

# DELTA Test Report

*TEST REPORT issued by an Accredited Testing Laboratory*



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## Radio parameter test of Smart Box Link, 200612

### Performed for Anticimex Innovation Center

618-20125-10-R2

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31 August 2018

**DELTA Development  
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DELTA Development  
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is a subsidiary company of  
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**Title** EMC test of Smart Box Link, 200612

**Test object** Smart Box Link, 200612

**Report no.** 618-20125-10-R2

**Test period** 25 June 2018 to 28 August 2018

**Client** Anticimex Innovation Center  
Skovgaardsvej 25  
3200 Helsingør  
Denmark

**Contact person** Kim Jemail  
E-mail: kim.jemail@prevas.se

**Manufacturer** Anticimex Innovation Center

**Specifications** FCC Part 15 subpart C

**Results** The test object was found to be in compliance with the specifications, as listed in Section 1

**Test personnel** Lars Johnsson, Carlos Bernardo Garcia

**Date** 31 August 2018

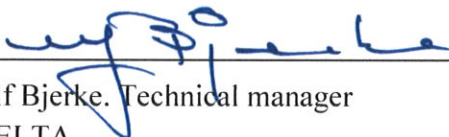
**Project Manager**



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Lars Johnsson  
DELTA

**Responsible**



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Ulf Bjerke. Technical manager  
DELTA

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## 1. Summary of tests

Tests	Test methods	Specification	Results
Measurement of maximum conducted output power	ANSI C63.10:2013	47 CFR Part 15C Subpart 15.247(b)(3)	Passed
Measurement of 6 dB Bandwidth	ANSI C63.10:2013	47 CFR Part 15C Subpart 15.247(a)(2)	Passed
Measurement of 20 dB Bandwidth	ANSI C63.10:2013	47 CFR Part 15C Subpart 15.215(c)	Passed
Measurement of Power Spectral Density	ANSI C63.10:2013	47 CFR Part 15C Subpart 15.247(e)	Passed
Measurement of conducted spurious emission	ANSI C63.10:2013	47 CFR Part 15C Subpart 15.247(d)	Passed
Measurement of radiated emission; restricted bands	ANSI C63.10:2013	47 CFR Part 15 B&C Subpart 15.109, 15.209	Passed

### Conclusion

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

- FCC Part 15 subpart C

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

## 2. Test object(s) and auxiliary equipment

### 2.1 Test object(s)



Photo 2.1.1 Test object(s).

#### Test object 2.1.1

Name of test object	Smart Box Link
Part no.	200612
Serial no.	58005005
FCC ID	2AOFP-200612
Manufacturer	Anticimex Innovation Center
Supply voltage	Internal battery 14.4 V
Software version	2.42
Hardware version	200612
Cycle time	Continuous
Highest frequency generated or used	920 MHz
Received	Date: 26 Jun. 2018 Status: Prototype

## 2.1.1 Radio specification, receiver and transmitter

The radio transceiver in the test object has the following specified RF parameters.  
(declared by the manufacturer)

Type of equipment	:	Low power device
Operating frequency range	:	920 MHz
Antenna	:	Monopol antenna with SMA-RP connector
Antenna gain	:	+2 dBi (manufacturer specification)
Power level	:	Fixed. +11 dBm
No of channels	:	1
Bandwidth	:	
Occupied bandwidths (99%)	:	~850 kHz (Measured)
Channel separation	:	-
Modulation	:	DSSS-BPSK
Data rate	:	40 kbit/s

## 2.2 Auxiliary equipment

No auxiliary equipment was used.

### **3. General test conditions**

#### **3.1 Test setup during test**

##### **3.1.1 Description of test setup**

The mode of the Smart Box Link is controlled by setting parameters on the MMI of the unit. Different modes were used depending on test performed. See section 3.1.3 below.

##### **3.1.2 Description and intended use of test object**

The Smart Box Link is used for rodent control. It is a part of a mesh network together with up to 50 other units in the Smart family product line and is controlled by the Smart Connect unit which is the network master.

The Smart Box Link senses when a rodent has entered the trap and then elevates the floor to incarcerate the rodent. The floor is elevated until it reaches the high voltage connectors and the rodent is electrocuted. After the electrocution, the floor is elevated to the top and the rodent is tipped into the waste basket

##### **3.1.3 Test modes during emission tests**

Continuous Tx mode     The radio is continuously transmitting in the 902-928 MHz band at 920 MHz.

Continuous Rx mode     The device is in operational mode and the radio module is not transmitting.

##### **3.1.4 Nominal power consumption**

The test object is powered by an internal 4S6P battery pack of Li-Ion batteries with a nominal output voltage of 14.4 V and a capacity of 19.2 Ah.

#### **3.2 Modifications of the test object**

No modification was incorporated

### 3.3 Test sequence

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

1. Measurement of conducted spurious emissions Tx On
2. Measurement of maximum conducted output power Tx On
3. Measurement of power spectral density conducted Tx On
4. Measurement of radiated emission (below 1 GHz). Tx both On and Off
5. Measurement of radiated emission (above 1 GHz). Tx both On and Off
6. Measurement of 6 dB bandwidth Tx On
7. Measurement of 20 dB bandwidth Tx On



## 4. Test results

### 4.1 Measurement of radio frequency electromagnetic field

Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	03 Jul. 18, 22 Aug. 18
Serial no.	58005005	Initials	CABG, LAJ
Specification	FCC part 15 C	Frequency	30-1000 MHz

Test method	ANSI C63.10:2013	Temperature	21 °C
Characteristics	Complete search, antenna distance 10 m	Humidity	45 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMC Hall A Västerås Setup VEC1	Uncertainty	5 dB

Test result	The measured field strengths were below the limit
Compliant	Yes
Comments	<p>Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation.</p> <p>During emission test with the radio in transmit mode the intentional transmitter is above the general emission limit at the transmit frequency.</p> <p>The test was performed with the test object in normal orientation. It was also performed with the test object in horizontal orientation to obtain maximum exposure of the circuit board.</p>
Example calculation	$\text{Measured level (dB}\mu\text{V/m)} = \text{Analyzer reading [dB}\mu\text{V]} + \text{cable loss [dB]} - \text{preamplifier gain [dB]} + \text{antenna factor [dB}\mu\text{V/m]} + \text{attenuator [dB]} \text{ (impedance matching).}$



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.

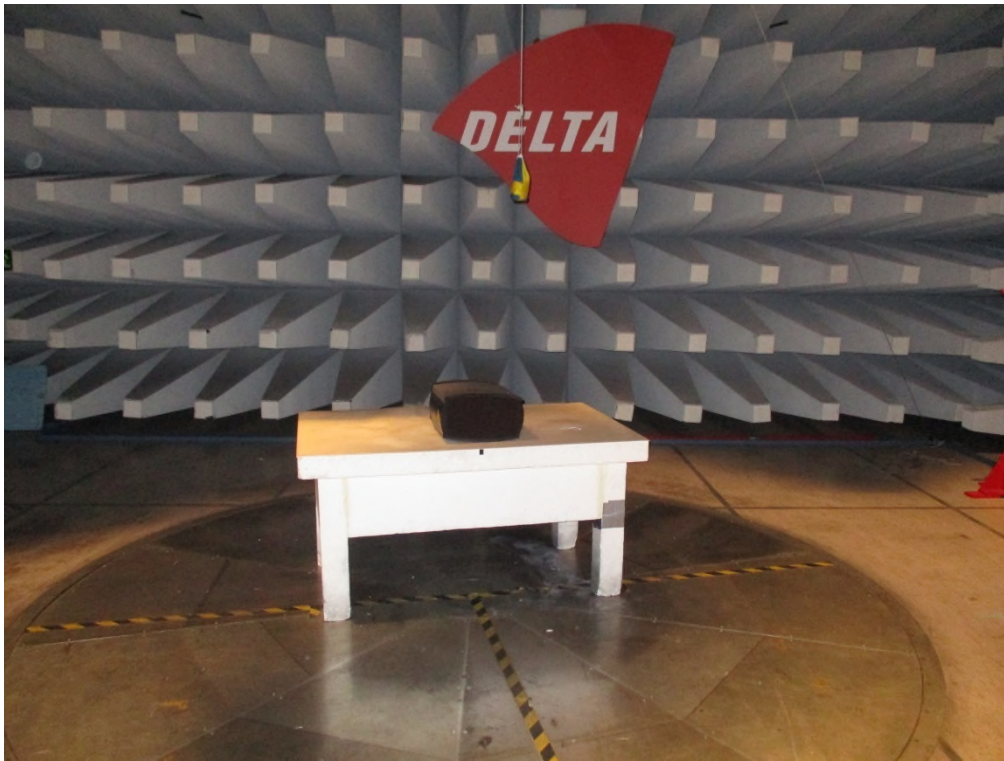


Photo 4.1.3 Test setup regarding measurement of radio frequency electromagnetic field.  
Horizontal orientation of test object

