




BUREAU VERITAS

Test Report No.: W7L-P23040022RF02



# FCC TEST REPORT (Part 15, Subpart C)

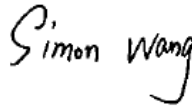
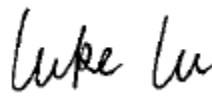
Applicant:	Suzhou Mojawa Intelligent Electronic Co., Ltd
Address:	Room F1-A-1028, Building A2, No. 8, Qicun Road, Suzhou Industrial Park, Suzhou Area, China(Jiangsu) Pilot Free Trade Zone , Jiangsu Province, PRC

Manufacturer or Supplier:	Suzhou Mojawa Intelligent Electronic Co., Ltd
Address:	Room F1-A-1028, Building A2, No. 8, Qicun Road, Suzhou Industrial Park, Suzhou Area, China(Jiangsu) Pilot Free Trade Zone , Jiangsu Province, PRC
Product:	Bone Conduction Headphones
Brand Name:	 mojawa
Model Name:	M2101
FCC ID:	2A2YH-M2101
Date of tests:	Apr. 20, 2023 ~ May. 09, 2023

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

- FCC Part 15, Subpart C, Section 15.247
- ANSI C63.10-2013

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

Prepared by Simon Wang Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
 Date: May. 09, 2023	 Date: May. 09, 2023

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**BUREAU  
VERITAS**

Test Report No.: W7L-P23040022RF02

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23040022RF02	Original release	May. 09, 2023



## 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
15.207	AC Power Conducted Emission	Compliance
15.205 15.209	Radiated Emissions	Compliance
15.247(d)	Out of band Emission Measurement	Compliance
15.247(a)(2)	6dB bandwidth	Compliance
15.247(b)	Conducted Output power	Compliance
15.247(e)	Power Spectral Density	Compliance
15.203	Antenna Requirement	Compliance



## 1.1 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	UNCERTAINTY
AC Power Conducted emissions	±2.70dB
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions (30MHz~1GHz)	±4.98dB
Radiated emissions (1GHz ~6GHz)	±4.70dB
Radiated emissions (6GHz ~18GHz)	±4.60dB
Radiated emissions (18GHz ~40GHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Conducted Output power	±2.06dB
Power Spectral Density	±0.85 dB

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



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Bone Conduction Headphones
<b>BRAND NAME</b>	
<b>MODEL NAME</b>	M2101
<b>NOMINAL VOLTAGE</b>	5Vdc (adapter or host equipment) 3.8Vdc (Li-Polymer, battery)
<b>MODULATION</b>	GFSK
<b>TRANSMISSION RATE</b>	BT_LE: 1 Mbps/2 Mbps
<b>OPERATING FREQUENCY</b>	2402-2480MHz for BT-LE(GFSK)
<b>MAX. OUTPUT POWER</b>	BT-LE: 1.97mW (Maximum)
<b>ANTENNA TYPE</b>	Unipolar ceramics Antenna with -1.03dBi gain
<b>HW VERSION</b>	V1.4
<b>SW VERSION</b>	V0.13.0
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	USB cable: non-shielded cable, with w/o ferrite core, 0.33 meter

**NOTE:**

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The EUT incorporates a SISO function. Physically, the EUT provides one transmitter and one receiver.

MODULATION MODE	TX/RX FUNCTION
BT_LE(1MHz)	1TX /1RX
BT_LE(2MHz)	1TX /1RX

- For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.



## 2.2 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





### 2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

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

### 2.2.2 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 and antenna ports. The worst case was found when positioned on Y 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				MODE
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	√	√	-

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.

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	39	GFSK	1.0



**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 and antenna ports (if EUT with antenna diversity architecture).

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	GFSK	1.0
BT-LE	0 to 39	1,19, 38	GFSK	2.0

**POWER LINE CONDUCTED EMISSION TEST**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0	GFSK	1.0

**BANDEDGE MEASUREMENT:**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	GFSK	1.0
BT-LE	0 to 39	1,19, 38	GFSK	2.0

**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, data rates and antenna ports (if EUT with antenna diversity architecture).

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	GFSK	1.0
BT-LE	0 to 39	1,19, 38	GFSK	2.0



**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 70%RH	DC 3.8V By Battery	Jace Hu
RE≥1G	23deg. C, 70%RH	DC 3.8V By Battery	Jace Hu
PLC	25deg. C, 52%RH	DC 5V By Adapter	Carl Xie
APCM	25deg. C, 60%RH	DC 3.8V By Battery	James Fu



### 2.3 DUTY CYCLE OF TEST SIGNAL

Please Refer to Appendix Of this test report.

#### WORST-CASE DATA:

Measured Duty Cycle		
Mode		Duty Cycle [%]
		ANT1
BT LE	BT4.0	85.20
	BT5.0	43.60

Note:

Duty cycle of test signal is < 98%, duty factor shall be considered.



## 2.4 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**

**KDB 558074 D01 DTS Meas Guidance v05r02**

**ANSI C63.10-2013**

Note :

1. All test items have been performed and recorded as per the above standards.
2. The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Certification). The test report has been issued separately.

## 2.5 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	Desktop	Lenovo	M73 SFF	PC04GRQV	N/A
2	Desktop	Lenovo	M73 SFF	PC06CS27	N/A
3	Laptop	Lenovo	Thinkpad T450	PC-049PT1	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.5m
2	AC Line: Unshielded, Detachable 1.5m
3	AC Line: Unshielded, Detachable 1.5m



### 3 TEST TYPES AND RESULTS

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	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.

##### 3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Feb. 14,23	Feb. 13,24
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 03,23	Mar. 02,24

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



### 3.1.3 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.

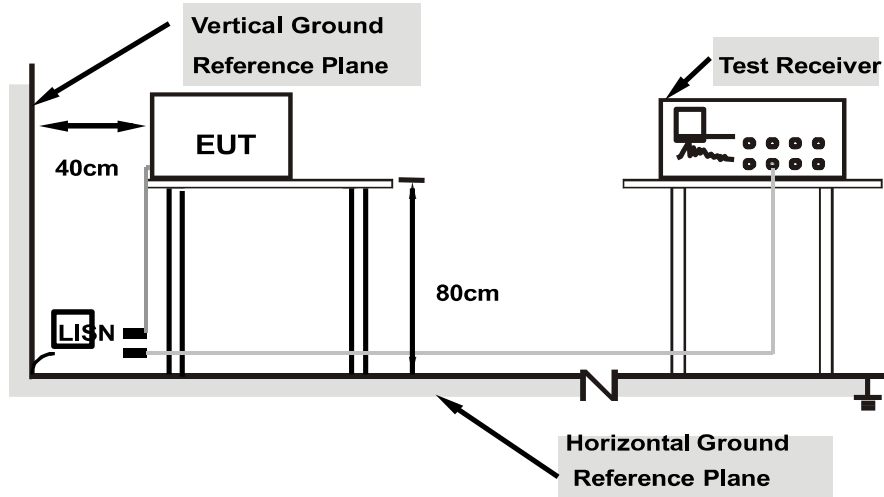
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation.



### 3.1.5 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).

### 3.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power and connected of all equipment.
- b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.





### 3.1.7 TEST RESULTS

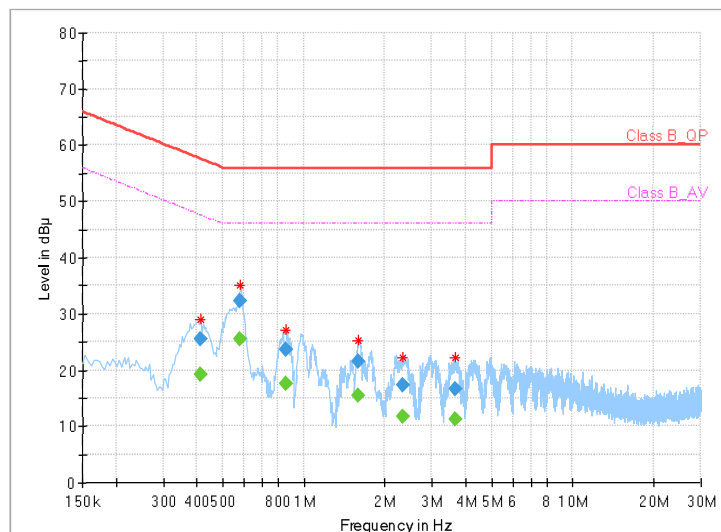
**CONDUCTED WORST-CASE DATA:**

<b>Frequency Range</b>	150KHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	26deg. C, 51%RH
<b>Tested By</b>	Carl Xie		

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.412000	---	19.11	47.61	28.50	L1	ON	9.7
0.412000	25.46	---	57.61	32.15	L1	ON	9.7
0.580000	---	25.60	46.00	20.40	L1	ON	9.7
0.580000	32.33	---	56.00	23.67	L1	ON	9.7
0.860000	---	17.50	46.00	28.50	L1	ON	9.7
0.860000	23.68	---	56.00	32.32	L1	ON	9.7
1.600000	---	15.44	46.00	30.56	L1	ON	9.7
1.600000	21.50	---	56.00	34.50	L1	ON	9.7
2.344000	---	11.78	46.00	34.22	L1	ON	9.7
2.344000	17.39	---	56.00	38.61	L1	ON	9.7
3.664000	---	11.30	46.00	34.70	L1	ON	9.7
3.664000	16.52	---	56.00	39.48	L1	ON	9.7

- 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 = Limit value -Emission level
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

Full Spectrum



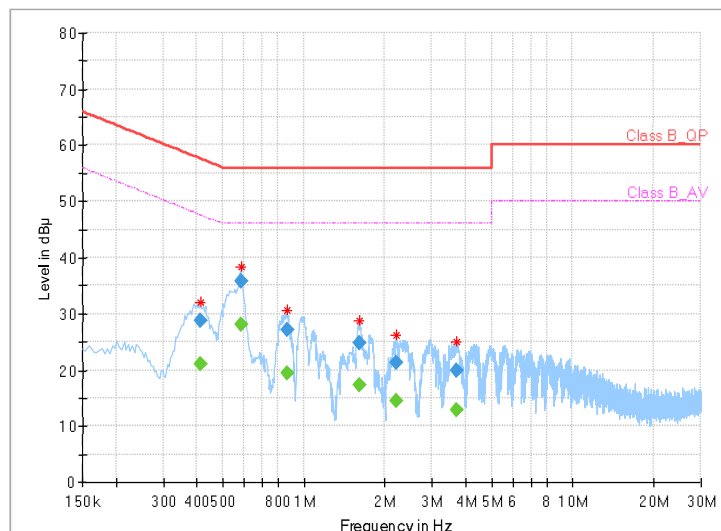


<b>Frequency Range</b>	150KHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	26deg. C, 51%RH
<b>Tested By</b>	Carl Xie		

Frequency (MHz)	QuasiPeak (dBUV)	CAverage (dBUV)	Limit (dBUV)	Margin (dB)	Line	Filter	Corr. (dB)
0.412000	---	21.05	47.61	26.56	N	ON	9.7
0.412000	28.74	---	57.61	28.87	N	ON	9.7
0.584000	---	28.15	46.00	17.85	N	ON	9.7
0.584000	35.70	---	56.00	20.30	N	ON	9.7
0.864000	---	19.30	46.00	26.70	N	ON	9.7
0.864000	27.04	---	56.00	28.96	N	ON	9.7
1.616000	---	17.39	46.00	28.61	N	ON	9.8
1.616000	24.80	---	56.00	31.20	N	ON	9.8
2.208000	---	14.45	46.00	31.55	N	ON	9.8
2.208000	21.28	---	56.00	34.72	N	ON	9.8
3.708000	---	12.89	46.00	33.11	N	ON	9.8
3.708000	19.87	---	56.00	36.13	N	ON	9.8

- 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 = Limit value -Emission level
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

Full Spectrum





### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 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.

