



Accredited testing-laboratory

DAR registration number: DGA-PL-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)

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Test report no. : 1-1440-01-09/09 A
Type identification : OPS9955
Applicant : KAPSCH TrafficCom AG
FCC ID : XZU9955
IC Certification No : -/-
Test standards : 47 CFR Part 95 L
47 CFR Part 2
ASTM E2213
IEEE 802.11a

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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:

2010-01-28

Marco Bertolino



Date

Name

Signature

2010-01-28

Stefan Bös



Date

Name

Signature

Technical responsibility for area of testing:

2010-01-28

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: DGA-PL-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:	KAPSCH TrafficCom AG
Street:	Am Europlatz 2
Town:	1120 Vienna
Country:	AUSTRIA
Telephone:	+43 50811 7857
Fax:	+43 50811 2209
Contact:	Herbert Diemling
E-mail:	herbert.diemling@kapsch.net
Telephone:	+43 50811 7857

1.4 Application details

Date of receipt of order:	2009-07-21
Date of receipt of test item:	2009-11-23
Date of start test:	2009-11-23
Date of end test:	2009-12-11
Persons(s) who have been present during the test:	Mr. Egger Mr. Peter

2 Test standard/s

47 CFR Part 2	2008-10	Frequency allocations and radio treaty matters; GENERAL RULES AND REGULATIONS
47 CFR Part 95	2008-10	Title 47 of the Code of Federal Regulations; Part 95 Personal Radio Services / subpart L - Dedicated Short Range Communications Service On-Board Units (DSRCS-OBUs)
IEEE 802.11 a	1999/2000	Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications High-speed Physical Layer in the 5 GHz Band
ASTM E2213	2003	Standard Specification for Telecommunications and Information Exchange between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications

3 Technical tests

3.1 Details of manufacturer

Name:	KAPSCH TrafficCom AG
Street:	Am Europlatz 2
Town:	1120 Vienna
Country:	AUSTRIA

3.1.1 Test item

Kind of test item	:	Transceiver OPS9955
Type identification	:	OPS9955
S/N serial number	:	Unit 1: GFQ00295 (Radiated sample) Unit 2: GFQ00294 (Conducted sample)
HW hardware status	:	No information available!
SW software status	:	No information available!
Frequency Band [MHz]	:	5860 MHz – 5920 MHz
Type of Modulation	:	OFDM → BPSK / 64 QAM
Emission designator	:	8M32GXD
Number of channels	:	9
Antenna	:	Integrated PCB antenna – for more information, please take a look at sub clause 8 → Photos of the EUT
Power Supply	:	115 AC / 12 DC by mains adapter GFP241DA-1220B-1
Temperature Range	:	-20°C to +55 °C

Max. power radiated: 11.62 dBm
Max. power conducted: 9.58 dBm

FCC ID: XZU9955
IC: -/-

3.1.2 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	20
Nominal Humidity	H _{nom}	%	43
Nominal Power Source	V _{nom}	V	115 / 12

Type of power source: 115 AC / 12 DC by mains adapter GFP241DA-1220B-1

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

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 95 L, 802.11 a, ASTM E2213	PASS	2010-01-28	-/-

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
None	Antenna Gain	Yes			
ASTM – 8.9.2 Part 95	Spectrum Bandwidth of a OFDM System / 20dB BW	Yes			
ASTM Table3 Part 95	Modulation characteristics	Yes			
ASTM – 8.9.2 Part 95	Transmit Spectrum Mask	Yes			
ASTM – 8.9.4 Part 95	Transmit Center Frequency Tolerance	Yes			
ASTM – 8.9.1 Part 95	Maximum output power (conducted)	Yes			
ASTM – 8.9.1 Part 95	Max. peak output power (radiated)	Yes			
ASTM – 8.9.2 Part 95	Spurious Emission - conducted (Transmitter)	Yes			
ASTM – 8.9.2 Part 95	Spurious Emission -radiated (Transmitter)	Yes			

5 RF measurement testing

5.1 Measurements and results

For Part 2 / Part 95 we use the substitution method (TIA/EIA 603).

5.2 Referenced Documents

None

5.3 Additional comments

Setting antenna port: software power setting 7 = 10 dBm

The EUT has two switchable antenna connectors Port 1 and Port 2. Both show the same behaviour. All measurements are performed with port 1. These two antenna ports can only be switched internally to increase the coverage of the antenna range and they can't be activated together at the same time..

5.4 Antenna gain

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Results:

	low channel 5860 MHz	mid channel 5890 MHz	mid channel 5900 MHz	high channel 5920 MHz
Conducted power [dBm] (<i>measured</i>)	9.58	9.35	9.43	9.24
Radiated power [dBm] (<i>measured</i>)	11.62	11.32	10.93	10.47
Gain [dBi] (<i>calculated</i>)	2.04	1.97	1.50	1.23

5.5 Frequency Tolerance (according ASTM §8.9.4 / IEEE 802.11 a 17.3.9.4 / § 2.1055)

Results:

Temperatur	5860 MHz F	5860 MHz kHz / PPM	5890 MHz F	5890 MHz kHz / PPM	5900 MHz F	5900 MHz kHz / PPM
55 C°	5859.9700	-22.9 / -3.91	5889.9701	-22.5 / -3.82	5899.9701	-22.4 / -3.80
40 C°	5859.9683	-24.6 / -4.20	5889.9680	-24.6 / -4.18	5899.9680	-24.5 / -4.15
30 C°	5859.9704	-22.5 / -3.84	5889.9770	-15.6 / -2.65	5899.9770	-15.5 / -2.63
20 C°	5859.9929	0 / 0	5889.9926	0 / 0	5899.9925	0 / 0
20 C° V low	5859.9929	No deviation.	5889.9926	No deviation.	5899.9925	No deviation.
20 C° V high	5859.9929	No deviation.	5889.9926	No deviation.	5899.9925	No deviation.
10 C°	5860.0069	14.0 / 2.39	5890.0070	14.4 / 2.44	5900.0070	14.5 / 2.46
0 C°	5860.0212	28.3 / 4.83	5890.0211	28.5 / 4.84	5900.0210	28.5 / 4.83
-10 C°	5860.0290	36.1 / 6.16	5890.0292	36.6 / 6.21	5900.0300	37.5 / 6.36
-20 C°	5860.0310	38.1 / 6.50	5890.0312	38.6 / 6.55	5900.0313	38.8 / 6.58

Temperatur	5920 MHz F	5920 MHz kHz / PPM	-/-	-/-	-/-	-/-
55 C°	5919.9702	-22.3 / -3.77				
40 C°	5919.9679	-24.6 / -4.16				
30 C°	5919.9769	-15.6 / -2.64				
20 C°	5919.9925	0 / 0				
20 C° V low	5919.9925	No deviation.				
20 C° V high	5919.9925	No deviation.				
10 C°	5920.0070	14.5 / 2.45				
0 C°	5920.0205	28.0 / 4.73				
-10 C°	5920.0301	37.6 / 6.35				
-20 C°	5920.0314	38.9 / 6.57				

Limits:

Under normal test conditions and extreme test condition (temperature & voltage)	The transmitted center frequency tolerance shall be ± 20 ppm maximum. (according IEEE 802.11 a 17.3.9.4)
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5.6 Modulation characteristics (ASTM Table 3 / § 2.1047 / § 95.631)

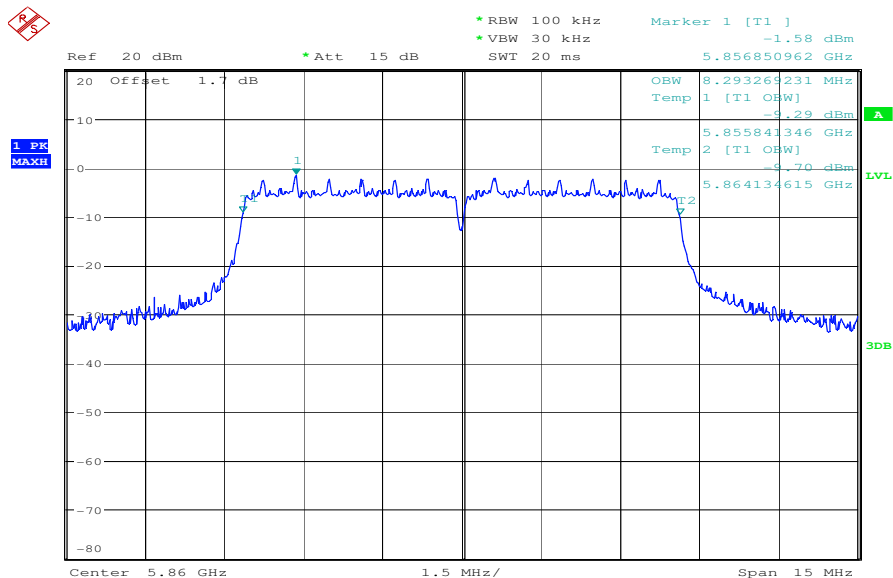
The EUT used for different data rates – different sub-carrier modulations!

3 Mbit/s data rate	BPSK modulation
4.5 Mbit/s data rate	BPSK modulation
6 Mbit/s data rate	QPSK modulation
9 Mbit/s data rate	QPSK modulation
12 Mbit/s data rate	16-QAM modulation
18 Mbit/s data rate	16-QAM modulation
24 Mbit/s data rate	64-QAM modulation
27 Mbit/s data rate	64-QAM modulation

Emission designator: 8M32GXD

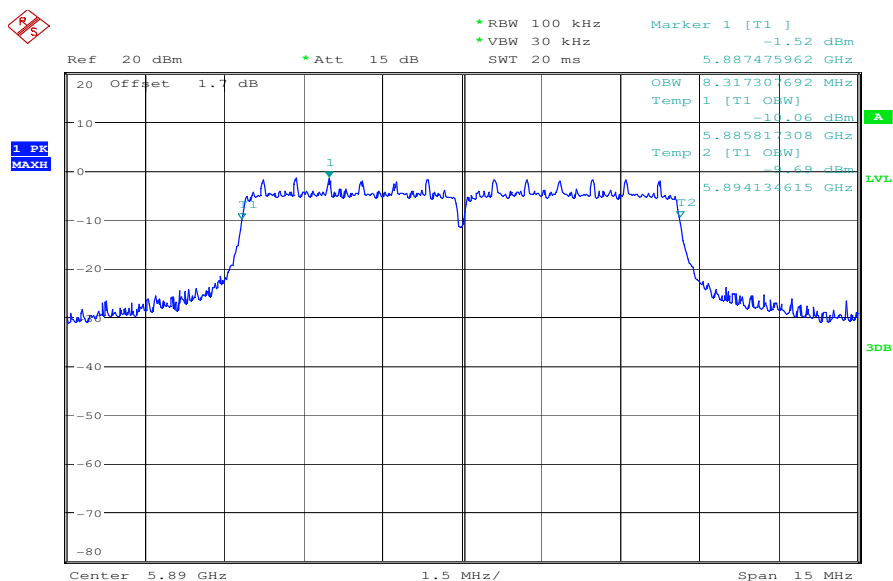
5.7 Spectrum Bandwidth of a OFDM System / 99% Bandwidth (ASTM 8.9.2 / § 95.633 g / § 95.1509)

Plot 1: low channel (5860 MHz), low data rate



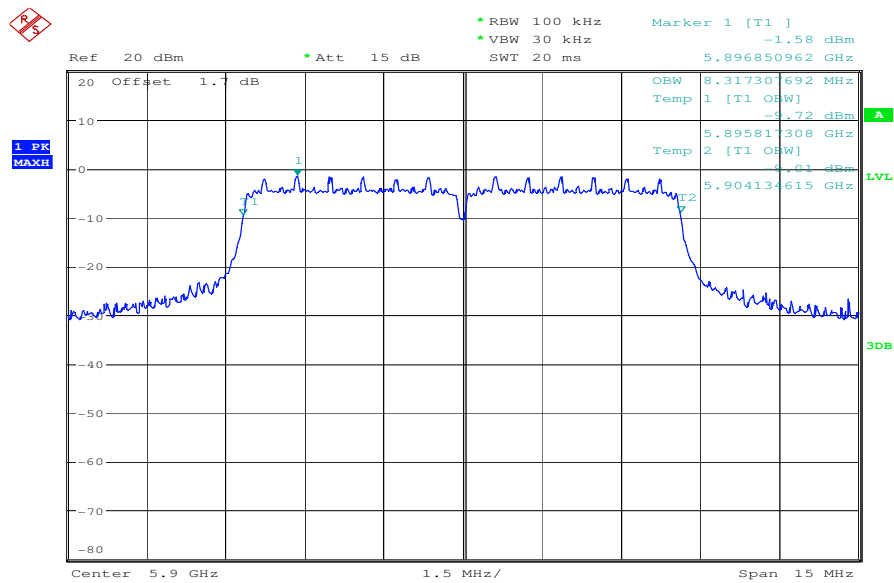
Date: 8.DEC.2009 07:07:22

Plot 2: mid channel (5890 MHz), low data rate



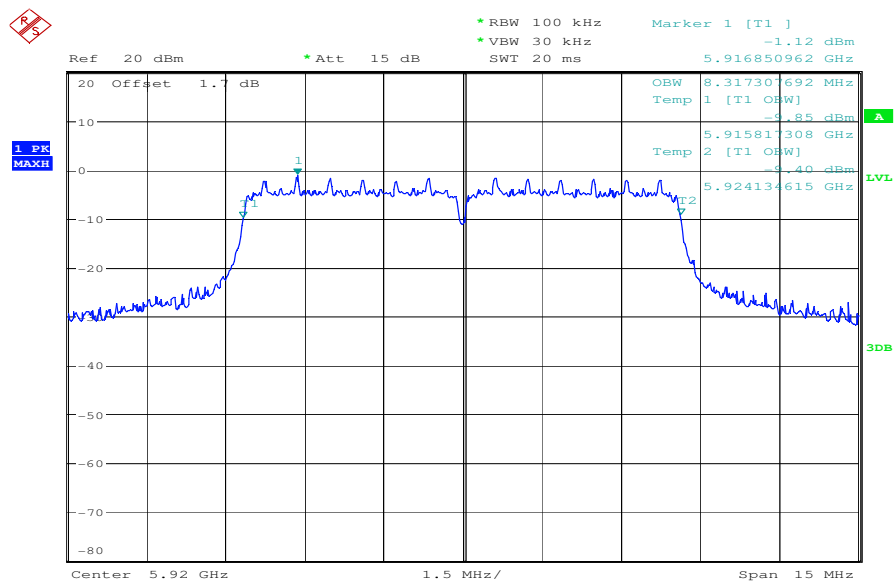
Date: 8.DEC.2009 07:10:36

Plot 3: high channel (5900 MHz), low data rate



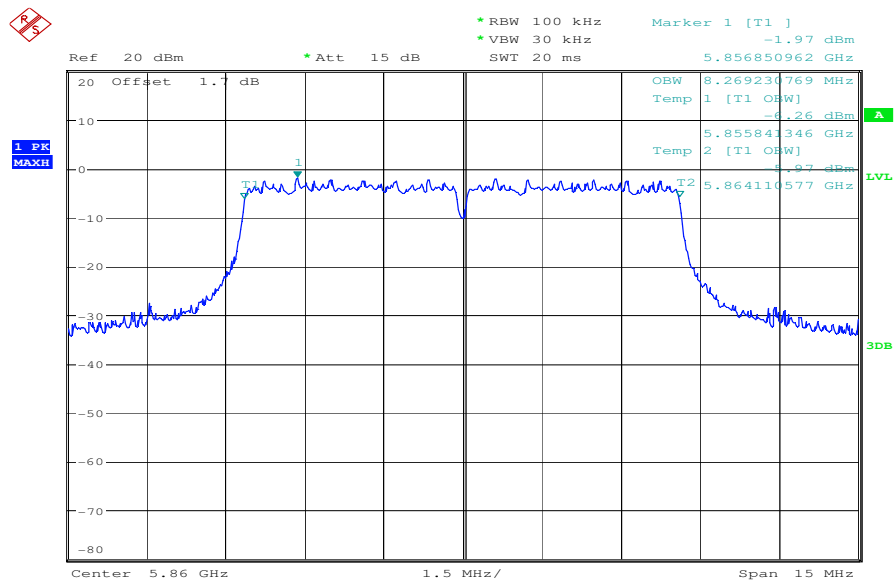
Date: 8.DEC.2009 07:22:11

Plot 4: high channel (5920 MHz), low data rate



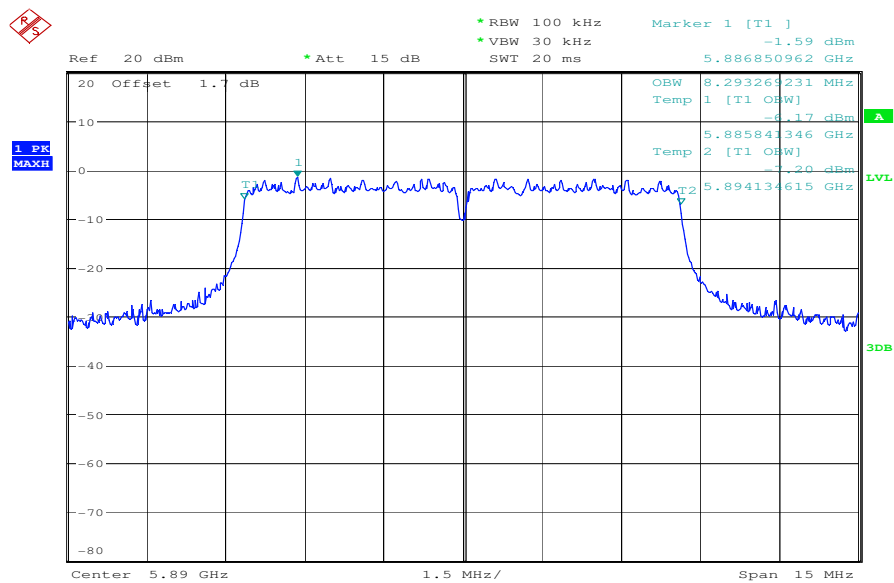
Date: 8.DEC.2009 07:31:09

Plot 5: low channel (5860 MHz), high data rate



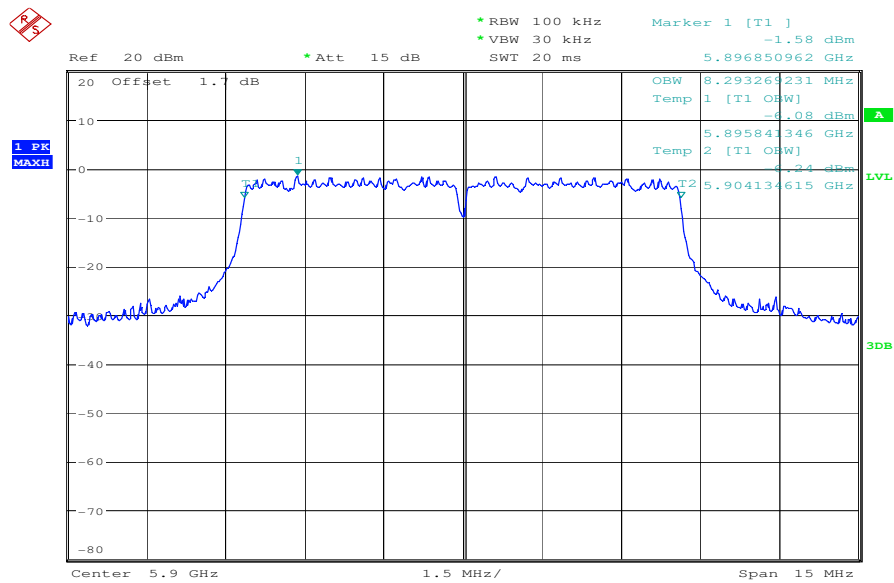
Date: 8.DEC.2009 07:09:31

Plot 6: mid channel (5890 MHz), high data rate



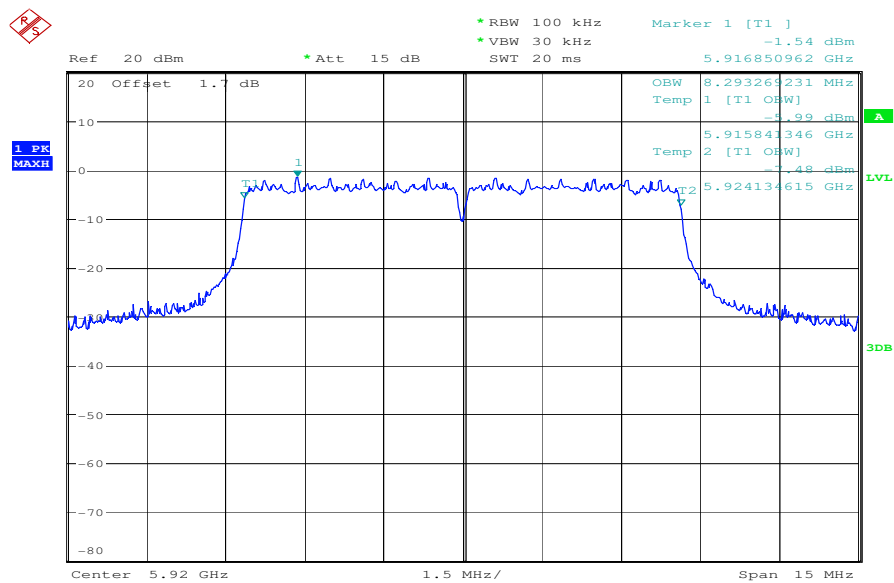
Date: 8.DEC.2009 07:12:28

Plot 7: high channel (5900 MHz), high data rate



Date: 8.DEC.2009 07:28:49

Plot 8: high channel (5920 MHz), high data rate



Date: 8.DEC.2009 07:32:42

Results: low data rate

Test conditions		99 % BANDWIDTH [MHz]			
Frequency [MHz]		5860	5890	5900	5920
T_{nom}	V_{nom}	8.29	8.32	8.32	8.32
Measurement uncertainty		± 100 kHz			

RBW: 100 kHz / VBW 30 kHz

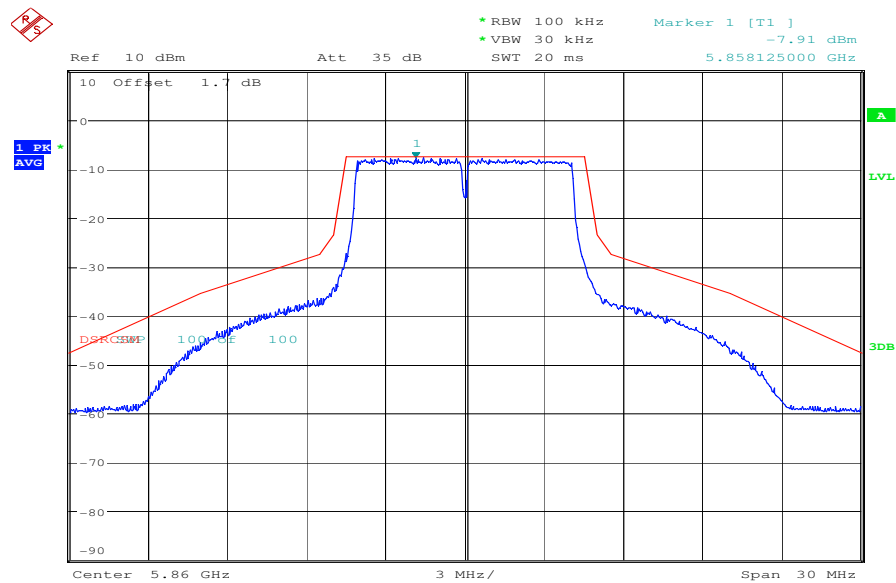
Results: high data rate

Test conditions		99 % BANDWIDTH [MHz]			
Frequency [MHz]		5860	5890	5900	5920
T_{nom}	V_{nom}	8.27	8.29	8.29	8.29
Measurement uncertainty		± 100 kHz			

RBW: 100 kHz / VBW 30 kHz

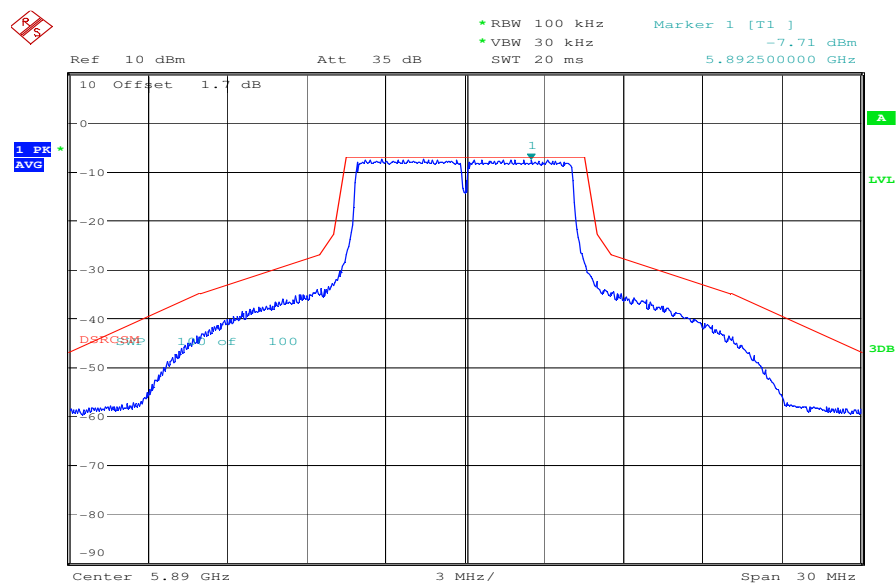
5.8 Transmit Spectrum Mask (ASTM 8.9.2 / § 95.635 F / § 95.1509)

Plot 1: low channel (5860 MHz), low data rate



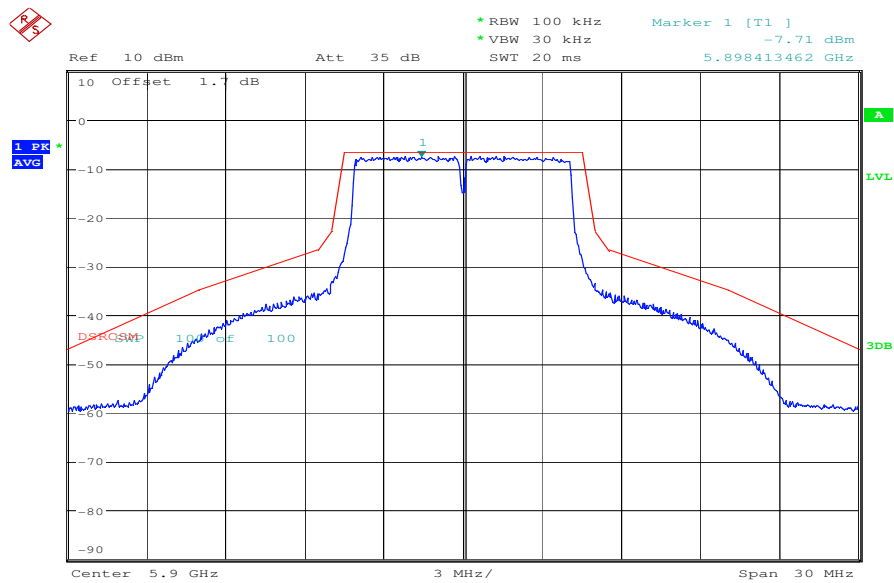
Date: 8.DEC.2009 08:55:09

Plot 2: mid channel (5890 MHz), low data rate



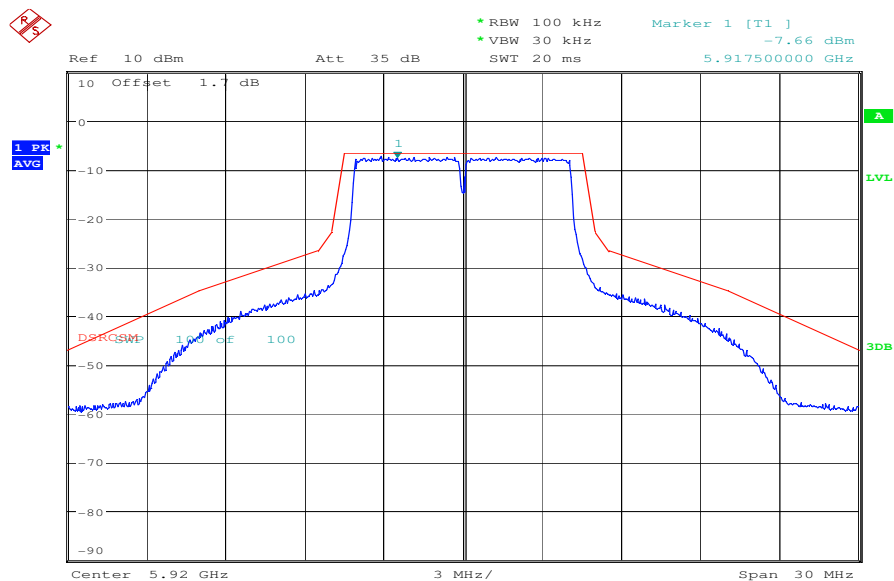
Date: 8.DEC.2009 08:56:26

Plot 3: high channel (5900 MHz), low data rate



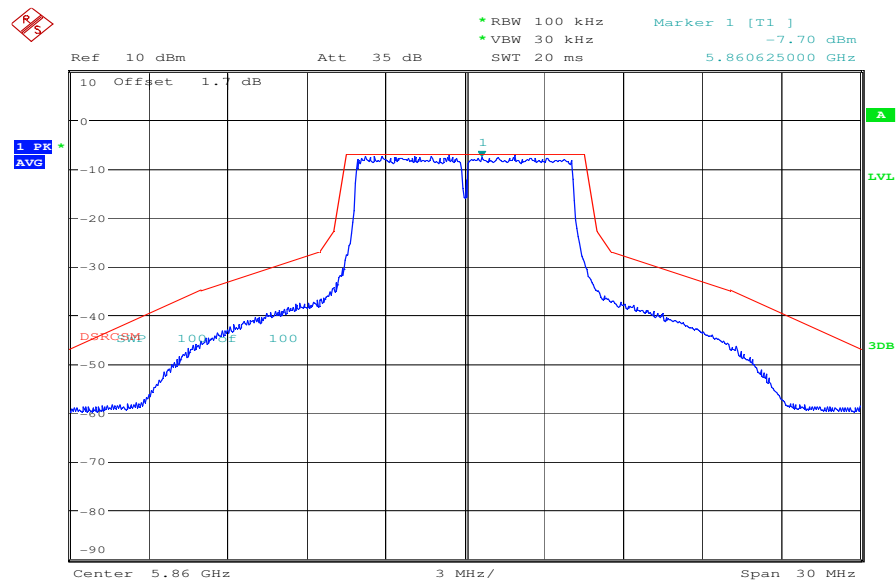
Date: 8.DEC.2009 08:58:08

Plot 4: high channel (5920 MHz), low data rate



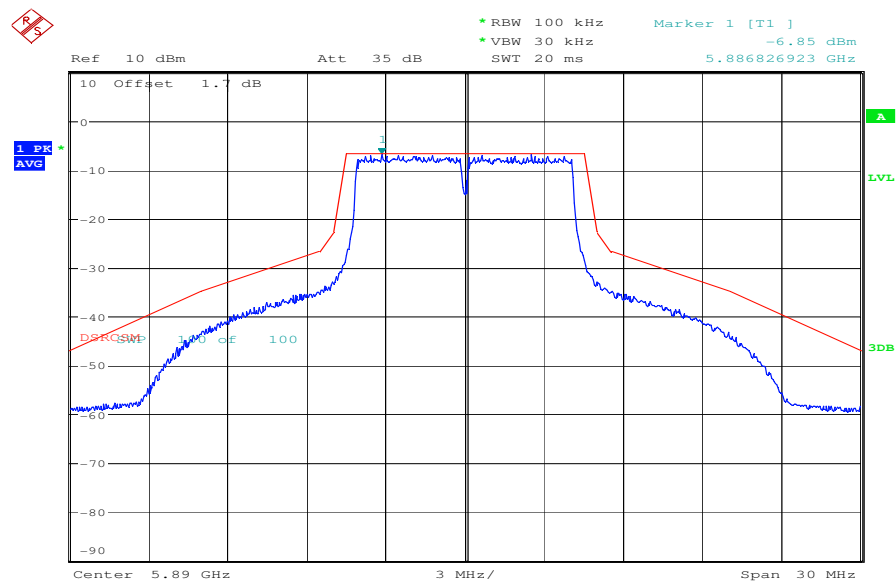
Date: 8.DEC.2009 08:59:14

Plot 5: low channel (5860 MHz), high data rate



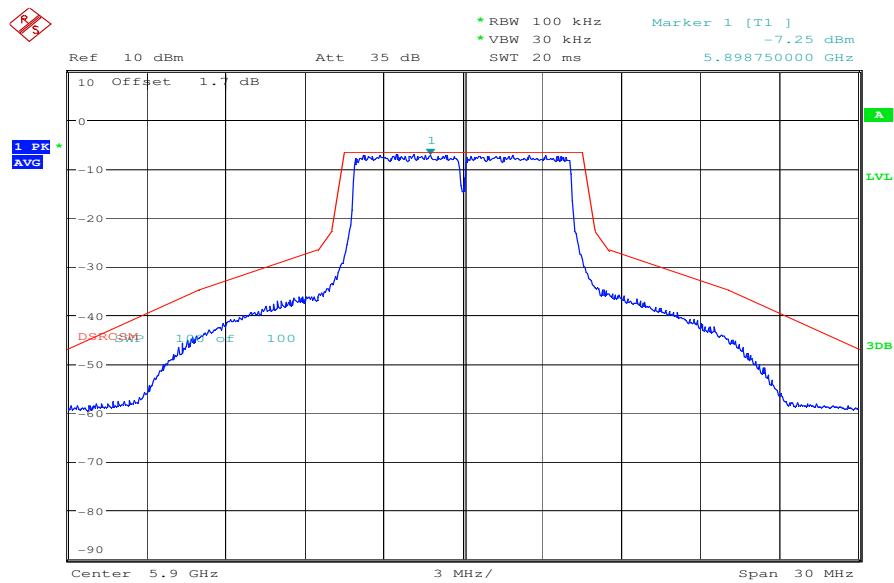
Date: 8.DEC.2009 08:55:46

Plot 6: mid channel (5890 MHz), high data rate



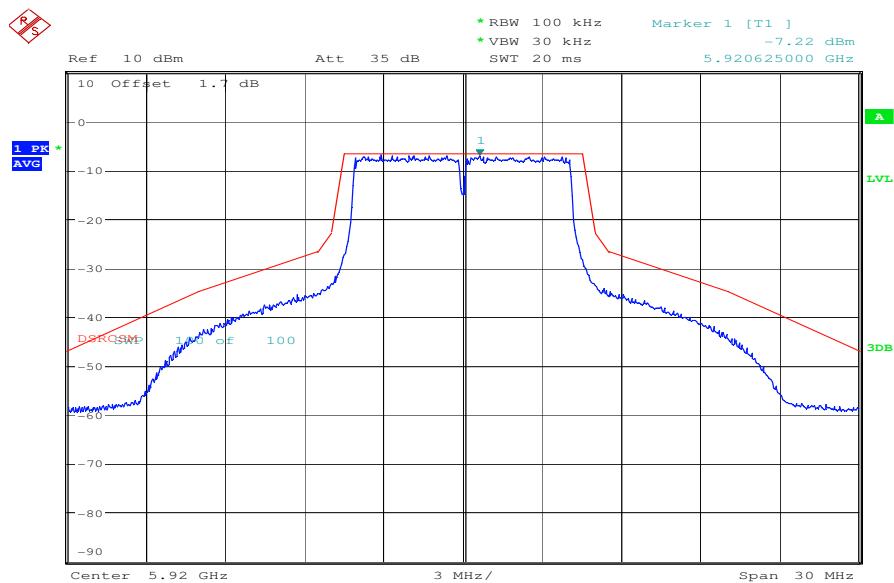
Date: 8.DEC.2009 08:57:31

Plot 7: high channel (5900 MHz), high data rate



Date: 8.DEC.2009 08:58:37

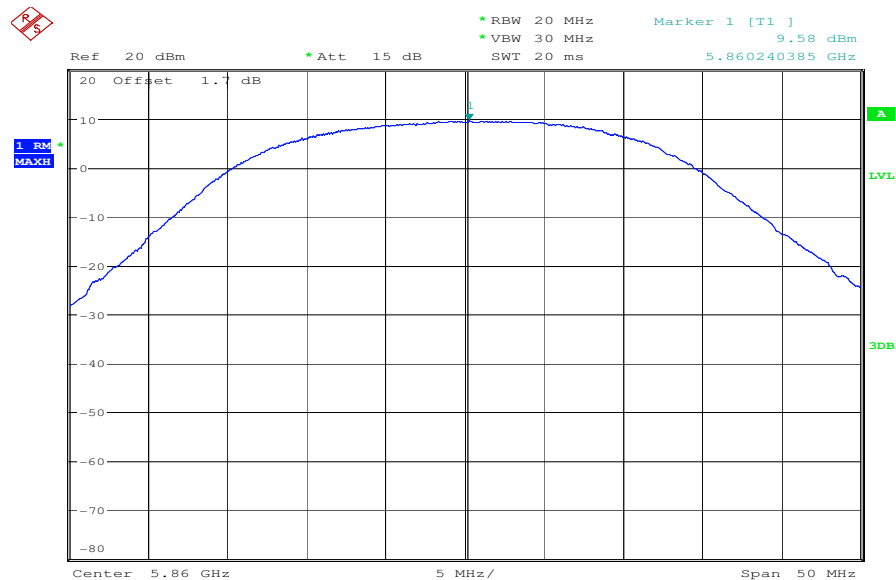
Plot 8: high channel (5920 MHz), high data rate



Date: 8.DEC.2009 08:59:36

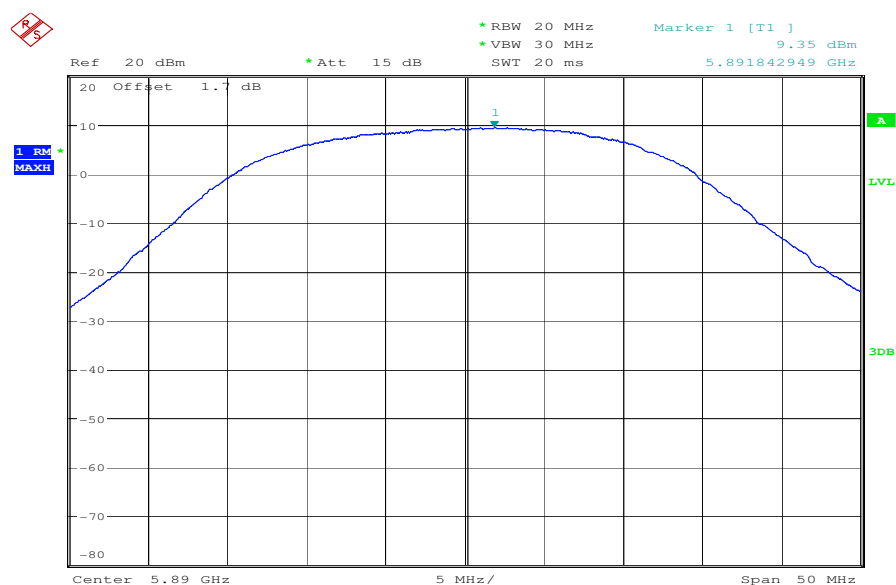
5.9 Maximum output power (conducted) (ASTM 8.9.1 / § 2.1046 / § 95.639 / § 95.1509)

