




**BUREAU
VERITAS**

Test Report No.: FC120913N021

TEST REPORT



Applicant	SHENZHEN CHENGYAN SCIENCE & TECHNOLOGY CO., Ltd
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Manufacturer or Supplier	SHENZHEN YANXI SCIENCE AND TECHNOLOGY CO.,Ltd	
Address	2F, East E building, Zhong Haixin Industrial Park, Shengbao Rd, Lilang Ave, Buji Town, Longgang district, Shenzhen city, Guangdong Province, China	
Product	Bluetooth headphone	
Brand Name	N/A	
Model	MH-809	
Additional Model & Model Difference	N/A	
Date of tests	Sep. 24 ~Oct. 17, 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

Tested by Kent Liu Project Engineer / EMC Department	Approved by Sam Tung Manager / EMC Department
	 Date: Oct. 17, 2012

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FC120913N021	Original release	Oct. 17, 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)	AC Power Conducted Emission	N/A	N/A
§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

PRODUCT	Bluetooth headphone
MODEL NO.	MH-809
FCC ID	YILMH809
NOMINAL VOLTAGE	DC 3.7V by built-in battery
MODULATION TECHNOLOGY	FHSS
OPERATING FREQUENCY	2402-2480MHz
ANTENNA TYPE	Integral CHIP Antenna with gain 2dBi
I/O PORTS	USB port
DATA CABLE SUPPLIED	USB MIC cable: Shielded, Detachable,0.03m USB charging cable: Shielded, Detachable,0.8m

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 showed in test report.
- 3 When connect USB charging mode, Bluetooth not functioning.



3.2 DESCRIPTION OF TEST MODES

The EUT was tested under following conditions.

Condition	Configuration
1	Device powered by battery

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Y axis for radiated emission.

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	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	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.

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

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS



4. TEST TYPES AND RESULTS

4.1 AC POWER CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ 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	ESU 26	100005	May 15,12	May 14,13
Artificial Mains Network Rohde&Schwarz	ENV216	101173	May 15,12	May 14,13
Artificial Mains Network Rohde&Schwarz	ESH2-Z5	100071	May 15,12	May 14,13
Test software	ADT_Cond_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

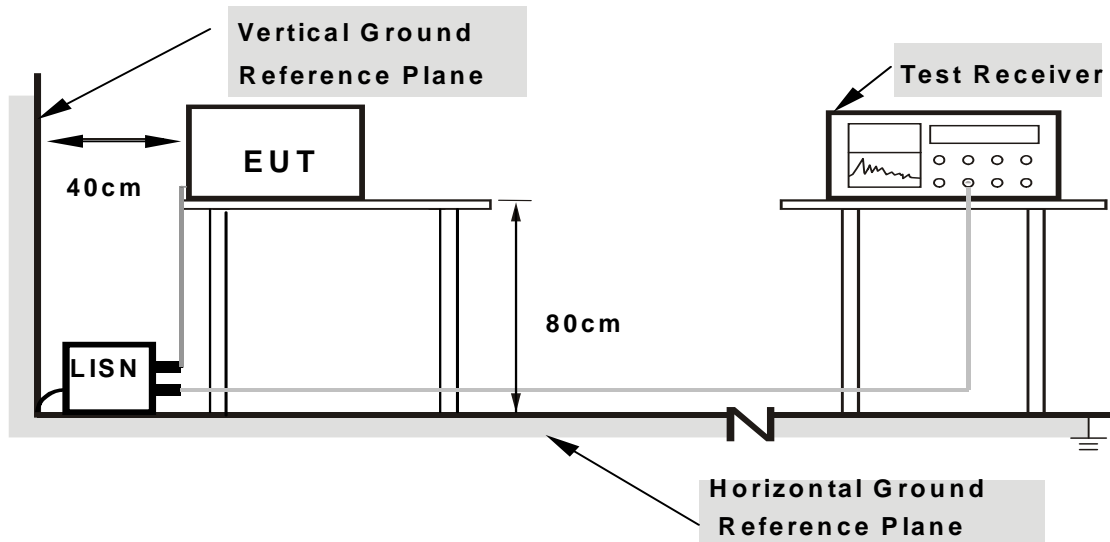
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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

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

4.1.7 TEST RESULTS

No required.



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 ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Test Receiver ROHDE & SCHWARZ	ESVD	847398/003	May 15,12	May 14,13
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	Mar 24,12	Mar 23,13
RF Cable IMRO	IMRO-400	10m Cable 1#10m	May 16,12	May 15,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
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 16,12	May 15,13
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 10m Chamber.
 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 10 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. 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.

