CERTIFICATION TEST REPORT
PART 15.247C

For The Transmitter Module
Model: 599

FCC ID: IWC-DTS
IC: 9113A-DTS

PREPARED FOR:

Noraxon USA
13430 Nort Scottsdale Road, Suite 104
Scottsdale, AZ 85254

Prepared on: July 29, 2010

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DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	July 29, 2010	Prepared By: A. Laudani
-	July 29, 2010	Initial Release: Alan Laudani

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4 (2003) "Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz":

- The unit described in this report was received at Nemko USA, Inc.'s facilities on July 8, 2010.
- Testing was performed on the unit described in this report on July 26, 2010 to July 28, 2010.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), Industry Canada, NVLAP or any other government agency.

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CERTIFICATION

Nemko USA, Inc., an independent Electromagnetic Compatibility (EMC) Test Laboratory, produced this Test Report and performed the Radio Frequency Interference (RFI) testing and data evaluation contained herein.

Nemko USA, Inc.'s measurement facility is currently registered with the United States Federal Communications Commission (FCC) in accordance with the provisions of 47 United States Code (CFR) Part 2, Subpart I, Section 2.948(a). A current description of Nemko USA, Inc.'s measurement facility is on file with the FCC. Nemko USA Inc. has additionally satisfied the FCC that it complies with the requirements set forth in 47 CFR Part 2, Subpart I, Section 2.948(d) regarding the accreditation of EMC laboratories.

The RFI testing, test data collection and test data evaluation were accomplished in accordance with the ANSI C63.4–2003 Standard, and in accordance with the applicable sections of the FCC rules (47 CFR Parts 2 and 15). The testing was also accomplished in accordance with Industry Canada's ICES-003 standard for unintentional radiating device per EMCAB-3, Issue 3 (May 1998). The administrative summary of this test report provides a description of the test sample.

I hereby certify that the test data, test data evaluation, and equipment configurations used to compile this test report are a true and accurate representation of the test sample's radio frequency interference characteristics as of the test date(s), and, for the design of the test sample.

Alan Laudani
EMC Engineer

1. ADMINISTRATIVE DATA AND TEST SUMMARY

1.1. Administrative Data

CLIENT:	Noraxon USA 13430 Nort Scottsdale Road, Suite 104 Scottsdale, AZ 85254
CONTACT: E-Mail:	Frank Hosner Frank.Hosner@Noraxon.com
DATE (S) OF TEST:	July 26, 2010 to August 9, 2010
EQUIPMENT UNDER TEST (EUT):	Transmitter Module
MODEL:	599
SERIAL NUMBER:	1026
CONDITION UPON RECEIPT:	Suitable for Test
TEST SPECIFICATION:	RSS 210 (Issue 7, June 2007) Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

2. Test Summary

This section contains the following:

FCC Part 15 Subpart C:
IC RSS-210 Issue 7 June 2007 Annex 8
IC RSS-Gen Issue 2 June 2007

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 section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

Part 15C	RSS	Test Description	Required	Result
15.207 (a)	RSS-Gen 7.2.2	Conducted Emission Limit	NA	Battery powered
15.215(c)	RSS-Gen 4.6.1	20 dB Bandwidth	Y	Pass
15.247(a)(2)	RSS-210 A8.2 (a)	Minimum 6dB RF Bandwidth	Y	Pass
15.247(b)(3)	RSS-Gen 4.8	Peak Output Power	Y	Pass
15.247(d)		Band-edge Compliance of RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-210 A8.5	Spurious RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-Gen 4.9	Spurious Radiated Emissions	Y	Pass
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density for Digitally Modulated Devices	Y	Pass
	RSS-Gen 4.10	Receiver Spurious Emissions	Y	Pass

3. SYSTEM CONFIGURATION

3.1. Description and Method of Exercising the EUT

The 599 is a Transmitter Module for EMG (Electromyography) and other biomechanical sensors. The EUT transmits data from the electrode or sensor site to a belt worn receiver. The EUT was configured by connecting a test fixture provided by the client through the Molex connector which in turn connected to a PC via serial port. Using HyperTerminal on the PC, test program can be loaded and executed and then disconnected. These test programs are: Carrier Test (No Modulation), Transmit Burst Test (sending random packets as fast as possible.) and Receive Test (enables RX only). The device does not transmit in charging mode.

3.2. System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Transmitter Module	Noraxon USA Model: 599 Serial #: N/A	N/A
EUT - Transmitter Module	Noraxon USA Model: 599 with SMA connector for testing purposes Serial #: 1023	N/A
Support Equipment – Test Fixture	Noraxon USA Model: 599 Test Fixture Serial #: N/A	N/A
Support Equipment – DTS EMG Charger	Noraxon USA Model: 543 Serial #: N/A	DC cable via external AC adapter
Support Equipment – DTS EMG Charger AC Adapter	SL Power/AULT Model: MW172KB0503B01 Serial #: N/A	Direct wall plug-in
Support Equipment – Laptop	Dell PP20L 26082100189	DC cable via external AC adapter
Support Equipment – laptop AC Adapter	Dell Model: LA65NS0-00 Serial #: CN0DF2637161566SADDF	1.5m, unshielded, 18 AWG, 3-wire, IEC connector

3.3. Device Interconnection and I/O Cables

Connection	I/O Cable
EUT to Test Fixture	0.07 meter, 4 conductors, unshielded (<20AWG), molex connector
Test Fixture to Laptop	1.7 meters, DB9, standard serial cable

3.4. Design Modifications for Compliance

No design modifications were necessary to meet compliance.

3.5. Technical Specifications of the EUT

Manufacturer:	Noraxon USA
Operating Frequency:	2402.7 MHz to 2477.7 MHz in the 2400-2483.5 MHz Band
Rated Power:	2.12 dBm or 0.002W
Modulation:	Pulsed GFSK
Number of Operating Frequencies:	75
Antenna Type:	Soldered Chip antenna, 4.4 dBi max.
Antenna Connector:	RUFA 2.4GHz SMD antenna
Power Source:	3.7 Vdc 190mA battery

4. DESCRIPTION OF TEST SITE AND ENVIRONMENT

4.1. Description of Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022 (1987), CISPR 16 and 22 (1985) and ANSI C63.4-2001 documents. The OATS normalized site attenuation characteristics are verified for compliance every year, and registered with the Federal Communications Commission under Registration Number 90579 and Industry Canada under 2040B-1 and 2040B-2.

4.2. Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedures.

4.3. Modifications Performed During Assessment

No modifications were performed during assessment.

4.4. Record Of Technical Judgements

No technical judgements were made during the assessment.

4.5. EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.6. Test Deleted

No Tests were deleted from this assessment.

4.7. Additional Observations

There were no additional observations made during this assessment.

4.8. Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	17 – 22 ^{o}C
Humidity range	:	29 - 50%
Pressure range	:	87 - 105 kPa
Power supply range	:	120VAC 60Hz (±15%)

5. DESCRIPTION OF TESTING METHODS

5.1. Introduction

As required in 47 CFR, Parts 2 and 15, the methods employed to test the radiated and conducted emissions (as applicable) of the EUT are those contained within the American National Standards Institute (ANSI) document ANSI C63.4–2003, titled "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." All applicable FCC Rule Sections that provide further guidance for performance of such testing are also observed.

For General Test Configuration please refer to Figure 1 on the following page.

Digital devices sold in Canada are required to comply with the Interference Causing Equipment Standard for Digital Apparatus, ICES-003. These test methods and limits are specified in the Canadian Standards Association's (CSA) Standard C108.8-M1983 (1-1-94 version) and are "essentially equivalent" with FCC, Part 15 and CISPR 22 (EN55022) rules for unintentional radiators per EMCAB-3, Issue 3 (May 1998). No further testing is required for compliance to ICES-003.

5.2. Configuration and Methods of Measurements for Conducted Emissions

Section 7 of ANSI C63.4 determines the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Tabletop devices are placed on a non-conducting surface 80 centimeters above the ground plane floor and 40 centimeters from the ground plane wall. The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. The EUT is powered via a Line Impedance Stabilization Network (LISN). The emissions are recorded using the required bandwidth of 9 kHz in the quasi-peak mode. The average amplitude is also observed employing a 10 kHz bandwidth to determine the presence of broadband RFI. When such interference is caused by broadband sources (as defined by the FCC and ANSI Rules), the deviation guidelines contained in Section 11.3.1 of ANSI C63.4 are employed, which allows a correction factor of 13 dB to be subtracted from the quasi-peak reading. The emission levels are then compared to the applicable FCC limits to determine compliance.

