

Test report No:
 NIE: 67469REM.002

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Wellness ring + Charger
(*) Trademark	ÕURA
(*) Model and /or type reference	Gen3 Ring (BLB_03) Gen3 Charger (GCH_10)
(*) Derived model not tested	BLB_03 Sizes: US6, US7, US8, US9, US10, US12 & US13 BLB_04 Sizes US6, US7, US8, US9, US10, US11, US12 & US13
Other identification of the product	Ring: HW version: BLB_03 (SIZE US11) SW version: 1.15.1 FCC ID: 2AD7V-OURA2101 IC: 20635-OURA2101 Charger: HW version: GCH_10 SW version: 4.2.0
(*) Features	Sleep Analysis, Activity Monitoring, Readiness Score, Bluetooth LE
Manufacturer	Oura Health Oy Elektroniikkatie 10, 90590 Oulu, Finland
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Industrial & Automotive EMC Lab. Manager
Date of issue	2021-10-29
Report template No	FDT08_23 (* "Data provided by the client")

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Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
Line	Conducted Emissions - Tested Line
OM	Operation Mode
S/	Sample
V	Verdict

Competences and guarantees

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In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the measured conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is $I = \pm 3,9$ dB for quasi-peak measurements, $I = \pm 3,2$ dB for peak measurements ($k = 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $I = \pm 4,9$ dB for quasi-peak measurements, $I = \pm 4,6$ dB for peak measurements ($k = 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is $I = \pm 2,6$ dB for peaks and average measurements ($k = 2$).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested")
2. OURA is a revolutionary wellness ring and app, designed to help user gets more restful sleep and performs better. It enables user to learn how the lifestyle choices affect user's sleep, and how the quality of the sleep affects user's ability to perform.

The OURA ring can automatically tell when user is sleeping. When user goes to sleep, the OURA ring analyzes the quality of the rest and recovery by measuring the heart rate (optically), respiration rate, body temperature, and movement. While user is awake, it monitors the duration and intensity of the activities, and the time user spends sitting.

The OURA app integrates and visualizes this data to identify patterns between the sleep quality and daily activities. By understanding how well user slept and recharged, it can determine the readiness to perform and help user adjust the intensity and duration of the day's activities. It can also uncover actionable insights for changes to the daily activities that can help user sleep better.

3. Customer provides the following information related the Derived Models not tested:

OURA

Declaration of differences

Purpose of the document:

This document contains general information of the Oura Ring Gen3 HW differences.

Ring sizes:

There are eight sizes of the rings: US6, US7, US8, US9, US10, US11, US12 and US13. All sizes are identical in RF characteristics.

All sizes were pre-tested and size US11 was selected as worst case to represent all sizes.

The rings in different sizes also have different size circuit boards and capacity batteries.

Every eight size of rings need dedicated battery type/physical size. Batteries are Li-ion type.

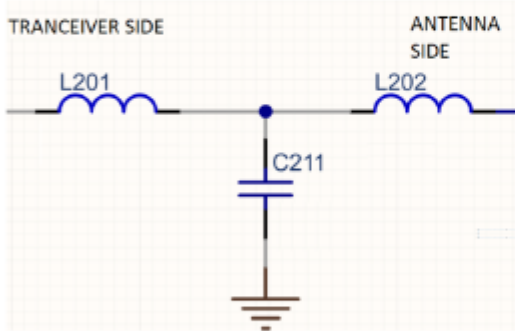
- Li-ion type
- Nominal voltage 3.7V
- Capacities varying from 15mAh to 22mAh depending on battery size.
- Batteries are CB certified and tested according to UN 38.3 requirements

Component / Part No.	Manufacturer/ Trademark	Type No./ Model	Technical data	Standard No., Edition/year	Mark(s) & Certificates of conformity ¹
Battery	Shenzhen Grepow Battery CO. LTD	1)YE160722G 2)YE160723G 3)YE160724G 4)YE160725G 5)YE160726G 6)YE160727G 7)YE160728G 8)YE160729G	3.7 Vdc Li-ion, 15-22 mAh, 0.0555Wh -0.0703Wh, Charging voltage 4.2Vdc, min. discharge voltage 3 Vdc	IEC 62133 (ed.2) edition	1)DK-73416-UL 2)DK-73886-UL 3)DK-73253-UL 4)DK-73413-UL 5)DK-73251-UL 6)DK73573-UL 7)DK-73720-UL 8)DK-73572-UL

OURA

Antenna matching:

Antenna matching varies for different sizes of rings. Matching is done by varying L201, C211 and L202 values according to the following table.



