

Prüfbericht-Nr.: <i>Test report no.:</i>	CN24EL71 001	Auftrags-Nr.: <i>Order no.:</i>	48247860	Seite 1 von 48 Page 1 of 48
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2024-05-31	
Auftraggeber: <i>Client:</i>	Hon Hai Precision Industry Co., Ltd. No. 151, Sec. 1, Nankan Rd., Lujhu Dist., Taoyuan City 33859, Taiwan (R.O.C.)			
Prüfgegenstand: <i>Test item:</i>	AIoT WIRELESS MODULE			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	FPWB-A013BBKZ, FPWB-A014BBKZ			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15E Test report (WiFi 5GHz)			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart E Section 15.407			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-05-27			
Prüfmuster-Nr.: <i>Test sample no:</i>	A003728266-012 & 025 & 027 A003728266-021 & 032			
Prüfzeitraum: <i>Testing period:</i>	2024-05-25 - 2024-06-12			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>compiled by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i>	2024-06-19	Ausstellungsdatum: <i>Issue date:</i>	2024-06-19	
Stellung / Position:	Senior Project Manager	Stellung / Position:	Senior Project Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
5 = mangelhaft N/T = nicht getestet 5 = poor N/T = not tested				
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Anmerkungen
Remarks

- | | |
|----------|--|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.
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| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.
Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.
Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p> |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p> |

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.407(a) & 15.203	Antenna Requirement	Pass
5.1.2	15.407(a)	Maximum Conducted Output Power	Pass
5.1.3	15.407(h)(1)	Transmit Power Control (TPC)	Pass
5.1.4	15.407(a)	26 dB Bandwidth	Pass
5.1.4	2.1049	99% Occupied Bandwidth	Pass
5.1.5	15.407(e)	6 dB Bandwidth (U-NII-3 Band only)	Pass
5.1.6	15.407(g)	Frequency Stability	Pass
5.1.7	15.407(a)	Power Spectral Density	Pass
5.1.8	15.407(b) & 15.205 & 15.209	Radiated Spurious Emissions and Band Edges	Pass
5.1.9	15.407(h) & KDB 905462 D02	Dynamic Frequency Selection	Pass
5.2.1	15.207	Mains Conducted Emission	Pass

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

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APPENDIX A - TEST RESULT OF CONDUCTED

APPENDIX B - TEST RESULT OF RADIATED EMISSIONS & MAINS CONDUCTED EMISSION

APPENDIX SP - PHOTOGRAPHS OF TEST SETUP

APPENDIX EP - PHOTOGRAPHS OF EUT

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HISTORY OF THIS TEST REPORT

Revision	Description	Date Issued
R01	Original Release	2024-06-19

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Conducted

Appendix B - Test Result of Radiated Emissions & Mains Conducted Emission

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart E Section 15.407
FCC 47CFR Part 2: Subpart J Section 2.1049
ANSI C63.10:2013
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

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2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 180491
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.30 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.30 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.54 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.52 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a AIoT WIRELESS MODULE. It contains a WLAN compatible module enabling the user to communicate data through a Wireless interface.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	AIoT WIRELESS MODULE
Type Identification	FPWB-A013BBKZ, FPWB-A014BBKZ
FCC ID	RX3-BZ02

Technical Specification of EUT

Item	EUT information
Operating Frequency	Band 1: 5180 MHz ~ 5240 MHz Band 2: 5260 MHz ~ 5320 MHz Band 3: 5500 MHz ~ 5720 MHz Band 4: 5745 MHz ~ 5825 MHz
Channel Number	Band 1: 4 for 802.11a, 802.11n HT20 2 for 802.11n HT40 Band 2: 4 for 802.11a, 802.11n HT20 2 for 802.11n HT40 Band 3: 9 for 802.11a, 802.11n HT20 5 for 802.11n HT40 Band 4: 5 for 802.11a, 802.11n HT20 2 802.11n HT40
Data Rate	802.11a: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
Operation Voltage	5 Vdc (FPWB-A014BBKZ) 3.3 Vdc (FPWB-A013BBKZ)
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Maximum Output Power (mW)	5180 ~ 5240 MHz: 25.00 5260 ~ 5320 MHz: 25.06 5500 ~ 5720 MHz: 25.06 5745 ~ 5825 MHz: 6.30
Maximum EIRP (mW)	5260 ~ 5320 MHz: 37.325 5500 ~ 5720 MHz: 47.973
DFS Mode	Slave without radar detection
Antenna Information	Refer to 5.1.1
Accessory Device	Refer to 4.4

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Note:

1. All models are listed as below.

Main Model (Main test)	Series Model	Difference
FPWB-A014BBKZ	FPWB-A013BBKZ	The two models have the same PCB layout, some components difference because audio and difference operating voltage.

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output expected by the customer and is going to be fixed on the firmware of the final end product.

Table for Parameters of Test Software Setting

<FPWB-A014BBKZ>

802.11a		802.11n HT20		802.11n HT40	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
36	96	36	97	38	96
40	95	40	96	46	94
48	95	48	95	54	94
52	94	52	95	62	95
60	94	60	95	102	101
64	96	64	96	110	105
100	100	100	101	134	110
116	106	116	106	142	115
140	110	140	112	151	91
144	115	144	115	159	94
149	90	149	91		
157	94	157	94		
165	94	165	94		

<FPWB-A013BBKZ>

802.11a		802.11n HT20		802.11n HT40	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
36	89	36	91	38	91
40	88	40	89	46	88
48	88	48	88	54	92
52	92	52	93	62	93
60	92	60	93	102	101
64	93	64	94	110	104
100	100	100	101	134	105
116	106	116	106	142	110
140	107	140	107	151	85
144	111	144	110	159	88
149	85	149	83		
157	88	157	86		
165	88	165	88		

4.2 Carrier Frequency and Channel

Band	Channel	Frequency (MHz)	802.11a 802.11n HT20	802.11n HT40
U-NII-1 (Band 1)	36	5180	V	
	38	5190		V
	40	5200	V	
	42	5210		
	44	5220	V	
	46	5230		V
	48	5240	V	
U-NII-2A (Band 2)	52	5260	V	
	54	5270		V
	56	5280	V	
	58	5290		
	60	5300	V	
	62	5310		V
	64	5320	V	
U-NII-2C (Band 3)	100	5500	V	
	102	5510		V
	104	5520	V	
	106	5530		
	108	5540	V	
	110	5550		V
	112	5560	V	
	116	5580	V	
	118	5590		V
	132	5660	V	
	134	5670		V
	136	5680	V	
	140	5700	V	
Straddle Channel	138	5690		
	142	5710		V
	144	5720	V	
U-NII-3 (Band 4)	149	5745	V	
	151	5755		V
	153	5765	V	
	155	5775		
	157	5785	V	
	159	5795		V
	161	5805	V	
	165	5825	V	

4.3 Test Operation and Test Software

Setup for testing: Test samples are provided with cable interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	AmebaD_mptool_2V0
---------------	-------------------

The samples were used as follows:

A003728266-012 & 025 & 027

A003728266-021 & 032

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To				Description
	Antenna Port Conducted Measurement	Radiated Spurious Emissions above 1 GHz	Radiated Spurious Emissions below 1 GHz	Mains Conducted Emission	
A	√	√	√	√	FPWB-A014BBKZ
B	√ (Power only)	√	√	√	FPWB-A013BBKZ

Note:

- The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on **Z-plane**.
- "-" means no effect.

