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DELTA Test Report

TEST Reg. no. 19

Test of Smart A-Cool Appliance Interface according to FCC requirements

Performed for Diehl AKO Stiftung & Co. KG

DANAK-19/12544 Rev. B
Project no.:T202039
Page 1 of 37

12 November 2012

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Title	Test of Smart A-Cool Appliance Interface according to FCC requirements
Test object	Smart A-Cool Appliance Interface
Report no.	DANAK-19/12544 Rev. B
Project no.	T202039
Test period	21 to 24 September 2012
Client	Diehl AKO Stiftung & Co. KG Pfannerstraße 75 88239 Wangen im Allgäu Germany Tel.: +49 (75 72) 73-0
Contact person	Sergej Hoffmann E-mail: Sergej.hoffmann@diehl-controls.com
Manufacturer	Diehl AKO Stiftung & Co. KG
Specifications	47 CFR Part 15, Subpart C (Specific rule part §15.249)
Results	The test objects were found to be in compliance with the specifications, as listed in Section 1
Test personnel	Claus Momme Thomsen
Test site(s)	DELTA, Venlighedsvej 4, 2970 Hørsholm, Denmark
Date	12 November 2012

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This test report replaces previously issued test report DANAK-19/12544 Rev. A dated 06 November 2012. The changes in this report are:

Type of antenna has been corrected from “Integrated PCB antenna” to “Integrated soldered punched antenna”.

Number of channels has been corrected from 2 to 3.

Photo of test object at page 6 has been updated.

“908.4 MHz” has been corrected to “908.42 MHz” at the pages 7, 15, 18, 29, 33.

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1. Summary of tests

The authorization procedure for the Smart A-Cool Appliance Interface is:

Certification by FCC Part 15C.

Test case ID	Description	Specification	Test methods	Results
01	Conducted limits	47 CFR Part 15C Subpart 15.207	ANSI C63.10-2009	Passed
02	Radiated limits; general requirements	47 CFR Part 15C Subpart 15.209	ANSI C63.10-2009	Passed
03	Field strength of fundamental	47 CFR Part 15C Subpart 15.249(a)	ANSI C63.10-2009	Passed
04	Occupied Bandwidth & Band Edge Compliance	47 CFR Part 15C Subpart 15.215(c)	ANSI C63.10-2009	Passed

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

Conclusion

The test objects mentioned in this report meet the requirements of the rule part stated below.

- 47 CFR Part 15, Subpart C (Specific rule part §15.249).

The test results relate only to the objects tested.

2. Test object and auxiliary equipment

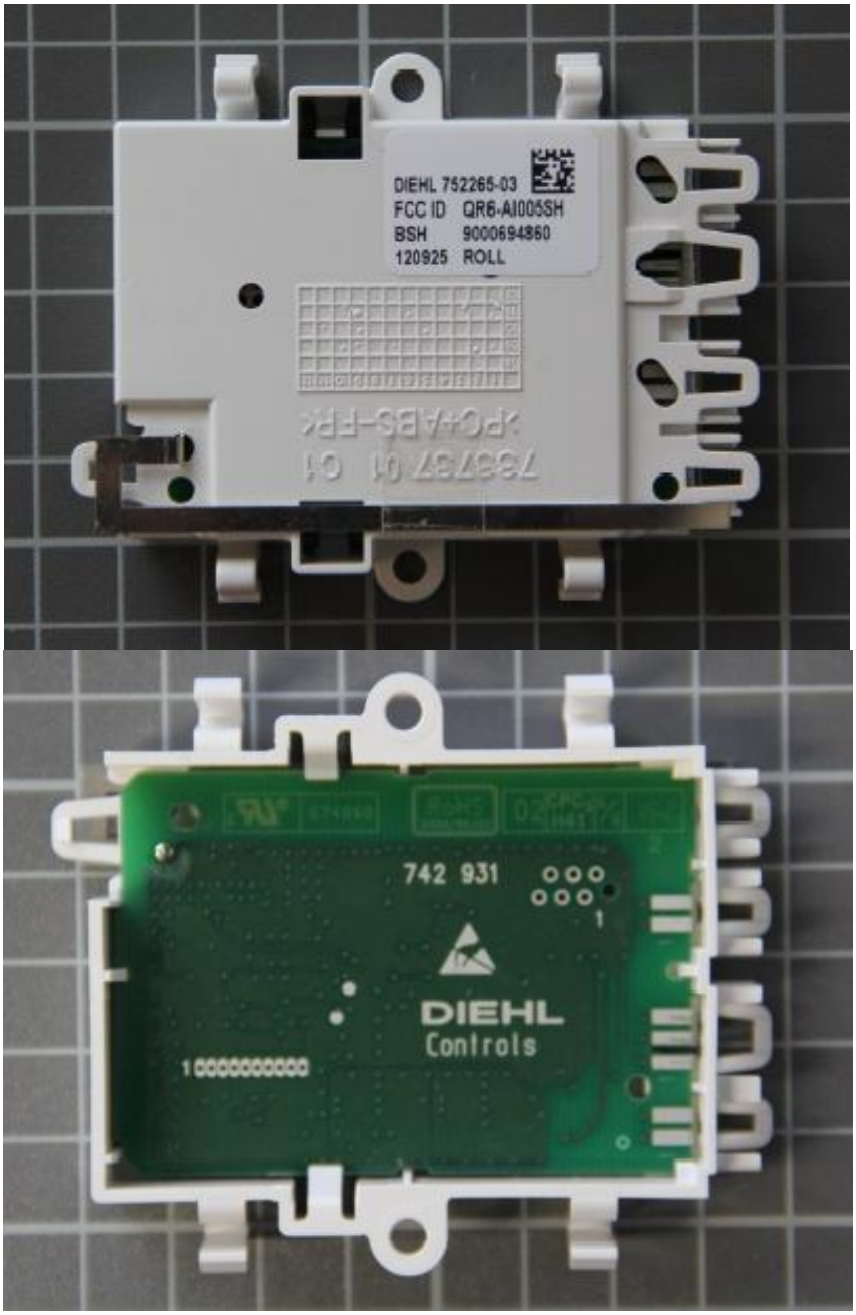


Photo 2.1.1 Front and back of the test object.

2.1 Test objects

Test object 2.1.1

Name of test object	Smart A-Cool Appliance Interface 9.6
Model / type	Smart A-Cool 9.6 kbs
Part no.	-
Serial no.	TX_mod US 9.6 kbit/s
FCC ID	QR6-AI005SH
Manufacturer	Diehl AKO Stiftung & Co. KG
Supply voltage	9.0 VDC
Software version	Test software ver “RFPOW=0x06”
Hardware version	-
Cycle time	0.1 msec
Highest frequency generated or used	908.42 MHz
Comment	-

Test object 2.1.2

Name of test object	Smart A-Cool Appliance Interface 40
Model / type	Smart A-Cool 40 kbs
Part no.	-
Serial no.	TX_mod US 40 kbit/s
FCC ID	QR6-AI005SH
Manufacturer	Diehl AKO Stiftung & Co. KG
Supply voltage	9.0 VDC
Software version	Test software ver “RFPOW=0x06”
Hardware version	-
Cycle time	0.1 msec
Highest frequency generated or used	908.4 MHz
Comment	-

Test object 2.1.3

Name of test object	Smart A-Cool Appliance Interface 100
Model / type	Smart A-Cool 100 kbs
Part no.	-
Serial no.	TX_mod US 100 kbit/s
FCC ID	QR6-AI005SH
Manufacturer	Diehl AKO Stiftung & Co. KG
Supply voltage	9.0 VDC
Software version	Test software ver “RFPOW=0x06”
Hardware version	-
Cycle time	0.1 msec
Highest frequency generated or used	916.0 MHz
Comment	-

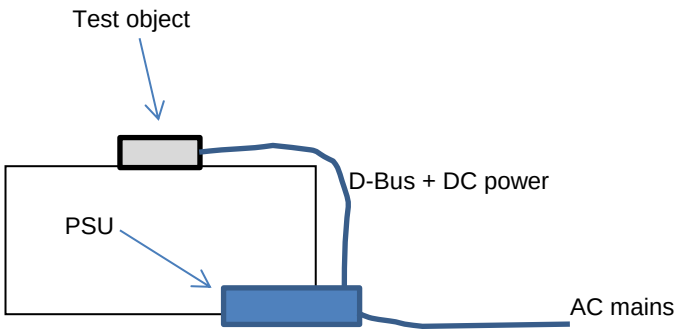
2.2 Auxiliary equipment

Auxiliary equipment 2.2.1

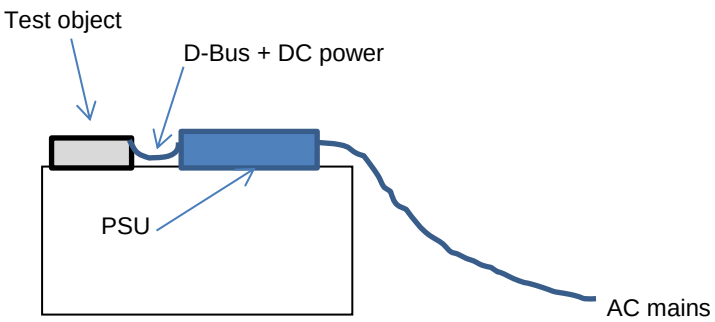
Name of auxiliary equipment	9 VDC power supply
Model / type	WKK CPM/BM36(A.COOL.US)
Part no.	-
Serial no.	9 000 395 907
FCC ID	-
Manufacturer	WKK
Supply voltage	9 VDC
Highest frequency generated or used	-
Comment	Conducted emission is performed at the AC mains port of the power supply

3. General test conditions

3.1 Test setup during test



For radiated measurements, the test object is positioned on a table and supplied from the auxiliary PSU located on the floor.



For conducted measurements, the AC mains port of the PSU is used, and the test objects and the power supply are both positioned on a table.

Figure 3.1 Block diagram of test objects with cables and auxiliary equipment.

The Smart A-Cool Appliance Interface is powered by a representative power supply and put into continuous Tx mode.

All AC mains conducted emission tests are performed on the AC mains port of the power supply.

3.1.1 Description and intended use of test object

The Smart A-Cool Appliance Interface is a single modular transmitter intended for implementation into Read refrigerators, rendering the refrigerators capable of wireless communication via Z-Wave protocol at three different data rates and two different frequencies:

9.6 kbit/s & 908.4 MHz

40 kbit/s & 908.4 MHz

100 kbit/s & 916.0 MHz.

The Appliance Interface manages the communication between Z-Wave and the refrigerator's internal D-bus, and converts specified commands into D-bus commands and vice versa.

3.1.2 Test modes during emission tests

All test objects were running special test software.

Tests were performed at the following fundamental frequency of the radio transmitter:

908.4 or 916.0 MHz.

For all the emission tests, all relevant functions are activated in order to maximize emissions and to monitor that the radio is active. The presence of an active radio is checked both prior to and after each test.

The test object is put into constant, modulated Tx operating mode with a modulation cycle no higher than 0.1 msec, so that each measurement sample completely covers a cycle.

3.2 Radio specification

Radio	Sigma Designs Z-Wave 908.4 / 916.0 MHz radio
Fundamental operating frequency (f_center)	908.4 or 908.42 or 916.0 MHz
Maximum measured field strength @ 3m	93.8 dBuV/m
Antenna type	Integrated soldered punched antenna
Equipment Type	I: Transfer of messages (digital or analogue signals)
Equipment intended for fixed use?	Yes
Equipment intended for vehicular or mobile use?	Yes
Equipment intended for portable use? (<20cm from user)	No
Transmit mode available	Yes
Receive mode available	Yes
Environment	General population
User proximity by FCC definition	Portable and Mobile use (may be less than 20 cm from user during normal operation)
Frequency band	902-928 MHz
Maximum permissible output power in the band	50mV/m (94 dBuV/m @ 3m)
Number of power levels	1
Number of channels	3
Modulation forms	FSK (digital modulation)
Maximum Data Rate [kbps]	100
Manufacturer stated band width (20 dB) [kHz]	150
Manufacturer stated band width (6 dB) [kHz]	Less than 500
Channel spacing	One channel only by configuration
Maximum Duty Cycle during normal use	1 %

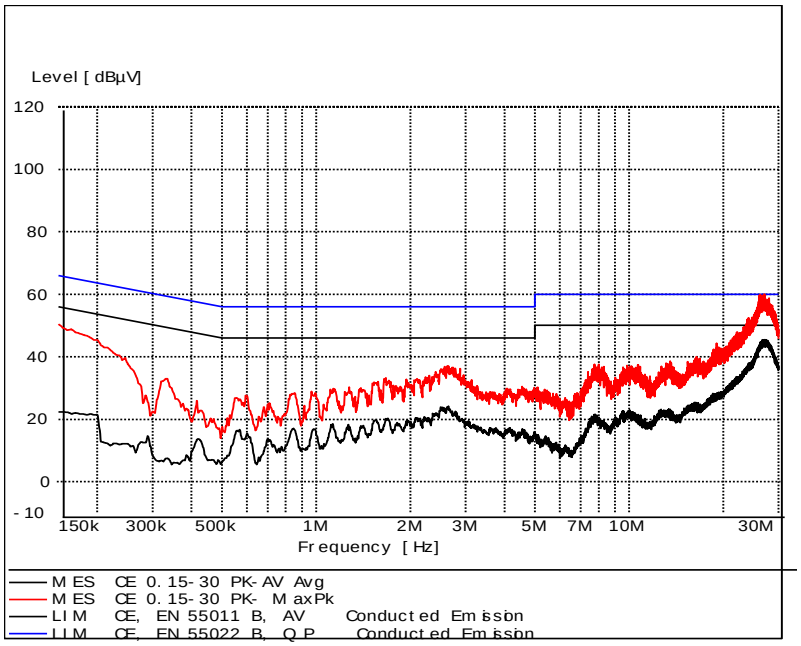
4. Test results

4.1 Test ID 01a: Conducted limits, AC Mains

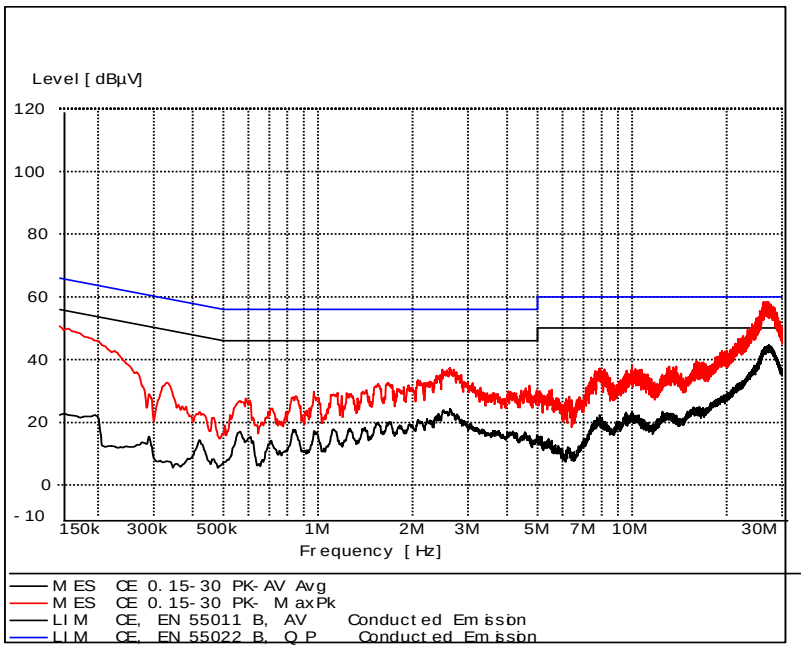
Test objects and Aux. equipment	Combination of 2.1.1: Smart A-Cool Appliance Interface 9.6 2.2.1: 9 VDC power supply	Sheet	CE-1
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	24 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	0.15-30 MHz

Test method Characteristics	ANSI C63.10:2009 Artificial mains network: 50 Ω, 50 μH	Temperature Humidity	24 °C 45 % RH
Detector	Peak and average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29301 29680	Uncertainty	1.7 dB

Line under test	Line and neutral
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Conducted limits are performed on the AC mains of the auxiliary equipment (PSU) using estimated worst case condition, represented by the chosen test object and the chosen auxiliary equipment. AC Mains voltage: 115 VAC.



Line



Neutral

Photo 4.1.1 Test setup regarding measurement of radio conducted limits, AC Mains.

Photo 4.1.2 Test setup regarding measurement of conducted limits, AC Mains.

4.2 Test ID 02aa: Radiated limits below 1 GHz

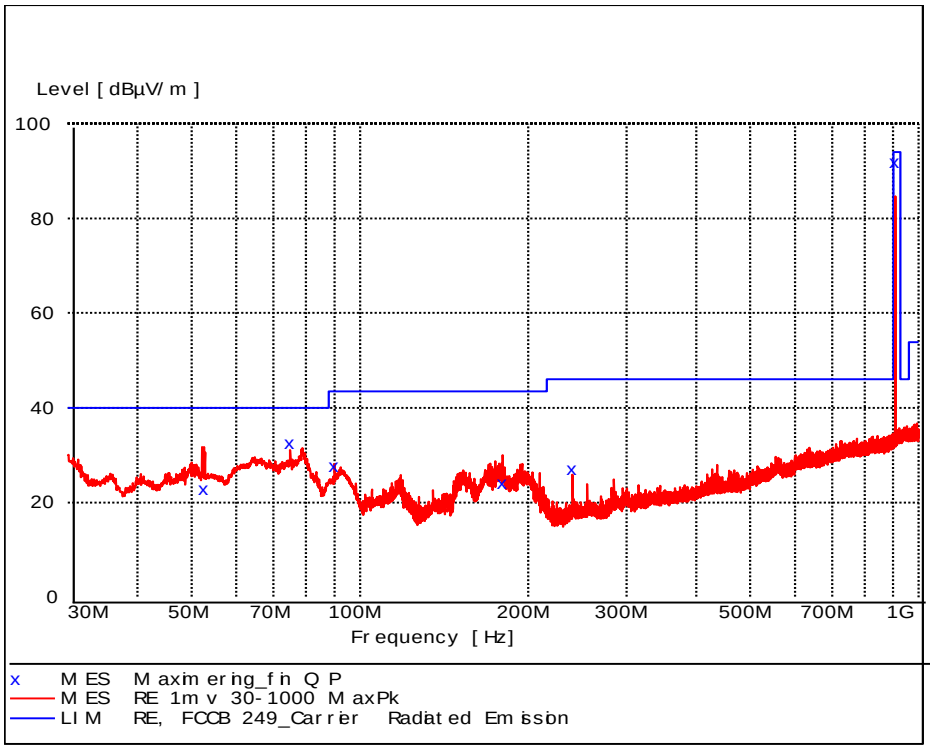
Test objects and Aux. equipment	Combination of 2.1.1: Smart A-Cool Appliance Interface 9.6 2.2.1: 9 VDC power supply	Sheet	RE_Spur-1
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.10:2009 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	24 °C 45 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

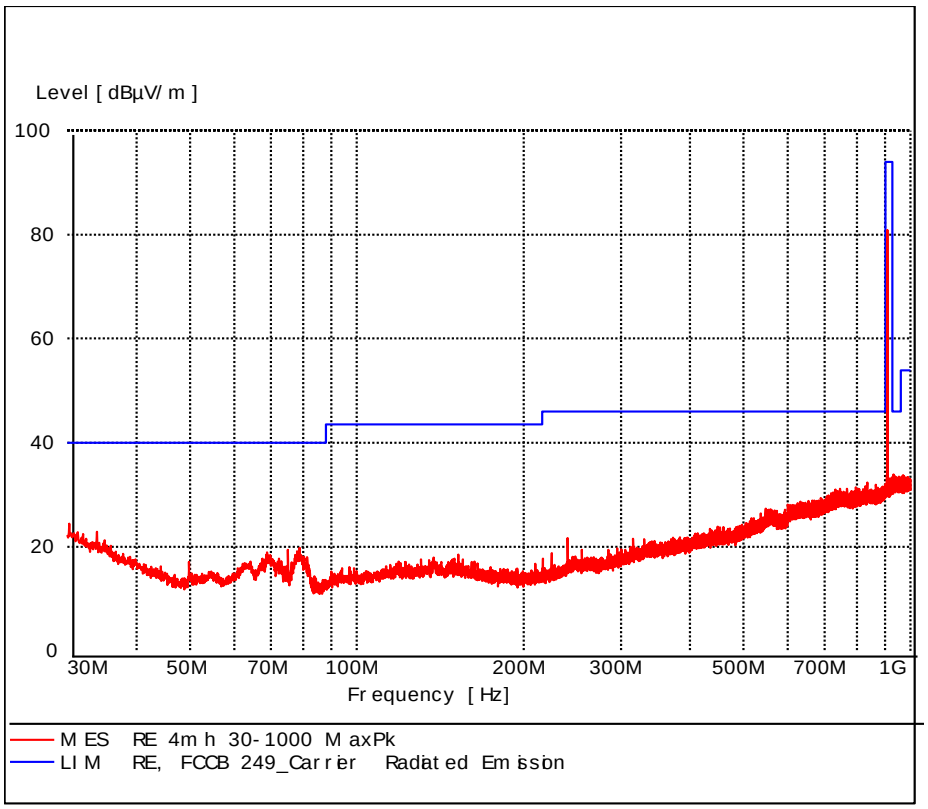
Final max (Quasi peak):

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
52.620000	22.80	9.7	40.0	17.2	108.0	233.00	VERTICAL
75.020000	32.50	9.8	40.0	7.5	133.0	284.00	VERTICAL
90.030000	27.80	11.8	43.5	15.7	104.0	266.00	VERTICAL
180.050000	24.10	12.6	43.5	19.4	107.0	357.00	VERTICAL
240.070000	27.20	14.4	46.0	18.8	187.0	204.00	HORIZONTAL
908.420000	91.90	29.0	94.0	2.1	229.0	133.00	HORIZONTAL

Test result	The measured field strengths were below the limit
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 908.42 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation



Pre-scan, Antenna at 3 m, 1 m height, vert. pol. Peak detector.



Pre-scan, Antenna at 3 m, 4 m height, hor. pol. Peak detector.

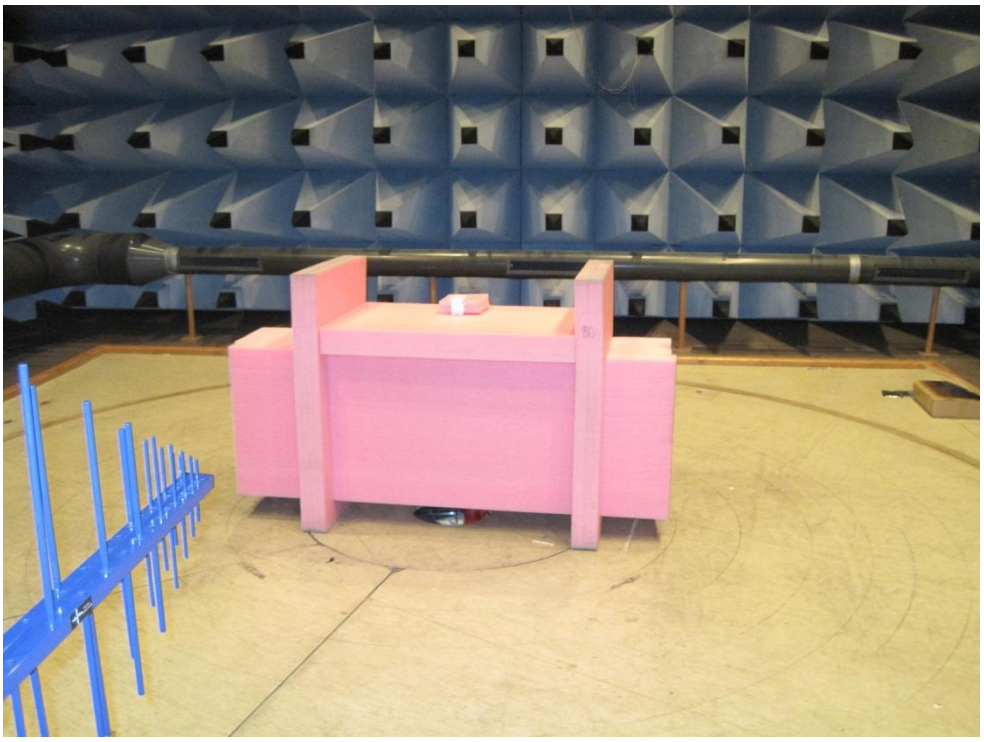


Photo 4.2.1 Test setup regarding measurement of radiated limits below 1 GHz.

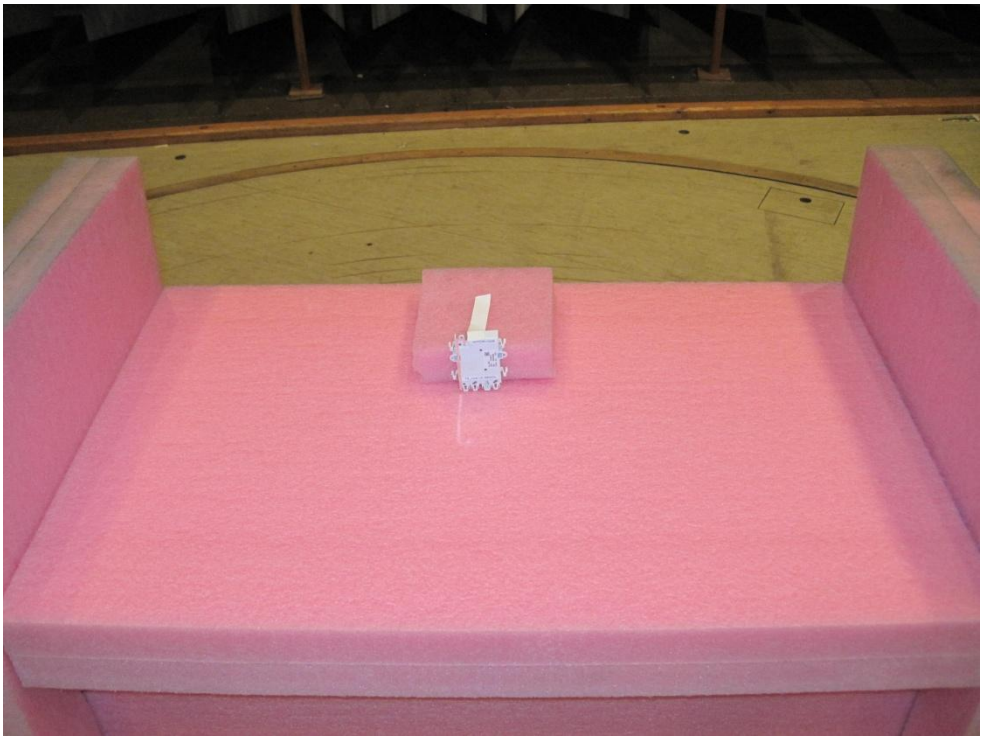


Photo 4.2.2 Test setup regarding measurement of radiated limits below 1 GHz.

4.3 Test ID 02ab: Radiated limits above 1 GHz

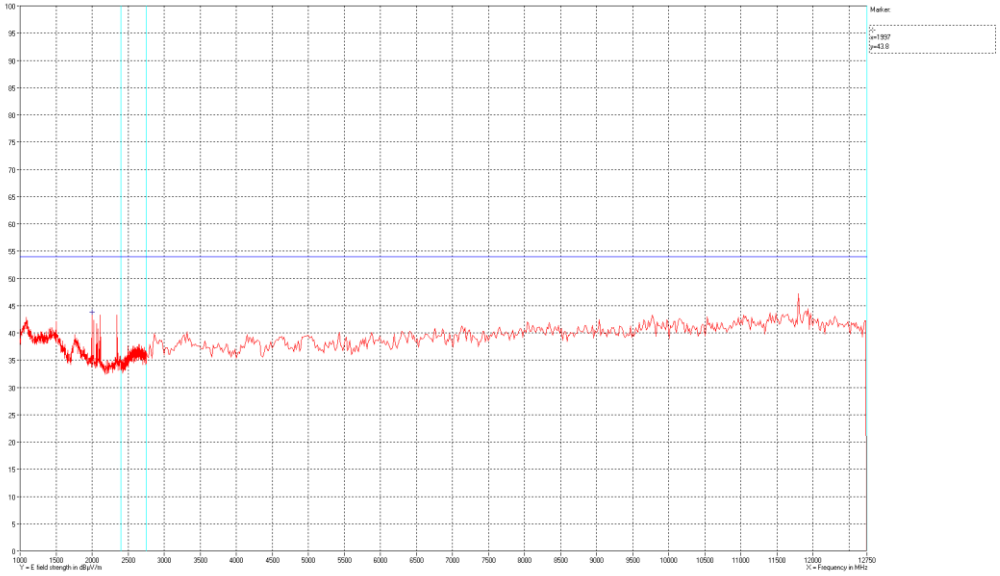
Test objects and Aux. equipment	Combination of 2.1.1: Smart A-Cool Appliance Interface 9.6 2.2.1: 9 VDC power supply	Sheet	RE_Spur-2
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	1-12.75 GHz

Test method Characteristics	ANSI C63.10:2009 Complete search, antenna distance 3 m	Temperature Humidity	24 °C 45 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49712 49625	Uncertainty	4.9 dB

Final max (Peak):

Frequency MHz	Level dBµV/m	Peak Limit dBµV/m	AV Limit dBµV/m	Margin to AV dB	Polarisation
1997.00000	43.8	74.0	54.0	10.2	Complete search
2111.10000	43.1	74.0	54.0	10.9	Complete search
2346.40000	43.2	74.0	54.0	10.8	Complete search
11801.60000	47.2	74.0	54.0	6.8	Complete search

Test result	The measured field strengths were below the limit
Test Port	Enclosure
Test frequency	Tx @ 908.42 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization



Polarization	Vertical and horizontal peak measurements
Comments	All measurements were performed with a peak detector. All peak measurements were below average limit.

Photo 4.3.1 Test setup regarding measurement of radiated limits above 1 GHz.

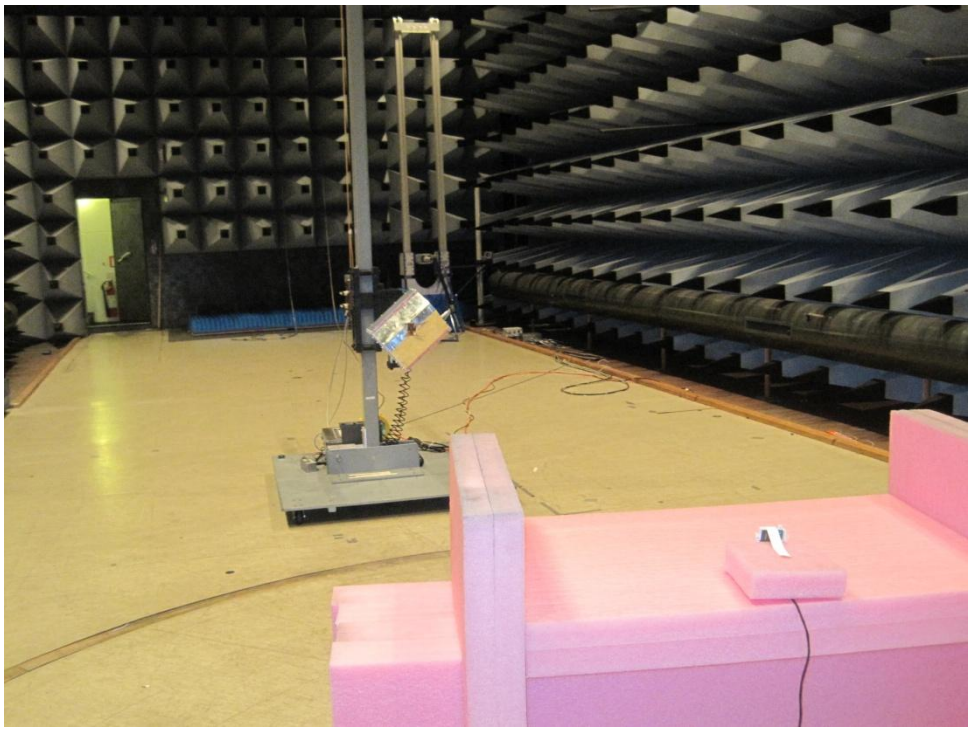


Photo 4.3.2 Test setup regarding measurement of radiated limits above 1 GHz.

4.4 Test ID 02ba: Radiated limits below 1 GHz

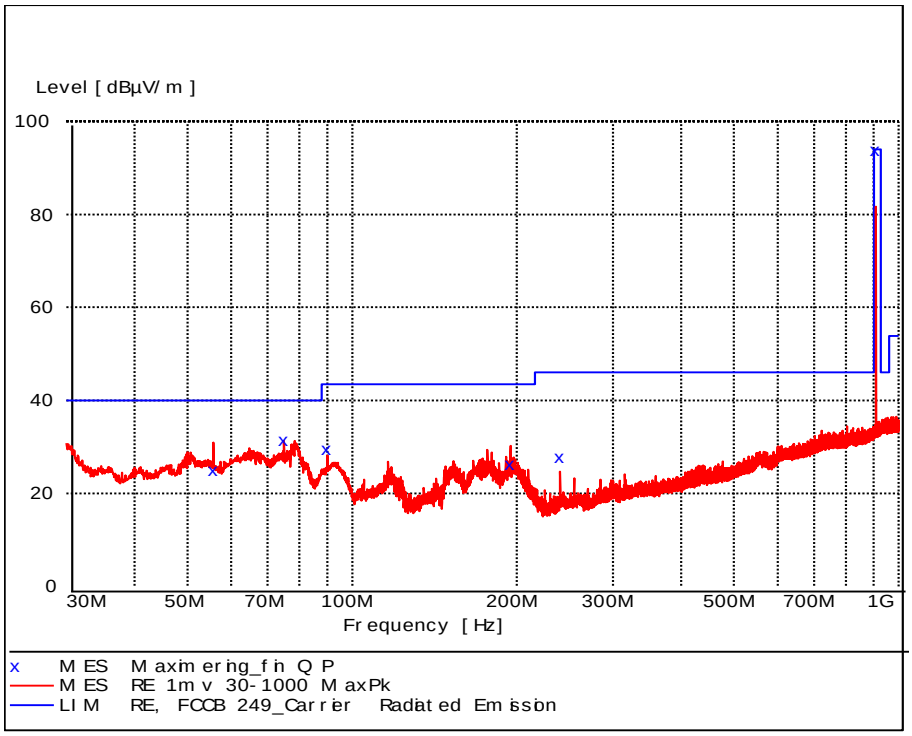
Test objects and Aux. equipment	Combination of 2.1.2: Smart A-Cool Appliance Interface 40 2.2.1: 9 VDC power supply	Sheet	RE_Spur-3
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.10:2009 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	24 °C 45 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

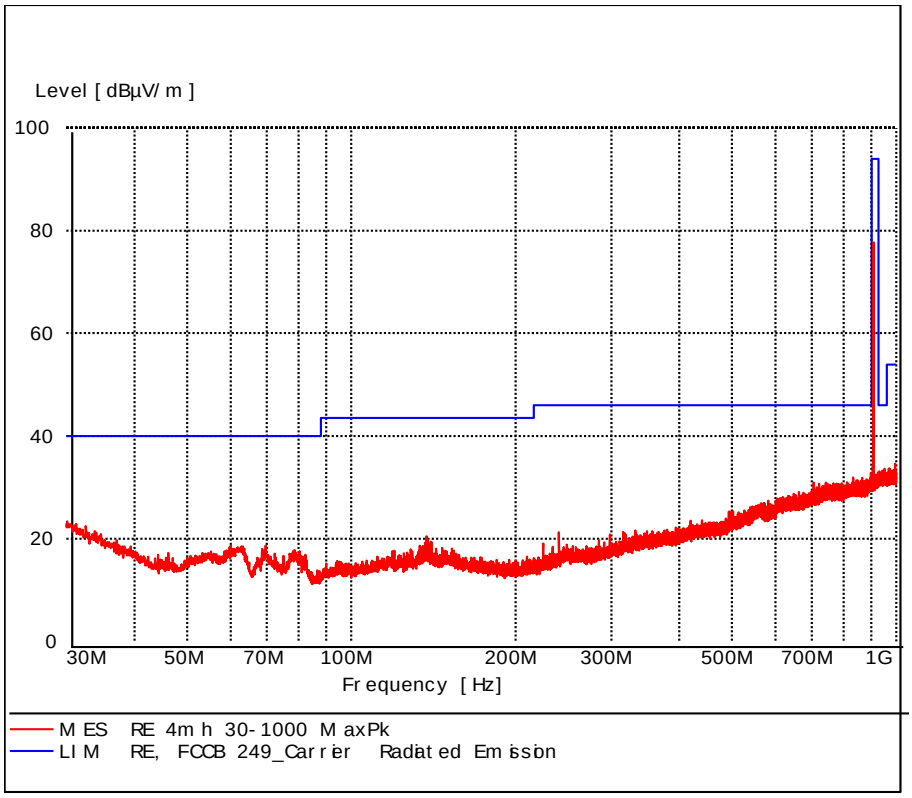
Final max (Quasi peak):

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
55.750000	25.00	8.8	40.0	15.0	104.0	232.00	VERTICAL
75.020000	31.40	9.8	40.0	8.6	144.0	285.00	VERTICAL
90.030000	29.40	11.8	43.5	14.1	101.0	279.00	VERTICAL
195.060000	26.20	12.3	43.5	17.3	101.0	251.00	VERTICAL
240.070000	27.80	14.4	46.0	18.2	103.0	273.00	VERTICAL
908.400000	93.80	29.0	94.0	0.2	227.0	127.00	HORIZONTAL

Test result	The measured field strengths were below the limit.
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 908.4 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation



Pre-scan, Antenna at 3 m, 1 m height, vert. pol. Peak detector.



Pre-scan, Antenna at 3 m, 4 m height, hor. pol. Peak detector.

4.5 Test ID 02bb: Radiated limits above 1 GHz

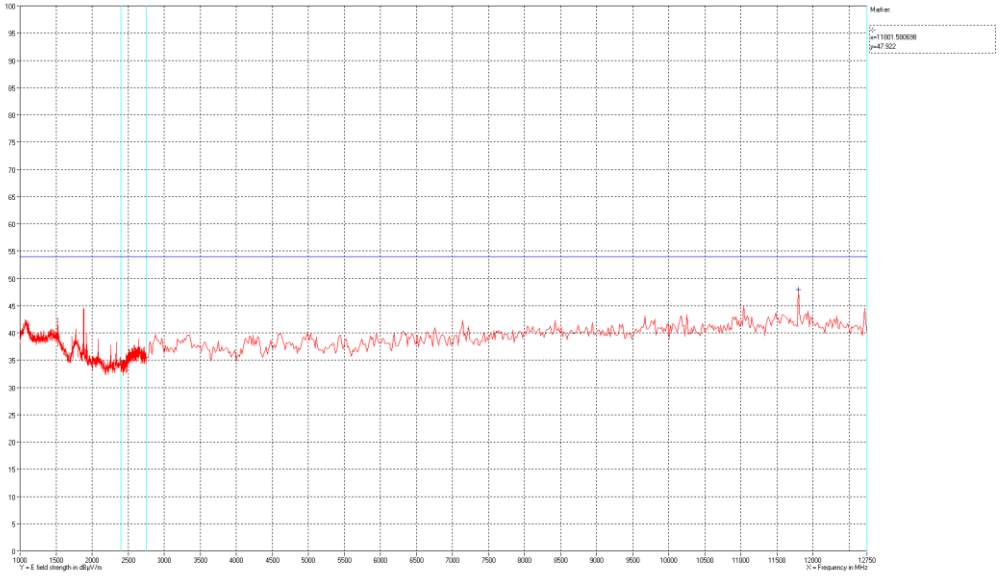
Test objects and Aux. equipment	Combination of 2.1.2: Smart A-Cool Appliance Interface 40 2.2.1: 9 VDC power supply	Sheet	RE_Spur-4
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	1-12.75 GHz

Test method Characteristics	ANSI C63.10:2009 Complete search, antenna distance 3 m	Temperature Humidity	24 °C 45 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49712 49625	Uncertainty	4.9 dB

Final max (Peak):

Frequency MHz	Level dBµV/m	Peak Limit dBµV/m	AV Limit dBµV/m	Margin to AV dB	Polarisation
1880.50000	43.8	74.0	54.0	10.2	Complete search
11801.60000	47.9	74.0	54.0	6.1	Complete search

Test result	The measured field strengths were below the limit
Test Port	Enclosure
Test frequency	Tx @ 908.4 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization



Polarization	Vertical and horizontal peak measurements
Comments	All measurements were performed with a peak detector, all peak measurements were below average limit.

4.6 Test ID 02ca: Radiated limits below 1 GHz

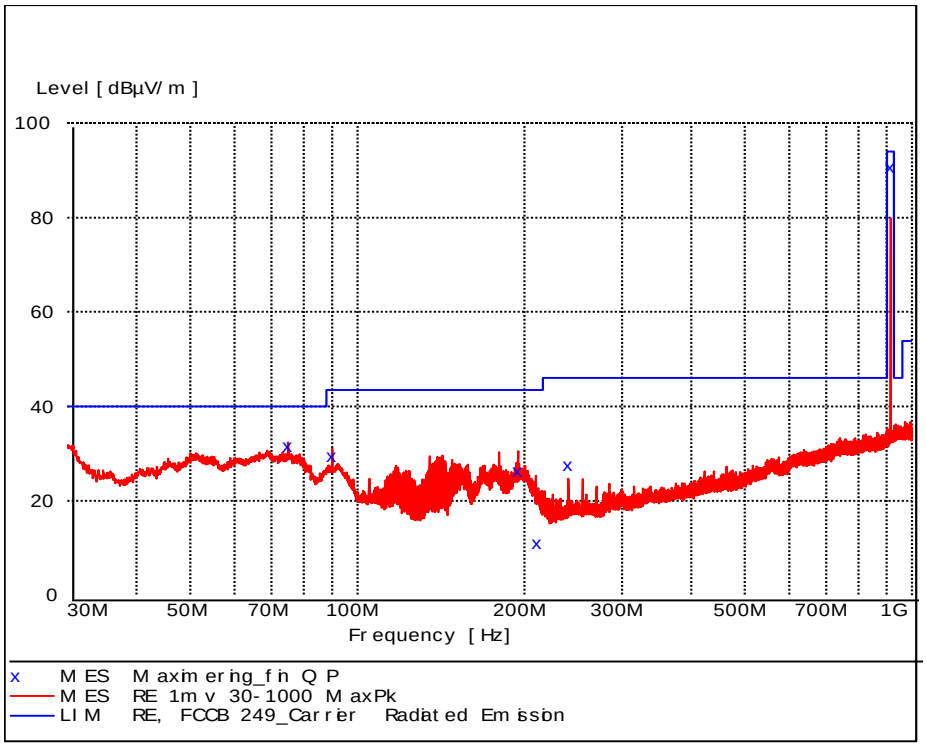
Test objects and Aux. equipment	Combination of 2.1.3: Smart A-Cool Appliance Interface 100 2.2.1: 9 VDC power supply	Sheet	RE_Spur-5
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.10:2009 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	24 °C 45 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

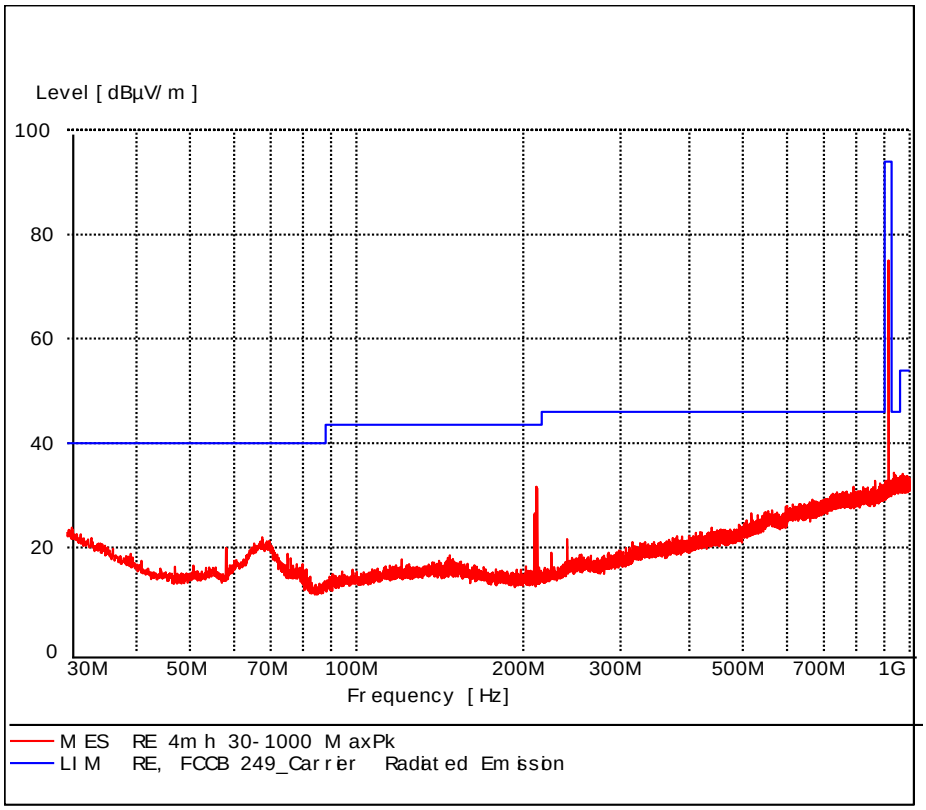
Final max (Quasi peak):

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
75.020000	31.70	9.8	40.0	8.3	131.0	288.00	VERTICAL
90.030000	29.40	11.8	43.5	14.1	101.0	279.00	VERTICAL
195.060000	26.20	12.3	43.5	17.3	105.0	250.00	VERTICAL
211.260000	11.10	13.0	43.5	32.4	400.0	20.00	VERTICAL
240.070000	27.70	14.4	46.0	18.3	104.0	273.00	VERTICAL
916.000000	90.70	29.3	94.0	3.3	129.0	194.00	HORIZONTAL

Test result	The measured field strengths were below the limit
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 916.0 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation



Pre-scan, Antenna at 3 m, 1 m height, vert. pol. Peak detector.



Pre-scan, Antenna at 3 m, 4 m height, hor. pol. Peak detector.

4.7 Test ID 02cb: Radiated limits above 1 GHz

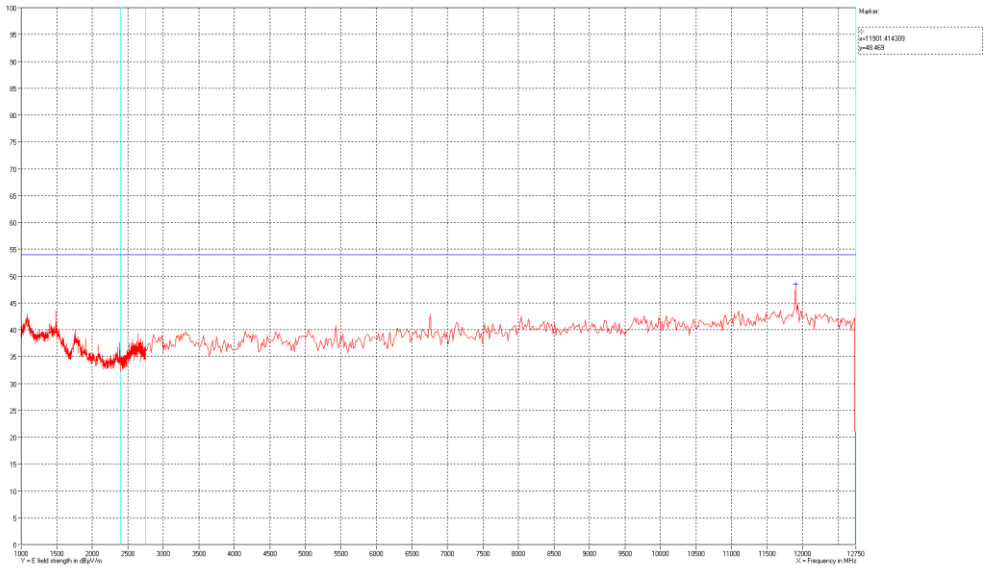
Test objects and Aux. equipment	Combination of 2.1.3: Smart A-Cool Appliance Interface 100 2.2.1: 9 VDC power supply	Sheet	RE_Spur-6
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	1-12.75 GHz

Test method Characteristics	ANSI C63.10:2009 Complete search, antenna distance 3 m	Temperature Humidity	24 °C 45 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49712 49625	Uncertainty	4.9 dB

Final max (Peak):

Frequency MHz	Level dBµV/m	Peak Limit dBµV/m	AV Limit dBµV/m	Margin to AV dB	Polarisation
1491.50000	43.4	74.0	54.0	10.6	Complete search
6759.70000	42.9	74.0	54.0	11.1	Complete search
2346.40000	43.2	74.0	54.0	10.8	Complete search
11901.40000	48.5	74.0	54.0	5.5	Complete search

Test result	The measured field strengths were below the limit
Test Port	Enclosure
Test frequency	Tx @ 916.0 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization



Polarization	Vertical and horizontal peak measurements
Comments	All measurements are performed with a peak detector, all peak measurements are below average limit

4.8 Test ID 03a: Field strength of the fundamental

Test objects and Aux. equipment	Combination of 2.1.1: Smart A-Cool Appliance Interface 9.6 2.2.1: 9 VDC power supply	Sheet	RE_Spur-7
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	908.4 MHz

Test method Characteristics	ANSI C63.10:2009 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	24 °C 45 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

Final max (Quasi peak):

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
908.420000	91.90	29.0	94.0	2.1	229.0	133.00	HORIZONTAL

Test result	The field strength of the fundamental was below the limit.
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 908.42 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation

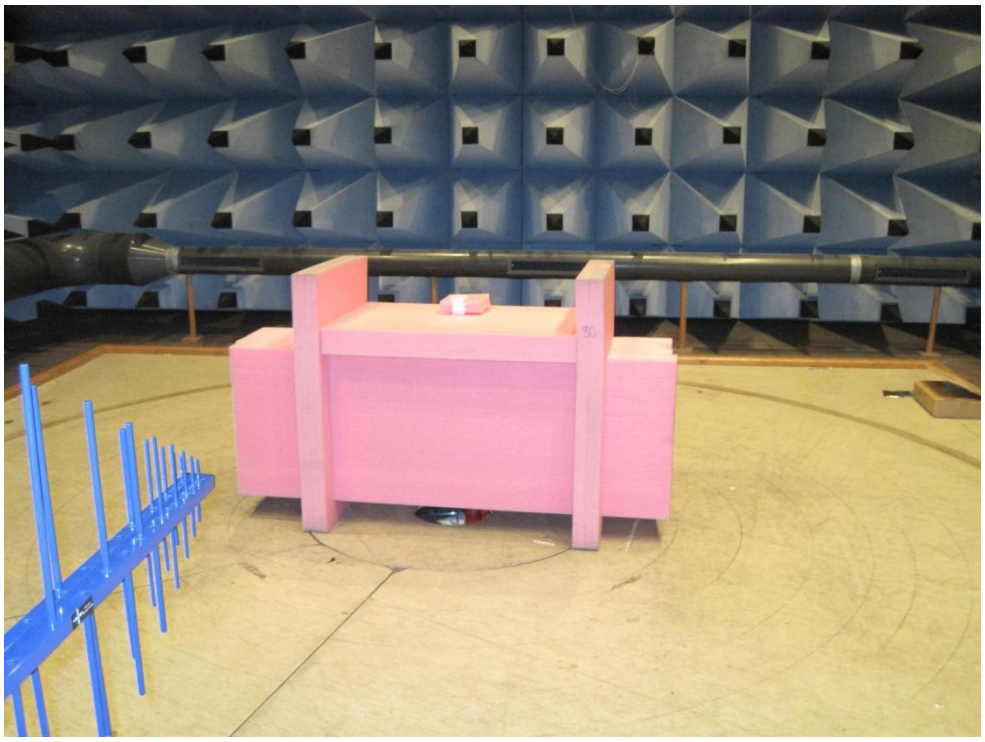


Photo 4.8.1 Test setup regarding measurement of field strength of the fundamental.

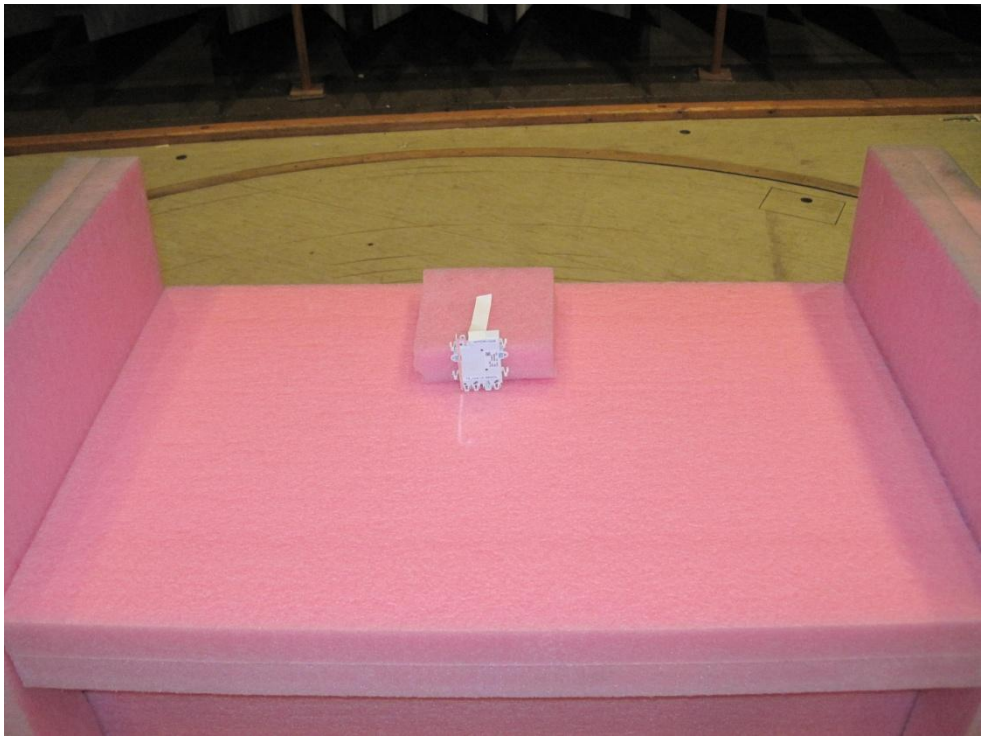


Photo 4.8.2 Test setup regarding measurement of field strength of the fundamental.

4.9 Test ID 03b: Field strength of the fundamental

Test objects and Aux. equipment	Combination of 2.1.2: Smart A-Cool Appliance Interface 40 2.2.1: 9 VDC power supply	Sheet	RE_Spur-8
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	908.4 MHz

Test method Characteristics	ANSI C63.10:2009 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	24 °C 45 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

Final max (Quasi peak):

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
908.400000	93.80	29.0	94.0	0.2	227.0	127.00	HORIZONTAL

Test result	The field strength of the fundamental was below the limit
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 908.4 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation

4.10 Test ID 03c: Field strength of the fundamental

Test objects and Aux. equipment	Combination of 2.1.3: Smart A-Cool Appliance Interface 100 2.2.1: 9 VDC power supply	Sheet	RE_Spur-9
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	916.0 MHz

Test method Characteristics	ANSI C63.10:2009 Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Temperature Humidity	24 °C 45 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

Final max (Quasi peak):

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
916.000000	90.70	29.3	94.0	3.3	129.0	194.00	HORIZONTAL

Test result	The field strength of the fundamental was below the limit
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 916.0 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation

4.11 Test ID 04a: Occupied bandwidth & band edge compliance

Test object	Smart A-Cool Appliance Interface 9.6	Sheet	RE_Con-1
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	908.4 MHz

Test method Characteristics	ANSI C63.10:2009 Radiated measurement @ enclosure	Temperature Humidity	24 °C 45 % RH
Span	3 MHz	RBW	10 kHz
Sweep	Auto	VBW	30 kHz
Detector	Peak	Trace	Max hold
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	1.1 dB

```
Final max (Peak):
   Frequency      Frequency       Frequency         20 dB OBW
     Peak 1    20 dB Delta 1   20 dB Delta 2    Delta 2 - Delta 1
      MHz            MHz             MHz               MHz
    908.420        908.375         908.465           000.090

   Band Edge      20 dB OBW frequency      Margin
      MHz              MHz                 MHz
    902.000          908.375               6.375
    928.000          908.465              19.535
```

Test result	The measured occupied bandwidth was within the limit. Band edges are respected.
Test Port	Enclosure
Test frequency	Fundamental frequency was set at 908.42 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The measured 20 dB OBW was 90 kHz. The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule Section under which the equipment is operated (15.249).

4.12 Test ID 04b: Occupied bandwidth & band edge compliance

Test object	Smart A-Cool Appliance Interface 40	Sheet	RE_Con-2
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	908.4 MHz

Test method Characteristics	ANSI C63.10:2009 Radiated measurement @ enclosure	Temperature Humidity	24 °C 45 % RH
Span	3 MHz	RBW	10 kHz
Sweep	Auto	VBW	30 kHz
Detector	Peak	Trace	Max hold
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	1.1 dB

```
Final max (Peak):
   Frequency      Frequency       Frequency         20 dB OBW
     Peak 1    20 dB Delta 1   20 dB Delta 2    Delta 2 - Delta 1
      MHz            MHz             MHz               MHz
    908.400        908.345         908.450           000.105

   Band Edge      20 dB OBW frequency      Margin
      MHz              MHz                 MHz
    902.000          908.345               6.345
    928.000          908.450              19.550
```

Test result	The measured occupied bandwidth was within the limit. Band edges are respected.
Test Port	Enclosure
Test frequency	Fundamental frequency was set at 908.4 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The measured 20 dB OBW was 105 kHz. The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule Section under which the equipment is operated (15.249).

4.13 Test ID 04c: Occupied bandwidth & band edge compliance

Test object	Smart A-Cool Appliance Interface 100	Sheet	RE_Con-3
Type	See Section 2	Project no.	T202039
Serial no.	See Section 2	Date	21 Sep. 2012
Client	Diehl AKO Stiftung & Co. KG	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	916.0 MHz

Test method Characteristics	ANSI C63.10:2009 Radiated measurement @ enclosure	Temperature Humidity	24 °C 45 % RH
Span	3 MHz	RBW	10 kHz
Sweep	Auto	VBW	30 kHz
Detector	Peak	Trace	Max hold
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	1.1 dB

```
Final max (Peak):
   Frequency      Frequency       Frequency         20 dB OBW
     Peak 1    20 dB Delta 1   20 dB Delta 2    Delta 2 - Delta 1
      MHz            MHz             MHz               MHz
    916.000        915.930         916.065           000.135

   Band Edge      20 dB OBW frequency      Margin
      MHz               MHz                 MHz
    902.000           915.930              13.930
    928.000           916.065              11.935
```

Test result	The measured occupied bandwidth was within the limit. Band edges are respected.
Test Port	Enclosure
Test frequency	Fundamental frequency was set at 916.0 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The measured 20 dB OBW was 135 kHz. The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule Section under which the equipment is operated (15.249).

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.

CISPR 22 is equivalent to AS/NZS CISPR 22, and therefore this report can be used for applying the **Australian C-Tick mark** for IT equipment, when this test has been passed.

CISPR 22:2002 is equivalent to ICES-003:2004, and therefore this report can be used for approval in Canada for IT equipment, when this test has been passed.

5.2 FCC Registrations

Organization: Federal Communications Commission, USA

Registration Number: 90529

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 2 Hørsholm (EMC-2):	C-707, T-246 and T-1547
EMC room 3 Hørsholm (EMC-3):	C-2532, T-247 and T-1548
EMC room 4 Hørsholm (EMC-4):	C-2533, T-248 and T1549
EMI room Hørsholm (EMC-5):	R-1180, C-706 and T-1550, 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.	Description	Manufacturer	Type No.	Cal date	Cal exp
29301	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	2011-12-21	2012-12-21
29861	EMI-SOFTWARE VER. 1.60	ROHDE & SCHWARZ	ES-K1, PART: 1026.6790.02	-	-
49086	REMI EMISSION SOFTWARE PACKAGE v. 2.133, ROOM 5	NeWeTec	REMI	-	-
49421	IMPULSE VOLTAGE LIMITER (BNC)	ROHDE & SCHWARZ	ESH3/Z2	2012-06-21	2013-06-21
49550	SIGNAL ANLYZER	ROHDE & SCHWARZ	FSQ8	2012-02-28	2013-02-28
49600	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESU40	2011-12-16	2012-12-16
49624	DUAL RIDGE HORN ANTENNA – 1 GHz – 26 GHz (2 GHz – 32 GHz)	SATIMO	SH2000	2011-09-19	2014-09-19
49625	SRD COAX SWITCH MATRIX USED IN 1GHZ TO 26 GHz SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX	2012-05-11	2013-05-11