

TEST REPORT

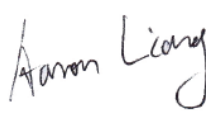
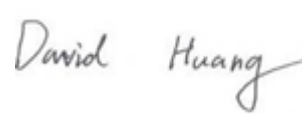
Applicant	FKA Distributing Co., LLC
Address	3000 N. Pontiac Trail, Commerce Township, Michigan, 48390, United States

Manufacturer or Supplier	Wonders Technology Co., Ltd
Address	4/F, 3rd Buildings, Tower A, Tian'an Yungu Cloud Park, Xuegang North Road, Bantian Avenue, Shenzhen 518129, China
Product	JAM TWS Sport
Brand Name	N/A
Model	HX-EP525A
Additional Model & Model Difference	N/A
Date of tests	Dec. 10, 2020~ Jan. 10, 2020

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 Aaron Liang Project Engineer / EMC Department	Approved by David Huang Supervisor / EMC Department
	 Date: Jan. 11, 2021

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Test Report No.: RF2012WSZ0038-4

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2012WSZ0038-4	Original release	Jan. 11, 2021



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	2.16dB
	30MHz ~ 1GMHz	3.74dB
	1GHz ~ 18GHz	4.66dB
	18GHz ~ 40GHz	4.67dB

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	JAM TWS Sport
MODEL NO.	HX-EP525A
ADDITIONAL MODELS	N/A
FCC ID	TG3-HXEP525AR
NOMINAL VOLTAGE	Earphone: DC 3.7V from Li-ion battery or DC 5V from charging case Charging case: DC 5V from USB
MODULATION TECHNOLOGY	DTS
MODULATION TYPE	BT-LE(GFSK)
OPERATING FREQUENCY	2402-2480MHz
PEAK OUTPUT POWER	0.718mW (Max. Measured)
ANTENNA TYPE	Ceramic Antenna, with 0dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Line: Unshielded, Detachable 30cm

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 2012WSZ0038) for detailed product photo.
4. When the EUT charging that wireless function can't working, the charging mode was tested in the FCC Part 15B(sDOC) report.(report no.: FS2012WSZ0038)



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 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	√	√	-	√	DC 3.7V from Full Battery

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

RE≥1G: Radiated Emission above 1GHz
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, XYZ axis 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 TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	39	DTS	BT-LE	1
BT-LE	0 to 39	39	DTS	BT-LE	2

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	DTS	BT-LE	1
BT-LE	0 to 39	0,19, 39	DTS	BT-LE	2

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 TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	0, 19, 39	DTS	BT-LE	1
BT-LE	0 to 39	0,19, 39	DTS	BT-LE	2

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	24deg. C, 53%RH	DC 3.7V from Full Battery	Aaron Liang
RE≥1G	25deg. C, 55%RH	DC 3.7V from Full Battery	Aaron Liang
PLC	N/A	N/A	N/A
APCM	22deg. C, 55%RH	DC 3.7V from Full Battery	Aaron Liang



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

558074 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 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	Computer	lenove	E40-30	MP05R4Z1	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Line: Unshielded, Detachable 1m



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.



4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06 -100262-eQ	Mar. 24, 20	Mar. 24, 21
Bilog Antenna	Sunol Sciences	JB6	A110712	Jul. 21, 20	Jul. 21, 21
Active Antenna	CMO-POWER	AL-130	121031	Jun. 30, 20	Jun. 30, 21
Signal Amplifier	HP	8447E	443008	Mar. 24, 20	Mar. 24, 21
Signal and Spectrum Analyzer	R&S	FSV40	101094	Mar. 19, 20	Mar. 19, 21
MXA signal analyzer	Agilent	N9020A	MY49100060	Mar. 24, 20	Mar. 24, 21
Horn Antenna	COM-POWER	AH-118	71259	Apr. 17, 20	Apr. 17, 21
Horn Antenna	COM-POWER	AH-118	71283	Jul. 21, 20	Jul. 21, 21
SHF-EHF Horn	Schwarzbeck	BBHA9170	BBHA9170147	May 10, 20	May 10, 21
SHF-EHF Horn	Schwarzbeck	BBHA9170	BBHA9170242	May 10, 20	May 10, 21
AMPLIFIER	EM Electornic Corporation	EM01G26G	60613	Mar. 24, 20	Mar. 24, 21
Pre-amplifier	Rohde&Schwarz	SCU40	100437	Oct. 17, 20	Oct. 16, 21
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 18,18	Oct. 17, 21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

NOTE:

1. The test was performed in 966 Chamber.
2. The calibration interval of the above test instruments is 12 months (Except 3m Semi-anechoic Chamber). 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 535293.



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. For below 30MHz, 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 1m 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/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz(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.

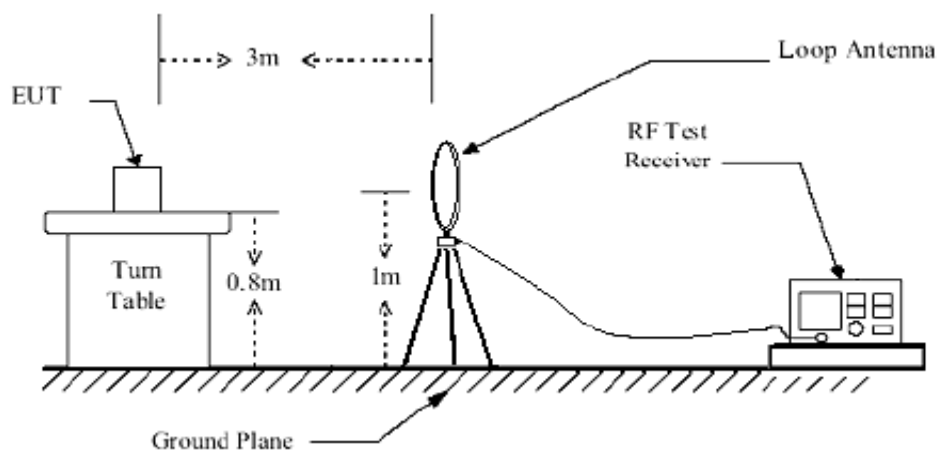


4.1.4 DEVIATION FROM TEST STANDARD

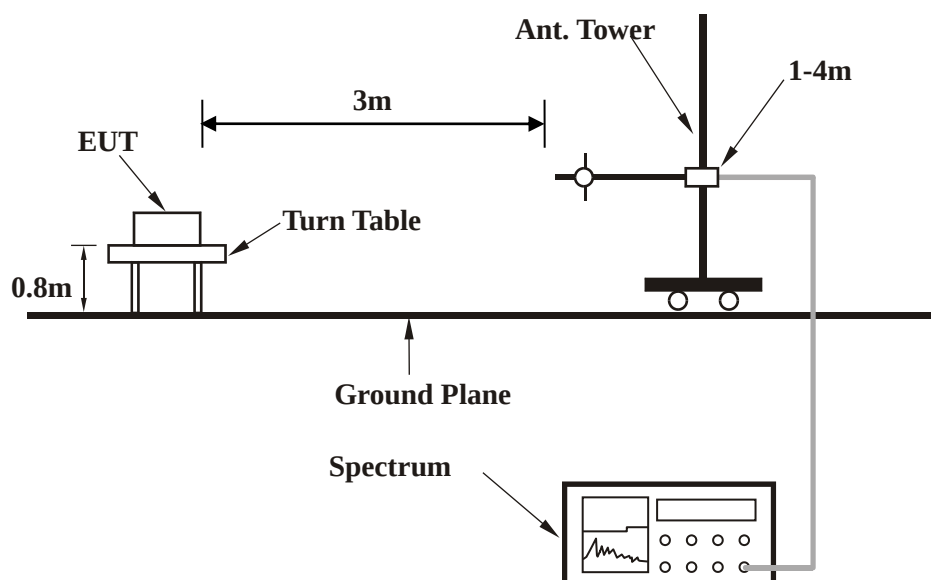
No deviation.

4.1.5 TEST SETUP

Below 30MHz test setup



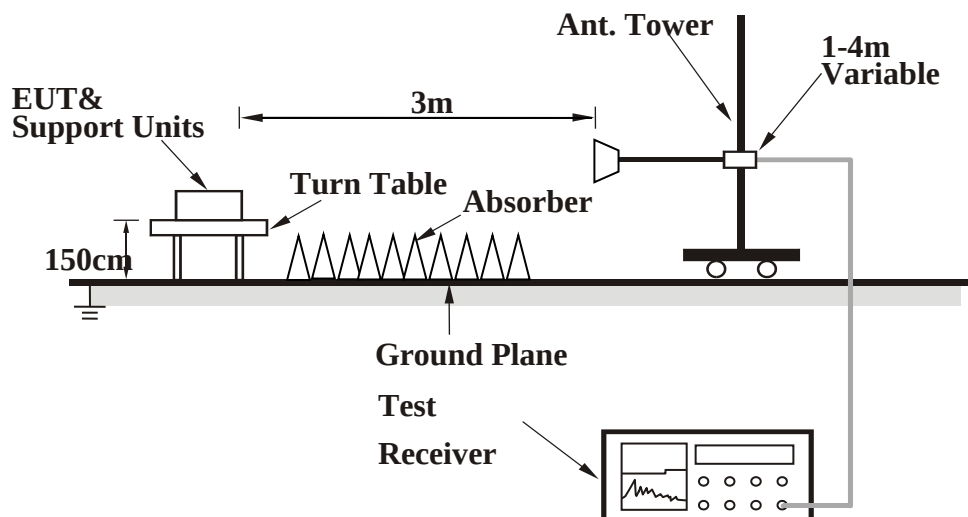
Below 1GHz test setup



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



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.



4.1.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:

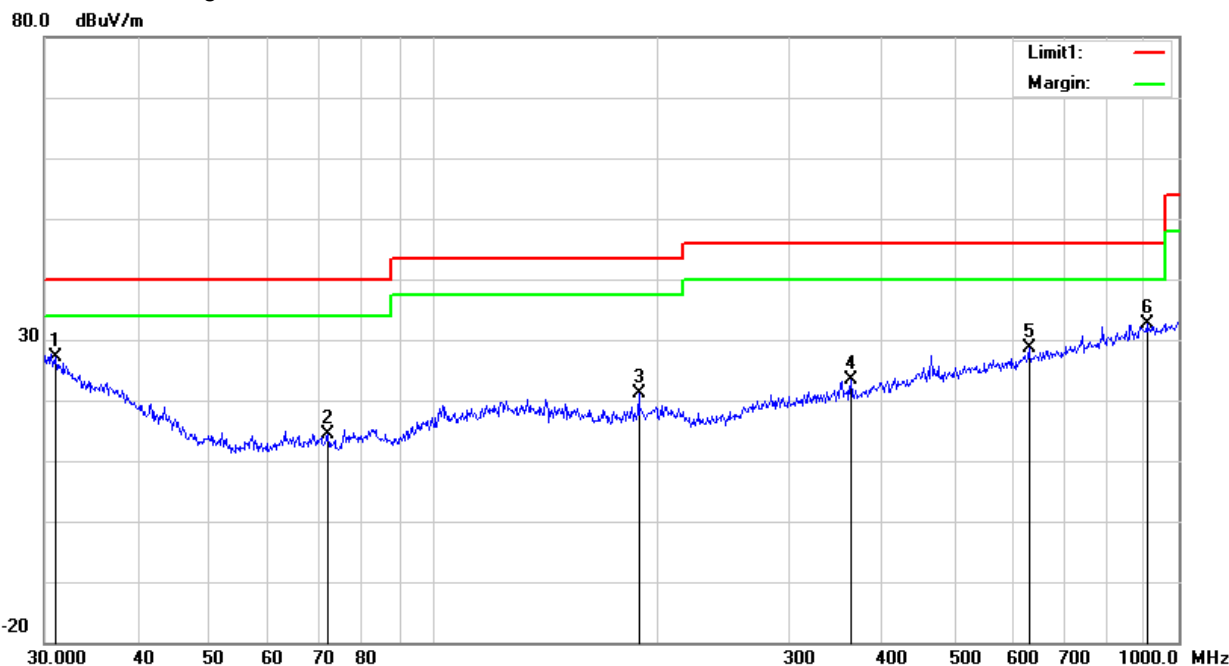
BT-LE GFSK (2 Mbps)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	31.0706	27.76	20.45	21.63	0.43	27.01	40.00	-12.99	200	165
2	72.0843	27.42	7.82	21.62	0.79	14.41	40.00	-25.59	100	262
3	188.4125	29.27	12.14	21.78	1.38	21.01	43.50	-22.49	100	68
4	362.9845	28.70	14.66	22.00	1.96	23.32	46.00	-22.68	100	150
5	629.4772	28.60	19.37	21.99	2.57	28.55	46.00	-17.45	100	282
6	906.4824	28.61	22.44	21.52	3.21	32.74	46.00	-13.26	200	63

