

Prüfbericht-Nr.: <i>Test report no.:</i>	CN25TIXC 001	Auftrags-Nr.: <i>Order no.:</i>	48223853	Seite 1 von 32 Page 1 of 32
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2023-09-13	
Auftraggeber: <i>Client:</i>	Microchip Technology Inc. 2355 West Chandler Blvd. Chandler, Arizona 85224-6199, United States			
Prüfgegenstand: <i>Test item:</i>	IEEE 802.11 b/g/n SmartConnect IoT Module			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	ATWINC1500-MR210UB, ATWINC1510-MR210UB			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15C Test report (WiFi 2.4GHz)			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-09-04			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003785093-001, 003 A003809998-005, 006			
Prüfzeitraum: <i>Testing period:</i>	2024-08-09 - 2025-07-04			
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			
zusammengestellt von: <i>compiled by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2025-09-18	 Ryan Chen		 Brenda Chen	
Stellung / Position:	Senior Project Manager		Stellung / Position: Senior Project Manager	
Sonstiges / Other:	This EUT is only evaluated and verified the output power and RSE tests for two alternative crystals change (Taisaw TZ1039PAAF32 & Taitien A0183-X-001-3). The other test results refer to TUV report no.: 50124667 001.			
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	5 = mangelhaft N/T = nicht getestet
* 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 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Anmerkungen
Remarks

- | | |
|----------|--|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüflabors kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
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| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>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.</i></p> <p><i>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 115:2023, 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 115:2023, 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	15.247(b) & 15.203	Antenna Requirement	Pass
5.1.2	15.247(b)(3)	Peak Output Power	Pass
5.1.3	15.247(d) & 15.205 & 15.209	Radiated Spurious Emissions and Band Edges	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 RADIATED EMISSIONS & MAINS CONDUCTED EMISSION FOR
TAISAW CRYSTAL**

**APPENDIX B - TEST RESULT OF RADIATED EMISSIONS & MAINS CONDUCTED EMISSION FOR
TAITIEN CRYSTAL**

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	2025-07-11
R02	Removed 802.11n HT40 mode from channel number in page no.: 10 and updated regulation standard version in page no.: 7	2025-09-18

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 Radiated Emissions & Mains Conducted Emission for Taisaw Crystal

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

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.247
FCC 47CFR Part 2: Subpart J Section 2.1049
ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
KDB 558074 D01 15.247 Meas Guidance v05r02

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.

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)	± 1.32 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.31 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.53 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.50 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a IEEE 802.11 b/g/n SmartConnect IoT 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	IEEE 802.11 b/g/n SmartConnect IoT Module
Type Identification	ATWINC1500-MR210UB, ATWINC1510-MR210UB
FCC ID	2ADHKATWINC1500U

Technical Specification of EUT

Item	EUT information				
Operating Frequency	2412 MHz ~ 2462 MHz				
Channel Spacing	5 MHz				
Channel Number	802.11b/g/n HT20: 11				
Data Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7				
Operation Voltage	3.0 ~ 4.2 Vdc (Typical = 3.3 Vdc)				
Modulation	DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16QAM, 64QAM)				
Maximum Output Power (mW)	<table border="1"> <tr> <td>Taisaw Crystal</td> <td>802.11b: 129.42 802.11g: 195.88 802.11n HT20: 180.72</td> </tr> <tr> <td>Taitien Crystal</td> <td>802.11b: 128.53 802.11g: 187.93 802.11n HT20: 194.98</td> </tr> </table>	Taisaw Crystal	802.11b: 129.42 802.11g: 195.88 802.11n HT20: 180.72	Taitien Crystal	802.11b: 128.53 802.11g: 187.93 802.11n HT20: 194.98
Taisaw Crystal	802.11b: 129.42 802.11g: 195.88 802.11n HT20: 180.72				
Taitien Crystal	802.11b: 128.53 802.11g: 187.93 802.11n HT20: 194.98				
Antenna Information	Refer to 5.1.1				
Accessory Device	Refer to 4.4				

Note:

- All models are listed as below.