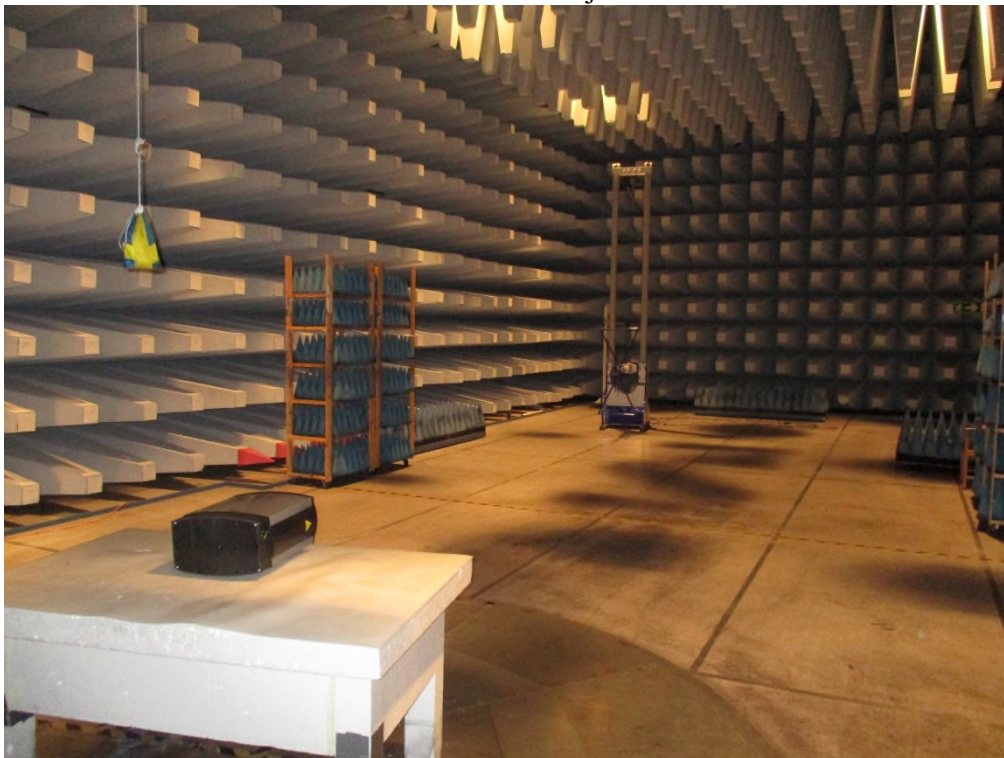
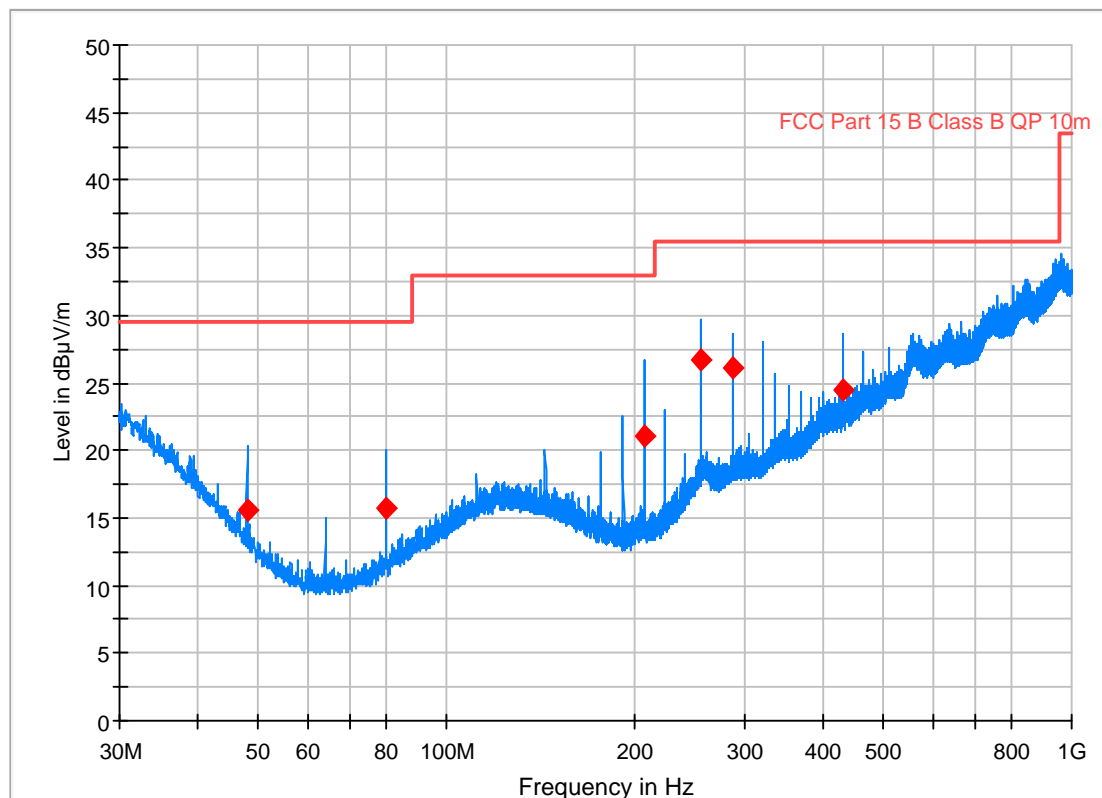


Photo 4.1.4 Test setup regarding measurement of radio frequency electromagnetic field.  
Horizontal orientation of test object

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 30 - 1000 MHz  
 Date: 2018-08-21  
 EUT Name: SmartBox Link  
 Manufacturer: Anticimex  
 Serial Number: 58005005  
 Operating Conditions: Battery, radio off  
 Test Site: DELTA Development Technology AB  
 Operator Name: Lars J  
 Test Specification: FCC part 15 C  
 Comment: Normal orientation



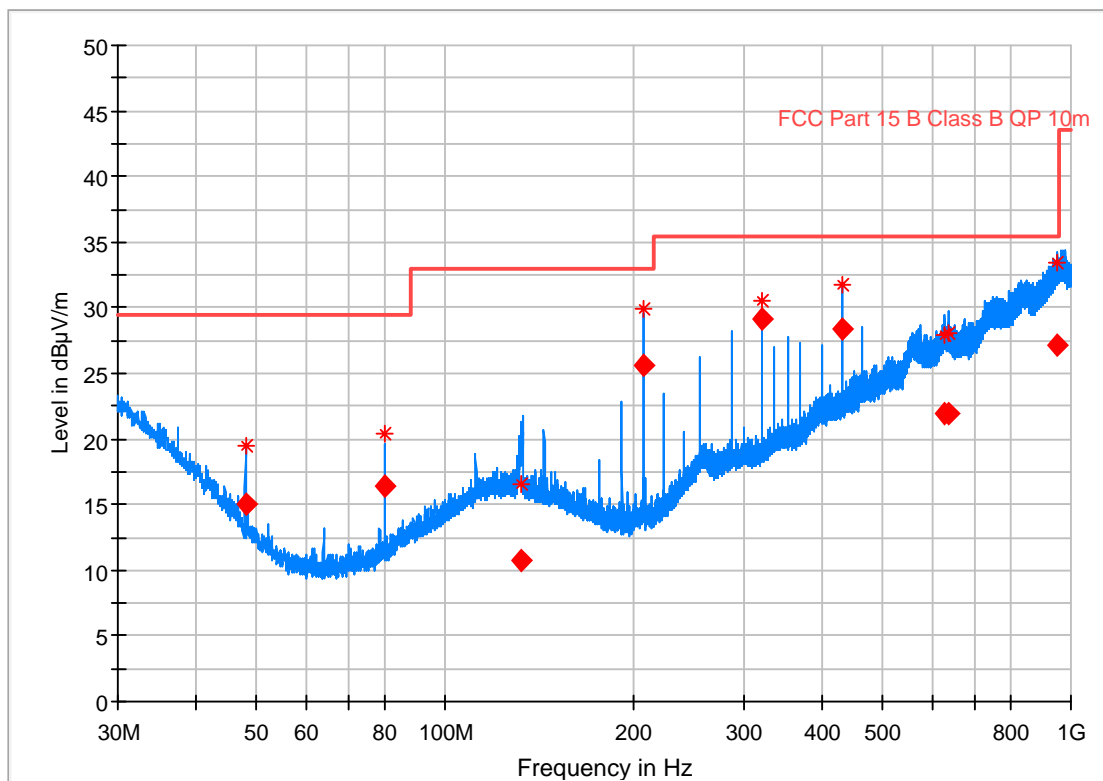
— Preview Result 1-PK+    — FCC Part 15 B Class B QP 10m    ◆ Final\_Result QPK

## Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
48.000000	15.64	29.50	13.86	1000.0	120.000	150.0	V	191.0	-13.0
79.980000	15.67	29.50	13.83	1000.0	120.000	250.0	V	149.0	-14.8
207.990000	21.07	33.00	11.93	1000.0	120.000	292.0	H	268.0	-11.6
255.990000	26.68	35.50	8.82	1000.0	120.000	304.0	H	97.0	-7.3
288.000000	26.04	35.50	9.46	1000.0	120.000	225.0	H	98.0	-7.2
431.970000	24.52	35.50	10.98	1000.0	120.000	165.0	H	275.0	-4.1