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
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.: RF2012WSZ0038-4

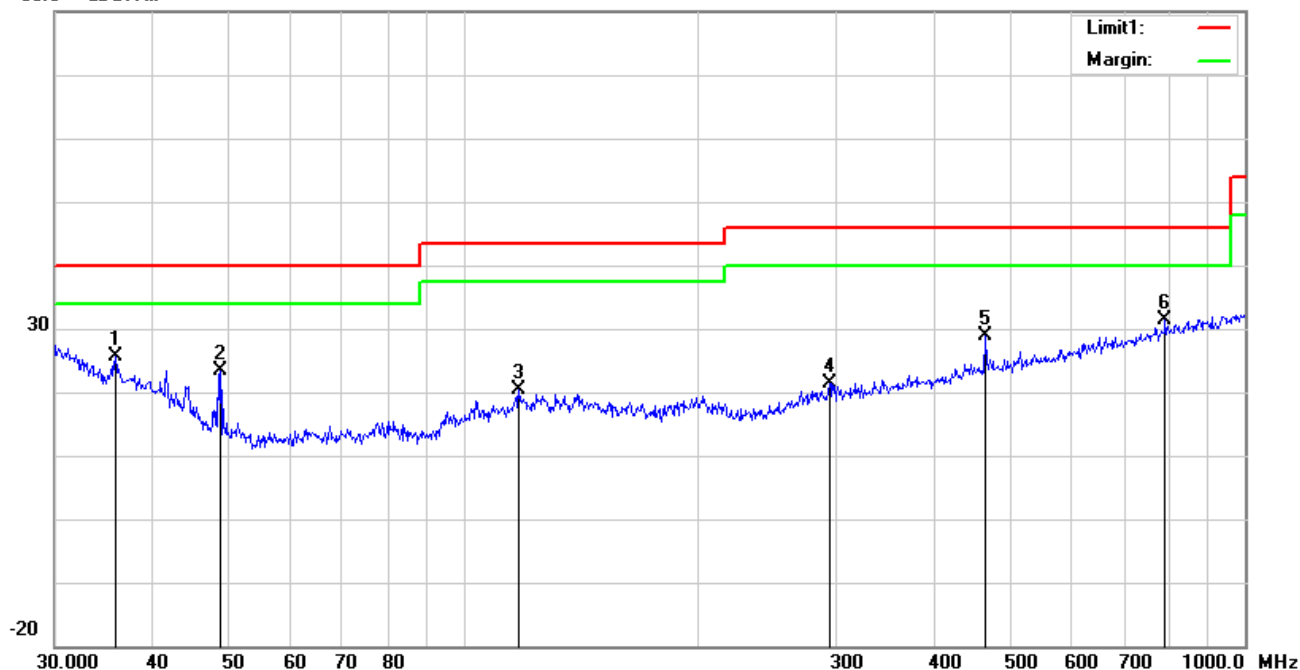
CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	35.8747	29.75	17.09	21.62	0.47	25.69	40.00	-14.31	100	296
2	48.8429	35.75	8.60	21.62	0.58	23.31	40.00	-16.69	100	315
3	117.7725	28.28	12.55	21.64	1.10	20.29	43.50	-23.21	200	22
4	294.1137	28.13	13.53	21.98	1.80	21.48	46.00	-24.52	100	31
5	465.5994	31.43	17.21	22.02	2.20	28.82	46.00	-17.18	100	233
6	790.6188	28.99	21.27	21.72	2.94	31.48	46.00	-14.52	200	129

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.

80.0 dBuV/m



Bureau Veritas (Shenzhen)
Consumer Products Services Co., Ltd.

Zone A, Floor 1, Building 2, Wan Ye Long Technology
Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

Tel: +86-755-26014629 Ext.800
Email: customerservice.sz@bureauveritas.com



ABOVE 1GHz TEST DATA:

BT-LE GFSK (1 Mbps)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	2364.6	42.71 PK	74	-31.29	225	96	54.09	-11.38
2	2364.6	32.66 AV	54	-21.34	225	96	44.04	-11.38
3	*2402	82.89 PK			170	58	94.27	-11.38
4	*2402	82.52 AV			170	58	93.9	-11.38
5	4804	46.86 PK	74	-27.14	188	165	52.93	-6.07
6	4804	37 AV	54	-17	188	165	43.07	-6.07
7	7206	52.25 PK	74	-21.75	216	349	51.96	0.29
8	7206	42.77 AV	54	-11.23	216	349	42.48	0.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	((dB/m)
1	2351.18	42.5 PK	74	-31.5	230	335	53.88	-11.38
2	2351.18	35.33 AV	54	-18.67	230	335	46.71	-11.38
3	*2402	79.17 PK			244	33	90.55	-11.38
4	*2402	79.01 AV			244	33	90.39	-11.38
5	4804	46.6 PK	74	-27.4	209	61	52.67	-6.07
6	4804	37.86 AV	54	-16.14	209	61	43.93	-6.07
7	7206	51.53 PK	74	-22.47	200	207	51.24	0.29
8	7206	42.82 AV	54	-11.18	200	207	42.53	0.29

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	*2440	86.04 PK			224	130	97.42	-11.38
2	*2440	85.31 AV			224	130	96.69	-11.38
3	4880	46.55 PK	74	-27.45	169	226	52.62	-6.07
4	4880	37.14 AV	54	-16.86	169	226	43.21	-6.07
5	7320	50.63 PK	74	-23.37	178	120	50.34	0.29
6	7320	41.11 AV	54	-12.89	178	120	40.82	0.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	*2440	84.23 PK			235	249	95.61	-11.38
2	*2440	83.68 AV			235	249	95.06	-11.38
3	4880	46.97 PK	74	-27.03	178	48	53.04	-6.07
4	4880	37.63 AV	54	-16.37	178	48	43.7	-6.07
5	7320	51.17 PK	74	-22.83	250	147	50.88	0.29
6	7320	41.25 AV	54	-12.75	250	147	40.96	0.29

