FCC Test Report

(Co-Located)

Report No.: RFBHKO-WTW-P22010776A-1

FCC ID: 2A3ULSB02M

Product Name: AMBEO Soundbar | Mini

Brand Name: SENNHEISER

Model No.: SB02S

Received Date: 2022/9/23

Test Date: 2022/12/13

Issued Date: 2023/1/11

Applicant: Sonova Consumer Hearing GmbH

Address: Am Labor 1, 30900 Wedemark, Germany

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

FCC Registration / Designation Number: 198487 / TW2021

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RFBHKO-WTW-P22010776A-1	Original release	2023/1/11

1 Certificate of Conformity

Product Name: AMBEO Soundbar | Mini

Brand Name: SENNHEISER

Model No.: SB02S

Sample Status: Engineering sample

Applicant: Sonova Consumer Hearing GmbH

Test Date: 2022/12/13

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)
47 CFR FCC Part 15, Subpart E (Section 15.407)

Measurement procedure: ANSI C63.10-2013
KDB 789033 D02 General UNII Test Procedure New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
KDB 558074 D01 15.247 Meas Guidance v05r02

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Annie Chang , **Date:** 2023/1/11
Annie Chang / Senior Specialist

Approved by : Jeremy Lin , **Date:** 2023/1/11
Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407)		
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d) 15.407(b)(9)	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -0.4dB at 11160.00MHz.
15.207 / 15.407(b)(9)	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -12.02dB at 0.41953MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 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:

Parameter	Specification	Uncertainty
AC Power Conducted Emissions	150 kHz ~ 30 MHz	2.94 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	2.38 dB
	30 MHz ~ 1 GHz	5.70 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 6 GHz	4.83 dB
	6 GHz ~ 18 GHz	5.37 dB
	18 GHz ~ 40 GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Test item description	AMBEO Soundbar
Product Name	AMBEO Soundbar | Mini
Brand Name	SENNHEISER
Model No.	SB02S
HW Version	DVT sample
SW Version	2.1.0.14
Status of EUT	Engineering sample
Power Ratings	AC I/P: 100-240Vac 50/60Hz max. 2.5A
Power Supply (Nominal and Testing)	100-240Vac
Temperature Operating Range	0℃ ~ 40℃
Modulation Type	GFSK
Transmission Technology	DSSS
Technology	Bluetooth
Channel Spacing	2MHz
Channel Bandwidth	80MHz
DataTransfer Rate	Bluetooth LE 4.0: 1Mbps Bluetooth LE 5.2: 2Mbps
Operating Frequency	2402MHz ~ 2480MHz
For Frequency Band	2400MHz ~ 2483.5MHz
Number of Channel	40
Output Power	Bluetooth LE 4.0: 1.910 mW (2.81 dBm) Bluetooth LE 5.2: 1.905 mW (2.80 dBm)
Accessory Device	Remote Control (Sennheiser/SB02-RC)
Data Cable Supplied	Non-shielded AC 2-Pin cable (2.0m) Shielded HDMI cable (1.5m)

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to BV CPS report no.: RFBHKO-WTW-P22010776-1. The difference compared with original report is listing as below, therefore only Conducted Emission and Radiated Emissions tests were performed for this addendum.
   - ✧Add Product name
   - ✧Add new antenna
   - ✧Add new model
   - ✧Add new Exterior

2. The EUT contains following wireless modules:

Module	Wireless Function	Antenna	FCC ID
WLAN+BT Combo	WLAN 2.4G WLAN 5G BT EDR BT LE	Antenna 1&2	2AJYB-ST1955
BT LE	BT LE	Antenna 3	Certified with EUT

3. WLAN+BT Combo module & BT LE module can transmit at same time.

4. This report is issued for the BTLE module only, more information of WLAN+BT Combo module refer to FCC ID: 2AJYB-ST1955.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Antenna Description of EUT

1. The EUT used antennas listed as below and the maximum antenna gain is chosen for final test. (additional antennas as shaded area)

Antenna No.	Frequency Range (MHz)	Antenna Peak Gain (dBi)			Antenna Type	Antenna Connector	Remark
		ZX	ZY	XY			
Antenna 1	2400	0.67	-0.77	1.93	PCB	ipex(MHF)	Original
	2450	2.61	-0.82	3.03	PCB	ipex(MHF)	
	2500	2.34	-0.84	1.63	PCB	ipex(MHF)	
	5150	-0.07	-0.46	0.75	PCB	ipex(MHF)	
	5500	0.94	0.59	-0.74	PCB	ipex(MHF)	
	5850	2.48	0.51	-0.35	PCB	ipex(MHF)	
	2400	1.20	2.71	2.66	PCB	ipex(MHF)	Additional
	2450	2.22	3.04	3.00	PCB	ipex(MHF)	
	2500	0.65	2.55	2.61	PCB	ipex(MHF)	
	5150	-1.46	0.23	4.19	PCB	ipex(MHF)	
	5500	-2.12	1.94	3.81	PCB	ipex(MHF)	
	5850	-1.22	1.58	2.59	PCB	ipex(MHF)	
Antenna 2	2400	0.39	-0.97	1.63	PCB	ipex(MHF)	Original
	2450	1.21	-0.06	1.93	PCB	ipex(MHF)	
	2500	1.57	0.00	1.45	PCB	ipex(MHF)	
	5150	-1.64	3.29	4.10	PCB	ipex(MHF)	
	5500	-2.24	3.65	3.83	PCB	ipex(MHF)	
	5850	-2.14	3.46	3.20	PCB	ipex(MHF)	
	2400	1.88	1.38	2.02	PCB	ipex(MHF)	Additional
	2450	2.21	3.04	2.88	PCB	ipex(MHF)	
	2500	0.21	2.43	2.39	PCB	ipex(MHF)	
	5150	-1.17	1.15	4.16	PCB	ipex(MHF)	
	5500	-1.48	-0.90	2.00	PCB	ipex(MHF)	
	5850	-1.68	-1.05	2.15	PCB	ipex(MHF)	
Antenna 3	2400	-2.21	-0.74	2.08	PCB	ipex(MHF)	Original
	2450	-2.63	0.30	3.17	PCB	ipex(MHF)	
	2500	-2.91	-0.02	2.24	PCB	ipex(MHF)	
	2400	0.93	1.52	2.08	PCB	ipex(MHF)	Additional
	2450	0.95	0.79	2.86	PCB	ipex(MHF)	
	2500	1.63	1.11	3.13	PCB	ipex(MHF)	

*Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

2. The EUT incorporates a MIMO function:

2.4GHz Band		
Modulation Mode	TX Function	RX Function
802.11b	2TX	2RX
802.11g	2TX	2RX
802.11n (HT20)	2TX	2RX
VHT20	2TX	2RX
802.11ax (HE20)	2TX	2RX
5GHz Band		
Modulation Mode	TX Function	RX Function
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
802.11ax (HE80)	2TX	2RX

3.3 Description of Test Modes

40 channels are provided to this EUT:

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

3.3.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE≥1G	RE<1G	PLC	
-	√	√	√	-

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

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	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
802.11g + BT LE (1M)	2412 ~ 2462	1 to 11	6 + 0	OFDM
	2402 ~ 2480	0 to 39		GFSK
802.11ax (HE20) + BT LE (1M)	5180 ~ 5240 5260 ~ 5320 5500 ~ 5700 5745 ~ 5825	36 to 48 52 to 64 100 to 140 149 to 165	116 + 0	OFDMA
	2402 ~ 2480	0 to 39		GFSK
BT EDR + BT LE (1M)	2402 ~ 2480	0 to 78	78 + 0	GFSK
	2402 ~ 2480	0 to 39		GFSK
BT LE (2M) + BT LE (1M)	2402 ~ 2480	0 to 39	39 + 0	GFSK
	2402 ~ 2480	0 to 39		GFSK

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	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
802.11g + BT LE (1M)	2412 ~ 2462	1 to 11	6 + 0	OFDM
	2402 ~ 2480	0 to 39		GFSK
802.11ax (HE20) + BT LE (1M)	5180 ~ 5240 5260 ~ 5320 5500 ~ 5700 5745 ~ 5825	36 to 48 52 to 64 100 to 140 149 to 165	116 + 0	OFDMA
	2402 ~ 2480	0 to 39		GFSK
BT EDR + BT LE (1M)	2402 ~ 2480	0 to 78	78 + 0	GFSK
	2402 ~ 2480	0 to 39		GFSK
BT LE (2M) + BT LE (1M)	2402 ~ 2480	0 to 39	39 + 0	GFSK
	2402 ~ 2480	0 to 39		GFSK

