



# RF TEST REPORT

**Report No.:** SET2016-03876

**Product Name:** Mini Computer (Mobile Computer)

**FCC ID:** V2X-PM200

**Model No.:** PM200

**Applicant:** POINTMOBILE CO.,LTD.

**Address:** B-9F Kabul Great Valley 32, Digital-ro9-gil, Geumcheon-gu, Seoul, Korea

**Dates of Testing:** 03/07/2016 — 03/22/2016

**Issued by:** CCIC-SET

**Lab Location:** Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China

**Tel:** 86 755 26627338    **Fax:** 86 755 26627238

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## Test Report

**Product Name** ..... : Mini Computer (Mobile Computer)

**Brand Name** ..... : POINTMOBILE

**Trade Name** ..... : POINTMOBILE

**Applicant** ..... : POINTMOBILE CO.,LTD.

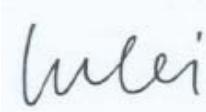
**Applicant Address** ..... : B-9F Kabul Great Valley 32, Digital-ro9-gil, Geumcheon-gu, Seoul, Korea

**Manufacturer** ..... : POINTMOBILE CO.,LTD.

**Manufacturer Address** ..... : B-9F Kabul Great Valley 32, Digital-ro9-gil, Geumcheon-gu, Seoul, Korea

**Test Standards** ..... : 47 CFR Part 15 Subpart C 2014: Radio Frequency Devices  
ANSI C63.10:2013: American National Standard for Testing  
Unlicensed Wireless Devices  
RSS-247:Issue 1,December2015 / RSS-GEN Issue 4,  
November 2014  
DA 00-705: Filing and Measurement Guidelines  
for Frequency Hopping Spread Spectrum Systems

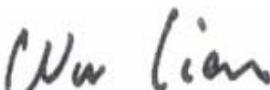
**Test Result** ..... : PASS

**Tested by** ..... :   
2016.03.22

Lu Lei, Test Engineer

**Reviewed by** ..... :   
2016.03.22

Zhu Qi, Senior Engineer

**Approved by** ..... :   
2016.03.22

Wu Li'an, Manager

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Change History		
Issue	Date	Reason for change
1.0	2016.03.22	First edition

## 1. General Information

### 1.1. EUT Description

EUT Type	Mini Computer (Mobile Computer)
Hardware Version	1
Software Version	20.00
Power Supply	3.8V DC
EUT supports Radios application	Bluetooth EDR
Frequency Range	2402MHz~2480MHz
Channel Number	79
Bit Rate of Transmitter	1/2/3Mbps
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna Type	Internal Antenna
Antenna Gain	2.2dBi

Note 1: The EUT is a Mini Computer, it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is  $F(\text{MHz})=2402+1*n$  ( $0 \leq n \leq 78$ ). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 3: a. When power on, the EUT will scan the whole frequency until a Connection command from the other BT devices.  
b. When receiving the signal from the other BT devices, The EUT transmit are response signal.  
c. The other devices receive the response signal and recognize it, then send a connection command to establish the connection.  
d. After the connection establish successfully, the data transmission is beginning. At the same time, the both devices will shift frequencies in synchronization per a same pseudo randomly ordered list of hopping frequencies, the hopping rate is 1600 times per second. This device conforms to the criteria in FCC Public Notice DA 00-705.  
e. The bandwidth of the receiver, which is set to a fixed width by the software.

Note 4: Bluetooth signal has 9 packages DH1, DH3, DH5, 3DH1, 3DH3, 3DH5, 5DH1, 5DH3, 5DH5, DH5 package is largest, we are testing DH5 in the document.

## 1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC/IC Certification:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C 2013	Radio Frequency Devices
2	ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices
3	RSS-GEN: Issue 4, November 2014	General Requirements and Information for the Certification of Radio Apparatus
4	RSS-247: Issue 1, December 2015:	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Standard(s) Section		Description	Result
	FCC	IC		
1	15.203	8.3	Antenna Requirement	PASS
2	15.247(a)	RSS-247 Issue1 - 5.1	Number of Hopping Frequency	PASS
3	15.247(b)	RSS-247 Issue1 - 5.4	Peak Output Power	PASS
4	15.247(a)	RSS-247 Issue1 - 5.1	Bandwidth	PASS
5	15.247(a)	RSS-247 Issue1 - 5.1	Carrier Frequency Separation	PASS
6	15.247(a)	RSS-247 Issue1 - 5.1	Time of Occupancy (Dwell time)	PASS
7	15.247(d)	RSS-247 Issue1 - 5.5	Conducted Spurious Emission	PASS
8	15.247(d)	RSS-247 Issue1 - 5.5 RSS - Gen	Conducted Band Edge	PASS
9	15.207	RSS-GEN	Conducted Emission	PASS
10	15.209 15.247(c)	RSS-247 Issue1 - 5.5 RSS - Gen	Radiated Band Edges and Spurious Emission	PASS

Note 1: The tests were performed according to the method of measurements prescribed in DA-00-705.

Note 2: The test of Radiated Emission was performed according to the method of measurements prescribed in ANSI C63.10 2013.

## 1.3. Frequency Hopping System Requirements

### 1.3.1. Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

### 1.3.2. Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centered from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no

impact on the bandwidth used.

This device was tested with a bluetooth system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements for DA 00-705 and FCC Part 15.247 rule.

### 1.3.3. EUT Pseudorandom Frequency Hopping Sequence

Pseudorandom Frequency Hopping Sequence Table as below:

Channel: 08, 24, 40, 56, 40, 56, 72, 09, 01, 09, 33, 41, 33, 41, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78, 68, 76, 21, 29, 10, 26, 42, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 55, 71, 08, 24, 08, 24, 40, 56, 40, 48, 72, 01, 72, 01, 25, 33, 12, 28, 44, 60, 42, 58, 74, 11, 05, 13, 37, 45 etc.

The system receiver has input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

## 1.4. Description of test environment test modes

79 channels are provided for Bluetooth EDR

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	2402	40	2442
1	2403	41	2443
2	2404	42	2444
3	2405	43	2445
4	2406	44	2446
5	2407	45	2447
6	2408	46	2448
7	2409	47	2449
8	2410	48	2450
9	2411	49	2451
10	2412	50	2452
11	2413	51	2453
12	2414	52	2454
13	2415	53	2455
14	2416	54	2456
15	2417	55	2457
16	2418	56	2458
17	2419	57	2459
18	2420	58	2460
19	2421	59	2461
20	2422	60	2462
21	2423	61	2463
22	2424	62	2464
23	2425	63	2465
24	2426	64	2466
25	2427	65	2467
26	2428	66	2468
27	2429	67	2469
28	2430	68	2470

29	2431	69	2471
30	2432	70	2472
31	2433	71	2473
32	2434	72	2474
33	2435	73	2475
34	2436	74	2476
35	2437	75	2477
36	2438	76	2478
37	2439	77	2479
38	2440	78	2480
39	2441		

## 1.5. Facilities and Accreditations

### 1.5.1. Facilities

#### **CNAS-Lab Code: L1659**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8\*6.8\*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

#### **FCC-Registration No.: 406086**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

#### **IC-Registration No.: 11185A-1**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

### 1.5.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86KPa-106KPa

## 2. 47 CFR Part 15C Requirements

### 2.1. Antenna requirement

#### 2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

And according to FCC 47 CFR Section 15.247(c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### 2.1.2. Antenna Information

**Antenna Category:** Internal antenna

An Internal antenna was placed on PCB, can't be removed.

#### Antenna General Information:

No.	EUT	Ant. Type	Gain(dBi)
1	Mini Computer (Mobile Computer)	Internal	2.2

#### 2.1.3. Result: comply

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

## 2.2. Number of Hopping Frequency

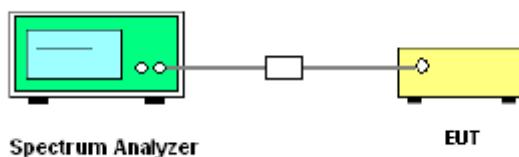
### 2.2.1. Limit of Number of Hopping Frequency

Frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

### 2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.2.3. Test Setup



### 2.2.4. Test Procedure

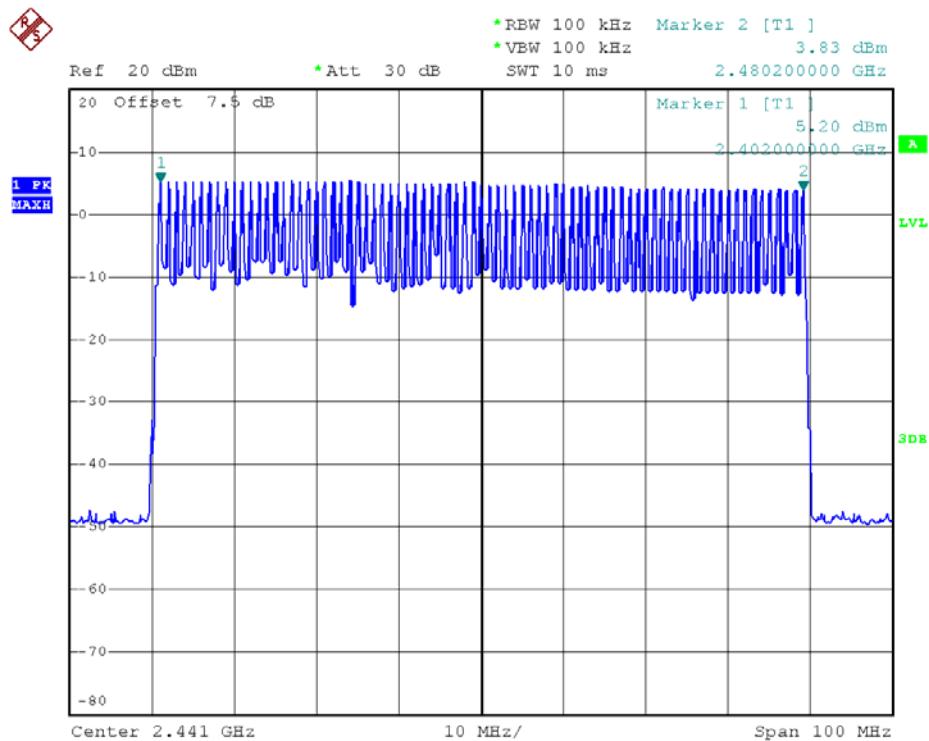
1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation;  $RBW \geq 1\%$  of the span;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

## 2.2.5. Test Results of Number of Hopping Frequency

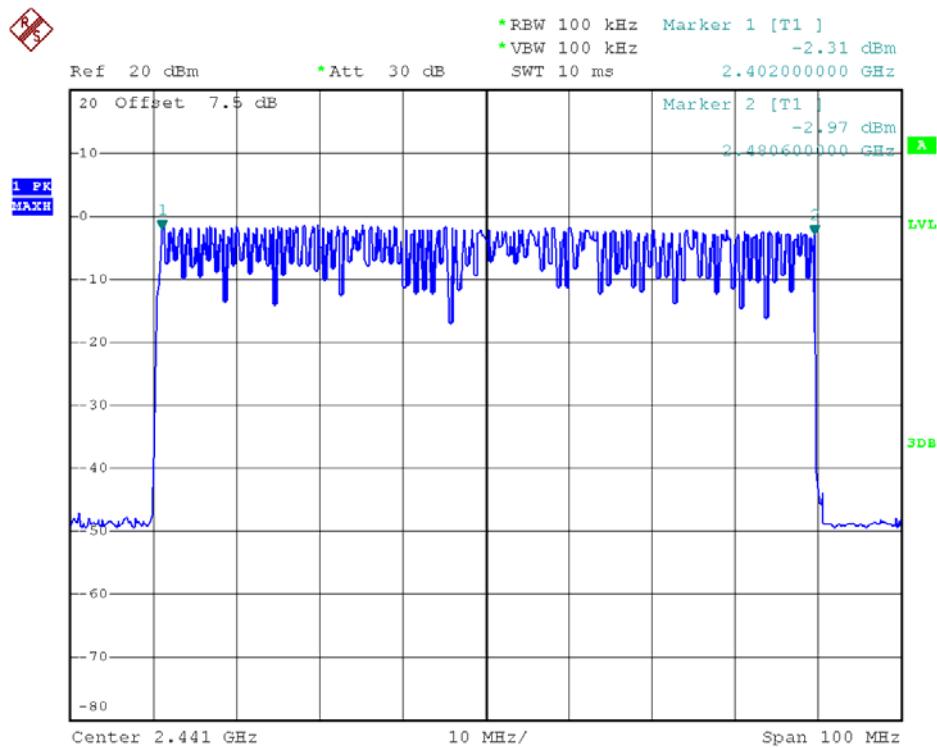
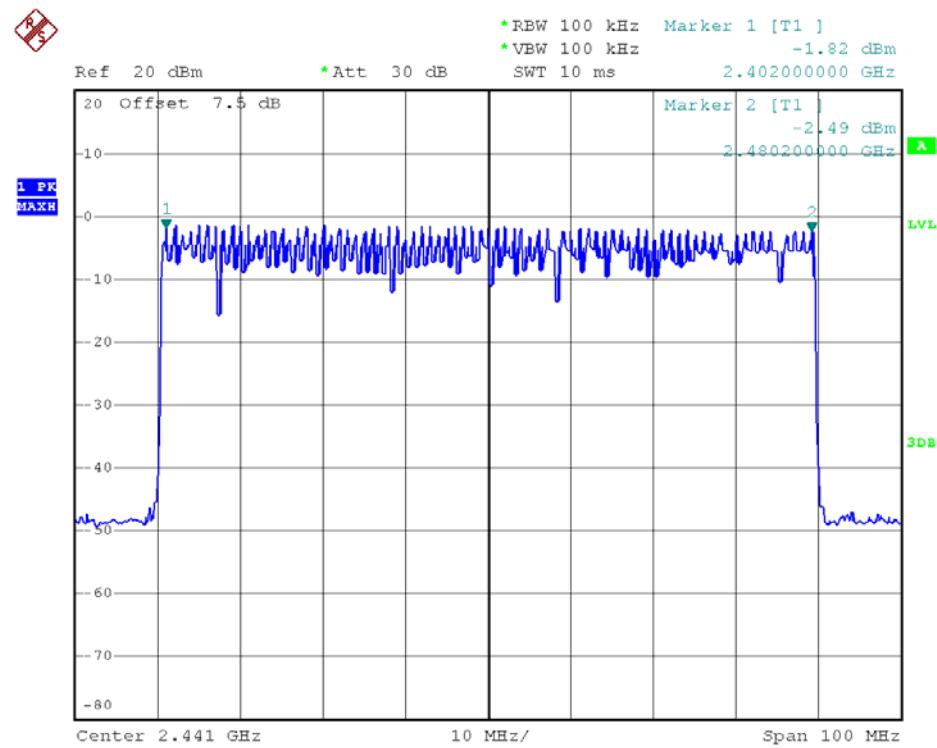
The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
GFSK	2400 - 2483.5	79	15	Plot A	PASS
$\pi/4$ -DQPSK	2400 - 2483.5	79	15	Plot B	PASS
8-DPSK	2400 - 2483.5	79	15	Plot C	PASS

## 2.2.6. Test Results (plots) of Number of Hopping Frequency



(Plot A: GFSK)

(Plot B:  $\pi/4$ -DQPSK)

(Plot C: 8- DPSK)

## 2.3. Peak Output Power

### 2.3.1. Limit of Peak Output Power

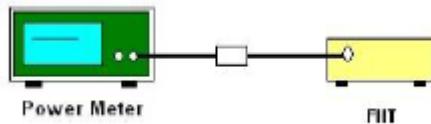
Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW

### 2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.3.3. Test Setup



### 2.3.4. Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

### 2.3.5. Test Result

Test Mode	Channel	Frequency (MHz)	RF Power(dBm)	Gain(dBi) Calculated	Radiated power (dBm)	Limit (dBm)	Verdict
GFSK	0	2402	2.72	2.2	4.92	30	PASS
	39	2441	2.54		4.74		PASS
	78	2480	2.12		4.32		PASS
$\pi/4$ -DQPSK	0	2402	0.43	2.2	2.63	30	PASS
	39	2441	0.15		2.35		PASS
	78	2480	-0.24		1.96		PASS
8- DPSK	0	2402	0.90	2.2	3.10	30	PASS
	39	2441	0.61		2.81		PASS
	78	2480	-0.08		2.12		PASS

## 2.4. Bandwidth

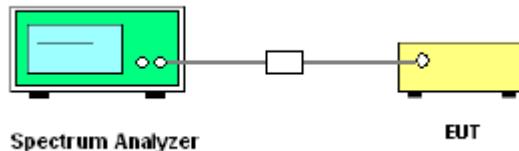
### 2.4.1. Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth ( $10 \times \log 1\% = 20\text{dB}$ ) taking the total RF output power.

### 2.4.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.4.3. Test Setup



### 2.4.4. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.  
The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;

$\text{RBW} \geq 1\%$  of the 20 dB bandwidth;  $\text{VBW} \geq \text{RBW}$ ; Sweep = auto; Detector function = peak;

Trace = max hold.

5. Use the following spectrum analyzer setting for 99% Bandwidth measurement.

For 99% Bandwidth measurement, the  $\text{RBW} = 30\text{kHz}$ , and  $\text{VBW} = 100\text{kHz}$ , Sweep=auto

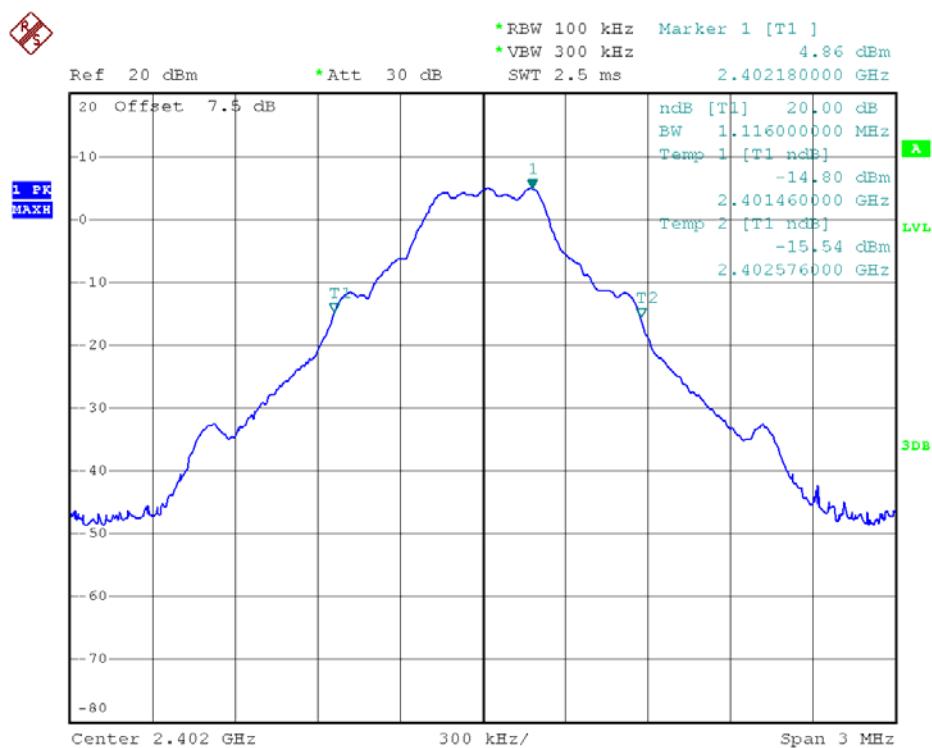
Detector function=sample ,Trace = max. hold

6. Measure and record the results in the test report.

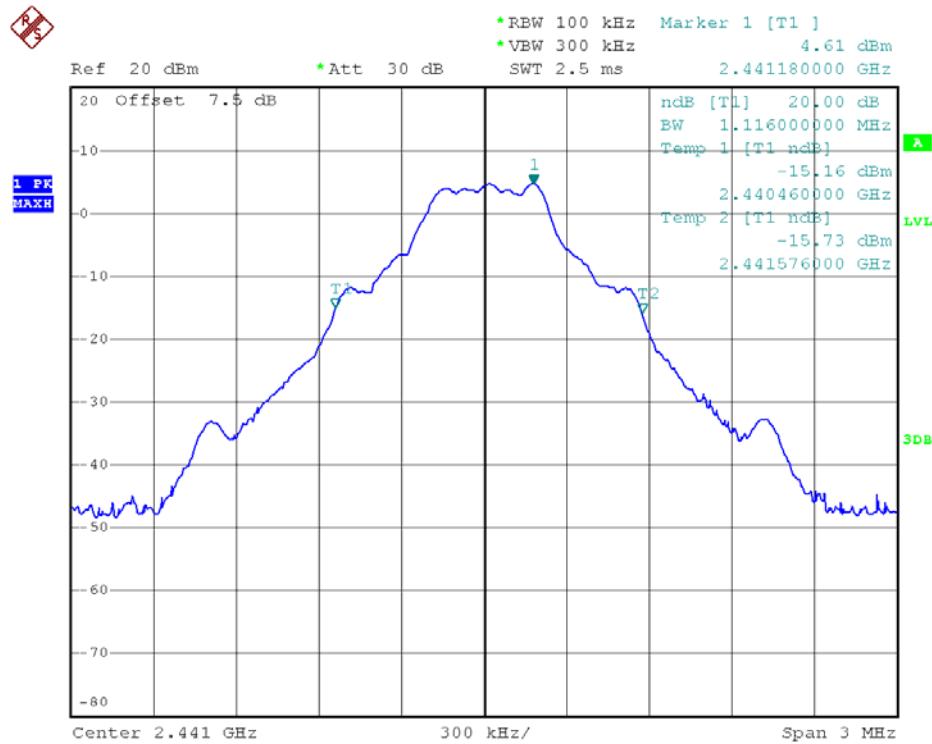
#### 2.4.5. Test Results of Bandwidth

Mode	Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% bandwidth (MHz)
GFSK	0	2402	1.116	0.936
	39	2441	1.116	0.924
	78	2480	1.110	0.918
$\pi/4$ -DQPSK	0	2402	1.368	1.224
	39	2441	1.368	1.224
	78	2480	1.368	1.224
8-DPSK	0	2402	1.332	1.236
	39	2441	1.332	1.242
	78	2480	1.338	1.236

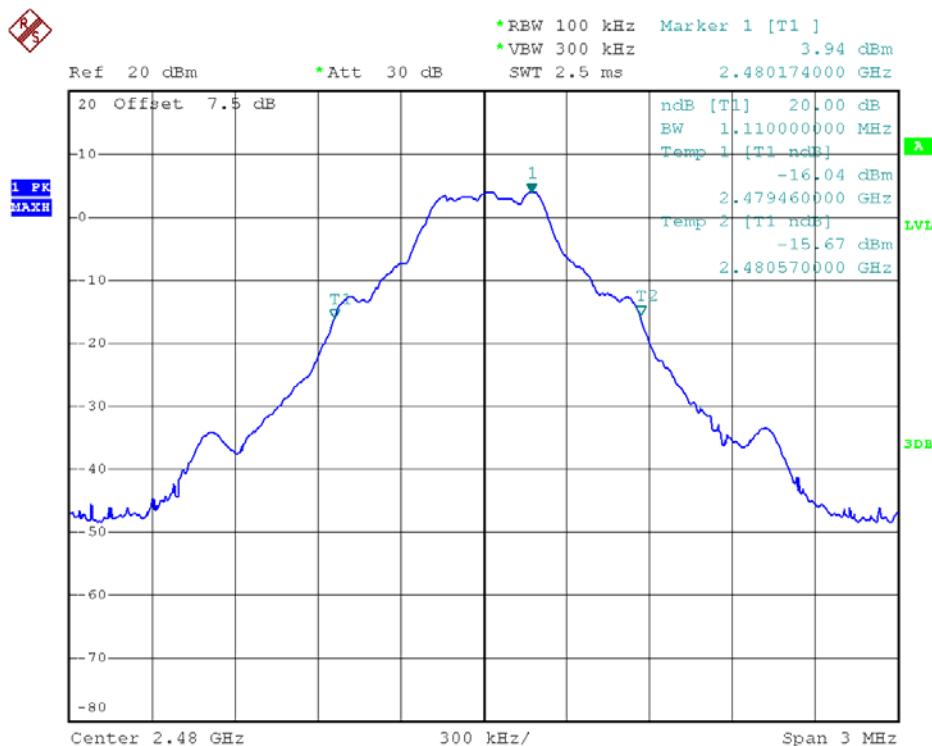
#### 2.4.6. Test Results (plots) of 20dB Bandwidth