Antenna Port Conducted Measurement

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
A, B	802.11a	5180-5240	36 to 48	36, 40, 48	6.0
		5260-5320	52 to 64	52, 60, 64	
		5500-5720	100 to 144	100, 116, 140, 144	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT20	5180-5240	36 to 48	36, 40, 48	MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5720	100 to 144	100, 116, 140, 144	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT40	5180-5240	38 to 46	38, 46	MCS0
		5260-5320	54 to 62	54, 62	
		5500-5720	102 to 142	102, 110, 134, 142	
		5745-5825	151 to 159	151, 159	

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Radiated Spurious Emissions (Above 1 GHz)

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	6.0
		5260-5320	52 to 64	52, 60, 64	
		5500-5720	100 to 144	100, 116, 140, 144	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT20	5180-5240	36 to 48	36, 40, 48	MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5720	100 to 144	100, 116, 140, 144	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT40	5180-5240	38 to 46	38, 46	MCS0
		5260-5320	54 to 62	54, 62	
		5500-5720	102 to 142	102, 110, 134, 142	
		5745-5825	151 to 159	151, 159	
B	802.11n HT20	5260-5320	52 to 64	52	MCS0

Radiated Spurious Emissions (Below 1 GHz)

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
A	802.11n HT40	5500-5720	102 to 142	102	MCS0
B	802.11n HT20	5260-5320	52 to 64	52	MCS0

Mains Conducted Emission Test

- ☒ Pre-Scan full test was applied on all test modes, but only worst case was shown.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
A	802.11n HT40	5500-5720	102 to 142	102	MCS0
B	802.11n HT20	5260-5320	52 to 64	52	MCS0

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Conducted Measurement	24.3-25.5 °C	57-60 %	Nick Guan
Radiated Spurious Emissions above 1 GHz	23.8-26.7 °C	52-57 %	Chuan Chu
Radiated Spurious Emissions below 1 GHz	23.8-26.7 °C	52-57 %	Chuan Chu
Mains Conducted Emission	21.2 °C	59 %	Chuan Chu

4.4 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

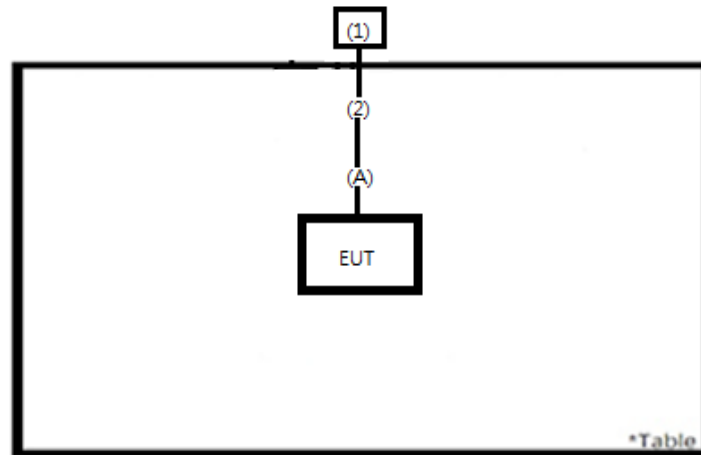
None

Support Unit

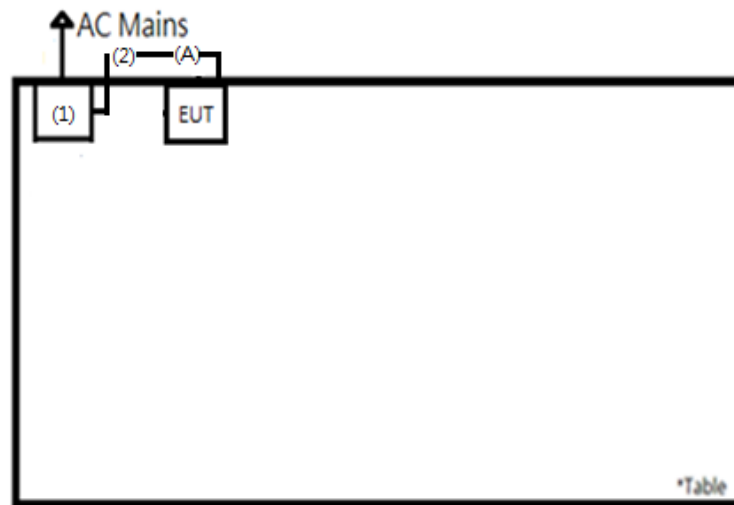
Support Unit								
No	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
A	Single Cable	Hon Hai	Hon Hai-001	N/A	-	-	15	--
1	DC Power Supply	Gwinstek	GPS-3303	GEU915618	-	-	-	--
2	Cable	TUV	TUV-001	N/A	-	-	150	--
-	Notebook	HP	TPN-Q222	5CD2206LB9	-	-	-	--
-	Power Supply	GWINSTEK	GPS-3303	GEU915620	-	-	-	--

4.5 Test Setup Diagram

<Radiated Spurious Emissions mode>

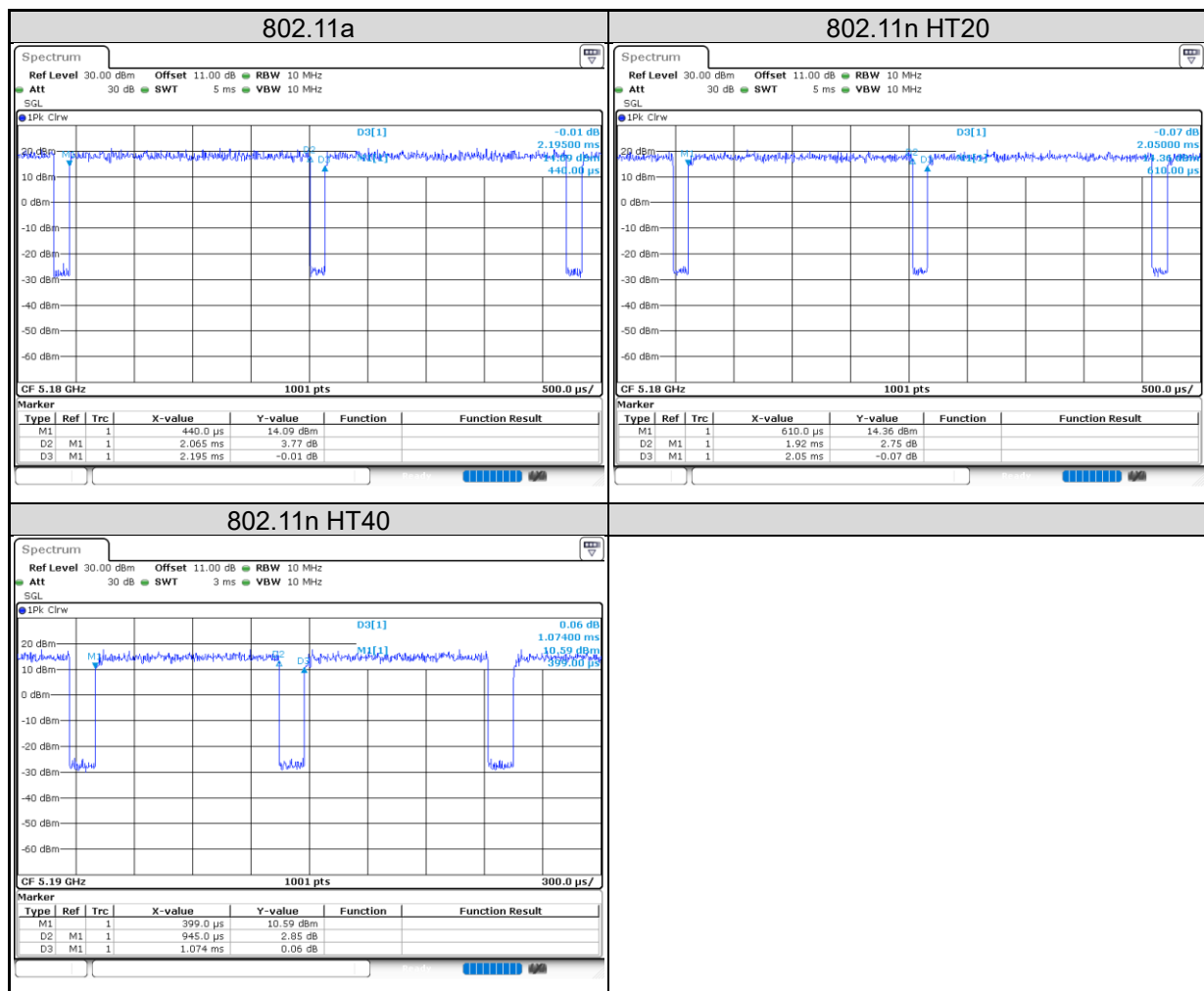


<Mains Conducted Emission mode>



4.6 Duty Cycle of Test Signal

Mode	On + Off Time (ms)	On Time (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	2.20	2.07	94.08	0.27
802.11n HT20	2.05	1.92	93.66	0.28
802.11n HT40	1.07	0.95	87.99	0.56