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	2494.44	45.87 PK	74	-28.13	164	318	57.25	-11.38
2	2494.44	38.48 AV	54	-15.52	164	318	49.86	-11.38
3	*2480	85.81 PK			231	168	97.19	-11.38
4	*2480	85.49 AV			231	168	96.87	-11.38
5	4960	47.25 PK	74	-26.75	186	238	53.32	-6.07
6	4960	38.11 AV	54	-15.89	186	238	44.18	-6.07
7	7440	53 PK	74	-21	151	280	52.71	0.29
8	7440	42.45 AV	54	-11.55	151	280	42.16	0.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	2483.5	45.38 PK	74	-28.62	177	347	56.76	-11.38
2	2483.5	37.76 AV	54	30.79	177	347	49.14	-11.38
3	*2480	85.01 PK			115	288	96.39	-11.38
4	*2480	84.79 AV			115	288	96.17	-11.38
5	4960	45.83 PK	74	-28.17	170	299	51.9	-6.07
6	4960	37.92 AV	54	-16.08	170	299	43.99	-6.07
7	7440	53.55 PK	74	-20.45	214	224	53.26	0.29
8	7440	42.46 AV	54	-11.54	214	224	42.17	0.29

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



BT-LE GFSK (2 Mbps)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	2390	42.57 PK	74	-31.43	224	250	53.95	-11.38
2	2390	33.7 AV	54	-20.3	224	250	45.08	-11.38
3	*2402	84.91 PK			218	254	96.29	-11.38
4	*2402	82.29 AV			218	254	93.67	-11.38
5	4804	47.07 PK	74	-26.93	184	183	53.14	-6.07
6	4804	38.73 AV	54	-15.27	184	183	44.8	-6.07
7	7206	52.77 PK	74	-21.23	138	36	52.48	0.29
8	7206	44.11 AV	54	-9.89	138	36	43.82	0.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	((dB/m)
1	2389.75	45.02 PK	74	-28.98	228	167	56.4	-11.38
2	2389.75	32.91 AV	54	-21.09	228	167	44.29	-11.38
3	*2402	80.34 PK			110	36	91.72	-11.38
4	*2402	77.52 AV			110	36	88.9	-11.38
5	4804	47.46 PK	74	-26.54	139	98	53.53	-6.07
6	4804	38.44 AV	54	-15.56	139	98	44.51	-6.07
7	7206	53.57 PK	74	-20.43	214	132	53.28	0.29
8	7206	43.84 AV	54	-10.16	214	132	43.55	0.29

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	*2440	87.85 PK			187	78	99.23	-11.38
2	*2440	84.66 AV			187	78	96.04	-11.38
3	4880	47.29 PK	74	-26.71	109	221	53.36	-6.07
4	4880	38.52 AV	54	-15.48	109	221	44.59	-6.07
5	7320	52.39 PK	74	-21.61	118	254	52.1	0.29
6	7320	42.83 AV	54	-11.17	118	254	42.54	0.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	*2440	84.9 PK			138	22	96.28	-11.38
2	*2440	82.03 AV			138	22	93.41	-11.38
3	4880	47.91 PK	74	-26.09	109	312	53.98	-6.07
4	4880	38.37 AV	54	-15.63	109	312	44.44	-6.07
5	7320	51.72 PK	74	-22.28	195	68	51.43	0.29
6	7320	42.52 AV	54	-11.48	195	68	42.23	0.29

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	2483.5	48.58 PK	74	-25.42	166	292	59.96	-11.38
2	2483.5	41.06 AV	54	-12.94	166	292	52.44	-11.38
3	*2480	91.34 PK			106	329	102.72	-11.38
4	*2480	90.18 AV			106	329	101.56	-11.38
5	4960	46.99 PK	74	-27.01	199	88	53.06	-6.07
6	4960	39.11 AV	54	-14.89	199	88	45.18	-6.07
7	7440	53.99 PK	74	-20.01	175	133	53.7	0.29
8	7440	43.43 AV	54	-10.57	175	133	43.14	0.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	FREQ.	Emission Level	Limit	Margin	Height	Degree	Raw Value	Correction Factor
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	(dBuV)	(dB/m)
1	2483.5	48.27 PK	74	-25.73	156	111	59.65	-11.38
2	2483.5	39.44 AV	54	-14.56	156	111	50.82	-11.38
3	*2480	89.11 PK			211	112	100.49	-11.38
4	*2480	87.9 AV			211	112	99.28	-11.38
5	4960	46.97 PK	74	-27.03	104	247	53.04	-6.07
6	4960	38.62 AV	54	-15.38	104	247	44.69	-6.07
7	7440	54.08 PK	74	-19.92	193	29	53.79	0.29
8	7440	43.73 AV	54	-10.27	193	29	43.44	0.29

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



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.	Last Cal.	Next Cal.
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 28, 19	Dec. 27, 20
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 27, 20	Dec. 26, 21
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 24, 20	Mar. 24, 21
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 24, 20	Mar. 24, 21
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 24, 20	Mar. 24, 21
Signal Generation	Agilent	E4421B	US40051152	Dec. 18, 20	Dec. 17, 21
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 30, 20	Mar. 30, 21
Programmable Temperature & Humidity Chamber	Hongjin	HYC-TH-225 DH	DG-180746	Mar. 24, 20	Mar. 24, 21
Test System	Tonscend	JS 1120-3	N/A	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 27, 20	Mar. 27, 21

NOTE:

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



4.2.3 TEST PROCEDURE

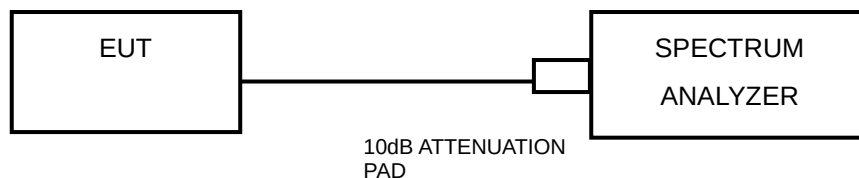
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (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.



4.2.7 TEST RESULTS

BT-LE GFSK (1 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.516	0.5	PASS
19	2440	0.500	0.5	PASS
39	2480	0.504	0.5	PASS

WORSE PLOT





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BT-LE GFSK (2 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.672	0.5	PASS
19	2440	0.692	0.5	PASS
39	2480	0.836	0.5	PASS

WORSE PLOT



Bureau Veritas (Shenzhen)
Consumer Products Services Co., Ltd.