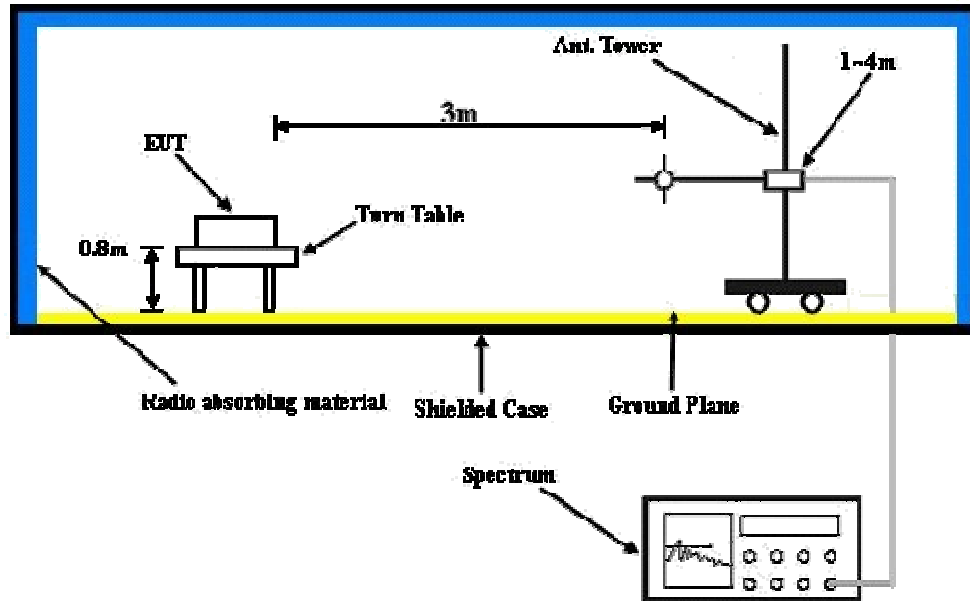
NOTE:

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 item 4.1.6



4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:GFSK DH5

EUTTESTCONDITION		MEASUREMENTDETAIL	
CHANNEL	Channel0	FREQUENCYRANGE	Below1000MHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Quasi-Peak

ANTENNA POLARITY&TESTDISTANCE:HORIZONTALAT3M								
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	67.09	30.4QP	40.0	-9.6	1.00H	54	23.15	7.29
2	126.92	28.4QP	43.5	-15.1	1.00H	128	15.52	12.84
3	167.34	24.9QP	43.5	-18.7	1.00H	257	13.69	11.16
4	600.70	31.3QP	46.0	-14.7	1.00H	154	8.66	22.63
5	667.00	31.4QP	46.0	-14.6	1.00H	223	8.08	23.36
6	733.29	37.2QP	46.0	-8.8	1.00H	11	12.36	24.85
ANTENNA POLARITY&TESTDISTANCE:VERTICALAT3M								
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	54.16	34.7QP	40.0	-5.3	1.00V	78	25.27	9.43
2	125.30	30.8QP	43.5	-12.8	1.00V	40	17.89	12.86
3	524.70	26.3QP	46.0	-19.7	1.00V	81	5.75	20.59
4	600.70	30.2QP	46.0	-15.8	1.00V	26	7.56	22.63
5	667.00	27.8QP	46.0	-18.2	1.00V	287	4.45	23.36
6	733.29	32.5QP	46.0	-13.5	1.00V	50	7.66	24.85

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.



ABOVE1GHz WORST-CASE DATA: GFSK DH5

CHANNEL	Channel 0	FREQUENCYRANGE	1~25GHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Peak(PK)

ANTENNAPOLARITY&TESTDISTANCE:HORIZONTALAT3M								
NO.	FREQ.(MHz)	EMISSIONL EVEL(dBuV/ m)	LIMIT(dBuV/ m)	MARGIN(dB)	ANTENNAH EIGHT(m)	TABLEANG LE(Degree)	RAWVALUE (dBuV)	CORRECTION FACTOR(dB/m)
1	2390.00	50.2PK	74.0	-23.8	1.05H	30	11.38	38.82
2	2390.00	20.1AV	54.0	-33.9	1.05H	30	-18.72	38.82
3	*2402.00	105.4PK	114.0	-8.6	1.00H	240	66.57	38.83
4	*2402.00	75.3AV	94.0	-18.7	1.00H	240	36.47	38.83
5	4804.00	52.9PK	74.0	-21.1	1.00H	310	11.81	41.09
6	4804.00	22.8AV	54.0	-31.2	1.00H	310	-18.29	41.09
7	7206.00	50.1PK	74.0	-23.9	1.00H	262	7.21	42.89
8	7206.00	20.0AV	54.0	-34.0	1.00H	262	-22.89	42.89
9	9608.00	49.4PK	74.0	-24.6	1.10H	150	4.98	44.42
10	9608.00	19.3AV	54.0	-34.7	1.10H	150	-25.12	44.42
ANTENNAPOLARITY&TESTDISTANCE:VERTICALAT3M								
NO.	FREQ.(MHz)	EMISSIONL EVEL(dBuV/ m)	LIMIT(dBuV/ m)	MARGIN(dB)	ANTENNAH EIGHT(m)	TABLEANG LE(Degree)	RAWVALUE (dBuV)	CORRECTION FACTOR(dB/m)
1	2390.00	48.9PK	74.0	-25.1	1.10V	165	12.49	36.41
2	2390.00	18.8AV	54.0	-35.2	1.10V	165	-17.61	36.41
3	*2402.00	98.4PK	114.0	-15.6	1.05V	272	61.88	36.52
4	*2402.00	68.3AV	94.0	-25.7	1.05V	272	31.78	36.52
5	4804.00	56.6PK	74.0	-17.4	1.05V	270	7.35	49.25
6	4804.00	26.5AV	54.0	-27.5	1.05V	270	-22.75	49.25
7	7206.00	49.9PK	74.0	-24.1	1.00V	150	3.38	46.52
8	7206.00	19.8AV	54.0	-34.2	1.00V	150	-26.72	46.52
9	9608.00	49.5PK	74.0	-24.5	1.10V	240	4.60	44.90
10	9608.00	19.4AV	54.0	-34.6	1.10V	240	-25.50	44.90

