



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2



Certificate # 2951.01

## TEST REPORT

Applicant	Shenzhen Alilo Smart Technology Co., Ltd
Address	21st Floor, Block B, Building 1, International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen City, China

Manufacturer or Supplier	Shenzhen Alilo Smart Technology Co., Ltd
Address	21st Floor, Block B, Building 1, International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen City, China
Product	alilo Pocket Bunny
Brand Name	alilo
Model	K1
Additional Models & Model Difference	K2, K3, K4, K5, see section 3.1
Date of tests	Oct. 13, 2023 ~ Nov. 23, 2023

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

**FCC Part 15, Subpart C, Section 15.247**

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

Tested by Eric Fang Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department

Date: Dec. 20, 2023

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended 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. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; 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.



## TABLE OF CONTENTS

<b>RELEASE CONTROL RECORD .....</b>	<b>4</b>
<b>1 SUMMARY OF TEST RESULTS.....</b>	<b>5</b>
<b>2 MEASUREMENT UNCERTAINTY .....</b>	<b>5</b>
<b>3 GENERAL INFORMATION .....</b>	<b>6</b>
3.1 GENERAL DESCRIPTION OF EUT .....	6
3.2 DESCRIPTION OF TEST MODES .....	7
3.2.1. CONFIGURATION OF SYSTEM UNDER TEST.....	7
3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	7
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	10
3.4 DESCRIPTION OF SUPPORT UNITS .....	10
3.5 CONFIGURATION OF SYSTEM UNDER TEST .....	10
3.6 DUTY CYCLE OF TESET SIGNAL.....	11
<b>4 TEST TYPES AND RESULTS.....</b>	<b>12</b>
4.1 RADIATED EMISSION MEASUREMENT .....	12
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....	12
4.1.2 TEST INSTRUMENTS.....	13
4.1.3 TEST PROCEDURES .....	14
4.1.4 DEVIATION FROM TEST STANDARD .....	15
4.1.5 TEST SETUP.....	15
4.1.6 EUT OPERATING CONDITIONS .....	16
4.1.7 TEST RESULTS .....	17
4.2 6DB BANDWIDTH MEASUREMENT .....	22
4.2.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT .....	22
4.2.2 TEST INSTRUMENTS.....	22
4.2.3 TEST PROCEDURE.....	23
4.2.4 DEVIATION FROM TEST STANDARD .....	23
4.2.5 TEST SETUP.....	24
4.2.6 EUT OPERATING CONDITIONS .....	24
4.2.7 TEST RESULTS .....	25
4.3 CONDUCTED OUTPUT POWER.....	27
4.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	27
4.3.2 TEST SETUP.....	27



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

4.3.3	TEST INSTRUMENTS.....	27
4.3.4	TEST PROCEDURES .....	28
4.3.5	DEVIATION FROM TEST STANDARD .....	28
4.3.6	EUT OPERATING CONDITIONS .....	28
4.3.7	TEST RESULTS .....	28
4.3.7.1	MAXIMUM PEAK OUTPUT POWER .....	28
4.3.7.2	AVERAGE OUTPUT POWER (FOR REFERENCE).....	29
4.4	POWER SPECTRAL DENSITY MEASUREMENT .....	30
4.4.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	30
4.4.2	TEST SETUP.....	30
4.4.3	TEST INSTRUMENTS.....	30
4.4.4	TEST PROCEDURE.....	30
4.4.5	DEVIATION FROM TEST STANDARD .....	30
4.4.6	EUT OPERATING CONDITION .....	30
4.4.7	TEST RESULTS .....	31
4.5	OUT OF BAND EMISSION MEASUREMENT .....	32
4.5.1	LIMITS OF OUT OF BAND EMISSION MEASUREMENT.....	32
4.5.2	TEST SETUP.....	32
4.5.3	TEST INSTRUMENTS.....	32
4.5.4	TEST PROCEDURE.....	32
4.5.5	DEVIATION FROM TEST STANDARD .....	33
4.5.6	EUT OPERATING CONDITION .....	33
4.5.7	TEST RESULTS .....	34
5	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	36
6	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	37



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2310WDG0032-2	Original release	Dec. 20, 2023



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	N/A	Powered from battery
15.205 15.209	Radiated Emission	PASS	Meet the requirement of limit.
15.247(d)	Out of band Emission Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used

## 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	2.80dB
	30MHz ~ 1GHz	4.24dB
	1GHz ~ 18GHz	4.76dB
	18GHz ~ 40GHz	4.50dB

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	alilo Pocket Bunny
MODEL NO.	K1
ADDITIONAL MODELS	K2, K3, K4, K5
FCC ID	2AZOH-K1
NOMINAL VOLTAGE	DC 3.7V from Battery
MODULATION TECHNOLOGY	DTS
MODULATION TYPE	BT-LE(GFSK)
OPERATING FREQUENCY	2402-2480MHz
PEAK OUTPUT POWER	0.9141mW (Max. Measured)
ANTENNA TYPE	PCB Antenna, 2dBi Gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

#### NOTES:

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.: 2310WDG0032) for detailed product photo.
4. Additional models (see above table) are identical with the test model K1 except the model name and brand name for trading purpose.
5. The BT function is not working while in charging mode.



