TEST REPORT

No. I18Z60700-EMC01

for

WORKERBASE GmbH

WIFI/BT Watch

Model Name: WB-3301

FCC ID: 2APQFWB3301

with

Hardware Version: PIO01

Software Version: W0P

Issued Date: 2018-09-06

TESTING
NVLAP LAB CODE 600118-0

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z60700-EMC01	Rev.0	1st edition	2018-09-06

CONTENTS

1. Test Laboratory

1.1. Testing Location

CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.2. Testing Environment

Normal Temperature: 15-35°C

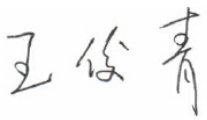
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-08-26

Testing End Date: 2018-08-31

1.4. Signature

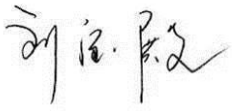


Wang Junqing

(Prepared this test report)

Zhang Ying

(Reviewed this test report)



Liu Baodian

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Certification Information

Company Name:	WORKERBASE GmbH
Address /Post:	Aventinstr. 7, Munich, Germany
Contact Person:	Norman Hartmann
Contact Email	info@workerbase.com
Telephone:	+49 89 21540295

2.2. Applicant Information

Company Name:	WORKERBASE GmbH
Address /Post:	Aventinstr. 7, Munich, Germany
Contact Person:	Norman Hartmann
Contact Email	info@workerbase.com
Telephone:	+49 89 21540295

2.3. Manufacturer Information

Company Name:	WORKERBASE GmbH
Address /Post:	Aventinstr. 7, Munich, Germany
Contact Person:	Norman Hartmann
Contact Email	info@workerbase.com
Telephone:	+49 89 21540295

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	WIFI/BT Watch
Model Name	WB-3301
FCC ID	2APQFWB3301
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.7VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	/	PIO01	W0P

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	Battery	/	inbuilt
AE2	Cradle	/	/
AE3	USB Cable	/	/
AE4	OTG Cable	/	/

AE1

Model	CAB22B0000C1
Manufacturer	BYD
Capacitance	750mAh
Nominal voltage	3.7V

AE2

Model	/
Manufacturer	/
Length of cable	/

AE3

Model	JWUB1342-T01
Manufacturer	Juwei Electronics Co., Ltd.
Length of cable	cm

AE4

Model	JWUB1343-T01
Manufacturer	Juwei Electronics Co., Ltd.
Length of cable	cm

*AE ID: is used to identify the test sample in the lab internally.

Note: The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1+ AE2 +AE3 +PC	PC Charger
Set.2	EUT1+ AE1+ AE2 +AE3 +PC	USB mode
Set.3	EUT1+ AE1+ AE2 +AE4 +USB Disk	OTG USB mode

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices - Unintentional Radiators	2016
ANSI C63.4	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	2014

Note: The test methods have no deviation with standards.

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz－1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	P	**CTTL(huayuan North Road)**
2	Conducted Emission	15.107(a)	B.2	P	**CTTL(huayuan North Road)**

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100235	R&S	2019-03-31	1 year
3	Test Receiver	ESCI3	100344	R&S	2019-02-28	1 year
5	Universal Radio Communication Tester	CMW500	116588	R&S	2018-11-26	1 year
6	LISN	ENV216	101200	R&S	2019-04-15	1 year
	BT Tester	CBT	101042	R&S	2019-03-08	1 year
7	EMI Antenna	VULB 9163	9163-302	Schwarzbeck	2020-02-27	3 years
8	EMI Antenna	3115	0067250	ETS-Lindgren	2020-05-21	3 years
9	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
	Test PC	T420	JI0009842	Lenovo	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
11	Keyboard	L100	CN0RH659658907ATOI40	DELL	N/A	N/A
12	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01	R&S
Conducted Emission	EMC32 V8.52.0	R&S

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

Reference

FCC: CFR Part 15.109(a).

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (USB mode of MS and charging mode of MS) at distances of 10 meters(for 30MHz-1GHz) and 3 meters (for above 1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

A.1.4 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/1MHz	15	Peak, Average

A.1.5 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”. It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

Result = $P_{Mea} + A_{Rpl} = P_{Mea} + G_A + G_{PL}$

Where

G_A: Antenna factor of receive antenna

G_{PL}: Path Loss

P_{Mea}: Measurement result on receiver.

Measurement uncertainty (worst case): U = 4.3 dB, k=2.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17954.667	40.0	-25.5	43.4	22.102	H
17967.133	40.0	-25.5	43.4	22.102	H
17958.633	39.8	-25.5	43.4	21.902	V
17955.800	39.8	-25.5	43.4	21.902	H
17943.900	39.7	-25.5	43.4	21.802	H
17955.233	39.7	-25.5	43.4	21.802	H

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17983.567	51.3	-25.5	43.4	33.402	H
17938.233	51.0	-25.5	43.4	33.102	H
17937.667	51.0	-25.5	43.4	33.102	V
17959.200	51.0	-25.5	43.4	33.102	H
17993.200	50.8	-25.5	43.4	32.902	H
17946.733	50.7	-25.5	43.4	32.802	H

Measurement results for Set.2:

USB Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17955.800	40.1	-25.5	43.4	22.202	H
17994.333	39.9	-25.5	43.4	22.002	H
17964.300	39.8	-25.5	43.4	21.902	V
17954.667	39.7	-25.5	43.4	21.802	H
17996.600	39.7	-25.5	43.4	21.802	H
17960.333	39.6	-25.5	43.4	21.702	H

USB Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17951.833	51.1	-25.5	43.4	33.202	H
17997.733	51.0	-25.5	43.4	33.102	H
17985.833	51.0	-25.5	43.4	33.102	V
17977.333	50.9	-25.5	43.4	33.002	H
17911.033	50.8	-25.7	43.4	33.142	H
18000.000	50.8	-26.5	46.4	30.905	H

Measurement results for Set.3:

USB Mode(OTG Cable)/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17986.400	40.0	-25.5	43.4	22.102	H
17837.933	39.9	-25.7	43.4	22.242	H
17952.400	39.9	-25.5	43.4	22.002	V
17951.267	39.8	-25.5	43.4	21.902	H
17941.067	39.8	-25.5	43.4	21.902	H
17969.400	39.8	-25.5	43.4	21.902	H

USB Mode (OTG Cable)/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17968.833	51.3	-25.5	43.4	33.402	H
17956.933	51.3	-25.5	43.4	33.402	H
17969.967	51.2	-25.5	43.4	33.302	V
17988.667	50.9	-25.5	43.4	33.002	H
17973.933	50.9	-25.5	43.4	33.002	H
17871.367	50.8	-25.7	43.4	33.142	H

Charging Mode, Set.1

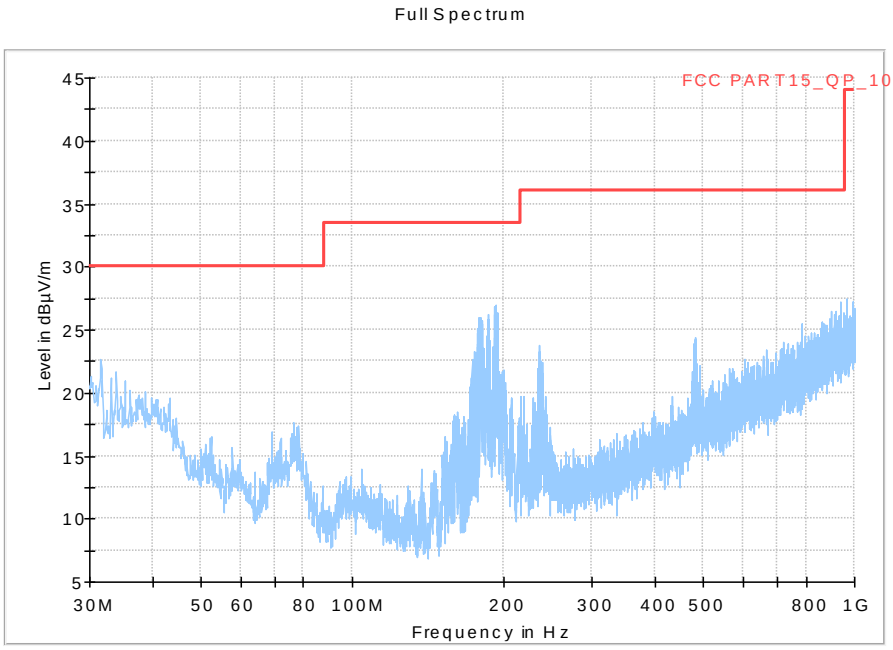


Fig A.1 Radiated Emission from 30MHz to 1GHz

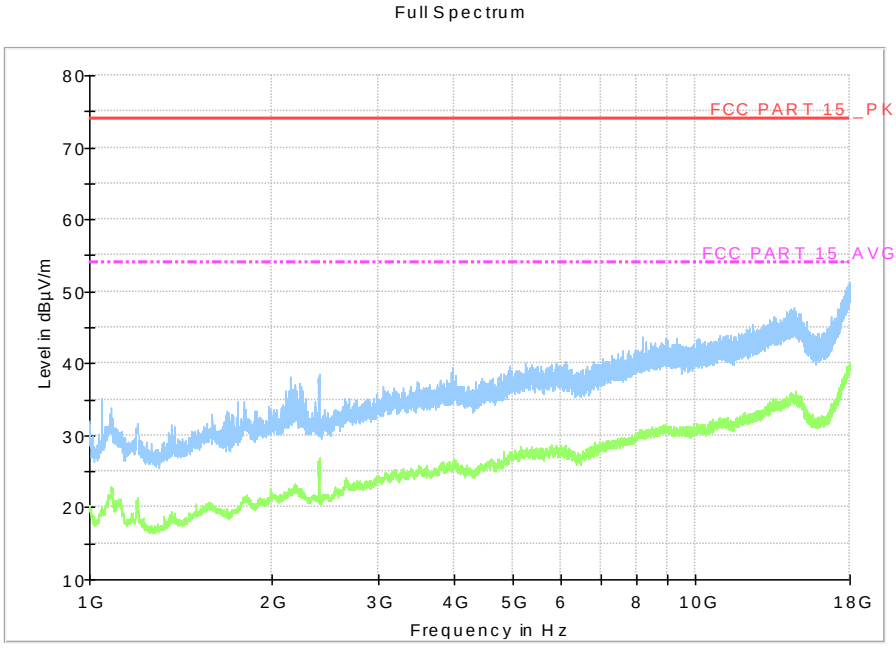


Fig A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

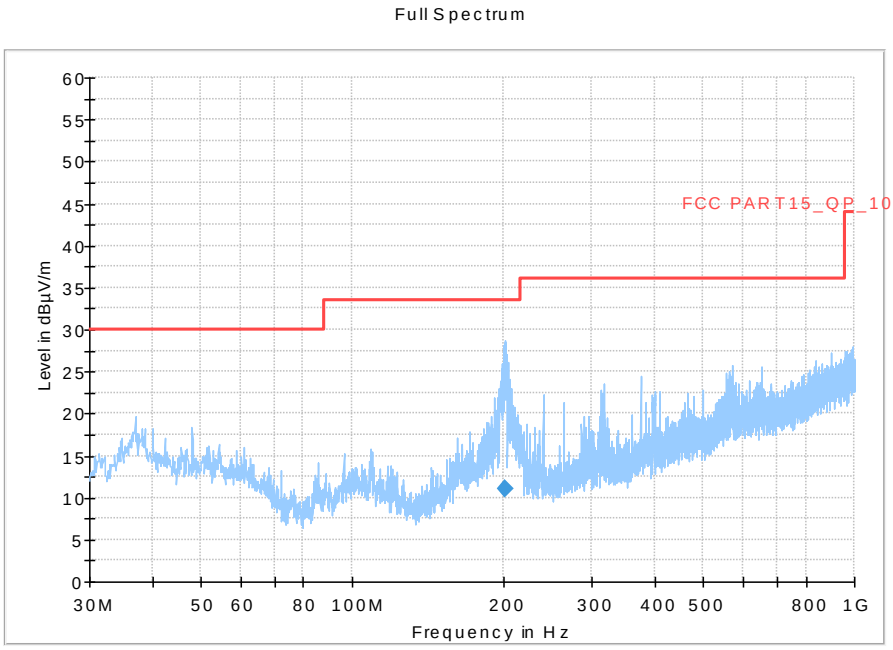


Fig A.3 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dB礦/m)	Limit (dB礦/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
201.625000	11.00	33.50	22.52	1000.0	120.000	325.0	H	-12.0

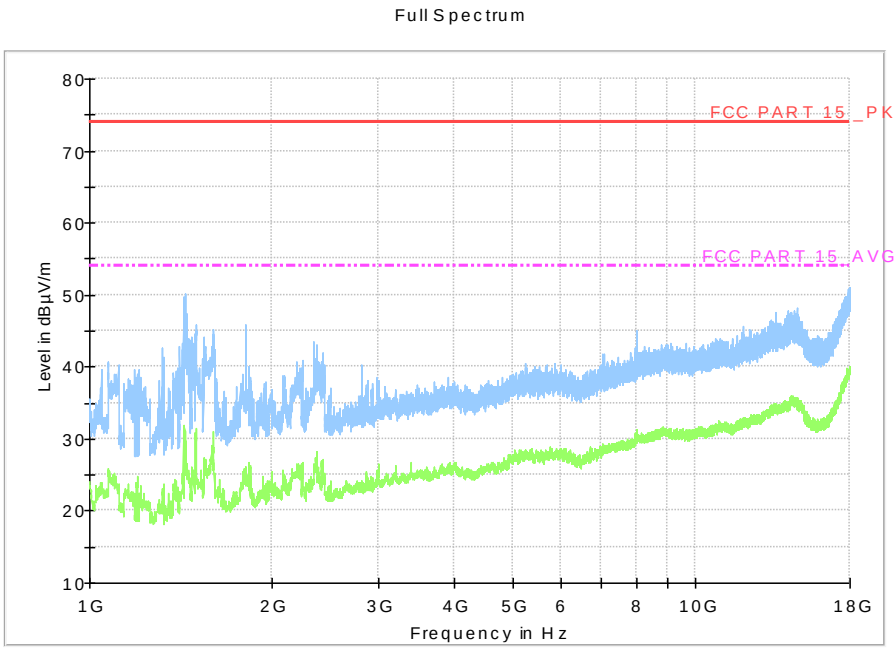


Fig A.4 Radiated Emission from 1GHz to 18GHz

USB Mode(OTG Cable), Set.3

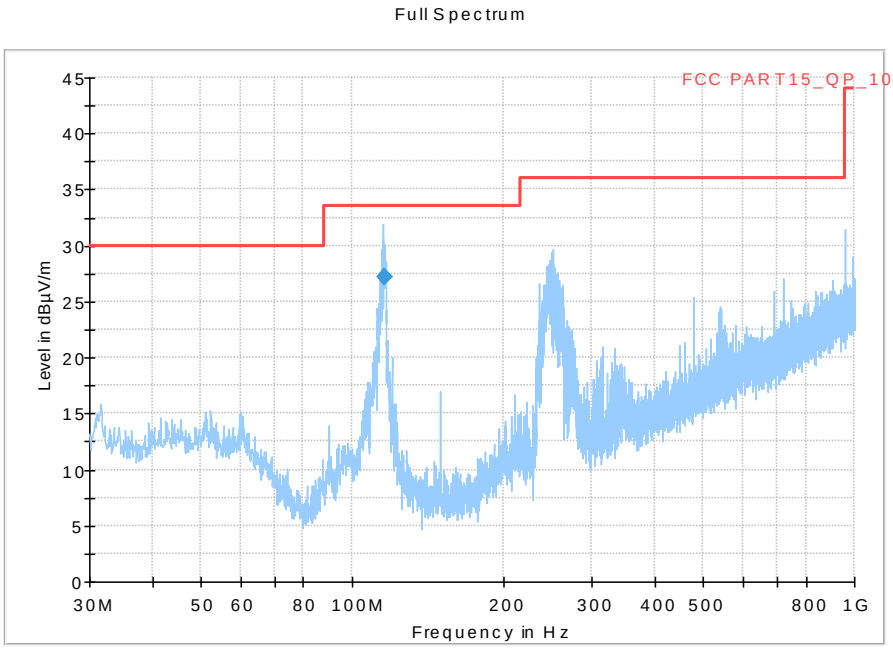


Fig A.5 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dB礦/m)	Limit (dB礦/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
115.914000	27.17	33.50	6.35	1000.0	120.000	102.0	V	86.0