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.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1\text{dB}$.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



CHANNEL	Channel 39	FREQUENCYRANGE	1~25GHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Peak(PK) Average(AV)

ANTENNA POLARITY&TESTDISTANCE:HORIZONTALAT3M								
NO.	FREQ.(MHz)	EMISSIONL EVEL(dBuV /m)	LIMIT(dBuV/m)	MARGIN(dB)	ANTENNAH EIGHT(m)	TABLEANG LE(Degree)	RAWVALUE (dBuV)	CORRECTION FACTOR(dB/m)
1	*2441.00	108.1PK	114.0	-5.9	1.00H	330	69.22	38.88
2	*2441.00	78.0AV	94.0	-16	1.00H	330	39.12	38.88
3	4882.00	54.2PK	74.0	-19.8	1.00H	60	13.04	41.16
4	4882.00	24.1AV	54.0	-29.9	1.00H	60	-17.06	41.16
5	7323.00	49.7PK	74.0	-24.3	1.00H	50	6.72	42.98
6	7323.00	19.6AV	54.0	-34.4	1.00H	50	-23.38	42.98
7	9764.00	48.8PK	74.0	-25.2	1.00H	180	4.25	44.55
8	9764.00	18.7AV	54.0	-35.3	1.00H	180	-25.85	44.55
ANTENNA POLARITY&TESTDISTANCE:VERTICALAT3M								
NO.	FREQ.(MHz)	EMISSIONL EVEL(dBuV/ m)	LIMIT(dBuV/ m)	MARGIN(dB)	ANTENNAH EIGHT(m)	TABLEANG LE(Degree)	RAWVALUE (dBuV)	CORRECTION FACTOR(dB/m)
1	*2441.00	97.5PK	114.0	-16.5	1.10V	262	60.63	36.87
2	*2441.00	67.4AV	94.0	-26.6	1.10V	262	30.53	36.87
3	4882.00	67.3PK	74.0	-6.7	1.00V	260	18.07	49.23
4	4882.00	37.2AV	54.0	-16.8	1.00V	260	-12.03	49.23
5	7323.00	58.3PK	74.0	-15.7	1.00V	255	11.69	46.61
6	7323.00	28.2AV	54.0	-25.8	1.00V	255	-18.41	46.61
7	9764.00	56.8PK	74.0	-17.2	1.10V	160	11.99	44.81
8	9764.00	26.7AV	54.0	-27.3	1.10V	160	-18.11	44.81

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.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1\text{dB}$.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



CHANNEL	Channel 78	FREQUENCYRANGE	1~25GHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Peak(PK) Average(AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M								
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	107.6PK	114.0	-6.4	1.10H	290	68.67	38.93
2	*2480.00	77.5AV	94.0	-16.5	1.10H	290	38.57	38.93
3	2483.50	58.2PK	74.0	-15.8	1.05H	278	19.26	38.94
4	2483.50	28.1AV	54.0	-25.9	1.05H	278	-10.84	38.94
5	4960.00	53.9PK	74.0	-20.1	1.00H	295	12.67	41.23
6	4960.00	23.8AV	54.0	-30.2	1.00H	295	-17.43	41.23
7	7440.00	56.2PK	74.0	-17.8	1.05H	280	13.13	43.07
8	7440.00	26.1AV	54.0	-27.9	1.05H	280	-16.97	43.07
9	9920.00	54.2PK	74.0	-19.8	1.00H	280	9.53	44.67
10	9920.00	24.1AV	54.0	-29.9	1.00H	280	-20.57	44.67
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M								
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	97.6PK	114.0	-16.4	1.05V	180	60.39	37.21
2	*2480.00	67.5AV	94.0	-26.5	1.05V	180	30.29	37.21
3	2483.50	51.7PK	74.0	-22.3	1.00V	185	14.46	37.24
4	2483.50	21.6AV	54.0	-32.4	1.00V	185	-15.64	37.24
5	4960.00	68.2PK	74.0	-5.8	1.10V	50	18.99	49.21
6	4960.00	38.1AV	54.0	-15.9	1.10V	50	-11.11	49.21
7	7440.00	64.2PK	74.0	-9.8	1.05V	275	17.50	46.70
8	7440.00	34.1AV	54.0	-19.9	1.05V	275	-12.60	46.70
9	9920.00	62.8PK	74.0	-11.2	1.00V	180	18.09	44.71
10	9920.00	32.7AV	54.0	-21.3	1.00V	180	-12.01	44.71