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

Requirement Use of approved antennas only

According to the manufacturer declaration, the EUT's antenna specifications are described as below.
The antenna is used with no possibility of replacement with a non-approved antenna by the end-user.
Therefore, the EUT is considered to comply with this provision.

Printing antenna with 0.98 dBi gain (5180 ~ 5240 MHz)

Printing antenna with 1.73 dBi gain (5260 ~ 5320 MHz)

Printing antenna with 2.82 dBi gain (5500 ~ 5720 MHz)

Printing antenna with 2.94 dBi gain (5745 ~ 5825 MHz)

Refer to EUT photo for details.

5.1.2 Maximum Conducted Output Power

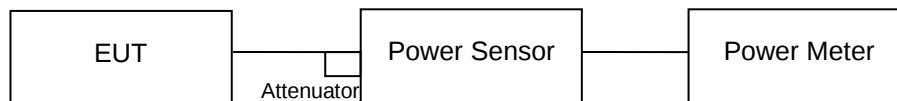
Limit

Operation Band	EUT Category	Limit
U-NII-1	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125 mW (21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	Fixed point-to-point Access Point	1 Watt (30 dBm)
	Indoor Access Point	1 Watt (30 dBm)
	Mobile and Portable client device	250 mW (24 dBm)
U-NII-2A	---	250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-2C	---	250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-3	---	1 Watt (30 dBm)

Note: B* is the 26 dB emission bandwidth in megahertz

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Power Meter	Anritsu	ML2495A	1901008	2024/03/12	2025/03/11	2024/5/25	2024/6/6
Power Sensor	Anritsu	MA2411B	1725269	2024/03/12	2025/03/11	2024/5/25	2024/6/6

Test Procedures

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to AVERAGE. Duty factor is not added to measured value.

Test Result

<FPWB-A014BBKZ>

<802.11a>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	13.96	24.89	24.00
40	5200	13.93	24.72	24.00
48	5240	13.96	24.89	24.00
52	5260	13.89	24.49	24.00
60	5300	13.87	24.38	24.00
64	5320	13.92	24.66	24.00
100	5500	13.80	23.99	24.00
116	5580	13.87	24.38	24.00
140	5700	13.86	24.32	24.00
144	5720 (U-NII-2C)	13.94	24.77	23.39
144	5720 (U-NII-3)	13.94	24.77	30.00
149	5745	7.97	6.27	30.00
157	5785	7.94	6.22	30.00
165	5825	7.91	6.18	30.00

Note:

For U-NII-2A, U-NII-2C Band:

1. $11 \text{ dBm} + 10\log(22.34) = 24.49 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(22.10) = 24.44 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(22.22) = 24.47 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(22.34) = 24.49 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(22.66) = 24.55 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(27.49) = 25.39 \text{ dBm} > 24 \text{ dBm}$.
7. $11 \text{ dBm} + 10\log(17.35) = 23.39 \text{ dBm} < 24 \text{ dBm}$.

<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	13.82	24.10	24.00
40	5200	13.98	25.00	24.00
48	5240	13.94	24.77	24.00
52	5260	13.99	25.06	24.00
60	5300	13.94	24.77	24.00
64	5320	13.93	24.72	24.00
100	5500	13.91	24.60	24.00
116	5580	13.84	24.21	24.00
140	5700	13.94	24.77	24.00
144	5720 (U-NII-2C)	13.88	24.43	23.70
144	5720 (U-NII-3)	13.88	24.43	30.00
149	5745	7.93	6.21	30.00
157	5785	7.94	6.22	30.00
165	5825	7.89	6.15	30.00

Note:

For U-NII-2A, U-NII-2C Band:

1. $11 \text{ dBm} + 10\log(23.14) = 24.64 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(22.94) = 24.61 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(22.98) = 24.61 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(22.78) = 24.58 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(24.10) = 24.82 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(29.37) = 25.68 \text{ dBm} > 24 \text{ dBm}$.
7. $11 \text{ dBm} + 10\log(18.63) = 23.70 \text{ dBm} < 24 \text{ dBm}$.

<802.11n HT40>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
38	5190	13.95	24.83	24.00
46	5230	13.93	24.72	24.00
54	5270	13.96	24.89	24.00
62	5310	13.84	24.21	24.00
102	5510	13.99	25.06	24.00
110	5550	13.91	24.60	24.00
134	5670	13.90	24.55	24.00
142	5710 (U-NII-2C)	13.91	24.60	24.00
142	5710 (U-NII-3)	13.91	24.60	30.00
151	5755	7.98	6.28	30.00
159	5795	7.99	6.30	30.00

Note:

For U-NII-2A, U-NII-2C Band:

1. $11 \text{ dBm} + 10\log(39.24) = 26.94 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(38.92) = 26.90 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(38.60) = 26.87 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(38.60) = 26.87 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(39.64) = 26.98 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(34.66) = 26.40 \text{ dBm} > 24 \text{ dBm}$.

<FPWB-A013BBKZ>
<802.11a>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	13.86	24.32	24.00
40	5200	13.80	23.99	24.00
48	5240	13.95	24.83	24.00
52	5260	13.85	24.27	24.00
60	5300	13.83	24.15	24.00
64	5320	13.88	24.43	24.00
100	5500	13.80	23.99	24.00
116	5580	13.87	24.38	24.00
140	5700	13.83	24.15	24.00
144	5720 (U-NII-2C)	13.84	24.21	23.39
144	5720 (U-NII-3)	13.84	24.21	30.00
149	5745	7.87	6.12	30.00
157	5785	7.93	6.21	30.00
165	5825	7.87	6.12	30.00

<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	13.80	23.99	24.00
40	5200	13.92	24.66	24.00
48	5240	13.82	24.10	24.00
52	5260	13.97	24.95	24.00
60	5300	13.87	24.38	24.00
64	5320	13.87	24.38	24.00
100	5500	13.83	24.15	24.00
116	5580	13.81	24.04	24.00
140	5700	13.93	24.72	24.00
144	5720 (U-NII-2C)	13.82	24.10	23.70
144	5720 (U-NII-3)	13.82	24.10	30.00
149	5745	7.84	6.08	30.00
157	5785	7.91	6.18	30.00
165	5825	7.83	6.07	30.00

<802.11n HT40>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
38	5190	13.89	24.49	24.00
46	5230	13.90	24.55	24.00
54	5270	13.92	24.66	24.00
62	5310	13.81	24.04	24.00
102	5510	13.79	23.93	24.00
110	5550	13.88	24.43	24.00
134	5670	13.87	24.38	24.00
142	5710 (U-NII-2C)	13.90	24.55	24.00
142	5710 (U-NII-3)	13.90	24.55	30.00
151	5755	7.84	6.08	30.00
159	5795	7.95	6.24	30.00

5.1.3 Transmit Power Control (TPC)

U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p of less than 500 mW.

