

TEST REPORT

EUT Description	2x2 Wi-Fi and BT, M.2 1216 adapter card
Brand Name	Intel® BE211D2W
Model Name	BE211D2W, BE211D2W M
FCC ID	PD9BE201D2
Date of Test Start/End	2025-06-11 / 2025-07-21
Features	2x2 WiFi - Bluetooth® (see section 5)

Applicant	Intel Corporation SAS
Address	425 Rue de Goa – Le Cargo B6 – 06600 Antibes, FRANCE
Contact Person	Benjamin Lavenant
Telephone/Fax/ Email	Benjamin.lavenant@intel.com

Reference Standards	FCC CFR Title 47 Part 15 E (see section 1)
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Test Report identification	250519-02.TR36
Revision Control	Rev. 01 This test report revision replaces any previous test report revision (see section 8)

The test results relate only to the samples tested.
Reference to accreditation shall be used only by full reproduction of test report.

Issued by

Reviewed by

Khodor RIDA
(Test Engineer Lead)

Zayd OUACHICHA
(Technical Manager)

Intel Corporation S.A.S – WRF Lab
425 rue de Goa – Le Cargo B6 - 06600, Antibes, France
Tel. +33493001400 / Fax +33493001401

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1. Standards, reference documents and applicable test methods

FCC	1.	FCC Title 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices. 2024-10-01 Edition Edition
	2.	FCC Title 47 CFR part 15 – Subpart C – §15.209 Radiated emission limits; general requirements. 2024-10-01 Edition
	3.	FCC OET KDB 662911 D01 v02r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
	4.	FCC OET KDB 789033 D02 v02r01 - Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) devices part 15, subpart E
	5.	ANSI C63.10-2020 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
	6.	FCC OET KDB 291074 D01 v01 - General Requirements
	7.	FCC OET KDB 291074 D02 v01 - EMC Measurement
	8.	FCC OET KDB 291074 D03 v01 - QA General Questions and Answers
	9.	FCC OET KDB 291074 D04 v01 – UN5GHz Checklist v01

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	Min: 22.03°C Max: 27.84°C Average: 24.94°C
Humidity	Min: 42.15% Max: 58.23% Average: 50.19%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	250528-01.S07	Module	BE211D2W	289200F96596	2025-05-28	Used for Radiated Spurious Emissions tests
	200803-01.S01	Extender	ADEXELEC	139245	2020-08-31	
	170000-01.S57	Adapter	BNJ C0 V3	ASS00959-00-0C	2025-03-24	
	200611-03.S30	Test PC	Latitude 5401	6DJLK13	2020-08-19	
	230223-02.S48	Triband Antenna	-	006	2023-04-20	
	230526-09.S08	Triband Antenna	-	016	2023-07-06	
#02	250528-01.S07	Module	BE211D2W	289200F96596	2025-05-28	Used for Radiated Spurious Emissions tests
	200904-01.S14	Extender	ADEXELEC	12	2023-06-22	
	170000-01.S56	Adapter	BNJ C0 V3	E1578726888186A	2025-03-24	
	170000-01.S55	Test PC	LATITUDE 5530	00425000000002AA521	2025-03-24	
	230526-09.S06	Triband Antenna	-	014	2023-07-06	
	230526-09.S05	Triband Antenna	-	013	2023-07-06	
#03	250528-01.S29	Module	BE211D2W	C0A810A3BB50	2025-07-16	Used for Radiated Spurious Emissions tests
	180001-01.S21	Socket	1216SD to M.2	-	2021-06-07	
	200904-01.S14	Extender	ADEXELEC	12	2023-06-22	
	170000-01.S56	Adapter	BNJ C0 V3	E1578726888186A	2025-03-24	
	170000-01.S55	Test PC	LATITUDE 5530	00425000000002AA521	2025-03-24	
	230526-09.S06	Triband Antenna	-	014	2023-07-06	
	230526-09.S05	Triband Antenna	-	013	2023-07-06	

5. EUT Features

The herein information is provided by the customer.