Type Identification	Difference
ATWINC1500-MR210UB	ATWINC1500-MR210UB and ATWINC1510-MR210UB use the same hardware and are electrically equivalent. The difference between ATWINC1500 (4Mb) and ATWINC1510 (8Mb) is the embedded/stacked flash size.
ATWINC1510-MR210UB	

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

<Taisaw Crystal>

Frequency (MHz)	Power Setting		
	Mode		
	802.11b	802.11g	802.11n HT20
2412	-8	-8	-9
2437	-8	-8	-8
2462	-8	-9.5	-9

<Taitien Crystal>

Frequency (MHz)	Power Setting		
	Mode		
	802.11b	802.11g	802.11n HT20
2412	-6	-8	-8
2437	-6	-8	-8
2462	-6	-9	-9

4.2 Carrier Frequency and Channel

802.11b, 802.11g and 802.11n HT20:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

4.3 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB 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	MCHPRT2 Ver_1.7.6.2
---------------	---------------------

The samples were used as follows:

A003785093-001, 003

A003809998-005, 006

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	
-	√	√	√	√	Taisaw Crystal
-	√	√	√	√	Taitien Crystal

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on **X-plane**.
2. "-" means no effect.
3. The antenna has been evaluated, and only the worst-case scenario has been recorded.

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	Available Channel	Tested Channel	Date Rate (Mbps)
Power Only	802.11b	1 to 11	1, 6, 11	1.0
Power Only	802.11g	1 to 11	1, 6, 11	6.0
Power Only	802.11n HT20	1 to 11	1, 6, 11	MCS0

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	Available Channel	Tested Channel	Date Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	1.0
-	802.11g	1 to 11	1, 6, 11	6.0
-	802.11n HT20	1 to 11	1, 6, 11	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	Available Channel	Tested Channel	Date Rate (Mbps)
-	802.11g	1 to 11	6	6.0

Mains Conducted Emission

- ☒ 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	Available Channel	Tested Channel	Date Rate (Mbps)
-	802.11g	1 to 11	6	6.0

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Page 14 of 32**Test Condition**

Test Item	Crystal	Ambient Temperature	Relative Humidity	Tested by
Conducted Measurement	Taisaw	23.5-24.1 °C	65-68 %	Andy Chen & Nick Hsu
	Taitien	23.6-24.3 °C	61-68 %	Andy Chen
Radiated Spurious Emissions above 1 GHz	Taisaw	23.3-24.9 °C	53-55 %	Ivan Chiang
	Taitien	23.2-24.5 °C	52-55 %	Chuan Chu
Radiated Spurious Emissions below 1 GHz	Taisaw	23.3-24.9 °C	53-55 %	Ivan Chiang
	Taitien	23.2-24.5 °C	52-55 %	Chuan Chu
Mains Conducted Emission	Taisaw	22.4 °C	52 %	Chuan Chu
	Taitien			

4.4 Special Accessories and Auxiliary Equipment

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

Accessory of EUT

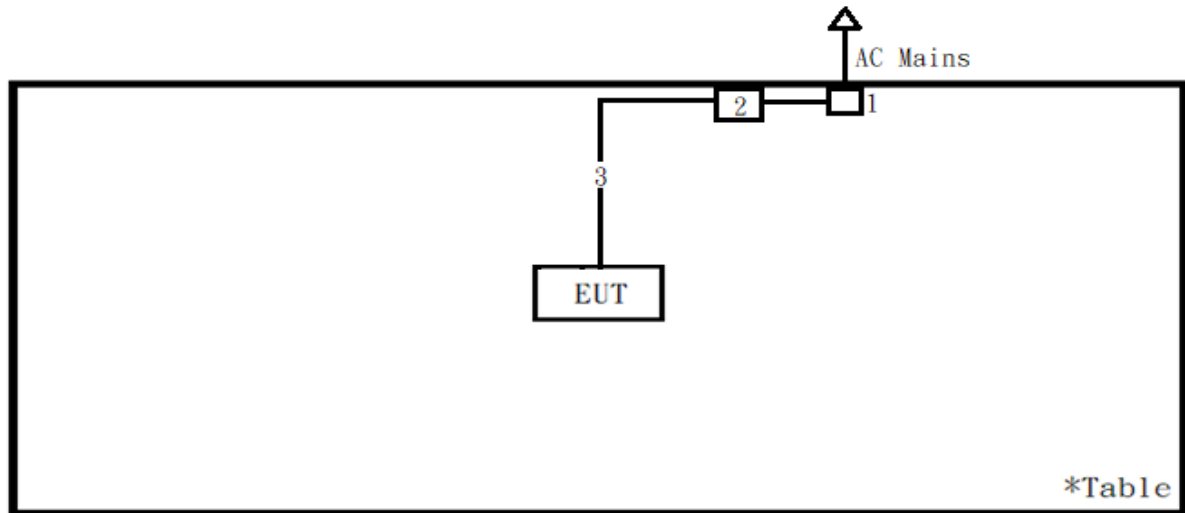
None.

