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Test Report No.: RF150505N023



Test Lab  
Cert 2951.01

# TEST REPORT

Applicant	Clarion Co., Ltd.
Address	6F, NO. 40, Guanri Road, Software Park Stage II, Xiamen, China

Manufacturer or Supplier	Clarion Co., Ltd.
Address	6F, NO. 40, Guanri Road, Software Park Stage II, Xiamen, China
Product	CAR NAVIGATION
Brand Name	CLARION
Model	QY-8400
Additional Model & Model Difference	QY-8450, See Items 3.1
Date of tests	May 05, 2015 ~ May 19, 2015

The submitted sample of the above equipment has been tested 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**

Tested by Yuqiang Yin  
Project Engineer / EMC Department

Approved by Glyn He  
Supervisor / EMC Department

Date: May 19, 2015

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification



## 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 RADIATED EMISSION MEASUREMENT .....	8
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....	8
4.1.2 TEST INSTRUMENTS.....	9
4.1.3 TEST PROCEDURES .....	10
4.1.4 DEVIATION FROM TEST STANDARD .....	11
4.1.5 TEST SETUP.....	11
4.1.6 EUT OPERATING CONDITIONS .....	11
4.1.7 TEST RESULTS .....	12
4.2 20dB BANDWIDTH MEASUREMENT.....	20
4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT .....	20
4.2.2 TEST INSTRUMENTS .....	20
4.2.3 TEST PROCEDURE .....	20
4.2.4 DEVIATION FROM TEST STANDARD.....	21
4.2.5 TEST SETUP .....	21
4.2.6 EUT OPERATING CONDITIONS .....	21
4.2.7 TEST RESULTS.....	21
<b>5 PHOTOGRAPHS OF THE TEST CONFIGURATION .....</b>	<b>26</b>
<b>6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....</b>	<b>27</b>



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF150505N023	Original release	May 19, 2015



## 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	Non-standard antenna connector is used
§15.207 (a)	AC Power Conducted Emission	N/A	EUT is powered by battery
§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
Radiated emissions	9KHz ~ 30MHz	2.74dB
	30MHz ~ 1GHz	3.55dB
	1GHz ~ 18GHz	4.84dB
	18GHz ~ 40GHz	4.84dB

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>	CAR NAVIGATION
<b>TEST MODEL</b>	QY-8400
<b>ADDITIONAL MDOEL</b>	QY-8450
<b>FCC ID</b>	WY2QY8400
<b>NOMINAL VOLTAGE</b>	DC 13.5V from battery
<b>MODULATION TECHNOLOGY</b>	FHSS
<b>MODULATION TYPE</b>	GFSK, 8DPSK, $\pi/4$ DQPSK
<b>OPERATING FREQUENCY</b>	2402-2480MHz
<b>ANTENNA TYPE</b>	PCB Antenna, with 0dBi gain
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	Refer to user's manual

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 150505N023) for detailed product photo.
4. Additional model QY-8450 is identical with the test model QY-8400 except the Bose function for trading purpose.



### 3.2 DESCRIPTION OF TEST MODES

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and packet type. The EUT was tested under the following modes, and the final worst is marked in boldface and recorded in the report.

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	BW	
<b>A</b>	√	√	-	√	<b>Power by Battery + BT link</b>

Where **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission

**RE≥1G**: Radiated Emission above 1GHz  
**BW**: 20dB bandwidth

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	DH1/3/5
Low, Middle, High	FHSS	$\pi/4$ DQPSK	2M	DH1/3/5
Low, Middle, High	FHSS	8DPSK	3M	DH1/3/5

CHANNEL NUMBER	TESTED CHANNEL	TESTED FREQUENCY
0	Low	2402 MHz
39	Middle	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	1M	DH5
Low, Middle, High	FHSS	8DPSK	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, Section 15.249**

**ANSI C63.10-2009**

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

**NOTE:** It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Verification). The test report has been issued separately.

