Prüfbericht-Nr.: *Test report no.:*	**60435629-001**	**Auftrags-Nr.:** *Order no.*:	23870435 030	Seite 1 von 20 *Page 1 of 20*
Kunden-Referenz-Nr.: *Client reference no.:*	2285816	**Auftragsdatum:** *Order date:*	**2020.09.30**	
Auftraggeber: *Client:*	The Raymond Corporation			
Prüfgegenstand: *Test item:*	RTU (Remote Transmitter Unit)			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	2302042400 / FCC ID: ¤TBD			
Auftrags-Inhalt: *Order content*:	Accredited testing according to FCC 47 CFR Part 15			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 15B with part 15.109 ANSI C63.4: 2014			

Wareneingangsdatum: *Date of sample receipt:*	2020.09.30
Prüfmuster-Nr.: *Test sample no:*	A002921813-005
Prüfzeitraum: *Testing period:*	2020.10.09 – 2020.10.22
Ort der Prüfung: *Place of testing:*	Lund, Sweden
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Sweden
Prüfergebnis*: *Test result*:*	Pass

überprüft von: reviewed by:	X Signed by: Fariborz Abasi	**genehmigt von:** authorized by:	X Signed by: Per Isacsson
Datum: 2021.01.29 *Date:*		**Datum: 2021.01.29** *Date:*	
Stellung / *Position:*	**Test Engineer**	**Stellung** / *Position:*	**Lab Manager**

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* 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 specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Revision History60435629-00160435629-001

REVISION	DATE	REMARKS	AUTHOR
001	2021.01.20	First release	Fariborz Abasi
Note: Latest revision report will replace all previous reports			
This report based on FCC Part 15B no JBP Template version 1.1			

Summary of Test Results

FCC 47 CFR Rule Part	Test Description	Applicability	Report Section	RESULT	REMARKS
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	No	4.1	N/A	
15.109	Radiated Emissions (Unintentional Radiators)	YES	4.2	PASS	

Possible test case verdicts:

- Test case does not apply to the test object: N/A
- Test object complies with the requirement: PASS or COMPLIANT
- Test object does not meet the requirement: FAIL or NOT COMPLIANT
- Test case not performed on the test object: N.P.

Table of Contents

1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	**TÜV Rheinland Sweden AB**
Address:	**Mobilvägen 10**
	223 62 Lund
	Sweden
Swedac Registration Number: **FCC Test Firm Registration Number:** **ISED Test Site Registration Number:**	**10325** **517458** **24753**

1.2 Client Information

Company Name:	**The Raymond Corporation**
Address:	**22 S Canal St**
	Greene, NY 13778
Contact Person:	**Ben Grotton**
Contact e-Mail / Telephone	**(607) 656-2311 x2040**

2. PRODUCT INFORMATION

2.1 General Description

Model name:	RTU (Remote Transmitter Unit)
Manufacturer:	Scanfil
Model number / Marketing name:	2302042400
FCC ID:	TBD ¤
Description:	Remote Control
Ancillary Equipment:	None
Device Type and Usage	Remote control for transmitting and requesting remote travel of a material handling vehicle. For industrial use in warehouse environments. Not for use in cold storage environments. Will be handheld by user in close proximity to the receiving unit.

2.2 Device Characteristics

Device Class for 47 CFR Part 15 B	B
Type of Power Supply	DC
Nominal Supply Voltage	3.5V
Supply Voltage Range	1.5V – 3.5V
Operating Temperature Range	0ºC - 50 ºC
Operating Air Humidity Range	-
Highest Internal Frequency Source	2480 MHz

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A002921813-005	Small Remote - RSE Rx	-Radiated Emissions

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
NFC	13.56 MHz	13.56 MHz	YES
BLE	2.4 GHz	2402 MHz - 2480 MHz	YES

*This statement refers only to this report. Other wireless technologies may be covered by other reports.

