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DELTA Test Report

TEST Reg. no. 19

Radio parameter test of assembly box for weighing cells according to FCC and IC specification

Performed for JE electronic a/s

DANAK-19/15443
Project no.: T220089-1

09 July 2015

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Title	Radio parameter test of assembly box for weighing cells according to FCC and IC specification
Test object	Assembly box for weighing cells
Report no.	DANAK-19/15443
Project no.	T220089-1
Test period	27 May to 10 June 2015
Client	JE electronic a/s Maserativej 3 7100 Vejle Denmark Tel.: +45 75857077
Contact person	Teddy Rørby E-mail: tr@je-electronic.dk
Manufacturer	JE electronic a/s
Specifications	See Section 1 Summary of tests
Results	The test object was found to be in compliance with the specifications, as listed in Section 1
Test personnel	Poul Nørgaard Jan Askov
Test site(s)	DELTA, Venlighedsvej 4, 2970 Hørsholm, Denmark

Date 09 July 2015

Project Manager

Jan Askov
Senior Consultant, EMC & Wireless
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Responsible

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1. Summary of tests

Tests	Test methods	Rule Section	Results
Measurement of radiated emission	ANSI C63.10:2013	47 CFR Part 15.209 47 CFR Part 15.249(a)(c)(d)(e) RSS-210 A2.9 RSS-Gen 8.9 & 8.10	Passed
Measurement of field strength of fundamental	ANSI C63.10:2013	47 CFR Part 15.249(a)(c) RSS-210 A2.9	Passed
Measurement of 20 dB bandwidth	ANSI C63.10:2013	47 CFR Part 15.215(c)	Passed
Measurement of band edge compliance	ANSI C63.10:2013	47 CFR Part 15.209(a) 47 CFR Part 15.249(a)(c)(d) RSS-210 A2.9	Passed
Measurement of occupied bandwidth, IC	ANSI C63.10:2013	RSS-Gen 6.6	Passed

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 standards stated below.

- 47 CFR Part 15, Subpart C (Specific rule part §15.249)
- RSS-210, Issue 8:2010
- RSS-Gen, Issue 3:2014.

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.

Test object 2.1.1

Name of test object	Assembly box for weighing cells
Model / type	JE783
Part no.	07-783-00
Serial no.	100001
FCC ID	2AE3QJE783
IC ID:	IC: 20352-JE783
Manufacturer	JE electronic a/s
Supply voltage	10-24 V DC (13.2 VDC typical)
Software version	SW:1001
Hardware version	HW:1001
Cycle time	Less than 1 ms.
Highest frequency generated or used	918 MHz
Comment	-10 dB settings
Received	Date: 26 May 2015. Status: -

2.2 Auxiliary equipment

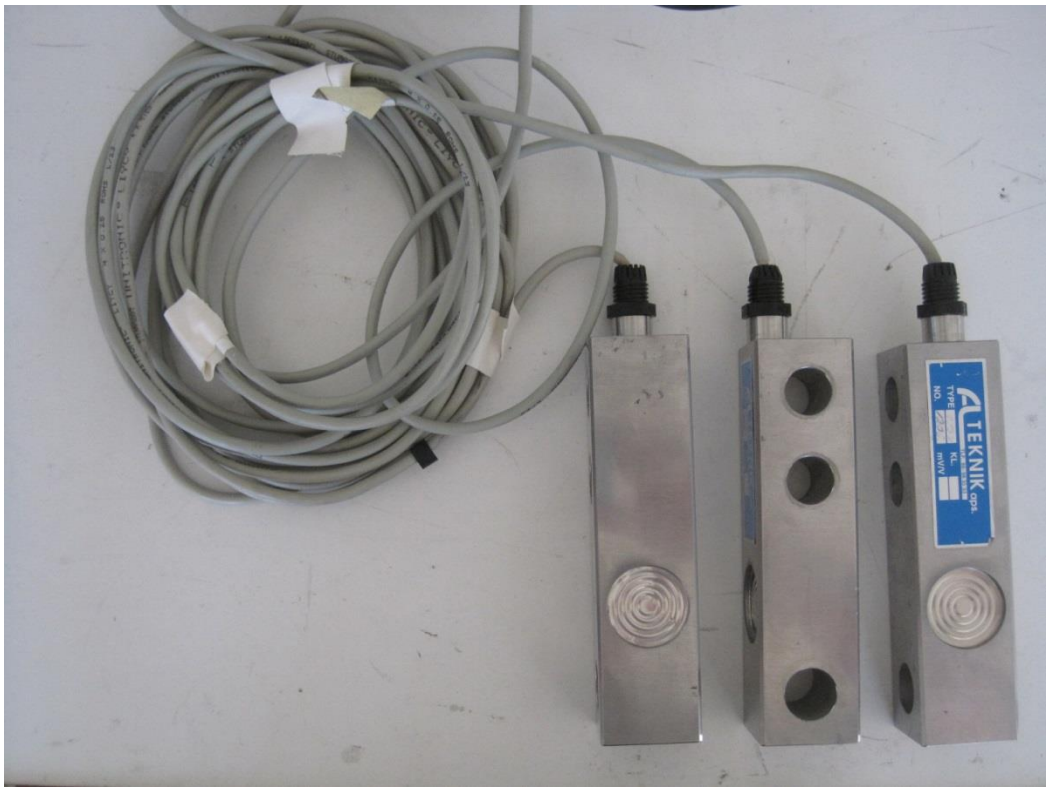


Photo 2.2.1 Auxiliary equipment.

Photo 2.2.2 Auxiliary equipment.

Auxiliary equipment 2.2.1

Name of auxiliary equipment	Load cell
Model / type	6Ton
Part no.	-
Serial no.	0
FCC ID	-
Manufacturer	AL Teknik
Supply voltage	5 VDC
Highest frequency generated or used	N/A
Comment	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up

Auxiliary equipment 2.2.2

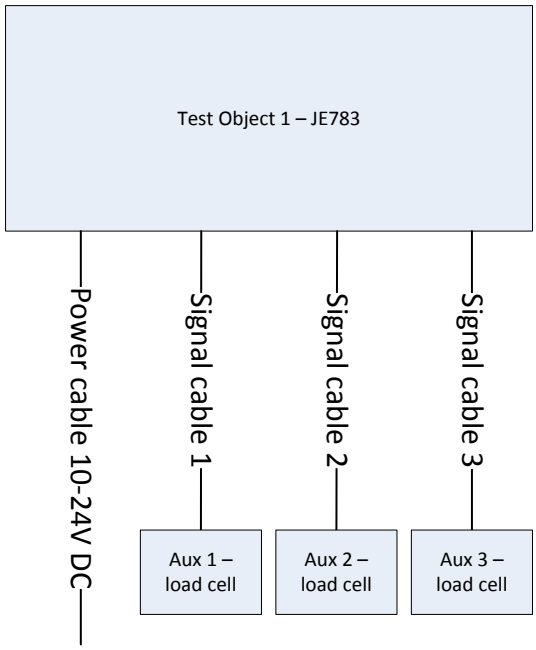
Name of auxiliary equipment	Load cell
Model / type	6Ton
Part no.	-
Serial no.	0
FCC ID	-
Manufacturer	AL Teknik
Supply voltage	5 VDC
Highest frequency generated or used	N/A
Comment	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up

Auxiliary equipment 2.2.3

Name of auxiliary equipment	Load cell
Model / type	6Ton
Part no.	-
Serial no.	0
FCC ID	-
Manufacturer	AL Teknik
Supply voltage	5 VDC
Highest frequency generated or used	N/A
Comment	Auxiliary equipment supplied by the client, who also has the responsibility for its correct function and set up

3. General test conditions

3.1 Test setup



Name	Cat.	Type	Max. length
Power Cable 10-24 VDC	DC Power	Unshielded	10 m
Signal cable 1-3	Signal	Shielded	6 m

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

3.1.1 Description and intended use of test object

The test object is intended for use as a wireless weighing system.

3.1.2 Test modes during emission tests

The unit transmits a constant modulated carrier at 918 MHz.

3.1.3 Nominal power consumption

50 mA @ 12 VDC.