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	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
802.11g + BT LE (1M)	2412 ~ 2462	1 to 11	6 + 0	OFDM
	2402 ~ 2480	0 to 39		GFSK
802.11ax (HE20) + BT LE (1M)	5180 ~ 5240 5260 ~ 5320 5500 ~ 5700 5745 ~ 5825	36 to 48 52 to 64 100 to 140 149 to 165	116 + 0	OFDMA
	2402 ~ 2480	0 to 39		GFSK
BT EDR + BT LE (1M)	2402 ~ 2480	0 to 78	78 + 0	GFSK
	2402 ~ 2480	0 to 39		GFSK
BT LE (2M) + BT LE (1M)	2402 ~ 2480	0 to 39	39 + 0	GFSK
	2402 ~ 2480	0 to 39		GFSK

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE>1G	22deg. C, 69%RH	120Vac, 60Hz	Ian Chang
RE<1G	14deg. C, 59%RH	120Vac, 60Hz	Ian Chang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Jed Wu

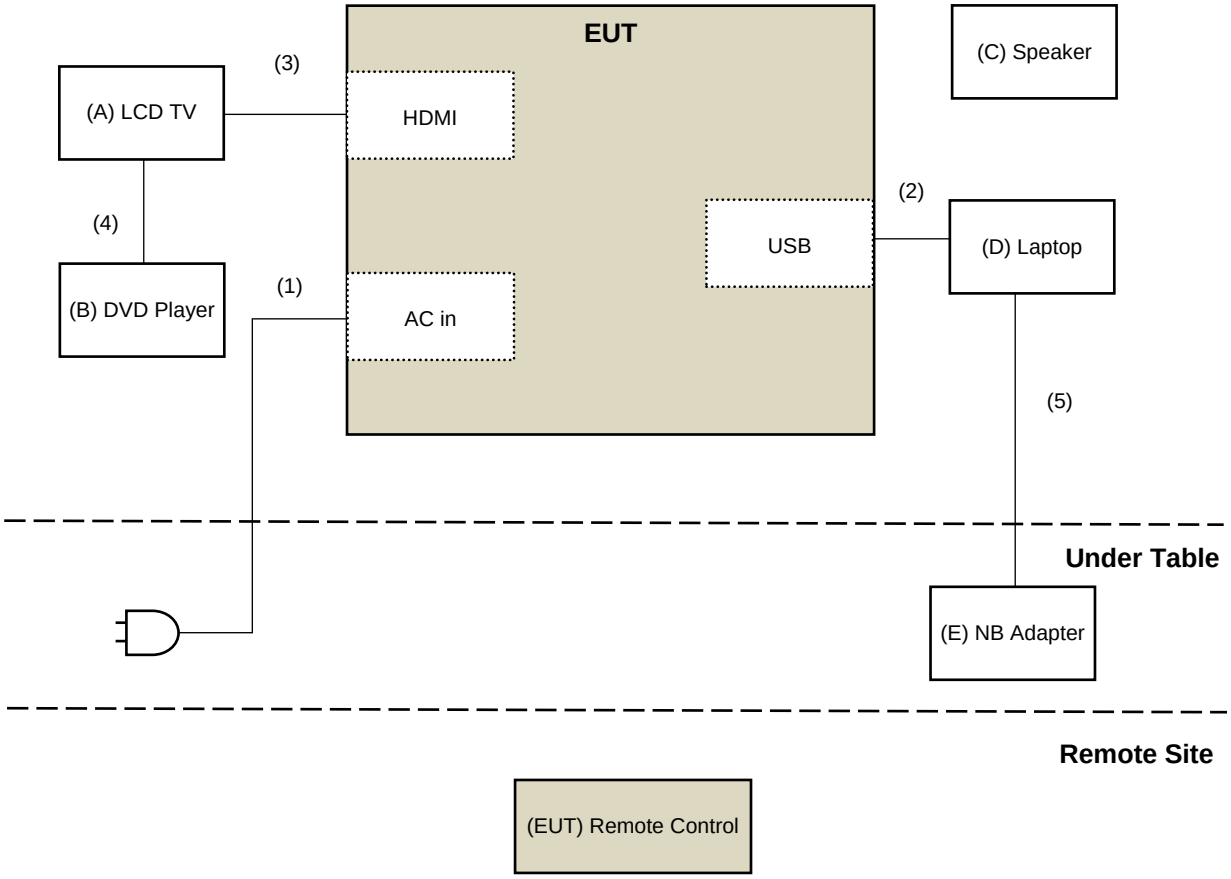
3.4 Description of Support Units

The ET 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	LCD TV	SONY	KDL-32W700C	3052433	N/A	Provided by Lab
B	DVD Player	Pioneer	BDP-160	N/A	N/A	Provided by Lab
C	Speaker	Sennheiser	SW02	N/A	N/A	Supplied by applicant
D	Laptop	Lenovo	IdeaPad 5 15ITL05	N/A	N/A	Provided by Lab
E	NB Adapter	Lenovo	PA-1450-55LL	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	AC power cable	1	2	N	0	Supplied by applicant
2	USB Type A to C cable	1	1	Y	0	Provided by Lab
3	HDMI cable	1	1.5	N	0	Supplied by applicant
4	HDMI cable	1	2	N	0	Provided by Lab
5	DC cable	1	1.8	N	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 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 and references:

Test Standard:
FCC Part 15, Subpart C (15.247)
FCC Part 15, Subpart E (15.407)
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:
KDB 789033 D02 General UNII Test Procedure New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

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. 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.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Frequency Band	Applicable To	EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	15.407(b)(4)(i)	PK: -27 (dBm/MHz) *1 PK: 10 (dBm/MHz) *2 PK: 15.6 (dBm/MHz) *3 PK: 27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK: 105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK: 122.2 (dBμV/m) *4

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
LOOP ANTENNA EMCI	LPA600	270	2021/9/2	2023/9/1
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2022/10/21	2023/10/20
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
	CDNE-M3	00091	2022/6/1	2023/5/31
Pre_Amplifier EMCI	EMC001340	980269	2022/6/28	2023/6/27
Pre_Amplifier HP	8447D	2432A03504	2022/2/17	2023/2/16
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2022/6/30	2023/6/29
Software BVADT	Radiated_V7.7.1.1.1	N/A	N/A	N/A
	Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer R&S	FSV40	101544	2022/5/9	2023/5/8
Test Receiver Agilent	N9038A	MY51210129	2022/4/8	2023/4/7
		MY51210137	2022/6/9	2023/6/8
Tower ADT	AT100	0306	N/A	N/A
Turn Table ADT	TT100	0306	N/A	N/A

Notes:

1. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA
2. The test was performed in Linkou 966 Chamber 6 (CH 6).
3. Tested Date: 2022/12/13

Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Band Pass Filter MICRO-TRONICS	BRM17690	005	2022/5/26	2023/5/25
Boresight antenna tower fixture BV	BAF-02	6	N/A	N/A
High Pass Filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	2022/5/26	2023/5/25
Horn Antenna EMCO	3115	00027024	2022/11/13	2023/11/12
		00028257	2022/11/13	2023/11/12
Horn Antenna ETS-Lindgren	3117-PA	00215857	2022/11/13	2023/11/12
Horn Antenna Schwarzbeck	BBHA 9170	212	2022/10/20	2023/10/19
Notch Filter MICRO-TRONICS	BRC50703-01	010	2022/5/26	2023/5/25
Pre-amplifier HP	8449B	3008A01201	2022/2/17	2023/2/16
Pre-amplifier (18GHz-40GHz) EMCI	EMC184045B	980175	2022/9/3	2023/9/2
Pre_Amplifier EMCI	EMC0126545	980076	2022/2/17	2023/2/16
	EMC184045B	980235	2022/2/17	2023/2/16
RF Coaxial Cable EM	EM102-KMKM-3.5+1M	EM102-KMKM-3.5+1M-01	2022/7/7	2023/7/6
RF Coaxial Cable HUBER SUHNER	SF-104	Cable-CH6-01	2022/9/20	2023/9/19
Software BVADT	Radiated_V7.7.1.1.1	N/A	N/A	N/A
	Radiated_V8.7.08	N/A	N/A	N/A
Spectrum Analyzer Agilent	E4446A	MY51100009	2022/6/27	2023/6/26
Spectrum Analyzer KEYSIGHT	N9030A	MY54490260	2022/7/14	2023/7/13
Spectrum Analyzer R&S	FSV40	101042	2022/9/5	2023/9/4
		101544	2022/5/9	2023/5/8
Test Receiver Agilent	N9038A	MY51210129	2022/4/8	2023/4/7
		MY51210137	2022/6/9	2023/6/8
Tower ADT	AT100	0306	N/A	N/A
Turn Table ADT	TT100	0306	N/A	N/A

