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DELTA Test Report

TEST Reg. no. 19

Radio parameter test of hand terminal according to FCC and IC specification

Performed for JE electronic a/s

DANAK-19/15445
Project no.:T220089-3

09 July 2015

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Title	Radio parameter test of hand terminal according to FCC and IC specification
Test object	Hand terminal
Report no.	DANAK-19/15445
Project no.	T220089-3
Test period	2 to 3 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	Claus Momme Thomsen Jan Askov
Test site(s)	DELTA, Venlighedsvej 4, 2970 Hørsholm, Denmark

Date 09 July 2015

Project Manager

Jan Askov
Senior Consultant, EMC and Wireless
DELTA

Responsible

Jørgen Duvald Christensen
Senior Technology Specialist, EMC
DELTA

Table of contents

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

2.1 Test object

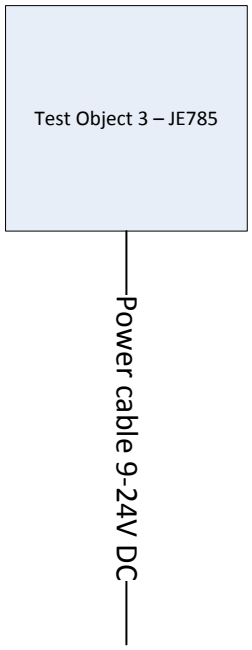
Photo 2.1.1 Test object.

Test object 2.1.1

Name of test object	Hand terminal
Model / type	JE785
Part no.	07-785-00
Serial no.	100001
FCC ID	2AE3QJE785
IC ID:	IC: 20352-JE785
Manufacturer	JE electronic a/s
Supply voltage	9-24 VDC (13.2 V DC typical) or internal alkaline battery at 9 V DC
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: 01 June 2015. Status: -

3. General test conditions

3.1 Test setup



Name	Cat.	Type	Max. length
Power Cable 9-24 VDC	DC Power	Unshielded	3 m

Figure 3.1.1 Block diagram of test object with cable.

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

200 mA @ 12 VDC.

3.2 Test sequence

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

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

3.3 Radio specifications, receiver and transmitter

Test object	Hand terminal	Sheet	Radio-1
Type	JE785	Project no.	T220089-3
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 PCB antenna
Maximum gain	:	0 dBi
Transmit power, quasi peak	:	0.06 mW EIRP
Field Strength, quasi peak	:	83.0 dBµV/m (14.1 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 or internal alkaline 9 V battery
Specified min voltage	:	9 VDC
Specified max voltage	:	24 VDC
Temperature category	:	-20 to +70 ºC
Canada: (IC)		
Emission Designator	:	220KF1D
Max. TX spurious emission, max peak	:	538 µV/m @ 3 meter (Field Strength)

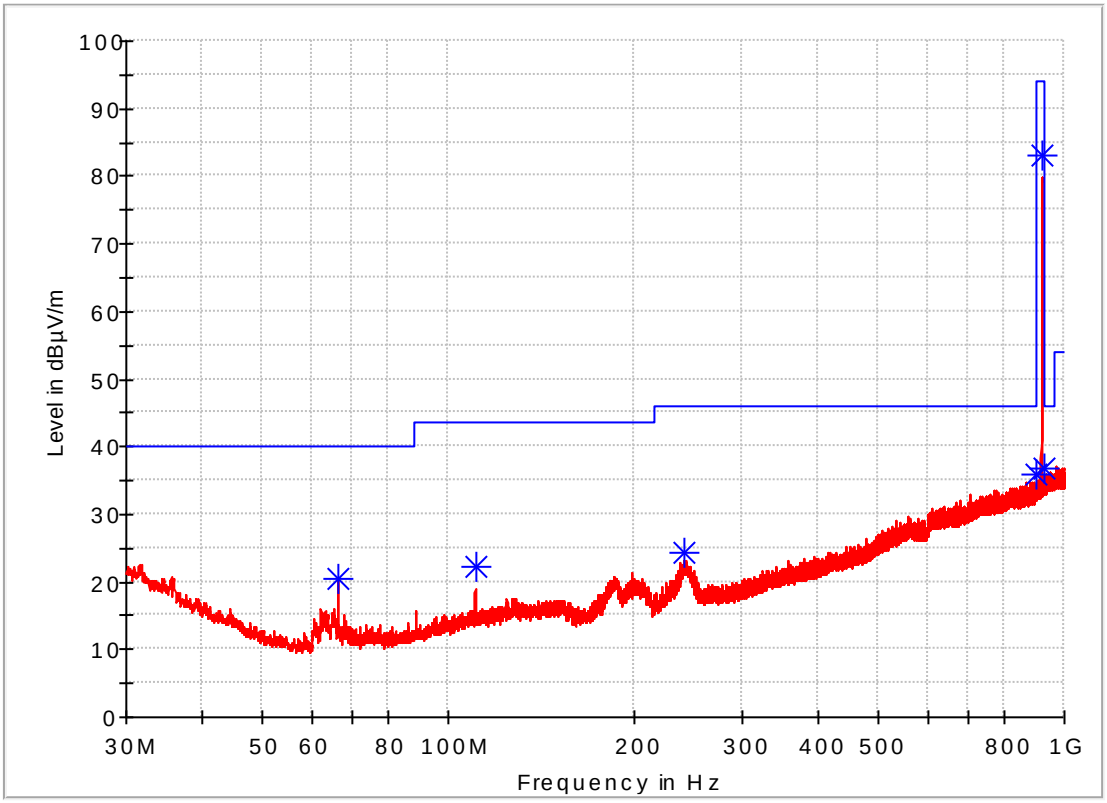
4. Test results

4.1 Measurement of radiated emission

Test object	Hand terminal	Sheet	RE_Spur-1
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °C 47 % RH
Detector	Peak and quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29797	Uncertainty	4.9 dB

Full Spectrum

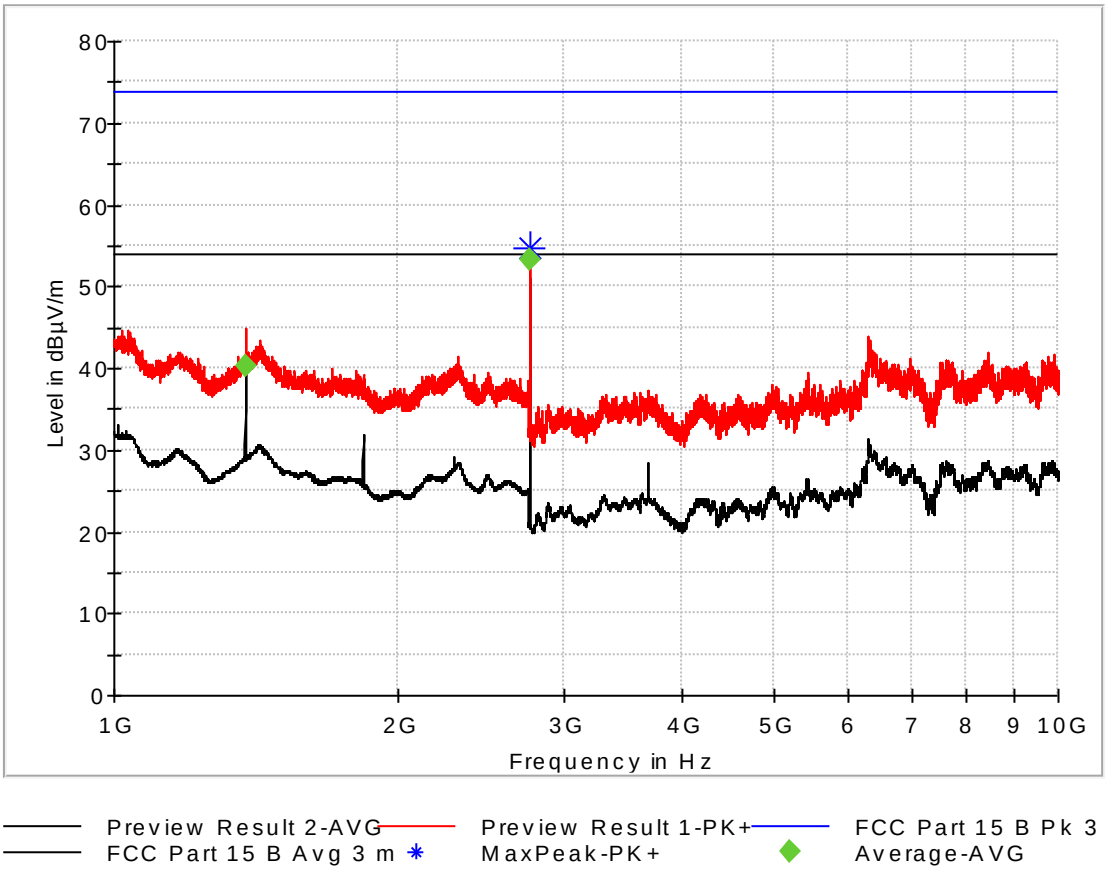


Comments Continuous Tx - normal modulation

Test object	Hand terminal	Sheet	RE_Spur-2
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °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	Hand terminal	Sheet	RE_Spur-3
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °C 47 % RH
Detector	Quasi peak below 1 GHz Peak and average above 1 GHz	Bandwidth	120 kHz / 1MHz
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)
66.36	20.45	40.00	19.55	15000.0	120.000	129.0	V	180	8.7
110.61	22.20	43.50	21.30	15000.0	120.000	141.0	H	266	12.6
242.34	24.48	46.00	21.52	15000.0	120.000	110.0	V	191	14.7
902.00	35.98	46.00	10.02	15000.0	120.000	274.0	H	226	28.6
918.03	83.01	94.00	10.99	15000.0	120.000	153.0	H	290	29.1
928.00	36.86	46.00	9.14	15000.0	120.000	174.0	V	3	29.4

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1377.00	---	40.21	54.00	13.79	15000.0	1000.000	142.0	H	316
2753.75	54.62	---	74.00	19.38	15000.0	1000.000	112.0	H	271
2754.00	---	53.35	54.00	0.65	15000.0	1000.000	110.0	H	271

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. Test voltage: External power supply at 13.2 VDC.

Photo 4.1.1 Test setup regarding measurement of radiated emission.

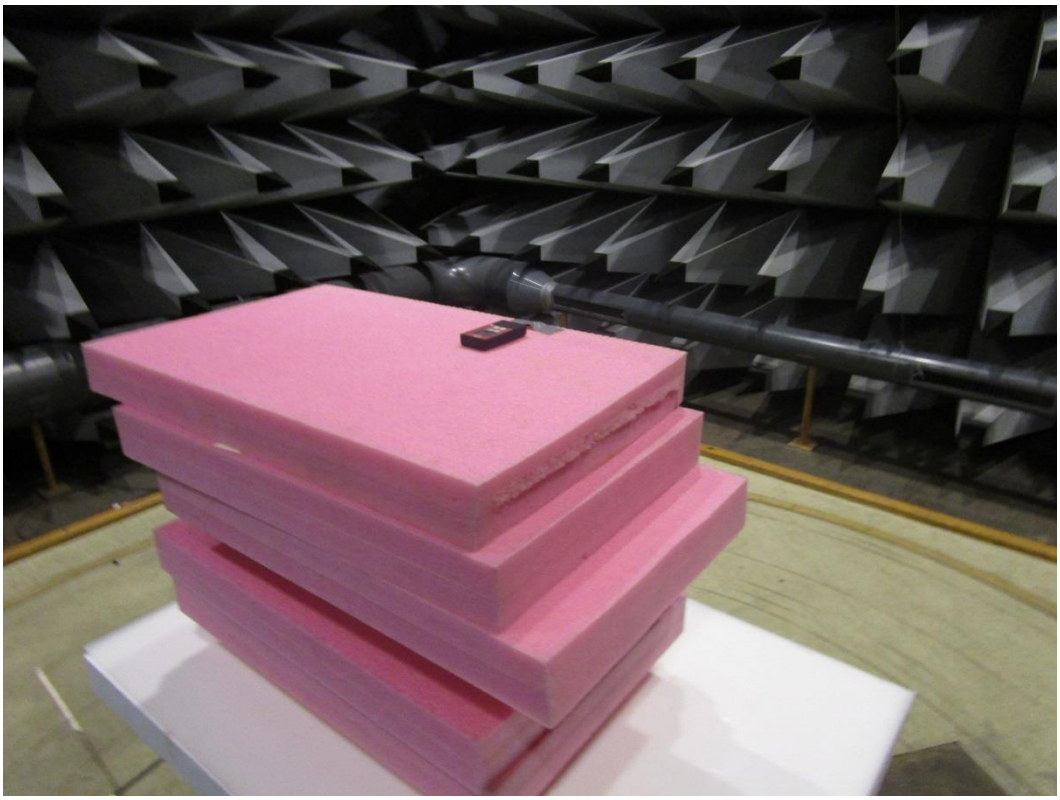


Photo 4.1.2 Test setup regarding measurement of radiated emission.

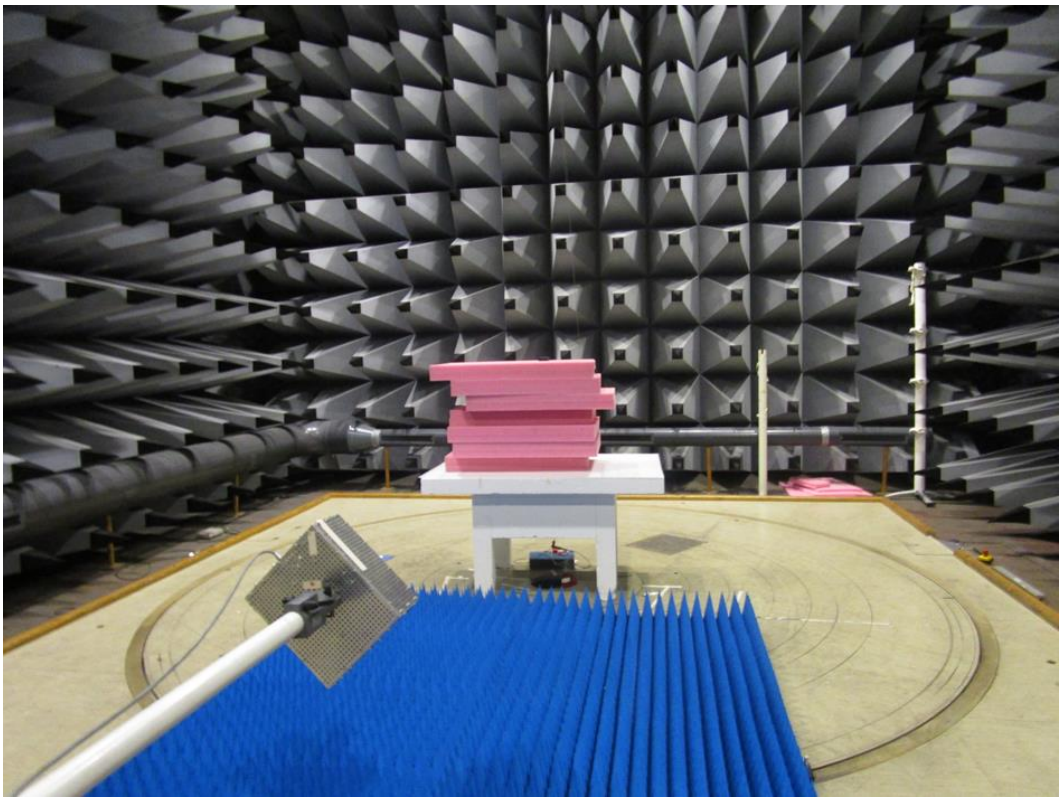


Photo 4.1.3 Test setup regarding measurement of radiated emission.

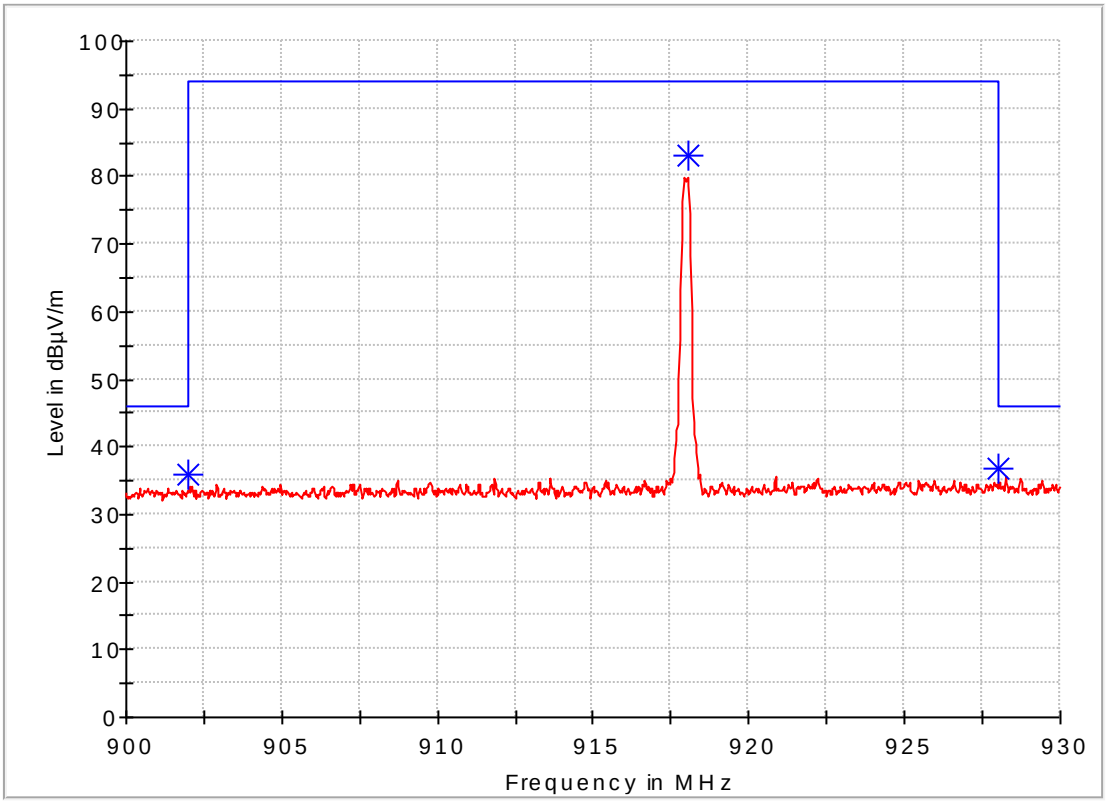
Photo 4.1.4 Test setup regarding measurement of radiated emission.

4.2 Measurement of field strength of fundamental

Test object	Hand terminal	Sheet	RE_Spur-4
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °C 47 % RH
Detector	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	Hand terminal	Sheet	RE_Spur-5
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °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)
918.03	**83.01**	**94.00**	**10.99**	**15000.0**	**120.000**	**153.0**	**H**	**290**	**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. Test voltage: External power supply at 13.2 VDC.

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

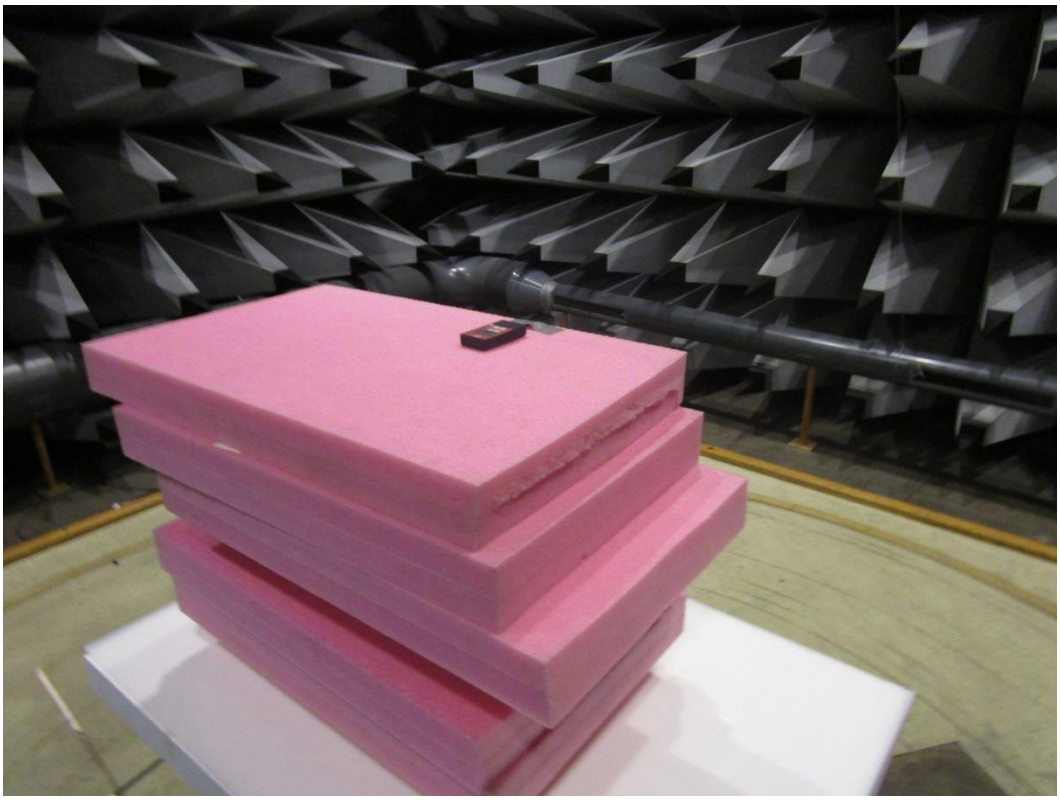


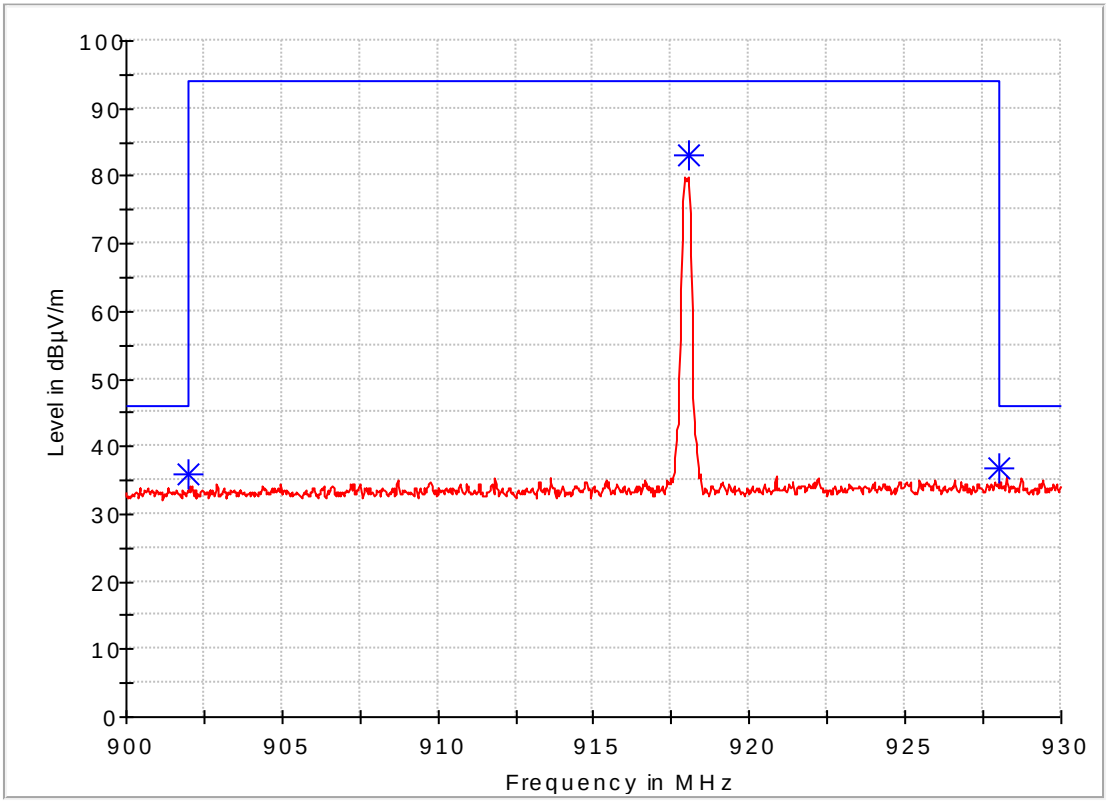
Photo 4.2.2 Test setup regarding measurement of field strength of fundamental.

4.3 Measurement of band edge compliance

Test object	Hand terminal	Sheet	RE_Spur-6
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °C 47 % RH
Detector	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	Hand terminal	Sheet	RE_Spur-7
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	2 June 2015
Client	JE electronic a/s	Initials	CMT
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	21 °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	35.98	46.00	10.02	15000.0	120.000	274.0	H	226	28.6
928.00	36.86	46.00	9.14	15000.0	120.000	174.0	V	3	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.
Test voltage: External power supply at 13.2 VDC.

Photo 4.3.1 Test setup regarding measurement of band edge compliance.

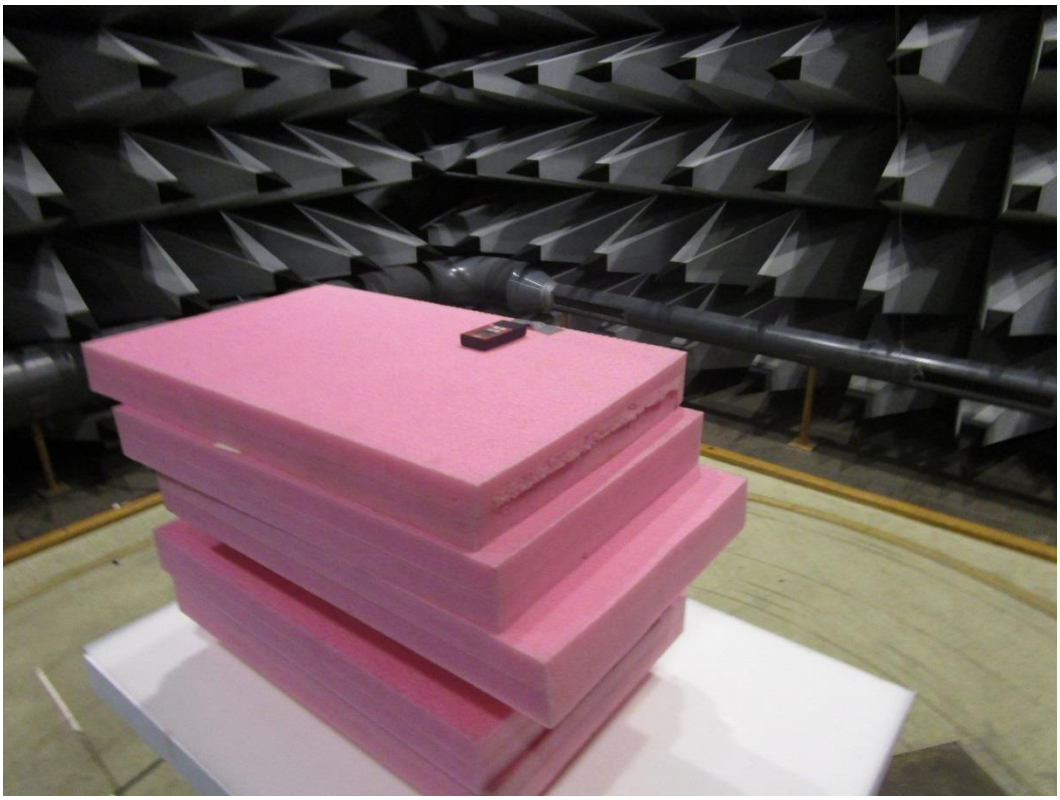
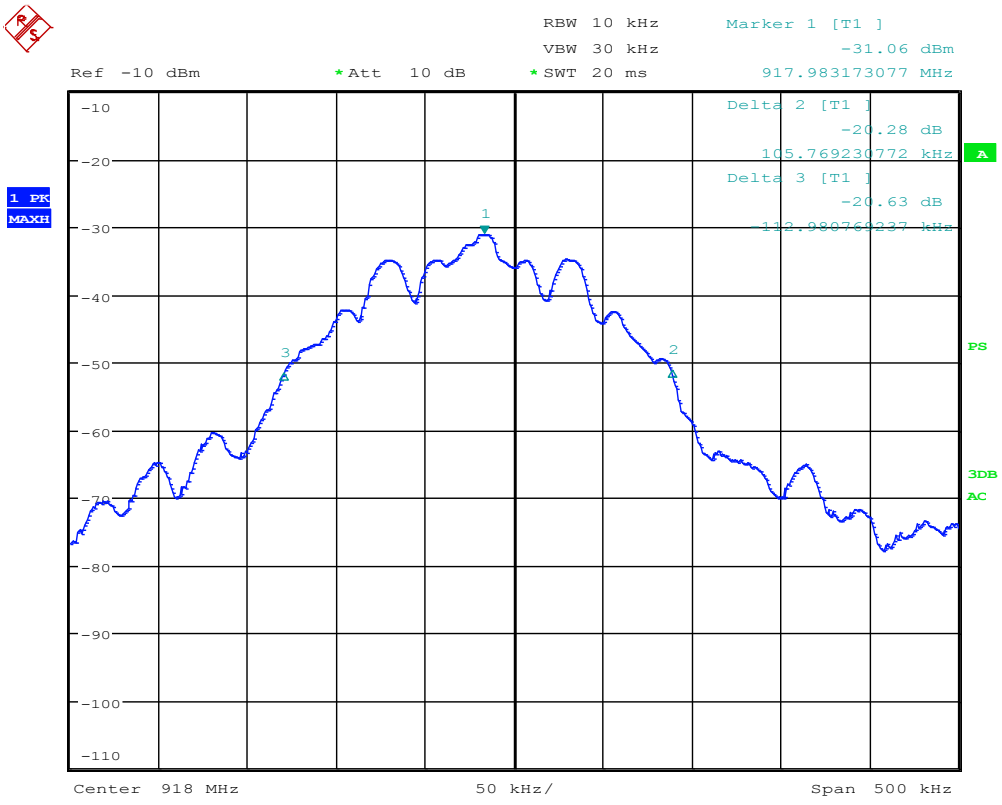


Photo 4.3.2 Test setup regarding measurement of band edge compliance.

4.4 Measurement of 20 dB bandwidth

Test object	Hand terminal	Sheet	PROF-1
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	3 June 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	23 °C 41 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 10 kHz VBW: 30 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		



Date: 3.JUN.2015 09:26:04

Comments Operating frequency: 918 MHz

Test object	Hand terminal	Sheet	PROF-2
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	3 June 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	23 °C 41 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 10 kHz VBW: 30 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		

Operating frequency [MHz]	Measured [MHz]	Limit [MHz]	Remarks
Lowest frequency	917.87	902.00	-
Highest frequency	918.09	928.00	-

Band edge criteria	20 dB bandwidth (20 dBc)
Test result	The measured 20 dB bandwidth were 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.

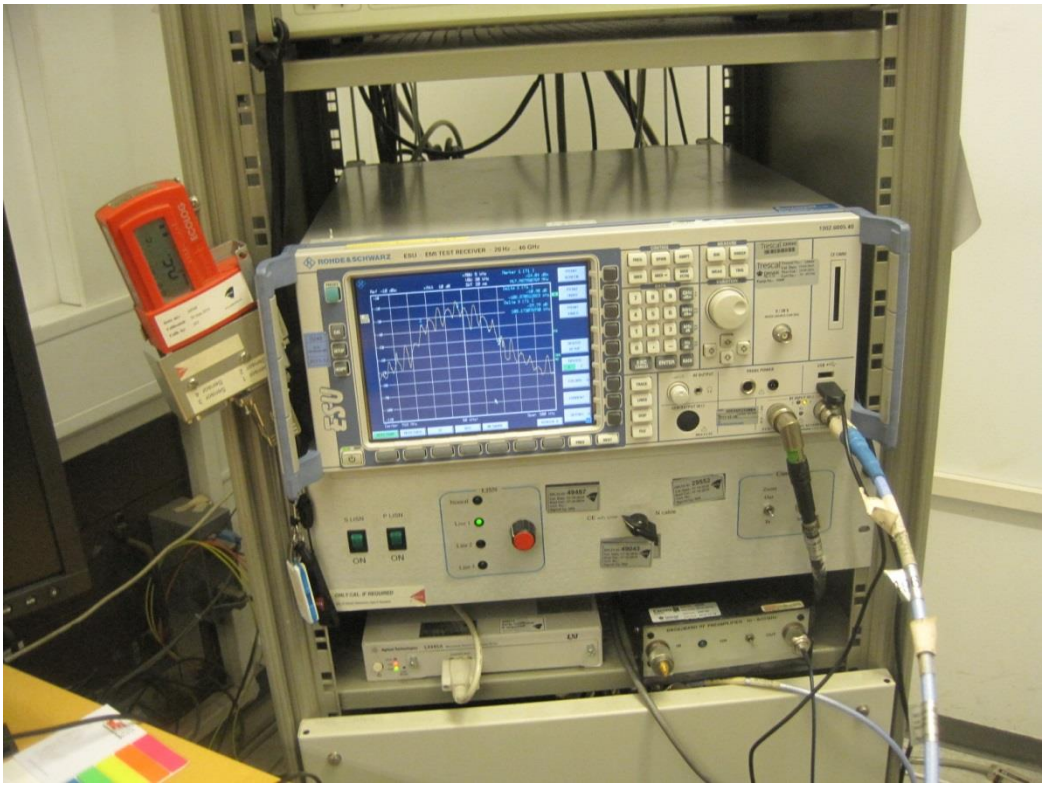
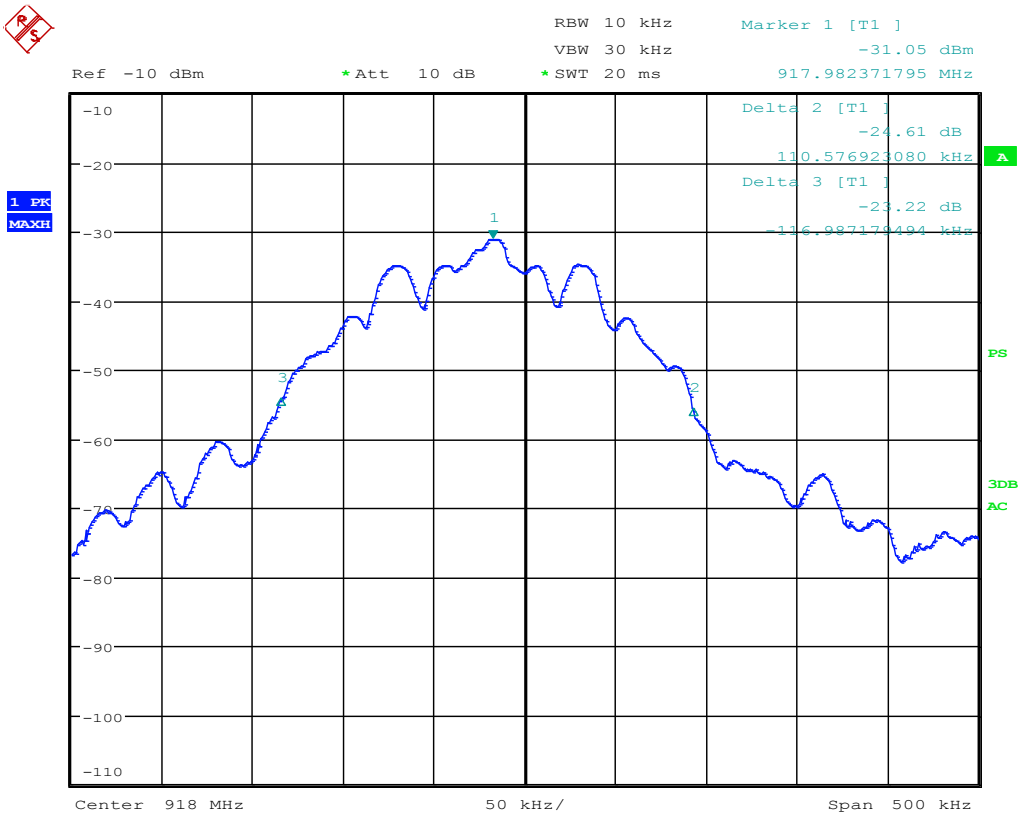


Photo 4.4.2 Test setup regarding measurement of 20 dB bandwidth.

4.5 Measurement of occupied bandwidth, IC

Test object	Hand terminal	Sheet	PROF-3
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	3 June 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	23 °C 41 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 10 kHz VBW: 30 kHz SPAN: 500 kHz DET: Peak Trace: Max. hold CF: 918 MHz		



Date: 3.JUN.2015 09:26:53

Comments Operating frequency: 918 MHz

Test object	Hand terminal	Sheet	PROF-4
Type	JE785	Project no.	T220089-3
Serial no.	100001	Date	3 June 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	23 °C 41 % RH
Test equipm.	49600	Uncertainty	1.8 dB
SA Settings	RBW: 10 kHz VBW: 30 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	917.87	918.09	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.

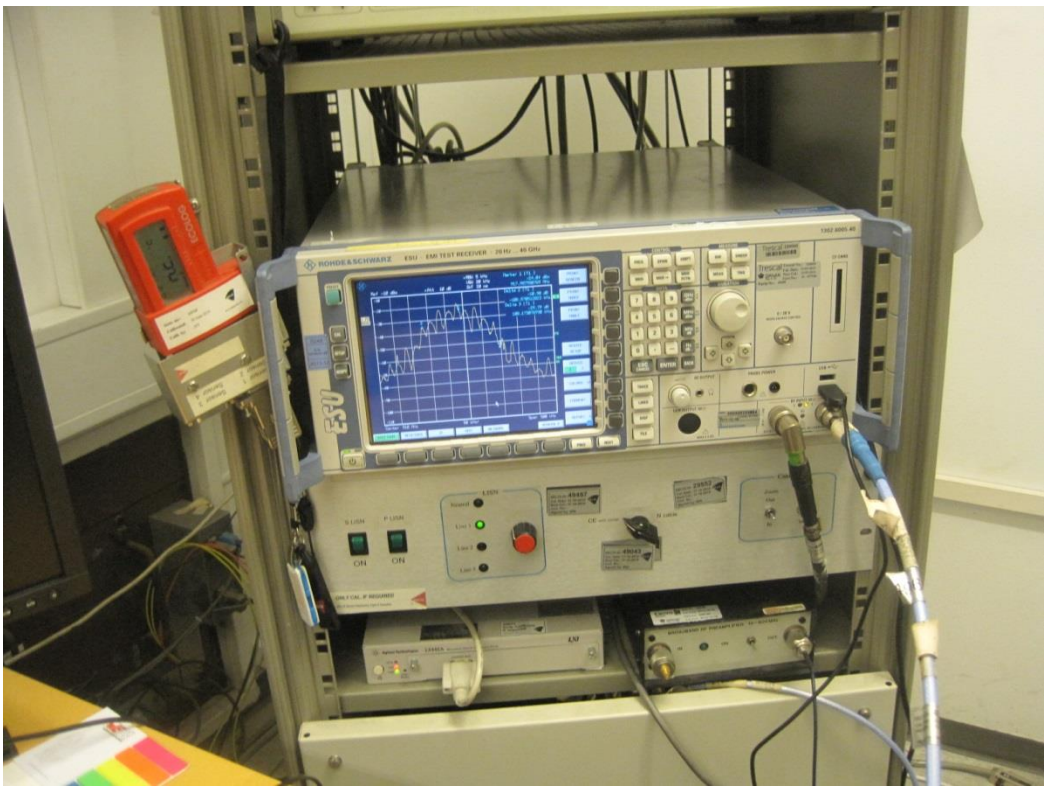


Photo 4.5.2 Test setup regarding measurement of occupied bandwidth, IC.

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 1GHz – 26 GHz SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX	09-09-2014	09-09-2015