REPORT

issued by an FCC listed Laboratory Reg. no. 93866.
The test site complies with RSS 212, Issue 1, file no: IC 3482

1002
ISO/IEC 17025

Date: 2007-05-23 | Reference: F703077-F24 | Page: 1 (2)

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: B5KEKRC1311004-2

(9 appendices)

Test object

Transceiver Unit dTRU 19 Edge, KRC 131 1004/2, R4A

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	-

Note 1: The maximum output power that can be used on the channels adjacent to the frequency band edges (channel 512 and 810) are 37 dBm (GMSK) and (8-PSK) in order to comply with CDU-K and CDU-F.

SP Sveriges Tekniska Forskningsinstitut
Electronics - EMC

Jan Welinder
Technical Manager

Jonas Bremholt
Technical Officer

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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

Nominal power voltage: 24 V DC

Tested Channels

Radiated measurements:

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

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

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

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

Conducted measurements:

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

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 TR45478203. The dTRU with serial number AE54185936 was used for the measurements. The CDU-F (BFL 119 156/1 rev. R2B) with serial number A400206745 were used for the measurements with CDU-F. The dTRUs with serial number AE54185951, AE54185952, and AE54185938 were used for the measurements with CDU-F. The measurements were performed with configurations that represents worst case scenario.

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/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: 2007-04-27

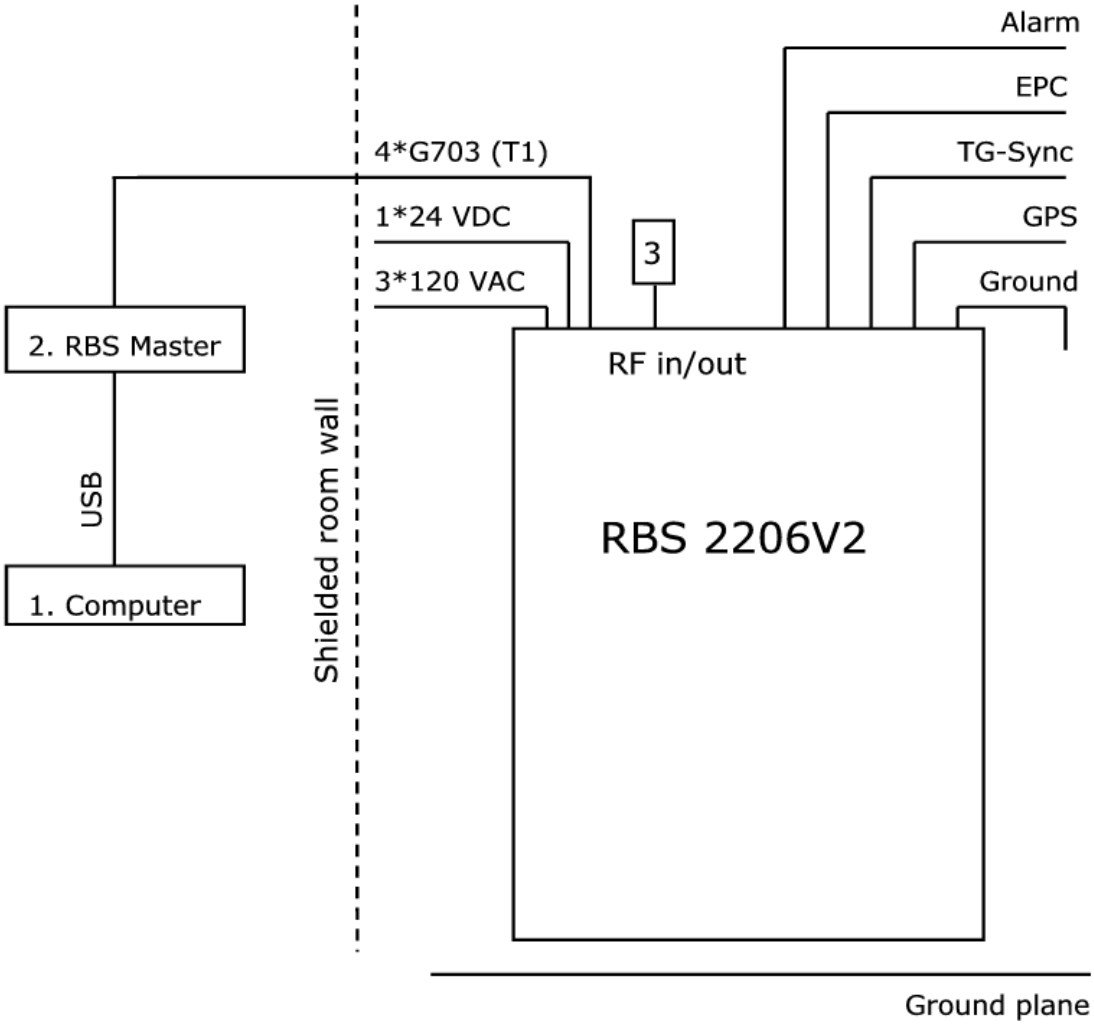
Test engineers

Jörgen Wassholm, Stefan Larsson, Fredrik G Isaksson and Jonas Bremholt

Test witnesses

Lars Hagbjörk, Annika Szalkai, and Mikael Ohlsson, Ericsson AB

Test set-up



1. Computer, with software RBSMMI ver. R10A07
2. Ericsson RBS Master 2 LPY 107 1007/1 R1F/A
3. 6 Dummy loads (50 ohm)

Interfaces:	**Type of port:**
Power: 120 VAC, 60 Hz	AC mains
Power: 24 VDC	DC power
Antenna: Coaxial cable 50 ohm	Antenna
G703: T1, shielded multi-wire with 15-pin D-sub connector	Telecom
TG-sync: Shielded multi-wire, unterminted	Signal
Alarm: Unshielded multi-wire, terminated in distribution frame	Signal
GPS: Shielded multi-wire, 9-pin DSUB, unterminated	Signal
EPC: Shielded multi-wire	Signal

RF Power output measurements according to CFR 47 2.1046

Date	Temperature	Humidity
2007-05-02	23 °C ± 3 °C	22 % ± 5 %
2007-05-04	22 °C ± 3 °C	35 % ± 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	2007-08	503 144
Boonton Power sensor 56518-S/4	2008-02	503 145
Multimeter Fluke 87	2007-11	502 190
Testo 610, Temperature and humidity meter	2008-04	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: 46 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	47.0/ 46.1	47.4/ 46.4	47.0/ 46.1

dTRU, output 1, without internal combiner:
Maximum rated output power level after CDU-K: 45 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/ 43.8	45.1/ 44.2	44.6/ 43.8

dTRU, output 2, without internal combiner:
Maximum rated output power level after CDU-K: 45 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	44.8/ 43.9	45.2/ 44.3	44.8/ 43.9

dTRU, output 1, with internal combiner:
Maximum rated output power level after CDU-K: 40 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/ 40.1	41.2/ 40.5	40.9/ 40.2

dTRU, output 2, with internal combiner:
Maximum rated output power level after CDU-K: 40 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	41.0/ 40.2	41.3/ 40.5	41.0/ 40.2

dTRU, output 1, without internal combiner:
Maximum rated output power level after CDU-F 2x6: 41 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	41.6/ 40.8	41.4/ 40.6	41.7/ 41.0

dTRU, output 2, without internal combiner:
Maximum rated output power level after CDU-F 2x6: 41 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	41.5/ 40.8	41.4/ 40.6	41.8/ 41.0

Modulation: **8-PSK**

dTRU, output 1+2, with internal combiner plus TCC:
Maximum rated output power level after CDU-K: 44 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	47.1/ 43.1	47.4/ 43.4	47.1/ 43.1

dTRU, output 1, without internal combiner:
Maximum rated output power level after CDU-K: 41 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	45.0/ 41.1	44.6/ 40.7

dTRU, output 2, without internal combiner:
Maximum rated output power level after CDU-K: 41 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	44.8/ 40.8	45.2/41.2	44.8/ 40.8

dTRU, output 1, with internal combiner:
Maximum rated output power level after CDU-K: 38 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	40.8/ 37.0	41.2/ 37.5	41.0/ 37.1

dTRU, output 2, with internal combiner:
Maximum rated output power level after CDU-K: 38 dBm

Test conditions		Transmitter power (dBm) Peak/ RMS		
		Channel 512	Channel 661	Channel 810
T_{nom} 22 °C	V_{nom} 24 V DC	41.0/ 37.2	41.3/ 37.5	40.9/ 37.2

dTRU, output 1, without internal combiner:
Maximum rated output power level after CDU-F 2x6: 38 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/ 38.1	41.6/ 37.9	41.9/ 38.3

dTRU, output 2, without internal combiner:
Maximum rated output power level after CDU-F 2x6: 38 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/ 38.1	41.7/ 37.9	41.9/ 38.3

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

Occupied bandwidth measurements according to 47CFR 2.1049

Date	Temperature	Humidity
2007-05-02	23 °C ± 3 °C	22 % ± 5 %
2007-05-04	22 °C ± 3 °C	35 % ± 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	2007-08	503 738
Testo 610, Temperature and humidity meter	2008-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results with CDU-K are shown in appendix 3.1

Modulation: **GMSK**			Modulation: **8-PSK**		
TRX 1	**ARFCN**	**OBW**	**TRX 1**	**ARFCN**	**OBW**
Diagram 1:	Ch 512	238 kHz	Diagram 7:	Ch 512	240 kHz
Diagram 2:	Ch 661	242 kHz	Diagram 8:	Ch 661	242 kHz
Diagram 3:	Ch 810	238 kHz	Diagram 9:	Ch 810	244 kHz
TRX 2	**ARFCN**	**OBW**	**TRX 2**	**ARFCN**	**OBW**
Diagram 4:	Ch 512	244 kHz	Diagram 10:	Ch 512	240 kHz
Diagram 5:	Ch 661	238 kHz	Diagram 11:	Ch 661	240 kHz
Diagram 6:	Ch 810	240 kHz	Diagram 12:	Ch 810	242 kHz

The results with CDU-F are shown in appendix 3.2

Modulation: **GMSK**			Modulation: **8-PSK**		
TRX 1	**ARFCN**	**OBW**	**TRX 1**	**ARFCN**	**OBW**
Diagram 1:	Ch 512	240 kHz	Diagram 7:	Ch 512	240 kHz
Diagram 2:	Ch 661	240 kHz	Diagram 8:	Ch 661	238 kHz
Diagram 3:	Ch 810	240 kHz	Diagram 9:	Ch 810	242 kHz
TRX 2	**ARFCN**	**OBW**	**TRX 2**	**ARFCN**	**OBW**
Diagram 4:	Ch 512	240 kHz	Diagram 10:	Ch 512	240 kHz
Diagram 5:	Ch 661	236 kHz	Diagram 11:	Ch 661	238 kHz
Diagram 6:	Ch 810	242 kHz	Diagram 12:	Ch 810	234 kHz

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

FCC ID: B5KEKRC1311004-2 Appendix 3.1

Diagram 1

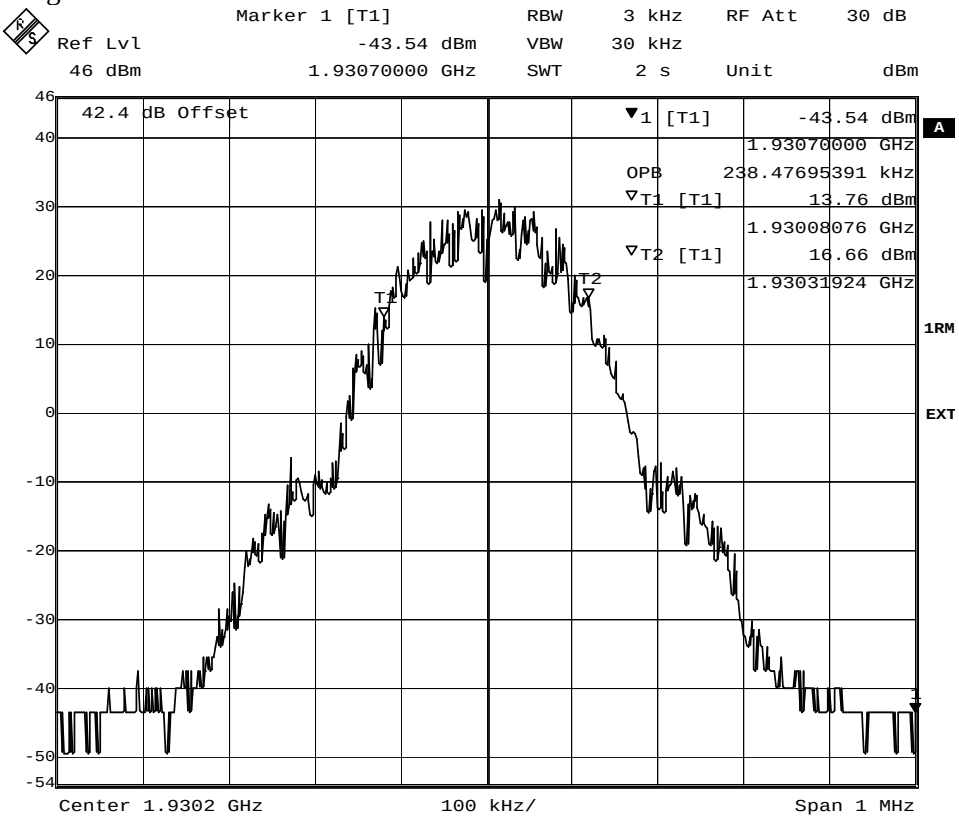


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Diagram 2

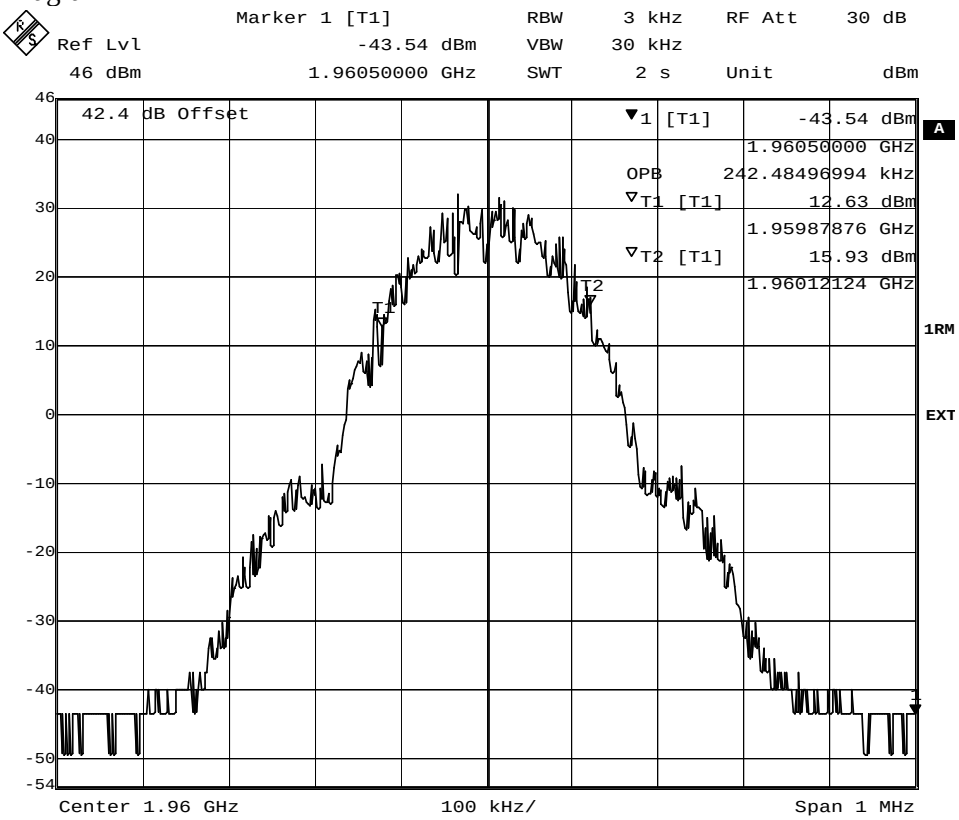

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Diagram 3

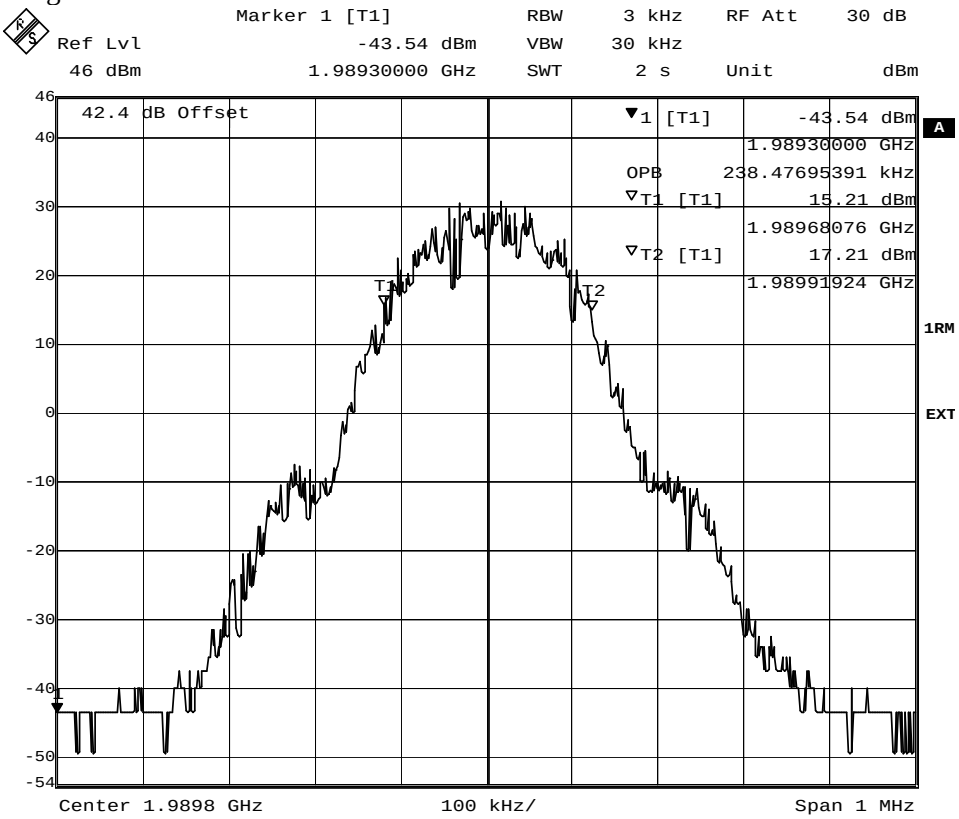

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Diagram 4

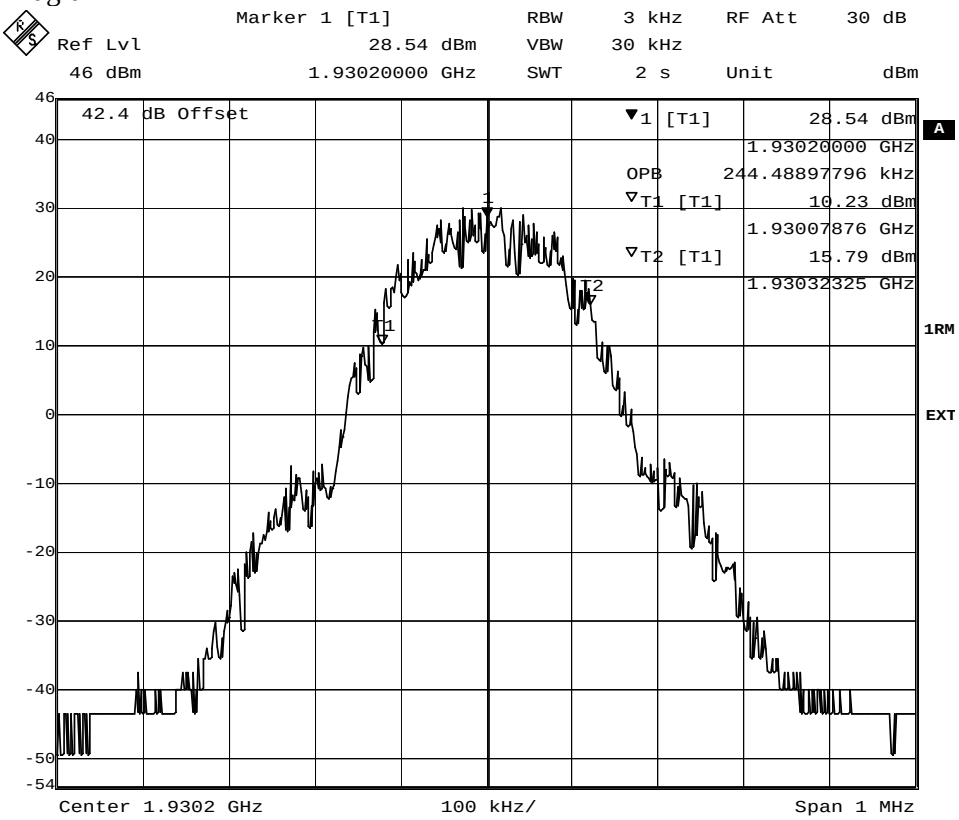

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Diagram 5

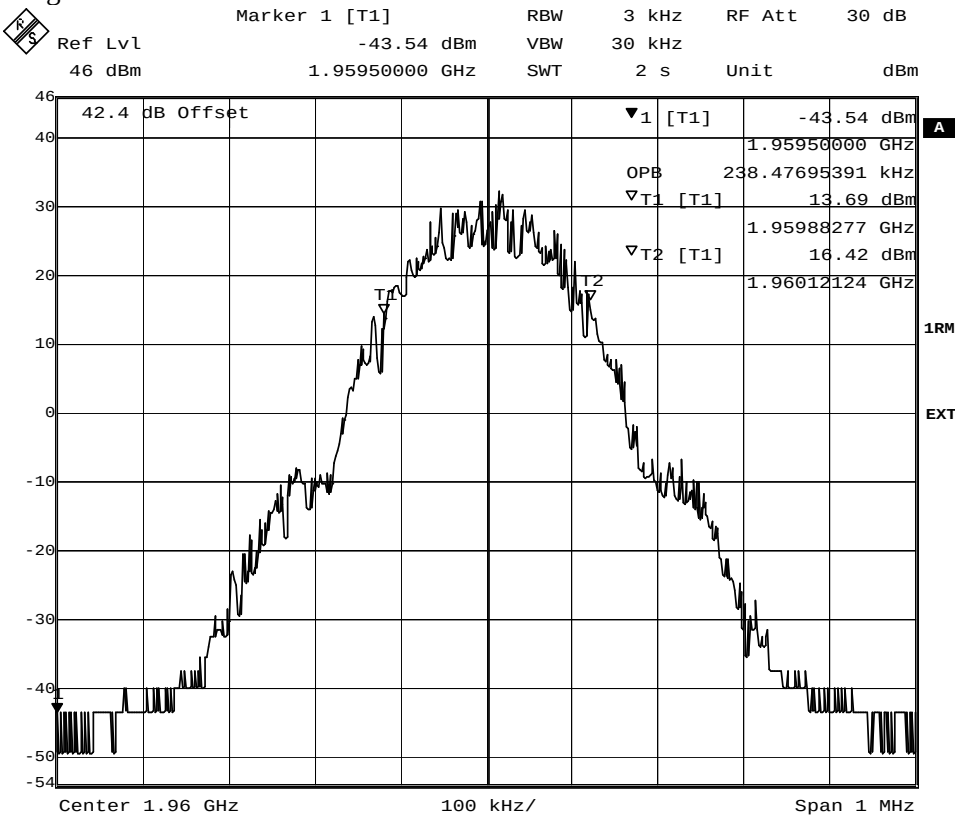

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Diagram 6

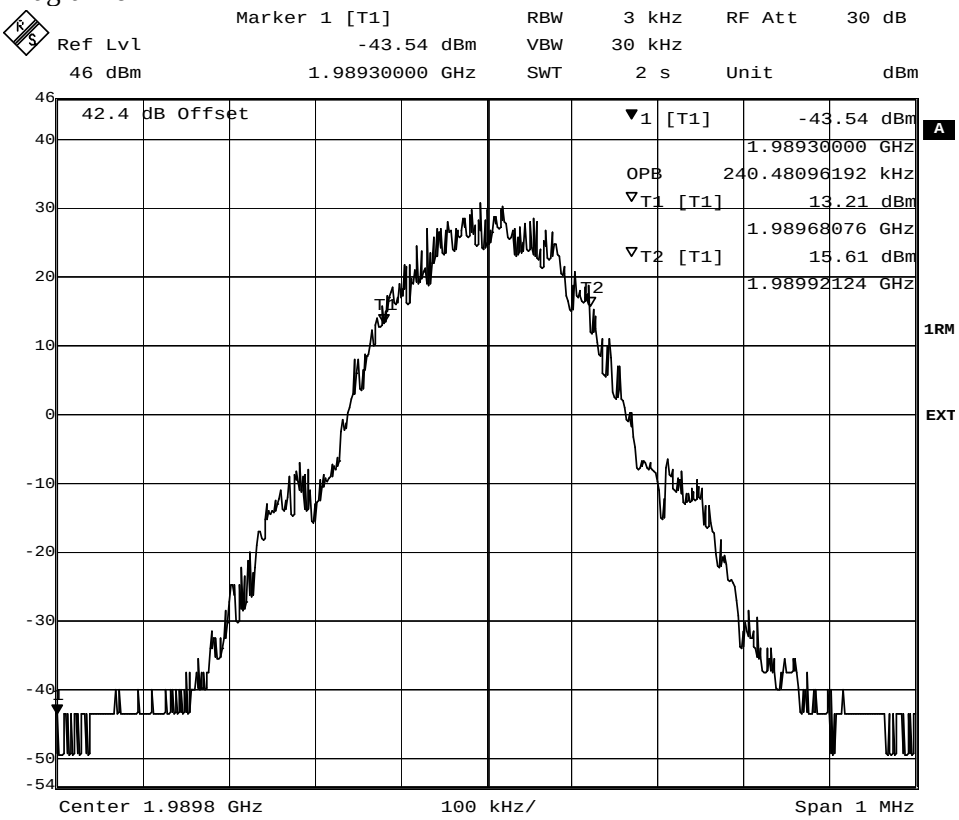

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Diagram 7

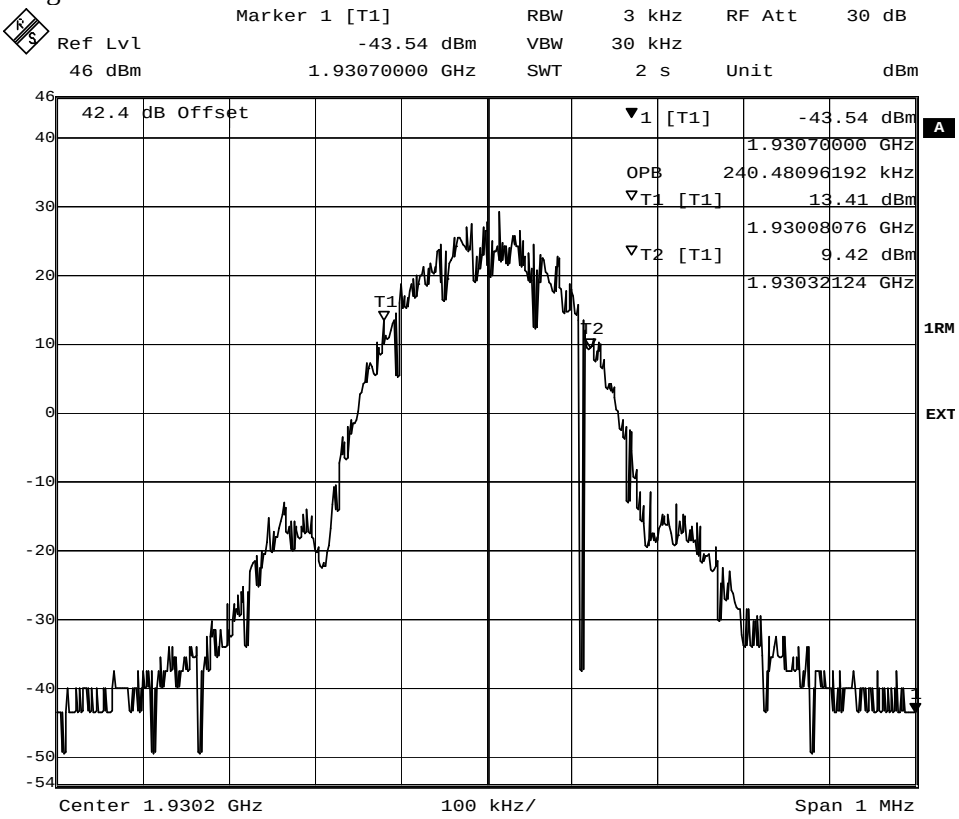

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Diagram 8

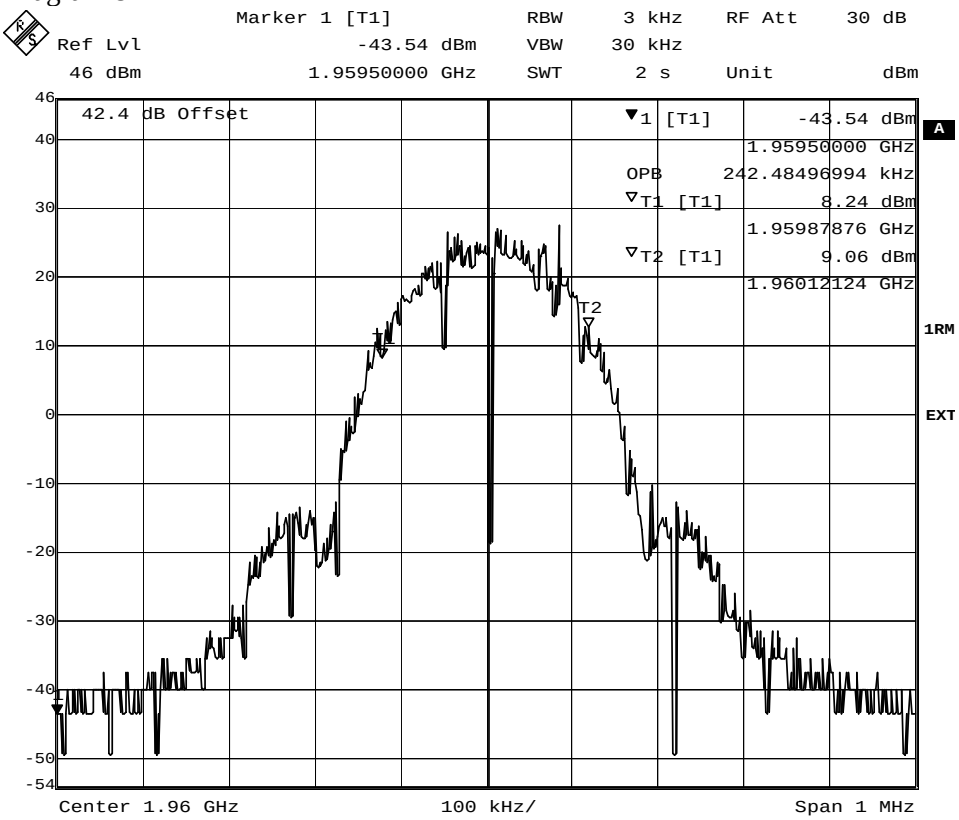

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Diagram 9

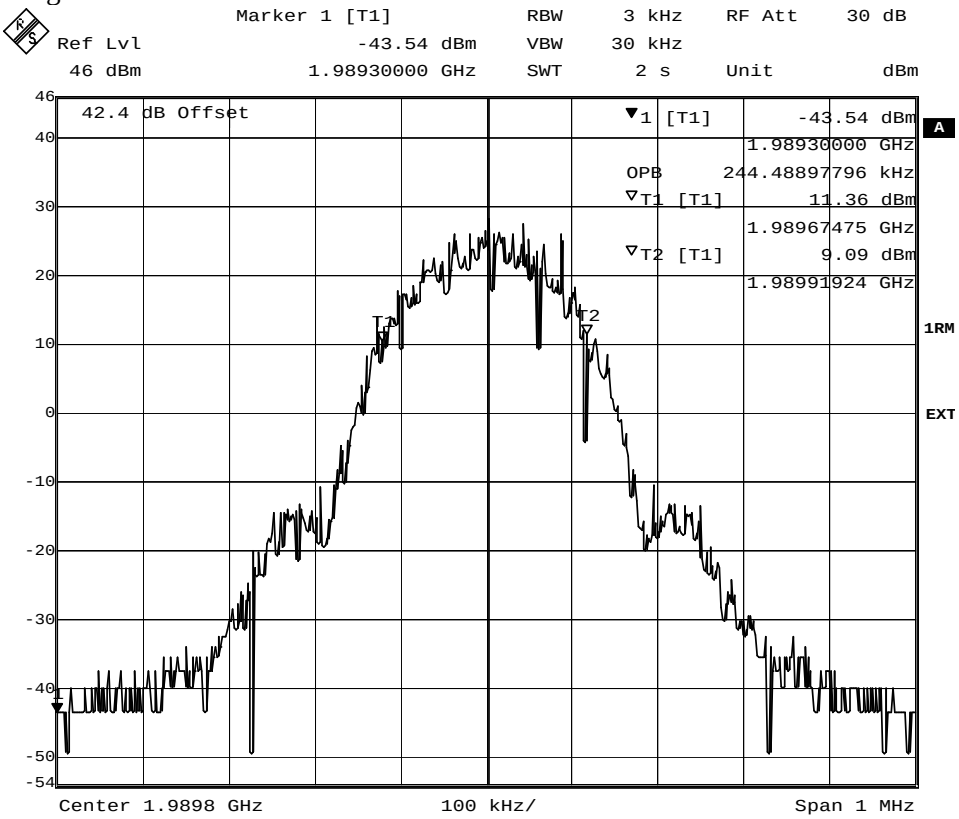

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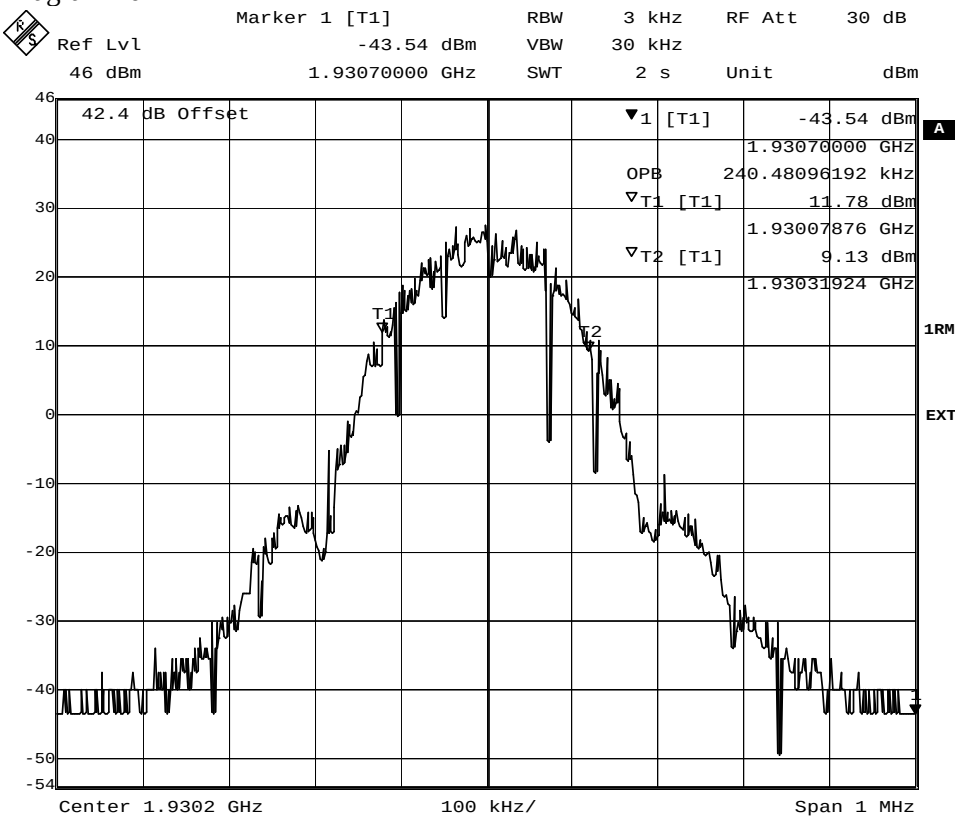
Diagram 10



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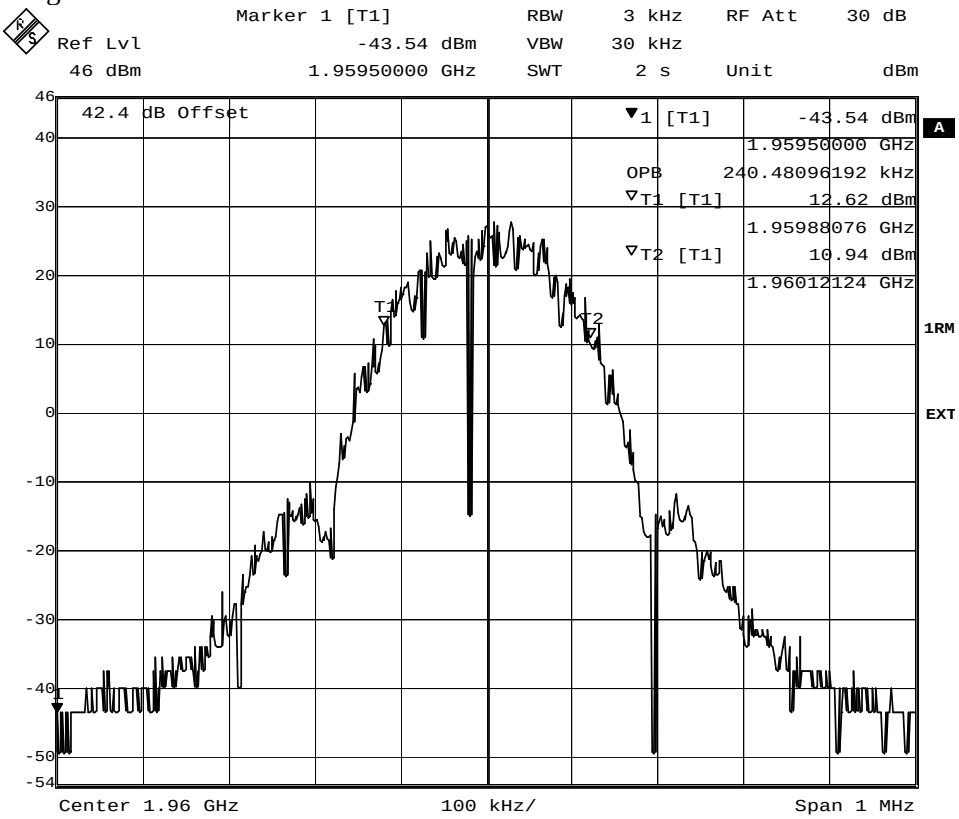

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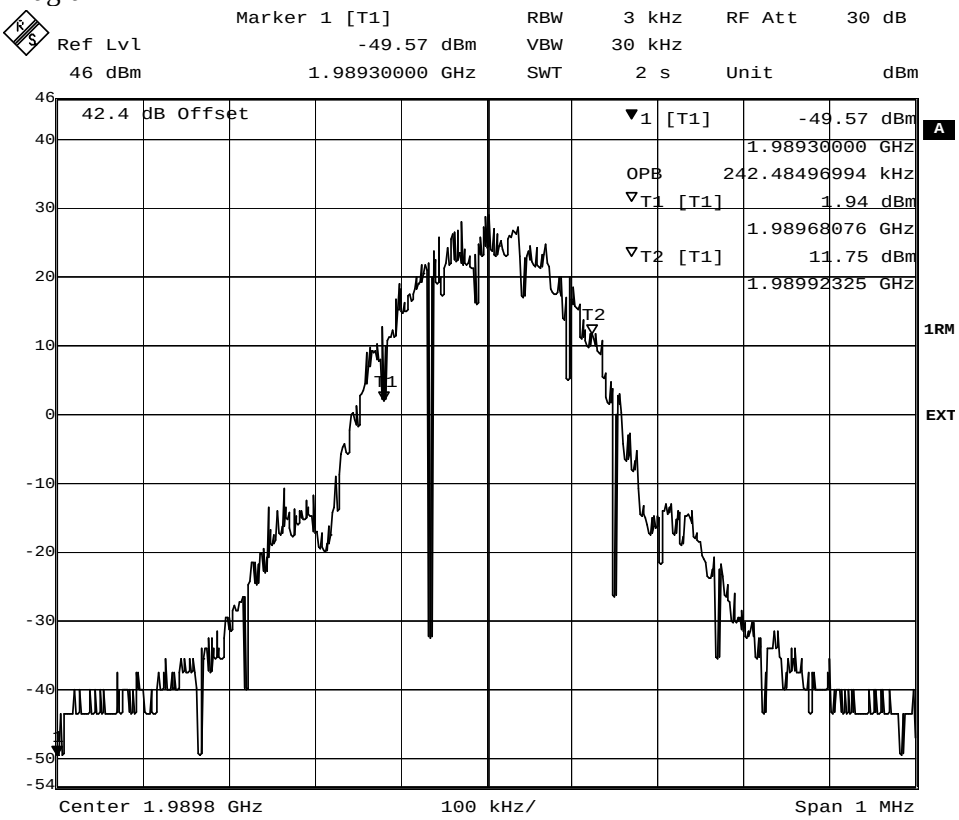

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FCC ID: B5KEKRC1311004-2 Appendix 3.2

