

FORCE Technology Test Report



EMC emission test of Smart Connect

Performed for Anticimex Innovation Center

Report no.: 117-21624-5 Revision 1

Page 1 of 28

12 February 2018

FORCE Technology
Venlighedsvej 4
2970 Hørsholm
Denmark
Tlf. +45 72 19 40 00
Fax +45 72 19 40 01
www.force.dk

Title	EMC emission test of Smart Connect
Test object	Smart Connect
Report no.	117-21624-5 Revision 1
Test period	05 to 22 December 2017
Client	Anticimex Innovation Center Skovgårdsvej 25 3200 Helsingør Denmark Tel.: +45 48207348
Contact person	Dennis Dupont Hansen E-mail: Dennis.hansen@anticimex.com
Manufacturer	Anticimex Innovation Center
Specifications	FCC 47 CFR Part 15, Subpart B, Class B
Results	The test object was found to be in compliance with the specifications
Test personnel	Henrik Klarskov Møller Peter Wolf Frandsen
Test site	Venlighedsvej 4, 2970 Hørsholm, Denmark

Date 12 February 2018

Project Manager

A handwritten signature in blue ink, appearing to read "Peter Wolf Frandsen".

Peter Wolf Frandsen
Specialist, EMC
FORCE Technology

Responsible

A handwritten signature in blue ink, appearing to read "K. K. Jensen".

Karsten Kruse Jensen
Head of Department
FORCE Technology

This test report replaces previously issued test report 117-21624-5 dated 29 January 2018.
The changes in this report are:

FCC ID corrected in Clause 2.1

	Table of contents	Page
1.	Summary of tests	5
2.	Test object and auxiliary equipment	6
2.1	Test object	6
2.2	Auxiliary equipment	7
3.	General test conditions	8
3.1	Test setup during test	8
3.2	Test sequence	9
4.	Test results	10
4.1	Measurement of radio frequency voltage on mains (GSM-826 MHz)	10
4.2	Measurement of radio frequency voltage on mains (GSM-1.853 GHz)	12
4.3	Measurement of radio frequency electromagnetic field (GSM-826 MHz)	14
4.4	Measurement of radio frequency electromagnetic field (GSM-1.853 GHz)	17
4.5	Measurement of radio frequency electromagnetic field (> 1 GHz) (GSM-826 MHz)	20
4.6	Measurement of radio frequency electromagnetic field (> 1 GHz) (GSM-1.853 GHz)	23
5.	National registrations and accreditations	27
5.1	DANAK Accreditation	27
5.2	FCC Registrations	27
5.3	VCCI Registrations	27
5.4	IC Registrations	27
6.	List of instruments	28

1. Summary of tests

Tests	Test methods	Results
Measurement of radio frequency voltage on mains	ANSI C63.4:2014	Passed, see Note 1
Measurement of radio frequency electromagnetic field	ANSI C63.4:2014	Passed

Note 1: The test object contains no AC mains port. The measurement was performed on Auxiliary equipment 2.2.1 as a representable AC mains source.

The given result is based on a shared risk principle with respect to the measurement uncertainty.

Conclusion

The test object mentioned in this report meets the requirements of the standard stated below, with respect to the tests listed above.

- FCC 47 CFR Part 15, Subpart B, Class B

The test results relate only to the object tested.

2. Test object and auxiliary equipment

2.1 Test object

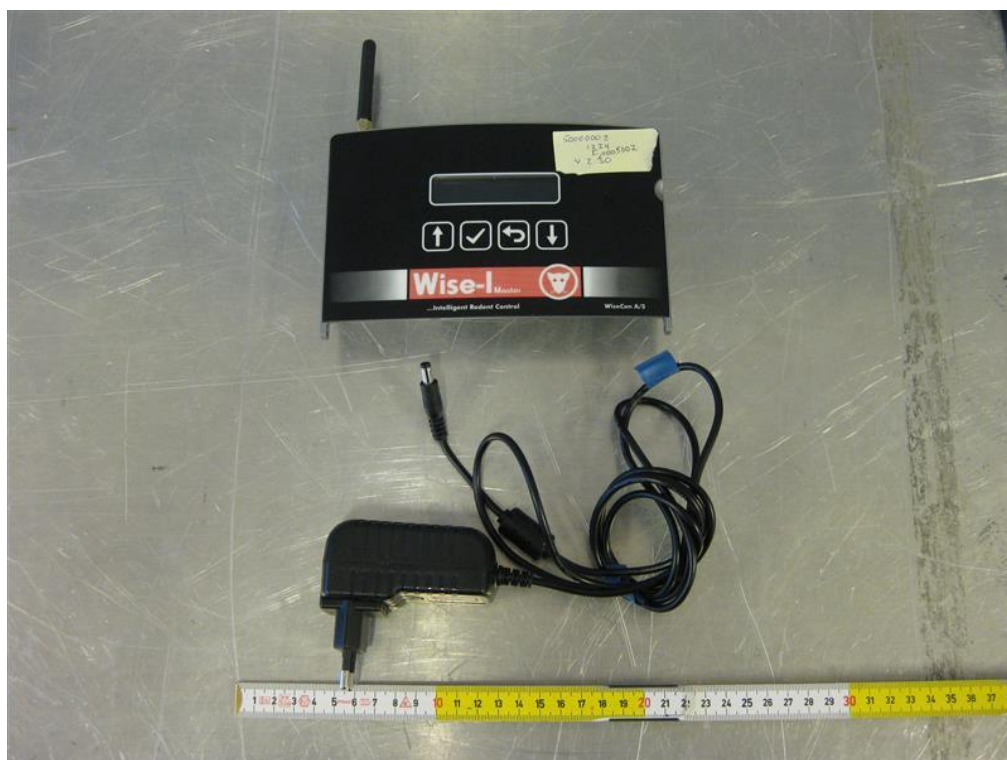


Photo 2.1.1 Test object and auxiliary equipment.

Test object 2.1.1

Name of test object	Smart Connect
Model / type	US-type
Part no.	300101
Serial no.	50000001
FCC ID	2A0FP-300101 Contains FCC ID XMR201510UC20
Manufacturer	Anticimex Innovation Center
Supply voltage	5 V
Software version	2.31
Hardware version	E1025-03
Cycle time	Continually
Highest frequency generated or used	2.1 GHz GSM
Comment	None
Received	Date: 05 December 2017. Status: Test object sampled and provided by customer.

2.2 Auxiliary equipment

Auxiliary equipment 2.2.1

Name of auxiliary equipment	Power Supply Smart Connect
Model / type	SK02G-0500300Z
Part no.	-
Serial no.	-
FCC ID	-
Manufacturer	STARWELL
Supply voltage	100-240 V ac
Highest frequency generated or used	< 108 MHz
Comment	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and setup.

3. General test conditions

3.1 Test setup during test

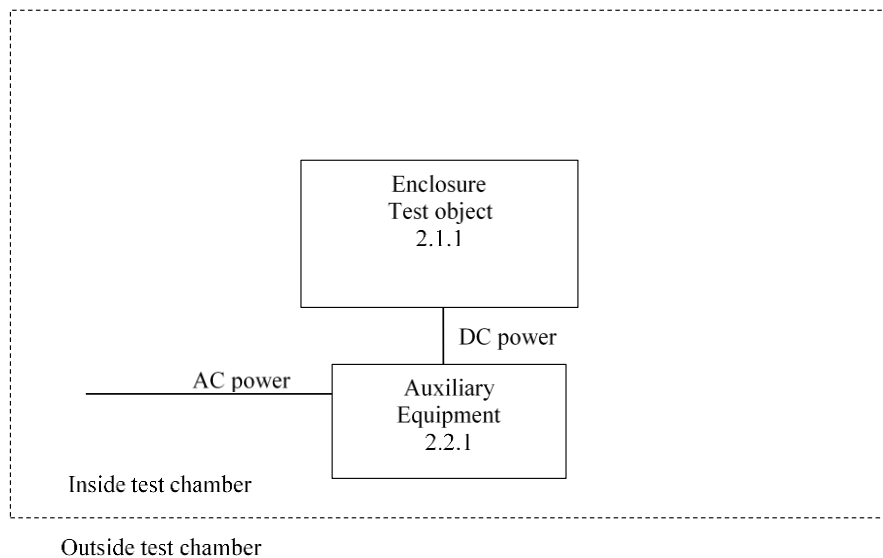


Figure 3.1.1 Block diagram of test object with cables and auxiliary equipment.

Cable name	Cable type	Shielded cable	Unshielded cable	Max. length		
				< 3 m	< 30 m	> 30 m
DC power	DC power		x	x		
AC power	AC power		x	-	-	-

Table 1: Cable specification.

3.1.1 Description of test setup

Special SRD test modes were used during testing. The tests are performed with an AC power at 120 VAC.

There are four test modes: (Only one radio transmits at a time, no simultaneous transmission).

1. The radio module modem is continuously transmitting in the 824-835 MHz band at 826 MHz.
2. The radio module modem is continuously transmitting in the 1850-1865 MHz band at 1.853 GHz.
3. An SRD radio is continuously transmitting in the 902-928 MHz band at 920 MHz. See test report 117-21624-4.
4. Normal mode: Operation mode – the device is active during the test and the radio module is deactivated (not transmitting). See test report 117-21624-4.

3.1.2 Description and intended use of test object

Rodent surveillance and trap with build-in radio communication, with a battery backup system

1. An SRD radio is continuously transmitting in the 902-928 MHz band at 920 MHz. See test report 117-21624-4.
2. An SMS/GPRS modem using a certified radio module (certified as modular transmitters with FCC ID XMR201510UC20) is operating as per CFR47 part 22H or part 24E.

3.2 Test sequence

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

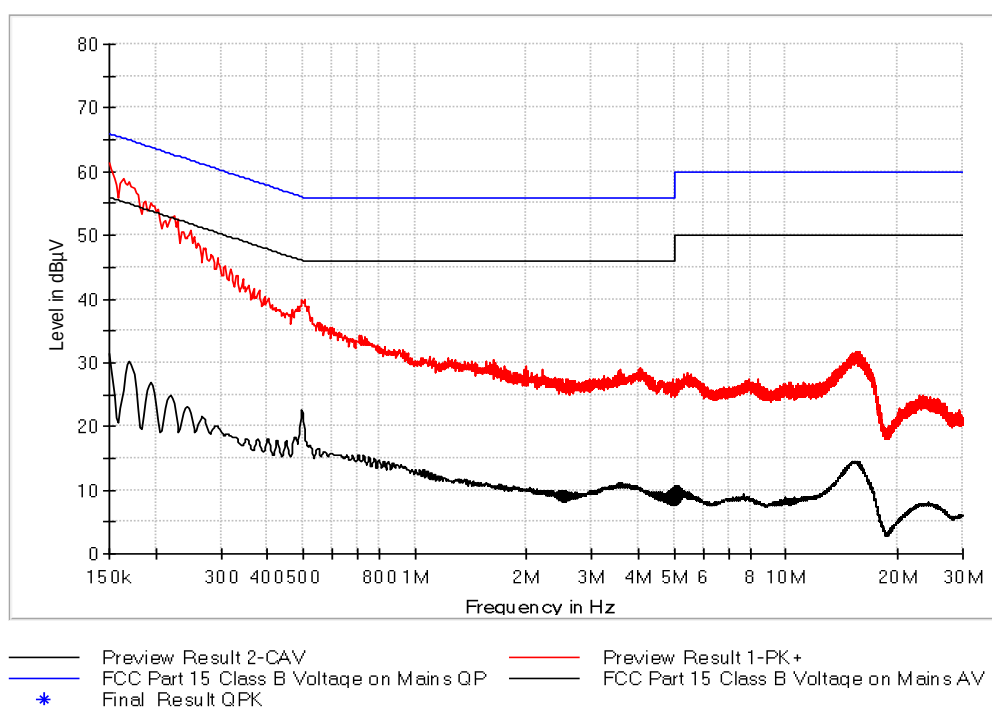
1. Measurement of radio frequency electromagnetic field
2. Measurement of radio frequency voltage on mains

4. Test results

4.1 Measurement of radio frequency voltage on mains (GSM-826 MHz)

Test object	Smart Connect	Sheet	CE-1
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	21 Dec. 2018
Client	Anticimex Innovation Center	Initials	HKM
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	0.15-30 MHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Artificial mains network: 50 Ω , 50 μ H	Humidity	35 % RH
Detector	Peak and average	Bandwidth	9 kHz
Test equipm.	EMI room Hørsholm 49568 49429 49043 49457 29978 49900 49999	Uncertainty	2.7 dB



Line under test	Maximum of Line and Neutral
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Mains voltage: 120 VAC.



Photo 4.1.1 Test setup regarding measurement of radio frequency voltage on mains.

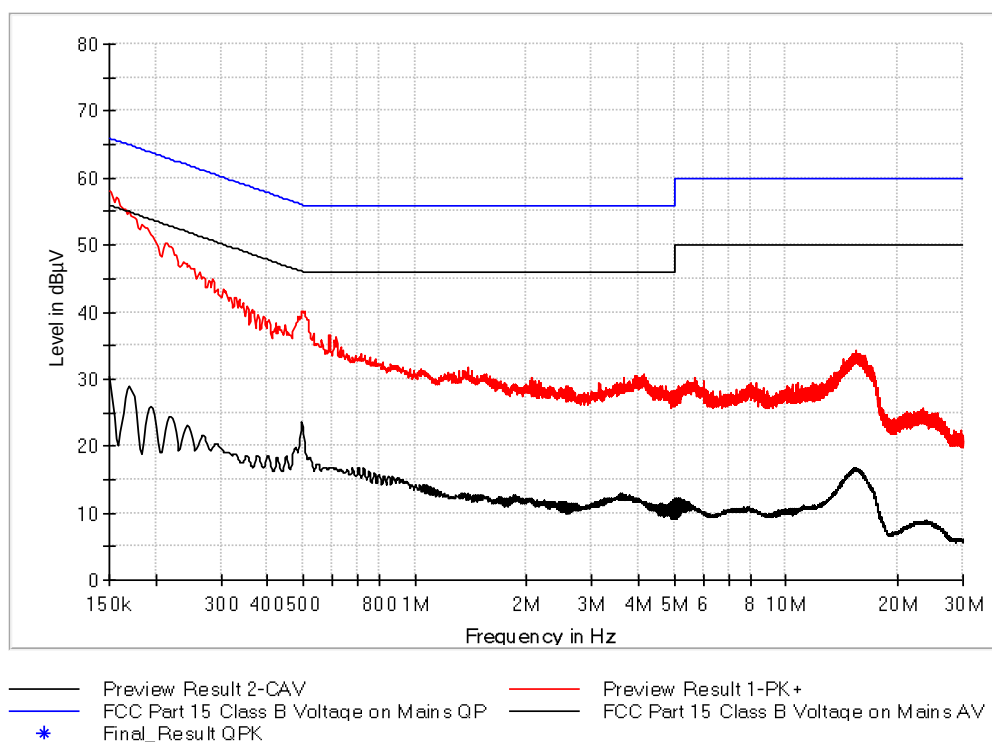


Photo 4.1.2 Test setup regarding measurement of radio frequency voltage on mains.

4.2 Measurement of radio frequency voltage on mains (GSM-1.853 GHz)

Test object	Smart Connect	Sheet	CE-2
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	21 Dec. 2018
Client	Anticimex Innovation Center	Initials	HKM
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	0.15-30 MHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Artificial mains network: 50 Ω , 50 μ H	Humidity	35 % RH
Detector	Peak and average	Bandwidth	9 kHz
Test equipm.	EMI room Hørsholm 49568 49429 49043 49457 29978 49900 49999	Uncertainty	2.7 dB



Line under test	Maximum of Line and Neutral
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Mains voltage: 120 VAC.

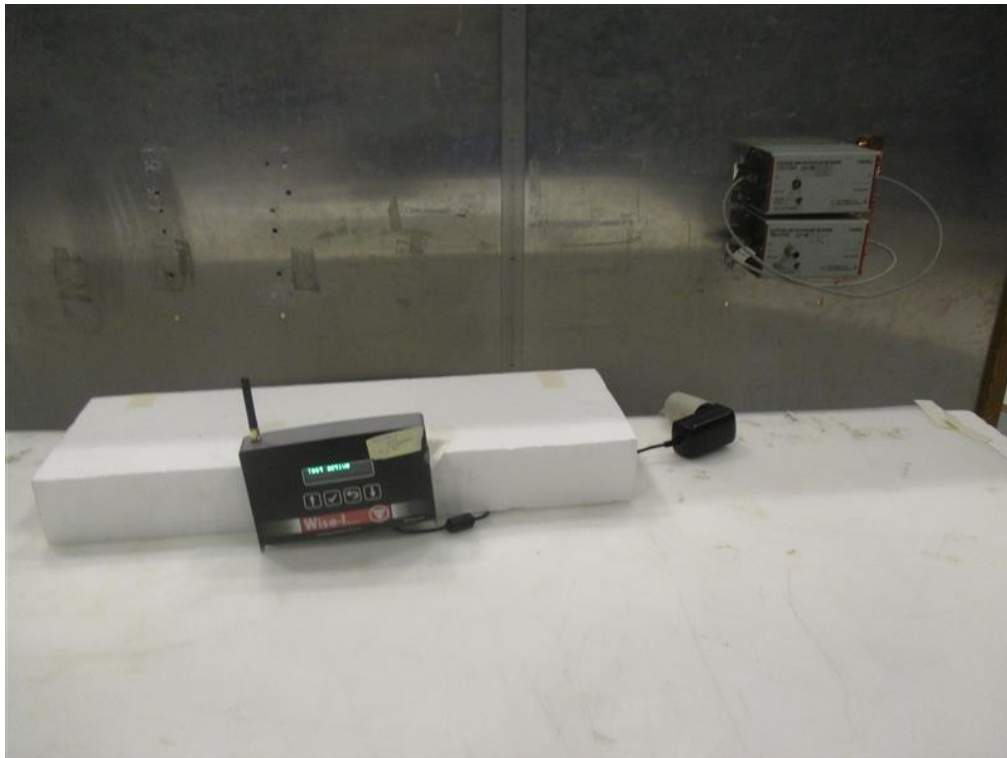


Photo 4.2.1 Test setup regarding measurement of radio frequency voltage on mains.



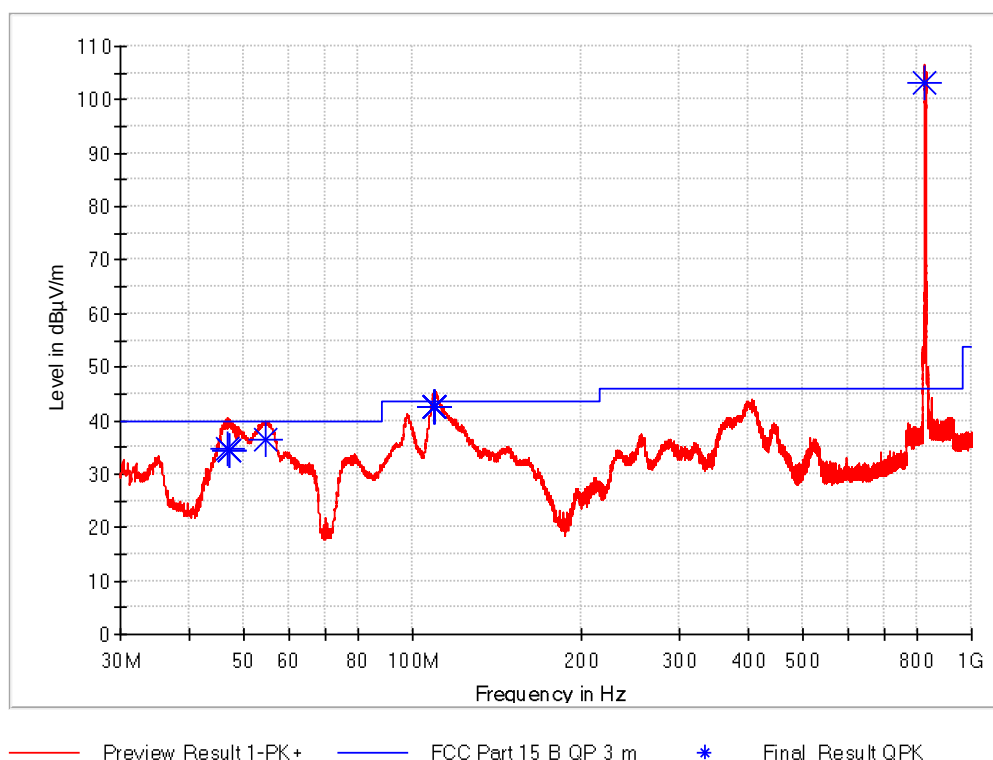
Photo 4.2.2 Test setup regarding measurement of radio frequency voltage on mains.

4.3 Measurement of radio frequency electromagnetic field (GSM-826 MHz)

Test object	Smart Connect	Sheet	RE-1
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	05 Dec. 2017
Client	Anticimex Innovation Center	Initials	HKM
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	30-1000 MHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	30 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49154 49704 49590 49817 49900 49999 49807	Uncertainty	6.3 dB

Full Spectrum



Comments None

Test object	Smart Connect	Sheet	RE-2
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	05 Dec. 2017
Client	Anticimex Innovation Center	Initials	HKM
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	30-1000 MHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	30 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49154 49704 49590 49817 49900 49999 49807	Uncertainty	6.3 dB

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
46.80	34.66	40.00	5.34	15000.0	120.0	104.0	V	137	17.9
46.86	34.49	40.00	5.51	15000.0	120.0	104.0	V	137	17.9
46.92	34.47	40.00	5.53	15000.0	120.0	105.0	V	137	17.9
54.66	36.58	40.00	3.42	15000.0	120.0	100.0	V	182	14.8
109.32	42.51	43.50	0.99	15000.0	120.0	102.0	V	271	19.2
109.35	42.51	43.50	0.99	15000.0	120.0	102.0	V	272	19.2
109.38	42.43	43.50	1.07	15000.0	120.0	102.0	V	272	19.2
109.44	42.51	43.50	0.99	15000.0	120.0	102.0	V	272	19.2
109.47	42.48	43.50	1.02	15000.0	120.0	104.0	V	271	19.2
109.50	42.44	43.50	1.06	15000.0	120.0	104.0	V	271	19.3
109.53	42.64	43.50	0.86	15000.0	120.0	102.0	V	227	19.3
825.15	103.27	In Band	n/a	15000.0	120.0	100.0	H	327	33.9