Maximum EIRP of this device is 47.973 mW which is less than 500mW, therefore TPC function is not required.

TPC	E.I.R.P	15.407(h)(1)
	> 500mW	The TPC mechanism is required for system with an E.I.R.P. of above 500mW
V	< 500mW	-

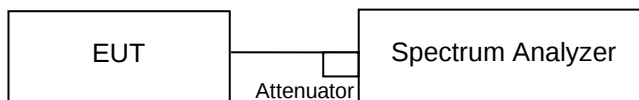
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5.1.4 26 dB Bandwidth and 99% Occupied Bandwidth

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV	101512	2024/02/22	2025/02/21	2024/5/25	2024/6/6
Thermal Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-011	2024/04/12	2025/04/11	2024/5/25	2024/6/6

Test Procedure

- a. Set RBW = approximately 1% of the emission bandwidth.
- b. Set the VBW > RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- f. For 99% Bandwidth Measurement, the transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to PEAK. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean power of a given emission.

Test Results

Please refer to Appendix A

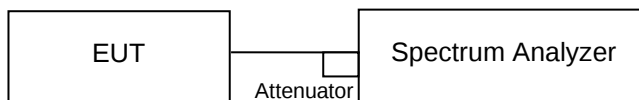
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5.1.5 6 dB Bandwidth (5725-5850MHz)

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV	101512	2024/02/22	2025/02/21	2024/5/25	2024/6/6
Thermal Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-011	2024/04/12	2025/04/11	2024/5/25	2024/6/6

Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Results

Please refer to Appendix A

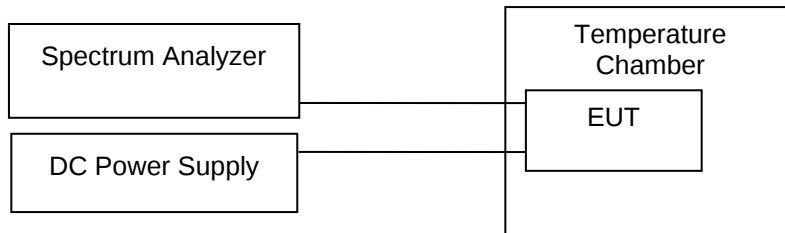
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5.1.6 Frequency Stability Measurement

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV	101512	2024/02/22	2025/02/21	2024/5/25	2024/6/6
Thermal Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-011	2024/04/12	2025/04/11	2024/5/25	2024/6/6

Test Procedure

- To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
- The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10 dB lower than the measured peak value.
- The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

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Test Results

Frequency (MHz)	5180			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
5.5	5180.01852			3.575
5	5180.01766			3.409
4.5	5180.02026			3.911
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5180.022	5180.05876	5180.05933	5180.0657
40	5180.0206	5180.04234	5180.04689	5180.0542
30	5180.01867	5180.02341	5180.02656	5180.03246
20	5180.01766	5180.01737	5180.01708	5180.01737
10	5180.03478	5180.03421	5180.03404	5180.03355
0	5180.06472	5180.04523	5180.0427	5180.04035
-10	5180.08307	5180.05239	5180.05181	5180.05123
Max. Deviation (ppm)	16.037	11.344	11.454	12.683

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5.1.7 Power Spectral Density

Limit

For the 5.15~5.25GHz Bands:

For mobile and portable client devices in the 5.15~5.25GHz band, the Maximum Power spectral density shall not exceed 11dBm/MHz. For an indoor access point operating in the band 5.15~5.25GHz, the maximum power spectral density shall not exceed 17dBm/MHz.

For the 5.25~5.35GHz and 5.47~5.725GHz Bands:

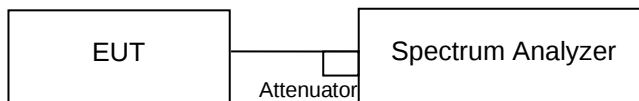
The maximum power spectral density shall not exceed 11dBm/MHz.

For the 5.745~5.85GHz Bands:

The maximum power spectral density shall not exceed 30dBm/500kHz.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV	101512	2024/02/22	2025/02/21	2024/5/25	2024/6/6
Thermal Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-011	2024/04/12	2025/04/11	2024/5/25	2024/6/6

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Test Procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW $\geq$ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

※For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 500 kHz, Set VBW $\geq$ 3 RBW, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
4. Sweep time = auto, trigger set to "free run".
5. Trace average at least 100 traces in power averaging mode.
6. Record the max value and add 10 log (1/duty cycle)

Test Results

Please refer to Appendix A

5.1.8 Radiated Spurious Emissions

Limit

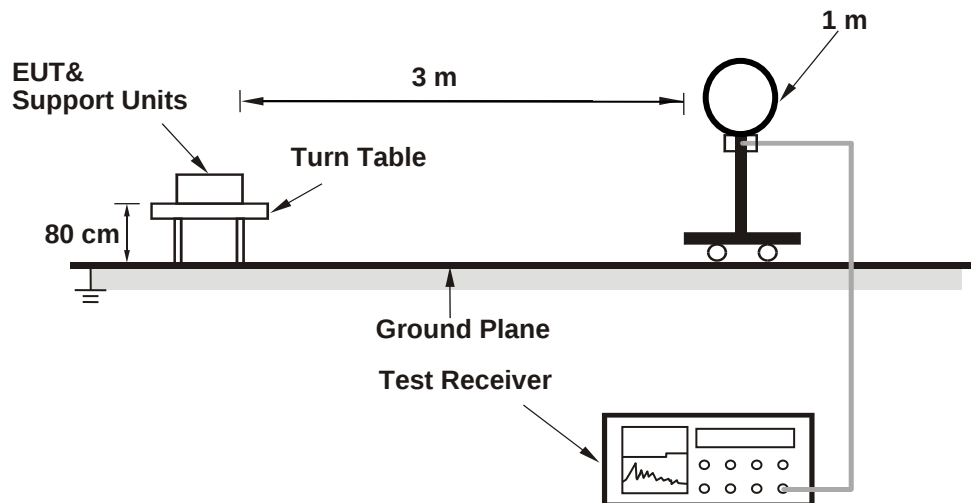
Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Emissions radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in §15.407(b).

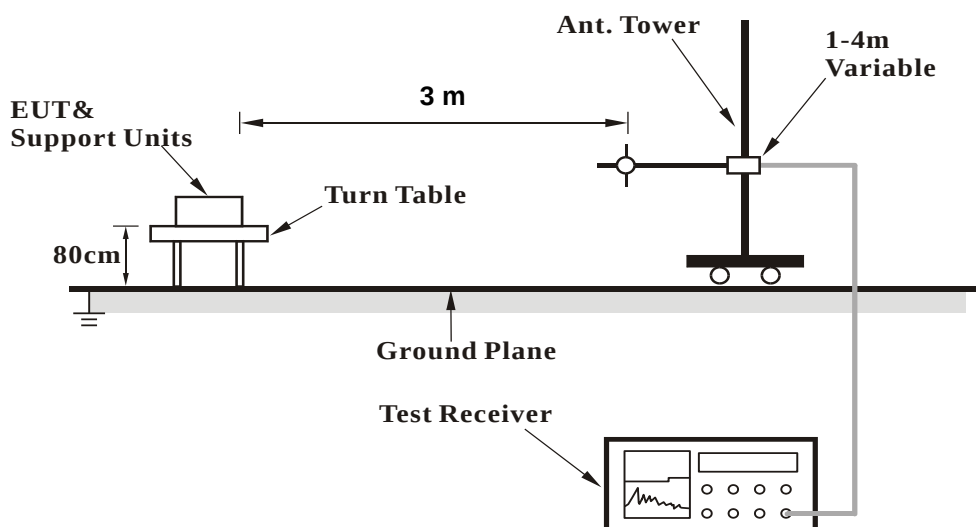
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

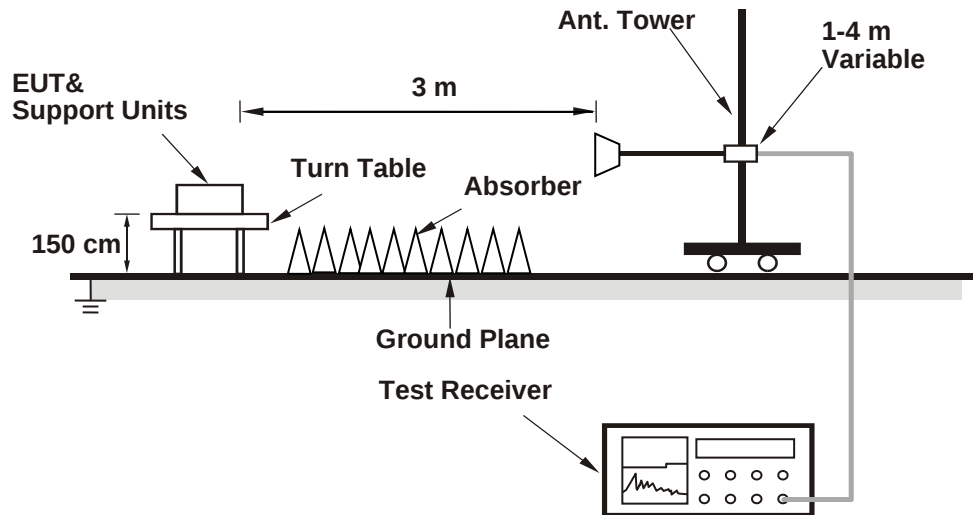
<Radiated Emissions below 30 MHz>



<Radiated Emissions 30 MHz to 1 GHz>



<Radiated Emissions above 1 GHz>



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

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Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Above 1 GHz					
Signal Analyzer	R&S	FSV40	101509	2024/4/24	2025/4/23
Horn Antenna	ETS-Lindgren	3117	00218930	2024/2/22	2025/2/21
HF-AMP + AC source	EMCI	EM01G18GA	980633	2024/1/24	2025/1/23
HF-AMP + AC source	EMCI	EMC184045SE	980657	2024/1/24	2025/1/23
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2024/5/2	2025/5/1
Test Software	Audix E3	15914a_20191106 tuv	PK-001087	N/A	N/A
30 MHz ~ 1 GHz					
Receiver	R&S	ESR7	102109	2024/2/23	2025/2/22
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2024/3/29	2025/3/28
LF-AMP	Agilent	8447D	2944a107722	2024/3/20	2025/3/19
Test Software	Audix E3	15914a_20191106 tuv	PK-001087	N/A	N/A
Below 30 MHz					
Receiver	R&S	ESR7	102109	2024/2/23	2025/2/22
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2024/1/4	2025/1/3
Test Software	Audix E3	15914a_20191106 tuv	PK-001087	N/A	N/A

Test Procedures**For Radiated Emissions below 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated Emissions above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.
6. The emission levels of other frequencies (including the 10th harmonic of the highest fundamental frequency) are very lower than the limit and are not shown in the test report.

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Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier (dB)

Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix B.

5.1.9 Dynamic Frequency Selection

Limit

<DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection>

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

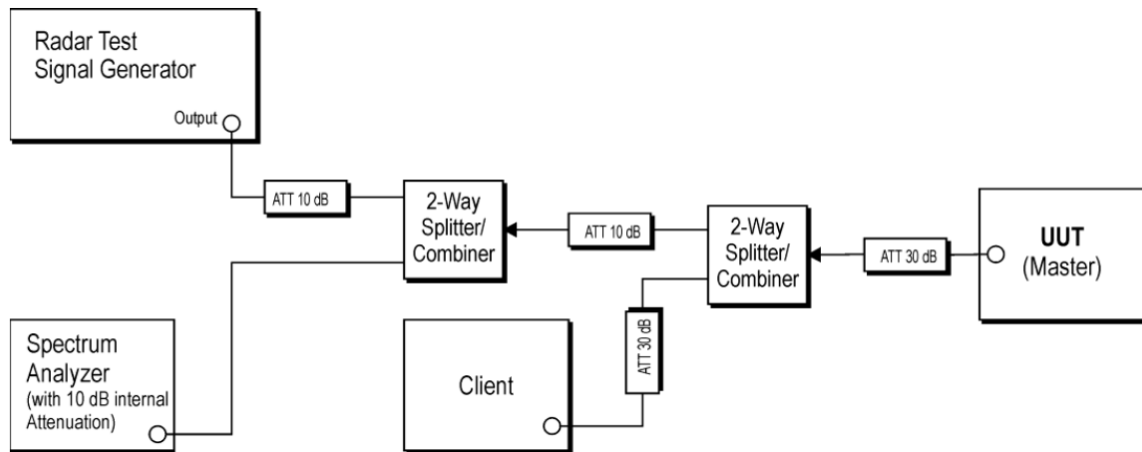
<DFS Response Requirement Values>

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel</i> move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the <i>U-NII Detection Bandwidth</i> detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

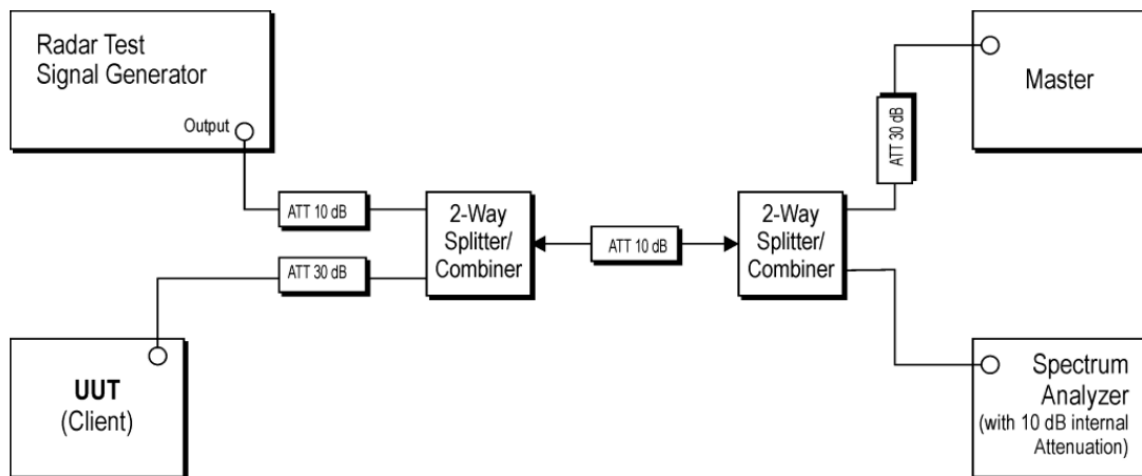
Kind of Test Site Shielded room

Test Setup

<Setup for Master with injection at the Master>



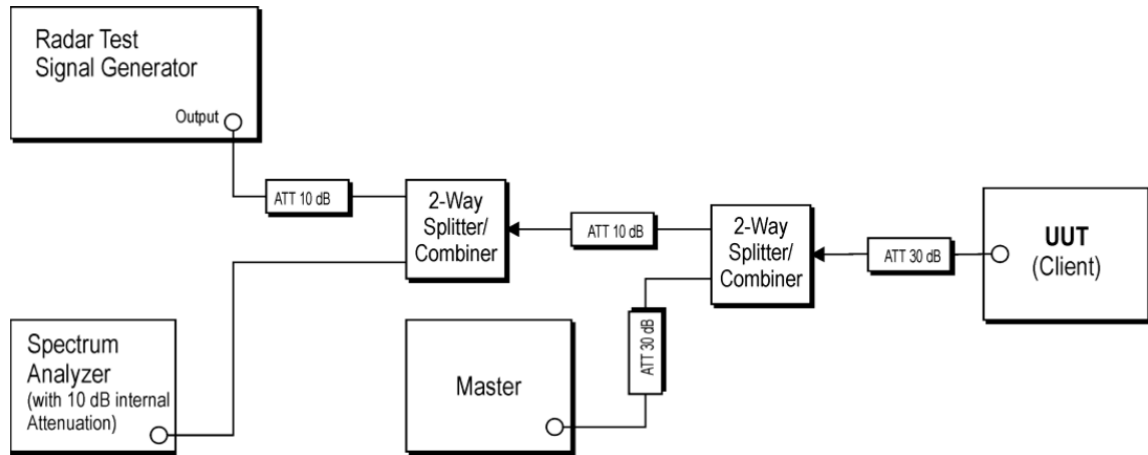
<Setup for Client with injection at the Master>



