



FCC Test Report



Report Number : 6128626044602

Applicant : Hangzhou Huacheng Software
Technology Co., Ltd.

Product : IMOU Smart Lock

Brand : IMOU

Model : Cubo1

FCC ID : 2BQWU-CUBO1-A1

Applicable Standard:

FCC Subpart 15.247

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Approved By	Jack Chang		2026-09-21
Prepared By	Ariel Hsu		2026-09-21

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service control rules.

EXECUTIVE SUMMARY

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1 General Information

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	Initial Issue	2026-09-16
2	Radiated Spurious Emissions Test Configuration Update	2026-09-21

1.2 Introduction

The information contained in this report is intended to show verification of RF qualification approval. The testing requirements of the standards for the tests listed in Section 1.4.

Applicant : Hangzhou Huacheng Software Technology Co., Ltd.
Address : 15th Floor, Building 3, No. 582, Liye Road, Changhe Street, Binjiang District
Manufacturer : Hangzhou Huacheng Software Technology Co., Ltd.
Brand Name : IMOU
Product Name : IMOU Smart Lock
Model Number(s) : Cubo1
Date of Receipt of EUT : 2026-06-04
Start of Test : 2026-06-17
Finish of Test : 2026-07-07
Test Laboratory : TÜV SÜD Asia Ltd., Taiwan Branch
7F., No. 37, Sec. 2, Zhongyang S. Rd., Beitou District, Taipei City 11270, R.O.C. Taiwan
Test Location : Guishan Laboratory
No. 31, Dinghu Road, Guishan District, Taoyuan City, TAIWAN (R.O.C.)

The test facility is accredited by TAF (member of ILAC), under number 2573 according to ISO/IEC 17025: 2017.

FCC OET Designation Number: TW2573

1.3 Reference Measurement Document

☒ ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024

☒ KDB 558074 D01 15.247 Meas Guidance v05r02

☐ KDB 662911 D01 Multiple Transmitter Output v02r01

1.4 Brief Summary of Test Results

§ 15.247			
Clause	Test item	Result	Remark
§15.203	Antenna Requirement	Compliant	
§15.247(b)(3)	Peak Conducted Output Power	Compliant	
§15.247(a)(2)	6 dB Bandwidth	Compliant	
§15.247(e)	Peak Power Spectral Density	Compliant	
§15.247(d)	Conducted Spurious Emission	Compliant	
§15.247(d)& 15.209	Radiated Spurious Emissions and Band Edges	Compliant	
§15.207	AC Power Line Conducted Emission	Compliant	

Note:

N/A

2 General EUT Information

2.1 Technical Specification of EUT

Items	EUT information
Operating Frequency	2412-2462 MHz
Number of Channels	11 for 20 MHz BW mode 7 for 40 MHz BW mode
Hardware Version	V1.04
Software Version	V1.000.0000001.0.R.20250722
Operating Voltage	6Vdc from battery(1.5V*4) 5Vdc from USB (for testing)
Data Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n-HT20: up to 72.2 Mbps 802.11n-HT40: up to 150 Mbps
Modulation	DSSS, OFDM (BPSK, QPSK, 16QAM, 64QAM)
TX Streaming Mode	☒ SISO ☐ MIMO, 2T2R ☐ 2TX for Diversity
Sample ID	Conducted:201880010331-E1-003 Radiated: 201880010331-E1-005
Test Software Version	ttermpro_V5.3

TÜV SÜD Asia Ltd assumes no responsibility for any technical specification (including antenna information) provided by the applicant.

