



BUREAU
VERITAS

Test Report No.: RF141024N001R1



Test Lab
Cert 2951.01

TEST REPORT



Applicant	KOLIBREE
Address	36, Rue de Turin, 75008, Paris

Manufacturer or Supplier	Kaertech Limited
Address	Unit 1601-02, 16F, Seaview Commercial Building, 21-24 Connaught Road West, Sheung Wan, Hong Kong
Product	Bluetooth Electric Toothbrush
Brand Name	N/A
Model	KLTB001
Additional Model & Model Difference	N/A
Date of tests	Oct. 24, 2014 ~ Nov. 11, 2014

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: Jan. 14, 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

RELEASE CONTROL RECORD	4
1 SUMMARY OF TEST RESULTS.....	5
2 MEASUREMENT UNCERTAINTY	5
3 GENERAL INFORMATION	6
3.1 GENERAL DESCRIPTION OF EUT.....	6
3.2 DESCRIPTION OF TEST MODES.....	7
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	8
3.4 DESCRIPTION OF SUPPORT UNITS.....	8
4 TEST TYPES AND RESULTS.....	9
4.1 CONDUCTED EMISSION MEASUREMENT	9
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	9
4.1.2 TEST INSTRUMENTS	9
4.1.3 TEST PROCEDURES	10
4.1.4 DEVIATION FROM TEST STANDARD.....	10
4.1.5 TEST SETUP	11
4.1.6 EUT OPERATING CONDITIONS	11
4.1.7 TEST RESULTS.....	12
4.2 RADIATED EMISSION MEASUREMENT	14
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	14
4.2.2 TEST INSTRUMENTS	15
4.2.3 TEST PROCEDURES.....	16
4.2.4 DEVIATION FROM TEST STANDARD.....	17
4.2.5 TEST SETUP	17
4.2.6 EUT OPERATING CONDITIONS	17
4.2.7 TEST RESULTS.....	18
4.3 20dB BANDWIDTH MEASUREMENT	23
4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT.....	23
4.3.2 TEST INSTRUMENTS.....	23
4.3.3 TEST PROCEDURE.....	23
4.3.4 DEVIATION FROM TEST STANDARD	24
4.3.5 TEST SETUP.....	24
4.3.6 EUT OPERATING CONDITIONS.....	24
4.3.7 TEST RESULTS	24



Test Report No.: RF141024N001R1

5	PHOTOGRAPHS OF THE TEST CONFIGURATION	27
6	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	28



**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141024N001	Original release	Nov. 12, 2014
RF141024N001R1	Based on the original report RF141024N001 change the data description.	Jan. 14, 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	No antenna connector is used
§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	2.66dB
Radiated emissions	9KHz ~ 30MHz	2.74dB
	30MHz ~ 1GHz	4.06dB
	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

PRODUCT	Bluetooth Electric Toothbrush
TEST MODEL	KLTB001
FCC ID	2ACPT-KOLIBREE14
NOMINAL VOLTAGE	DC 3.7 V by Battery or DC 7V by Adapter
MODULATION TECHNOLOGY	FHSS
MODULATION TYPE	GFSK
BT VERSION	BT V2.1
OPERATING FREQUENCY	2402-2480MHz
ANTENNA TYPE	PCB Antenna; -0.41dBi Gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	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.:141024N001) for detailed product photo.
4. The EUT was powered by the following adapter:

Adapter	
Brand:	Kolibree
Model:	KLTB001
Input:	AC 100-240V, 50/60Hz 0.3A
Output:	DC 7V, 500mA
DC Line:	Unshielded, Non-detachable, 1.2m.

5. RF141024N001R1 cancels and replaces the previous one with the report number RF141024N001 dated on Jan. 14, 2015.



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	
A	√	√	√	-	Power by Adapter +BT link
B	-	-	-	√	Powered by Battery+ BT link

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

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



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.