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<Setup for Client with injection at the Client>



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	Keysight	N9000B	MY62361339	2024/01/25	2025/01/24	2024/4/22	2024/4/25
EXG Vector Signal Generator	Keysight	N5172B	MY61253270	2023/12/22	2024/12/21	2024/4/22	2024/4/25
Frequency Extender	Keysight	N5182BX07	MY61500182	2023/12/22	2024/12/21	2024/4/22	2024/4/25

Requirement

<Applicability of DFS Requirements Prior to Use of a Channel>

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Closing Transmission Time</i>	Yes	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

<Applicability of DFS requirements during normal operation>

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required

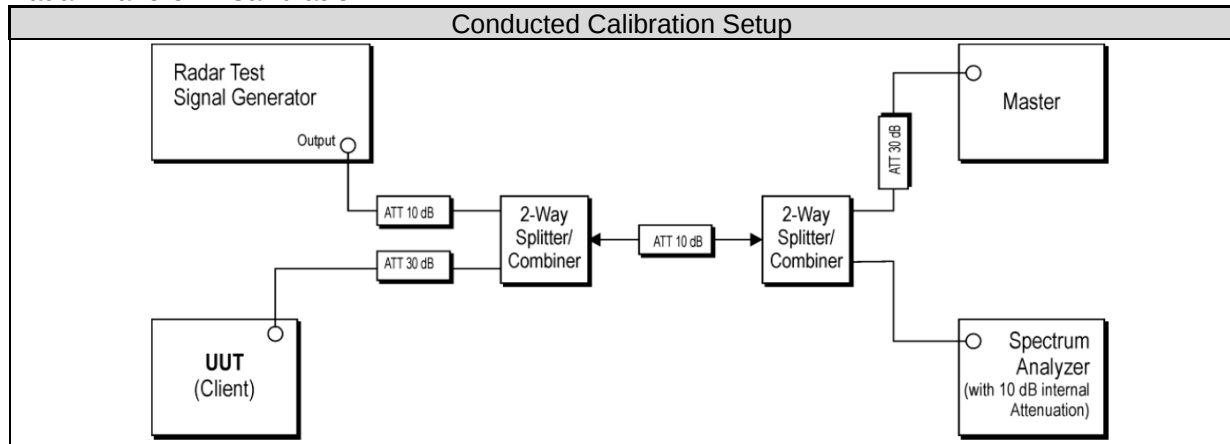
Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Channel Loading

☐	a) The data file must be of a type that is typical for the device (i.e., MPEG-2, MPEG-4, WAV, MP3, MP4, AVI, etc.) and must generally be transmitting in a streaming mode.
☐	b) Software to ping the client is permitted to simulate data transfer but must have random ping intervals.
☒	c) Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater.
☐	d) Unicast or Multicast protocols are preferable but other protocols may be used. The appropriate protocol used must be described in the test procedures.

Test Procedures

Radar Waveform Calibration



The Interference Radar Detection Threshold Level is $-64\text{dBm} + 0 [\text{dBi}] + 1 \text{ dB} = -63 \text{ dBm}$ that had been taken into account the output power range and antenna gain. the tested level is lower than required level for 1dB, hence it provides margin to the limit.

U-NII Detection Bandwidth

- Adjust the equipment to produce a single Burst of the Short Pulse Radar Types 0 at the center frequency of the UUT Operating Channel at the specified DFS Detection Threshold level.
- Set the UUT up as a standalone device (no associated Client or Master, as appropriate) and no traffic. Frame based systems will be set to a talk/listen ratio reflecting the worst case (maximum) that is user configurable during this test.
- Generate a single radar Burst, and note the response of the UUT. Repeat for a minimum of 10 trials. The UUT must detect the Radar Waveform within the DFS band using the specified U-NII Detection Bandwidth criterion. In cases where the channel bandwidth may exceed past the DFS band edge on specific channels (i.e., 802.11ac or wideband frame based systems) select a channel that has the entire emission bandwidth within the DFS band. If this is not possible, test the detection BW to the DFS band edge.
- Starting at the center frequency of the UUT operating Channel, increase the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion specified in this section limit. Repeat this measurement in 1MHz steps at frequencies 5 MHz below where the detection rate begins to fall. Record the highest frequency (denote as F_H) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies above F_H is not required to demonstrate compliance.
- Starting at the center frequency of the UUT operating Channel, decrease the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion specified in this section limit. Repeat this measurement in 1MHz steps at frequencies 5 MHz above where the detection rate begins to fall. Record the lowest frequency (denote as F_L) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies below F_L is not required to demonstrate compliance.
- The U-NII Detection Bandwidth is calculated as follows:

$$\text{U-NII Detection Bandwidth} = F_H - F_L$$

Channel Availability Check Time

<Initial Channel Availability Check Time>

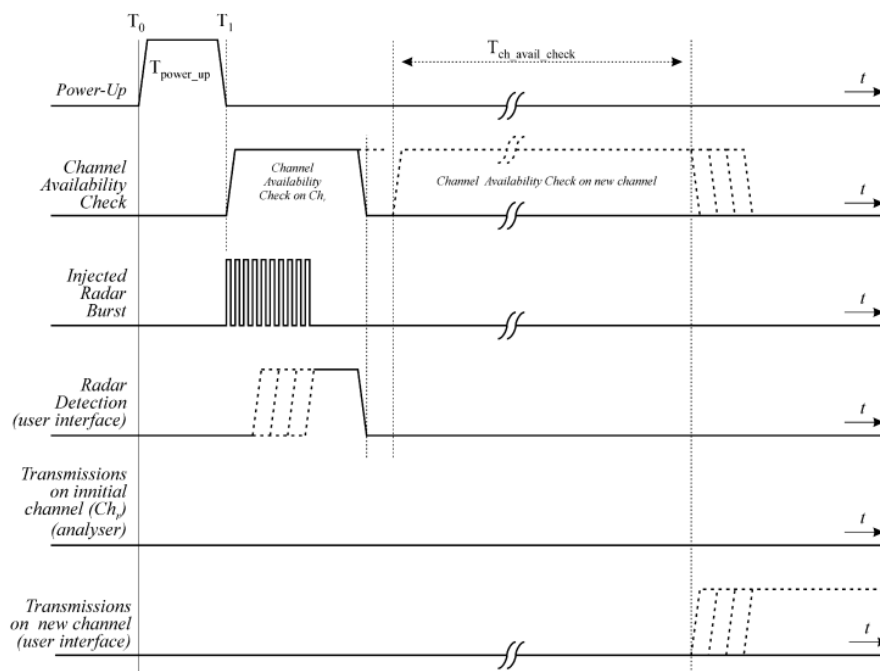
This test does not use any Radar Waveforms and only needs to be performed one time.

