

Test report nr. 0051FCC11

Measurements performed in accordance with:

**FCC Rules: code of Federal Regulations (CFR) no. 47
PART 15 – RADIO FREQUENCY DEVICES**

Product: Transmitter (Nemo)
Tested model: WSCT/U, SCT/U
FCC ID PML433WSC
Applicant: Nice S.p.A.
Manufacturer: Nice S.p.A.
Trademark: Nice
Testing Laboratory Nice S.p.A.
Via Pezza Alta, 13
I-31046 Rustignè di Oderzo (TV)
Registration number: 771316
Date of receipt sample: 2011-02-07
Testing date: 2011-02-07 to 2011-02-08
Issue date: 22 March 2011

Tested by: L. Pastres



Checked by: E. Campion



Notice: The result of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.
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1

General Description of Equipment under Test**1.1 Applicant**

Name: Nice S.p.A.
Address: via Pezza Alta, 13
Country: 31046 Rustignè di Oderzo (TV) – Italy

1.2 Manufacturer

Name: Nice S.p.A.
Address: via Pezza Alta, 13
Country: 31046 Rustignè di Oderzo (TV) – Italy

1.3 Equipment classification

According to definition 15.3 (o) is a intentional Radiator operating within the Bands:

so it shall fulfil provisions of 47CFR Part 15 Subpart C – international radiators – and Section 15.209.

According to definition 15.3 (z) is a unintentional Radiator:

So it shall fulfil provisions of 47CFR Part 15 Subpart B – Unintentional radiator and section 15.107 and 15.109.

1.4 Basic Description of equipment under test

Parameters	Value
Type of equipment:	weather sensor (wind and solar) with LPD transmitter
Model:	WSCT/U, SCT/U
FCC ID:	PML433WSC
Trade Name:	Nice
Data cable:	-
Telecom cable:	-
Power supply type:	internal battery and solar cell
AC power input cable:	-
DC power input cable:	internal battery CR2032

Model	Description
WSCT/U	whether sensor (wind, solar) with transmitter LPD at 433,92MHz for tubular motor. It is equipped with solar cell and battery CR2032
SCT/U	same of WSCT/U without wind sensor

1.5 Feature of equipment under test

Parameters	Value
Power specification	internal battery CR2032 and solar cell
Operating frequency:	433,92MHz
Maximum RF output power:	76,51dB μ V/m at 3m (peak 83,91dB μ V/m at 3m)
Occupied Bandwidth (99% BW):	18,9kHz
Emission Designator (ITU):	18K9A1D
Modulation:	AM (OOK)
Channel spacing:	no channel spacing
Antenna:	integral
Rx Sensitivity:	none
Main SW identification:	none
Main HW board identification:	PCB nr. 259-C
Peripherals included (for system application):	none
Interfaces:	none
Integrated interfaces	none
AC adapter:	none

2

Test configuration of equipment under test

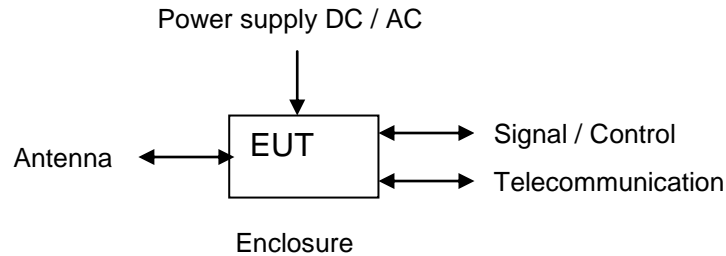
2.1 Environmental conditions

Test conditions	Measured
Ambient temperature:	20 ÷ 25°C
Relative humidity:	50 ÷ 60%
Atmospheric pressure:	900 ÷ 1010mb

2.2 Description of support equipment

Equipment	Manufacturer	Model
none	none	none

2.3 Interface identification and connection diagram of test system



#	Interface	Description	Maximum length	Ref. Document
1	Enclosure	plastic enclosure	lxhwxw = 20 x 6 x 3mm	-
2	AC mains power input	none	none	none
3	DC power port	solar cell plus battery CR2032	none	none
4	Signal / control port	none	none	none
5	Antenna port	none	none	none

3

Operation of equipment under test

3.1 Operating test conditions

#	Description
1	transmission
2	standby

4

Tests identification and result

CFR47 Part 15 Section	Title	Operating condition	Result
15.203 15.247 (b)(4)(i)	Antenna requirements	not applicable	-
15.207 (a)	Conducted emission	not applicable	-
15.209 (a) (f)	Radiated emission	#1	PASS
15.231 (a)	Timing of the transmitter	#1	PASS
15.231 (a)	Transmit behaviour after releasing the TX-button	not applicable	-
15.231 (b)	Radiated output power	#1	PASS
15.35 (c)	Typical pulse train of a signal	#1	PASS
15.231 (b)	Compliance with the limit of FCC	#1 #2	PASS
15.231 (b)	Spurious emission - radiated	#1	PASS
15.231 (c)	Occupied bandwidth	#1	PASS

4.1 Methods of measurement

All compliance measurements have been carried out using the procedures described in the standard ANSI C63.4-2003 (excluding sub-par. 4.1.5.2, 5.7.9 and 14) and Section 15.31 of CFR47 Part 15 – Subpart A (General).

4.2 Frequency range investigated

- a) conducted emission tests: from 9kHz to 30MHz.
- b) Radiated emission tests: from 150kHz to tenth harmonic of fundamental.

5 Tests

5.1 Radiated emission

Specify:

Base standard:	47CFR Part 15 Section 15.209
----------------	------------------------------

- 1) The EUT was placed on turntable which is 0,8m above the ground plane.
- 2) The turntable shall rotate from 0° to 360° degrees to determine the position of maximum emission level.
- 3) The EUT is positioned 3m away from the receiving antenna which varied from 1 to 4m to find the highest emission.
- 4) The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 100kHz below 1000MHz and 1MHz above 1000MHz.
- 5) The receiving antenna was positioned in both horizontal and vertical polarization.
- 6) The measurements with Quasi-Peak detector, below 1000MHz are performed only for frequencies for which the Peak values are \geq (Q.P. limit – 6dB).

Test Requirements:

Test Setup:	ANSI C63.4
Test facility:	Anechoic chamber
Test distance:	3m
Limits for radiated disturbances:	15.209 (a)
Frequency range:	150kHz to 5GHz
IF bandwidth (below 30MHz):	9kHz
IF bandwidth (below 1000MHz):	120kHz
IF bandwidth (above 1000MHz):	1MHz
EMC class:	B

Limits ⁽¹⁾:

Frequency [MHz]	Field Strength (μ V/m)	Measurement distance (m)
0,0009 – 0,490	2400/F(kHz)	300
0,490 – 1,750	24000/F(kHz)	30
1,750 - 30	30	30
30 - 88	100	30
88 -216	150	3
216 - 960	200	3
above 960	500	3

Note: ⁽¹⁾ to convert the measuring distance from 3m to 300m and 30m to 300m a correction factor from 40dB/decade was used

Test Data.:

Port under test	Operating condition	Result
Enclosure	#1	Complies

Comments:

worst case between WSCT/U and SCT/U

EMC32 Report

Test Information

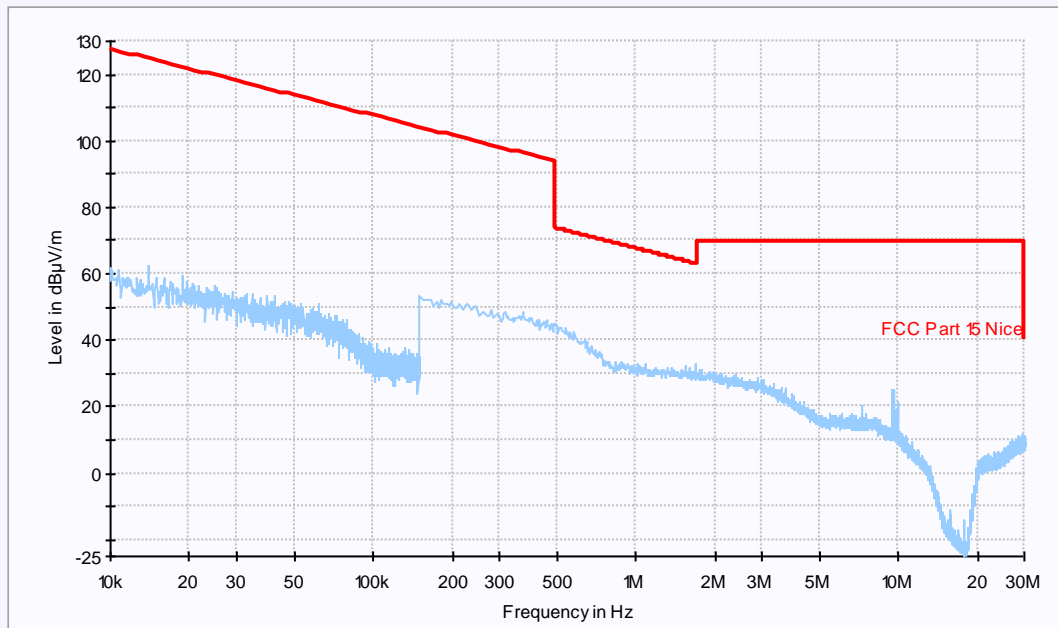
EUT name: WSCT/U, SCT/U
 Test Description: Radiated emission
 Serial number: 2011_201/1, 2011_201/2
 Operating Conditions: transmit
 Operator Name: EC
 Comment: -
 Description: -