REMARKS:

- Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- The other emission levels were very low against the limit.
- Margin value = Emission level – Limit value.
- " * ": Fundamental frequency.
- The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1\text{dB}$.
- Average value = peak reading + $20\log(\text{duty cycle})$.



CHANNEL	Channel 0	FREQUENCYRANGE	1~25GHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Peak(PK) Average(AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M								
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	2390.00	49.8PK	74.0	-24.2	1.00H	360	13.39	36.41
2	2390.00	19.7AV	54.0	-34.3	1.00H	360	-16.71	36.41
3	2402.20	96.9PK	114.0	-17.1	1.00H	360	60.35	36.52
4	2402.20	66.8AV	94.0	-27.2	1.00H	360	30.28	36.52
5	4804.30	55.3PK	74.0	-18.7	1.00H	1	6.05	49.25
6	4804.30	25.2AV	54.0	-28.8	1.00H	1	-24.05	49.25
7	7206.30	48.6PK	74.0	-25.4	1.00H	120	2.08	46.52
8	7206.30	18.5AV	54.0	-35.5	1.00H	120	-28.02	46.52
9	9608.10	50.3PK	74.0	-23.7	1.00H	320	5.40	44.90
10	9608.10	20.2AV	54.0	-33.8	1.00H	320	-24.70	44.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M								
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	2390.50	49.5PK	74.0	-24.5	1.00V	220	13.08	36.42
2	2390.50	19.4AV	54.0	-34.6	1.00V	220	-17.02	36.42
3	2402.30	97.2PK	114.0	-16.8	1.00V	320	60.68	36.52
4	2402.30	67.1AV	94.0	-26.9	1.00V	320	30.58	36.52
5	4804.40	55.2PK	74.0	-18.8	1.00V	120	5.95	49.25
6	4804.40	25.1AV	54.0	-28.9	1.00V	120	-24.15	49.25
7	7206.50	48.2PK	74.0	-25.8	1.00V	140	1.68	46.52
8	7206.50	18.1AV	54.0	-35.9	1.00V	140	-28.42	46.52
9	9608.40	47.9PK	74.0	-26.1	1.00V	0	3.00	44.90
10	9608.40	17.8AV	54.0	-36.2	1.00V	0	-27.10	44.90

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.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1\text{dB}$.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



CHANNEL	Channel 39	FREQUENCYRANGE	1~25GHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Peak(PK) Average(AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M								
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	2441.20	105.3PK	114.0	-8.7	1.00H	320	68.43	36.87
2	2441.20	75.2AV	94.0	-18.8	1.00H	320	38.33	36.87
3	4882.40	52.7PK	74.0	-21.3	1.00H	120	3.47	49.23
4	4882.40	22.6AV	54.0	-31.4	1.00H	120	-26.63	49.23
5	7323.30	48.2PK	74.0	-25.8	1.00H	230	1.59	46.61
6	7323.30	18.1AV	54.0	-35.9	1.00H	230	-28.51	46.61
7	9764.60	46.9PK	74.0	-27.1	1.00H	240	2.09	44.81
8	9764.60	16.8AV	54.0	-37.2	1.00H	240	-28.01	44.81
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M								
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	2441.30	95.7PK	114.0	-18.3	1.00V	360	58.83	36.87
2	2441.30	65.6AV	94.0	-28.4	1.00V	360	28.73	36.87
3	4882.20	65.6PK	74.0	-8.4	1.00V	220	16.37	49.23
4	4882.20	35.5AV	54.0	-18.5	1.00V	220	-13.73	49.23
5	7323.00	56.8PK	74.0	-17.2	1.00V	214	10.19	46.61
6	7323.00	26.7AV	54.0	-27.3	1.00V	214	-19.91	46.61
7	9764.30	55.9PK	74.0	-18.1	1.10V	245	11.09	44.81
8	9764.30	25.8AV	54.0	-28.2	1.10V	245	-19.01	44.81

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.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1\text{dB}$.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



