

Prüfbericht-Nr.: <i>Test report no.:</i>	60419852 002	Auftrags-Nr.: <i>Order no.:</i>	168279017	Seite 1 von 16 <i>Page 1 of 16</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2020-08-21	
Auftraggeber: <i>Client:</i>	Wellington Drive Technologies 21 Arrenway Drive, Rosedale, Auckland, New Zealand, 0632			
Prüfgegenstand: <i>Test item:</i>	Connect Monitor			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Monitor (Trademark: Connect IoT, Wellington)			
Auftrags-Inhalt: <i>Order content:</i>	FCC and IC approval			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.225 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209		RSS-210 Issue 10 December 2019 RSS-Gen Issue 5 April 2018 RSS-102 Issue 5 March 2015	
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-09-02	Please refer to photo documents		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002899729-003 to 005			
Prüfzeitraum: <i>Testing period:</i>	2020-09-03 - 2020-09-27			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i>	2020-11-18		2020-11-18	
Stellung / Position	Jackson Yang / Project Engineer		Winnie Hou / Technical Certifier	
Sonstiges / Other: FCC ID: 2AHCE-MON1 IC: 21145-MON1 HVIN: MONITOR				
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 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable 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>				

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 20dB BANDWIDTH

RESULT: Pass

5.1.3 99% BANDWIDTH

RESULT: Pass

5.1.4 FREQUENCY TOLERANCE

RESULT: Pass

5.1.5 RADIATED SPURIOUS EMISSION

RESULT: Pass

Contents

1	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS	4
2	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	5
2.3	TRACEABILITY	5
2.4	CALIBRATION	5
2.5	MEASUREMENT UNCERTAINTY.....	6
2.6	LOCATION OF ORIGINAL DATA.....	6
2.7	STATUS OF FACILITY USED FOR TESTING.....	6
3	GENERAL PRODUCT INFORMATION	7
3.1	PRODUCT FUNCTION AND INTENDED USE.....	7
3.2	RATINGS AND SYSTEM DETAILS	7
3.3	INDEPENDENT OPERATION MODES	7
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	7
3.5	SUBMITTED DOCUMENTS.....	7
4	TEST SET-UP AND OPERATION MODES	8
4.1	PRINCIPLE OF CONFIGURATION SELECTION	8
4.2	TEST OPERATION AND TEST SOFTWARE	8
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	8
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	8
4.5	TEST SETUP DIAGRAM	9
5	TEST RESULTS	11
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	11
5.1.1	Antenna Requirement	11
5.1.2	20dB Bandwidth	12
5.1.3	99% Bandwidth	13
5.1.4	Frequency Tolerance	14
5.1.5	Radiated Spurious Emission	15
6	PHOTOGRAPHS OF THE TEST SET-UP	16
7	LIST OF TABLES.....	16

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: Photographs of the Test Set-up

Appendix B: Test Results of NFC

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
System Controller Interface	R&S	SCI-100	S10010038	N/A
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2020-09-30
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
Temperature	± 1 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A and B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Connect Monitor, which supports Bluetooth low energy wireless and NFC function.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Connect Monitor
Type Designation	Monitor
Trademark	Connect IoT, Wellington
FCC ID	2AHCE-MON1
IC	21145-MON1
HVIN	MONITOR
Operating Voltage	DC 3.6V@4000mAh Lithium Thionyl Chloride
Testing Voltage	DC 3.6V
Technical Specification of NFC	
Operating Frequency	13.56 MHz
Type of Modulation	ASK
Channel Number	1 channel
Antenna Type	PCB Layout Antenna
Antenna Gain	0 dBi

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, NFC transmitting mode
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form

- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model *Monitor* in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 3: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	T480	PF-16A6N8	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

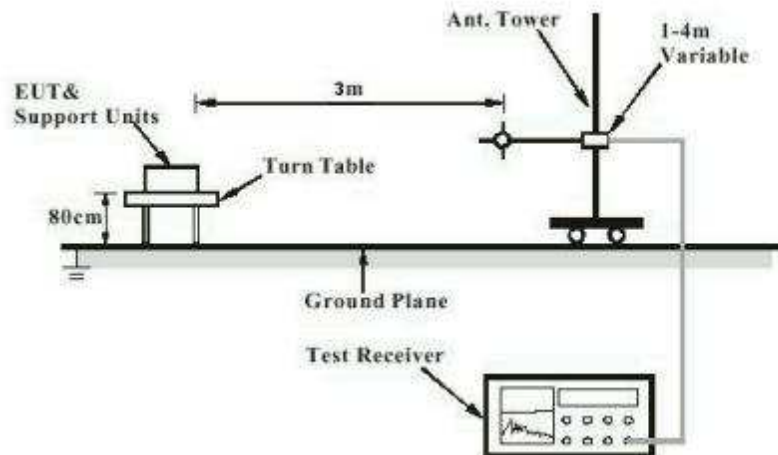


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

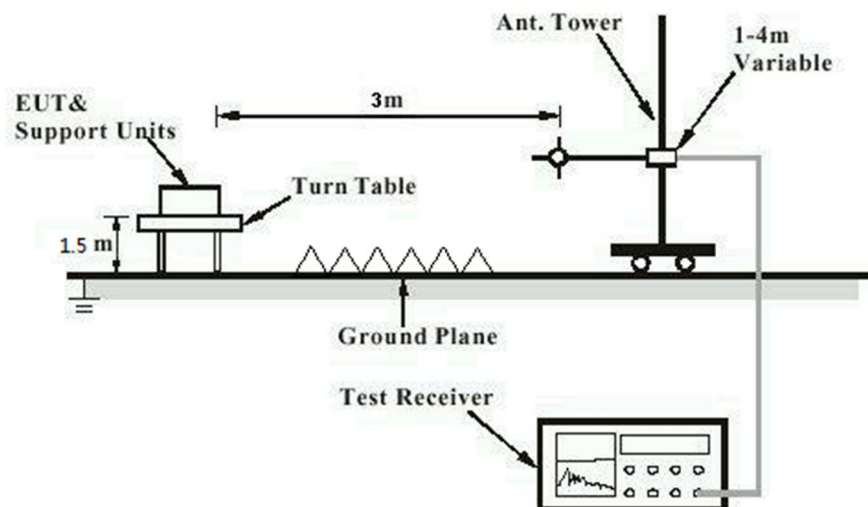
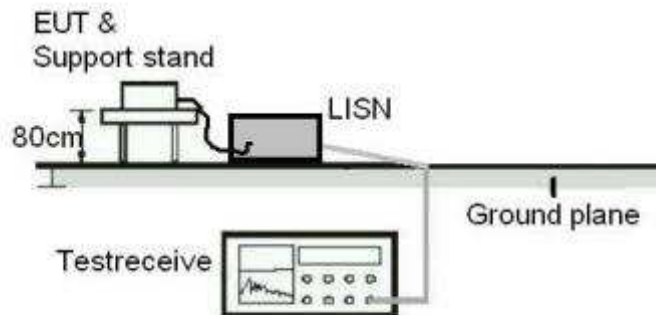


Diagram of Measurement Configuration for Mains Conduction Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.203
RSS-Gen Clause 6.7

According to the manufacturer declared, the EUT has an air coil antenna, the directional gain of antenna of NFC is 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

Prüfbericht - Nr.: 60419852 002
Test Report No.

Seite 12 von 16
Page 12 of 16

5.1.2 20dB Bandwidth

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.215 (c) RSS-Gen Issue 5
Basic standard	: ANSI C63.10: 2013
Limits	: N/A
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2020-09-08
Input voltage	: DC 3.6V
Operation mode	: A
Ambient temperature	: 24.5 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: 60419852 002
Test Report No.

Seite 13 von 16
Page 13 of 16

5.1.3 99% Bandwidth

RESULT:

Pass

Test Specification

Test standard : RSS-Gen Clause 6.6
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 2020-09-08
Input voltage : DC 3.6V
Operation mode : A
Ambient temperature : 24.5 °C
Relative humidity : 50 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: 60419852 002
Test Report No.

Seite 14 von 16

Page 14 of 16

5.1.4 Frequency Tolerance

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.225 (e)
RSS-Gen Issue 5
Basic standard : ANSI C63.10: 2013
Limits : 1.356 KHz
Kind of test site : Shielded Room

Test Setup

Date of testing : 2020-09-20
Input voltage : DC 3.6V
Operation mode : A
Ambient temperature : 24.5 °C
Relative humidity : 50 %
Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 4: Test Result of Frequency Tolerance

Test Frequency (MHz)	Test Conditions		Test Results (KHz)	Deviation (KHz)	Limit (KHz)	Result
	Temp(°C)	Volt(V DC)				
13.56	-35	3.6	13.560132	0.132	±0.01% (1.356 KHz)	Pass
	-25	3.6	13.560134	0.134		Pass
	-15	3.6	13.560131	0.131		Pass
	-5	3.6	13.560138	0.138		Pass
	5	3.6	13.560135	0.135		Pass
	15	3.6	13.560140	0.140		Pass
	25	3.6	13.560139	0.139		Pass
	40	3.6	13.560141	0.141		Pass
	25	3.24	13.560134	0.134		Pass
		3.96	13.560131	0.131		Pass

Note: Deviation (kHz) = (Test Result-13.56MHz)*1000

Prüfbericht - Nr.: **60419852 002**
Test Report No.Seite 15 von 16
Page 15 of 16

5.1.5 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.209 & 15.205
RSS-Gen Issue 5

Basic standard : ANSI C63.10: 2013

Limits : Refer to 15.209(a)

Kind of test site : 3m Semi-anechoic Chamber

Test Setup

Date of testing : 2020-09-16 ~ 2020-09-18

Input voltage : DC 3.6V

Operation mode : A

Ambient temperature : 23 °C

Relative humidity : 55 %

Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Technical Specification of EUT	7
Table 3: Auxiliary Equipment Used during Test	8
Table 4: Test Result of Frequency Tolerance	14