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	N/A	N/A	N/A	N/A	N/A

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



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 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

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	100340	May 17,14	May 16,15
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	May 13,14	May 12,15
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	May 13,14	May 12,15
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

- NOTE:**
1. The test was performed in shielded room 553.
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.

4.1.3 TEST PROCEDURES

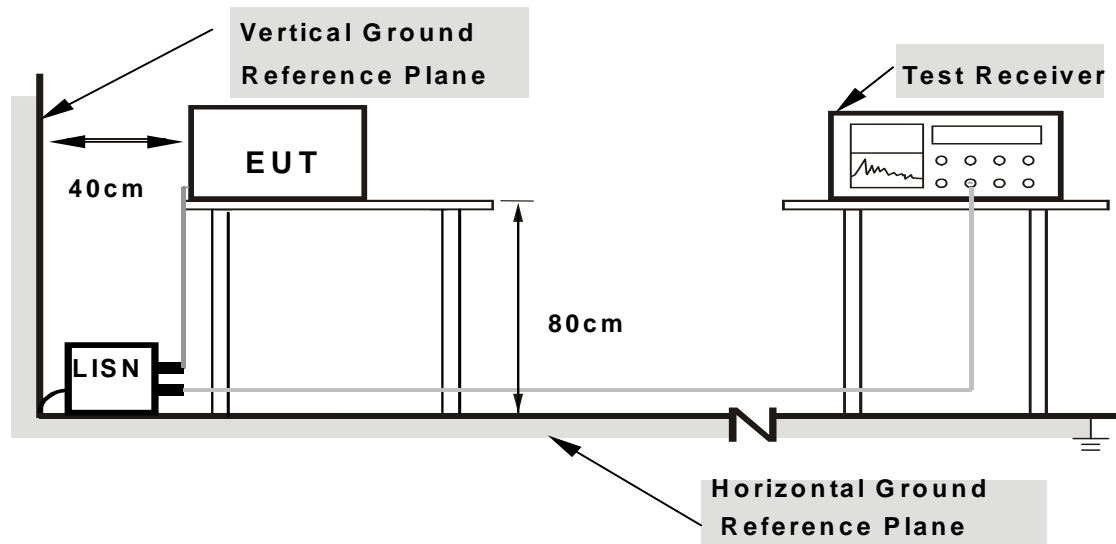
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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



**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

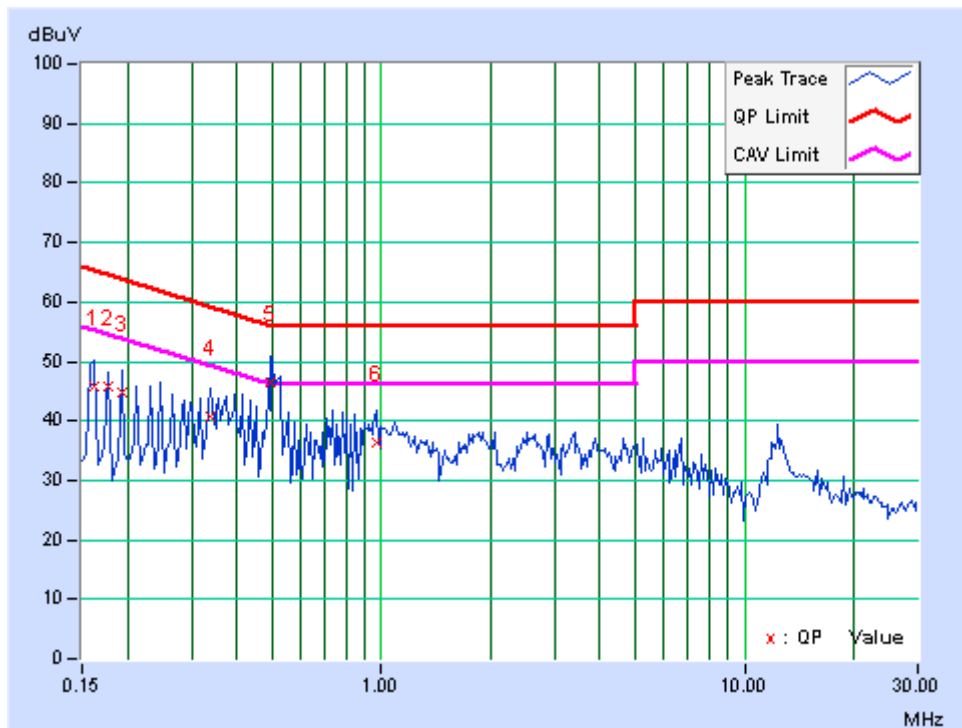
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA

PHASE	Line 1	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

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	0.16172	10.81	35.00	21.59	45.81	32.40	65.38	55.38	-19.57	-22.98
2	0.17734	10.75	35.12	22.28	45.87	33.03	64.61	54.61	-18.74	-21.58
3	0.19297	10.69	34.23	21.80	44.92	32.49	63.91	53.91	-18.99	-21.42
4	0.33750	10.65	30.20	23.45	40.85	34.10	59.26	49.26	-18.41	-15.16
5	0.49375	10.55	35.79	30.48	46.34	41.03	56.10	46.10	-9.76	-5.07
6	0.96641	10.31	26.04	20.73	36.35	31.04	56.00	46.00	-19.65	-14.96

- 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.



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



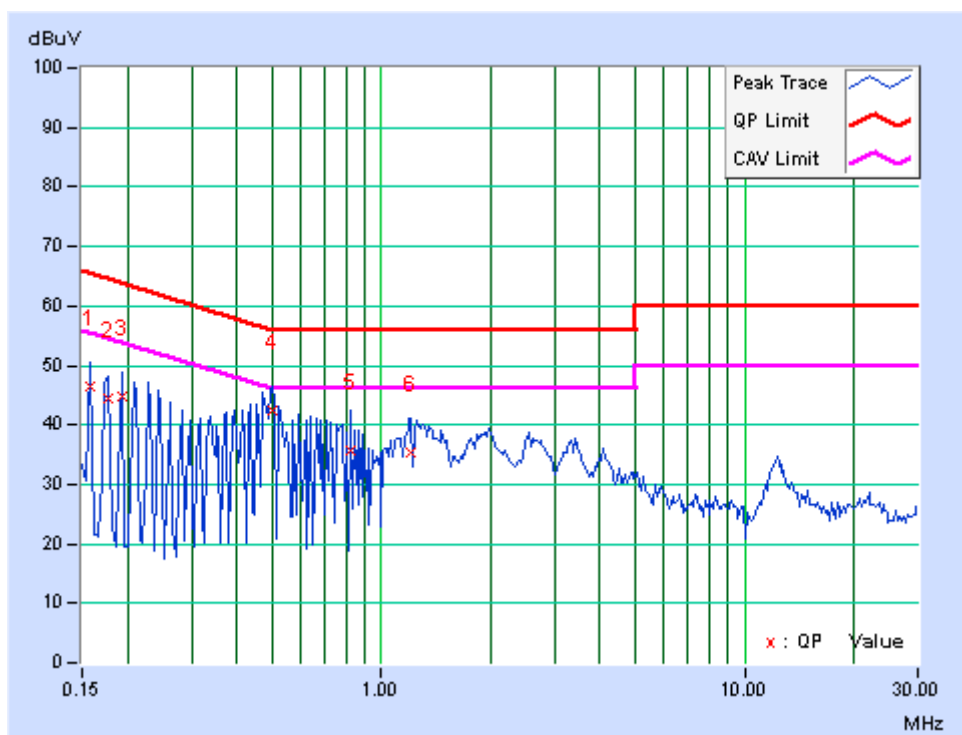
**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

PHASE	Neutral	6dB BANDWIDTH	9kHz
--------------	---------	----------------------	------

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	0.15781	10.63	35.69	19.95	46.32	30.58	65.58	55.58	-19.25	-24.99
2	0.17734	10.60	33.93	17.95	44.53	28.55	64.61	54.61	-20.08	-26.06
3	0.19297	10.56	34.35	18.74	44.91	29.30	63.91	53.91	-18.99	-24.60
4	0.50156	10.55	31.91	21.97	42.46	32.52	56.00	46.00	-13.54	-13.48
5	0.82188	10.28	25.31	11.02	35.59	21.30	56.00	46.00	-20.41	-24.70
6	1.21094	10.10	25.27	13.81	35.37	23.91	56.00	46.00	-20.63	-22.09

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.



