
Radio Test Report

Report No.: AGC12440250101ER02

PRODUCT DESIGNATION : WIRELESS SPEAKER

BRAND NAME : N/A

MODEL NAME : M06819, M06818

APPLICANT : MID OCEAN BRANDS B.V.

DATE OF ISSUE : Feb. 24, 2025

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

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>



Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Feb. 24, 2025	Valid	Initial Release

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Attestation of Global Compliance(Shenzhen)Co., Ltd
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Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>

Table of Contents

1. General Information	4
2. Product Information	5
2.1 Product Technical Description	5
2.2 Test Frequency List	6
2.3 Objective.....	7
2.4 Test Items and The Results	7
2.5 Description of Test Modes	8
3. Setup of Equipment Under Test	9
3.1 Setup Configuration of EUT	9
3.2 Support Equipment.....	9
4. Test Environment	10
4.1 Address of The Test Laboratory	10
4.2 Test Facility	10
4.3 Environmental Conditions.....	11
4.4 Measurement Uncertainty	11
4.5 List of Equipment Used	12
5. ETSI EN 300 328 Requirements for Transmitter	14
5.1 RF Output Power.....	14
5.2 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence.....	19
5.3 Hopping Frequency Separation	27
5.4 Occupied Channel Bandwidth	30
5.5 Adaptivity (Adaptive Frequency Hopping).....	35
5.6 Transmitter Unwanted Emissions in the Out-of-Band Domain.....	37
5.7 Transmitter Unwanted Emissions in the Spurious Domain	41
6. ETSI EN 300 328 Requirements for Receiver	50
6.1 Receiver Unwanted Emissions in the Spurious Domain.....	50
6.2 Receiver Blocking.....	59
Appendix I: Photographs of Test Setup	63
Appendix II: Photographs of Test EUT	65

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1. General Information

Applicant	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Manufacturer	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Factory	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Product Designation	WIRELESS SPEAKER
Brand Name	N/A
Test Model	MO6819
Series Model(s)	MO6818
Difference Description	All are the same except for the appearance material
Date of receipt of test item	Jan. 17, 2025
Date of Test	Jan. 17, 2025~Feb. 24, 2025
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-EU-BR_EDR-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	<i>Thea Huang</i>	
	Thea Huang (Project Engineer)	Feb. 24, 2025
Reviewed By	<i>Calvin Liu</i>	
	Calvin Liu (Reviewer)	Feb. 24, 2025
Approved By	<i>Angela Li</i>	
	Angela Li (Authorized Officer)	Feb. 24, 2025

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2. Product Information

2.1 Product Technical Description

Equipment Type	FHSS adaptive equipment
Supported Technologies	Classic Bluetooth
Operation Frequency Range	2.4G ISM band (2402MHz-2480MHz)
Bluetooth Version	V5.3
Hardware Version	V2.0
Software Version	ac696n_soundbox_sdk_v1.6.0
Modulation Type	☒ BR: GFSK ☒ EDR: $\pi/4$ -DQPSK ☒ EDR: 8DPSK
Data Rate	☒ 1Mbps ☒ 2Mbps ☒ 3Mbps
Number of Channels	79 of Hopping Channels
Maximum RF Output Power	-3.98dBm (E.I.R.P.)
Antenna Designation	☒ PCB Antenna (Temporary RF connector provided by manufacturer)
	☐ Dedicated Antenna
Antenna Gain	1.2dBi
Receiver Category	☐ Category 1 ☐ Category 2 ☒ Category 3
Power Supply	DC 3.7V, 300mAh by battery
Geo-location capability	☐ Yes ☒ No
Extreme Operating Conditions	Lowest temperature range (LT): 0°C
	Normal temperature range (NT): 25°C
	Highest temperature range (HT): 40°C

Note:

1. The above information was declared by the manufacturer.
2. The equipment submitted are representative production models.
3. For more details, please refer to the User's manual of the EUT.

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2.2 Test Frequency List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	42	2443
02	2403	43	2444
03	2404	44	2445
04	2405	45	2446
05	2406	46	2447
06	2407	47	2448
07	2408	48	2449
08	2409	49	2450
09	2410	50	2451
10	2411	51	2452
11	2412	52	2453
12	2413	53	2454
13	2414	54	2455
14	2415	55	2456
15	2416	56	2457
16	2417	57	2458
17	2418	58	2459
18	2419	59	2460
19	2420	60	2461
20	2421	61	2462
21	2422	62	2463
22	2423	63	2464
23	2424	64	2465
24	2420	65	2466
25	2426	66	2467
26	2427	67	2468
27	2428	68	2469
28	2429	69	2470
29	2430	70	2471
30	2431	71	2472
31	2432	72	2473
32	2433	73	2474
33	2434	74	2475
34	2435	75	2476
35	2436	76	2477
36	2437	77	2478
37	2438	78	2479
38	2439	79	2480
39	2440		
40	2441		
41	2442		

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2.3 Objective

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the Radio Equipment Directive (2014/53/EU) for the Bluetooth function of the EUT.

2.4 Test Items and The Results

The tests were performed according to following standards:

ETSI EN 300 328 V2.2.2 (2019-07)	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonized Standard for access to radio spectrum
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ETSI EN 300 328 test items and the results are as bellow:

No.	Test Item	Standard Require	Result
Transmitter Requirement			
1	RF Output Power	sub-clause 4.3.1.2	Pass
2	Duty Cycle, Tx-sequence, Tx-gap	sub-clause 4.3.1.3	N/A (See Note1,2)
3	Accumulated transmit time, Frequency Occupation and hopping Sequence	sub-clause 4.3.1.4	Pass
4	Hopping Frequency Separation	sub-clause 4.3.1.4	Pass
6	Medium Utilisation (MU) Factor	sub-clause 4.3.2.5	N/A (See Note1,2)
7	Adaptivity (Adaptive Frequency Hopping)	sub-clause 4.3.2.6	N/A (See Note1,3)
8	Occupied Channel Bandwidth	sub-clause 4.3.2.7	Pass
9	Transmitter Unwanted Emissions in the Out-of-Band Domain	sub-clause 4.3.2.8	Pass
10	Transmitter Unwanted Emissions in the Spurious Domain	sub-clause 4.3.2.9	Pass
Receiver Requirement			
11	Receiver Spurious Emissions	sub-clause 4.3.2.10	Pass
12	Receiver Blocking	sub-clause 4.3.2.11	Pass

Note:

1. "N/A" means not applicable.
2. This device is a FHSS adaptive device and is not applicable to this test item.
3. The maximum RF output power of this device is less than 10dBm, so this test item is not applicable

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2.5 Description of Test Modes

Test Mode	Description
BR_TX_2402_1Mbps	Bluetooth BR Transmitting mode (Channel: 2402, Rate: 1Mbps)
BR_TX_2480_1Mbps	Bluetooth BR Transmitting mode (Channel: 2480, Rate: 1Mbps)
EDR_TX_2402_2Mbps	Bluetooth EDR Transmitting mode (Channel: 2402, Rate: 2Mbps)
EDR_TX_2480_2Mbps	Bluetooth EDR Transmitting mode (Channel: 2480, Rate: 2Mbps)
EDR_TX_2402_3Mbps	Bluetooth EDR Transmitting mode (Channel: 2402, Rate: 3Mbps)
EDR_TX_2480_3Mbps	Bluetooth EDR Transmitting mode (Channel: 2480, Rate: 3Mbps)
BR_HOP_NA_1Mbps	Bluetooth BR Hopping mode (Rate: 1Mbps)
EDR_HOP_NA_2Mbps	Bluetooth EDR Hopping mode (Rate: 2Mbps)
EDR_HOP_NA_3Mbps	Bluetooth EDR Hopping mode (Rate: 3Mbps)
BR_RX_2402_1Mbps	Bluetooth BR Receiving mode (Channel: 2402, Rate: 1Mbps)
BR_RX_2480_1Mbps	Bluetooth BR Receiving mode (Channel: 2480, Rate: 1Mbps)
EDR_RX_2402_2Mbps	Bluetooth EDR Receiving mode (Channel: 2402, Rate: 2Mbps)
EDR_RX_2480_2Mbps	Bluetooth EDR Receiving mode (Channel: 2480, Rate: 2Mbps)
EDR_RX_2402_3Mbps	Bluetooth EDR Receiving mode (Channel: 2402, Rate: 3Mbps)
EDR_RX_2480_3Mbps	Bluetooth EDR Receiving mode (Channel: 2480, Rate: 3Mbps)
Note: All modes have been tested and the worst mode test data recording in the test report, if no any other data.	

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3. Setup of Equipment Under Test

3.1 Setup Configuration of EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

3.2 Support Equipment

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?				
☒ Yes ☐ No				
Item	Equipment	Trade Name	Model No.	Specification
1	Control Box	USB-TTL	--	--

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4. Test Environment

4.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

4.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

4.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	45 % - 85 %
Pressure range (kPa)	86 - 106

4.4 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

Test Item	Measurement Uncertainty
Uncertainty of Radio Frequency	$U_c = \pm 1 \times 10^{-7}$
Uncertainty of Total RF power, Conducted	$U_c = \pm 0.8\text{dB}$
Uncertainty of RF Power Density, Conducted	$U_c = \pm 2.6\text{dB}$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$
Uncertainty of spurious Emissions, Conducted	$U_c = \pm 2.7\text{dB}$
Uncertainty of Spurious Emissions, Radiated	$U_c = \pm 5.4\text{dB}$
Uncertainty of Dwell Time	$U_c = \pm 2\%$
Uncertainty of Temperature	$U_c = 0.5^\circ \text{C}$
Uncertainty of Humidity	$U_c = \pm 1 \%$
Uncertainty of DC and Low Frequency Voltages	$U_c = \pm 2 \%$

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4.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2025-01-30	2026-01-29
☐	AGC-ER-E041	Spectrum Analyzer	Agilent	N9020A	W1312-60196	2024-05-24	2025-05-23
☐	AGC-ER-E061	Spectrum Analyzer	Agilent	N9020A	MY52090123	2024-05-28	2025-05-27
☒	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2025-01-14	2026-01-13
☒	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2025-01-14	2026-01-13
☐	AGC-ER-E027	Power Sensor	Agilent	U2021XA	MY5411000B	2025-01-14	2026-01-13
☒	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08
☒	AGC-ER-E079	Wireless Connectivity Tester	R&S	CMW270	101933	2024-05-24	2025-05-23
☒	AGC-ER-E075	Small Environmental Tester	SH-242	ESPEC	93008290	2024-07-24	2026-07-23
☒	AGC-ER-E059	Signal Generator	Agilent	N5182B	MY53050647	2025-01-14	2026-01-13
☒	AGC-ER-E060	Signal Generator	Agilent	N5171B	MY53050474	2024-05-28	2025-05-27
☒	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2024-05-23	2025-05-22
☒	--	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	--	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2025-01-14	2026-01-13
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E005	Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	2025-01-03	2026-01-02
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-05-24	2025-05-23
☒	AGC-EM-E102	Broadband Ridged Horn Antenna	ETS	3117	00154520	2023-06-03	2025-06-02
☐	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23
☒	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2024-05-23	2025-05-22
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2025-06-08

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● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0
☒	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
☐	AGC-ER-S009	BT/WIFI Test System	Tonscend	JS1120-3	2.6.77.0518

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5. ETSI EN 300 328 Requirements for Transmitter

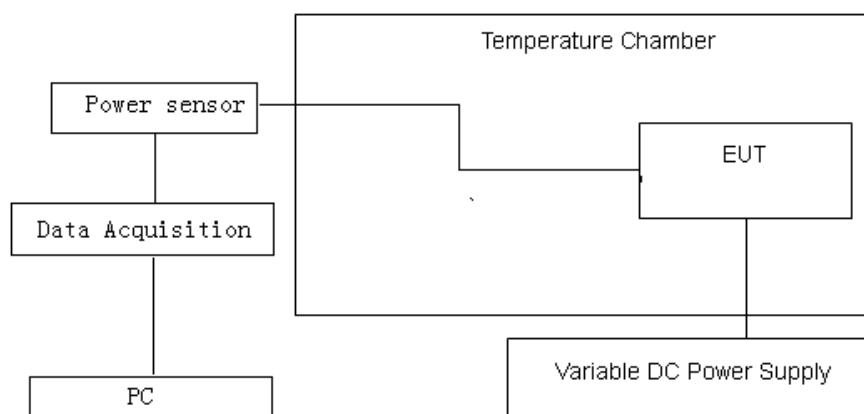
5.1 RF Output Power

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

Test Limit

RF Output Power $\leq$ 100mW (20dBm) over Normal and Extreme conditions.

Test Setup



Test Procedure

- 1) Use a fast power sensor and set the samples speed 1MS/s or faster.
- 2) Connect one power sensor to each transmit port, Trigger the power sensors so that they start sampling at the same time. For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.
- 3) Find the start and stop times of each burst in the stored measurement samples.
- 4) Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these P burst values, as well as the start and stop times for each burst.
- 5) The highest of all P burst values (Value "A" in dBm) will be used for maximum e.i.r.p calculations.
- 6) The cable loss factor shall be considered to the value "A".
- 7) Add the (stated) antenna assembly gain "G" in dBi of the individual antenna. If applicable, add the additional beamforming gain "Y" in dB.
- 8) The RF output power (P) shall be calculated using the formula: $P=A+G+Y$

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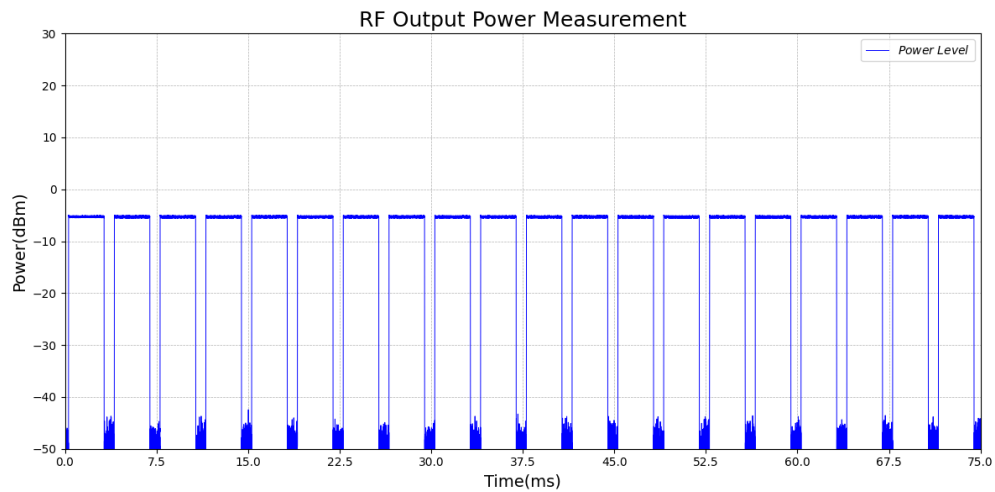
Test Result

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

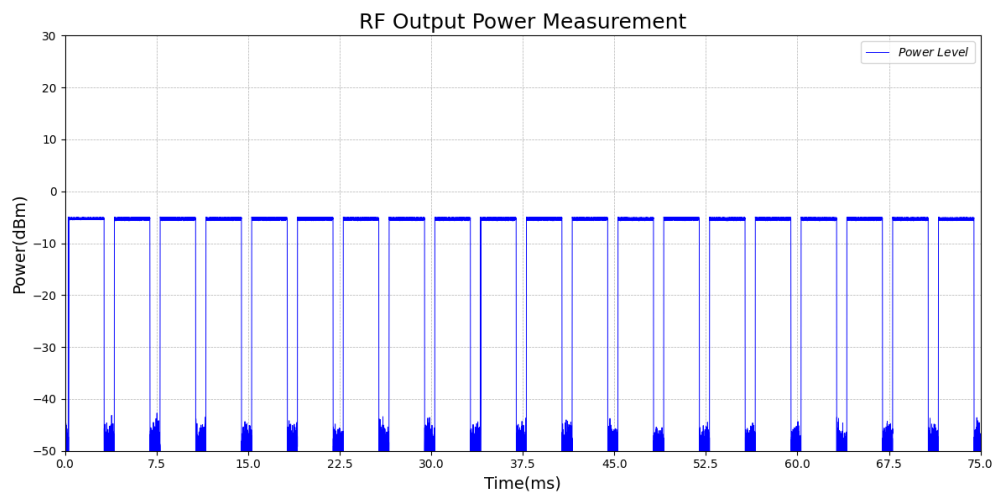
Test Data of RF Output Power					
Test Mode	RF Output Power [dBm]			Limit [dBm]	Verdict
	NT	LT	HT		
BR_HOP_1Mbps	-3.98	-4.04	-4.06	20	Pass
EDR_HOP_2Mbps	-5.09	-5.34	-5.30	20	Pass
EDR_HOP_3Mbps	-5.20	-5.27	-5.28	20	Pass

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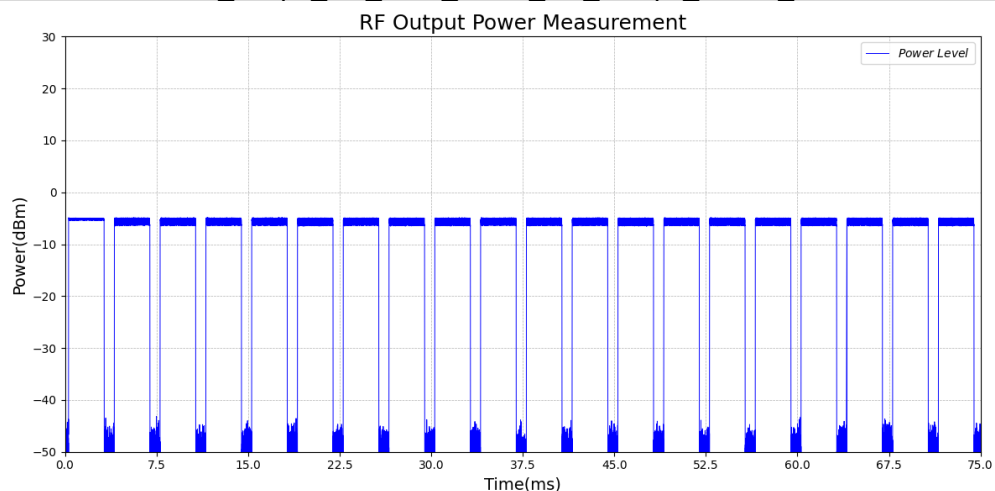
Test Graphs of RF Output Power



Test_Graph_BR_HOP_ANT1_NA_1Mbps_Power_HT



Test_Graph_BR_HOP_ANT1_NA_1Mbps_Power_LT



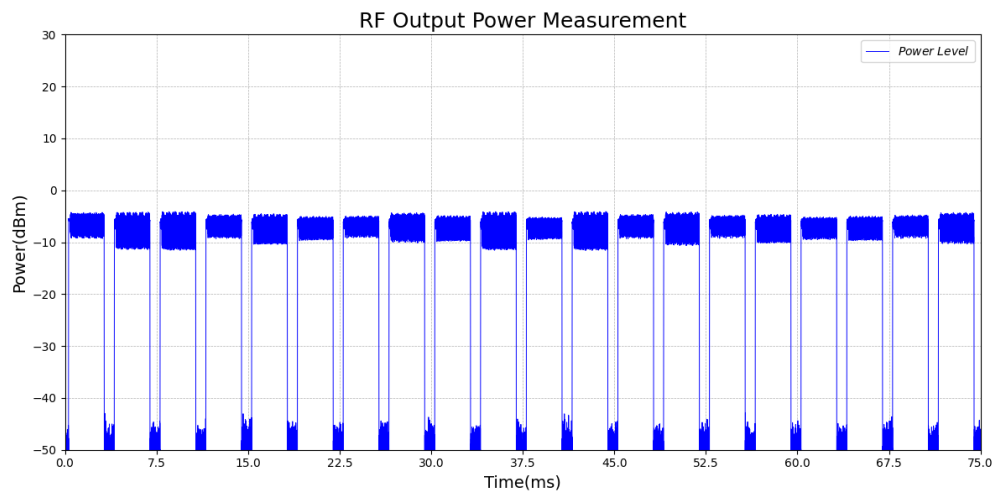
Test_Graph_BR_HOP_ANT1_NA_1Mbps_Power_NT