Test result The measured field strengths were below the limit

Compliant Yes

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

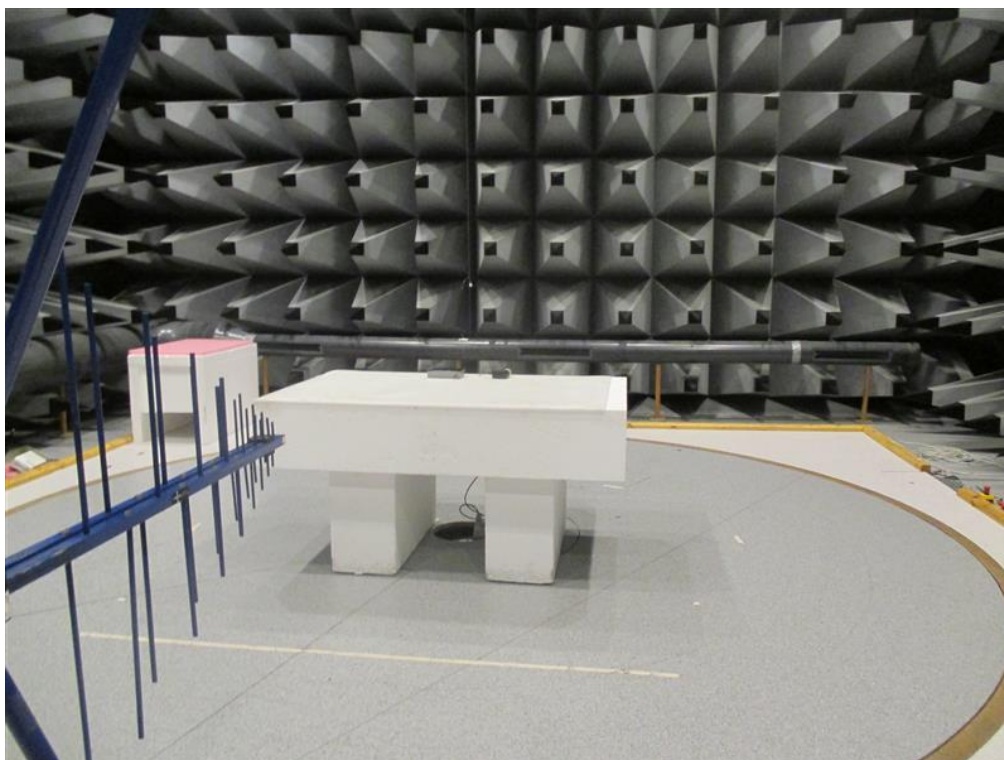


Photo 4.3.1 Test setup regarding measurement of radio frequency electromagnetic field.

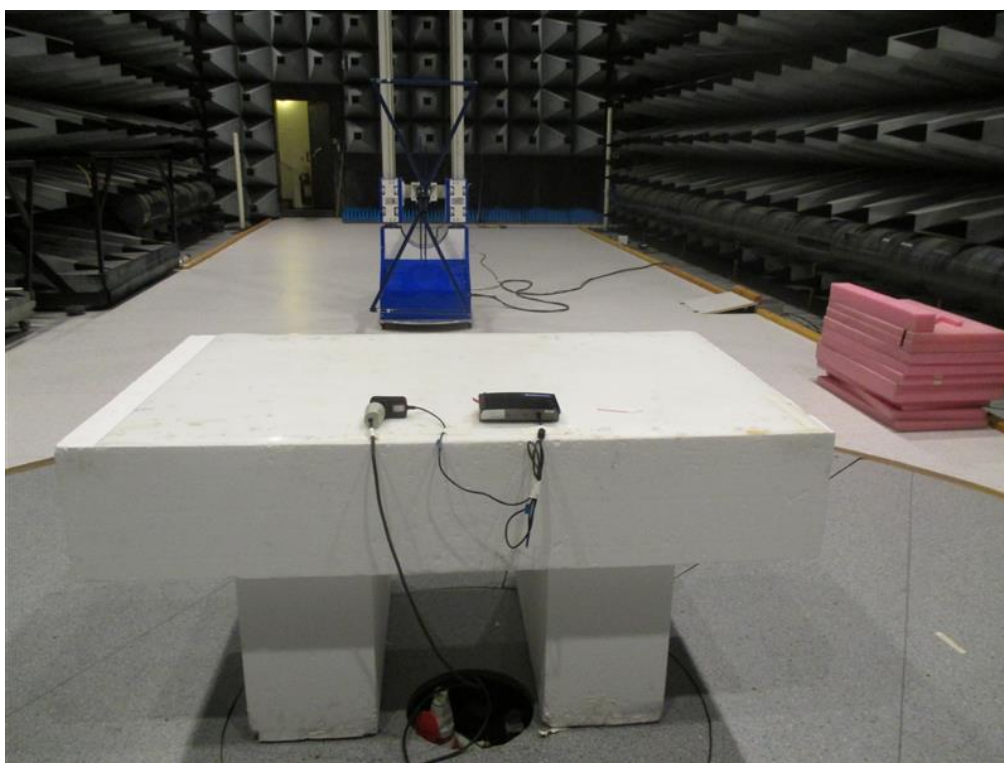


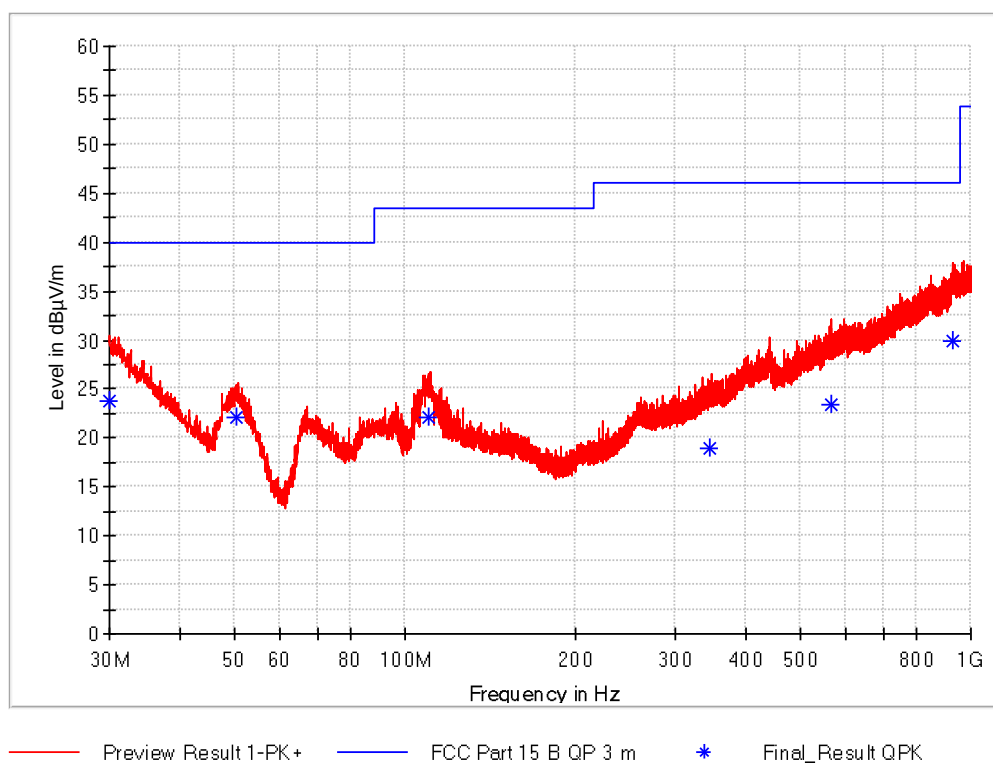
Photo 4.3.2 Test setup regarding measurement of radio frequency electromagnetic field.

4.4 Measurement of radio frequency electromagnetic field (GSM-1.853 GHz)

Test object	Smart Connect	Sheet	RE-3
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	08 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	30-1000 MHz

Test method	ANSI C63.4:2014	Temperature	23 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49154 49704 49590 49817 49900 49999 49807	Uncertainty	6.3 dB

Full Spectrum



Comments

None

Test object	Smart Connect	Sheet	RE-4
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	08 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	30-1000 MHz

Test method	ANSI C63.4:2014	Temperature	23 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49154 49704 49590 49817 49900 49999 49807	Uncertainty	6.3 dB

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.00	23.77	40.00	16.23	15000.0	120.0	202.0	V	4	26.8
50.22	22.16	40.00	17.84	15000.0	120.0	102.0	V	231	16.3
109.80	22.07	43.50	21.43	15000.0	120.0	102.0	V	-51	19.3
346.47	18.99	46.00	27.01	15000.0	120.0	284.0	H	91	24.2
564.99	23.38	46.00	22.62	15000.0	120.0	300.0	H	276	29.7
931.11	29.97	46.00	16.03	15000.0	120.0	400.0	H	326	35.6

Test result The measured field strengths were below the limit

Compliant Yes

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

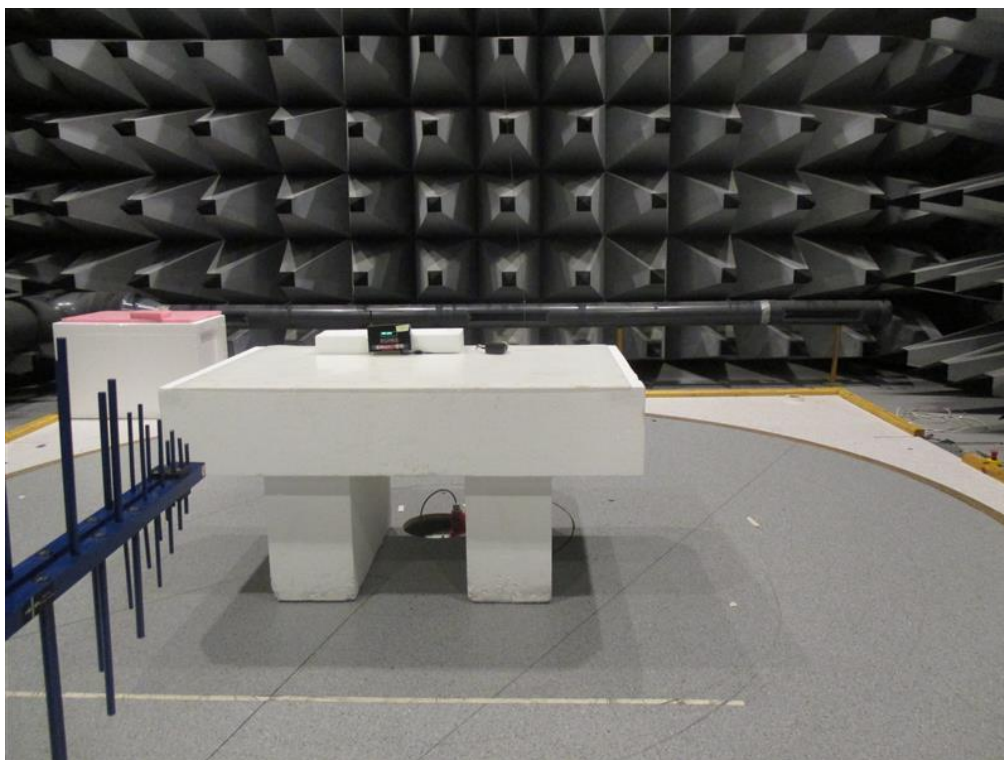


Photo 4.4.1 Test setup regarding measurement of radio frequency electromagnetic field.

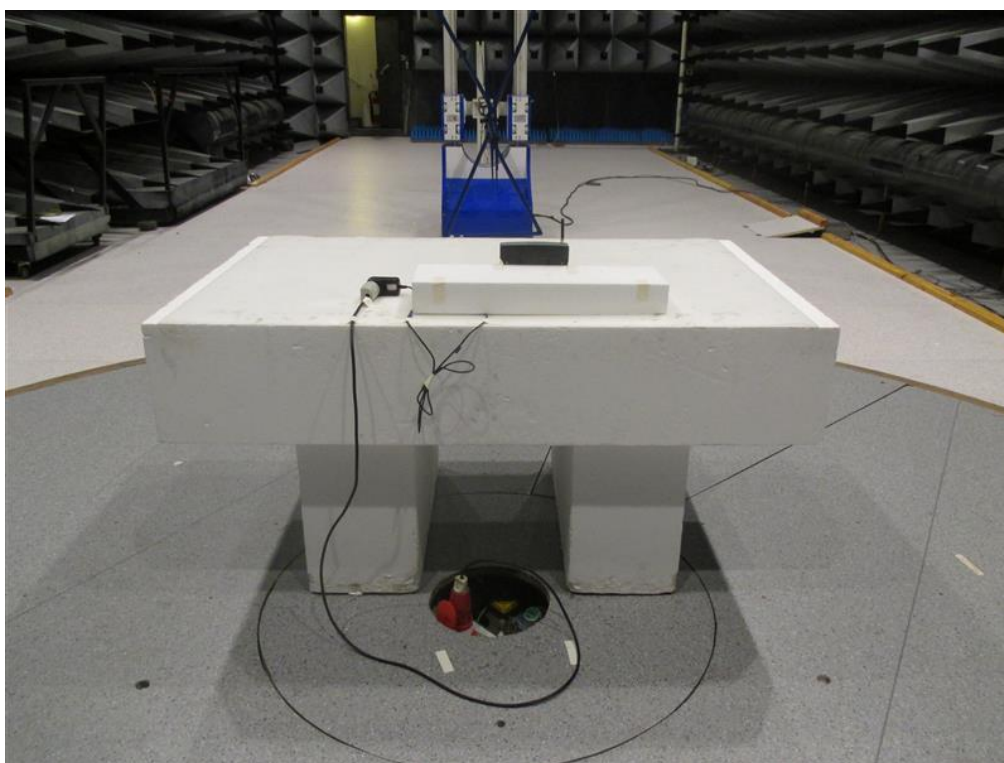


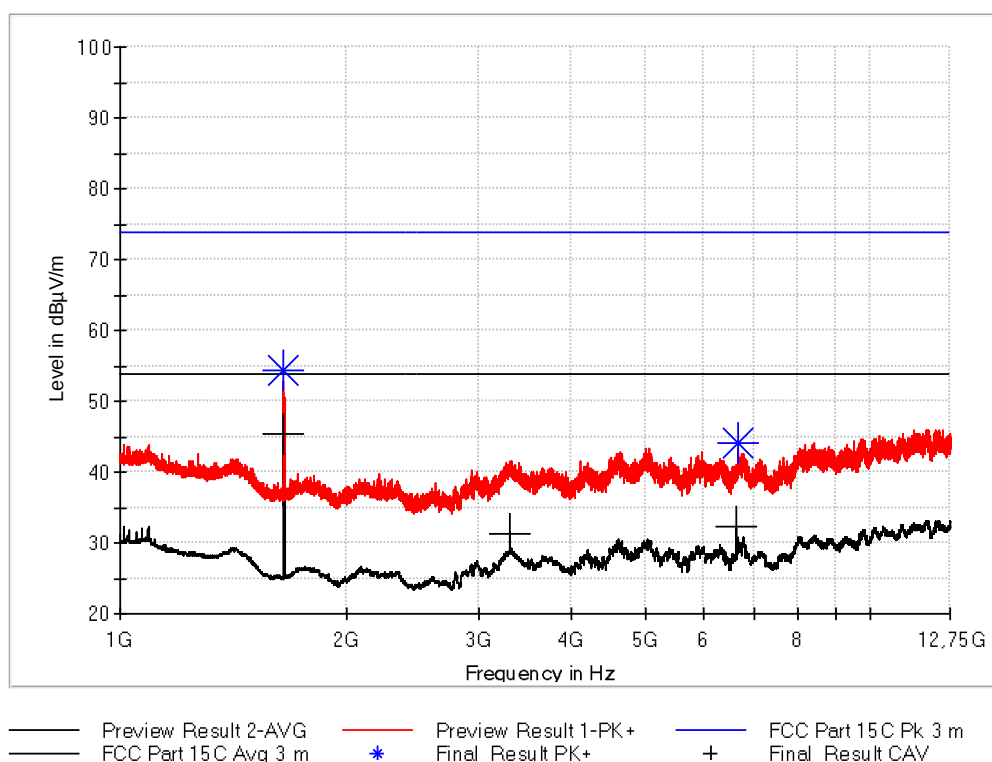
Photo 4.4.2 Test setup regarding measurement of radio frequency electromagnetic field.

4.5 Measurement of radio frequency electromagnetic field (> 1 GHz) (GSM-826 MHz)

Test object	Smart Connect	Sheet	RE-5
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	08 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	1-12.75 GHz

Test method	ANSI C63.4:2014	Temperature	23 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49900 49999 49624 49625 49622 49623	Uncertainty	4.9 dB

Full Spectrum



Comments

None

Test object	Smart Connect	Sheet	RE-6
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	08 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	1-12.75 GHz

Test method	ANSI C63.4:2014	Temperature	23 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	36 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49900 49999 49624 49625 49622 49623	Uncertainty	4.9 dB

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Corr. (dB)	Azimuth (deg)
1650.75	54.36	---	73.90	19.54	15000.0	263.0	H	-13.3	214
1651.25	---	45.38	53.90	8.52	15000.0	209.0	H	-13.3	49
3305.50	---	31.37	53.90	22.53	15000.0	100.0	H	-41.0	130
6611.25	---	32.29	53.90	21.61	15000.0	110.0	V	-35.3	6
6664.00	44.19	---	73.90	29.71	15000.0	161.0	V	-34.2	300

Test result The measured field strengths were below the limit

Compliant Yes

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

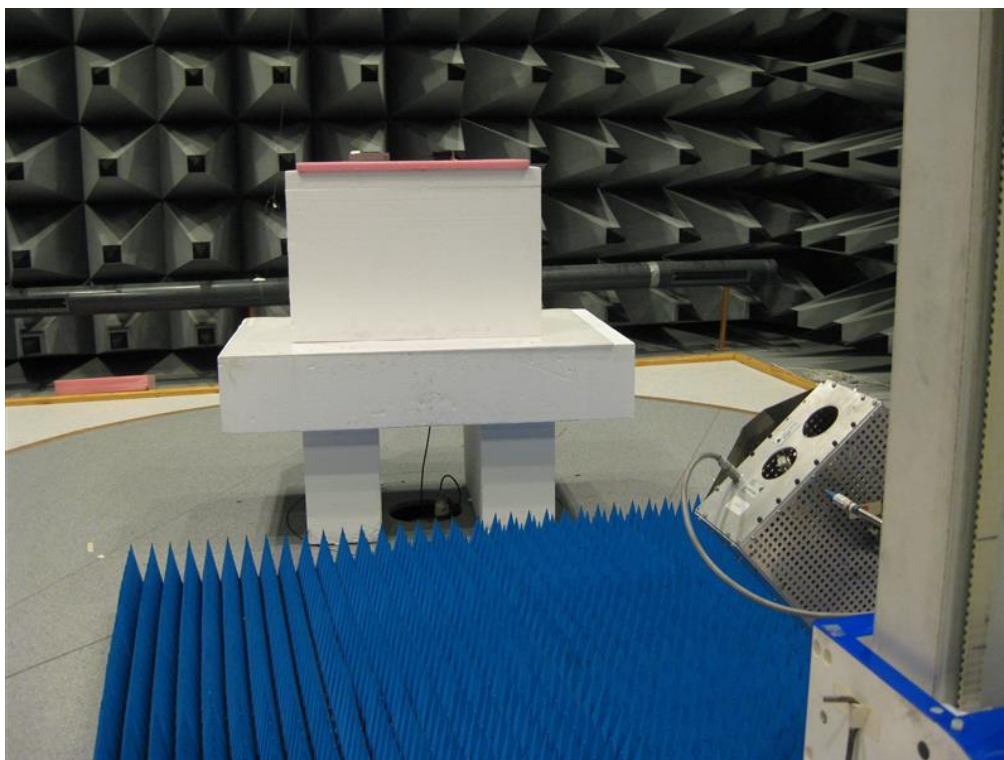


Photo 4.5.1 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz).

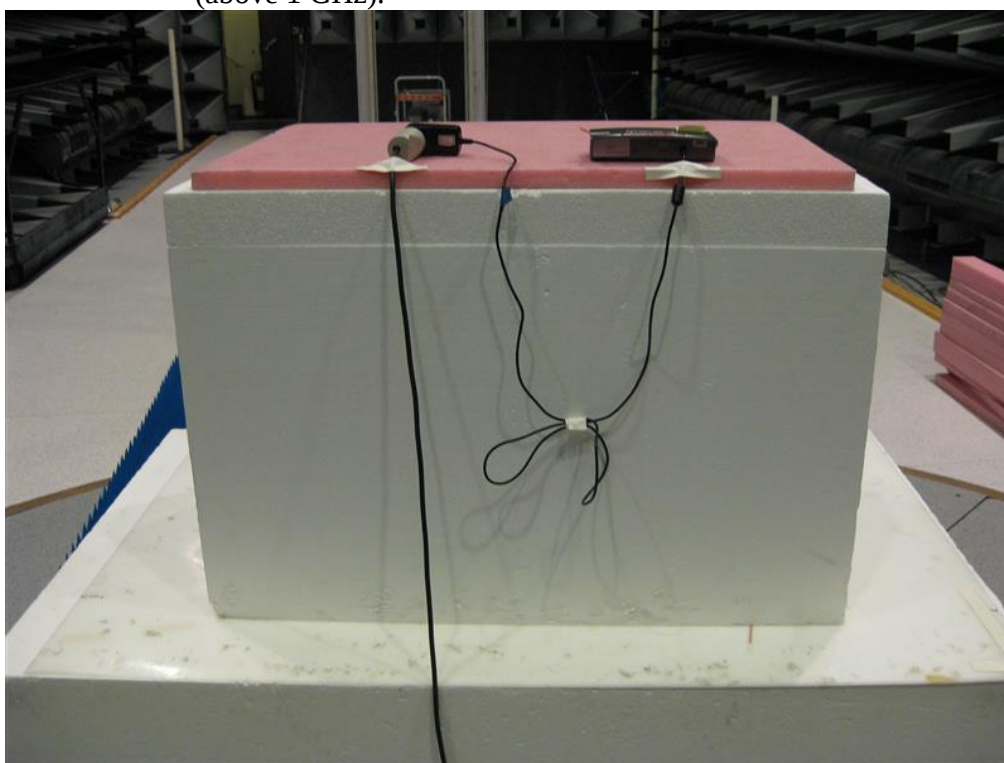


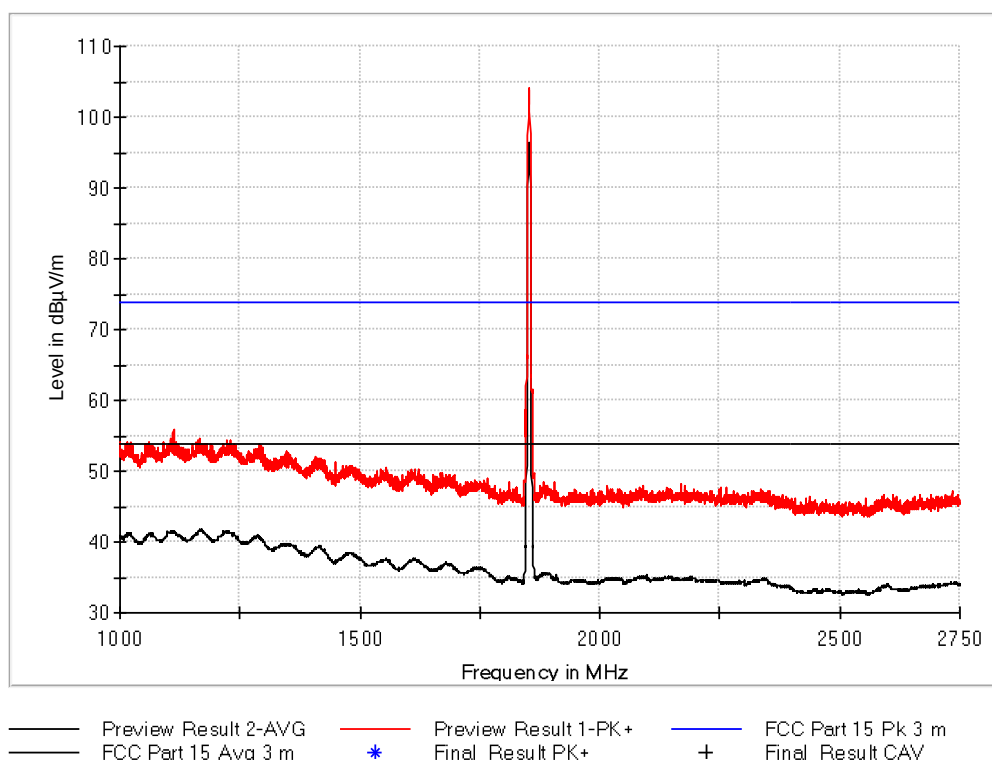
Photo 4.5.2 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz).

4.6 Measurement of radio frequency electromagnetic field (> 1 GHz) (GSM-1.853 GHz)

Test object	Smart Connect	Sheet	RE-7
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	22 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	1-2.75 GHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	34 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49900 49999 49624 49625 49590 49823 49704	Uncertainty	4.9 dB

Full Spectrum



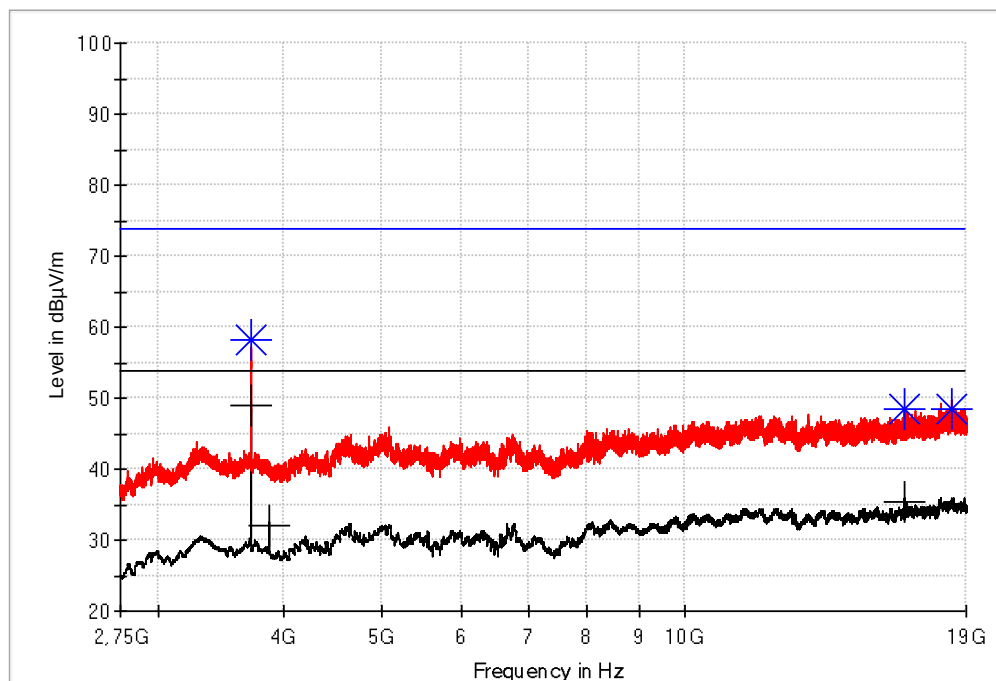
Comments

None

Test object	Smart Connect	Sheet	RE-8
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	22 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	2.75-19 GHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	34 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49900 49999 49624 49625 49590 49823 49704	Uncertainty	4.9 dB

Full Spectrum



— Preview Result 2-AVG — Preview Result 1-PK+ — FCC Part 15 Pk 3 m
 — FCC Part 15 Avg 3 m * Final_Result PK+ + Final_Result CAV

Comments

None

Test object	Smart Connect	Sheet	RE-9
Type	US-type	Project no.	117-21624-5
Serial no.	50000001	Date	22 Dec. 2017
Client	Anticimex Innovation Center	Initials	PWF
Specification	FCC 47 CFR Part 15, Subpart B, Class B	Frequency	1-19 GHz

Test method	ANSI C63.4:2014	Temperature	21 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	34 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49900 49999 49624 49625 49590 49823 49704	Uncertainty	4.9 dB

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Corr. (dB)	Azimuth (deg)
3706.25	---	48.98	53.90	4.92	15000.0	109.0	H	-40.4	25
3706.75	58.24	---	73.90	15.66	15000.0	110.0	H	-40.4	31
3864.75	---	31.98	53.90	21.92	15000.0	126.0	H	-40.5	129
16480.75	---	35.33	53.90	18.57	15000.0	102.0	H	-21.1	246
16490.75	48.50	---	73.90	25.40	15000.0	102.0	V	-21.4	185
18414.50	48.39	---	73.90	25.51	15000.0	218.0	V	-18.3	275

Test result	The measured field strengths were below the limit
Compliant	Yes
Comments	Final measurements by variation of turntable azimuth, antenna height, and antenna polarisation.

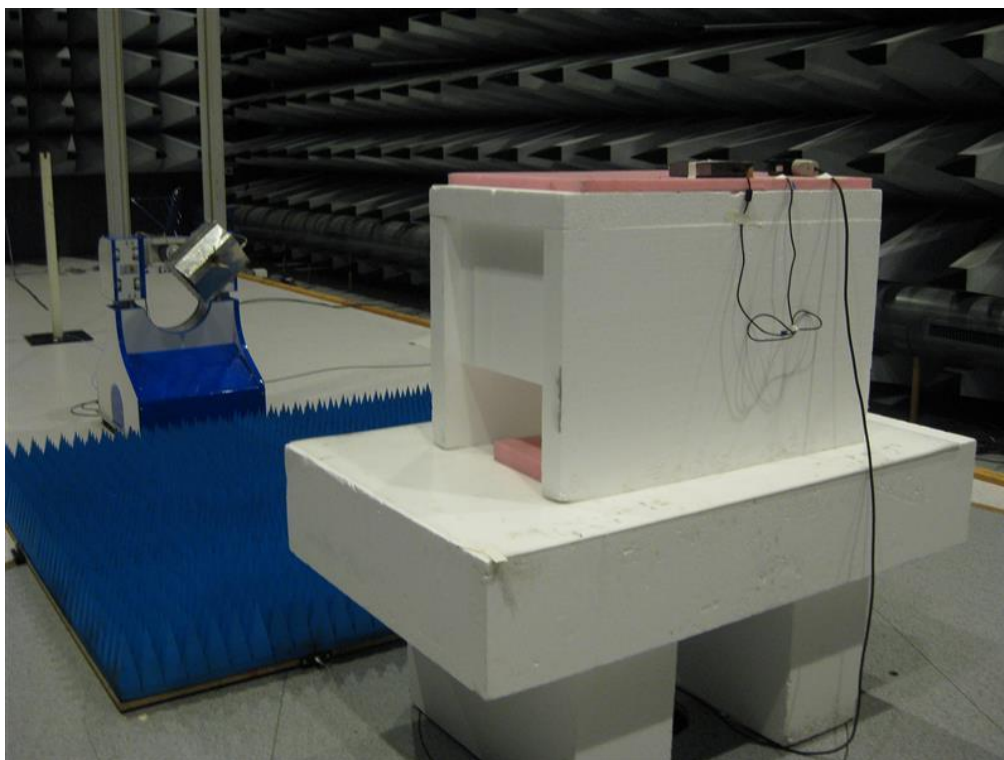


Photo 4.6.1 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz).

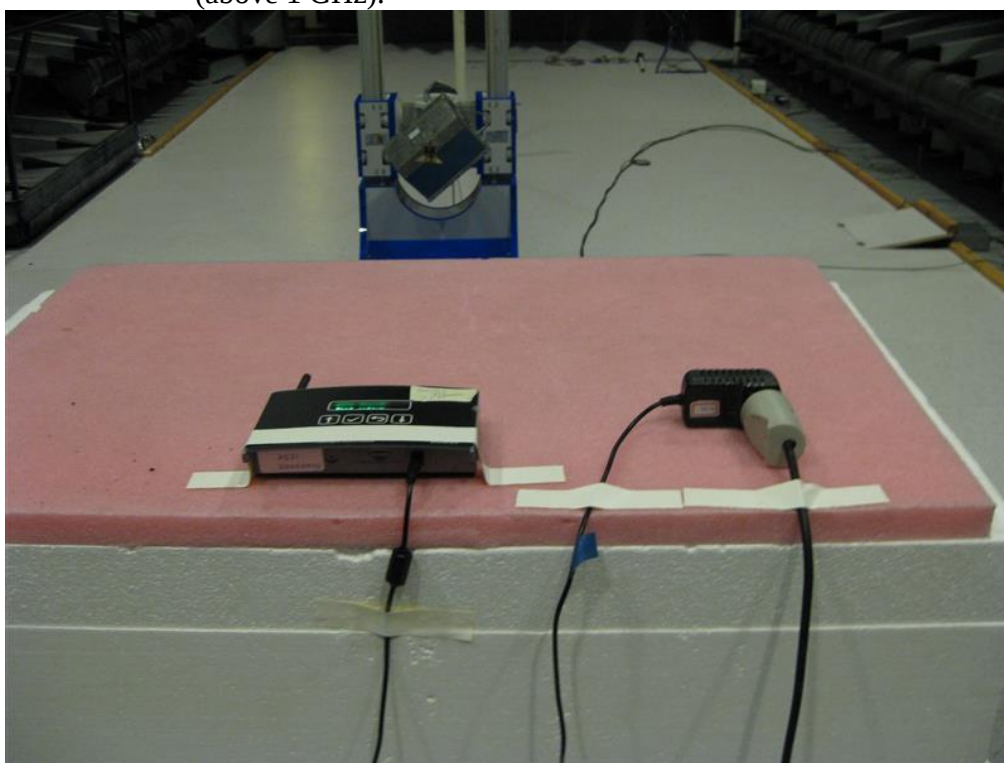


Photo 4.6.2 Test setup regarding measurement of radio frequency electromagnetic field (above 1 GHz).

5. National registrations and accreditations

5.1 DANAK Accreditation

Organization: Danish Accreditation and Metrology Fund - DANAK,
see www.danak.dk and www.ilac.org

Registration Number: 19

Area Number: C

DANAK is part of ILAC (International Laboratory Accreditation Cooperation) including its MRA (Mutual Recognition Arrangement). The MRA includes the Australian NATA and Canadian SCC.

5.2 FCC Registrations

Organization: Federal Communications Commission, USA

Registration Number: 913950

Facilities: EMC room 2 Hørsholm (EMC-2)
EMC room 3 Hørsholm (EMC-3)
EMC room 4 Hørsholm (EMC-4)
EMI room Hørsholm (EMC-5)

5.3 VCCI Registrations

Organization: Voluntary Control Council for Interference by Information Technology, Japan

Member Number: 910

Facilities: EMC room 3 Hørsholm (EMC-3): C-2532 and T-1548
EMC room 4 Hørsholm (EMC-4): C-2533 and T-1549
EMI room Hørsholm (EMC-5): R-1180, C-706, T-1550
and G-470

5.4 IC Registrations

Organization: Industry Canada, Certification and Engineering Bureau

Registration Number: IC4187A-5

Facilities: EMI room Hørsholm (EMC-5)

6. List of instruments

No	Category/Action	Manufacturer	Type no	Cal. date	Cal. exp.
29978	CABLE#34, RG 223, 40 m, COND. EMISSION, ROOM 5	SUHNER	RG 223/U	02-11-2017	02-11-2018
49043	COAXIAL SWITCH ROOM 5 (EMI)	RLC ELECTRONICS	SM-3-N	02-11-2017	02-11-2018
49154	Bilog Antenne	CHASE	CBL6111A	23-06-2016	23-06-2018
49429	CABLE 2m N-Nangle		RG214U	02-11-2017	02-11-2018
49457	CABLE 3m BNC-BNC	SUHNER	RG 223/U	02-11-2017	02-11-2018
49568	ARTIFICIAL MAINS NETWORK	ROHDE&SCHWARZ	ESH2/Z5	15-09-2017	15-09-2018
49590	CABLE, LOW-LOSS uWAVE CABLE, N-N, 8.0 m "EMI"	SUHNER	SUCOFLEX 104 PB	02-11-2017	02-11-2018
49622	CABLE 3.25 M PC3.5 MALE-FEMALE SUCOFLEX 104	HUBER+SUHNER		03-11-2017	03-11-2018
49623	CABLE 16 M PC3.5 MALE-MALE SUCOFLEX 104PB	HUBER+SUHNER		03-11-2017	03-11-2018
49624	DUAL RIDGE HORN ANTENNA – 1GHZ-26GHZ (2GHZ-32GHZ)	SATIMO	SH2000	04-11-2014	04-11-2017
49625	SRD COAX SWITCH MATRIX USED IN 1GHZ TO 26GHZ SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX	03-11-2017	03-11-2018
49704	CABLE 3 m SMA-N	SUHNER	SUCOFLEX104	04-11-2017	04-11-2018
49807	ATTENUATOR, DC-12.4GHz, 6 dB	HUBER-SUHNER	6806.17A	15-02-2017	15-02-2018
49817	CABLE, LOW-LOSS uWAVE CABLE, N-N, 8.0 m "EMI"	SUHNER	SUCOFLEX 104 PB	02-11-2017	02-11-2018
49823	CABLE SF126 SMA-SMA 7 m	HUBER & SUHNER	SF126/11SMA/11 SMA/7000	21-12-2017	21-12-2018
49900	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESW26	11-09-2017	11-09-2018
49999	EMC32-SOFTWARE	ROHDE & SCHWARZ	Ver. 9.26	N/A	N/A