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Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: IC 3462C-1
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
DGA-PL-176/94-D1



Accredited Bluetooth® Test Facility (BQTF)

Test report no. : 1-2302-01-03A/10
Applicant : Oticon A/S
Type : BTE Super Power
Test Standard : 47 CFR Part15
RSS-210 Issue 7
FCC ID : U28FUSPR01
Certification No. IC : 1350B-FUSPR01

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1. Administrative data

1.1. Administrative data of the test facility

1.1.1 Identification of the testing laboratory

Company name:	Cetecom ICT Services GmbH
Address:	Untertürkheimerstr. 6-10 D-66117 Saarbruecken Germany
Laboratory accreditation:	DAR-Registration No. DGA-PL-176/94-D1 Bluetooth Qualification Test Facility (BQTF)
Responsible for testing laboratory:	Dipl.-Ing. (FH) Stefan Bös Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

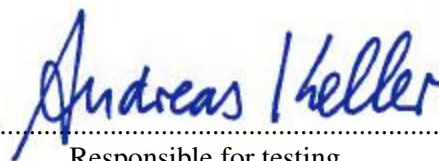


.....
Responsible for testing laboratory
(Dipl.-Ing. (FH) Stefan Bös)

1.1.2 Organizational items

Reference No.:	1-2302-01-03A/10
Order No.:	-/-
Receipt of EUT:	2010-06-22
Date(s) of test:	2010-06-22
Date of report:	2010-08-18
Number of report pages:	25
Number of pages (annex):	7

Version of template:	1.8



.....
Responsible for testing
(Andreas Keller)

Note:

The test results of this test report relate exclusively to the item tested as specified in this report. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

During the test no hardware and software changes are allowed to be performed at the EUT.

1.1.3 Applicant's details

Applicant's name:	Oticon A/S
Address:	Kongebakken 9 2765 Smørum Denmark Tel: +45 39 17 71 00 Fax: +45 39 27 79 00 Email: http://www.oticon.com
Contact person:	Mr. Jørgen Peter Hanuscheck Tel: +45 39 13 85 38 Fax: -/- Email: jnp@oticon.dk

1.2 Administrative data of manufacturer / member

Manufacturer's name:	Oticon A/S
Address:	Kongebakken 9 2765 Smørum Denmark Tel: +45 39 17 71 00 Fax: +45 39 27 79 00 Email: http://www.oticon.com
Contact person:	Mr. Jørgen Peter Hanuscheck Tel: +45 39 13 85 38 Fax: -/- Email: jnp@oticon.dk

1.3 Description of the Equipment under test (EUT)

1.3.1 EUT: Type, S/N etc.

Type of equipment	:	Hearing Aid
Model name	:	Transmit mode samples (testmode) 16160478, 16160541, 16160627, 16160634, 16160474 Receive mode samples 16160541, 16160625
Manufacturer	:	Oticon A/S
Address	:	Kongebakken 9
City	:	2765 Smørum
Country	:	Denmark
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 7
Open Area Test Site Industry Canada Number	:	IC 3462C
Frequency Range (or fixed frequency)	:	TX: 3.8 MHz
Field Strength	:	-7.5dB μ V/m @ 30m
Occupied Bandwidth (99% BW)	:	381kHz
Type of Modulation	:	A1D
Antenna Information	:	Integrated coil antenna
Emission Designator	:	381KA1D
Transmitter Spurious (worst case)	:	22.4dBuV/m@ 10m (noise floor)
Receiver Spurious (worst case)	:	22.2dBuV/m @ 10m (noise floor)
IC no.	:	U28FUSPR01
FCC ID	:	1350B-FUSPR01

ATTESTATION:


DECLARATION OF COMPLIANCE:

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager:

2010-08-18
Date

Andreas Keller
Name


Signature

1.4 Test Setup

Hardware	:	Version 3
Software	:	06-1.0.0 V1.01

Manufacturer statement:

The RF-carrier frequency in Oticons wireless hearing aids, targeted for 3.84 MHz, is in the current Fusion platform generated by an RC-oscillator in turn feeding an LC-tank circuit in the transceiver. In other words, there is NO stable crystal oscillator and NO closed phase lock loop keeping the oscillator frequency in place. Furthermore, due to tolerances of the self induction of the antenna coil, which is part of the RF-tank circuit, and tolerances of the parallel capacitors, the initial carrier frequency tolerance of the RF-carrier is about plus and minus 2.5%. Finally due to the configuration of the RF-carrier frequency generating parts as described above an uncorrelated temperature drift of about plus and minus 2% can be added to the initial tolerance, resulting in an overall frequency accuracy of about plus minus 4.5% worst case!

The measurements were performed at room ambient temperature of 23°C.

1.5 Test Specifications

FCC:	CFR Part 15.209, CFR Part 15.223
IC:	RSS 210, Issue 7

2 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

2.1 Summary of Measurement Results

2.1.1 CFR 47 Part 15 Radio frequency devices

Section in this Report	Test Name / Section FCC Part 15	Test Name / Section RSS 210 Issue 7	applicable	Verdict
4.1	§ 15.35 (c) Timing of the transmitter	-/-	YES	Passed
4.2	§ 15.209 (a) FIELDSTRENGTH OF FUNDAMENTAL	2.6	YES	Passed
4.3	§ 15.209 (a) FIELDSTRENGTH OF HARMONICS and SPURIOUS	2.6	YES	Passed
4.4	§ 15.109 Receiver spurious emissions (radiated)	2.6	YES	Passed
4.5	§ 15.107 / 15.207 Conducted Limits	-/-	NO	-/-

3 Measurements and results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.

The receiving antennas conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set-ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.

Antennas conform with ANSI C63.2-1996 item 15.

9 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, active loop antenna.

30 MHz - 1GHz: Quasi Peak measurement, 120kHz Bandwidth, trigon antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.209 and 15.207

4 FCC Part 15 Subpart C

4.1 Timing of the transmitter

Reference

FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	-/-

Duty cycle of the samples with test mode: 22%.

In normal use the duty cycle is approximately 2.5% (declared by the manufacturer).

Limits: § 15.35 (c)

(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

4.2 Field strength of the fundamental / bandwidth

§ 15.209 (a)

Reference

FCC:	CFR Part SUBCLAUSE § 15.223
IC:	RSS 210, Issue 7, 2.3

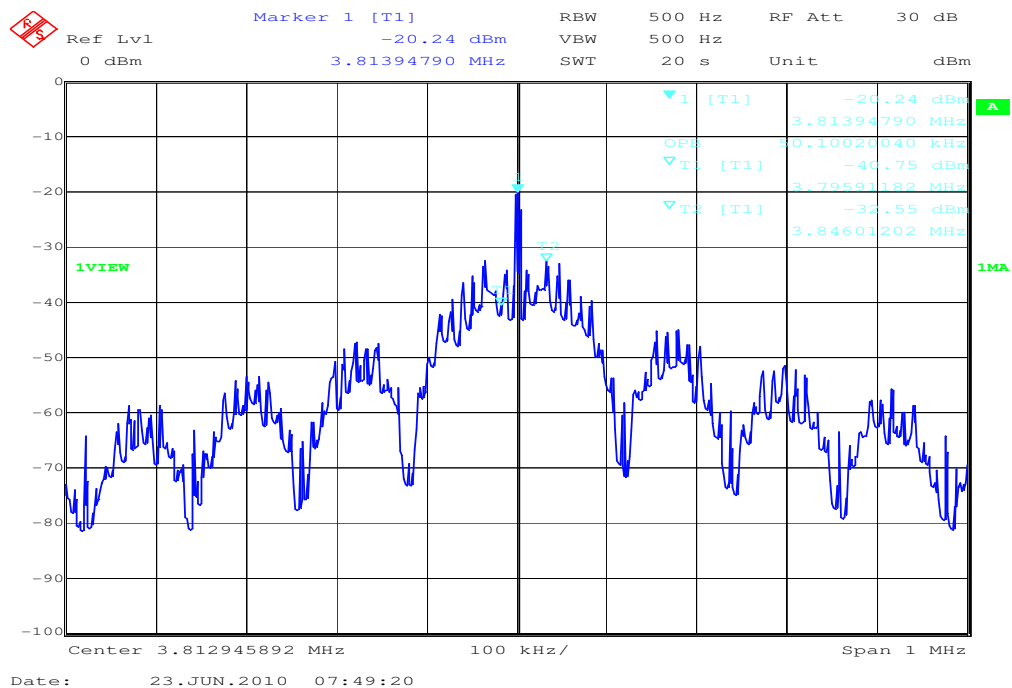
Sample 16160634

Results:

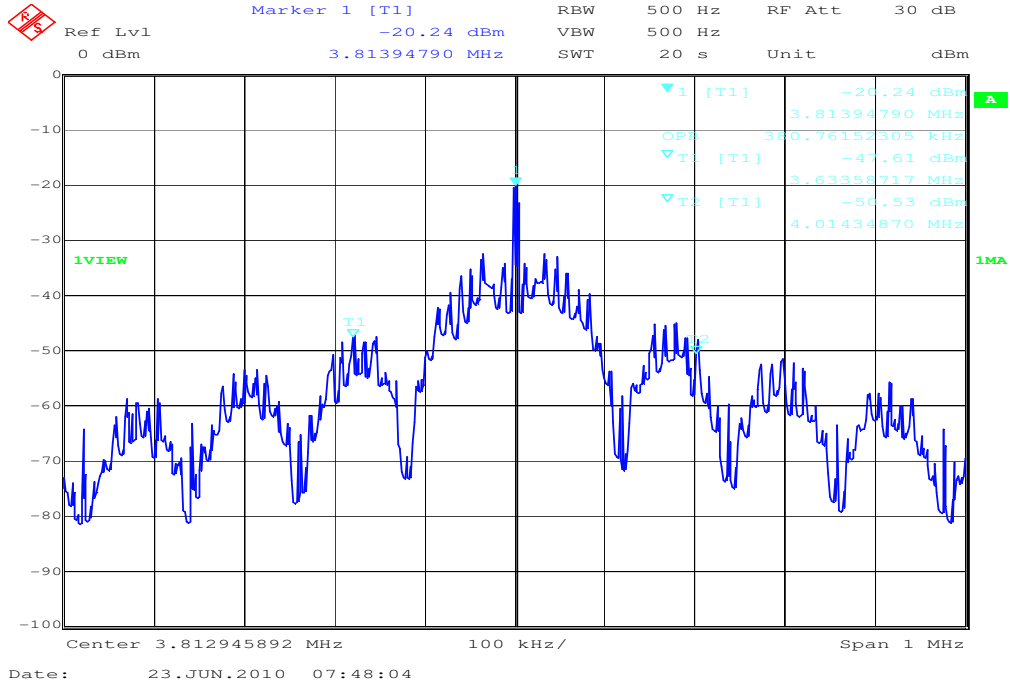
	Occupied Bandwidth (kHz)
6 dB (75%)	50
20 dB (99%)	381

Measured with the integrated OBW-function of the spectrum analyser Rohde&Schwarz FSIQ26 (measurement criteria is the integrated power in %).

Plot 1: 6 dB (75%) – bandwidth



Plot 2: 20 dB (99%) – bandwidth



4.3 Maximum output power (quasi peak) – (radiated)

Reference

FCC:	CFR Part SUBCLAUSE § 15.223
IC:	RSS 210, Issue 7, 2.3

Sample 16160627

Power measured

TEST CONDITIONS		Maximum field strength (dB μ V/m)	
Frequency		3.8 MHz	
Distance		1 m	30 m
T _{nom}	V _{nom}	52.5	-7.5
Measurement uncertainty		± 3 dB	

Noise floor: 26.5dB μ V/m

*Calculation:

Measured maximum field strength @ 1 m: 52.5dB μ V/m

Correction factor from 1m to 10m: -40 dB (40 dB/decade)
52.5dB μ V/m @ 1 meter - 40 dB = 12.5dB μ V/m @ 10 meter

Correction factor from 1m to 30m: -60 dB (40 dB/decade)
52.5dB μ V/m @ 1 meter - 60 dB = -7.5dB μ V/m @ 30 meter

Limits

SUBCLAUSE § 15.223

Fundamental Frequency (MHz)	Field strength of Fundamental (μ V/m)	Measurement Distance (meter)
1.705 – 10.0	[15] or [6dB-BW(kHz)/F(MHz)] whichever is higher	30

4.4 Field strength of the harmonics and the spurious

Reference

FCC:	CFR Part SUBCLAUSE § 15.209 (a)
IC:	RSS Gen 4.9, RSS 210, Issue 7, 2.2

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dB μ V/m) Average/QP	limit max. allowed emission power <u>at 30 m</u>	actual attenuation below frequency of operation (dB)	results
No peaks detected.					
Measurement uncertainty			± 3 dB		

RBW/VBW: 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Limits

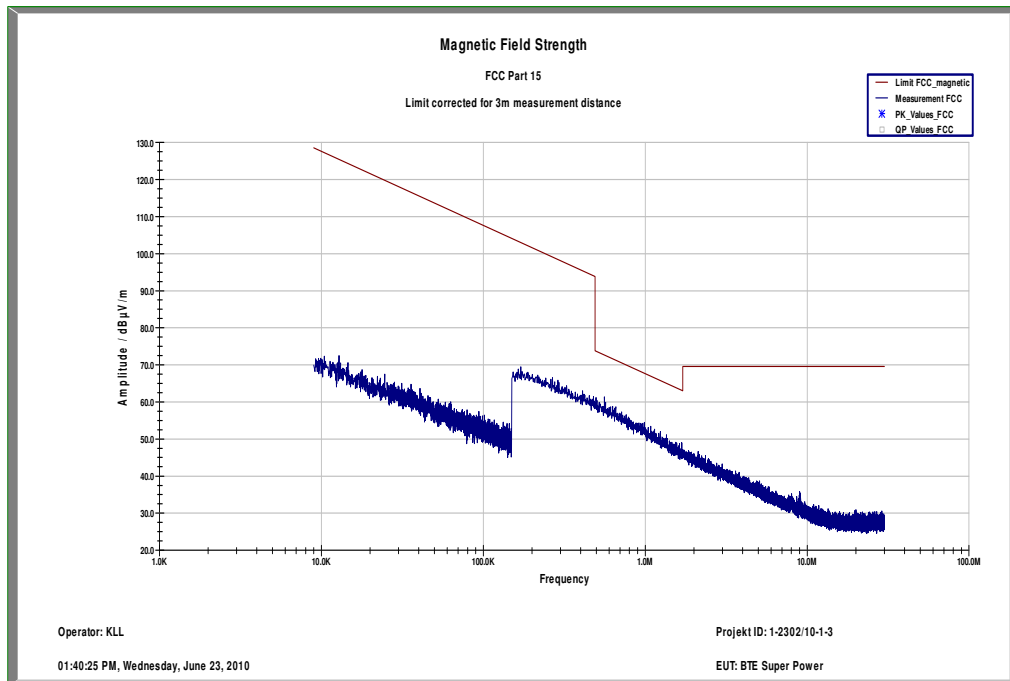
SUBCLAUSE § 15.209 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (μ V/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30.0 – 88.0	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

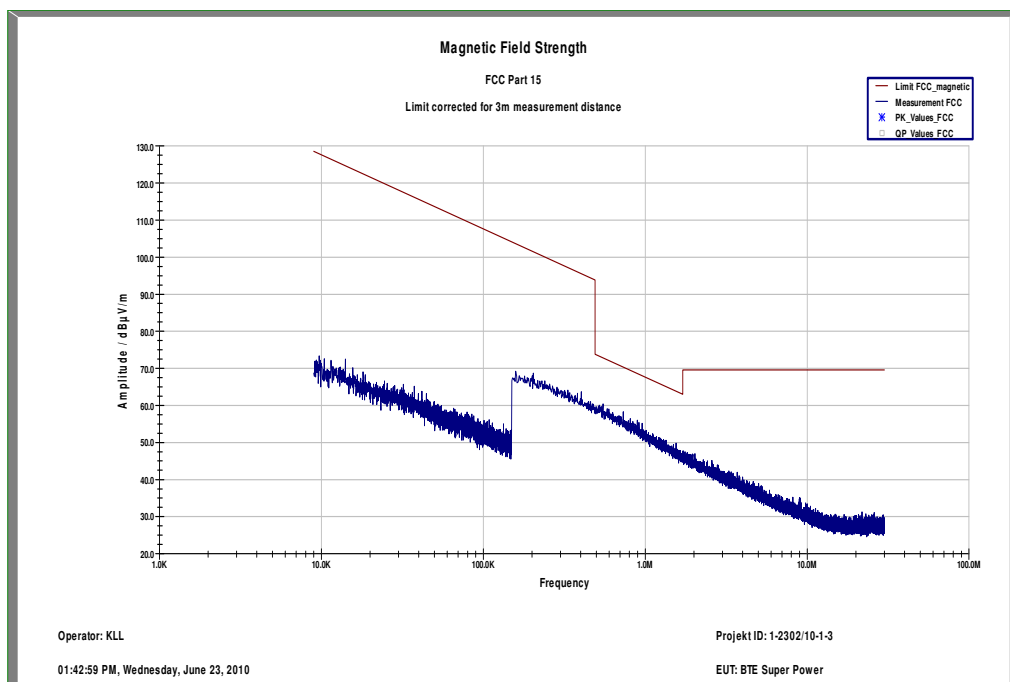
4.4.1 Plots of measurements

Sample 16160627

Plot 1: Transmit mode 9kHz – 30MHz, loop 0°



Plot 2: Transmit mode 9kHz – 30MHz, loop 90°



(To convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used.
Here we use 80 dB to recalculate from 3m to 300m)

Measurement distance 3 m

This measurement was done in 3 planes; the plot shows the worst case.

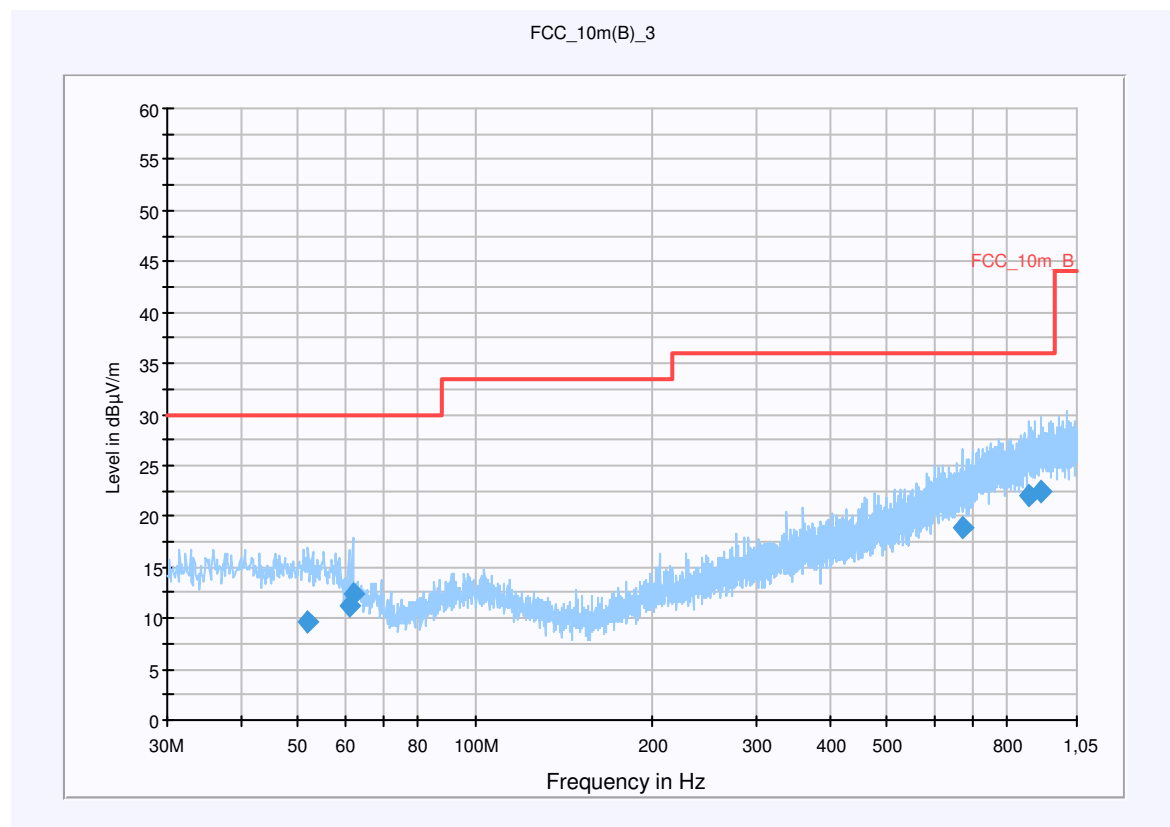
The values may have some errors because of the small distance between measuring antenna and sample.
Therefore we re-measured all found peaks at 10m.

Plot 3: Transmit mode

EUT: CHILI SP9, BTE 13 SP CBE
 Serial Number: 16160474
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: continous Tx
 Operator Name: LNG
 Comment: Battery powered (1,4 V DC)

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m
Subrange **Detectors** **IF Bandwidth** **Meas. Time** **Receiver**
 30 MHz - 1,05 GHz QuasiPeak 120 kHz 15 s Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
51.999450	9.6	15000.000	120.000	98.0	H	5.0	13.2	20.4	30.0	
60.969750	11.2	15000.000	120.000	128.0	V	18.0	11.4	18.8	30.0	
61.944450	12.3	15000.000	120.000	105.0	V	288.0	11.1	17.7	30.0	
672.244950	18.8	15000.000	120.000	220.0	H	76.0	21.7	17.2	36.0	
867.140850	22.0	15000.000	120.000	195.0	V	18.0	24.8	14.0	36.0	
913.051350	22.4	15000.000	120.000	185.0	V	172.0	25.2	13.6	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

4.5 Receiver spurious emission (radiated)

Reference

FCC:	CFR Part SUBCLAUSE § 15.109
IC:	RSS Gen 4.10/6, RSS 210, Issue 7, Section 2.6

SPURIOUS EMISSIONS LEVEL ($\mu\text{V/m}$)								
Receiver mode								
F [MHz]	Detector	Level [$\mu\text{V/m}$]	F [MHz]	Detector	Level [$\mu\text{V/m}$]	F [MHz]	Detector	Level [$\mu\text{V/m}$]
No peaks detected.								
Measurement uncertainty			± 3 dB					

$f < 1$ GHz : RBW/VBW: 100 kHz

$f \geq 1$ GHz : RBW/VBW: 1 MHz

Limits

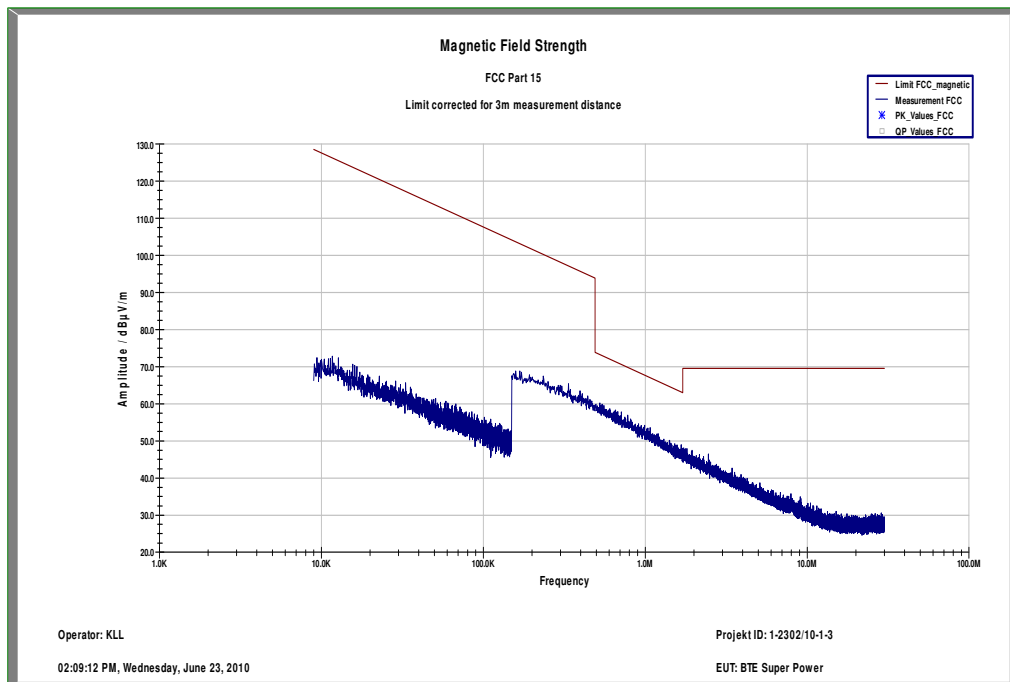
SUBCLAUSE § 15.109

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

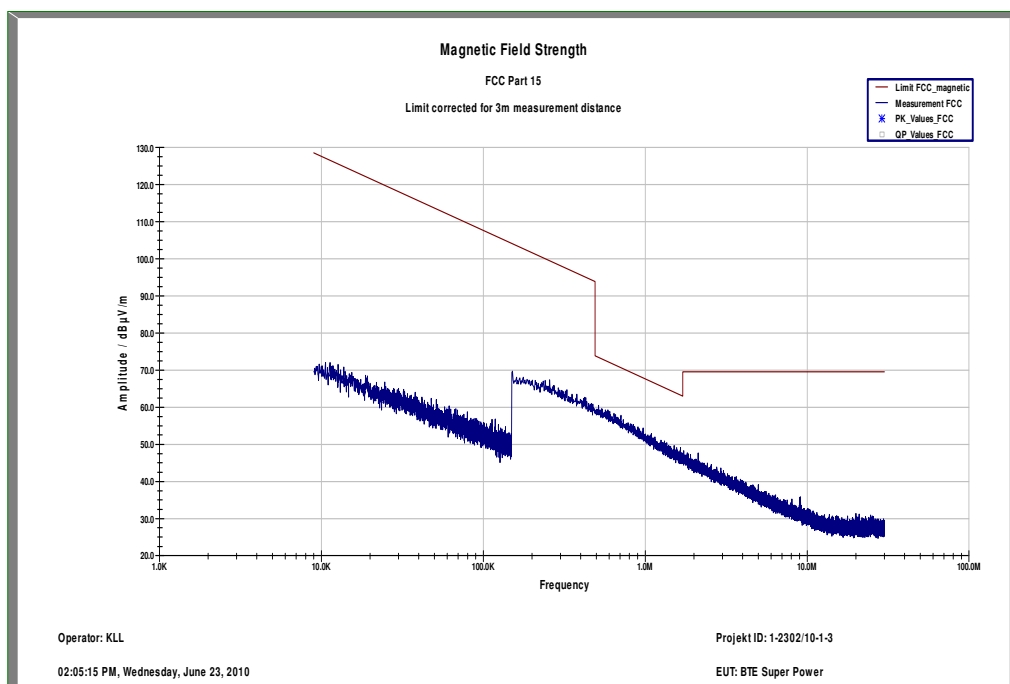
4.5.1 Plots of measurements

Sample 16160541

Plot 1: Receive mode 9kHz – 30MHz, loop 0°



Plot 2: Receive mode 9kHz – 30MHz, loop 90°



(To convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 80 dB to recalculate from 3m to 300m)

Measurement distance 3 m

This measurement was done in 3 planes; the plot shows the worst case.

The values may have some errors because of the small distance between measuring antenna and sample. Therefore we re-measured all found peaks at 10m.

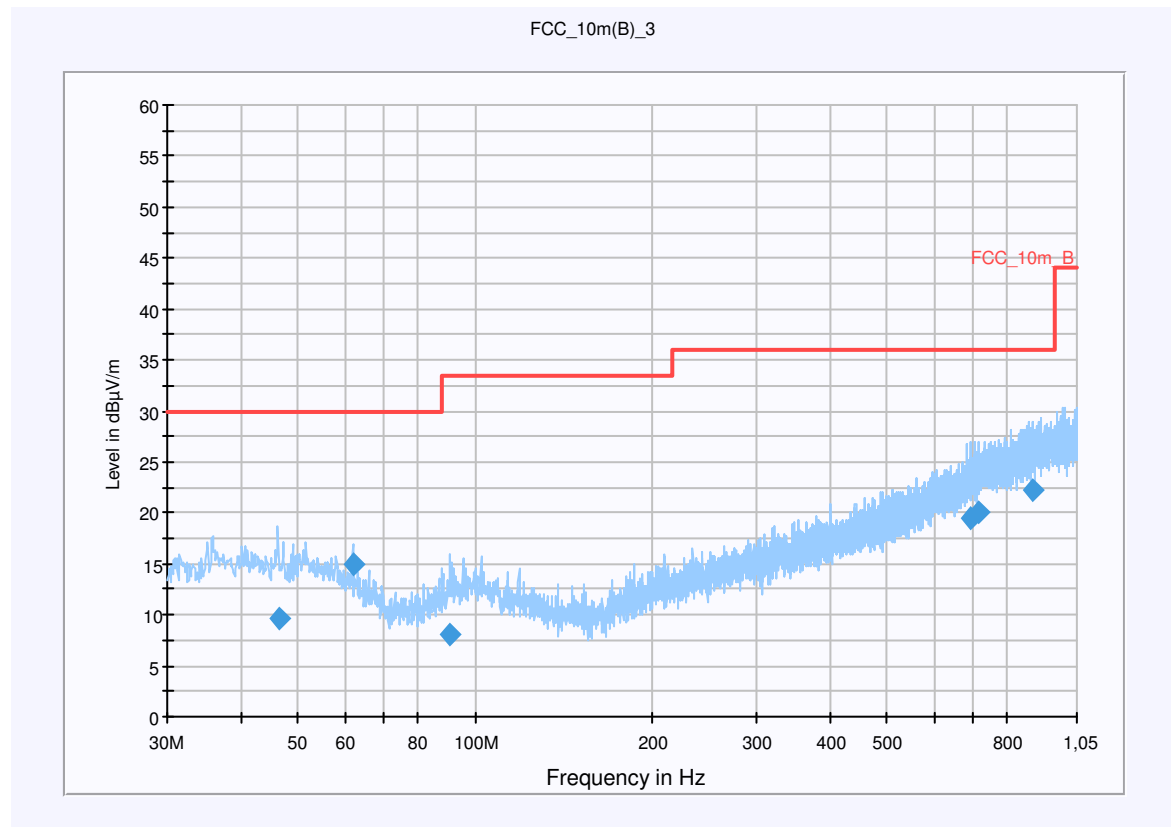
Plot 3: Receive mode

EUT: CHILI SP9, BTE 13 SP CBE
 Serial Number: 16160625
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: Rx
 Operator Name: LNG
 Comment: Battery powered (1,4 V DC)

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
46.544550	9.7	15000.000	120.000	140.0	V	82.0	13.3	20.3	30.0	
62.018250	15.0	15000.000	120.000	98.0	V	289.0	11.1	15.0	30.0	
90.511650	8.0	15000.000	120.000	140.0	V	13.0	10.6	25.5	33.5	
692.996850	19.4	15000.000	120.000	220.0	H	110.0	22.3	16.6	36.0	
717.000600	20.1	15000.000	120.000	143.0	H	13.0	22.9	15.9	36.0	
886.421550	22.2	15000.000	120.000	220.0	V	181.0	25.0	13.8	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

4.6 Conducted Limits

Reference

FCC:	CFR Part 15.207, 15.107
IC:	-/-

Not applicable!

Limits: § 15.107 / 15.207

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

5 Used Test equipment

In order to simplify the identification of the equipment used at each specific test, each item of test equipment and ancillaries are provided with an identifier or number in the equipment list below.

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
2	n. a.	PowerAttenuator	8325	Byrd	1530	300001595			
3	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.03.2011
4	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
5	n. a.	Anechoic chamber		MWB	87400/02	300000996			
6	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
7	9	Artificial Mains 9 kHz to 30 MHz, 4 x 25 Ampere	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
8	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
9	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
10	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
11	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
12	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
13	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
14	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
15	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
16	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
17	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
18	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
19	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k		
20	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k		
21	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vIKI!		
22	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	17.12.2008	17.12.2010
23	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	28.05.2009	28.05.2011
24	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04590	300001041	Ve	08.01.2009	08.01.2012
25	n. a.	Test Receiver	ESH2	R&S	871921/095	300002505	Ve	12.02.2010	12.02.2012
26	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	872096/61	300001824	vIKI!	18.11.2008	18.11.2011