### 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	DC source	LONG WEI	PS-6403D	010934269	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m



## 4 TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 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.



**4.1.2 TEST INSTRUMENTS**

<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Cal.</b>	<b>Next Cal.</b>
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 29,15	Apr. 28,16
EMI Test Receiver	Rohde&Schwarz	ESVS10	841431/004	May 11,15	May 10,16
Loop antenna (9kHz~30MHz)	Daze	ZN30900A	0708	Dec. 22,14	Dec. 21,15
Bilog Antenna	Teseq	CBL 6111D	30643	Jul. 25, 14	Jul. 24, 15
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 30,14	May 29,16
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Jan. 21,15	Jan. 20,16
Amplifier (9kHz-1GHz)	SONOMA	310D	186955	Mar. 04,15	Mar. 03, 16
Signal Amplifier	Agilent	8447D	2944A10488	Jun. 25,14	Jun. 24,15
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 13,15	May 12,16
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 20,14	Nov. 19,15
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Apr. 19,14	Apr. 18,16
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 27,14	Oct. 26,15
Test Software	ADT	ADT_Radiated _V7.6.15.9.2	N/A	N/A	N/A

**NOTE:**

1. The test was performed in 966 Chamber.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 494399.



### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 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/spectrum system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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:

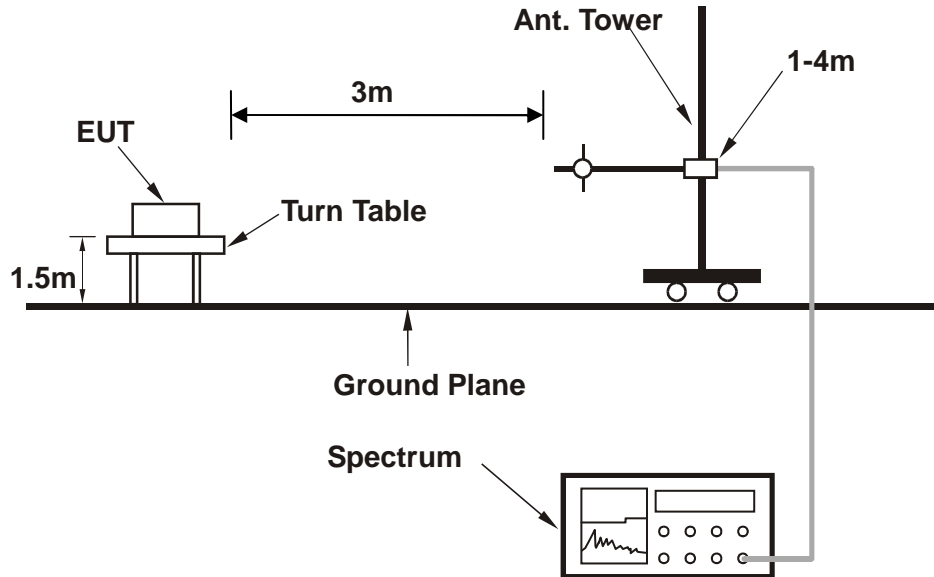
- 1 The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2 The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3 Bluetooth duty factor correction is not correct as it is based on 79 channels, worst case would be with AFH enabled and device using the minimum of 20 channels. In this case the dwell time for a DH5 packet is  $0.625 * 5$  per 75ms, (assuming one DH5 packet transmitted and then a DH1 packet received, 20 channels to cycle through would take 75ms on average before repeating a channel) so in any 100ms there would be, on average, two DH5 packets = 6.25ms per 100ms  
Therefore, the duty cycle correlation factor be equal to:  $20\log(6.25 / 100) = -24.1$  dB.  
Average value = peak reading +  $20\log(\text{duty cycle})$ .
- 4 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



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

#### 4.1.6 EUT OPERATING CONDITIONS

Set the EUT under transmission condition continuously at specific channel frequency.



### 4.1.7 TEST RESULTS

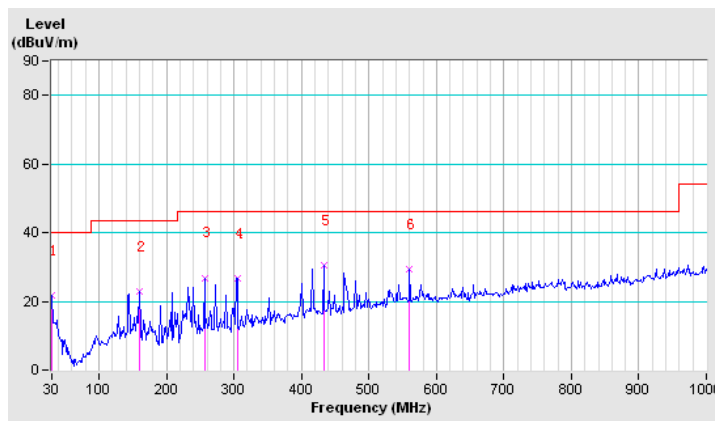
#### BELOW 1GHz WORST-CASE DATA: GFSK DH5

