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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. : 2-4856-02-04/07
Applicant : ads-tec GmbH
Type : TT13C4 / TT13W
Test Standard(s) : FCC Part 15.247
RSS 210 Issue 7
FCC ID : T9GTT13C4
IC Cert. No. : 6275A-TT13C4

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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. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF)
Responsible for testing laboratory:	Harro Ames, Michael Berg Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de



.....
Responsible for testing laboratory
(Harro Ames)

1.1.2 Organizational items

Reference No.:	2-4856-02-04/07
Order No.:	
Responsible for test report and project leader:	Harro Ames, Michael Berg
Receipt of EUT:	2008-02-19
Date(s) of test:	2008-02-19 to 2008-03-14
Date of report:	2008-03-26
Number of report pages:	60
Number of diagram pages (annex):	

Version of template:	1.6



.....
Responsible for test report
(Michael Berg)

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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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:	ads-tec GmbH
Address:	Raiffeisenstr. 14 D- 70771 Leinfelden-Echterdingen Germany
Contact person:	Mr. C. Remmert Tel: +49 (0)711 45894-286 Fax: +49 (0)711 45894-994 email: C.Remmert@ads-tec.de

1.2 Administrative data of manufacturer / member

Manufacturer's name:	- applicant -
Address:	

1.3 Description of the Equipment under test (EUT)

1.3.1 EUT: Type, S/N etc.

Product name	Product ID	Description	S/N serial number	HW hardware status	SW software status
TT13C4 / TT13W		Dual band WLAN Client	-	-	-
Frequency Band [MHz]	Type of Modulation	Number of channels	Antenna	Power Supply	Temperature Range
ISM 5725 - 5850	OFDM	5	2 internal antennas	External AC power supply	-20°C to +55°C

for more infos see subpart 1.3.3

1.3.2 If RF component testing only, description of additional used HW/SW

	Product name	Product ID	Description	S/N serial number	HW hardware status	SW software status
1						
2						

1.3.3 Additional EUT information

The sample is a client for dualband use. (2.4 and 5 GHz).

Inside the client there is one RF part, able to work on 2.4 and 5 GHz.

In this report we test the frequency range 5725 to 5850 MHz according to FCC15.247

Other frequency ranges are tested in separate reports.

1.3.4 Additional EUT information For IC Canada (appendix 2)

IC Certification Number:	6275A-TT13C4
Model Name:	TT13C4 / TT13W
Manufacturer (complete Adress):	ads-tec GmbH Raiffeisenstr. 14 D-70771 Leinfelden-Echterdingen Germany
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3463A-1
Frequency Range (or fixed frequency) [MHz]:	5745 - 5825 MHz
RF: Power [W] (max):	Rad. EIRP: 109.6 mW Conducted : 190.5 mW
Antenna Type:	Build in print antennas
Occupied Bandwidth (99% BW) [MHz]:	18.3 MHz
Type of Modulation:	OFDM
Emission Designator (TRC-43):	18M3G7D
Transmitter Spurious (worst case) [dB μ V/m in 3m]:	46.7 dB μ V/m@3m at 11570 MHz
Receiver Spurious (worst case) [dB μ V/m in 3m]:	No peaks found <15 dB below limits

ATTESTATION: 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 the applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:



Date: 2008-03-26

Testengineer: Harro Ames

1.3.5 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. 3		low temperature, high power source conditions
Op. 4		high temperature, low power source conditions
Op. 5		high temperature, high power source conditions

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

1.3.6 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature / humidity	T _{nom}	°C / %	22°C / 33%
Low Temperature	T _{low}	°C	-20°C
High Temperature	T _{high}	°C	55°C
Nominal Power Source	V _{nom}	V	115V AC
Low Power Source	V _{low}	V	100V AC
High Power Source	V _{high}	V	130V AC

Type of powersource: External AC power supply with 20V DC output, delivered by the customer

2 Test standard & summary list of all performed test cases

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.247 - CANADA RSS-210	pass	2008-03-26	

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
None	Antenna Gain	Yes			
§15.247 (e)	Peak power spectral density	Yes			
§15.247(a2)	Spectrum Bandwidth of an OFDMSystem 6dB/20dB BW	Yes			
§ 15.247 (b) (3)	Maximum output power (conducted)	Yes			
§ 15.247 (b) (3)	Max. peak output power (radiated)	Yes			
§15.247 d)	Band-edge compliance of conducted emissions	Yes			
§15.205	Band-edge compliance of radiated emissions	Yes			
§15.247 (d)	Spurious Emission - conducted (Transmitter)	Yes			
§ 15.209	Spurious Emission -radiated (Transmitter)	Yes			
§ 15.247 (d)	Spurious Emissions-radiated (Receiver)	Yes			
§ 15.209	Spurious Emissions-radiated <30 MHz	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	Yes			

3 RF measurement testing

3.1 Description of test set-up

3.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 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 setups 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 - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.

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

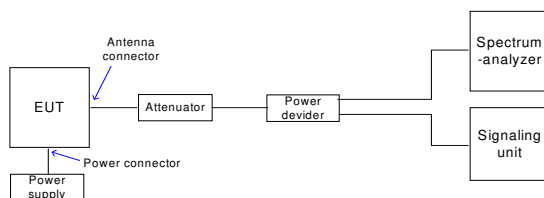
30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

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

>1GHz: Average, RBW 1MHz, VBW 10 MHz, waveguide horn with lownoise preamp

3.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is connected to the spectrum analyzer. The specific losses for signal paths are first checked within a calibration. The measurement readings on the spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signaling unit and the spectrum analyzer are impedance matched on 50 Ohm.



3.1.3 AC-conducted measurements

We used the dedicated power supply delivered by the customer.

3.2 Referenced Documents

none

3.3 Additional comments

For testing we used a special software tool delivered by the customer. (ART)

3.4 Antenna gain

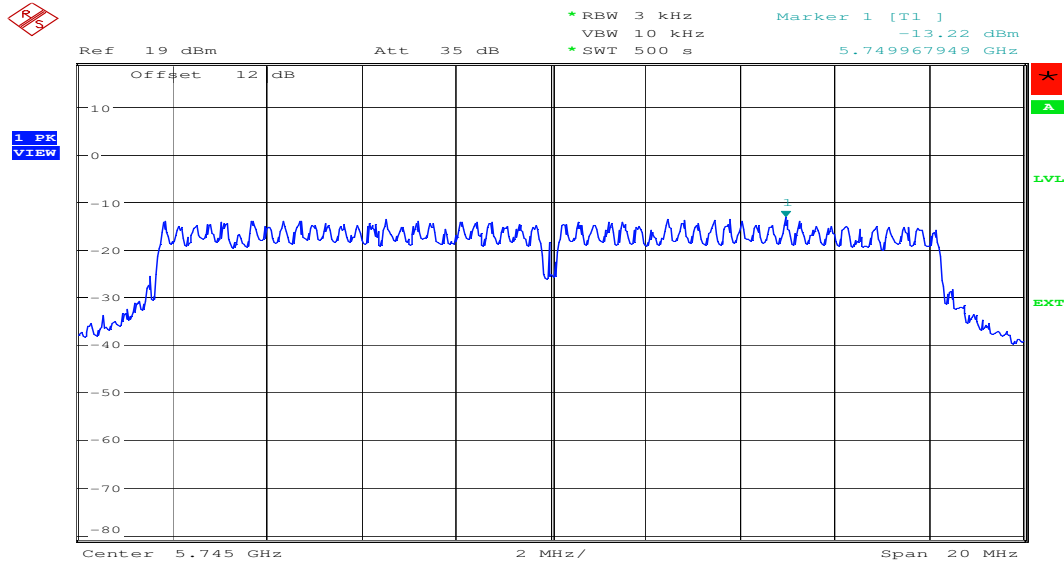
The antenna gain is calculated by subtracting the conducted from the radiated power.

For the dedicated rod antenna, we calculated max 2.4 dBi at 5825 MHz.

3.5 Peak Power Spectral density

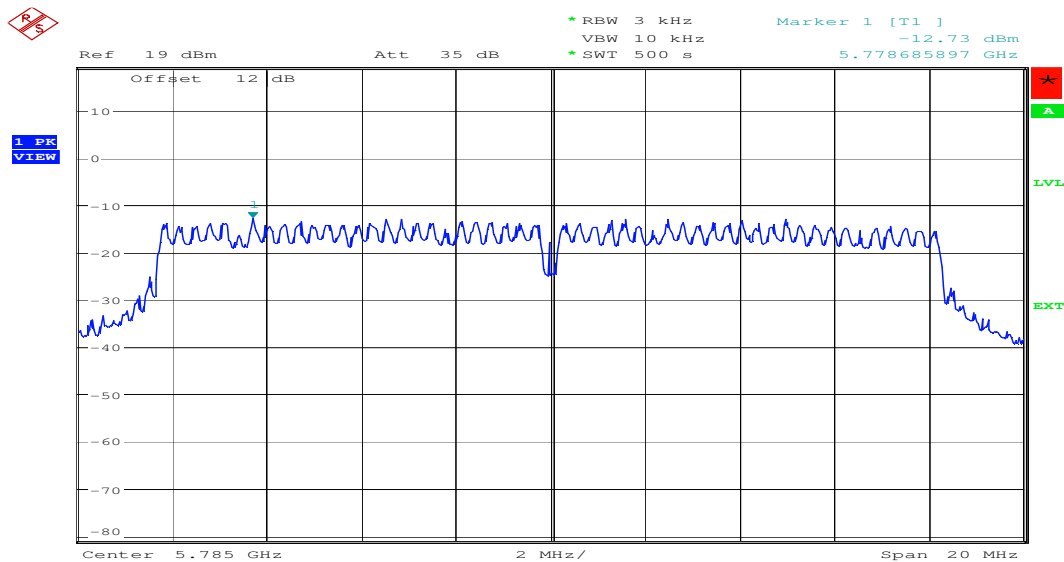
§15.247(e)

Plot 1:



Date: 13.MAR.2008 08:51:15

Plot 2:



Date: 13.MAR.2008 09:27:10

SRD-Testreport

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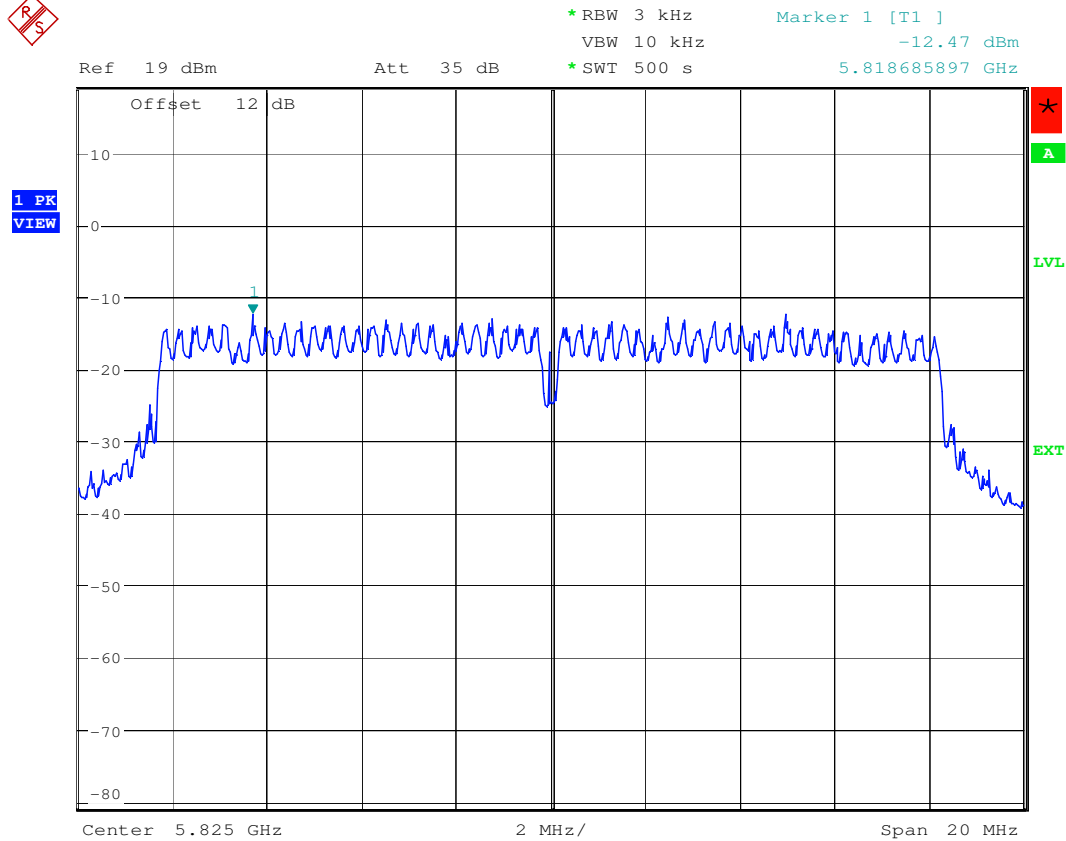


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Plot 3:



Date: 13.MAR.2008 09:34:21

Results: Plot 1: Power density : = - 13.2 dBm / 3 KHz
 Plot 2: Power density : = - 12.7 dBm / 3 KHz
 Plot 3: Power density : = - 12.5 dBm / 3 KHz

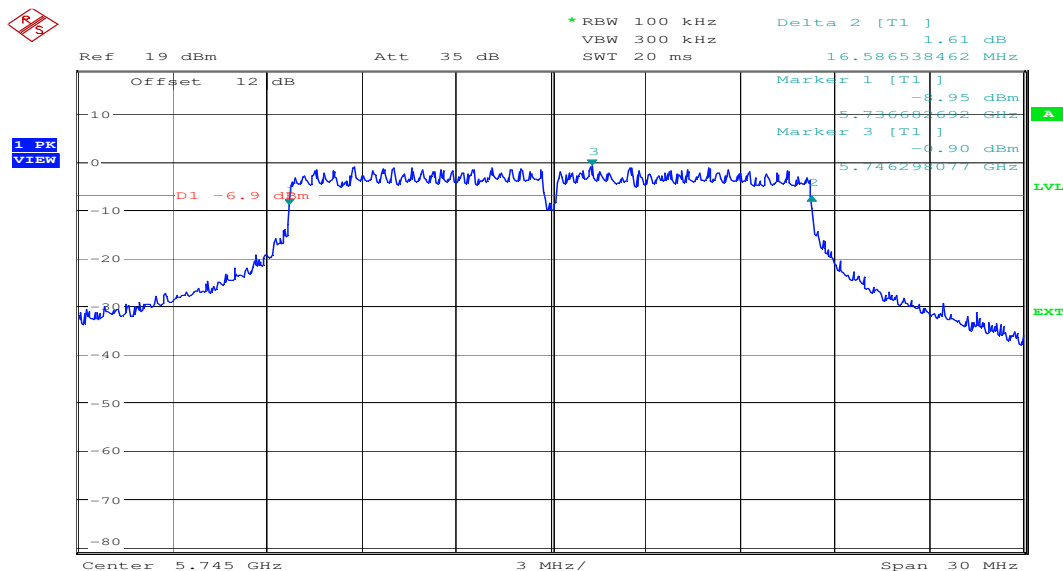
Limits :

Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band during any time interval of continuous transmission
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3.6 Spectrum Bandwidth of an OFDM System

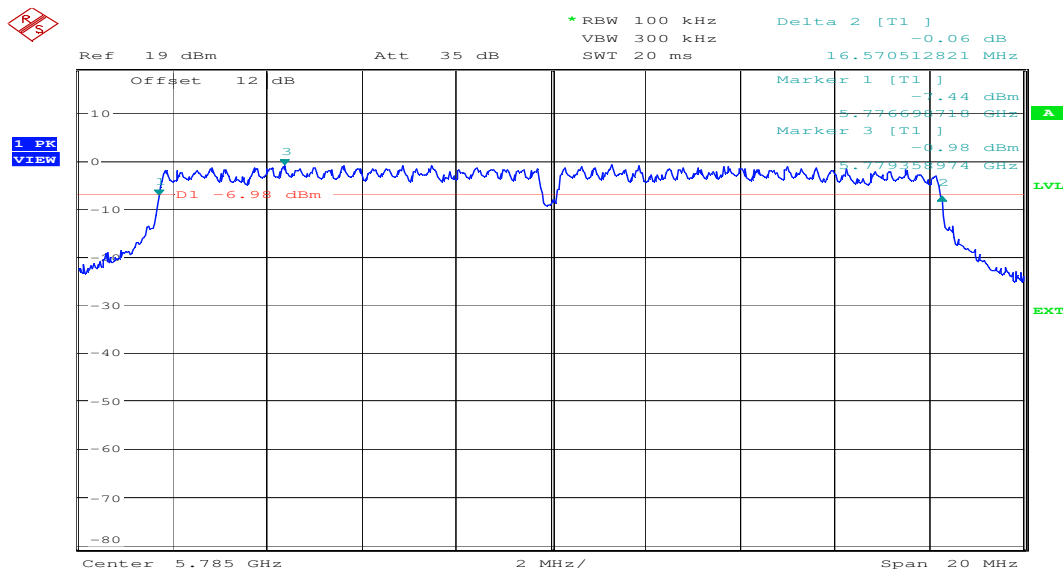
§15.247(a2)