	L201	C211	L202
US06	0n6	3p0	1n8
US07	0n6	3p3	1n3
US08	0n6	3p3	1n3
US09	0n6	3p3	1n0
US10	0n6	3p0	2n2
US11	0n6	2p5	1n8
US12	0n6	2p6	2n0
US13	0n6	3p6	1n3

HW versions BLB03 vs. BLB04:

Memory

BLB03 and BLB04 HW versions have slightly different memory systems. BLB_03 have two of SPI controllable MX25R6435FBDILO 64MB flash memories and BLB_04 one GD25LE128ELIGR 128MB flash memory component.

BLB_03

- o two of MX25R6435FBDILO NOR flash memory component
- o size 2x64MB
- o 100 000 erase/program cycles, 20-year data retention
- o SPI controlled
- o operation voltage 1.65V to 3.6V
- o Max clock frequency 80 MHz

BLB_04

- o GD25LE128ELIGR NOR flash memory component
- o size 128 MB
- o 100 000 erase/program cycles, 20-year data retention
- o SPI controlled
- o Operation voltage 1.65V to 2.0V
- o Max clock frequency 133 MHz

Battery charge state sensing:

The charge state is sensed from the battery. There are differences between state sensing between BLB_3 and BLB_04 design. BLB_03 design uses battery gauge MAX17260 for the sensing and the BLB_04 uses direct battery voltage sensing using processors ADC input.

OURA

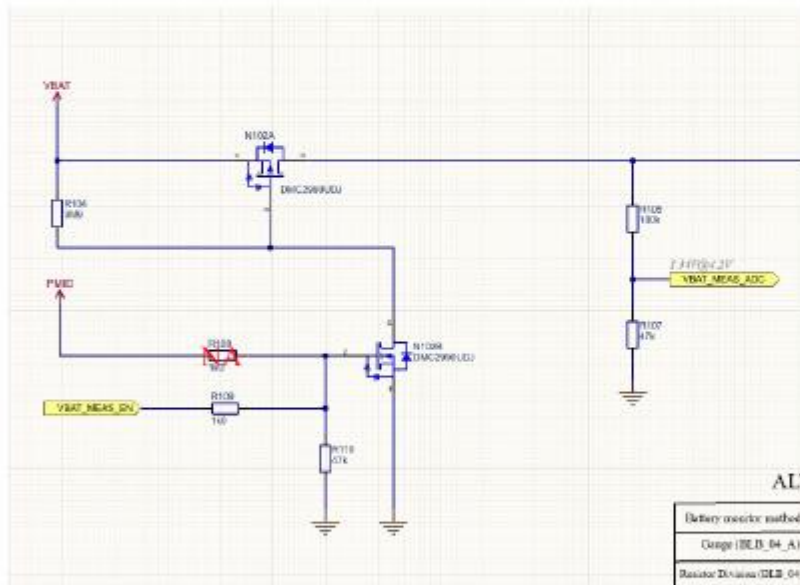
BLB_03

MAX17260 Fuel gauge in BLB_03

- • 1 ohm sense resistor used
- • I2C interface
- • State of charge sensing
- • Current measurement
- • Temperature sensing - not used
- • Vsupply 2.3V - 4.9V
- • shutdown current typ. 0.5uA, max 0.9 uA
- • Hibernate current typ 5.1 uA max 12uA
- • Active mode current typ. 15 uA max 30 uA

BLB_04

- Measurement is done by reading VBAT_MEAS_ADC value by the processor P10_5 pin.



- Leakage current through resistors R105 and R107 can be prevented by setting VBAT_MEAS_EN low state or input state. (Processor pin P6_3)

Signed on behalf of Oura Health Oy in Oulu, 20th October 2021

 **Oura Health Oy**
 Elektronikkatie 10
 90590 Oulu, FINLAND
 VAT n:o FI25427764


 (signature & company stamp)
 Name: Jyri Suokas
 Title: Senior Quality Specialist

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/02	67469B_23.1	Smart ring	GEN3 (BLB_03) – Size US11	--	2021-07-12	Element Under Test
S/02	67469B_15.1	Charger base #7	GEN3 Charger (GCH_10) – Size US11	--	2021-07-06	Element Under Test
S/02	67469B_19.1	USB-C cable	--	--	2021-07-06	Element Under Test

Notes referenced to samples during the project.

Test sample description

Test Sample description (compulsory information for EMC and RF testing services)

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	[]	[]	[]		
	[]	[]	[]		
	[]	[]	[]		
	[]	[]	[]		
	[]	[]	[]		
Supplementary information to the ports..... :						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: 5 Vdc					
[]	DC:						
Rated Power						
Clock frequencies.....						
Other parameters						
Software version	Ring: 1.15.1 Charger: 4.2.0						
Hardware version	Ring: BLB_03 (Size US11) Charger: GCH_10						

Dimensions in cm (W x H x D)	4.6 x 4.6 x 1.5		
Mounting position	<input checked="" type="checkbox"/>	Table top equipment	
	<input type="checkbox"/>	Wall/Ceiling mounted equipment	
	<input type="checkbox"/>	Floor standing equipment	
	<input checked="" type="checkbox"/>	Hand-held equipment	
	<input type="checkbox"/>	Other:	
Modules/parts.....	Module/parts of test item	Type	Manufacturer

Accessories (not part of the test item)	Description	Type	Manufacturer

Documents as provided by the applicant	Description	File name	Issue date

⁽³⁾ Only for Medical Equipment

Identification of the client

Oura Health Oy
Elektroniikkatie 10,
90590 Oulu,
Finland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-08-18
Date (finish)	2021-10-14

Document history

Report number	Date	Description
67469REM.002	2021-10-29	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Humberto Perez Guerrero and Verónica García Capilla.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

List of equipment used during the test

Control No.	Equipment	Model	Manufacturer	Next Calibration
7743	HORN ANTENNA 0,75-18GHz	3115	ETS LINDGREN	2023-08-24
7746	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-07-23
4659	PRE-AMPLIFIER G>28dB 1-18GHz	BBV 9718	SCHWARZBECK	2022-07-09
6666	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE & SCHWARZ	2022-02-05
6204	THREE-PHASE ARTIFICIAL NETWORK 32A	PMM L3-32	NARDA	2023-09-27

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC 47 CFR Part 15B	RE Radiated emission. Electromagnetic field measure	Pass	
FCC 47 CFR Part 15B	CE Continuous conducted emission	Pass	

Supplementary information and remarks:

None

Appendix A: Test results

Appendix A content

DESCRIPTION OF THE OPERATION MODES	17
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Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM/01	EUT ON. Charging in IDLE mode. Power supply: 5 Vdc
OM/02	EUT ON. Charging ring with Bluetooth ON with communication established. Power supply: 5 VDC (through auxiliary AC/DC 110 Vac).
OM/03	EUT ON. Charging ring with Bluetooth ON without communication established. Power supply: 5 VDC (through auxiliary AC/DC 110 Vac).

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	CE Continuous conducted emission

Test Cases Details

FCC 47 CFR Part 15B

RE Radiated emission. Electromagnetic field measure

Limits

Limits of interference Class B

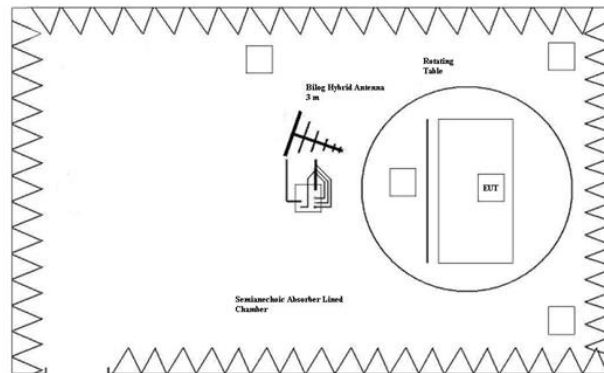
The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	($\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)	($\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46	---	---
230 to 960	200	46	224	47		
960 to 1000	500	54	500	54	---	---
Above 1000	---	---	---	---	74	54

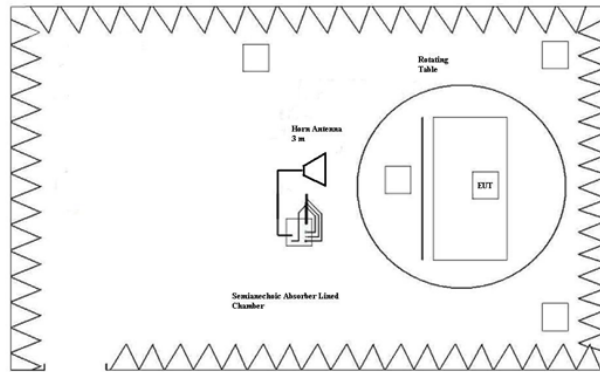
NOTE: FCC QP and AVG limits are in concordance with RSS-Gen Issue 5 (March 2019), Secs. 7.1 and 7.3.

Limits according to FCC Part 15B, equal to o more stringent than those of ICES-003 Issue 7.

Setup for measurements



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

Results

S/	OM	Code	Freq Rng (MHz)	Comments	V
02	OM/01	RE0201LR	[30, 1000]	---	P
02	OM/01	RE0201HR	[1000, 12750]	---	P

Verdict

Pass

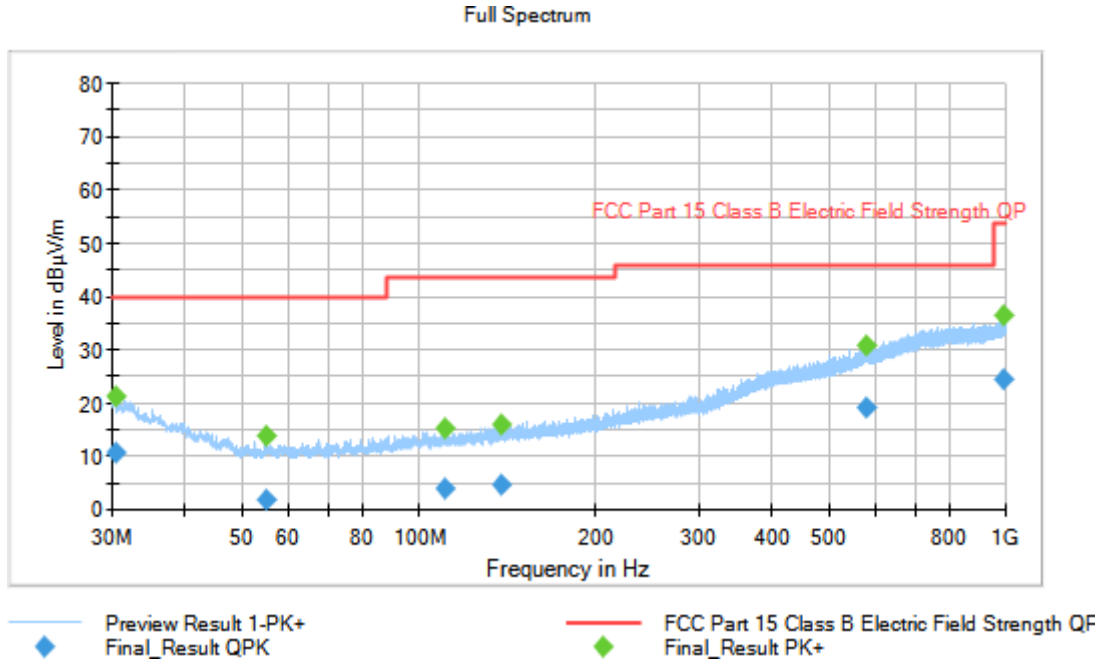
Attachments

EMC Test Code = RE0201LR, Frequency Range MHz = [30, 1000]

Sample ID: S/02

Operation Mode: OM/01. EUT ON. Charging in IDLE mode. Power supply: 110 Vac.

Images:



Documents:

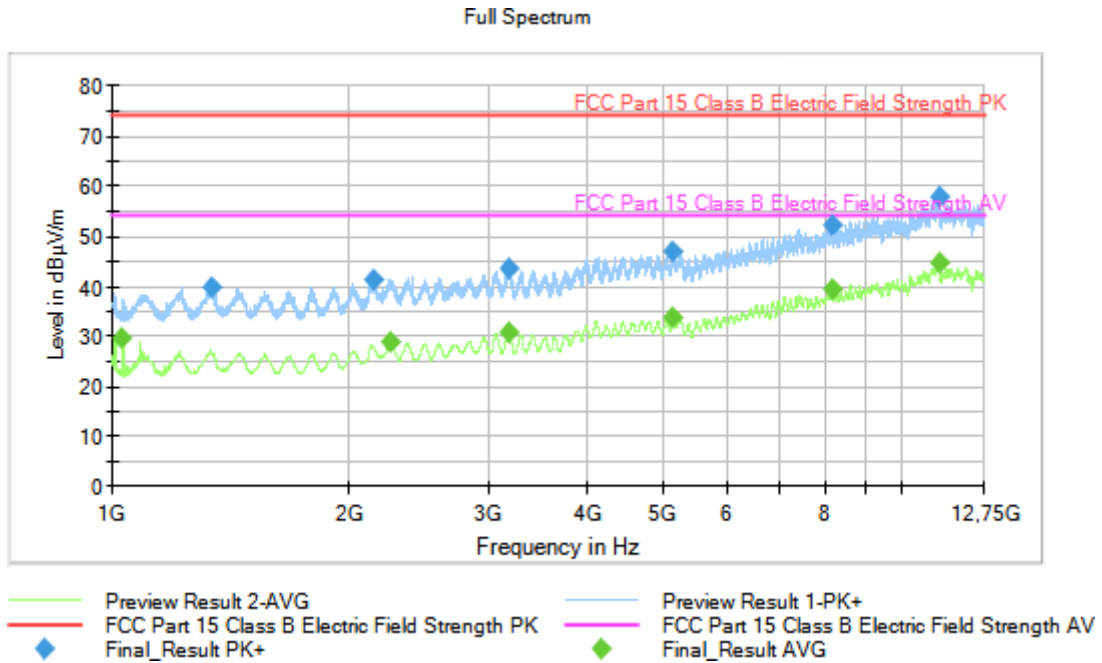
Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	PoI	Azimuth (deg)
30.417000	---	21.34	---	---	400.0	V	196.0
30.417000	10.50	---	40.00	29.50	400.0	V	196.0
55.033000	---	13.78	---	---	105.0	H	49.0
55.033000	1.87	---	40.00	38.13	105.0	H	49.0
110.482000	---	15.16	---	---	331.0	V	81.0
110.482000	3.74	---	43.52	39.78	331.0	V	81.0
138.080000	---	15.88	---	---	252.0	V	269.0
138.080000	4.63	---	43.52	38.89	252.0	V	269.0
578.505000	19.00	---	46.00	27.00	282.0	V	69.0
578.505000	---	30.88	---	---	282.0	V	69.0
989.478000	24.32	---	53.97	29.65	124.0	H	89.0
989.478000	---	36.56	---	---	124.0	H	89.0

EMC Test Code = RE0201HR, Frequency Range MHz = [1000, 12750]

Sample ID: S/02

Operation Mode: OM/01. EUT ON. Charging in IDLE mode. Power supply: 110 Vac.