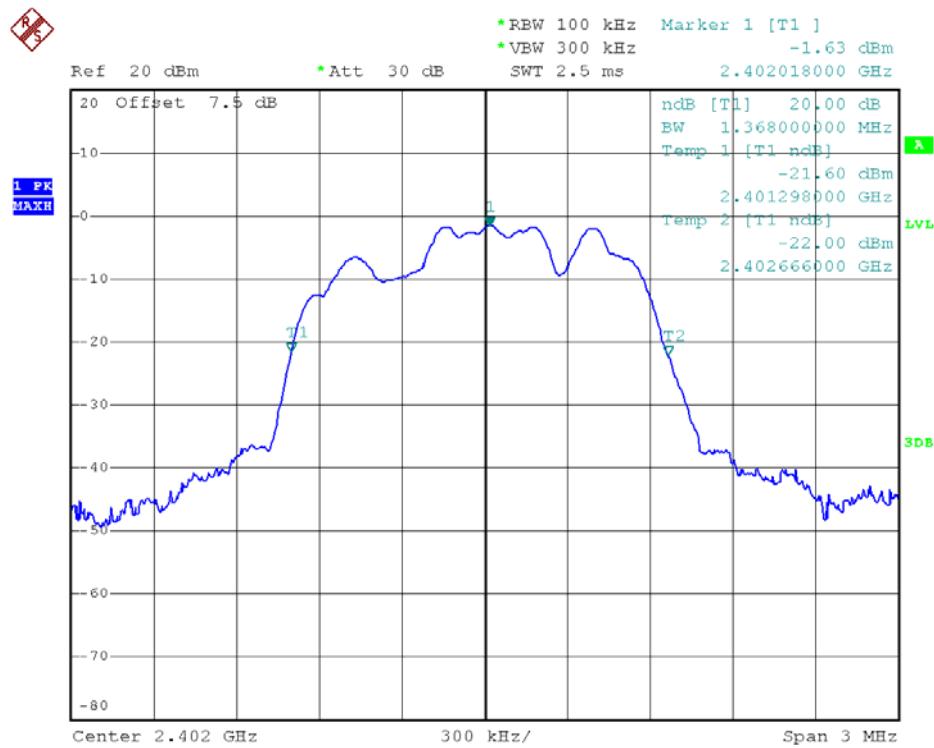
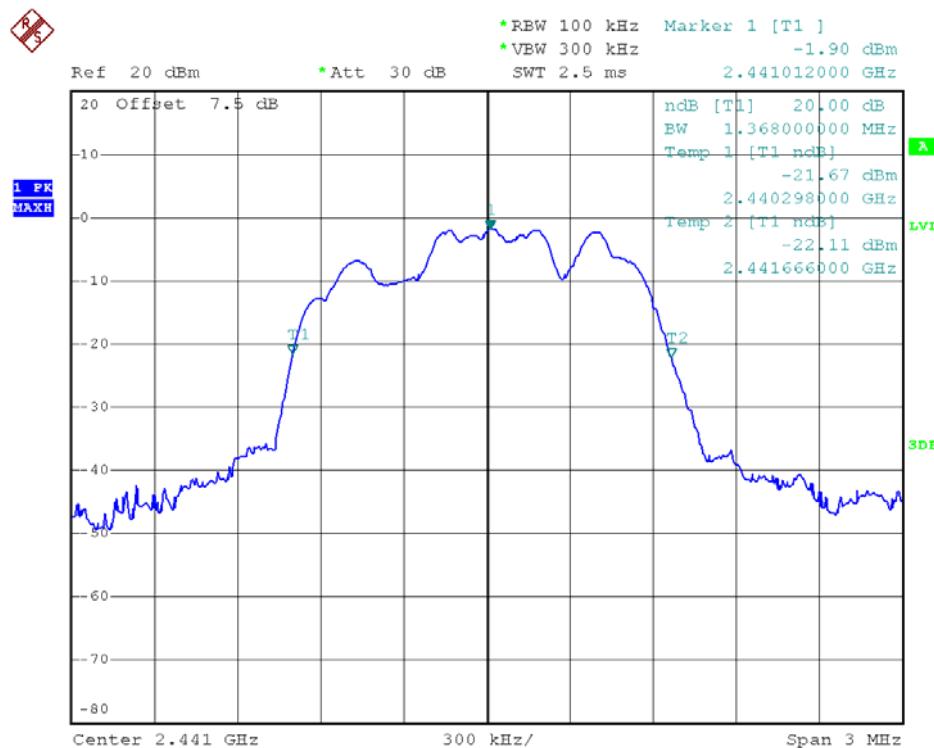
0 Channel @ GFSK

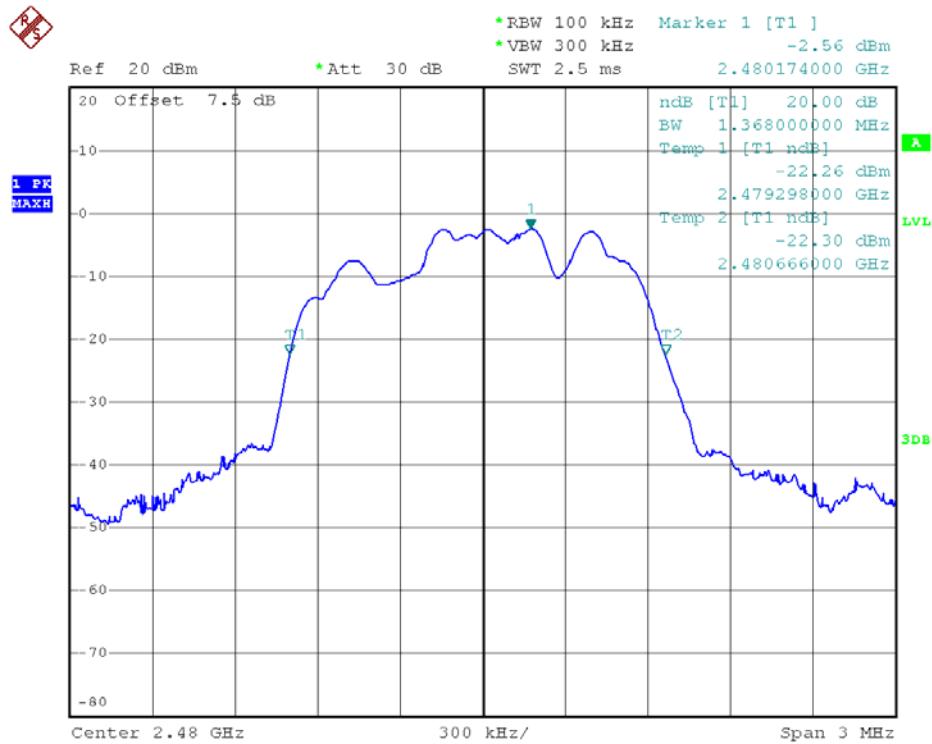
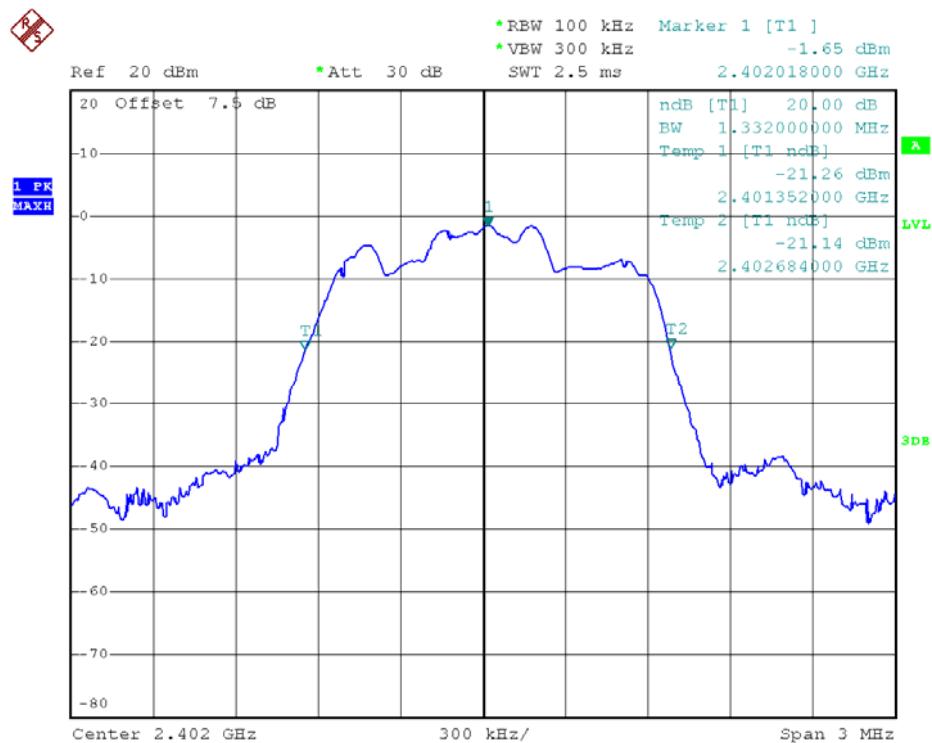


39 Channel @ GFSK

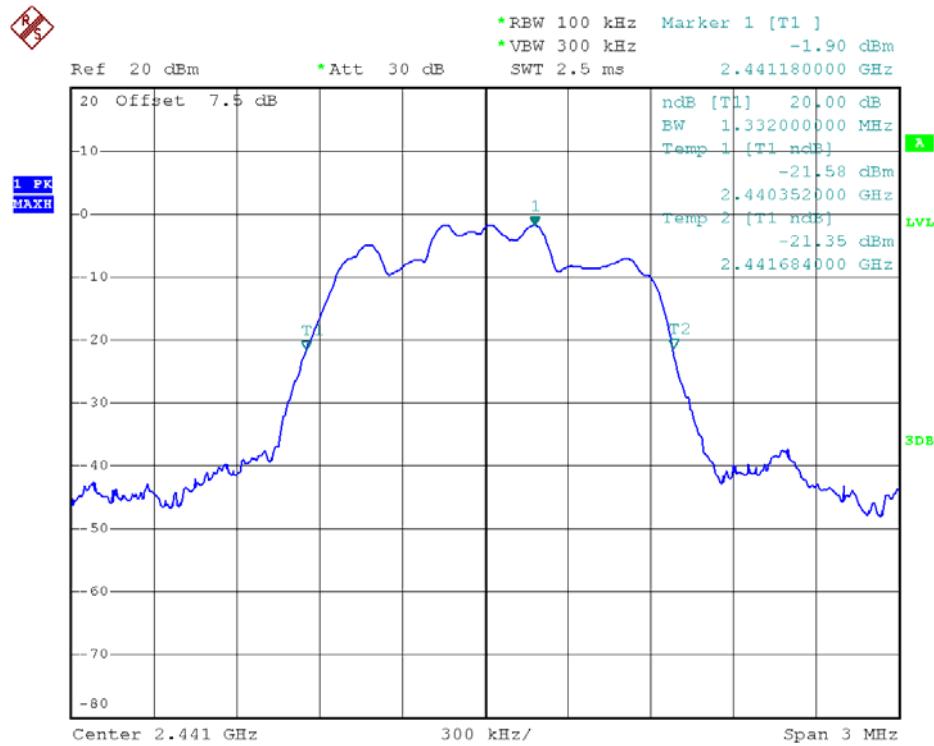


78 Channel @ GFSK

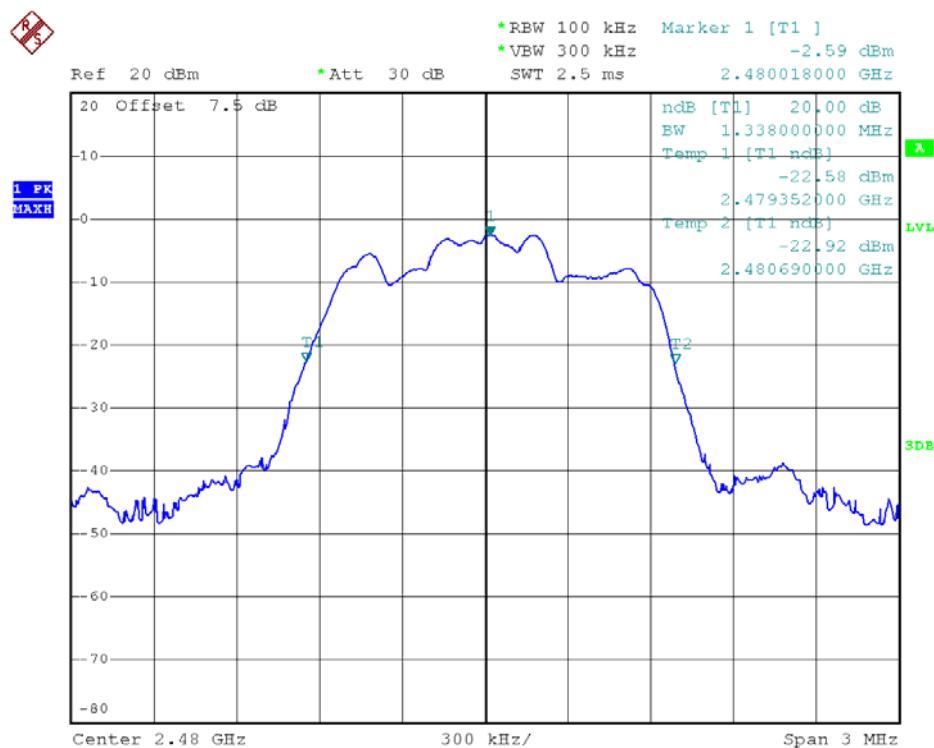

 0 Channel @  $\pi/4$ -DQPSK

 39 Channel @  $\pi/4$ -DQPSK


 78 Channel @  $\pi/4$ -DQPSK


0 Channel @ 8-DPSK

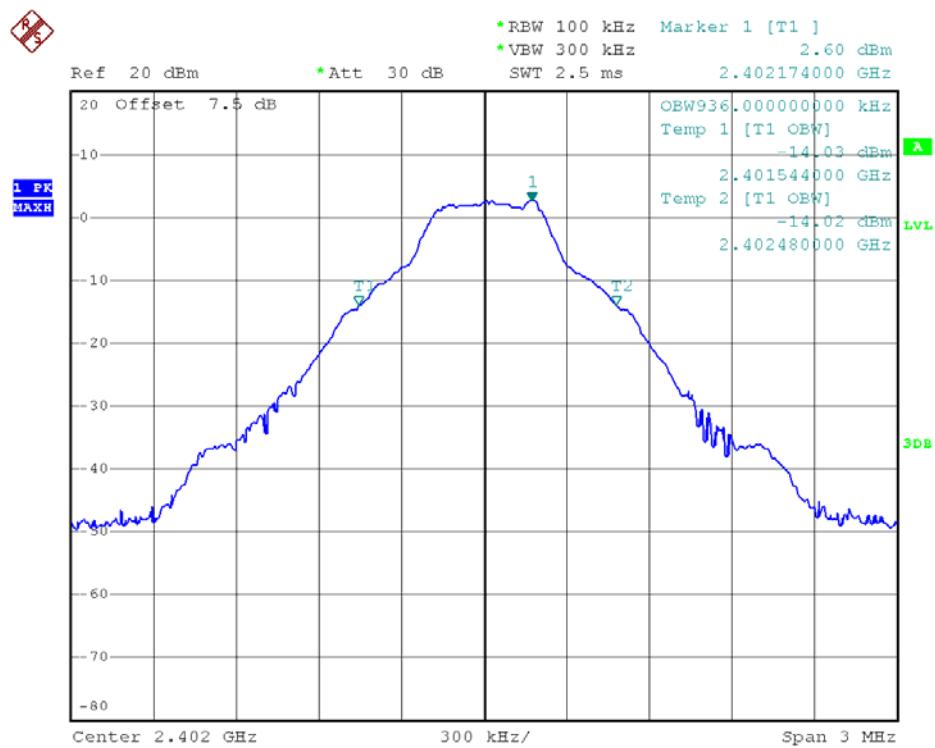


39 Channel @ 8-DPSK

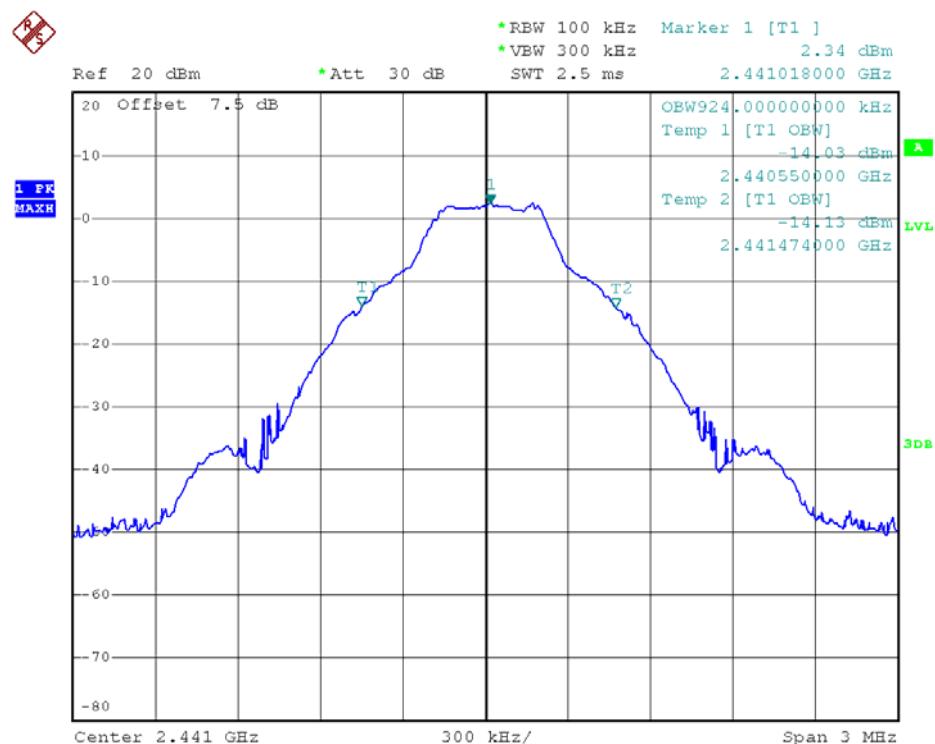


78 Channel @ 8-DPSK

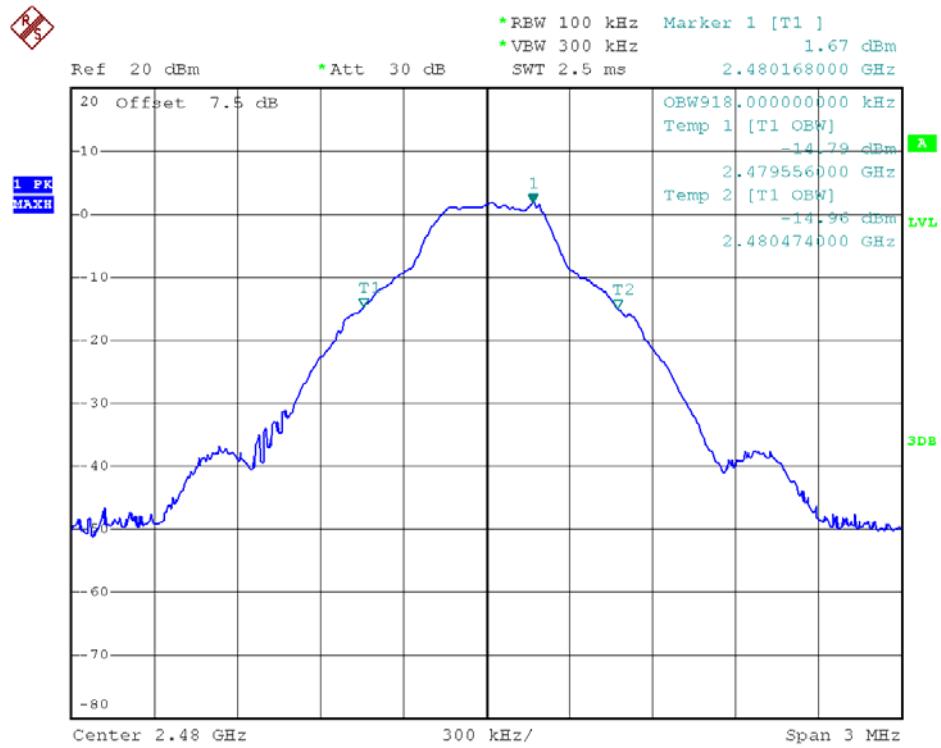
## 2.4.7. Test Results (plots) of 99% Bandwidth



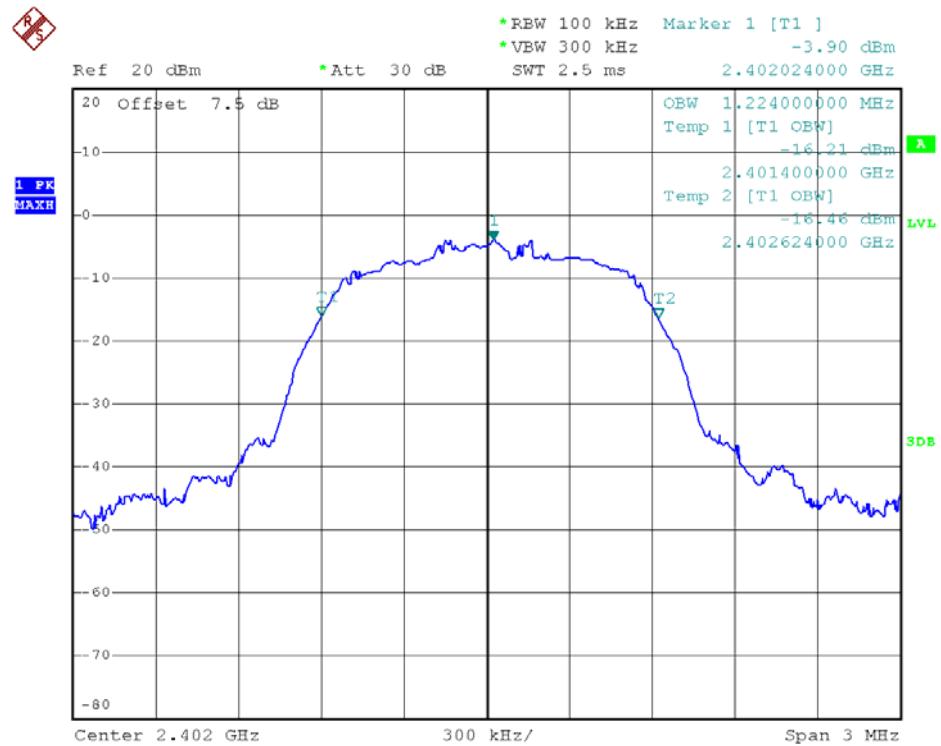
0 Channel @ GFSK

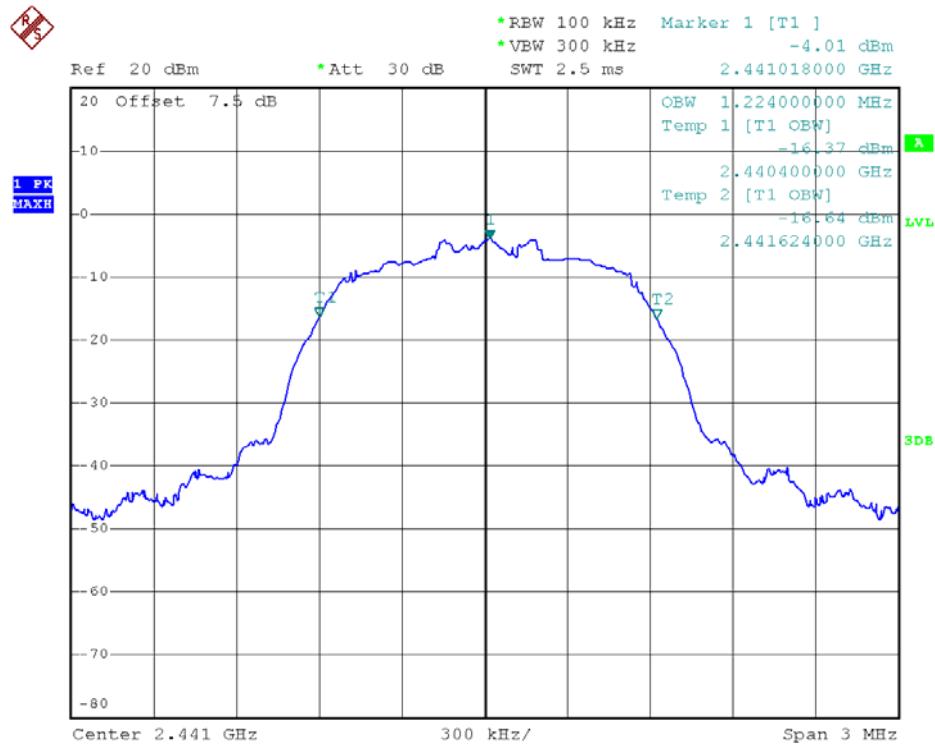
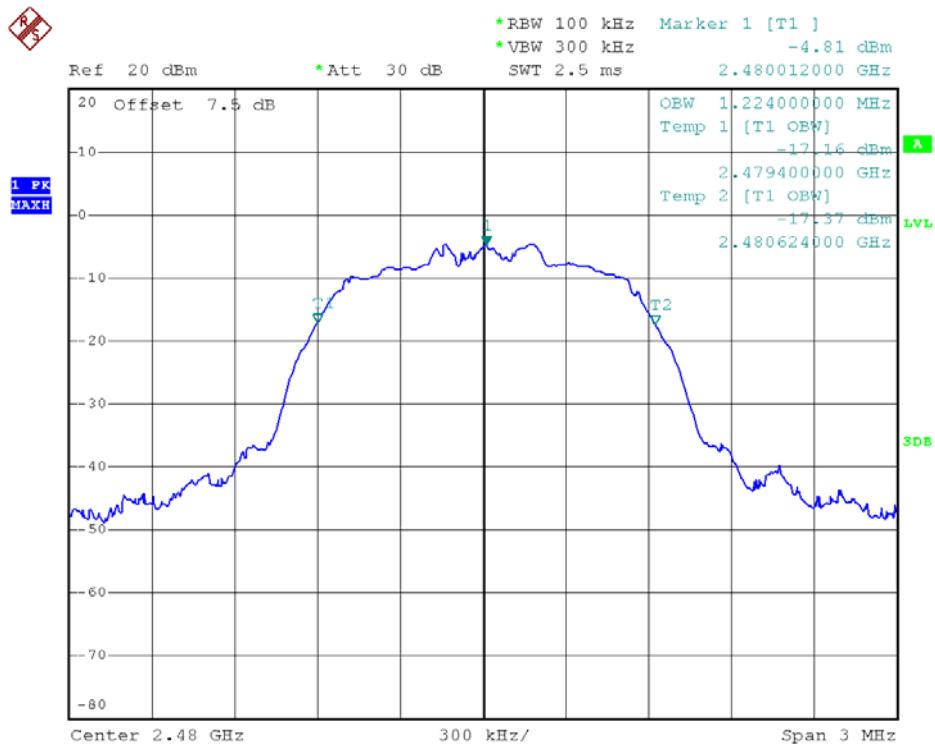


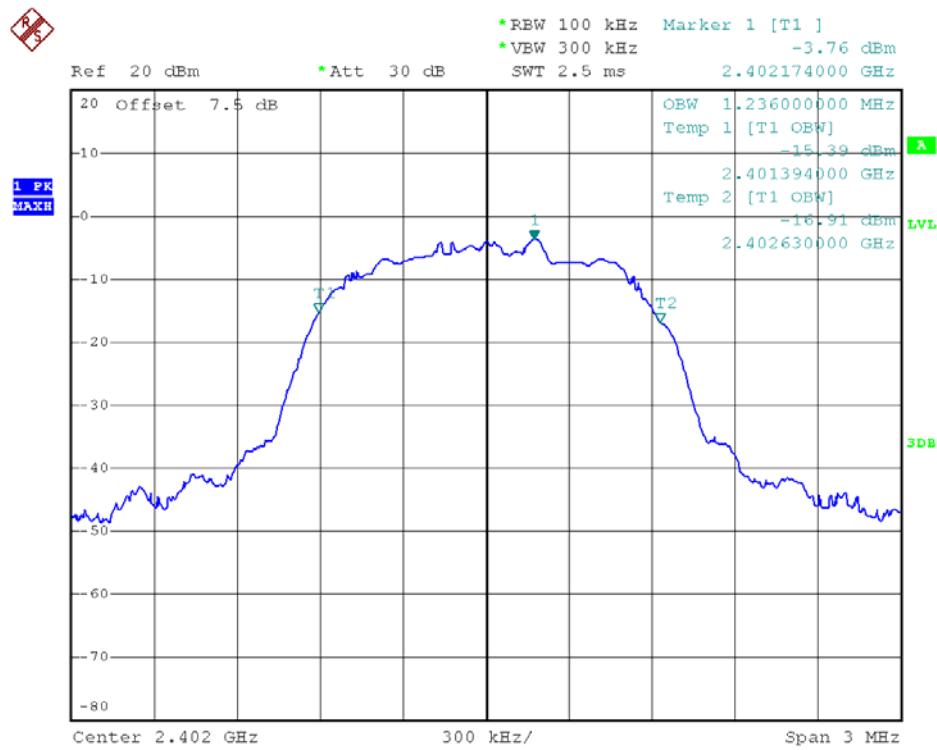
39 Channel @ GFSK



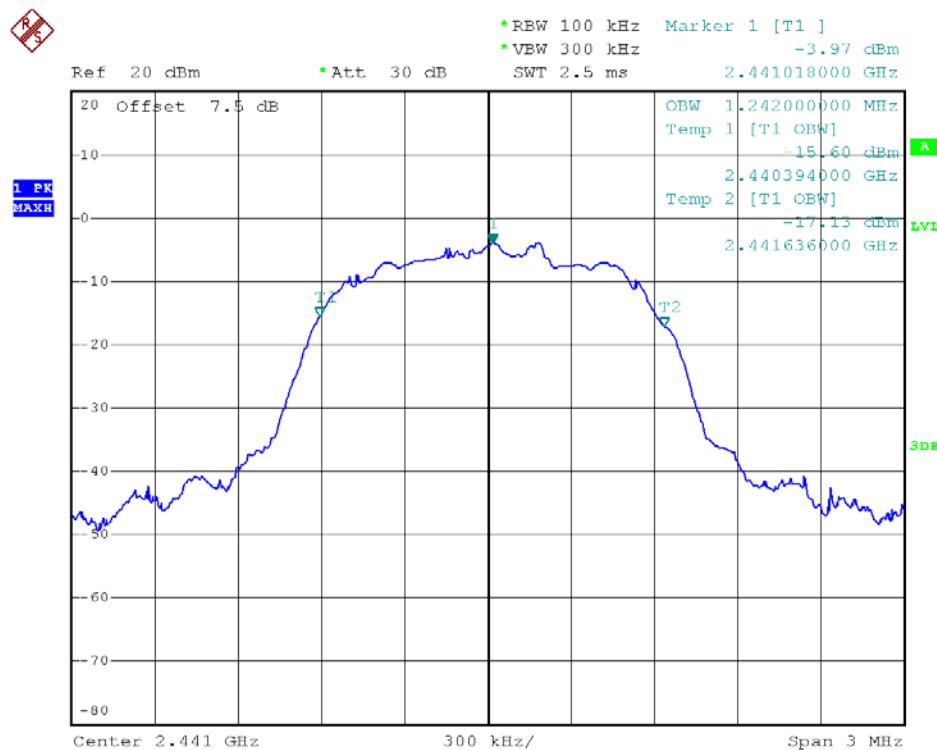
78 Channel @ GFSK


 0 Channel @  $\pi/4$ -DQPSK

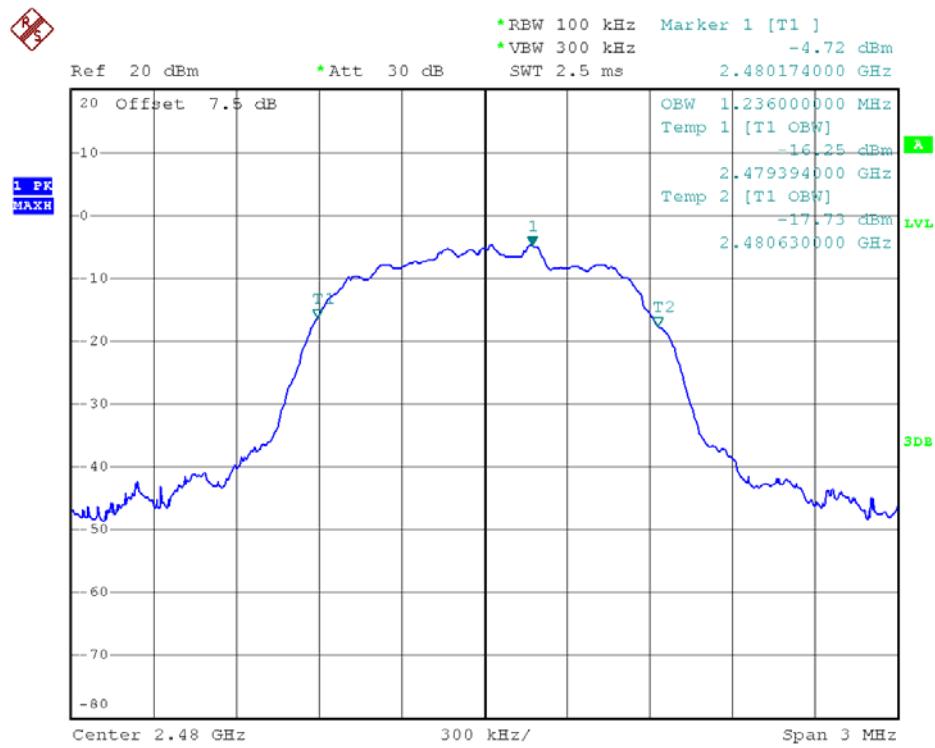

 39 Channel @  $\pi/4$ -DQPSK

 78 Channel @  $\pi/4$ -DQPSK



## 0 Channel @ 8-DPSK



## 39 Channel @ 8-DPSK



78 Channel @ 8-DPSK

## 2.5. Carried Frequency Separation

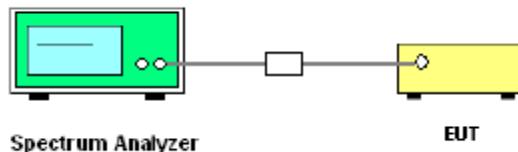
### 2.5.1. Limit of Carried Frequency Separation

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

### 2.5.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.5.3. Test Setup



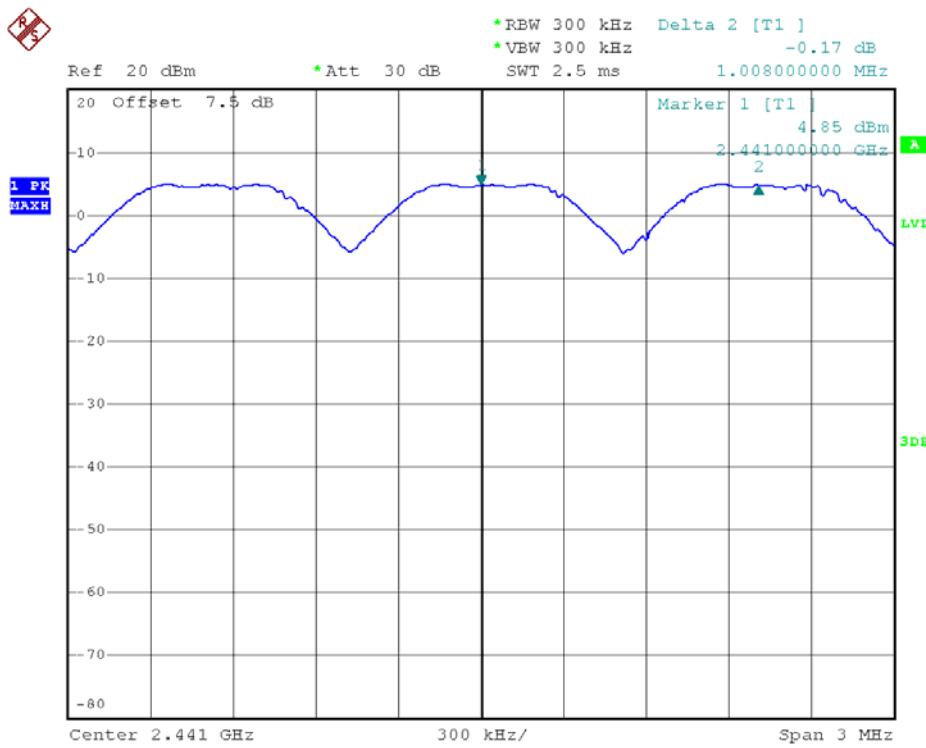
### 2.5.4. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:  
Span = wide enough to capture the peaks of two adjacent channels;  $RBW \geq 1\%$  of the span;  
 $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

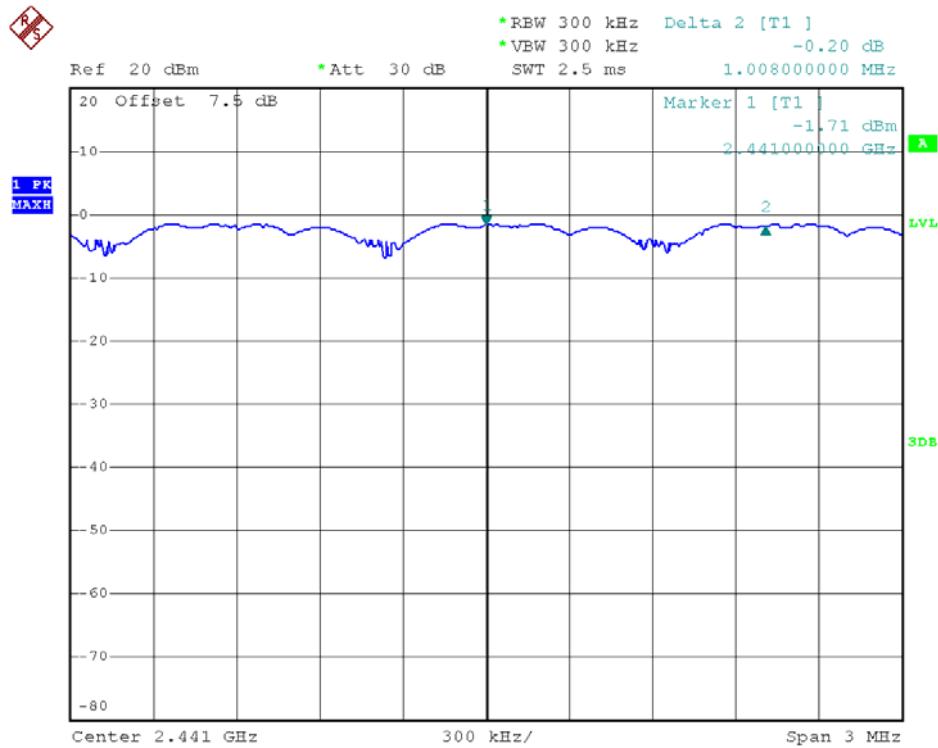
## 2.5.5. Test Results of Carried Frequency Separation

Test mode	Frequency Separation(MHz)	(2/3 of 20dB BW) Limits (MHz)	Verdict
GFSK	1.008	0.744	PASS
$\pi/4$ -DQPSK	1.008	0.912	PASS
8-DPSK	1.008	0.892	PASS

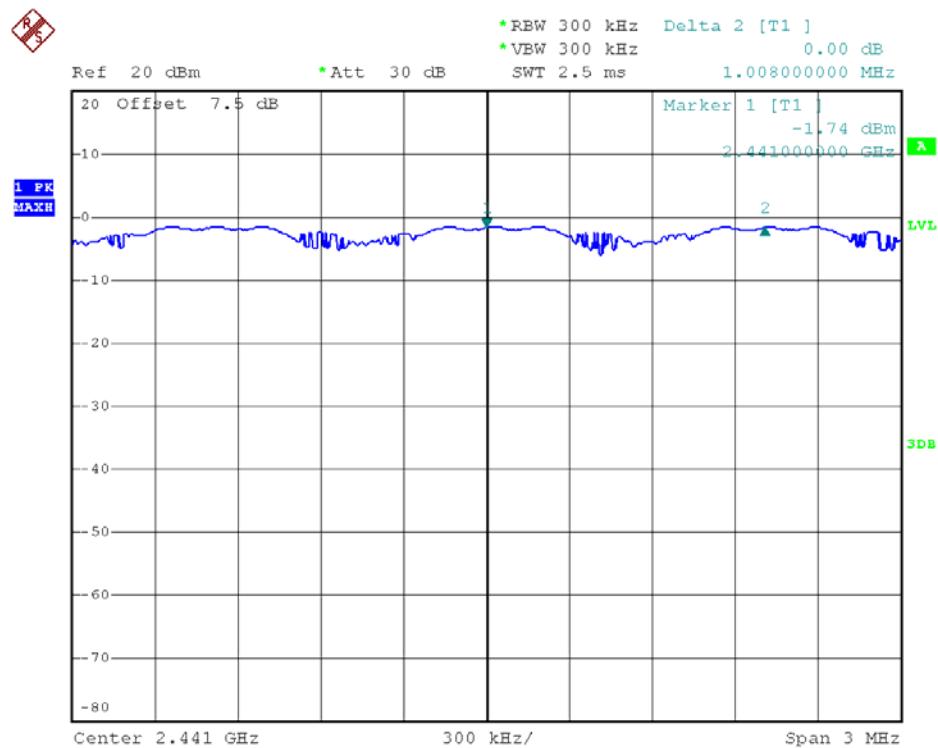
## 2.5.6. Test Results (plots) of Carried Frequency Separation



GFSK Mode



$\pi/4$ -DQPSK Mode



8-DPSK Mode

## 2.6. Dwell time

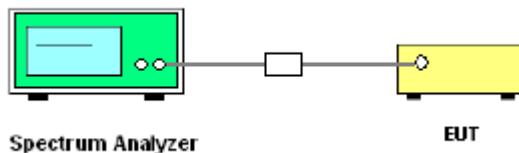
### 2.6.1. Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 2.6.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.6.3. Test Setup



### 2.6.4. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz;  $VBW \geq RBW$ ; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

## 2.6.5. Test Results of Dwell Time

For DH1 package type:

$$\{\text{Total of Dwell}\} = \{\text{Pulse Time}\} * (1600 / 2) / \{\text{Number of Hopping Frequency}\} * \{\text{Period}\}$$

$$\{\text{Period}\} = 0.4s * \{\text{Number of Hopping Frequency}\}$$

For DH3 package type:

$$\{\text{Total of Dwell}\} = \{\text{Pulse Time}\} * (1600 / 4) / \{\text{Number of Hopping Frequency}\} * \{\text{Period}\}$$

$$\{\text{Period}\} = 0.4s * \{\text{Number of Hopping Frequency}\}$$

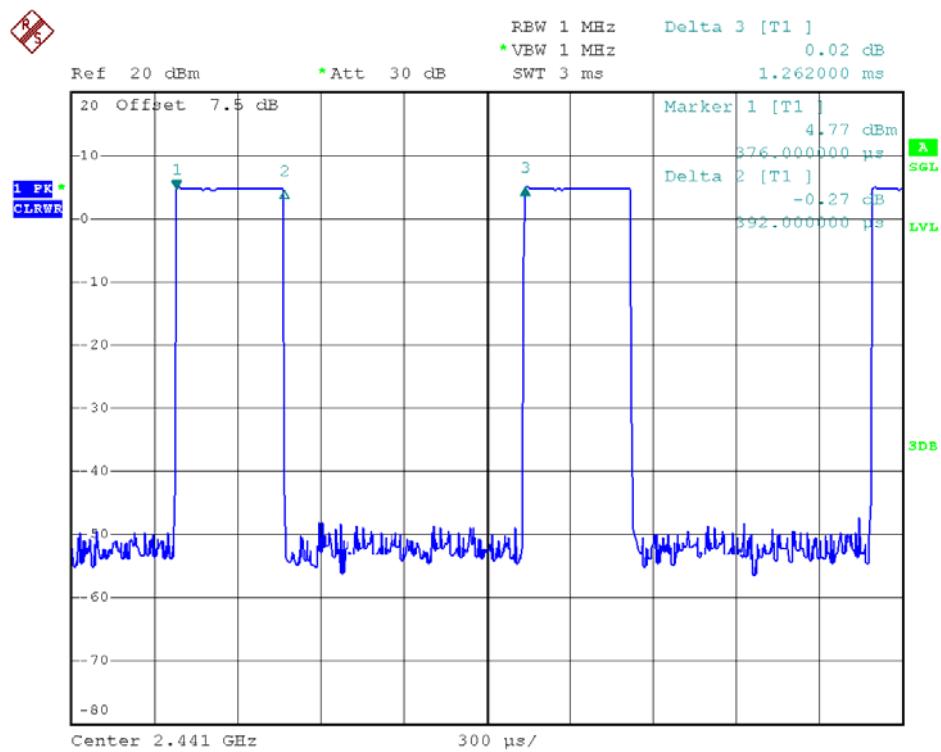
For DH5 package type:

$$\{\text{Total of Dwell}\} = \{\text{Pulse Time}\} * (1600 / 6) / \{\text{Number of Hopping Frequency}\} * \{\text{Period}\}$$

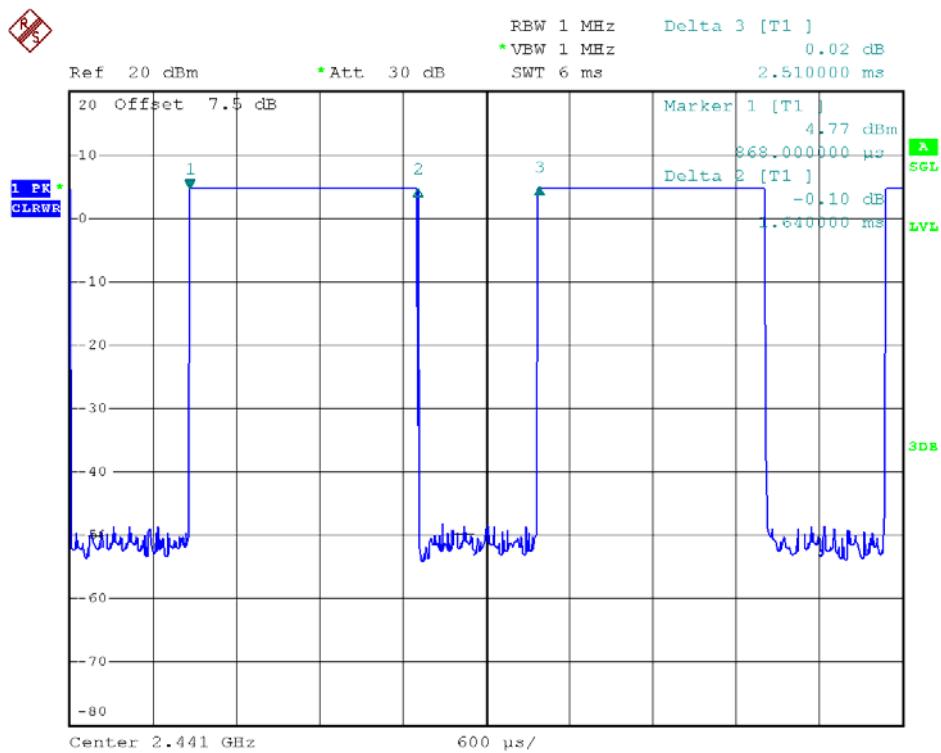
$$\{\text{Period}\} = 0.4s * \{\text{Number of Hopping Frequency}\}$$

Modulation	Packet Type	Channel	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	DH1	39	0.392	125.44	400	PASS
	DH3	39	1.640	262.40		PASS
	DH5	39	2.880	307.20		PASS
$\pi/4$ -DQPSK	DH1	39	0.390	124.80	400	PASS
	DH3	39	1.626	260.16		PASS
	DH5	39	2.906	309.97		PASS
8-DPSK	DH1	39	0.384	122.88	400	PASS
	DH3	39	1.644	263.04		PASS
	DH5	39	2.904	309.76		PASS

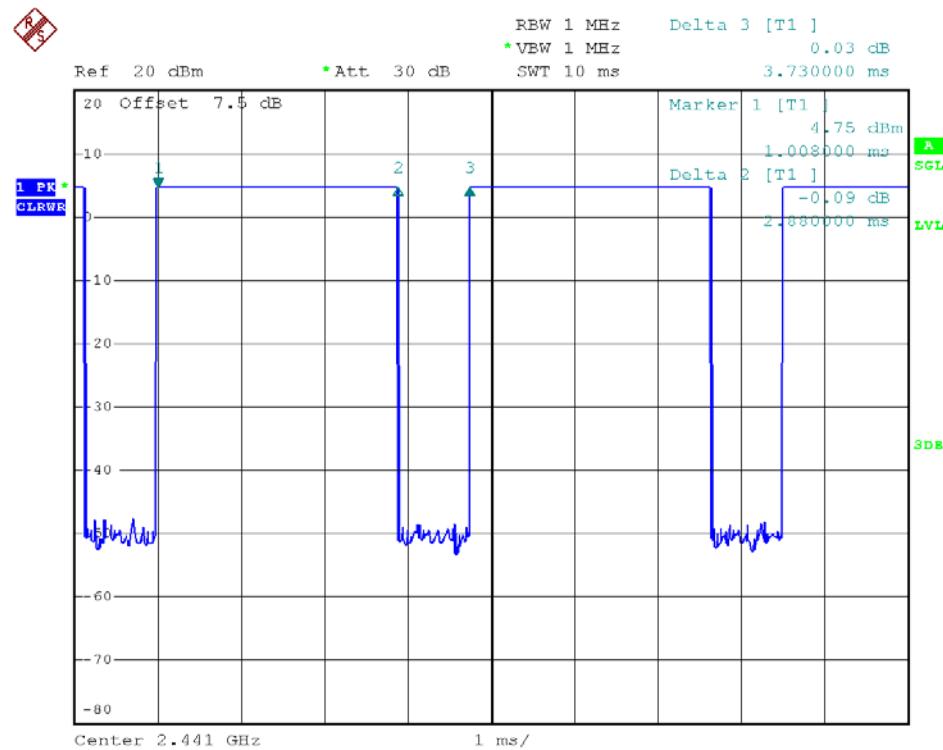
## 2.6.6. Test Results (plots) of Dwell Time



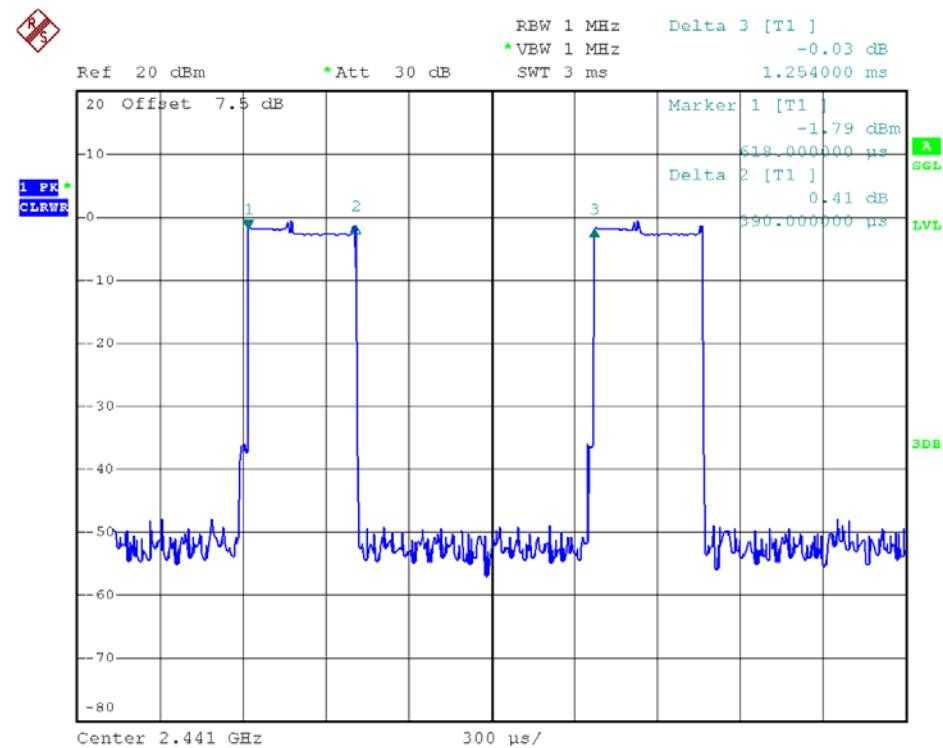
39 Channel @ DH1



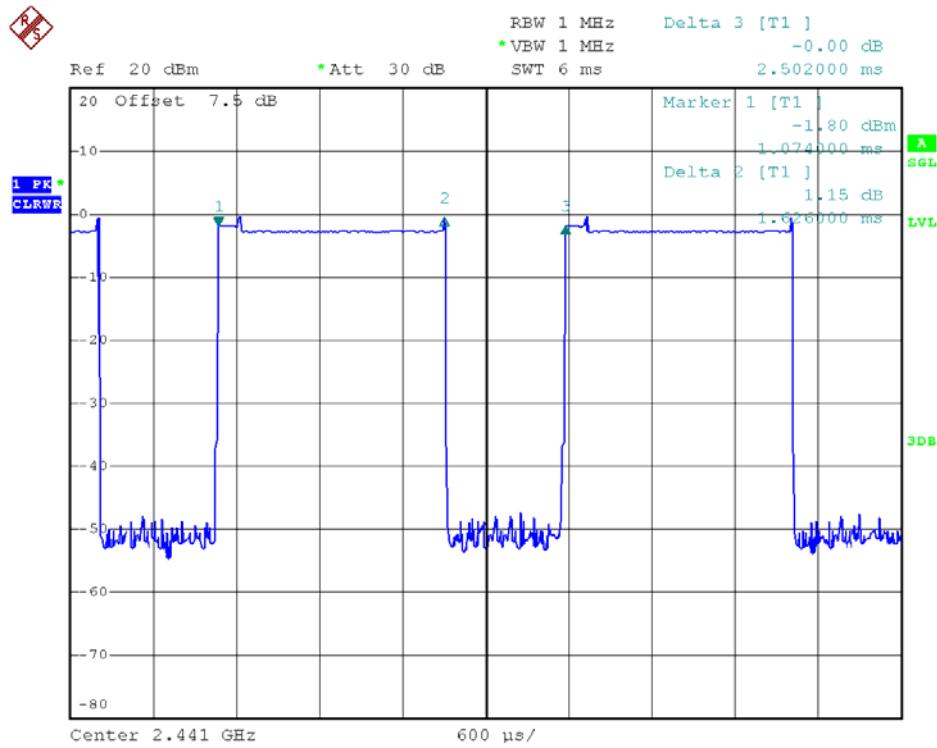
39 Channel @ DH3



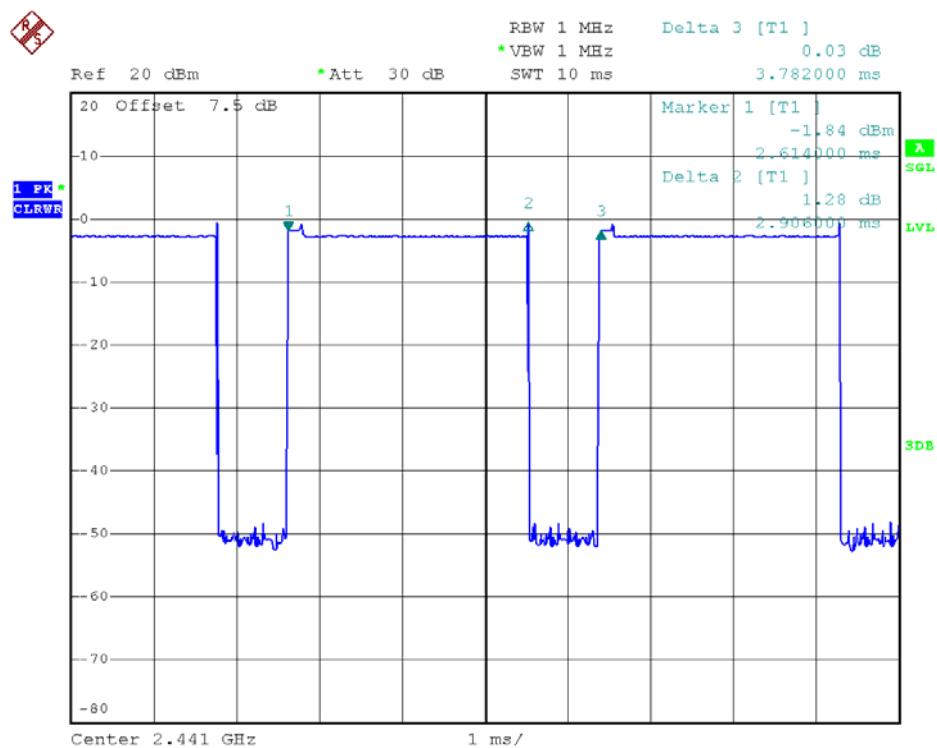
39 Channel @ DH5



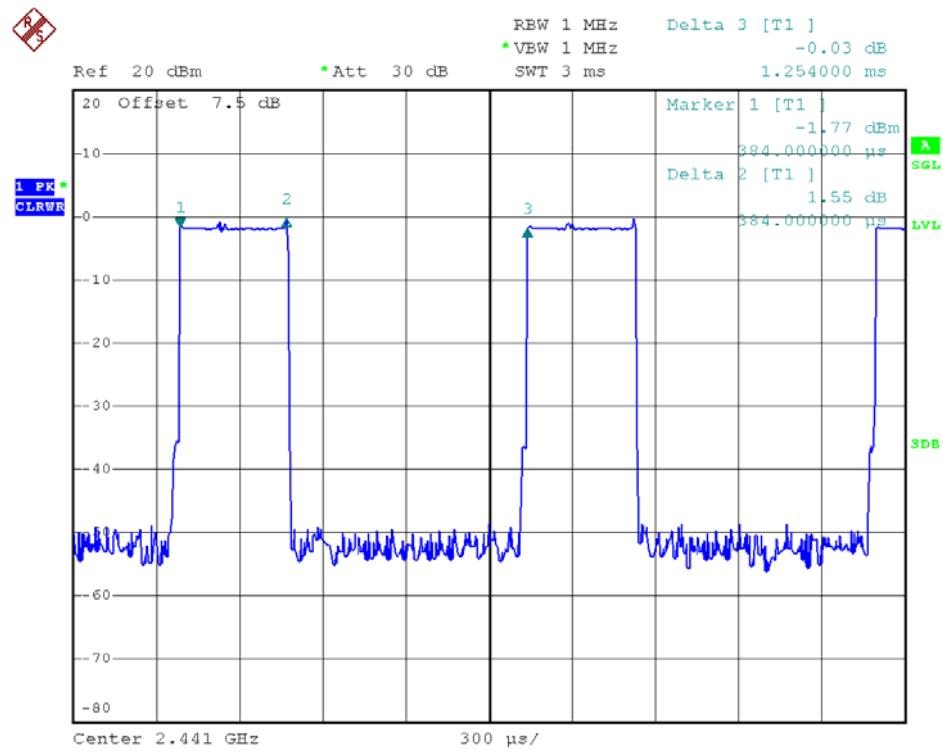
39 Channel @ 2DH1



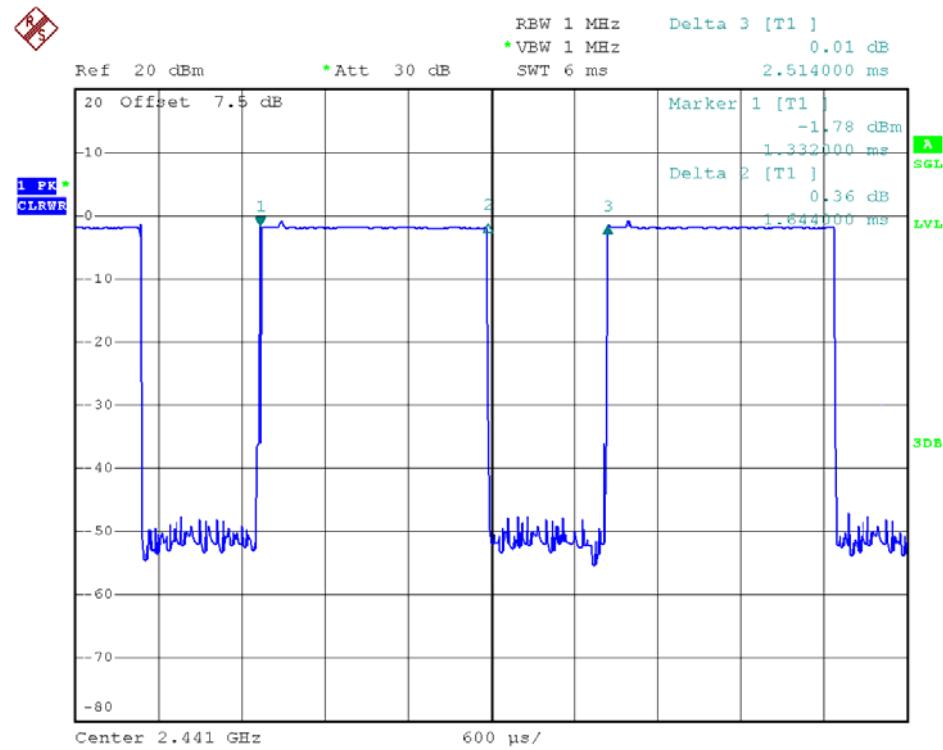
39 Channel @ 2DH3



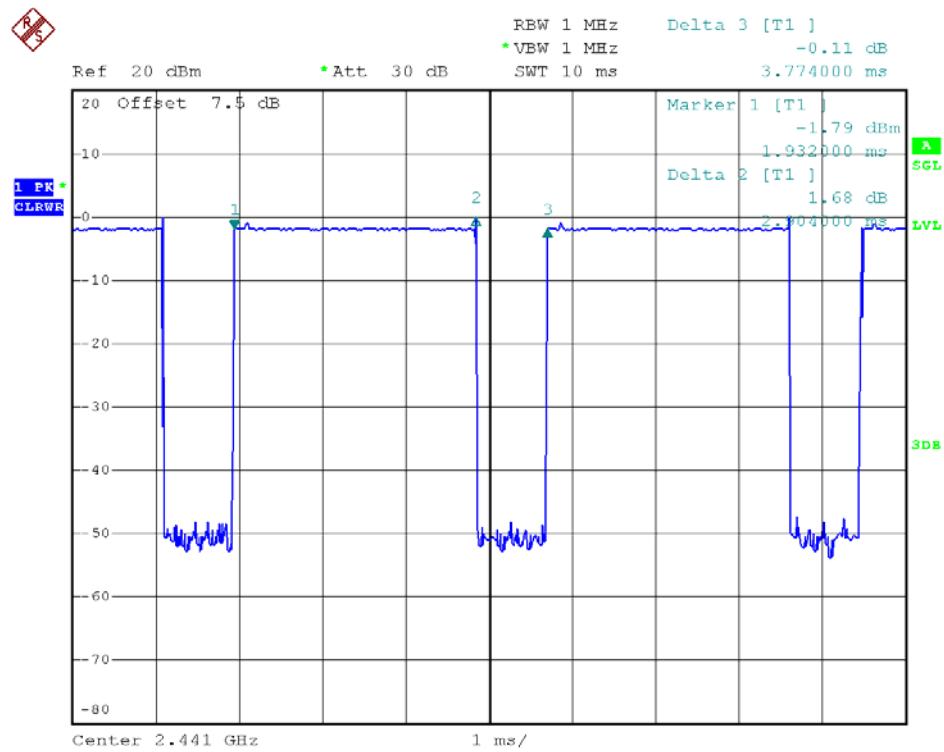
39 Channel @ 2DH5



39 Channel @ 3DH1



39 Channel @ 3DH3



39 Channel @ 3DH5

## 2.7. Conducted Spurious Emissions

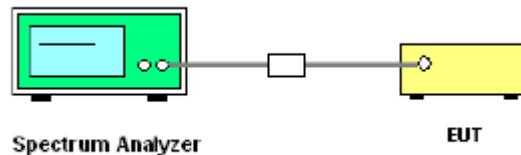
### 2.7.1. Limit of Spurious Emission

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

### 2.7.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.7.3. Test Setup

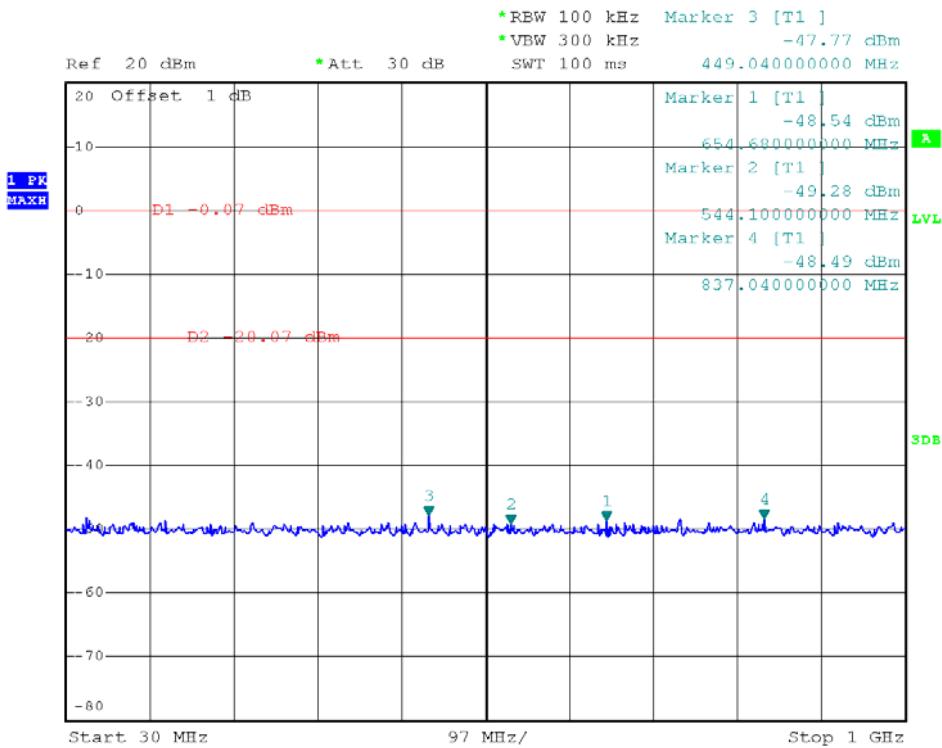


### 2.7.4. Test Procedure

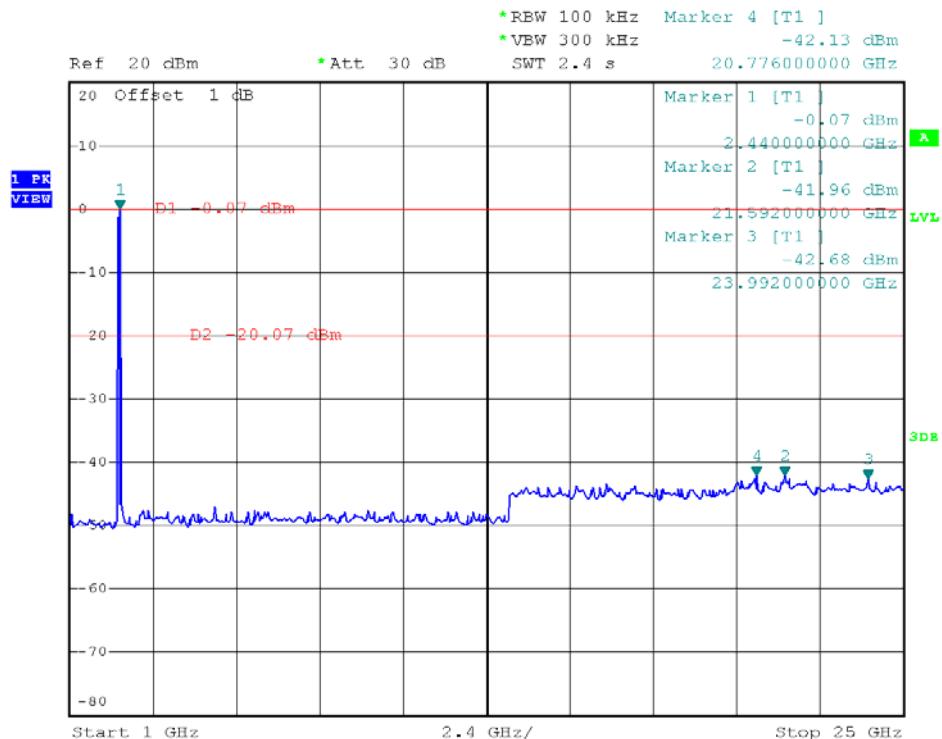
1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

### 2.7.5. Test Results of Conducted Spurious Emissions

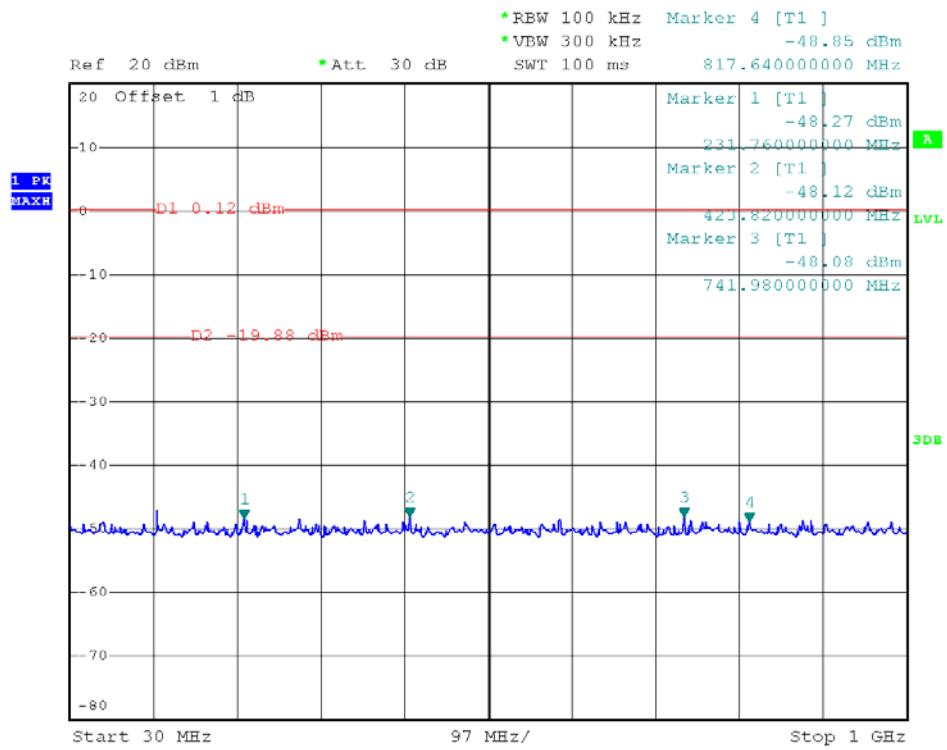
Note: For 9 kHz to 30MHz the amplitude of conducted spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



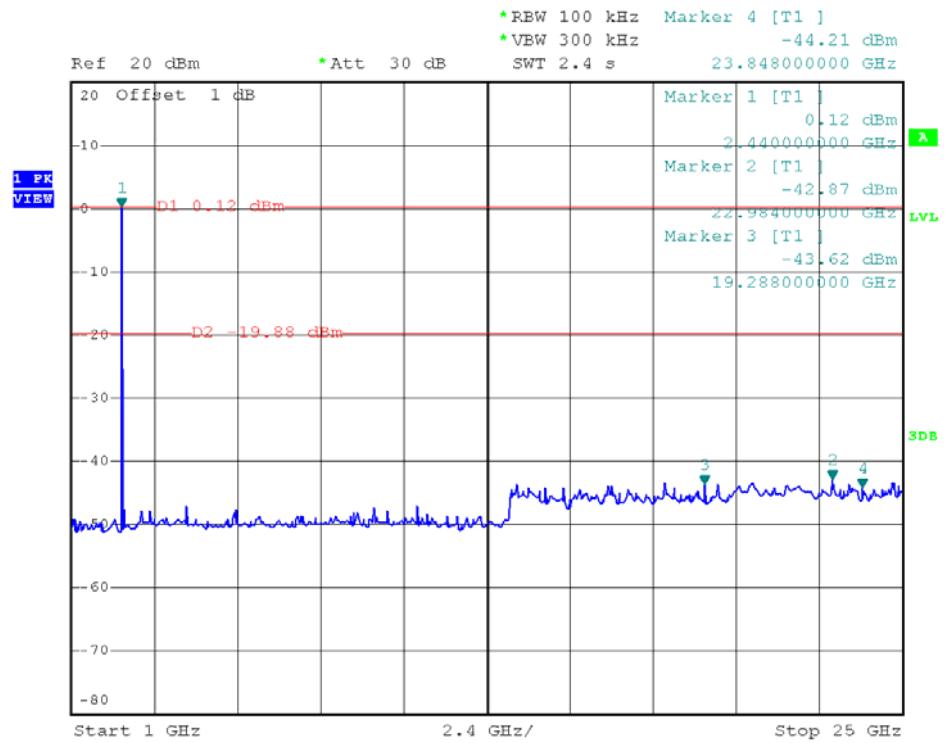
## Low Channel 30MHz to 1GHz @ GFSK Mode



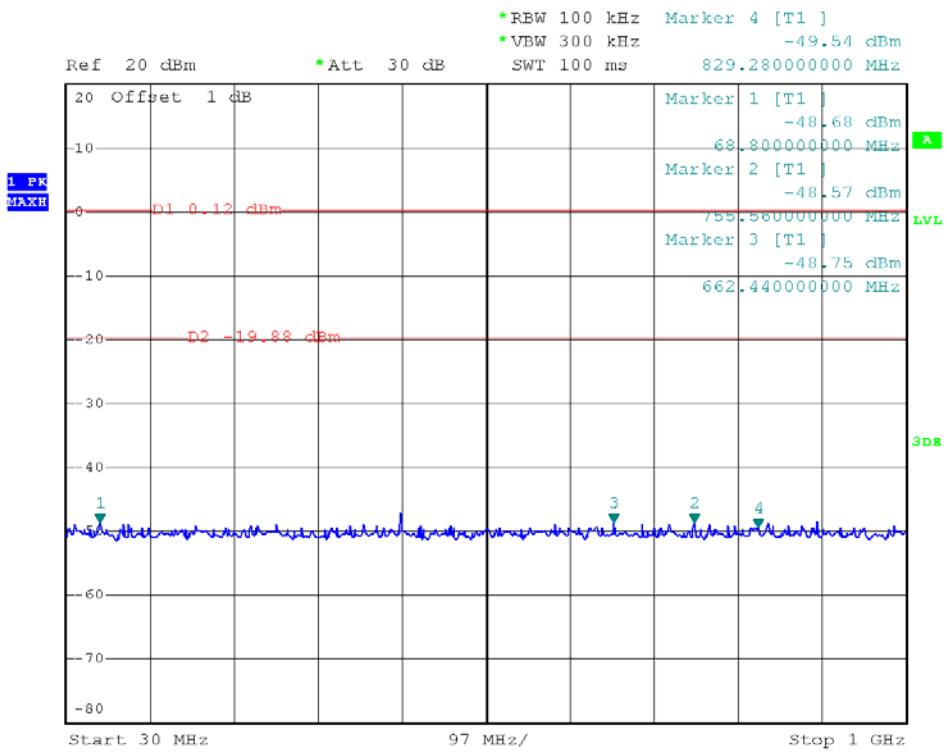
## Low Channel 1GHz to 25GHz @ GFSK Mode



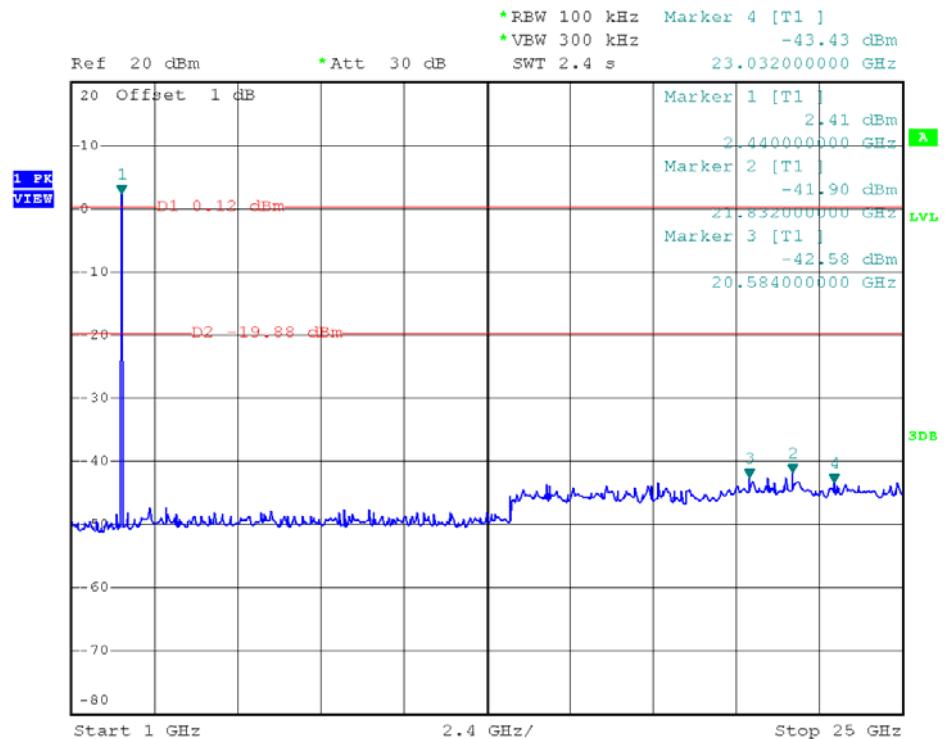
Mid Channel 30MHz to 1GHz @ GFSK Mode



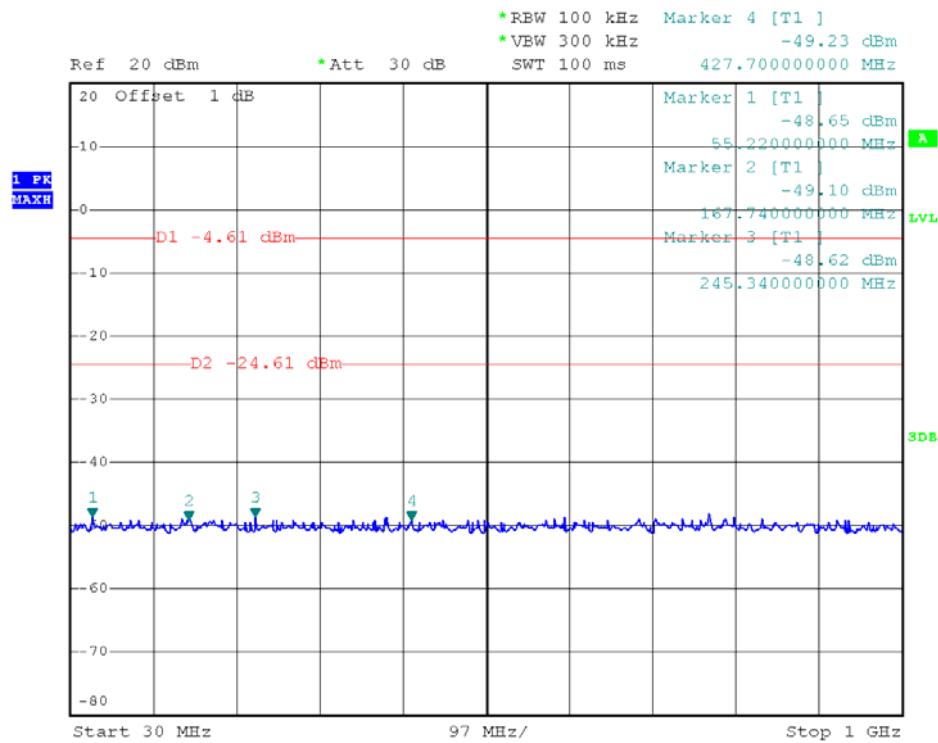
Mid Channel 1GHz to 25GHz @ GFSK Mode



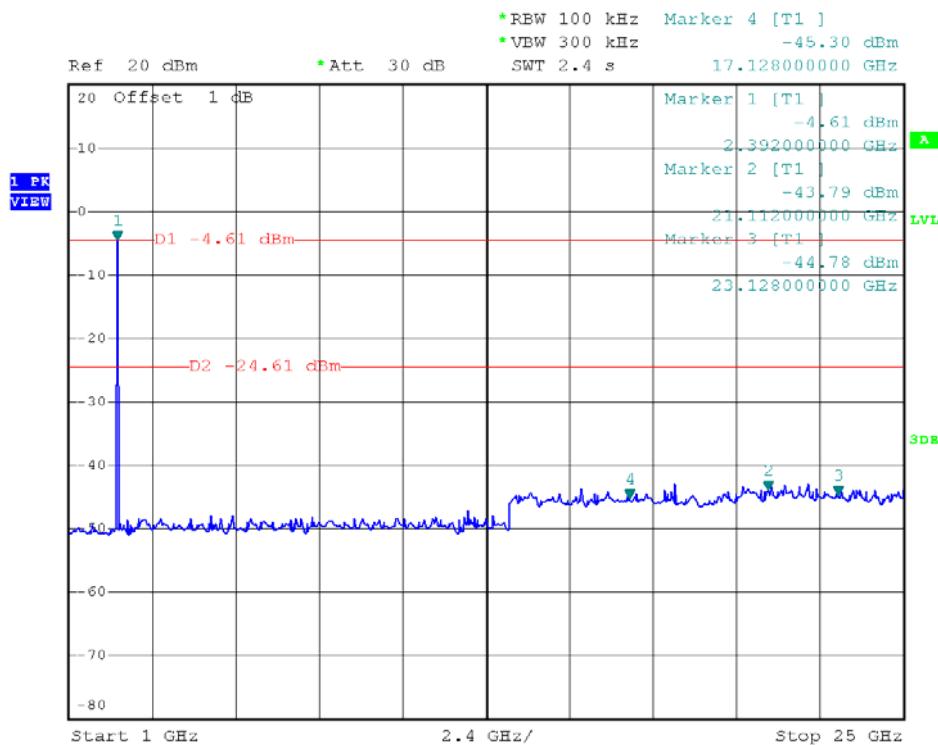
High Channel 30MHz to 1GHz @ GFSK Mode



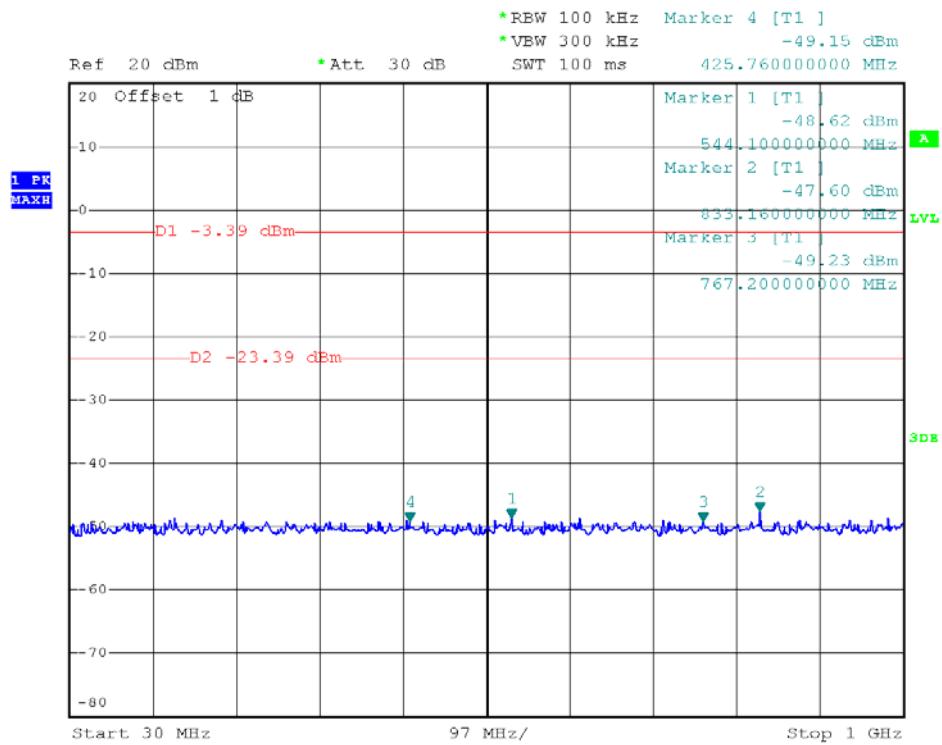
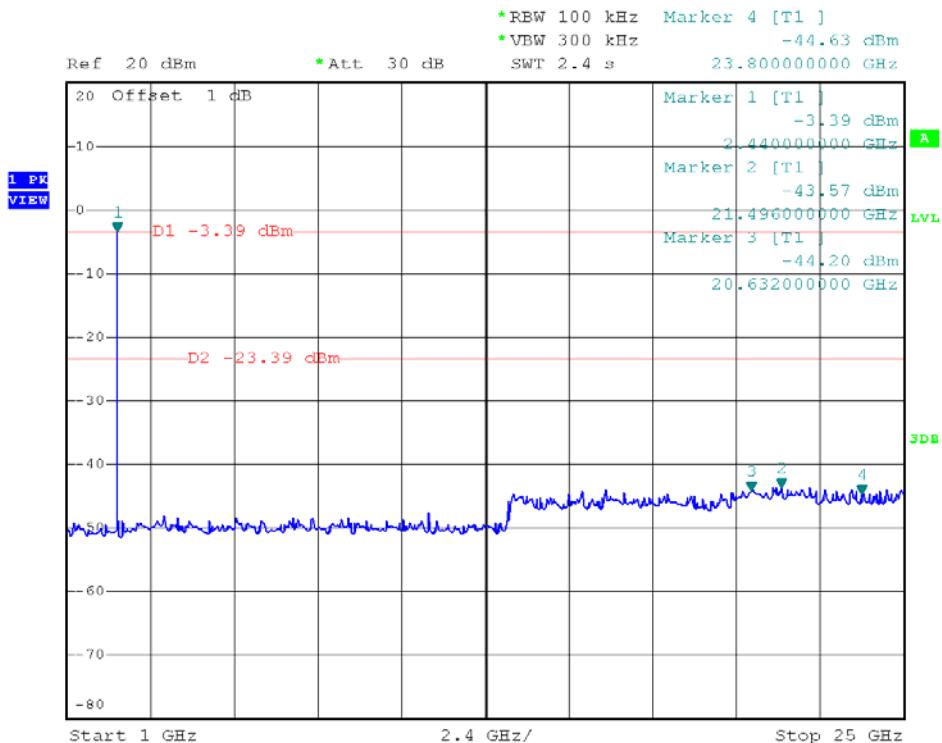
High Channel 1GHz to 25GHz @ GFSK Mode

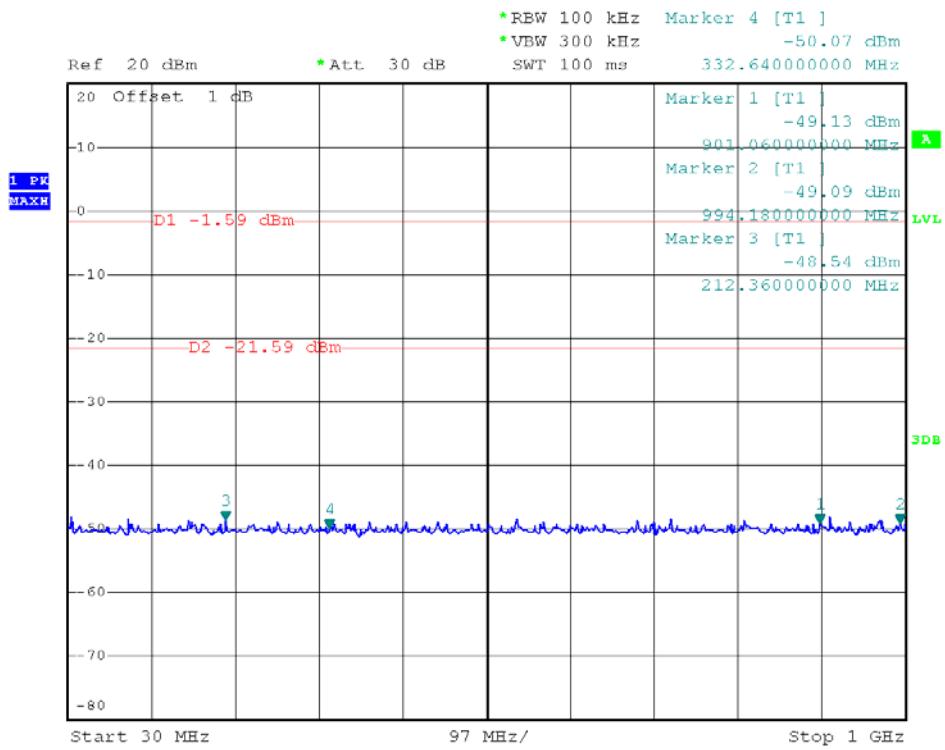
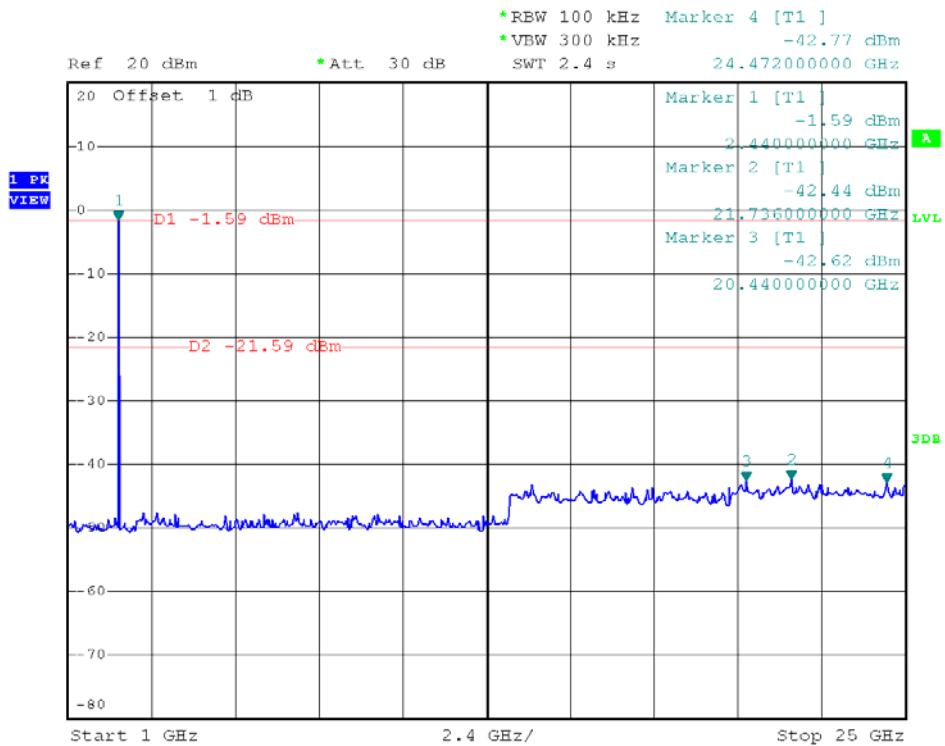


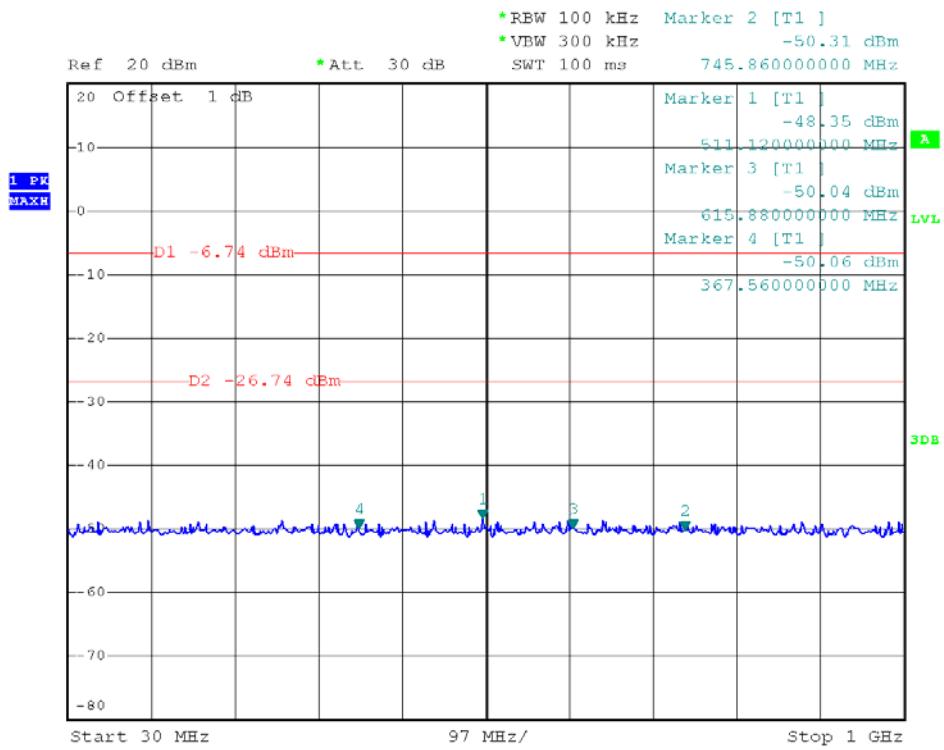
## Low Channel 30MHz to 1GHz @ $\pi/4$ -DQPSK



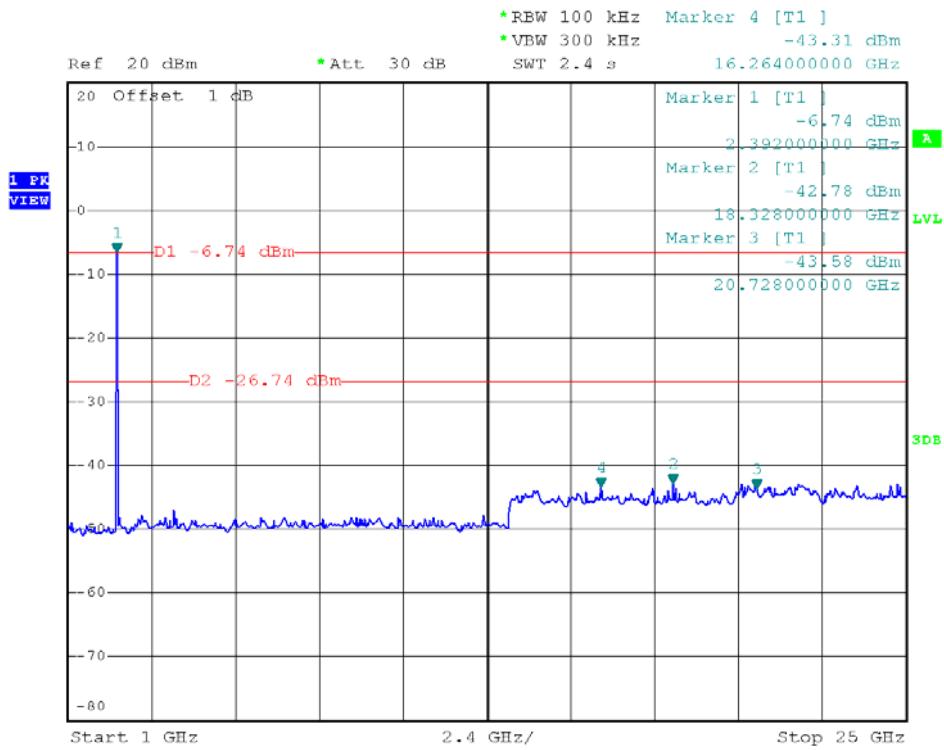
## Low Channel 1GHz to 25GHz @ $\pi/4$ -DQPSK


 Mid Channel 30MHz to 1GHz @ $\pi/4$ -DQPSK

 Mid Channel 1GHz to 25GHz @ $\pi/4$ -DQPSK

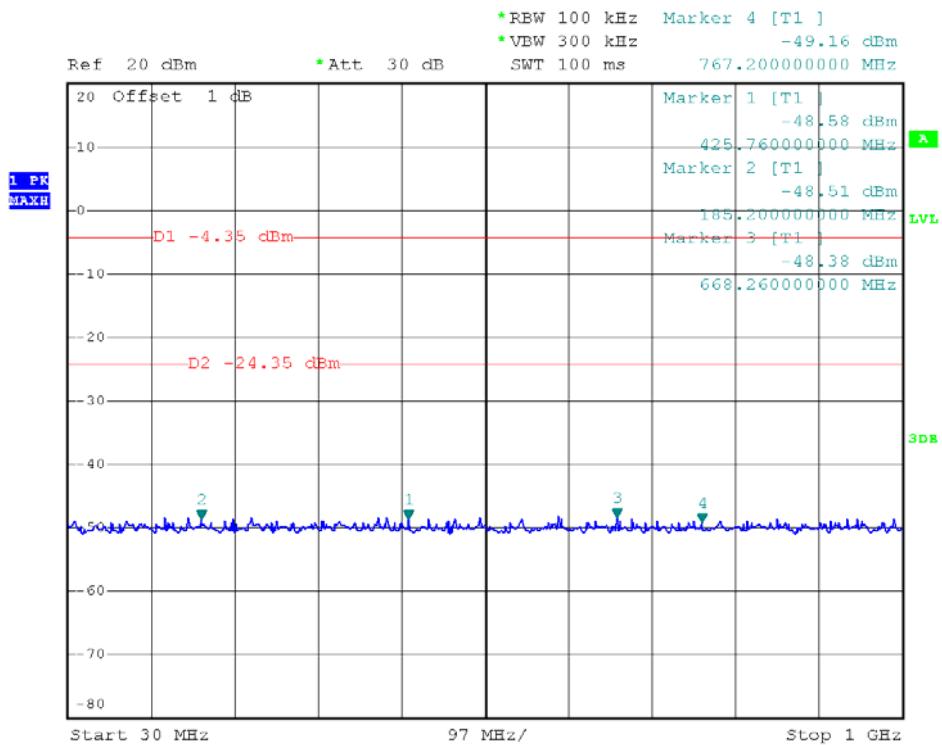

 High Channel 30MHz to 1GHz @ $\pi/4$ -DQPSK

 High Channel 1GHz to 25GHz @ $\pi/4$ -DQPSK



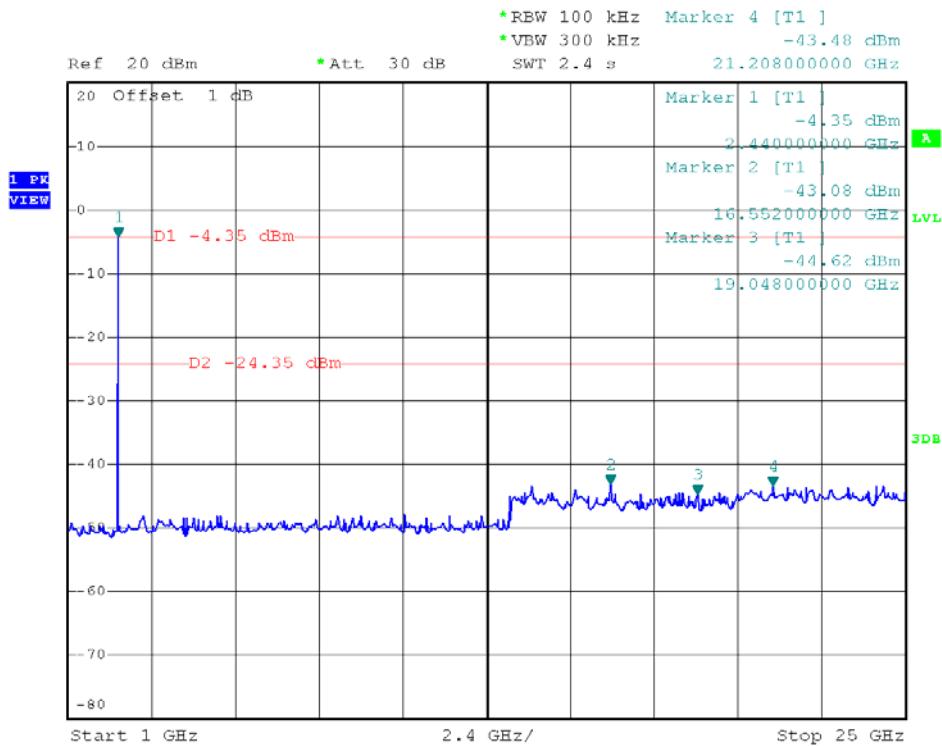
Low Channel 30MHz to 1GHz @ 8-DPSK



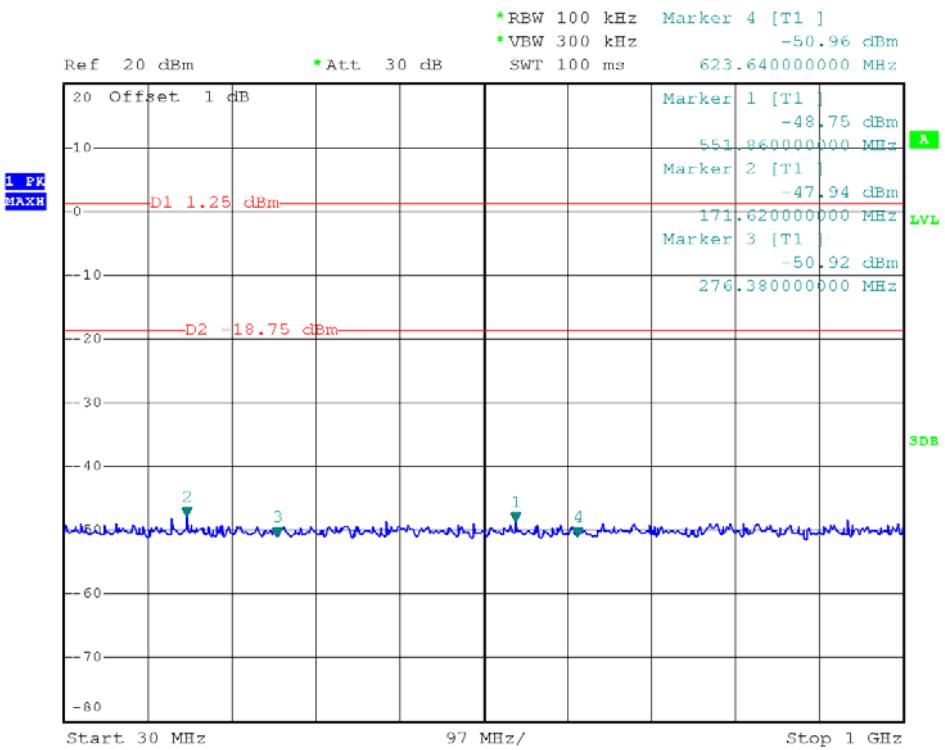
Low Channel 1GHz to 25GHz @ 8-DPSK



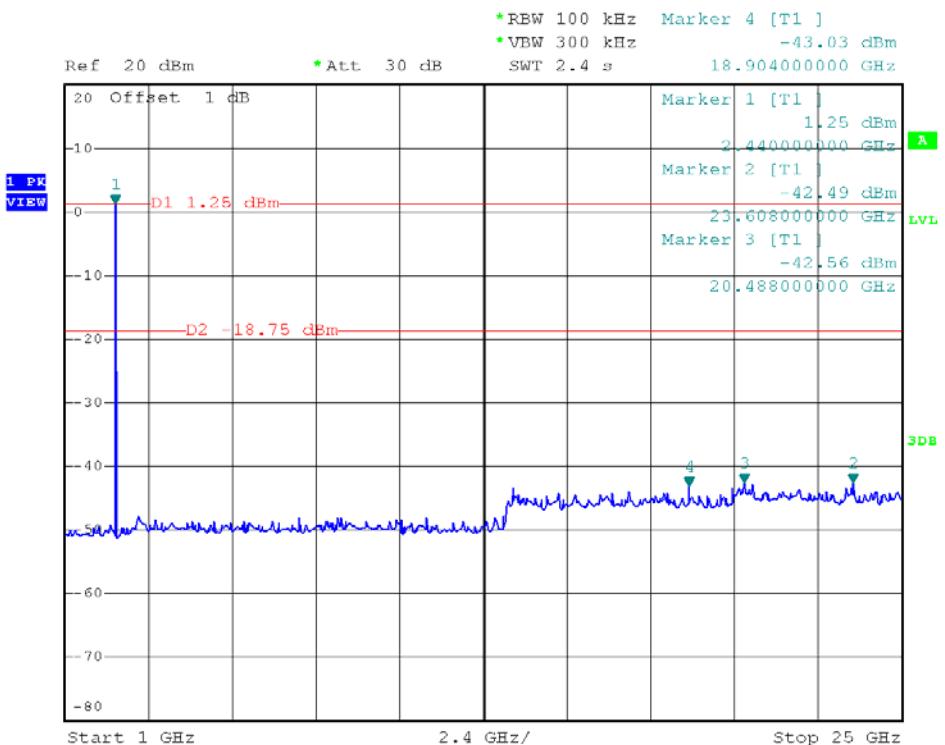
Mid Channel 30MHz to 1GHz @ 8-DPSK



Mid Channel 1GHz to 25GHz @ 8-DPSK



High Channel 30MHz to 1GHz @ 8-DPSK



High Channel 1GHz to 25GHz @ 8-DPSK

## 2.8. Conducted Band Edge

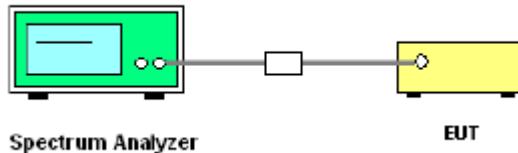
### 2.8.1. Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

### 2.8.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.8.3. Test Setup

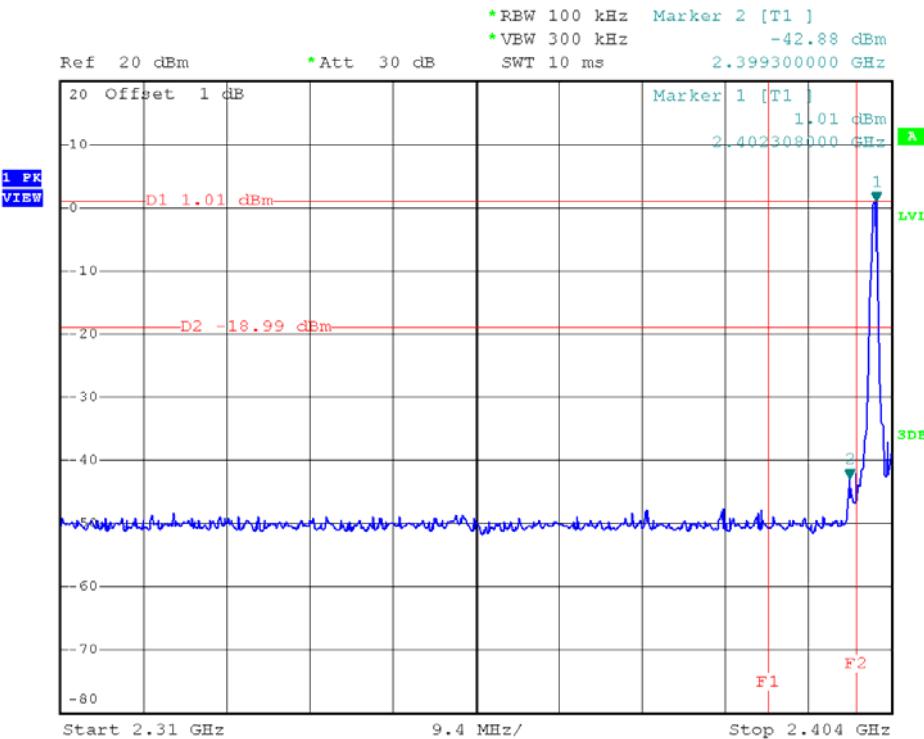


#### 2.8.1. Test Procedure

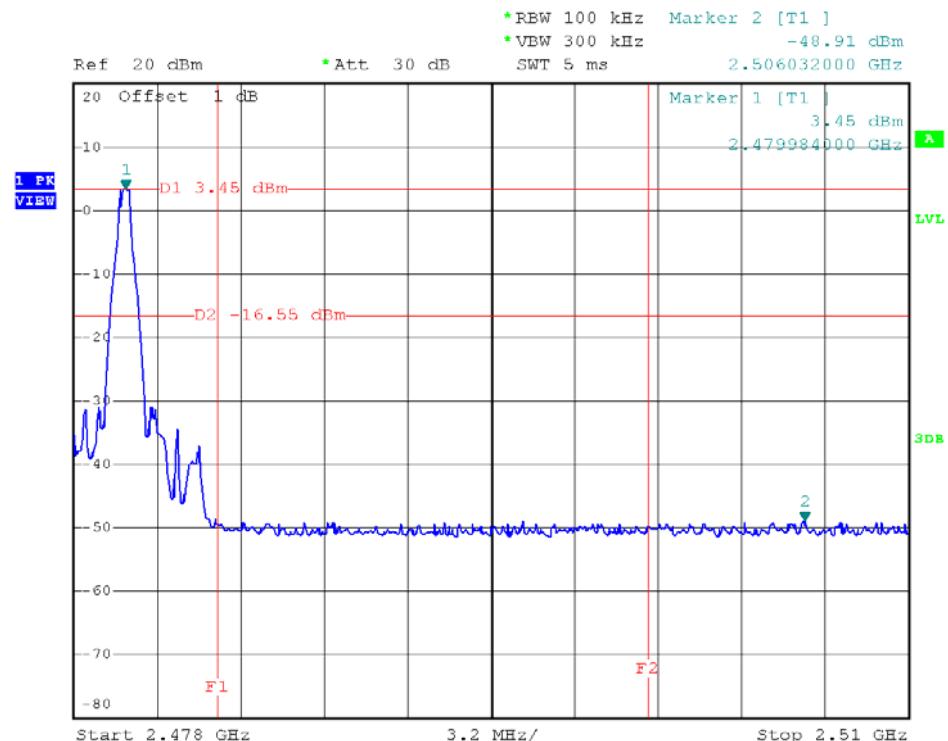
1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz ( $\geq 1\%$  span=10MHz), VBW = 300kHz ( $\geq$ RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

## 2.8.2. Test Results of Conducted Band Edge

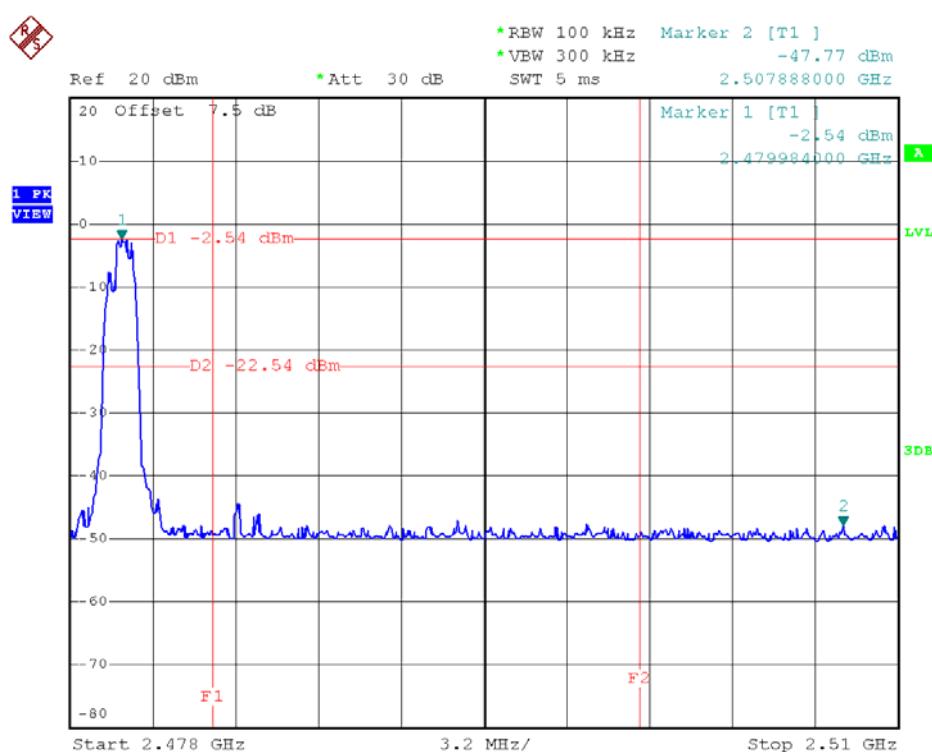
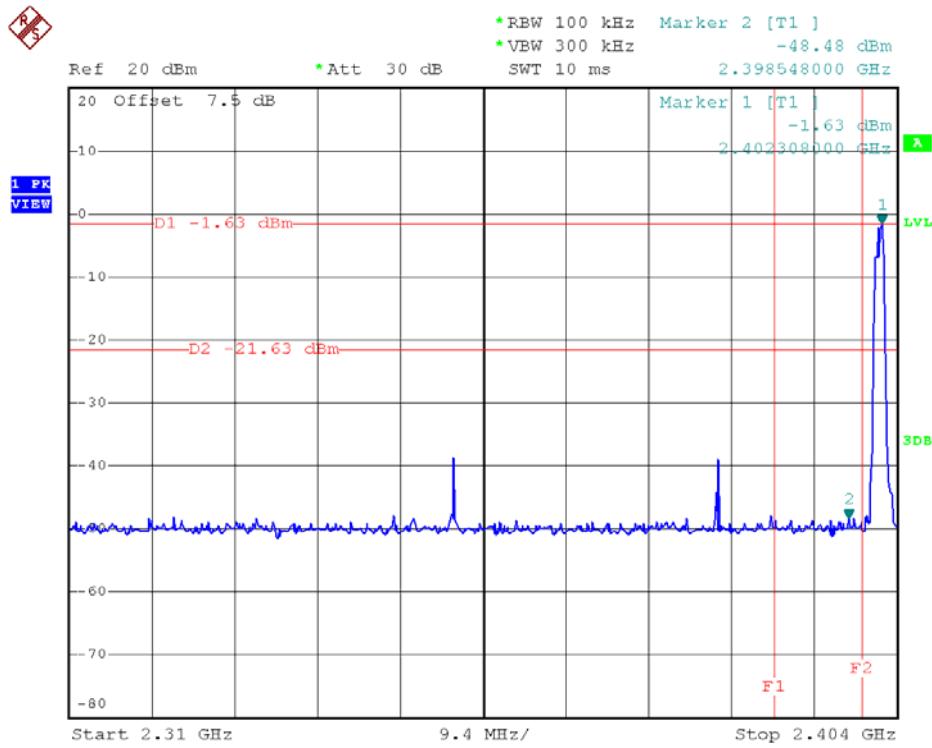
Band edge – Conducted (Un-hopping)

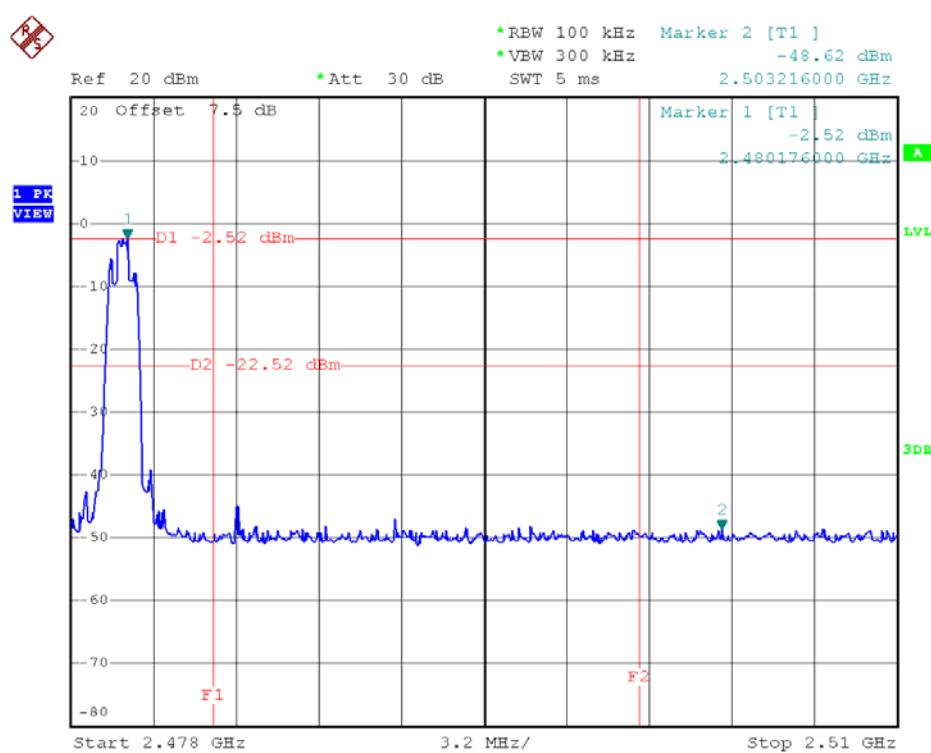
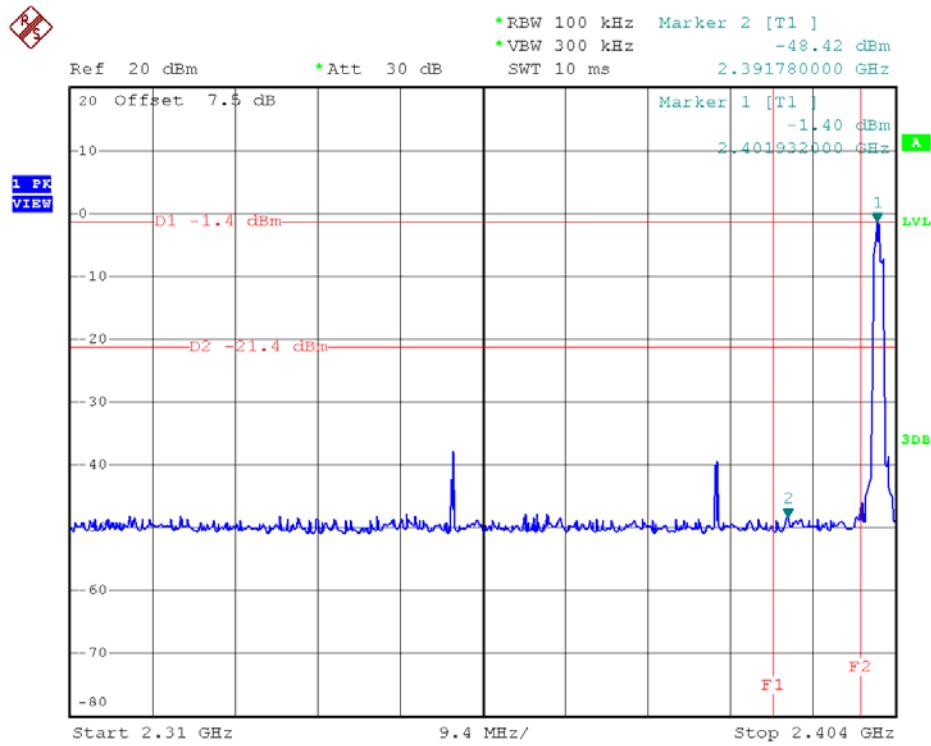


