Nemko Test Report:	115734-2TRFWL
Applicant:	Communications Digicharm Inc., 2030 Pie-IX, Suite 206 Montreal, Québec H1V 2C8, Canada
Apparatus:	MicroSignage Player MS00011
FCC ID:	WVXMS00011
In Accordance With:	FCC Part 15 Subpart C, 15.247 FHSS System and Digitally Modulated Radiators 902-928MHz, 2400 - 2483.5 MHz, 5725-5850MHz
Authorized By:	Jason Nixon, Telecom/Wireless Specialist
Date:	February 25, 2009
Total Number of Pages:	31

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Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

Apparatus Assessed:	MicroSignage Player MS00011
Specification:	FCC Part 15 Subpart C, 15.247
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release
Test Location:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Registration Number:	176392 (3 m Semi-Anechoic Chamber)
Tests Performed By:	Andrey Adelberg, EMC/Wireless Specialist
Test Dates:	October 28, 2008 to November 3, 2008

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Section 2 : Equipment Under Test

2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	MicroSignage Player
Brand Name:	DIGICHARM
Model Name or Number:	MS00011
Serial Number:	CAD-007 and CAD-040
Nemko Sample Number:	3 and 2
FCC ID:	WVXMS00011
Date of Receipt:	October 27, 2008

2.2 Accessories

The following information identifies accessories used to exercise the EUT during testing:

Description:	Switching Power Supply
Brand Name:	Sinpro
Model Name or Number:	SPU12A-105
Serial Number:	None
Nemko Sample Number:	7
Connection Port	RJ11

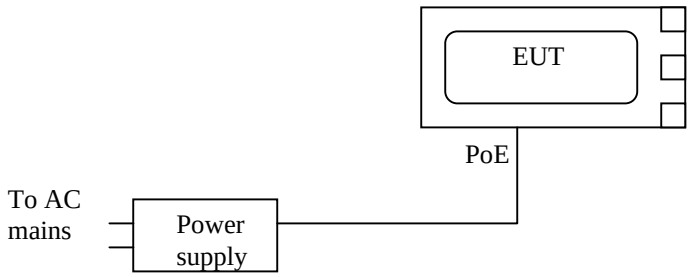
2.3 EUT Description

The unit is a 3.7" LCD signage color display used to display promotional marketing material.
Dimensions: 87.5 mm x 105 mm x 27 mm (approx.)
Weight: TDB (less than 400 g)
Option/Configuration: Unit can be mounted vertically or horizontally.
External I/O cable: none, only one cable is connected for powering the device.
Power: 12 Vdc provided by an external plug-in power adapter

2.4 Technical Specifications of the EUT

Operating Band:	2400 – 2483.5 MHz
Operating Frequency:	2405 – 2480 MHz
Modulation:	OQPSK
Occupied Bandwidth:	1.942 MHz
Channel Bandwidth:	5 MHz
Emission Designator:	G1D
Antenna Data:	Johanson Technology, Ceramic Chip Antenna, 2 dBi, P/N: 2450AT43A100E
Power Supply Requirements:	120 VAC @ 60 Hz

2.5 EUT Setup diagram



2.6 Operation of the EUT during testing

The EUT was set to Transmit mode:

1. On channel #1: 2405 MHz
2. On channel #8: 2440 MHz
3. On channel #16: 2480 MHz

The EUT was set to operate in Receive mode

2.7 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

Section 3 : Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247
FHSS System and Digitally Modulated Radiators
902-928MHz, 2400 - 2483.5 MHz, 5725-5850MHz

3.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 - 30 ^{o}C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5 % of rated voltages

3.4 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko Canada document MU-003.

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
Horn Antenna #2	EMCO	3115	FA000825	Jan. 15/08	May 06/09
Temperature Chamber	Thermotron	SM-16C	FA001030	NCR	Jan. 21/09
Power Meter	HP	E4418B	FA001413	Jun 05/08	NCR
Multimeter	Fluke	16	FA001831	Jan 14/08	NCR
Spectrum Analyzer	Rohde & Schwarz	FSU46	FA001877	Jan 23/08	NCR
Power Sensor	HP	8487A	FA001908	Jun 05/08	Sept. 02/09
Notch Filter	Microwave Circuits	2400-2483MHz	FA001940	COU	Dec. 07/08
Power Meter	Agilent	N1911A	FA001946	Jan 10/08	Aug. 05/09
Power Sensor	Agilent	N1922A	FA001947	Jan 10/08	July 07/09
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 07/07	July 07/09
Electro-Magnetic Interference Test Chamber	TDK	SAC-3	FA002047	May 06/08	Jan. 16/09
Controller	Sunol	SC104V	FA002060	NCR	Jan. 15/09
Mast	Sunol	TLT2	FA002061	NCR	Oct 2/09
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR	Aug 28/09
1 – 18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 2/08	Oct 2/09
Bilog	Sunol	JB3	FA002108	Jan. 21/08	Jan. 21/09
LISN	Rohde & Schwarz	ENV216	FA002023	Sept. 02/08	Sept. 02/09
50 Coax cable	HUBER + SUHNER	None	FA002074	July 07/08	July 07/09

COU – Calibrate on Use
NCR – No Calibration Required

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See Report Summary)

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of power supply	Y	PASS
15.207(a)	Powerline Conducted Emissions	Y	PASS
15.209(a)	Radiated Emissions within Restricted Bands	Y	PASS
15.247(a)(1)	Frequency hopping systems	—	—
15.247(a)(1)(i)	Frequency hopping systems operating in the 902-928 MHz band	Y	
15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725-5850 MHz band	N	
15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400-2483.5 MHz band	N	
15.247(a)(2)	Minimum 6 dB Bandwidth	Y	PASS
15.247(b)(1)	Maximum peak output power of Frequency hopping systems operating in the 2400-2483.5 MHz band and 5725-5850 MHz band	N	
15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902-928 MHz band	N	
15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands	Y	PASS
15.247(b)(4)	Maximum peak output power	Y	PASS
15.247(c)(1)	Fixed point-to-point Operation with directional antenna gains greater than 6 dBi	N	
15.247(c)(2)	Transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams	N	
15.247(d)	Conducted Spurious Emissions	Y	PASS
15.247(e)	Power Spectral Density for Digitally Modulated Devices	Y	PASS
15.247(f)	Time of Occupancy for Hybrid Systems	N	

Appendix A : Test Results

Clause 15.207(a) Powerline Conducted Emissions

Frequency of Conducted limit (dBµV)

Emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Results: Pass

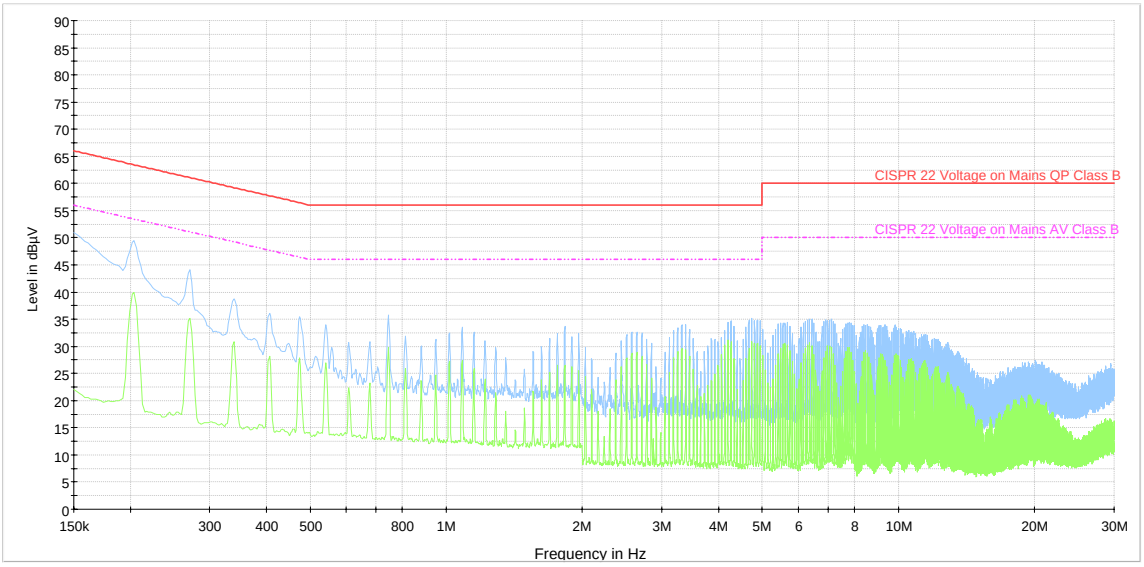
Additional Observations:

Preview measurements:
0.15 MHz to 30 MHz
Receiver settings:
- Peak Detector, Max Hold and Average
- 10 kHz RBW

Final measurement:
0.15 MHz to 30 MHz
Receiver settings:
- Q-Peak Detector and Average
- 10 kHz RBW

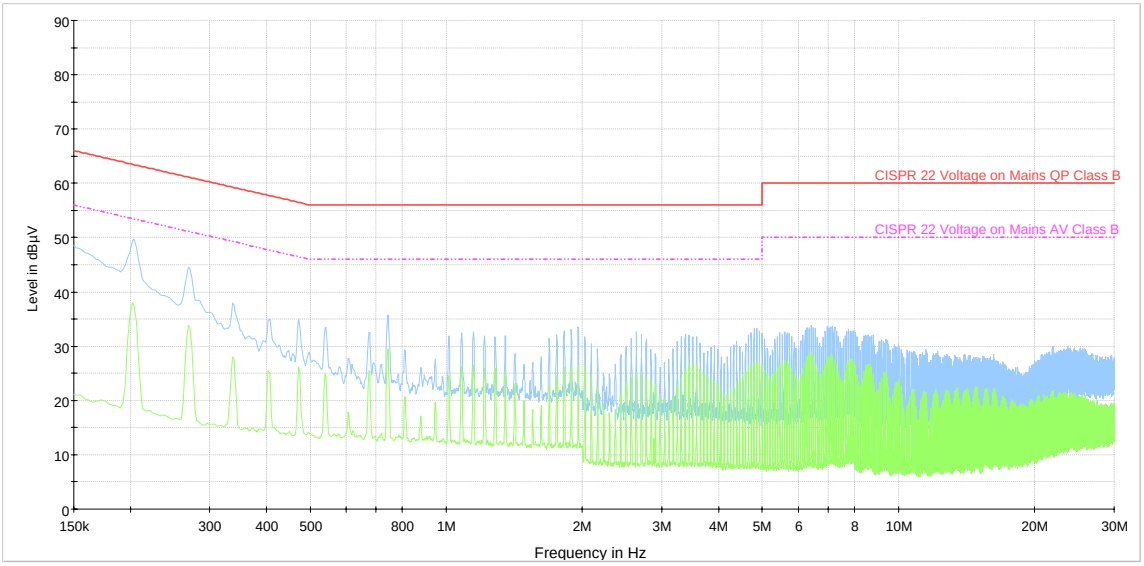
- Spectral plots have been corrected for transducer factors; cable loss, LISN, and attenuator.
- No emissions within 6 dB of limit were detected.

Phase Line



Conducted Emissions, Phase conductor
CISPR 22 Voltage on Mains QP Class B.LimitLine
CISPR 22 Voltage on Mains AV Class B.LimitLine
Preview Peak Result
Preview Average Result

Neutral Line



Conducted Emissions on Neutral conductor
CISPR 22 Voltage on Mains QP Class B.LimitLine
CISPR 22 Voltage on Mains AV Class B.LimitLine
Preview Peak Result
Preview Average Result

Clause 15.209(a) Radiated Emissions within Restricted Bands

§ 15.209 (a) Radiated emission limits; general requirements
Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

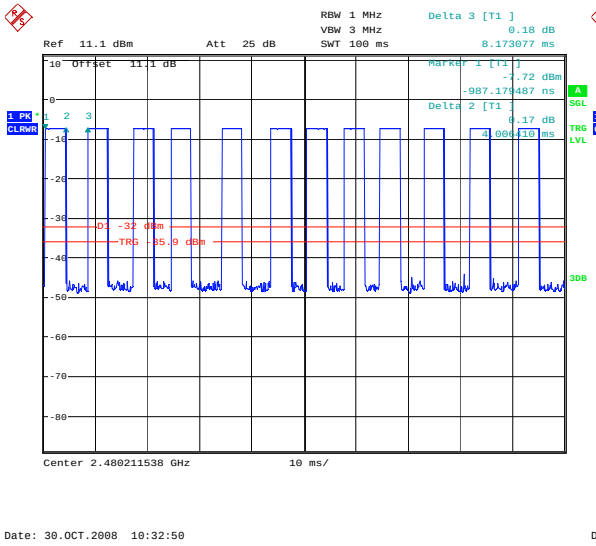
Test Results: Pass.
See attached tables and plots for results.

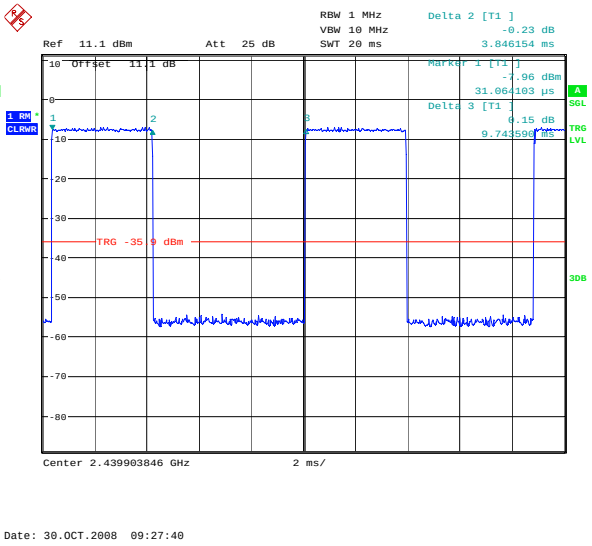
Additional Observations:

These results apply to emissions found in the restricted bands defined in FCC Part 15 Subpart C, 15.205.
The Spectrum was searched from 30 MHz to 40 GHz
All measurements were performed at a distance of 3 meters.
Test receiver with 120 kHz RBW was used below 1 GHz.
Spectrum Analyzer with 1 MHz RBW / 3 MHz VBW for peak measurements and 1 MHz RBW / 10 Hz VBW (video averaging / video filtering mode) for average measurements was used above 1 GHz.

No radiated emissions associated with the transmitter above the noise-floor were found.

Duty Cycle:





Duration of Pulse: T_{ON} = Delta 2 = 3.846154 ms

Number of Pulses within 100 ms: 12

Transmission duration within 100 ms: 12·3.846154 ms = 46.153848 ms

Correction Factor: $20 \cdot \log_{10}(Tx_{100\ ms}/100\ ms) = 20 \cdot \log_{10}(46.153848/100) = -6.72$ dB

Delta Marker Measurement for 2.4835 MHz Band Edge

Measured Field Strength for High Channel in 1 MHz RBW = 84.92 dBµV/m

Delta Marker = 37.16 dB (see page 24)

Therefore, Peak Field Strength = 84.92 dBµV/m – 37.16 dB = 47.76 dBµV/m
Limit = 74 dBµV/m
Margin = 26.24 dB
Average Field Strength = 47.76 dBµV/m – 6.72 dB (Duty Cycle) = 41.04 dBµV/m
Limit = 54 dBµV/m
Margin = 12.96 dB

Clause 15.247(a)(2) Minimum 6 dB Bandwidth

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Results: Pass

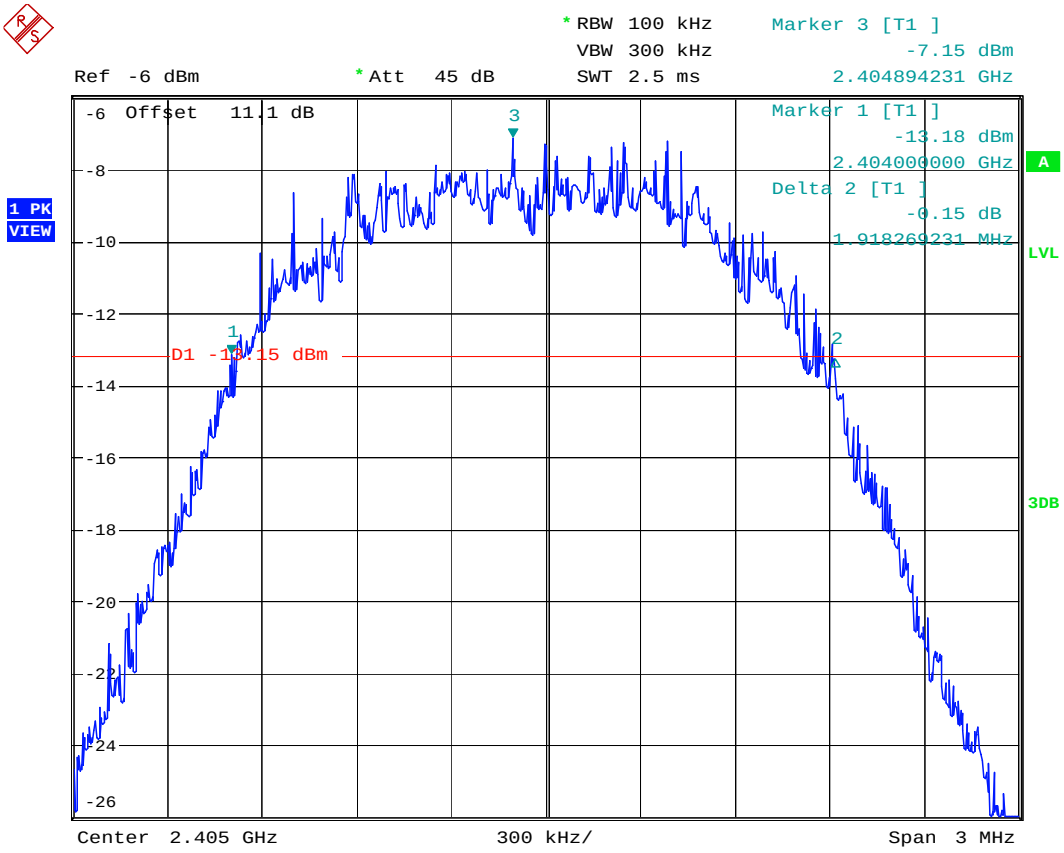
See attached table and plots.

Minimum 6 dB Bandwidth test results:

Channel	Frequency, MHz	Measured 6 dB BW, MHz	Limit, kHz	Margin, MHz
1	2405	1.918269231	500	1.41826923
8	2440	1.903846154	500	1.40384615
16	2480	1.942307692	500	1.44230769

Low Channel

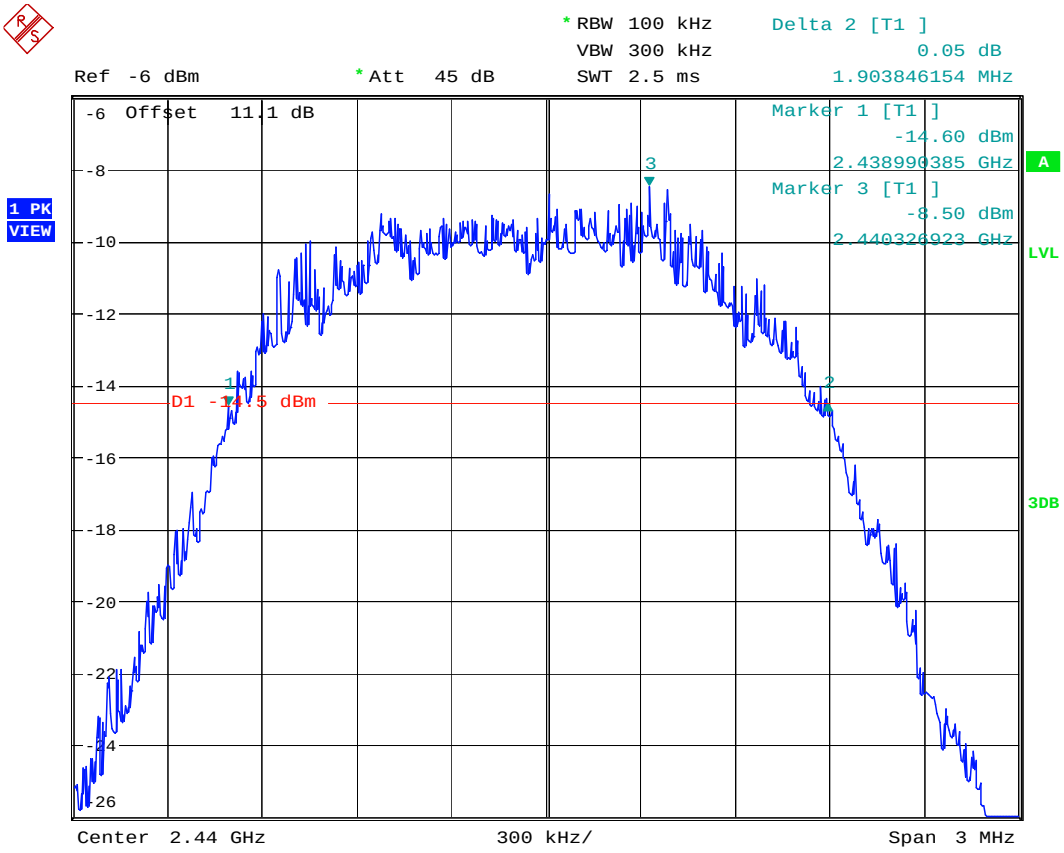
6 dB Bandwidth



Date: 30.OCT.2008 11:50:45

Mid Channel

6 dB Bandwidth



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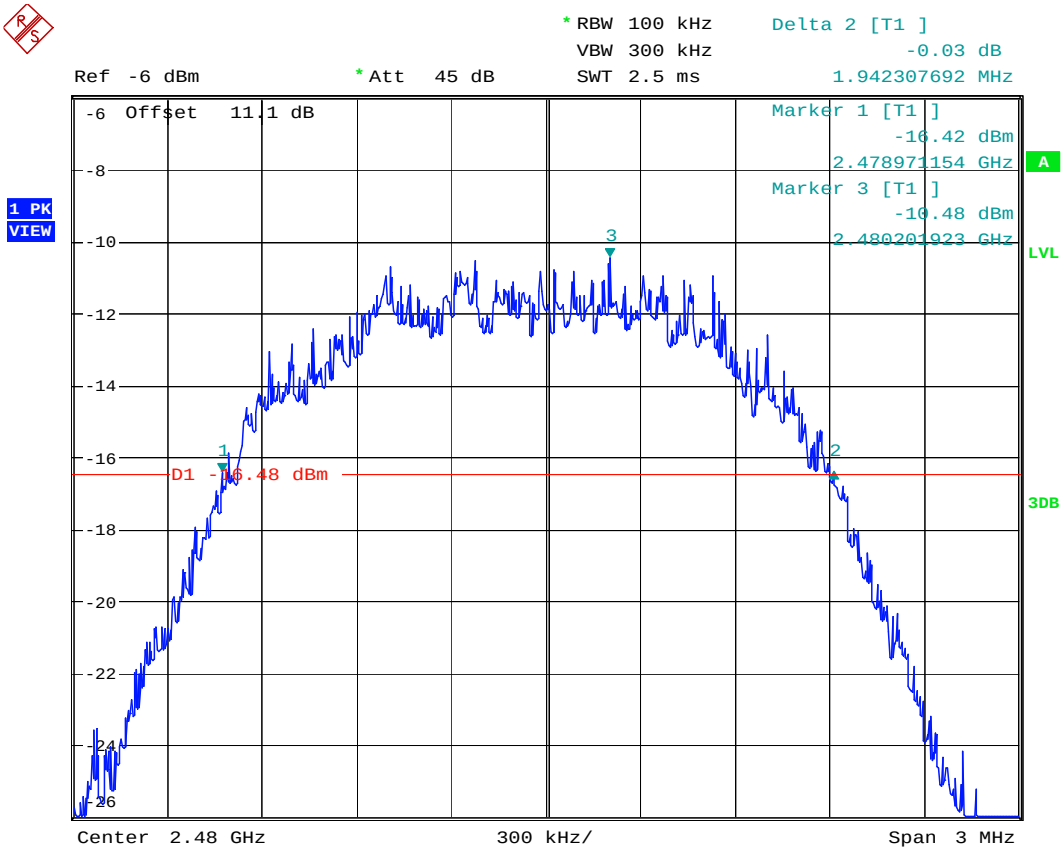
High Channel

6 dB Bandwidth



Date: 30.OCT.2008 11:54:21

Clause 15.247(b)(3) Maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Clause 15.247(b)(4) Maximum peak output power

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Results: Pass
See attached table.

Additional Observations:

The output RF power was measured on the antenna port by means of a spectrum analyzer and following the *'Power Output Option 1'* procedure from the FCC guidelines for Measurement of Digital Transmission Systems operating under Section 15.247.

The RBW/VBW was set to 10 MHz / 10 MHz using Peak Detector.

Transmit output power was measured while supply voltage was varied from 102 VAC to 138 VAC (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.

Ch #	Freq. (MHz)	G_{ANT} (dBi)	P_{Tx} Cond. (dBm)	Limit (dBm)	Margin (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2405	2	-3.55	30.00	33.55	-1.55	36.00	37.55
8	2440	2	-4.70	30.00	34.70	-2.70	36.00	38.70
16	2480	2	-5.85	30.00	35.85	-3.85	36.00	39.85

Clause 15.247(d) Conducted Spurious Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Results: Pass.
See attached plots for results.

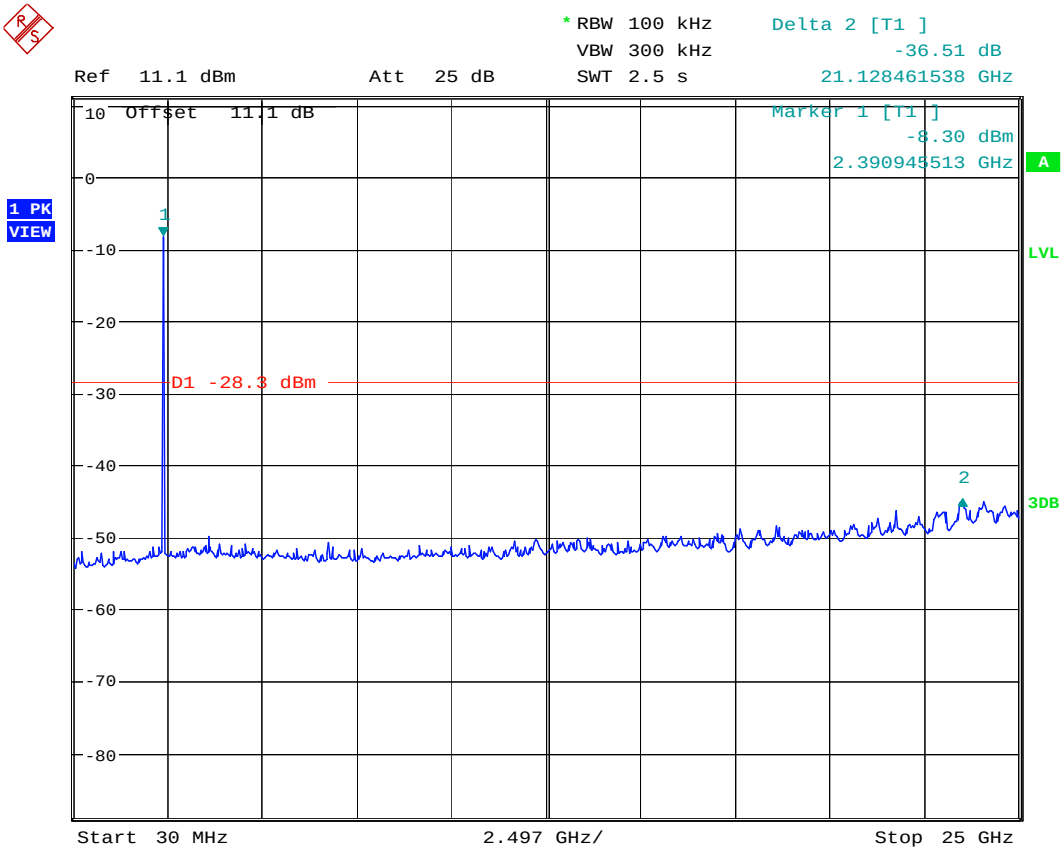
Additional Observations:

The Spectrum was searched from 30 MHz to 40 GHz.
All measurements for spurious emissions were performed conducted using a Spectrum analyzer with Peak Detector with 100 kHz RBW

'Power Output Option 1' procedure from the FCC guidelines for Measurement of Digital Transmission Systems operating under Section 15.247 was used for power measurements, therefore the attenuation of 20 dB down from the highest emission level within the authorized band was used.

20 dBc Limit Check

Low Channel



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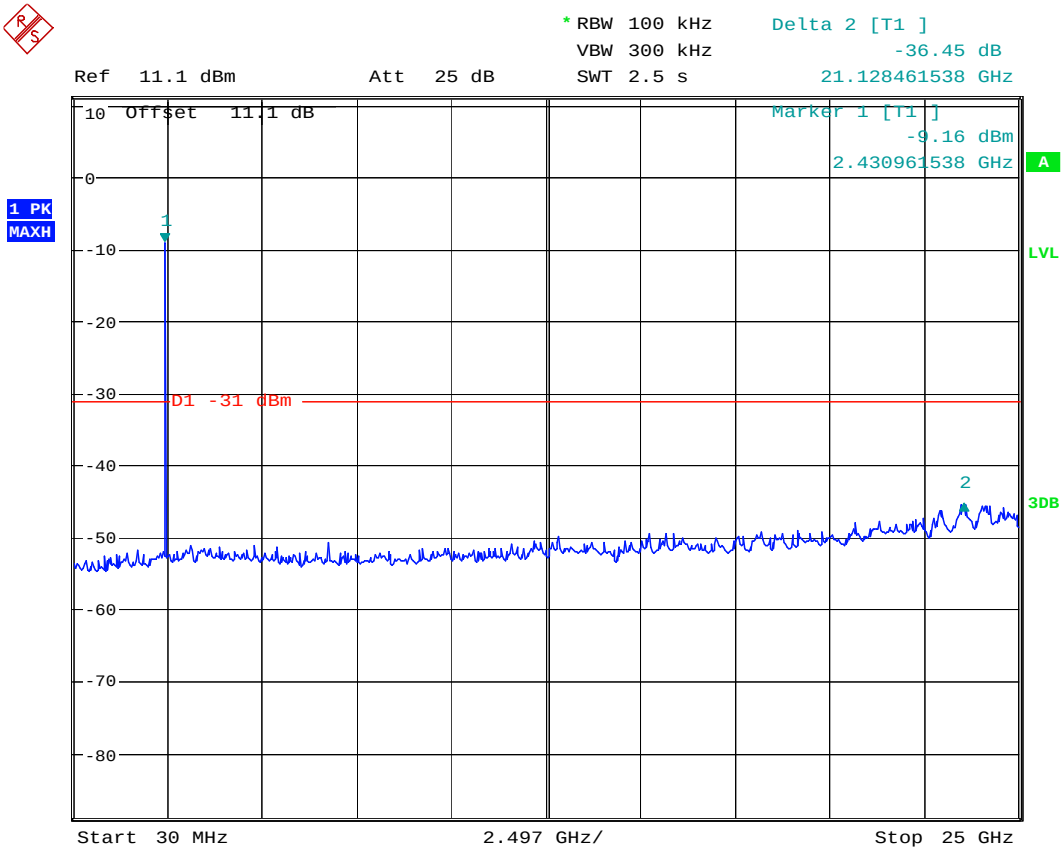
20 dBc Limit Check

Mid Channel



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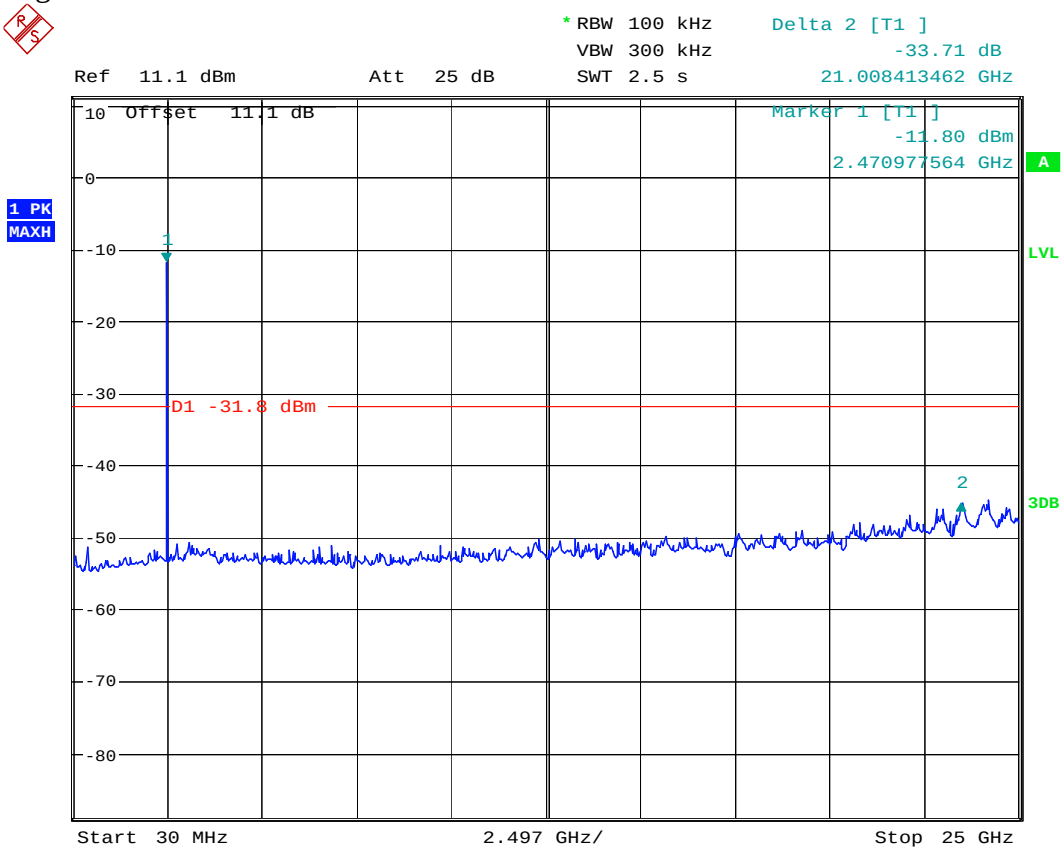
20 dBc Limit Check

High Channel



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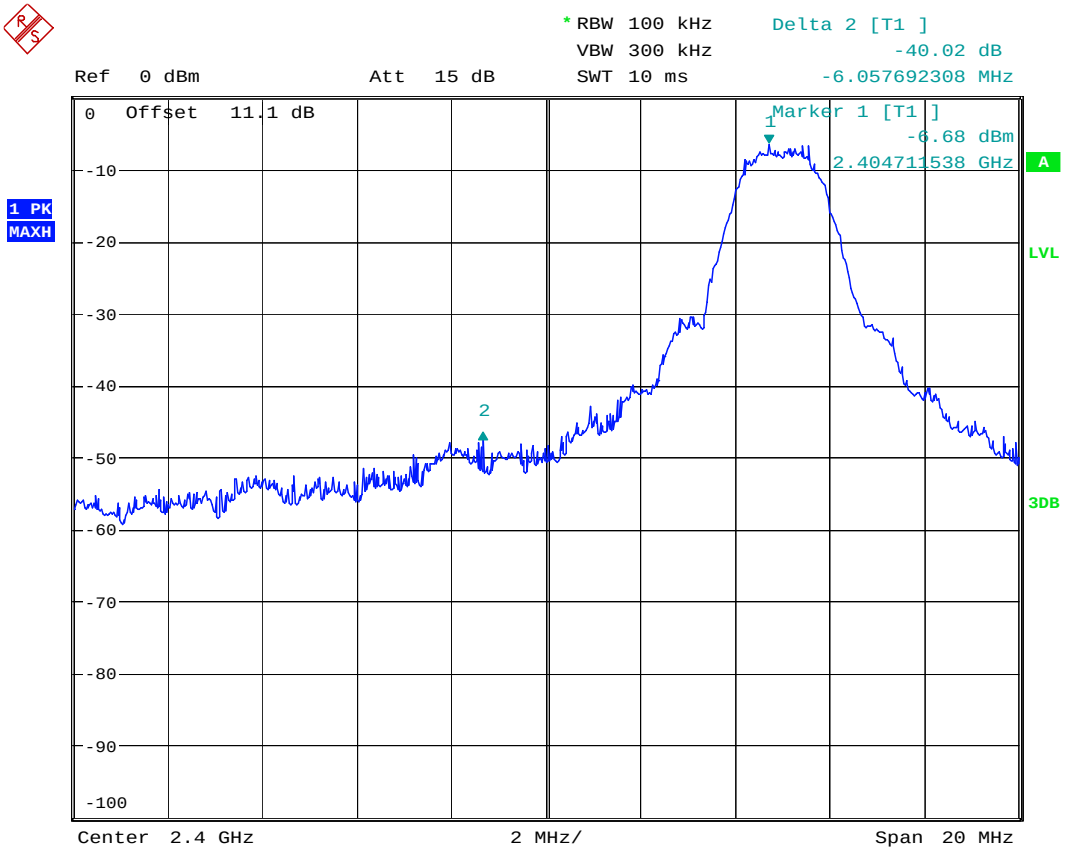
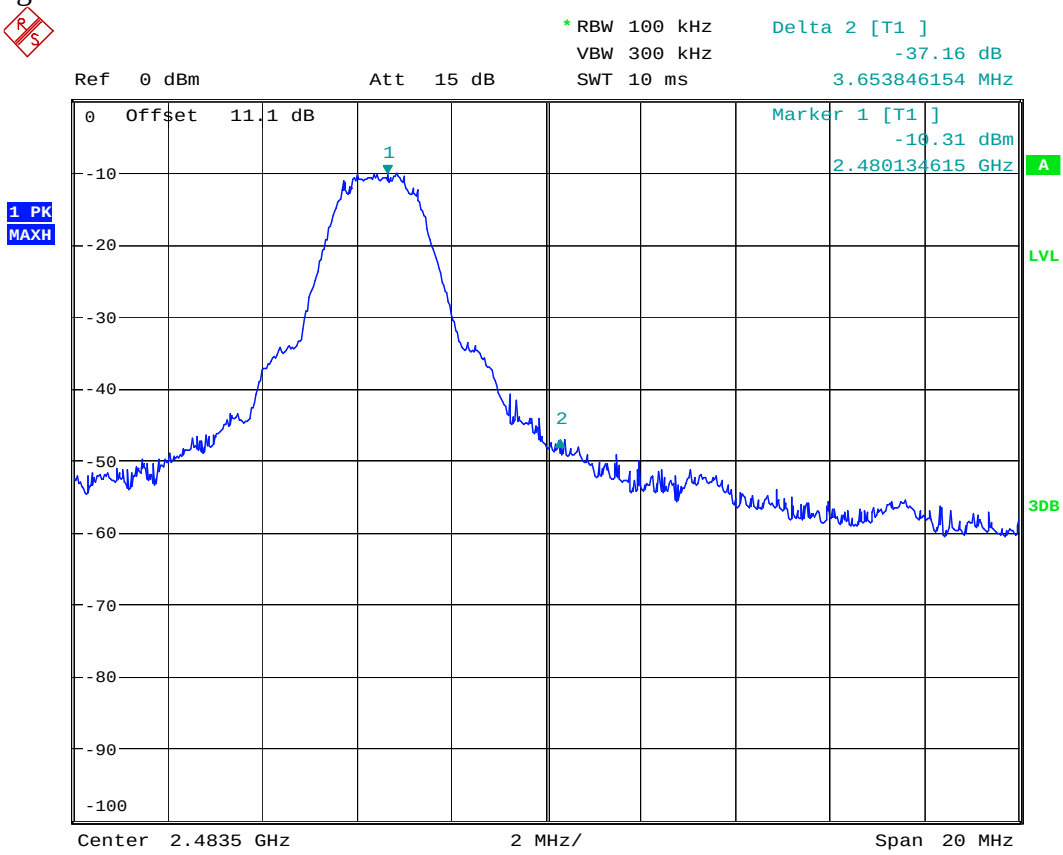
Band edge emissions
Low channel



Date: 31.OCT.2008 13:32:09

Band edge emissions

High channel



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Clause 15.247(e) Power Spectral Density for Digitally Modulated Devices

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Results: Pass

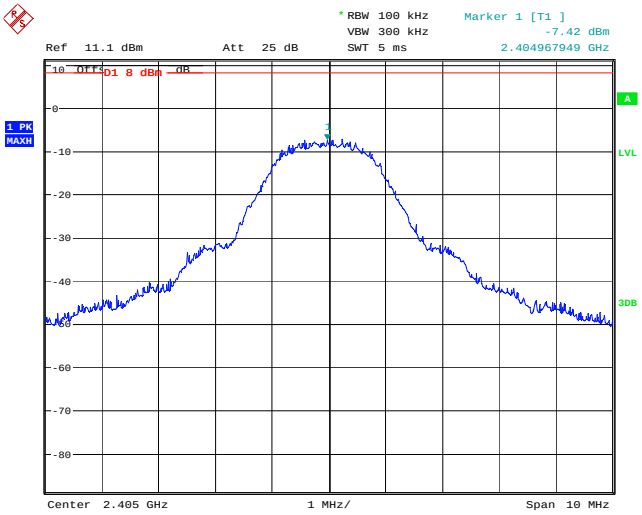
See attached table and plots.

Additional Observations:

The Power Spectral Density was measured on the antenna port by means of a spectrum analyzer and following procedure described in *'PSD Option 1'* in FCC guidelines for Measurement of Digital Transmission Systems operating under Section 15.247.

Ch #	Freq. (MHz)	G_{ANT} (dBi)	PSD Cond. (dBm/3 kHz)	Limit (dBm)	Margin (dB)
1	2405	2	-19.00	8.00	27.00
8	2440	2	-20.08	8.00	28.08
16	2480	2	-22.92	8.00	30.92

Low Channel, peak:



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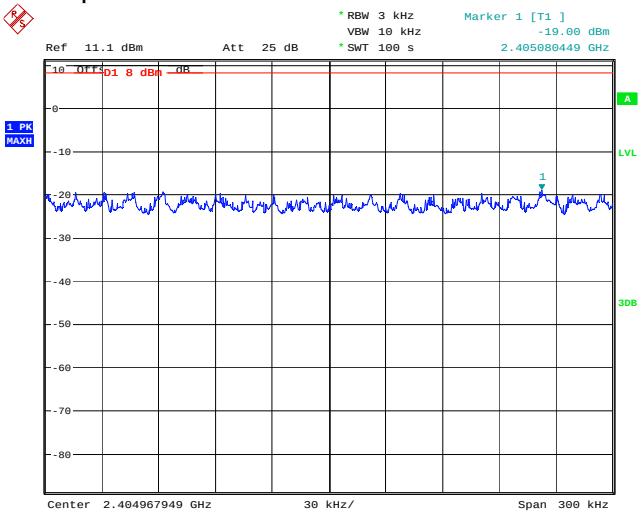
Low Channel, zoomed on peak:



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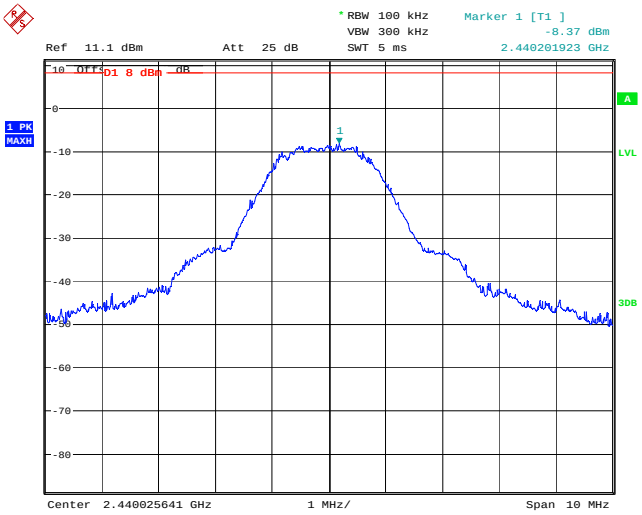
Mid Channel, peak:



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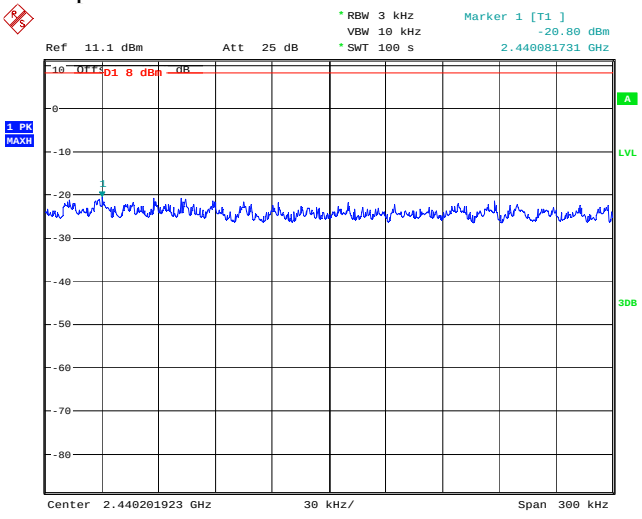
Mid Channel, zoomed on peak:



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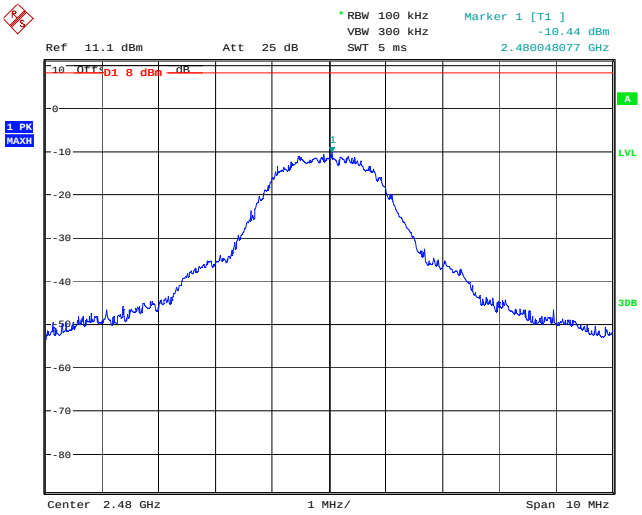
High Channel, peak:



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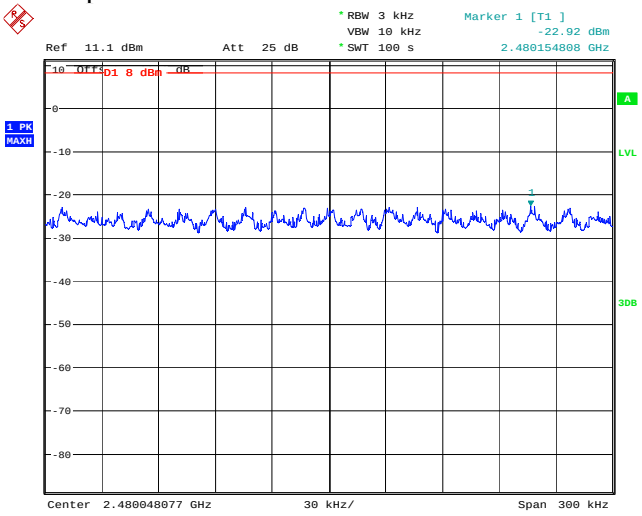
High Channel, zoomed on peak:



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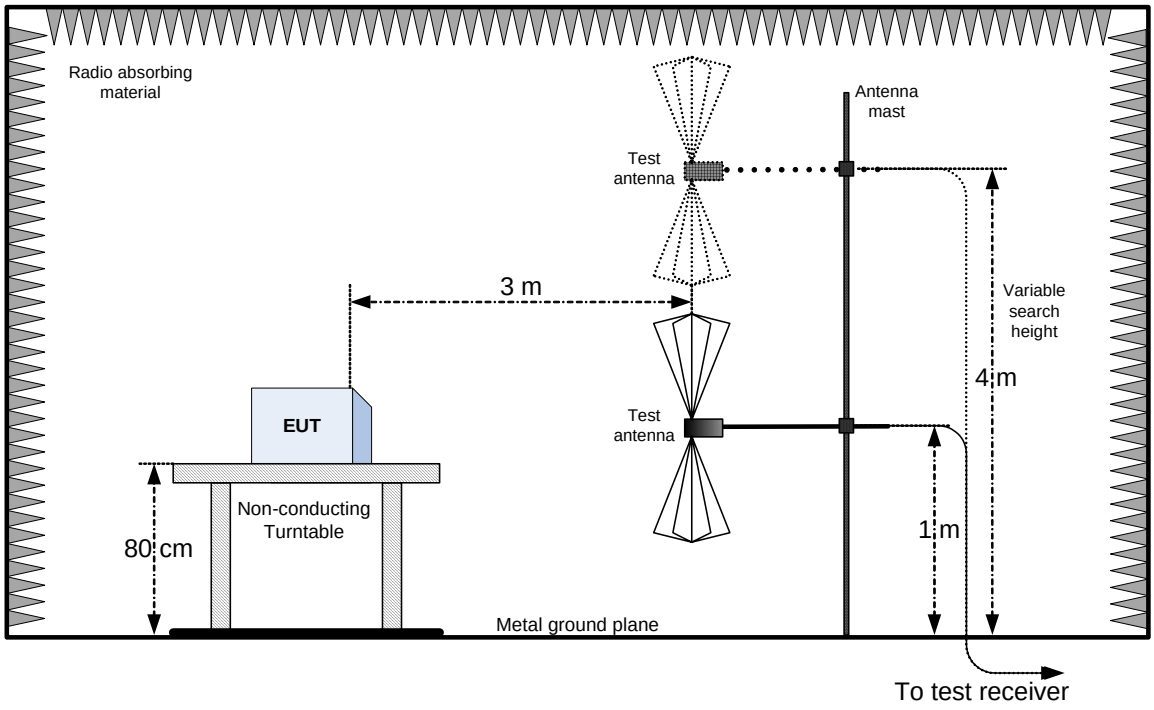
Appendix B : Setup Photographs

Conducted Emissions Setup:

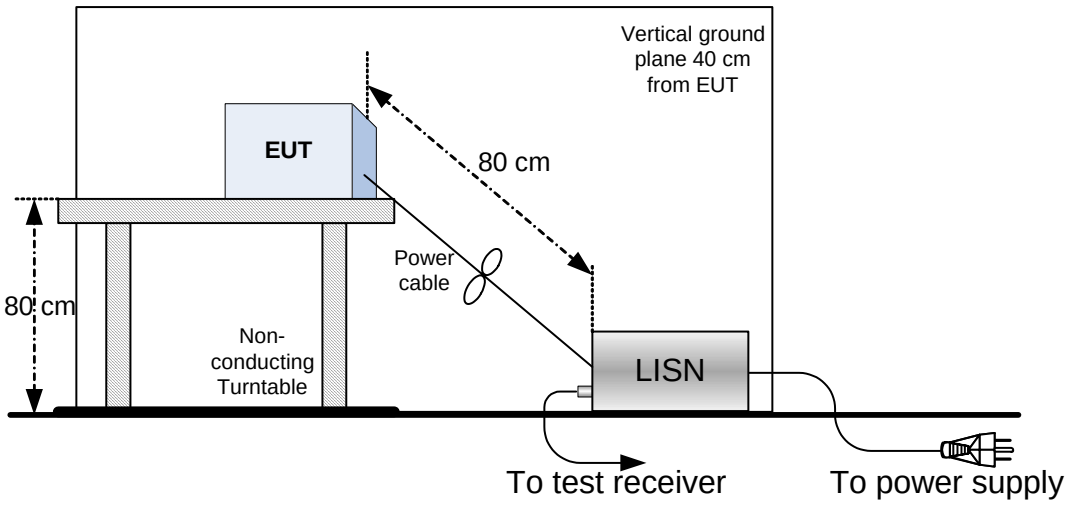
Spurious Emissions Setup:

Appendix C : Block Diagram of Test Setups

Radiated Emissions above 30 MHz Test Site



Conducted Emissions Test Site



Transmitter power, PSD, Occupied Bandwidth, Conducted Spurious emissions, frequency hopping Setup