Images:



Documents:

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1030.400000	---	29.61	53.97	24.36
1338.400000	39.90	---	73.97	34.07
2148.800000	41.50	---	73.97	32.47
2256.400000	---	28.88	53.97	25.09
3180.000000	---	30.63	53.97	23.35
3185.200000	43.39	---	73.97	30.58
5136.000000	46.82	---	73.97	27.15
5140.400000	---	33.82	53.97	20.15
8162.400000	---	39.40	53.97	14.57
8165.600000	52.19	---	73.97	21.78
11153.600000	57.87	---	73.97	16.10
11158.000000	---	44.76	53.97	9.21

CE Continuous conducted emission

Limits

Limits of interference Class B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B, Secs. 15.107 & ICES-003 Issue 7, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0,15 to 0,5	66 - 56	56 - 46
0,5 to 5	56	46
5 to 30	60	50

Results

S/	OM	Code	Freq Rng (MHz)	Line	Comments	V
02	OM/02	CE02020N	[0.15, 30]	N	---	P
02	OM/02	CE0202L1	[0.15, 30]	L1	---	P
02	OM/03	CE02030N	[0.15, 30]	N	---	P
02	OM/03	CE0203L1	[0.15, 30]	L1	---	P

Verdict

Pass

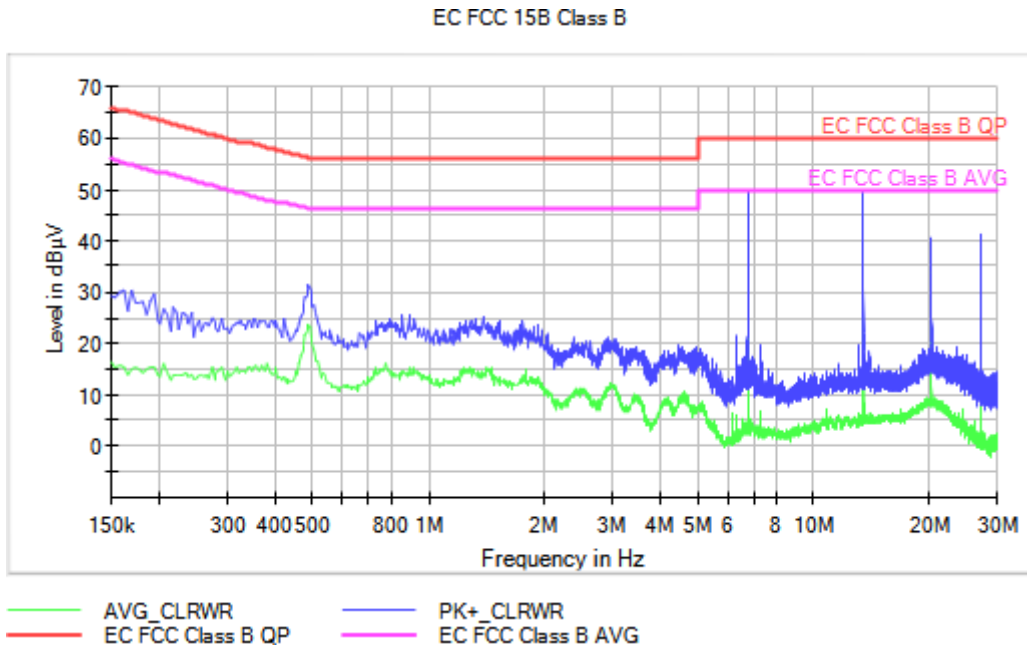
Attachments

EMC Test Code = CE02020N, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = N

Sample ID: S/02

Operation Mode: OM/02. EUT ON. Charging ring with Bluetooth ON with communication established. Power supply: 5 VDC (through auxiliary AC/DC 110 Vac).

Images:



Documents:

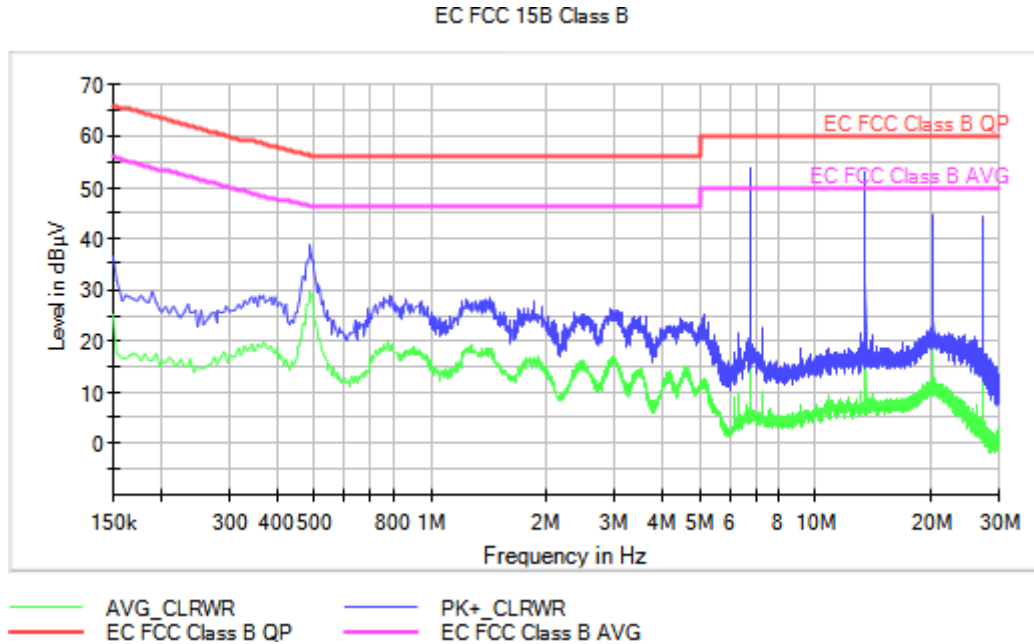
Frequency(MHz)	Max Peak (dBµV)	Average (dBµV)
0.162000	30.4	15.4
0.274000	24.9	15.3
0.490000	31.4	23.9
0.898000	25.8	14.5
1.386000	25.3	13.4
2.374000	21.3	10.1
4.506000	19.8	8.4
6.782000	50.0	47.0
13.562000	49.4	46.0
27.122000	41.5	32.6

EMC Test Code = CE0202L1, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = L1

Sample ID: S/02

Operation Mode: OM/02. EUT ON. Charging ring with Bluetooth ON with communication established. Power supply: 5 VDC (through auxiliary AC/DC 110 Vac).

Images:



Documents:

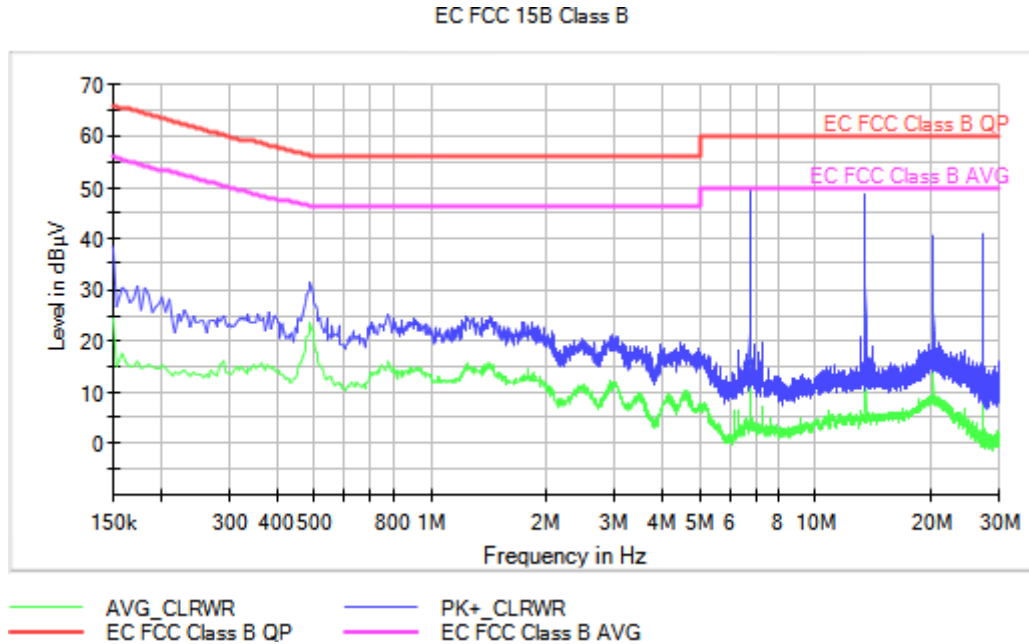
Frequency(MHz)	Max Peak (dBµV)	Average (dBµV)
0.150000	36.7	25.4
0.362000	29.0	18.9
0.490000	38.7	29.6
0.786000	29.0	18.6
1.426000	28.7	18.6
2.926000	26.2	15.4
5.102000	25.3	12.7
6.782000	53.9	49.2
13.562000	53.3	47.6
20.342000	44.6	38.9