Support Unit

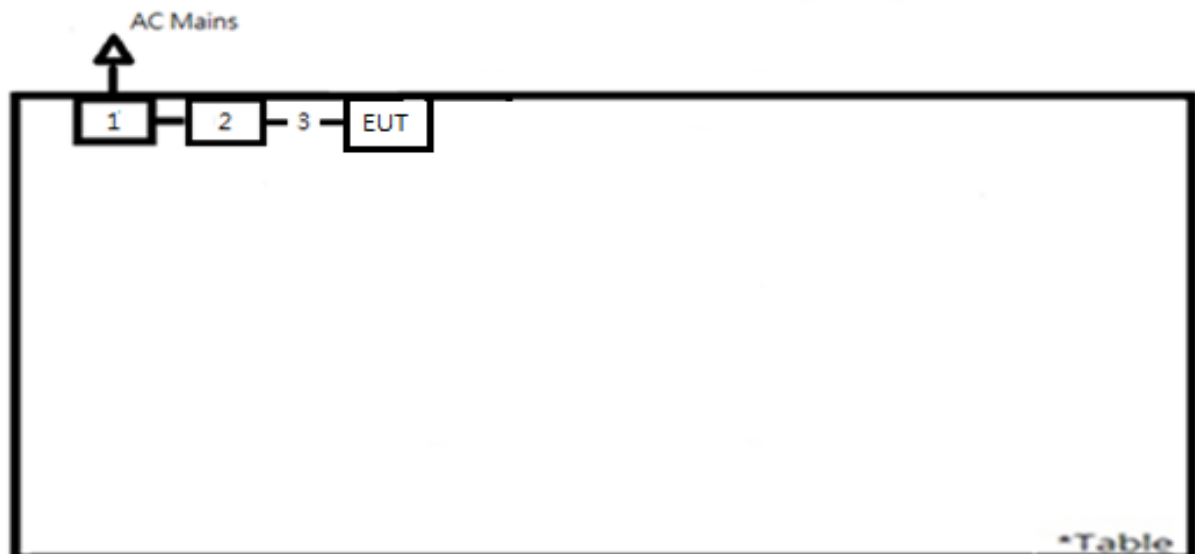
Support Unit								
No	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
1	Adapter	HP	TPN-CA16	-	-	-	100	Radiated and Mains Conducted Tests
2	NoteBook	HP	15s-du0007TX	CND93662VF	-	-	-	
3	USB Cable	TUV	TUV-01	-	-	-	124	
-	Notebook	LENOVO	TP00094A	PF-1GT015	-	-	-	Conducted Test
-	Micro USB to USB Type A	TUV	-	1	-	-	150	
-	USB Type A to USB Type B	TUV	-	1	-	-	180	

4.5 Test Setup Diagram

<Radiated Spurious Emissions Mode>



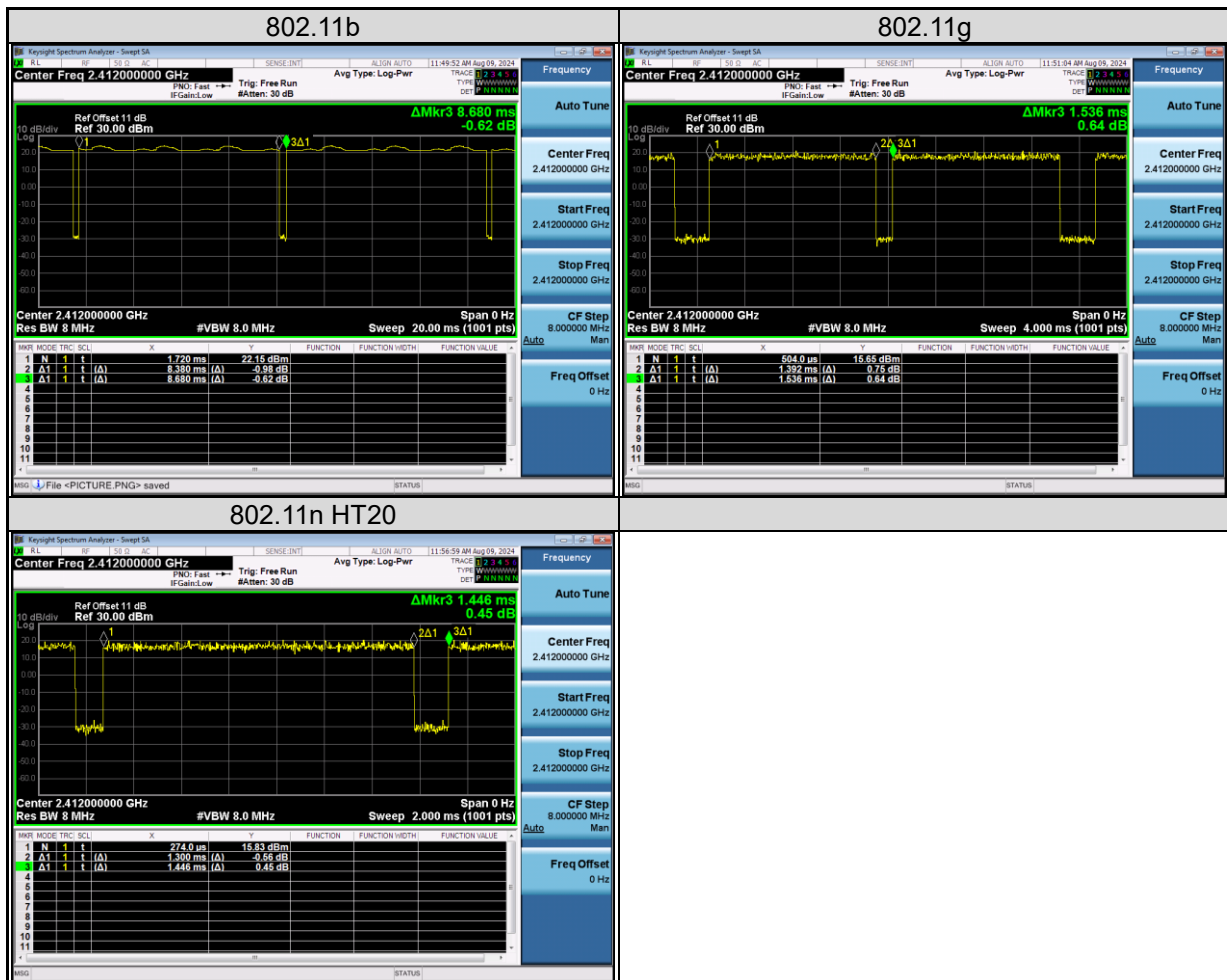
<Mains Conducted Emission Mode>



4.6 Duty Cycle of Test Signal

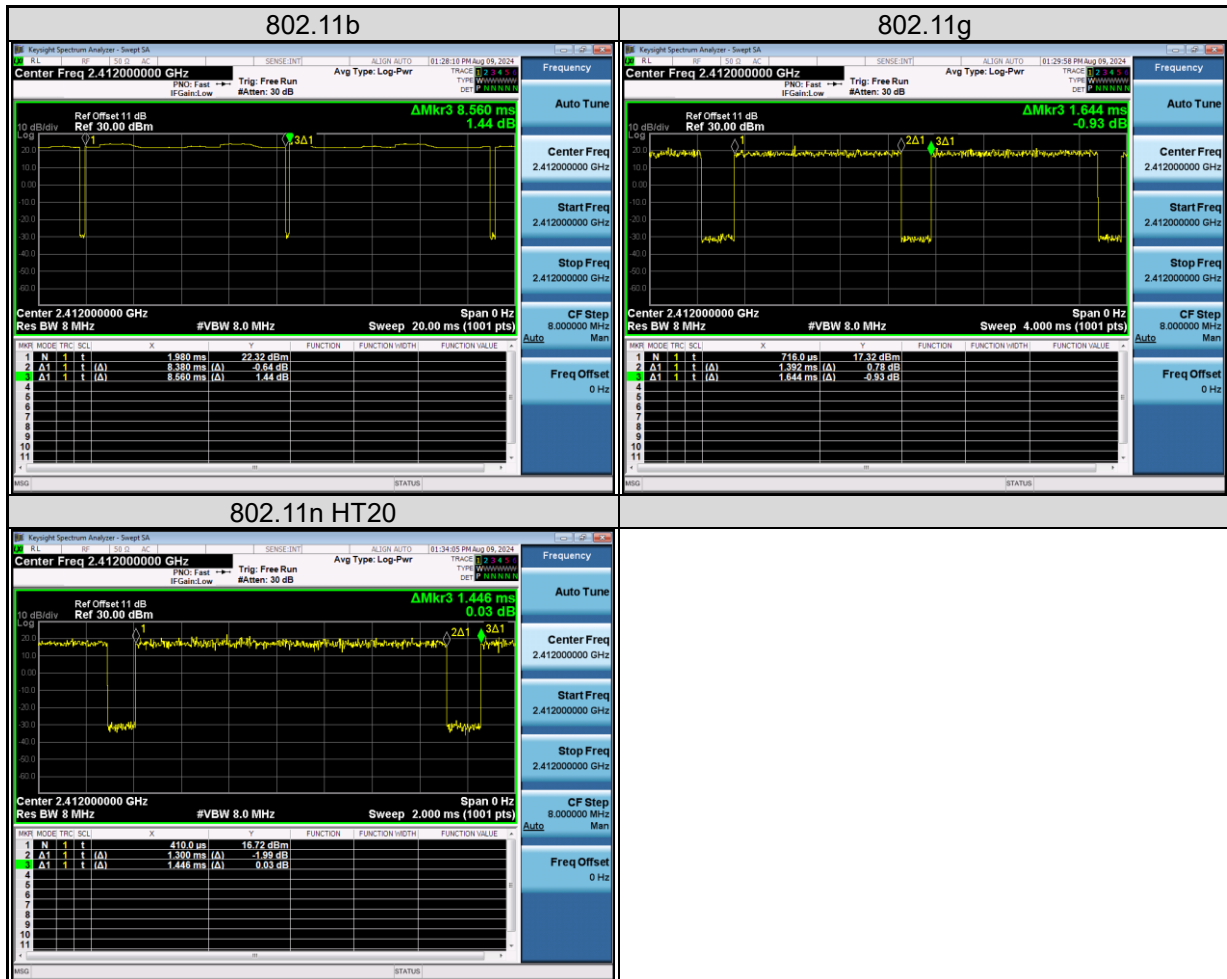
<For Taisaw Crystal>

Mode	On + Off Time (ms)	On Time (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	8.68	8.38	96.54	0.15
802.11g	1.54	1.39	90.63	0.43
802.11n HT20	1.45	1.30	89.90	0.46



<For Taitien Crystal>

Mode	On + Off Time (ms)	On Time (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	8.56	8.38	97.90	0.09
802.11g	1.64	1.39	84.67	0.72
802.11n HT20	1.45	1.30	89.90	0.46



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 antenna information is as listed below. The antenna is with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

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*Antennas no.: 4, 6 and 9 are selected for testing and antenna no.: 1, 3, 8, 11, 12 are selected for spot check.

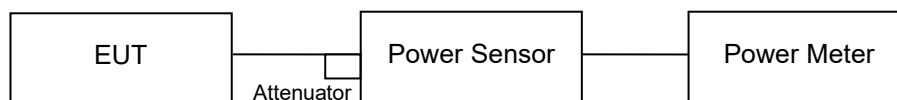
Sino.	P/N	Vendor	Antenna Gain @ 2.4GHz Band	Antenna Type	Remarks