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 30 - 1000 MHz  
 Date: 2018-07-03  
 EUT Name: SmartBox Link  
 Manufacturer: Anticimex  
 Serial Number: 58005005  
 Operating Conditions: Battery, radio off  
 Test Site: DELTA Development Technology AB  
 Operator Name: CABG  
 Test Specification: FCC Part 15 C  
 Comment: Horizontal orientation of test object



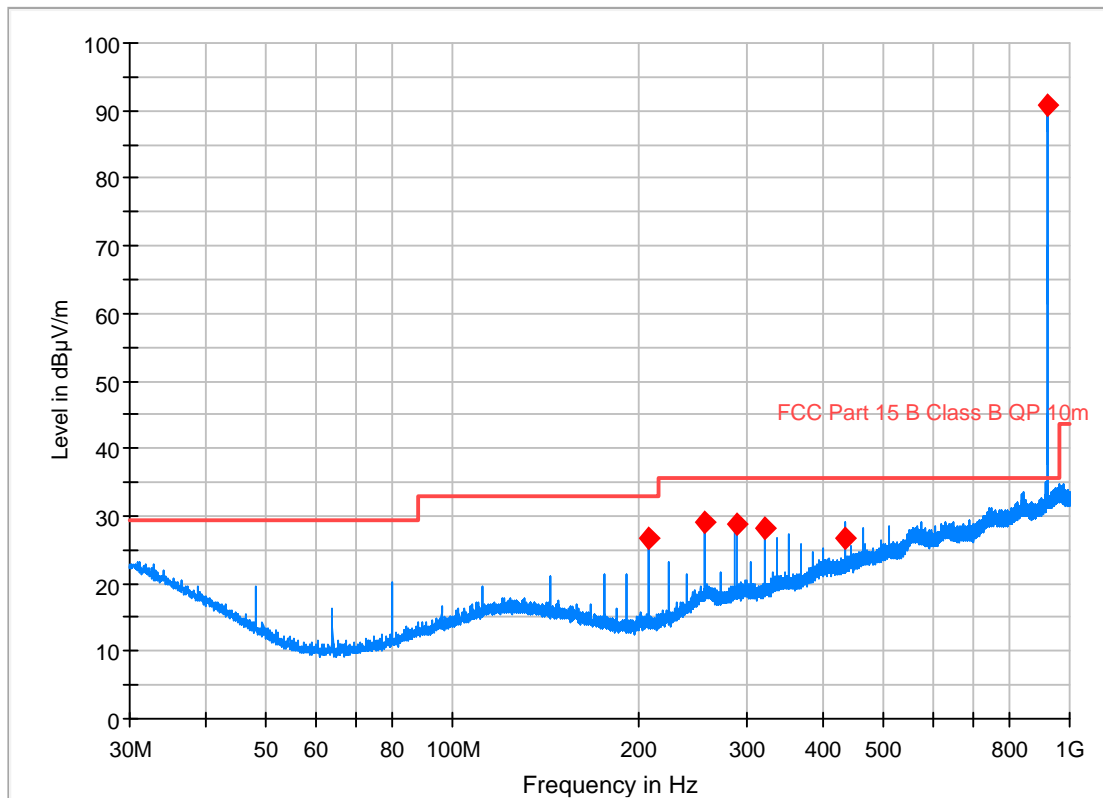
— 618-20125 RE1-PK+      \* Critical\_Freqs PK+  
 — FCC Part 15 B Class B QP 10m      ◆ Final\_Result QPK

## Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
48.000000	15.00	29.50	14.50	1000.0	120.000	290.0	V	160.0	-13.0
79.980000	16.41	29.50	13.09	1000.0	120.000	400.0	H	176.0	-14.8
132.300000	10.70	33.00	22.30	1000.0	120.000	350.0	V	301.0	-9.8
207.990000	25.61	33.00	7.39	1000.0	120.000	322.0	H	325.0	-11.6
319.980000	29.12	35.50	6.38	1000.0	120.000	250.0	H	58.0	-7.1
431.970000	28.40	35.50	7.10	1000.0	120.000	197.0	H	222.0	-4.1
627.180000	21.87	35.50	13.63	1000.0	120.000	150.0	H	49.0	0.0
638.790000	21.91	35.50	13.59	1000.0	120.000	308.0	V	127.0	0.1
951.720000	27.09	35.50	8.42	1000.0	120.000	136.0	H	1.0	5.8

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 30 - 1000 MHz  
 Date: 2018-08-21  
 EUT Name: SmartBox Link  
 Manufacturer: Anticimex  
 Serial Number: 58005005  
 Operating Conditions: Battery, radio on  
 Test Site: DELTA Development Technology AB  
 Operator Name: Lars J  
 Test Specification: FCC part 15 C  
 Comment: Normal orientation



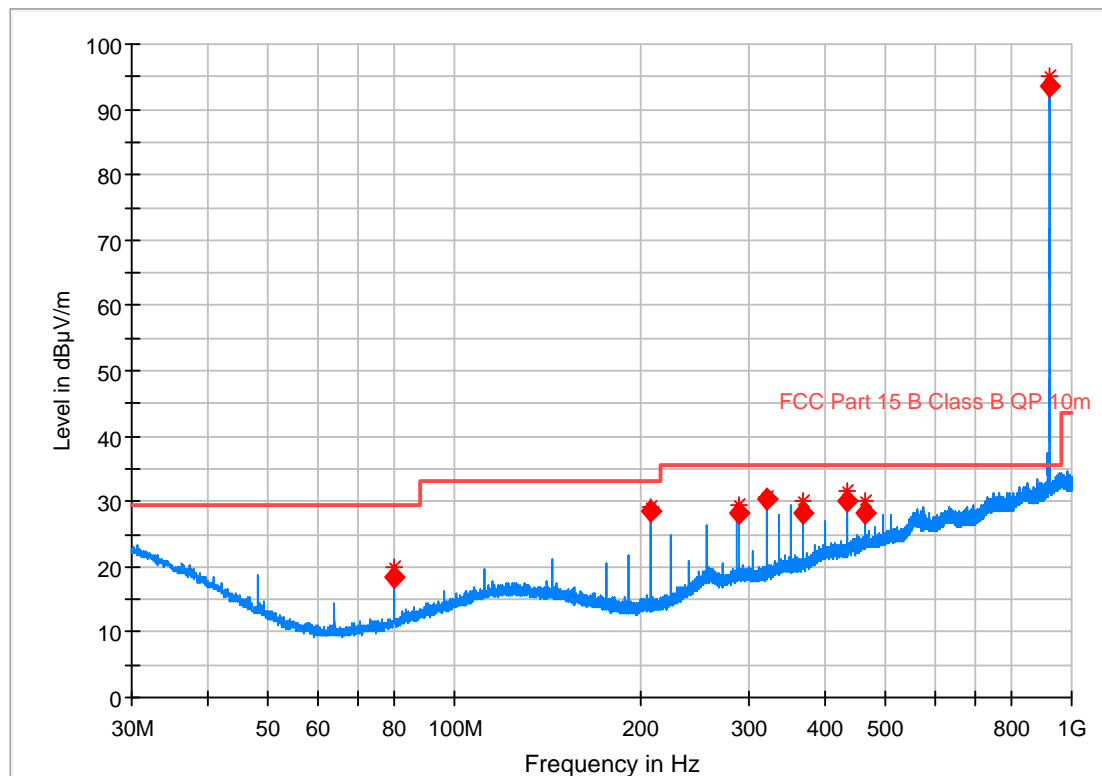
— Preview Result 1-PK+    — FCC Part 15 B Class B QP 10m    ◆ Final\_Result QPK

## Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
207.990000	26.60	33.00	6.40	1000.0	120.000	100.0	V	358.0	-11.6
255.990000	29.08	35.50	6.42	1000.0	120.000	291.0	H	95.0	-7.3
288.000000	28.89	35.50	6.61	1000.0	120.000	220.0	H	83.0	-7.2
319.980000	28.09	35.50	7.41	1000.0	120.000	232.0	H	56.0	-7.1
432.000000	26.75	35.50	8.75	1000.0	120.000	400.0	H	263.0	-4.1
920.010000	90.76	35.50	-55.26	1000.0	120.000	204.0	V	315.0	4.6

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 30 - 1000 MHz  
 Date: 2018-07-03  
 EUT Name: SmartBox Link  
 Manufacturer: Anticimex  
 Serial Number: 58005005  
 Operating Conditions: Battery, radio on continuously  
 Test Site: DELTA Development Technology AB  
 Operator Name: CABG  
 Test Specification: FCC Part 15 C  
 Comment: Horizontal orientation of test object



— 618-20125 RE2-PK+      \* Critical\_Freqs PK+  
 — FCC Part 15 B Class B QP 10m      ◆ Final\_Result QPK

## Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
80.010000	18.47	29.50	11.03	1000.0	120.000	390.0	H	168.0	-14.8
207.990000	28.66	33.00	4.34	1000.0	120.000	323.0	H	338.0	-11.6
288.000000	28.23	35.50	7.27	1000.0	120.000	298.0	H	93.0	-7.2
319.980000	30.52	35.50	4.98	1000.0	120.000	237.0	H	61.0	-7.1
367.980000	28.10	35.50	7.40	1000.0	120.000	202.0	H	90.0	-5.7
431.970000	29.99	35.50	5.51	1000.0	120.000	186.0	H	92.0	-4.1
463.980000	28.35	35.50	7.15	1000.0	120.000	175.0	H	94.0	-3.3
920.010000	93.53	35.50	-58.03	1000.0	120.000	150.0	V	221.0	4.6

## 4.2 Measurement of radio frequency electromagnetic field (above 1 GHz)

Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	03 Jul. 18, 21 Aug. 18
Serial no.	58005005	Initials	CABG, LAJ
Specification	FCC Part 15 C	Frequency	1-10 GHz

Test method	ANSI C63.10:2013	Temperature	22 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	40 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMC Hall A Västerås Setup VEC1	Uncertainty	5 dB

Test result	The measured field strengths were below the limit
Compliant	Yes
Comments	<p>Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation</p> <p>The test was performed with the test object in normal orientation. It was also performed with the test object in horizontal orientation to obtain maximum exposure of the circuit board.</p>
Example calculation	$\text{Measured level (dB}\mu\text{V/m)} = \text{Analyzer reading [dB}\mu\text{V]} + \text{cable loss [dB]} - \text{preamplifier gain [dB]} + \text{antenna factor [dB}\mu\text{V/m]}$



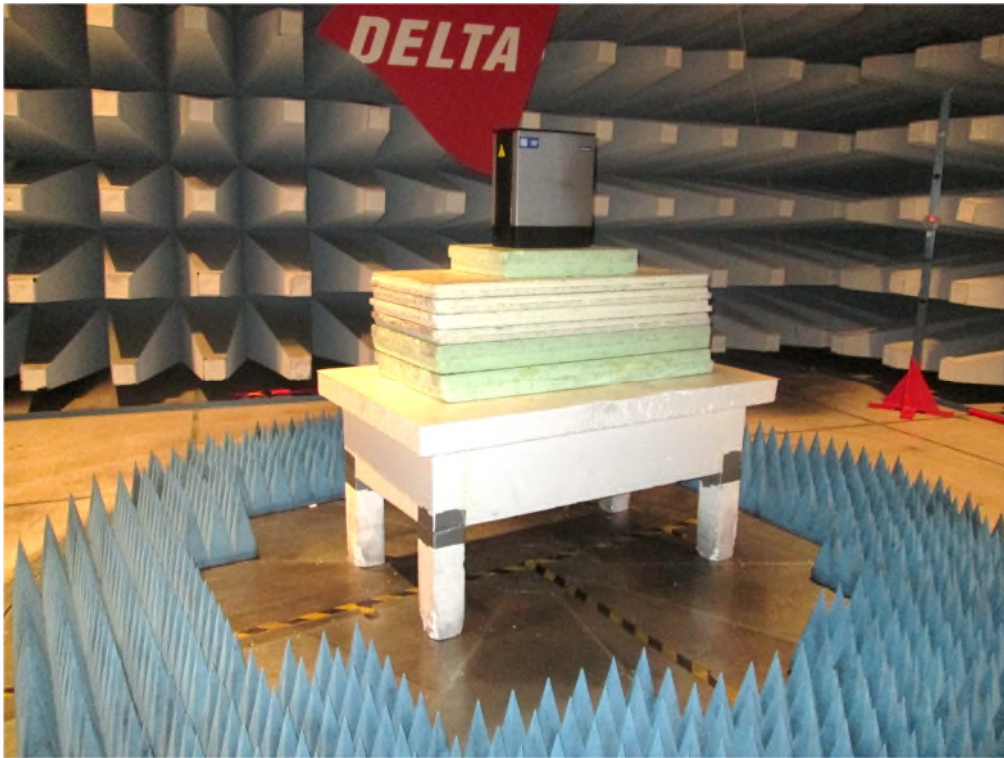


Photo 4.2.1 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz). Normal orientation of test object



Photo 4.2.2 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz). Normal orientation of test object

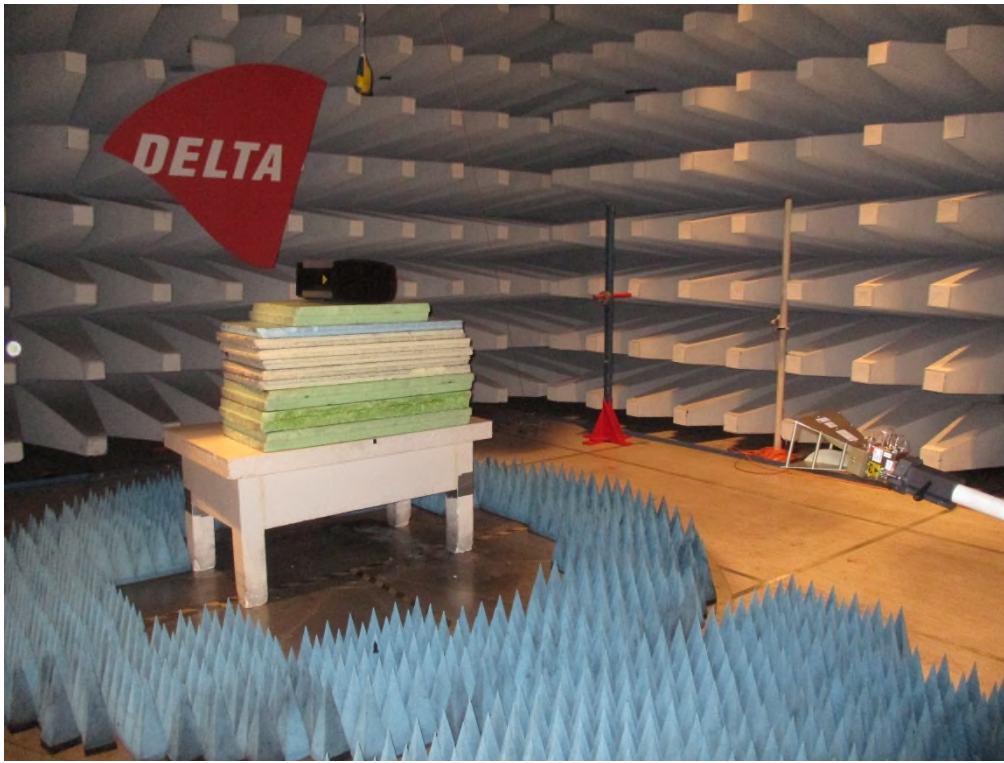


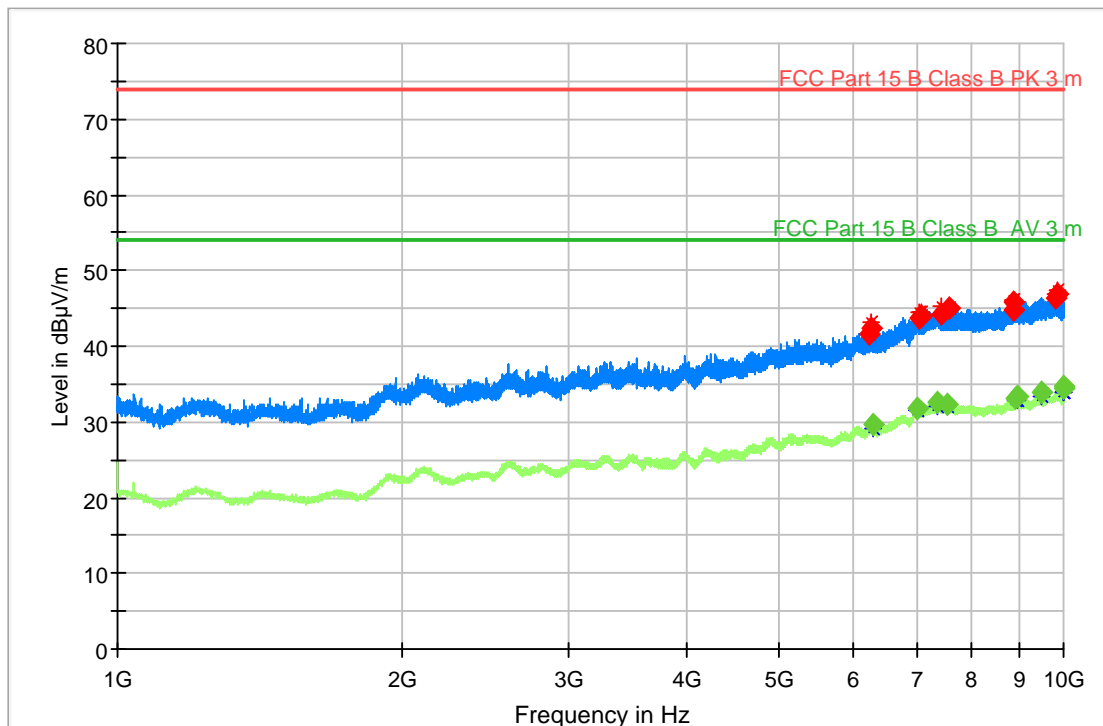
Photo 4.2.3 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz). Horizontal orientation of test object



Photo 4.2.4 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz). Horizontal orientation of test object

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 1-10 GHz  
Date: 2018-07-03  
EUT Name: SmartBox Link  
Manufacturer: Anticimex  
Serial Number: 58005005  
Operating Conditions: Battery, radio off  
Test Site: DELTA Development Technology AB  
Operator Name: CABG  
Test Specification: FCC Part 15 C  
Comment: Horizontal orientation of test object



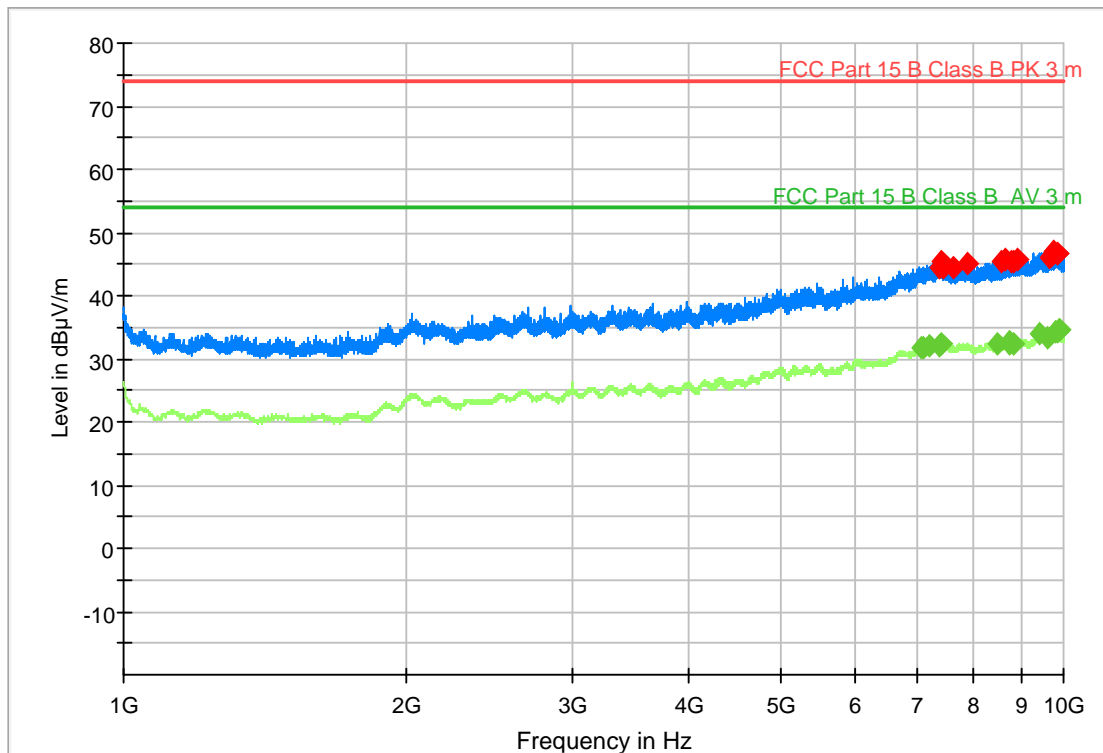
- 618-20134 RE4-AVG
- 618-20134 RE4-PK+
- Critical\_Freqs AVG
- Critical\_Freqs PK+
- FCC Part 15 B Class B PK 3 m
- FCC Part 15 B Class B AV 3 m
- Final\_Result PK+
- Final\_Result CAV

## Final\_Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
6219.791000	41.65	---	74.00	32.35	1500.0	1000.000	103.0	H	118.0	2.8
6261.177500	42.26	---	74.00	31.74	1500.0	1000.000	103.0	V	250.0	2.8
6276.705000	---	29.78	54.00	24.22	1500.0	1000.000	106.0	V	85.0	2.8
7011.236000	---	31.73	54.00	22.27	1500.0	1000.000	100.0	V	339.0	5.8
7016.651000	---	31.82	54.00	22.18	1500.0	1000.000	100.0	V	351.0	5.8
7032.636000	43.73	---	74.00	30.27	1500.0	1000.000	200.0	V	327.0	5.8
7060.466000	43.98	---	74.00	30.02	1500.0	1000.000	258.0	H	174.0	5.9
7352.077500	---	32.71	54.00	21.29	1500.0	1000.000	103.0	V	192.0	6.5
7441.472500	44.35	---	74.00	29.65	1500.0	1000.000	300.0	H	190.0	6.4
7552.762500	---	32.36	54.00	21.64	1500.0	1000.000	100.0	V	356.0	6.6
7588.155000	44.94	---	74.00	29.06	1500.0	1000.000	150.0	V	355.0	6.6
8848.541000	44.80	---	74.00	29.20	1500.0	1000.000	200.0	H	192.0	7.6
8853.579000	45.75	---	74.00	28.25	1500.0	1000.000	161.0	V	175.0	7.6
8912.007500	---	33.21	54.00	20.79	1500.0	1000.000	103.0	V	300.0	7.6
8943.731000	---	33.27	54.00	20.73	1500.0	1000.000	103.0	V	344.0	7.7
9495.302500	---	33.86	54.00	20.14	1500.0	1000.000	106.0	V	351.0	8.5
9821.207500	46.40	---	74.00	27.60	1500.0	1000.000	184.0	V	263.0	8.9
9872.574000	46.80	---	74.00	27.20	1500.0	1000.000	214.0	H	269.0	9.0
9998.192500	---	34.53	54.00	19.47	1500.0	1000.000	100.0	V	311.0	9.2
10000.000000	---	34.64	54.00	19.36	1500.0	1000.000	103.0	V	296.0	9.2

# Radiated Emission Test

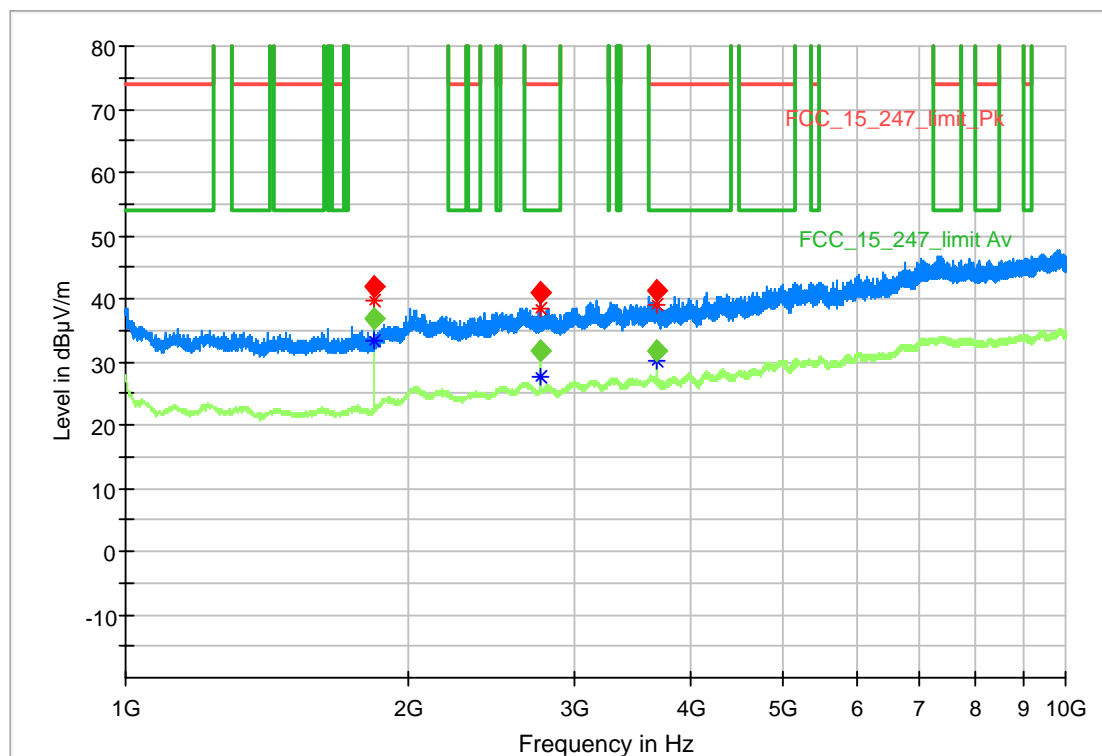
Test Description: Radiated emission. Complete measurement 1-10 GHz  
Date: 2018-08-21  
EUT Name: SmartBox Link  
Manufacturer: Anticimex  
Serial Number: 58005005  
Operating Conditions: Battery, radio off  
Test Site: DELTA Development Technology AB  
Operator Name: Lars J  
Test Specification: FCC part 15 C  
Comment: Normal orientation



— Preview Result 2-AVG      — Preview Result 1-PK+  
— FCC Part 15 B Class B PK 3 m      — FCC Part 15 B Class B AV 3 m  
◆ Final\_Result PK+      ◆ Final\_Result CAV

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 1-10 GHz  
 Date: 2018-08-08  
 EUT Name: SmartBox Link  
 Manufacturer: Anticimex  
 Serial Number: 58005005  
 Operating Conditions: Battery, radio on  
 Test Site: DELTA Development Technology AB  
 Operator Name: CABG  
 Test Specification: FCC part 15 C  
 Comment: 1 GHz high pass filter at rx antenna. Horizontal orientation of EUT



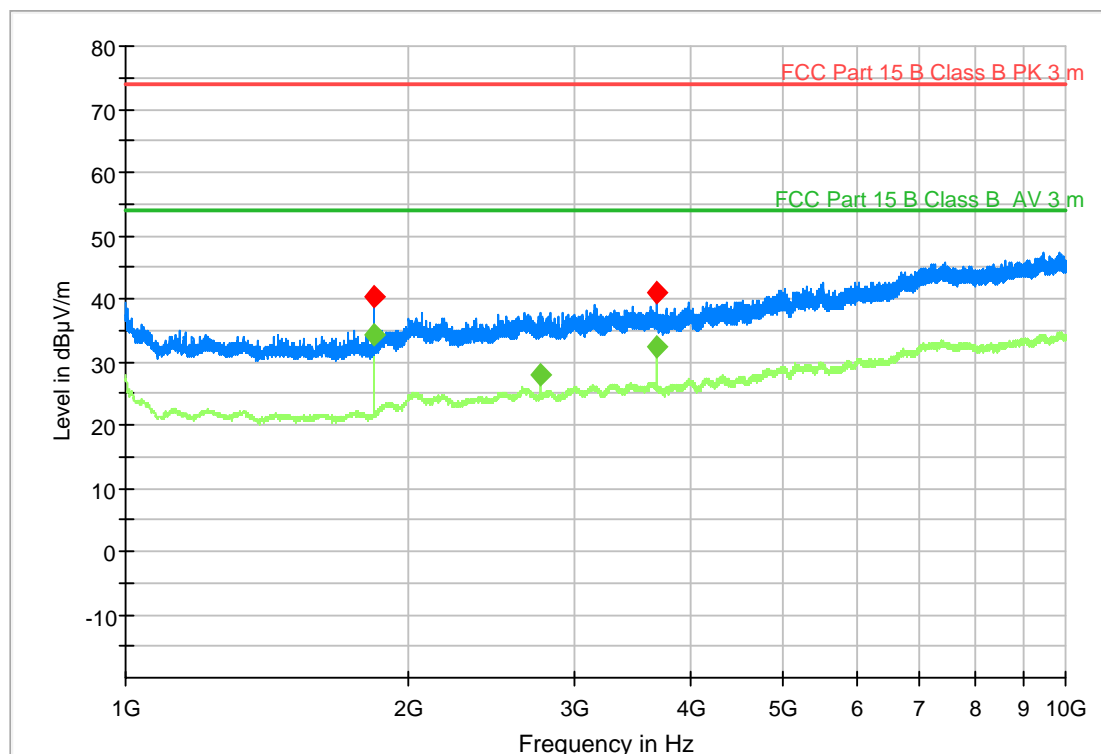
— 618-20125 RE5-AVG      — 618-20125 RE5 -PK+      \* Critical\_Freqs AVG  
♦ Critical\_Freqs PK+      — FCC\_15\_247\_limit\_Pk      — FCC\_15\_247\_limit\_Av  
♦ Final\_Result PK+      ♦ Final\_Result CAV

## Final\_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1840.000000	---	36.80	540.00	503.20	1500.0	1000.000	100.0	V	-11.0	-10.2
1840.000000	41.86	---	540.00	498.14	1500.0	1000.000	103.0	V	-8.0	-10.2
2760.000000	---	31.84	54.00	22.16	1500.0	1000.000	100.0	V	264.0	-5.6
2760.000000	41.08	---	74.00	32.92	1500.0	1000.000	150.0	V	266.0	-5.6
3680.000000	41.23	---	74.00	32.77	1500.0	1000.000	111.0	V	284.0	-2.9
3680.000000	---	31.69	54.00	22.31	1500.0	1000.000	103.0	V	283.0	-2.9

# Radiated Emission Test

Test Description: Radiated emission. Complete measurement 1-10 GHz  
 Date: 2018-08-22  
 EUT Name: SmartBox Link  
 Manufacturer: Anticimex  
 Serial Number: 58005005  
 Operating Conditions: Battery, radio on  
 Test Site: DELTA Development Technology AB  
 Operator Name: Lars J  
 Test Specification: FCC part 15 C  
 Comment: Normal orientation



— ExistingD2-AVG      — ExistingD1-PK+  
— FCC Part 15 B Class B PK 3 m      — FCC Part 15 B Class B AV 3 m  
◆ Final\_Result PK+      ◆ Final\_Result CAV

## Final\_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1840.000000	---	34.42	54.00	19.58	1500.0	1000.000	100.0	H	6.0	-10.2
1840.000000	40.25	---	74.00	33.75	1500.0	1000.000	103.0	H	6.0	-10.2
2760.000000	---	27.79	54.00	26.21	1500.0	1000.000	100.0	V	101.0	-5.6
3680.000000	---	32.24	54.00	21.76	1500.0	1000.000	137.0	V	1.0	-2.9
3680.000000	40.85	---	74.00	33.15	1500.0	1000.000	136.0	V	3.0	-2.9

### 4.3 Measurement of maximum conducted output power

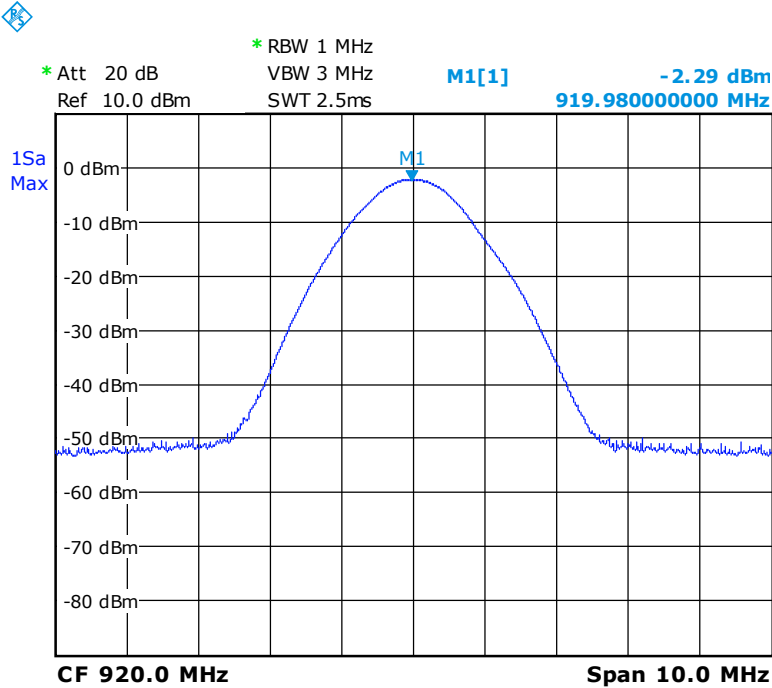
Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	26 Jun. 18
Serial no.	58005005	Initials	LAJ
Specification	FCC 47 CFR 15.247		

Test method	ANSI C63.10:2013	Temperature	24°C
Characteristics	Procedures for testing DTS devices	Humidity	40 % RH
Test equipm.	SRD lab Västerås. Setup VSRD	Uncertainty	1.1 dB
SA Settings	RBW: 1 MHz VBW: 3 MHz SPAN: 10 MHz DET: Peak CF: 920 Trace: Max. hold		

Operating frequency [MHz]	Measured [dBm]	Ext. attenuation [dB]	Conducted output power [dBm]	Limit [dBm]	Passed	Remarks
920	-2.29	12.3	10.0	30 (1 Watts)	Yes	

Test result	The measured maximum conducted output power is within limit
Test port	Antenna connector
Test frequency	920 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	External attenuation 12.3 dB (Cable and attenuator) shall be added to measured result.





Date: 26.JUN.2018 10:51:56

Figure 4.3.1 Maximum conducted output power. Nominal temperature and voltage.



Photo 4.3.2 Test setup regarding measurement of maximum conducted output power.

#### 4.4 Measurement of 6 dB bandwidth

Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	28 Aug. 18
Serial no.	58005005	Initials	LAJ
Specification	FCC 47 CFR 15.247		

Test method	ANSI C63.10:2013	Temperature	22°C
Characteristics	Procedures for testing DTS devices	Humidity	50 % RH
Test equipm.	SRD lab Västerås. Setup VSRD	Uncertainty	1.1 dB
SA Settings	RBW: 30 kHz VBW: 100 kHz SPAN: 3 MHz CF: 920 MHz DET: Peak Trace: Max. hold		

Operating frequency [MHz]	Low frequency [MHz]	High frequency [MHz]	6 dB bandwidth [kHz]	Limit [kHz]	Passed	Remarks
920	919.667	920.320	652	≥ 500	Yes	

Band edge criteria                      The minimum 6 dB bandwidth shall be  $\geq 500$  kHz

Test result                                      The measured 6 dB bandwidth were within limit

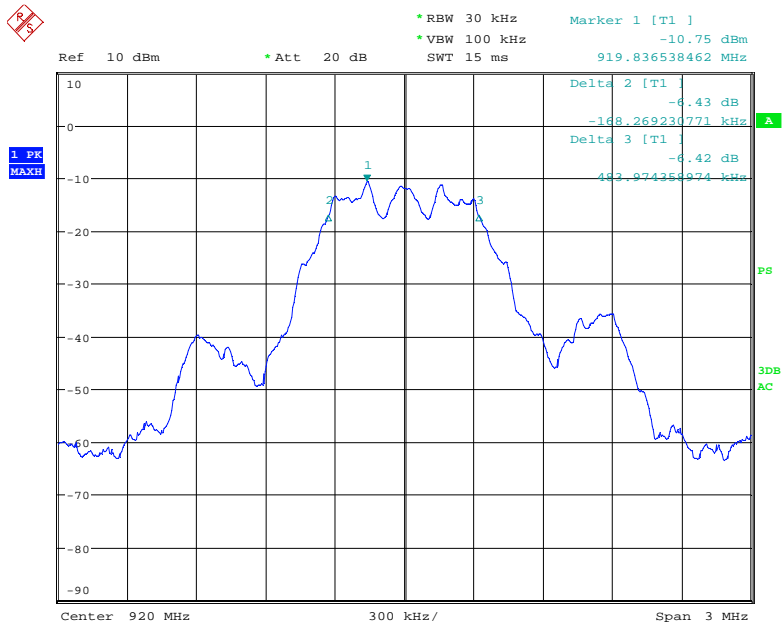
Test port    Antenna connector

Frequency at reference value              919.837 MHz

Test mode    Continuous Tx - normal modulation

Condition    Normal

Compliant    Yes



Date: 28.AUG.2018 14:48:50

Figure 4.4.1 Measurement of 6 dB bandwidth.



Photo 4.4.2 Test setup regarding measurement of 6 dB bandwidth.

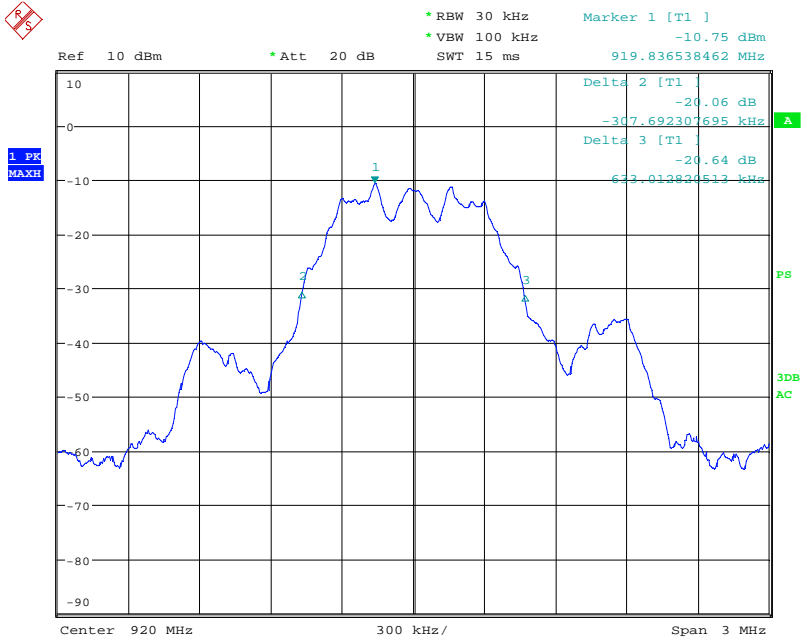
#### 4.5 Measurement of 20 dB bandwidth

Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	28 Aug. 18
Serial no.	58005005	Initials	LAJ
Specification	FCC 47 CFR 15.215(c)		

Test method	ANSI C63.10:2013	Temperature	24°C
Characteristics	Procedures for testing DTS devices	Humidity	40 % RH
Test equipm.	SRD lab Västerås. Setup VSRD	Uncertainty	1.1 dB
SA Settings	RBW: 30 kHz VBW: 100 kHz SPAN: 3 MHz CF: 920 MHz DET: Peak Trace: Max. hold		

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Passed	Remarks
Lowest frequency	919.53	902	Yes	
Highest frequency	920.47	928	Yes	

Band edge criteria	20 dB bandwidth
Test result	The measured 20 dBc bandwidth were within limit
Test port	Antenna connector
Frequency at reference value	919.837 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes



Date: 28.AUG.2018 14:49:57

Figure 4.5.1 Measurement of 20 dB bandwidth.



Photo 4.5.2 Test setup regarding measurement of 20 dB bandwidth.

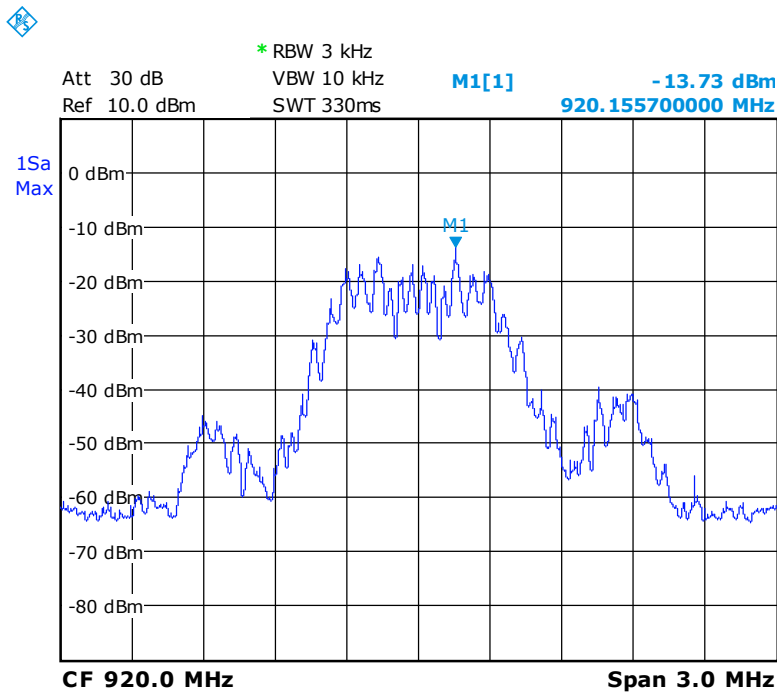
#### 4.6 Measurement of power spectral density, conducted

Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	26 Jun. 18
Serial no.	58005005	Initials	LAJ
Specification	FCC 47 CFR 15.247		

Test method	ANSI C63.10:2013	Temperature	24°C
Characteristics	Procedures for testing DTS devices	Humidity	40 % RH
Test equipm.	SRD lab Västerås. Setup VSRD	Uncertainty	1.1 dB
SA Settings	RBW: 3 kHz VBW: 10 kHz SPAN: MHz DET: Peak CF: MHz Trace: Max. hold		

Operating frequency [MHz]	Measured power [dBm]	Ext. attenuation [dB]	Power spectral density [dBm]	Limit [dBm]	Passed	Remarks
920	-13.73	12.3	-1.4	8	Yes	

Test result	The measured power spectral density was within the limit
Test Port	Antenna connector
Test frequency	920 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes



Date: 26.JUN.2018 10:55:41

Figure 4.6.1 Measurement of power spectral density.

#### 4.7 Measurement of conducted spurious emission

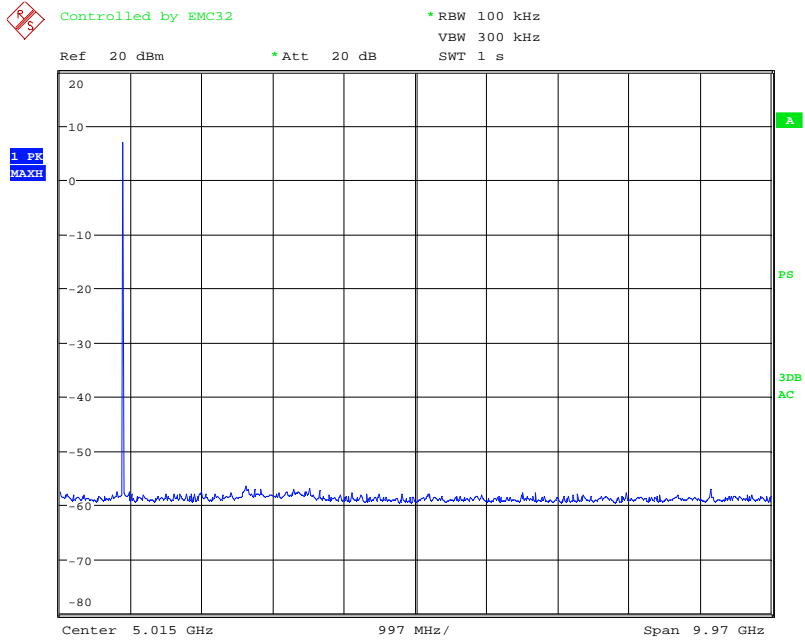
Test object	Smart Box Link	Project no.	618-20125
Type	200612	Date	26 Jun. 18
Serial no.	58005005	Initials	LAJ
Specification	FCC 47 CFR 15.247	Frequency	30 MHz- 10 GHz

Test method	ANSI C63.10:2013	Temperature	24°C
Characteristics	Procedures for testing DTS devices	Humidity	40 % RH
Test equipm.	SRD lab Västerås. Setup VSRD	Uncertainty	1.1 dB
SA Settings	RBW: 100 kHz VBW: 300 kHz DET: Peak Trace: Max. hold		

Frequency [MHz]	Peak measurement [dBm]	Limit [dB]	Passed	Remarks
0.03-10 000	noise	>20	Yes	

Test result	The measured conducted spurious emissions are within limit
Test port	Antenna connector
Test frequency	920 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	No spurious emission was detected.





