

Handled by, department
Jonas Bremholt
Electronics
+46 10 516 54 38, jonas.bremholt@sp.se

Ericsson AB
Per Helmersson
Färögatan 2, Kista
164 80 Stockholm

Equipment Authorization measurements on GSM Base station Transceiver unit with FCC ID: B5KFKRC1311004-2 (10 appendices)

Test object

Transceiver Unit dTRU 19 Edge, KRC 131 1004/2, R4E

Summary


Standard	Compliant	Appendix	Remarks
FCC CFR 47			
2.1046 RF Power output	Yes	2	-
2.1049 Occupied bandwidth	Yes	3	-
2.1049 Band Edge	Yes	4	Note 1
2.1051 Spurious emission at antenna	Yes	5	-
2.1053 Field strength of spurious radiation	Yes	6	-
2.1055 Frequency stability	Yes	7	-
Industry Canada RSS-133			
Section 6.7 Receiver spurious emissions	Yes	8	

Note 1: The maximum output power that can be used on the channels adjacent to the frequency band edges (channel 512 and 810) are 38.1 dBm (GMSK) and (8-PSK) in order to comply with CDU-K and 37.5 dBm (GMSK) and (8-PSK) in order to comply with CDU-F.

SP Sveriges Tekniska Forskningsinstitut
Electronics – EMC



Jan Welinder
Technical Manager



Jonas Bremholt
Technical Officer

SP Technical Research Institute of Sweden

Postal address
SP
Box 857
SE-501 15 Borås
SWEDEN

Office location
Västeråsen
Brinellgatan 4
SE-504 62 Borås
SWEDEN

Phone / Fax / E-mail
+46 10 516 50 00
+46 33 13 55 02
info@sp.se

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FCC ID: B5KFKRC1311004-2

Appendix 1

Description - Equipment Under Test (EUT)

Equipment: GSM Base station transceiver 1900 MHz

Tx Frequency range: 1930.2-1989.8 MHz

Modulations: GMSK and 8-PSK

Maximum output power (RMS):

CDU-K	GMSK	8-PSK
Uncombined:	44.8 dBm	41.5 dBm
Combined:	41.5 dBm	38.2 dBm
Combined+TCC:	47.5 dBm	44.2 dBm

CDU-F		
Uncombined:	41.0 dBm	38.7 dBm

Nominal power voltage: 24 V DC

Tested Channels

Conducted measurements:

ARFCN	Frequency	ARFCN	Frequency
512	1930.2	760	1979.8
513	1930.4	785	1984.8
537	1935.2	809	1989.6
562	1940.2	810	1989.8
661	1960.0		

All RF conducted measurements were performed with the EUT installed in a RBS 2206V2 powered with DC power (the list of the RBS hardware is shown in appendix 8). The measurements were done at the output connector of CDU-K (BFL 119 447/1 rev. R1A) with serial number TR44918246. The dTRU with serial number AE55454279 was used for the measurements. The CDU-F (BFL 119 156/1 rev. R2B) with serial number TB36375046 were used for the measurements with CDU-F. The dTRUs with serial number AE55467540, AE55454281, and AE55454277 were used for the measurements with CDU-F. The measurements were performed with configurations that represents worst case scenario.

Radiated measurements:

CDU-F

All six dTRUs were activated at maximum output power with the following settings:

dTRU	TRX	ARFCN	Modulation	RF config.
1	0	512	GMSK	Uncombined
	1	542	8-PSK	Uncombined
2	2	572	GMSK	Uncombined
	3	602	8-PSK	Uncombined
3	4	631	GMSK	Uncombined
	5	661	8-PSK	Uncombined
4	6	685	GMSK	Uncombined
	7	710	8-PSK	Uncombined
5	8	735	GMSK	Uncombined
	9	760	8-PSK	Uncombined
6	10	785	GMSK	Uncombined
	11	810	8-PSK	Uncombined

CDU-K

Five dTRUs were activated at maximum output power with the following settings:

dTRU	TRX	ARFCN	Modulation	RF config
1	0	512	GMSK	Combined
	1	537	8-PSK	Combined
2	2	710	GMSK	Combined TCC
	3	-	-	-
3	4	652	8-PSK	Combined
	5	587	GMSK	Combined
4	6	661	8-PSK	Combined TCC
	7	-	-	-
5	8	785	GMSK	Uncombined
	9	810	8-PSK	Uncombined

The radiated spurious emission measurements were done with the three RF configurations listed above at the same time as worst case configuration.

The radiated measurements were performed with the EUT installed in a RBS 2206V2 which was used as a worst case configuration.

Manufacturer's representative

Per Helmersson, Ericsson AB

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in FCC CFR47.

References

Measurements were done according to relevant parts of the following standards:

ANSI 63.4 2003

ANSI/TIA/EIA-603-C-2004

J-STD007A Vol 1

ANSI/TIA/EIA 136-280-D-2002

Reservation

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in the report.

Delivery of test object

The test object was delivered: 2007-09-03

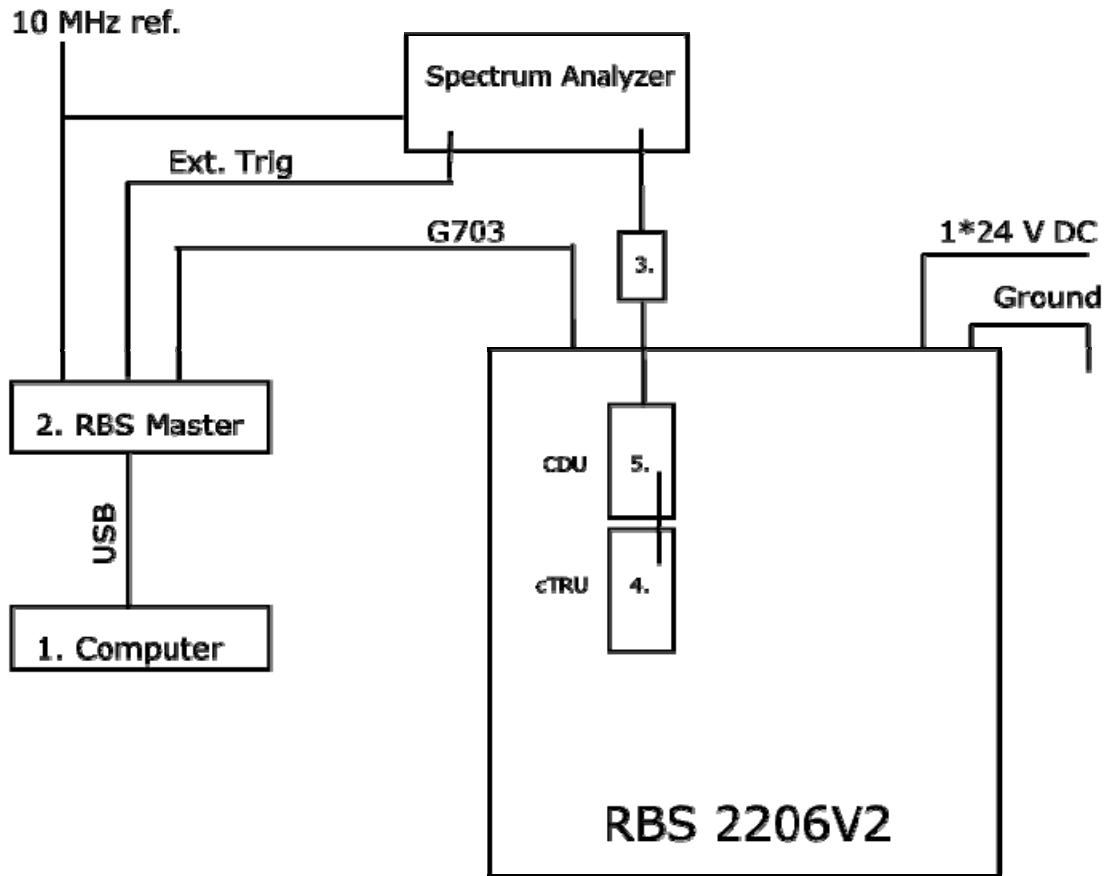
Test engineers

Jörgen Wassholm, Stefan Larsson, and Jonas Bremholt

Test witnesses

Lars Hagbjörk and Bror Sjöblom, Ericsson AB

Test set-up, conducted measurements



Note: The TG-Sync and Ext. trig were only used during the frequency stability measurements.

1. Computer with software RBSMMI ver. R9D08
2. Ericsson RBS Master 2 LPY 107 1007/1 R1F/A software ver. R5A08
3. Attenuator
4. Test object with FCC ID: B5KFKRC1311004-2
5. CDU-K/ CDU-F

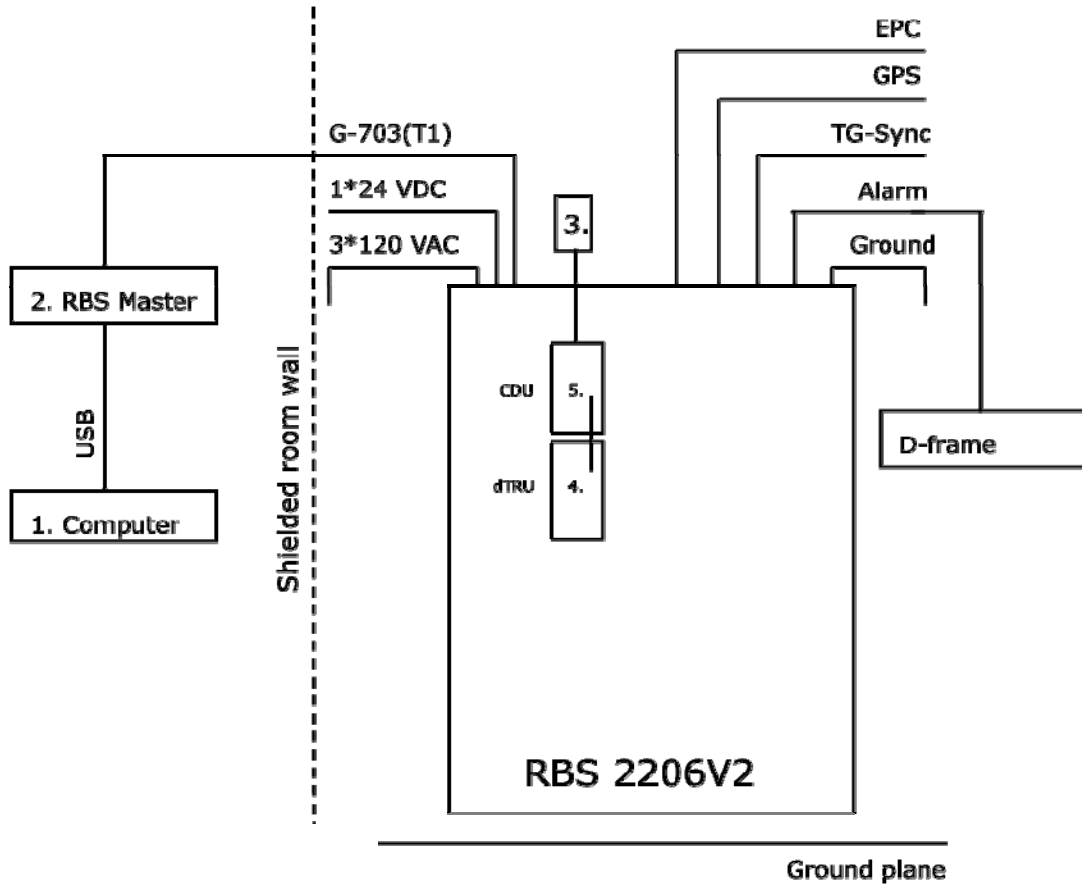
Interfaces:

24 VDC
 Antenna: Coaxial cable (50 ohm)
 G703: T1, shielded multi-wire (120 ohm)
 TG-sync: Shielded multi-wire

Type of port:

DC power
 Antenna
 Telecom
 Signal

Test set-up, radiated emission



1. Computer, with software RBSMMI ver. R9D08
2. Ericsson RBS Master 2 LPY 107 1007/1 R1F/A
3. 6 Dummy loads (50 ohm)
4. Test object with FCC ID: B5KFKRC1311004-2
5. CDU-K/ CDU-F

Interfaces:

- Power: 120 VAC, 60 Hz
- Power: 24 VDC
- Antenna: Coaxial cable 50 ohm
- G703: T1, shielded multi-wire with 15-pin D-sub connector
- TG-sync: Shielded multi-wire, unterminated
- Alarm: Unshielded multi-wire, terminated in distribution frame
- GPS: Shielded multi-wire, 9-pin DSUB, unterminated
- EPC: Shielded multi-wire, unterminated

Type of port:

- AC mains
- DC power
- Antenna
- Telecom
- Signal
- Signal
- Signal
- Signal

RF Power output measurements according to CFR 47 2.1046

Date	Temperature	Humidity
2007-09-04	23 °C ± 3 °C	35 % ± 5 %
2007-09-14	23 °C ± 3 °C	48 % ± 5 %

Test set-up and procedure

Measurements were made at CDU-K and CDU-F output connectors. The output was connected to a Peak power analyser via a 50 ohm attenuator. The transmitter was modulated with pseudorandom data and with maximum power in all the time slots during the measurements.

Measurement equipment	Calibration Due	SP number
Boonton RF Peak power meter/analyzer	2008-12	503 144
Boonton Power sensor 56518-S/4	2009-06	503 146
Multimeter Fluke 87	2007-12	502 190
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 0.5 dB

Results

Modulation: **GMSK**

dTRU, output 1+2, with internal combiner plus TCC.

Maximum rated output power level after CDU-K: 47.5 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	46.8/ 46.0	47.2/ 46.3	47.2/ 46.2

dTRU, output 1, without internal combiner:

Maximum rated output power level after CDU-K: 44.8 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	44.5/ 43.7	44.8/ 44.0	44.7/ 43.9

dTRU, output 2, without internal combiner:

Maximum rated output power level after CDU-K: 44.8 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	44.7/ 43.8	45.1/ 44.2	44.9/ 44.1

dTRU, output 1, with internal combiner:

Maximum rated output power level after CDU-K: 41.0 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	40.9/ 40.0	41.1/ 40.4	41.0/ 40.3

dTRU, output 2, with internal combiner:

Maximum rated output power level after CDU-K: 41.0 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	40.6/ 39.9	40.9/ 40.2	40.8/ 40.1

dTRU, output 1, without internal combiner:

Maximum rated output power level after CDU-F 2x6: 41.0 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	41.8/ 41.1	41.8/ 41.2	41.7/ 41.0

dTRU, output 2, without internal combiner:

Maximum rated output power level after CDU-F 2x6: 41.0 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	41.7/ 40.9	41.8/ 41.1	41.7/ 40.9

Modulation: **8-PSK**

dTRU, output 1+2, with internal combiner plus TCC:

Maximum rated output power level after CDU-K: 44.2 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	46.8/ 42.9	47.1/ 43.2	47.1/ 43.1

dTRU, output 1, without internal combiner:

Maximum rated output power level after CDU-K: 41.5 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	44.5/ 40.6	44.8/ 40.9	44.7/ 40.8

dTRU, output 2, without internal combiner:

Maximum rated output power level after CDU-K: 41.5 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	44.6/ 40.7	45.1/ 41.1	44.9/ 41.0

dTRU, output 1, with internal combiner:

Maximum rated output power level after CDU-K: 37.7 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	40.7/ 36.9	41.1/ 37.3	41.0/ 37.2

dTRU, output 2, with internal combiner:

Maximum rated output power level after CDU-K: 37.7 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	40.7/ 36.8	40.9/ 37.0	40.8/ 37.0



dTRU, output 1, without internal combiner:
Maximum rated output power level after CDU-F 2x6: 38.7 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	42.1/ 38.3	41.9/ 38.3	41.7/ 38.2

dTRU, output 2, without internal combiner:
Maximum rated output power level after CDU-F 2x6: 38.7 dBm

Test conditions		Transmitter power (dBm)		
		Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T _{nom} 22 °C	V _{nom} 24 V DC	41.8/ 38.2	42.1/ 38.4	41.8/ 38.2

Limit

§ 24.232: Maximum peak output power shall not exceed 100W (50dBm).

GMSK: The measured output power shall be within ± 2dB of the rated output power (J-STD007A Vol 1)

8-PSK: The measured output power shall be within +1 to -3 dB of the rated output power (ANSI/TIA/EIA 136-280-B)

Complies?	Yes
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Occupied bandwidth measurements according to 47CFR 2.1049

Date	Temperature	Humidity
2007-09-04	22 °C ± 3 °C	36 % ± 5 %
2007-09-06	23 °C ± 3 °C	45 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. Measurements were made at CDU-K and CDU-F output connectors. The output was connected to a spectrum analyser. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements. The transmitter was activated at maximum output power and modulated with pseudorandom data during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results with CDU-K are shown in appendix 3.1

Modulation: **GMSK**

TRX 1	ARFCN	OBW
Diagram 1:	Ch 512	238 kHz
Diagram 2:	Ch 661	242 kHz
Diagram 3:	Ch 810	238 kHz

Modulation: **8-PSK**

TRX 1	ARFCN	OBW
Diagram 7:	Ch 512	240 kHz
Diagram 8:	Ch 661	242 kHz
Diagram 9:	Ch 810	244 kHz

TRX 2	ARFCN	OBW
Diagram 4:	Ch 512	244 kHz
Diagram 5:	Ch 661	238 kHz
Diagram 6:	Ch 810	240 kHz

TRX 2	ARFCN	OBW
Diagram 10:	Ch 512	240 kHz
Diagram 11:	Ch 661	240 kHz
Diagram 12:	Ch 810	242 kHz

The results with CDU-F are shown in appendix 3.2

Modulation: **GMSK**

TRX 1	ARFCN	OBW
Diagram 1:	Ch 512	240 kHz
Diagram 2:	Ch 661	238 kHz
Diagram 3:	Ch 810	236 kHz

Modulation: **8-PSK**

TRX 1	ARFCN	OBW
Diagram 7:	Ch 512	244 kHz
Diagram 8:	Ch 661	236 kHz
Diagram 9:	Ch 810	242 kHz

TRX 2	ARFCN	OBW
Diagram 4:	Ch 512	238 kHz
Diagram 5:	Ch 661	240 kHz
Diagram 6:	Ch 810	238 kHz

TRX 2	ARFCN	OBW
Diagram 10:	Ch 512	232 kHz
Diagram 11:	Ch 661	238 kHz
Diagram 12:	Ch 810	234 kHz

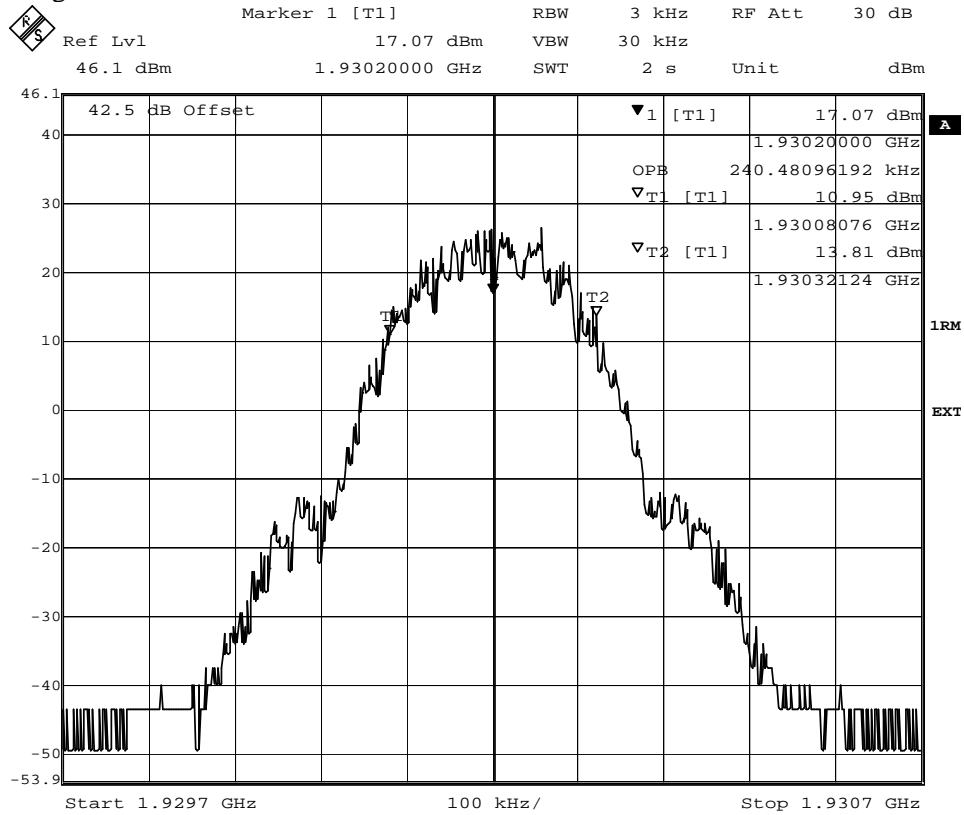
Complies?	Yes
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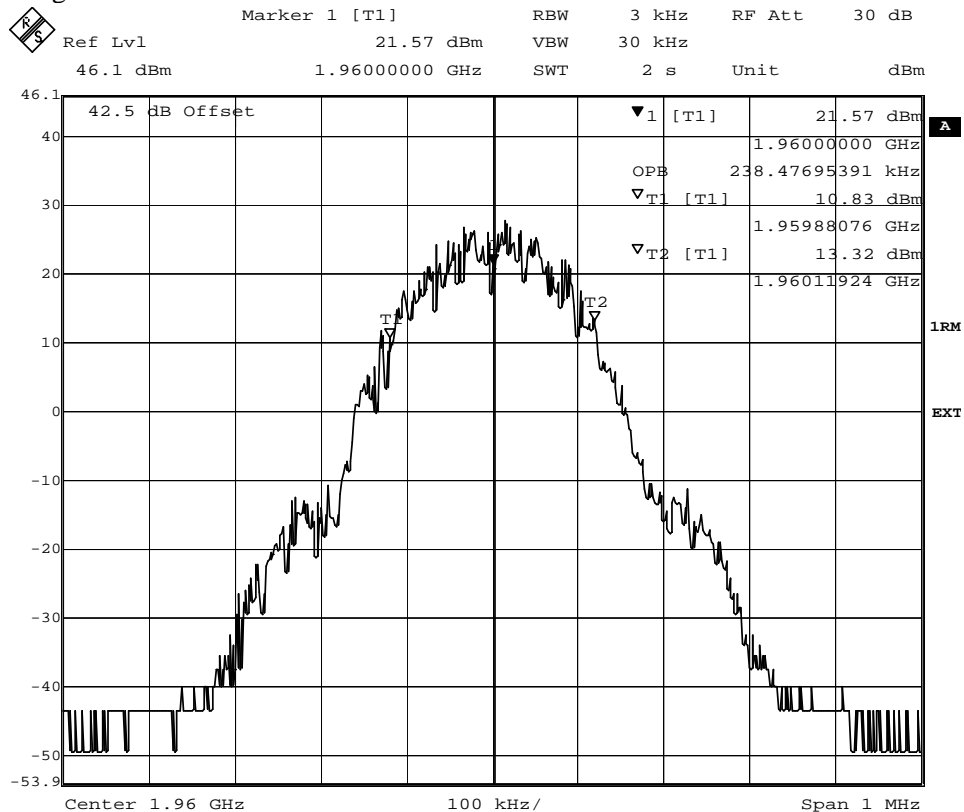
Appendix 3.1

Diagram 1



Date: 4.SEP.2007 15:04:38

Diagram 2



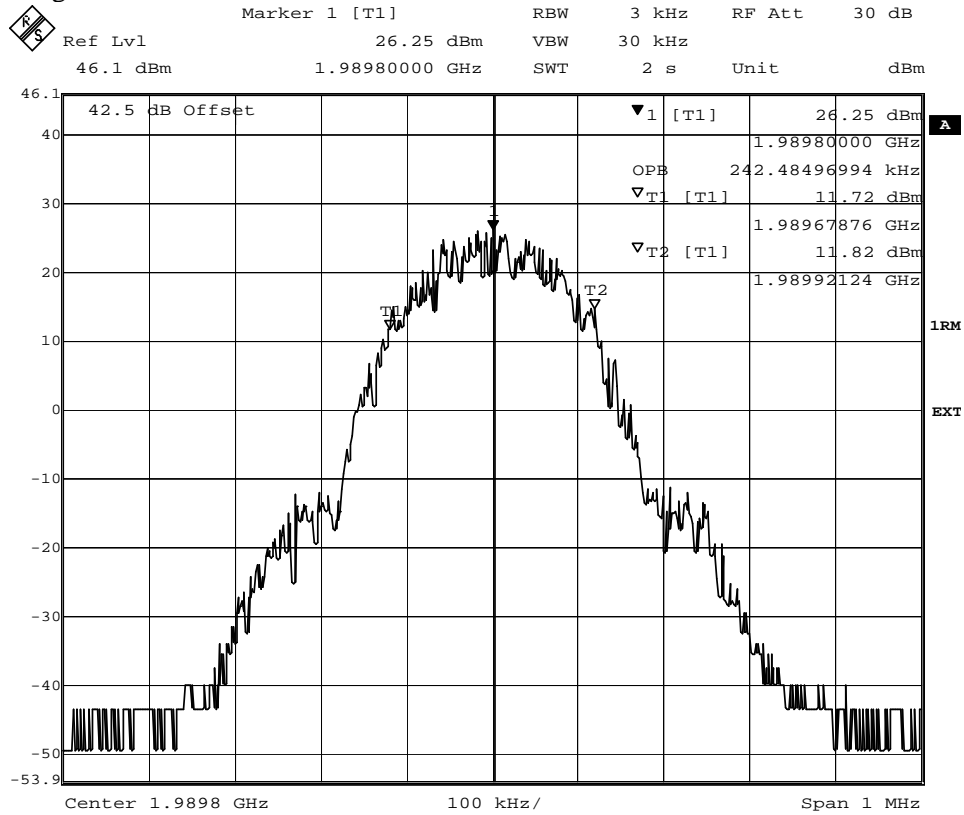
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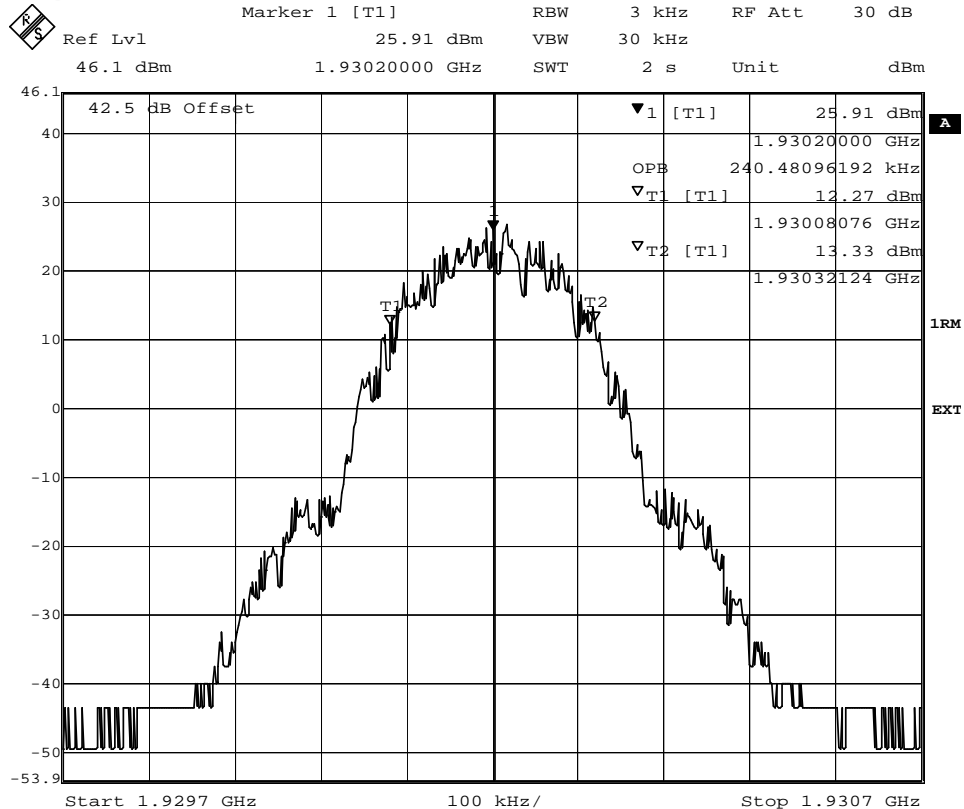
Appendix 3.1

Diagram 3



Date: 4.SEP.2007 15:21:48

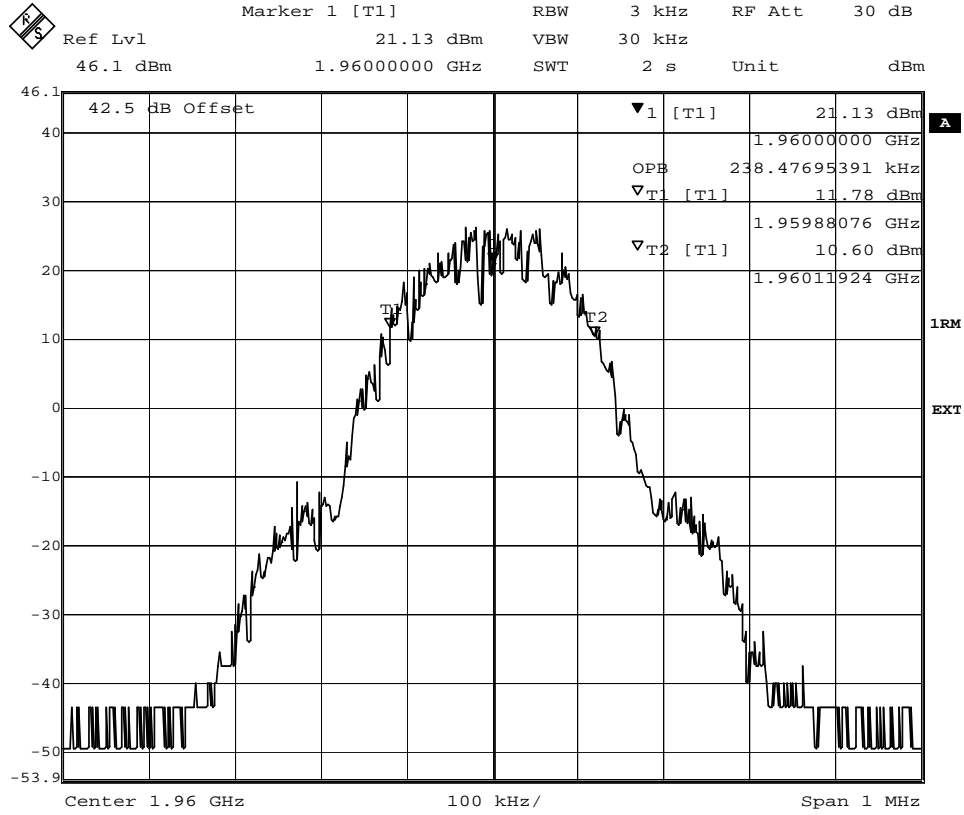
Diagram 4



Date: 4.SEP.2007 15:09:58

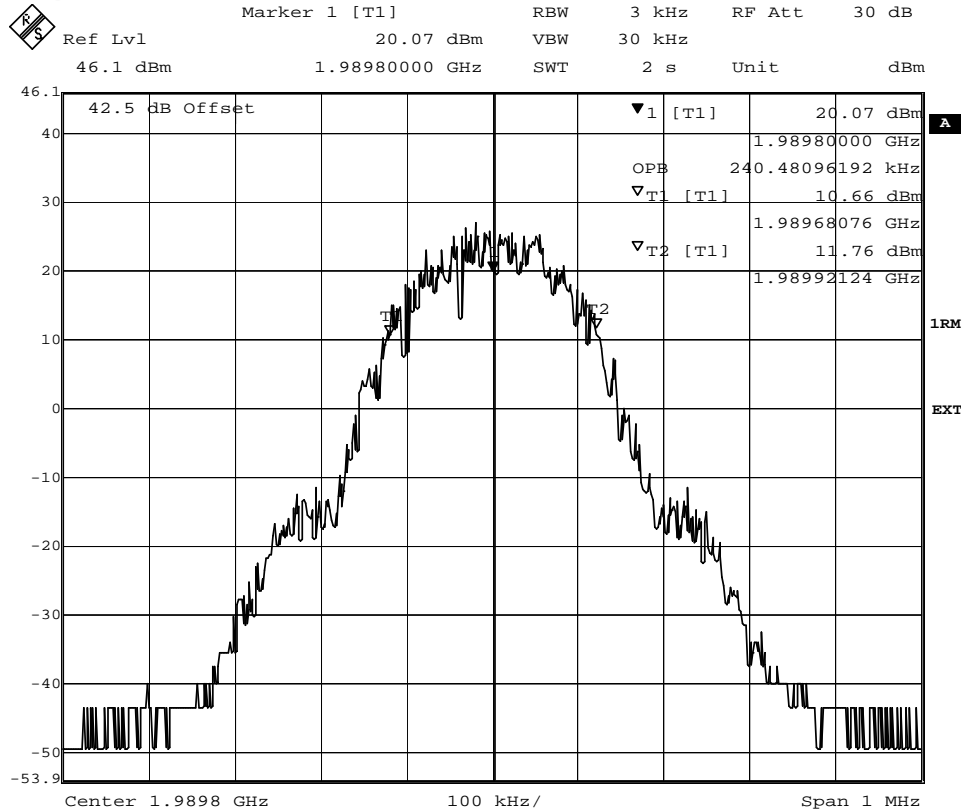


Diagram 5



Date: 4.SEP.2007 15:18:17

Diagram 6



Date: 4.SEP.2007 15:25:52



Diagram 7

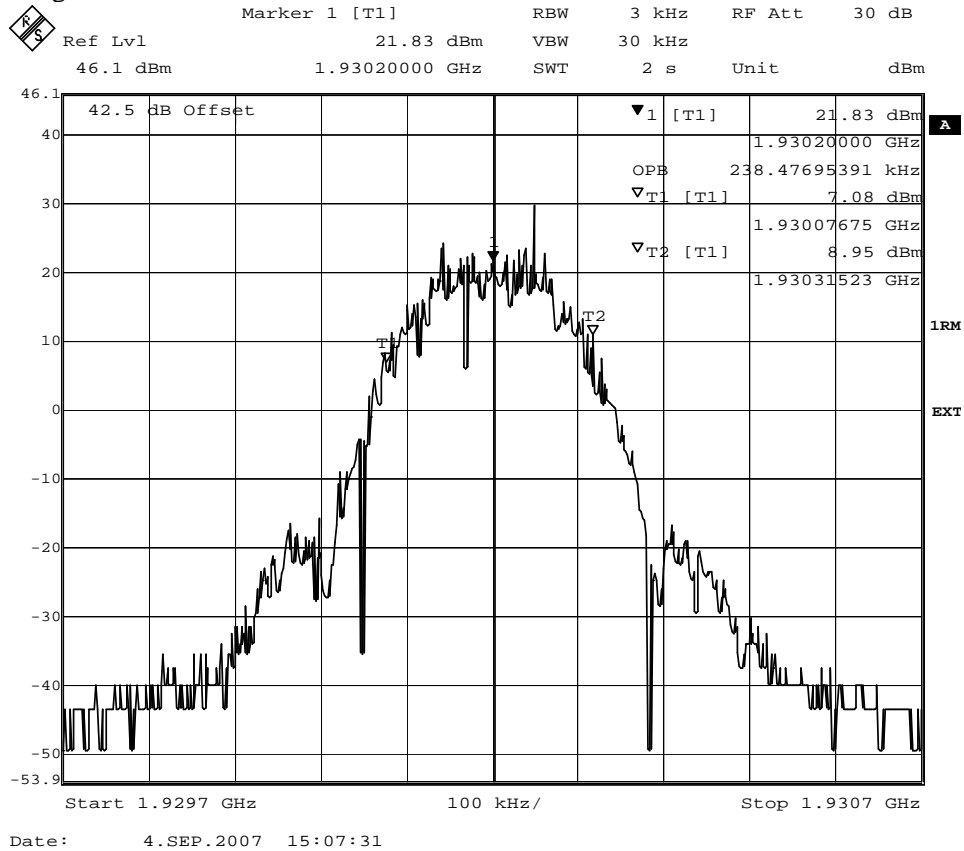


Diagram 8

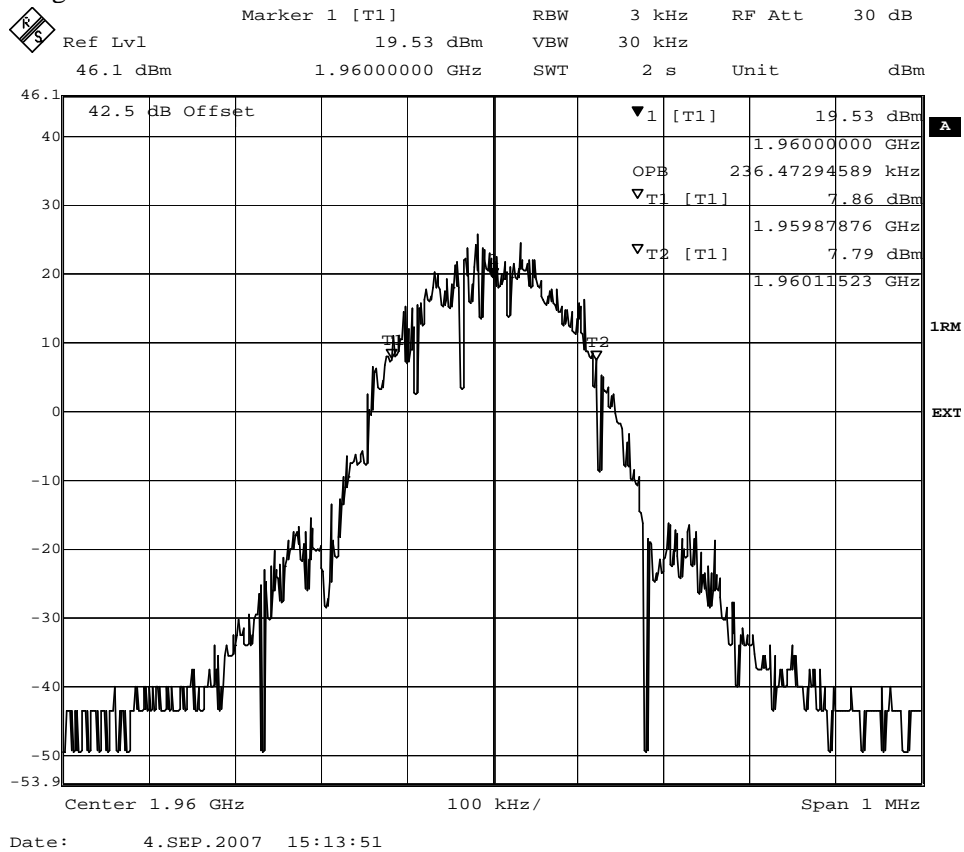
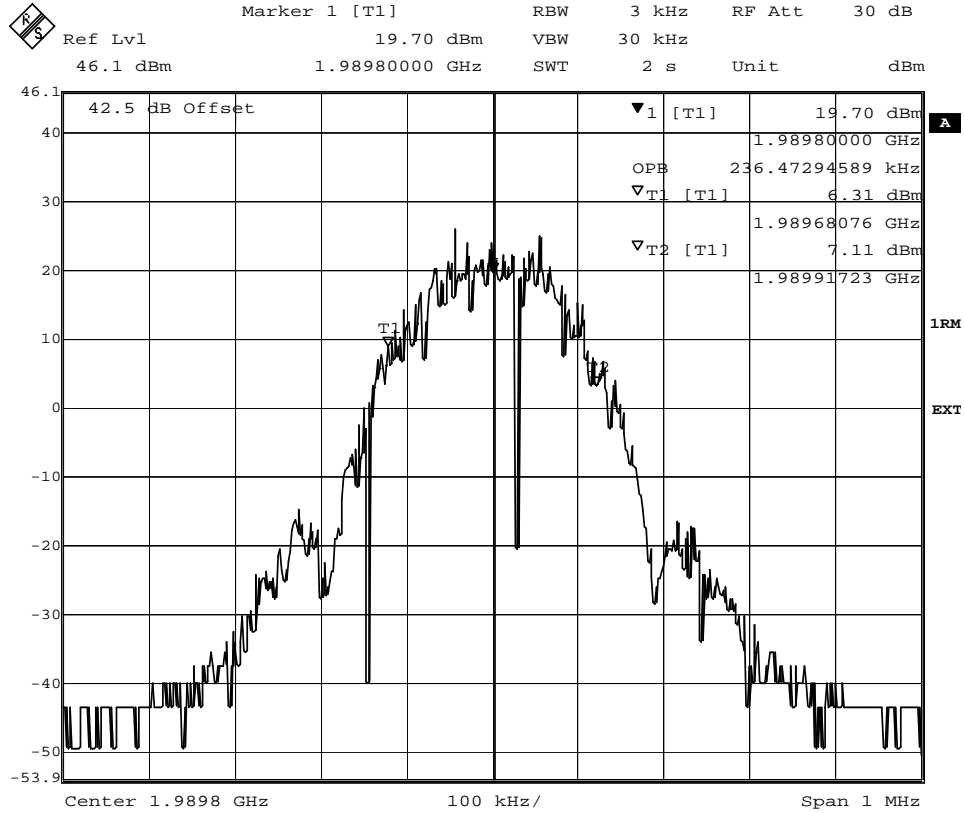