CHANNEL	Channel 78	FREQUENCYRANGE	1~25GHz
INPUTPOWER (SYSTEM)	DC3.7V	DETECTORFUNCTION	Peak(PK) Average(AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M								
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	2480.30	104.3PK	114.0	-9.7	1.00H	230	67.08	37.22
2	2480.30	74.2AV	94.0	-19.8	1.00H	230	36.98	37.22
3	2483.50	56.5PK	74.0	-17.5	1.00H	250	19.26	37.24
4	2483.50	26.4AV	54.0	-27.6	1.00H	250	-10.84	37.24
5	4960.00	51.6PK	74.0	-22.4	1.00H	360	2.39	49.21
6	4960.00	21.5AV	54.0	-32.5	1.00H	360	-27.71	49.21
7	7440.20	55.1PK	74.0	-18.9	1.00H	230	8.40	46.70
8	7440.20	25.0AV	54.0	-29.0	1.00H	230	-21.70	46.70
9	9920.00	52.8PK	74.0	-21.2	1.00H	210	8.09	44.71
10	9920.00	22.7AV	54.0	-31.3	1.00H	210	-22.01	44.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M								
NO.	FREQ.(MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dB uV/m)	MARGIN (dB)	ANTENNA HEIGHT(m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2480.20	95.8PK	114.0	-18.2	1.10V	320	58.59	37.21
2	2480.20	65.7AV	94.0	-28.3	1.10V	320	28.49	37.21
3	2483.50	50.6PK	74.0	-23.4	1.00V	250	13.36	37.24
4	2483.50	20.5AV	54.0	-33.5	1.00V	250	-16.74	37.24
5	4959.80	65.9PK	74.0	-8.1	1.20V	230	16.69	49.21
6	4959.80	35.8AV	54.0	-18.2	1.20V	230	-13.41	49.21
7	7440.50	62.8PK	74.0	-11.2	1.00V	254	16.10	46.70
8	7440.50	32.7AV	54.0	-21.3	1.00V	254	-14.00	46.70
9	9919.80	60.3PK	74.0	-13.7	1.00V	320	15.59	44.71
10	9919.80	30.2AV	54.0	-23.8	1.00V	320	-14.51	44.71

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.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on $0.625 * 5$ per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1\text{dB}$.
7. Average value = peak reading + $20\log(\text{duty cycle})$.

**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 ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Horn Antenna EMCO	3117	00062558	Nov.07,11	Nov.07,12
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar 24,12	Mar 23,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	EMC 012645	980077	Nov 07,11	Nov 07,12
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
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.

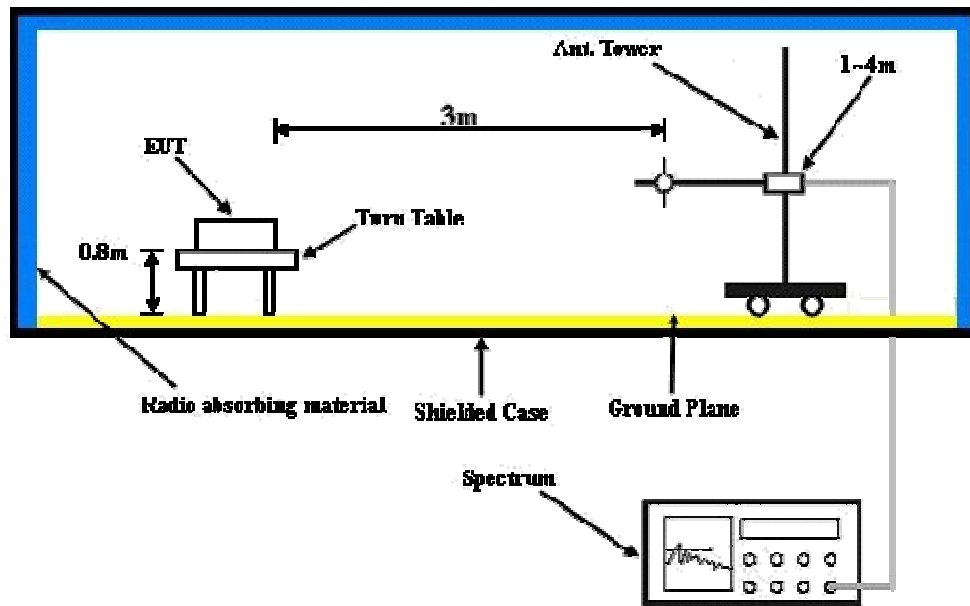
The spectrum analyzer was receiving the maximum emission level. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

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.

