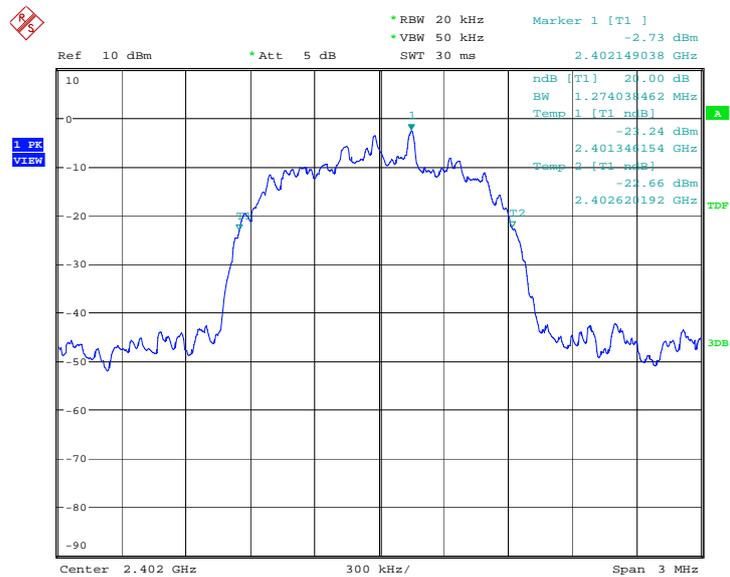
Date: 19.SEP.2010 04:01:49

Fig.99 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39



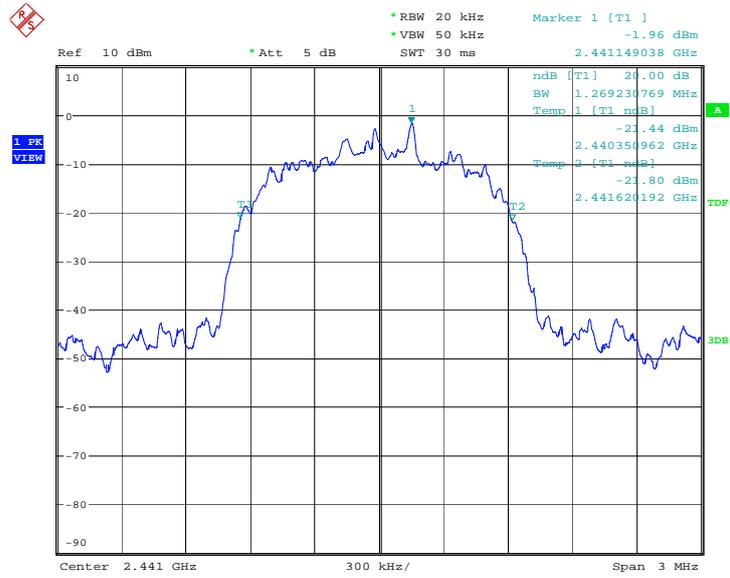
Date: 19.SEP.2010 04:02:21

Fig.100 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78



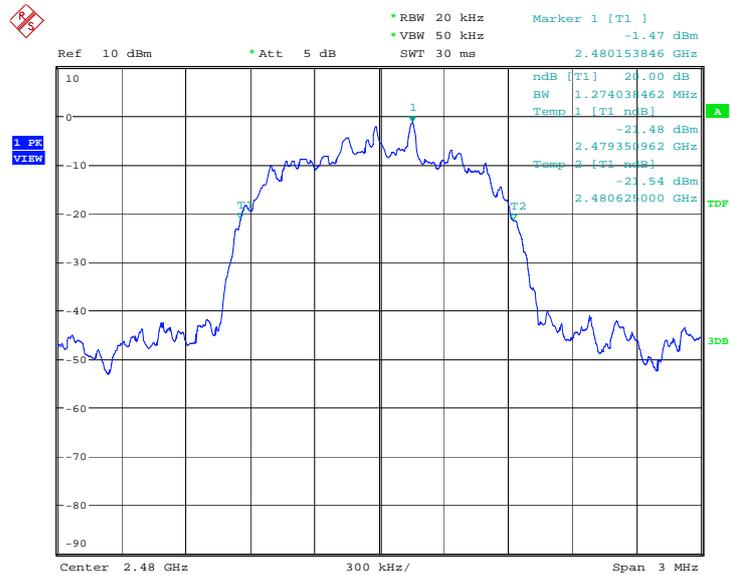
Date: 19.SEP.2010 04:21:46

Fig.101 20dB Bandwidth: 8DPSK, Channel 0



Date: 19.SEP.2010 04:22:18

Fig.102 20dB Bandwidth: 8DPSK, Channel 39



Date: 19.SEP.2010 04:22:50

Fig.103 20dB Bandwidth: 8DPSK, Channel 78

### A.8. Carrier Frequency Separation

#### Measurement Limit:

Standard	Limit(kHz)
FCC 47 CFR Part 15.247(a)(1)	over 25 kHz or $(2/3) * 20\text{dB}$ bandwidth

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

\* Comment: This limit should be over 25 kHz or  $(2/3) * 20\text{dB}$  bandwidth, whichever is greater.