2.5 Antenna Information

Technology	Band	Number of Antennas	Antenna Type(s)	Gain
NFC	13.56 MHz	1	PCB Loop	2 dBi
BLE	2.4 GHz	1	PIFA	-2.28 dBi

2.6 Wireless Technology Details

Technology	Band	Modulation Type(s)	No. of Channels	Channel Spacing	Adaptivity
NFC	13.56 MHz	ASK	1	-	N/A
BLE	2.4 GHz	GFSK	40	2 MHz	N/A

2.7 Ancillary Equipment

None

2.8 EUT Diagrams

N/A

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
FCC 47 CFR 15.107	-	Conducted limits
FCC 47 CFR 15.109	-	Radiated emission limits

3.2 Additional references

The following standards / references were also considered for the testing

Standard	Version	Description
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.3 Limits

FCC 47 CFR Rule Part	Test Description	Limit Reference (FCC 47 CFR Reference)
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	15.107 (a) for Class B Devices
15.109	Radiated Emissions (Unintentional Radiators)	15.109 (a) for Class B Devices *See Note 1

Note 1

Radiated Emissions limits in the tables from 47 CFR sections 15.109 are presented in µV/m. Measurements on the test system are made in dBµV/m. To convert between these, the following adjustment is used:

$New\ Limit = 20\log\left(\frac{Original\ Limit}{10^6}\right)$+120

Example: from 15.209(a) the limit for 30MHz – 88MHz is 100µV/m at 3m. This gives:

$New\ Limit = 20\log\left(\frac{100}{10^6}\right)$+120 = 40dBµV/m at 3m

Additionally, in some cases testing has been performed at distances other than those specified in the tables. When this has occurred, the limits have been adjusted in accordance with the requirements in 47 CFR 15.31, using an extrapolation factor of 40dB/decade at frequencies below 30MHz and 20dB/decade at or above 30MHz

Example: from 15.209(a) the limit for 1.705MHz – 30MHz is 30µV/m (=29.54 dBµV/m) at 30m

$Limit@3m = Limit@30m + 40\log\left(\frac{30}{3}\right)$ = 29.54 +40.00 = 69.54 dBµV/m at 3m

Example: from 15.209(a) the limit for 1GHz – 18GHz is 500µV/m (=53.98 dBµV/m) at 3m

$Limit@1m = Limit@3m + 20\log\left(\frac{3}{1}\right)$ = 53.98 +9.54 = 63.52 dBµV/m at 1m

3.4 Description of Test Methods and Equipment Setup

3.4.1 General Description

Testing was performed in accordance with the various requirements of ANSI C63.4 and ANSI C63.10. Any deviations from the test methods are described in section 3.7

Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

3.4.2 Test Equipment Setup Used by Test Type

FCC 47 CFR Rule Part	Test Description	Test Equipment Used
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	N/A
15.109	Radiated Emissions (Unintentional Radiators)	SAC5

3.4.3 Test Equipment Setup – Conducted Emissions

N/A for this product.

3.4.4 Test Equipment Setup – SAC 5 (Radiated Emissions)

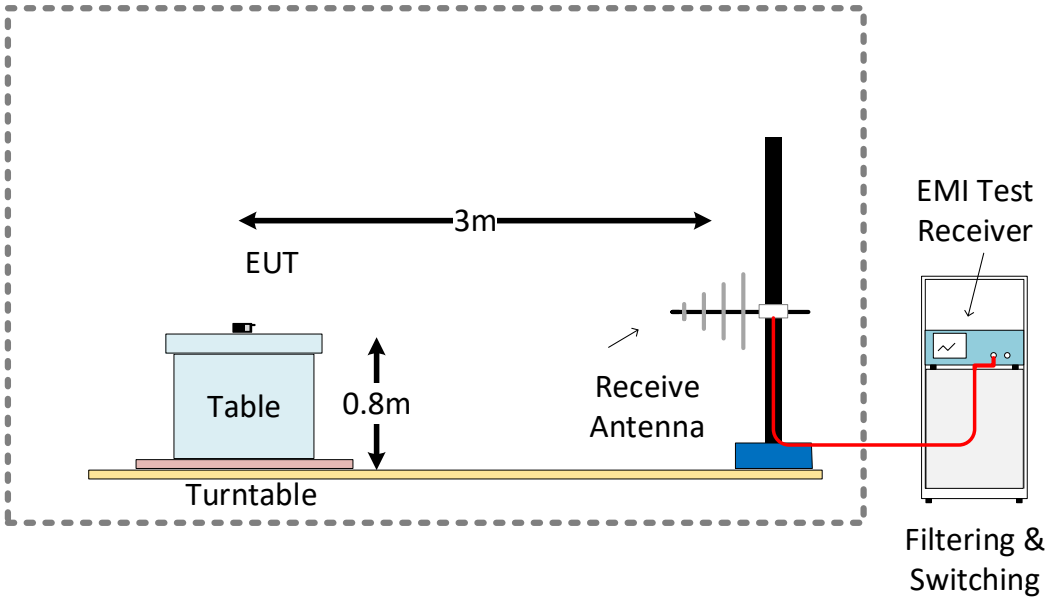
- For frequency range 30MHz-1GHz Log-Periodic Antenna was used. Antenna elevated from 100 cm from floor to 400 cm from floor, and was placed at 3 m from center of turntable in tilted position. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