Zone A, Floor 1, Building 2, Wan Ye Long Technology
Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

Tel: +86-755-26014629 Ext.800
Email: customerservice.sz@bureauveritas.com

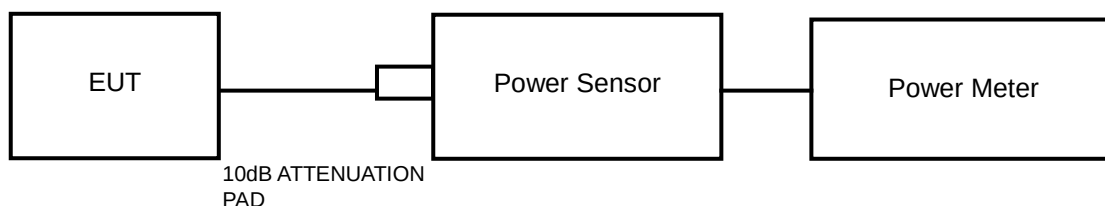


4.3 CONDUCTED OUTPUT POWER

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.	Last Cal.	Next Cal.
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 28, 19	Dec. 27, 20
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 27, 20	Dec. 26, 21
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 24, 20	Mar. 24, 21
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 24, 20	Mar. 24, 21
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 24, 20	Mar. 24, 21
Signal Generation	Agilent	E4421B	US40051152	Dec. 18, 20	Dec. 17, 21
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 30, 20	Mar. 30, 21
Programmable Temperature & Humidity Chamber	Hongjin	HYC-TH-225 DH	DG-180746	Mar. 24, 20	Mar. 24, 21
Test System	Tonscend	JS 1120-3	N/A	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 27, 20	Mar. 27, 21

NOTE:1. The test was performed in RF Oven room.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



4.3.4 TEST PROCEDURES

A peak sensor was used on the output port of the EUT. A peak power meter was used to read the response of the peak power sensor. Record the peak 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 (1 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
0	2402	-2.24	0.597	1	PASS
19	2440	-1.82	0.658	1	PASS
39	2480	-1.94	0.640	1	PASS

BT-LE GFSK (2 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
0	2402	-1.84	0.655	1	PASS
19	2440	-1.44	0.718	1	PASS
39	2480	-1.44	0.718	1	PASS



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 (1 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)
0	2402	-3.51
19	2440	-3.15
39	2480	-2.67

BT-LE GFSK (2 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)
0	2402	-4.22
19	2440	-3.81
39	2480	-3.94

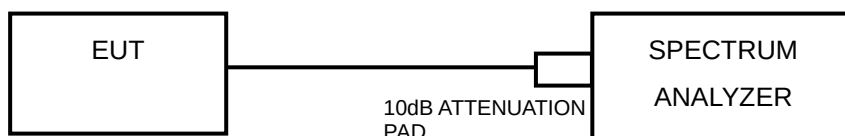


4.4 POWER SPECTRAL DENSITY MEASUREMENT

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 $\geq 3 \times$ 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.



4.4.7 TEST RESULTS

BT-LE GFSK (1 Mbps)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-20.801	8	PASS
19	2440	-20.517	8	PASS
39	2480	-20.412	8	PASS

WORSE PLOT





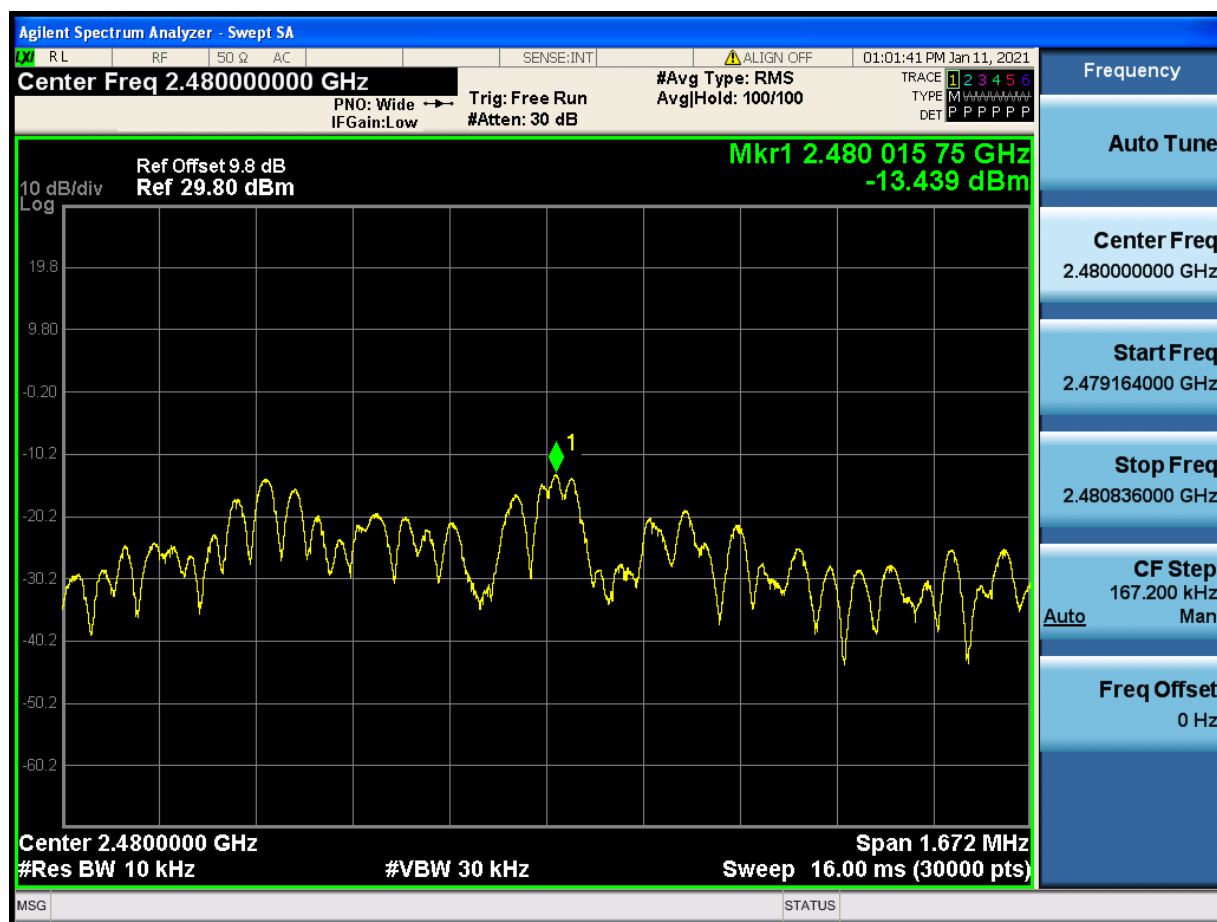
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BT-LE GFSK (2 Mbps)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-14.160	8	PASS
19	2440	-13.635	8	PASS
39	2480	-13.439	8	PASS

WORSE PLOT



Bureau Veritas (Shenzhen)
Consumer Products Services Co., Ltd.