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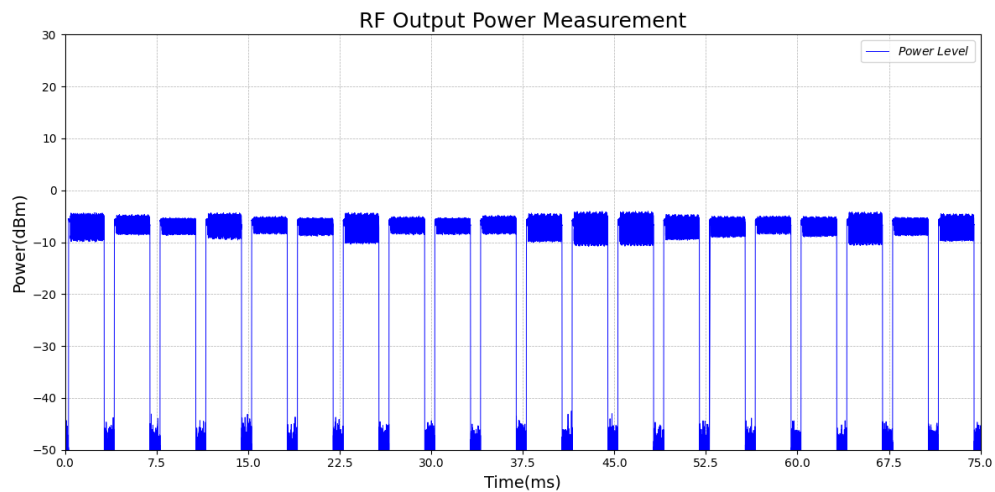
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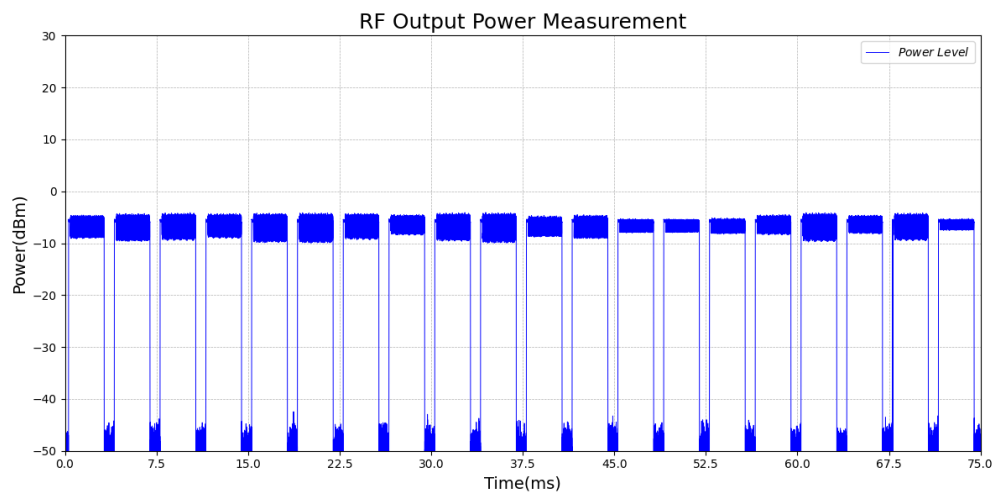
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Power_HT



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Power_LT



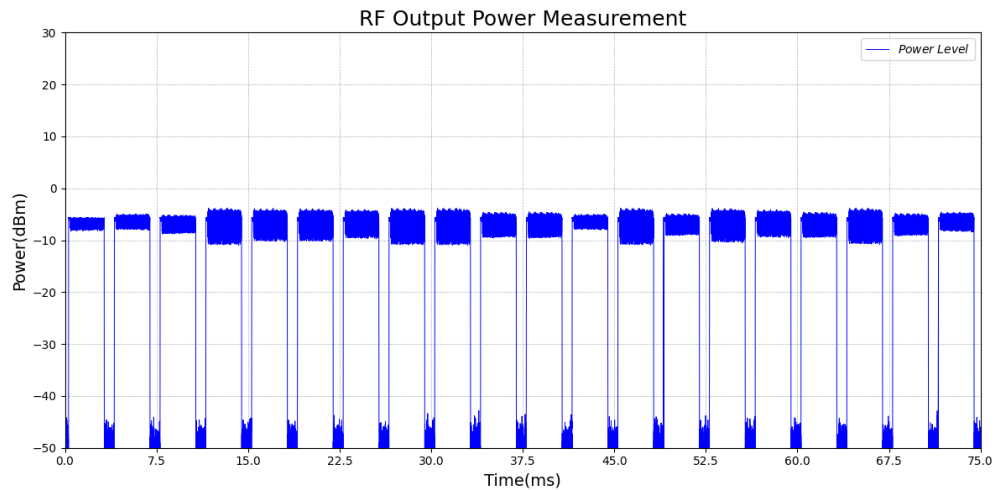
Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Power_NT

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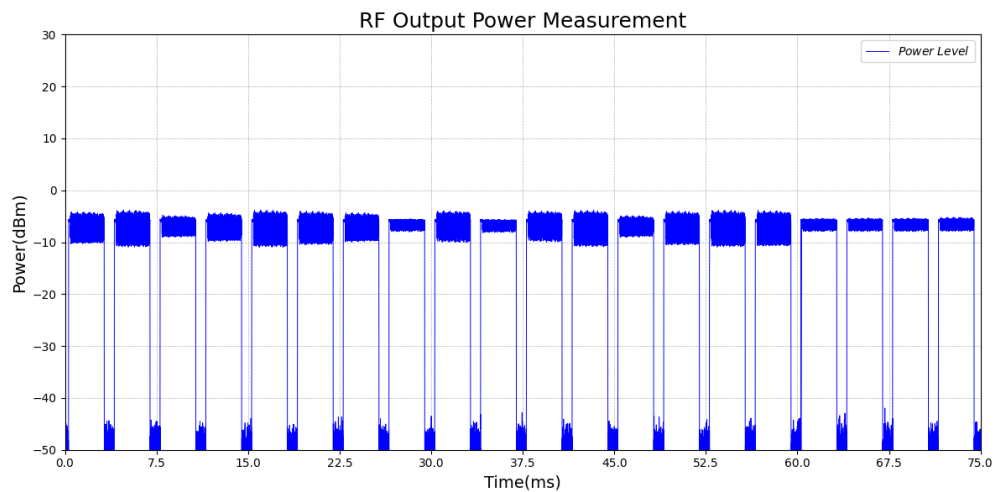
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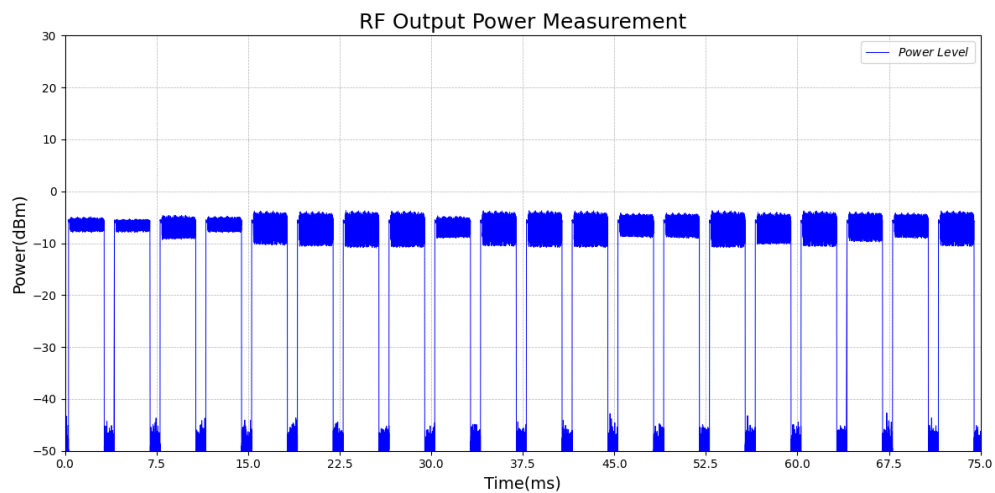
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Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Power_HT



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Power_LT



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Power_NT

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5.2 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

The Accumulated Transmit Time is the total of the transmitter 'on'-times, during an observation period, on a particular hopping frequency.

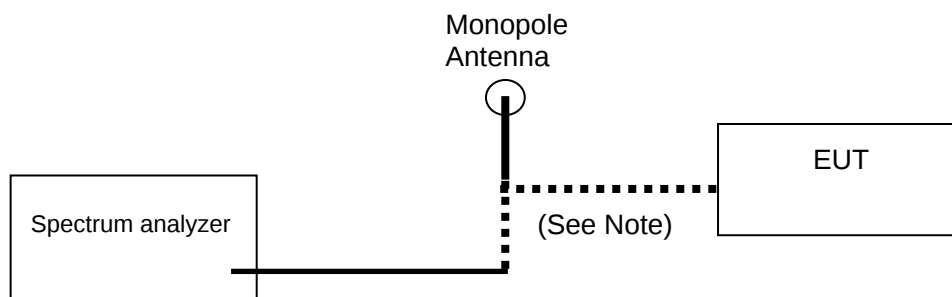
The Frequency Occupation is the number of times that each hopping frequency is occupied within a given period. A hopping frequency is considered to be occupied when the equipment selects that frequency from the Hopping Sequence. FHSS equipment may be transmitting, receiving or stay idle during the dwell time spent on that hopping frequency.

The Hopping Sequence of a FHSS equipment is the pattern of the hopping frequencies used by the equipment

Test Limit

Accumulated Transmit Time	
Condition	Limit
☐ Non-adaptive frequency hopping systems	≤ 15ms
☒ Adaptive frequency hopping systems	≤ 400ms
Frequency Occupation	
Condition	Limit (Option 1)
☐ Non-adaptive frequency hopping systems	Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use.
☒ Adaptive frequency hopping systems	
Hopping Sequence	
Condition	Limit
☐ Non-adaptive frequency hopping systems	≥5 hopping frequencies or 5/minimum Hopping Frequency Separation in MHz, whichever is the greater.
☒ Adaptive frequency hopping systems	Operating frequency band ≥58.45MHz (Operating over a minimum of 70 % of the operating in the band 2,4 GHz to 2,4835 GHz)
	≥15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz, whichever is the greater.

Test Setup



Remarks:

EUT was direct connected to test equipment through coupling device.

Test Procedure

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The test procedure refers to the requirements of EN 300 328 Section 5.4.4 as follows:

Step 1:

- The output of the transmitter shall be connected to a spectrum analyzer or equivalent.
- The analyzer shall be set as follows:
 - Centre Frequency: Equal to the hopping frequency being investigated
 - Frequency Span: 0 Hz - RBW: ~ 50 % of the Occupied Channel Bandwidth
 - VBW: $\geq$ RBW - Detector Mode: RMS
 - Sweep time: Equal to the applicable observation period (see clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2)
 - Number of sweep points: 30 000
 - Trace mode: Clear/Write
 - Trigger: Free Run

Step 2:

- Save the trace data to a file for further analysis by a computing device using an appropriate software application or program.

Step 3:

- Identify the data points related to the frequency being investigated by applying a threshold.

The data points resulting from transmissions on the hopping frequency being investigated are assumed to have much higher levels compared to data points resulting from transmissions on adjacent hopping frequencies. If a clear determination between these transmissions is not possible, the RBW in step 1 shall be further reduced. In addition, a channel filter may be used.
- Count the number of data points identified as resulting from transmissions on the frequency being investigated and multiply this number by the time difference between two consecutive data points.

Step 4:

- The result in step 3 is the Accumulated Transmit Time which shall comply with the limit provided in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 and which shall be recorded in the test report.

Step 5:

This step is only applicable for equipment implementing Option 1 in clause 4.3.1.4.3.1 or Option 1 in clause 4.3.1.4.3.2 for complying with the Frequency Occupation requirement.

- Make the following changes on the analyzer and repeat step 2 and step 3.

Sweep time: $4 \times \text{dwell time} \times \text{Actual number of hopping frequencies in use}$.

The hopping frequencies occupied by the equipment without having transmissions during the dwell time (blacklisted frequencies) should be taken into account in the actual number of hopping frequencies in use. If this number cannot be determined (number of blacklisted frequencies unknown) it shall be assumed that the equipment uses the maximum possible number of hopping frequencies.
- The result shall be compared to the limit for the Frequency Occupation defined in clause 4.3.1.4.3.1, Option 1 or clause 4.3.1.4.3.2, Option 1. The result of this comparison shall be recorded in the test report.

Step 6:

- Make the following changes on the analyzer:
 - Start Frequency: 2 400 MHz
 - Stop Frequency: 2 483,5 MHz
 - RBW: ~ 50 % of the Occupied Channel Bandwidth (single hopping frequency)
 - VBW: ≥ RBW
 - Detector Mode: Peak
 - Sweep time: 1 s; this setting may result in long measuring times. To avoid such long measuring times, an FFT analyzer may be used
 - Number of sweep points: ~ 400 / Occupied Channel Bandwidth (MHz); the number of sweep points may need to be further increased in case of overlapping channels
 - Trace Mode: Max Hold
 - Trigger: Free Run
- Wait for the trace to stabilize. Identify the number of hopping frequencies used by the Hopping Sequence.
- The result shall be compared to the limit (value N) defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2. This value shall be recorded in the test report.

For equipment with blacklisted frequencies, it might not be possible to verify the number of hopping frequencies in use. However, they shall comply with the requirement for Accumulated Transmit Time and Frequency Occupation assuming the minimum number of hopping frequencies (N) defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 is used.

Step 7:

- For adaptive FHSS equipment, it shall be verified whether the equipment uses 70 % of the band specified in table 1. This verification can be done using the lowest and highest -20 dB points from the total spectrum envelope obtained in step 6. The result shall be recorded in the test report.

Test Result

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

Test Data of Accumulated Transmit Time, Frequency Occupation						
Test Mode	Channel (MHz)	Accumulated transmit time (ms)	Limit (ms)	Frequency Occupation (pcs)	Limit (pcs)	Verdict
BR_HOP_1Mbps	2402	285.376	≤400	6	≥1	Pass
BR_HOP_1Mbps	2480	237.350	≤400	4	≥1	Pass

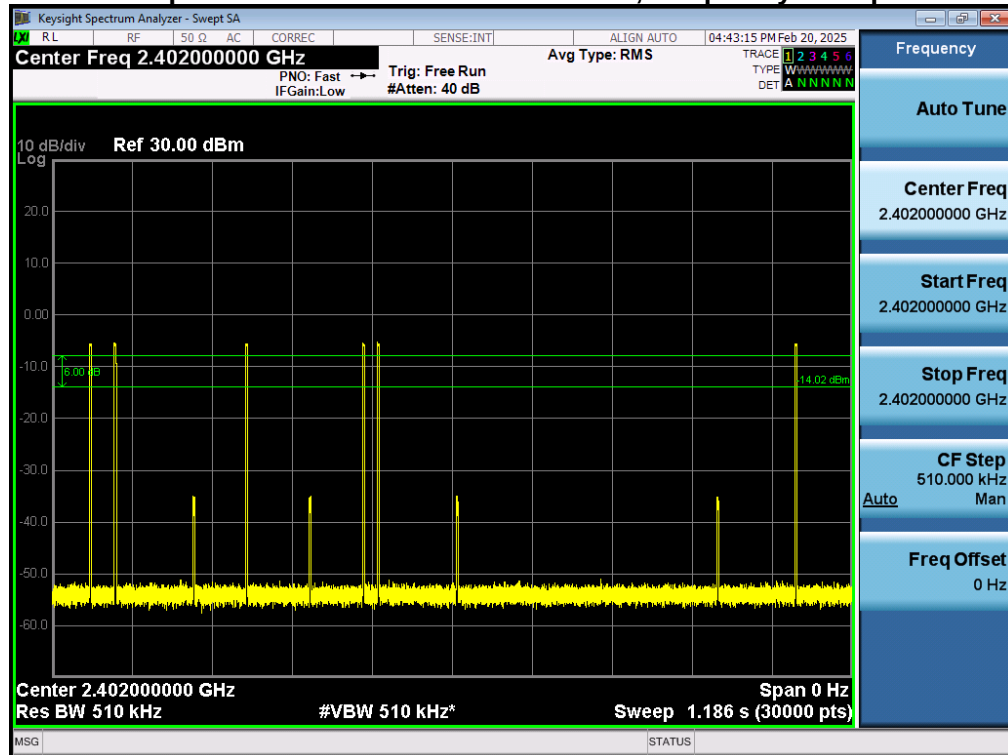
Note:

- 1) All the modes had been tested, but only the worst data recorded in the report.
- 2) The Accumulated transmit time and Dwell Time are calculated by a computing device using an appropriate software application or program.
- 3) Sweep time for Frequency Occupation= Dwell Time*4*79.

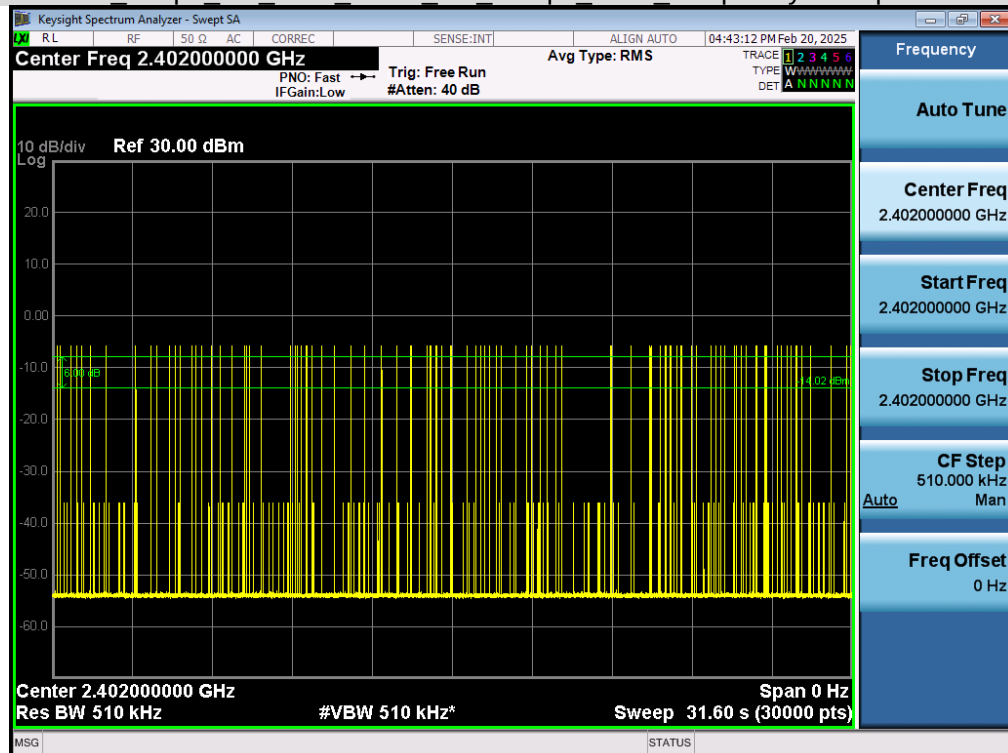
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Test Graphs of Accumulated Transmit Time, Frequency Occupation

