Test Report

ETSI EN 300 328 V2.2.2(2019-07)

For

Product: Wireless Speaker

Model: MO6813

Report No.: RKEYS250521048

Issued for

Mid Ocean Brands B.V.

Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.

Issued by

Guangdong KEYS Testing Technology Co.,Ltd.

Address: Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China

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Contents

1 Test Result Certification

Applicant's name	:	Mid Ocean Brands B.V.
Address	:	Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.
Manufacture's name	:	117486
Address	:	N/A
Product name	:	Wireless Speaker
Model name	:	MO6813
Remark:	:	/

The above equipment has been tested by Guangdong KEYS Testing Technology Co., Ltd. and found compliance with the requirements in the technical standards mentioned above. The test results presented in this report only relate to the product/system tested. The other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Sample Received Date:	May 21, 2025
Date (s) of performance of tests:	May 21, 2025 to May 26, 2025
Date of Issue:	May 26, 2025
Test Result:	Pass

Prepared by: Linda Chen
Linda Chen / Engineer

Approved by: Jason Zhan / Manager
Jason Zhan

2 Test Summary

Clause	Test Item	Verdict	Remark
4.3.2.2	RF output power	PASS	
4.3.2.3	Power Spectral Density	PASS	
4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	N/A	NOTE 1
4.3.2.5	Medium Utilisation (MU) factor	N/A	NOTE 1
4.3.2.6	Adaptivity	N/A	NOTE 1
4.3.2.7	Occupied Channel Bandwidth	PASS	
4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	PASS	
4.3.2.9	Transmitter unwanted emissions in the spurious domain	PASS	
4.3.2.10	Receiver spurious emissions	PASS	
4.3.2.11	Receiver Blocking	PASS	
4.3.2.12	Geo-location capability	N/A	NOTE 2

NOTE
1.The requirement does not apply for equipment with a maximum declared RF Output power of less than 10 dBm e.i.r.p
2.The supplier declared that the equipment is unable to perform this funetion.

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Wireless Speaker
Model Name	:	MO6813
List Model	:	N/A
Specification	:	Bluetooth
Operation Frequency	:	2402-2480MHz
Number of Channel	:	40
Type of Modulation	:	GFSK
Antenna installation	:	PCB Antenna
Antenna Gain	:	1dBi
Power supply	:	Type-C Input : DC 5V, 1A Battery :DC 3.7V, 300mAh
Note: N/A		

3.2 Channel List for Bluetooth

1CH	2402 MHz	**21CH**	2442 MHz
2CH	2404 MHz	**22CH**	2444 MHz
3CH	2406 MHz	**23CH**	2446 MHz
4CH	2408 MHz	**24CH**	2448 MHz
5CH	2410 MHz	**25CH**	2450 MHz
6CH	2412 MHz	**26CH**	2452 MHz
7CH	2414 MHz	**27CH**	2454 MHz
8CH	2416 MHz	**28CH**	2456 MHz
9CH	2418 MHz	**29CH**	2458 MHz
10CH	2420 MHz	**30CH**	2460 MHz
11CH	2422 MHz	**31CH**	2462 MHz
12CH	2424 MHz	**32CH**	2464 MHz
13CH	2426 MHz	**33CH**	2466 MHz
14CH	2428 MHz	**34CH**	2468 MHz
15CH	2430 MHz	**35CH**	2470 MHz
16CH	2432 MHz	**36CH**	2472 MHz
17CH	2434 MHz	**37CH**	2474 MHz
18CH	2436 MHz	**38CH**	2476 MHz
19CH	2438 MHz	**39CH**	2478 MHz
20CH	2440 MHz	**40CH**	2480 MHz

3.3 Test environment and test mode

Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: 0℃ ~ +40℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: DC5V
Test mode:	
Transmitting mode:	Keep the EUT in continuously transmitting mode with modulation.
Receiving mode:	Keep the EUT in receiving mode.
Remark:/	

3.4 Test Configuration of EUT

Clause No.	Test Conditions			Test Channel			Mode	Test mode		
	NVNT	NVLT	NVHT	Low	Middle	High	GFSK	Tx	Rx	Normal
4.3.2.2	√	√	√	√	√	√	√	√		
4.3.2.3	√			√	√	√	√	√		
4.3.2.4										
4.3.2.5										
4.3.2.6										
4.3.2.7	√			√		√	√	√		
4.3.2.8	√			√		√	√	√		
4.3.2.9	√			√		√	√	√		
4.3.2.10	√			√		√	√		√	
4.3.2.11	√			√		√	√		√	

Note:
"√" means that this configuration is chosen for test.
"NVNT" means Normal Voltage Normal Temperature, "NVLT" means Normal Voltage Low Temperature, "NVHT" means Normal Voltage High Temperature.

3.5 Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5dB
Power Spectral Density, conducted	±3dB
Unwanted Emissions, conducted	±3dB
All emissions, radiated	±6dB
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conduction disturbance(150kHz~30MHz)	±3.26dB
Radiated Emission(30MHz~1GHz)	±4.76dB
Radiated Emission(1GHz~25GHz)	±5.39dB

4 Equipment During Test

Name of Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal.Interval
Spectrum Analyzer	Keysight	N9020A	MY57440518	Mar. 03, 2025	1 Year
Vector Signal Generator	Agilent	N 5182A	MY50144442	Mar. 03, 2025	1 Year
Wideband Radio Communication tester	R&S	CMW500	132430	Mar. 03, 2025	1 Year
Power Switch	WCS Technology	SMU-3002	SMU3002250301A	Apr.16,2025	1 Year
DC Power source	Agilent	E3632A	MY40023743	Mar. 03, 2025	1 Year
Temperature Chamber	Guangke	GK-TH-1000	/	Oct.12,2024	1 Year
Logarithmic periodic antenna	Schwarzbeck	VULB9168	01145	Mar. 06, 2025	3 Year
Horn antenna	Schwarzbeck	BBHA9120D	03083	Mar. 06, 2025	3 Year

5 Test Result

5.1 RF Output power

5.1.1 Definition

The RF output power is defined as the mean equivalent isotropically radiated power (e.i.r.p.) of the equipment during a transmission burst.

5.1.2 Limit

The RF output power for non-FHSS equipment shall be equal to or less than 20 dBm.For non-adaptive non-FHSS equipment, where the manufacturer has declared an RF output power of less than 20 dBm e.i.r.p., the RF output power shall be equal to or less than that declared value. This limit shall apply for any combination of power level and intended antenna assembly.

5.1.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.1.4 Test Procedure

Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s.

1. Use the following settings:
   - Sample speed 1 MS/s.
   - The samples represent the RMS power of the signal.
   - Measurement duration: For non-adaptive equipment: equal to the observation period defined in clauses 4.3.1.3.2 or 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.

   NOTE 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.
2. For conducted measurements on devices with one transmit chain:
   - Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.