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



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

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 29,14	Apr. 28,15
EMI Test Receiver	Rohde&Schwarz	ESU 26	100005	May 13,14	May 12,15
Loop antenna (9kHz~30MHz)	Daze	ZN30900A	0708	Dec. 05,13	Dec. 04,14
Bilog Antenna	Teseq	CBL 6111D	27089	Jun. 27, 14	Jun. 26, 15
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 30,14	May 29,15
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Feb. 13,14	Feb. 12,15
Pre-Amplifier (9kHz~1GHz)	SONOMA	310D	186955	Mar. 05,14	Mar. 04,15
Signal Amplifier	Agilent	8447D	2944A10488	Jun. 25,14	Jun. 24,15
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 14,14	May 13,15
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,14	Nov. 03,15
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Apr. 19,14	Apr. 18,15
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30, 14	Oct. 29, 15
Test Software	ADT	ADT_Radiated _V7.6.15.9.2	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, GREGT/CHINA and NIM/CHINA.
2. The test was performed in 966 Chamber.
3. The FCC Site Registration No. is 502831.

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/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:

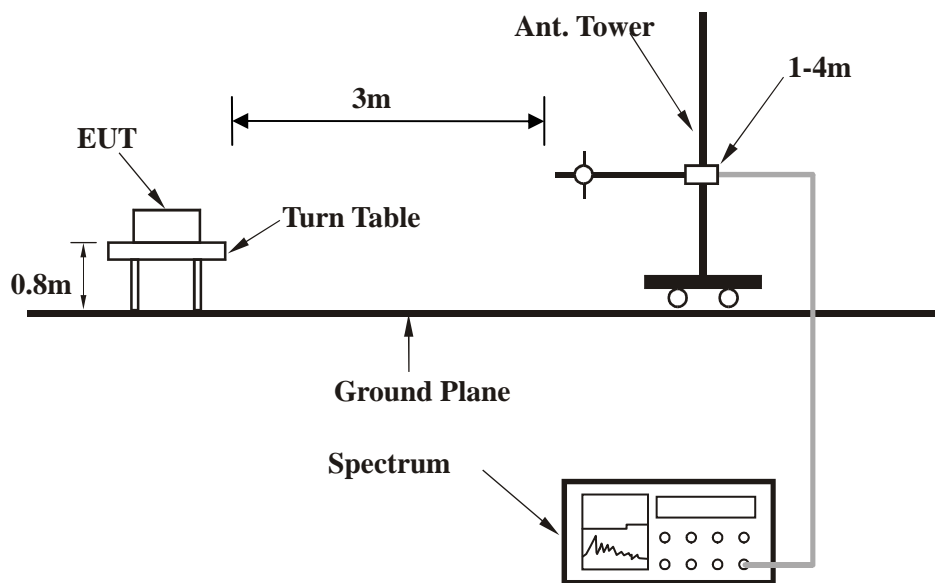
- 1 The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2 The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3 Bluetooth 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.