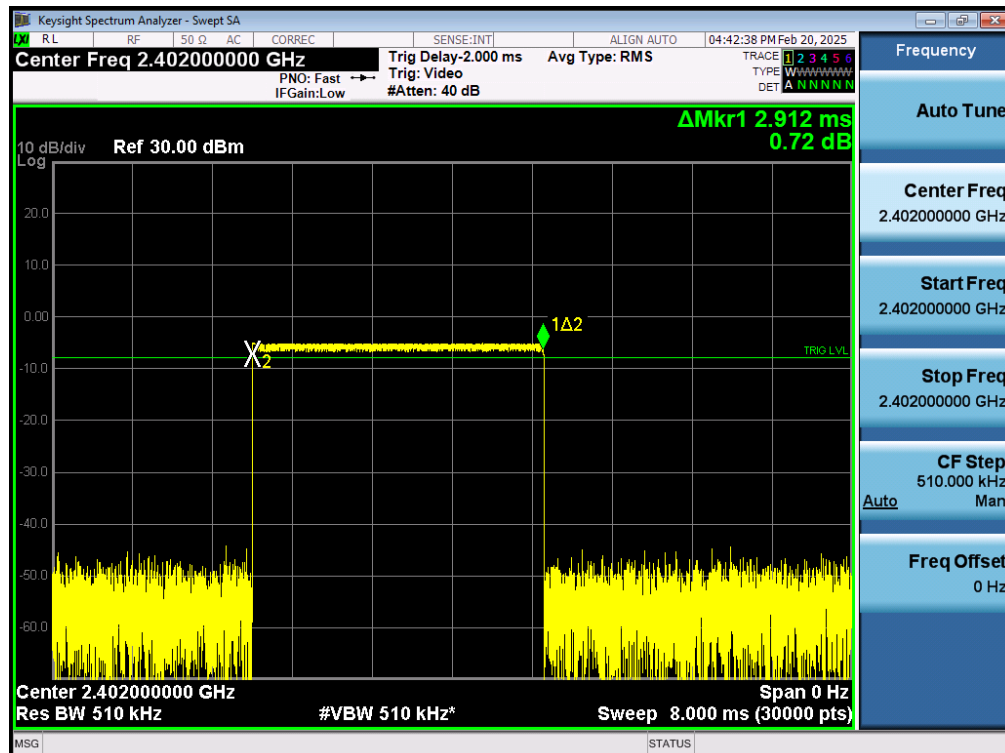


Test Graph BR HOP ANT1 NA 1Mbps 2402 Frequency Occupation

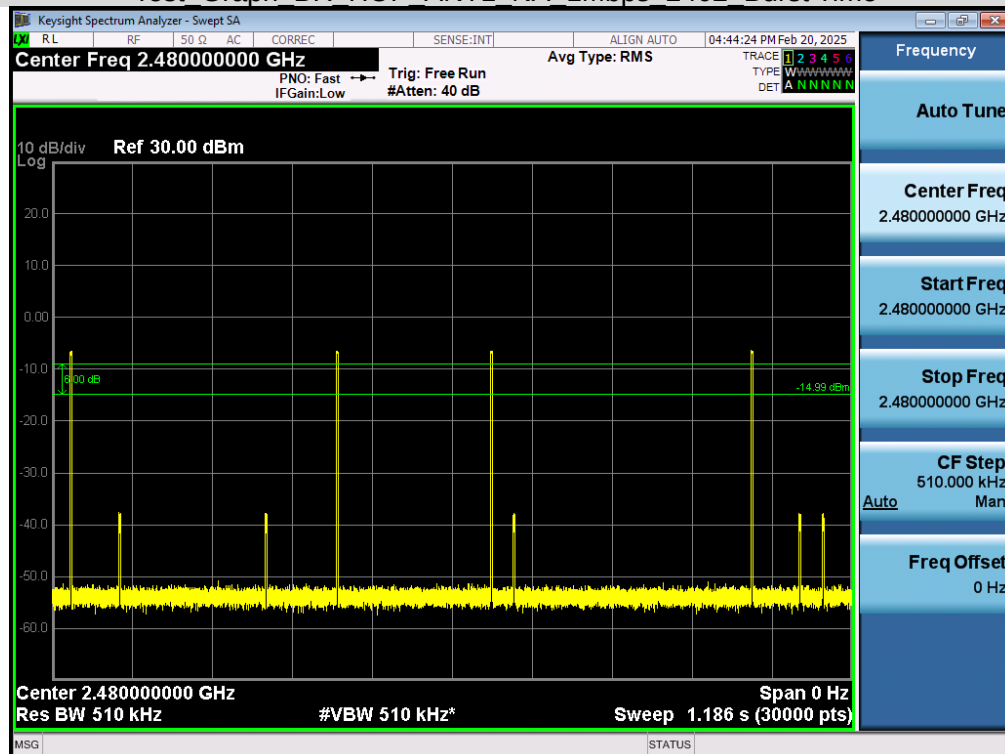


Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Accumulated Transmit Time

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Test Graph BR HOP ANT1 NA 1Mbps 2402 Burst Time



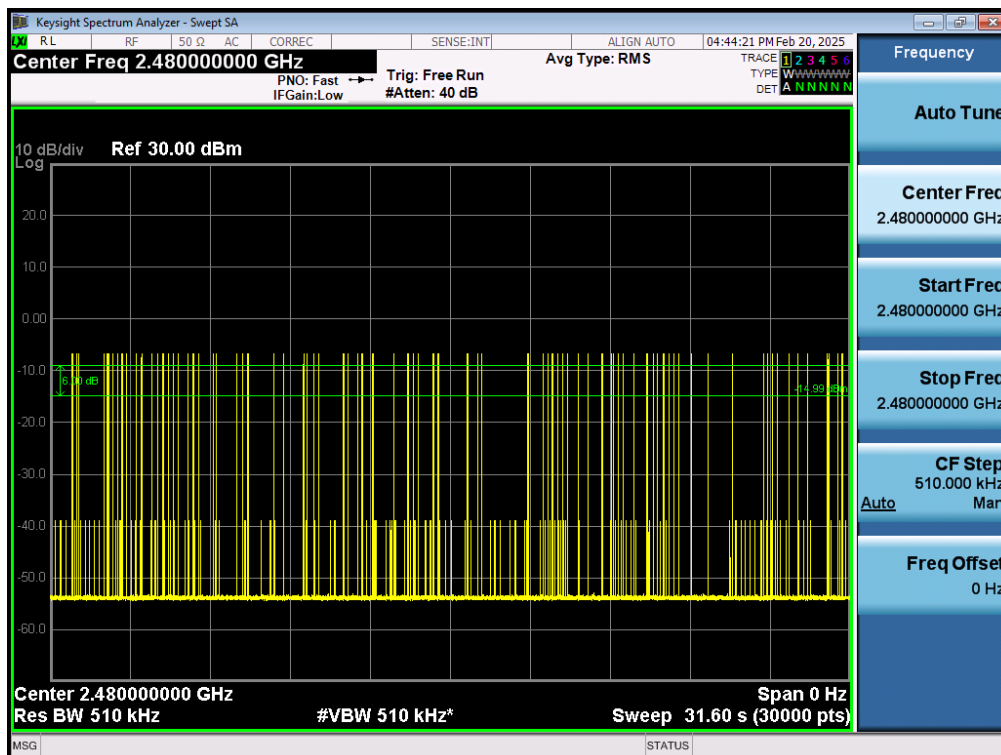
Test_Graph_BR_HOP_ANT1_NA_1Mbps_2480_Frequency Occupation

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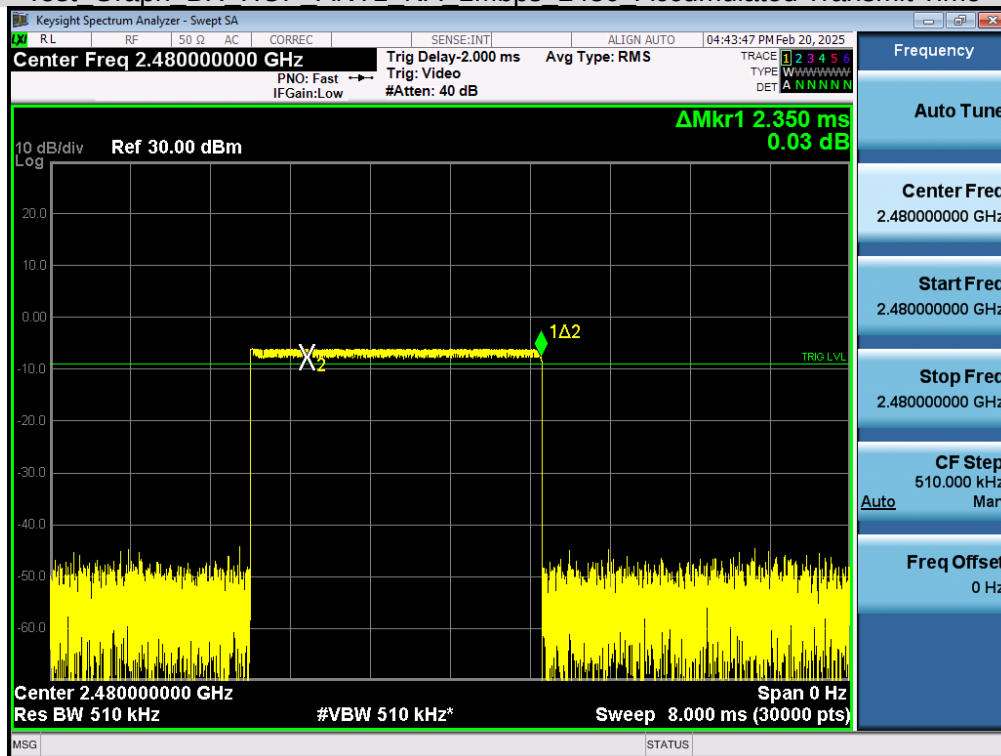
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Test Graph BR HOP ANT1 NA 1Mbps 2480 Accumulated Transmit Time



Test_Graph_BR_HOP_ANT1_NA_1Mbps_2480_Burst Time

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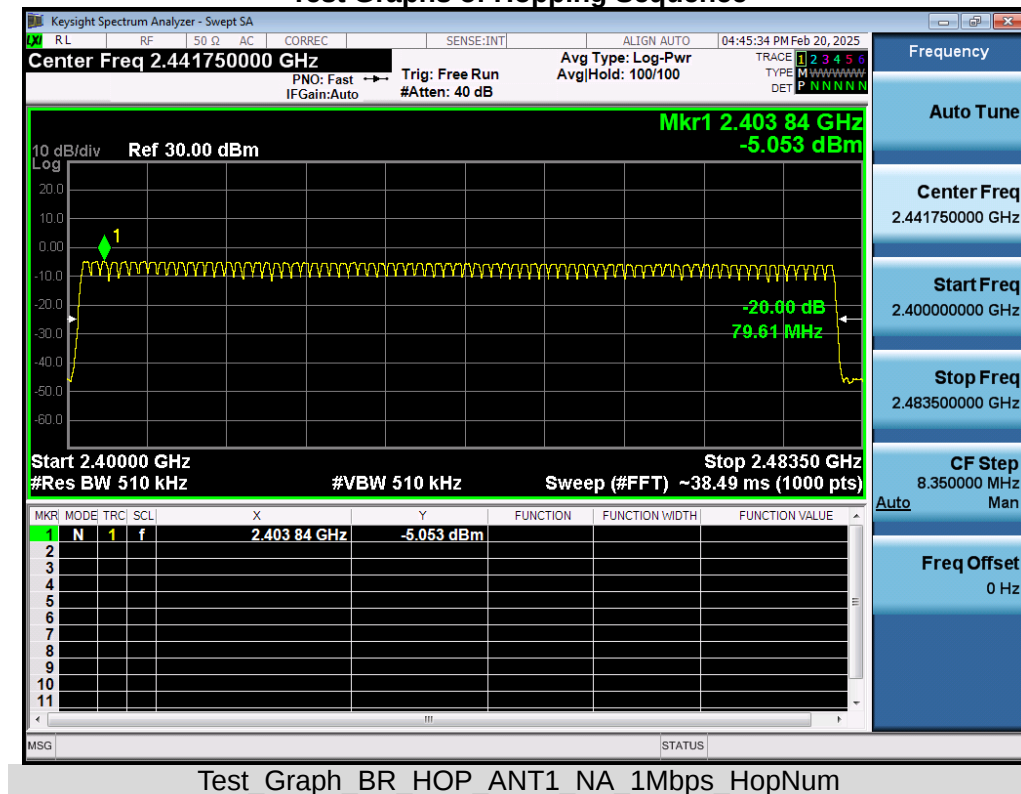
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Test Data of Hopping Sequence					
Test Mode	Number of hopping frequencies	Limit	-20dBc Hopping BW [MHz]	Limit [MHz]	Verdict
BR_HOP_1Mbps	78	≥ 15	79.605	≥ 58.45	Pass

Note: The modulation used during test is GFSK and this is the worst case.

Test Graphs of Hopping Sequence



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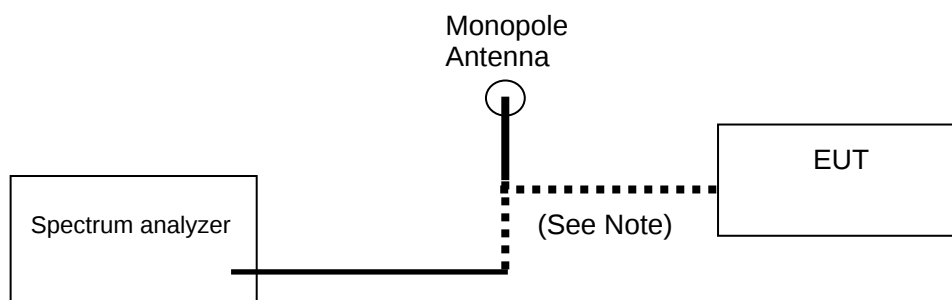
5.3 Hopping Frequency Separation

The Hopping Frequency Separation is the frequency separation between two adjacent hopping frequencies.

Test Limit

- For Non-adaptive frequency hopping systems:
The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth (see clause 4.3.1.7) of a single hop, with a minimum separation of 100 kHz.
- For Adaptive frequency hopping systems:
The minimum Hopping Frequency Separation shall be 100 kHz.

Test Setup



Remarks:

EUT was direct connected to test equipment through coupling device.

Test Procedure

Refer as EN 300 328, clause 5.4.5 for the test conditions and the measurement method.
The test procedure shall be as follows:

Step 1:

- The output of the transmitter shall be connected to a spectrum analyzer or equivalent.
- The analyzer shall be set as follows:
 - Centre Frequency: Centre of the two adjacent hopping frequencies
 - Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies
 - RBW: 1 % of the span (30KHz)
 - VBW: 3 × RBW (100KHz)
 - Detector Mode: Max Peak
 - Trace Mode: Max Hold
 - Sweep Time: Auto

Step 2:

- Wait for the trace to stabilize.
- Use the marker-delta function to determine the Hopping Frequency Separation between the center of the two adjacent hopping frequencies (e.g. by identifying peaks or notches at the center of the power envelope for the two adjacent signals). This value shall be compared with the limits defined in clause 4.3.1.5.3 and shall be recorded in the test report.

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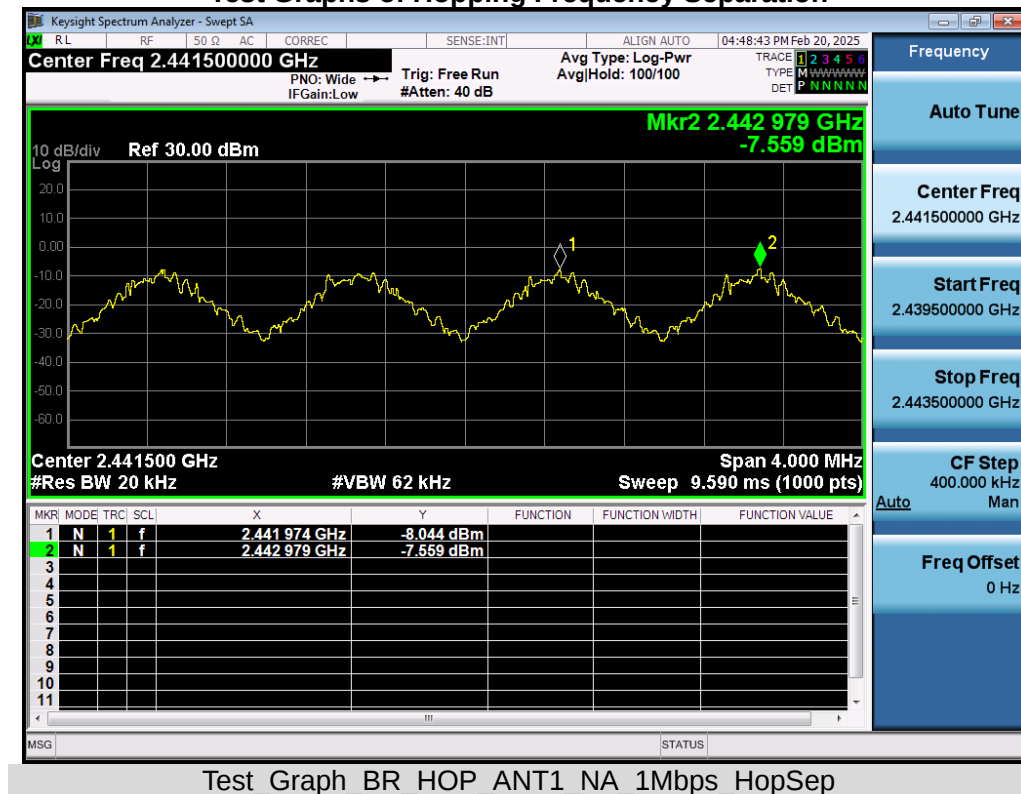
Test Result

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

Test Data of Hopping Frequency Separation			
Test Mode	Hopping Frequency Separation [MHz]	Limit [MHz]	Verdict
BR_HOP_1Mbps	1.005	≥ 0.1	Pass

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Test Graphs of Hopping Frequency Separation



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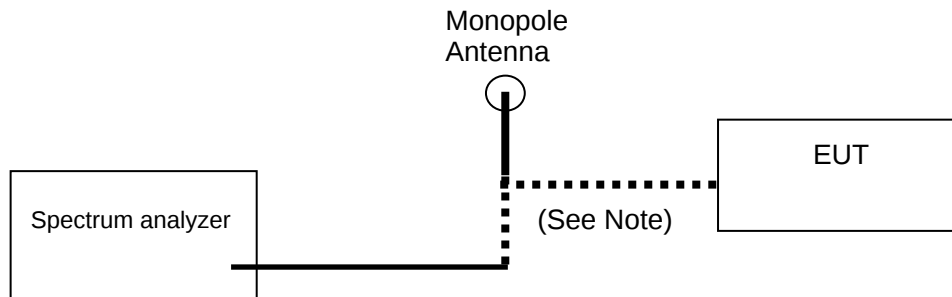
5.4 Occupied Channel Bandwidth

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

Test Limit

The Occupied Channel Bandwidth shall fall completely within the band 2400MHz to 2483.5MHz.

Test Setup



Remarks:

EUT was direct connected to test equipment through coupling device.