   For conducted measurements on devices with multiple transmit chains:
   - Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
   - Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
   - For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.
3. Find the start and stop times of each burst in the stored measurement samples.
   The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.

In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

4. Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these burst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

5. The highest of all P_{burst} values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.
6. Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

   In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.

   If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G +Y) shall be used.

   The RF Output Power (P_{out}) shall be calculated using the formula below:

$$P_{out} = A + G + Y$$

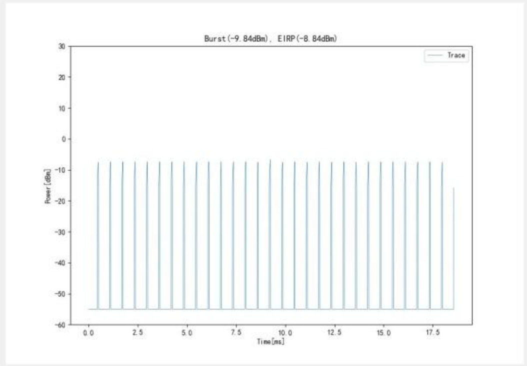
   This value, which shall comply with the limit given in clauses 4.3.1.1.2 or 4.3.2.1.2, shall be recorded in the test report.

5.1.5 Test Result

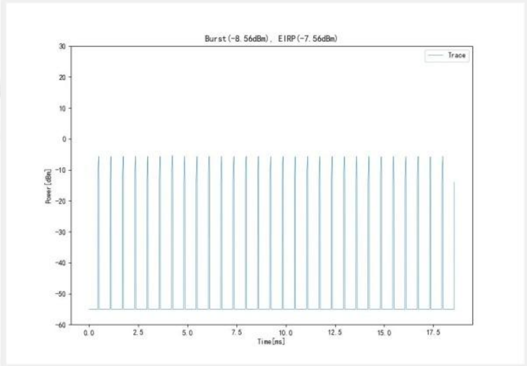
Condition	Mode	Channel	Max Burst RMS Power (dBm)	Max EIRP (dBm)	Limit (dBm)	Number of Burst	Result
NT/NV	BLE 1M	0	-9.84	-8.84	≤20	30	PASS
		19	-8.56	-7.56		30	PASS
		39	-7.89	-6.89		30	PASS

All conditions have been tested only the worst mode NTNV was recorded in this report

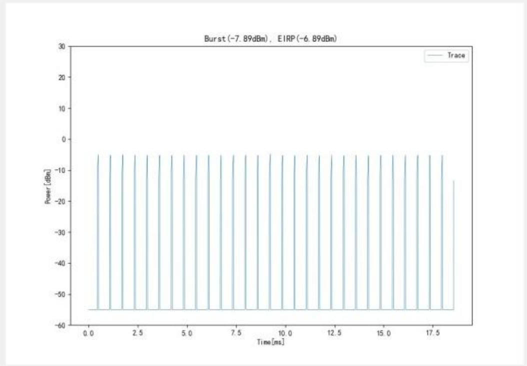
Test Graphs



NT/NV_BLE 1M_Channel 0



NT/NV_BLE 1M_Channel 19



NT/NV_BLE 1M_Channel 39

5.2 Power Spectral Density

5.2.1 Definition

The Power Spectral Density (PSD) is the mean equivalent isotropically radiated power (e.i.r.p.) spectral density in a 1 MHz bandwidth during a transmission burst

5.2.2 Limit

The maximum Power Spectral Density for non-FHSS equipment is 10 dBm per MHz.

5.2.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.2.4 Test Procedure

The transmitter shall be connected to a spectrum analyser and the Power Spectral Density as defined in clause 4.3.2.3 shall be measured and recorded.

The test procedure shall be as follows:

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8350, for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented.
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: For non-continuous transmissions: 2 × Channel Occupancy Time × number of sweep

  For non-adaptive equipment use the maximum TX-sequence time in the formula above

  instead of the Channel Occupancy Time

  For continuous transmissions: 10 s; the sweep time may be increased further until a value where the sweep time has no further impact anymore on the RMS value of the signal

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

Step 2:

For conducted measurements on smart antenna systems using either operating mode 2 or 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for amplitude (power) for all the samples in the file using the formula below.

$$P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$$

with k being the total number of samples and n the actual sample number

Step 4:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used:

$$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$

$$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$

with n being the actual sample number

Step 5:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to #101).

Step 7:

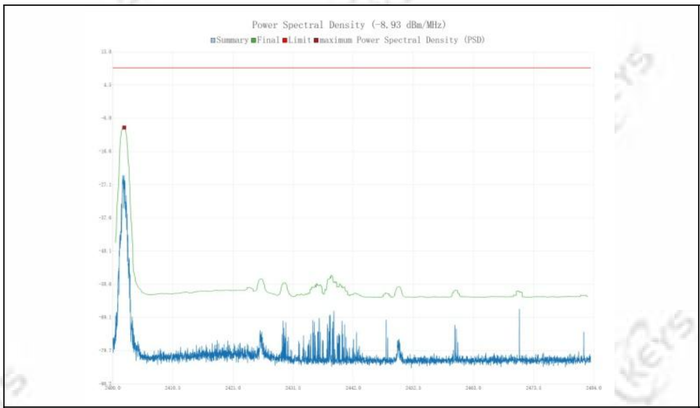
Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments.

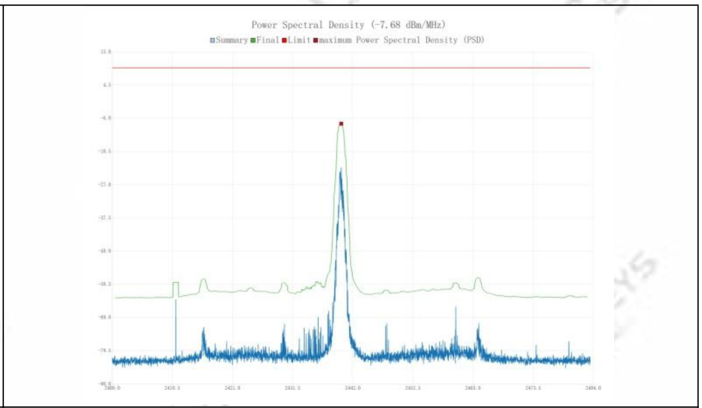
From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.2.3, shall be recorded in the test report.