1	W3525B039	Pulse Electronics Corporation	2 dBi	PCB	Cable length 100mm
2	RN-SMA-4 (Used in Original Certification)	Microchip	2.2 dBi	Dipole	--
3	RFDPA870920IMLB301	WALSIN	1.84 dBi	Dipole-DB	Dual Band
4	RFMTA331215IMAB701	WALSIN	3.8 dBi	PIFA (Metal Stamp)	Cable length 150mm
5	RFMTA331240IMAB701	WALSIN	3.0 dBi	PIFA (Metal Stamp)	Antenna same as SIno.4, cable length 400 mm
6	RFPCA381013IMAB701	WALSIN	4.50 dBi	PCB	Cable length 130mm
7	RFPCA381035IMAB701	WALSIN	2.7 dBi	PCB	Antenna same as SIno.6, cable length 350mm
8	RFA-02-3-C5H1	Aristotle	3 dBi	Dipole	--
9	RFA-02-5-C7H1	Aristotle	5 dBi	Dipole-Long	--
10	RFA-02-P33	Aristotle	2 dBi	PCB	Cable length 150mm
11	1461530100	Molex	3 dBi	PCB/Flexi	Cable length 100mm Dual Band
12	RN-SMA-S	Microchip	0.56 dBi	Dipole-short	--
13	RN-SMA-7	Microchip	5 dBi	Dipole-Long	--
14	RFA-02-5-F7H1	Aristotle	5 dBi	Dipole-Long	--
15	RFA-02-D3	Aristotle	2 dBi	Dipole-no encl.	--
16	RFA-02-G03	Aristotle	2 dBi	PIFA (Metal Stamp)	Cable length 150mm
17	RFA-02-L2H1	Aristotle	2 dBi	Dipole	--
18	RFA-02-P05	Aristotle	2 dBi	PCB	Cable length 150mm
19	RFA-02-C2M2	Aristotle	2 dBi	Dipole	--

