Accredited testing-laboratory

DAR registration number: DAT-P-176/94-D1

Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Recognized by the Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3462C-1 (IC)
Certification ID: DE 0001
Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

Test report no.	**:**	**1-1246-01-03/09**
Type identification	**:**	**SKP100 G3**
Applicant	**:**	**Sennheiser electronic GmbH & Co. KG**
IC Certification No	**:**	**2099A-G3SKP**
Test standards	**:**	**RSS - 123 Issue 1**

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations 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.

Test laboratory manager:

2009-05-15	**Jakob Reschke**	
Date	Name	Signature

Technical responsibility for area of testing:

2009-05-15	**Michael Berg**	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10
66117 Saarbrücken
Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
e-mail: info@ICT.cetecom.de
Internet: http://www.cetecom-ict.de

State of accreditation:	**The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 DAR registration number: DAT-P-176/94-D1**
Accredited by:	**Federal Motor Transport Authority (KBA) DAR registration number: KBA-P 00070-97**

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	**Sennheiser electronic GmbH & Co. KG**
Street:	**Am Labor 1**
Town:	**30900 Wedemark**
Country:	**Germany**
Telephone:	**+49 (0) 5130 6 00 -0**
Fax:	**+49 (0) 5130 600 330**
Contact:	**Volker Bartsch**
E-mail:	**bartschv@sennheiser.com**
Telephone:	**+49 (0) 5130 600 465**

1.4 Application details

Date of receipt of order:	**2009-05-06**
Date of receipt of test item:	**2009-05-06**
Date of start test:	**2009-05-06**
Date of end test	**2009-05-15**
Persons(s) who have been present during the test:	**-/-**

2 Test standard/s

RSS - 123 Issue 1	**1999-11**	**Spectrum Management and Telecommunications Policy - Radio Standards Specification** **Low Power Licensed Radiocommunication Devices**

3 Technical tests

3.1 Details of manufacturer

Name:	**Sennheiser electronic GmbH & Co. KG**
Street:	**Am Labor 1**
Town:	**30900 Wedemark**
Country:	**Germany**

3.1.1 Test item and Additional EUT information For IC Canada (appendix 2)

Kind of test item:	**Transmitter**
Type identification:	**SKP100 G3**
Open Area Test Site Industry Canada Number:	**IC 3462C-1**
S/N serial number:	**516 MHz – 558 MHz: 2149100068** **566 MHz – 608 MHz: 2129100018** **626 MHz – 668 MHz: 2149100039** **734 MHz – 776 MHz: 2149100049** **780 MHz – 822 MHz: 2159100027**
HW hardware status:	**Unknown**
SW software status:	**0.5.7**
Frequency Band [MHz]:	**470 MHz – 608 MHz & 614 MHz – 806 MHz**
Number of Channels:	**1680**
Measured Channels	
Channel 1:	**516.00 MHz**
Channel 2:	**607.75 MHz**
Channel 3:	**647.00 MHz**
Channel 4:	**668.00 MHz**
Channel 5:	**755.00 MHz**
Channel 6:	**805.75 MHz**
RF: Power [W] (max):	**Rad. EIRP: 34.59 mW**
Type of Modulation:	**FM**

Emission Designator:	**<u>516 MHz</u>** **140KF3E** **(2x max. Audio Frequency + 2x max. FM Deviation)** **108K2F3E** **(measured Bandwidth)** **<u>607.75 MHz</u>** **140KF3E** **(2x max. Audio Frequency + 2x max. FM Deviation)** **115K2F3E** **(measured Bandwidth)** **<u>647 MHz</u>** **140KF3E** **(2x max. Audio Frequency + 2x max. FM Deviation)** **110K2F3E** **(measured Bandwidth)** **<u>668 MHz</u>** **140KF3E** **(2x max. Audio Frequency + 2x max. FM Deviation)** **110K2F3E** **(measured Bandwidth)** **<u>755 MHz</u>** **140KF3E** **(2x max. Audio Frequency + 2x max. FM Deviation)** **109K2F3E** **(measured Bandwidth)** **<u>805.75 MHz</u>** **140KF3E** **(2x max. Audio Frequency + 2x max. FM Deviation)** **107K2F3E** **(measured Bandwidth)**
Antenna Type:	**Integrated antenna**
Power Supply:	**3.00 V DC by 2 x 1.5 V (AA) Battery**
Temperature Range:	**-30 °C to 50 °C**
Occupied Bandwidth (99% BW) [kHz]:	**115 (max. 200)**
Transmitter Spurious (worst case) [dBm]:	**-53.00**
IC Registration Number:	**2099A-G3SKP**
IC Standards:	**RSS-123 Issue 1, Rev. 2 November 6, 1999**

<u>ATTESTATION:</u>

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

Signature:

<u>Test engineer</u>: Jakob Reschke
<u>Date</u>: 2009-05-15

3.1.2 RF Technical Brief Cover Sheet acc. To RSS-102

All Fields must be completed with the requested information or the following codes: N/A for Not Applicable, N/P for Not Performed or N/V for Not Available. Where applicable, check appropriate box.

1. COMPANY NUMBER: **2099A**

2. MODEL NUMBER: **SKP100 G3**

3. MANUFACTURER: **Sennheiser electronic GmbH & Co. KG**

4. TYPE OF EVALUATION: **RF Evaluation**

- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 100 %
- Standard used for evaluation: RSS-102 Issue 2 (2005-11)
- Measurement distance: 0.20 m
- RF value: 0.07 V/m □ A/m □ W/m^2 ☒

Measured ☐ Computed ☐ Calculated ☒

Declaration of RF Exposure Compliance

ATTESTATION:

I attest that the information provided in this test report is correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Name: Jakob Reschke
Title: Engineer
Company: Cetecom ICT Services GmbH

3.1.3 Description of the test

In this report we tested only the radiated emissions of the sample.

All tests were done in accordance with the EIA/TIA 603.
The substitution method (TIA/EIA 603) was used.
This products fulfils also the requirements for CANADA RSS-123

3.1.4 EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
Op. 0	Normal mode	Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the test plan

3.1.5 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T_{nom}	°C	**23**
Nominal Humidity	H_{nom}	%	**51**
Nominal Power Source	V_{nom}	V	**3.00**

Type of power source: **DC by 2 x 1.5 V (AA) Battery**

Deviations from these values are reported in chapter 2

4 Summary of Measurement Results and list of all performed test cases

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

Section in this Report	Test Name	Verdict
5.1	RF Power Output	Pass
5.2	Frequency Stability	Pass
5.3	Frequency Error	Pass
5.4	Characteristics of the Audio Modulation	Pass
5.5	Occupied Bandwidth	Pass
5.6	Emission Mask	Pass
5.7	Radiated Emissions	Pass

5 Measurements and results

5.1 Output Power (radiated) RSS-123 6.2

Method of measurement:

Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method
(a) The measurements were performed with full rf output power and modulation.
(b) Test was performed at listed 3m test site (listed with FCC, IC).
The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)
(d) The BICONILOG antenna (20 MHz to 1 GHz) or HORN antenna (1 GHz to 18 GHz) was used for measuring.
(e) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)
(f) Set the EMI Receiver and #2 as follows:

Centre Frequency: test frequency
Resolution BW: 100 kHz
Video BW: same
Detector Mode: positive
Average: off
Span: 3 x the signal bandwidth

(g) The test antenna was lowered or raised from 1 to 4 meters until the maximum signal level was detected.
(h) The transmitter was rotated through 360 o about a vertical axis until a higher maximum signal was received.
(i) The test antenna was lowered or raised again from 1 to 4 meters until a maximum was obtained. This level was recorded.
(j) The recorded reading was corrected to the true field strength level by adding the antenna factor, cable loss and subtracting the pre-amplifier gain.
(k) The above steps were repeated with both transmitters' antenna and test receiving antenna placed in vertical and horizontal polarization. Both readings with the antennas placed in vertical and horizontal polarization shall be recorded.
(l) Repeat for all different test signal frequencies

Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method

(a) Set the EMI Receiver (for measuring E-Field) and Receiver #2 (for measuring EIRP) as follows:

Centre Frequency	: equal to the signal source
Resolution BW	: 10 kHz
Video BW	: same
Detector Mode	: positive
Average	: off
Span	: 3 x the signal bandwidth

(b) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)
Select the frequency and E-field levels for ERP/EIRP measurements.
(d) Substitute the EUT by a signal generator and one of the following transmitting antennas (substitution antenna):
.DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz}.

(e) Mount the transmitting antenna at 1.5 meter high from the ground plane.
(f) Use one of the following antenna as a receiving antenna: .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz }.
(g) If the DIPOLE antenna is used, tune its elements to the frequency as specified in the calibration manual.
(h) Adjust both transmitting and receiving antenna in a VERTICAL polarization.
(i) Tune the EMI Receivers to the test frequency.
(j) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(k) The transmitter was rotated through 360 o about a vertical axis until a higher maximum signal was received.
(l) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(m) Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.
(n) Record the power level read from the Average Power Meter and calculates the ERP/EIRP as follows:
P = P1 - L1 = (P2 + L2) – L1 = P3 + A + L2 - L1
EIRP = P + G1 = P3 + L2 - L1 + A + G1
ERP = EIRP – 2.15 dB
Total Correction factor in EMI Receiver # 2 = L2 – L1 + G1
Where: P: Actual RF Power fed into the substitution antenna port after corrected.
P1: Power output from the signal generator
P2: Power measured at attenuator A input
P3: Power reading on the Average Power Meter
EIRP: EIRP after correction
ERP: ERP after correction
(o) Adjust both transmitting and receiving antenna in a HORIZONTAL polarization, then repeat step (k) to (o)
(p) Repeat step (d) to (o) for different test frequency
(q) Repeat steps to (j) with the substitution antenna oriented in horizontal polarization.
(r) Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.

Results:

TEST CONDITIONS		**TRANSMITTER ERP [mW]**					
Frequency [MHz]		**516.00**	**607.75**	**647.00**	**668.00**	**755.00**	**805.75**
T_{nom} °C	V_{nom} V	22.54	18.71	34.59	33.19	31.62	11.04
Maximum deviation from output power under extreme test conditions (dBc)		±0.2 dB					
Measurement uncertainty		±3dB					

Sample calculation:

Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERP Result	ERP Result	
MHz	dBµV	dBm	dBi	dBd	dB	dBm	mW	
758.0	108.5	13.9	-	0.0	2.9	11.0	12.6	

ERP = SG (dBm) - Cable Loss (dB) + Ant. gain (dBd)

LIMIT **RSS-123 6.2**

Frequency range MHz	**Power level W**
54-72, 76-88, 174-216	1
470-608, 614-806	1

5.2 AFC Frequency Error vs. Voltage RSS-123 7.0

Method of measurement:

The EUT was fixed in test fixture to a resistive coaxial attenuator of normal load impedance, and the un-modulated carrier was measured by means of a spectrum analyzer.
The input voltage was varied in a range from 2.2V to 3.1V and the maximum change in frequency was noted within one minute.
The temperature tests were performed for each frequency range on one channel

516.00 MHz

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
2.20	1700	0.00033	3.30
2.40	1750	0.00034	3.40
2.60	1700	0.00033	3.30
2.80	1750	0.00034	3.40
3.00	1800	0.00035	3.48
3.10	1750	0.00034	3.40

607.75 MHz

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
2.20	1900	0.00031	3.13
2.40	1800	0.00029	2.96
2.60	1900	0.00031	3.13
2.80	1850	0.00030	3.04
3.00	1900	0.00031	3.13
3.10	1900	0.00031	3.13

647.00 MHz

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
2.20	1800	0.00028	2.78
2.40	1850	0.00029	2.85
2.60	1850	0.00029	2.85
2.80	1800	0.00028	2.78
3.00	1850	0.00029	2.85
3.10	1800	0.00028	2.78

668.00 MHz

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
2.20	2400	0.00036	3.59
2.40	2400	0.00036	3.59
2.60	2450	0.00037	3.74
2.80	2400	0.00036	3.59
3.00	2350	0.00035	3.51
3.10	2400	0.00036	3.59

755.00 MHz

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
2.20	1480	0.00020	1.96
2.40	1490	0.00020	1.97
2.60	1500	0.00020	1.98
2.80	1500	0.00020	1.98
3.00	1480	0.00020	1.96
3.10	1490	0.00020	1.97

805.75 MHz

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
2.20	1530	0.00019	1.89
2.40	1500	0.00018	1.86
2.60	1520	0.00019	1.89
2.80	1500	0.00018	1.86
3.00	1500	0.00018	1.86
3.10	1500	0.00018	1.86

LIMIT **RSS-123 7.0**

The frequency tolerance of the transmitter shall be 0.005 percent

5.3 AFC Frequency Error vs. Temperature RSS-123 7.0

Method of measurement:

The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the un-modulated carrier was measured by means of a spectrum analyzer. With all power removed, the temperature was decreased to –30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency error was noted within one minute. The temperature tests were performed for each frequency range on one channel.

516.00 MHz

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	1700	0.00033	3.30
-20	1750	0.00034	3.40
-10	1700	0.00033	3.30
±0.0	1750	0.00034	3.40
+10	1800	0.00035	3.48
+20	1750	0.00034	3.40
+30	1750	0.00034	3.40
+40	1750	0.00034	3.40
+50	1700	0.00033	3.30

607.75 MHz

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	1900	0.00031	3.13
-20	1800	0.00029	2.96
-10	1900	0.00031	3.13
±0,0	1850	0.00030	3.04
+10	1900	0.00031	3.13
+20	1900	0.00031	3.13
+30	1900	0.00031	3.13
+40	1800	0.00029	2.96
+50	1900	0.00031	3.13

647.00 MHz

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	1800	0.00028	2.78
-20	1850	0.00029	2.85
-10	1850	0.00029	2.85
±0,0	1800	0.00028	2.78
+10	1850	0.00029	2.85
+20	1800	0.00028	2.78
+30	1800	0.00028	2.78
+40	1850	0.00029	2.85
+50	1800	0.00028	2.78

668.00 MHz

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	2400	0.00036	3.59
-20	2400	0.00036	3.59
-10	2450	0.00037	3.74
±0.0	2400	0.00036	3.59
+10	2350	0.00035	3.51
+20	2400	0.00036	3.59
+30	2400	0.00036	3.59
+40	2400	0.00036	3.59
+50	2400	0.00036	3.59

755.00 MHz

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	1480	0.00020	1.96
-20	1490	0.00020	1.97
-10	1500	0.00020	1.98
±0.0	1500	0.00020	1.98
+10	1480	0.00020	1.96
+20	1490	0.00020	1.97
+30	1500	0.00020	1.98
+40	1490	0.00020	1.97
+50	1500	0.00020	1.98

805.75 MHz

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	1520	0.00019	1.89
-20	1500	0.00018	1.86
-10	1520	0.00019	1.89
±0.0	1520	0.00019	1.89
+10	1500	0.00018	1.86
+20	1500	0.00018	1.86
+30	1530	0.00019	1.89
+40	1500	0.00018	1.86
+50	1520	0.00019	1.89