**3.2.2 TEST INSTRUMENTS**

<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Cal.</b>	<b>Next Cal.</b>
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	May. 19,20	May. 18,23
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 05,23	Mar. 04,24
Horn Antenna	ETS-LINDGREN	3117	00168692	Mar. 05,23	Mar. 04,24
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Sep.04, 22	Sep.03, 23
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	JS1120-3	3.2.06	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	N/A	May. 12,22	May. 11,23
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Feb. 20,23	Feb. 19,24
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May.12,22	May.11,23
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.12,22	May.11,23
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,23	Feb. 16,24
DC Source	Kikusui/JP	PMX18-5A	0000001	Aug. 12,22	Aug. 11,23
Power Meter	Anritsu	ML2495A	1506002	Feb. 14,23	Feb. 13,24
Power Sensor	Anritsu	MA2411B	1339352	Feb. 14,23	Feb. 13,24
Loop Antenna	Schwarzbeck	FMZB 1519B	00173	Sep.03,22	Sep.02,23

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
  2. The test was performed in 3m Chamber.
  3. The FCC Site Registration No. is 525120; The Designation No. is CN1171.



### 3.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

#### **Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

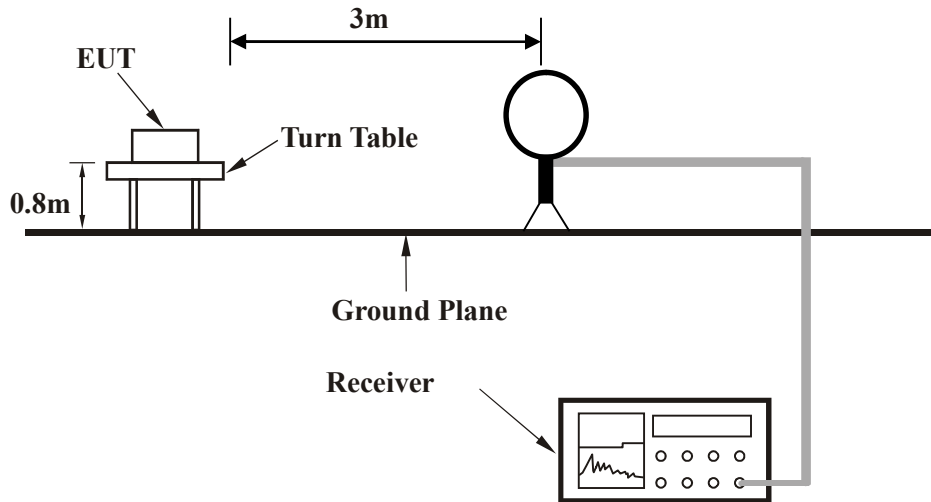
### 3.2.4 DEVIATION FROM TEST STANDARD

No deviation

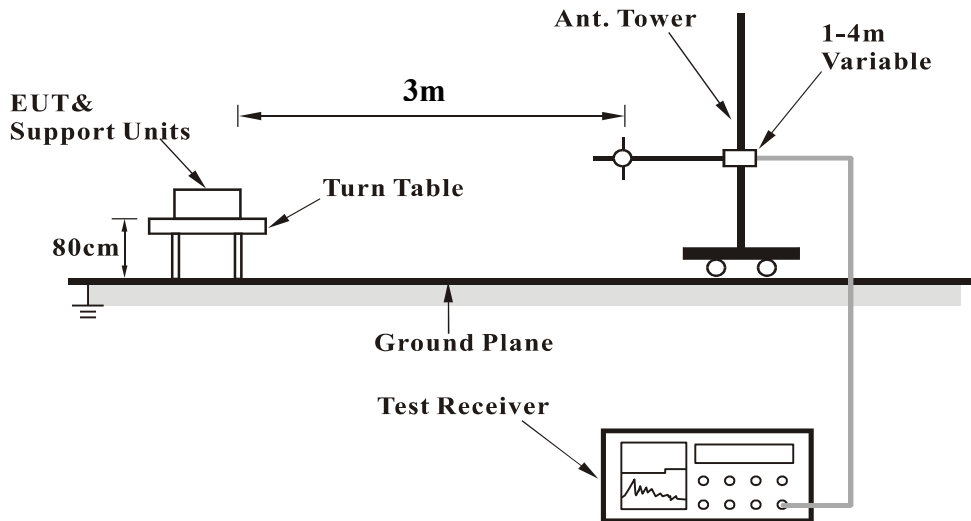


### 3.2.5 TEST SETUP

#### <Frequency Range 9KHz~30MHz >

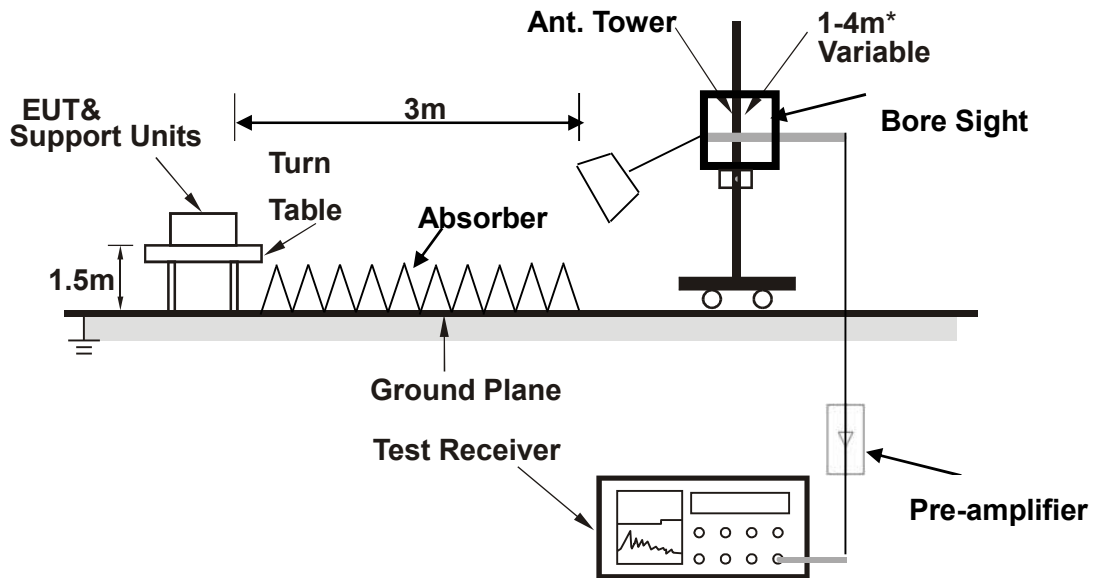


#### < Frequency Range 30MHz~1GHz >





<Frequency Range above 1GHz>



**Note:** Above 1G is a directional antenna

Depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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

### 3.2.6 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.



**3.2.7 TEST RESULTS**

NOTE : The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

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

**30 MHz – 1GHz data:**

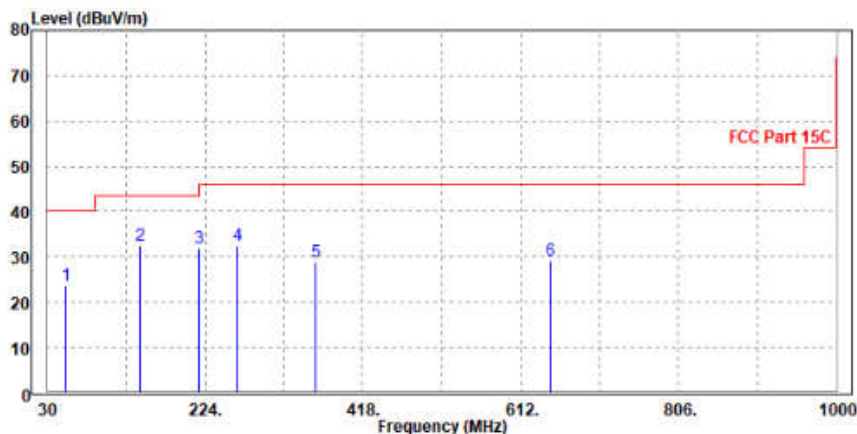
**BT-LE\_1M**

<b>CHANNEL</b>	TX Channel 39	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
52.31	23.63	50.24	40	-16.37	9.97	0.41	36.99	138	124	QP
144.46	32.69	59.26	43.5	-10.81	9.37	0.65	36.59	175	207	QP
216.24	32.01	55.52	46	-13.99	12.01	0.77	36.29	130	74	QP
263.77	32.44	54.22	46	-13.56	13.64	0.85	36.27	107	93	QP
359.8	28.75	48.78	46	-17.25	15.32	1.01	36.36	195	335	QP
647.89	29.1	44.09	46	-16.9	20.61	1.42	37.02	129	261	QP

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value





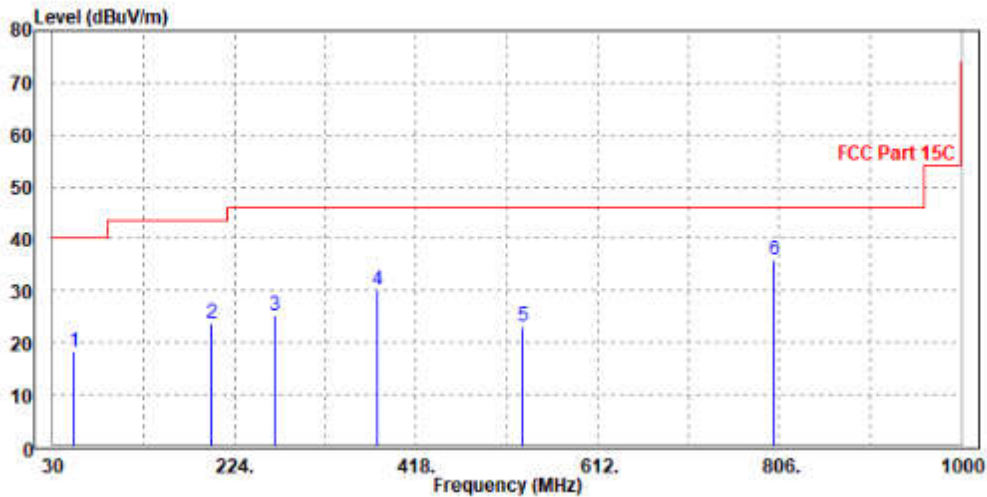


<b>CHANNEL</b>	TX Channel 39	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
52.31	18.25	45.38	40	-21.75	9.45	0.41	36.99	105	139	QP
199.75	23.86	47.92	43.5	-19.64	11.5	0.73	36.29	196	295	QP
266.68	25.23	47.57	46	-20.77	13.07	0.86	36.27	125	83	QP
377.26	30.1	49.66	46	-15.9	15.78	1.04	36.38	137	344	QP
532.46	23.25	40.42	46	-22.75	18.25	1.27	36.69	180	215	QP
800.18	35.88	49.9	46	-10.12	21.6	1.58	37.2	128	28	QP

**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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



**ABOVE 1GHz TEST DATA:**

**Note:** 1. For radiated emissions testing , the full testing range of different modes have been scanned , only the worst case harmonic data is reported in the sheet.