Low Band Edge Plot on channel 0 @ GFSK

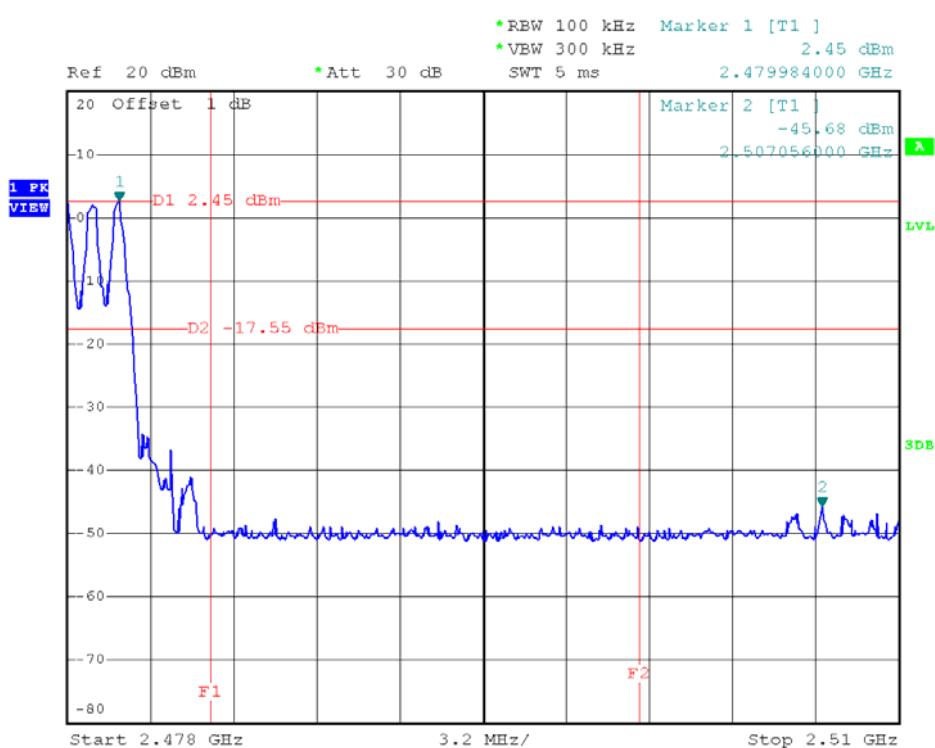
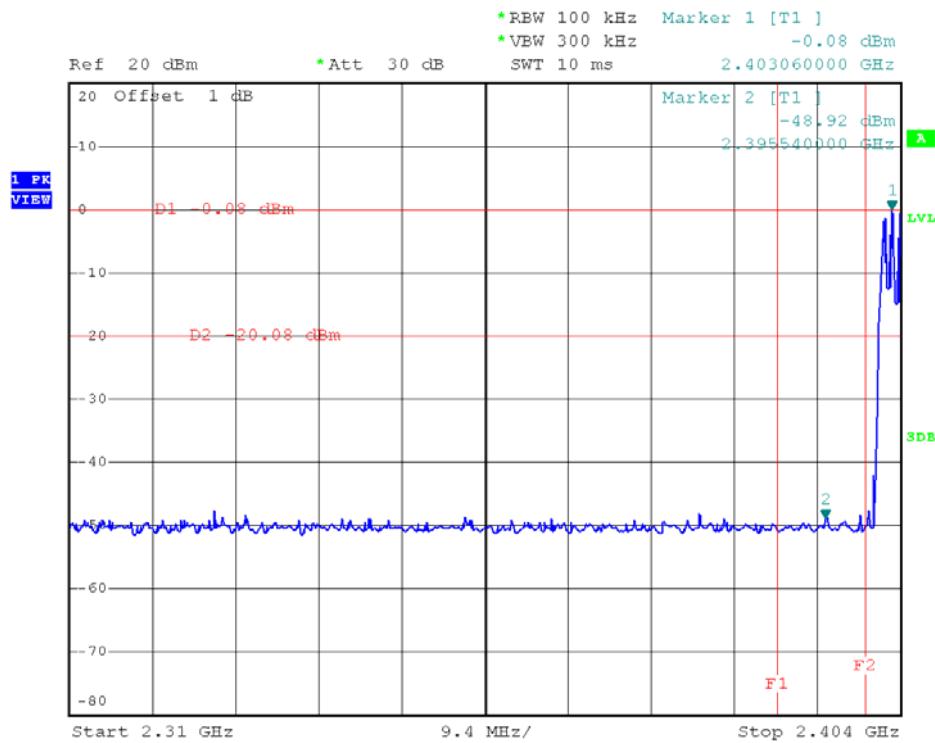


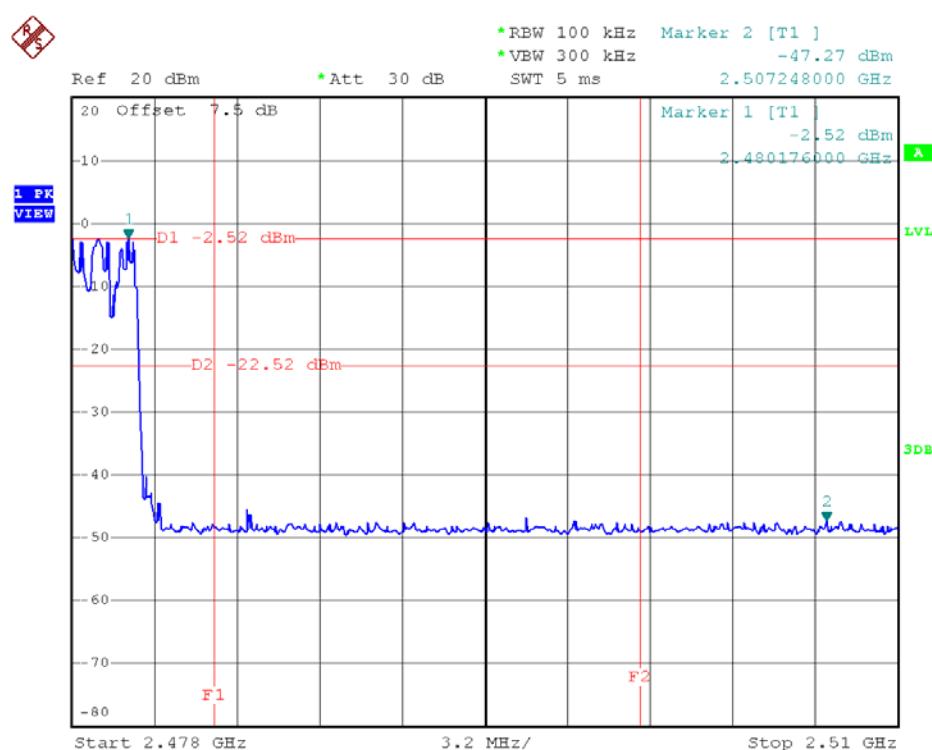
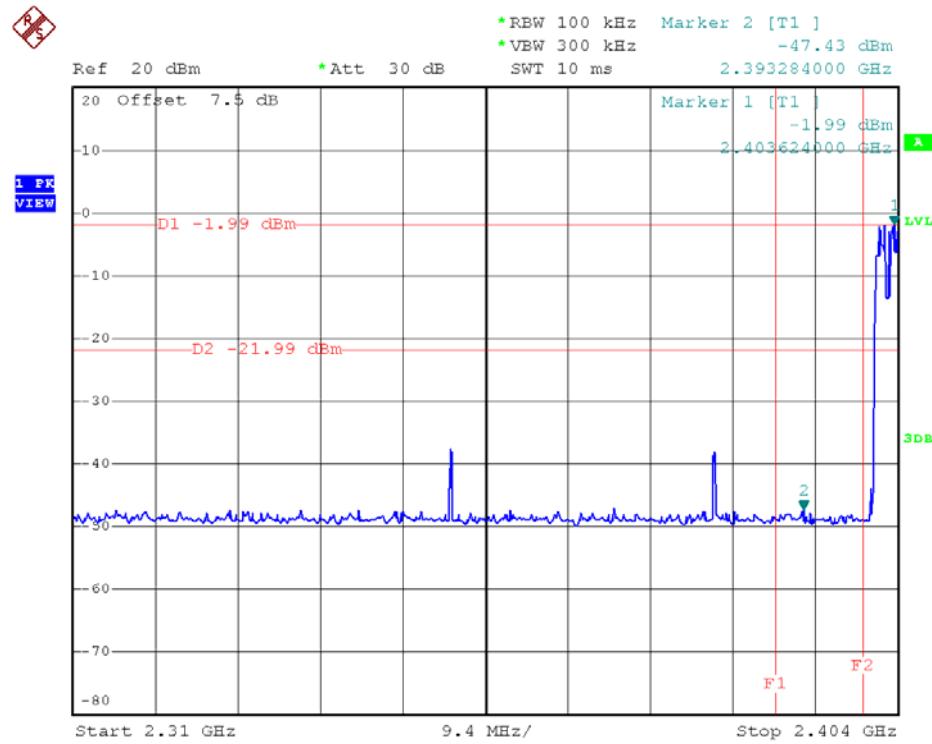
High Band Edge Plot on channel 78 @ GFSK

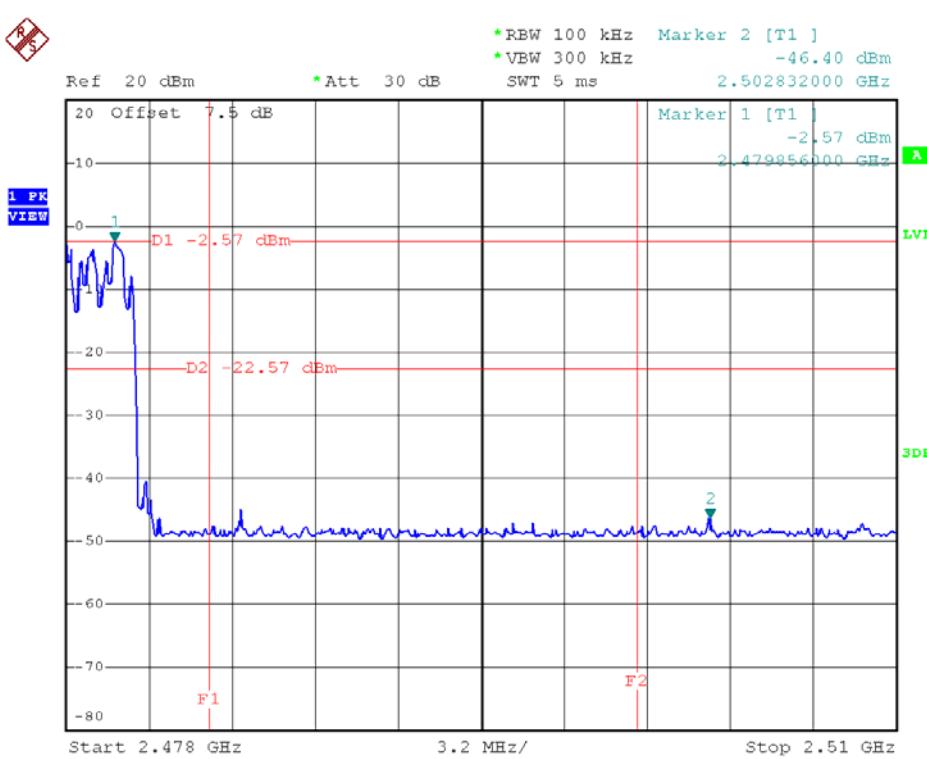
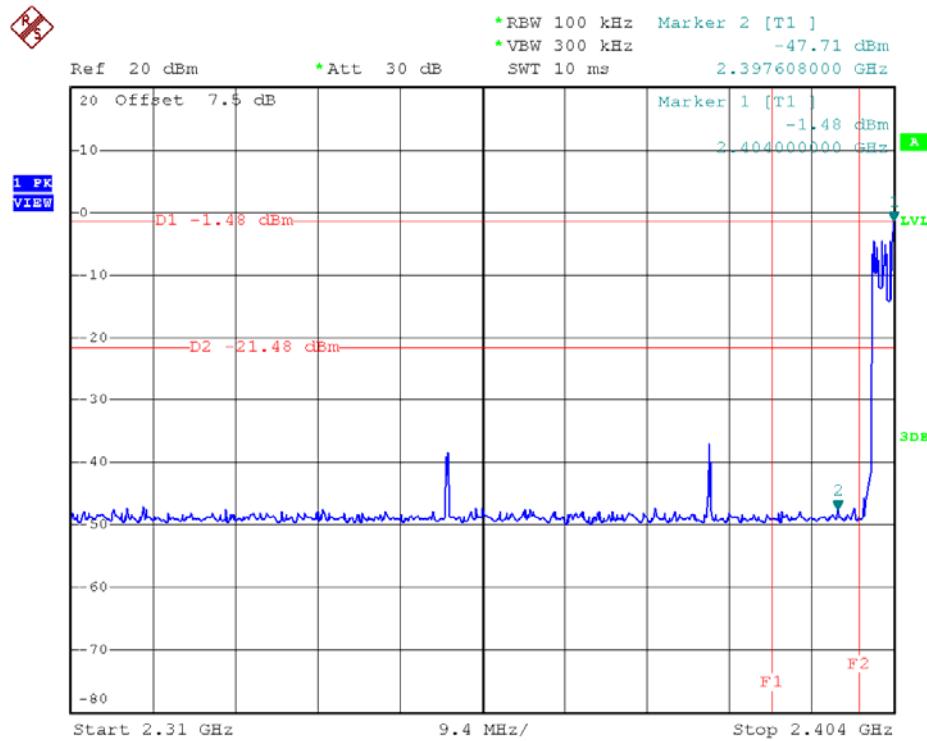




## Band edge - Conducted (hopping)







## 2.9. Conducted Emission

### 2.9.1. Limit of Conducted Emission

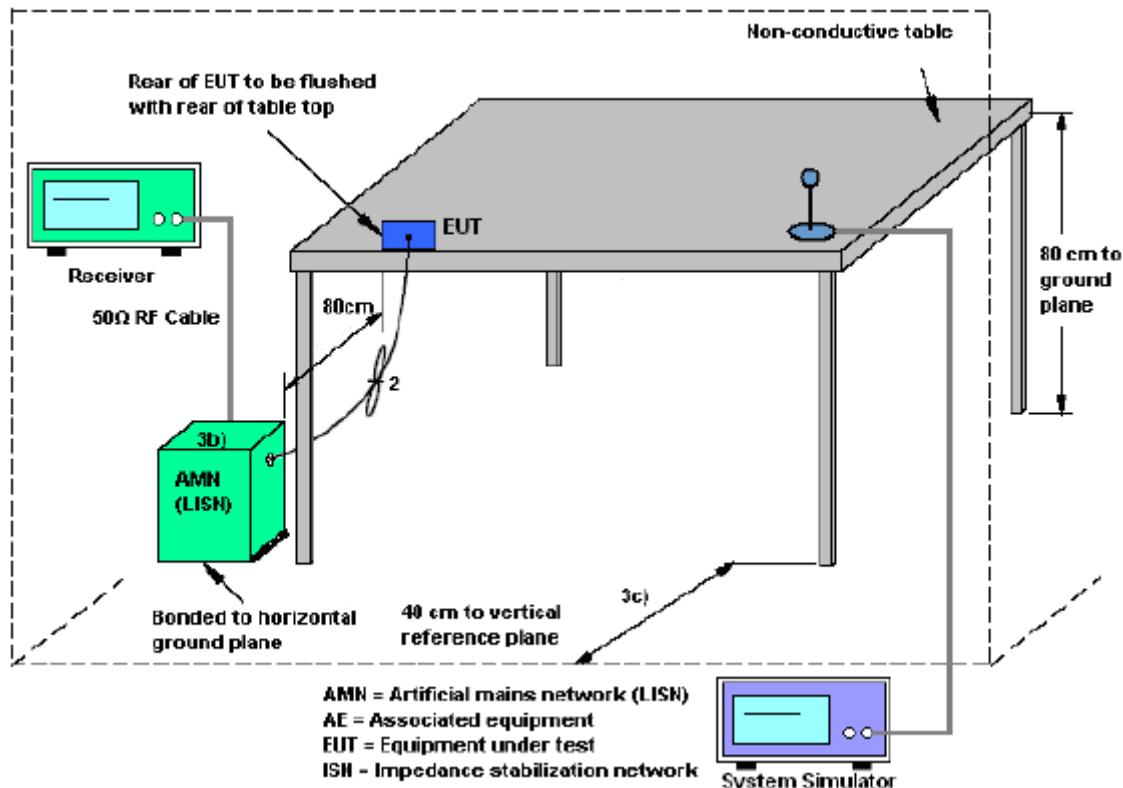
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

### 2.9.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.9.3. Test Setup



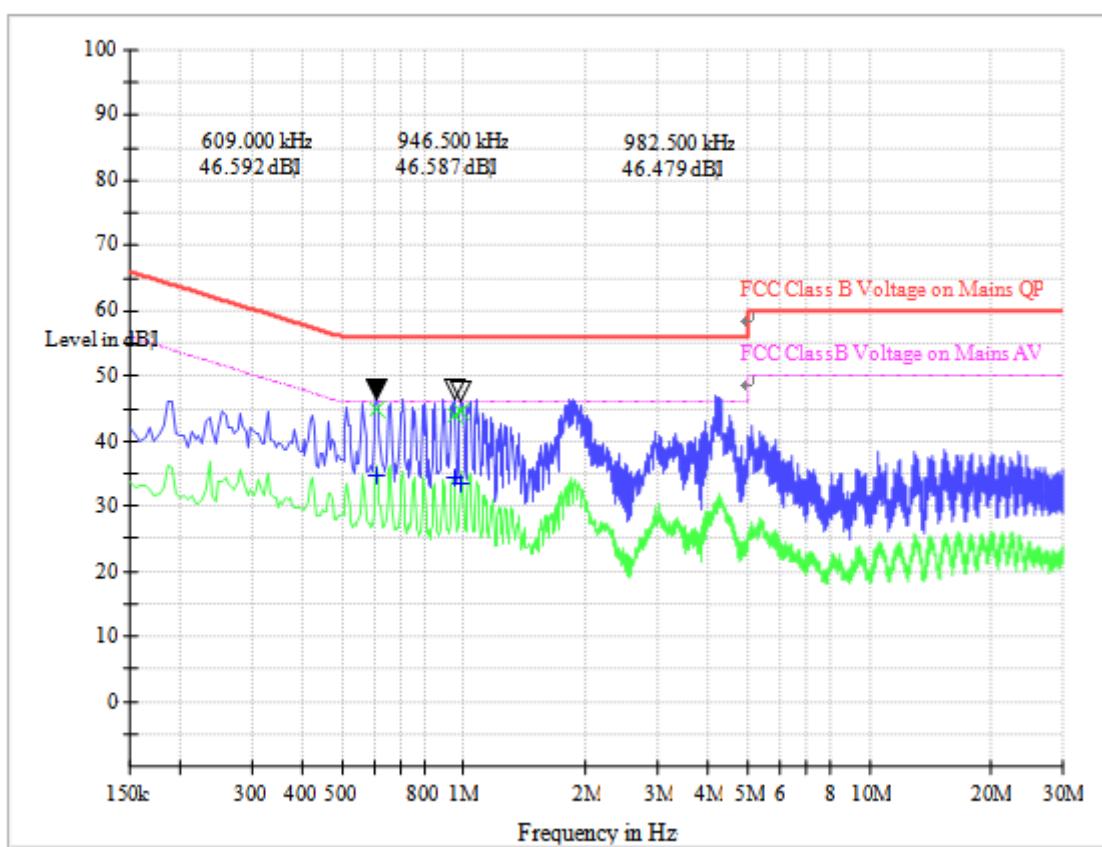
#### 2.9.4. Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 micrometry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

#### 2.9.3. Test Results of Conducted Emission

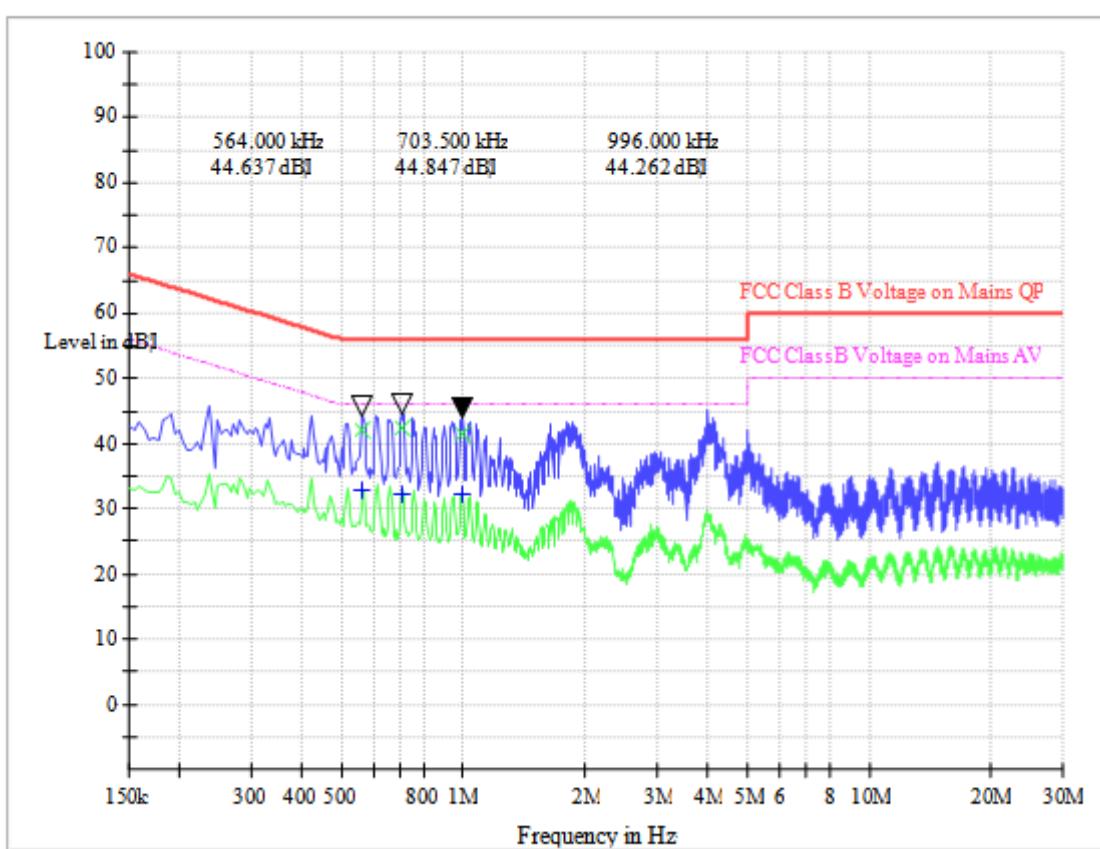
The EUT configuration of the emission tests is Bluetooth Link + USB Cable (Charging from Adapter).