Date: 26.JUN.2018 07:57:26

Figure 4.7.1 Measurement of conducted spurious emission.

## 5. National registrations and accreditations

### 5.1 SWEDAC Accreditation

**Organization:** Swedish Board for Accreditation and Conformity Assessment - SWEDAC, see [www.swedac.se](http://www.swedac.se) and [www.ilac.org](http://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

<b>Setup VEC1</b>						
<b>Measurement of radio frequency electromagnetic field</b>				<b>Setup uncertainty:</b>		
				5.0 dB	30-1000 MHz (10 m)	
				6.3 dB	30-1000 MHz (3 m)	
				5.0 dB	1-18 GHz (3 m)	
				5.2 dB	18-26.5 GHz (3 m)	
<b>Used</b>	<b>ID no.</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Type no.</b>	<b>Cal Date</b>	<b>Due Date</b>
<input checked="" type="checkbox"/>	-	Chamber A	-	NSA 3 and 10 m	12/01/2018	12/01/2021
<input checked="" type="checkbox"/>	-	Chamber A	-	VSWR	04/02/2018	04/02/2021
<input checked="" type="checkbox"/>	36070	Software	Rohde & Schwarz	EMC32 v. 10.28.00	-	
<input checked="" type="checkbox"/>	36020	Measuring receiver	Rohde & Schwarz	ESU26	26/01/2018	26/01/2019
<input checked="" type="checkbox"/>	IE-B928	Antenna Bilog	Chase	CBL6111A	09/08/2017	09/08/2019
<input checked="" type="checkbox"/>	IE-B758	Preamplifier	HP	8447F	26/07//2018	26/07//2019
<input checked="" type="checkbox"/>	36126	Attenuator 4 dB	Weinschel	WA8/6-4-34	04/06/2018	04/06/2019
<input checked="" type="checkbox"/>	E-1839	Antenna Horn 1-18 GHz	ARA	DRG-118/A	02/08/2017	02/08/2019
<input checked="" type="checkbox"/>	36021	Preamplifier 1-18 GHz	Quinstar	QLJ-01184040-J0	23/11/2016	23/11/2018
<input type="checkbox"/>	36090	Antenna Horn 18-26.5 GHz	Com-Power Corp.	AH-826	08/11/2017	08/11/2019
<input type="checkbox"/>	36091	Low Noise amplifier 18-26.5 GHz	Miteq	AMF-4F-18002650- 20-10P-R	26/07/2017	26/07/2019
<input checked="" type="checkbox"/>	W40.08	Cable 10 m, CP1 – Ant.	Rosenberger	UFB293C-1-10	23/05/2018	23/05/2020
<input checked="" type="checkbox"/>	W52.25	Cable 18 m, Cntrl.room-CP1	Rosenberger	UFB311A-0-18	23/05/2018	23/05/2020
<input checked="" type="checkbox"/>	W18.03	Cable 3 m, Preamp. – AP3	Rosenberger	UFB293C-1-3	23/05/2018	23/05/2020
<input checked="" type="checkbox"/>	W52.16	Cable 1 m, ESU26–Preamp	Rohde & Schwarz	RG214	23/05/2018	23/05/2020
<input checked="" type="checkbox"/>	W53.07	Cable 7 m. ESU -Horn ant.	Rosenberger	LU1-S012-7000	31/01/2018	31/01/2020
<input checked="" type="checkbox"/>	36071	Controller	Maturo	NCD	-	-
<input checked="" type="checkbox"/>	36072	Tilt antenna mast	Maturo	TAM 4.0-E	-	-
<input checked="" type="checkbox"/>		Turntable	Heinrich Deisel	DT 440	-	-

<b>Västerås Setup VSRD</b>						
<b>Measurement of radio parameters</b>						
<b>Used</b>	<b>ID no.</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Type no.</b>	<b>Cal Date</b>	<b>Due Date</b>
<input checked="" type="checkbox"/>	36065	Measuring receiver	Rohde & Schwarz	ESL6	31/07/2018	31/07/2019
<input checked="" type="checkbox"/>	36020	Measuring receiver	Rohde & Schwarz	ESU26	26/01/2018	26/01/2019
<input checked="" type="checkbox"/>	35120	Attenuator 10 dB	Mini-Circuits	NAT-10 1W, N	07/12/2017	07/12/2018
<input checked="" type="checkbox"/>	-	RF cable SMA-RP	No name	RG-58	26/06/2017	Note1
<input checked="" type="checkbox"/>	-	RF cable SMA - N	Siretta	ASMA300R058L	26/06/2017	Note1
Note 1: Cable loss measured prior to test						

## 6.1 Previous calibration dates

Certain instruments have been calibrated between test occasions. For tests performed before the 24 of august the following calibration and due dates applies.

<b>Setup VEC1</b>						
<b>Measurement of radio frequency electromagnetic field</b>				<b>Setup uncertainty:</b>		
				5.0 dB	30-1000 MHz (10 m)	
				6.3 dB	30-1000 MHz (3 m)	
				5.0 dB	1-18 GHz (3 m)	
				5.2 dB	18-26.5 GHz (3 m)	
<b>Used</b>	<b>ID no.</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Type no.</b>	<b>Cal Date</b>	<b>Due Date</b>
<input checked="" type="checkbox"/>	-	Chamber A	-	NSA 3 and 10 m	12/01/2018	12/01/2021
<input checked="" type="checkbox"/>	-	Chamber A	-	VSWR	04/02/2018	04/02/2021
<input checked="" type="checkbox"/>	36070	Software	Rohde & Schwarz	EMC32 v. 10.28.00	-	
<input checked="" type="checkbox"/>	36020	Measuring receiver	Rohde & Schwarz	ESU26	26/01/2018	26/01/2019
<input checked="" type="checkbox"/>	IE-B928	Antenna Bilog	Chase	CBL6111A	09/08/2017	09/08/2019
<input checked="" type="checkbox"/>	IE-B758	Preamplifier	HP	8447F	26/07/2017	26/07/2018
<input checked="" type="checkbox"/>	36126	Attenuator 4 dB	Weinschel	WA8/6-4-34	04/06/2018	04/06/2019
<input checked="" type="checkbox"/>	E-I839	Antenna Horn 1-18 GHz	ARA	DRG-118/A	02/08/2017	02/08/2019
<input checked="" type="checkbox"/>	36021	Preamplifier 1-18 GHz	Quinstar	QLJ-01184040-J0	23/11/2016	23/11/2018
<input checked="" type="checkbox"/>	36071	Controller	Maturo	NCD	-	-
<input checked="" type="checkbox"/>	36072	Tilt antenna mast	Maturo	TAM 4.0-E	-	-
<input checked="" type="checkbox"/>		Turntable	Heinrich Deisel	DT 440	-	-

<b>Västerås Setup VSRD</b>						
<b>Measurement of radio parameters</b>						
<b>Used</b>	<b>ID no.</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Type no.</b>	<b>Cal Date</b>	<b>Due Date</b>
<input checked="" type="checkbox"/>	36065	Measuring receiver	Rohde & Schwarz	ESL6	31/07/2017	31/07/2018
<input checked="" type="checkbox"/>	35120	Attenuator 10 dB	Mini-Circuits	NAT-10 1W, N	07/12/2017	07/12/2018
<input checked="" type="checkbox"/>	-	RF cable SMA-RP	No name	RG-58	26/06/2017	Note1
<input checked="" type="checkbox"/>	-	RF cable SMA - N	Siretta	ASMA300R058L	26/06/2017	Note1
Note 1: Cable loss measured prior to test. Measured with ESL6, ID no. 36065						

## 7. Revision

<b>Rev. index</b>	<b>Description</b>	<b>Date/ Init</b>
-	New document	13 Aug 2018/ LAJ
R1	Model designation changed from US-type to 200612 Section 2.1: Radio parameters specified Section 4.1 and 4.2: Emission measurements complemented with measurements in normal orientation. Section 4.4 and 4.5: Measurement results corrected Section 6: Instrument list corrected	26 Aug 2018/ LAJ
R2	Section 2.1: Manufacturers antenna gain declared Section 4.4 and 4.5: Measurement results corrected Section 6: Date format corrected	29 Aug 2018/ LAJ