2. All other emissions were greater than 20dB below the limit was not recorded

**BT-LE \_1M**

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

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.24	57.28	74	-24.76	31.75	6.18	45.97	180	265	Peak
2390	42.58	50.62	54	-11.42	31.75	6.18	45.97	180	265	Average
2402	90.08	98.07	/	/	31.79	6.19	45.97	175	263	Peak
2402	89.77	97.76	/	/	31.79	6.19	45.97	175	263	Average
2483.5	50.28	57.85	74	-23.72	32.05	6.31	45.93	171	272	Peak
2483.5	42.97	50.54	54	-11.03	32.05	6.31	45.93	171	272	Average
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.98	57.63	74	-24.02	32.14	6.18	45.97	154	129	Peak
2390	42.45	50.1	54	-11.55	32.14	6.18	45.97	154	129	Average
2402	92.09	99.71	/	/	32.16	6.19	45.97	149	126	Peak
2402	91.8	99.42	/	/	32.16	6.19	45.97	149	126	Average
2483.5	49.77	57.03	74	-24.23	32.36	6.31	45.93	145	132	Peak
2483.5	42.94	50.2	54	-11.06	32.36	6.31	45.93	145	132	Average

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2402MHz: Fundamental frequency.



<b>CHANNEL</b>	TX Channel 19	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.43	57.47	74	-24.57	31.75	6.18	45.97	167	258	Peak
2390	42.68	50.72	54	-11.32	31.75	6.18	45.97	167	258	Average
2440	91.79	99.58	/	/	31.91	6.25	45.95	176	251	Peak
2440	91.34	99.13	/	/	31.91	6.25	45.95	176	251	Average
2483.5	49.45	57.02	74	-24.55	32.05	6.31	45.93	168	251	Peak
2483.5	43.06	50.63	54	-10.94	32.05	6.31	45.93	168	251	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.03	57.68	74	-23.97	32.14	6.18	45.97	194	198	Peak
2390	42.63	50.28	54	-11.37	32.14	6.18	45.97	194	198	Average
2440	94.35	101.79	/	/	32.26	6.25	45.95	188	192	Peak
2440	94.02	101.46	/	/	32.26	6.25	45.95	188	192	Average
2483.5	50.89	58.15	74	-23.11	32.36	6.31	45.93	202	198	Peak
2483.5	43.1	50.36	54	-10.9	32.36	6.31	45.93	202	198	Average

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2440MHz: Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49	57.04	74	-25	31.75	6.18	45.97	170	132	Peak
2390	42.42	50.46	54	-11.58	31.75	6.18	45.97	170	132	Average
2480	91.33	98.92	/	/	32.04	6.3	45.93	176	126	Peak
2480	90.95	98.54	/	/	32.04	6.3	45.93	176	126	Average
2483.5	50.49	58.06	74	-23.51	32.05	6.31	45.93	178	135	Peak
2483.5	42.86	50.43	54	-11.14	32.05	6.31	45.93	178	135	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.03	57.68	74	-23.97	32.14	6.18	45.97	131	21	Peak
2390	43.06	50.71	54	-10.94	32.14	6.18	45.97	131	21	Average
2480	92.5	99.78	/	/	32.35	6.3	45.93	132	11	Peak
2480	92.14	99.42	/	/	32.35	6.3	45.93	132	11	Average
2483.5	50.67	57.93	74	-23.33	32.36	6.31	45.93	131	11	Peak
2483.5	43.18	50.44	54	-10.82	32.36	6.31	45.93	131	11	Average

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2480MHz: Fundamental frequency.



**BUREAU  
VERITAS**

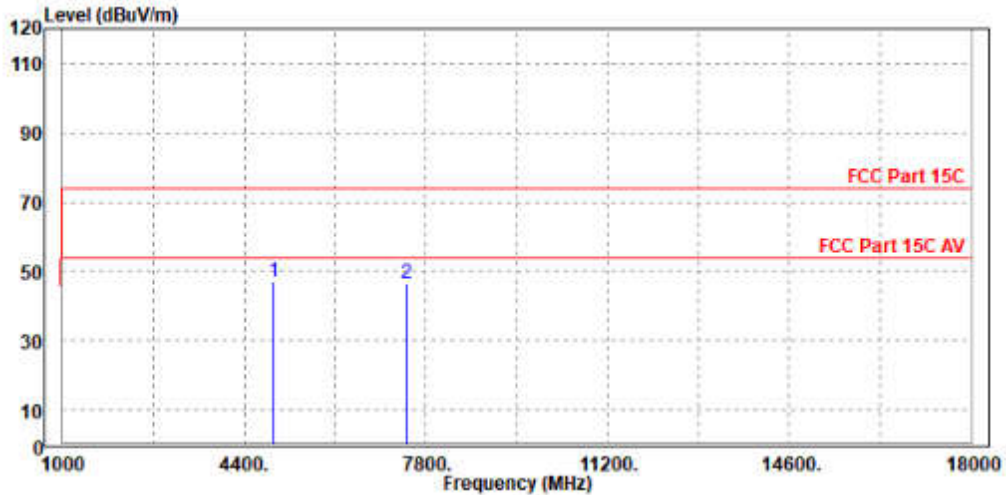
Test Report No.: W7L-P23040022RF02

Worst case harmonic:

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

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

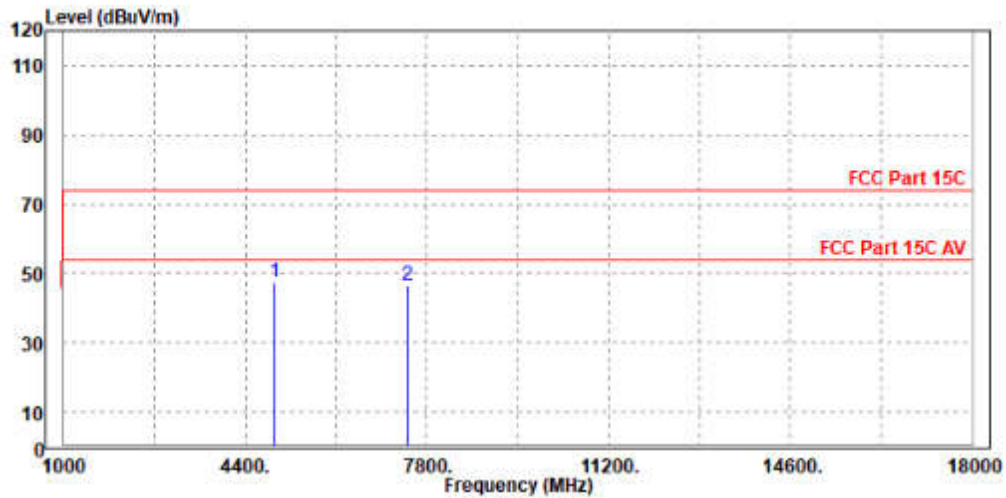
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	PP 4960.000	46.88	48.07	74.00	-27.12	-1.19	Peak	Horizontal
2	7443.000	46.57	44.59	74.00	-27.43	1.98	Peak	Horizontal





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

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	PP 4961.000	47.29	48.28	74.00	-26.71	-0.99	Peak	Vertical
2	7440.000	46.43	44.42	74.00	-27.57	2.01	Peak	Vertical



**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 2480MHz: Fundamental frequency.
3. For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet



**BT-LE\_2M**

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.83	57.87	74	-24.17	31.75	6.18	45.97	198	335	Peak
2390	42.58	50.62	54	-11.42	31.75	6.18	45.97	198	335	Average
2404	90.1	98.08	/	/	31.79	6.2	45.97	197	340	Peak
2404	88.14	96.12	/	/	31.79	6.2	45.97	197	340	Average
2483.5	49.88	57.45	74	-24.12	32.05	6.31	45.93	189	333	Peak
2483.5	42.86	50.43	54	-11.14	32.05	6.31	45.93	189	333	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.83	58.48	74	-23.17	32.14	6.18	45.97	157	127	Peak
2390	42.67	50.32	54	-11.33	32.14	6.18	45.97	157	127	Average
2404	92.11	99.71	/	/	32.17	6.2	45.97	165	137	Peak
2404	90.23	97.83	/	/	32.17	6.2	45.97	165	137	Average
2483.5	50	57.26	74	-24	32.36	6.31	45.93	167	117	Peak
2483.5	43.39	50.65	54	-10.61	32.36	6.31	45.93	167	117	Average

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2404MHz: Fundamental frequency.



<b>CHANNEL</b>	TX Channel 19	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.74	57.78	74	-24.26	31.75	6.18	45.97	115	278	Peak
2390	42	50.04	54	-12	31.75	6.18	45.97	115	278	Average
2440	91.99	99.78	/	/	31.91	6.25	45.95	122	273	Peak
2440	90.14	97.93	/	/	31.91	6.25	45.95	122	273	Average
2483.5	49.51	57.08	74	-24.49	32.05	6.31	45.93	107	284	Peak
2483.5	42.7	50.27	54	-11.3	32.05	6.31	45.93	107	284	Average
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.54	58.19	74	-23.46	32.14	6.18	45.97	188	340	Peak
2390	42.42	50.07	54	-11.58	32.14	6.18	45.97	188	340	Average
2440	94.55	101.99	/	/	32.26	6.25	45.95	180	339	Peak
2440	92.67	100.11	/	/	32.26	6.25	45.95	180	339	Average
2483.5	50.08	57.34	74	-23.92	32.36	6.31	45.93	182	342	Peak
2483.5	43.05	50.31	54	-10.95	32.36	6.31	45.93	182	342	Average

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2440MHz: Fundamental frequency.





<b>CHANNEL</b>	TX Channel 38	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.33	58.37	74	-23.67	31.75	6.18	45.97	120	272	Peak
2390	42.93	50.97	54	-11.07	31.75	6.18	45.97	120	272	Average
2478	91.59	99.19	/	/	32.03	6.3	45.93	127	266	Peak
2478	89.66	97.26	/	/	32.03	6.3	45.93	127	266	Average
2483.5	51.39	58.96	74	-22.61	32.05	6.31	45.93	113	277	Peak
2483.5	43.31	50.88	54	-10.69	32.05	6.31	45.93	113	277	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.99	57.64	74	-24.01	32.14	6.18	45.97	155	181	Peak
2390	42.85	50.5	54	-11.15	32.14	6.18	45.97	155	181	Average
2478	92.85	100.13	/	/	32.35	6.3	45.93	149	184	Peak
2478	90.95	98.23	/	/	32.35	6.3	45.93	149	184	Average
2483.5	50.01	57.27	74	-23.99	32.36	6.31	45.93	161	182	Peak
2483.5	43.35	50.61	54	-10.65	32.36	6.31	45.93	161	182	Average

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 2478MHz: Fundamental frequency.