Diagram 1

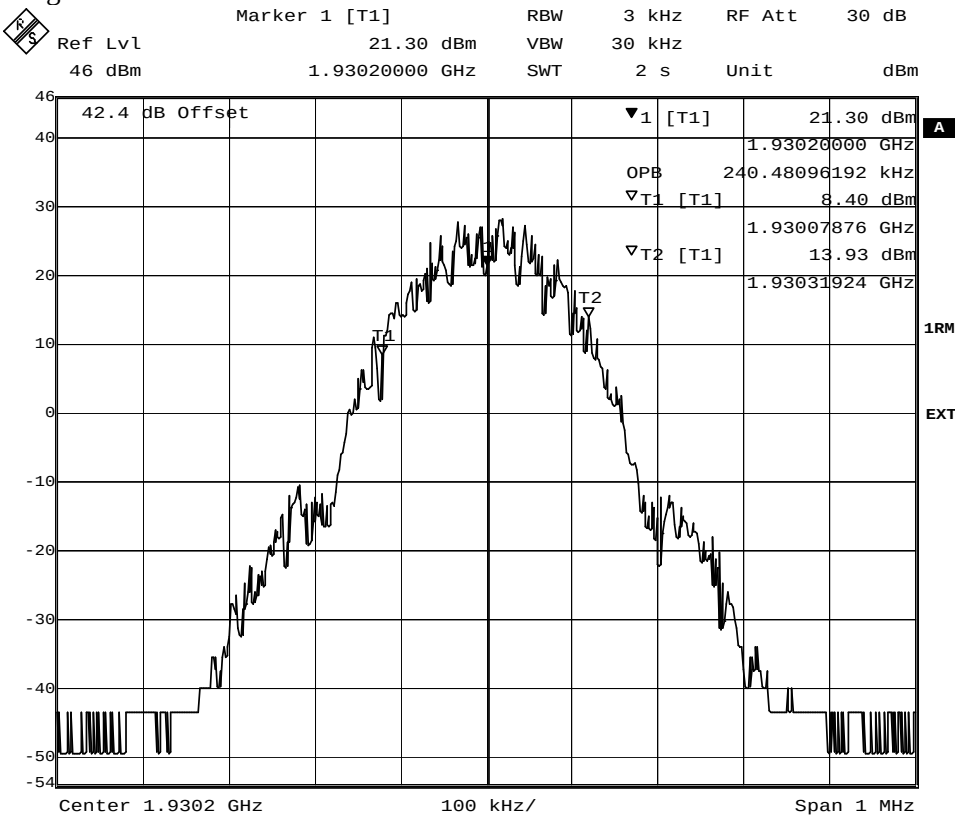

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Diagram 2

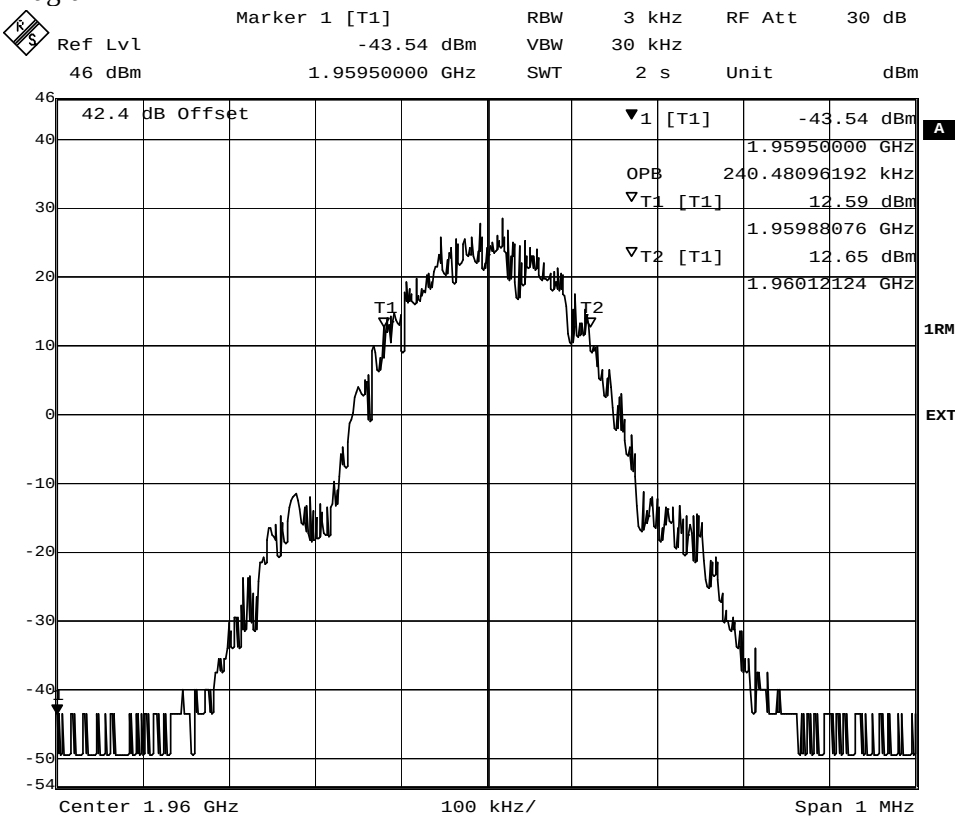

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Diagram 3

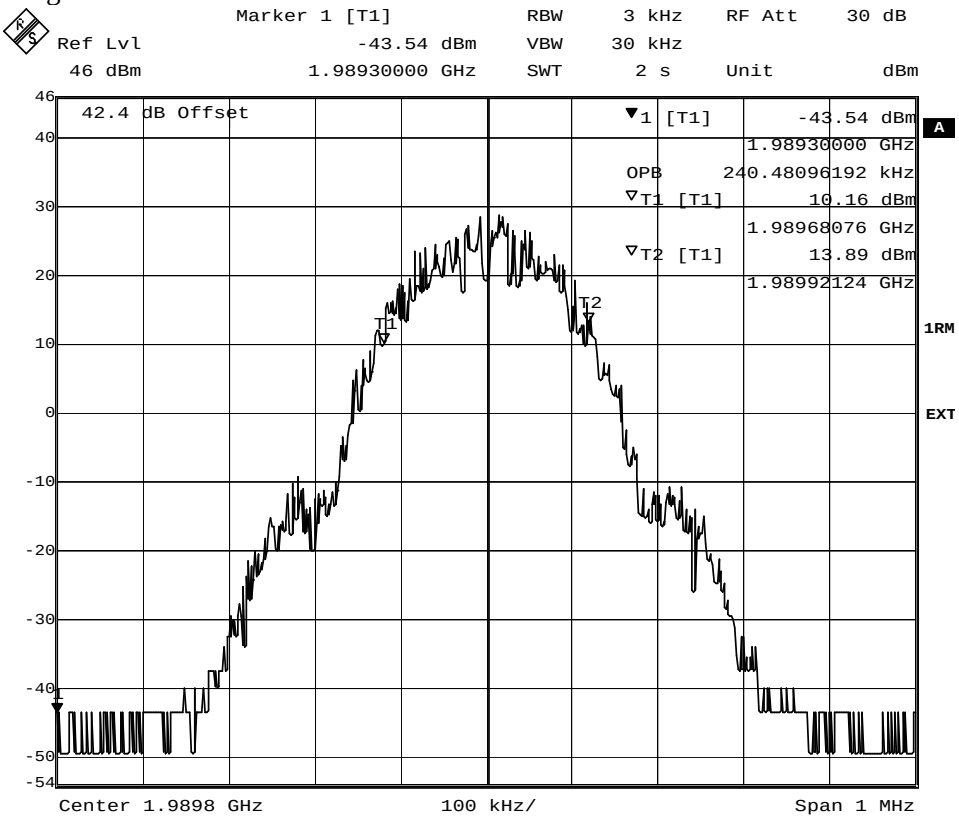

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Diagram 4

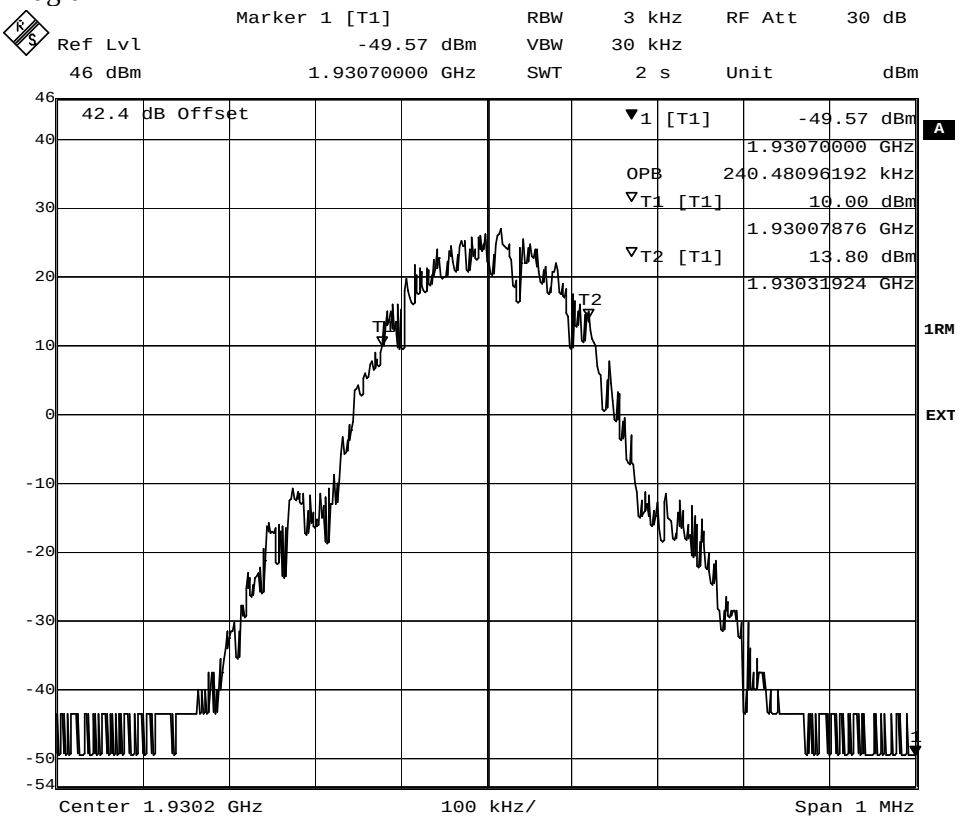

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Diagram 5

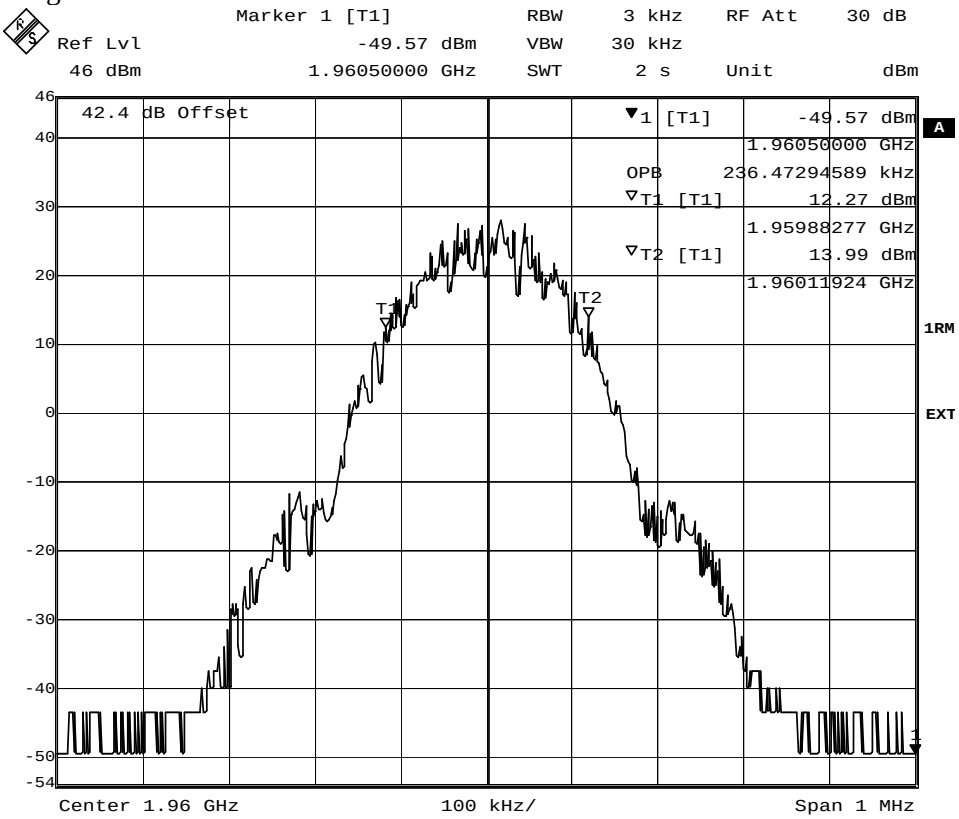

Diagram 6

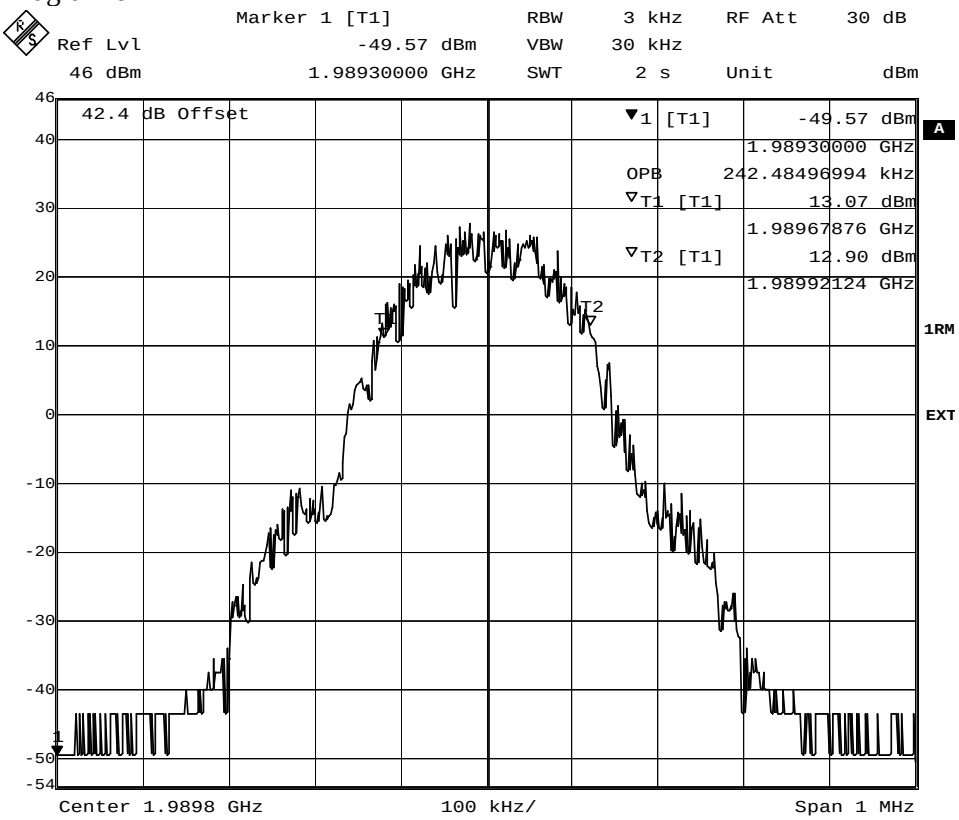

Diagram 7

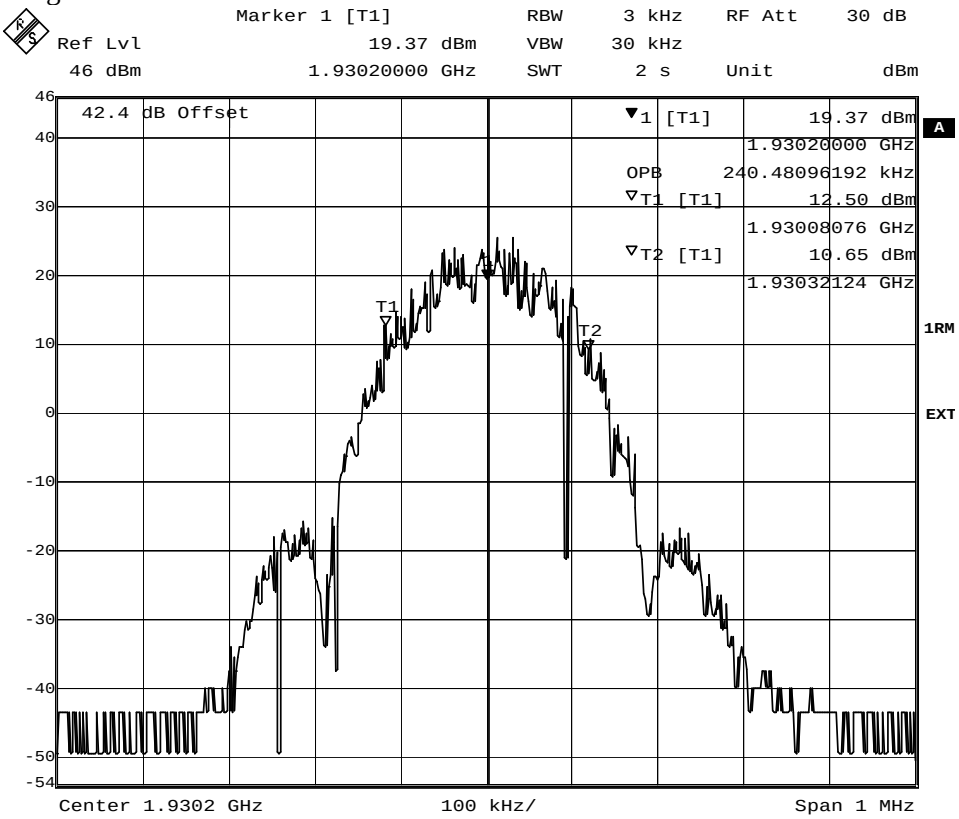

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Diagram 8

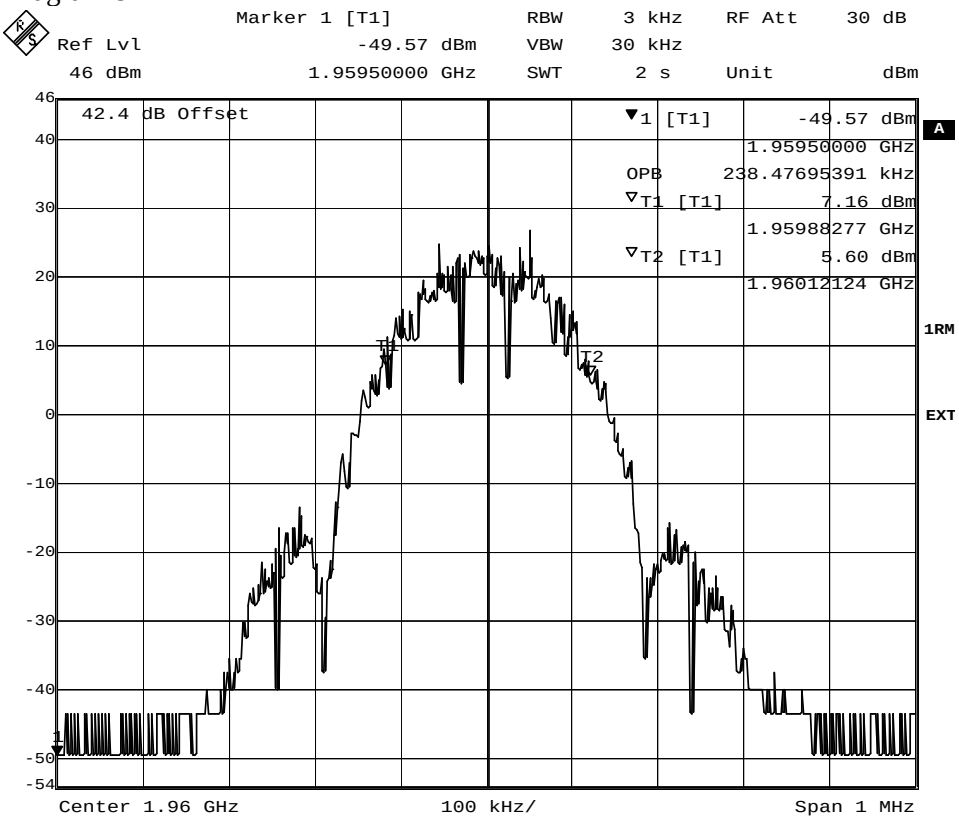

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Diagram 9

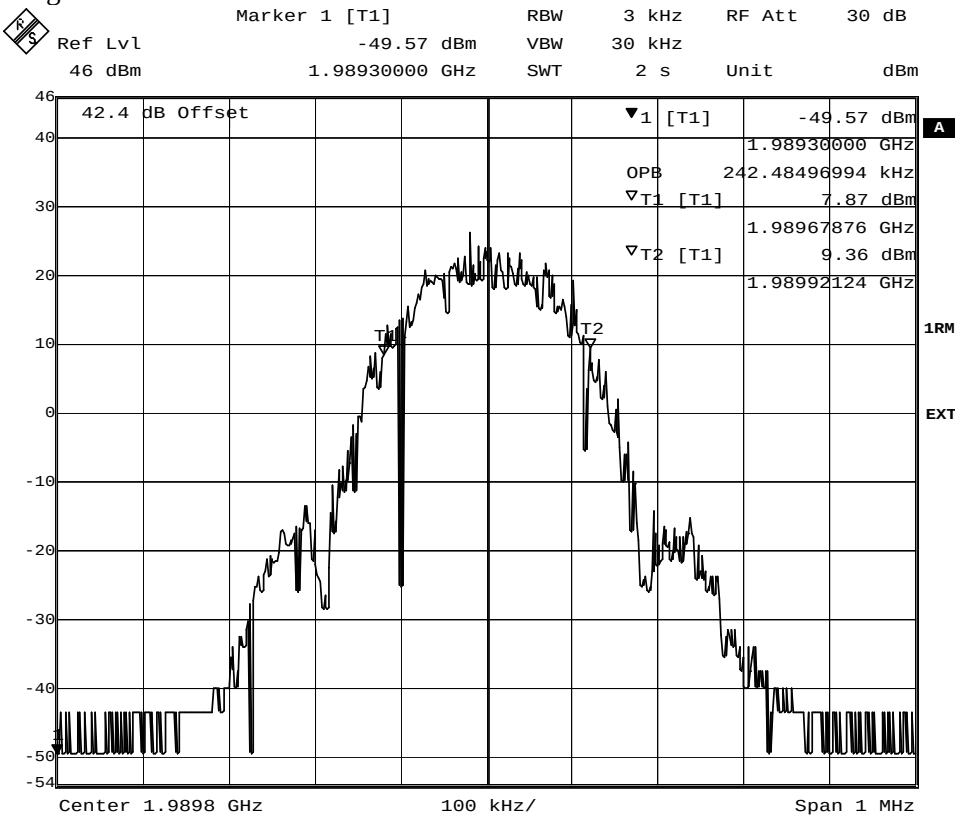

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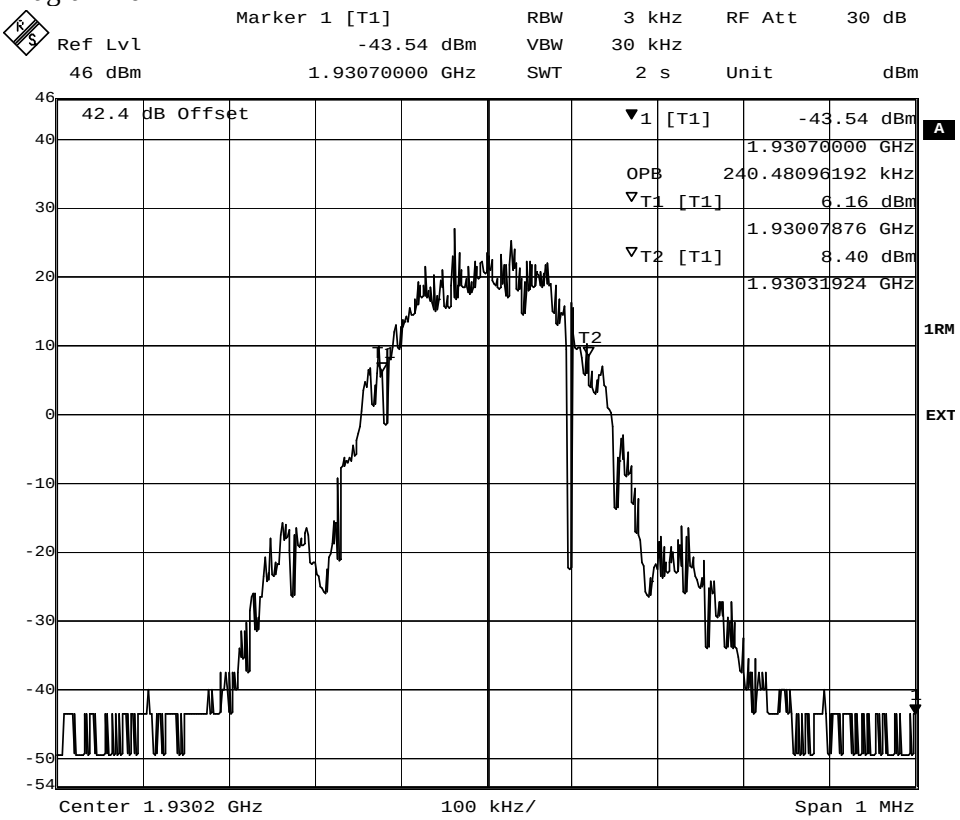
Diagram 10



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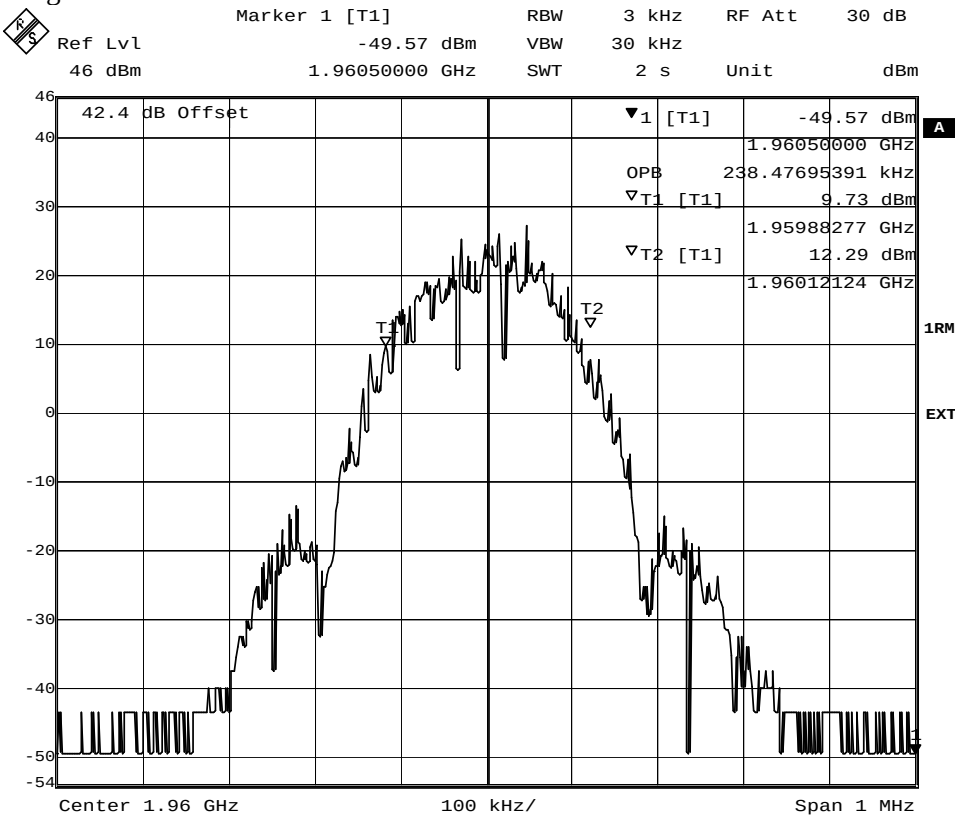

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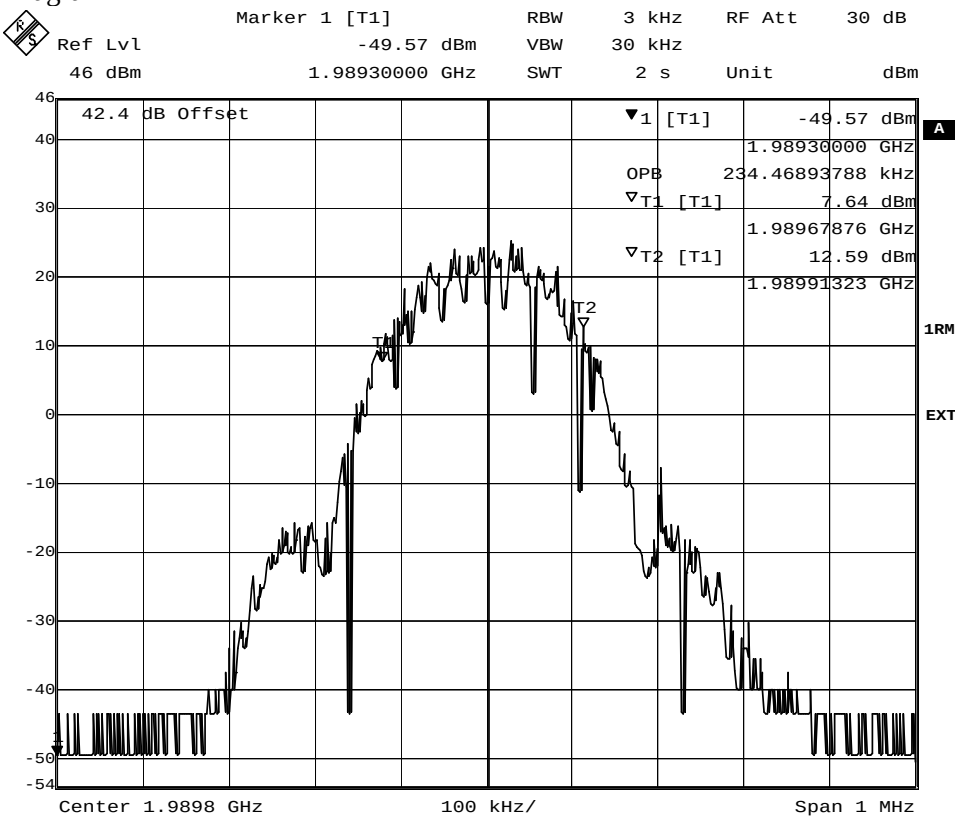
Diagram 12



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Band edge measurements according to 47CFR 2.1049

Date	Temperature	Humidity
2007-05-02	23 °C ± 3 °C	22 % ± 5 %
2007-05-03	23 °C ± 3 °C	20 % ± 5 %
2007-05-04	22 °C ± 3 °C	25 % ± 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	2007-08	503 738
Testo 610, Temperature and humidity meter	2008-04	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 +37 dBm output power
Diagram 2 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

dTRU Output 2, without internal combiner (CDU-K):
Diagram 3 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 4 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

(TCC), dTRU Output 1+2 (TX1+TX2) (CDU-K):
Diagram 5 Ch 513 (1930.4 MHz) Band edge +46 dBm output power
Diagram 6 Ch 809 (1989.6 MHz) Band edge +46 dBm output power

dTRU Output 1, without internal combiner (CDU-F):
Diagram 7 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 8 Ch 513 (1930.4 MHz) Band edge +41 dBm output power
Diagram 9 Ch 809 (1989.6 MHz) Band edge +41 dBm output power
Diagram 10 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

dTRU Output 2, without internal combiner (CDU-F):
Diagram 11 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 12 Ch 513 (1930.4 MHz) Band edge +41 dBm output power
Diagram 13 Ch 809 (1989.6 MHz) Band edge +41 dBm output power
Diagram 14 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

Modulation: **8-PSK**

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

Diagram 15 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 16 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

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

Diagram 17 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 18 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

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

Diagram 19 Ch 513 (1930.4 MHz) Band edge +43 dBm output power
Diagram 20 Ch 809 (1989.6 MHz) Band edge +43 dBm output power

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

Diagram 21 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 22 Ch 513 (1930.4 MHz) Band edge +41 dBm output power
Diagram 23 Ch 809 (1989.6 MHz) Band edge +41 dBm output power
Diagram 24 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

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

Diagram 25 Ch 512 (1930.2 MHz) Band edge +37 dBm output power
Diagram 26 Ch 513 (1930.4 MHz) Band edge +41 dBm output power
Diagram 27 Ch 809 (1989.6 MHz) Band edge +41 dBm output power
Diagram 28 Ch 810 (1989.8 MHz) Band edge +37 dBm output power

Remarks

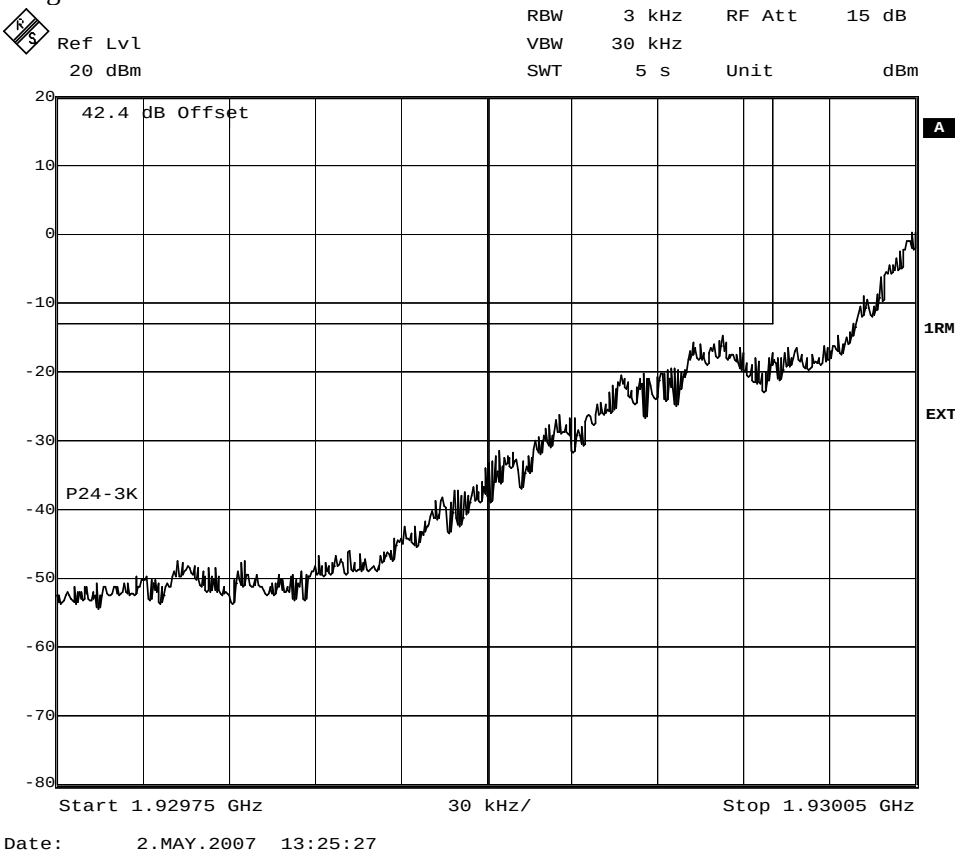
The maximum output power that can be used on the channels adjacent to the frequency band edges (channel 512 and 810) are 37 dBm (GMSK) and (8-PSK) in order to comply with CDU-K and CDU-F.

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

Diagram 1


Ref Lvl
20 dBm
RBW 3 kHz
VBW 30 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92975 GHz
30 kHz/
Stop 1.93005 GHz
Date: 2.MAY.2007 13:25:27

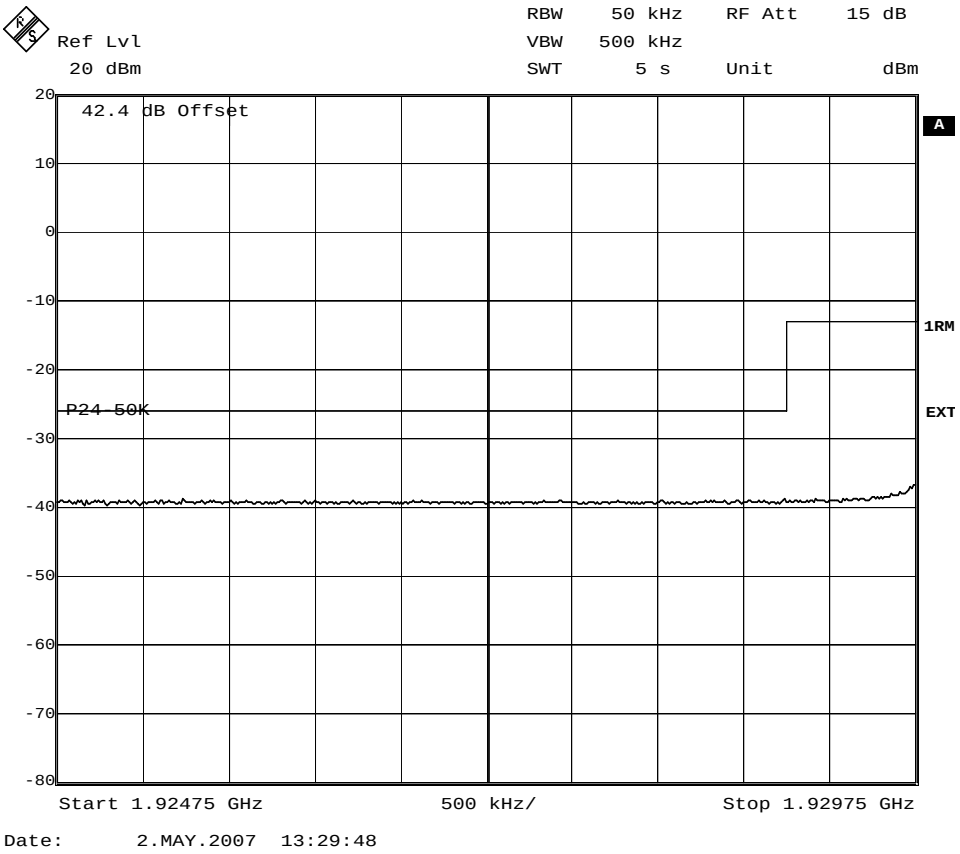
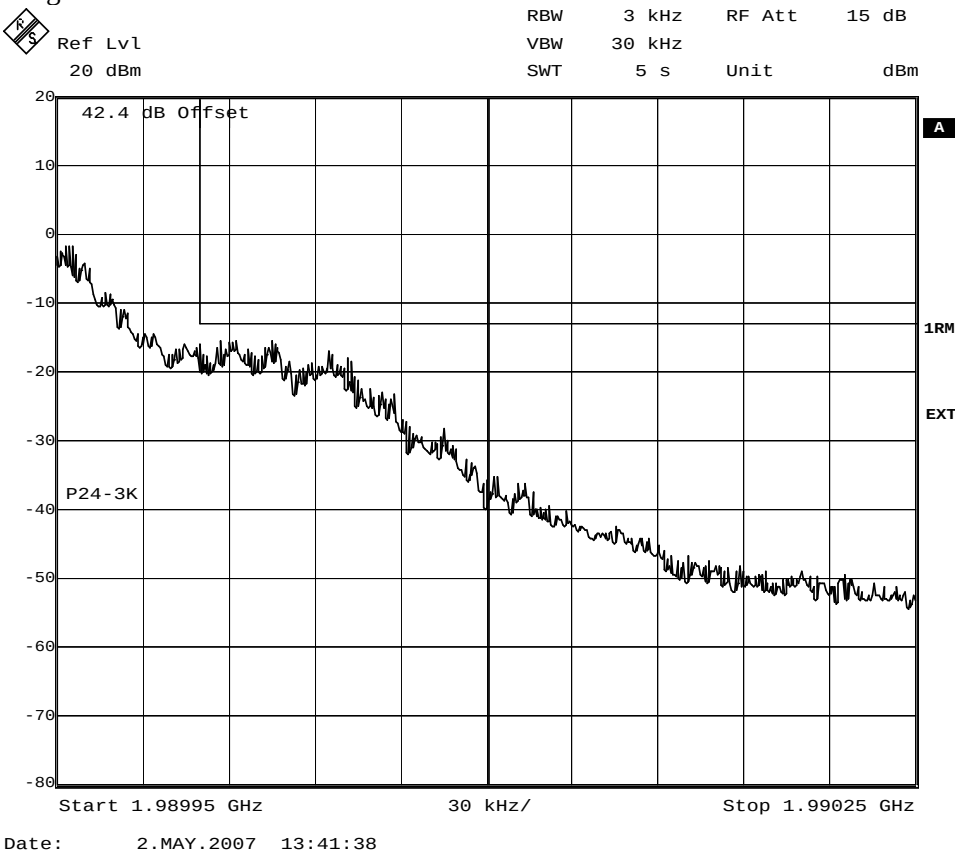

Ref Lvl
20 dBm
RBW 50 kHz
VBW 500 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92475 GHz
500 kHz/
Stop 1.92975 GHz
Date: 2.MAY.2007 13:29:48

Diagram 2


RBW 3 kHz
VBW 30 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
Ref Lvl
20 dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 2.MAY.2007 13:41:38

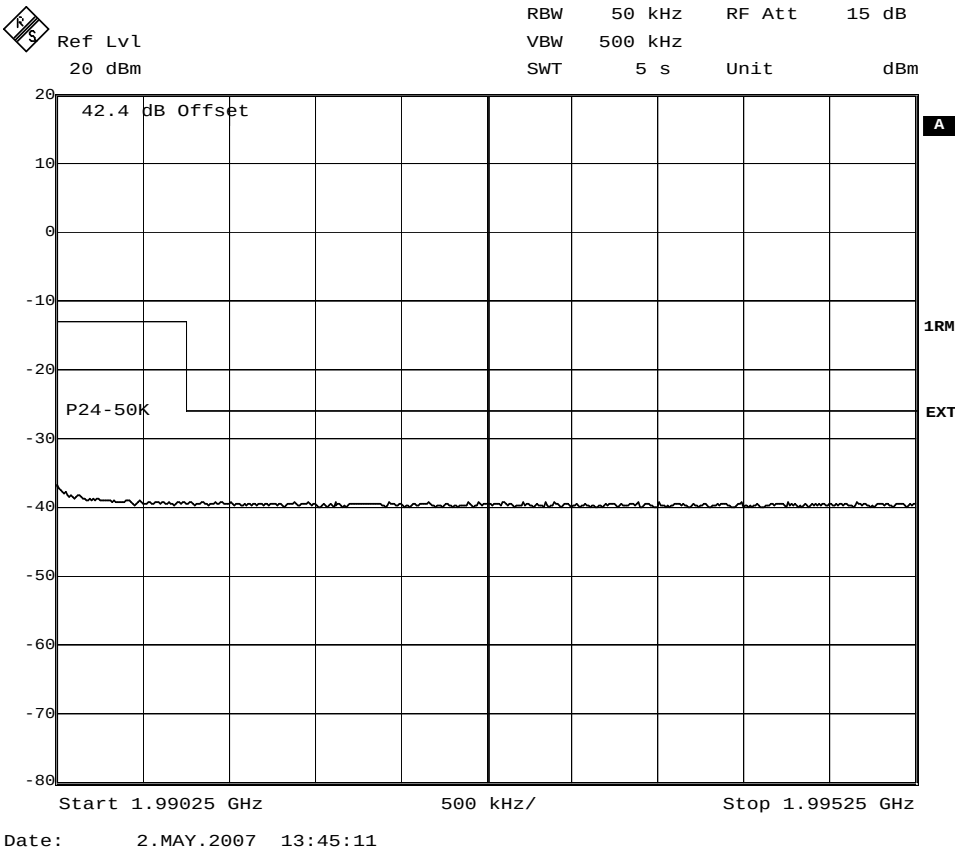
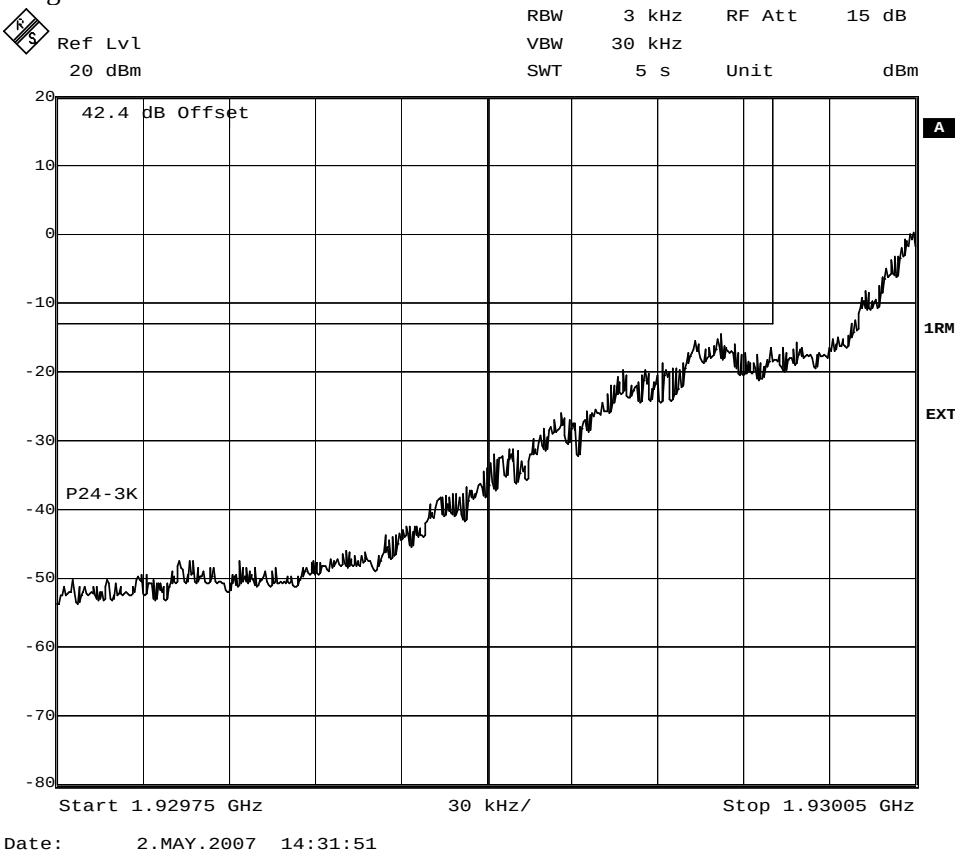

RBW 50 kHz
VBW 500 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
Ref Lvl
20 dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.99025 GHz
500 kHz/
Stop 1.99525 GHz
Date: 2.MAY.2007 13:45:11

Diagram 3


Ref Lvl
20 dBm
RBW 3 kHz
VBW 30 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92975 GHz
30 kHz/
Stop 1.93005 GHz
Date: 2.MAY.2007 14:31:51

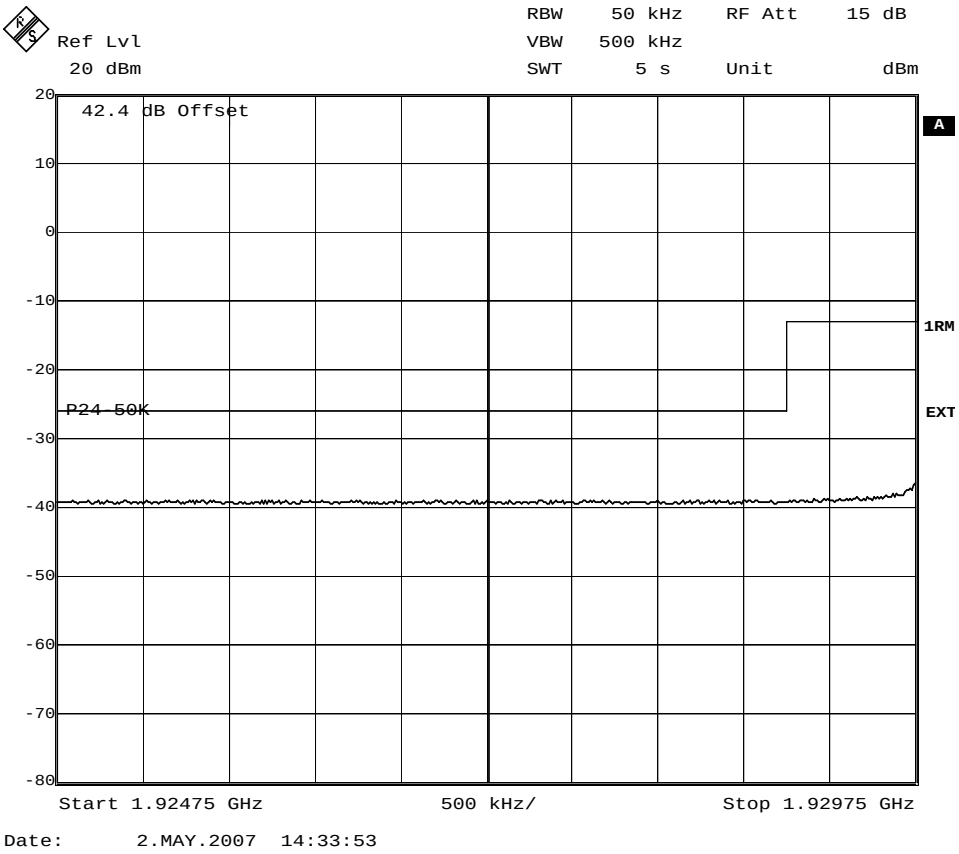
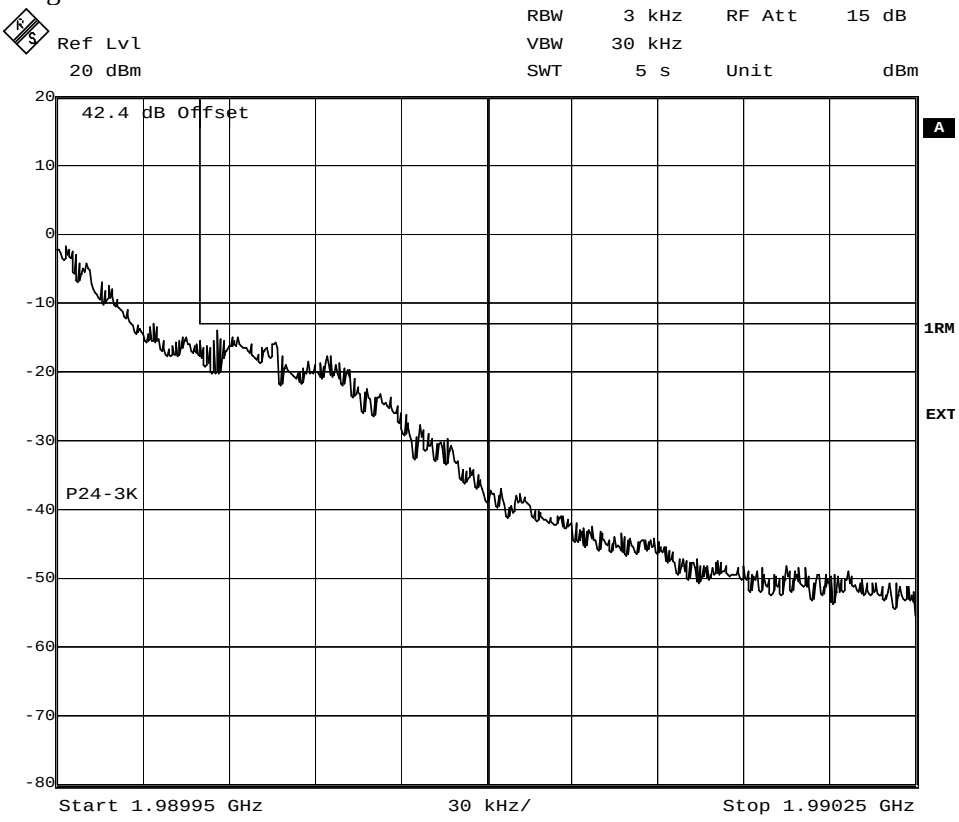

Ref Lvl
20 dBm
RBW 50 kHz
VBW 500 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92475 GHz
500 kHz/
Stop 1.92975 GHz
Date: 2.MAY.2007 14:33:53

Diagram 4


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 2.MAY.2007 14:35:25

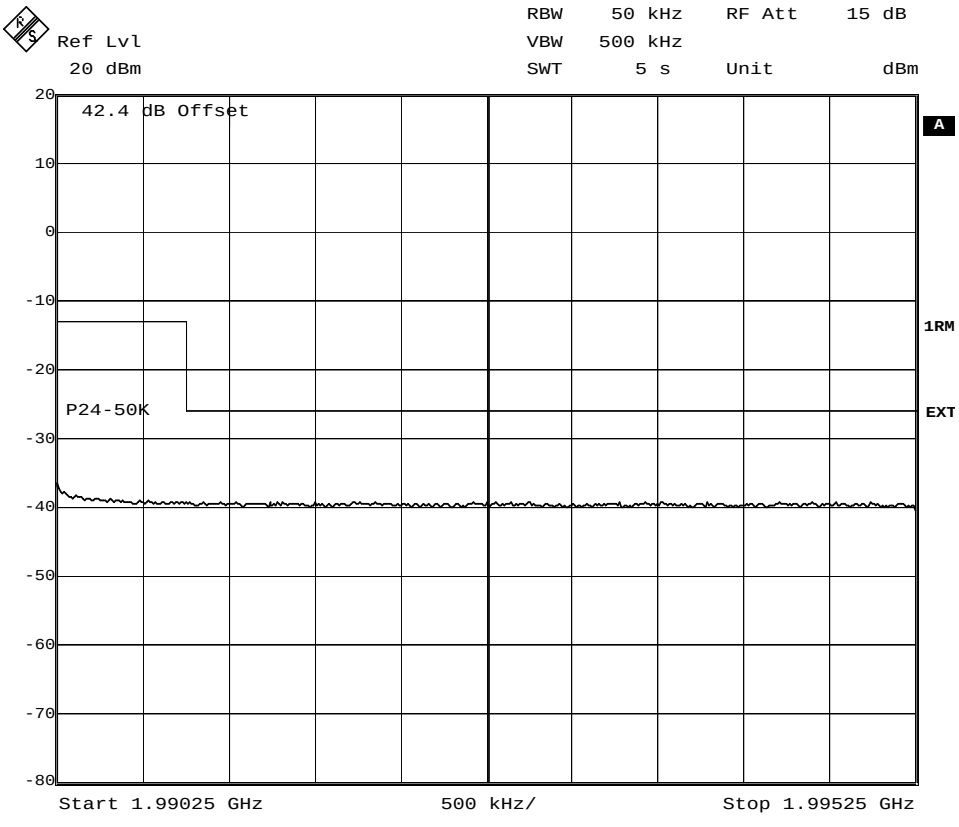
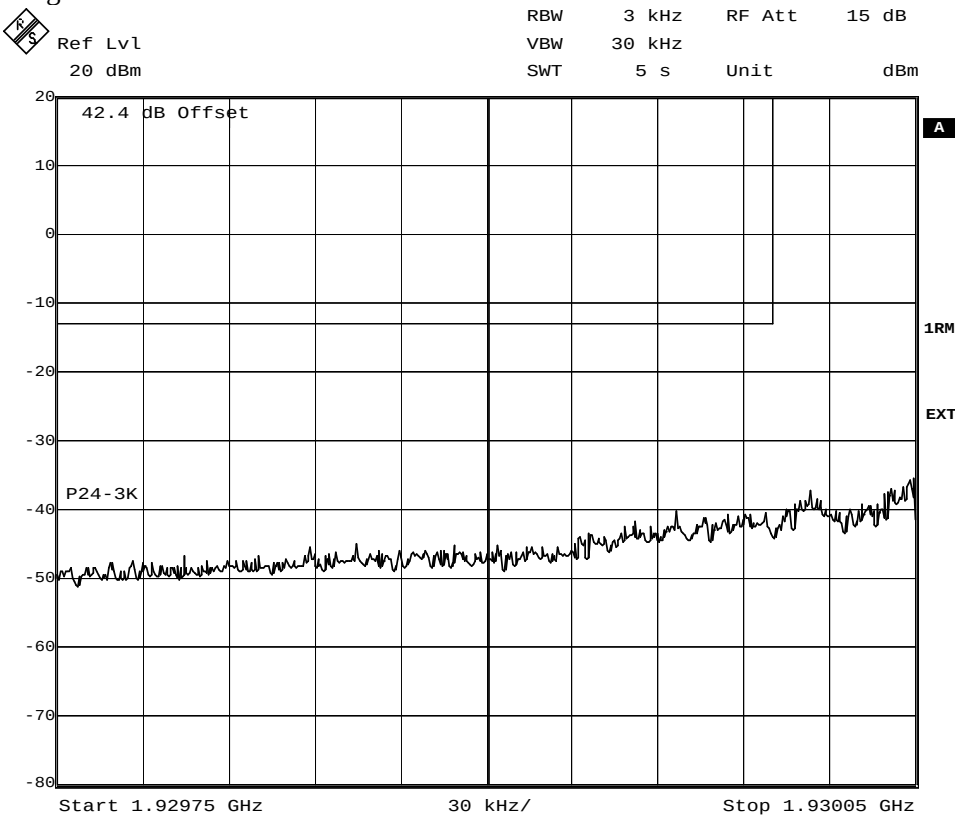
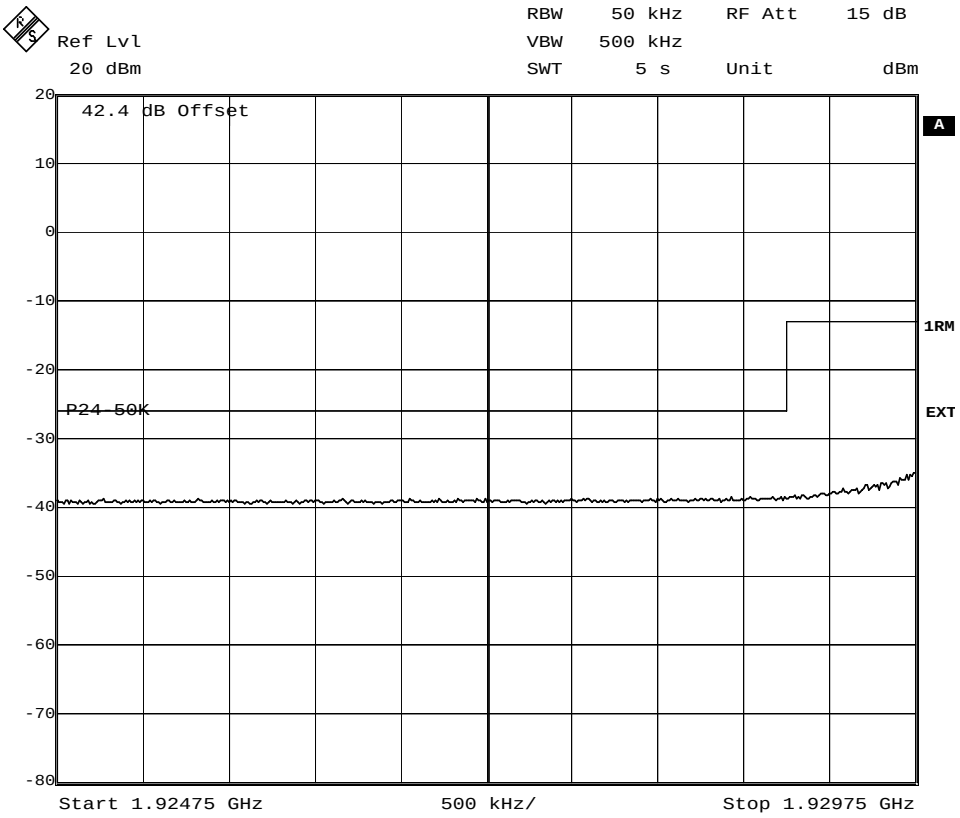

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.99025 GHz
500 kHz/
Stop 1.99525 GHz
Date: 2.MAY.2007 14:35:59

Diagram 5

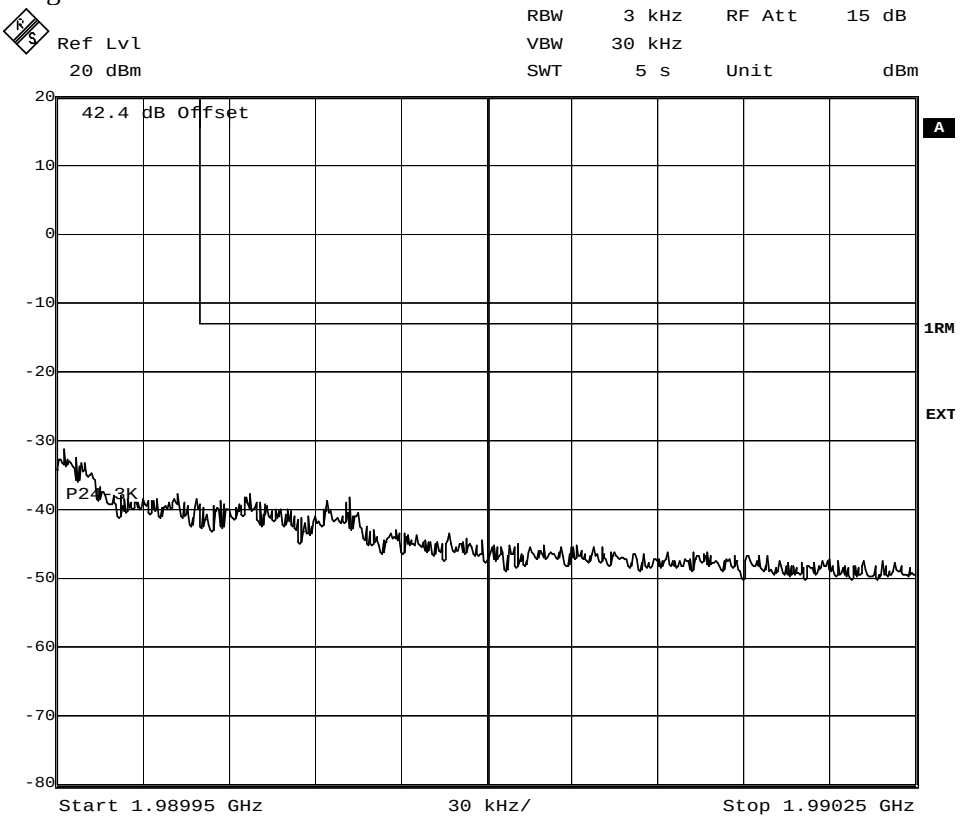


Date: 3.MAY.2007 09:22:48

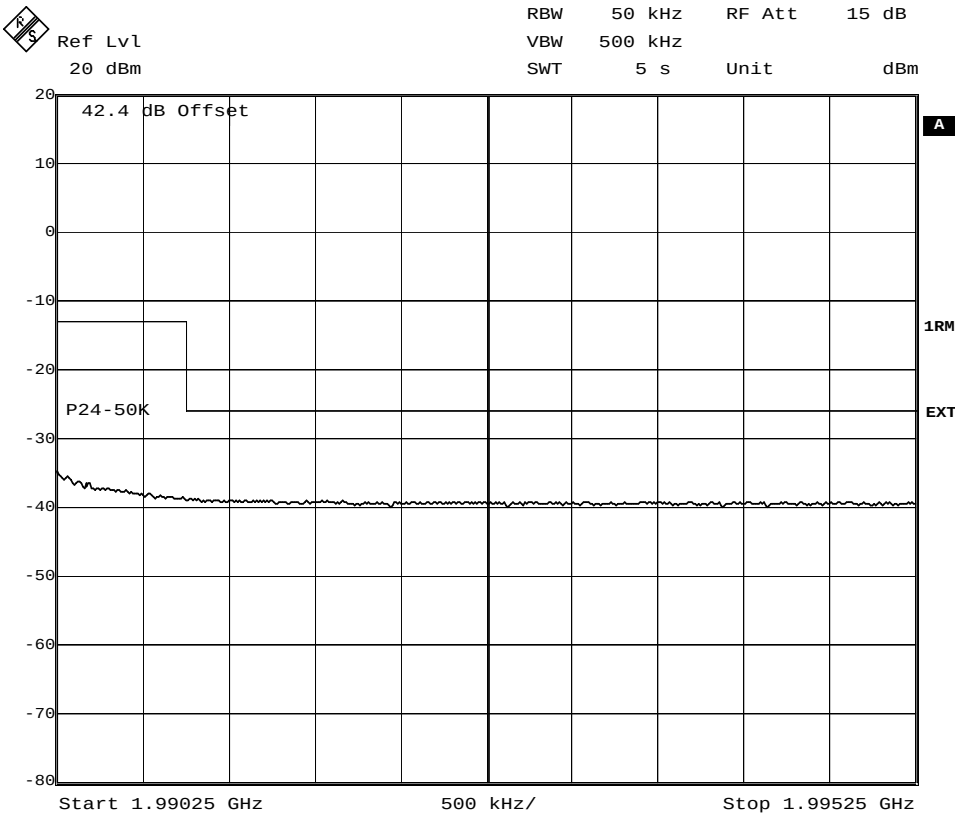


Date: 3.MAY.2007 09:24:56

Diagram 6

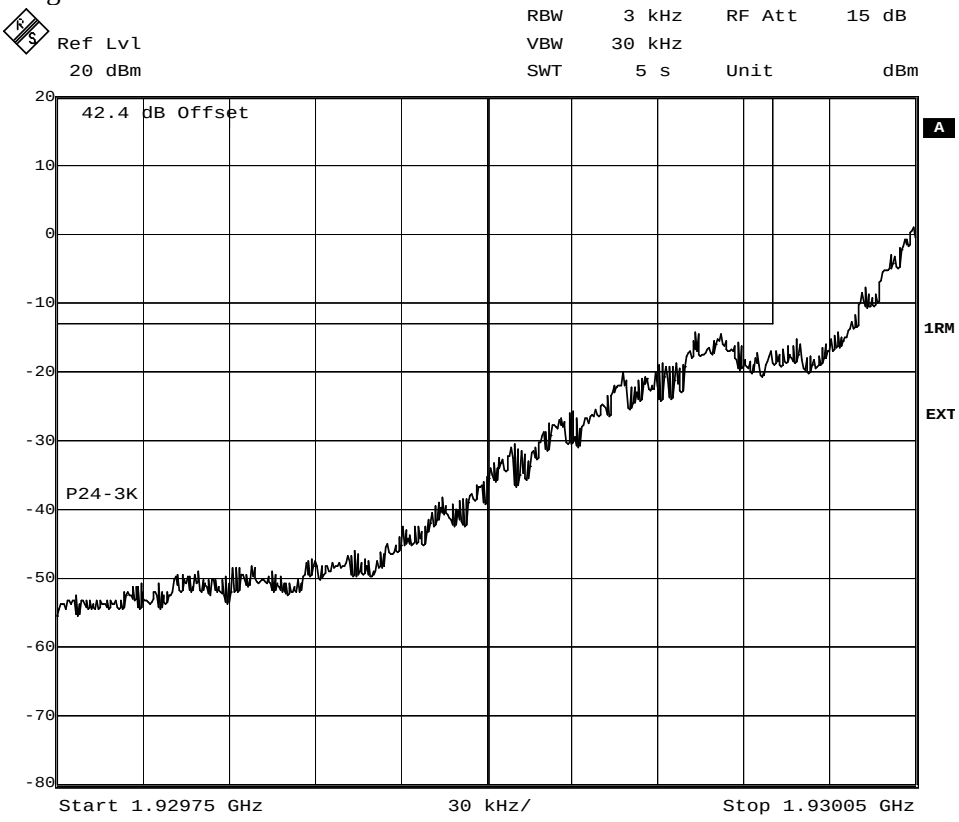


Date: 3.MAY.2007 09:25:53

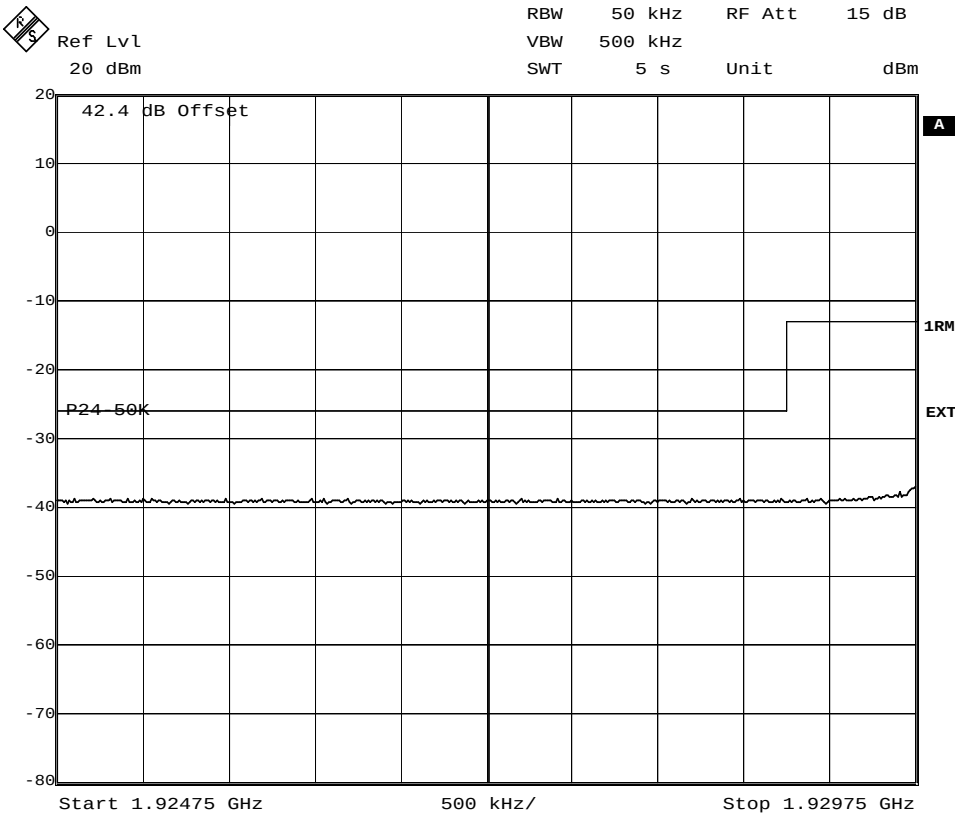


Date: 3.MAY.2007 09:26:49

Diagram 7

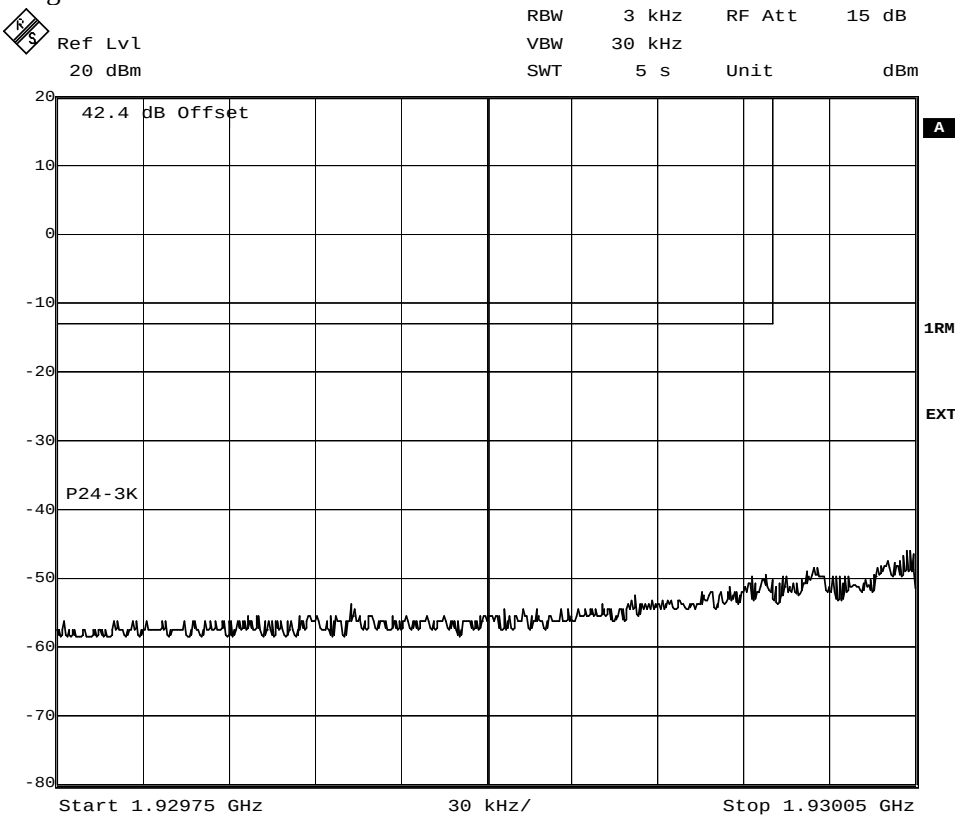


Date: 4.MAY.2007 13:00:19

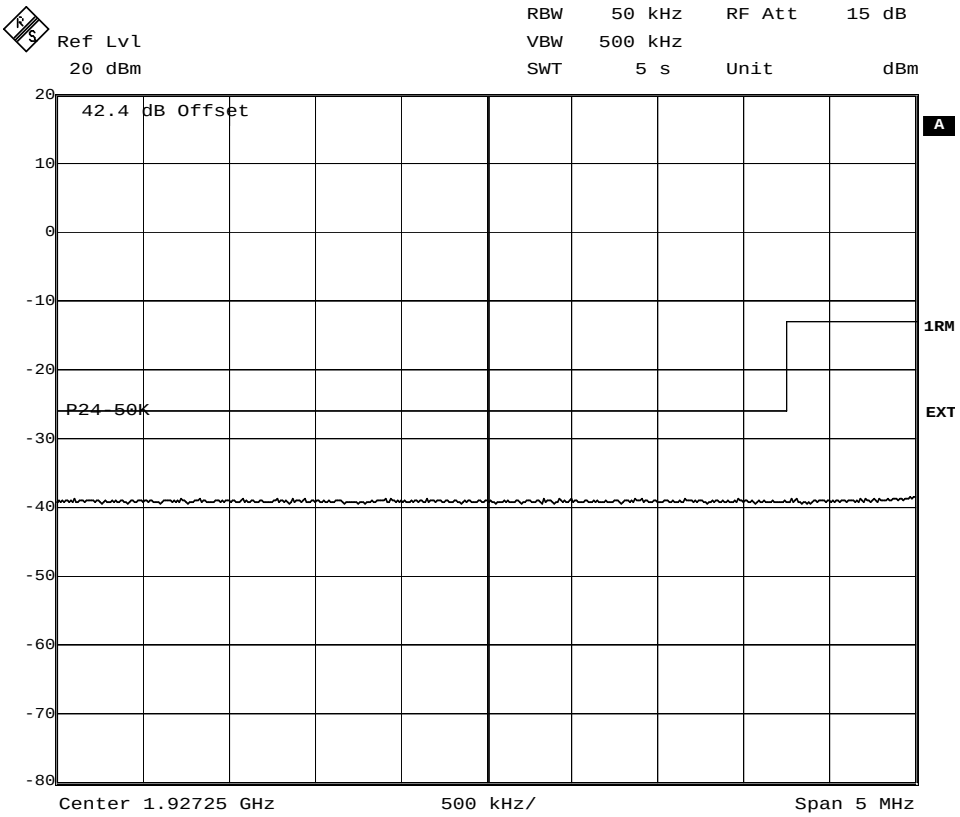


Date: 4.MAY.2007 13:31:51

Diagram 8

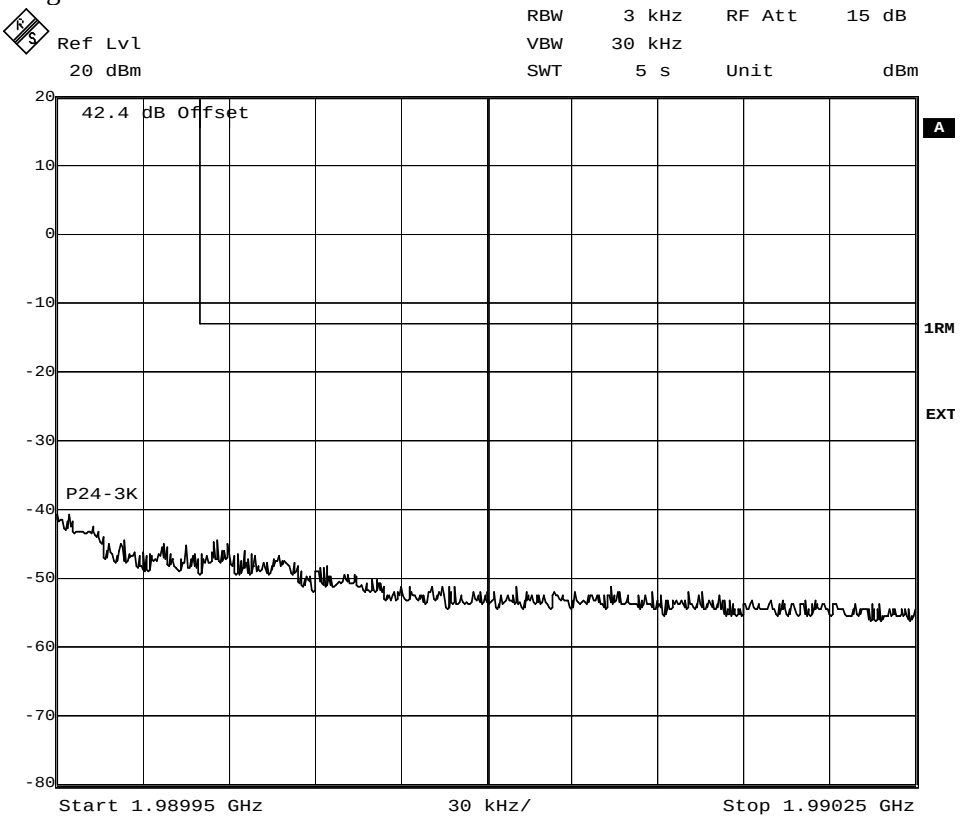


Date: 4.MAY.2007 13:29:57

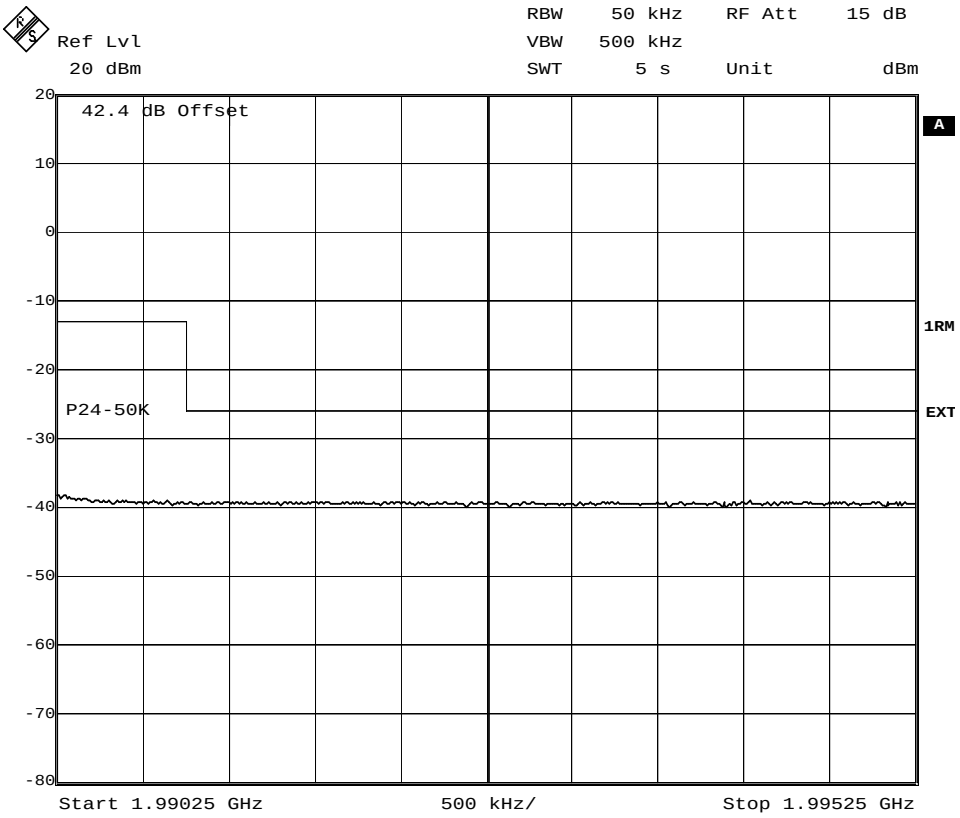


Date: 4.MAY.2007 13:28:01

Diagram 9

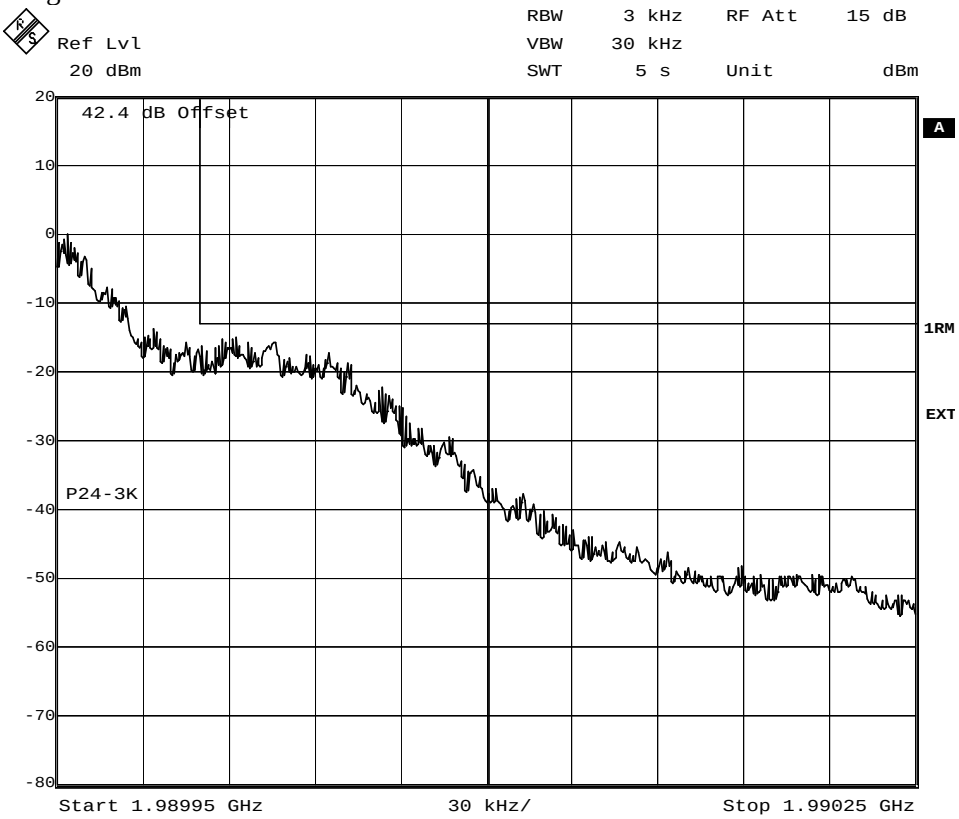


Date: 4.MAY.2007 13:57:36



Date: 4.MAY.2007 13:58:59

Diagram 10


Ref Lvl
20 dBm
RBW 3 kHz
VBW 30 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 4.MAY.2007 13:34:24

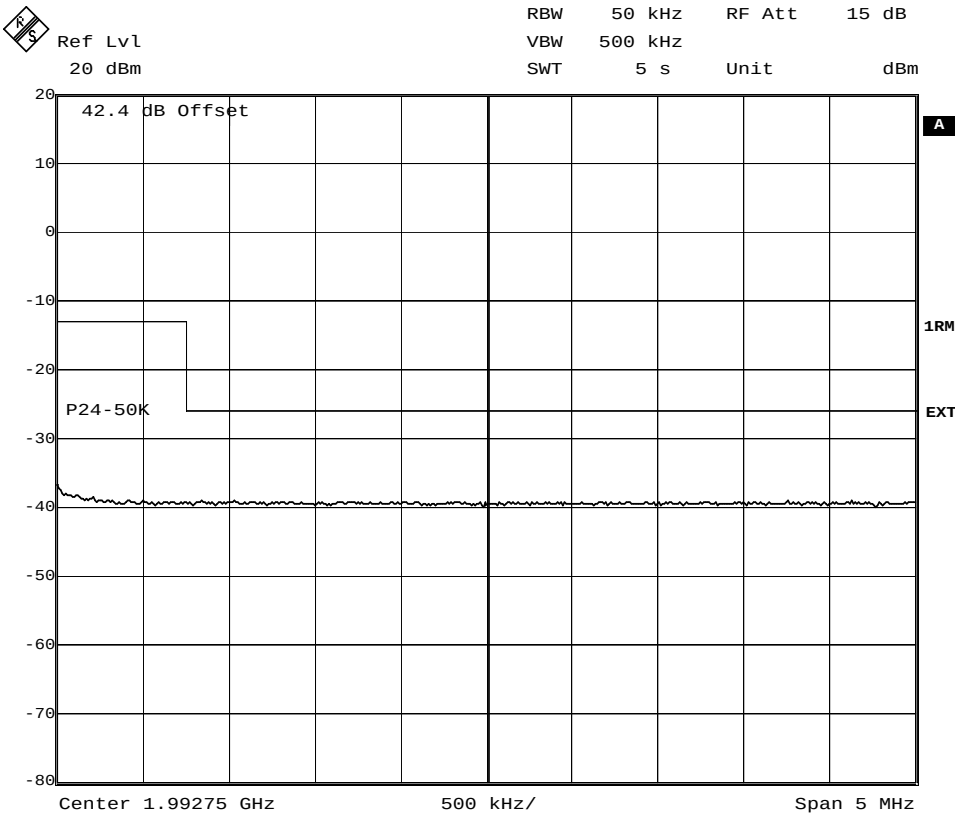
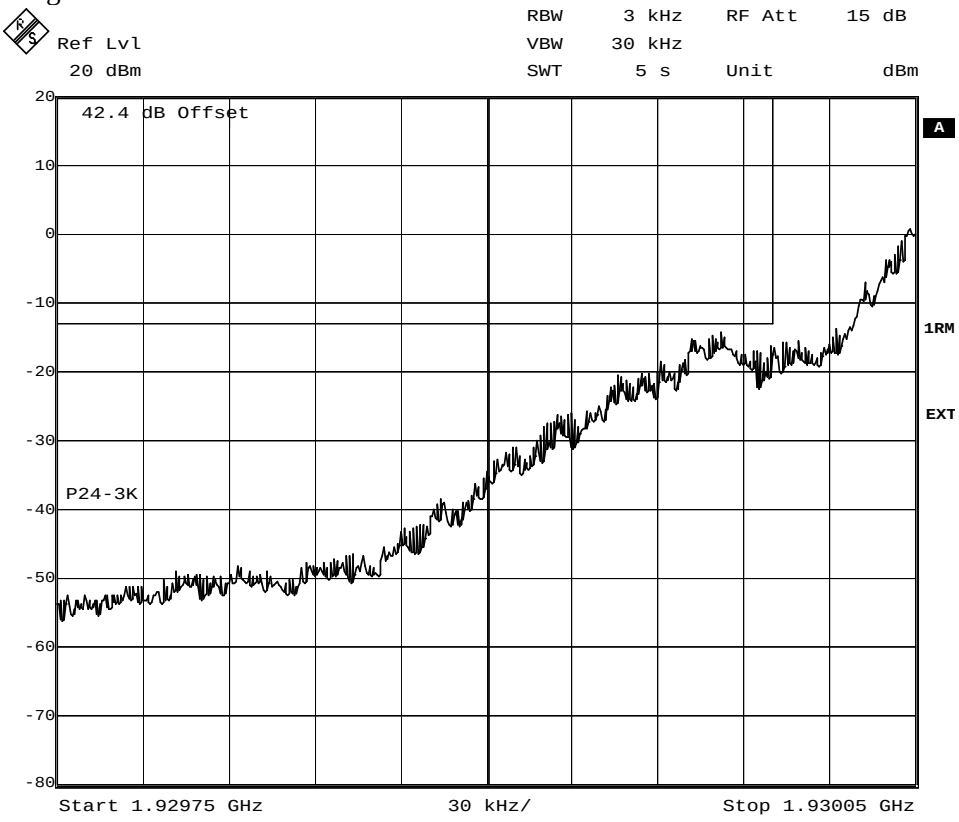

Ref Lvl
20 dBm
RBW 50 kHz
VBW 500 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 1.99275 GHz
500 kHz/
Span 5 MHz
Date: 4.MAY.2007 13:38:07

Diagram 11


Ref Lvl
20 dBm
RBW 3 kHz
VBW 30 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92975 GHz
30 kHz/
Stop 1.93005 GHz
Date: 4.MAY.2007 15:06:32

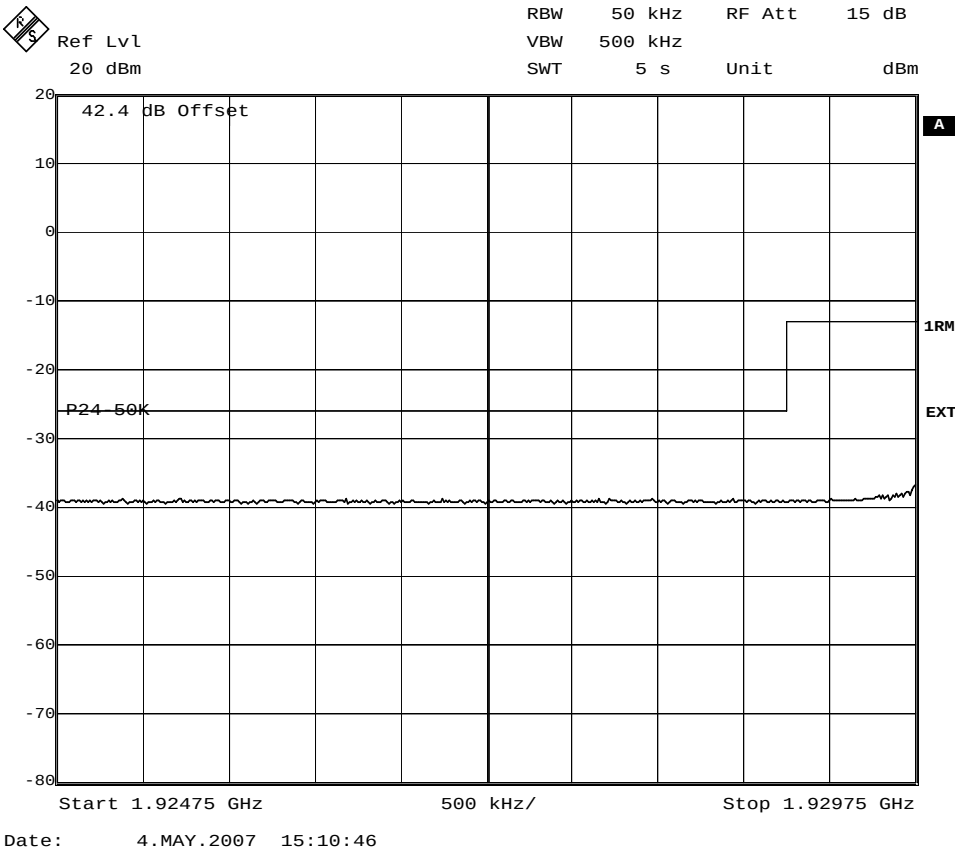
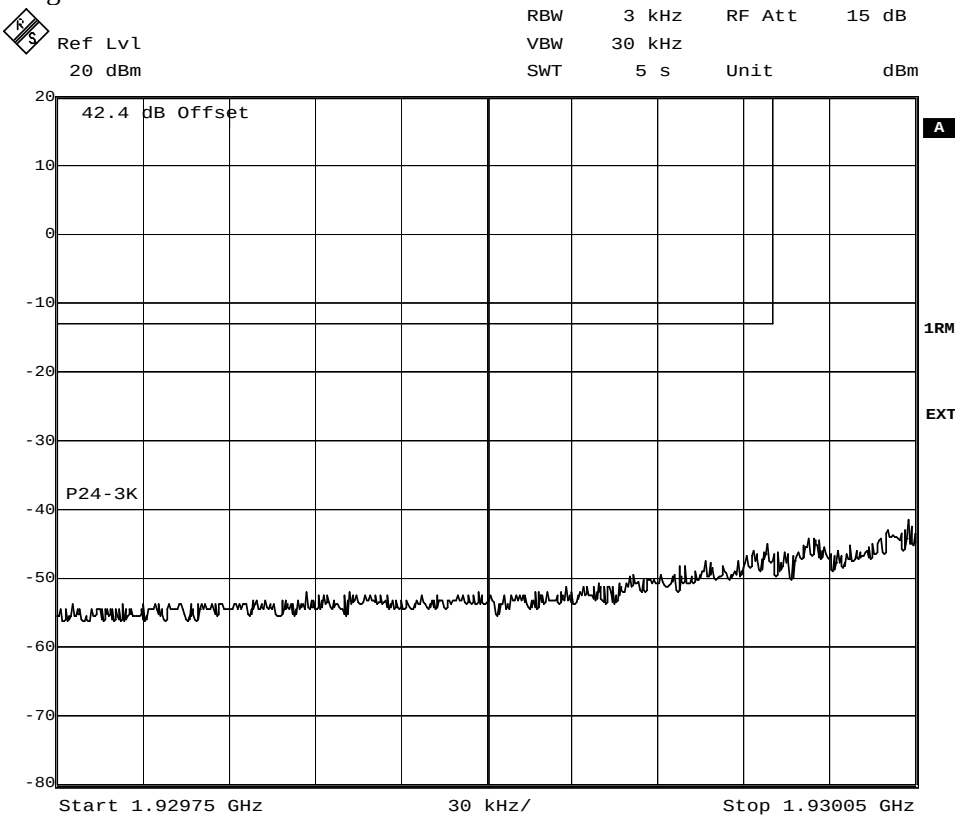
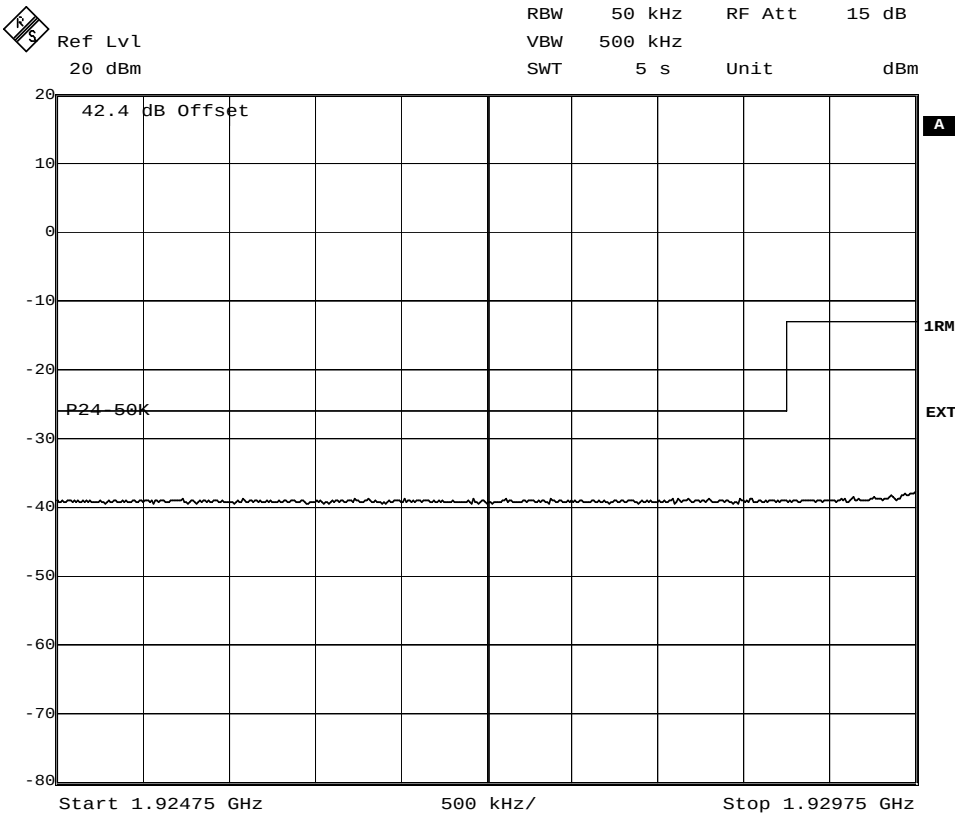

Ref Lvl
20 dBm
RBW 50 kHz
VBW 500 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92475 GHz
500 kHz/
Stop 1.92975 GHz
Date: 4.MAY.2007 15:10:46

Diagram 12

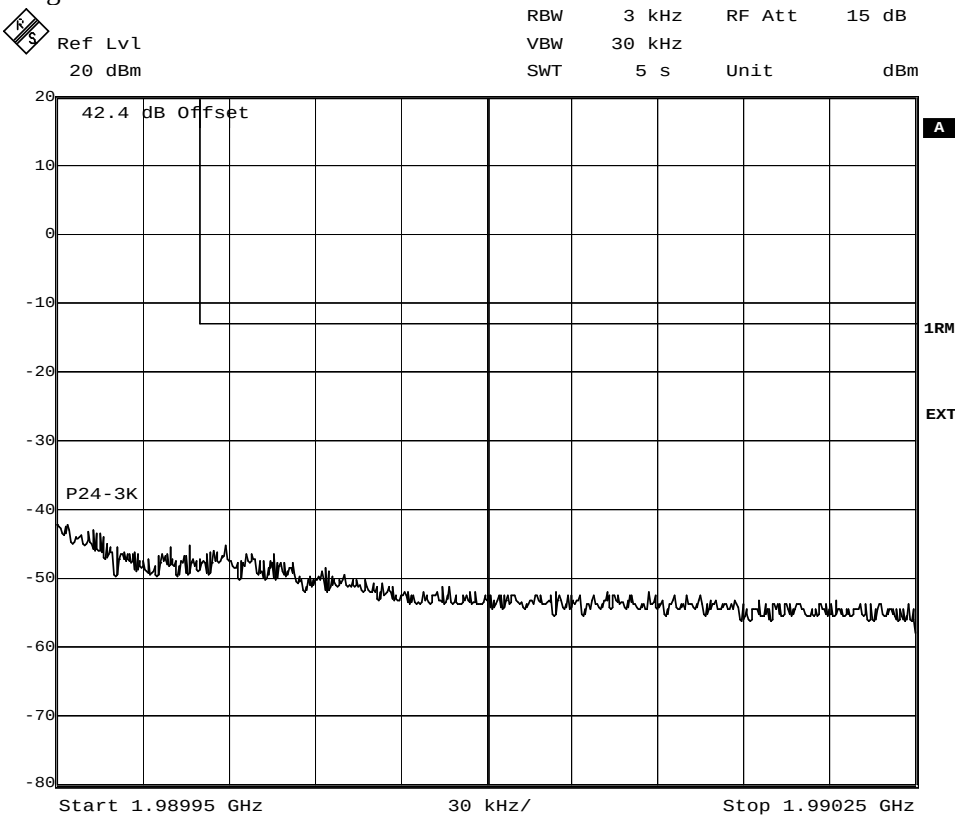


Date: 4.MAY.2007 15:08:38



Date: 4.MAY.2007 15:09:51

Diagram 13


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 4.MAY.2007 15:17:35

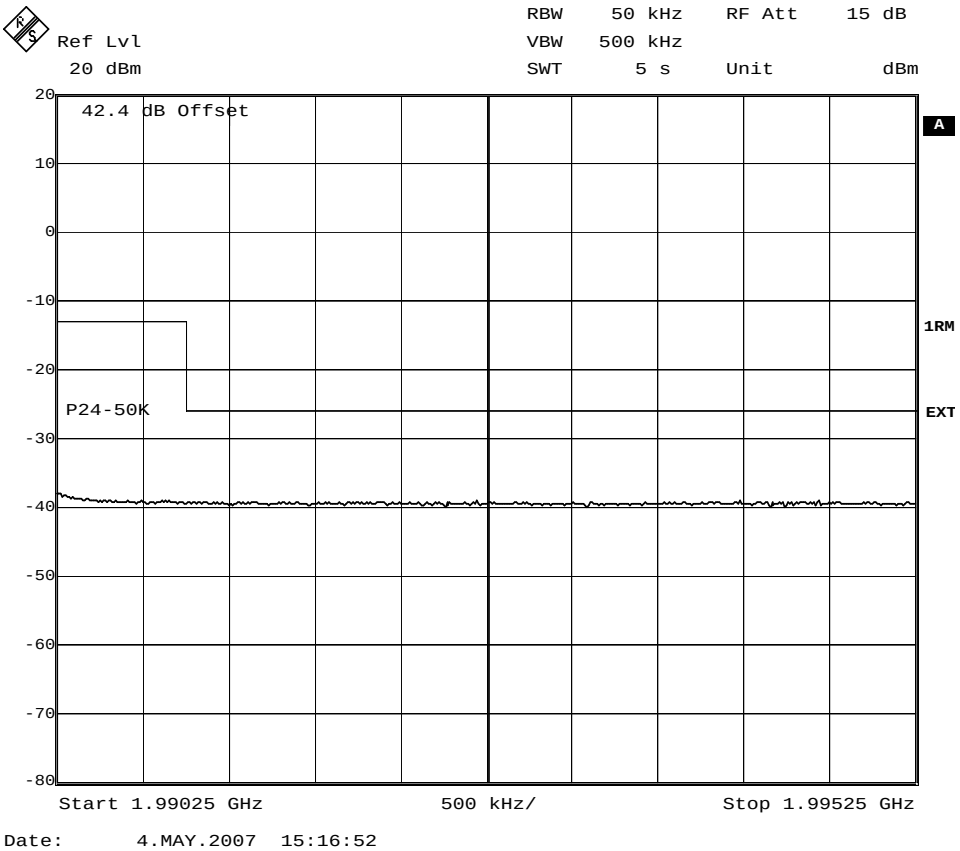
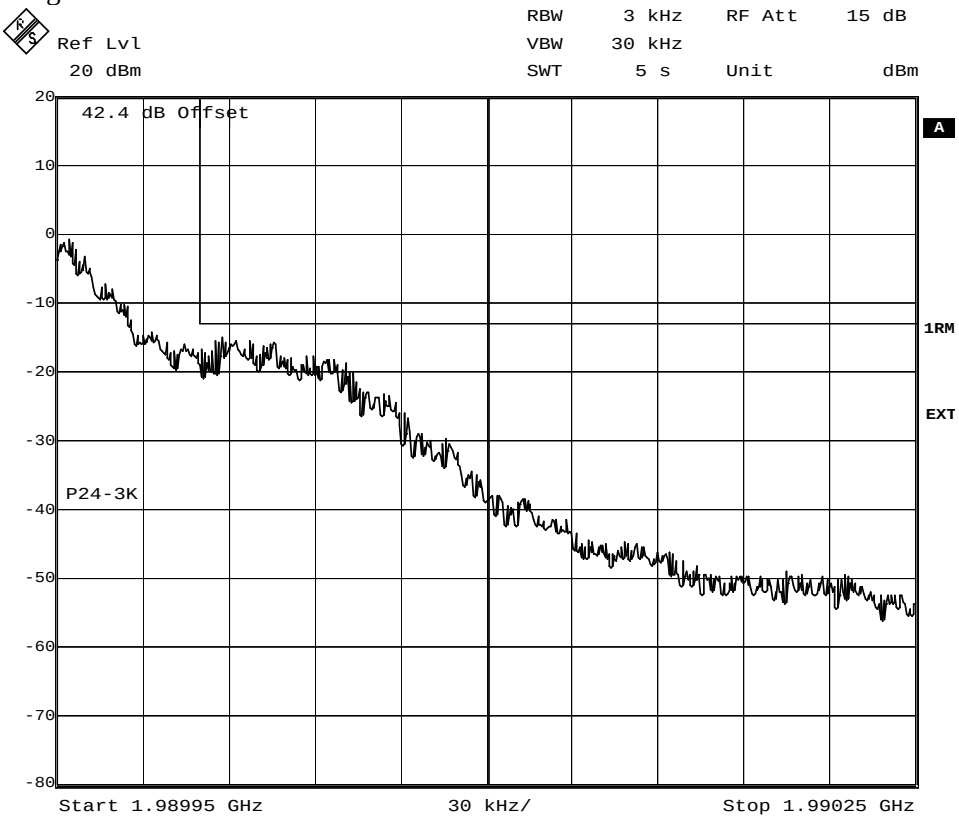

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.99025 GHz
500 kHz/
Stop 1.99525 GHz
Date: 4.MAY.2007 15:16:52

Diagram 14


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 4.MAY.2007 15:13:41

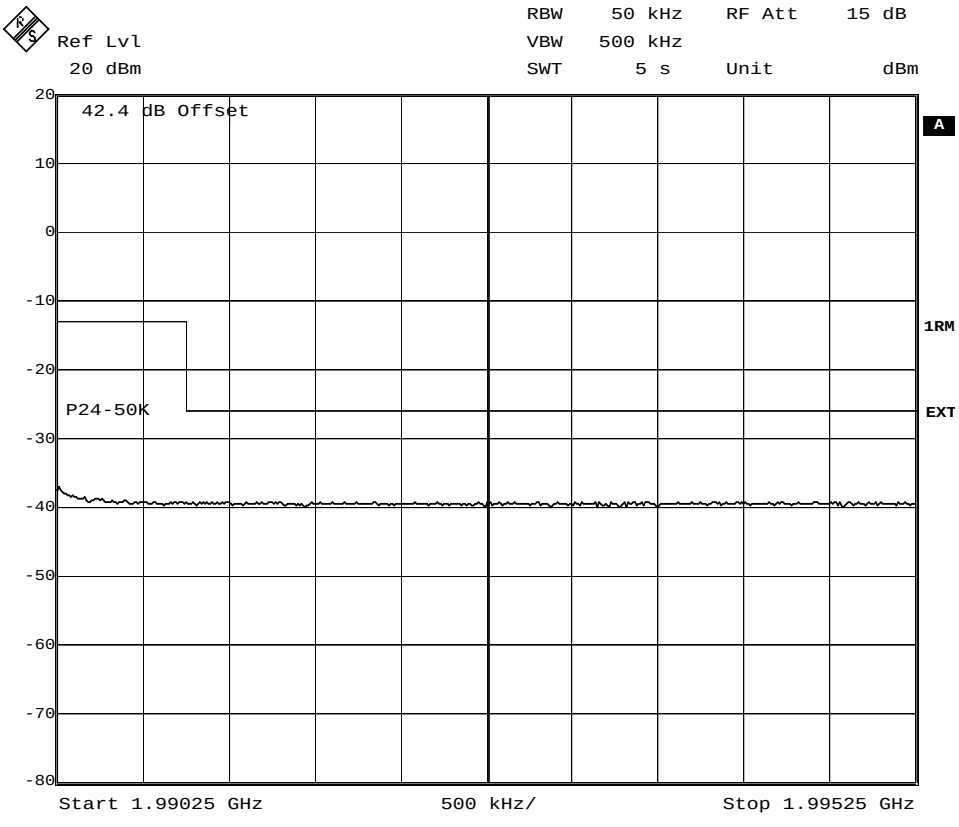
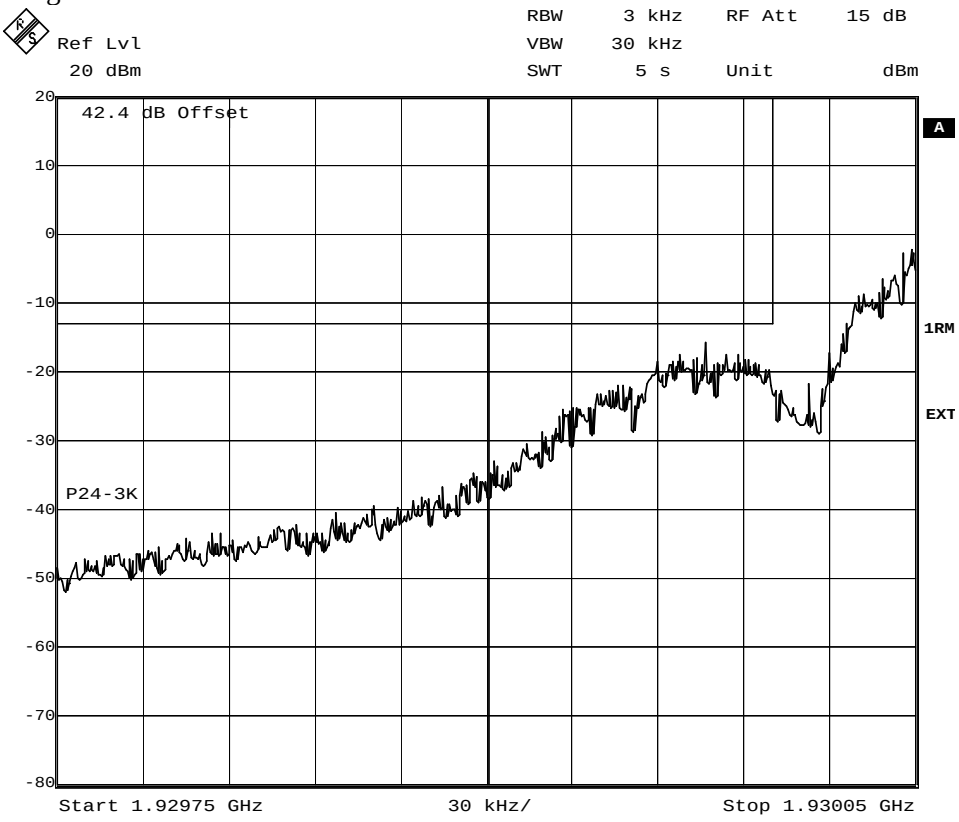

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
Start 1.99025 GHz
500 kHz/
Stop 1.99525 GHz
Date: 4.MAY.2007 15:14:37

Diagram 15


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
Start 1.92975 GHz
30 kHz/
Stop 1.93005 GHz
Date: 2.MAY.2007 14:42:55