Notes:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA
2. The test was performed in Linkou 966 Chamber 6 (CH 6).
3. Tested Date: 2022/12/13

4.1.3 Test Procedure

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case 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 Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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 height of antenna 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

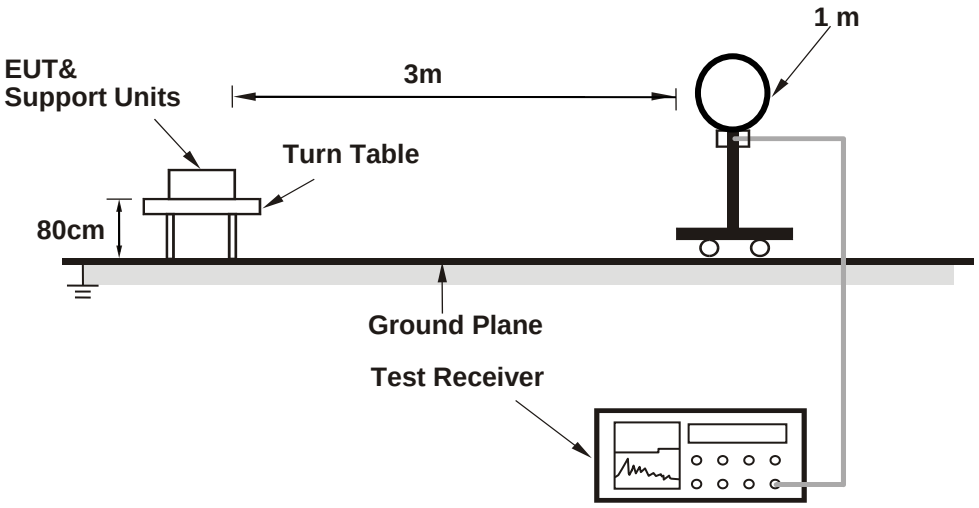
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

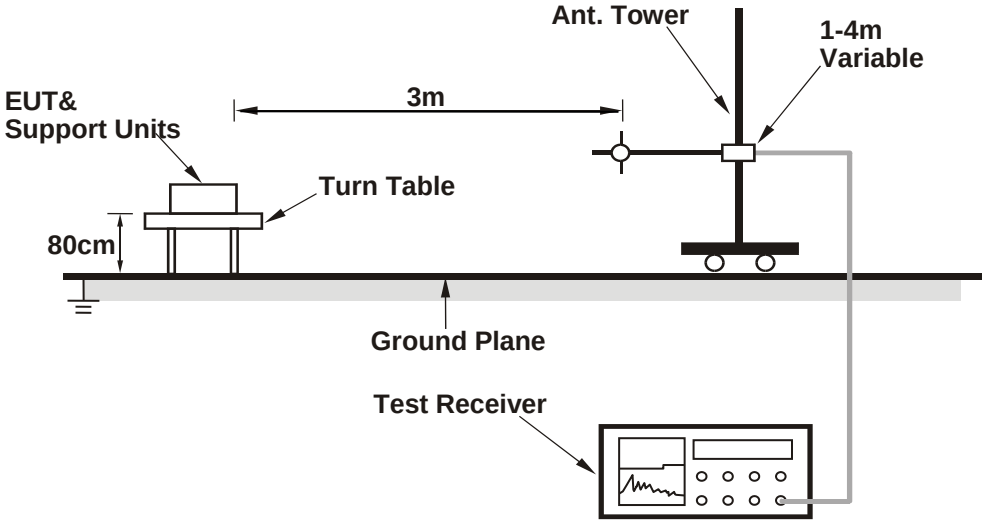
No deviation.

4.1.5 Test Setup

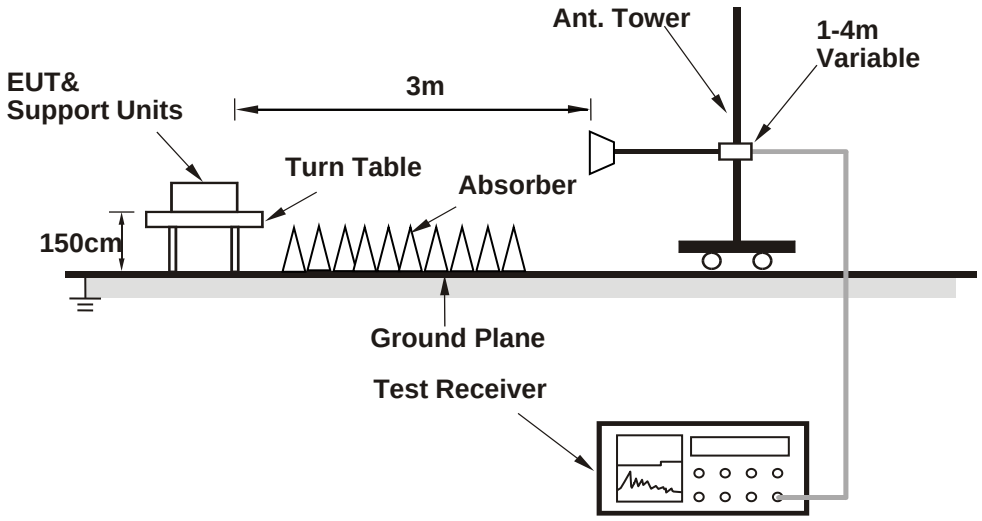
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Condition

Controlling software (Tera Term v4.8 & nRF Connect for Desktop V3.11.1) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz data:

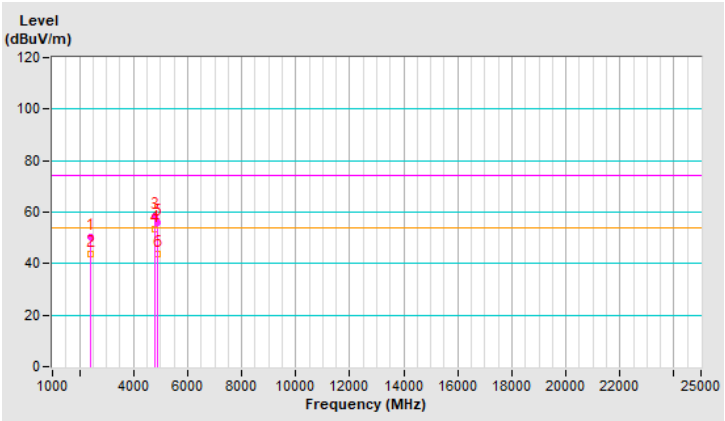
802.11g: CH 6 + BT LE (1M): CH 0

RF Mode	802.11g + BT LE (1M)	**Channel**	CH 6：2437 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	50.2 PK	74.0	-23.8	1.23 H	182	51.5	-1.3
2	2390.00	43.7 AV	54.0	-10.3	1.23 H	182	45.0	-1.3
3	4804.00	58.4 PK	74.0	-15.6	2.21 H	259	51.8	6.6
4	4804.00	53.5 AV	54.0	-0.5	2.21 H	259	46.9	6.6
5	4874.00	56.1 PK	74.0	-17.9	1.65 H	177	49.4	6.7
6	4874.00	43.6 AV	54.0	-10.4	1.65 H	177	36.9	6.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

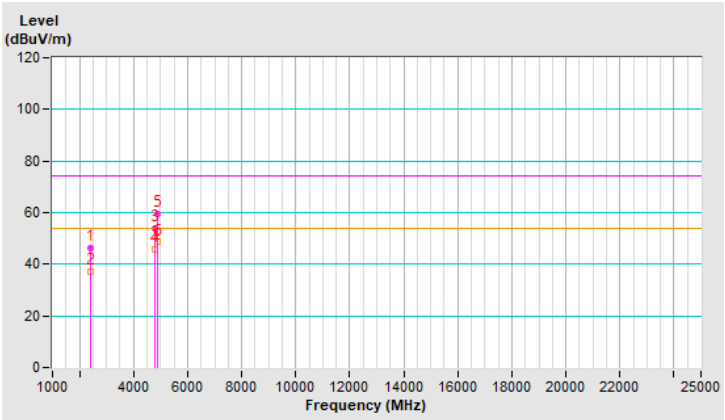


RF Mode	802.11g + BT LE (1M)	**Channel**	CH 6 : 2437 MHz + CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	46.3 PK	74.0	-27.7	3.26 V	329	47.6	-1.3
2	2390.00	37.3 AV	54.0	-16.7	3.26 V	329	38.6	-1.3
3	4804.00	53.8 PK	74.0	-20.2	1.78 V	328	47.2	6.6
4	4804.00	45.9 AV	54.0	-8.1	1.78 V	328	39.3	6.6
5	4874.00	59.4 PK	74.0	-14.6	2.23 V	336	52.7	6.7
6	4874.00	48.6 AV	54.0	-5.4	2.23 V	336	41.9	6.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