**Adapter Model NO.: DG30**



(Plot A: L Phase)

Conducted Disturbance at Mains Terminals					
L Test Data					
QP			AV		
Frequency (MHz)	Limits (dB $\mu$ V)	Measurement Value (dB $\mu$ V)	Frequency (MHz)	Limits (dB $\mu$ V)	Measurement Value (dB $\mu$ V)
0.609000	56.0	46.59	0.609000	46.0	35.65
0.946500	56.0	46.59	0.946500	46.0	34.59
0.982500	56.0	46.48	0.982500	46.0	33.46



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals					
N Test Data					
QP			AV		
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)
0.564000	56.0	44.64	0.564000	46.0	33.70
0.703500	56.0	44.85	0.703500	46.0	33.30
0.996000	56.0	44.26	0.996000	46.0	33.35

Test Result: PASS

## 2.10. Radiated Band Edges and Spurious Emission

### 2.10.1. Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

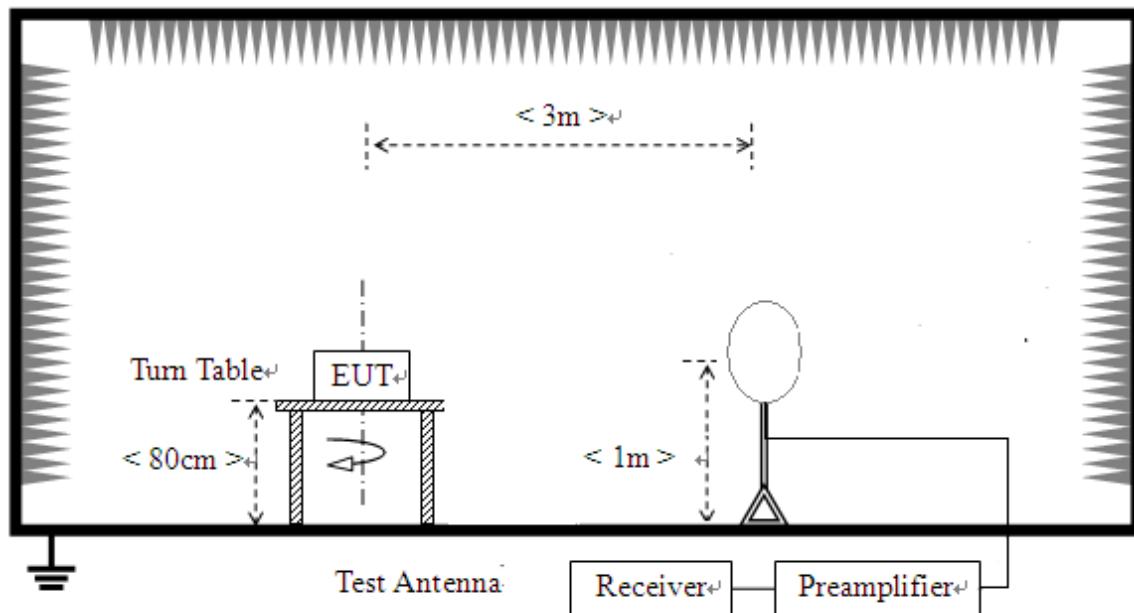
Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

### 2.10.2. Measuring Instruments

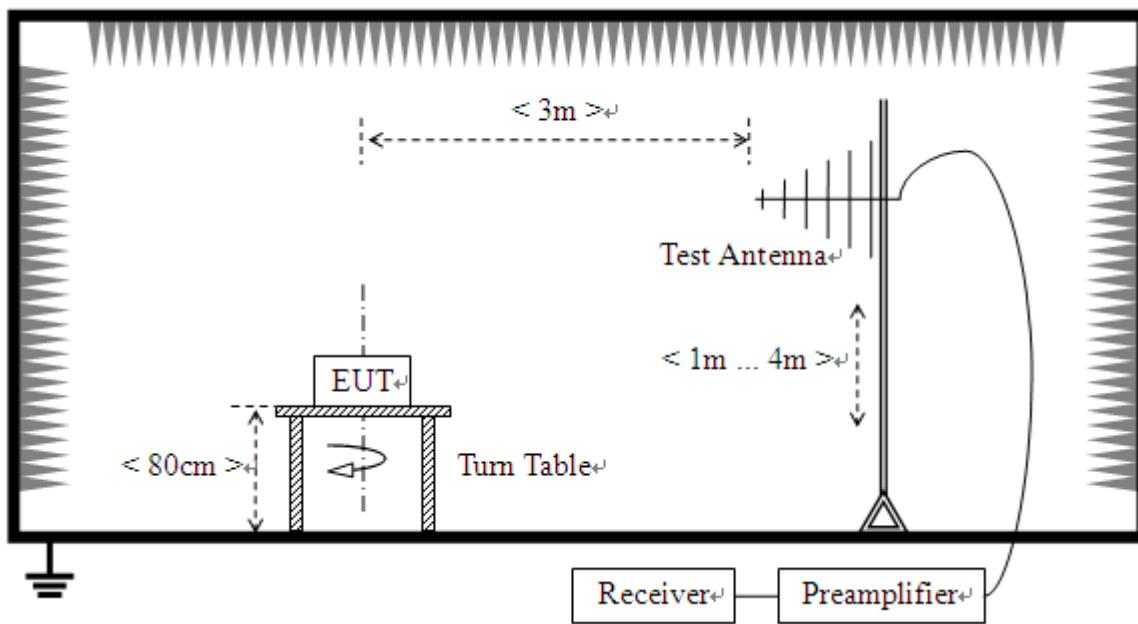
The measuring equipment is listed in the section 3 of this test report.

### 2.10.3. Test Setup

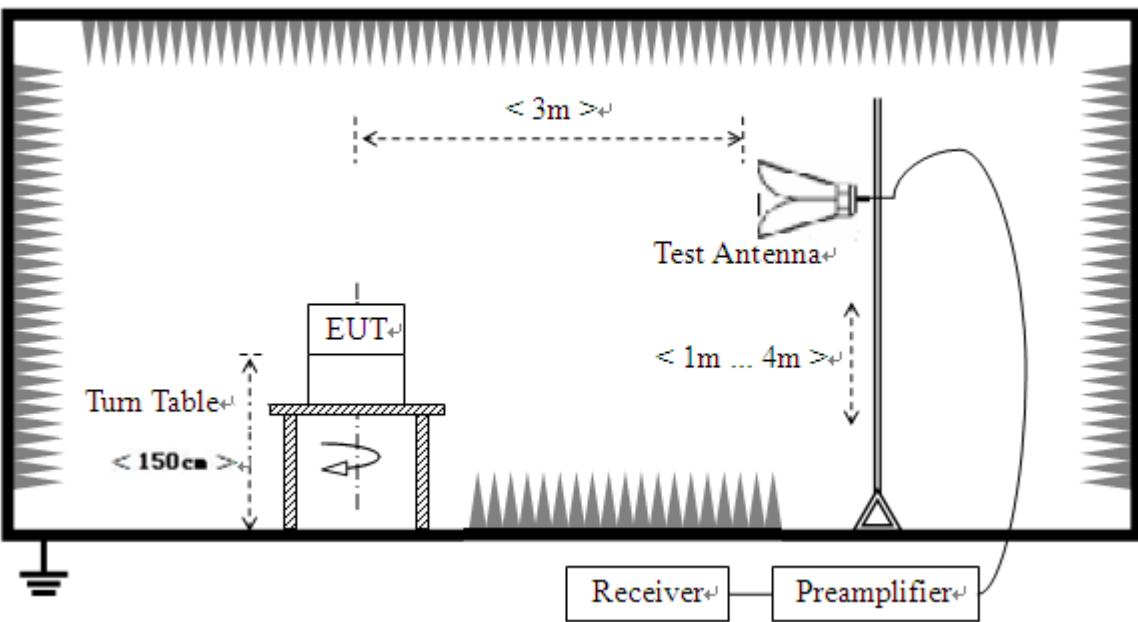
- 1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



#### 2.10.4. Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 meters semi-anechoic chamber.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz, RBW=1MHz for  $f > 1$  GHz ;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold for peak
  - (3) For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds

On time =  $N_1 \cdot L_1 + N_2 \cdot L_2 + \dots + N_{n-1} \cdot L_{n-1} + N_n \cdot L_n$

Where  $N_1$  is number of type 1 pulses,  $L_1$  is length of type 1 pulses, etc.

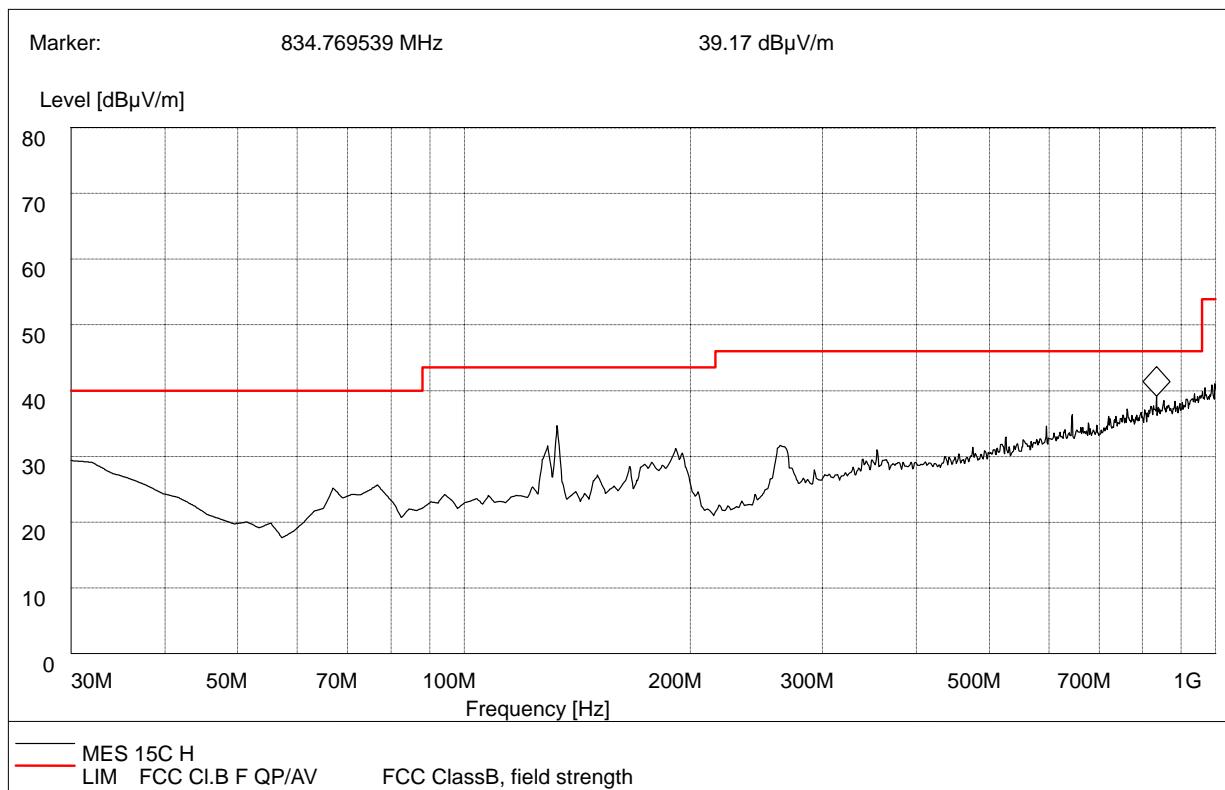
Average Emission Level = Peak Emission Level +  $20 \cdot \log_{10}$  (Duty cycle)
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

## 2.10.5. Test Results of Radiated Band Edge and Spurious Emission

### For 9KHz to 30MHz

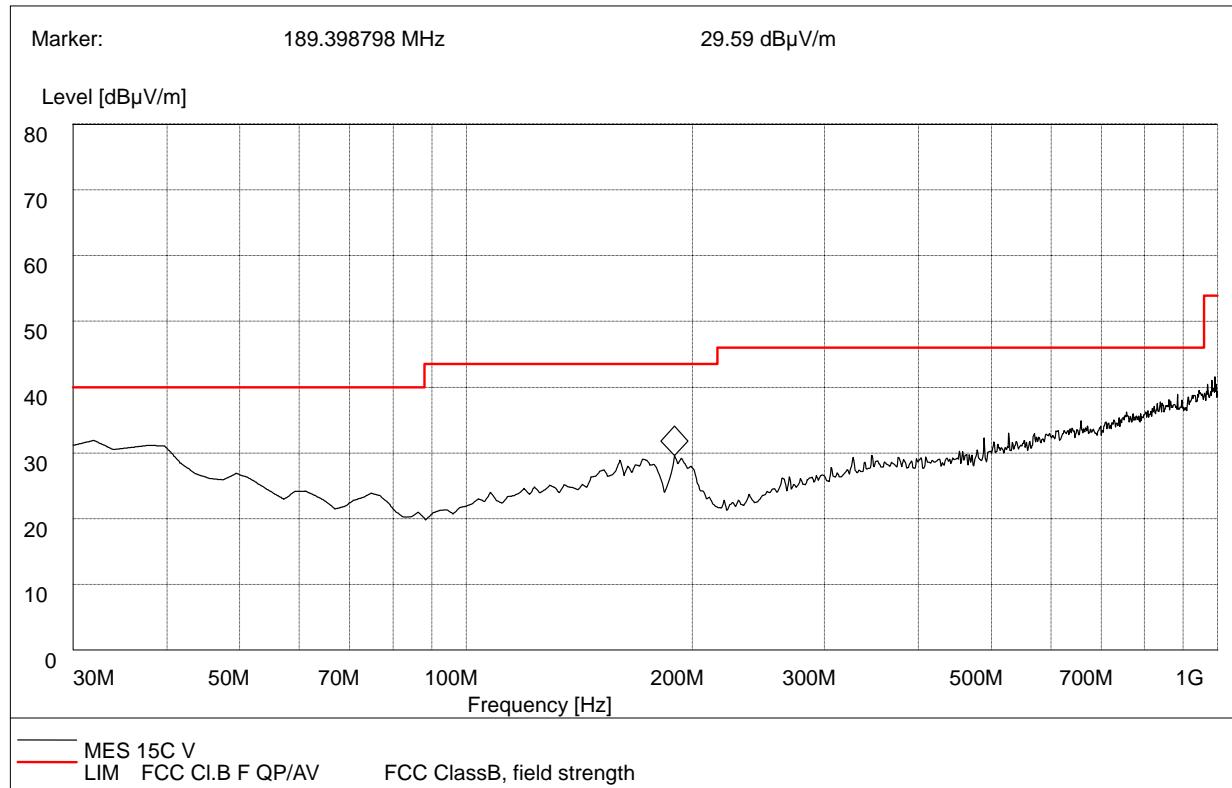
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

### For 30MHz to 1000MHz



Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Antenna	Verdict
133.7200	33.17	120.000	100.0	43.5	Horizontal	Pass
834.7695	39.17	120.000	100.0	46.0	Horizontal	Pass

(Plot A: 30MHz to 1GHz, Antenna Vertical)



Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Antenna	Verdict
32.4900	32.41	120.000	100.0	40.0	Vertical	Pass
189.1500	29.43	120.000	100.0	43.5	Vertical	Pass

(Plot B: 30MHz to 1GHz, Antenna Horizontal)

**For 1GHz to 25GHz**
**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (GFSK-2402MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	56.70	PK	74.0	-17.30	1.01 H	228	24.50	32.20
2	2390.00	43.50	AV	54.0	-10.50	1.01 H	228	11.30	32.20
3	*2402.00	106.60	PK	/	/	1.03 H	112	74.40	32.20
4	*2402.00	105.80	AV	/	/	1.03 H	112	73.60	32.20
5	4804.00	50.50	PK	74.00	-23.50	1.00 H	254	45.20	5.30
6	4804.00	42.80	AV	54.00	-11.20	1.00 H	254	37.50	5.30

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (GFSK-2402MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	56.90	PK	74.0	-17.10	1.11 V	228	24.70	32.20
2	2390.00	44.30	AV	54.0	-9.70	1.11 V	228	12.10	32.20
3	*2402.00	107.10	PK	/	/	1.09 V	112	74.90	32.20
4	*2402.00	107.60	AV	/	/	1.03 V	112	75.40	32.20
5	4804.00	51.40	PK	74.00	-22.60	1.21 V	254	46.10	5.30
6	4804.00	43.70	AV	54.00	-10.30	1.21 V	254	38.40	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (GFSK\_2441MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2441.00	107.80	PK	/	/	1.01 H	210	75.60	32.20
2	*2441.00	106.70	AV	/	/	1.01 H	210	74.50	32.20
3	4882.00	54.50	PK	74.00	-19.50	1.03 H	272	49.20	5.30
4	4882.00	43.6	AV	54.00	-10.40	1.03 H	272	38.30	5.30

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (GFSK\_2441MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2441.00	108.40	PK	/	/	1.09 V	112	76.20	32.20
2	*2441.00	106.10	AV	/	/	1.09 V	112	73.90	32.20
3	4884.00	55.50	PK	74.00	-18.50	1.21 V	254	50.20	5.30
4	4884.00	42.80	AV	54.00	-11.20	1.21 V	254	37.50	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (GFSK\_2480MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2480.00	108.00	PK	/	/	1.05 H	215	75.70	32.30
2	*2480.00	106.50	AV	/	/	1.05 H	215	74.20	32.30
3	2483.50	56.80	PK	74.0	-17.20	1.05 H	211	24.40	32.40
4	2483.50	45.20	AV	54.0	-8.80	1.05 H	211	12.80	32.40
5	4960.00	52.20	PK	74.0	-21.80	1.45 H	320	46.70	5.50
6	4960.00	45.10	AV	54.0	-8.90	1.45 H	320	39.60	5.50

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (GFSK\_2480MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2480.00	109.10	PK	/	/	1.05 V	174	76.80	32.30
2	*2480.00	107.80	AV	/	/	1.05 V	174	75.50	32.30
3	2483.50	56.30	PK	74.0	-17.70	1.05 V	177	23.90	32.40
4	2483.50	45.90	AV	54.0	-8.10	1.05 V	177	13.50	32.40
5	4960.00	53.70	PK	74.0	-20.30	1.45 V	201	48.20	5.50
6	4960.00	42.60	AV	54.0	-11.40	1.45 V	201	37.10	5.50

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M ( $\pi/4$ -DQPSK -2402MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	57.30	PK	74.0	-16.70	1.01 H	228	25.10	32.20
2	2390.00	43.70	AV	54.0	-10.30	1.01 H	228	11.40	32.20
3	*2402.00	107.70	PK	/	/	1.03 H	112	75.50	32.20
4	*2402.00	106.50	AV	/	/	1.03 H	112	74.30	32.20
5	4804.00	52.80	PK	74.00	-21.2	1.00 H	254	47.50	5.30
6	4804.00	44.30	AV	54.00	-9.70	1.00 H	254	39.00	5.30

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M ( $\pi/4$ -DQPSK -2402MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	56.70	PK	74.0	-17.30	1.11 V	228	24.50	32.20
2	2390.00	43.30	AV	54.0	-10.70	1.11 V	228	12.10	32.20
3	*2402.00	108.4	PK	/	/	1.09 V	112	76.20	32.20
4	*2402.00	107.3	AV	/	/	1.03 V	112	75.10	32.20
5	4804.00	54.10	PK	74.00	-19.90	1.21 V	254	48.80	5.30
6	4804.00	43.40	AV	54.00	-10.60	1.21 V	254	38.10	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M ( $\pi/4$ -DQPSK \_2441MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2441.00	108.60	PK	/	/	1.01 H	210	76.40	32.20
2	*2441.00	107.90	AV	/	/	1.01 H	210	75.70	32.20
3	4882.00	53.20	PK	74.00	-19.80	1.03 H	272	47.90	5.30
4	4882.00	40.80	AV	54.00	-13.20	1.03 H	272	35.50	5.30

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M ( $\pi/4$ -DQPSK \_2441MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2441.00	109.40	PK	/	/	1.09 V	112	77.20	32.20
2	*2441.00	107.30	AV	/	/	1.09 V	112	75.10	32.20
3	4884.00	53.60	PK	74.00	-20.40	1.21 V	254	48.30	5.30
4	4884.00	41.80	AV	54.00	-12.20	1.21 V	254	36.50	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M ( $\pi/4$ -DQPSK \_2480MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2480.00	108.40	PK	/	/	1.05 H	215	76.10	32.30
2	*2480.00	107.60	AV	/	/	1.05 H	215	75.30	32.30
3	2483.50	57.10	PK	74.0	-16.90	1.05 H	211	24.70	32.40
4	2483.50	43.20	AV	54.0	-10.80	1.05 H	211	10.80	32.40
5	4960.00	52.00	PK	74.0	-22.00	1.45 H	320	46.50	5.50
6	4960.00	44.30	AV	54.0	-9.70	1.45 H	320	38.80	5.50

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M ( $\pi/4$ -DQPSK \_2480MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2480.00	109.80	PK	/	/	1.05 V	174	77.50	32.30
2	*2480.00	106.40	AV	/	/	1.05 V	174	74.10	32.30
3	2483.50	55.80	PK	74.0	-18.20	1.05 V	177	23.40	32.40
4	2483.50	43.90	AV	54.0	-10.10	1.05 V	177	11.50	32.40
5	4960.00	53.80	PK	74.0	-20.20	1.45 V	201	48.30	5.50
6	4960.00	44.60	AV	54.0	-9.40	1.45 V	201	39.10	5.50

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (8-DPSK -2402MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	55.30	PK	74.0	-18.70	1.01 H	228	23.10	32.20
2	2390.00	44.60	AV	54.0	-9.40	1.01 H	228	12.40	32.20
3	*2402.00	109.70	PK	/	/	1.03 H	112	77.50	32.20
4	*2402.00	108.30	AV	/	/	1.03 H	112	76.10	32.20
5	4804.00	52.50	PK	74.00	-21.50	1.00 H	254	47.20	5.30
6	4804.00	45.40	AV	54.00	-8.60	1.00 H	254	40.10	5.30

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (8-DPSK -2402MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	56.40	PK	74.0	-17.60	1.11 V	228	24.20	32.20
2	2390.00	44.00	AV	54.0	-10.00	1.11 V	228	11.80	32.20
3	*2402.00	109.10	PK	/	/	1.09 V	112	76.90	32.20
4	*2402.00	109.60	AV	/	/	1.03 V	112	77.40	32.20
5	4804.00	53.40	PK	74.00	-20.60	1.21 V	254	48.10	5.30
6	4804.00	44.70	AV	54.00	-9.30	1.21 V	254	39.40	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (8-DPSK\_2441MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2441.00	107.60	PK	/	/	1.01 H	210	75.40	32.20
2	*2441.00	106.70	AV	/	/	1.01 H	210	74.50	32.20
3	4882.00	53.40	PK	74.00	-20.60	1.03 H	272	48.10	5.30
4	4882.00	45.10	AV	54.00	-8.90	1.03 H	272	39.80	5.30

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (8-DQPSK\_2441MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2441.00	108.30	PK	/	/	1.09 V	112	76.10	32.20
2	*2441.00	106.10	AV	/	/	1.09 V	112	73.90	32.20
3	4884.00	54.80	PK	74.00	-17.2	1.21 V	254	49.50	5.30
4	4884.00	43.90	AV	54.00	-10.5	1.21 V	254	38.60	5.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (8-DPSK\_2480MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2480.00	110.20	PK	/	/	1.05 H	215	77.90	32.30
2	*2480.00	107.80	AV	/	/	1.05 H	215	75.50	32.30
3	2483.50	57.60	PK	74.0	-16.40	1.05 H	211	25.20	32.40
4	2483.50	44.70	AV	54.0	-9.30	1.05 H	211	12.30	32.40
5	4960.00	54.60	PK	74.0	-19.40	1.45 H	320	49.10	5.50
6	4960.00	41.70	AV	54.0	-12.30	1.45 H	320	36.20	5.50

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (8-DPSK\_2480MHz)**

No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	*2480.00	109.10	PK	/	/	1.05 V	174	76.80	32.30
2	*2480.00	109.70	AV	/	/	1.05 V	174	77.40	32.30
3	2483.50	57.20	PK	74.0	-16.80	1.05 V	177	24.80	32.40
4	2483.50	43.90	AV	54.0	-10.10	1.05 V	177	11.50	32.40
5	4960.00	54.90	PK	74.0	-19.10	1.45 V	201	49.40	5.50
6	4960.00	42.80	AV	54.0	-11.20	1.45 V	201	37.30	5.50

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
  - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " \* ": Fundamental frequency.

### 3. List of measuring equipment

Description	Manufacturer	Model	Serial No.	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESIB26	A0304218	2015.06.02	2016.06.01	Radiation
Full-Anechoic Chamber	Albatross	12.8m*6.8m* 6.4m	A0412372	2015.06.02	2016.06.01	Radiation
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2015.06.02	2016.06.01	Radiation
Bilog Antenna	Schwarzbeck	VULB 9163	9163-274	2015.06.02	2016.06.01	Radiation
Double ridge horn antenna	R&S	HF906	100150	2015.06.02	2016.06.01	Radiation
Ultra-wideband antenna	R&S	HL562	100089	2015.06.02	2016.06.01	Radiation
Test Antenna – Horn (18-26.5GHz)	ETS	3160-09	A0902607	2015.06.02	2016.06.01	Radiation
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.02	2016.06.01	Radiation
Amplifier 1G~18GHz	R&S	MITEQ AFS42-00101 800	25-S-42	2015.06.02	2016.06.01	Radiation
Amplifier 18G~40GHz	R&S	JS42-180026 00-28-5A	12111.0980.00	2015.06.02	2016.06.01	Radiation
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2015.07.07	2016.07.06	Conducted
Power Meter	R&S	NRVS	1020.1809.02	2015.06.02	2016.06.01	Conducted
Power Sensor	R&S	NRV-Z4	823.3618.03	2015.06.02	2016.06.01	Conducted
LISN	ROHDE&SC HWARZ	ESH2-Z5	A0304221	2015.06.02	2016.06.01	Conducted
Test Receiver	R&S	ESCS30	A0304260	2015.06.02	2016.06.01	Conducted
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.01	Radiation
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.02	2016.06.01	Radiation

\*\* END OF REPORT \*\*