Plot 1: 6 dB-Bandwidth (5745 MHz)



Date: 13.MAR.2008 10:00:54

Plot 2: 6 dB-Bandwidth (5785MHz)



Date: 13.MAR.2008 09:54:56

SRD-Testreport

CETECOM ICT Services GmbH Saarbruecken, Germany

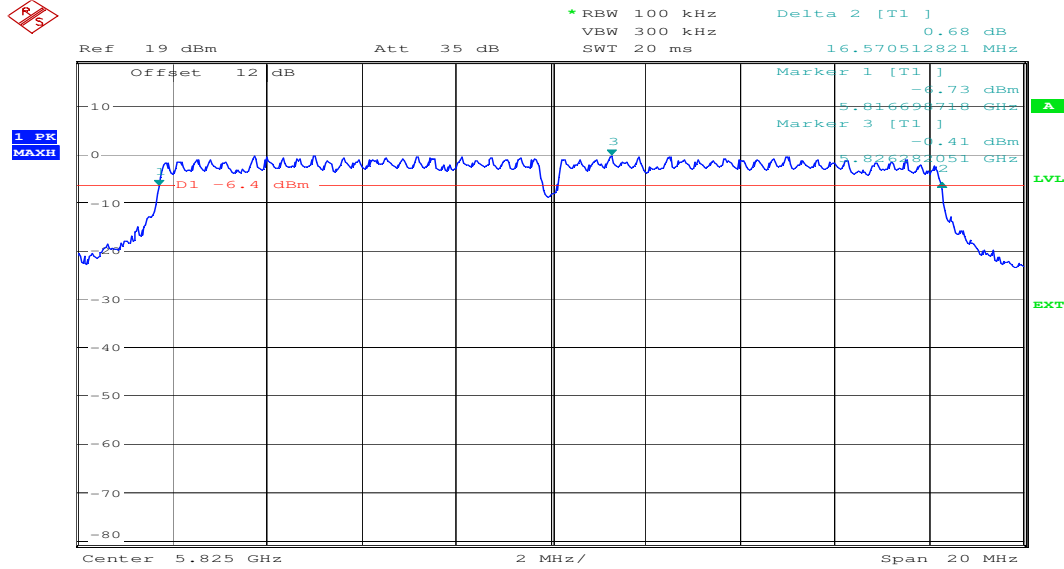


Test report No.: 2-4856-02-04/07

Date: 2008-03-26

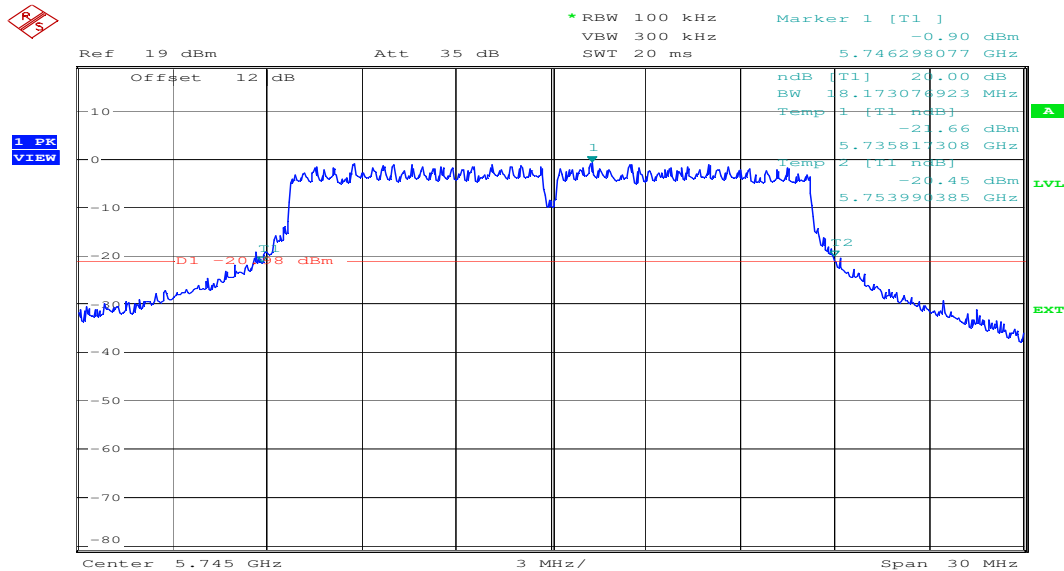
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Plot 3: 6 dB-Bandwidth (5825 MHz)



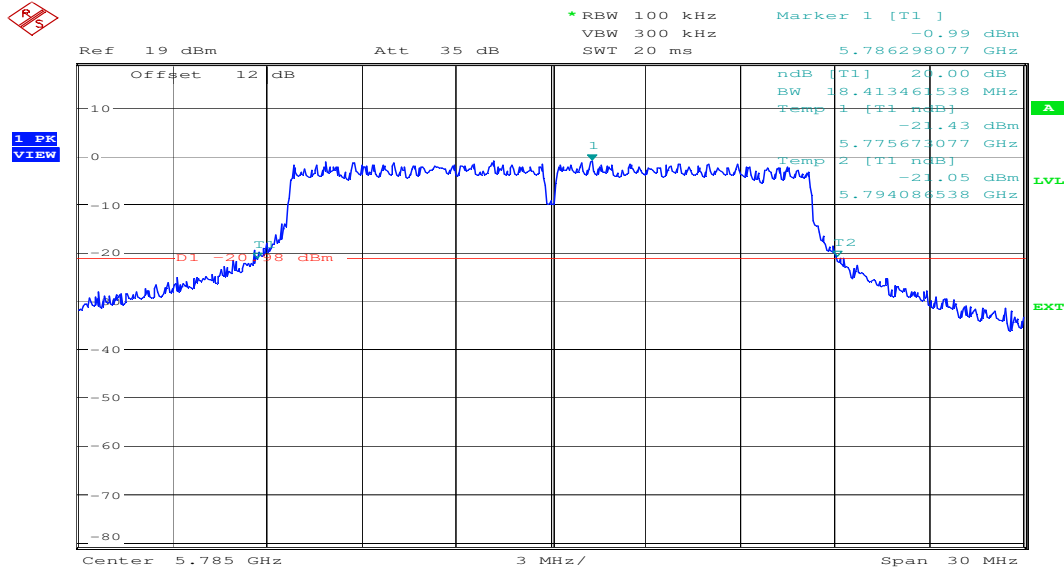
Date: 13.MAR.2008 09:53:22

Plot 4: 20 dB-Bandwidth (5745 MHz)



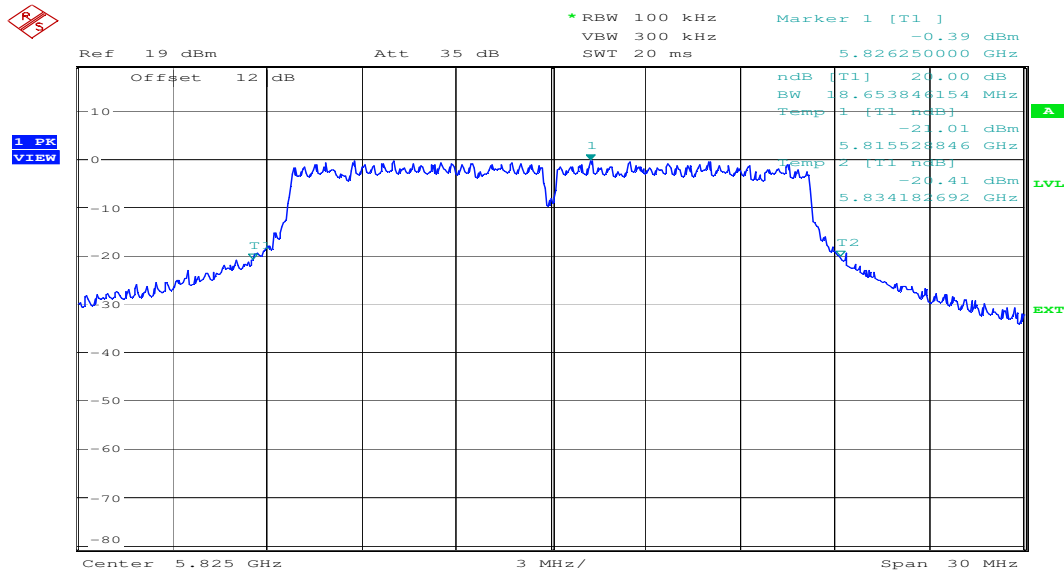
Date: 13.MAR.2008 09:59:30

Plot 5: 20 dB-Bandwidth (5785 MHz)



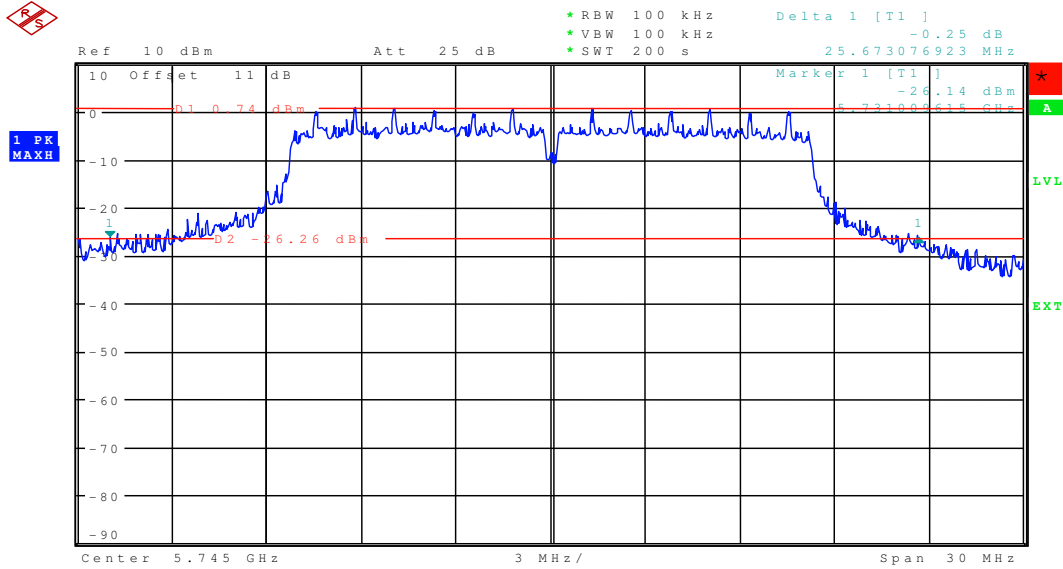
Date: 13.MAR.2008 09:58:33

Plot 6: 20 dB-Bandwidth (5825 MHz)

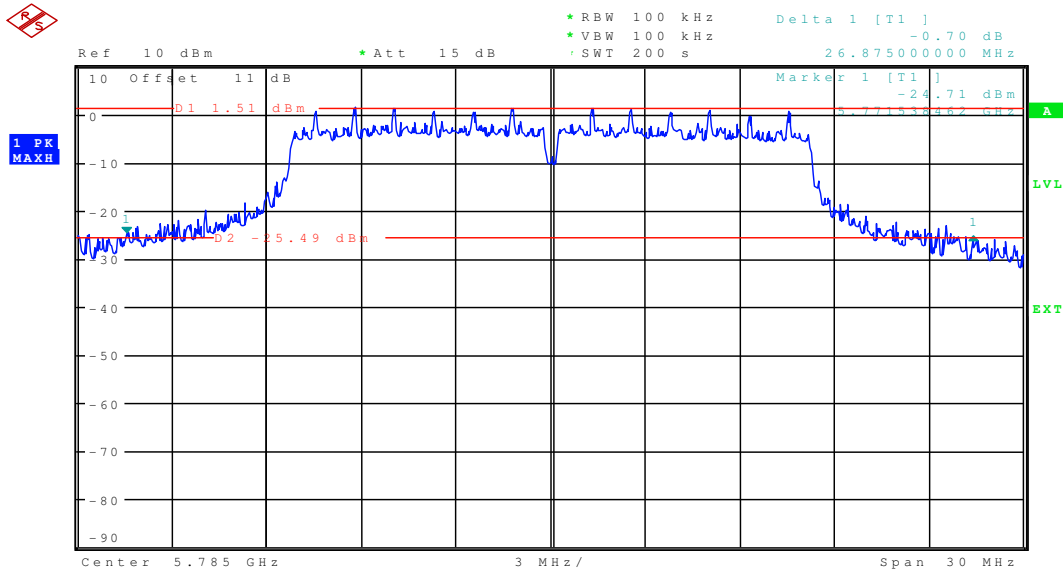


Date: 13.MAR.2008 10:02:33

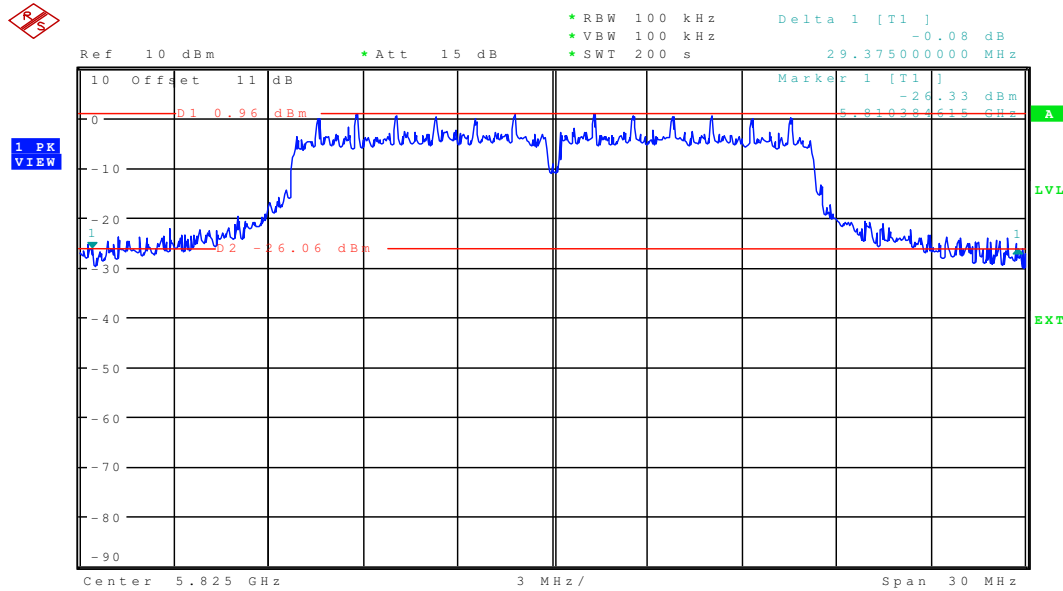
Plot 7: 26 dB-Bandwidth (5745MHz)



Plot 8: 26 dB-Bandwidth (5785 MHz)



Plot 9: 26 dB-Bandwidth (5825 MHz)



Results:

Test conditions	BANDWIDTH [MHz]		
	5745	5785	5825
Frequency [MHz]	5745	5785	5825
6 dB - Bandwidth	16.6	16.6	16.6
20 dB - Bandwidth	18.2	18.4	18.7
26 dB - Bandwidth	25.67	26.88	29.38
Measurement uncertainty	±1kHz		