<b>CHANNEL</b>	Channel 0	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	21.87	40.00	-18.13	100	0	34.42	-12.55
2	159.33	23.01	43.50	-20.49	100	0	42.20	-19.19
3	256.33	26.86	46.00	-19.14	100	0	42.88	-16.02
4	304.83	26.81	46.00	-19.19	100	0	41.97	-15.16
5	432.55	30.64	46.00	-15.36	100	0	41.60	-10.96
6	560.27	29.33	46.00	-16.67	100	0	35.29	-5.96

**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.



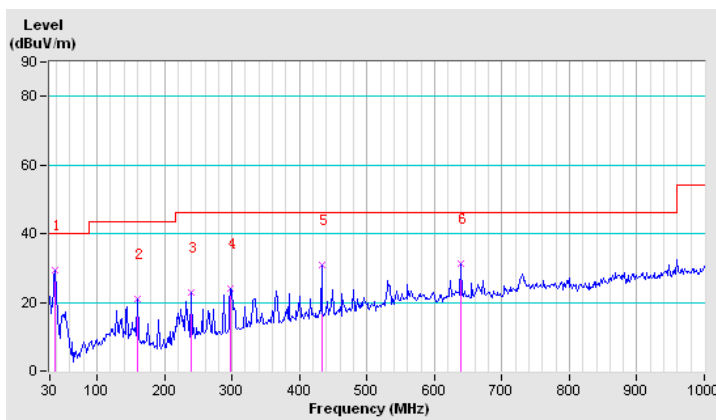


<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	38.08	29.20	40.00	-10.80	100	0	45.57	-16.37
2	159.33	21.12	43.50	-22.38	100	0	40.31	-19.19
3	240.17	22.70	46.00	-23.30	100	0	40.97	-18.27
4	298.37	23.86	46.00	-22.14	100	0	39.30	-15.44
5	432.55	30.94	46.00	-15.06	100	0	41.90	-10.96
<b>6</b>	<b>639.48</b>	<b>31.14</b>	<b>46.00</b>	<b>-14.86</b>	<b>100</b>	<b>0</b>	<b>36.75</b>	<b>-5.61</b>

**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.





ABOVE 1GHz WORST-CASE DATA: GFSK DH5

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	50.1 PK	74.0	-23.9	1.02 H	288	46.91	3.19
2	2400.00	26.0 AV	54.0	-28.0	1.02 H	288	22.81	3.19
3	*2402.00	75.3 PK	114.0	-38.7	1.02 H	288	72.10	3.20
4	*2402.00	51.2 AV	94.0	-42.8	1.02 H	288	48.00	3.20
5	4804.00	45.9 PK	74.0	-28.1	1.00 H	56	36.49	9.41
6	4804.00	21.8 AV	54.0	-32.2	1.00 H	56	12.39	9.41

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	50.0 PK	74.0	-24.0	1.10 V	25	46.81	3.19
2	2400.00	25.9 AV	54.0	-28.1	1.10 V	25	22.71	3.19
3	*2402.00	74.7 PK	114.0	-39.3	1.10 V	25	71.50	3.20
4	*2402.00	50.6 AV	94.0	-43.4	1.10 V	25	47.40	3.20
5	4804.00	46.1 PK	74.0	-27.9	1.00 V	328	36.69	9.41
6	4804.00	22.0 AV	54.0	-32.0	1.00 V	328	12.59	9.41

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.