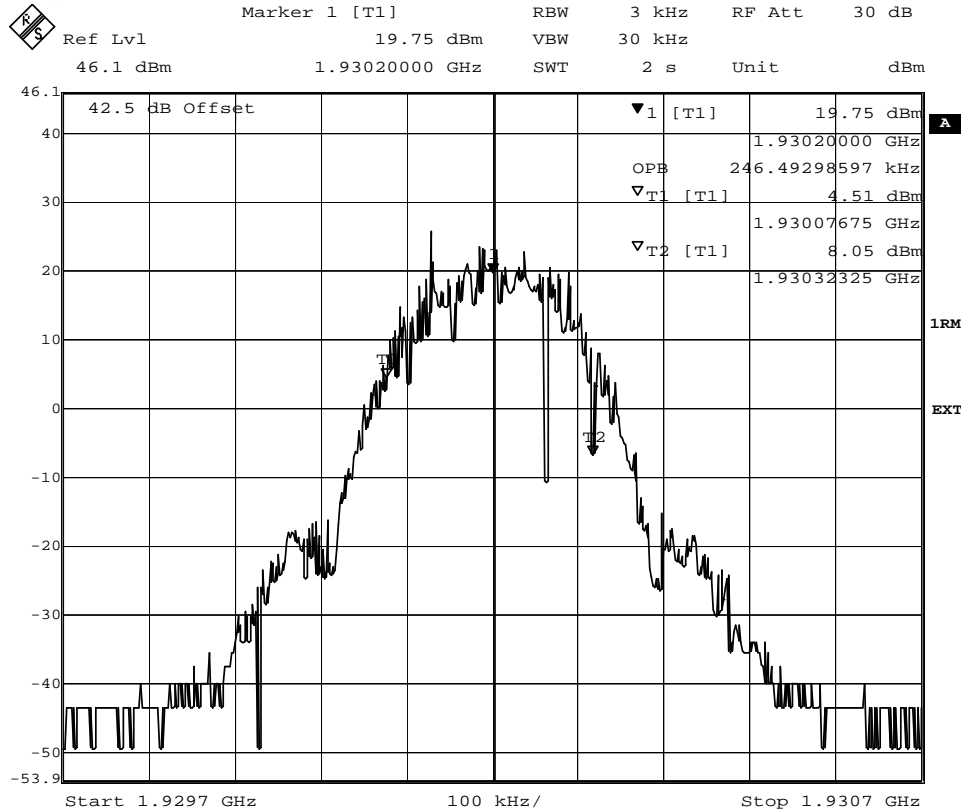


Diagram 9



Date: 4.SEP.2007 15:23:08

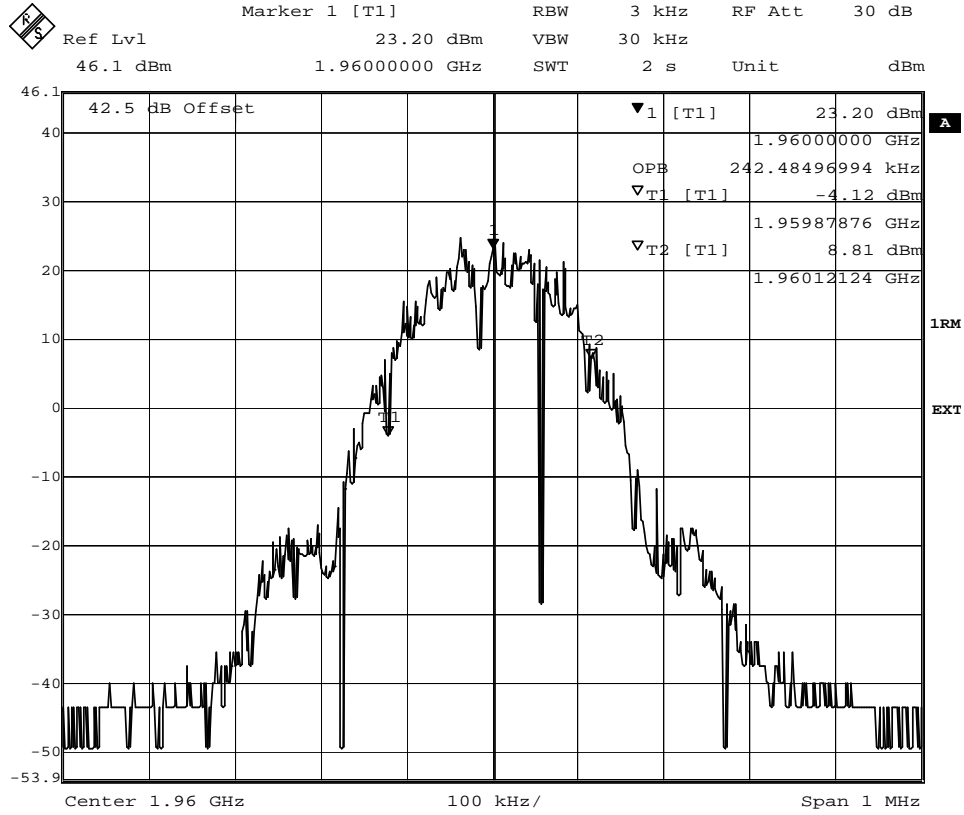
Diagram 10



Date: 4.SEP.2007 15:08:56

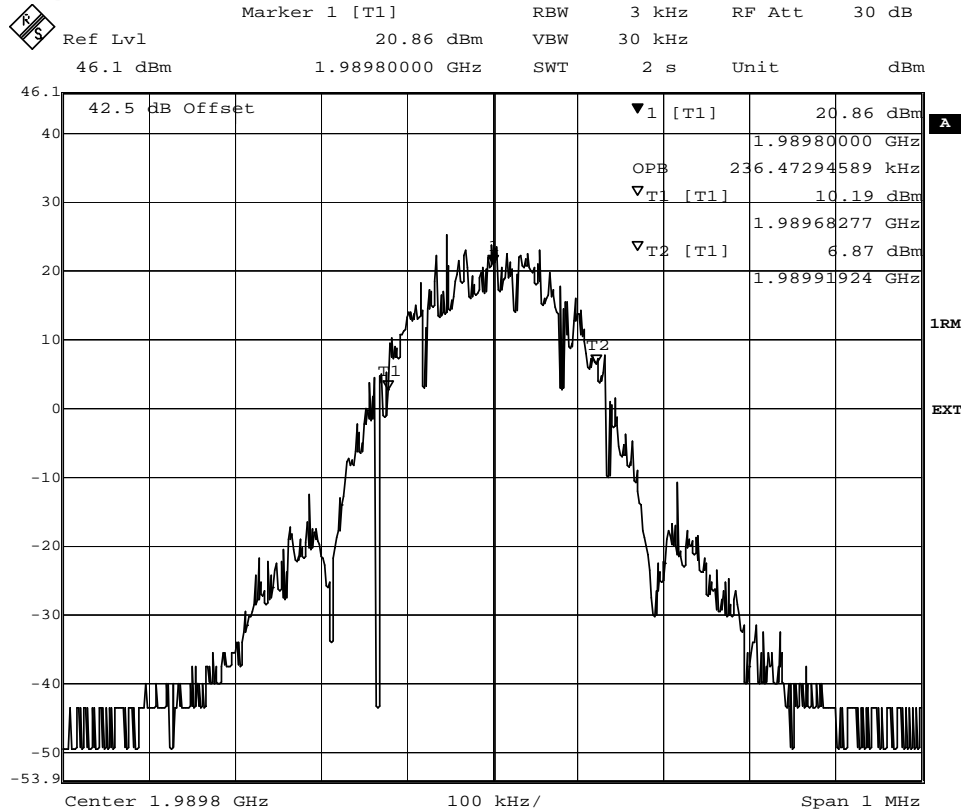


Diagram 11



Date: 4.SEP.2007 15:19:46

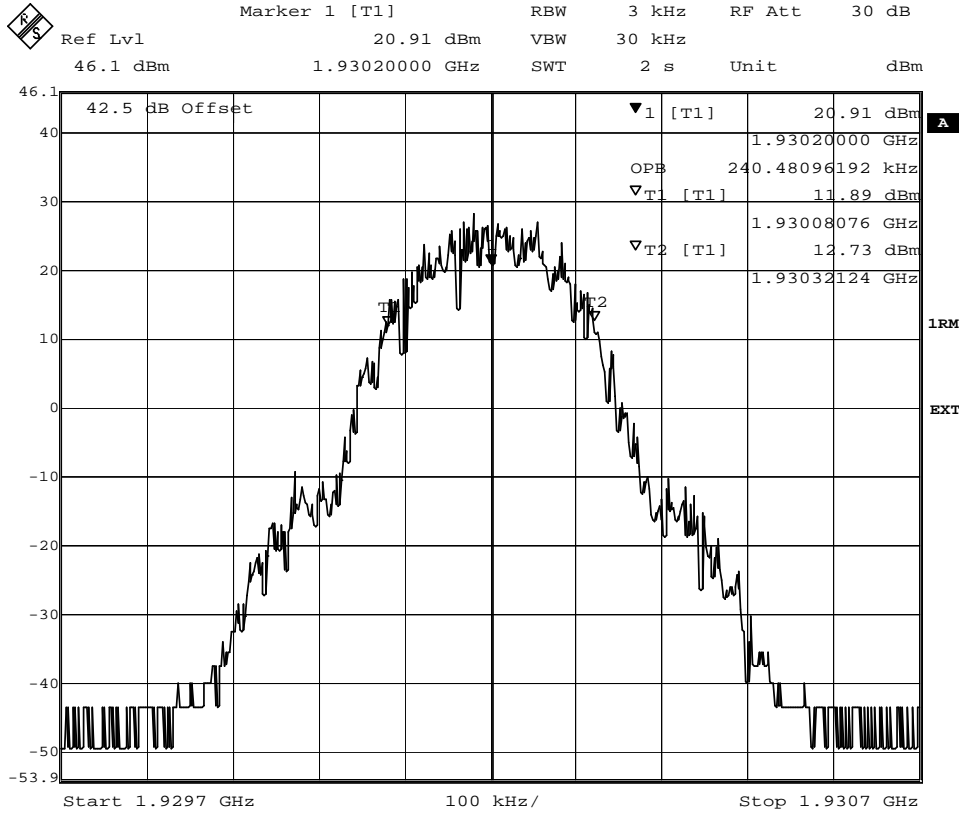
Diagram 12



Date: 4.SEP.2007 15:24:38

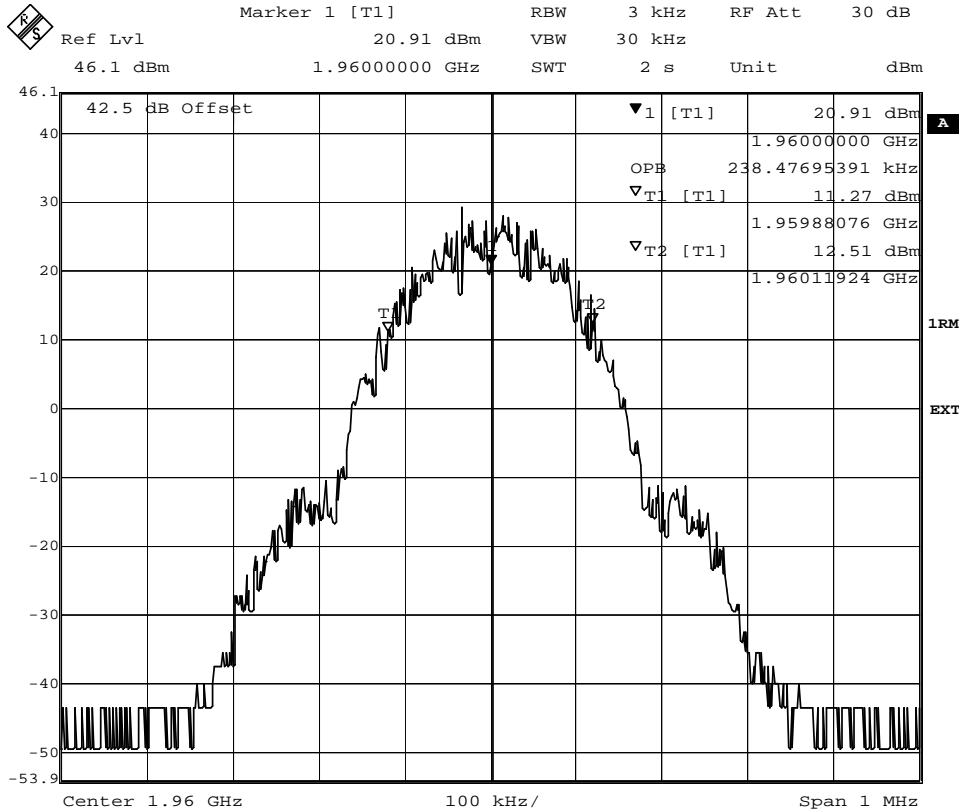


Diagram 1



Date: 6.SEP.2007 10:46:29

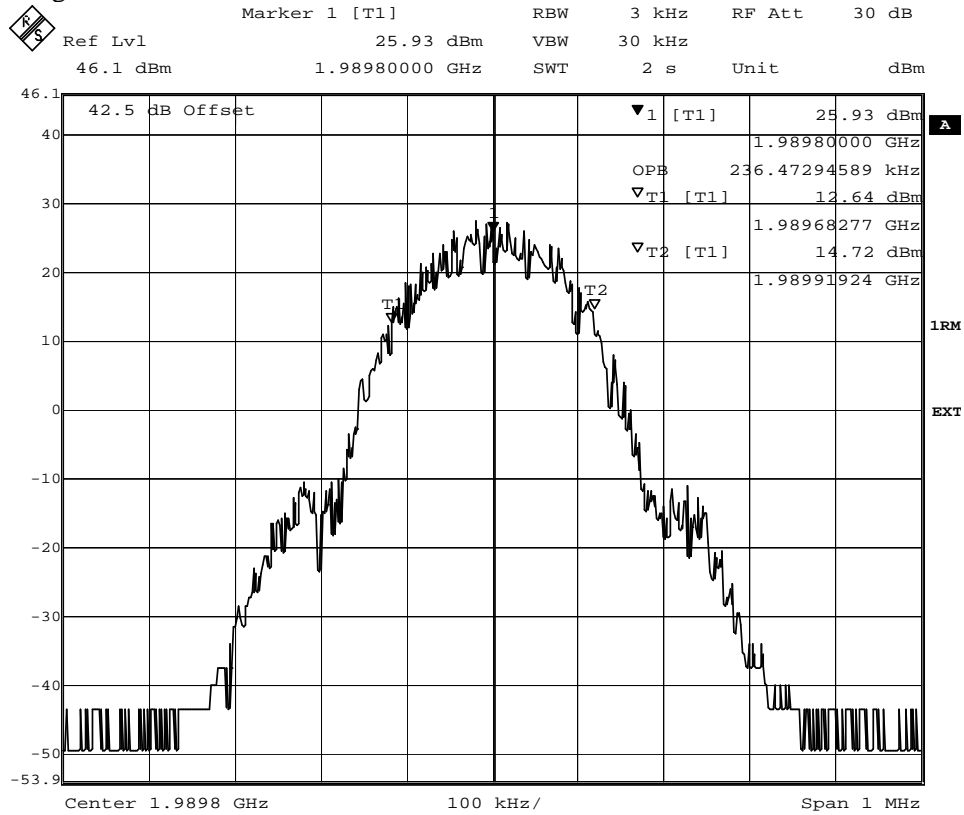
Diagram 2



Date: 6.SEP.2007 11:10:44

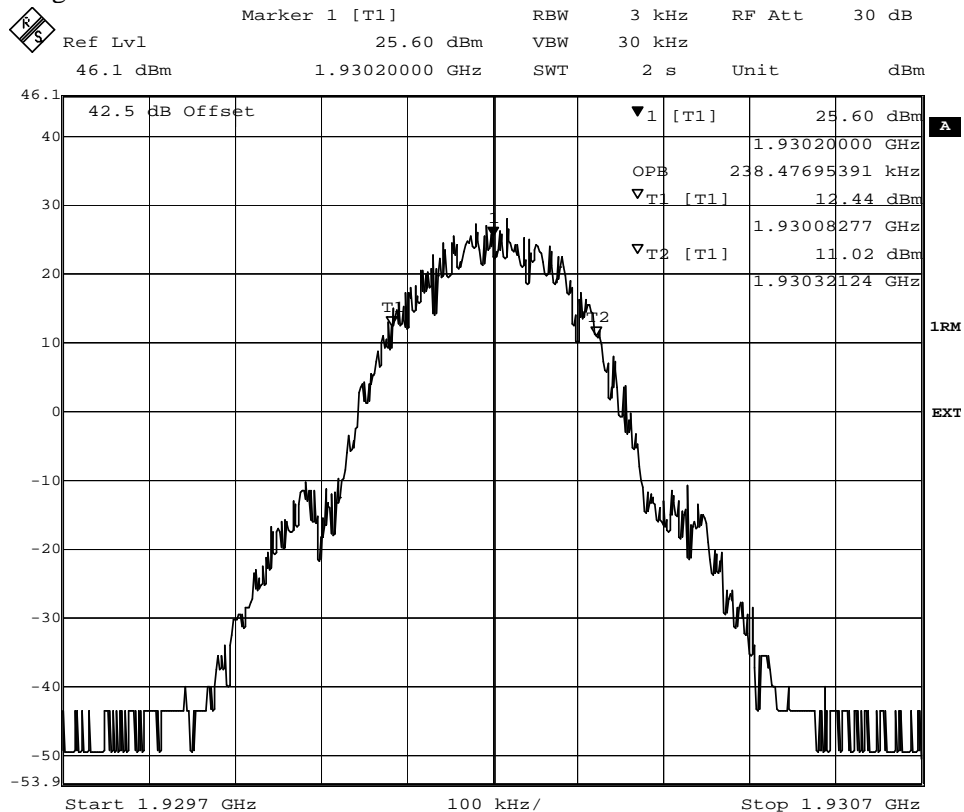


Diagram 3



Date: 6.SEP.2007 13:19:05

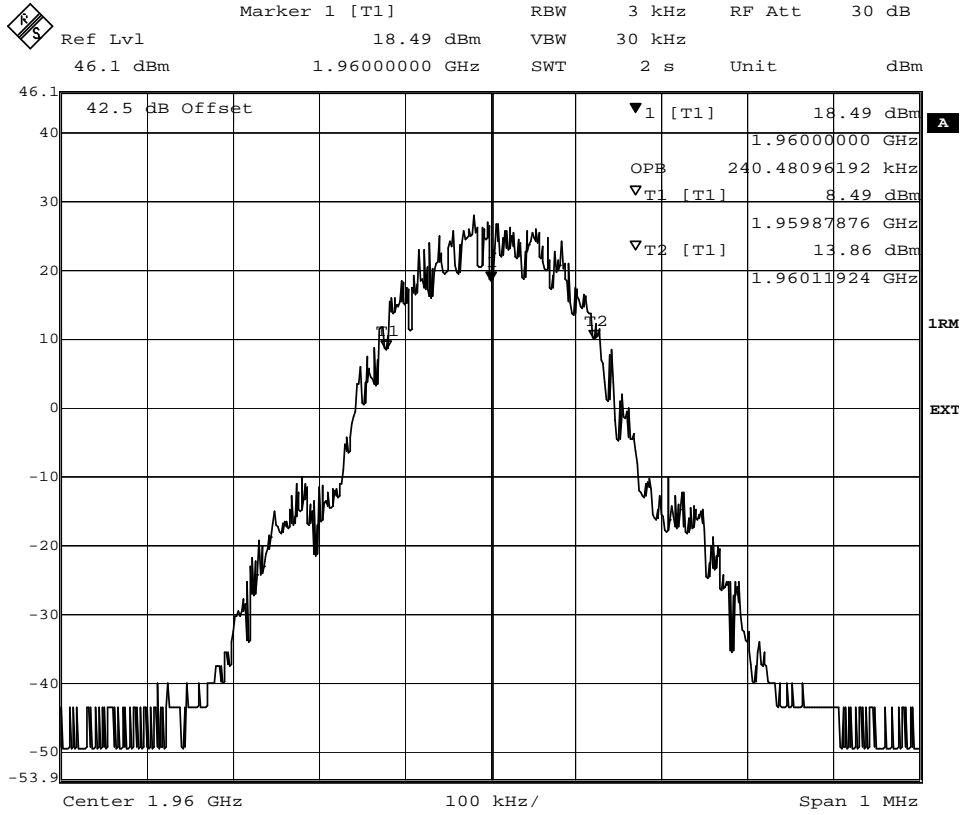
Diagram 4



Date: 6.SEP.2007 10:58:34

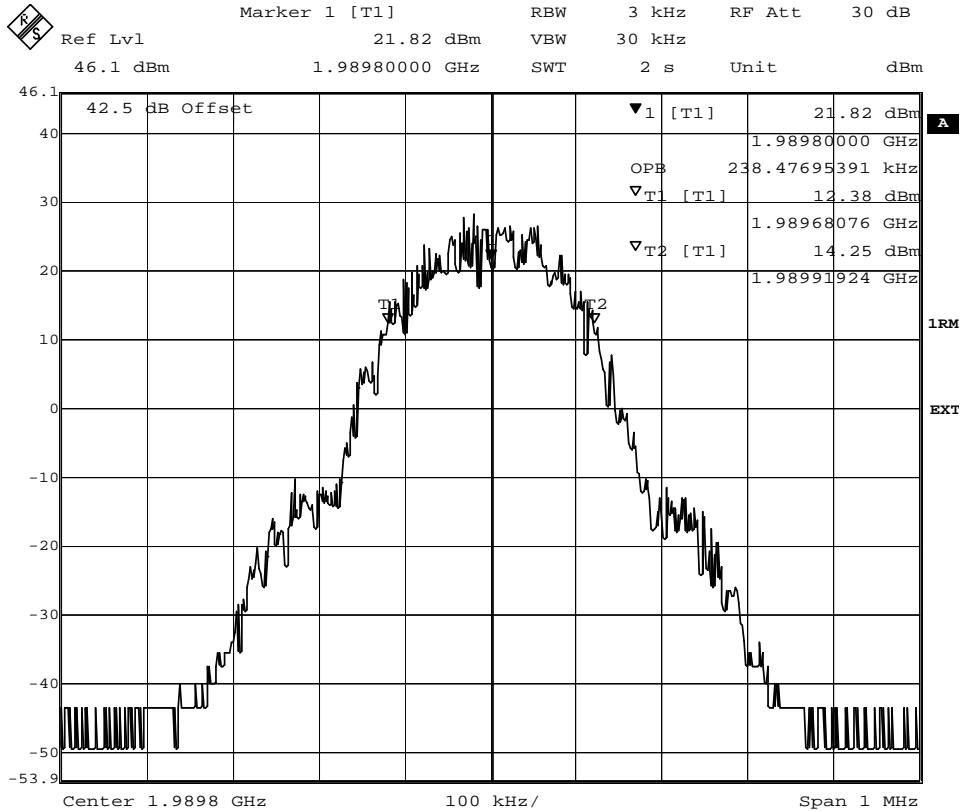


Diagram 5



Date: 6.SEP.2007 11:12:55

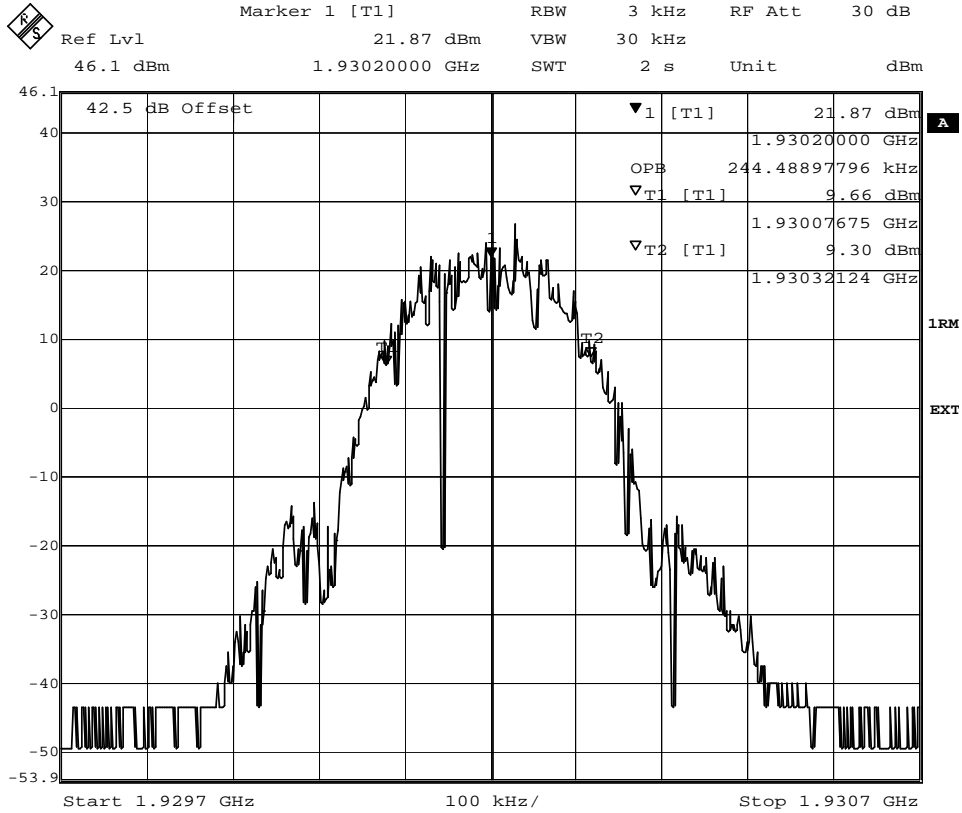
Diagram 6



Date: 6.SEP.2007 13:22:17

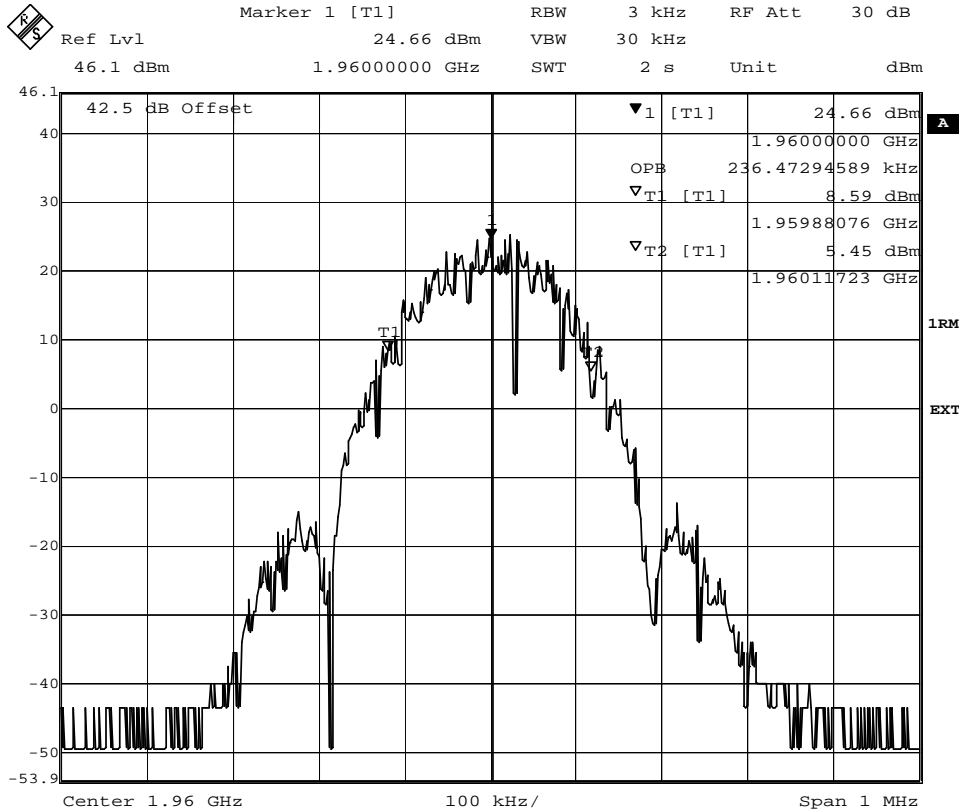


Diagram 7



Date: 6.SEP.2007 10:57:05

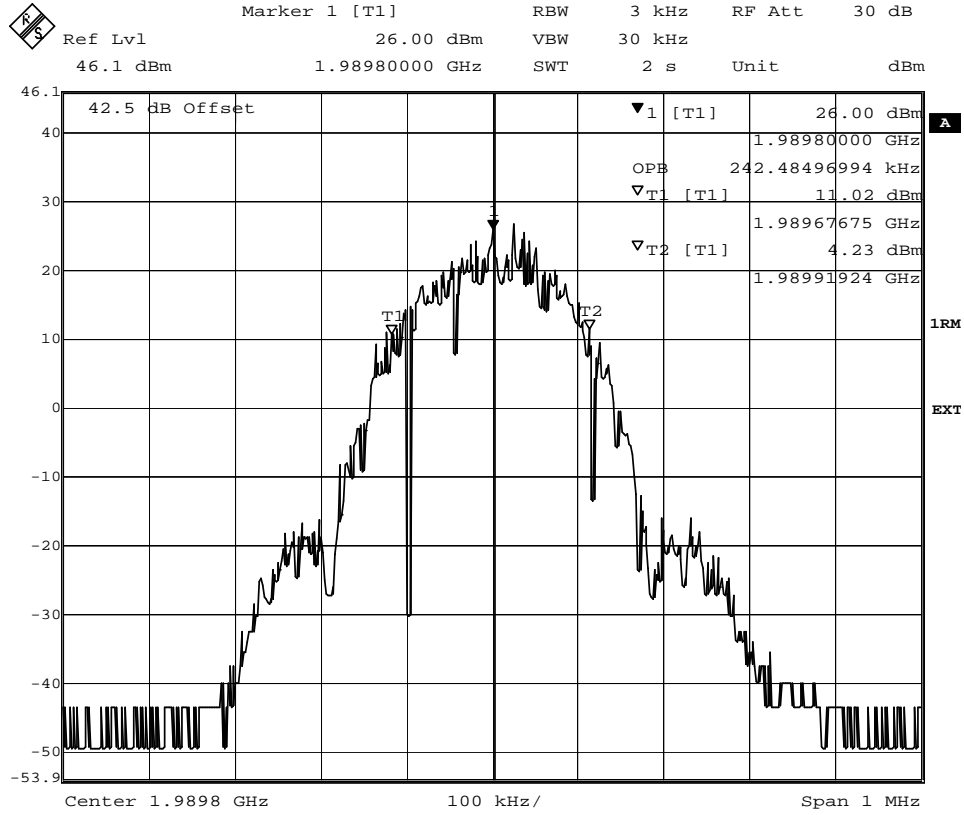
Diagram 8



Date: 6.SEP.2007 11:11:48

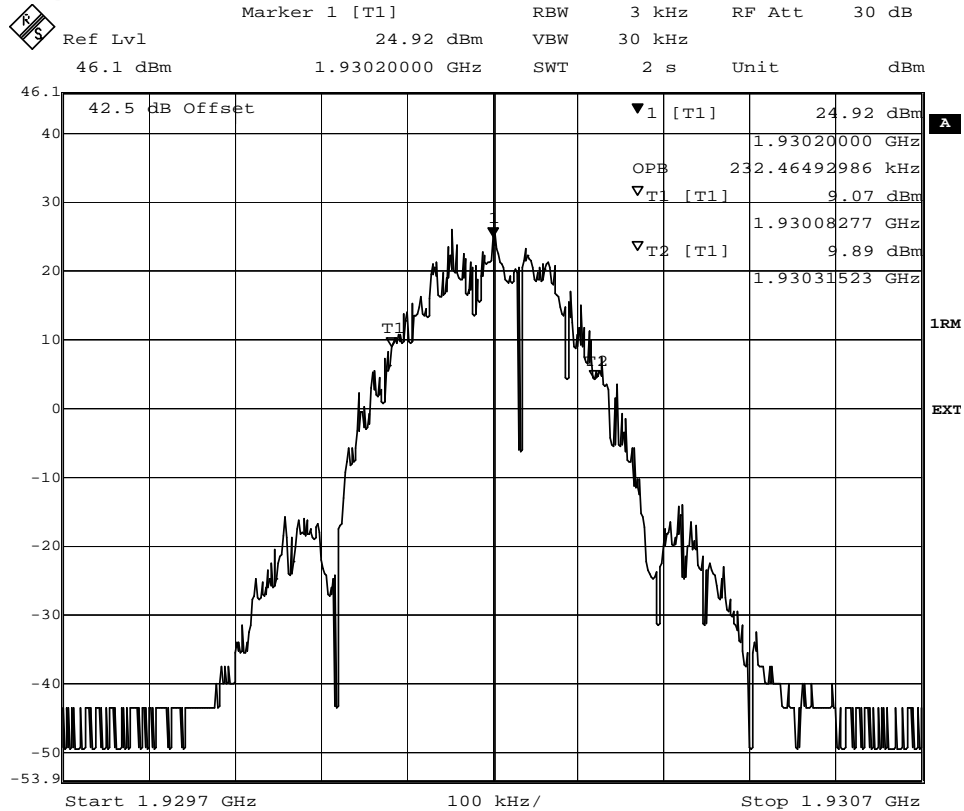


Diagram 9



Date: 6.SEP.2007 11:38:12

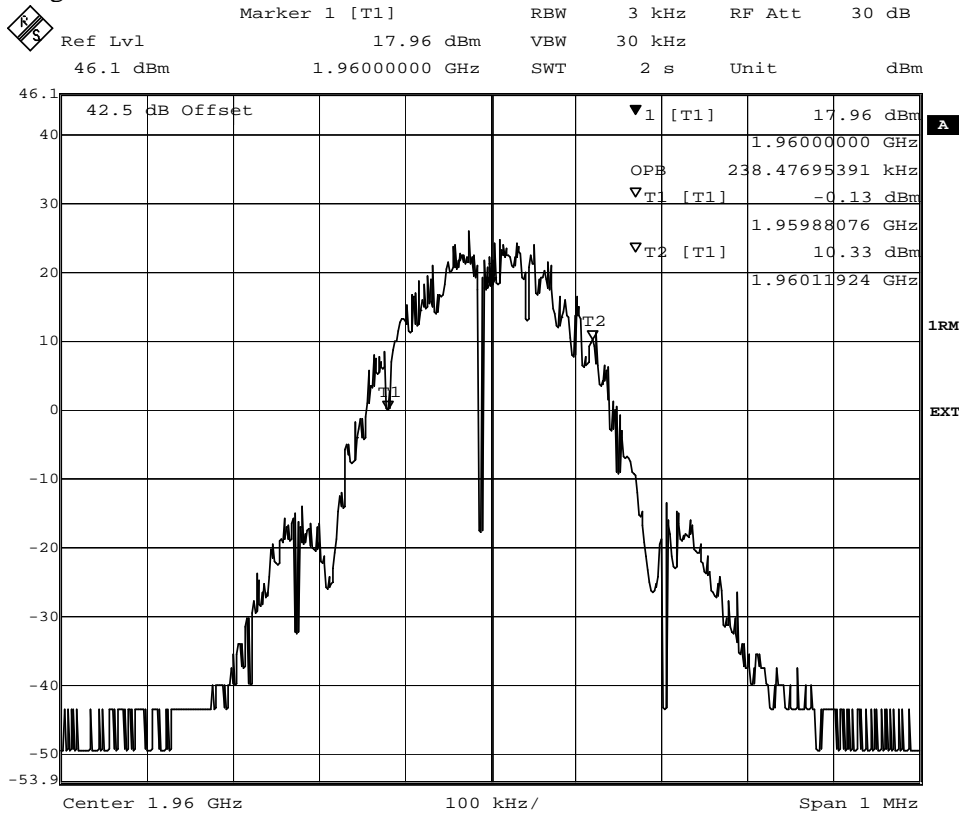
Diagram 10



Date: 6.SEP.2007 11:00:48

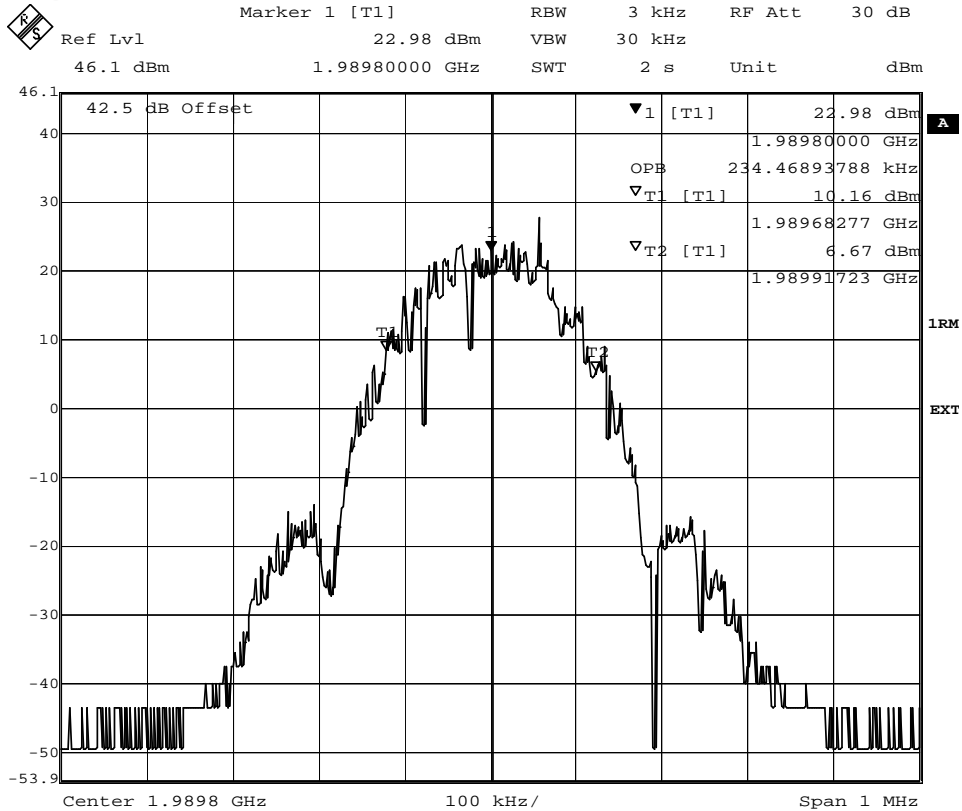


Diagram 11



Date: 6.SEP.2007 11:34:43

Diagram 12



Date: 6.SEP.2007 13:23:09



Band edge measurements according to 47CFR 2.1049

Date	Temperature	Humidity
2007-09-09	23 °C ± 3 °C	38 % ± 5 %
2007-09-14	23 °C ± 3 °C	42 % ± 5 %

Test set-up and procedure

The measurements were made per definition in 24.238. The measurements were made at CDU-K and CDU-F output connectors. The output was connected to a spectrum analyzer with the RMS detector activated. A resolution bandwidth of 50 kHz was used up to 5 MHz away from the band edges. As the FCC rules specify a RBW of 1 MHz for measurements of emissions >1 MHz away from the band edges, the limit was adjusted with 13 dB to -26 dBm to compensate for the reduced measurement bandwidth.

The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. The transmitter was modulated with pseudorandom data during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 4.1

Modulation: **GMSK**

dTRU Output 1, without internal combiner (CDU-K):

- Diagram 1 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 2 Ch 810 (1989.8 MHz) Band edge, reduced output power

dTRU Output 2, without internal combiner (CDU-K):

- Diagram 3 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 4 Ch 810 (1989.8 MHz) Band edge, reduced output power

(TCC), dTRU Output 1+2 (TX1+TX2) (CDU-K):

- Diagram 5 Ch 513 (1930.4 MHz) Band edge, maximum output power
- Diagram 6 Ch 809 (1989.6 MHz) Band edge, maximum output power

dTRU Output 1, without internal combiner (CDU-F):

- Diagram 7 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 8 Ch 513 (1930.4 MHz) Band edge, maximum output power
- Diagram 9 Ch 809 (1989.6 MHz) Band edge, maximum output power
- Diagram 10 Ch 810 (1989.8 MHz) Band edge, reduced output power

dTRU Output 2, without internal combiner (CDU-F):

- Diagram 11 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 12 Ch 513 (1930.4 MHz) Band edge, maximum output power
- Diagram 13 Ch 809 (1989.6 MHz) Band edge, maximum output power
- Diagram 14 Ch 810 (1989.8 MHz) Band edge, reduced output power



Modulation: **8-PSK**

dTRU Output 1, without internal combiner (CDU-K):

- Diagram 15 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 16 Ch 810 (1989.8 MHz) Band edge, reduced output power

dTRU Output 2, without internal combiner (CDU-K):

- Diagram 17 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 18 Ch 810 (1989.8 MHz) Band edge, reduced output power

(TCC), dTRU Output 1+2 (TX1+TX2) (CDU-K):

- Diagram 19 Ch 513 (1930.4 MHz) Band edge, maximum output power
- Diagram 20 Ch 809 (1989.6 MHz) Band edge, maximum output power

dTRU Output 1, without internal combiner (CDU-F):

- Diagram 21 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 22 Ch 513 (1930.4 MHz) Band edge, maximum output power
- Diagram 23 Ch 809 (1989.6 MHz) Band edge, maximum output power
- Diagram 24 Ch 810 (1989.8 MHz) Band edge, reduced output power

dTRU Output 2, without internal combiner (CDU-F):

- Diagram 25 Ch 512 (1930.2 MHz) Band edge, reduced output power
- Diagram 26 Ch 513 (1930.4 MHz) Band edge, maximum output power
- Diagram 27 Ch 809 (1989.6 MHz) Band edge, maximum output power
- Diagram 28 Ch 810 (1989.8 MHz) Band edge, reduced output power

Remarks

The maximum output power that can be used on the channels adjacent to the frequency band edges (channel 512 and 810) are 38.1 dBm in order to comply with CDU-K and 37.5dBm (GMSK) and (8-PSK) in to comply with CDU-F.

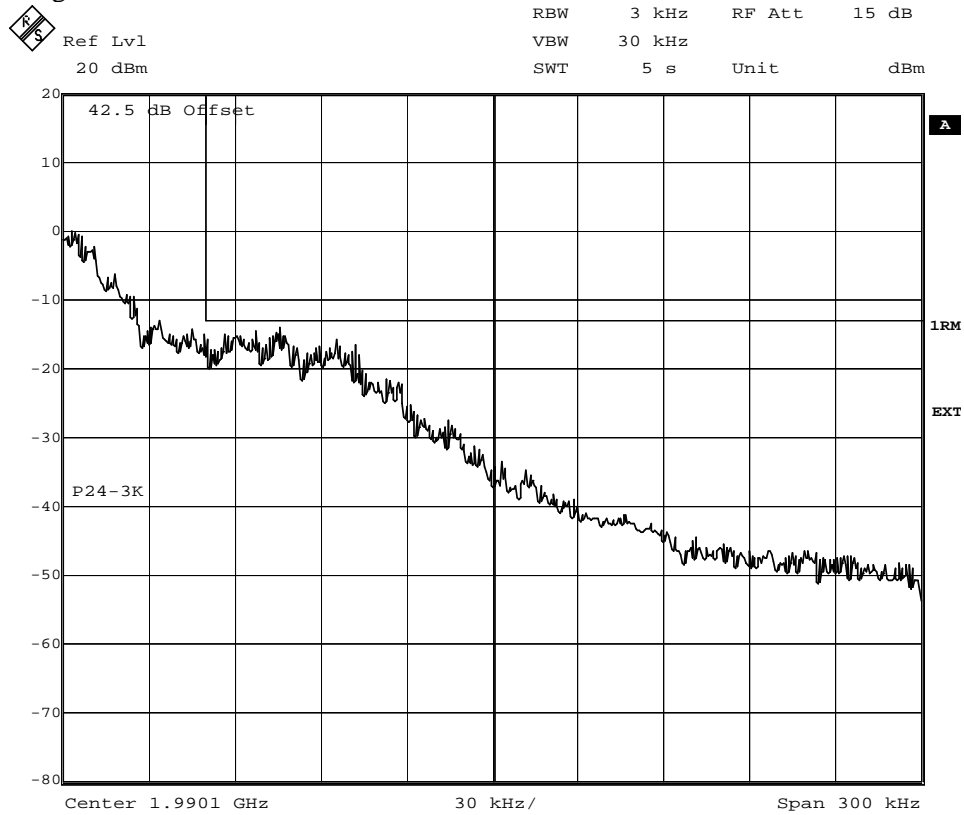
Limits

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

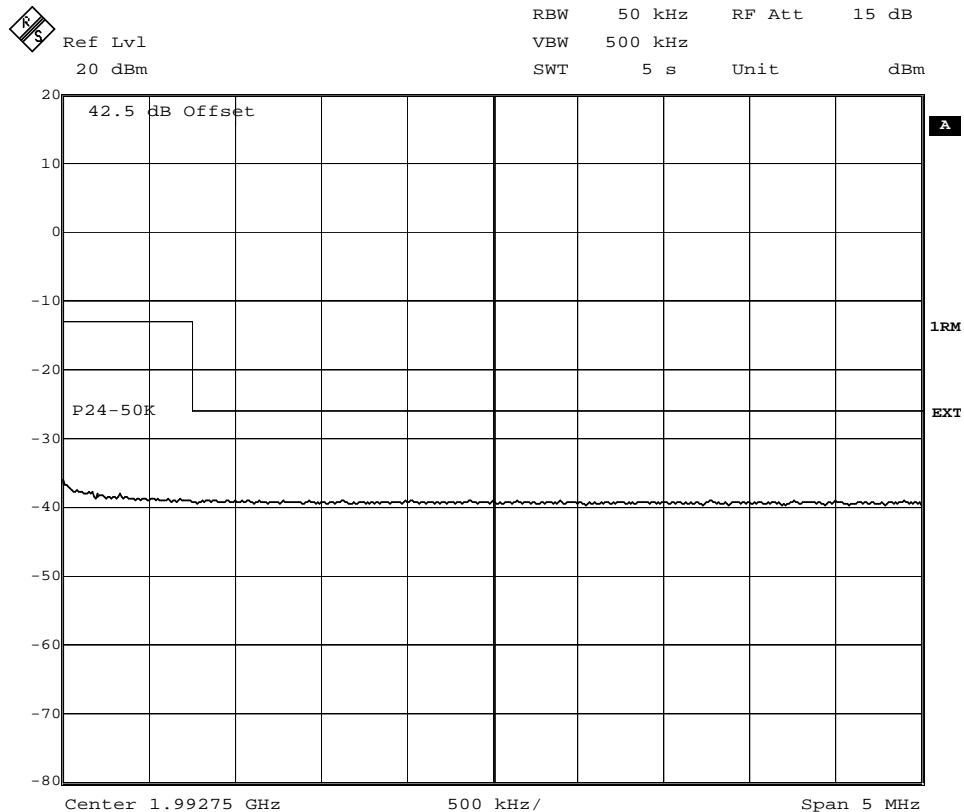
Complies?	Yes
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Diagram 2



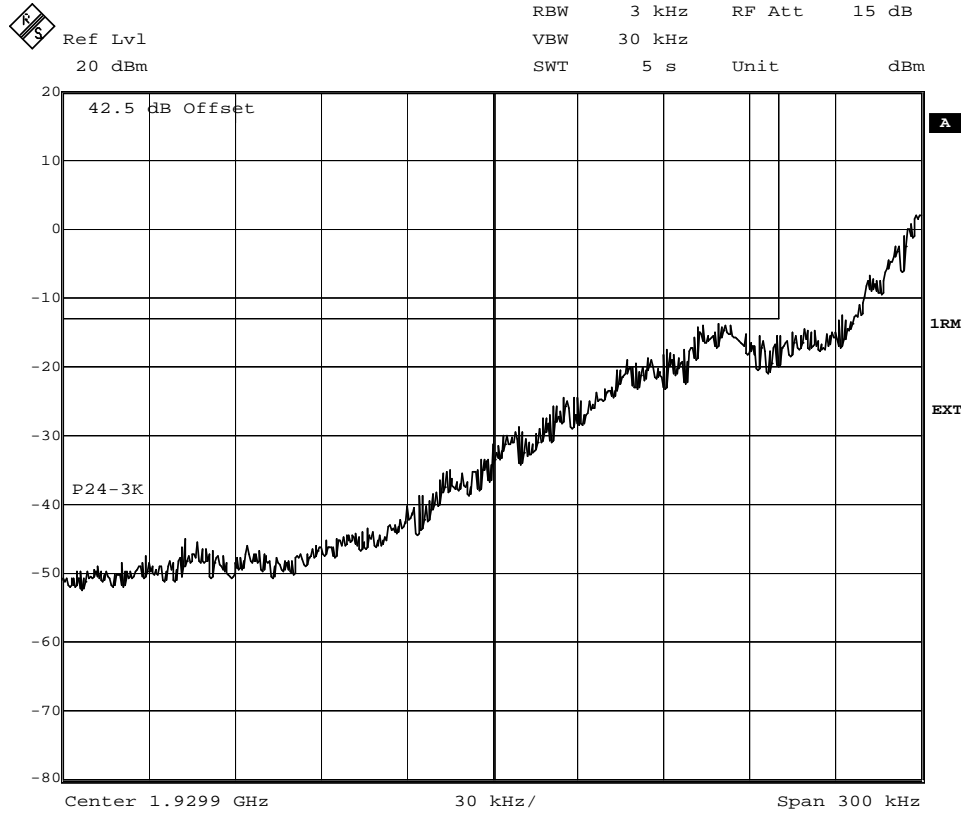
Date: 14.SEP.2007 13:34:18



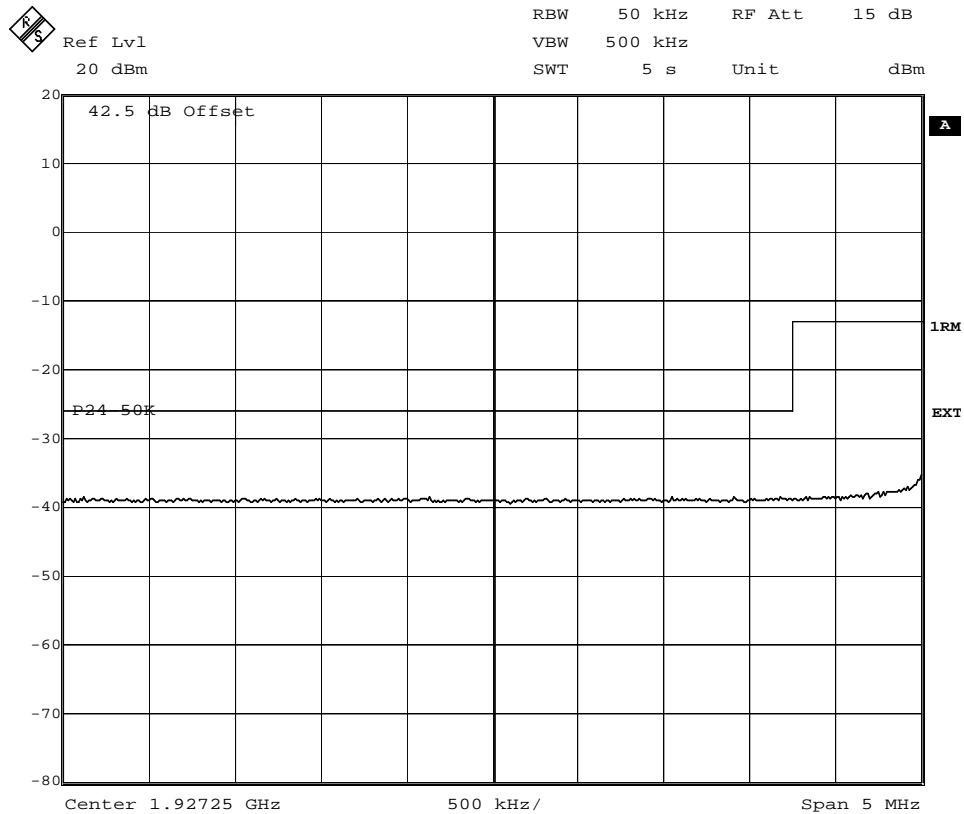
Date: 14.SEP.2007 13:33:24



Diagram 3



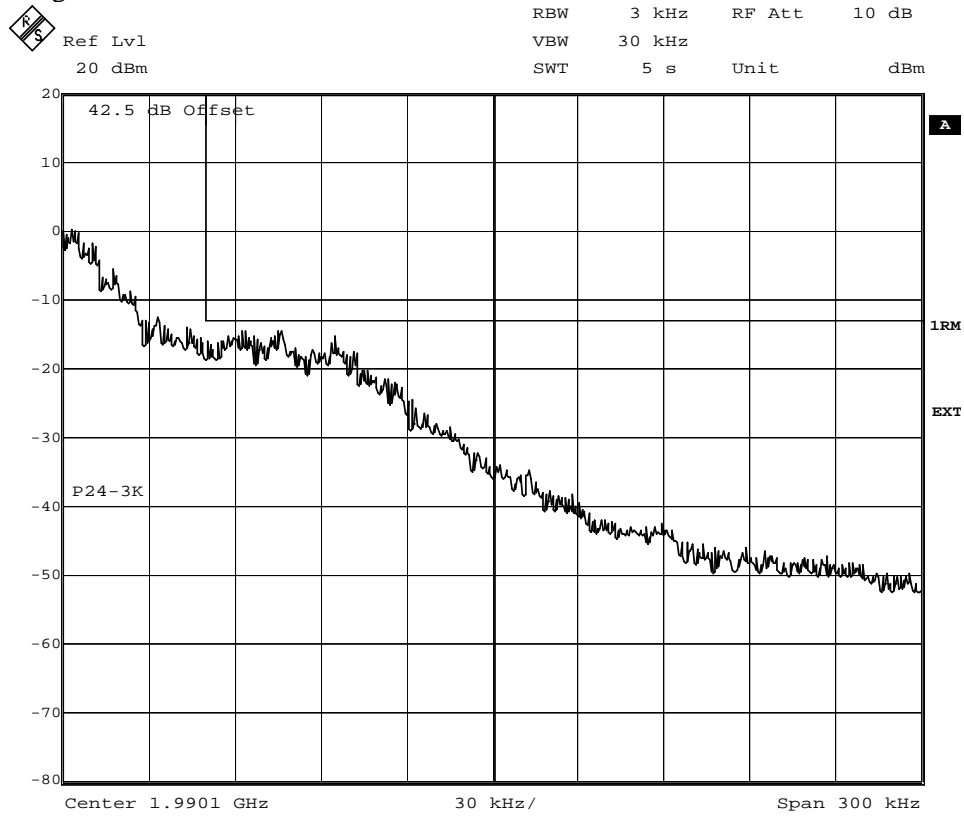
Date: 14.SEP.2007 13:21:36



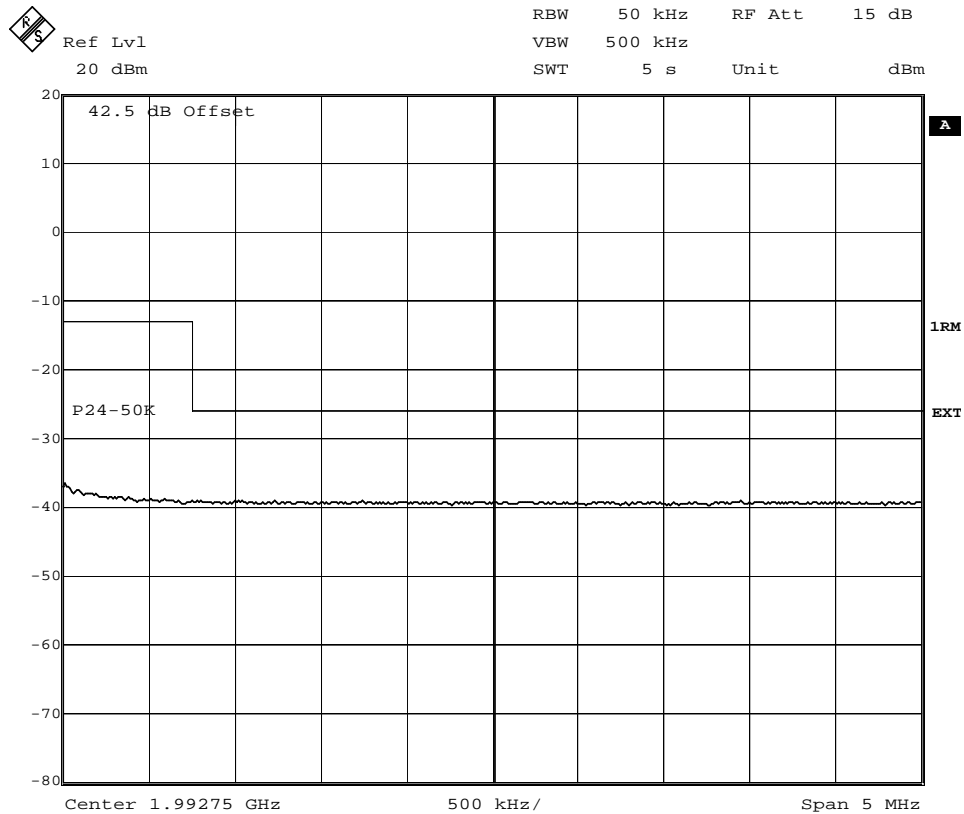
Date: 14.SEP.2007 13:20:29



Diagram 4



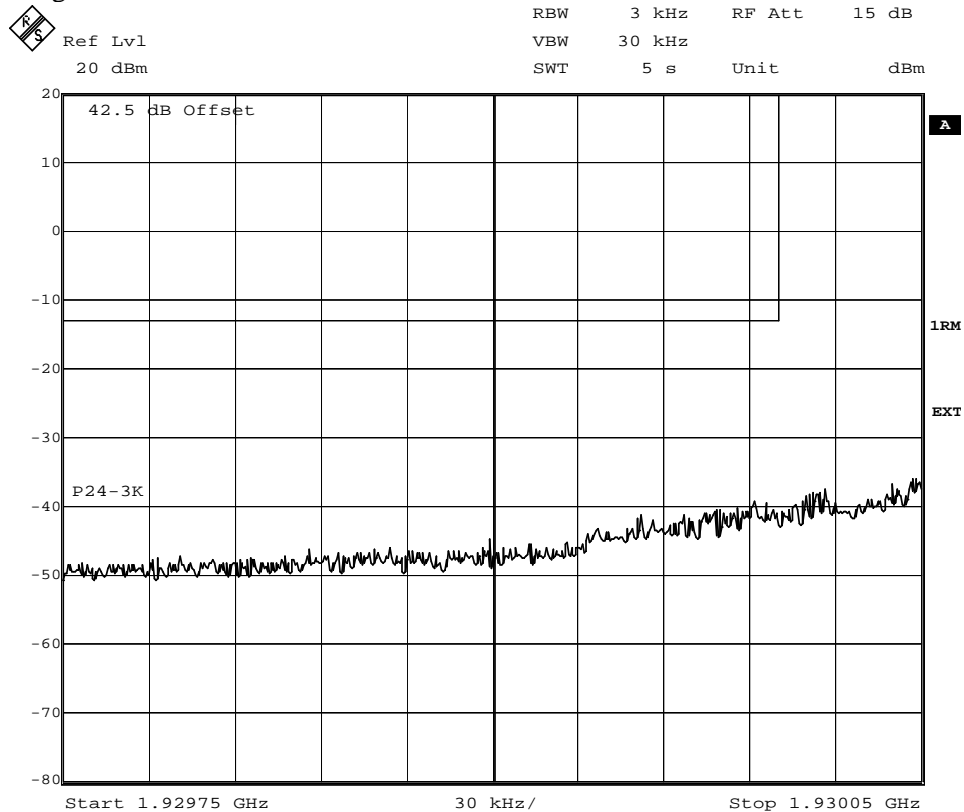
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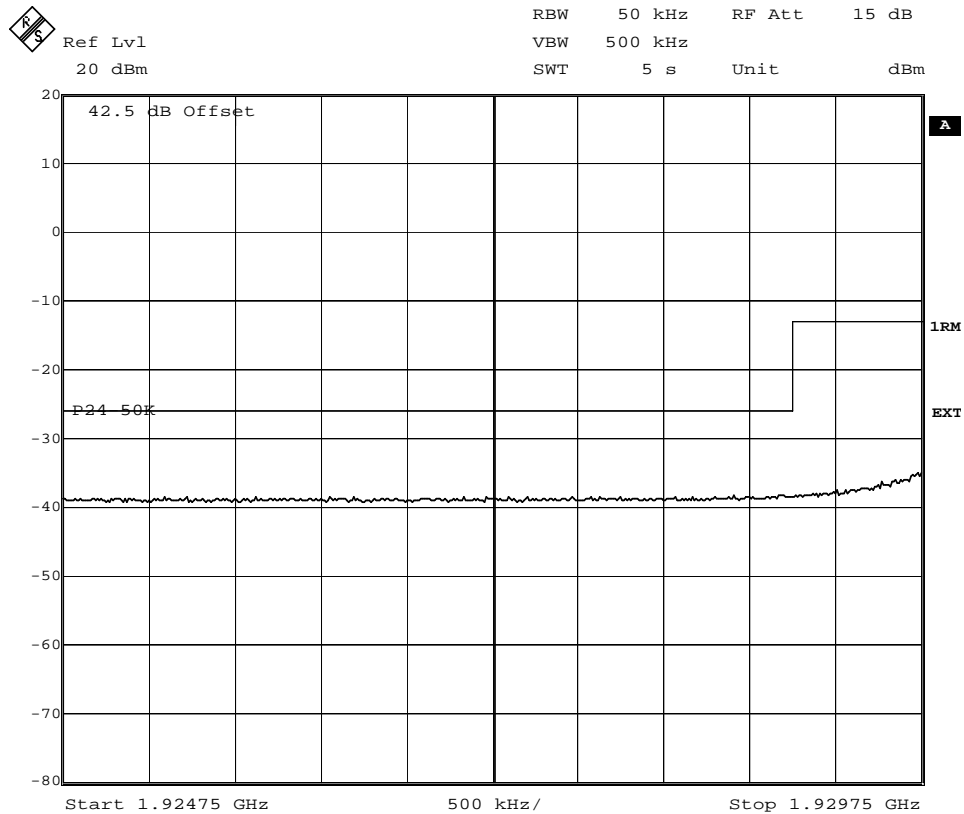
Date: 14.SEP.2007 13:11:54



Diagram 5



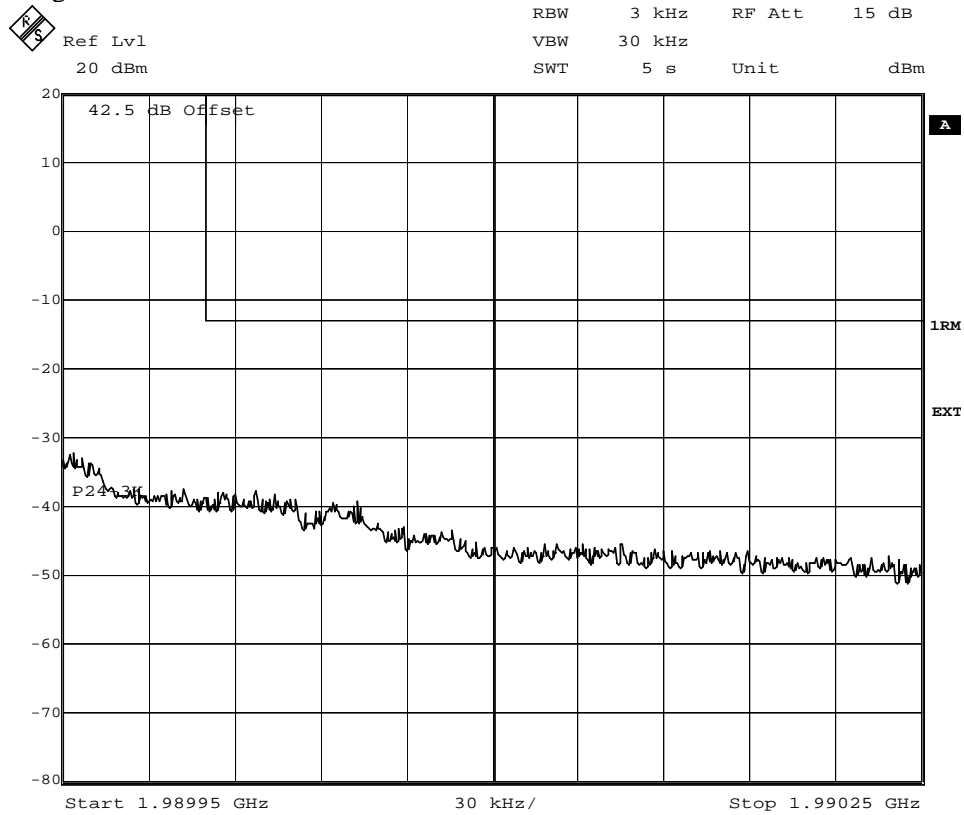
Date: 14.SEP.2007 15:59:24



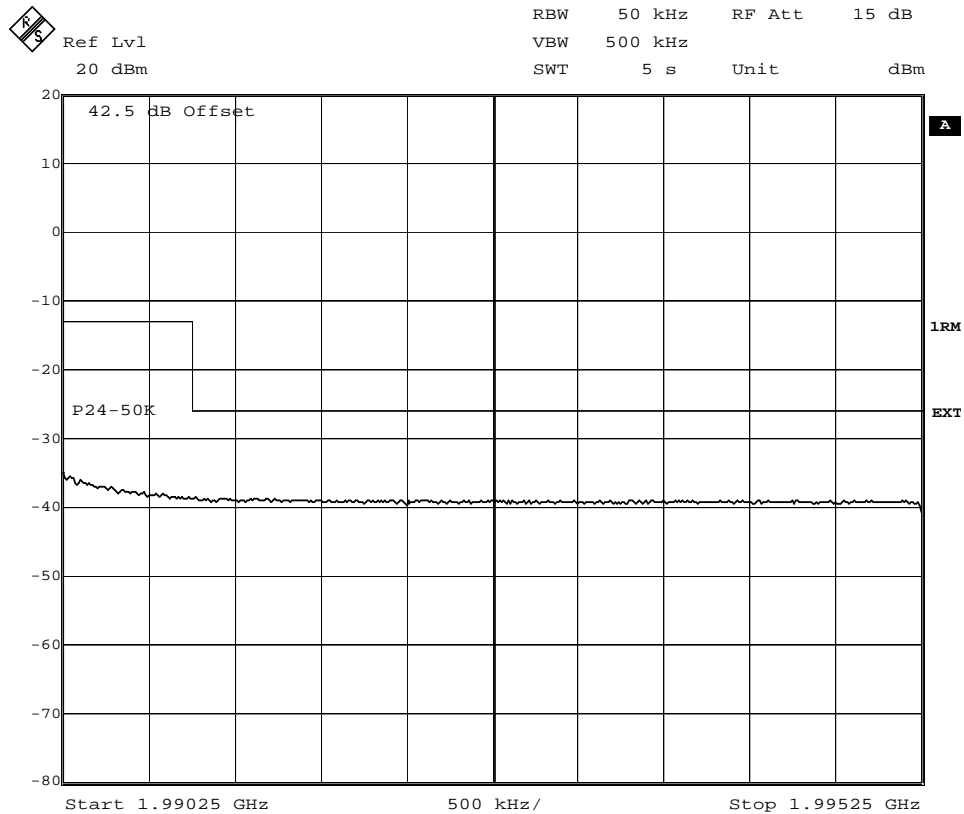
Date: 14.SEP.2007 16:00:49



Diagram 6



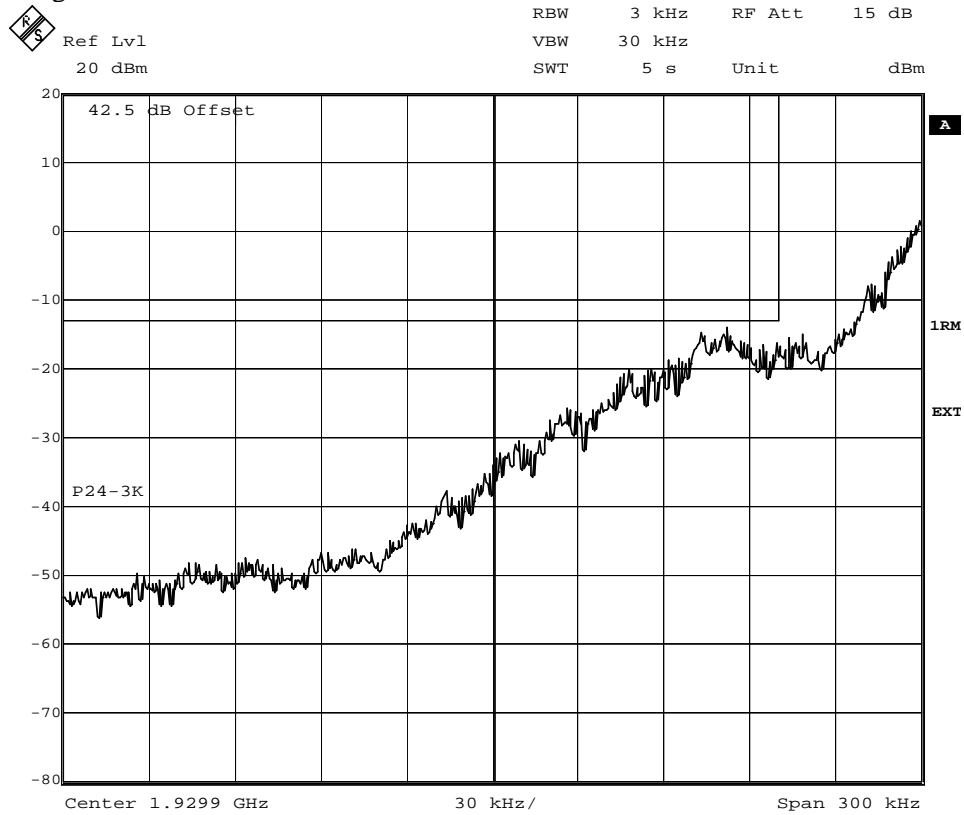
Date: 14.SEP.2007 16:07:04



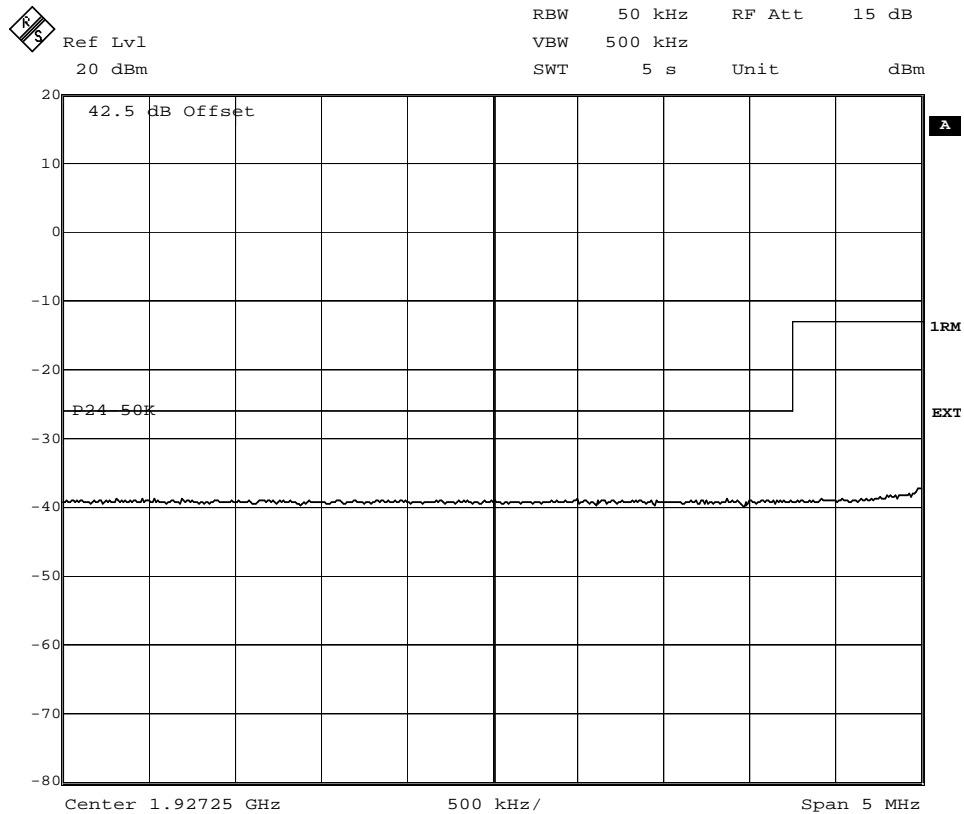
Date: 14.SEP.2007 16:08:18



Diagram 7



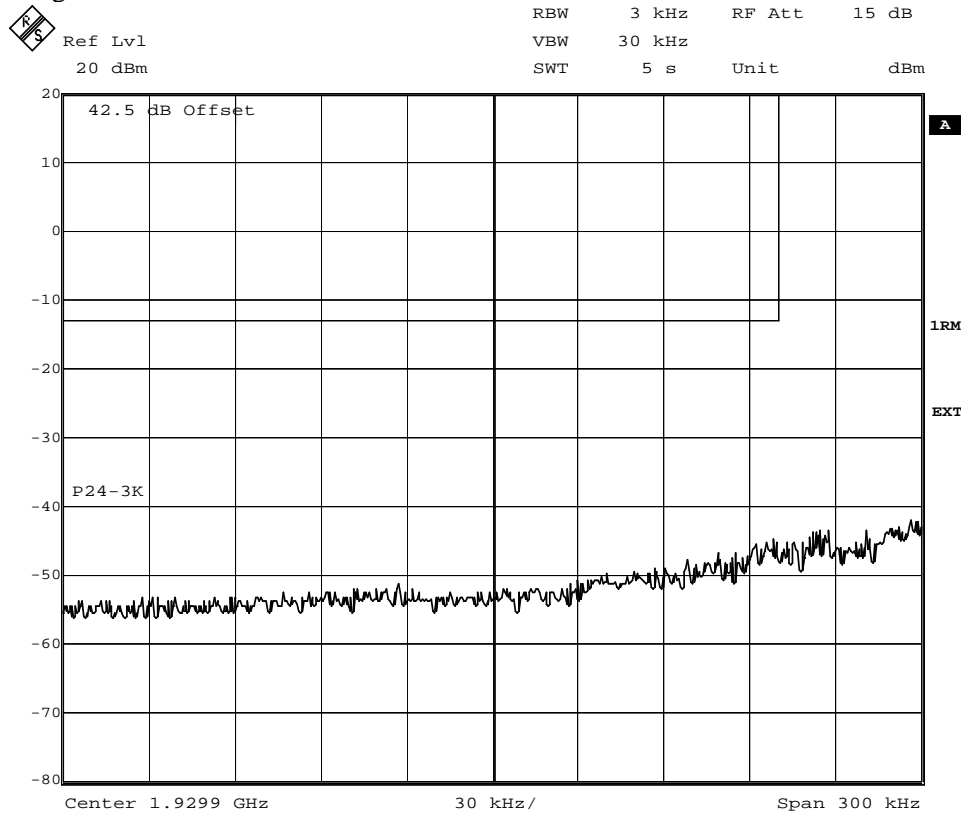
Date: 6.SEP.2007 14:04:50



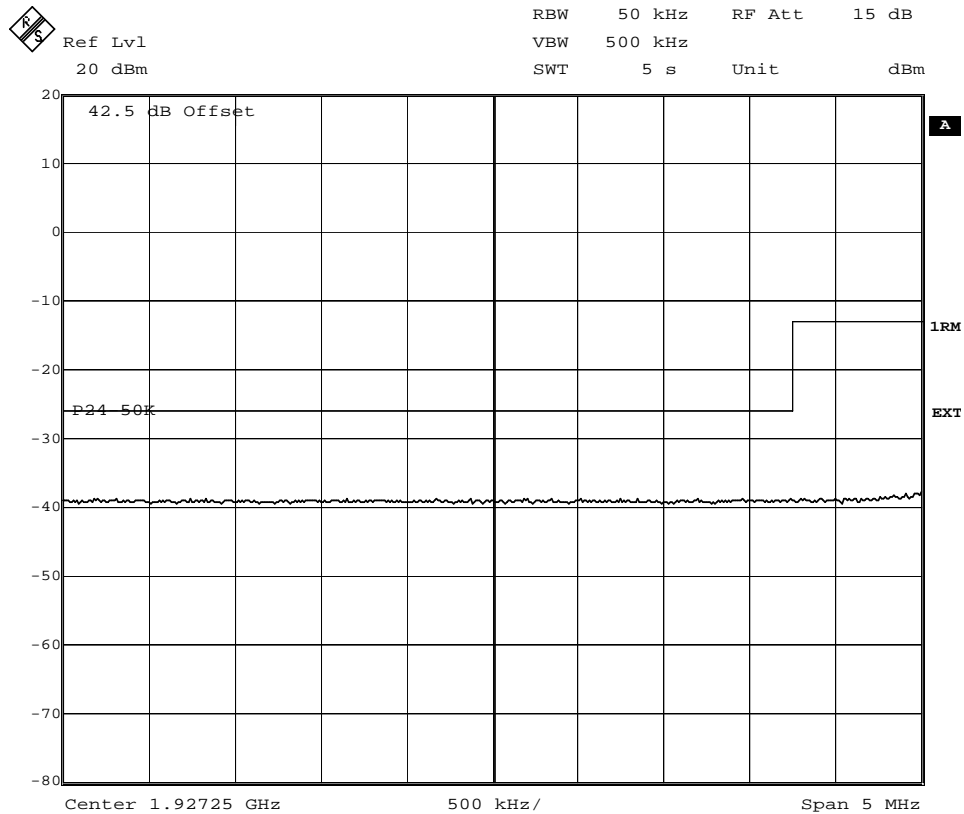
Date: 6.SEP.2007 14:06:20



Diagram 8



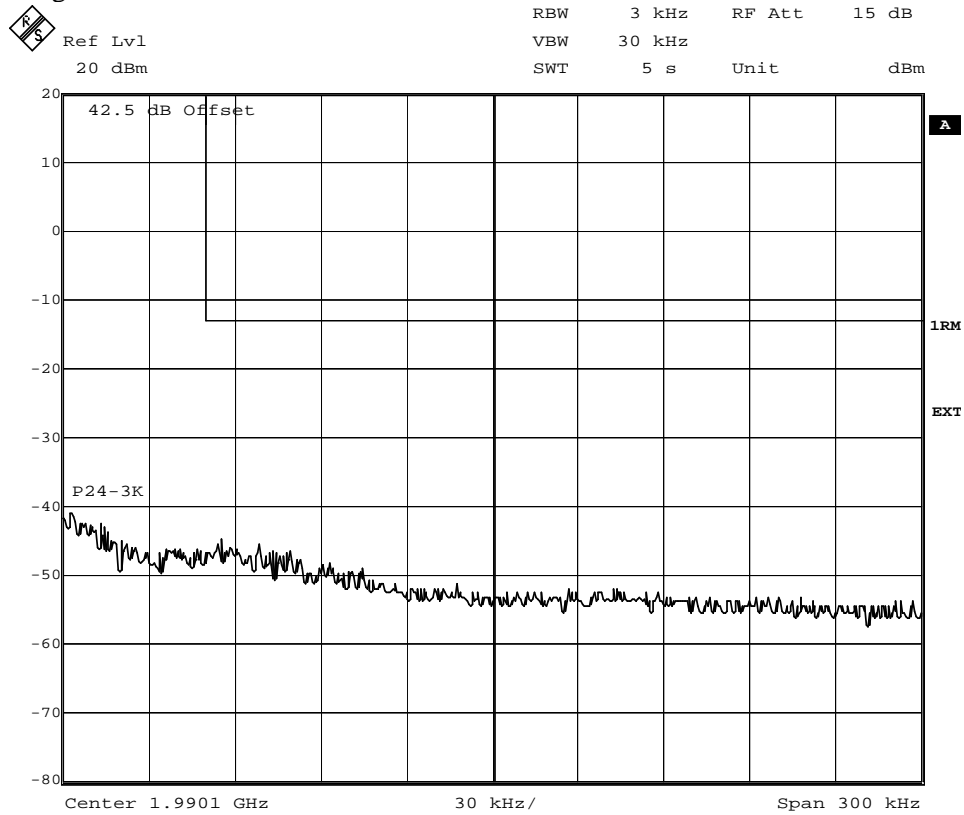
Date: 6.SEP.2007 15:13:43



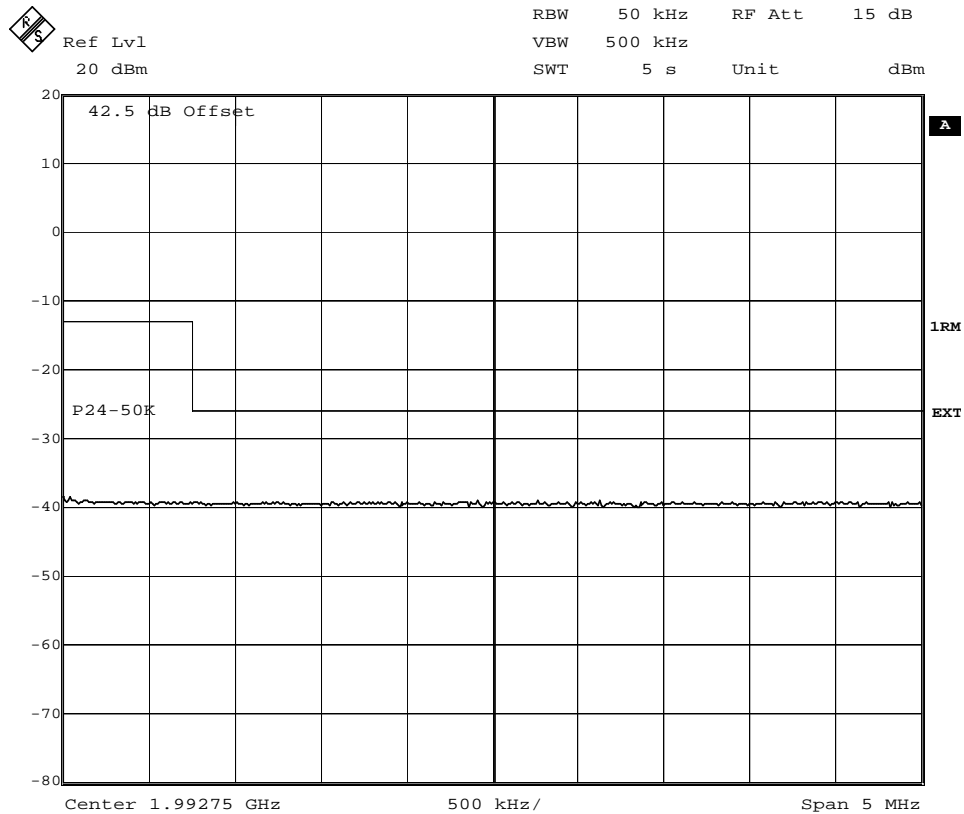
Date: 6.SEP.2007 15:22:00



Diagram 9



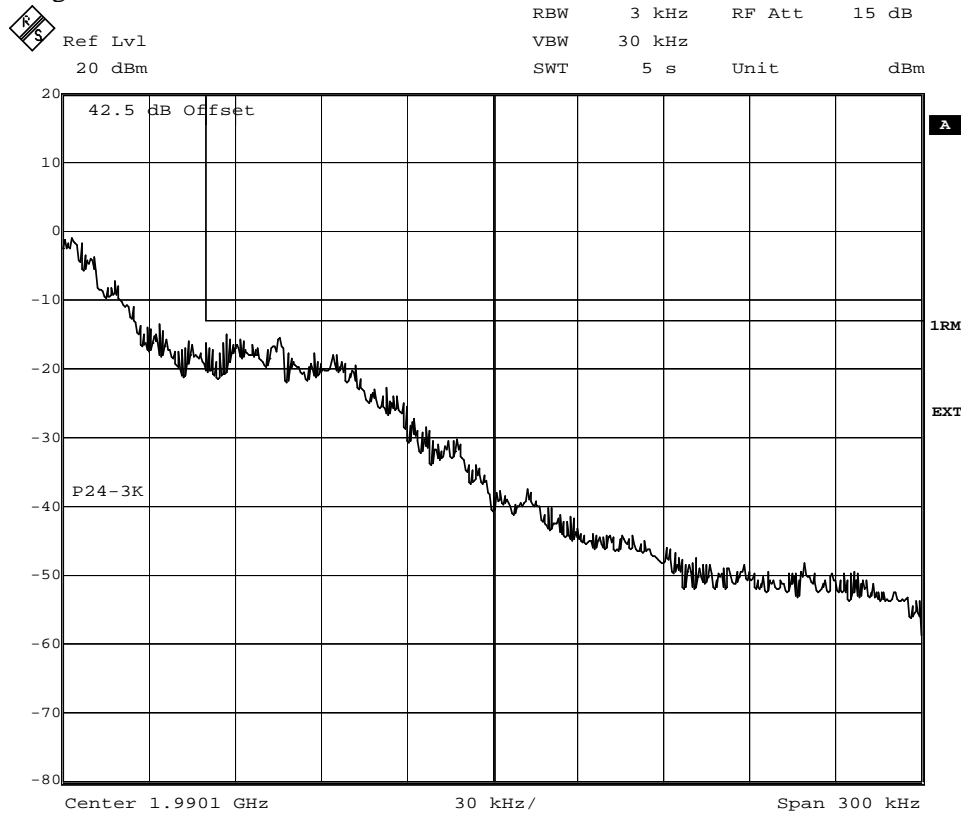
Date: 6.SEP.2007 15:39:54



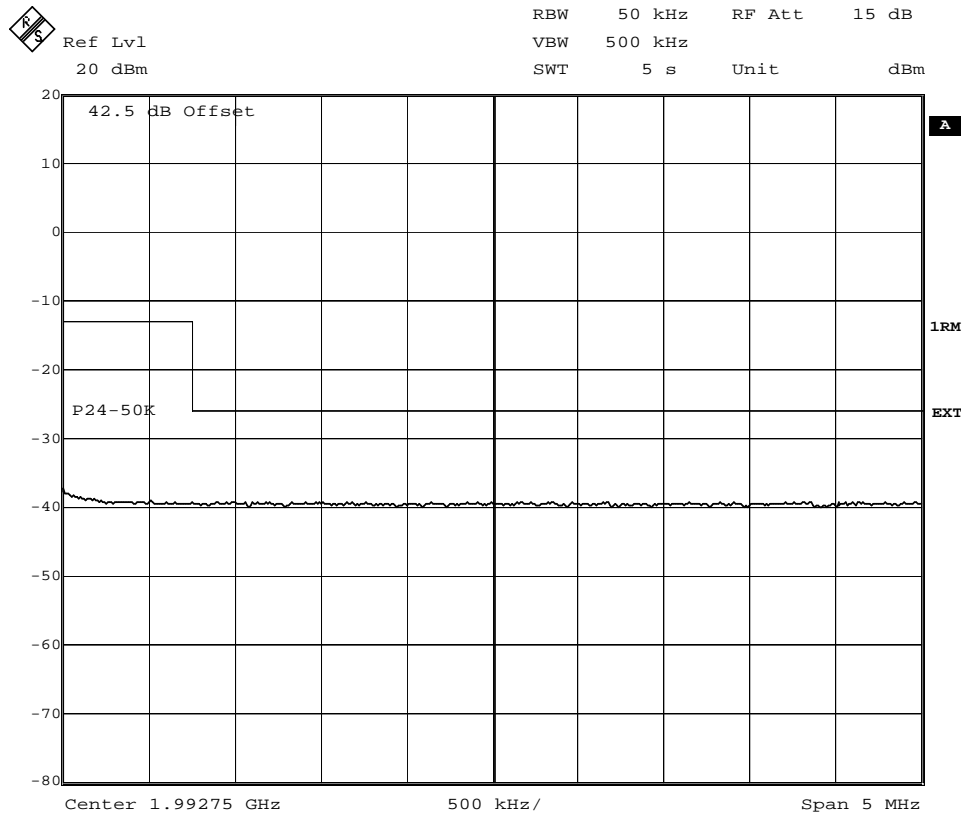
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Diagram 10