RBW: 100 kHz / VBW 100 kHz

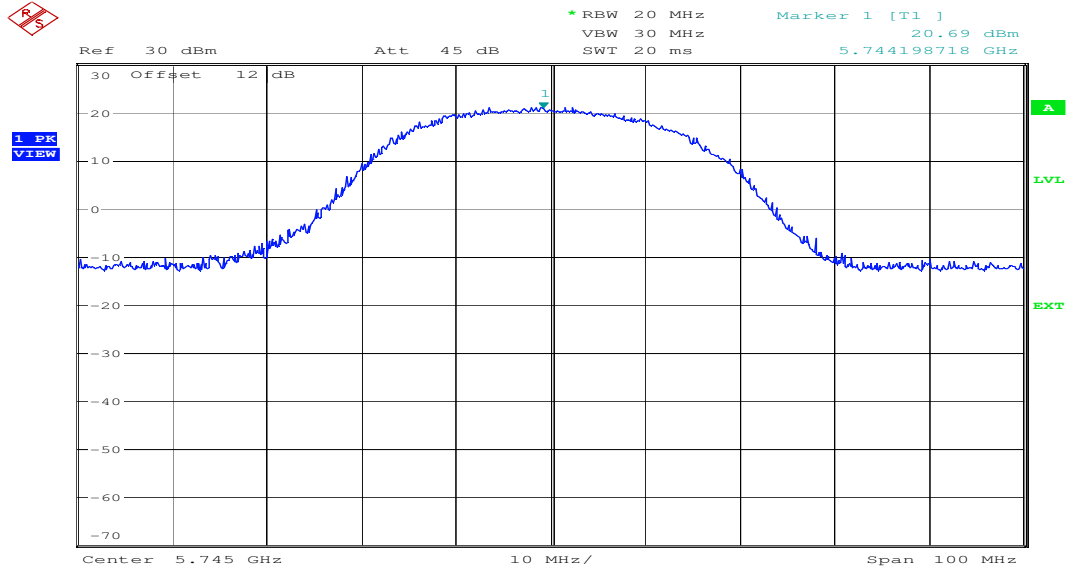
Limits :

Under normal test conditions only	> 500 KHz
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3.7 Maximum output power (conducted) (OFDM)

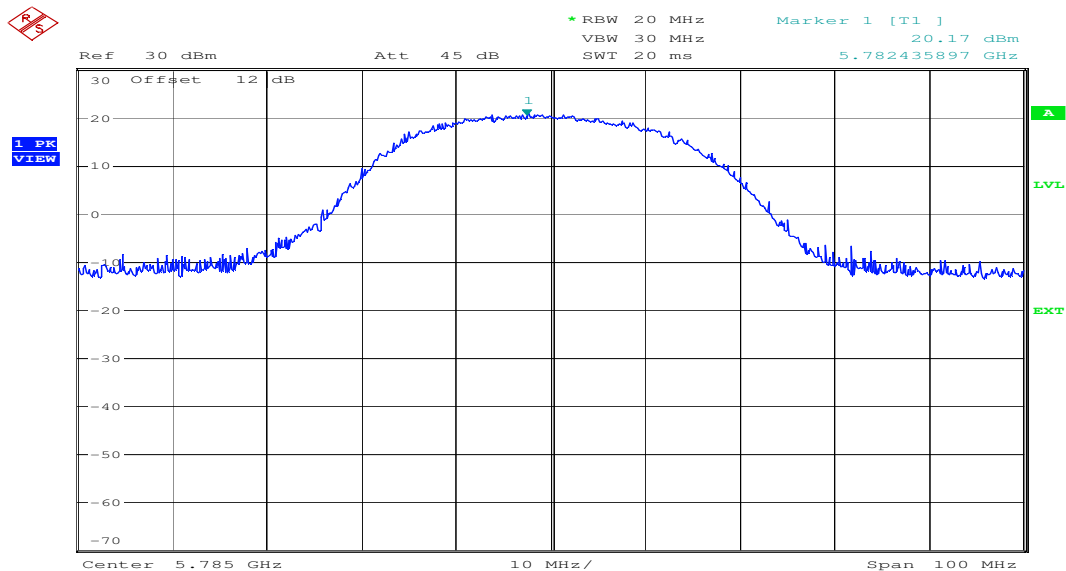
§15.247 (b) (3)

Plot 1:



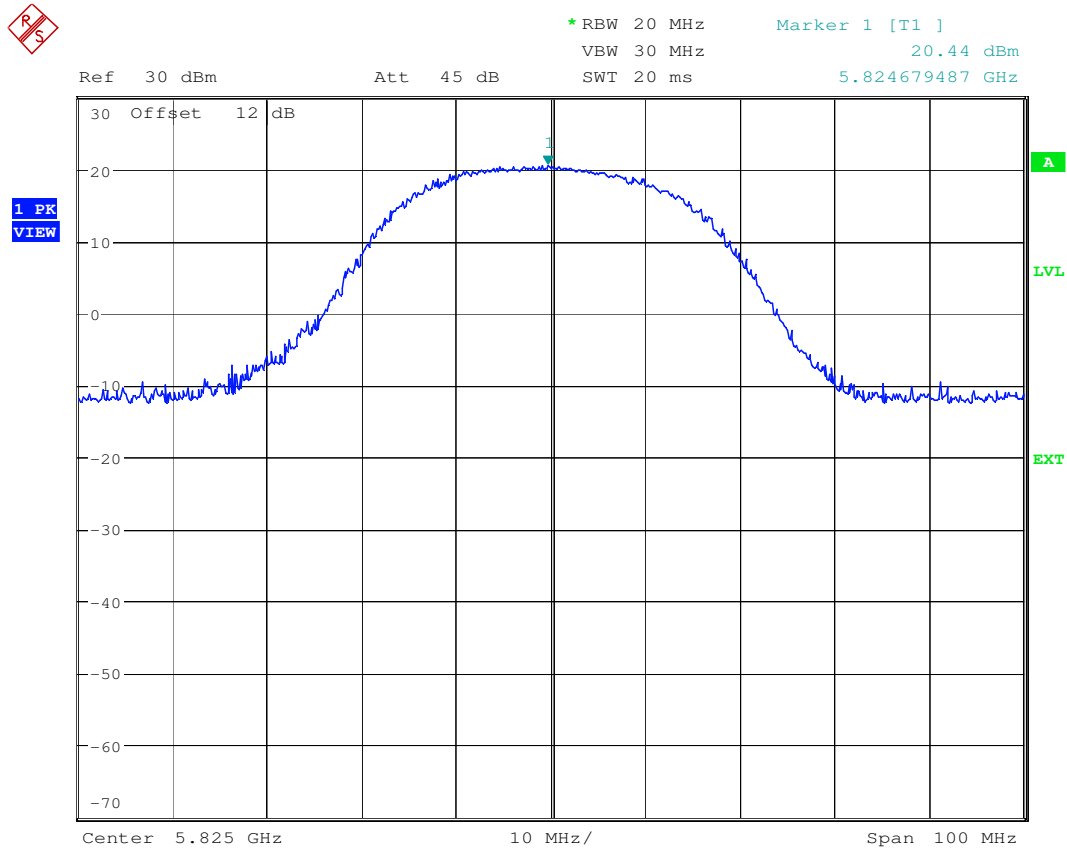
Date: 13.MAR.2008 10:05:49

Plot 2:



Date: 13.MAR.2008 10:05:12

Plot 3:



Date: 13.MAR.2008 10:04:23

Results:

Test conditions		Max. peak output power [dBm]					
Frequency [MHz]		5745		5785		5825	
T _{nom}	V _{nom}	PK	20.7	20.2	20.4		
Measurement uncertainty		±3dB					

Under normal test conditions only, for frequency range 5725 - 5850 MHz	Max. 1.0 Watt / 30 dBm
--	------------------------

MPE calculation

These equations are generally accurate in the far field of an antenna but will over predict power density in the near field, where they could be used for making a “worst case” prediction.

$$S = PG/4\pi R^2$$

where S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units e.g. mW)

G = power gain of the antenna in the direction of interest relative to the isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units e.g. cm)

Or

$$S = EIRP/4\pi R^2$$

where EIRP = equivalent isotropically radiated power

Calculation:

(Calculated for max. EIRP)

EIRP: 22.8 dBm = 190.5 mW

calculated at distance of 20 cm:

power density = $190.5 / 4\pi 20^2 = 0.038 \text{ mW/cm}^2$

Limit:

1mW/ cm ² is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

3.8 Max. peak output power (radiated)

§15.247 (b) (3)

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		5745	5785	5825
T_{nom}	V_{nom}	20.7 cond	20.2 cond	20.4 cond
OFDM		22.4 rad	22.6 rad	22.8 rad
Measurement uncertainty		±3dB		

RBW / VBW : 20 MHz

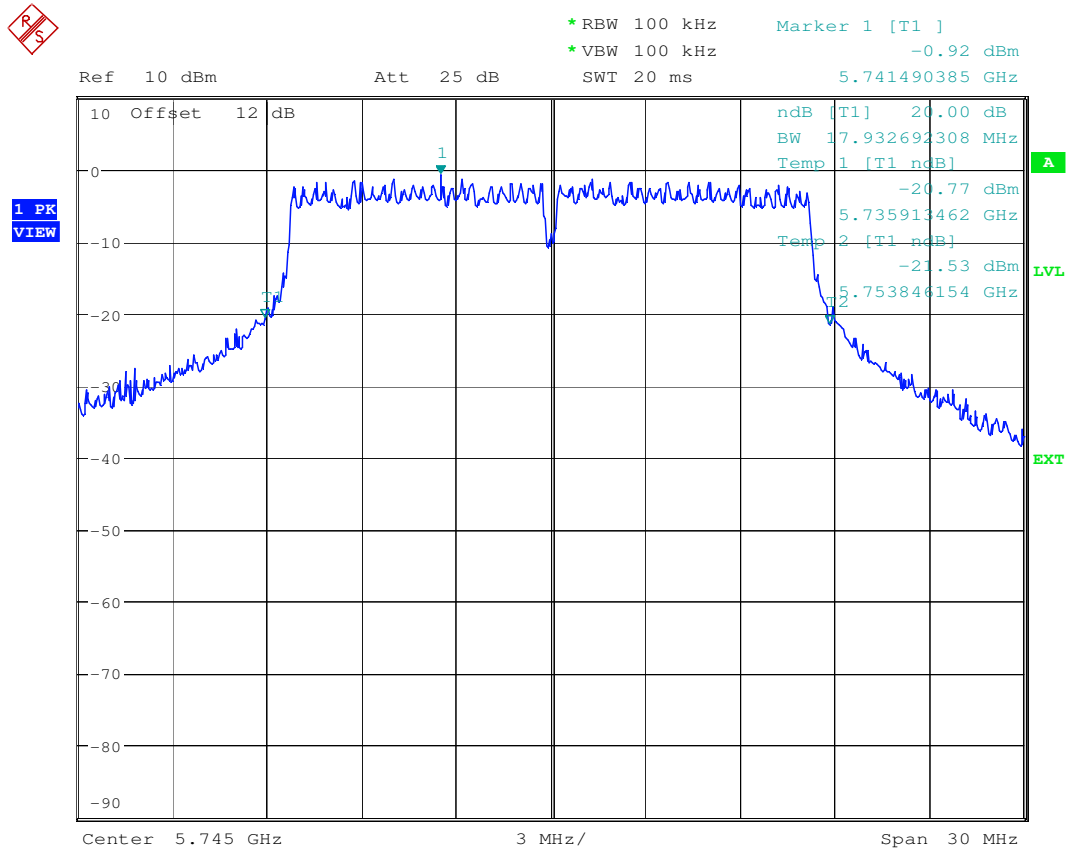
Limits:

Under normal test conditions only, for frequency range 5725 - 5850 MHz	Max. 1.0 Watt / 30 dBm
--	------------------------

3.9 Band-edge compliance of conducted emissions

§15.247 (d)

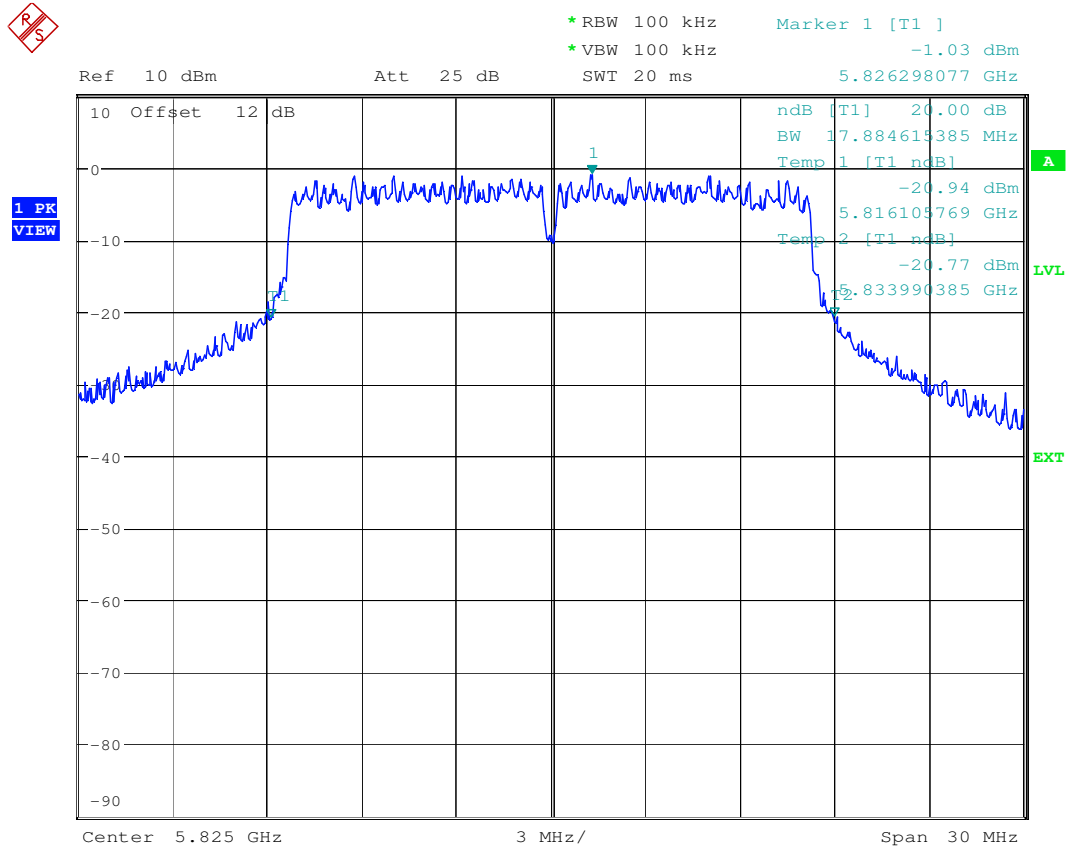
Plot 1, lowest channel



Date: 13.MAR.2008 10:14:05

The -20dBc point is at 5736 MHz

Plot 2, highest channel



Date: 13.MAR.2008 10:15:35

The -20dBc point is at 5834 MHz

Limits:

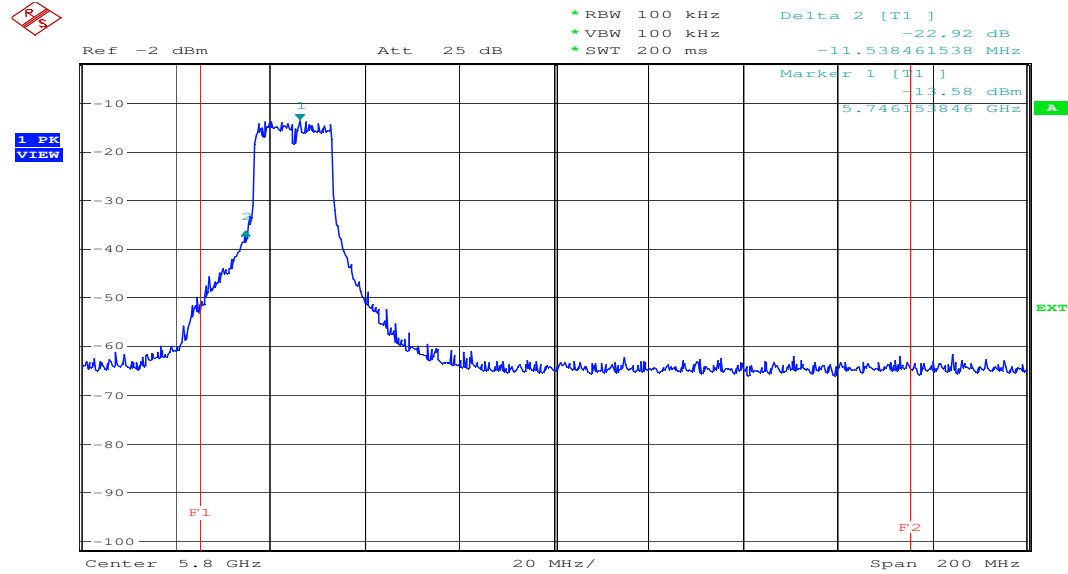
Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth 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)).
-----------------------------------	--

3.10 Band-edge compliance of radiated emissions (OFDM)

§15.205

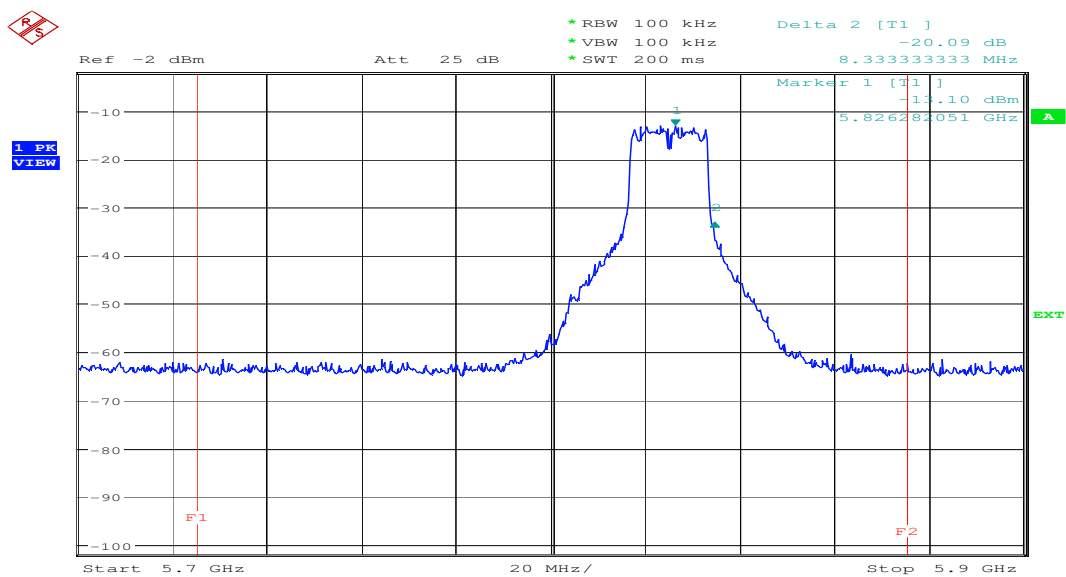
There are no restricted bands besides the tested frequency range.