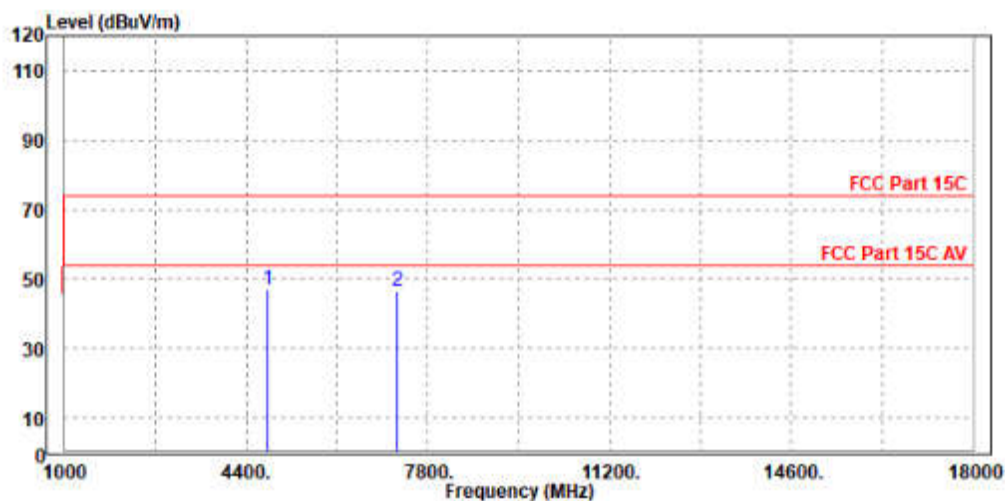
**BUREAU VERITAS** Test Report No.: W7L-P23040022RF02

Worst case harmonic:

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

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

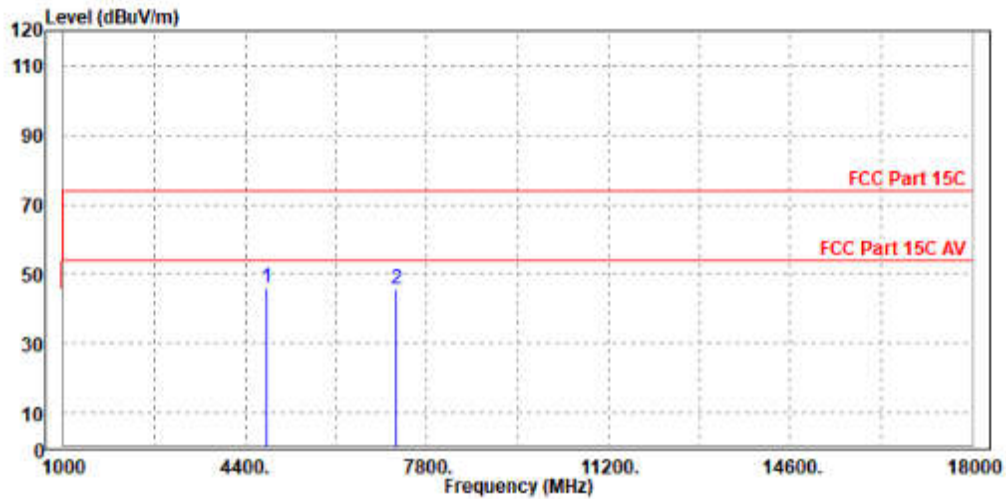
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	PP 4808.000	47.05	48.49	74.00	-26.95	-1.44	Peak	Horizontal
2	7212.000	46.52	44.78	74.00	-27.48	1.74	Peak	Horizontal





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

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	PP 4808.000	46.21	47.45	74.00	-27.79	-1.24	Peak	Vertical
2	7212.000	45.85	44.00	74.00	-28.15	1.85	Peak	Vertical



**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 2404MHz: Fundamental frequency.
3. For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet



### 3.3 6 dB BANDWIDTH MEASUREMENT

#### 3.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Feb. 14,23	Feb. 13,24
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 17,23	Feb. 16,24
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.14,22	May.13,23
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 14,23	Feb. 13,24

**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.

#### 3.3.3 TEST PROCEDURE

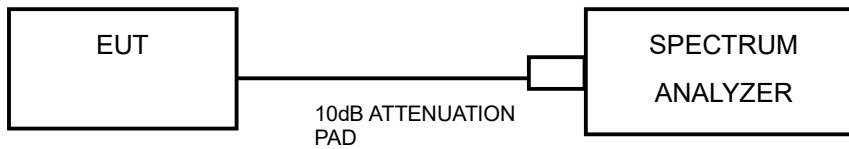
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude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



### 3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.3.5 TEST SETUP



### 3.3.6 EUT OPERATING CONDITIONS

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



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**VERITAS**

### 3.3.7 TEST RESULTS

Please Refer to Appendix Of this test report.

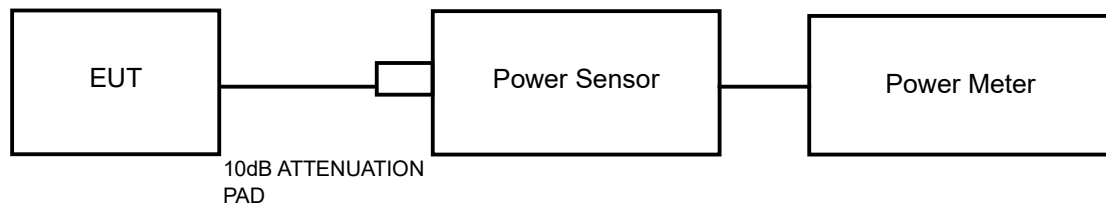


### 3.4 CONDUCTED OUTPUT POWER

#### 3.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.4.4 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. Record the power level.

#### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.4.6 EUT OPERATING CONDITIONS

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



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### 3.4.7 TEST RESULTS

#### 3.4.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix Of this test report.





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### 3.4.7.2 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.

Please Refer to Appendix Of this test report.

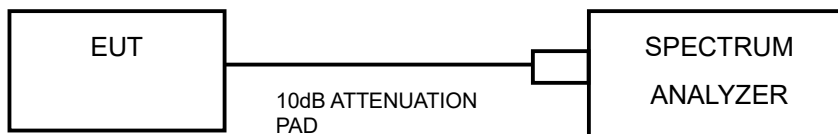


### 3.5 POWER SPECTRAL DENSITY MEASUREMENT

#### 3.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

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

#### 3.5.2 TEST SETUP



#### 3.5.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.5.4 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.

#### 3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.5.6 EUT OPERATING CONDITION

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



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### 3.5.7 TEST RESULTS

Please Refer to Appendix Of this test report.

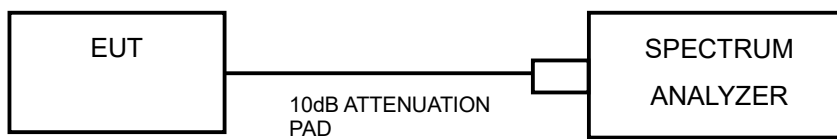


### 3.6 OUT OF BAND EMISSION MEASUREMENT

#### 3.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

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

#### 3.6.2 TEST SETUP



#### 3.6.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.6.4 TEST PROCEDURE

##### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 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 kHz band segment within the fundamental EBW.



## 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.

### 3.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.6.6 EUT OPERATING CONDITION

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

### 3.6.7 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

Please Refer to Appendix Of this test report.



### **3.7 ANTENNA REQUIREMENTS**

#### **3.7.1 STANDARD APPLICABLE**

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **3.7.2 ANTENNA CONNECTED CONSTRUCTION**

An embedded-in antenna design is used.

#### **3.7.3 ANTENNA GAIN**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit and PSD limit



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## 4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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## **5 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.





## 6 APPENDIX

### DTS BANDWIDTH

#### TEST RESULT

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.664	2401.632	2402.296	0.5	PASS
		2440	0.696	2439.632	2440.328	0.5	PASS
		2480	0.660	2479.632	2480.292	0.5	PASS
BLE_2M	Ant1	2404	1.148	2403.396	2404.544	0.5	PASS
		2440	1.216	2439.316	2440.532	0.5	PASS
		2478	1.140	2477.408	2478.548	0.5	PASS

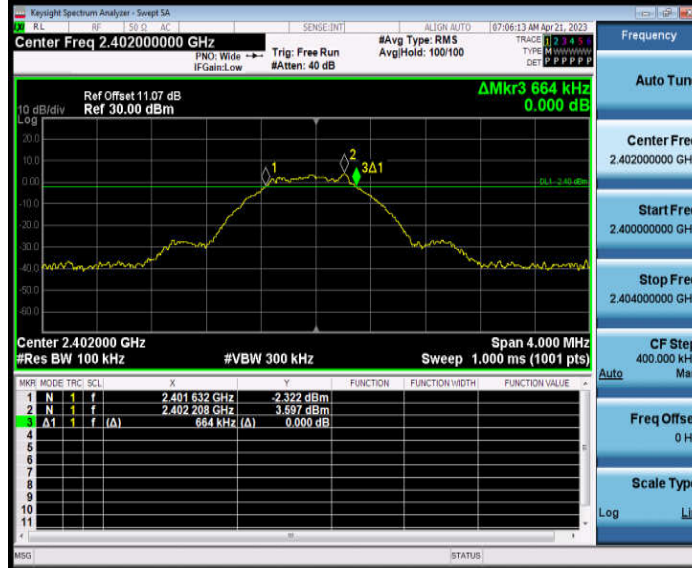


BUREAU VERITAS

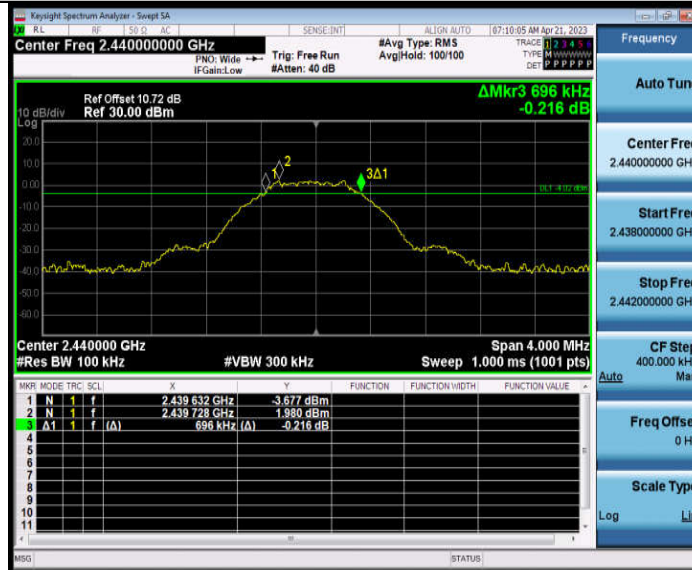
Test Report No.: W7L-P23040022RF02

### TEST GRAPHS

BLE\_1M\_Ant1\_2402



BLE\_1M\_Ant1\_2440

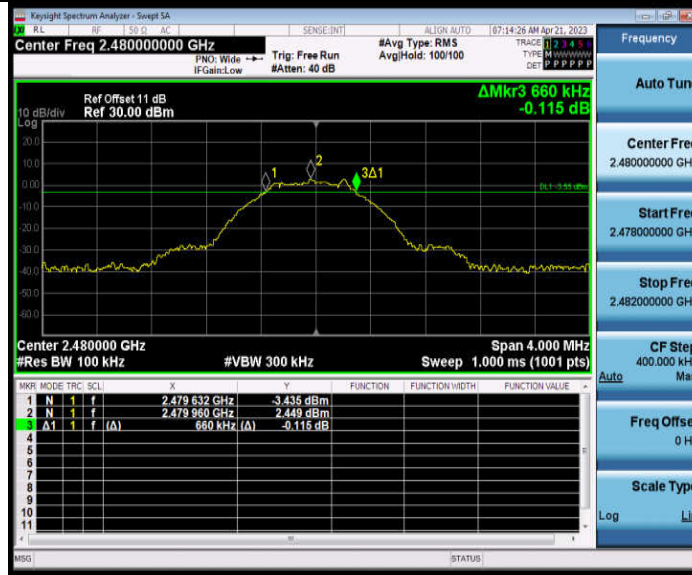


BLE\_1M\_Ant1\_2480



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**Test Report No.: W7L-P23040022RF02**