3.2 Test sequence

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

1. Measurement of 20 dB bandwidth
2. Measurement of occupied bandwidth, IC
3. Measurement of radiated emission
4. Measurement of field strength of fundamental
5. Measurement of band edge compliance.

3.3 Radio specifications, receiver and transmitter

Test object	Assembly box for weighing cells	Sheet	Radio-1
Type	JE783	Project no.	T220089-1
Serial no.	-		
Client	JE electronic a/s		
Specification	-		

The radio of the test object has the following specified RF parameters. The below mentioned information regarding the receiver and the transmitter is declared by the manufacturer.

Type of equipment	:	Low power device (902-928 MHz)
Operating frequency range	:	918 MHz
Antenna	:	Permanently attached wire antenna
Maximum gain	:	0 dBi
Transmit power, quasi peak	:	0.6 mW EIRP
Field Strength, quasi peak	:	93.2 dBµV/m (45.8 mV/m) @ 3 meter
Power level	:	No
No. of channels	:	1
Bandwidth	:	1
Occupied bandwidths (99 %)	:	0.22 MHz (Measured)
Channel separation	:	-
Modulation	:	GFSK
Data rate	:	0.05 Mbits
Duty cycle	:	-
Transmit mode	:	Yes
Receive mode	:	-
Standby mode	:	-
Power supply	:	13.2 VDC
Specified min voltage	:	10 VDC
Specified max voltage	:	24 VDC
Temperature category	:	-20 to +70 ºC
Canada: (IC)		
Emission Designator	:	220KF1D
Max. TX spurious emission, max peak	:	328 µV/m @ 3 meter (Field Strength)

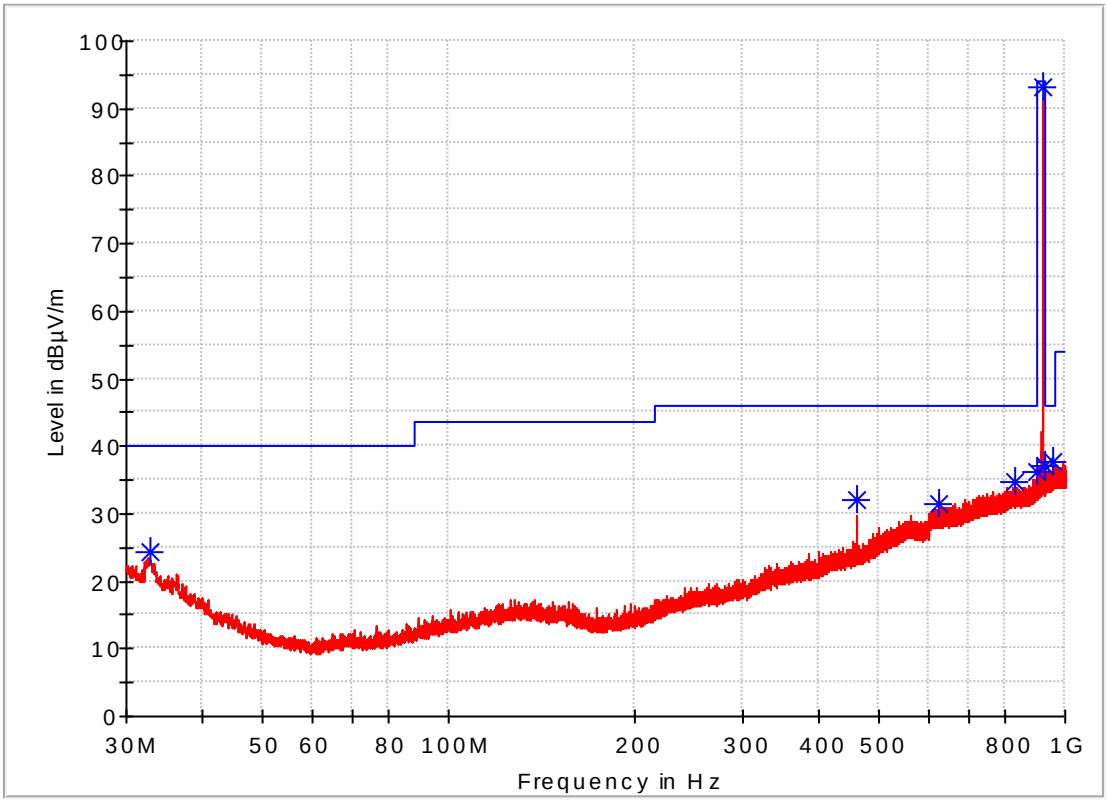
4. Test results

4.1 Measurement of radiated emission

Test object	Assembly box for weighing cells	Sheet	RE_Spur-1
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m	Temperature Humidity	20 °C 47 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB

Full Spectrum

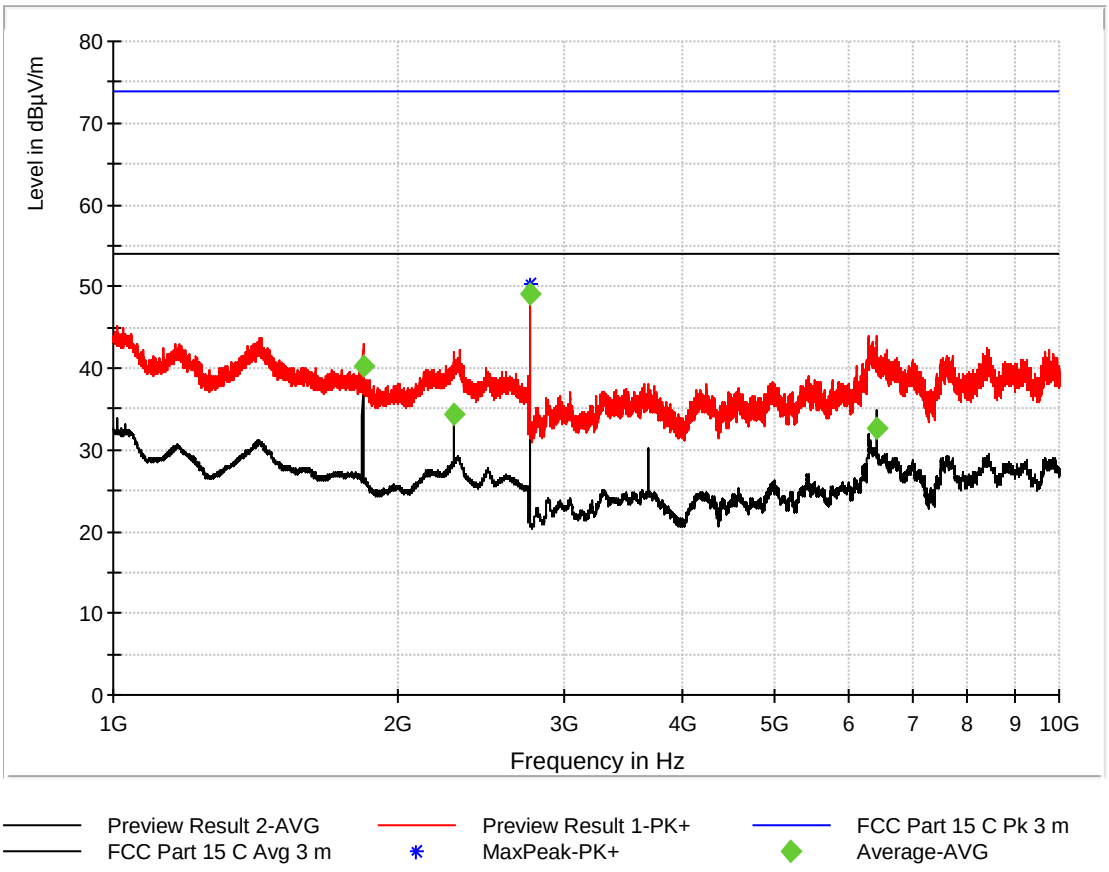


Comments Continuous Tx - normal modulation

Test object	Assembly box for weighing cells	Sheet	RE_Spur-2
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	1-10 GHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m.	Temperature Humidity	20 °C 47 % RH
Detector	Peak and average	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49624 49625	Uncertainty	4.9 dB

Full Spectrum



Comments Continuous Tx - normal modulation

Test object	Assembly box for weighing cells	Sheet	RE_Spur-3
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	30 MHz - 10 GHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m	Temperature Humidity	20 °C 47 % RH
Detector	Quasi peak below 1 GHz Peak and average above 1 GHz	Bandwidth	120 kHz / 1 MHz
Test equipm.	EMI room Hørsholm 49600 29797 49624 49625	Uncertainty	4.9 dB

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.70	24.26	40.00	15.74	15000.0	120.000	102.0	V	-29	17.9
459.00	31.94	46.00	14.06	15000.0	120.000	102.0	H	138	20.8
626.52	31.60	46.00	14.40	15000.0	120.000	111.0	H	251	24.5
830.85	34.81	46.00	11.19	15000.0	120.000	151.0	H	317	27.7
902.00	36.28	46.00	9.72	15000.0	120.000	102.0	V	252	28.6
917.94	93.22	94.00	0.78	15000.0	120.000	232.0	V	313	29.1
928.00	37.21	46.00	8.79	15000.0	120.000	265.0	H	217	29.4
955.14	37.75	46.00	8.25	15000.0	120.000	231.0	H	286	30.2

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1836.00	---	40.29	54.00	13.71	15000.0	1000.000	289.0	V	183
2295.00	---	34.43	54.00	19.57	15000.0	1000.000	215.0	H	252
2753.75	50.33	---	74.00	23.67	15000.0	1000.000	195.0	V	268
2754.00	---	48.99	54.00	5.01	15000.0	1000.000	212.0	V	270
6426.00	---	32.74	54.00	21.26	15000.0	1000.000	146.0	V	214

Test result	The measured field strengths are below the limits
Test Port	Enclosure
Test frequency	918 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation

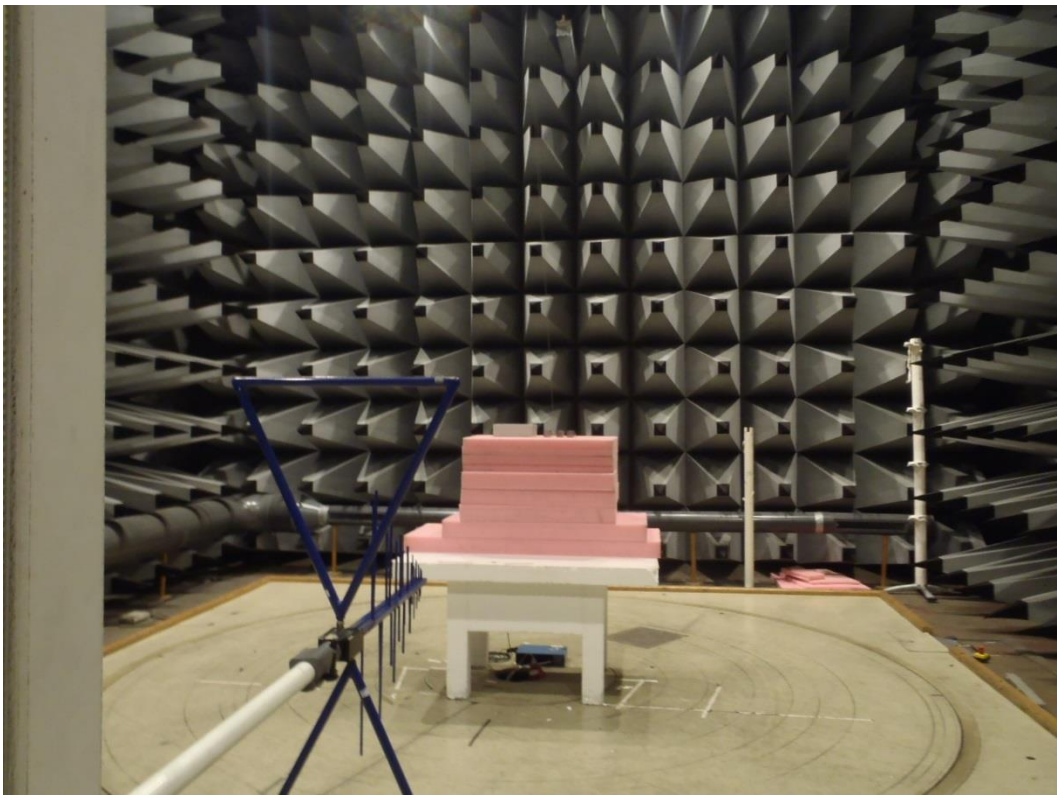


Photo 4.1.1 Test setup regarding measurement of radiated emission.

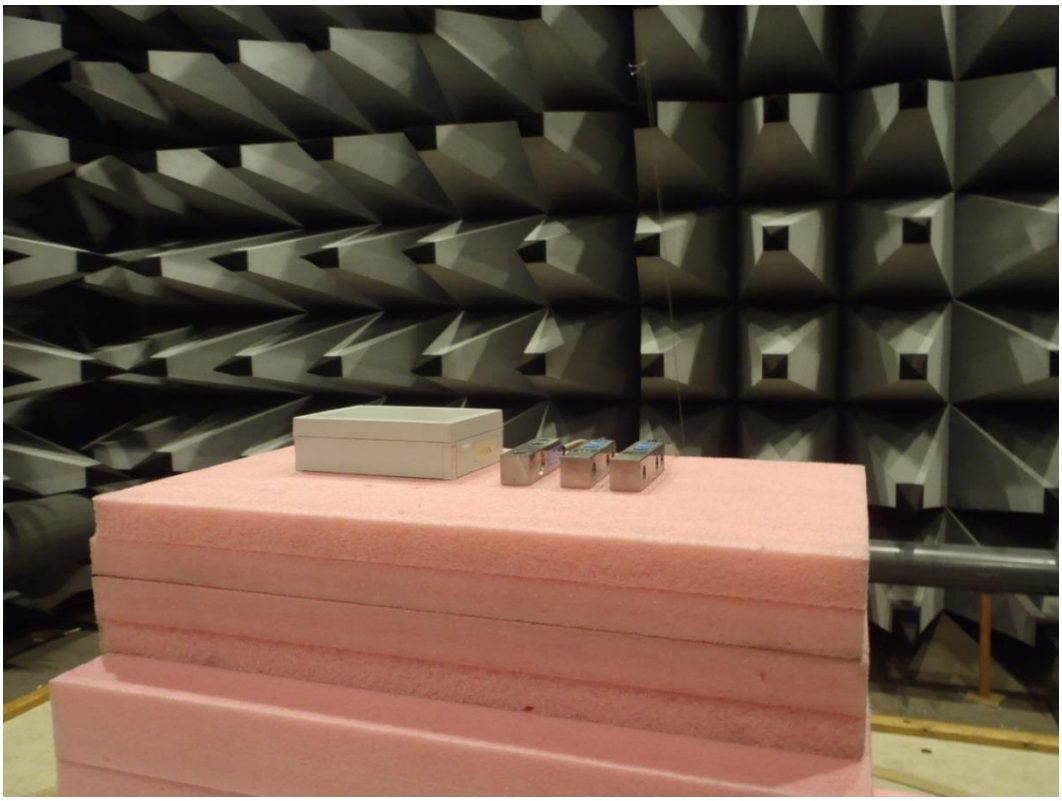


Photo 4.1.2 Test setup regarding measurement of radiated emission.