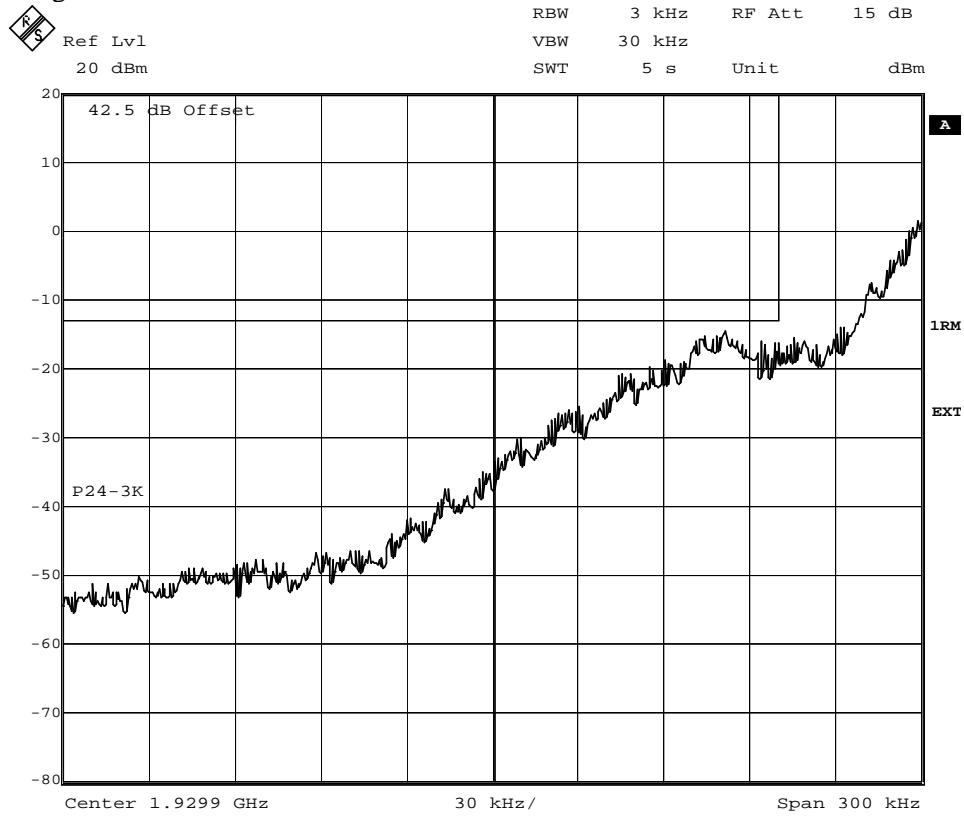
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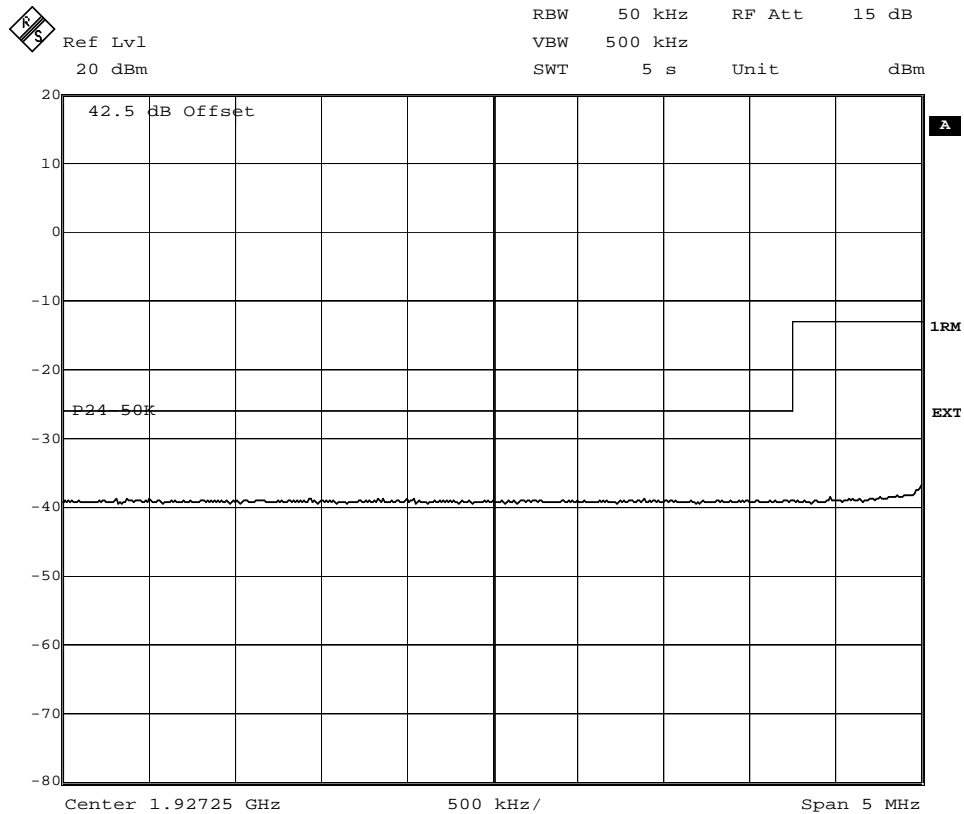
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Diagram 11



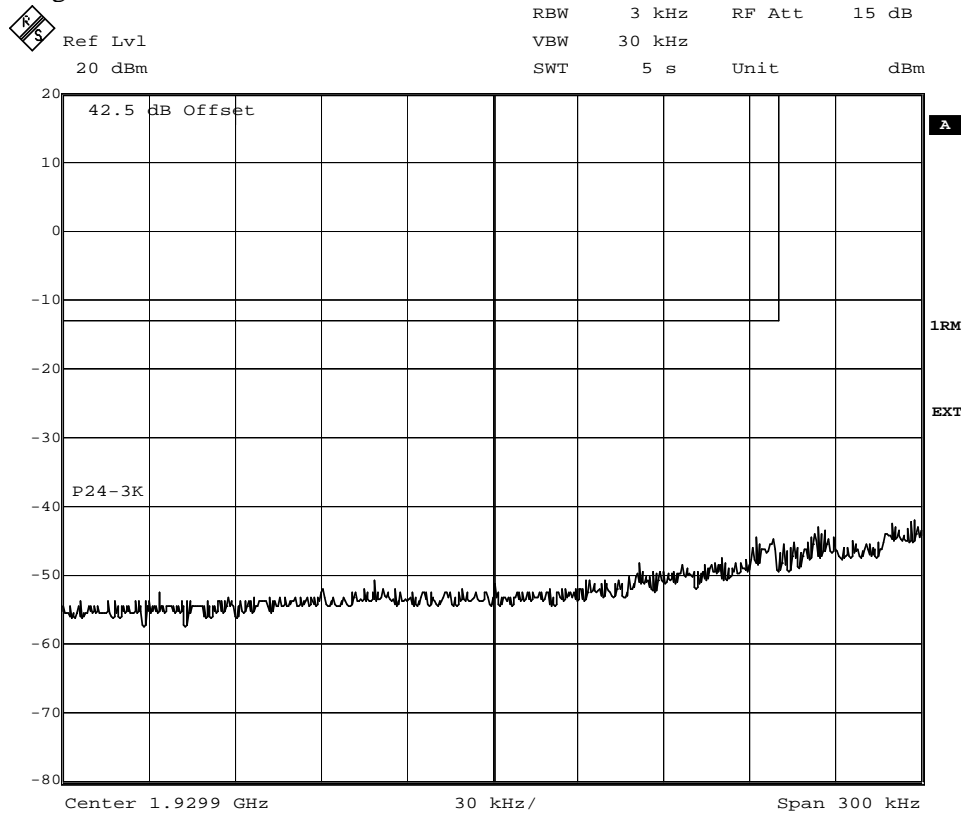
Date: 6.SEP.2007 14:22:41



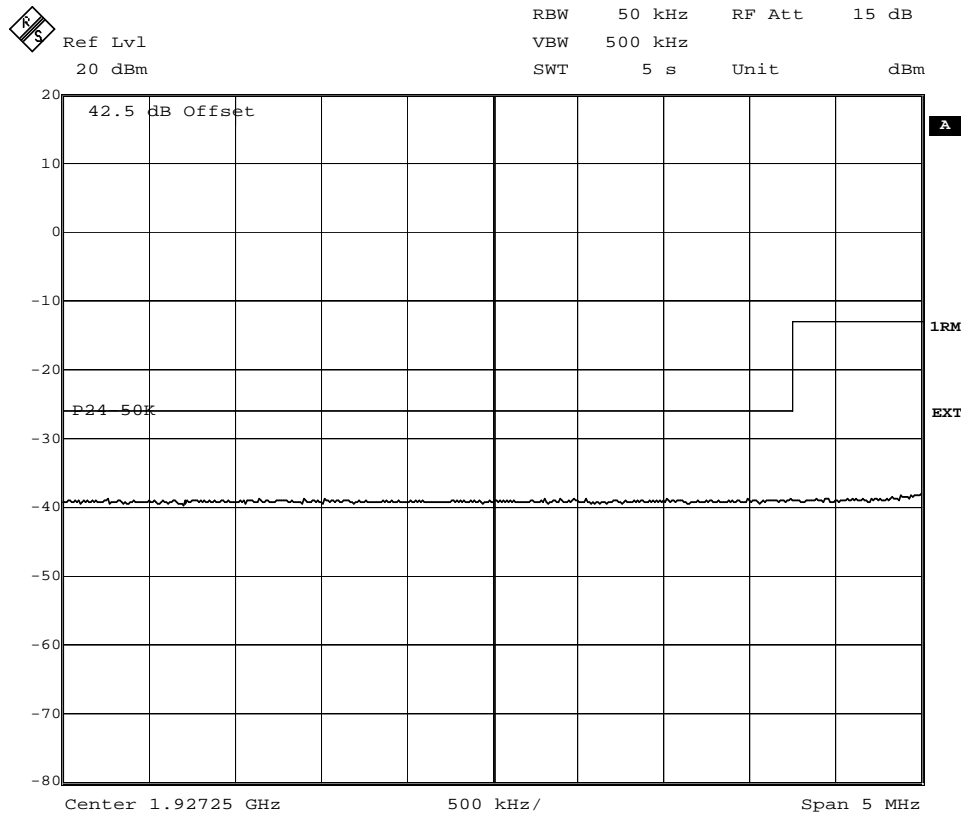
Date: 6.SEP.2007 14:23:39



Diagram 12



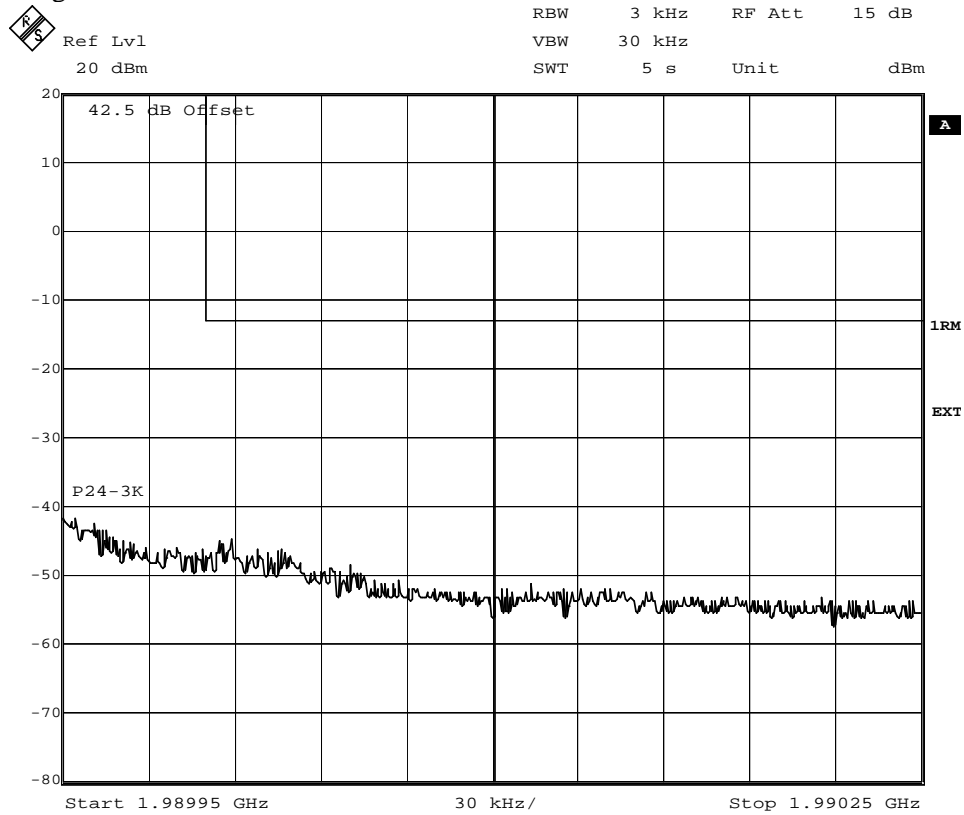
Date: 6.SEP.2007 15:17:58



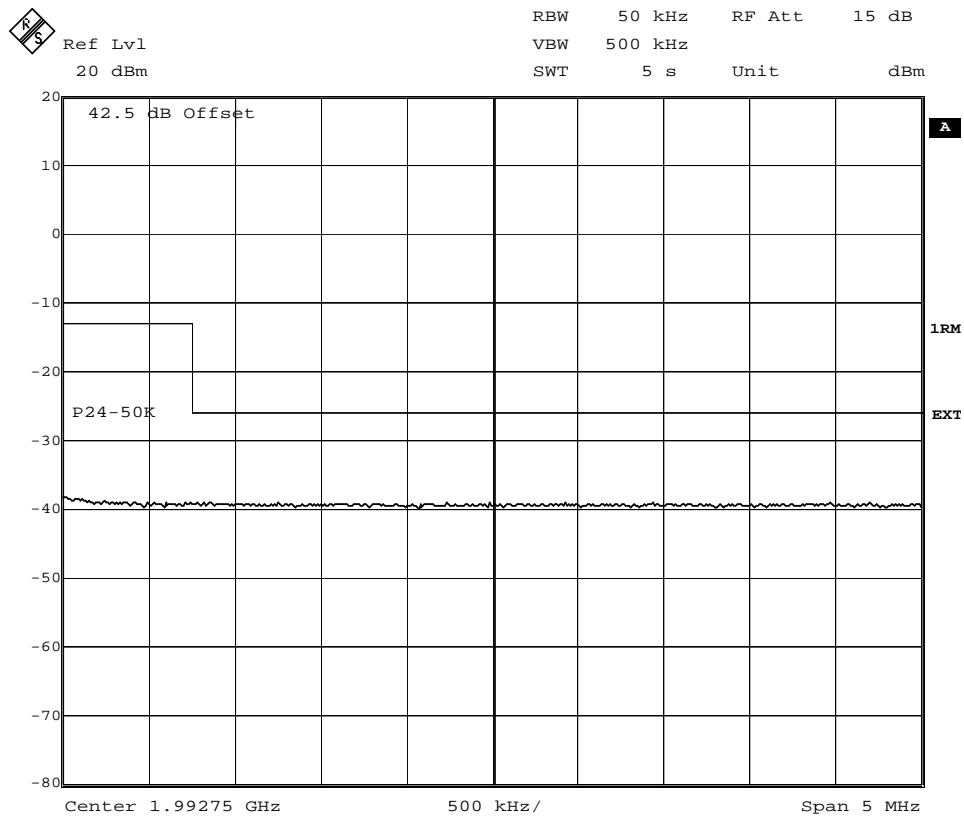
Date: 6.SEP.2007 15:19:01



Diagram 13



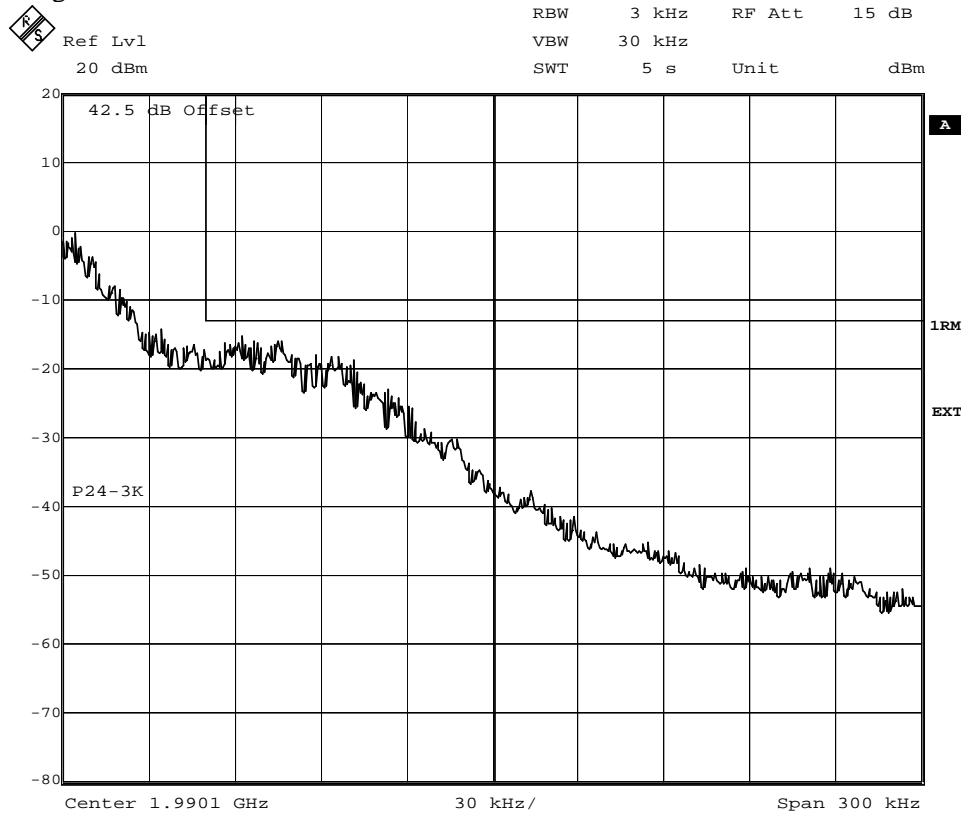
Date: 6.SEP.2007 16:31:58



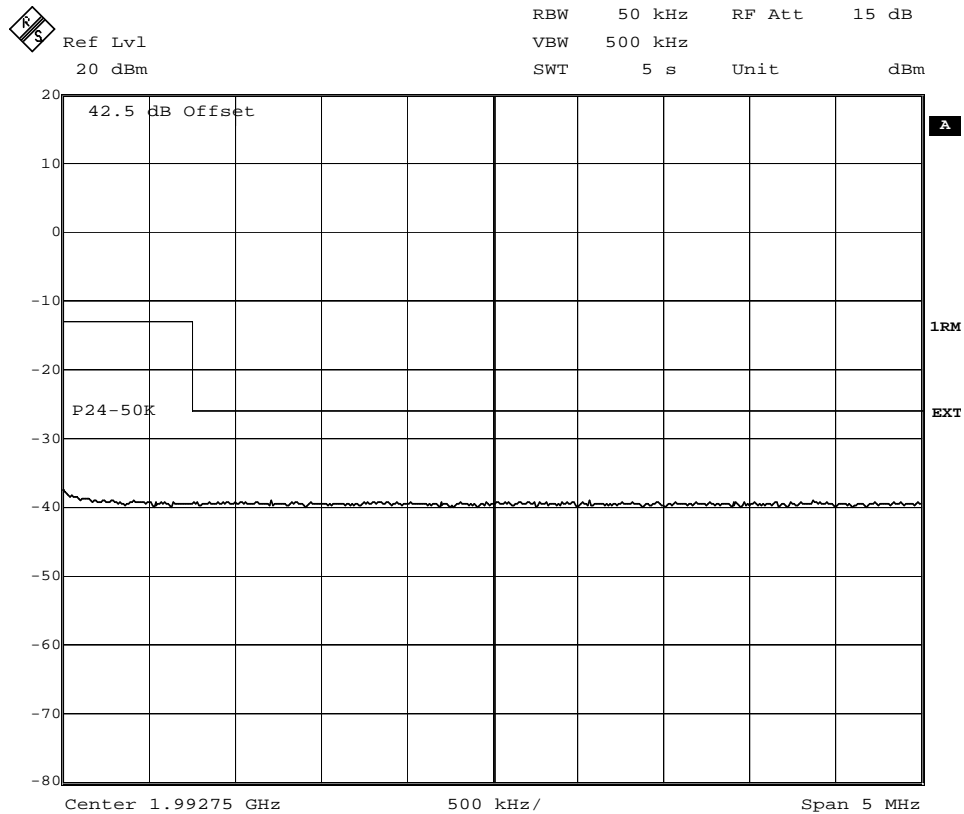
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Diagram 14



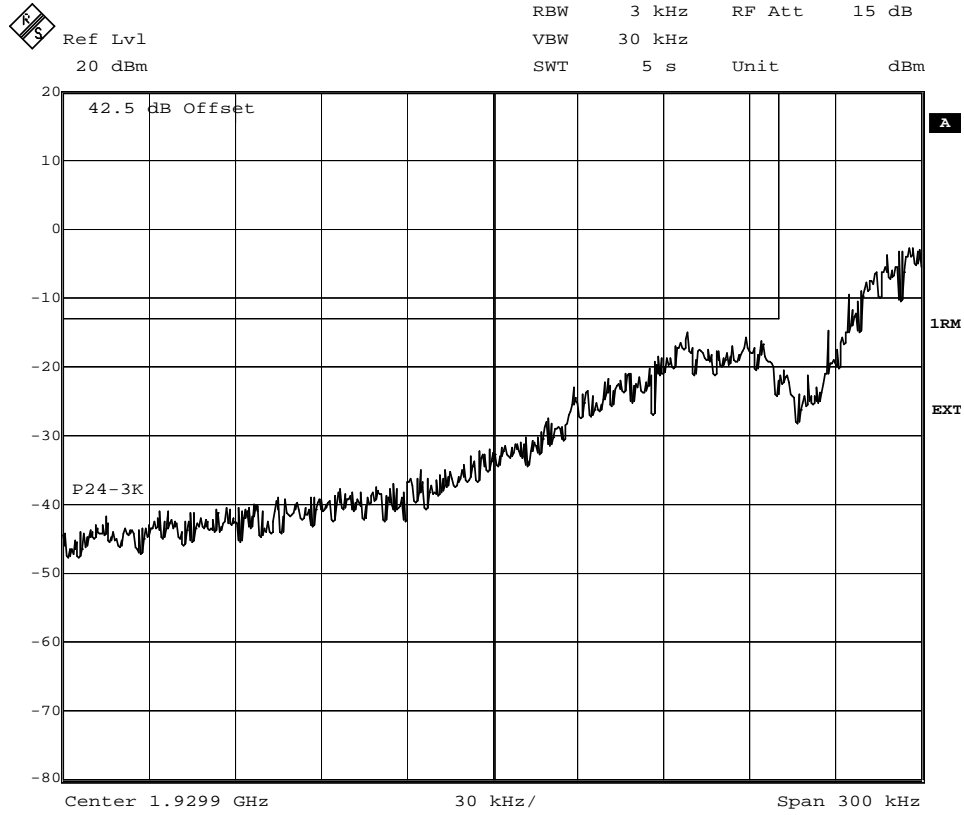
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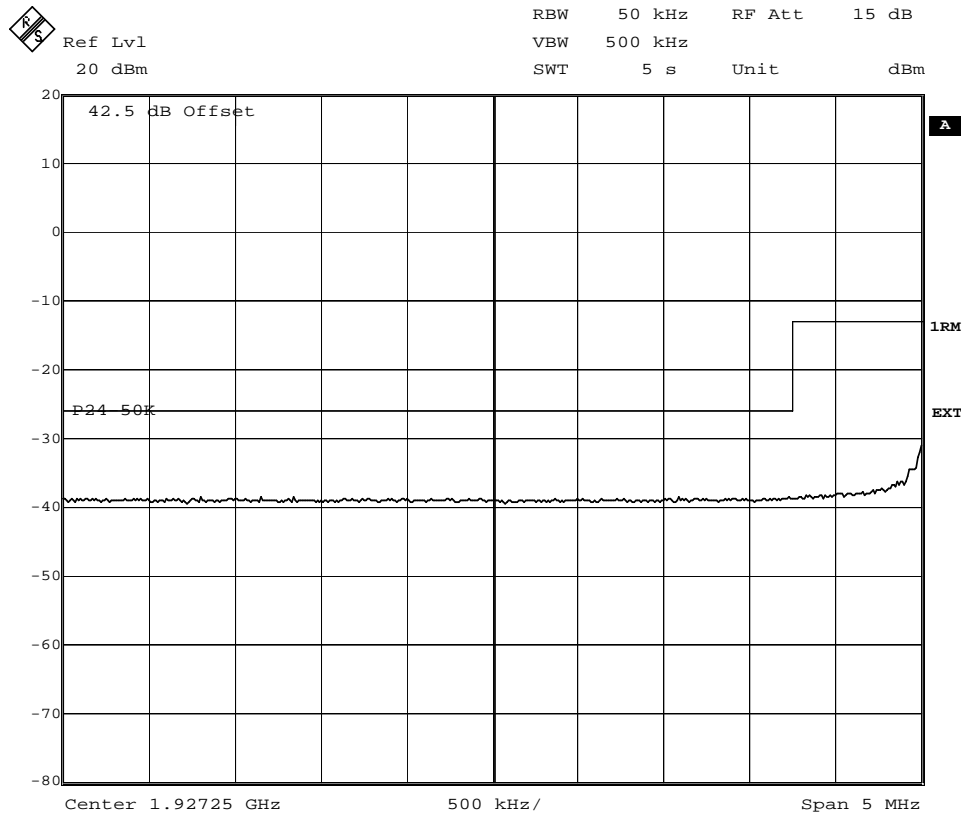
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Diagram 15



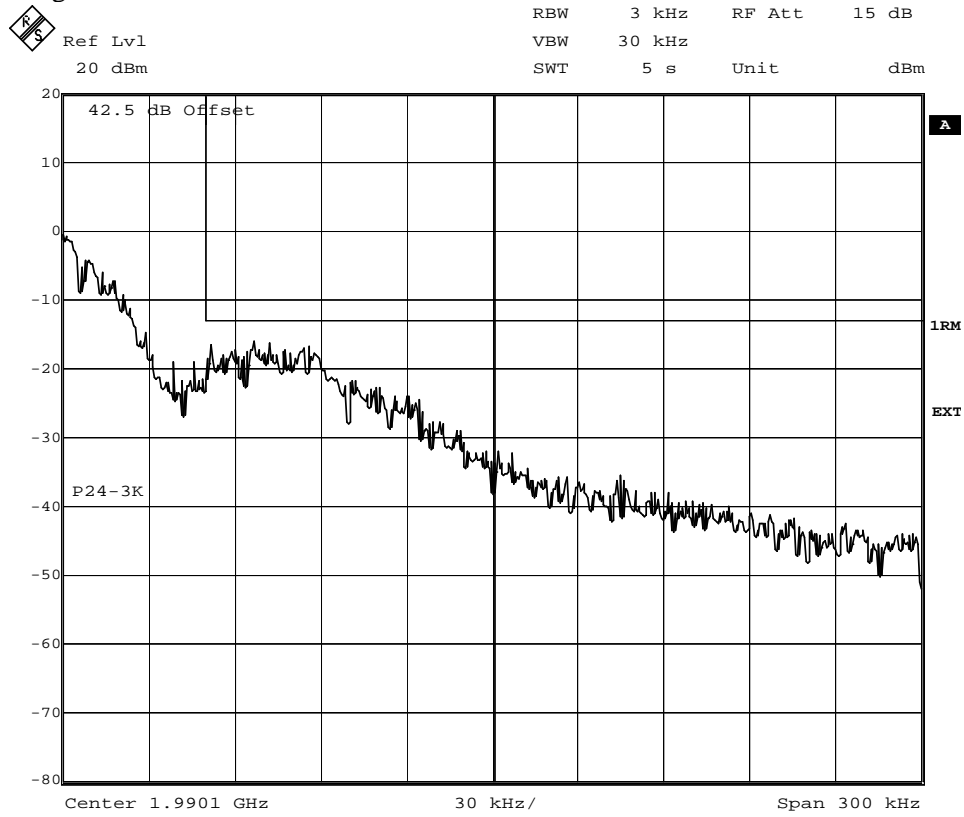
Date: 14.SEP.2007 13:25:24



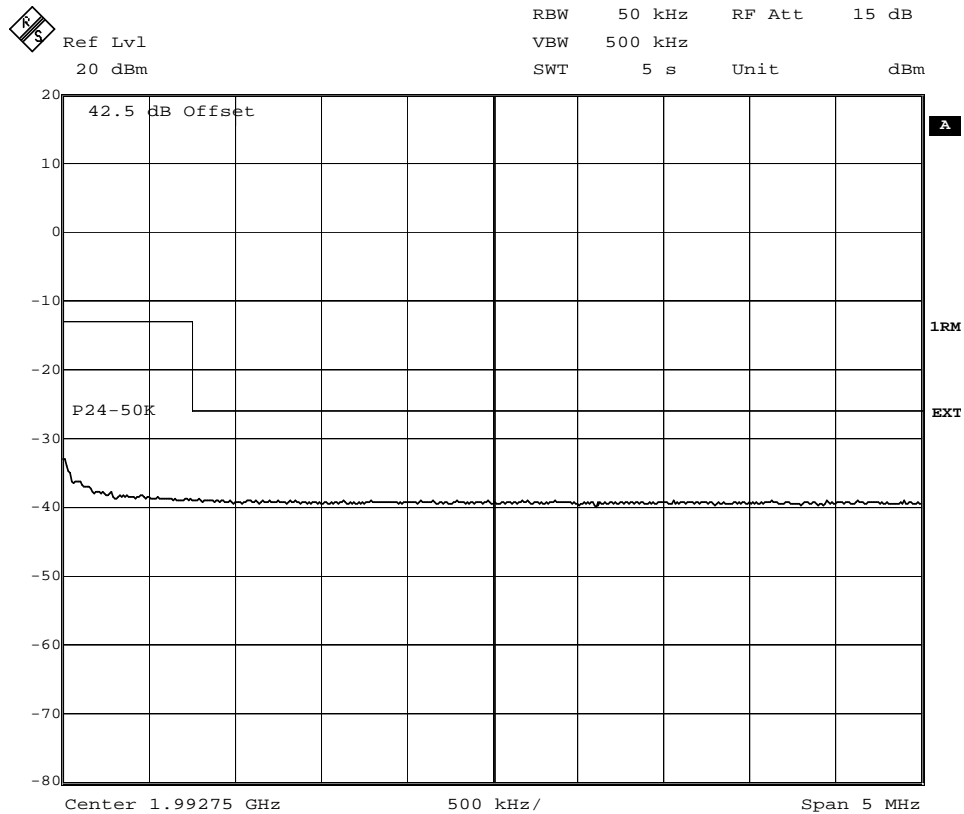
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Diagram 16



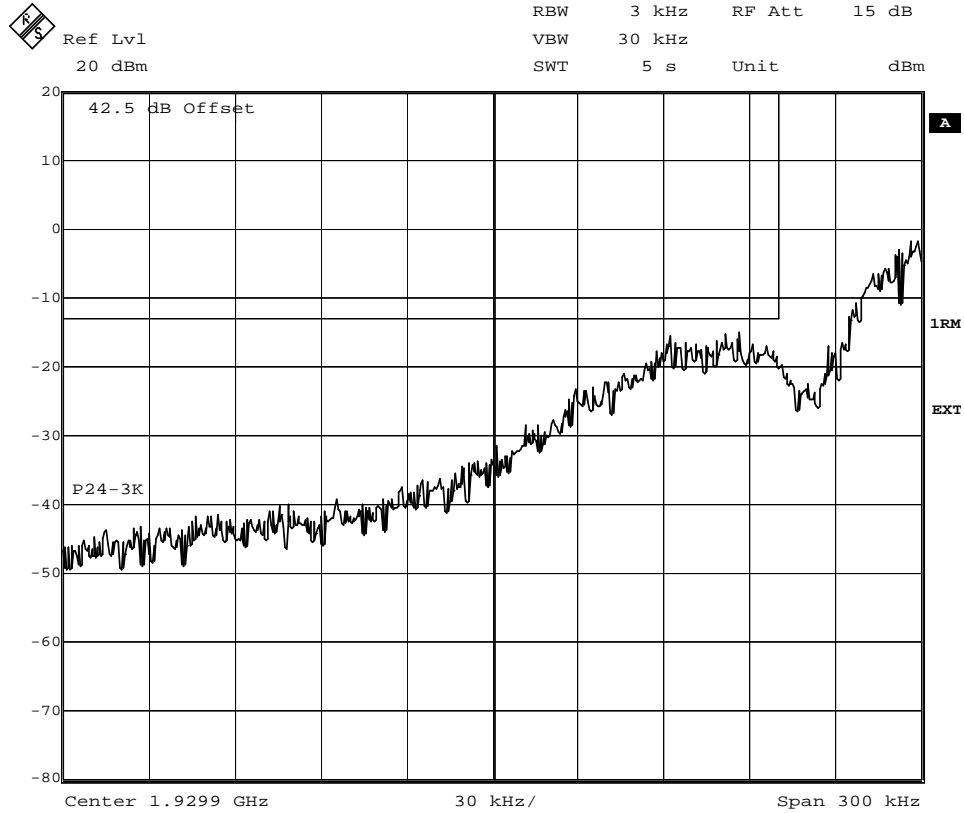
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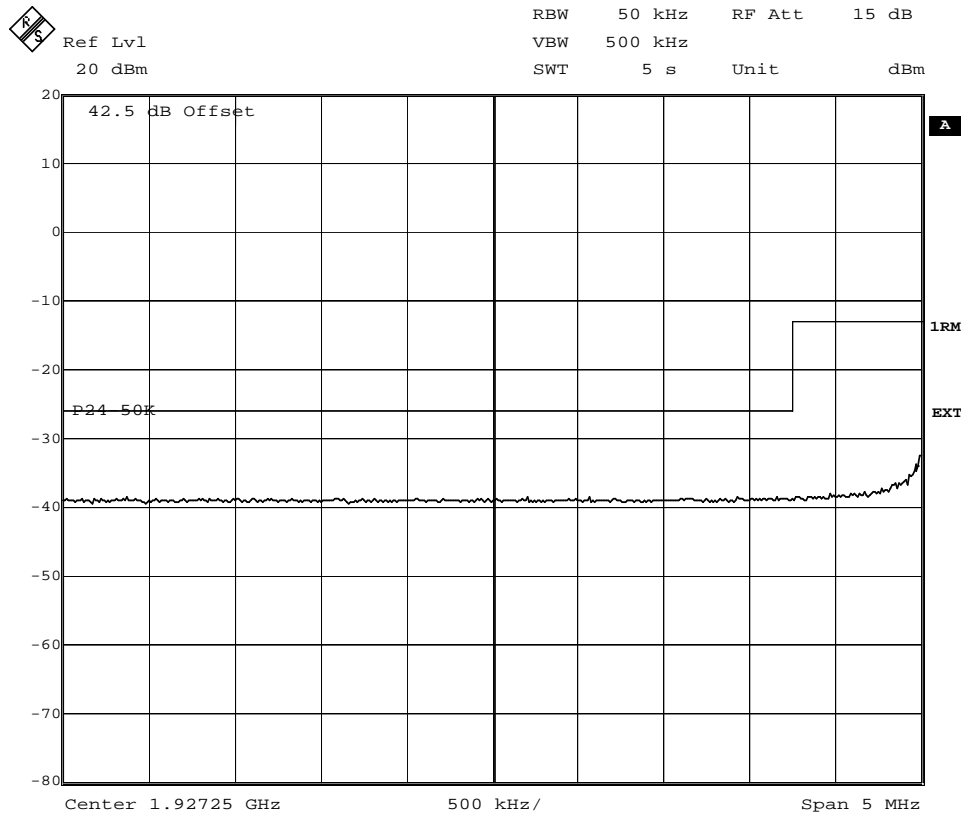
Date: 14.SEP.2007 13:31:26



Diagram 17



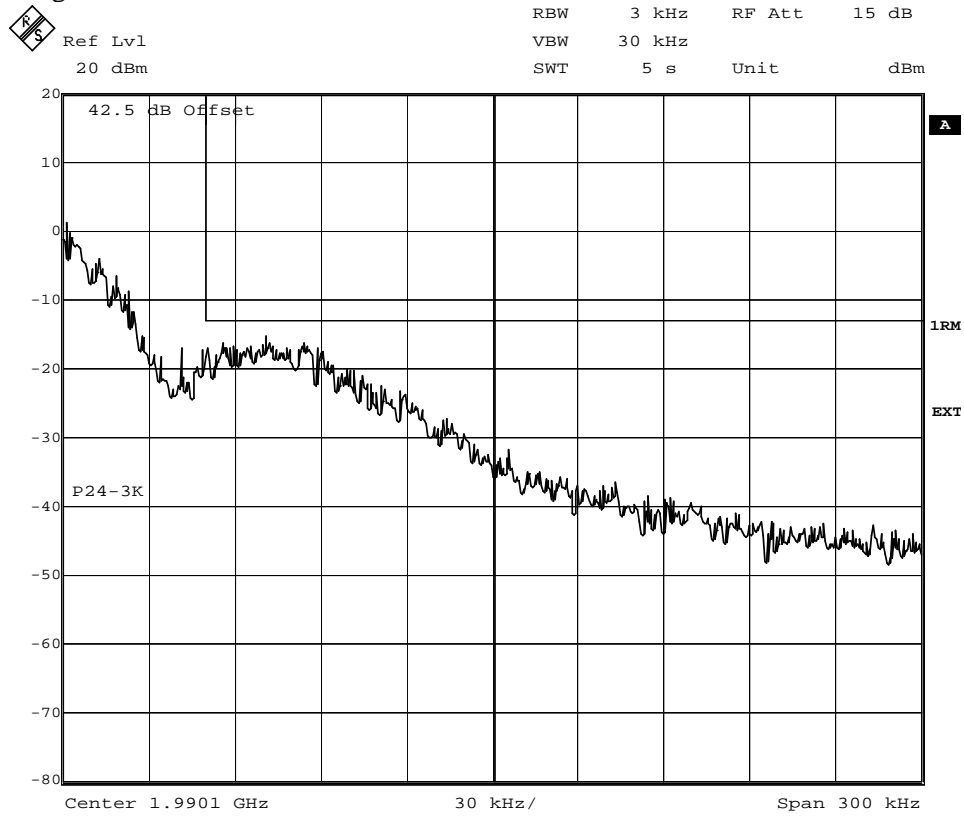
Date: 14.SEP.2007 13:17:37



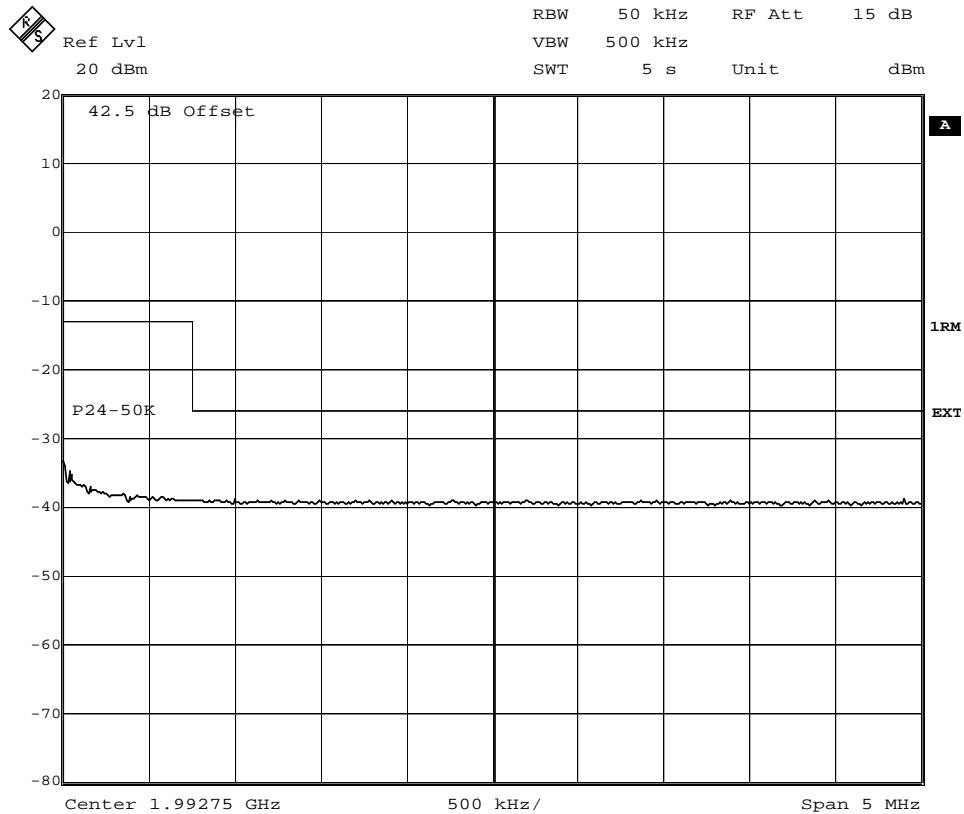
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Diagram 18