- For frequency range 1GHz-18GHz horn Antenna was used. Antenna elevated from 100 cm from floor to 200 cm from floor, and was placed at 3 m from center of turntable. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

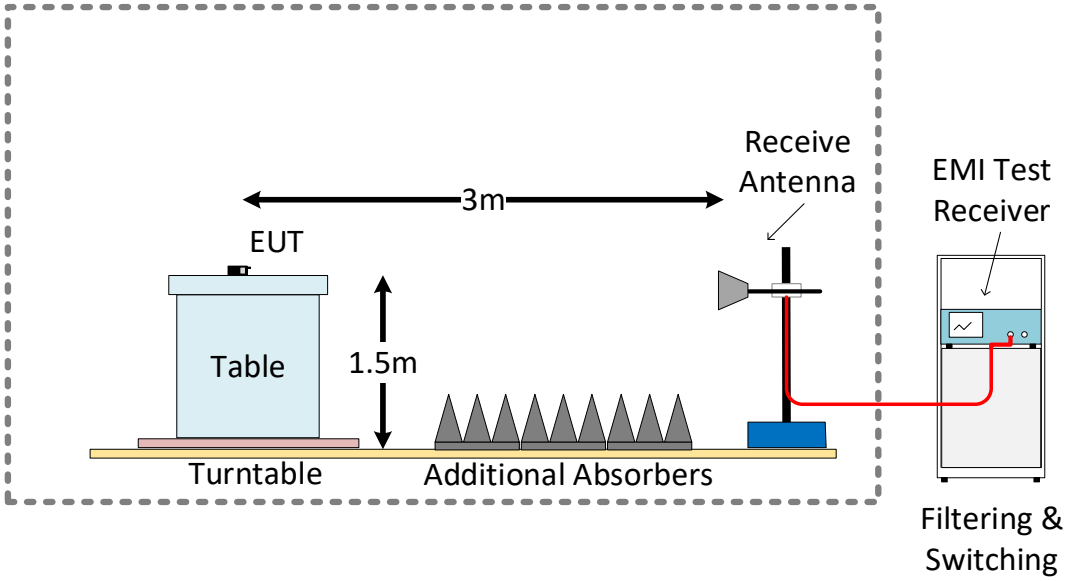
- For frequency range 18GHz-40GHz double horn Antenna was used. Antenna's height was adjusted to150 cm from floor, and 1 m distance to center of turntable. The equipment under test (EUT) was placed at the middle of the turntable on at 150 cm height from floor.

- For all frequency ranges the turntable was rotated 360˚ for obtaining the maximum emission.

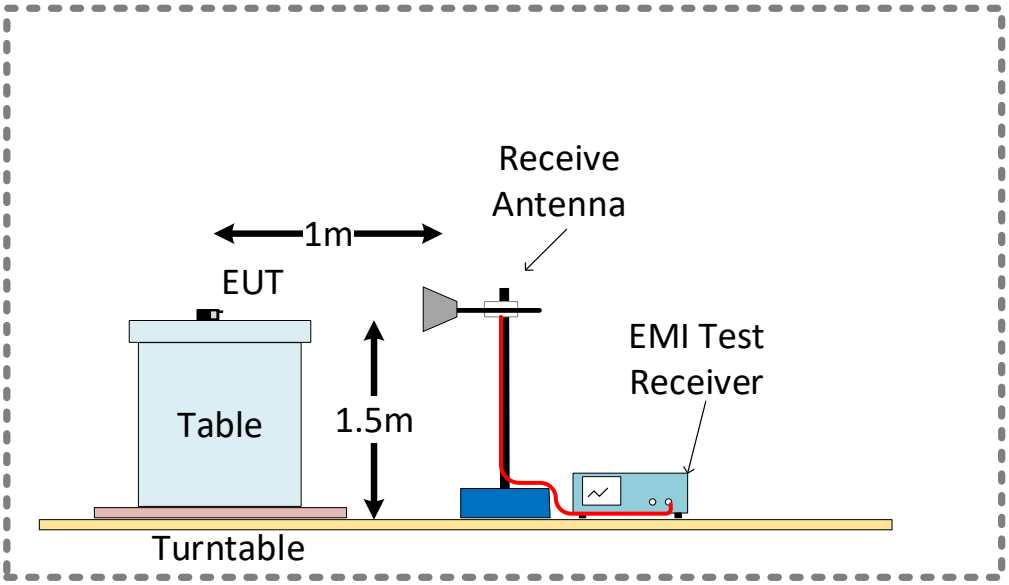
SAC 5 Test Setup Configuration 30MHz – 1GHz



SAC 5 Test Setup Configuration 1GHz – 18GHz



SAC 5 Test Setup Configuration 18GHz – 40GHz



3.5 EUT Configuration During Test

N/A

3.6 EUT Operation Modes

Operation mode	Description
#1	Bluetooth Low Energy – RX / Idle mode

3.7 Deviations from the Test Standard

N/A

3.8 Environmental Conditions

3.8.1 Environmental Conditions – Conducted Emissions System

N/A

3.8.2 Environmental Conditions – SAC5 (Radiated Emissions)

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.10.09	7:28	18.6	61
2020.10.22	10:12	19.2	50

4. TEST RESULTS

4.1 Test Results – AC Power Line Conducted Emissions (Unintentional Trans.)

N/A. Activity is not applicable.

4.2 Test Results – Radiated Emissions (Unintentional Transmitter)

4.2.1 Radiated Emissions (Unintentional) – Test Summary

Test Specification	FCC 47 CFR 15.109 (Part 15 Subpart B)	
Test Engineer & Date	Niall Forrester Joel Efraimsson	2020.10.09 2020.10.22
EUT and Ancillary Equipment IDs	A002921813-005	None
EUT Operation Mode(s)	Bluetooth Low Energy 1Mbs– RX / Idle mode	
EUT Wireless Configuration(s)	-	
EUT Hardware Configuration(s)	-	
Overall Result	Pass	

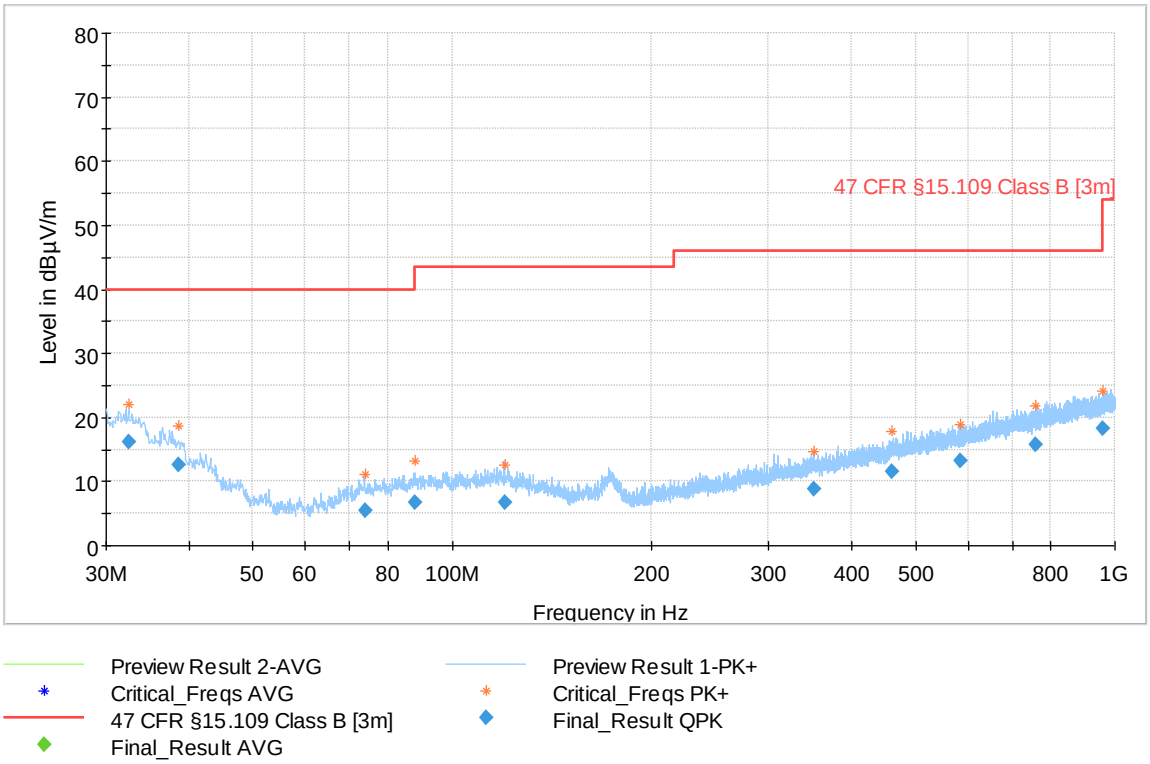
Test Parameter	Frequency Range	Result*
Radiated Emissions - Idle Mode	30 MHz – 1 GHz	Pass
Radiated Emissions - Idle Mode	1 GHz – 18 GHz	Pass

* For detailed measurements, see tables and graphs in sections below

4.2.2 Radiated Emissions (Unintentional) – Test Details

30MHz – 1GHz

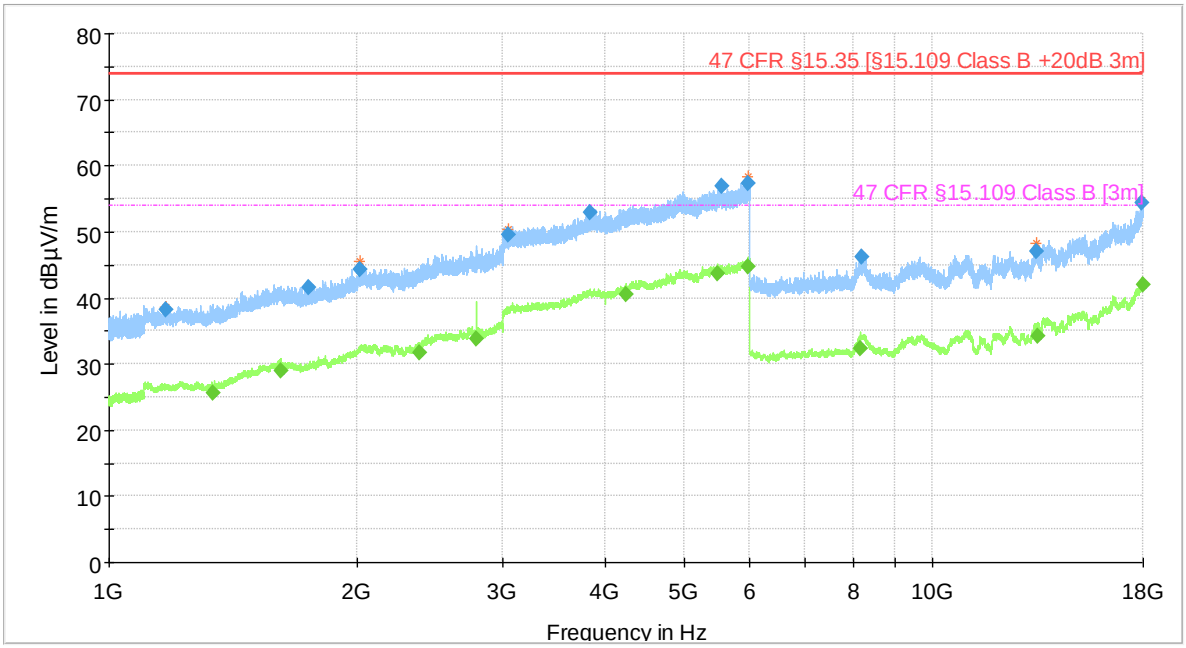
Test mode condition	BLE RX mode_Idle	
Antenna orientation	Horizontal and vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	FCC Part 15 subpart B	
EUT	A002921813-005	
Ancillary Equipment	None	
Test Engineer	Niall Forrester	Date: 2020.10.09
Environmental conditions	See	
Chamber details	Chamber: SAC 5	



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
32.44912	16.12	40	23.88	1000	120	133	H	86
38.69196	12.52	40	27.48	1000	120	410	H	199
87.86548	6.64	40	33.36	1000	120	254	H	248
584.63064	13.19	46.02	32.83	1000	120	133	V	22
760.65464	15.81	46.02	30.21	1000	120	410	H	158
958.03868	18.24	46.02	27.78	1000	120	275	V	142

1GHz – 18GHz

Test mode condition	BLE RX mode_Idle	
Antenna orientation	Horizontal and vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	FCC Part 15 subpart B	
EUT	A002921819-005	
Ancillary Equipment	None	
Test Engineer	Joel Efraimsson	Date: 2020.10.22
Environmental conditions	See 3.8.2	
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
4240.594	---	40.54	53.98	13.44	1000	1000	265	V	308
5486.196	---	43.58	53.98	10.4	1000	1000	135	H	278
5546.043	56.96	---	73.98	17.02	1000	1000	365	V	132
5969.194	---	44.81	53.98	9.17	1000	1000	165	H	82
5970.829	57.26	---	73.98	16.72	1000	1000	410	V	8
17979.406	---	41.97	53.98	12.01	1000	1000	285	H	128

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – Conducted Emissions System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Two-Line V-network	Rohde & Schwarz	ENV216	101090 2704076	2020.07.16	2021.07.16
Test Receiver 9KHz to 3.5 GHz	Rohde & Schwarz	ESR3	101674 2704016	2020.07.17	2021.07.17

5.1.2 Hardware List – SAC5 System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
EMI Test Receiver	Rohde & Schwarz	ESW44	101760 2881044	2020.07.17	2021.07.17
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988 2823181	2019.07.23	2021.07.23
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678 2823164	2019.07.15	2021.07.15
Control Device	Maturo	NCD	NCD/393/2372.01	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	2020.08.04	2021.08.04
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 1	101333 2761265	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 2	101335 2761266	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330 2761262	2020.08.04	2021.08.04
Humidity Temperature Probe	Lufft	OPUS 20	1236.0118.0802.033 2771042	2020.07.31	2022.07.31

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
Conducted Emissions System	EMC 32	V10.60.10
SAC 5	EMC 32	V10.60.10

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for Conducted Emissions

Parameter	Uncertainty (Coverage Factor k=2)
Conducted emissions with LISN 150KHz to 30 MHz	2.98 dB

6.2 Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)

Parameter	Uncertainty (Coverage Factor k=2)
Field Strength 10 Hz -9 kHz	3.38 dB
Field Strength 9 kHz -30 MHz	3.38 dB
Field Strength 30 MHz -1000 MHz	3.38 dB
Field Strength 1 GHz -18 GHz	4.88 dB
Field Strength 18 GHz - 40 GHz	5.14 dB

7. PHOTOGRAPHS

7.1 Photographs of the EUT

See Appendix 1