BLE\_2M\_Ant1\_2404



BLE\_2M\_Ant1\_2440



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# Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_2478





## OCCUPIED CHANNEL BANDWIDTH TEST RESULT

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0314	2401.4560	2402.4874	---	---
		2440	1.0487	2439.4438	2440.4925	---	---
		2480	1.0525	2479.4399	2480.4924	---	---
BLE_2M	Ant1	2404	2.0767	2402.9388	2405.0155	---	---
		2440	2.0865	2438.9357	2441.0222	---	---
		2478	2.0861	2476.9314	2479.0175	---	---

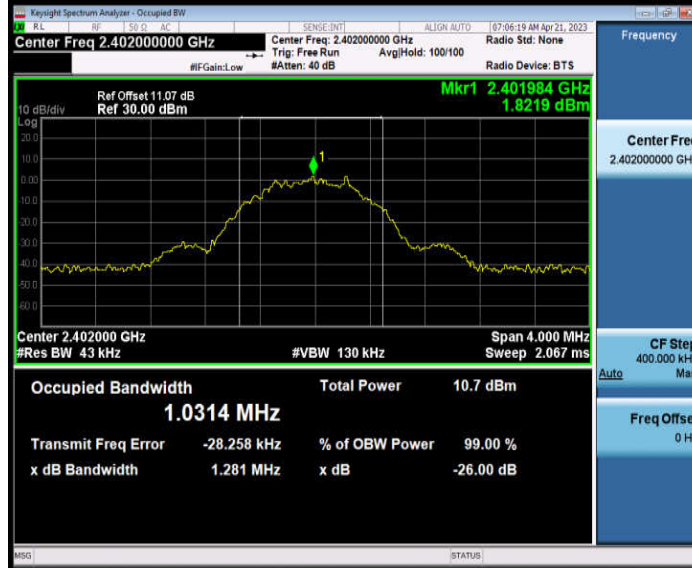


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Test Report No.: W7L-P23040022RF02

### TEST GRAPHS

BLE\_1M\_Ant1\_2402



BLE\_1M\_Ant1\_2440



BLE\_1M\_Ant1\_2480



BLE\_2M\_Ant1\_2404



BLE\_2M\_Ant1\_2440





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BLE\_2M\_Ant1\_2478







## MAXIMUM CONDUCTED OUTPUT POWER TEST RESULT

TestMode	Antenna	Channel	Average power [dBm]	Peak power [dBm]	Peak power [mw]	Conducted Limit [dBm]	EIRP [dBm]	EIRP [mw]	EIRP Limit [dBm]	Verdict	Power Setting
BLE_1M	Ant1	2402	2.35	2.78	1.90	≤30	1.75	1.50	≤36	PASS	Default
		2440	2.48	2.89	1.95	≤30	1.86	1.53	≤36	PASS	Default
		2480	1.91	2.40	1.74	≤30	1.37	1.37	≤36	PASS	Default
BLE_2M	Ant1	2404	2.85	2.87	1.94	≤30	1.84	1.53	≤36	PASS	Default
		2440	2.97	<b>2.95</b>	1.97	≤30	1.92	1.56	≤36	PASS	Default
		2478	2.41	2.44	1.75	≤30	1.41	1.38	≤36	PASS	Default

**Note:**EIRP=Peak Power+Gain



## MAXIMUM POWER SPECTRAL DENSITY

### TEST RESULT

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-12.32	≤8.00	PASS
		2440	-13.2	≤8.00	PASS
		2480	-13.3	≤8.00	PASS
BLE_2M	Ant1	2404	-14.84	≤8.00	PASS
		2440	-15.85	≤8.00	PASS
		2478	-16.22	≤8.00	PASS

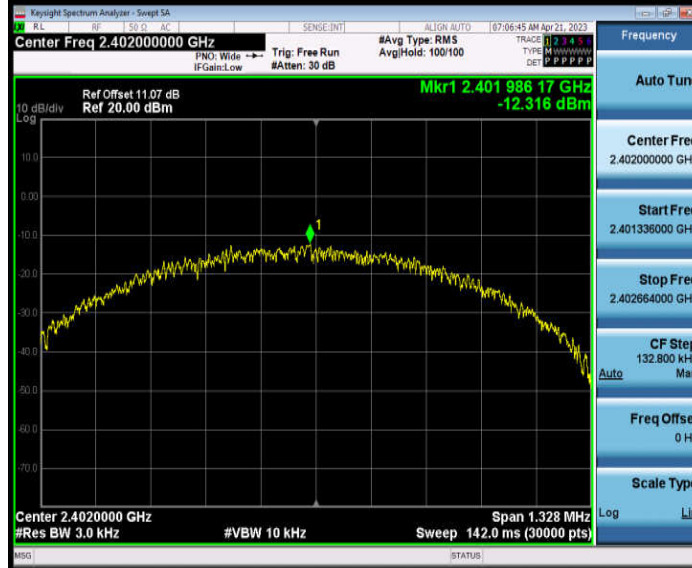


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Test Report No.: W7L-P23040022RF02

### TEST GRAPHS

BLE\_1M\_Ant1\_2402



BLE\_1M\_Ant1\_2440



BLE\_1M\_Ant1\_2480



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BLE\_2M\_Ant1\_2404

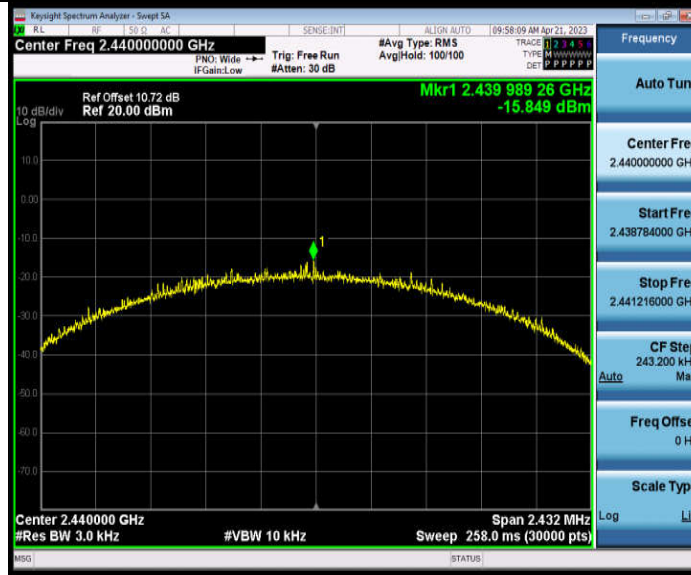


BLE\_2M\_Ant1\_2440



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# Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_2478





## BAND EDGE MEASUREMENTS

### TEST RESULT

TestMode	Antenna	ChName	Frequency [MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	2.89	-44.53	≤-17.11	PASS
		High	2480	1.84	-43.98	≤-18.16	PASS
BLE_2M	Ant1	Low	2404	0.28	-42.6	≤-19.72	PASS
		High	2478	1.76	-43.93	≤-18.24	PASS

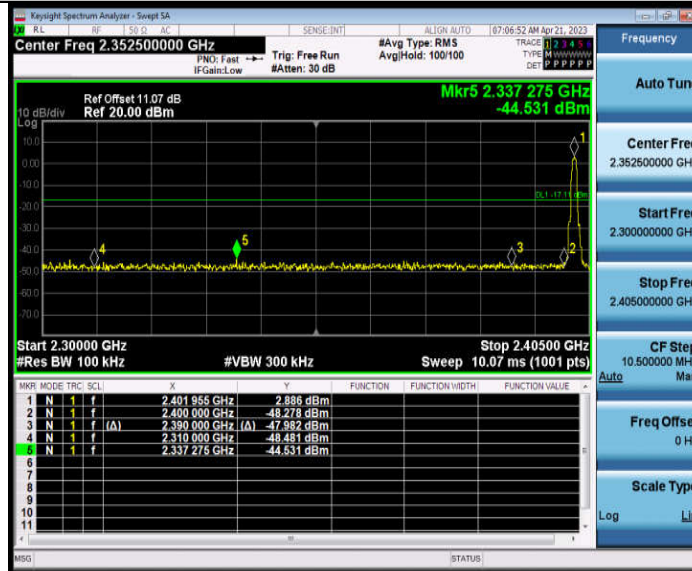


BUREAU VERITAS

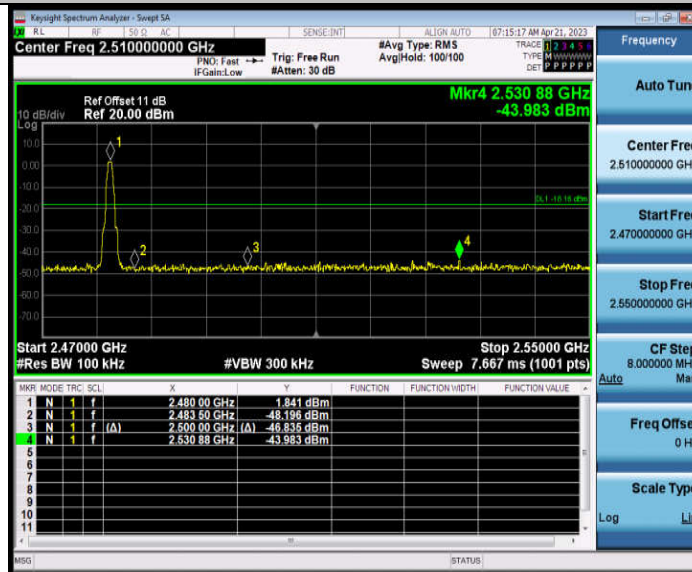
Test Report No.: W7L-P23040022RF02

### TEST GRAPHS

BLE\_1M\_Ant1\_Low\_2402



BLE\_1M\_Ant1\_High\_2480

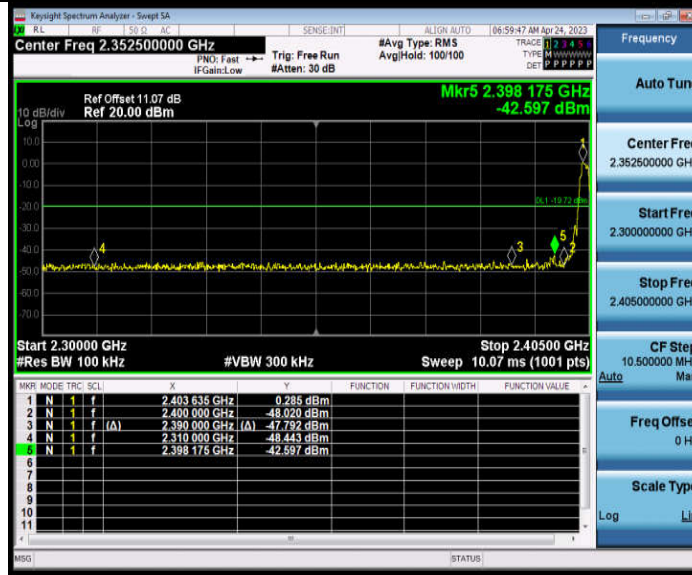


BLE\_2M\_Ant1\_Low\_2404

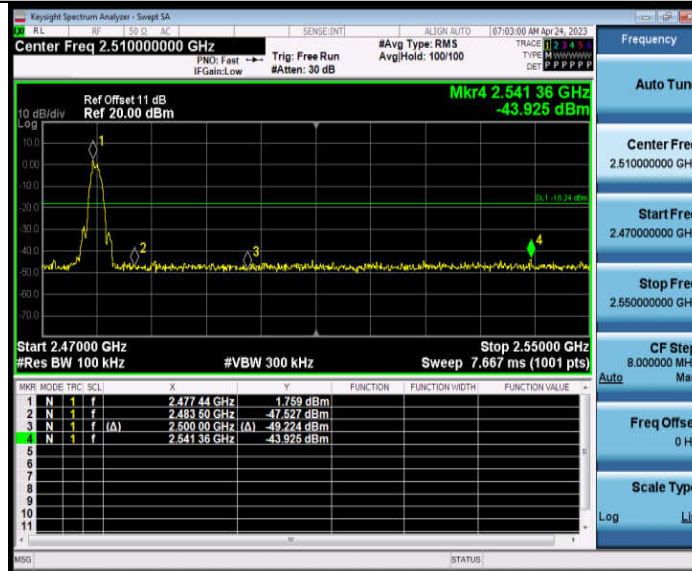


BUREAU VERITAS

# Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_High\_2478



BV 7Layers Communications Technology (Shenzhen) Co., Ltd

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Email: [customerservice.sw@bureauveritas.com](mailto:customerservice.sw@bureauveritas.com)





## CONDUCTED SPURIOUS EMISSION TEST RESULT

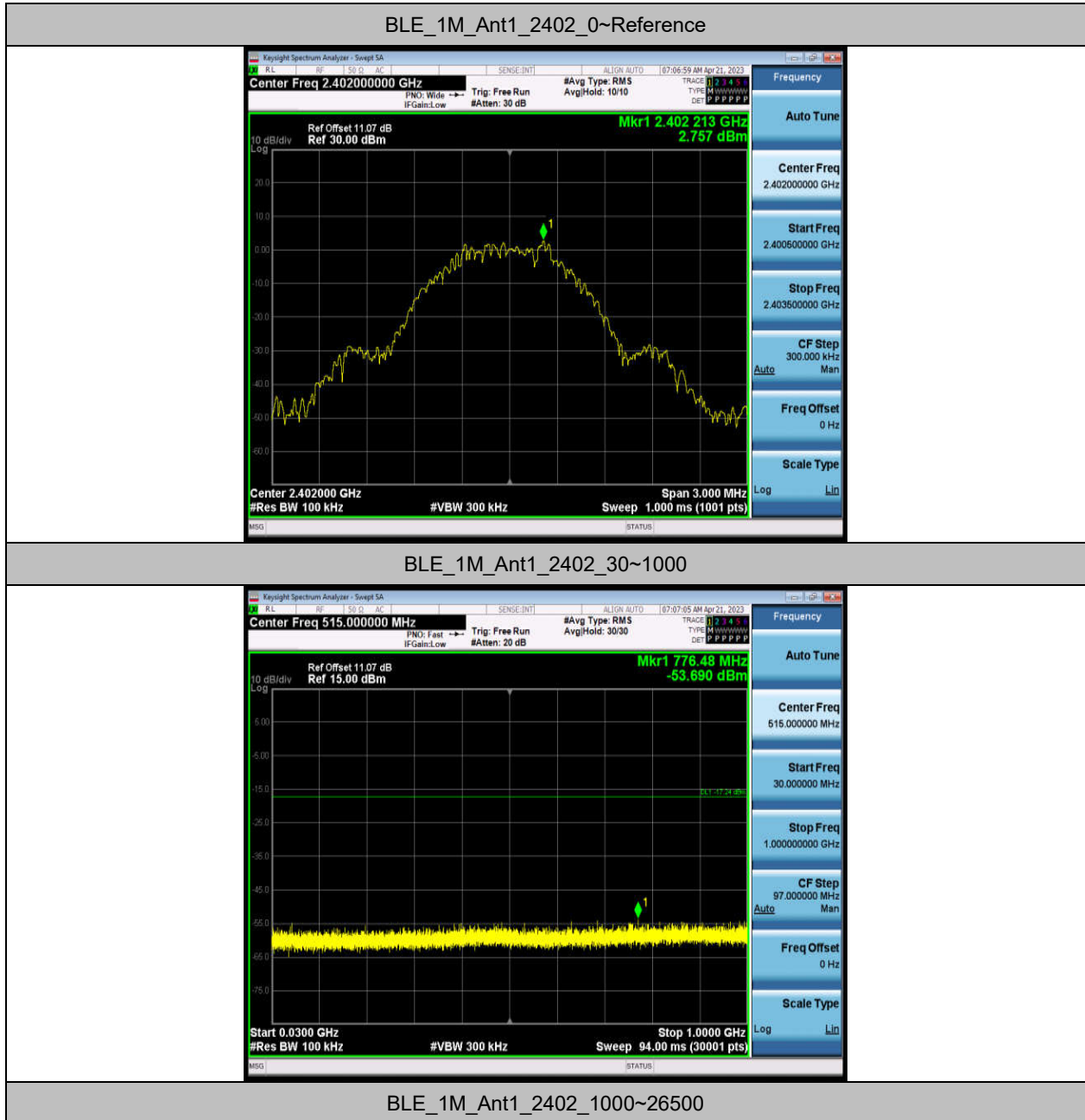
TestMode	Antenna	Frequency [MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	2.76	2.76	---	PASS
			30~1000	2.76	-53.69	≤-17.24	PASS
			1000~26500	2.76	-34.13	≤-17.24	PASS
		2440	Reference	1.40	1.40	---	PASS
			30~1000	1.40	-53.92	≤-18.6	PASS
			1000~26500	1.40	-34.41	≤-18.6	PASS
		2480	Reference	2.41	2.41	---	PASS
			30~1000	2.41	-54.13	≤-17.59	PASS
			1000~26500	2.41	-34.79	≤-17.59	PASS
BLE_2M	Ant1	2404	Reference	2.20	2.20	---	PASS
			30~1000	2.20	-53.12	≤-17.8	PASS
			1000~26500	2.20	-35.07	≤-17.8	PASS
		2440	Reference	0.95	0.95	---	PASS
			30~1000	0.95	-53.8	≤-19.05	PASS
			1000~26500	0.95	-34.61	≤-19.05	PASS
		2478	Reference	1.87	1.87	---	PASS
			30~1000	1.87	-53.74	≤-18.13	PASS
			1000~26500	1.87	-33.84	≤-18.13	PASS



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Test Report No.: W7L-P23040022RF02

### TEST GRAPHS





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Test Report No.: W7L-P23040022RF02



BLE\_1M\_Ant1\_2440\_0~Reference

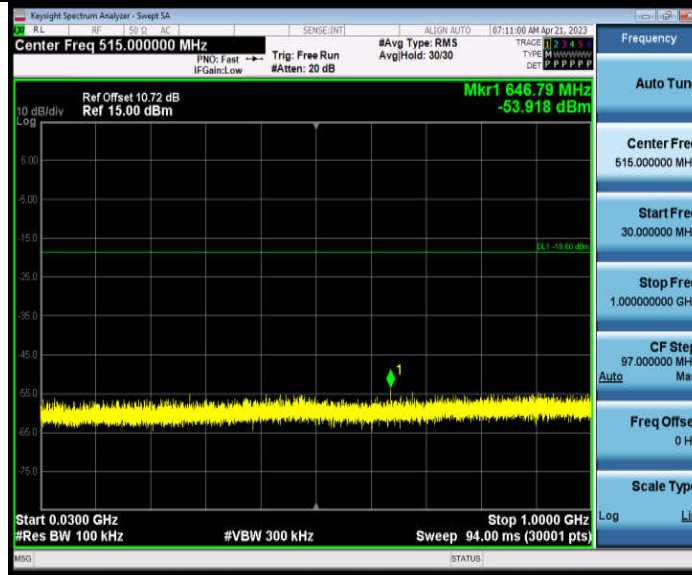


BLE\_1M\_Ant1\_2440\_30~1000

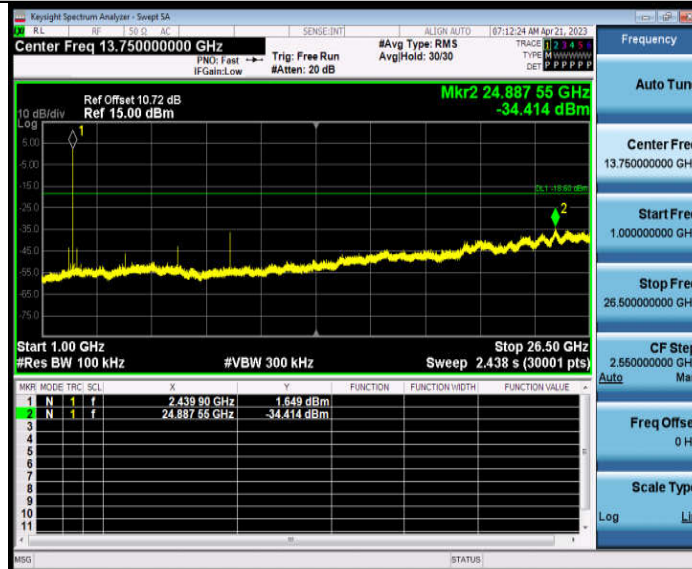


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**Test Report No.: W7L-P23040022RF02**