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

Brand Name	Intel® BE211D2W		
Model Name	BE211D2W, BE211D2W M		
Software Version	DRTU.08798.99.0.99		
Driver Version	99.0.99.2		
Prototype / Production	Production		
Supported Radios	802.11b/g/n/ax/be	2.4GHz	
	802.11a/n/ac/ax/be	5.2GHz	
		5.6GHz	
		5.8GHz	
		5.9GHz	
	802.11ax/be	6.0GHz	
Antenna Information	Bluetooth	2.4GHz	
	Transmitter	Chain A(1)	Chain B(2)
	Manufacturer	Intel WRF Lab	Intel WRF Lab
	Antenna type	PIFA	PIFA
	Part number	WRF-Tri Band-Antenna	WRF-Tri Band-Antenna
	Declared antenna gain (dBi)	+5.15	+5.15

6. Remarks and comments

1. No deviations were made from the test methods listed in section 1 of this report

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

7.1. 802.11 a/n/ac/ax/be – U-NII- 4

FCC part	Test name	Verdict
15.407 (b) (3) 15.209	Undesirable emissions limits: Spurious emissions (radiated)	P

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	K.RIDA	First Issue
Rev. 01	K.RIDA	Update Test Condition Section

Annex A. Test & System Description

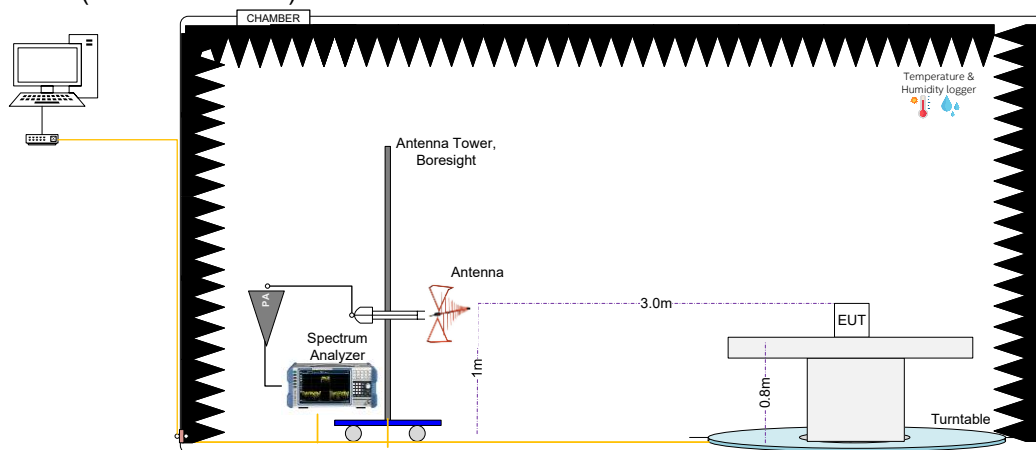
A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of ANSI C63.10 2020.

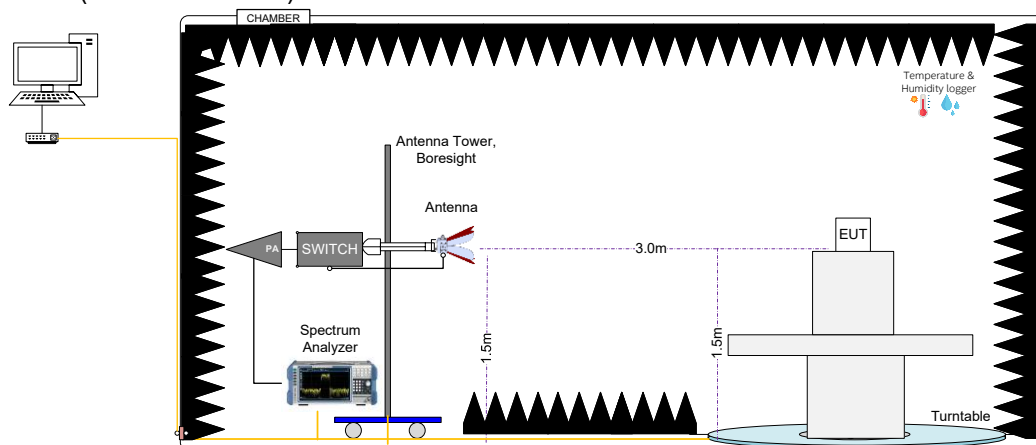
The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary tool DRTU.

