FCC and ISEDC Test Report

Apple Inc.
Model: A2304

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

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

FCC ID: BCGA2304 IC: 579C-A2304

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Document 75945250-14 Issue 01

SIGNATURE			
AZ Lawson.			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Andy Lawson	Senior Engineer	Authorised Signatory	28 November 2019

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 ISEDC RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Matthew Smart	28 November 2019	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
12669A 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: 2018 and ISEDC RSS-GEN: Issue 5 A1 (2019-03) 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	28 November 2019

Table 1

1.2 Introduction

Applicant	Apple Inc.
Manufacturer	Apple Inc.
Model Number(s)	A2304
Serial Number(s)	C02Z1003N5VN
Hardware Version(s)	REV 1.0
Software Version(s)	19A556
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2018 ISEDC RSS-GEN: Issue 5 A1 (2019-03)
Order Number Date	0540176069 25-February-2019
Date of Receipt of EUT	21-October-2019
Start of Test	31-October-2019
Finish of Test	31-October-2019
Name of Engineer(s)	Matthew Smart
Related Document(s)	ANSI C63.10 (2013)

1.3 Brief Summary of Results

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

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 15C	RSS-GEN			
Configuration and Mode: 2.4 GHz Bluetooth					
2.1	15.207	8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)
Configuration and Mode: 2.4 GHz WLAN					
2.1	15.207	8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)
Configuration and Mode: 5.0 GHz WLAN					
2.1	15.207	8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10 (2013)

Table 2

1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) was a rack mounted computer, with Bluetooth, Bluetooth Low Energy and 802.11 a/b/g/n/ac capabilities in the 2.4 GHz and 5.0 GHz bands.

1.5 Deviations from the Standard

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

1.6 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: A2304: Serial Number: C02Z1003N5VN			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.7 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 2.4 GHz Bluetooth		
AC Power Line Conducted Emissions	Matthew Smart	UKAS
Configuration and Mode: 2.4 GHz WLAN		
AC Power Line Conducted Emissions	Matthew Smart	UKAS
Configuration and Mode: 5.0 GHz WLAN		
AC Power Line Conducted Emissions	Matthew Smart	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
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, Clause 15.207
ISEDC RSS-GEN, Clause 18.8

2.1.2 Equipment Under Test and Modification State

A2304, S/N: C02Z1003N5VN - Modification State 0

2.1.3 Date of Test

31-October-2019

2.1.4 Test Method

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

2.1.5 Environmental Conditions

Ambient Temperature	21.5 °C
Relative Humidity	45.0 %

2.1.6 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)

2.1.7 Example Test Setup Diagram

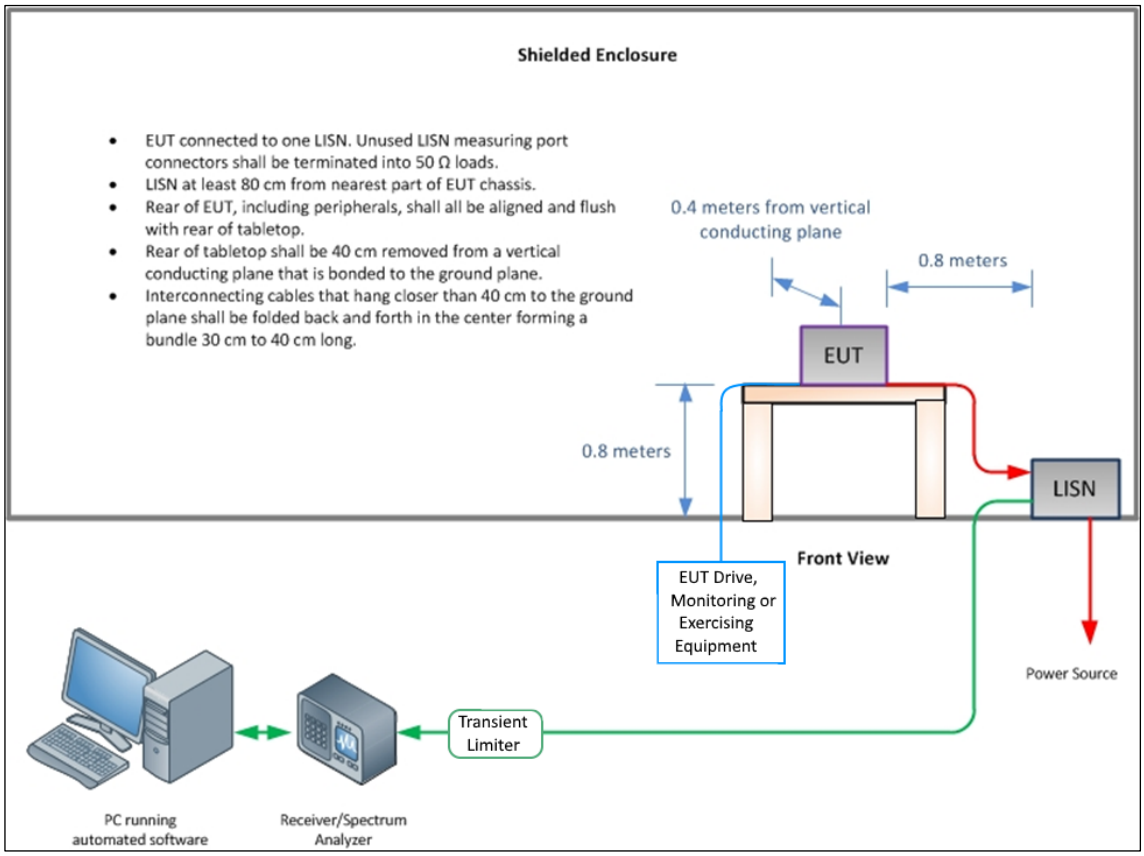

Figure 1 - Conducted Disturbance Example Test Setup

2.1.8 Test Results

2.4 GHz Bluetooth

Applied supply Voltage: 120 V AC
Applied supply frequency: 60 Hz

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
*						

Table 5 - Live Line Emissions Results

* No emissions were detected with 10 dB of the limit.

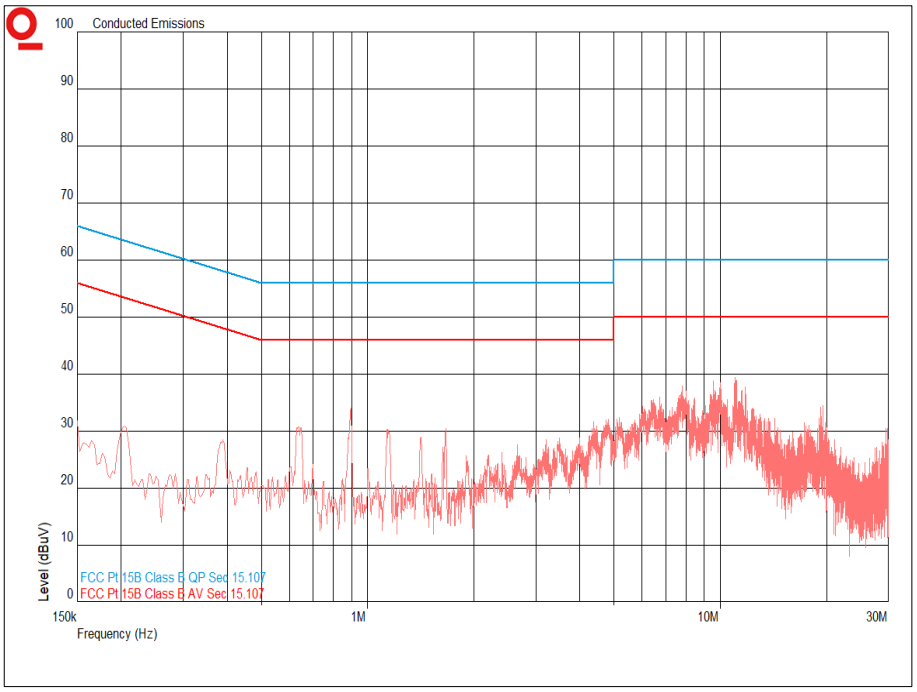

Figure 2 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
10.998	33.4	60.0	-26.6	25.4	50.0	-24.6
11.243	34.6	60.0	-25.4	26.5	50.0	-23.5

Table 6 - Neutral Line Emissions Results

No other emissions were detected with 10 dB of the limit.

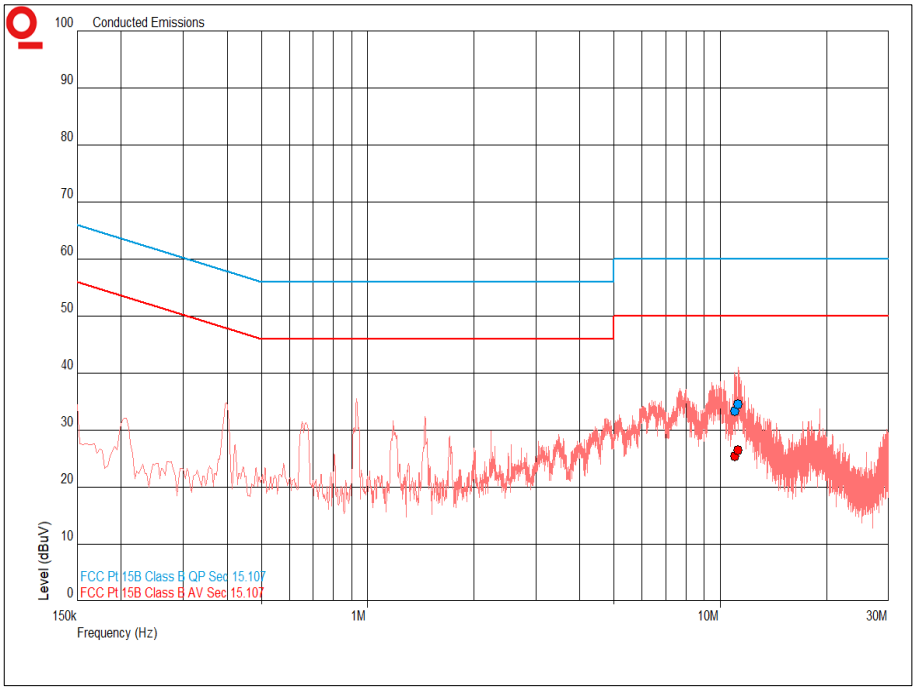

Figure 3 - Neutral Line - 150 kHz to 30 MHz

2.4 GHz WLAN

Applied supply Voltage: 120 V AC
Applied supply frequency: 60 Hz

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
10.971	33.4	60.0	-26.6	25.8	50.0	-24.2

Table 7 - Live Line Emissions Results

No other emissions were detected with 10 dB of the limit.

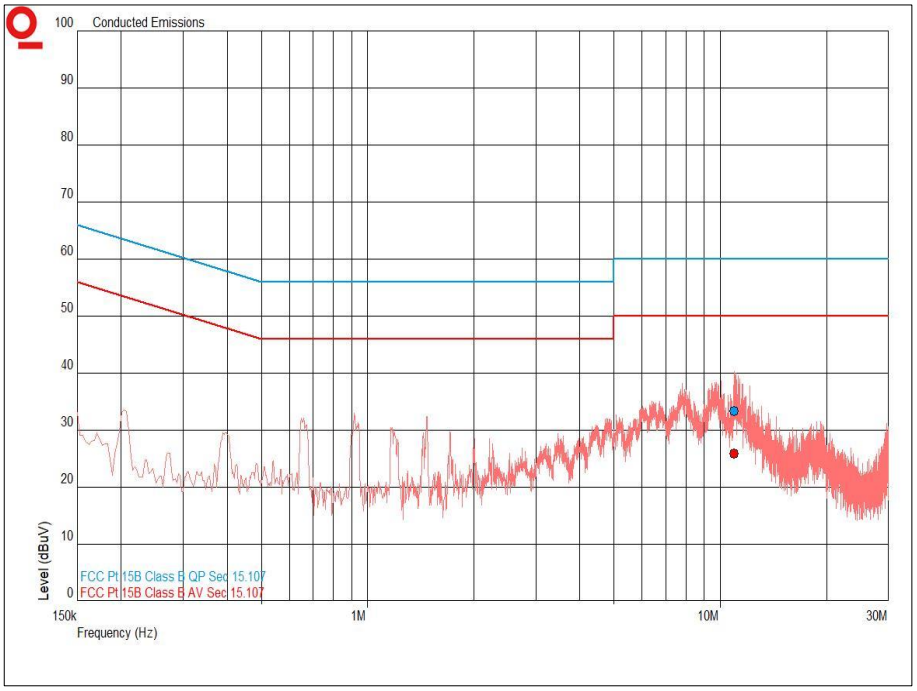

Figure 4 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
0.654	33.3	56.0	-22.7	24.1	46.0	-21.9
11.269	35.2	60.0	-24.8	28.4	50.0	-21.6

Table 8 - Neutral Line Emissions Results

No other emissions were detected with 10 dB of the limit.

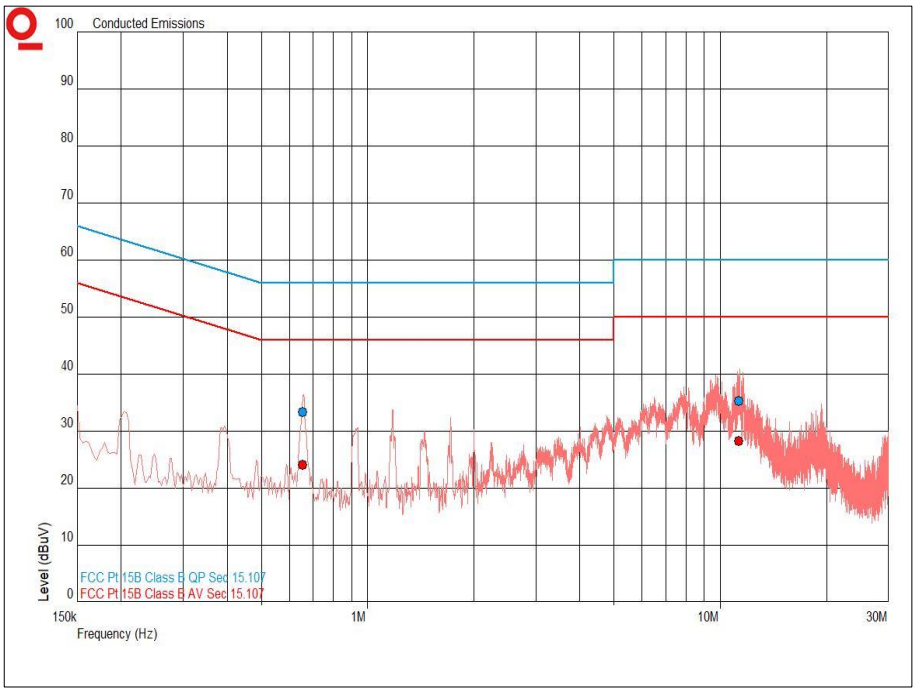

Figure 5 - Neutral Line - 150 kHz to 30 MHz

5.0 GHz WLAN

Applied supply Voltage: 120 V AC
Applied supply frequency: 60 Hz

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
11.142	34.5	60.0	-25.5	26.3	50.0	-23.7

Table 9 - Live Line Emissions Results

No other emissions were detected with 10 dB of the limit.

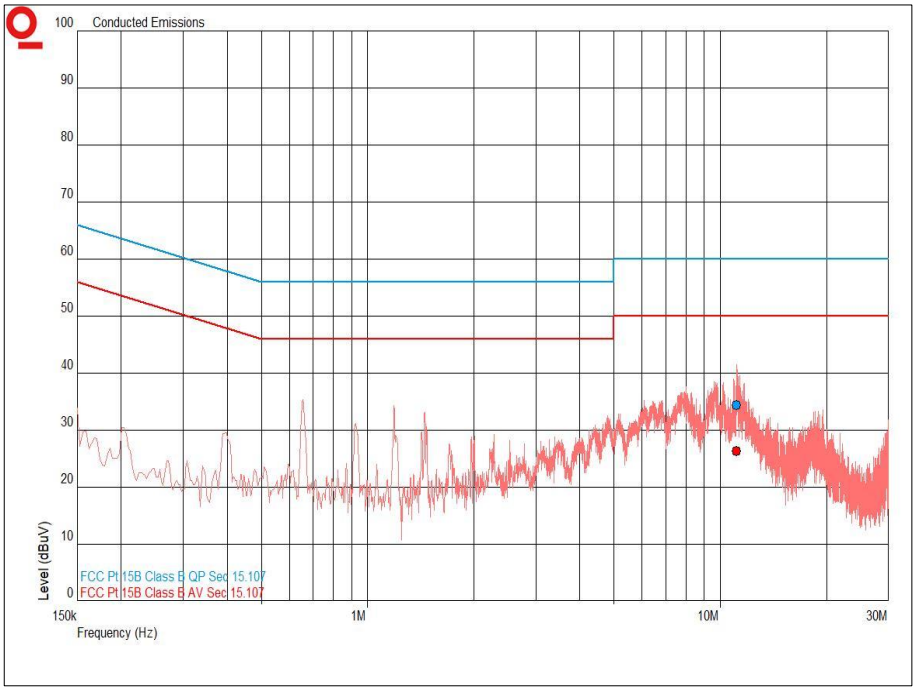

Figure 6 - Live Line - 150 kHz to 30 MHz

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
11.032	33.9	60.0	-26.1	26.4	50.0	-23.6

Table 10 - Neutral Line Emissions Results

No other emissions were detected with 10 dB of the limit.

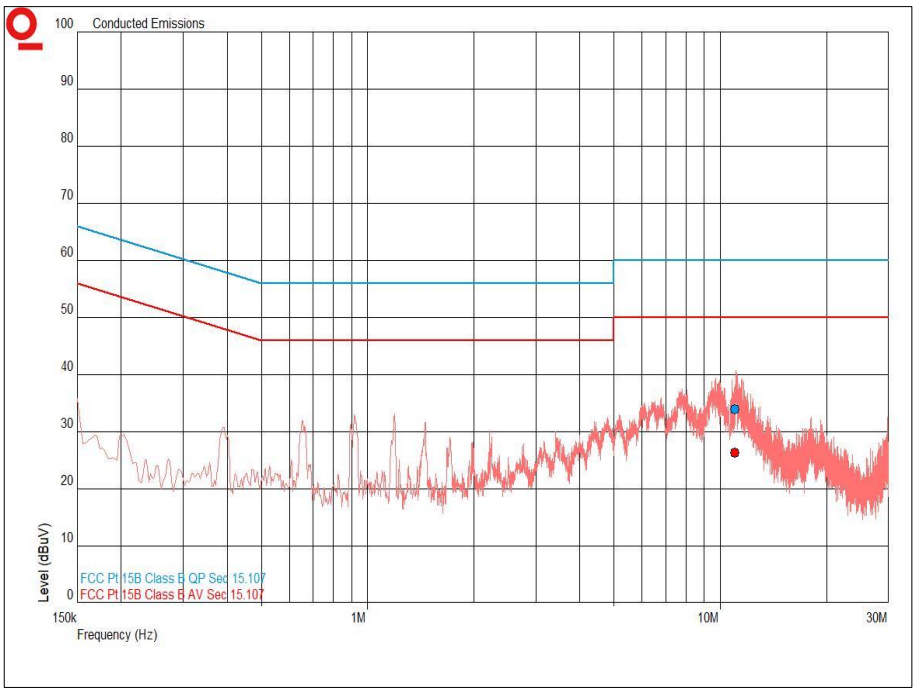

Figure 7 - Neutral Line - 150 kHz to 30 MHz

FCC 47 CFR Part 15, Limit Clause 15.207 and ISEDC RSS-GEN, Limit Clause 8.8

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 11

*Decreases with the logarithm of the frequency.

2.1.9 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Compliance 5 Emissions	Teseq	V5.26.51	3275	-	Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	17-Dec-2019
Transient Limiter	Hewlett Packard	11947A	2377	12	26-Feb-2020
3 Phase Artificial Mains Network (LISN)	Rohde & Schwarz	ESH2-Z5	16	12	28-Feb-2020
LISN	Rohde & Schwarz	ESH3-Z5	1390	12	20-Nov-2019

Table 12

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 13

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2007, clause 4.4.3 and 4.5.1.