5.3. Configuration and Methods of Measurements for Frequency Identification

When performing all testing of equipment, the actual emissions of the EUT are segregated from ambient signals present within the laboratory or the open-field test range. Preliminary testing is performed to ensure that ambient signals are sufficiently low to allow for proper observation of the emissions from the EUT. Incoming power lines are filtered using a 120 dB, 30-ampere; 115/208-volt filter to assist in reducing ambient signals for tests of levels of conducted emissions. Ambients within the laboratory are compared to those noted at the nearby open-field site to discriminate between signals produced from the EUT and ambient signals. In the event that a significant emission is produced by the EUT at a frequency which is also demonstrating significant ambient signals, the spectrum analyzer is placed in the peak mode, the bandwidth is narrowed, the EUT's signal is centered on the analyzer, the scan width is expanded to 50 kHz while monitoring the audio to ensure that only the EUT signal is present, the analyzer is switched to quasi-peak mode, and the level of the EUT signal is recorded.

5.4. Configuration and Methods of Measurements for Radiated Emissions

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified inside a shielded chamber by positioning a broadband receive antenna one meter from the EUT. Next, the EUT and associated system are placed on a turntable on a ten-meter open area test site (OATS) with known attenuation characteristics and all significant radiated emissions are recorded. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. The numerical results are included herein to demonstrate compliance. The numerical results of the test are included herein to demonstrate compliance.

The numerical results that are applied to the emissions limits are arrived as demonstrated by the example below:

A	B	C	D	E	F	G	H	I	J	K
Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail
47.2	44.5	44.6	Q	-	1.0	44.6	24.2	30.0	-5.8	Pass

A. Frequency Measured in MHz.
B. Meter Reading: Emission Amplitude as measured with the antenna in Vertical polarity in dBµV, this is from the EMI receiver or Spectrum Analyzer.
C. Meter Reading: Emission Amplitude as measured with the antenna in Horizontal polarity in dBµV, this is from the EMI receiver or Spectrum Analyzer.
D. Detector used: Q for Quasi-Peak, A for average, P for peak.
E. EUT Side F/L/R/B: Side of EUT facing the receiving antenna. Front, Left, Right, Back. If not noted, emission did not peak in a significant manner to discriminate which side of the EUT emitted the emission.
F. Ant. Height m: Antenna height in meters of strongest emission when the antenna was raised from 1 to 4 meters, vertical or horizontal.
G. Max Reading: Max meter reading of B vertical and C horizontal in dBµV.
H. Corrected Reading: Corrected Reading in dBµV/m; Max Reading corrected for cable loss (dB), antenna factor (dBV/m) and preamplifier gain (dB).
I. Spec limit: Specification Limit at the measured frequency in dBµV/m.
J. CR/SL Diff.: Difference in dB of Corrected Reading and Specification Limit, negative result is pass margin.
K. Pass Fail: Result; EUT does or does not comply at this frequency.

Example:
44.6 dBµV (Meter reading—Max.)
+0.8 dB (cable loss @ frequency)
45.4 dBµV
+11.5 dB/m (antenna factor @ frequency)
56.9 dBµV/m
-32.7 dB (preamplifier gain @ frequency)
24.2 dBµV/m --Final Corrected Reading
30.0 dBµV/m Specification Limit @ frequency
-5.8 dB CR/SL Difference.
Pass as difference is negative (below limit).

6. Test Results

6.1. Conducted Emissions

Part 15.207(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

7.2.2 The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network. Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown below. The tighter limit applies at the frequency range boundaries. The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network

Frequency Range (MHz)	Conducted Limit (dBuV)	
	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.

Conducted Emissions Test Data

EUT is battery powered.

6.2. 20 dB & 99% Bandwidths

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

RSS-Gen 4.6.1
When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

Sample Number:	599	Temperature:	24°C
Date:	6-10-2010	Humidity:	55%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Room 2

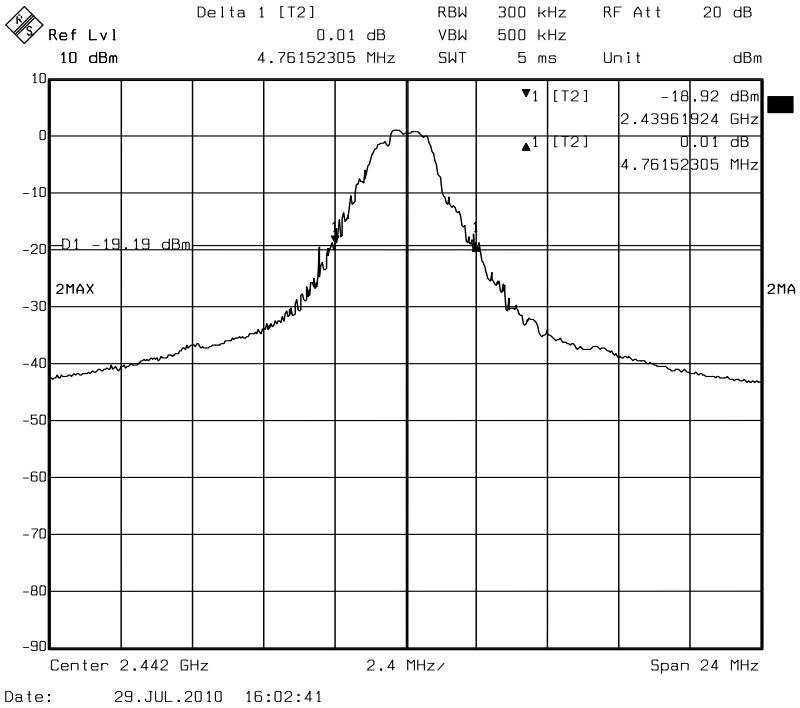
15.247(a)(1)

- Measurements were made conductively.
- Each channel investigated was maximized peak hold conducted. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
- Span is wide enough to capture the channel transmission
- RBW is 1% of the span
- VBW is greater than RBW
- Sweep is auto
- The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- The 99% bandwidth used the spectrum analyzer's function for channel power.

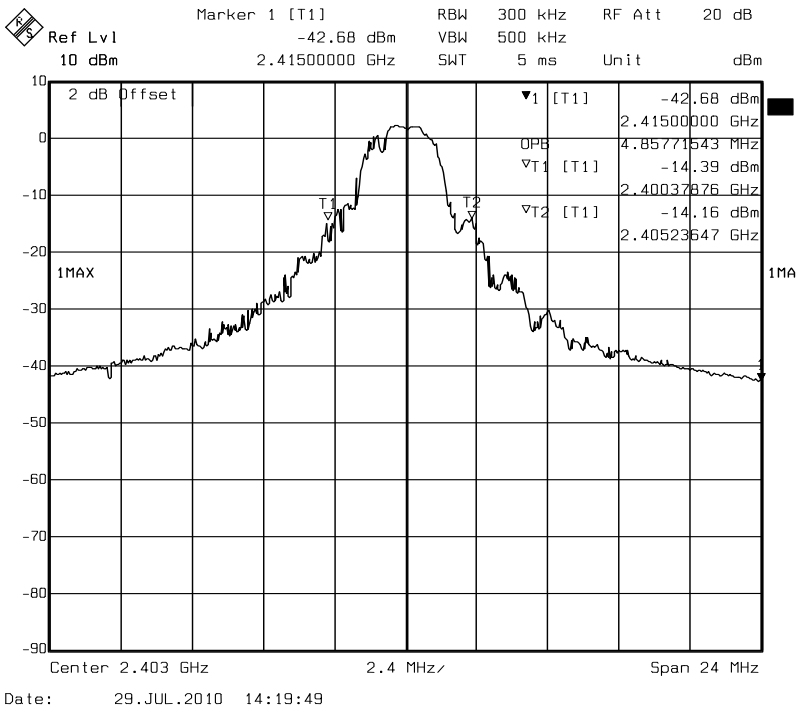
Test Results:
2402.7 MHz – 20dB BW/2 = 2400.32 MHz (within the frequency band)
2477.7 MHz + 20dB BW/2 = 2479.91 MHz (within the frequency band)

	99% Bandwidth	20 dB Bandwidth
Low	4.86 MHz	4.76 MHz
Mid	3.85 MHz	5.00 MHz
High	3.90 MHz	4.42 MHz

Low frequency 2402.7 MHz
20 dB Bandwidth 4.76 MHz

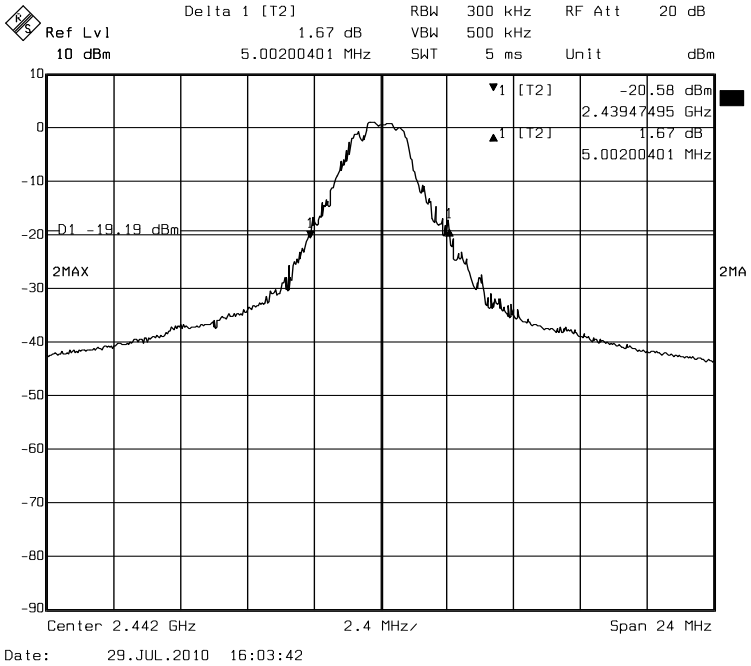


Low frequency 2402.7 MHz
99% Bandwidth = 4.86 MHz

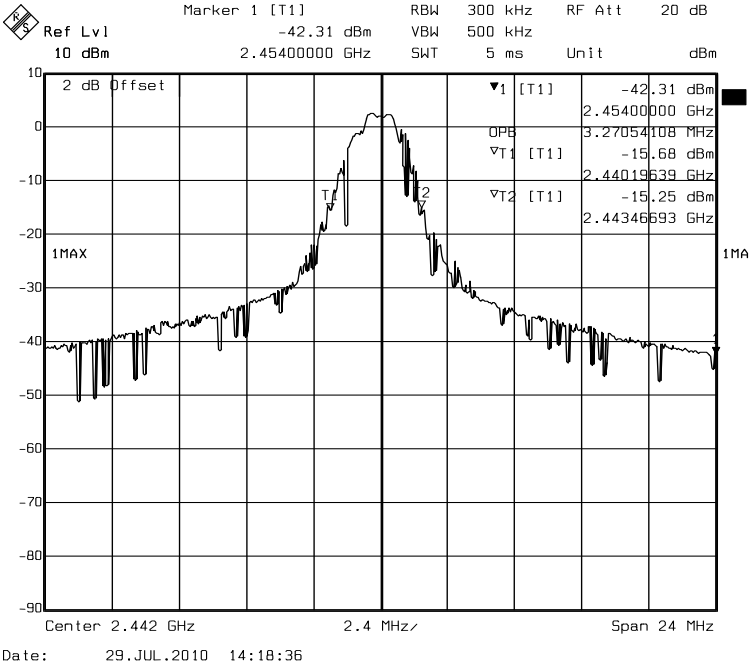


Mid frequency 2441.7 MHz

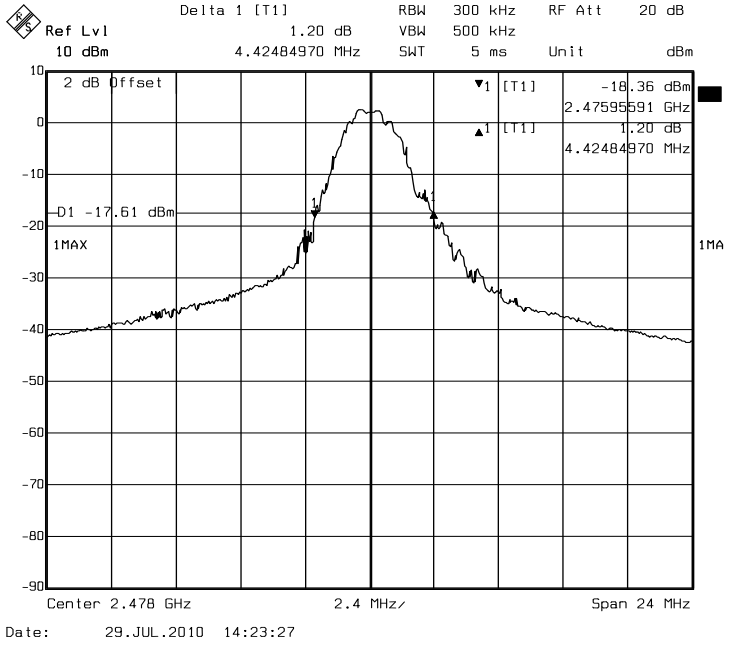
20 dB Bandwidth 5.00 MHz



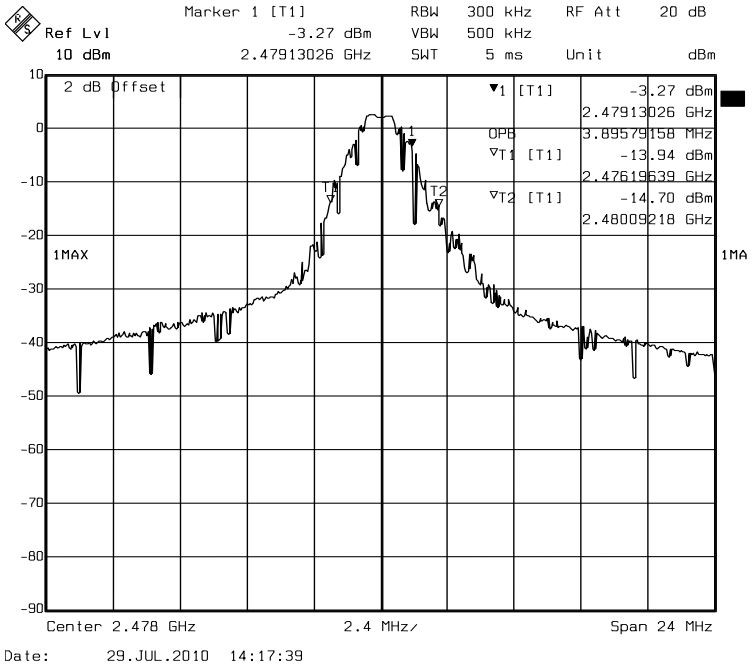
Mid frequency 2441.7 MHz
99% Bandwidth = 3.27 MHz



High frequency 2447.7 MHz
20 dB Bandwidth 4.42 MHz



High frequency 2447.7 MHz
99% Bandwidth = 3.90 MHz



6.3. Out-of-band Emissions – Conducted

15.247 (d) 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 Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

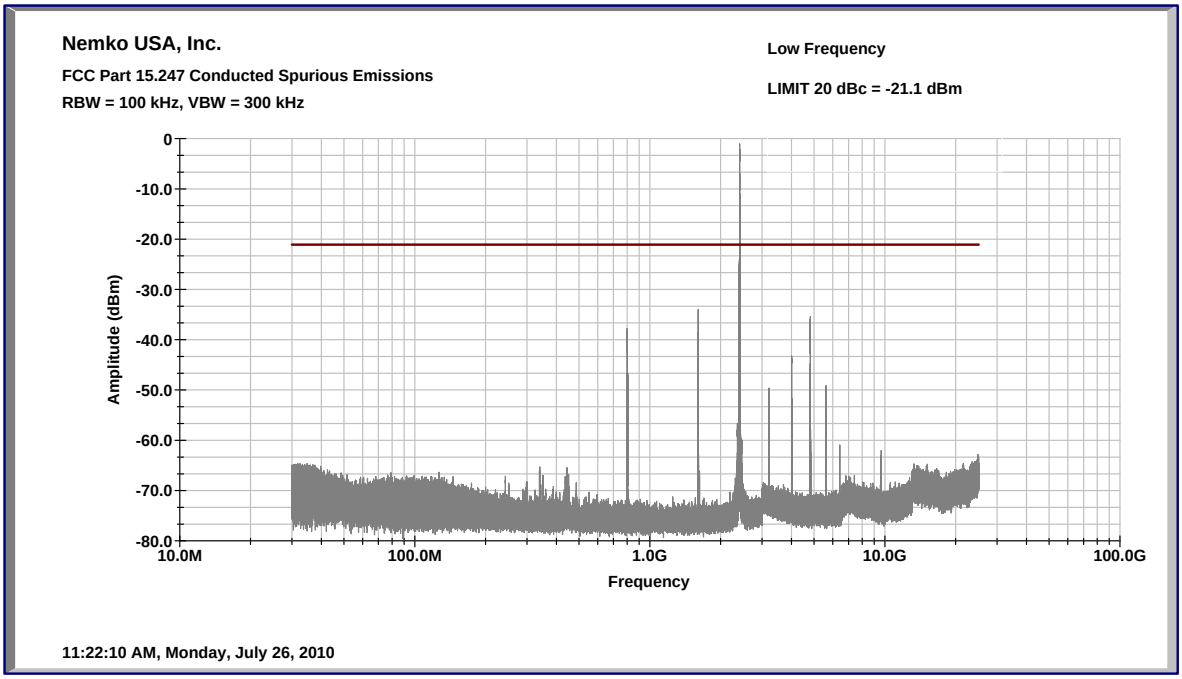
A8.5 Out-of-band Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

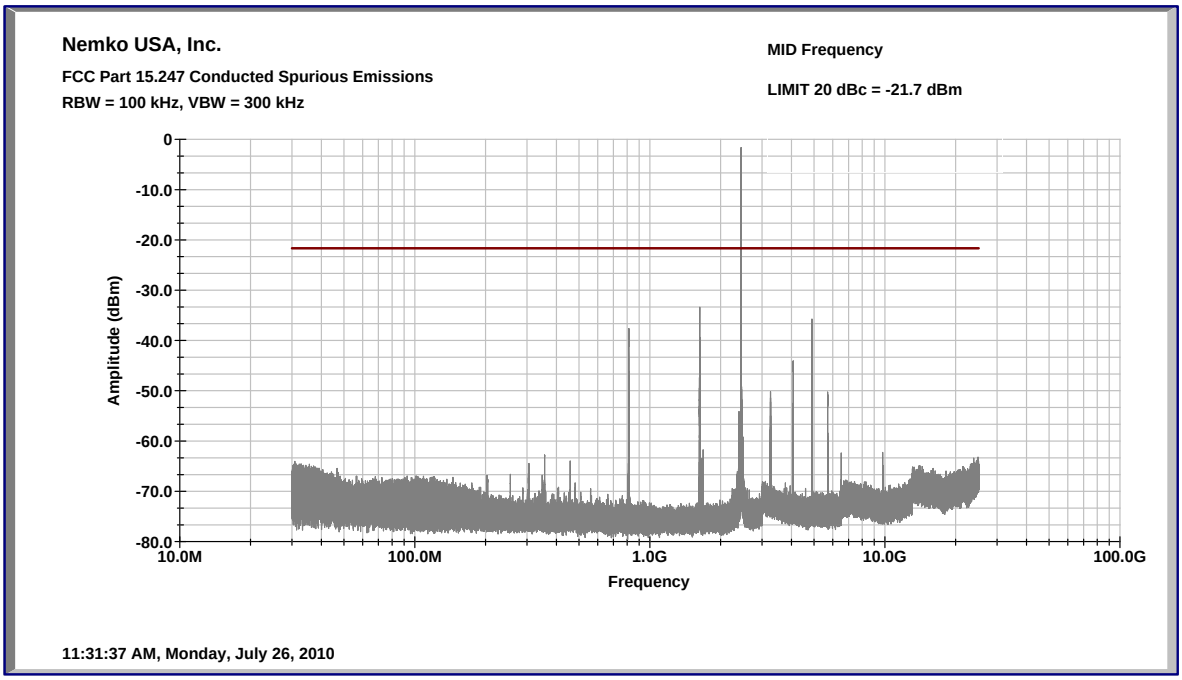
Sample Number:	599	Temperature:	24°C
Date:		Humidity:	55%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Room 2

- This is a conducted test. The 11.0dB offset is from the attenuator and cable assembly used.
- Span is wide enough to capture the peak level of the emission. Each start of a measurement, a preliminary scan using a span capturing the 20dB bandwidth is performed to verify that the peak emissions is captured on the final span used during the actual measurement.
- Emissions are investigated from 30 MHz to 25,000 MHz.
- RBW is 100kHz
- VBW is > RBW
- Detector is Peak
- Trace is Max Hold
- Display line is –20dBc

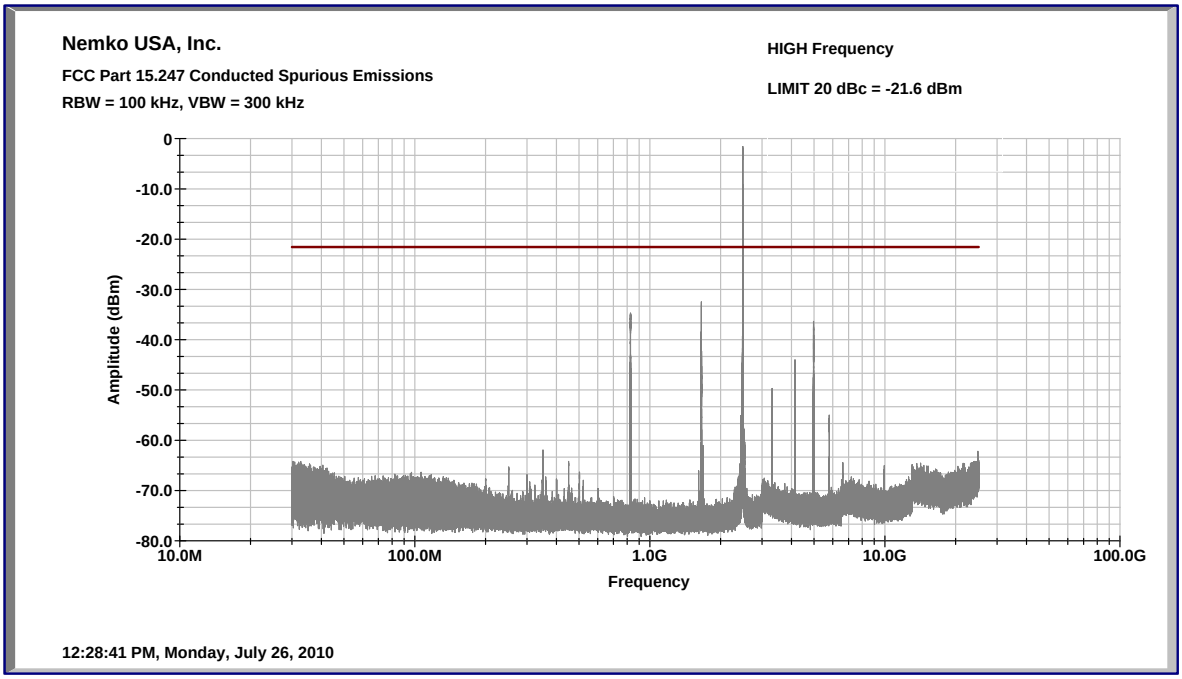
Low Channel:



Mid Channel:



High Channel:



6.4. Out-of-band Emissions / Radiated Emissions within Restricted Bands

(a) 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 (uV/meter)	Measurement Distance (meter)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

15.247 (d) 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 Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

A8.5 Out-of-band Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

Sample Number:	599	Temperature:	18°C
Date:	7-27-2010	Humidity:	77%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	SOATS

Test Results

- The Spectrum was searched from 30MHz to the 10th Harmonic, 25000 MHz.
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Radiated Measurements below 1GHz were performed at 3m with a Quasi-Peak detector (RBW 120kHz/VBW 300kHz) while Radiated Peak (RBW 1MHz/VBW 3MHz) and Average (RBW 1MHz/VBW 10Hz) measurements conducted above 1GHz.
- No emissions observed other than the fundamental.
- No emissions observed in receive mode within 20 dB of the limits.
- Testing was performed with a newly charged battery

Radiated Emissions Data

Job # : 47002-1 Date : 7-27-2010 Page 1 of 1
NEX #: 153601 Time : 1000
Staff : aal

Client Name : Noraxon USA
EUT Name : Transmitter Module
EUT Model # : 599
EUT Serial # : 1026
EUT Config. : TRANSMIT

EUT Voltage : BATT
EUT Frequency : -
Phase: -
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

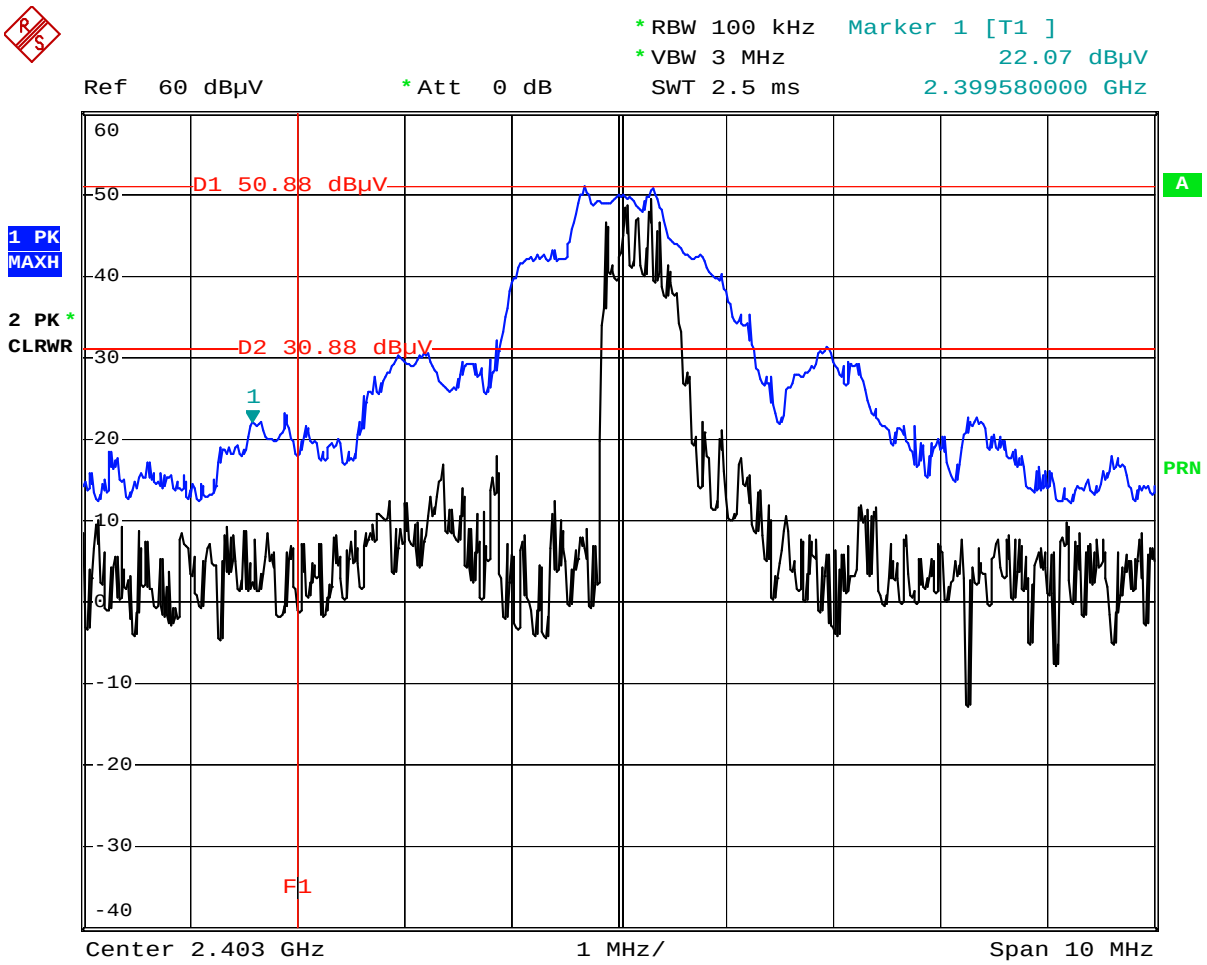
Specification : CFR47 Part 15, Subpart C, 247
Loop Ant. #: NA
Bicon Ant.#: 128_3m
Log Ant.#: 110_3m
DRG Ant. # 877
Cable LF#: SOATS
Cable HF#: SOATS
Preamp LF#: 901
Preamp HF# 317

Temp. (°C) : 18
Humidity (%) : 77
Spec Analyzer #: 897
Analyzer Display #: 897
Quasi-Peak Detector #: 897
Preselector #: NA

Quasi-Peak RBW:	120 kHz
Video Bandwidth	300 kHz
Peak RBW:	1 MHz
Video Bandwidth	3 MHz
Average = Peak + DCF unless otherwise stated	

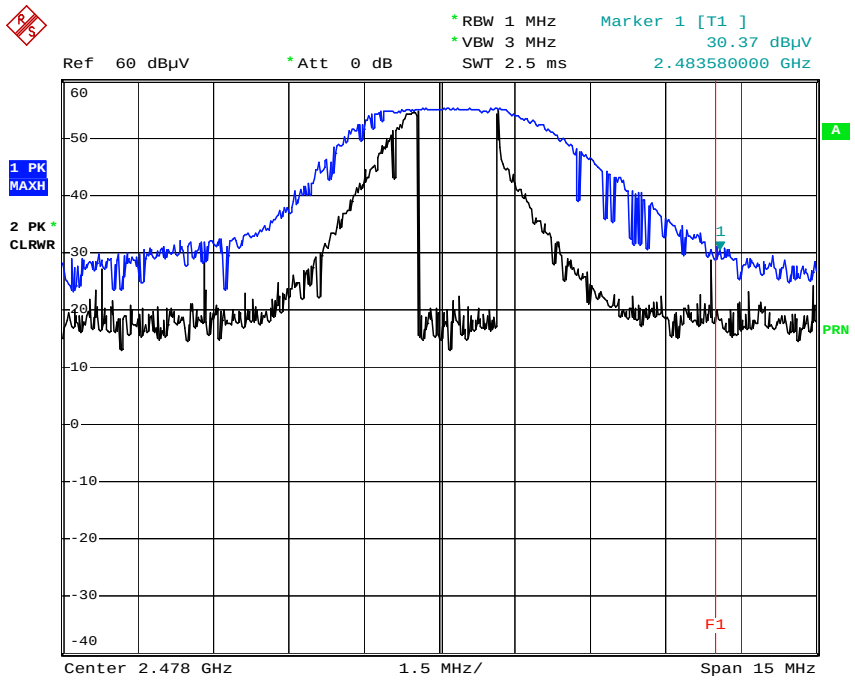
Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
2400.0	22.1	20.4	P	-	1.0	22.1	26.4	74.0	-47.6	Pass	100 kHz RBW
											Limit = 20 dBC of 91.0
											10MHz
2402.7	52.7	51.1	P	-	1.0	52.7	90.2	114.0	-23.8	Pass	back
2402.7	51.2	49.3	P	-	1.0	51.2	88.7	114.0	-25.3	Pass	side
2402.7	53.5	49.2	P	-	1.0	53.5	91.0	114.0	-23.0	Pass	standing
2402.7	50.7	49.1	A	-	1.0	50.7	88.2	94.0	-5.8	Pass	back
2402.7	49.2	47.3	A	-	1.0	49.2	86.7	94.0	-7.3	Pass	side
2402.7	51.5	47.2	A	-	1.0	51.5	89.0	94.0	-5.0	Pass	standing
2441.7	52.8	53.0	P	-	1.0	53.0	90.5	114.0	-23.5	Pass	back
2441.7	55.3	49.0	P	-	1.0	55.3	92.8	114.0	-21.2	Pass	side
2441.7	57.2	49.8	P	-	1.0	57.2	94.7	114.0	-19.3	Pass	standing
2441.7	50.8	51.0	A	-	1.0	51.0	88.5	94.0	-5.5	Pass	back
2441.7	53.3	47.0	A	-	1.0	53.3	90.8	94.0	-3.2	Pass	side
2441.7	55.2	47.8	A	-	1.0	55.2	92.7	94.0	-1.3	Pass	standing
2477.7	52.9	51.4	P	-	1.0	52.9	90.4	114.0	-23.6	Pass	back
2477.7	51.0	52.1	P	-	1.0	52.1	89.6	114.0	-24.4	Pass	side
2477.7	55.9	48.1	P	-	1.0	55.9	93.4	114.0	-20.6	Pass	standing
2477.7	50.9	49.4	A	-	1.0	50.9	88.4	94.0	-5.6	Pass	back
2477.7	49.0	50.1	A	-	1.0	50.1	87.6	94.0	-6.4	Pass	side
2477.7	53.9	46.1	A	-	1.0	53.9	91.4	94.0	-2.6	Pass	standing
2483.5	30.4	20.3	P	-	1.0	30.4	67.9	74.0	-6.0	Pass	1MHz 3 MHz
2483.5	10.8	10.4	A	-	1.0	10.8	48.3	54.0	-5.6	Pass	1MHz 10 Hz

Band Edge Plots

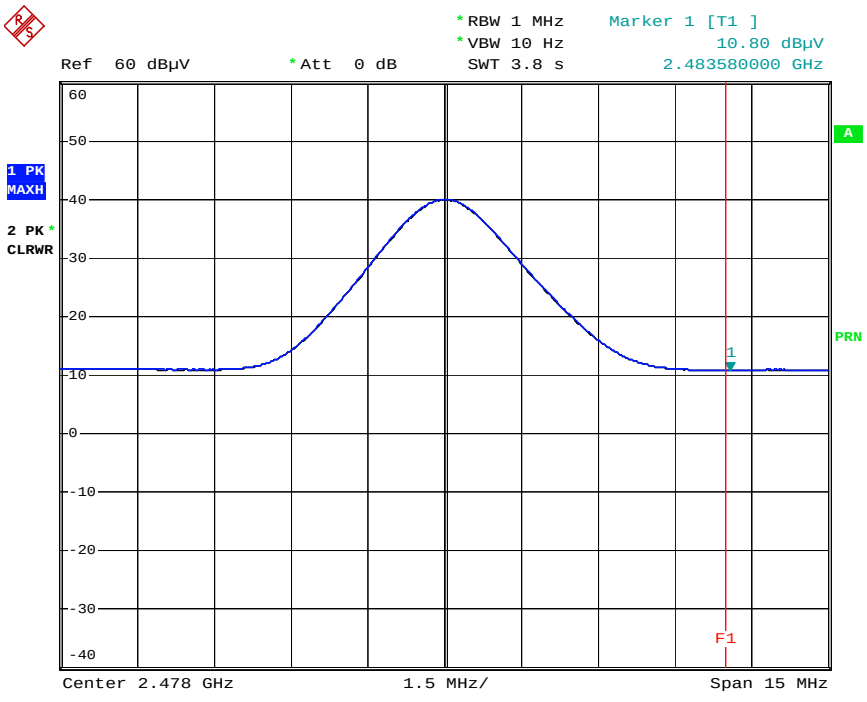


Date: 27.JUL.2010 17:48:36

Low Channel 2402.7 MHz (Peak Measurement)
See table above.



High Channel 2477.7 MHz (Peak Measurement)
See table above.



High Channel 2477.7 MHz (Average Measurement)
See table above.

6.5. Minimum 6dB RF Bandwidth

(a)(2) 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.

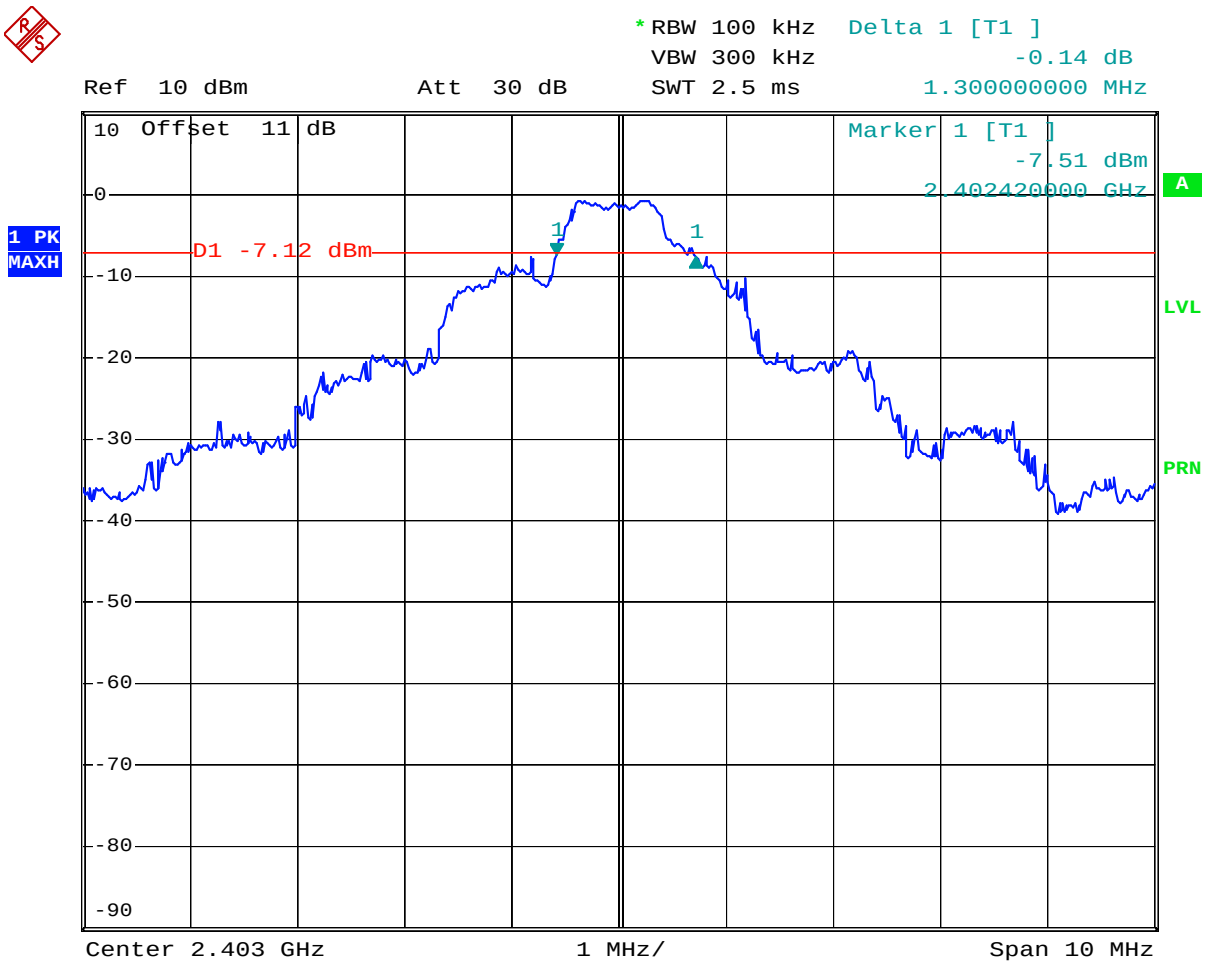
A8.2 (a) The minimum 6 dB bandwidth shall be at least 500 kHz.

Sample Number:	599	Temperature:	24°C
Date:	7-26-2010	Humidity:	55%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Room 2

Test Results:

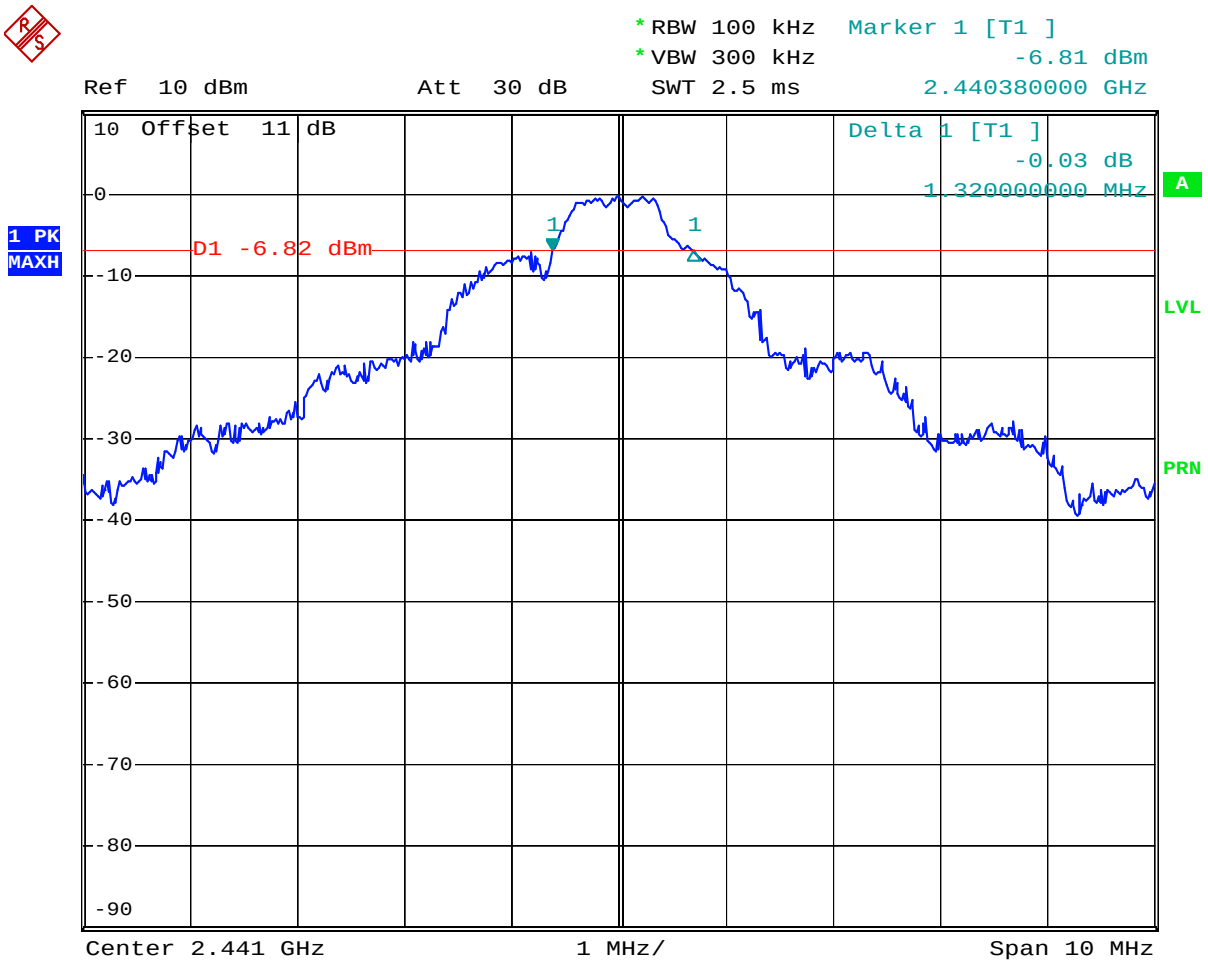
- This is a conducted test
- RBW is set to 100kHz
- VBW is 3X RBW
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was plotted; a DISPLAY line was drawn 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

Channel Range	6 dB Bandwidth
Low (2402.7 MHz)	2.40 MHz
Mid (2441.7 MHz)	1.32 MHz
High (2477.7 MHz)	1.22 MHz



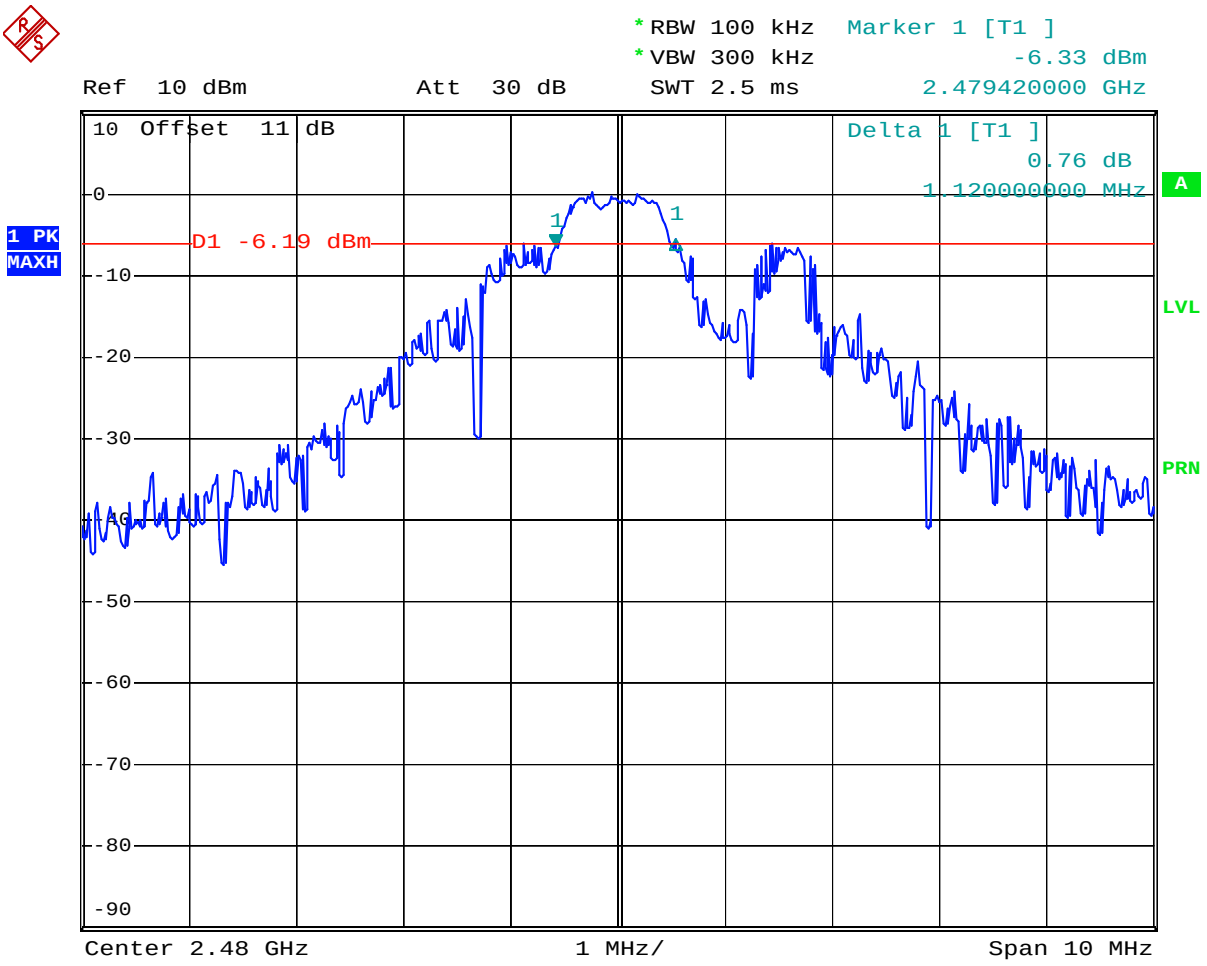
Date: 26.JUL.2010 12:58:53

LOW Channel 2402.7 MHz



Date: 26.JUL.2010 13:23:47

MID Channel 2440.7 MHz



Date: 26.JUL.2010 15:17:01

HIGH Channel 2477.7 MHz

6.6. Maximum peak output power

(b) 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.

A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

Sample Number:	599	Temperature:	24°C
Date:	6-10-2010	Humidity:	55%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Room 2

Additional Observations:

- This is a conducted test using a peak power meter. A correction factor of 24.0 was added to compensate for power attenuator and cable loss.
- Measurements were made at 3.700 VDC, 3.145 VDC, 4.225 VDC, however no significant differences were observed.
- Antenna gain (maximum) 4.4 dBi
- Testing was performed with a power supply monitored by a multimeter.

Test Results:

Voltage Input	Peak Output Power Low channel dBm	Peak Output Power Mid channel dBm	Peak Output Power High channel dBm
3.700 VDC	1.62	2.12	2.07
3.145 VDC	1.63	2.12	2.06
4.225 VDC	1.62	2.12	2.07

EIRP	Power Low channel dBm	Power Mid channel dBm	Power High channel dBm
3.700 VDC	6.0	6.5	6.2

6.7. Power Spectral Density

(e) 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.
A8.2(b) The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration. This power spectral density shall be determined in accordance with the provisions of Section A8.4(4); (i.e. the power spectral density shall be determined using the same method for determining the conducted output power).