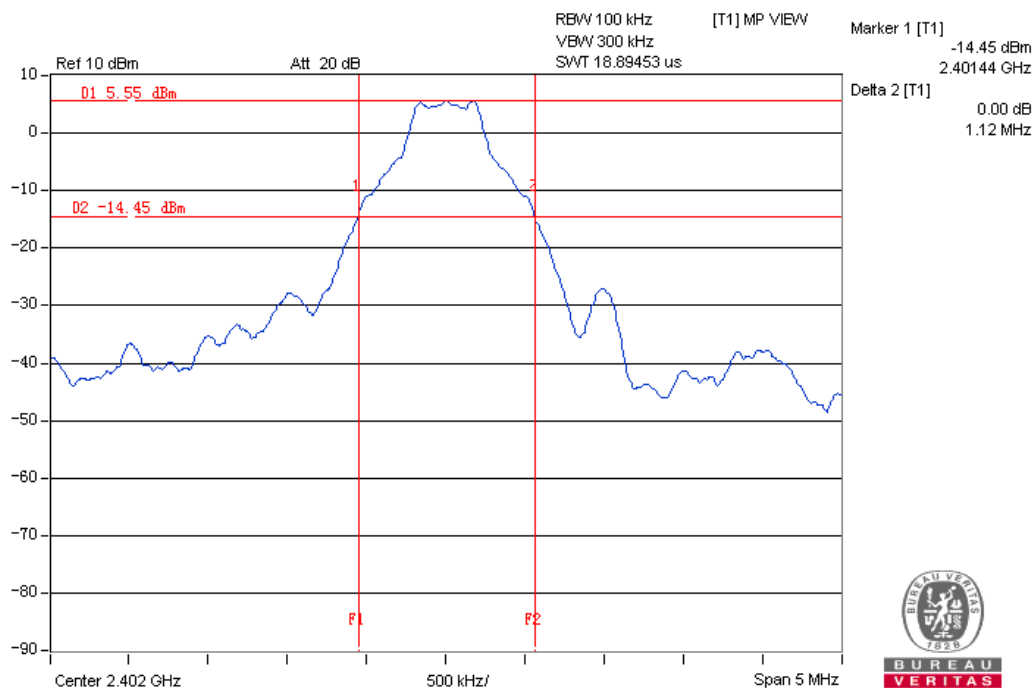


4.3.7 TEST RESULTS

GFSK DH5

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.12
Middle	2441	1.12
High	2480	1.11