Zone A, Floor 1, Building 2, Wan Ye Long Technology
Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

Tel: +86-755-26014629 Ext.800
Email: customerservice.sz@bureauveritas.com

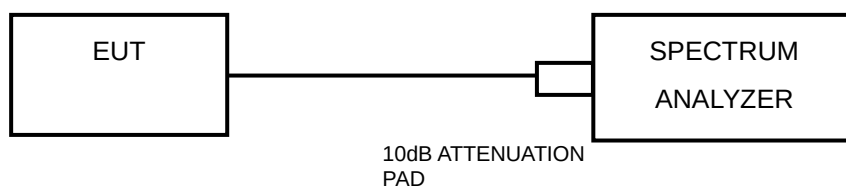


4.5 OUT OF BAND EMISSION MEASUREMENT

4.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz 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 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 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.

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.

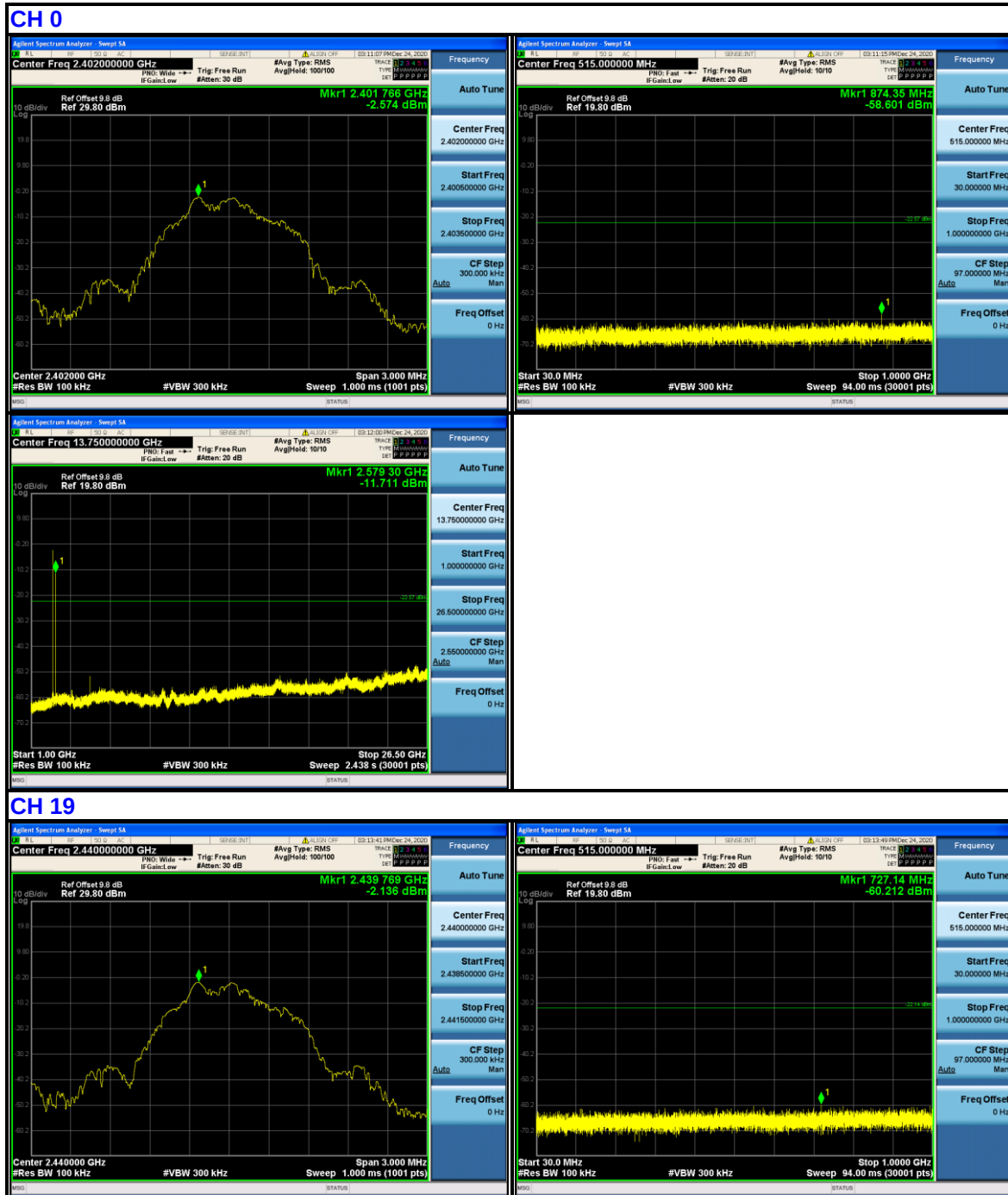


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4.5.7 TEST RESULTS

BT-LE GFSK (1 Mbps)



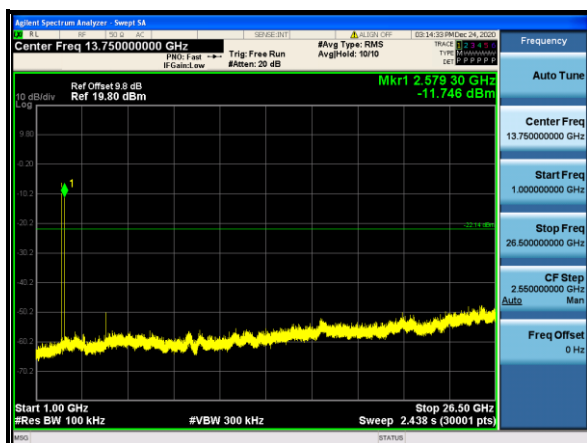
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Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

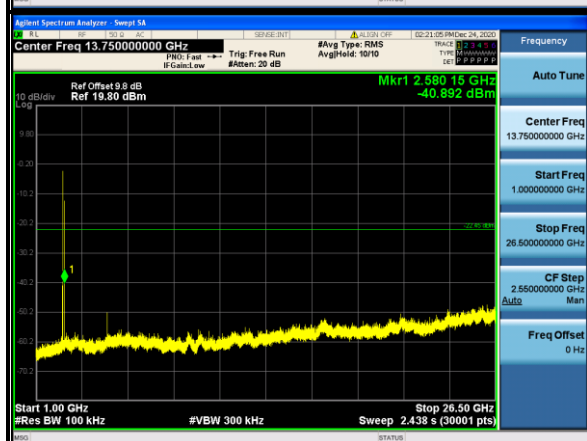
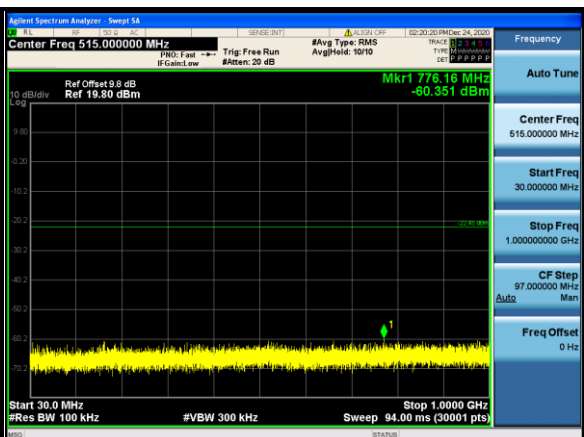
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Email: customerservice.sz@bureauveritas.com



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**Bureau Veritas (Shenzhen)
Consumer Products Services Co., Ltd.**

Zone A, Floor 1, Building 2, Wan Ye Long Technology
Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

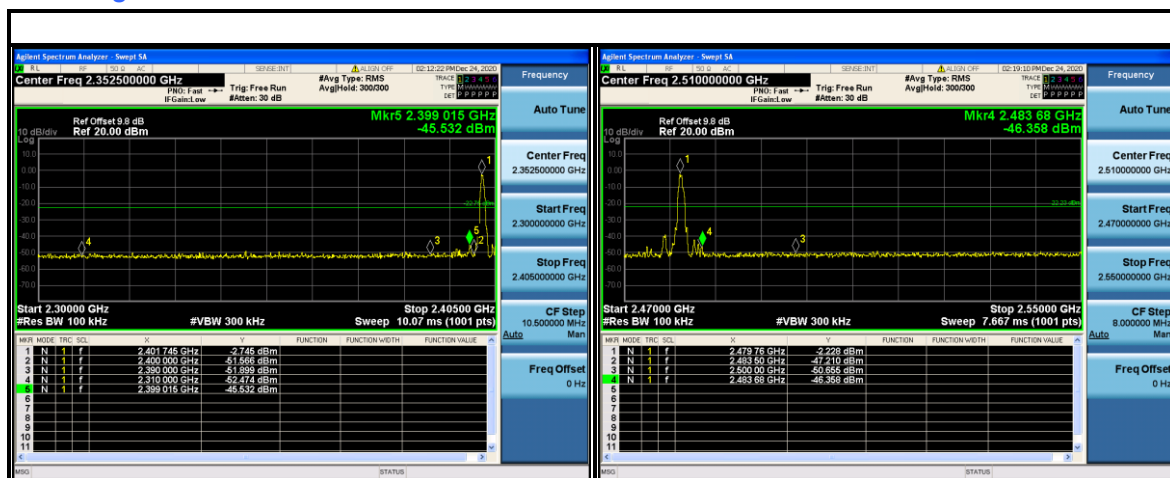
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Bureau Veritas (Shenzhen)
Consumer Products Services Co., Ltd.

Zone A, Floor 1, Building 2, Wan Ye Long Technology
Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

Tel: +86-755-26014629 Ext.800
Email: customerservice.sz@bureauveritas.com

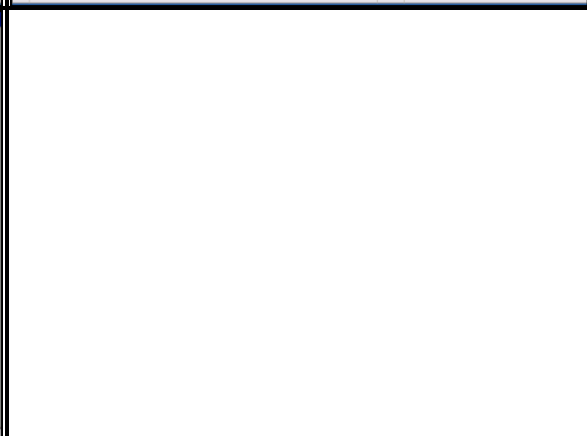
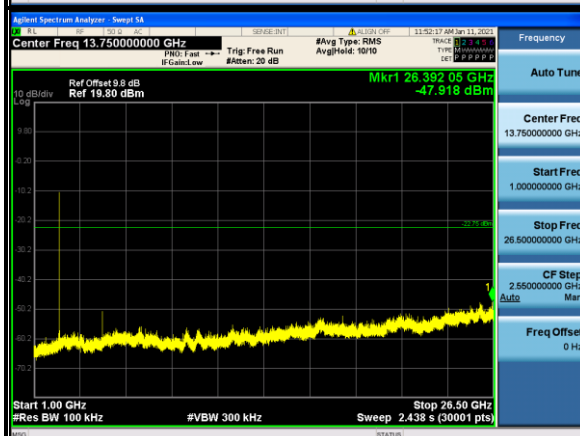
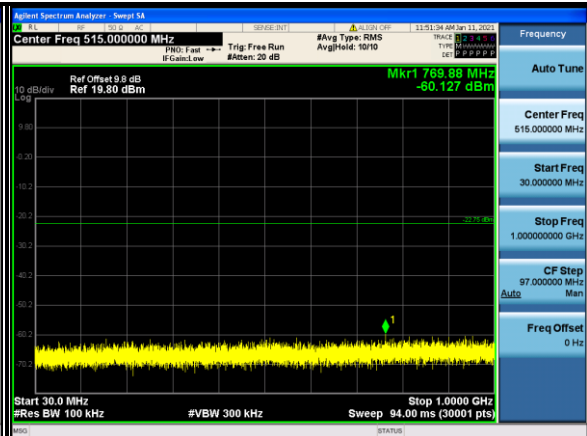