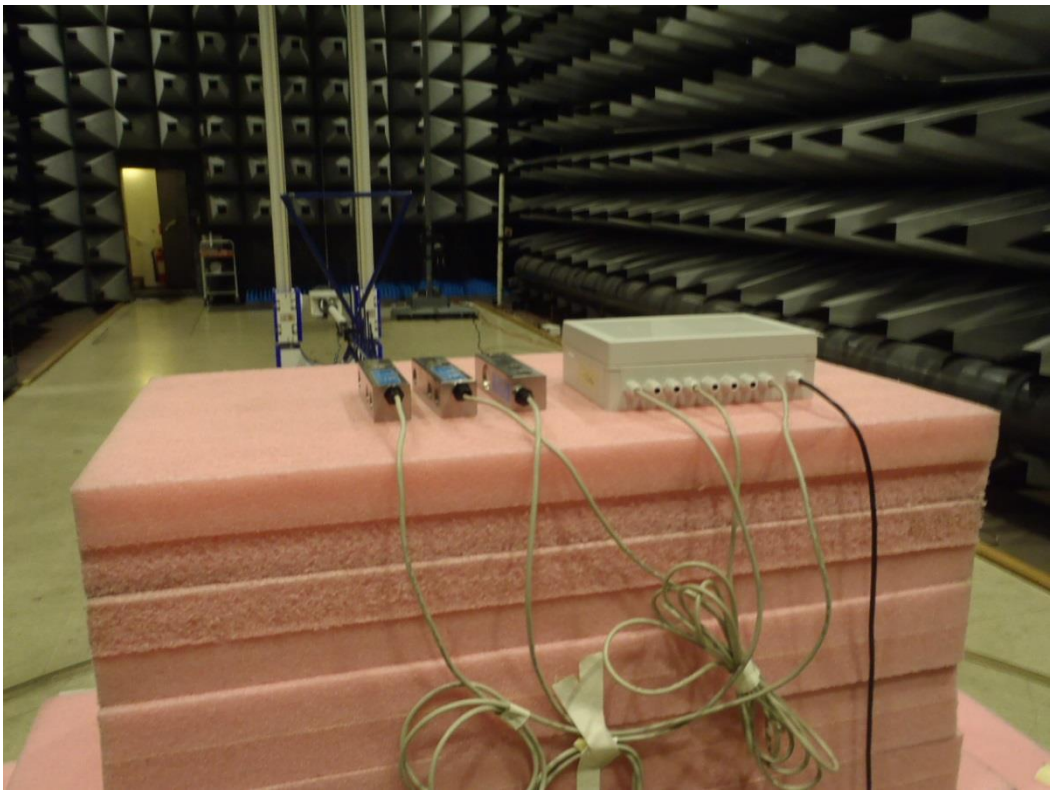
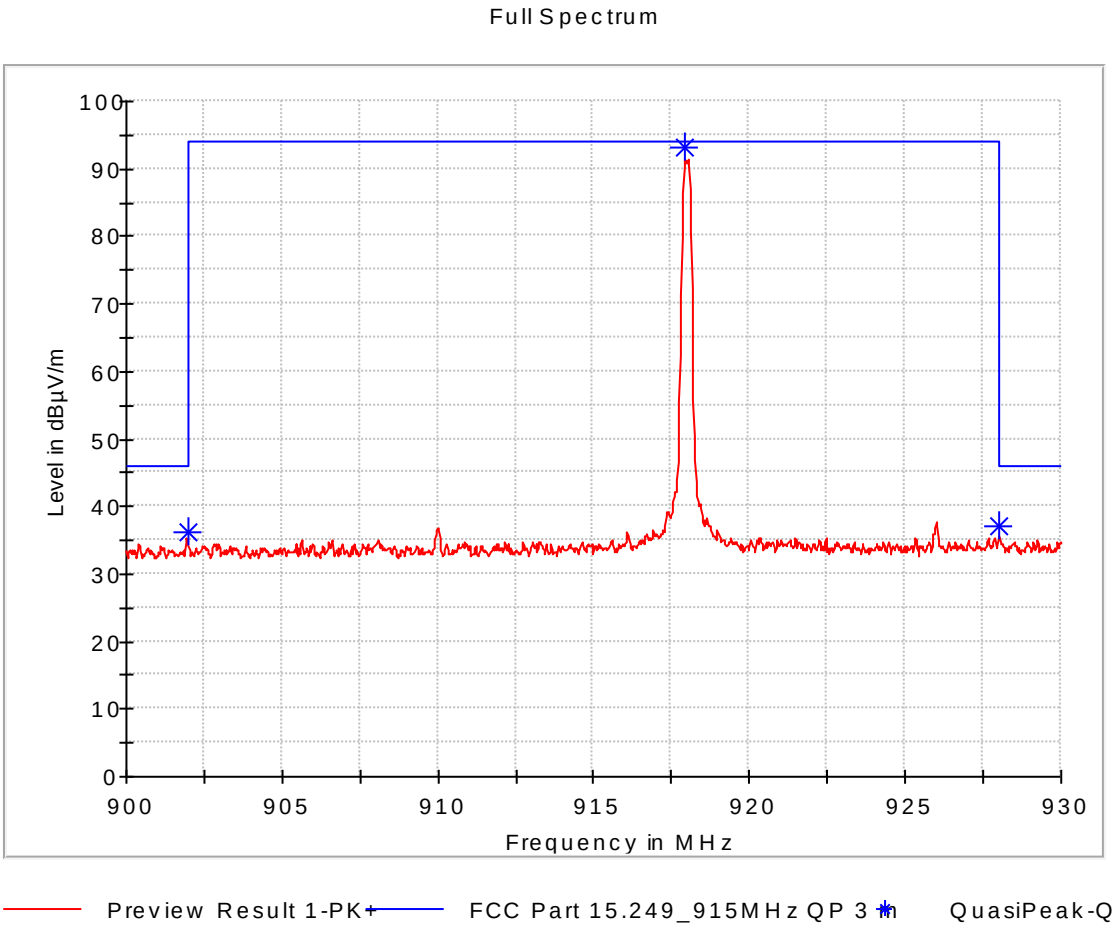


Photo 4.1.3 Test setup regarding measurement of radiated emission.

4.2 Measurement of field strength of fundamental

Test object	Assembly box for weighing cells	Sheet	RE_Spur-4
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	900-930 MHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m	Temperature Humidity	20 °C 47 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB



Comments Continuous Tx - normal modulation

Test object	Assembly box for weighing cells	Sheet	RE_Spur-5
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m	Temperature Humidity	20 °C 47 % RH
Detector	Quasi peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
917.94	**93.22**	**94.00**	**0.78**	**15000.0**	**120.000**	**232.0**	**V**	**313**	**29.1**

Test result	The measured field strengths are below the limit
Test Port	Enclosure
Test frequency	918 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization

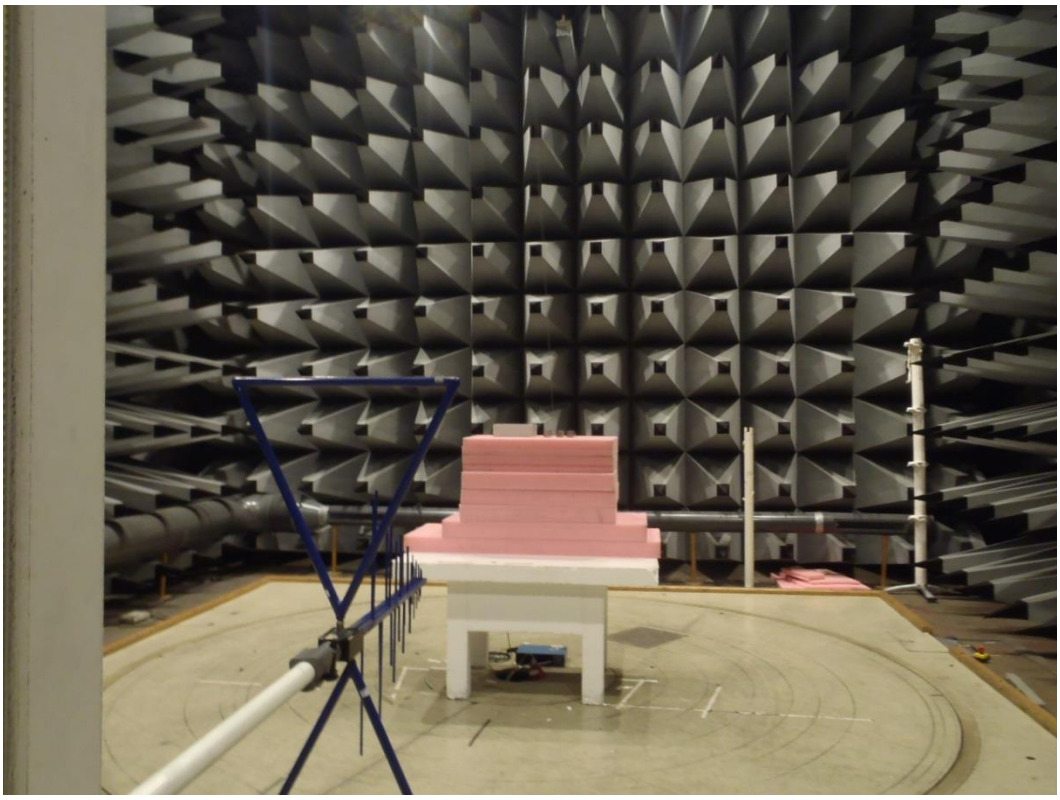


Photo 4.2.1 Test setup regarding measurement of field strength of fundamental.

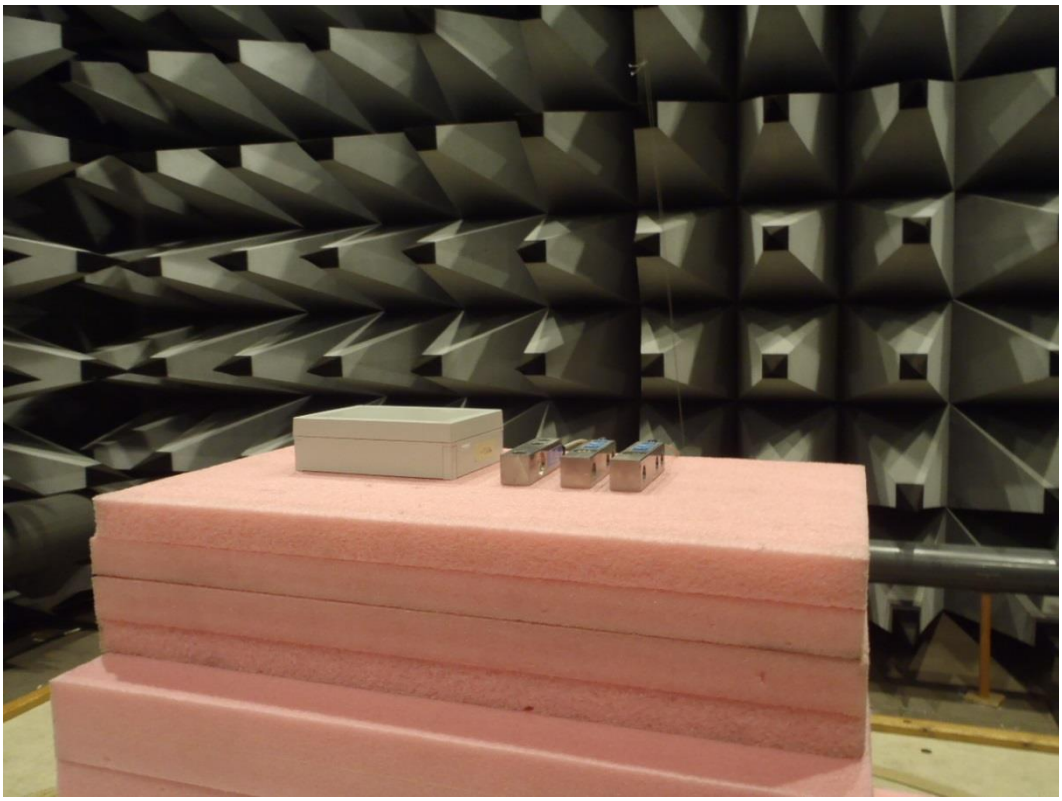
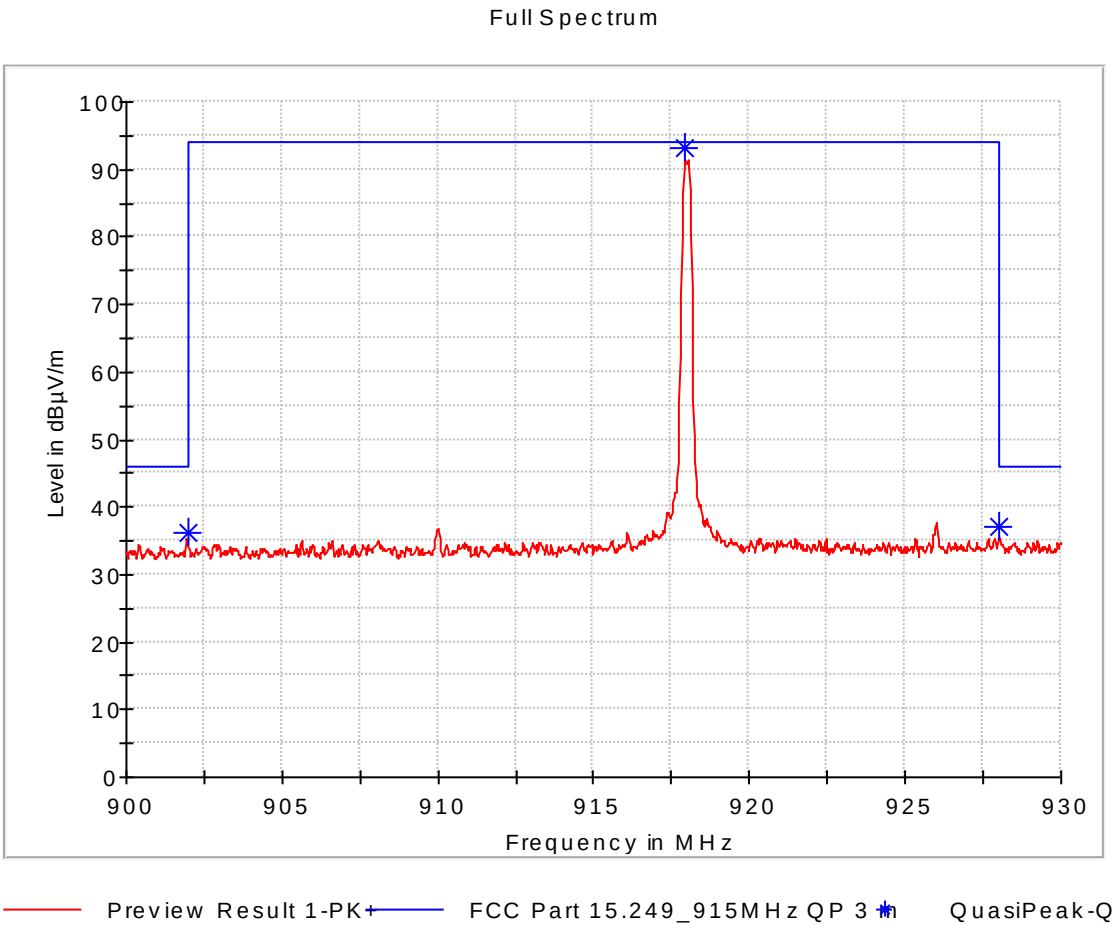


Photo 4.2.2 Test setup regarding measurement of field strength of fundamental.

4.3 Measurement of band edge compliance

Test object	Assembly box for weighing cells	Sheet	RE_Spur-6
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	900-930 MHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m	Temperature Humidity	20 °C 47 % RH
Detector	Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB



Comments Continuous Tx - normal modulation

Test object	Assembly box for weighing cells	Sheet	RE_Spur-7
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	10 June 2015
Client	JE electronic a/s	Initials	PFN
Specification	See Section 1 Summary of tests	Frequency	30-1000 MHz

Test method Characteristics	ANSI C63.10:2013 Complete search, antenna distance 3 m	Temperature Humidity	20 °C 47 % RH
Detector	Quasi peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
902.00	**36.28**	**46.00**	**9.72**	**15000.0**	**120.000**	**102.0**	**V**	**252**	**28.6**
928.00	**37.21**	**46.00**	**8.79**	**15000.0**	**120.000**	**265.0**	**H**	**217**	**29.4**

Test result	The measured field strengths at the band edge were below the limit
Test Port	Enclosure
Test frequency	918 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation

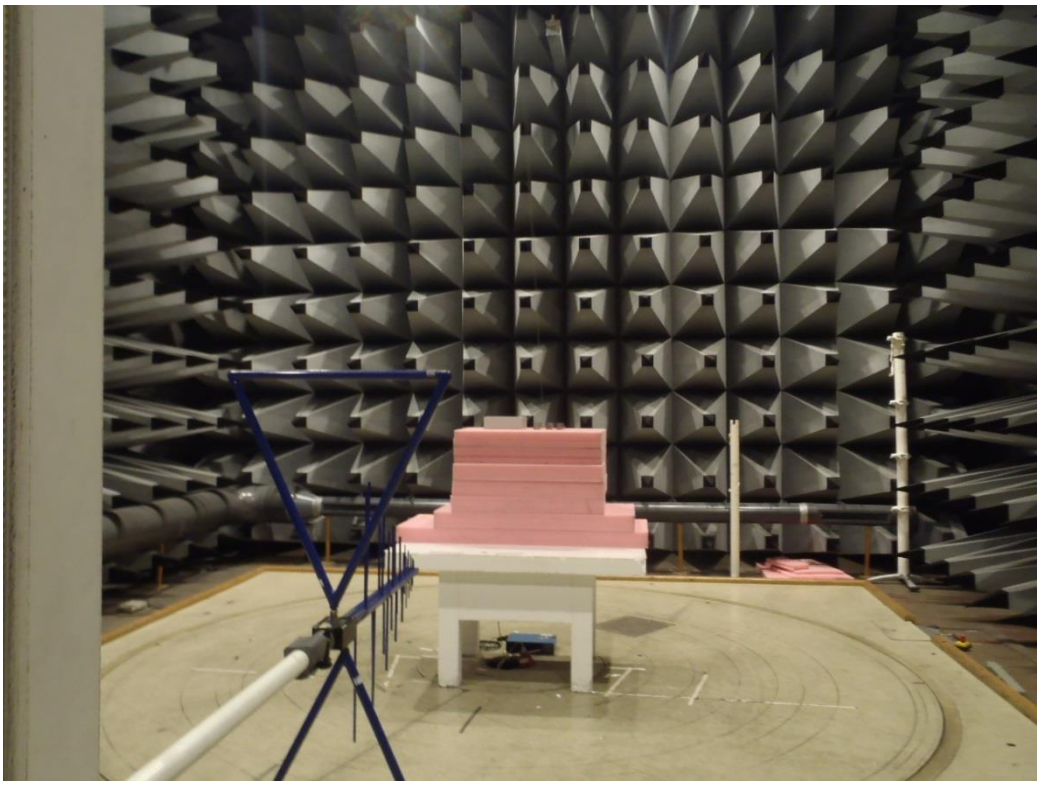


Photo 4.3.1 Test setup regarding measurement of band edge compliance.

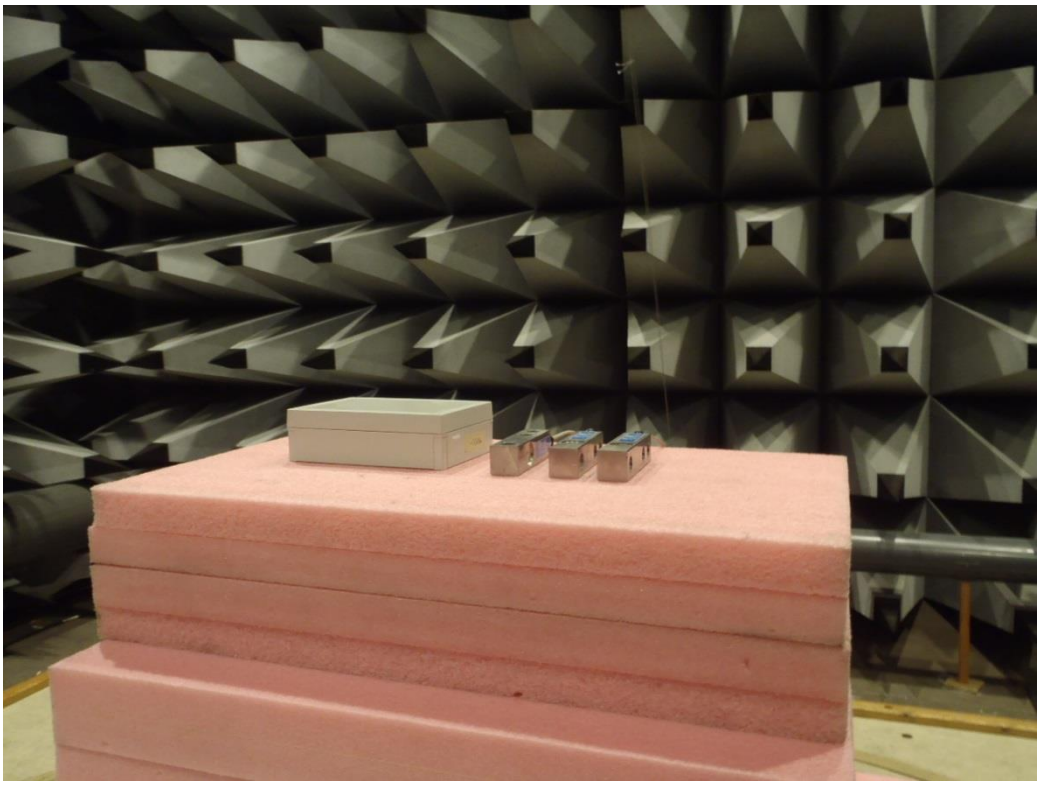
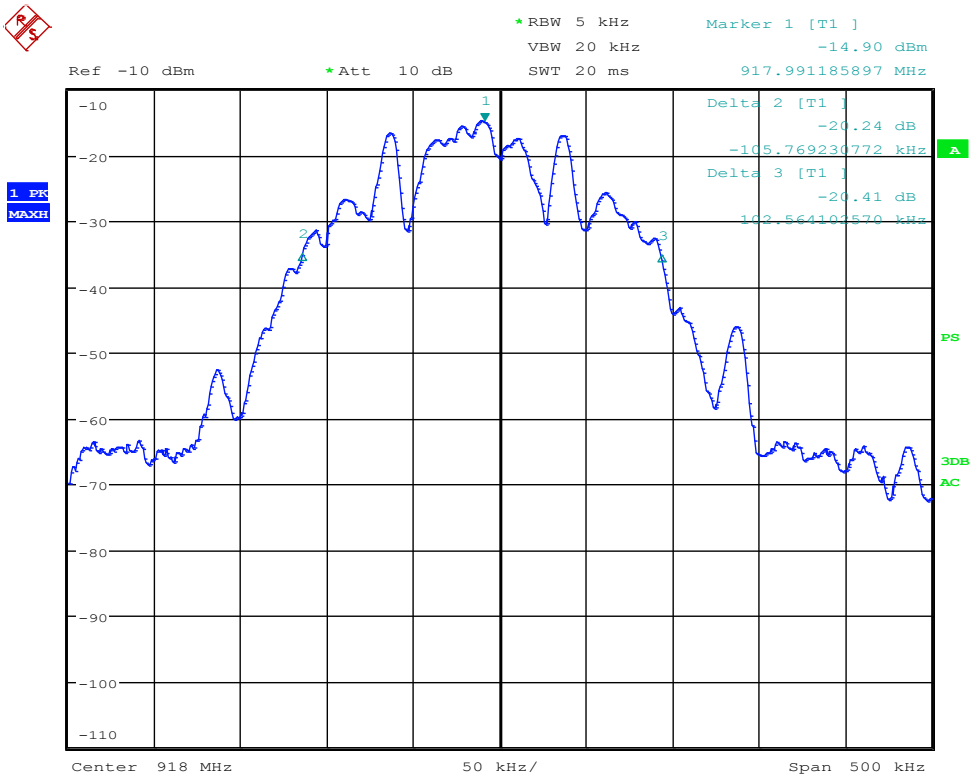


Photo 4.3.2 Test setup regarding measurement of band edge compliance.

4.4 Measurement of 20 dB bandwidth

Test object	Assembly box for weighing cells	Sheet	PROF-1
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	27 May 2015
Client	JE electronic a/s	Initials	JAS
Specification	See Section 1 Summary of tests		

Test method Characteristics	ANSI C63.10:2013 Test voltage: External power supply at 13.2 VDC	Temperature Humidity	22 °C 49 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 5 kHz VBW: 20 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		



Date: 27.MAY.2015 15:55:20

Comments Operating frequency: 918 MHz

Test object	Assembly box for weighing cells	Sheet	PROF-2
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	27 May 2015
Client	JE electronic a/s	Initials	JAS
Specification	See Section 1 Summary of tests		

Test method Characteristics	ANSI C63.10:2013 Test voltage: External power supply at 13.2 VDC	Temperature Humidity	22 °C 49 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 5 kHz VBW: 20 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Remarks
Lowest frequency	917.89	902.00	-
Highest frequency	918.09	928.00	-

Band edge criteria	20 dB bandwidth (20 dBc)
Test result	The measured 20 dB bandwidth was within limit designated in 15.215(c)
Test port	Enclosure
Test frequency	918 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	-

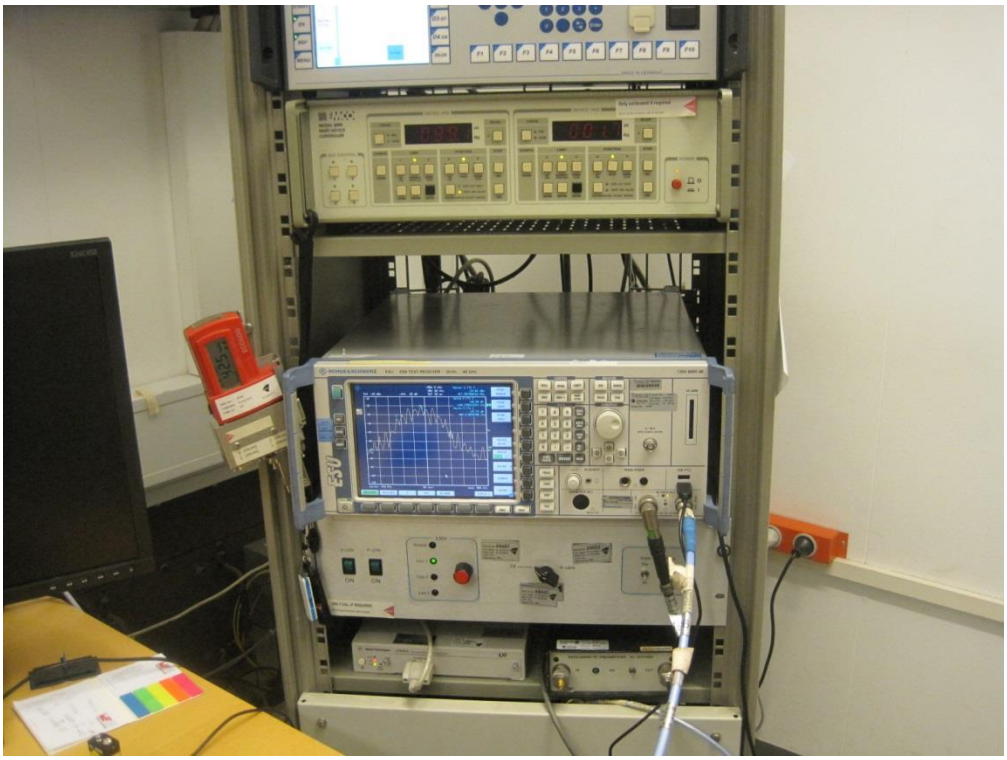


Photo 4.4.1 Test setup regarding measurement of 20 dB bandwidth.

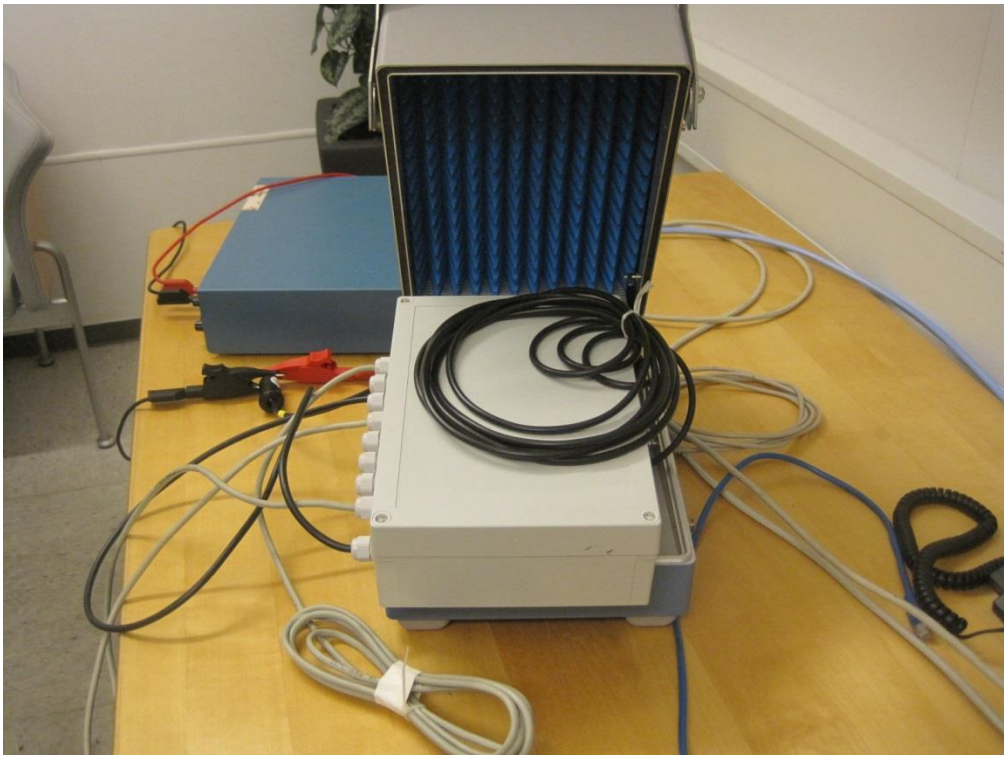
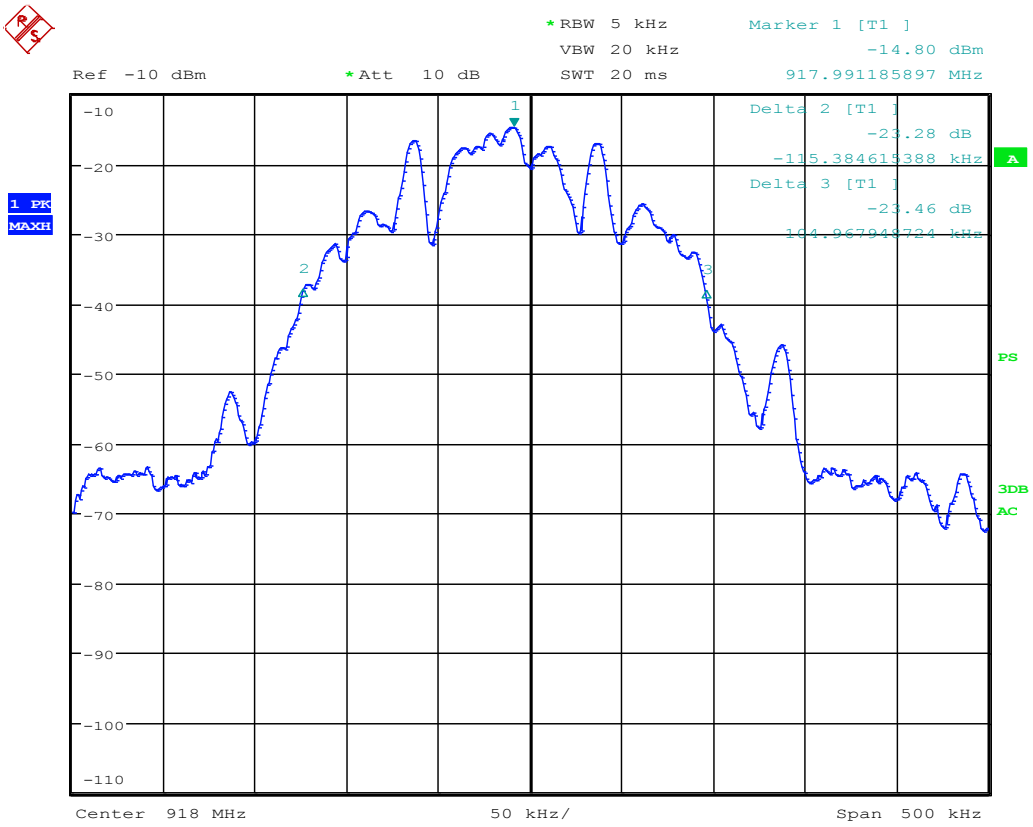


Photo 4.4.2 Test setup regarding measurement of 20 dB bandwidth.

4.5 Measurement of occupied bandwidth, IC

Test object	Assembly box for weighing cells	Sheet	PROF-3
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	27 May 2015
Client	JE electronic a/s	Initials	JAS
Specification	See Section 1 Summary of tests		

Test method Characteristics	ANSI C63.10:2013 Test voltage: External power supply at 13.2 VDC	Temperature Humidity	22 °C 49 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 5 kHz VBW: 20 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		



Date: 27.MAY.2015 15:55:46

Comments Operating frequency: 918 MHz

Test object	Assembly box for weighing cells	Sheet	PROF-4
Type	JE783	Project no.	T220089-1
Serial no.	100001	Date	27 May 2015
Client	JE electronic a/s	Initials	JAS
Specification	See Section 1 Summary of tests		

Test method Characteristics	ANSI C63.10:2013 Test voltage: External power supply at 13.2 VDC	Temperature Humidity	22 °C 49 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 5 kHz VBW: 20 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		

Operating frequency [MHz]	Low frequency [MHz]	High frequency [MHz]	Measured 99% emission bandwidth [MHz]
918	917.88	918.10	0.22
Note 1:-			

Band edge criteria	Measured 99 % emission bandwidth (23 dBc)
Test port	Enclosure
Test frequency	918 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	-

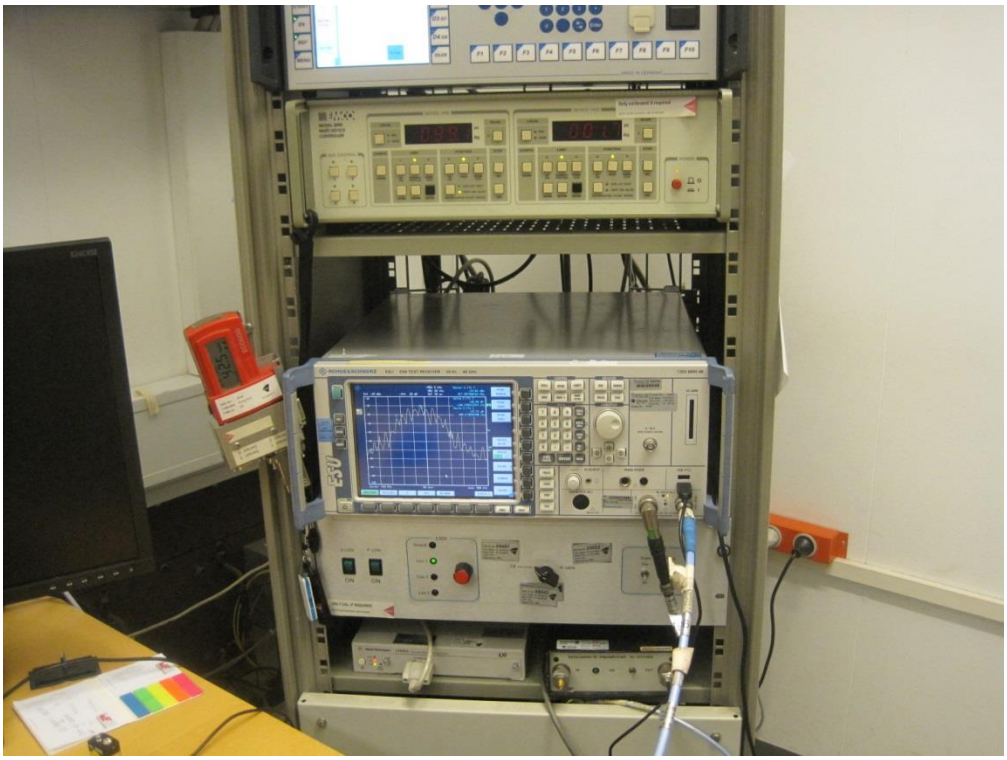


Photo 4.5.1 Test setup regarding measurement of occupied bandwidth, IC.

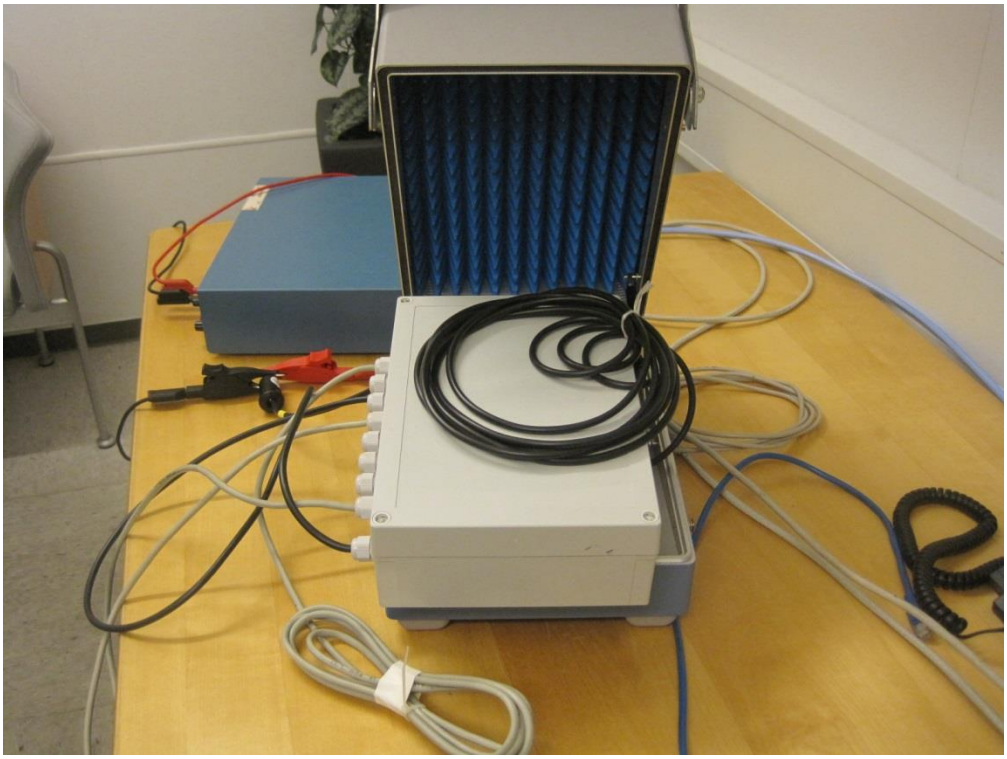


Photo 4.5.2 Test setup regarding measurement of occupied bandwidth, IC.

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 2 Hørsholm (EMC-2):	C-707 and T-1547
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.	Description	Manufacturer	Type No.	Cal. date	Cal. exp.
29301	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	01-09-2014	01-09-2015
29797	BILOG ANTENNA, 30-2000 MHz	CHASE ELECTRICS LTD	CBL 6111A	07-06-2013	07-07-2015
49421	IMPULSE VOLTAGE LIMITER (BNC)	ROHDE & SCHWARZ	ESH3/Z2	08-09-2014	08-09-2015
49600	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESU40	13-03-2015	13-03-2016
49624	DUAL RIDGE HORN ANTENNA – 1 GHz - 26 GHz (2 GHz – 32 GHz)	SATIMO	SH2000	04-11-2014	04-11-2017
49625	SRD COAX SWITCH MATRIX USED IN 1 GHz – 26 GHz SRD ANTENNA SYSTEM	DELTA	COAX SWITCH MATRIX	09-09-2014	09-09-2015