5745 MHz



Date: 13.MAR.2008 10:21:13

5825 MHz



Date: 13.MAR.2008 10:20:29

3.11 Spurious Emissions - conducted (Transmitter)

§15.247 (d)

Result & Limits

Emission Limitations (worst case)					
f [MHz]	Modulation (OFDM)	amplitude of emission [dBm]	limit max. allowed emmission power	actual attenuation below frequency of operation [dB]	results
5745		20.7	30 dBm	-	Operating frequency
3828		-41.0	-20 dBc		
5785		20.2	30 dBm		Operating frequency
3848		-40.6	-20 dBc		
5825		20.4	30 dBm		Operating frequency
3886		-40.2	-20 dBc		
all peaks	> 20 dB	below limit			
Measurement uncertainty		± 3dB			

RBW : 100 kHz VBW: 100 kHz

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
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Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

SRD-Testreport

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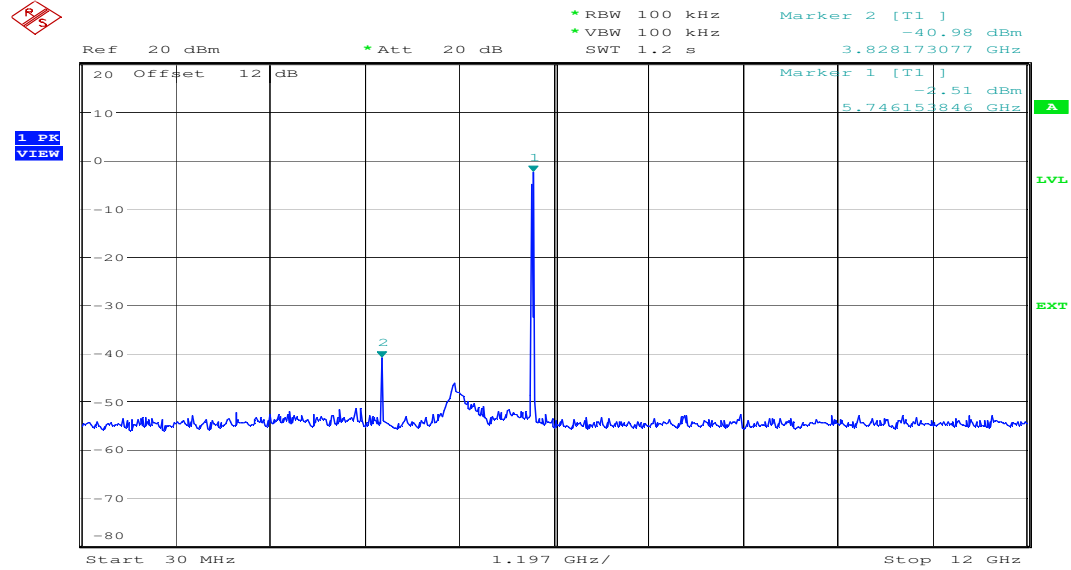


Test report No.: 2-4856-02-04/07

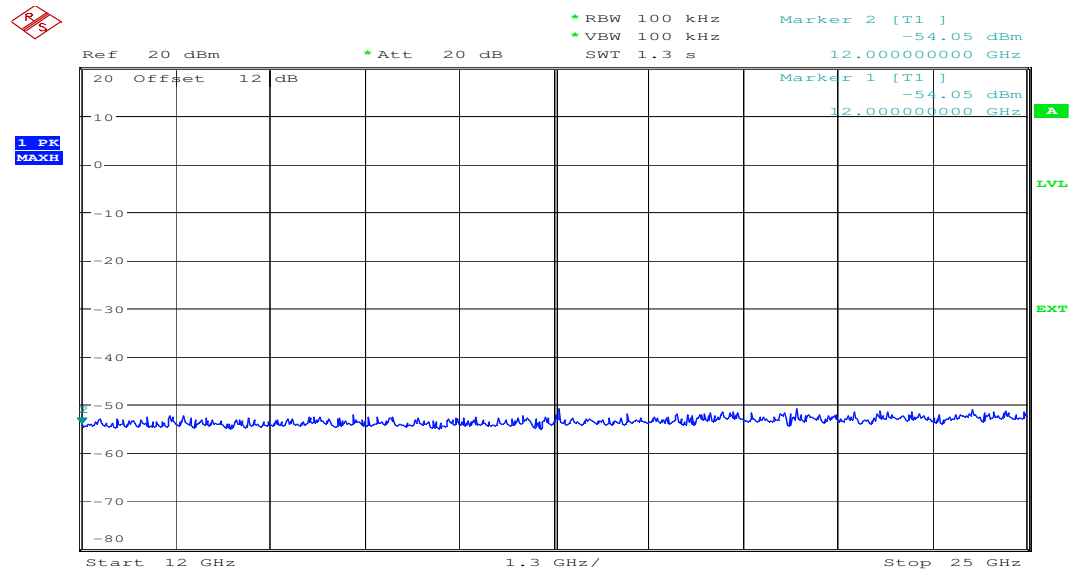
Date: 2008-03-26

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5745 MHz



Date: 13.MAR.2008 10:23:57



Date: 13.MAR.2008 10:24:24

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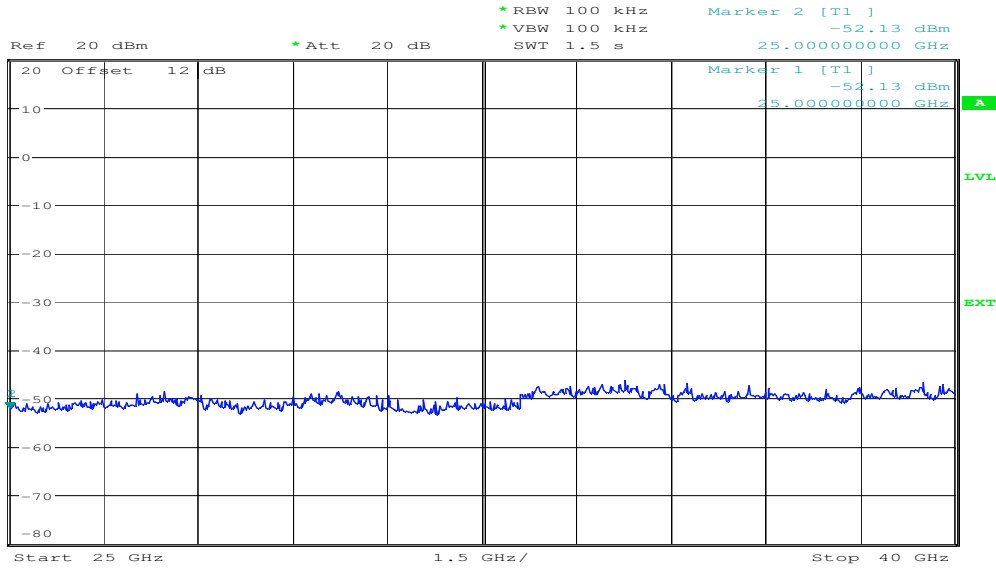
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1 PK
MAXH

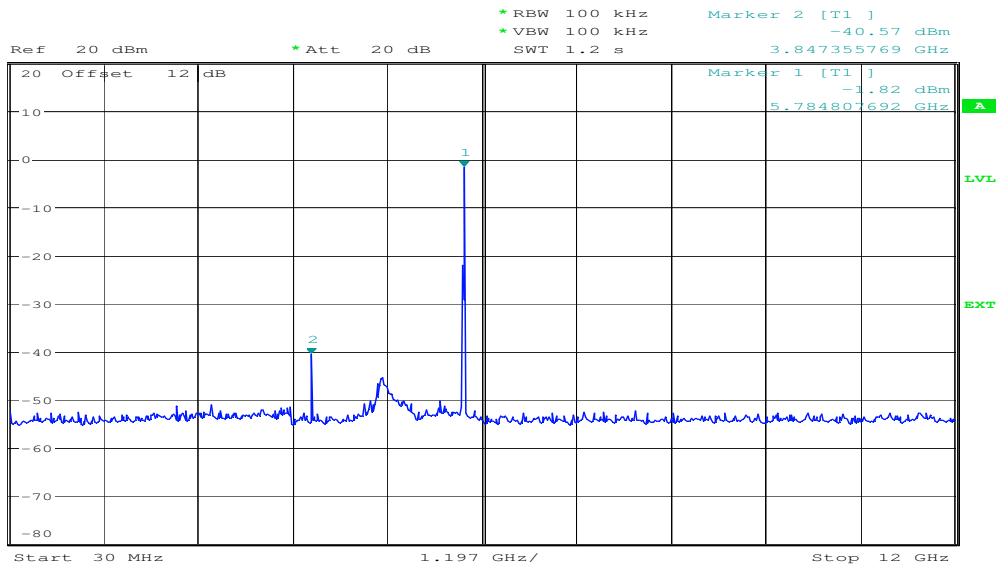


Date: 13.MAR.2008 10:24:49

5785 MHz



1 PK
MAXH



Date: 13.MAR.2008 10:36:03

SRD-Testreport

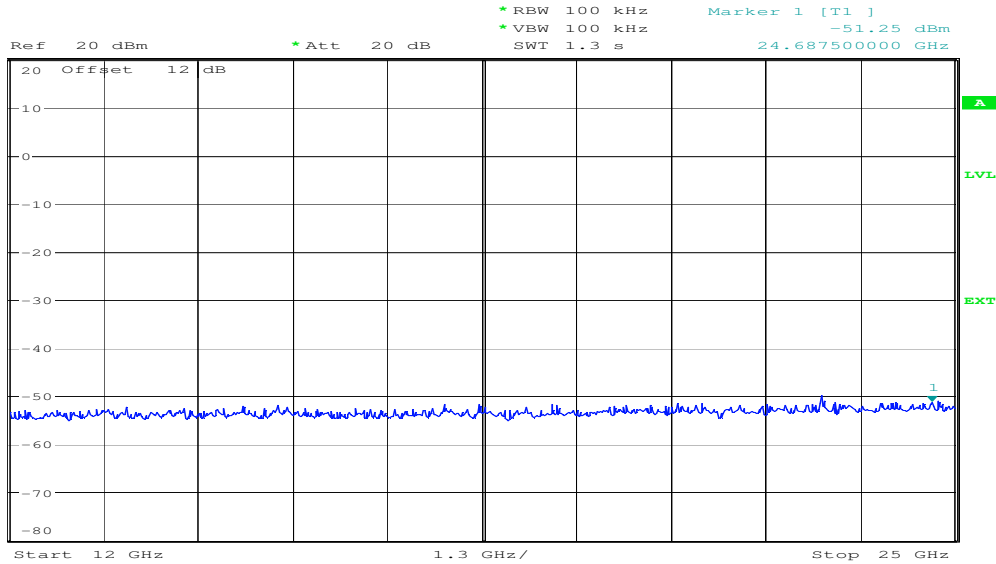
CETECOM ICT Services GmbH Saarbruecken, Germany



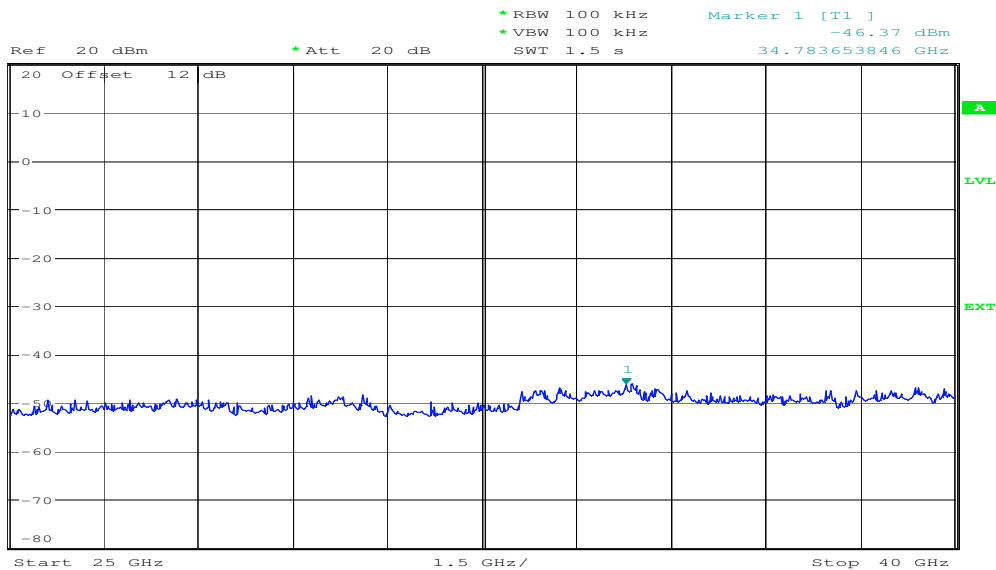
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Date: 13.MAR.2008 10:34:33



Date: 13.MAR.2008 10:34:02

SRD-Testreport

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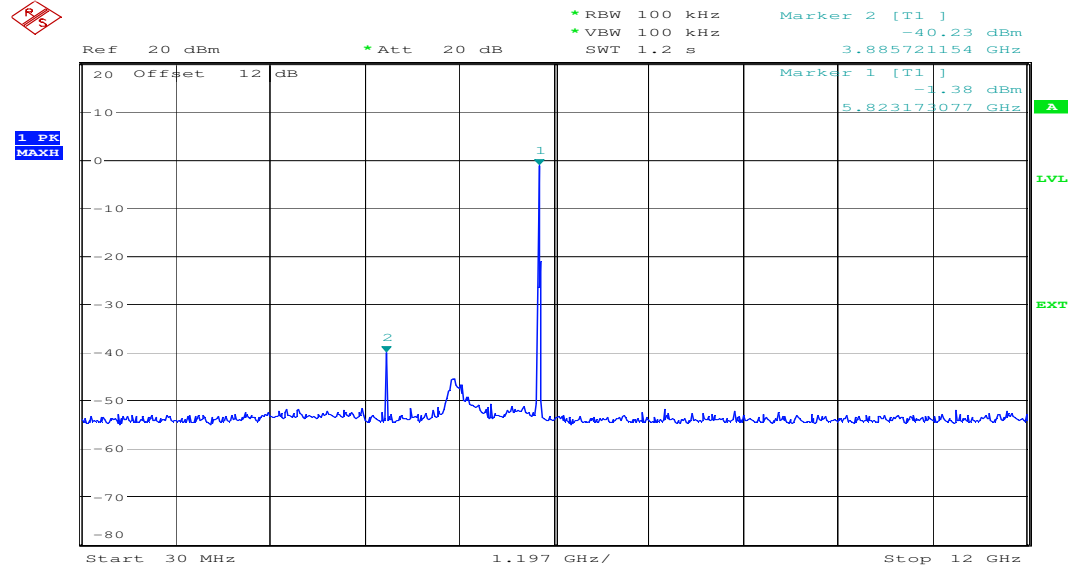