BLE\_1M\_Ant1\_2440\_1000~26500



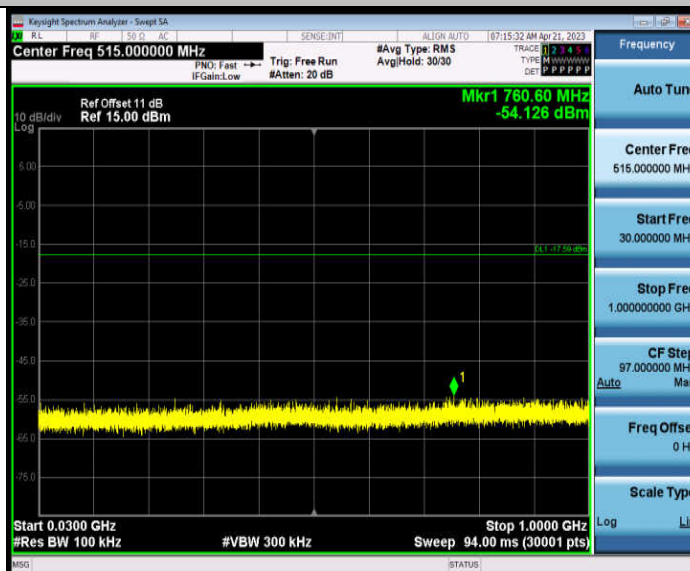
BLE\_1M\_Ant1\_2480\_0~Reference



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BLE\_1M\_Ant1\_2480\_30~1000



BLE\_1M\_Ant1\_2480\_1000~26500



BUREAU VERITAS

# Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_2404\_0~Reference



BLE\_2M\_Ant1\_2404\_30~1000

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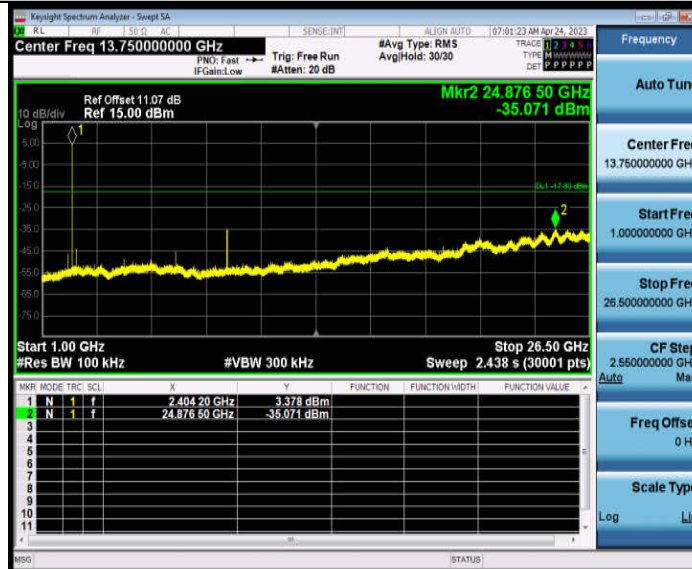


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BLE\_2M\_Ant1\_2404\_1000~26500



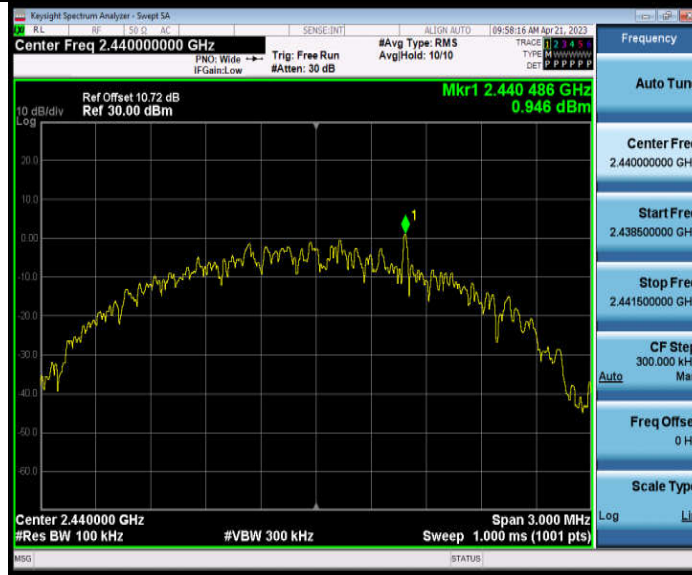
BLE\_2M\_Ant1\_2440\_0~Reference



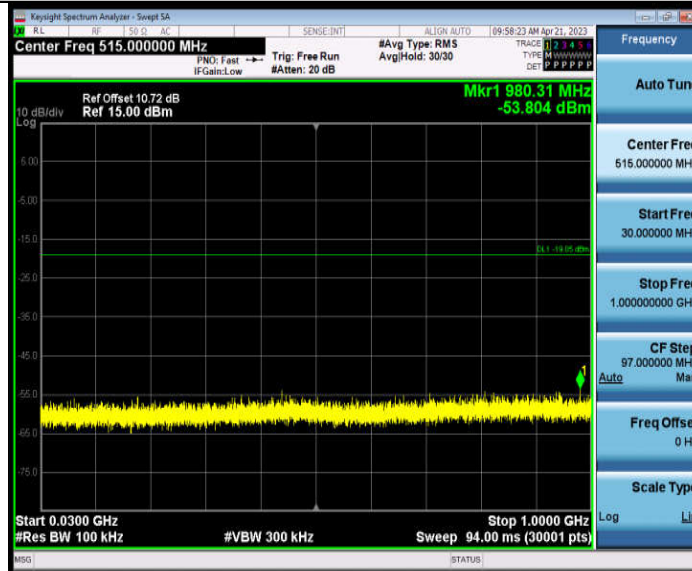


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**Test Report No.: W7L-P23040022RF02**



BLE\_2M\_Ant1\_2440\_30~1000



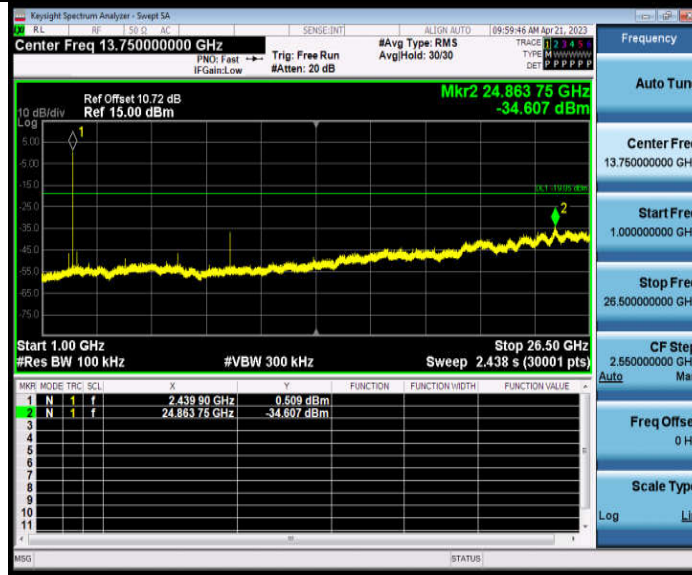
BLE\_2M\_Ant1\_2440\_1000~26500



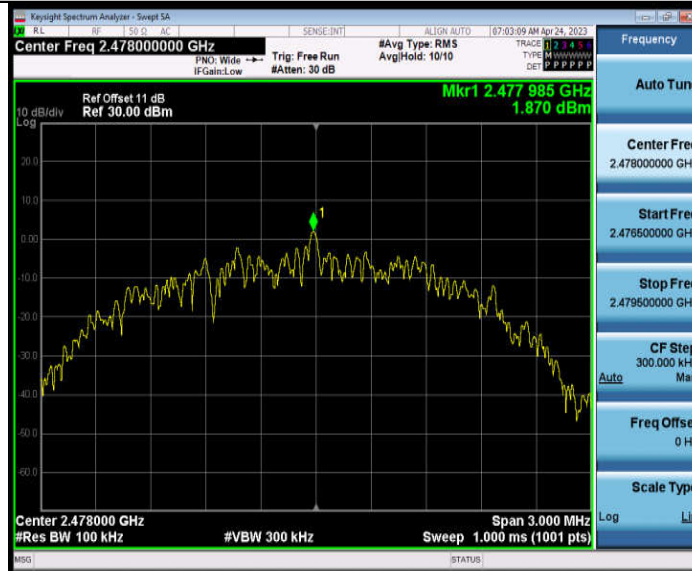


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### Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_2478\_0~Reference



BLE\_2M\_Ant1\_2478\_30~1000

BV 7Layers Communications Technology  
(Shenzhen) Co., Ltd

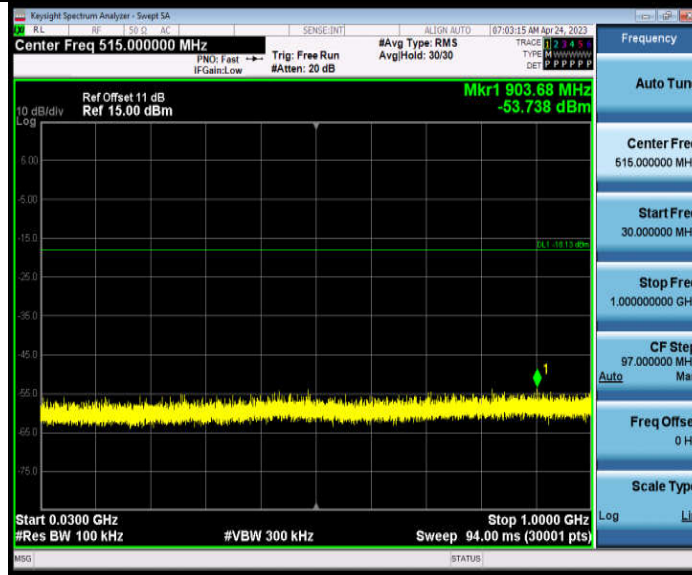
No.B102, Dazu Chuangxin Mansion, North of Beihuan  
Avenue, North Area, Hi-Tech Industrial Park, Nanshan  
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Email: [customerservice.sw@bureauveritas.com](mailto:customerservice.sw@bureauveritas.com)

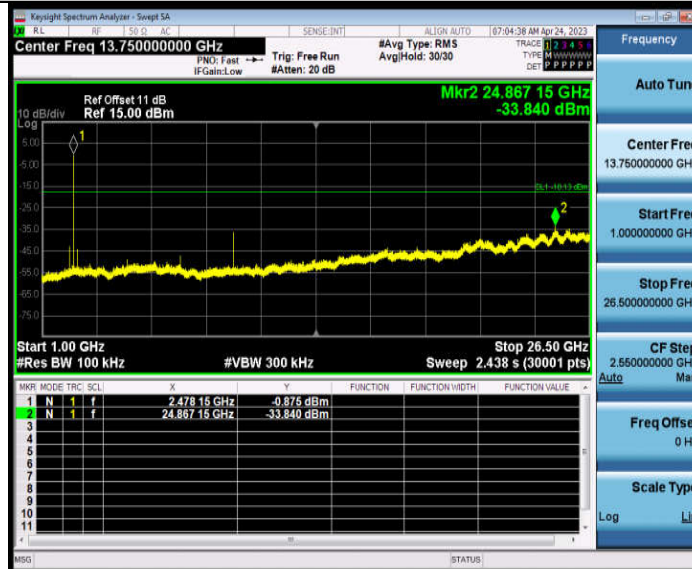


**BUREAU  
VERITAS**

**Test Report No.: W7L-P23040022RF02**



BLE\_2M\_Ant1\_2478\_1000~26500





## DUTY CYCLE TEST RESULT

TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	2.13	2.50	85.20	0.70
		2440	2.13	2.50	85.20	0.70
		2480	2.13	2.50	85.20	0.70
BLE_2M	Ant1	2404	1.09	2.50	43.60	3.61
		2440	1.08	2.50	43.20	3.65
		2478	1.09	2.50	43.60	3.61