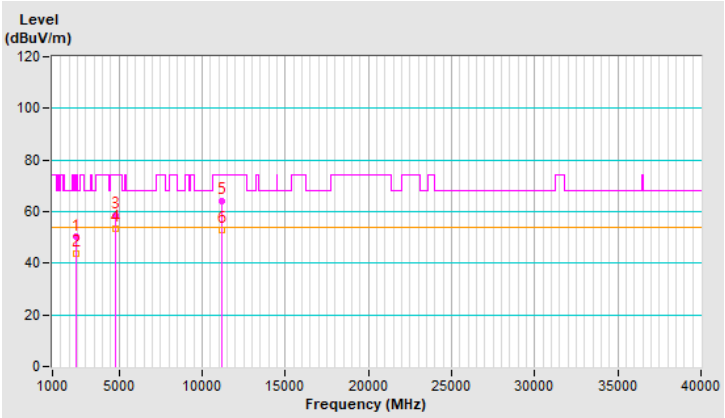
802.11ax (HE20): CH 116 + BT LE (1M): CH 0

RF Mode	802.11ax (HE20) + BT LE (1M)	**Channel**	CH 116：5580 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 40 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	50.1 PK	68.2	-18.1	1.24 H	182	51.4	-1.3
2	2390.00	43.6 AV	54.0	-10.4	1.24 H	182	44.9	-1.3
3	4804.00	58.4 PK	74.0	-15.6	2.20 H	258	51.8	6.6
4	4804.00	53.3 AV	54.0	-0.7	2.20 H	258	46.7	6.6
5	11160.00	63.9 PK	74.0	-10.1	3.28 H	138	46.9	17.0
6	11160.00	52.9 AV	54.0	-1.1	3.28 H	138	35.9	17.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

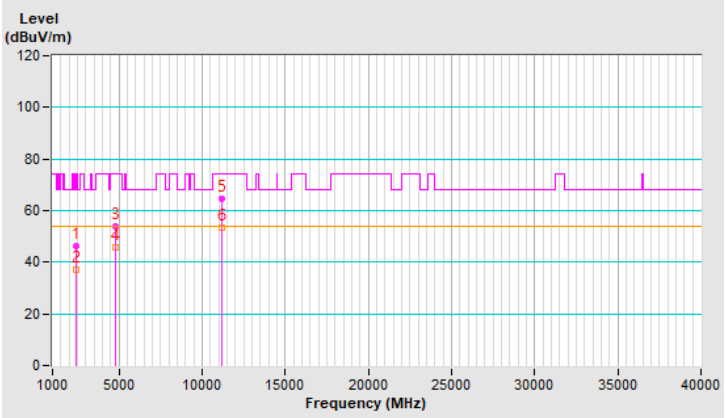


RF Mode	802.11ax (HE20) + BT LE (1M)	**Channel**	CH 116：5580 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 40 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	46.3 PK	68.2	-21.9	3.31 V	329	47.6	-1.3
2	2390.00	37.3 AV	54.0	-16.7	3.31 V	329	38.6	-1.3
3	4804.00	53.8 PK	74.0	-20.2	1.71 V	329	47.2	6.6
4	4804.00	45.6 AV	54.0	-8.4	1.71 V	329	39.0	6.6
5	11160.00	64.8 PK	74.0	-9.2	3.40 V	55	47.8	17.0
6	**11160.00**	**53.6 AV**	**54.0**	**-0.4**	**3.40 V**	**55**	**36.6**	**17.0**

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



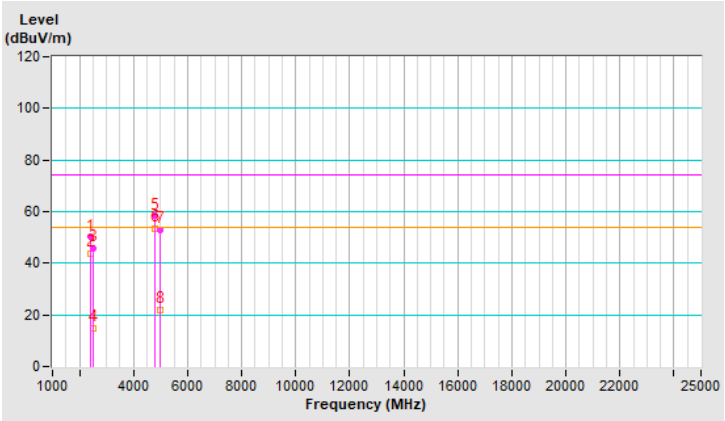
BT GFSK: CH 78 + BT LE (1M): CH 0

RF Mode	BT GFSK + BT LE (1M)	**Channel**	CH 78：2480 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (PK) RB = 1 MHz, VB = 3 MHz (RMS) (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	50.1 PK	74.0	-23.9	1.22 H	181	51.4	-1.3
2	2390.00	43.8 AV	54.0	-10.2	1.22 H	181	45.1	-1.3
3	2483.50	45.6 PK	74.0	-28.4	1.56 H	185	46.6	-1.0
4	2483.50	14.8 AV	54.0	-39.2	1.56 H	185	15.8	-1.0
5	4804.00	58.3 PK	74.0	-15.7	2.22 H	259	51.7	6.6
6	4804.00	53.4 AV	54.0	-0.6	2.22 H	259	46.8	6.6
7	4960.00	52.9 PK	74.0	-21.1	2.18 H	123	46.1	6.8
8	4960.00	22.1 AV	54.0	-31.9	2.18 H	123	15.3	6.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

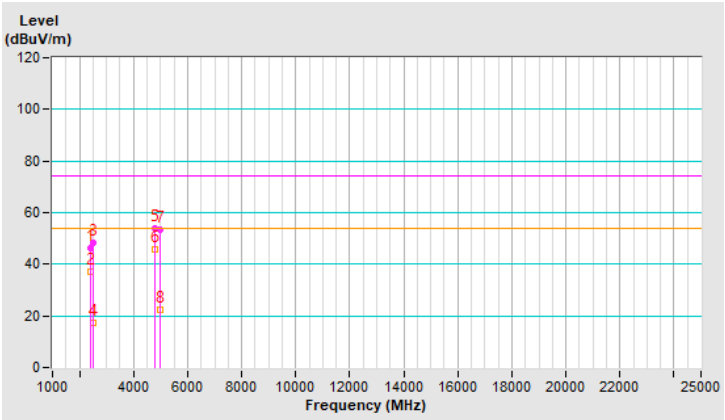


RF Mode	BT GFSK + BT LE (1M)	**Channel**	CH 78：2480 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (PK) RB = 1 MHz, VB = 3 MHz (RMS) (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	46.2 PK	74.0	-27.8	3.29 V	333	47.5	-1.3
2	2390.00	37.1 AV	54.0	-16.9	3.29 V	333	38.4	-1.3
3	2483.50	48.2 PK	74.0	-25.8	1.09 V	11	49.2	-1.0
4	2483.50	17.4 AV	54.0	-36.6	1.09 V	11	18.4	-1.0
5	4804.00	53.8 PK	74.0	-20.2	1.62 V	328	47.2	6.6
6	4804.00	45.6 AV	54.0	-8.4	1.62 V	328	39.0	6.6
7	4960.00	53.4 PK	74.0	-20.6	1.74 V	250	46.6	6.8
8	4960.00	22.6 AV	54.0	-31.4	1.74 V	250	15.8	6.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



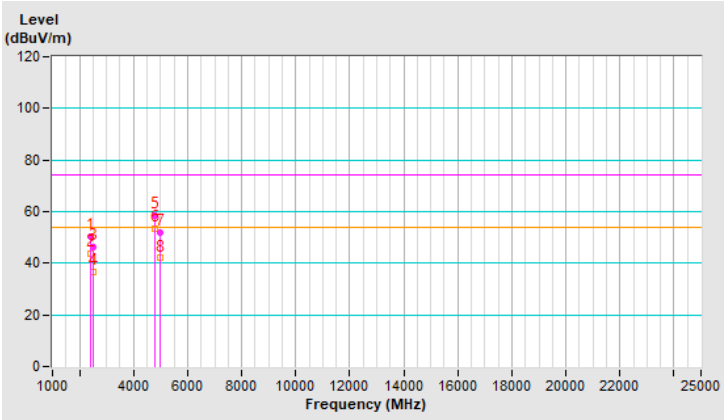
BT LE (2M): CH 39 + BT LE (1M): CH 0

RF Mode	BT LE (2M) + BT LE (1M)	**Channel**	CH 39：2480 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	**Detector Function & Bandwidth**	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	50.2 PK	74.0	-23.8	1.23 H	189	51.5	-1.3
2	2390.00	43.8 AV	54.0	-10.2	1.23 H	189	45.1	-1.3
3	2483.50	46.3 PK	74.0	-27.7	1.26 H	191	47.3	-1.0
4	2483.50	36.6 AV	54.0	-17.4	1.26 H	191	37.6	-1.0
5	4804.00	58.6 PK	74.0	-15.4	2.23 H	258	52.0	6.6
6	4804.00	53.5 AV	54.0	-0.5	2.23 H	258	46.9	6.6
7	4960.00	52.1 PK	74.0	-21.9	1.63 H	192	45.3	6.8
8	4960.00	42.0 AV	54.0	-12.0	1.63 H	192	35.2	6.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

