Test Report

INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C

Equipment Under Test:	Inductive communication module (123 kHz)
Model:	UWIS-INDS100
Manufacturer:	UWIS Oy Kaarinantie 700 20540 Turku FINLAND
Customer:	UWIS Oy Kaarinantie 700 20540 Turku FINLAND
FCC Rule Part:	15.209: 2016

Date:	30 June 2020	Date:	30 June 2020
Issued by:	Jani Tuomela Testing Engineer	Checked by:	Rauno Repo Testing Engineer

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GENERAL REMARKS

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

RELEASE HISTORY

Version	Changes	Issued
1.0	Initial release	30 June 2020

PRODUCT DESCRIPTION

Equipment Under Test

Trade mark:	-
Model:	UWIS-INDS100
Type:	Inductive communication module
Serial no:	-
FCC ID:	-
IC:	-

General Description

EUT is an Inductive low frequency transceiver (DXT) communication module with 123 kHz operating frequency.

Classification

Fixed device	☐
Mobile Device (Human body distance > 20cm)	☒
Portable Device (Human body distance < 20cm)	☐

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

Ratings and declarations

Operating Frequency Range (OFR):	123 kHz
Channels:	1
Channel separation:	-
Transmission technique:	-
Modulation:	-
Output power (peak):	25 dBm (declared by the customer)
Antenna type:	Coil antenna
Integral Antenna gain:	2.15 dBi max

Power Supply

Operating voltage range: 12 VDC

During the test, EUT was powered with 12 V battery back.

Mechanical Size of the EUT

Height: 17 mm Width: 60 mm Length: 20 mm

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.209(a)	Radiated Emissions 9 kHz to 2 GHz	**PASS**

The decision rule applied for the tests results stated in this test report is according to the requirements of section 1.3 of ANSI C63.10-2013.

EUT Test Conditions during Testing

The EUT was operating on 123 kHz and was in continuous transmit/receive mode during all the tests. EUT was transmitting and receiving alternately.

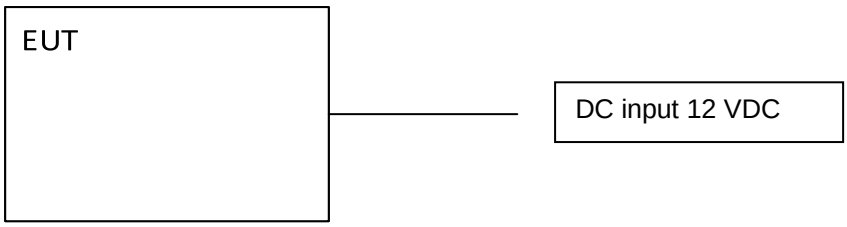

Figure 1: Test setup blocking diagram

Test Facility

Testing Laboratory / address: FCC designation number: **FI0002** ISED CAB identifier: **T004**	SGS Fimko Ltd Takomotie 8 FI-00380, HELSINKI FINLAND
Test Site:	☐ K10LAB, ISED Canada registration number: **8708A-1** ☒ K5LAB, ISED Canada registration number: **8708A-2** ☐ T10LAB

TEST RESULTS

Transmitter Radiated Spurious Emissions 9 kHz - 2 GHz

Standard:	ANSI C63.10 (2013)	
Tested by:	JAT	
Date:	14 November 2017, 4 June 2020	
Temperature:	23 ± 3 °C	
Humidity:	20 - 60 % RH	
Measurement uncertainty:	± 4.51 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.209(a)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a)**.**

Three orthogonal positions (X, Y, Z) were measured and the worst-case result has been reported.

The correction factor in the final result table contains the sum of the transducers (antenna + amplifier + cables).

Peak values of emissions below 1000 MHz measured for reference as well as transmitter fundamental.

Testing was performed at a 3 meter distance and the field strength reading below 30MHz extrapolated to 30 or 300 meters for comparison to the 30 or 300 meters limits.

The field strength reading was extrapolated using the extrapolation (distance) factor of 40dB/decade as specified in 15.31 (f) (2) for frequencies below 30MHz.

Distance Factor from 30 meters to 3 meters (1 decade) = -40dB

Distance Factor from 300 meters to 3 meters (2 decades) = -80dB

Frequency range [MHz]	Limit [µV/m]	Limit [dBµV/m]	Detector
30 - 80	100	40.0	Quasi-peak
88 - 216	150	43.5	Quasi-peak
216 - 960	200	46.0	Quasi-peak
960 - 1000	500	53.9	Quasi-peak
Above 1000	500	53.9	Average
Above 1000	5000	73.9	Peak

Results

30 MHz – 2000 MHz measured 14 November 2017

9 kHz – 30 MHz measured 4 June 2020

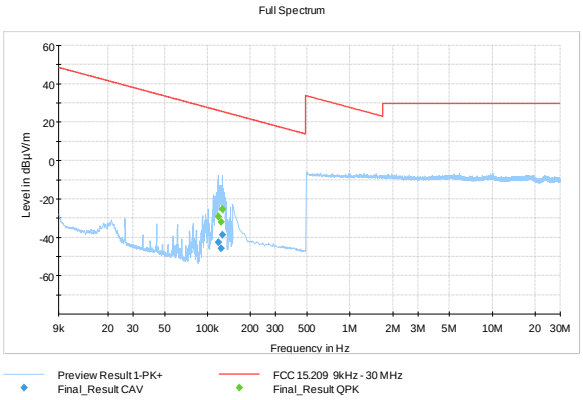

Figure 2: 9 kHz – 30 MHz The field strength reading extrapolated to the measuring distance of 300 / 30 m.

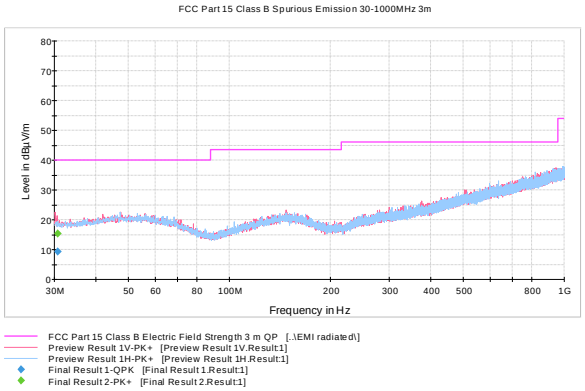

Figure 3: 30 MHz – 1000 MHz

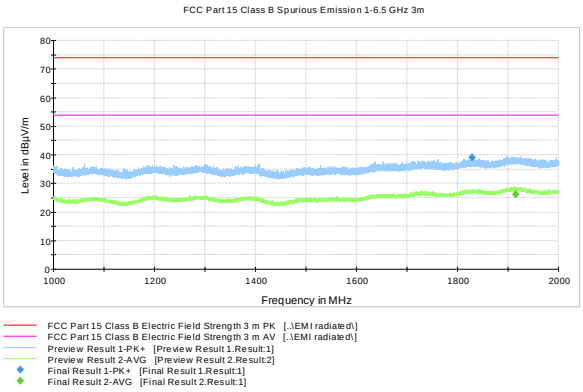

Figure 4: 1 GHz – 2 GHz

Table 1: Peak results

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1828.500000	38.9	1000.0	1000.000	198.0	H	55.0	2.8	35.0	73.9

Table 2: Average results

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
0.118930	-42.48	1000.0	0.200	100.0	90°	282.0	-60.3	68.57	26.09
0.123920	-45.77	1000.0	0.200	100.0	90°	277.0	-60.3	71.50	25.74
0.127490	-38.86	1000.0	0.200	100.0	90°	273.0	-60.3	64.35	25.49
1915.300000	26.1	1000.0	1000.000	150.0	V	237.0	3.7	27.8	53.9

Table 3: Quasi-peak results

Frequency (MHz)	QuasiP (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Antenna Angle (deg) or Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.720000	9.3	1000.0	120.000	343.0	V	228.0	13.0	30.7	40.0

TEST EQUIPMENT

RF-Test Equipment, 9 kHz – 30 MHz measured 4 June 2020

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv:10517	2019-11-07	2020-11-07
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	NCR	NCR
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	NCR	NCR
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	NCR	NCR
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv:10679	2019-06-28	2020-06-27
ANTENNA	ROHDE & SCHWARZ	HFH2-Z2, 335.4711.52	inv:8013	2018-10-30	2020-10-30

RF-Test Equipment 30 MHz – 2000 MHz measured 14 November 2017

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ANTENNA	A.H. SYSTEMS	SAS-200/518	inv:7873	NCR	NCR
SPECTRUM ANALYZER	AGILENT	E7405A	inv:9746	2016-01-07	2018-01-07
PREAMPLIFIER	CIAO	CA118-3123	inv:10278	2016-11-28	2017-11-28
ANTENNA	EMCO	3117	inv:7293	2016-03-16	2018-03-06
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	NCR	NCR
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	NCR	NCR
ANTENNA MAST	MATURO	TAM 4.0E	inv:10181	NCR	NCR
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	NCR	NCR
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU 26	inv:8453	2017-07-10	2018-07-10
ANTENNA	SCHWARZBECK	VULB 9168	inv:8911	2016-10-25	2018-10-25
TEMPERATURE/ HUMIDITY METER	VAISALA	HMT 333	inv:8638	2017-02-21	2018-02-21

NCR = No calibration required

END OF REPORT