Radiated test setup

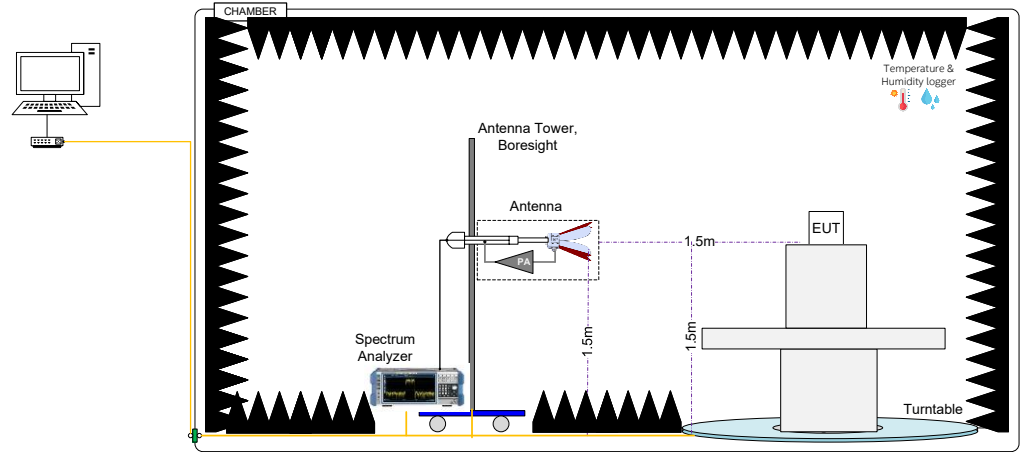
Radiated Setup 30 MHz – 1 GHz (Transmitter tests)



Radiated Setup 1 GHz – 11 GHz (Transmitter tests)



Radiated Setup 11 GHz – 40 GHz (Transmitter tests)



Sample Calculation

The spurious received voltage $V(\text{dB}\mu\text{V})$ in the spectrum Analyzer is converted to Electric field strength using the transducer factor F corresponding to the Rx path Loss:

$$F(\text{dB/m}) = \text{Rx Antenna Factor (dB/m)} + \text{Cable losses (dB)} - \text{Amplifiers Gain (dBi)}$$

$$E(\text{dB}\mu\text{V}) = V(\text{dB}\mu\text{V}) + F(\text{dB/m})$$

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{\text{SpecLimit}} = E_{\text{Meas}} + 20 \cdot \log(D_{\text{Meas}}/D_{\text{SpecLimit}})$$

where

$E_{\text{SpecLimit}}$ is the field strength of the emission at the distance specified by the limit, in $\text{dB}\mu\text{V/m}$

E_{Meas} is the field strength of the emission at the measurement distance, in $\text{dB}\mu\text{V/m}$