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**Test Report No.: RF150505N023**

<b>CHANNEL</b>	TX Channel 39	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	72.6 PK	114.0	-41.4	1.00 H	280	69.27	3.33
2	*2441.00	48.5 AV	94.0	-45.5	1.00 H	280	45.17	3.33
3	4882.00	46.2 PK	74.0	-27.8	1.00 H	177	36.66	9.54
4	4882.00	22.1 AV	54.0	-31.9	1.00 H	177	12.56	9.54
5	7323.00	49.1 PK	74.0	-24.9	1.00 H	331	37.25	11.85
6	7323.00	25.0 AV	54.0	-29.0	1.00 H	331	13.15	11.85
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	71.9 PK	114.0	-42.1	1.00 V	133	68.57	3.33
2	*2441.00	47.8 AV	94.0	-46.2	1.00 V	133	44.47	3.33
3	4882.00	46.5 PK	74.0	-27.5	1.00 V	212	36.96	9.54
4	4882.00	22.4 AV	54.0	-31.6	1.00 V	212	12.86	9.54
5	7323.00	49.2 PK	74.0	-24.8	1.00 V	263	37.35	11.85
6	7323.00	25.1 AV	54.0	-28.9	1.00 V	263	13.25	11.85

**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.

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CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	73.5 PK	114.0	-40.5	1.65 H	348	70.04	3.46
2	*2480.00	49.4 AV	94.0	-44.6	1.65 H	348	45.94	3.46
3	2483.50	50.1 PK	74.0	-23.9	1.65 H	348	46.63	3.47
4	2483.50	26.0 AV	54.0	-28.0	1.65 H	348	22.53	3.47
5	4960.00	47.1 PK	74.0	-26.9	1.00 H	133	37.44	9.66
6	4960.00	23.0 AV	54.0	-31.0	1.00 H	133	13.34	9.66
7	7440.00	48.8 PK	74.0	-25.2	1.00 H	342	37.03	11.77
8	7440.00	24.7 AV	54.0	-29.3	1.00 H	342	12.93	11.77

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	70.5 PK	114.0	-43.5	1.42 V	25	67.04	3.46
2	*2480.00	46.4 AV	94.0	-47.6	1.42 V	25	42.94	3.46
3	2483.50	49.8 PK	74.0	-24.2	1.42 V	25	46.33	3.47
4	2483.50	25.7 AV	54.0	-28.3	1.42 V	25	22.23	3.47
5	4960.00	46.2 PK	74.0	-27.8	1.00 V	112	36.54	9.66
6	4960.00	22.1 AV	54.0	-31.9	1.00 V	112	12.44	9.66
7	7440.00	49.3 PK	74.0	-24.7	1.00 V	78	37.53	11.77
8	7440.00	25.2 AV	54.0	-28.8	1.00 V	78	13.43	11.77

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.

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**BT\_8DPSK DH5**

<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	49.4 PK	74.0	-24.6	1.00 H	292	46.21	3.19
2	2400.00	25.3 AV	54.0	-28.7	1.00 H	292	22.11	3.19
3	*2402.00	71.2 PK	114.0	-42.8	1.00 H	292	68.00	3.20
4	*2402.00	47.1 AV	94.0	-46.9	1.00 H	292	43.90	3.20
5	4804.00	46.6 PK	74.0	-27.4	1.00 H	114	37.19	9.41
6	4804.00	22.5 AV	54.0	-31.5	1.00 H	114	13.09	9.41

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	50.2 PK	74.0	-23.8	1.11 V	25	47.01	3.19
2	2400.00	26.1 AV	54.0	-27.9	1.11 V	25	22.91	3.19
3	*2402.00	73.2 PK	114.0	-40.8	1.11 V	25	70.00	3.20
4	*2402.00	49.1 AV	94.0	-44.9	1.11 V	25	45.90	3.20
5	4804.00	46.3 PK	74.0	-27.7	1.00 V	193	36.89	9.41
6	4804.00	22.2 AV	54.0	-31.8	1.00 V	193	12.79	9.41

**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.



CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	71.3 PK	114.0	-42.7	1.00 H	281	67.97	3.33
2	*2441.00	47.2 AV	94.0	-46.8	1.00 H	281	43.87	3.33
3	4882.00	47.1 PK	74.0	-26.9	1.00 H	198	37.56	9.54
4	4882.00	23.0 AV	54.0	-31.0	1.00 H	198	13.46	9.54
5	7323.00	49.7 PK	74.0	-24.3	1.00 H	49	37.85	11.85
6	7323.00	25.6 AV	54.0	-28.4	1.00 H	49	13.75	11.85

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	70.8 PK	114.0	-43.2	1.00 V	133	67.47	3.33
2	*2441.00	46.7 AV	94.0	-47.3	1.00 V	133	43.37	3.33
3	4882.00	46.5 PK	74.0	-27.5	1.00 V	177	36.96	9.54
4	4882.00	22.4 AV	54.0	-31.6	1.00 V	177	12.86	9.54
5	7323.00	49.1 PK	74.0	-24.9	1.00 V	331	37.25	11.85
6	7323.00	25.0 AV	54.0	-29.0	1.00 V	331	13.15	11.85

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.



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Test Report No.: RF150505N023

<b>CHANNEL</b>	TX Channel 78	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	73.2 PK	114.0	-40.8	1.67 H	352	69.74	3.46
2	*2480.00	49.1 AV	94.0	-44.9	1.67 H	352	45.64	3.46
3	2483.50	49.6 PK	74.0	-24.4	1.67 H	352	46.13	3.47
4	2483.50	25.5 AV	54.0	-28.5	1.67 H	352	22.03	3.47
5	4960.00	46.5 PK	74.0	-27.5	1.00 H	199	36.84	9.66
6	4960.00	22.4 AV	54.0	-31.6	1.00 H	199	12.74	9.66
7	7440.00	49.7 PK	74.0	-24.3	1.00 H	226	37.93	11.77
8	7440.00	25.6 AV	54.0	-28.4	1.00 H	226	13.83	11.77

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	70.1 PK	114.0	-43.9	1.47 V	28	66.64	3.46
2	*2480.00	46.0 AV	94.0	-48.0	1.47 V	28	42.54	3.46
3	2483.50	49.4 PK	74.0	-24.6	1.47 V	28	45.93	3.47
4	2483.50	25.3 AV	54.0	-28.7	1.47 V	28	21.83	3.47
5	4960.00	47.2 PK	74.0	-26.8	1.00 V	224	37.54	9.66
6	4960.00	23.1 AV	54.0	-30.9	1.00 V	224	13.44	9.66
7	7440.00	48.9 PK	74.0	-25.1	1.00 V	76	37.13	11.77
8	7440.00	24.8 AV	54.0	-29.2	1.00 V	76	13.03	11.77

**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.

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## 4.2 20dB BANDWIDTH MEASUREMENT

### 4.2.1 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.

### 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (10Hz–40GHz)	Rohde&Schwarz	FSV40	101003	Apr. 07,15	Apr. 06,16
Power Meter	Anritsu	ML2495A	1139001	Feb. 21,15	Feb. 20,16
Power Sensor	Anritsu	MA2411B	1126068	Feb. 21,15	Feb. 20,16
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 27,14	Oct. 26,15
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.04,14	Sep. 03,15
Oscilloscope	Agilent	DSO9254A	MY51260160	Oct. 17, 14	Oct. 16, 15
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 05,14	Nov. 04,15

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.2.3 TEST PROCEDURE

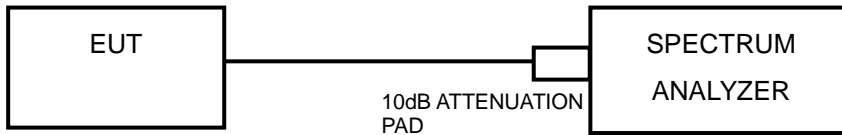
- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.