Scan Setup: Emissione Loop Attivo dBuV QP-AV [EMI radiated]

Hardware Setup: Emissione Loop Attivo dBuV
 Level Unit: dBuV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
10kHz - 150kHz	QuasiPeak; Average	200Hz	1s	ESCI 3
150kHz - 30MHz	QuasiPeak; Average	9kHz	1s	ESCI 3

Emissione Magnetica FCC



EMC32 Report

Test Information

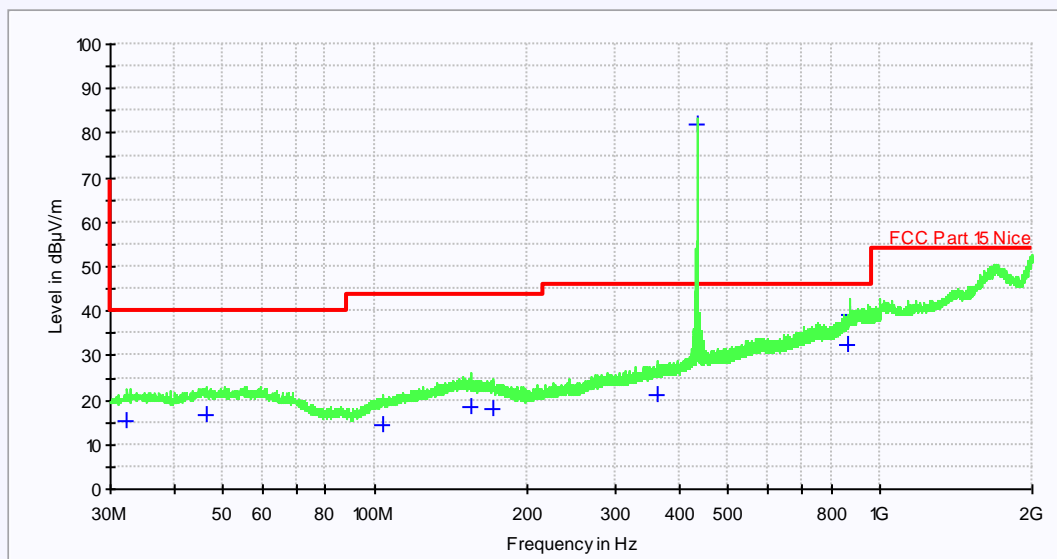
EUT name: WSCT/U, SCT/U
 Test Description: Radiete emissions
 Serial number: 2011_201/1, 2011_201/2
 Operating Conditions: transmit
 Operator Name: EC
 Comment: -
 Description: -

Scan Setup: Copy of Emissione radiata PK FCC [EMI radiated]

Hardware Setup: Emissione Radiata
 Level Unit: dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30MHz - 1GHz	MaxPeak	120kHz	0,01s	ESCI 3
1GHz - 2GHz	MaxPeak	1MHz	0,01s	ESCI 3

Copy of Emissione radiata PK FCC



—	MaxPeak-ClearW rite	—	FCC Part 15 Nice	×	MaxPeak (Single)
+	QuasiPeak (Single)	×	Average (Single)	+	RMS (Single)
×	Min Peak (Single)	×	CAverage (Single)	×	CRMS (Single)
×	ACVideo (Single)	—	MaxPeak-ClearW rite(1)		

Result Table_Single

Frequency (MHz)	MaxPeak (dB μ V/m)	QuasiPeak (dB μ V/m)	Average (dB μ V/m)	RMS (dB μ V/m)	MinPeak (dB μ V/m)
32.400000	---	15.5	---	---	---
46.400000	---	16.7	---	---	---
103.880000	---	14.5	---	---	---
154.760000	---	18.2	---	---	---
172.200000	---	17.8	---	---	---
362.600000	---	21.3	---	---	---
433.920000	---	82.0	---	---	---
862.960000	---	32.6	---	---	---
867.880000	---	39.4	---	---	---

(continuation of the "Result Table_Single" table from column 6 ...)

Frequency (MHz)	CAverage (dB μ V/m)	CRMS (dB μ V/m)	ACVideo (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)
32.400000	---	---	---	1000.000	120.000
46.400000	---	---	---	1000.000	120.000
103.880000	---	---	---	1000.000	120.000
154.760000	---	---	---	1000.000	120.000
172.200000	---	---	---	1000.000	120.000
362.600000	---	---	---	1000.000	120.000
433.920000	---	---	---	1000.000	120.000
862.960000	---	---	---	1000.000	120.000
867.880000	---	---	---	1000.000	120.000

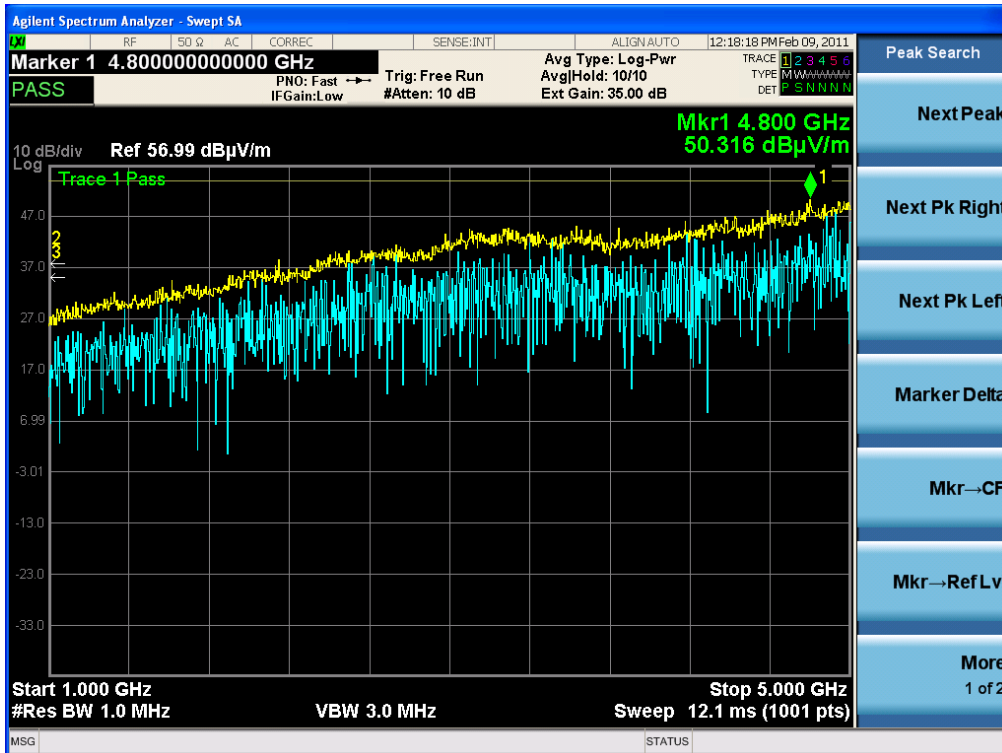
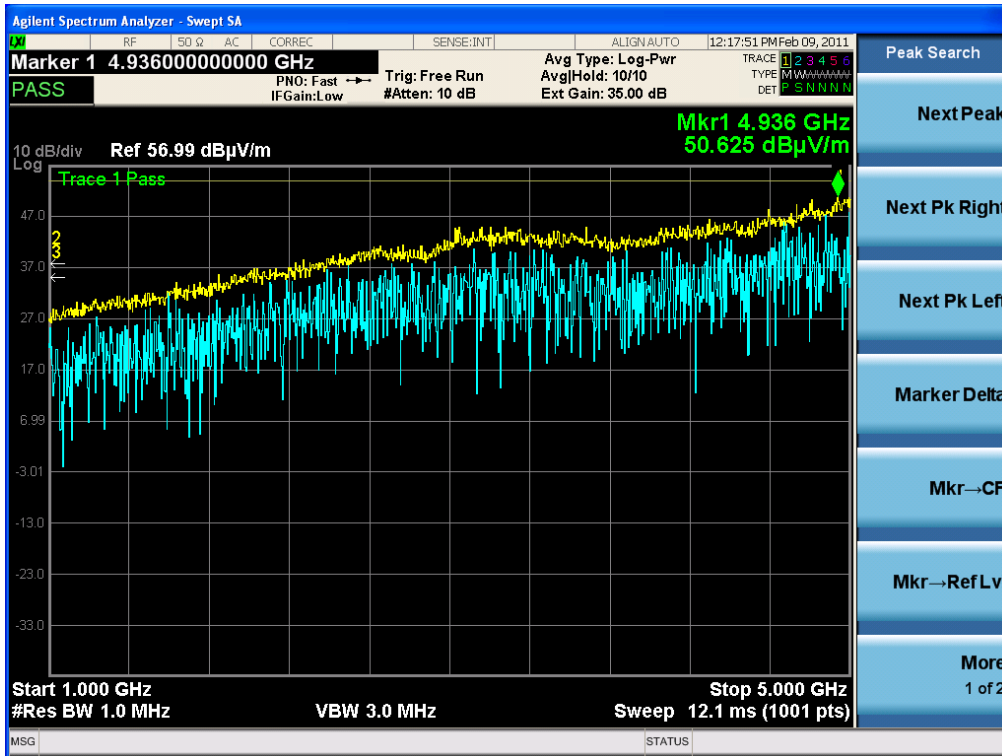
(continuation of the "Result Table_Single" table from column 11 ...)

Frequency (MHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
32.400000	100.0	H	0.0	11.5	
46.400000	100.0	H	0.0	12.7	
103.880000	120.0	H	180.0	11.1	
154.760000	100.0	H	180.0	14.7	
172.200000	120.0	V	90.0	14.4	
362.600000	100.0	H	270.0	18.0	
433.920000	100.0	H	180.0	20.3	
862.960000	100.0	H	90.0	28.0	
867.880000	100.0	H	0.0	28.2	

Margin QP

Frequency (MHz)	Margin QP (dB)
32.400000	24.5
46.400000	23.3
103.880000	29.0
154.760000	25.3
172.200000	25.7
362.600000	24.7
862.960000	13.4
867.880000	6.6

FCC test report



5.2 Timing of the transmitter

Specify:

Base standard:	CFR47 Part 15 Section 15.231 (a)
----------------	----------------------------------

Unless otherwise specified, e.g. Section 15.225 (b), when the radiated emission limits are expressed in term of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0,1 seconds. As an alternative (provided the transmitter operates for longer than 0,1 seconds) or in cases where the pulse exceeds 0,1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0,1 second interval strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subjected to notification or verification.

Test requirements:

Test Setup:	CFR47 Part 15 Section 15.35 (c)
RBW:	1MHz
VBW:	3MHz

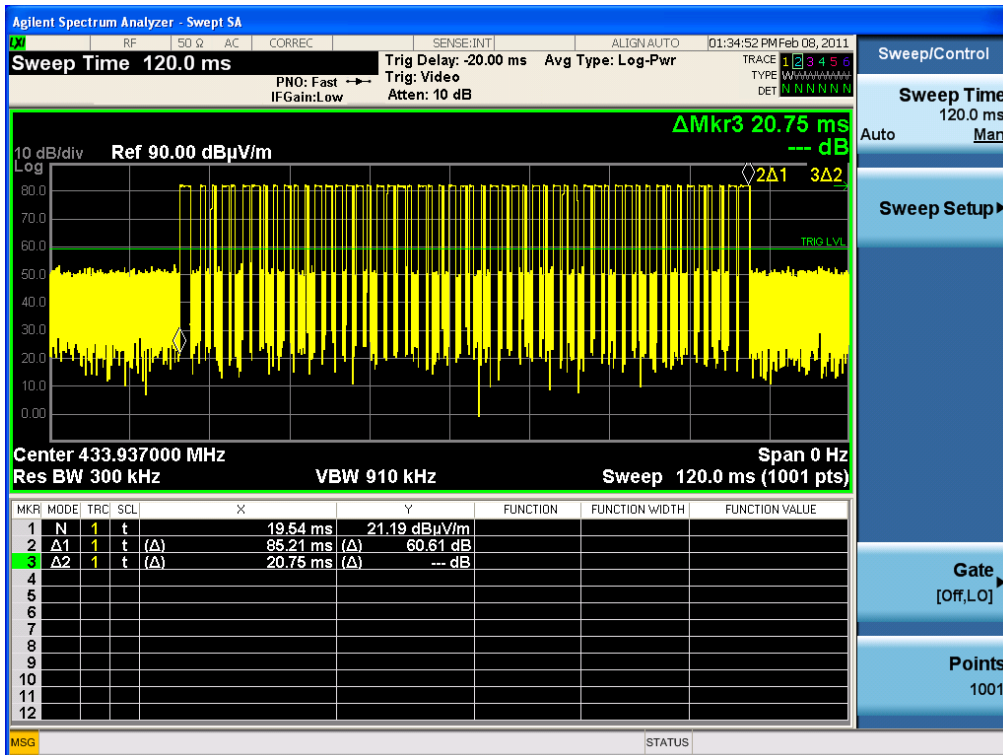
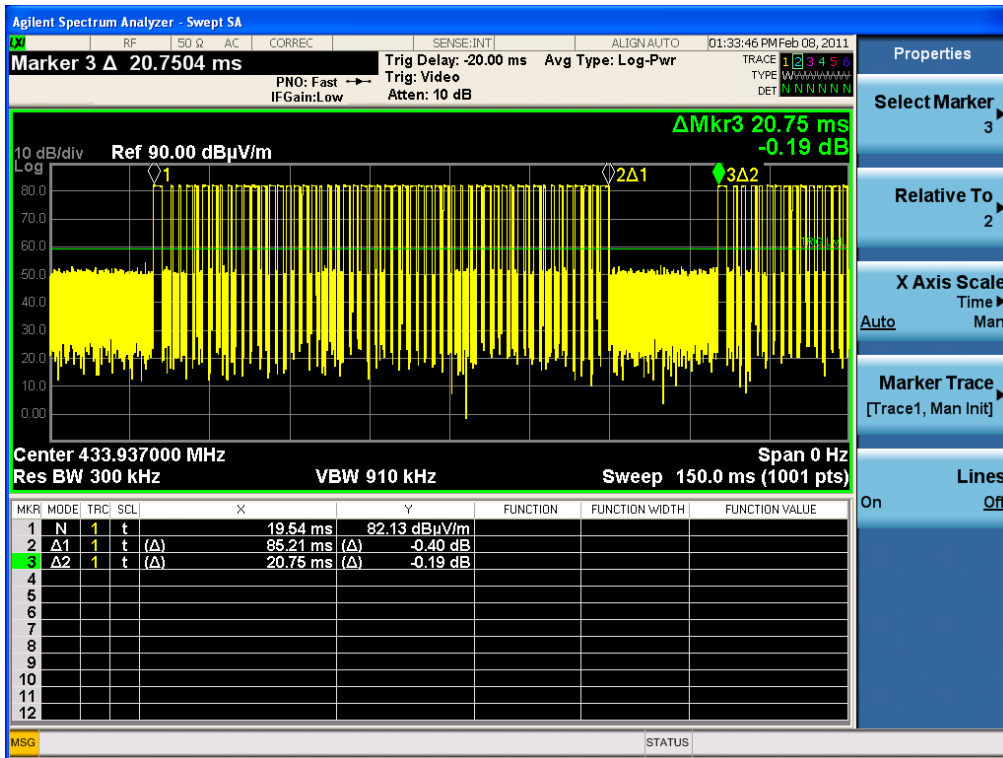
Test Data:

Timing of the transmitter:	105,96ms
Transmit button pressed shorter than:	-
Pulse train length:	105,96ms
ON Time:	85,21ms
OFF Time:	20,75ms

Comments:

-

FCC test report



5.3 Radiated output power

Specify:

Base standard: FCC 15.231 (b)

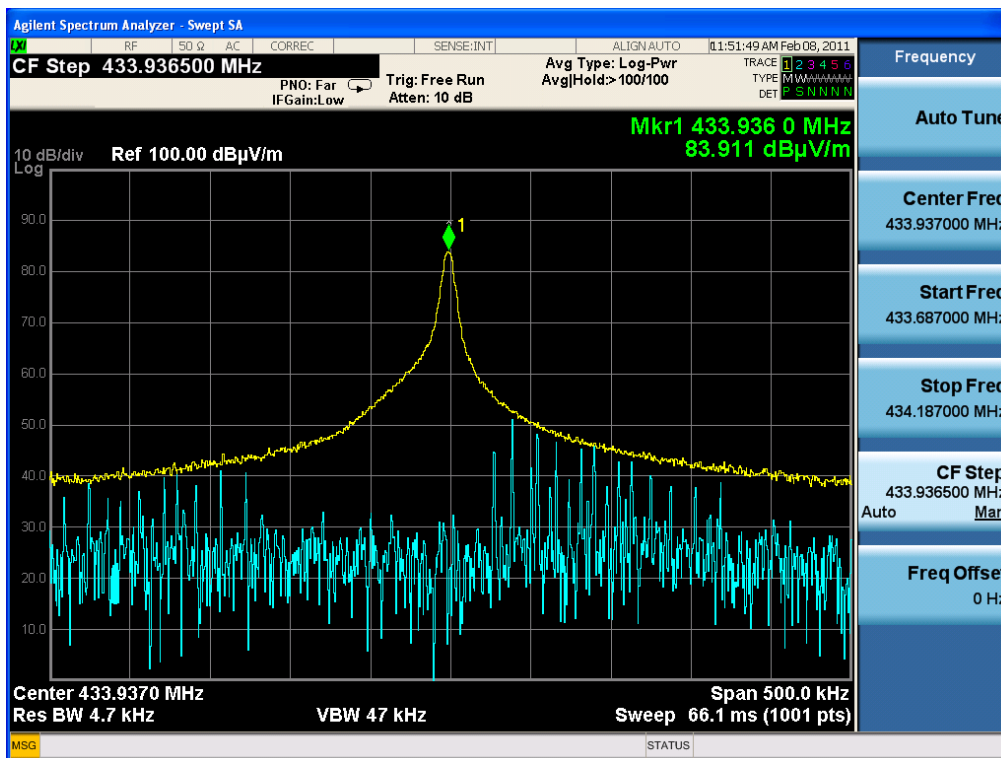
Test Requirements:

RBW / VBW:

200Hz ($f < 150\text{kHz}$)
 9kHz ($150\text{kHz} < f < 30\text{MHz}$)
 120kHz ($30\text{MHz} < f < 1000\text{MHz}$)
 1MHz ($f > 1000\text{MHz}$)

Test data:Output radiated power (3m of distance): 83,91dB μ V/m at distance of 3m at 433,9360MHz**Comments:**

worst case between WSCT and SCT



5.4 Typical pulse train of a signal

Specify:

Base standard: 47CFR Part 15 Section 15.231 (a)

Test Setup:

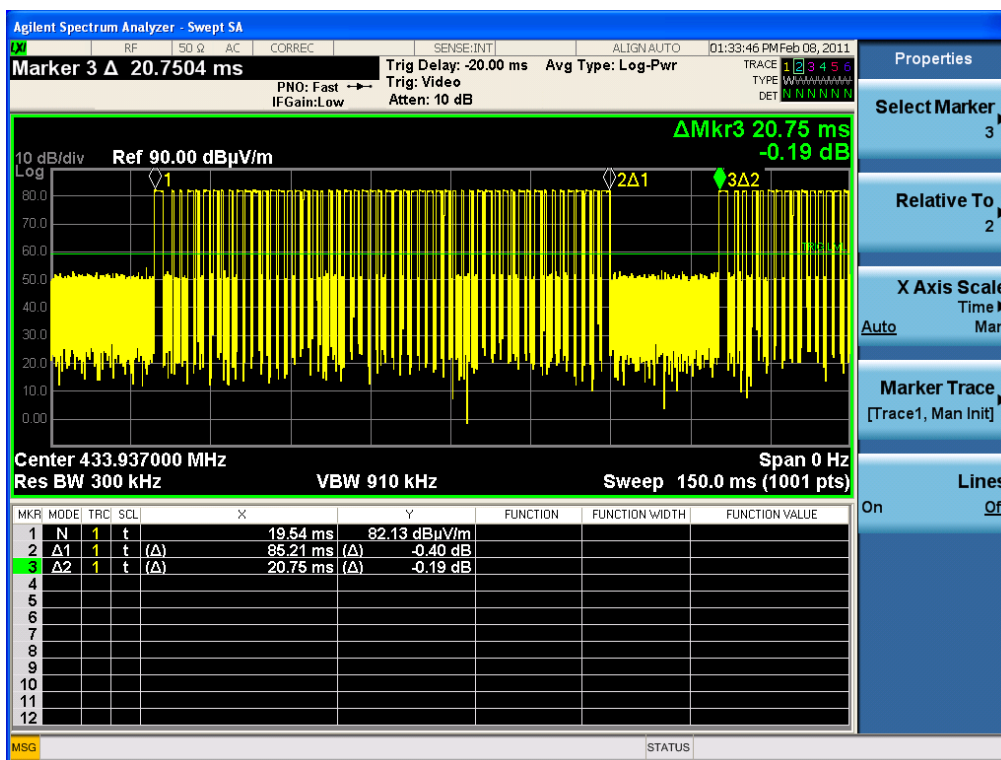
RBW: 1MHz
VBW: 3MHz

Test Data:

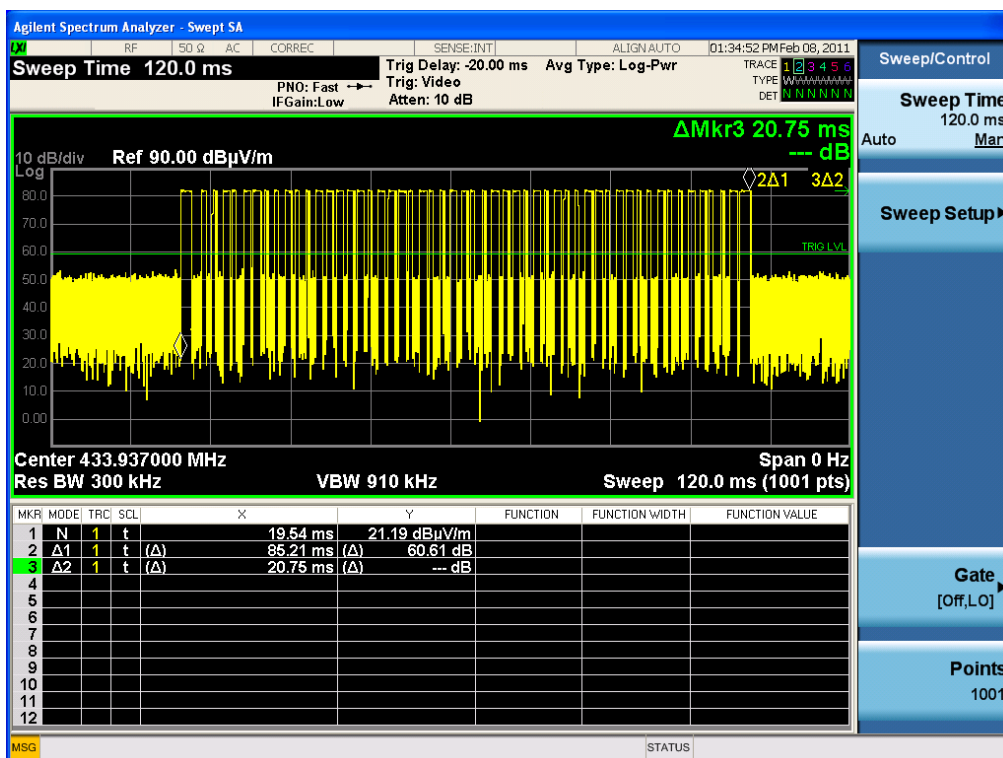
Duty-cycle	-
TX on	85,21ms
TX off	20,75ms
Average correction factor (20*log(duty cycle)):	$20 \log ((85,21 * 0.5) / 100\text{ms}) = -7,4\text{dB}$

Comments:

-



FCC test report



5.5 Compliance with the limit of FCC

Specify:

Base standard:	47CFRF Part 15 Section 15.231 (b)
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Test Setup:

RBW / VBW:	200Hz (f < 150kHz) 9kHz (150kHz < f < 30MHz) 120kHz (30MHz < f < 1000MHz) 1MHz (f > 1000MHz)
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Limits:

Frequency [MHz]	Field Strength of the fundamental	Field Strength of spurious emissions
40,66 – 40,70	2 250 μ V/m / 67dB μ V/m	225 μ V/m / 47dB μ V/m
70 – 130	1 250 μ V/m / 62dB μ V/m	125 μ V/m / 42dB μ V/m
130 - 174	1 250 μ V/m to 3 750 μ V/m ⁽¹⁾ 62 μ V/m to 71,5 μ V/m	125 μ V/m to 375 μ V/m ⁽¹⁾ 42dB μ V/m to 51,5dB μ V/m
174 – 260	3 750 μ V/m / 71,5dB μ V/m	375 μ V/m / 51,5dB μ V/m
260 – 470	3 750 μ V/m to 12 500 μ V/m ⁽¹⁾ 71,5 dB μ V/m to 82 dB μ V/m	375 μ V/m to 1 250 μ V/m ⁽¹⁾ 51,5dB μ V/m to 62dB μ V/m
above 470	12 500 μ V/m / 82dB μ V/m	1 250 μ V/m / 62dB μ V/m

Note: ⁽¹⁾ linear interpolations
 for 130 to 174MHz the interpolation is: 56,8182*f – 6136,36 (f in MHz)
 for 260 to 470MHz the interpolation is: 41,667*f – 7083,33 (f in MHz)

Test Result:

Frequency:	
Calculated average (3m of distance):	(83,91 – 7,4) dB μ V/m = 76,51 dB μ V/m < 80,82 dB μ V/m

Comments:

worst case between WSCT/U and SCT/U

5.6 Spurious emission - radiated

Specify:

Base standard: 47CFR Part 15 Section 15.231 (b)

Test Setup:

-

Limits:

Frequency [MHz]	Field Strength of the fundamental	Field Strength of spurious emissions
40,66 – 40,70	2 250 μ V/m / 67dB μ V/m	225 μ V/m / 47dB μ V/m
70 – 130	1 250 μ V/m / 62dB μ V/m	125 μ V/m / 42dB μ V/m
130 - 174	1 250 μ V/m to 3 750 μ V/m ⁽¹⁾ 62 μ V/m to 71,5 μ V/m	125 μ V/m to 375 μ V/m ⁽¹⁾ 42dB μ V/m to 51,5dB μ V/m
174 – 260	3 750 μ V/m / 71,5dB μ V/m	375 μ V/m / 51,5dB μ V/m
260 – 470	3 750 μ V/m to 12 500 μ V/m ⁽¹⁾ 71,5 dB μ V/m to 82 dB μ V/m	375 μ V/m to 1 250 μ V/m ⁽¹⁾ 51,5dB μ V/m to 62dB μ V/m
above 470	12 500 μ V/m / 82dB μ V/m	1 250 μ V/m / 62dB μ V/m

Note: ⁽¹⁾ linear interpolations
for 130 to 174MHz the interpolation is: $56,8182 \cdot f - 6136,36$ (f in MHz)
for 260 to 470MHz the interpolation is: $41,667 \cdot f - 7083,33$ (f in MHz)

Test Result:

Frequency [MHz]	Peak Amplitude of emission (dB μ V/m)	Average Amplitude of emission (dB μ V/m)	Limit maximum allowed emission power	Actual attenuation below frequency of operation (dB)	Results
433,9360	83,91	76,51	80,83dB μ V/m	-	operating frequency
867,8965	47,70	40,30	-20dBc	20,52	complies
1301,8035	60,25	52,85	54,0dB μ V/m	1,15	complies
1735,7400	56,28	48,88	-20dBc	11,94	complies
2169,6705	60,76	53,36	-20dBc	7,46	complies
2603,6038	52,37	44,97	-20dBc	15,85	complies
3037,5349	61,50	54,1	-20dBc	6,72	complies
3471,4687	60,20	52,8	-20dBc	8,02	complies
3905,3542	52,72	45,32	54,0dB μ V/m	8,68	complies
4339,34351	44,43	37,03	54,0dB μ V/m	16,97	complies

Comments:

worst case between WSCT/U and SCT/U

5.7 Occupied bandwidth

Specify:

Base standard: 47CFR Part 15.231 (c)

The bandwidth of the emission shall be no wider than 0,25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0,5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

Test Setup:

RBW: 3kHz

VBW: 3kHz

Limits:

< 0,25% of the centre frequency, here 1,08MHz

Test Data:

Occupied bandwidth at -20dB: 18,9kHz

Comments:

worst case between WSCT/U and SCT/U



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Measurement and Test Equipment instrumentation

Instruments Description	Code	nr.	Manufacturer	Model	Serial number	Date of Calibration	Calibration Due
analizzatore di spettro	ANA	7	Agilent	N9020A	MY48011101	28/01/2010	28/01/2012
antenna (dipoli)	ANT	1	EMCO	3121C DB-4	9312-901	29/05/2009	29/05/2011
antenna (logperiodica)	ANT	3	Schwarzbeck	VULB9160	3180	26/05/2009	26/05/2011
antenna (double ridge)	ANT	4	AH System	SAS-571	684	29/05/2009	29/05/2011
antenna (loop)	ANT	5	AH System	SAS-562B	236	27/05/2009	27/05/2011
antenna (double ridge)	ANT	6	AH System	SAS-571	1025	08/10/2009	08/10/2011
antenna (BicoLOG 30100)	ANT	7	Aaronia	BicoLOG 30100	1293	18/05/2010	18/05/2012
attenuatore (6dB)	ATT	1	-	PE7021-6		17/06/2009	17/06/2011
carico 50 ohm	ATT	2	Tyco Electronics Co.	50WCW	-	17/06/2009	17/06/2011
attenuatore 10dB	ATT	5	RADIALL	R414.710.000	-	23/05/2008	23/05/2013
attenuatore 10dB	ATT	6	RADIALL	R414.710.000	-	23/05/2008	23/05/2013
attenuatore 20dB	ATT	7	RADIALL	R414.720.000	-	23/05/2008	23/05/2013
cavo RF	CAV	1	Rohde & Schwarz	HFU2-Z5	-	21/06/2006	21/06/2011

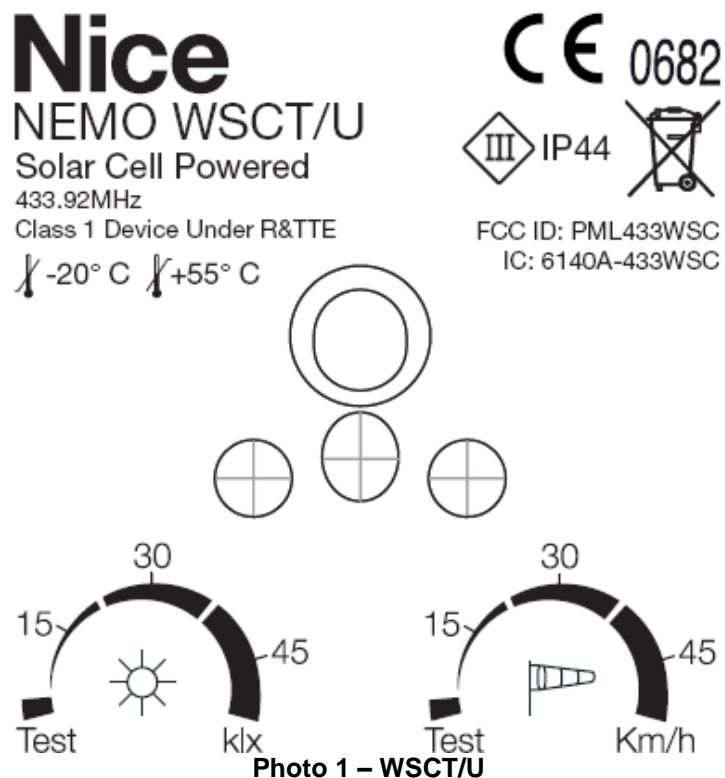
Instruments Description	Code	nr.	Manufacturer	Model	Serial number	Date of Calibration	Calibration Due
cavo RF	CAV	2	Rohde & Schwarz	HFU2-Z4	-	21/06/2006	21/06/2011
cavo RF	CAV	3	TESEO	CAVO A	-	21/06/2006	21/06/2011
cavo RF	CAV	4	TESEO	CAVO B	-	21/06/2006	21/06/2011
cavo RF	CAV	5	TESEO	CAVO C	-	21/06/2006	21/06/2011
cavo RF	CAV	6	TESEO	CAVO D	-	21/06/2006	21/06/2011
cavo RF	CAV	7	TESEO	CAVO E	-	21/06/2006	21/06/2011
Cavo RF	CAV	13	TESEO	CAVO G	-	27/07/2006	27/07/2011
Cavo RF	CAV	14	TESEO	CAVO H	-	27/07/2006	27/07/2011
Cavo RF	CAV	15	TESEO	CAVO I	-	27/07/2006	27/07/2011
Cavo RF	CAV	16	Rohde & Schwarz	9111505/200 (CAVO J)	5995-12-161-6890	22/04/2008	22/04/2013
Cavo RF	CAV	17	Nice	CAVO K	-	28/05/2010	28/05/2015
Cavo RF	CAV	18	Nice	CAVO L	-	28/05/2010	28/05/2015
camera semianecoica RF	CSA	1	TESEO	EN 55022	NSA	12/08/2010	12/08/2011
camera semianecoica RF					CISPR 16-1-4	14/04/2009	14/04/2014
camera semianecoica RF					EN 61000-4-3	10/08/2010	10/08/2011

Instruments Description	Code	nr.	Manufacturer	Model	Serial number	Date of Calibration	Calibration Due
generatore di segnali	GEN	7	Rohde & Schwarz	SML 03	102178	17/12/2009	17/12/2011
generatore di segnali	GEN	8	Agilent	N5182A	MY48180288	06/10/2010	06/10/2012
LISN trifase	LIS	2	Rohde & Schwarz	ESH2-Z5	100183	27/05/2008	27/05/2011
pinza assorbente	PAS	1	FCC	F-202	197	29/05/2009	29/05/2011
power meter	POW	1	Rohde & Schwarz	NRVD	101221	10/11/2009	10/11/2011
power sensor	POW	2	Rohde & Schwarz	NRV-Z5	100314	09/11/2009	09/11/2011
power sensor	POW	3	Rohde & Schwarz	NRV-Z5	100315	10/11/2009	10/11/2011
preamplificatore	PRE	2	Schwarzbeck	BBV 9718	9718-178	23/02/2010	23/02/2012
ricevitore	RIC	1	Rohde & Schwarz	ESCI	100140	07/01/2011	07/01/2012
Software	SOF	1	Rohde & Schwarz	EMC32	V5.20.2		

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Photographic Documentation

8.1 EUT Identification



Nice

NEMO SCT/U

Solar Cell Powered

433.92MHz

Class 1 Device under R&TTE

-20° C +55° C

CE 0682

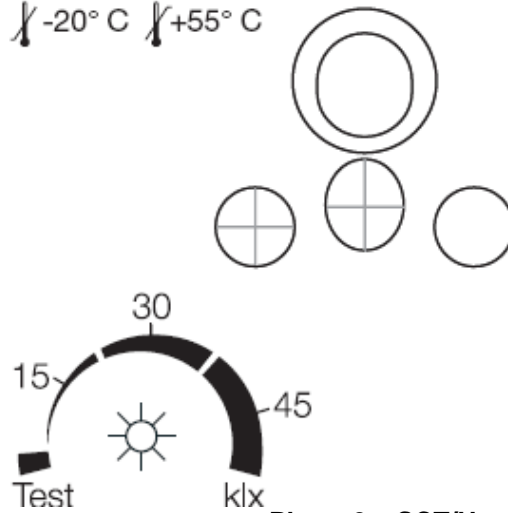
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Photo 2 – SCT/U

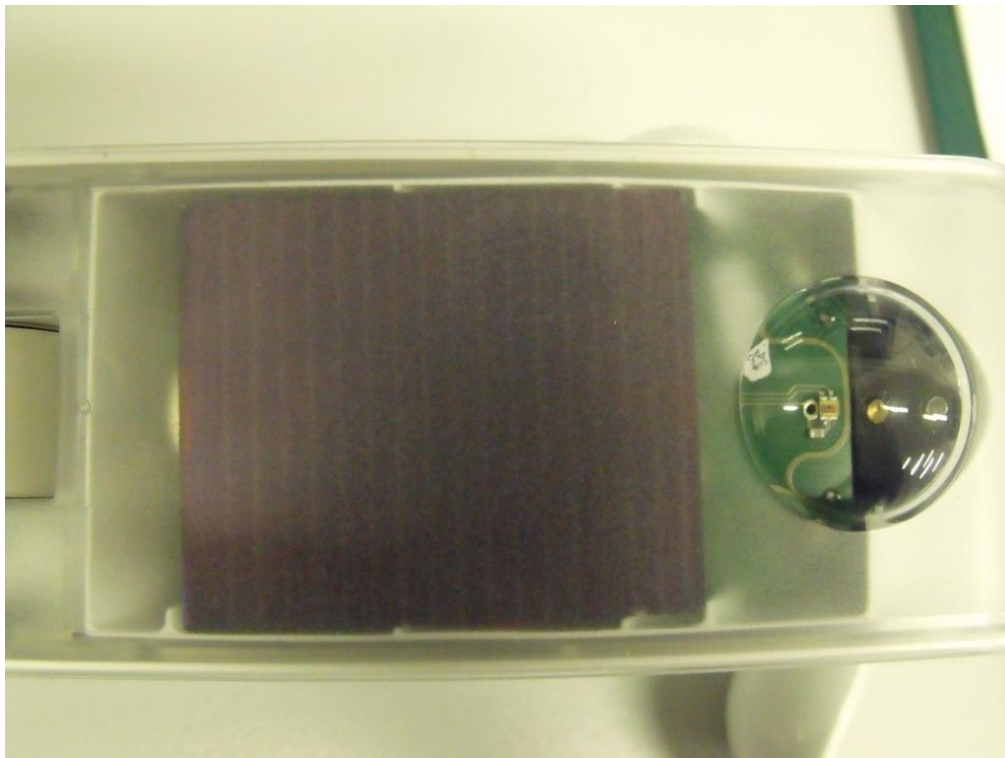


Photo 3 – WSCT/U

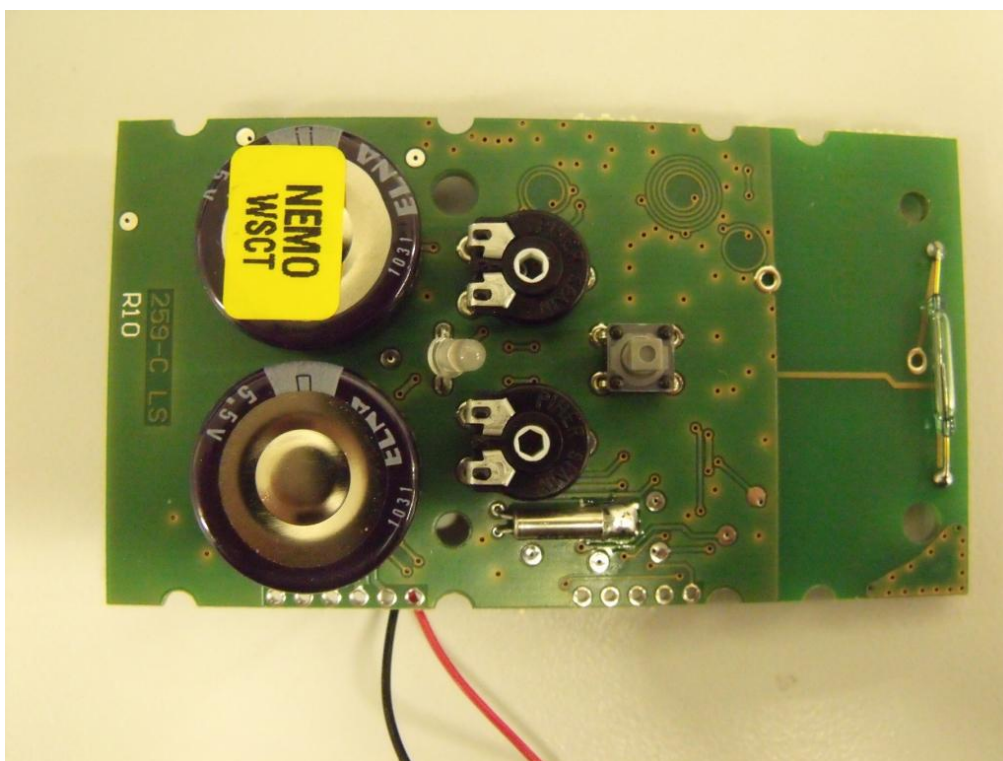


Photo 4 – WSCT/U

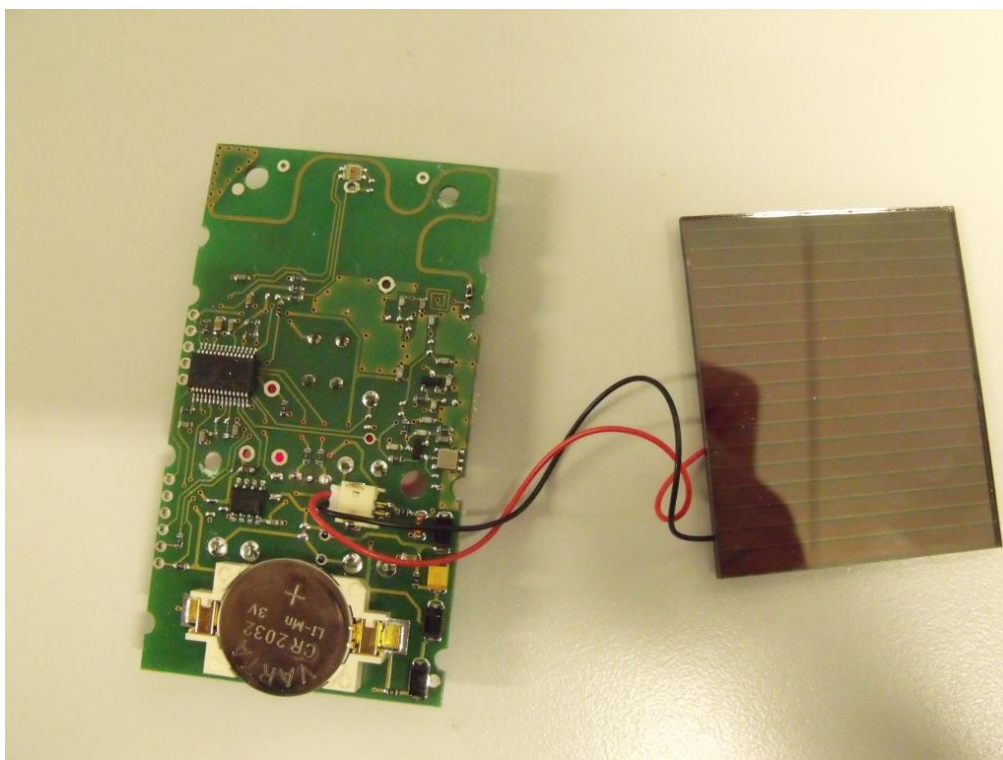


Photo 5 – SCT/U

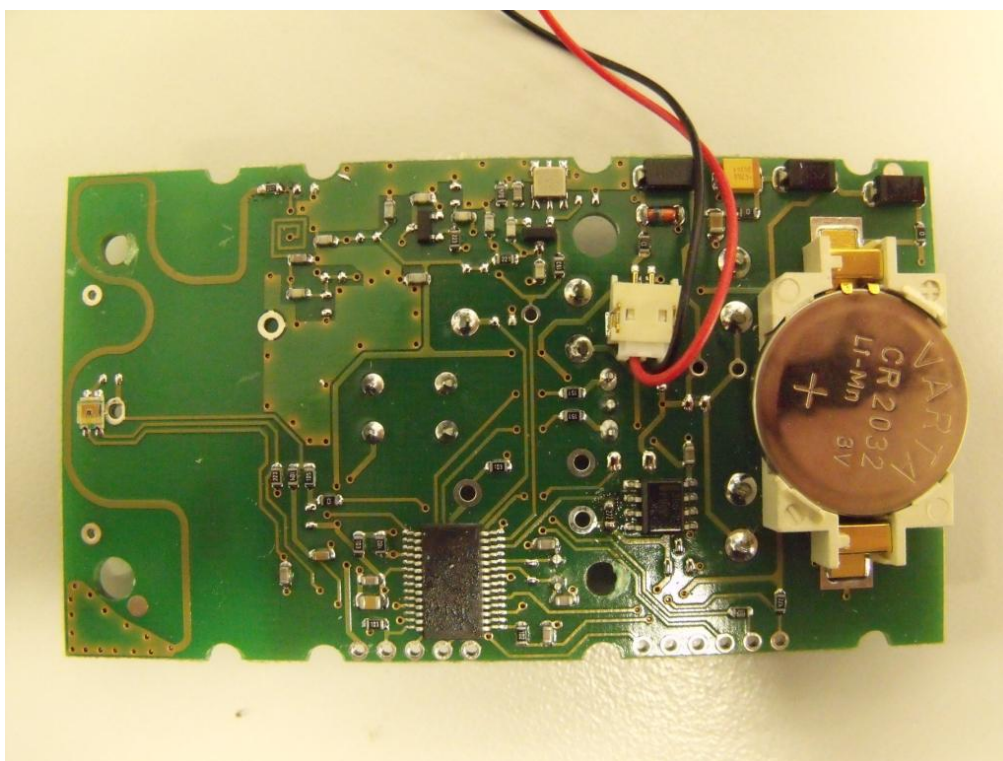


Photo 6 – SCT/U

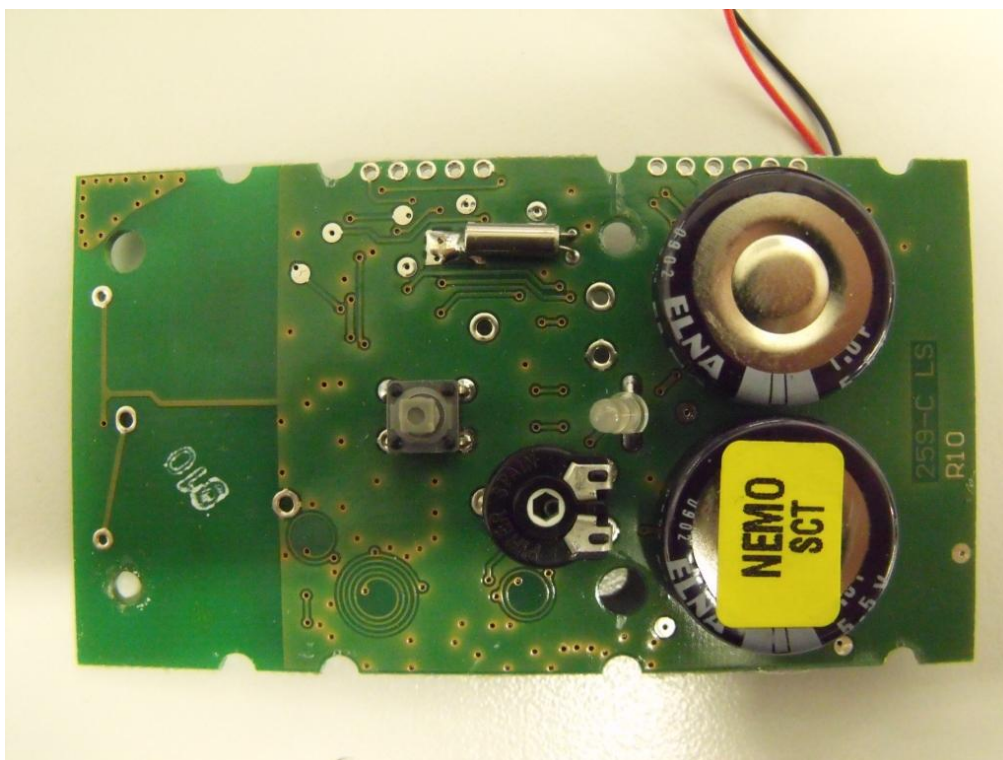


Photo 7 – SCT/U

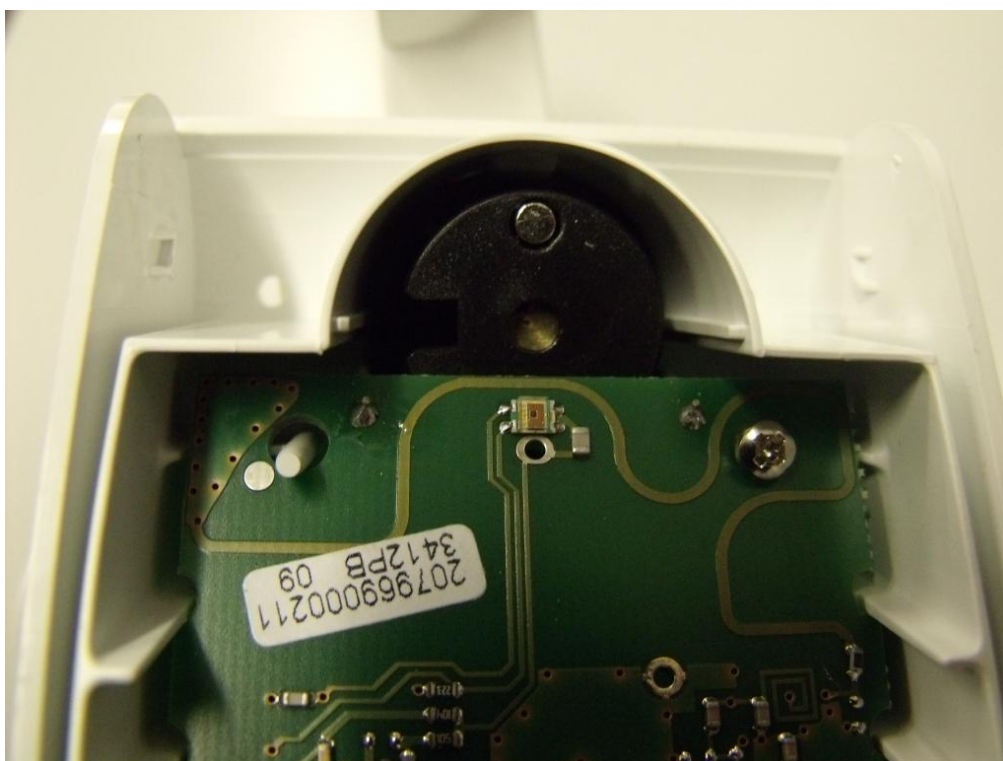


Photo 8 – WSCT/U

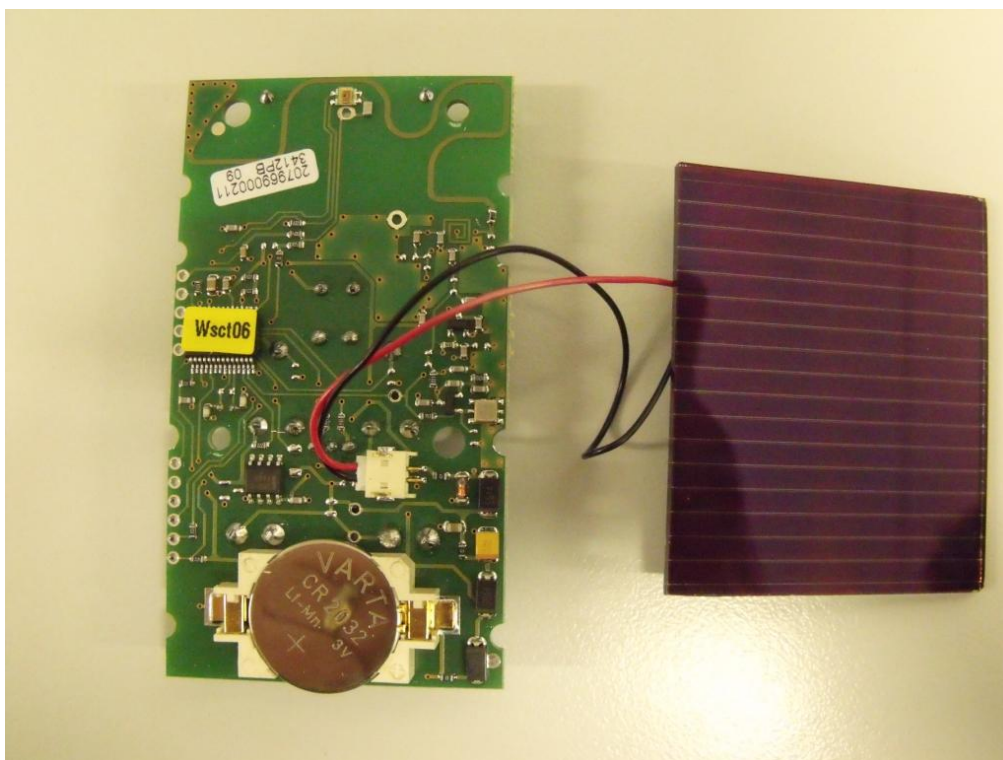


Photo 9 – WSCT/U

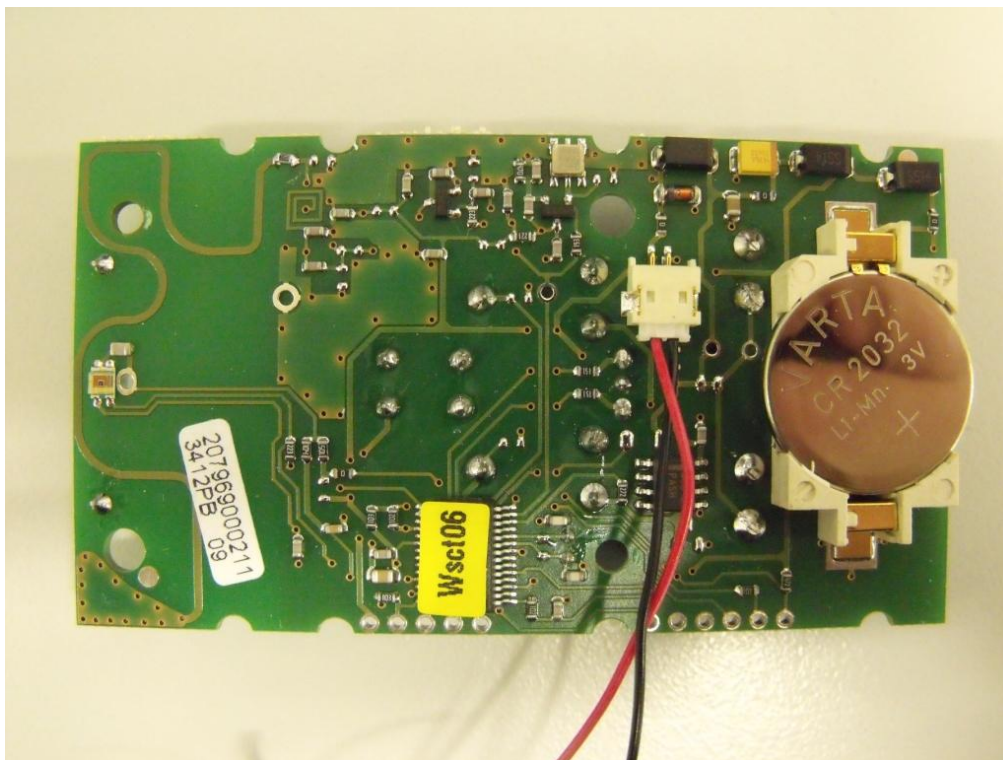


Photo 10 – WSCT/U

8.2 Test Set-up

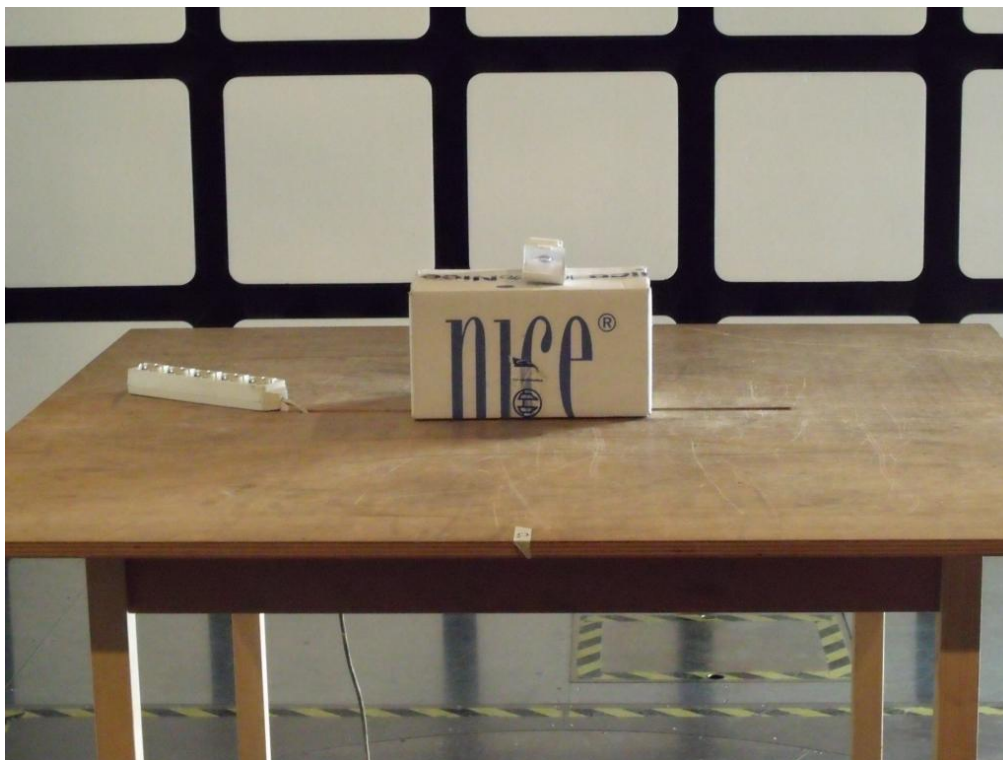


Photo 11 – Emission Radiated Power

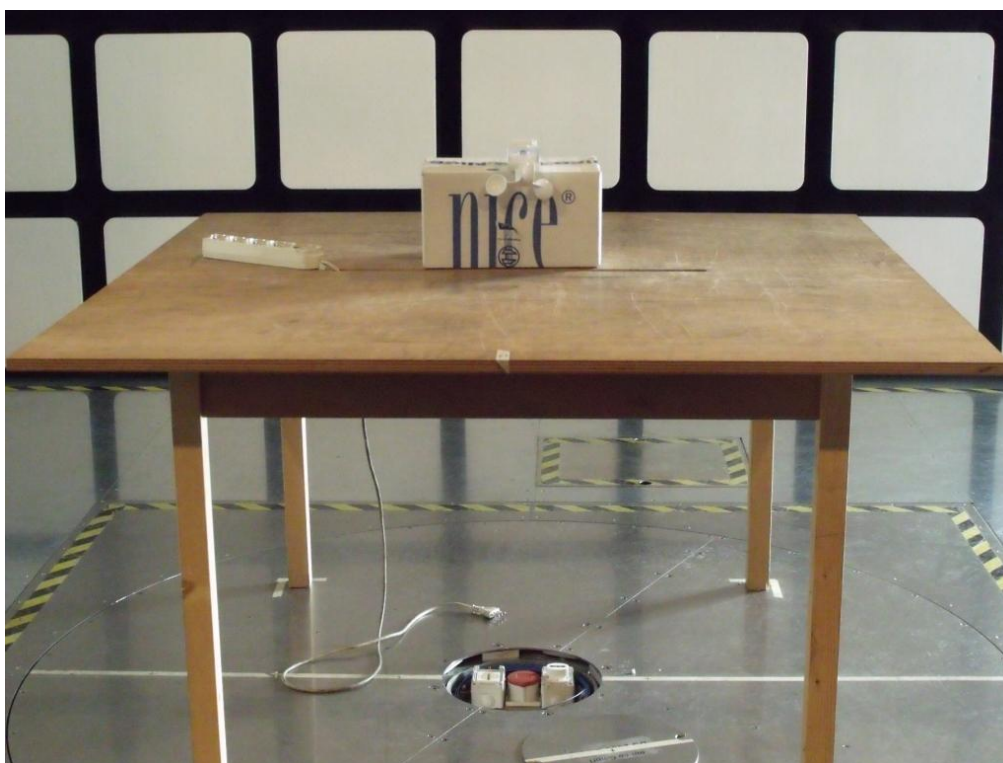


Photo 12 – Emission Radiated Power

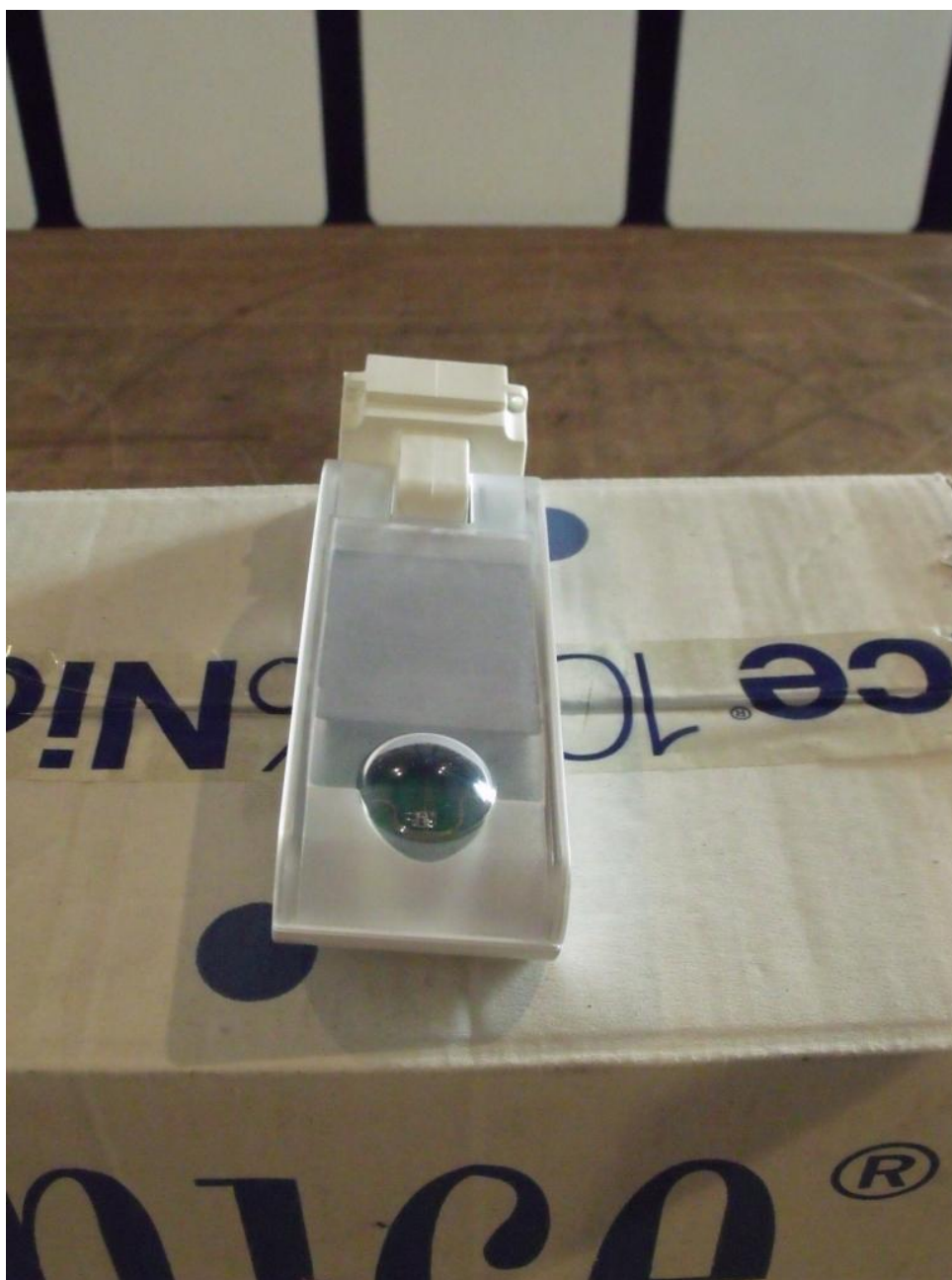


Photo 13 – SCT



Photo 14 – WSCT