Test Procedure

- 1) The spectrum analyser shall be used the following settings:
- 2) Centre Frequency: The centre frequency of the channel under test
 - Resolution BW: ~1% of the span without going below 1%
 - Video BW: 3×RBW
 - Span: 2×OBW
 - Detector: RMS
 - Trace mode: Max Hold
- 3) Wait until the trace is completed, find the peak value of the trace and place the analyser marker on this peak.
- 4) Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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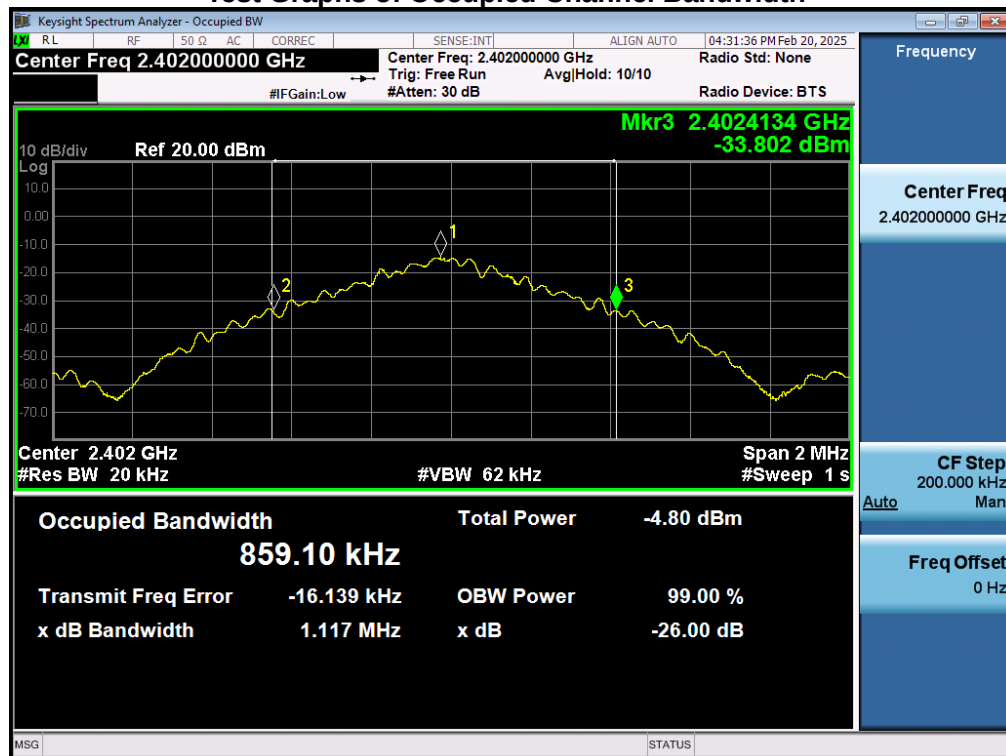
Test Result

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

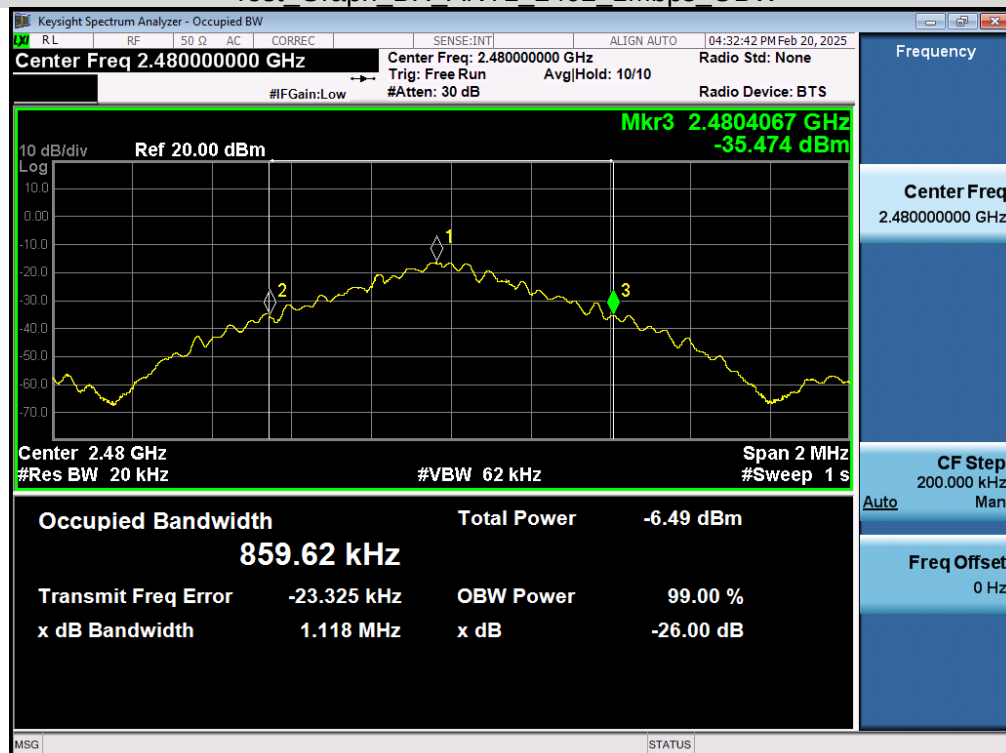
Test Data of Occupied Channel Bandwidth					
Test Mode	Occupied Channel Bandwidth [MHz]			Limit [MHz]	Verdict
	OCB	FL	FH		
BR_2402_1Mbps	0.859	2401.554	2402.413	2400 to 2483.5	Pass
BR_2480_1Mbps	0.860	2479.547	2480.407	2400 to 2483.5	Pass
EDR_2402_2Mbps	1.191	2401.391	2402.582	2400 to 2483.5	Pass
EDR_2480_2Mbps	1.191	2479.385	2480.576	2400 to 2483.5	Pass
EDR_2402_3Mbps	1.196	2401.387	2402.583	2400 to 2483.5	Pass
EDR_2480_3Mbps	1.197	2479.380	2480.577	2400 to 2483.5	Pass

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Test Graphs of Occupied Channel Bandwidth



Test Graph BR ANT1 2402 1Mbps OBW



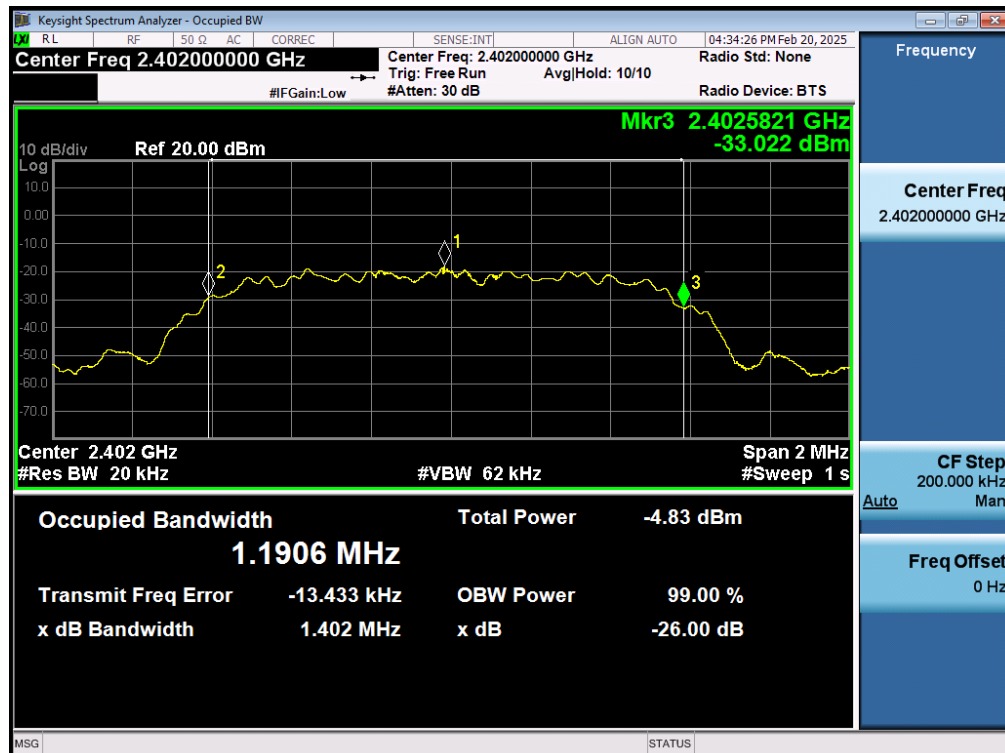
Test_Graph_BR_ANT1_2480_1Mbps_OBW

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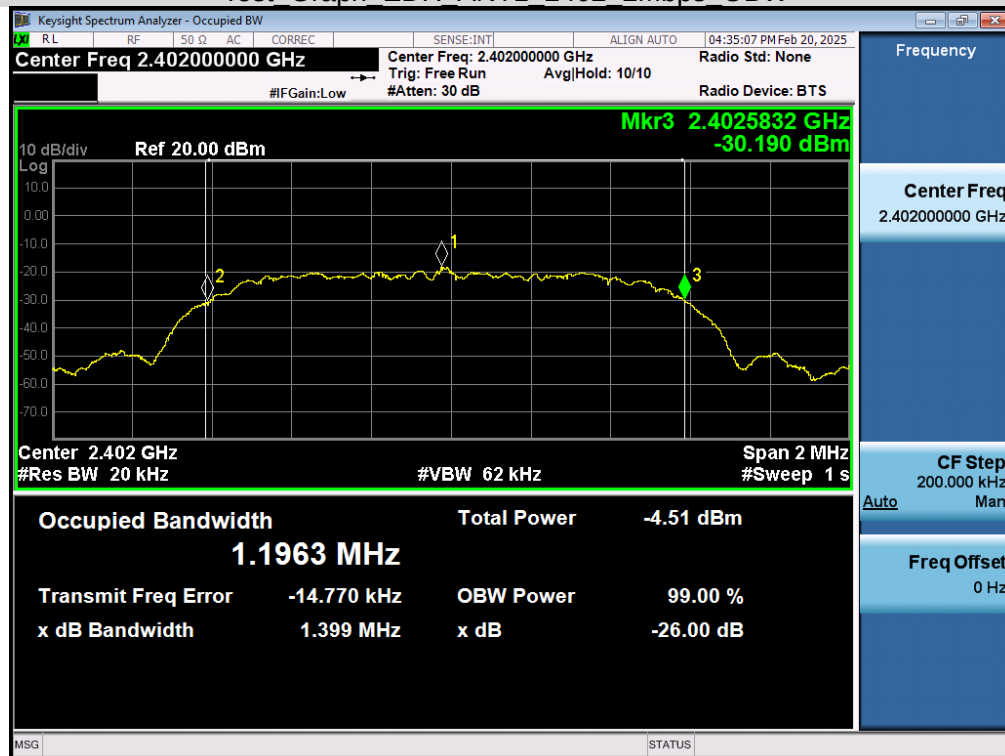
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Test Graph EDR ANT1 2402 2Mbps OBW



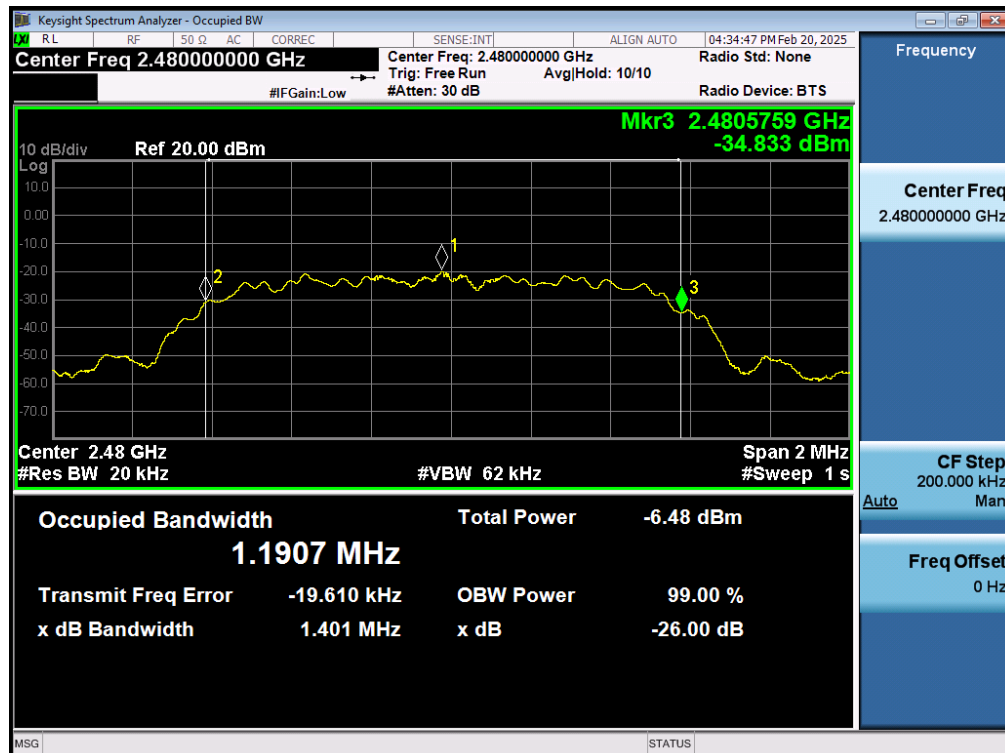
Test_Graph_EDR_ANT1_2402_3Mbps_OBW

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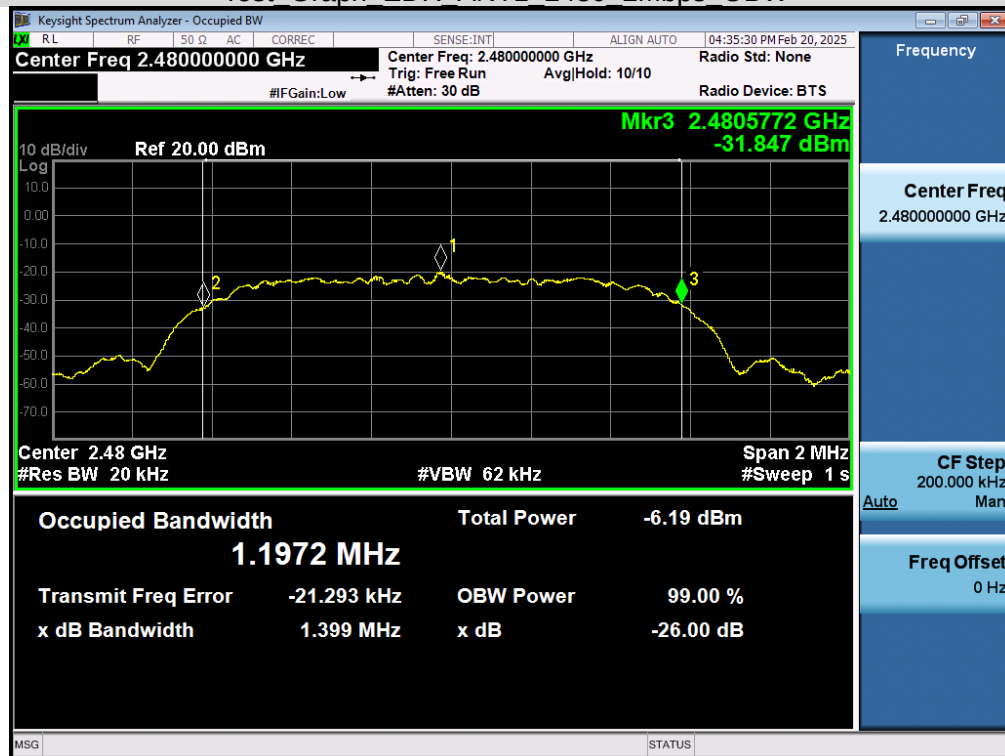
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Test Graph EDR ANT1 2480 2Mbps OBW



Test_Graph_EDR_ANT1_2480_3Mbps_OBW

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5.5 Adaptivity (Adaptive Frequency Hopping)

The method of adaptivity is using LBT based on LBE.

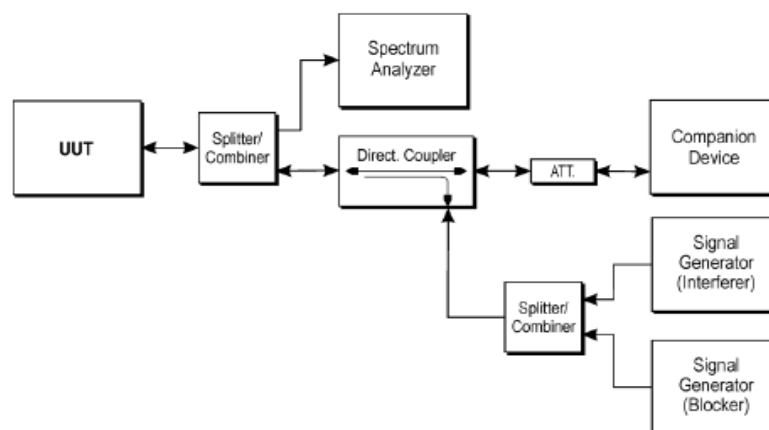
Adaptive FHSS using LBT is a mechanism by which FHSS adaptive equipment avoids transmissions in a channel in the presence of an interfering signal in that channel. This mechanism shall operate as intended in the presence of an unwanted signal on frequencies other than those of the operating band.

Test Limit

- The Channel Occupancy Time shall be less than 13ms.
- If implemented, short control signaling transmissions for adaptive devices using wideband modulation of FHSS shall have a maximum duty cycle of 10% within an observation period of 50 ms.
- For power levels less than 20 dBm e.i.r.p., the CCA threshold level (TL) may be relaxed to:
- $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100\text{mW} / P_{out})$ (P_{out} in mW e.i.r.p.)
- An unwanted CW signal as defined in the below table.

Wanted signal mean power from companion device (dBm)	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
-30 (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 2)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1. NOTE 2: 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 in front of the UUT antenna (see example below).		

Test Setup



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Test Procedure

- 1) The EUT connect to a companion device during the test. Adjust the received signal level at the EUT to the value of -50dBm/MHz.
- 2) the analyzer shall be set as below: RBW $\geq$ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used) and VBW $\geq$ 3 $\times$ RBW.
- 3) Configure the EUT for normal transmission with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
- 4) Adding the interference signal and verification of reaction to the interference signal.
- 5) Adding the unwanted signal and verification of reaction to the unwanted signal.
- 6) Removing the interference and unwanted signal.

Test Result

Note: The EIRP of the EUT is less than 10dBm, So the adaptivity test is not applicable for the EUT.

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5.6 Transmitter Unwanted Emissions in the Out-of-Band Domain

In the present document, transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the allocated band, but excluding unwanted emissions in the spurious domain.

Test Limit

The transmitter unwanted emissions in the out-of-band domain shall not exceed the values provided by the mask in figure 3.

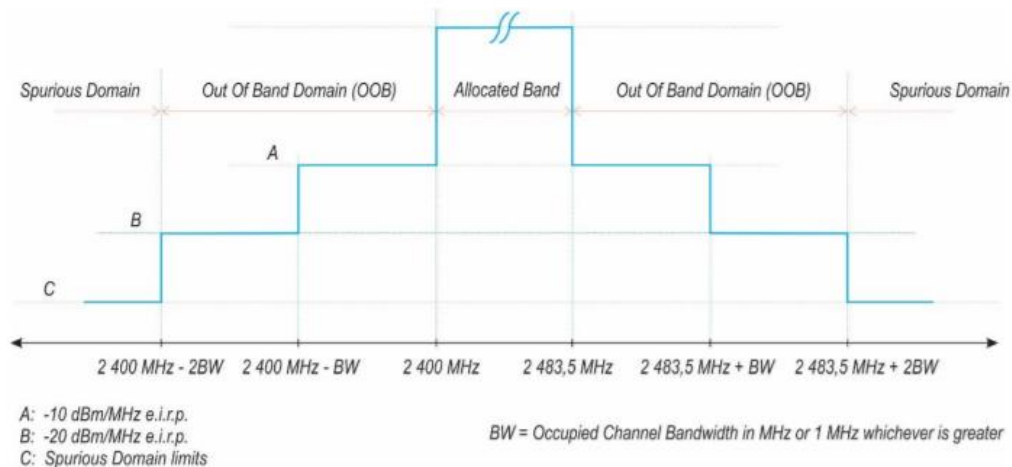
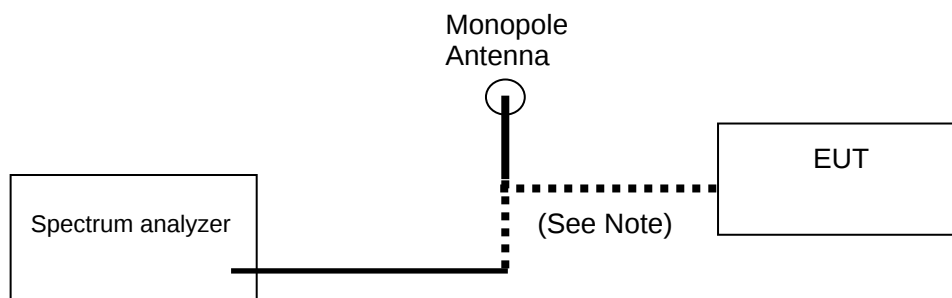


Figure 3: Transmit mask

Test Setup



Remarks:

EUT was direct connected to test equipment through coupling device.

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Test Procedure

- 1) The spectrum analyzer shall be used the following settings:
 - ◆ Centre Frequency: 2484MHz
 - ◆ Resolution BW: 1MHz; Video BW: 3MHz; Span: 0Hz; Detector: RMS
 - ◆ Trace mode: Max Hold; Sweep Points: 5000
- 2) Segment 2 483.5 MHz to 2 483.5 MHz + BW
 - ◆ Adjust the trigger level to select the transmissions with the highest power level.
 - ◆ Increase the center 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.
- 3) Segment 2 483.5 MHz + BW to 2 483.5 MHz + 2BW
 - ◆ Change the center frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483.5 MHz + BW to 2 483.5 MHz + 2BW. Increase the center frequency in 1 MHz steps and repeat the measurements to cover this whole range. The center frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW – 0.5MHz.
- 4) Segment 2 400 MHz - BW to 2 400 MHz
 - ◆ Change the center frequency of the analyzer to 2 399.5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the center frequency in 1 MHz steps and repeat the measurements to cover this whole range. The center frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5MHz.
- 5) Segment 2 400 MHz - 2BW to 2 400 MHz - BW
 - ◆ Change the center frequency of the analyzer to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the center frequency in 1 MHz steps and repeat the measurements to cover this whole range. The center frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5MHz.
- 6) The cable loss and attenuator factor shall be considered to the test result.

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Test Result

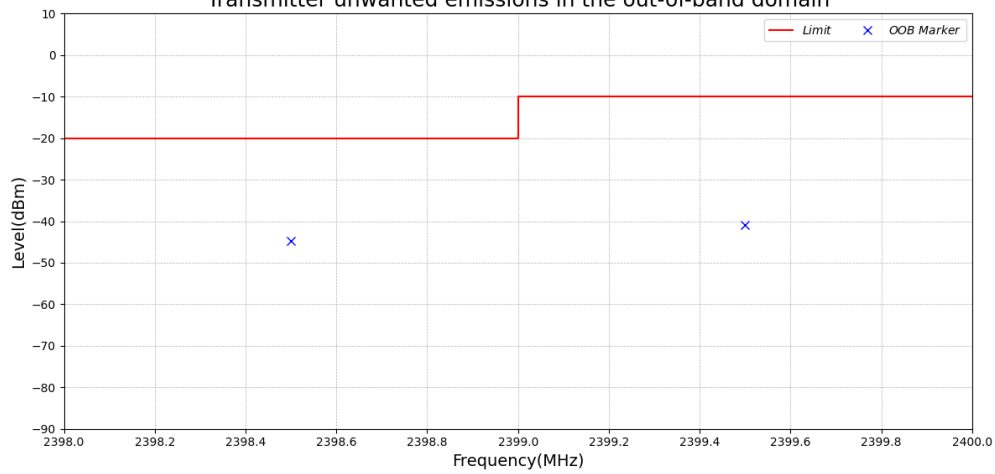
Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

Test Data of OOB Emissions				
Test Mode	Frequency [MHz]	Level [dBm]	Limit [dBm]	Verdict
BR_HOP_1Mbps	2399.5	-40.81	-10	Pass
BR_HOP_1Mbps	2398.5	-44.78	-20	Pass
BR_HOP_1Mbps	2484	-48.98	-10	Pass
BR_HOP_1Mbps	2485	-51.88	-20	Pass

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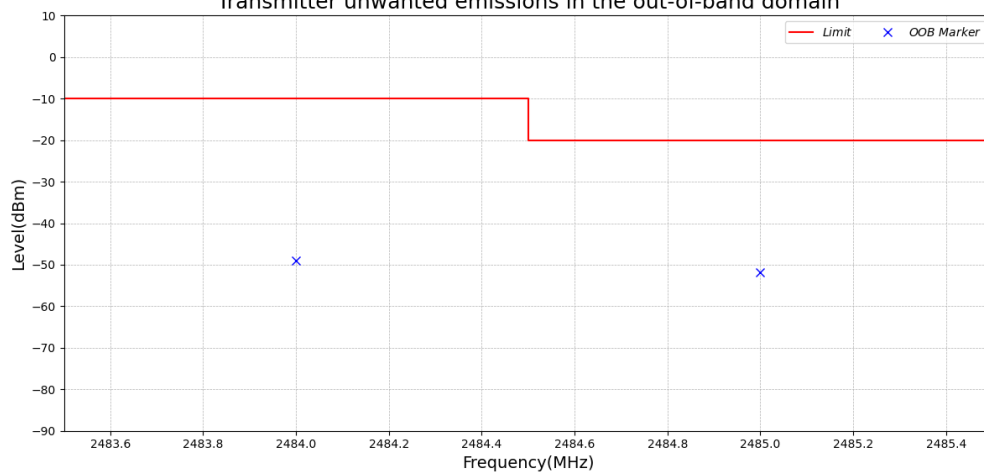
Test Graphs of OOB Emissions

Transmitter unwanted emissions in the out-of-band domain



Test Graph BR_HOP_ANT1_NA_1Mbps_OOB_L

Transmitter unwanted emissions in the out-of-band domain



Test Graph BR_HOP_ANT1_NA_1Mbps_OOB_R

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5.7 Transmitter Unwanted Emissions in the Spurious Domain

In the present document, 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.

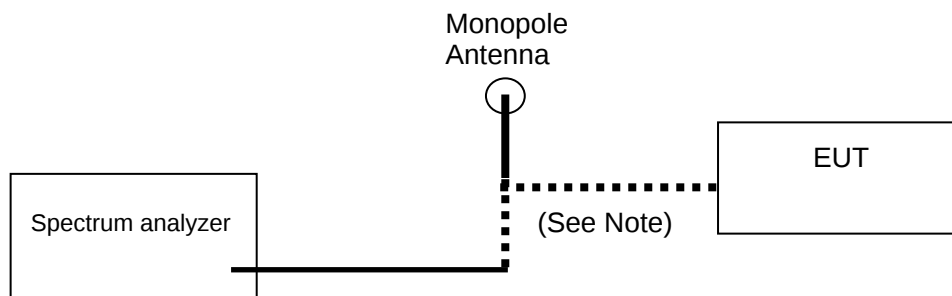
Test Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values.

Frequency Range	Maximum Power	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

Test Setup

☒ **Conducted Measurement Method:**

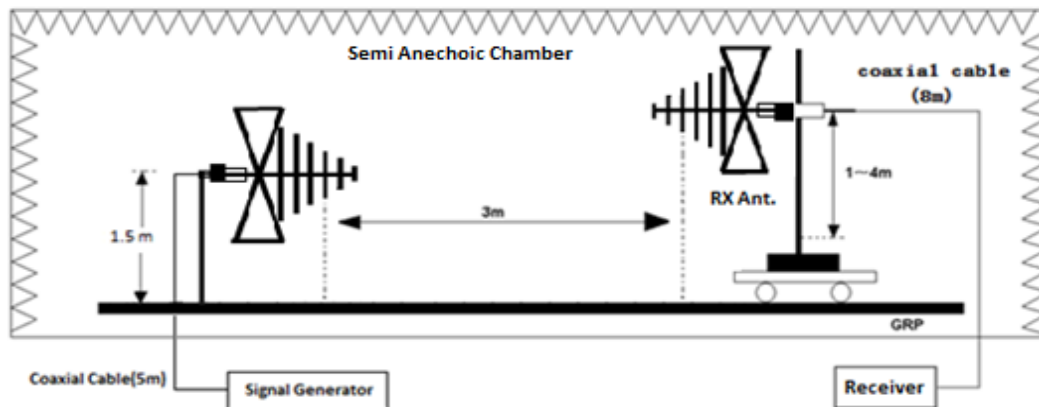
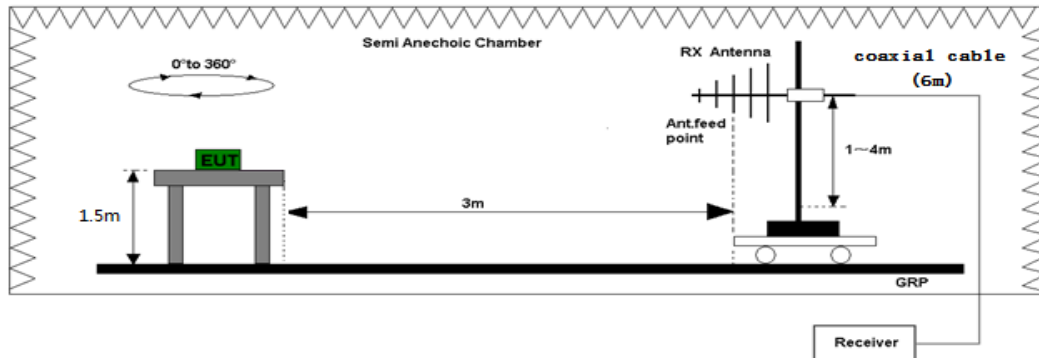


Remarks:

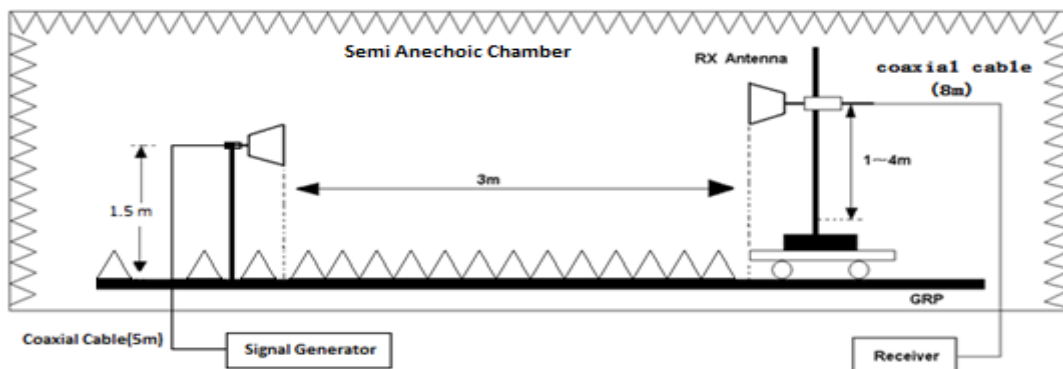
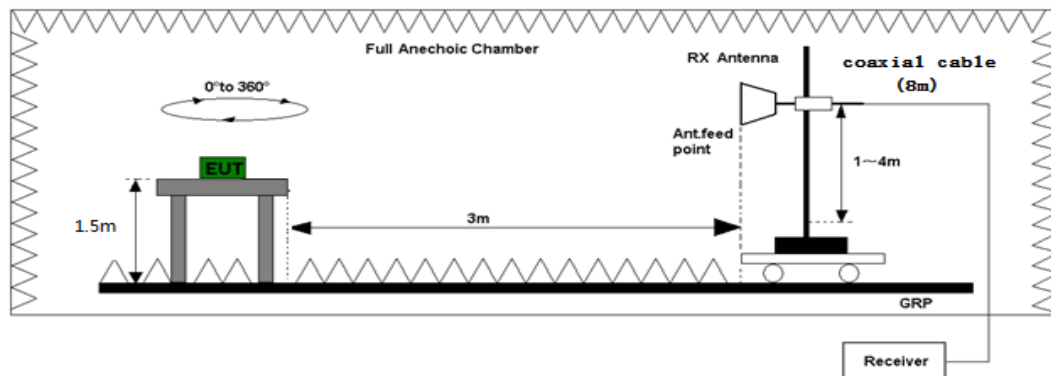
EUT was direct connected to test equipment through coupling device.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

☒ Radiated Measurement Method:



Radiated Emission Test Set-Up Frequency 30 MHz ~ 1 GHz



Radiated Emission Test Set-Up Frequency Above 1 GHz

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Test Procedure

- 1) The emissions over the range 30 MHz to 1 000 MHz shall be identified.
- 2) Spectrum analyzer settings:
 - Resolution bandwidth: 100 kHz
 - Video bandwidth: 300 kHz
 - Detector mode: Peak
 - Sweep Points: ≥19 400
 - Trace Mode: Max Hold
 - Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits.
- 3) The emissions over the range 1 GHz to 12,75 GHz shall be identified.
 - Resolution bandwidth: 1 MHz
 - Video bandwidth: 3 MHz
 - Detector mode: Peak
 - Trace Mode: Max Hold
 - Sweep Points: ≥23 500
 - Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits.
- 4) For radiated method, the applicable measurement procedures as described in the EN 300 328 V2.2.2 annex C.2 and C.4 are used.

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Test Result

☒ Conducted Measurement Method:

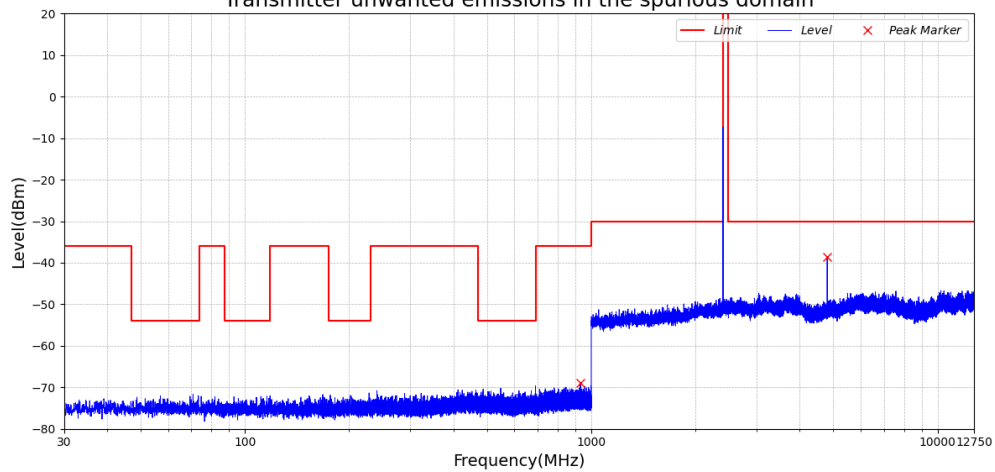
Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

Test Data of Transmitter Spurious Emissions				
Test Mode	Frequency [MHz]	Level [dBm]	Limit [dBm]	Verdict
BR_2402_1Mbps	929.479	-68.91	-36.00	Pass
BR_2402_1Mbps	4804.385	-38.57	-30.00	Pass
BR_2480_1Mbps	830.147	-69.01	-36.00	Pass
BR_2480_1Mbps	4960.274	-38.27	-30.00	Pass

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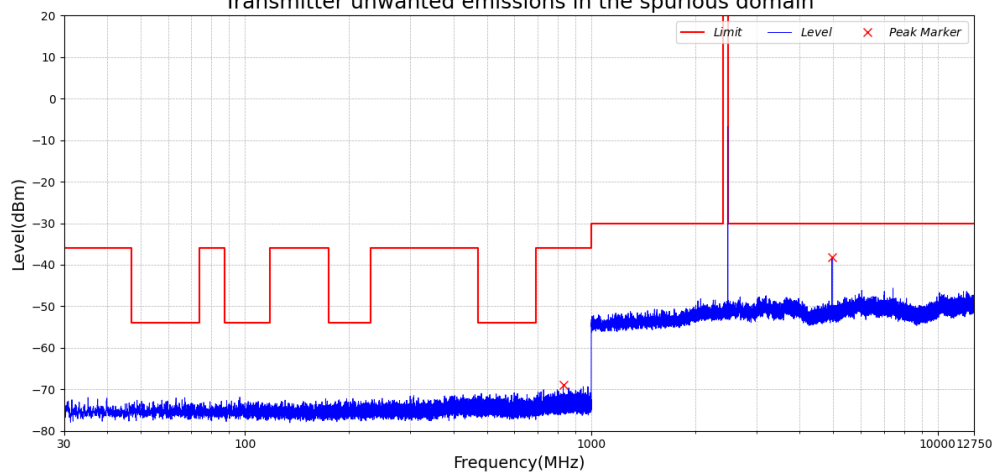
Test Graphs of Transmitter Spurious Emissions

Transmitter unwanted emissions in the spurious domain



Test_Graph_BR_ANT1_2402_1Mbps_TX

Transmitter unwanted emissions in the spurious domain



Test_Graph_BR_ANT1_2480_1Mbps_TX

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☒ **Radiated Measurement Method:**

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20
Worst Mode	BR_TX_2402_1Mbps		
Verdict	Pass		

■ Transmitter Spurious Emission below 1GHz (30MHz-1GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
78.06	28.94	-63.18	0.04	-0.50	-63.72	-36.00	27.72
234.23	30.07	-69.09	0.11	6.60	-62.60	-36.00	26.60
379.79	29.28	-70.07	0.28	6.51	-63.84	-36.00	27.84
387.45	30.32	-69.73	0.29	6.43	-63.59	-36.00	27.59
424.52	27.00	-72.91	0.33	7.02	-66.22	-36.00	30.22
828.93	31.85	-67.25	0.66	6.40	-61.51	-36.00	25.51
Other (30-1000)	--	--	--	--	--	-36.00/-54.00	--
Antenna Polarity: Horizontal							
139.29	31.23	-61.93	0.05	0.00	-61.98	-36.00	25.98
339.24	32.28	-67.09	0.23	5.74	-61.58	-36.00	25.58
396.95	29.50	-69.87	0.30	6.52	-63.65	-36.00	27.65
455.96	28.25	-71.26	0.37	6.55	-65.08	-36.00	29.08
613.18	31.58	-67.33	0.50	6.62	-61.21	-54.00	7.21
769.48	31.54	-67.67	0.62	6.87	-61.41	-36.00	25.41
Other (30-1000)	--	--	--	--	--	-36.00/-54.00	--

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■ Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
4804	58.67	-40.36	2.64	9.30	-33.70	-30.00	3.70
7206	56.54	-45.48	3.14	11.28	-37.34	-30.00	7.34
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-30.00	--
Antenna Polarity: Horizontal							
4804	59.42	-41.02	2.64	9.30	-34.35	-30.00	4.35
7206	56.13	-44.51	3.14	11.28	-36.36	-30.00	6.36
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-30.00	--

Note:

1. The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Emission Level=S.G.+ Ant.Gain- Cable Loss, Margin= Limit- Emission Level

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Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20
Worst Mode	BR_TX_2480_1Mbps		
Verdict	Pass		

■ Transmitter Spurious Emission below 1GHz (30MHz-1GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
77.65	27.54	-64.76	0.04	-0.70	-65.50	-36.00	29.50
236.49	29.52	-70.25	0.11	6.60	-63.76	-36.00	27.76
379.58	29.31	-69.43	0.28	6.51	-63.20	-36.00	27.20
388.22	30.50	-69.53	0.29	6.42	-63.40	-36.00	27.40
424.18	28.03	-72.81	0.33	7.02	-66.12	-36.00	30.12
830.86	31.50	-67.51	0.66	6.30	-61.87	-36.00	25.87
Other (30-1000)	--	--	--	--	--	-36.00/-54.00	--
Antenna Polarity: Horizontal							
138.76	31.57	-62.25	0.05	0.00	-62.30	-36.00	26.30
340.65	32.43	-66.46	0.23	5.70	-60.99	-36.00	24.99
395.01	29.95	-70.23	0.30	6.50	-64.03	-36.00	28.03
456.20	28.57	-71.18	0.37	6.58	-64.97	-36.00	28.97
617.22	31.08	-68.27	0.51	6.78	-62.00	-54.00	8.00
764.66	30.94	-68.25	0.61	6.72	-62.15	-36.00	26.15
Other (30-1000)	--	--	--	--	--	-36.00/-54.00	--

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■ Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
4960	58.74	-41.06	2.75	9.62	-34.19	-30.00	4.19
7440	53.25	-48.71	3.09	11.62	-40.18	-30.00	10.18
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-30.00	--
Antenna Polarity: Horizontal							
4960	57.68	-41.77	2.75	9.62	-34.90	-30.00	4.90
7440	52.16	-50.00	3.09	11.62	-41.48	-30.00	11.48
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-30.00	--

Note:

1. The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Emission Level=S.G.+ Ant.Gain- Cable Loss, Margin= Limit- Emission Level

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6. ETSI EN 300 328 Requirements for Receiver

6.1 Receiver Unwanted Emissions in the Spurious Domain

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

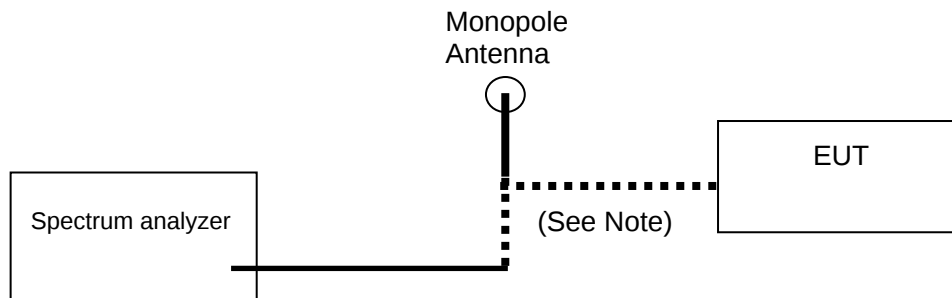
Test Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values.