Plot 1: low channel (5860 MHz), low data rate



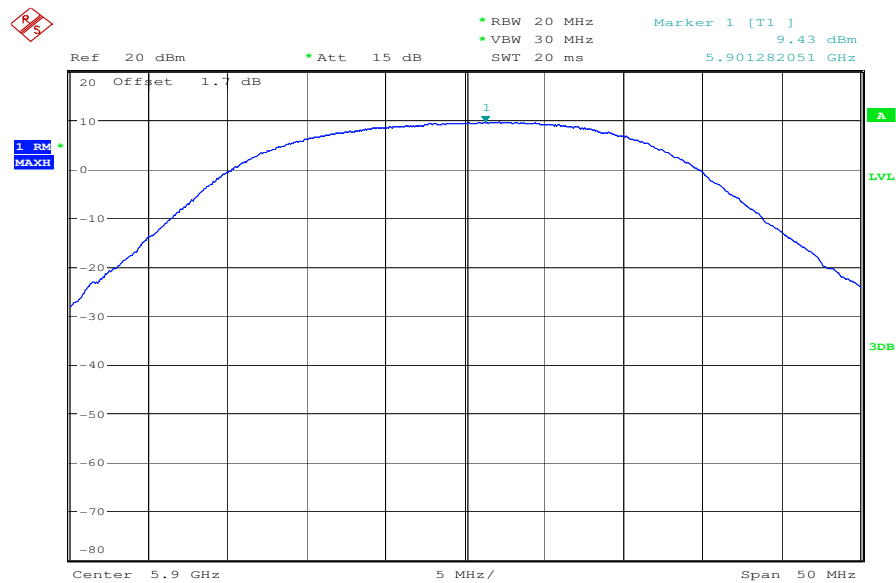
Date: 8.DEC.2009 08:11:22

Plot 2: mid channel (5890 MHz), low data rate



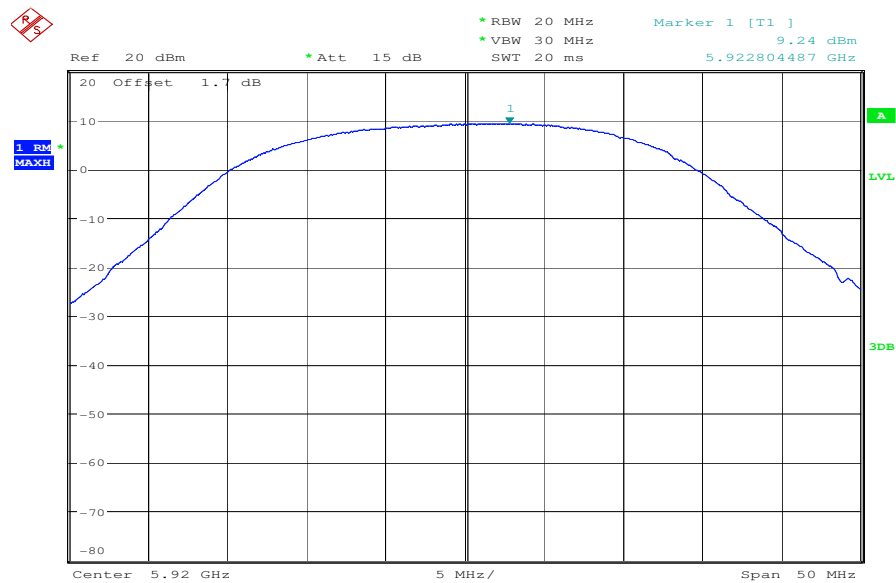
Date: 8.DEC.2009 08:17:13

Plot 3: high channel (5900 MHz), low data rate



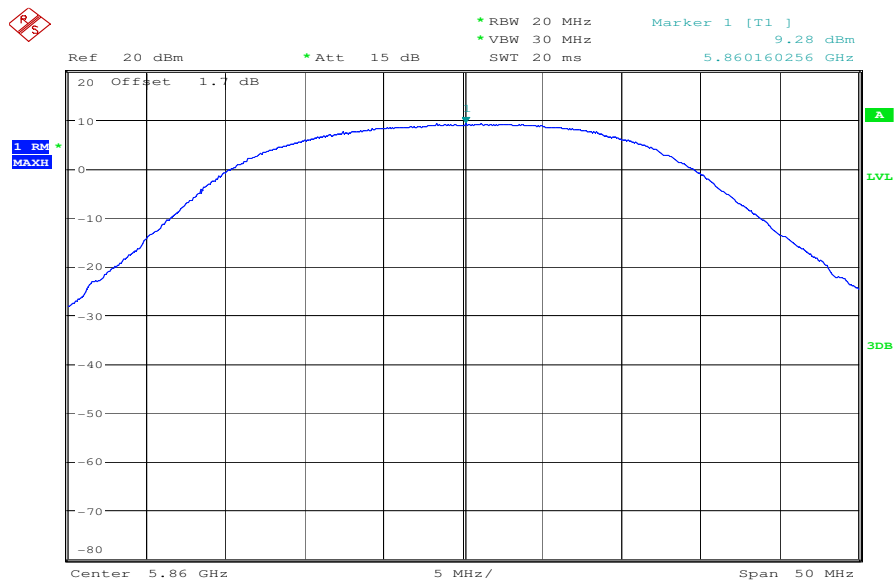
Date: 8.DEC.2009 08:19:06

Plot 4: high channel (5920 MHz), low data rate



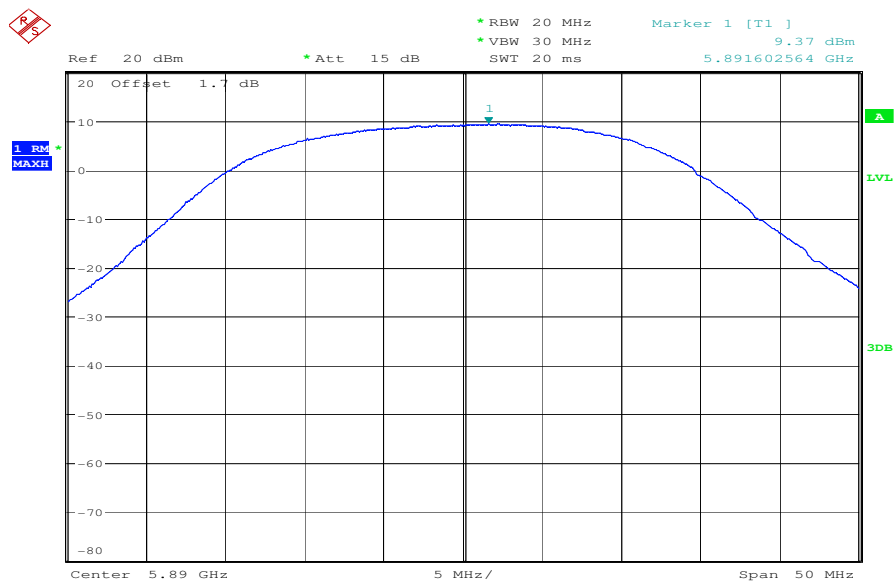
Date: 8.DEC.2009 08:20:36

Plot 5: low channel (5860 MHz), high data rate



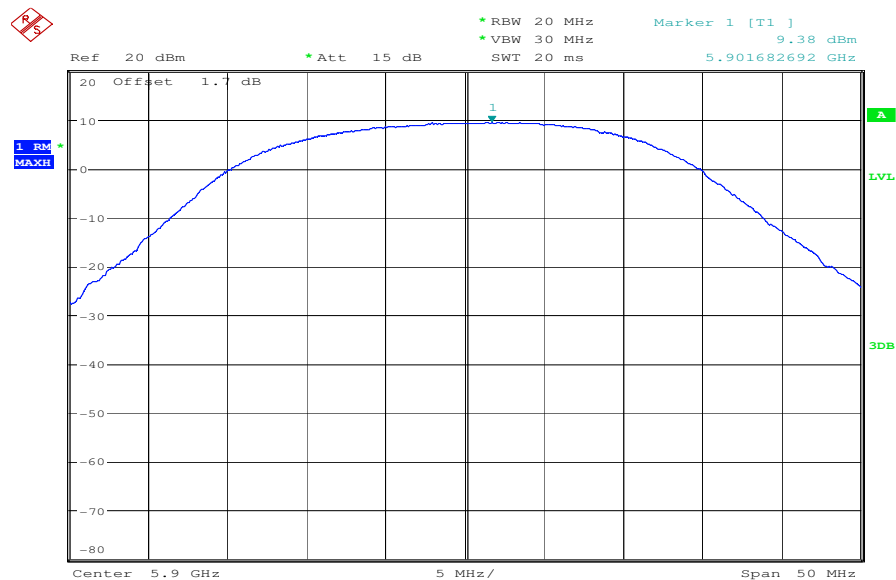
Date: 8.DEC.2009 08:12:22

Plot 6: mid channel (5890 MHz), high data rate



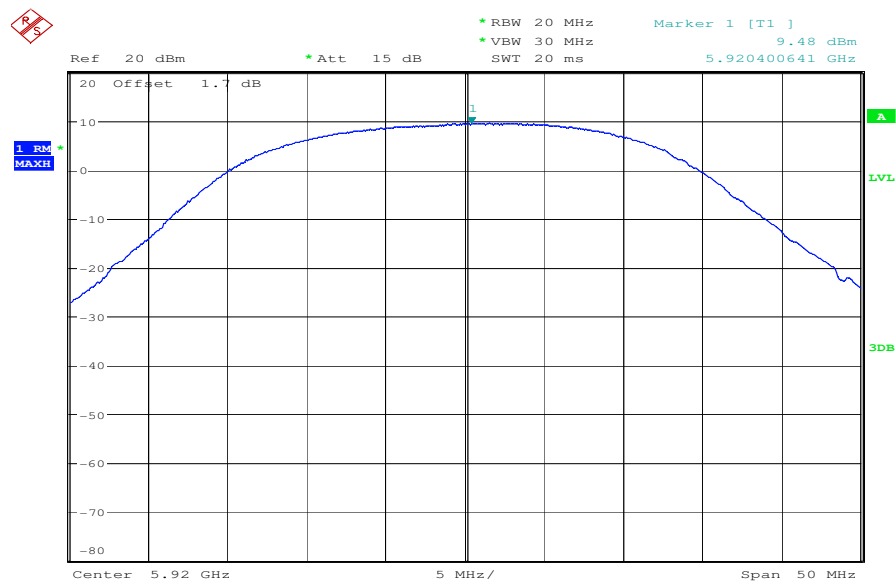
Date: 8.DEC.2009 08:18:11

Plot 7: high channel (5900 MHz), high data rate



Date: 8.DEC.2009 08:19:38

Plot 8: high channel (5920 MHz), high data rate



Date: 8.DEC.2009 08:21:18

Results: low data rate

Test conditions		Max. output power [dBm]			
Frequency [MHz]		5860	5890	5900	5920
T _{nom}	V _{nom}	9.58	9.35	9.43	9.24
Measurement uncertainty		±3dB			

Results: high data rate

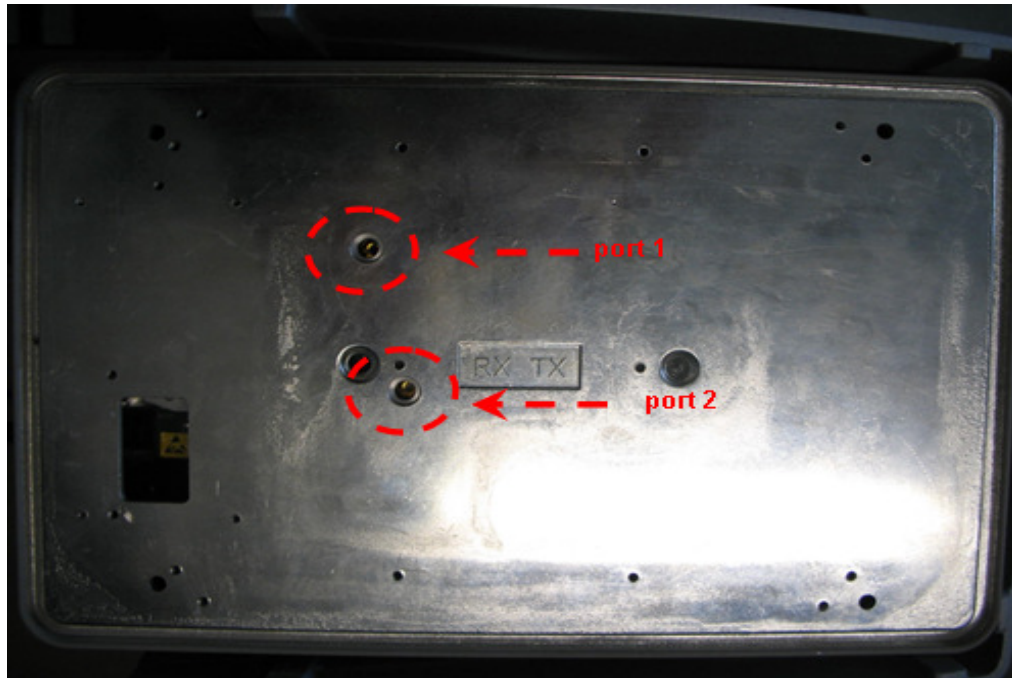
Test conditions		Max. output power [dBm]			
Frequency [MHz]		5860	5890	5900	5920
T _{nom}	V _{nom}	9.28	9.37	9.38	9.48
Measurement uncertainty		±3dB			

Limits:

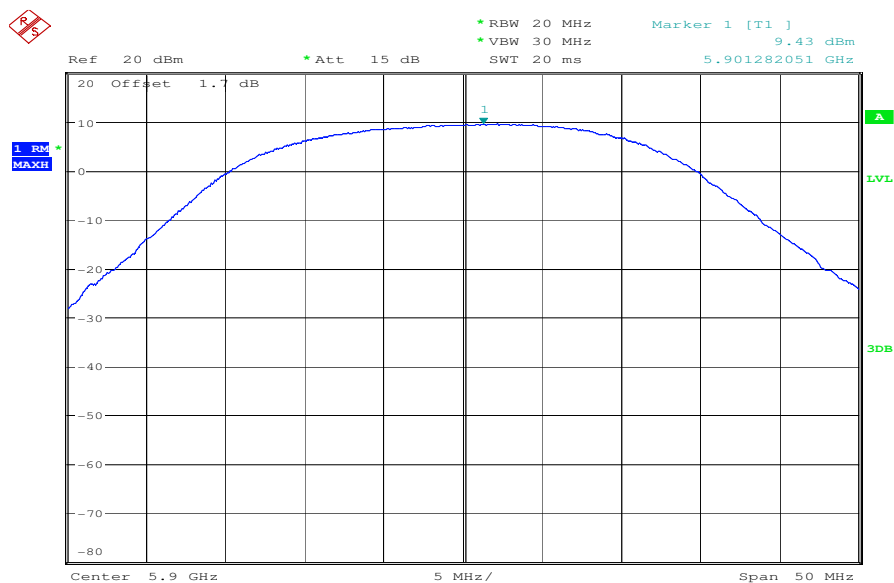
Under normal test conditions only	Class B – 10 dBm
-----------------------------------	------------------

Note:

Photo 1: Port 1 & port 2

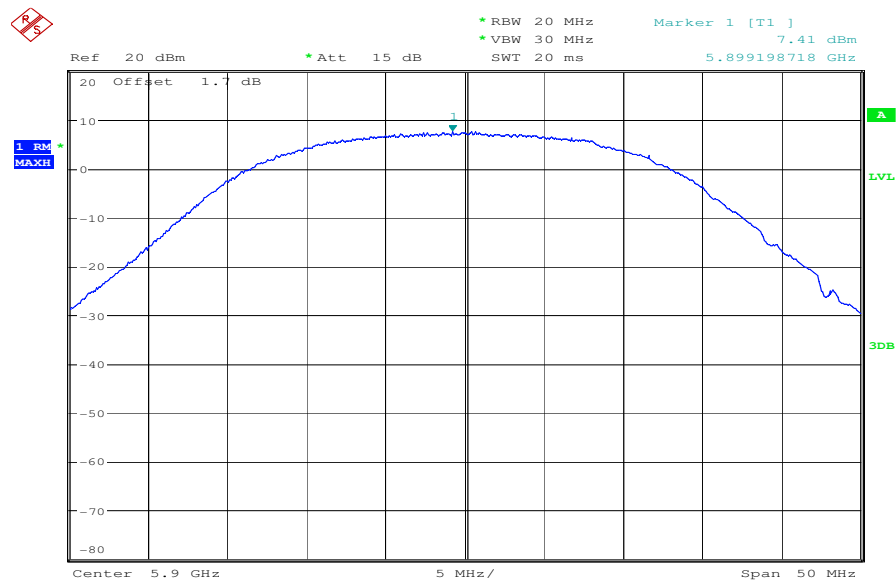


Plot 1: mid channel (5900 MHz), low data rate, port 1



Date: 8.DEC.2009 08:19:06

Plot 2: mid channel (5900 MHz), low data rate, port 2



Date: 8.DEC.2009 11:04:23

The EUT has two switchable antenna connectors Port 1 and Port 2. Both show the same behaviour. All measurements are performed with port 1. These two antenna ports can only be switched internally to increase the coverage of the antenna range and they can't be activated together at the same time..

5.10 Max. peak output power (radiated) (ASTM 8.9.1 / § 2.1046 / § 95.639 / § 95.1509)

Results: low data rate

Test conditions		Max. output power [dBm]			
Frequency [MHz]		5860	5890	5900	5920
T _{nom}	V _{nom}	11.62	11.32	10.93	10.47
Measurement uncertainty		±3dB			

Results: high data rate

Test conditions		Max. output power [dBm]			
Frequency [MHz]		5860	5890	5900	5920
T _{nom}	V _{nom}	11.32	11.34	10.88	10.71
Measurement uncertainty		±3dB			

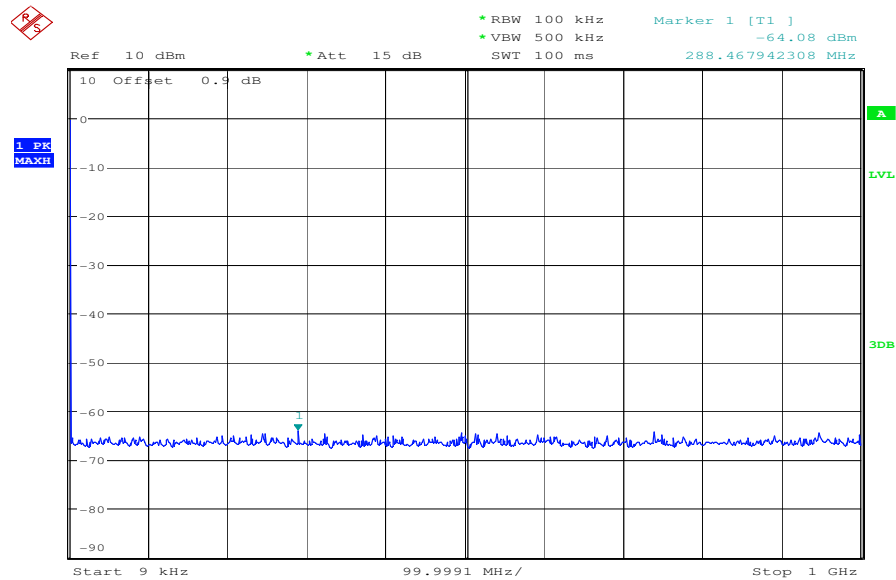
The radiated values are calculated with the antenna gain.

Limits:

Under normal test conditions only	Max. 23 dBm
-----------------------------------	-------------

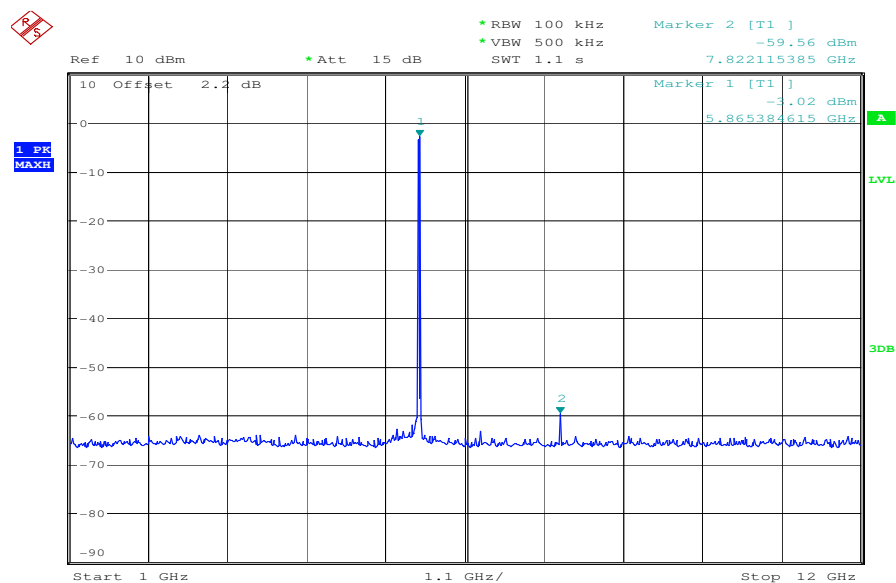
5.11 Spurious Emissions - conducted Transmitter (§ 95.635 / § 95.1509 / § 2.1051)

Plot 1: low channel (5860 MHz), low data rate



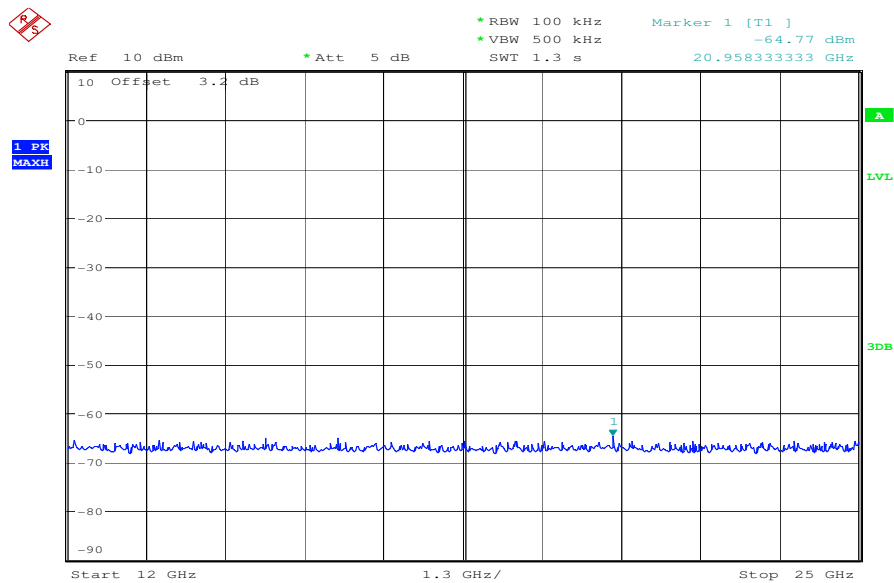
Date: 8.DEC.2009 09:14:38

Plot 2: low channel (5860 MHz), low data rate



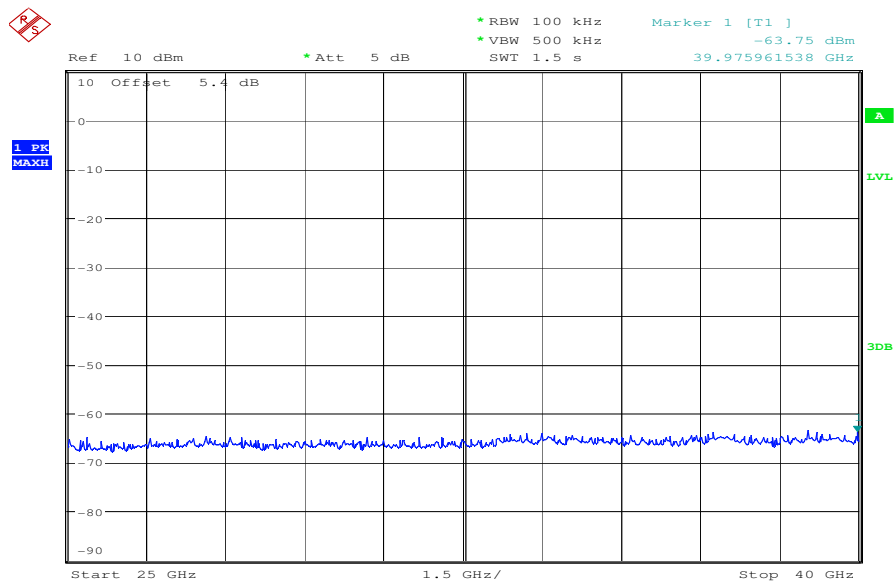
Date: 8.DEC.2009 09:23:42

Plot 3: low channel (5860 MHz), low data rate



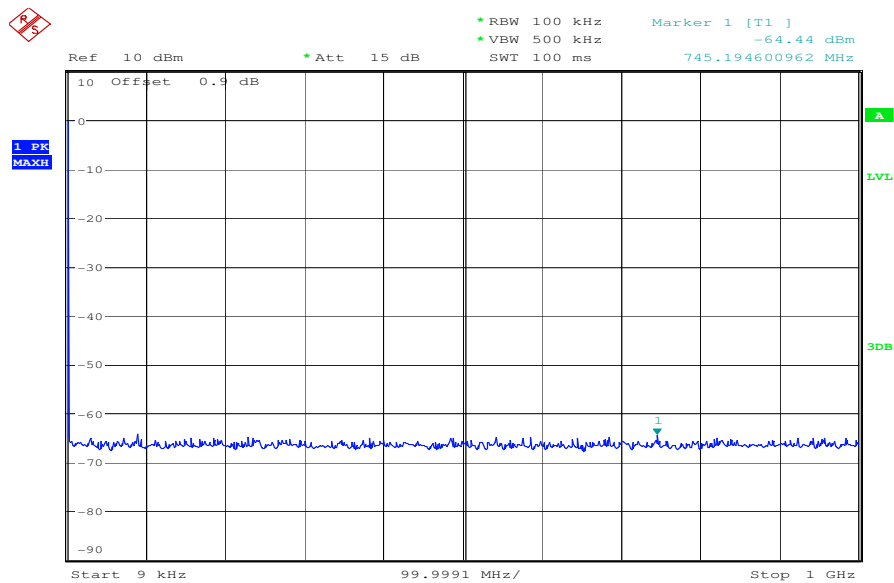
Date: 8.DEC.2009 09:30:59

Plot 4: low channel (5860 MHz), low data rate



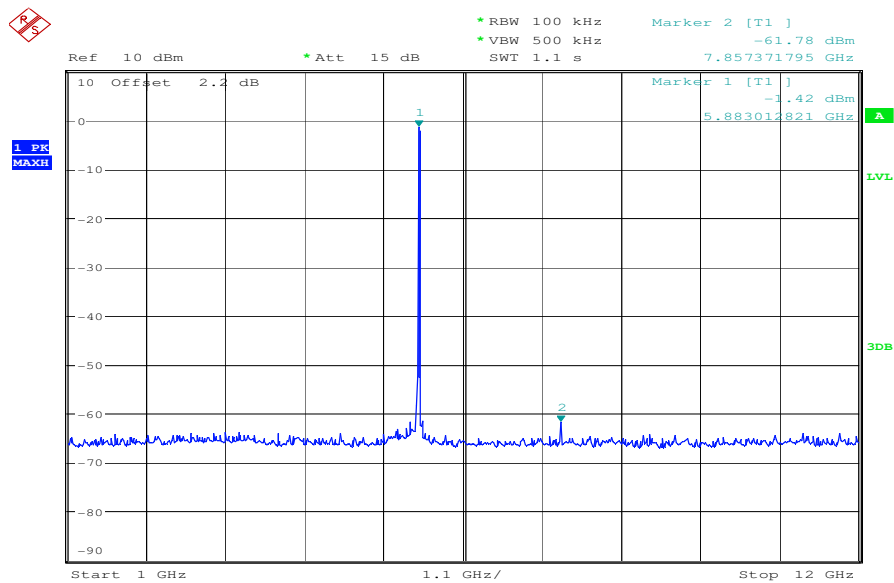
Date: 8.DEC.2009 09:40:29

Plot 5: mid channel (5890 MHz), low data rate



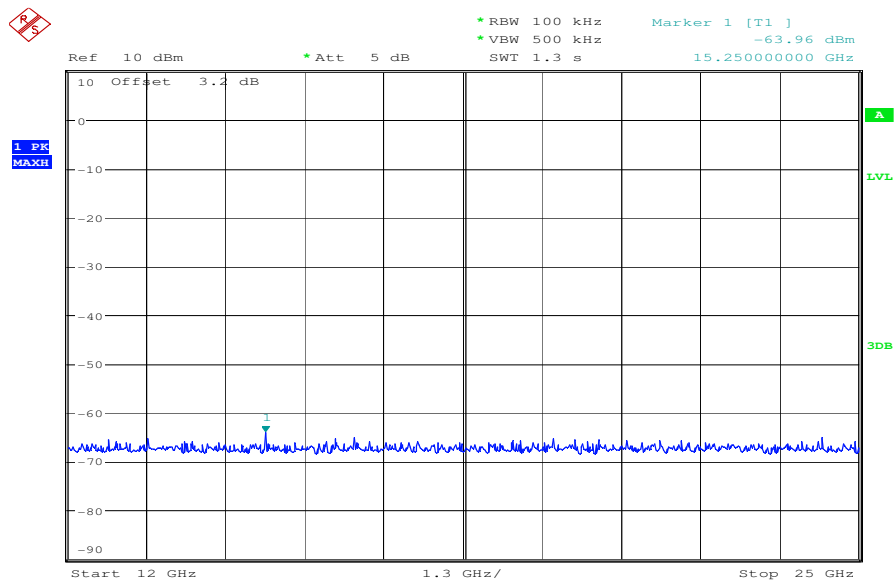
Date: 8.DEC.2009 09:16:12

Plot 6: mid channel (5890 MHz), low data rate



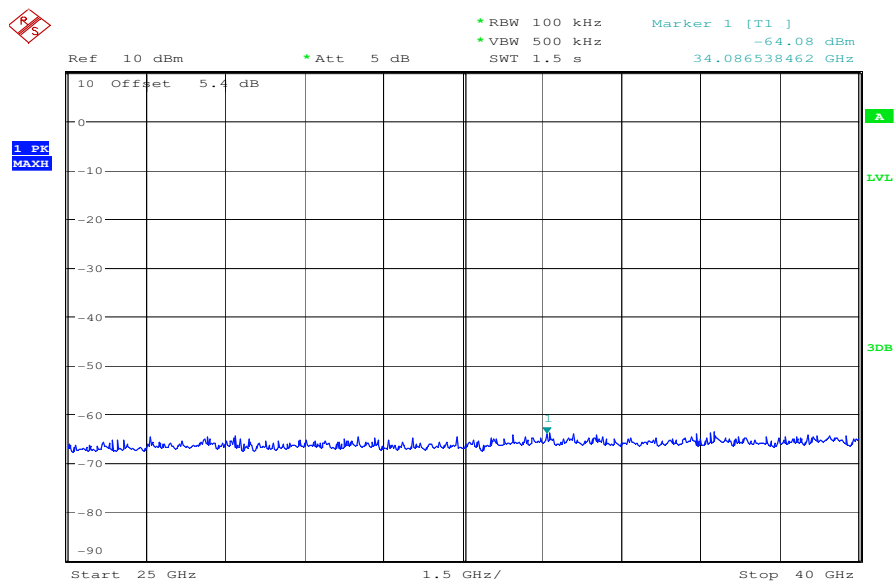
Date: 8.DEC.2009 09:25:11

Plot 7: mid channel (5890 MHz), low data rate



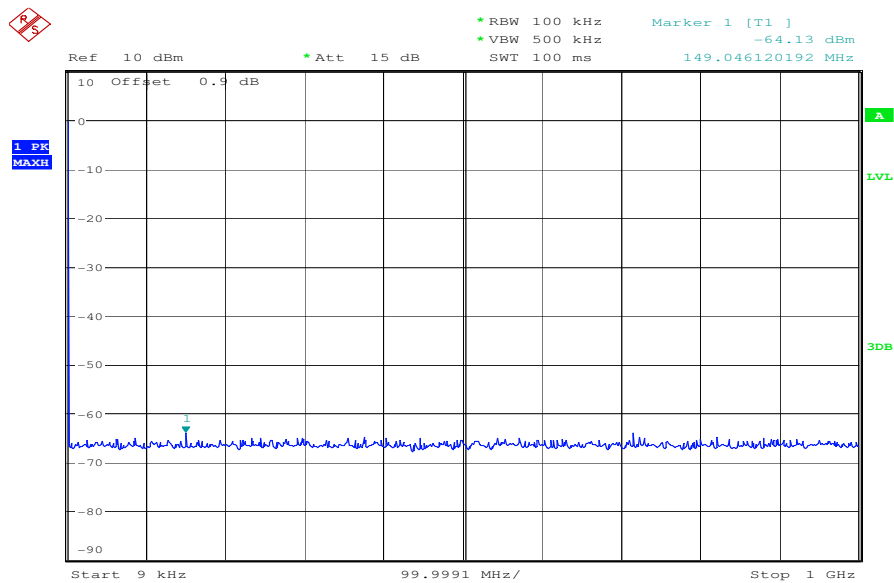
Date: 8.DEC.2009 09:32:49

Plot 8: mid channel (5890 MHz), low data rate



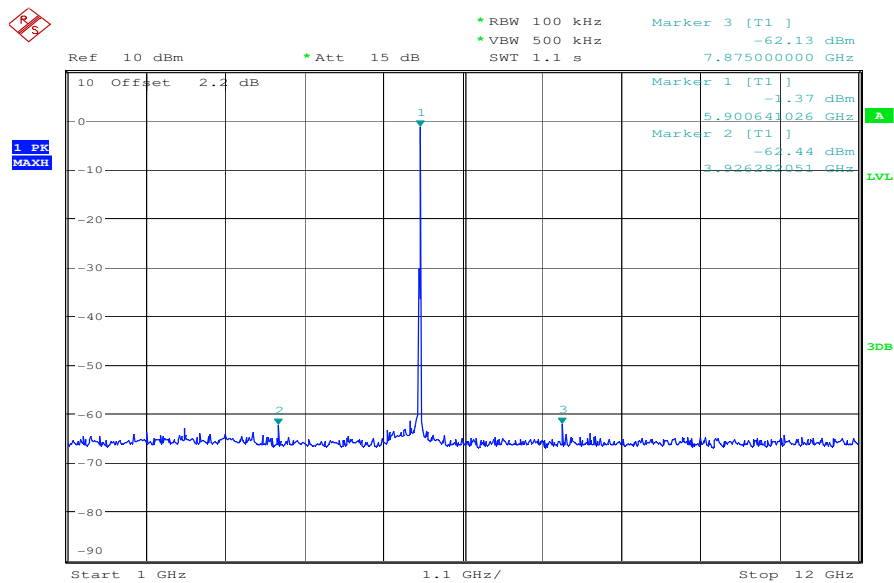
Date: 8.DEC.2009 09:38:33

Plot 9: high channel (5900 MHz), low data rate



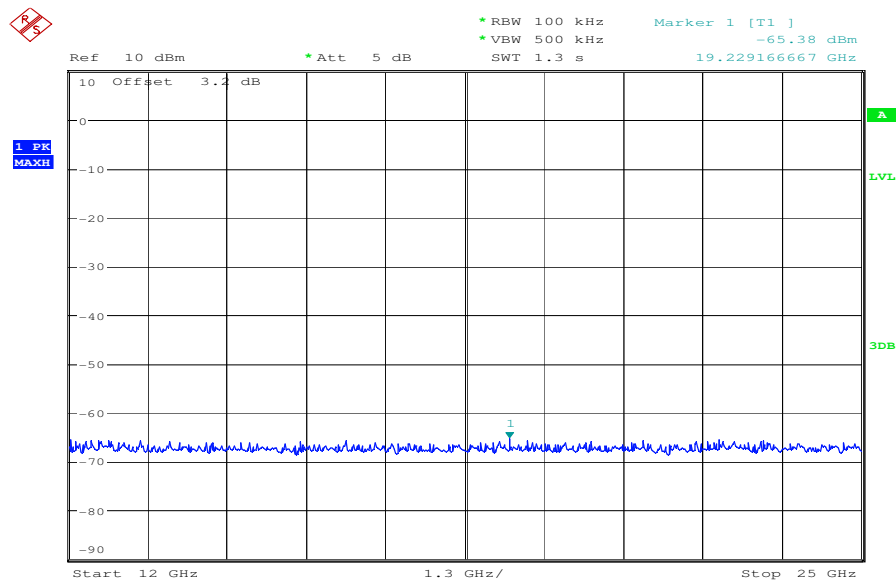
Date: 8.DEC.2009 09:17:29

Plot 10: high channel (5900 MHz), low data rate



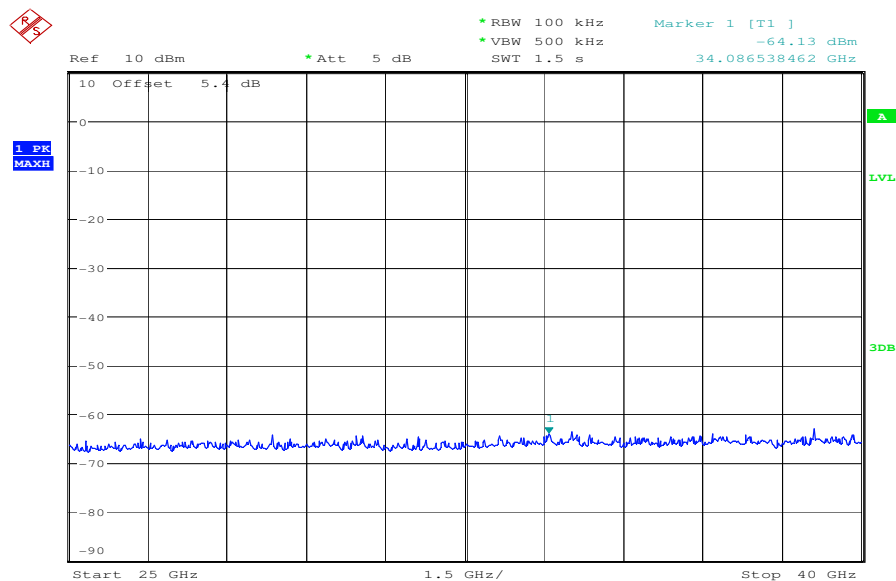
Date: 8.DEC.2009 09:27:33

Plot 11: high channel (5900 MHz), low data rate



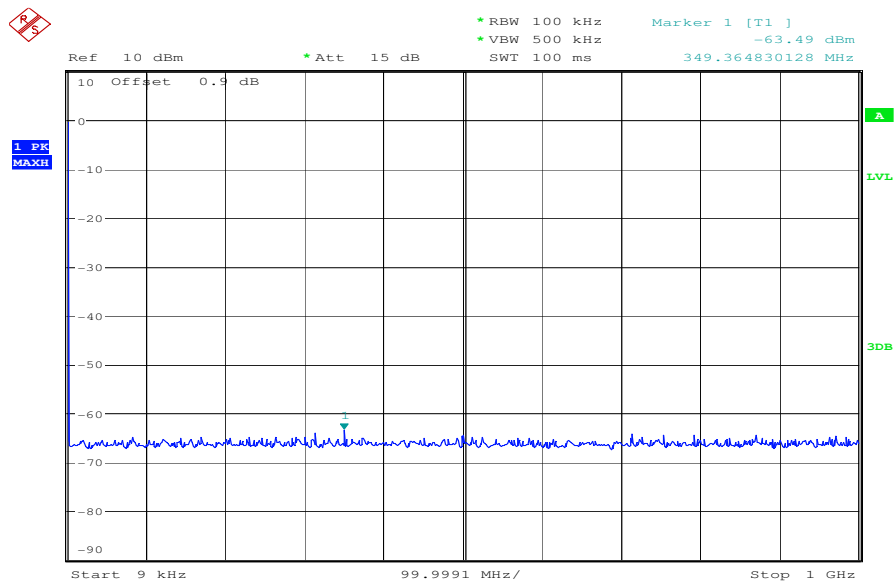
Date: 8.DEC.2009 09:33:24

Plot 12: high channel (5900 MHz), low data rate



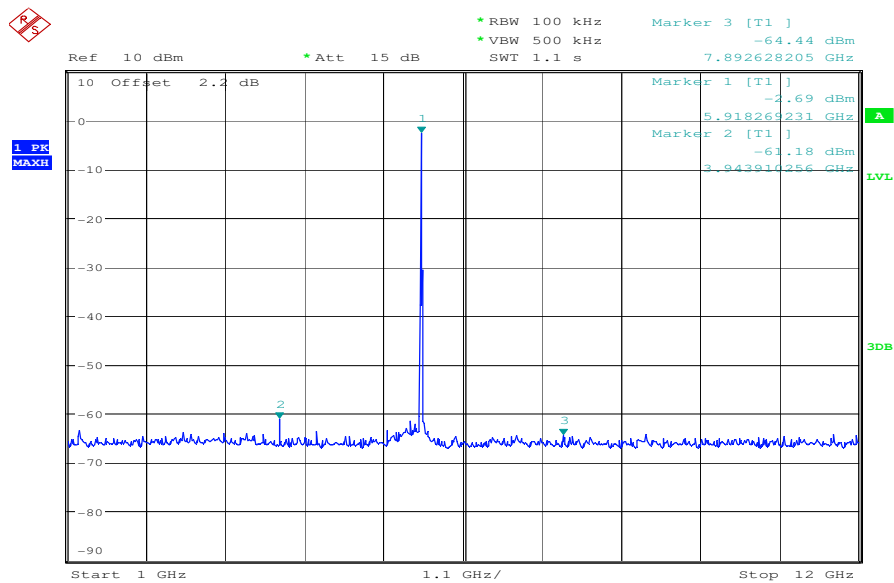
Date: 8.DEC.2009 09:37:15

Plot 13: high channel (5920 MHz), low data rate



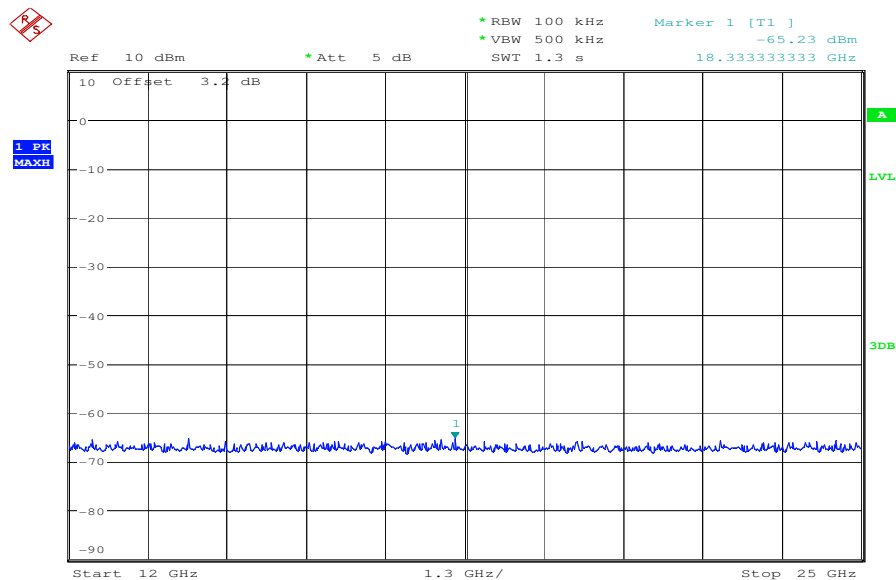
Date: 8.DEC.2009 09:19:16

Plot 14: high channel (5920 MHz), low data rate



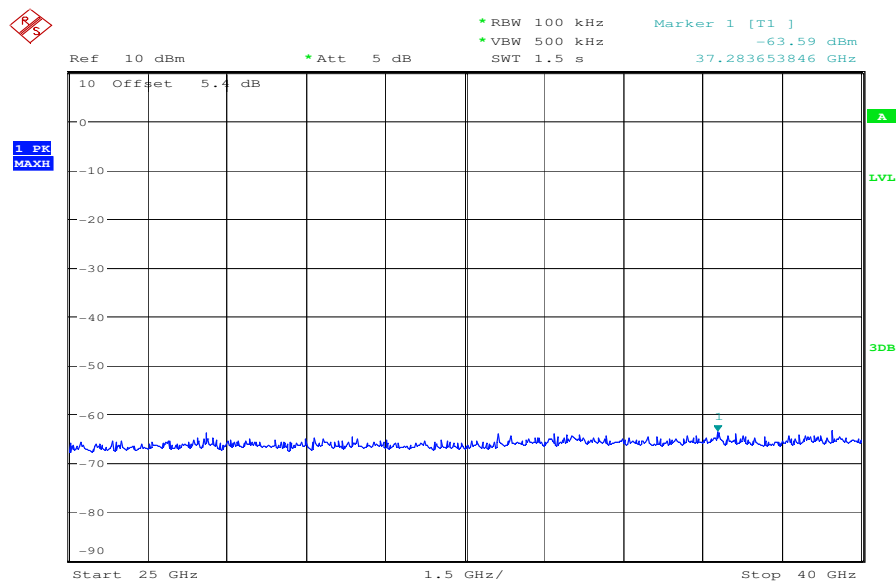
Date: 8.DEC.2009 09:28:48

Plot 15: high channel (5920 MHz), low data rate



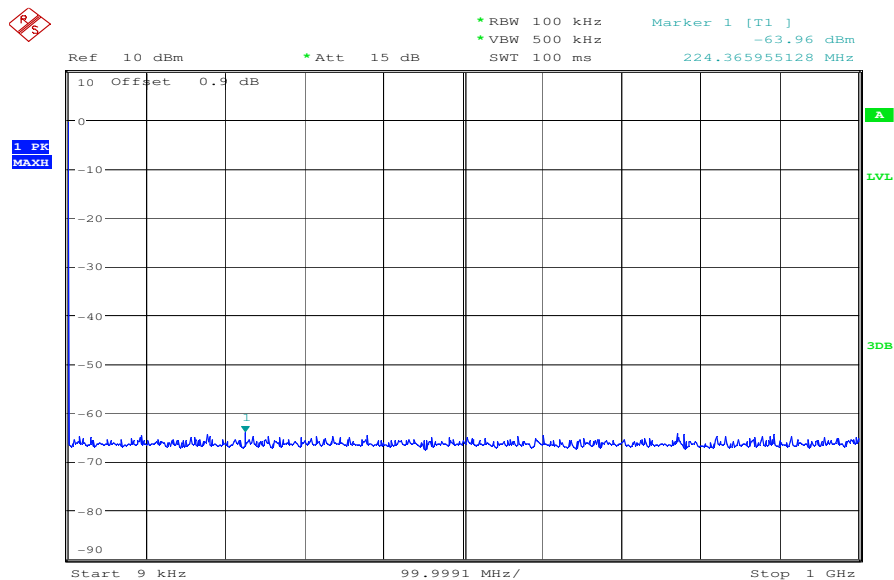
Date: 8.DEC.2009 09:34:37

Plot 16: high channel (5920 MHz), low data rate



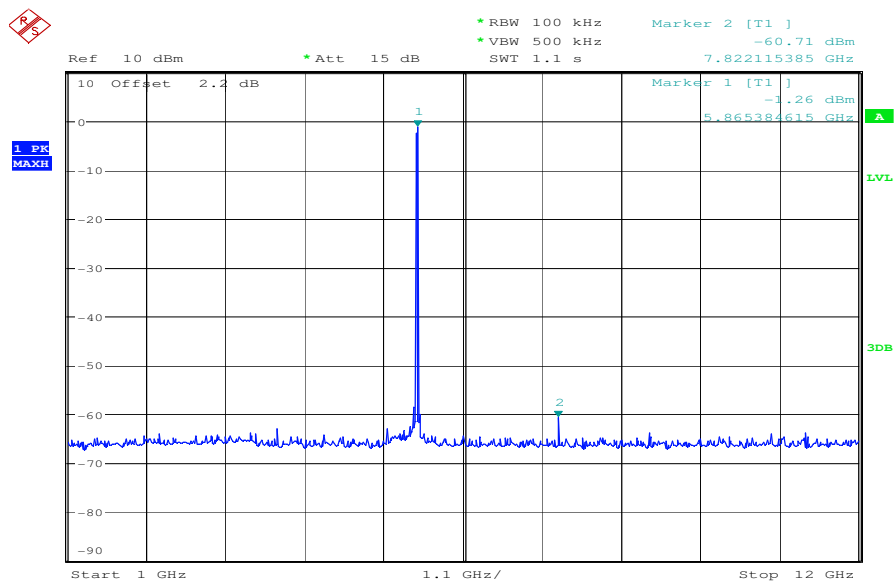
Date: 8.DEC.2009 09:36:39

Plot 17: low channel (5860 MHz), high data rate



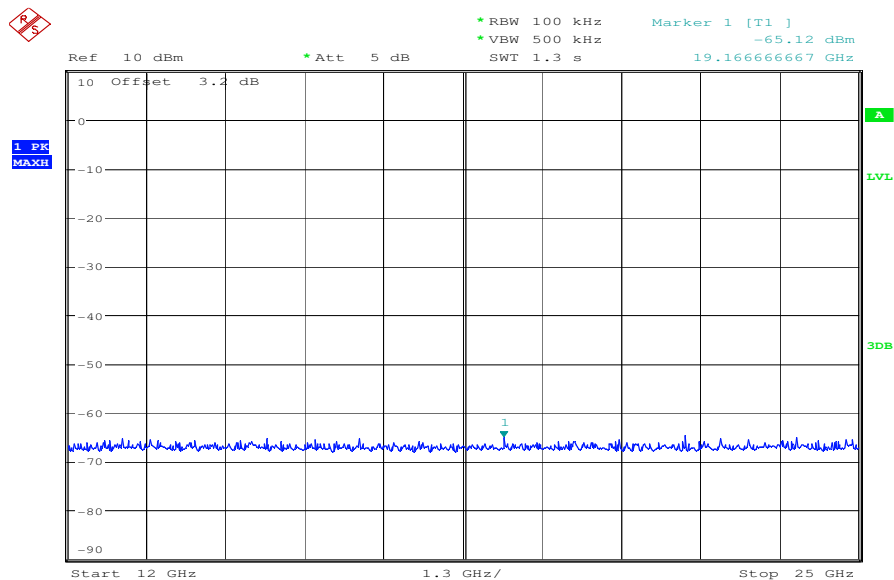
Date: 8.DEC.2009 09:15:28

Plot 18: low channel (5860 MHz), high data rate



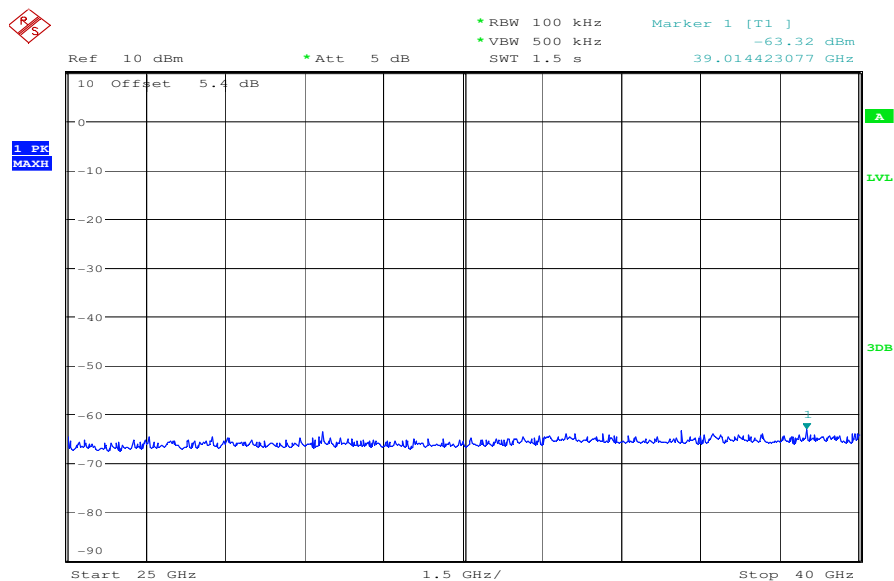
Date: 8.DEC.2009 09:24:16

Plot 19: low channel (5860 MHz), high data rate



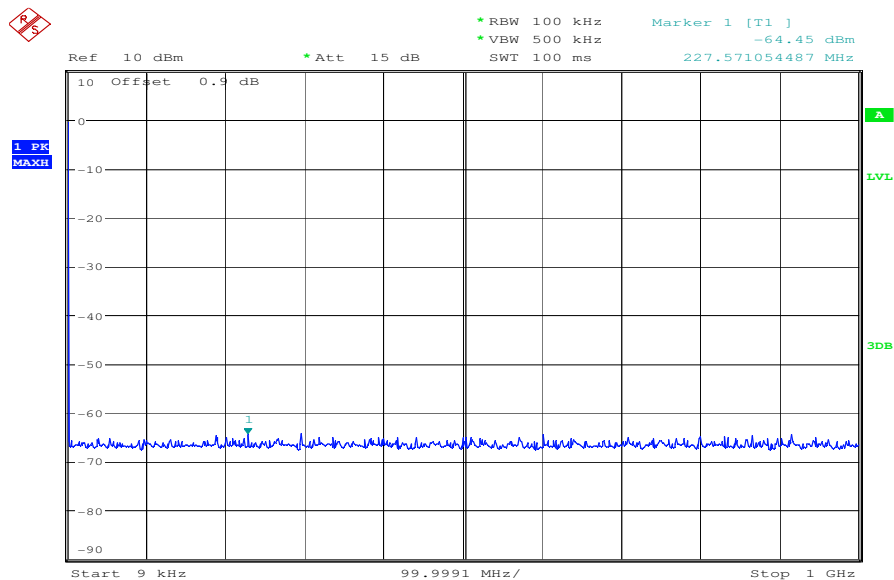
Date: 8.DEC.2009 09:31:50

Plot 20: low channel (5860 MHz), high data rate



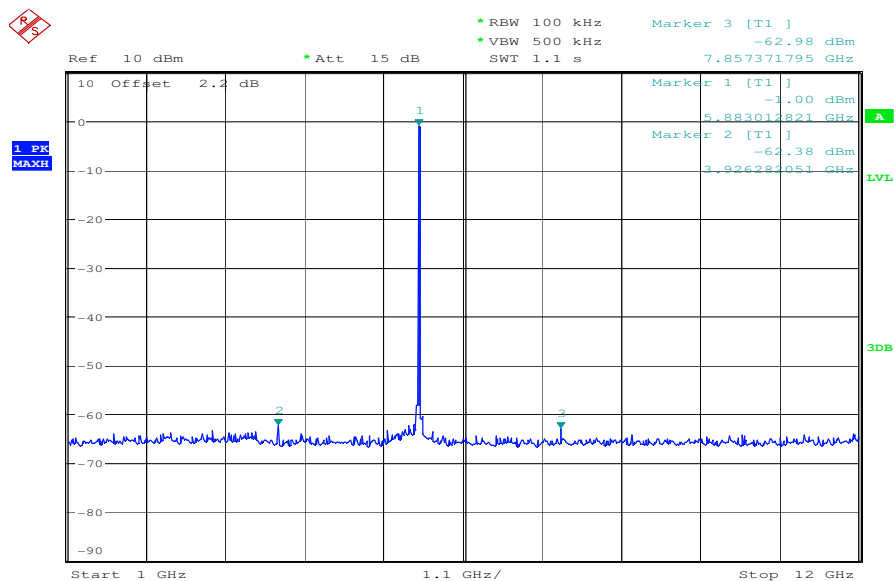
Date: 8.DEC.2009 09:39:41

Plot 21: mid channel (5890 MHz), high data rate



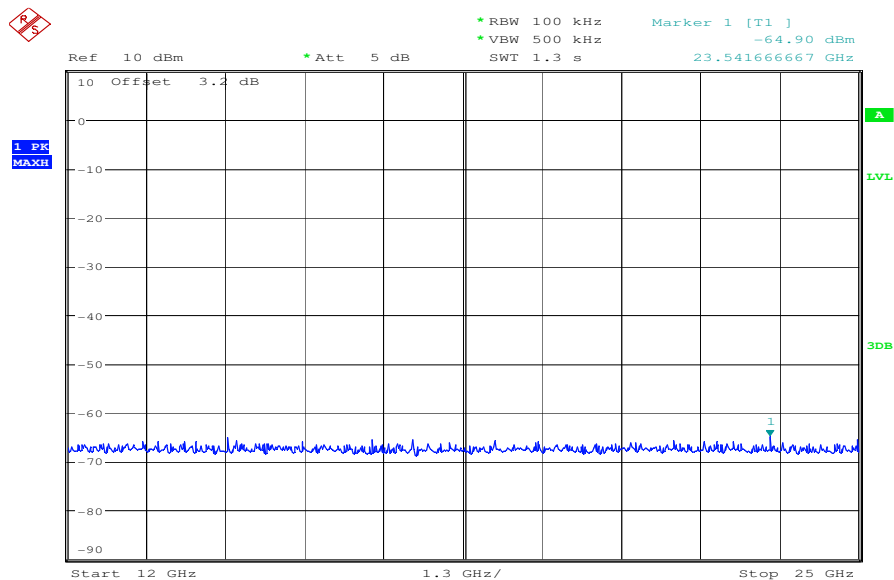
Date: 8.DEC.2009 09:16:45

Plot 22: mid channel (5890 MHz), high data rate



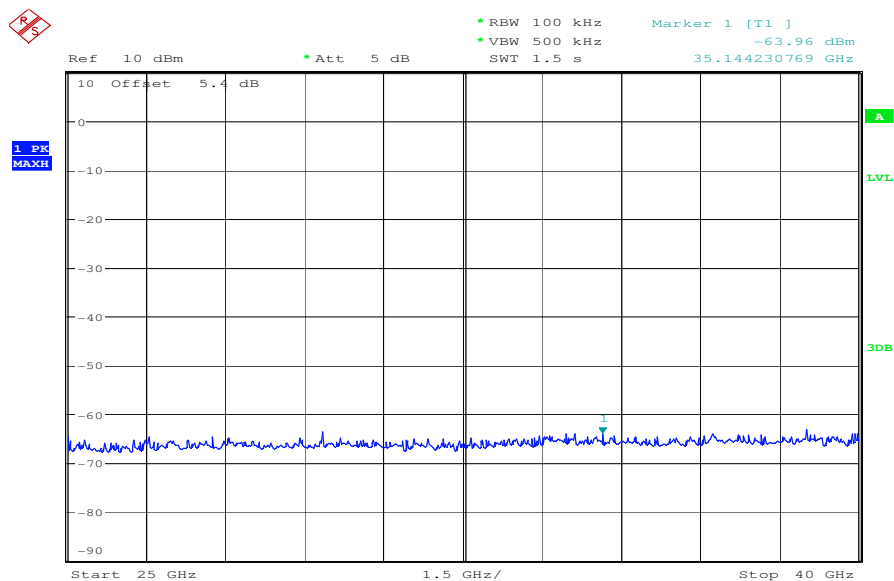
Date: 8.DEC.2009 09:26:18

Plot 23: mid channel (5890 MHz), high data rate



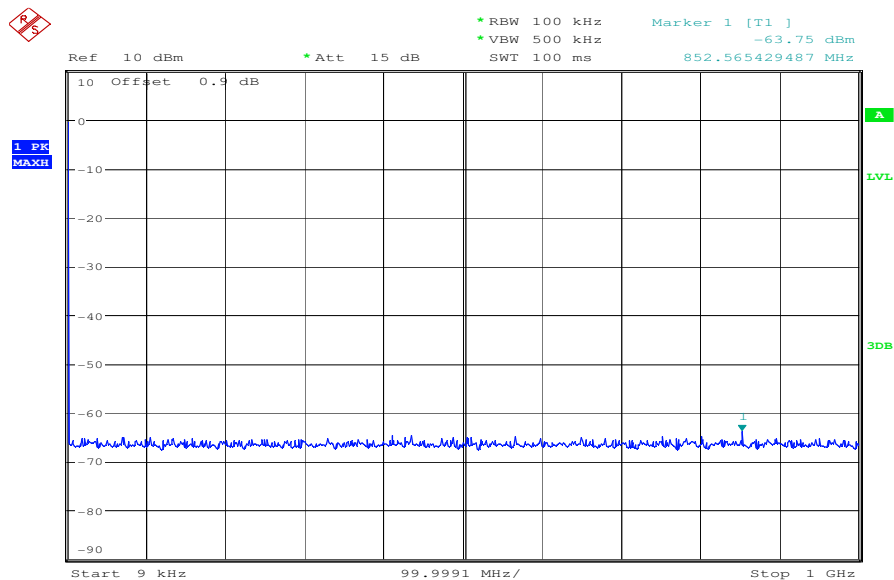
Date: 8.DEC.2009 09:32:17

Plot 24: mid channel (5890 MHz), high data rate



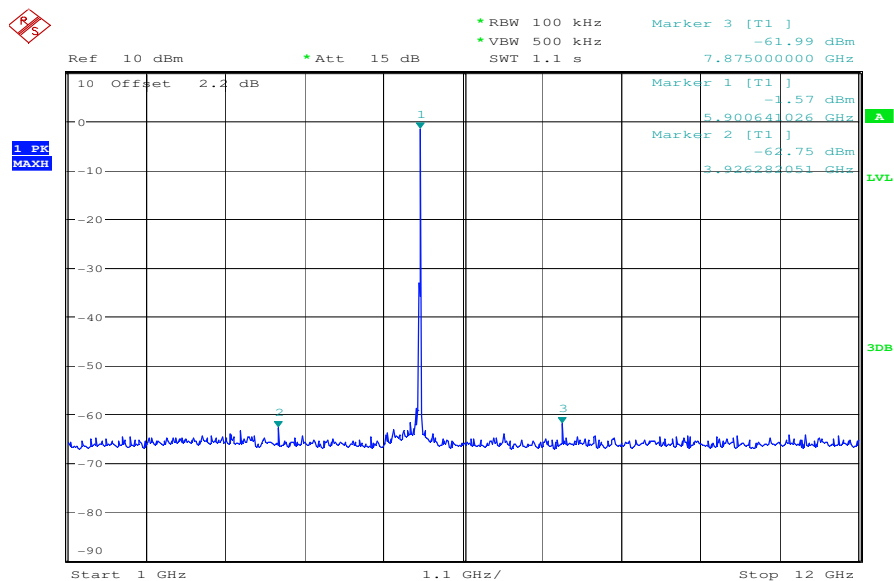
Date: 8.DEC.2009 09:39:15

Plot 25: high channel (5900 MHz), high data rate



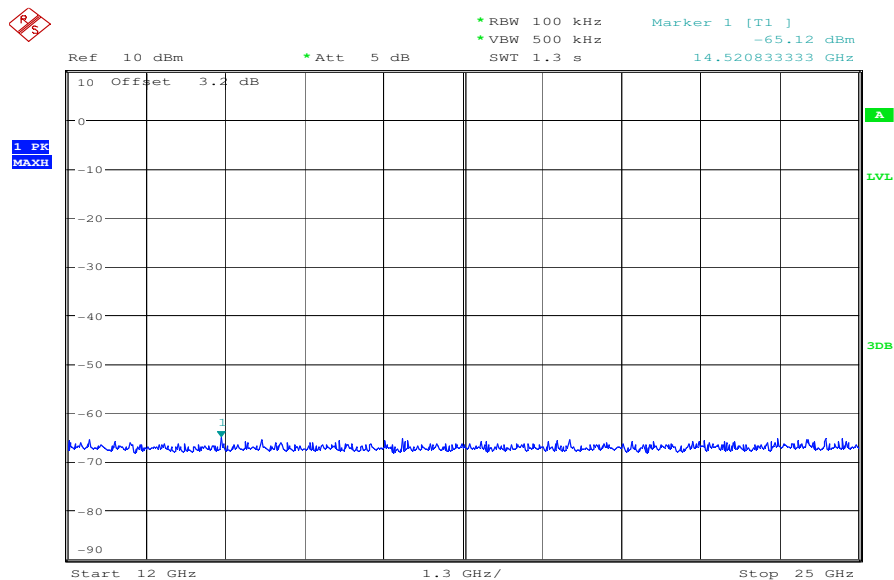
Date: 8.DEC.2009 09:18:12

Plot 26: high channel (5900 MHz), high data rate



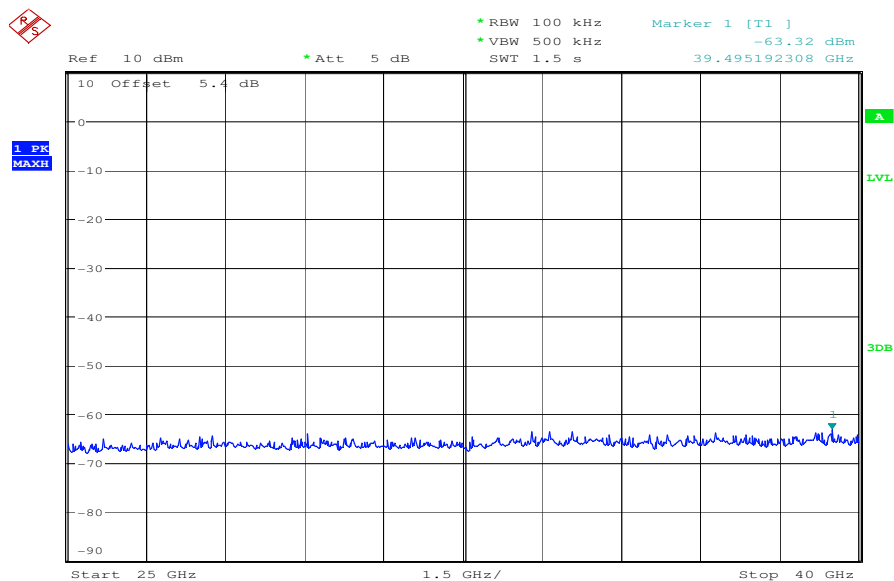
Date: 8.DEC.2009 09:28:09

Plot 27: high channel (5900 MHz), high data rate



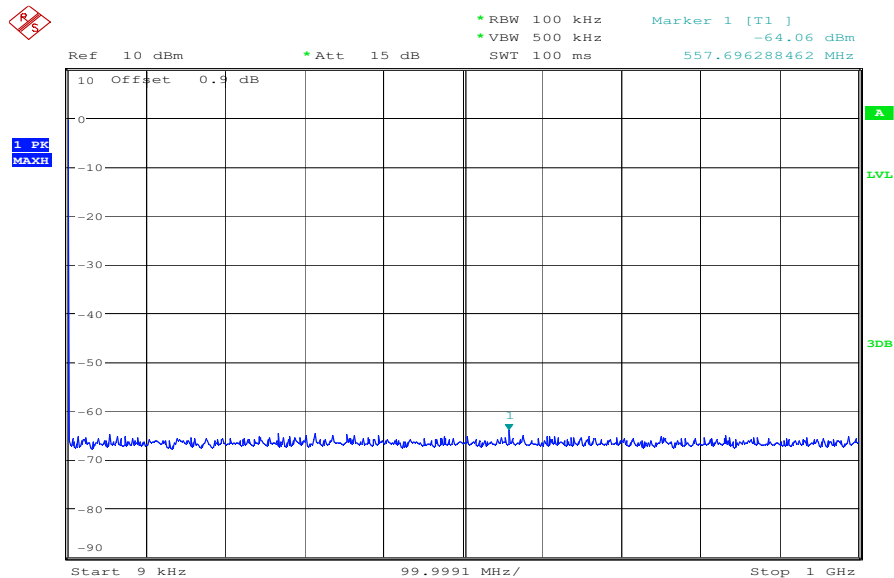
Date: 8.DEC.2009 09:34:01

Plot 28: high channel (5900 MHz), high data rate



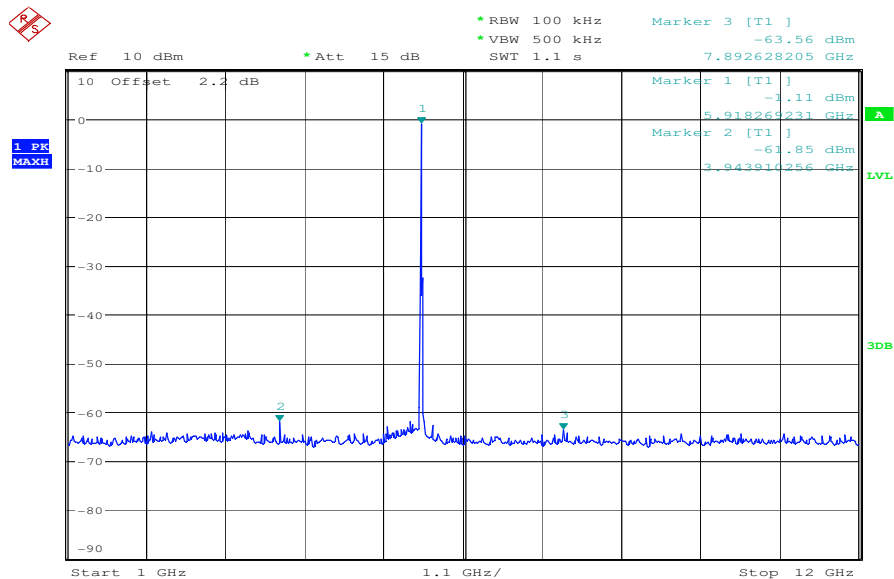
Date: 8.DEC.2009 09:37:55

Plot 29: high channel (5920 MHz), high data rate



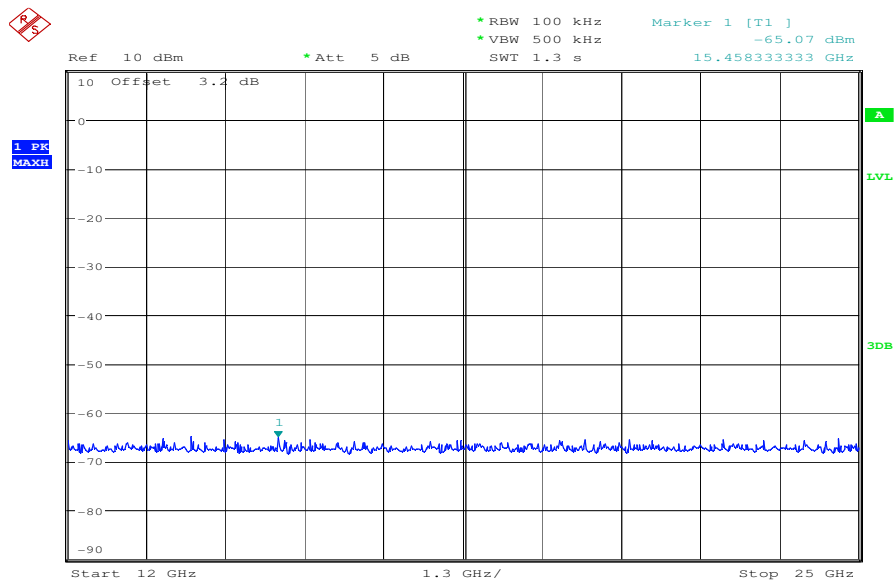
Date: 8.DEC.2009 09:19:48

Plot 30: high channel (5920 MHz), high data rate



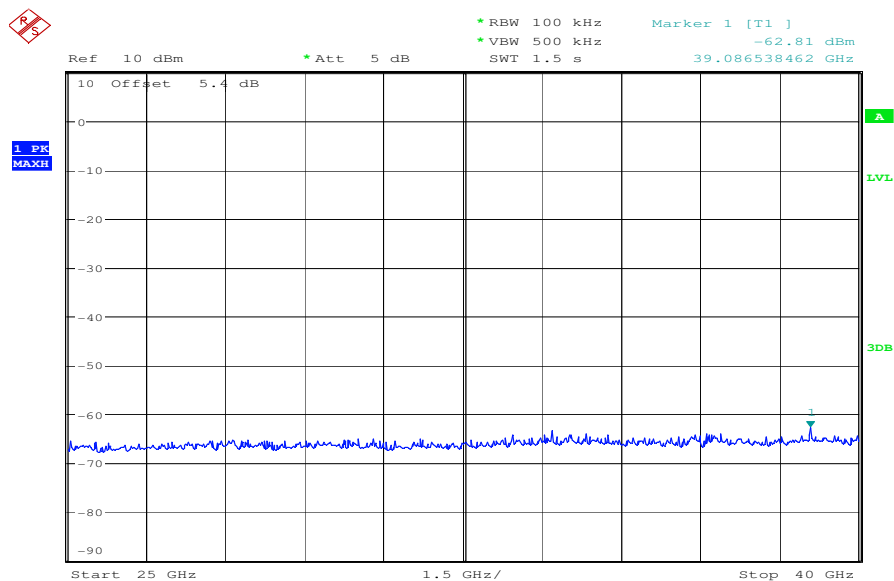
Date: 8.DEC.2009 09:29:30

Plot 31: high channel (5920 MHz), high data rate



Date: 8.DEC.2009 09:35:05

Plot 32: high channel (5920 MHz), high data rate



Date: 8.DEC.2009 09:36:00

Result & Limits: low data rate

Emission Limitations					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5860			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
5890			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
5900			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
5920			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
Measurement uncertainty		± 3dB			

Limit:

Under normal test conditions only	-25 dBm
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Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

Result & Limits: high data rate

Emission Limitations					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5860			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
5890			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
5900			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
5920			-25 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -25 dBm criteria.(according to ASTM E2213)					Complies
Measurement uncertainty		± 3dB			

Limit:

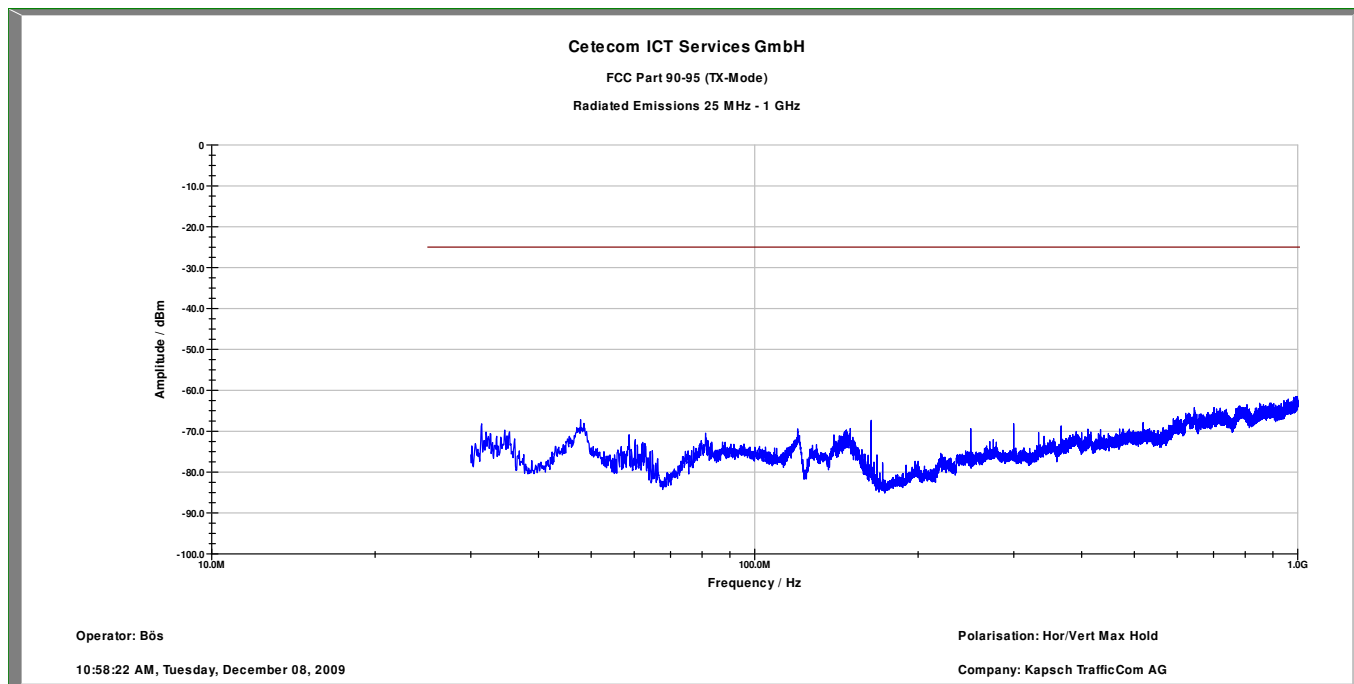
Under normal test conditions only	-25 dBm
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Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

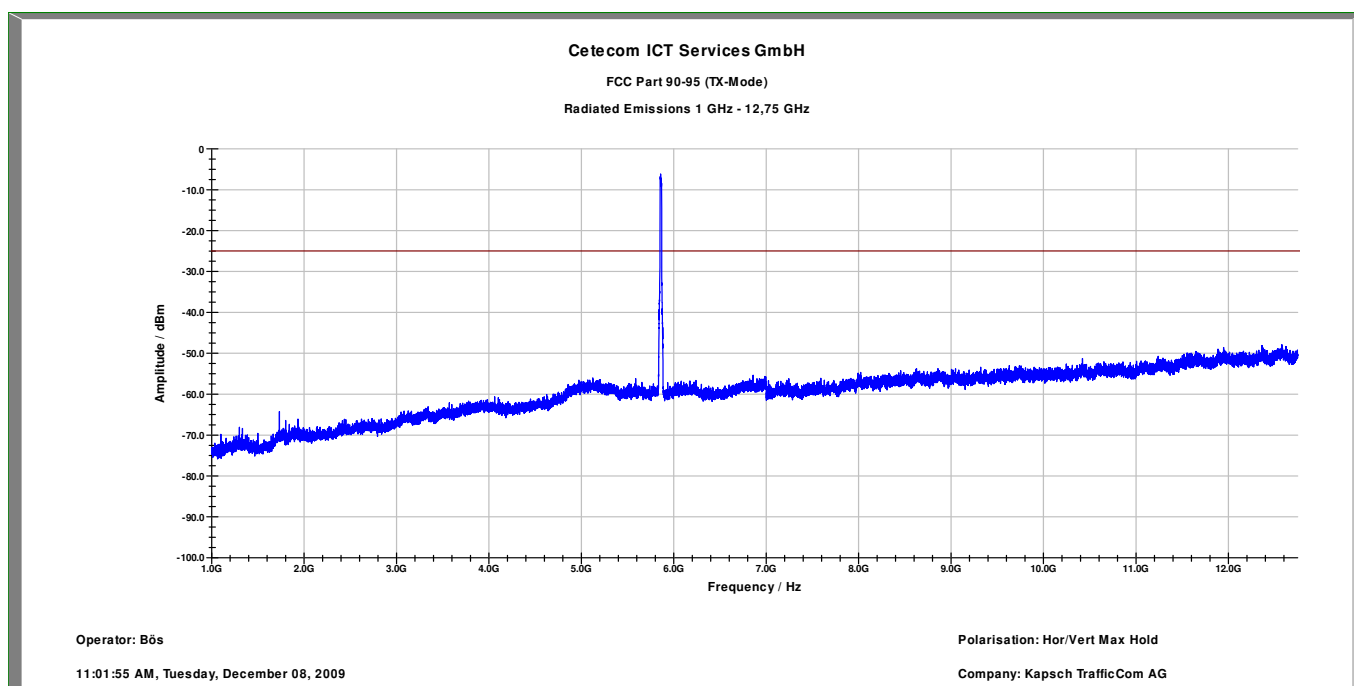
5.12 Spurious Emissions - radiated (Transmitter) (§ 95.635 / § 95.1509 / § 2.1053)

Port 1: Closed cover

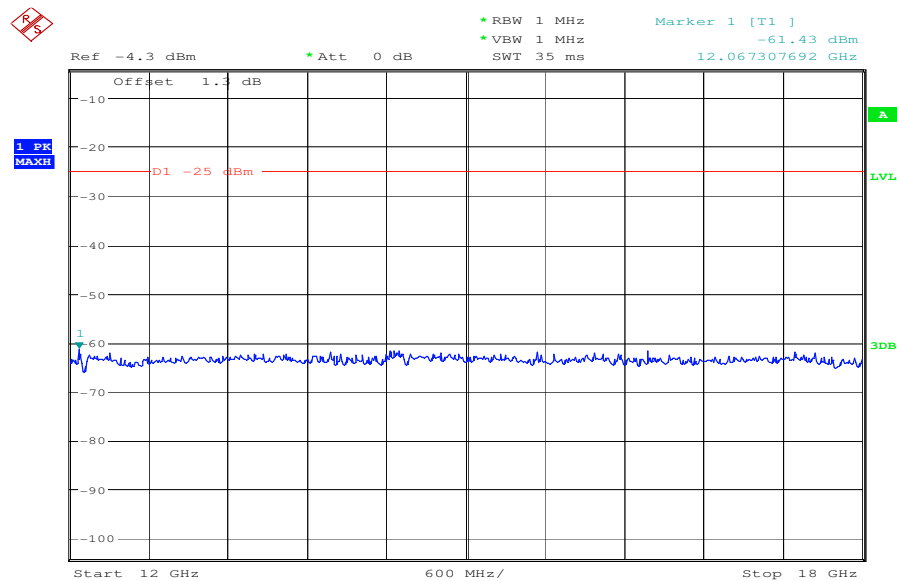
Plot 1: 5860 MHz, low data rate, 30 MHz – 1 GHz, vertical polarization & horizontal polarization



Plot 2: 5860 MHz, low data rate, 1 GHz – 12.75 GHz, vertical polarization & horizontal polarization

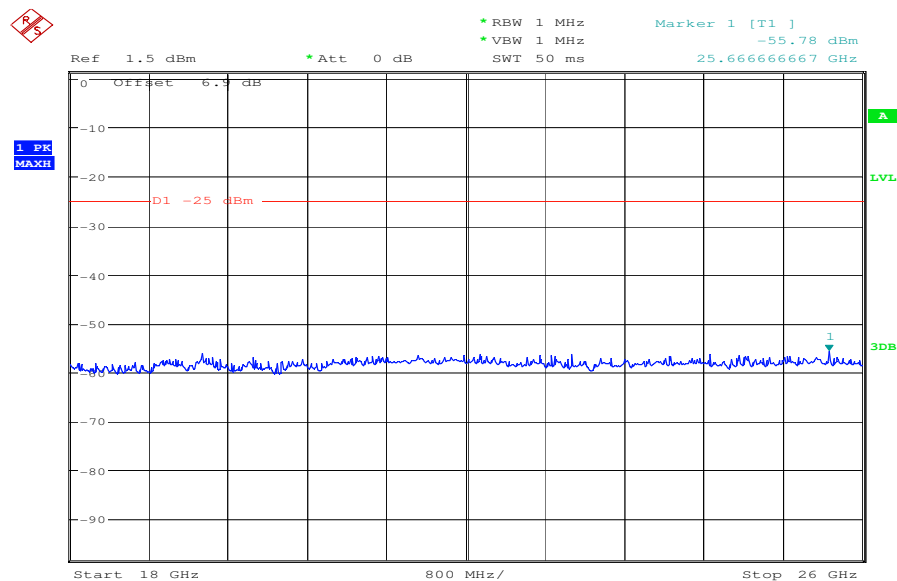


Plot 3: 5860 MHz, low data rate, 12 GHz – 18 GHz, vertical & horizontal polarization (valid for all channels)



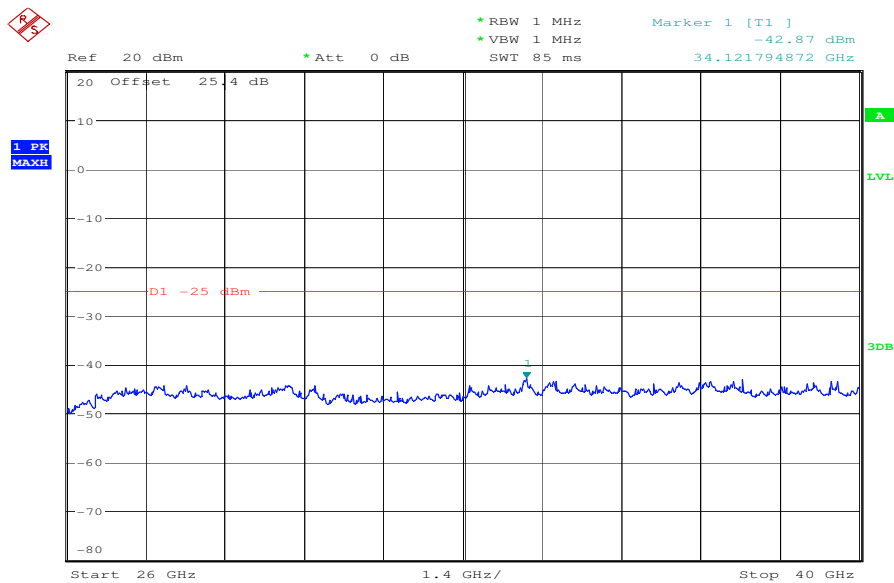
Date: 10.DEC.2009 09:21:59

Plot 4: 5860 MHz, low data rate, 18 GHz – 26 GHz, vertical & horizontal polarization (valid for all channels)



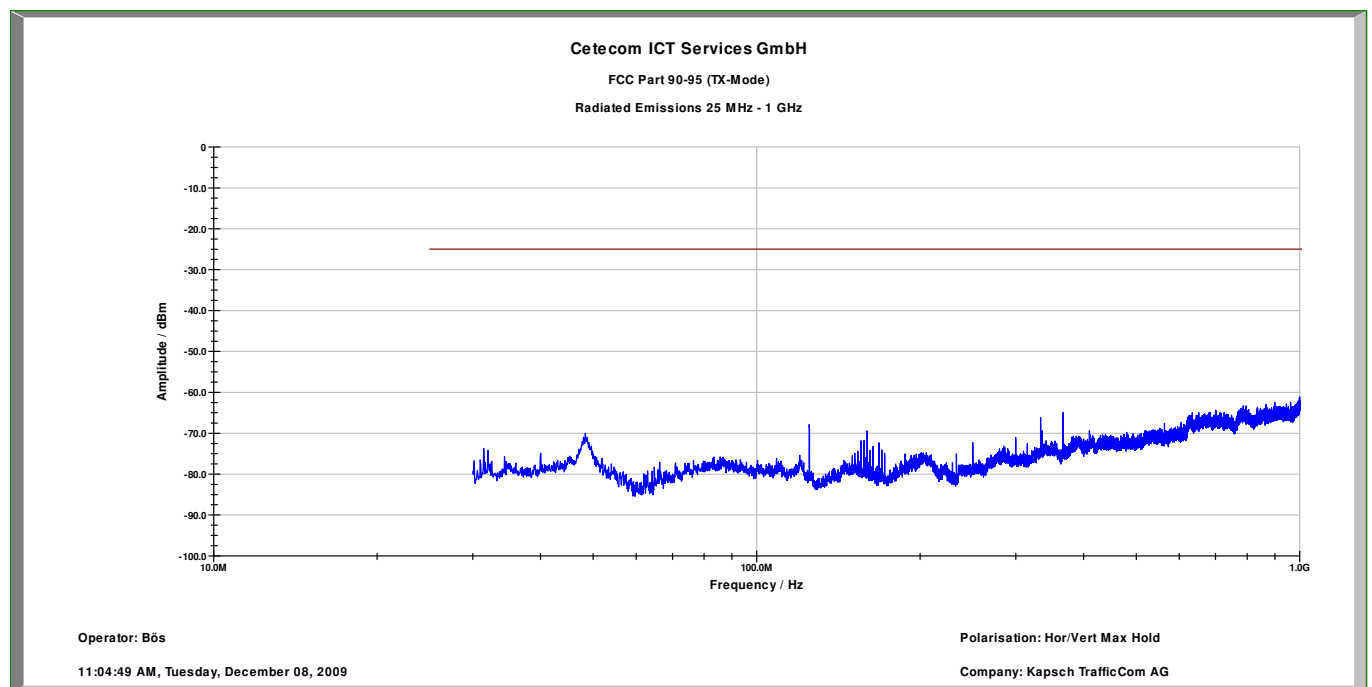
Date: 10.DEC.2009 09:18:02

Plot 5: 5860 MHz, low data rate, 26 GHz – 40 GHz, vertical & horizontal polarization (valid for all channels)

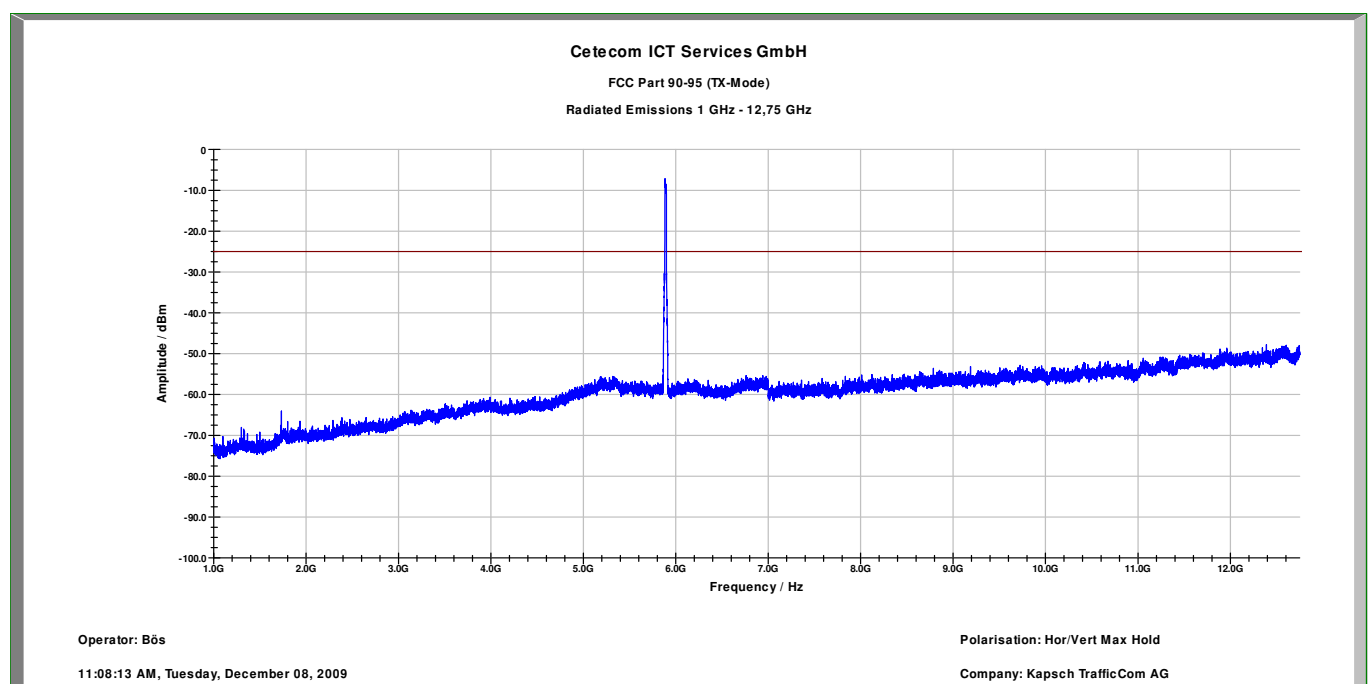


Date: 10.DEC.2009 09:07:09

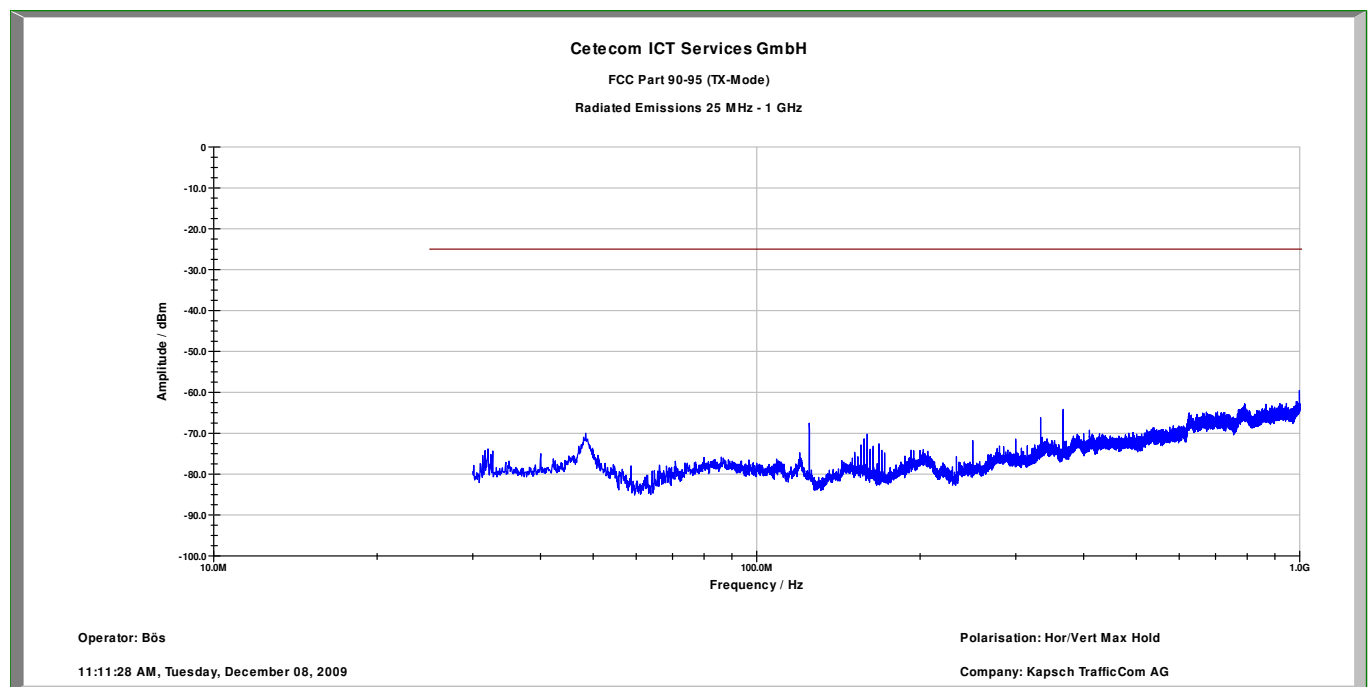
Plot 6: 5890 MHz, low data rate, 30 MHz – 1 GHz, vertical polarization & horizontal polarization



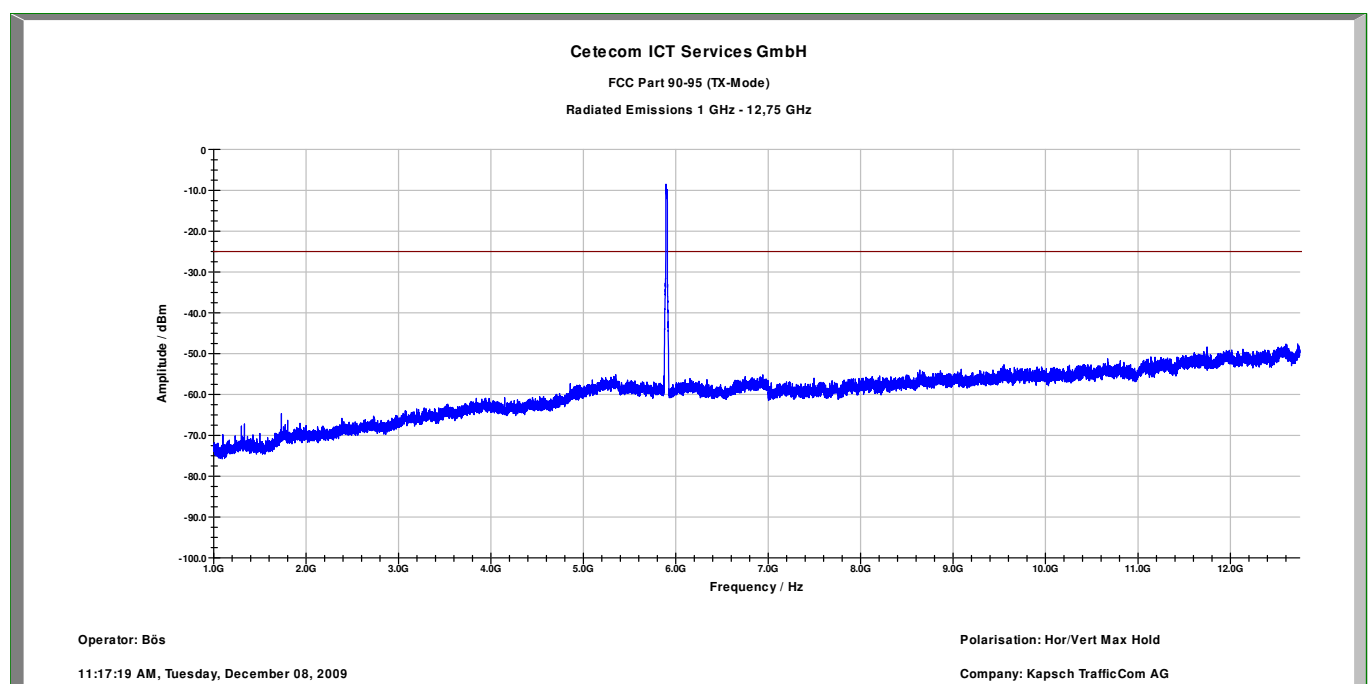
Plot 7: 5890 MHz, low data rate, 1 GHz – 12.75 GHz, vertical polarization & horizontal polarization



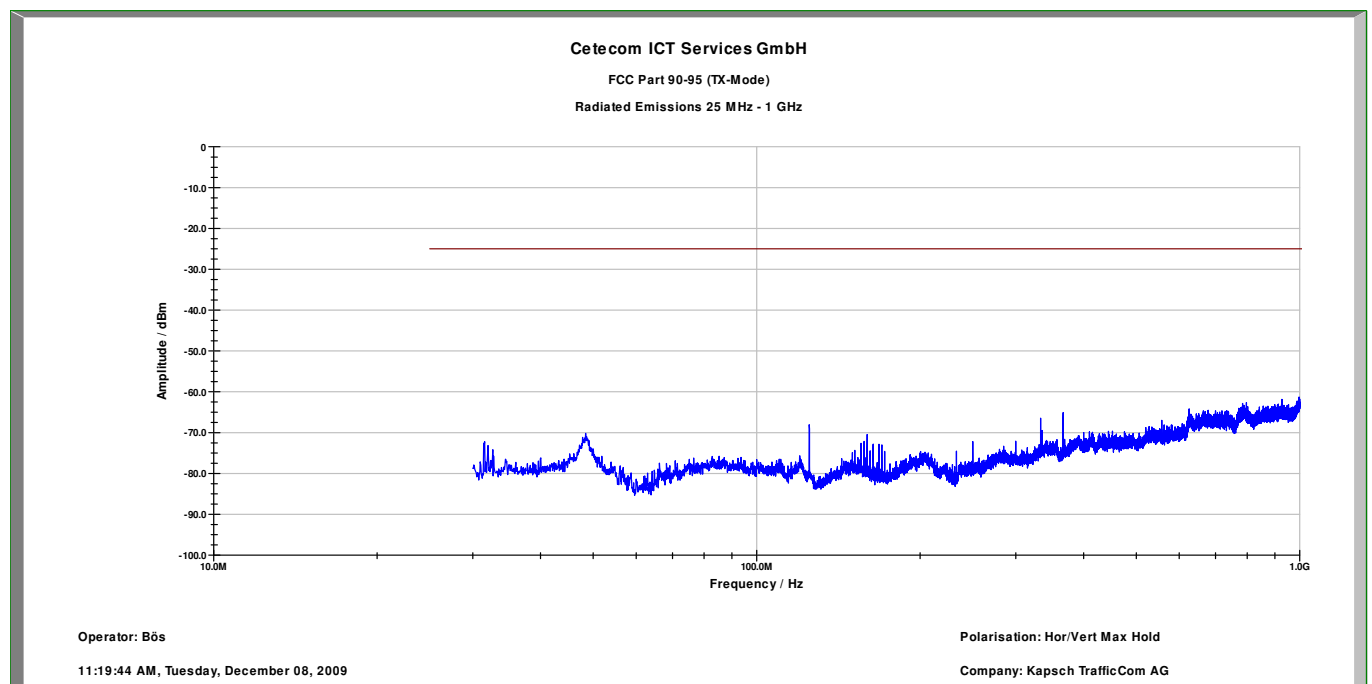
Plot 8: 5900 MHz, low data rate, 30 MHz – 1 GHz, vertical polarization & horizontal polarization



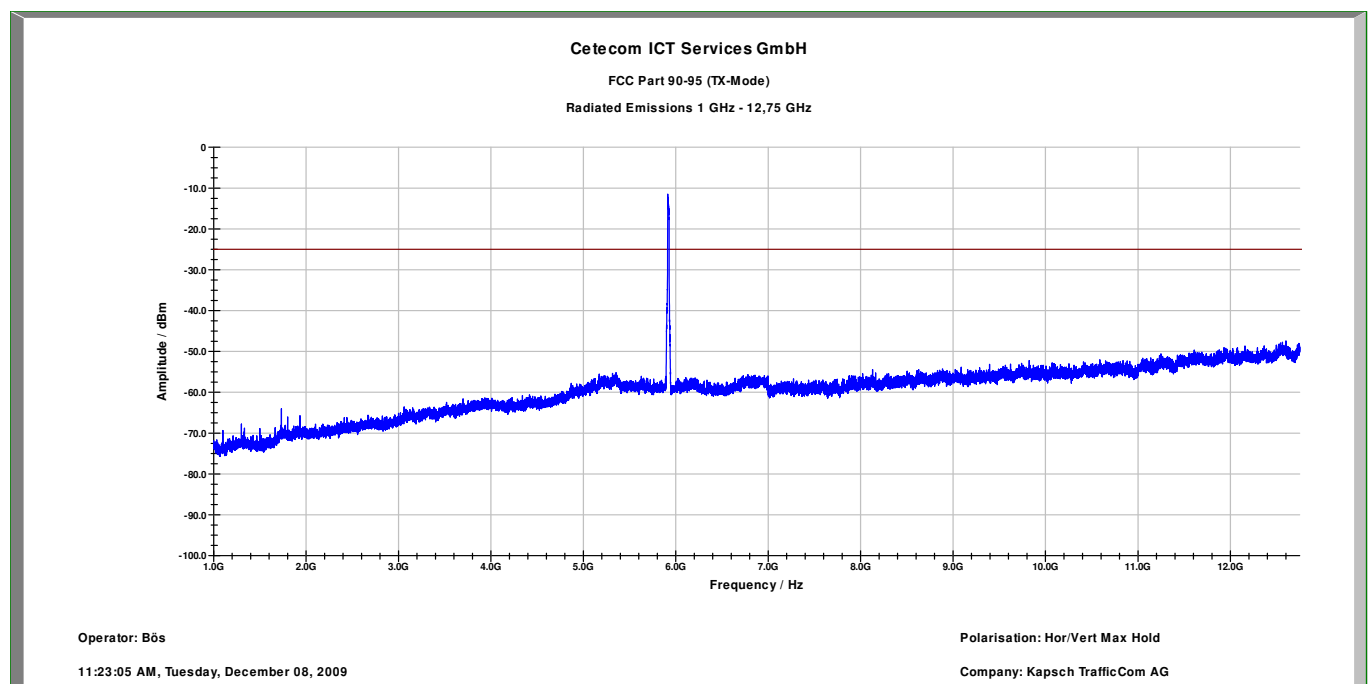
Plot 9: 5900 MHz, low data rate, 1 GHz – 12.75 GHz, vertical polarization & horizontal polarization



Plot 10: 5920 MHz, low data rate, 30 MHz – 1 GHz, vertical polarization & horizontal polarization

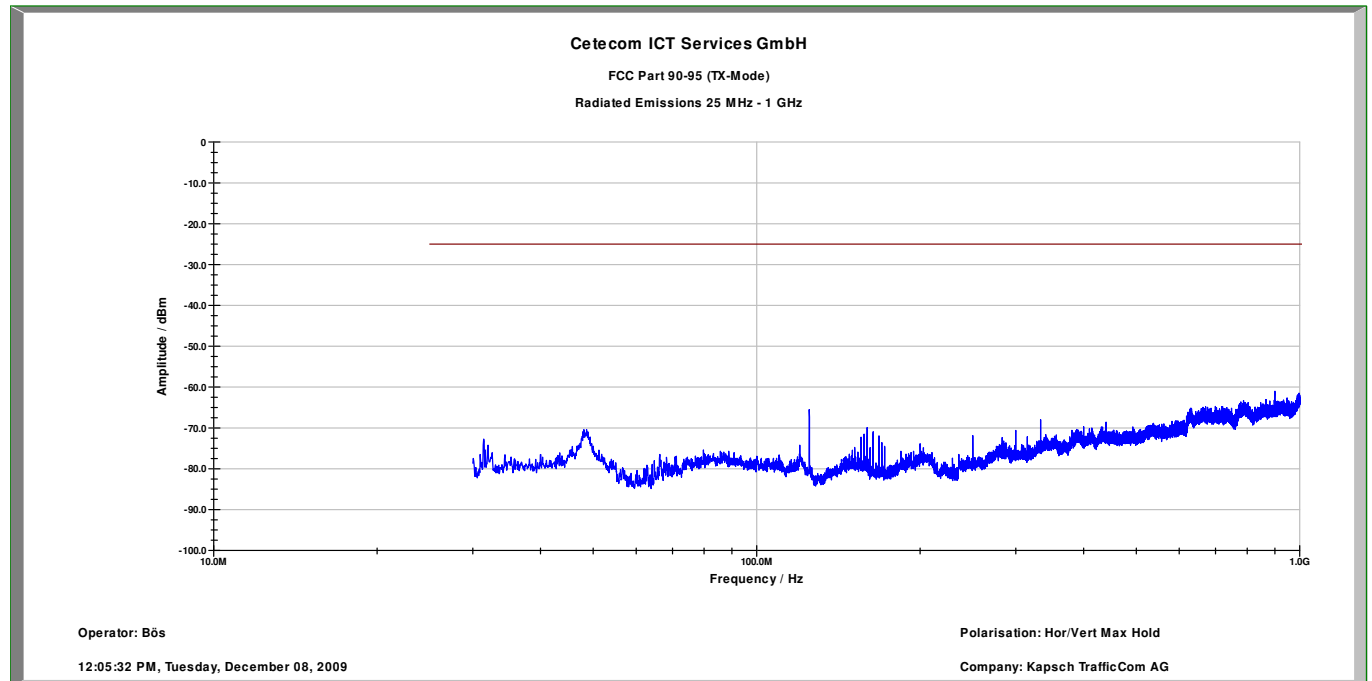


Plot 11: 5920 MHz, low data rate, 1 GHz – 12.75 GHz, vertical polarization & horizontal polarization

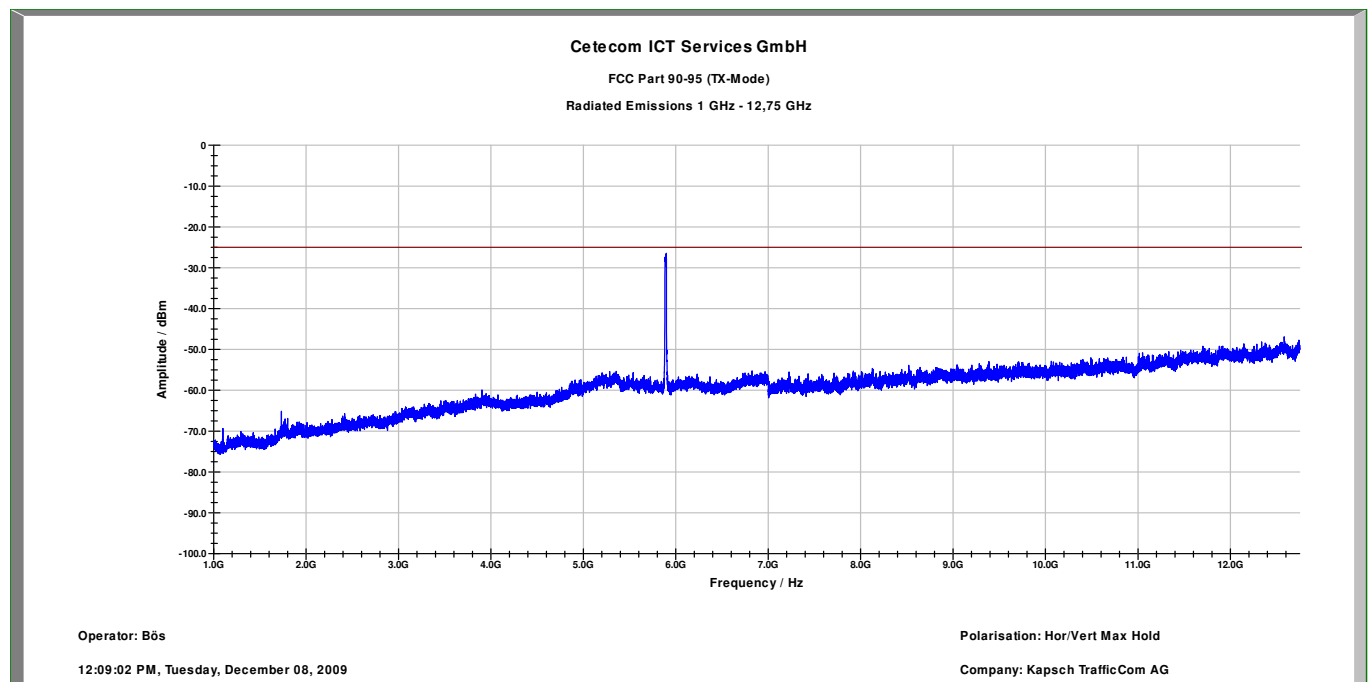


Port 1: Open cover

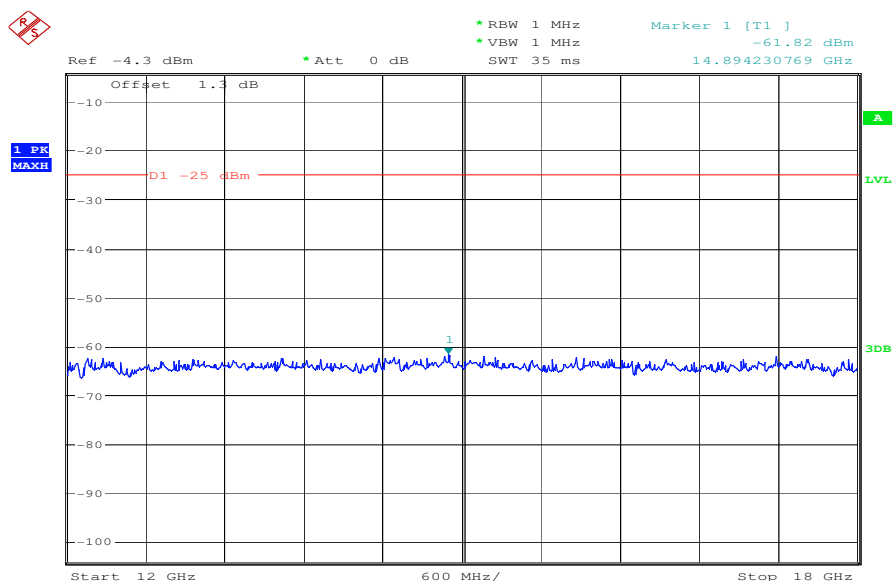
Plot 1: 5890 MHz, low data rate, 30 MHz – 1 GHz, vertical polarization & horizontal polarization



Plot 2: 5890 MHz, low data rate, 1 GHz – 12.75 GHz, vertical polarization & horizontal polarization

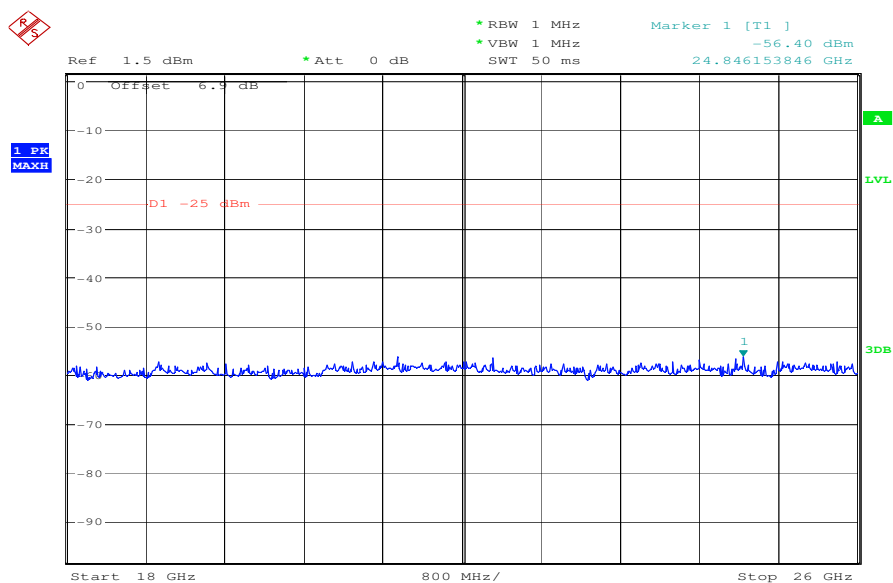


Plot 3: 5890 MHz, low data rate, 12 GHz – 18 GHz, vertical & horizontal polarization (valid for all channels)



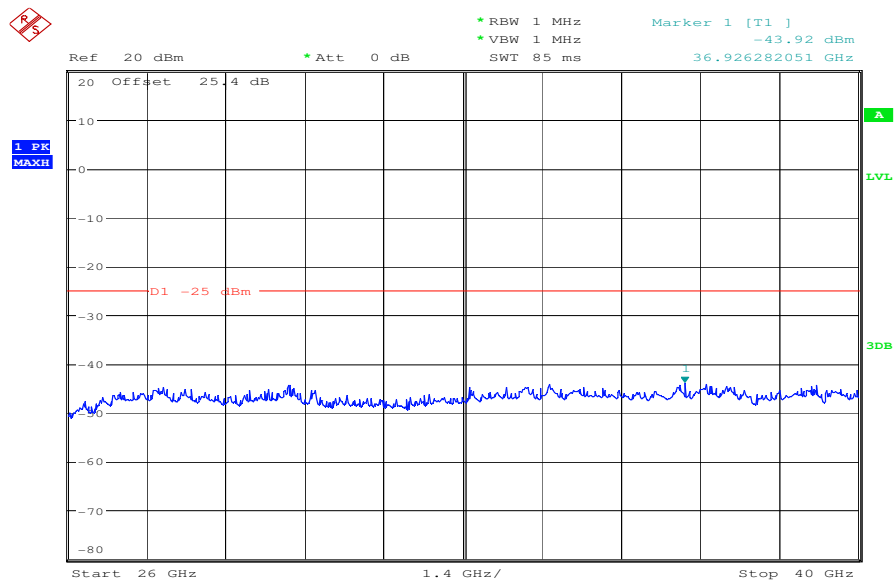
Date: 10.DEC.2009 09:20:30

Plot 4: 5890 MHz, low data rate, 18 GHz – 26 GHz, vertical & horizontal polarization (valid for all channels)



Date: 10.DEC.2009 09:18:16

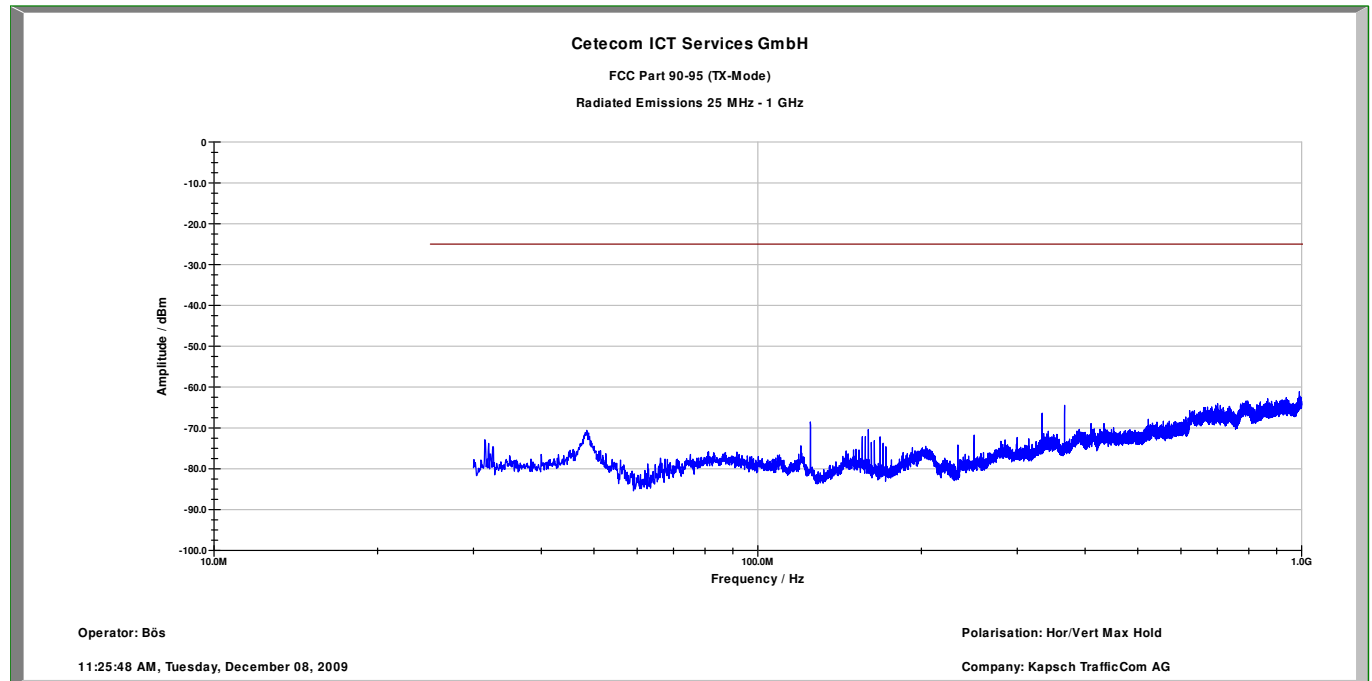
Plot 5: 5890 MHz, low data rate, 26 GHz – 40 GHz, vertical & horizontal polarization (valid for all channels)



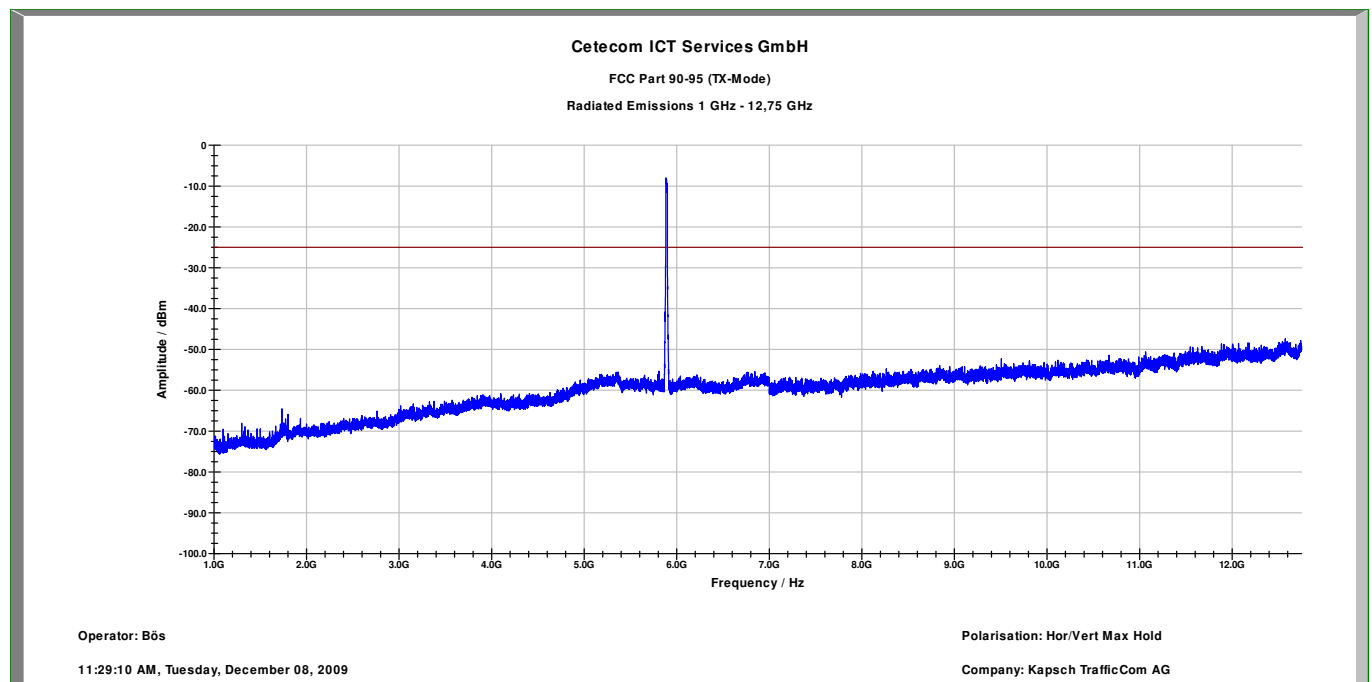
Date: 10.DEC.2009 09:07:24

Port 2: Closed cover

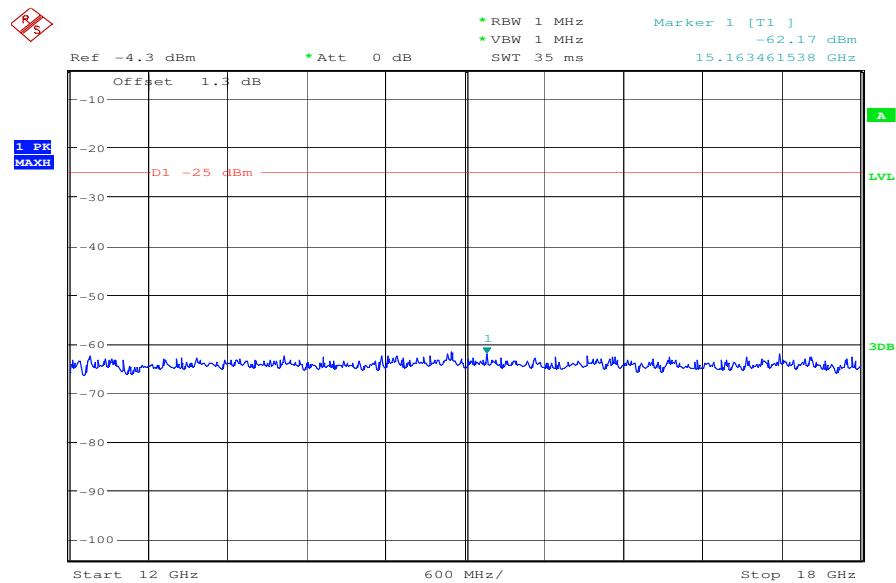
Plot 1: 5890 MHz, low data rate, 30 MHz – 1 GHz, vertical polarization & horizontal polarization



Plot 2: 5890 MHz, low data rate, 1 GHz – 12.75 GHz, vertical polarization & horizontal polarization

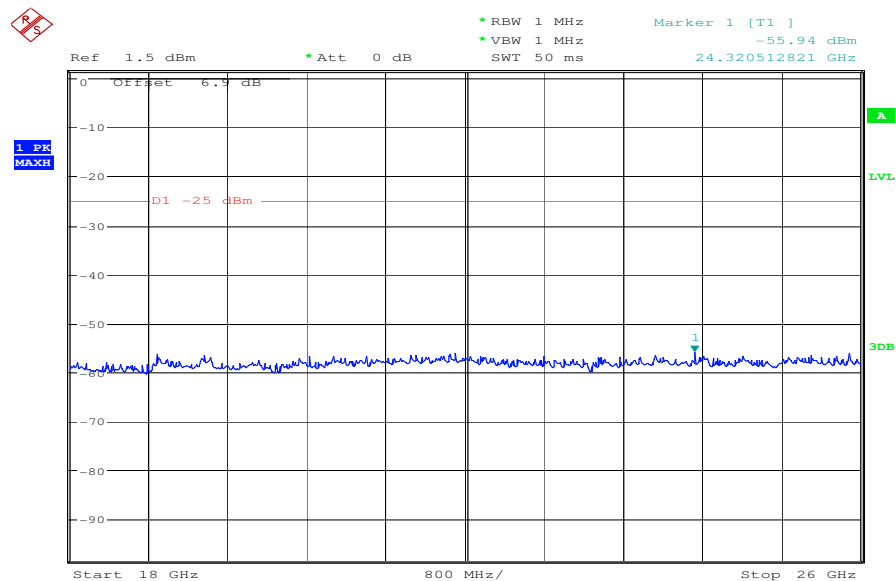


Plot 3: 5890 MHz, low data rate, 12 GHz – 18 GHz, vertical & horizontal polarization (valid for all channels)



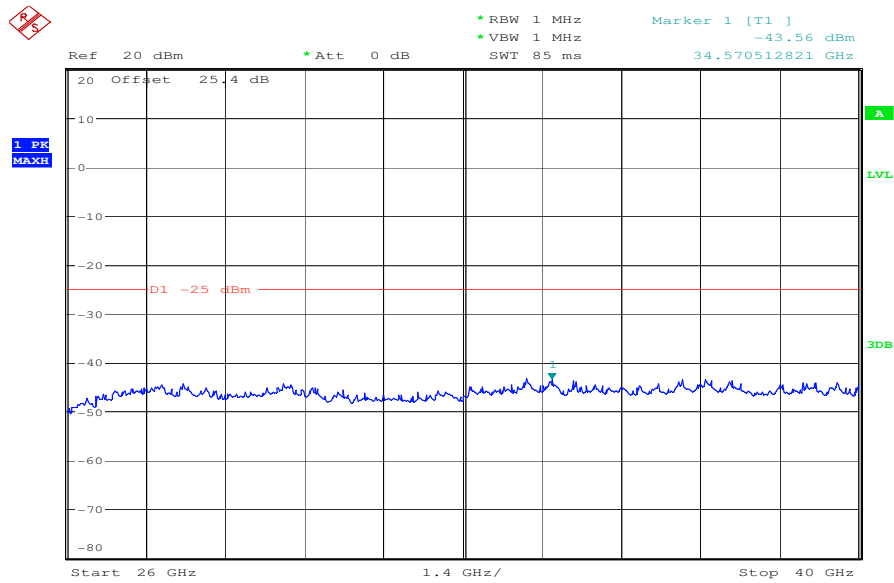
Date: 10.DEC.2009 09:20:24

Plot 4: 5890 MHz, low data rate, 18 GHz – 26 GHz, vertical & horizontal polarization (valid for all channels)



Date: 10.DEC.2009 09:16:54

Plot 5: 5890 MHz, low data rate, 26 GHz – 40 GHz, vertical & horizontal polarization (valid for all channels)



Date: 10.DEC.2009 09:10:44

Results: Port 1

SPURIOUS EMISSIONS LEVEL								
5860 MHz closed cover			5890 MHz closed cover			5900 MHz closed cover		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
No critical peaks detected.			No critical peaks detected.			No critical peaks detected.		
Measurement uncertainty			±3 dB					

SPURIOUS EMISSIONS LEVEL								
5920 MHz closed cover			-/-			5890 MHz open cover		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
No critical peaks detected.						No critical peaks detected.		
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limit:

Under normal test conditions only	-25 dBm
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Results: Port 2

SPURIOUS EMISSIONS LEVEL								
5890 MHz closed cover								
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBμV/m]	F [MHz]	Detector	Level [dBμV/m]
No critical peaks detected.								
Measurement uncertainty			±3 dB					

Limit:

Under normal test conditions only	-25 dBm
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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 9 kHz - 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 Broadband Antenna (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.		

System Rack Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S	100886	300003575	25.08.2008	24	25.08.2010
2	CBT	R&S	100313	300003516	03.09.2008	24	03.09.2010
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply 6625A	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator SMIQ03B	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

Signalling Units:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	CBT	R&S	100313	300003516	03.09.2008	24	03.09.2010
2	CBT	R&S	100185	300003416	27.08.2008	24	27.08.2010
3	CMU-200	R&S	103992	300003231	04.06.2008	24	04.06.2010
4	CMU-200	R&S	106240	300003321	27.08.2008	24	27.08.2010
5	CMU-200	R&S	832221/0055	300002862	20.03.2008	24	20.03.2010

Climatic Box:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Climatic box VT 4002	Heraeus Vötsch	58566046820010	300003019	28.05.2009	24	28.05.2011
2	Climatic box CTS T-40/50	CTS	064023	300003540	04.06.2009	24	04.06.2011

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	18.01.2008	24	18.01.2010
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	23.01.2008	24	23.01.2010
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	23.01.2008	24	23.01.2010
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

SRD Laboratory Room 011:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	NRP Power Meter	R&S	100212	300003780	27.02.2008	24	27.02.2010

Anechoic chamber F:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Control Computer	F+W	FW0502032	300003303	-/-	-/-	-/-
2	Trilog Antenna VULB 9163	Schwarzbeck	295	300003787	01.04.2008	24	01.04.2010
3	Amplifier - 0518C-138	Veritech Micro- wave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	01.06.2009	24	01.06.2011
6	Turntable Controller - 1061 3M	EMCO	1218	300000661	-/-	-/-	-/-
7	Tower Controller 1051 Controller	EMCO	1262	300000625	-/-	-/-	-/-
8	Tower - 1051	EMCO	1262	300000625	-/-	-/-	-/-
10	Ultra Notch-Filter Rejected band Ch. 62	WRCD	9	-/-	-/-	-/-	-/-