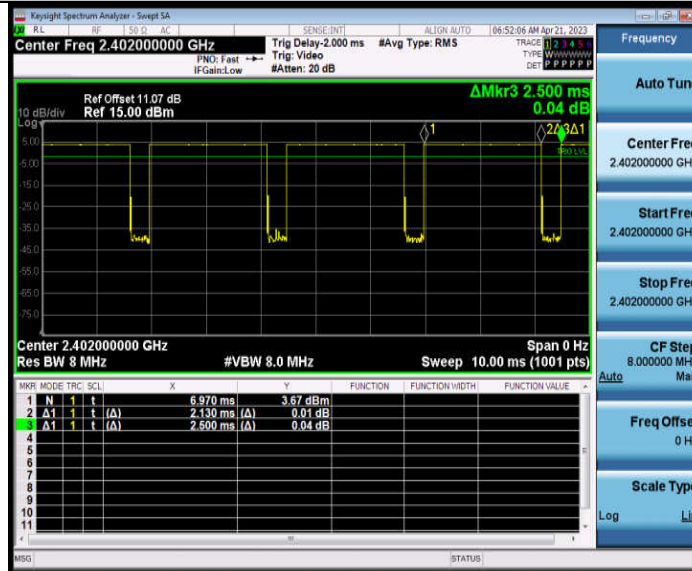


BUREAU VERITAS

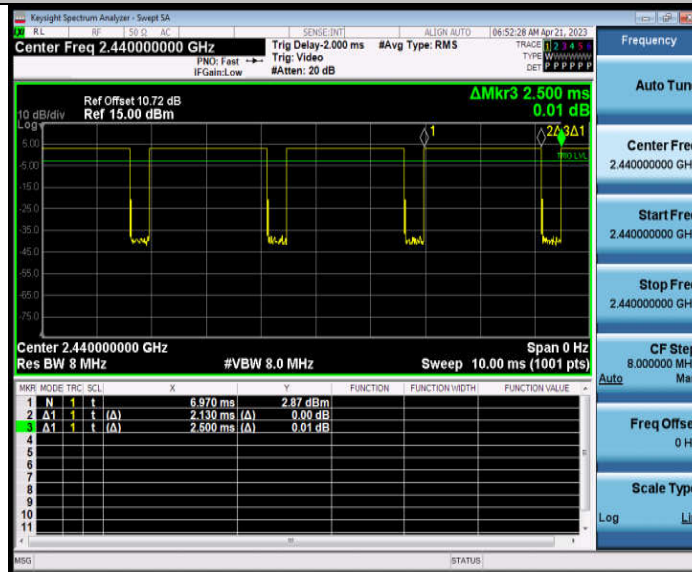
Test Report No.: W7L-P23040022RF02

### TEST GRAPHS

BLE\_1M\_Ant1\_2402



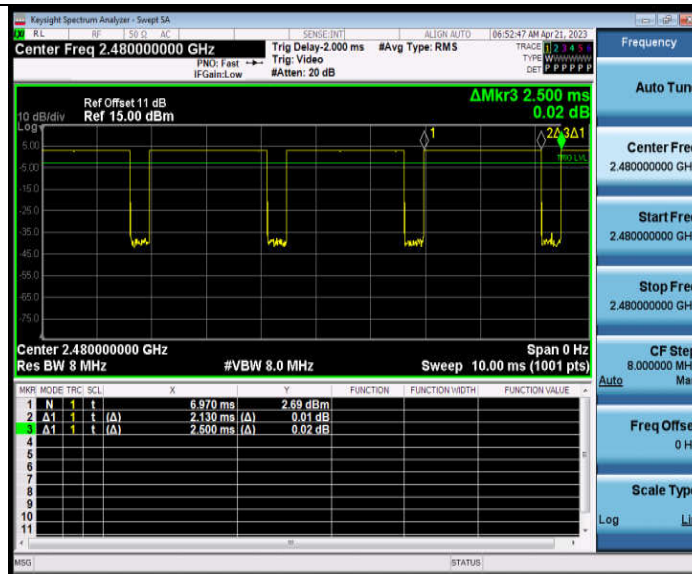
BLE\_1M\_Ant1\_2440



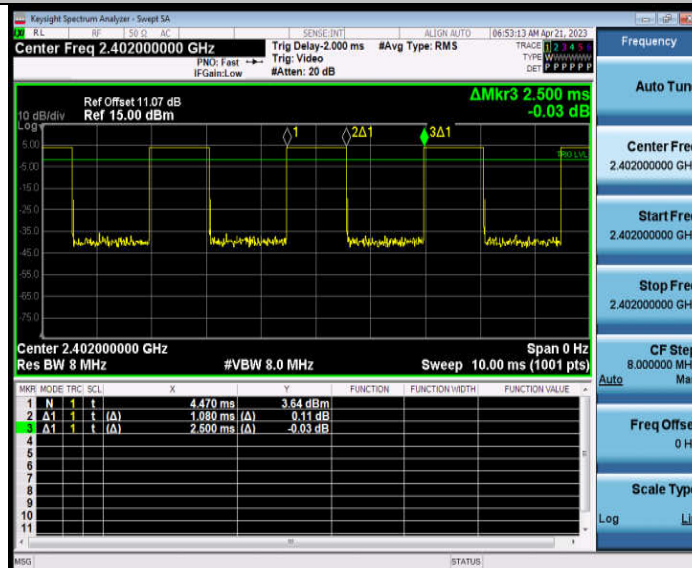
BLE\_1M\_Ant1\_2480



**BUREAU VERITAS** Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_2402

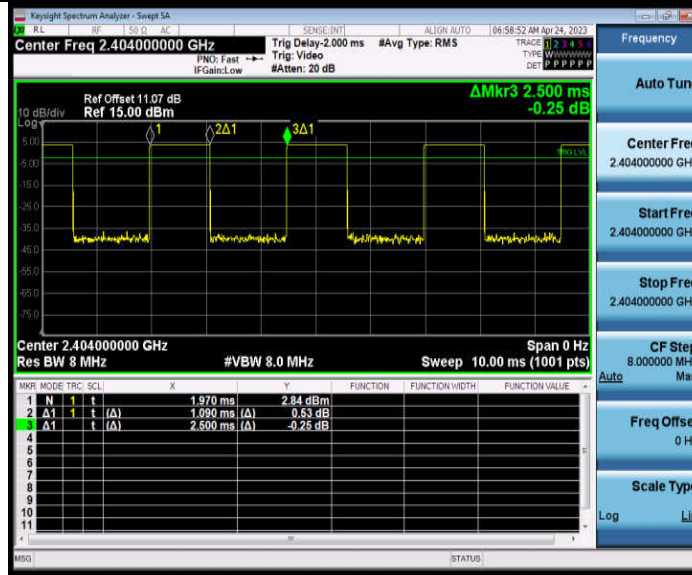


BLE\_2M\_Ant1\_2404

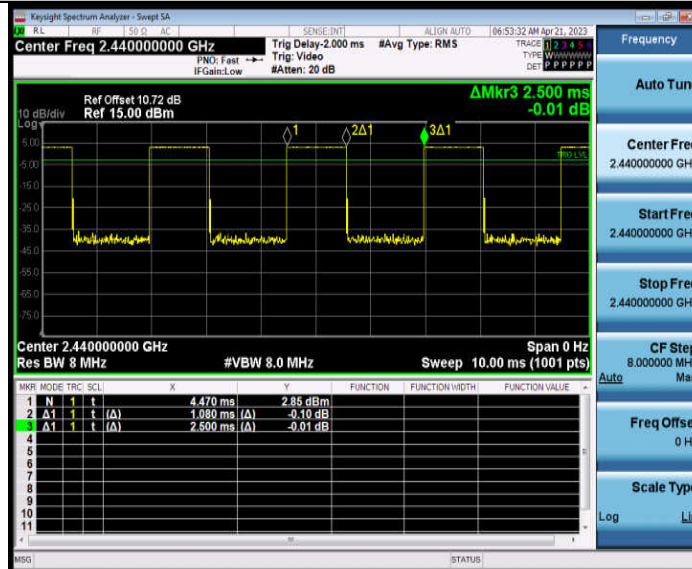


BUREAU VERITAS

Test Report No.: W7L-P23040022RF02



BLE\_2M\_Ant1\_2440

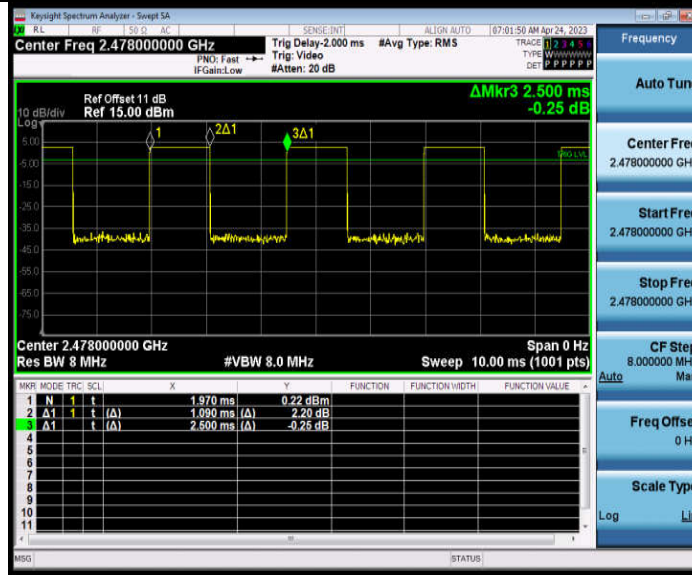


BLE\_2M\_Ant1\_2478

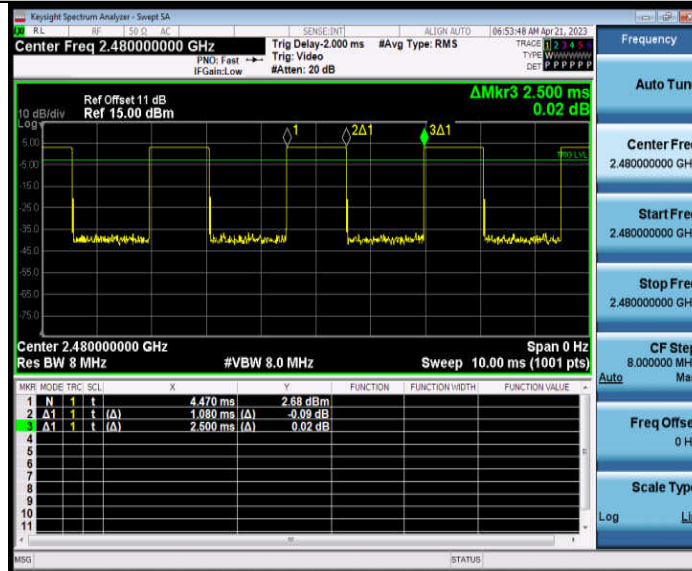


BUREAU VERITAS

Test Report No.: W7L-P23040022RF02



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