



TEST REPORT

Test Report No.: UL-RPT-EMC-12331248-119-FCC

Applicant : Procter & Gamble
Model Number : Obi-Wan Handle & Obi-Wan Base
FCC ID : 2AG9A41810
Technology : -/
Test Standard(s) : **FCC Part 15.107 & 15.109**

For details of applied tests refer to test results summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**

Prepared by: Muhammad Asim Shahzad
Title: Engineer
Date: 21.09.2018

Approved by: Bernd Woerl
Title: Operations Leader
Date: 28.09.2018



Deutsche
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D-PL-19381-02-00

This laboratory is accredited by DAkkS.
The tests reported herein have been performed in
accordance with its' terms of accreditation.

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1. Customer Information

1.1. Applicant information

Company Name:	Procter & Gamble
Company Address:	8611 Beckett Rd, West Chester OH, 5069, USA
Contact Person:	Robert Schick
Contact E-Mail Address:	schick.r@pg.com
Contact Phone No.:	+1 513 626 8667

1.2. Manufacturer Information

Company Name:	Procter & Gamble Service GmbH
Company Address:	Frankfurter Straße 145, 61476 Kronberg im Taunus, Germany
Contact Person:	Ian Good
Contact E-Mail Address:	good.i@pg.com
Contact Phone No.:	+49 6173 30 1295

2. Summary of Testing

2.1. General Information

Applied Standards

Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart B (Unintentional Radiators) – Sections 15.107 and 15.109
Test Firm Registration:	399704

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
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Date information

Order Date:	24.05.2018
EUT arrived:	06.08.2018
Test Dates:	07.08.2018 - 14.08.2018
EUT returned:	-/-

2.2. Summary of Test Results

Clause	Measurement	Complied	Did not complied	Not performed	Not applicable
Part 15.107 (b)	AC Conducted Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.109 (b)	Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Complies with class B limits.

Information regarding class A and class B devices

Excerpt of Title 47 chapter I Part 15 subchapter A § 15.3 Definitions

(h) *Class A digital device.* A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

(i) *Class B digital device.* A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

2.3. Method and procedure

Reference:	ANSI C63.4 (2014)
Title:	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.

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3 Equipment Under Test (EUT)

3.1 Identification of Equipment under Test (EUT)

EUT Description:	Data logging razor handle – sample 1
Brand Name:	Procter & Gamble
Model Name or Number:	Obi-Wan Handle
Test Sample Serial Number:	H3-309
Hardware Version Number:	3.0
Firmware Version Number:	3.0
FCC ID	2AG9A41810

EUT Description:	Cellular communication base – sample 1
Brand Name:	Procter & Gamble
Model Name or Number:	Obi-Wan Handle
Test Sample Serial Number:	B3-243
Hardware Version Number:	3.0
Firmware Version Number:	2.7
FCC ID	2AG9A41810

3.2 Description of Equipment Under Test (EUT)

The equipment under test was a powered data logging razor handle with accompanying base station for charging and data communication via a cellular connection.

3.3 Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4 Operating Modes

Mode Reference	Definition
Mode 1	Unintentional Radiator

3.5 Additional Information Related to Testing

Type of Device:	Unintentional Radiator	
Power Supply Requirement(s) Base:	Nominal	12V DC
Power Supply Requirement(s) Handle:	Nominal	5V DC
Highest Internal frequency generated/ used	576MHz	

3.6 Support Equipment

The following support equipment was used to exercise the EUT during testing:

A. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	AC/DC Adaptor	Braun	-/-	150389-11

4 Operation and Monitoring of the EUT during Testing

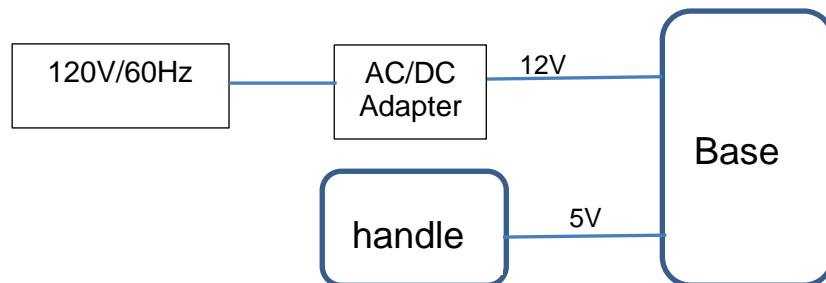
4.1 Operating Modes

The EUT was tested in the following operating mode(s):
<input type="checkbox"/> Transmitting Mode
<input type="checkbox"/> Idle Mode
<input type="checkbox"/> Receiving Mode
<input checked="" type="checkbox"/> Unintentional Radiator

4.2 Configuration and Peripherals

EUT has been tested in following configuration:

- The handle was powered by 5V DC from Base, which was powered by 12V DC from AC/DC Adapter via 120 VAC/ 60Hz mains supply.
- Set into Unintentional Radiation mode simply by testing complete discharged handle. Discharging method: by placing the handle into water glass discharging was started; then plugging into the Base and tested during charging.
- The EUT EMC sample was used for radiated emissions tests and for the AC conducted measurement.
- The following test setup was used.