Frequency Range	Maximum Power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

Test Setup

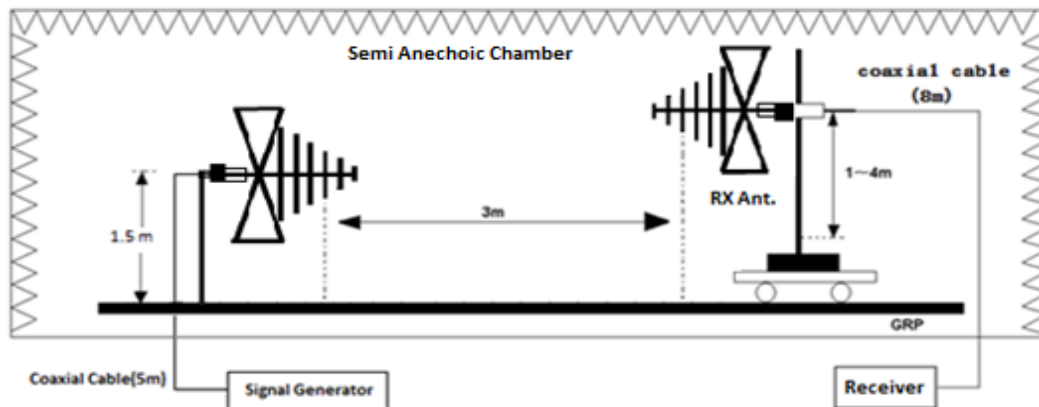
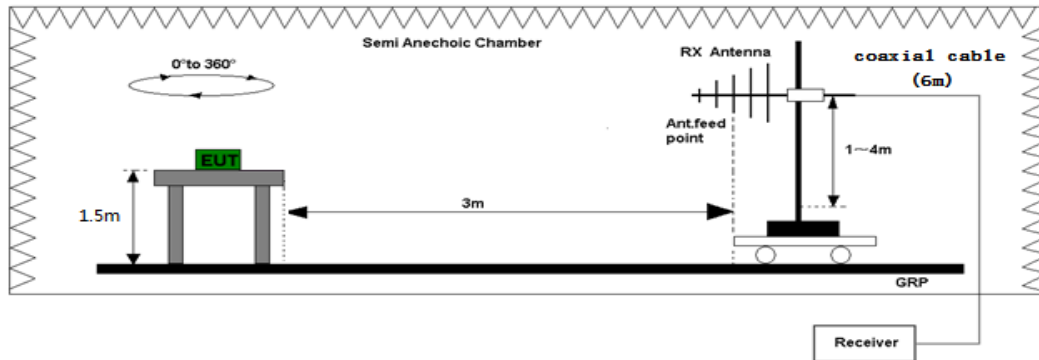
☒ Conducted Measurement Method:



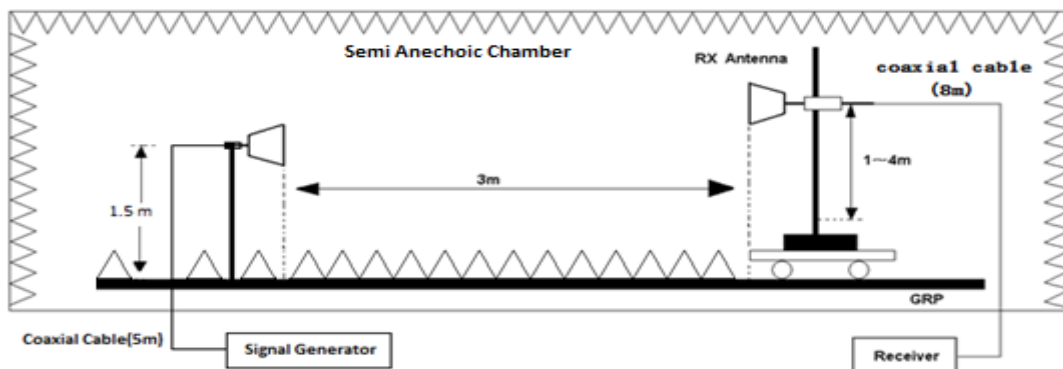
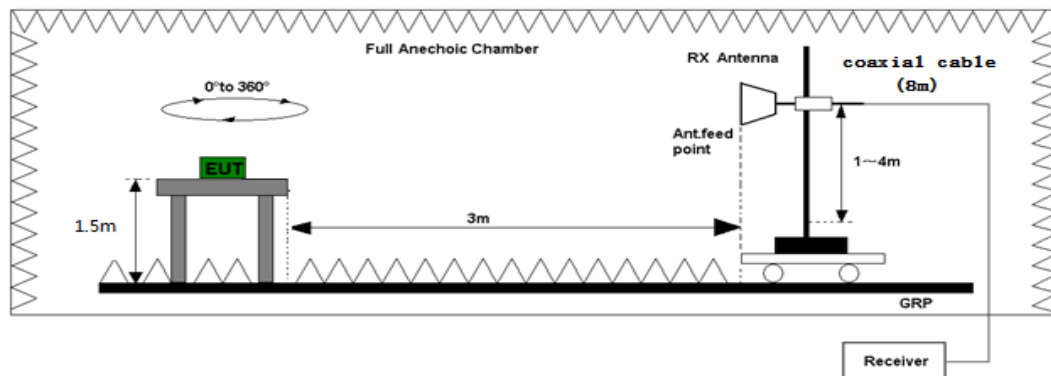
Remarks:

EUT was direct connected to test equipment through coupling device.

☒ Radiated Measurement Method:



Radiated Emission Test Set-Up Frequency 30 MHz ~ 1 GHz



Radiated Emission Test Set-Up Frequency Above 1 GHz

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Test Procedure

- 1) The emissions over the range 30 MHz to 1 000 MHz shall be identified.
- 2) Spectrum analyzer settings:
 - Resolution bandwidth: 100 kHz
 - Video bandwidth: 300 kHz
 - Detector mode: Peak
 - Sweep Points: ≥19 400
 - Trace Mode: Max Hold
 - Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits.
- 3) The emissions over the range 1 GHz to 12,75 GHz shall be identified.
 - Resolution bandwidth: 1 MHz
 - Video bandwidth: 3 MHz
 - Detector mode: Peak
 - Trace Mode: Max Hold
 - Sweep Points: ≥23 500
 - Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits.
- 4) For radiated method, the applicable measurement procedures as described in the EN 300 328 V2.2.2 annex C.2 and C.4 are used.

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Test Result

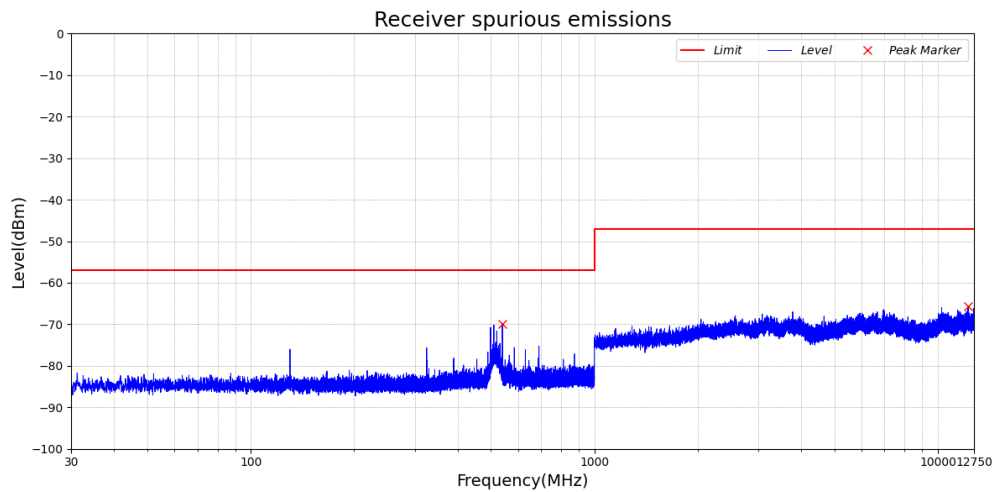
☒ Conducted Measurement Method:

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

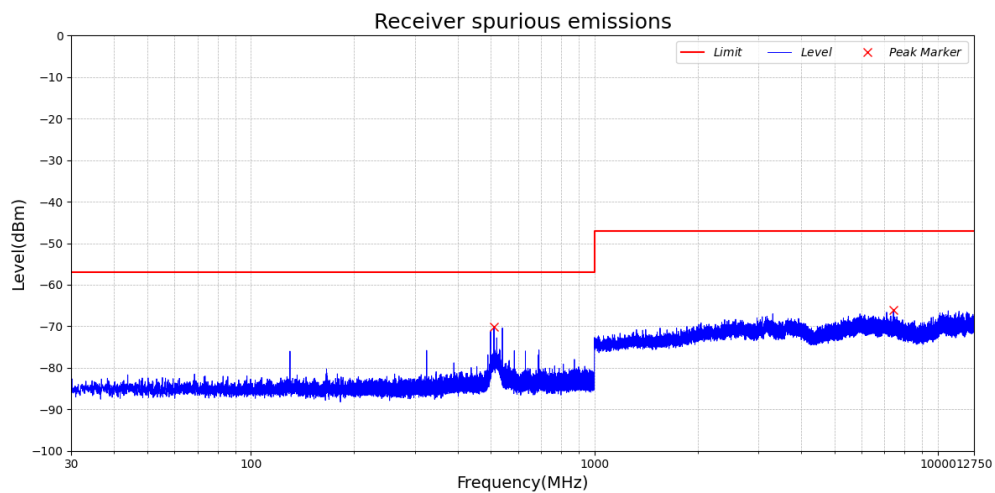
Test Data of Receiver Spurious Emissions				
Test Mode	Frequency [MHz]	Level [dBm]	Limit [dBm]	Verdict
BR_2402_1Mbps	539.994	-69.86	-57.00	Pass
BR_2402_1Mbps	12223.992	-65.62	-47.00	Pass
BR_2480_1Mbps	509.988	-70.1	-57.00	Pass
BR_2480_1Mbps	7430.775	-66.03	-47.00	Pass

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Test Graphs of Receiver Spurious Emissions



Test_Graph_RX_ANT1_2402_1Mbps_RX



Test_Graph_RX_ANT1_2480_1Mbps_RX

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☒ Radiated Measurement Method:

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20
Worst Mode	BR_RX_2402_1Mbps		
Verdict	Pass		

■ Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
89.29	28.34	-65.18	0.04	1.26	-63.96	-57.00	6.96
241.26	31.05	-68.90	0.12	6.66	-62.36	-57.00	5.36
313.64	27.72	-70.93	0.20	6.31	-64.82	-57.00	7.82
387.09	29.61	-69.35	0.29	6.43	-63.21	-57.00	6.21
475.82	28.32	-71.71	0.39	6.85	-65.25	-57.00	8.25
832.09	30.61	-68.10	0.66	6.44	-62.32	-57.00	5.32
Other (30-1000)	--	--	--	--	--	-57.00	--
Antenna Polarity: Horizontal							
139.62	29.33	-64.48	0.05	0.00	-64.53	-57.00	7.53
331.35	29.67	-68.53	0.22	6.06	-62.69	-57.00	5.69
395.42	29.30	-70.85	0.30	6.50	-64.65	-57.00	7.65
566.35	30.08	-69.74	0.47	6.84	-63.37	-57.00	6.37
613.32	28.07	-70.44	0.50	6.62	-64.32	-57.00	7.32
817.91	29.16	-69.36	0.65	6.89	-63.12	-57.00	6.12
Other (30-1000)	--	--	--	--	--	-57.00	--

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■ Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
4804	52.01	-47.35	2.65	9.34	-40.66	-47.00	10.66
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-47.00	--
Antenna Polarity: Horizontal							
4804	51.32	-49.53	2.65	9.34	-42.84	-47.00	12.84
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-47.00	--

Note:

1. The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Emission Level=S.G.+ Ant.Gain- Cable Loss, Margin= Limit- Emission Level

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Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20
Worst Mode	BR_RX_2480_1Mbps		
Verdict	Pass		

■ Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
92.06	28.31	-65.46	0.04	1.56	-63.94	-57.00	6.94
242.14	30.41	-69.51	0.12	6.72	-62.91	-57.00	5.91
313.80	28.94	-69.55	0.20	6.31	-63.44	-57.00	6.44
382.97	28.31	-71.46	0.28	6.48	-65.26	-57.00	8.26
477.56	29.06	-71.47	0.39	6.87	-64.99	-57.00	7.99
831.63	30.24	-68.24	0.66	6.37	-62.53	-57.00	5.53
Other (30-1000)	--	--	--	--	--	-57.00	--
Antenna Polarity: Horizontal							
137.02	29.60	-62.60	0.05	0.00	-62.65	-57.00	5.65
335.23	28.75	-69.22	0.23	5.90	-63.55	-57.00	6.55
395.60	31.05	-68.80	0.30	6.50	-62.60	-57.00	5.60
569.32	29.78	-69.21	0.47	6.81	-62.88	-57.00	5.88
616.15	28.61	-70.82	0.51	6.74	-64.58	-57.00	7.58
816.11	29.34	-70.78	0.65	6.92	-64.51	-57.00	7.51
Other (30-1000)	--	--	--	--	--	-57.00	--

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■ Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

Frequency (MHz)	Reading Level (dBμV/m)	S.G. (dBm)	Cable Loss (dB)	Ant.Gain (dBi)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Antenna Polarity: Vertical							
1830.48	33.26	-65.00	1.26	7.15	-59.11	-47.00	12.11
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-47.00	--
Antenna Polarity: Horizontal							
1786.77	31.52	-68.12	1.23	6.93	-62.42	-47.00	15.42
--	--	--	--	--	--	--	--
Other (1000-12750)	--	--	--	--	--	-47.00	--

Note:

1. The margins of the other spectrum are not exceeding the minimum value of margin, and this part of the results without recording in the test report.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Emission Level=S.G.+ Ant.Gain- Cable Loss, Margin= Limit- Emission Level

6.2 Receiver Blocking

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.

Test Limit

☐ 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 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log10(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 $P_{\text{min}} + 26 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 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 $P_{\text{min}} + 20 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 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 Blocking parameters for 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
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ 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 $P_{\text{min}} + 26 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 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.

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☒ Receiver Blocking parameters for Receiver Category 3 equipment

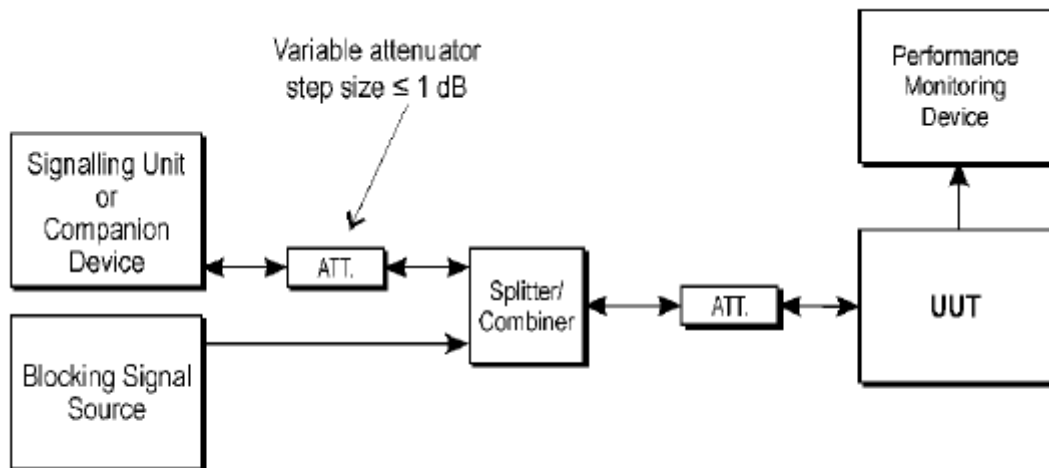
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log ₁₀ (OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

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 4.3.2.11.3 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.

Test Setup



Test Set-up for receiver blocking

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Test Procedure

- For non-FHSS equipment, having more than one operating channel, the operating channels on which the testing has to be performed shall be selected as follows:
 - For testing blocking frequencies less than 2 400 MHz, the equipment shall operate on the lowest operating channel.
 - For testing blocking frequencies greater than 2 500 MHz, the equipment shall operate on the highest operating channel.
- The simplified conducted measure procedures are as follows:
 - 1) For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed.
 - 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.
 - 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. 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. 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.
 - 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 is met.
 - 5) Repeat step 4 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.
 - 6) Repeat step 2 to step 5 with the UUT operating at the highest operating channel.

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Test Result

Test Temperature	24.8℃	Relative Humidity	44 %
Test Engineer	Icey Huang	Testing Time	2025-02-20

Test Data of Receiver Blocking						
Test Condition	Blocking Signal Frequency (MHz)	Blocking Signal Power(dBm)	Wanted signal mean power from companion device(dBm)	Performance PER	Limit PER	Result
GFSK Hopping Mode	2 300	-32.80	-58.46	0.56%	10%	Pass
	2 380	-32.80	-58.46	0.32%	10%	Pass
	2 504	-32.80	-58.46	0.14%	10%	Pass
	2 584	-32.80	-58.46	0.22%	10%	Pass

Test Data of Receiver Blocking						
Test Condition	Blocking Signal Frequency (MHz)	Blocking Signal Power(dBm)	Wanted signal mean power from companion device(dBm)	Performance PER	Limit PER	Result
π /4-DQPSK Hopping Mode	2 300	-32.80	-57.04	0.36%	10%	Pass
	2 380	-32.80	-57.04	0.14%	10%	Pass
	2 504	-32.80	-57.04	0.36%	10%	Pass
	2 584	-32.80	-57.04	0.19%	10%	Pass

Test Data of Receiver Blocking						
Test Condition	Blocking Signal Frequency (MHz)	Blocking Signal Power(dBm)	Wanted signal mean power from companion device(dBm)	Performance PER	Limit PER	Result
8DPSK Hopping Mode	2 300	-32.80	-57.02	0.42%	10%	Pass
	2 380	-32.80	-57.02	0.59%	10%	Pass
	2 504	-32.80	-57.02	0.17%	10%	Pass
	2 584	-32.80	-57.02	0.36%	10%	Pass

Note: The levels of the blocking signal and wanted signal have to be corrected for the (in-band) antenna assembly gain.

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Appendix I: Photographs of Test Setup

Radiated Spurious Emissions Below 1GHz Test Setup



Radiated Spurious Emissions Above 1GHz Test Setup



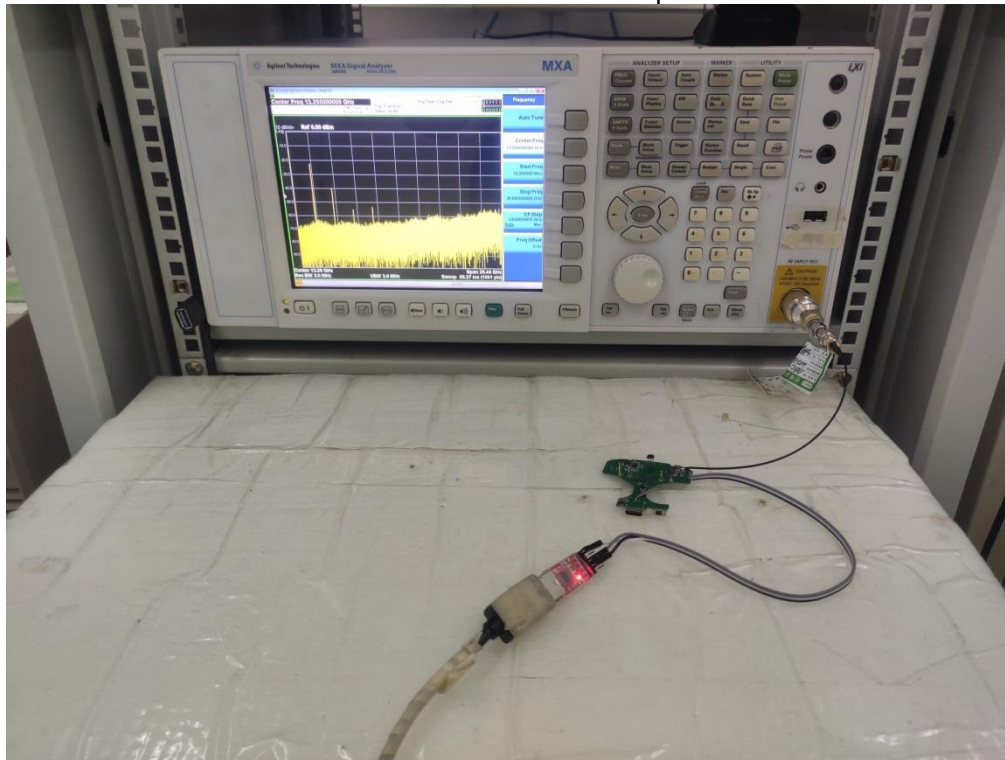
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RF Conducted Test Setup



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Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC12440250101AP01

-----End of Report-----

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Radio Test Report

Report No.: AGC12440250101ER03

PRODUCT DESIGNATION : WIRELESS SPEAKER

BRAND NAME : N/A

MODEL NAME : M06819, M06818

APPLICANT : MID OCEAN BRANDS B.V.