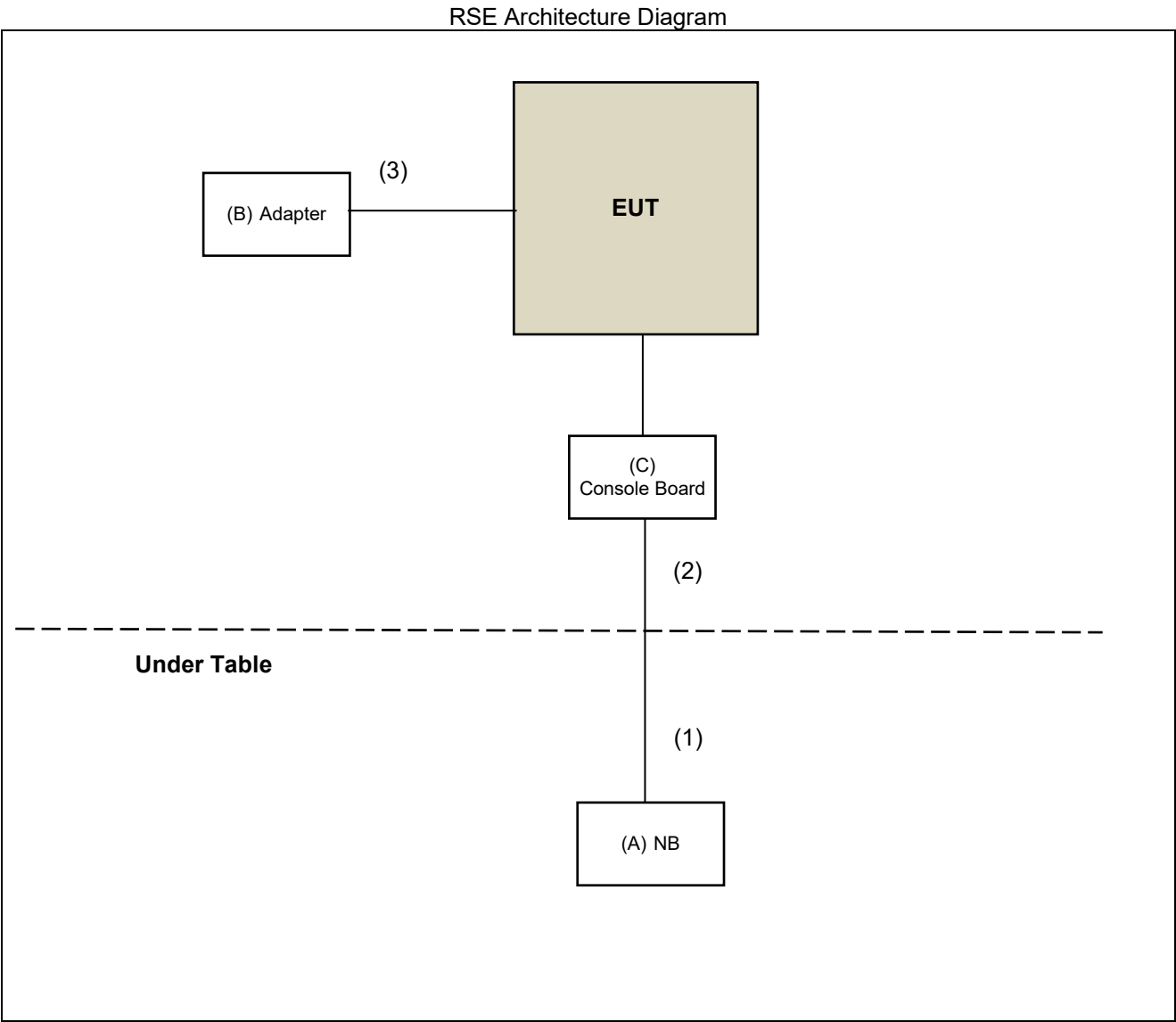
2.2 Antenna List

The antenna has been confirmed to be fully compliant with the requirements of FCC §15.203.

