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DELTA Test Report

TEST REPORT issued by an Accredited Testing Laboratory

1688
ISO/IEC 17025

Emission test to FCC requirements of DeLaval Activity receiver AR2

Performed for DeLaval International AB

REC-E703572_4 Rev. D
Project no.: E703572
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including 1 annex.

11 February 2015

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Title	Emission test to FCC requirements of DeLaval Activity receiver
Test object	DeLaval Activity receiver AR2
Report no.	REC-E703572_4 Rev. D
FCC-/IC ID.	FCC ID UCS86120691 / IC 6576A-86120691
Test period	04 June 2013 to 28 June 2013 and 19 June 2014
Client	DeLaval International AB Gustav De Lavals väg 15 147 41 Tumba Sweden
Contact person	Anders kvist E-mail: anders.kvist@delaval.com
Manufacturer	DeLaval International AB
Specifications	FCC:47 CFR Part 15, subpart C IC RSS-GEN, issue 4, IC RSS-210, issue 8
Results	The test object was found to be in compliance with the specifications, as listed in Section 1
Test personnel	Lars Johnsson
Date	11 February 2015

Project Manager

Lars Johnsson
DELTA

Responsible

Ulf Bjerke. Technical manager
DELTA

LAJ

Table of contents

1. Summary of tests

Tests	Test methods	Results
Measurement of radio frequency voltage on mains	ANSI C63.4:2009, ANSI C63.10:2013 FCC CFR 47, Part 15, Subpart C clause 15.207 IC RSS Gen, Issue 4, section 7.2.4	Passed
Measurement of radio frequency electromagnetic field	ANSI C63.4:2009, ANSI C63.10:2013 FCC CFR 47, Part 15, Subpart C clause 15.209 IC RSS Gen, Issue 4, section 7.2.5	Passed
Measurement of occupied bandwidth	FCC CFR 47, Part 15, Subpart C clause 15.231c IC RSS 210, Issue 8, A1.1	Passed
Measurement of peak output field strength of fundamental	FCC CFR 47, Part 15, Subpart C clause 15.231b IC RSS 210, Issue 8, A1.3	Passed
Periodic operation	FCC CFR 47, Part 15, Subpart C clause 15.231a IC RSS 210, Issue 8, A1.1.1	Passed

Conclusion

The test object(s) mentioned in this report meet(s) the requirements of the standard(s) stated below.

FCC:47 CFR Part 15, subpart C
IC RSS-GEN, issue 4
IC RSS-210, issue 8

The test results relate only to the object(s) tested.

2. Test object(s) and auxiliary equipment

Photo 2.1.1 Test object; activity receiver (AR).

2.1 Test object(s)

Test object details can be seen in Annex 1.

The system consists of an Activity meter (**AM2**) that is placed around the neck of the cow. The activity meter contains a sensor which detects the cow's movements. The movements are registered and transmitted to the Activity receiver (**AR2**) every hour.

The system helps to detect cows in heat by the fact that cows are more active than usual during the pre-heat and heat period.

Common information

FCC ID	AR2	UCS86120691
IC	AR2	6576A-86120691
Manufacturer		DeLaval International AB
Supply voltage		230V AC (activity receiver)
Hardware version		See Annex 1

Test object 2.1.1

Name of test object	AR2
Model / type	418MHz
Part no.	86120691
	RFI2 85821791
Serial no.	4B
Comment	Set to 15 transmissions/ s
Received	Date: 2013-06-04 Status: Prototype

Test object 2.1.2

Name of test object	AR2
Model / type	418MHz
Part no.	86120691
	RFI2 85821791
	Antenna part no 86121231
Serial no.	CE130245FX
Comment	Set to continuous transmission at TX level 1 with 10 dB attenuator enabled.
	Used during peak output field strength measurement.
Received	Date: 2014-06-19 Status: Prototype

Radio parameters.

Operating frequency	417.0 – 418.8 MHz
Number of channels	4
Channel spacing:	330 kHz
Duty cycle	0.06%
Bit rate and Modulation	20 kbps GFSK
Ambient temperature low	-25° C
Ambient temperature high	+55° C
Power supply	10 – 18 VAC
Antenna type	External antenna.

Above information is declared by the manufacturer.

For the radio parameter tests a number of Tx radio modules where used with different configuration of interface, modulation and send/ receive mode as listed in Annex 1.

2.2 Auxiliary equipment

Auxiliary equipment 2.2.1

Name of auxiliary equipment	230VAC/ 12VAC transformer
Model / type	115VAC/230VAC to 12VAC transformer SP60
Part no.	SP21106
Serial no.	-
Manufacturer	Transformator Teknik.
Supply voltage	115VAC/230VAC
	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.
Comment	

Auxiliary equipment 2.2.2

Name of auxiliary equipment	System controller
Model / type	SC
Part no.	942982-81
Serial no.	XA41571
Manufacturer	DeLaval International AB
Supply voltage	
	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.
Comment	

Auxiliary equipment 2.2.3

Name of auxiliary equipment	RFID reader
Model / type	Multirod reader
Part no.	946480-80
Serial no.	ZJ080194FX
Manufacturer	DeLaval International AB
Supply voltage	-
	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.
Comment	

Auxiliary equipment 2.2.4

Name of auxiliary equipment	MPC
Model / type	MPC680
Part no.	928500-83
Serial no.	ZD213247
Manufacturer	DeLaval International AB
Supply voltage	12 VAC
	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.
Comment	

Auxiliary equipment 2.2.5

Name of auxiliary equipment	Laptop PC
Model / type	Different PCs have been used. 14-06-18: Dell Latitude E5440
Part no.	-
Serial no.	-
Manufacturer	
Supply voltage	230 VAC
Comment	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up.

Auxiliary equipment 2.2.6

Name of test object	AM2 (3 pieces)	
Model / type	418MHz	
Part no.	86295081	
Serial no.	0x70707A 0x70707B 0x70707C	Used during measurement of radio frequency electromagnetic field
Comment	-	
Received	Date: 2013-06-04 Status: Prototype	

Auxiliary equipment 2.2.7

Name of test object	AM2	
Model / type	418MHz	
Part no.	86295081	
Serial no.	2347	(for reference, TX level 3)
	2472	TX level 4 (EUT)
	2032	(for reference, TX level 5)
Comment	Used during measurement of peak output field strength	
Received	Date: 2014-06-19 Status: Prototype	

Photo 2.2.1 Auxiliary equipment. Activity meters

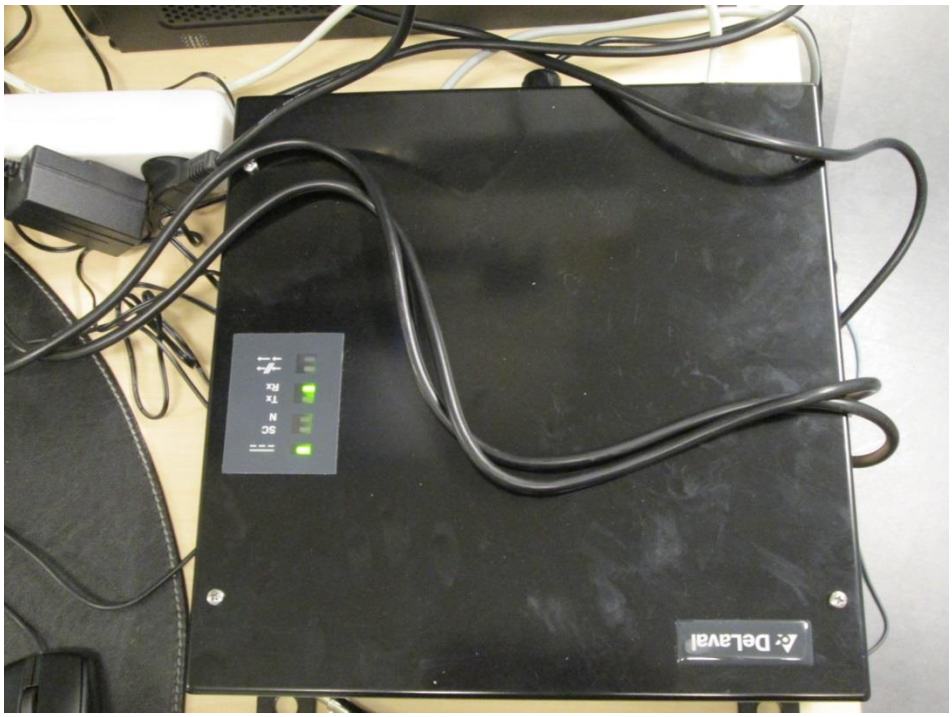


Photo 2.2.2 Auxiliary equipment **2.2.2**. System controller

Photo 2.2.3 Auxiliary equipment **2.2.5**, PC and **2.2.2**, system controller.