5.1.2 Peak Output Power

Limit 1 watt (30 dBm)

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	2024/3/12	2025/3/11	2024/8/9	2025/5/29
Power Meter	Anritsu	ML2495A	1901008	2025/2/26	2026/2/25		
Power Sensor	Anritsu	MA2411B	1725269	2024/3/12	2025/3/11	2024/8/9	2025/5/29
Power Sensor	Anritsu	MA2411B	1725269	2025/2/26	2026/2/25		

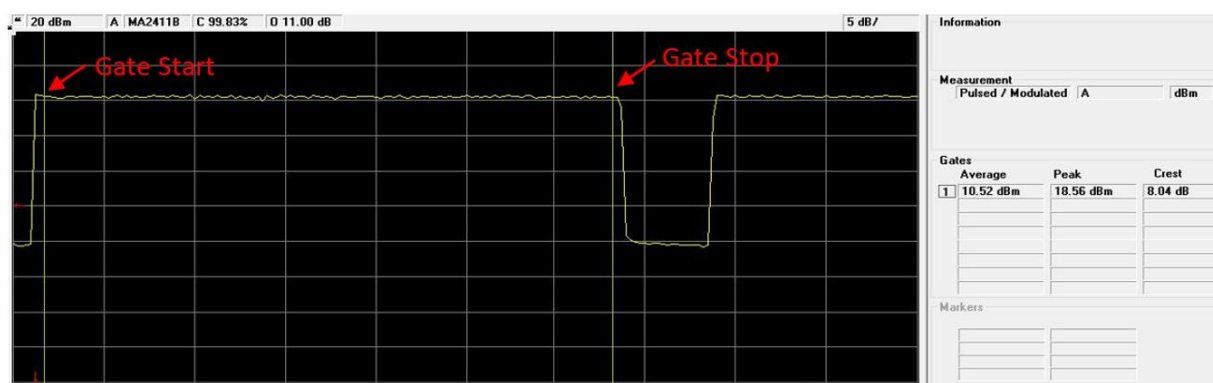
Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was 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. Duty factor is not added to measured value.

Gate Setup:

1. Select the [Gates] tab in the software.
2. Check the box (e.g., Gate 1) to display it on the trace.
3. Set Gate Position
 - Drag the gate line with the mouse to the desired point on the waveform, or
 - Enter Values using the [Set] button and input start/stop times.
4. Switch to the next measurement channel and repeat the same gate setup procedure.
5. The instrument calculates average/peak power only within the defined gate interval.



Test Result

Peak Output Power for Taisaw Crystal

<802.11b>

Channel	Channel Frequency (MHz)	Peak Output Power		Limit (dBm)
		(dBm)	(mW)	
1	2412	21.12	129.42	30
6	2437	20.93	123.88	30
11	2462	20.87	122.18	30

<802.11g>

Channel	Channel Frequency (MHz)	Peak Output Power		Limit (dBm)
		(dBm)	(mW)	
1	2412	22.83	191.87	30
6	2437	22.92	195.88	30
11	2462	21.65	146.22	30

<802.11n HT20>

Channel	Channel Frequency (MHz)	Peak Output Power		Limit (dBm)
		(dBm)	(mW)	
1	2412	22.27	168.66	30
6	2437	22.57	180.72	30
11	2462	22.21	166.34	30

Peak Output Power for Taitien Crystal
<802.11b>

Channel	Channel Frequency (MHz)	Peak Output Power		Limit (dBm)
		(dBm)	(mW)	
1	2412	21.04	127.06	30
6	2437	21.09	128.53	30
11	2462	21.01	126.18	30

<802.11g>

Channel	Channel Frequency (MHz)	Peak Output Power		Limit (dBm)
		(dBm)	(mW)	
1	2412	22.74	187.93	30
6	2437	22.63	183.23	30
11	2462	21.84	152.76	30

<802.11n HT20>

Channel	Channel Frequency (MHz)	Peak Output Power		Limit (dBm)
		(dBm)	(mW)	
1	2412	22.36	172.19	30
6	2437	22.90	194.98	30
11	2462	22.05	160.32	30

Average Power for Taisaw Crystal

<802.11b>

Channel	Channel Frequency (MHz)	Average Power	
		(dBm)	(mW)
1	2412	18.74	74.82
6	2437	18.52	71.12
11	2462	18.46	70.15

