FCC and ISED Test Report

Apple Inc
Model: A3239

In accordance with FCC 47 CFR Part 15C and ISED RSS-247 and ISED RSS-GEN

Prepared for: Apple Inc
One Apple Park Way
Cupertino
California
95014
USA

TUV SUD Limited Digitally signed by TUV SUD Limited Date: 2024.09.17 14:20:54 +01'00'

FCC ID: BCGA3239 IC: 579C-A3239

COMMERCIAL-IN-CONFIDENCE

Document 75961400-51 Issue 01

SIGNATURE			
AJ Lawson.			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Andrew Lawson	Chief Engineer, EMC	Authorised Signatory	17 September 2024

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

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C and ISED RSS-247 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Connor Lee	17 September 2024	

FCC Accreditation
492497/UK2010 Octagon House, Fareham Test Laboratory

ISED Accreditation
12669A/UK0003 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C, ISED RSS-247 and ISED RSS-GEN: 2023, Issue 3 (2023-08) and Issue 5 (2018-04) + A2 (2021-02) for the tests detailed in section 1.3.

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Contents

1 Report Summary

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	First Issue	17-Sept-2024

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
EUT/Sample Identification	Refer to section 1.6
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED RSS-247 and ISED RSS-GEN: 2023, Issue 3 (2023-08) and Issue 5 (2018-04) + A2 (2021-02)
Start of Test	07-August-2024
Finish of Test	07-August-2024
Name of Engineer(s)	Connor Lee
Related Document(s)	ANSI C63.10 (2020)

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and ISED RSS-247 and ISED RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - 2.4 GHz Bluetooth				
2.1	15.207, 3.1 and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10

Table 2

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - 2.4 GHz WLAN				
2.1	15.207, 3.1 and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10

Table 3

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - 5 GHz WLAN				
2.1	15.207, 3.1 and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10

Table 4

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - 6 GHz WLAN				
2.1	15.207, 3.1 and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10

Table 5

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - Thread				
2.1	15.207, 3.1 and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10

Table 6

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - Narrowband				
2.1	15.207, 3.1 and 8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10

Table 7

1.4 Product Information

1.4.1 Technical Description

The equipment under test (EUT) was a desktop computer.

1.4.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: AC Powered – All modes				
AC Power Port	2 m	Power	2 Pin Power Cable	No
USB-C Port 1	1 m	Data	USB Type C	No
USB-C Port 2	1 m	Data	USB Type C	No
USB-C Port 3	Unterminated	Data	USB Type C	No
USB-C Port 4	Unterminated	Data	USB Type C	No
USB-C Port 5	Unterminated	Data	USB Type C	No
Ethernet Port	3 m	Data	Cat 6	No
HDMI Port	2 m	Data	HDMI	No
Audio Jack Port	Unterminated	Data	Audio Jack 3.5mm	No

Table 8

1.4.3 Test Configuration

Configuration	Description
AC Powered	The EUT was powered from a 120 V 60 Hz AC supply. A 3.5 mm audio jack port was terminated with a set of headphones. An ethernet port was terminated to an ethernet switch. A mouse was used to terminate a USB-C port. A keyboard was used to terminate a USB-C Port. Three USB-C ports were unterminated. A monitor was used to terminate a HDMI port.

Table 9

1.4.4 Modes of Operation

Mode	Description
2.4 GHz Bluetooth	The EUT was powered with a connection established to a CMW 500 test set.
2.4 GHz WLAN	The EUT was powered with a network link established to an access point.
5 GHz WLAN	The EUT was powered with a network link established to an access point.
6 GHz WLAN	The EUT was powered with a network link established to an access point.
Thread	The EUT was powered and placed in a link with another customer provided slave device.
Narrowband	The EUT was powered and placed in a link with another customer provided slave device.

Table 10

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 Identification of the EUT

The table below details identification of the EUT(s) that have been used to carry out the testing within this report.

Model: A3239			
Serial Number	Hardware Version	Software Version	Firmware
MM2KXLKQX4	REV1.0	24A42521k	WLAN: 23.30.16 Bluetooth: 22.1.80.569 Thread: 22.1.80.569
T900Y661JW	REV1.0	24B18a	WLAN: 23.10.876.0.41.51.158 Bluetooth: 22.1.129.1265 Thread: 22.1.129.1265

Table 11

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: A3239, Serial Number: MM2KXLKQX4			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A3239, Serial Number: T900Y661JW			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 12

1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - 2.4 GHz Bluetooth		
AC Power Line Conducted Emissions	Connor Lee	UKAS

Table 13

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - 2.4 GHz WLAN		
AC Power Line Conducted Emissions	Connor Lee	UKAS

Table 14

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - 5 GHz WLAN		
AC Power Line Conducted Emissions	Connor Lee	UKAS

Table 15

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - 6 GHz WLAN		
AC Power Line Conducted Emissions	Connor Lee	UKAS

Table 16

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - Thread		
AC Power Line Conducted Emissions	Connor Lee	UKAS

Table 17

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - Narrowband		
AC Power Line Conducted Emissions	Connor Lee	UKAS

Table 18

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 AC Power Line Conducted Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 15C, ISED RSS-247 and ISED RSS-GEN, Clause 15.207, 3.1 and 8.8

2.1.2 Equipment Under Test and Modification State

A3239, S/N: MM2KXLKQX4 - Modification State 0
A3239, S/N: T900Y661JW - Modification State 0

2.1.3 Date of Test

07-August-2024

2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.2.

The EUT was placed on a non-conductive table 0.8 m above a reference ground plane and 0.4 m away from a vertical coupling plane.

All power was connected to the EUT through an Artificial Mains Network (AMN).

Conducted disturbance voltage measurements on mains lines were made at the output of the AMN.

2.1.5 Example Calculation

Quasi-Peak level (dBµV) = Receiver level (dBµV) + Correction Factor (dB)
Margin (dB) = Quasi-Peak level (dBµV) - Limit (dBµV)

CISPR Average level (dBµV) = Receiver level (dBµV) + Correction Factor (dB)
Margin (dB) = CISPR Average level (dBµV) - Limit (dBµV)

2.1.6 Example Test Setup Diagram

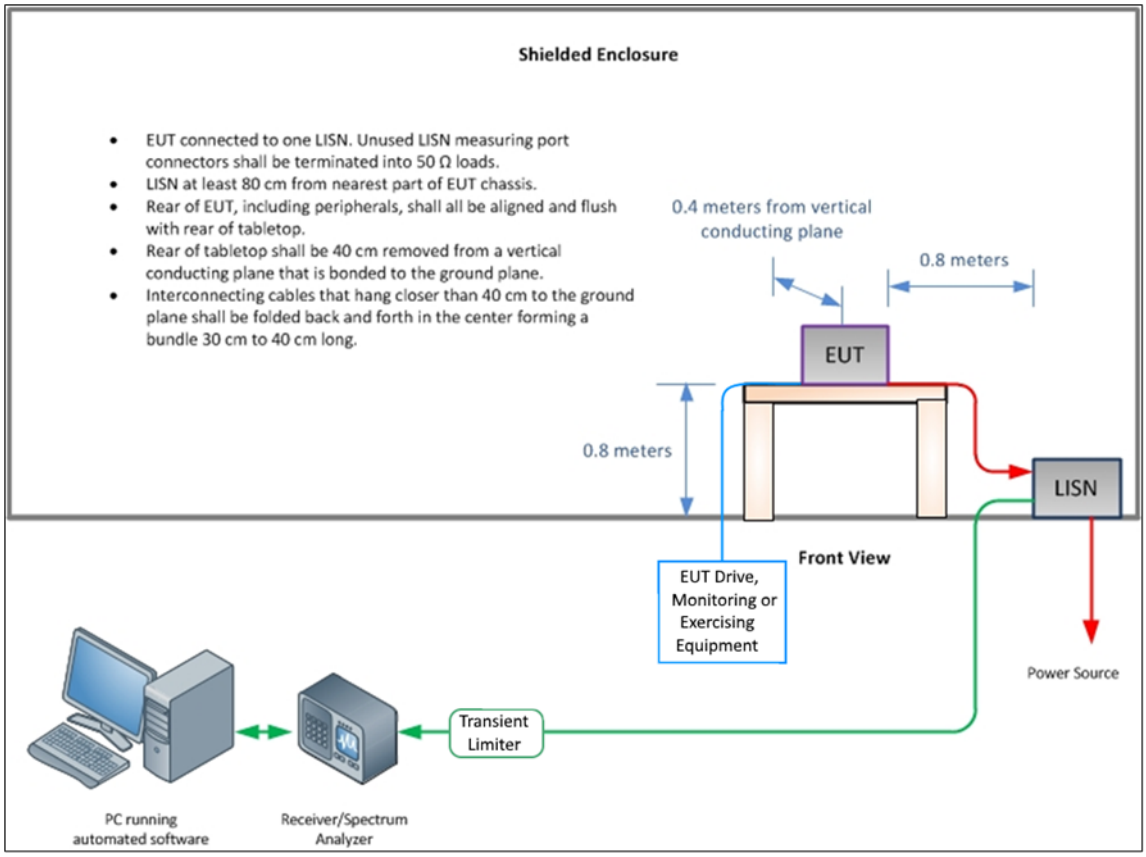

Figure 1 - Conducted Disturbance

2.1.7 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	58.4 %

2.1.8 Specification Limits

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	CISPR Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

Table 19

2.1.9 Test Results

AC Powered - 2.4 GHz Bluetooth

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz.

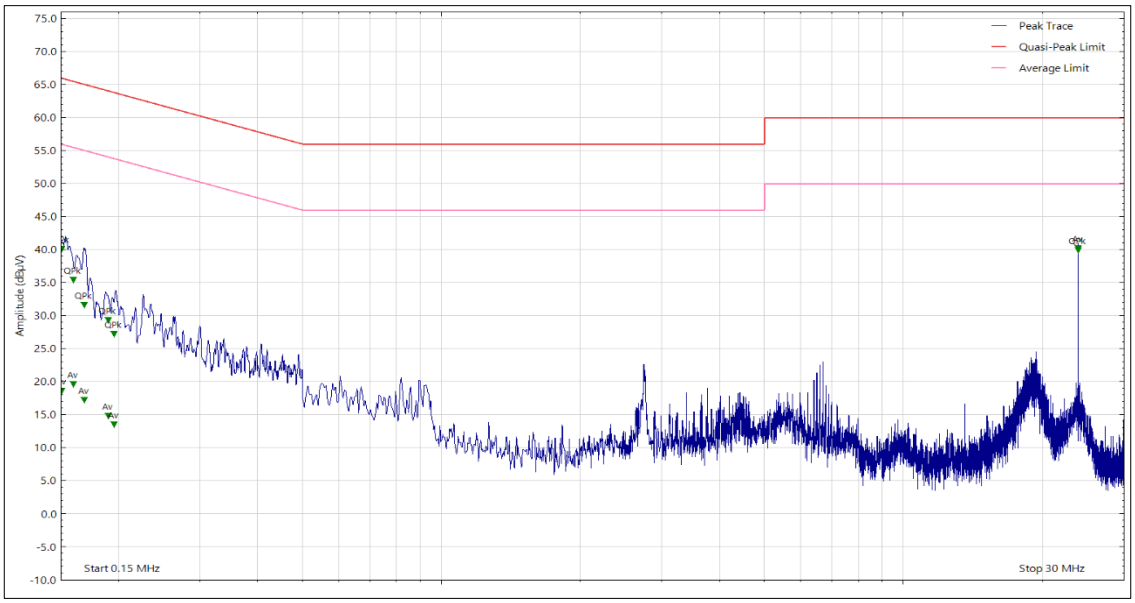

Figure 2 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	17.94	56.00	-38.06	CISPR Avg
0.151	39.44	66.00	-26.56	Q-Peak
0.160	34.74	65.50	-30.76	Q-Peak
0.160	18.88	55.50	-36.62	CISPR Avg
0.169	16.47	55.00	-38.53	CISPR Avg
0.169	30.92	65.00	-34.08	Q-Peak
0.190	14.17	54.10	-39.93	CISPR Avg
0.190	28.59	64.10	-35.51	Q-Peak
0.196	12.82	53.80	-40.98	CISPR Avg
0.196	26.53	63.80	-37.27	Q-Peak
23.878	39.45	50.00	-10.55	CISPR Avg
23.878	39.21	60.00	-20.79	Q-Peak

Table 20 - Live Line Emissions Results

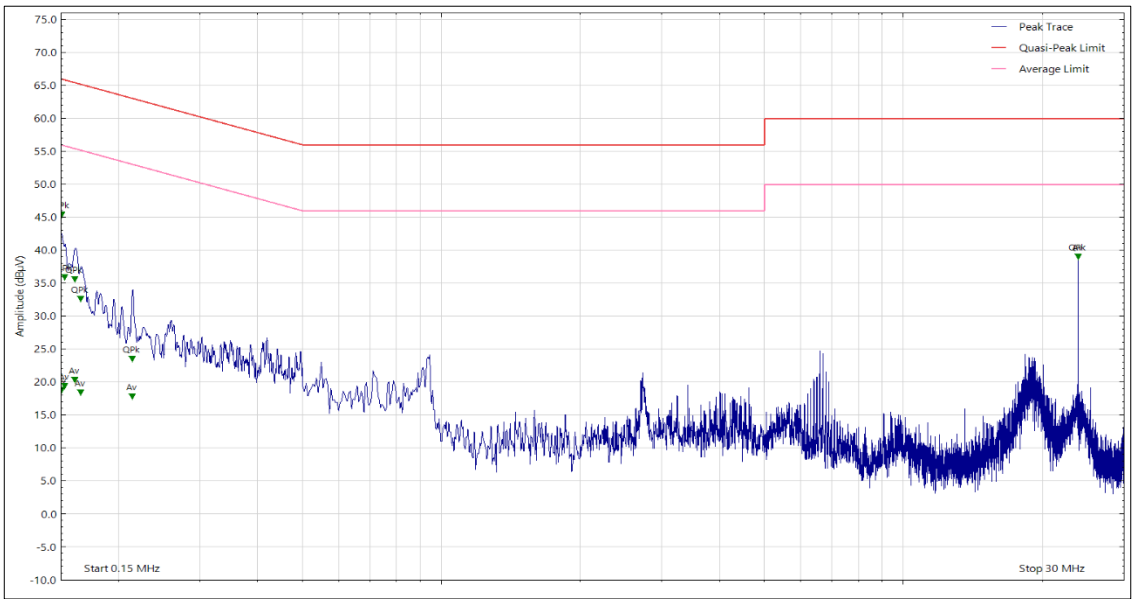

Figure 3 - Neutral Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	18.14	55.90	-37.76	CISPR Avg
0.151	44.69	65.90	-21.21	Q-Peak
0.153	18.76	55.80	-37.04	CISPR Avg
0.153	35.18	65.80	-30.62	Q-Peak
0.161	19.60	55.40	-35.80	CISPR Avg
0.161	34.92	65.40	-30.48	Q-Peak
0.166	31.89	65.20	-33.31	Q-Peak
0.166	17.72	55.20	-37.48	CISPR Avg
0.214	17.09	53.00	-35.91	CISPR Avg
0.214	22.85	63.00	-40.15	Q-Peak
23.879	38.25	60.00	-21.75	Q-Peak
23.879	38.34	50.00	-11.66	CISPR Avg

Table 21 - Neutral Line Emissions Results

AC Powered - 2.4 GHz WLAN

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz.

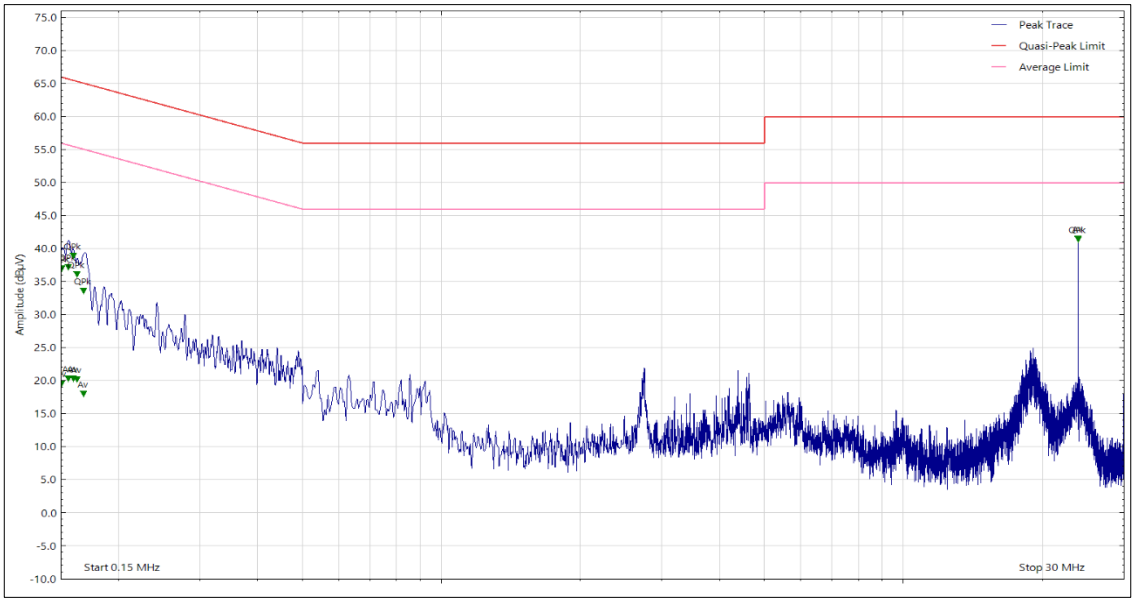

Figure 4 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	36.34	66.00	-29.66	Q-Peak
0.151	18.96	56.00	-37.04	CISPR Avg
0.156	36.50	65.70	-29.20	Q-Peak
0.156	19.57	55.70	-36.13	CISPR Avg
0.160	38.18	65.50	-27.32	Q-Peak
0.160	19.65	55.50	-35.85	CISPR Avg
0.163	35.38	65.30	-29.92	Q-Peak
0.163	19.48	55.30	-35.82	CISPR Avg
0.168	32.95	65.10	-32.15	Q-Peak
0.168	17.35	55.10	-37.75	CISPR Avg
23.879	40.81	50.00	-9.19	CISPR Avg
23.879	40.70	60.00	-19.30	Q-Peak

Table 22 - Live Line Emissions Results

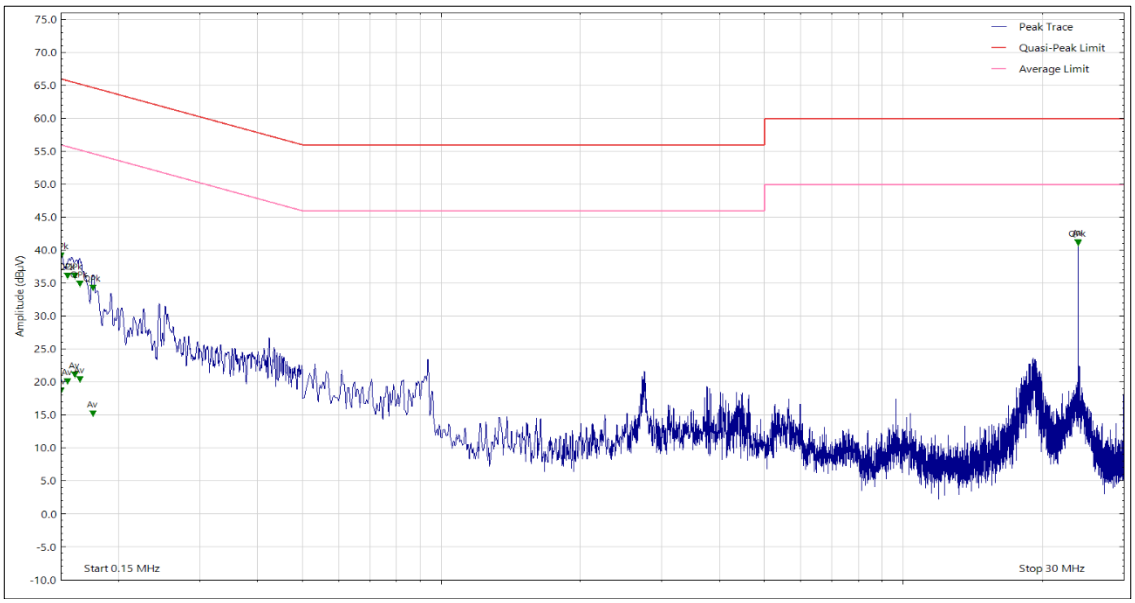

Figure 5 - Neutral Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150	38.47	66.00	-27.53	Q-Peak
0.150	18.04	56.00	-37.96	CISPR Avg
0.155	19.39	55.70	-36.31	CISPR Avg
0.155	35.39	65.70	-30.31	Q-Peak
0.161	20.39	55.40	-35.01	CISPR Avg
0.161	35.38	65.40	-30.02	Q-Peak
0.165	19.70	55.20	-35.50	CISPR Avg
0.165	34.19	65.20	-31.01	Q-Peak
0.176	14.52	54.70	-40.18	CISPR Avg
0.176	33.63	64.70	-31.07	Q-Peak
23.880	40.35	60.00	-19.65	Q-Peak
23.880	40.46	50.00	-9.54	CISPR Avg

Table 23 - Neutral Line Emissions Results

AC Powered - 5 GHz WLAN

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz.

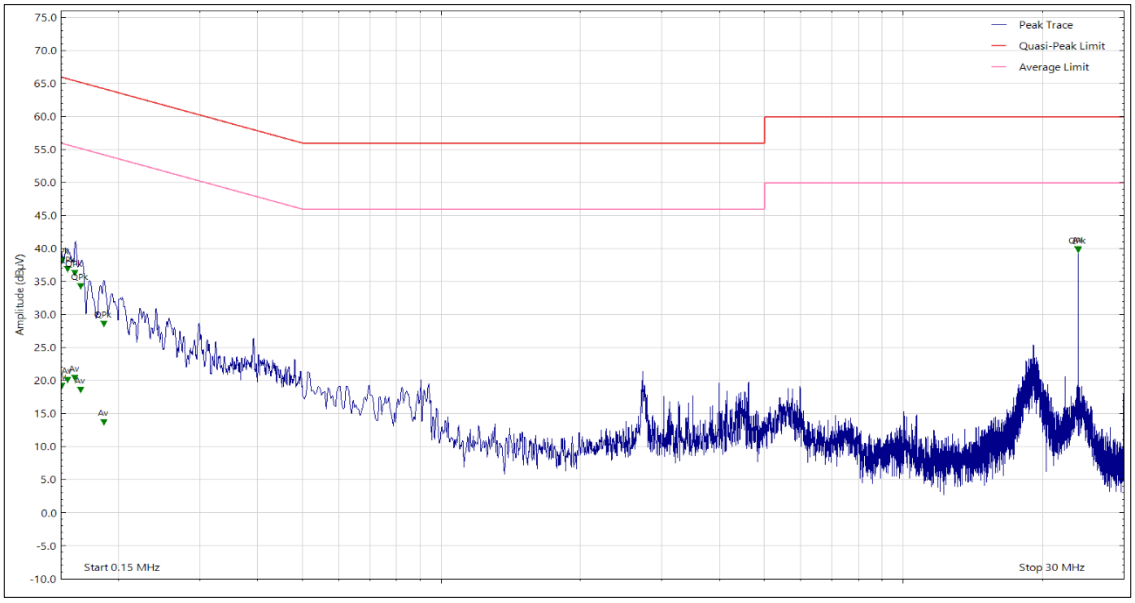

Figure 6 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	37.45	65.90	-28.45	Q-Peak
0.151	18.49	55.90	-37.41	CISPR Avg
0.155	36.20	65.70	-29.50	Q-Peak
0.155	19.37	55.70	-36.33	CISPR Avg
0.161	19.74	55.40	-35.66	CISPR Avg
0.161	35.59	65.40	-29.81	Q-Peak
0.166	17.96	55.20	-37.24	CISPR Avg
0.166	33.55	65.20	-31.65	Q-Peak
0.186	27.95	64.20	-36.25	Q-Peak
0.186	12.98	54.20	-41.22	CISPR Avg
23.880	39.09	60.00	-20.91	Q-Peak
23.880	39.21	50.00	-10.79	CISPR Avg

Table 24 - Live Line Emissions Results

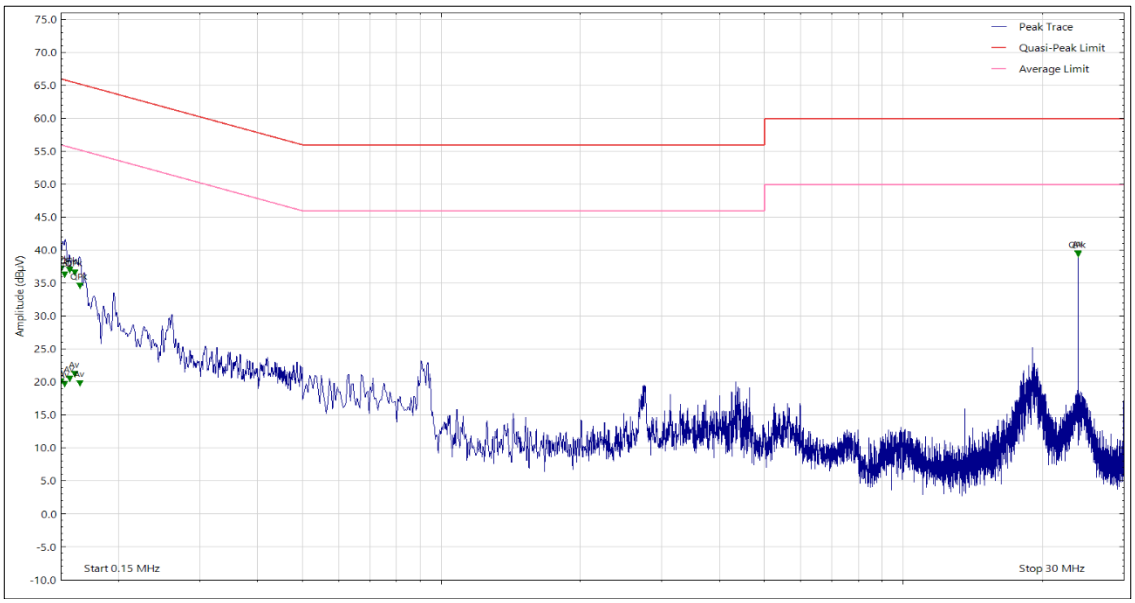

Figure 7 - Neutral Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150	19.37	56.00	-36.63	CISPR Avg
0.150	36.49	66.00	-29.51	Q-Peak
0.153	19.00	55.80	-36.80	CISPR Avg
0.153	35.62	65.80	-30.18	Q-Peak
0.157	19.81	55.60	-35.79	CISPR Avg
0.157	36.29	65.60	-29.31	Q-Peak
0.161	20.56	55.40	-34.84	CISPR Avg
0.161	35.86	65.40	-29.54	Q-Peak
0.165	33.92	65.20	-31.28	Q-Peak
0.165	19.14	55.20	-36.06	CISPR Avg
23.879	38.84	50.00	-11.16	CISPR Avg
23.879	38.73	60.00	-21.27	Q-Peak

Table 25 - Neutral Line Emissions Results

AC Powered - 6 GHz WLAN

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz.

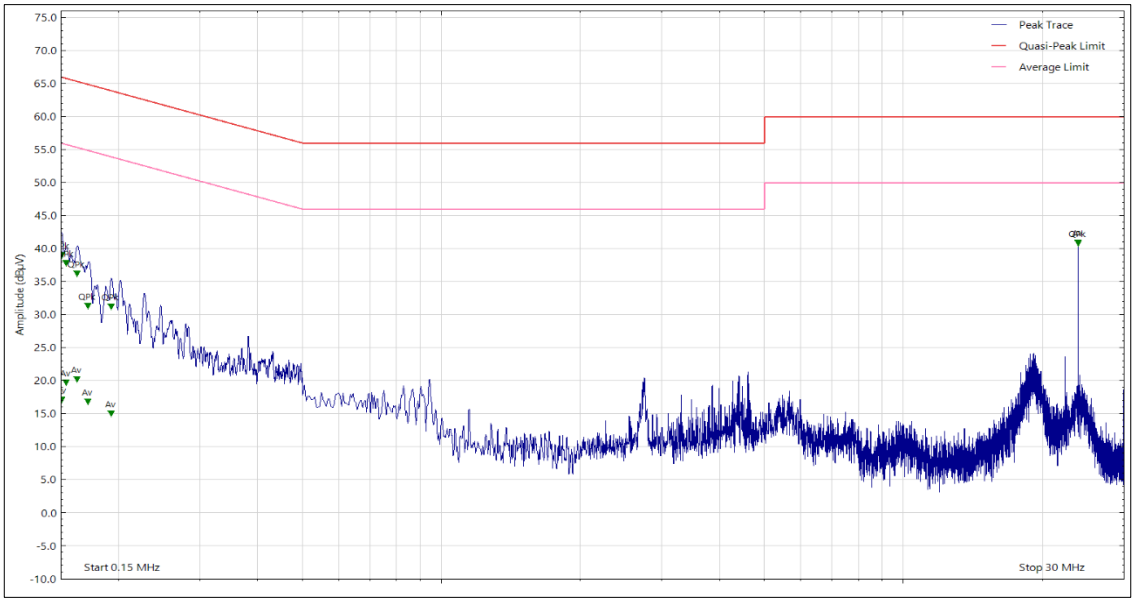

Figure 8 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	38.34	66.00	-27.66	Q-Peak
0.151	16.37	56.00	-39.63	CISPR Avg
0.154	37.11	65.80	-28.69	Q-Peak
0.154	18.97	55.80	-36.83	CISPR Avg
0.163	19.52	55.30	-35.78	CISPR Avg
0.163	35.52	65.30	-29.78	Q-Peak
0.172	16.14	54.80	-38.66	CISPR Avg
0.172	30.59	64.80	-34.21	Q-Peak
0.193	30.54	63.90	-33.36	Q-Peak
0.193	14.36	53.90	-39.54	CISPR Avg
23.880	40.18	50.00	-9.82	CISPR Avg
23.880	40.06	60.00	-19.94	Q-Peak

Table 26 - Live Line Emissions Results

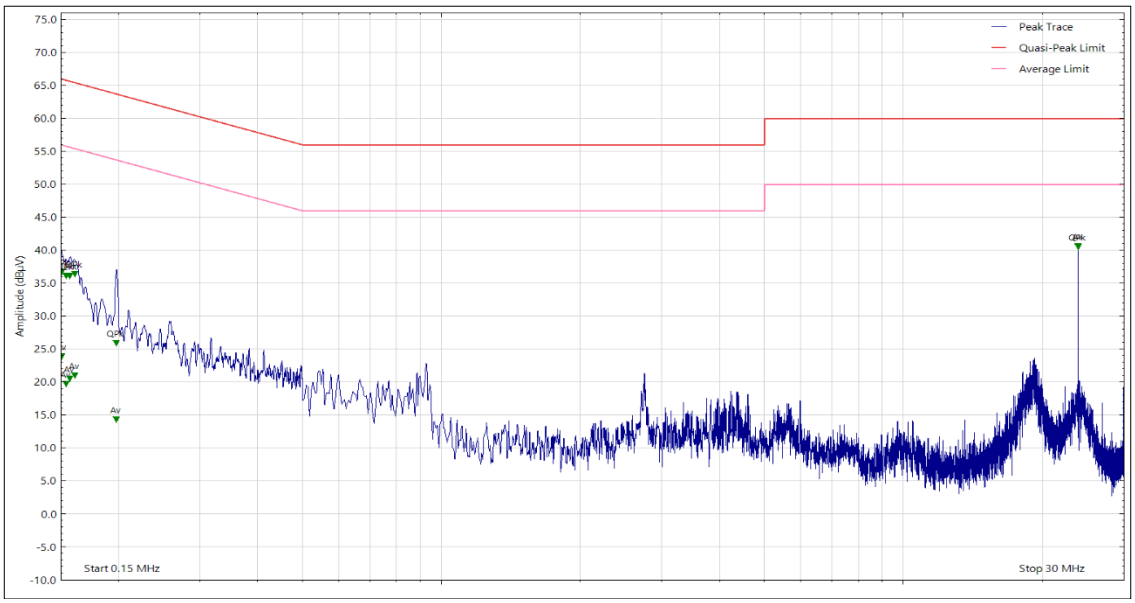

Figure 9 - Neutral Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	23.25	55.90	-32.65	CISPR Avg
0.151	35.98	65.90	-29.92	Q-Peak
0.154	18.98	55.80	-36.82	CISPR Avg
0.154	35.43	65.80	-30.37	Q-Peak
0.157	19.81	55.60	-35.79	CISPR Avg
0.157	35.39	65.60	-30.21	Q-Peak
0.161	20.35	55.40	-35.05	CISPR Avg
0.161	35.69	65.40	-29.71	Q-Peak
0.198	25.22	63.70	-38.48	Q-Peak
0.198	13.58	53.70	-40.12	CISPR Avg
23.881	39.79	60.00	-20.21	Q-Peak
23.881	39.91	50.00	-10.09	CISPR Avg

Table 27 - Neutral Line Emissions Results

AC Powered - Thread

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz.

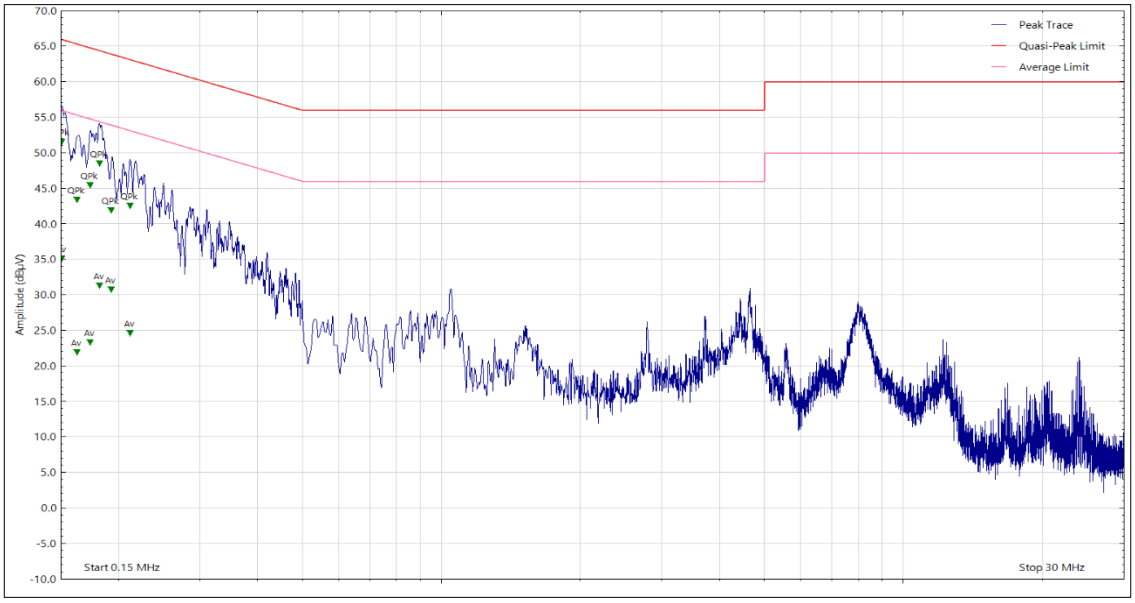

Figure 10 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	50.94	66.00	-15.06	Q-Peak
0.151	34.43	56.00	-21.57	CISPR Avg
0.163	42.74	65.30	-22.56	Q-Peak
0.163	21.30	55.30	-34.00	CISPR Avg
0.174	44.74	64.80	-20.06	Q-Peak
0.174	22.63	54.80	-32.17	CISPR Avg
0.182	47.85	64.40	-16.55	Q-Peak
0.182	30.63	54.40	-23.77	CISPR Avg
0.193	41.26	63.90	-22.64	Q-Peak
0.193	30.09	53.90	-23.81	CISPR Avg
0.212	23.92	53.10	-29.18	CISPR Avg
0.212	41.89	63.10	-21.21	Q-Peak

Table 28 - Live Line Emissions Results

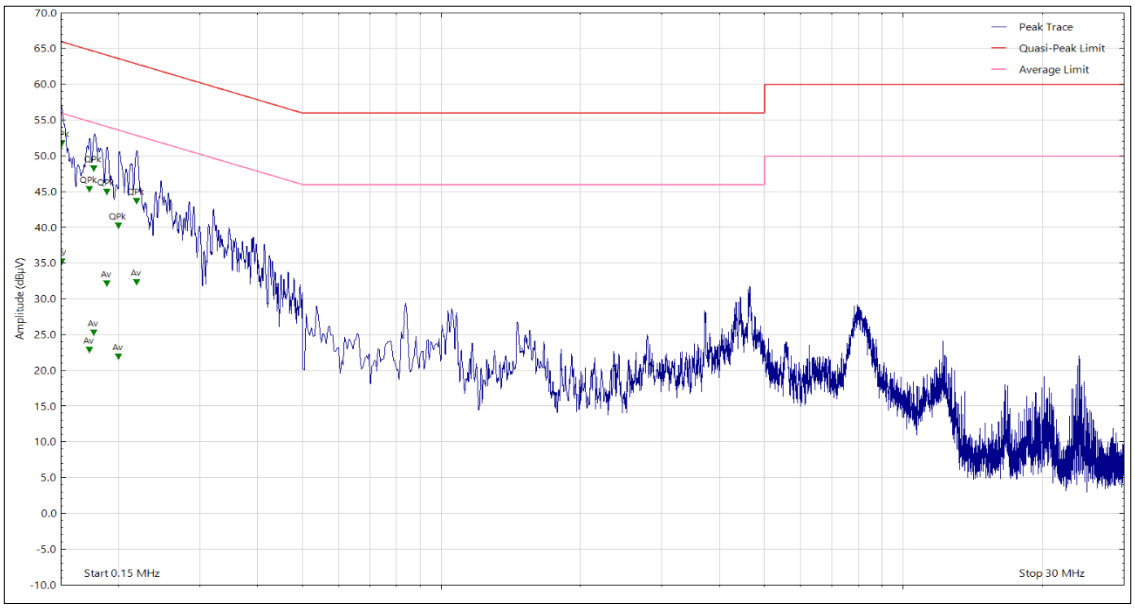

Figure 11 - Neutral Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	51.07	66.00	-14.93	Q-Peak
0.151	34.56	56.00	-21.44	CISPR Avg
0.173	22.23	54.80	-32.57	CISPR Avg
0.173	44.67	64.80	-20.13	Q-Peak
0.177	24.61	54.60	-29.99	CISPR Avg
0.177	47.58	64.60	-17.02	Q-Peak
0.189	31.47	54.10	-22.63	CISPR Avg
0.189	44.31	64.10	-19.79	Q-Peak
0.200	21.25	53.60	-32.35	CISPR Avg
0.200	39.61	63.60	-23.99	Q-Peak
0.219	43.03	62.90	-19.87	Q-Peak
0.219	31.63	52.90	-21.27	CISPR Avg

Table 29 - Neutral Line Emissions Results

AC Powered - Narrowband

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz.

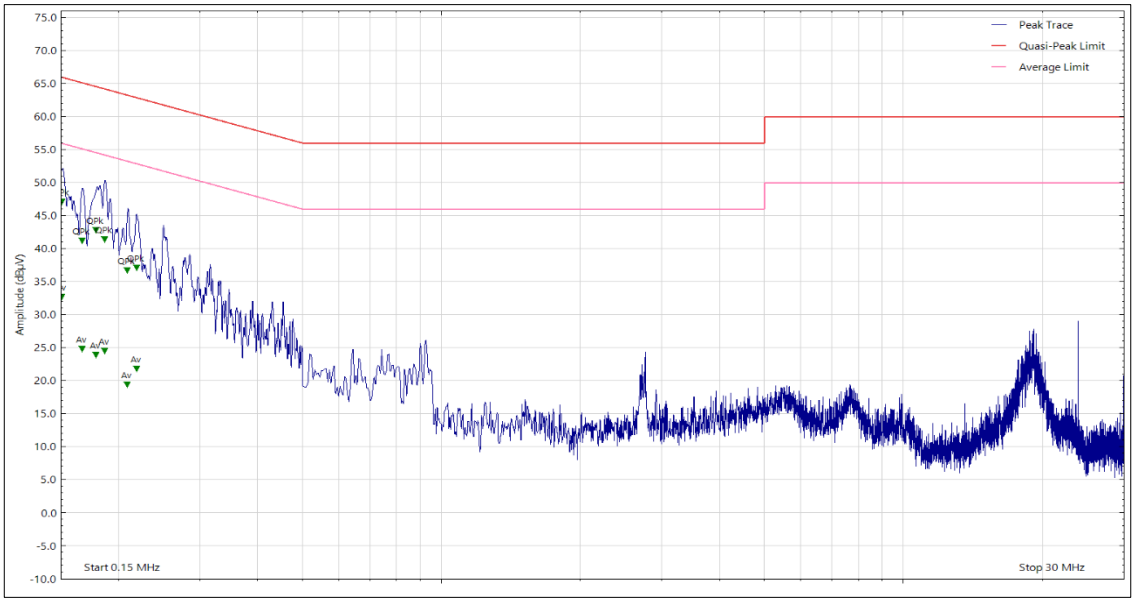

Figure 12 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.151	46.39	65.90	-19.51	Q-Peak
0.151	31.99	55.90	-23.91	CISPR Avg
0.167	40.53	65.10	-24.57	Q-Peak
0.167	24.09	55.10	-31.01	CISPR Avg
0.179	42.12	64.50	-22.38	Q-Peak
0.179	23.18	54.50	-31.32	CISPR Avg
0.187	23.82	54.20	-30.38	CISPR Avg
0.187	40.74	64.20	-23.46	Q-Peak
0.209	18.69	53.20	-34.51	CISPR Avg
0.209	35.96	63.20	-27.24	Q-Peak
0.219	36.43	62.90	-26.47	Q-Peak
0.219	21.14	52.90	-31.76	CISPR Avg

Table 30 - Live Line Emissions Results

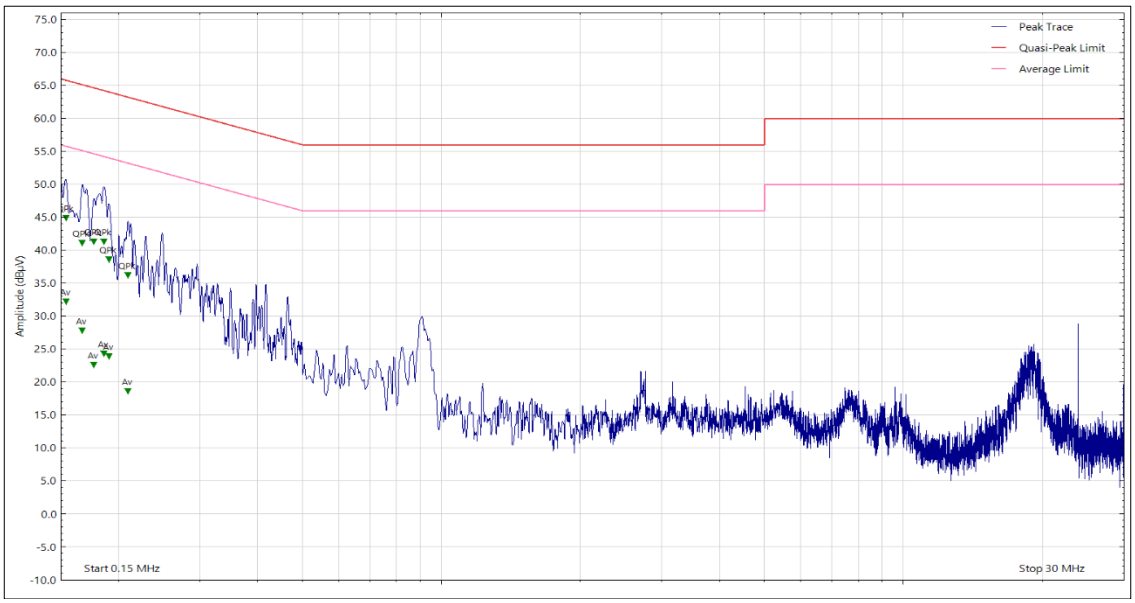

Figure 13 - Neutral Line - 150 kHz to 30 MHz

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.154	31.46	55.80	-24.34	CISPR Avg
0.154	44.21	65.80	-21.59	Q-Peak
0.167	27.08	55.10	-28.02	CISPR Avg
0.167	40.40	65.10	-24.70	Q-Peak
0.177	21.89	54.60	-32.71	CISPR Avg
0.177	40.59	64.60	-24.01	Q-Peak
0.186	23.61	54.20	-30.59	CISPR Avg
0.186	40.63	64.20	-23.57	Q-Peak
0.191	37.92	64.00	-26.08	Q-Peak
0.191	23.22	54.00	-30.78	CISPR Avg
0.210	35.50	63.20	-27.70	Q-Peak
0.210	17.90	53.20	-35.30	CISPR Avg

Table 31 - Neutral Line Emissions Results

2.1.10 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Transient Limiter	Hewlett Packard	11947A	15	12	24-Oct-2024
LISN (CISPR 16, Three Phase)	Rohde & Schwarz	ESH2-Z5	16	12	05-Sep-2024
LISN (CISPR 16, Single Phase)	Rohde & Schwarz	ESH3-Z5	1390	12	01-Feb-2025
Test Receiver	Rohde & Schwarz	ESU40	3506	12	17-Apr-2025
Termination (50ohm)	JFW	50T-054	3952	12	20-Mar-2025
Emissions Software	TUV SUD	EmX V3.2.0	5125	-	Software
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB 40	5604	12	22-Nov-2024
Cable (N-Type to N-Type, 2 m)	Junkosha	MWX221-02000AMSAMS/B	5726	6	17-Aug-2024
Cable (N-Type to N-Type, 8 m)	Junkosha	MWX221-08000NMSNMS/B	6321	12	04-Feb-2025

Table 32

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
AC Power Line Conducted Emissions	150 kHz to 30 MHz, LISN, ± 3.7 dB

Table 33

Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.