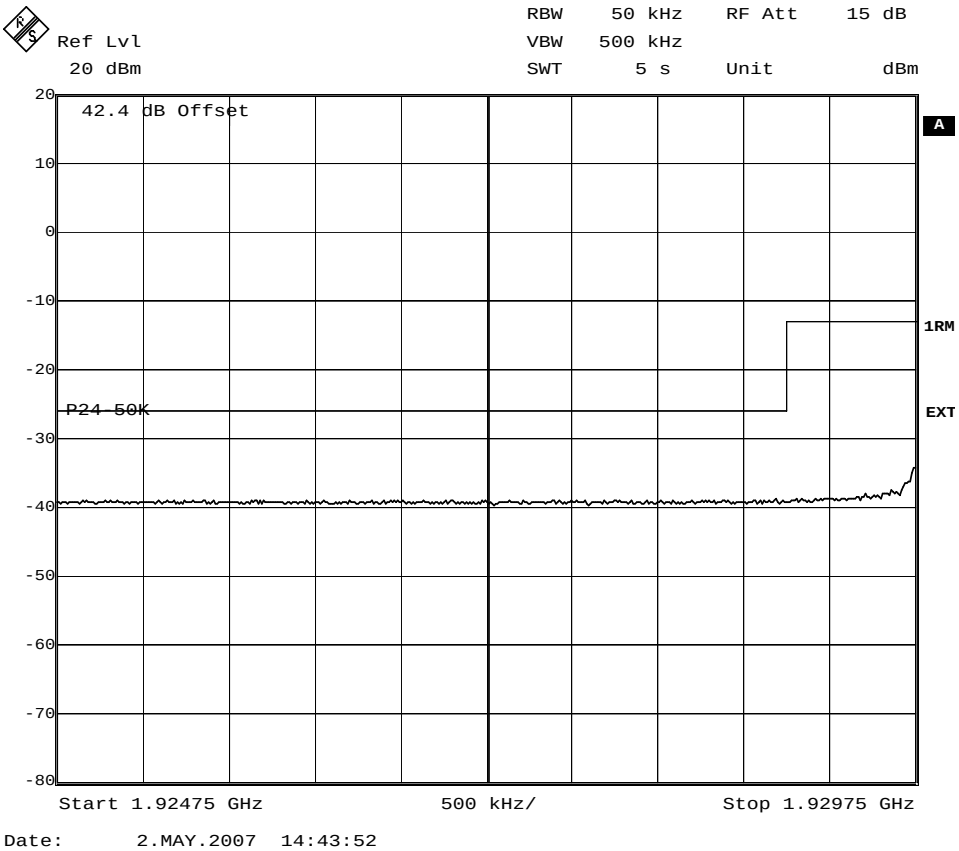
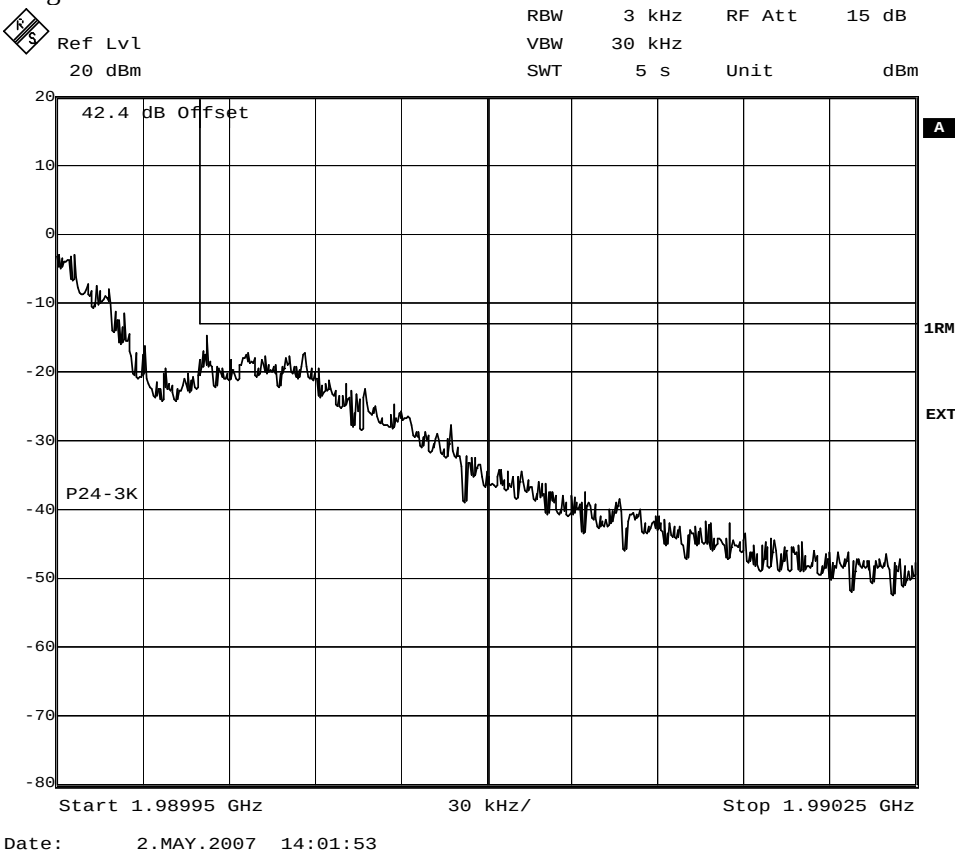

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
Start 1.92475 GHz
500 kHz/
Stop 1.92975 GHz
Date: 2.MAY.2007 14:43:52

Diagram 16


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 2.MAY.2007 14:01:53

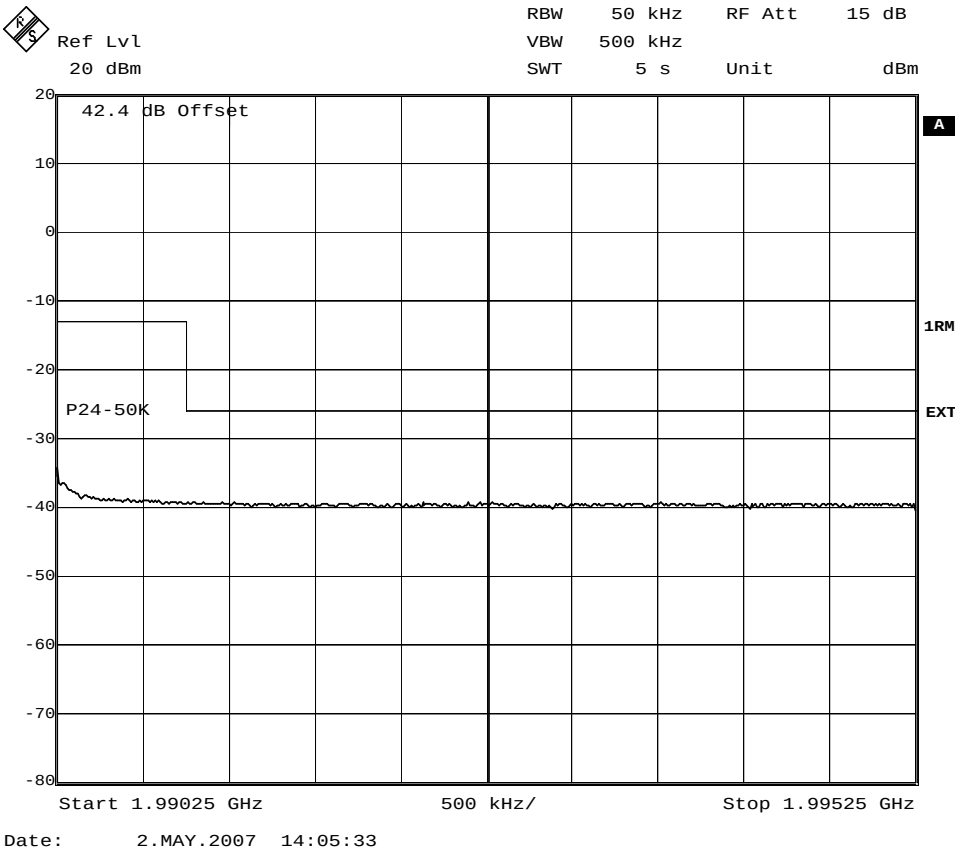
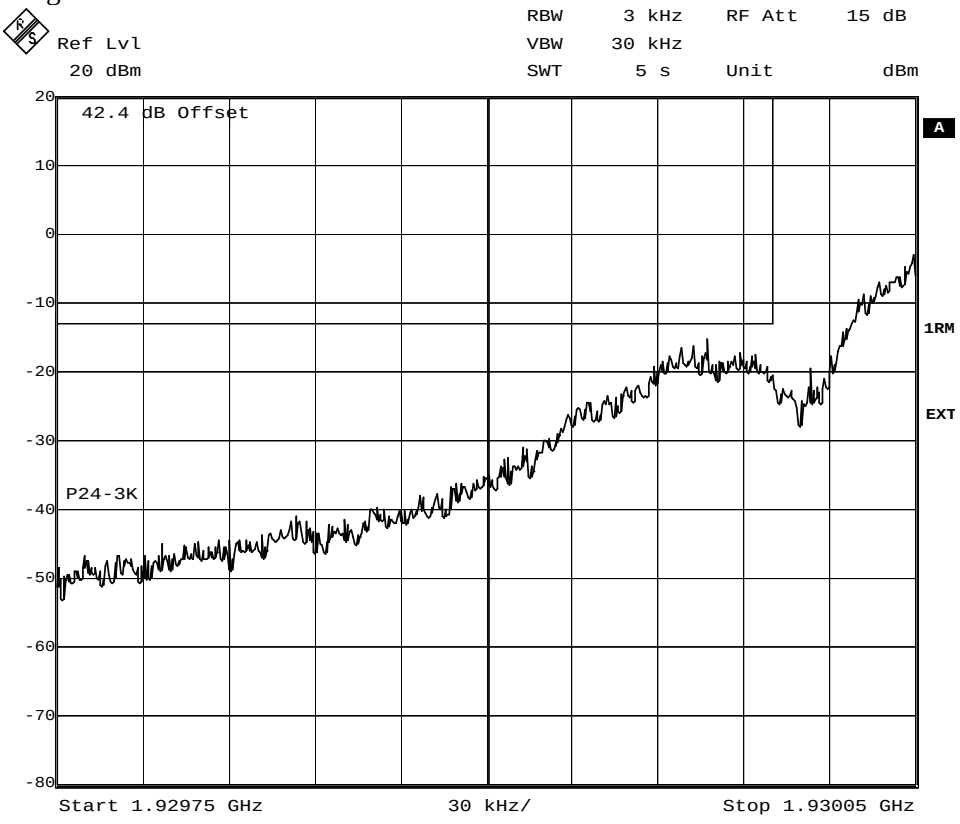

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.99025 GHz
500 kHz/
Stop 1.99525 GHz
Date: 2.MAY.2007 14:05:33

Diagram 17


Ref Lvl
20 dBm
RBW 3 kHz
VBW 30 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92975 GHz
30 kHz/
Stop 1.93005 GHz
Date: 2.MAY.2007 14:26:20

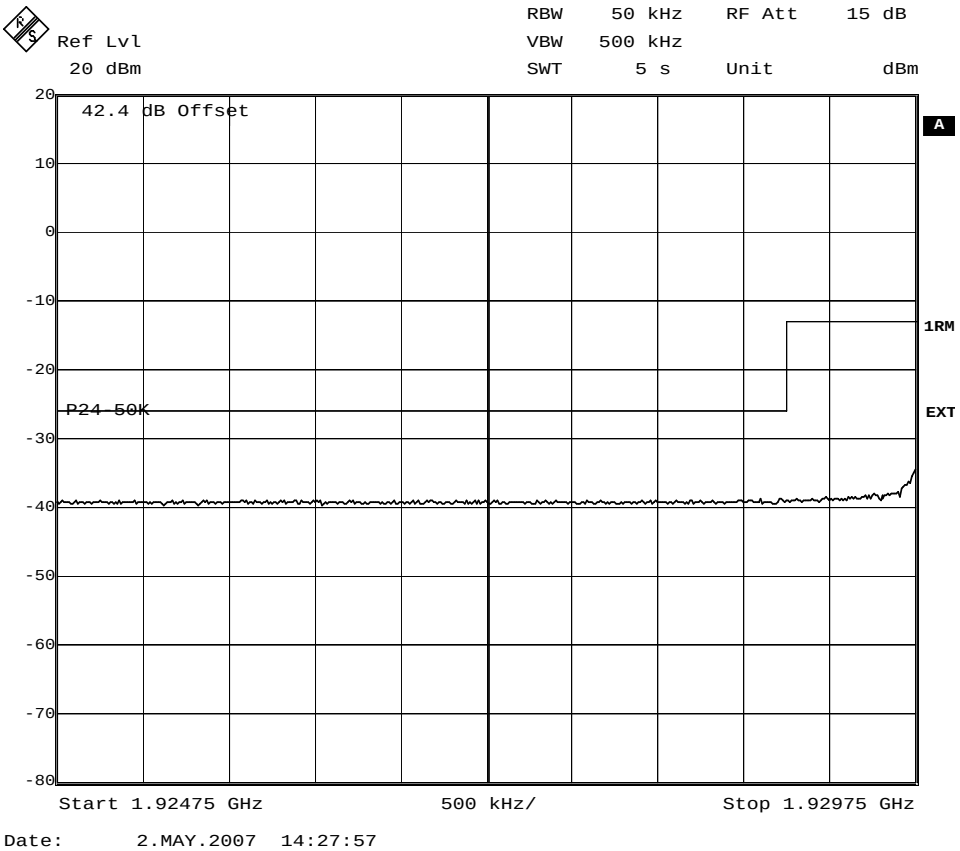
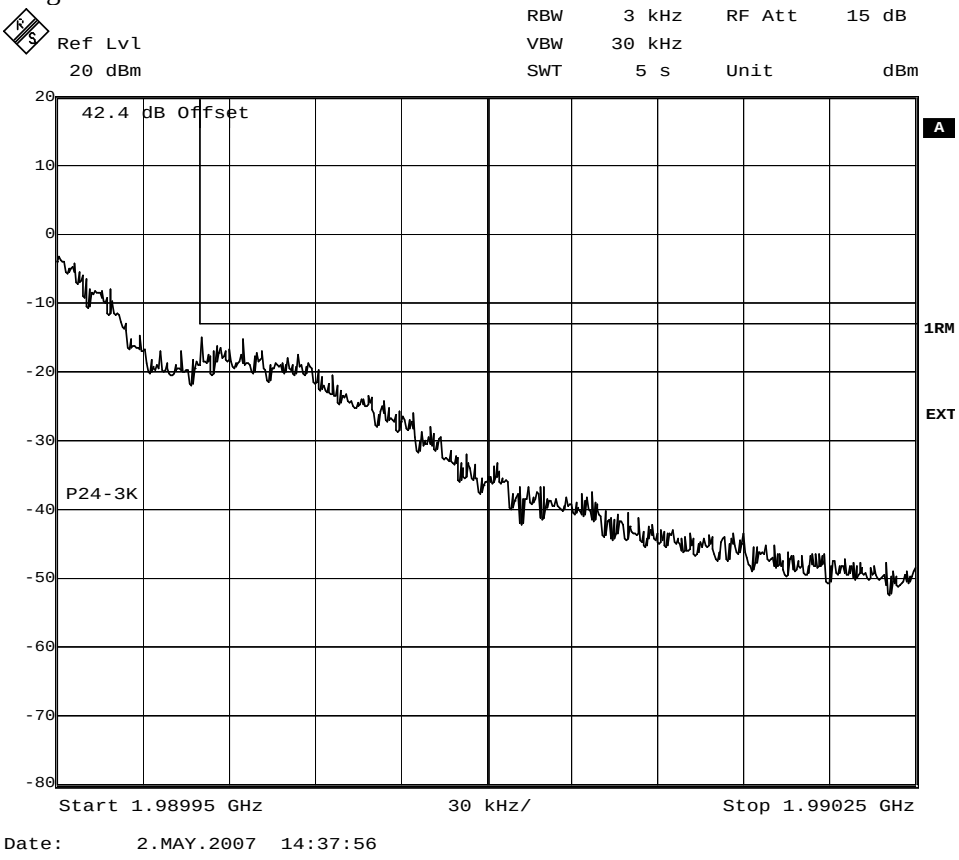
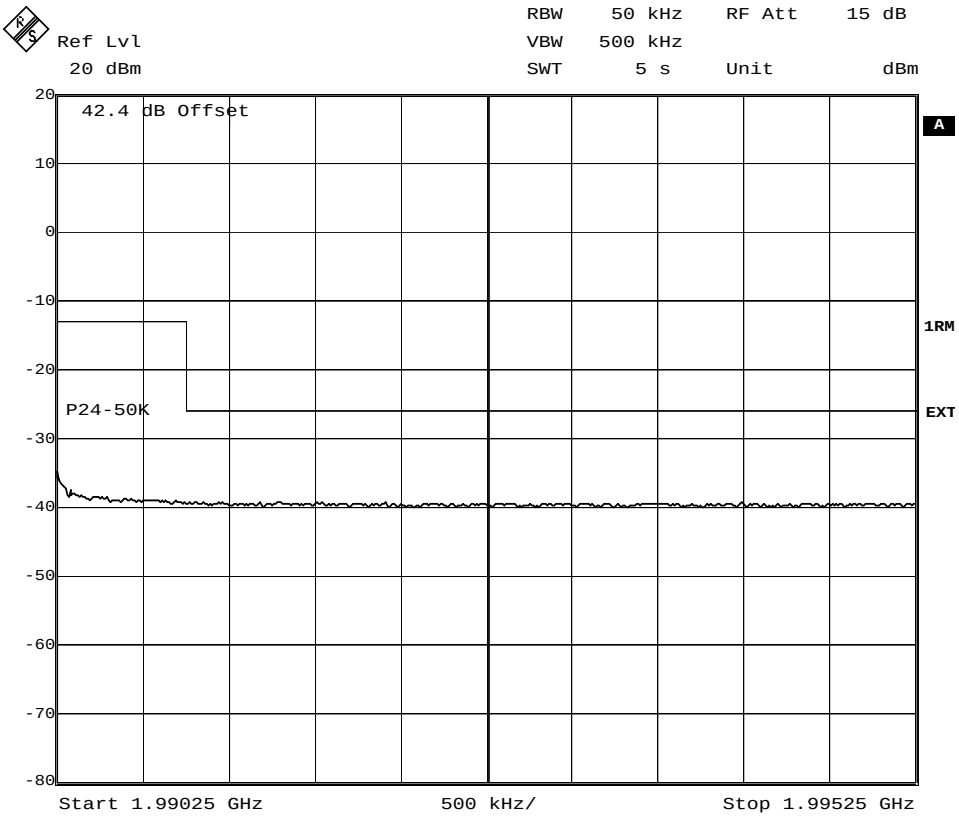

Ref Lvl
20 dBm
RBW 50 kHz
VBW 500 kHz
SWT 5 s
RF Att 15 dB
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 1.92475 GHz
500 kHz/
Stop 1.92975 GHz
Date: 2.MAY.2007 14:27:57

Diagram 18

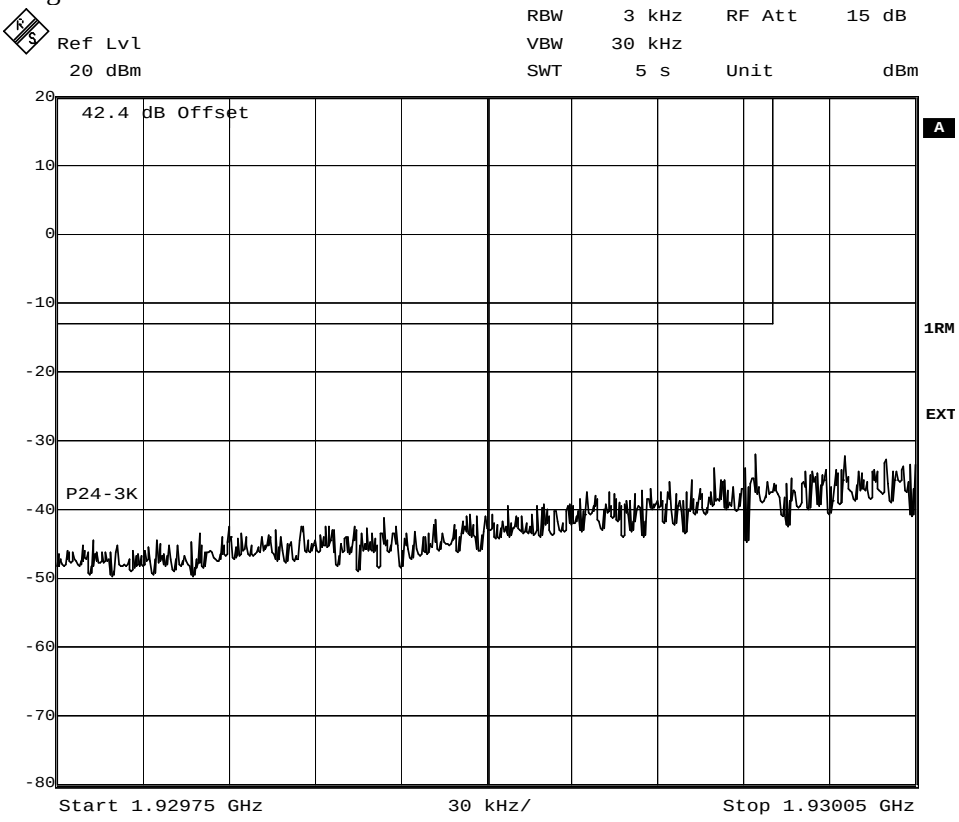


Date: 2.MAY.2007 14:37:56

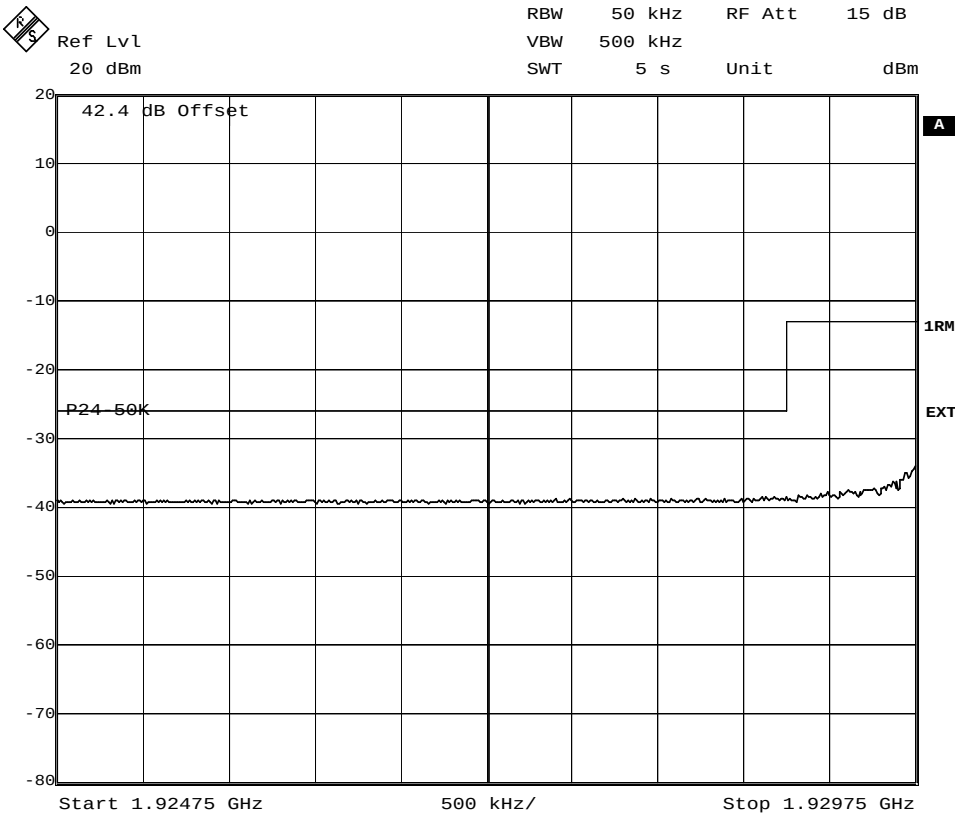


Date: 2.MAY.2007 14:39:11

Diagram 19

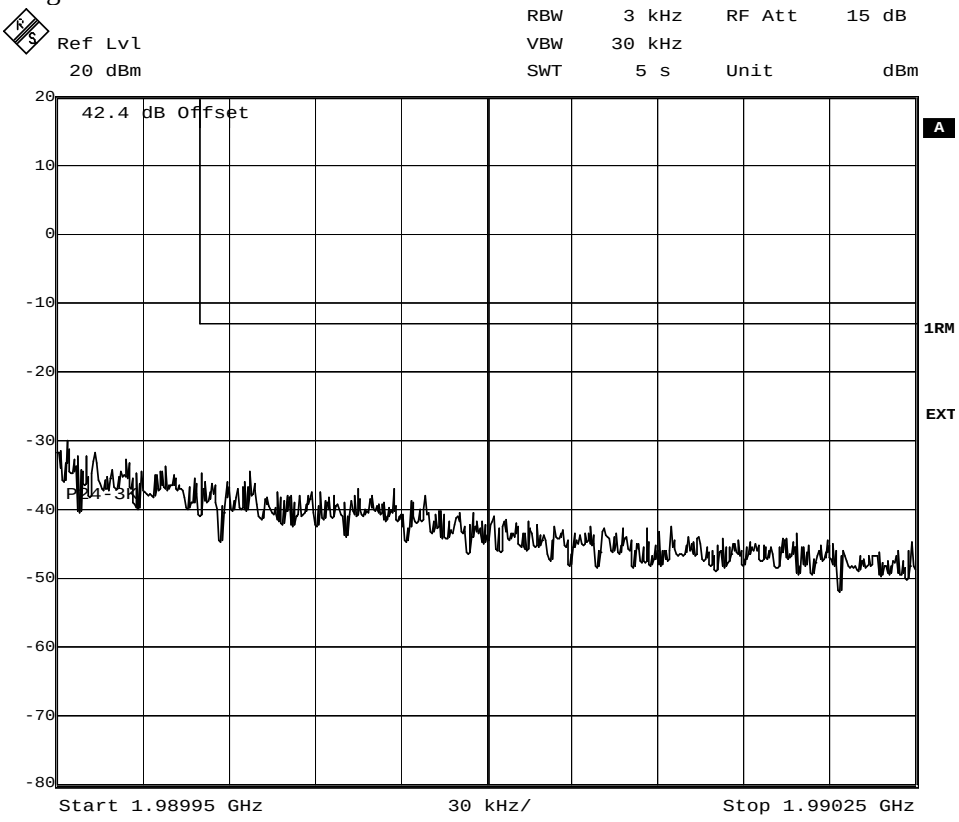


Date: 3.MAY.2007 10:12:25

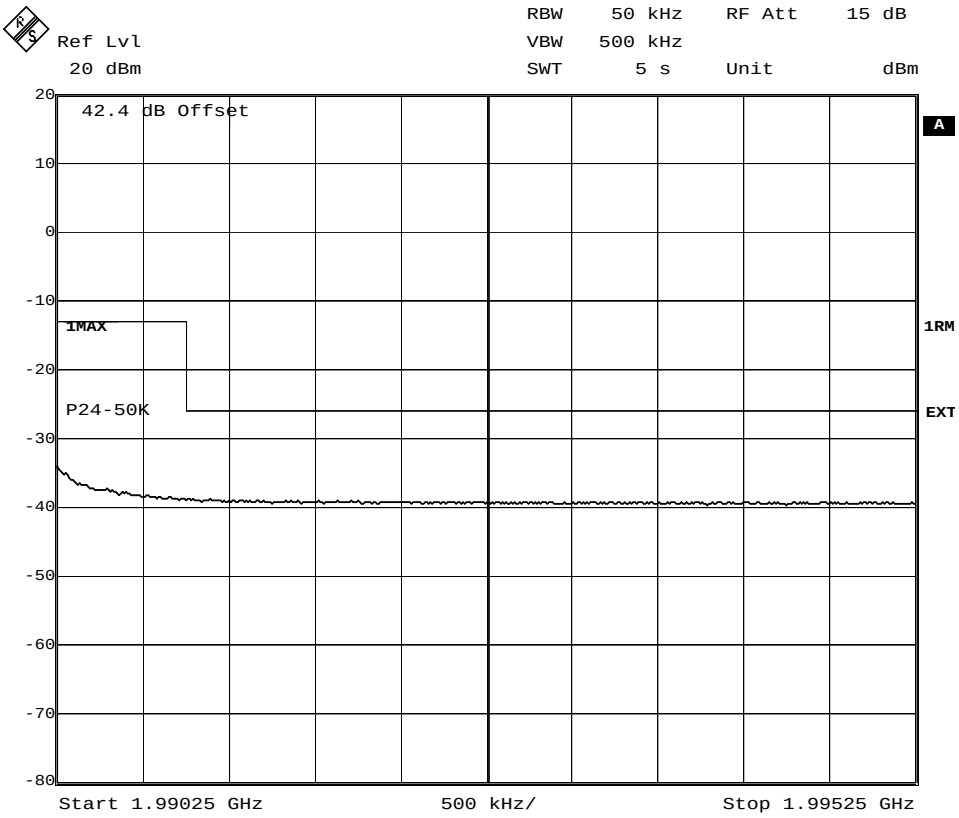


Date: 3.MAY.2007 10:13:20

Diagram 20

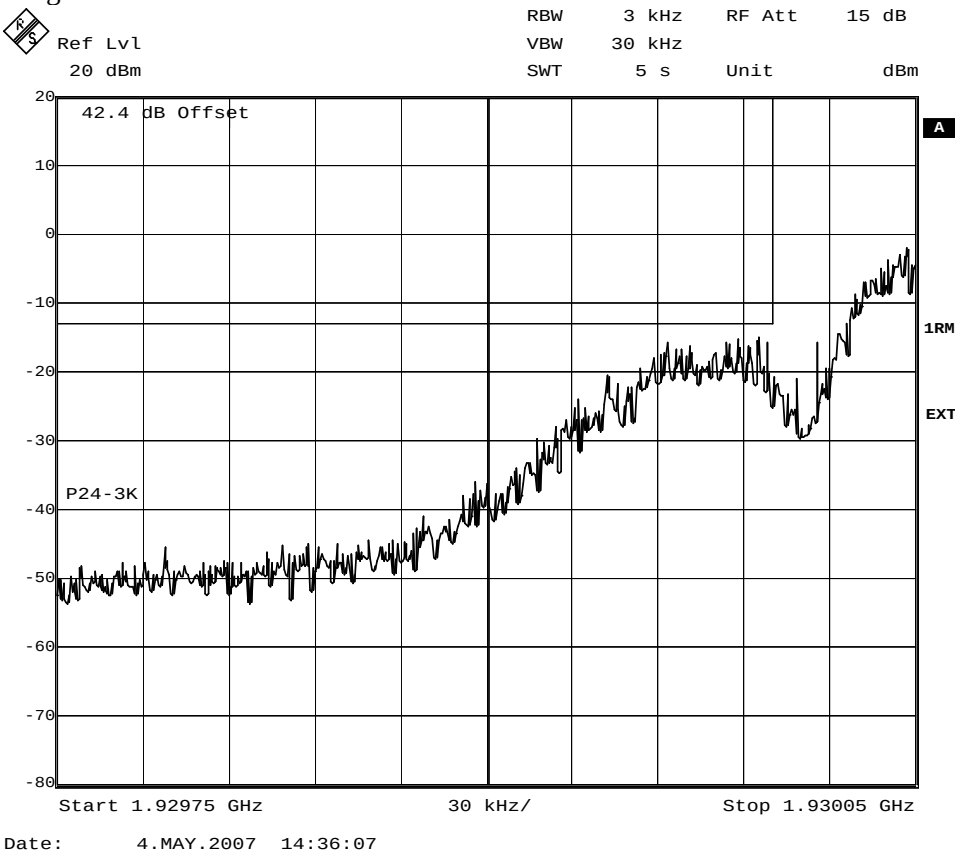


Date: 3.MAY.2007 10:11:25



Date: 3.MAY.2007 10:09:45

Diagram 21


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
Start 1.92975 GHz
30 kHz/
Stop 1.93005 GHz
Date: 4.MAY.2007 14:36:07

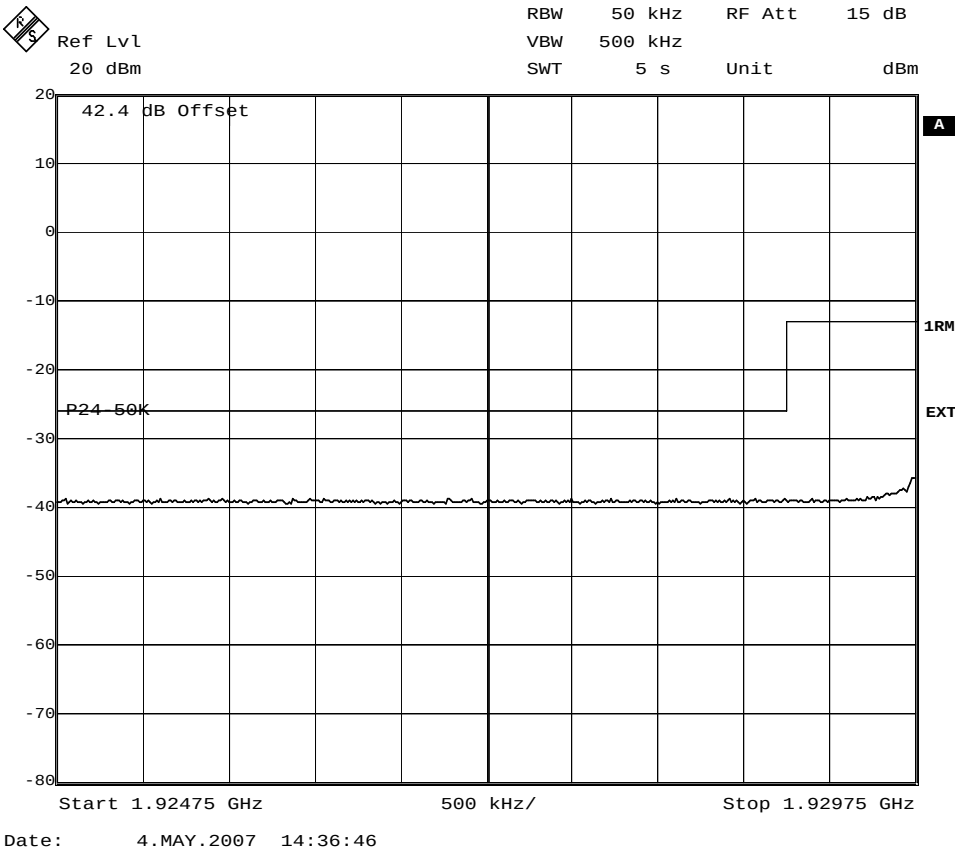
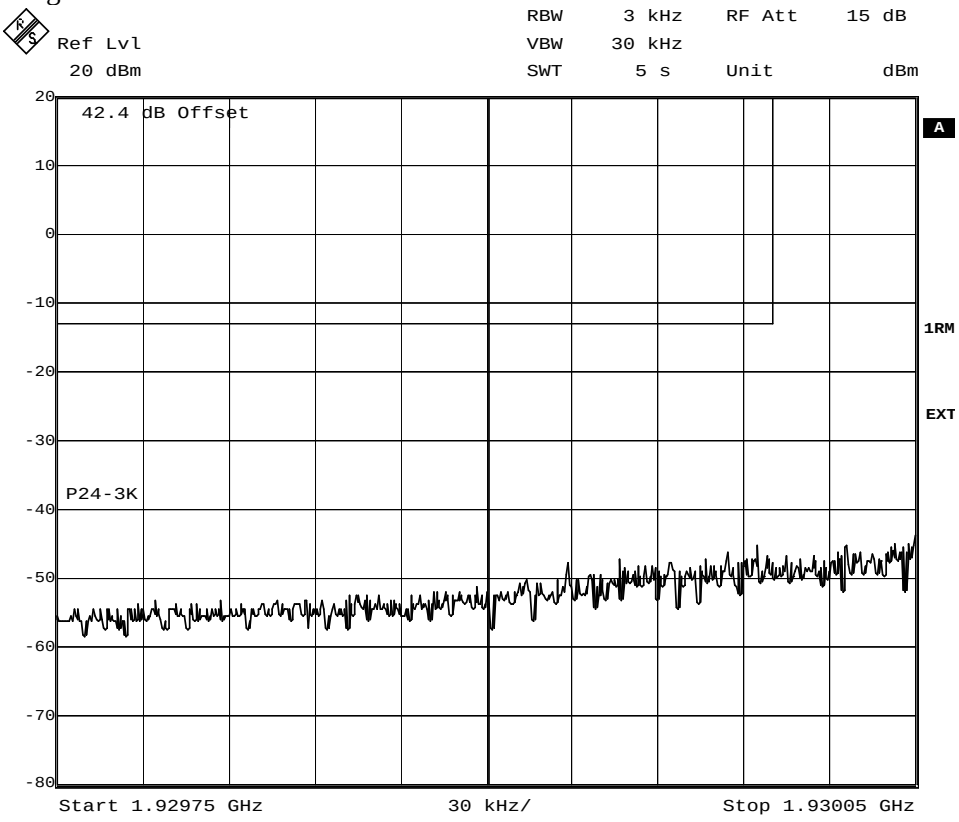
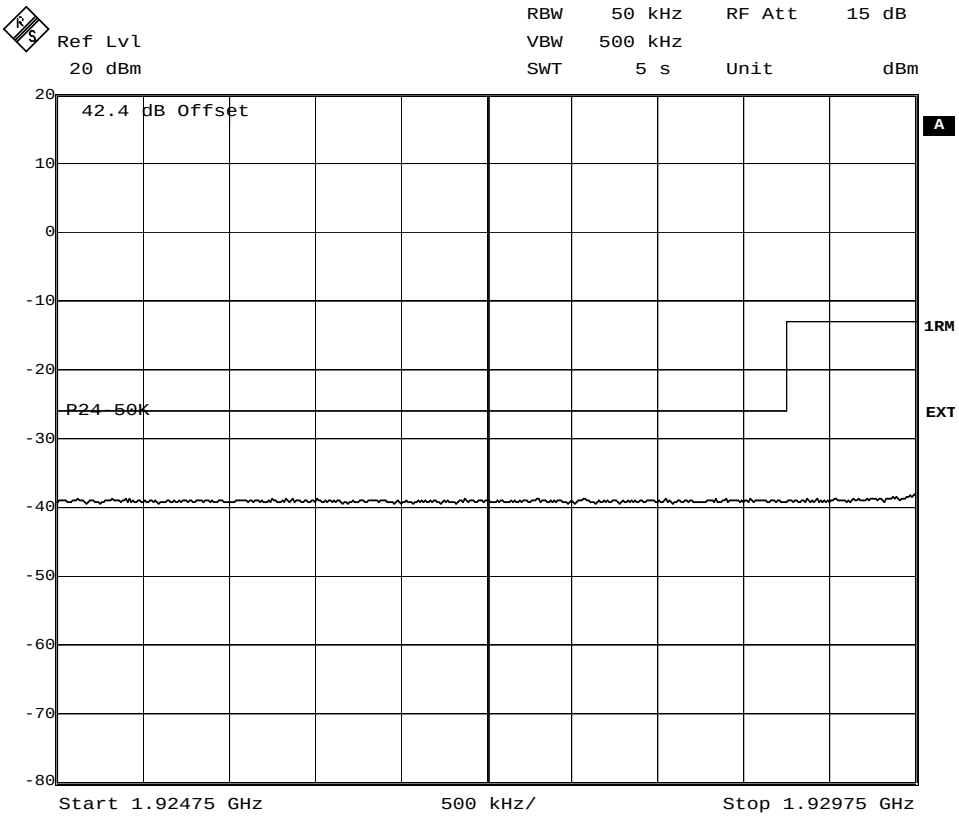

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-50K
Start 1.92475 GHz
500 kHz/
Stop 1.92975 GHz
Date: 4.MAY.2007 14:36:46

Diagram 22

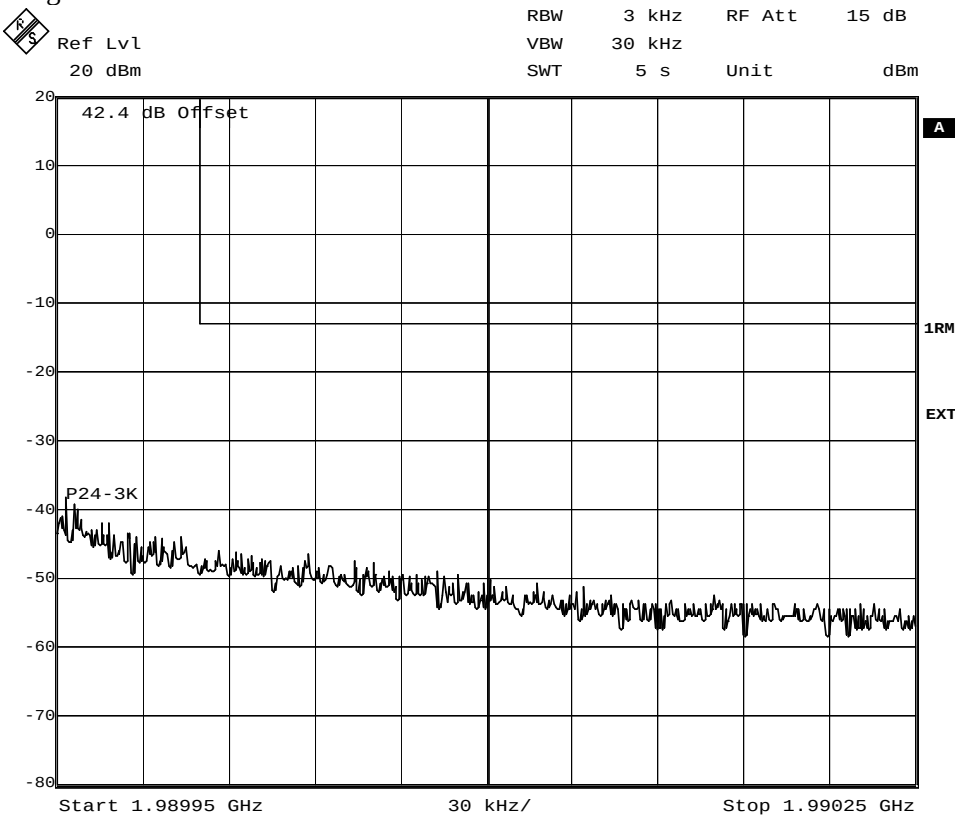


Date: 4.MAY.2007 14:39:11



Date: 4.MAY.2007 14:38:16

Diagram 23


RBW 3 kHz
RF Att 15 dB
VBW 30 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
A
1RM
EXT
P24-3K
Start 1.98995 GHz
30 kHz/
Stop 1.99025 GHz
Date: 4.MAY.2007 14:31:08

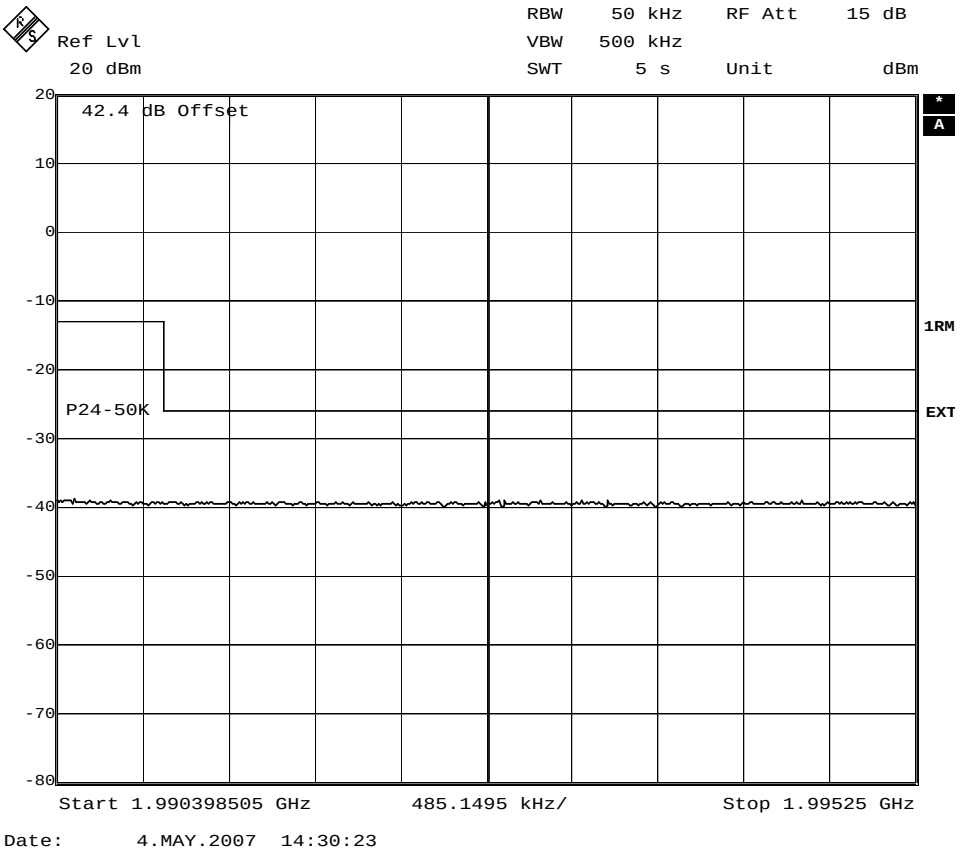
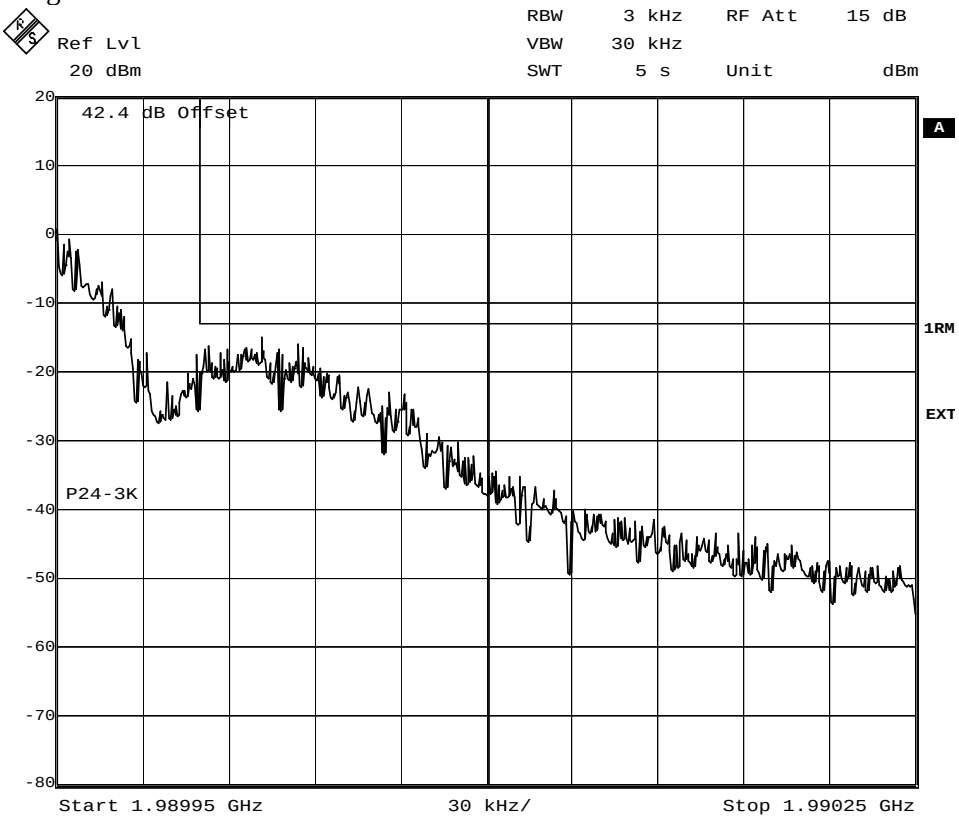
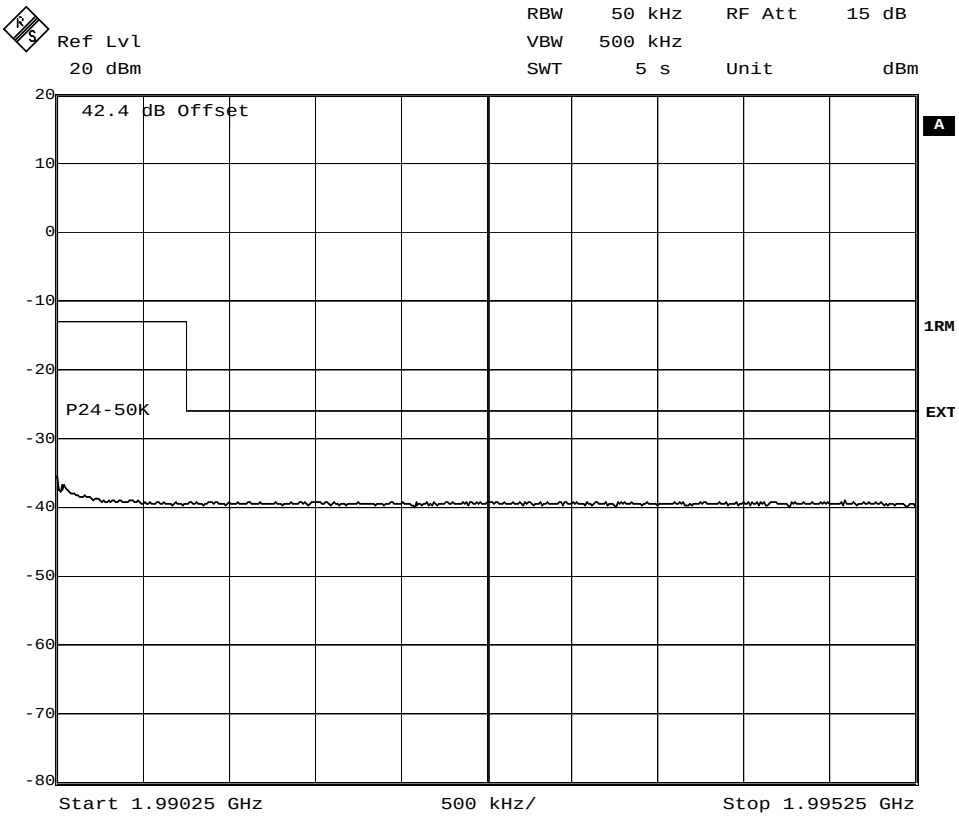

RBW 50 kHz
RF Att 15 dB
VBW 500 kHz
Ref Lvl
20 dBm
SWT 5 s
Unit dBm
42.4 dB Offset
*
A
1RM
EXT
P24-50K
Start 1.990398505 GHz
485.1495 kHz/
Stop 1.99525 GHz
Date: 4.MAY.2007 14:30:23

Diagram 24

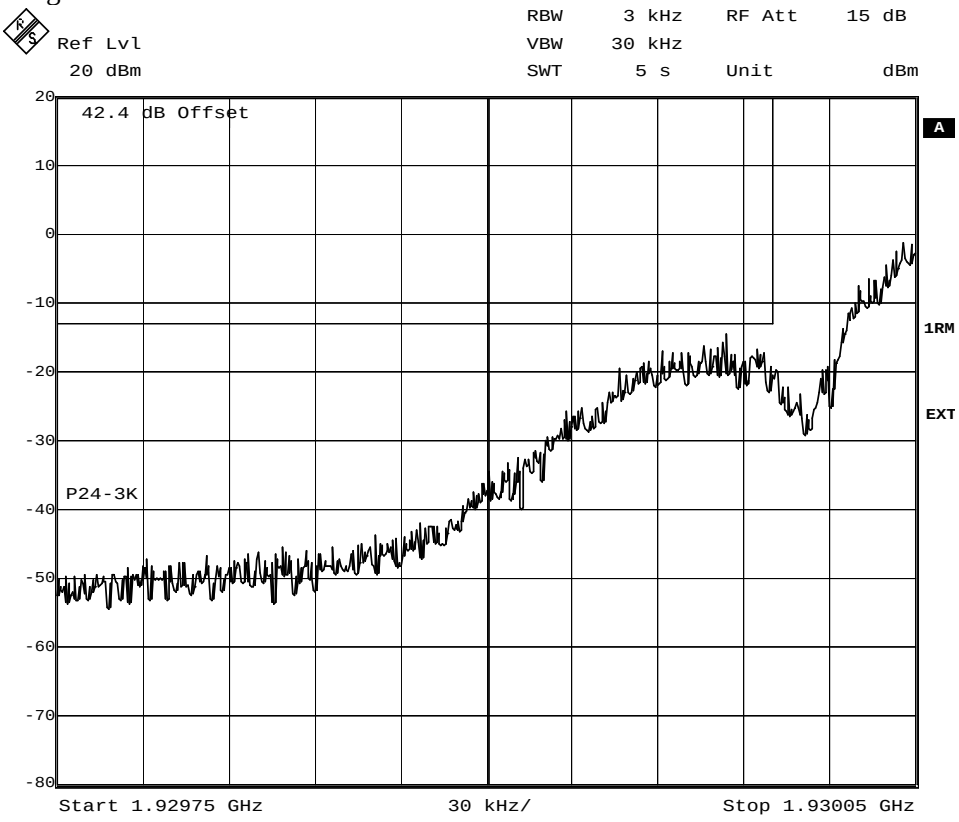


Date: 4.MAY.2007 14:27:39

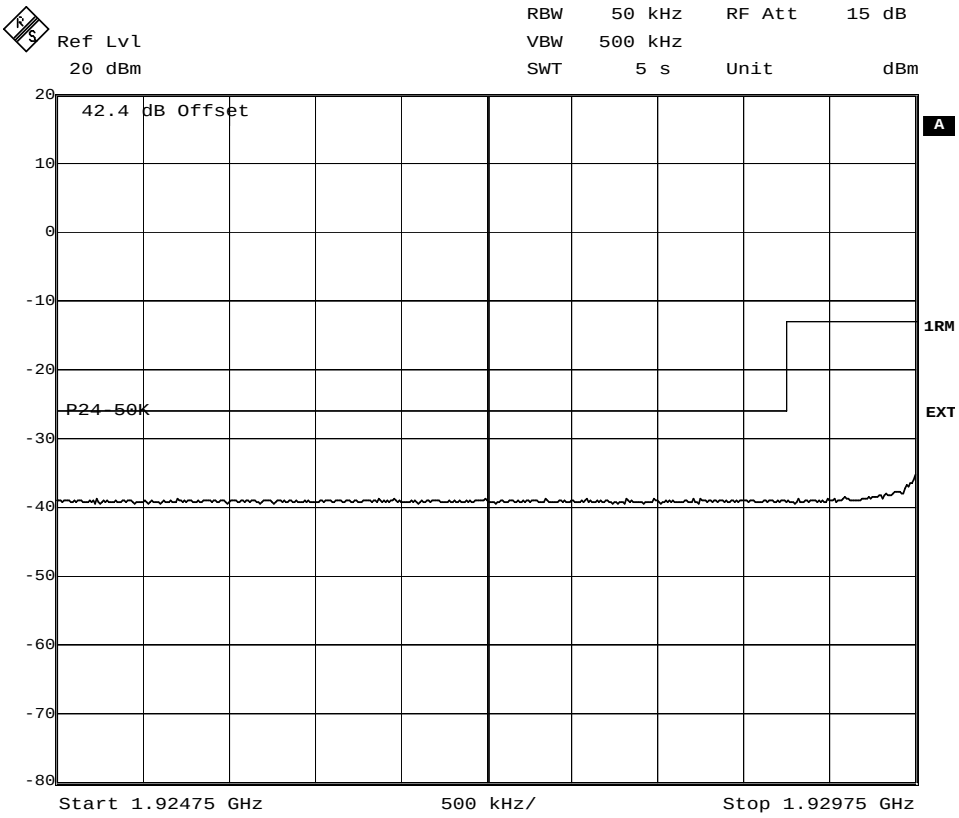


Date: 4.MAY.2007 14:29:08

Diagram 25

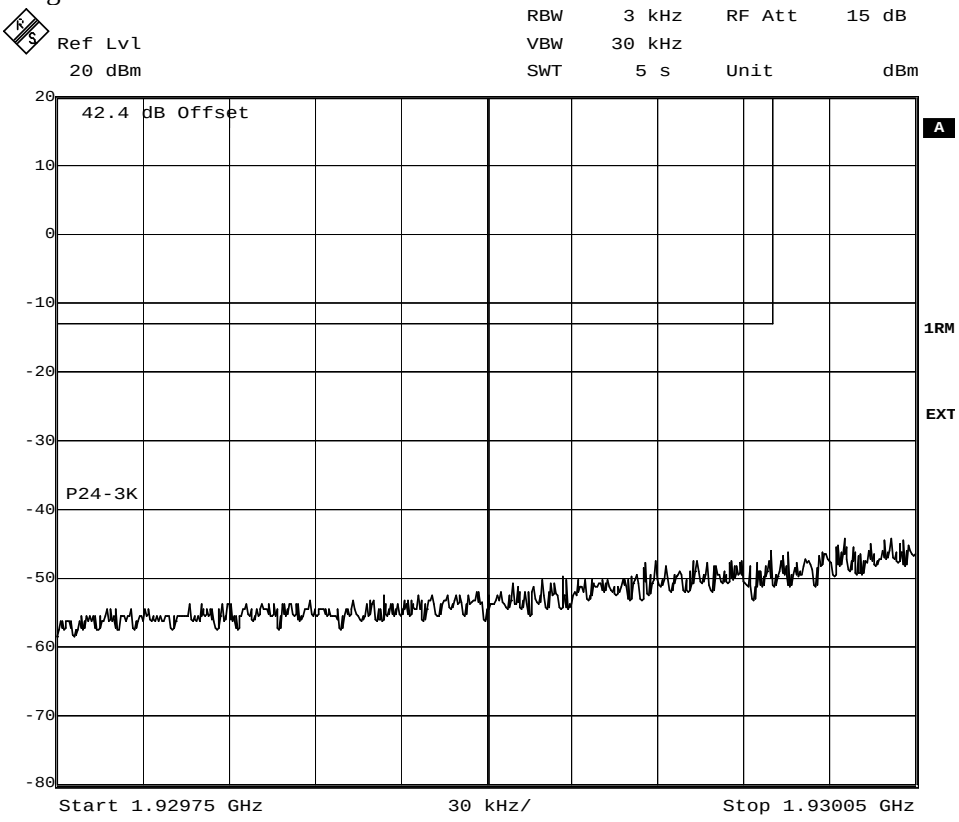


Date: 4.MAY.2007 15:24:51

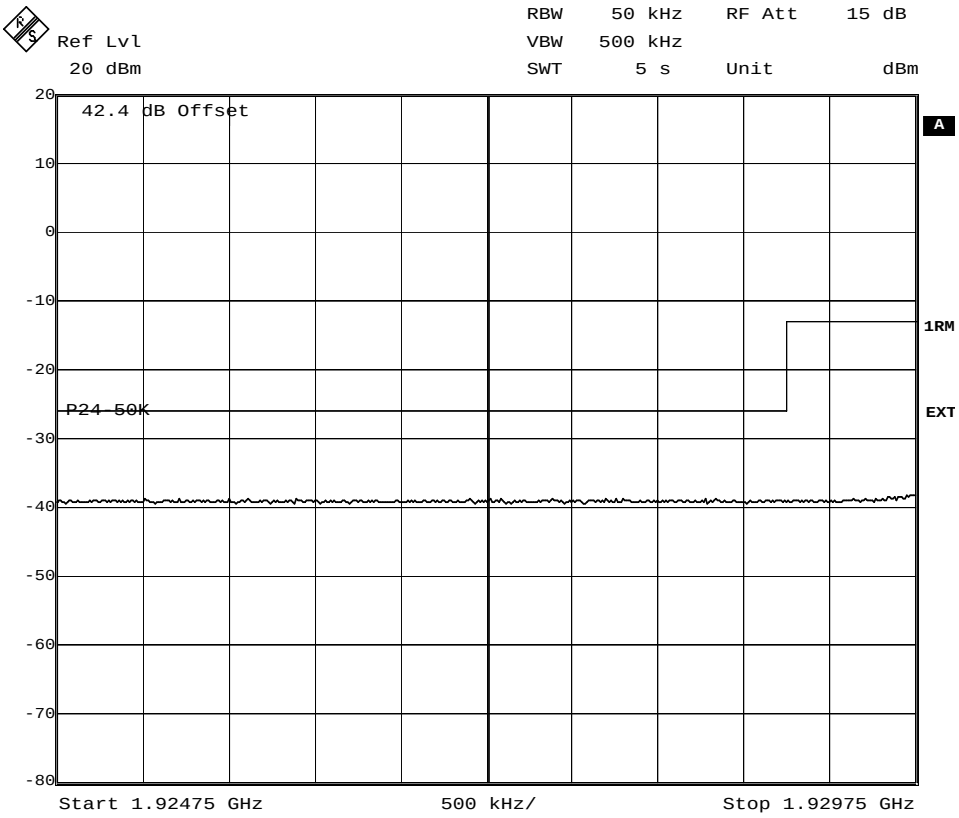


Date: 4.MAY.2007 15:25:40

Diagram 26

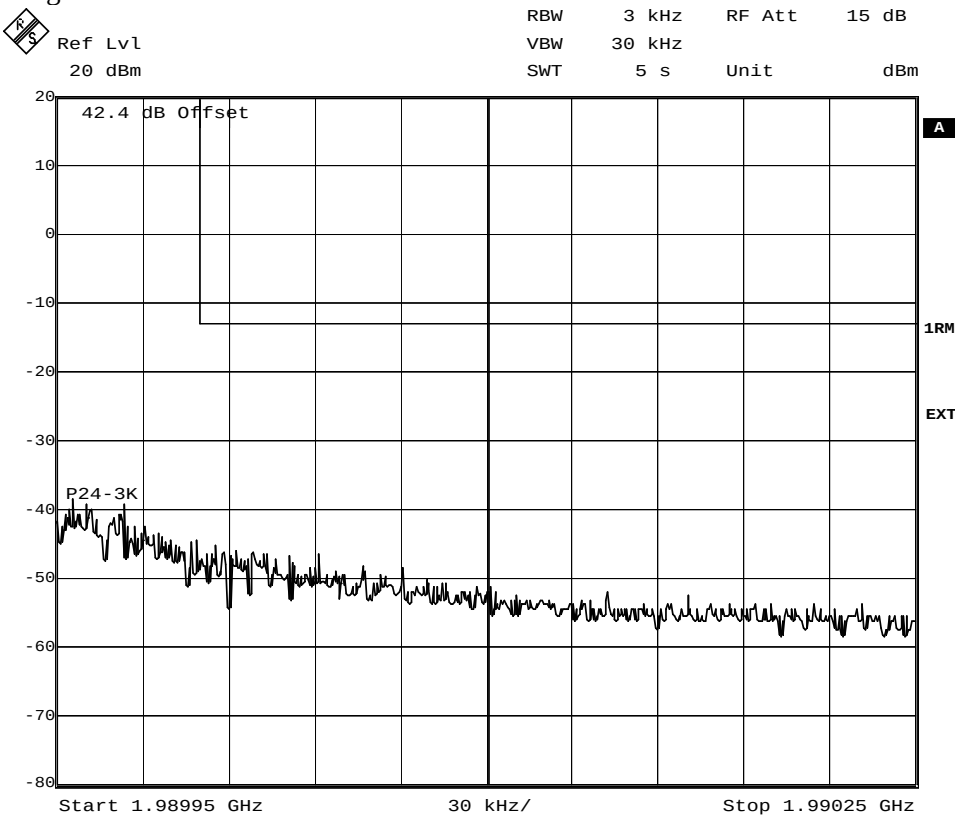


Date: 4.MAY.2007 15:27:38

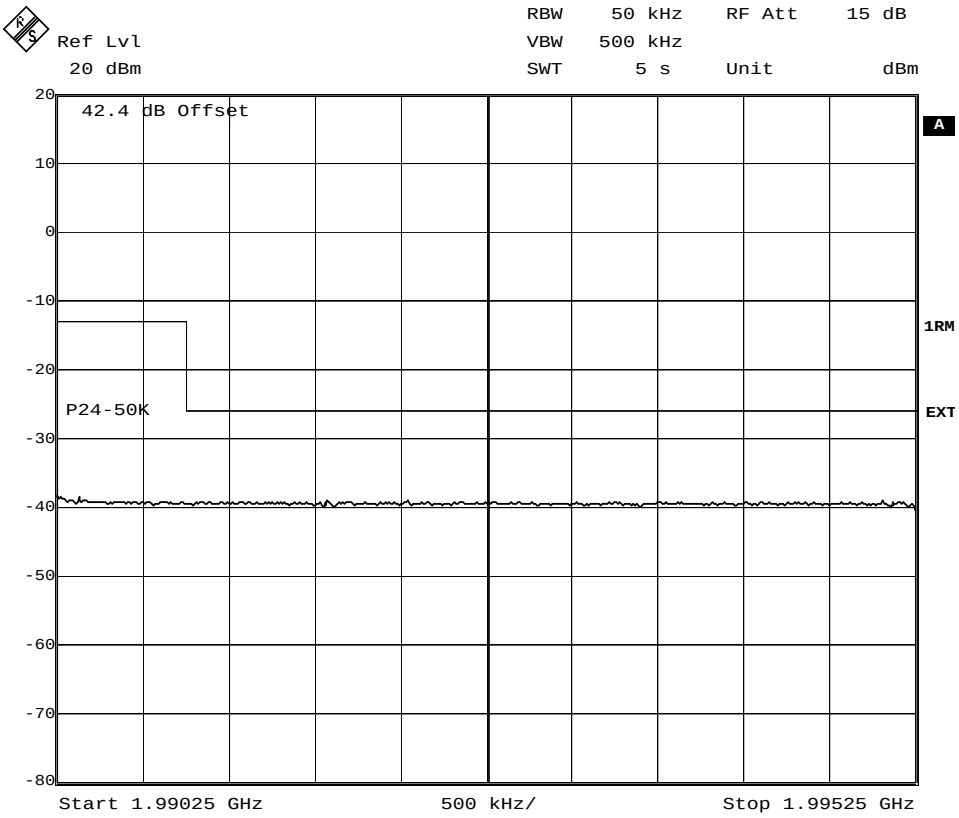


Date: 4.MAY.2007 15:26:30

Diagram 27

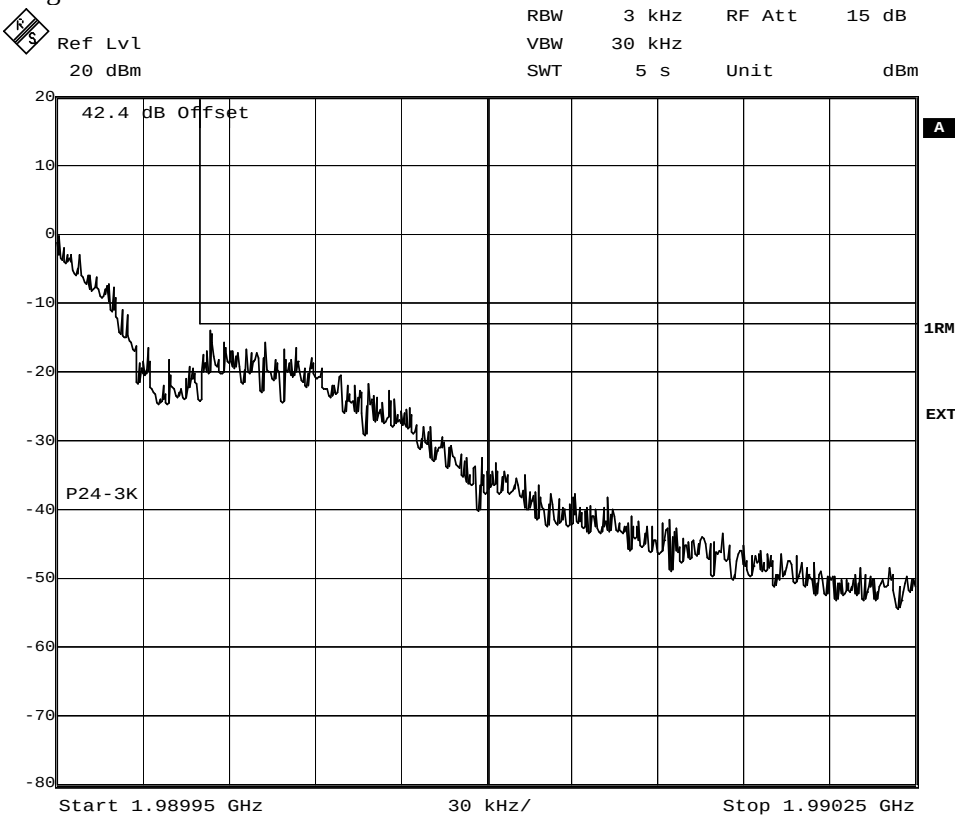


Date: 4.MAY.2007 15:21:56

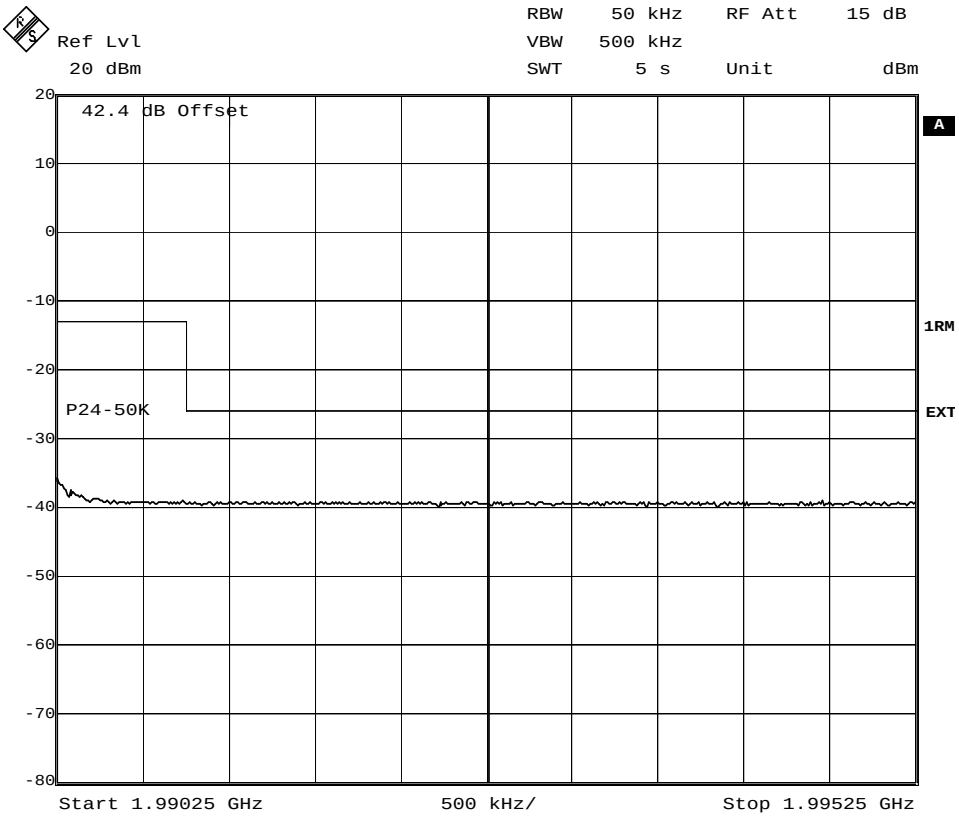


Date: 4.MAY.2007 15:33:46

Diagram 28



Date: 4.MAY.2007 15:22:50



Date: 4.MAY.2007 15:23:27

Conducted spurious emission measurements according to 47CFR 2.1051

Date	Temperature	Humidity
2007-05-02	23 °C ± 3 °C	22 % ± 5 %
2007-05-03	23 °C ± 3 °C	20 % ± 5 %
2007-05-07	22 °C ± 3 °C	37 % ± 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	2007-08	503 738
HP filter	2007-07	502 758
Testo 610, Temperature and humidity meter	2008-12	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

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):

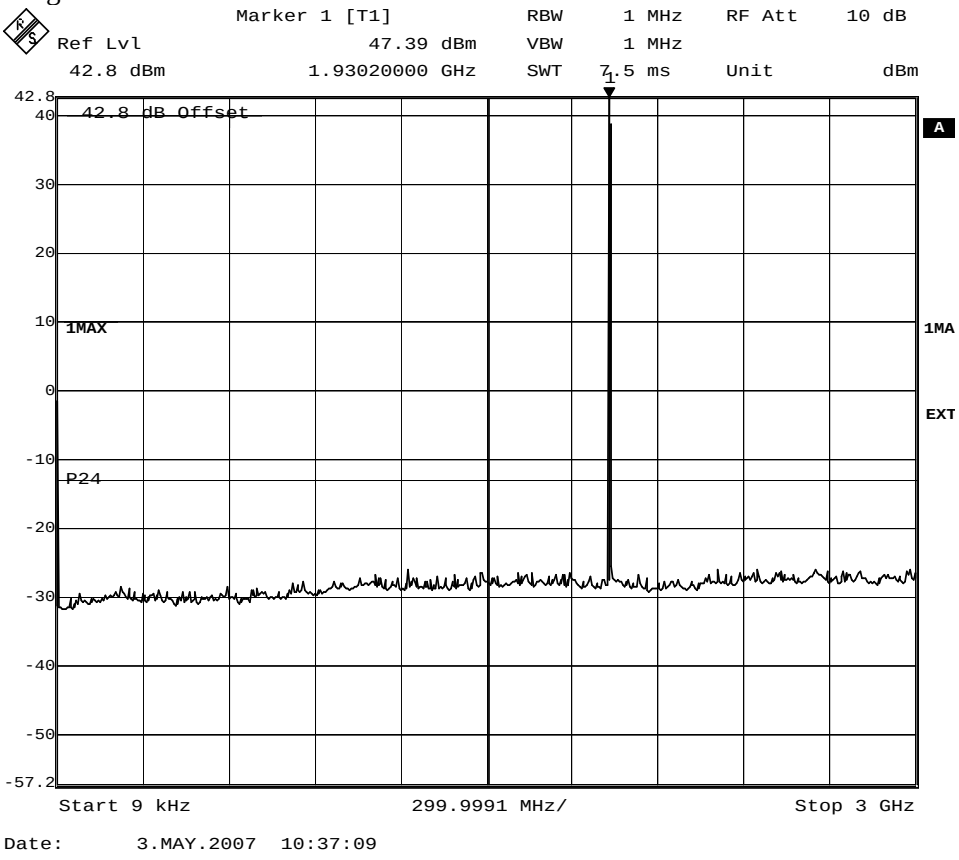
Diagram 24: dTRU 1, TRX output 1 Ch 512, TRX output 2 Ch 537
dTRU 2, TRX output 1 Ch 562, TRX output 2 Ch 760
dTRU 3, TRX output 1 Ch 785, TRX output 2 Ch 810

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

Diagram 1


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
47.39 dBm
VBW 1 MHz
42.8 dBm
1.93020000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 10:37:09

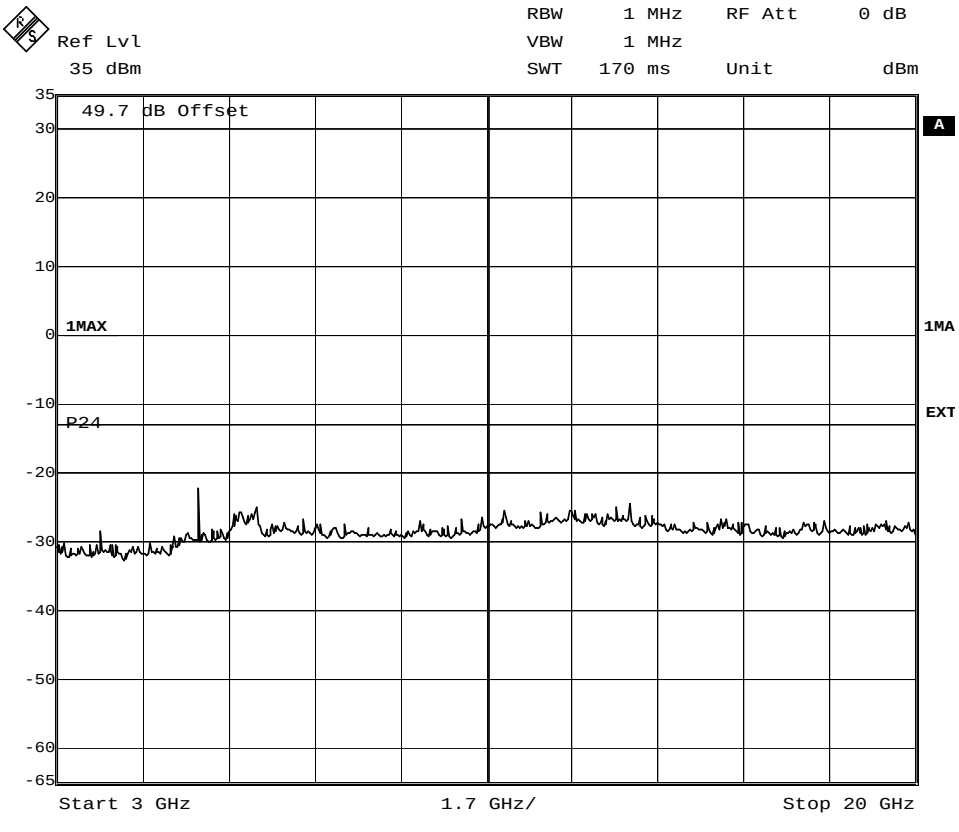
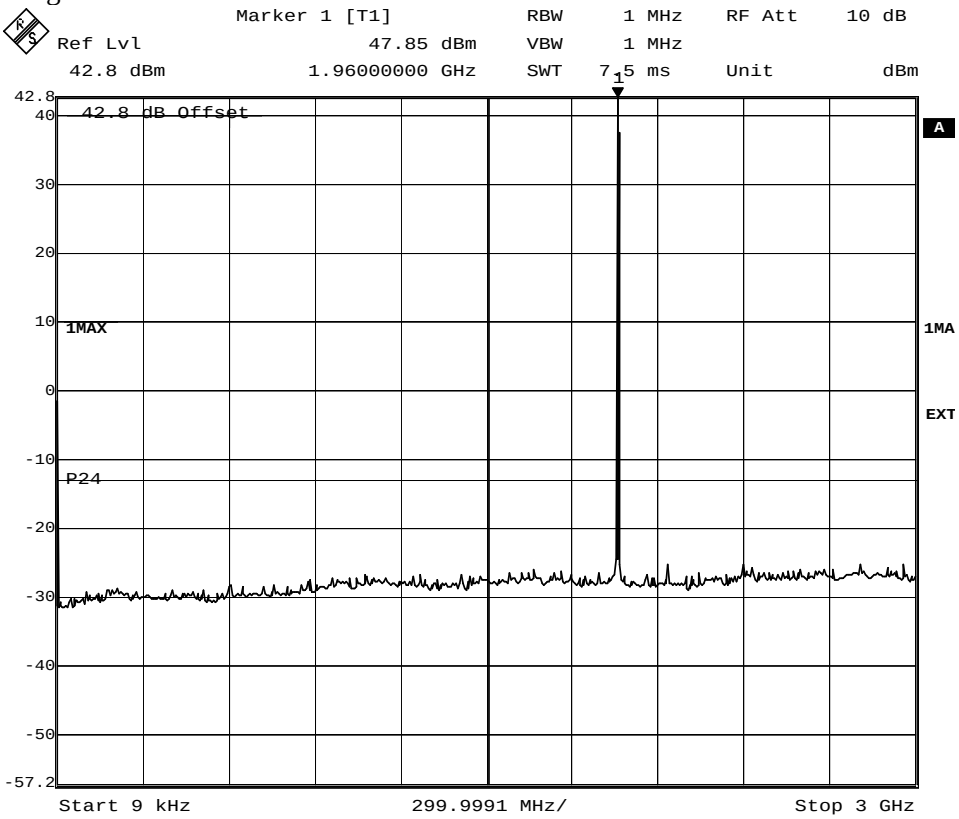

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 10:41:53

Diagram 2


Marker 1 [T1]
Ref Lvl
42.8 dBm
47.85 dBm
1.96000000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 10:38:46

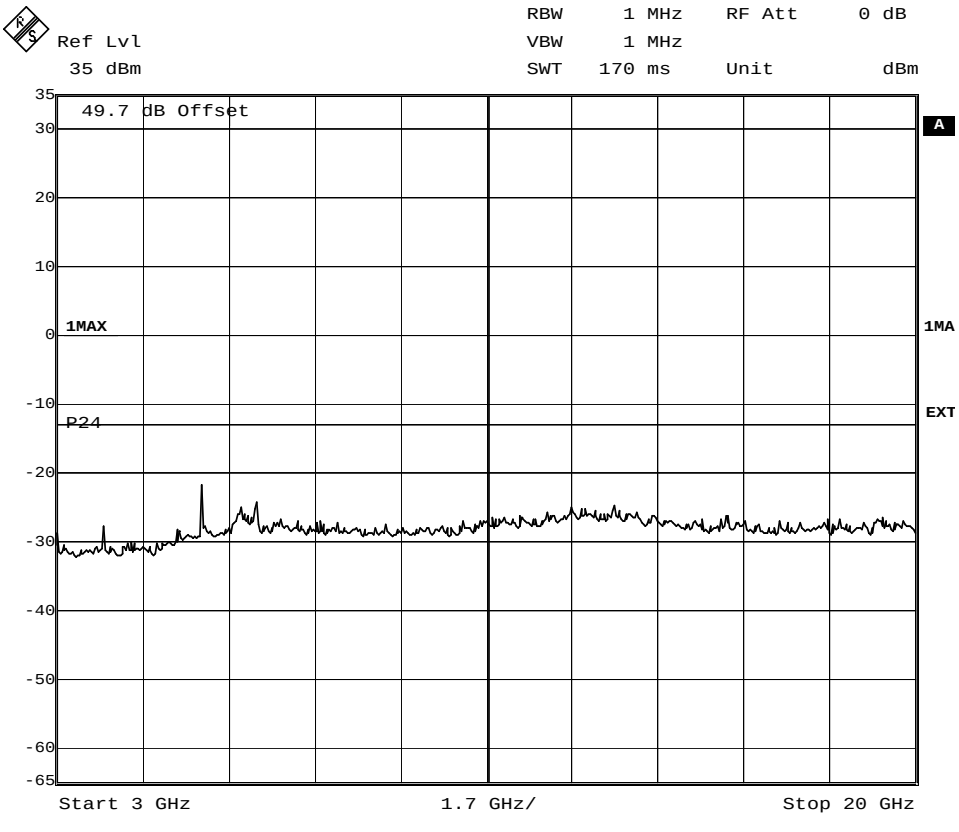
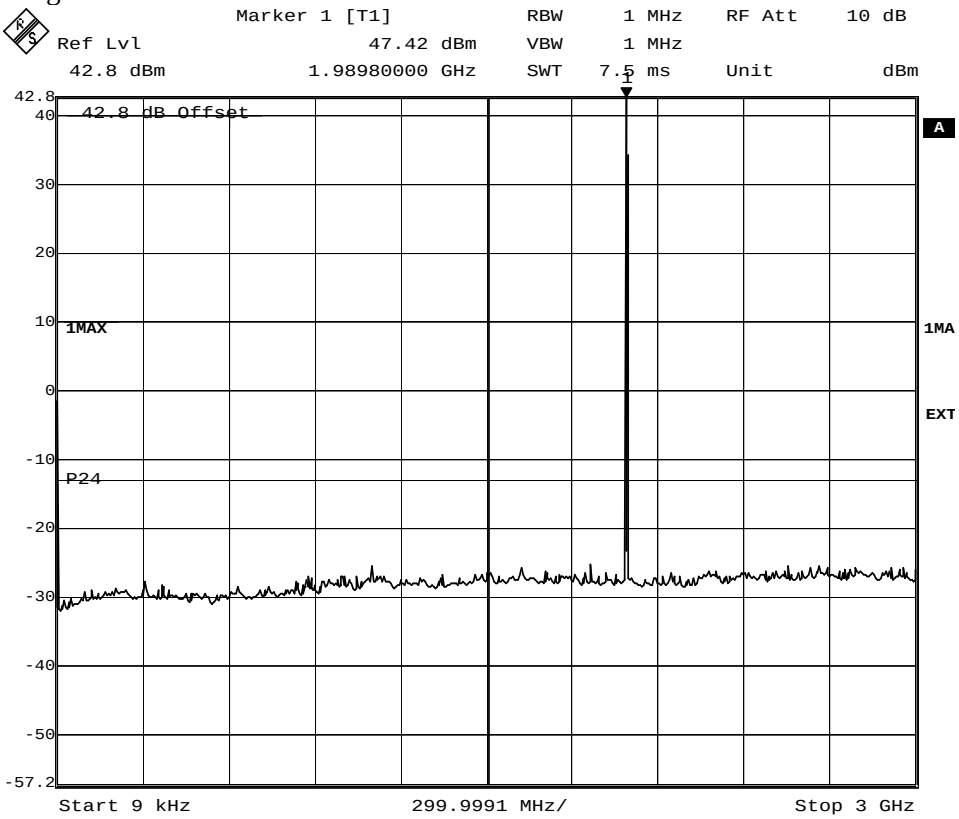

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 10:43:20

Diagram 3


Marker 1 [T1]
Ref Lvl
42.8 dBm
47.42 dBm
1.98980000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 10:26:29

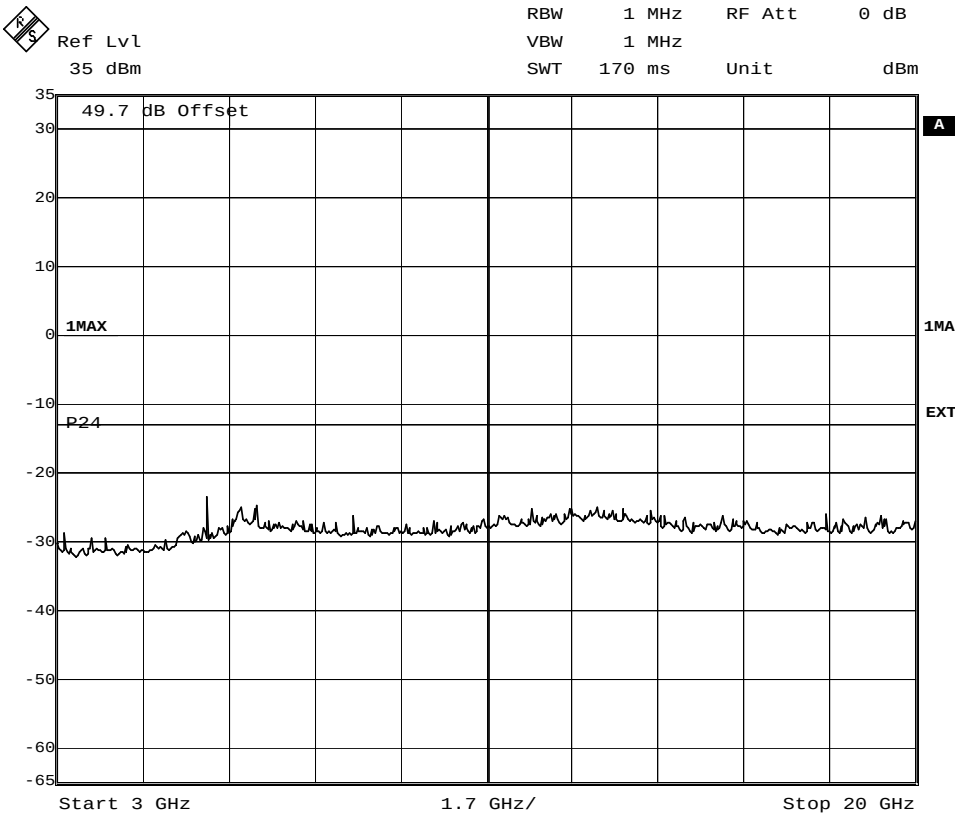
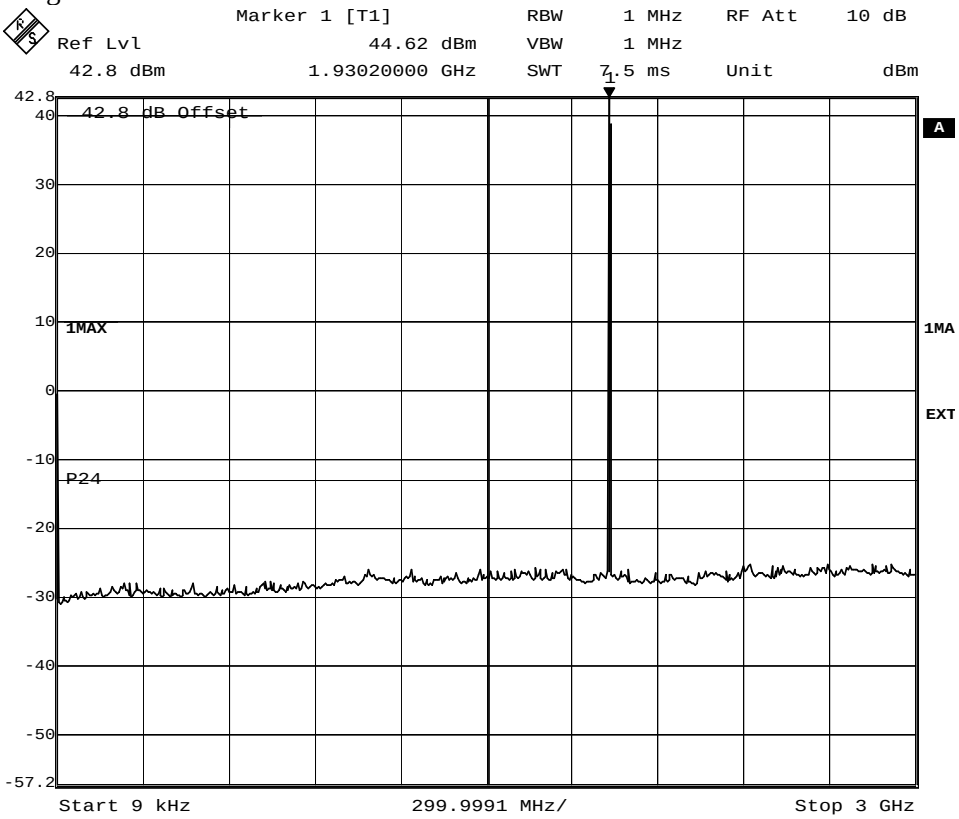

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 10:44:34

Diagram 4


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
44.62 dBm
VBW 1 MHz
42.8 dBm
1.93020000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 16:48:09

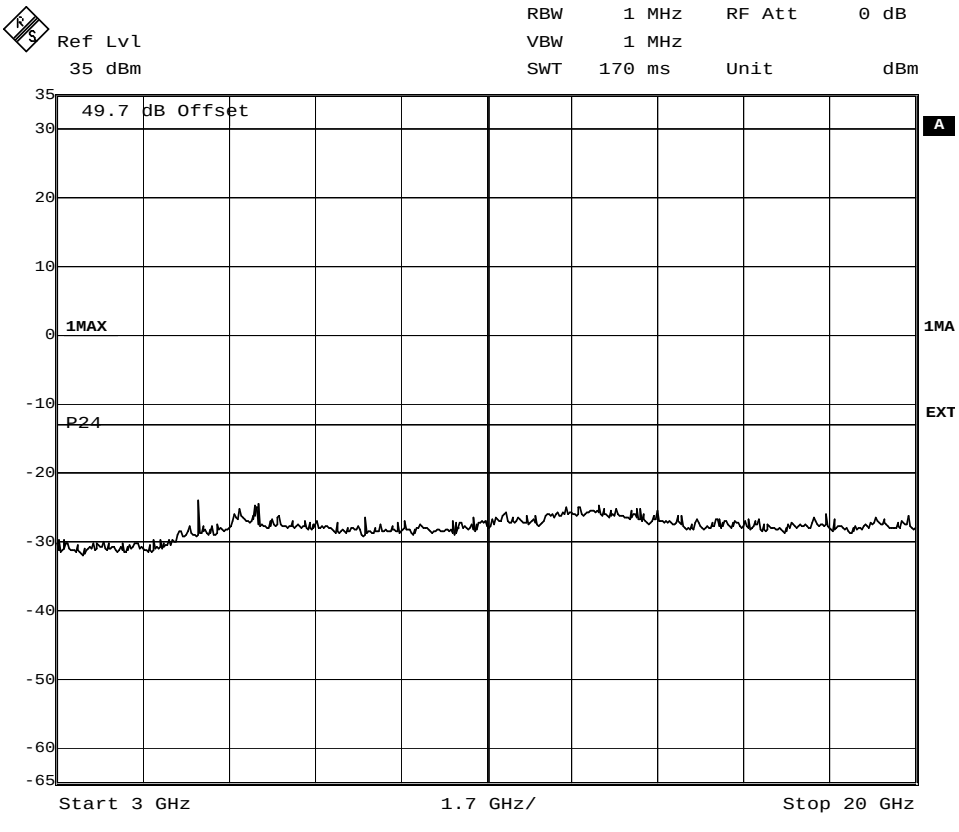
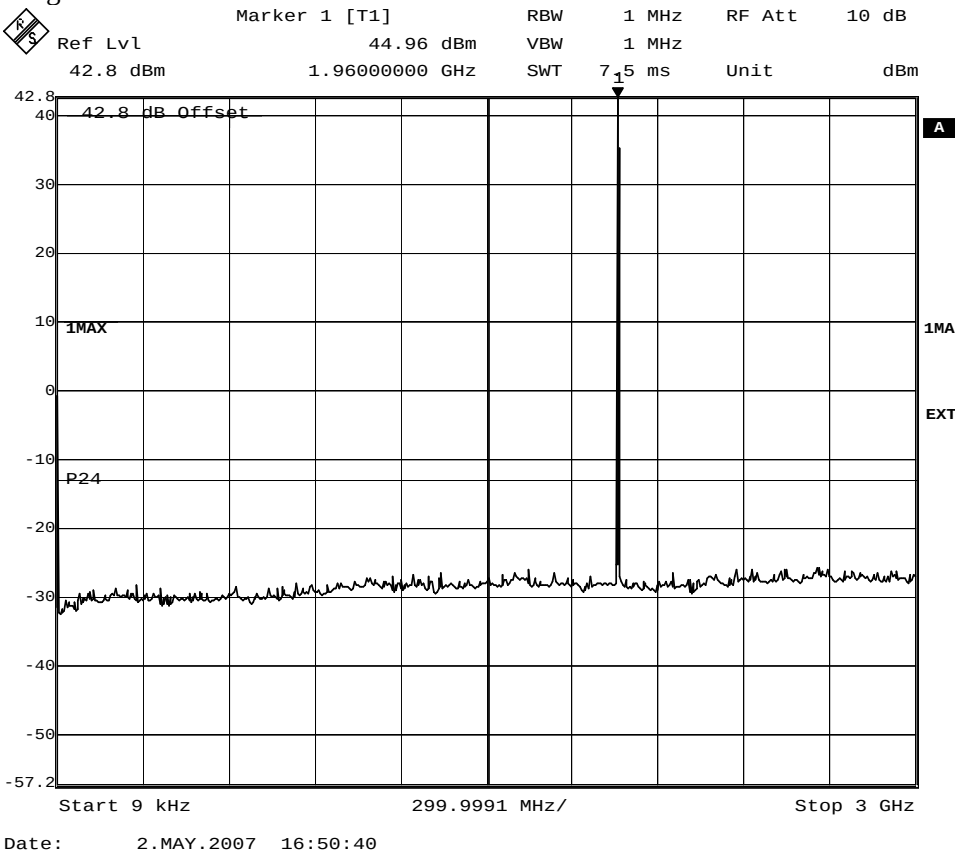

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:08:50

Diagram 5


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
44.96 dBm
VBW 1 MHz
42.8 dBm
1.96000000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 16:50:40

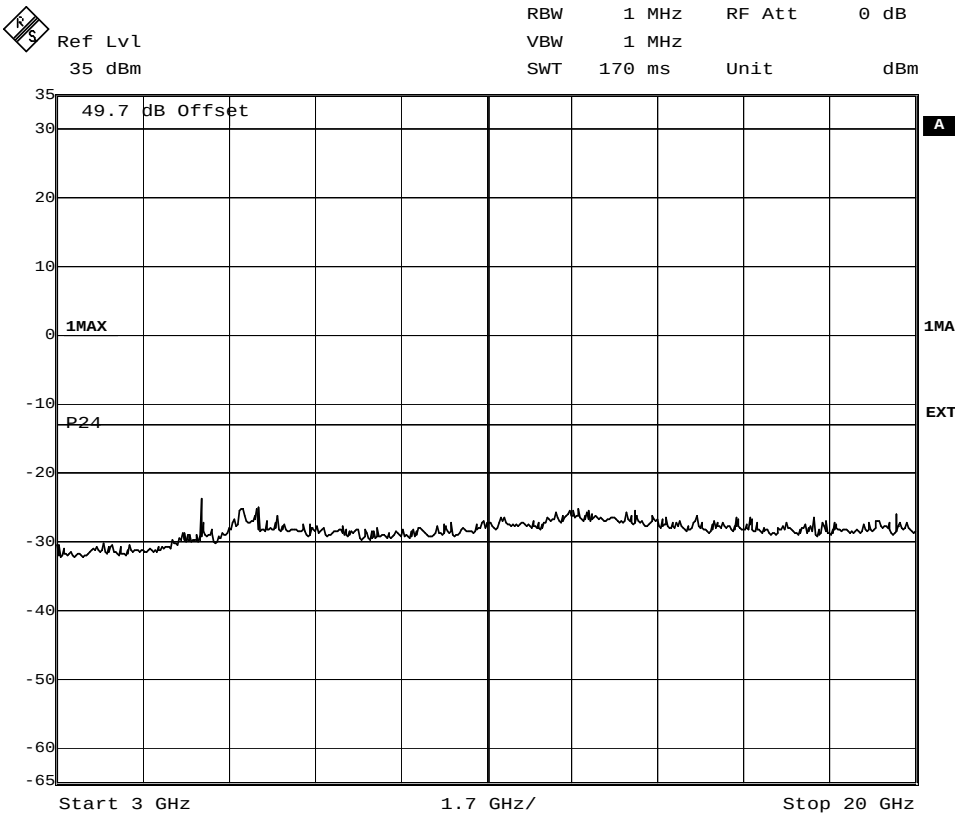
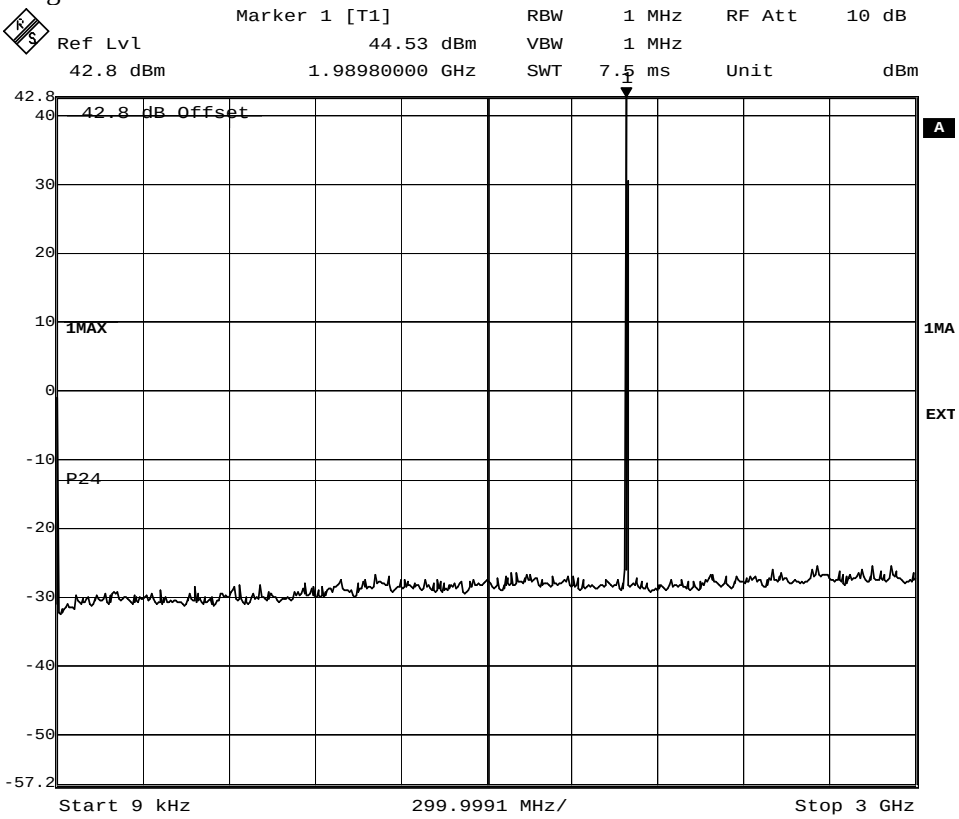

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:09:48

Diagram 6


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
44.53 dBm
VBW 1 MHz
42.8 dBm
1.98980000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 16:51:38

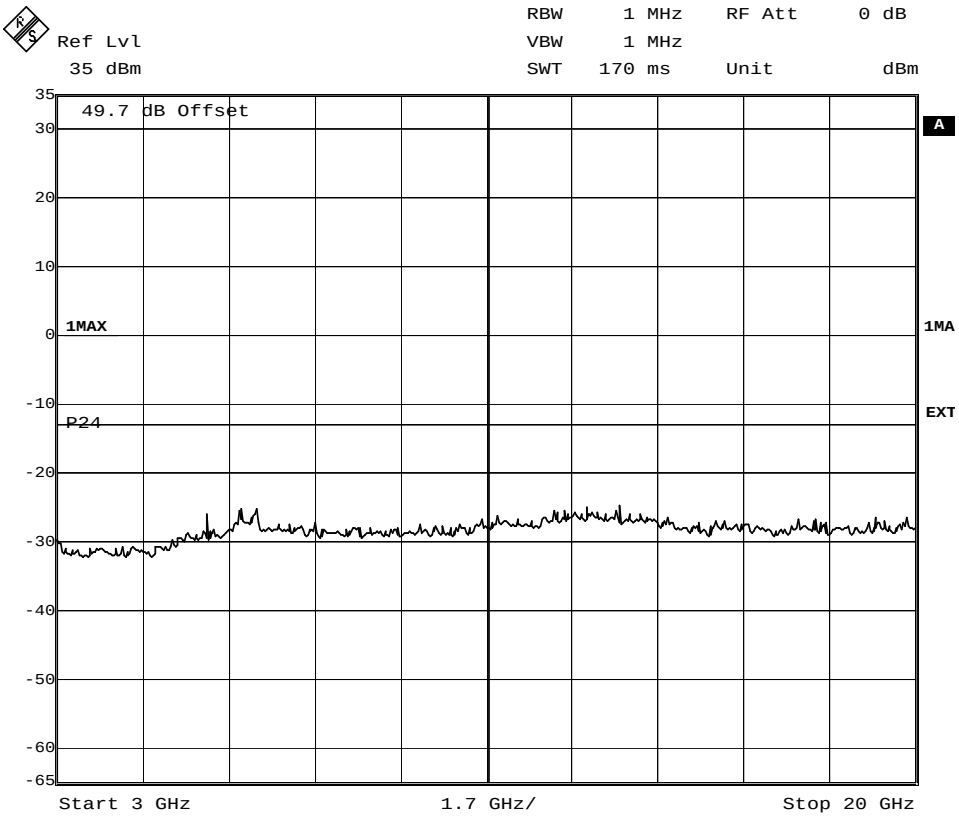
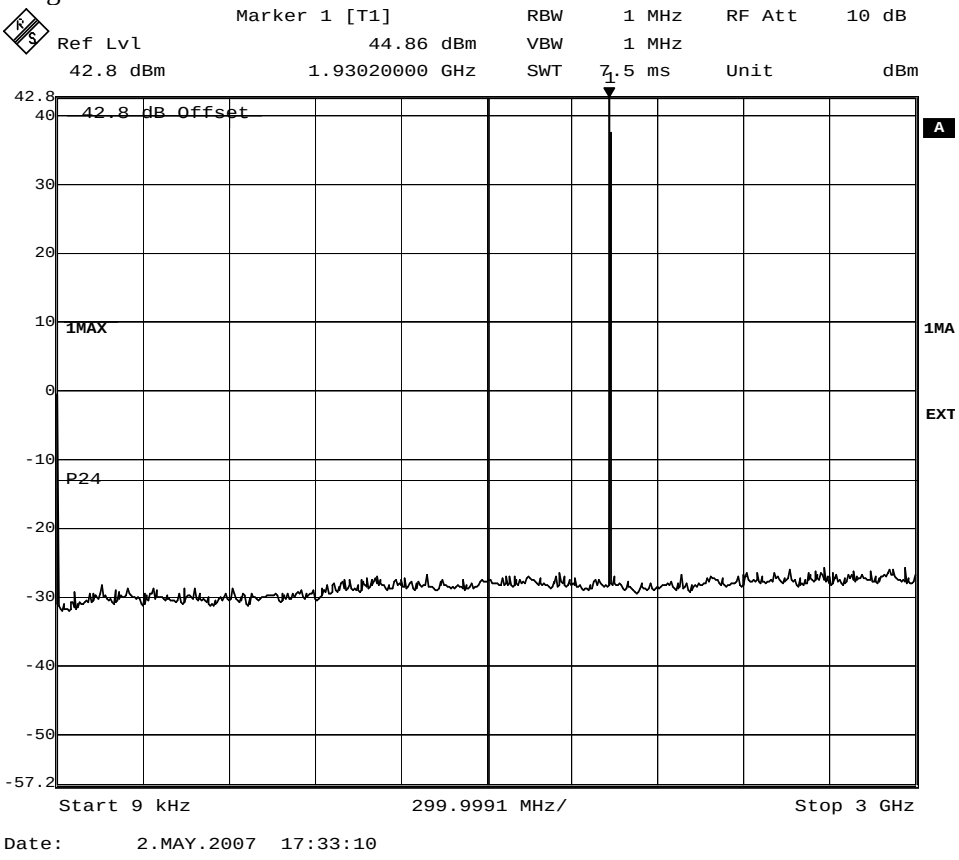

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:11:02

Diagram 7


Marker 1 [T1]
Ref Lvl
42.8 dBm
44.86 dBm
1.93020000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 17:33:10

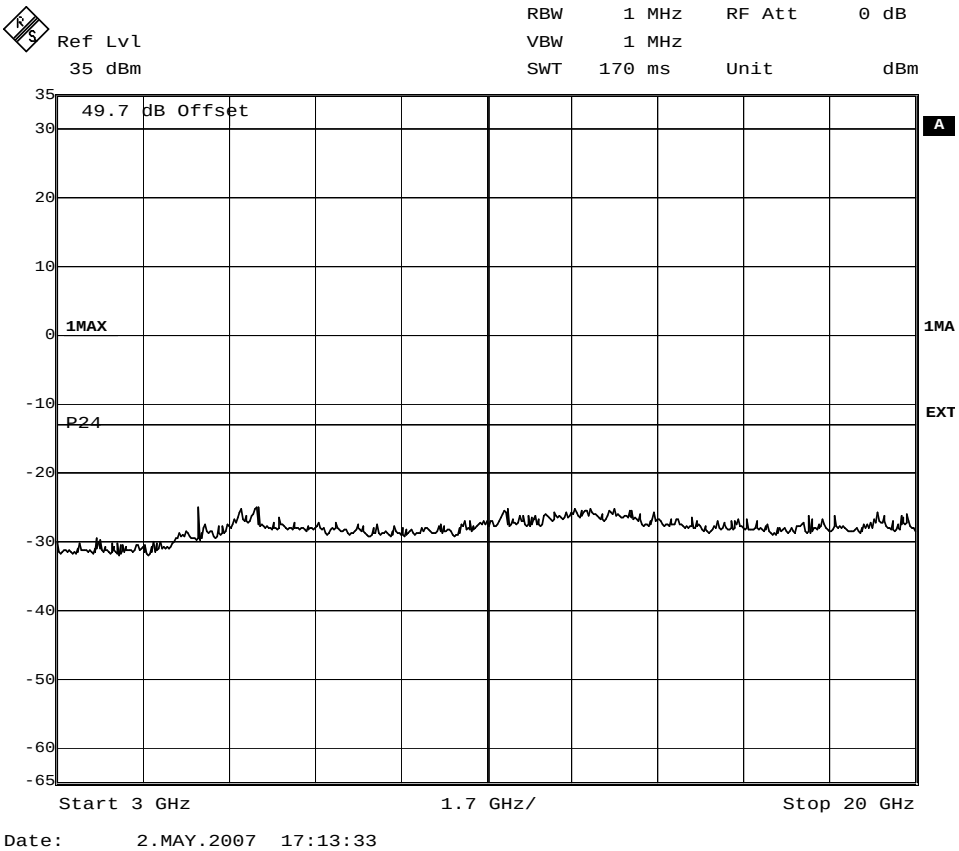
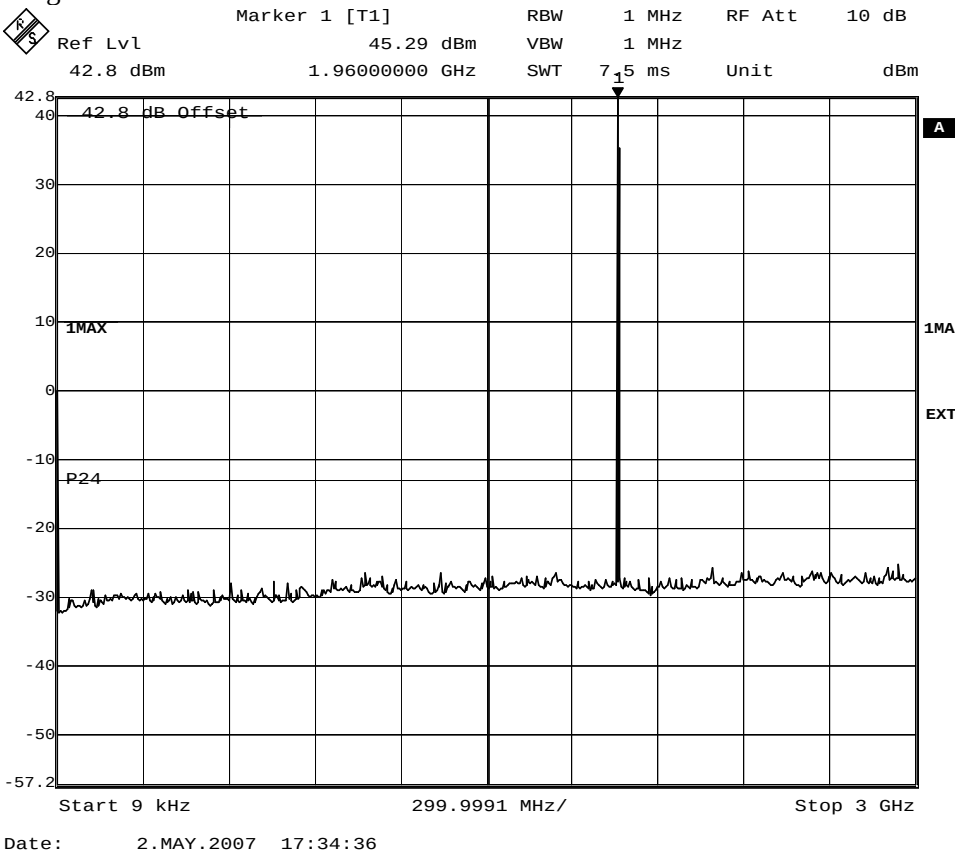

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:13:33

Diagram 8


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
45.29 dBm
VBW 1 MHz
42.8 dBm
1.96000000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 17:34:36

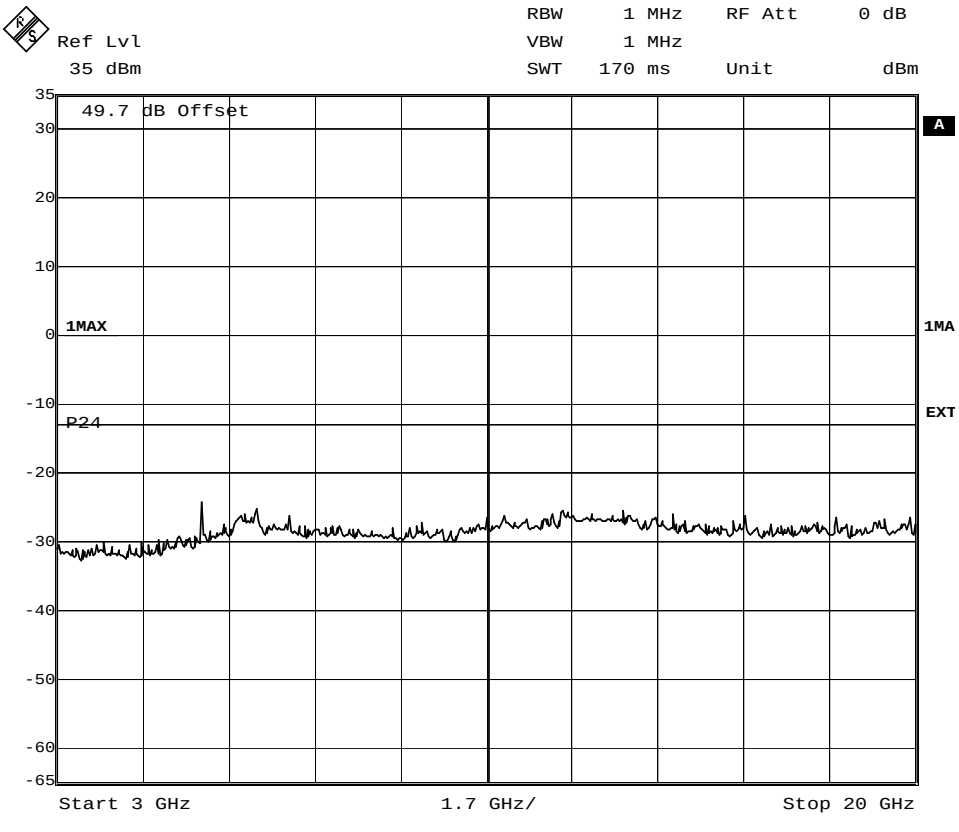
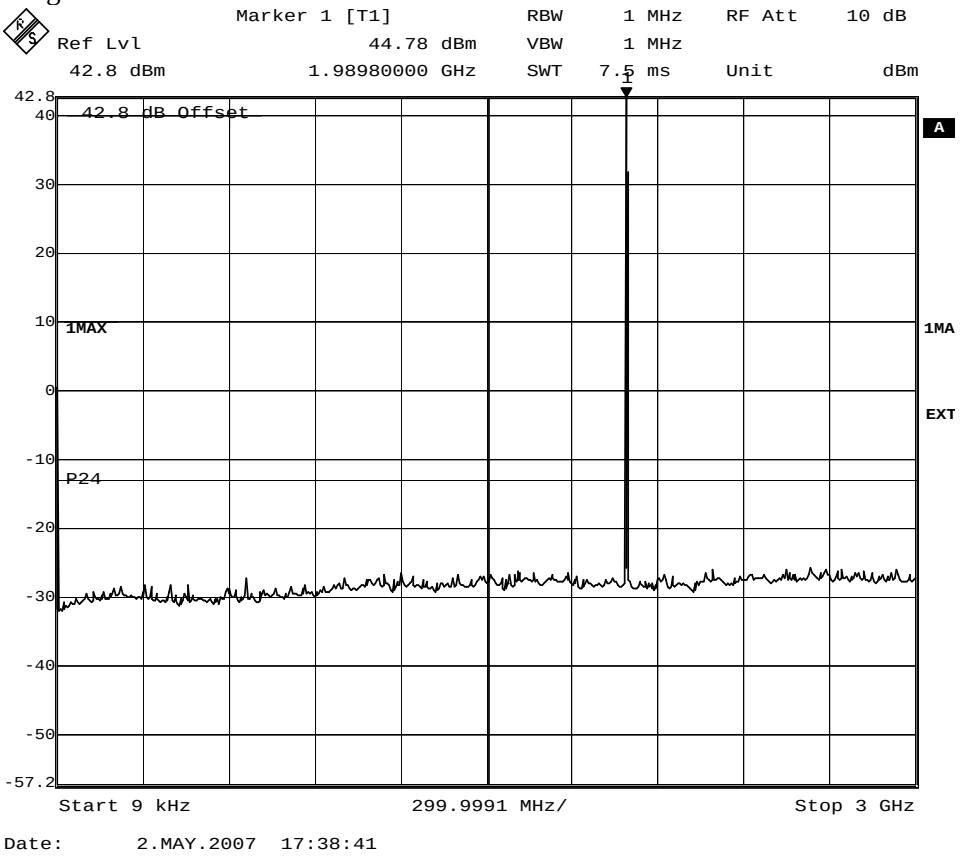

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:14:58

Diagram 9


Marker 1 [T1]
Ref Lvl
42.8 dBm
44.78 dBm
1.98980000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 17:38:41

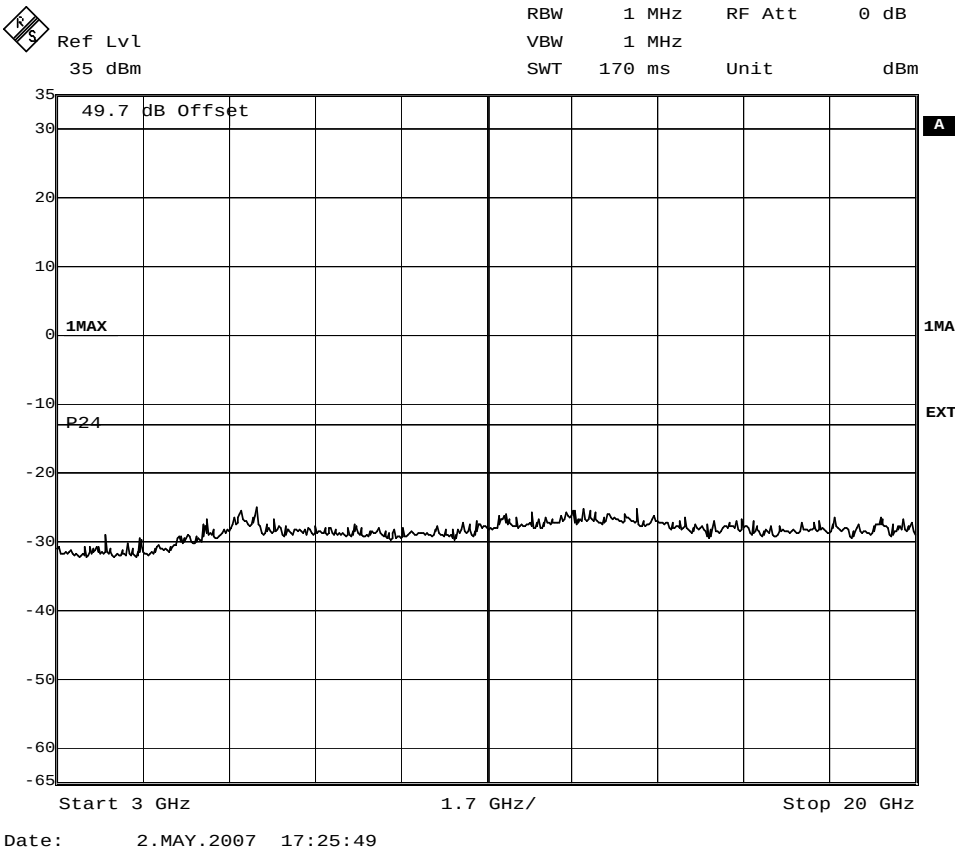
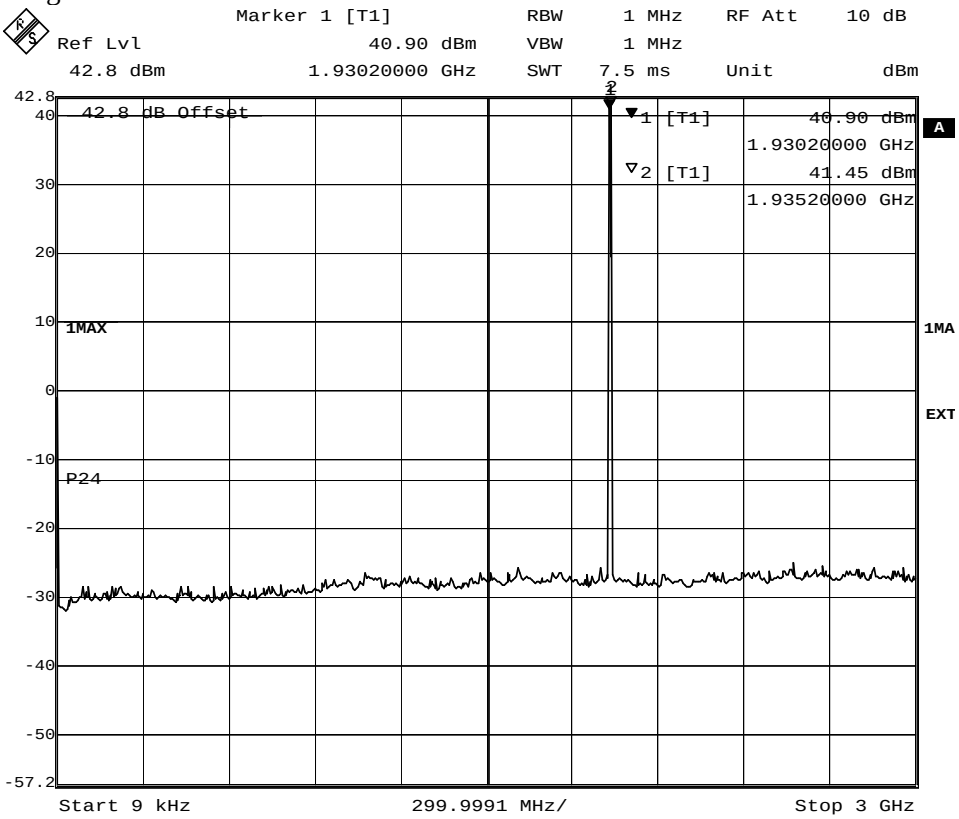

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:25:49

Diagram 10-1


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
40.90 dBm
VBW 1 MHz
42.8 dBm
1.93020000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1 [T1] 40.90 dBm
1.93020000 GHz
2 [T1] 41.45 dBm
1.93520000 GHz
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 11:16:35

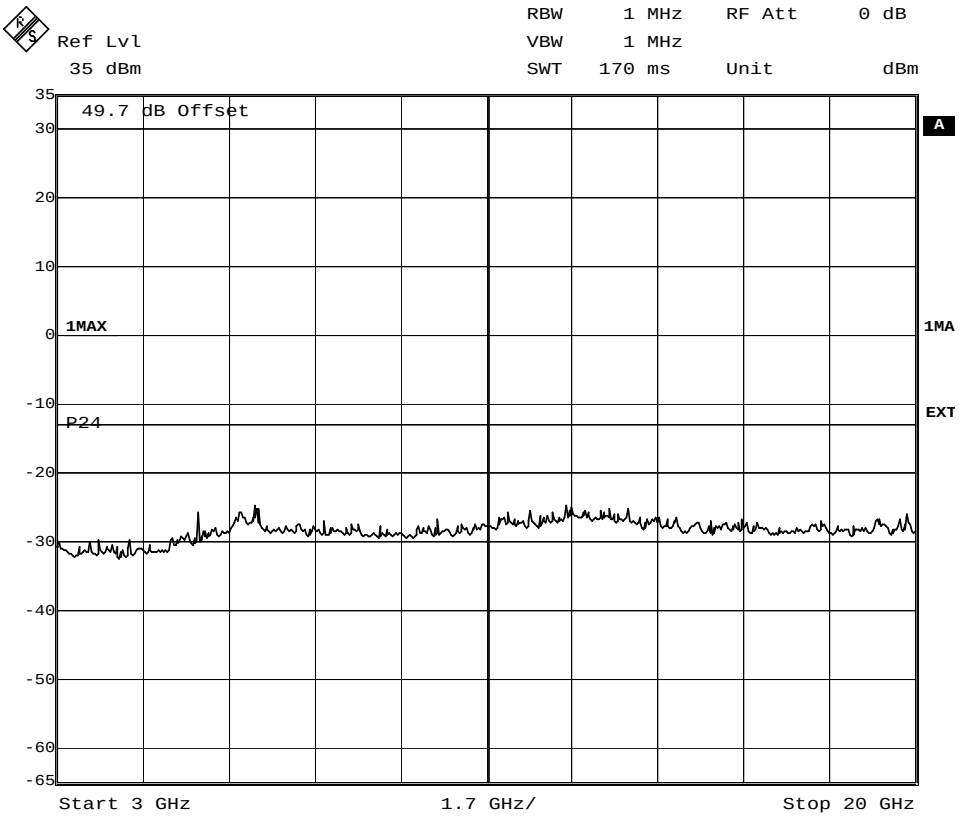
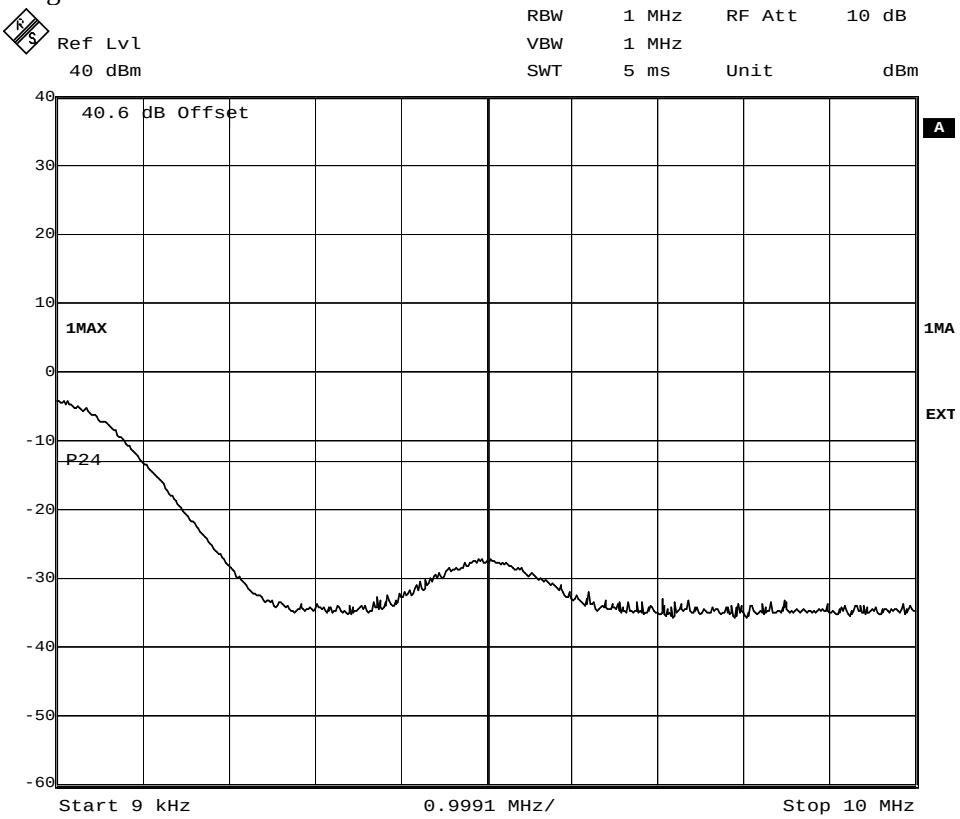
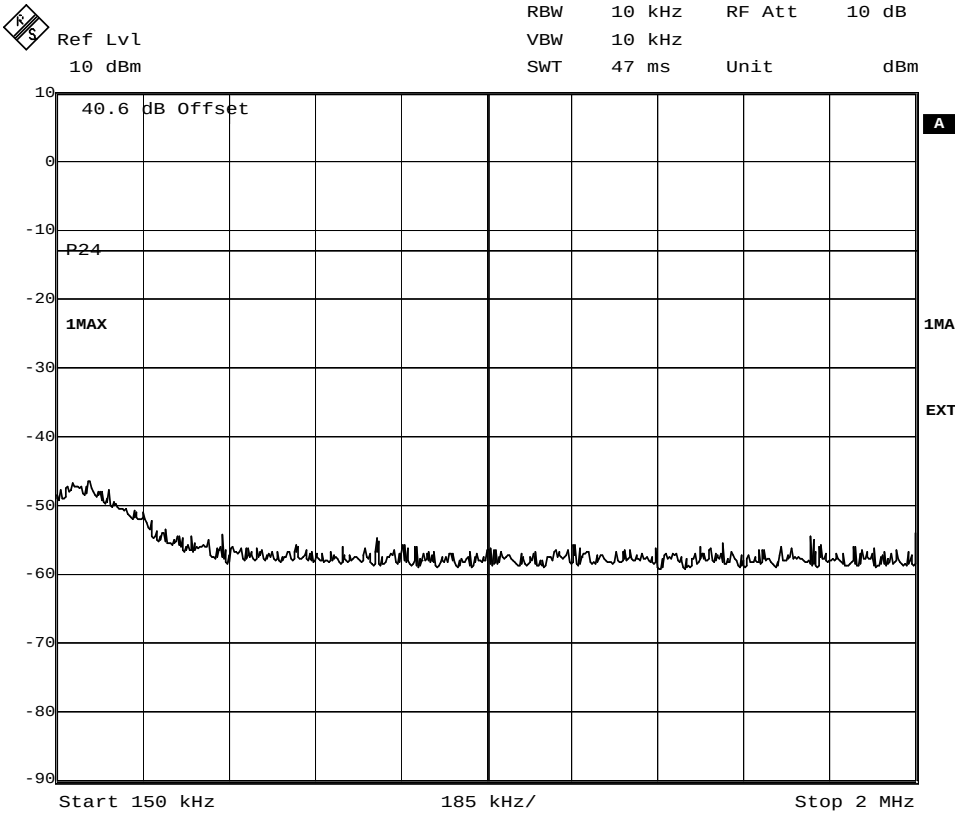

RBW 1 MHz
RF Att 0 dB
Ref Lvl
35 dBm
VBW 1 MHz
SWT 170 ms
Unit dBm
49.7 dB Offset
A
1MAX
1MA
EXT
P24
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 11:00:56

Diagram 10-2



Date: 3.MAY.2007 11:41:21

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: 3.MAY.2007 12:43:27

Diagram 10-3

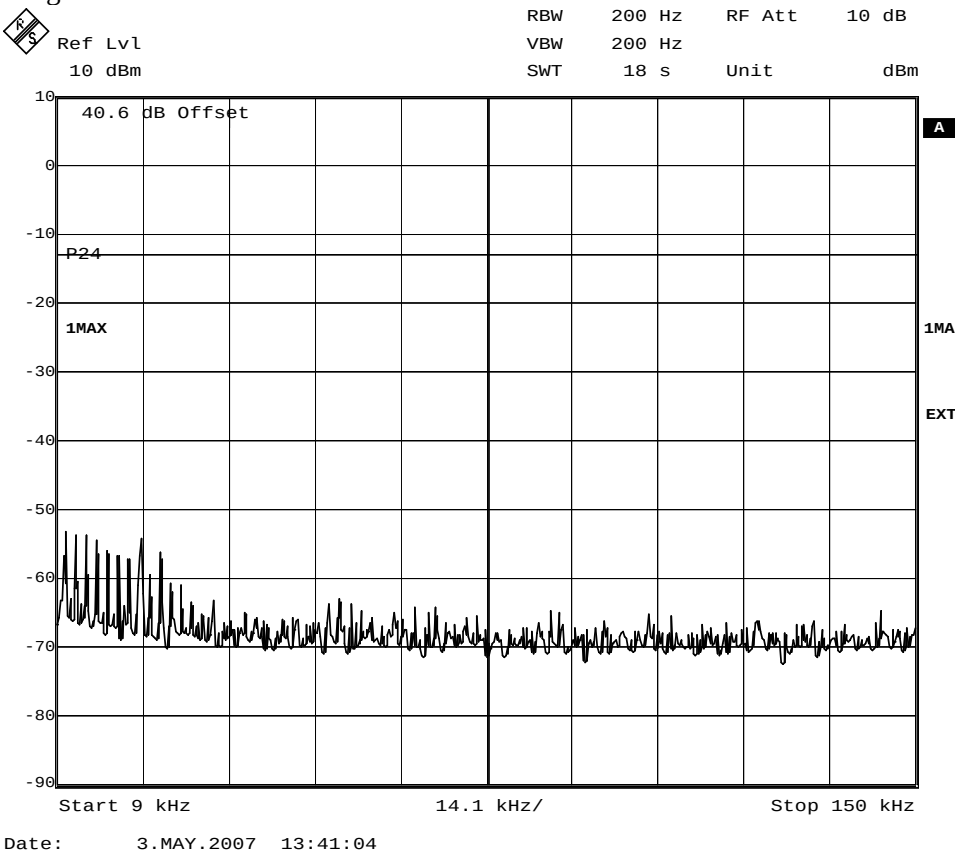
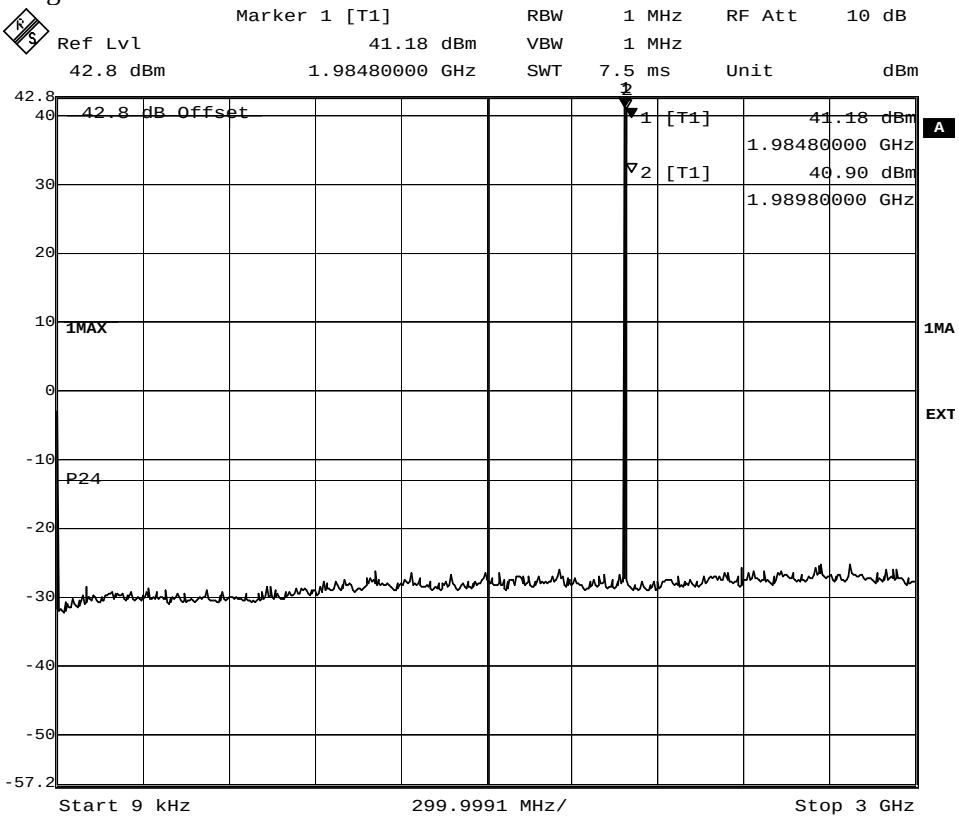

Ref Lvl
10 dBm
RBW 200 Hz
VBW 200 Hz
SWT 18 s
RF Att 10 dB
Unit dBm
40.6 dB Offset
A
P24
1MAX
1MA
EXT
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 9 kHz
14.1 kHz/
Stop 150 kHz
Date: 3.MAY.2007 13:41:04

Diagram 11-1


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
41.18 dBm
VBW 1 MHz
42.8 dBm
1.98480000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1 [T1] 41.18 dBm
1.98480000 GHz
2 [T1] 40.90 dBm
1.98980000 GHz
A
1MAX
1MA
EXT
P24
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 11:21:57

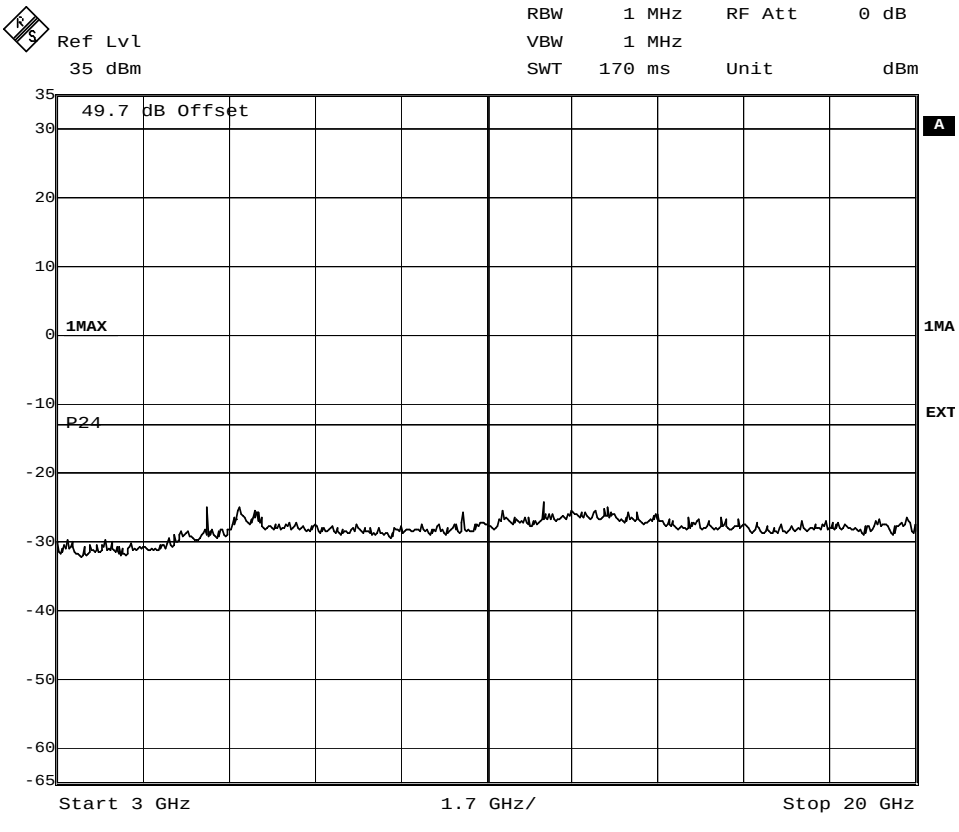
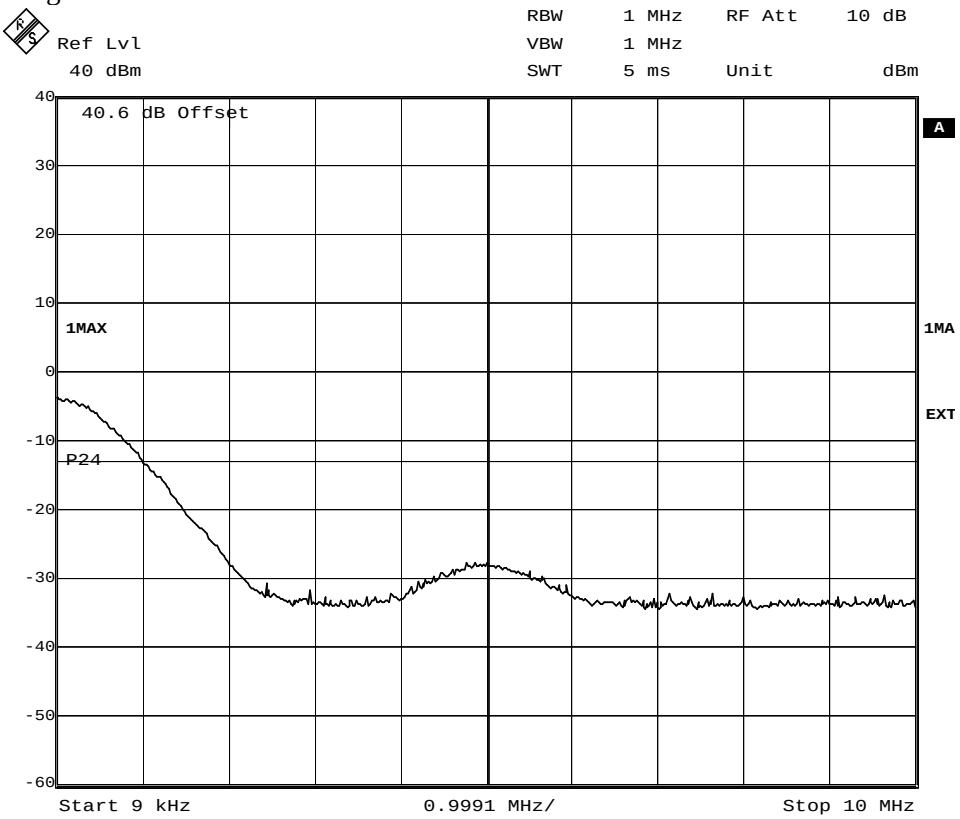
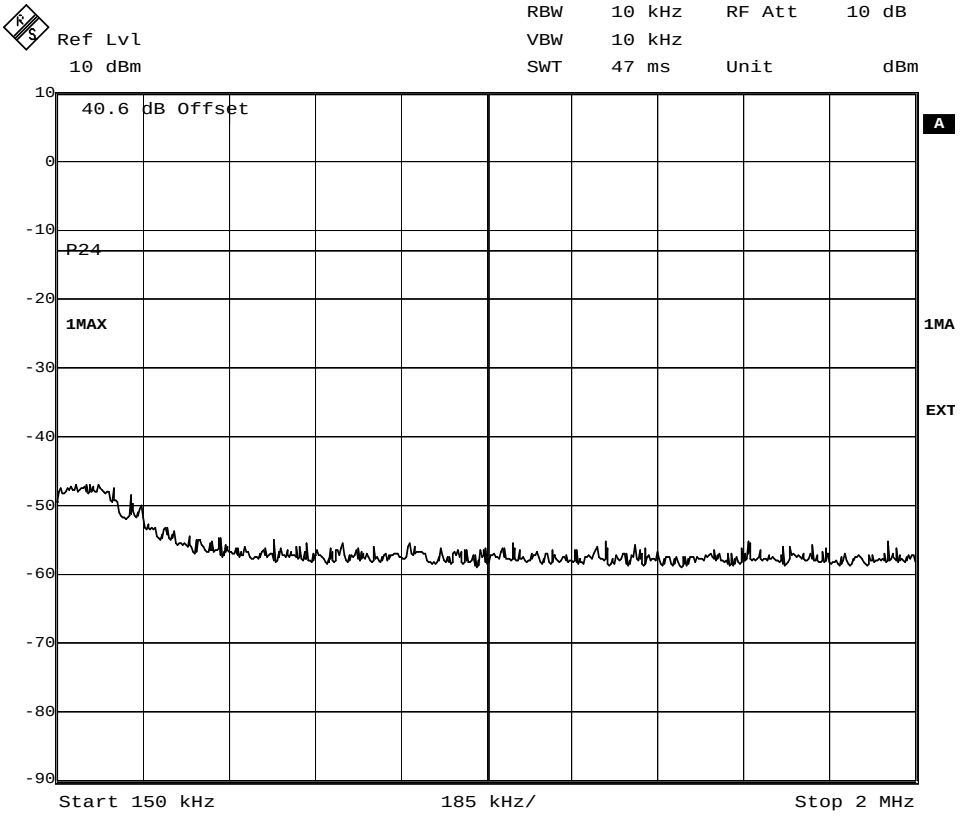

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
A
1MAX
1MA
EXT
P24
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 11:03:43

Diagram 11-2



Date: 3.MAY.2007 11:32:14

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: 3.MAY.2007 12:56:53

Diagram 11-3

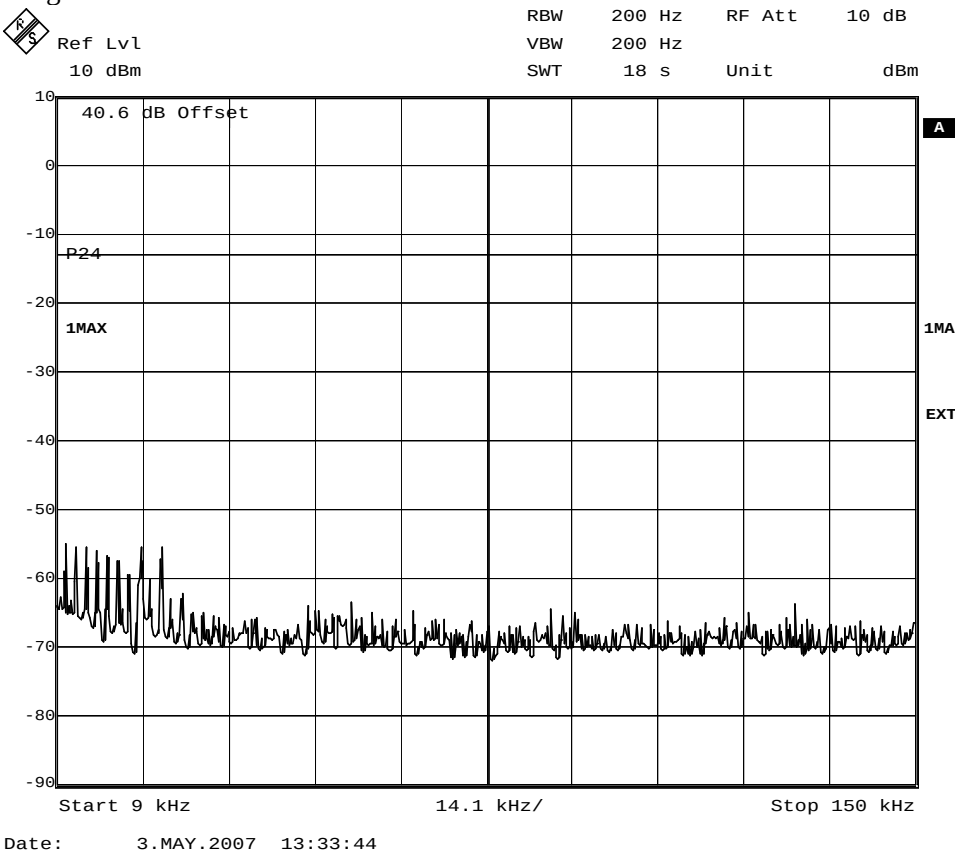
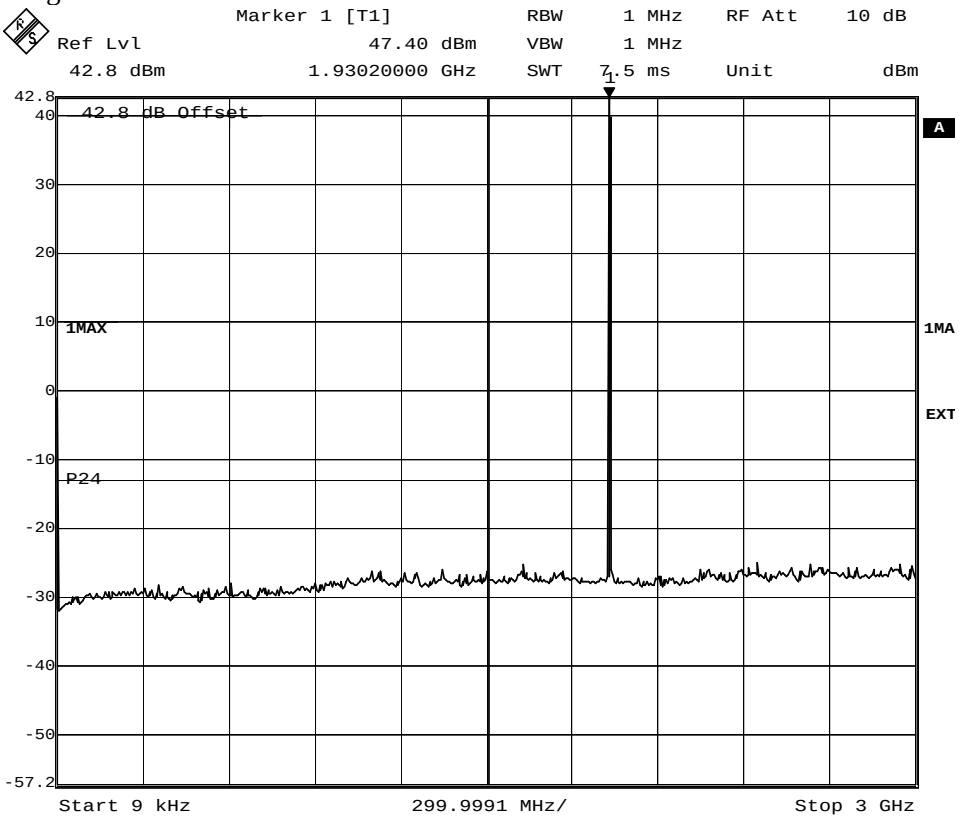

Ref Lvl
10 dBm
RBW 200 Hz
VBW 200 Hz
SWT 18 s
RF Att 10 dB
Unit dBm
40.6 dB Offset
A
P24
1MAX
1MA
EXT
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 9 kHz
14.1 kHz/
Stop 150 kHz
Date: 3.MAY.2007 13:33:44

Diagram 12


Marker 1 [T1]
47.40 dBm
1.93020000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
42.8 dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 10:21:50

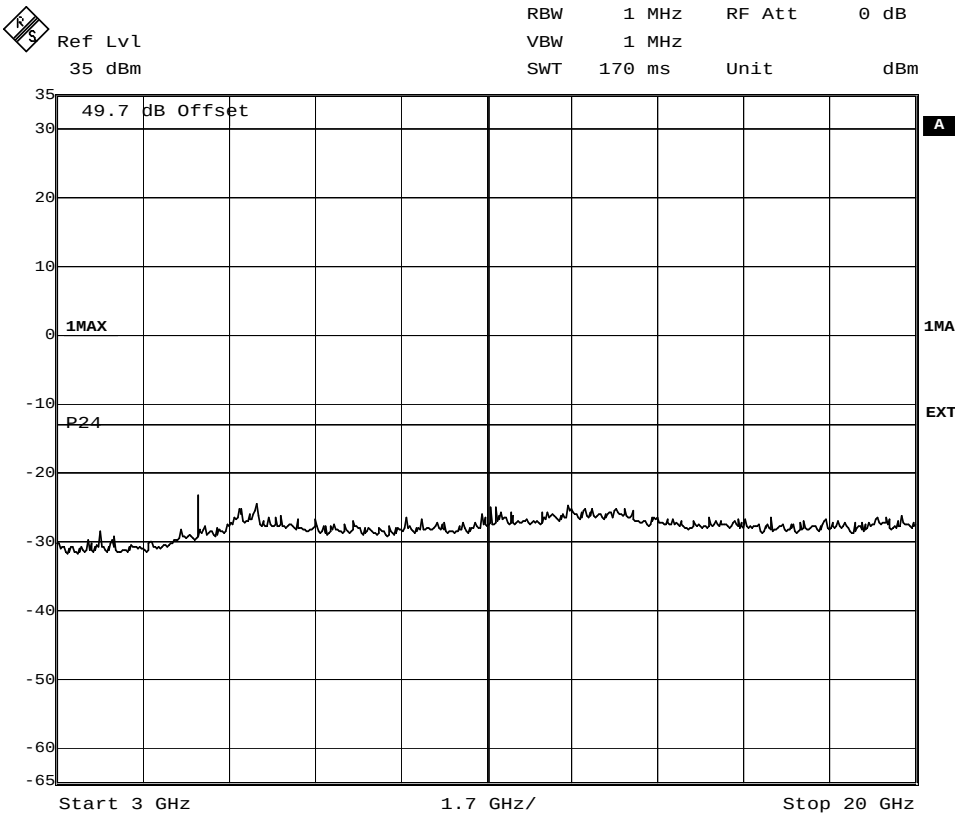
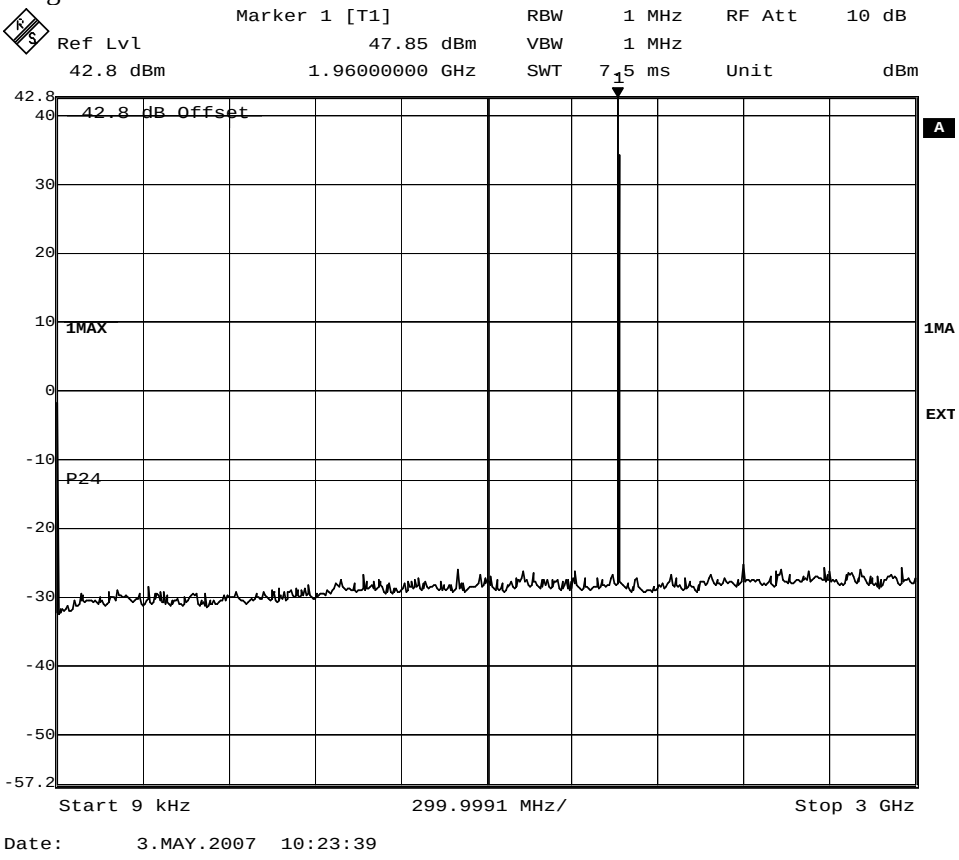

RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
Ref Lvl
35 dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 10:46:42

Diagram 13


Marker 1 [T1]
47.85 dBm
1.96000000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
42.8 dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 10:23:39

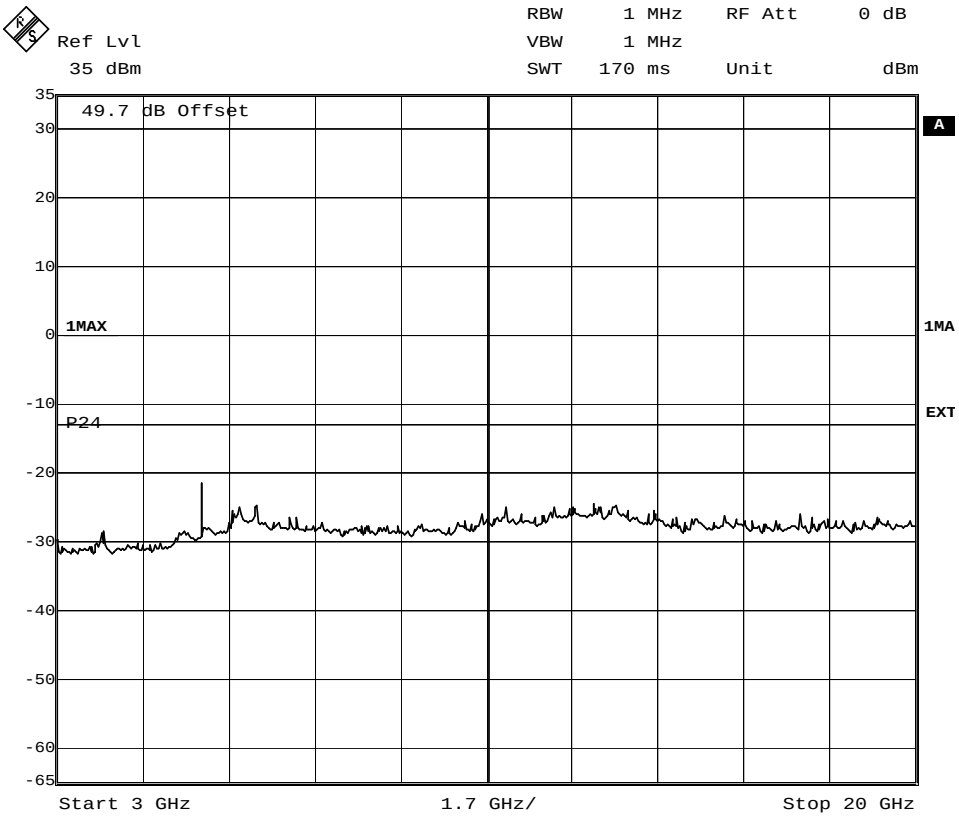
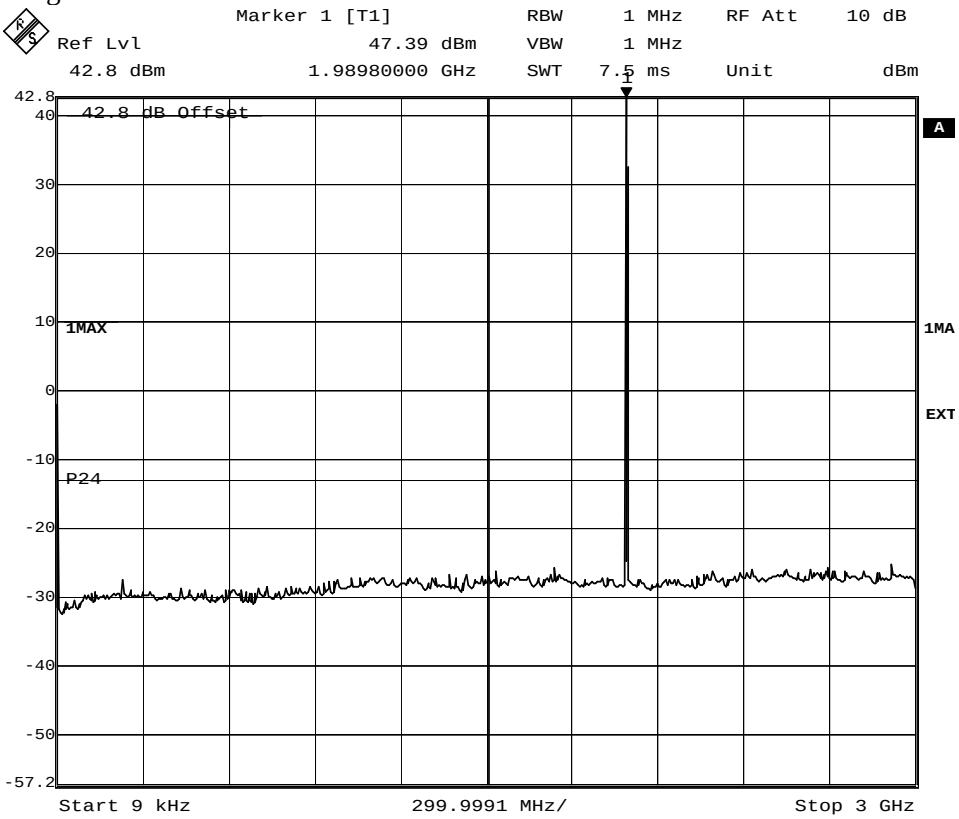

RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
Ref Lvl
35 dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 10:48:34

Diagram 14


Marker 1 [T1]
47.39 dBm
1.98980000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
42.8 dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 10:24:48

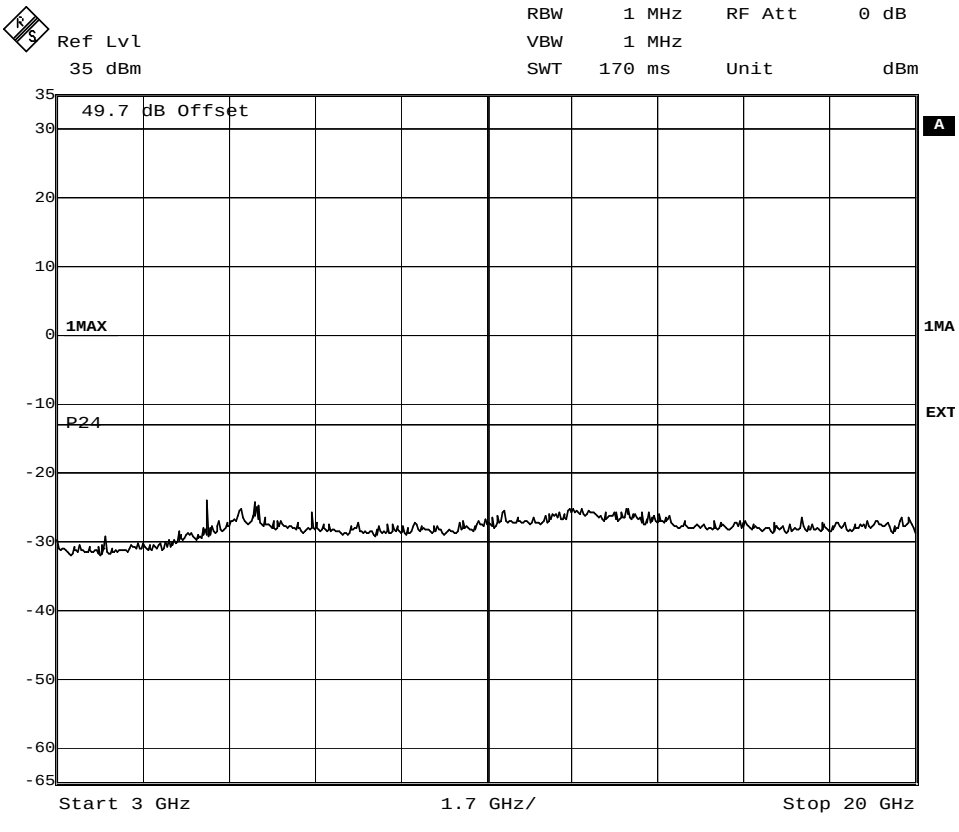
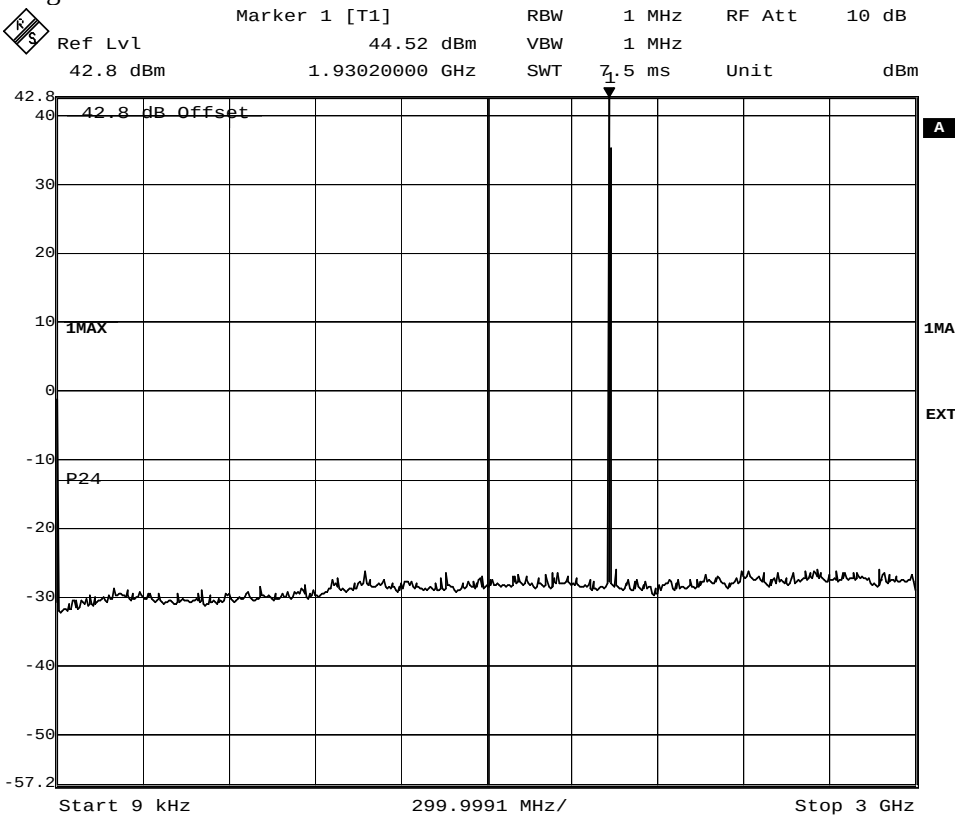

RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
Ref Lvl
35 dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 10:50:20

Diagram 15


Marker 1 [T1]
Ref Lvl
42.8 dBm
44.52 dBm
1.93020000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 16:55:55

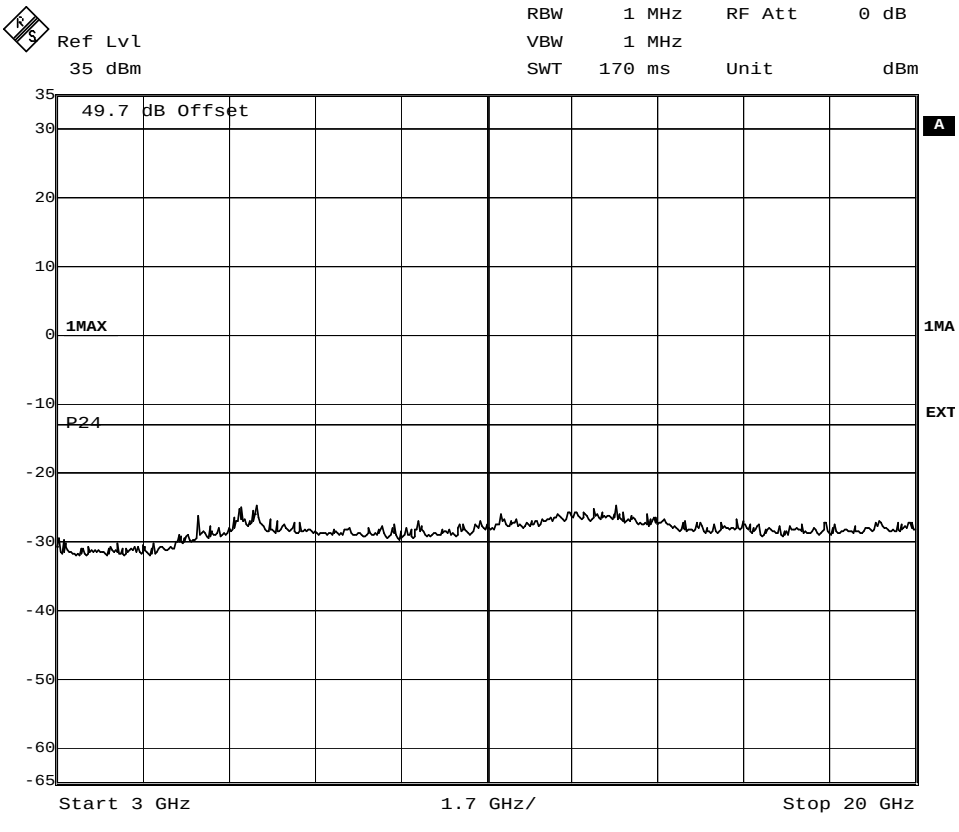
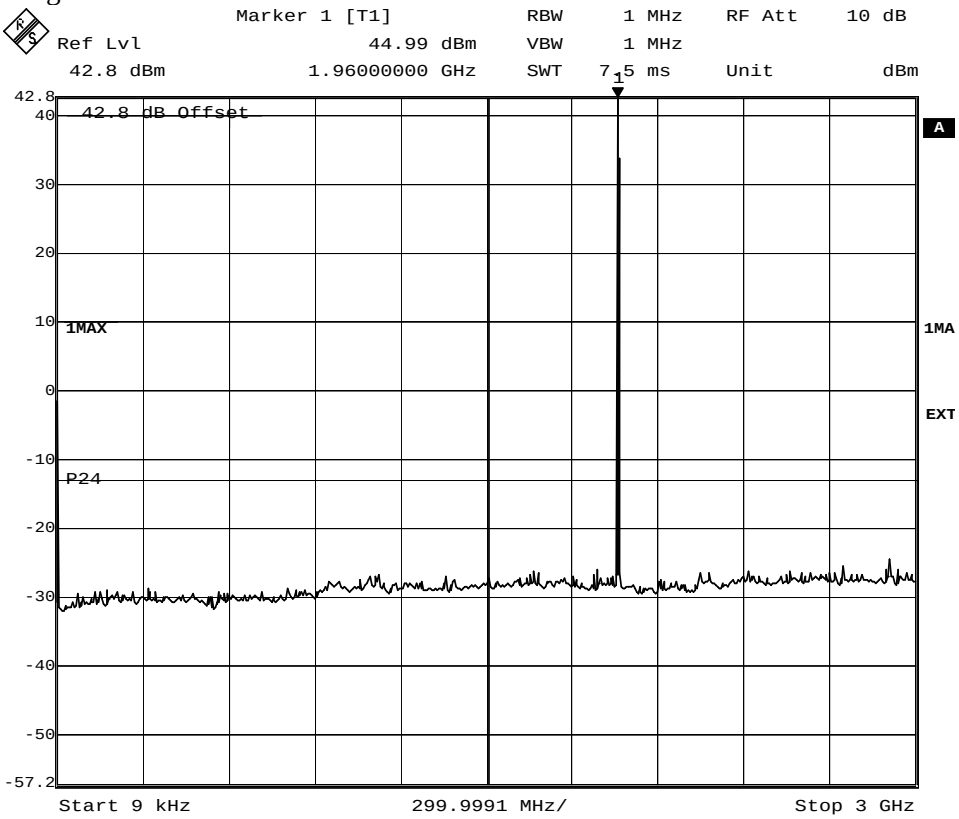

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 16:59:36

Diagram 16


Marker 1 [T1]
Ref Lvl
42.8 dBm
44.99 dBm
1.96000000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 16:54:52

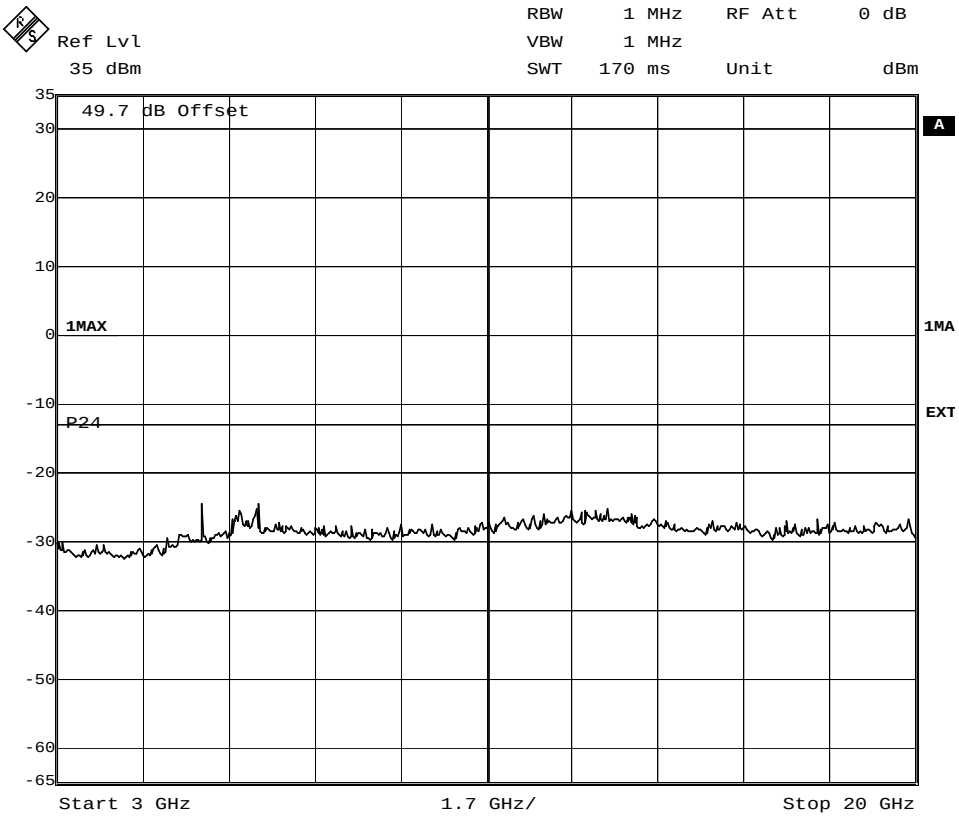
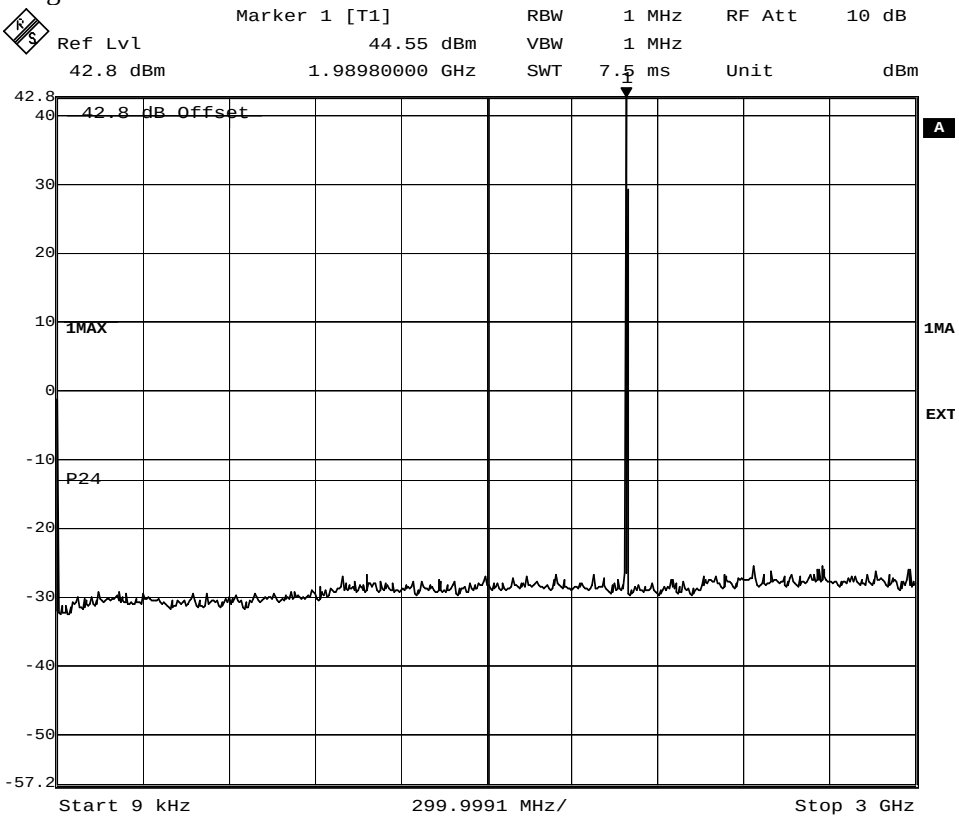

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:02:57

Diagram 17


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
44.55 dBm
VBW 1 MHz
42.8 dBm
1.98980000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 16:53:06

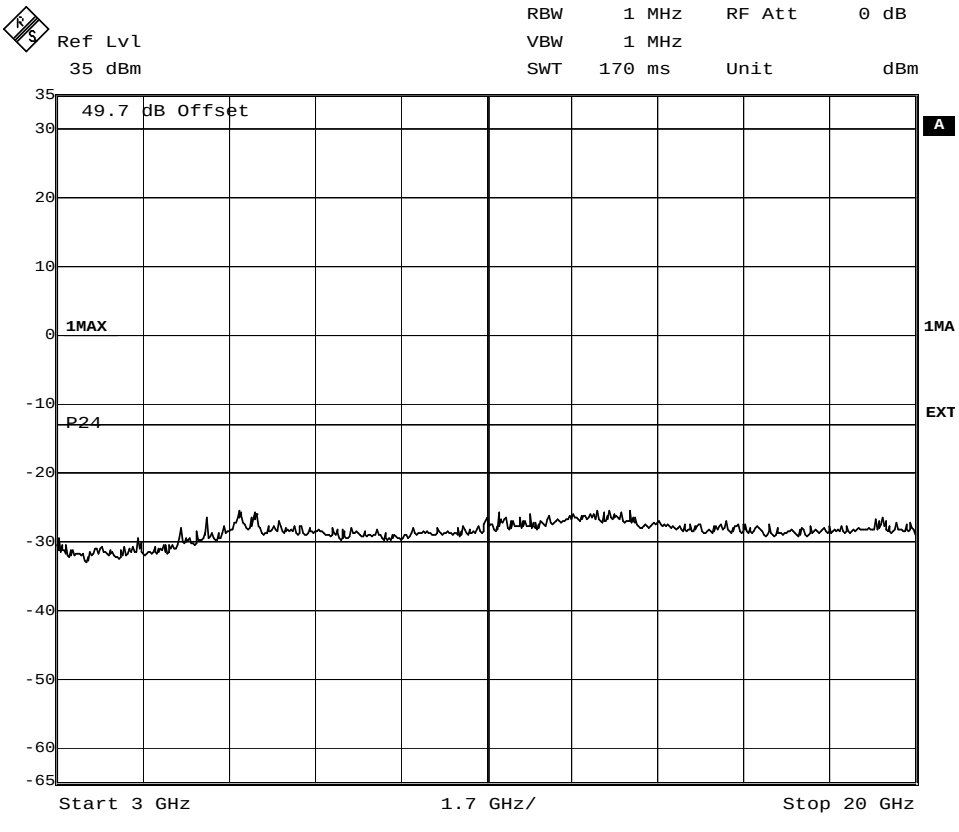
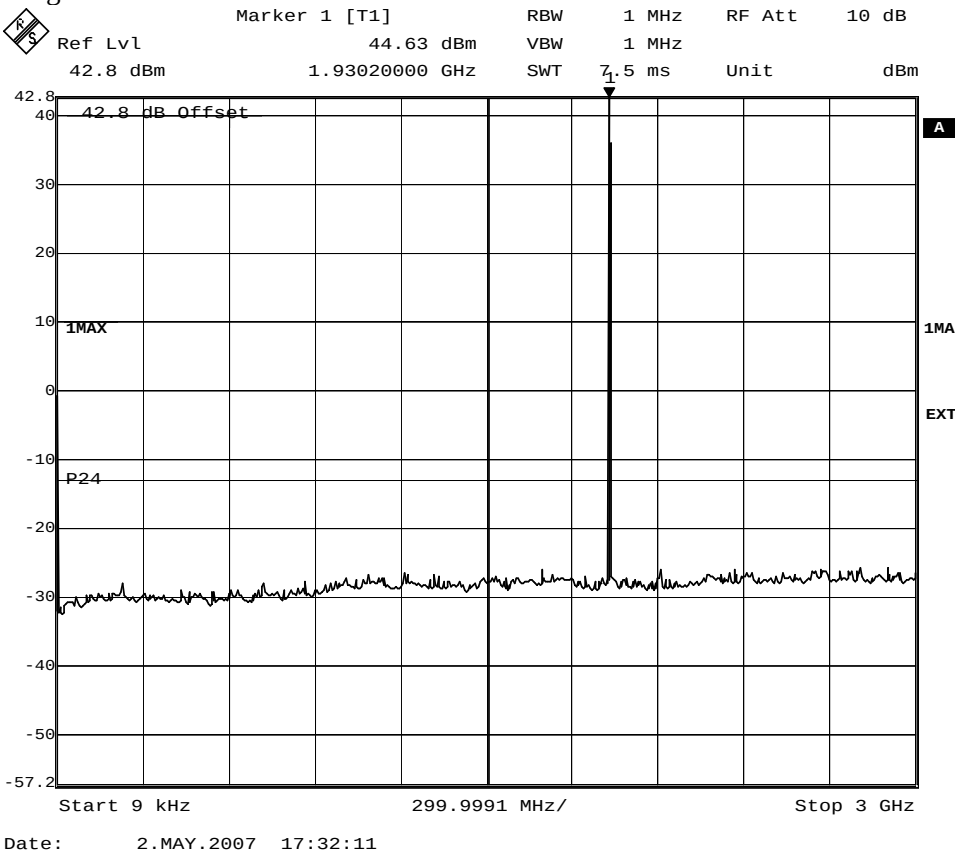

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:03:53

Diagram 18


Marker 1 [T1]
Ref Lvl
42.8 dBm
44.63 dBm
1.93020000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 17:32:11

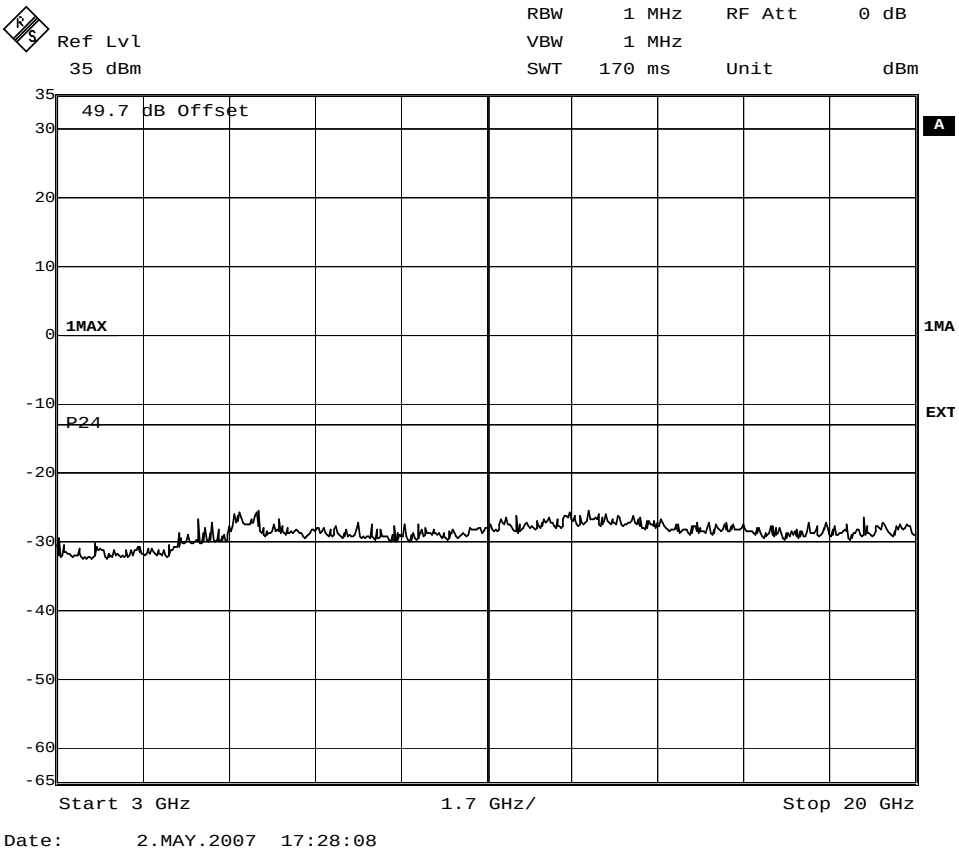
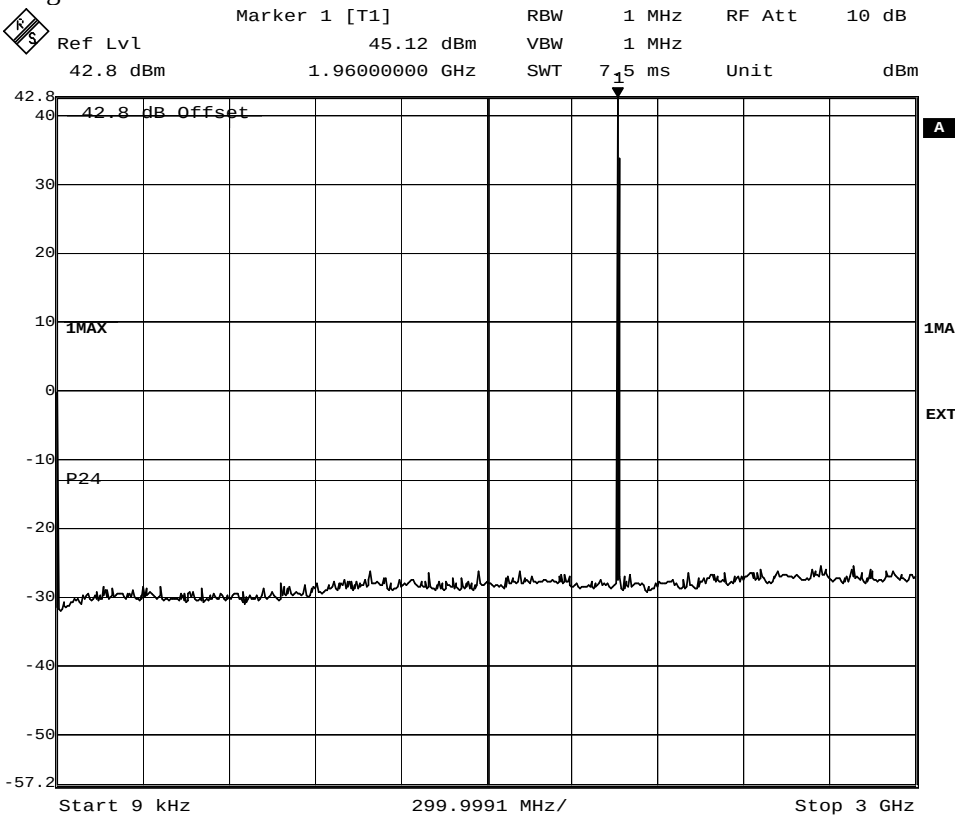

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:28:08

Diagram 19


Marker 1 [T1]
Ref Lvl
42.8 dBm
45.12 dBm
1.96000000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 17:35:59

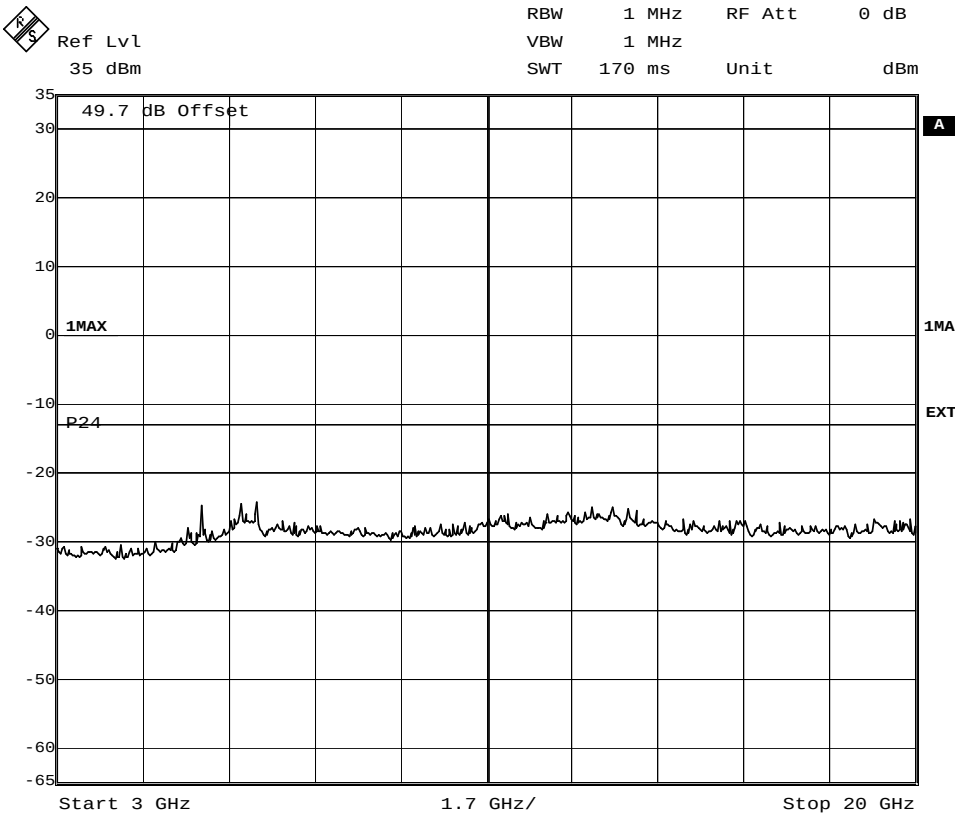
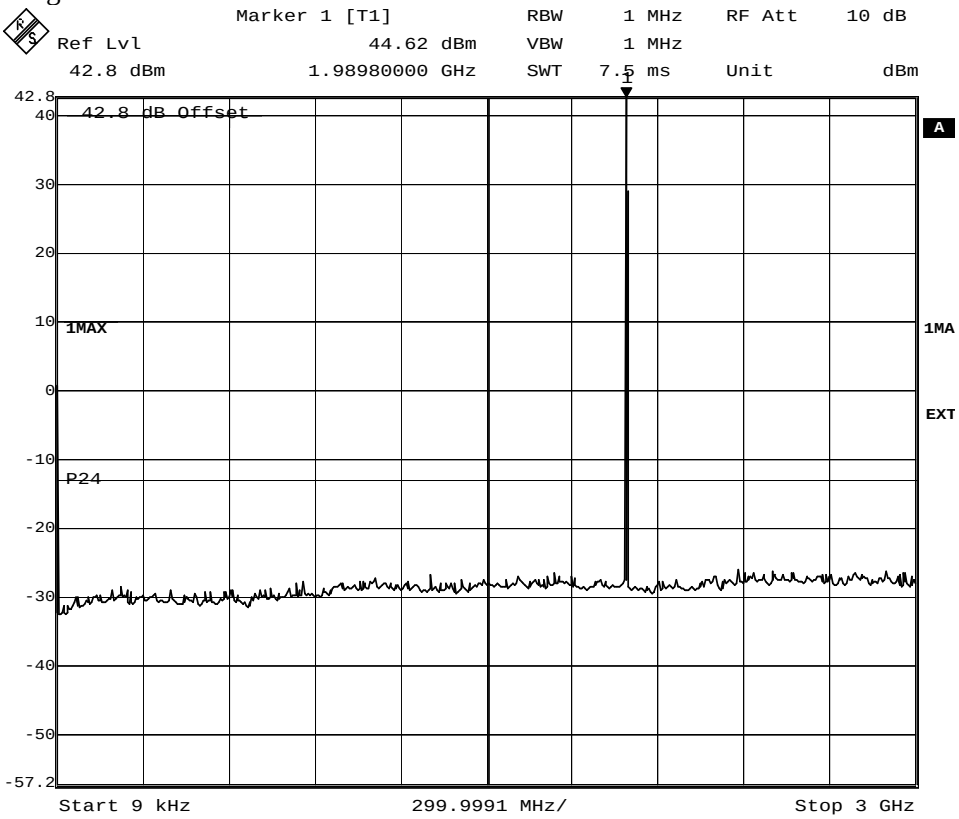

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:29:29

Diagram 20


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
44.62 dBm
VBW 1 MHz
42.8 dBm
1.98980000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1MAX
P24
A
1MA
EXT
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 2.MAY.2007 17:37:11

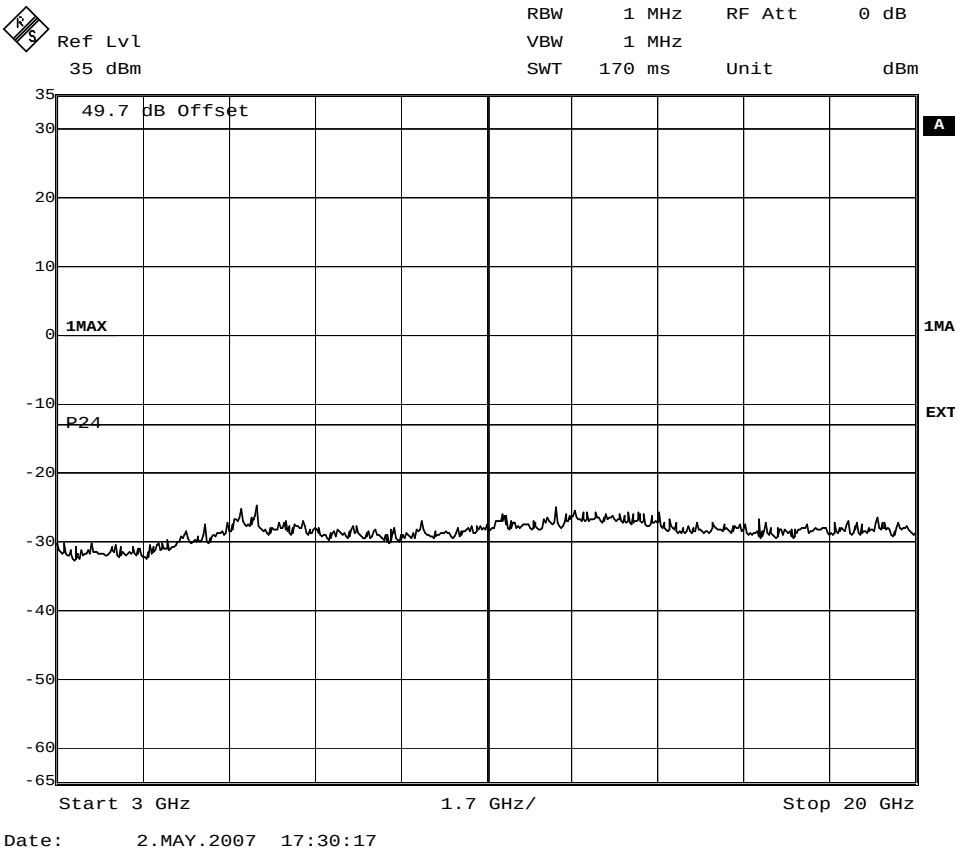
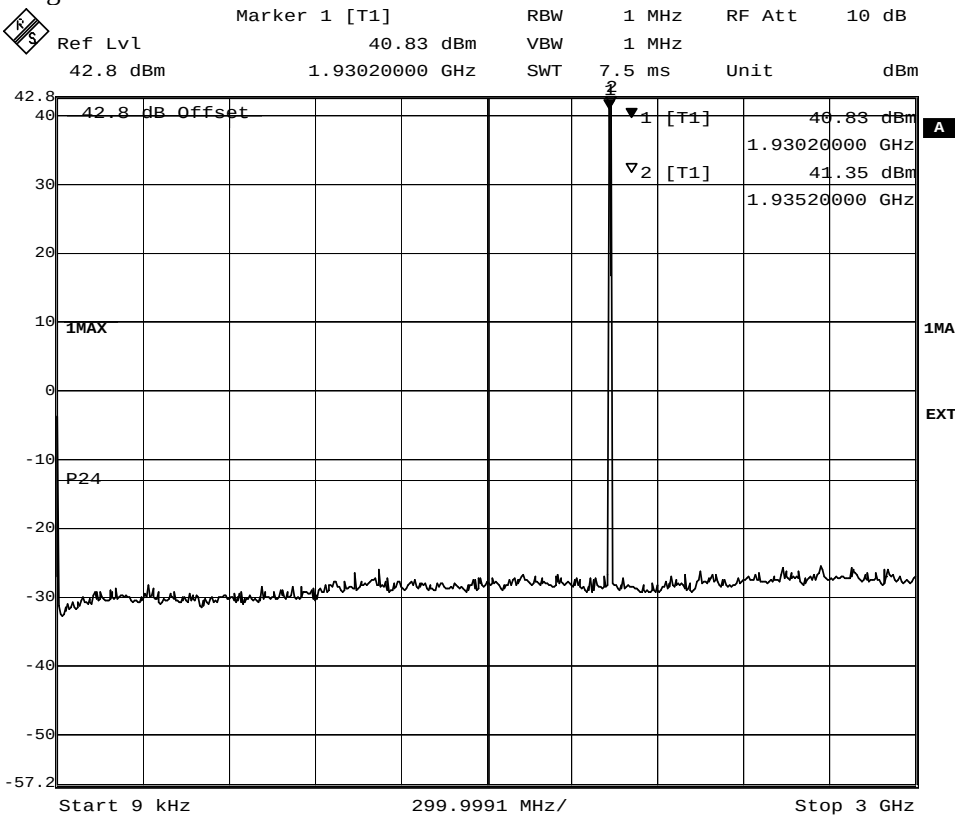

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 2.MAY.2007 17:30:17

Diagram 21-1


Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
40.83 dBm
VBW 1 MHz
42.8 dBm
1.93020000 GHz
SWT 7.5 ms
Unit dBm
42.8 dB Offset
1 [T1] 40.83 dBm
1.93020000 GHz
2 [T1] 41.35 dBm
1.93520000 GHz
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 11:18:14

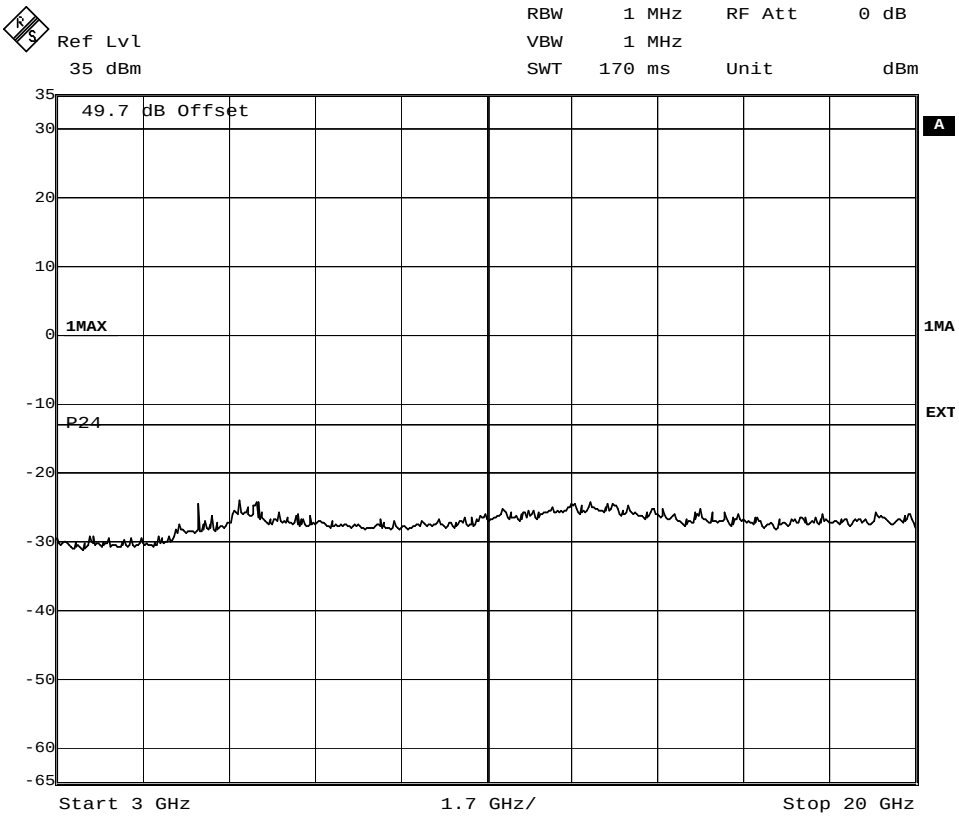
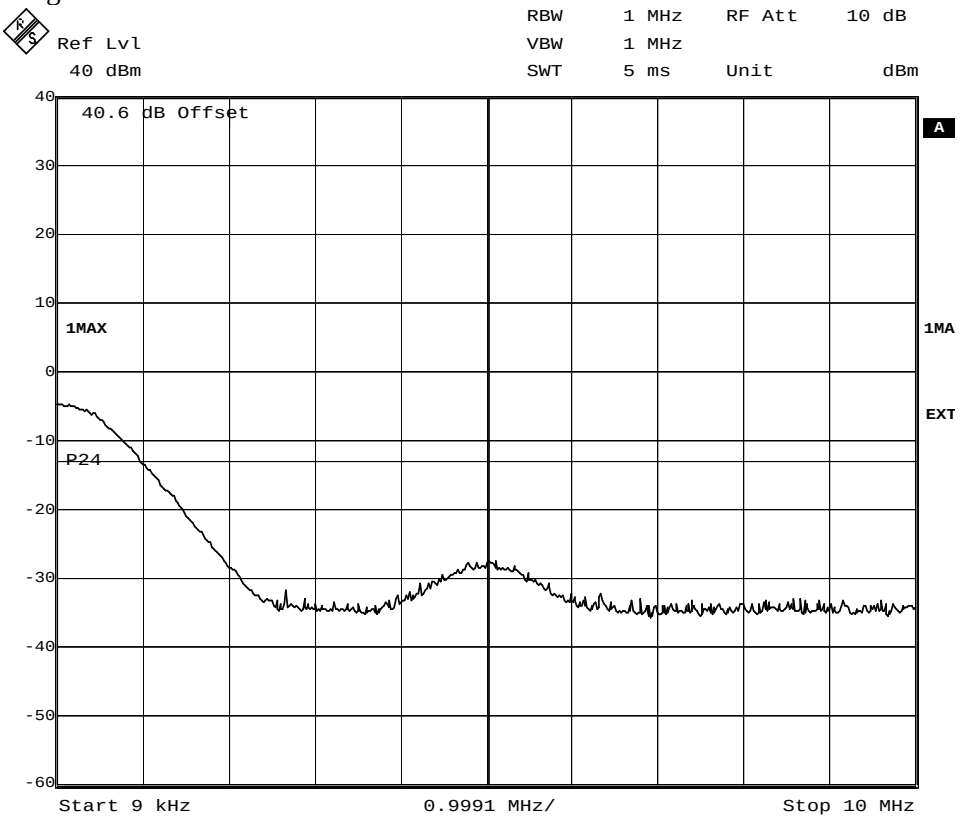
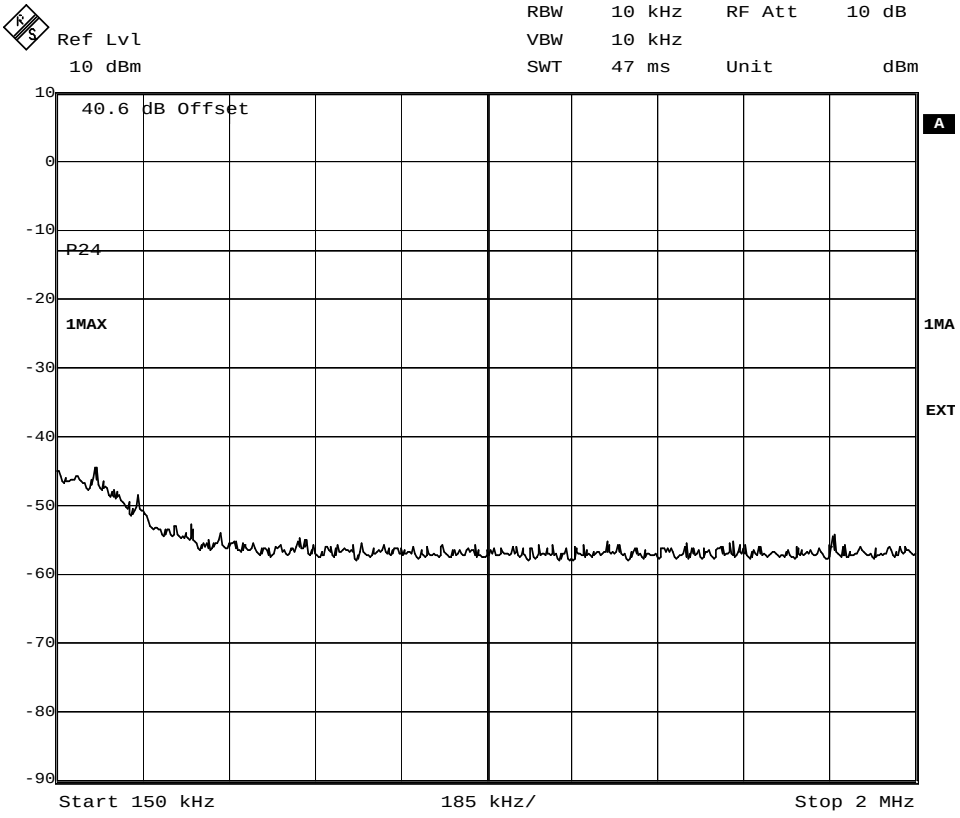

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
35 dBm
SWT 170 ms
Unit dBm
49.7 dB Offset
A
1MAX
1MA
EXT
P24
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 11:12:46