DATE OF ISSUE : Feb. 24, 2025

STANDARD(S) : ETSI EN 303 345-1 V1.1.1 (2019-06)
ETSI EN 303 345-3 V1.1.1 (2021-06)

REPORT VERSION : V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Feb. 24, 2025	Valid	Initial Release

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Table of Contents

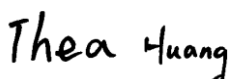
1. General Information	4
2. Product Information	5
2.1 Product Technical Description	5
2.2 Objective.....	6
2.3 Test Items and The Results	6
2.4 Description of Test Modes	6
2.5 Test Signal Configurations	6
3. Setup of Equipment Under Test	7
3.1 Setup Configuration of EUT	7
3.2 Support Equipment	7
4. Test Environment	8
4.1 Address of The Test Laboratory	8
4.2 Test Facility	8
4.3 Environmental Conditions	9
4.4 Measurement Uncertainty	9
4.5 List of Equipment Used	10
5. ETSI EN 303 345 Requirements for Receiver	11
5.1 Sensitivity	11
5.2 Adjacent Channel Selectivity and Blocking	13
5.3 Unwanted Emissions in the Spurious Domain	17
Appendix I: Photographs of Test Setup	22
Appendix II: Photographs of Test EUT	23

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1. General Information

Applicant	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Manufacturer	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Factory	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Product Designation	WIRELESS SPEAKER
Brand Name	N/A
Test Model	MO6819
Series Model(s)	MO6818
Difference Description	All are the same except for the appearance material
Date of receipt of test item	Jan. 17, 2025
Date of Test	Jan. 17, 2025~Feb. 24, 2025
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-EU-FMR3-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By		
	Thea Huang (Project Engineer)	Feb. 24, 2025
Reviewed By		
	Calvin Liu (Reviewer)	Feb. 24, 2025
Approved By		
	Angela Li (Authorized Officer)	Feb. 24, 2025

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2. Product Information

2.1 Product Technical Description

Operation Frequency Range	☐ VHF band I: 47MHz to 68MHz (FM)
	☒ VHF band II: 87.5 MHz to 108 MHz (FM)
	☐ VHF band III: 174 MHz to 240 MHz (DAB)
	☐ Low frequency (LF): 148.5 kHz to 283.5 kHz (FM)
	☐ Medium frequency (MF): 526.5 kHz to 1606.5 kHz (AM)
	☐ High frequency (HF): 3.95MHz to 26.1MHz (FM)
Hardware Version	V2.0
Software Version	ac696n_soundbox_sdk_v1.6.0
Modulation Method	☒ Frequency modulation (FM)
	☐ Amplitude Modulation (AM)
Operation Mode	Receive only mode
Antenna Designation	☒ Integral antenna ☐ Built-in antenna ☐ External antenna
Power Supply	DC 5V from Adapter and DC 3.7V, 300mAh by Battery

Note: For more details, refer to the user's manual of the EUT.

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2.2 Objective

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the Radio Equipment Directive (2014/53/EU) for the Broadcast Sound Receivers Function of the EUT.

2.3 Test Items and The Results

The tests were performed according to following standards:

ETSI EN 303 345-1 V1.1.1 (2019-06)	Broadcast Sound Receivers; Part 1: Generic requirements and measuring methods
ETSI EN 303 345-3 V1.1.1 (2021-06)	Broadcast Sound Receivers; Part 3: FM broadcast sound service; Harmonized Standard for access to radio spectrum

Test items and the results are as bellow:

No.	Test Item	Standard Require	Result
1	Sensitivity	EN 303 345-3 sub-clause 4.2	Pass
2	Adjacent channel selectivity and blocking	EN 303 345-3 sub-clause 4.3	Pass
3	Unwanted emissions in the spurious domain	EN 303 345-3 sub-clause 4.4	Pass

2.4 Description of Test Modes

No.	Test Mode Description
1	FM Receiving mode at 98MHz

2.5 Test Signal Configurations

The generated FM signals (wanted and unwanted) and the blocking signal shall be in accordance with table The configuration is based on Recommendation ITU-R BS.641.

Parameter	FM signals		AM signal
	Wanted	Unwanted	Blocking
Audio modulation	1 kHz tone	Weighted noise Recommendation ITU-R BS.559-2, clause 1, band limited to 15 kHz (See note 1)	1 kHz tone
Other modulation parameters	±60,8 kHz peak deviation	15,9 kHz RMS deviation (See note 2)	80 % depth
Pilot tone	None	None	None
Note 1: The filter shall have a cut-off frequency of 15 kHz and a minimum roll-off of 60 dB/octave. Note 2: This is equivalent to a quasi-peak deviation of 34,8 kHz and has pre-emphasis enabled. The quasi-peak level measurement is defined by Recommendation ITU-R BS.641, clause 5; with pre-emphasis disabled the quasi-peak deviation is 32 kHz (14,5 kHz RMS).			

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3. Setup of Equipment Under Test

3.1 Setup Configuration of EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

3.2 Support Equipment

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?				
No				
Item	Equipment	Trade Name	Model No.	Specification
1	--	--	--	--

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4. Test Environment

4.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

4.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

4.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106
Power supply	DC 3.7V

4.4 Measurement Uncertainty

Test Items	Measurement Uncertainty	Notes
Sensitivity	±3.8dB	(1)
Adjacent channel selectivity and blocking	±3.8dB	(1)
Radiated Emissions: 30MHz-1GHz	±3.9dB	(1)
Radiated Emissions: Above 1GHz	±4.1dB	(1)

Note:

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

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4.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E059	Signal Generator	Agilent	N5182B	MY53050647	2025-01-14	2026-01-13
☒	AGC-ER-E037	Signal Generator	Agilent	N5182A	MY50140530	2024-05-23	2025-05-22
☐	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-ER-A004	Power splitter	Agilent	1167B	/	2024-05-30	2025-05-29
☒	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2024-05-24	2025-05-23
☐	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2024-05-28	2025-05-27
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☐	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-03-31	2025-03-30
☐	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2024-07-24	2026-07-23
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	N/A	N/A

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☐	AGC-EM-S004	RE Test System	Tonscend	TS ⁺ Ver2.1(JS32-RE)	4.0.0.0
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A

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5. ETSI EN 303 345 Requirements for Receiver

5.1 Sensitivity

The receiver sensitivity is the minimum wanted signal level required to provide a given level of audio quality.

Test Limit

- **FM:** the limits for sensitivity specified in the table shall apply. Each figure quoted is the required level of wanted signal which provides a given level of audio quality. The audio impairment criteria relevant for these tests is that the audio SNR ≥ 40 dBQ ref $\pm 60,8$ kHz deviation, and that there shall be 10 seconds of audio with no subjective impairments (e.g. clicks resulting from FM threshold effects).

FM sensitivity requirements

De-modulation	Tuned frequency band	Wanted signal Centre frequency (MHz)	Required sensitivity limit	
			Conducted (dBm)	Radiated (dB μ V/m)
FM	VHF band II	98	-90	50 (see note)

Note: For products with an integral antenna, the requirement is relaxed to 67dB μ V/m.

Test Setup

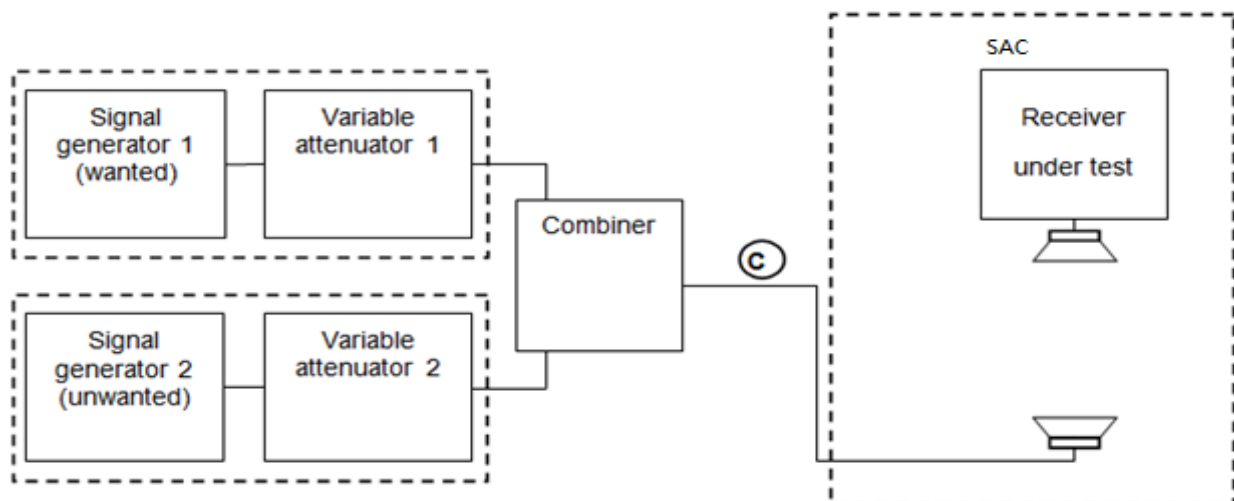


Figure 1: Generic measurement arrangement for receivers with built-in or integral antennas

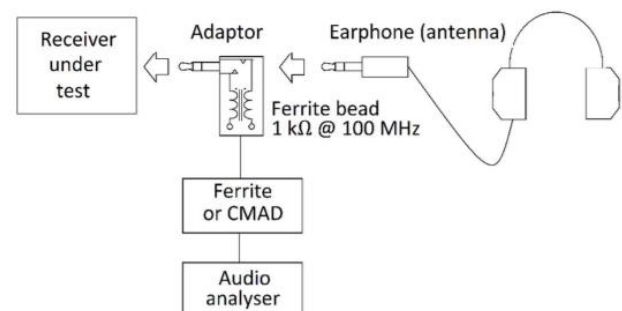
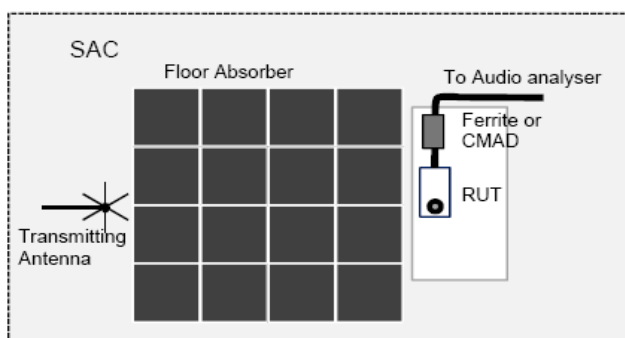


Figure B.1: Example set-up for electrical method (top view) Figure 4: Example adaptor for products using earphone as antenna

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Test Procedure

■ FM&AM test method is as follows:

1. For radiated testing, the EUT is placed in semi anechoic chamber (SAC). The field strength generated by the signal generator applying to the EUT at 3 meters distance from the antenna is pre-calibrated before testing.
2. The 'unwanted' signal generator remains switched off for the duration of the test.
3. The 'wanted' signal generator is set to the required modulation method and test configuration as specified, and to the frequency specified. The signal level is adjusted to provide the level, as measured at ©, specified plus 30dB.
4. The receiver (EUT) is tuned to the frequency of the 'wanted' signal generator. The audio level shall be set so as to provide clean 1 kHz audio tone at the audio output (that is less than 10 % total harmonic distortion) but of sufficient level to drive the measurement device.
5. The level of the 'wanted' signal generator is adjusted to provide the level, as measured at ©
6. The audio output, measured using the measurement device, is recorded as the signal level, S.
7. The modulating audio signal for the 'wanted' signal generator is removed. The audio output, measured using the measurement device, is recorded as the noise level, N.
8. If the impairment criteria given are met then the receiver has passed the test.

Test Result

FM VHF band II 98MHz (☒ Integral antenna ☐ Built-in antenna ☐ External antenna)					
Wanted Signal Level at © (dBμV/m)	S (mV)	N (mV)	SNR (dBQ)	Limit (dBQ)	Result
67	43.56	0.08	54.72	≥ 40	Pass

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5.2 Adjacent Channel Selectivity and Blocking

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal which differs in frequency from the wanted signal by an amount equal to a small multiple of the adjacent channel spacing. The wanted and unwanted signals are of the same modulation type.

The blocking ratio is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at a given frequency separation. The wanted and unwanted signals are of different modulation types.

Test Limit

● FM:

The limits for selectivity and blocking specified in the first table shall apply with the channel spacings given in the second table. Each figure quoted is the minimum acceptable level of unwanted signal, relative to that of the wanted signal, which provides a given level of audio quality. The audio impairment criteria relevant for these tests is that the audio SNR ≥ 40 dBQ ref $\pm 60,8$ kHz deviation, and that there shall be 10 seconds of audio with no subjective impairments (e.g. clicks resulting from FM threshold effects).

Channel spacing for adjacent channel selectivity and blocking

Demodulation	Tuned frequency band	Unwanted frequency (N = 2, 3, 4)	Unwanted frequency (blocking)
FM	VHF band II	$\pm N \times 100$ kHz	± 800 kHz

Adjacent channel selectivity and blocking requirements

Demodulation (see note 1)	Tuned frequency band	C Wanted signal center frequency (MHz)	C Wanted signal level		Required I/C ratio (see notes 2 and 3)			
			Conducted (dBm)	Radiated (dB μ V/m)	N = 2 (dB)	N = 3 (dB)	N = 4 (dB)	Blocking (dB)
FM (built-in or integral antenna)	VHF band II	98	n/a	56 (see note 4)	-15	-3	8	20
FM (external antenna)	VHF band II	98	-84	n/a	3	17	30	30

Note 1: The ACS and blocking requirements are currently separated into different limits for radiated and conducted testing methods. These limits are likely to be unified in a future revision of the present document. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Note 2: The frequency of the interferer shall be calculated using the channel spacing data in table 3 for each of the 6 defined adjacent channels $N = \{-4, -3, -2, +2, +3, +4\}$ and the two blocking offsets. Each row of table 4 thus defines 8 individual tests.

Note 3: The minimum level of I for the relevant level of impairment is calculated by adding the I/C ratio to the wanted C level.

Note 4: The wanted signal level for receivers with integral antenna is 73 dB μ V/m.

Test Setup

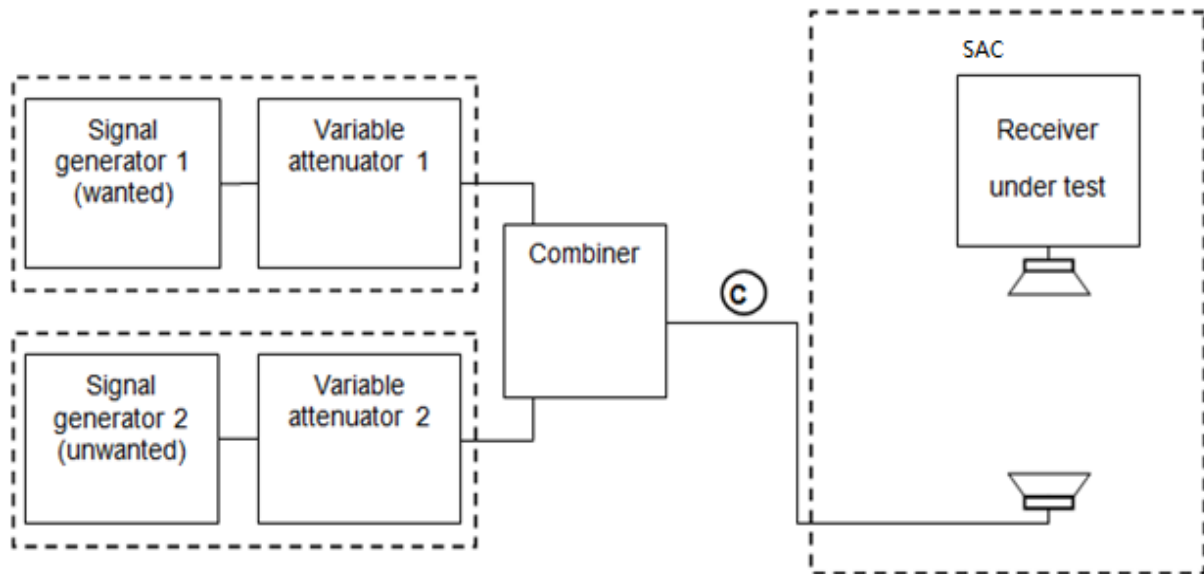


Figure 1: Generic measurement arrangement for receivers with built-in or integral antennas

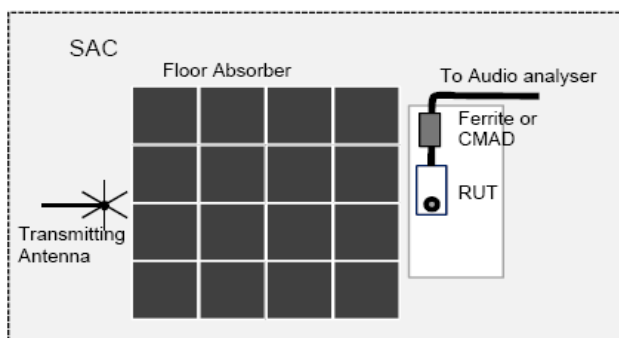


Figure B.1: Example set-up for electrical method (top view)

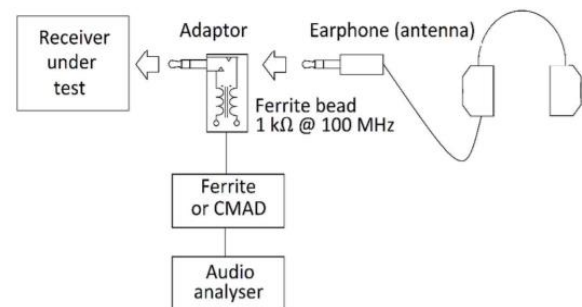


Figure 4: Example adaptor for products using earphone as antenna

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Test Procedure

■ FM test method is as follows:

1. For radiated testing, the EUT is placed in semi anechoic chamber (SAC). The field strength generated by the signal generator applying to the EUT at 3 meters distance from the antenna is pre-calibrated before testing.
2. The 'wanted' signal generator is set to the required modulation method and test configuration as specified, and to the frequency specified. The signal level is adjusted to provide the level, as measured at ©, specified in above table, with the 'unwanted' generator switched off
3. The receiver (EUT) is tuned to the frequency of the 'wanted' signal generator. The audio level shall be set so as to provide clean 1 kHz audio tone at the audio output (that is less than 10 % total harmonic distortion) but of sufficient level to drive the measurement device.
4. The 'unwanted' signal generator is set to the required modulation method and test configuration as specified. and to the frequency calculated from the wanted signal center frequency and the required offset specified in above Table. The signal level is adjusted to provide the level, as measured at ©, specified in above Table, with the 'wanted' generator switched off. For the blocking test only, the audio modulation of the 'unwanted' signal shall be removed whilst measuring the level at ©.
5. The 'wanted' signal generator is switched back on.
6. The audio output, measured using the measurement device, is recorded as the signal level, S.
7. The modulating audio signal for the 'wanted' signal generator is removed. The audio output, measured using the measurement device, is recorded as the noise level, N.
8. If the impairment criteria given are met then the receiver has passed the test.