#### Measurement Result:

##### For GFSK

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.104	P

##### For $\pi/4$ DQPSK

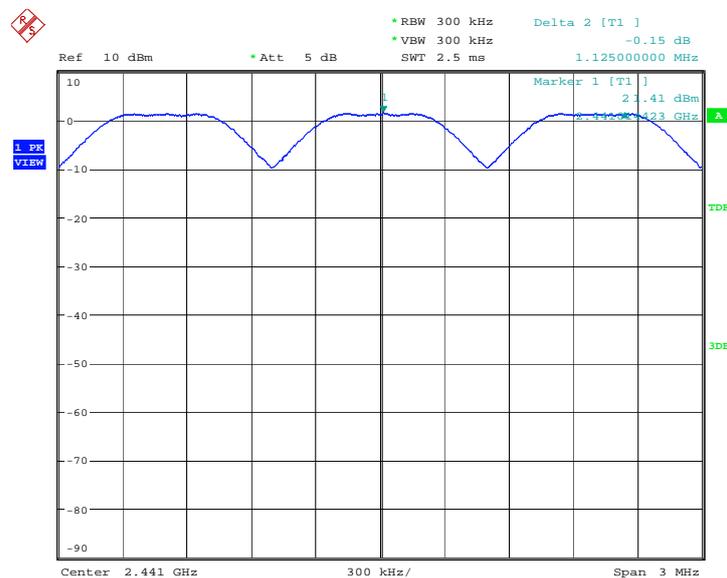
Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.105	P

##### For 8DPSK

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.106	P

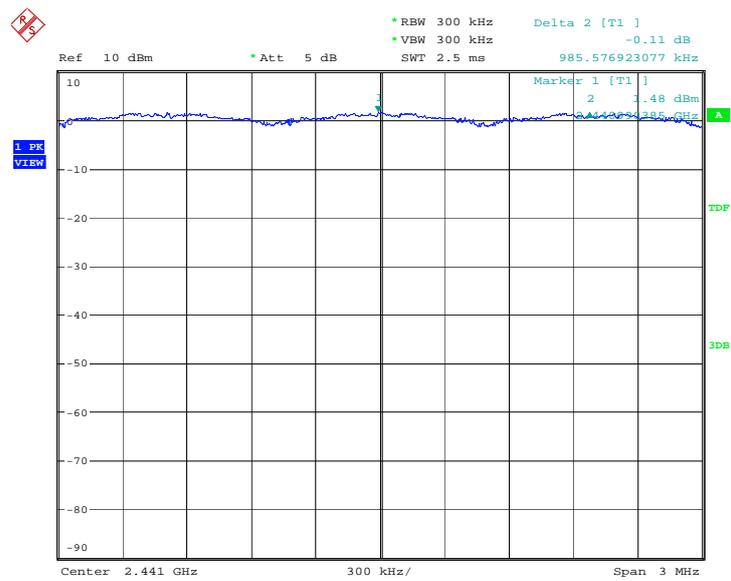
**Conclusion: PASS**

Test graphs as below:



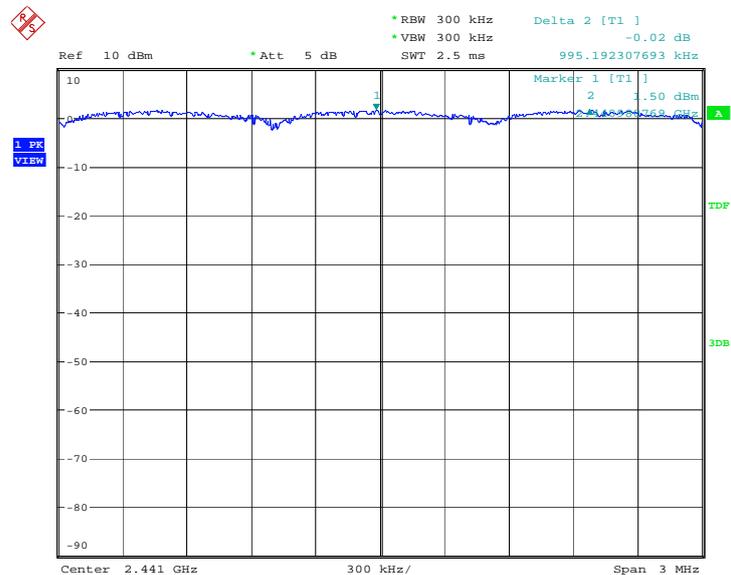
Date: 19.SEP.2010 03:43:58

Fig.104 Carrier frequency separation measurement: GFSK, Channel 39



Date: 19.SEP.2010 04:04:26

Fig.105 Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39



Date: 19.SEP.2010 04:24:54

Fig.106 Carrier frequency separation measurement: 8DPSK, Channel 39

### A.9. 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 made according to Public notice DA 00-705 and ANSI C63.4

**Measurement Result:**

**For GFSK**

Channel	Number of hopping channels	Conclusion
0~39	Fig.107	P
40~78	Fig.108	

**Forπ/4 DQPSK**

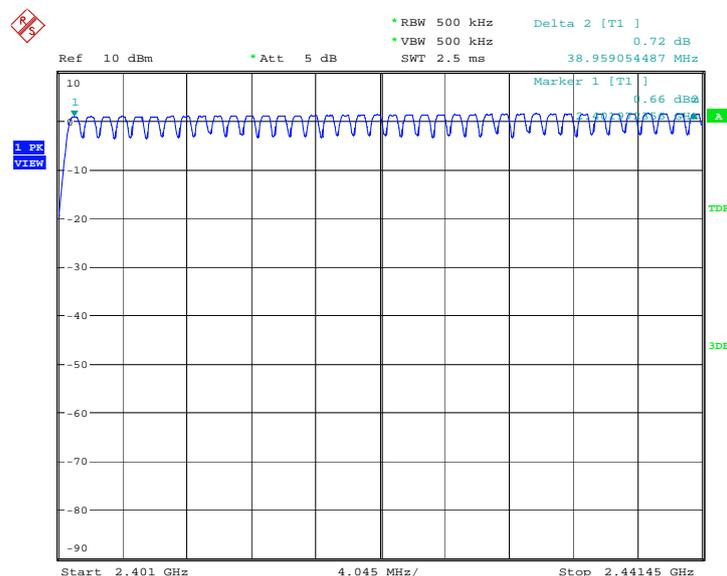
Channel	Number of hopping channels	Conclusion
0~39	Fig.109	P
40~78	Fig.110	