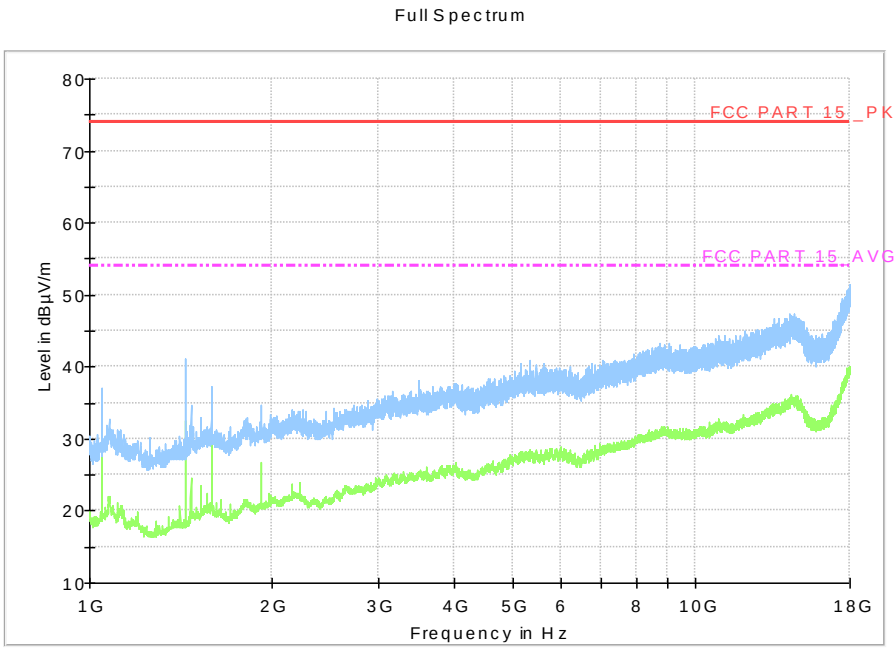


Fig A.6 Radiated Emission from 1GHz to 18GHz

A.2 Conducted Emission

Reference

FCC: CFR Part 15.107(a).

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 7.3.

A.2.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

A.2.4 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.5 Measurement Results

Measurement uncertainty: *U*= 2.9 dB, *k*=2.