EMC Test Code = CE02030N, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = N

Sample ID: S/02

Operation Mode: OM/03. EUT ON. Charging ring with Bluetooth ON without communication established. Power supply: 5 VDC (through auxiliary AC/DC 110 Vac).

Images:



Documents:

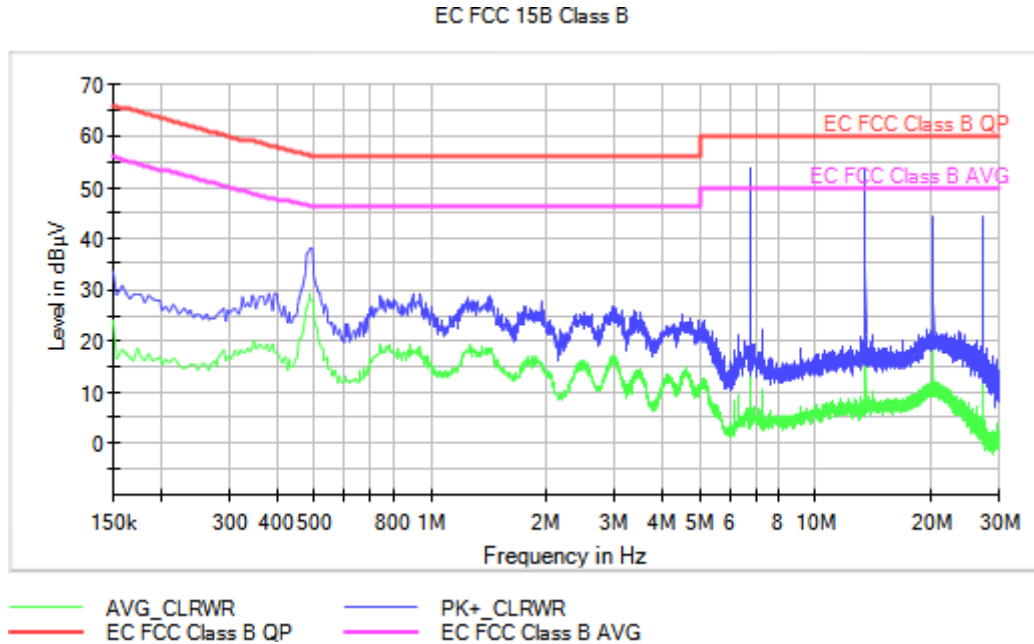
Frequency(MHz)	Max Peak (dBµV)	Average (dBµV)
0.150000	38.4	24.5
0.382000	25.5	14.9
0.490000	31.6	23.8
0.778000	25.3	16.2
1.250000	24.7	14.9
2.962000	21.3	11.7
4.490000	19.7	8.8
6.782000	49.7	46.2
13.562000	48.6	46.0
27.122000	41.1	32.8

EMC Test Code = CE0203L1, Frequency Range MHz = [0.15, 30], Conducted Emissions - Tested Line = L1

Sample ID: S/02

Operation Mode: OM/03. EUT ON. Charging ring with Bluetooth ON without communication established. Power supply: 5 VDC (through auxiliary AC/DC 110 Vac).

Images:



Documents:

Frequency(MHz)	Max Peak (dBµV)	Average (dBµV)
0.150000	33.7	24.2
0.382000	29.4	18.1
0.490000	38.2	28.3
0.942000	29.2	19.0
1.422000	29.0	17.7
2.958000	26.9	17.3
4.526000	25.1	13.3
6.782000	53.8	49.3
13.562000	53.3	47.5
20.342000	44.5	38.8