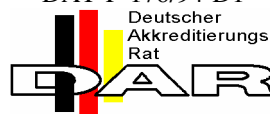


Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: IC 3463A-1
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
DAT-P-176/94-D1



Accredited Bluetooth[®] Test Facility (BQTF)

Test report no. : 2-4671-01-03/07
Applicant : Sennheiser electronic
GmbH & Co. KG
Type : SK3200
Test Standard : FCC Part 15.249
RSS210 Issue 7
FCC ID : DMOSK3200
Certification No. IC : 2099A-SK3200

*The Bluetooth word mark and logos are owned by the Bluetooth SIG,
Inc. and any use of such marks by Cetecom ICT is under license*

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1 General information

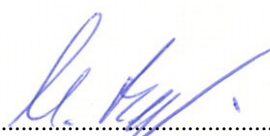
1.1 Administrative data of the test facility

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. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF) Federal Communications Commission (FCC)
Responsible for testing laboratory:	Identification/Registration No : 90462 Michael Berg / Dirk Hausknecht Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

1.2 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. 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. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.



.....
Responsible for testing laboratory
(Michael Berg)



.....
Responsible for test report
(Jakob Reschke)

1.3 Details of Applicant

Name : Sennheiser electronic GmbH & Co. KG
Address : Am Labor 1
City : 30900 Wedemark
Country : Germany
Phone : +49 (0) 5130 6 00 -0
Fax : +49 (0) 5130 6 00-3 24
Contact : Volker Bartsch
Phone : +49 (0) 5130 600 465
Fax : +49 (0) 5130 600 330
e-mail : bartschv@sennheiser.com

1.4 Application Details

Date of receipt of application : 2007-05-31
Date of receipt of test item : 2007-05-11
Date(s) of test : 2007-05-31 to 2007-07-12
Date of report : 2007-07-12

1.5 Test Item

Type of equipment : guidePort Mobile Transmitter
Model name : SK3200
Manufacturer : Sennheiser electronic GmbH & Co. KG
Address : Am Labor 1
City : 30900 Wedemark
Country : Germany
Tested to Radio Standards Specification(RSS) No. : 210 Issue 7
Open Area Test Site Industry Canada Number : IC 3463A-1
Frequency Range (or fixed frequency) : 2.4019,20 bis 2.4814,08 GHz
Number of channels : 93
Field Strength : 93.4 dB μ V/m @ 3m
Occupied Bandwidth (99% BW) : 2350 kHz
Type of Modulation : FSK
Antenna Information : external antenna
Emission Designator (TRC-43) : 2M35F1D
Transmitter Spurious (worst case) : Nothing found
Receiver Spurious (worst case) : Nothing found
IC Certification no. : 2099A-SK3200
FCC ID : DMOSK3200

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 :

2007-07-12

RSC 8437

Jakob Rschke



Date

Section

Name

Signature

1.6 Test Setup

Hardware : -.-
Software : -.-

1.7 Test Specifications

FCC:	CFR Part 15.249
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	Measurement applicable	Verdict
4.1	§ 15.35 (c) Timing of the transmitter (Duty cycle correction factor)	6.5 Pulsed Operation	NO	
4.2	§ 15.249 (a) FIELDSTRENGTH OF FUNDAMENTAL	6.2.2 (m2)(1) 902-928, 2400-2483.5 and 5725-5875 MHz	YES	pass
4.3	§ 15.249 (a) (d) FIELDSTRENGTH OF HARMONICS and SPURIOUS	6.2.2 (m2)(1)(3) 902-928, 2400-2483.5 and 5725-5875 MHz	YES	pass
4.4	§ 15.109 Receiver spurious emissions (radiated)	7.3 Receiver Spurious Emissions (Radiated)	YES	pass
4.5	§ 15.107 / 15.207 Conducted Limits	Section 6.6 , 7.4	YES	pass
4.6	Band-edge compliance of radiated emissions §15.205		YES	pass

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.

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

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

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

All measurement settings are according to FCC 15.109 and 15.107

4 FCC Part 15 Subpart C

4.1 Timing of the transmitter

Reference

FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	RSS 210, ISSUE 7 6.5 Pulsed operation

Measurement not applicable, transmitter is continuous FSK modulated

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

Reference

FCC:	CFR Part SUBCLAUSE § 15.249 (a)
IC:	RSS 210, Issue 7, 6.2.2 (m2)(1) 902-928, 2400-2483.5 and 5725-5875 MHz

MAXIMUM OUTPUT POWER (AVERAGE PEAK) RADIATED

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m) @ 3m		
		2401.920	2440.800	2481.408
Frequency				
T _{nom} 23 °C	V _{nom} 3.0V DC	93.40	93.30	93.35
Measurement uncertainty		±3dB		

RBW/VBW : 3 MHz

The Peak Power and Average Power have the same value.

Limits

SUBCLAUSE § 15.249 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Harmonics (V/m)
902-928	50 (94 dB μ V/m)	500 (54 dB μ V/m)
2400-2483.5	50 (94 dB μ V/m)	500 (54 dB μ V/m)
5725-5875	50 (94 dB μ V/m)	500 (54 dB μ V/m)
24.0-24.25 GHz	250 (108 dB μ V/m)	2500 (68 dB μ V/m)

4.3 Field Strength of the Harmonics and Spurious

Reference

FCC:	CFR Part SUBCLAUSE § 15.249 (a)(d)
IC:	RSS 210, Issue 7, 6.2.2 (m2)(1)(3) 902-928, 2400-2483.5 and 5725-5875 MHz

EMISSION LIMITATIONS					
f (MHz)	amplitude of emission (dBµV/m) Average/QP	limit max. allowed emmission power	actual attenuation below frequency of operation (dB)	results	
05 45 10 31					
2481.408	93.40 / AV	94BµV/m		Operating frequency	
		20 dBc or 46 dBµV/m		Complies	
		20dBc or 54 dBµV/m		Complies	
				Complies	
				Complies	
				Complies	
				Complies	
				Complies	
Measurement uncertainty		± 3dB			

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 3 MHz

Limits

SUBCLAUSE § 15.249 (a)

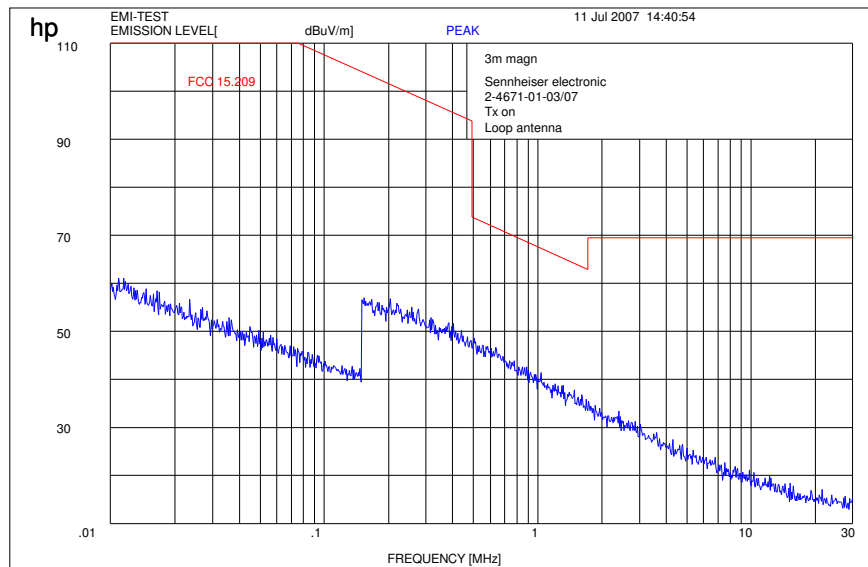
Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Fundamental (µV/m)
902-928	50 (94 dBµV/m)	500 (54 dBµV/m)
2400-2483.5	50 (94 dBµV/m)	500 (54 dBµV/m)
5725-5875	50 (94 dBµV/m)	500 (54 dBµV/m)
24.0-24.25 GHz	250 (108 dBµV/m)	2500 (68 dBµV/m)

Limits

SUBCLAUSE § 15.249 (d)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Part 15.109 Magnetics



(to convert the measuring distance from 3m to 30m and 30 to 300m a correction factor from 40 dB/decade was used)

Measurement distance 3m

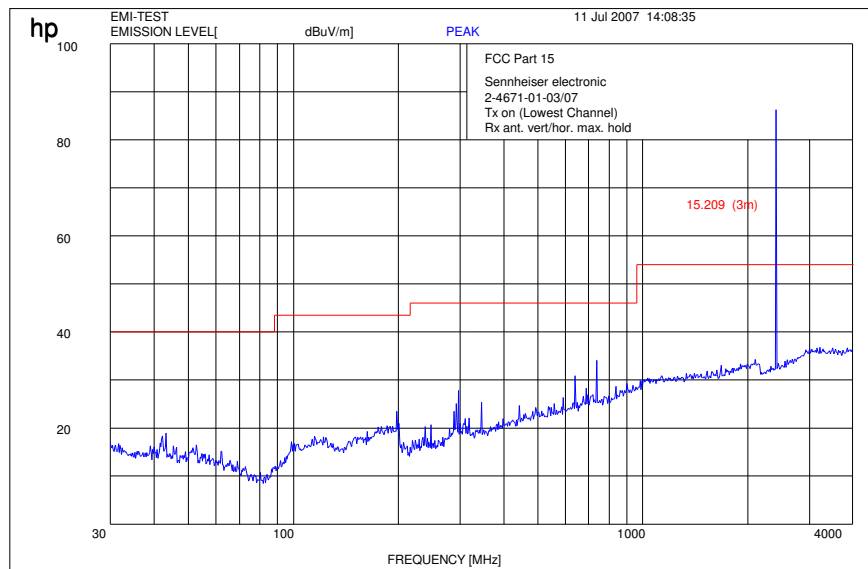
This measurement was done in 3 polarisation's, the plot shows the worst case

Limits

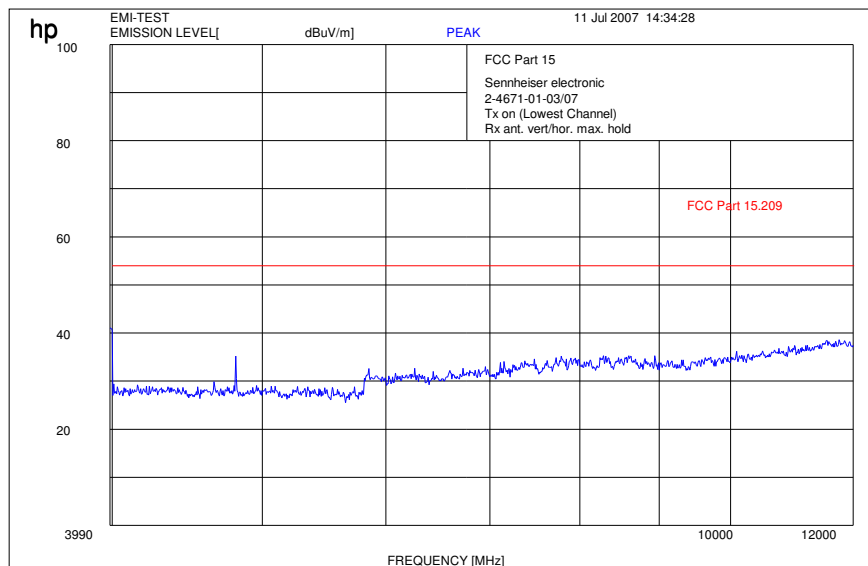
SUBCLAUSE § 15.209

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.0009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

Plot 1: (Lowest Channel)
Tx : 30 MHz - 4 GHz

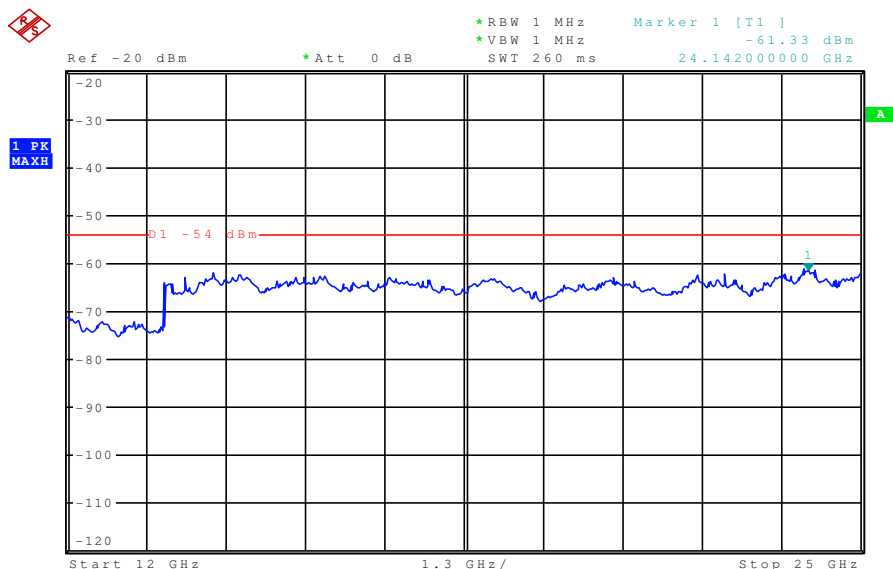


Plot 2: (Lowest Channel)
Tx : 4 GHz – 12 GHz



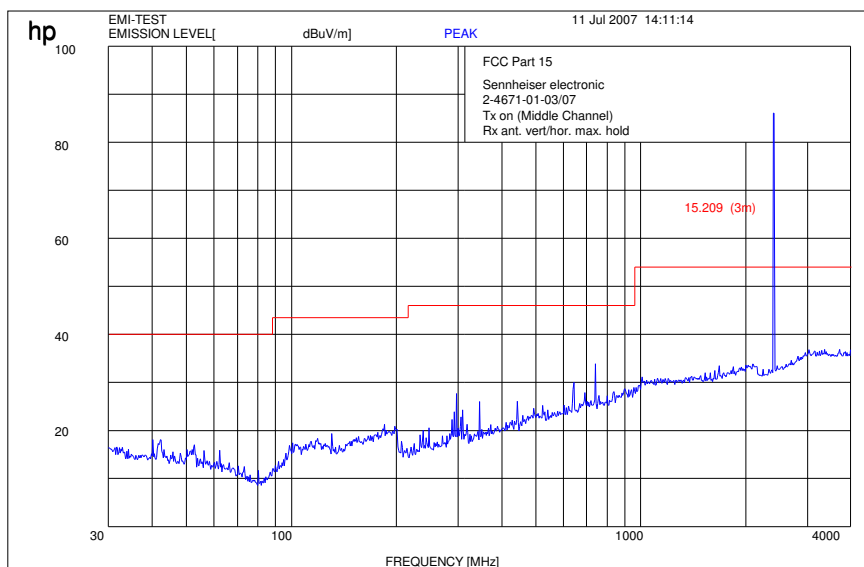
Plot 3: (Worst case – valid for all channels)

Tx : 12 GHz – 25 GHz

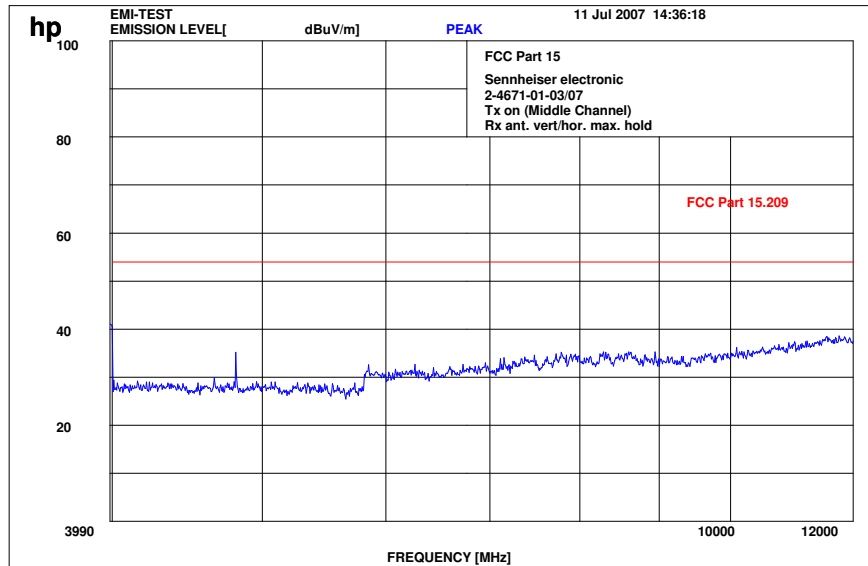


Plot 4: (Middle Channel)

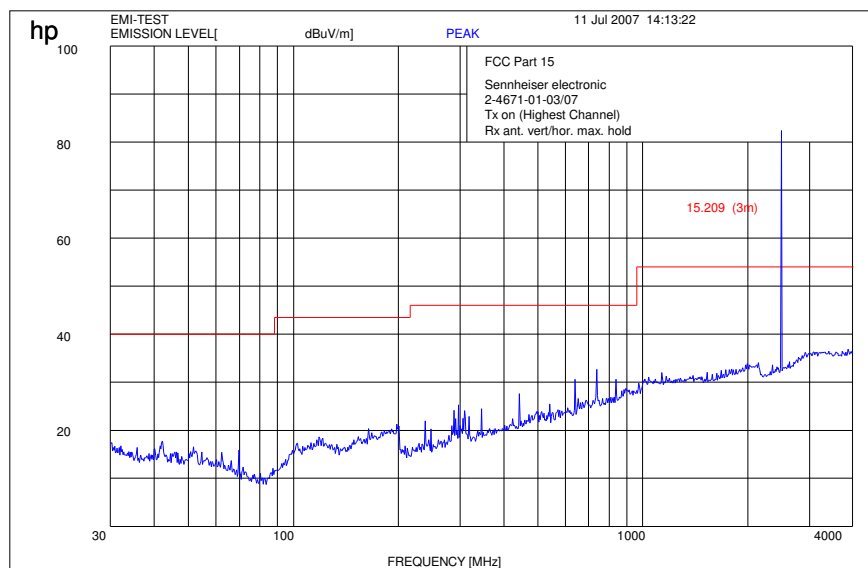
Tx : 30 MHz - 4 GHz



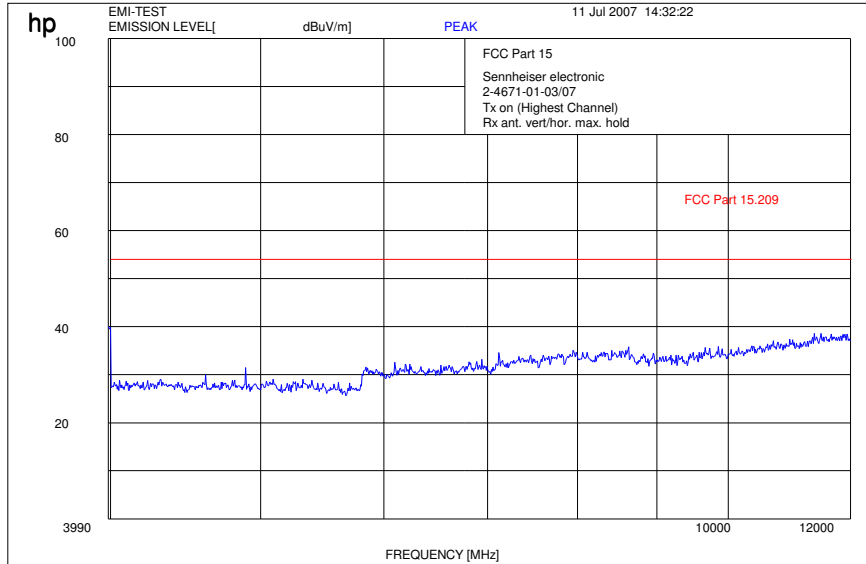
Plot 5: (Middle Channel)
Tx : 4 GHz – 12 GHz



Plot 6: (Highest Channel)
Tx : 30 MHz - 4 GHz



Plot 7: (Highest Channel)
Tx : 4 GHz – 12 GHz



4.4 Receiver Spurious Emission (radiated)

Not applicable

Reference

FCC:	CFR Part SUBCLAUSE § 15.109
IC:	RSS 210, Issue 7, Section 7.3 Receiver Spurious Emissions (Radiated)

Limits

SUBCLAUSE § 15.109

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

4.5 Conducted Limits

Not applicable

Reference

FCC:	CFR Part 15.207, 15.107
IC:	RSS 210, Issue 7, Section 6.6 , 7.4

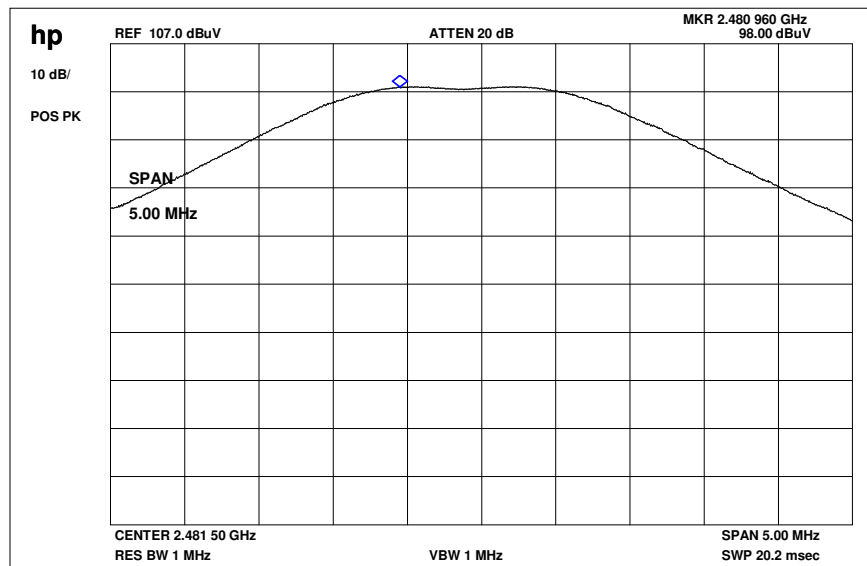
Limits: § 15.107 / 15.207

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

4.6 Band-edge compliance of radiated emissions §15.205

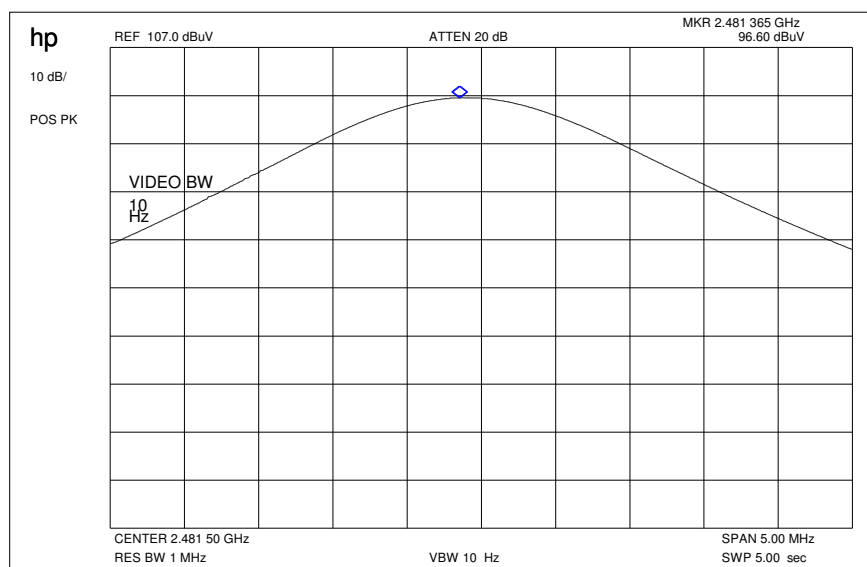
Plot 1 : Max field strength in 3m distance (single frequency) peak