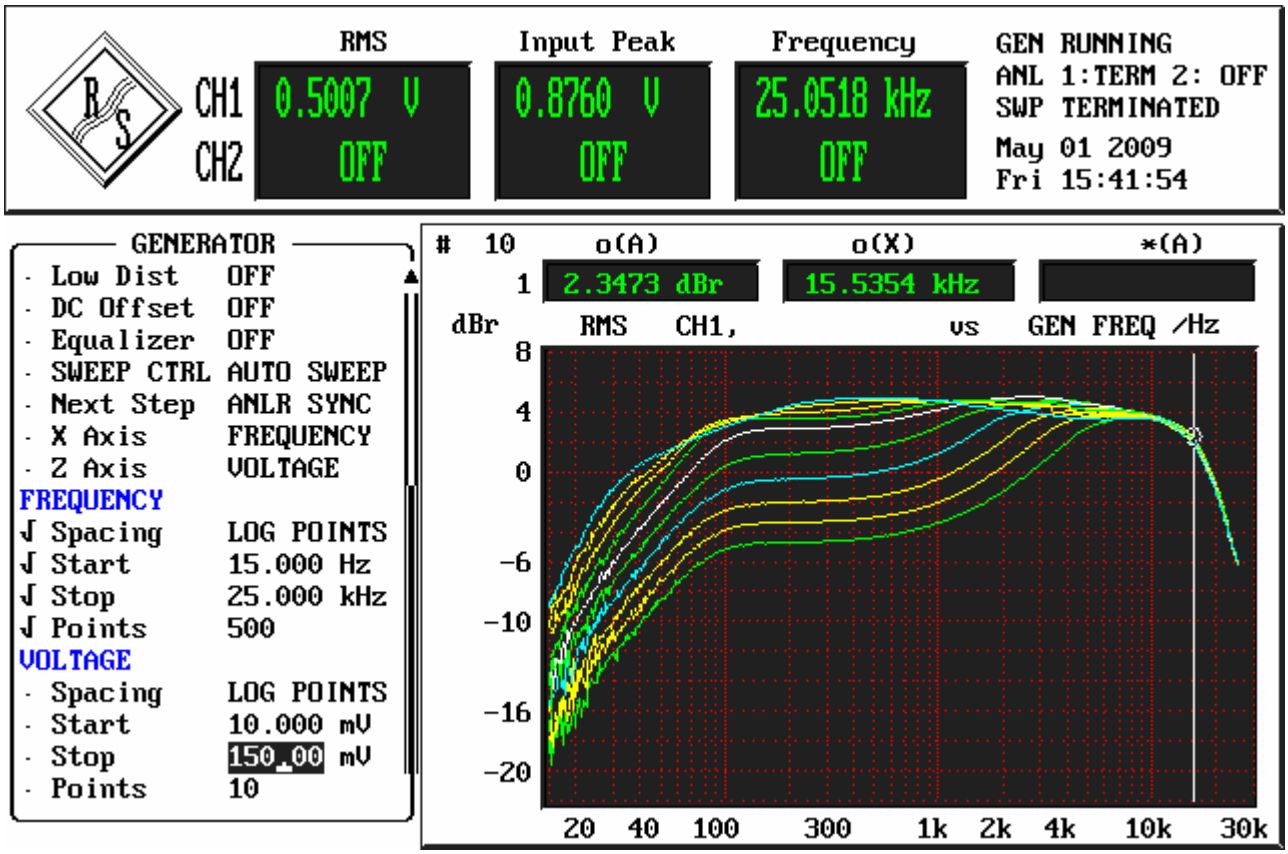
LIMIT **RSS-123 7.0**

The frequency tolerance of the transmitter shall be 0.005 percent

5.4 Characteristics of the Audio Modulation Circuitry RSS-123 6.3

Method of measurement:

The audio frequency responds was measured in accordance with EIA/TIA 603.
The plots shows 10 curves with different modulation levels, starting from 10.0mV to 150 mV (30%+20 dB Modulation), the frequency is varied from 20 Hz to 25 kHz.



Max. measured frequency deviation : 55 kHz

This measurement is valid for all channels

Limit: max Deviation ±75kHz

5.5 Occupied Bandwidth RSS-123 6.3

Test method:

The audio frequency responds was measured in accordance with EIA/TIA 603.

Data in the plots show that all sidebands between 50 & 100% for the authorized bandwidth are attenuated by at least 25dB. From 100 to 250% of the authorized bandwidth they are attenuated by at least 35dB and beyond 250% 43 log(Po) dB. The plot shows the transmitter modulated with 15000 Hz (the highest modulation frequency), adjusted for 50% modulation plus 16 dB. The spectrum analyzer was set with the un-modulated carrier at the top of the screen. The test procedure diagram and occupied bandwidth plots follow.

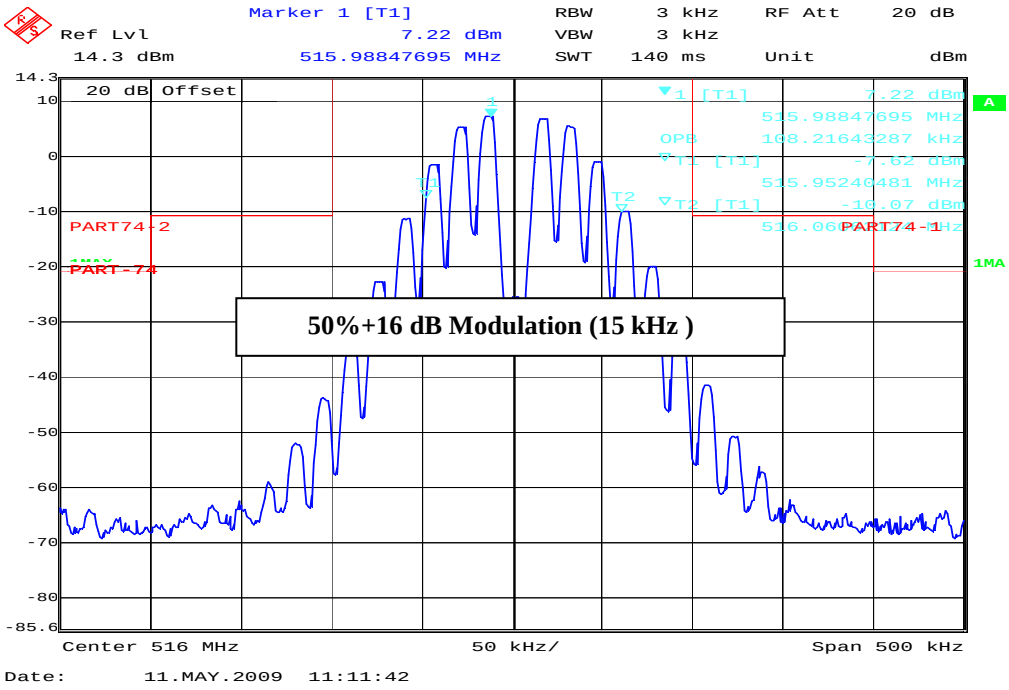
TEST CONDITIONS		OCCUPIED BANDWIDTH [kHz]					
Frequency [MHz]		**516.00**	**607.75**	**647.00**	**668.00**	**755.00**	**805.75**
T_{nom} °C	V_{nom} V	108	115	110	110	109	107
max. Deviation (FM)		55 kHz					
Measurement uncertainty		±0.5%					

Limits **RSS-123 6.3**

The operating bandwidth shall not exceed 200 kHz

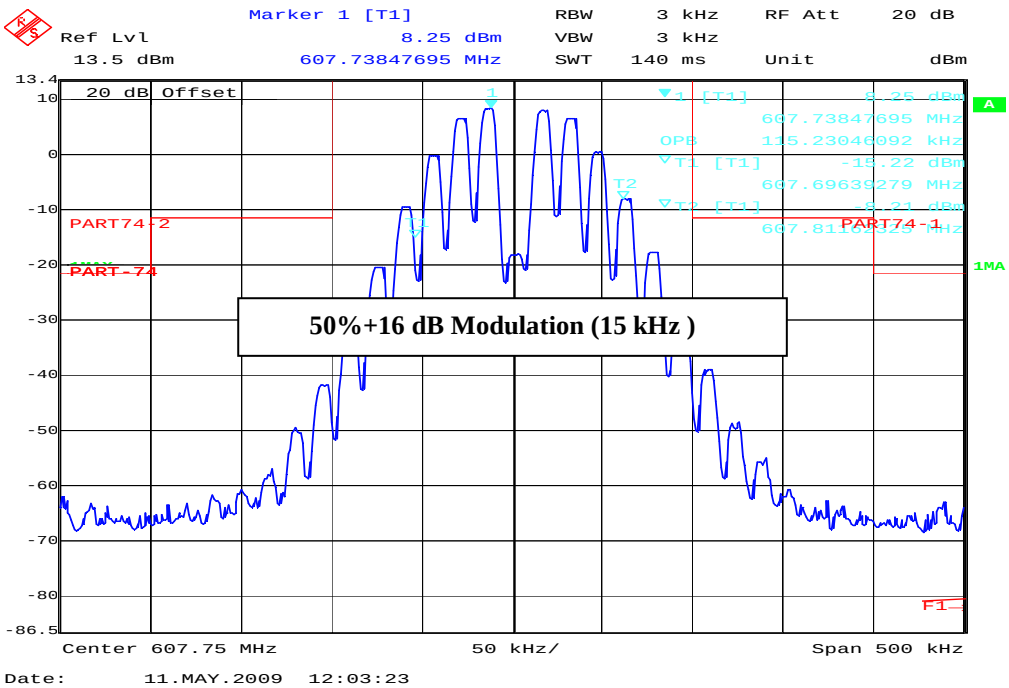
OCCUPIED BANDWIDTH **RSS-123 6.3**

Frequency: 516.00 MHz / max. deviation: ± 55 (Limit ± 75 kHz)



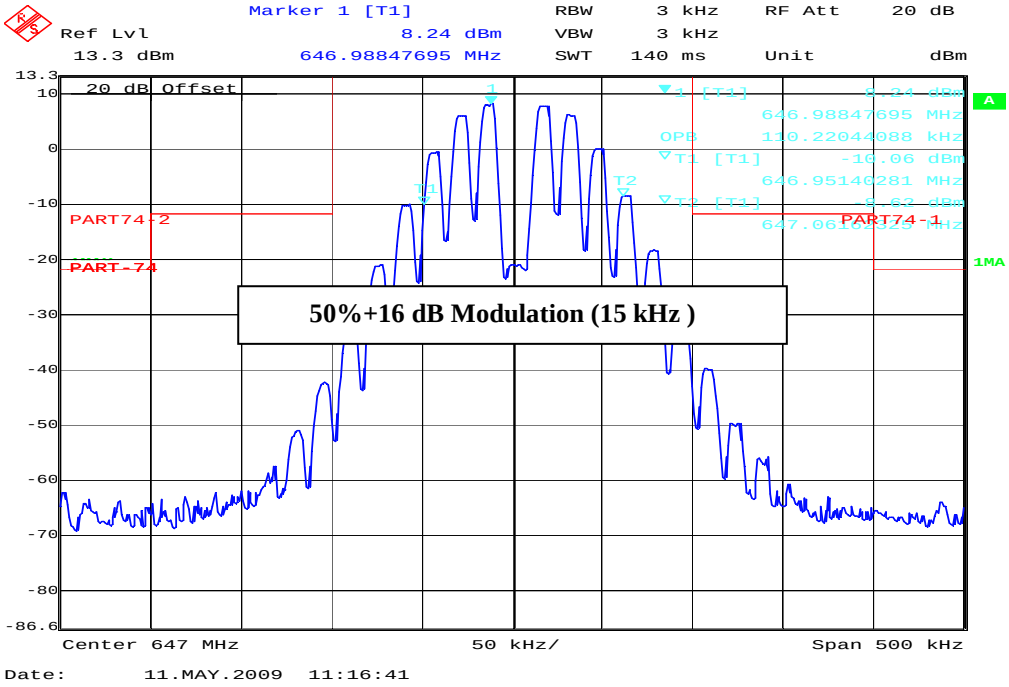
OCCUPIED BANDWIDTH **RSS-123 6.3**

Frequency: 607.75 MHz / max. deviation : ± 55 kHz (Limit ± 75 kHz)



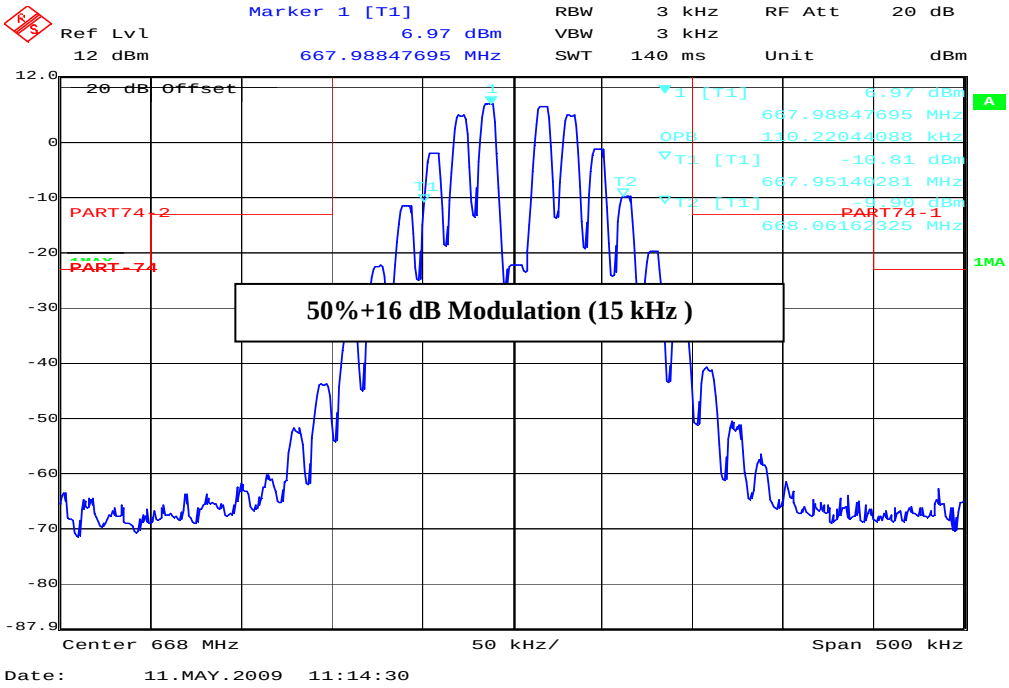
OCCUPIED BANDWIDTH **RSS-123 6.3**

Frequency: 647.00 MHz / max. deviation : ± 55 kHz (Limit ± 75 kHz)