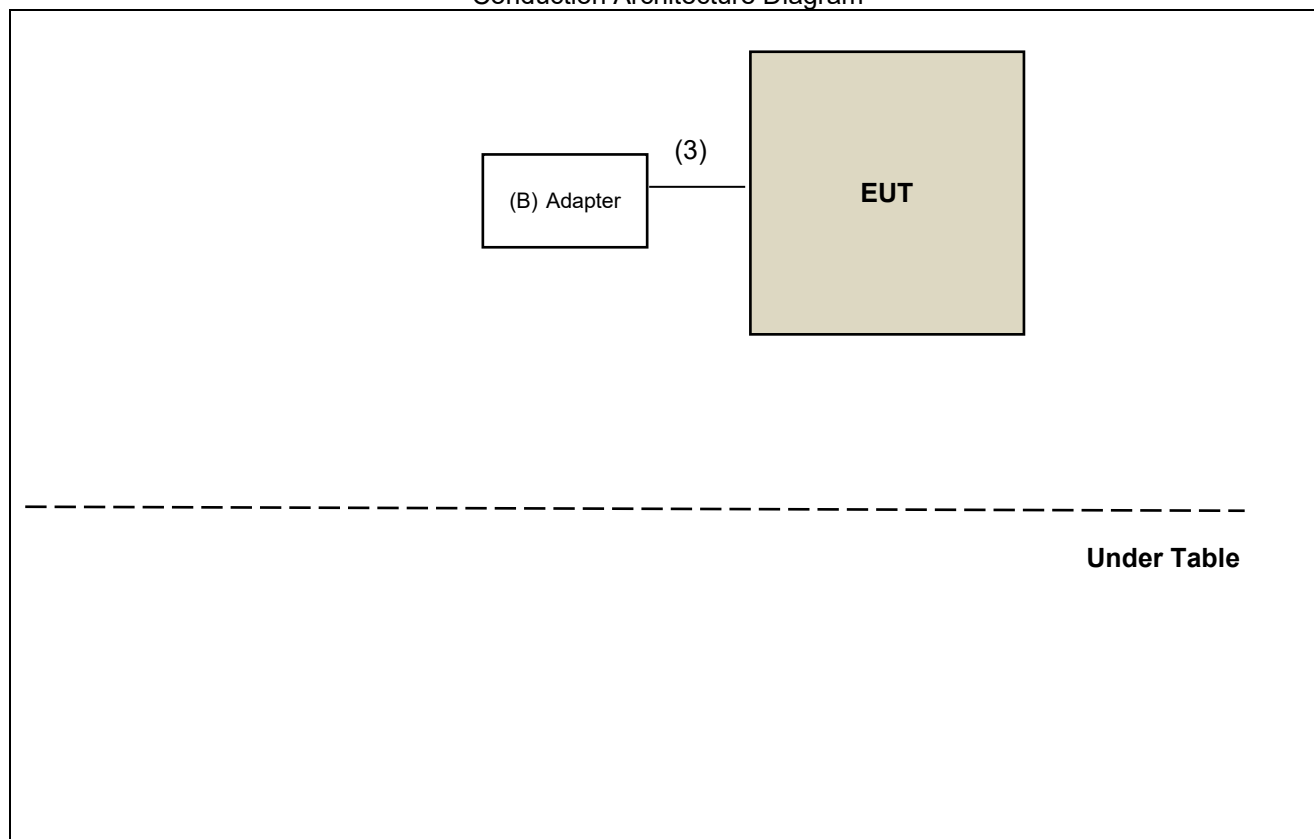
Antenna Type	Brand	Model	Connector	Freq. (MHz)	Peak Antenna Gain (dBi)
Stamped metal antenna	INNOWAVE	F06682506990001	Permanently attached antenna	2400~2500	-0.46

3 EUT Setup Configuration

3.1 Block Diagram



Conduction Architecture Diagram



3.2 Equipment used

No.	Product	Brand	Model	Serial No.	Remarks
A	Laptop	Lenovo	TP00048A	PC-00NQMT	Provided by Lab
B	Adapter	Apple	A1385	N/A	Provided by Lab
C	Console Board	N/A	N/A	N/A	Provided by Client

3.3 Cable(s) used

No.	Cable Descriptions	Brand	Model	Length(m)	Remarks
1	High-isolation extension line	Benevo	BUSB0300AMF	5	Provided by Lab
2	USB cable	UGREEN	USB Type C	1	Provided by Client
3	USB cable	IQOS	USB Type C	1	Provided by Lab

3.4 Operating Channels and Frequencies

802.11b, 802.11g, 802.11n-HT20:

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

802.11n-HT40:

Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2422	5	2442
2	2427	6	2447
3	2432	7	2452
4	2437		

3.5 Test Configuration

The EUT was configured to operate at its maximum power control level and set to a continuous transmitting and receiving state via the test software for all testing procedures.

3.5.1 RF Conducted Measurement

Test Item	Mode	Tested Channel	Data Rate (Mbps)
Peak Output Power, Maximum Spectral Power Density, Emission Bandwidth/ 6 dB Bandwidth Conducted Spurious Emission	802.11b	1, 6, 11	1
	802.11g	1, 6, 11	6
	802.11n-HT20	1, 6, 11	MCS0
	802.11n-HT40	3, 6, 9	MCS0

3.5.2 Radiated Spurious Emission

☒ Mobile Device

☐ Portable Device and 3 axis (X, Y, Z) were assessed. ☐ Lie(X) ☐ Stand(Y) ☐ Side(Z) was identified as the worst-case and is presented in the report.

The emission tests were performed with the EUT and accessories arranged and configured in a manner that tends to produce maximum emissions.

Radiated Spurious Emissions (Below 1 GHz)

Below tested channels were the worst-case of each modulation family determined in accordance with ANSI C63.10, clause 5.6.2.2 (b).

Mode	Tested Channel	Date Rate (Mbps)
802.11g	6	6.0

Radiated Spurious Emissions (Above 1 GHz)

☒ Following channel(s) was (were) selected for the final test as listed below.

Test Item	Mode	Tested Channel	Date Rate (Mbps)
Spurious Emission	802.11b	1, 6, 11	1.0
	802.11g	1, 6, 11	6.0
	802.11n-HT20	1, 6, 11	MCS0
	802.11n-HT40	3, 6, 9	MCS0
Band Edge	802.11b	1, 11	1.0
	802.11g	1, 11	6.0
	802.11n-HT20	1, 11	MCS0
	802.11n-HT40	3, 9	MCS0

AC Power Line Conducted Emission

☐ N/A, the device was powered by battery.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Channel	Date Rate (Mbps)
Tx	2412-2462	-	1.0

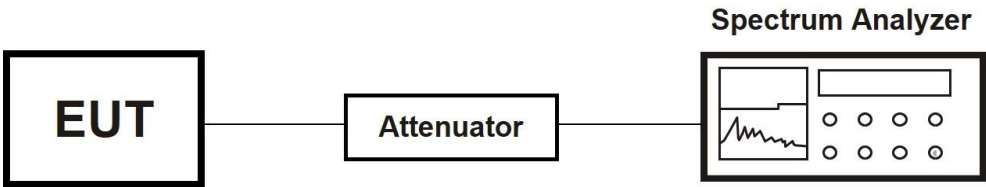
3.6 Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Conducted Measurement	20 - 24 °C	50-68 %	Sam Huang
Radiated Spurious Emissions	20 - 24 °C	50-68 %	Kevin Syu
AC Power Line Conducted Emission	20 - 24 °C	50-68 %	Kevin Syu

4 Technical Requirements

4.1 Duty Cycle

4.1.1 Block Diagram



4.1.2 Measurement procedure

Duty Cycle measurement is performed in accordance with the procedures of ANSI C63.10, clause 11.6. The EUT shall be configured to operate at the maximum achievable duty cycle.

Spectrum Parameters	Setting
Centre Frequency	equal to the centre of the transmission
Span	Zero Span
RBW	$\geq$ EBW, or the largest available value
VBW	$\geq$ RBW
Detector	Peak
Sweep Points	≥ 32001

4.1.3 Limit

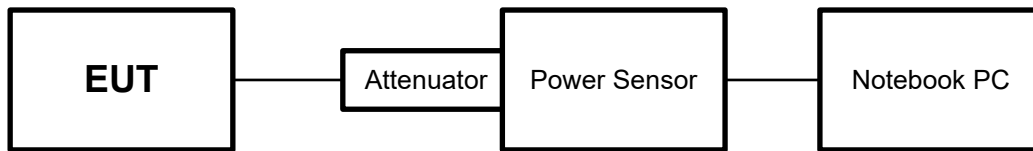
N/A, the duty cycle measurement was a reference value.

4.1.4 Result

Refer to Appendix B

4.2 Peak Conducted Output Power

4.2.1 Block Diagram



4.2.2 Measurement procedure

- 1) The measurement is performed in accordance with the procedures of ANSI C63.10, clause 11.9.1. The EUT shall be configured to operate at the maximum achievable duty cycle and the operation mode presented at section 3.5.
- 2) PKPM1, ANSI C63.10, Clause 11.9.1.2 was conducted for peak output power measurement.
- 3) If average power is necessary to be recorded, that Method AVGPM-G, clause 11.9.2.3.2 shall be conducted for average output power measurement. The wideband gated RF power meter is used to perform the measurement. The gate parameters are adjusted such that the power is measured the ON time of the transmissions.

4.2.3 Limit

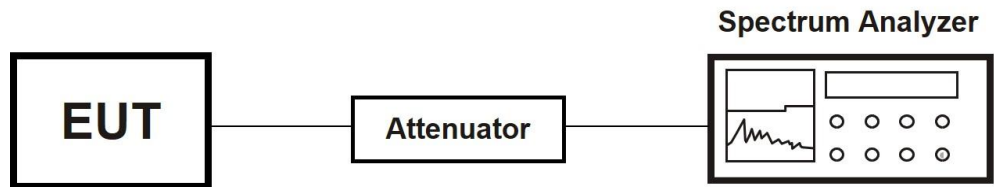
The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm).

4.2.4 Measurement result

Refer to Appendix C

4.3 Bandwidth Measurement

4.3.1 Block Diagram



4.3.2 Measurement procedure

99% Occupied Bandwidth

Spectrum Parameters	Setting
Centre Frequency	equal to the centre of the transmission
Span	encompass the entire 99% OBW of the signal
RBW	1-5% of EBW or OBW
VBW	$\geq 3 \times \text{RBW}$
Detector	Sample
Trace Mode	Single Sweep
Measurement Function	Use the 99% power bandwidth function of the spectrum.

6dB Bandwidth

Spectrum Parameters	Setting
Centre Frequency	equal to the centre of the transmission
Span	encompass the entire 6 dB BW of the signal
RBW	1-5% of EBW or OBW
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace Mode	Max Hold
Measurement Function	Measure the maximum width of the emission that is 6 dB down from the maximum of the emission.

4.3.3 Limit

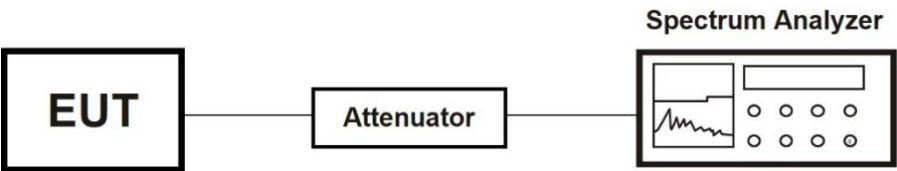
6 dB bandwidth shall be at least 500 kHz.

4.3.4 Measurement result

Refer to Appendix D

4.4 Peak Power Spectral Density

4.4.1 Block Diagram



4.4.2 Measurement procedure

Spectrum Parameters	Setting
Centre Frequency	equal to the centre of the transmission
Span	>1.5 times of the DTS bandwidth
RBW	3 kHz
VBW	≥ 3 RBW
Detector	Peak
Trace Mode	Max hold
Measurement Function	Use peak search to identify the max PSD

4.4.3 Limit

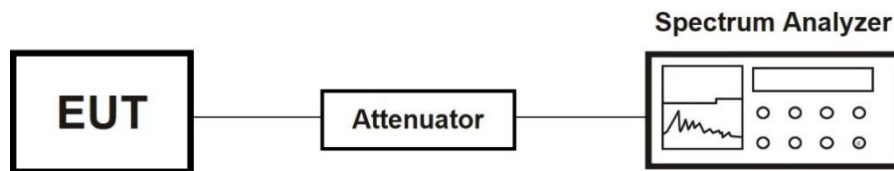
The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

4.4.4 Measurement result

Refer to Appendix E

4.5 Conducted Spurious Emission

4.5.1 Block Diagram



4.5.2 Measurement Procedure

Reference Level

Spectrum Parameters	Setting
Centre Frequency	equal to the centre of the transmission
Span	1.5*DTS bandwidth
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace Mode	Max hold
Measurement Function	Use peak search to identify the max value as the reference level

Emission Level

Spectrum Parameters	Setting
Frequency Range	30 MHz to 10 th harmonics
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace Mode	Max hold
Measurement Function	Use the peak marker function to determine the maximum amplitude level

All emissions shall be have 20 dB below reference level, or 30 dB below if average power was conducted as the reported power.

4.5.3 Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

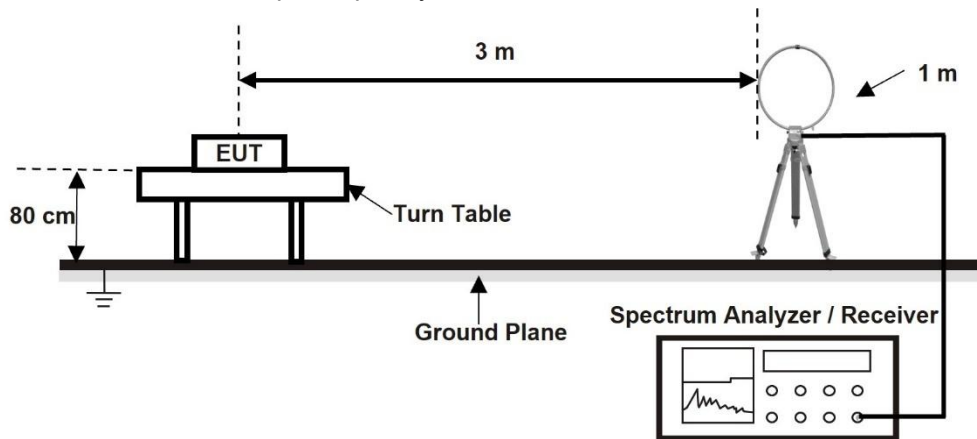
4.5.4 Test Result

Reference to Appendix F

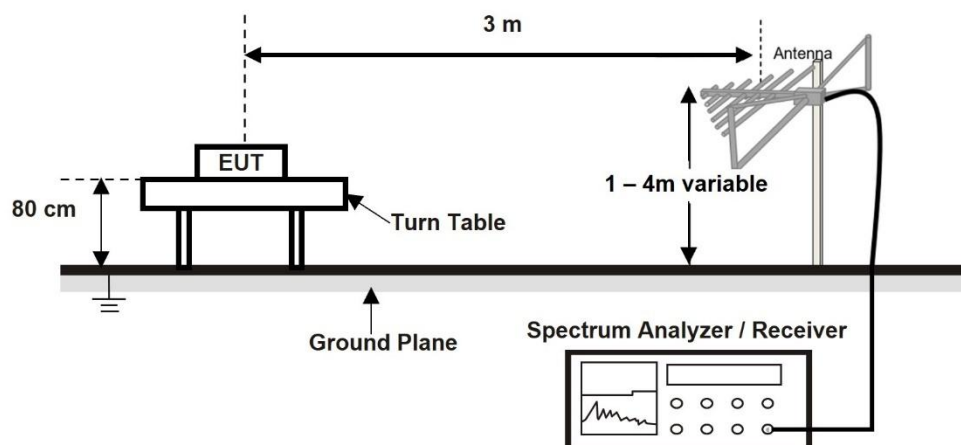
4.6 Radiated Spurious Emissions and Band Edges

4.6.1 Test Setup

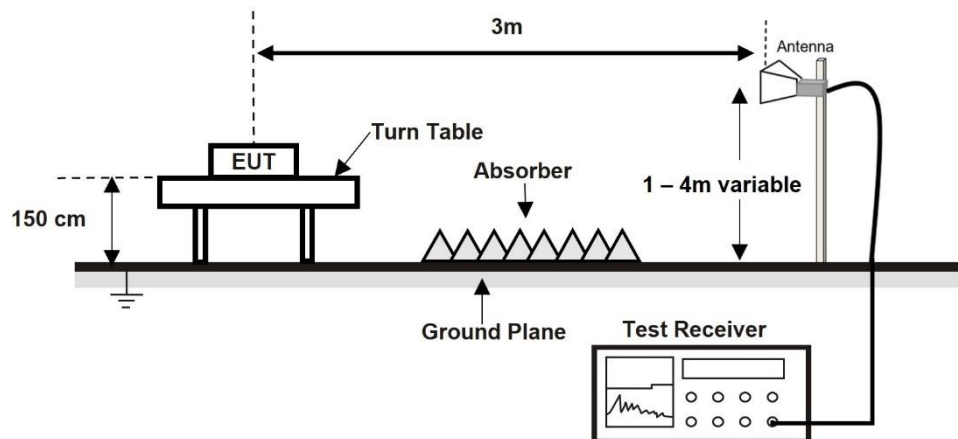
Radiated Emission Test Set-Up, Frequency Below 30MHz.



Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



Radiated Emission Test Set-Up, Frequency Above 1 GHz.



4.6.2 Measurement procedure

For Frequency below 30 MHz

The EUT was setup in accordance with section 3.1 and 4.6.1. The EUT was placed on top of the turntable with a height of 0.8 m for measurement of frequencies below 30 MHz. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° while varying the measurement antenna height in Parallel (OPEN), perpendicular (CLOSE), and 4 m Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations. The measurement shall be performed with the following spectrum setting.

The RBW/ VBW shall be set 9 kHz for the measurement with Q.P. Frequency ranges in 9-90 kHz and 110- 490 kHz are based on measurements employing average and peak detectors.

For Frequency from 30 MHz to 40 GHz

The EUT was setup in accordance with section 3.1 and 4.6.1. The EUT was placed on top of the turntable with a height of 0.8 m for measurement of frequencies below 1 GHz, and 1.5 m for measurement of frequencies above 1 GHz. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° while varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. The measurement shall be performed with the following spectrum setting.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

1. RBW = 120kHz
2. VBW $\geq 3 \times$ RBW
3. Detector = Peak
4. Sweep time = auto
5. Trace mode = max hold
6. Allow sweeps to continue until the trace stabilizes.

If peak detection results satisfy the limit, Q.P. measurements are unnecessary; otherwise, a final Q.P. measurement must be performed.

Frequency above 1 GHz to 10th harmonic (up to 25 GHz):

Peak Measurement:

1. RBW = 1MHz
2. VBW $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Sweep time = auto.
5. Trace mode = max hold.
6. Allow sweeps to continue until the trace stabilizes.

Where the peak values are below the average limit, further measurements using an average detector are not required.

Average Measurement:

1. RBW = 1MHz
2. VBW = 10Hz (for duty cycle $\geq 98\%$), or
VBW = the value calculated in Appendix B (when duty cycle $<98\%$).
3. Detector = Peak.
4. Sweep time = auto.
5. Trace mode = max hold.
6. Allow sweeps to continue until the trace stabilizes.

4.6.3 Limit

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits

Unwanted spurious emissions which fall in the restricted bands as specified in FCC §15.205 must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Distance (m)
0.009-0.490	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note: The lower limit shall apply at the transition frequencies.

Sample Calculation:

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Preamplifier Gain (dB)

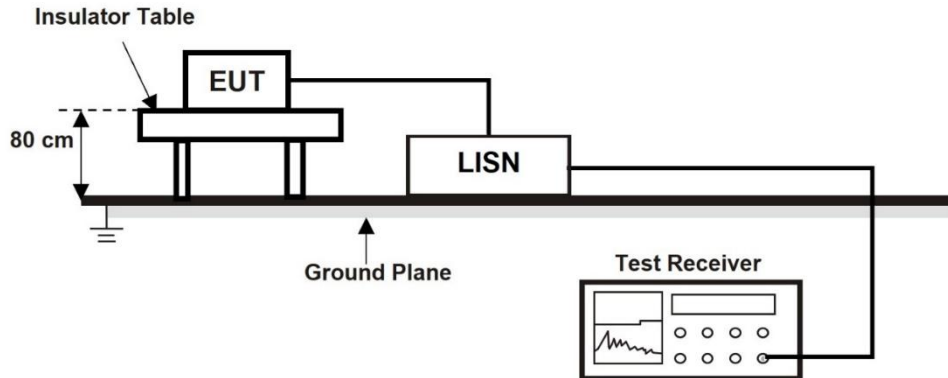
Level (dB $\mu\text{V/m}$) = Reading (dB μV) + Factor (dB/m)

4.6.4 Measurement result

Please refer to Appendix G

4.7 AC Power Line Conducted Emission Measurement

4.7.1 Test Setup



4.7.2 Measurement procedure

1. 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 μ H of coupling impedance for the measuring instrument.
2. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
3. The frequency range from 150 kHz to 30 MHz was scanned. Emission levels more than 20 dB below the limit was not recorded.

4.7.3 Limit

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

4.7.4 Measurement result

Please refer to Appendix H

5 Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

Item	Measurement Uncertainty			
	Test Site	Description	U	Unit
AC Power Line Conducted Emission	Shielded Room A	0.15 – 30MHz	2.69	dB
Radiated Emission, Horizontal @3m distance	Chamber 966B	9kHz – 30MHz	2.61	dB
		30 – 1000MHz	1.82	dB
		1 – 18GHz	2.11	dB
		18 – 40GHz	2.41	dB
Radiated Emission, Vertical @3m distance	Chamber 966B	9kHz – 30MHz	2.61	dB
		30 – 1000MHz	1.8	dB
		1 – 18GHz	2.11	dB
		18 – 40GHz	2.41	dB
Frequency stability	RF Room	--	± 29	Hz
Bandwidth Measurement	RF Room	6dB BW	± 29.78	kHz
	RF Room	20dB BW	± 46.91	kHz
	RF Room	26dB BW	± 55.99	kHz
	RF Room	99% OBW	± 28.95	kHz
Output Power	RF Room	Spectrum	± 1.44	dB
		Power Sensor	± 0.81	
Power Spectral Density	RF Room	--	± 1.44	dB
Conducted Spurious Emission	RF Room	--	± 1.62	dB

Appendix A. Test Equipment

Radiated Emission Measurement

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Spectrum Analyzer	R&S	FSV3044	101346	2025-07-29	1 Year
Test Receiver	R&S	ESR 7	102602	2025-08-05	1 Year
Horn (18-40G)	RF SPIN	DRH0844	LE2C01A0844	2025-12-19	1 Year
Horn (1-18G)	RF SPIN	DRH18-E	211218A18EN	2025-11-05	1 Year
Bi-Log Antenna	Schwarzbeck	VULB 9168	01496	2026-02-11	1 Year
Loop Antenna	TESEQ	HLA 6121	64165	2026-05-06	1 Year
Preamplifier (1-18G)	EMCI	EMC118A45SEE3	981150	2026-04-26	1 Year
Preamplifier (18-40G)	SGH	SGH184	20230214-8	2026-05-11	1 Year
Preamplifier (30M-1G)	EMCI	EMC330N-P	981122	2026-03-30	1 Year
Test Software	Audix	e3	221118, V9	NCR	NCR

AC Power Line Conducted Emission

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Test Receiver	R&S	ESR7	102600	2025-08-22	1 Year
LISN	R&S	ENV216	101517	2025-10-31	1 Year
Test Software	Audix	e3	221118, V9	NCR	NCR.

RF Conducted Measurement

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Spectrum Analyzer	Keysight	N9010B	MY63440384	2025-07-11	1 Year
Power Sensor	Anritsu	MA24408A	12778	2026-03-12	1 Year
Test Software	Anritsu	MA24400A USB Peak Power Sensor	1.1.0.0	NCR	NCR.
Test Software	Keysight	IOT0047A	24.11.25.17	NCR	NCR.

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.