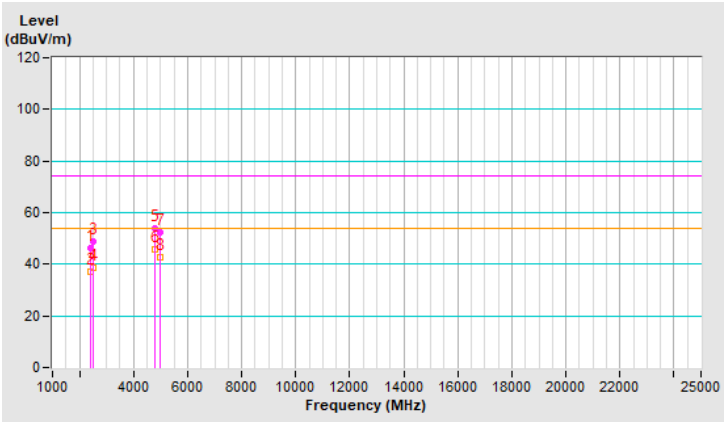


RF Mode	BT LE (2M) + BT LE (1M)	Channel	CH 39：2480 MHz + CH 0：2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	(PK) RB = 1 MHz, VB = 3 MHz (AV) RB = 1 MHz, VB = 1kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	46.3 PK	74.0	-27.7	3.33 V	319	47.6	-1.3
2	2390.00	37.3 AV	54.0	-16.7	3.33 V	319	38.6	-1.3
3	2483.50	48.7 PK	74.0	-25.3	1.06 V	10	49.7	-1.0
4	2483.50	38.6 AV	54.0	-15.4	1.06 V	10	39.6	-1.0
5	4804.00	53.9 PK	74.0	-20.1	1.78 V	321	47.3	6.6
6	4804.00	45.8 AV	54.0	-8.2	1.78 V	321	39.2	6.6
7	4960.00	52.6 PK	74.0	-21.4	1.58 V	278	45.8	6.8
8	4960.00	42.8 AV	54.0	-11.2	1.58 V	278	36.0	6.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.



Below 1GHz data:

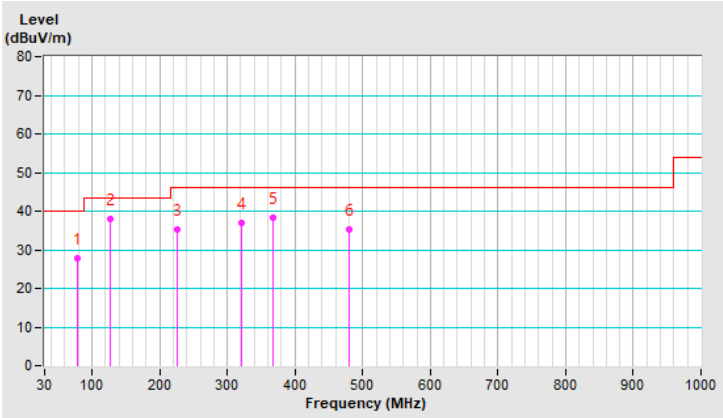
802.11g: CH 6 + BT LE (1M): CH 0

RF Mode	802.11g + BT LE (1M)	**Channel**	CH 6 : 2437 MHz + CH 0 : 2402 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	78.42	28.0 QP	40.0	-12.0	2.41 H	256	40.8	-12.8
2	127.24	38.0 QP	43.5	-5.5	2.95 H	287	47.9	-9.9
3	225.66	35.4 QP	46.0	-10.6	1.36 H	203	45.8	-10.4
4	320.31	37.0 QP	46.0	-9.0	1.15 H	202	42.2	-5.2
5	368.09	38.4 QP	46.0	-7.6	2.29 H	98	42.7	-4.3
6	479.68	35.3 QP	46.0	-10.7	3.21 H	111	37.0	-1.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

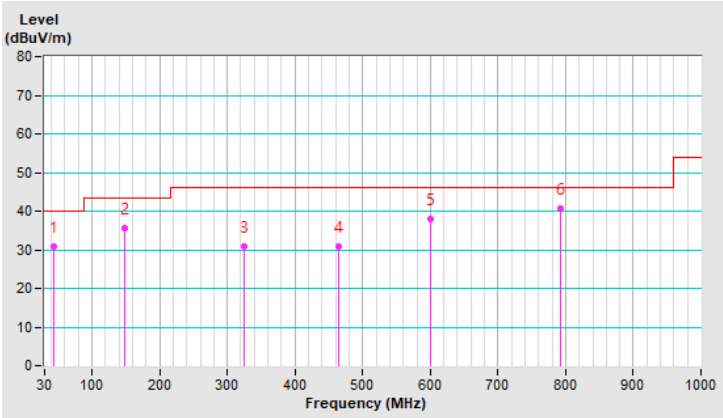


RF Mode	802.11g + BT LE (1M)	**Channel**	CH 6 : 2437 MHz + CH 0 : 2402 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	42.85	31.0 QP	40.0	-9.0	1.84 V	16	39.8	-8.8
2	148.15	35.7 QP	43.5	-7.8	1.63 V	6	43.8	-8.1
3	324.93	30.8 QP	46.0	-15.2	2.94 V	16	35.8	-5.0
4	465.19	30.9 QP	46.0	-15.1	1.23 V	181	32.9	-2.0
5	600.02	37.9 QP	46.0	-8.1	2.85 V	222	36.8	1.1
6	792.81	40.6 QP	46.0	-5.4	2.74 V	215	35.7	4.9

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



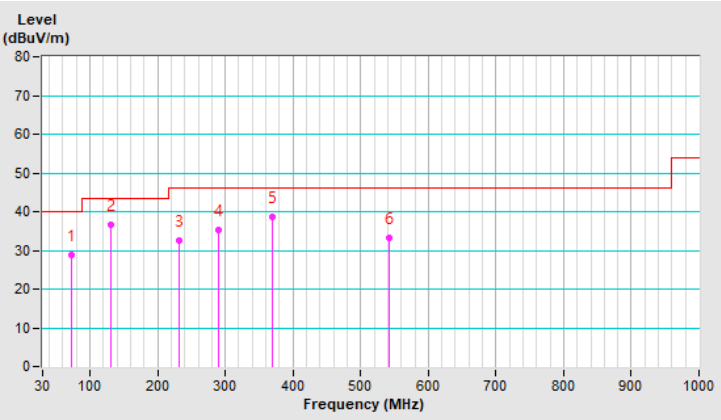
802.11ax (HE20): CH 116 + BT LE (1M): CH 0

RF Mode	802.11ax (HE20) + BT LE (1M)	**Channel**	CH 116：5580 MHz + CH 0：2402 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	73.40	28.9 QP	40.0	-11.1	1.63 H	225	40.5	-11.6
2	131.29	36.7 QP	43.5	-6.8	1.84 H	241	46.2	-9.5
3	230.98	32.6 QP	46.0	-13.4	1.45 H	289	42.5	-9.9
4	289.32	35.3 QP	46.0	-10.7	1.00 H	177	41.5	-6.2
5	368.97	38.6 QP	46.0	-7.4	1.96 H	226	42.8	-4.2
6	542.64	33.4 QP	46.0	-12.6	2.39 H	152	34.1	-0.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