<802.11g>

Channel	Channel Frequency (MHz)	Average Power	
		(dBm)	(mW)
1	2412	15.75	37.58
6	2437	15.82	38.19
11	2462	14.02	25.23

<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Power	
		(dBm)	(mW)
1	2412	14.63	29.04
6	2437	15.06	32.06
11	2462	14.67	29.31

Average Power for Taitien Crystal**<802.11b>**

Channel	Channel Frequency (MHz)	Average Power	
		(dBm)	(mW)
1	2412	18.80	75.86
6	2437	18.88	77.27
11	2462	18.78	75.51

<802.11g>

Channel	Channel Frequency (MHz)	Average Power	
		(dBm)	(mW)
1	2412	14.68	29.38
6	2437	14.95	31.26
11	2462	13.85	24.27

<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Power	
		(dBm)	(mW)
1	2412	14.71	29.58
6	2437	15.18	32.96
11	2462	13.83	24.15

5.1.3 Radiated Spurious Emissions and Band Edges

Limit

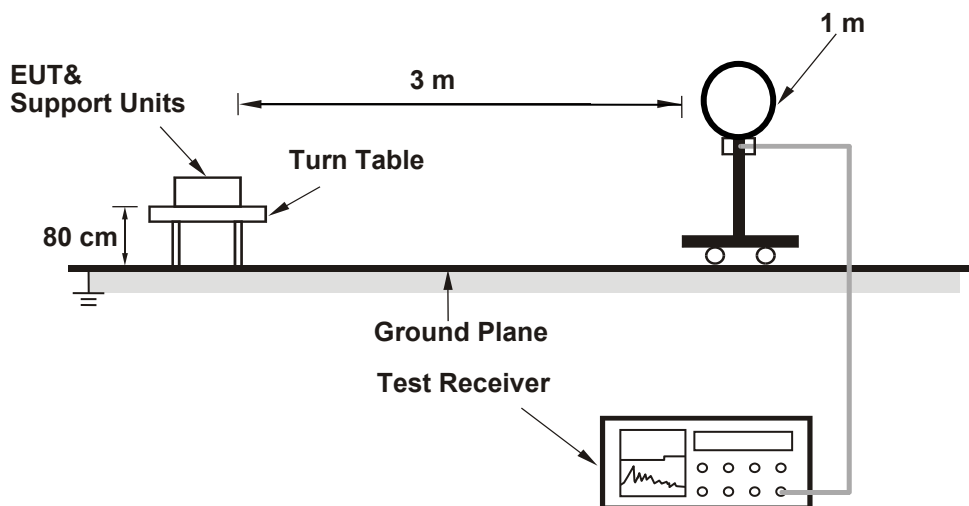
Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Emissions radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in §15.247(d).

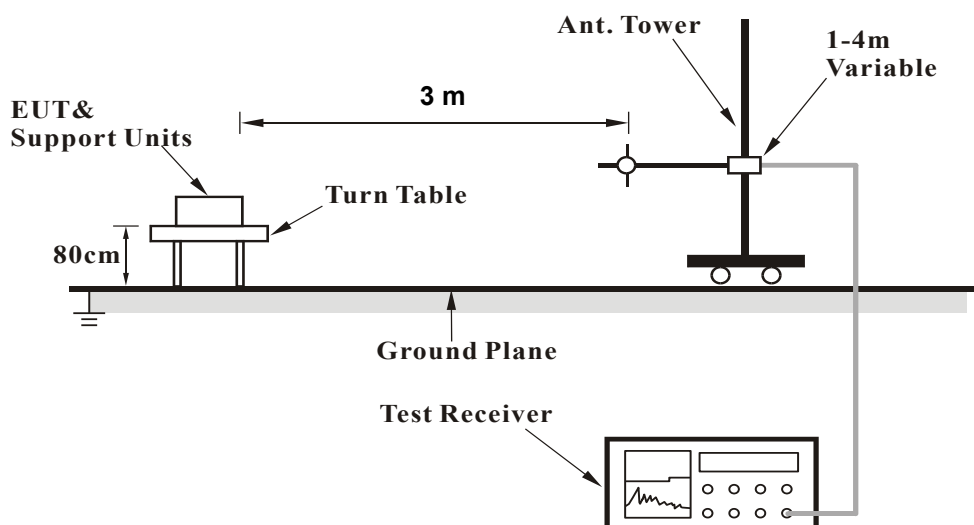
Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