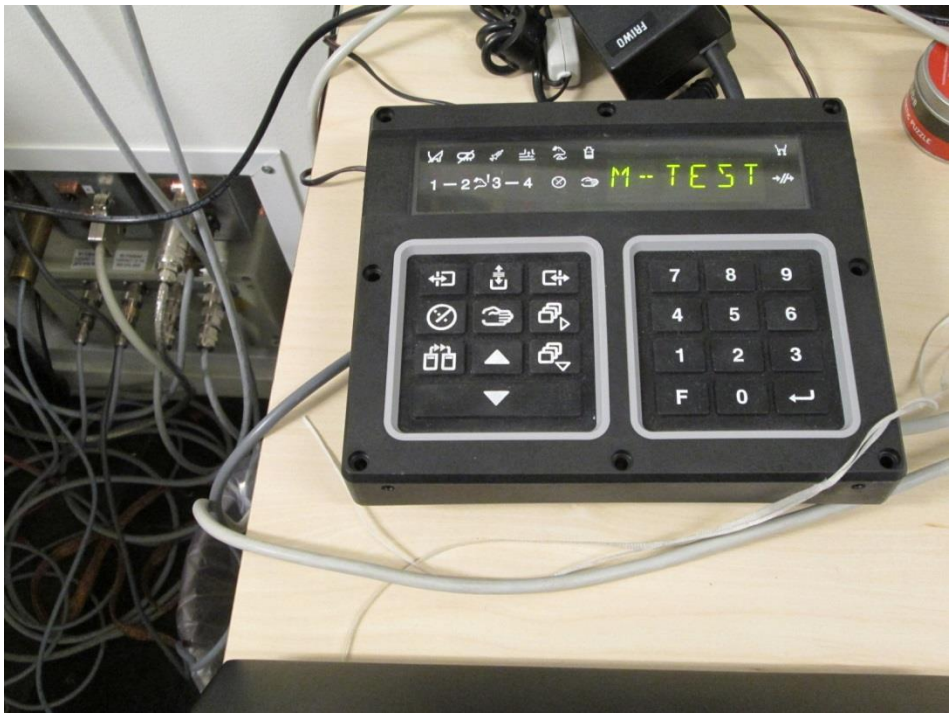


Photo 2.2.4 Auxiliary equipment.**2.2.4**.**2.2.4**

Photo 2.2.5 Auxiliary equipment. RFID reader.**2.2.3**.

3. General test conditions

3.1 Test setup during test

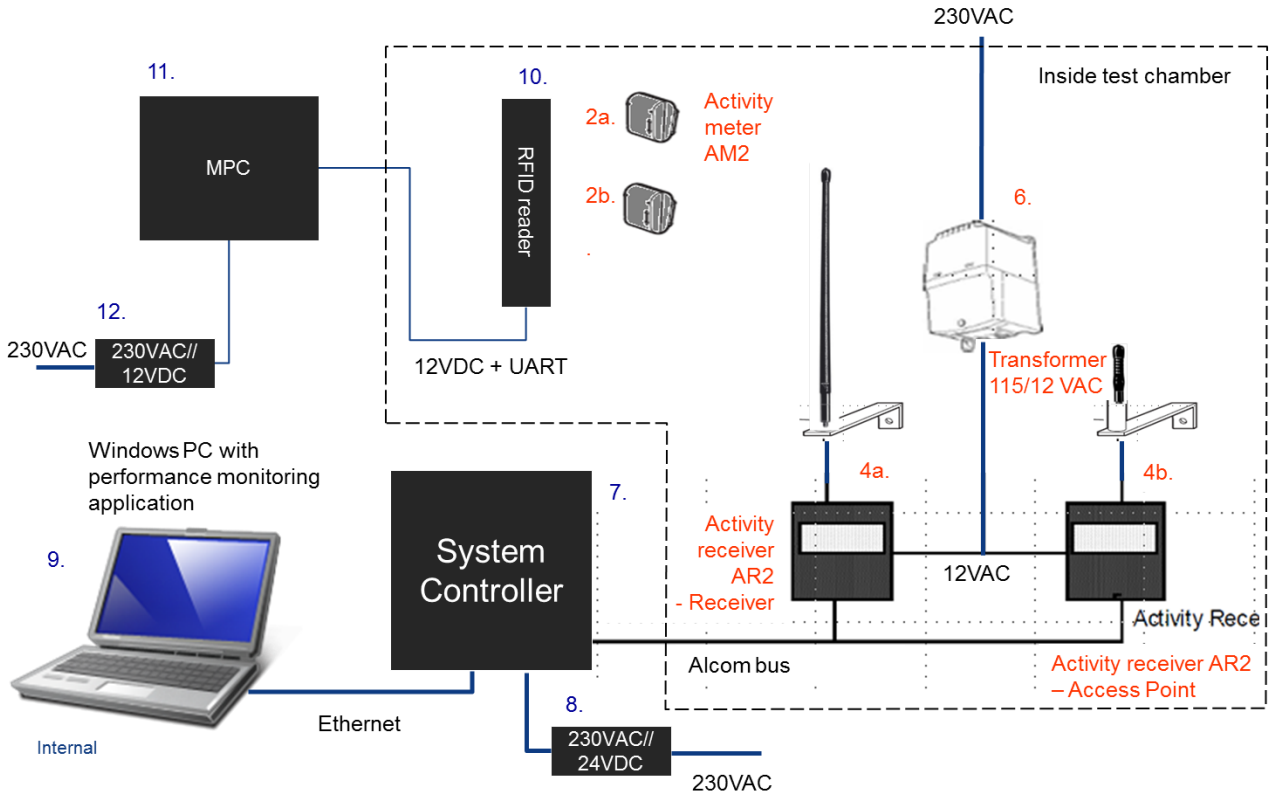


Figure 3.1.1 Block diagram of test object(s) with cables and auxiliary equipment.

3.2 Description and intended use of test object

The Activity receiver is a part of the Activity Meter System, an electronic, heat-detection system for cows and heifers in heat.

3.2.1 Test modes during emission tests

Normal operation. Continuous communication is established between the devices.

3.3 Modifications of the test object

No modifications were incorporated.

3.4 Test sequence

The tests described in this test report were performed in the following sequence:

1. Measurement of radio frequency voltage on mains
2. Measurement unwanted emissions in the spurious domain
3. Radio parameter tests

4. Test results

4.1 Measurement of radio frequency electromagnetic field.

Test object	Combination of 2.1.1: AR2 Auxiliary equipment 2.2.5: AM2 (3 pieces)	Sheet	RE-1
Type	See section 2	Project no.	E703572
Serial no.	See section 2	Date	07 June 2013
Client	DeLaval International AB	Initials	LAJ
Specification	FCC:47 CFR Part 15, subpart C	Frequency	30-1000 MHz

Parameters for 30 – 1000 MHz test

Test method Characteristics	ANSI C63:4:2009, ANSI C63.10:2013 Complete search, Antenna distance 3 m	Temperature Humidity	21 °C 41 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMC Hall A Västerås Setup VEC1	Uncertainty	6.2 dB

Parameters for 1 – 4,5 GHz test

Test method Characteristics	ANSI C63:4:2009 Complete search, Antenna distance 3 m	Temperature Humidity	21 °C 41 % RH
Detector	Peak, quasi peak and Average	Bandwidth	1 MHz
Test equipm.	EMC Hall A Västerås Setup VEC1	Uncertainty	4.5 dB

Test result — The measured field strengths are below the limit

Compliant — Yes

Comments — Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation.

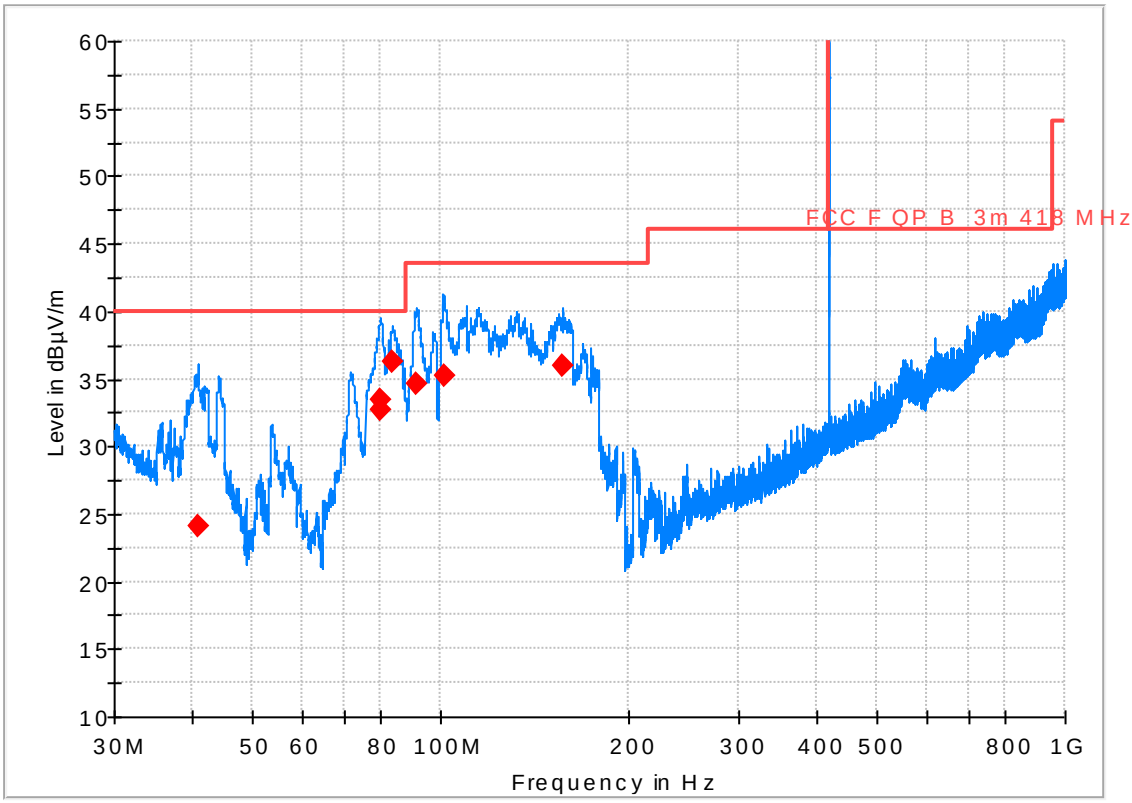
Measurement performed with transmitters continuously in Tx mode.

The test object is set to operate on the highest operating channel (ch 3) and Auxiliary Equipment 2.2.7 on the lowest operating channel (ch 0)

Radiated Spurious Emission Test

Test Description:	Radiated emission. Complete measurement 30 - 1000 MHz
Date:	2013-06-24
EUT Name:	Activity receiver Tx. Activity meter Tx
Manufacturer:	DeLaval
Serial Number:	Activity receiver: 4.B, Activity meters: 0x70707A, 0x70707B,
Operating Conditions:	115 VAC, 60 Hz
Test Site:	DELTA Development Technology AB
Operator Name:	Lars J
Test Specification:	FCC CFR 47, Part 15, Subpart C.
Comment:	

Full Spectrum



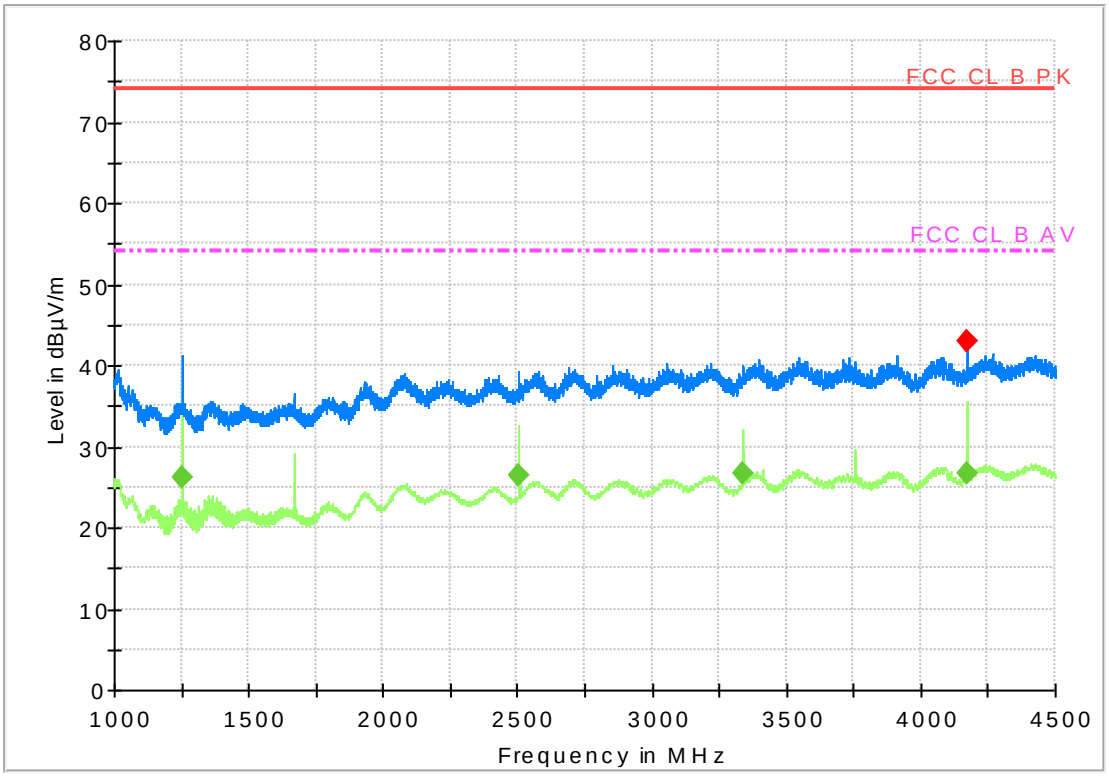
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.920000	24.15	40.00	15.85	1500.0	120.000	121.0	V	74.0	14.7
79.920000	32.73	40.00	7.27	1500.0	120.000	111.0	V	284.0	9.6
80.220000	33.39	40.00	6.61	1500.0	120.000	150.0	V	69.0	9.6
83.880000	36.19	40.00	3.81	1500.0	120.000	125.0	V	83.0	10.3
91.710000	34.57	43.50	8.93	1500.0	120.000	105.0	V	252.0	11.4
101.250000	35.22	43.50	8.28	1500.0	120.000	280.0	H	31.0	12.6
156.780000	35.99	43.50	7.51	1500.0	120.000	181.0	H	77.0	13.4

Radiated Spurious Emission Test

Test Description:	Radiated emission Complete measurement 1-4,5 GHz
Date:	2013-06-25
EUT Name:	Activity receiver Tx. Activity meter (Tag) Tx
Manufacturer:	DeLaval
Serial Number:	
Operating Conditions:	115 VAC, 60 Hz
Test Site:	DELTA Development Technology AB
Operator Name:	Lars J
Test Specification:	FCC CFR 47, Part 15, subpart C
Comment:	

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1252.000000	---	26.23	54.00	27.77	1500.0	1000.000	100.0	H	105.0	-16.0
2503.750000	---	26.50	54.00	27.50	1500.0	1000.000	111.0	V	236.0	-11.0
3338.250000	---	26.71	54.00	27.29	1500.0	1000.000	106.0	V	281.0	-8.1
4173.500000	42.93	---	74.00	31.07	1500.0	1000.000	120.0	V	330.0	-7.4
4174.000000	---	26.59	54.00	27.41	1500.0	1000.000	130.0	V	336.0	-7.4

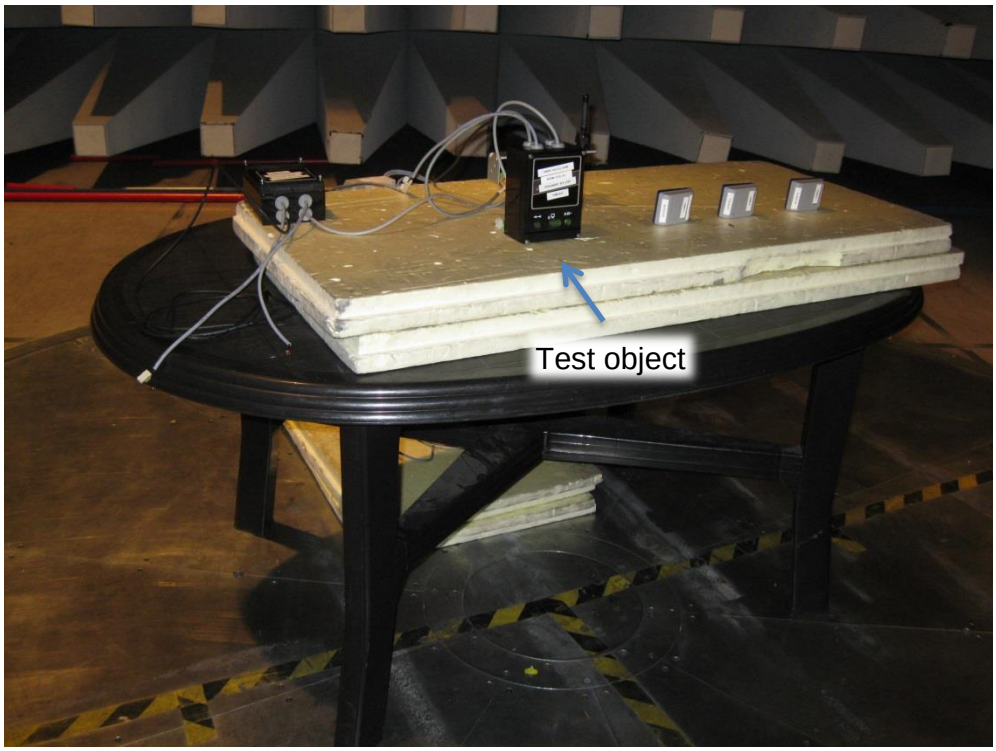


Photo 4.1.1 Test setup regarding measurement of radio frequency electromagnetic field.

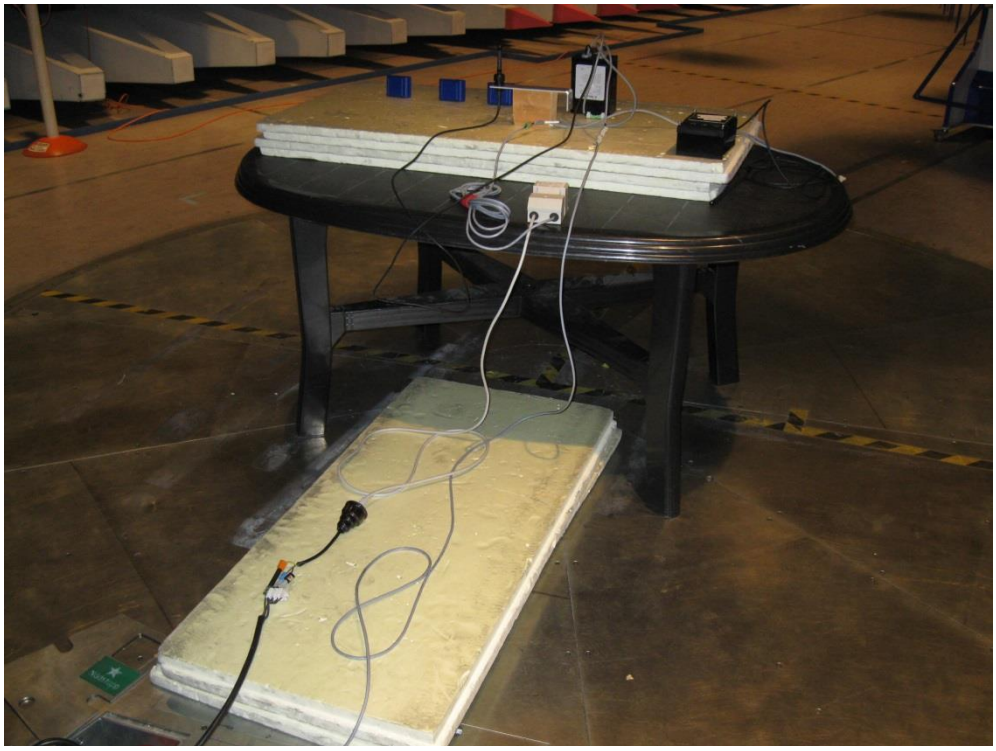


Photo 4.1.2 Test setup regarding measurement of radio frequency electromagnetic field.

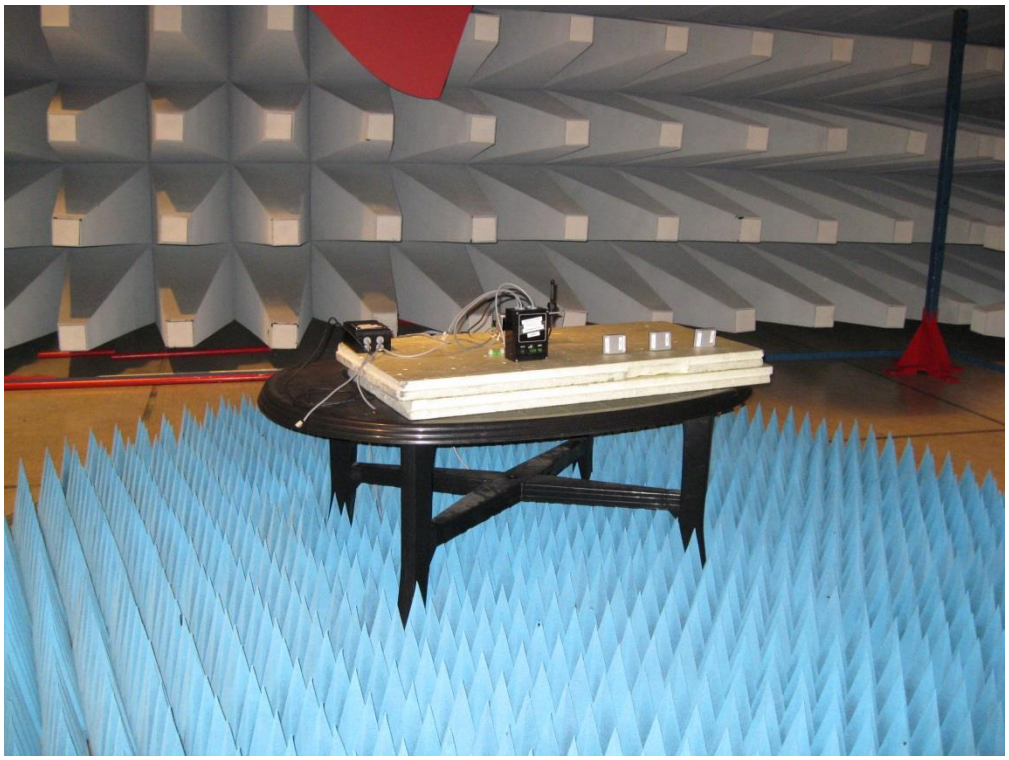


Photo 4.1.3 Test setup regarding measurement of radio frequency electromagnetic field > 1 GHz

Photo 4.1.4 Test setup regarding measurement of radio frequency electromagnetic field > 1 GHz

4.2 Measurement of radio frequency voltage on mains

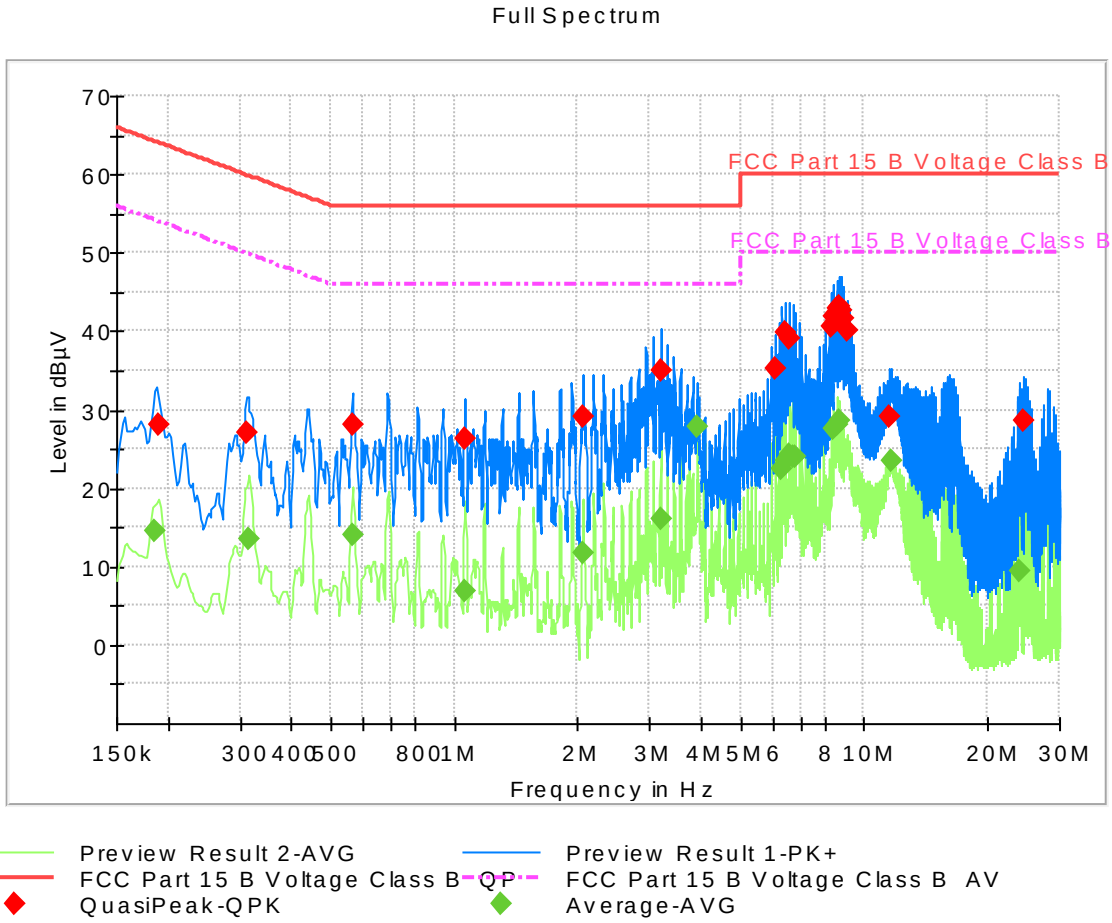
Test object	2.1.1: AR2	Sheet	CE-1
Type	86120692	Project no.	E703572
Serial no.	3A	Date	09 June 2013
Client	DeLaval International AB	Initials	LAJ
Specification	FCC:47 CFR Part 15, subpart C	Frequency	0.15-30 MHz

Test method Characteristics	ANSI C63:4:2009, ANSI C63.10:2013 Artificial mains network: 50 Ω, 50 µH	Temperature Humidity	21 °C 42 % RH
Detector	Peak, quasi peak, and average	Bandwidth	10 kHz
Test equipm.	EMC Hall A Västerås Setup VEA1	Uncertainty	1.8 dB

Line under test	Maximum of Line and Neutral
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Mains voltage: 115 VAC, 60 Hz

Conducted Emission Test

Test Description:	Conducted emission. Complete measurement 0.15-30 MHz
Date:	2013-06-09
EUT Name:	Activity meter system
Manufacturer:	DeLaval International AB
Serial Number:	3.A, 3.B
Operating Conditions:	115 VAC 60 Hz
Test Site:	DELTA Development Technology AB. Hall A
Operator Name:	Lars J
Test Specification:	FCC Part 15 B Class B
Comment:	Measured on primary side of transformer.



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.186000	---	14.44	54.20	39.77	2000.0	9.000	L1	FL	10.1
0.190500	28.09	---	64.00	35.92	2000.0	9.000	L1	FL	10.1
0.312000	27.13	---	59.90	32.79	2000.0	9.000	N	FL	10.1
0.316500	---	13.43	49.80	36.37	2000.0	9.000	L1	FL	10.1
0.564000	27.96	---	56.00	28.04	2000.0	9.000	N	FL	10.1
0.566250	---	13.91	46.00	32.09	2000.0	9.000	N	FL	10.1
1.061250	26.42	---	56.00	29.58	2000.0	9.000	N	FL	10.2
1.068000	---	6.86	46.00	39.14	2000.0	9.000	L1	FL	10.2
2.062500	29.18	---	56.00	26.82	2000.0	9.000	N	FL	10.3
2.064750	---	11.85	46.00	34.15	2000.0	9.000	N	FL	10.3
3.187500	34.92	---	56.00	21.08	2000.0	9.000	N	FL	10.4
3.189750	---	16.05	46.00	29.95	2000.0	9.000	N	FL	10.4
3.905250	---	27.74	46.00	18.26	2000.0	9.000	N	FL	10.4
6.063000	35.36	---	60.00	24.64	2000.0	9.000	N	FL	10.6
6.315000	---	22.56	50.00	27.44	2000.0	9.000	N	FL	10.7
6.438750	39.87	---	60.00	20.13	2000.0	9.000	N	FL	10.7
6.441000	---	23.45	50.00	26.55	2000.0	9.000	N	FL	10.7
6.562500	38.97	---	60.00	21.03	2000.0	9.000	N	FL	10.7
6.564750	---	24.19	50.00	25.81	2000.0	9.000	N	FL	10.7
6.686250	---	23.89	50.00	26.11	2000.0	9.000	N	FL	10.7
6.814500	---	24.02	50.00	25.98	2000.0	9.000	N	FL	10.7
8.313000	40.63	---	60.00	19.37	2000.0	9.000	N	FL	10.8
8.436750	---	27.60	50.00	22.40	2000.0	9.000	N	FL	10.8
8.439000	41.76	---	60.00	18.24	2000.0	9.000	N	FL	10.8
8.560500	---	28.20	50.00	21.80	2000.0	9.000	N	FL	10.8
8.562750	43.00	---	60.00	17.00	2000.0	9.000	N	FL	10.8
8.688750	43.04	---	60.00	16.96	2000.0	9.000	N	FL	10.9
8.691000	---	28.68	50.00	21.32	2000.0	9.000	N	FL	10.9
8.812500	42.58	---	60.00	17.42	2000.0	9.000	N	FL	10.9
8.938500	41.51	---	60.00	18.49	2000.0	9.000	N	FL	10.9
9.062250	40.10	---	60.00	19.90	2000.0	9.000	N	FL	10.8
11.562000	29.02	---	60.00	30.98	2000.0	9.000	L1	FL	11.2
11.685750	---	23.40	50.00	26.60	2000.0	9.000	N	FL	11.1
24.060750	---	9.39	50.00	40.61	2000.0	9.000	L1	FL	11.9
24.562500	28.54	---	60.00	31.46	2000.0	9.000	N	FL	11.9

Photo 4.2.1 Test setup regarding measurement of radio frequency voltage on mains. Only 2 of 4 units powered.

4.3 Measurement of peak output field strength of fundamental

Test object	Combination of Test object 2.1.2 and auxiliary equipment 2.2.7	Sheet	RE_Spur-1
Type	See section 2	Project no.	E703572
Serial no.	See section 2	Date	19 June 2014
Client	DeLaval International AB	Initials	LAJ
Specification	FCC Part 15, Subpart C, Section 15.231	Uncertainty	6.2 dB

Test method Characteristics	ANSI C63.4:2009, ANSI C63.10:2013 Complete search, Antenna distance 3 m.	Temperature Humidity	22 °C 27 % RH
Test equipm.	EMC Hall A Västerås Setup VEC1		
SA Settings	RBW: 120 kHz DET: Average/ Peak Trace: Max hold		

EUT	Frequency [MHz]	Average measurment [dBµV/m]	DCCF (δ) [dB]	Corrected average measurement [dBµV/m]	Average limit [dBµV/m]	Passed	Remarks
Activity meter	417.33	84.4	- 9.0	75.4	80.3	Yes	Note 1
Activity receiver	418.32	82.0	-6	76	80.3	Yes	

Note 1: Activity meter measured with peak detector.

Test result	The measured average field strengths corrected with the DCCF (δ) are below the average limit Corrected average: PAverage(resulting) = Ppeak + DCCF (δ).
Test Port	Enclosure
Test frequency	417.33 MHz & 418.32 MHz
Test mode	Continuous Tx with modulation.
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization. The test object is set to operate on the highest operating channel (ch 3) and Auxiliary Equipment 2.2.7 on the lowest operating channel (ch 0).

The limit for maximum radiated field strength at the fundamental frequency is given in 15.231b and calculated as 41.6667(F)-7083.3333, where F is the frequency in MHz.

Limit at 417.3 MHz =10 304 µV/m = 80.3 dBµV/m

Limit at 418.3 MHz = 10 346 µV/m = 80.3 dBµV/m.

The duty cycle correction factor (δ) can be applied to the peak pulse amplitude to find the average emission. This is valid for one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

The duty cycle correction factor for the **activity receiver** is determined as follows:

The value for the duty cycle (D) is:

Max. Tx on time: 35.6 ms

Period: 72 ms

The calculated duty cycle expressed in % is:

D(%) ((Max. Tx on time) µs / (period) µs) • 100% = 50 %.

The calculated duty cycle correction factor expressed in dB is:

δ(dB): 20 log (Max. Tx on time (µs) / period (µs)) = -6 dB.

The duty cycle correction factor for the **activity meter** is determined as follows:

The value for the duty cycle (D) is:

Max. Tx on time: 35.6 ms

Period: 100 ms.

The calculated duty cycle expressed in % is:

D(%) ((Max. Tx on time) µs / (period) µs) • 100% = 35.6 %.

The calculated duty cycle correction factor expressed in dB is:

δ(dB): 20 log (Max. Tx on time (µs) / period (µs)) = -8.97 dB.

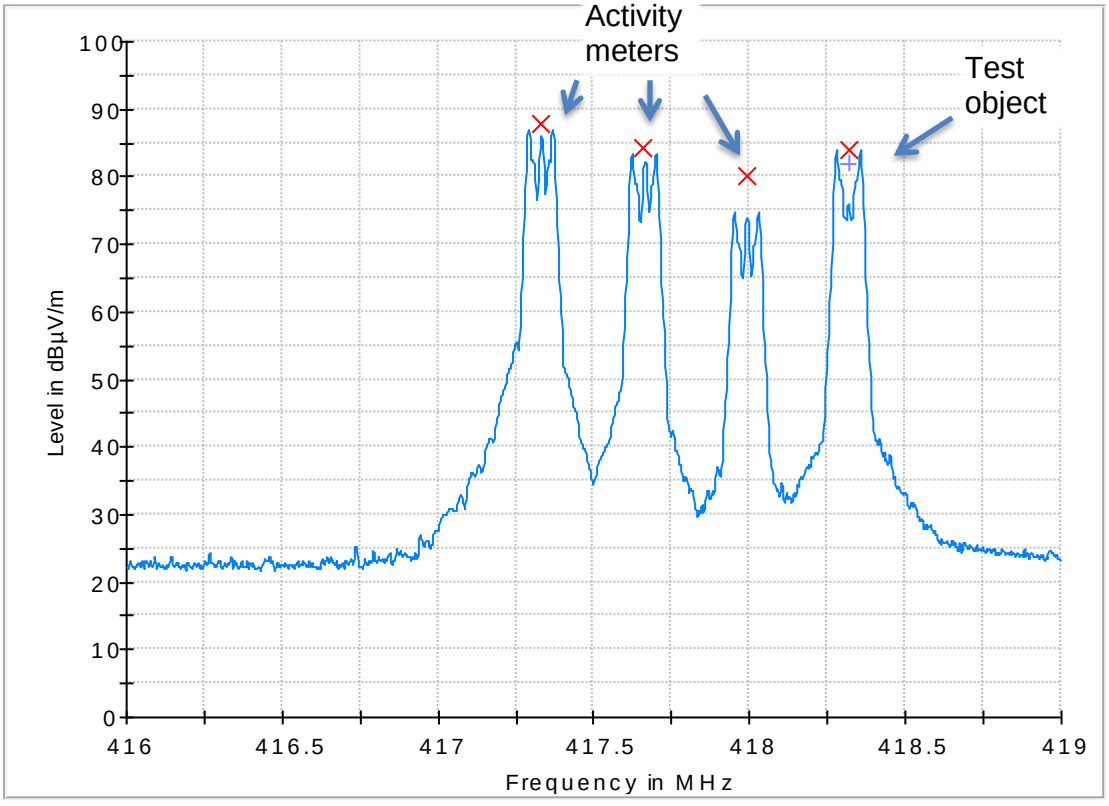
According to ANSI C63.10.2009 (section 4.2.3.2.4), FCC CFR 47 Part 15 Subpart C (Section 15.35(c)) and RSS-Gen (section 6.10) this correction factor can be applied for all emissions including the fundamental and harmonics above 1 GHz.

The corrected average is: PAverage(resulting) = Ppeak + DCCF (δ).

Measurement of peak output field strength of fundamental

Test Description:	Radiated emission scan 30 - 1000 MHz
Date:	2014-06-19
EUT Name:	Activity meter system
Manufacturer:	DeLaval International AB
Serial Number:	See Test object 2.1.2 and auxiliary equipment 2.2.7
Antenna:	Various heights/ polarizations
Turntable:	0 - 360 deg
Test Site:	DELTA Development Technology AB
Operator Name:	Lars J
Test Specification:	FCC Part 15, Subpart C,
Comment:	Activity receiver 418.32 MHz Pow lev 1 with activated attenuator. Activity meter at 417.33 MHz with power level 5 represents the lowest channel. Activity meter at 417.66 MHz, Pow lev 4, and at 417.99 MHz, pow level 3 are present of investigational purposes.

RE 30M-1GHz utan HP 3m Fast prescan CBL6111A



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
417.330000	87.8	---	1500.0	120.000	120.0	V	0.0	20.7
417.660000	84.4	---	1500.0	120.000	120.0	V	21.0	20.7
417.990000	80.2	---	1500.0	120.000	120.0	V	172.0	20.7
418.320000	83.9	82.0	1500.0	120.000	100.0	V	0.0	20.7

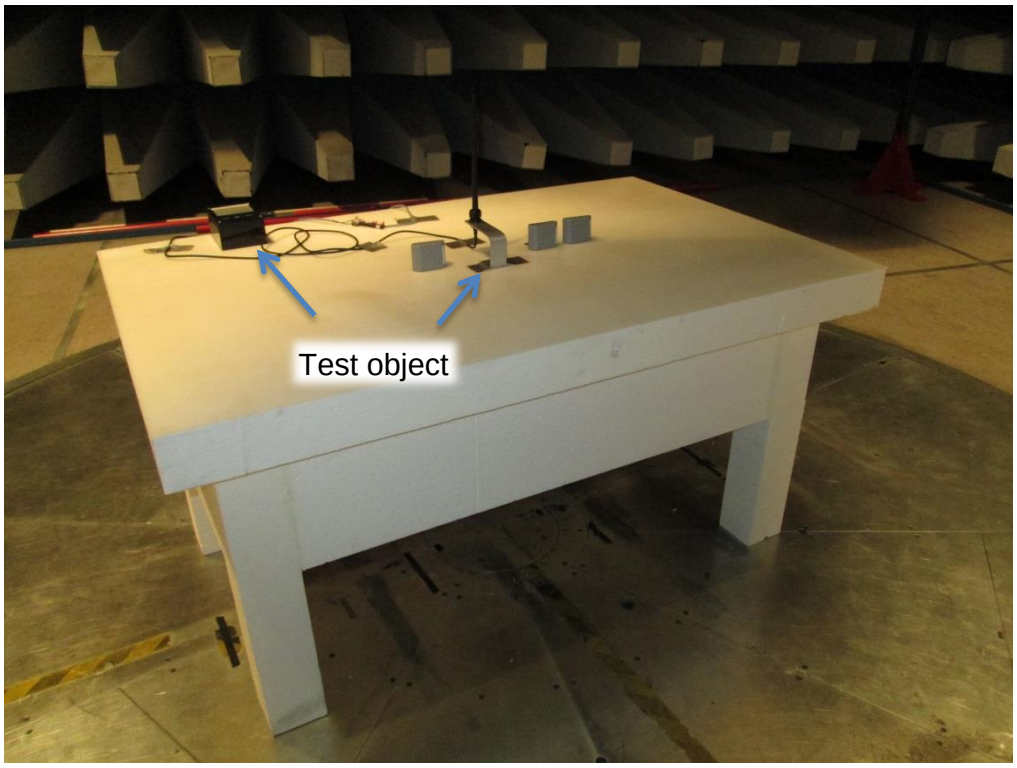


Photo 0.1 Test setup regarding measurement of peak output field strength of fundamental.

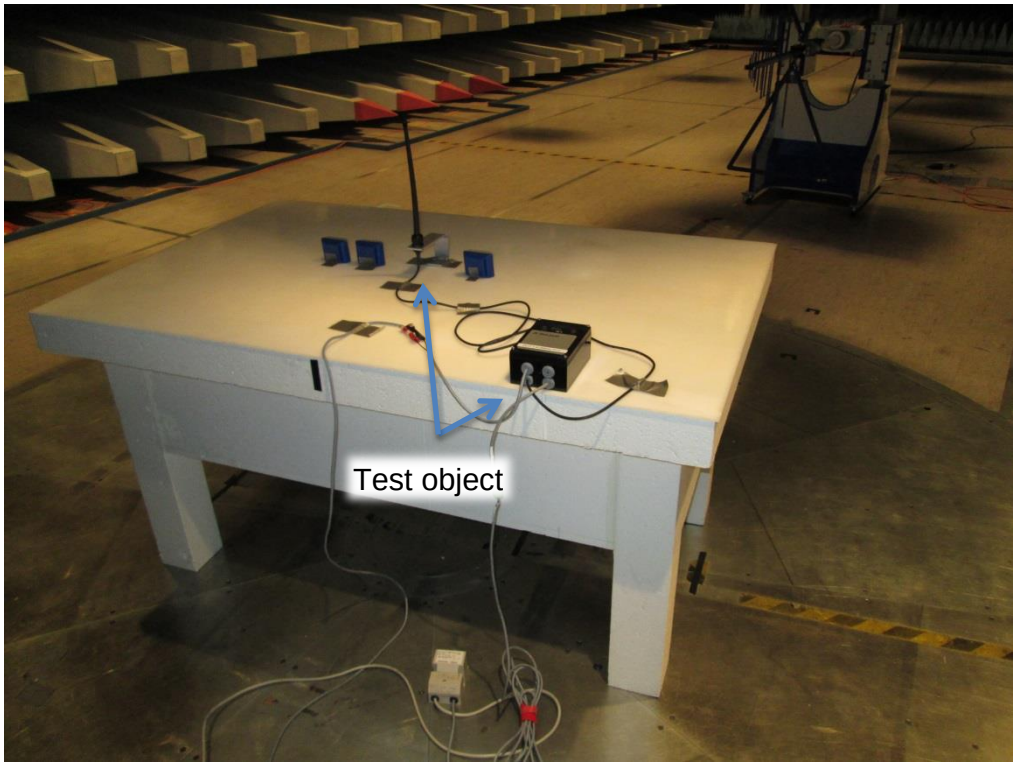


Photo 0.2 Test setup regarding measurement of peak output field strength of fundamental.

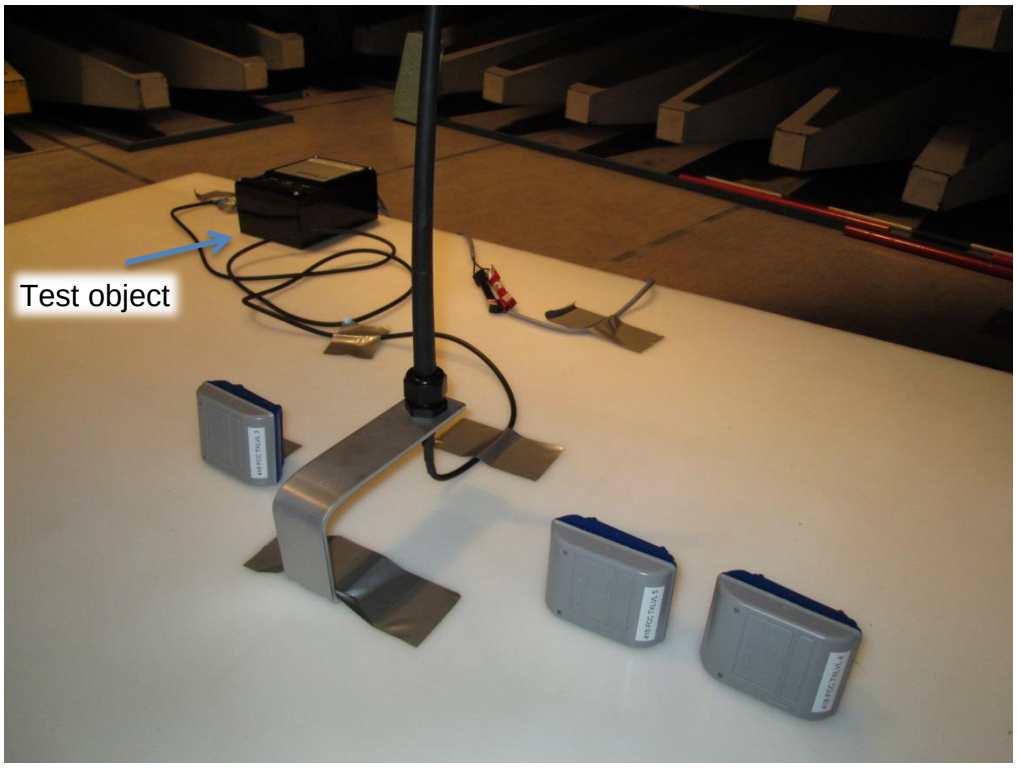


Photo 0.3 Test setup regarding measurement of peak output field strength of fundamental.

4.4 Measurement of occupied bandwidth

Test object	Combination of 2.1.1: AR2 Auxiliary equipment 2.2.5: AM2	Sheet	ADJ_PWR-1
Type	See section 2	Project no.	E703572
Serial no.	See section 2	Date	24 June 2013
Client	DeLaval International AB	Initials	LAJ
Specification	FCC Part 15, Subpart C, Section 15.231 C		

Test method	ANSI C63.4:2009, ANSI C63.10:2013	Temperature	23 °C
Characteristics	-20 dBc	Humidity	27 % RH
Test equipm.			
SA Settings	RBW: 120 kHz DET: Peak Trace: Max hold		

Frequency [MHz]	Occupied bandwidth	Limit	Passed	Remarks
418.32	310 kHz	1.05 MHz	Yes	Note 1
417.33	320 kHz	1.05 MHz	Yes	Note 1

Note 1: Limit is calculated as 0.25% x Cf.

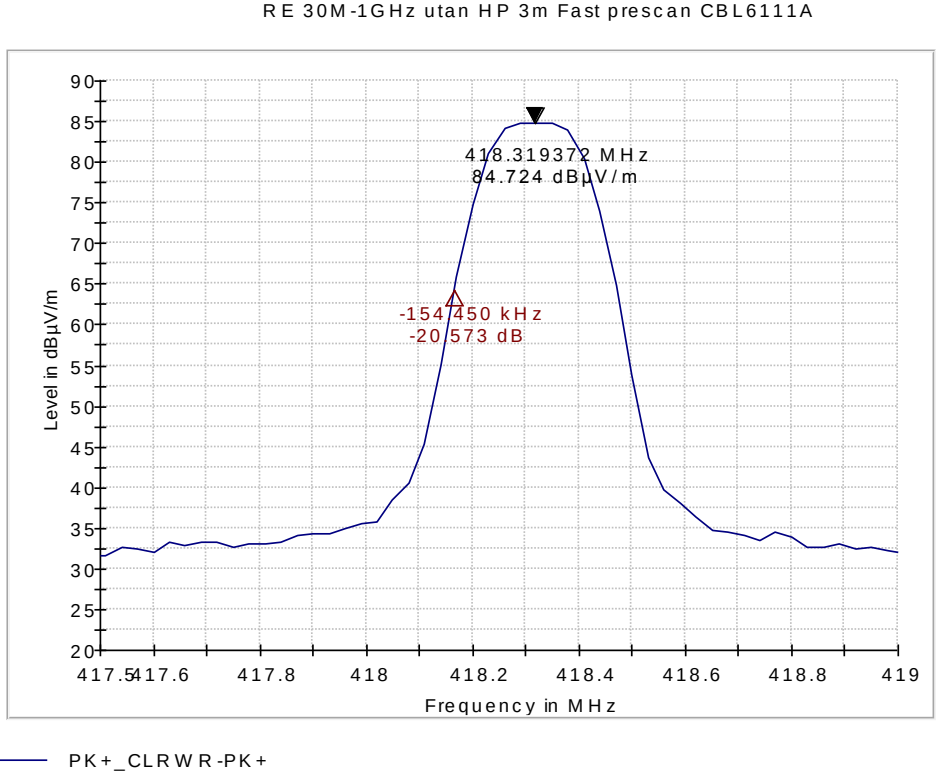


Figure 1 20 dB Bandwidth of the modulated carrier from the activity receiver.

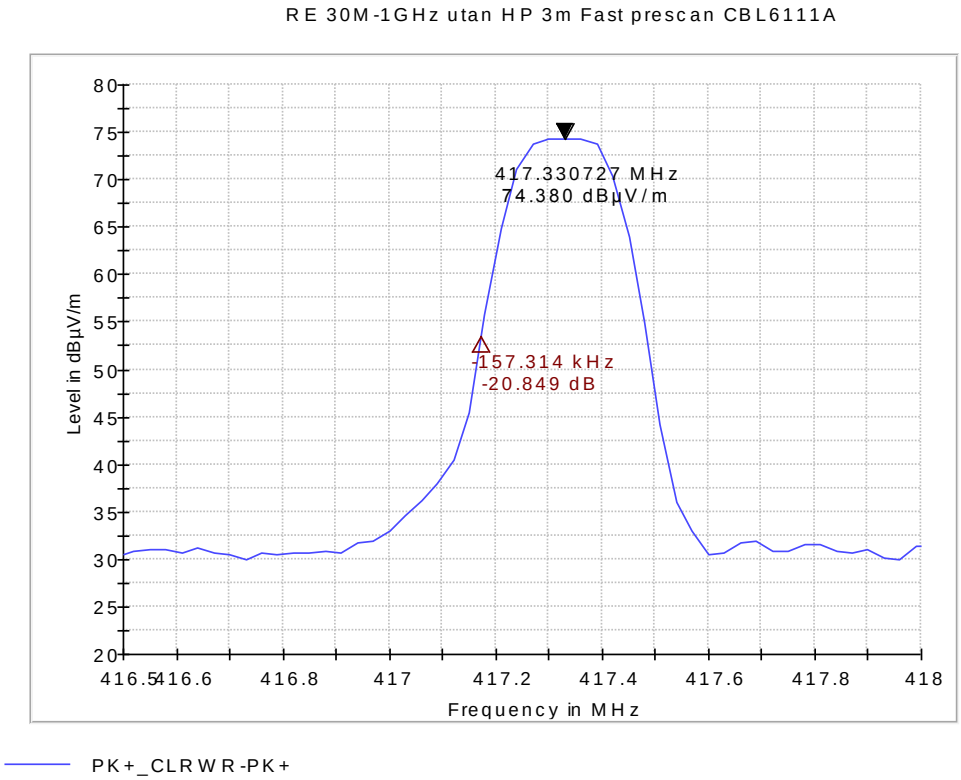


Figure 2 20 dB Bandwidth of the modulated carrier from activity meter.

Test result	The measured 20 dB bandwidths from activity receiver was within the limits
Test modulation	Normal modulation.
Compliant	Yes
Comments	The occupied bandwidth is channel independent. The test object is set to operate on the highest operating channel (ch 3) and Auxiliary Equipment 2.2.5 on the lowest operating channel (ch 0).

4.5 Periodic operation

The device is transmitting 4 times per hour in average, where the actual transmission time is randomized*.

The maximum TX data packet length** is 35,6 ms.

The nominal TX duty cycle generated is 4x35,5 ms=142 ms per hour (0,004% duty).

Footnotes:

* 0-1 s (corresponding to 28-75 data packets).

** The system supports variable data packet length.

Requirements	**Requirements**	**Verdict**
RSS-210 – clause A1.1.1	**FCC CFR 47, Part 15, Subpart C clause 15.231a**	
a).A manually operated transmitter ...	(1) A manually operated transmitter ...	**Complies** Not applicable since the device is not manually operated
b).A transmitter activated automatically shall cease transmission within 5 seconds after activation	(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation	**Complies** since the maximum TX data packet length is 35,6 ms i.e. transmission will cease within <<5 seconds
c) Periodic transmissions at regular predetermined intervals are not permitted	3) Periodic transmissions at regular predetermined intervals are not permitted.	**Complies** since the device transmission time is randomized and additionally the transmission time is limit to max 142 ms per h
d).Intentional radiators employed for radio control purposes during emergencies	(4) Intentional radiators which are employed for radio control purposes during emergencies	**Complies** Not applicable since the device is not for radio control purposes
	(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section	**Complies** Not applicable since the device do not transmit set-up information ..

5. National registrations and accreditations

5.1 SWEDAC Accreditation

Organization: Swedish Board for Accreditation and Conformity Assessment - SWEDAC, see www.swedac.se and www.ilac.org

Registration Number: 1688

SWEDAC is part of ILAC (International Laboratory Accreditation Cooperation) including its MRA (Mutual Recognition Arrangement).

5.2 FCC Registrations

Organization: Federal Communications Commission, USA

Registration Number: 516880

Facilities: EMC chamber A 3 and 10 m

5.3 IC Registrations

Organization: Industry Canada, Certification and Engineering Bureau

Registration Number: 9347A

Facilities: EMC chamber A (9347A-1)

6. List of instruments

Setup VEA1							
Measurement of radio frequency voltage on mains							
Used	***ID no.***	***Description***	***Manufacturer***	***Type no.***	***Cal Date***	***Due Date***	***Setup uncertainty***
☒	36070	Software	Rohde & Schwarz	EMC32 ver. 9.0.10	-	-	1.8 dB
☒	36020	Measuring receiver	Rohde & Schwarz	ESU26	27/09/2012 07/08/2013	27/09/2013 07/08/2014	
☒	IE-B919	LISN 2 x 10 A 250 V	Rohde & Schwarz	ESH3-Z5	15/08/2012 06/08/2013	15/08/2013 06/08/2014	
☒	36062	Impulse Voltage Limiter	Rohde & Schwarz	ESH3-Z2	01/10/2012 21/06/2013	01/10/2013 21/06/2014	

Setup VEC1							
Measurement of radio frequency electromagnetic field							
Used	***ID no.***	***Description***	***Manufacturer***	***Type no.***	***Cal Date***	***Due Date***	***Setup uncertainty***
☒	36070	Software	Rohde & Schwarz	EMC32 ver. 9.0.10	-	-	5.1 dB 30-1000 MHz (10 m) 6.2 dB 30-1000 MHz (3 m) 4.5 dB 1-6 GHz (3 m) Power measurement 5.0 dB 30 MHz-12.75 GHz
☒	36020	Measuring receiver	Rohde & Schwarz	ESU26	27/09/2012 07/08/2013	27/09/2013 07/08/2014	
☒	IE-B928	Antenna Bilog	Chase	CBL6111A	28/08/2011 31/07/2013	28/08/2013 31/07/2015	
☒	E-I839	Antenna Horn 18GHz	ARA	DRG-118/A	26/07/2011 30/07/2013	26/07/2013 30/07/2015	
☒	IE-B758	Preamplifier	HP	8447F	16/08/2012 08/08/2013 07/08/2014	16/08/2013 08/08/2014 07/08/2015	
☒	35122	Attenuator 10 dB	Mini-Circuits	NAT-10 1W, N	22/08/2012 01/10/2013	22/08/2013 01/10/2014	
☒	36066	Highpass filter 1 GHz	Micro-Tronics	HPM 15119	21/11/2012 21/11/2013	21/11/2013 21/11/2014	
☒	36021	Preamplifier	Quinstar	QLJ-01184040-J0	21/11/2012	21/11/2013	
☒	36022	Power supply	DELTA	UVB	-	-	
☒	36071	Controller	Maturo	NCD	-	-	
☒	36072	Tilt antenna mast	Maturo	TAM 4.0-E	-	-	
☒		Turntable	Heinrich Deisel	DT 440	-	-	

7. Revision

Rev. index	Description	Date/ Init
-	New document	15 July 2014/ LAJ
A	Section 2.1; Insertion of separate FCC and IC numbers. Clarification of system units.	03 Nov. 2014/ LAJ
B	Test object AM2 removed from report. Section 4.4 added. Calibration date added to instrument list	29 January 2015/LAJ
C	Section 4.5 Periodic operation. verdict clarified	06 February 2015/ULB
D	ANSI C63.10:2013 added	11 February 2015/ULB

Annex 1

Device list from DeLaval International AB.

DUT EMC test 130618

Test	#	ID	Product name short	Product art no	Accessories		PBA art, version	HW modifications	SW modifications	Prod config	RNW config	Indiv config
ESD	1a.	EBEB1A	AM2 433MHz	86295082V3				none	No RFID back-off	RFpwr=111 +13 dBm	4 ch	
Immunity, ESD	1b.	EBEB05	AM2 433MHz	86295082V4				none	No RFID back-off	RFpwr=101 +7 dBm	4 ch	LBT = 120 (default)
	1c.	EBEB1C	AM2 433MHz	86295082V4				Pull up 100k	No RFID back-off	RFpwr=101 +7 dBm	4 ch	
	2a.	EBEB2A	AM2 418MHz	86295081V3				none	No RFID back-off	RFpwr=101 +7 dBm	4 ch	
	2b.	EBEB2B	AM2 418MHz	86295081V4				none	No RFID back-off	RFpwr=010 –2 dBm	4 ch	
Immunity	3a.	addr 0xA	AR2 433 MHz	86120692	86121231	ANTENNA 418/434 MHZ CPL	85821782V9	none	none		4 ch	Receiver only
Immunity	3b.	addr 0xB	AR2 433 MHz	86120692	86121231	ANTENNA 418/434 MHZ CPL	85821782V9	none	none	RFpwr=111 +13 dBm	4 ch	Access Point
Emission	3c.	addr 0xE	AR2 433 MHz	86120692	86121231	ANTENNA 418/434 MHZ CPL	85821782V9	none	Cont TX mode	RFpwr=111 +13 dBm	1 ch=3	
	4a.	addr 0xC	AR2 418 MHz	86120691	86121231	ANTENNA 418/434 MHZ CPL	85821782V9	none	none		4 ch	Receiver only
Emission	4b.	addr 0xD	AR2 418 MHz	86120691	86121232	ANTENNA SHORT 418/433 CPL	85821782V9	none	Cont TX mode	RFpwr=000 –8 dBm	1 ch=3	Access Point
Emission	6a.	#42	AM2 433MHz	86295082V4				final ant matching	none	RFpwr=101 +7 dBm	1 ch=0	5 msg/s
Emission	6b.	#43	AM2 418MHz	86295081V4				final ant matching	none	RFpwr=010 –2 dBm	1 ch=0	5 msg/s
Emission	6c.	#41	AM2 418MHz	86295081V4				final ant matching	none	RFpwr=001 –5 dBm	1 ch=0	5 msg/s

EJ INGJUTNA / EJ KAPSLADE

	5a.	EBEB5A	AM2 418MHz	86295081V3				none	No RFID back-off	RFpwr=101 +7 dBm	4 ch	
Immunity	5b.	EBEB5B	AM2 433MHz	86295082V4				none	No RFID back-off	RFpwr=101 +7 dBm	4 ch	LBT = 100
Immunity	5c.	EBEB5C	AM2 433MHz	86295082V4				Pull up 100k	No RFID back-off	RFpwr=101 +7 dBm	4 ch	LBT = 130
Immunity	5d.	EBEB5D	AM2 433MHz	86295082V4				final ant matching	No RFID back-off	RFpwr=101 +7 dBm	4 ch	LBT = 110
Extr cond	7a.		AM2 433MHz	86295082V4				RF connector	Cont TX mode	RFpwr=101 +7 dBm	1 ch=0	
Extr cond	7b.	EBEB02	AM2 433MHz	86295082V4	(reserv)			RF connector	Cont TX mode	RFpwr=101 +7 dBm	1 ch=0	
Extr cond	8a.	addr 0xF	AM2 433MHz		RFI2 433 MHz		85821782V9	none	Cont TX mode	RFpwr=111 +13 dBm	1 ch = 3	