D_{Meas} is the measurement distance, in m

$D_{\text{SpecLimit}}$ is the distance specified by the limit, in m

A.2 Test Equipment List

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
006-000	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2024-01-17	2026-01-17
006-001	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
094-002	Thermo-hygrometer sensor	RMS-HCD-S	24050486	Rotronic	2024-09-02	2026-09-02
006-011	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
006-002	Switch & Positioning systems	EMC Center	00159757	ETS-Lindgren	N/A	N/A
147-000	Spectrum analyzer	FSW43	101847	Rohde & Schwarz	2025-03-07	2027-03-07
006-008	Measurement SW, v11.3	EMC32	100623	Rohde & Schwarz	N/A	N/A
301-000	Amplifier 9kHz-1300MHz	8447F	3113A07440	HP	2025-02-11	2026-02-11
006-067	Low Pass Filter 1.6GHz	LPM17671	G002	Micro-Tronics	2025-02-11	2026-02-11
007-034	Broadband RF Power Amplifier 0.5-40.0GHz	DEPA0540-43	2024A02	Diamond Engineering	2025-02-11	2026-02-11
189-000	Double Horn Ridged antenna 10GHz-40GHz	3116C	227716	ETS-Lindgren	2024-05-29	2026-05-29
057-000	Double ridged horn antenna (1GHz to 18GHz)	ETS-Lindgren-3117	167062	ETS-Lindgren	2024-07-23	2026-07-23
006-061	Bi-Log Periodic antenna	CBL6143A	61382	Teseq	2024-11-13	2026-11-13
006-068	RF Switch DC-40GHz	LPM17671	G002	Mini-Circuits	2025-02-11	2026-02-11
261-000	RF Amplifier Used for 1 GHz-11GHz	ETS-Lindgren-3117-PA	00157993	ETS-Lindgren	2025-02-11	2026-02-11
009-007	Filter HPF 11GHz	Mini-Circuits-ZHSS-k11G+	84931831830	Mini-Circuits	2025-02-11	2026-02-11
006-051	RF Cable 1.0m	CBL-1.5M-SMSM+	202879	Mini-Circuits	2025-03-12	2026-03-12
006-066	Cable 7m – 25MHz to 40GHz	R286304174	20.46.370	Radiall	2025-02-10	2026-02-10
006-063	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2025-02-10	2026-02-10
006-064	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2025-02-10	2026-02-10
006-065	Cable 60cm – 25MHz to 1GHz	PE300-24	-	Pasternack	2025-02-10	2026-02-10

N/A: Not Applicable

*Within a grace period of 30 days

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
007-000	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2024-01-18	2026-01-18
138-000	Spectrum Analyzer	FSV40**	101556	Rohde & Schwarz	2024-02-27	2026-02-27
137-000	Spectrum Analyzer	FSW67*	103266	Rohde & Schwarz	2025-02-11	2027-02-11
007-007	Double Ridge Horn Antenna (1- 18GHz)	3117	00152266	ETS Lindgren	2024-03-26	2026-03-26
026-008	Low noise amplifier 1-18GHz	LA1018N3209	J10100000407	A-INFO	2025-02-19	2026-02-19
007-004	Switch & Positioner	EMCenter	00162359	ETS Lindgren	N/A	N/A
007-006	EMControl & EMSwitch	EMCenter	00151232	ETS Lindgren	N/A	N/A
007-036	SMA-SMA 6.5m Cable	140-8500-11-51-001	001	Atem	2025-03-12	2026-03-12
007-005	Measurement SW, v11.30.00	EMC32	100401	Rohde & Schwarz	N/A	N/A
007-001	Styrofoam Column, 151mm	-	-	-	N/A	N/A
007-002	Turntable	-	-	ETS Lindgren	N/A	N/A
007-003	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
007-015	N-SMA 1.5m Cable	-	-	Spirent	2025-02-19	2026-02-19
007-018	SMA-SMA 1.2m Cable	0500990991200KE	-	Radiall	2025-02-19	2026-02-19
094-001	Temp & Humidity Logger	RMS-HCD-S	24050487	Rotronic	2024-09-02	2026-09-02

N/A: Not Applicable

*Used from 12/06/2025 to 16/06/2025

**Used since 17/06/2025

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
412-000	DRTU Power finder V2.1	-	-	Intel	N/A	N/A
139-000	Power Sensor	NRP-Z81	104383	Rohde & Schwarz	2025-05-20	2027-05-20
140-000	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2024-04-04	2026-04-04

N/A: Not Applicable

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of $k = 2$ to indicate a 95% level of confidence:

Measurement type	Uncertainty	Unit
Radiated tests <1GHz	± 6.33	dB
Radiated tests 1GHz – 40 GHz	± 6.72	dB

Annex B. Test Results U-NII-4

The herein test results were performed by:

Test case measurement	Test Personnel
Radiated spurious emissions	K. RIDA

B.1 Test Conditions

For 802.11a mode the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n20 & 802.11ax/be20 (20 MHz channel bandwidth), 802.11n40 and 802.11ax/be40 (40MHz channel bandwidth) 802.11ac80 & 802.11ax/be80 (80MHz channel bandwidth), 802.11ac160 & 802.11ax/be160 (160MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

The target Power is specified in report 250519-02.TR02, and the Tx settings were configured using the DRTU Tool

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

Transmission	Mode	Bandwidth (MHz)	Worst Case Data Rate
SISO	802.11a	20	6Mbps
	802.11n	20	HT0
		40	HT0
	802.11ac	80/160	VHT0
	802.11ax/be	20/40/80/160	MCS0
MIMO	802.11n	20/40	HT8
	802.11ac	80/160	VHT0
	802.11ax/be	20/40/80/160	MCS0

B.2 Test Results Tables

B.2.1 Radiated spurious emission

Standard references

FCC part	Limits
15.407 (b) (5) (iii)	For transmitters operating solely in the 5.850-5.895 GHz band or operating on a channel that spans across 5.725-5.895 GHz: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
15.407 (b) (5) (ii)	For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz
15.209	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):

Test procedure

The radiated setup shown in section A.1 was used to measure the radiated spurious emissions. Depending of the frequency range and bands being tested, different antennas and filters were used.

The final measurement is done by varying the antenna height, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.

According to ANSI C63.10, it might be possible to identify one or more specific operational modes that produce the “worst-case” test results with respect to all of the required technical limits (e.g., output power, power spectral density, unwanted emission power at the band edge and in all spurious emissions, and for each possible output data stream), and then reduce the testing to just these modes on each of the frequencies/channels required per Section 15.31(m).

In order to determine the worst case, a comprehensive evaluation was performed by varying all available bandwidths and operational modes. The results indicated that the narrowest bandwidth (20 MHz) represents the worst case, as it resulted in the lowest margins to the applicable spurious emission limits. Radiated spurious emissions were measured on the lowest, middle and highest channels.

For the 20 MHz bandwidth, only the operational modes identified as worst-case were retained and reported in this test report.

Test Results**Radiated spurious - 30 MHz to 1 GHz****Radiated Spurious – All modes**

Frequency	Level	Detector	Limit	Margin	Polarization
MHz	dBμV/m	---	dBμV/m	dB	---
36.9	23.2	Quasi-Peak	40	16.8	V
225.5	33.8	Quasi-Peak	46	12.2	H

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 40 GHz, 802.11n20, HT0, Chain A**Radiated Spurious – CH173**

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBμV/m	---	dBμV/m	dB	---
2656.1	53.1	Peak	74.0	20.9	H
2656.1	37.3	Average	54.0	16.7	V
10526.0	58.6	Peak	88.2	29.6	V
10526.0	47.2	RMS	68.2	21.0	V
17906.3	37.0	Average	54.0	17.0	V
17906.3	47.4	Peak	74.0	26.6	V
33465.3	41.5	RMS	68.2	26.7	H
33465.3	53.0	Peak	88.2	35.2	H

1 GHz – 40 GHz, 802.11ax/be20, HE0, Chain B

Radiated Spurious – CH173

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBμV/m	---	dBμV/m	dB	---
2661.7	50.6	Peak	74.0	23.4	H
2661.7	39.0	Average	54.0	15.0	H
23426.0	47.6	RMS	68.2	20.6	V
23426.0	55.4	Peak	88.2	32.8	V

1 GHz – 40 GHz, 802.11n20, HT8, Chain A+B

Radiated Spurious – CH177

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBμV/m	---	dBμV/m	dB	---
10440.0	57.4	Peak	88.2	30.8	V
10440.0	47.5	RMS	68.2	20.7	H
20719.8	47.8	Peak	74.0	26.2	V
20719.8	42.2	Average	54.0	11.8	V