5 Measurement Uncertainty

5.1 Overview

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Emissions	0.15 MHz to 30 MHz	95%	±2.49 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±4.40 dB
Radiated Spurious Emissions	1 GHz to 18 GHz	95%	±4.76 dB

6 Test Results

6.1 AC Conducted Emission

6.1.1 Test Summary:

Test Engineer:	M. Asim Shahzad	Test Date:	20.07.2017
Test Sample S/N:	H3-309, B3-243		
Test Site Identification:	SR 7/8		

Clause:	Part 15.107
Test Method:	ANSI C63.4 Section 7
Title:	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 AC power-line conducted emission measurements
Reference:	KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
Title:	AC Power-Line Conducted Emissions Frequently Asked Questions
Class:	Class B Limit

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	39

Note(s)

1. The final measured value, for the given emission, in the table below incorporates the cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. Measurements were performed in a shielded room (SR7/ 8 Asset Number 1603671). The EUT was placed at a height of 80 cm above the reference ground plane and in a distance of 40 cm from the vertical ground plane at the edge of the table.

6.1.2 Numerical Results:

Quasi Peak (Operating Mode1)

Frequency (MHz)	Line Phase	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.16411	N	50.3	65.3	15	Pass
0.18247	N	47.5	64.4	16.9	Pass
0.22374	N	44.8	62.7	17.9	Pass
0.2793	N	39.3	60.8	21.5	Pass
3.63513	N	21.6	56	34.4	Pass
8.20057	N	28.8	60	31.2	Pass
0.18819	L1	46.1	64.1	18	Pass
0.50487	L1	29.1	56	26.9	Pass
0.70945	L1	24.9	56	31.1	Pass
1.84345	L1	22.9	56	33.1	Pass
5.58955	L1	26.3	60	33.7	Pass
6.94901	L1	27.8	60	32.2	Pass

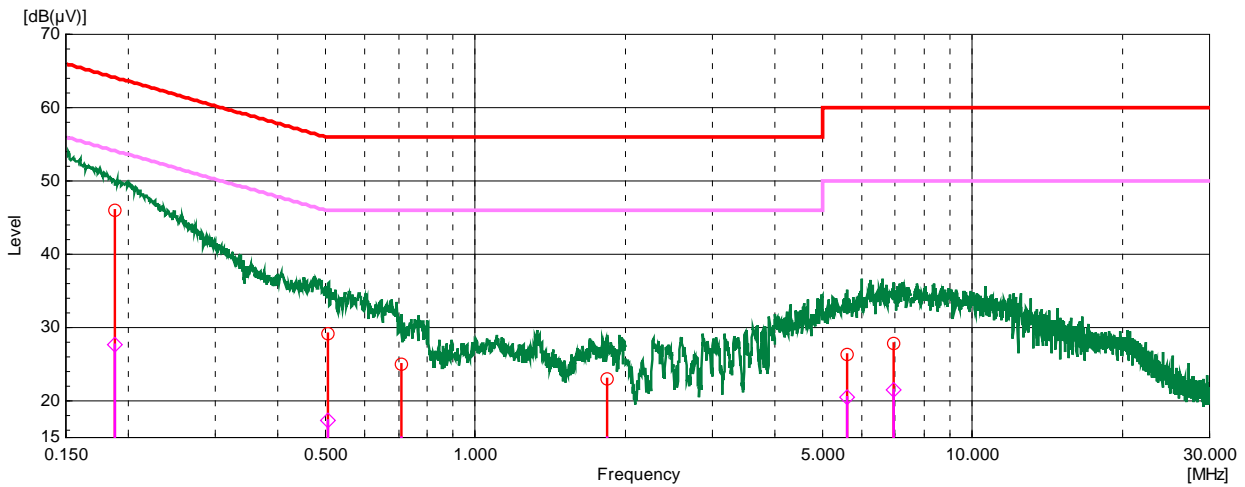
Average (Operating Mode1)

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.16411	N	29.6	55.3	25.7	Pass
0.18247	N	28.7	54.4	25.7	Pass
0.22374	N	29.5	52.7	23.2	Pass
0.2793	N	21.7	50.8	29.1	Pass
3.63513	N	17.2	46	28.8	Pass
8.20057	N	21.1	50	28.9	Pass
0.18819	L1	27.7	54.1	26.4	Pass
0.50487	L1	17.4	46	28.6	Pass
0.70945	L1	12.4	46	33.6	Pass
1.84345	L1	11.9	46	34.1	Pass
5.58955	L1	20.5	50	29.5	Pass
6.94901	L1	21.5	50	28.5	Pass

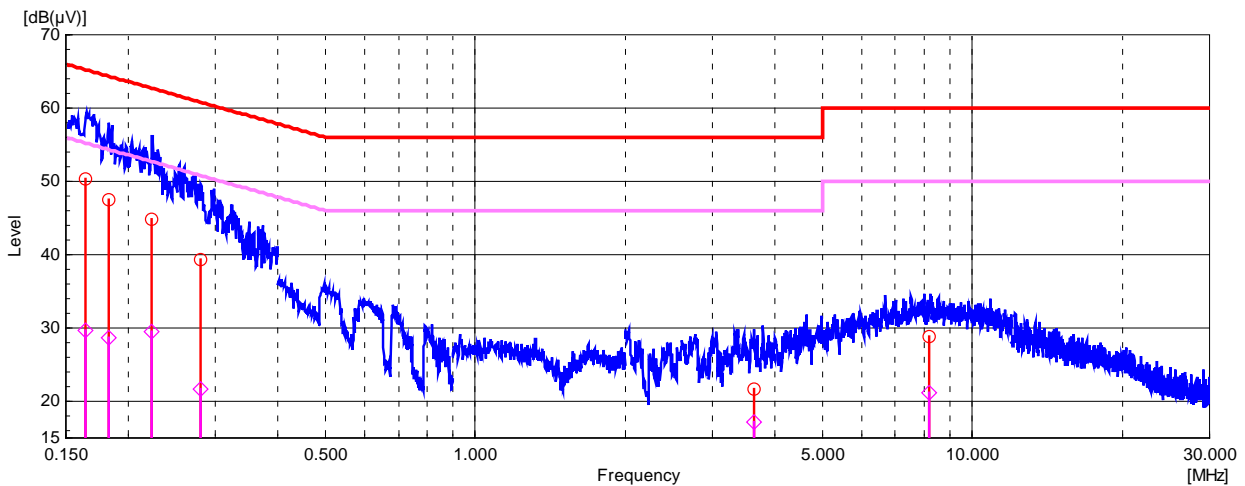
Result: Pass

6.1.3 Graphical Plots:

Conducted Emissions for L1 Line



Conducted Emissions for N Line

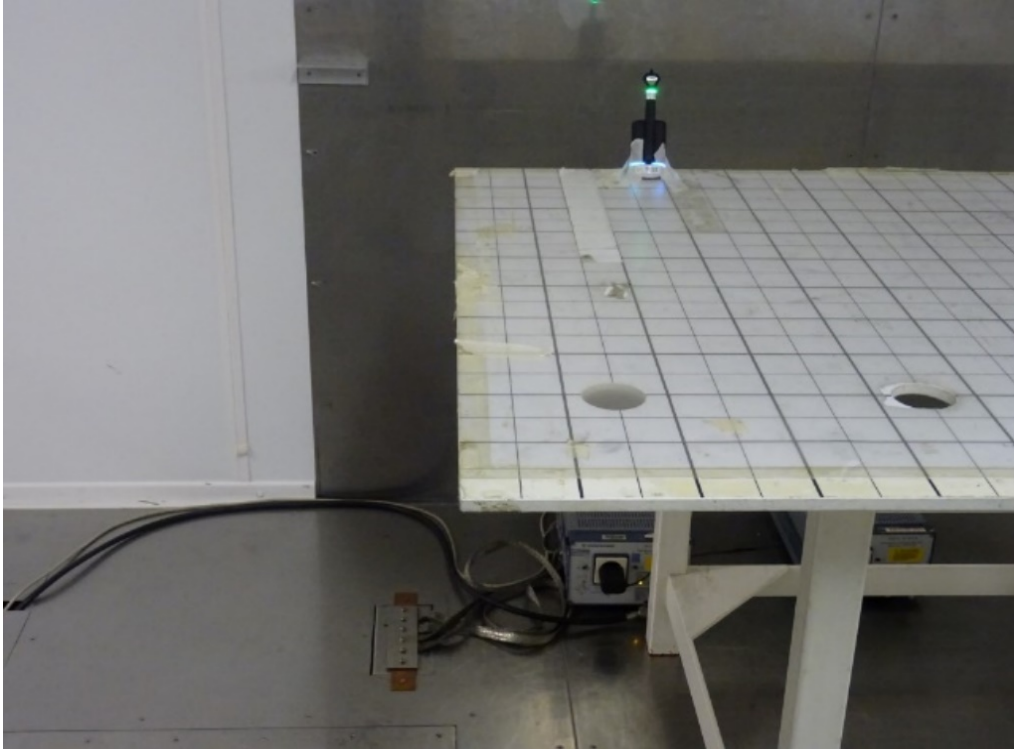


Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).

Legend (Conducted Emissions)	
Items	Description
	Blue graph is the result of peak measurement phase L
	Green graph is the result of peak measurement phase N
	Limit line Quasi-Peak
	Limit line Average
	Suspected item
	Suspected item
	Final item Quasi-Peak
	Final item Average

6.1.4 Setup Photos

Test Configuration Photograph - Conducted Emissions



Test Configuration Photograph - Conducted Emissions



6.2 Radiated Emissions below 1GHz

6.2.1 Test Summary:

Test Engineer:	M. Asim Shahzad	Test Date:	20.07.2017
Test Sample S/N:	H3-309, B3-243		
Test Site Identification:	SR 1/2		

FCC Reference:	Part 15.109
Test Method Used:	ANSI C63.4 Section 8
Title:	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 Radiated emission measurements
Frequency Range:	30 MHz to 1000 MHz
Class:	Class B Limit

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	40

Note(s):

4. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
5. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
6. Measurements below 1 GHz were performed in a semi-anechoic chamber (SR1/ 2 Asset Number 1603665) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

6.2.2 Numerical Results:

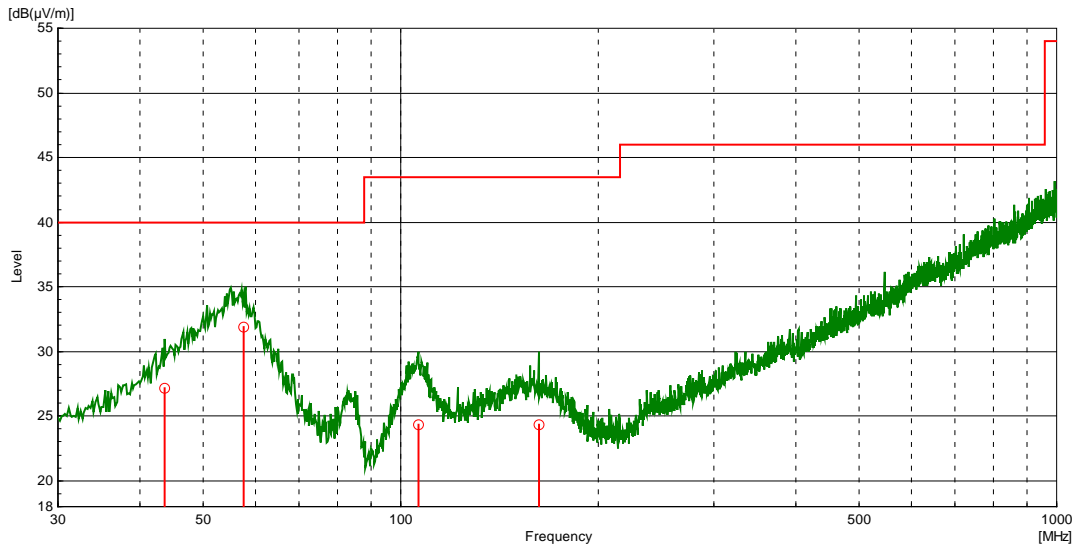
Operating Mode 1

Frequency [MHz]	(P)	Level QP [dB(µV/m)]	Limit QP [dB(µV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
43.70384	V	27.1	40	12.9	100	285
57.51538	V	31.9	40	8.1	100	45
106.5635	V	24.3	43.5	19.2	100	24
162.613	V	24.4	43.5	19.1	100	180
346.3847	H	25.7	46	20.3	100	61
782.2476	H	36.7	46	9.3	100	125

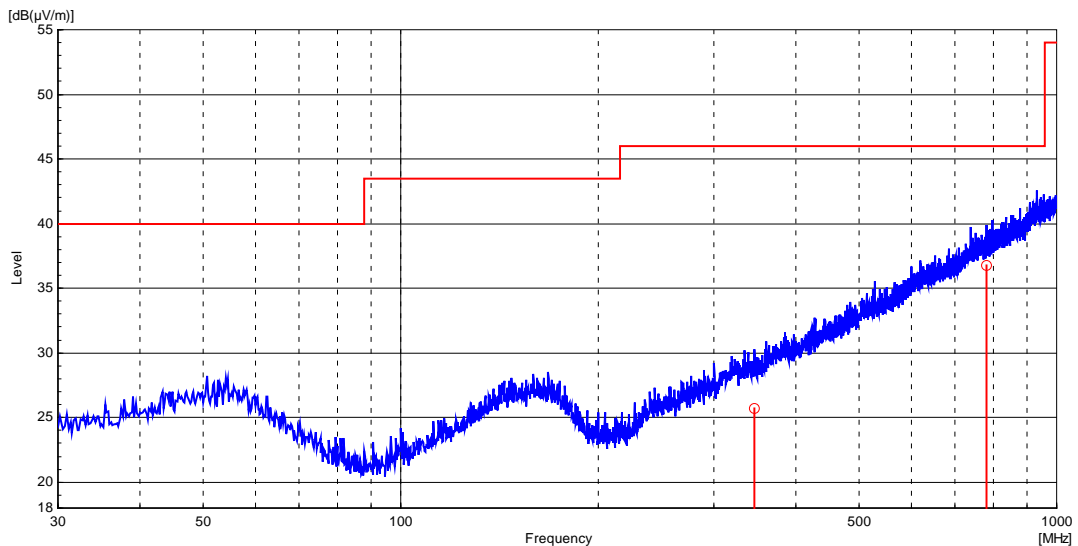
Result: Pass

6.2.3 **Graphical Plots:**

Radiated Emissions for Vertical Polarization



Radiated Emissions for Horizontal Polarization



Note: The plots show the max hold (peak detector) pre-scan results measured while rotating the TT continuously and an antenna movement between 1 – 4m height. Blue graph represents the result of the horizontal antenna polarization; green graph the results measured with vertical antenna polarization. The bar graphs indicate the final measurement result applying the detector at selected frequencies (red circle for quasi peak limit).

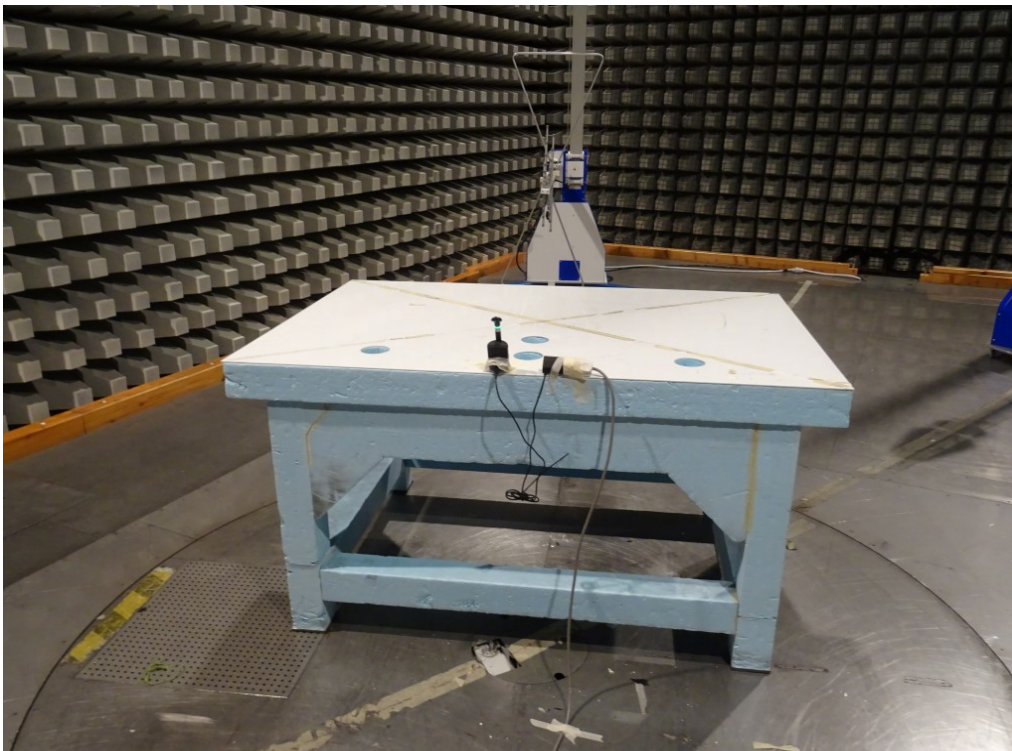
Legend (Radiated Emissions below 1 GHz)	
Items	Description
	Blue graph is the result of peak measurement for horizontal antenna polarization
	Green graph is the result of peak measurement for vertical antenna polarization
	Limit line Quasi-Peak
	Suspected item for horizontal antenna polarization – not shown on actual graphs
	Suspected item for vertical antenna polarization – not shown on actual graphs
	Final item Quasi-Peak for horizontal and vertical antenna polarization

6.2.4 Setup Photos

Test Configuration Photograph - Radiated emission below 1GHz.



Test Configuration Photograph - Radiated emission below 1GHz.



6.3 Radiated Emissions above 1GHz

6.3.1 Test Summary:

Test Engineer:	M. Asim Shahzad	Test Date:	14.08.2018
Test Sample S/N:	H3-309, B3-243		
Test Site Identification:	SR 1/2		

FCC Reference:	Part 15.109
Test Method Used:	ANSI C63.4 Section 8
Title:	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 Radiated emission measurements
Frequency Range:	1000 MHz to 18000 MHz
Class:	Class B Limit

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	44

Note(s):

7. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
8. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
9. Measurements Above 1 GHz were performed in a semi-anechoic chamber (SR1/ 2 Asset Number 1603665) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

6.3.2 Numerical Results:

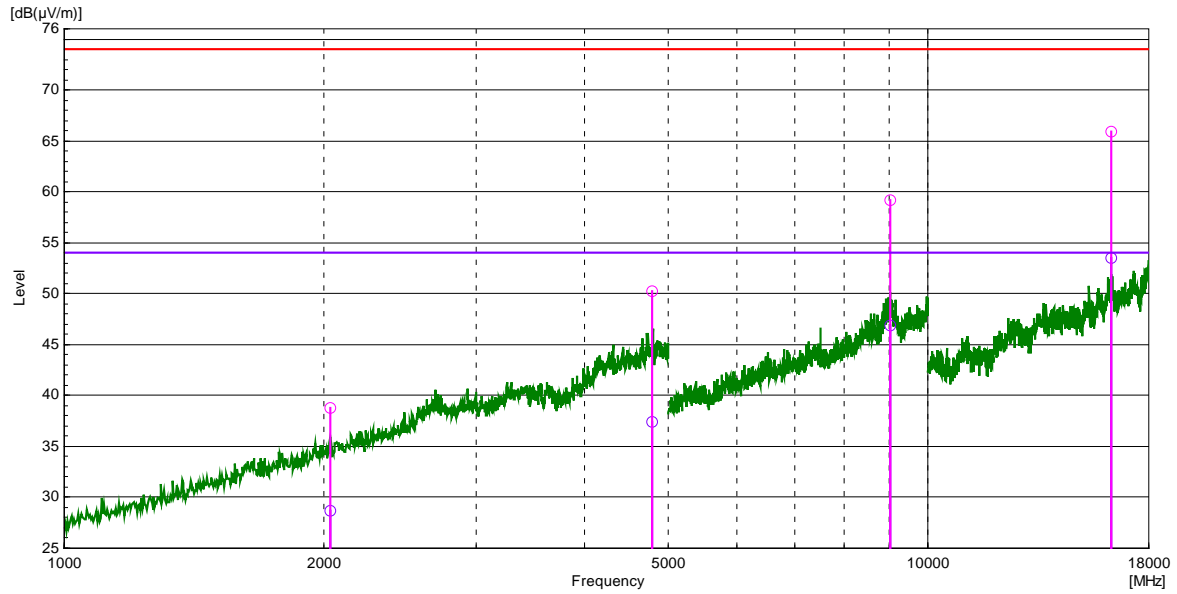
Operating Mode 1

Frequency [MHz]	(P)	Level AV [dB(µV/m)]	Level PK [dB(µV/m)]	Limit AV [dB(µV/m)]	Limit PK [dB(µV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [°]
2029.159	V	28.7	38.8	54	74	25.3	35.2	100	83
4794.536	V	37.4	50.2	54	74	16.6	23.8	100	89
4836.179	H	37.6	49.9	54	74	16.4	24.1	100	290
9025.473	V	46.9	59.2	54	74	7.1	14.8	100	108
9094.567	H	46.5	59.1	54	74	7.5	14.9	100	150
16282.01	V	53.4	65.9	54	74	0.6	8.1	100	53

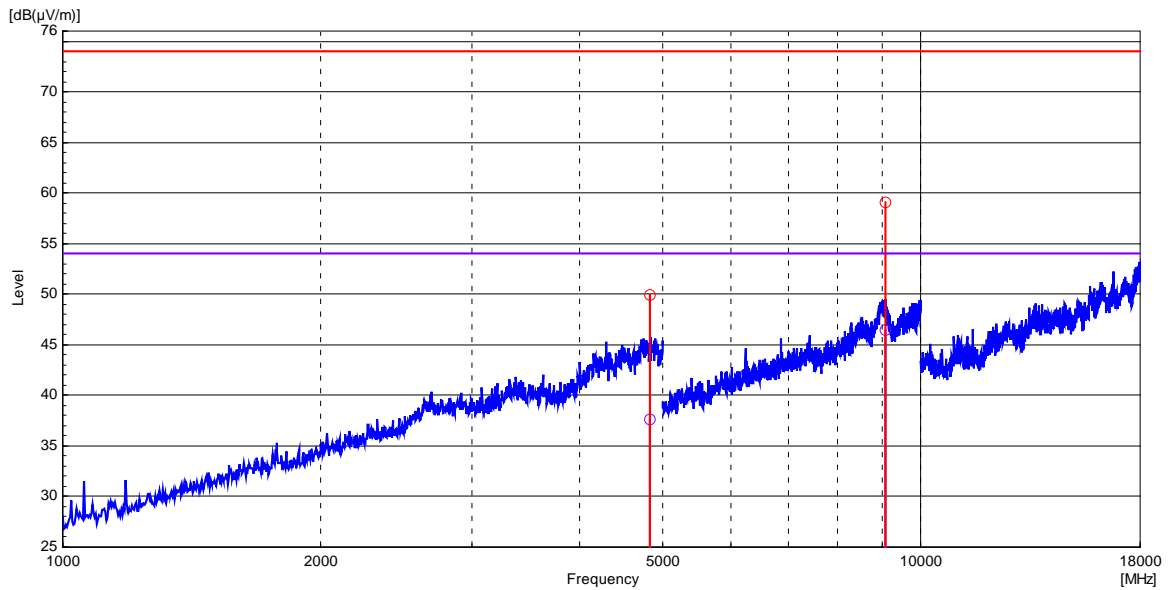
Result: Pass

6.3.3 Graphical Plots:










Radiated Emissions for Vertical Polarization



Radiated Emissions for Horizontal Polarization

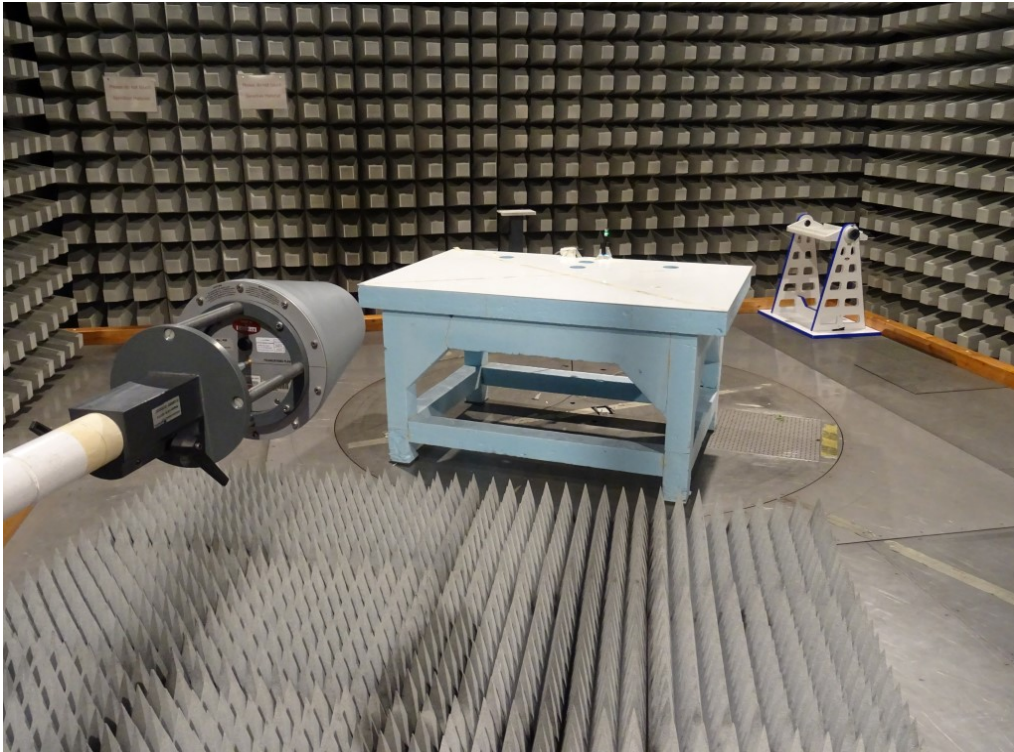


Note: The plots show the max hold (peak detector) pre-scan results measured while rotating the TT continuously and an antenna movement between 1 – 4m height. Blue graph represents the result of the horizontal antenna polarization; green graph the results measured with vertical antenna polarization. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for peak limit; violet cycle for average limit).

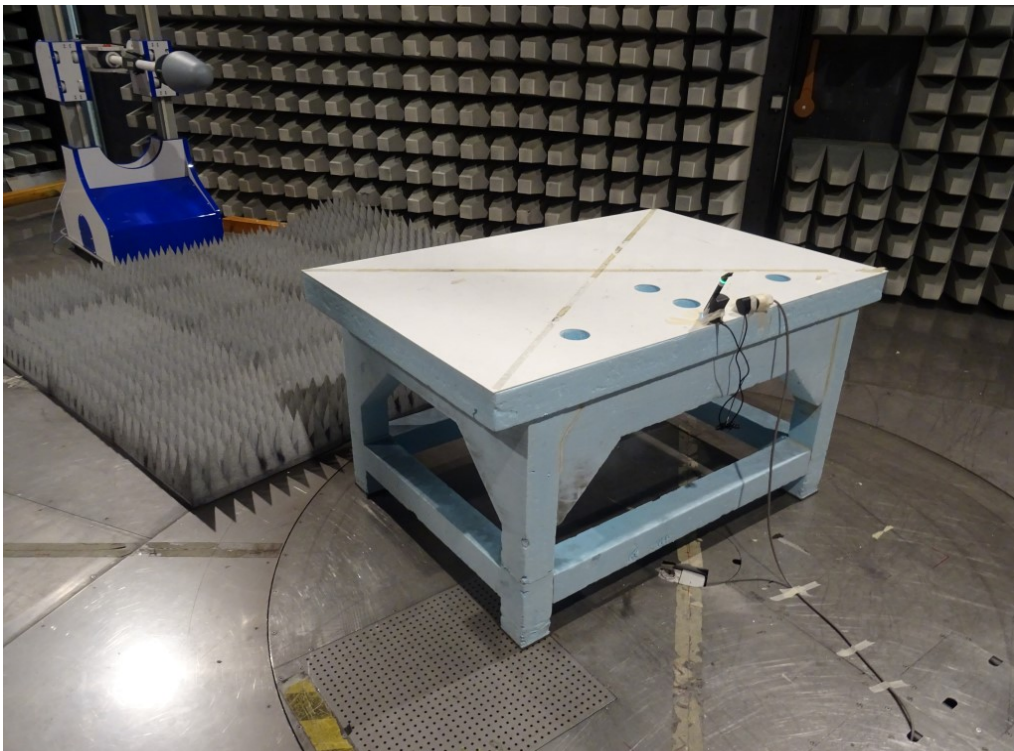
Legend (Radiated Emissions above 1 GHz)	
Items	Description
	Blue graph is the result of peak measurement for horizontal antenna polarization
	Green graph is the result of peak measurement for vertical antenna polarization
	Limit line Average
	Limit line Peak
	Suspected item for horizontal antenna polarization – not shown on actual graphs
	Suspected item for vertical antenna polarization – not shown on actual graphs
	Final item Average for horizontal and vertical antenna polarization
	Final item Peak for horizontal antenna polarization
	Final item Peak for vertical antenna polarization

6.3.4 Setup Photos

Test Configuration Photograph - Radiated emission above 1GHz.



Test Configuration Photograph - Radiated emission above 1GHz.



7 Used equipment

SR 1/ 2

ID	Manufacturer	Type	Model	Serial	Cal Date	Cal. Cycle
1	Rohde & Schwarz	Antenna, Loop	HFH2-Z2	831247/012	7/13/2018	36
103	EMCO	Antenna, Horn	3115	9008/3485	7/20/2016	36
104	EMCO	Antenna, Horn	3115	9008/3486	7/20/2016	36
156	Rohde & Schwarz	V-Network	ESH3-Z6	843864/004	7/11/2018	12
350	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/014	7/12/2018	12
363	Wainwright	Notch Filter GSM900	WW-NF9	100002	lab verification	n/a
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	7/12/2018	12
383	Rohde & Schwarz	Antenna, Rod	HFH2-Z1	890151/11	7/14/2017	24
425	Agilent	Generator, CW Signal	E8247C	MY43320849	7/10/2018	24
426	Agilent	Spectrum Analyzer	E4446A	US44020316	7/11/2018	24
460	Deisl	Turntable	DT 4250 S		n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	9/29/2017	24
474	Agilent	Analyzer, ENA Network	E5071C	MY46100912	7/13/2018	24
495	Rohde & Schwarz	Antenna, Log.- Periodical	HL050	100296	7/20/2016	36
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	7/20/2016	36
497	Schwarzbeck	Antenna, Biconical	VHBB 9124	423	8/24/2017	36
499	Schwarzbeck	Antenna, log.-per	VUSLP 9111	317	8/24/2017	36
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	7/12/2018	12
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	lab verification	n/a
611	Wainwright Instruments	Band Reject Filter DL LTE	WRCGV8-	1	lab verification	n/a
612	Wainwright Instruments	Band Reject Filter UL LTE	WRCGV8-	1	lab verification	n/a
613	Wainwright Instruments	Band Reject Filter WLAN/ BT	WRCTF12-	1	lab verification	n/a
614	Wainwright Instruments	Highpass Filter 3GHz	WHKX10-	1	lab verification	n/a
615	Wainwright Instruments	Highpass Filter 1GHz	WHKX12-	3	lab verification	n/a
620	Bonn Elektronik	pre-amplifier	BLNA 0110-01N	1510111	7/12/2018	24
624	Wainwright	6 GHz high-pass filter	WHKX10-5850-6500-18000-40SS	5	lab verification	n/a
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kippeinrichtung	KE 2.5-R-M	MAT002	n/a	n/a

SR 7/ 8

ID	Manufacturer	Type	Model	Serial	Cal Date	Cal. Cycle
22	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/014	7/11/2018	12
23	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/013	7/11/2018	12
28	Rohde & Schwarz	Passive Probe	ESH2-Z3	none	7/11/2018	12
215	Rohde & Schwarz	Artificial Mains Network	ESH2-Z5	879675/002	7/20/2016	12
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	7/10/2018	12
351	Rohde & Schwarz	network, Artificial Mains	ESH3-Z5	862770/018	7/11/2018	12
370	Rohde & Schwarz	Current probe	EZ-17	833335/010	7/11/2018	24
505	Luethi Feinmechanik AG	Absorbing clamp	MDS21	100005	7/20/2017	24
514	maturo	Gliderail & Controller	CGR 5.4 & SCU		n/a	n/a
564	Teseq	Impedance stabilisation network (ISN)	ISN T800	26076	7/12/2018	24
565	Teseq	Impedance stabilisation network (ISN)	ISN ST08	26575	7/12/2018	12
616	Rohde & Schwarz	ISN	ENY81-CA6	101656	7/12/2018	12

8 Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	25	-	AS: Initial Version

--End of Report--