**For 8DPSK**

Channel	Number of hopping channels	Conclusion
0~39	Fig.111	P
40~78	Fig.112	

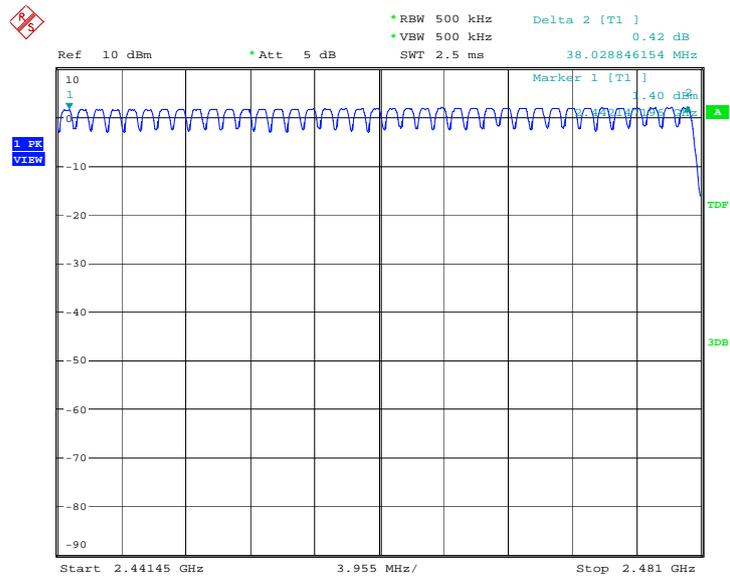
**Conclusion: PASS**

**Test graphs as below:**



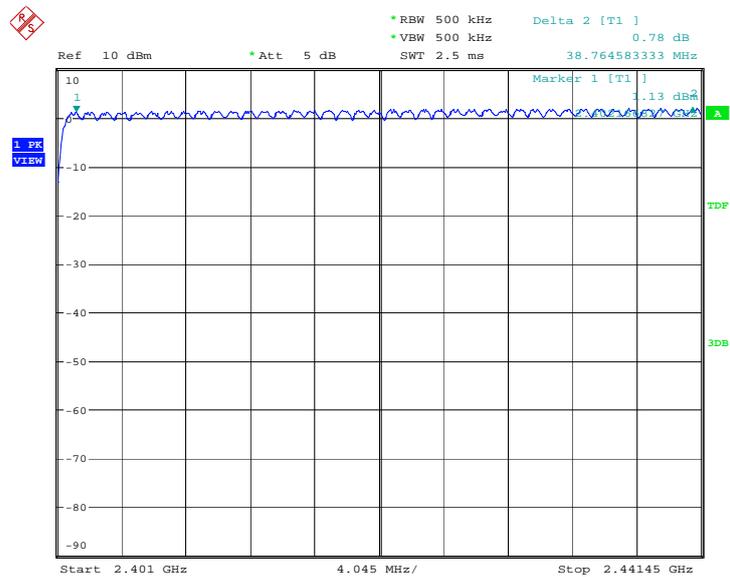
Date: 19.SEP.2010 03:46:02

Fig.107 Number of hopping frequencies: GFSK, Channel 0 - 39



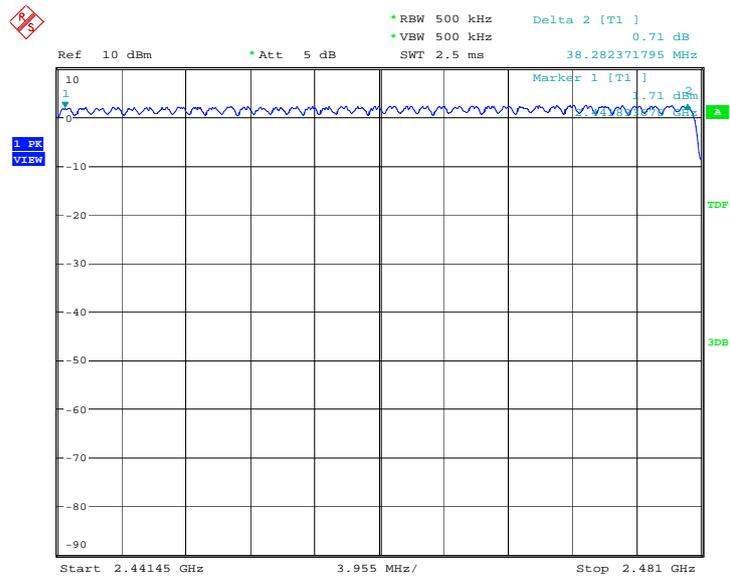
Date: 19.SEP.2010 03:48:05

Fig.108 Number of hopping frequencies: GFSK, Channel 40 - 78



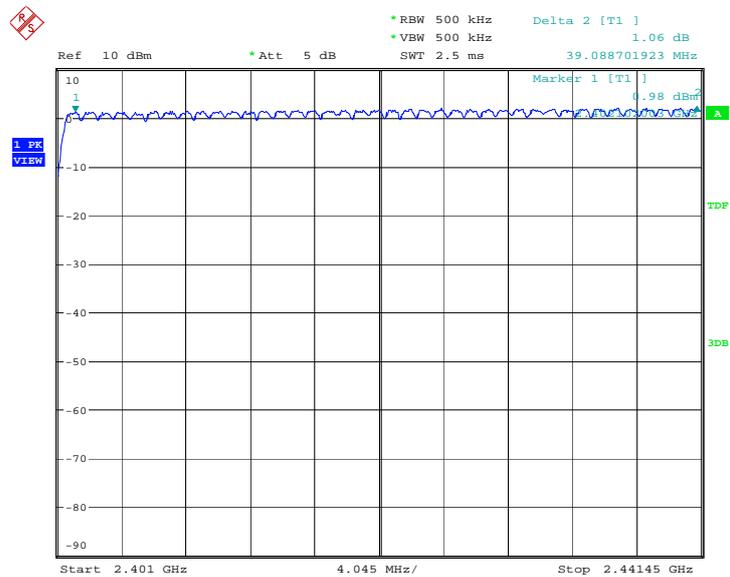
Date: 19.SEP.2010 04:06:30

Fig.109 Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39



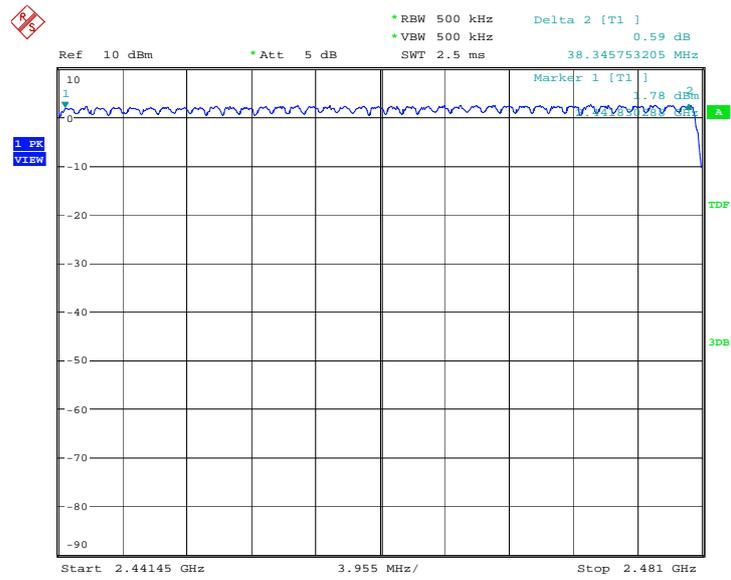
Date: 19.SEP.2010 04:08:32

Fig.110 Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78



Date: 19.SEP.2010 04:26:58

Fig.111 Number of hopping frequencies: 8DPSK, Channel 0 - 39



Date: 19.SEP.2010 04:29:01