Test report No.: 2-4856-02-04/07

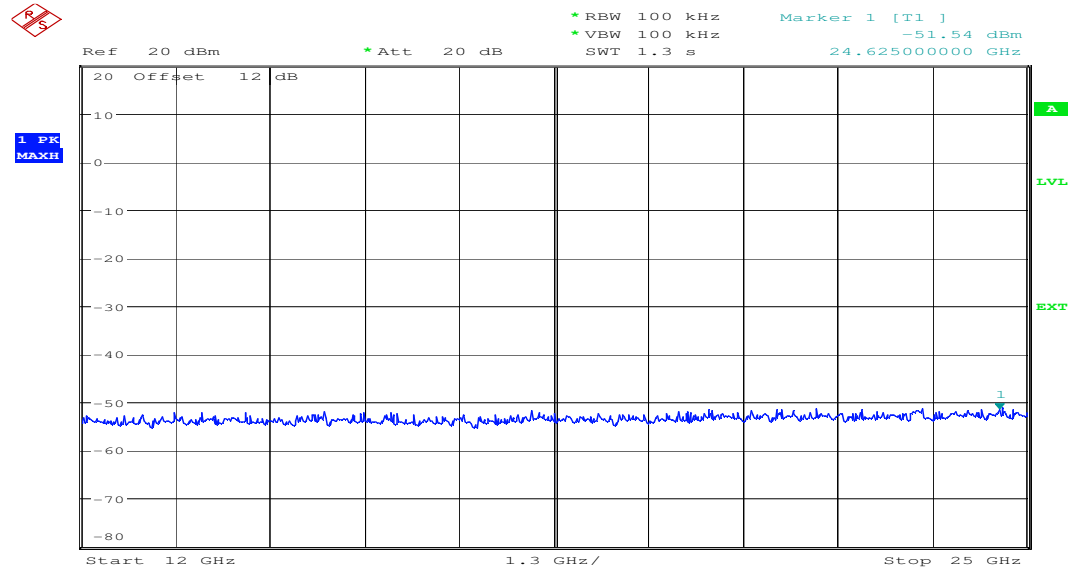
Date: 2008-03-26

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5825 MHz



Date: 13.MAR.2008 10:36:51



Date: 13.MAR.2008 10:37:20

SRD-Testreport

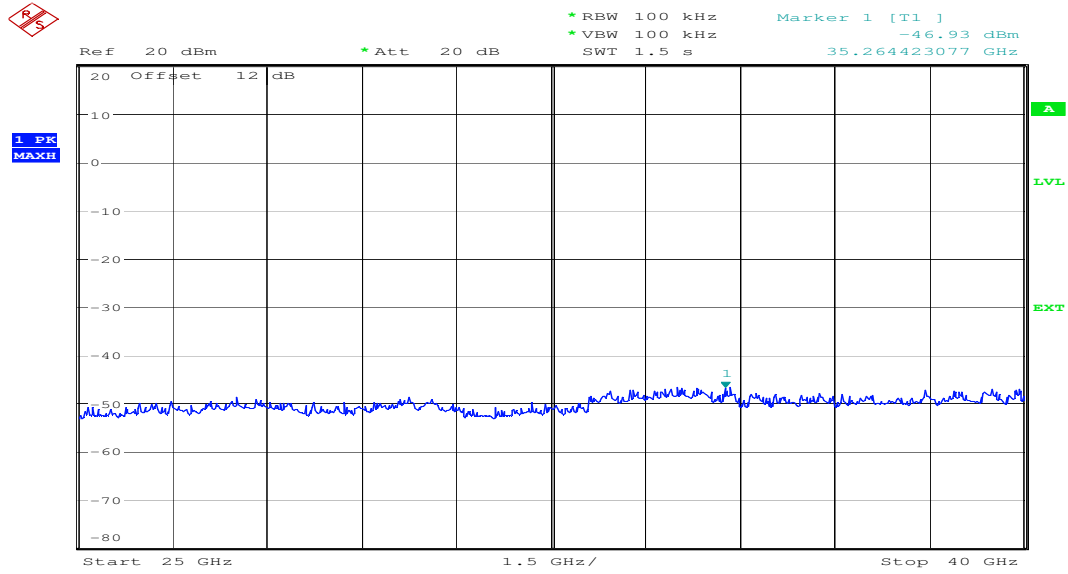
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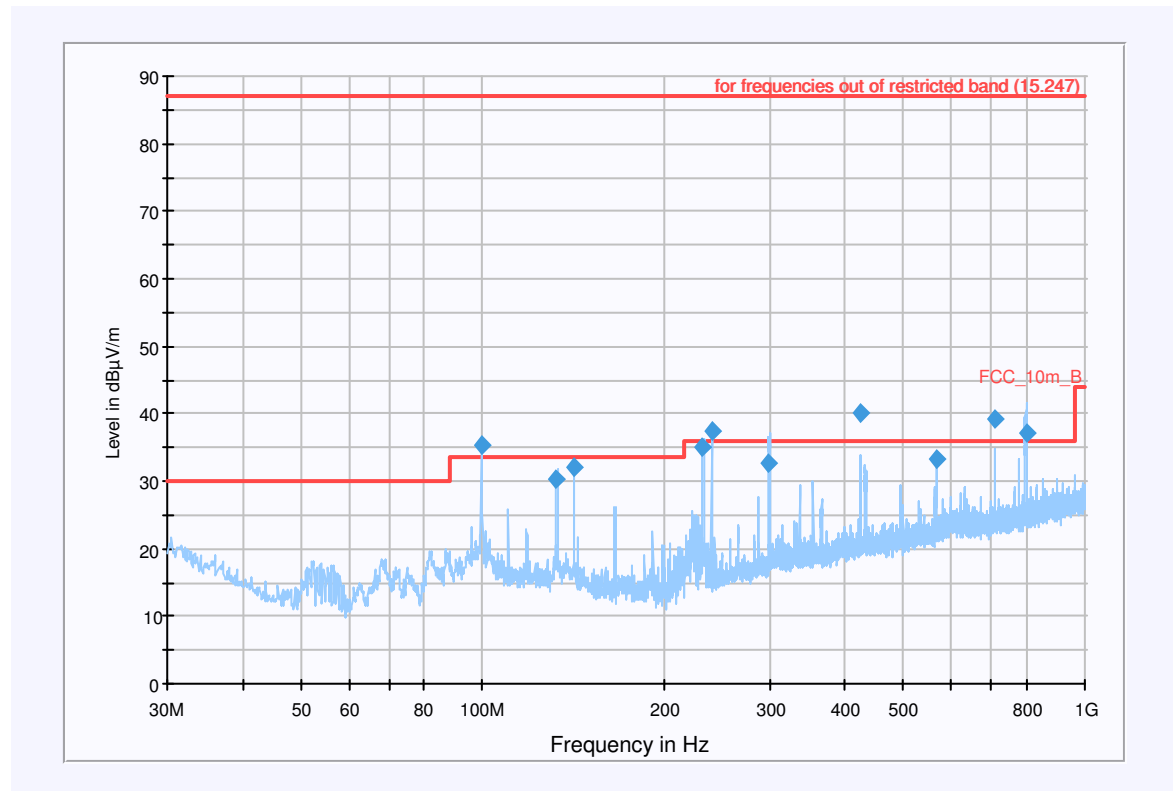


Date: 13.MAR.2008 10:37:47

3.12 Spurious Emissions - radiated (Transmitter)

§15.209

Plot 1: 0.03 - 1GHz vertical / horizontal (lowest channel)



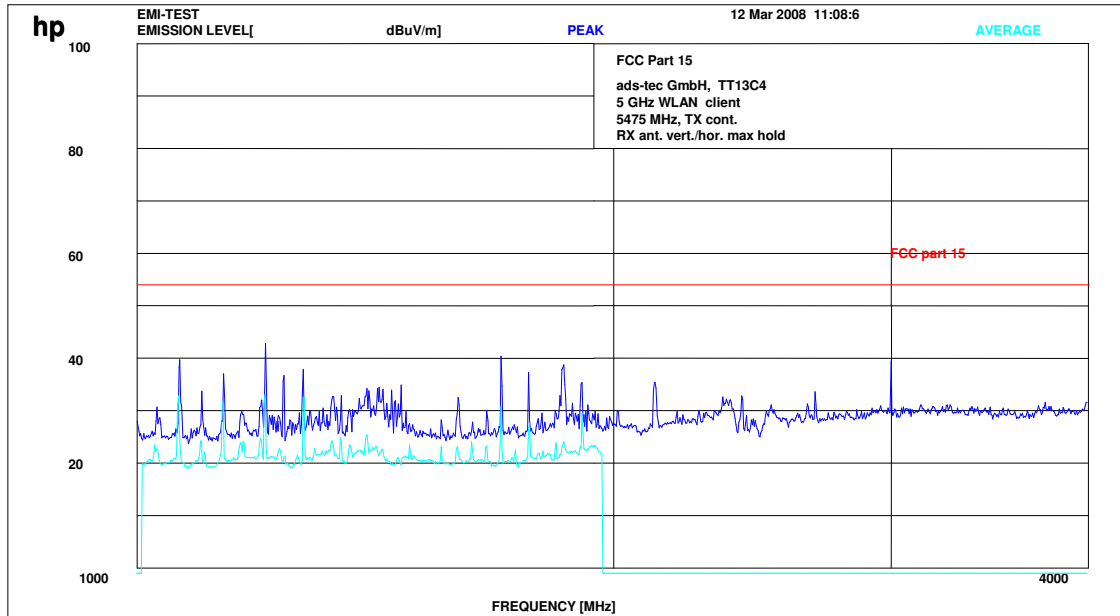
Final Measurement Detector 1

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
99.852600	35.4	15000.000	120.000	127.0	V	55.0	12.8	-1.9	33.5	No restr.band
132.822000	30.2	15000.000	120.000	114.0	V	45.0	13.3	3.3	33.5	
141.716100	32.1	15000.000	120.000	115.0	V	103.0	12.8	1.4	33.5	No restr.band
232.289300	34.9	15000.000	120.000	100.0	V	34.0	13.1	1.1	36.0	No restr.band
239.999150	37.5	15000.000	120.000	100.0	V	80.0	13.6	-1.5	36.0	No restr.band
299.356450	32.6	15000.000	120.000	100.0	V	92.0	16.0	3.4	36.0	No restr.band
425.130350	40.1	15000.000	120.000	200.0	H	5.0	19.0	-4.1	36.0	No restr.band
566.892150	33.3	15000.000	120.000	283.0	V	0.0	20.9	2.7	36.0	No restr.band
708.561550	39.2	15000.000	120.000	124.0	H	53.0	21.8	-3.2	36.0	No restr.band
798.215400	37.2	15000.000	120.000	115.0	H	272.0	22.8	-1.2	36.0	No restr.band

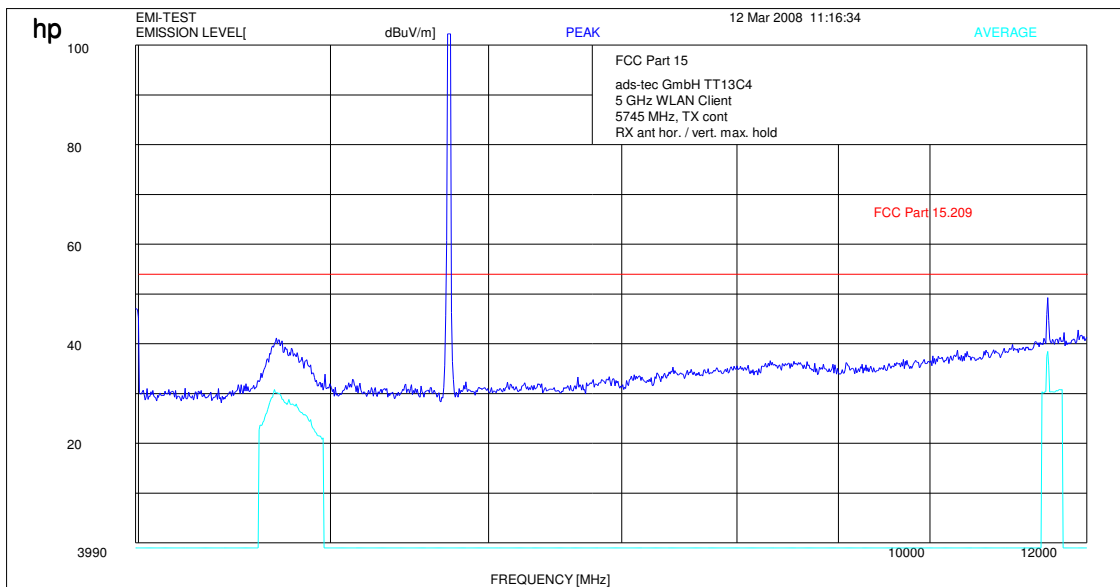
Calculated Limit for frequencies out of restricted bands

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
99.852600	35.4	15000.000	120.000	127.0	V	55.0	12.8	51.6	87	
132.822000	30.2	15000.000	120.000	114.0	V	45.0	13.3	3.3	33.5	Restr. band
141.716100	32.1	15000.000	120.000	115.0	V	103.0	12.8	54.9	87	
232.289300	34.9	15000.000	120.000	100.0	V	34.0	13.1	52.1	87	
239.999150	37.5	15000.000	120.000	100.0	V	80.0	13.6	49.5	87	
299.356450	32.6	15000.000	120.000	100.0	V	92.0	16.0	54.4	87	
425.130350	40.1	15000.000	120.000	200.0	H	5.0	19.0	46.9	87	
566.892150	33.3	15000.000	120.000	283.0	V	0.0	20.9	53.7	87	
708.561550	39.2	15000.000	120.000	124.0	H	53.0	21.8	47.8	87	
798.215400	37.2	15000.000	120.000	115.0	H	272.0	22.8	49.8	87	

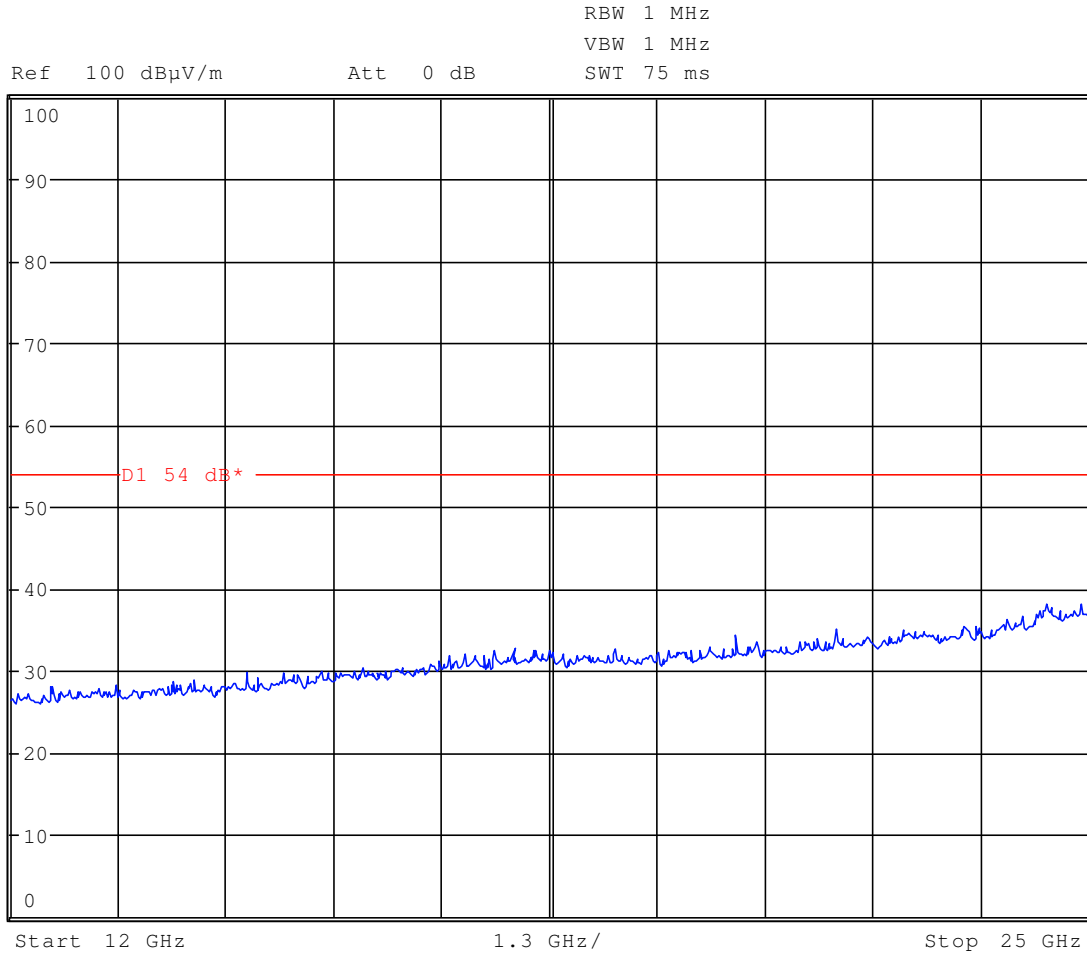
Plot 2: 1-4 GHz (lowest channel)



Plot 3: 4-12 GHz (lowest channel)



Plot 4: 12 – 25 GHz horizontal / vertical (valid for all three channels)



There were no peaks found.