- The U-NII devices will be powered on and be instructed to operate on the appropriate U-NII Channel that must incorporate DFS functions. At the same time the UUT is powered on, the spectrum analyzer will be set to zero span mode with a 3 MHz RBW and 3 MHz VBW on the Channel occupied by the radar (Chr) with a 2.5 minute sweep time. The spectrum analyzer's sweep will be started at the same time power is applied to the U-NII device.
- The UUT should not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle.
- Confirm that the UUT initiates transmission on the channel.

< Radar Burst at the Beginning of the Channel Availability Check Time Measurement>

The steps below define the procedure to verify successful radar detection on the test Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB occurs at the beginning of the Channel Availability Check Time.

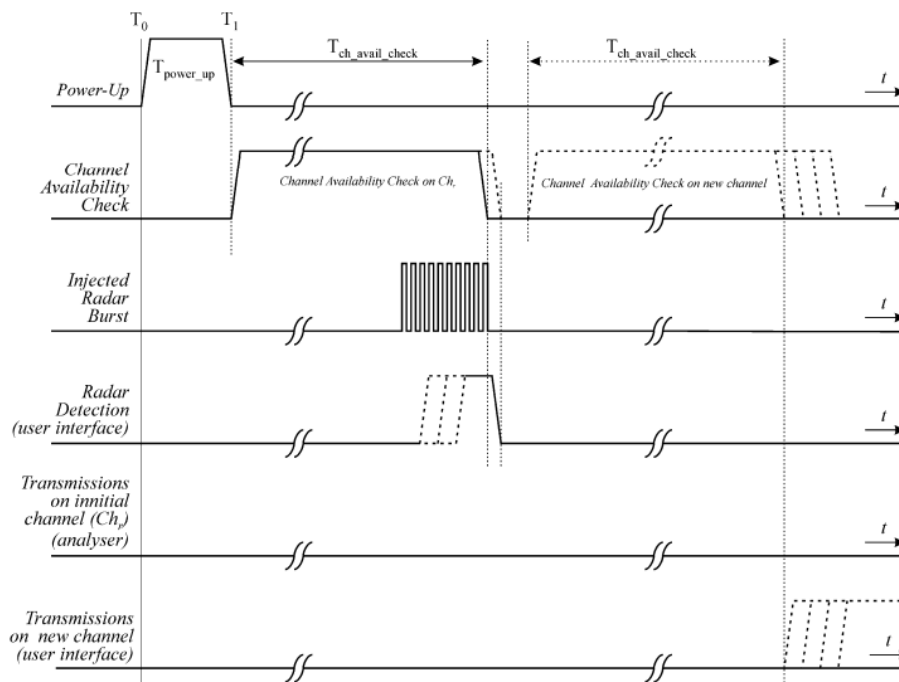
- The UUT is powered on at T_0 . T_1 denotes the instant when the UUT has completed its power-up sequence ($T_{\text{power_up}}$). The Channel Availability Check Time commences on Chr at instant T_1 and will end no sooner than $T_1 + T_{\text{ch_avail_check}}$.
- A single Burst of one of the Short Pulse Radar Types 0-4 will commence within a 6 second window starting at T_1 . An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- Visual indication or measured results on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of Chr for UUT emissions will continue for 2.5 minutes after the radar Burst has been generated.
- Verify that during the 2.5 minute measurement window no UUT transmissions occurred on Chr. The Channel Availability Check results will be recorded.



< Radar Burst at the End of the Channel Availability Check Time >

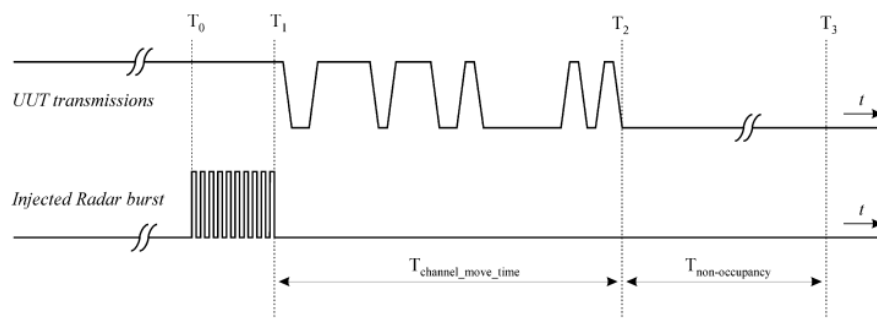
The steps below define the procedure to verify successful radar detection on the test Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1dB occurs at the end of the Channel Availability Check Time.

- The UUT is powered on at T_0 . T_1 denotes the instant when the UUT has completed its power-up sequence ($T_{\text{power_up}}$). The Channel Availability Check Time commences on Chr at instant T_1 and will end no sooner than $T_1 + T_{\text{ch_avail_check}}$.
- A single Burst of one of the Short Pulse Radar Types 0-4 will commence within a 6 second window starting at $T_1 + 54$ seconds. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- Visual indication or measured results on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of Chr for UUT emissions will continue for 2.5 minutes after the radar Burst has been generated.
- Verify that during the 2.5 minute measurement window no UUT transmissions occurred on Chr. The Channel Availability Check results will be recorded.



In-service Monitoring

- a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected.
- b) In case the UUT is a U-NII device operating as a Client Device (with or without DFS), a U-NII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will *Associate* with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.
- c) Stream the channel loading test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
- d) At time T_0 the Radar Waveform generator sends a Burst of pulses for one of the Radar Type 0 at levels defined, on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- e) Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs.
- f) When operating as a Master Device, monitor the UUT for more than 30 minutes following instant T_2 to verify that the UUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.
- g) In case the UUT is a U-NII device operating as a Client Device with In-Service Monitoring, perform steps a) to f).



Statistical Performance Check

- a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.
- b) In case the UUT is a U-NII device operating as a Client Device (with or without Radar Detection), a U-NII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will Associate with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.
- c) The TCP or UDP protocol unicast data stream was generated by the throughput software command line with at least 17% activity ratio over any 100ms period. Stream the channel loading traffic from the Master Device to the Client Device on the test Channel for the entire period of the test.
- d) At time T0 the Radar Waveform generator sends the individual waveform for each of the Radar Types 1- 6, at DFS Detection Threshold level on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- e) Observe the transmissions of the EUT at the end of the Burst on the Operating Channel for duration greater than 10 seconds for Short Pulse Radar Types 0 to ensure detection occurs.
- f) Observe the transmissions of the EUT at the end of the Burst on the Operating Channel for duration greater than 22 seconds for Long Pulse Radar Type 5 to ensure detection occurs.
- g) In case the UUT is a U-NII device operating as a Client Device with In-Service Monitoring, perform steps a) to f).

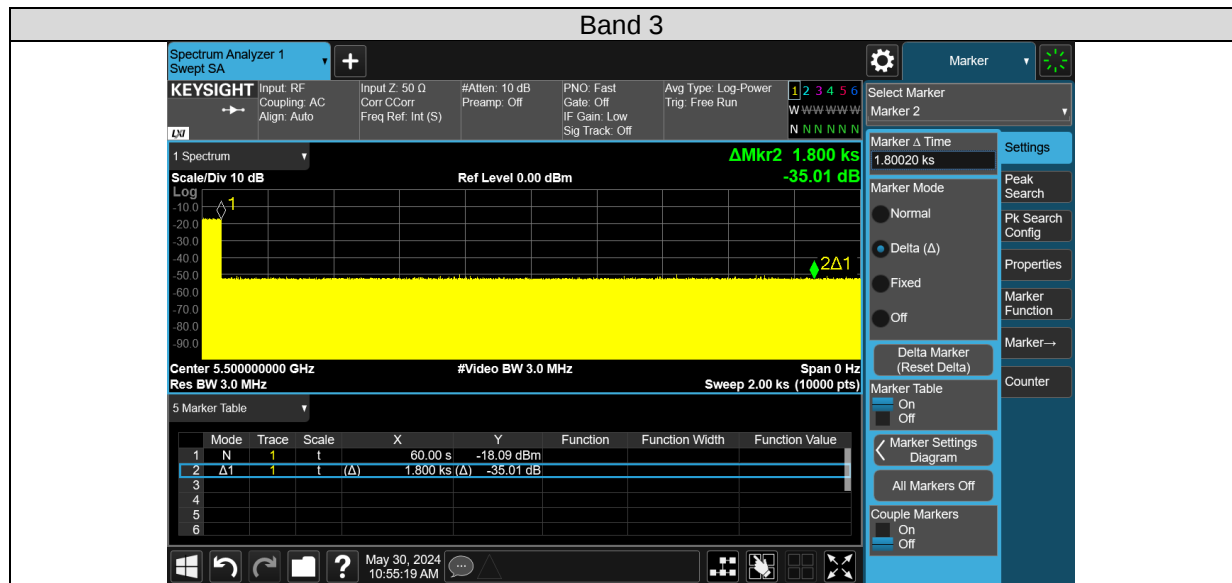
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Test Results
<802.11n HT20>

Non-occupancy period

Channel (MHz)	Limit (minute)	Result
5500	30	Pass

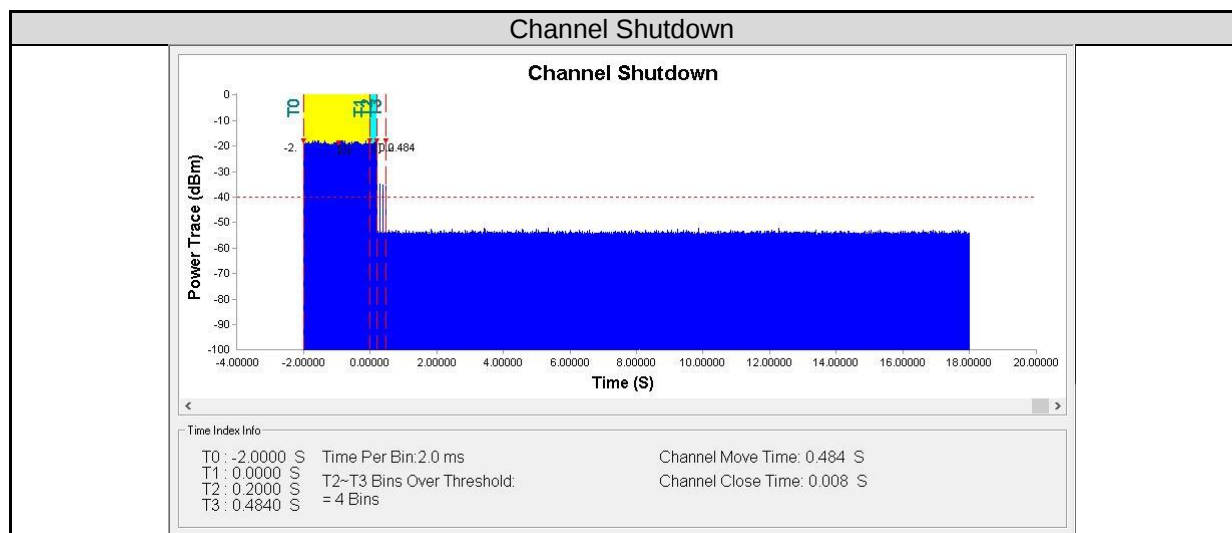

<802.11n HT40>

Channel Moving Time

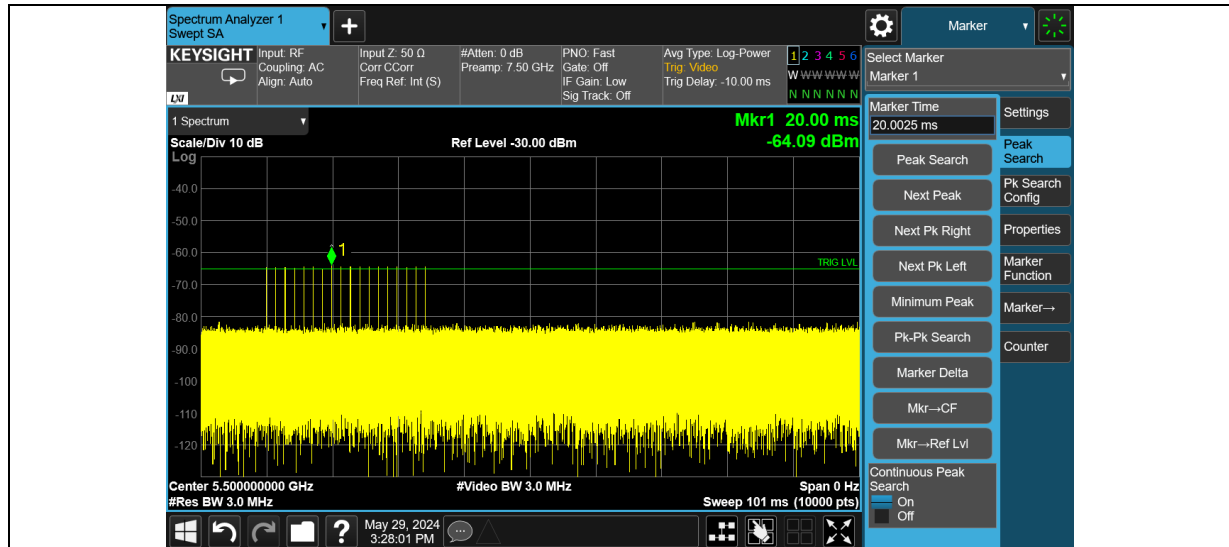
Channel (MHz)	Channel Move Time (s)	Limit (s)	Result
5510	0.484	10	Pass

Channel Closing Transmission Time

Channel (MHz)	Channel Closing Transmission Time (ms)	Limit (ms)	Result
5510	8	60	Pass



Radar Level



5.2 Mains Emission

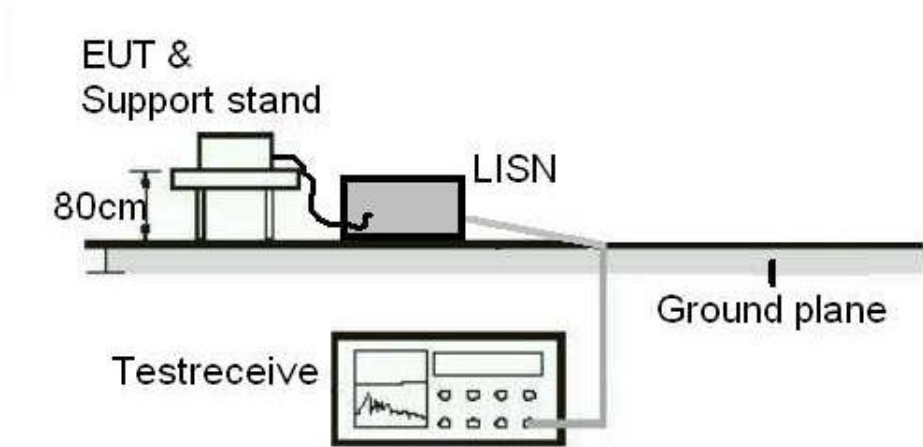
5.2.1 Mains Conducted Emission

Limit

Mains Conducted emissions as defined in §15.207 must comply with the mains conducted emission limits.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Two-Line V-Network	Rohde & Schwarz	ENV216	101938	2023/10/23	2024/10/22
EMI Test Receiver	R&S	ESCI	101094	2023/11/27	2024/11/26

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Test Procedures

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

Test Results

Please refer to Appendix B.