Date: 14.SEP.2007 13:15:11



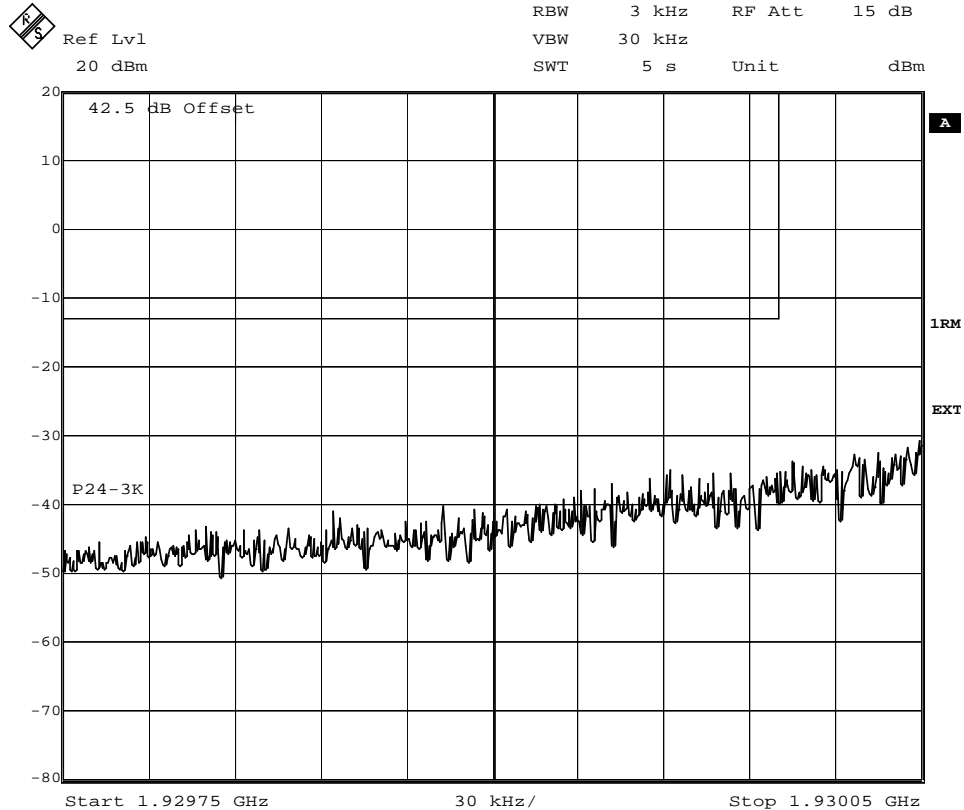
Date: 14.SEP.2007 13:16:00



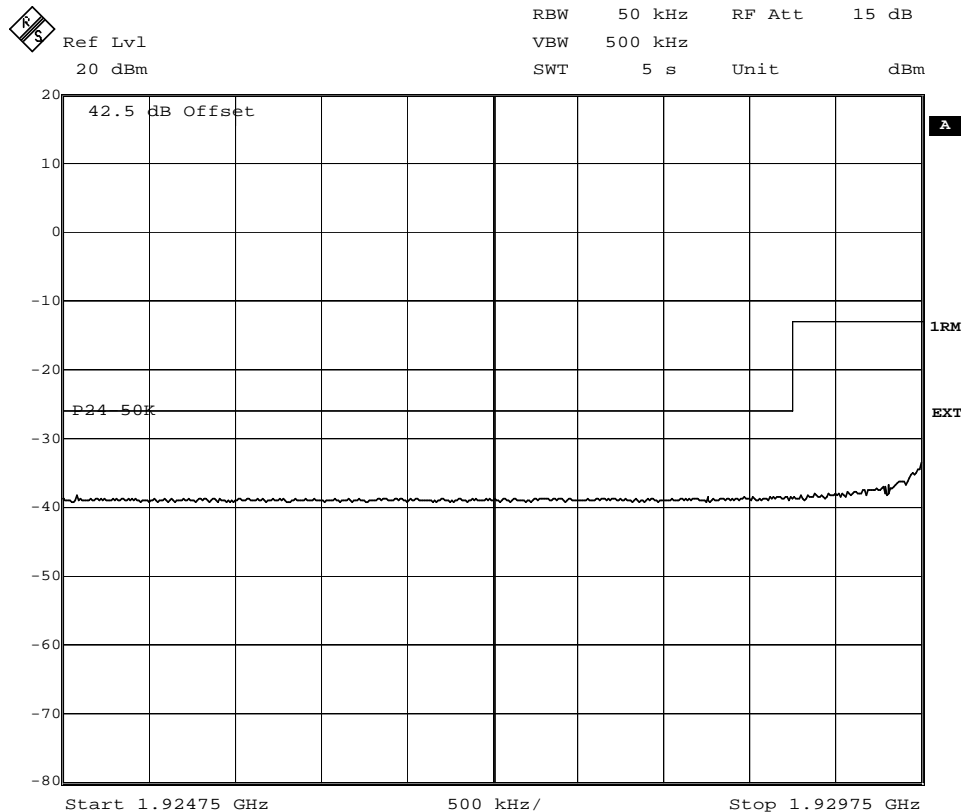
FCC ID: B5KFKRC1311004-2

Appendix 4.1

Diagram 19



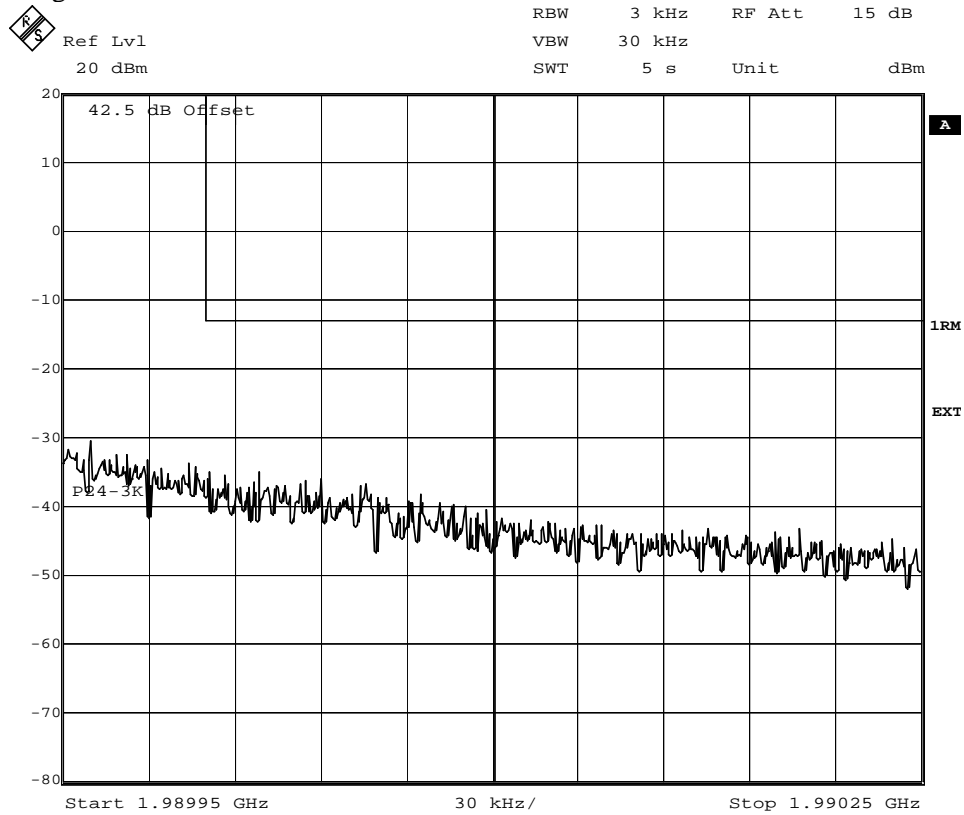
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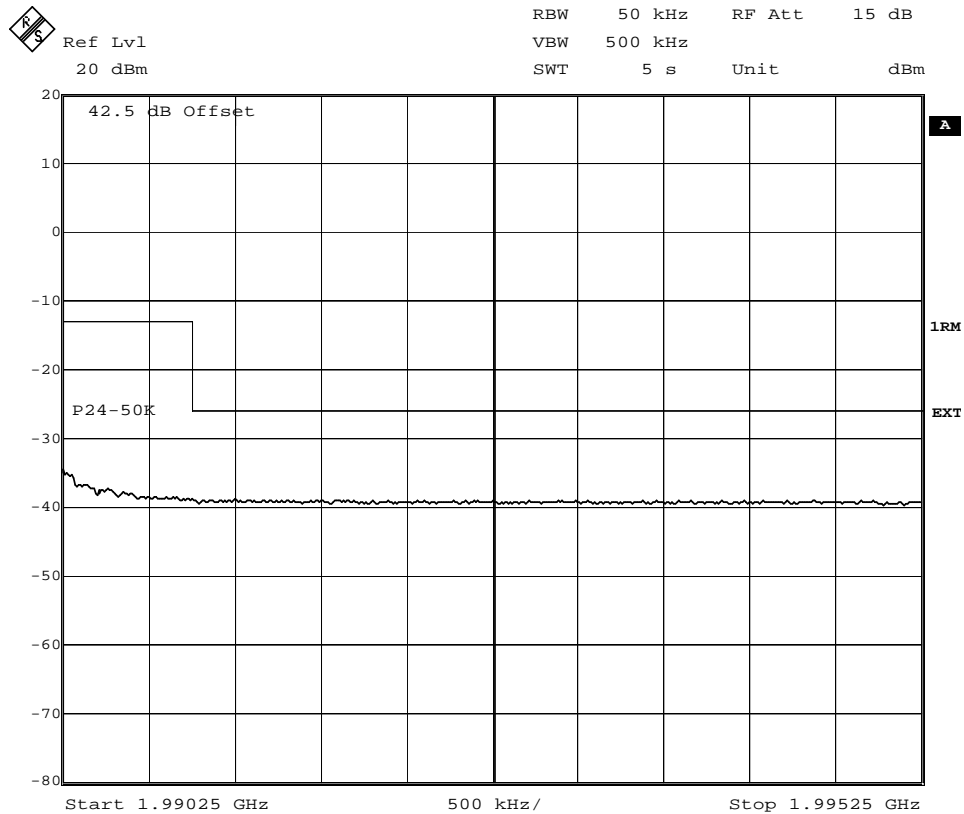
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Diagram 20



Date: 14.SEP.2007 16:04:18



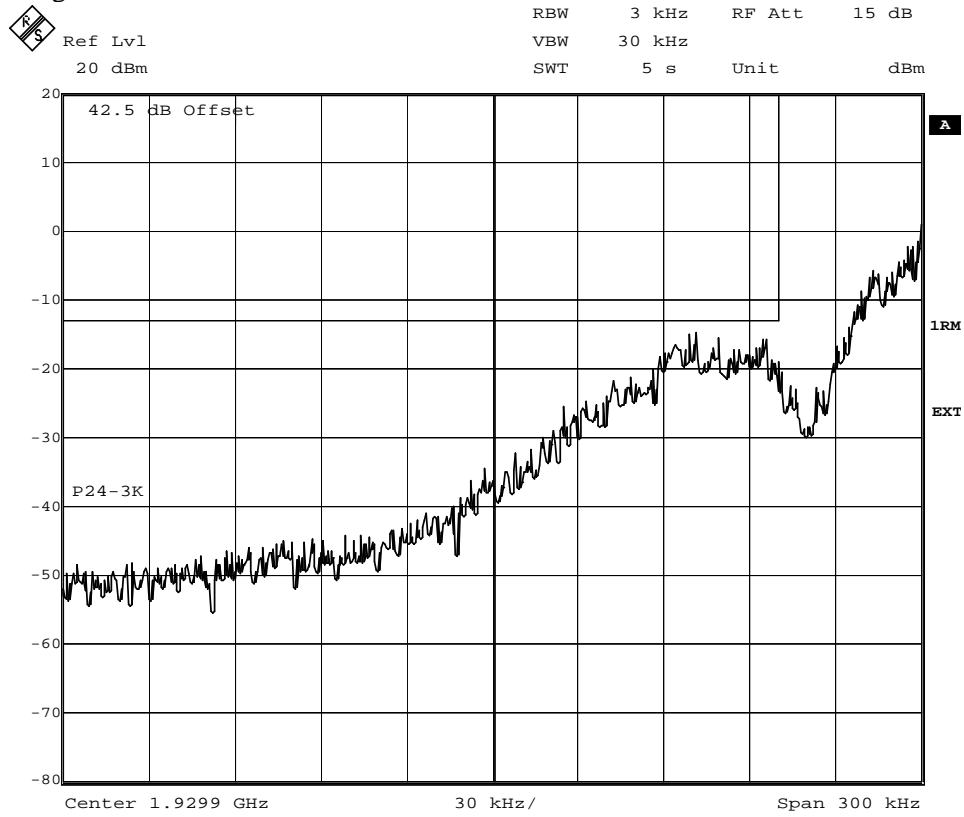
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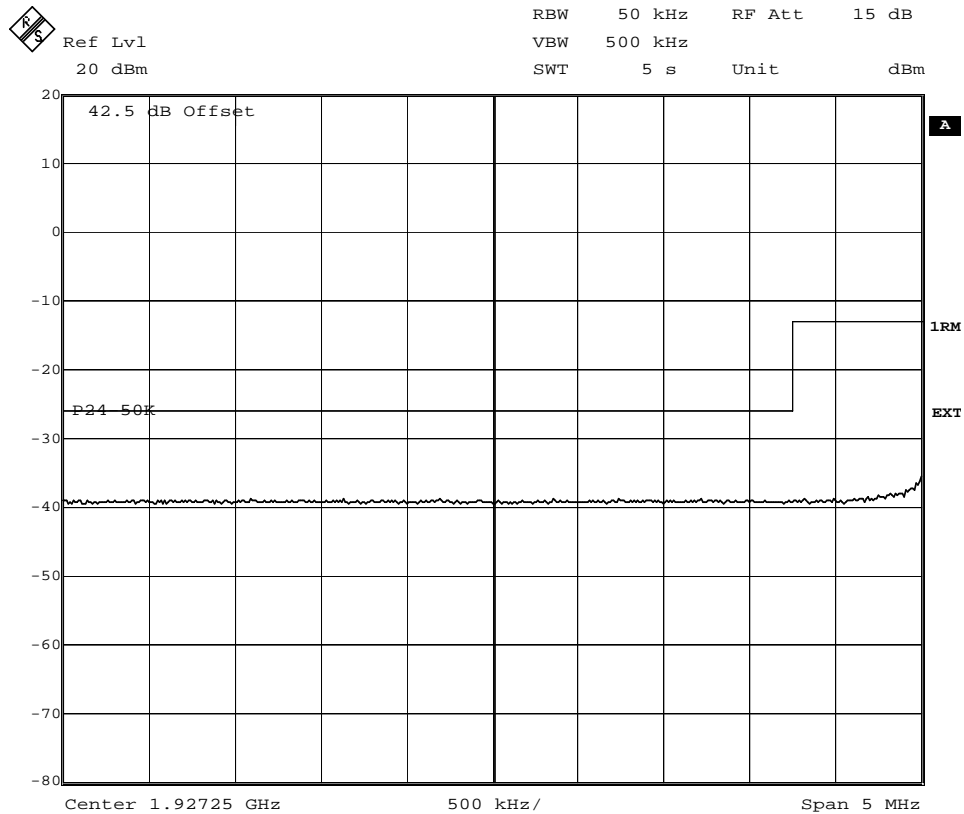
FCC ID: B5KFKRC1311004-2

Appendix 4.1

Diagram 21



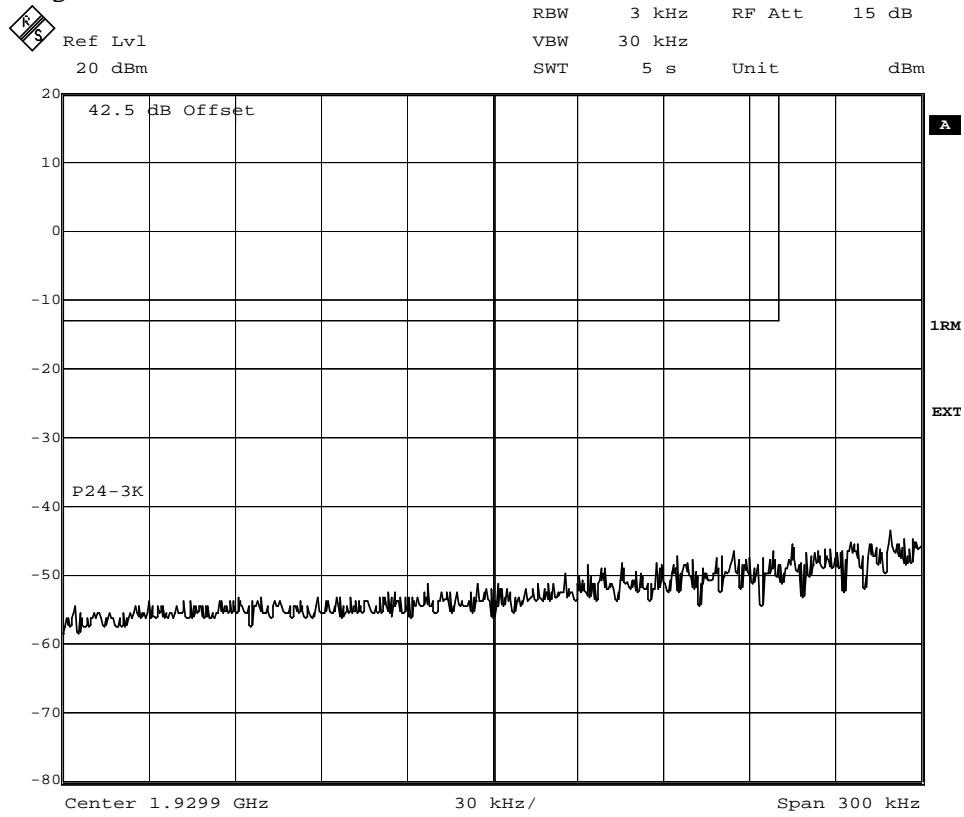
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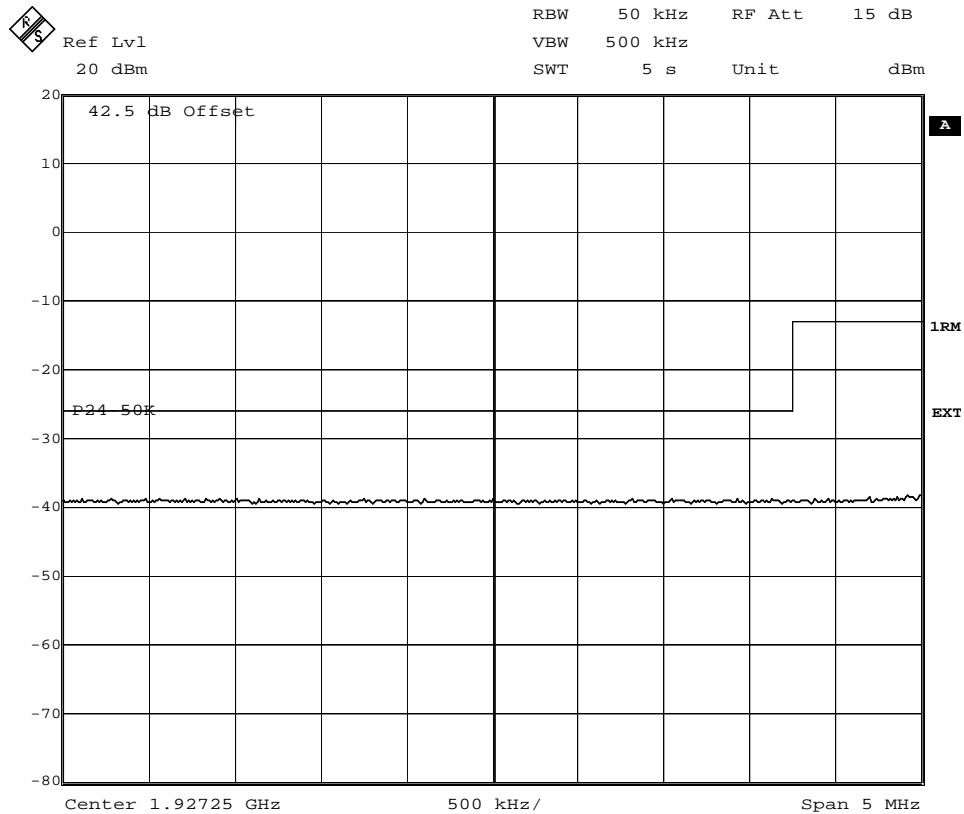
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Diagram 22



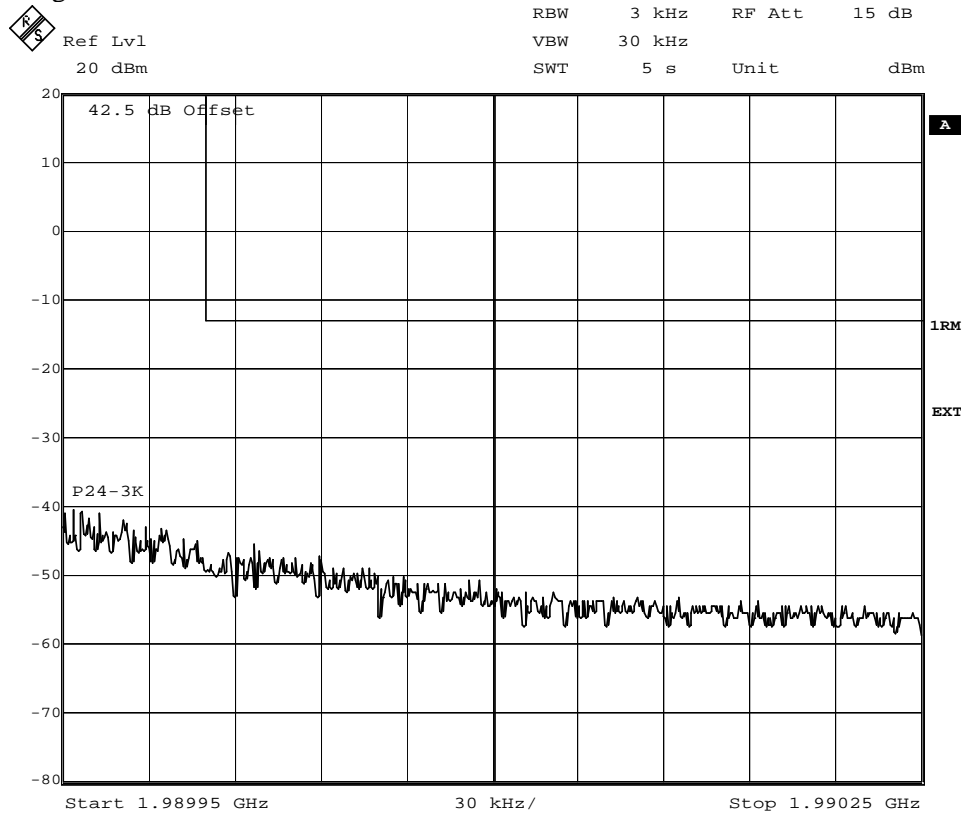
Date: 6.SEP.2007 15:15:32



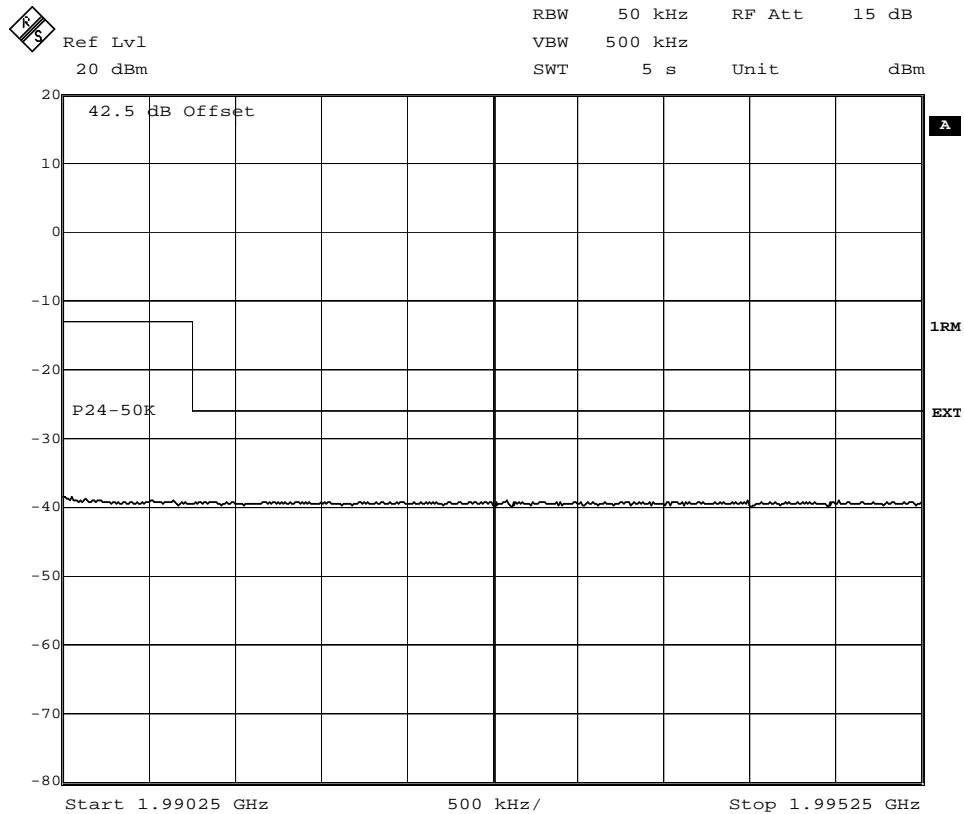
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Diagram 23



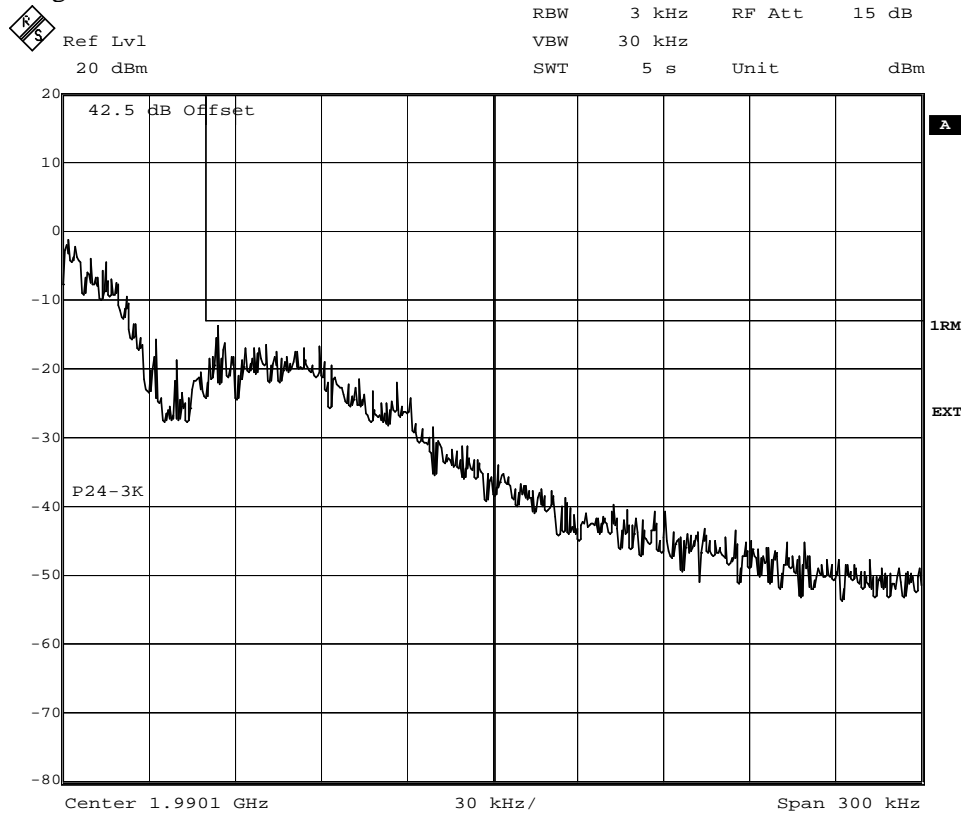
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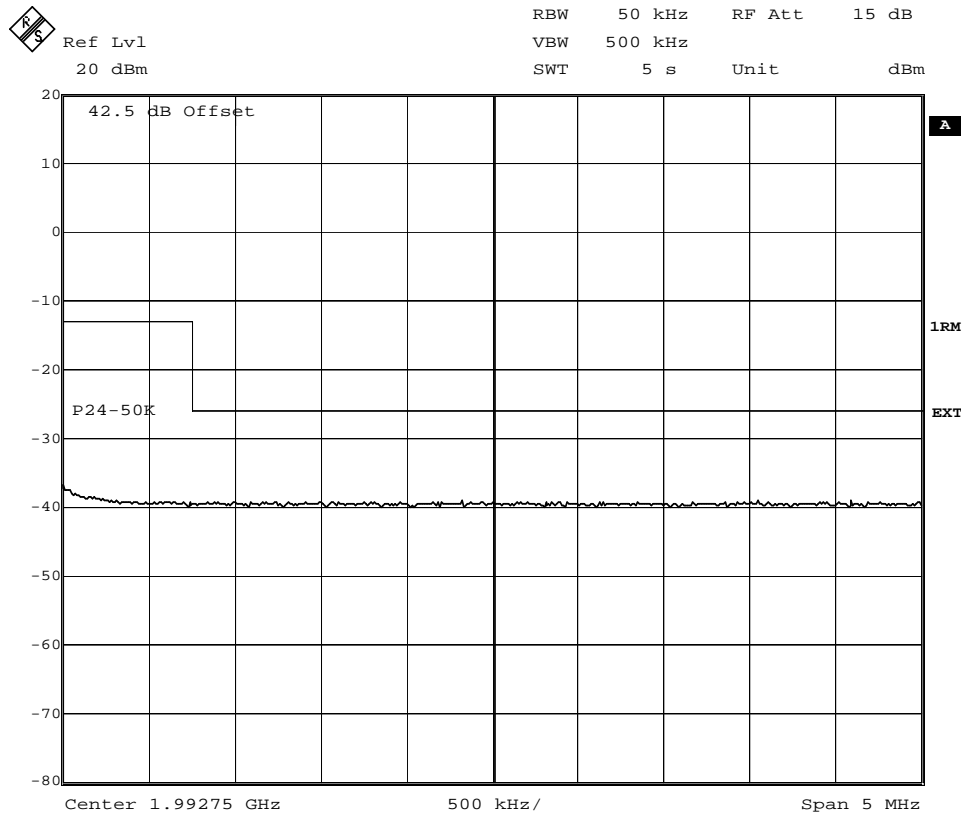
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Diagram 24



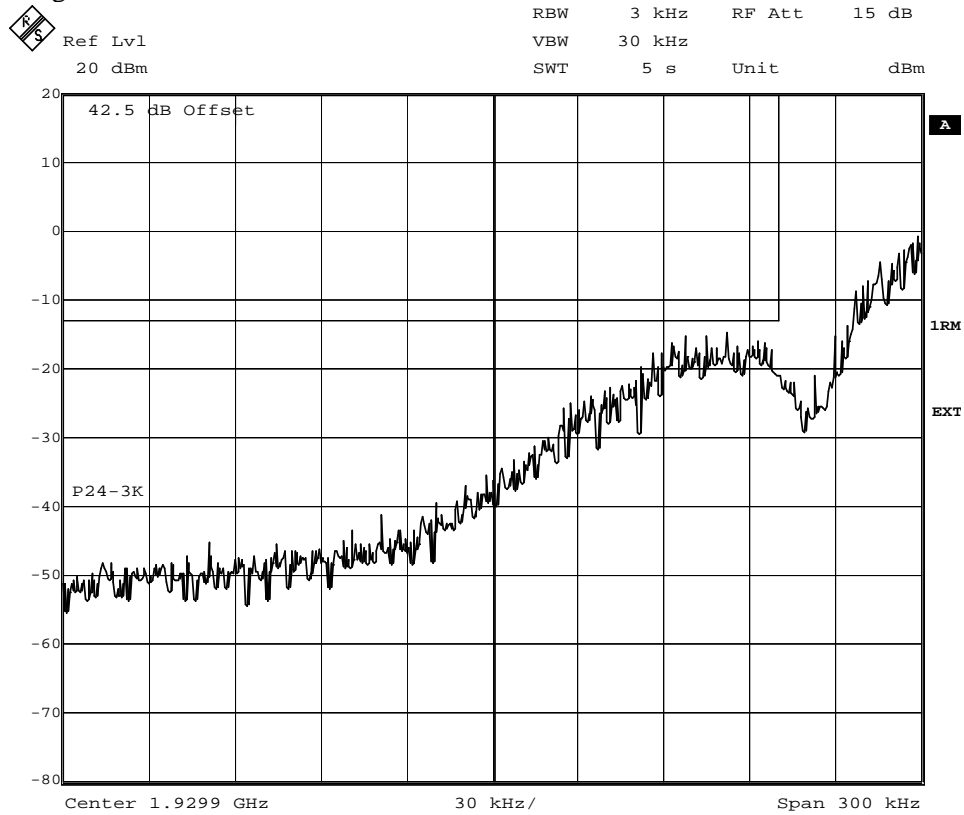
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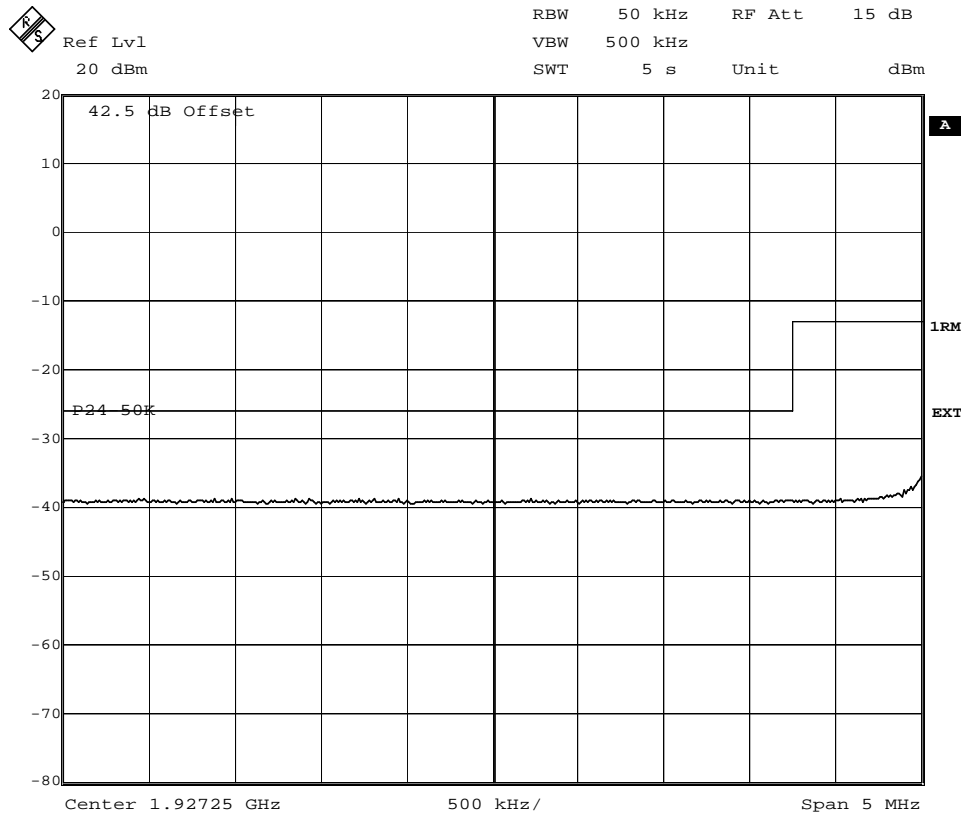
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Diagram 25



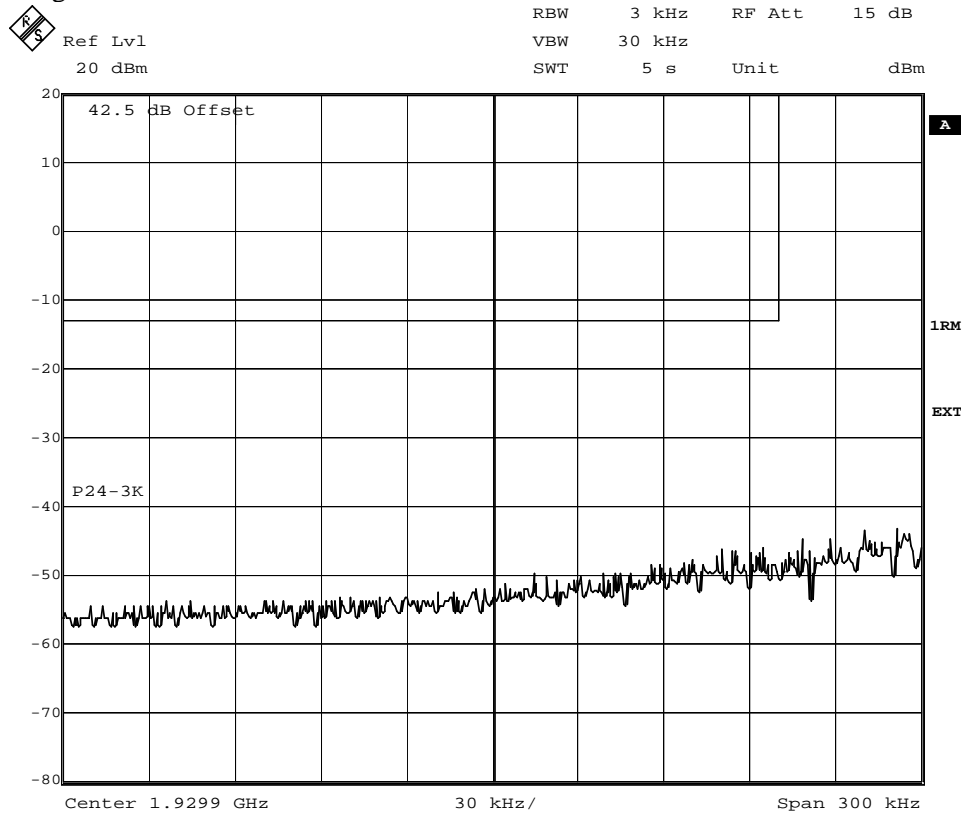
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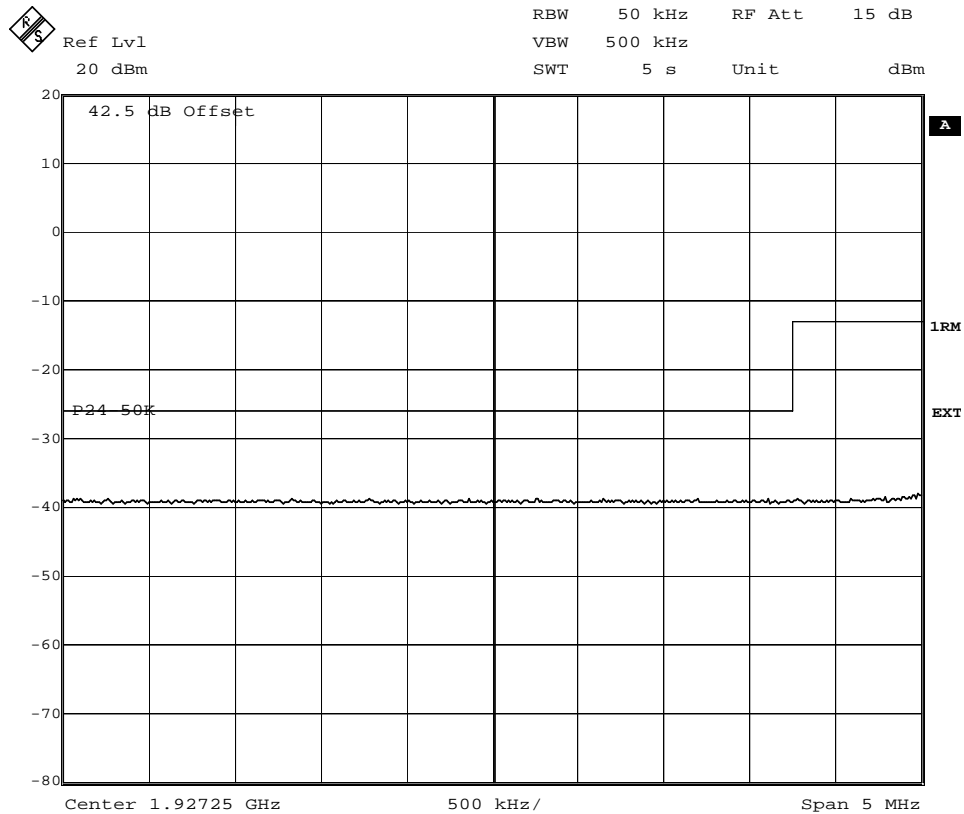
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Diagram 26



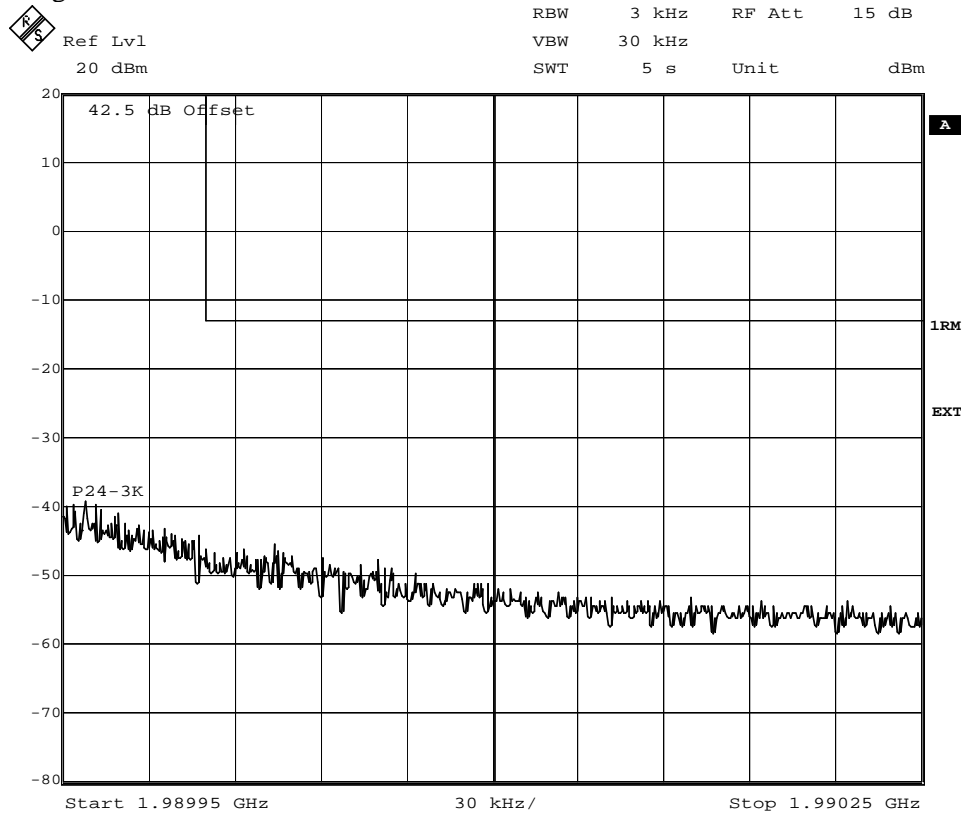
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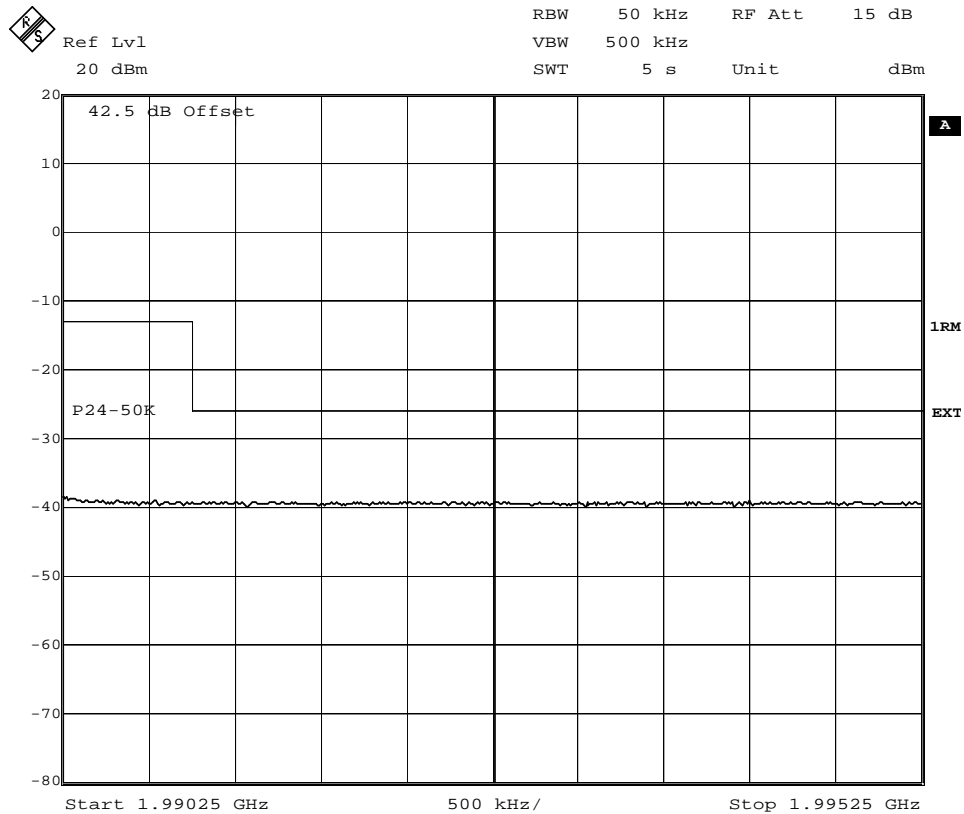
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Diagram 27