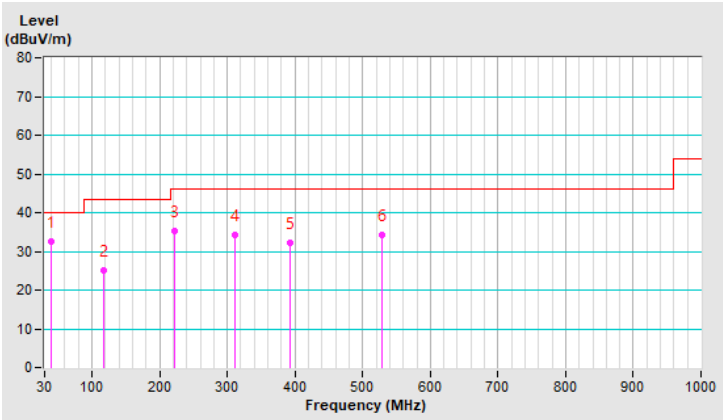


RF Mode	802.11ax (HE20) + BT LE (1M)	**Channel**	CH 116：5580 MHz + CH 0：2402 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	40.58	32.5 QP	40.0	-7.5	1.42 V	203	41.7	-9.2
2	117.24	25.2 QP	43.5	-18.3	2.36 V	288	36.2	-11.0
3	222.17	35.3 QP	46.0	-10.7	2.41 V	136	45.7	-10.4
4	310.44	34.3 QP	46.0	-11.7	1.58 V	299	39.8	-5.5
5	393.32	32.4 QP	46.0	-13.6	1.78 V	196	36.0	-3.6
6	528.17	34.3 QP	46.0	-11.7	2.36 V	36	35.1	-0.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



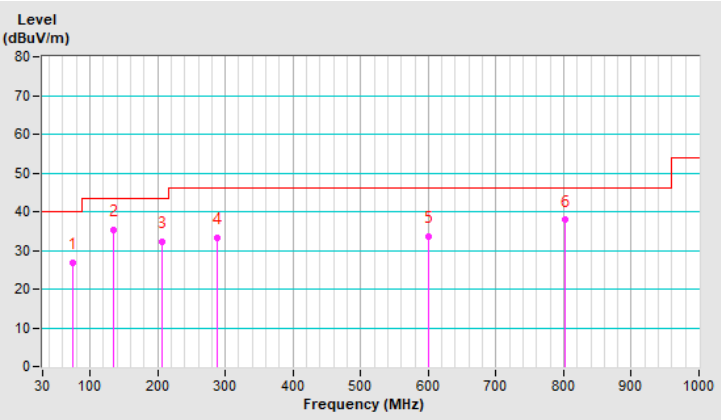
BT GFSK: CH 78 + BT LE (1M): CH 0

RF Mode	BT GFSK + BT LE (1M)	**Channel**	CH 78：2480 MHz + CH 0：2402 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	73.75	26.9 QP	40.0	-13.1	2.51 H	275	38.6	-11.7
2	135.39	35.3 QP	43.5	-8.2	1.98 H	192	44.4	-9.1
3	205.81	32.2 QP	43.5	-11.3	1.09 H	348	42.7	-10.5
4	288.31	33.2 QP	46.0	-12.8	2.69 H	211	39.4	-6.2
5	599.97	33.7 QP	46.0	-12.3	1.88 H	358	32.6	1.1
6	803.04	37.8 QP	46.0	-8.2	3.05 H	143	32.5	5.3

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

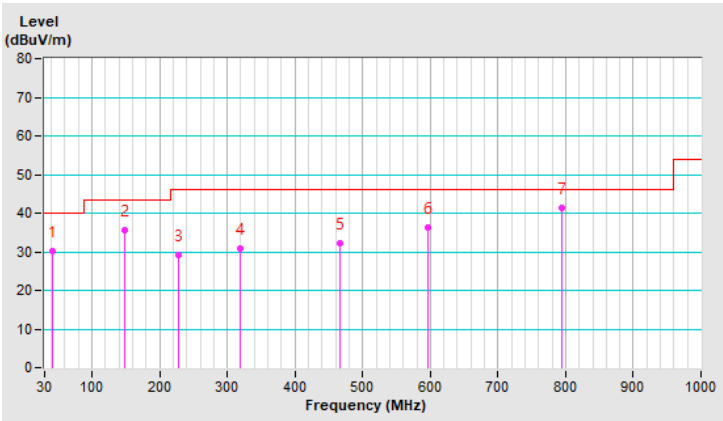


RF Mode	BT GFSK + BT LE (1M)	Channel	CH 78：2480 MHz + CH 0：2402 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	42.42	30.2 QP	40.0	-9.8	1.34 V	145	39.1	-8.9
2	148.92	35.6 QP	43.5	-7.9	1.87 V	360	43.6	-8.0
3	227.35	29.1 QP	46.0	-16.9	2.96 V	10	39.4	-10.3
4	319.50	31.0 QP	46.0	-15.0	2.03 V	15	36.2	-5.2
5	466.99	32.3 QP	46.0	-13.7	1.44 V	180	34.1	-1.8
6	595.95	36.4 QP	46.0	-9.6	2.87 V	167	35.4	1.0
7	794.46	41.4 QP	46.0	-4.6	2.33 V	205	36.5	4.9

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



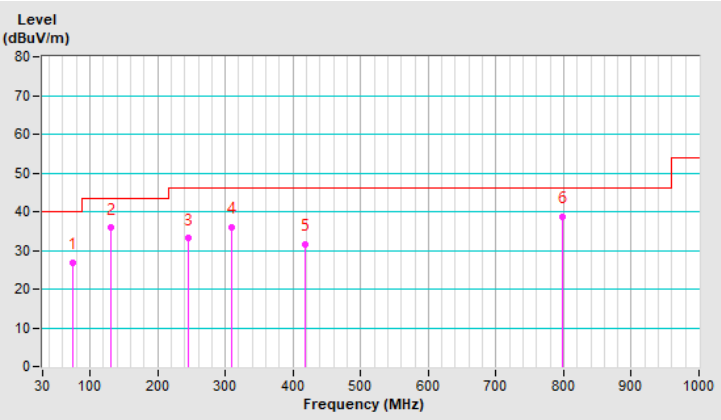
BT LE (2M): CH 39 + BT LE (1M): CH 0

RF Mode	BT LE (2M) + BT LE (1M)	**Channel**	CH 39：2480 MHz + CH 0：2402 MHz
Frequency Range	9 kHz ~ 1 GHz	**Detector Function & Bandwidth**	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	75.30	26.7 QP	40.0	-13.3	1.96 H	119	38.7	-12.0
2	130.98	35.8 QP	43.5	-7.7	2.41 H	343	45.4	-9.6
3	246.02	33.1 QP	46.0	-12.9	1.08 H	188	41.2	-8.1
4	308.44	35.9 QP	46.0	-10.1	3.21 H	205	41.4	-5.5
5	417.81	31.5 QP	46.0	-14.5	2.28 H	244	34.6	-3.1
6	798.29	38.7 QP	46.0	-7.3	1.56 H	146	33.7	5.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

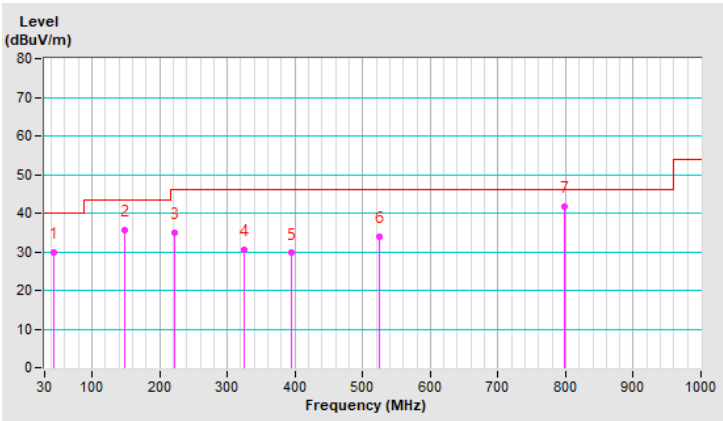


RF Mode	BT LE (2M) + BT LE (1M)	Channel	CH 39：2480 MHz + CH 0：2402 MHz
Frequency Range	9 kHz ~ 1 GHz	Detector Function & Bandwidth	(QP) RB = 120kHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	44.11	30.0 QP	40.0	-10.0	1.68 V	4	38.8	-8.8
2	148.92	35.7 QP	43.5	-7.8	2.36 V	12	43.7	-8.0
3	221.19	35.0 QP	46.0	-11.0	2.28 V	343	45.3	-10.3
4	323.91	30.5 QP	46.0	-15.5	1.32 V	360	35.5	-5.0
5	395.11	29.7 QP	46.0	-16.3	1.84 V	208	33.3	-3.6
6	524.02	33.9 QP	46.0	-12.1	1.52 V	182	34.8	-0.9
7	797.32	41.8 QP	46.0	-4.2	2.25 V	198	36.8	5.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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.

4.2.2 Test Instruments

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal LYNICS	0900510	E1-011285	2022/9/19	2023/9/18
		E1-011286	2022/9/19	2023/9/18
		E1-011484	2022/6/26	2023/6/25
Attenuator STI	STI02-2200-10	NO.1	2022/9/14	2023/9/13
DC LISN R&S	ESH3-Z6	100219	2022/8/2	2023/8/1
		844950/018	2022/8/2	2023/8/1
DC LISN Schwarzbeck	NNLK 8121	8121-808	2022/4/29	2023/4/28
Isolation Transformer Erika Fiedler	D-65396	017	2022/9/8	2023/9/7
LISN R&S	ENV216	101195	2022/8/1	2023/7/31
		101197	2022/7/5	2023/7/4
	ESH3-Z5	100220	2022/11/24	2023/11/23
LISN Schwarzbeck	NNLK 8121	8121-731	2022/5/26	2023/5/25
	NNLK8129	8129229	2022/6/8	2023/6/7
RF Coaxial Cable Commate	5D-FB	Cable-CO10-01	2022/2/9	2023/2/8
Software BVADT	Cond_V7.3.7.4	N/A	N/A	N/A
TEST RECEIVER Rohde&Schwarz	ESCI	100612	2022/11/15	2023/11/14

Notes:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Linkou Conduction 10.
3. Tested Date: 2022/12/13

4.2.3 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.

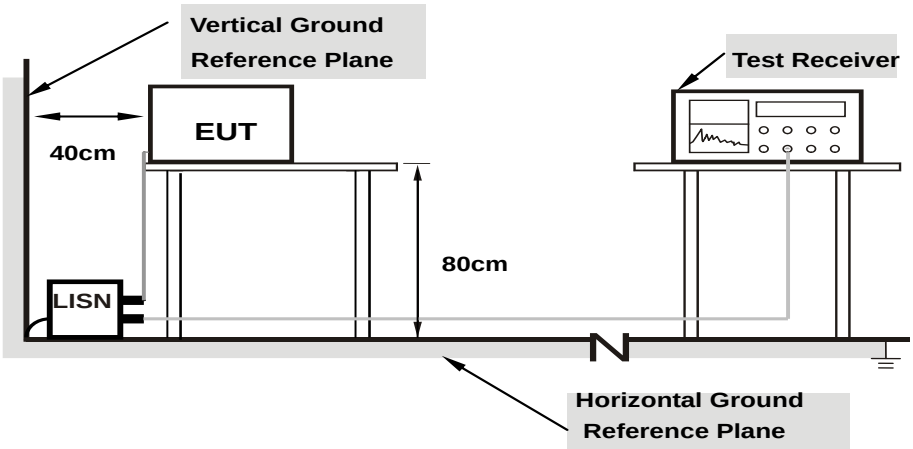
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation From Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Condition

Same as item 4.1.6.

4.2.7 Test Results

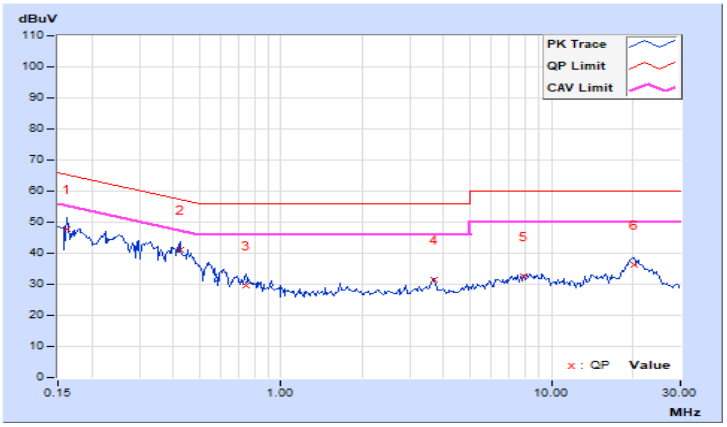
802.11g: CH 6 + BT LE (1M): CH 0

RF Mode	802.11g + BT LE (1M)	**Channel**	CH 6 : 2437 MHz + CH 0 : 2402 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.16172	19.70	28.10	18.78	47.80	38.48	65.38	55.38	-17.58	-16.90
2	0.42344	19.71	21.40	11.36	41.11	31.07	57.38	47.38	-16.27	-16.31
3	0.73984	19.73	10.02	4.18	29.75	23.91	56.00	46.00	-26.25	-22.09
4	3.66797	19.81	11.56	4.90	31.37	24.71	56.00	46.00	-24.63	-21.29
5	7.91797	19.87	12.87	0.78	32.74	20.65	60.00	50.00	-27.26	-29.35
6	20.11328	19.95	16.50	11.48	36.45	31.43	60.00	50.00	-23.55	-18.57

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

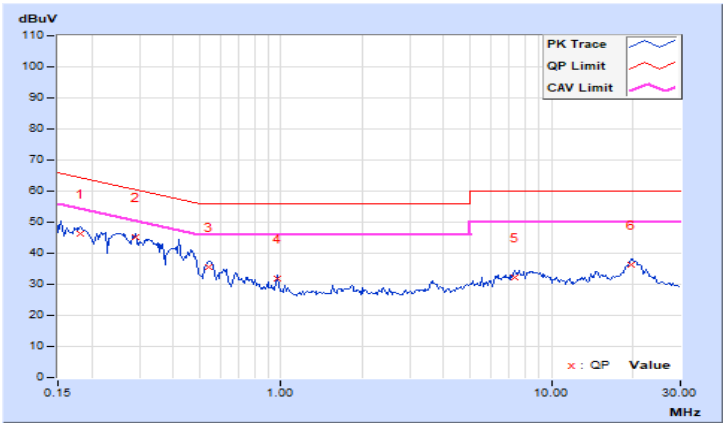


RF Mode	802.11g + BT LE (1M)	Channel	CH 6：2437 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	19.65	26.76	17.60	46.41	37.25	64.43	54.43	-18.02	-17.18
2	0.29063	19.65	25.62	11.21	45.27	30.86	60.51	50.51	-15.24	-19.65
3	0.54453	19.67	15.90	7.95	35.57	27.62	56.00	46.00	-20.43	-18.38
4	0.97031	19.69	12.21	4.34	31.90	24.03	56.00	46.00	-24.10	-21.97
5	7.28516	19.82	12.40	0.77	32.22	20.59	60.00	50.00	-27.78	-29.41
6	19.82422	19.99	16.43	11.45	36.42	31.44	60.00	50.00	-23.58	-18.56

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



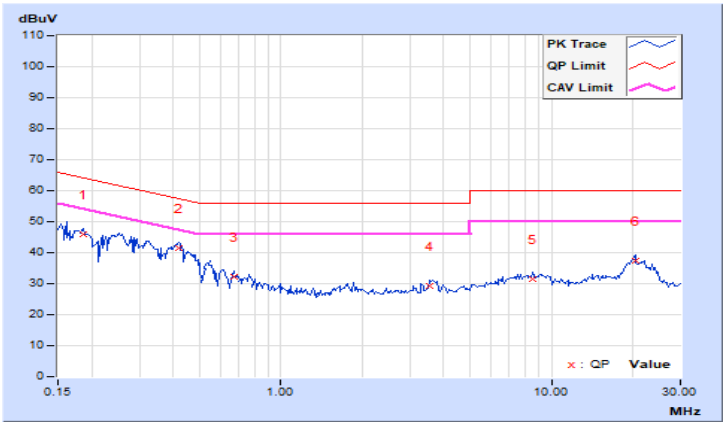
802.11ax (HE20): CH 116 + BT LE (1M): CH 0

RF Mode	802.11ax (HE20) + BT LE (1M)	**Channel**	CH 116：5580 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.18516	19.70	26.13	16.45	45.83	36.15	64.25	54.25	-18.42	-18.10
2	0.41953	19.71	21.63	12.66	41.34	32.37	57.46	47.46	-16.12	-15.09
3	0.66953	19.73	12.65	5.56	32.38	25.29	56.00	46.00	-23.62	-20.71
4	3.54688	19.81	9.54	1.85	29.35	21.66	56.00	46.00	-26.65	-24.34
5	8.55078	19.87	11.71	3.54	31.58	23.41	60.00	50.00	-28.42	-26.59
6	20.41016	19.95	17.33	11.57	37.28	31.52	60.00	50.00	-22.72	-18.48