Result:

Frequency	Meter reading	Correction factor	Results
2481.408 MHz	98.00 dB μ V	-3.2 dB	94.80 dB μ V

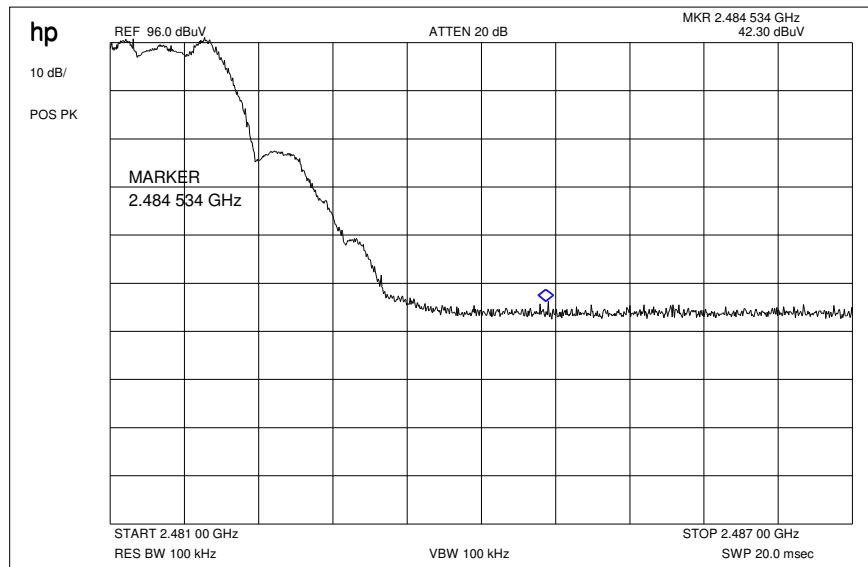
Plot 2 : Max field strength in 3m distance (single frequency) average



Result:

Frequency	Meter reading	Correction factor	Results
2481.408 MHz	96.60 dB μ V	-3.2 dB	93.40 dB μ V

Plot 3: Marker-Delta Method $RBW/VBW = 1\%$ of span

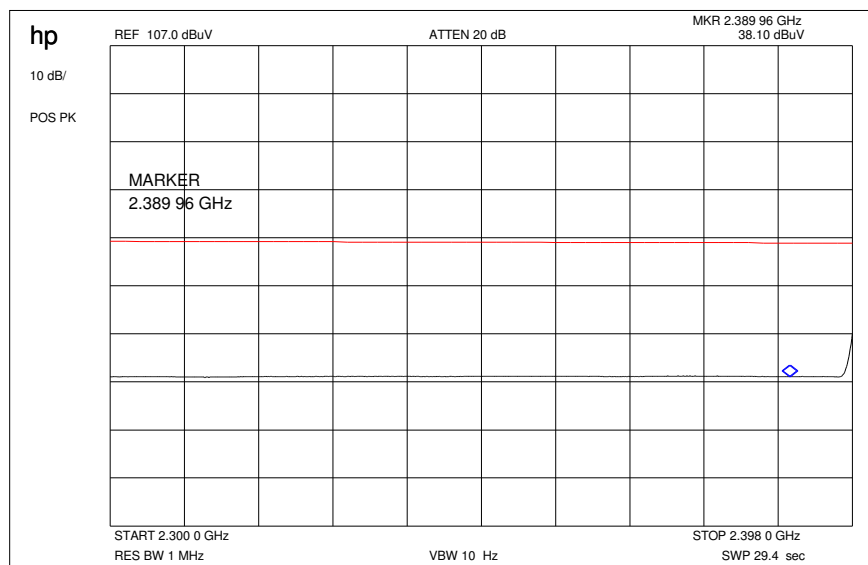


Result:

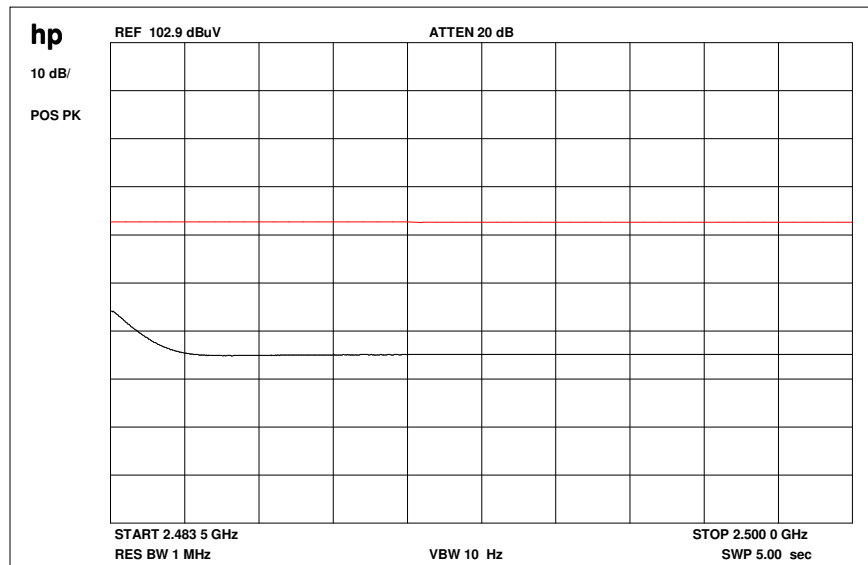
Marker-Delta-Value : 53.70 dB

This measurement was made to show that the behavior of the system is conform to FCC 15.205 (restricted bands)