#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



#### 4.2.6 EUT OPERATING CONDITIONS

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

#### 4.2.7 TEST RESULTS

##### GFSK DH5

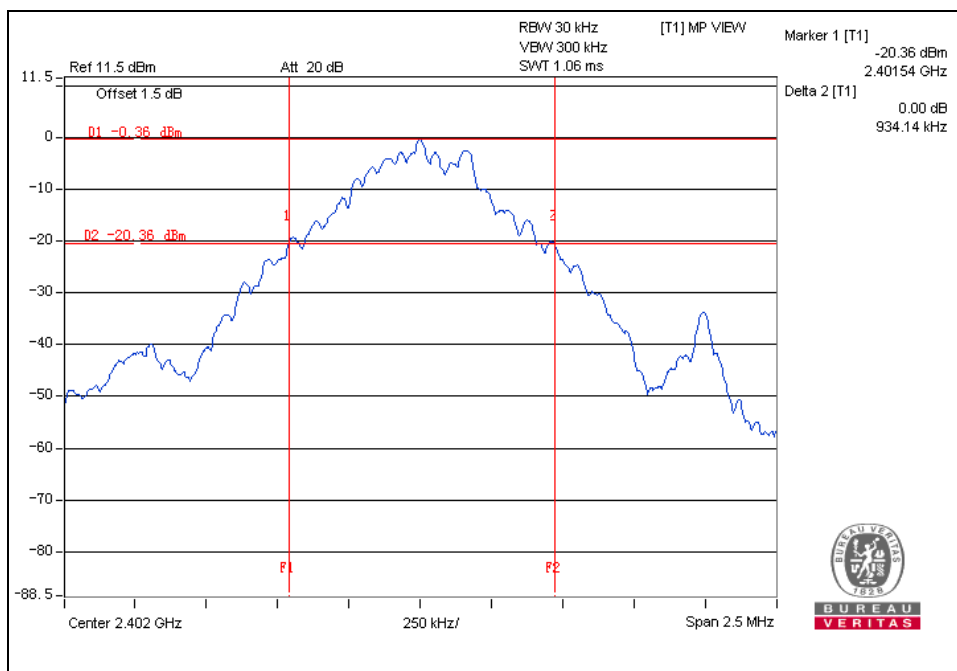
CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	0.934
Middle	2441	0.930
High	2480	0.932



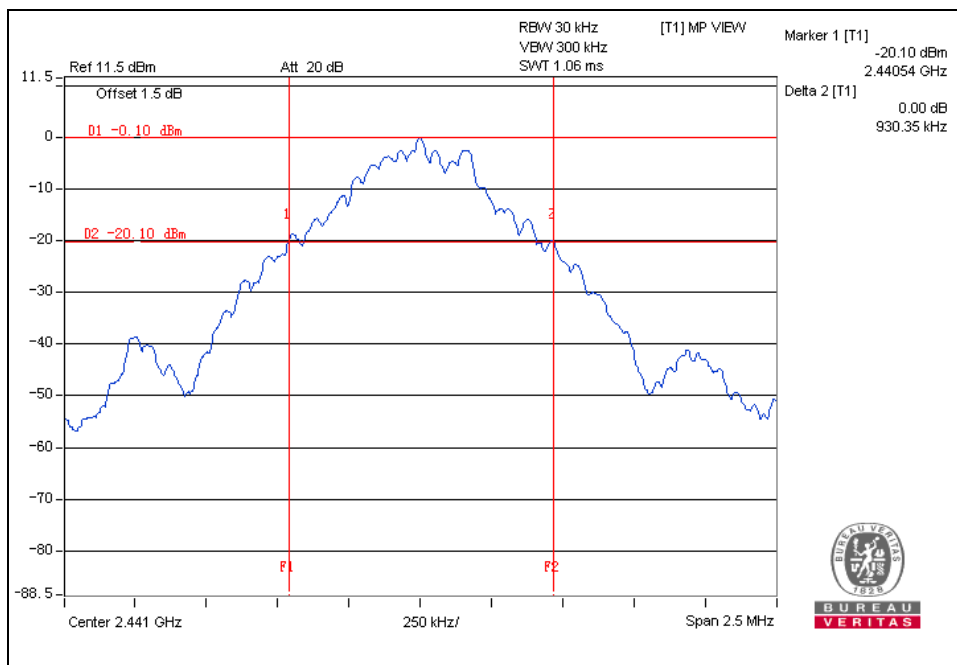
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Test Report No.: RF150505N023

Test Data: Low channel



Test Data: Middle channel

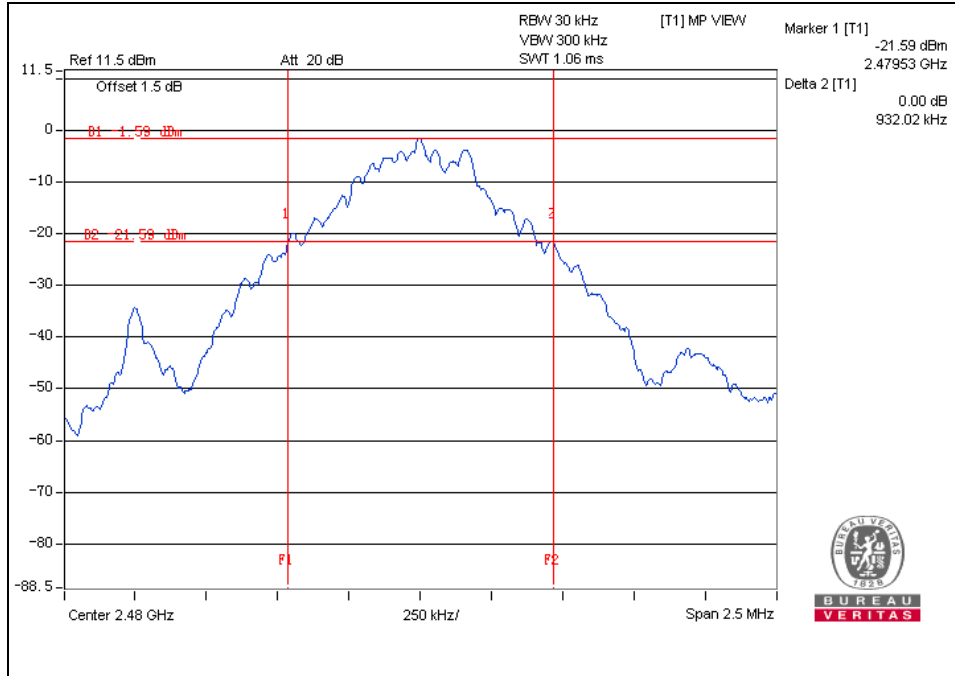




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Test Report No.: RF150505N023

Test Data: High channel





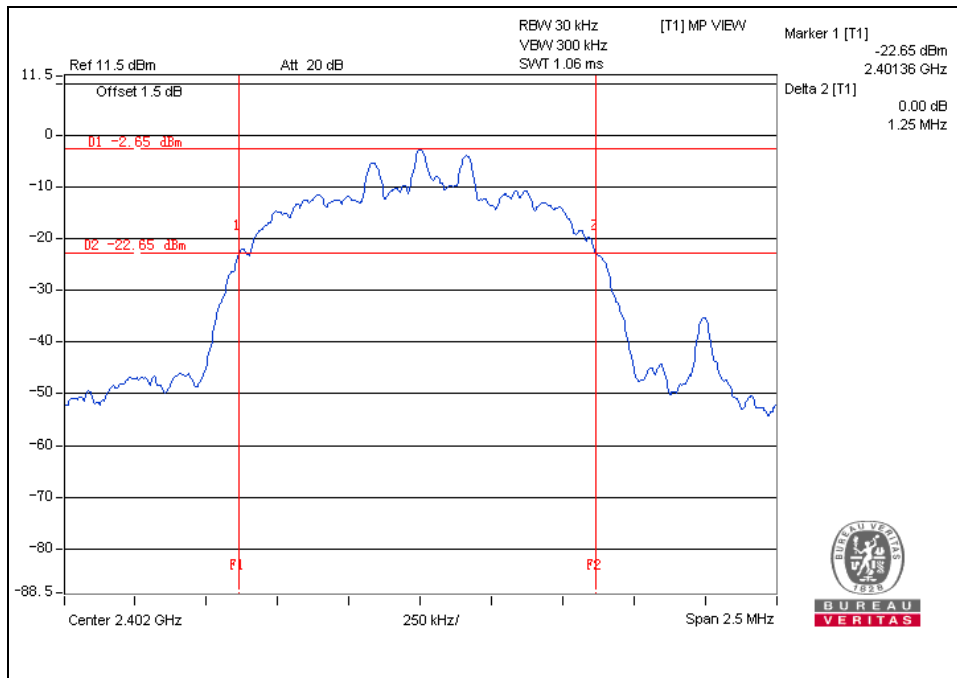
BUREAU VERITAS

Test Report No.: RF150505N023

### 8DPSK DH5

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.25
Middle	2441	1.25
High	2480	1.25