4.2.4 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

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



4.2.7 TEST RESULTS

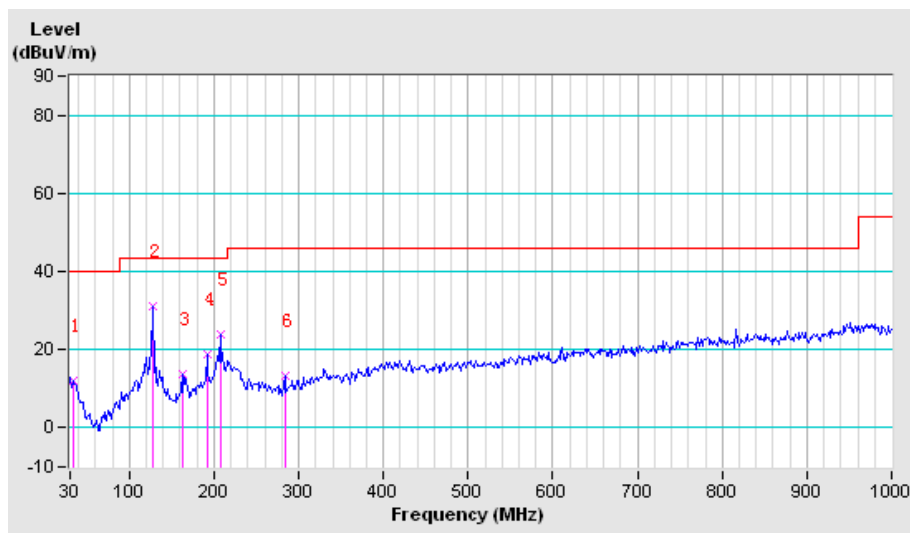
BELOW 1GHz WORST-CASE DATA: GFSK DH5

CHANNEL	Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	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	34.66	11.98	40.00	-28.02	150	0	-5.33	17.31
2	127.93	31.22	43.50	-12.28	150	0	17.35	13.87
3	162.13	13.61	43.50	-29.89	150	0	0.84	12.77
4	191.67	18.70	43.50	-24.80	150	0	8.34	10.36
5	207.21	23.86	43.50	-19.64	150	0	12.84	11.02
6	283.38	13.49	46.00	-32.51	150	0	-2.17	15.66

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.





BUREAU
VERITAS

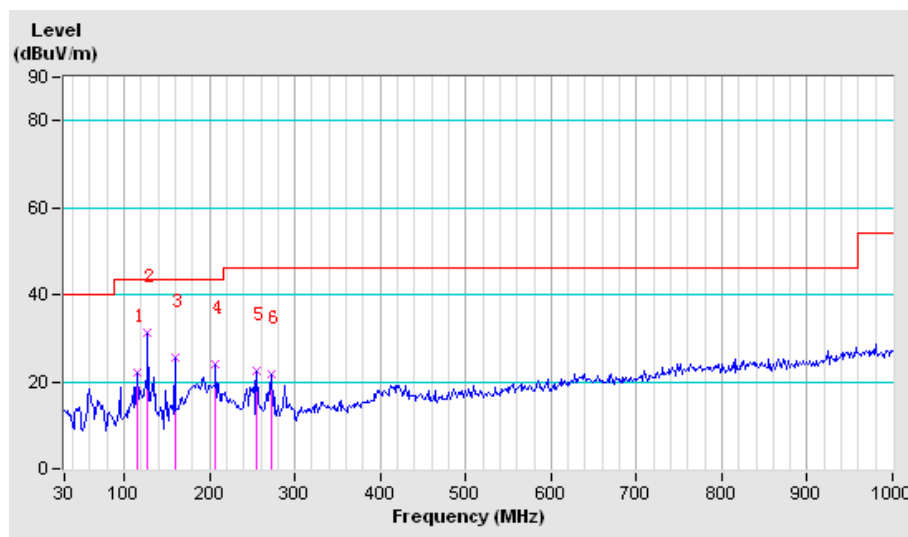
Test Report No.: RF141024N001R1

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	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	115.50	22.06	43.50	-21.44	150	0	8.91	13.15
2	127.93	31.22	43.50	-12.28	150	0	17.35	13.87
3	159.02	25.47	43.50	-18.03	150	0	12.30	13.17
4	207.21	23.86	43.50	-19.64	150	0	12.84	11.02
5	255.40	22.41	46.00	-23.59	150	0	6.95	15.46
6	272.50	21.85	46.00	-21.44	150	0	6.12	15.73

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.



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



**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

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	64.7 PK	74	-9.3	1.00 H	210	28.49	36.21
2	2400.00	40.6 AV	54	-13.4	1.00 H	210	4.39	36.21
3	*2402.00	79.1 PK	114	-34.9	1.00 H	210	42.88	36.22
4	*2402.00	55.0 AV	94	-39	1.00 H	210	18.78	36.22
5	4804.00	62.7 PK	74	-11.3	1.41 H	324	23.02	39.68
6	4804.00	38.6 AV	54	-15.4	1.41 H	324	-1.08	39.68
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	63.6 PK	74	-10.4	1.00 V	174	27.39	36.21
2	2400.00	39.5 AV	54	-14.5	1.00 V	174	3.29	36.21
3	*2402.00	82.4 PK	114	-31.6	1.00 V	174	46.18	36.22
4	*2402.00	58.3 AV	94	-35.7	1.00 V	174	22.08	36.22
5	4804.00	64.7 PK	74	-9.3	1.00 V	269	25.02	39.68
6	4804.00	40.6 AV	54	-13.4	1.00 V	269	0.92	39.68

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.



**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

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	79.1 PK	114	-34.9	1.00 H	234	42.83	36.27
2	*2441.00	55.0 AV	94	-39	1.00 H	234	18.73	36.27
3	4882.00	63.5 PK	74	-10.5	1.23 H	321	23.8	39.7
4	4882.00	3.4 AV	54	-14.6	1.23 H	321	-0.3	39.7
5	7323.00	55.5 PK	74	-18.5	1.00 H	360	12.34	43.16
6	7323.00	31.4 AV	54	-22.6	1.00 H	360	-11.76	43.16
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	80.1 PK	114	-33.9	1.00 V	170	43.83	36.27
2	*2441.00	56.0 AV	94	-38	1.00 V	170	19.73	36.27
3	4882.00	65.1 PK	74	-8.9	1.00 V	266	25.4	39.7
4	4882.00	41.0 AV	54	-13	1.00 V	266	1.3	39.7
5	7323.00	58.2 PK	74	-15.8	1.00 V	0	15.04	43.16
6	7323.00	34.1 AV	54	-19.9	1.00 V	0	-9.06	43.16

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.

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



**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

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	80.7 PK	114	-33.3	1.43 H	248	44.38	36.32
2	*2480.00	56.6 AV	94	-37.4	1.43 H	248	20.28	36.32
3	2483.50	61.5 PK	74	-12.5	1.43 H	248	25.17	36.33
4	2483.50	37.4 AV	54	-16.6	1.43 H	248	1.07	36.33
5	4960.00	61.3 PK	74	-12.7	1.46 H	288	21.59	39.71
6	4960.00	37.2 AV	54	-16.8	1.46 H	288	-2.51	39.71
7	7440.00	58.5 PK	74	-15.5	1.00 H	0	15.44	43.06
8	7440.00	34.4 AV	54	-19.6	1.00 H	0	-8.66	43.06
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	82.8 PK	114	-31.2	1.00 V	185	46.48	36.32
2	*2480.00	58.7 AV	94	-35.3	1.00 V	185	22.38	36.32
3	2483.50	60.6 PK	74	-13.4	1.00 V	185	24.27	36.33
4	2483.50	36.5 AV	54	-17.5	1.00 V	185	0.17	36.33
5	4960.00	63.1 PK	74	-10.9	1.00 V	288	23.39	39.71
6	4960.00	39.0 AV	54	-15	1.00 V	288	-0.71	39.71
7	7440.00	58.4 PK	74	-15.6	1.00 V	360	15.34	43.06
8	7440.00	34.3 AV	54	-19.7	1.00 V	360	-8.76	43.06

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.

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



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

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (10Hz–40GHz)	Rohde&Schwarz	FSV40	101003	Apr. 09,14	Apr. 08,15
Power Meter	Anritsu	ML2495A	1139001	Feb. 21,14	Feb. 20,15
Power Sensor	Anritsu	MA2411B	1126068	Feb. 21,14	Feb. 20,15
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30, 14	Oct. 29, 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. 25,14	Nov. 24,15

NOTE:

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

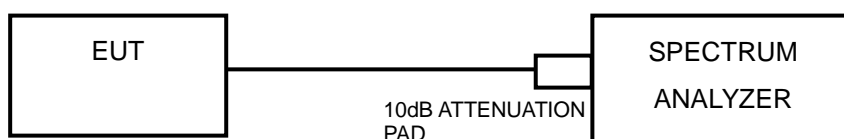
4.3.3 TEST PROCEDURE

- 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.

4.3.4 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

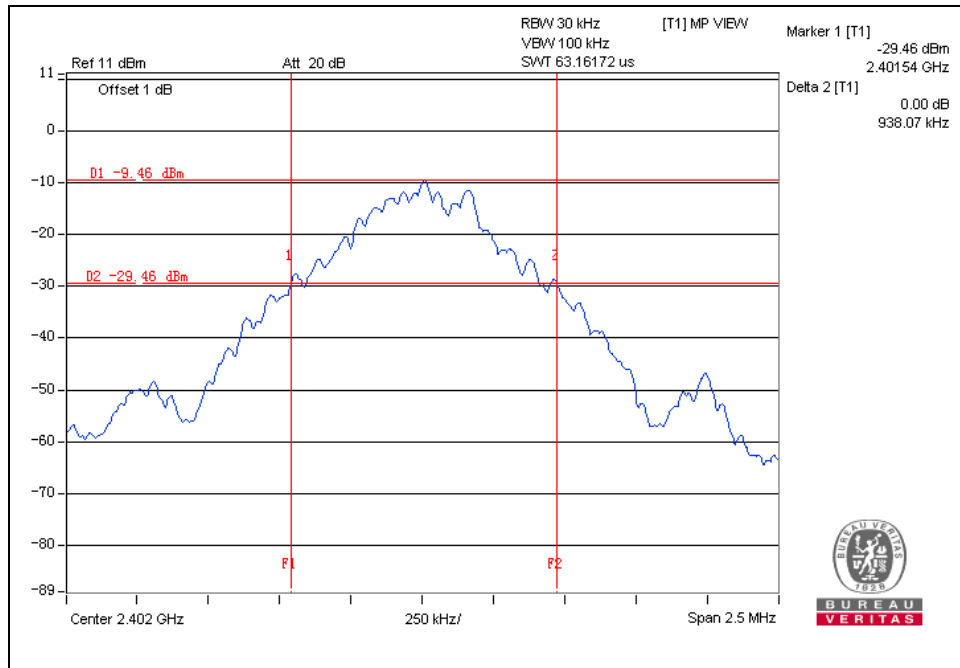
CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	0.938
Middle	2441	0.937
High	2480	0.936