5.2.5 Test Result

Mode	Channel	PSD Ant. 0 (dBm/MHz)	Limit (dBm/MHz)	Result
BLE 1M	0	-8.93	10	PASS
	19	-7.68		PASS
	39	-7.07		PASS

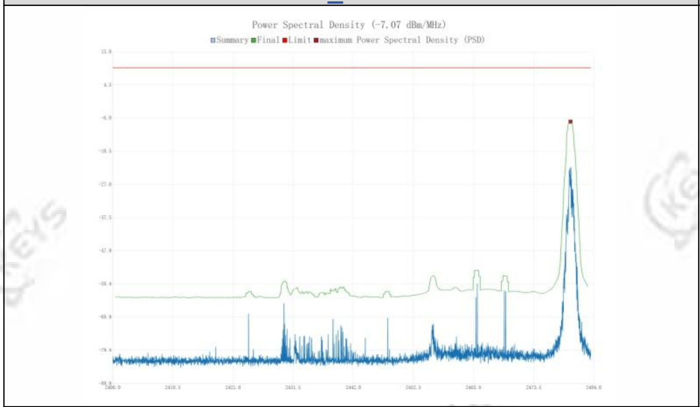
Test Graphs





BLE 1M_Channel 0

BLE 1M_Channel 19



5.3 Adaptivity (Adaptive Frequency Hopping)

5.3.1 Definition

Adaptive non-FHSS using LBT is a mechanism by which non-FHSS adaptive equipment avoids transmissions in a channel in the presence of an interfering signal in that channel. This mechanism shall operate as intended in the presence of an unwanted signal on frequencies other than those of the operating band.

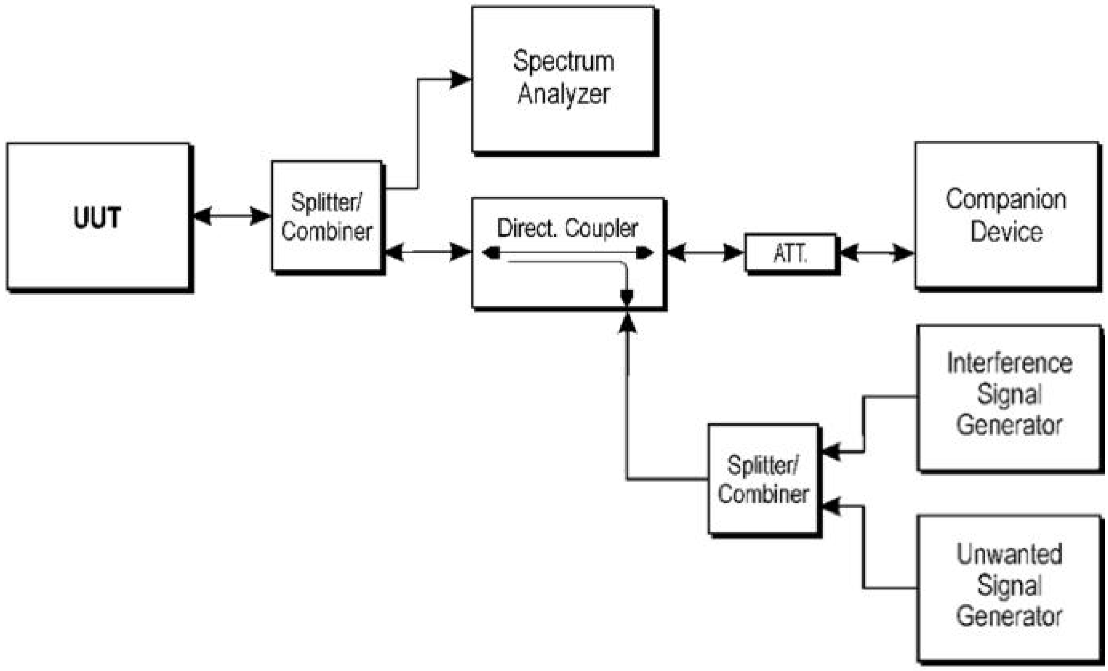
5.3.2 Limit

Refer to section 4.3.2.6.2.3 of EN 300 328 V2.2.2

5.3.3 EUT Operation Condition

The EUT was programmed to be in hopping on mode.

5.3.4 Test Procedure



5.3.5 Test Result

The EIRP is less than 10dBm, so the test is not applicable

5.4 Occupied Channel Bandwidth

5.4.1 Definition

The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal.

5.4.2 Limit

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in clause 1.

In addition, for non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 20 MHz.

5.4.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.4.4 Test Procedure

1. Connect the UUT to the spectrum analyzer and use the following settings:

• Centre Frequency: The centre frequency of the channel under test

• Resolution BW: ~ 1 % of the span without going below 1 %

• Video BW: 3 × RBW

• Frequency Span: 2 × Nominal Channel Bandwidth

• Detector Mode: RMS

• Trace Mode: Max Hold

• Sweep time: 1s

2. Wait until the trace is completed. Find the peak value of the trace and place the analyzer marker on this peak.

3. Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

Make sure that the power envelope is sufficiently above the noise floor of the analyzer to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

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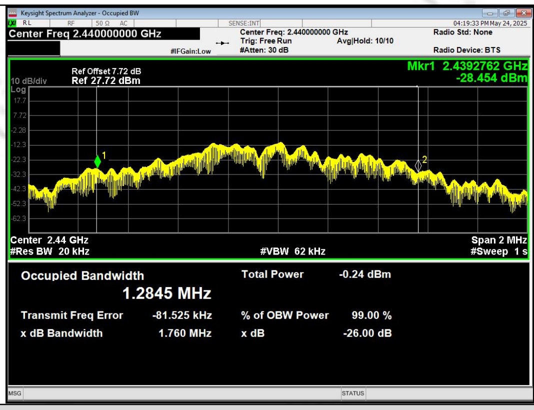
5.4.5 Test Result

Worst-case:

Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	FL (MHz)	FH (MHz)	Limit	Result
BLE 1M	0	2402	1.1794	2401.3488	2402.528	2400 MHz to 2483.5 MHz	PASS
	19	2440	1.2845	2439.2762	2440.5606		PASS
	39	2480	1.3459	2479.2504	2480.5962		PASS

Test Graphs

BLE 1M_Channel 0



BLE 1M_Channel 19

5.5 Transmitter unwanted emissions in the out-of-band domain

5.5.1 Definition

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious.

5.5.2 Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1.

NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.7.