### Test Data: Low channel



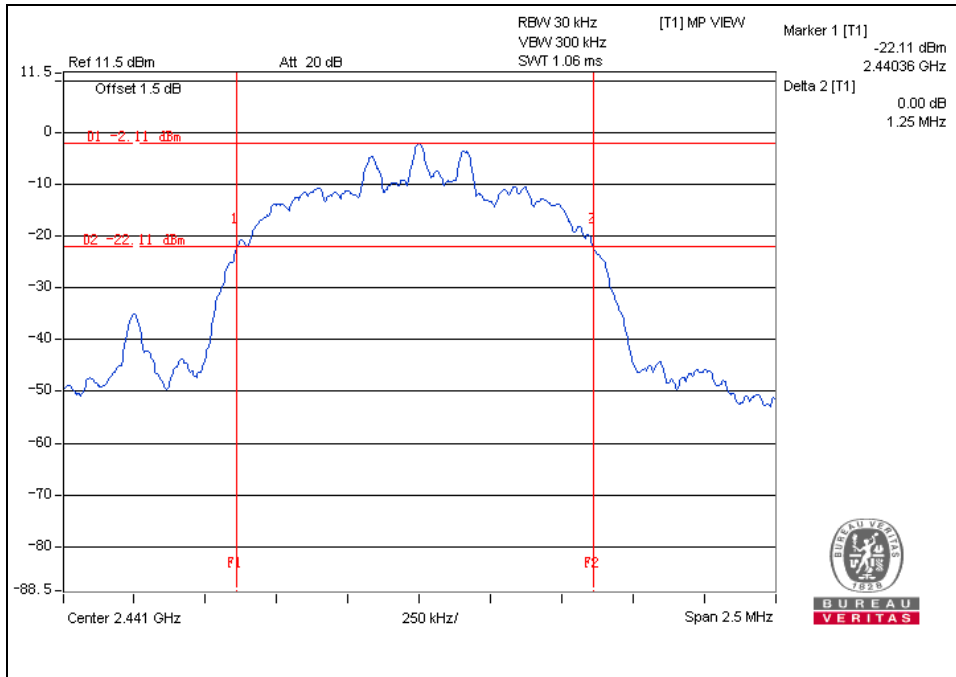




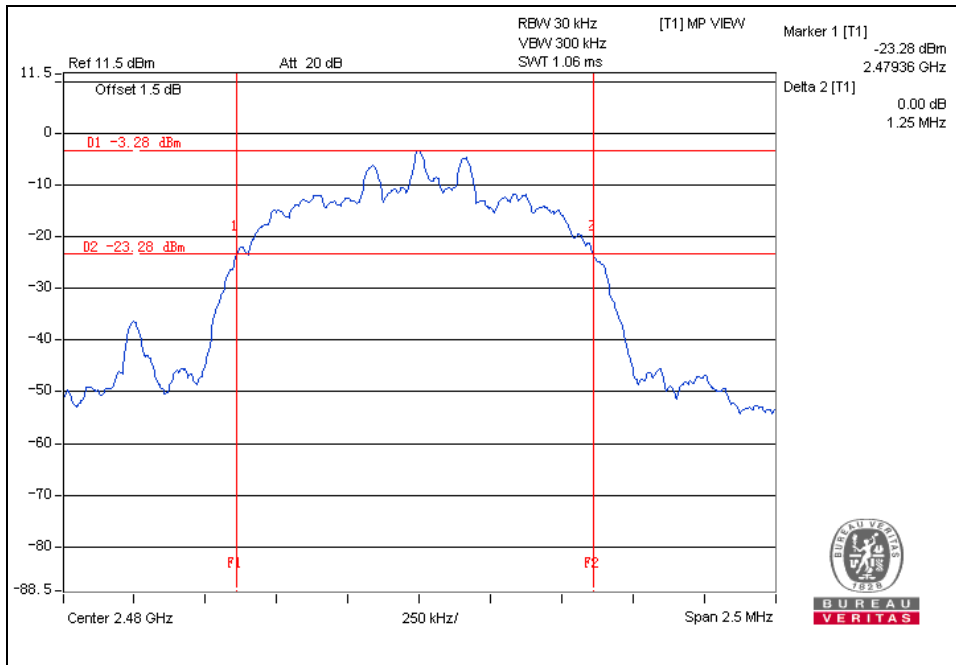
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**Test Data: Middle channel**



**Test Data: High channel**



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## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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## **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---**