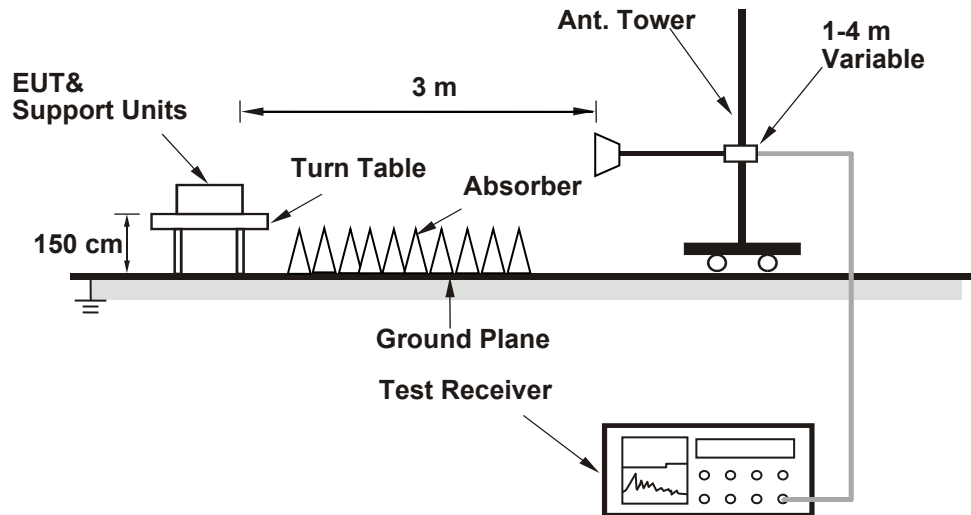
<Radiated Emissions below 30 MHz>



<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

Test Date: 2025/3/12 ~ 2025/4/28

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Above 1 GHz					
Signal Analyzer	R&S	FSV40	101512	2025/2/26	2026/2/25
Horn Antenna	ETS-Lindgren	3117	00218929	2024/11/21	2025/11/20
HF-AMP + AC source	EMCI	EMC051845SE	980633	2025/1/15	2026/4/1
HF-AMP + AC source	EMCI	EMC184045SE	980656	2025/1/15	2026/1/14
Horn Antenna	SCHWARZBECK	BBHA 9170	00896	2025/1/14	2026/1/13
Test Software	Audix E3	15914a_20191106 tuv	PK-001087	N/A	N/A
30 MHz 1 GHz					
Receiver	R&S	ESR7	102109	2025/2/13	2026/2/12
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2024/5/9	2025/5/8
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2025/4/8	2026/4/7
LF-AMP	Agilent	8447D	2727A05146	2025/1/15	2026/1/14
Test Software	Audix E3	15914a_20191106 tuv	PK-001087	N/A	N/A
Below 30 MHz					
Receiver	R&S	ESR7	102109	2025/2/13	2026/2/12
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2024/12/11	2025/12/10
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 A and B.

5.2 Mains Emission

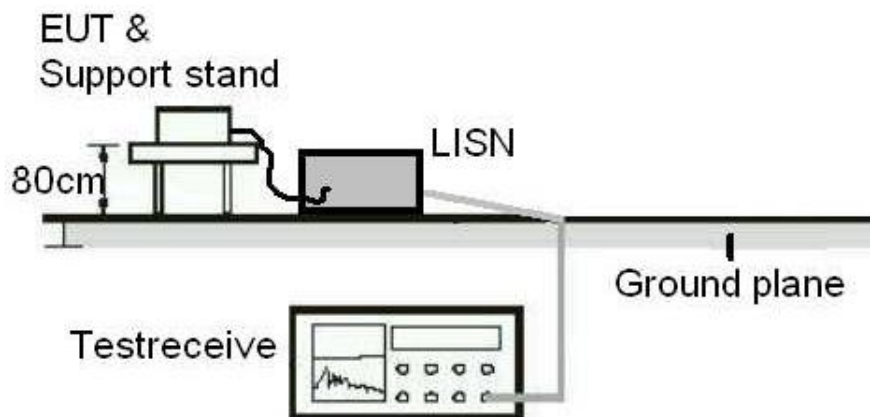
5.2.1 Mains Conducted Emission

Limit

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

Kind of Test Site Shielded room

Test Setup



Test Instruments

Test Date: 2025/7/4

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Two-Line V-Network	Rohde & Schwarz	ENV216	101938	2024/10/22	2025/10/21
EMI Test Receiver	R&S	ESCI	101094	2024/11/25	2025/11/24

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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 A and B.