Test Data: Low channel

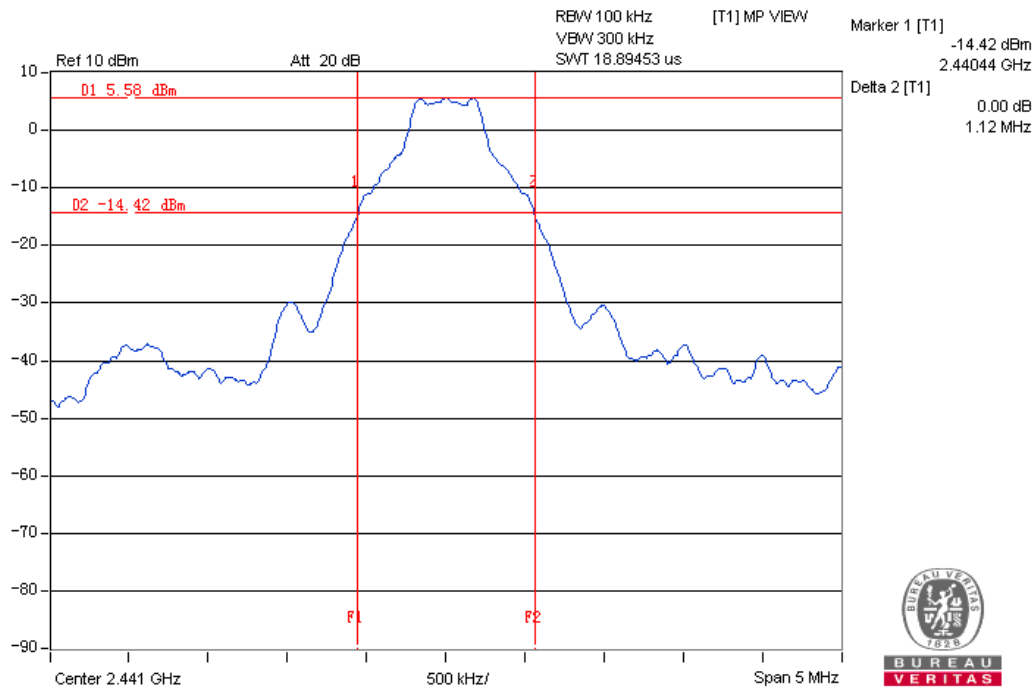




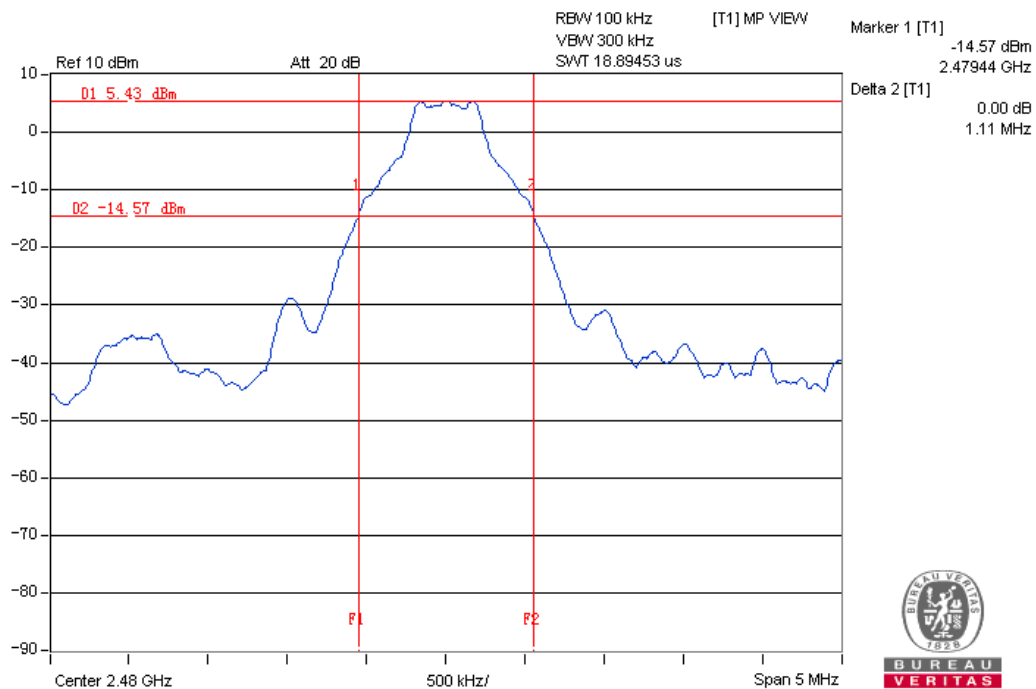
BUREAU
VERITAS

Test Report No.: FC120913N021

Test Data: Middle channel



Test Data: High channel



Bureau Veritas Shenzhen Co., Ltd.
Dongguan Branch

No. 34, Chenwulu Section, Guantai Rd., Houjie
Town, Dongguan City,
Guangdong 523942, China

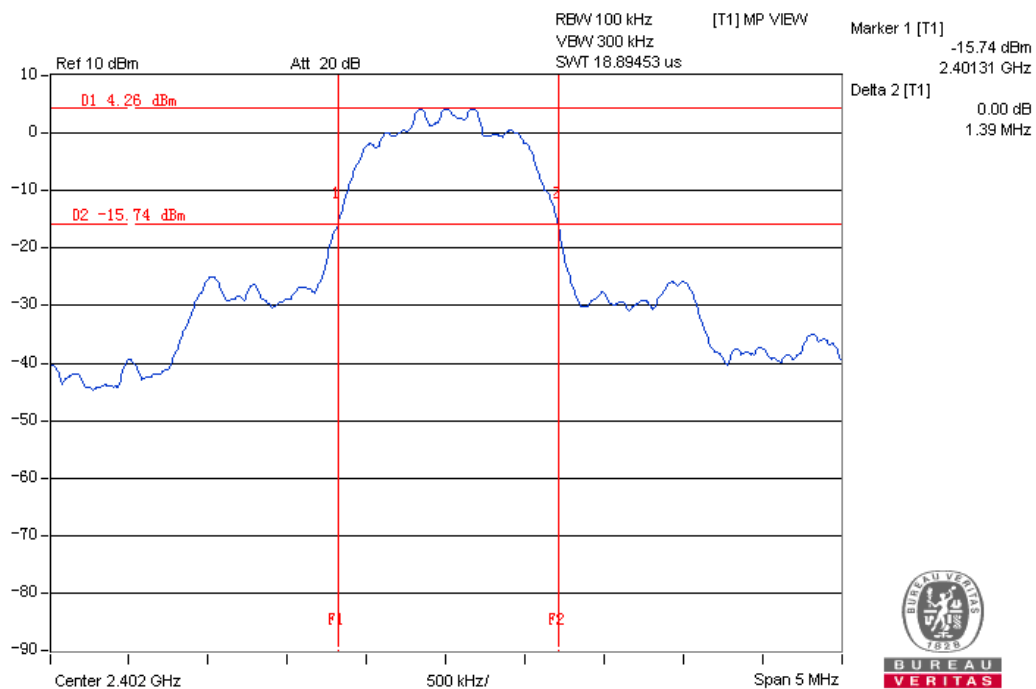
Tel: +86 769 8593 5656
Fax: +86 769 8593 1080
Email: customerservice.dg@cn.bureauveritas.com



8DPSK DH5

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.39
Middle	2441	1.39
High	2480	1.38