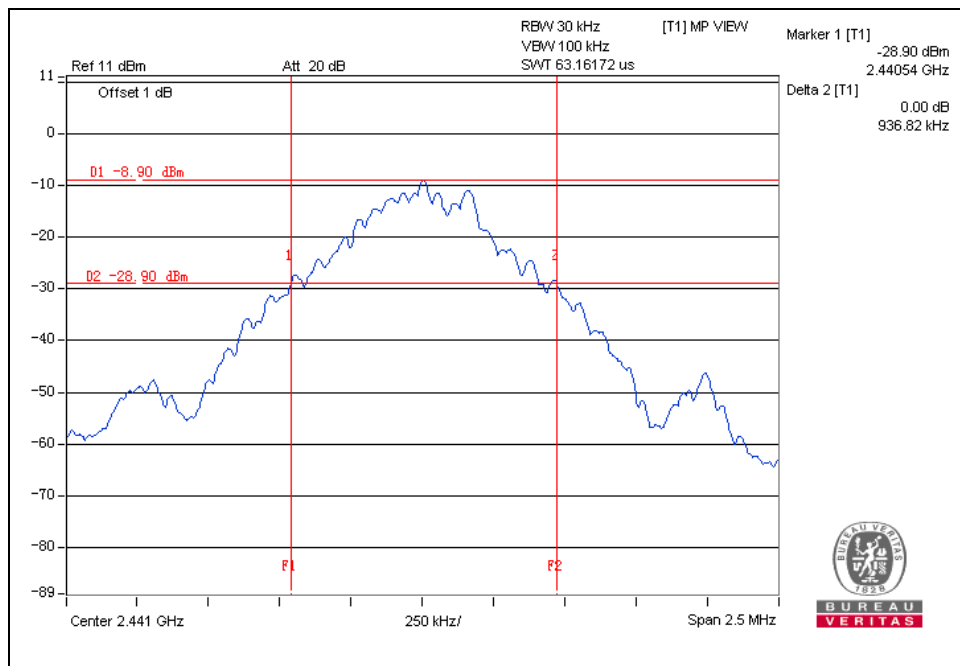
BUREAU
VERITAS

Test Report No.: RF141024N001R1

Test Data: Low channel



Test Data: Middle channel



Bureau Veritas Shenzhen Co., Ltd.
Dongguan Branch

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

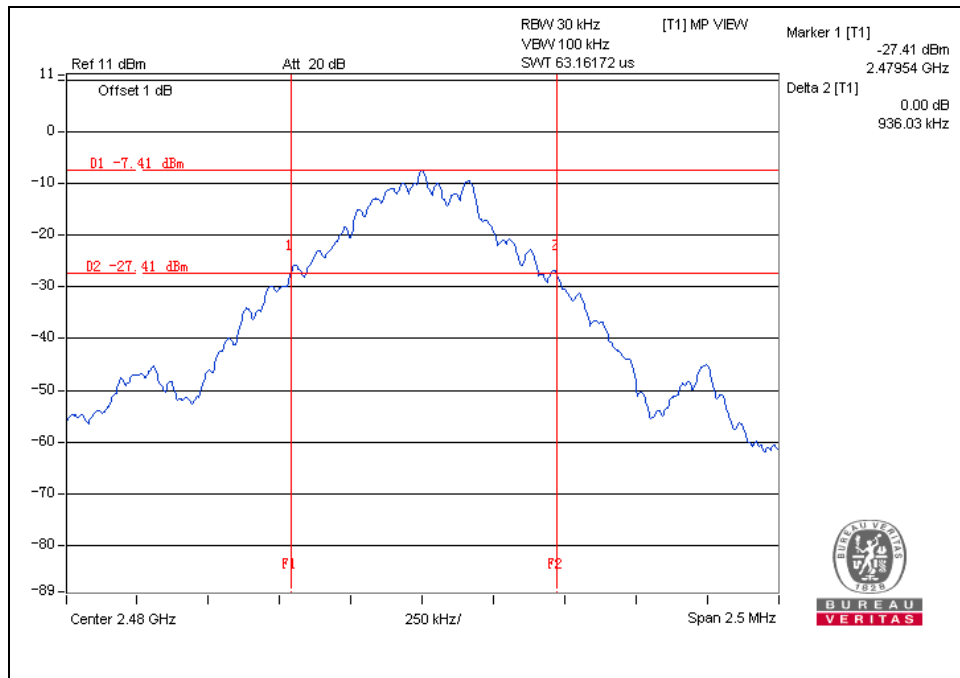
Tel: +86 769 8593 5656
Fax: +86 769 8593 1080
Email: customerservice.dg@cn.bureauveritas.com



BUREAU
VERITAS

Test Report No.: RF141024N001R1

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



5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



**BUREAU
VERITAS**

Test Report No.: RF141024N001R1

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---