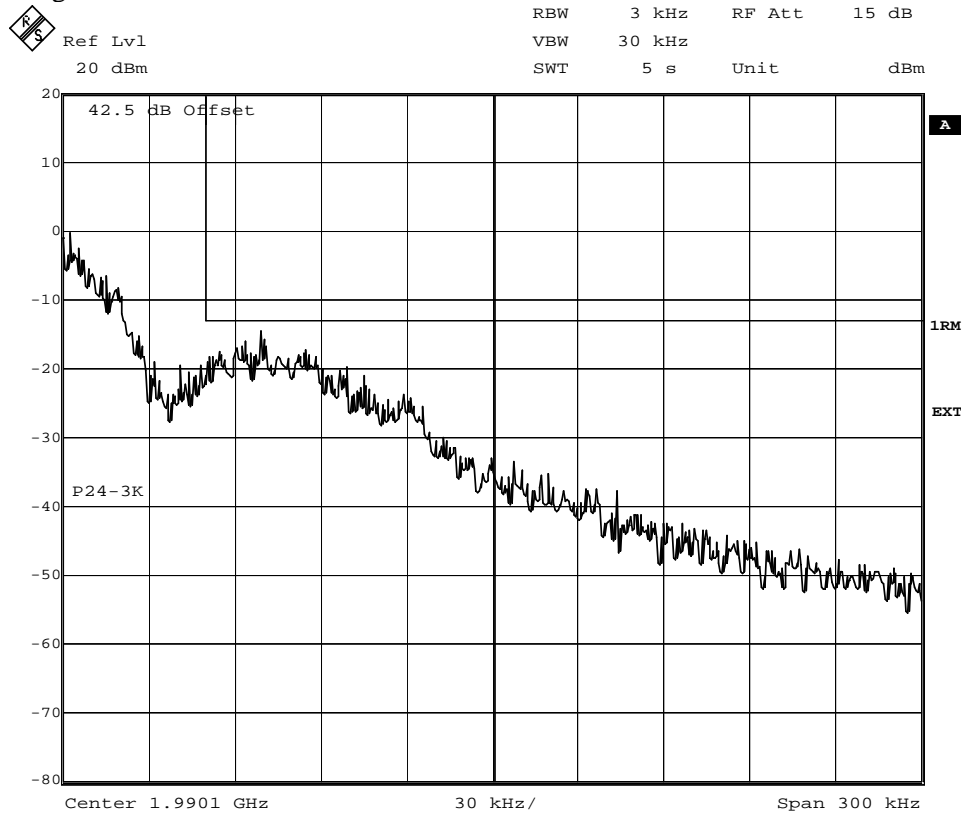
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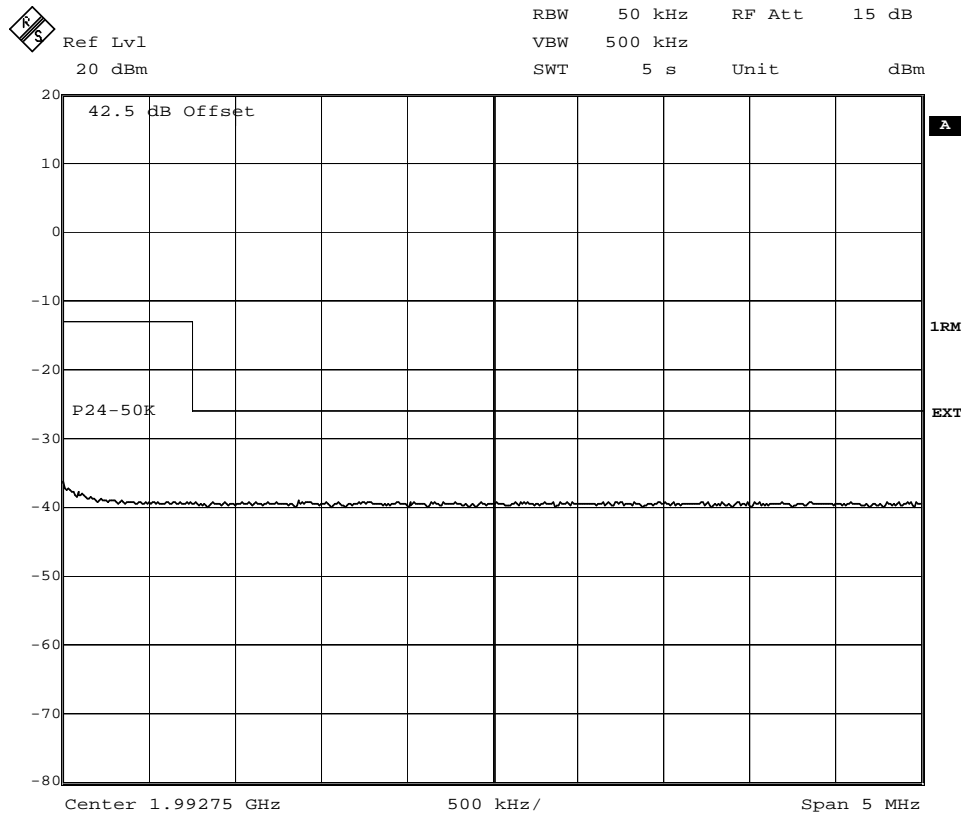
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Diagram 28



Date: 6.SEP.2007 14:13:01



Date: 6.SEP.2007 14:14:19



Conducted spurious emission measurements according to 47CFR 2.1051

Date	Temperature	Humidity
2007-09-06	23 °C ± 3 °C	45 % ± 5 %
2007-09-07	22 °C ± 3 °C	42 % ± 5 %
2007-09-14	23 °C ± 3 °C	48 % ± 5 %

Test set-up and procedure

The measurements were made per definition in 24.238. Measurements were made at CDU-K and CDU-F output connector. The output was connected to a spectrum analyser. A pre-measurement was performed with the PEAK detector activated. Emission above the limit with the PEAK detector is measured with the RMS detector activated. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements. The transmitter was activated at maximum output power and modulated with pseudorandom data during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
HP filter	2008-07	503 739
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 5.1

CDU-K

Modulation: **GMSK**

dTRU, with internal combiner plus TCC:

- Diagram 1: Ch 512
- Diagram 2: Ch 661
- Diagram 3: Ch 810

dTRU, without internal combiner:

- Diagram 4: TRX output 1, Ch 512
- Diagram 5: TRX output 1, Ch 661
- Diagram 6: TRX output 1, Ch 810
- Diagram 7: TRX output 2, Ch 512
- Diagram 8: TRX output 2, Ch 661
- Diagram 9: TRX output 2, Ch 810

dTRU, with internal combiner:

- Diagram 10: TRX output 1 Ch 512, TRX output 2 Ch 537
- Diagram 11: TRX output 1 Ch 785, TRX output 2 Ch 810



FCC ID: B5KFKRC1311004-2

Appendix 5

Modulation: **8-PSK**

dTRU, with internal combiner plus TCC:

- Diagram 12: Ch 512
- Diagram 13: Ch 661
- Diagram 14: Ch 810

dTRU, without internal combiner:

- Diagram 15: TRX output 1, Ch 512
- Diagram 16: TRX output 1, Ch 661
- Diagram 17: TRX output 1, Ch 810
- Diagram 18: TRX output 2, Ch 512
- Diagram 19: TRX output 2, Ch 661
- Diagram 20: TRX output 2, Ch 810

dTRU, with internal combiner:

- Diagram 21: TRX output 1 Ch 512, TRX output 2 Ch 537
- Diagram 22: TRX output 1 Ch 785, TRX output 2 Ch 810

CDU-F

Modulation: **GMSK**

dTRU, without internal combiner (2x6):

- Diagram 23: dTRU 1, TRX output 1 Ch 512, TRX output 2 Ch 537
dTRU 2, TRX output 1 Ch 562, TRX output 2 Ch 760
dTRU 3, TRX output 1 Ch 785, TRX output 2 Ch 810

Modulation: **8-PSK**

dTRU, without internal combiner (2x6):

- Diagram 24: dTRU 1, TRX output 1 Ch 512, TRX output 2 Ch 537
dTRU 2, TRX output 1 Ch 562, TRX output 2 Ch 760
dTRU 3, TRX output 1 Ch 785, TRX output 2 Ch 810

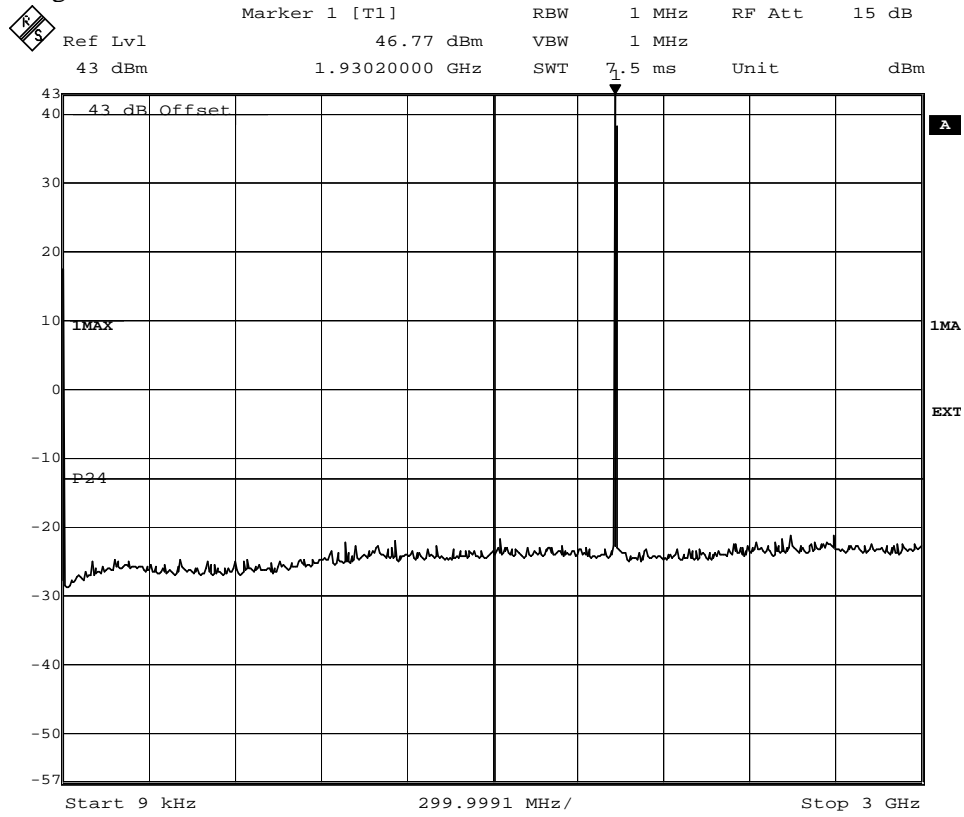
Limits

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

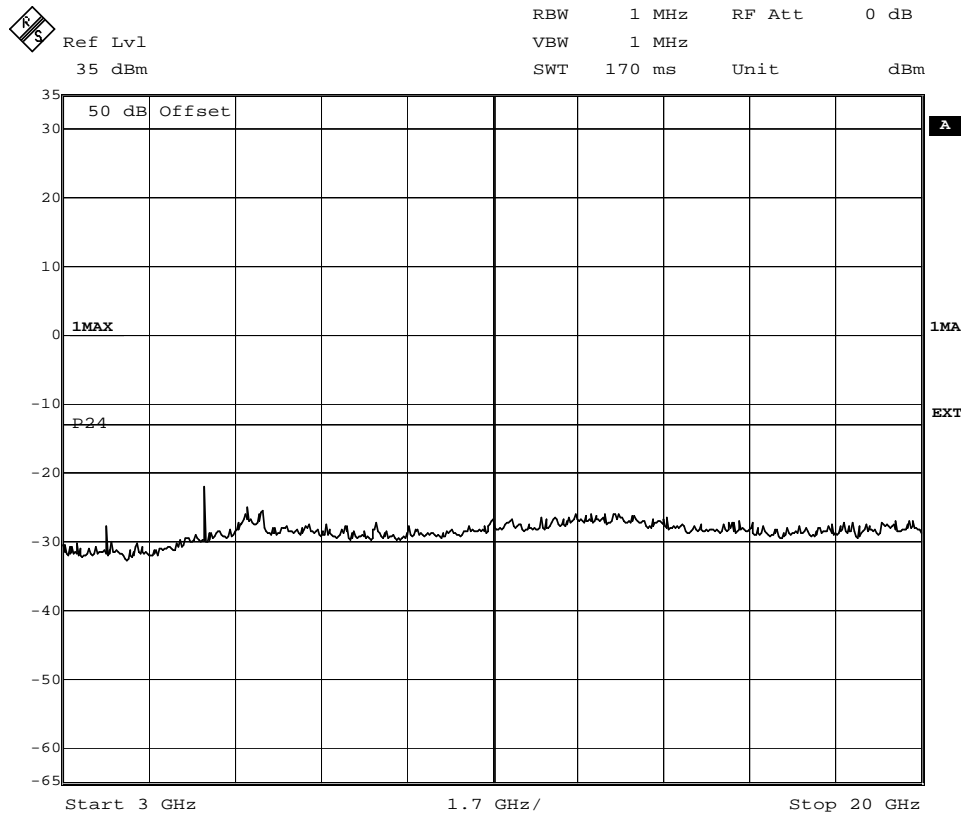
Complies?	Yes
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Diagram 1



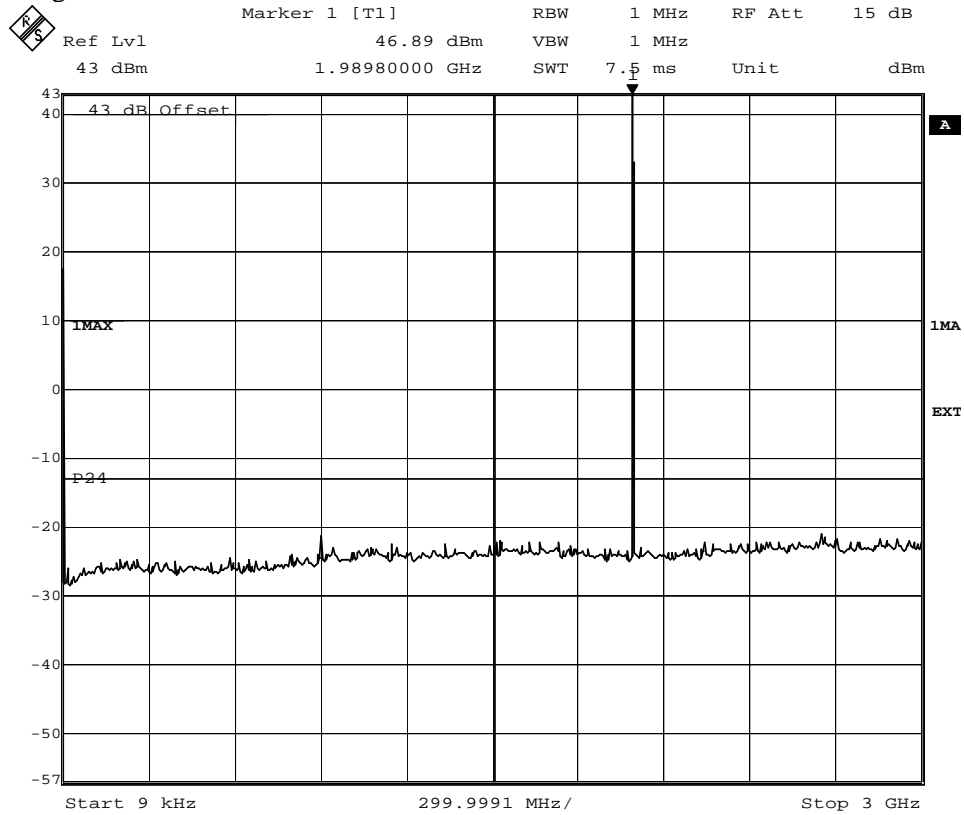
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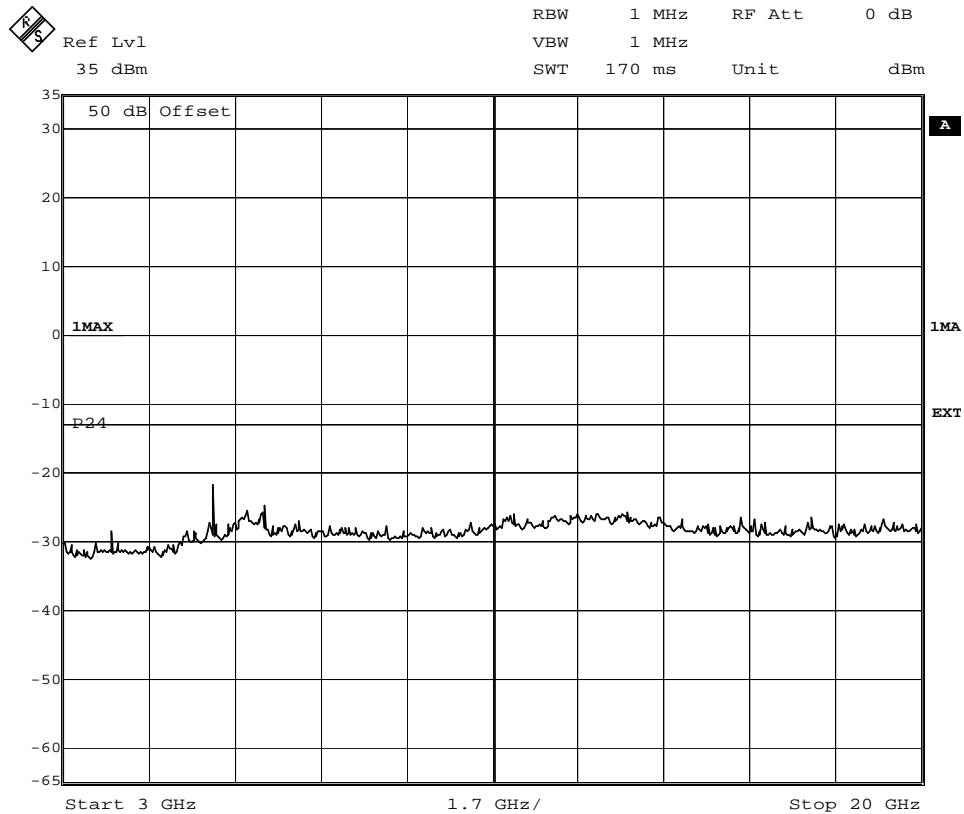
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Diagram 3



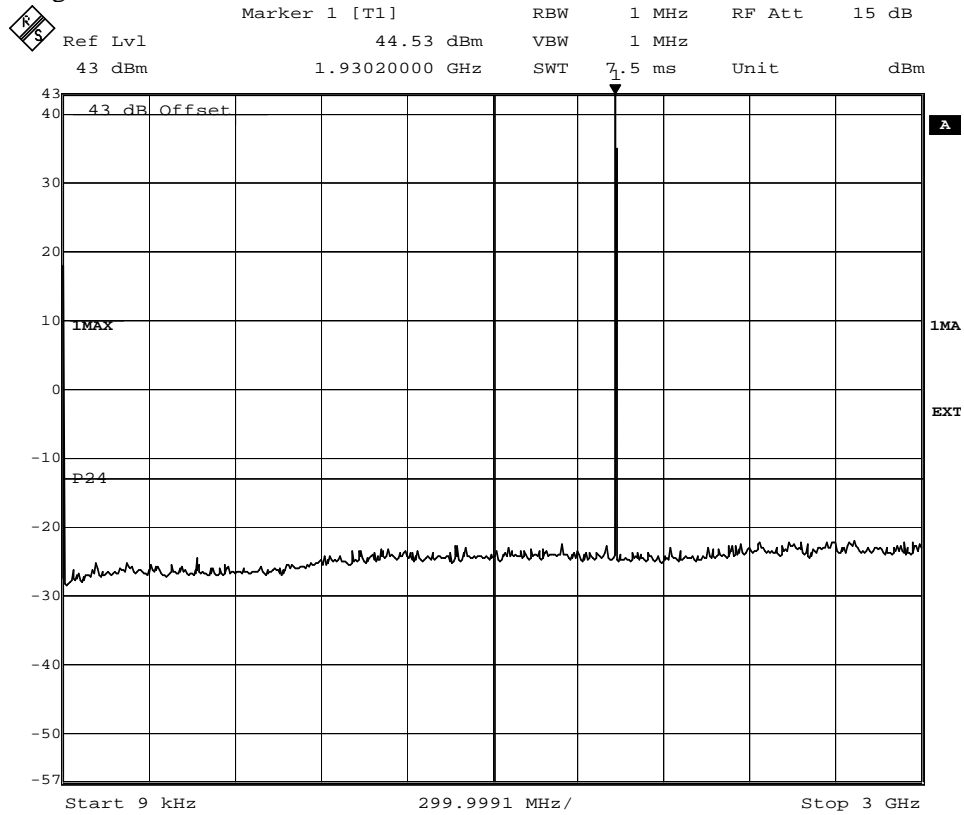
Date: 14.SEP.2007 15:41:23



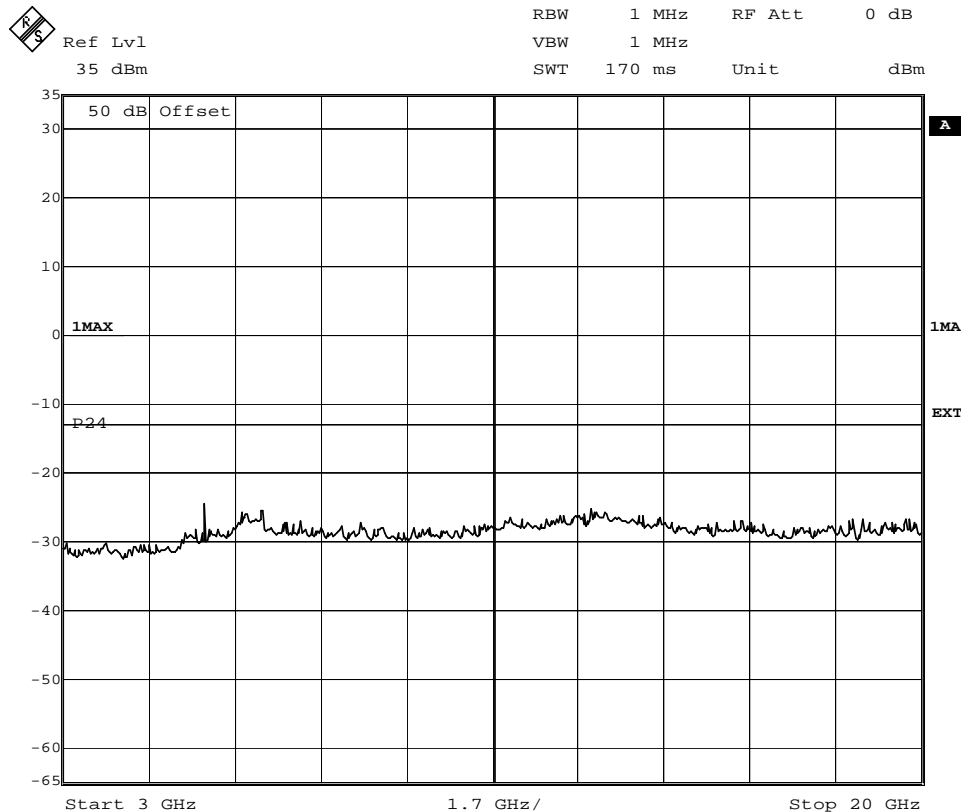
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Diagram 4



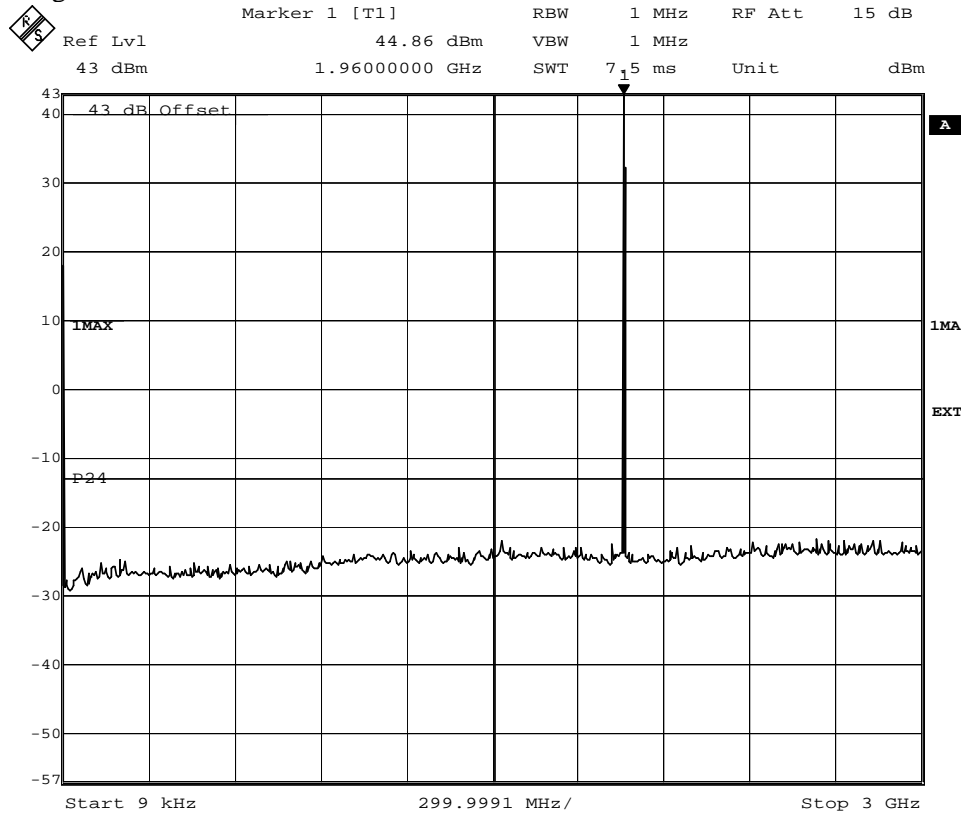
Date: 14.SEP.2007 14:02:16



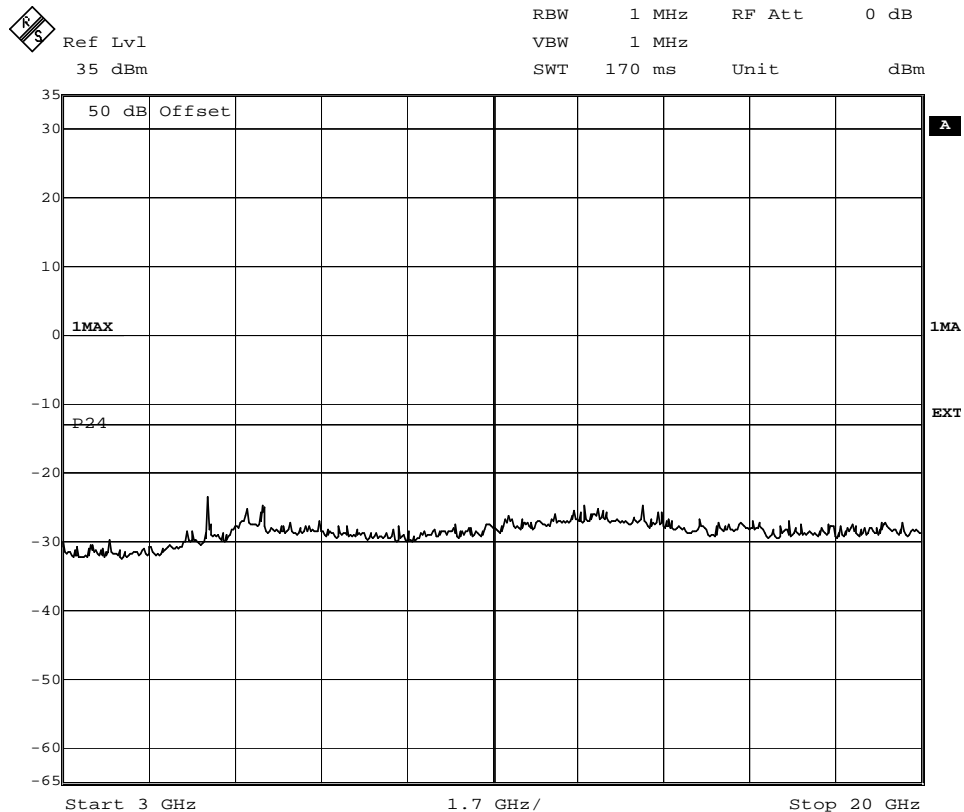
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Diagram 5



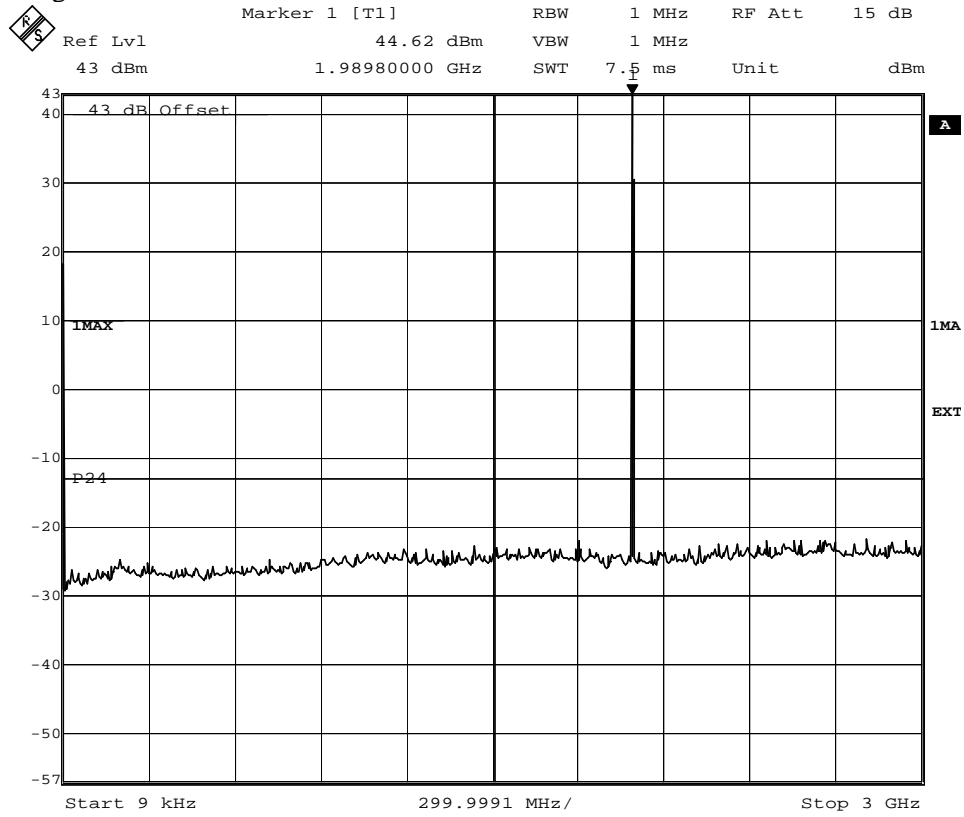
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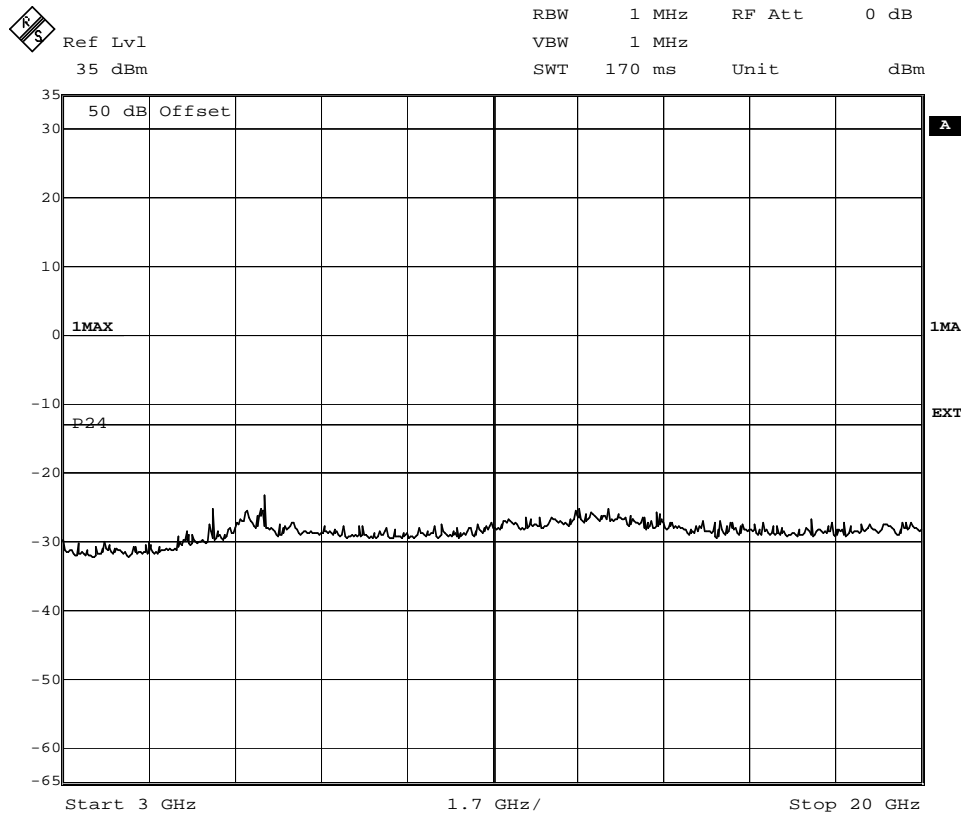
Date: 14.SEP.2007 14:06:51



Diagram 6



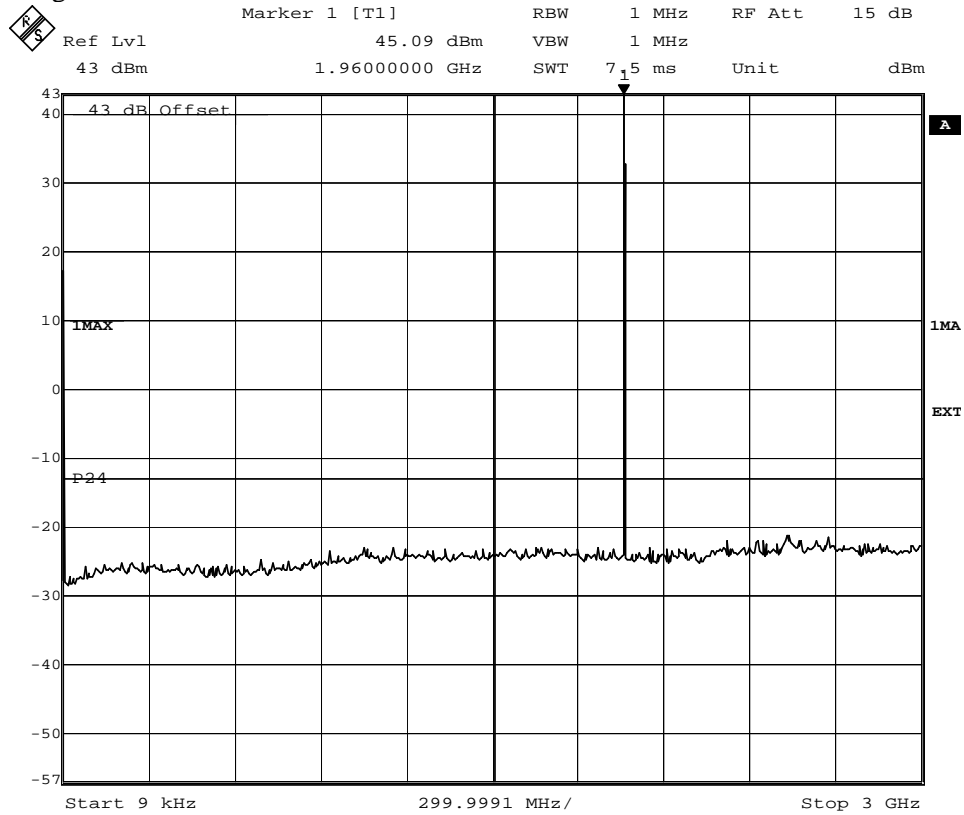
Date: 14.SEP.2007 13:57:32



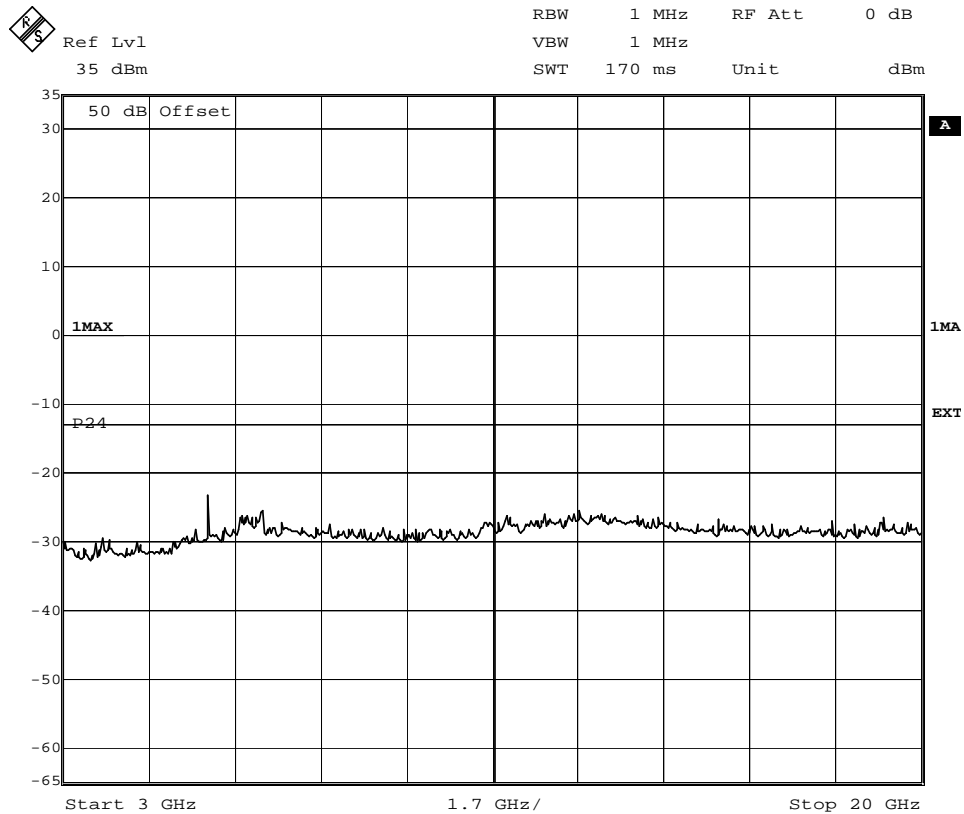
Date: 14.SEP.2007 14:08:12



Diagram 8



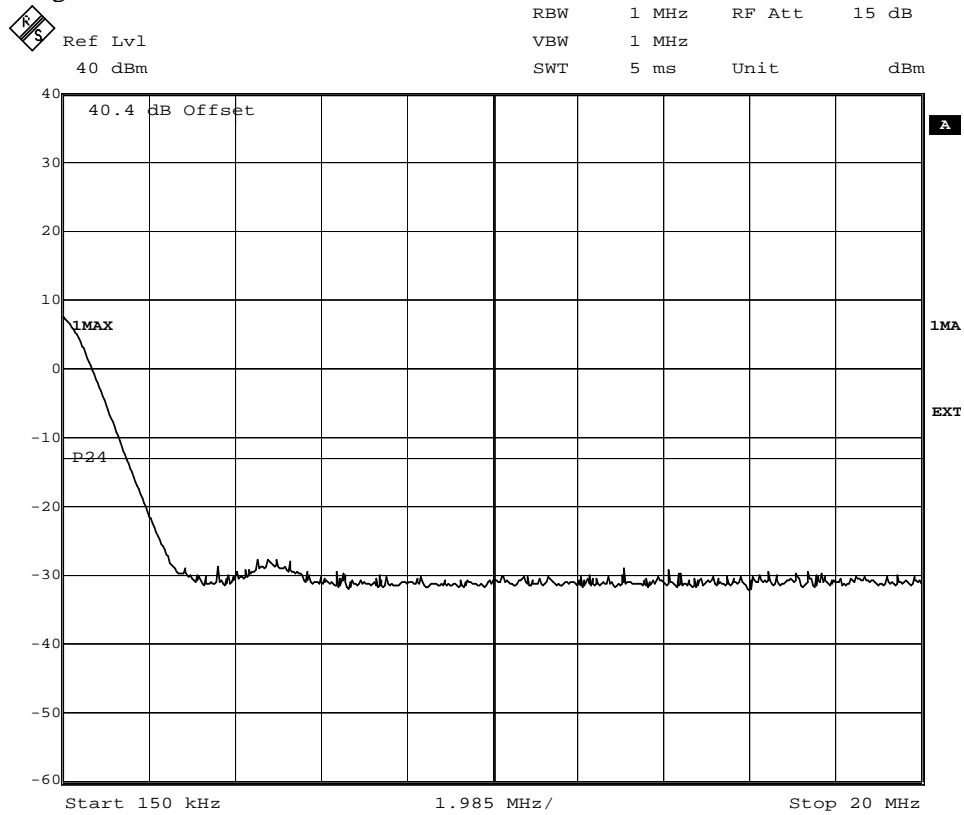
Date: 14.SEP.2007 15:13:04



Date: 14.SEP.2007 14:18:33

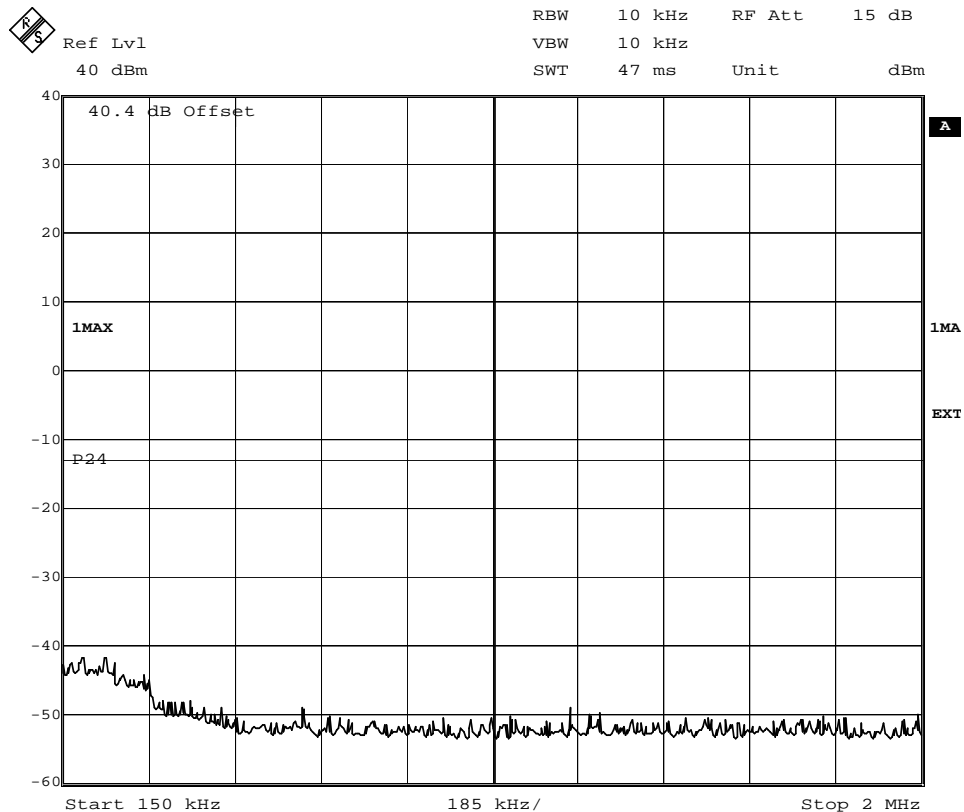


Diagram 10-2



Date: 7.SEP.2007 14:55:13

Note: The emission at 9 kHz was related to the LO feed through. A complementary measurement was performed with a smaller RBW to verify that there were no emissions in the frequency range 9k-10MHz, see plots below.