Test Data: Low channel

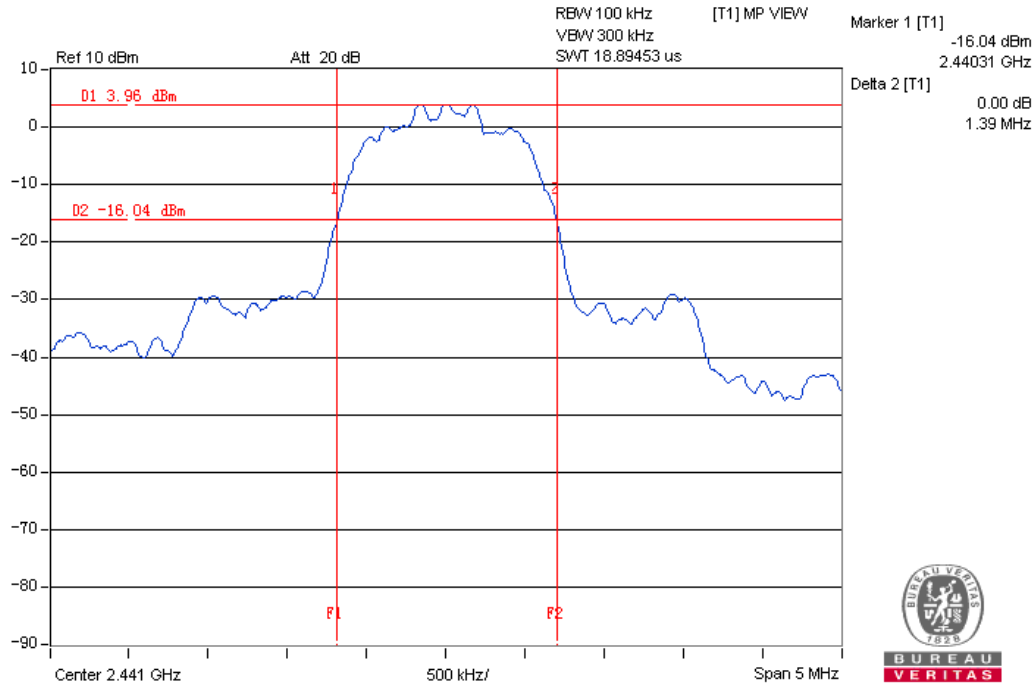




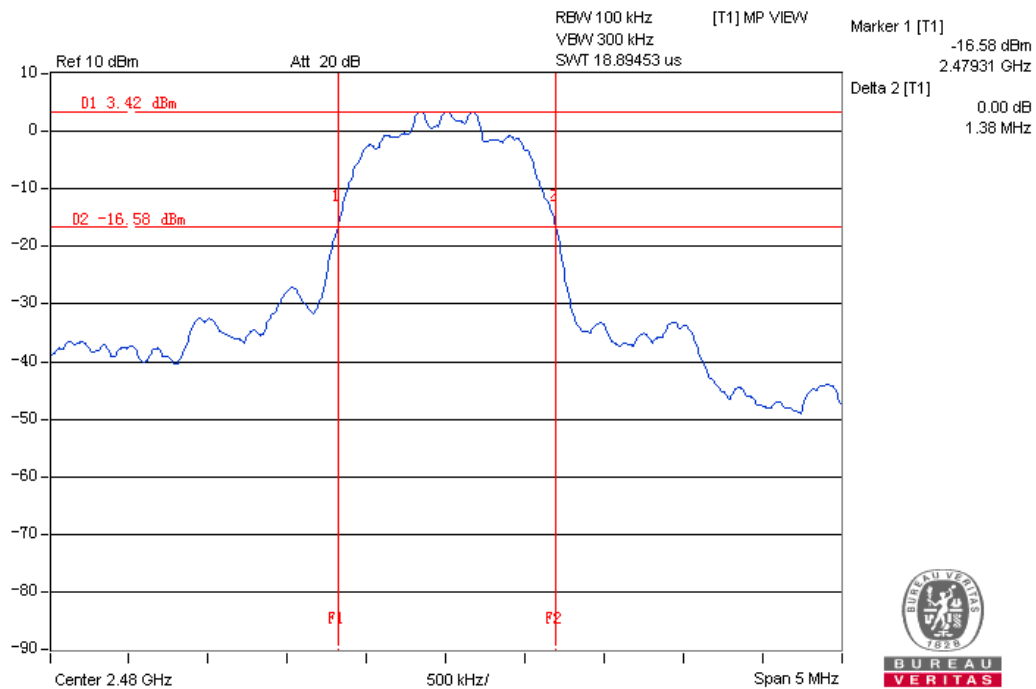
BUREAU
VERITAS

Test Report No.: FC120913N021

Test Data: Middle channel



Test Data: High channel



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Test Report No.: FC120913N021

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: FC120913N021

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.

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