

FCC BT TEST REPORT

No. 150701-BT

For

Bullitt Group

Product Name: Smartphone

Model Name: SP4

Trade Name: Kodak

Issued Date: 2015-08-04

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 GCCT.

To verify test report authenticity, send full test report to Email: dr_xywen@126.com

Test Laboratory:

GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center
Technology Road, High-tech Zone, He Yuan, Guang Dong, PR China 517001

Tel: +86(0)762-3607221, Fax: +86(0)762-3603336 Email: ncctmail@126.com. www.ncct.org.cn

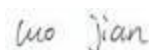
CONTENTS

1. Test Laboratory.....	4
1.1 Testing Location.....	4
1.2 Testing Environment.....	4
1.3 Project Data.....	4
2. Client Information	4
2.1 Applicant Information.....	4
2.2 Manufacturer Information.....	4
3. Equipment Under Test (EUT) and Ancillary Equipment (AE).....	5
3.1 About EUT.....	5
3.2 Internal Identification of EUT.....	6
3.3 Internal Identification of AE	6
4. Test Results	7
4.1 Summary of Test Results	7
4.2 Statements	7
5. Test Equipment Utilized	8
ANNEX A: EUT Photograph.....	9
ANNEX B: Detailed Test Results.....	19
B.1 Maximum Transmit Power.....	19
B.2 20dB Bandwidth.....	20
B.3 Band Edge Compliance	27
B.4 Carrier Frequency Separation.....	36
B.5 Time Of Occupancy (Dwell Time).....	39
B.6 Number of Channel Hopping	46
B.7 Conducted Spurious Emissions	50
B.8 AC Conducted Emission	66
B.9 Radiated Emission.....	72
B.10 Antenna Requirements	78
ANNEX C: Report Revision History.....	80

GENERAL SUMMARY

Product Name	Smartphone
Model Name	SP4
Trade Name	Kodak
Applicant	Bullitt Group
Manufacturer	CK Telecom Limited
Test Laboratory	GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center
Reference Standards	FCC CFR 47 Part 15C: "Radio Frequency Devices Sub-Part C: intentional Radiators" ANSI C63.10-2013, "American National Standard for Testing Unlicensed Wireless Devices" FCC Public Notice DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems"
Test Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in annex B of this test report are below limits specified in the relevant standards. General Judgment: Pass Date of issue: 2015.08.04
Comment	The test results in this report apply only to the tested sample of the stated device/equipment.

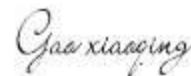
Approved by:

Luo Jian
Manager

Reviewed by:

Wen Xiaoyong
Deputy Manager

Tested by:

Gao Xiaoqing
Test Engineer

1. Test Laboratory

1.1 Testing Location

Company Name	GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center
Address	Technology Road, High-tech Zone, Heyuan, Guangdong Province, P.R.China
CNAS Registration No.	L4992
FCC Registration No.	303878
Postal Code	517001
Telephone	+86-762-3607221
Fax	+86-762-3603336

1.2 Testing Environment

Environment Data	Temperature(°C)	Humidity(%)
Maximum Ambient	25.8	54
Minimum Ambient	18.5	49

EUT is under testing environment.

1.3 Project Data

Project Leader	Wen Xiaoyong
Testing Start Date	2015-07-06
Testing End Date	2015-08-04

2. Client Information

2.1 Applicant Information

Company Name	Bullitt Group
Address	4 The Aquarium, 1-7 King Street, Reading, RG1 2AN, UK
City	/
Postal Code	/
Country	UK

2.2 Manufacturer Information

Company Name	CK Telecom Limited
Address	Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.

City	Heyuan
Postal Code	/
Country	China

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

3.1 About EUT

Model Name	SP4
FCC ID	ZL5SP4
Tx Frequency	GSM850:824~848 MHz UMTS Band V : 826~846MHz PCS1900 : 1850~1909MHz UMTS Band II : 1852~1907MHz Bluetooth/BLE: 2402 ~ 2480 MHz WIFI(802.11b/g/n-20): 2412 ~ 2462 MHz WIFI(n-40): 2422 ~ 2452 MHz
Rx Frequency	GSM850: 869~893 MHz UMTS Band V : 871~891 MHz PCS1900 : 1930~1989 MHz UMTS Band II : 1932~1987 MHz Bluetooth/BLE: 2402 ~ 2480 MHz WIFI(802.11b/g/n-20): 2412 ~ 2462 MHz WIFI(n-40): 2422 ~ 2452 MHz
Number of Channels	GSM850&WCDMA Band V:25 PCS1900&WCDMA Band II: 60 Bluetooth:79 WIFI(802.11b/g/n-20):11 WIFI(n-40):7 BLE:40
Modulation	GSM&DCS:GMSK WCDMA:BPSK/QPSK Bluetooth: GFSK& $\pi/4$ -DQPSK&8DPSK WIFI:CCK/OFDM BLE:GFSK
Antenna Type	PIFA(GSM/DCS/WCDMA); MONOPOLE (Bluetooth/WIFI)
Antenna Gain	GSM850:-0.5dBi DCS1900: -0.5dBi WCDMA850: -1dBi WCDMA1900: -1dBi Bluetooth/BLE/WIFI: -1dBi
Normal Voltage	3.8V
Extreme Low Voltage	3.6V

Extreme High Voltage	4.2V
Extreme Low Temperature	0°C
Extreme High Temperature	40°C

3.2 Internal Identification of EUT

EUT ID *	IMEI	HW Version	SW Version
150701-M01	356092022307067 356092022307075	SLFQPLUS-V1.0	SLFQPLUS14A-S00A_CKT_L2EN_101_150130
150701-M03	356092022307083 356092022307091	SLFQPLUS-V1.0	SLFQPLUS14A-S00A_CKT_L2EN_101_150130

*EUT ID: is used to identify the test sample in the lab internally. 150701-M01 and 150701-M03 are the same mobile phone.

3.3 Internal Identification of AE

AE ID *	Description	Type	SN
150701-B01	Battery	HD395759AR	/
150701-C01	Adapter	A8-510100	/
150701-B03	Battery	HD395759AR	/
150701-C04	Adapter	A8-510100	/

*AE ID: is used to identify the test sample in the lab internally. 150701-B01 and 150701-B03 are the same accessory , 150701-C01 and 150701-C03 are the same accessory.

4. Test Results

4.1 Summary of Test Results

No	Test cases	Sample	Verdict
1	Maximum transmit power	M01	Pass
2	20dB Bandwidth	M01	Pass
3	Band Edge Compliance	M01	Pass
4	Carrier Frequency Separation	M01	Pass
5	Time Of Occupancy (Dwell Time)	M01	Pass
6	Number Of Channel Hopping	M01	Pass
7	Conducted Spurious Emissions	M01	Pass
8	AC Conducted Emission	M03	Pass
9	Radiated Emissions	M03	Pass
10	Antenna Requirements	M01	Pass

Note: please refer to Annex B in this test report for the detailed test results.

4.2 Statements

GCCT has evaluated the test cases requested by the applicant/manufacture as listed in section 4.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in general summary.

5. Test Equipment Utilized

Table 1. Measurement Equipment

Hardware						
No.	Name	Model	SN	Manufacture	Cal. Date	Cal. Due Date
1	Signal Tester	MT8852B	1307002	Anritsu	2014.08.15	2015.08.15
2	Spectrum Analyzer	N9020A	MY52091261	Agilent	2014.08.15	2015.08.15
3	Switch Unit	/	E0112	/	2014.08.15	2015.08.15
Software						
Tech BT			v1.0.3			

Table 2. Radiated emission test system

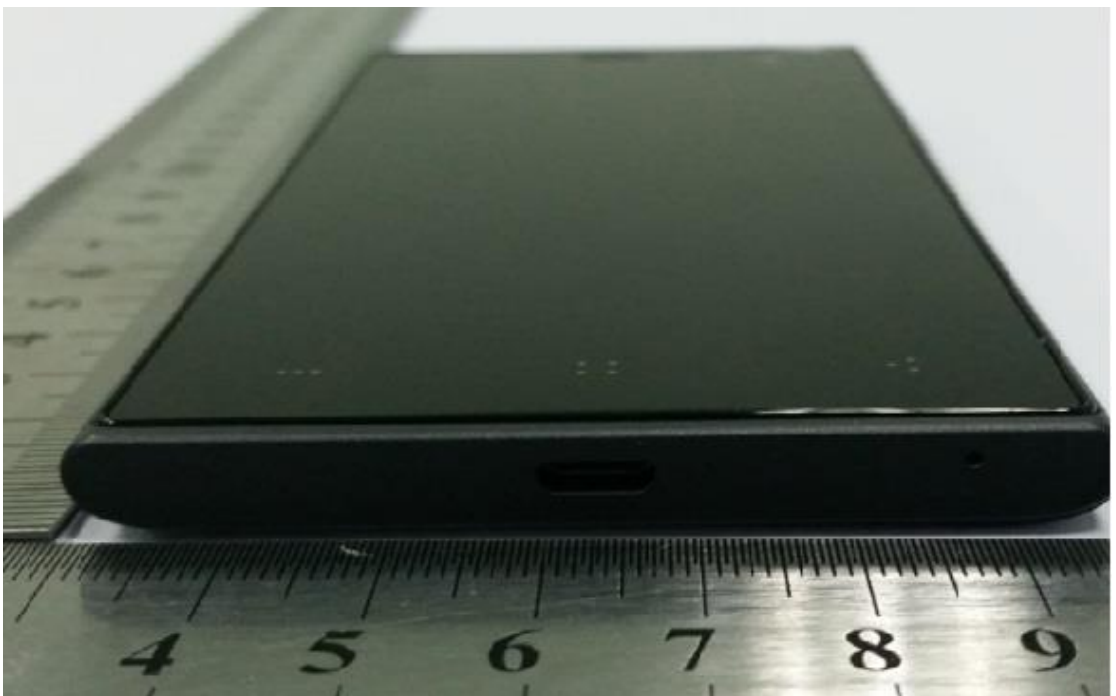
No.	Name	Model	SN	Manufacture	Cal. date	Cal. Due Date
1	Spectrum Analyzer	E4440A	MY48250641	Agilent	2014.08.15	2015.08.15
2	BiCoNilog Antenna	3142E	00142015	ETS-Lindgren	2013-10-25	2015-10-25
3	Horn Antenna	3117	129169	ETS-Lindgren	2013-10-25	2015-10-25
4	Signal Generator	N5183A-532	MY49060563	Agilent	2014.08.15	2015.08.15
5	Universal Radio Communication Tester	E5515C	MY48367105	Agilent	2014.08.15	2015.08.15
6	RF Preselector	N9039A	MY48260024	Agilent	/	/
7	Loop Antenna	HFH2	860015/00	R&S	2014.08.15	2015.08.15

ANNEX A: EUT Photograph

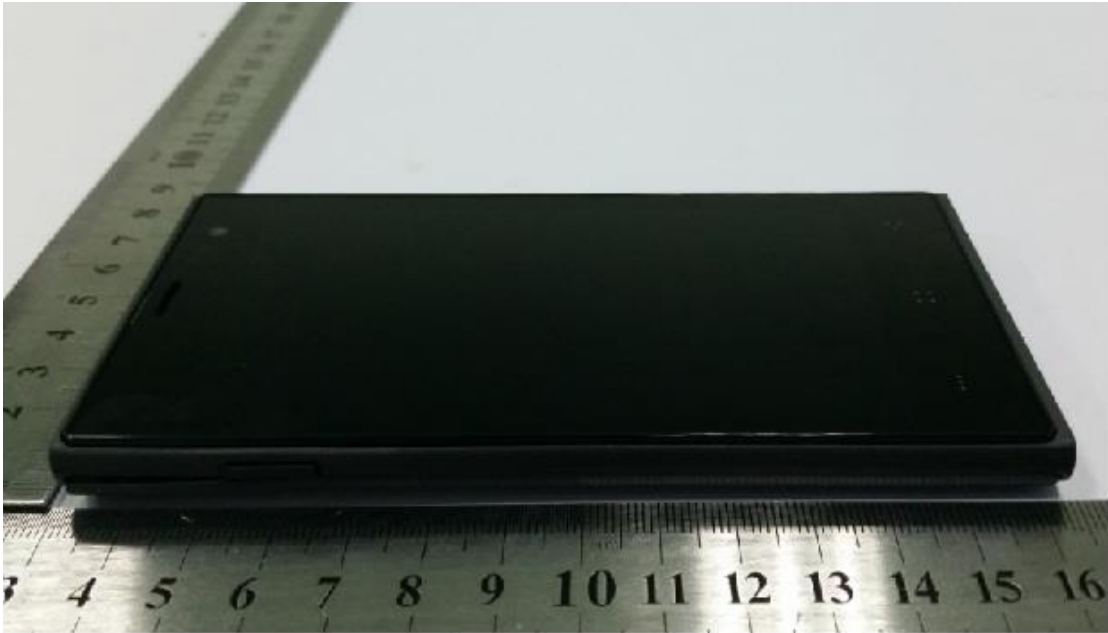
EUT -Top View



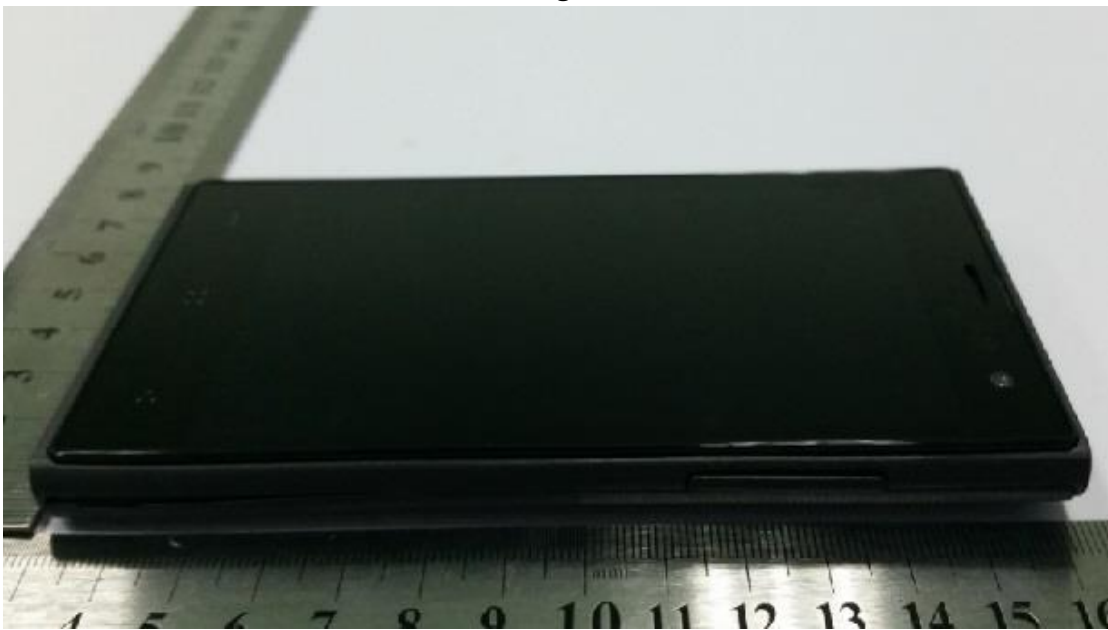
EUT- Bottom View



EUT -Left View



EUT -Right View



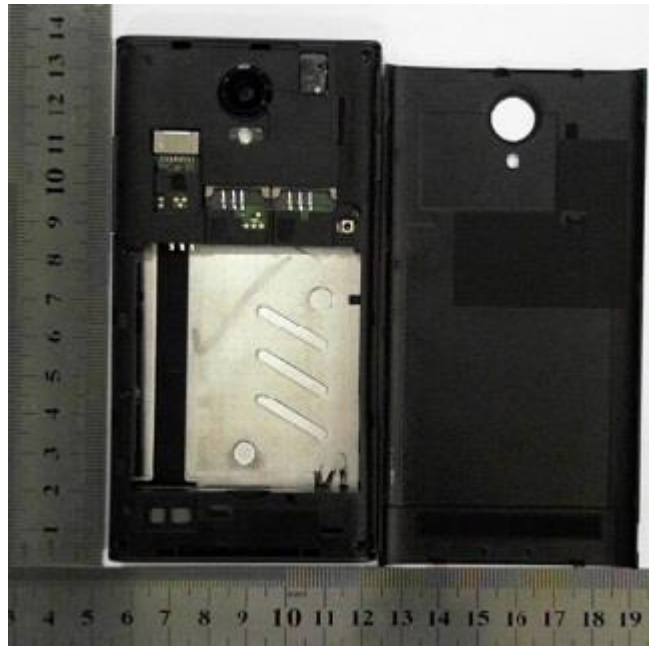
EUT- Front View



EUT -Rear View



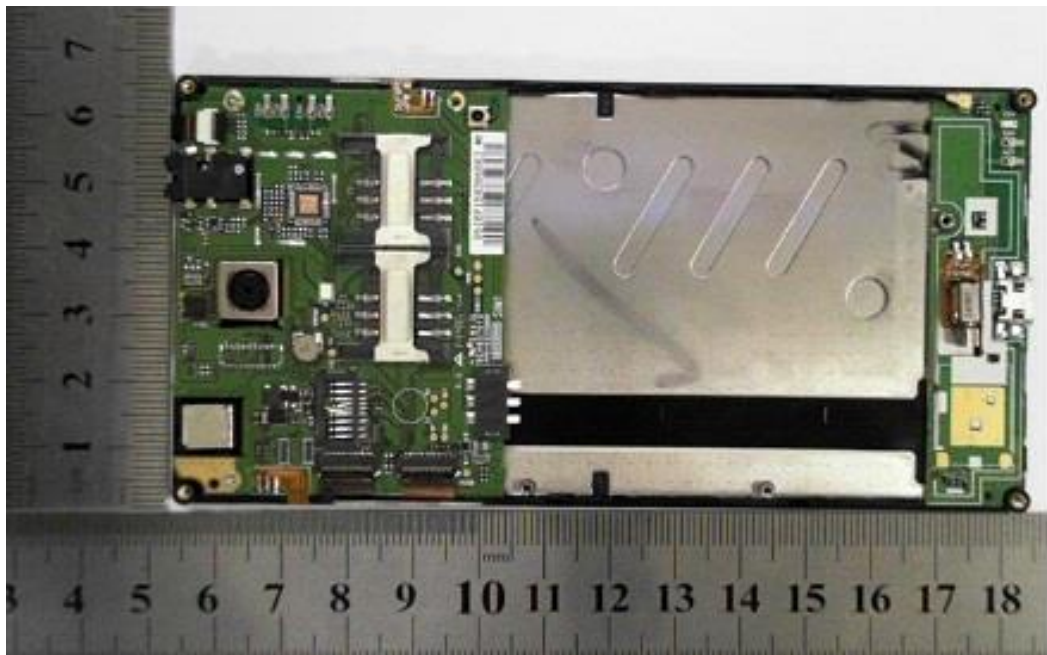
Cover off-Top view



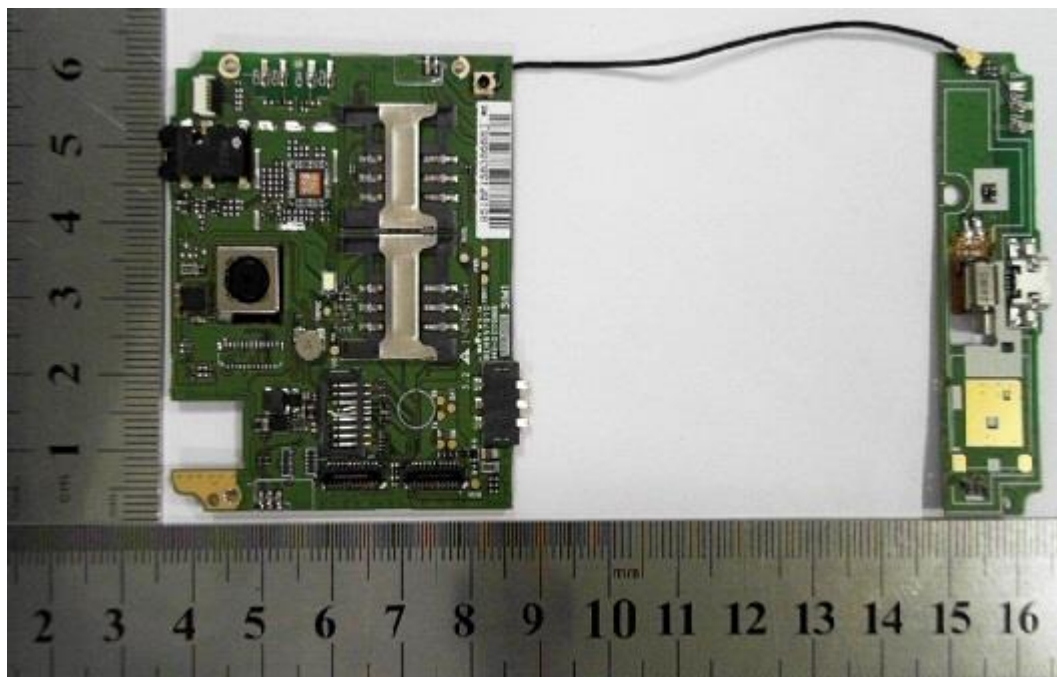
All



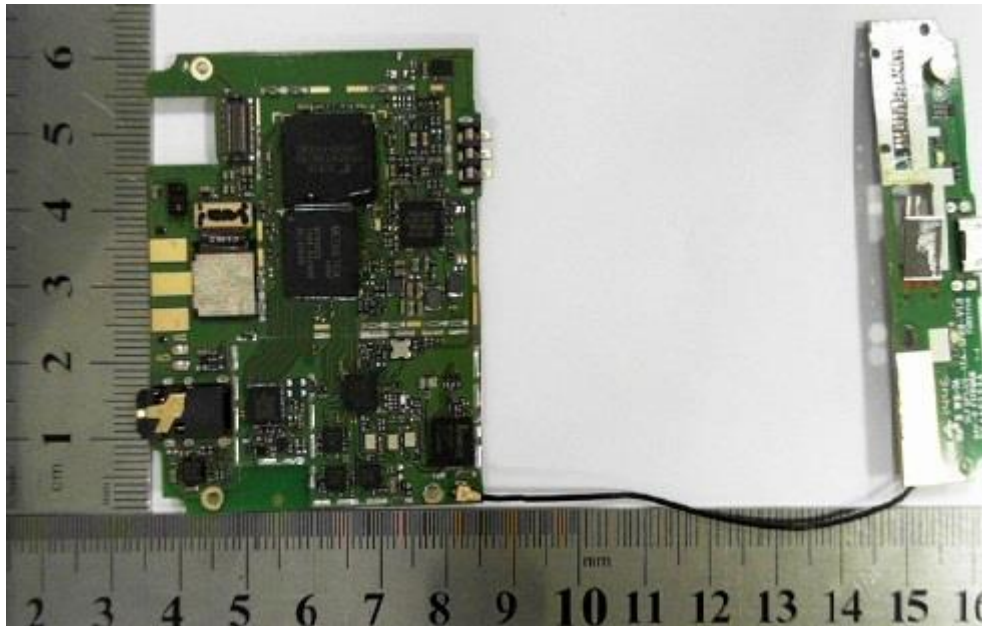
Main board With shielding -Front View



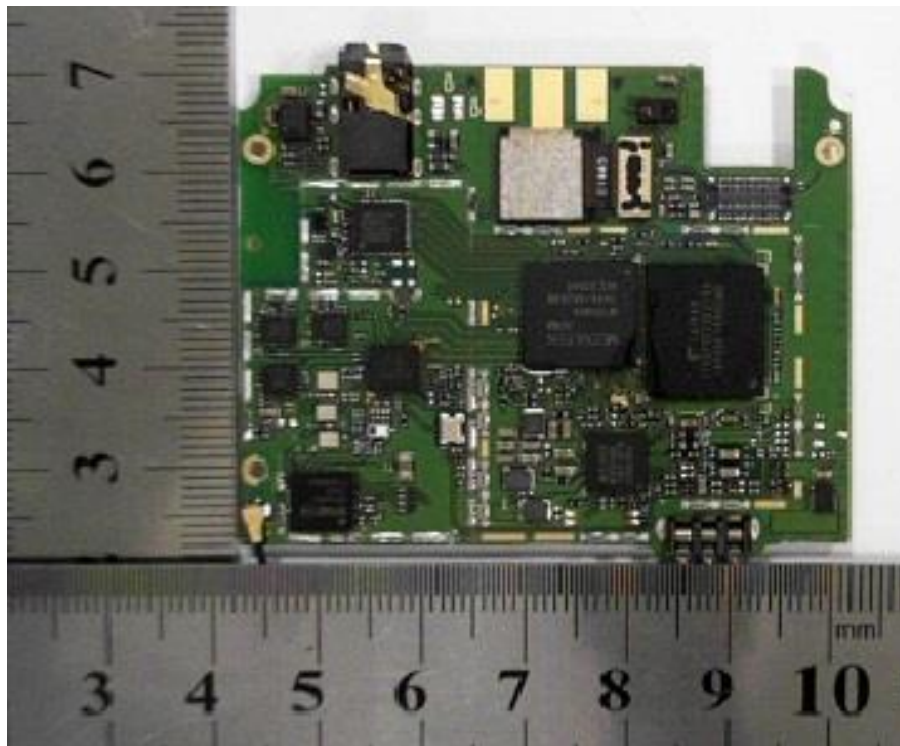
Main board Without shielding -Front View



Main board - Rear View



Main board - Rear View



Headset



USB cable



GSM/DCS Antenna View



BT Antenna View



Battery View



Adapter label view

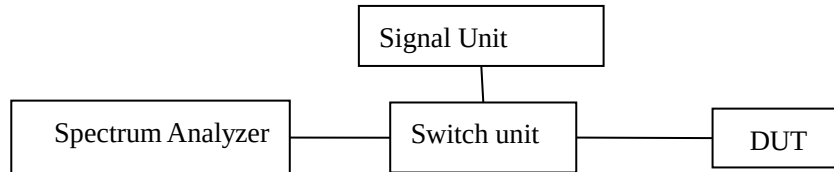


Adapter view



ANNEX B: Detailed Test Results

The radiated test setup is shown in each radiated test case section. The conducted test setup is shown as following:



All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

B.1 Maximum Transmit Power

B.1.1 Description

According to §15.247(b)(1),

The maximum Peak Output power shall be equal to or less than 125mW≈21dBm

B.1.2 Test procedures

Conducted Measurement

EUT was set for low, mid, high channel with modulated mode and highest RF output power

The spectrum analyzer was connected to the antenna terminal.

Procedures:

- Place the EUT on the table and set it in transiting mode.
- RF output of EUT was connected to SA by a low loss cable.
- SA settings as follow: Span= approximately 5 times the 20 dB bandwidth, centered on a hopping channel, RBW≥the 20 dB bandwidth of the emission being measured,, VBW≥ RBW, Sweep time= auto, Detector function= Peak, Trace= Max hold
- Then set the EUT to transmit at low, middle and high frequency and measure the conducted output power separately

B.1.3 Test Results

Date rate (Mbps)	Maximum peak output power			Verdict
	2402MHz	2441MHz	2480MHz	
1	5.537 dBm (2.402GHz)	5.788 dBm (2.440GHz)	6.127 dBm (2.479GHz)	Pass
2	4.881 dBm (2.401GHz)	5.228 dBm (2.441GHz)	5.173 dBm (2.479GHz)	Pass

3	4.823 dBm (2.402GHz)	5.241 dBm (2.441GHz)	5.898 dBm (2.480GHz)	Pass
---	-------------------------	-------------------------	-------------------------	------

B.2 20dB Bandwidth

B.2.1 Description

According to §15.247(a)(1)(iii)

The bandwidth at 20 dBm down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receiver antenna while the EUT is operating in transmission mode at the appropriate frequencies.

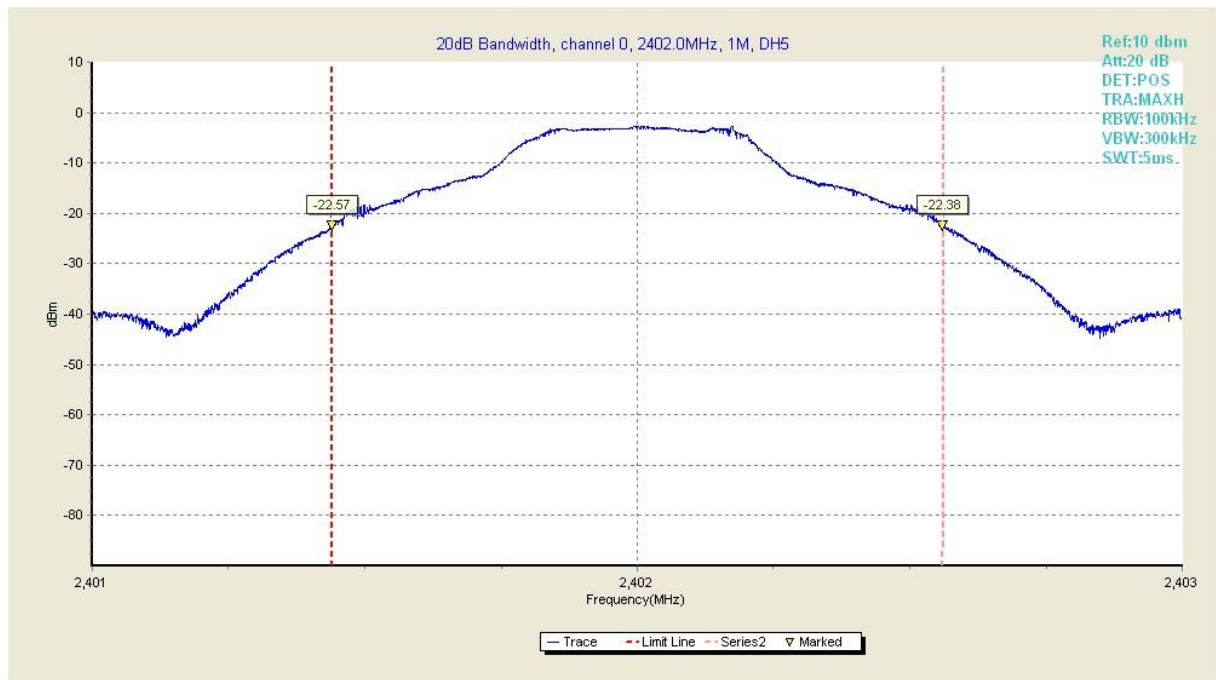
B.2.2 Test procedures

- Testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- RF output of EUT was connected to SA by a low loss cable.
- SA settings as follow: Span= approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel, RBW $\geq$ 1% of 20 dB bandwidth, VBW $\geq$ RBW, Sweep time= auto, Detector function= Peak, Trace= Max hold
- Set the measured low, middle and high frequency and test 20dB bandwidth with spectrum analyzer

B.2.3 Test Results

GFSK Modulation

Date rate (Mbps)	Frequency(MHz)	Test Result(MHz)		Verdict
1	2402	1.122	Fig.1	Pass
	2441	1.117	Fig.2	Pass
	2480	1.112	Fig.3	Pass



Test plot 1	2401.438965	-22.570000
Test plot 2	2402.561035	-22.379999

Fig1. 20dB Bandwidth in 2402MHz,1Mbps



Test plot 1	2440.444580	-21.879999
Test plot 2	2441.561523	-21.940001

Fig2. 20 dB Bandwidth in 2441MHz,1Mbps

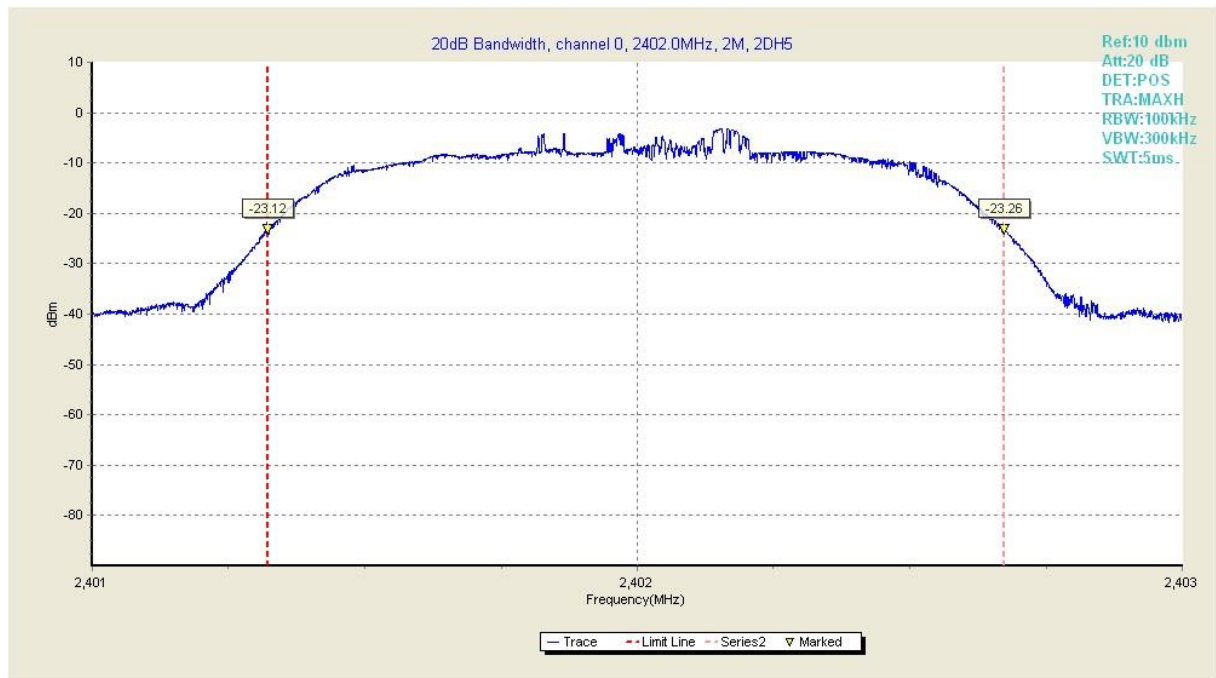


Test plot 1	2479.444580	-21.840000
Test plot 2	2480.556885	-21.559999

Fig3. 20 dB Bandwidth in 2480MHz,1Mbps

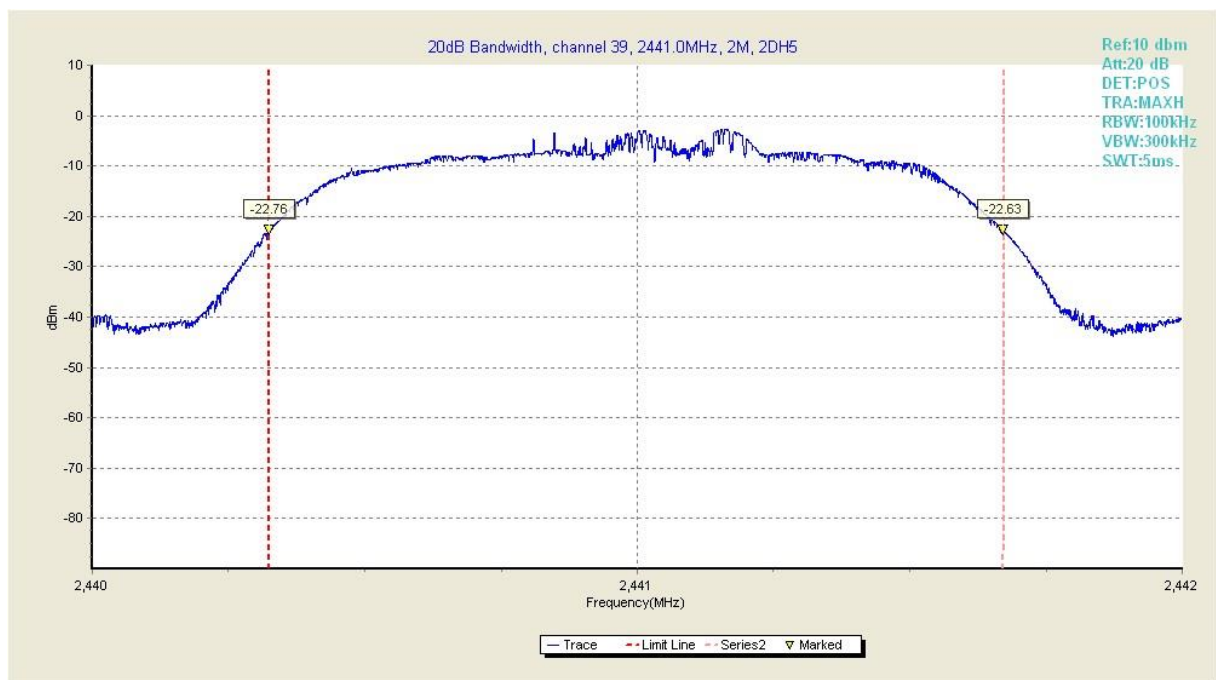
$\pi/4$ -DQPSK Modulation

Date rate (Mbps)	Frequency(MHz)	Test Result(MHz)		Verdict
2	2402	1.352	Fig.4	Pass
	2441	1.347	Fig.5	Pass
	2480	1.346	Fig.6	Pass



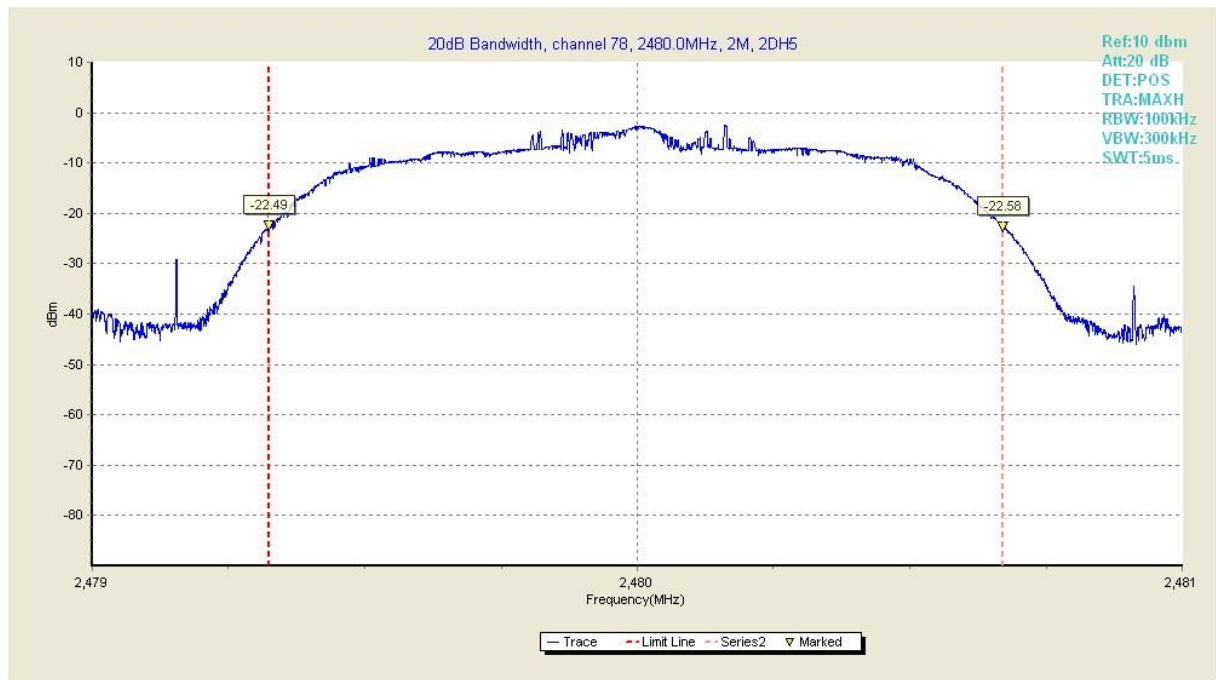
Test plot 1	2401.321533	-23.120001
Test plot 2	2402.673584	-23.260000

Fig4. 20dB Bandwidth in 2402MHz,2Mbps



Test plot 1	2440.324463	-22.760000
Test plot 2	2441.672119	-22.629999

Fig5. 20 dB Bandwidth in 2441MHz,2Mbps

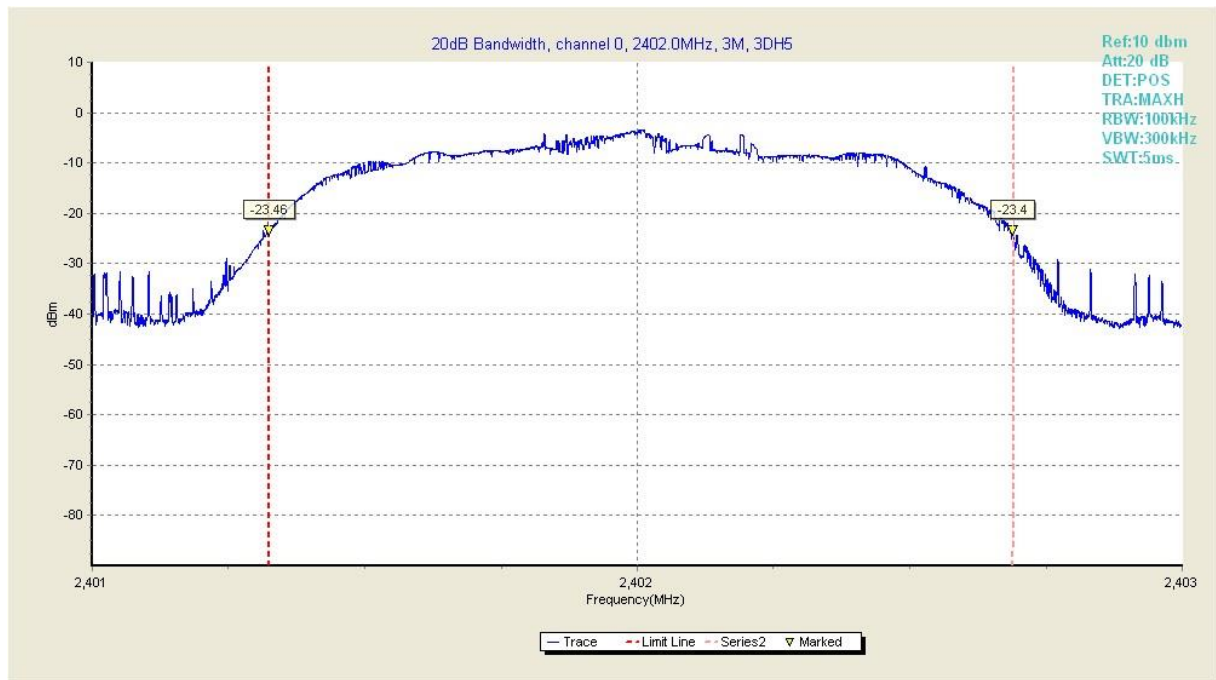


Test plot 1	2479.324463	-22.490000
Test plot 2	2480.670898	-22.580000

Fig6. 20 dB Bandwidth in 2480MHz,2Mbps

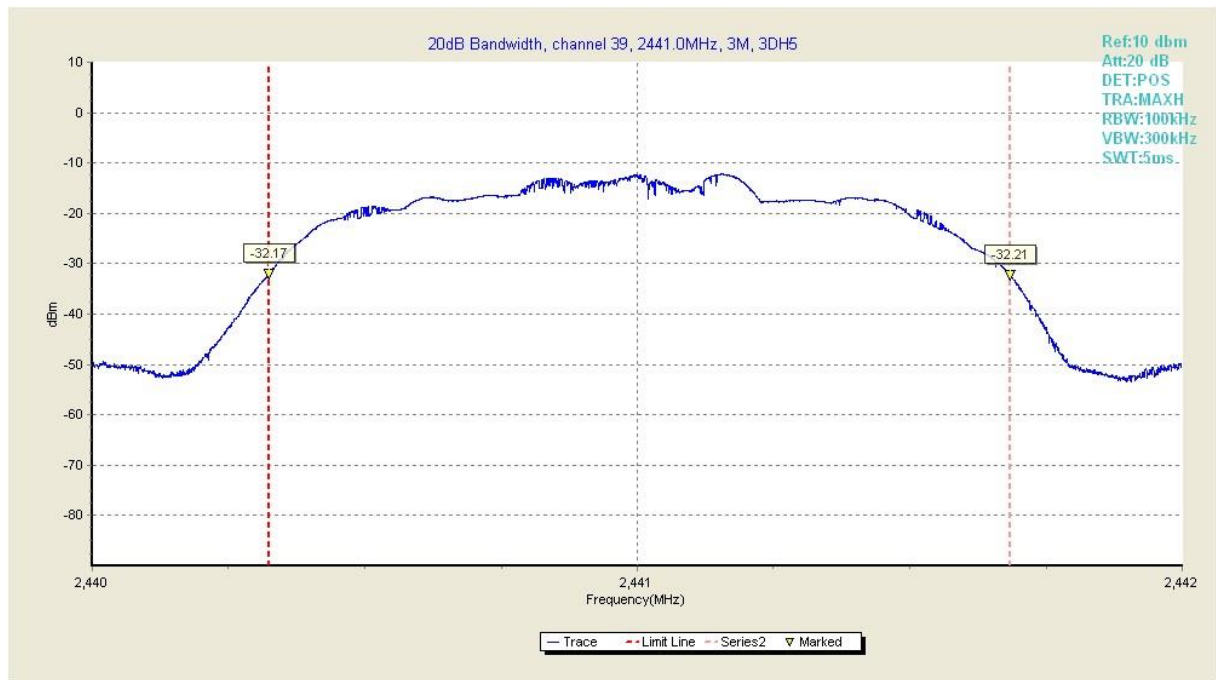
8DPSK Modulation

Date rate (Mbps)	Frequency(MHz)	Test Result(MHz)		Verdict
3	2402	1.366	Fig.7	Pass
	2441	2.000	Fig.8	Pass
	2480	1.364	Fig.9	Pass



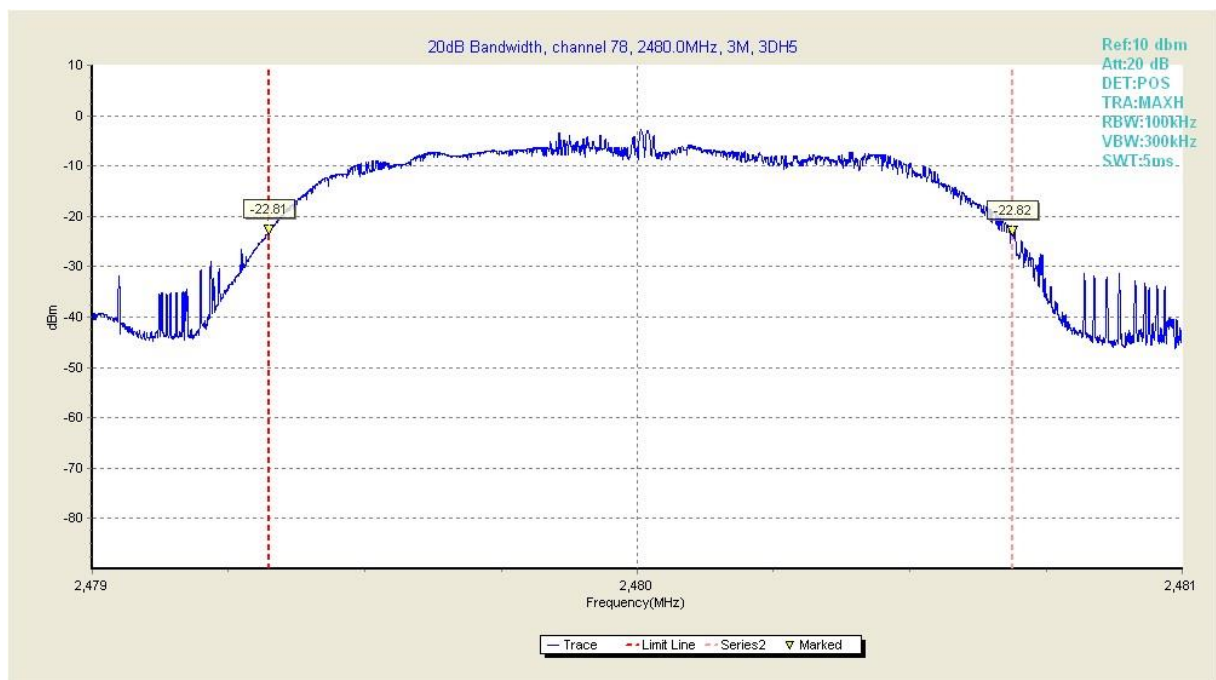
Test plot 1	2401.323975	-23.459999
Test plot 2	2402.689941	-23.400000

Fig7. 20dB Bandwidth in 2402MHz,3Mbps



Test plot 1	2440.323486	-32.169998
Test plot 2	2441.683594	-32.209999

Fig8. 20 dB Bandwidth in 2441MHz,3Mbps



Test plot 1	2479.324951	-22.809999
Test plot 2	2480.689453	-22.820000

Fig9. 20 dB Bandwidth in 2480MHz, 3Mbps

B.3 Band Edge Compliance

B.3.1 Conducted Measurement

B.3.1.1 Description

According to §15.247(d), the Band Edges Compliance shall be equal to or less than -20 dB.

B.3.1.2 Test procedures

Conducted Measurement

EUT was set for low, mid, high channel with modulated mode and highest RF output power

The spectrum analyzer was connected to the antenna terminal.

Standard Requirement

Emissions within 2 MHz of an authorized band edge may be measured using either the marker-delta method (for peak or average emissions) or the integration method (for average emissions only), described below, provided that the OBW edge falls within 2 MHz of the band edge. Otherwise, all unwanted emissions measurements shall be performed using the standard methods.

Procedures

Peak Detection

When using a peak detector to measure unwanted emissions at or near the band edge (within 2 MHz of the authorized band), the following integration procedure can be used.

- Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).
- Set span to 2 MHz
- RBW = 100 kHz.
- $VBW \geq 3 \times RBW$.
- Detector = peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)
- Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency ($f_{\text{emission}} \pm 0.5$ MHz). If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by $f_{\text{emission}} \pm 0.5$ MHz.

B.3.1.3 Test Results

GFSK Modulation

Date rate (Mbps)	Frequency(MHz)	Limit (dB)	Test Result(dB)		Verdict
1	2400	-20	-41.48	Fig.10	Pass

	2483.5		-43.07	Fig.11	Pass
			-54.26	Fig.12	
			-58.39	Fig.13	

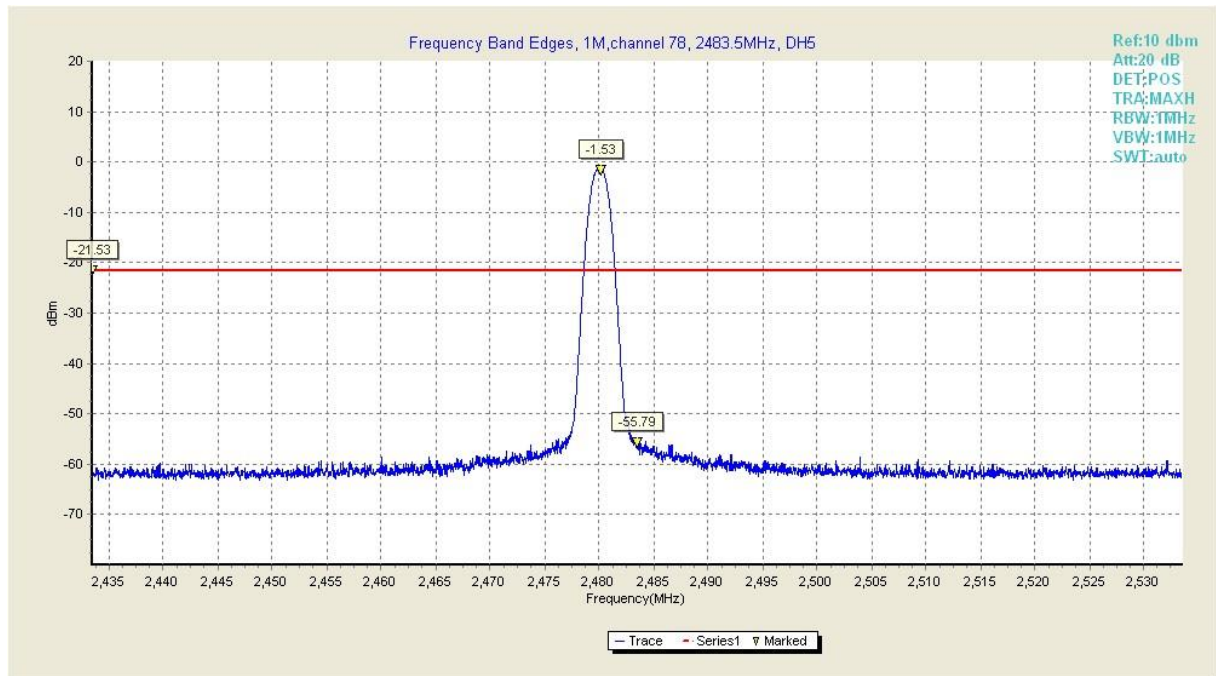


Fig10. Frequency Band Edges in CH0,1Mbps,Hopping off

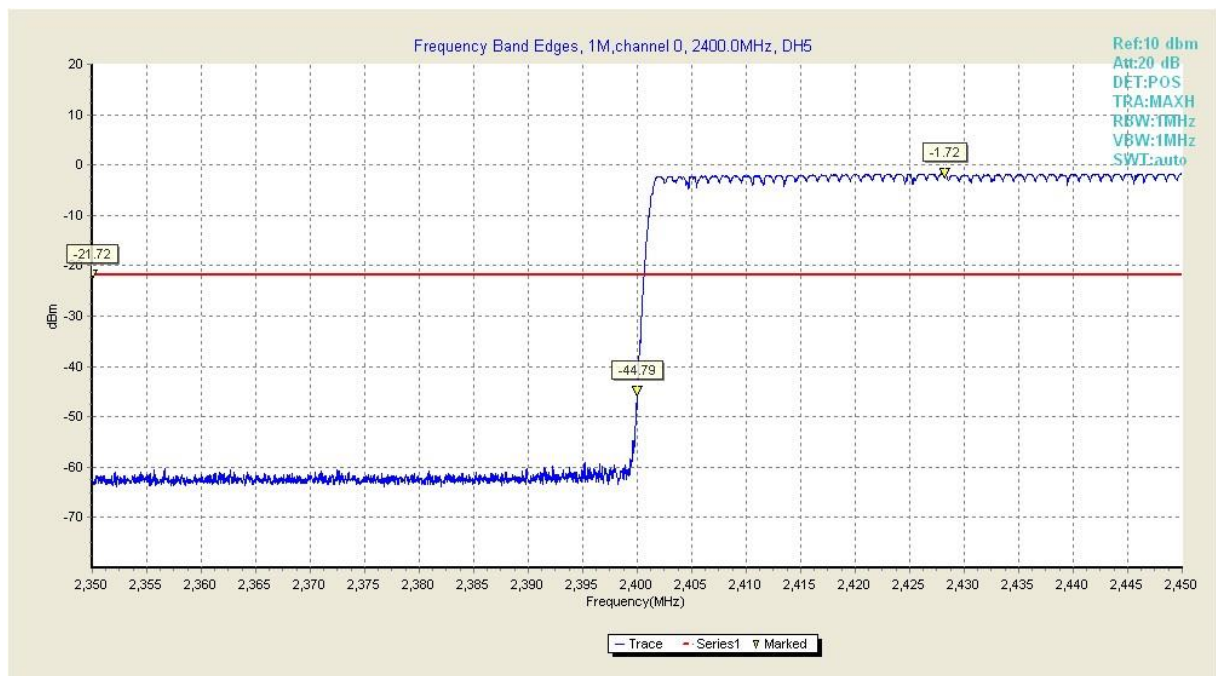


Fig11. Frequency Band Edges in CH0,1Mbps,Hopping on

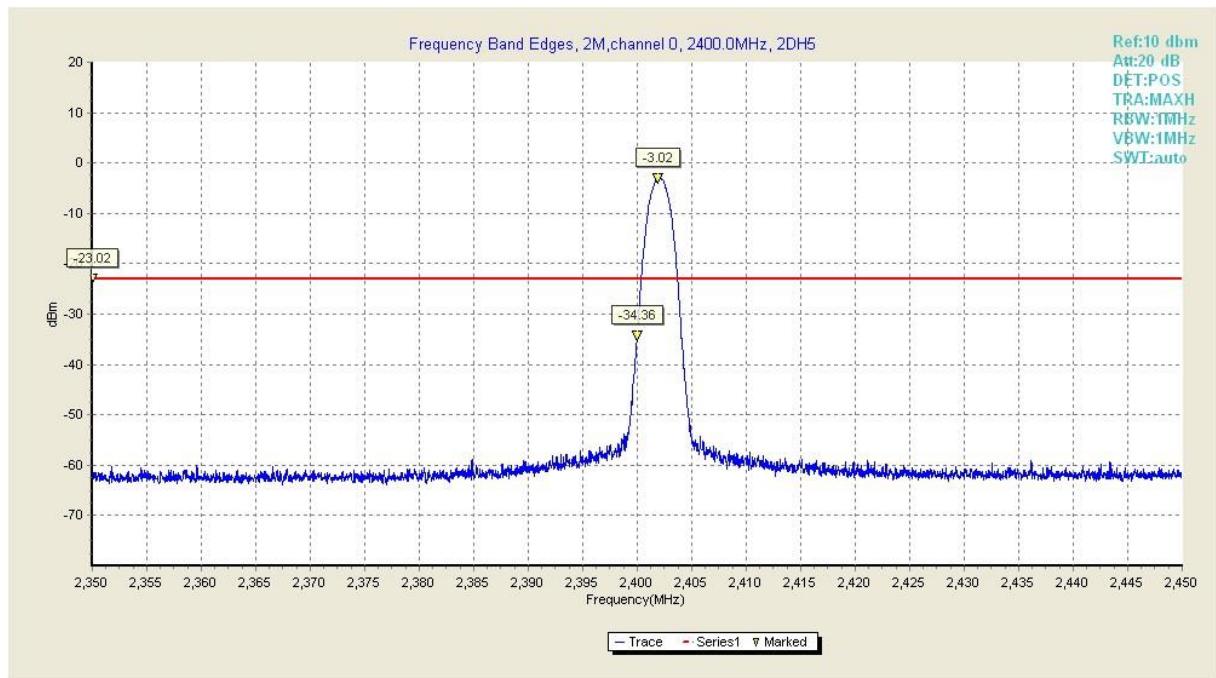


Fig12. Frequency Band Edges in CH78,1Mbps, Hopping off

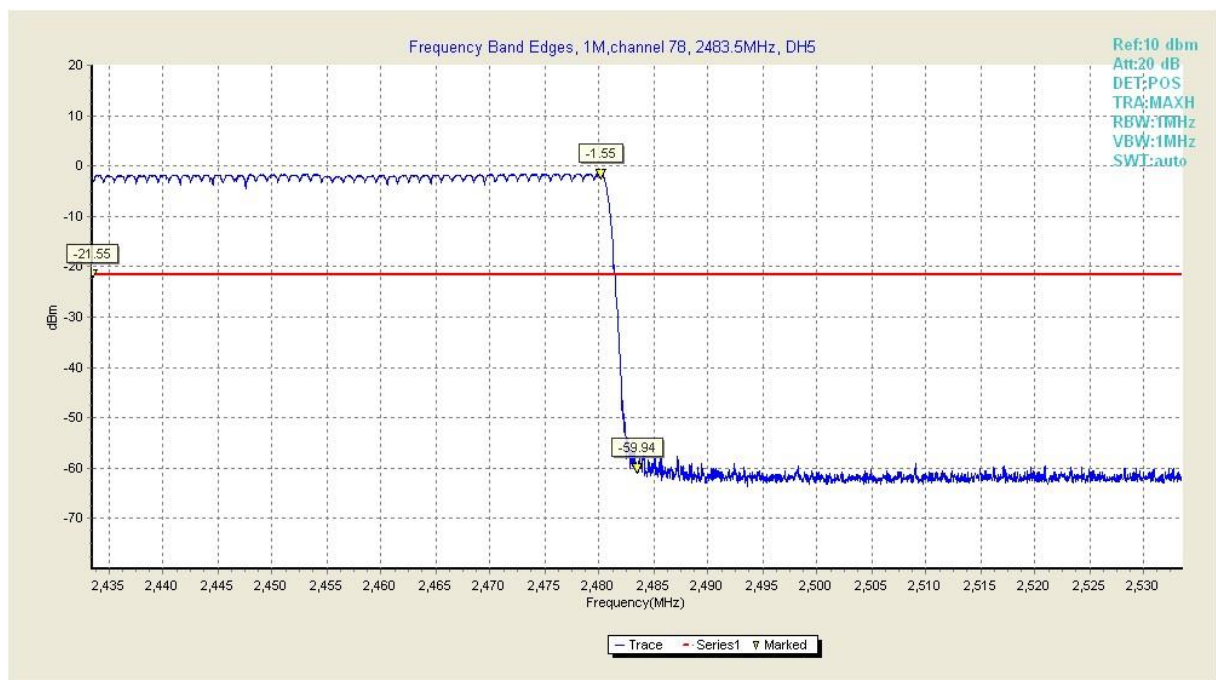


Fig13. Frequency Band Edges in CH78,1Mbps, Hopping on

$\pi/4$ -DQPSK Modulation

Date rate (Mbps)	Frequency(MHz)	Limit (dB)	Test Result(dB)		Verdict
2	2400	-20	-31.34	Fig.14	Pass
			-36.65	Fig.15	

	2483.5		-51.42	Fig.16	Pass
			-56.79	Fig.17	

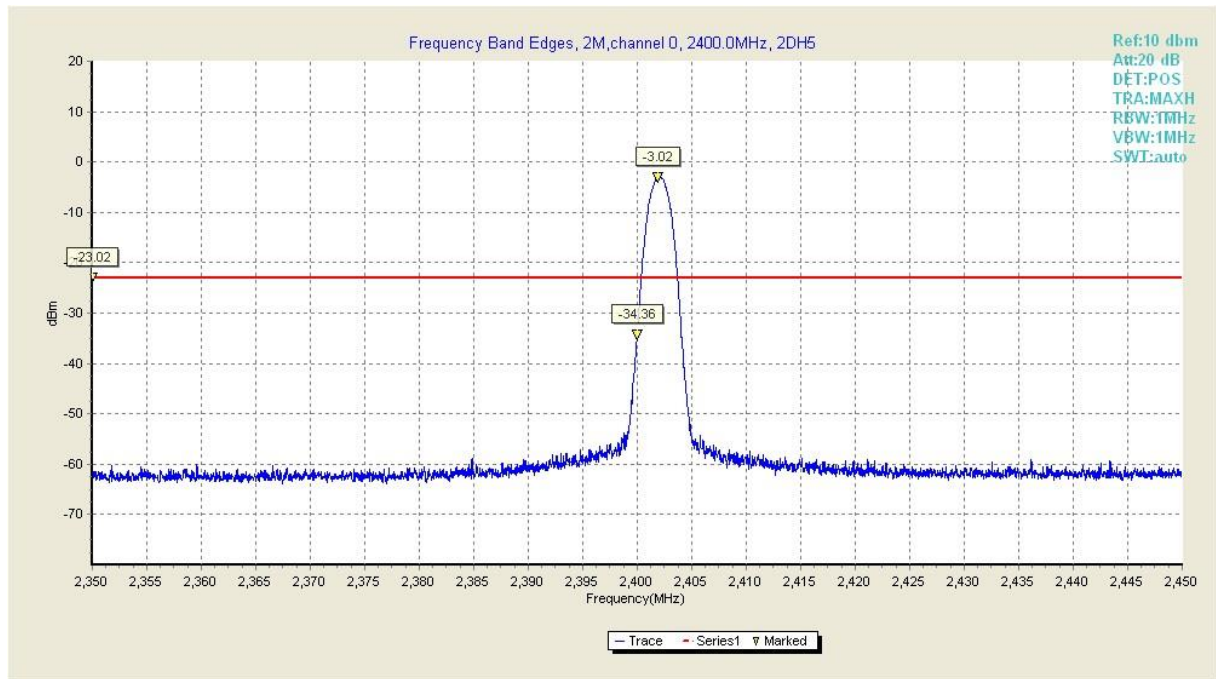


Fig14. Frequency Band Edges in CH 0, 2Mbps,Hopping off

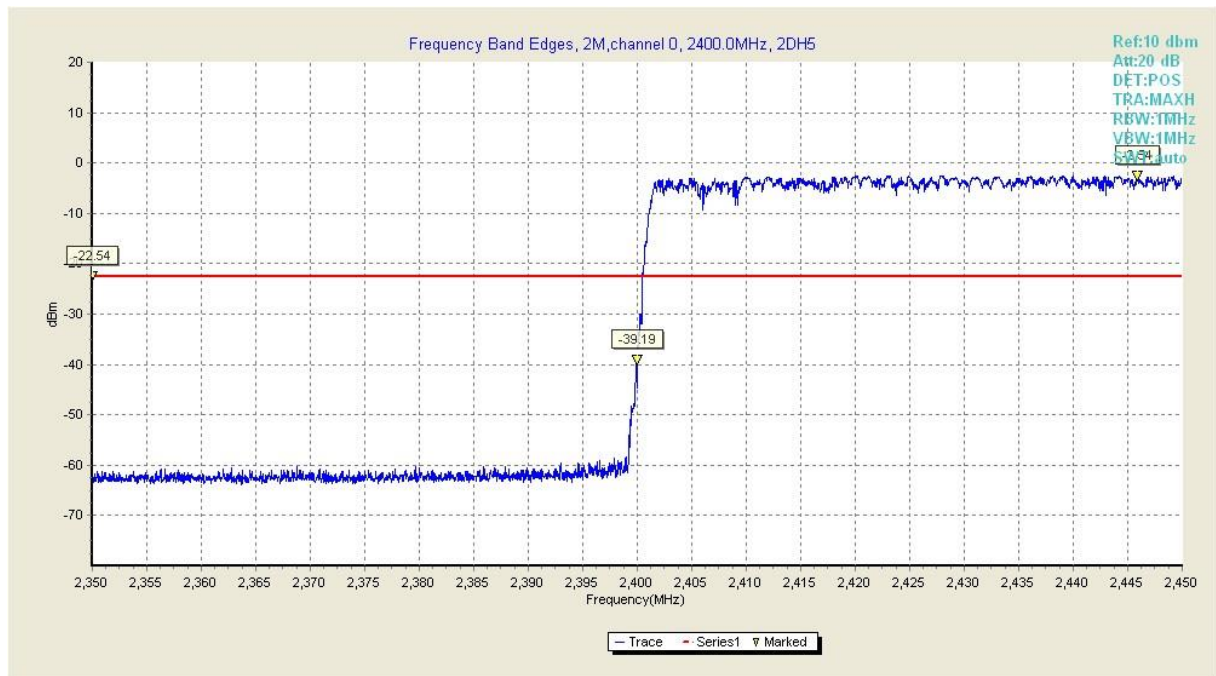


Fig15. Frequency Band Edges in CH 0, 2Mbps,Hopping on

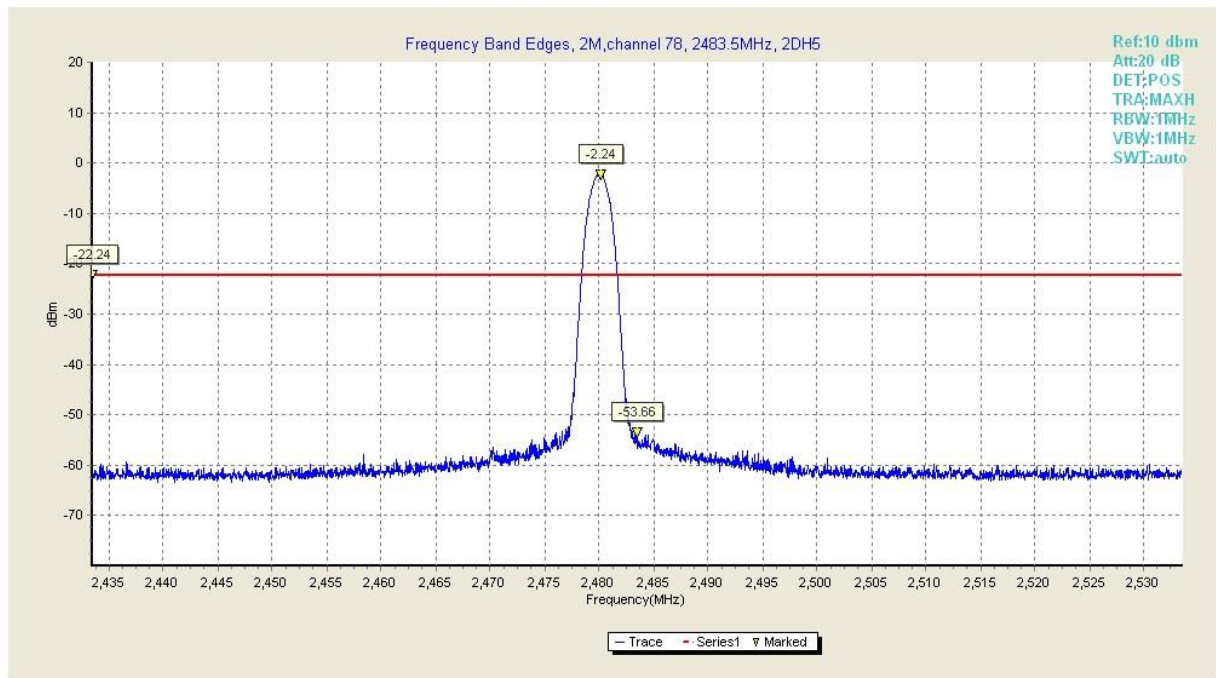


Fig16. Frequency Band Edges in CH 78, 2Mbps, Hopping off

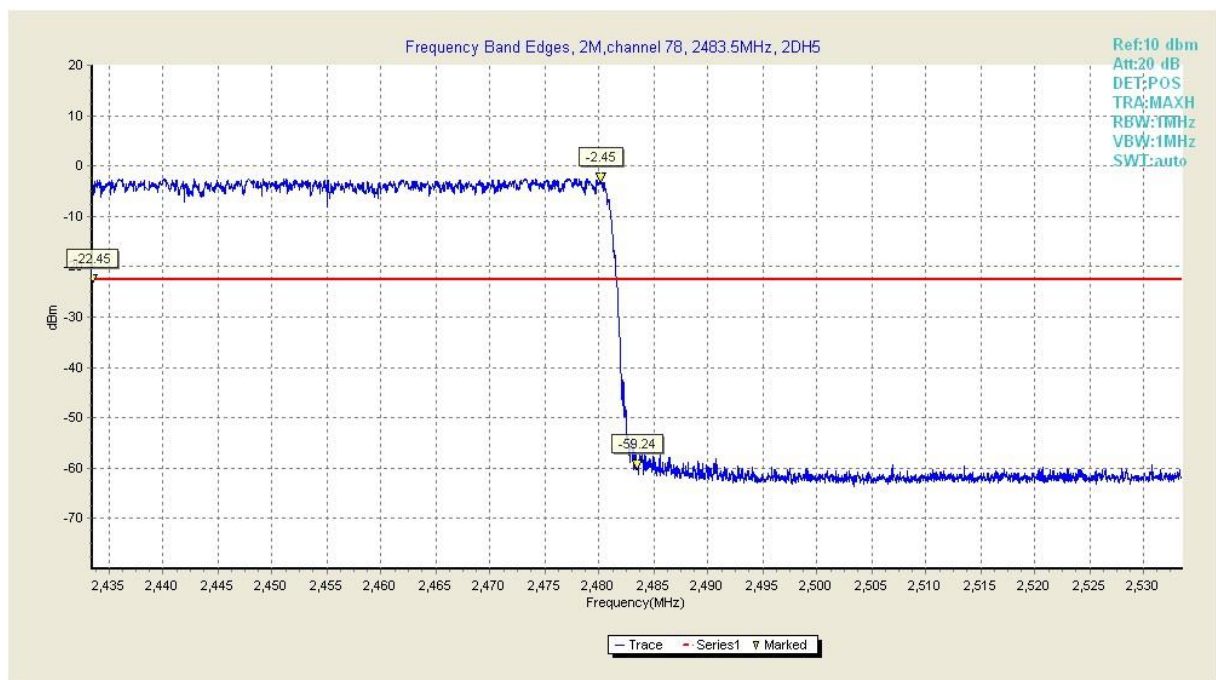


Fig17. Frequency Band Edges in CH 78, 2Mbps, Hopping on

8DPSK Modulation

Date rate (Mbps)	Frequency(MHz)	Limit (dB)	Test Result(dB)		Verdict
3	2400	-20	-31.46	Fig.18	Pass
			-34.41	Fig.19	
	2483.5		-60.08	Fig.20	Pass

-59.96

Fig.21

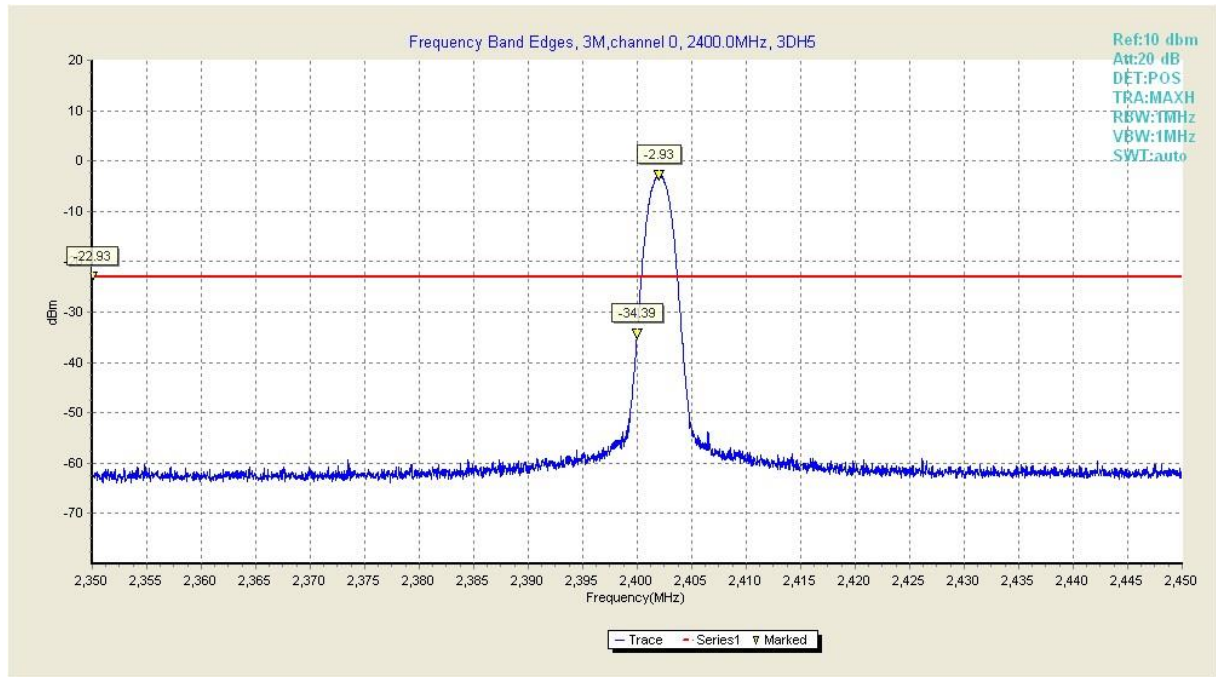


Fig18. Frequency Band Edges in CH0 , 3Mbps,Hopping off

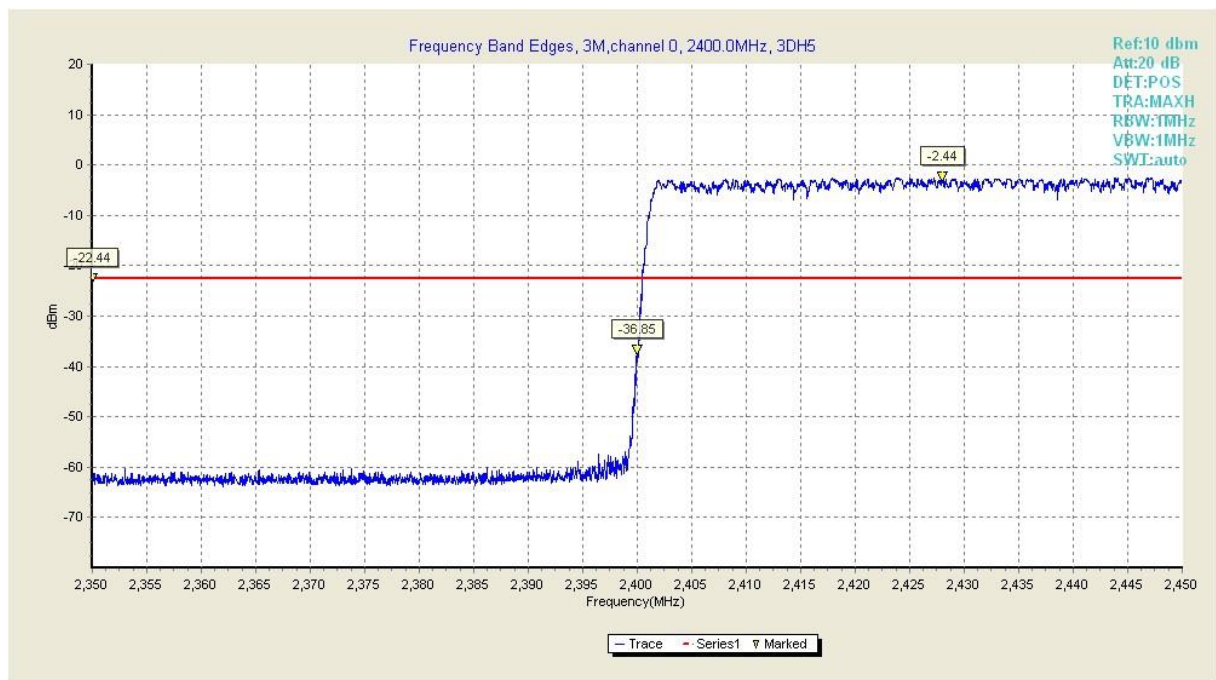


Fig19. Frequency Band Edges in CH0 , 3Mbps,Hopping on

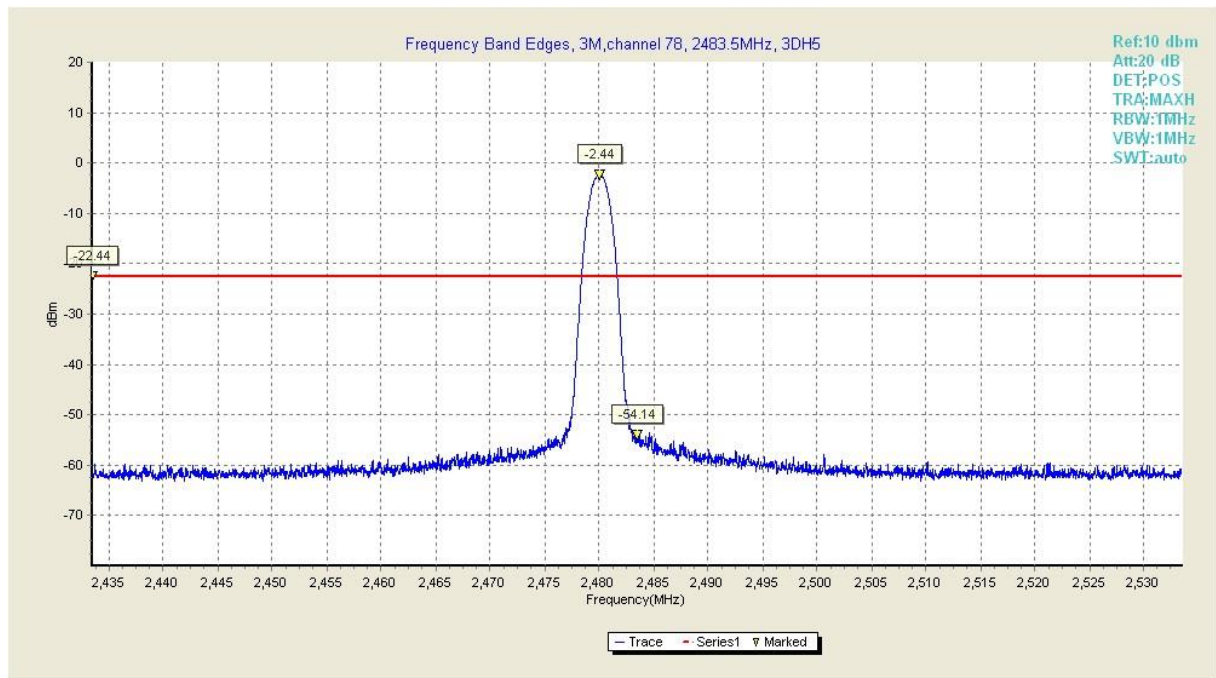


Fig20. Frequency Band Edges in CH 78, 3Mbps,Hopping off

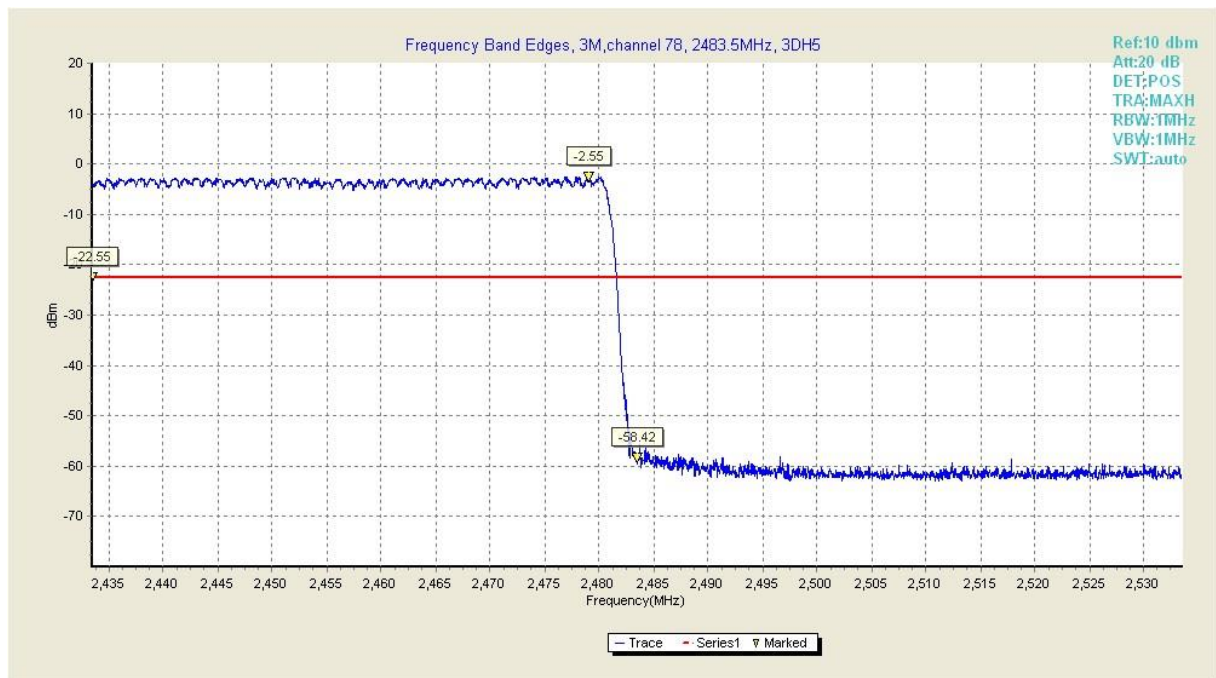


Fig21. Frequency Band Edges in CH 78, 3Mbps,Hopping on

B.3.2 Radiated measurement

B.3.2.1 Procedures:

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Position the EUT on the rotated table inside the anechoic chamber without connection to measurement instrument. Turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel

and High Channel within its operating range, and make sure the instrument is operated in its linear range. Repeat above procedures until all measured frequencies were complete.

- c) Set band RBW=1MHz, VBW=3MHz with a convenient frequency span from band edge.
- d) Find the highest point in edge frequency, and then calculated results.
- e) Repeat above procedures until all measured frequencies were complete.

B.3.2.2 Test Results

Only the GFSK worst case were reported.

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2400MHz									
175.68	20.32	QP	24	1.4	H	10.52	30.84	43.50	-12.66
175.68	20.05	QP	92	1.3	V	10.52	30.57	43.50	-12.93
4804.00	52.22	PK	253	1.3	V	-1.05	51.17	74.00	-22.83
4804.00	41.29	Ave	253	1.3	V	-1.05	40.24	54.00	-13.76
7206.00	51.96	PK	215	1.6	H	1.33	53.29	74.00	-20.71
7206.00	41.18	Ave	215	1.6	H	1.33	42.51	54.00	-11.49
2326.45	46.66	PK	118	1.9	V	-13.19	33.47	74.00	-40.53
2326.45	39.12	Ave	118	1.9	V	-13.19	25.93	54.00	-28.07
2368.48	42.40	PK	32	1.3	H	-13.15	29.25	74.00	-44.75
2368.48	37.05	Ave	32	1.3	H	-13.15	23.90	54.00	-30.10
2400	44.55	PK	315	1.2	V	-13.12	34.13	74.00	-39.87
2400	42.64	Ave	315	1.2	V	-13.12	29.52	54.00	-24.48
2496.27	44.29	PK	112	2.0	V	-13.08	31.21	74.00	-42.79
2496.27	36.41	Ave	112	2.0	V	-13.08	23.33	54.00	-30.67
2483.5MHz									
175.68	20.01	QP	174	1.6	H	10.52	30.53	43.50	-12.97
175.68	19.72	QP	182	1.9	V	10.52	30.24	43.50	-13.26
4960.00	52.96	PK	2	1.9	V	-0.24	52.72	74.00	-21.28
4960.00	43.52	Ave	2	1.9	V	-0.24	43.28	54.00	-10.72
7440.00	51.21	PK	314	1.5	H	2.85	54.06	74.00	-19.94

7440.00	43.39	Ave	314	1.5	H	2.85	46.24	54.00	-7.76
2348.63	45.19	PK	44	1.6	V	-13.19	32.00	74.00	-42.00
2348.63	38.65	Ave	44	1.6	V	-13.19	25.46	54.00	-28.54
2365.85	43.39	PK	71	1.7	H	-13.15	30.24	74.00	-43.76
2365.85	36.00	Ave	71	1.7	H	-13.15	22.85	54.00	-31.15
2483.5	43.37	PK	309	1.6	V	-13.11	30.26	74.00	-43.74
2483.5	38.69	Ave	309	1.6	V	-13.11	25.58	54.00	-28.42
2492.34	43.62	PK	173	1.6	V	-13.08	30.54	74.00	-43.46
2492.34	38.88	Ave	173	1.6	V	-13.08	25.80	54.00	-28.20

B.4 Carrier Frequency Separation

B.4.1 Description

According to §15.247(a)(1), Carrier Frequency Separation should be more than two-thirds of the 20 dB bandwidth of the hopping channel

B.4.2 Test Procedures

- a) Testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
- b) Place the EUT on the table and set it in hopping mode
- c) EUT was connected to SA by a low loss cable.
- d) Set center frequency of spectrum analyzer=middle of hopping channel.
- d) SA setting: Span= wide enough to capture the peaks of two adjacent channels; Set $RBW \geq 1\%$ of span, $VBW \geq RBW$, sweep time- auto, detector function= peak, trace= max hold.
- d) Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

B.4.2 Test Results

The Worst case is 1M and only 1M results are present

Worst case data rate: 1M

GFSK Modulation

Channel	Frequency(MHz)	Limit (MHz)	Test Result(MHz)		Verdict
Low Channel	2402	0.7395	1.012	Fig.22	Pass
Adjacency Channel	2403				
Low Channel	2441	0.7441	1.030	Fig.23	Pass
Adjacency Channel	2442				
Low Channel	2479	0.7432	0.996	Fig.24	Pass
Adjacency Channel	2480				



Fig 22. Carrier Frequency Separation in Low channel, 1Mbps



Fig 23. Carrier Frequency Separation in Middle channel, 1Mbps



Fig 24. Carrier Frequency Separation in High channel,1Mbps

B.5 Time Of Occupancy (Dwell Time)**B.5.1 Description**

According to §15.247(a)(1)(iii)

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.

B.5.2 Test Procedures**Conducted Measurement**

EUT was set for low, mid, high channel with modulated mode and highest RF output power

The spectrum analyzer was connected to the antenna terminal.

Procedures

- a) Place the EUT on the table and set it in transmitting mode and switch on frequency hopping function.
- b) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- c) Set the spectrum analyzer as Span=zero span, centered on a hopping channel, RBW=1MHz, VBW $\geq$ RBW, Sweep=as necessary to capture the entire dwell time per hopping channel, Detector function=peak, Trace=max hold.
- d) Calculate the time of occupancy in a period with time occupancy of a burst and quantity of bursts.

B.5.3 Test Results**GFSK Modulation**

Date rate (Mbps)	Frequency(MHz)	Limit (ms)	Test Result(ms)		Verdict
1	2402	400	306.50	Fig.25	Pass
	2441		306.46	Fig.26	Pass
	2480		306.46	Fig.27	Pass

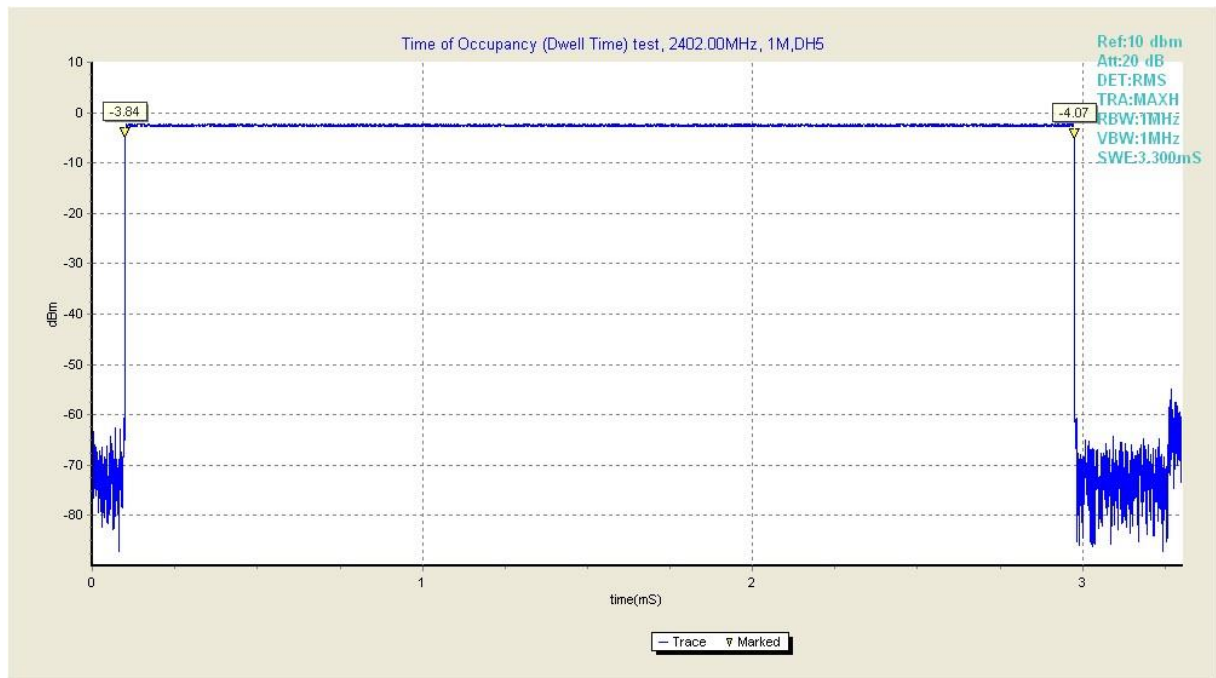


Fig25. Dwell Time in 2402MHz,1Mbps

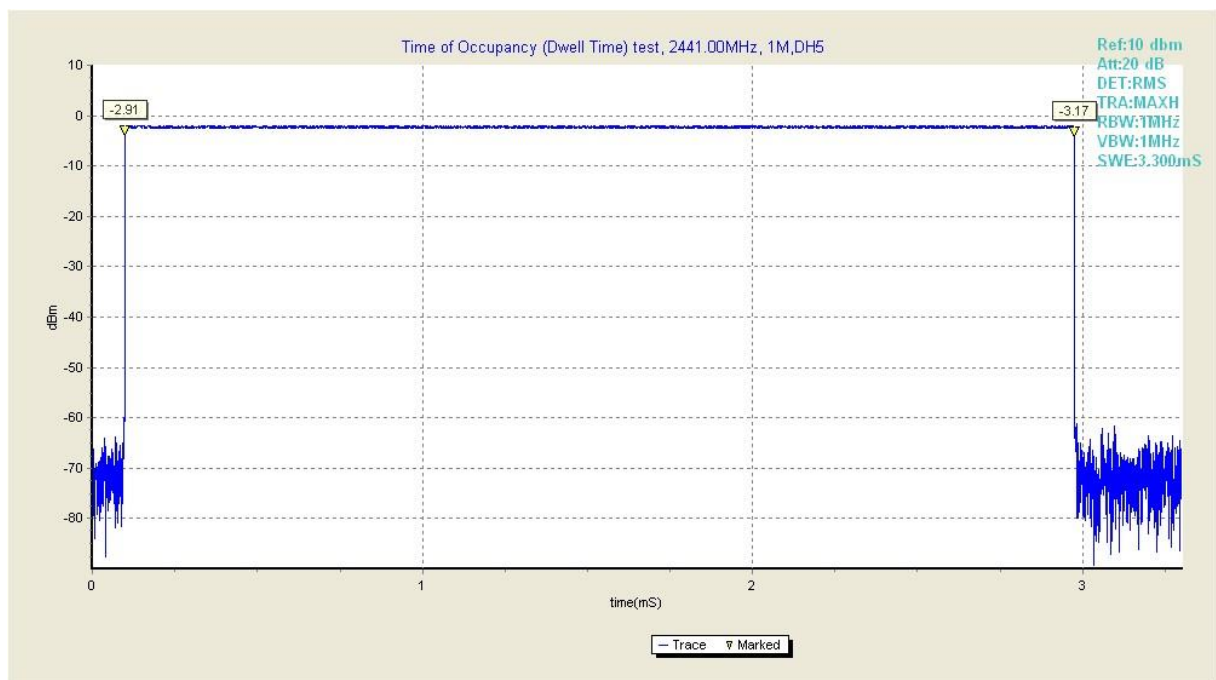
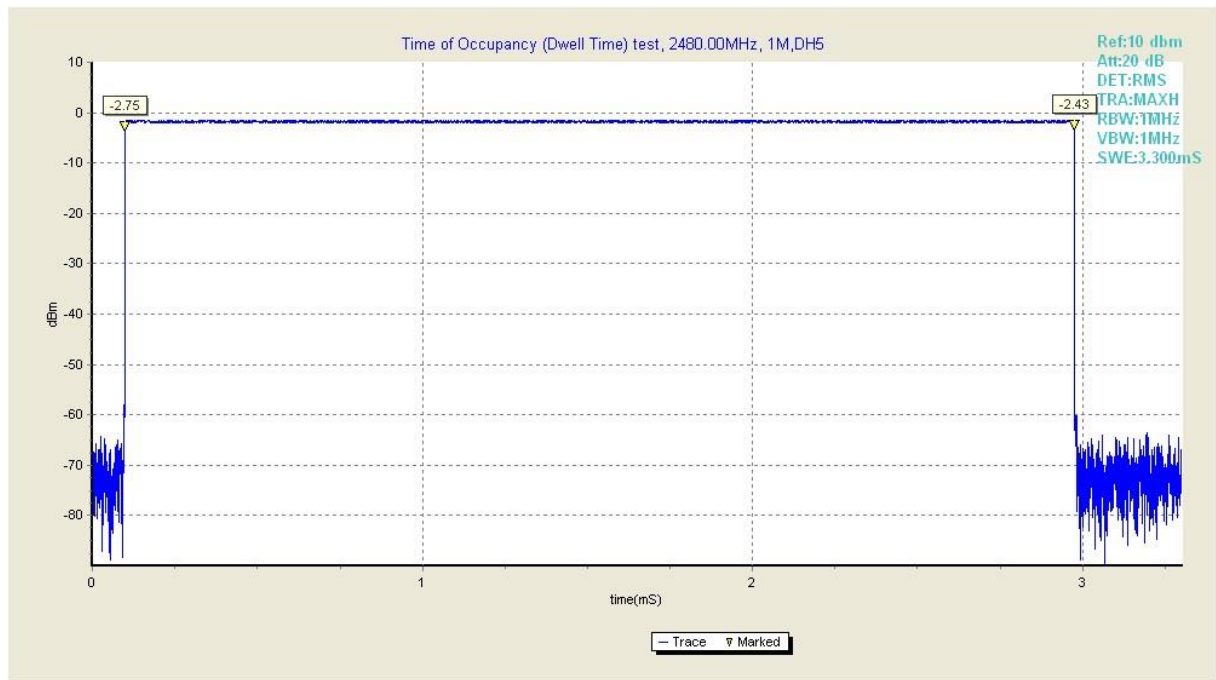


Fig26. Dwell Time in 2441MHz,1Mbps

**Fig27. Dwell Time in 2480MHz,1Mbps**

$\pi/4$ -DQPSK Modulation

Date rate (Mbps)	Frequency(MHz)	Limit (ms)	Test Result(ms)		Verdict
2	2402	400	306.76	Fig.28	Pass
	2441		306.81	Fig.29	Pass
	2480		306.81	Fig.30	Pass

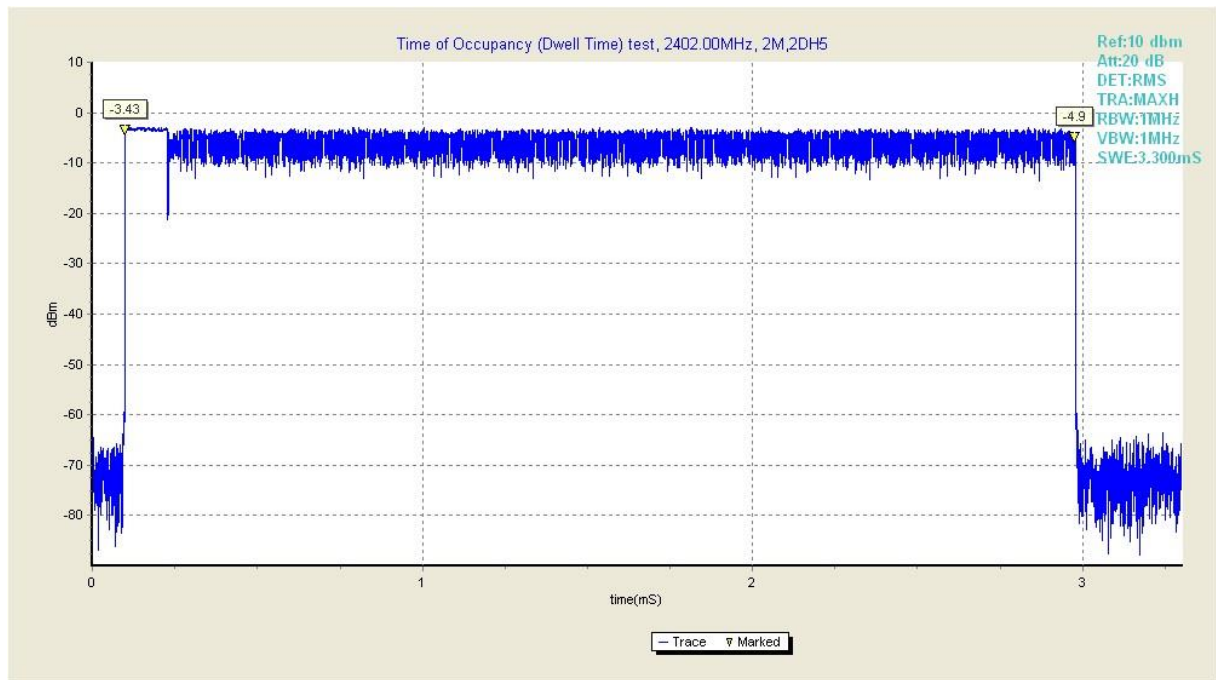


Fig28. Dwell Time in 2402MHz,2Mbps

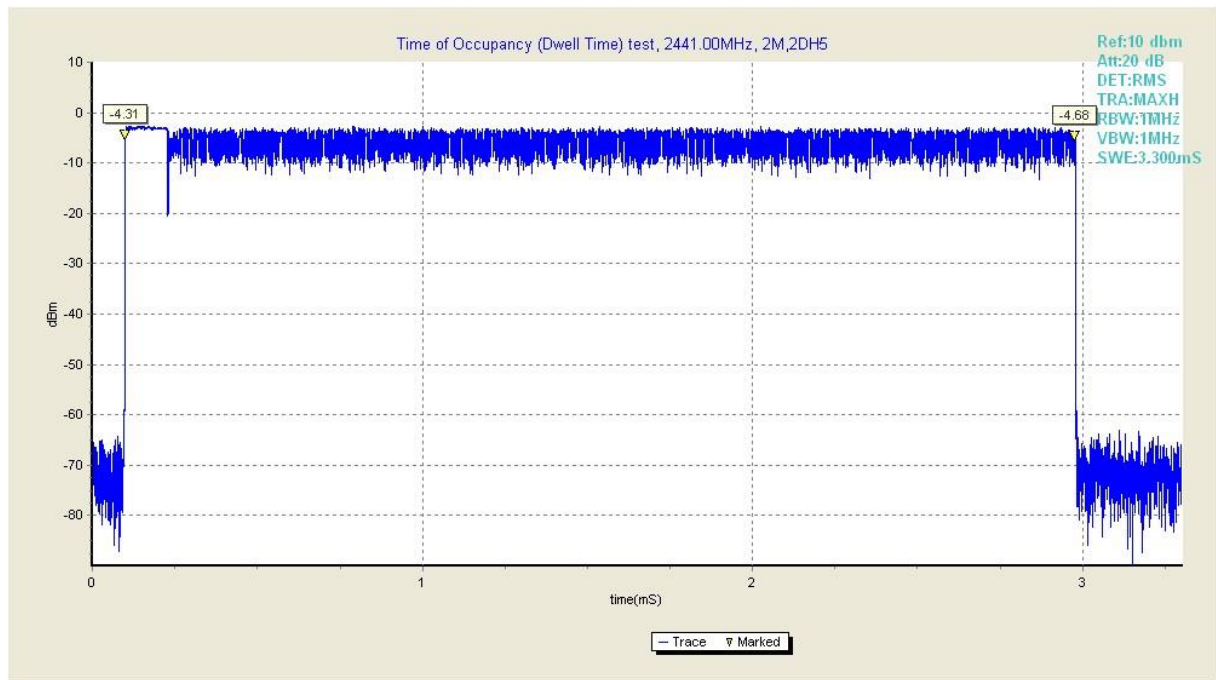


Fig29. Dwell Time in 2441MHz, 2Mbps

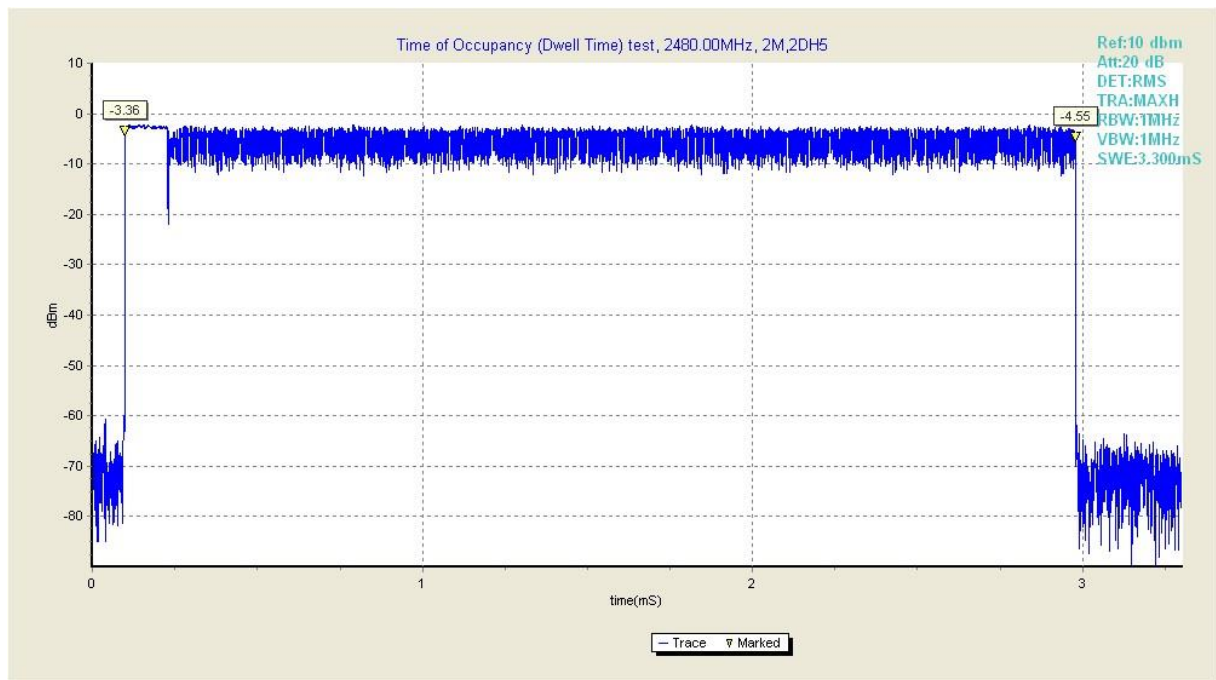


Fig30. Dwell Time in 2480MHz, 2Mbps

8DPSK Modulation

Date rate (Mbps)	Frequency(MHz)	Limit (ms)	Test Result(ms)		Verdict
3	2402	400	306.98	Fig.31	Pass

	2441		307.03	Fig.32	Pass
	2480		306.98	Fig.33	Pass

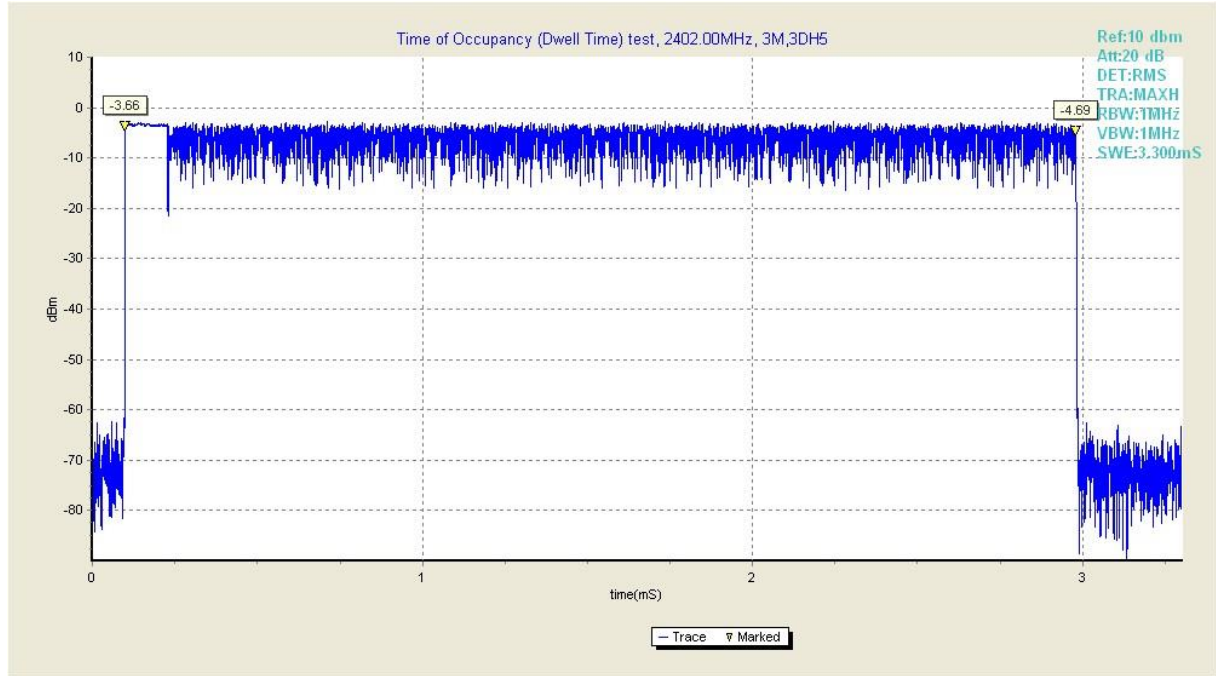


Fig31 Dwell Time in 2402MHz,3Mbps

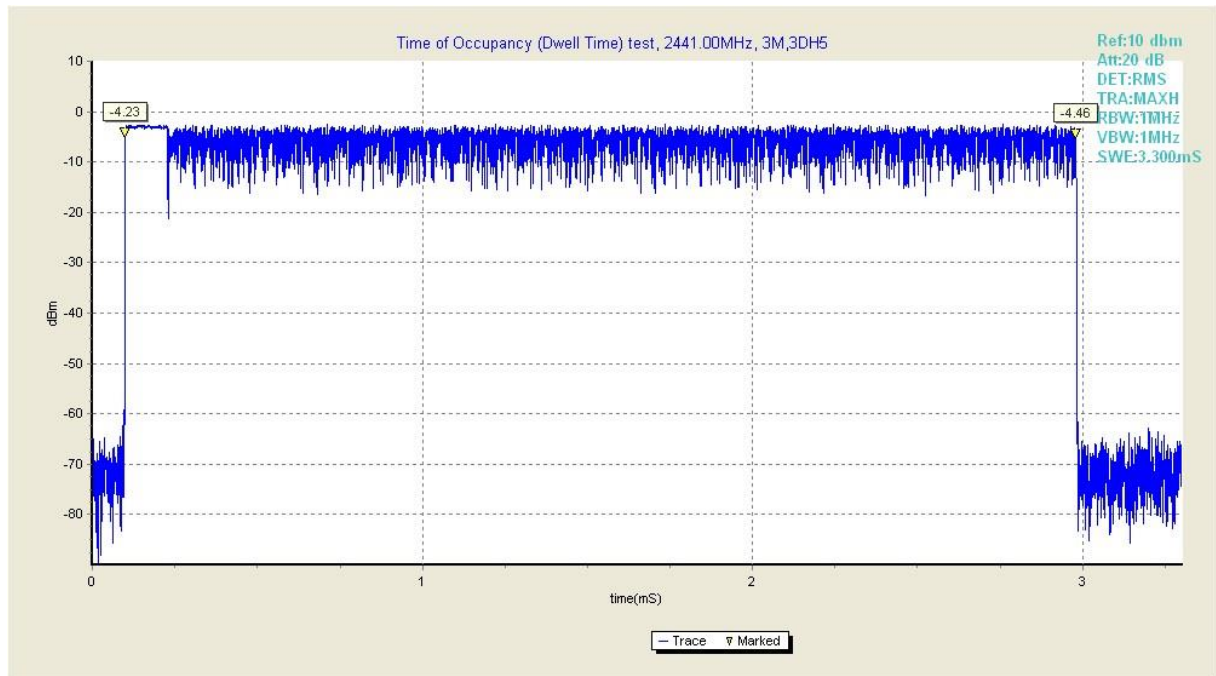
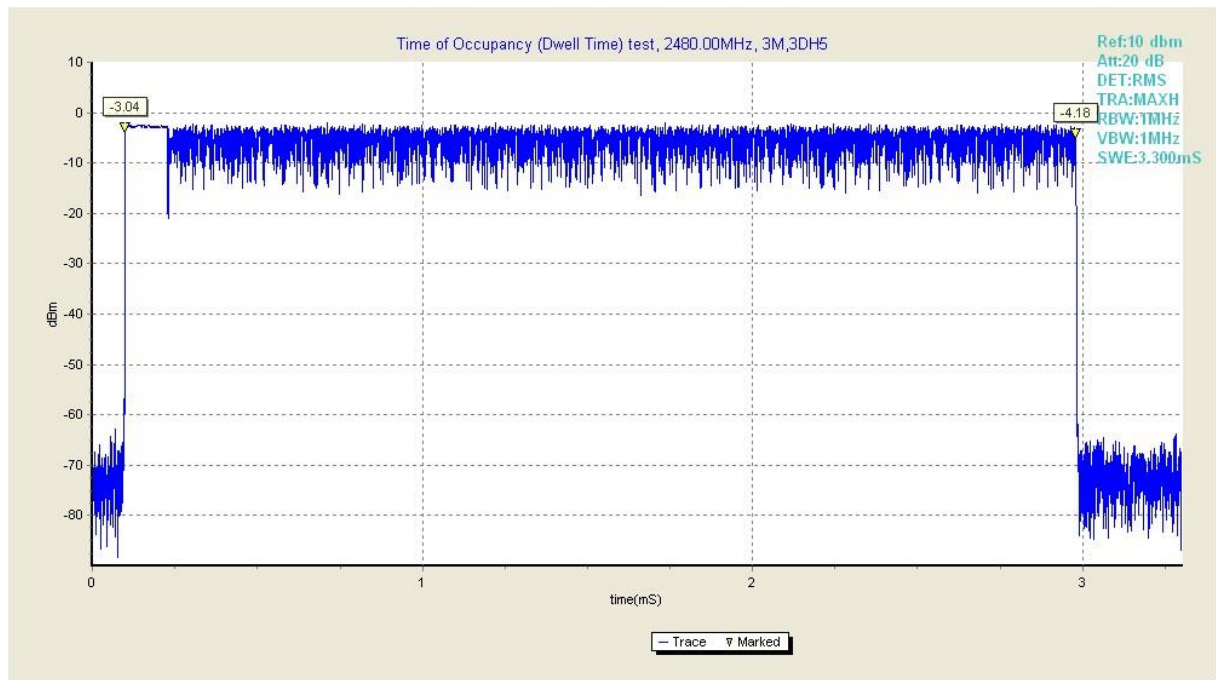


Fig32. Dwell Time in 2441MHz,3Mbps

**Fig33. Dwell Time in 2480MHz,3Mbps**

B.6 Number of Channel Hopping

B.6.1 Description

According to §15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

B.6.2 Test Procedures

Conducted Measurement

EUT was set for low, mid, high channel with modulated mode and highest RF output power

The spectrum analyzer was connected to the antenna terminal.

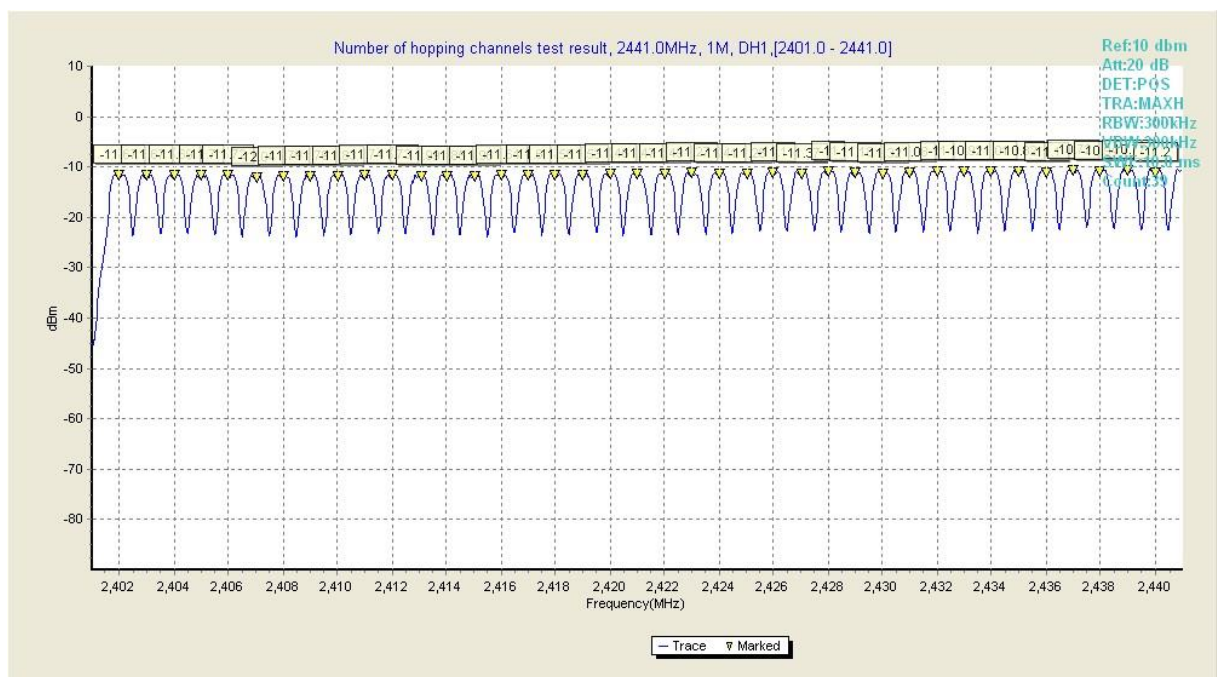
Procedures

- Place the EUT on the table and set it in transmitting mode and switch on frequency hopping function.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- Set the spectrum analyzer as Start=2400MHz, Stop=2483.5MHz, Span=the frequency band of operation, RBW $\geq$ 1% of the span, VBW $\geq$ RBW, Sweep=auto, Detector function=peak, Trace=max hold.
- Count the quantity of peaks to get the number of hopping channels.

B.6.3 Test Results

GFSK Modulation

Hopping Channel Frequency Range(MHz)	Limits(Channel)	Number of hopping Channel	Test Results	Verdict
2402~2480	15	79	Fig.34	Pass



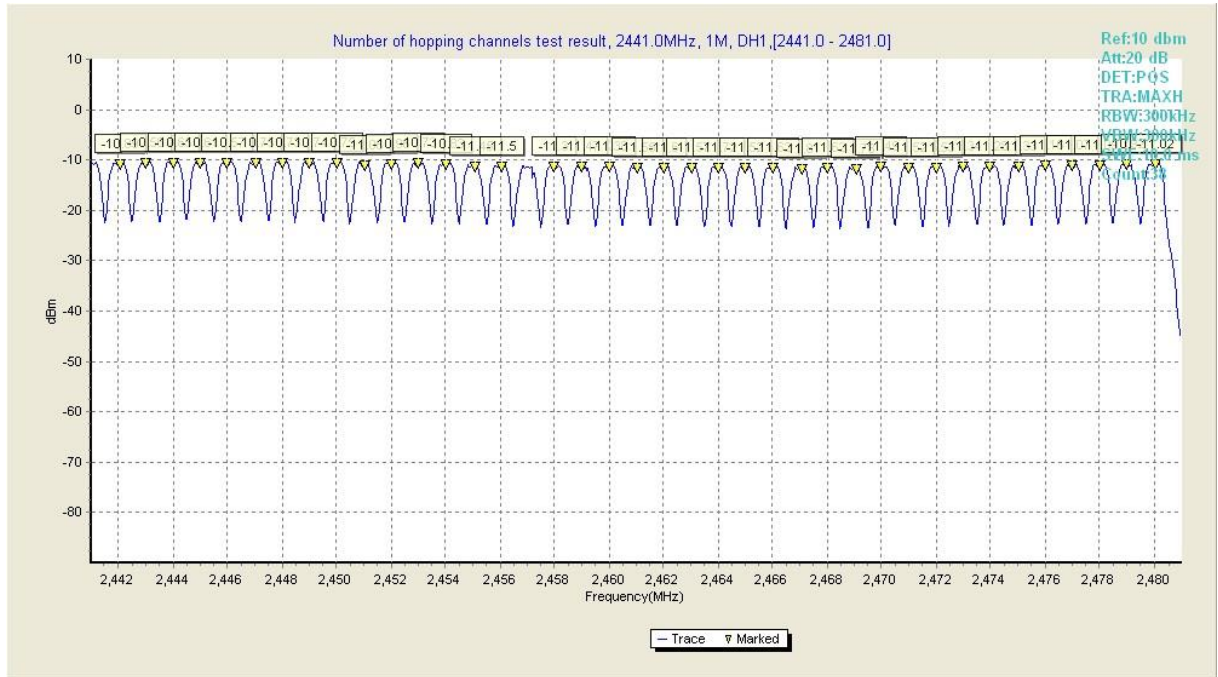
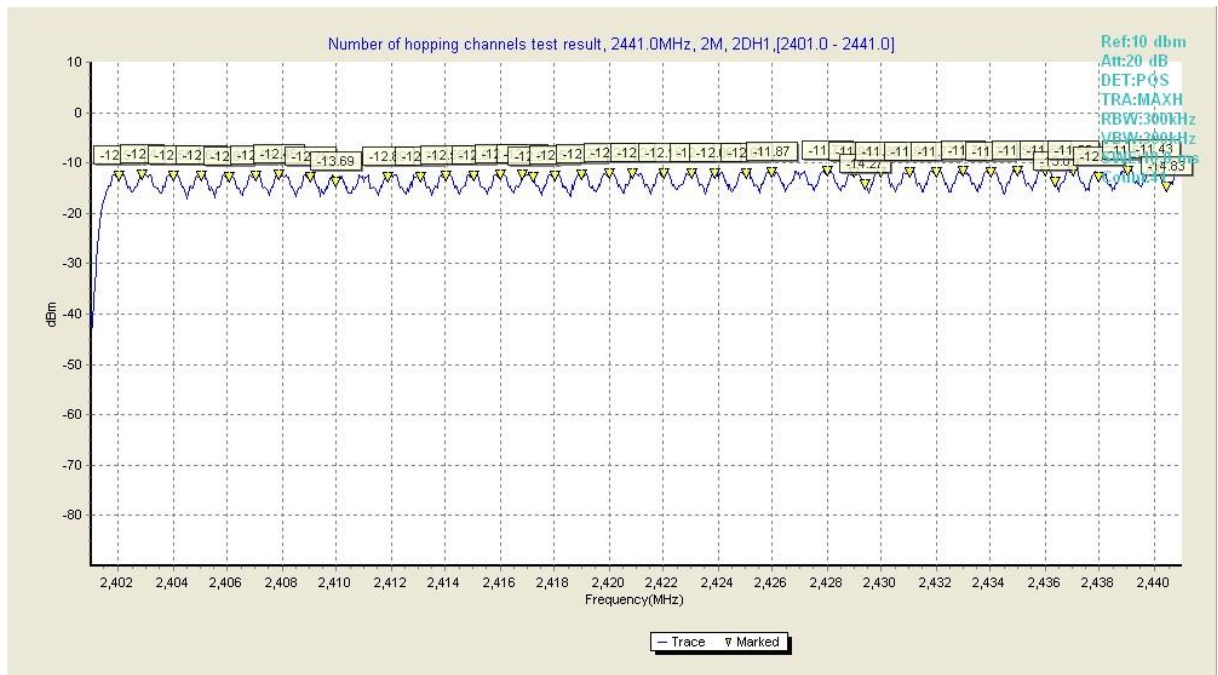


Fig34. Dwell Time in 1Mbps

$\pi/4$ -DQPSK Modulation

Hopping Channel Frequency Range(MHz)	Limits(Channel)	Number of hopping Channel	Test Results	Verdict
2402~2480	15	79	Fig.35	Pass



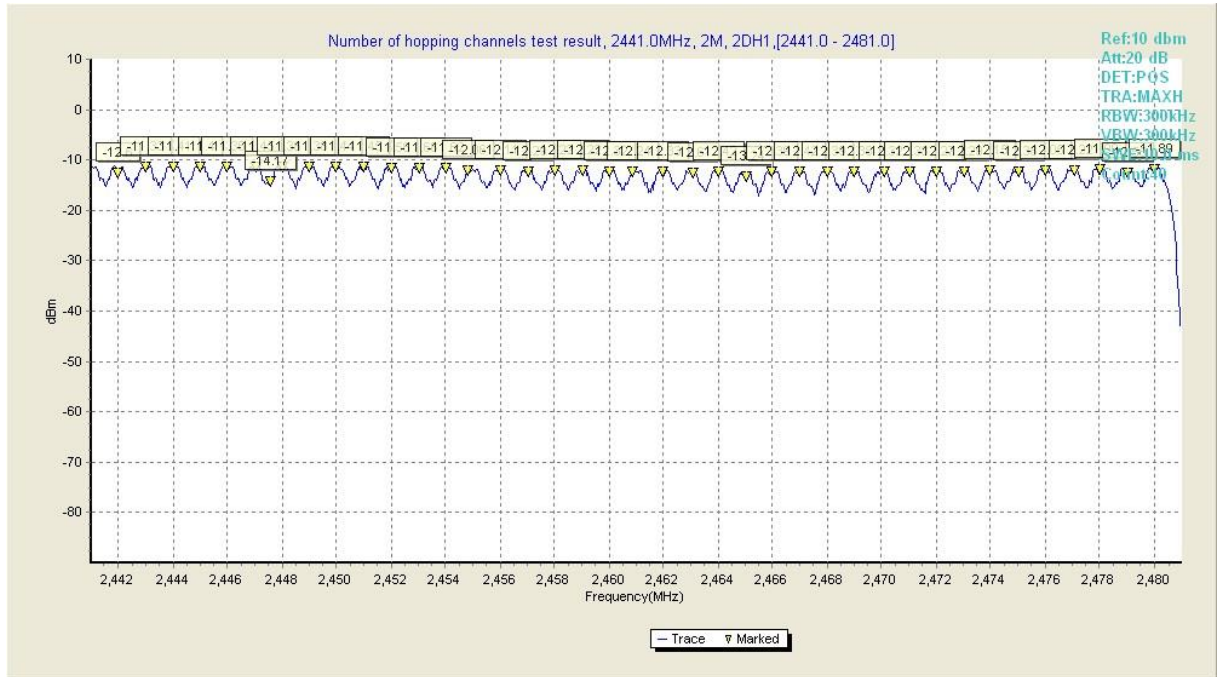
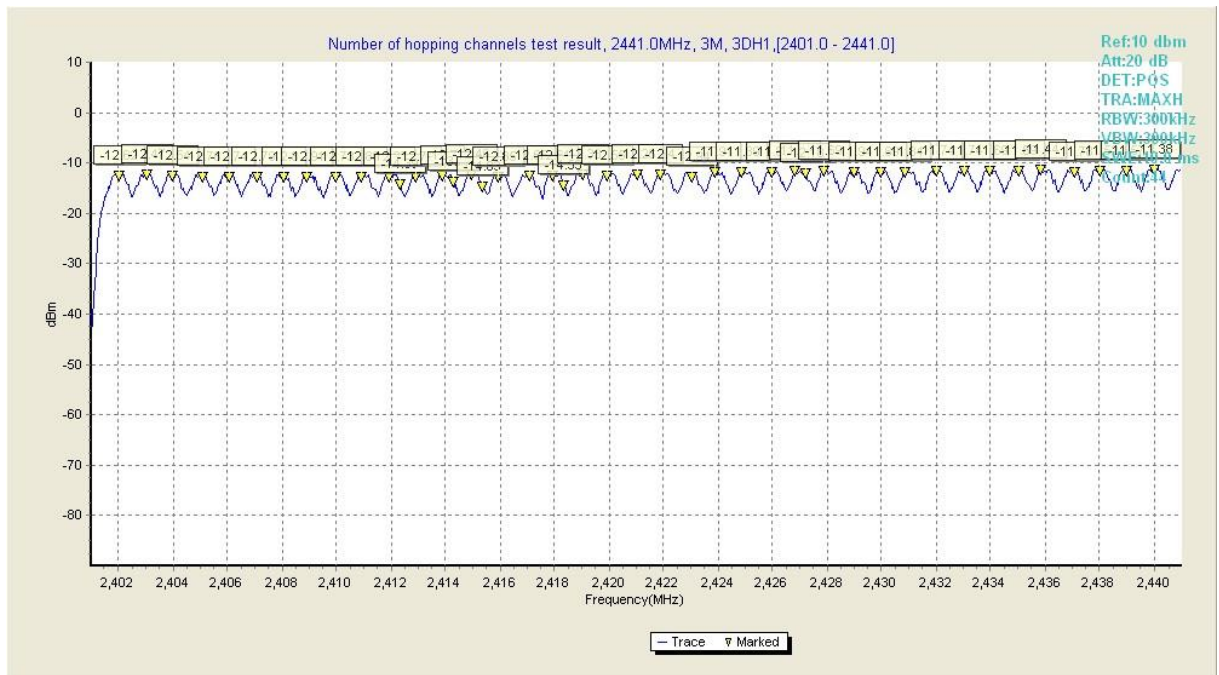


Fig35. Dwell Time in 2Mbps

8DPSK Modulation

Hopping Channel Frequency Range(MHz)	Limits(Channel)	Number of hopping Channel	Test Results	Verdict
2402~2480	15	79	Fig.36	Pass



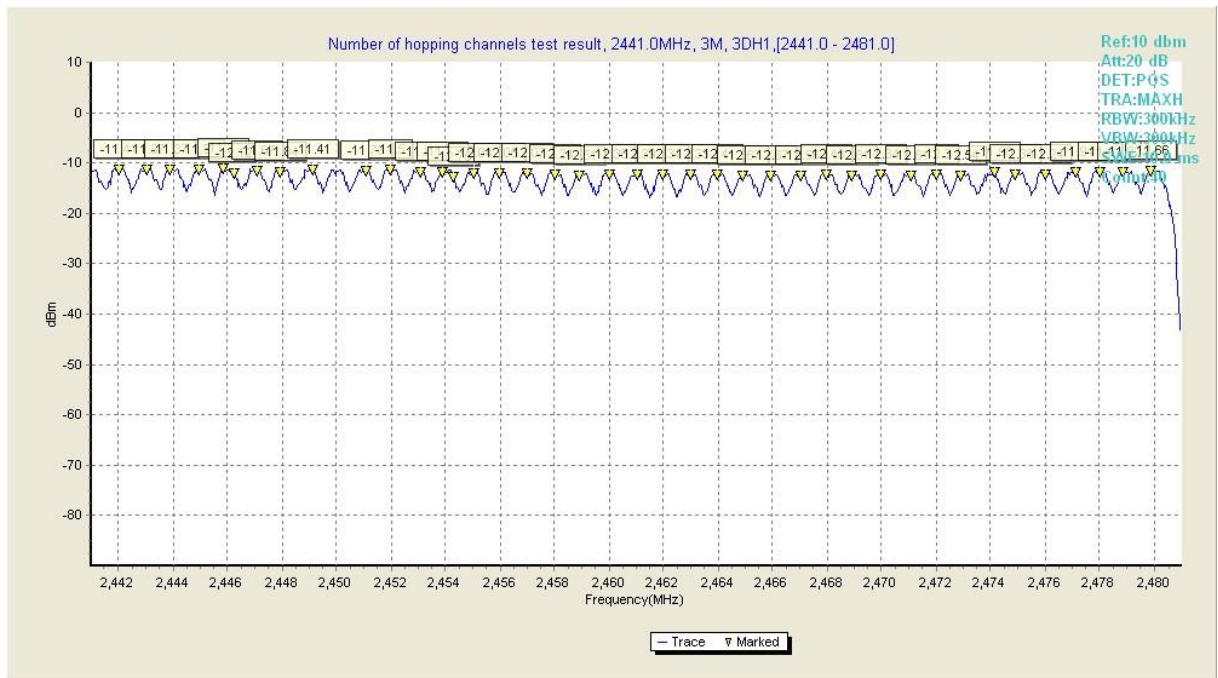


Fig36. Dwell Time in 3Mbps

B.7 Conducted Spurious Emissions

B.7.1 Description

According to §15.247(d),

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

B.7.2 Test Procedures

Conducted Measurement

EUT was set for low, mid, high channel with modulated mode and highest RF output power

The spectrum analyzer was connected to the antenna terminal.

Procedures

- a) The EUT was connected to SA by a low loss cable.
- b) Set RBW=100 kHz, VBW $\geq$ RBW, scan up to 10th harmonics. All harmonics/Spurs emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

B.7.3 Test Result

GFSK Modulation

Channel	Frequency Range	Test Results	Verdict
0	30MHz ~ 1GHz	Fig.37	Pass
	1GHz ~ 10GHz	Fig.38	Pass
	10GHz ~ 26GHz	Fig.38	Pass
39	30MHz ~ 1GHz	Fig.39	Pass
	1GHz ~ 10GHz	Fig.40	Pass
	10GHz ~ 26GHz	Fig.41	Pass
78	30MHz ~ 1GHz	Fig.42	Pass
	1GHz ~ 10GHz	Fig.43	Pass
	10GHz ~ 26GHz	Fig.44	Pass

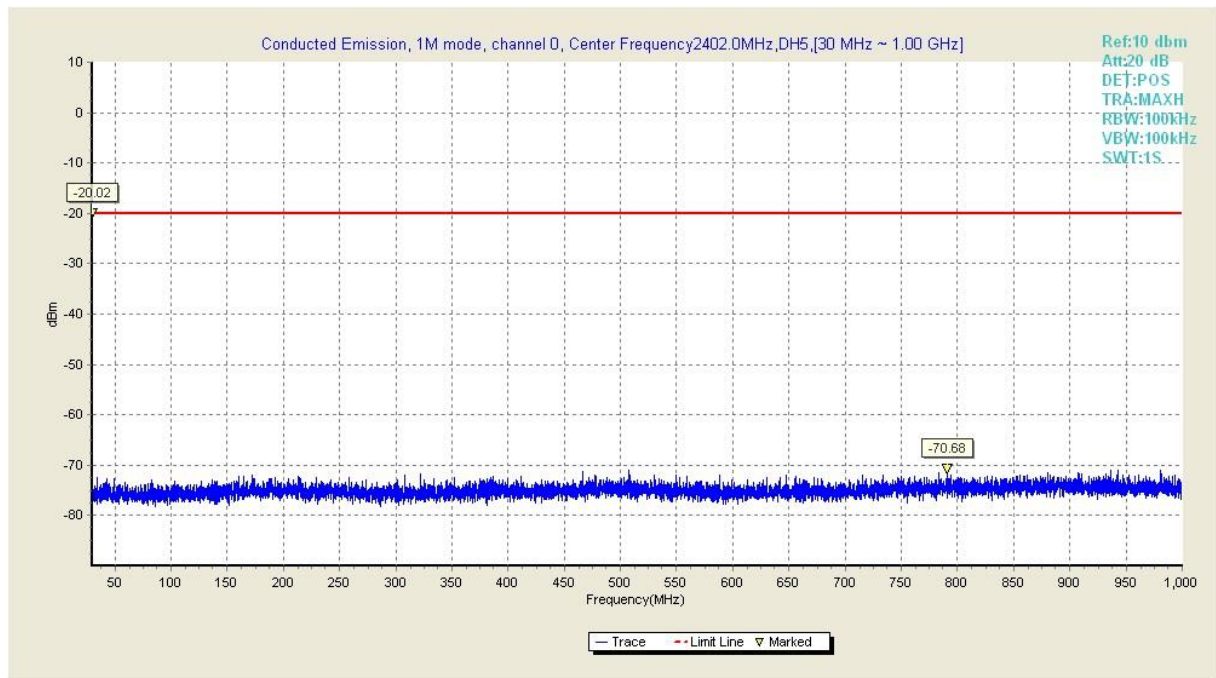


Fig.37 Conducted Emission in 1M mode ,channel 0, (30 MHz ~ 1 GHz)

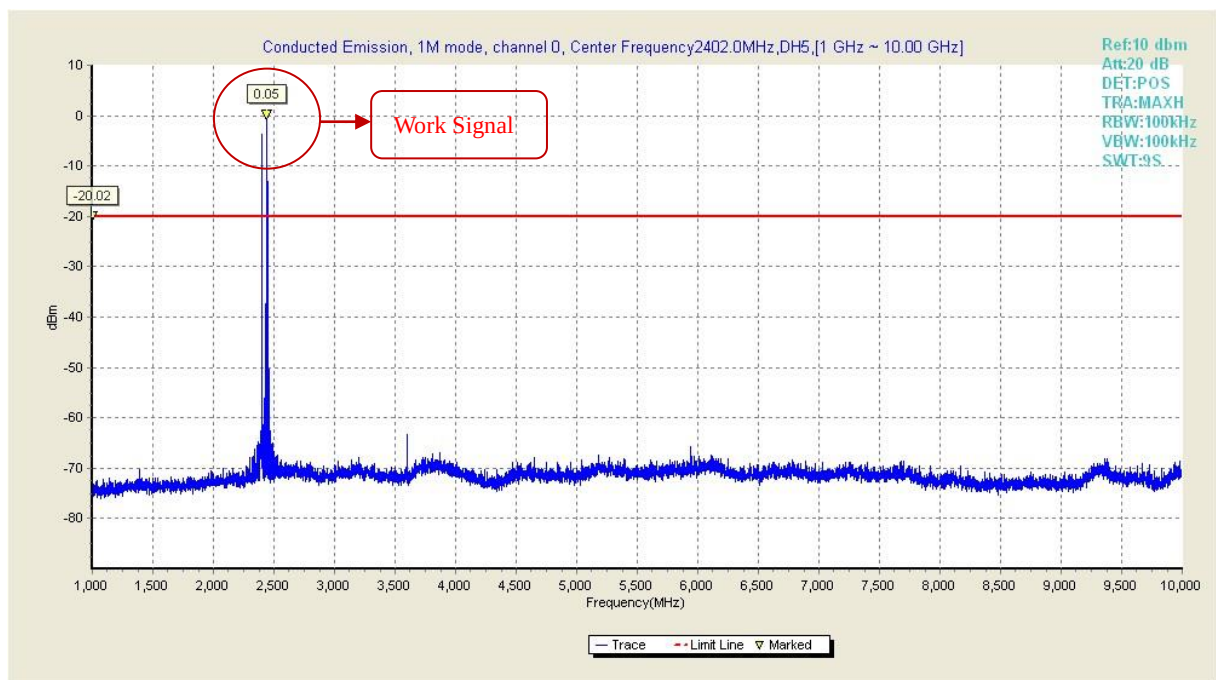


Fig.38 Conducted Emission in 1M mode ,channel 0, (1 GHz ~ 10 GHz)

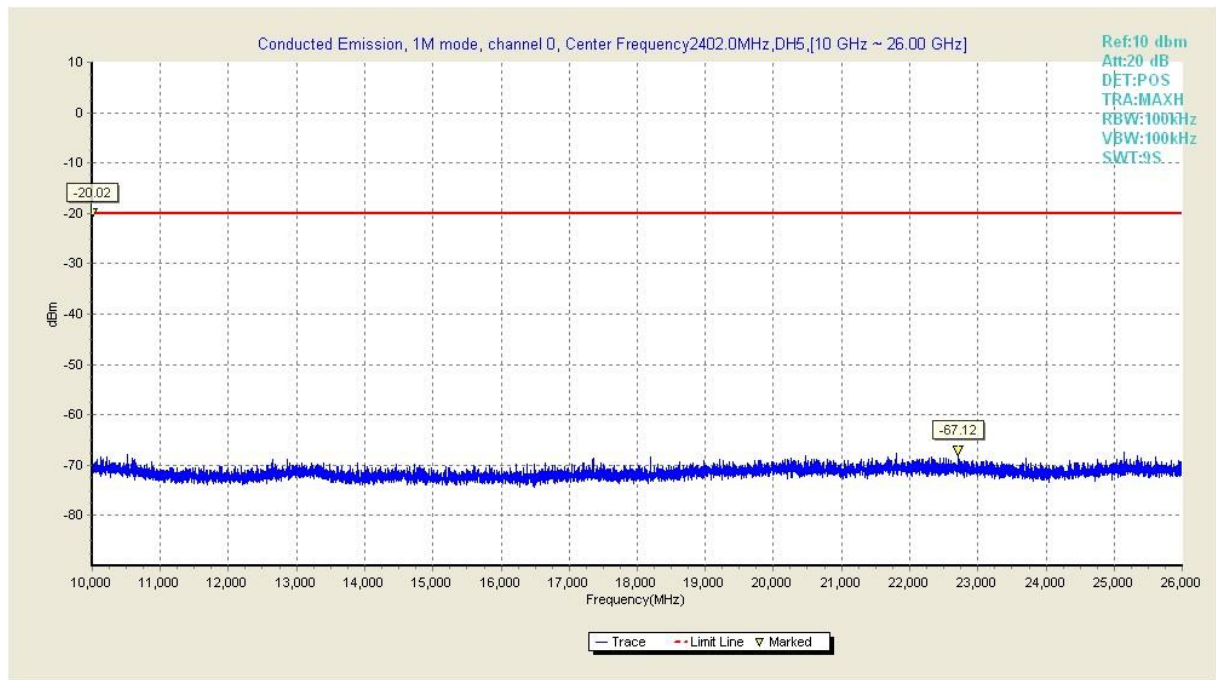


Fig.39 Conducted Emission in 1M mode ,channel 0, (10 GHz ~ 26 GHz)

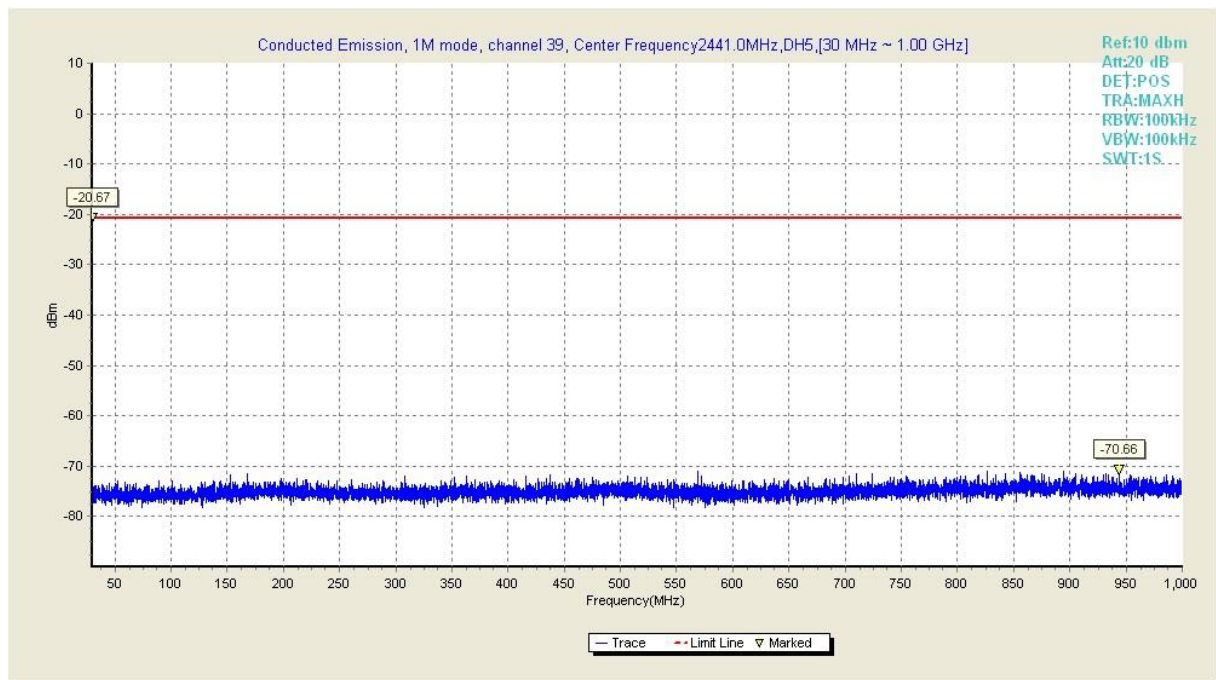


Fig.40 Conducted Emission in 1M mode ,channel 39, (30 MHz ~ 1 GHz)

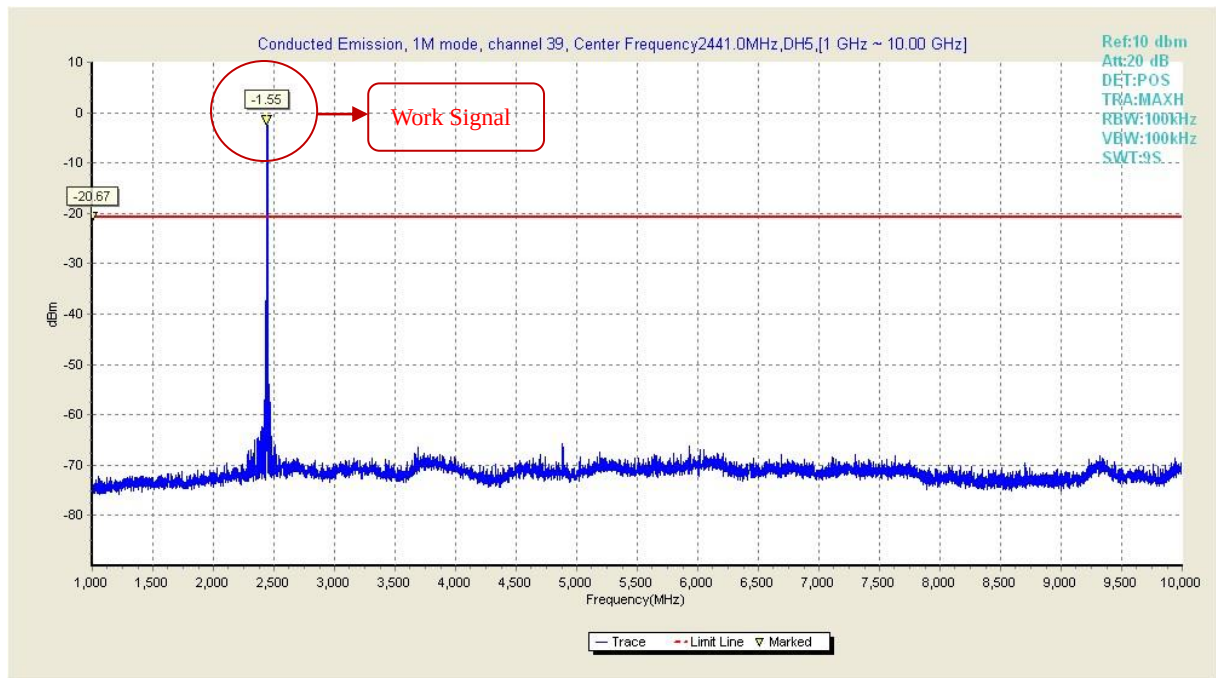


Fig.41 Conducted Emission in 1M mode ,channel 39, (1 GHz ~ 10 GHz)

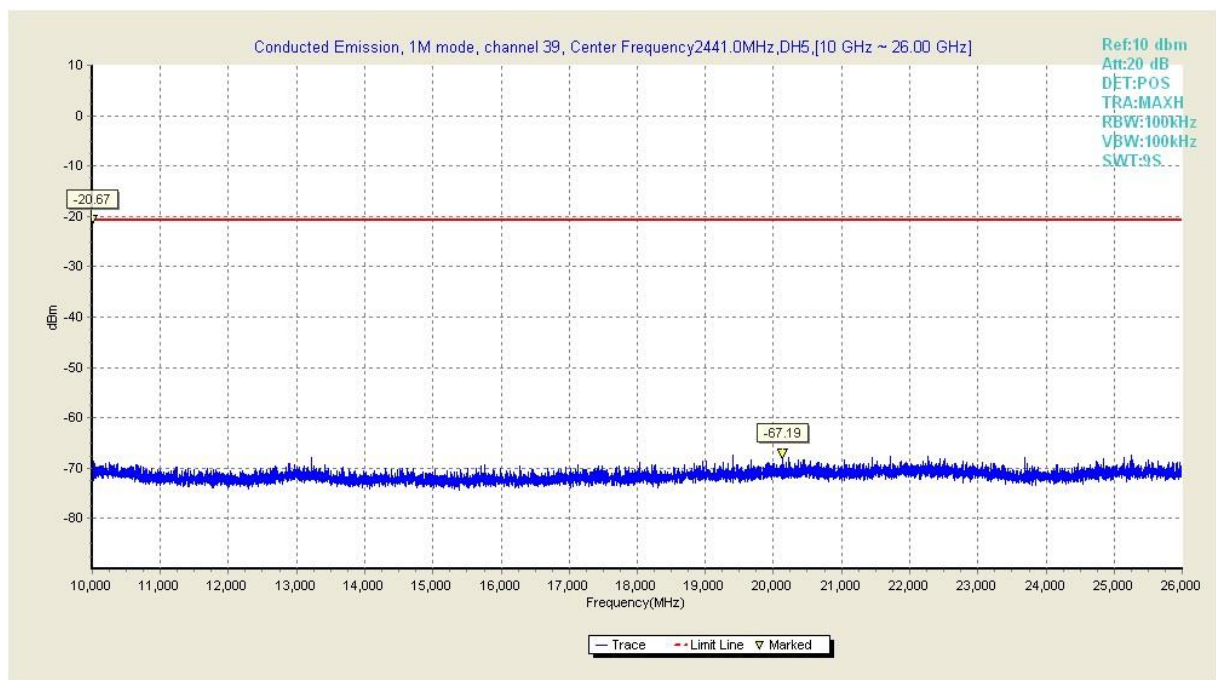


Fig.42 Conducted Emission in 1M mode ,channel 39, (10 GHz ~ 26 GHz)

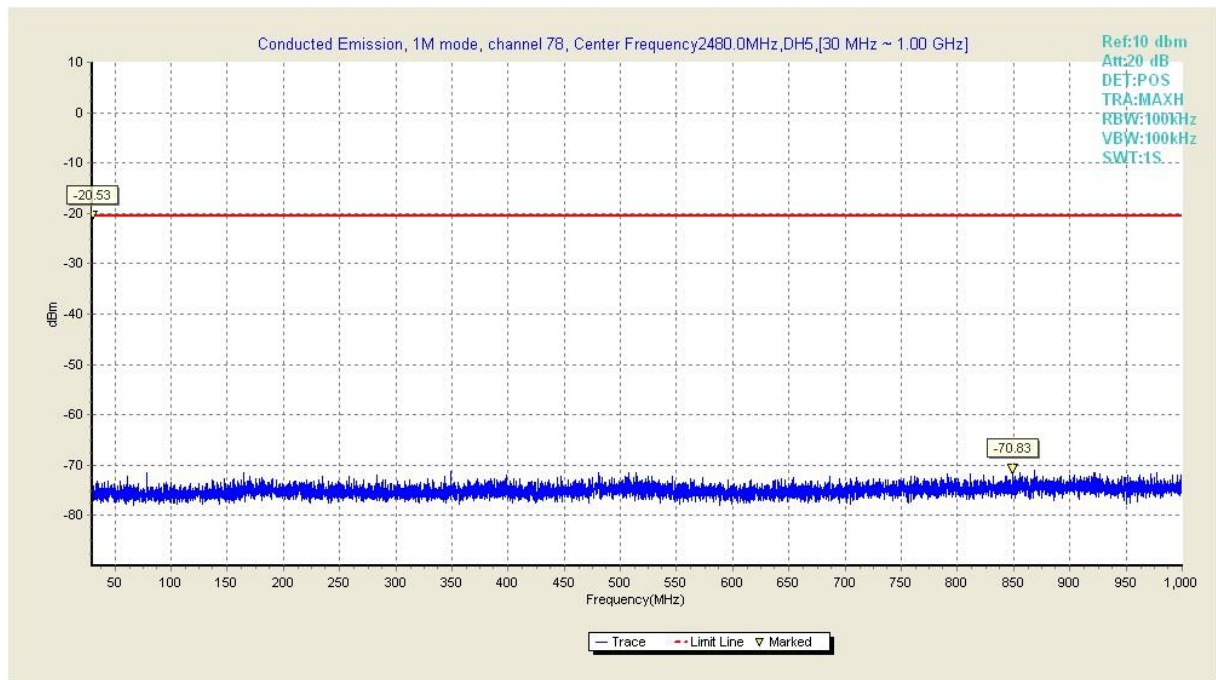


Fig.43 Conducted Emission in 1M mode ,channel 78, (30 MHz ~ 1 GHz)

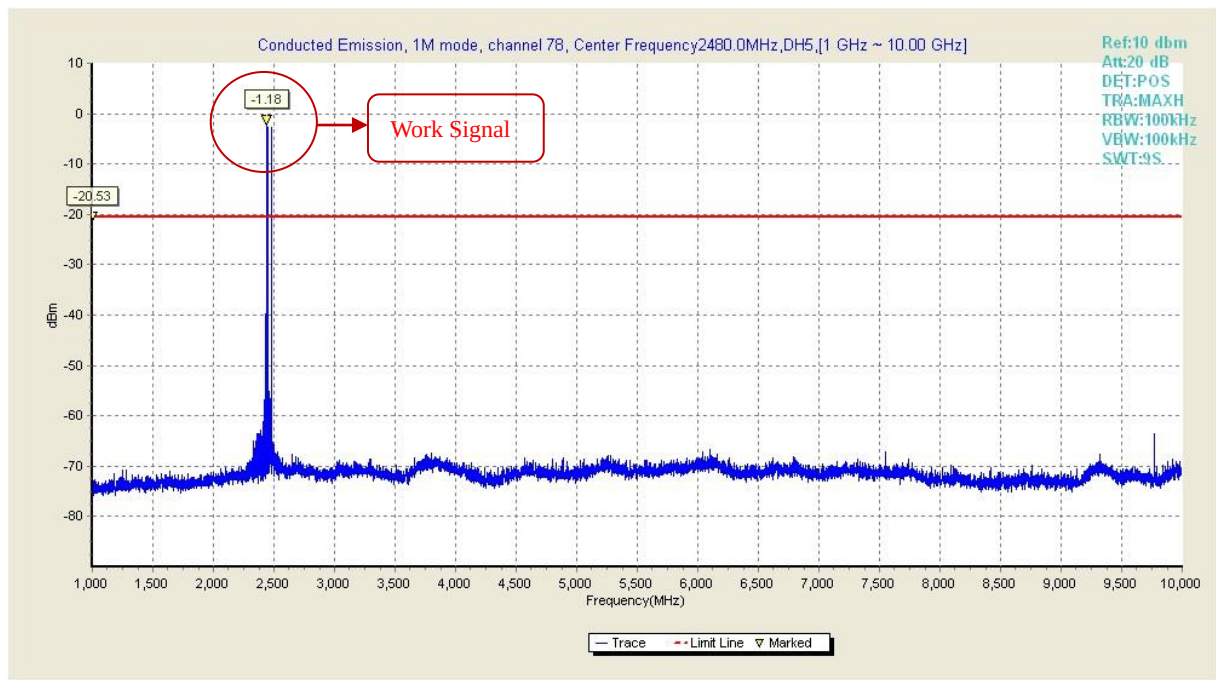


Fig.44 Conducted Emission in 1M mode ,channel 78, (1 GHz ~ 10 GHz)

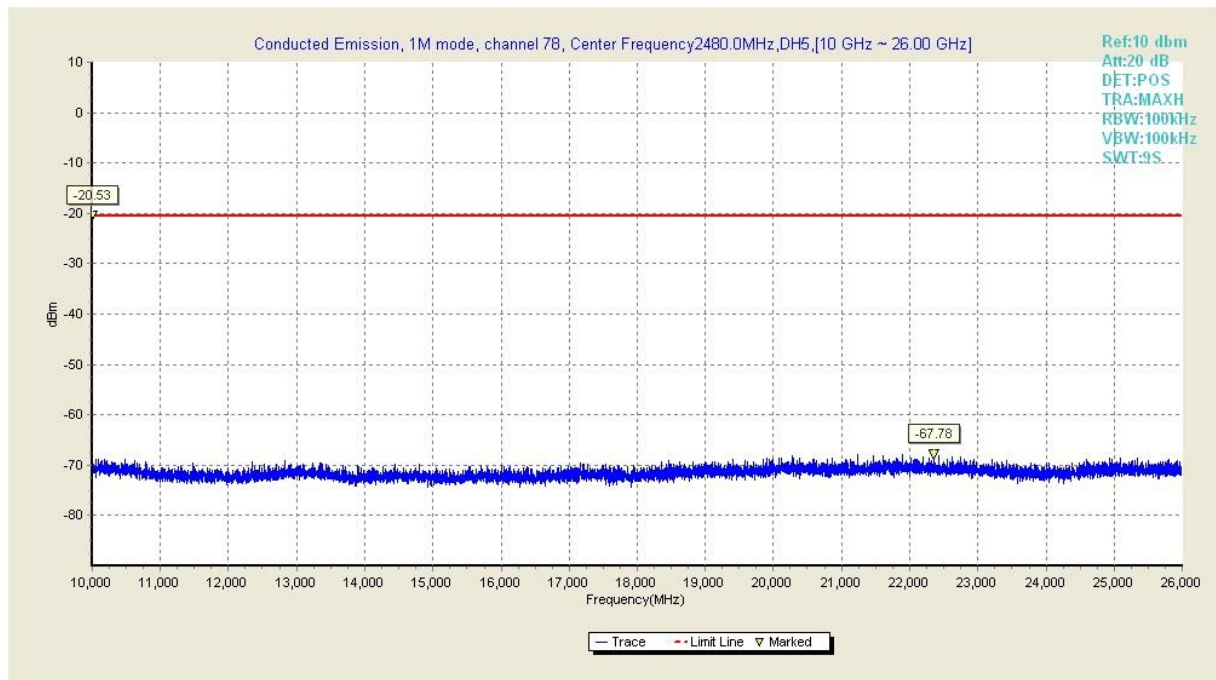


Fig.45 Conducted Emission in 1M mode ,channel 78, (10 GHz ~ 26 GHz)

$\pi/4$ -DQPSK Modulation

Channel	Frequency Range	Test Results	Verdict
0	30MHz ~ 1GHz	Fig.46	Pass
	1GHz ~ 10GHz	Fig.47	Pass
	10GHz ~ 26GHz	Fig.48	Pass
39	30MHz ~ 1GHz	Fig.49	Pass
	1GHz ~ 10GHz	Fig.50	Pass
	10GHz ~ 26GHz	Fig.51	Pass
78	30MHz ~ 1GHz	Fig.52	Pass
	1GHz ~ 10GHz	Fig.53	Pass
	10GHz ~ 26GHz	Fig.54	Pass

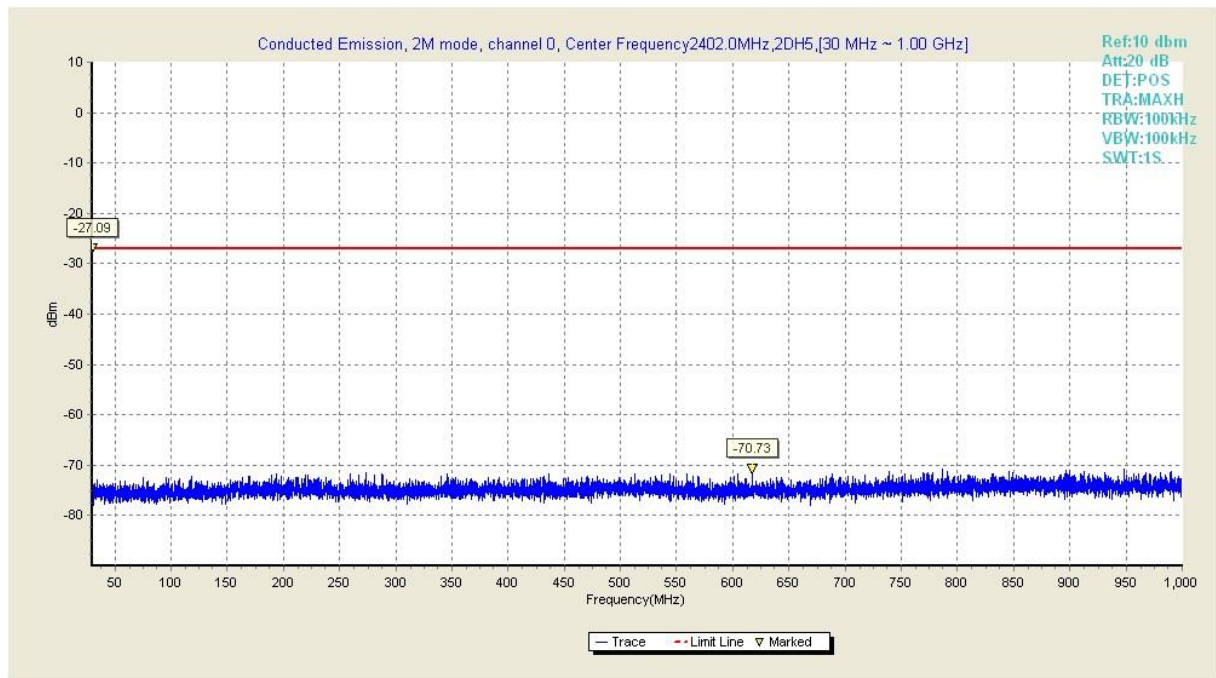


Fig.46 Conducted Emission in 2M mode ,channel 0, (30 MHz ~ 1 GHz)

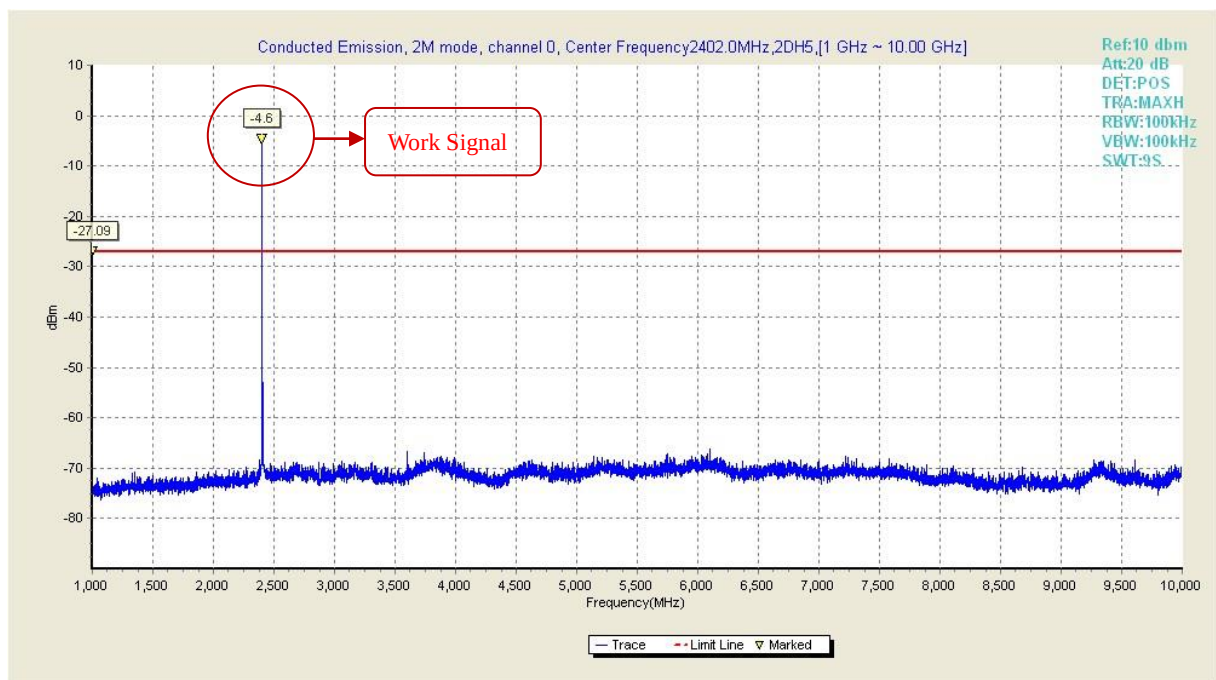


Fig.47 Conducted Emission in 2M mode ,channel 0, (1 GHz ~ 10 GHz)

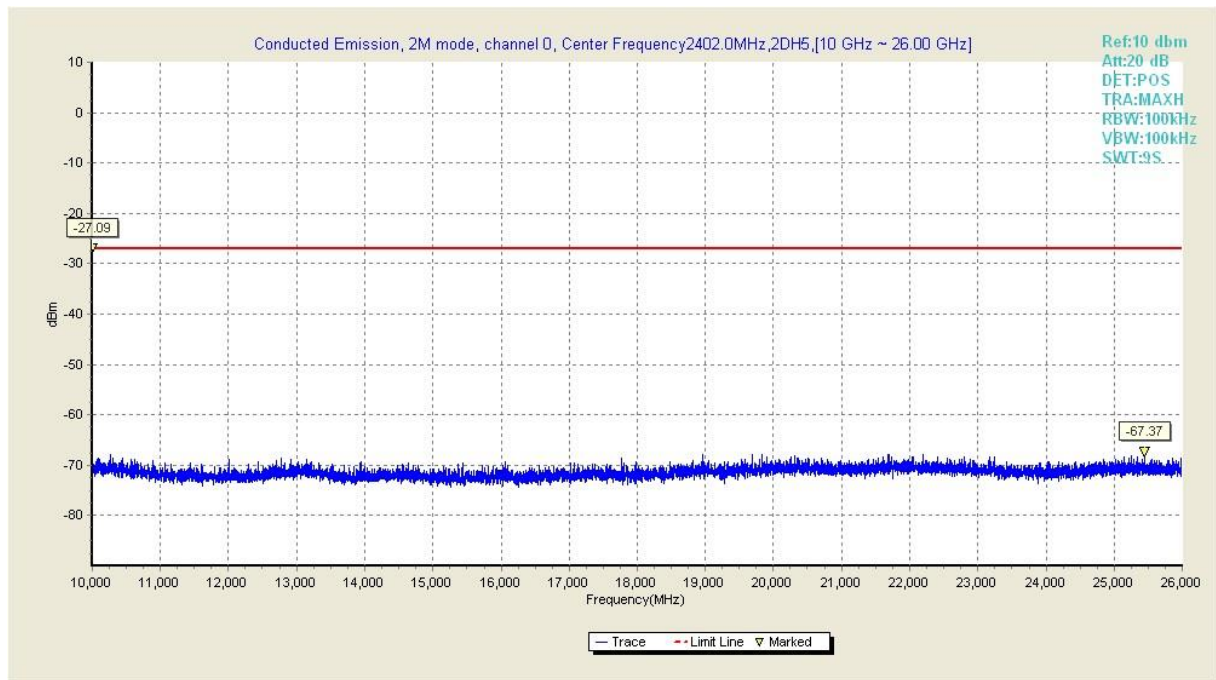


Fig.48 Conducted Emission in 2M mode ,channel 0, (10 GHz ~ 26 GHz)

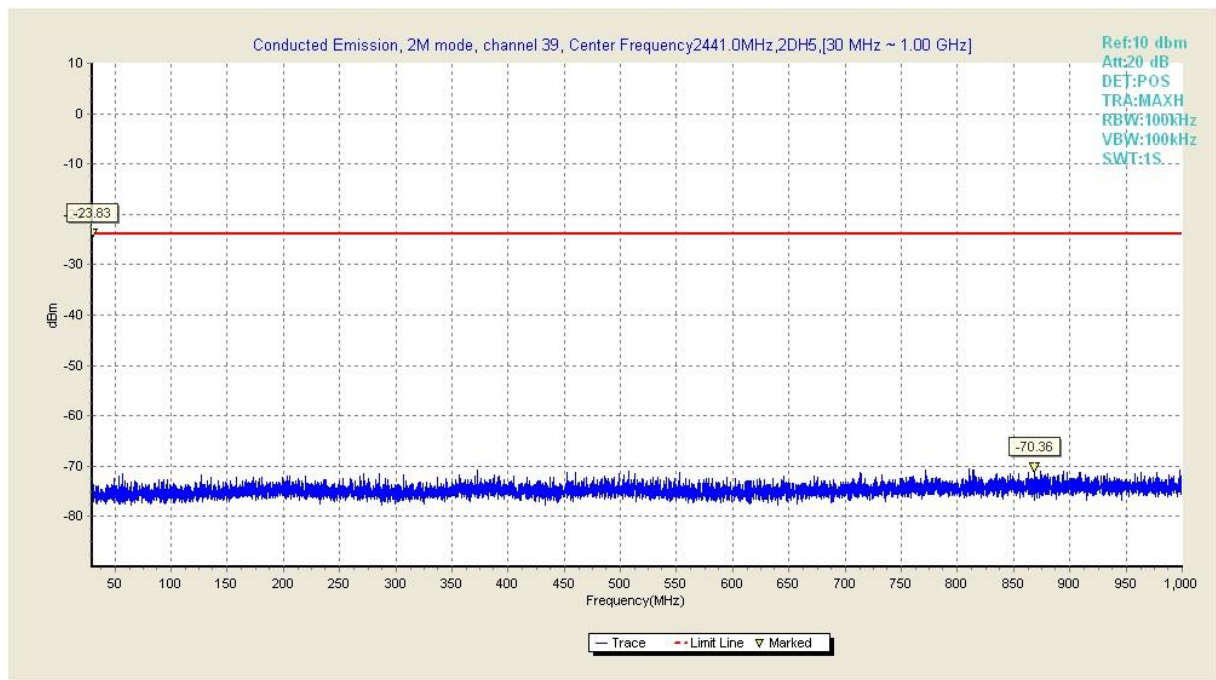


Fig.49 Conducted Emission in 2M mode ,channel 39, (30 MHz ~ 1 GHz)

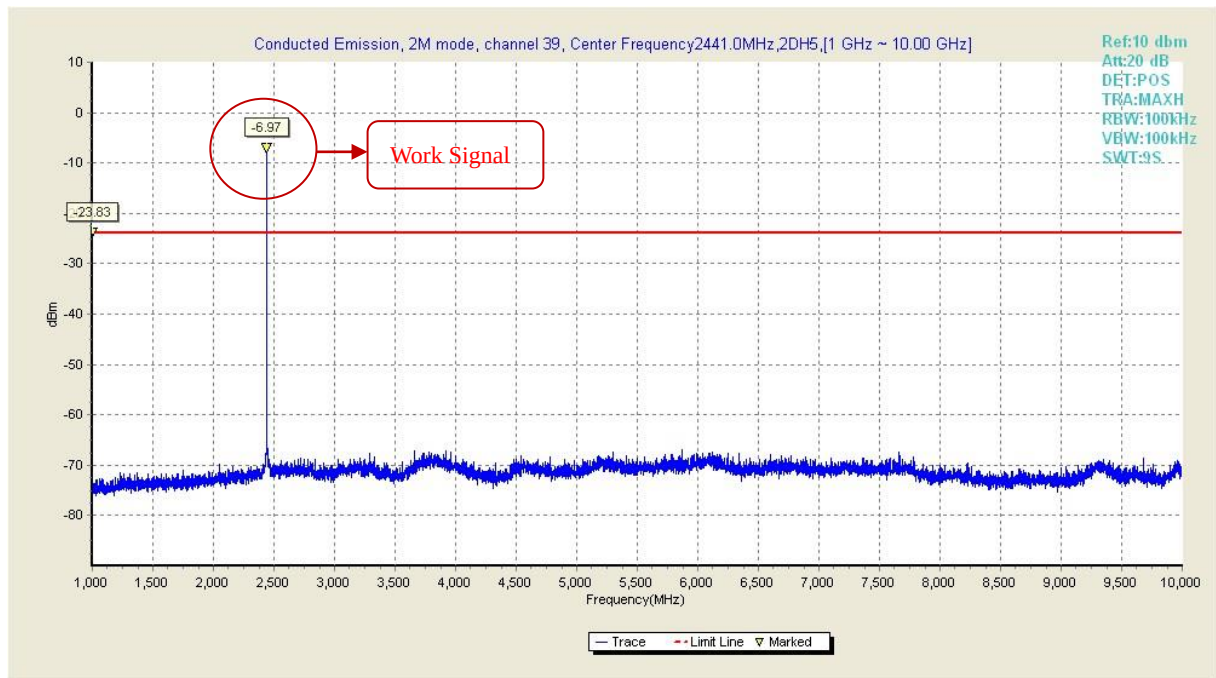


Fig.50 Conducted Emission in 2M mode ,channel 39, (1 GHz ~ 10 GHz)

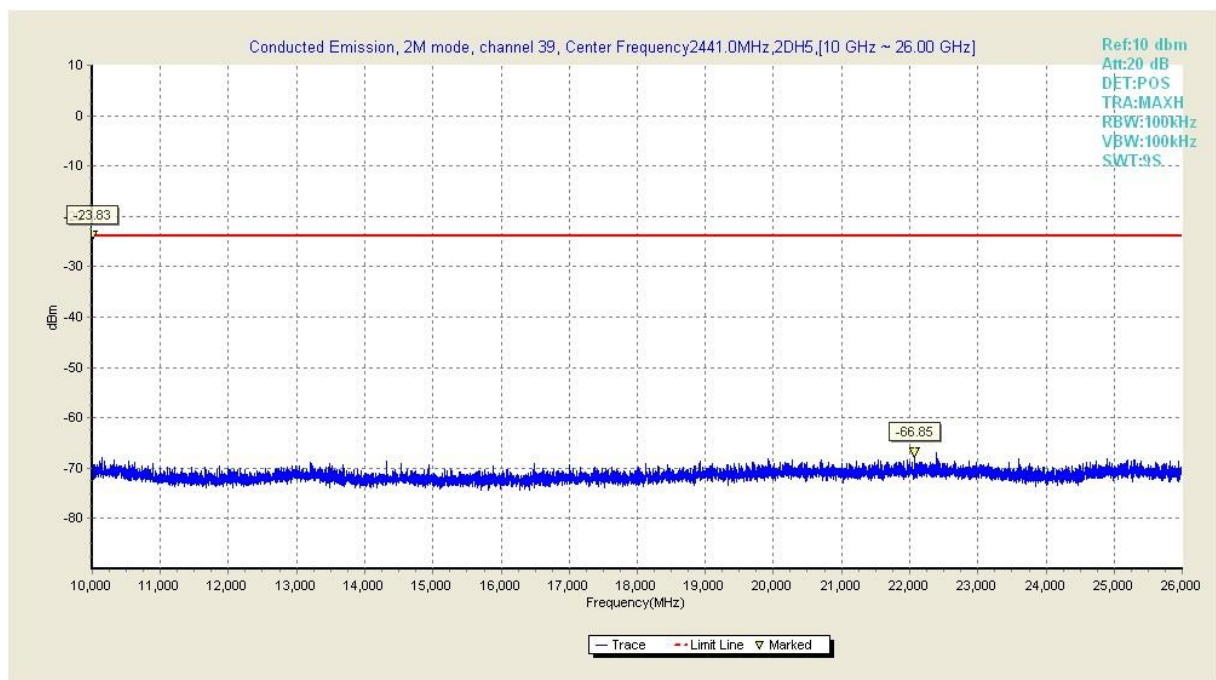


Fig.51 Conducted Emission in 2M mode ,channel 39, (10 GHz ~ 26 GHz)