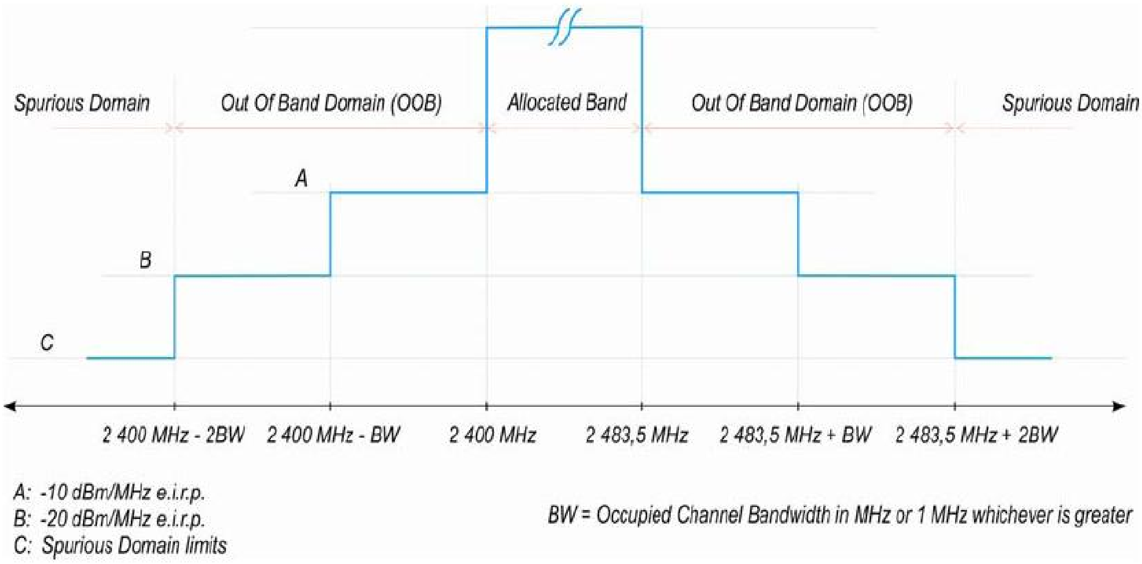


Figure 1: Transmit mask

5.5.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.5.4 Test Procedure

1. Connect the UUT to the spectrum analyzer and use the following settings:
   - Mode: Time Domain Power
   - Centre Frequency: 2 484 MHz
   - Span: 0 Hz
   - Resolution BW: 1 MHz
   - Filter mode: Channel filter
   - Video BW: 3 MHz
   - Detector Mode: RMS
   - Trace Mode: Max Hold
   - Sweep Mode: Single Sweep
   - Sweep Points: Sweep time [µs] / (1 µs) with a maximum of 30 000
   - Trigger Mode: Video
   - Sweep Time > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

2. (segment 2 483,5 MHz to 2 483,5 MHz + BW)

   1) The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
   2) For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
   3) Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
   4) Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
   5) Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

3. (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW):

   Change the centre frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1MHz segment within range 2 483,5MHz + BW to 2 483,5MHz + 2BW. Increase the centre frequency in 1MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1MHz segment shall be set to 2 483,5MHz + 2 BW - 0,5MHz(which means this may partly overlap with the previous 1 MHz segment).

4. (segment 2 400 MHz - BW to 2 400 MHz):

Change the centre frequency of the analyzer to 2 399,5MHz and perform the measurement for the first 1MHz segment within range 2 400MHz - BW to 2 400MHz Reduce the centre frequency in 1MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1MHz segment shall be set to 2400MHz - 2BW + 0,5MHz(which means this may partly overlap with the previous 1 MHz segment).

5. (segment 2 400 MHz - 2BW to 2 400 MHz - BW):

1) Change the centre frequency of the analyzer to 2 399,5MHz - BW and perform the measurement for the first 1MHz segment within range 2 400MHz - 2BW to 2 400MHz - BW. Reduce the centre frequency in 1MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2400MHz - 2BW + 0,5MHz(which means this may partly overlap with the previous 1 MHz segment).

6.

In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
- Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

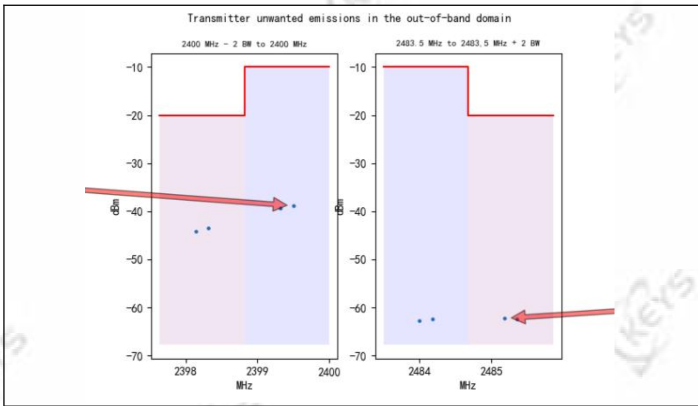
NOTE: Ach refers to the number of active transmit chains.

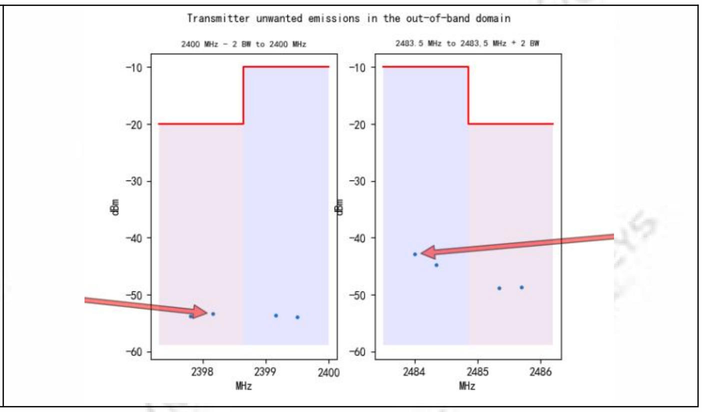
5.5.5 Test Result

Mode	Channel	Test Freq. (MHz)	OOB Emission (dBm)	Segments	Limit (dBm)	Margin (dB)	Result
BLE 1M	0	2399.5	-38.864	2 400 MHz - BW to 2 400 MHz	-10	-28.86	PASS
		2398.3206	-43.523	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-23.52	PASS
		2484.1794	-62.393	2 483,5 MHz to 2 483,5 MHz + BW	-10	-52.39	PASS

		2485.1794	-62.286	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-42.29	PASS
	39	2399.1541	-53.564	2 400 MHz - BW to 2 400 MHz	-10	-43.56	PASS
		2398.1541	-53.348	2 400 MHz - 2 BW to 2 400 MHz - BW	-20	-33.35	PASS
		2484	-42.863	2 483,5 MHz to 2 483,5 MHz + BW	-10	-32.86	PASS
		2485.6918	-48.596	2 483,5 MHz + BW to 2 483,5 MHz + 2 BW	-20	-28.6	PASS

Test Graphs





5.6 Transmitter unwanted emissions in the spurious domain

5.6.1 Definition

Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain as indicated in figure 3 when the equipment is in Transmit mode.

5.6.2 Limit

Table 12: Transmitter limits for spurious emissions

Frequency range	Maximum power,e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87.5 MHz	-36 dBm	100 kHz
87.5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

5.6.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.6.4 Test Procedure

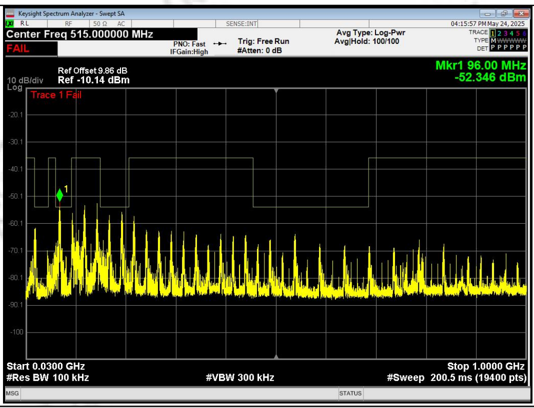
The test site as described in annex B and applicable measurement procedures as described in annex C shall be used.

The test procedure is further as described under clause 5.4.9.2.1.

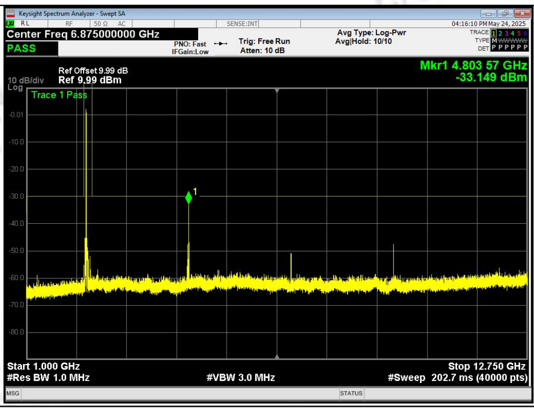
5.6.5 Test Result

Mode	Ch.	Start Frequency (MHz)	Stop Frequency (MHz)	Mark Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
BLE 1M	0	30	47	46.60	-63.563	-36	-27.563	PASS
		47	74	48.45	-61.664	-54	-7.664	PASS
		74	87.5	85.65	-70.580	-36	-34.580	PASS
		87.5	118	96.00	-54.061	-54	-0.061	PASS
		118	174	168.06	-52.628	-36	-16.628	PASS
		174	230	216.06	-60.893	-54	-6.893	PASS
		230	470	240.01	-57.394	-36	-21.394	PASS
		470	694	552.03	-63.972	-54	-9.972	PASS
		694	1000	792.04	-65.996	-36	-29.996	PASS
		1000	12750	4803.6	-36.378	-30	-6.378	PASS
	19	30	47	46.60	-63.733	-36	-27.733	PASS
		47	74	47.55	-61.236	-54	-7.236	PASS
		74	87.5	85.65	-70.586	-36	-34.586	PASS
		87.5	118	96.00	-54.254	-54	-0.254	PASS
		118	174	168.01	-51.852	-36	-15.852	PASS
		174	230	215.96	-60.294	-54	-6.294	PASS
		230	470	240.01	-57.799	-36	-21.799	PASS
		470	694	552.03	-64.161	-54	-10.161	PASS
		694	1000	743.99	-66.543	-36	-30.543	PASS
		1000	12750	4879.7	-35.570	-30	-5.570	PASS
	39	30	47	46.55	-63.772	-36	-27.772	PASS
		47	74	47.55	-61.102	-54	-7.102	PASS
		74	87.5	85.65	-70.659	-36	-34.659	PASS
		87.5	118	95.95	-55.655	-54	-1.655	PASS
		118	174	168.01	-51.958	-36	-15.958	PASS
		174	230	192.01	-60.398	-54	-6.398	PASS
		230	470	240.01	-58.505	-36	-22.505	PASS
		470	694	551.53	-64.043	-54	-10.043	PASS
		694	1000	840.04	-67.088	-36	-31.088	PASS
		1000	12750	4960.1	-33.294	-30	-3.294	PASS

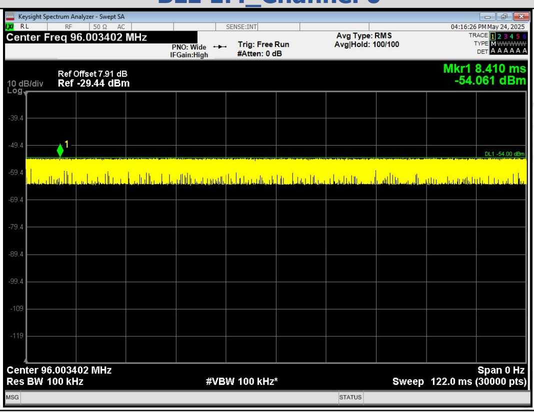
Test Graphs



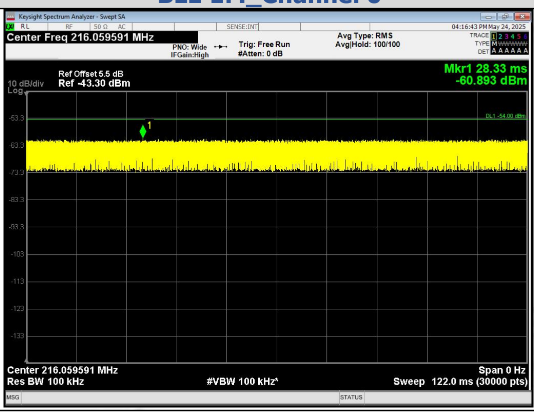
30MHz - 1000MHz
BLE 1M_Channel 0



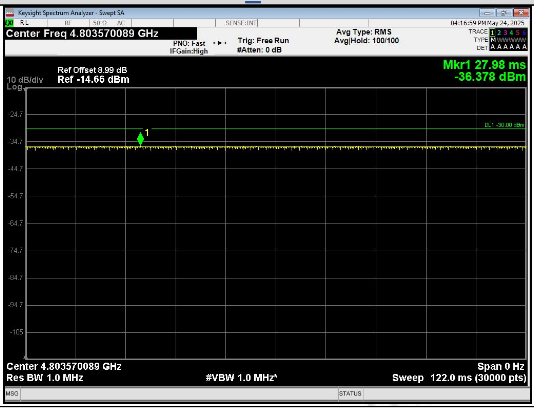
1GHz - 12.75GHz
BLE 1M_Channel 0



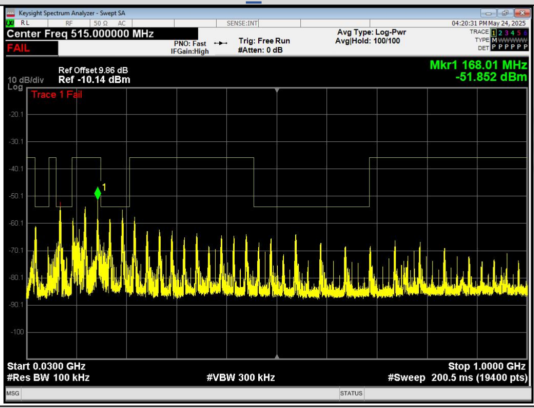
Unwant Emission Frequency: 96.0MHz
BLE 1M_Channel 0



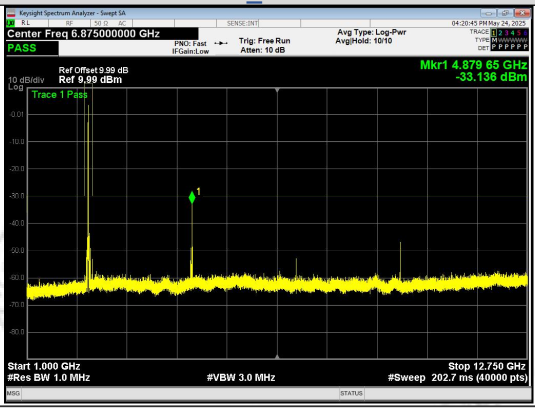
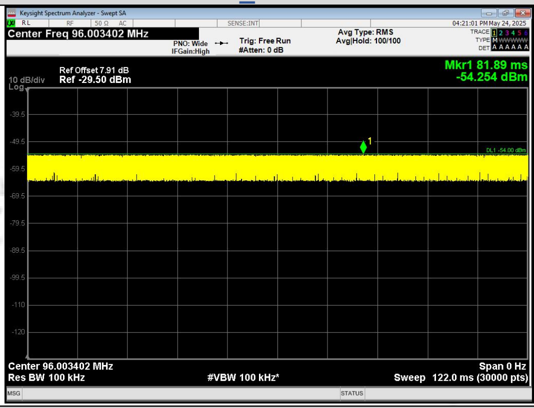
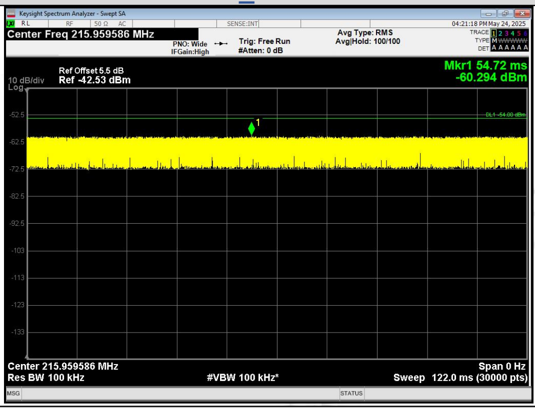
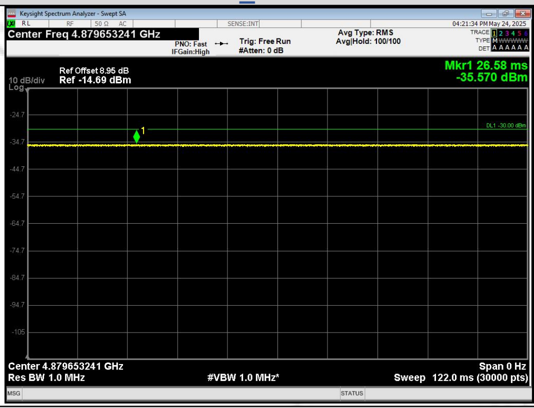
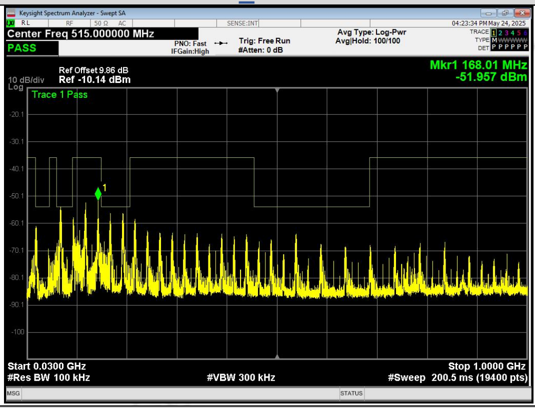
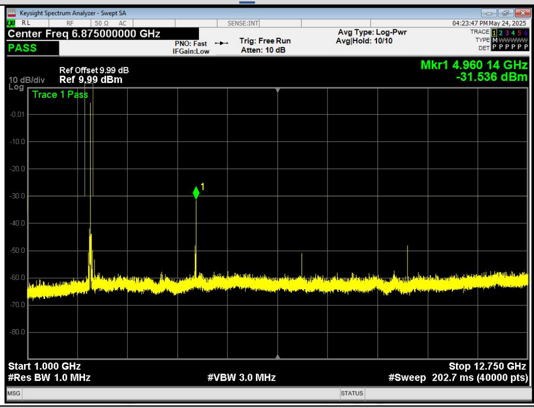
Unwant Emission Frequency: 216.06MHz
BLE 1M_Channel 0

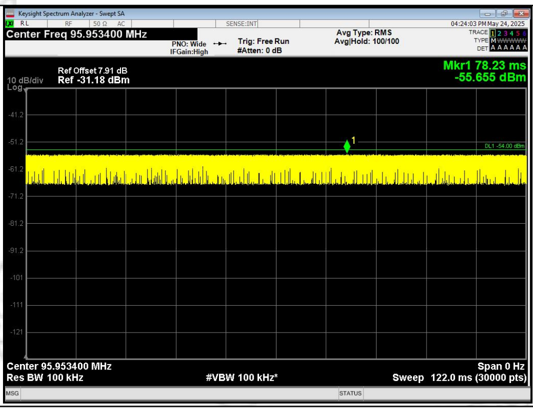


Unwant Emission Frequency: 4803.57MHz

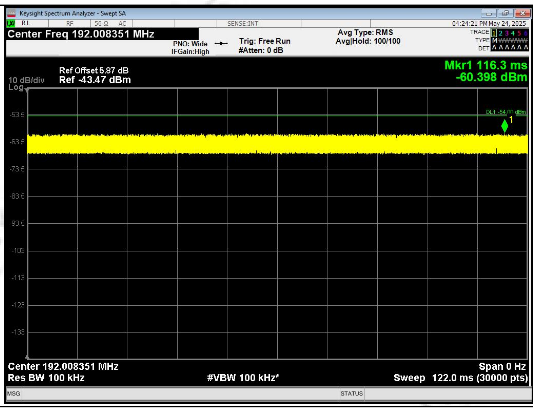


30MHz - 1000MHz

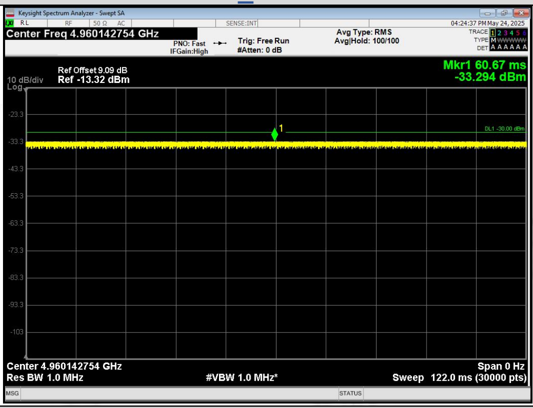
BLE 1M_Channel 0	BLE 1M_Channel 19
	
1GHz - 12.75GHz BLE 1M_Channel 19	Unwant Emission Frequency: 96.0MHz BLE 1M_Channel 19
	
Unwant Emission Frequency: 215.96MHz BLE 1M_Channel 19	Unwant Emission Frequency: 4879.65MHz BLE 1M_Channel 19
	
30MHz - 1000MHz BLE 1M_Channel 39	1GHz - 12.75GHz BLE 1M_Channel 39



Unwant Emission Frequency: 95.95MHz
BLE 1M_Channel 39



Unwant Emission Frequency: 192.01MHz
BLE 1M_Channel 39



Unwant Emission Frequency: 4960.14MHz
BLE 1M_Channel 39

Note: All Frequency were tested, the data of the worst mode are described

5.7 Receiver spurious emissions

5.7.1 Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

5.7.2 Limit

Table 13: Spurious emission limits for receivers

Frequency range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

5.7.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.7.4 Test Procedure

The test site as described in annex B and applicable measurement procedures as described in annex C shall be used.

The test procedure is further as described under clause 5.3.10.2.1.

5.7.5 Test Result

Frequency (MHz)	Antenna polarization	Result (dBm)	Limit (dBm)	Margin (dB)	Verdict
159.67	H	-61.37	-57	-4.37	Pass
255.36	H	-62.38	-57	-5.38	Pass
553.14	H	-63.18	-57	-6.18	Pass
1250.37	H	-62.38	-47	-15.38	Pass
2513.39	H	-61.46	-47	-14.46	Pass
3461.27	H	-57.68	-47	-10.68	Pass
300.15	V	-63.57	-57	-6.57	Pass
490.37	V	-63.81	-57	-6.81	Pass
731.24	V	-62.76	-57	-5.76	Pass
1243.57	V	-61.39	-47	-14.39	Pass
2781.39	V	-63.28	-47	-16.28	Pass
3764.51	V	-64.51	-47	-17.51	Pass

Note: All Frequency were tested, the data of the worst mode are described

5.8 Receiver Blocking

5.8.1 Definition

Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) at frequencies other than those of the operating band and spurious responses.

5.8.2 Limit

For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

■ General

.While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16..

●Receiver Category 1

Table 14 contains the Receiver Blocking parameters for Receiver Category 1 equipment.

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

●Receiver Category 2

Table 15 contains the Receiver Blocking parameters for Receiver Category 2 equipment.

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Table 15: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

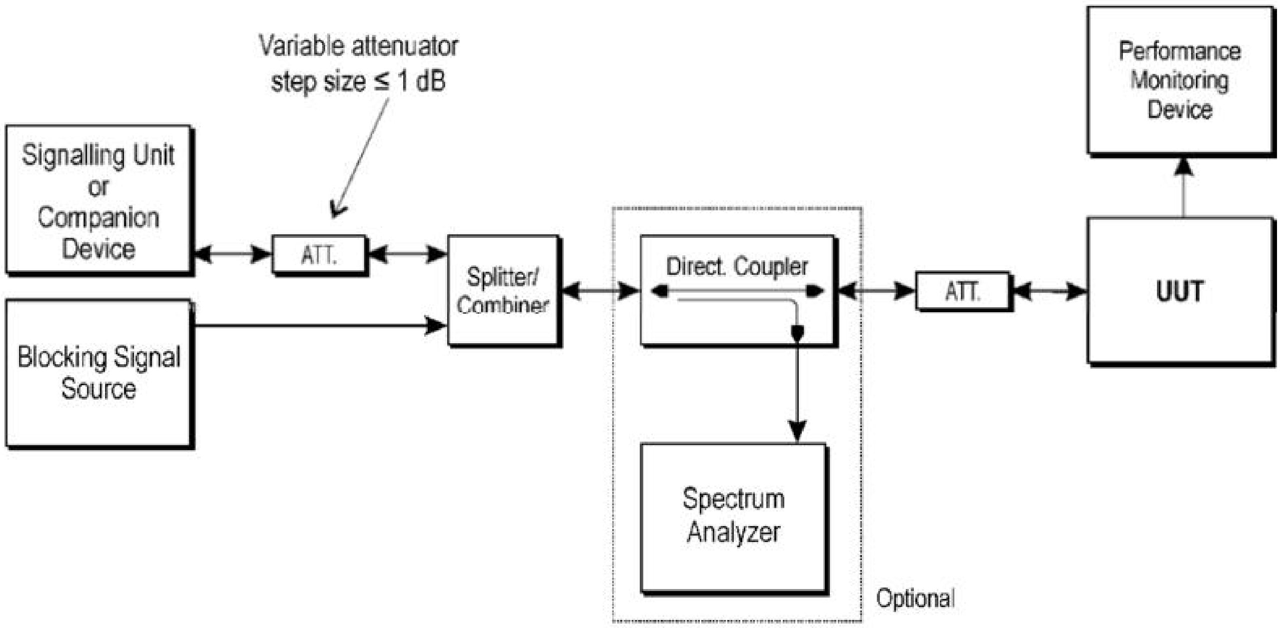
●Receiver Category 3

Table 16 contains the Receiver Blocking parameters for Receiver Category 3 equipment.

Table 16: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

5.8.3 Test Configuration



5.8.4 Test Procedure

- Conducted measurement

Step 1:

• For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.

• Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.

• When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin. This signal level (Pmin) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz.

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• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

• It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

• Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

• For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 8:

• It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

■ Radiated measurements

When performing radiated measurements on equipment with dedicated antennas, measurements shall be repeated for each alternative dedicated antenna.

The power levels specified in table 6, table 7, table 8, table 14, table 15 and table 16 can be converted to a corresponding power flux density (PFD) value using the formula below

$$PFD = P + 11 - 20 \times \log_{10}(300 / F)$$

'P' is the power level in dBm

'F' is the frequency in MHz

A test site as described in annex B and applicable measurement procedures as described in annex C shall be used.

The test procedure is further as described under clause 5.4.11.2.1.

The level of the blocking signal at the UUT referred to in step 4 is assumed to be the level in front of the UUT antenna(s). The UUT shall be positioned with its main beam pointing towards the antenna radiating the blocking signal. The position recorded in clause 5.4.2.2.2 can be used.

5.8.5 Test Results

■ Receiver category

☐	Receiver category 1	Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p.
☐	Receiver category 2	Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p.
☒	Receiver category 3	Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or equipment (adaptive or non-adaptive) with a maximum RF output power of 0 dBm e.i.r.p.

Mode	Frequency (MHz)	Blocking Signal Frequency(MHz)	Wanted Signal(dBm)	Blocking Signal Level(dBm)	PER(%)	PER Limit %
GFSK	Low	2380	-68.8	-33 (Note1)	1.3	≤10%
		2300	-68.8	-33 (Note1)	1.2	≤10%
	High	2504	-68.8	-33 (Note1)	0.5	≤10%
		2584	-68.8	-33 (Note1)	1.4	≤10%
Note1： The antenna gain is1dBi.						

6 Annex A: Information for testing

Information as required by ETSI EN 300 328 V2.2.2, clause 5.4.1

In accordance with ETSI EN 300 328, clause 5.4.1, the following information is provided by the manufacturer.

a) The type of modulation used by the equipment:

☐ FHSS

☒ non-FHSS

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:

  The number of Hopping Frequencies:
- In case of Adaptive Frequency Hopping Equipment:

  The maximum number of Hopping Frequencies:

  The minimum number of Hopping Frequencies:
- The Dwell Time:
- The Minimum Channel Occupation Time:
- The (average) Dwell Time:

c) **Adaptive / non-adaptive equipment:**

☐ non-adaptive Equipment

☒ adaptive Equipment without the possibility to switch to a non-adaptive mode

☐ adaptive Equipment which can also operate in a non-adaptive mode

d) **In case of adaptive equipment:**

The Channel Occupancy Time implemented by the equipment: ms

☐ The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐ The equipment is Frame Based equipment

☒ The equipment is Load Based equipment

☐ The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: µs

☐ The equipment has implemented an non-LBT based DAA mechanism

☐ The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): dBm

The maximum (corresponding) Duty Cycle: %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power: GFSK
- Power Spectral Density: GFSK
- Duty cycle, Tx-Sequence, Tx-gap: N/A
- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment): N/A
- Hopping Frequency Separation (only for FHSS equipment): N/A
- Medium Utilisation: N/A
- Adaptivity & Receiver Blocking: N/A
- Occupied Channel Bandwidth: GFSK
- Transmitter unwanted emissions in the OOB domain: GFSK
- Transmitter unwanted emissions in the spurious domain: GFSK
- Receiver spurious emissions: GFSK

g) The different transmit operating modes (tick all that apply):

☒ Operating mode 1: Single Antenna Equipment

☒ Equipment with only one antenna

☐ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE1: Add more lines if more channel bandwidths are supported.

☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE2: Add more lines if more channel bandwidths are supported.

h) **In case of Smart Antenna Systems:**

- The number of Receive chains:
- The number of Transmit chains:

☐ symmetrical power distribution

☐ asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: dB

NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) **Operating Frequency Range(s) of the equipment:**

- Operating Frequency Range 1: 2402 MHz to 2480MHz
- Operating Frequency Range 2: MHz to MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) **Occupied Channel Bandwidth(s):**

- Occupied Channel Bandwidth 1: 1 MHz
- Occupied Channel Bandwidth 2: 2 MHz

NOTE: Add more lines if more channel bandwidths are supported.

k) **Type of Equipment (stand-alone, combined, plug-in radio device, etc.):**

☒ Stand-alone

☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

☐ Plug-in radio device (Equipment intended for a variety of host systems)

☐ Other

l) **The extreme operating conditions that apply to the equipment:**

Normal operating conditions (if applicable):

Operating temperature: 25°C

Other (please specify if applicable): ……

Extreme operating conditions:

Operating temperature range: Minimum: 0 ° C Maximum 40° C

Other (please specify if applicable): …… Minimum: …… Maximum ……

Details provided are for the:

☐ stand-alone equipment

☒ combined (or host) equipment

☐ test jig

m) **The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:**

Antenna Type:

☒ Integral Antenna (information to be provided in case of conducted measurements)

Antenna Gain: 1 dBi

If applicable, additional beamforming gain (excluding basic antenna gain): dB

☐ Temporary RF connector provided

☐ No temporary RF connector provided

☐ Dedicated Antennas (equipment with antenna connector)

☐ Single power level with corresponding antenna(s)

☐ Multiple power settings and corresponding antenna(s)

Number of different Power Levels:

Power Level 1: dBm

Power Level 2: dBm

Power Level 3: dBm

NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

- For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable

Power Level 1: dBm

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 3: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 2: dBm

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 4: Add more rows in case more antenna assemblies are supported for this power level.

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Power Level 3: dBm

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 5: Add more rows in case more antenna assemblies are supported for this power level.

n) **The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:**

Details provided are for the: ☒ stand-alone equipment

☐ combined (or host) equipment

☐ test jig

Supply Voltage ☐ AC State mains State AC voltage : V

☒ DC State DC voltage 5V

In case of DC, indicate the type of power source

☐ Internal Power Supply

☐ External Power Supply or AC/DC adapter

☒ Battery

☐ Other:

o) **Describe the test modes available which can facilitate testing:**

Continuous transmitting mode control in engineer mode.

p) **The equipment type (e.g. Bluetooth®, IEEE 802.11™ , IEEE 802.15.4™, proprietary, etc.):**

Bluetooth® BLE

q) **If applicable, the statistical analysis referred to in clause 5.4.1 q)**

(to be provided as separate attachment)

r) If applicable, the statistical analysis referred to in clause 5.4.1 r)

(to be provided as separate attachment)

s) **Geo-location capability supported by the equipment:**

☐ Yes

☐ The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user.

☒ No

******THE END REPORT******

Test Report

EN62479:2010

For

Product:Wireless Speaker

Model: MO6813

Report No.: RKEYS250521049

Issued for

Mid Ocean Brands B.V.

Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.

Issued by

Guangdong KEYS Testing Technology Co.,Ltd.

Address: Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China

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1 TEST RESULT CERTIFICATION

Applicant's name	:	Mid Ocean Brands B.V.
Address	:	Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.
Manufacture's name	:	117486
Address	:	N/A
Product name	:	Wireless Speaker
Model name	:	MO6813
Remark:	:	/

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Date of Test	May 21, 2025
Date (s) of performance of tests:	May 21, 2025 to May 26, 2025
Date of Issue:	May 26, 2025
Test Result:	Pass
Prepared by:	Linda Chen Linda Chen / Engineer
Approved by:	Jason Zhan / Manager Jason Zhan

Contents

2 General Information

2.1 General Description of E.U.T.

Product Name	:	Wireless Speaker
Model Name	:	MO6813
List Model	:	N/A
Specification	:	Bluetooth
Operation Frequency	:	2402-2480MHz
Number of Channel	:	40
Type of Modulation	:	GFSK
Antenna installation	:	PCB Antenna
Antenna Gain	:	1dBi
Power supply	:	Type-C Input : DC 5V, 1A Battery :DC 3.7V, 300mAh
Note: N/A		

3 RF Exposure Evaluation

3.1 Standard

EN62479:2010 Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz)

3.2 Limits

Equipment complying with the requirements for the general public is deemed to comply with the requirements for workers without further testing.

The conformity assessment to demonstrate equipment compliance shall be made according to EN 62479:2010, 4.1 and Clause 6.

If routes B, C or D of 4.1 of EN 62479:2010 are followed then the values of P_{max}, as described in 4.2 of EN 62479:2010 and given in Annex A of EN 62479:2010, shall be meet in below Table 1 below.

Exposure tier	Region of body	P_{max}(mW)
General public	Head and trunk	20
	Limbs	40
Workers	Head and trunk	100
	Limbs	200

3.3 Test Result

Mode	Maximum E.I.R.P. (dBm)	Maximum E.I.R.P. (mW)	Pmax (mW)	Result
BLE	-8.84	0.13	20	PASS

******THE END REPORT******