Diagram 21-2



Date: 3.MAY.2007 11:39:41

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: 3.MAY.2007 12:47:03

Diagram 21-3

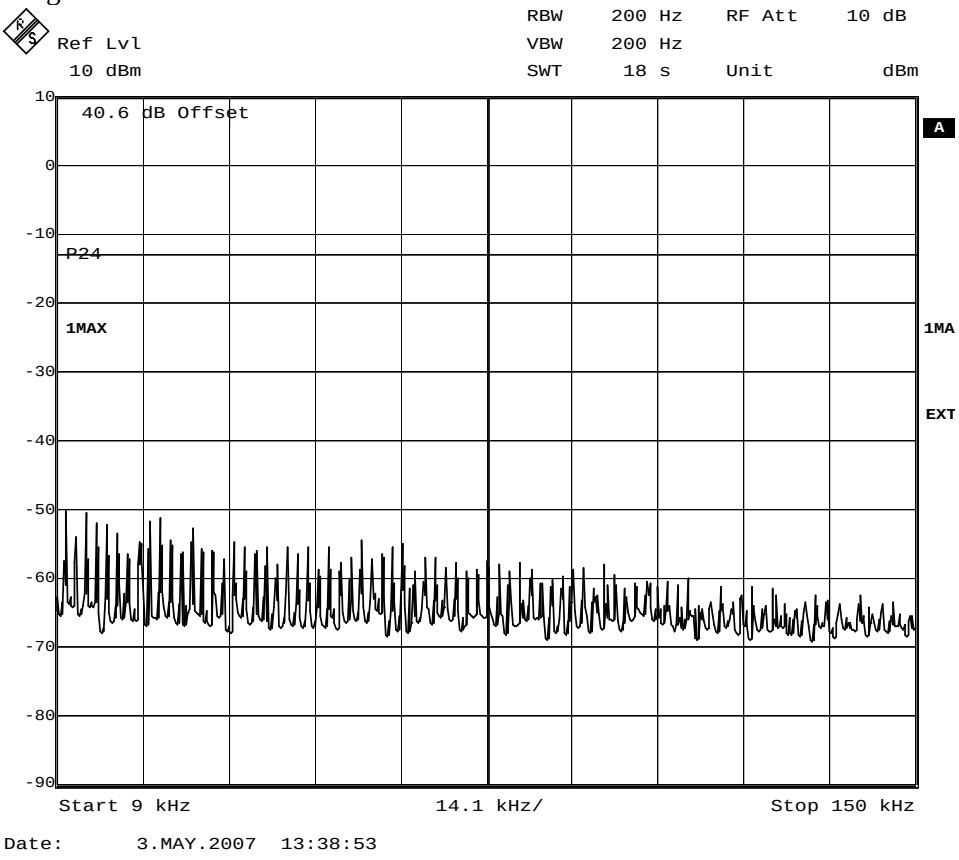
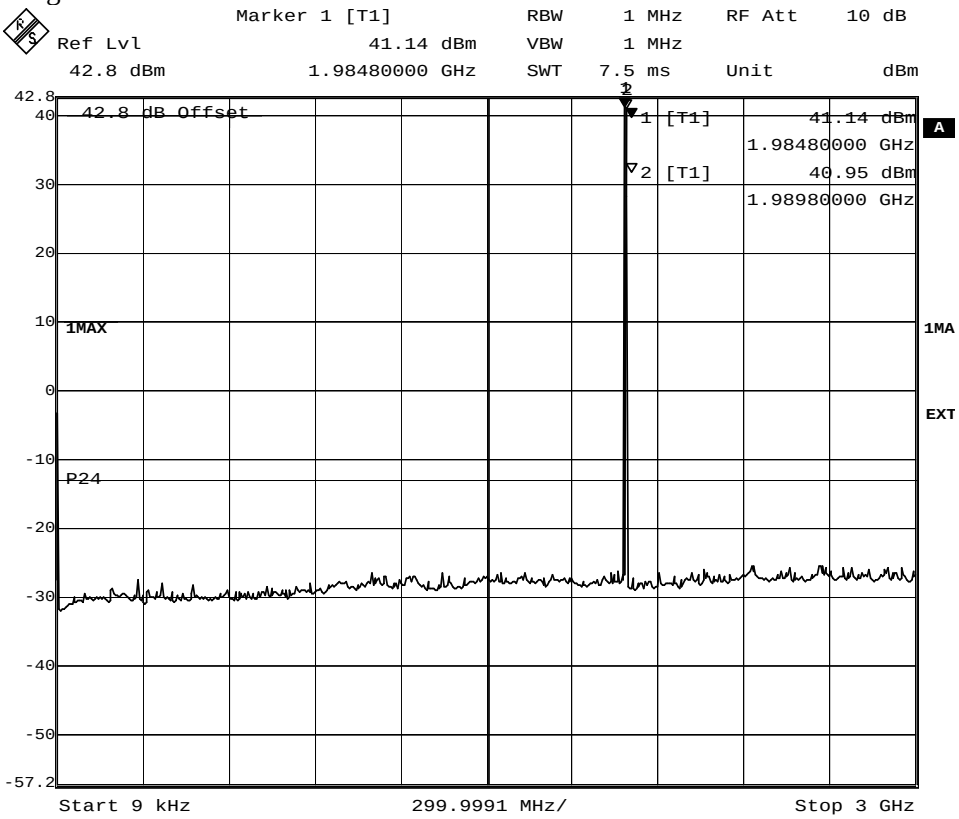

Ref Lvl
10 dBm
RBW 200 Hz
VBW 200 Hz
SWT 18 s
RF Att 10 dB
Unit dBm
40.6 dB Offset
A
P24
1MAX
1MA
EXT
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 9 kHz
14.1 kHz/
Stop 150 kHz
Date: 3.MAY.2007 13:38:53

Diagram 22-1


Marker 1 [T1]
Ref Lvl
42.8 dBm
41.14 dBm
1.98480000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1 [T1] 41.14 dBm
1.98480000 GHz
2 [T1] 40.95 dBm
1.98980000 GHz
1MAX
P24
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 3.MAY.2007 11:20:30

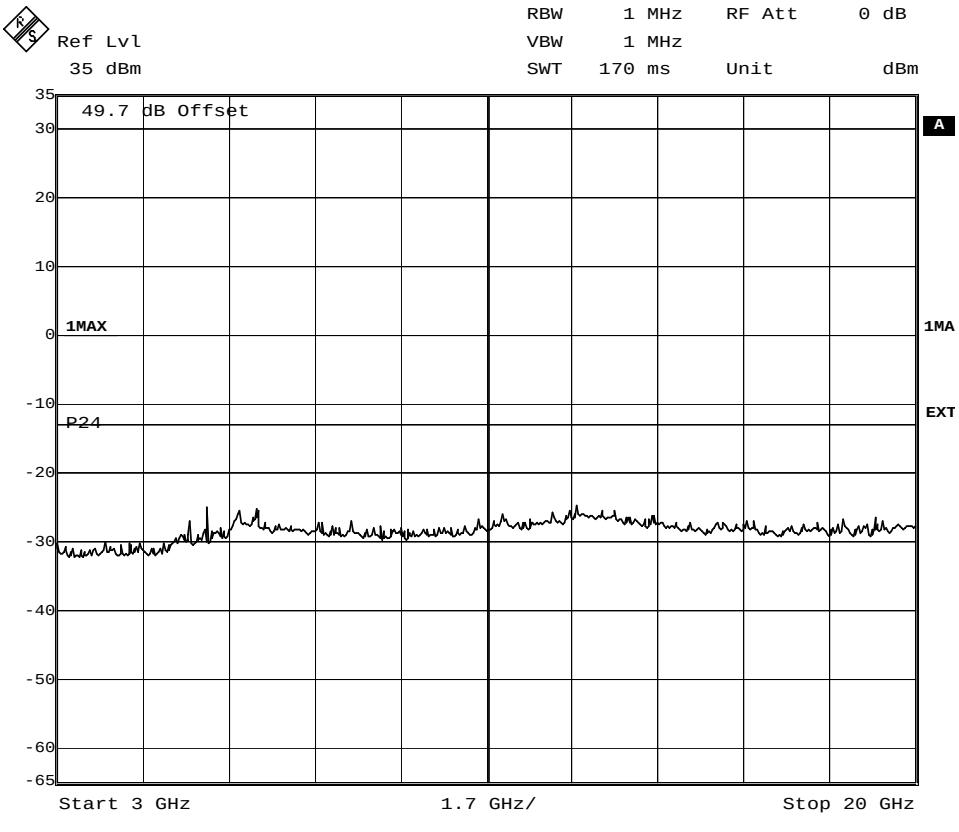
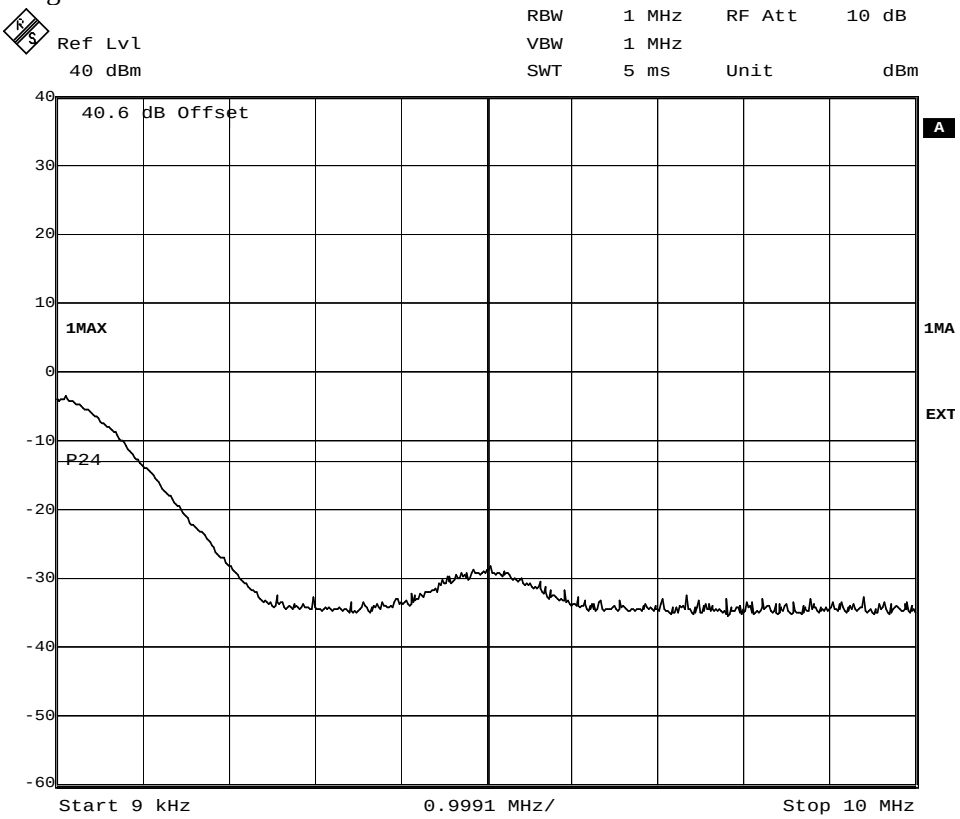
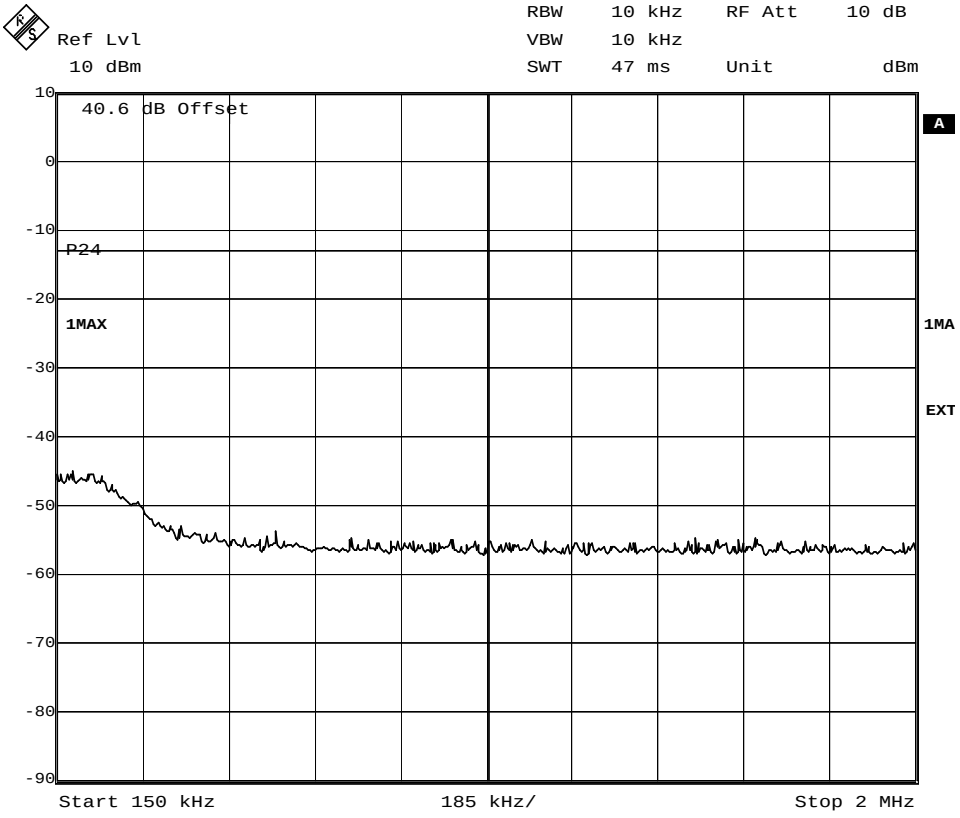

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 3.MAY.2007 11:05:24

Diagram 22-2



Date: 3.MAY.2007 11:38:16

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: 3.MAY.2007 12:54:15

Diagram 22-3

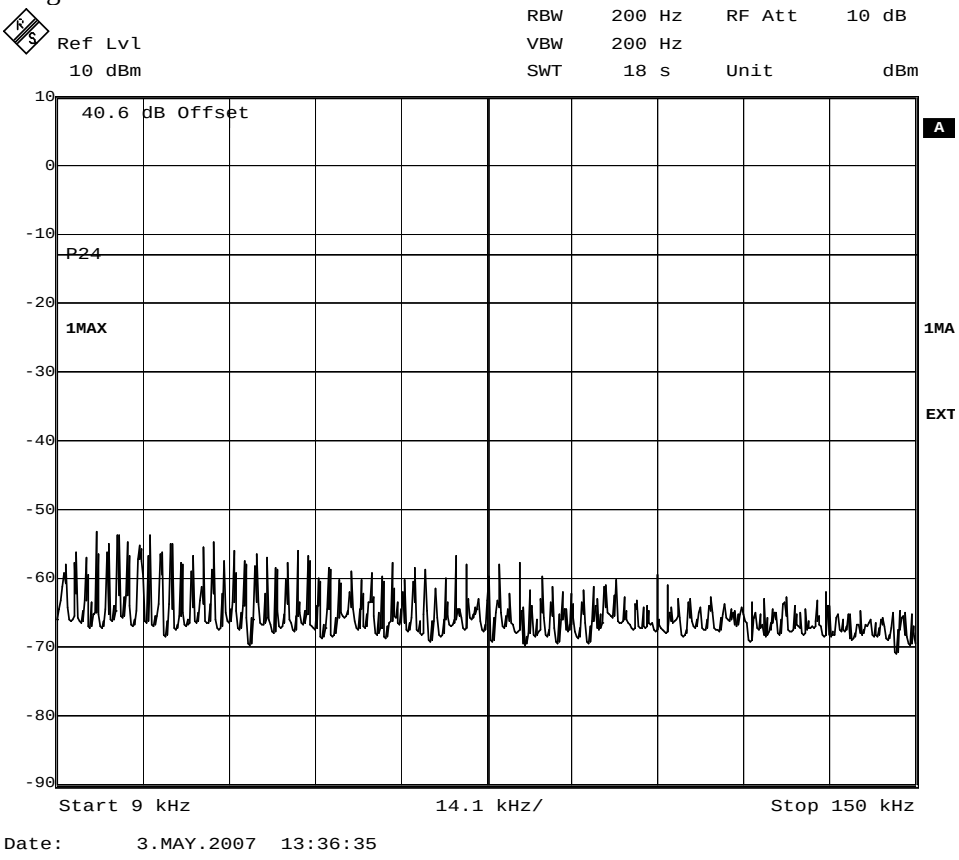
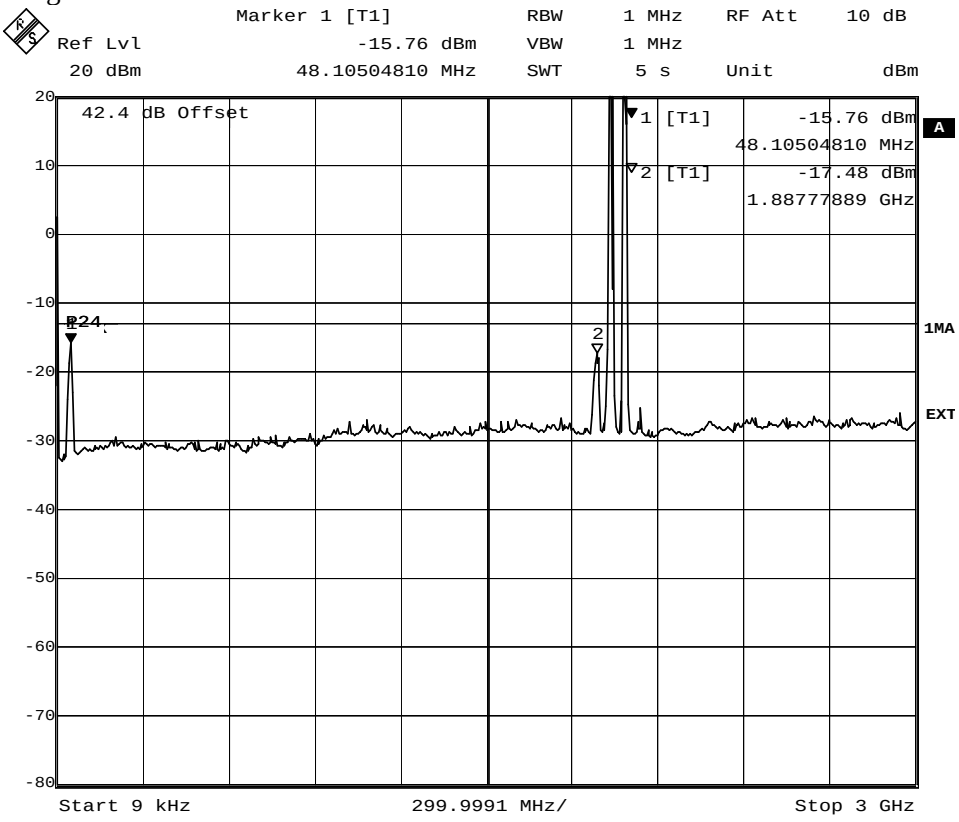
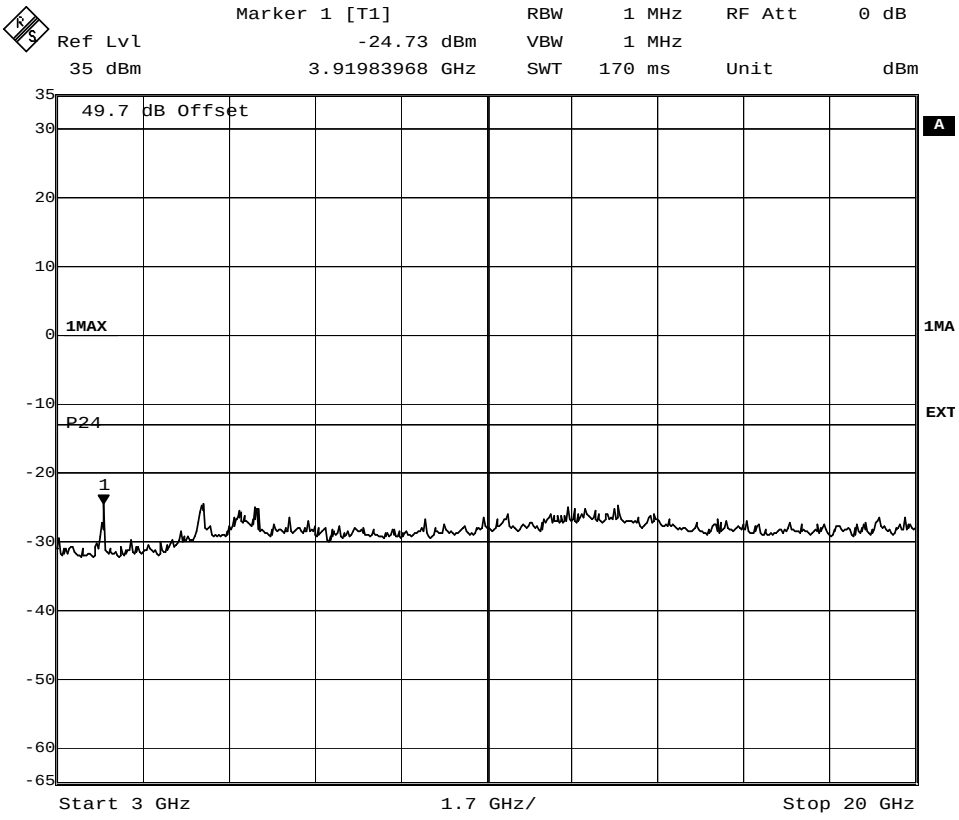

Ref Lvl
10 dBm
RBW 200 Hz
VBW 200 Hz
SWT 18 s
RF Att 10 dB
Unit dBm
40.6 dB Offset
A
P24
1MAX
1MA
EXT
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 9 kHz
14.1 kHz/
Stop 150 kHz
Date: 3.MAY.2007 13:36:35

Diagram 23-1

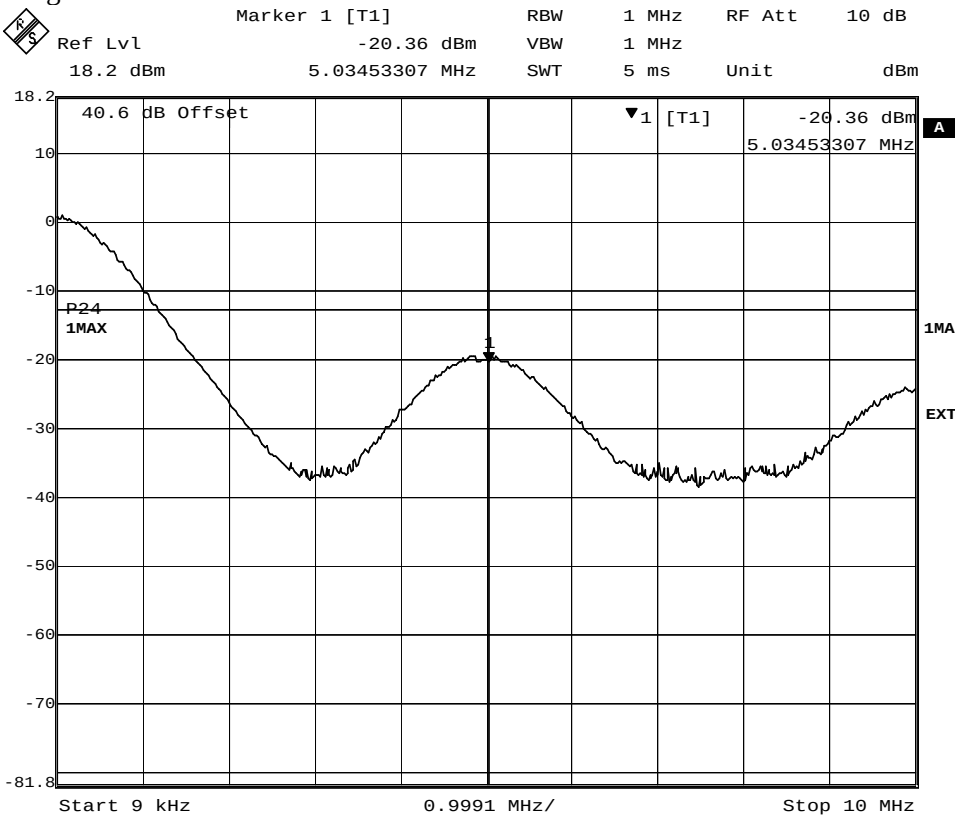


Date: 7.MAY.2007 09:53:05



Date: 7.MAY.2007 13:36:43

Diagram 23-2



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.

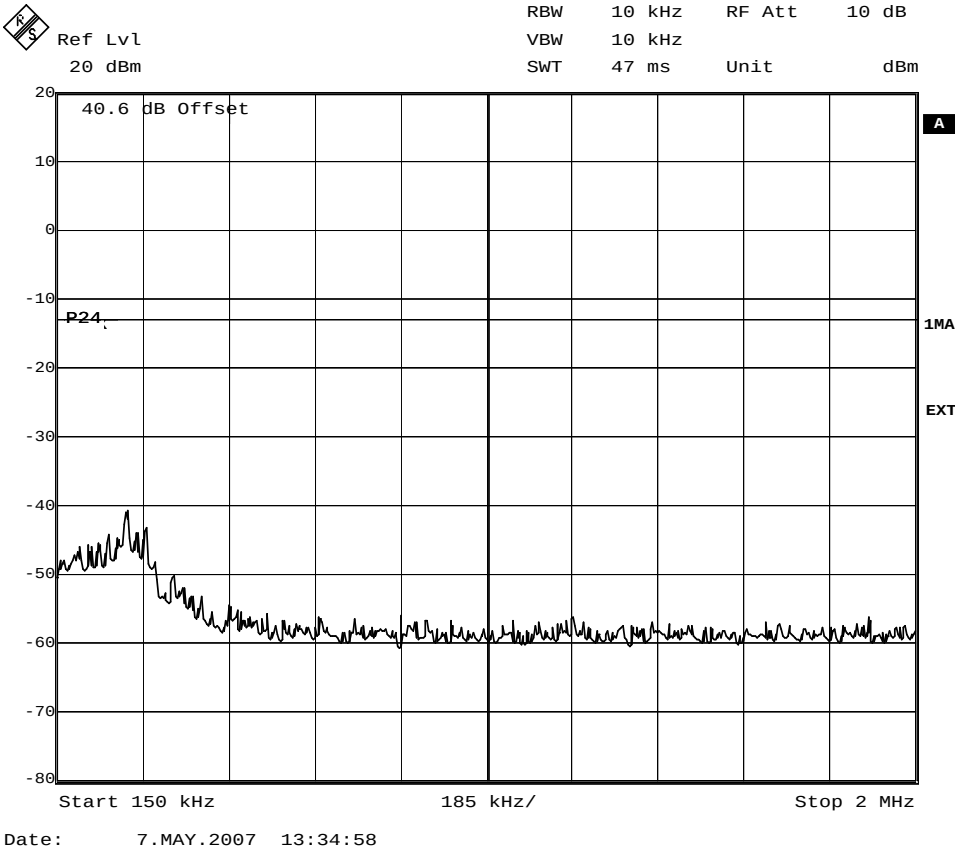


Diagram 23-3

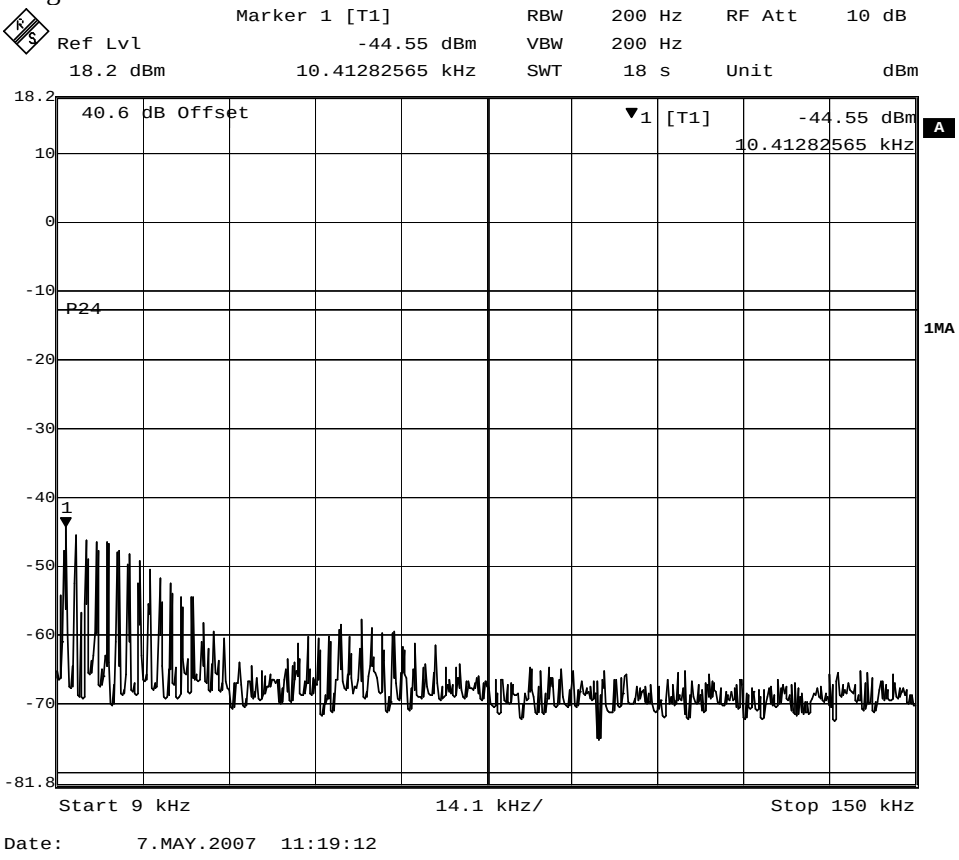
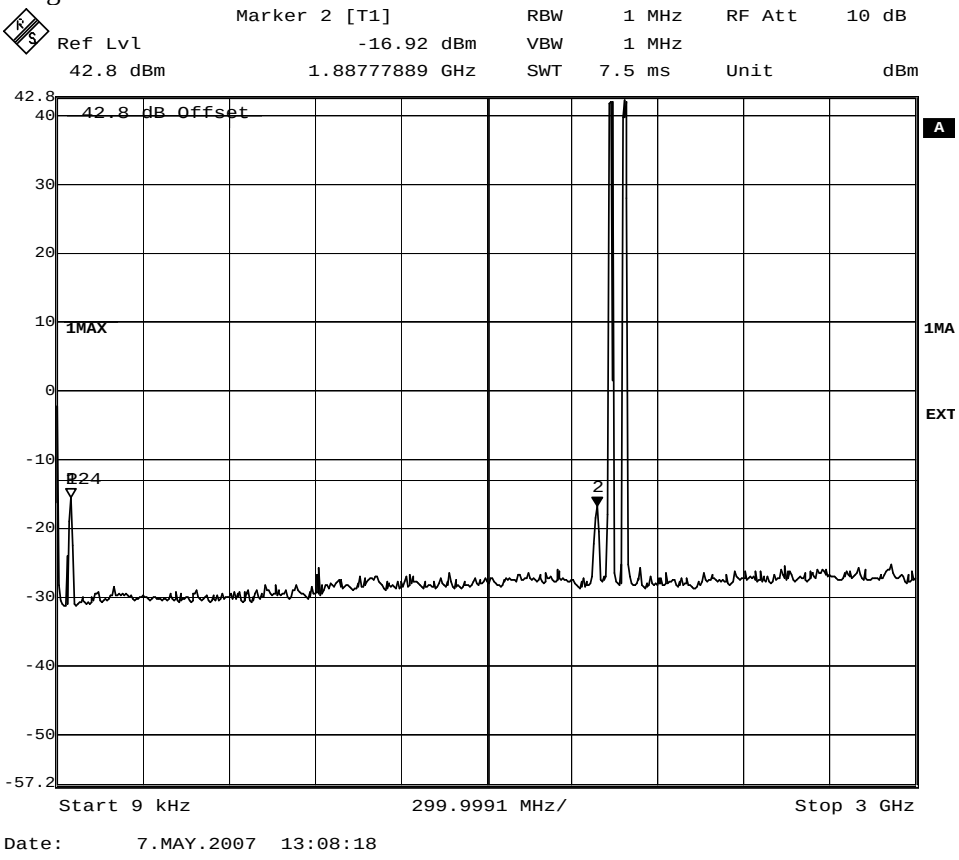

Marker 1 [T1]
RBW 200 Hz
RF Att 10 dB
Ref Lvl
-44.55 dBm
VBW 200 Hz
18.2 dBm
10.41282565 kHz
SWT 18 s
Unit dBm
18.2
40.6 dB Offset
▼1 [T1]
-44.55 dBm
10.41282565 kHz
A
10
0
-10
P24
1MA
-20
-30
-40
1
-50
-60
-70
-81.8
Start 9 kHz
14.1 kHz/
Stop 150 kHz
Date: 7.MAY.2007 11:19:12

Diagram 24-1


Marker 2 [T1]
Ref Lvl
42.8 dBm
-16.92 dBm
1.88777889 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7.5 ms
RF Att 10 dB
Unit dBm
42.8 dB Offset
1MAX
P24
2
A
1MA
EXT
42.8
40
30
20
10
0
-10
-20
-30
-40
-50
-57.2
Start 9 kHz
299.9991 MHz/
Stop 3 GHz
Date: 7.MAY.2007 13:08:18

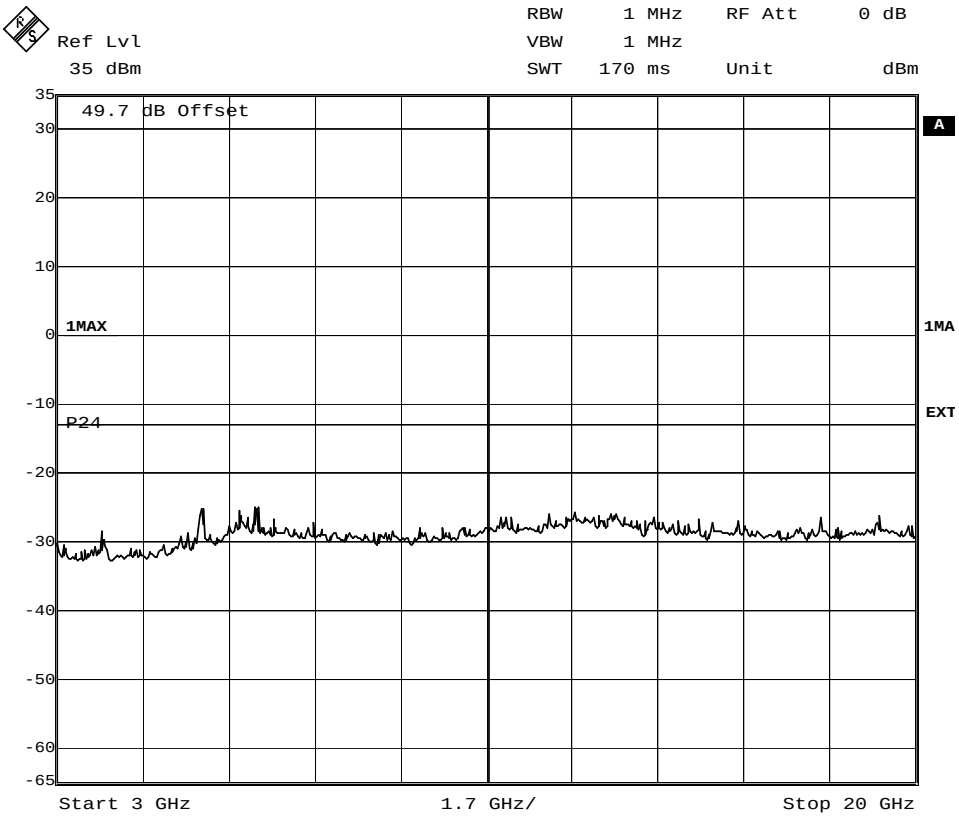
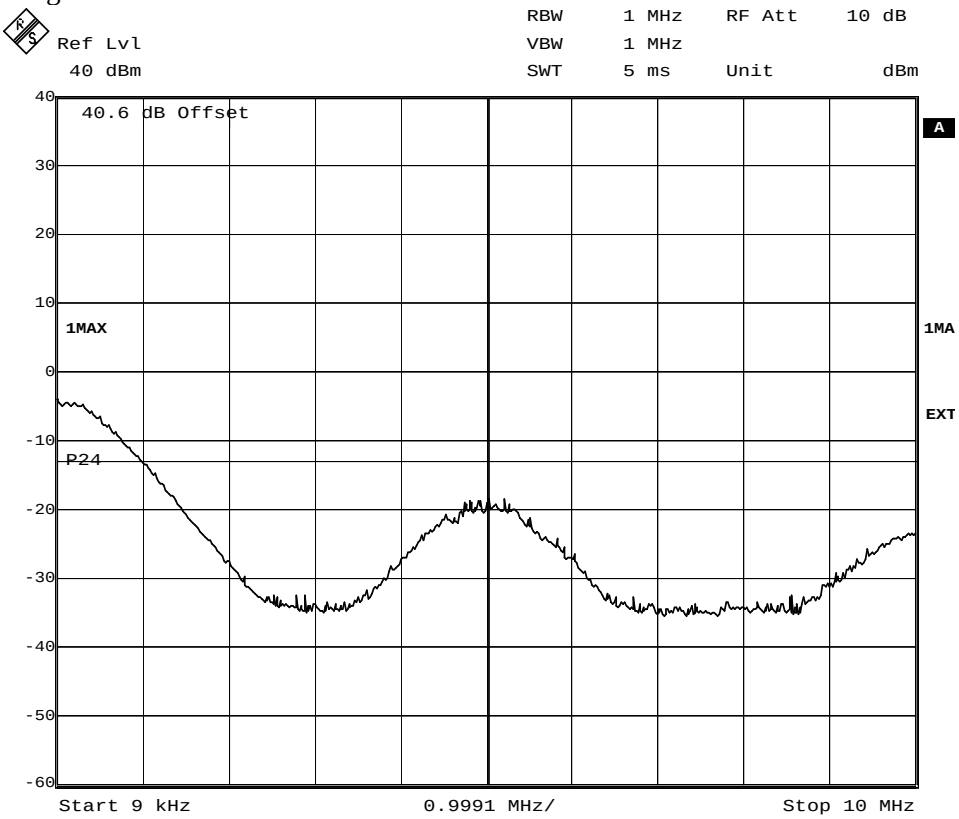
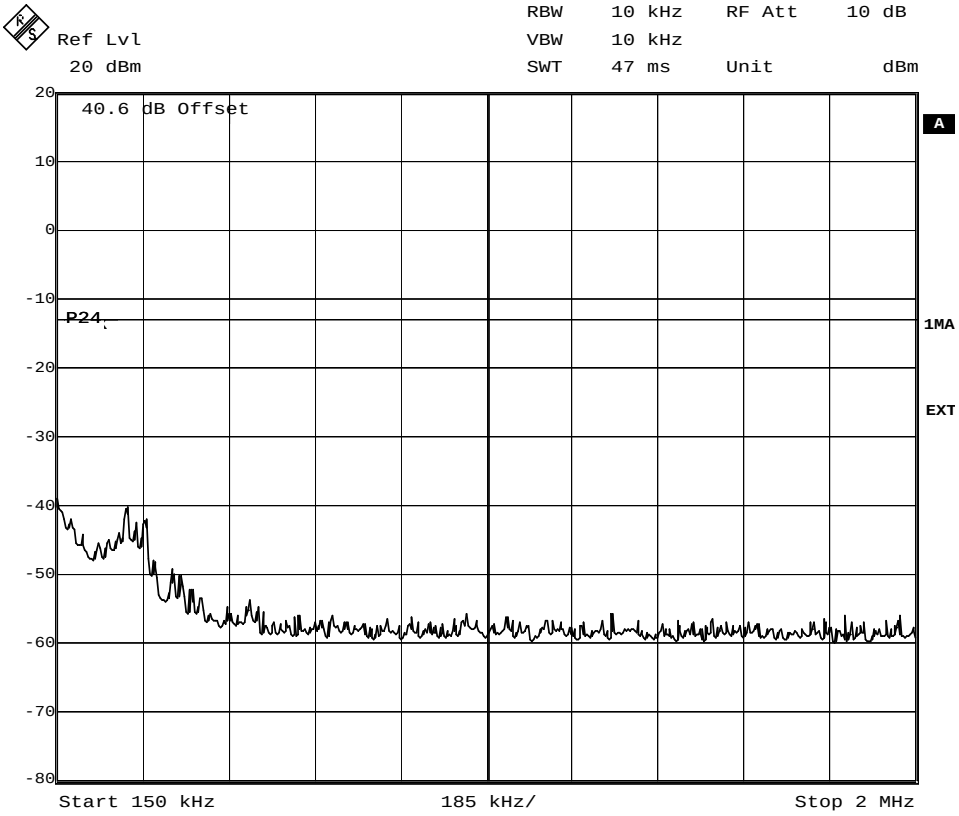

Ref Lvl
35 dBm
RBW 1 MHz
VBW 1 MHz
SWT 170 ms
RF Att 0 dB
Unit dBm
49.7 dB Offset
1MAX
P24
A
1MA
EXT
35
30
20
10
0
-10
-20
-30
-40
-50
-60
-65
Start 3 GHz
1.7 GHz/
Stop 20 GHz
Date: 7.MAY.2007 13:19:19

Diagram 24-2



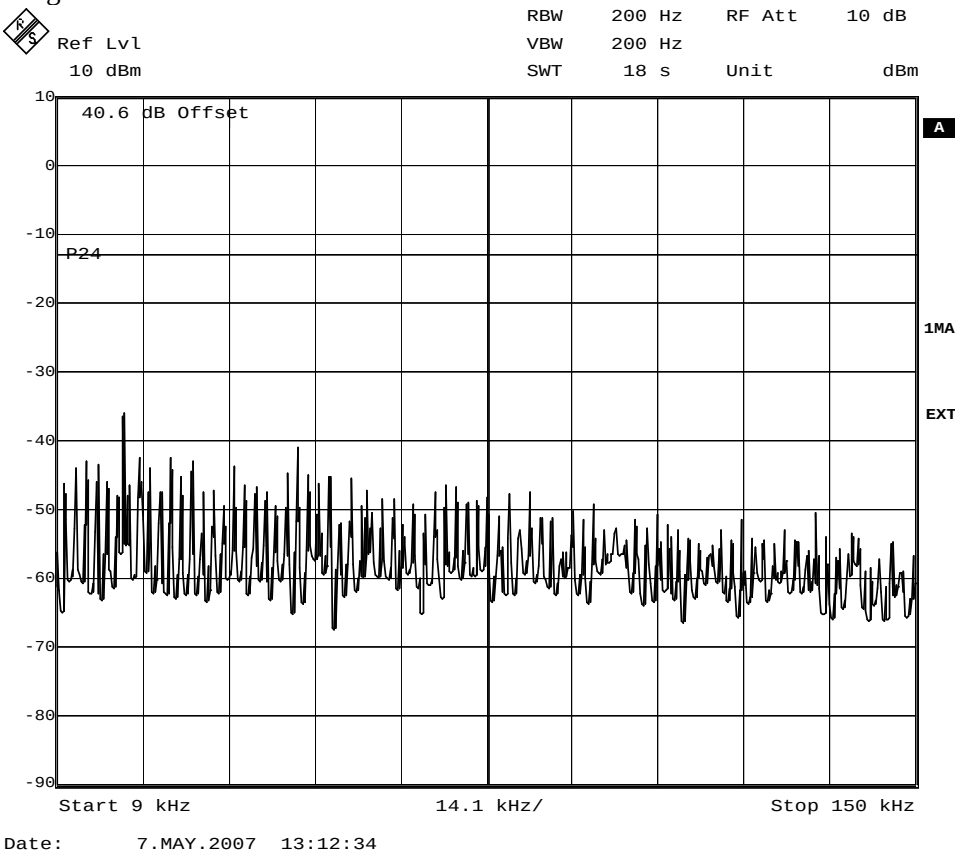
Date: 7.MAY.2007 13:09:14

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.MAY.2007 13:30:39

Diagram 24-3


Ref Lvl
10 dBm
RBW 200 Hz
VBW 200 Hz
SWT 18 s
RF Att 10 dB
Unit dBm
40.6 dB Offset
P24
A
1MA
EXT
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 9 kHz
14.1 kHz/
Stop 150 kHz
Date: 7.MAY.2007 13:12:34

Field strength of spurious radiation measurements according to 47CFR 2.1053

Date	Temperature	Humidity
2007-05-09	23 °C ± 3 °C	34 % ± 5 %
2007-05-11	21°C ± 3 °C	36 % ± 5 %
2007-05-14	22°C ± 3 °C	40 % ± 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,

$\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D 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	2007-09	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
ETS Lindgren 3116	2007-06	503 878
MITEQ Low Noise Amplifier	2007-08	503 285
Testo 615, Temperature and humidity meter	2007-09	503 505

Results

CDU-K

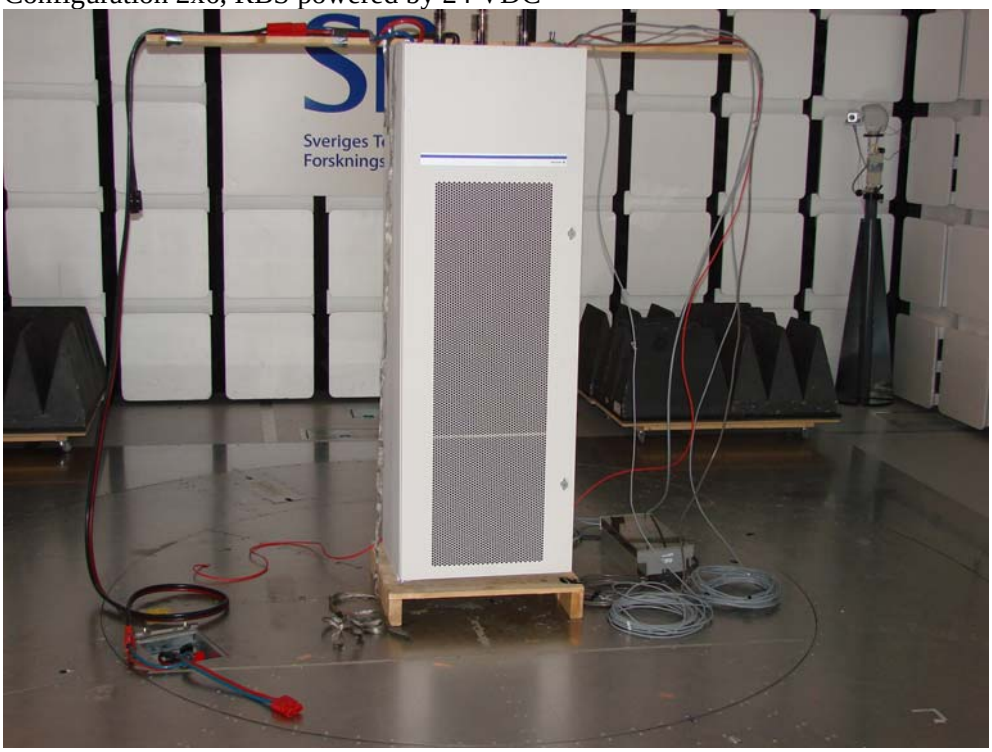
The test set-up during the spurious radiation measurements can be seen in the picture below

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 24 VDC



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

Frequency stability measurements according to 47CFR 2.1055

Date	Temperature	Humidity
2007-05-09 to 2007-05-16	21-23 °C ± 3 °C	29-45 % ± 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	2007-08	503 738
Multimeter Fluke 87	2008-04	502 190
Testo 610, Temperature and humidity meter	2008-04	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	+5	+5	+7	+7
27.6	+20	+7	-6	-9	-8
20.4	+20	-5	+5	-7	-9
24.0	+30	-6	-8	-7	-7
24.0	+40	-8	+9	+9	+10
24.0	+50	-7	-7	-12	-10
24.0	+10	-27	-20	-15	-10
24.0	0	-26	-20	-13	-10
24.0	-10	-44	-33	-20	-21
24.0	-20	-75	-46	-29	-22
24.0	-30	-90	-68	-52	-34
Maximum freq. error (Hz)		90		52	
Measurement uncertainty		$< \pm 1 \times 10^{-7}$			

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

Hardware list RBS 2206V2 with CDU-K

Unit	Product Number	Revision	Serial Number
Cabinet	SEB 112 1154/1	R3A	AB20170232
Door	SXK 109 7157/1	R1A	-
DCCU-13	BMG 980 07/11	R1D	BH41065714
ACCU-11	BMG 980 07/9	R1C	BH41071674
Subrack	BFL 119 424/1	R2C	-
CDU-K19-01	BFL 119 447/1	R1A	TR45478203
CDU-K19-01	BFL 119 447/1	R1A	TR45478161
CDU-K19-01	BFL 119 447/1	R1A	TR44918246
Dummy	SXK 107 5031/2	R1B	-
CXU-10	KRY 101 1856/1	R3D	TR42629771
Dummy	-	-	-
TRU shelf	BFL 119 425/1	R1C	-
Backplane	BFX 101 107/3	R1B	-
dTRU-19	KRC 131 1004/2	R4A	AE54185936
dTRU-19	KRC 131 1004/2	R4A	AE54185933
dTRU-19	KRC 131 1004/2	R4A	AE54185932
dTRU-19	KRC 131 1004/2	R4A	AE54185959
dTRU-19	KRC 131 1004/2	R4A	AE54185935
dTRU-19	KRC 131 1004/2	R4A	AE54185940
IDM-11	BMG 980 327/2	R1B	X181184415
PSU-shelf	BFL 119 453/1	R1A	-
Backplane	BFX 101 109/1	R1A	-
PSU-AC-32	BML 353 206/2	R1C	BR80348926
PSU-AC-32	BML 353 206/2	R1C	BR80348872
PSU-AC-32	BML 353 206/2	R1C	BR80348801
Dummy	SXK 107 9314/1	R1C	-
Dummy	-	-	-
TMA-CM-02	SDK 107 881/1	R4A	BG800006U6
Dummy	-	-	-
DXU-23	BOE 602 21/1	R1C	AE53362955

Software	Revision
R06B	R13J

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	R1D	BH41057603
ACCU-11	BMG 980 07/9	R1C	BH41071675
Subrack	BFL 119 424/1	R2C	-
CDU-F19	BFL 119 156/1	R2B	TB36375045
CDU-F19	BFL 119 156/1	R2B	TB36375040
CDU-F19	BFL 119 156/1	R2B	TB36375046
Dummy	SXK 107 5031/2	R1B	-
CXU-10	KRY 101 1856/1	R3D	TR44542643
Dummy	-	-	-
TRU shelf	BFL 119 425/1	R1C	-
Backplane	BFX 101 107/3	R1B	-
dTRU-19	KRC 131 1004/2	R4A	AE54185951
dTRU-19	KRC 131 1004/2	R4A	AE54185952
dTRU-19	KRC 131 1004/2	R4A	AE54185938
dTRU-19	KRC 131 1004/2	R4A	AE54185939
dTRU-19	KRC 131 1004/2	R4A	AE54185937
dTRU-19	KRC 131 1004/2	R4A	AE54155371
IDM-11	BMG 980 327/2	R1B	X181184157
PSU-shelf	BFL 119 453/1	R1A	BK41073469
Backplane	BFX 101 109/1	R1A	-
PSU-AC-32	BML 353 206/2	R1C	BR80299554
PSU-AC-32	BML 353 206/2	R1C	BR80299553
PSU-AC-32	BML 353 206/2	R1C	BR80299542
Dummy	SXK 107 9314/1	R1C	-
Dummy	-	-	-
Dummy	SXK 107 5029/1	R1D	-
TMA-CM-02	SDK 107 881/1	R4A	BG800007QU
DXU-23	BOE 602 21/1	R1C	TU8B435620

Software	Revision
R06B	R13J

Photos
Transceiver Unit KRC 131 1004/2, R4A

Front side

Rear side

FCC ID label

Left side

Right side