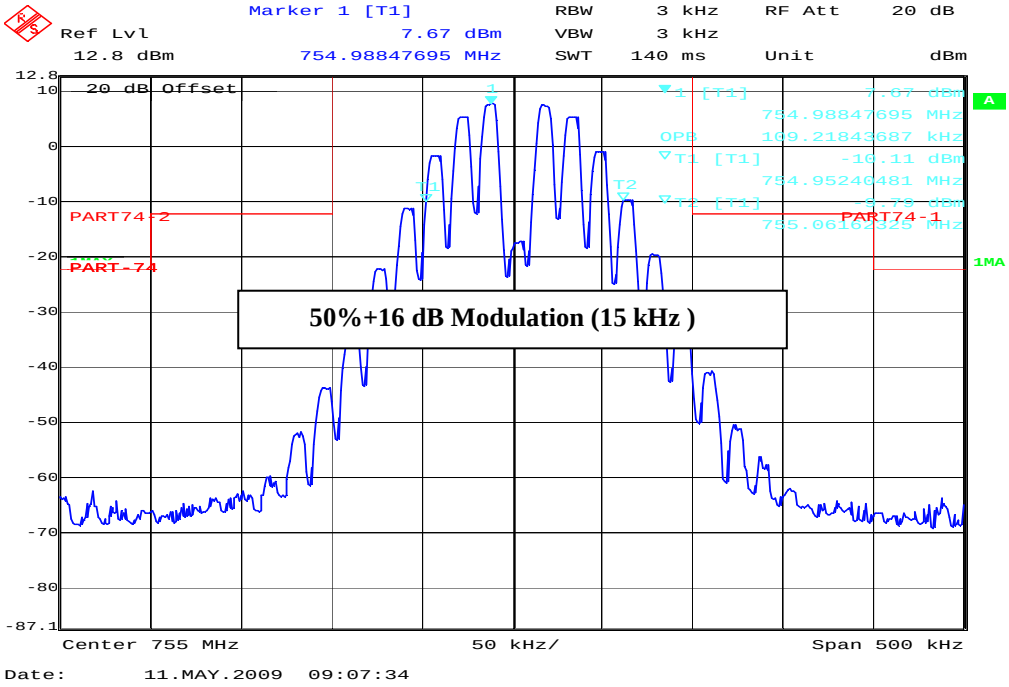
OCCUPIED BANDWIDTH **RSS-123 6.3**

Frequency: 668.00 MHz / max. deviation : ± 55 kHz (Limit ± 75 kHz)



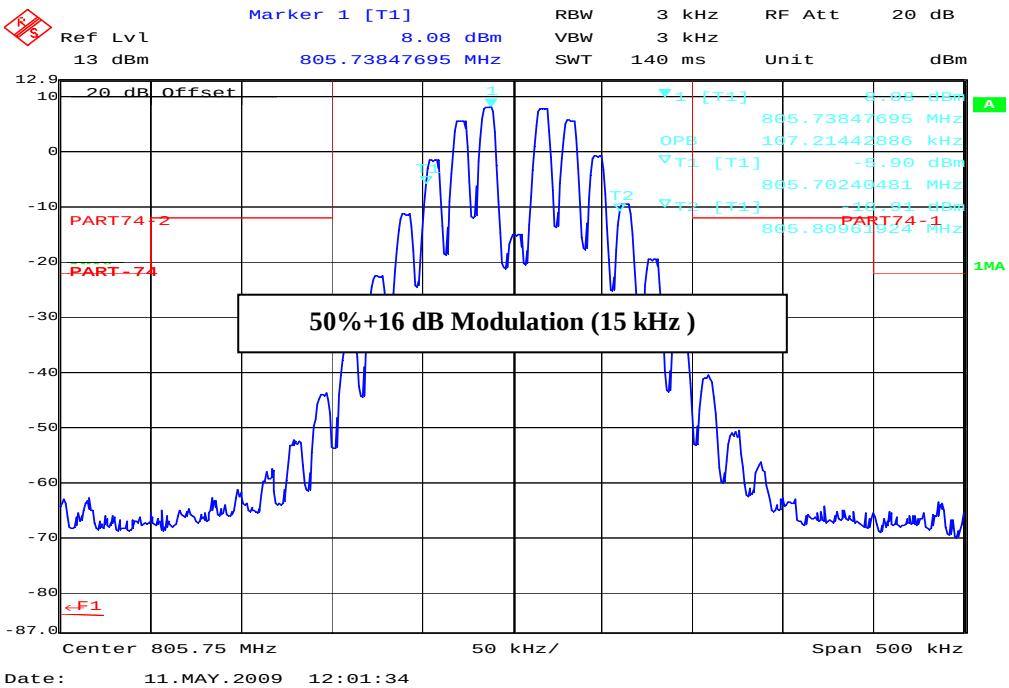
OCCUPIED BANDWIDTH **RSS-123 6.3**

Frequency: 755.00 MHz / max. deviation : ± 55 kHz (Limit ± 75 kHz)



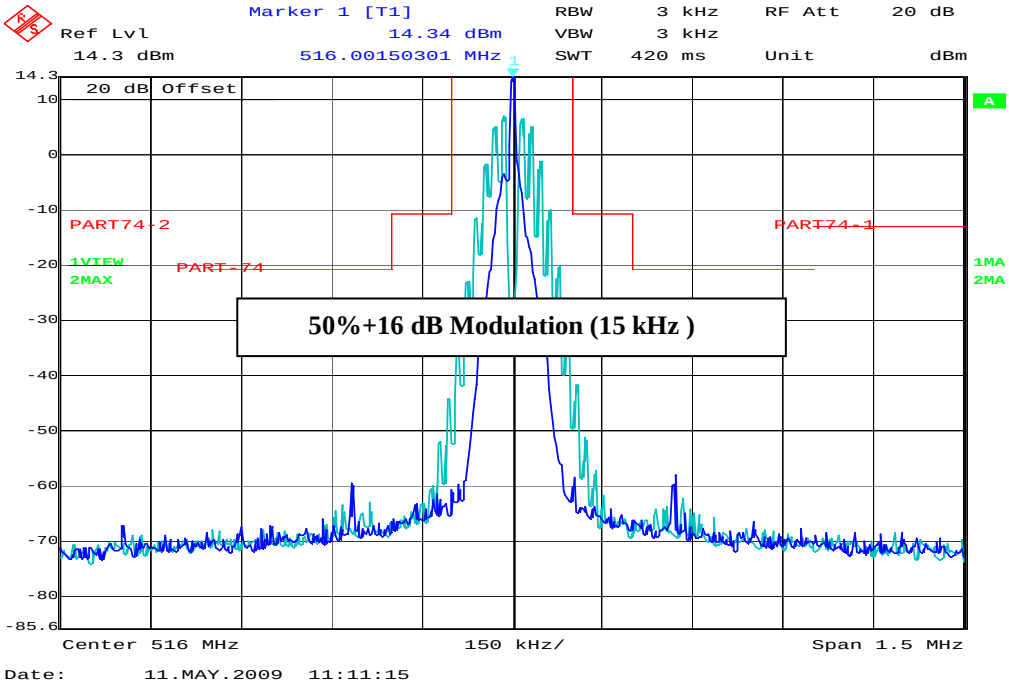
OCCUPIED BANDWIDTH **RSS-123 6.3**

Frequency: 805.75 MHz / max. deviation : ± 55 kHz (Limit ± 75 kHz)

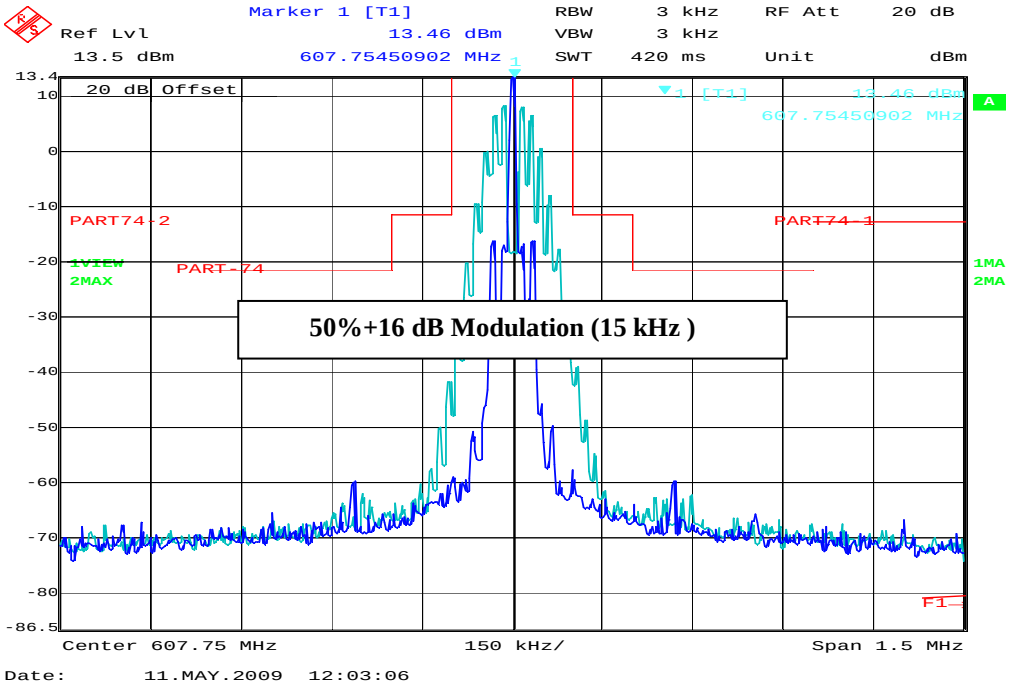


5.6 Emission mask RSS-123 6.3

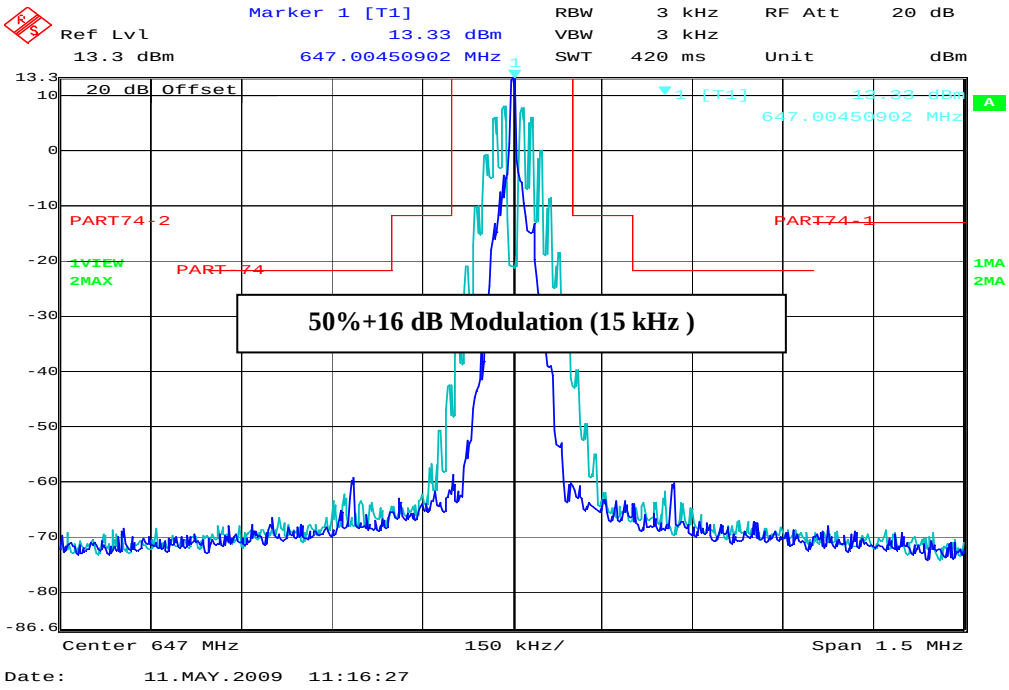
Frequency: 516.00 MHz



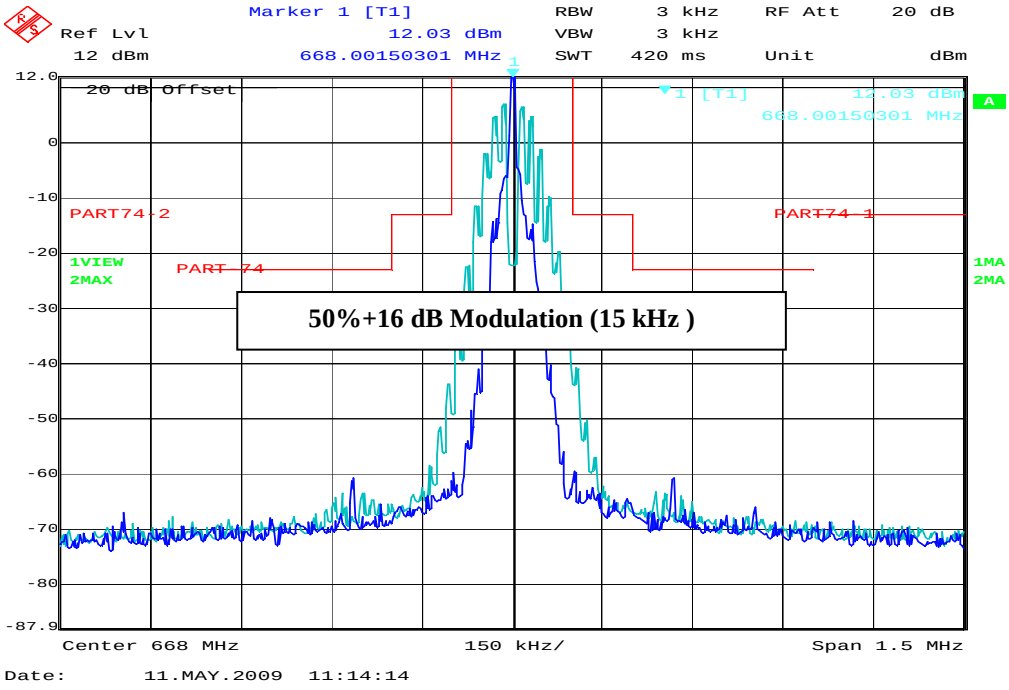
Frequency: 607.75 MHz



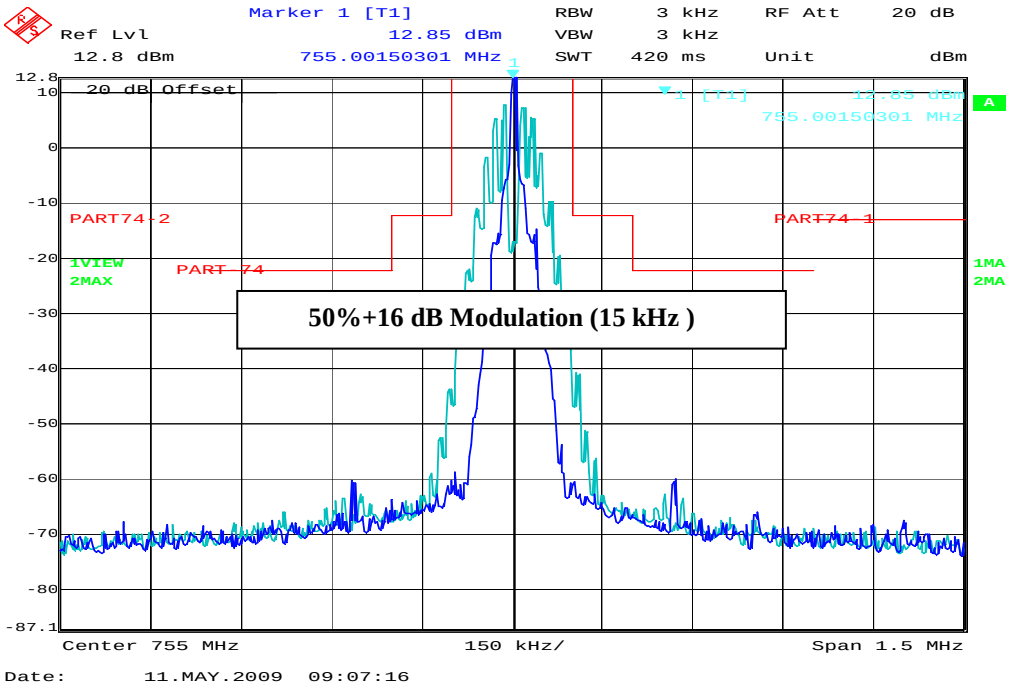
Frequency: 647.00 MHz



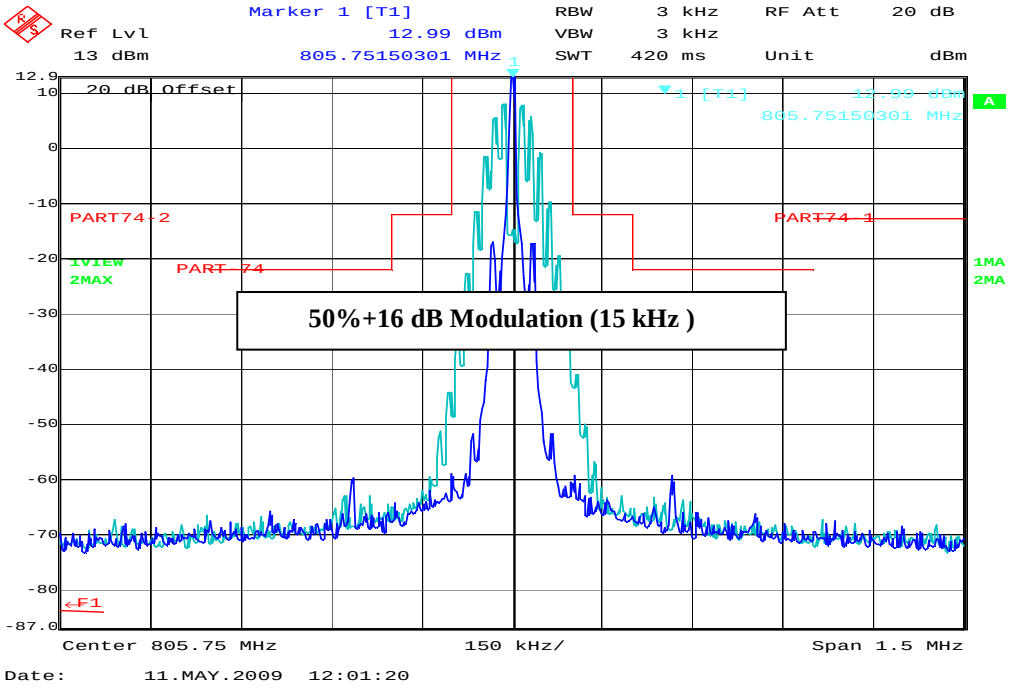
Frequency: 668.00 MHz



Frequency: 755.00 MHz



Frequency: 805.75 MHz



Limits **RSS-123 6.3**

f ± 100 kHz to f ± 200 kHz	f ± 200 kHz to f ± 500 kHz	f ± 500 kHz
25 dBc	35 dBc	-43 +10 $\log_{10}$(mean output power in watts) dB below the mean output power

5.7 Radiated Emissions RSS-123 6.3

Test procedure

1). on a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
2). the test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.
3). the output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). the transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5). the test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6). the transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7). the test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8). the maximum signal level detected by the measuring receiver shall be noted.
9). the transmitter shall be replaced by a substitution antenna (tuned dipole for f less than 1GHz and horn for frequency higher than 1GHz).
10). the substitution antenna shall be oriented for vertical polarization and the length (if a dipole antenna is used) of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
11). the substitution antenna shall be connected to a calibrated signal generator.
12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13). the test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
14). the input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
15). the input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16). the measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
17). the measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.
18). Repeat above substitution measurement procedure for fundamental and all harmonica emissions.

5.7.1 Results of the measurements

Freg	SA Reading	SG Setting	Ant. gain	Dipole gain	Cable loss	ERP Result	Limit	Margin	Pol
MHz	dBµV	dBm	dBi	dBd	dB	dBm	dBm	dBm	H/V
All peaks > 25 dB below Limit									

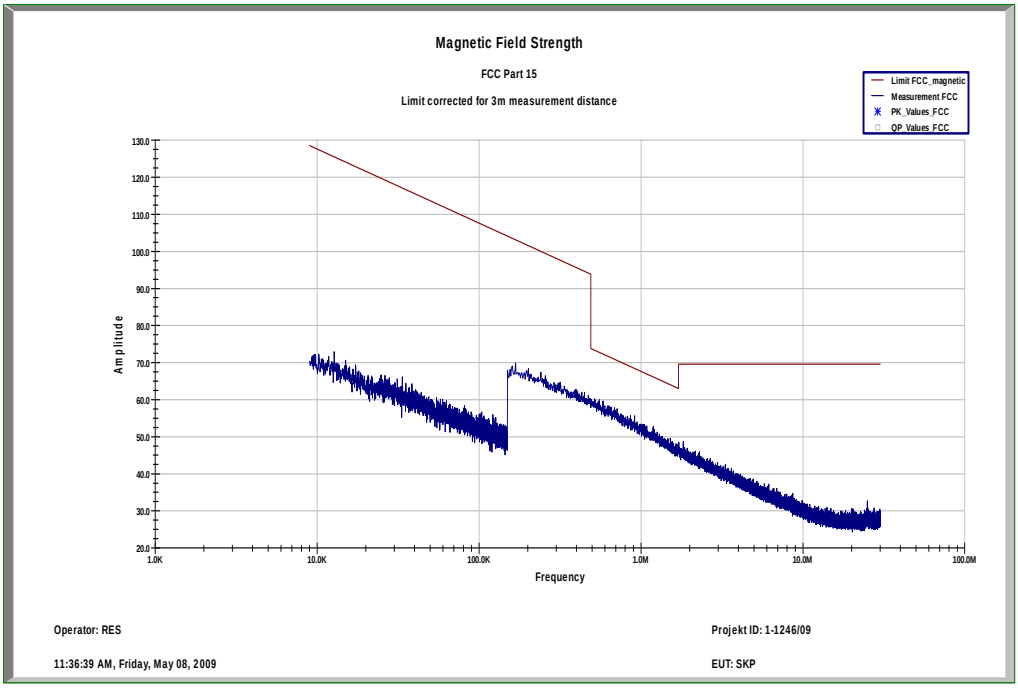
All results worst case

Limits **RSS-123 6.3**

f ± 100 kHz to f ± 200 kHz	f ± 200 kHz to f ± 500 kHz	f ± 500 kHz
25 dBc	35 dBc	55 +10 log(mean output power in watts) dB below the mean output power

5.7.2 Plots of the measurements

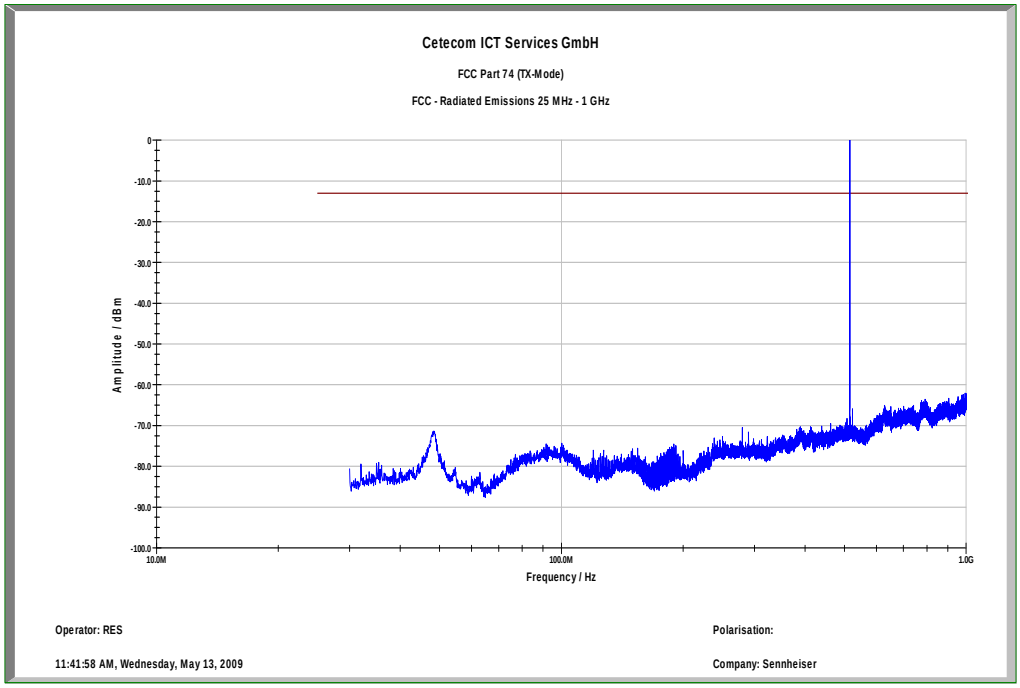
RADIATED EMISSIONS **RSS-123 6.3**
(This plot is valid for all channels)



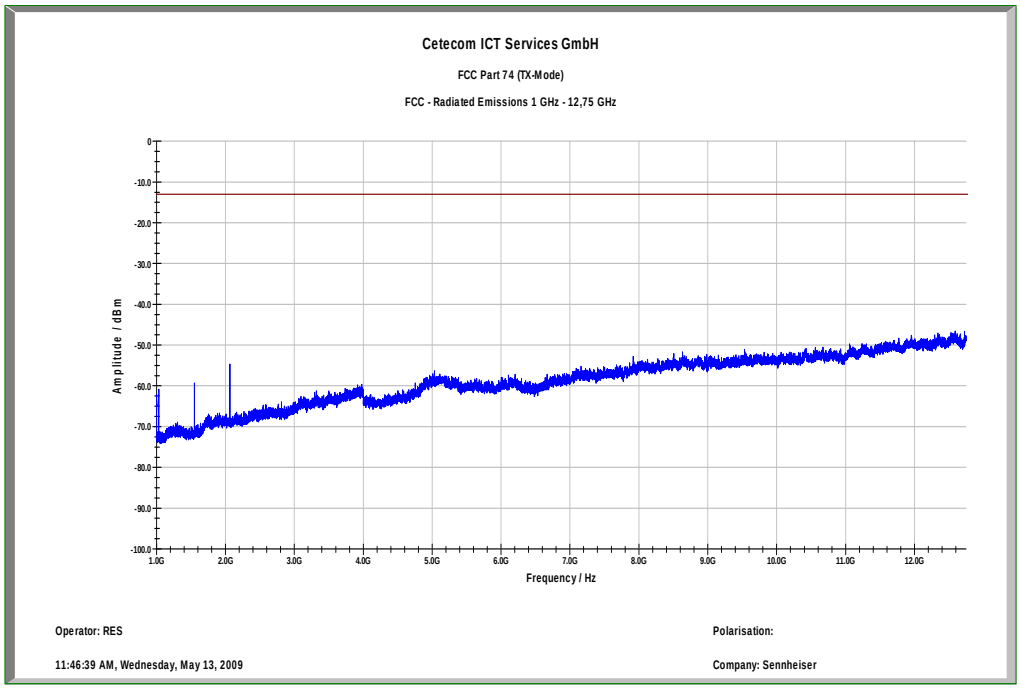
RADIATED EMISSIONS (25 MHz to 10 GHz)

516.00 MHz:

Plot 1:

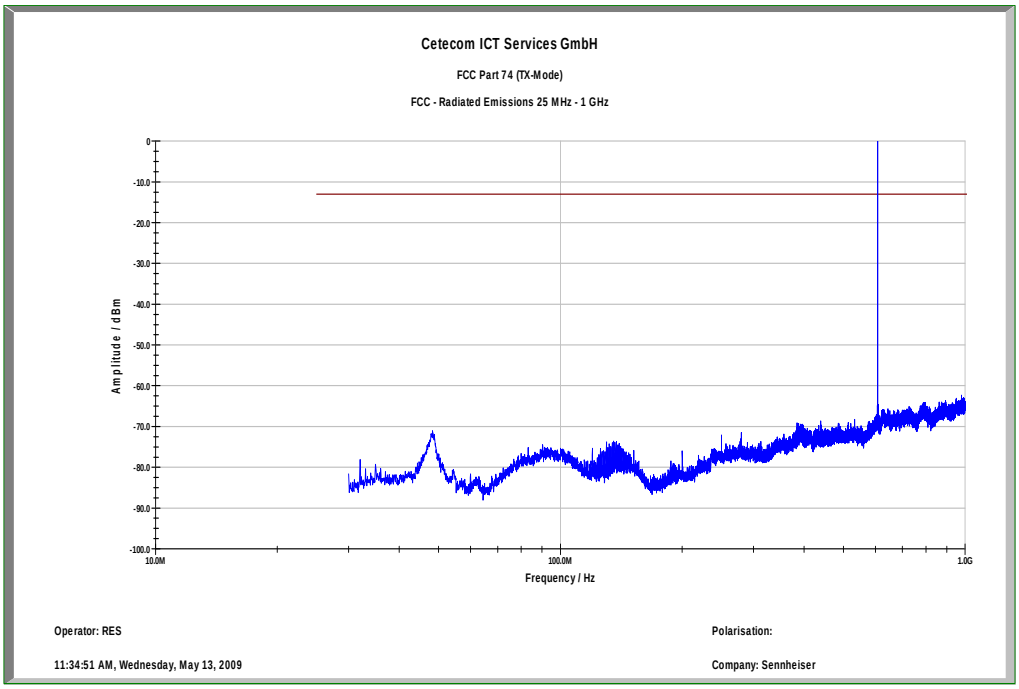


Plot 2:

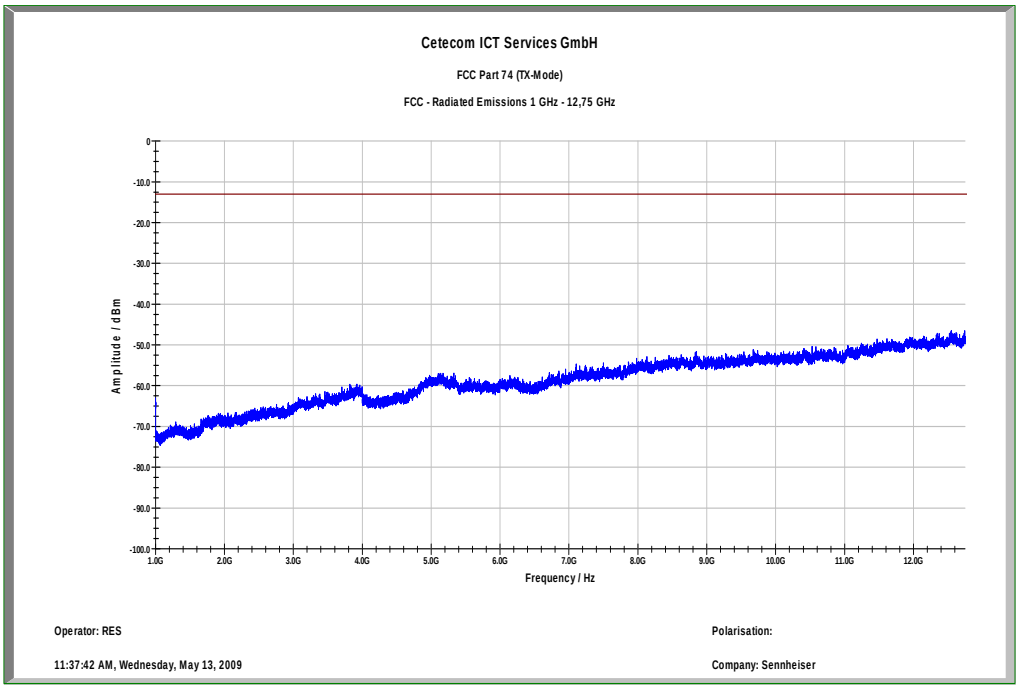


607.75 MHz:

Plot 1:

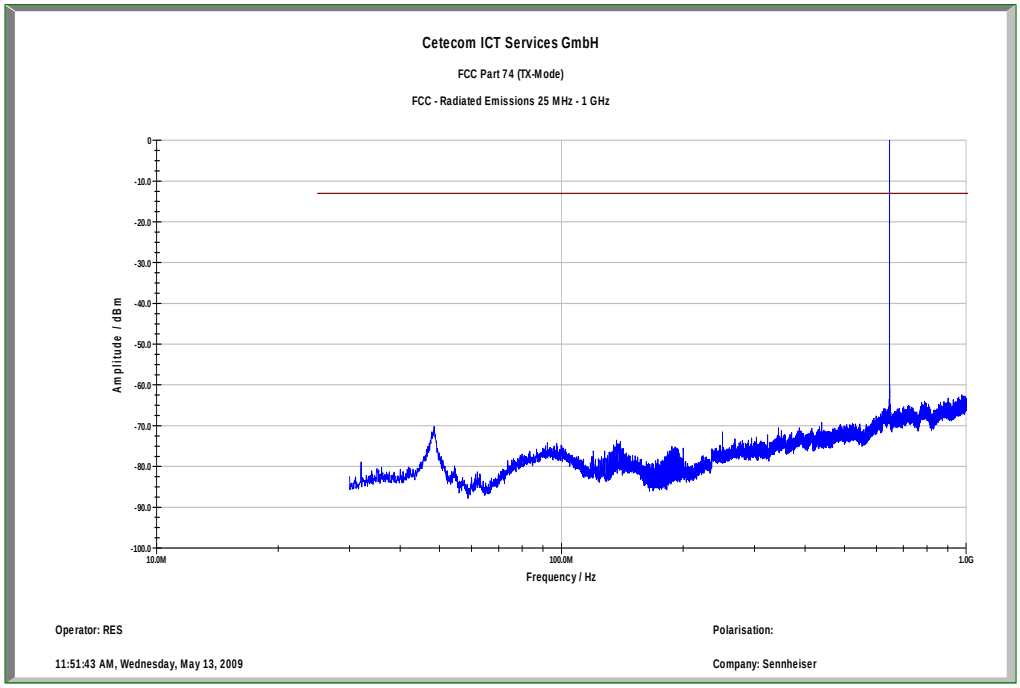


Plot 2:

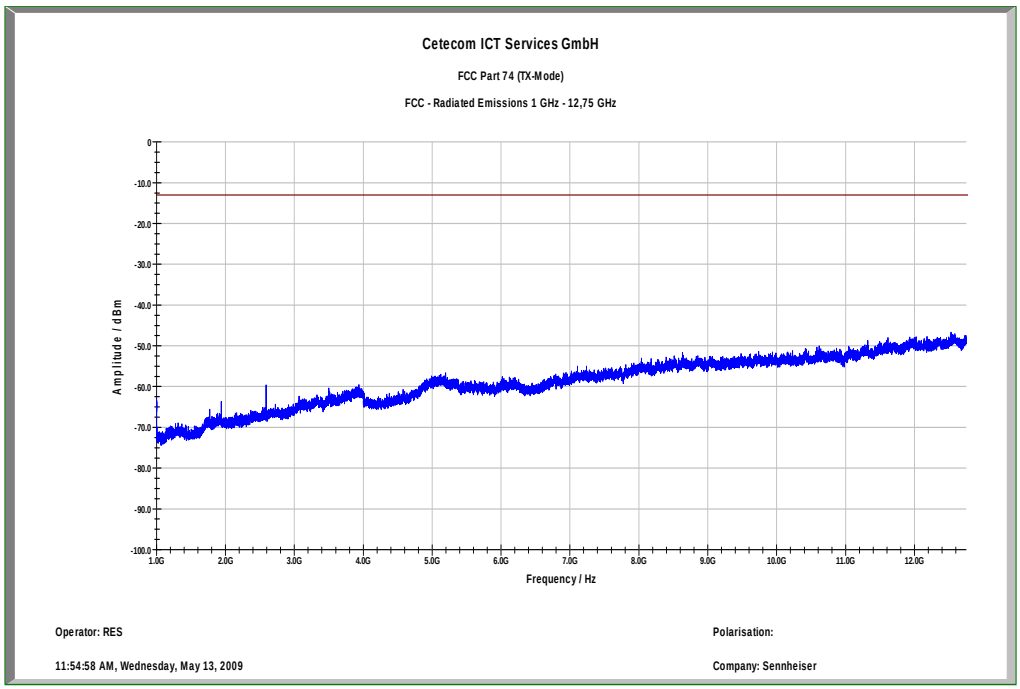


647.00 MHz:

Plot 1:

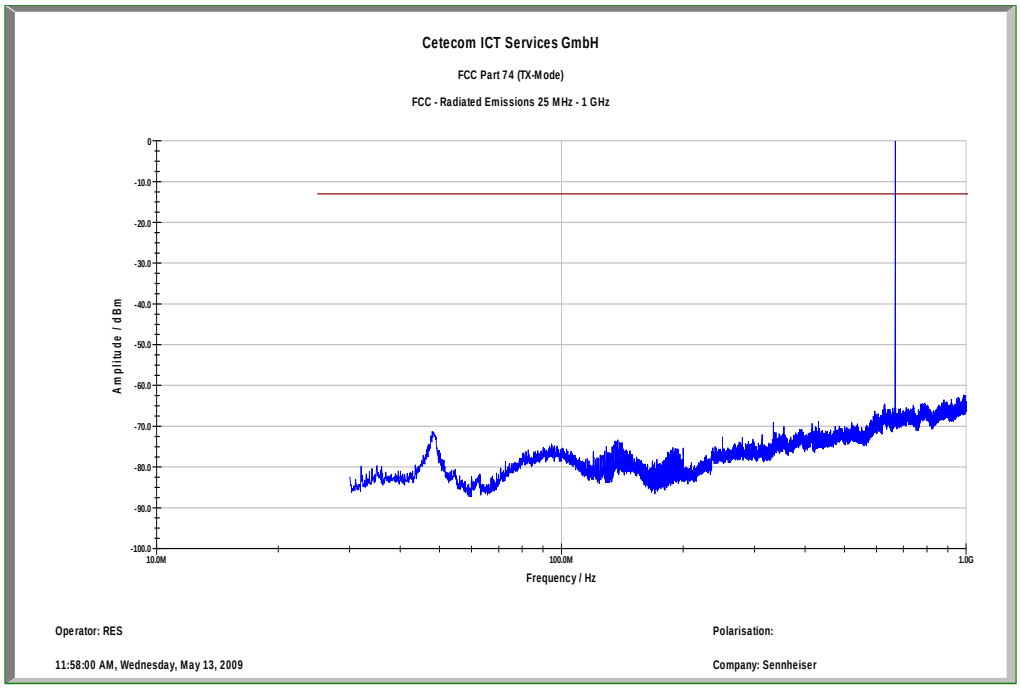


Plot 2:

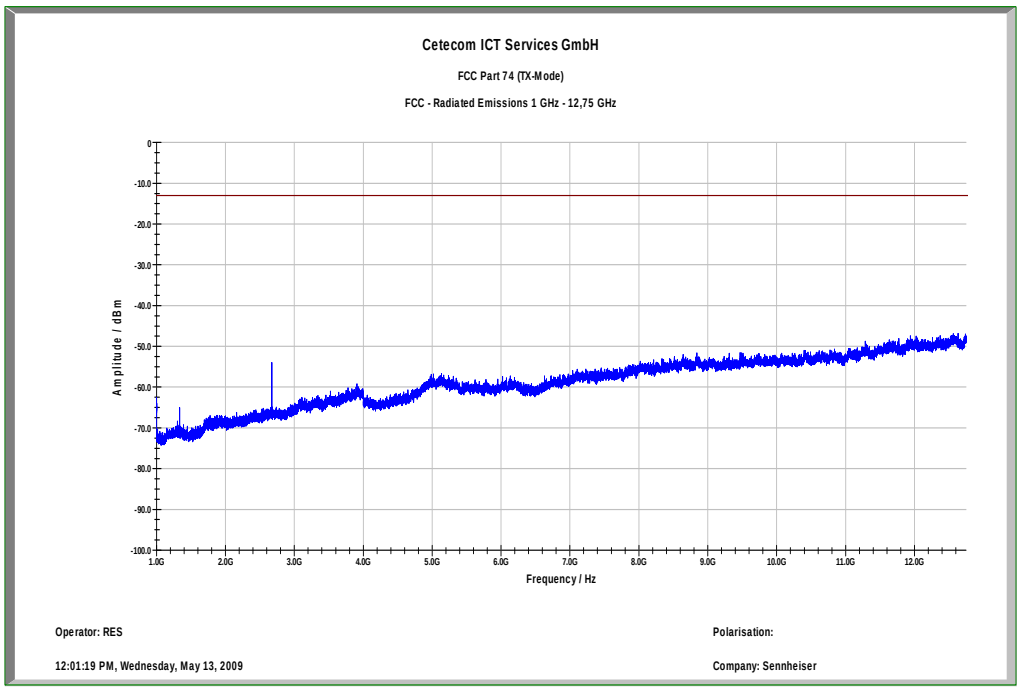


668.00 MHz:

Plot 1:

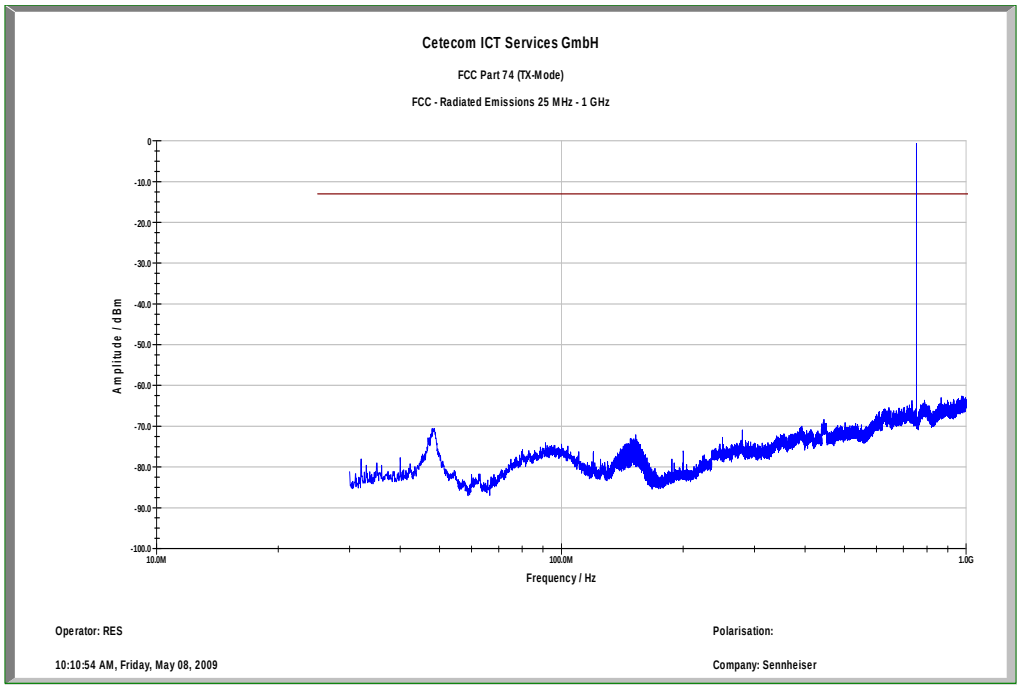


Plot 2:

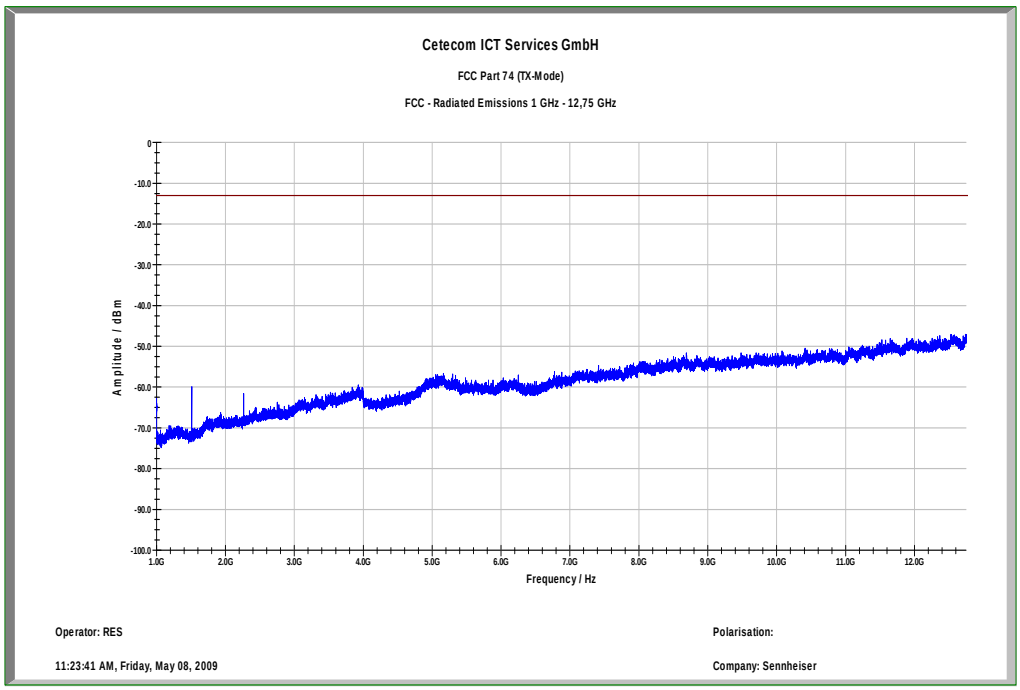


755.00 MHz:

Plot 1:

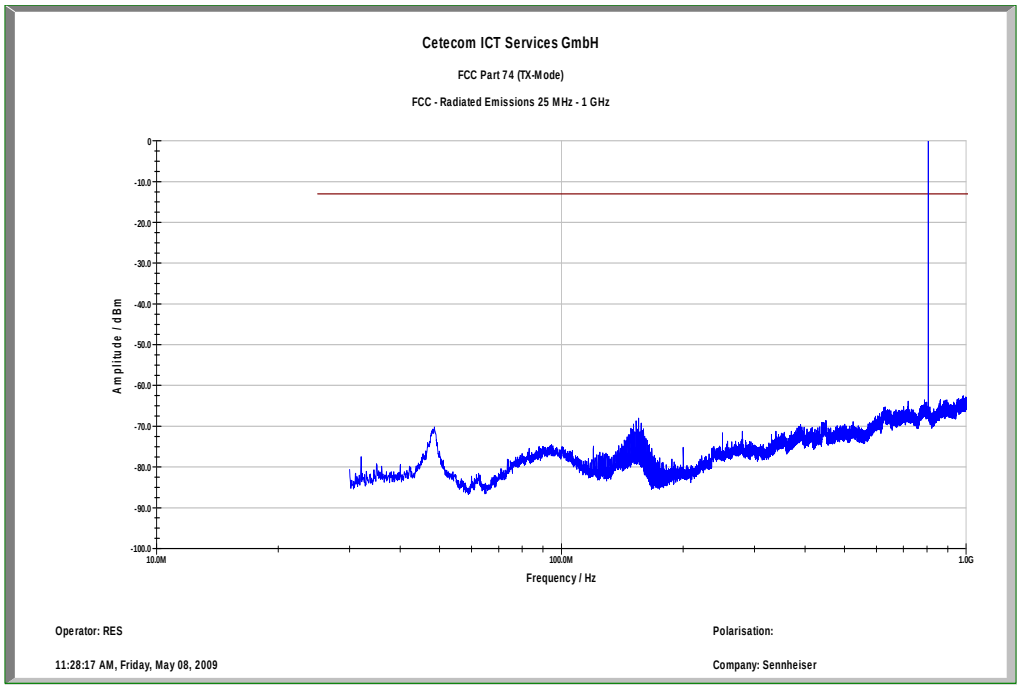


Plot 2:

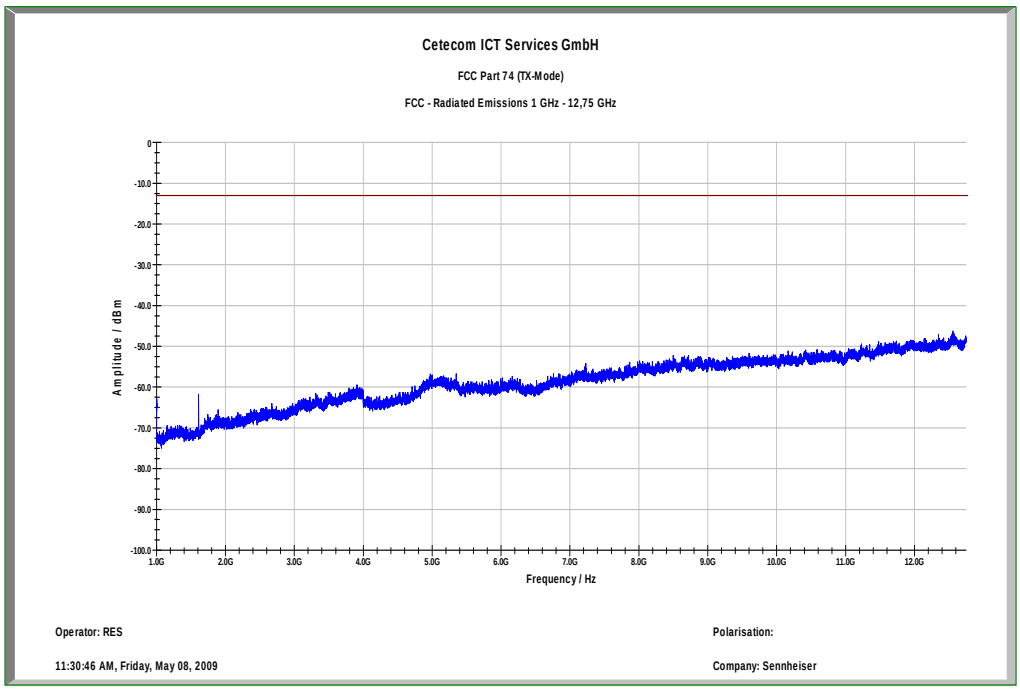


805.75 MHz:

Plot 1:



Plot 2:



6 Test equipment and ancillaries used for tests

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.

All reported calibration intervals are calibrations according to the EN/ISO/IEC 17025 standard. These calibrations were performed from an accredited external calibration laboratory.
Additional to these calibrations the laboratory performed comparison measurements with other calibrated systems and performed a weekly chamber inspection.
All used devices are connected with a 10 MHz external reference.
According to the manufacturers' instruction is it possible to establish a calibration interval for the FSP unit of 24 month, if the device has an external 10 MHz reference.

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	PSA-Spektrumanalysator 3 Hz - 26,5 GHz (E4440A)	Agilent	MY48250080	300003812	05.08.2008	24	05.08.2010
5	EMI Preselector 9kHz - 1 GHz (N9039A)	Agilent	MY48260003	300003825	19.08.2008	24	19.08.2010
6	Microwave Analog Signal Generator (N5183A)	Agilent	MY47420220	300003813	06.08.2008	24	06.08.2010
7	PC	F+W			n.a.		
8	TILE	TILE			n.a.		
9	TRILOG Super Breitband Antenne (VULB9163)	Schwarzbeck	371	300003854	Monthly verification (System cal.)		
10	Double Ridged Antenna 3115	EMCO	3088	300001032	Monthly verification (System cal.)		
11	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
12	Switch / Control Unit 3488A	HP	2719A15013	300001156	n.a.		
13	Power Supply 6032A	HP	2818A03450	300001040	08.01.2009	36	08.01.2012
14	Busisolator	Kontron		300001056	n.a.		
15	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
16	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
17	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
18	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		
19	Hochpassfilter WHK1.1/15G-10SS	Wainwright	3	300003255	Monthly verification (System cal.)		
20	Hochpassfilter WHKX2.9/18G-12SS	Wainwright	1	300003492	Monthly verification (System cal.)		
21	Hochpassfilter WHKX7.0/18G-8SS	Wainwright	18	300003789	Monthly verification (System cal.)		
22	Switch / Control Unit 3488A	HP	2605e08770	300001443	n.a.		
23	Trenntrafo RT5A	Grundig	9242	300001263	n.a.		
24	Relais Matrix PSU	R&S	890167/024	300001168	n.a.		
25	Netznachbildung ESH3-Z5	R&S	828576/020	300001210	n.a.		

SRD Laboratory Room 002:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	System Controller PSM 12	R&S	835259/007	300002681-00xx	n.a.		
2	Memory Extension PSM-K10	R&S	To 1	300002681	n.a.		
3	Operating Software PSM-B2	R&S	To 1	300002681	n.a.		
4	19'' Monitor		22759020-ED	300002681	n.a.		
5	Mouse		LZE 0095/6639	300002681	n.a.		
6	Keyboard		G00013834L461	300002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	300002681-0005	10.01.2008	24	10.01.2010
8	Tracking Generator FSIQ-B10	R&S	835107/015	300002681	s.No.7		
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	300002681-0002	26.08.2008	36	26.08.2011
11	Modulation Coder SMIQ-B20	R&S	To 10	300002681	s.No.10		
12	Data Generator SMIQ-B11	R&S	To 10	300002681	s.No.10		
13	RF Rear Connection SMIQ-B19	R&S	To 10	300002681	s.No.10		
14	Broadband horn antenna (1-18 GHz)	EMCO	9107-3696	300001604	16.04.2008	24	16.04.2010
15	Broadband horn antenna (1-18 GHz)	EMCO	9107-3697	300001605	21.08.2008	24	21.08.2010
16	Std gain horn antenna (18-26.5 GHz)	Narda	Model no. 638	300000486	n.a.		
17	Std gain horn antenna (18-26.5 GHz)	Narda	Model no. 638	300000487	n.a.		
18	Sleeve dipole antenna Model 3126-880	ETS-Lindgren	00040887	3000000	n.a.		
19	Fast CPU SM-B50	R&S	To 10	300002681	s.No.10		
20	FM Modulator SM-B5	R&S	835676/033	300002681	s.No.10		
21	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	300002681-0001	25.08.2008	36	25.08.2011
22	Modulation Coder SMIQ-B20	R&S	To 21	300002681	s.No.21		
23	Data Generator SMIQ-B11	R&S	To 21	300002681	s.No.21		
24	RF Rear Connection SMIQ-B19	R&S	To 21	300002681	s.No.21		
25	Fast CPU SM-B50	R&S	To 21	300002681	s.No.21		
26	FM Modulator SM-B5	R&S	836061/022	300002681	s.No.21		
27	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	300002681-0003	26.08.2008	36	26.08.2011
28	Attenuator SMP-B15	R&S	835136/014	300002681	S.No.27		
29	RF Rear Connection SMP-B19	R&S	834745/007	300002681	S.No.27		
30	Power Meter NRVD	R&S	835430/044	300002681-0004	26.08.2008	24	26.08.2010
31	Power Sensor NRVD-Z1	R&S	833894/012	300002681-0013	26.08.2008	24	26.08.2010
32	Power Sensor NRVD-Z1	R&S	833894/011	300002681-0010	26.08.2008	24	26.08.2010
33	Rubidium Standard RUB	R&S		300002681-0009	27.08.2008	24	27.08.2010
34	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	300002681-0006	Verified with path compensation		
35	Laser Printer HP Deskjet 2100	HP	N/A	300002681-0011	n.a.		
36	19'' Rack	R&S	11138363000004	300002681	n.a.		
37	RF-cable set	R&S	N/A	300002681	n.a.		
39	IEEE-cables	R&S	N/A	300002681	n.a.		
40	Sampling System FSIQ-B70	R&S	835355/009	300002681	s.No.7		
41	RSP programmable attenuator	R&S	834500/010	300002681-0007	26.08.2008	24	26.08.2010
42	Signalling Unit	R&S	838312/011	300002681	n.a.		
43	NGPE programmable Power Supply for EUT	R&S	192.033.41	300002681			
44	Power Splitter 6005-3	Inmet Corp.	none	300002841	n.a.		
45	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
46	CBT32 with EDR Signaling Unit	R&S					

47	Coupling unit	Narda	N/A	--	n.a.		
48	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
49	RF-cable set	R&S	N/A	different	n.a.		
50	IEEE-cables	R&S	N/A	--	n.a.		

Note: 3000002681-00xx inventoried as a system

7 Photographs of the Test Set-up

Photo documentation

Photo 1:

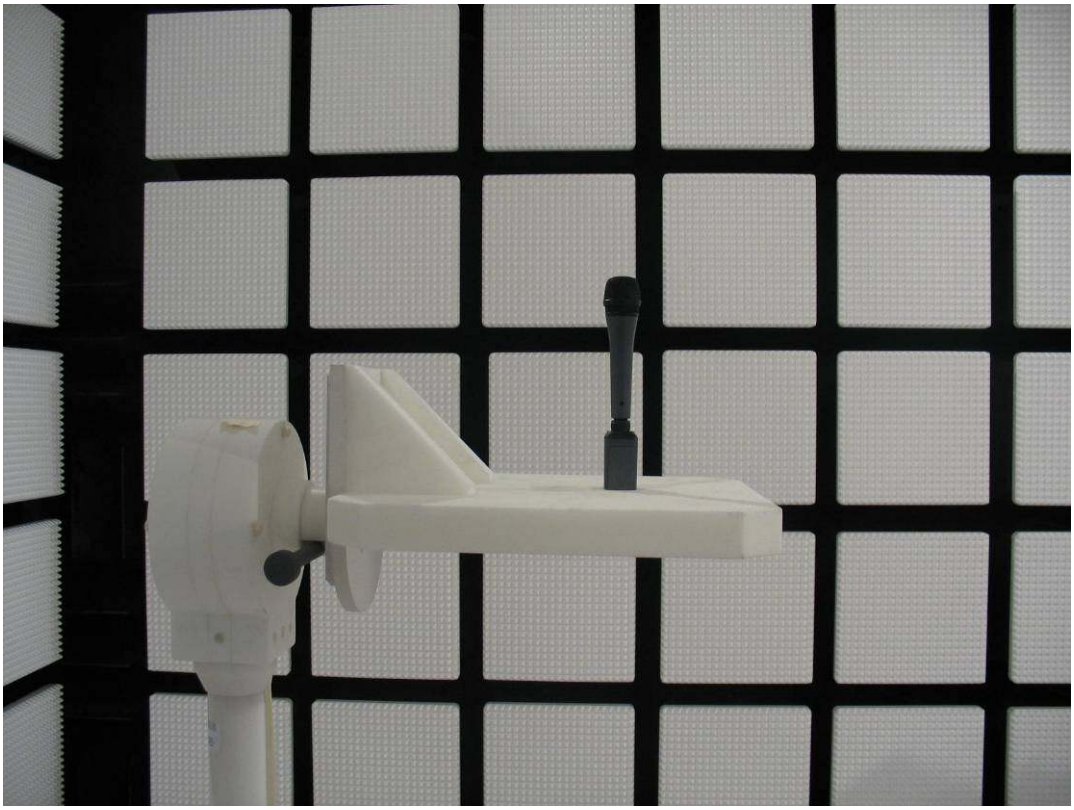


Photo 2:

8 Photographs of the EUT

Photo documentation

Photo 3:

Photo 4:

Photo 5:

Photo 6:

Photo 7:

Photo 8:

Photo 9:

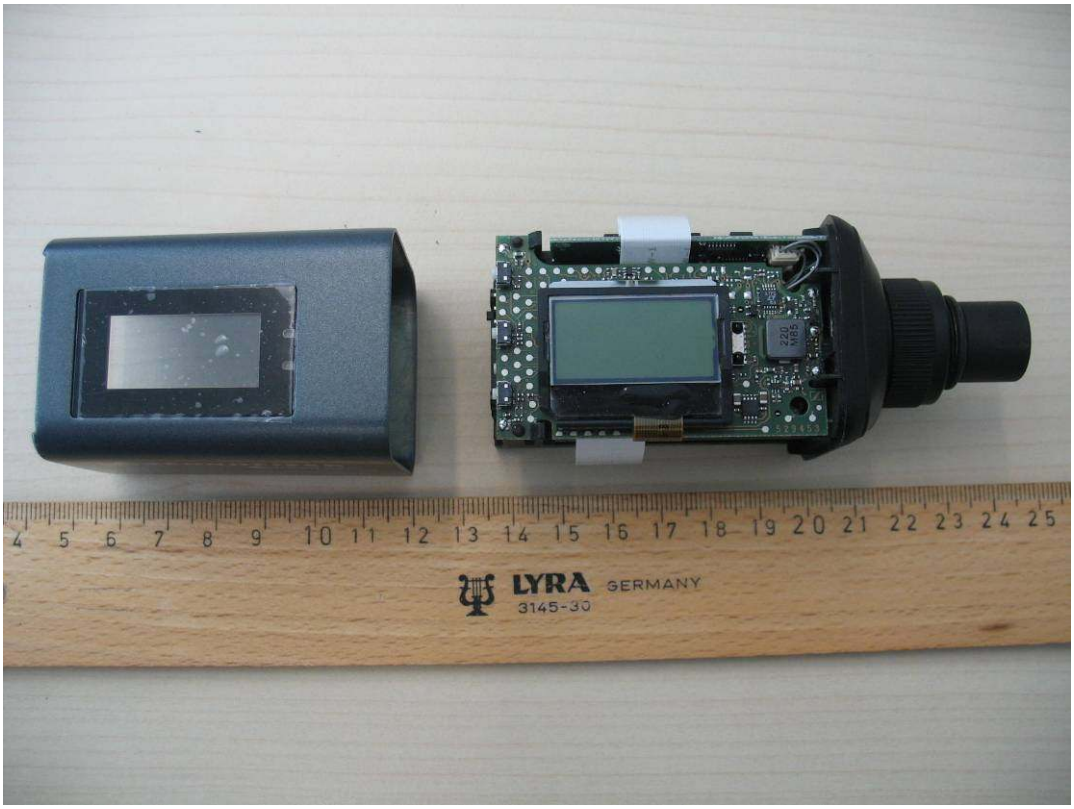


Photo 10:

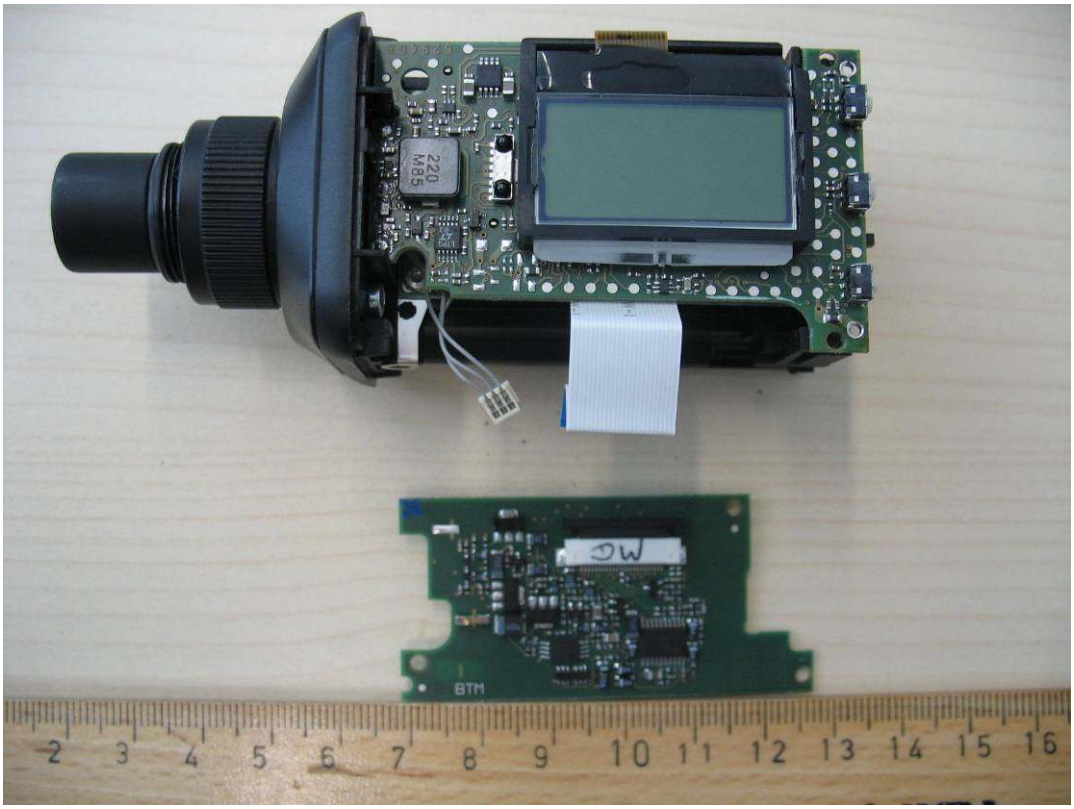


Photo 11:

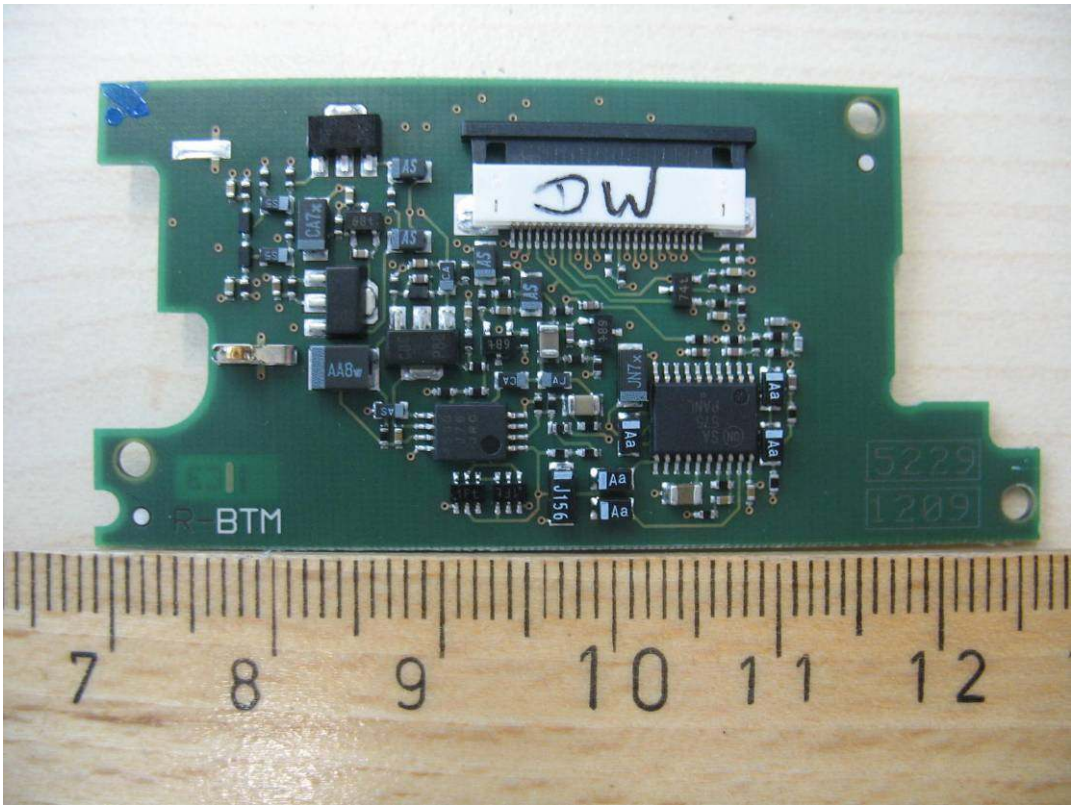


Photo 12:

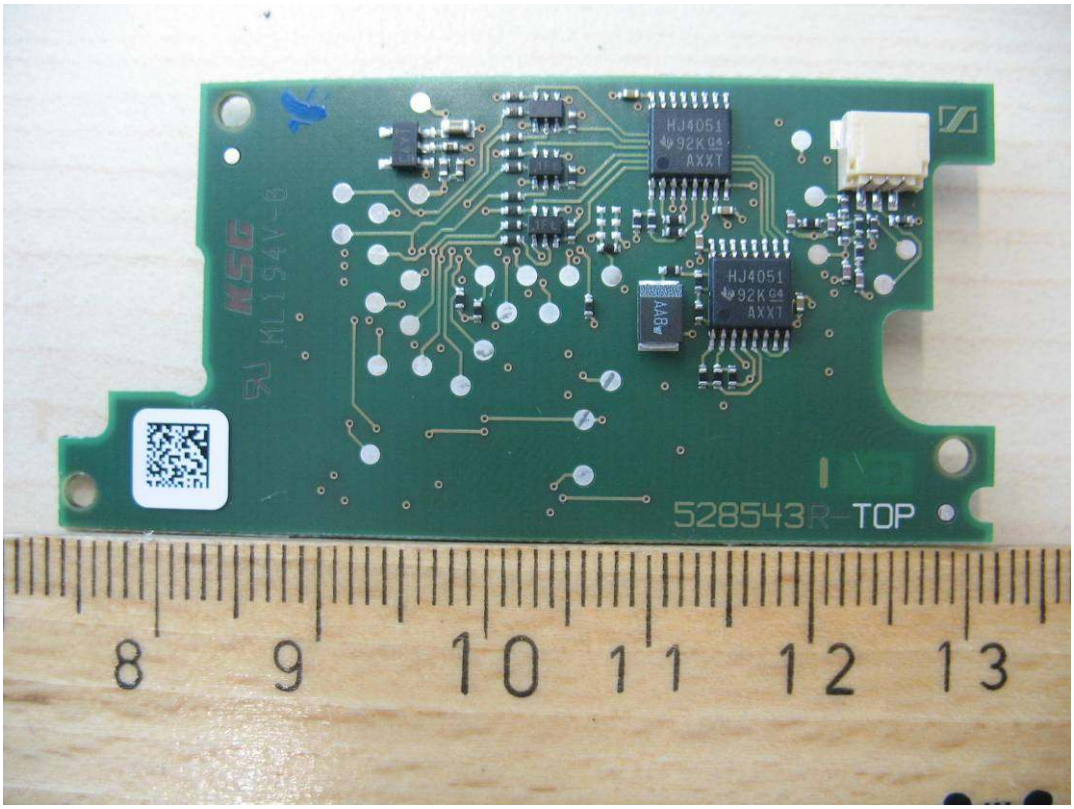


Photo 13:

Photo 14:

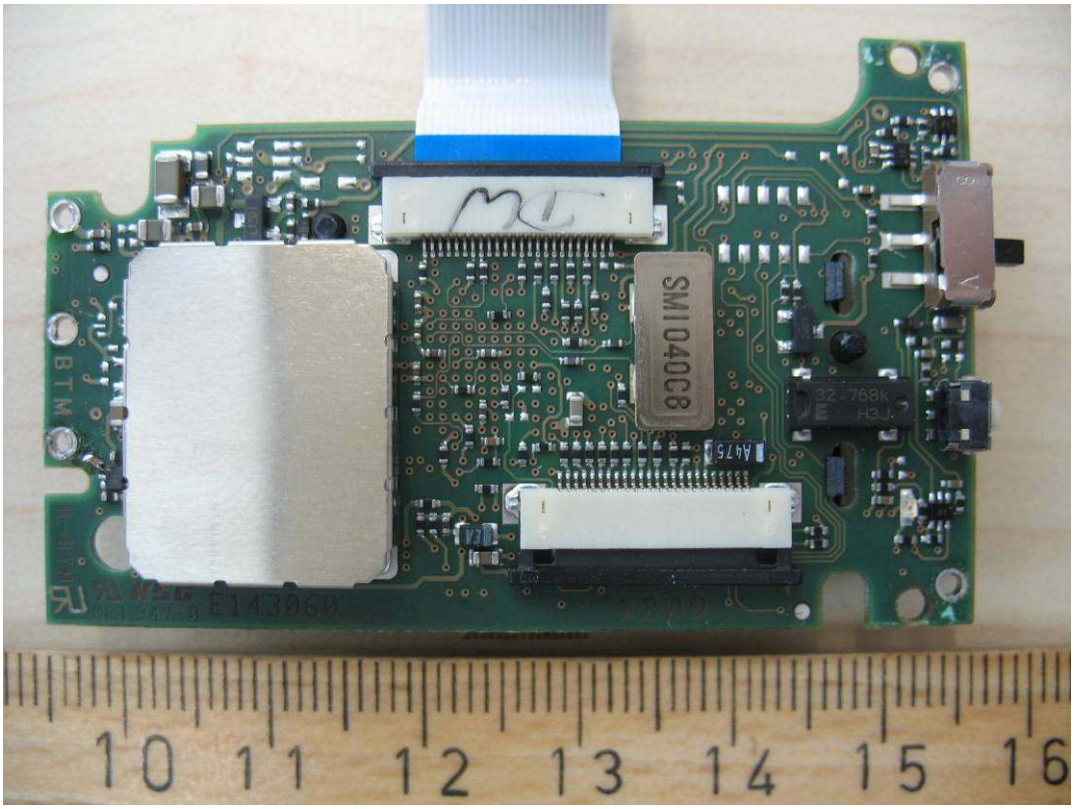


Photo 15:

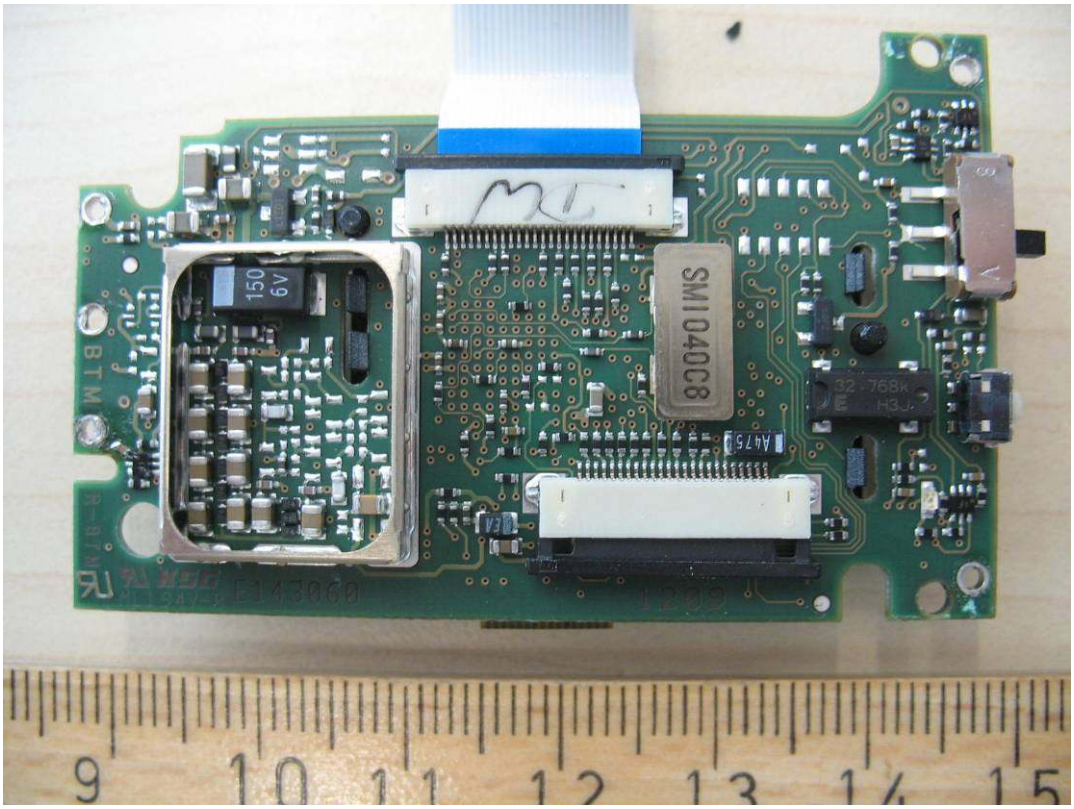


Photo 16:

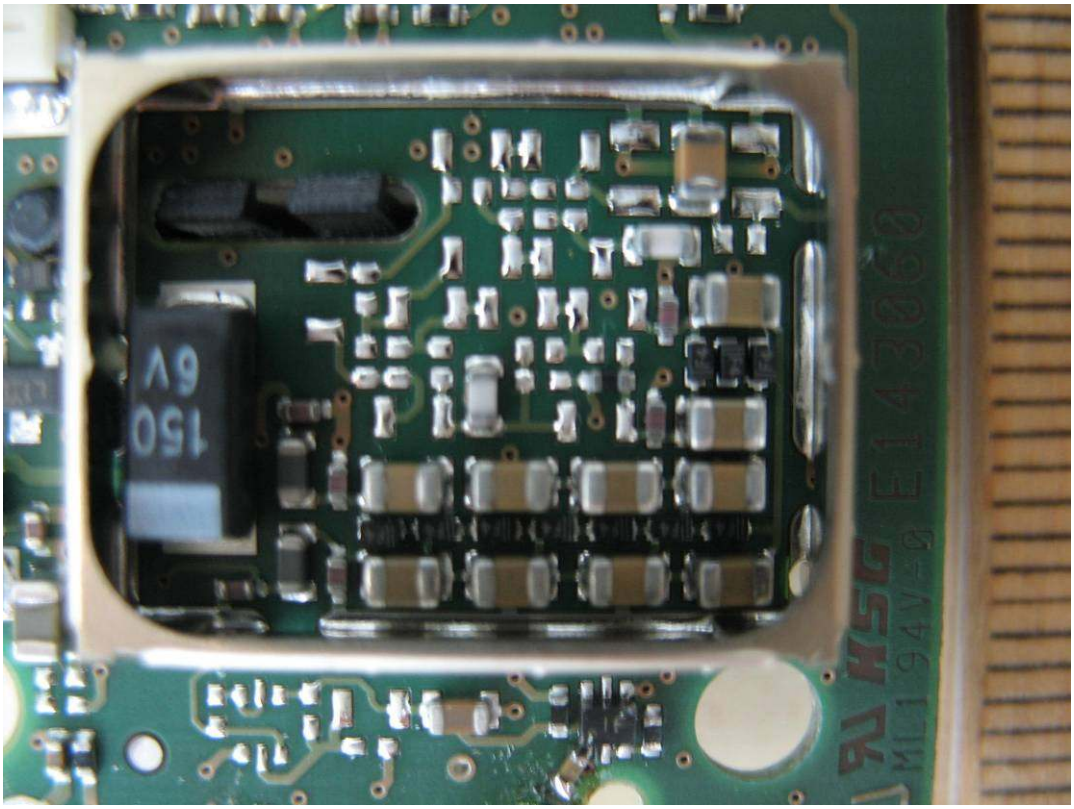


Photo 17:

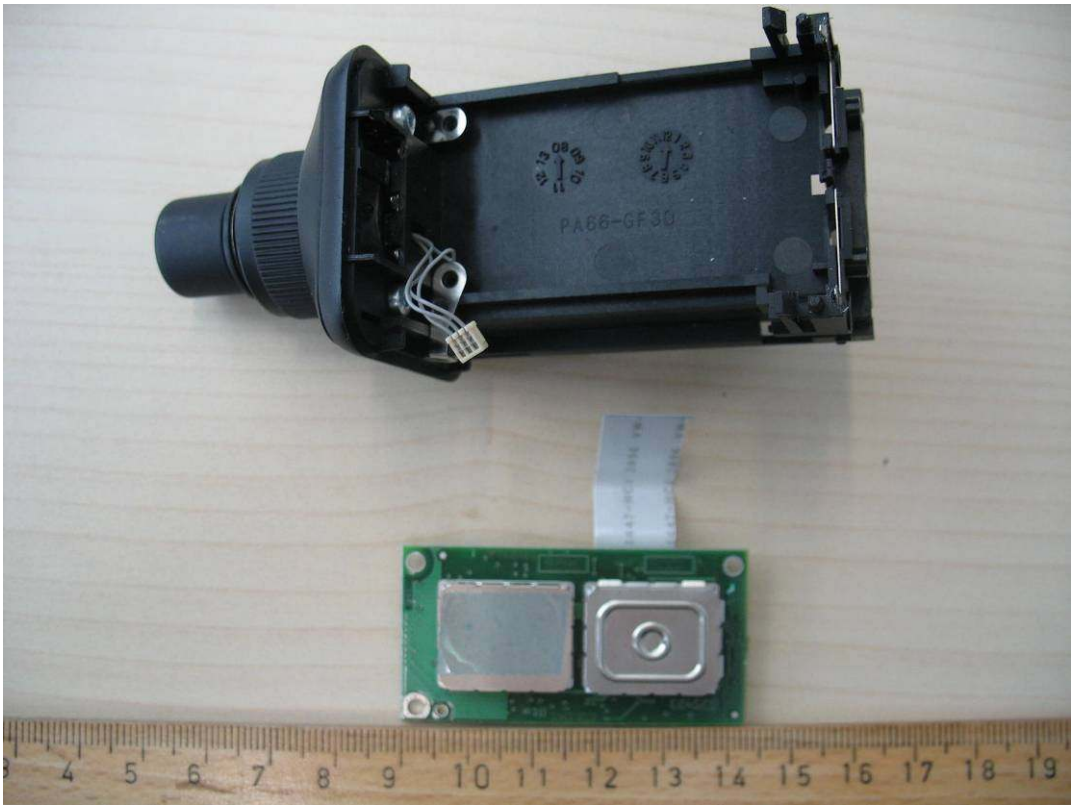


Photo 18:

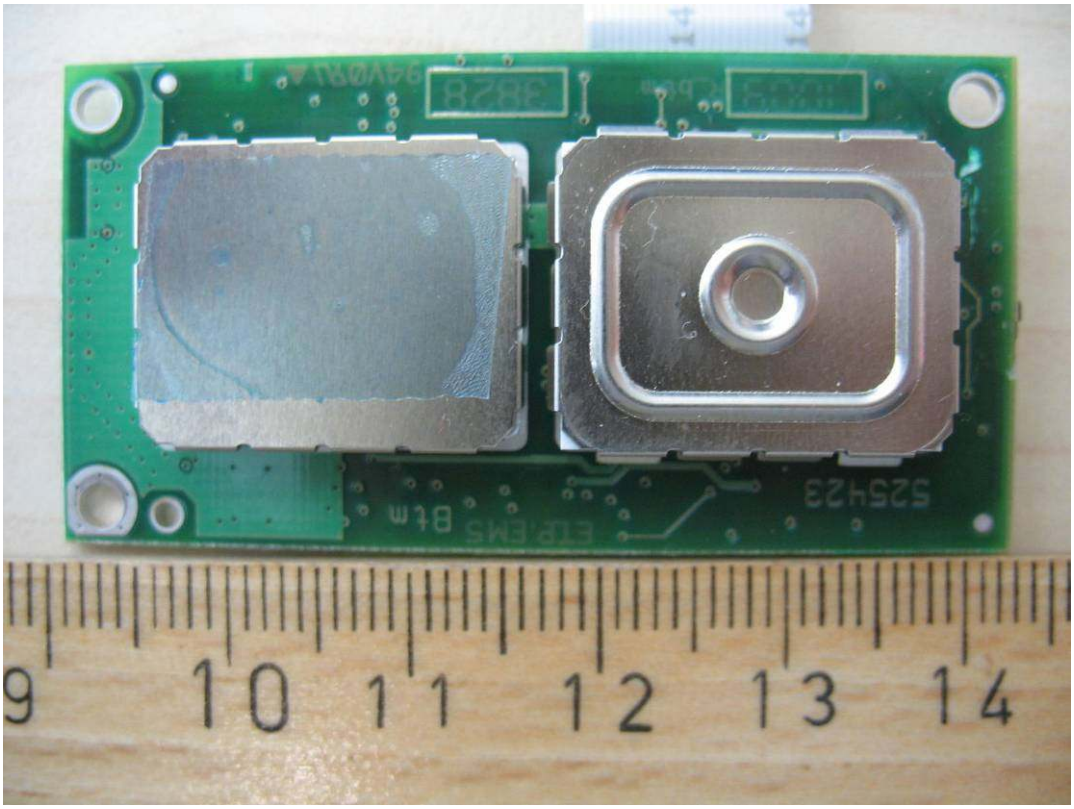


Photo 19:

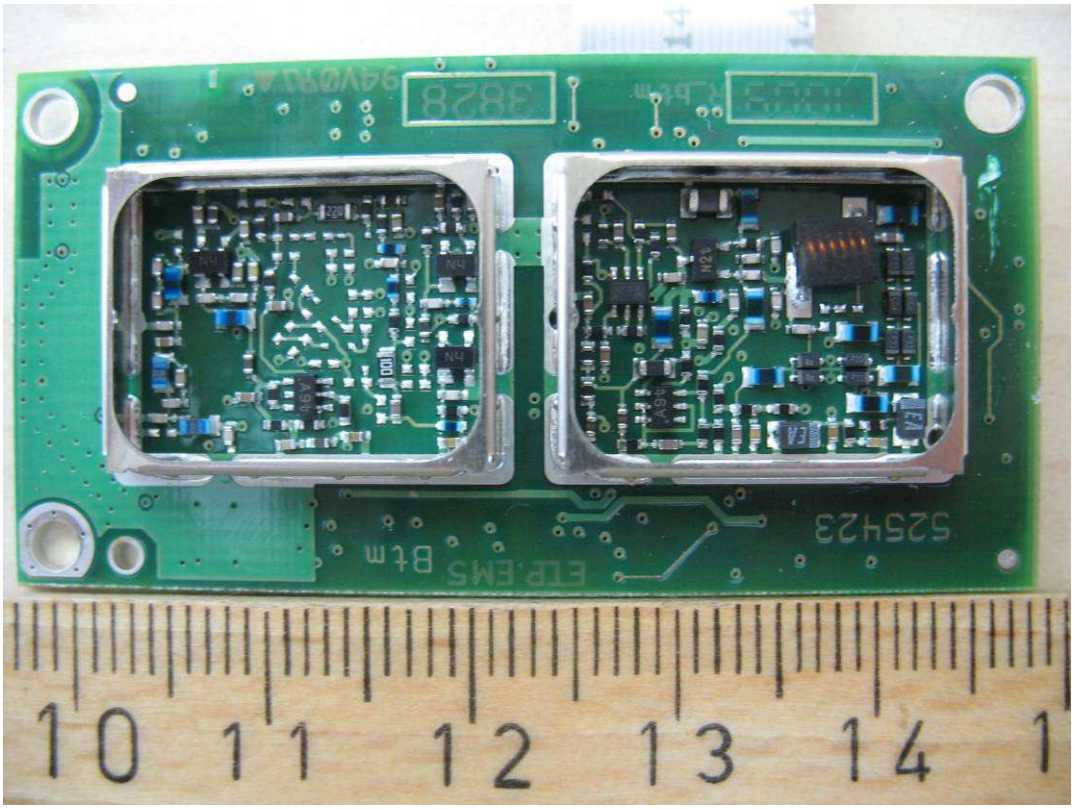


Photo 20:

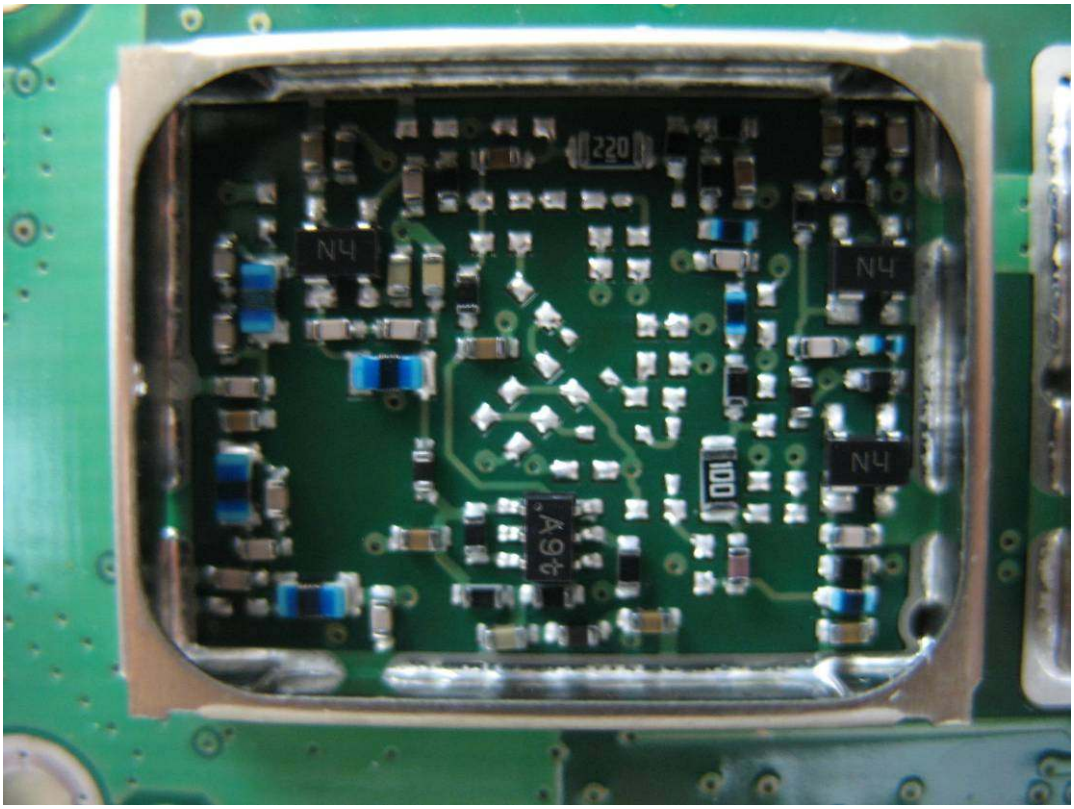


Photo 21:

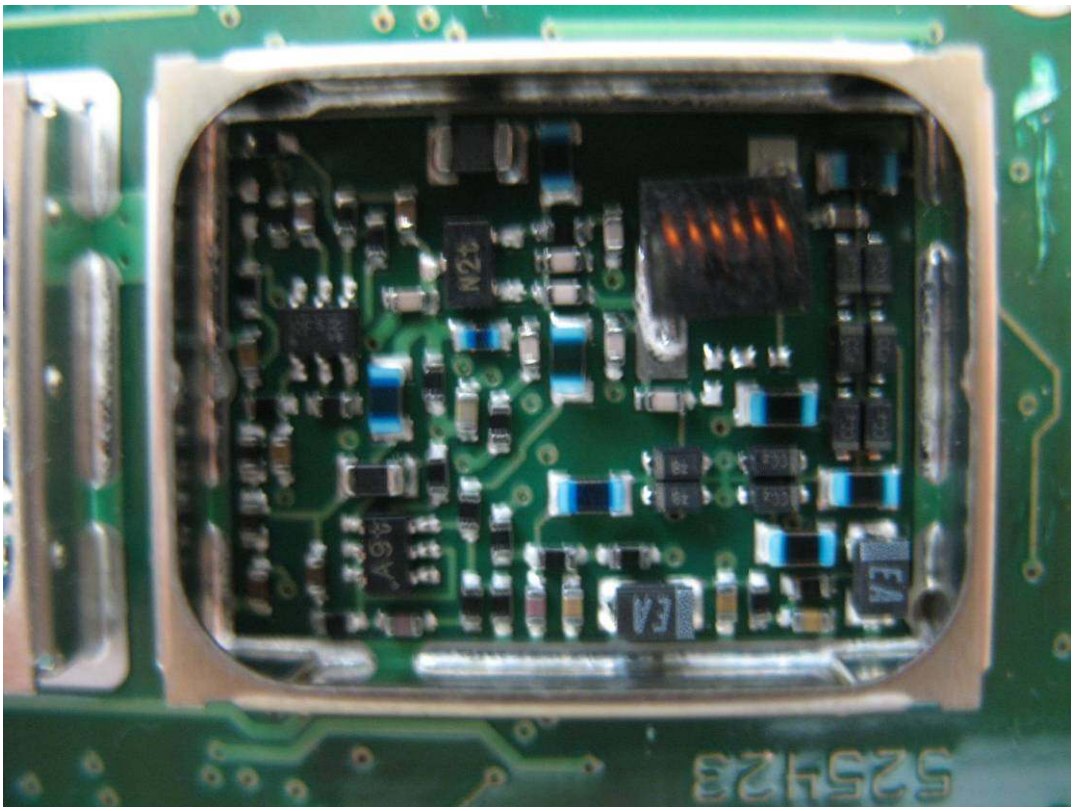


Photo 22: