Nemko Test Report: 29477RUS4

Applicant: E. I. Medical Imaging
348 N. Jefferson St.
Loveland, CO 80537

Equipment Under Test: (E.U.T.) Ibex Pro and Ibex Lite

FCC Identifier: XMOIBEX

IC Product ID: 8512A-IBEX

In Accordance With: **FCC Part 15, Subpart C, 15.247 and RSS 210, Issue 7**
Digital Transmission System Transmitter

Tested By: Nemko USA, Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

TESTED BY: _____ **DATE:** **29 September 2009**
Tom Tidwell, Telecom Direct

APPROVED BY: _____ **DATE:** **29 September 2009**
David Light, Wireless Engineer

Number of Pages: 53

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Section 1. Summary of Test Results

Manufacturer: E. I. Medical Imaging

Model No.: Ibex (representing both Ibex Pro and Ibex Lite)

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 and RSS 210, Issue 7 for Digital Transmission Systems. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on a listed test site. A description of the test facility is on file with the FCC and Industry Canada.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP®
LAB CODE: 100426-0

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a), RSS GEN 7.2.2	Complies[1]
Minimum 6 dB Bandwidth	15.247(a)(2), RSS 210 A8.2(a)	Complies
Maximum Peak Power Output	15.247(b)(3), RSS 210 A8.4(4)	Complies
Spurious Emissions (Antenna Conducted)	15.247(d), RSS 210 A8.5	Complies
Spurious Emissions (Restricted Bands)	15.247(d)/15.209(a), RSS 210, Table 1	Complies
Receiver Spurious Emissions	RSS GEN, 7.2.3	Complies
Peak Power Spectral Density	15.247(e), RSS 210 A8.2(b)	Complies

Notes:

[1]The conducted emission test results are found in Criterion test report file 90629-1435C.pdf, pages 61 and 62. The results indicate that the equipment complies with the requirements of 15.207 and RSS GEN 7.2.2.

Description of DUT:

The EUT is a portable imaging device for use with animals. The device contains a Wireless LAN radio as well as a Class II Bluetooth radio module. The Bluetooth radio module is used to communicate with an RFID wand that is used for identification of the animal. The RFID wand is not manufactured by E. I. Medical Imaging and holds a separate certification.

The wireless LAN radio follows the IEEE 802.11b/g standard. The WLAN radio uses a chip antenna mounted on the PCB. The chip antenna is manufactured by Antenova and is identified by part number 3030A5839-01.

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band (MHz):	902-928	2400-2483.5	5725-5850
	☐	☒	☐

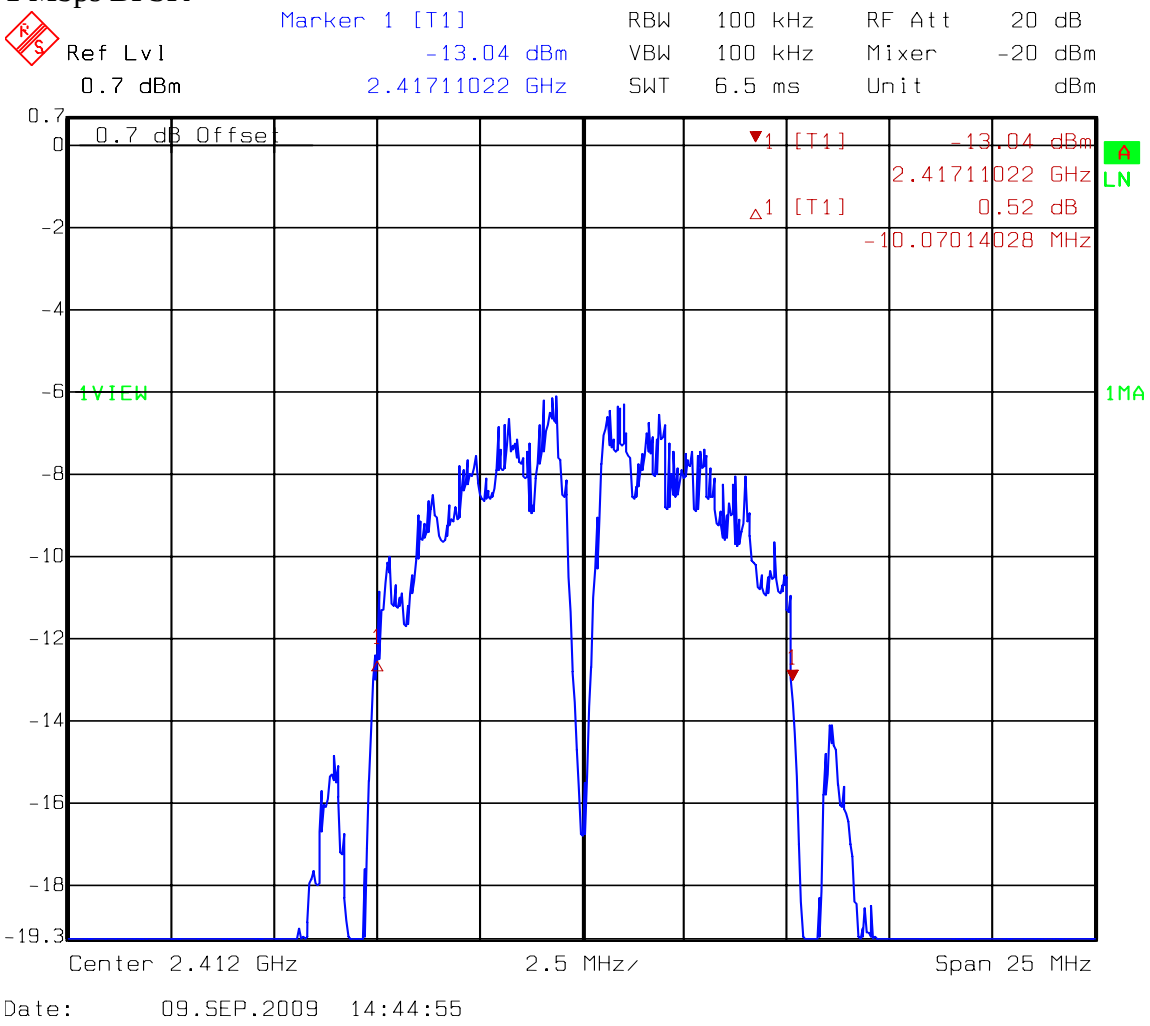
Operating Frequency of Test Sample:	2412 – 2462 MHz
Modulation(s):	BPSK(Binary Phase-Shift Keying), CCK(Complementary-Code Shift Keying), QPSK(Quadrature Phase-Shift Keying), OFDM(Orthogonal Frequency Division Multiplexing)
Emission Designator(s):	11M0G1D (802.11b mode) 17M0W7D (802.11g mode)
User Frequency Adjustment:	Software controlled

Section 3. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY:	DATE:

Test Results: See attached plots

1 Mbps BPSK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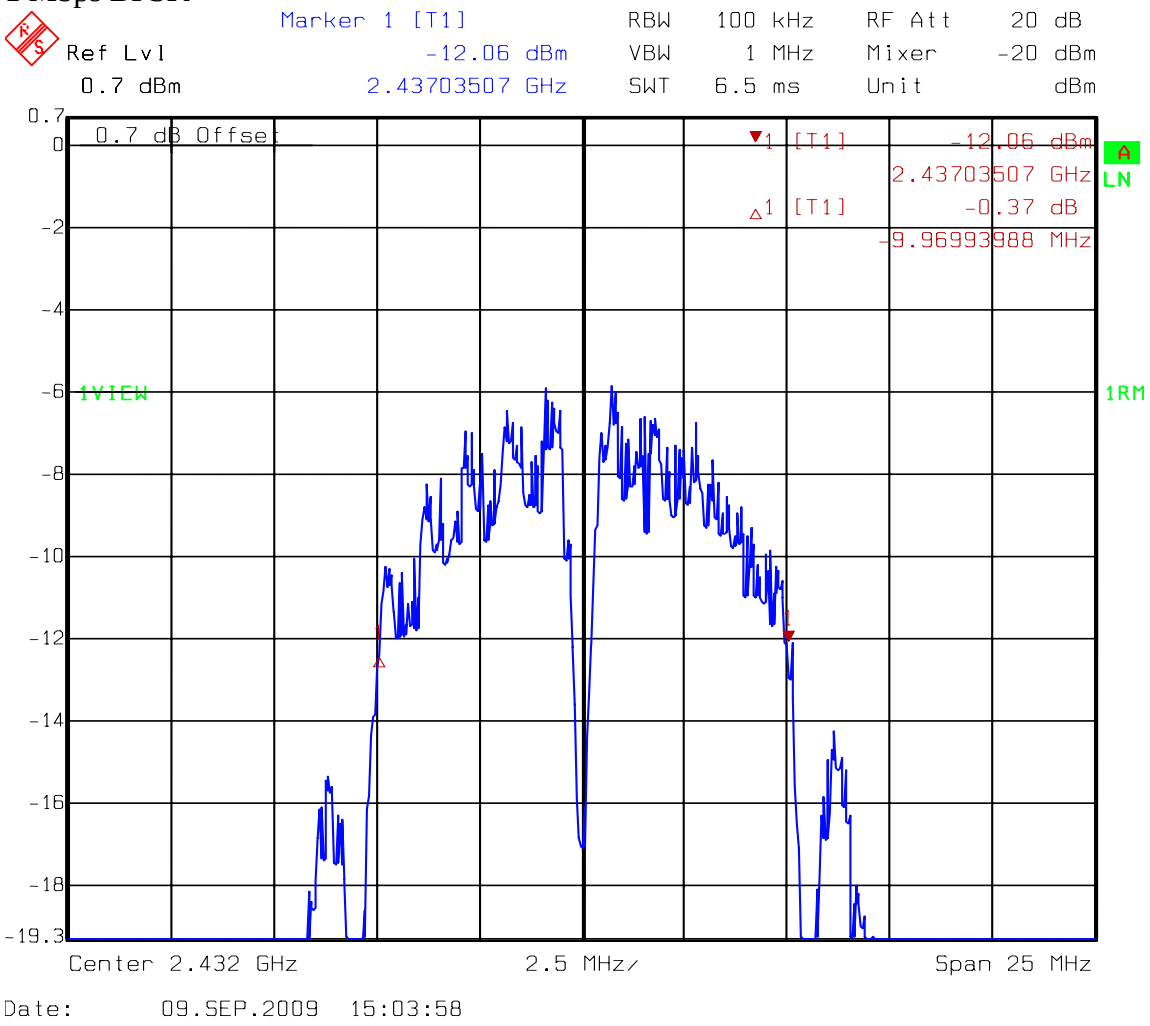
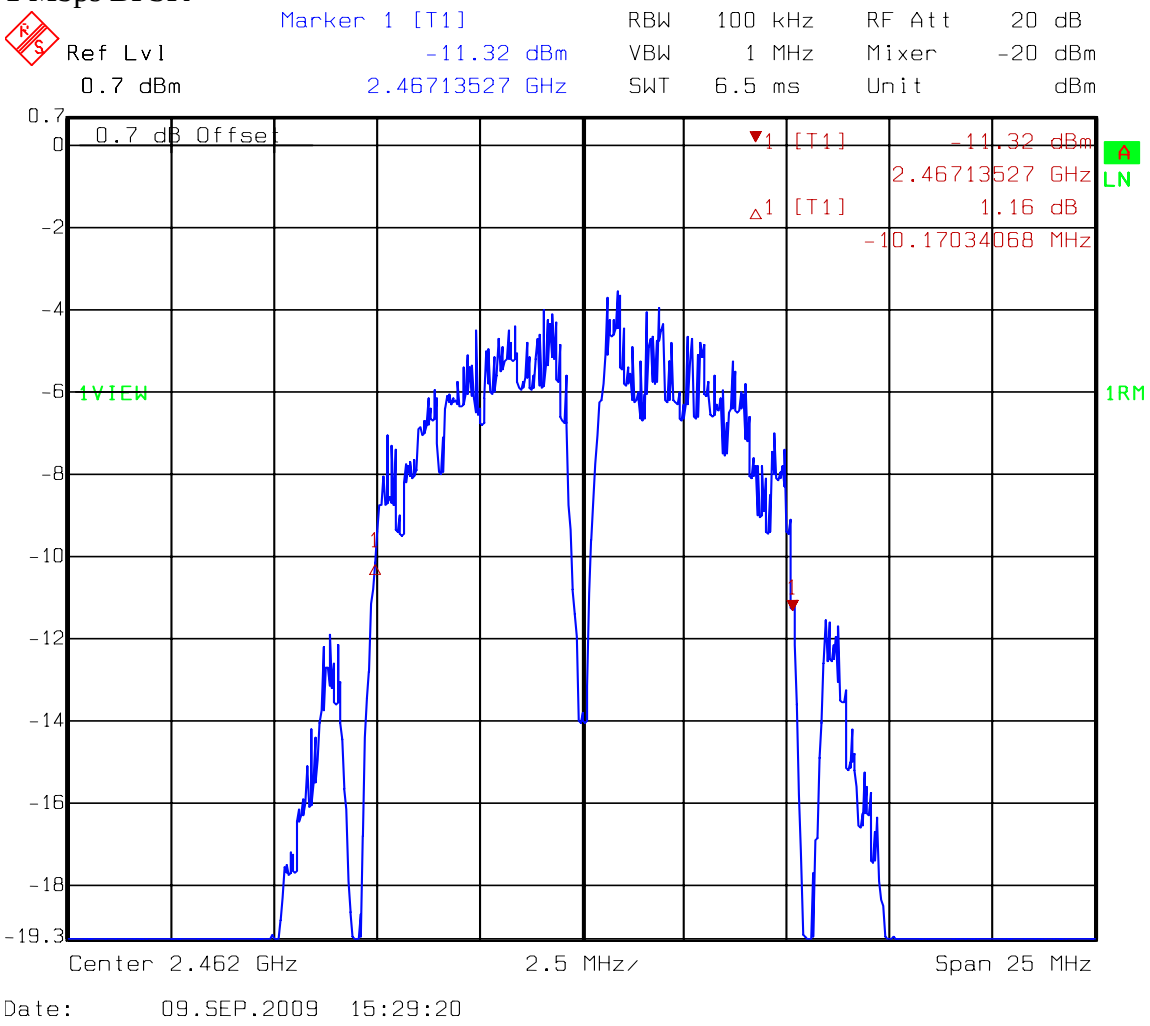
Ref Lvl
0.7 dBm
-13.04 dBm
2.41711022 GHz
RBW 100 kHz
VBW 100 kHz
SWT 6.5 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm
0.7 dB Offset
1 [T1] -13.04 dBm
2.41711022 GHz
Δ1 [T1] 0.52 dB
-10.07014028 MHz
A
LN
1VIEW
1MA
0.7
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-19.3
Center 2.412 GHz
2.5 MHz/
Span 25 MHz
Date: 09.SEP.2009 14:44:55

1 Mbps BPSK


Marker 1 [T1]
Ref Lvl
0.7 dBm
-12.06 dBm
2.43703507 GHz
RBW 100 kHz
VBW 1 MHz
SWT 6.5 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm
0.7 dB Offset
1 [T1] -12.06 dBm
2.43703507 GHz
Δ1 [T1] -0.37 dB
-9.96993988 MHz
A
LN
1VIEW
1RM
0.7
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-19.3
Center 2.432 GHz
2.5 MHz/
Span 25 MHz
Date: 09.SEP.2009 15:03:58

1 Mbps BPSK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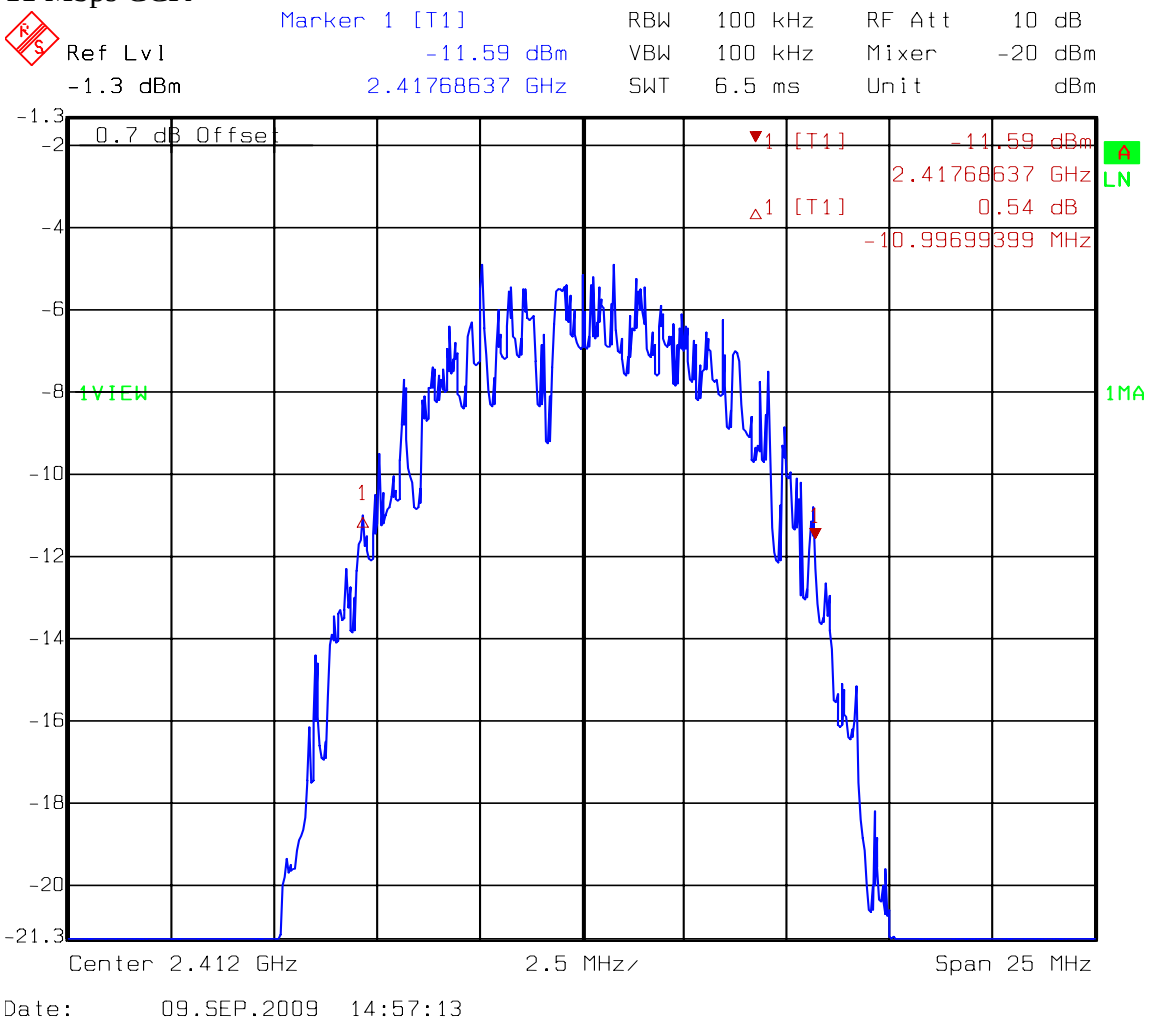
0.7 dBm
-11.32 dBm
2.46713527 GHz
RBW 100 kHz
VBW 1 MHz
SWT 6.5 ms
RF Att 20 dB
Mixer -20 dBm
Unit dBm
0.7 dB Offset
1 [T1] -11.32 dBm
2.46713527 GHz
Δ1 [T1] 1.16 dB
-10.17034068 MHz
1VIEW
1RM
A
LN
0.7
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-19.3
Center 2.462 GHz
2.5 MHz/
Span 25 MHz
Date: 09.SEP.2009 15:29:20

11 Mbps CCK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-11.59 dBm
2.41768637 GHz
RBW 100 kHz
VBW 100 kHz
SWT 6.5 ms
RF Att 10 dB
Mixer -20 dBm
Unit dBm
0.7 dB Offset
1 [T1] -11.59 dBm
2.41768637 GHz
Δ1 [T1] 0.54 dB
-10.99699399 MHz
A
LN
1VIEW
1MA
-1.3
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-21.3
Center 2.412 GHz
2.5 MHz/
Span 25 MHz
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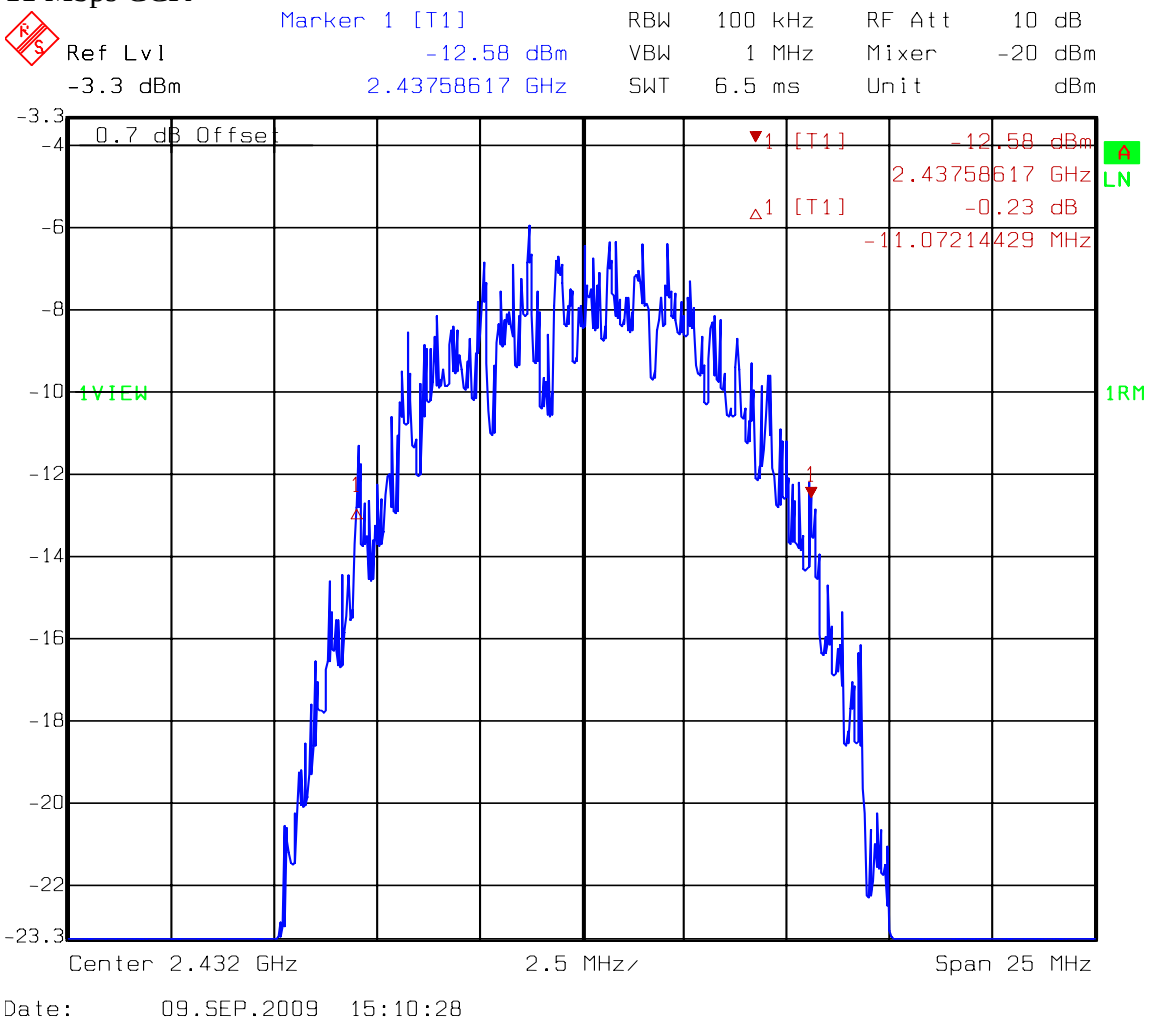
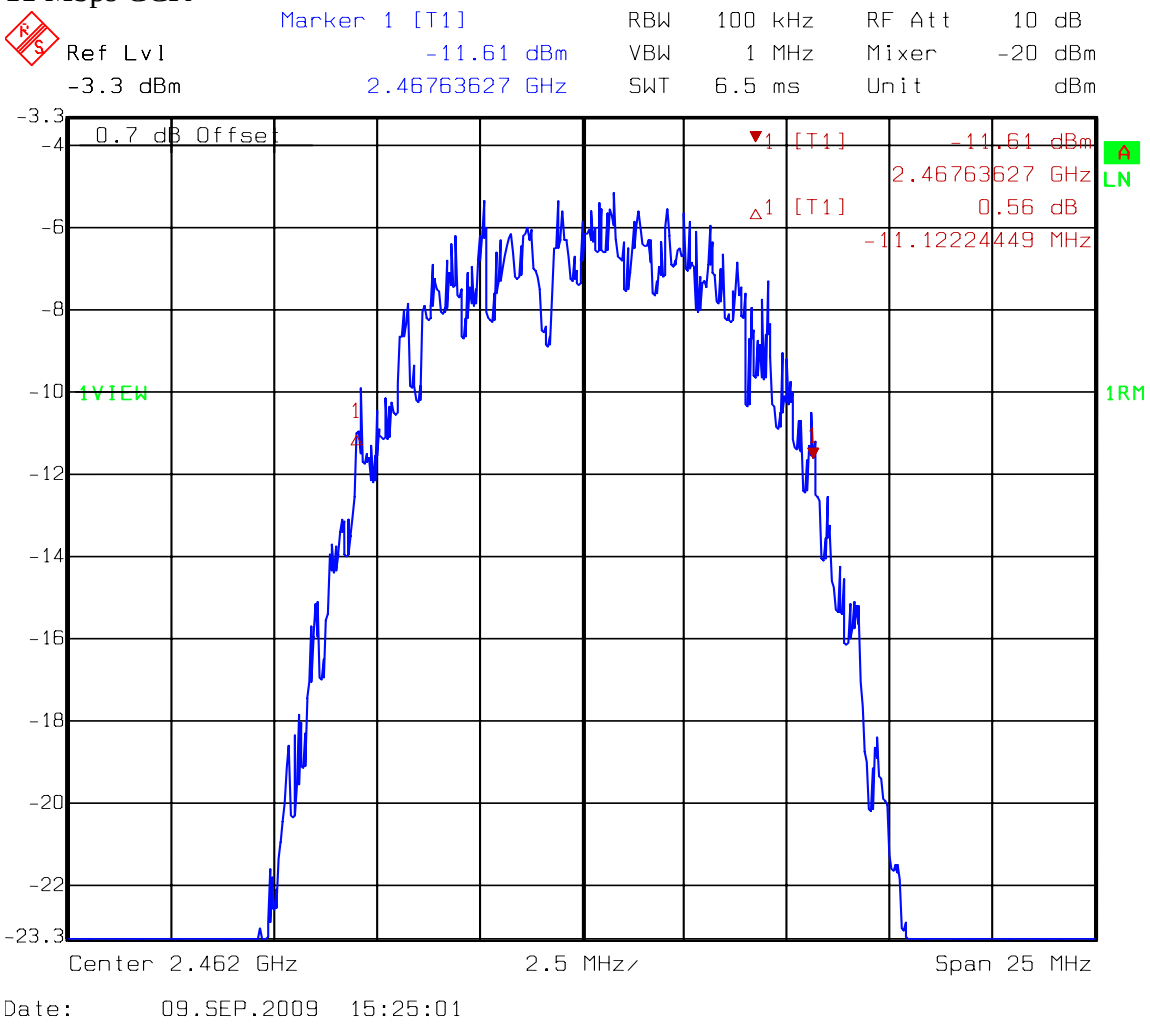
11 Mbps CCK


Marker 1 [T1]
Ref Lvl
-3.3 dBm
-12.58 dBm
2.43758617 GHz
RBW 100 kHz
VBW 1 MHz
SWT 6.5 ms
RF Att 10 dB
Mixer -20 dBm
Unit dBm
0.7 dB Offset
1 [T1] -12.58 dBm
2.43758617 GHz
Δ1 [T1] -0.23 dB
-11.07214429 MHz
1VIEW
1RM
A
LN
-3.3
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-23.3
Center 2.432 GHz
2.5 MHz/
Span 25 MHz
Date: 09.SEP.2009 15:10:28

11 Mbps CCK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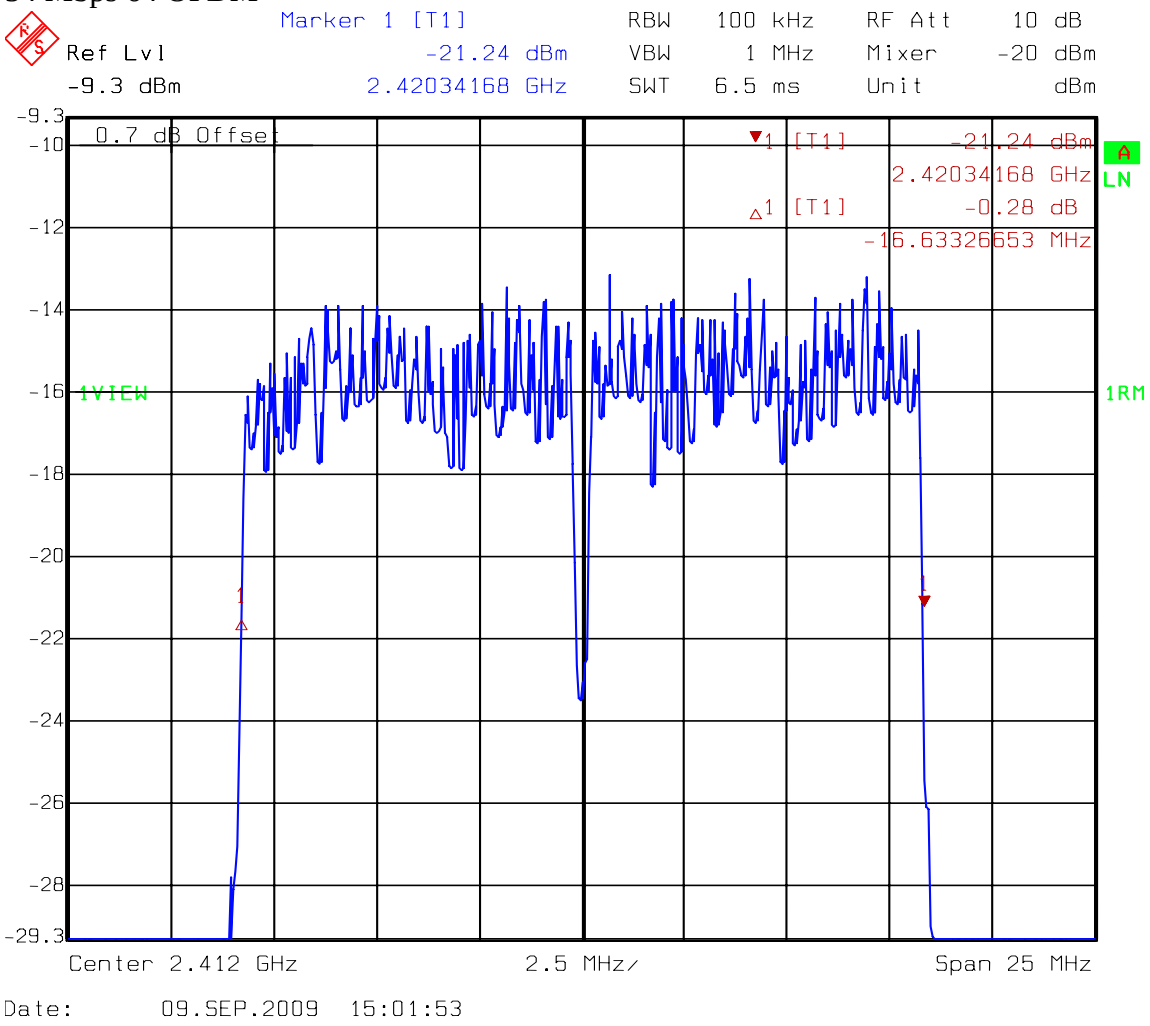
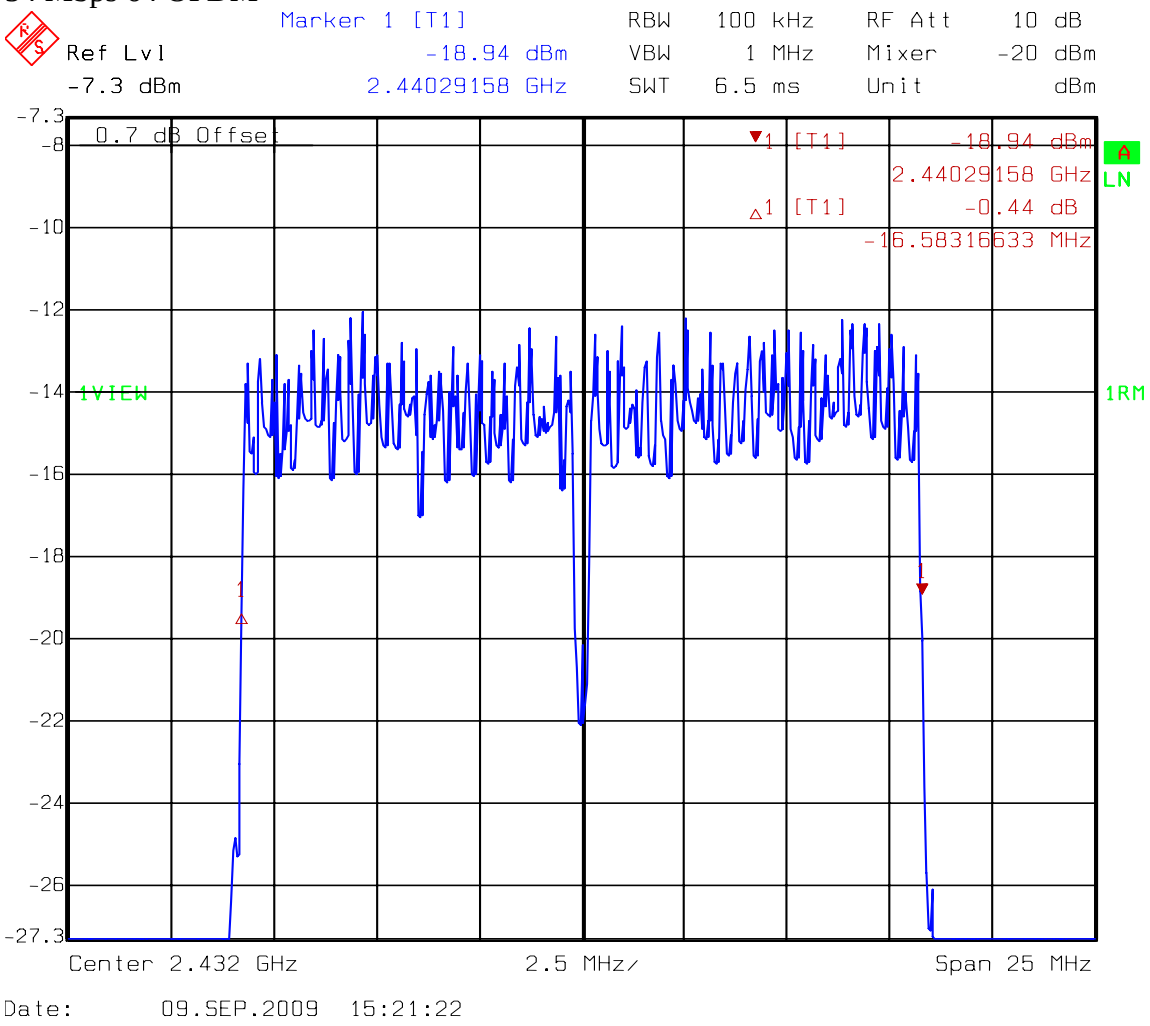
Ref Lvl
-3.3 dBm
-11.61 dBm
2.46763627 GHz
RBW 100 kHz
VBW 1 MHz
SWT 6.5 ms
RF Att 10 dB
Mixer -20 dBm
Unit dBm
0.7 dB Offset
1 [T1] -11.61 dBm
2.46763627 GHz
Δ1 [T1] 0.56 dB
-11.12224449 MHz
A
LN
1VIEW
1RM
-3.3
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-23.3
Center 2.462 GHz
2.5 MHz/
Span 25 MHz
Date: 09.SEP.2009 15:25:01

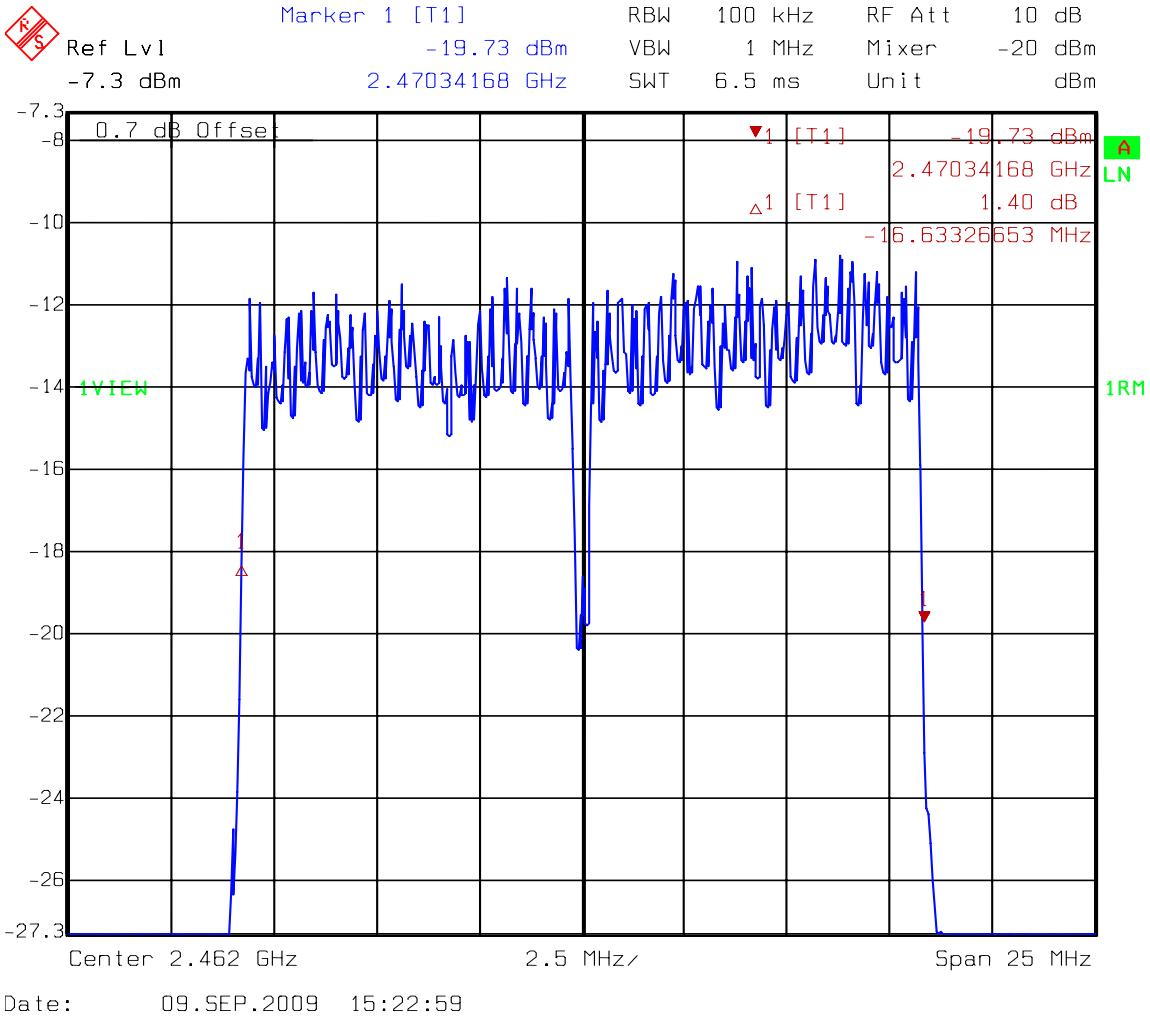
54 Mbps 64 OFDM



54 Mbps 64 OFDM



54 Mbps 64 OFDM



Section 4. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(3)
TESTED BY: T. Tidwell	DATE: 24 July 2009

Test Results: Complies.

Measurement Data: Refer to attached data

Test Conditions: 22 %RH
35 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1082-1036-1472

☒ This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.

The power was varied on the regulated power supply provided with the radio.

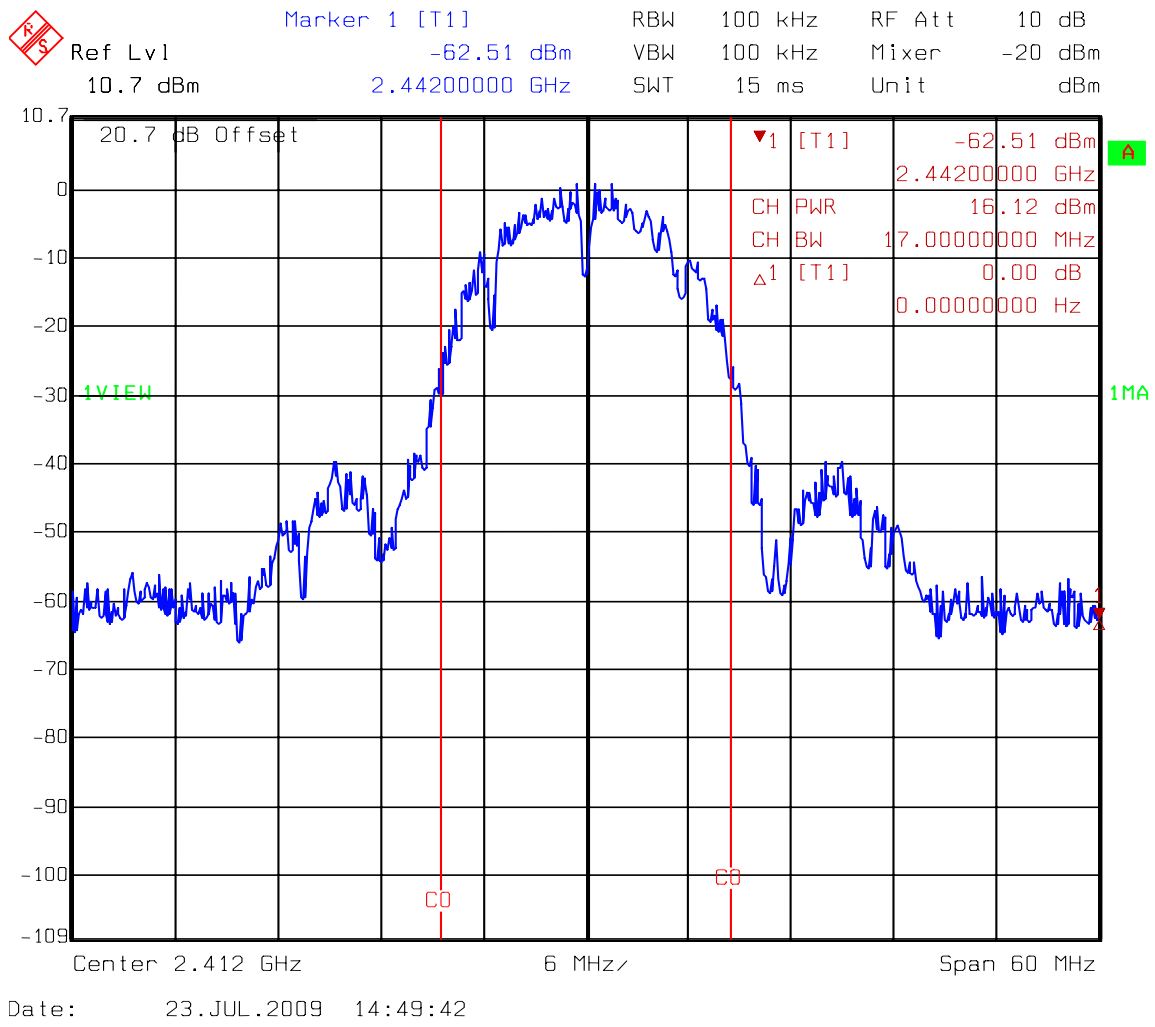
☒ The device was tested on three channels per 15.31(l).

Test Data – Peak Power

Modulation	Channel	Frequency (MHz)	Peak Power (dBm)	Gain (dBi)	Peak EIRP (dBm)	Peak EIRP (mW)
BPSK/1 Mbps	1	2412	16.12	-2.8	13.3	21.4
BPSK/1 Mbps	6	2437	16.12	-2.8	13.3	21.4
BPSK/1 Mbps	11	2462	16.80	-2.8	14.0	25.1
CCK/2 Mbps	1	2412	16.14	-2.8	13.3	21.4
CCK/2 Mbps	6	2437	16.54	-2.8	13.7	23.4
CCK/2 Mbps	11	2462	16.62	-2.8	13.8	24.0
OFDM/54 Mbps	1	2412	15.33	-2.8	12.5	17.8
OFDM/54 Mbps	6	2437	15.47	-2.8	12.7	18.6
OFDM/54 Mbps	11	2462	16.03	-2.8	13.2	20.9

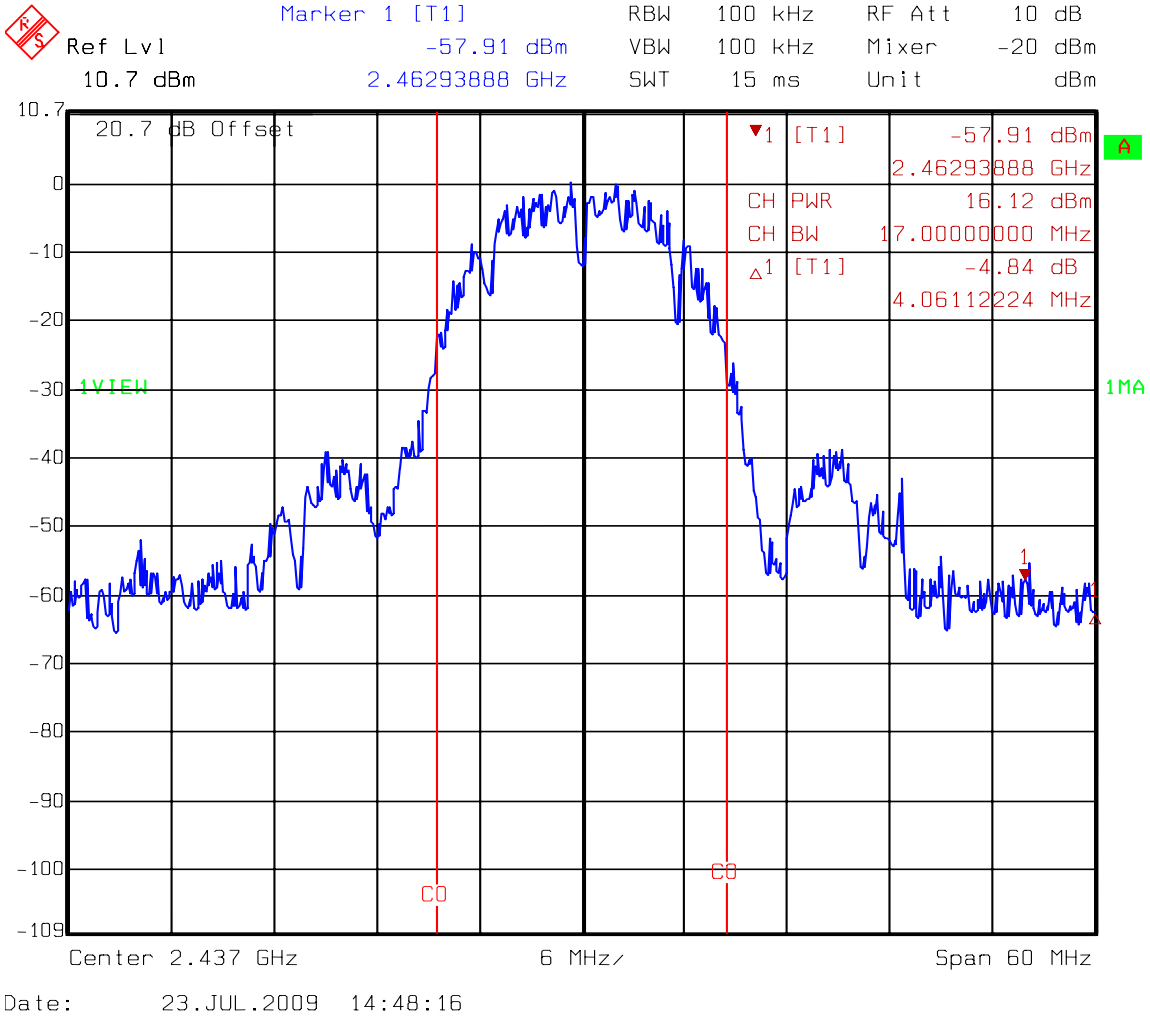
Test Data – Peak Power

Channel 1 – 1 Mbps BPSK



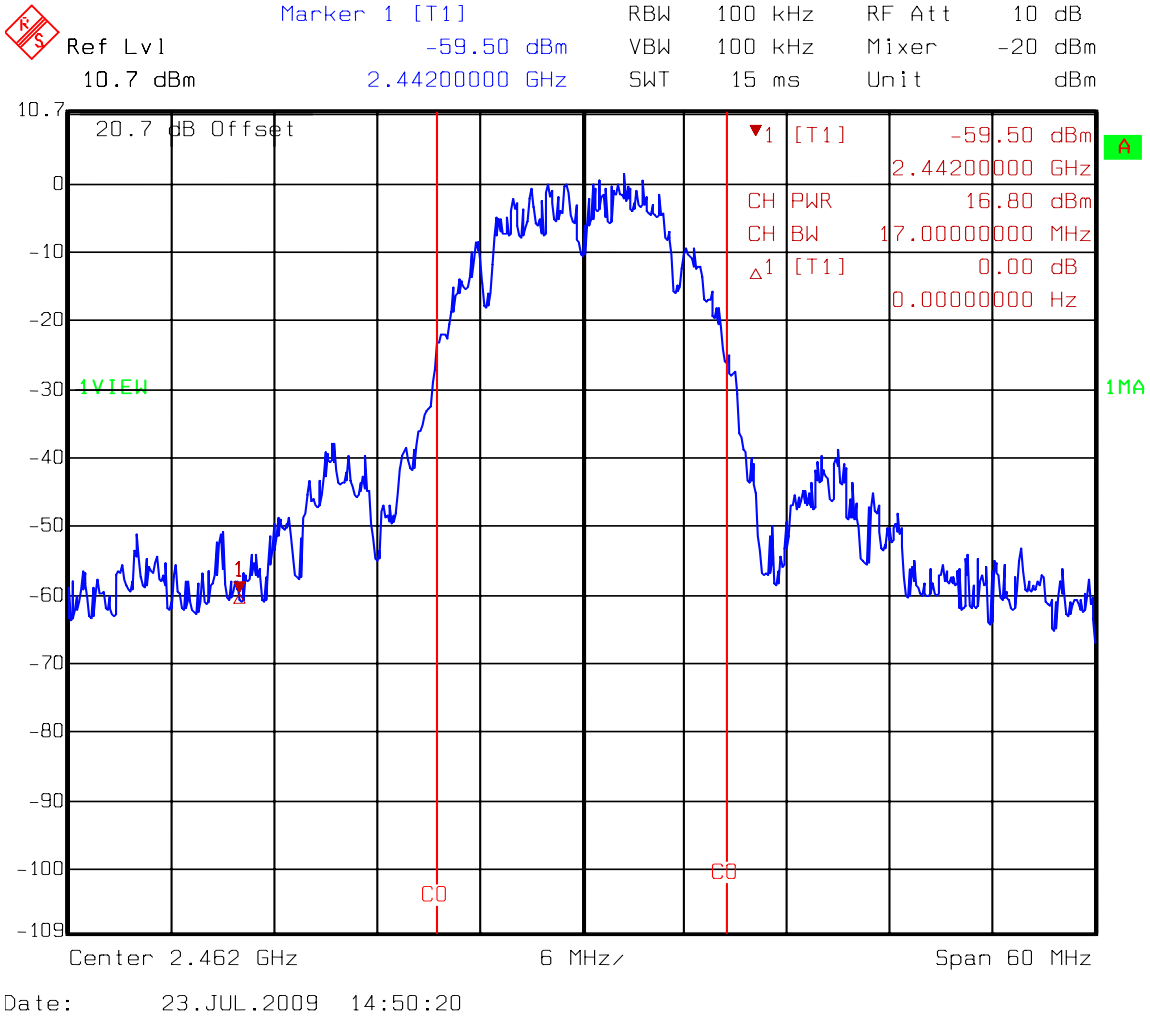
Test Data – Peak Power

Channel 6 – 1 Mbps BPSK



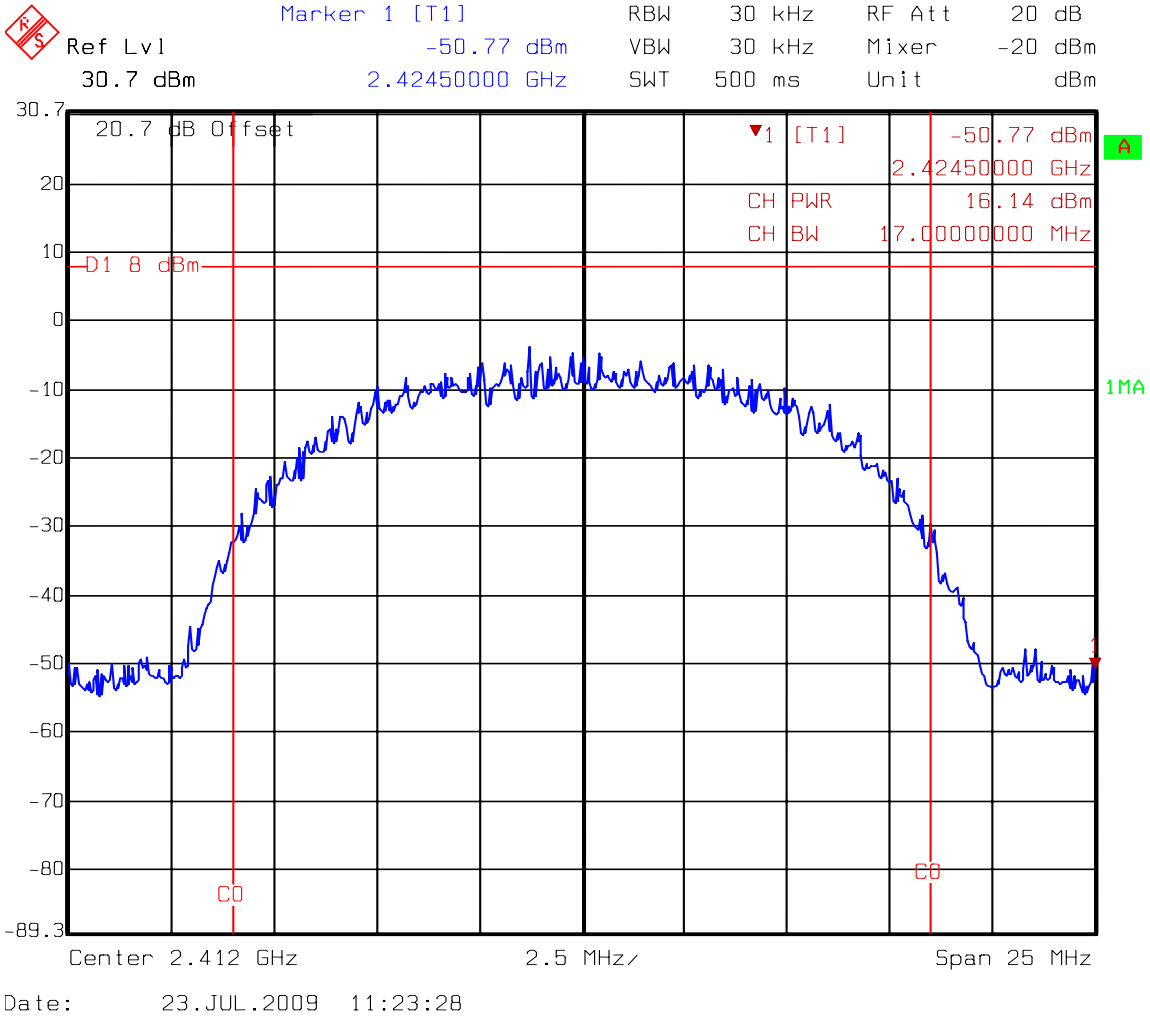
Test Data – Peak Power

Channel 11 – 1 Mbps BPSK



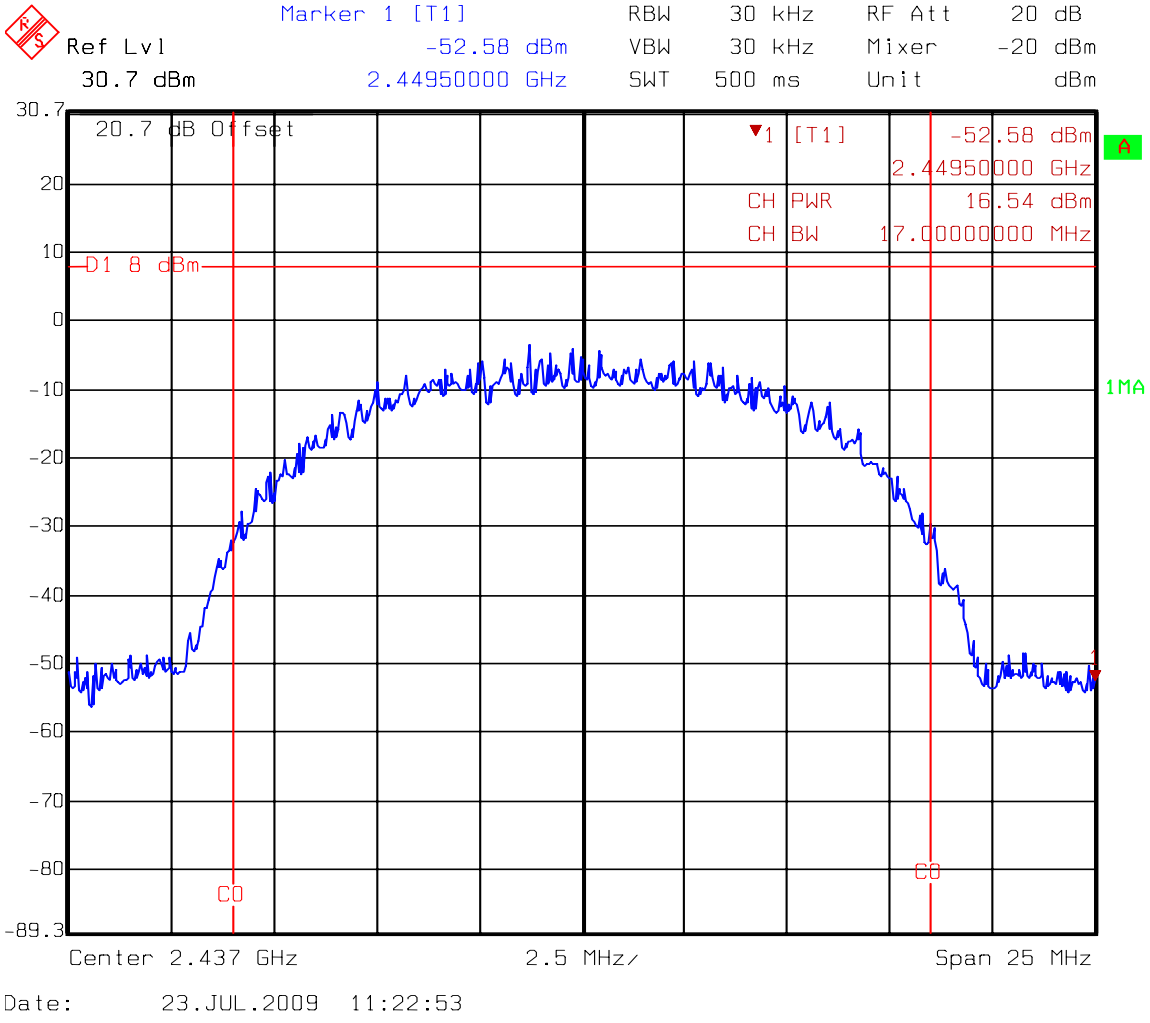
Test Data – Peak Power

Channel 1 – 11 Mbps CCK



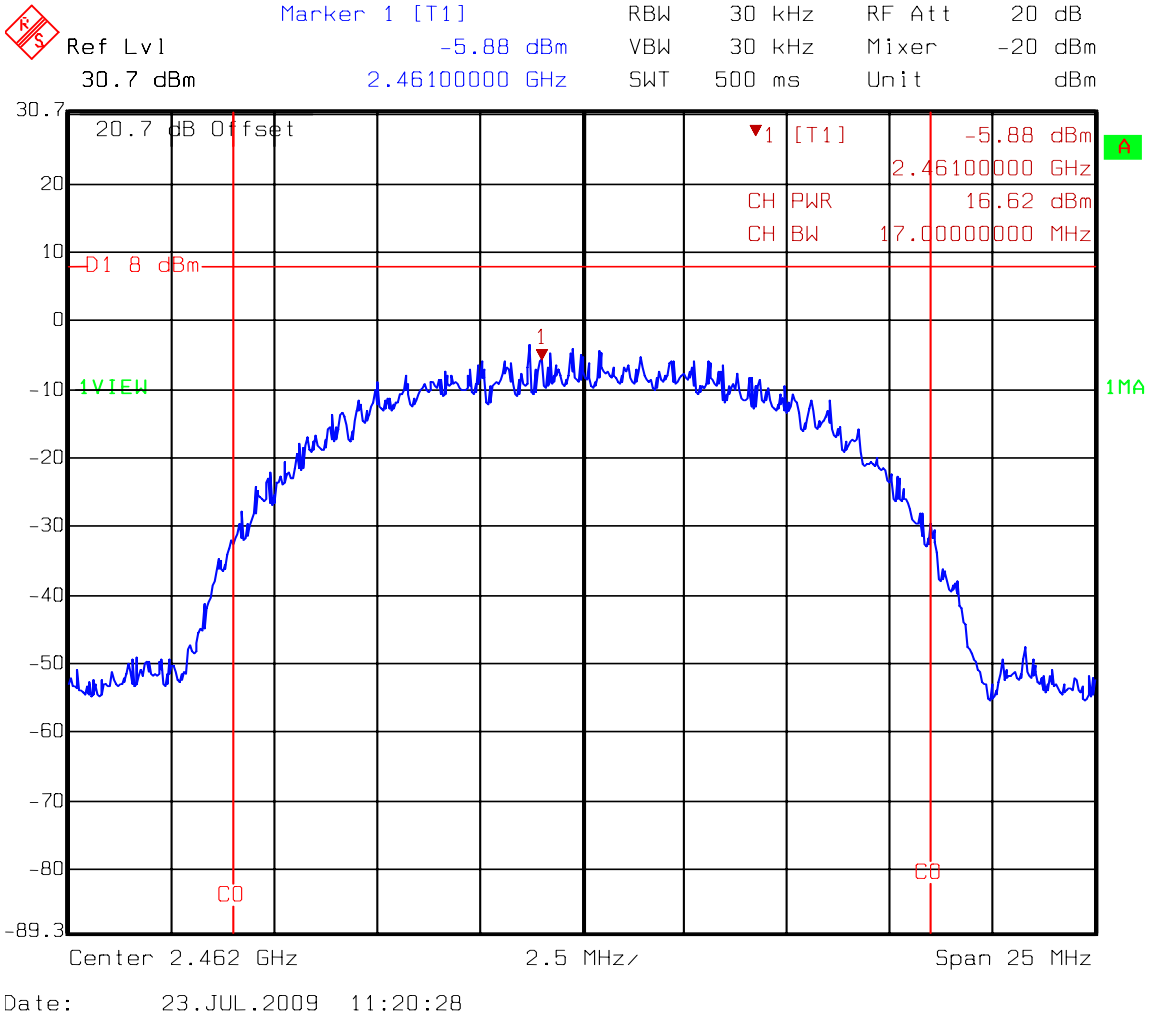
Test Data – Peak Power

Channel 6 – 11 Mbps CCK



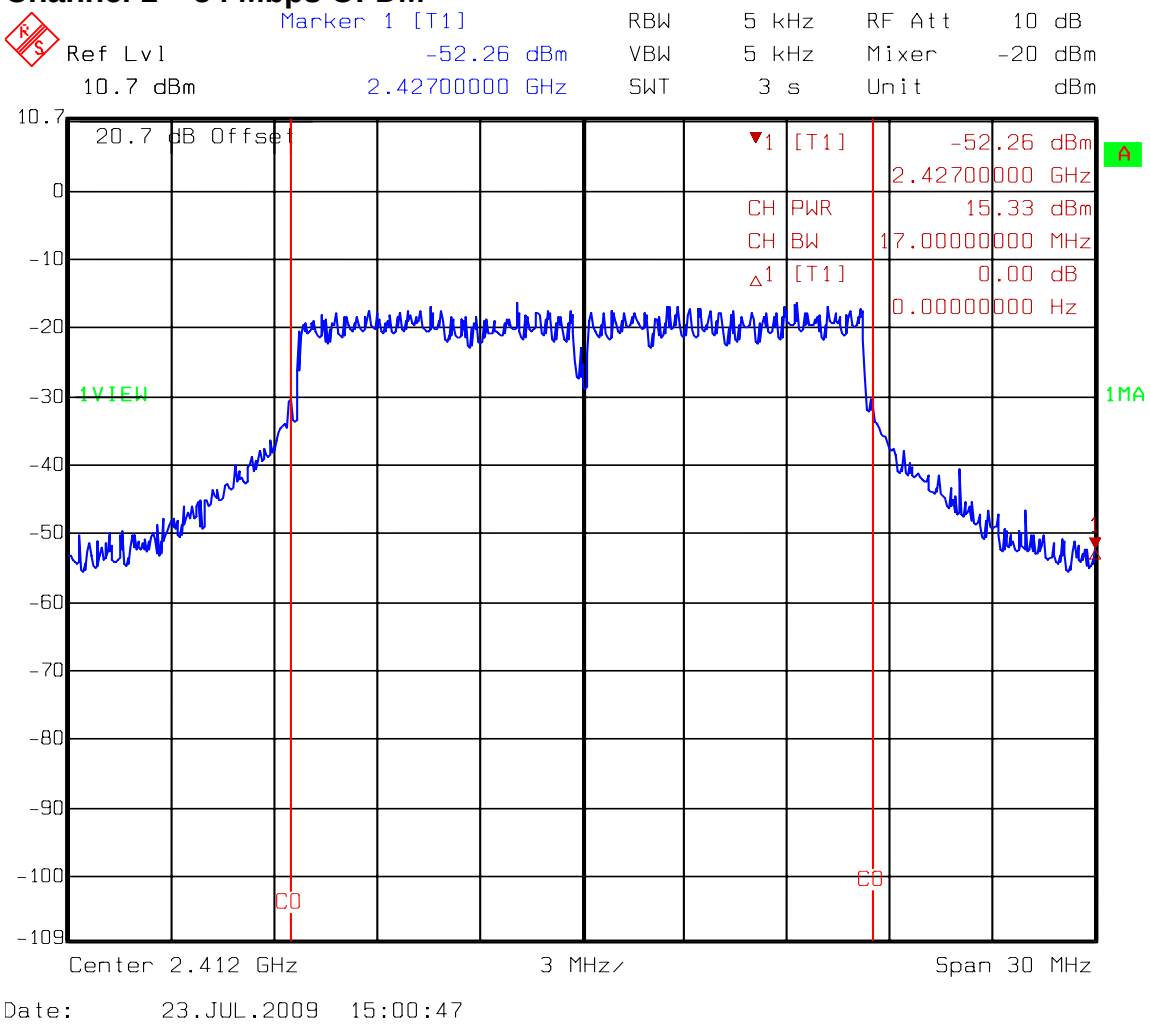
Test Data – Peak Power

Channel 11 – 11 Mbps CCK



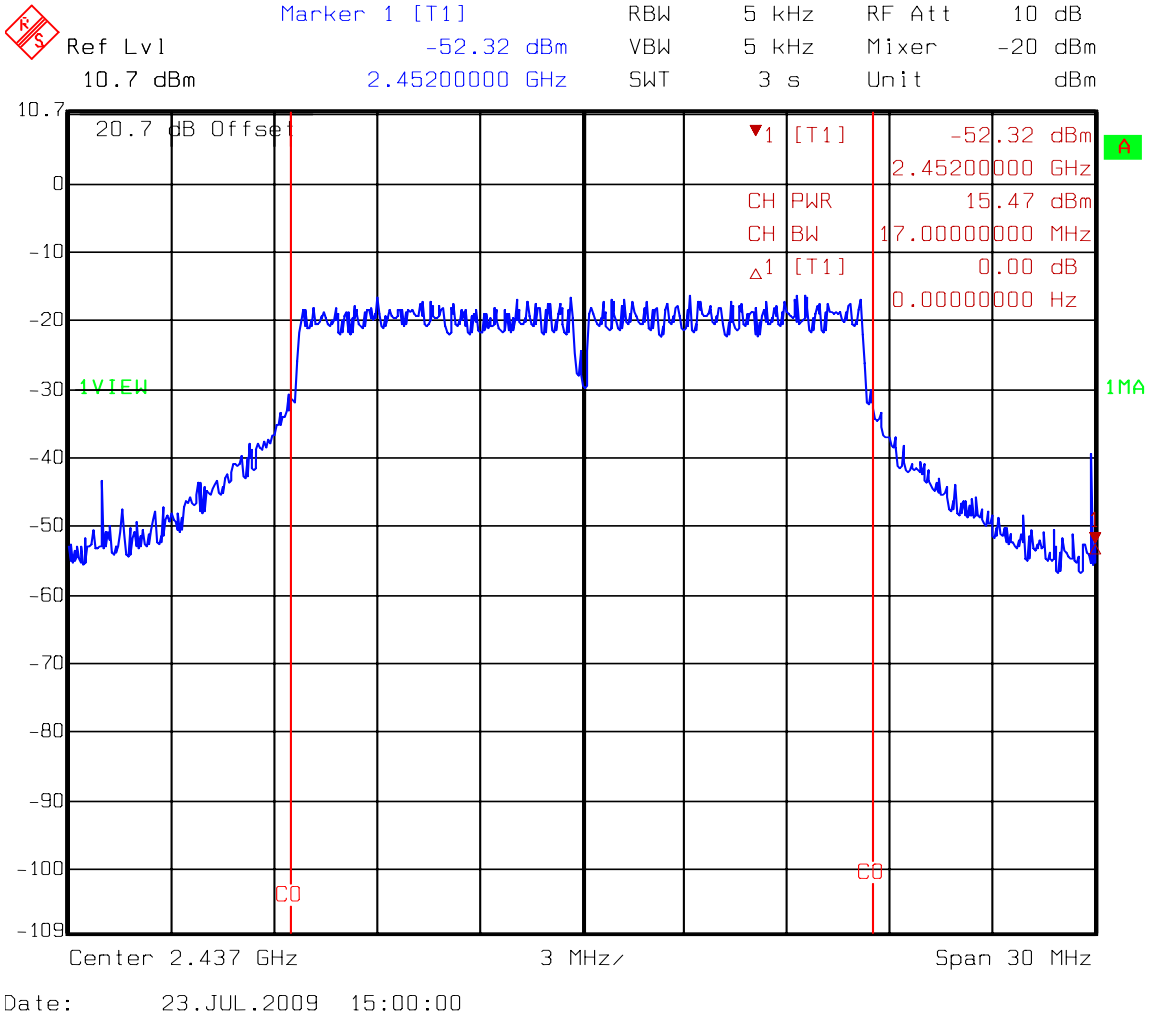
Test Data – Peak Power

Channel 1 – 54 Mbps OFDM



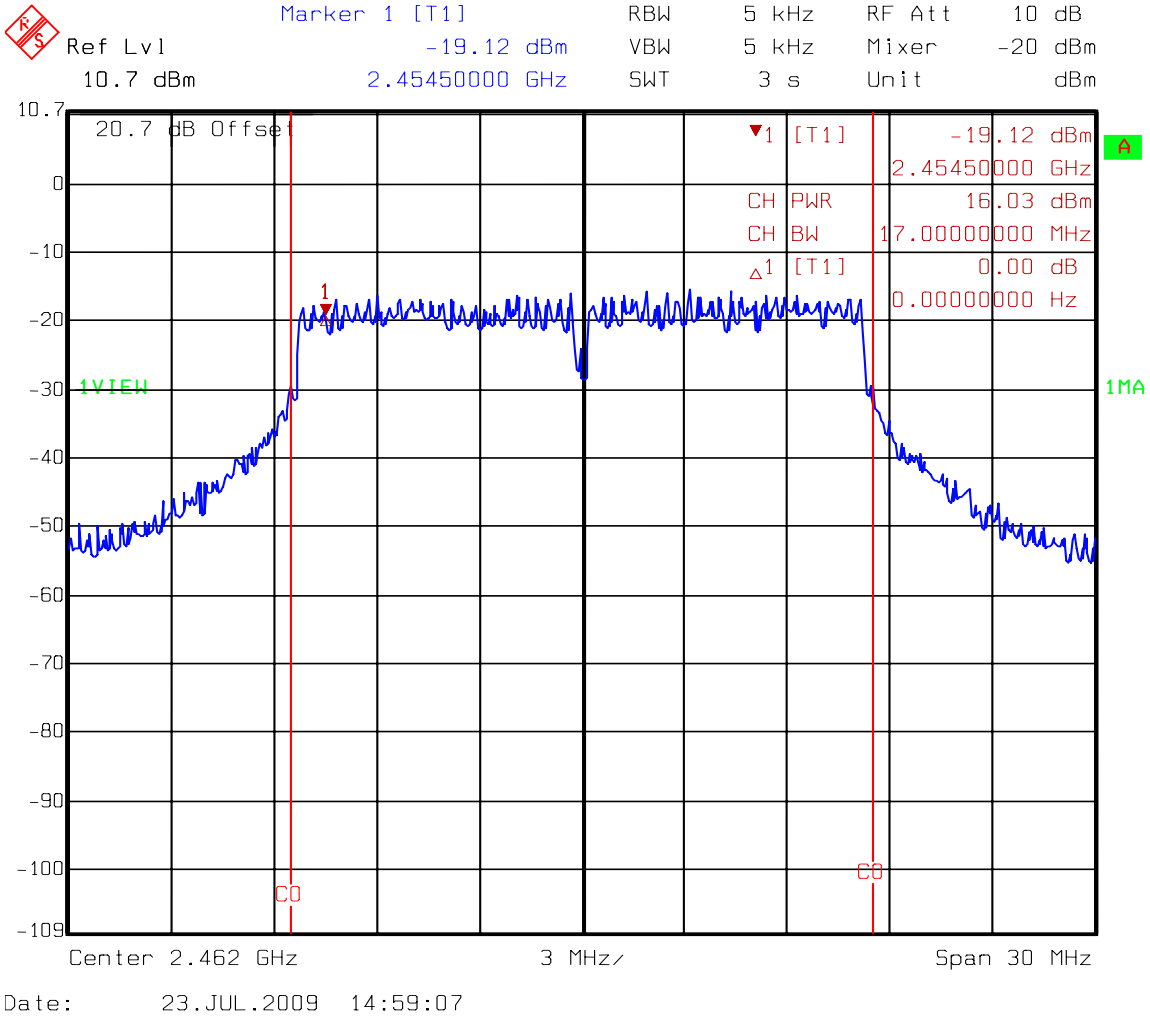
Test Data – Peak Power

Channel 6 – 54 Mbps OFDM



Test Data – Peak Power

Channel 11 – 54 Mbps OFDM



Section 4 Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions at Antenna Terminals	PARA. NO.: 15.247 (d)
TESTED BY: T. Tidwell	DATE: 23 July 2009

Test Results: Complies.

Measurement Data: See attached plots.

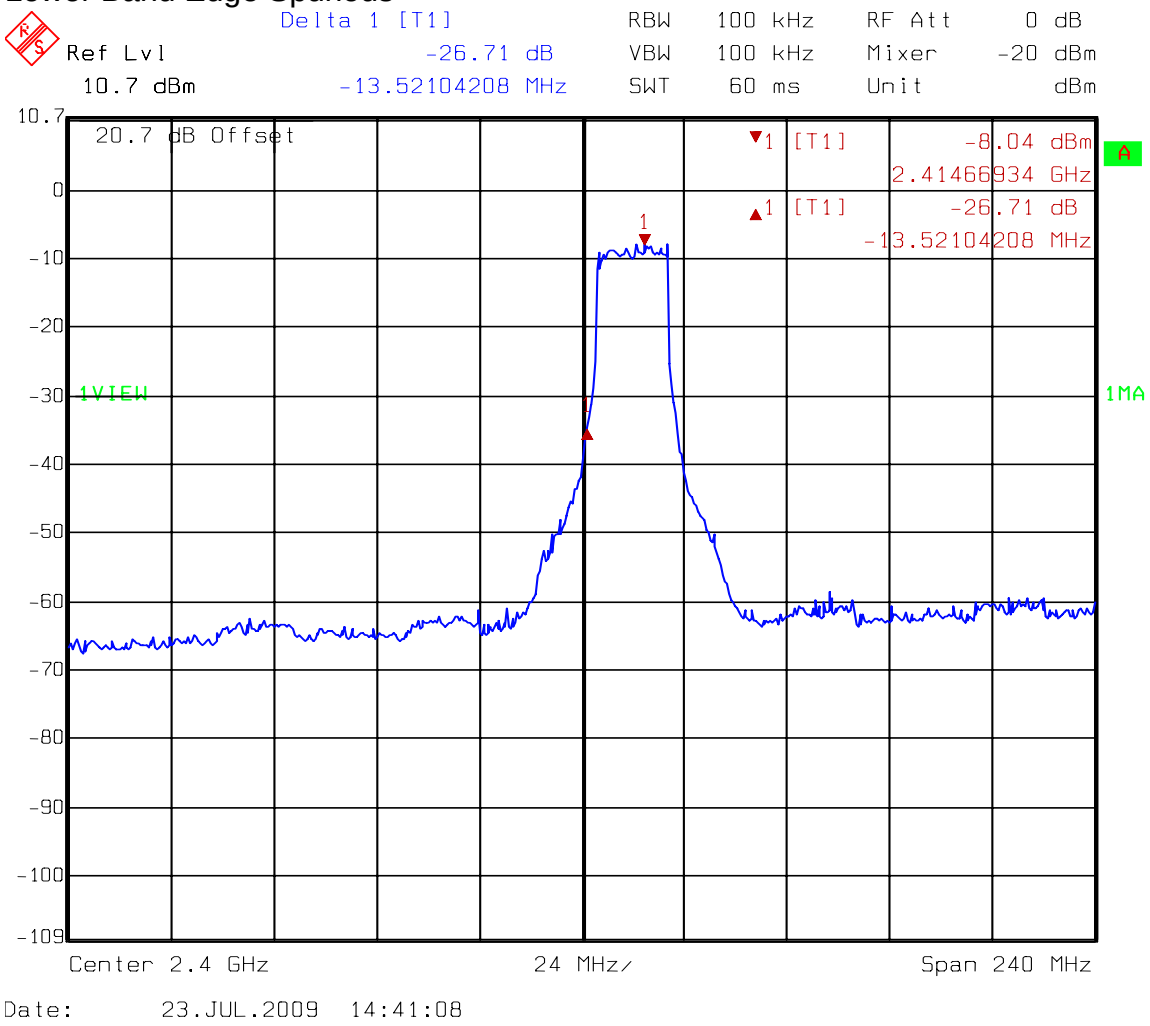
Test Conditions: 22 %RH
35 °C

Measurement Uncertainty: +/-1.7 dB

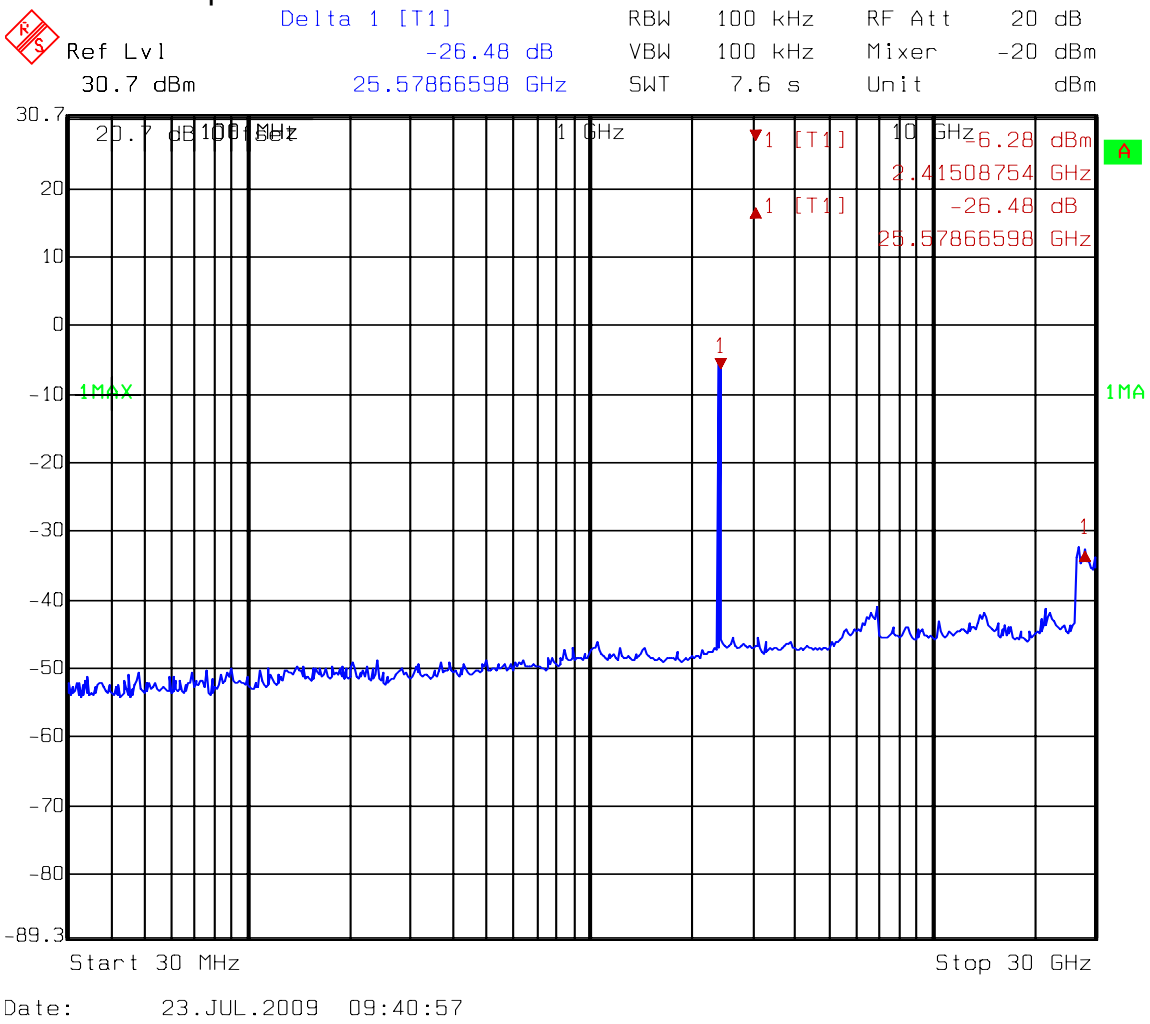
Test Equipment Used: 1082-1036-1472

Test Data – Spurious Emissions at Antenna Terminals

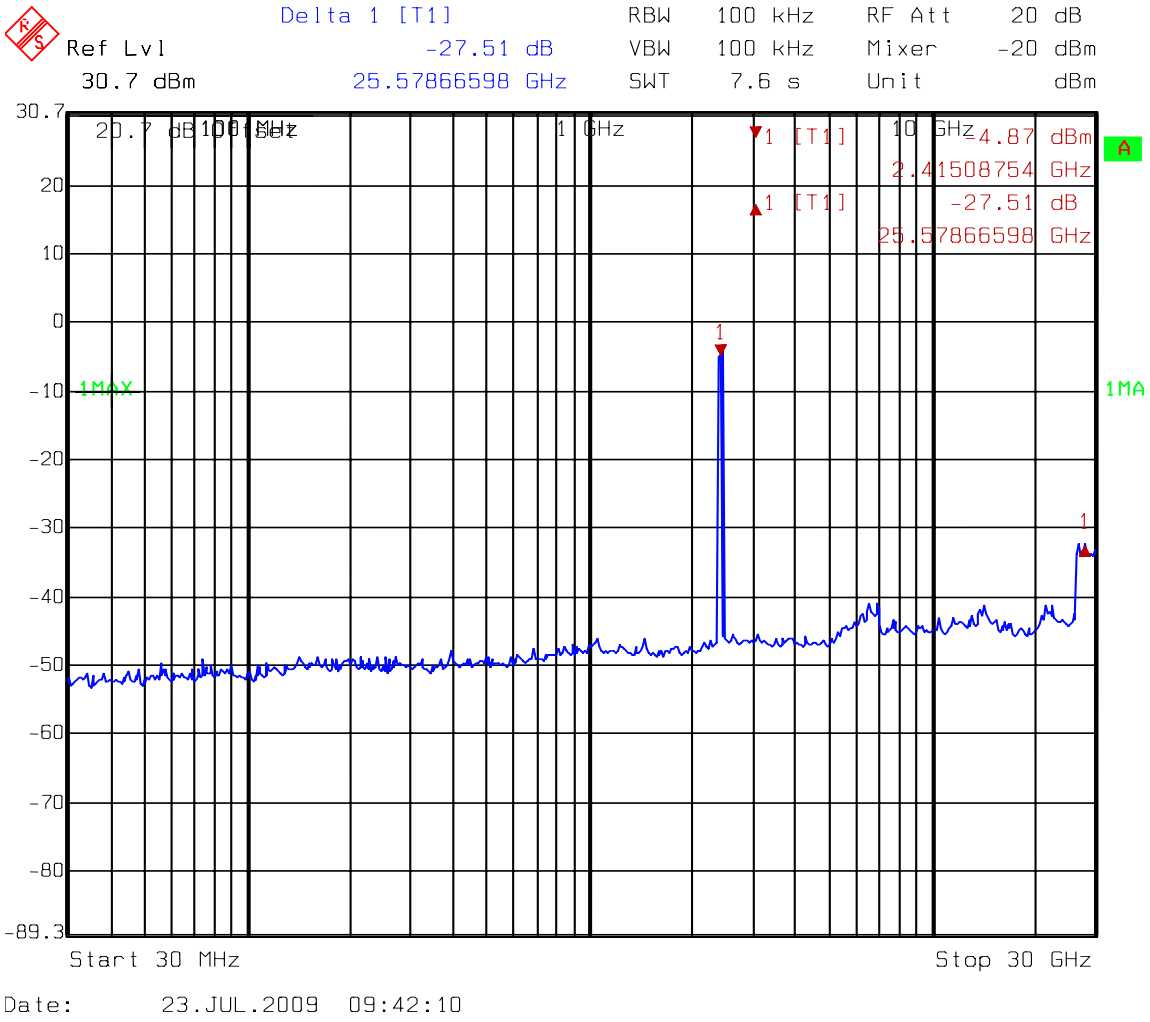
Lower Band Edge Spurious



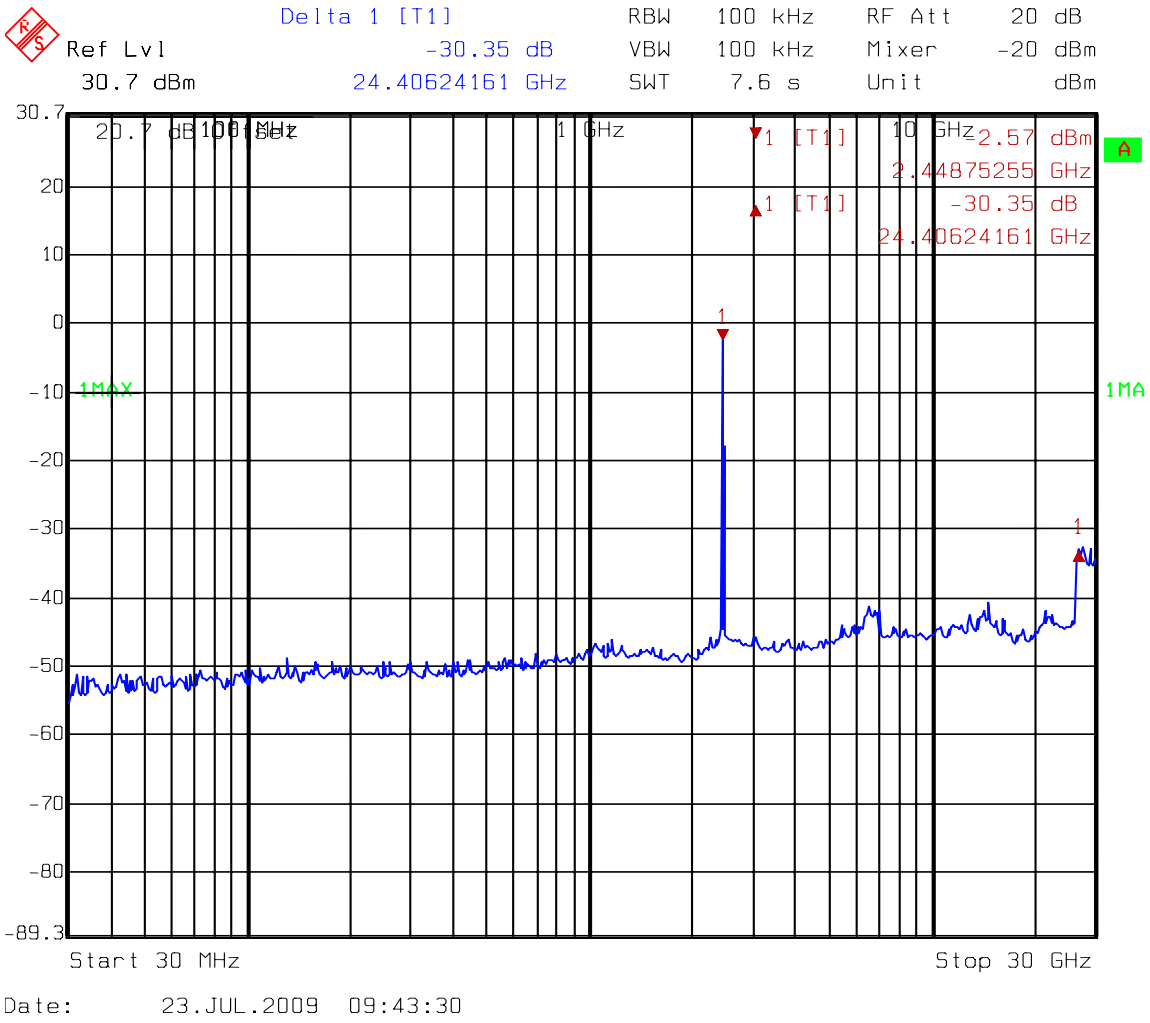
Channel 1 – Spurious Emissions



Channel 6– Spurious Emissions

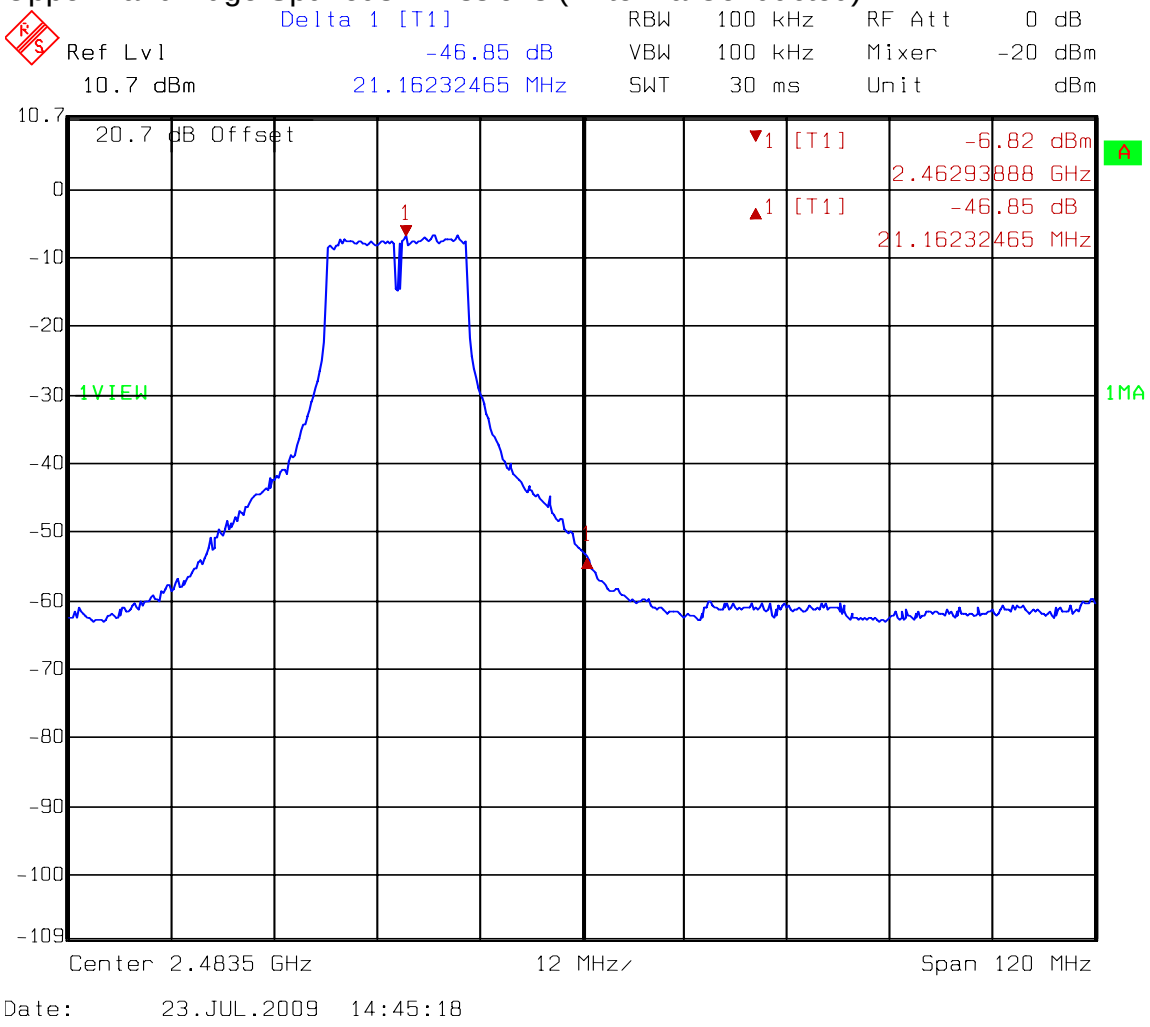


Channel 11- Spurious Emissions



Test Data – Spurious Emissions at Antenna Terminals

Upper Band Edge Spurious Emissions (Antenna Conducted)



Section 5. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.247 (d)
TESTED BY: T. Tidwell	DATE: 23 July 2009

Test Results: Complies.

Measurement Data: See attached table.

Test Conditions: 22 %RH
35 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1763-1767-1783-1785-993

Notes:

☒ For handheld devices, the EUT was tested on three orthogonal axis'

☒ The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33

☒ The device was tested on three channels per 15.31(l).

RBW=VBW=100 kHz below 1000 MHz, Peak Detector
RBW=VBW=1 MHz < 1000 MHz, Peak Detector (Peak Readings)
RBW= 1 MHz, VBW=10Hz, Peak Detector (Average Readings)

The carrier was modulated over 99% (no duty cycle) for testing purposes.

Radiated Emissions

Upper Band Edge

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Detector / Polarity
2.4835	33.7	29.0	1.6	0.0	64.3	74		Peak/Vertical
2.4835	17.3	29.0	1.6	0.0	47.9		54	Average/Vertical
2.4835	33.5	29.0	1.6	0.0	64.1	74		Peak/Horizontal
2.4835	16.8	29.0	1.6	0.0	47.4		54	Average/Horizontal

Note: The measurements above were taken with the carrier set to channel 11 (2462 MHz). The resolution bandwidth and Video bandwidth of the spectrum analyzer were both set to 1 MHz and the detector was set to PEAK for peak readings. For average readings the video bandwidth was reduced to 10 Hz and the sweep time was set to AUTO.

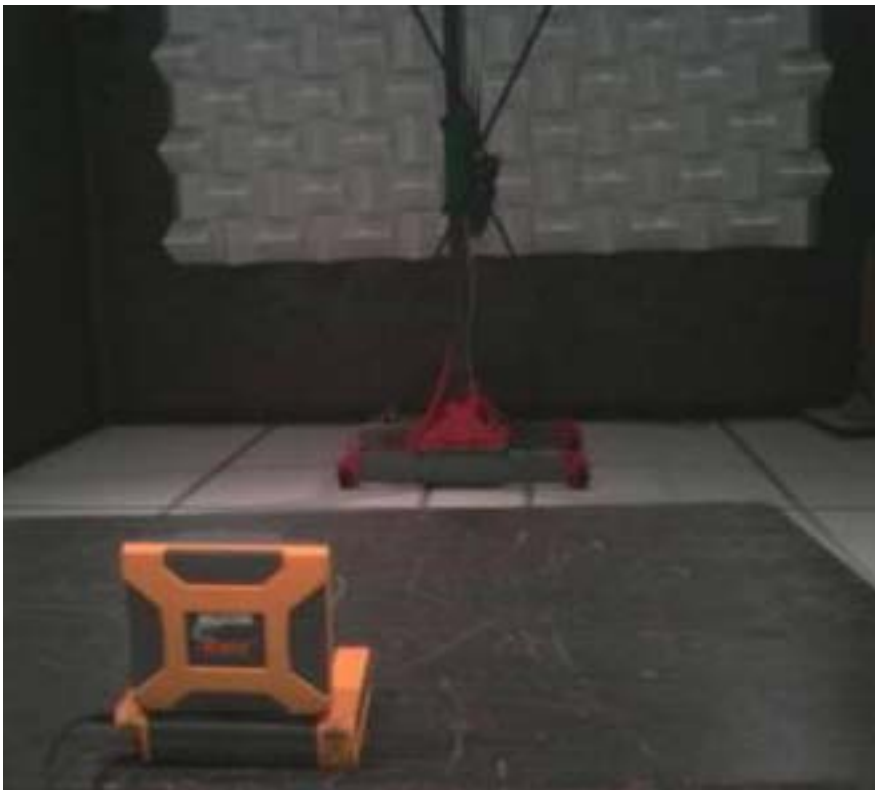
Spurs

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Detector / Polarity
4945.500	42.2	33.8	2.3	31.5	46.8	74		Peak/Vertical
4945.500	30.0	33.8	2.3	31.5	34.6		54	Average/Vertical
7429.000	42.1	35.9	2.5	31.3	49.2	74		Peak/Vertical
7429.000	28.8	35.9	2.5	31.3	35.9		54	Average/Vertical
17.363	37.2	44.1	4.2	35.5	50.0	74		Peak/Vertical
17.363	28.8	44.1	4.2	35.5	41.6		54	Average/Vertical

NOTE: The above levels are noise floor readings.

There were no out-of-band spurious emissions detected above the noise floor demonstrated above.

Test setup photos



Section 6. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(e)
TESTED BY: T. Tidwell	DATE: 23 July 2009

Test Results: Complies.

Measurement Data: See attached data.

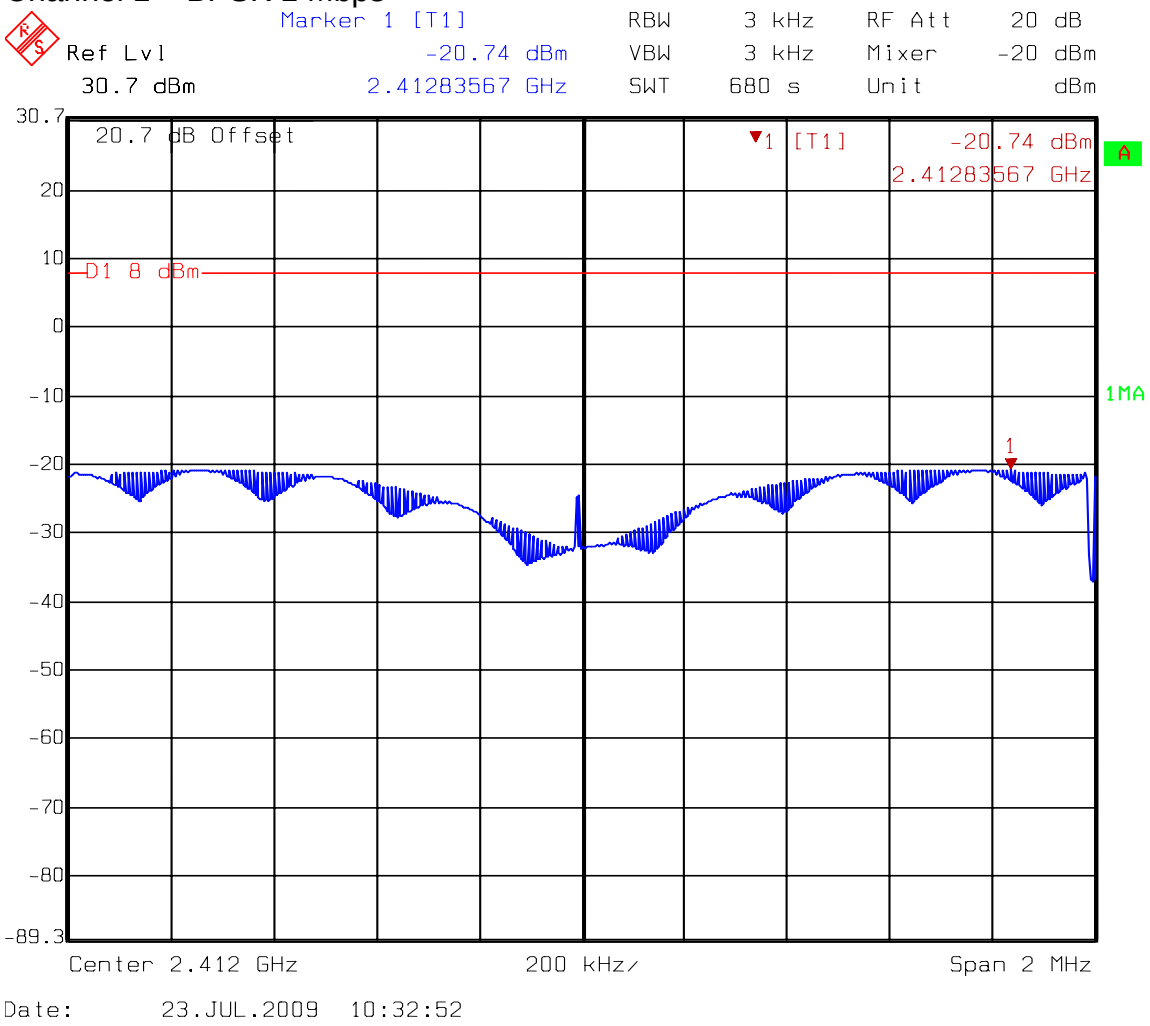
Test Conditions: 22 %RH
35 °C

Measurement Uncertainty: +/-1.7 dB

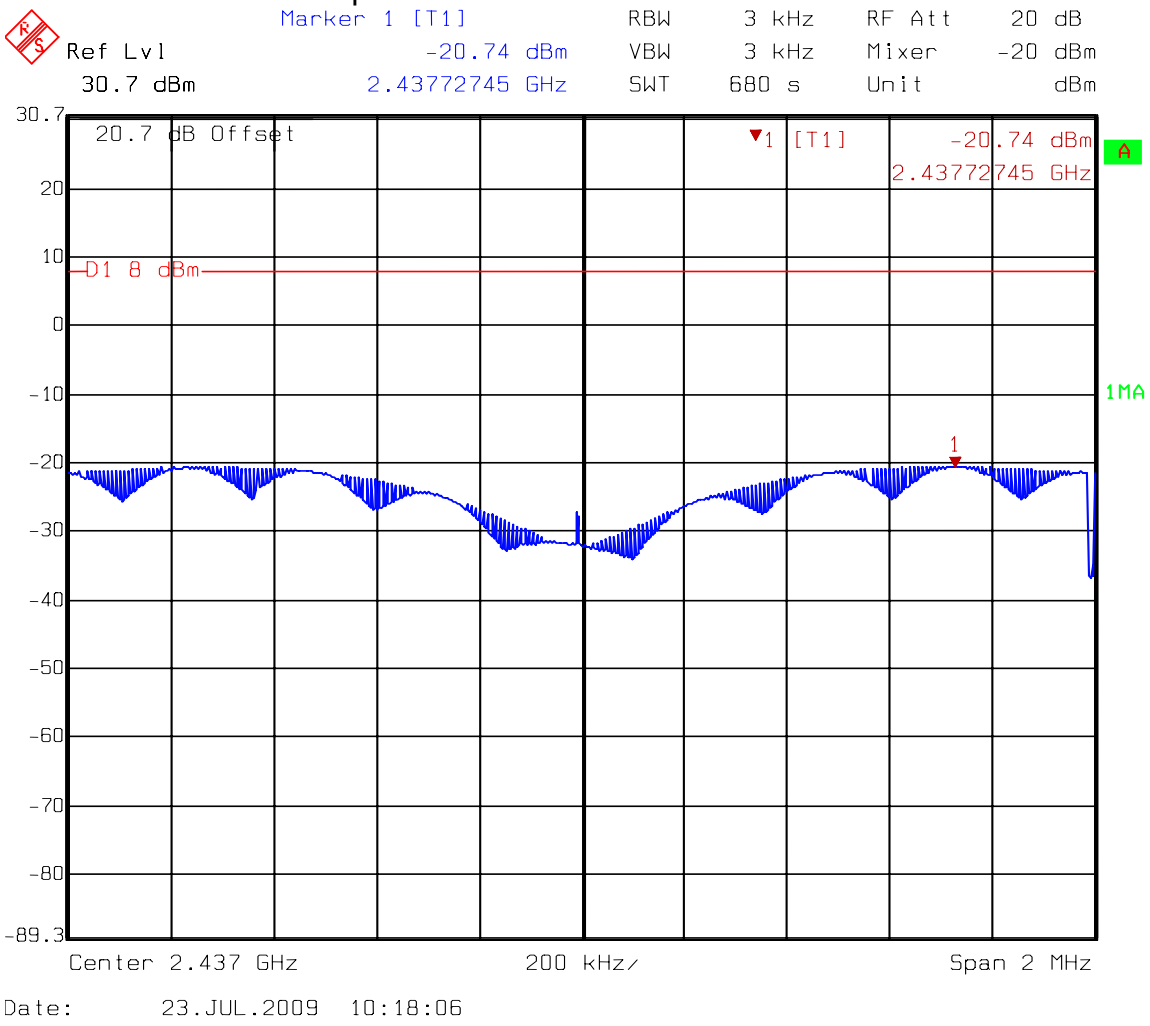
Test Equipment Used: 1082-1472-1036

Peak Power Spectral Density

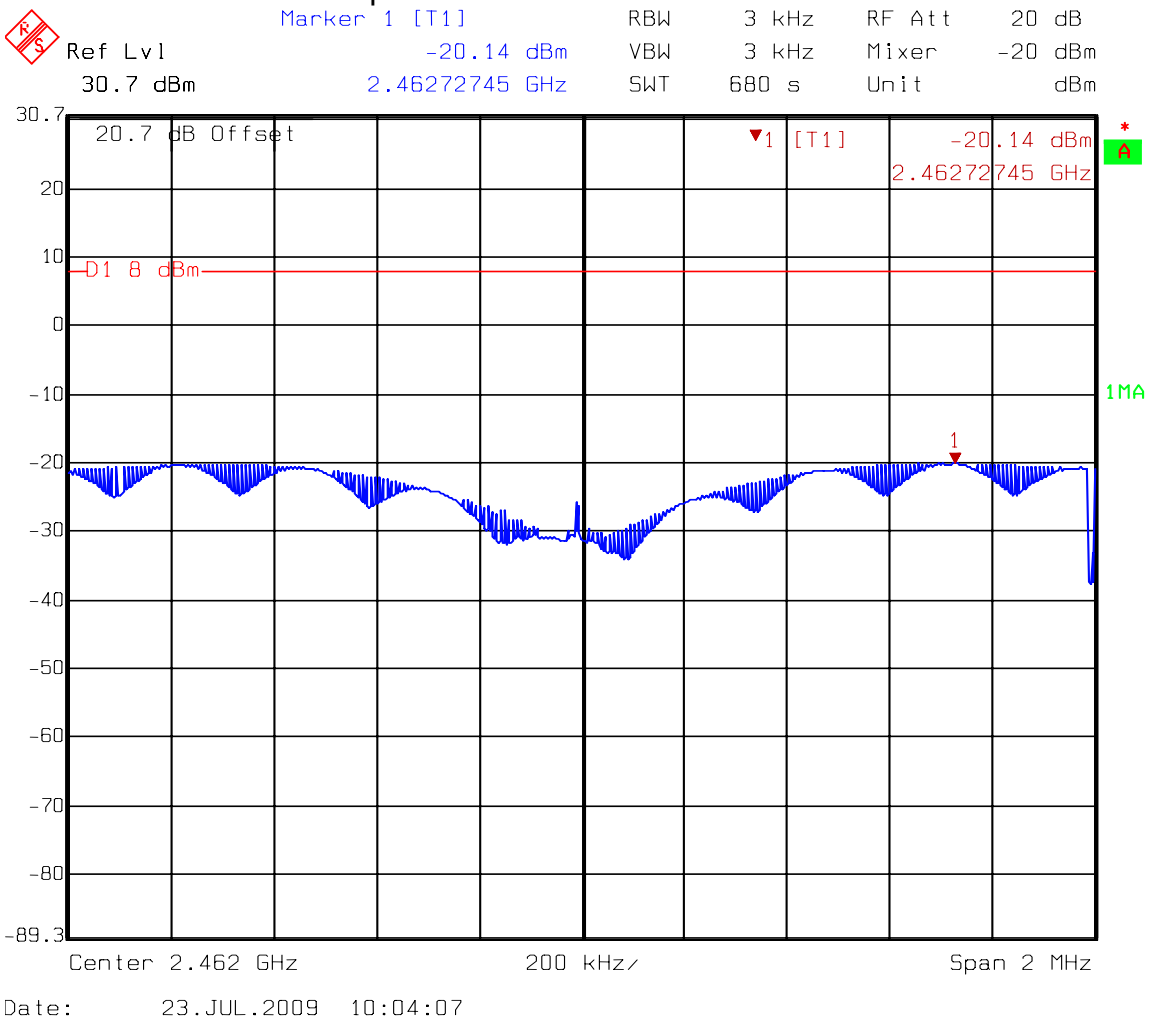
Channel 1 – BPSK 1 Mbps



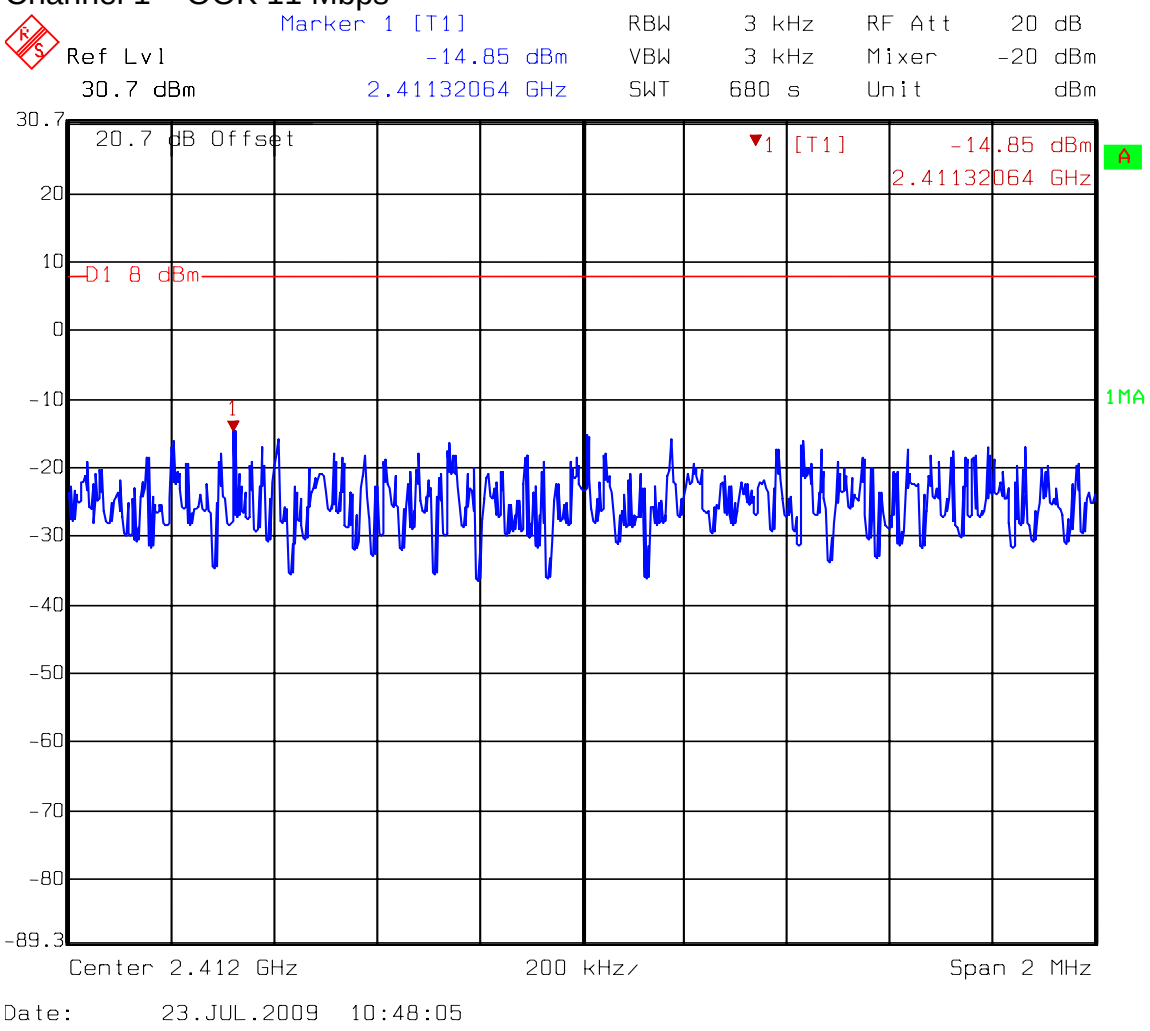
Channel 6 – BPSK 1 Mbps



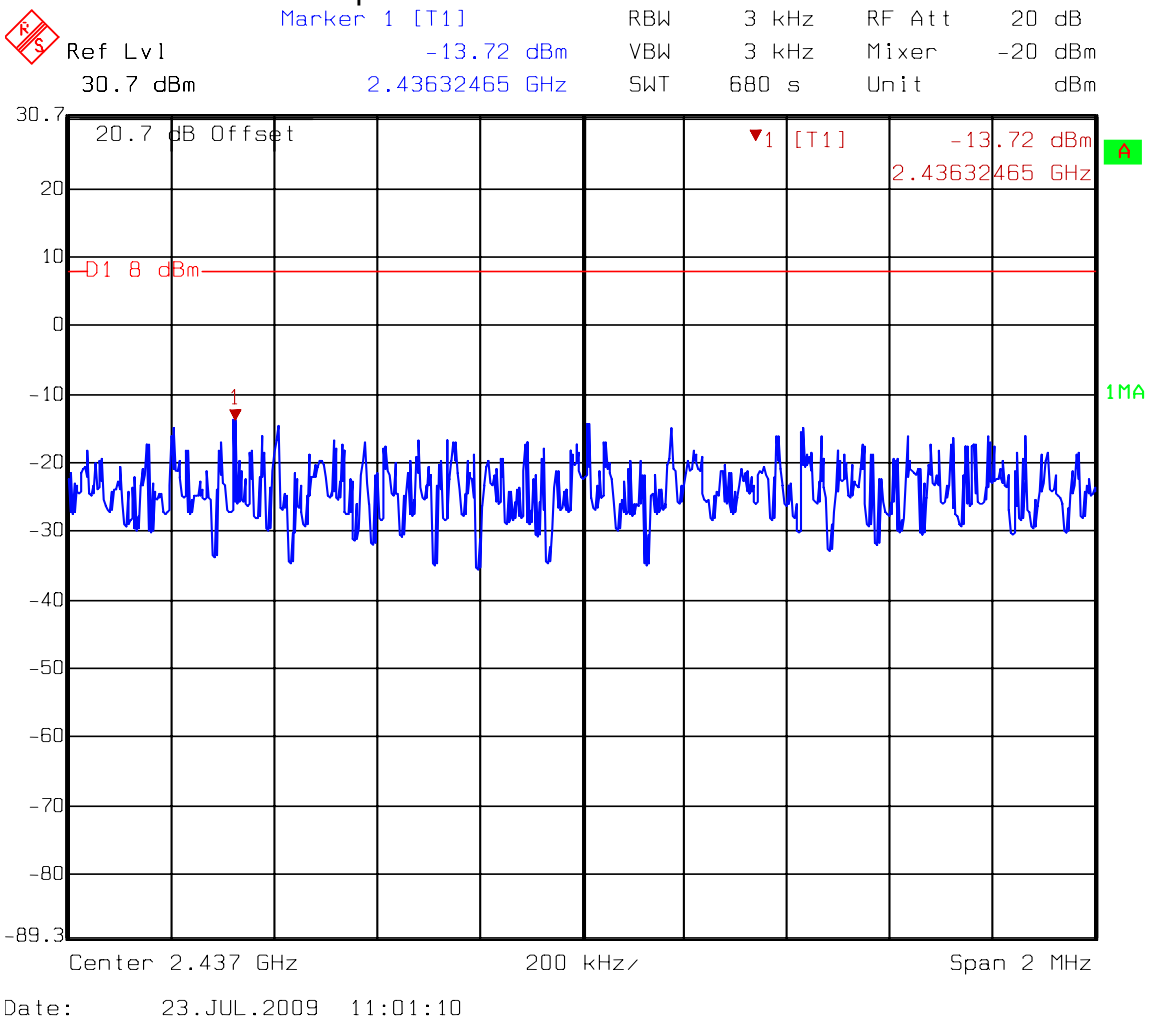
Channel 11 – BPSK 1 Mbps



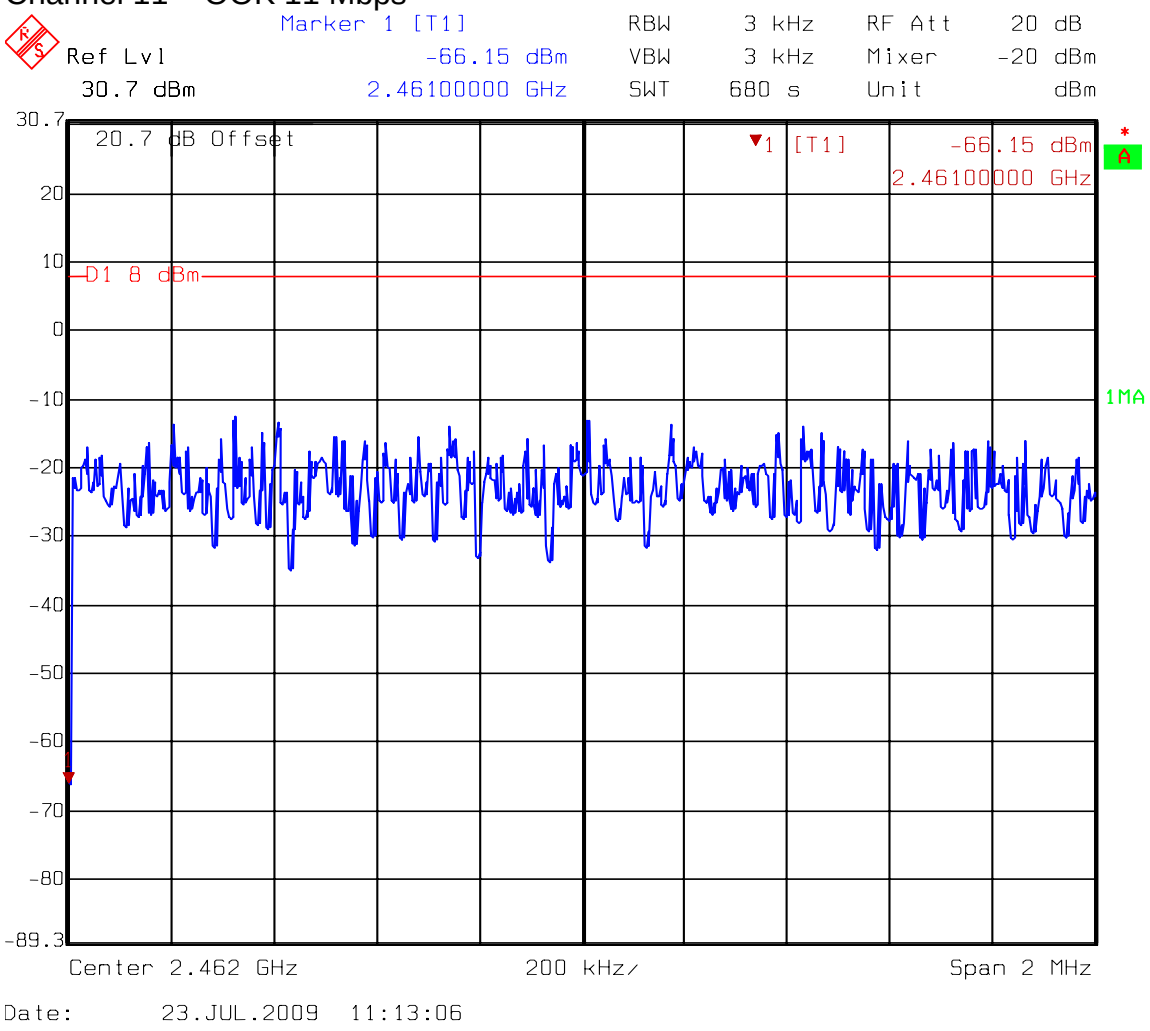
Channel 1 – OOK 11 Mbps



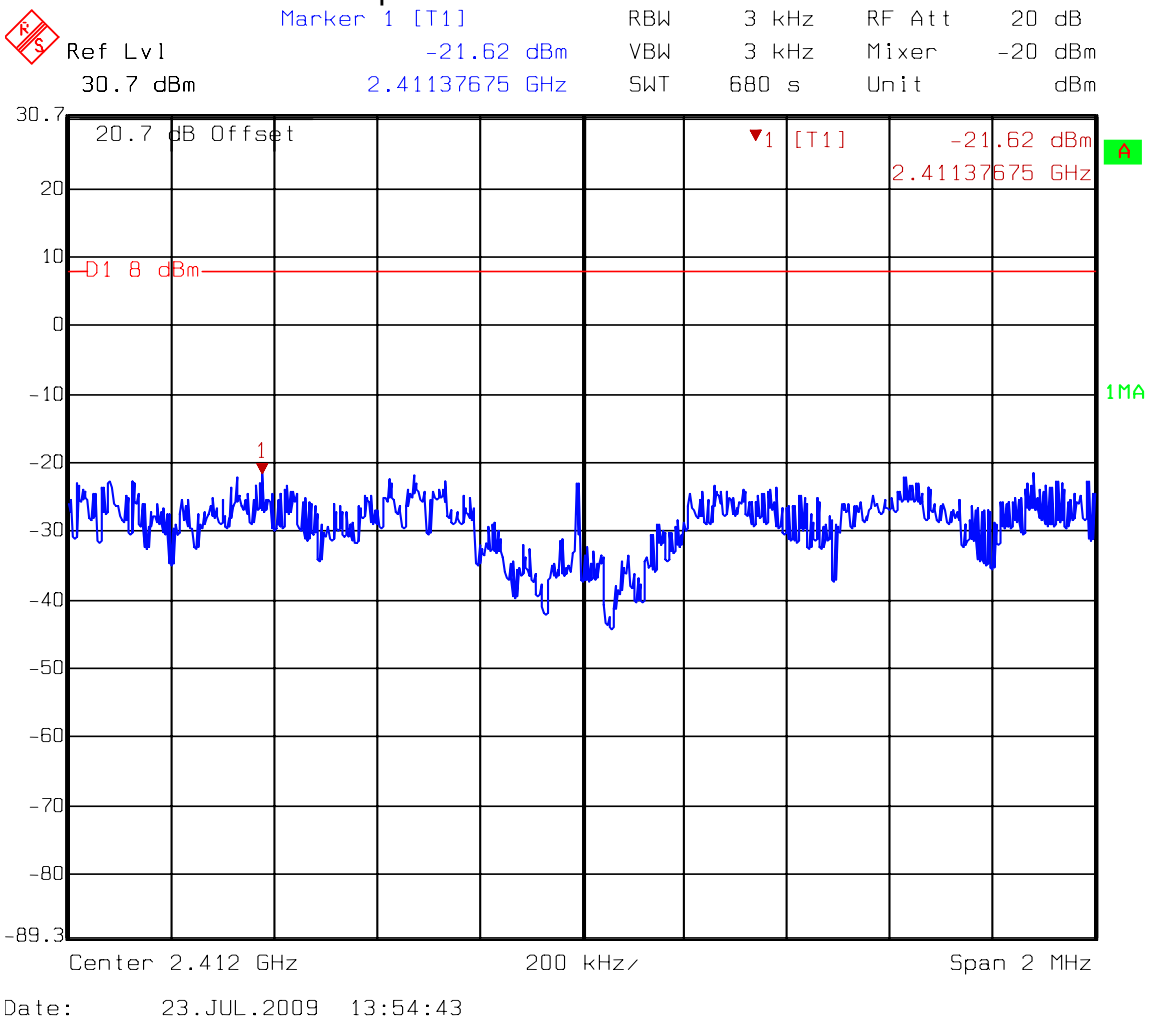
Channel 6 – OOK 11 Mbps



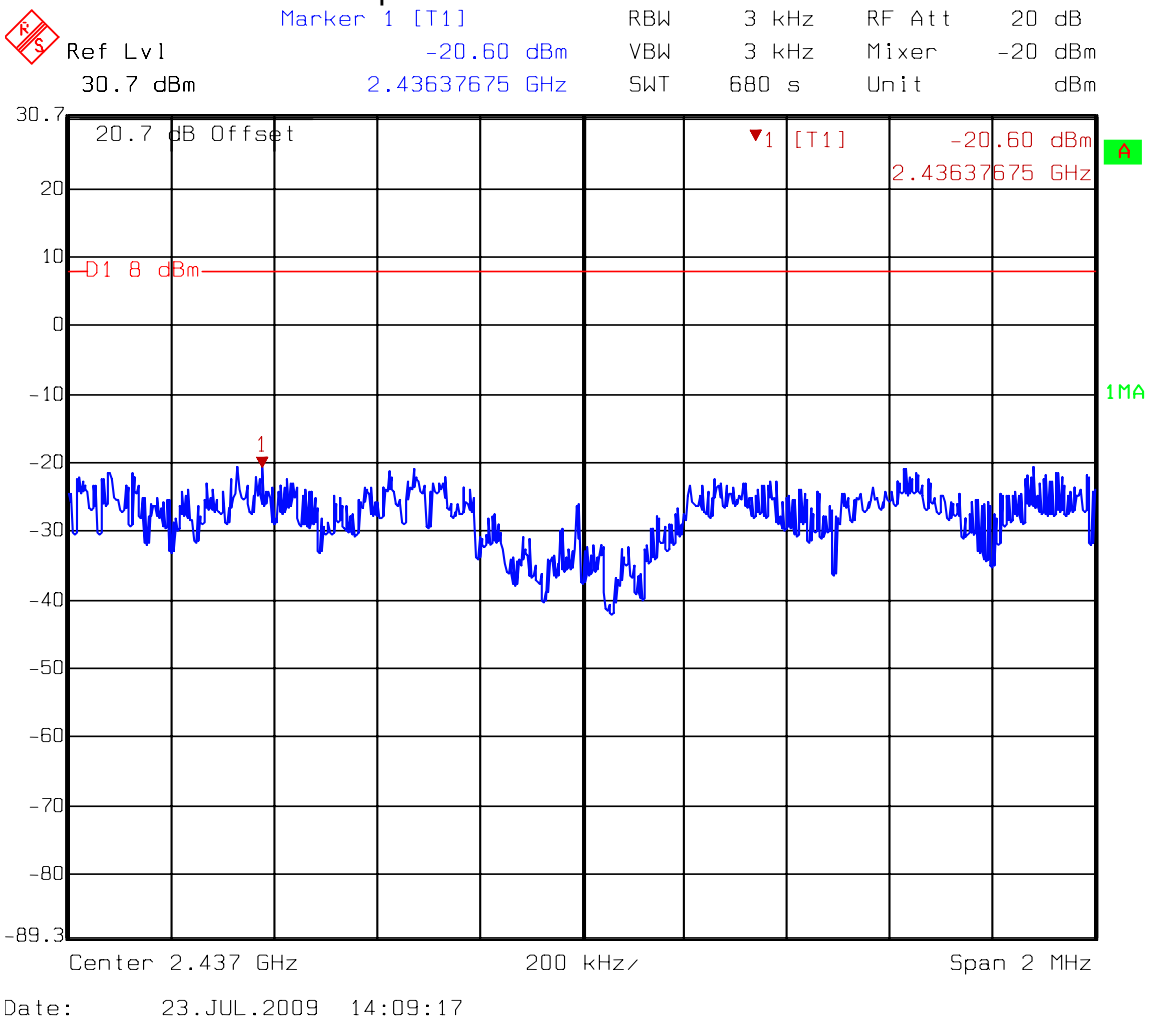
Channel 11 – OOK 11 Mbps



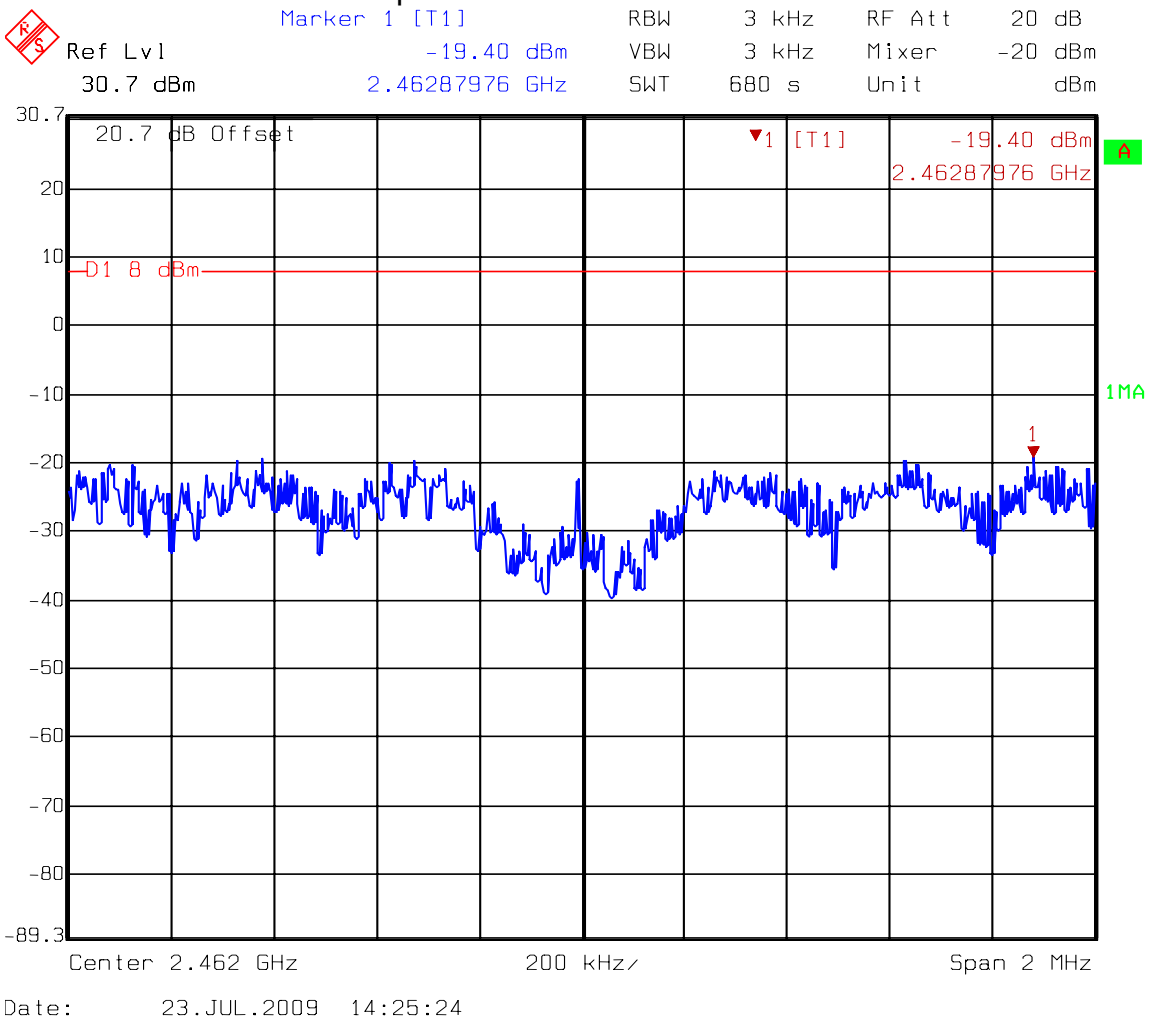
Channel 1 – OFDM 54 Mbps



Channel 6 – OFDM 54 Mbps



Channel 11 – OFDM 54 Mbps



Section 7. Receiver Spurious Emissions

NAME OF TEST: Receiver Spurious Emissions	PARA. NO.: RSS-Gen 7.2.3
TESTED BY: T. Tidwell	DATE: 23 July 2009

Test Results: Complies. See attached plots.

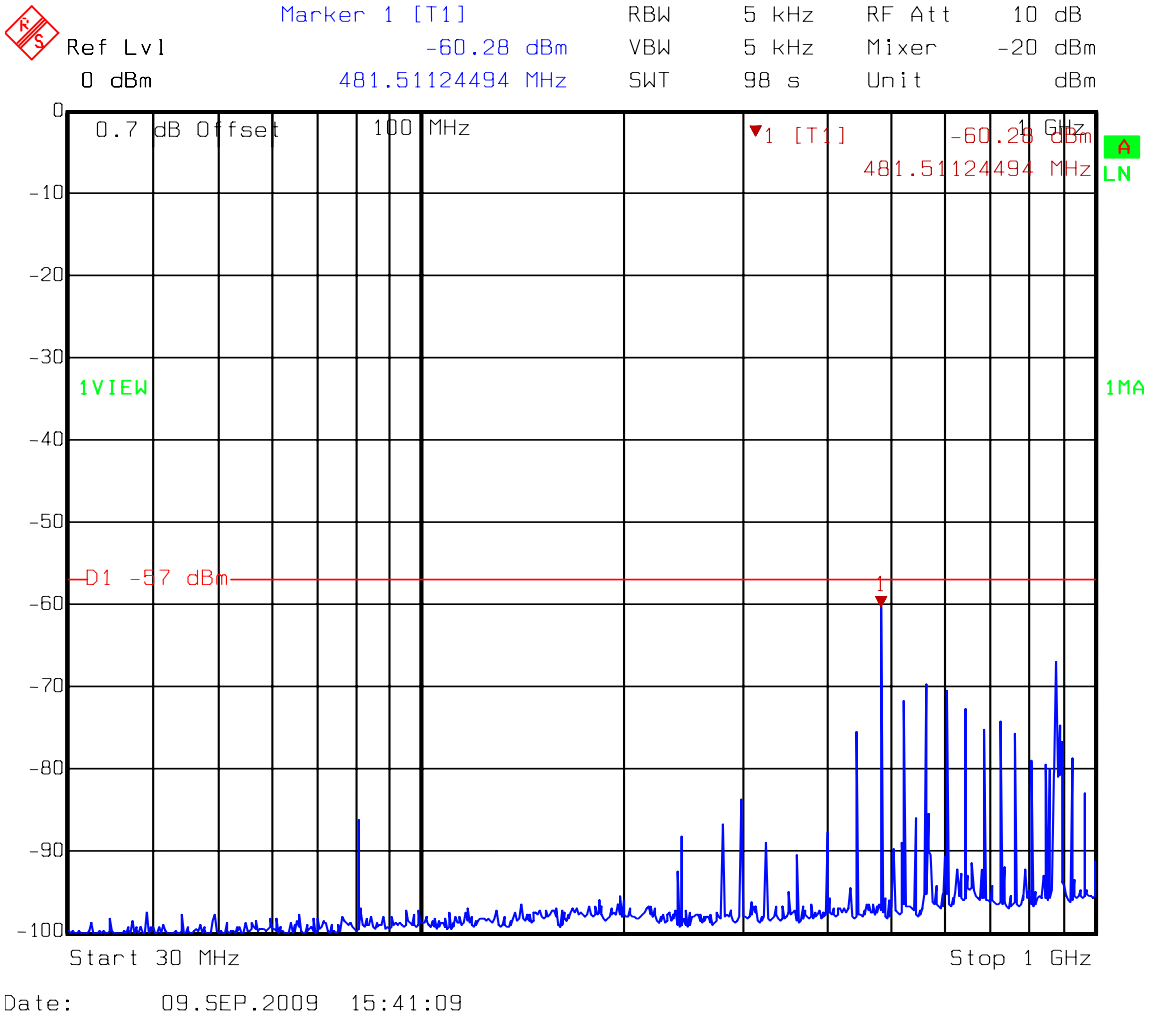
Measurement Data: See chart.

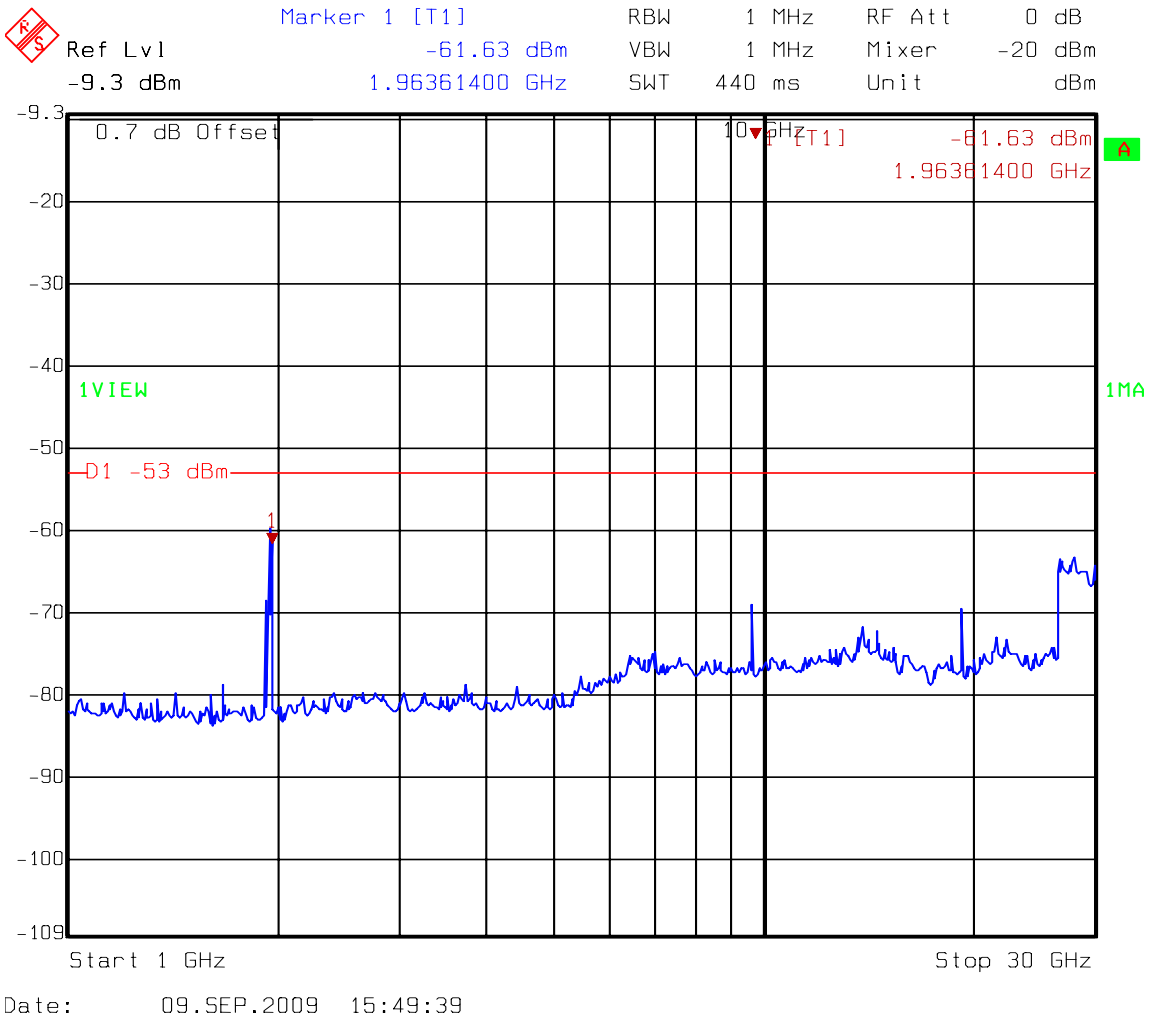
Test Conditions: 23 %RH
34 °C

Measurement Uncertainty: +/-2.8 dB

Test Equipment Used: 1763-1783-1785-1767-993

Test Data – Receiver Spurious Emissions





The spectrum was searched from 30 MHz to the fifth harmonic of the LO. There were no emissions above 1000 MHz. The device was tested with the receiver tuned to low, mid, and high channels (channel 1, 6, and 11). The spectrum was the same as depicted above on each channel.

Section 8. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)

Test Results: Complies. The conducted emission test results are found in Criterion test report file 90629-1435C.pdf, pages 61 and 62.

Test Conditions: 23 %RH
21 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 0969, 1659

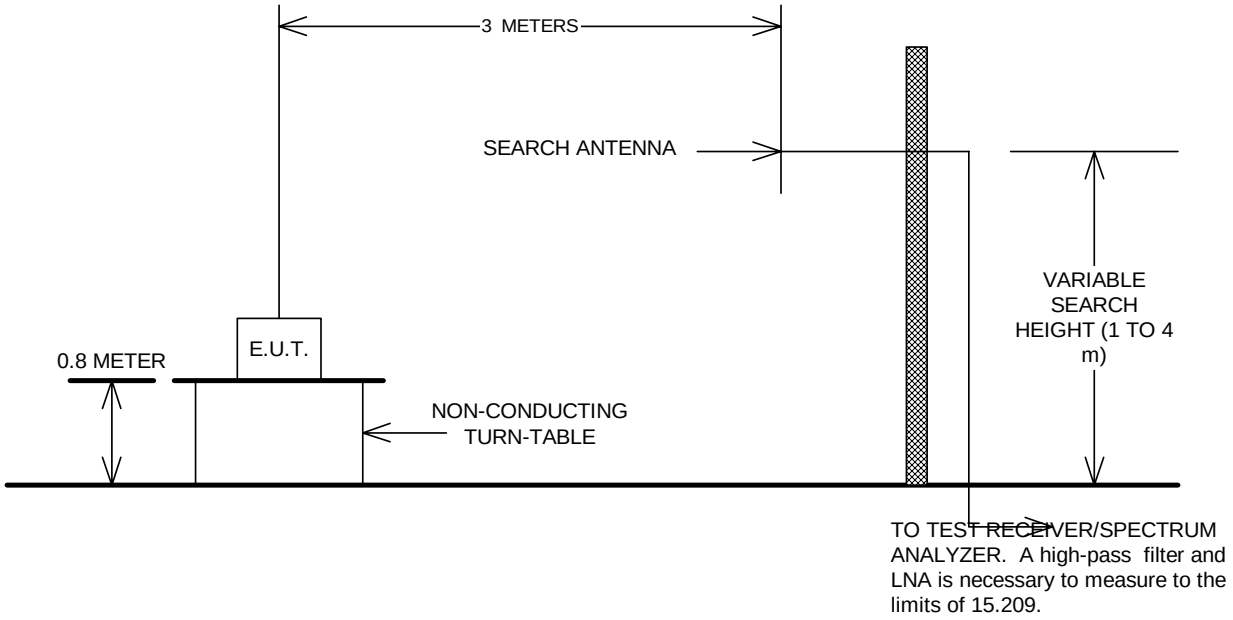
Measurement Data: See attached.

Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	01/19/09	01/20/11
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09
1785	Preamplifier	A.H. SYSTEMS PAM-0126	143	04/06/09	04/06/10
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09
1783	Cable	Nemko 0	0	06/12/09	06/12/10
1767	MI Test Receiver 20Hz - 26.5 GHz - 150 - +30 dBm LC	ROHDE & SCHWARZ ESIB26	837491/0002	09/20/07	09/20/09

ANNEX B - TEST DIAGRAMS

Test Site for Radiated Emissions



Minimum 6 dB Bandwidth
Peak Power Output
Peak Power Spectral Density
Spurious Emissions (conducted)