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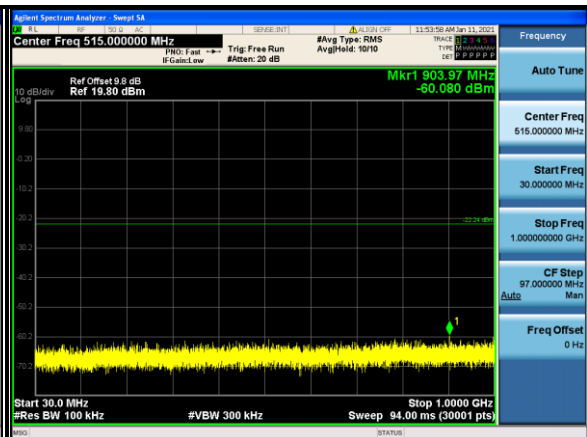
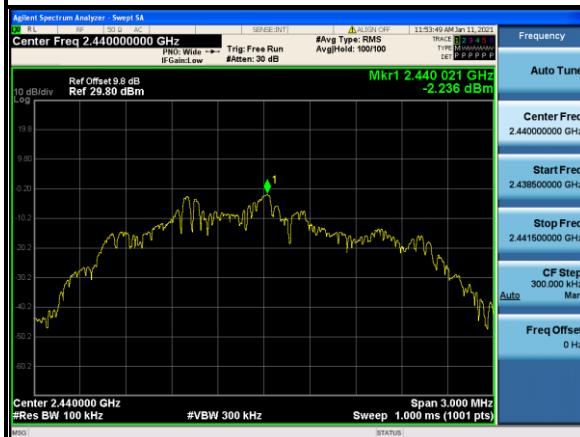
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BT-LE GFSK (2 Mbps)

CH 0



CH 19



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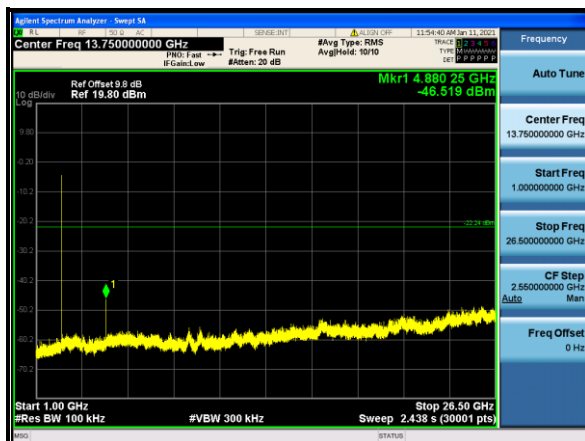
Zone A, Floor 1, Building 2, Wan Ye Long Technology
Park, South Side of Zhoushi Road, Bao'an District,
Shenzhen Guangdong, 518108, China.

Tel: +86-755-26014629 Ext.800
Email: customerservice.sz@bureauveritas.com

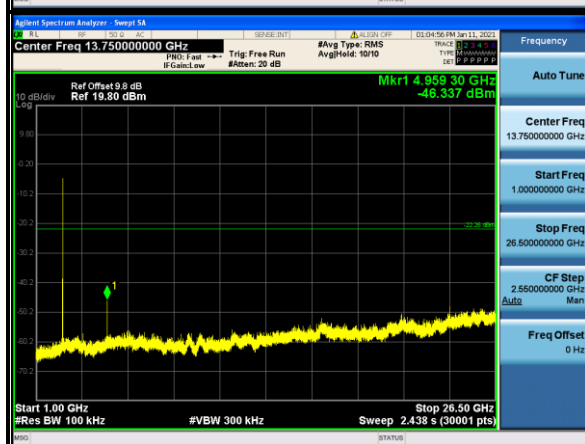
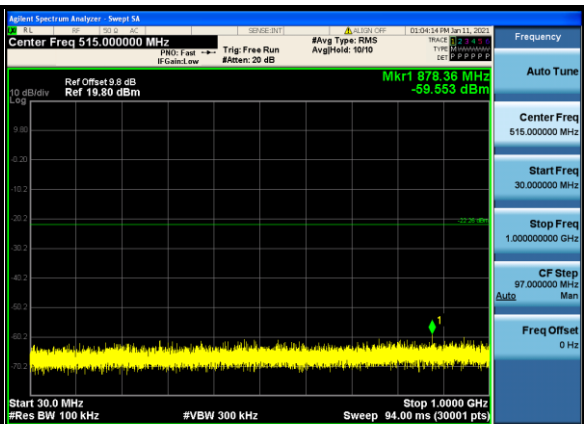


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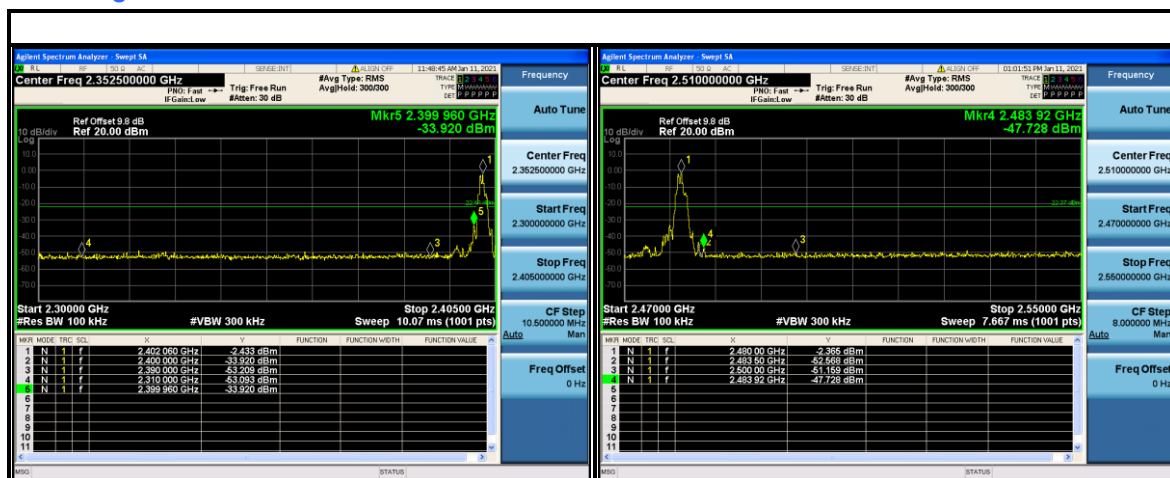
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Bureau Veritas (Shenzhen)
Consumer Products Services Co., Ltd.

Zone A, Floor 1, Building 2, Wan Ye Long Technology
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Shenzhen Guangdong, 518108, China.

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5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---