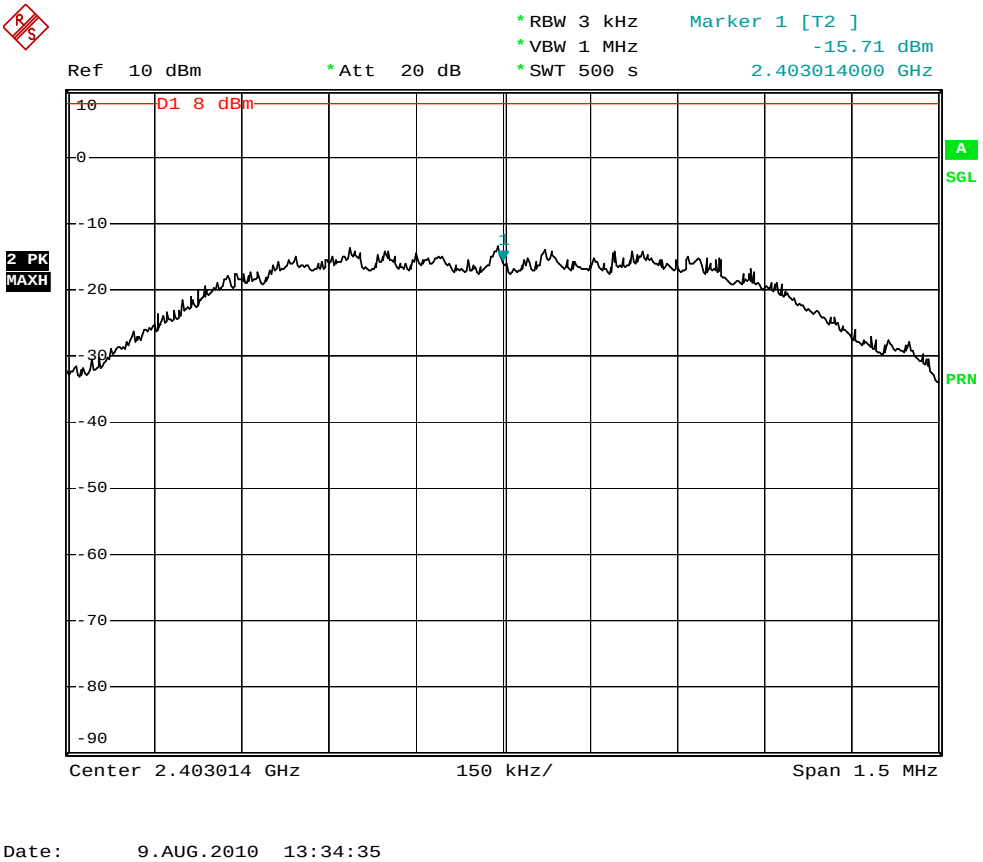
Sample Number:	599	Temperature:	23°C
Date:	August 9, 2010	Humidity:	51%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Ground plane 2

Additional Observations:

- This is a conducted test.
- Span is wide enough to capture the peak level of the emission. Each start of a measurement, a preliminary scan using a span capturing the 20dB bandwidth is performed to verify that the peak emissions is captured on the final span used during the actual measurement.
- Testing was performed with a freshly charged battery.
- 1.5 MHz was verified the absolute minimum span that would contain the peak emissions.
- RBW is 3kHz
- VBW is > RBW
- Sweep is Span/RBW (1.5MHz/3kHz = 500 seconds).
- Detector is Peak
- Trace is Max Hold

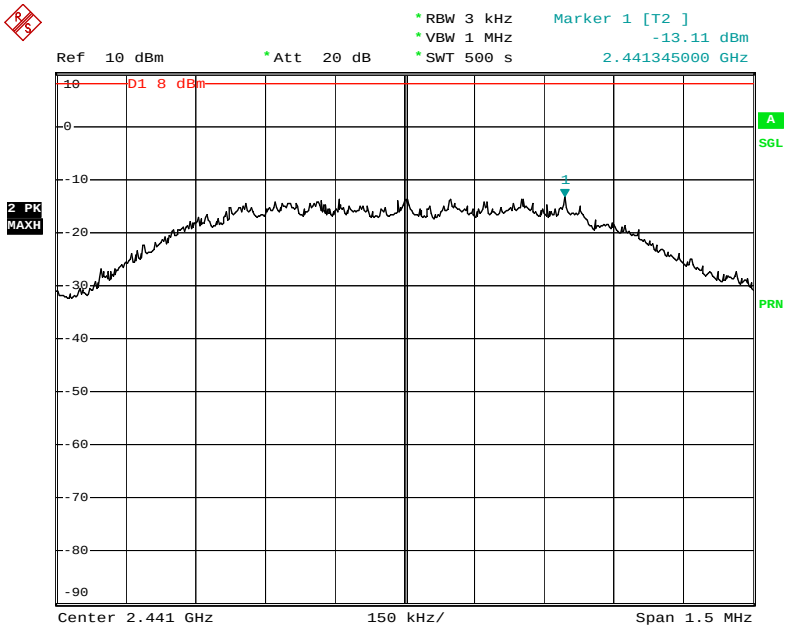
Test Results:

Channel Frequency (MHz)	RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	PASS/FAIL
2403.014000	-15.71	8	Pass
2441.345000	-13.11	8	Pass
2477.799900	-13.16	8	Pass



Low Channel

Mid Channel



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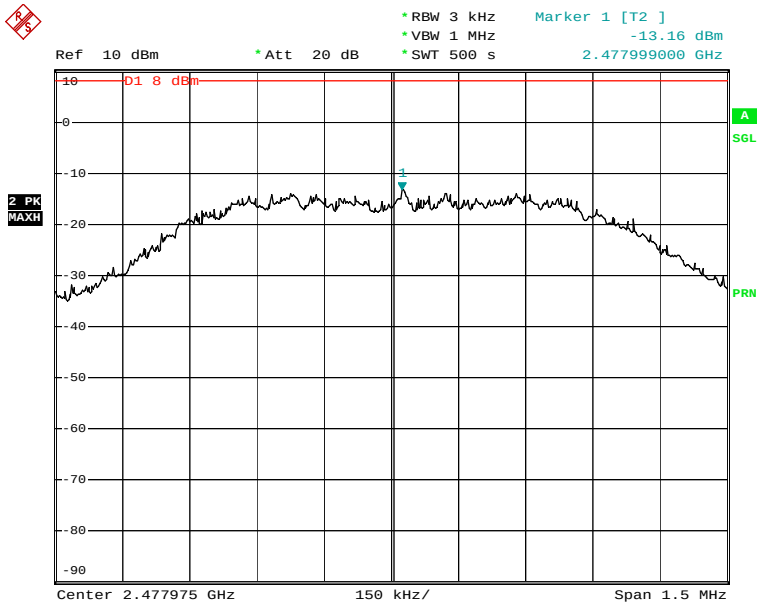
High Channel



Date: 9.AUG.2010 13:44:34

6.8. RSS Gen. 4.10 and 6.0 – Receiver Spurious Emissions

The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

Test Conditions:

Sample Number:	599	Temperature:	18°C
Date:	7-27-2010	Humidity:	77%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	SOATS

Test Results: No receiver spurious emissions detected.

Additional Observations:

- The Spectrum was searched from 30MHz to approx. 10th Harmonic, 10000 MHz.
- The EUT was investigated on three orthogonal axes.
- The EUT was investigated using a fresh battery

6.9. Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
810	Multimeter	Fluke	111	77820242	3/16/2010	3/16/2011
911	Spectrum Analyzer	Agilent	E4440A	US41421266	12/17/2009	12/17/2010
E1018	9kHz to 7GHz Spectrum Analyzer	Rohde & Schwarz	FSP7	835363/0003	1/22/2010	1/22/2011
946	Peak Power Sensor	Hewlett Packard	84815A 0.05-18GHz (-40 to 20dBm)	3318A01726	9/16/2009	9/16/2010
947	Peak Power Analyzer	Hewlett Packard	8991A	3621A00906	9/16/2009	9/16/2010
128	Antenna, Bicon	EMCO	3104	2882	2/9/2009	2/9/2011
110	Antenna, LPA	Electrometrics	LPA-25	1217	1/10/2009	2/10/2011
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	7/12/2010	7/12/2011
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	7/28/2008	7/28/2010
E1013	DRG Horn (Small)	EMCO	3116	00119488	12/23/2009	12/23/2011
317	Preamplifier	HP	8449A	2749A00167	5/7/2010	5/7/2011
897	Spectrum Analyzer	Rohde & Schwarz	FSP7	837620/009	10/14/2009	10/14/2010
901	pre amp	Sonoma	310 N	130607	4/20/2010	4/20/2011
898	EMI Receiver & filter set	HP	8546A	3625A00348	6/22/2010	6/22/2011
899	Filter Section	HP	85460A	3448A00288	6/22/2010	6/22/2011

Registration of the OATS are on file with the Federal Communications Commission, under Registration Number 90579, the VCCI under registration number R-3027, and are also registered with Industry Canada under Site Numbers 2040B-1 and 2040B-2.