Fig.112 Number of hopping frequencies: 8DPSK, Channel 40 - 78

### A.10. AC Powerline Conducted Emission

#### Test Condition

Voltage (V)	Frequency (Hz)
120	60

#### Measurement Result and limit:

##### Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)	Conclusion
		With Charger	
0.15 to 0.5	66 to 56	Fig.113 (TX Mode)	P
0.5 to 5	56		
5 to 30	60		

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

##### Bluetooth (Average Limit)

Frequency range (MHz)	Average Limit (dB $\mu$ V)	Result (dB $\mu$ V)	Conclusion
		With Charger	
0.15 to 0.5	56 to 46	Fig.113 (TX Mode)	P
0.5 to 5	46		
5 to 30	50		

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

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

**Conclusion: PASS**

**Test graphs as below:**

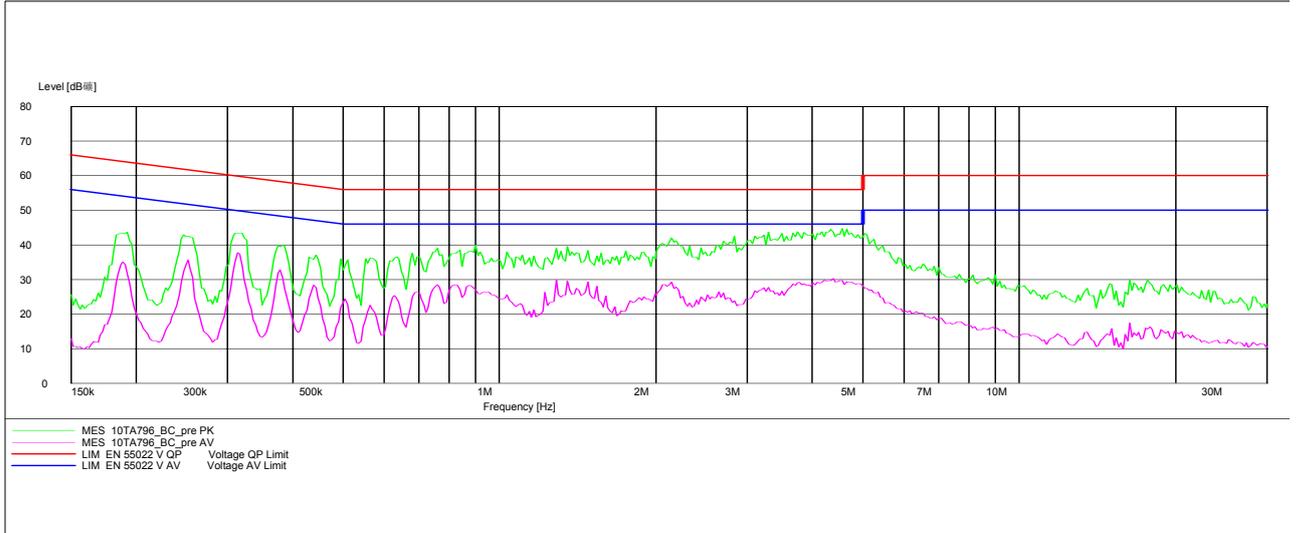


Fig.113 AC Powerline Conducted Emission with charger

\*\*\* END OF REPORT BODY \*\*\*