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

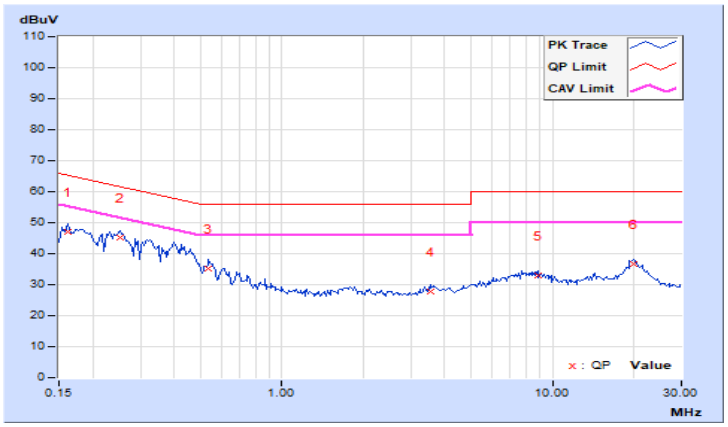


RF Mode	802.11ax (HE20) + BT LE (1M)	Channel	CH 116：5580 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	19.65	27.38	18.20	47.03	37.85	65.38	55.38	-18.35	-17.53
2	0.25156	19.65	25.64	16.39	45.29	36.04	61.71	51.71	-16.42	-15.67
3	0.53672	19.67	15.70	7.53	35.37	27.20	56.00	46.00	-20.63	-18.80
4	3.55469	19.76	8.03	0.72	27.79	20.48	56.00	46.00	-28.21	-25.52
5	8.82031	19.84	12.95	0.32	32.79	20.16	60.00	50.00	-27.21	-29.84
6	20.03125	19.99	16.60	11.81	36.59	31.80	60.00	50.00	-23.41	-18.20

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



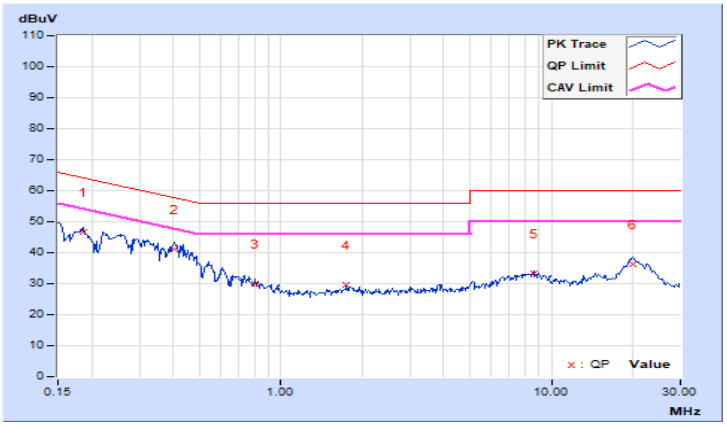
BT GFSK: CH 78 + BT LE (1M): CH 0

RF Mode	BT GFSK + BT LE (1M)	**Channel**	CH 78：2480 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.18516	19.70	27.11	17.33	46.81	37.03	64.25	54.25	-17.44	-17.22
2	0.40391	19.71	21.54	12.33	41.25	32.04	57.77	47.77	-16.52	-15.73
3	0.80234	19.74	10.29	1.00	30.03	20.74	56.00	46.00	-25.97	-25.26
4	1.74219	19.77	9.71	2.31	29.48	22.08	56.00	46.00	-26.52	-23.92
5	8.58984	19.87	13.53	0.91	33.40	20.78	60.00	50.00	-26.60	-29.22
6	20.09766	19.95	16.48	11.56	36.43	31.51	60.00	50.00	-23.57	-18.49

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

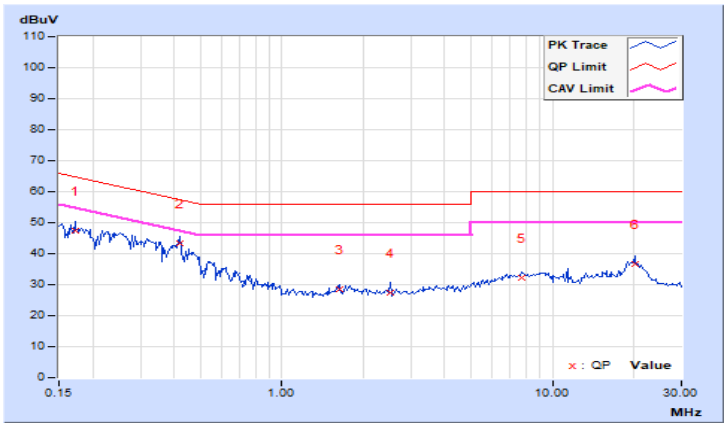


RF Mode	BT GFSK + BT LE (1M)	Channel	CH 78：2480 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	19.65	27.76	17.38	47.41	37.03	64.79	54.79	-17.38	-17.76
2	**0.41953**	**19.66**	**23.85**	**15.78**	**43.51**	**35.44**	**57.46**	**47.46**	**-13.95**	**-12.02**
3	1.62500	19.71	8.68	2.81	28.39	22.52	56.00	46.00	-27.61	-23.48
4	2.50391	19.74	7.62	1.95	27.36	21.69	56.00	46.00	-28.64	-24.31
5	7.66797	19.83	12.54	0.76	32.37	20.59	60.00	50.00	-27.63	-29.41
6	20.12109	19.99	16.52	11.50	36.51	31.49	60.00	50.00	-23.49	-18.51

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



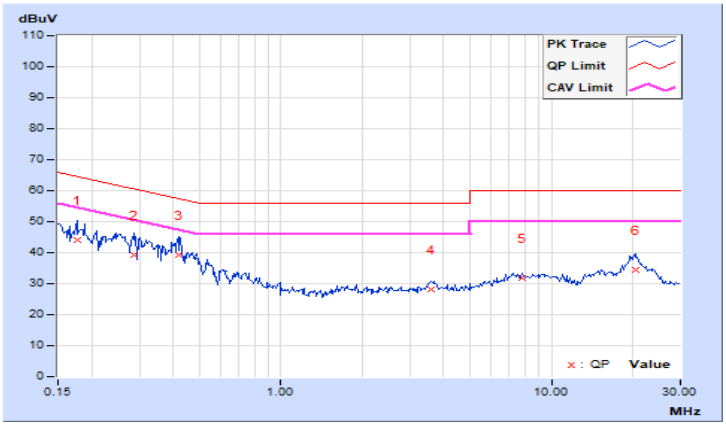
BT LE (2M): CH 39 + BT LE (1M): CH 0

RF Mode	BT LE (2M) + BT LE (1M)	**Channel**	CH 39：2480 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Line (L)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.17734	19.70	24.27	15.49	43.97	35.19	64.61	54.61	-20.64	-19.42
2	0.28672	19.70	19.60	6.08	39.30	25.78	60.62	50.62	-21.32	-24.84
3	0.41953	19.71	19.55	11.92	39.26	31.63	57.46	47.46	-18.20	-15.83
4	3.58594	19.81	8.47	0.67	28.28	20.48	56.00	46.00	-27.72	-25.52
5	7.80859	19.86	11.96	0.11	31.82	19.97	60.00	50.00	-28.18	-30.03
6	20.41797	19.95	14.44	9.06	34.39	29.01	60.00	50.00	-25.61	-20.99

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

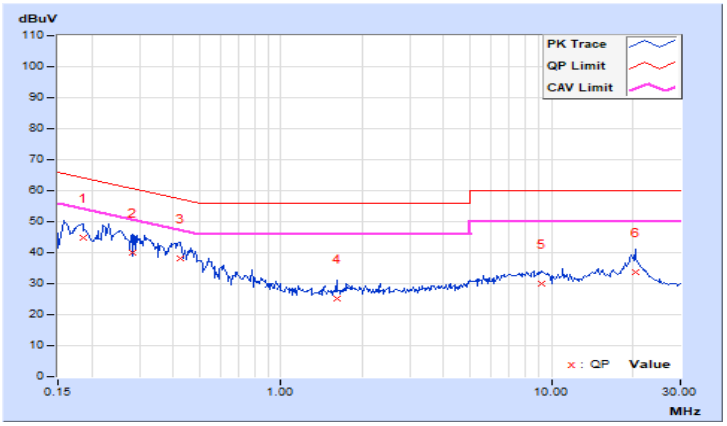


RF Mode	BT LE (2M) + BT LE (1M)	Channel	CH 39：2480 MHz + CH 0：2402 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	19.65	25.18	15.49	44.83	35.14	64.25	54.25	-19.42	-19.11
2	0.28281	19.65	20.20	7.02	39.85	26.67	60.73	50.73	-20.88	-24.06
3	0.42734	19.66	18.47	10.57	38.13	30.23	57.30	47.30	-19.17	-17.07
4	1.62109	19.71	5.48	0.54	25.19	20.25	56.00	46.00	-30.81	-25.75
5	9.21094	19.85	10.03	1.92	29.88	21.77	60.00	50.00	-30.12	-28.23
6	20.37500	19.99	13.85	8.47	33.84	28.46	60.00	50.00	-26.16	-21.54

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



5 Pictures of Test Arrangements

Please refer to the attached file RFBHKO-WTW-P22010776A_TSup Photo

6 Construction Photos of EUT.

Please refer to the attached file: CDFY-WTW-P22090790 (EUT Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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