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Test Result

FM VHF band II 98MHz (☒ Integral antenna ☐ Built-in antenna ☐ External antenna)								
Adjacency and Blocking	C Wanted signal level at © (dBμV/m)	I Unwanted Signal Level at © (dBμV/m)	Required I/C ratio(dB)	S (mV)	N (mV)	SNR (dBQ)	Limit (dBQ)	Result
97.8 MHz	73	58	-15	42.63	0.08	54.53	≥ 40	Pass
98.2 MHz	73	58	-15	42.63	0.08	54.53	≥ 40	Pass
97.7 MHz	73	70	-3	42.63	0.08	54.53	≥ 40	Pass
98.3 MHz	73	70	-3	42.63	0.08	54.53	≥ 40	Pass
97.6 MHz	73	81	8	42.63	0.08	54.53	≥ 40	Pass
98.4 MHz	73	81	8	42.63	0.08	54.53	≥ 40	Pass
97.2 MHz	73	93	20	42.63	0.08	54.53	≥ 40	Pass
98.8 MHz	73	93	20	42.63	0.08	54.53	≥ 40	Pass

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5.3 Unwanted Emissions in the Spurious Domain

Spurious domain radiated and conducted (differential voltage) emissions from the equipment.

Test Limit

Limits for radiated emission 30MHz to 1 GHz at a measurement distance of 3 m

Frequency range (MHz)	Class B limits dB(μ V/m)
30 to 230	40
230 to 1000	47

Limits for radiated emission above 1 GHz at a measurement distance of 3 m

Frequency (MHz)	Class B limits dB(μ V/m)	
	Peak	Average
1000 to 3000	70	50
3000 to 6000	74	54

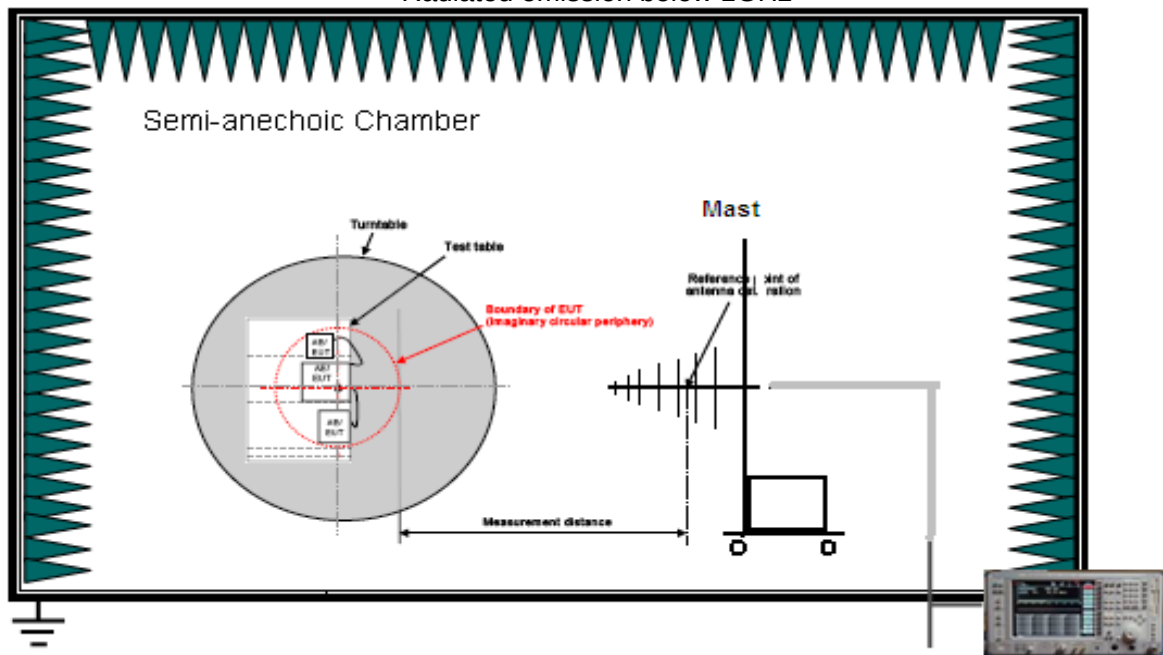
Limits for radiated emission from FM receivers at a measurement distance of 3 m

Frequency (MHz)	Class B limits dB(μ V/m)	
	Fundamental	Harmonics
30 to 230	60	52
230 to 300		52
300 to 1 000		56

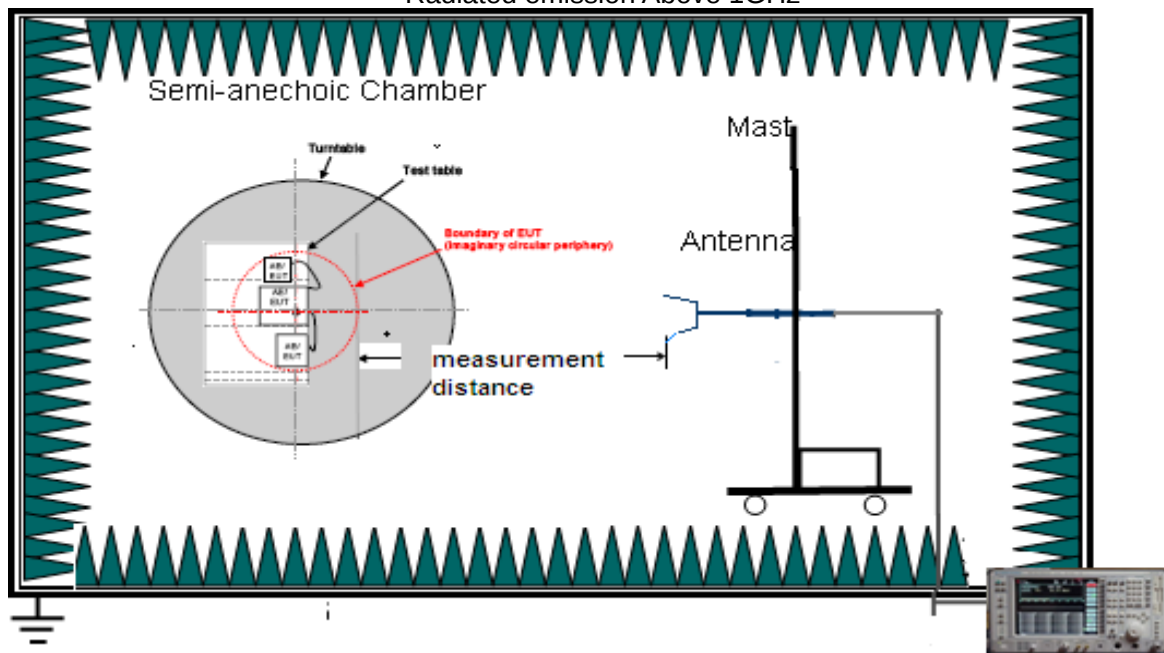
Note: These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the LO. Signals at all other frequencies shall be compliant with the limits given in the above tables.

Test Setup

Radiated emission below 1GHz



Radiated emission Above 1GHz



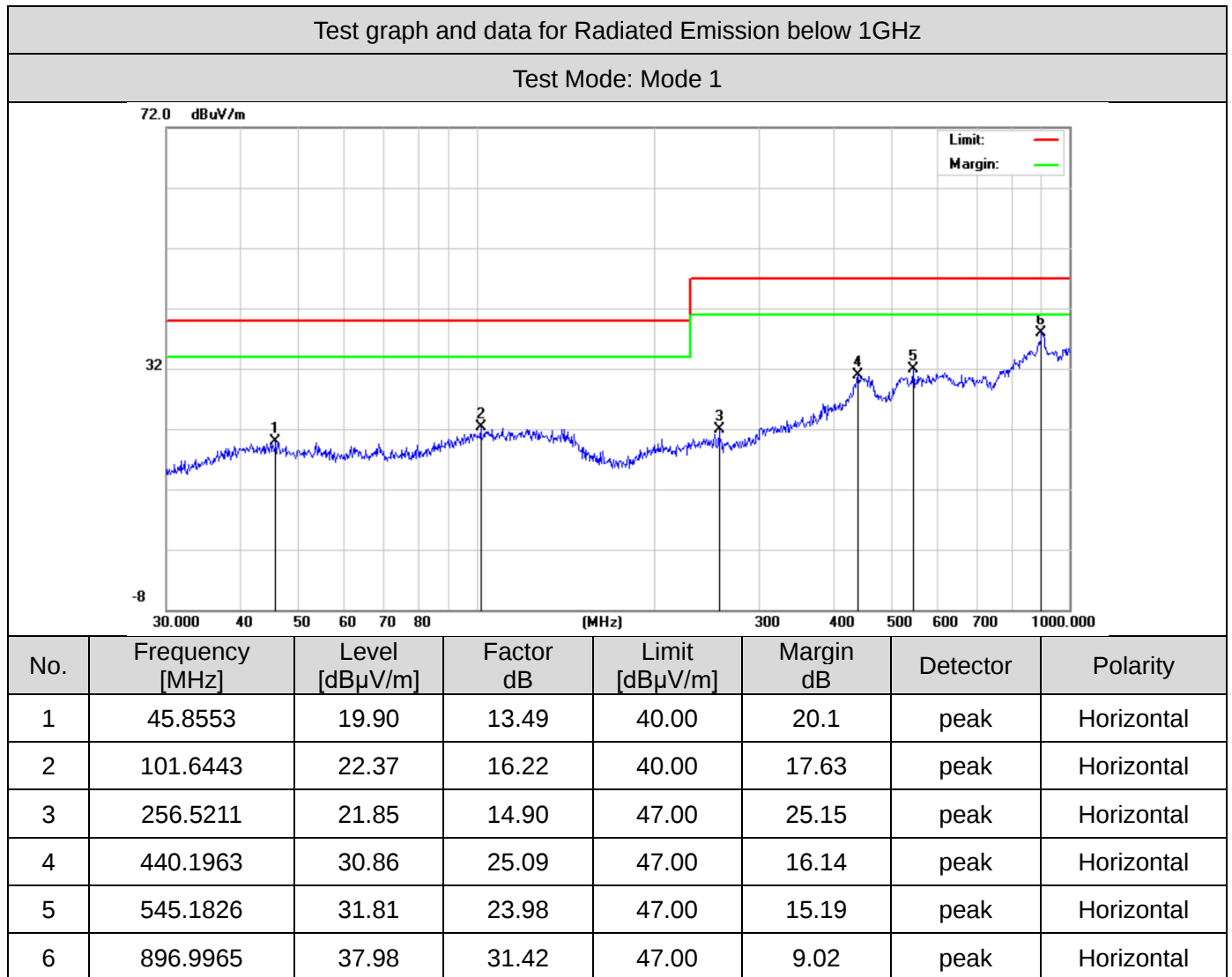
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Test Procedure

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55032 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10cm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per EN 55032.
3. All I/O cables were positioned to simulate typical actual usage as per EN 55032.
4. The EUT was operated in the selected mode(s) while the ports are exercised in accordance with Clause 2.
5. The antenna was placed at 3 meters away from the EUT as stated in EN 55032. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
6. The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
7. The test mode(s) were scanned during the test:
8. Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented.

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Test Result



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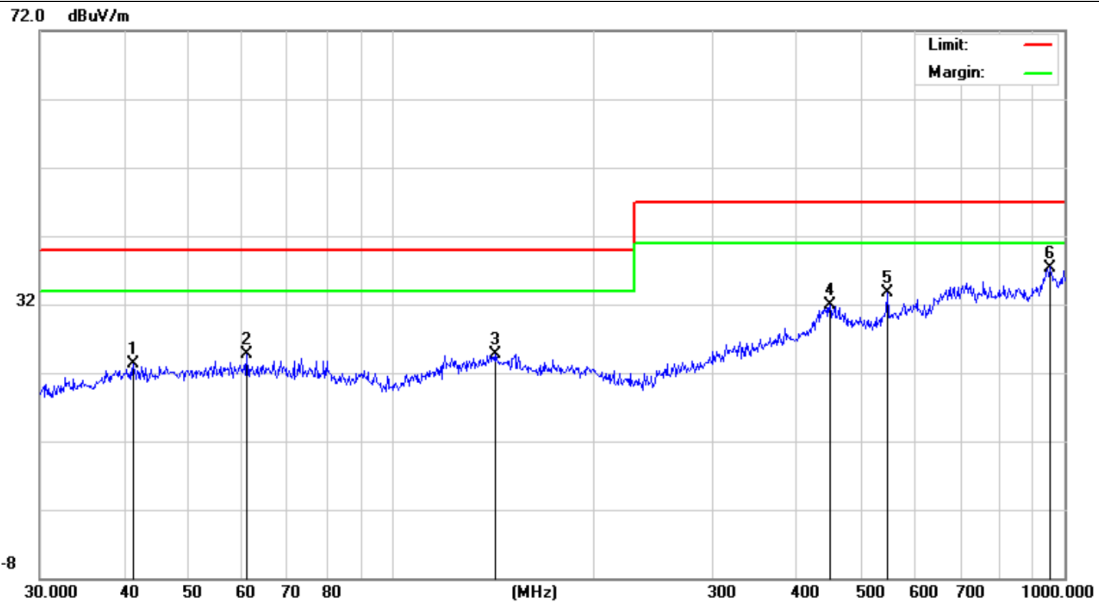
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Test graph and data for Radiated Emission below 1GHz

Test Mode: Mode 1



No.	Frequency [MHz]	Level [dBμV/m]	Factor dB	Limit [dBμV/m]	Margin dB	Detector	Polarity
1	41.2765	23.31	16.91	40.00	16.69	peak	Vertical
2	60.9176	24.61	17.09	40.00	15.39	peak	Vertical
3	142.3243	24.63	18.20	40.00	15.37	peak	Vertical
4	447.9822	31.94	25.74	47.00	15.06	peak	Vertical
5	545.1826	33.80	24.67	47.00	13.2	peak	Vertical
6	952.0937	37.40	30.52	47.00	9.6	peak	Vertical

Result: Pass

Note:

- Margin = Limit – Level; Factor = Cable Loss + Antenna Factor.
- The highest internal frequency of EUT is not more than 108MHz, so the highest measured frequency is 1GHz for radiated emission.

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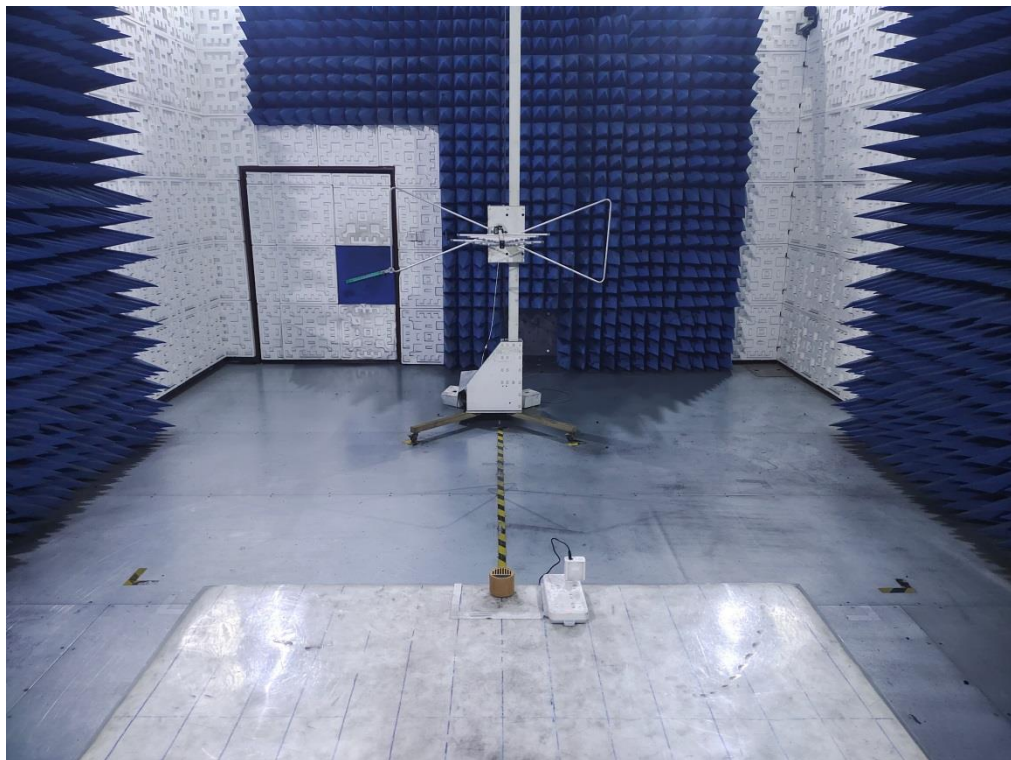
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Appendix I: Photographs of Test Setup

Sensitivity, Adjacent channel selectivity and blocking Test Setup



Radiated Emissions Below 1GHz Test Setup



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Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC12440250101AP01

-----End of Report-----

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2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the “Dedicated Testing/Inspection Stamp” is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15 days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

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Health Test Report

Report No.: AGC12440250101EH01

PRODUCT DESIGNATION : WIRELESS SPEAKER

BRAND NAME : N/A

MODEL NAME : M06819, M06818

APPLICANT : MID OCEAN BRANDS B.V.

DATE OF ISSUE : Feb. 24, 2025

STANDARD(S) : EN 62479:2010
EN 50663:2017

REPORT VERSION : V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Feb. 24, 2025	Valid	Initial Release

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Table of Contents

1. General Information	4
2. Product Information	5
2.1 Product Technical Description	5
3. Test Environment	6
3.1 Address of The Test Laboratory	6
3.2 Test Facility	6
4. EN 62479 Requirements for Power Exemption.....	7
4.1 Evaluation Methodology	7
4.2 Evaluation Conclusion	7

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1. General Information

Applicant	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Manufacturer	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Factory	MID OCEAN BRANDS B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, Hong Kong.
Product Designation	WIRELESS SPEAKER
Brand Name	N/A
Test Model	MO6819
Series Model(s)	MO6818
Difference Description	All are the same except for the appearance material
Date of receipt of test item	Jan. 17, 2025
Date of Test	Jan. 17, 2025~Feb. 24, 2025
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-EU-Health/1-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	<u>Thea Huang</u>	
	Thea Huang (Project Engineer)	Feb. 24, 2025
Reviewed By	<u>Calvin Liu</u>	
	Calvin Liu (Reviewer)	Feb. 24, 2025
Approved By	<u>Angela Li</u>	
	Angela Li (Authorized Officer)	Feb. 24, 2025

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2. Product Information

2.1 Product Technical Description

Product Designation	WIRELESS SPEAKER
Test Model	MO6819
Hardware Version	V2.0
Software Version	ac696n_soundbox_sdk_v1.6.0
Power Supply	DC 5V from Adapter and DC 3.7V, 300mAh by Battery
Classic Bluetooth Technical Parameters	
Operating Frequency	2402MHz-2480MHz
Bluetooth Version	V5.3
Modulation Type	☒ BR: GFSK ☒ EDR: π /4-DQPSK ☒ EDR: 8DPSK
Number of channels	79 channels
Antenna Designation	PCB Antenna
Antenna Gain	1.2dBi

Note:

1. The above information was declared by the manufacturer.
2. The equipment submitted are representative production models.
3. For more details, please refer to the User's manual of the EUT.

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3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

4. EN 62479 Requirements for Exemption Assessment

4.1 Evaluation Methodology

Test Mode	Maximum Output Power (dBm)	Maximum Output Power (mW)	Limit (mW)	Verdict
BT_BR	-3.98	0.40	≤20	Pass

Note: The above maximum output power comes from the test report (AGC12440250101ER02)

4.2 Evaluation Conclusion

Remark: EUT meets the basic requirements in the standard.

-----End of Report-----

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2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the “Dedicated Testing/Inspection Stamp” is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15 days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Attestation of Global Compliance(Shenzhen)Co., Ltd

Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>