Date: 7.SEP.2007 16:13:24



Diagram 10-3

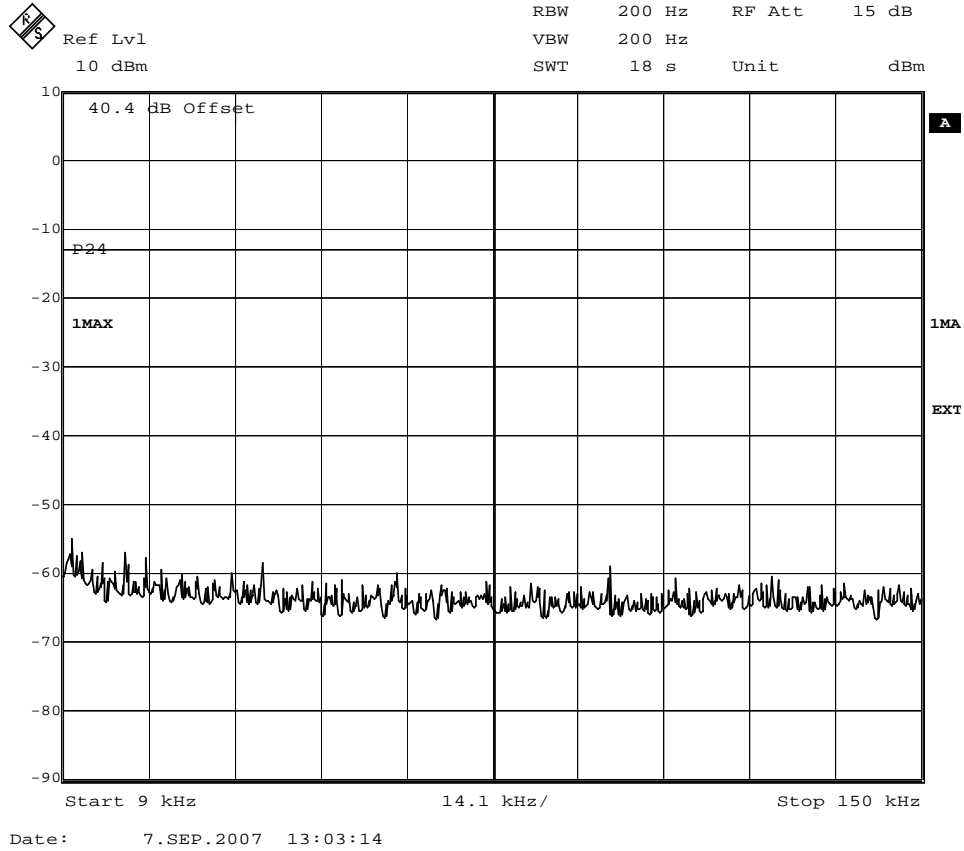
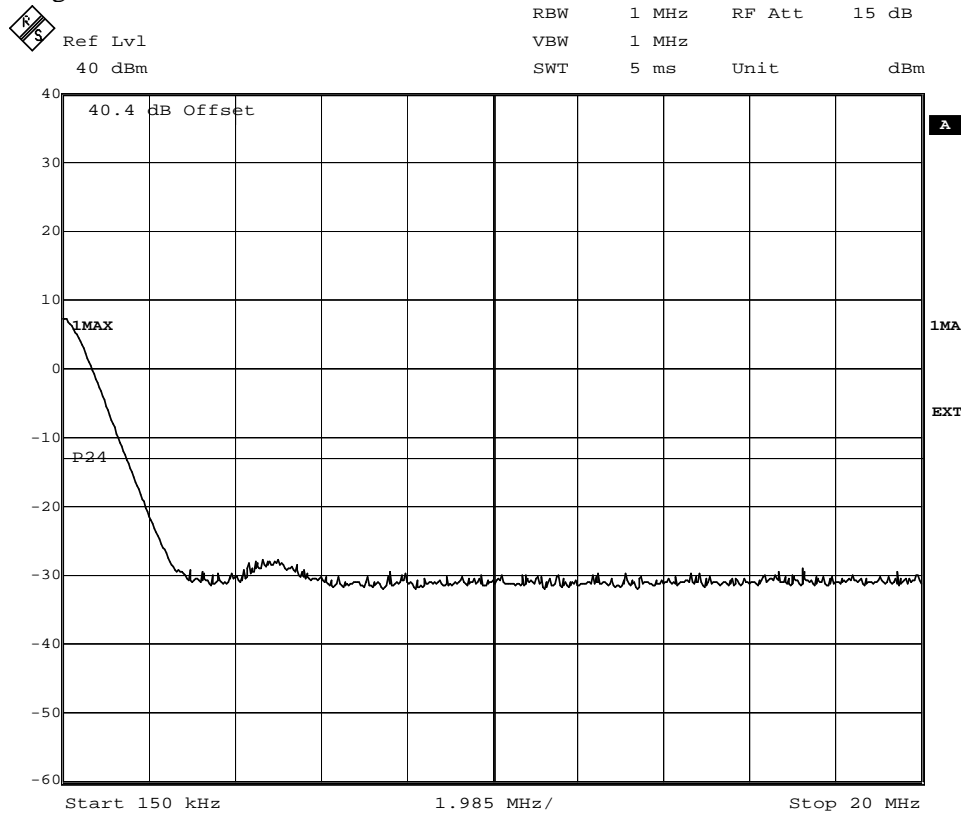


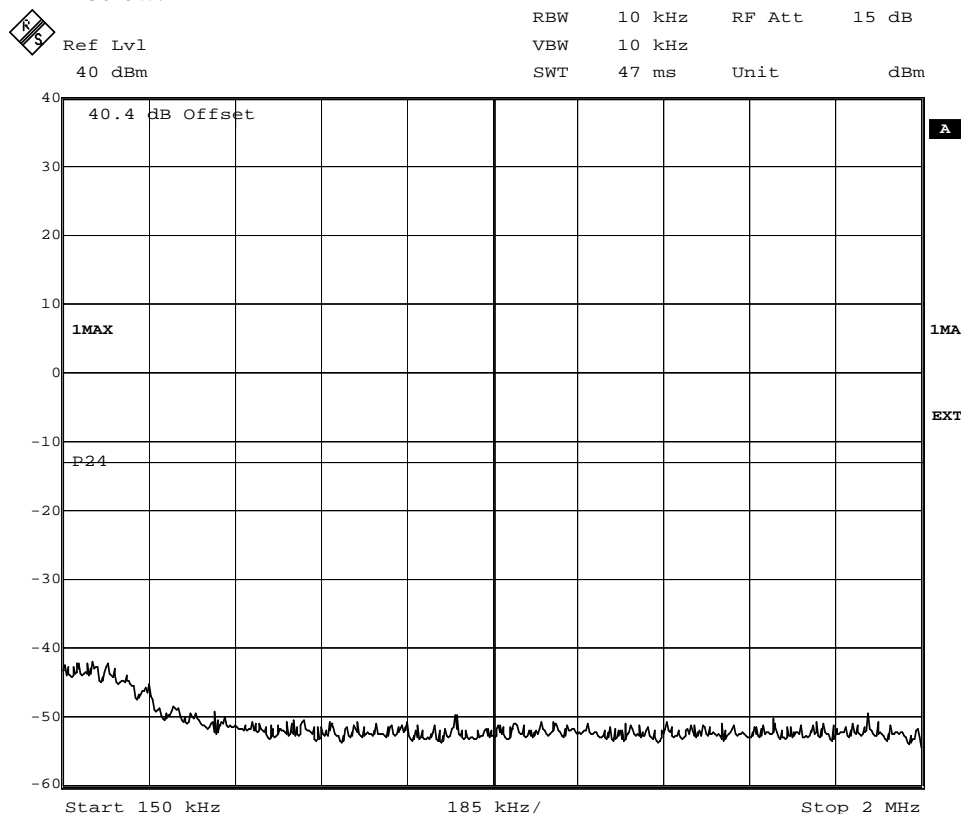


Diagram 11-2



Date: 7.SEP.2007 16:41:23

Note: The emission at 9 kHz was related to the LO feedthrough. A complementary measurement was performed with a smaller RBW to verify that there were no emission in the frequency range 9k-10MHz, see plots below.



Date: 7.SEP.2007 16:39:55



Diagram 11-3

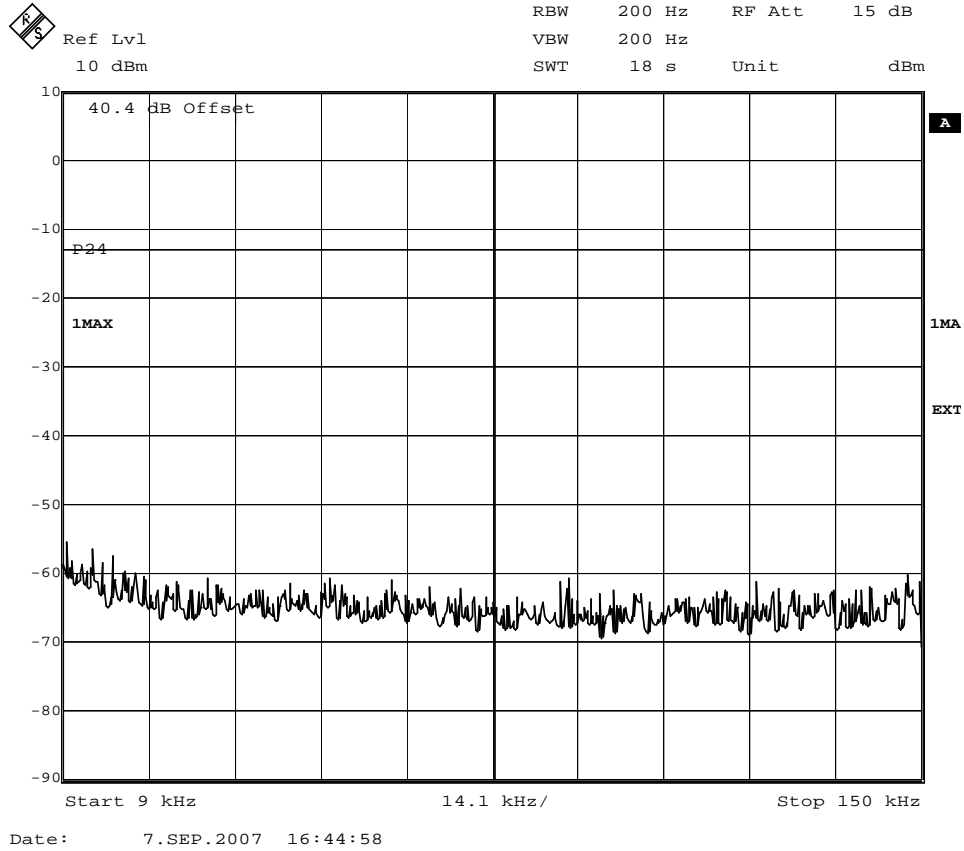
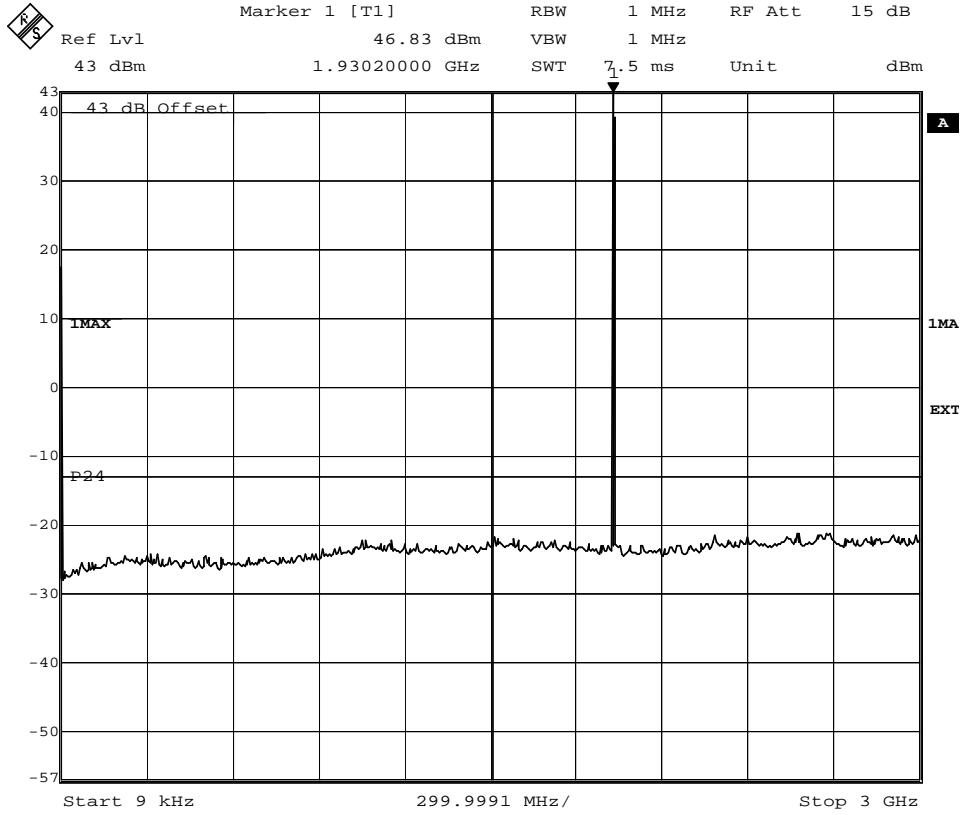
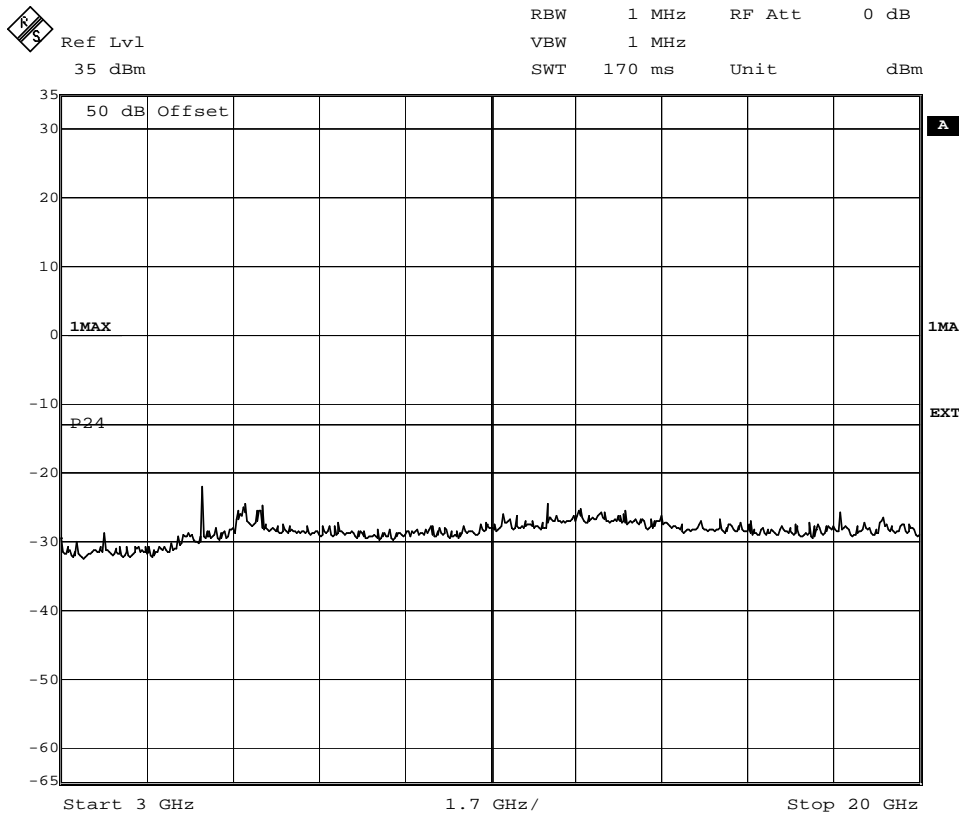




Diagram 12



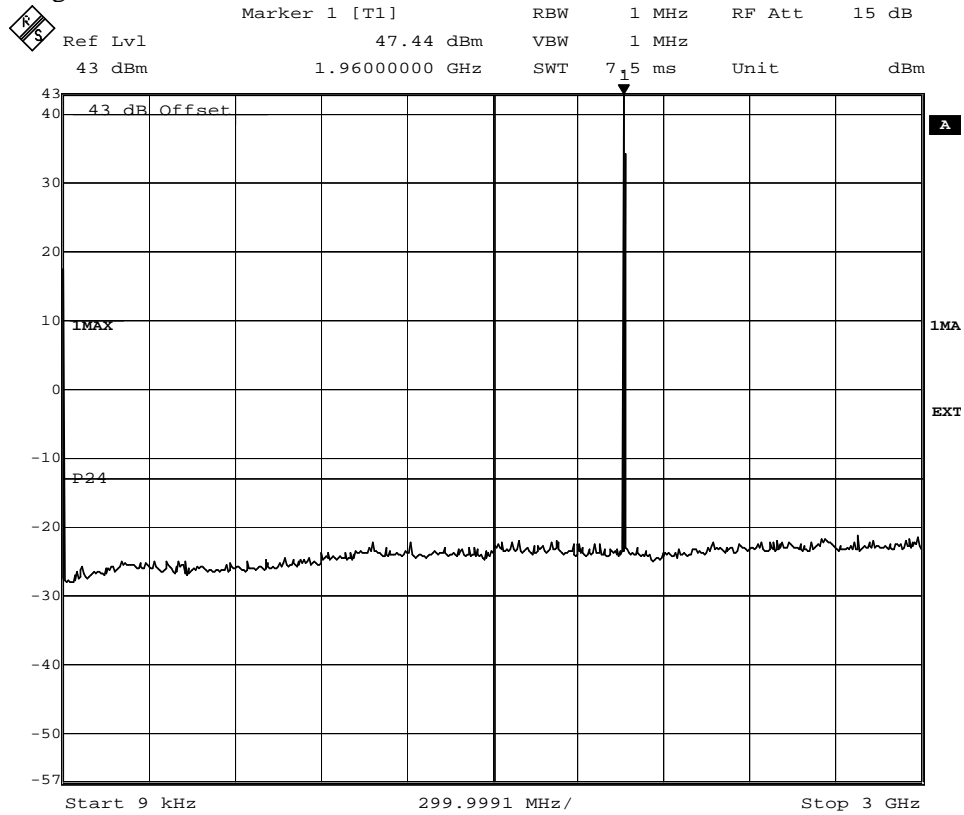
Date: 14.SEP.2007 15:28:00



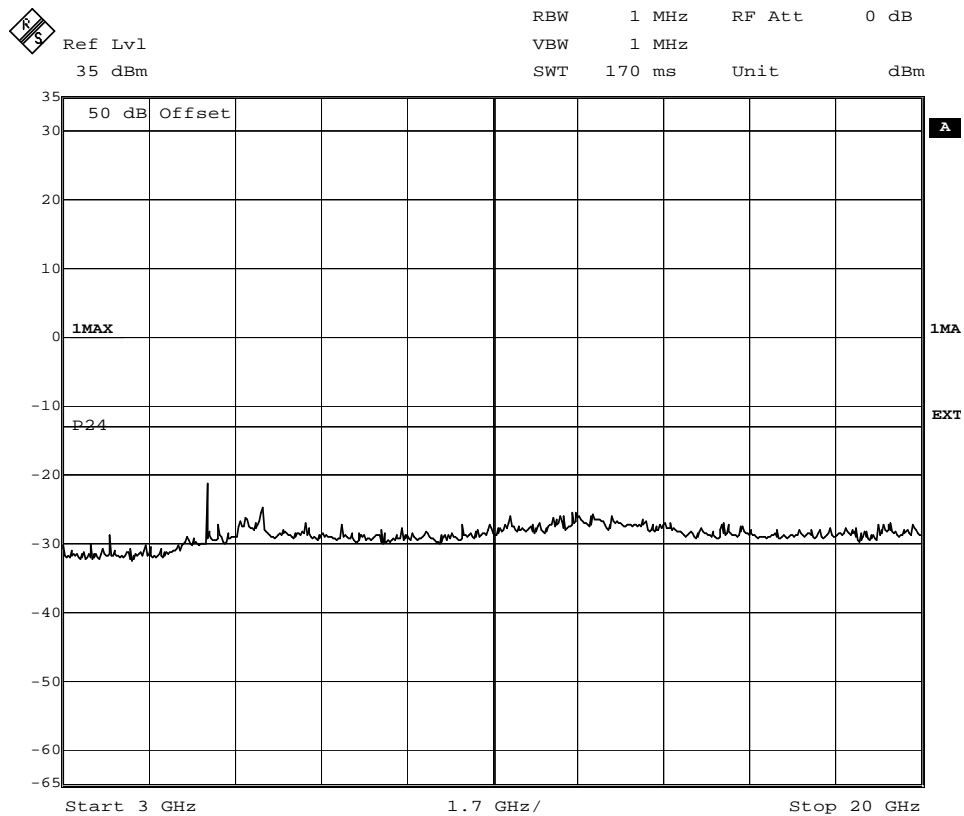
Date: 14.SEP.2007 15:36:07



Diagram 13



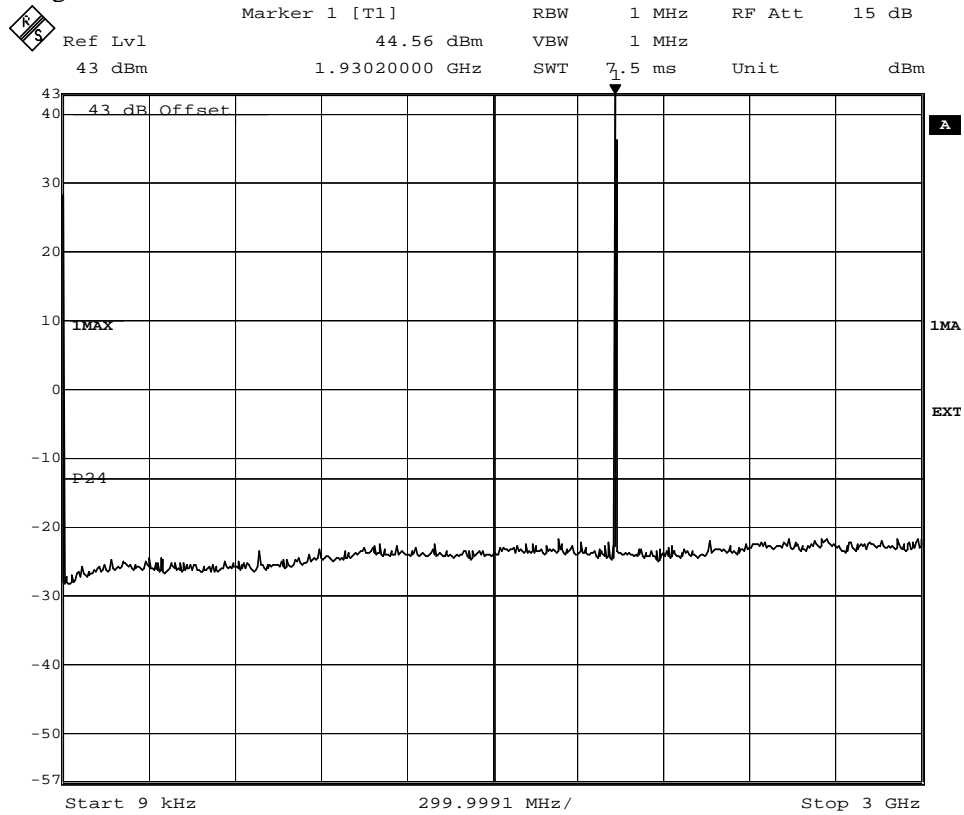
Date: 14.SEP.2007 15:30:55



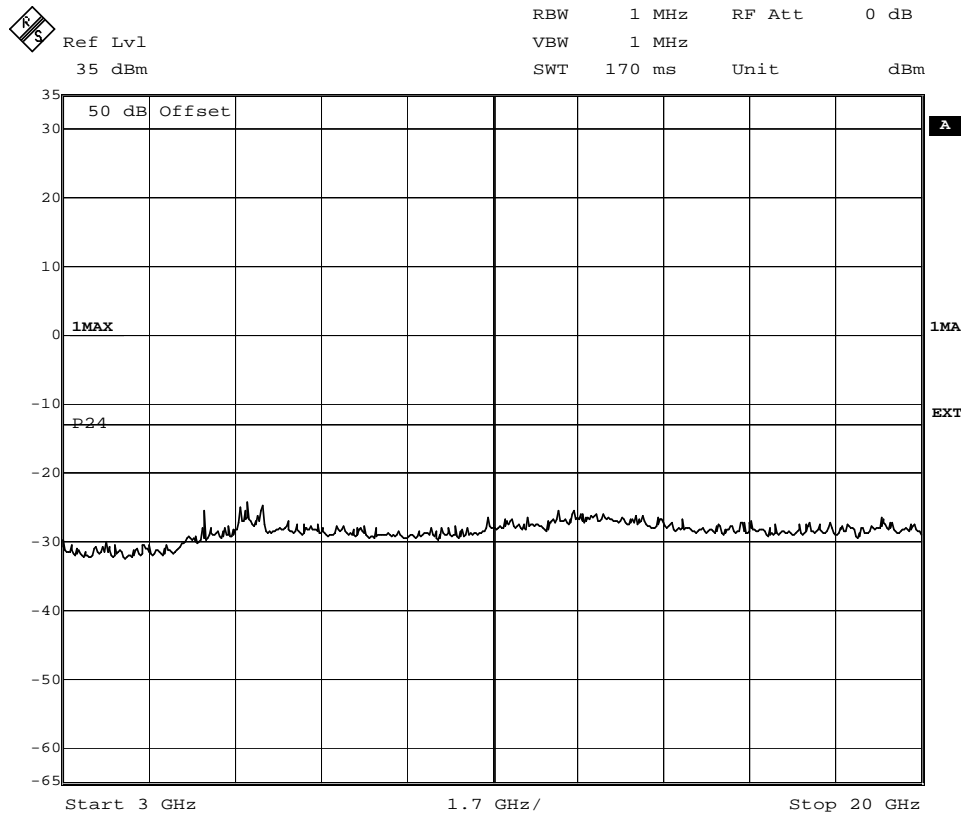
Date: 14.SEP.2007 15:34:44



Diagram 18



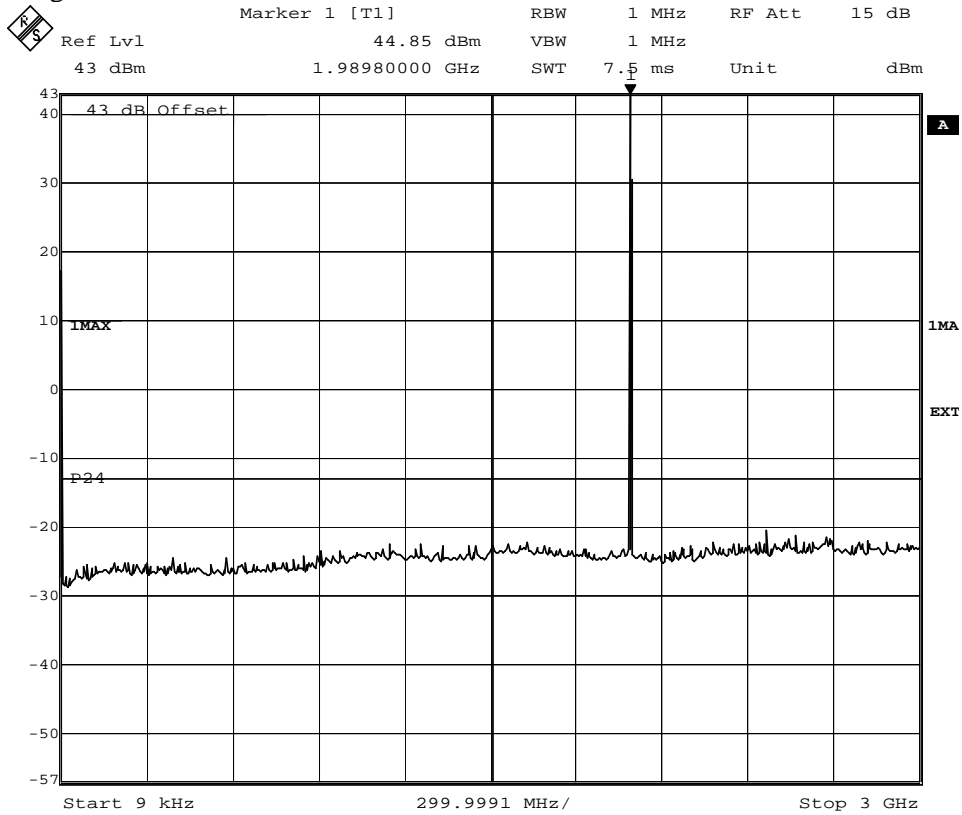
Date: 14.SEP.2007 15:06:19



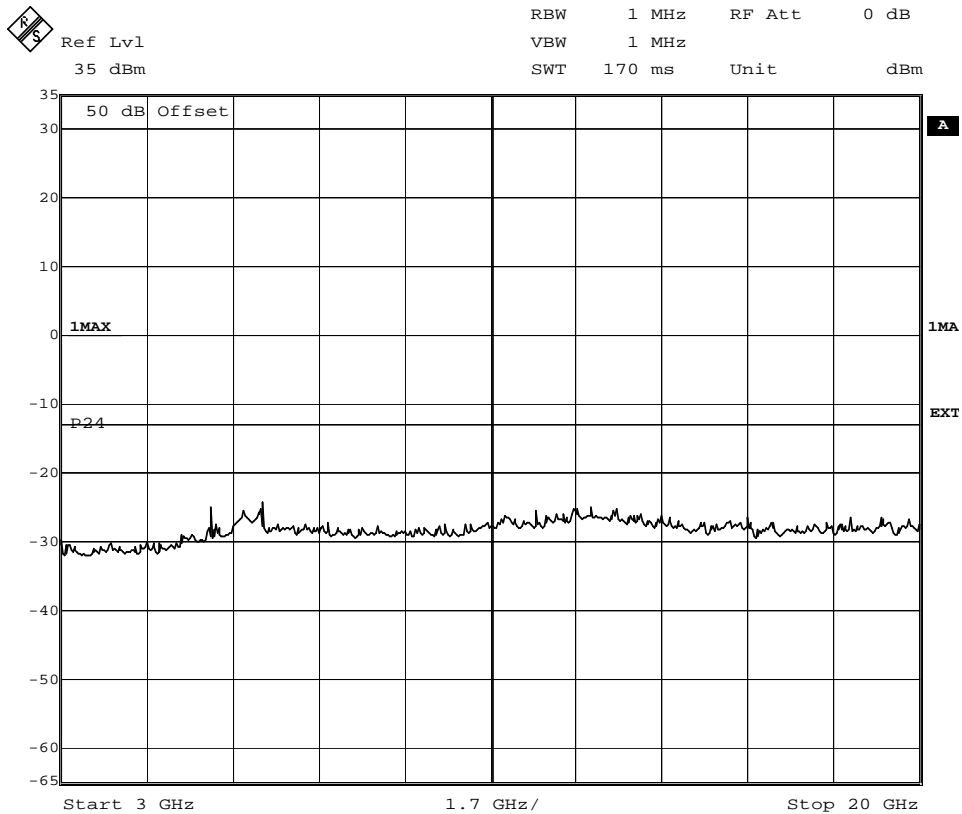
Date: 14.SEP.2007 14:34:31



Diagram 20



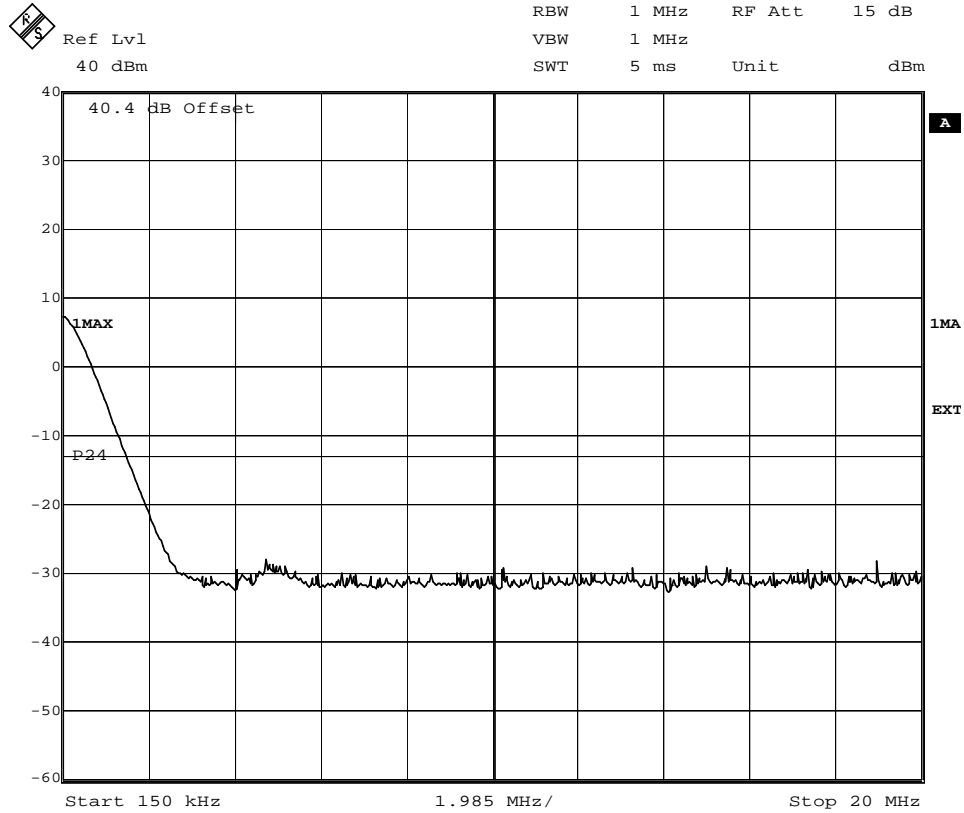
Date: 14.SEP.2007 15:09:35



Date: 14.SEP.2007 14:30:00

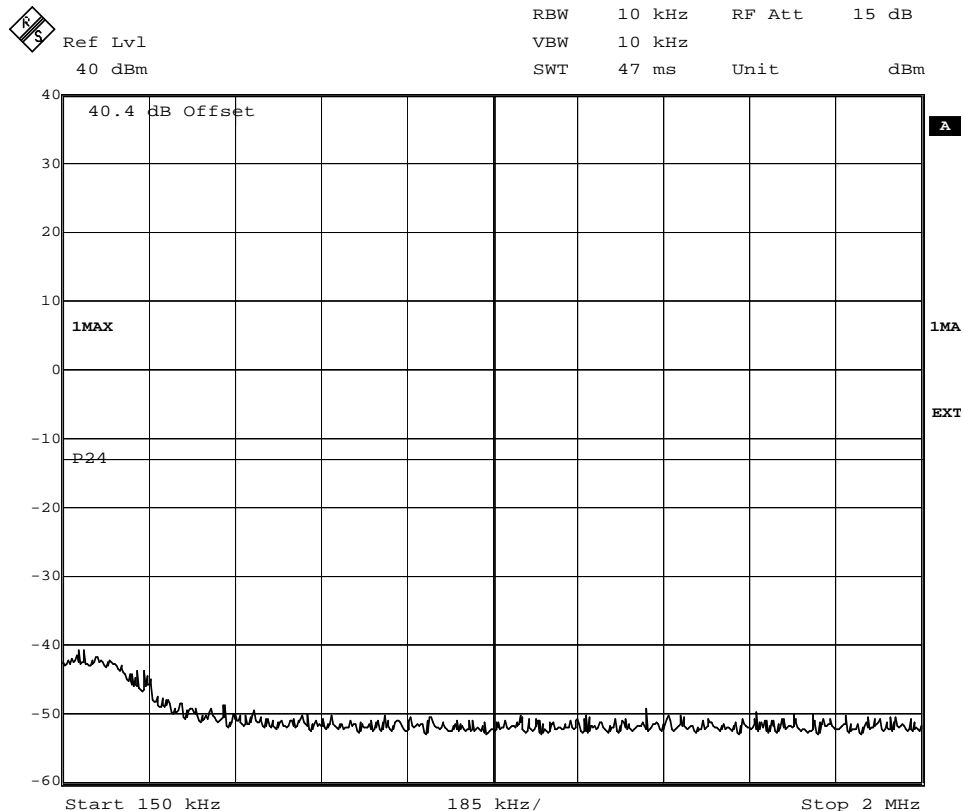


Diagram 21-2



Date: 7.SEP.2007 14:39:39

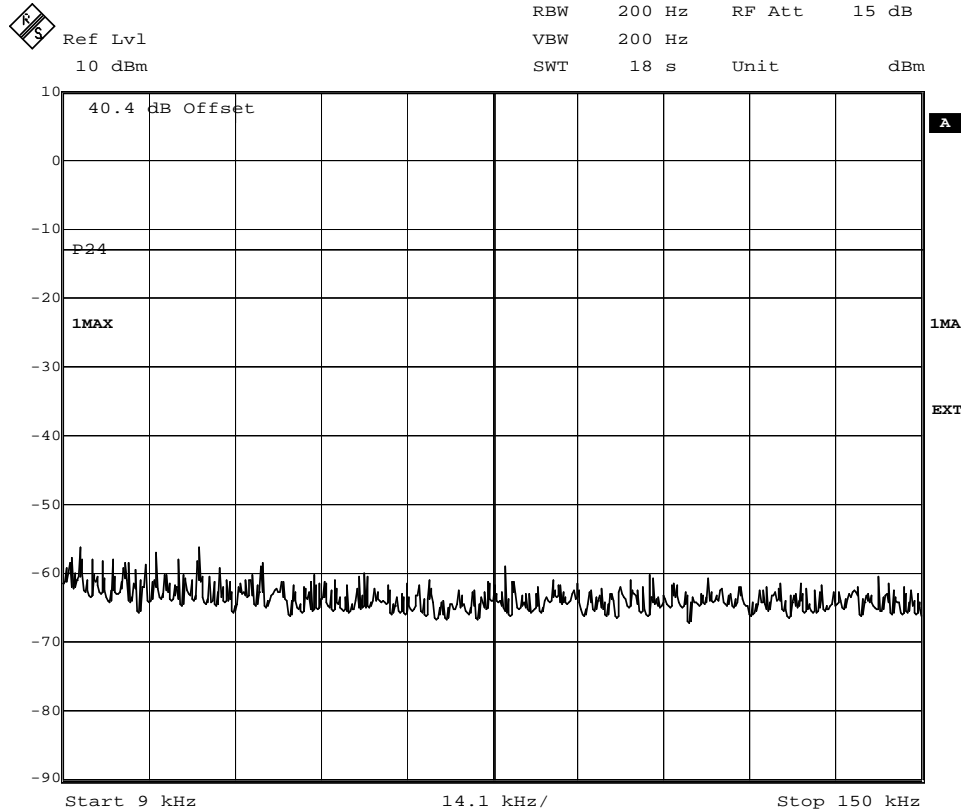
Note: The emission at 9 kHz was related to the LO feedthrough. A complementary measurement was performed with a smaller RBW to verify that there were no emission in the frequency range 9k-10MHz, see plots below.



Date: 7.SEP.2007 16:15:31



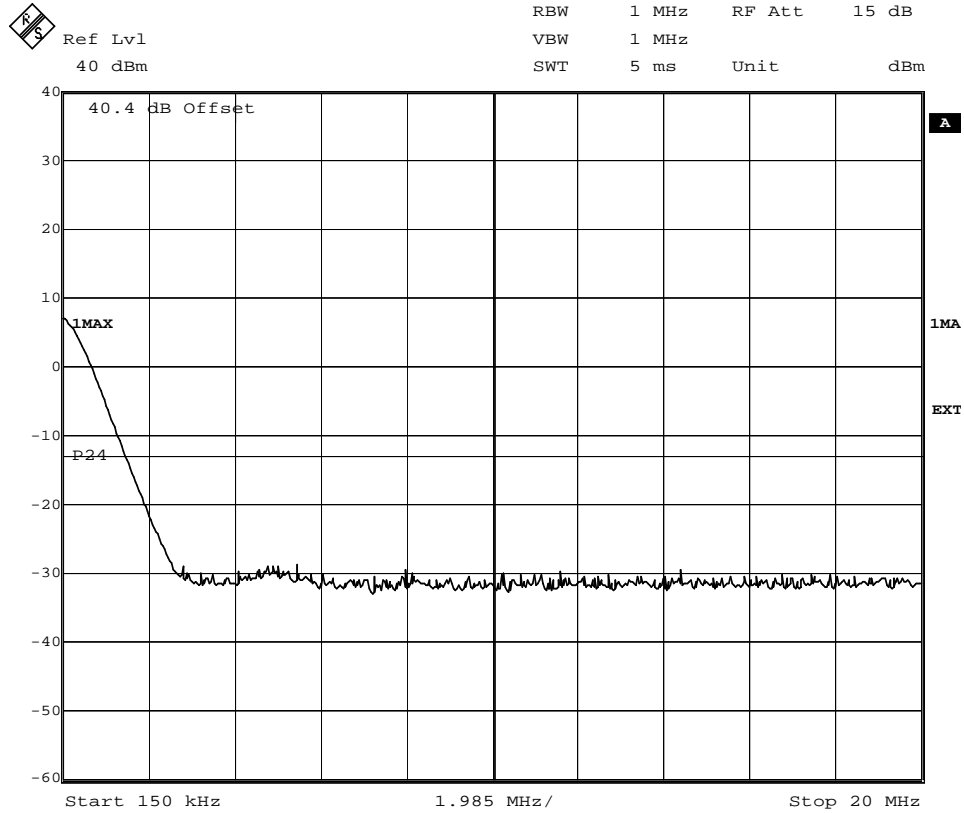
Diagram 21-3



Date: 7.SEP.2007 13:06:45

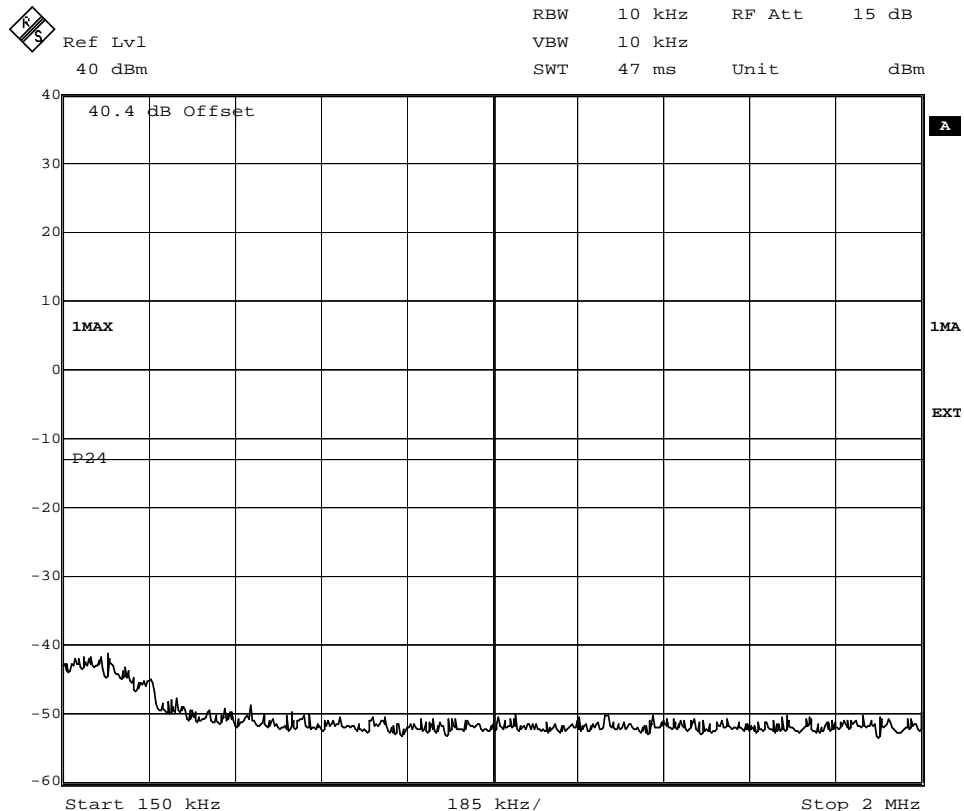


Diagram 22-2



Date: 7.SEP.2007 16:42:11

Note: The emission at 9 kHz was related to the LO feedthrough. A complementary measurement was performed with a smaller RBW to verify that there were no emission in the frequency range 9k-10MHz, see plots below.



Date: 7.SEP.2007 16:32:49



Diagram 22-3

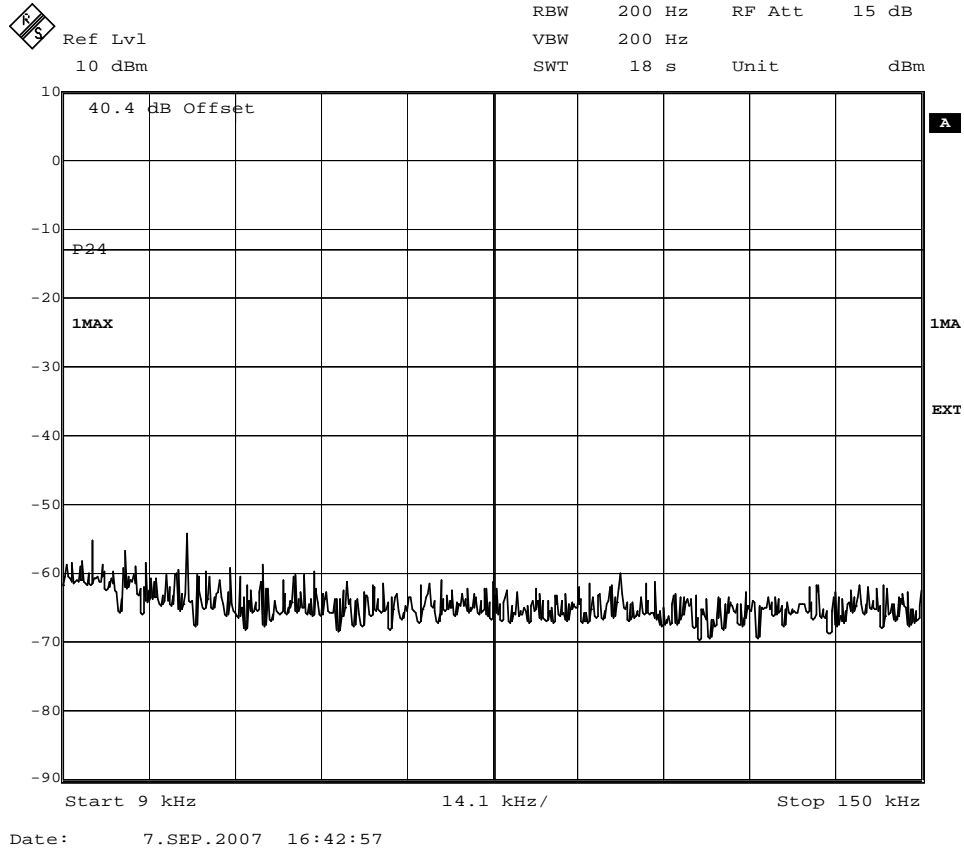
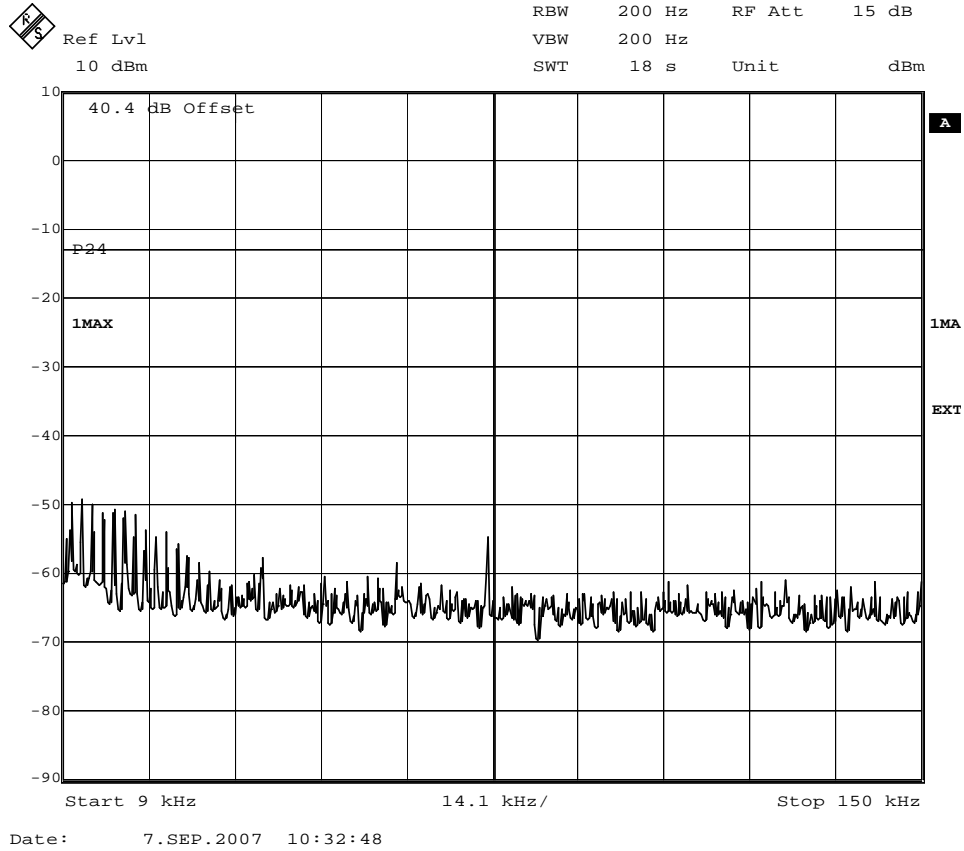




Diagram 23-3

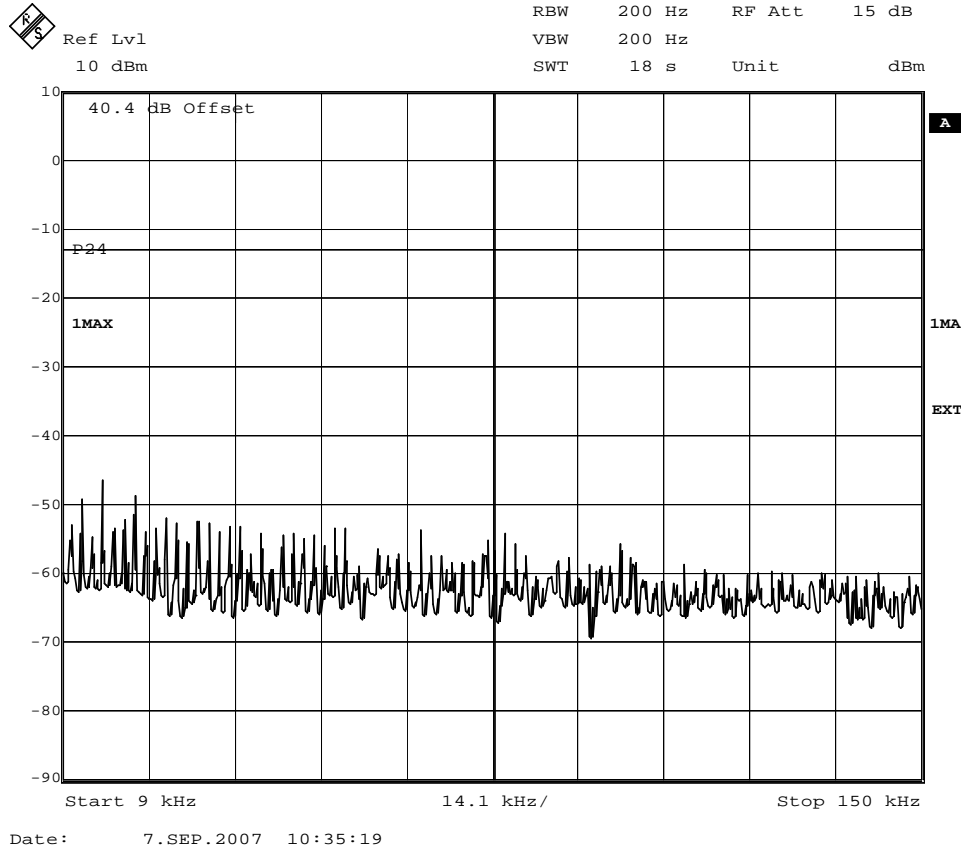




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Appendix 5.1

Diagram 24-3



Field strength of spurious radiation measurements according to 47CFR 2.1053

Date	Temperature	Humidity
2007-09-04	21 °C ± 3 °C	36 % ± 5 %
2007-09-05	22 °C ± 3 °C	33 % ± 5 %

Test set-up and procedure

The test site is listed at FCC, Columbia with registration number: 93866. The test site also complies with RSS 212, Issue 1, Industry Canada file no.:IC 3482.

The transmitter was modulated with pseudorandom data during the measurements. The antenna ports were terminated with 50 ohm loads.

The measurements were performed with both horizontal and vertical polarisation of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18-20 GHz.

A pre-measurement was first performed:

In the frequency range 30 MHz-20 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was,

$$\gamma = 20 \log \left(\frac{4\pi D}{\lambda} \right), \gamma \text{ is the propagation loss and } D \text{ is the antenna distance.}$$

The measurement procedure was as the following:

1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit is scanned 0-360 degrees and the antenna is scanned 1-4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported, frequencies closer than 10 dB to the limit measured with the RMS detector was measured with the substitution method according to the standard.

Measurement equipment	Calibration Due	SP number
Test site, Tesla	2008-11	503 881
R&S ESI 26	2008-07	503 292
Control computer	-	503 479
Software: R&S ES-K1, ver. 1.60	-	-
Chase Bilog antenna CBL 6111A	2008-11	503 182
EMCO Horn Antenna 3115	2007-11	502 548
Std. gain: 16240-25	-	503 939
Std. gain: 18240-25	-	503 900
Std. gain: 20240	-	-
MITEQ Low Noise Amplifier	2008-08	503 285
Testo 615, Temperature and humidity meter	2007-09	503 505

Results

CDU-K

The test set-up during the spurious radiation measurements can be seen in the picture below



GMSK and 8-PSK

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-20 000	All emission > 20 dB below limit	All emission > 20 dB below limit
Measurement uncertainty 4.7 dB		

CDU-F

Configuration 2x6, RBS powered by 120 VAC

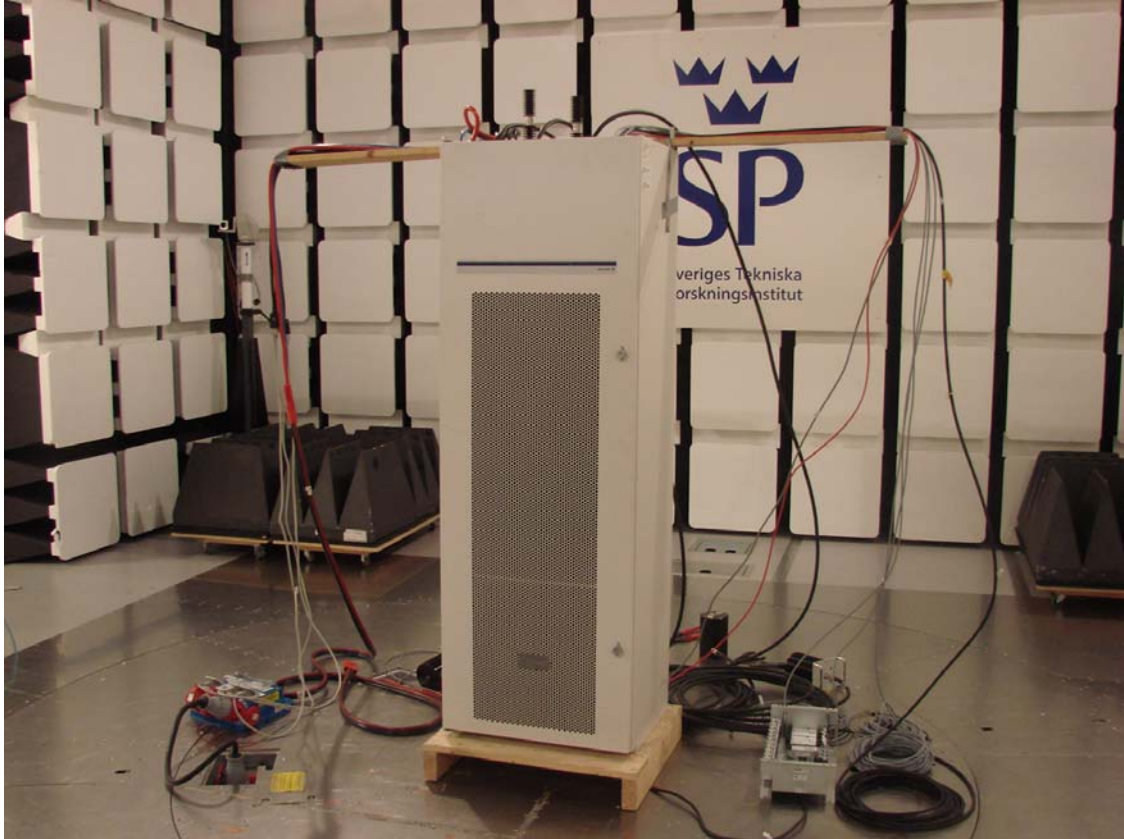


GMSK and 8-PSK

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-20 000	All emission > 20 dB below limit	All emission > 20 dB below limit
Measurement uncertainty 4.7 dB		

CDU-F

Configuration 3x4, RBS powered by 120 VAC/ 60 Hz



GMSK and 8-PSK

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-20 000	All emission > 20 dB below limit	All emission > 20 dB below limit
Measurement uncertainty 4.7 dB		

Limits

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

Complies?	Yes
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Frequency stability measurements according to 47CFR 2.1055

Date 2007-09-11 to 2007-09-14	Temperature 22-23 °C ± 3 °C	Humidity 39-50 % ± 5 %
----------------------------------	--------------------------------	---------------------------

Test set-up and procedure

The measurements were made per J-STD-007A (GMSK) and TIA/EIA-136-280 (8-PSK).

The test was made with the dTRU mounted in the RBS 2206V2 cabinet.

Measurements were made at CDU-K output connector. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during measurement.

The transmitter was activated at maximum output power and modulated with pseudorandom data during the measurements.

Measurement equipment	Calibration Due	SP number
Climate chamber	2009-05	503 546
R&S FSIQ	2008-10	503 738
Multimeter Fluke 87	2007-12	502 190
Testo 610, Temperature and humidity meter	2009-04	502 658

Results

Nominal Voltage 24 V DC
Channel 661 (1960.0 MHz)

Test conditions		Frequency error (Hz)			
Supply voltage DC (V)	Temperature (°C)	GMSK		8-PSK	
		TRX 1	TRX 2	TRX 1	TRX 2
24.0	+20	-8	-10	-8	-11
27.6	+20	-7	-8	-8	-8
20.4	+20	-7	-8	-6	-10
24.0	+30	-8	-11	-6	-11
24.0	+40	-10	-11	+8	-9
24.0	+50	-7	-9	-10	-10
24.0	+10	-6	-9	-8	-11
24.0	0	+9	+5	+8	-6
24.0	-10	-9	-11	-8	-14
24.0	-20	-4	-8	-7	-11
24.0	-30	-6	-10	-10	-13
Maximum freq. error (Hz)		11		14	
Measurement uncertainty		$< \pm 1 \times 10^{-7}$			



REPORT

Date
2007-09-24

Reference
F713506-F24

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2 (2)

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Appendix 7

Note1: At -10 °C the following was reported in the RBS Fault log:
“CF Fault 2A No. 16: Indoor Temp Out Of Normal Conditional Range“.

Note2: At -20 and -30 °C the following was reported in the RBS Fault log:
“CF Fault 1A No. 10: Indoor Temp Out of Safe Range“.

Limits

The maximum frequency error shall not be greater than 0.05 ppm (98 Hz).

Complies?	Yes
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Industry Canada RSS-133 section 6.7, Receiver spurious emissions

Date 2007-09-17	Temperature 22 °C ± 3 °C	Humidity 47 % ± 5 %
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Test set-up and procedure

The measurements were performed according to ANSI C63.4.

The EUT was powered with 24 VDC.

The measurements were performed on the CDU-K antenna ports. The measurement is first performed with peak detector. Emission on frequencies close to or above the limit is re-measured with quasi-peak detector (average detector above 1000 MHz).

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
Testo 610, Temperature and humidity meter	2009-04	502 658

Result

The emission spectra are shown in appendix 8.1:

- Diagram 1: 9 kHz-20 GHz, Rx-mode RX 1 Ch. 512
- Diagram 2: 9 kHz-20 GHz, Rx-mode RX 1 Ch. 810
- Diagram 3: 9 kHz-20 GHz, Rx-mode RX 2 Ch. 512
- Diagram 4: 9 kHz-20 GHz, Rx-mode RX 2 Ch. 810

Limit

The power at the antenna terminal shall not exceed 2.0 nanowatts (-57 dBm) in the frequency range 30-1000 MHz and shall not exceed 5.0 nanowatts (-53 dBm) above 1 GHz.

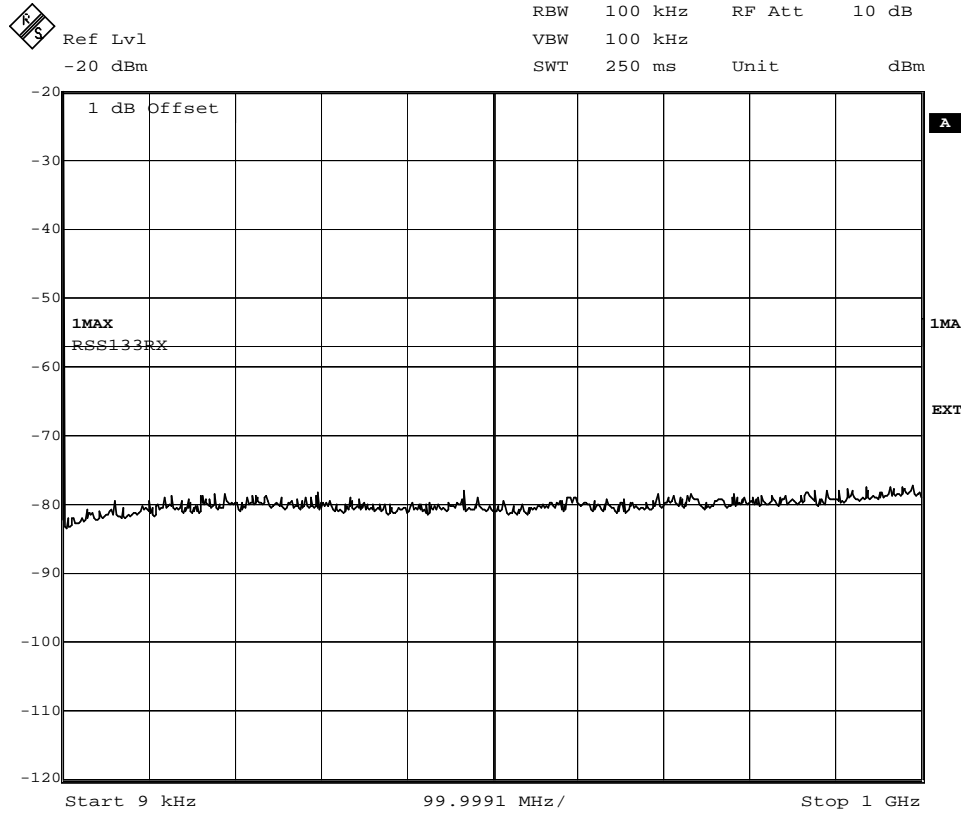
Compliant ?	Yes
-------------	-----



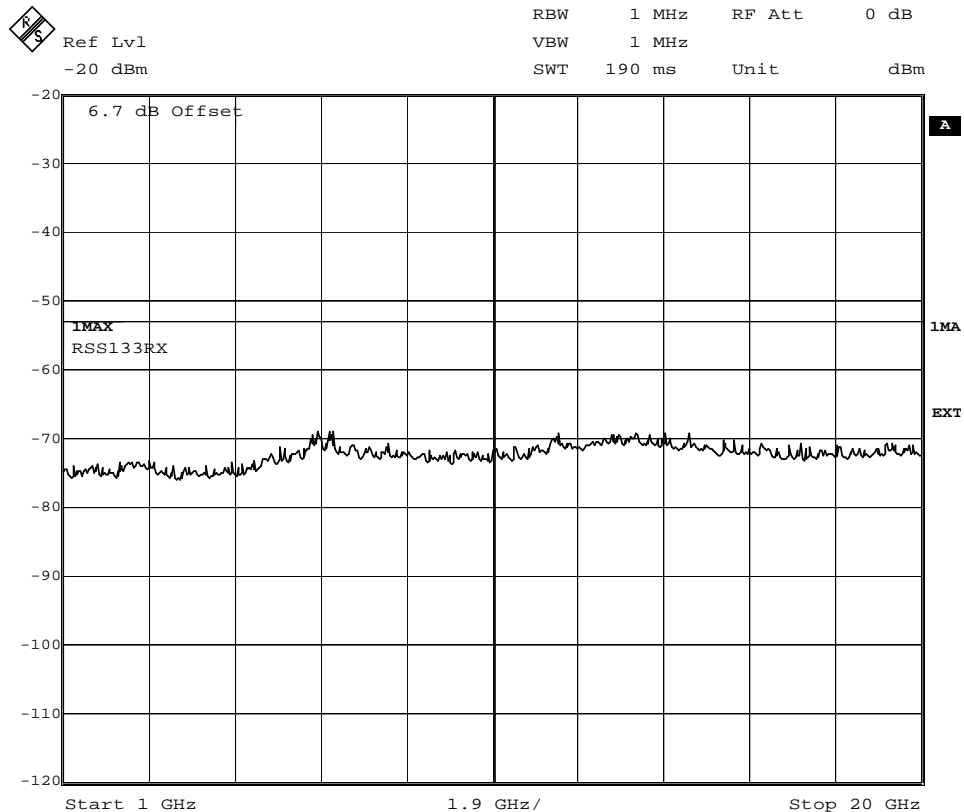
FCC ID: B5KFKRC1311004-2

Appendix 8.1

Diagram 1



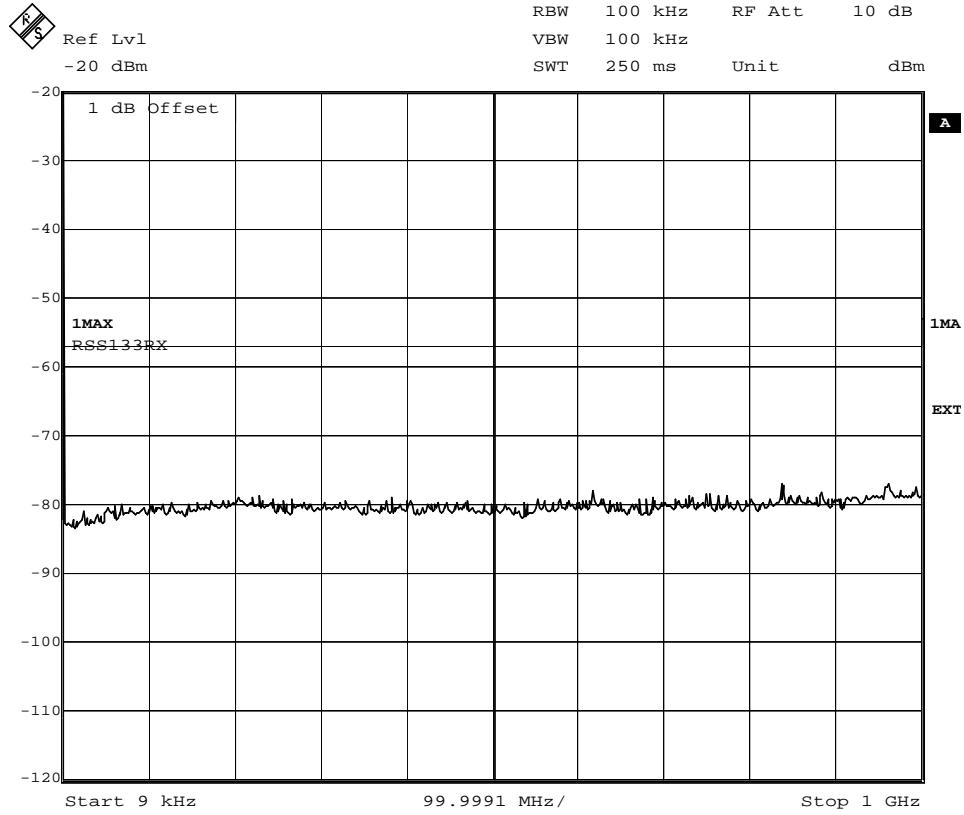
Date: 17.SEP.2007 09:27:19



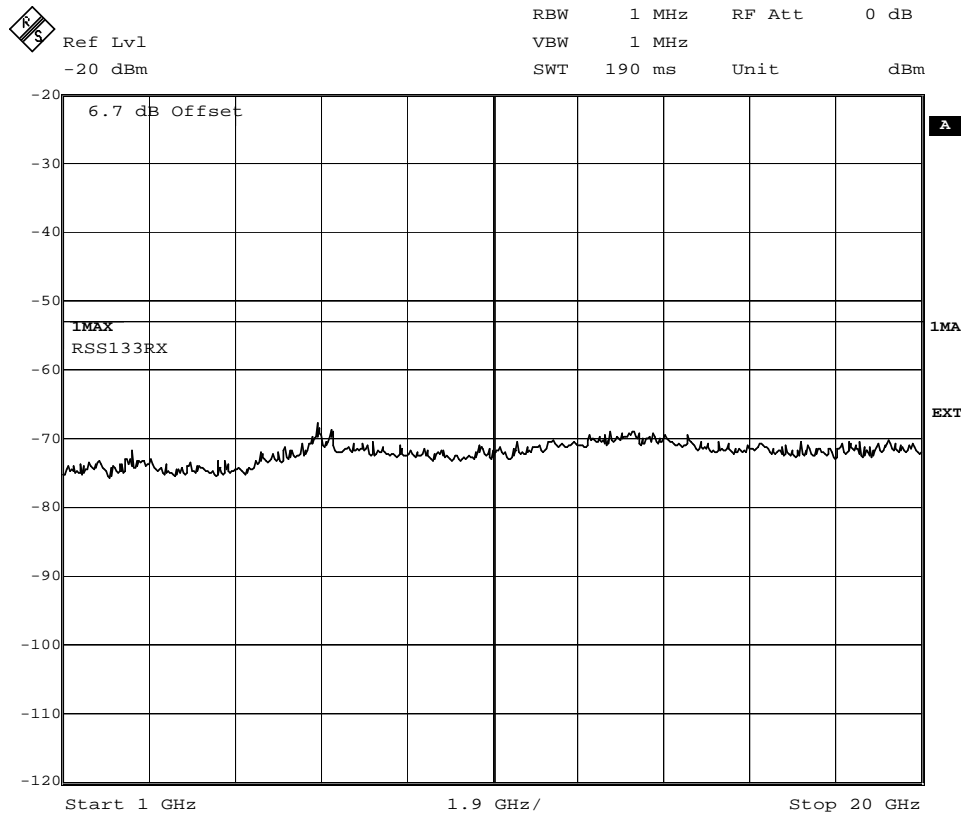
Date: 17.SEP.2007 09:30:32



Diagram 2



Date: 17.SEP.2007 09:26:31



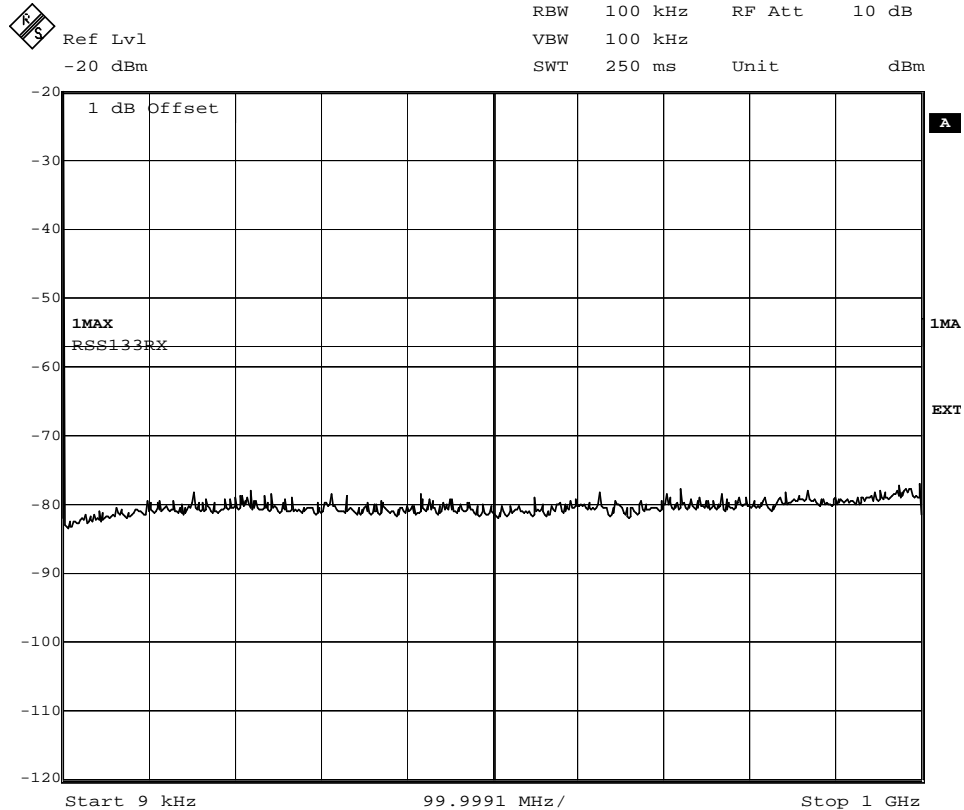
Date: 17.SEP.2007 09:32:12



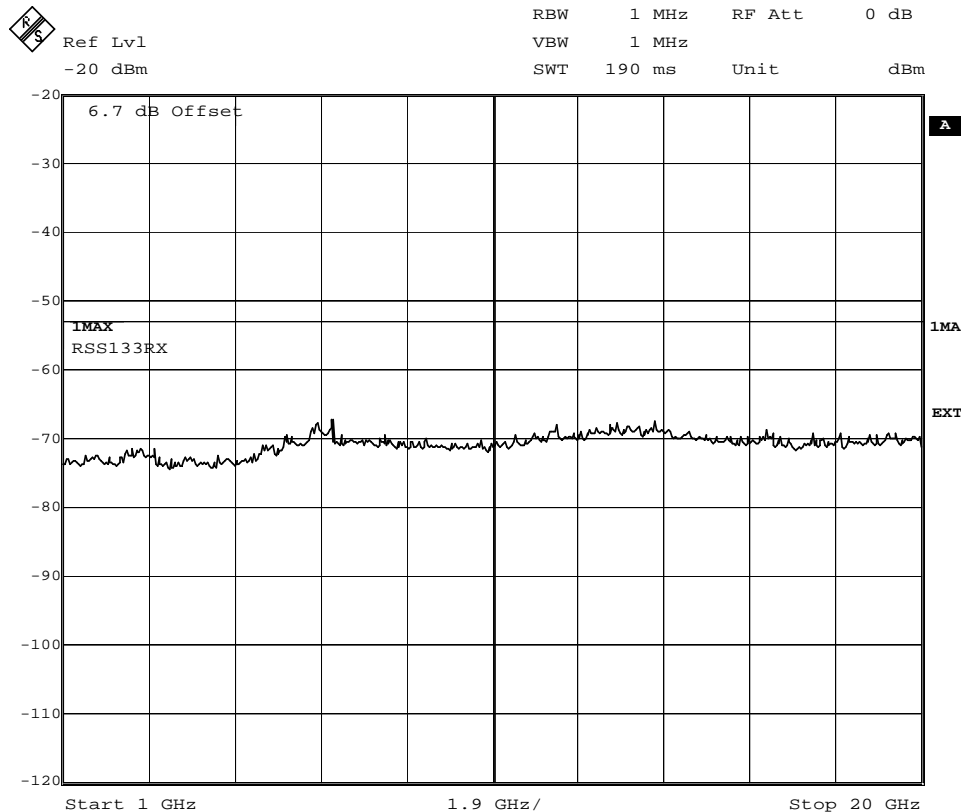
FCC ID: B5KFKRC1311004-2

Appendix 8.1

Diagram 4



Date: 17.SEP.2007 09:41:44



Date: 17.SEP.2007 09:40:53



FCC ID: B5KFKRC1311004-2

Appendix 9

Hardware list RBS 2206V2 with CDU-K

Unit	Product Number	Revision	Serial Number
Cabinet	SEB 112 1154/1	R3A	AB20131925
Door	SXK 109 7157/1	R1A	-
DCCU-13	BMG 980 07/11	R1D	(s)BH41069665
ACCU-11	BMG 980 07/9	R1C	(s)BH41057582
Subrack	BFL 119 424/1	R2C	-
CDU-K19-01	BFL 119 447/1	R1A	TR44918246
CDU-K19-01	BFL 119 447/1	R1A	TR45718211
CDU-K19-01	BFL 119 447/1	R1A	TR44918247
CDU-K19-01	BFL 119 447/1	R1A	TR45478207
CDU-K19-01	BFL 119 447/1	R1A	TR44918245
CDU-K19-01	BFL 119 447/1	R1A	TR45736911
Dummy	SXK 107 5031/2	R1B	-
CXU-10	KRY 101 1856/1	R3D	TR44542641
CXU-10	KRY 101 1856/1	R3D	TR44612389
TRU shelf	BFL 119 425/1	R1C	-
Backplane	BFX 101 107/3	R1B	-
dTRU-19	KRC 131 1004/2	R4E	AE55454279
dTRU-19	KRC 131 1004/2	R4E	AE55454278
dTRU-19	KRC 131 1004/2	R4E	AE55454280
dTRU-19	KRC 131 1004/2	R4E	AE55454284
dTRU-19	KRC 131 1004/2	R4E	AE55454285
dTRU-19	KRC 131 1004/2	R4E	AE55454277
IDM-11	BMG 980 327/2	R1C	X181204835
PSU-shelf	BFL 119 424/1	R1A/A	-
PSU-AC-32	BML 353 206/2	R1E	BR80555486
PSU-AC-32	BML 353 206/2	R1E	BR80555492
PSU-AC-32	BML 353 206/2	R1E	BR80555485
Dummy	SXK 107 9314/1	R1D	-
Dummy	-	-	-
TMA-CM-02	SDK 107 881/1	R4A	(s)BG8026UJH5
TMA-CM-02	SDK 107 881/1	R4A	(s)BR60000VY2
DXU-23	BOE 602 21/1	R1C	AE53414481

Software	Revision
R07A	R14H



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Appendix 9

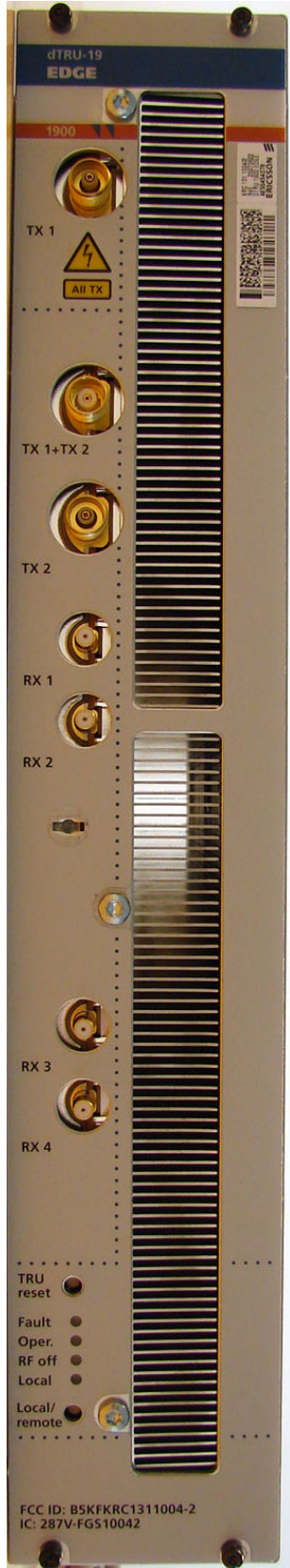
Hardware list RBS 2206V2 with CDU-F

Unit	Product Number	Revision	Serial Number
Cabinet	SEB 112 1154/1	R3A	AB20131929
Door	SXK 109 7157/1	R1A	-
DCCU-13	BMG 980 07/11	R1A	BH41049197
ACCU-11	BMG 980 07/9	R1C	BH41057584
Subrack	BFL 119 424/1	R2C	-
CDU-F19	BFL 119 156/1	R2B	TB36375046
CDU-F19	BFL 119 156/1	R2B	TB36375040
CDU-F19	BFL 119 156/1	R2B	TB36375045
Dummy	SXK 107 5031/2	R1B	-
CXU-10	KRY 101 1856/1	R3A	A40003DCGF
Dummy	SXK 107 5031/1	R1B	-
TRU shelf	BFL 119 425/1	R1C	-
Backplane	BFX 101 107/3	R1B	-
dTRU-19	KRC 131 1004/2	R4E	AE55467540
dTRU-19	KRC 131 1004/2	R4E	AE55454281
dTRU-19	KRC 131 1004/2	R4E	AE55454277
dTRU-19	KRC 131 1004/2	R4E	AE55454285
dTRU-19	KRC 131 1004/2	R4E	AE55454280
dTRU-19	KRC 131 1004/2	R4E	AE55454284
IDM-11	BMG 980 327/2	R1C	X181204836
PSU-shelf	BFL 119 453/1	R1A	BK41073469
Backplane	BFX 101 109/1	R1A	-
PSU-AC-32	BML 353 206/2	R1C	BR80299544
PSU-AC-32	BML 353 206/2	R1C	BR80299553
PSU-AC-32	BML 353 206/2	R1C	BR80397740
Dummy	SXK 107 9314/1	R1C	-
Dummy	-	-	-
TMA-CM-02	SDK 107 881/1	R4A	BR60000VY1
Dummy	SXK 107 5029/1	R1D	-
DXU-23	BOE 602 21/1	R1B	AE53357127

Software	Revision
R07A	R14H

Photos
Transceiver Unit KRC 131 1004/2, R4E

Front side



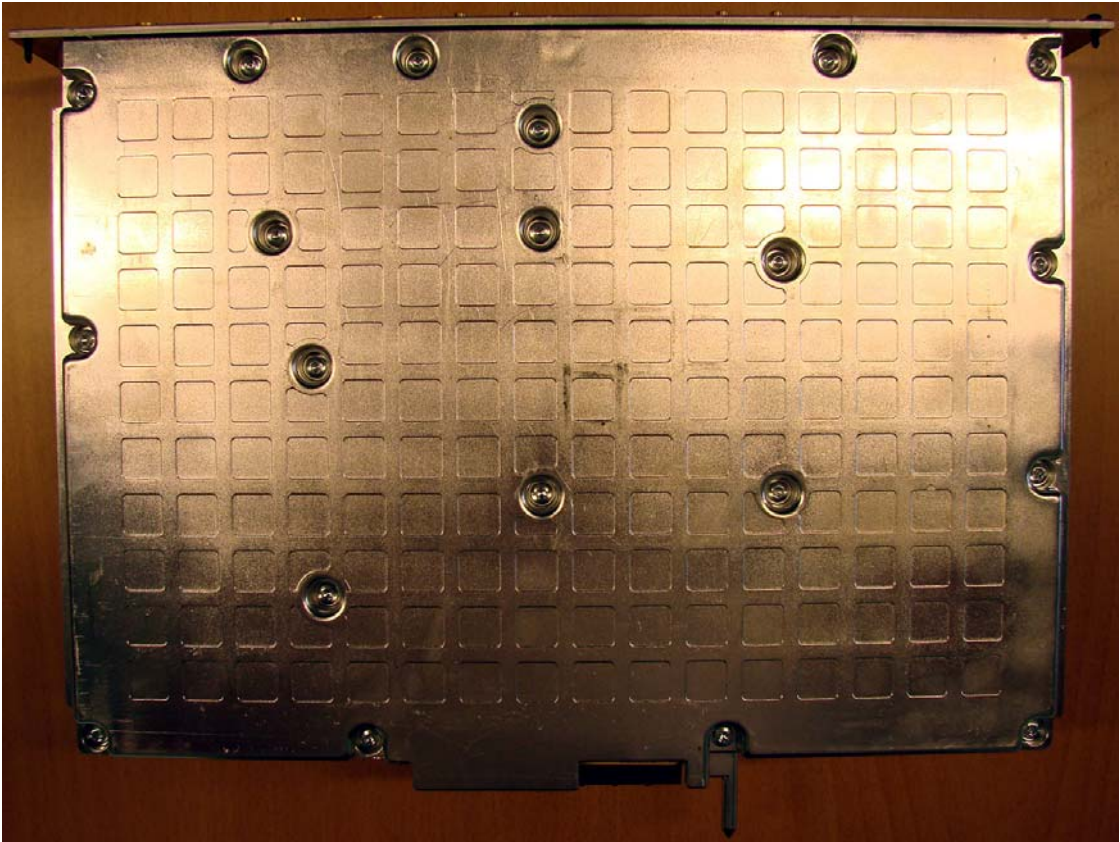
Rear side



FCC ID label



Left side



Right side