Charging Mode, Set.1

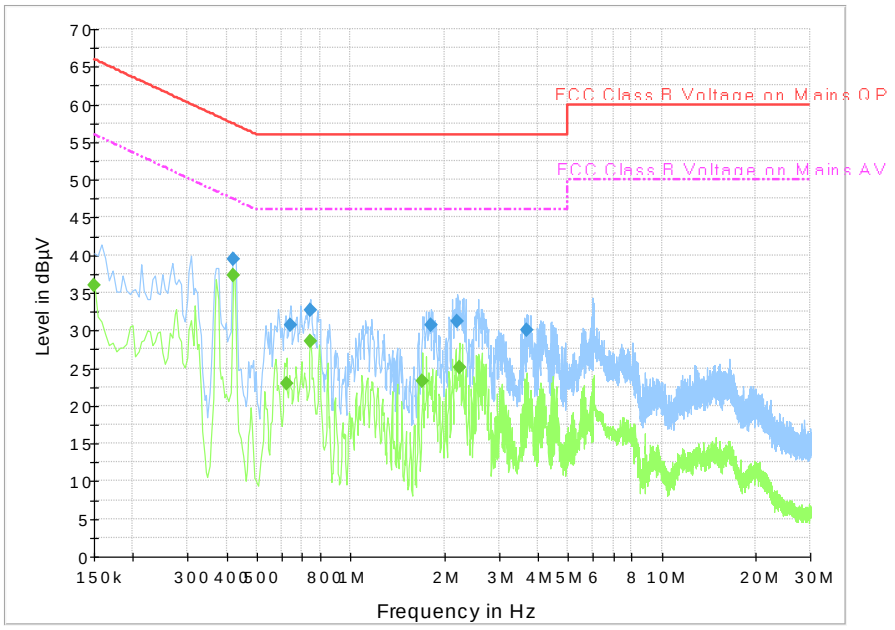


Fig A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.420000	39.5	2000.0	9.000	On	N	19.9	18.0	57.4	
0.640500	30.8	2000.0	9.000	On	N	19.9	25.2	56.0	
0.744000	32.7	2000.0	9.000	On	N	19.9	23.3	56.0	
1.806000	30.6	2000.0	9.000	On	L1	19.7	25.4	56.0	
2.206500	31.3	2000.0	9.000	On	L1	19.7	24.7	56.0	
3.669000	30.0	2000.0	9.000	On	L1	19.6	26.0	56.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	36.0	2000.0	9.000	On	N	20.2	20.0	56.0	
0.420000	37.3	2000.0	9.000	On	N	19.9	10.1	47.4	
0.622500	23.0	2000.0	9.000	On	N	19.9	23.0	46.0	
0.744000	28.5	2000.0	9.000	On	N	19.9	17.5	46.0	
1.702500	23.3	2000.0	9.000	On	L1	19.7	22.7	46.0	
2.233500	25.1	2000.0	9.000	On	L1	19.7	20.9	46.0	

USB Mode, Set.2

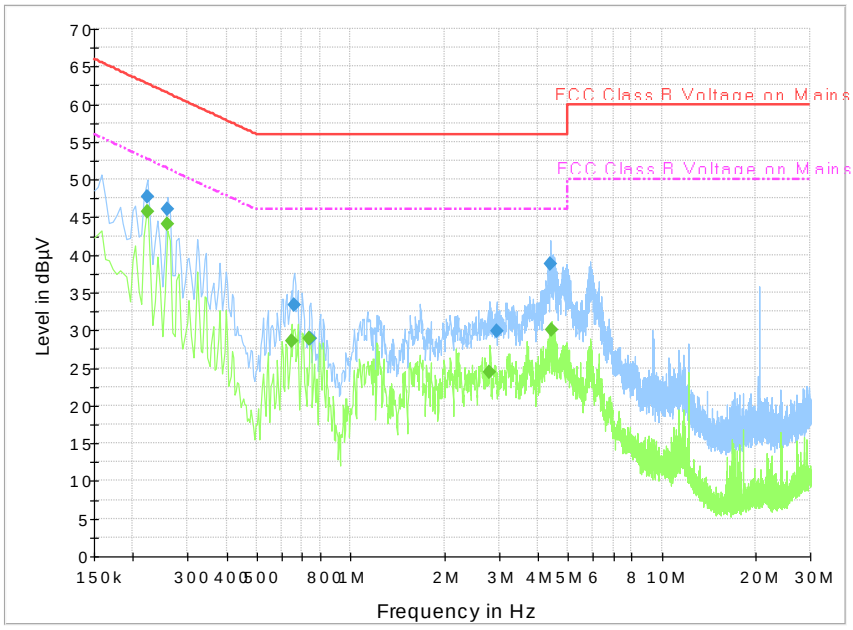


Fig A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	47.8	2000.0	9.000	On	N	19.8	15.0	62.7	
0.258000	46.0	2000.0	9.000	On	N	19.8	15.5	61.5	
0.658500	33.4	2000.0	9.000	On	N	19.9	22.6	56.0	
0.744000	28.8	2000.0	9.000	On	N	19.9	27.2	56.0	
2.944500	29.8	2000.0	9.000	On	N	19.6	26.2	56.0	
4.398000	38.8	2000.0	9.000	On	L1	19.6	17.2	56.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	45.7	2000.0	9.000	On	N	19.8	7.1	52.7	
0.258000	44.1	2000.0	9.000	On	N	19.8	7.4	51.5	
0.645000	28.6	2000.0	9.000	On	N	19.9	17.4	46.0	
0.739500	28.8	2000.0	9.000	On	N	19.9	17.2	46.0	
2.805000	24.4	2000.0	9.000	On	L1	19.7	21.6	46.0	
4.425000	30.1	2000.0	9.000	On	L1	19.6	15.9	46.0	

ANNEX B: Persons involved in this testing

Test Item	Tester
Conducted Continuous Emission	Shi Suolan
Radiated Continuous Emission	Shi Suolan

*****END OF REPORT*****