### 3.2 DESCRIPTION OF TEST MODES

40 channels are provided for BT-LE(GFSK):

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

#### 3.2.1. CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

#### 3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, power supply voltage range and antenna ports. The worst case was found when positioned on X axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
A	√	√	-	√	Powered by Battery with BT <b>Function</b>

Where

**RE<1G:** Radiated Emission below 1GHz

**RE≥1G:** Radiated Emission above 1GHz

**PLC:** Power Line Conducted Emission

**APCM:** Antenna Port Conducted Measurement

**NOTE:** No need to concern of Conducted Emission due to the EUT is powered by battery.



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

#### RADIATED EMISSION TEST (BELOW 1GHz):

- 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 (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	0 to 39	39	DTS	GFSK	1

For the test results, only the worst case was shown in test report.

#### RADIATED EMISSION TEST (ABOVE 1GHz):

- 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 (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	0 to 39	0,19, 39	DTS	GFSK	1

#### POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CONDITION
A	BT Link

#### ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	0 to 39	0,19, 39	DTS	GFSK	1



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER(POE)	TESTED BY
RE<1G	25deg. C, 53%RH	DC 3.7V From Battery	Durant
RE≥1G	25deg. C, 53%RH	DC 3.7V From Battery	Stalker
PLC	-	-	-
APCM	25deg. C, 60%RH	DC 3.7V From Battery	Vincent



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

### 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:

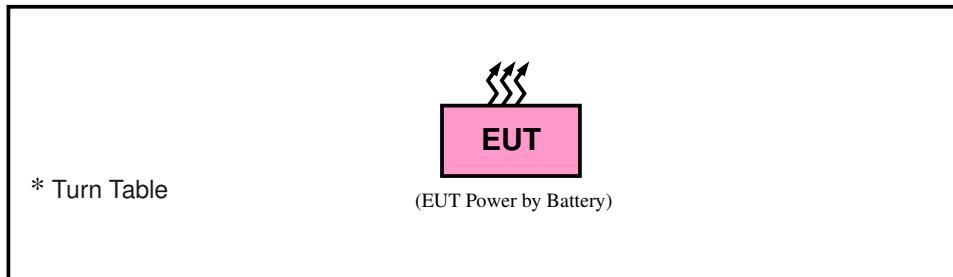
**FCC Part 15, Subpart C, Section 15.247**  
**KDB558074 D01 15.247 Meas Guidance v05r02**  
**ANSI C63.10-2013**

Note: 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 without any other necessary accessories or support units.

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST



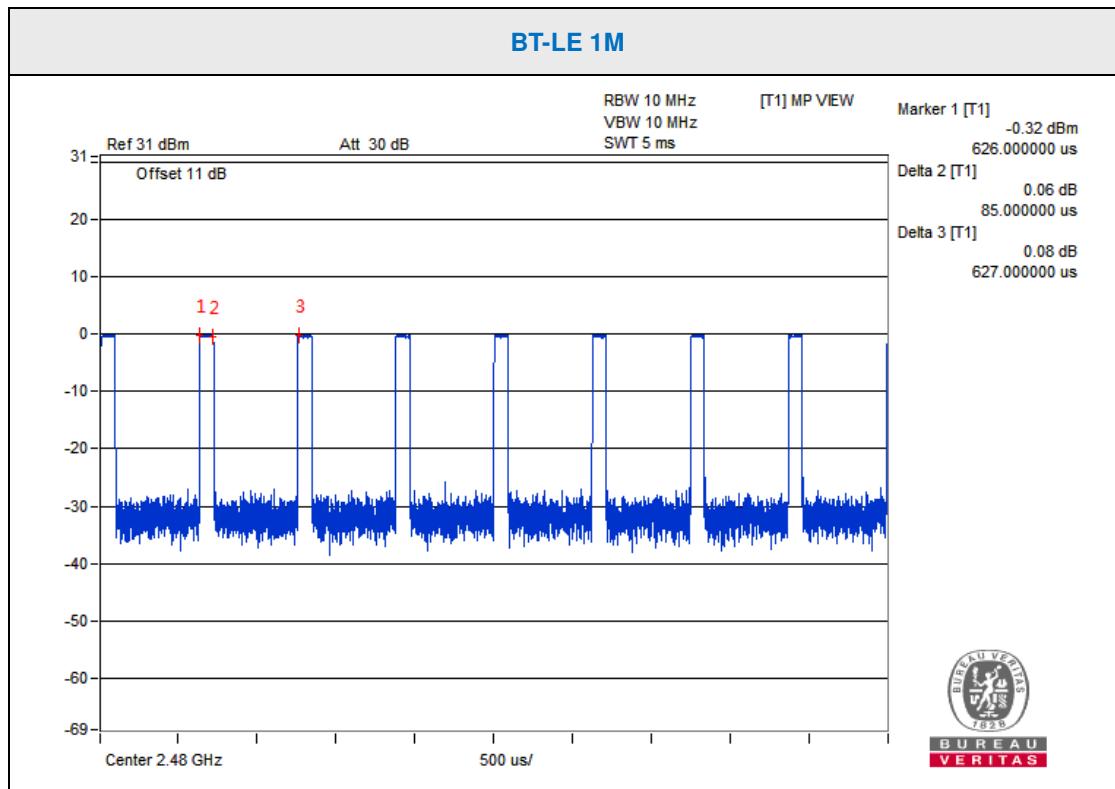


BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

### 3.6 DUTY CYCLE OF TESET SIGNAL

Test Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	1/T Min. VBW (KHz)	VBW Setting
BT-LE 1M	0.085	0.627	13.6	11.8	20kHz



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



## 4 TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

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

**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.



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Spectrum Analyzer	Rohde&Schwarz	FSV3044	101326	July 13, 24
EMI Test Receiver	Rohde&Schwarz	ESU8	100372	Apr. 06, 24
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-555	Jan. 08, 24
Pre-Amplifier	Agilent	8447D	2944A10488	July. 26, 24
3m Semi-anechoic Chamber	ETS-Lindgren	9m*6m*6m	D3040003DG-1	July 30, 24
Coaxial RF Cable	Joinfront	JFAA6-NMNM-8000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAR-NMBNCM-2000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAR-BNCMSMM-500	2100033742	July 10, 24
Test software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
Horn Antenna	ETS-Lindgren	3117	00240041	May 06, 24
Horn Antenna	SCHWARZBECK	BBHA 9170	01024	Oct. 16, 24
Pre-Amplifier (1GHz-18GHz)	Rohde&Schwarz	SCU18	102265	Apr. 01, 24
Pre-Amplifier (18GHz-40GHz)	Rohde&Schwarz	SCU40	100437	Oct. 10, 24
Coaxial RF Cable	Joinfront	JFAA6-NMNM-8000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAA6-NMSMM-2000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAA6-NMSMM-800	2100033742	July 10, 24

#### NOTES:

1. The test was performed in 966 Chamber -3.
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 749762.



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) 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. For below 1GHz was used bilog antenna, and above 1GHz was used horn 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. a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1.3m above the ground.
- g. 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 fresh batteries. The turntable was rotated to maximize the emission level.

#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.



BUREAU  
VERITAS

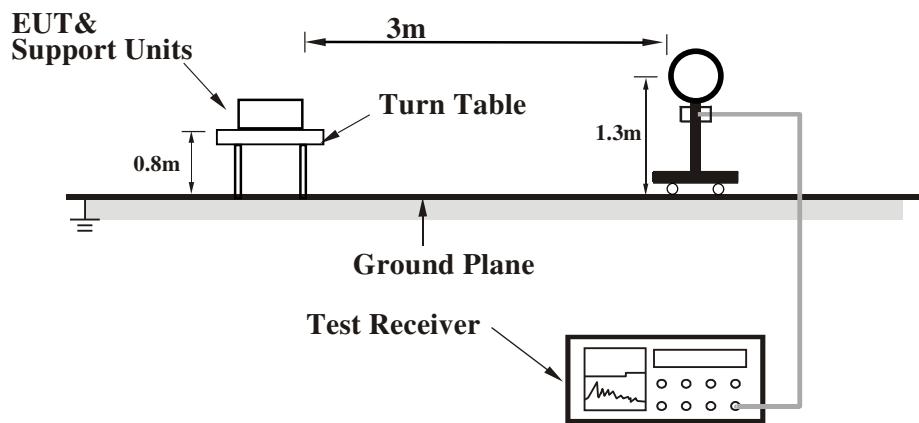
Test Report No.: RF2310WDG0032-2

#### 4.1.4 DEVIATION FROM TEST STANDARD

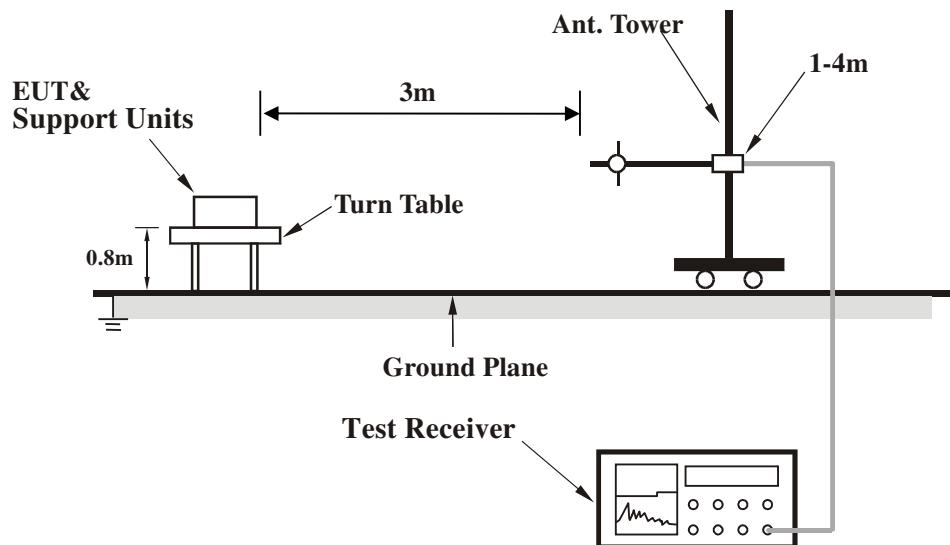
No deviation.

#### 4.1.5 TEST SETUP

##### Below 30MHz test setup



##### Below 1GHz test setup

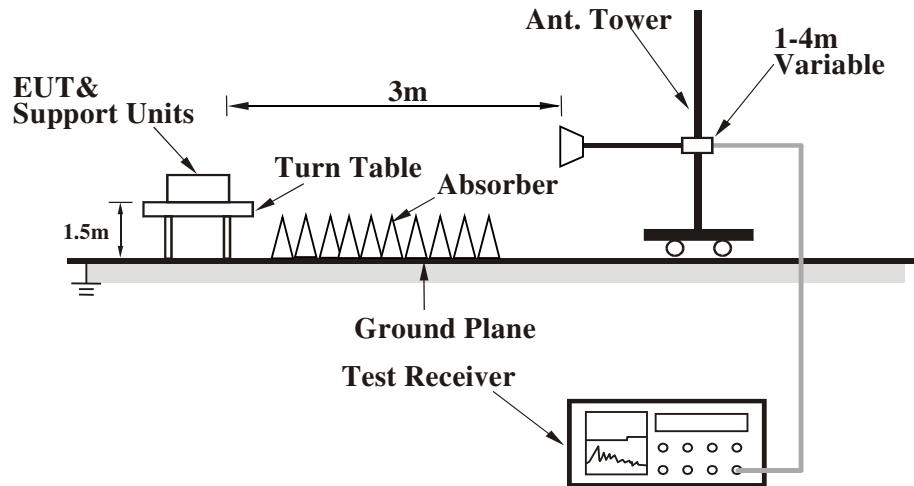




BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

### Above 1GHz test setup



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

#### 4.1.6 EUT OPERATING CONDITIONS

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

#### 4.1.7 TEST RESULTS

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

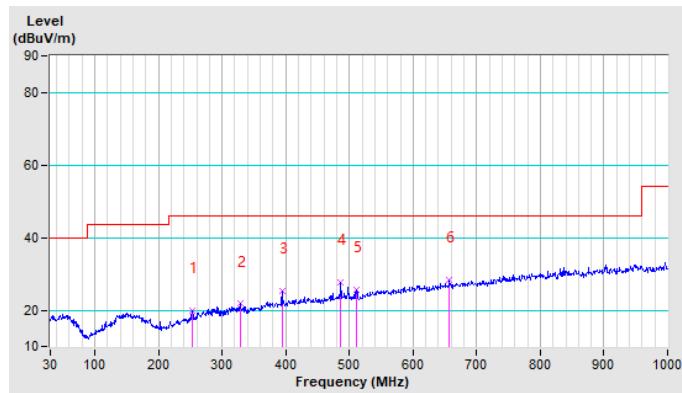
###### BT-LE (GFSK)

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

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	253.10	19.83 QP	46.00	-26.17	1.00 H	125	28.71	-8.88
2	327.79	21.76 QP	46.00	-24.24	1.00 H	223	28.43	-6.67
3	393.75	25.19 QP	46.00	-20.81	1.00 H	176	30.74	-5.55
4	485.90	27.68 QP	46.00	-18.32	1.00 H	217	31.93	-4.25
5	511.12	25.76 QP	46.00	-20.24	1.00 H	75	29.42	-3.66
6	656.62	28.35 QP	46.00	-17.65	1.00 H	126	29.20	-0.85

###### 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 emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value





BUREAU  
VERITAS

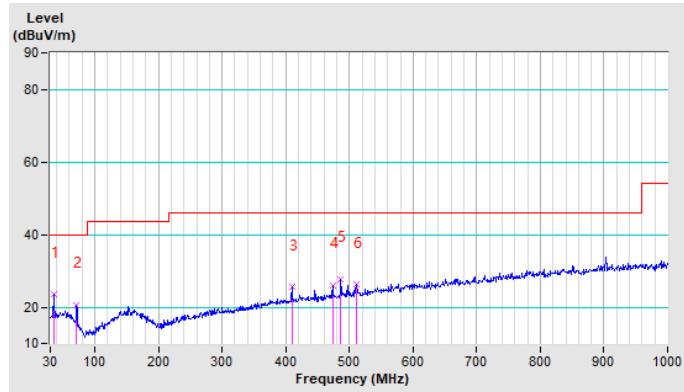
Test Report No.: RF2310WDG0032-2

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

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	34.85	23.40 QP	40.00	-16.60	1.00 V	12	33.33	-9.93
2	70.74	20.47 QP	40.00	-19.53	1.00 V	306	31.69	-11.22
3	410.24	25.50 QP	46.00	-20.50	1.00 V	217	30.93	-5.43
4	473.29	26.09 QP	46.00	-19.91	1.00 V	106	30.33	-4.24
5	485.90	27.55 QP	46.00	-18.45	1.00 V	203	31.80	-4.25
6	511.12	26.15 QP	46.00	-19.85	1.00 V	54	29.81	-3.66

**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 emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)

BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

## ABOVE 1GHz TEST DATA:

## BT-LE (GFSK)

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	2390.00	52.37 PK	74.00	-21.63	1.00 H	210	49.38	2.99
2	2390.00	41.20 AV	54.00	-12.80	1.00 H	210	38.21	2.99
3	*2402.00	90.20 PK			1.00 H	210	87.19	3.01
4	*2402.00	88.97 AV			1.00 H	210	85.96	3.01
5	4804.00	51.26 PK	74.00	-22.74	1.24 H	51	43.43	7.83
6	4804.00	40.10 AV	54.00	-13.90	1.24 H	51	32.27	7.83
7	#7206.00	52.16 PK	74.00	-21.84	1.46 H	252	41.83	10.33
8	#7206.00	41.34 AV	54.00	-12.66	1.46 H	252	31.01	10.33
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	2390.00	49.28 PK	74.00	-24.72	1.04 V	149	46.29	2.99
2	2390.00	40.68 AV	54.00	-13.32	1.04 V	149	37.69	2.99
3	*2402.00	90.21 PK			1.04 V	149	87.20	3.01
4	*2402.00	89.20 AV			1.04 V	149	86.19	3.01
5	4804.00	51.25 PK	74.00	-22.75	1.00 V	95	43.42	7.83
6	4804.00	41.32 AV	54.00	-12.68	1.00 V	95	33.49	7.83
7	#7206.00	52.31 PK	74.00	-21.69	1.34 V	201	41.98	10.33
8	#7206.00	40.10 AV	54.00	-13.90	1.34 V	201	29.77	10.33

## 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 emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

CHANNEL	TX Channel 19	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	*2440.00	93.31 PK			1.03 H	52	90.22	3.09
2	*2440.00	92.70 AV			1.03 H	52	89.61	3.09
3	4880.00	51.26 PK	74.00	-22.74	1.34 H	269	43.25	8.01
4	4880.00	40.38 AV	54.00	-13.62	1.34 H	269	32.37	8.01
5	7320.00	51.35 PK	74.00	-22.65	1.36 H	118	40.63	10.72
6	7320.00	42.01 AV	54.00	-11.99	1.36 H	118	31.29	10.72
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	*2440.00	90.18 PK			1.40 V	21	87.09	3.09
2	*2440.00	88.73 AV			1.40 V	21	85.64	3.09
3	4880.00	51.26 PK	74.00	-22.74	1.00 V	103	43.25	8.01
4	4880.00	40.12 AV	54.00	-13.88	1.00 V	103	32.11	8.01
5	7320.00	51.29 PK	74.00	-22.71	1.35 V	269	40.57	10.72
6	7320.00	40.87 AV	54.00	-13.13	1.35 V	269	30.15	10.72

**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 emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.

BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

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	*2480.00	94.49 PK			1.33 H	25	91.32	3.17
2	*2480.00	93.49 AV			1.33 H	25	90.32	3.17
3	2483.50	53.17 PK	74.00	-20.83	1.33 H	25	50.00	3.17
4	<b>2483.50</b>	<b>46.70 AV</b>	<b>54.00</b>	<b>-7.30</b>	<b>1.33 H</b>	<b>25</b>	<b>43.53</b>	<b>3.17</b>
5	4960.00	51.26 PK	74.00	-22.74	3.20 H	109	43.05	8.21
6	4960.00	40.10 AV	54.00	-13.90	3.20 H	109	31.89	8.21
7	7440.00	51.26 PK	74.00	-22.74	1.33 H	52	40.13	11.13
8	7440.00	40.20 AV	54.00	-13.80	1.33 H	52	29.07	11.13

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	88.97 PK			1.03 V	52	85.80	3.17
2	*2480.00	87.39 AV			1.03 V	52	84.22	3.17
3	2483.50	48.62 PK	74.00	-25.38	1.69 V	50	45.45	3.17
4	2483.50	39.48 AV	54.00	-14.52	1.69 V	50	36.31	3.17
5	4960.00	52.36 PK	74.00	-21.64	1.34 V	127	44.15	8.21
6	4960.00	41.18 AV	54.00	-12.82	1.34 V	127	32.97	8.21
7	7440.00	51.26 PK	74.00	-22.74	1.00 V	320	40.13	11.13
8	7440.00	41.29 AV	54.00	-12.71	1.00 V	320	30.16	11.13

**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 emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

## 4.2 6dB BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Jan. 11, 24
Power Meter	Anritsu	ML2495A	1139001	Jul. 11, 24
Power Sensor	Anritsu	MA2411B	1531155	Jul. 11, 24
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Oct. 15, 24
Oscilloscope	Agilent	DSO9254A	MY51260160	Jul. 11, 24
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 11, 24
Signal Generator	Agilent	N5183A	MY50140980	Jul. 23, 24
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jul. 11, 24
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	N/A
Test software	ADT	ADT_RF Test Software V6.6.5.3	N/A	N/A

#### NOTES:

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

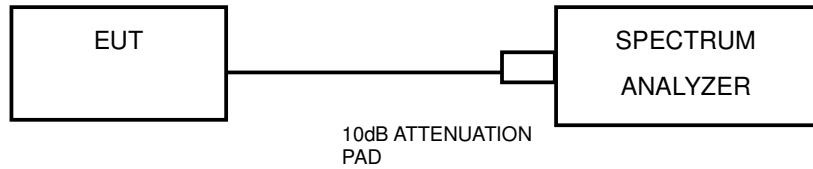
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq$  3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 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.



BUREAU  
VERITAS

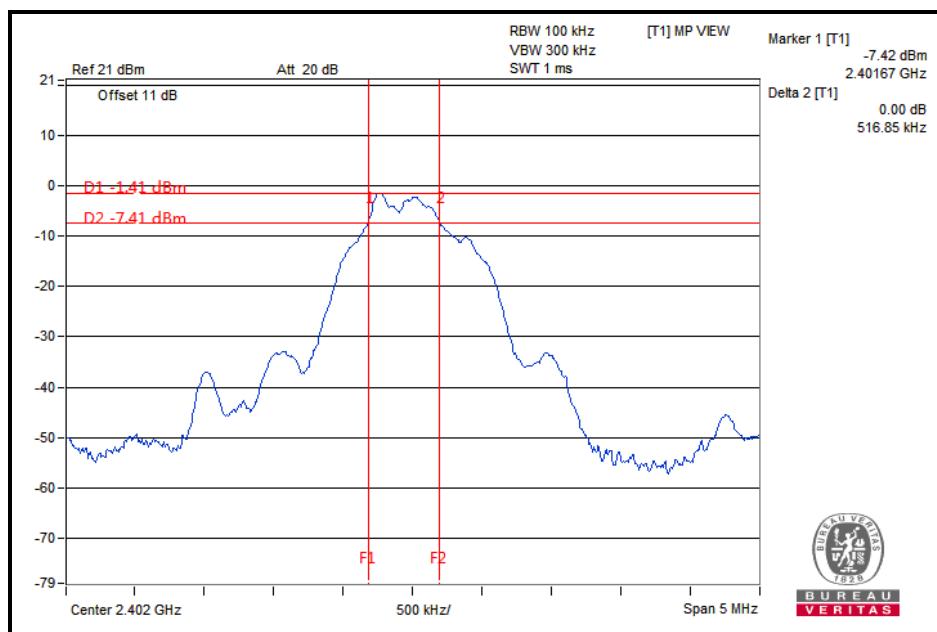
Test Report No.: RF2310WDG0032-2

#### 4.2.7 TEST RESULTS

##### BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.52	0.5	PASS
19	2440	0.52	0.5	PASS
39	2480	0.52	0.5	PASS

CH 0



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

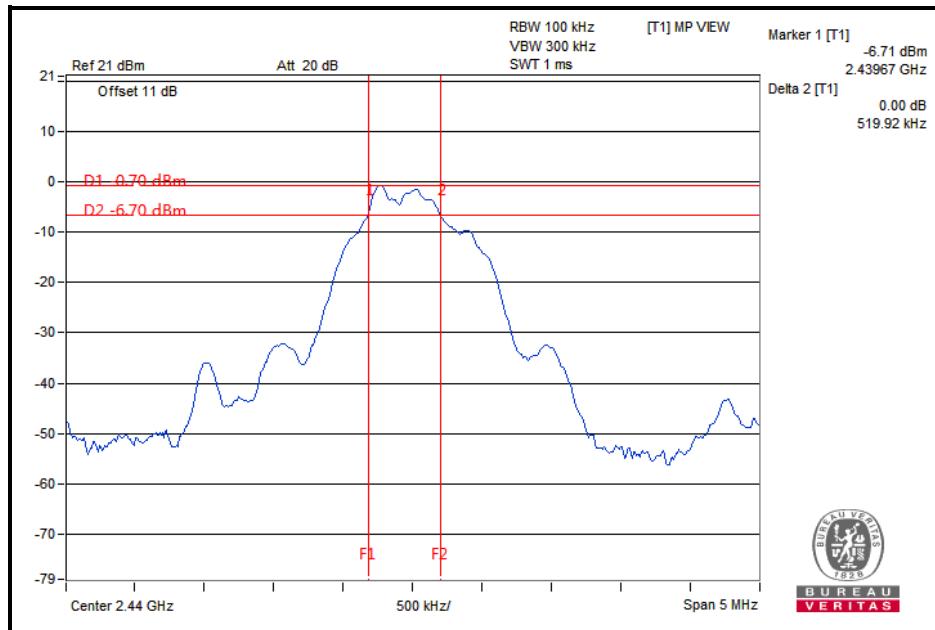
Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



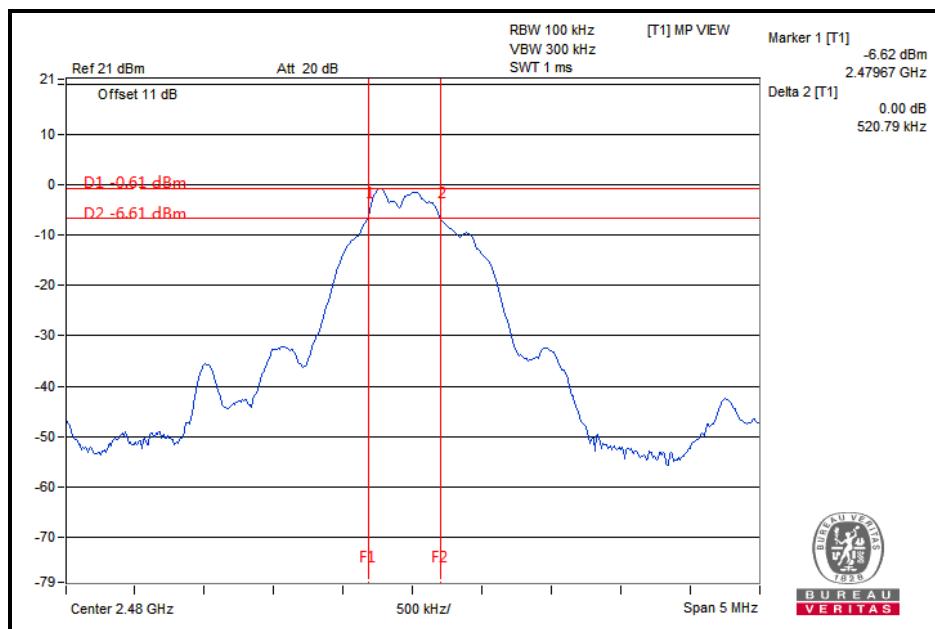
BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

CH 19



CH 39



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



BUREAU  
VERITAS

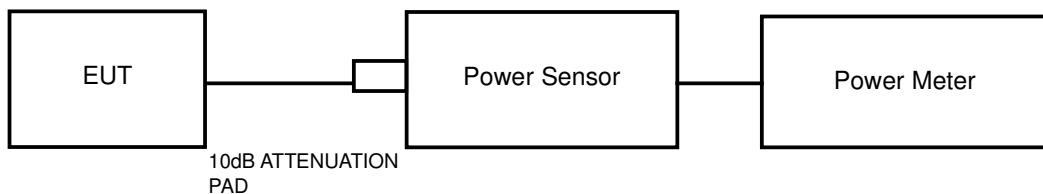
Test Report No.: RF2310WDG0032-2

## 4.3 CONDUCTED OUTPUT POWER

### 4.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

### 4.3.2 TEST SETUP



### 4.3.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Jan. 11, 24
Power Meter	Anritsu	ML2495A	1139001	Jul. 11, 24
Power Sensor	Anritsu	MA2411B	1531155	Jul. 11, 24
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Oct. 15, 24
Oscilloscope	Agilent	DSO9254A	MY51260160	Jul. 11, 24
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 11, 24
Signal Generator	Agilent	N5183A	MY50140980	Jul. 23, 24
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jul. 11, 24
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	N/A
Test software	ADT	ADT_RF Test Software V6.6.5.3	N/A	N/A

**NOTES:**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, GRRG/CHINA and NIM/CHINA.



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

#### 4.3.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor and set the detector to PEAK. Record the power level.

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor and set the detector to AVERAGE. Record the power level.

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 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

##### 4.3.7.1 MAXIMUM PEAK OUTPUT POWER

###### BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
0	2402	-1.19	0.7603	1	PASS
19	2440	-0.48	0.8954	1	PASS
39	2480	-0.39	0.9141	1	PASS



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

#### 4.3.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

##### BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)
0	2402	-2.54
19	2440	-1.65
39	<b>2480</b>	<b>-1.99</b>



BUREAU  
VERITAS

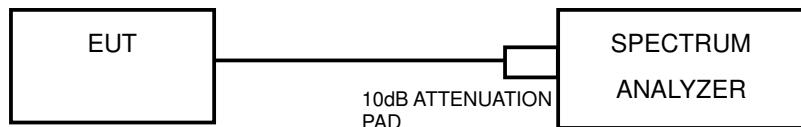
Test Report No.: RF2310WDG0032-2

## 4.4 POWER SPECTRAL DENSITY MEASUREMENT

### 4.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.4.4 TEST PROCEDURE

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW  $\geq$  3 x RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 EUT OPERATING CONDITION

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



BUREAU  
VERITAS

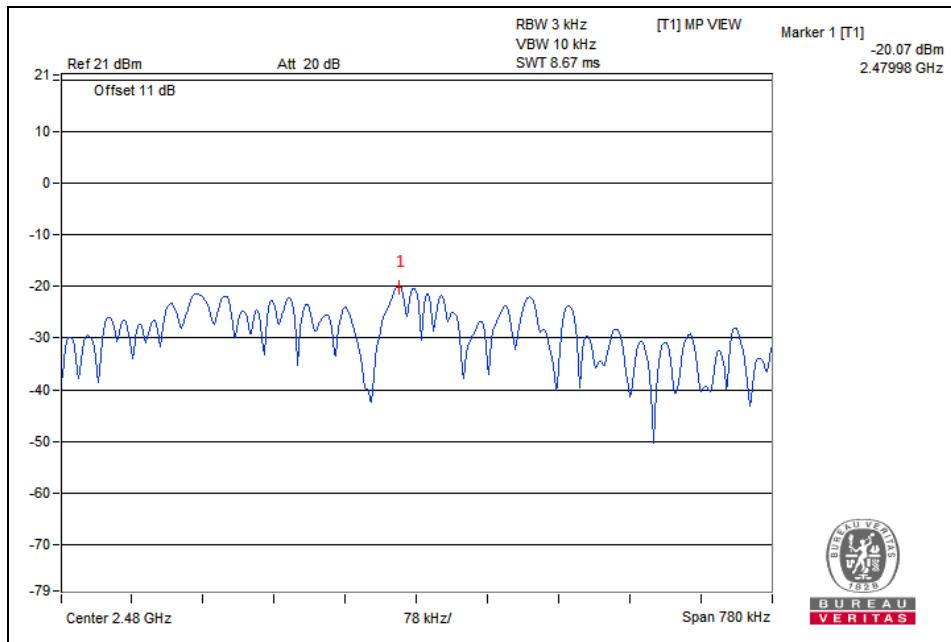
Test Report No.: RF2310WDG0032-2

#### 4.4.7 TEST RESULTS

##### BT-LE (GFSK)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-21.02	8	PASS
19	2440	-20.40	8	PASS
39	2480	-20.07	8	PASS

##### WORSE PLOT



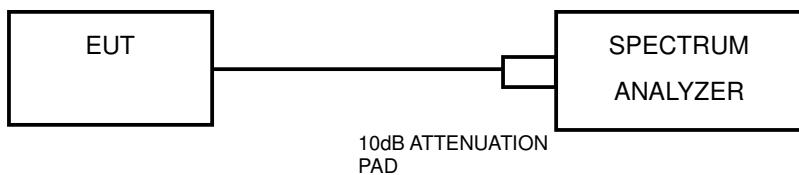


## 4.5 OUT OF BAND EMISSION MEASUREMENT

### 4.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below  $-20\text{dB}$  of the highest emission level of operating band (in  $100\text{kHz}$  Resolution Bandwidth).

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

1. Set the RBW =  $100\text{ kHz}$ .
2. Set the VBW  $\geq 300\text{ kHz}$ .
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any  $100\text{ kHz}$  band segment within the fundamental EBW.



**BUREAU  
VERITAS** Test Report No.: RF2310WDG0032-2

## MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

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



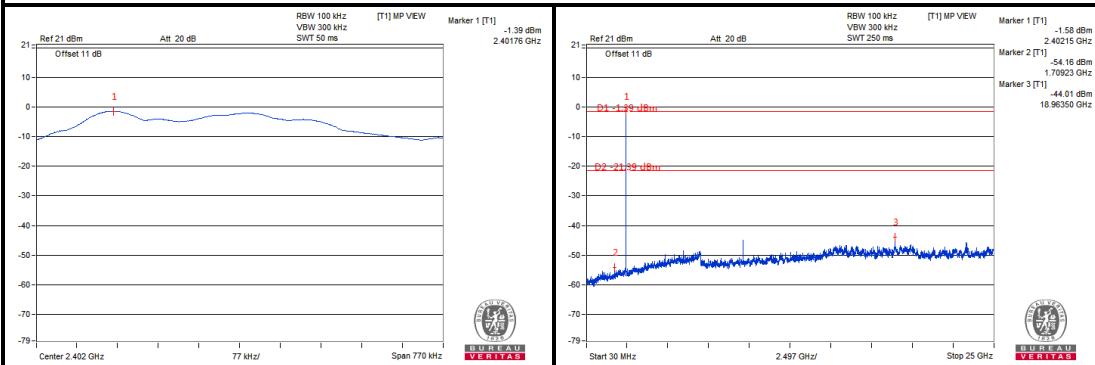
BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

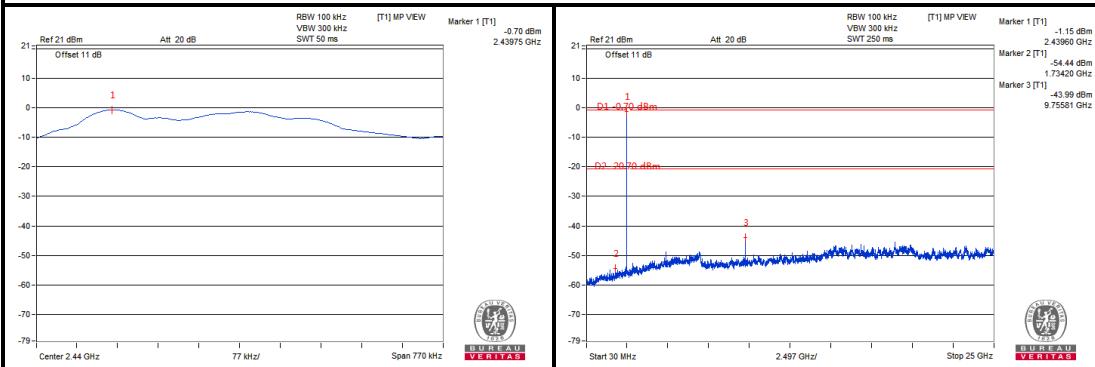
#### 4.5.7 TEST RESULTS

##### BT-LE (GFSK)

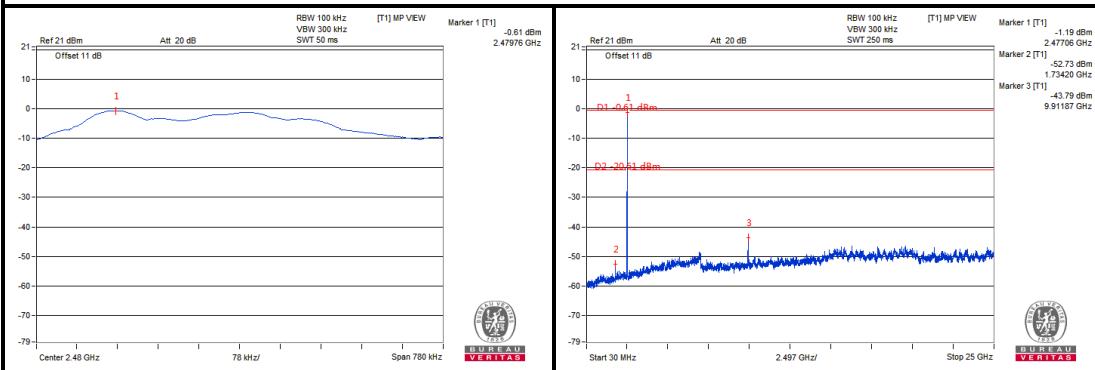
CH 0



CH 19



CH 39



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

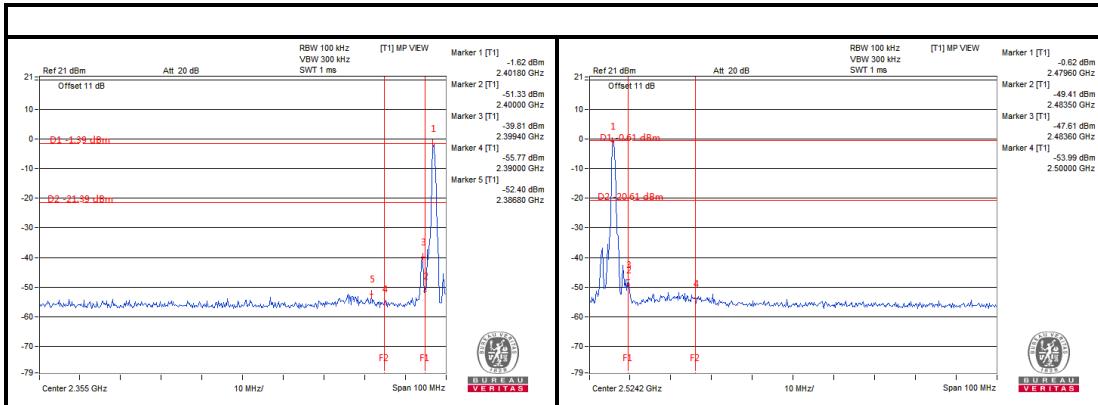
Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



BUREAU  
VERITAS

Test Report No.: RF2310WDG0032-2

**Band Edge:**



**Bureau Veritas Shenzhen Co., Ltd.**  
**Dongguan Branch**

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



**BUREAU  
VERITAS** Test Report No.: RF2310WDG0032-2

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



**BUREAU  
VERITAS** Test Report No.: RF2310WDG0032-2

## **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---**