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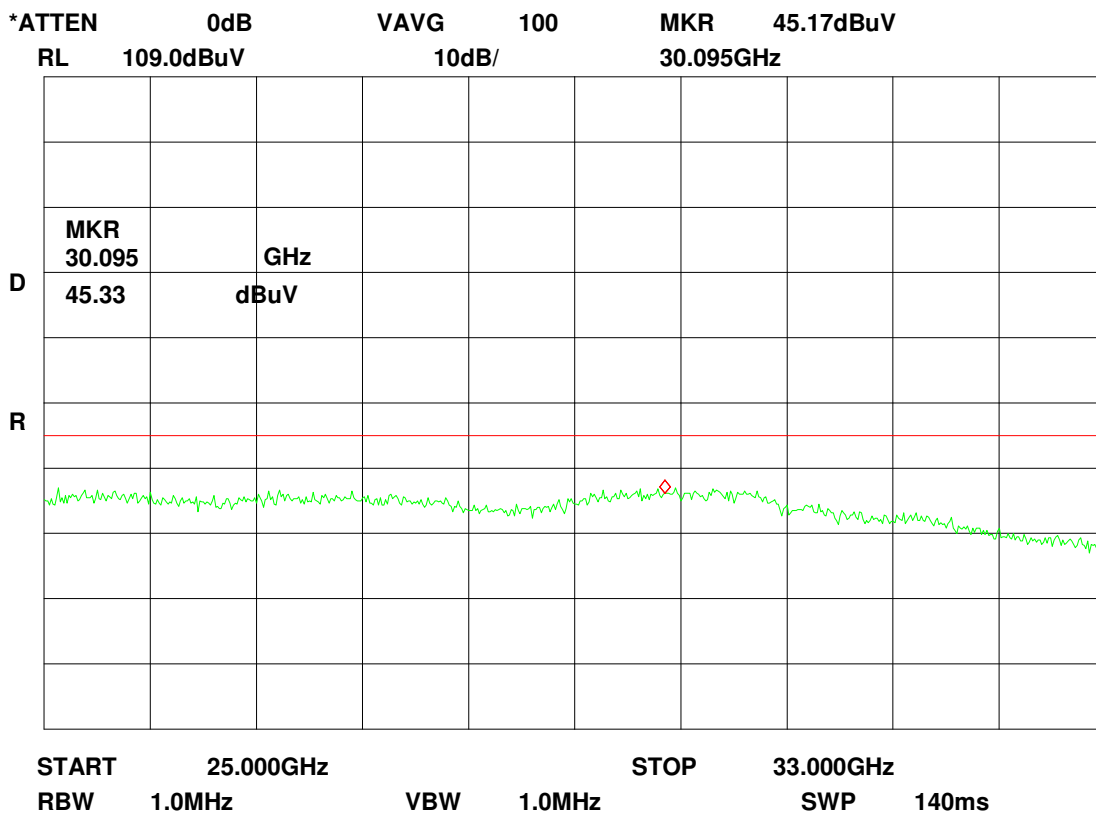


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Plot 5: 25 - 33 GHz horizontal / vertical (valid for all three channels)



Calculation: Field strength = analyzer reading + cable loss - amplifier gain + antenna factor

$$e \text{ [dB}(\mu\text{V/m)}] = u \text{ [dB}(\mu\text{V)}] + a \text{ [dB]} - g \text{ [dB]} + k \text{ [dB(1/m)]}$$

see page 9-11

The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.

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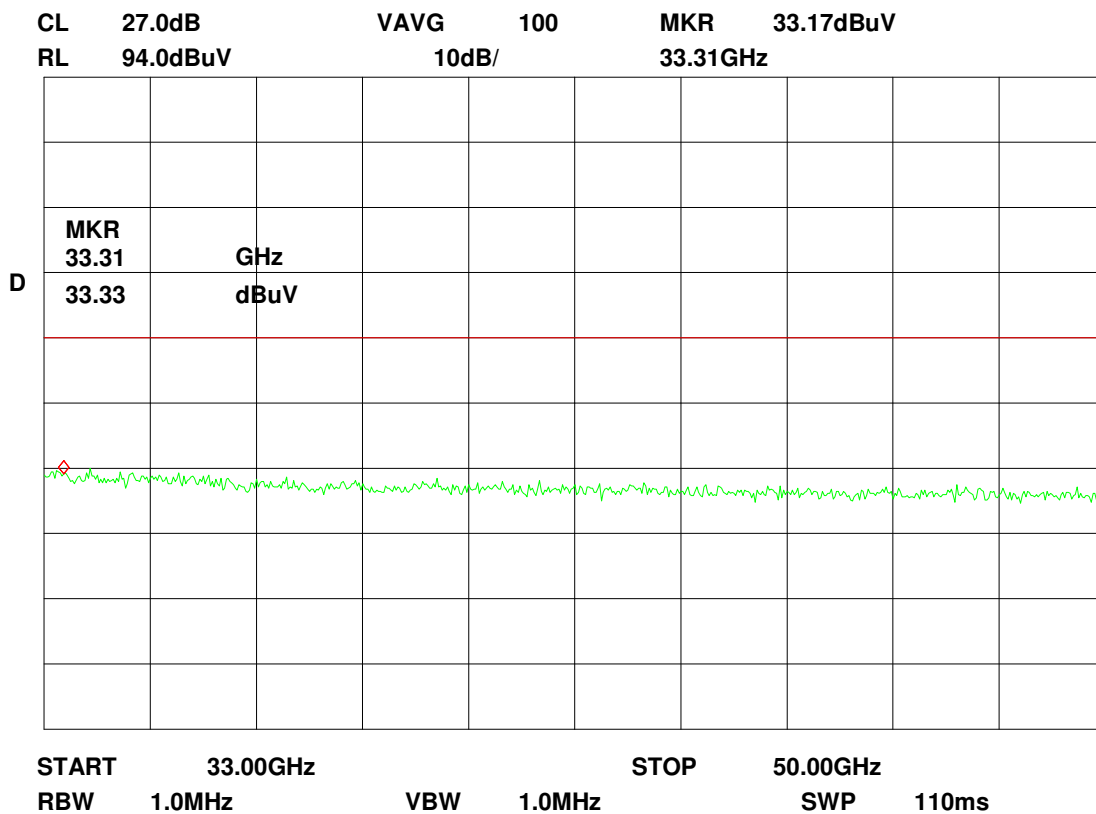


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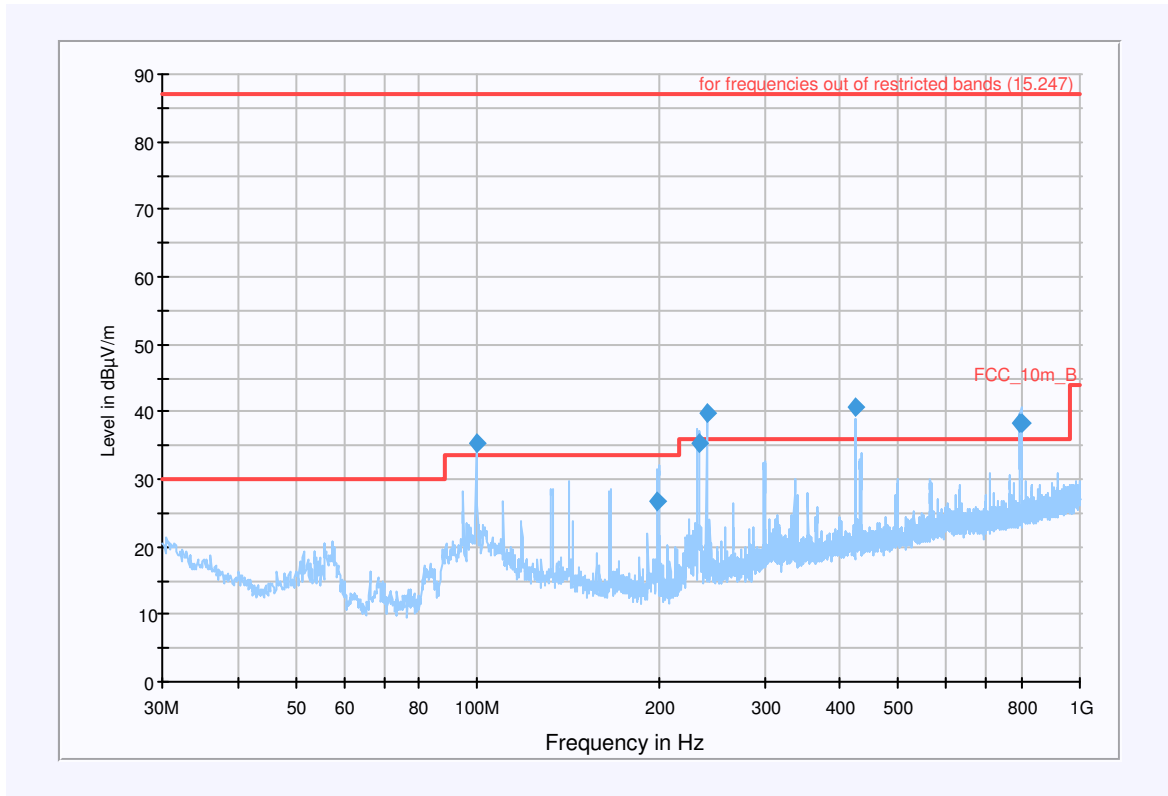
Plot 6: 33 – 50 GHz horizontal / vertical (valid for all three channels)



Calculation: Field strength = analyser reading + antenna factor - distance correction
 $e \text{ [dB}(\mu\text{V/m)}] = u \text{ [dB}(\mu\text{V)}] + k \text{ [dB(1/m)}] - d \text{ [dB]}$
 see page 9-11

The offset (antenna factor - distance correction) is considered in the analyzer reading.

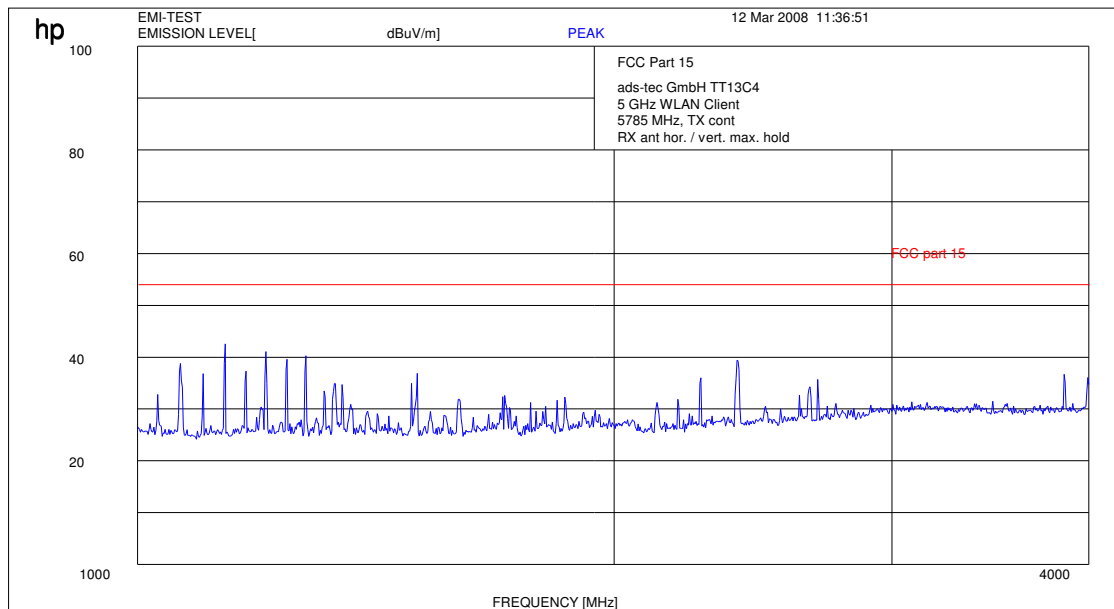
Plot 7: 0.03 - 1 GHz vertical / horizontal (middle channel)



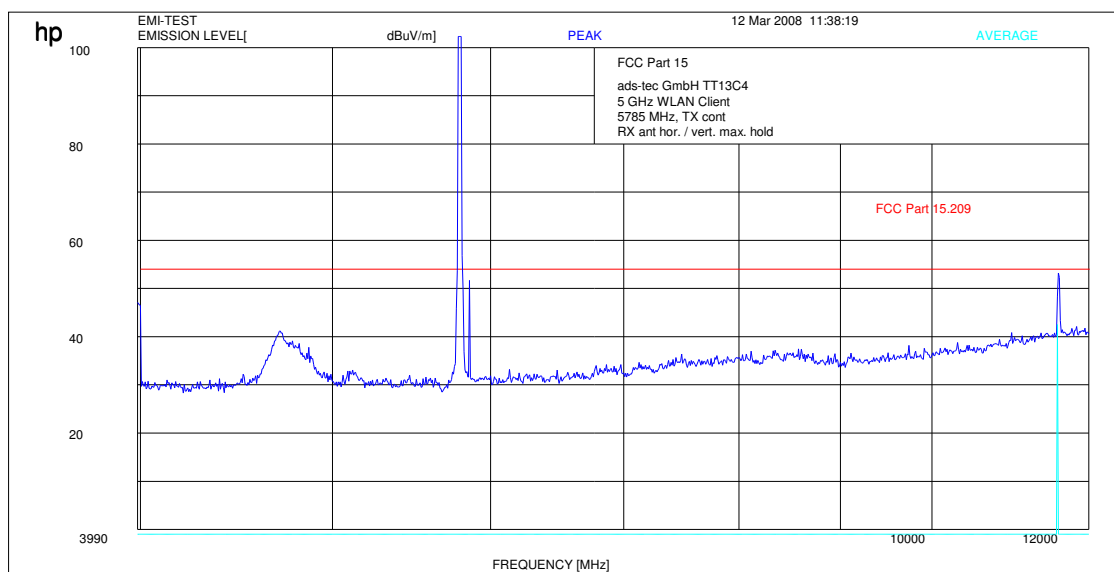
Final Measurement Detector 1

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
99.615300	35.4	15000.000	120.000	168.0	V	43.0	12.7	51,6	87	No restr.band
199.399200	26.8	15000.000	120.000	100.0	V	29.0	10.6	60,2	87	No restr.band
232.729400	35.5	15000.000	120.000	115.0	V	40.0	13.1	51,5	87	No restr.band
239.995400	39.8	15000.000	120.000	100.0	V	81.0	13.6	47,2	87	No restr.band
425.136050	40.7	15000.000	120.000	198.0	H	-1.0	19.0	56,3	87	No restr.band
796.770600	38.3	15000.000	120.000	100.0	H	272.0	22.8	48,7	87	No restr.band

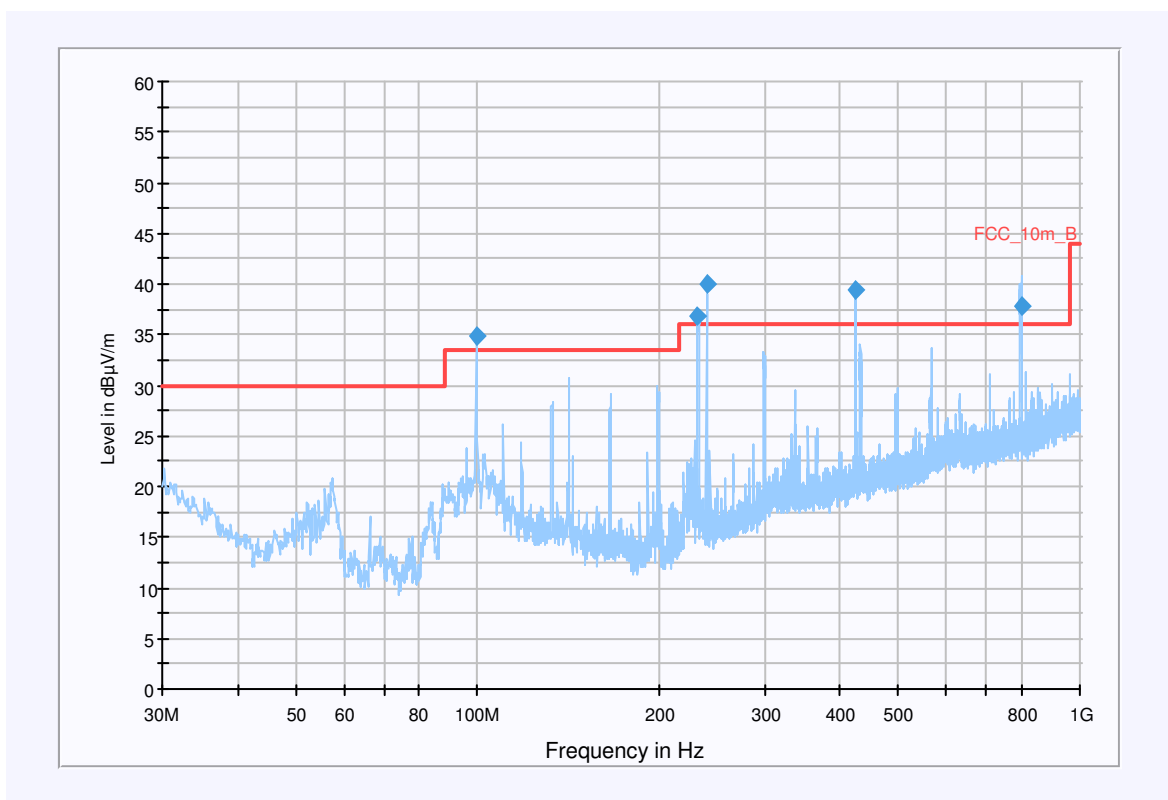
Plot 8: 1- 4 GHz (middle channel)



Plot 9: 4 - 12 GHz (middle channel)



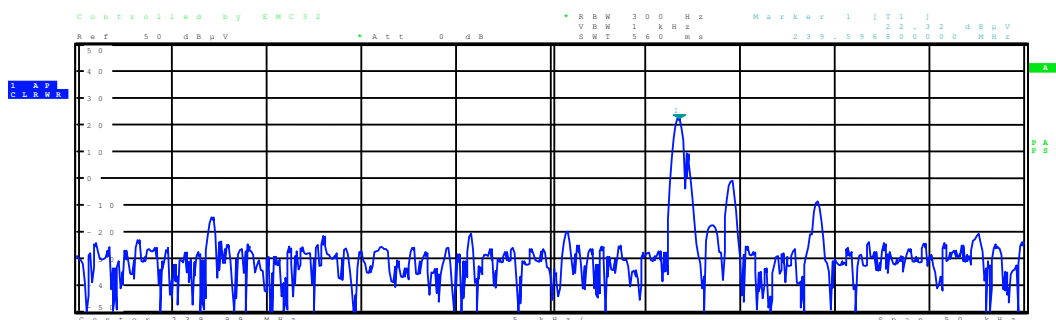
Plot 10: 0.03 - 4 GHz vertical / horizontal (highest channel)



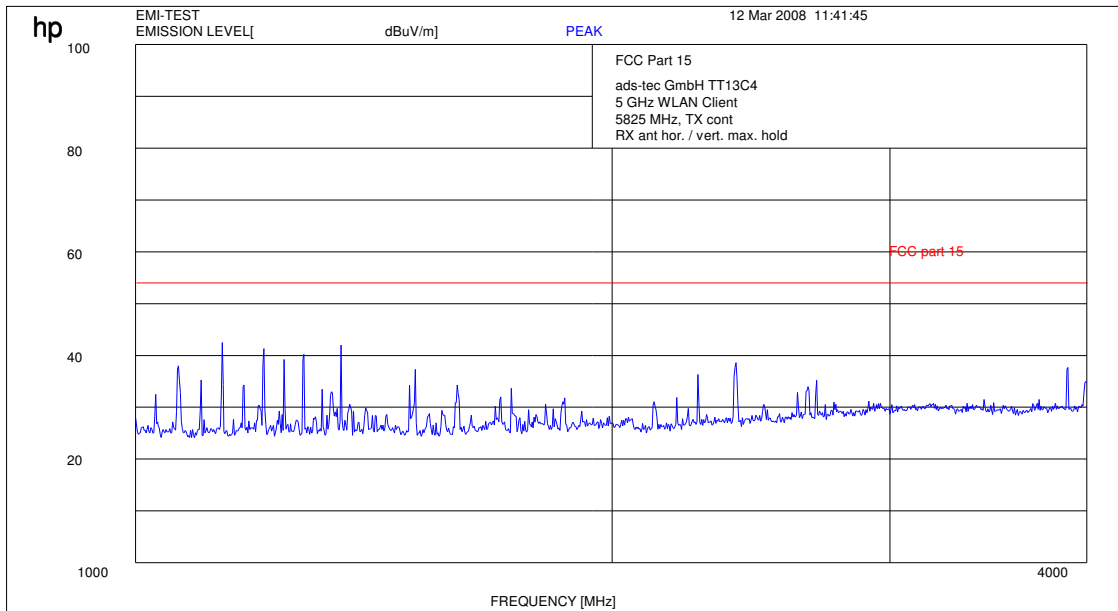
Final Measurement Detector 1

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
99.608550	34.9	15000.000	120.000	150.0	V	64.0	12.7	-1.4	33.5	No restr.band
232.381250	36.8	15000.000	120.000	100.0	V	46.0	13.1	-0.8	36.0	No restr.band
240.005000	39.9	15000.000	120.000	100.0	V	74.0	13.6	-3.9	36.0	No restr.band
425.105600	39.5	15000.000	120.000	204.0	H	1.0	19.0	-3.5	36.0	No restr.band
798.033250	37.9	15000.000	120.000	124.0	H	307.0	22.8	-1.9	36.0	No restr.band

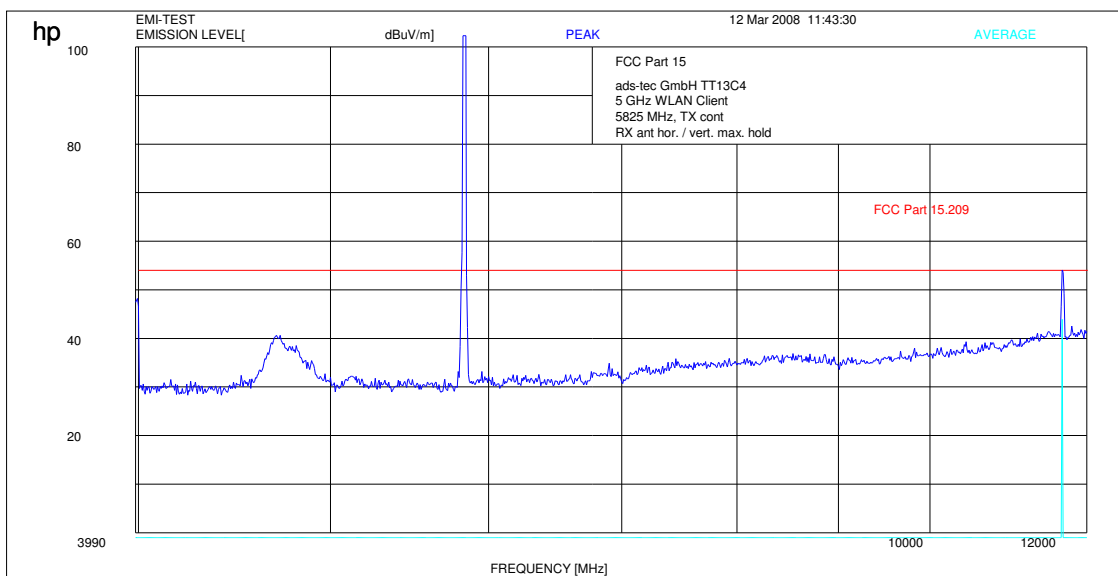
Next plot shows the real emission just below 240 MHz. It is 239.597 MHz, measured with 300 Hz RBW.



Plot 11: 1 – 4 GHz (highest channel)



Plot 12: 4 - 12 GHz (highest channel)



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Results: (black line on the plots)

SPURIOUS EMISSIONS LEVEL §15.209								
5745 MHz			5785 MHz			5825 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
11490	AV	39.6	11570	AV	46.7	11650	AV	44.5
all	other	peaks	> 20 dB	below	limit	line		
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits: § 15.247 (d)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

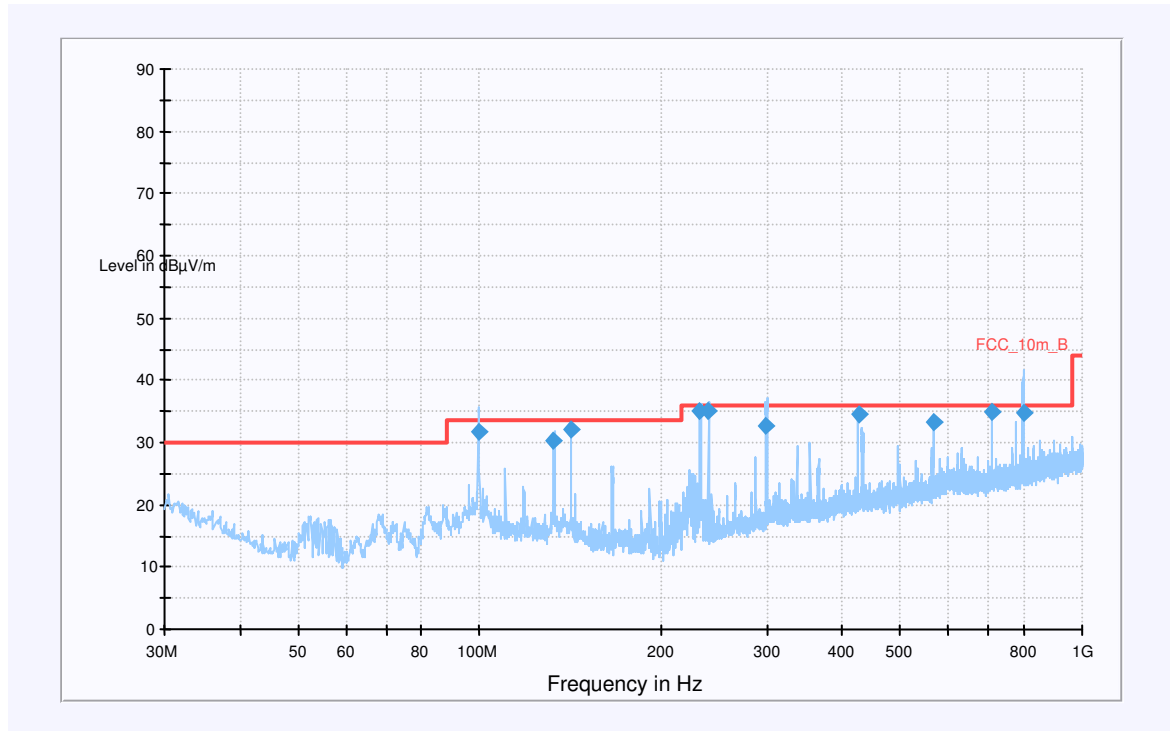
Limits: § 15.209

Frequency [MHz]	Field strength [µV/m]	Measurement distance (m)
30 - 88	100 (40 dBµV/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3
above 960	500 (54 dBµV/m)	3

3.13 Spurious Emissions - radiated Receiver

§15.109 / 209

Plot 1: 0.03 - 1 GHz vertical / horizontal (receiver)



Final Measurement Detector 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
99.852600	30.4	15000.000	120.000	127.0	V	55.0	12.8	3.1	33.5	No restr.band
132.822000	30.2	15000.000	120.000	114.0	V	45.0	13.3	3.3	33.5	Restr. band
141.716100	32.1	15000.000	120.000	115.0	V	103.0	12.8	1.4	33.5	No restr.band
232.289300	34.9	15000.000	120.000	100.0	V	34.0	13.1	1.1	36.0	No restr.band
239.999150	34.5	15000.000	120.000	100.0	V	80.0	13.6	1.5	36.0	No restr.band
299.356450	32.6	15000.000	120.000	100.0	V	92.0	16.0	3.4	36.0	No restr.band
425.130350	34.9	15000.000	120.000	200.0	H	5.0	19.0	1.1	36.0	No restr.band
566.892150	33.3	15000.000	120.000	283.0	V	0.0	20.9	2.7	36.0	No restr.band
708.561550	35.2	15000.000	120.000	124.0	H	53.0	21.8	0.8	36.0	No restr.band
798.215400	35.2	15000.000	120.000	115.0	H	272.0	22.8	0.8	36.0	No restr.band

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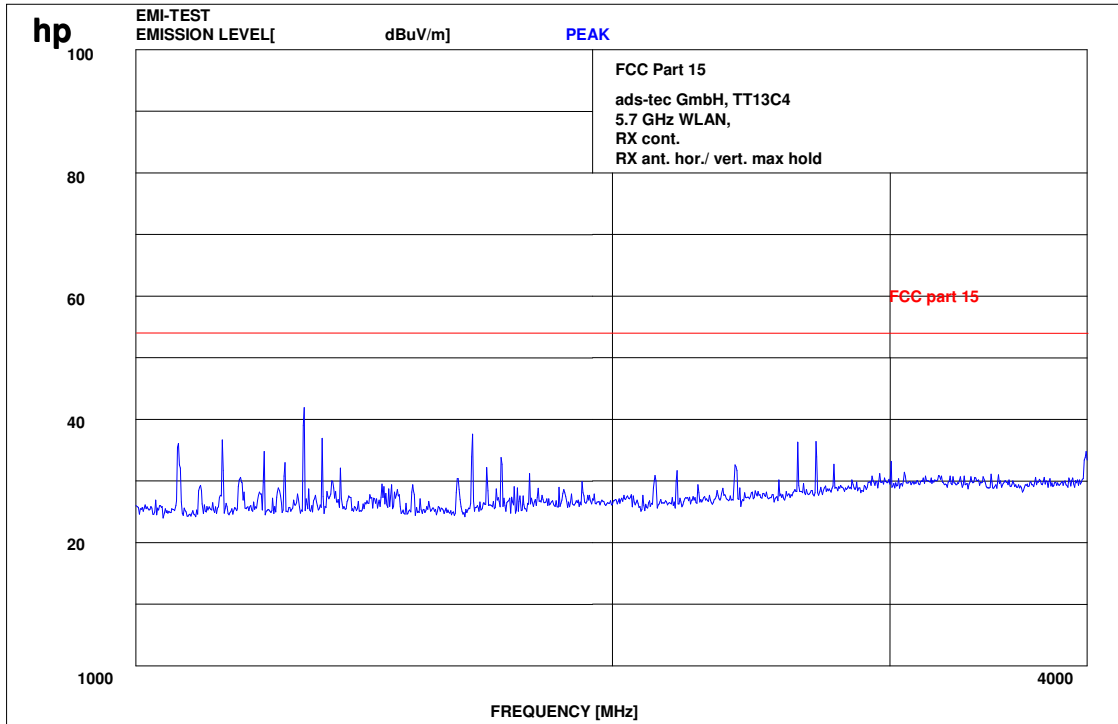


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Plot 2: 1- 4 GHz (receiver)



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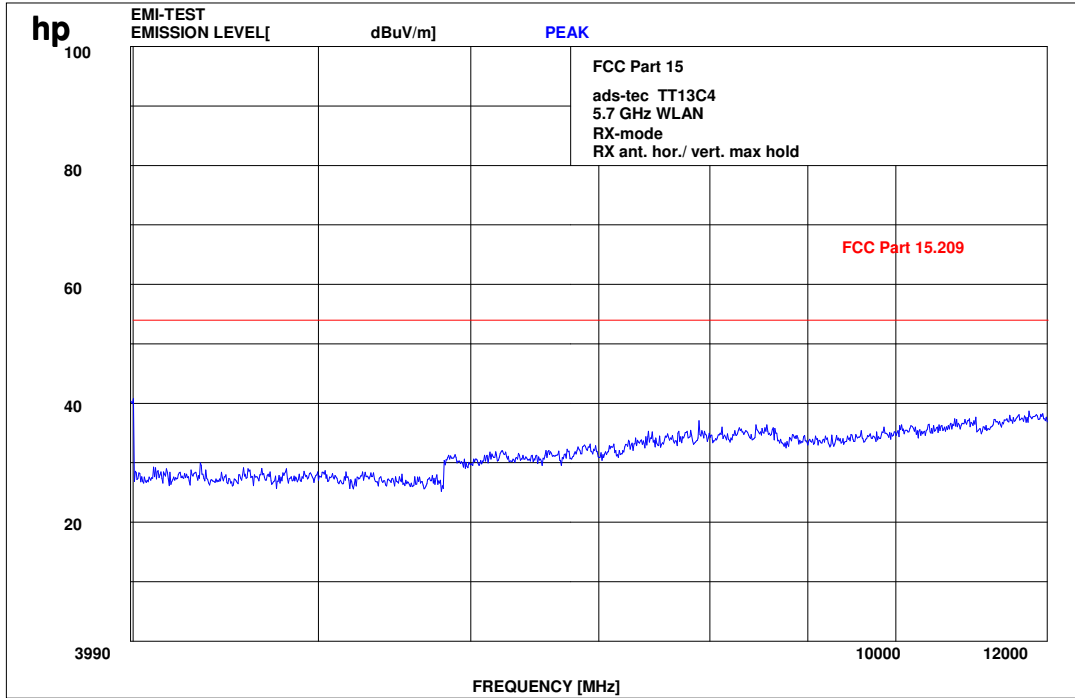


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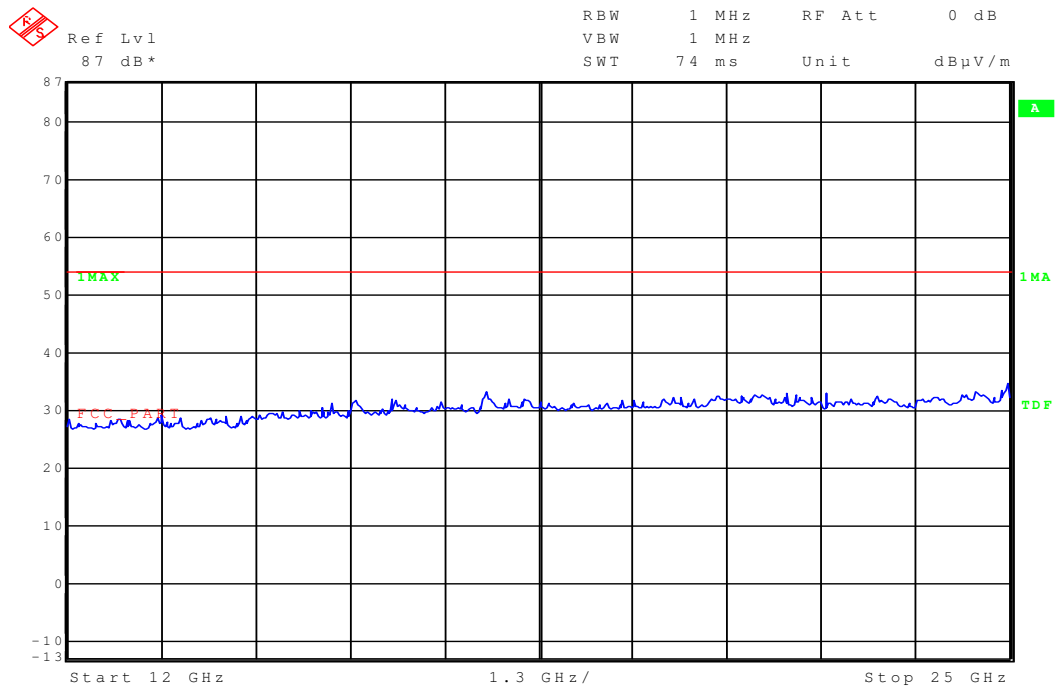
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Plot 3: 4- 12 GHz (receiver)



Plot 4: 12- 25 GHz (receiver)



The measurements were performed up to 40 GHz. There were no peaks found.

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Results:

Spurious Emissions level [$\mu\text{V/m}$]								
CH 1 / 2 / 3								
f[MHz]	Detector	Level [$\mu\text{V/m}$]	f[MHz]	Detector	Level [$\mu\text{V/m}$]	f[MHz]	Detector	Level [$\mu\text{V/m}$]
All peaks were > 20 dB below limit line with AV detector								
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz
see above plots

f ≥ 1GHz : RBW/VBW: 1 MHz

Measurement distance see table

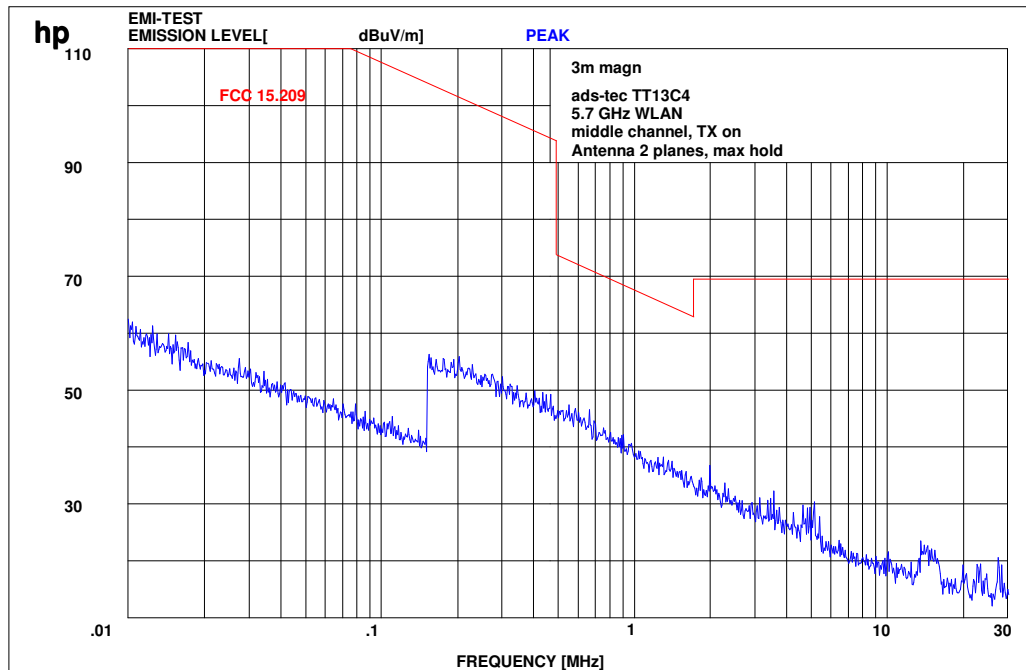
Limits : § 15.109 / 209

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100 (40 dB $\mu\text{V/m}$)	3
88 - 216	150 (43.5 dB $\mu\text{V/m}$)	3
216 - 960	200 (46 dB $\mu\text{V/m}$)	3
above 960	500 (54 dB $\mu\text{V/m}$)	3

3.14 Spurious Emissions - radiated <30 MHz

§15.209

Transmit mode, valid for all three channels



Measured at 3 m distance.

Values recalculated with 40 dB/decade according to FCC rules.

Limits:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dB $\mu\text{V/m}$	30
30 - 88	100 / 40 dB $\mu\text{V/m}$	3
88 - 216	150 / 43.5 dB $\mu\text{V/m}$	3
216 - 960	200 / 46 dB $\mu\text{V/m}$	3
above 960	54 dB $\mu\text{V/m}$	3

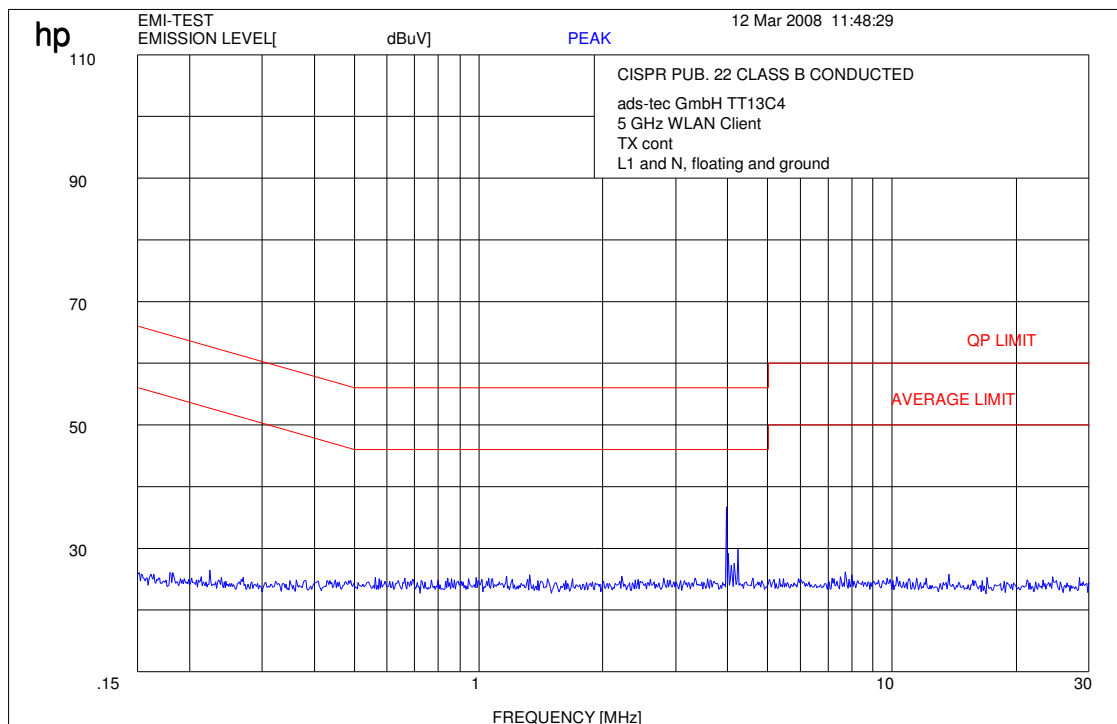
3.15 Conducted Emissions <30 MHz

§15.107/207

(measured with the 115V AC power supplied by the customer)

Transmit mode

Plot 1: CISPR 22



We measured L1 and N floating and grounded, max value was hold.

Limits :

Under normal test conditions only	0.15 to 0.5 MHz, 66-56 dB μ V QP, 56-46 dB μ V AV 0.5 to 5.0 MHz, 56 dB μ V QP, 46 dB μ V AV 5.0 to 30 MHz, 60 dB μ V QP, 50 dB μ V AV
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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		G00013834L 461	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	11138363000 004	3000002681	n.a.		
32	RF-cable set	R&S	N/A	3000002681	n.a.		
33	IEEE-cables	R&S	N/A	3000002681	n.a.		

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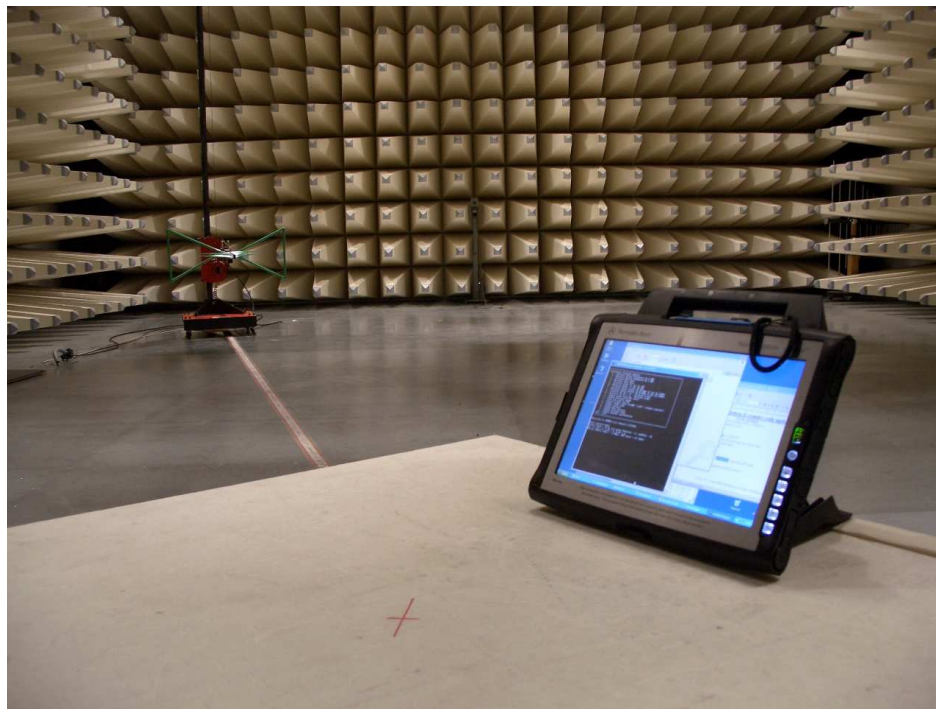
34	Sampling System FSIQ-B70	R&S	835355/009	3000002681	s.No.7		
35	RSP programmable attenuator	R&S	834500/010	3000002681-0007	01.08.2006	24	01.08.2008
36	Signalling Unit	R&S	838312/011	3000002681	n.a.		
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
38	Climatic box VT 4002	Heraeus 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.		

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	08.11.2006	24	08.11.2008
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	08.11.2006	24	08.11.2008
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	08.11.2006	24	08.11.2008
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010

5 Photographs of test site

Test site Radiated Emissions:



Test site Radiated Emissions:



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AC-conducted:



6 Photographs of equipment under test

Photograph No.: 1



Photograph No.: 2



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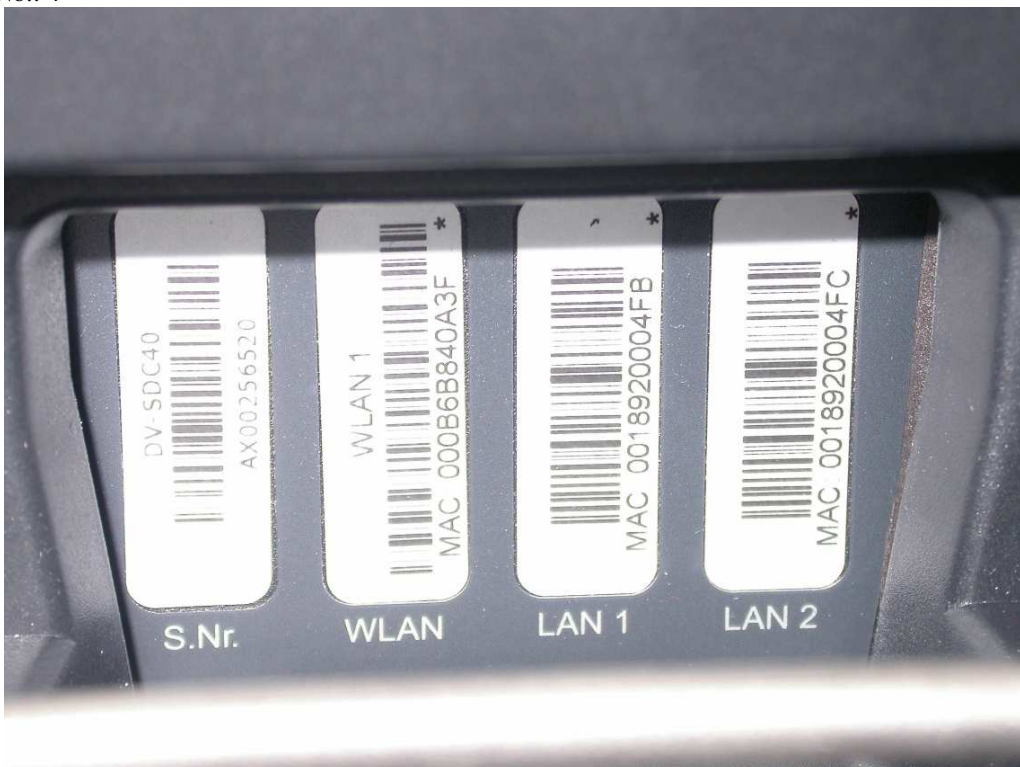
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Photograph No.: 3



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Photograph No.: 7



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Photograph No.: 10



Photograph No.: 11



Photograph No.: 12



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Photograph No.: 14



Photograph No.: 15



Photograph No.: 16

