


BUREAU  
VERITAS

Test Report No.: FC120411N005

**TEST REPORT**



To:	Zhongshan K-mate General Electronics Co., Ltd
Address:	B1 Building, Fuwan Ind. Zone, Fuwan Nan Road, East District, Zhongshan, China

Manufacturer or Supplier	Zhongshan K-mate General Electronics Co., Ltd	
Address	B1 Building, Fuwan Ind. Zone, Fuwan Nan Road, East District, Zhongshan, China	
Product:	Bluetooth Stereo Headset	
Brand Name:	K-mate	
Model:	BTH033	
Date of tests:	April. 11 ~ April. 26, 2012	

the tests have been carried out according to the requirements of the following standards:

☒ **FCC Part 15, Subpart C (Section 15.249)**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Prepared by Glyn He Project Engineer / EMC Department	Approved by Sam Tung Manager / EMC Department
	
Date: Apr.26, 2012	

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## TABLE OF CONTENTS

<b>RELEASE CONTROL RECORD.....</b>	<b>3</b>
<b>1 SUMMARY OF TEST RESULTS.....</b>	<b>4</b>
<b>2 MEASUREMENT UNCERTAINTY .....</b>	<b>4</b>
<b>3 GENERAL INFORMATION.....</b>	<b>5</b>
3.1 GENERAL DESCRIPTION OF EUT .....	5
3.2 DESCRIPTION OF TEST MODES .....	6
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	7
3.4 DESCRIPTION OF SUPPORT UNITS.....	7
<b>4. TEST TYPES AND RESULTS.....</b>	<b>8</b>
4.1 CONDUCTED EMISSION MEASUREMENT .....	8
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	8
4.1.2 TEST INSTRUMENTS .....	8
4.1.3 TEST PROCEDURES.....	9
4.1.4 DEVIATION FROM TEST STANDARD.....	9
4.1.5 TEST SETUP .....	10
4.1.6 EUT OPERATING CONDITIONS .....	10
4.1.7 TEST RESULTS.....	11
4.2 RADIATED EMISSION MEASUREMENT .....	13
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT.....	13
4.2.2 TEST INSTRUMENTS .....	14
4.2.3 TEST PROCEDURES.....	15
4.2.4 DEVIATION FROM TEST STANDARD.....	16
4.2.5 TEST SETUP .....	16
4.2.6 EUT OPERATING CONDITIONS .....	16
4.2.7 TEST RESULTS.....	17
4.3 20dB BANDWIDTH MEASUREMENT.....	21
4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT .....	21
4.3.2 TEST INSTRUMENTS .....	21
4.3.3 TEST PROCEDURE .....	22
4.3.4 DEVIATION FROM TEST STANDARD.....	22
4.3.5 TEST SETUP .....	23
4.3.6 EUT OPERATING CONDITIONS .....	23
4.3.7 TEST RESULTS.....	24
<b>5 PHOTOGRAPHS OF THE TEST CONFIGURATION.....</b>	<b>30</b>
<b>6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE</b>	
<b>    EUT BY THE LAB.....</b>	<b>31</b>



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**Test Report No.: FC120411N005**

## **RELEASE CONTROL RECORD**

<b>ISSUE NO.</b>	<b>REASON FOR CHANGE</b>	<b>DATE ISSUED</b>
Original release	N/A	Apr. 26, 2012



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	Compliant
§15.207 (a)	Conducted Emission	PASS	Compliant
§15.205	Restricted Band of Operation	PASS	Compliant
§15.209 §15.249(a)	Radiated Emission	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

## 2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	3.19dB
	200MHz ~1000MHz	3.21dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



### **3 GENERAL INFORMATION**

#### **3.1 GENERAL DESCRIPTION OF EUT**

<b>PRODUCT</b>	Bluetooth Stereo Headset
<b>MODEL NO.</b>	BTH033
<b>ADDITIONAL MODEL &amp; MODEL DIFFERENCE:</b>	N/A
<b>FCC ID</b>	WAD-BTH033
<b>NOMINAL VOLTAGE</b>	DC 3.7V By Battery or DC 5V By USB
<b>MODULATION TYPE</b>	FHSS
<b>OPERATING FREQUENCY</b>	2402-2480MHz
<b>ANTENNA TYPE</b>	Integral Antenna; 0dBi gain
<b>I/O PORTS</b>	USB input Port, AUX Port
<b>DATA CABLE SUPPLIED</b>	USB Cable: Unshielded, Detachable, 0.6m Audio Cable: Unshielded, Detachable, 1.0m

**NOTE:**

1. The EUT was powered by the following adapters:

<b>ADAPTER</b>	
<b>BRAND:</b>	N/A
<b>MODEL:</b>	N/A
<b>INPUT:</b>	N/A
<b>OUTPUT:</b>	N/A
<b>DC LINE:</b>	N/A

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

Following channel(s) was (were) selected for the test as listed below.

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE	PACKET TYPE
Low, Middle, High	FHSS	GFSK	1M/2M/3M	DH1/3/5
Low, Middle, High	FHSS	8DPSK	1M/2M/3M	DH1/3/5
Low, Middle, High	FHSS	$\pi/4$ DPSK	1M/2M/3M	DH1/3/5

CHANNEL NUMBER	TESTED CHANNEL	TESTED FREQUENCY
0	Low	2402 MHz
39	Mid.	2441 MHz
78	High	2480 MHz

After estimating all the combination of every test mode, the result shown as below is the worst case

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE	PACKET TYPE
Low, Middle, High	FHSS	GFSK	3M	DH5



### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.249)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	iPhone 4	APPLE	A1332	81124KCJA4S	N/A
2	Notebook	DELL	D531	CN-0XM006-48643 -81U-2610	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

**NOTE:**



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
EMI Test Receiver Rohde&Schwarz	ESCS30	100199	May 25,11	May 25,12
Artificial Mains Network Rohde&Schwarz	ENV216	101173	May 25,11	May 25,12
Artificial Mains Network Rohde&Schwarz	ESH2-Z5	100071	May 25,11	May 25,12
RF Cable FUJIKURA	3D-2W	553 Cable	May 02,11	May 02,12
Test software	ADT_Conc_V7.3.7	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA
2. The test was performed in Dongguan Shielded Room 553.





#### 4.1.3 TEST PROCEDURES

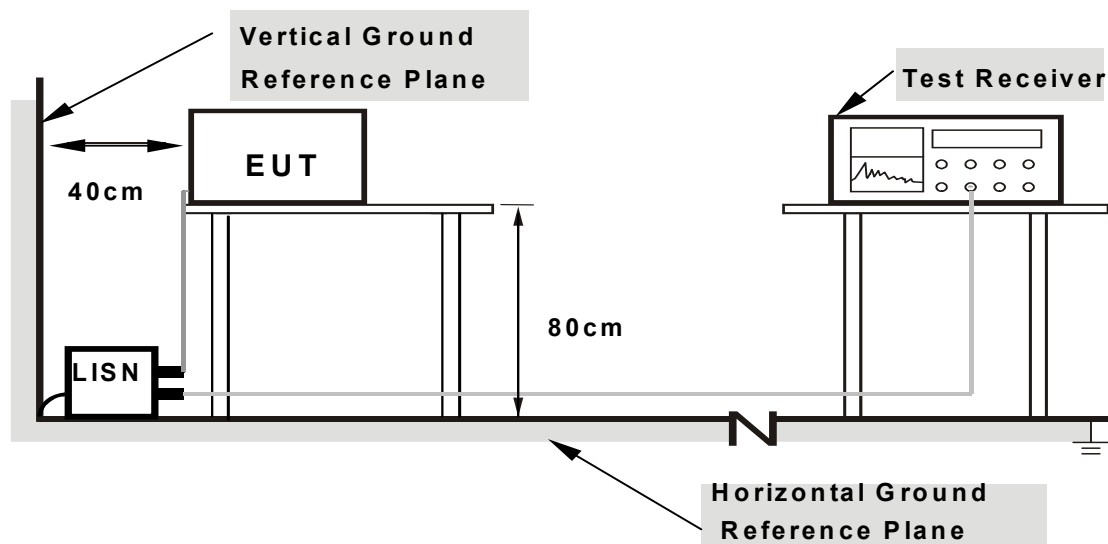
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. Playing the music from PC or iPhone. And Charging from the PC.
- c. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.



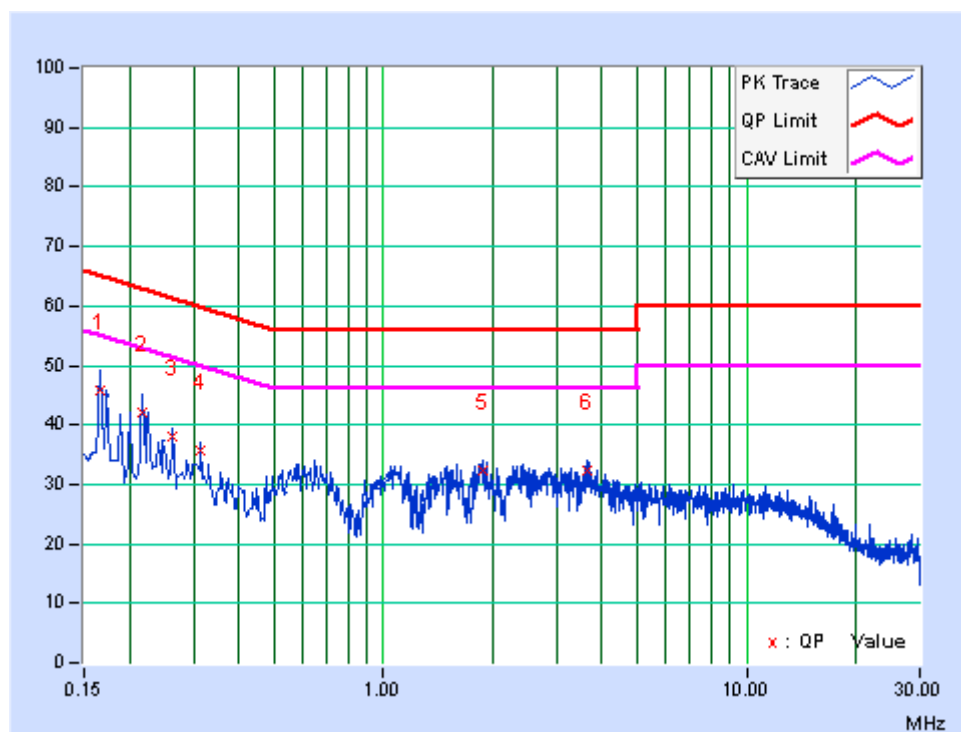
#### 4.1.7 TEST RESULTS

##### CONDUCTED WORST-CASE DATA

PHASE	Line	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.80	35.90	23.15	45.70	32.95	65.18	55.18	-19.48	-22.23
2	0.21647	9.75	32.22	20.36	41.97	30.11	62.95	52.95	-20.98	-22.84
3	0.26339	9.75	28.42	16.89	38.17	26.64	61.32	51.32	-23.15	-24.68
4	0.31422	9.75	25.96	14.38	35.71	24.13	59.86	49.86	-24.14	-25.72
5	1.8704	9.81	22.65	11.47	32.46	21.28	56.00	46.00	-23.54	-24.72
6	3.62208	9.84	22.35	11.68	32.19	21.52	56.00	46.00	-23.81	-24.48

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

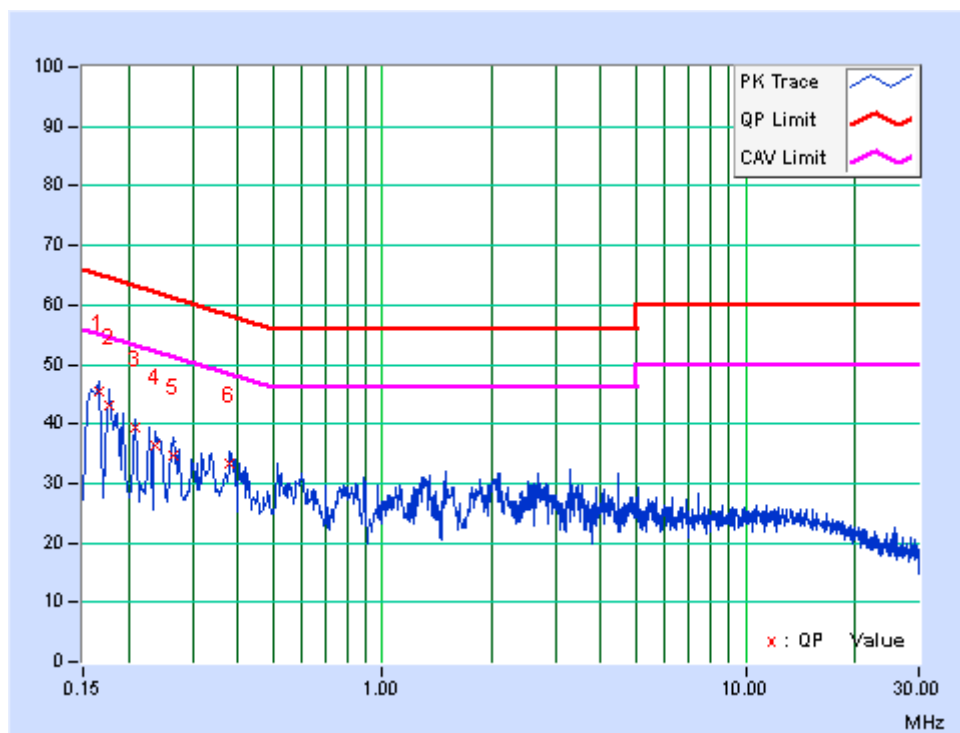




PHASE	Neutral	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.87	35.42	18.16	45.29	28.03	65.18	55.18	-19.89	-27.15
2	0.17744	9.83	33.35	16.21	43.18	26.04	64.60	54.60	-21.42	-28.56
3	0.20865	9.77	29.54	13.43	39.31	23.20	63.26	53.26	-23.95	-30.06
4	0.23602	9.77	26.73	12.05	36.50	21.82	62.24	52.24	-25.73	-30.41
5	0.26695	9.77	24.91	12.57	34.68	22.34	61.21	51.21	-26.53	-28.87
6	0.38099	9.78	23.65	13.82	33.43	23.60	58.26	48.26	-24.83	-24.66

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
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

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

**4.2.2 TEST INSTRUMENTS**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY46180622	Apr. 25, 11	Apr. 25, 12
Test Receiver ROHDE & SCHWARZ	ESVS10	841431/004	May 25,11	May 25,12
Bilog Antenna TESEQ	CBL 6111D	25758	Nov.07,11	Nov.07,12
Horn Antenna EMCO	3117	00062558	Nov.07,11	Nov.07,12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	May 02,11	May 02,12
RF Cable IMRO	IMRO-400	10m Cable 1#10m	May 02,11	May 02,12
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 02,11	May 02,12
Signal Amplifier EMCI	EMC330	980095	Nov 07,11	Nov 07,12
Signal Amplifier EMCI	EMC 012645	980077	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 02,11	May 02,12
Test software ADT	ADT_Radiated_V7. 6.15	N/A	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
  2. The test was performed in Dongguan Chamber 10m.
  3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.

#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using new battery. The turntable was rotated to maximize the emission level.
- g. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

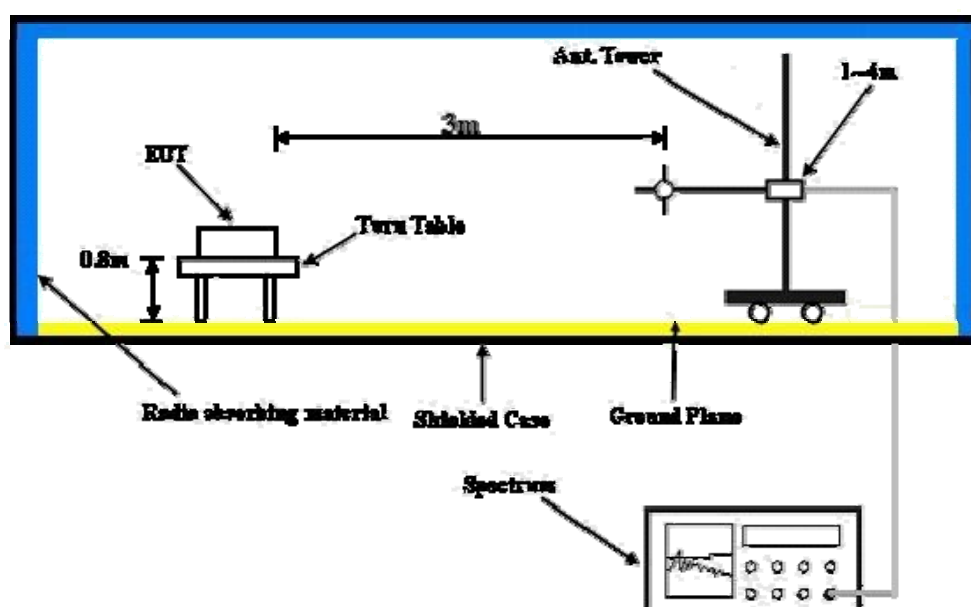
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

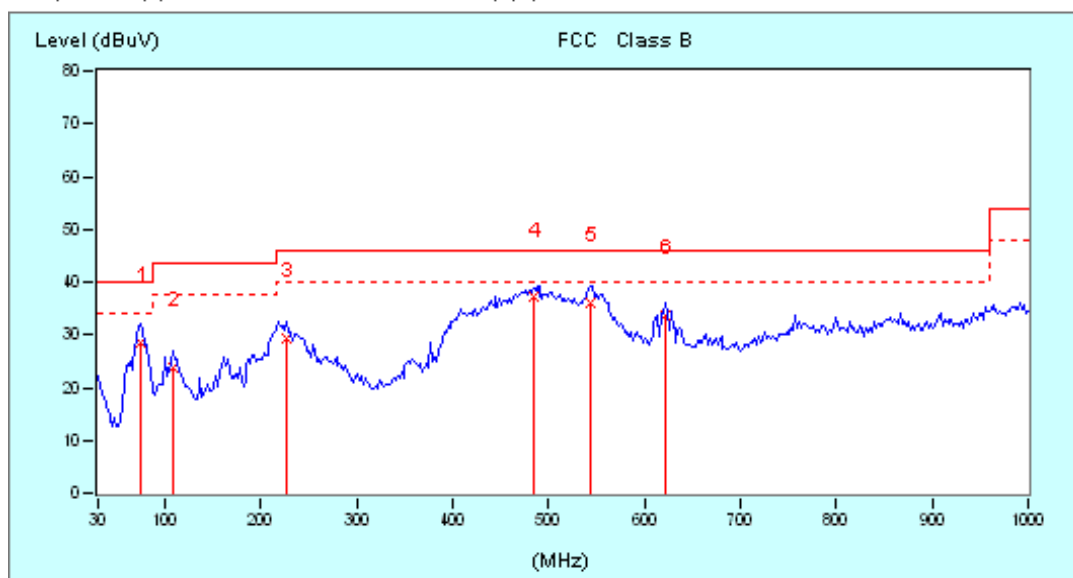




#### 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA: Middle channel

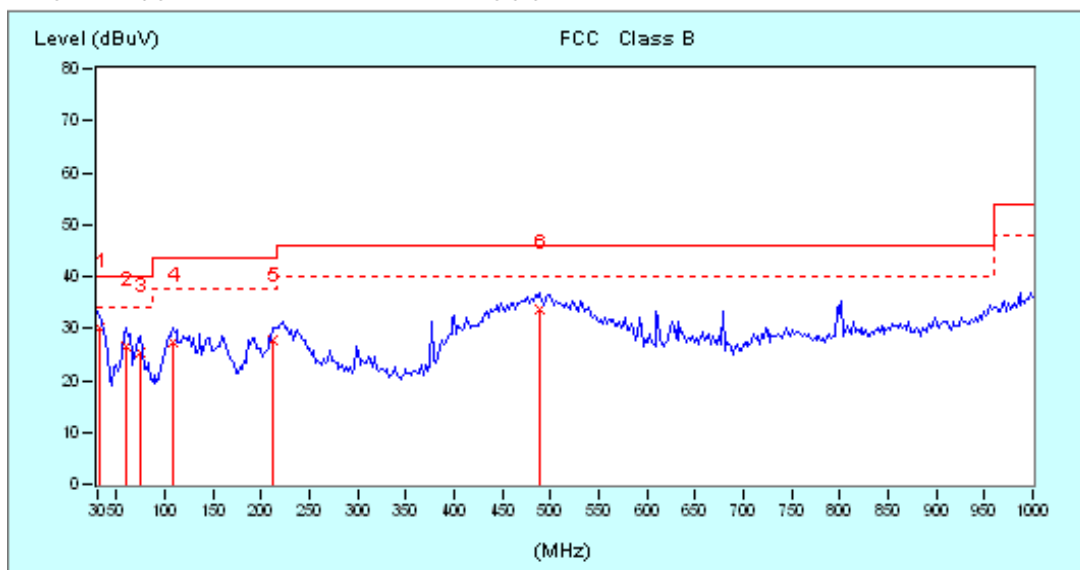
Polarity: Horizontal

[illegible]



Temperature (C): 25.0

Polarity: Vertical

[illegible]

**REMARKS:**

1. Emission level (dBuV/m) = Reading (dBuV) + Factor (dB/m).
2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



ABOVE 1GHz WORST-CASE DATA: Low channel

Frequency MHz	Detector	Raw Value dBuV	Polar H / V	Correction factor dB/m	Emission level dBuV/m	Limit dBuV/m	Margin dB
2390.00	PK	19.24	V	36.41	55.65	74	-18.35
2390.00	AV	6.24	V	36.41	42.65	54	-11.35
2390.00	PK	17.26	H	36.41	53.67	74	-20.33
2390.00	AV	4.20	H	36.41	40.61	54	-13.39
2402.00	PK	61.51	V	34.94	96.45	114	-17.55
2402.00	AV	48.75	V	34.94	83.69	94	-10.31
2402.00	PK	57.21	H	34.94	92.15	114	-21.85
2402.00	AV	44.14	H	34.94	79.08	94	-14.92
4804.00	PK	10.04	V	49.25	59.29	74	-14.71
4804.00	AV	-1.77	V	49.25	47.48	54	-6.52
4804.00	PK	7.63	H	49.25	56.88	74	-17.12
4804.00	AV	-4.05	H	49.25	45.20	54	-8.80

ABOVE 1GHz WORST-CASE DATA: Middle channel

Frequency MHz	Detector	Raw Value dBuV	Polar H / V	Correction factor dB/m	Emission level dBuV/m	Limit dBuV/m	Margin dB
2441.00	PK	61.64	V	35.25	96.89	114	-17.11
2441.00	AV	49.41	V	35.25	84.66	94	-9.34
2441.00	PK	56.10	H	35.25	91.35	114	-22.65
2441.00	AV	47.08	H	35.25	82.33	94	-11.67
4882.00	PK	8.33	V	49.23	57.56	74	-16.44
4882.00	AV	-0.69	V	49.23	48.54	54	-5.46
4882.00	PK	20.17	H	49.23	69.40	74	-4.60
4882.00	AV	3.26	H	49.23	52.49	54	-1.51



ABOVE 1GHz WORST-CASE DATA: High channel

Frequency MHz	Detector	Raw Value dBuV	Polar H / V	Correction factor dB/m	Emission level dBuV/m	Limit dBuV/m	Margin dB
2480.0	PK	64.25	V	33.56	95.12	114	-18.88
2480.0	AV	52.47	V	33.56	80.35	94	-13.65
2480.0	PK	61.48	H	33.56	92.86	114	-21.14
2480.0	AV	49.36	H	33.56	79.45	94	-14.55
2483.5	PK	17.32	V	37.24	54.56	74	-19.44
2483.5	AV	3.99	V	37.24	41.23	54	-12.77
2483.5	PK	14.32	H	37.24	51.56	74	-22.44
2483.5	AV	0.36	H	37.24	37.60	54	-16.40
4960.0	PK	9.88	V	49.21	59.09	74	-14.91
4960.0	AV	0.75	V	49.21	49.96	54	-4.04
4960.0	PK	6.39	H	49.21	55.60	74	-18.40
4960.0	AV	-2.14	H	49.21	47.07	54	-6.93

- 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).  
3. The other emission levels were very low against the limit.  
4. Margin value = Emission level – Limit value.  
5. “ \* “: Fundamental frequency.



### 4.3 20dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E7405A	MY45118807	May 25,11	May 25,12
Horn Antenna EMCO	3117	00062558	Nov.07,11	Nov.07,12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	May 02,11	May 02,12
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 02,11	May 02,12
Signal Amplifier EMCI	EMC0140045	980102	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 02,11	May 02,12
Test software ADT	ADT_Radiated_V7. 6.15	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA
2. The test was performed in Dongguan Chamber 10m.



#### 4.3.3 TEST PROCEDURE

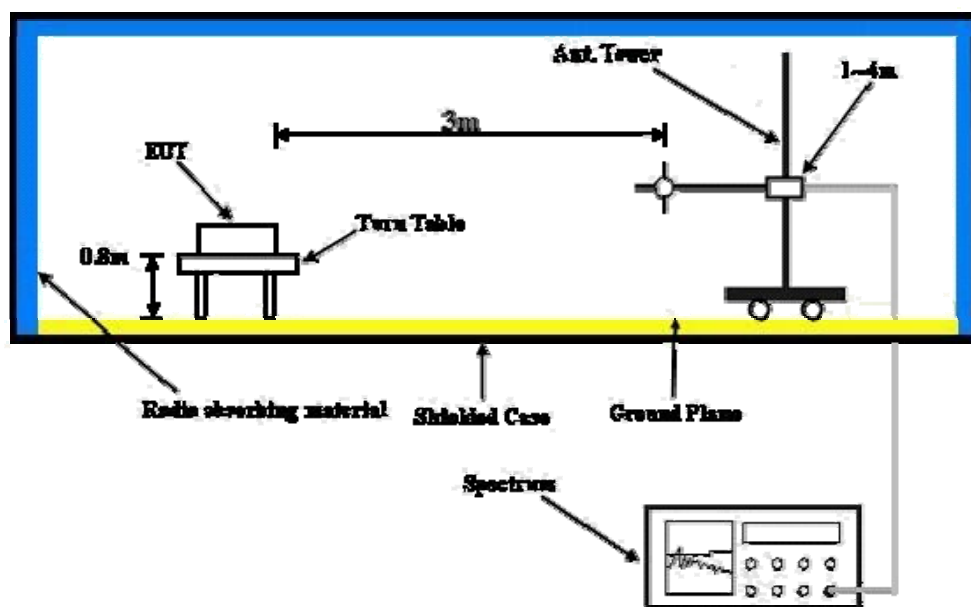
The EUT was placed on a turn table which was 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. At the frequency band of 30MHz to 1GHz, The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 to 4 m for horizontal and vertical polarizations.

The spectrum analyzer was receiving the maximum emission level. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

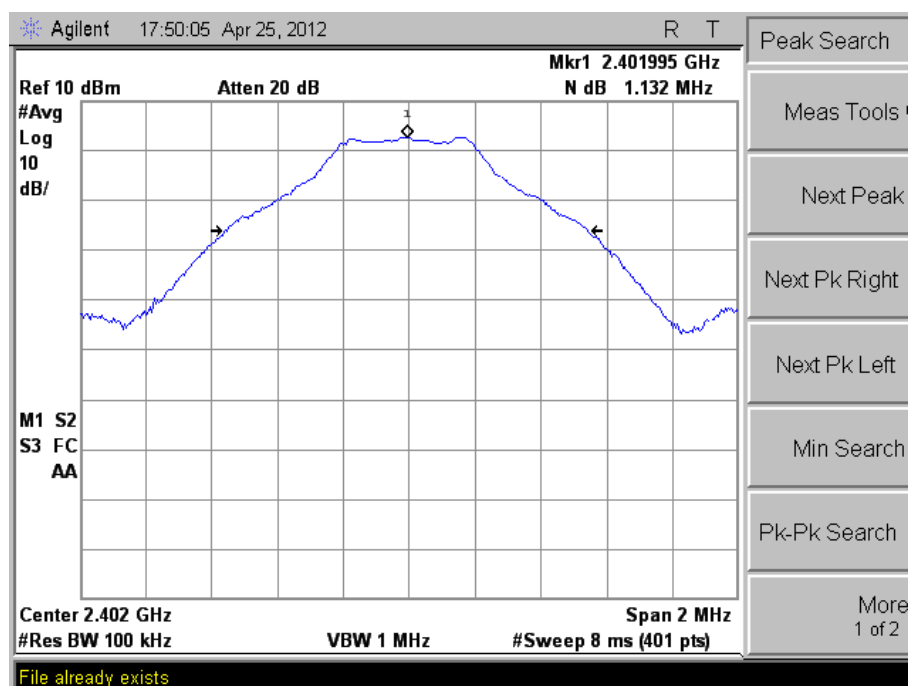


#### 4.3.7 TEST RESULTS

##### GFSK DH5

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.132
Middle	2441	1.132
Hight	2480	1.137

##### Test Data: Low channel



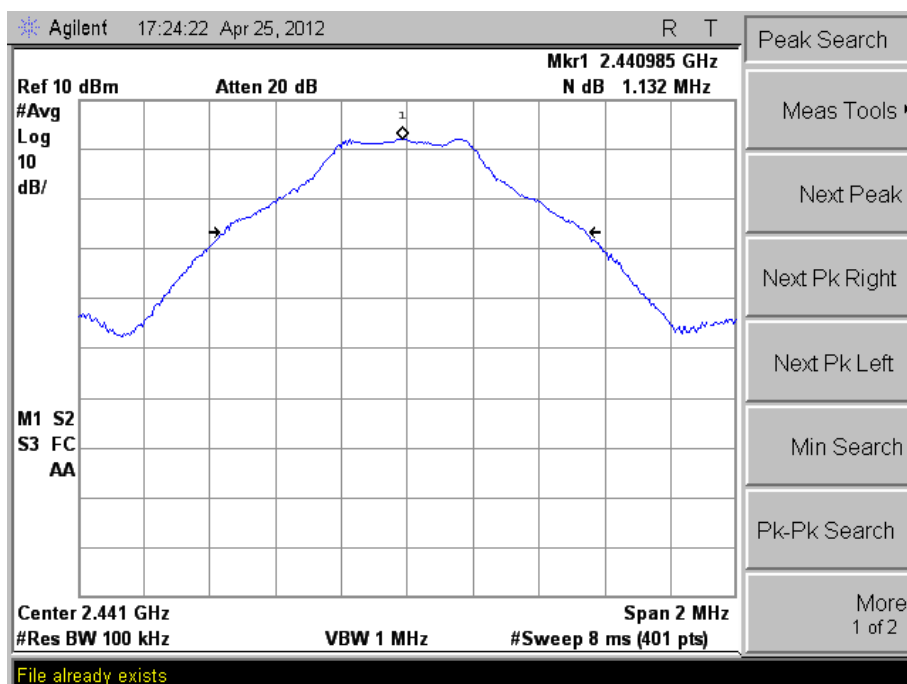




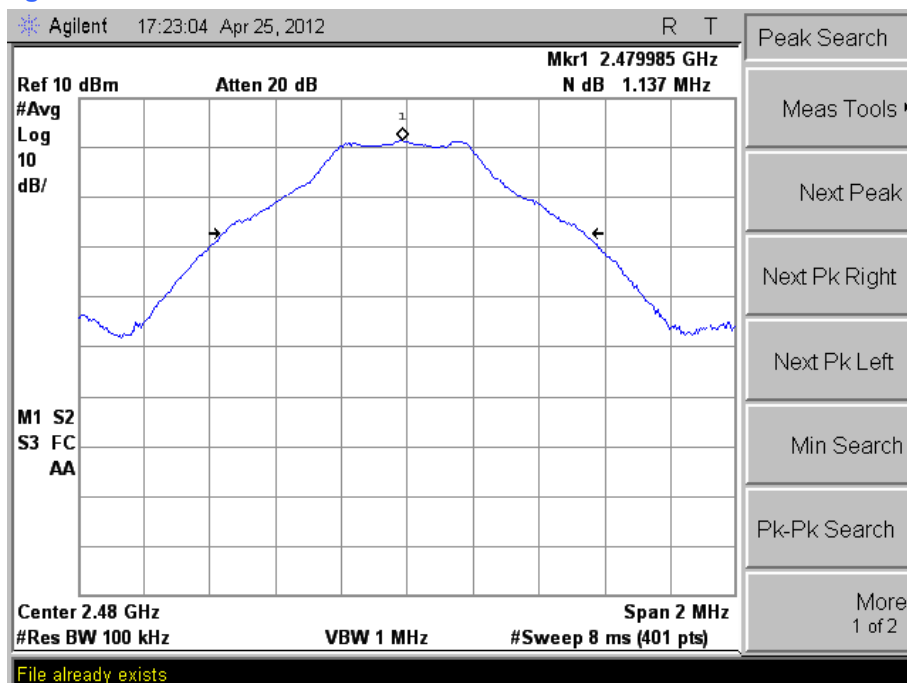
BUREAU  
VERITAS

Test Report No.: FC120411N005

Test Data: Middle channel



Test Data: High channel

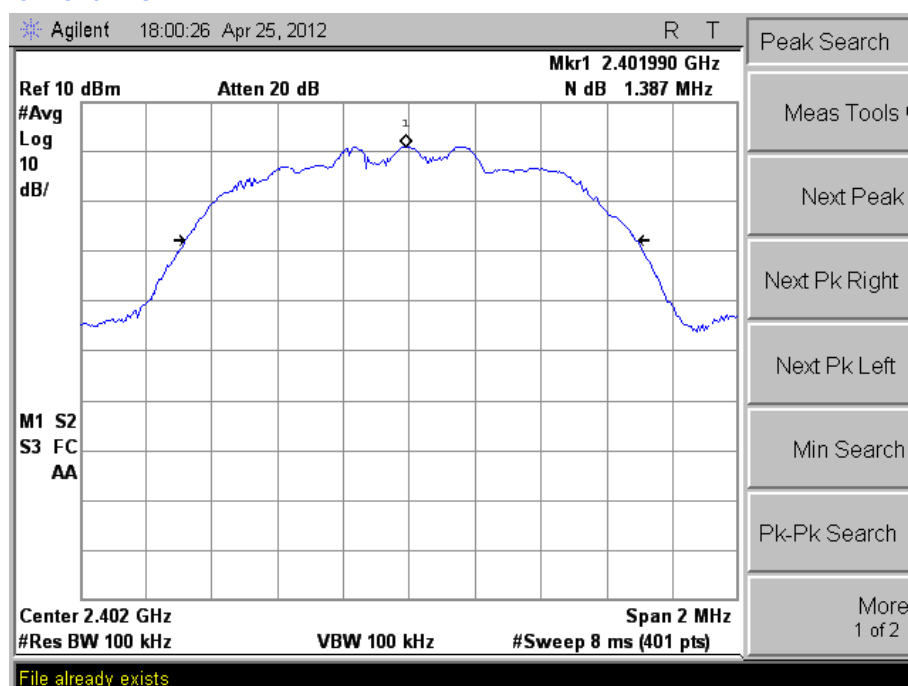




## 8DPSK DH5

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.387
Middle	2441	1.392
Hight	2480	1.392

### Test Data: Low channel

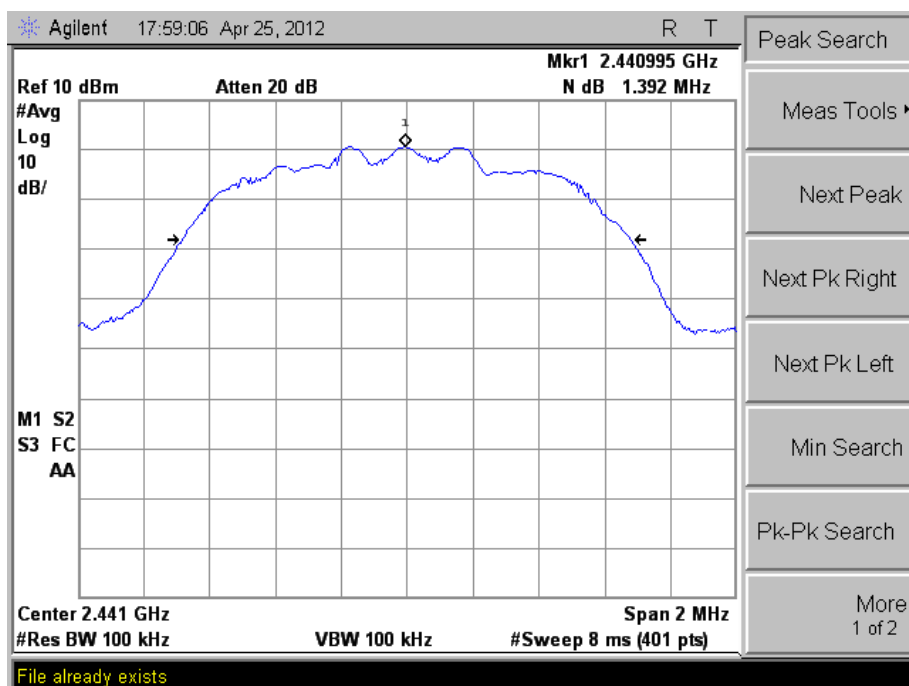




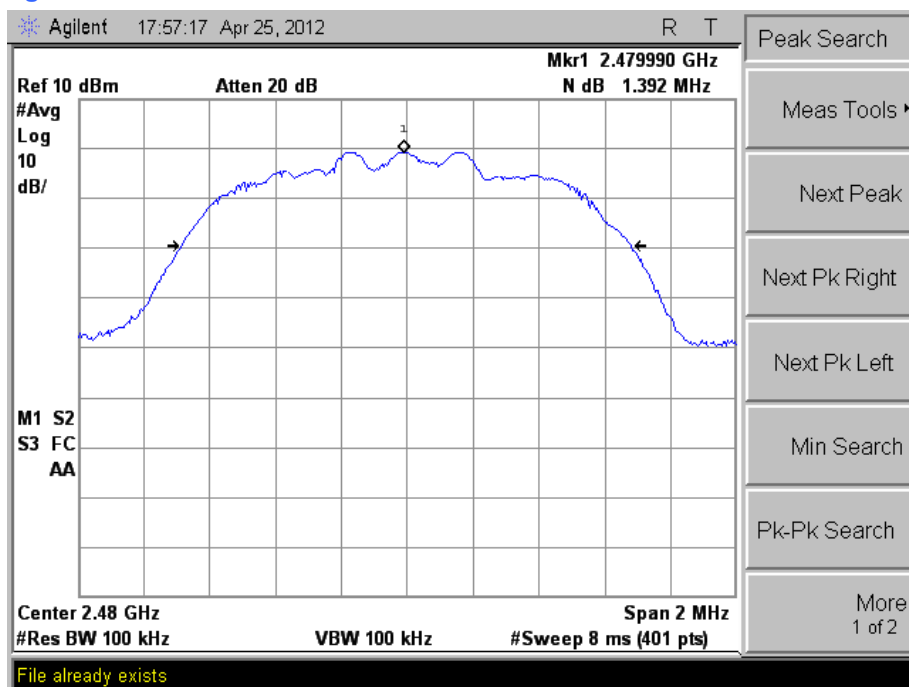
BUREAU  
VERITAS

## Test Report No.: FC120411N005

### Test Data: Middle channel



### Test Data: High channel

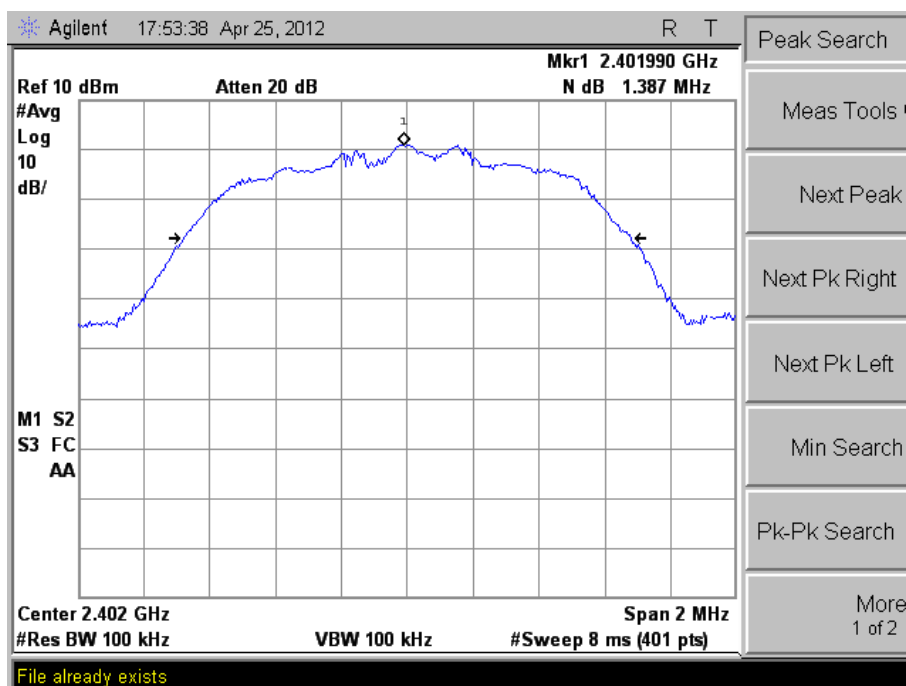




## $\pi/4$ DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.387
Middle	2441	1.387
Hight	2480	1.382

### Test Data: Low channel

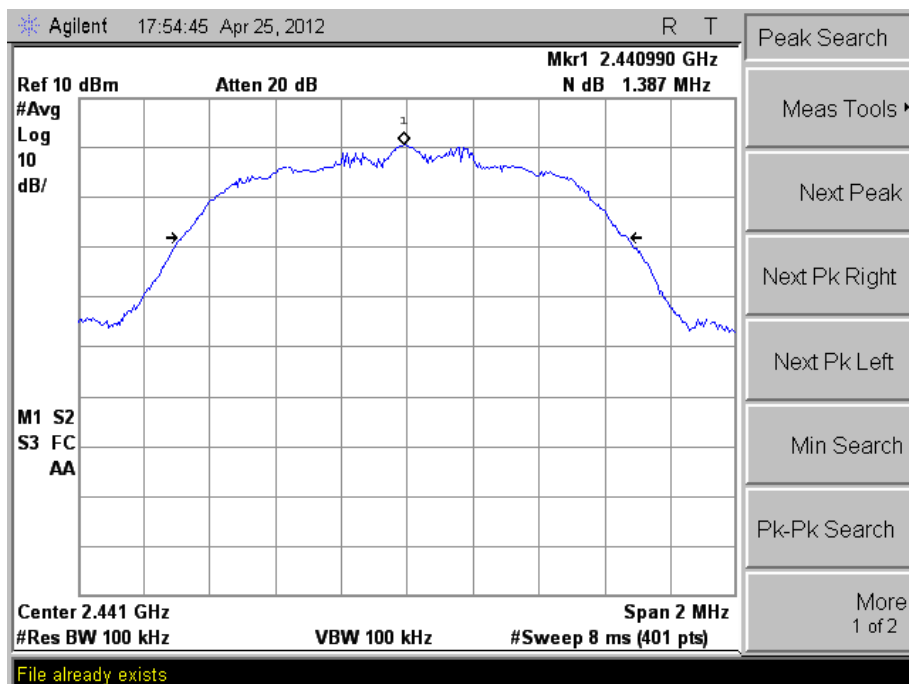




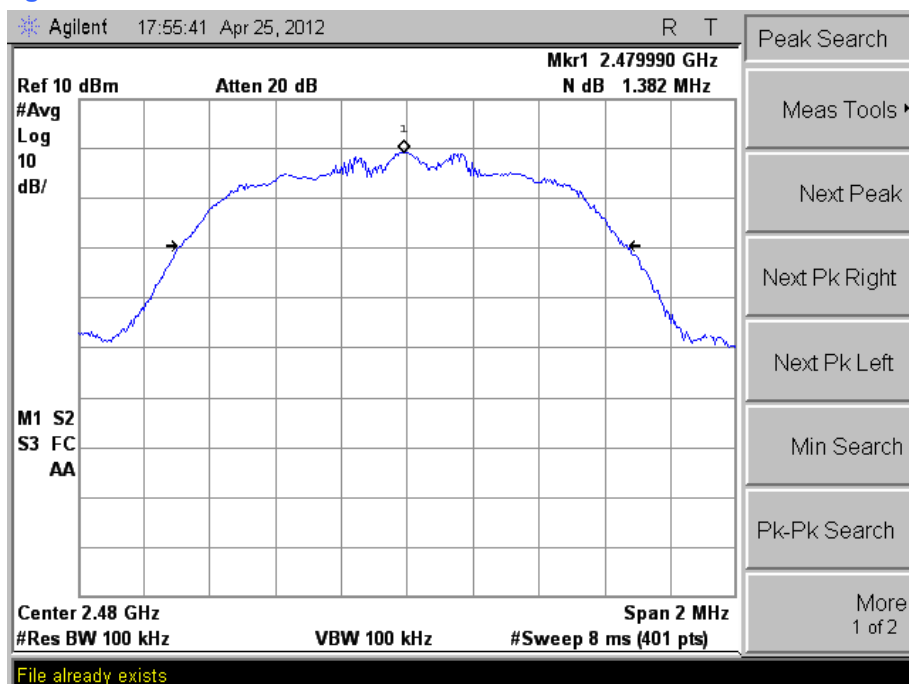
BUREAU  
VERITAS

## Test Report No.: FC120411N005

### Test Data: Middle channel



### Test Data: High channel





**Test Report No.: FC120411N005**

## **5 PHOTOGRAPHS OF THE TEST CONFIGURATION**

Please refer to the attached file (Test Setup Photo).



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**Test Report No.: FC120411N005**

## **6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**