

TEST REPORT



DT&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2002-0033

2. Customer

- Name : Sky Labs Inc.
- Address : #703, 58, Pangyo-ro 255beon-gil Bundang-gu, Seongnam-si Gyeonggi-do South Korea

3. Use of Report : FCC Original Grant

4. Product Name / Model Name : Heart Monitor/ C0K1

FCC ID : 2AU9T-CART1C

5. Test Method Used : ANSI C63.10 - 2013

Test Specification : FCC Part 15 Subpart C

6. Date of Test : 2018.11.11 ~ 2018.11.22

7. Testing Environment : See appended test report.

8. Test Result : Refer to the attached test result.

Affirmation	Tested by Name : JungWoo Kim 	Reviewed by Name : JaeJin Lee 
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The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

2020 . 02 . 10 .

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If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Tested by	Reviewed by
DRTFCC2002-0032	Feb. 10, 2020	Initial issue	JungWoo Kim	JaeJin Lee

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1. General Information

1.1. Testing Laboratory

DT&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.

The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.

- FCC MRA Accredited Test Firm No. : KR0034

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1.2. Testing Environment

Ambient Condition

▪ Temperature	23 °C ~ 25 °C
▪ Relative Humidity	35 % ~ 43 %

1.3. Measurement Uncertainty

Test items	Measurement uncertainty
AC conducted emission	2.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, k = 2)

1.4. Details of Applicant

Applicant : Sky Labs Inc.
Address : #703, 58, Pangyo-ro 255beon-gil Bundang-gu, Seongnam-si Gyeonggi-do South Korea
Contact person : Jack Lee

1.5. Description of EUT

FCC Equipment Class	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
Equipment type	Heart Monitor
Equipment model name	C0K1
Equipment add model name	C0K2, C0K3, C0K4, C0K5, C0K6, C0K7, C0K8
Equipment serial no.	Identical prototype
Hardware Version	1.0
Software Version	1.0
Frequency	205 kHz
Output power	Max : 5 W
Power Supply	DC 5 V
Antenna type	Coil Antenna

2. Information about test items

2.1 Test mode

This device has been tested together with the client device (FCC ID: 2AU9T-CART1R). During measurements, the EUT was wirelessly charging a battery housed inside a client. The EUT was periodically stopping the test and fully discharging the client devices before resuming the test.

2.2 Support equipment

Product Name	FCC ID	Manufacturer	Note
CART-I	2AU9T-CART1R	Sky Labs Inc.	-
-	-	-	-

Note: The above equipment was supported by manufacturer.

2.3 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. Antenna requirements

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

The antenna is permanently attached.(Refer to Internal Photo file.)
Therefore this E.U.T Complies with the requirement of §15.203

4. Test Report

4.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
2.1049	20 dB Bandwidth	N/A	Radiated	C
15.209	Radiated Emission	FCC 15.209 limits		C
15.207	AC Conducted Emissions	FCC 15.207 limits	AC Line Conducted	C
15.203	Antenna Requirements	FCC 15.203	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.

4.2 Transmitter requirements

4.2.1 20 dB Bandwidth

- Procedure:

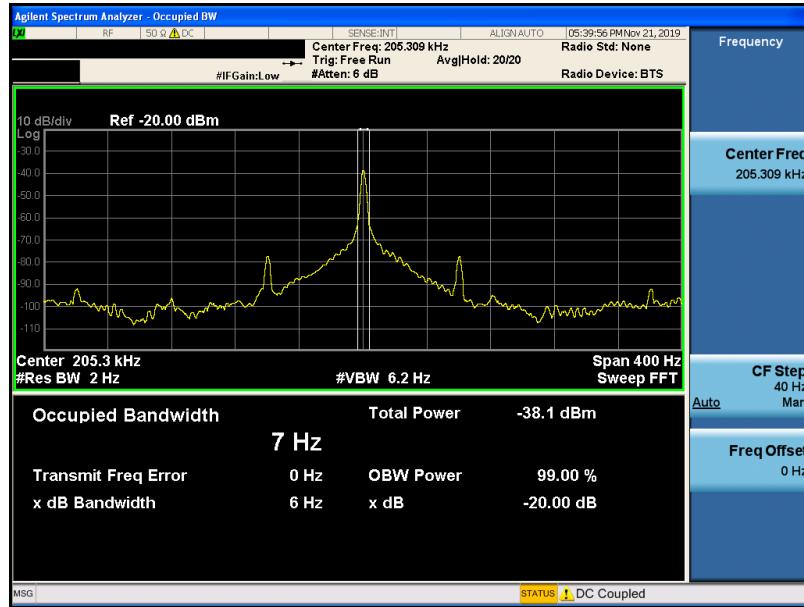
The 20 dB Bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

And spectrum analyzer setting use following test procedure of **ANCSI C63.10-2013 – Section 6.9.2.**

1. Center frequency = EUT channel center frequency
2. Span = 2 ~ 5 times the OBW
3. RBW = 1 % ~ 5 % OBW
(Note: The RBW setting cannot satisfy the 1.5% to 5% of the 20 dB BW due to signal characteristics.)
4. VBW \geq 3 x RBW
5. Detector = Peak
6. Trace = Max hold
7. The trace was allowed to stabilize
8. Determine the reference value = Set the spectrum analyzer marker to the highest level of the displayed trace
9. Using the marker-delta function of the instrument, determine the “-xx dB down amplitude” using [(reference value) – xx].
10. Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

- Measurement Data: Comply

Test mode	Tested Frequency(kHz)	20dB Bandwidth(Hz)
TM 1	250.3	6.000

-TM 1**- Minimum Standard: NA**

4.2.2 Radiated Emissions

- Limit: FCC Part 15.209(a)

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 - 88 MHz, 174 - 216 MHz or 470 - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

- Procedure:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- Measurement Data: **Comply** (refer to the next page)

- Measurement Data:

Measurement Distance : **3 Meters**

Tested Mode	Freq. [MHz]	Worst case ANT pol (Note 2)	Reading [dBuV]	T.F [dB/m]	D.C.F.	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
TM 1	0.208	P	61.20	11.90	80	-6.90	21.24	28.14
	0.494	P	38.80	11.90	40	10.70	33.73	23.03
	23.960	P	30.10	9.70	40	-0.20	29.54	29.74
	33.040	V	47.61	-10.10	NA	37.51	40.00	2.49
	42.610	V	43.40	-8.80	NA	34.60	40.00	5.40
	329.730	H	29.60	-4.70	NA	24.90	46.00	21.10
	608.118	V	39.40	1.10	NA	40.50	46.00	5.50
	870.980	V	28.60	5.40	NA	34.00	46.00	12.00
	977.677	H	28.50	7.50	NA	36.00	54.00	18.00

Note 1. * = Noise Floor

Note 2. Loop antenna orientation (30 MHz Below)

“P”= Parallel, “V”= perpendicular, “G”= ground-parallel

Bilog antenna polarization (30 MHz above)

“H”= Horizontal, “V”= Vertical

Note 3. All data were recorded using a spectrum analyzer employing a peak detector.

If PK results were meet Quasi-peak limit, Quasi-peak measurements were omitted.

Note 4. No other spurious and harmonic emissions were reported greater than listed emissions above table.

Note 5. Sample calculation

Margin = Limit – Field Strength

Field Strength = Reading + T.F – Distance factor

T.F = AF + CL – AG

Distance factor = $20\log(\text{Measurement distance} / \text{The measured distance})^2$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

4.2.3 AC Line Conducted Emissions

- Test Requirements and limit

For an intentional radiator 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 in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBuV)	
	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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration:

See test photographs for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Measurement Data: **Comply** (refer to the next page)

Measurement Data (5W)

Results of Conducted Emission

DTNC

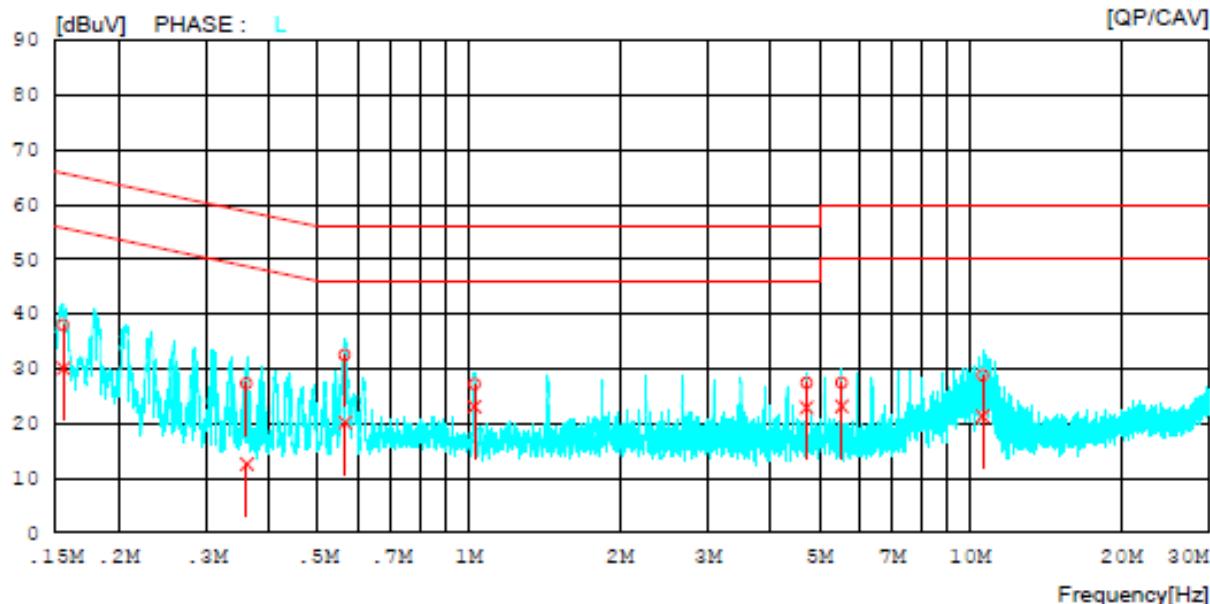
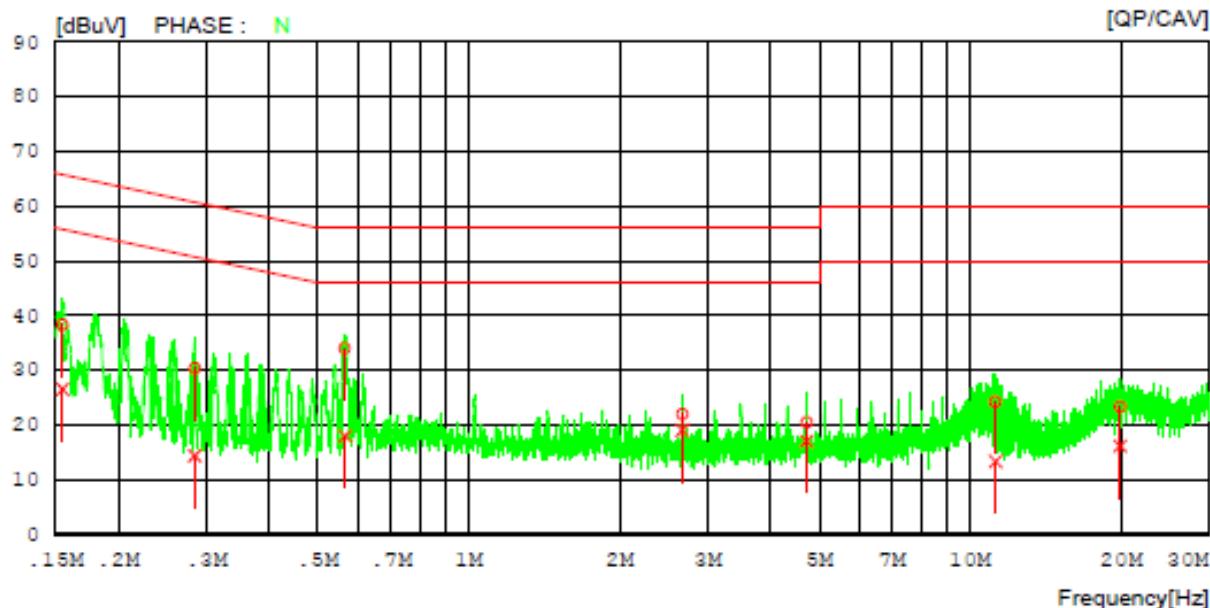
Date 2019-11-22

Order No.
Model No.
Serial No.
Test Condition

C0K1

Reference No.
Power Supply
Temp/Humi.
Operator120 V, 60 Hz
23 'C / 35 %
J.W.Kim

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

Measurement Data (5W)

Results of Conducted Emission

DTNC

Date 2019-11-22

Order No.
Model No. C0K1
Serial No.
Test Condition

Reference No.
Power Supply 120 V, 60 Hz
Temp/Humi. 23 'C / 35 %
Operator J.W.Kim

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	CAV [dBuV]		QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	
1	0.15481	28.32	16.64	9.94	38.26	26.58	65.74	55.74	27.48	29.16	N
2	0.28412	20.38	4.39	9.94	30.32	14.33	60.69	50.69	30.37	36.36	N
3	0.56690	24.05	8.01	9.95	34.00	17.96	56.00	46.00	22.00	28.04	N
4	2.66800	11.93	8.96	10.05	21.98	19.01	56.00	46.00	34.02	26.99	N
5	4.71980	10.29	6.91	10.15	20.44	17.06	56.00	46.00	35.56	28.94	N
6	11.24340	13.83	2.95	10.37	24.20	13.32	60.00	50.00	35.80	36.68	N
7	19.93520	12.73	5.58	10.55	23.28	16.13	60.00	50.00	36.72	33.87	N
8	0.15528	27.96	20.10	9.94	37.90	30.04	65.71	55.71	27.81	25.67	L
9	0.36076	17.33	2.54	9.95	27.28	12.49	58.71	48.71	31.43	36.22	L
10	0.56664	22.54	10.14	9.95	32.49	20.09	56.00	46.00	23.51	25.91	L
11	1.02720	17.12	13.05	9.97	27.09	23.02	56.00	46.00	28.91	22.98	L
12	4.72100	17.24	12.71	10.14	27.38	22.85	56.00	46.00	28.62	23.15	L
13	5.54420	17.19	12.95	10.18	27.37	23.13	60.00	50.00	32.63	26.87	L
14	10.60060	18.40	10.95	10.35	28.75	21.30	60.00	50.00	31.25	28.70	L

APPENDIX I

TEST EQUIPMENT FOR TESTS

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/06/26	20/06/26	MY46471251
Multimeter	FLUKE	17B	18/12/18	19/12/18	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	18/12/19	19/12/19	255571
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-1
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-2
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
PreAmplifier	H.P	8447D	18/12/18	19/12/18	2944A07774
EMI Receiver	ROHDE&SCHWARZ	ESW44	19/07/30	20/07/30	101645
RECEIVER	ROHDE&SCHWARZ	ESCI7	19/01/30	20/01/30	100910
LISN	SCHWARZBECK	NNLK 8121	19/05/23	20/05/23	6183
PULSE LIMITER	ROHDE&SCHWARZ	ESH3-Z2	19/09/17	20/09/17	101333
Cable	Radiall	TESTPRO3	19/01/16	20/01/16	M-01
Cable	Junkosha	MWX315	19/01/16	20/01/16	M-05
Cable	Junkosha	MWX221	19/01/16	20/01/16	M-06

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.