Restricted Band low



Restricted Band High



Results & Limits:

Radiated field strength

The field strength was measured with an EMI measuring receiver and 3 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	98.00 dB μ V/m	-3.20 dB	94.80 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	96.60 dB μ V/m	-3.20 dB	93.40 dB μ V/m
Delta value	Peak 100 kHz RBW/VBW	53.70 dB		
Value at band edge	limit 54 dB μ V/m			39.70 dB μ V/m
Statement:				Complies

Used Testequipment

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	26.10.2007
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

SRD Laboratory Room 005:

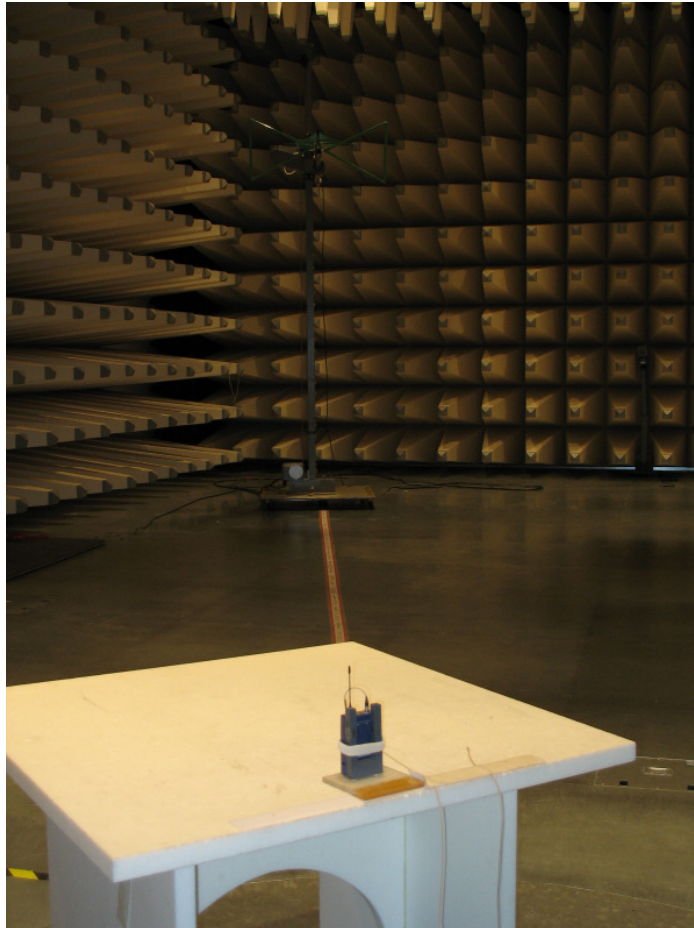
No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010
6	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
7	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010

5 Annex B: Photographs of Test site

Photo 1 (Radiated Emissions):



Photo 2 (Radiated Emissions):

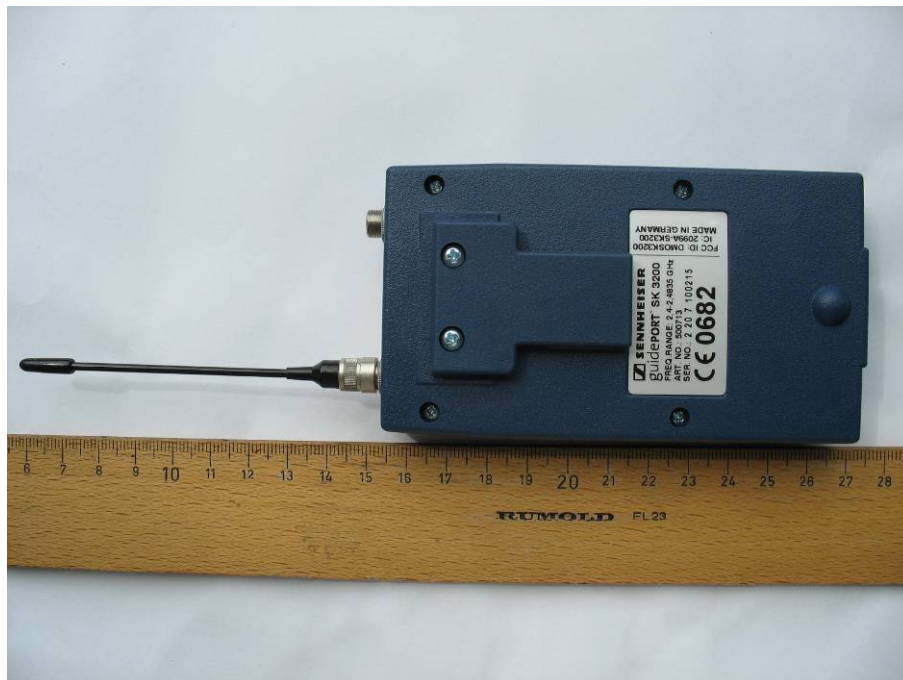


6 Annex C: External Photographs of the Equipment

Photo 1:



Photo 2:



7 Annex D: INTERNAL PHOTOGRAPHS OF THE EQUIPMENT

Photo 3:



Photo 4:

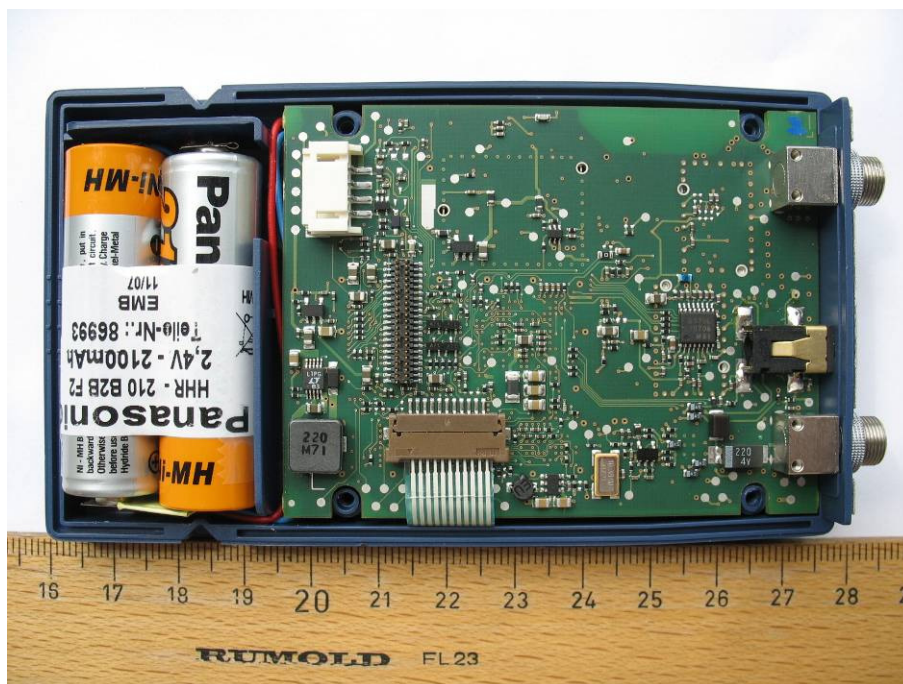


Photo 5:

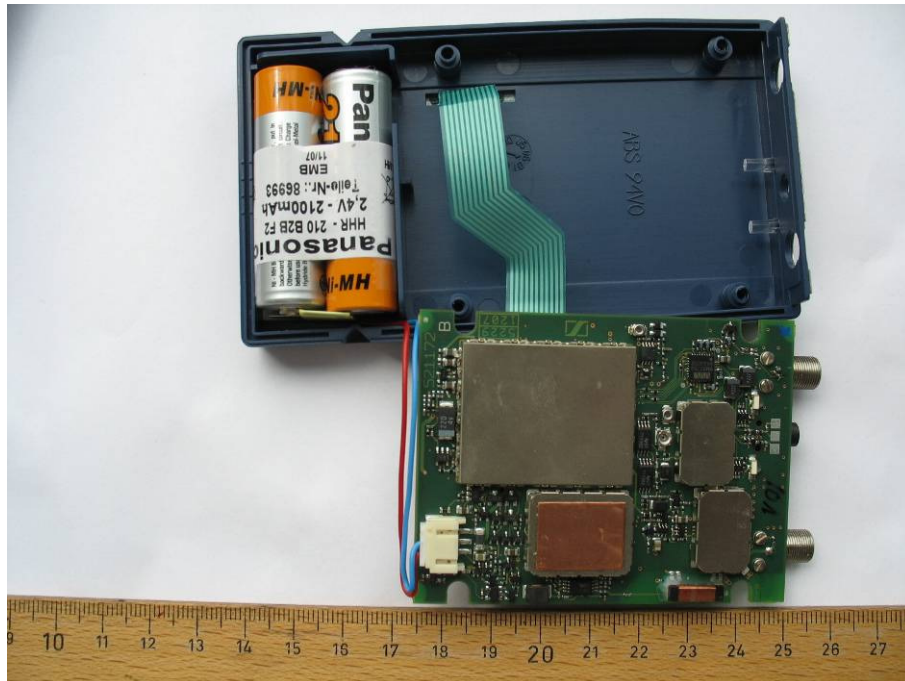


Photo 6:

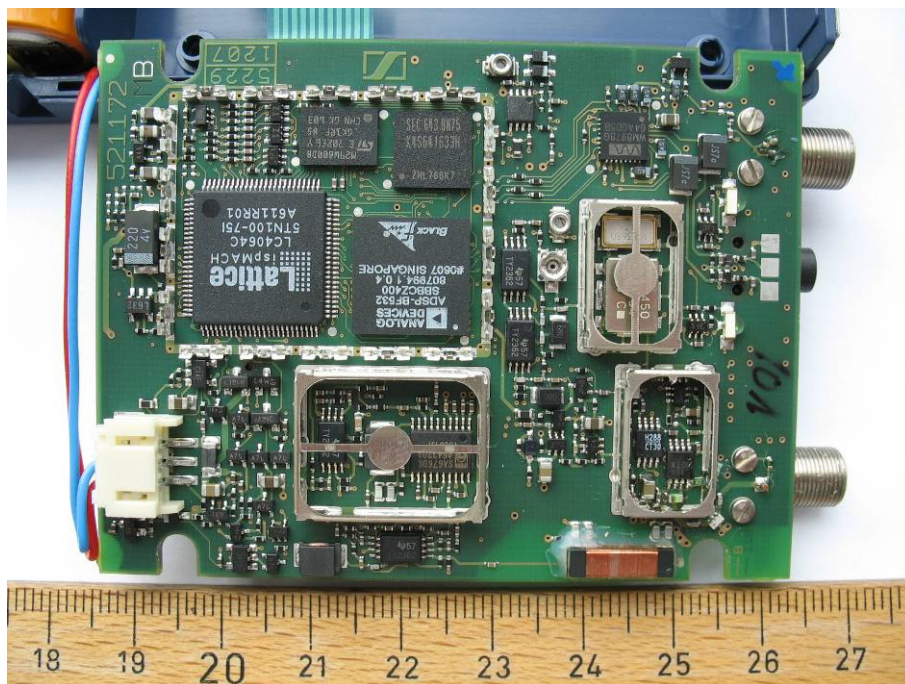


Photo 7:

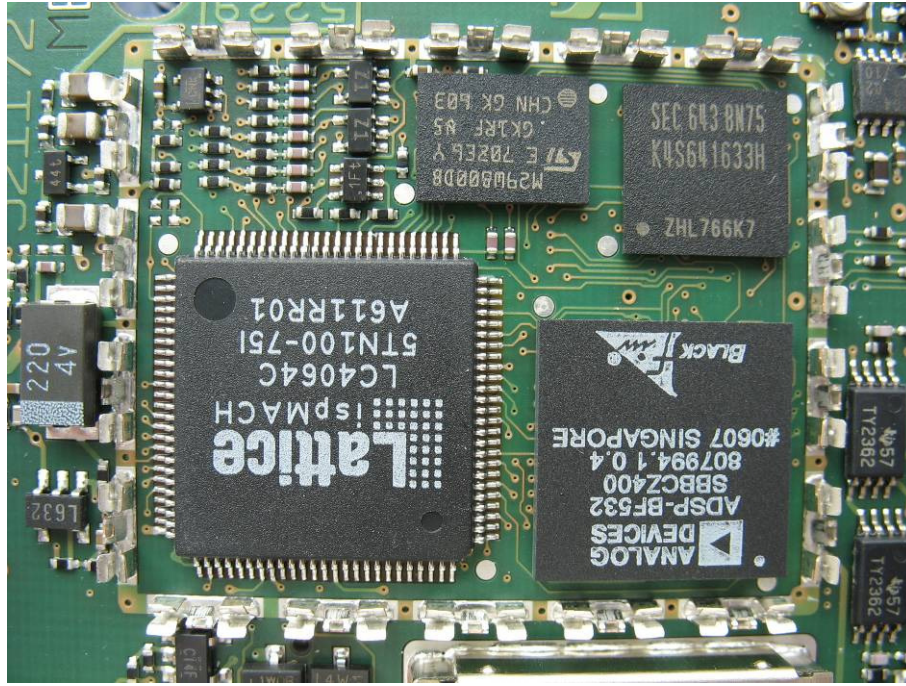


Photo 8:

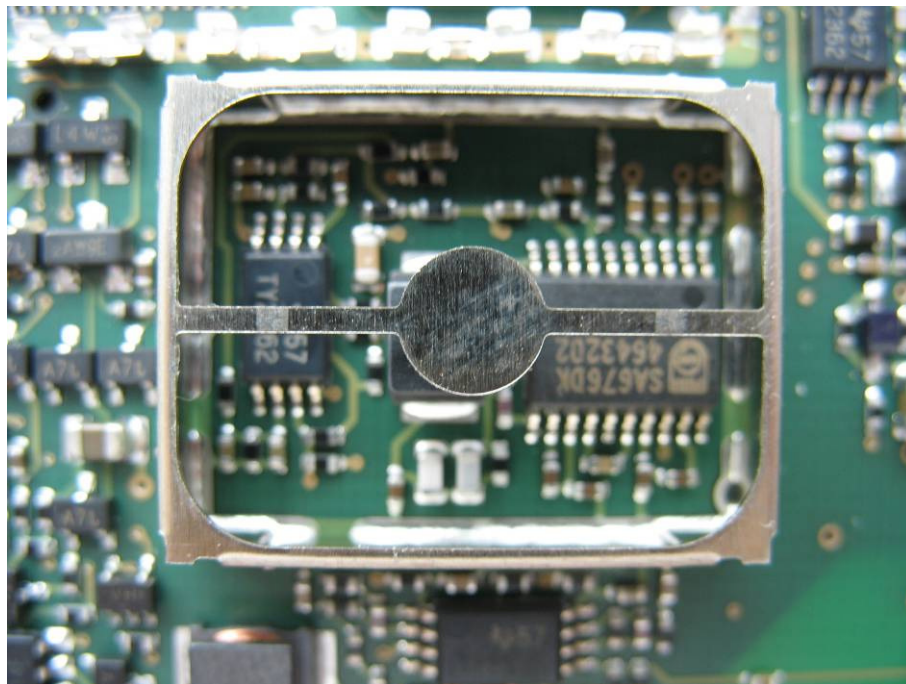


Photo 9:

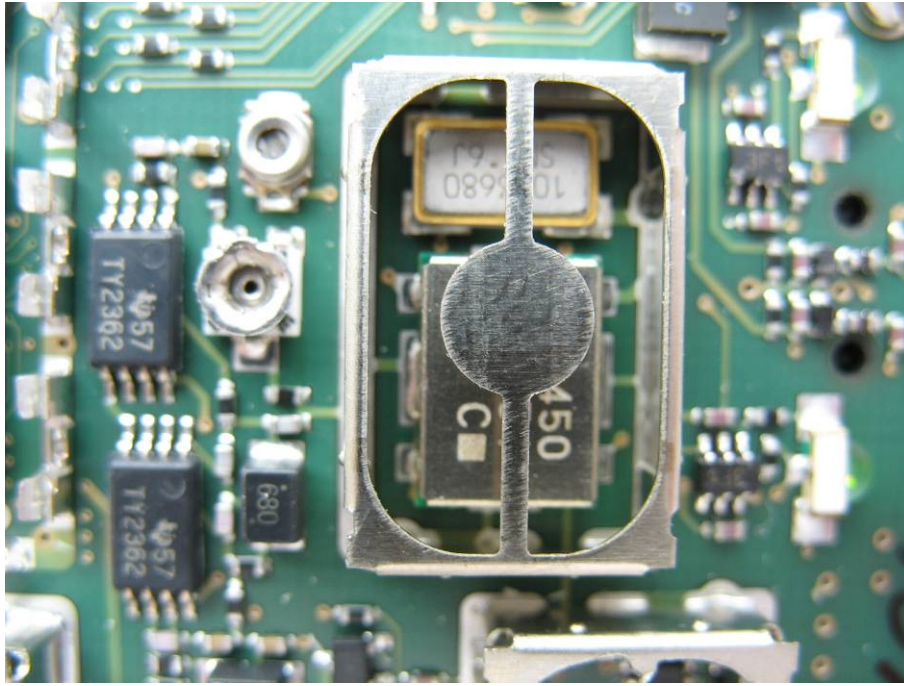


Photo 10:

