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.	**:**	**2-4790-01-04/07**
Applicant	**:**	**Pilz GmbH & Co. KG**
Type	**:**	**PSSu WB S IDN**
Test Standard	**:**	**FCC Part 15.249** **RSS210 Issue 7**
FCC ID	**:**	**VT8-IDN01**
Certification No. IC	**:**	**7482A -IDN01**

Table of contents

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) Identification/Registration No : 90462
Responsible for testing laboratory:	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	:	Pilz GmbH & Co. KG
Address	:	Felix-Wankel-Straße 2
City	:	73760 Ostfildern
Country	:	Germany
Phone	:	+49-711-3409-0
Fax	:	+49-711-3409-0
Contact	:	Thorsten Godau
Phone	:	+49-711-3409-577
Fax	:	+49-711-3409-9577
e-mail	:	t.godau@pilz.de

1.4 Application Details

Date of receipt of application	:	2007-11-13
Date of receipt of test item	:	2007-11-15
Date(s) of test	:	2007-11-15 to 2007-12-04
Date of report	:	2007-12-04

1.5 Test Item

Type of equipment	:	Industriel Wireless Communication System InduraNET p, wireless base station
Model name	:	PSSu WB S IDN
Manufacturer	:	Pilz GmbH & Co. KG
Address	:	Felix-Wankel-Straße 2
City	:	73760 Ostfildern
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)	:	2400 – 2483.5 MHz (2405 MHz, 2442 MHz, 2479 MHz)
Occupied Bandwidth (99% BW)	:	1250 kHz
Field strength [dBµV/m] in 3 m (average)	:	93.74
Type of Modulation	:	GFSK
Antenna Information	:	External Antenna (PSS ANT 1 IDN) with SMA connector and 2 m of coax-cable InduraNET p, antenna type 1
Emission Designator (TRC-43)	:	1M25FXD
Transmitter Spurious (worst case)	:	52.73 dBµV/m
Receiver Spurious (worst case)	:	Not applicable
IC no.	:	VT8-IDN01
FCC ID	:	7482A -IDN01

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 :

2007-12-04	Reschke	
Date	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	YES	pass
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)	NO	
4.5	§ 15.107 / 15.207 Conducted Limits	Section 6.6 , 7.4	YES	pass
4.6	Band-edge compliance of conducted emissions		YES	pass
4.7	§15.205 Band-edge compliance of radiated emissions		YES	pass
4.8	Occupied Bandwidth		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 are confirmed 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 are confirmed with ANSI C63.2-1996 item 15.

9 kHz - 150 MHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.
30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic 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:	RSS 210, ISSUE 7 6.5 Pulsed operation

Duty cycle:

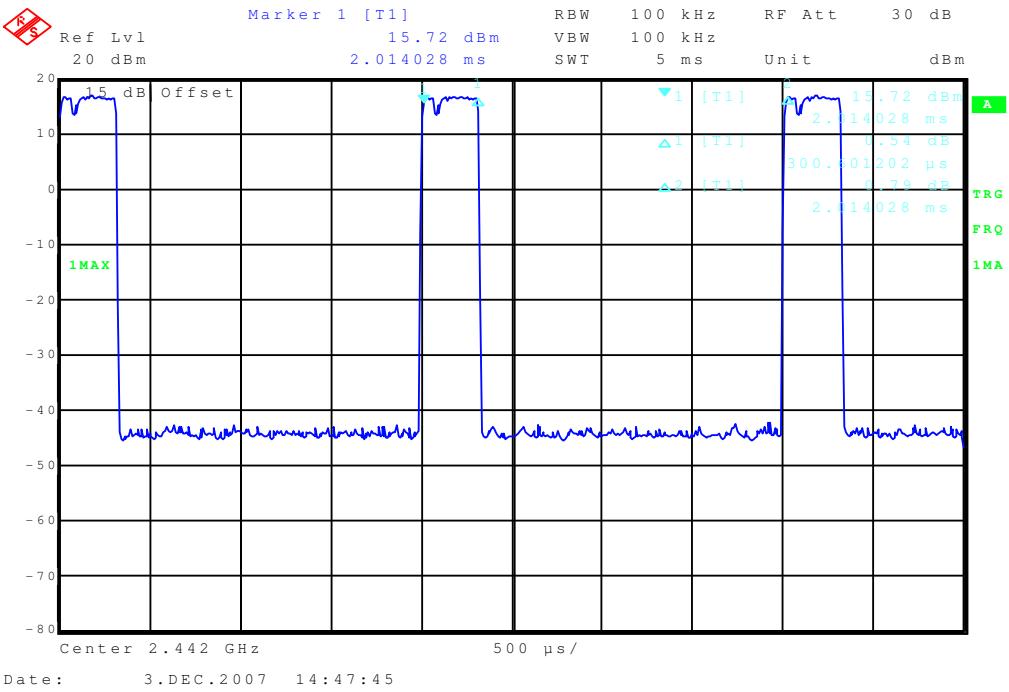
Results:

Tx : 2014 µs
Tx on : 300 µs
Tx off : 1714 µs

Duty cycle: 20 x log (300 / 2014)
Duty cycle: 20 x log (0.148)
Duty cycle: -16.59 dB

Plots:

Plot 1 Middle channel



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 (PEAK) (RADIATED)

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)		
Frequency		2405	2442	2479
T_{nom} 23 °C	V_{nom} 24 V DC	110.00	110.30	110.33
Measurement uncertainty		±3dB		

RBW/VBW : 1 MHz

MAXIMUM OUTPUT POWER (AVERAGE) (RADIATED)

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)		
Frequency		2405	2442	2479
T_{nom} 23 °C	V_{nom} 24 V DC	93.41	93.71	93.74
Measurement uncertainty		±3dB		

RBW/VBW : 1 MHz

Limits **SUBCLAUSE § 15.249 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Harmonics (V/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)

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) AV/QP/PK**	**limit max. allowed emmision power**	**actual attenuation below frequency of operation (dB)**	**results**
2479		93.74 AV	94 dBµV/m		Operating frequency
84.56		36.40 PK	20 dBc or 40 dBµV/m		Complies
4958		46.73 PK	20dBc or 54 dBµV/m		Complies
7437		52.73 PK			Complies
Measurement uncertainty			**± 3dB**		

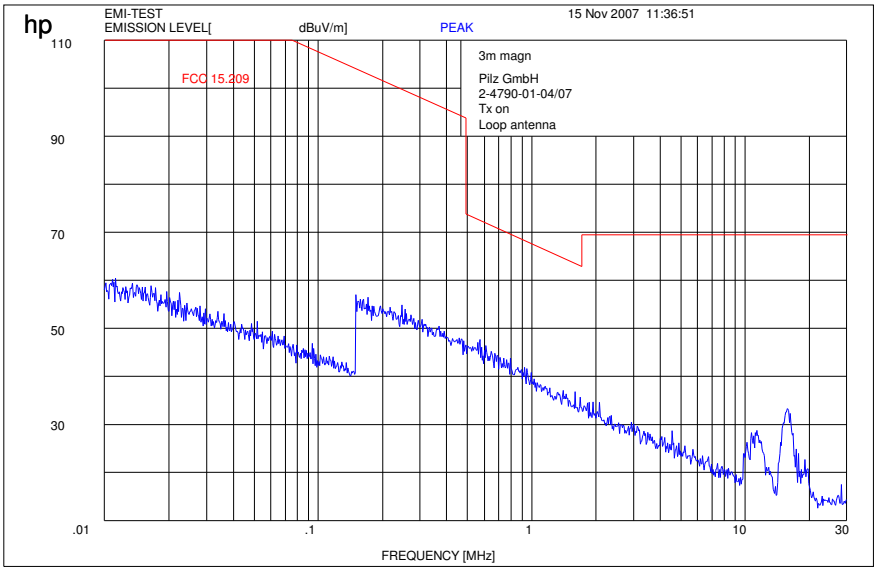
Limits **SUBCLAUSE § 15.249 (a)**

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



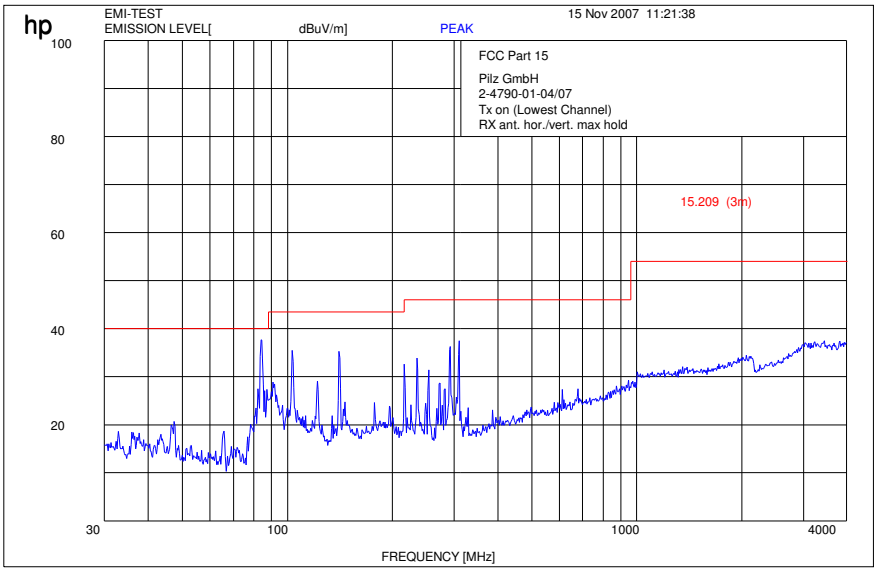
(to convert the measuring distance from 3m to 30m and 30 to 300m a correction factor from 40 dB/decade was used.)

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

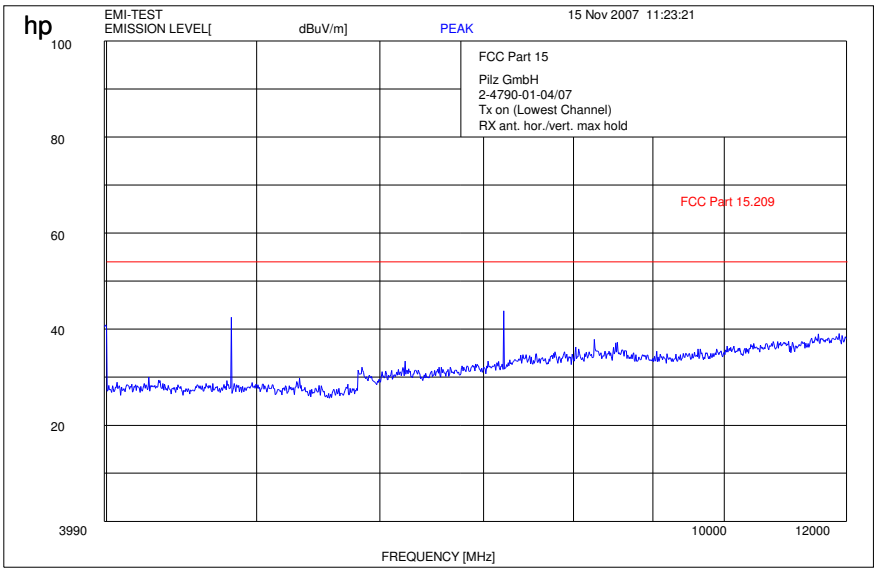
Limits SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

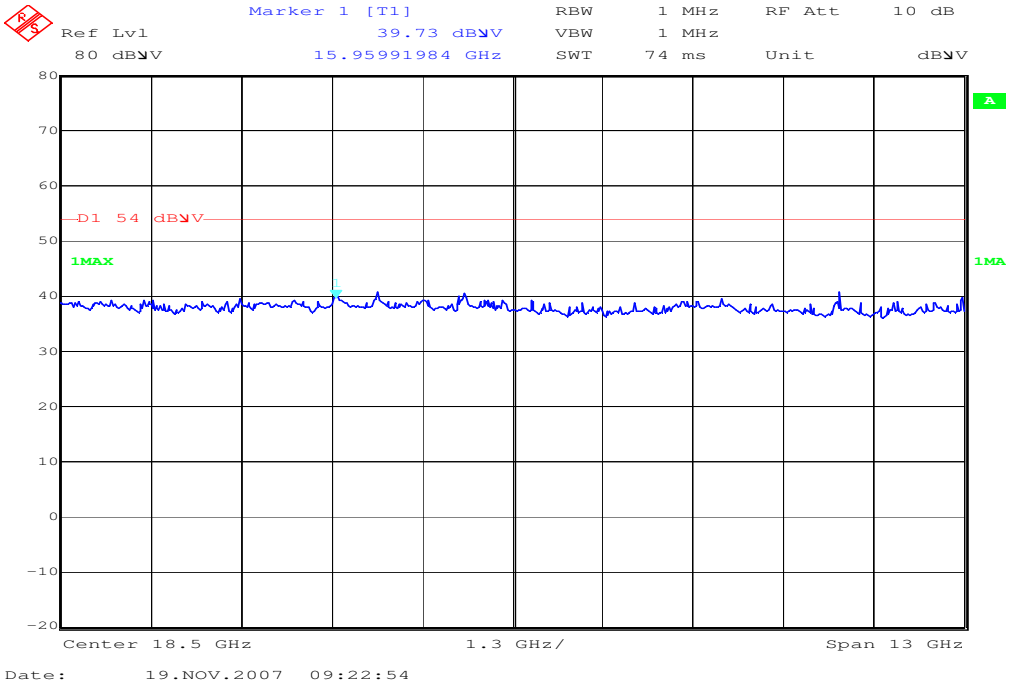
Plot 1: Lowest Channel
Tx : 30 MHz1- 4 GHz



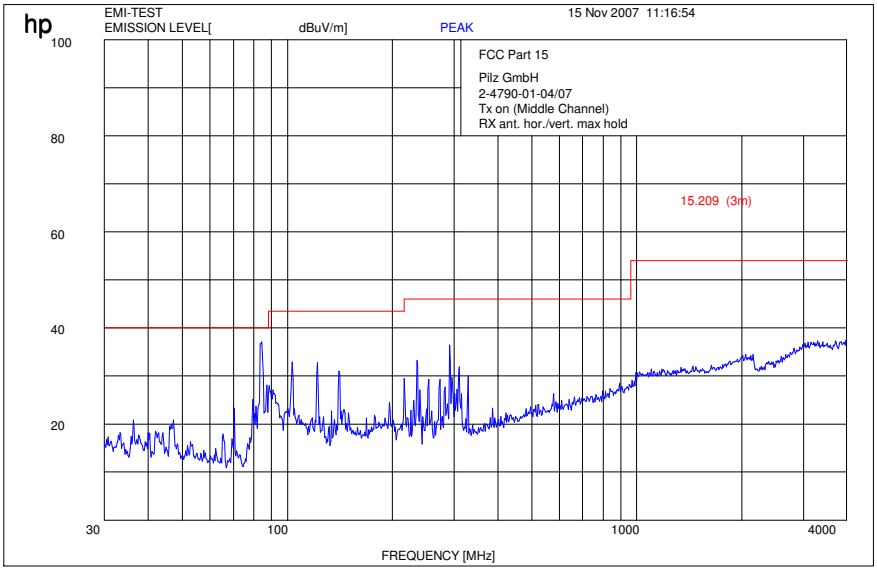
Plot 2: Lowest Channel
Tx : 4 GHz – 12 GHz



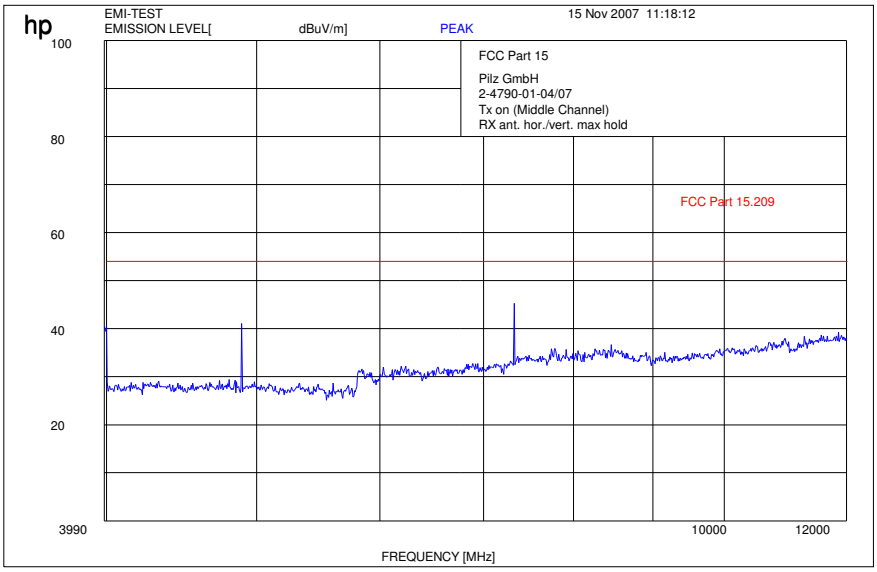
Plot 3: Valid for all channels
Tx : 12 GHz – 25 GHz



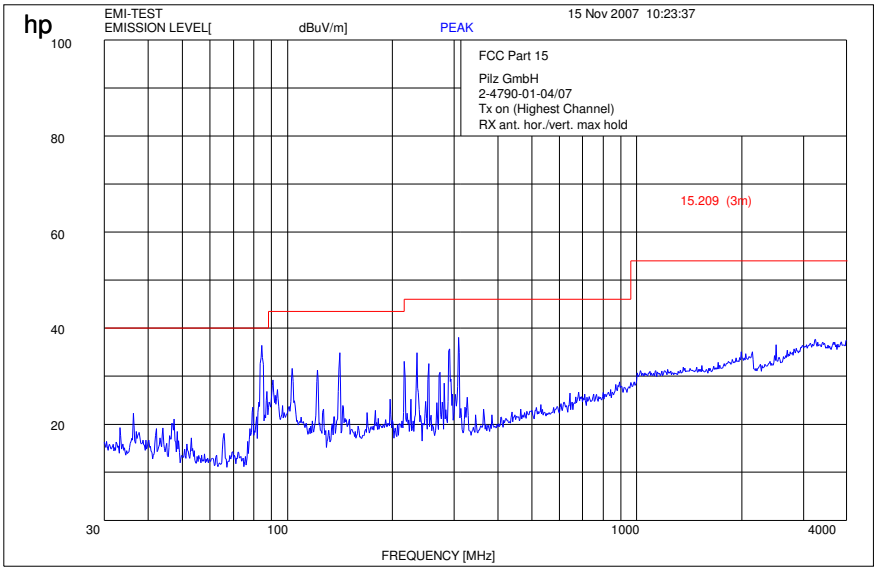
Plot 4: Middle Channel
Tx : 30 MHz1- 4 GHz



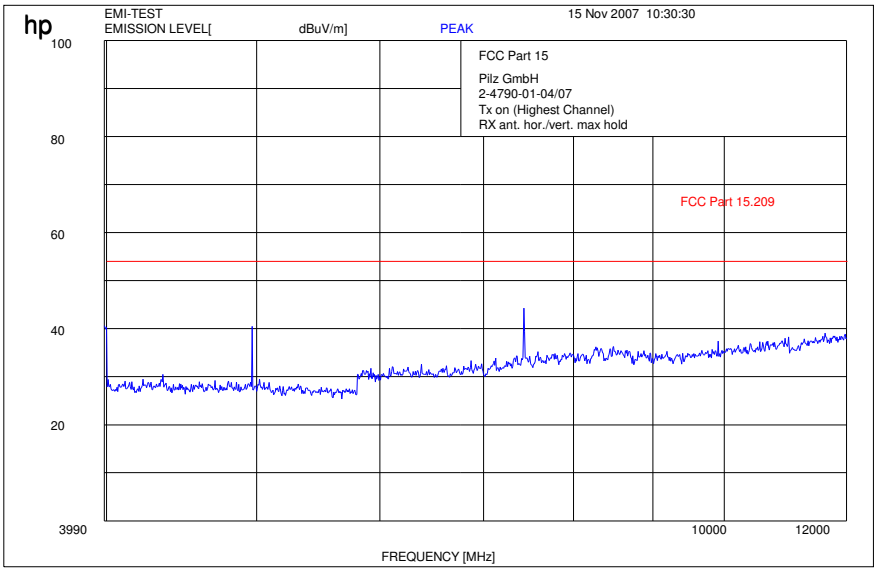
Plot 5: Middle Channel
Tx : 4 GHz – 12 GHz



Plot 6: Highest Channel
Tx : 30 MHz1- 4 GHz



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



4.4 Receiver Spurious Emission (radiated)

Not applicable

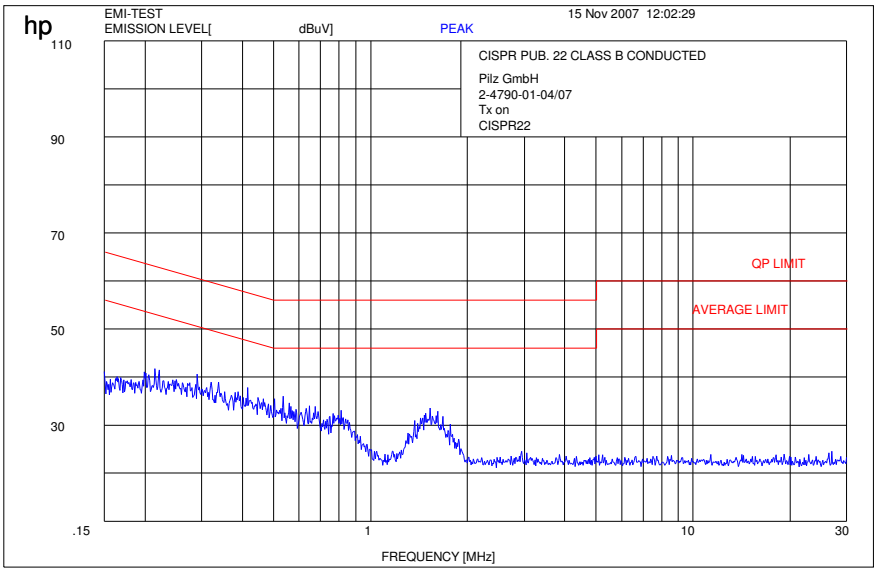
Reference

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 (µV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

4.5 Conducted Limits



Performed with 24 V DC

Reference

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

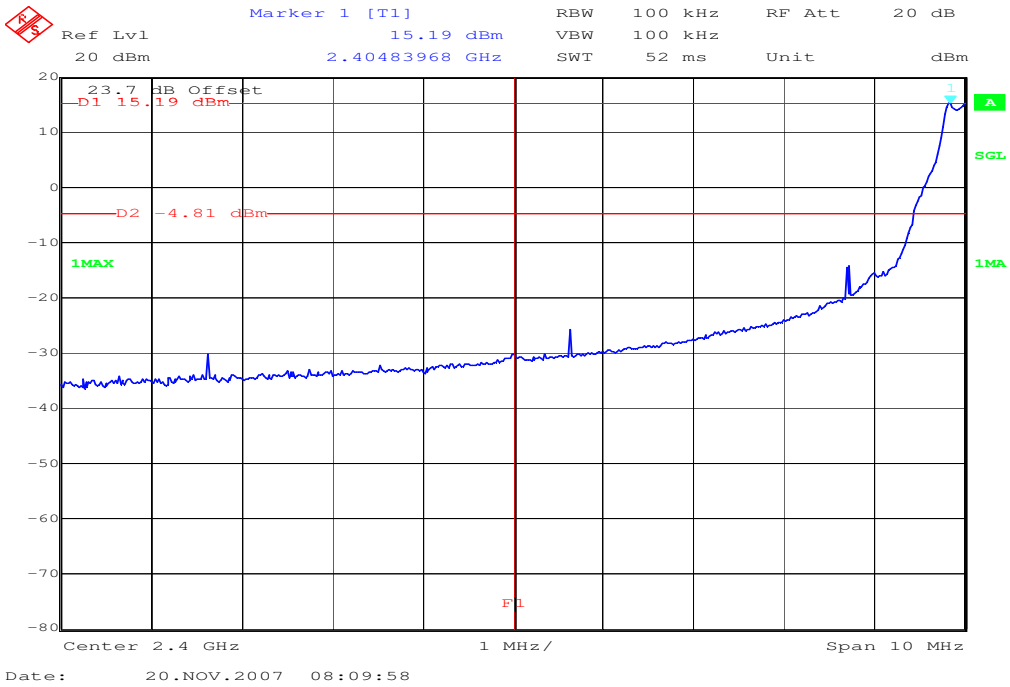
Limits: § 15.107 / 15.207

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

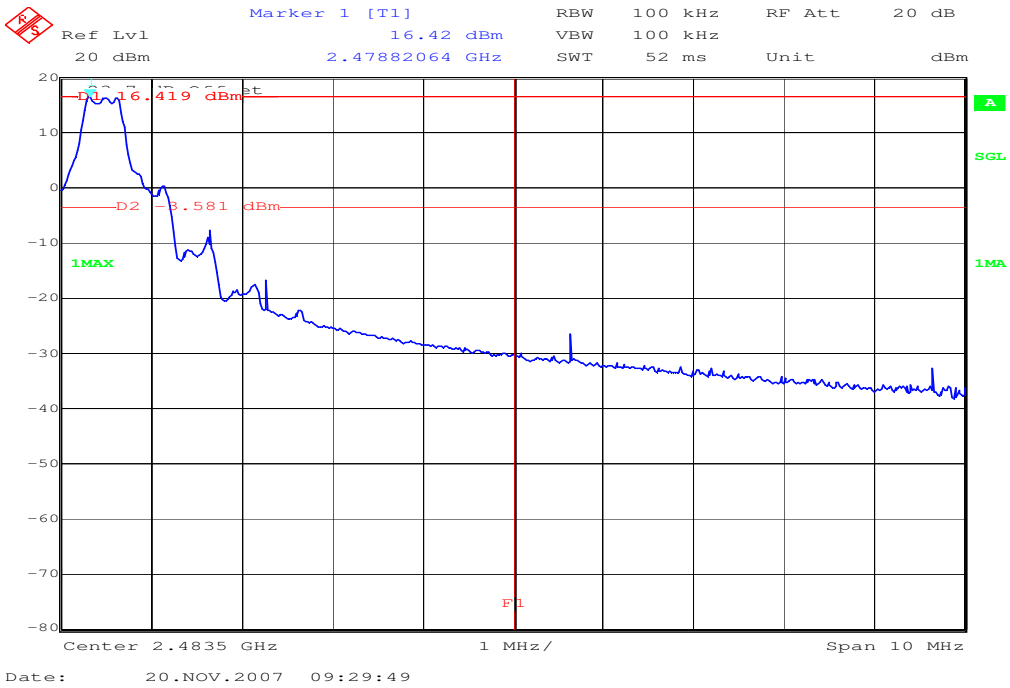
* Decreases with the logarithm of the frequency

4.6 Band-edge compliance of conducted emissions

Plot 1 of 2 (lowest frequency):



Plot 2 of 2 (highest frequency):



Results:

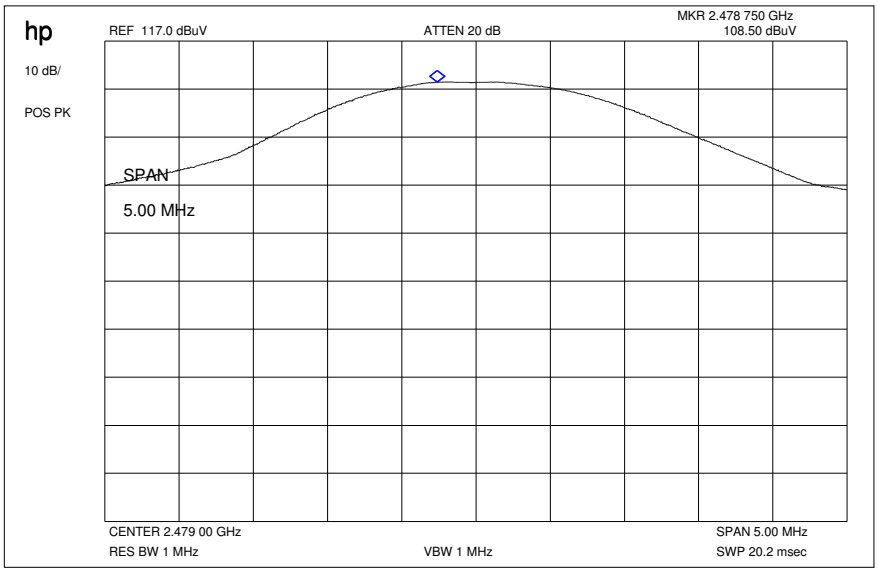
SZENARIO	DELTA VALUE [DB]
lowest frequency	> 20 dB
highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

Limits:

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

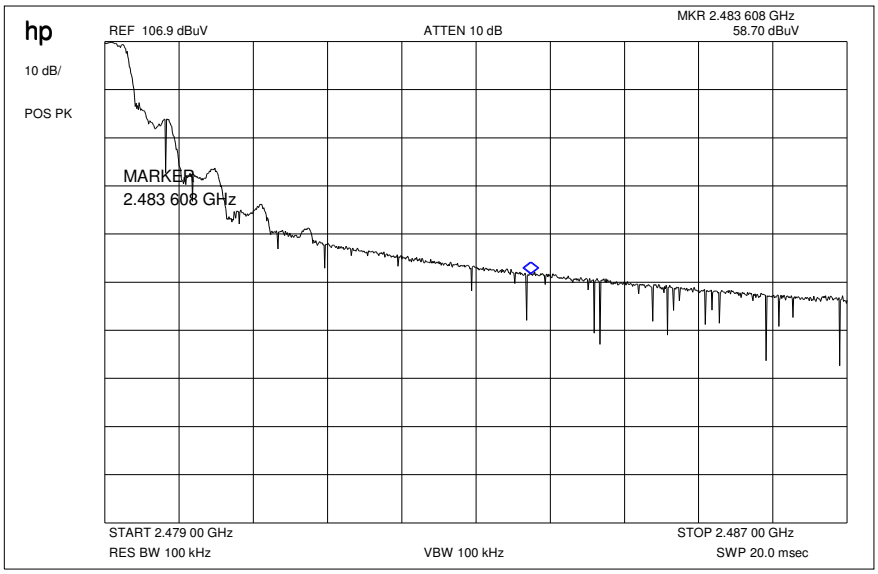
4.7 Band-edge compliance of radiated emissions §15.205

Plot 1: Max field strength in 3m distance



Result: 108.50 dBµV/m

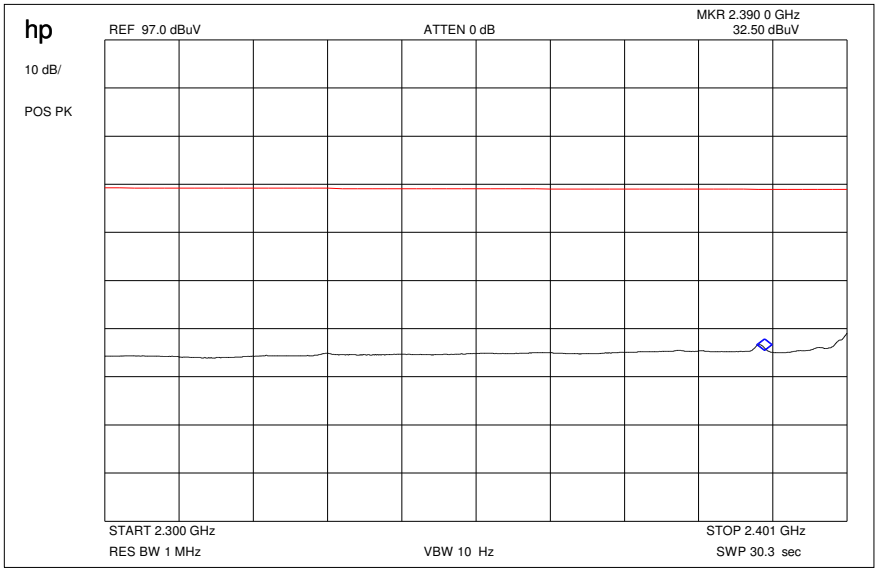
Plot 2: Marker-Delta Method



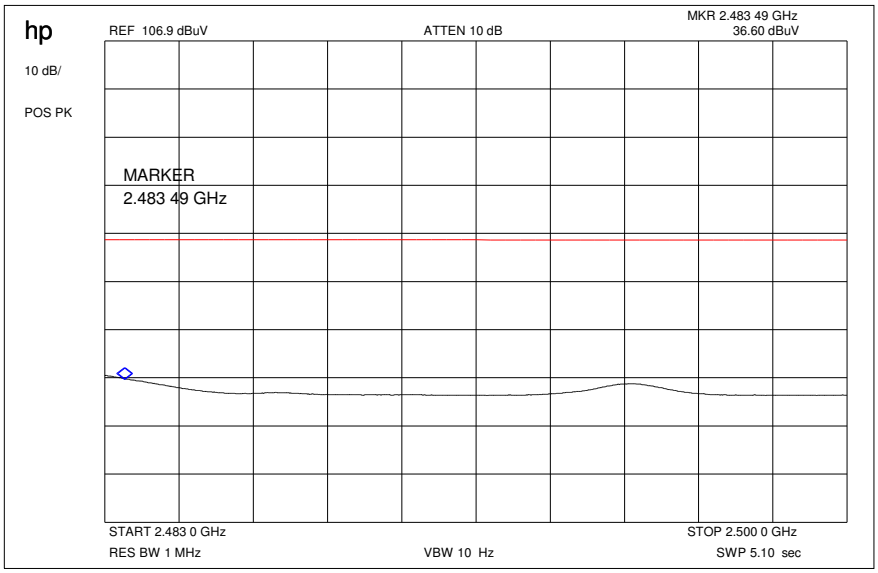
Marker-Delta-Value: 48.20 dB

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

Plot 4: Restricted Bands low



Plot 5: Restricted Bands high



Results & Limits:

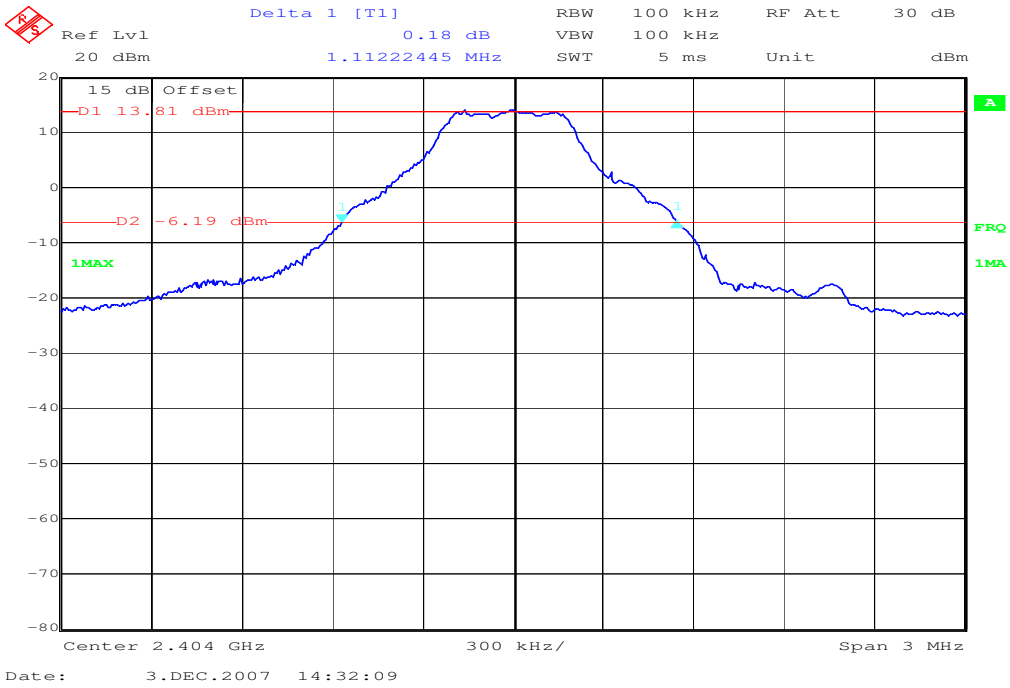
Radiated field strength

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

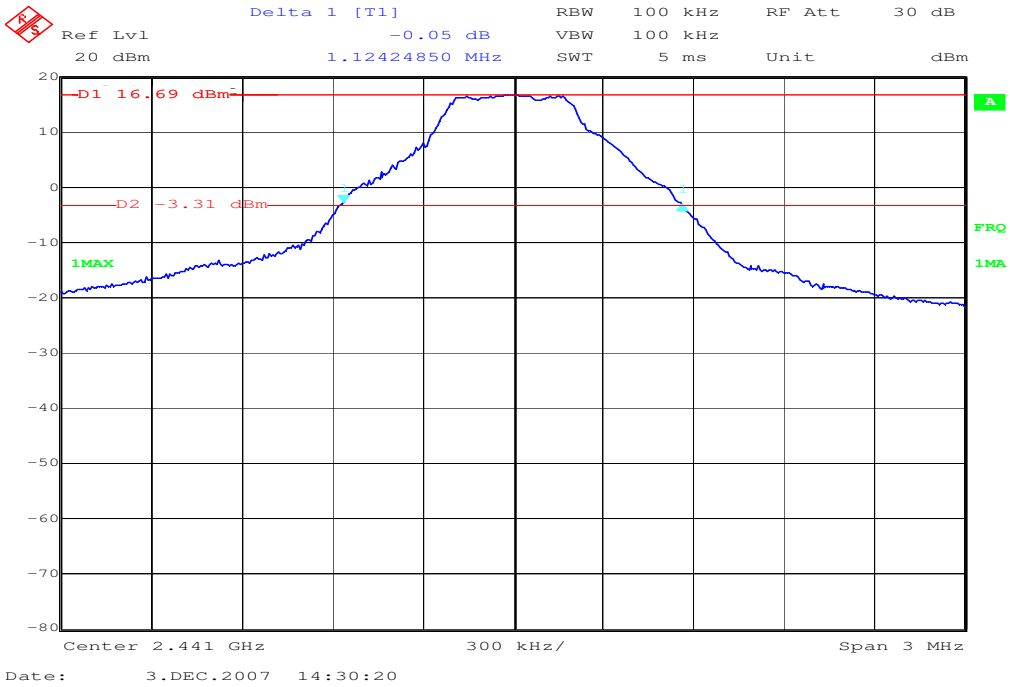
high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	108.50 dBµV/m	-1.97	106.53 dBµV/m
Max. average value	Calculated with duty cycle correction factor	106.53 dBµV/m peak	-17.7	88.83 dBµV/m
Delta value	Peak 100 kHz RBW/VBW	47.30 dB	-	-
Value at band edge	limit 54 dBµV/m			41.53 dBµV/m
Statement:				Complies

4.8 Occupied Bandwidth

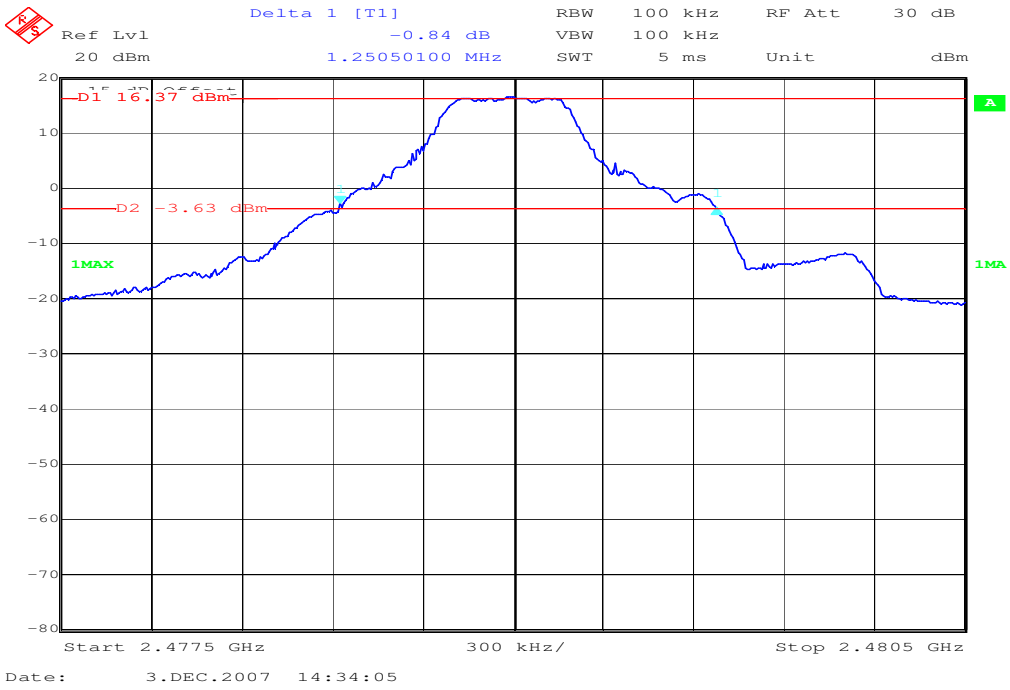
Plot 1: Lowest Channel



Plot 2: Middle Channel



Plot 3: Highest Channel



Results:

Test conditions		20 dB BANDWIDTH [kHz]		
Frequency [MHz]		2404	2441	2480
T_{nom}	V_{nom}	1112	1124	1250
Measurement uncertainty		±1kHz		

RBW: 100 kHz / VBW 100 kHz

Limits:

Under normal test conditions only	> 500 kHz

Used Testequipment

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	05.10.2007	24	15.10.2009
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 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	3000002681-00xx	n.a.		
2	Memory Extension PSM-K10	R&S	To 1	3000002681	n.a.		
3	Operating Software PSM-B2	R&S	To 1	3000002681	n.a.		
4	19'' Monitor		22759020-ED	3000002681	n.a.		
5	Mouse		LZE 0095/6639	3000002681	n.a.		
6	Keyboard		G00013834L461	3000002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	3000002681-0005	01.08.2006	24	01.08.2008
8	Tracking Generator FSIQ-B10	R&S	835107/015	3000002681	s.No.7		
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	3000002681-0002	01.08.2006	36	01.08.2009

11	Modulation Coder SMIQ-B20	R&S	To 10	3000002681	s.No.10		
12	Data Generator SMIQ-B11	R&S	To 10	3000002681	s.No.10		
13	RF Rear Connection SMIQ-B19	R&S	To 10	3000002681	s.No.10		
14	Fast CPU SM-B50	R&S	To 10	3000002681	s.No.10		
15	FM Modulator SM-B5	R&S	835676/033	3000002681	s.No.10		
16	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	3000002681-0001	01.08.2006	36	01.08.2009
17	Modulation Coder SMIQ-B20	R&S	To 16	3000002681	s.No.16		
18	Data Generator SMIQ-B11	R&S	To 16	3000002681	s.No.16		
19	RF Rear Connection SMIQ-B19	R&S	To 16	3000002681	s.No.16		
20	Fast CPU SM-B50	R&S	To 16	3000002681	s.No.16		
21	FM Modulator SM-B5	R&S	836061/022	3000002681	s.No.16		
22	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	3000002681-0003	01.08.2006	36	01.08.2009
23	Attenuator SMP-B15	R&S	835136/014	3000002681	S.No.22		
24	RF Rear Connection SMP-B19	R&S	834745/007	3000002681	S.No.22		
25	Power Meter NRVD	R&S	835430/044	3000002681-0004	01.08.2006	24	01.08.2008
26	Power Sensor NRVD-Z1	R&S	833894/012	3000002681-0013	01.08.2006	24	01.08.2008
27	Power Sensor NRVD-Z1	R&S	833894/011	3000002681-0010	01.08.2006	24	01.08.2008
28	Rubidium Standard RUB	R&S		3000002681-0009	01.08.2006	24	01.08.2008
29	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681-0006	01.08.2006	24	01.08.2008
30	Laser Printer HP Deskjet 2100	HP	N/A	3000002681-0011	n.a.		
31	19'' Rack	R&S	11138363000004	3000002681	n.a.		
32	RF-cable set	R&S	N/A	3000002681	n.a.		
33	IEEE-cables	R&S	N/A	3000002681	n.a.		
34	Sampling System FSIQ-B70	R&S	835355/009	3000002681	s.No.7		
35	RSP programmable attenuator	R&S	834500/010	3000002681-0007	01.08.2006	24	01.08.2008
36	Signalling Unit	R&S	838312/011	3000002681	n.a.		
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
38	Climatic box VT 4002	Heraeus Vötsch	58566046820010	300003019	11.05.2007	24	11.05.2009
39	Signaling Unit CMU200	R&S	832221/0055	300002862	12.01.2006	24	12.01.2008
40	Power Splitter 6005-3	Inmet Corp.	none	300002841	23.12.2006	24	23.12.2008
41	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
42	CBT32 with EDR Signaling Unit	R&S					
43	Coupling unit	Narda	N/A	--	n.a.		
44	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
45	RF-cable set	R&S	N/A	different	n.a.		
46	IEEE-cables	R&S	N/A	--	n.a.		

Anmerkung: 3000002681-00xx als Systeme inventarisiert

5 Annex B: Photographs of Test site

Photo 1 (Radiated Emissions):

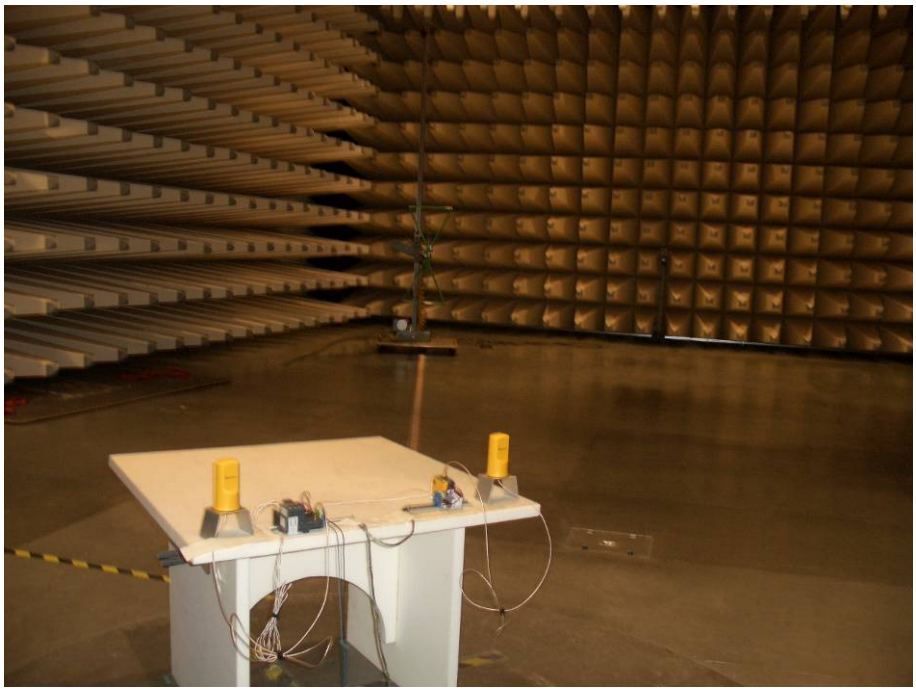
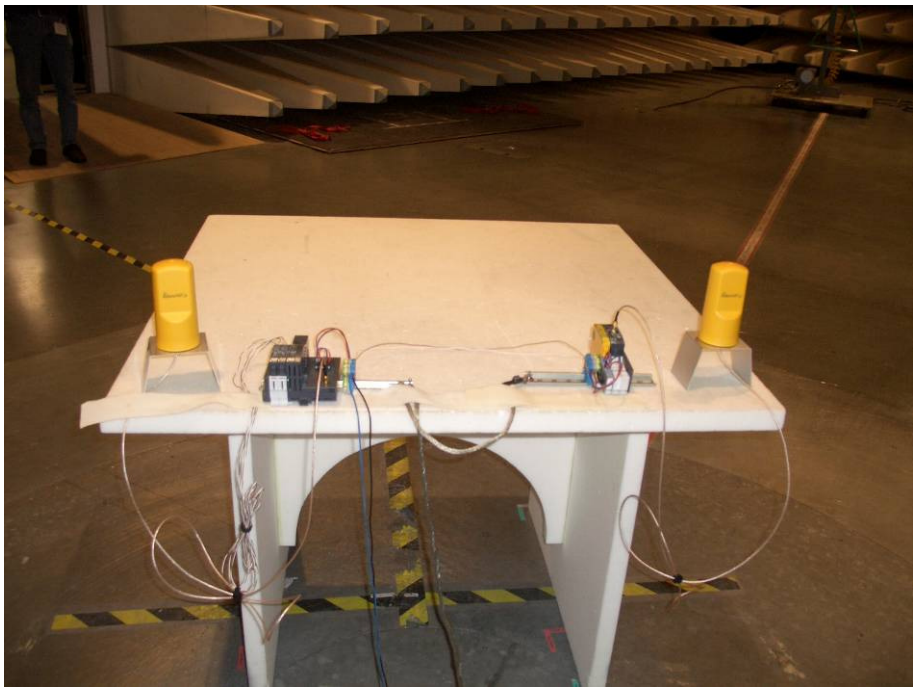


Photo 2 (Radiated Emissions):



6 Annex C: External Photographs of the Equipment

Photo 1:

Photo 2:

Photo 3:

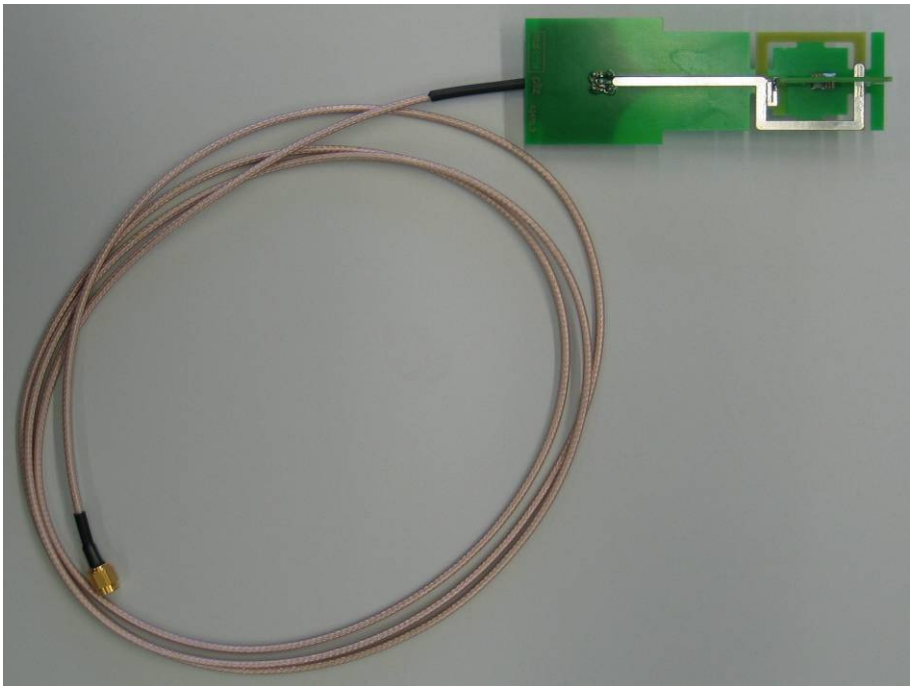


Photo 4:

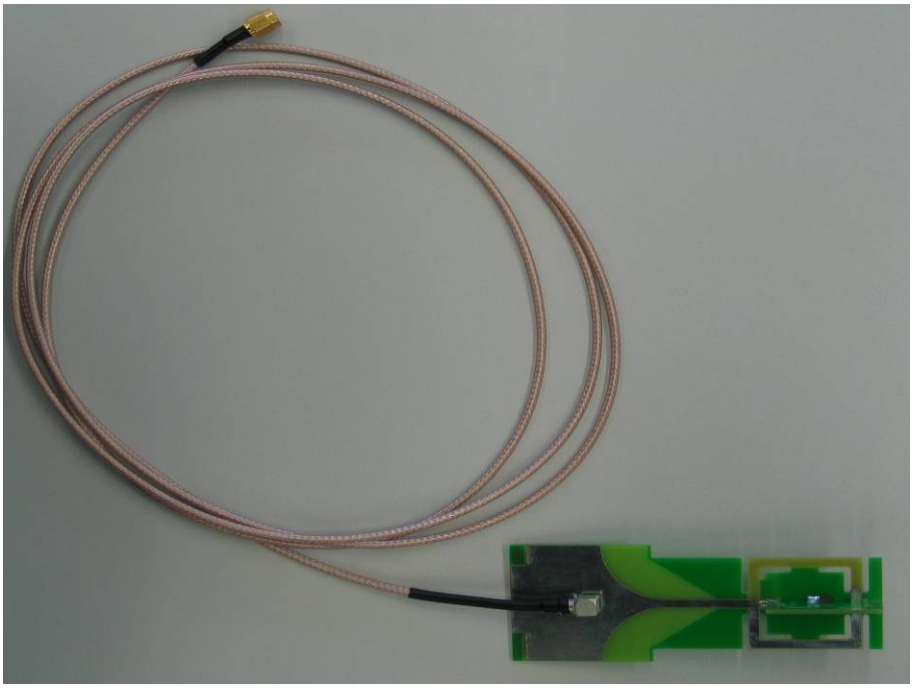


Photo 5:

Photo 6:

Photo 7:

Photo 8:

7 Annex D: INTERNAL PHOTOGRAPHS OF THE EQUIPMENT

Photo 9:

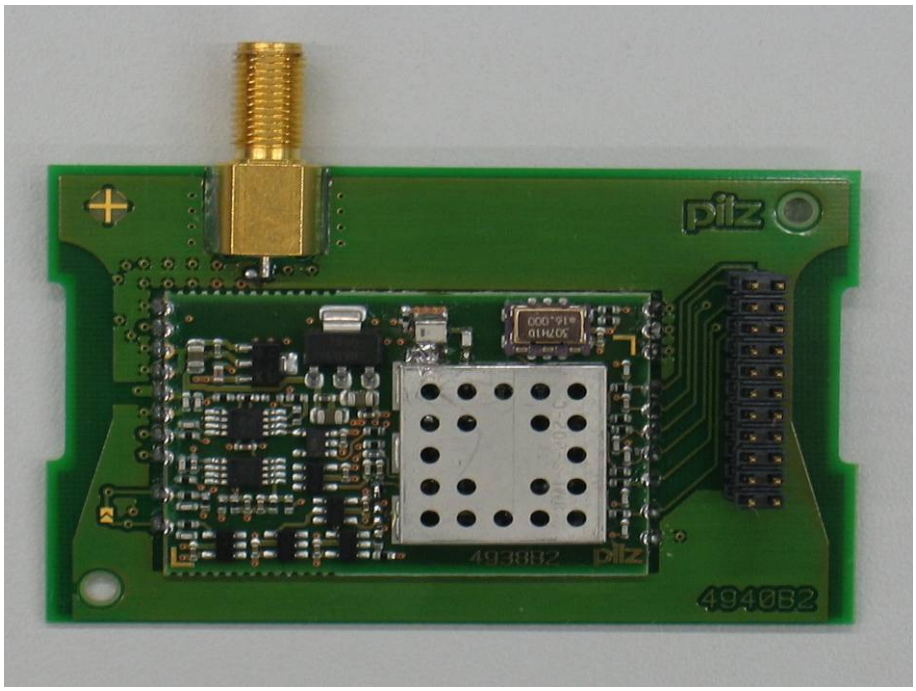


Photo 10:

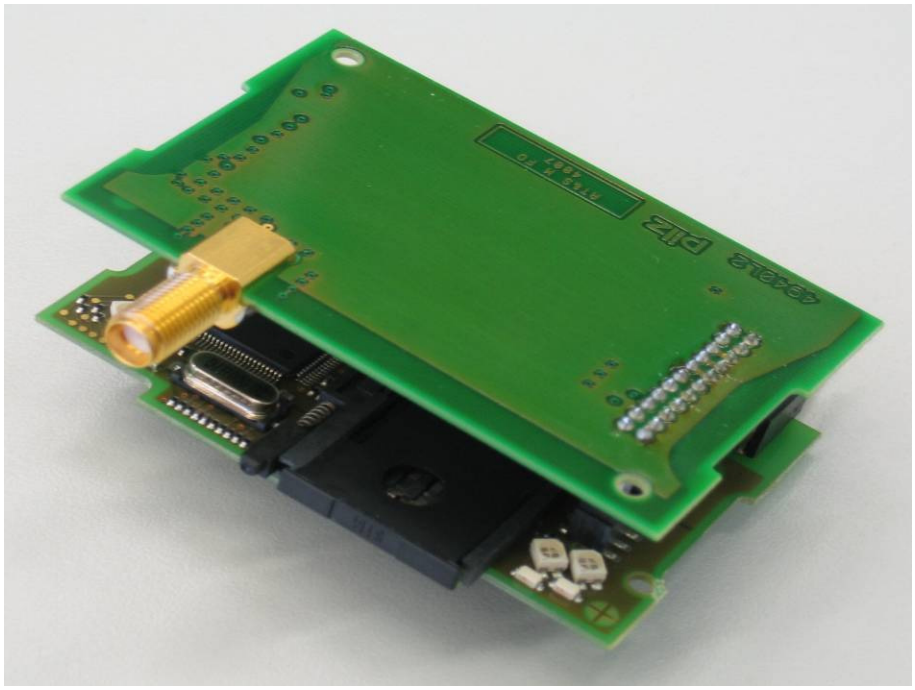


Photo 11:

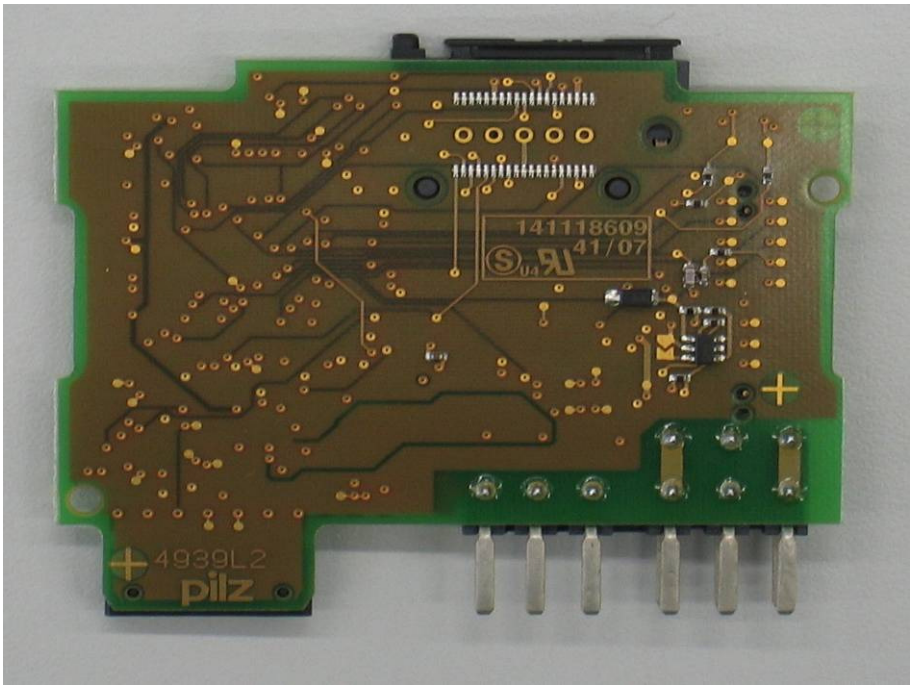


Photo 12:

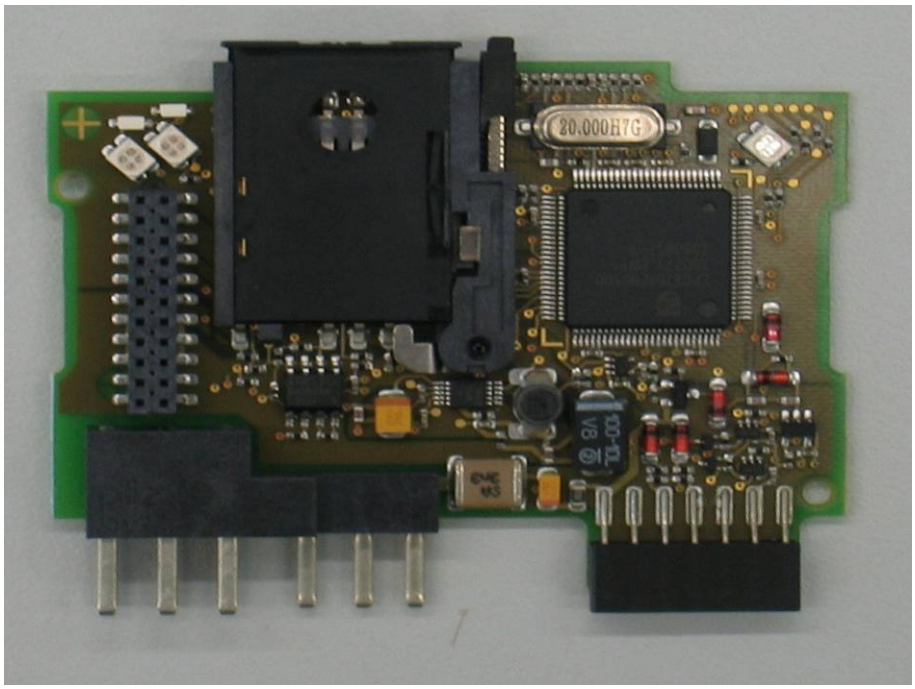


Photo 13:

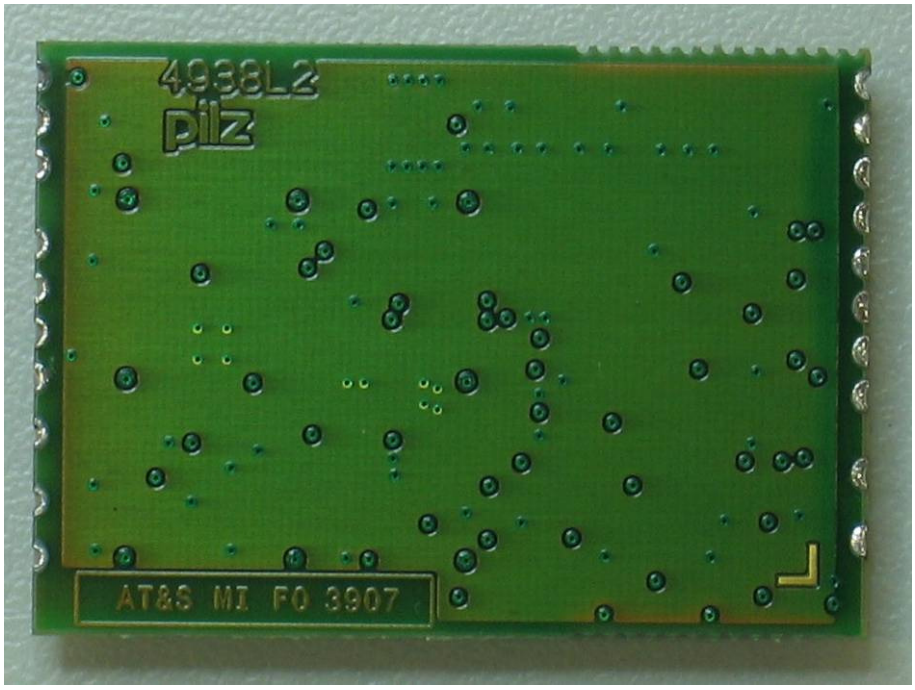


Photo 14:

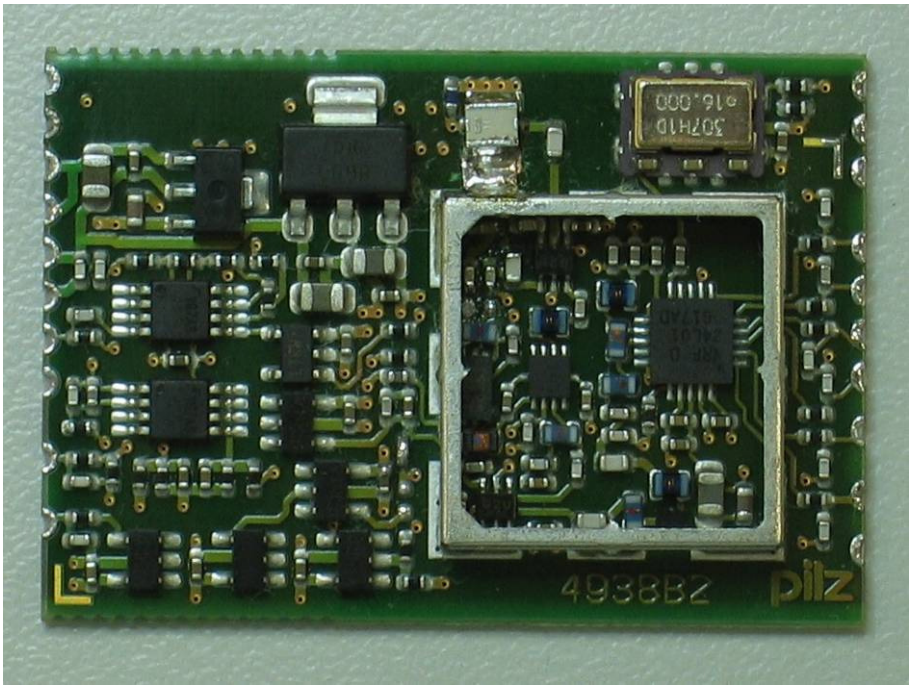


Photo 15: