Nemko Test Report: 10217451RUS2rev1

Applicant: AgileMesh, Inc.
1761 International ParkwaySuite 113
Richardson TX 75081
USA

Equipment Under Test: (E.U.T.) DNMA92AM

FCC ID.: TTHDNMA92AM
IC: 10127A-DNMA92AM

In Accordance With: **FCC Part 15, Subpart E, 15.407 and Industry Canada RSS-210, Issue 8**
Unlicensed National Information Infrastructure Devices

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

TESTED BY: _____ **DATE:** **16 January 2012**
David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **17-Jan-2012**
Michael Cantwell, GM

Number of Pages: 27

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Section 1. Summary of Test Results

Manufacturer: AgileMesh, Inc.

Model No.: DNMA92AM

Serial No.: None

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 E, Paragraph 15.407 and Industry Canada RSS-210, Issue 8 for Unlicensed National Information Infrastructure Devices. Radiated tests were conducted is accordance with ANSI C63.4-2003 and DA-789003 v01. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

☒	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

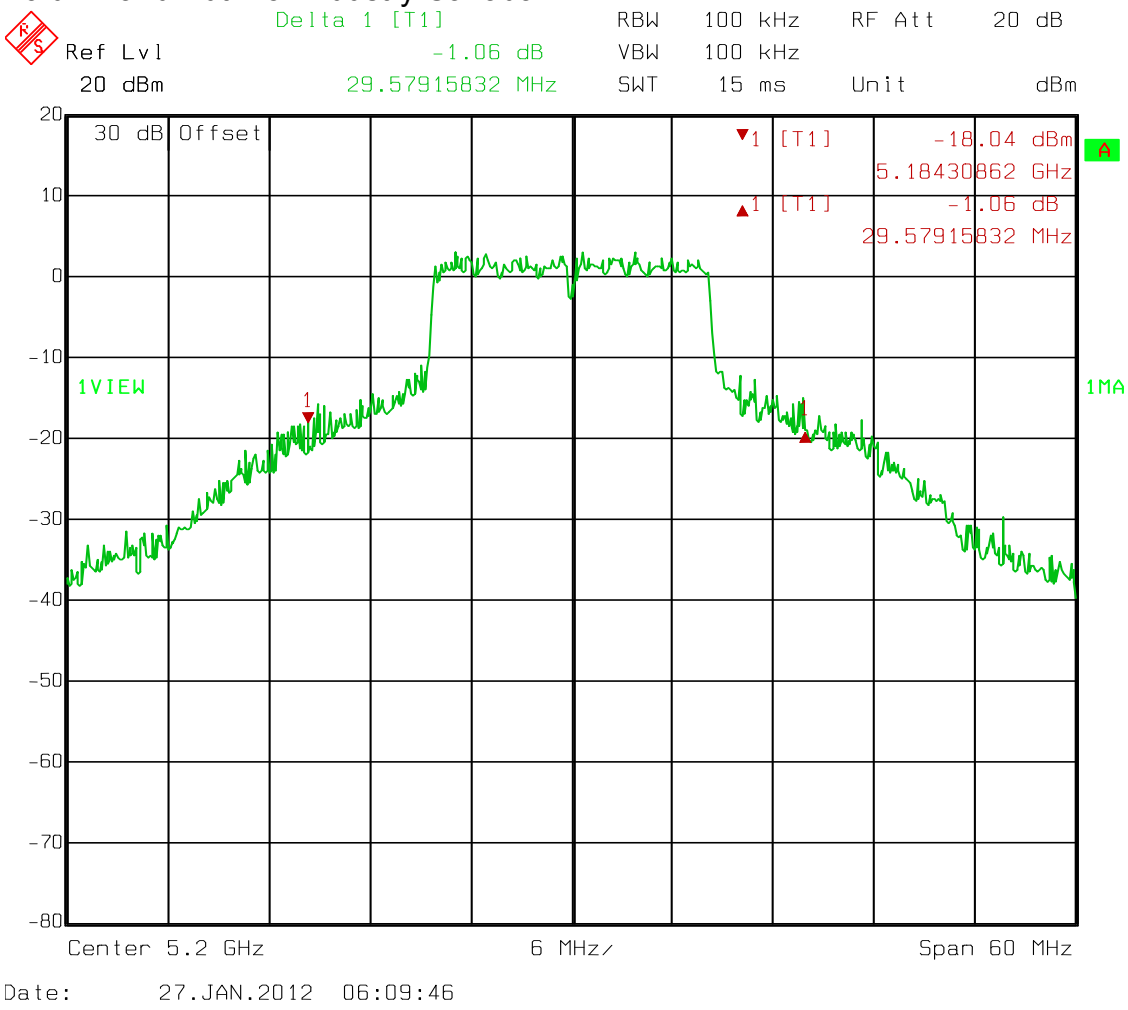
Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a) / RSS-Gen 7.2.4	Complies
Peak Excursion	15.407(a)(6) /	Complies
Maximum Peak Power Output	15.407(a)(1) / RSS-21 A9.2(1)	Complies
Unwanted Emissions	15.407(b)(1) / RSS-210 A9.2(1)	Complies
Spurious Emissions (Restricted Bands)	15.209(a) RSS-Gen 7.2.2	Complies
Peak Power Spectral Density	15.407(a)(1) / RSS-210 A9.4(2)	Complies

Revisions:

Rev1: Added data for Industry Canada to occupied bandwidth section.

20 dB Bandwidth for Industry Canada



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

General Equipment Information

Operating Frequency of Test Sample: 5180 to 5240 MHz

Channel Spacing: 20 MHz

User Frequency Adjustment: Software controlled

Description of EUT

Wireless data radio module.

Section 3. Output Power and Peak Power Spectral Density

NAME OF TEST: Output Power and Peak Power Spectral Density	PARA. NO.: FCC 15.407(a)(1) RSS-210 A9.2(1)
TESTED BY: David Light	DATE: 13 January 2012

Test Results: Complies.

Measurement Data: See plots below

Test Conditions: 48 %RH
22 °C

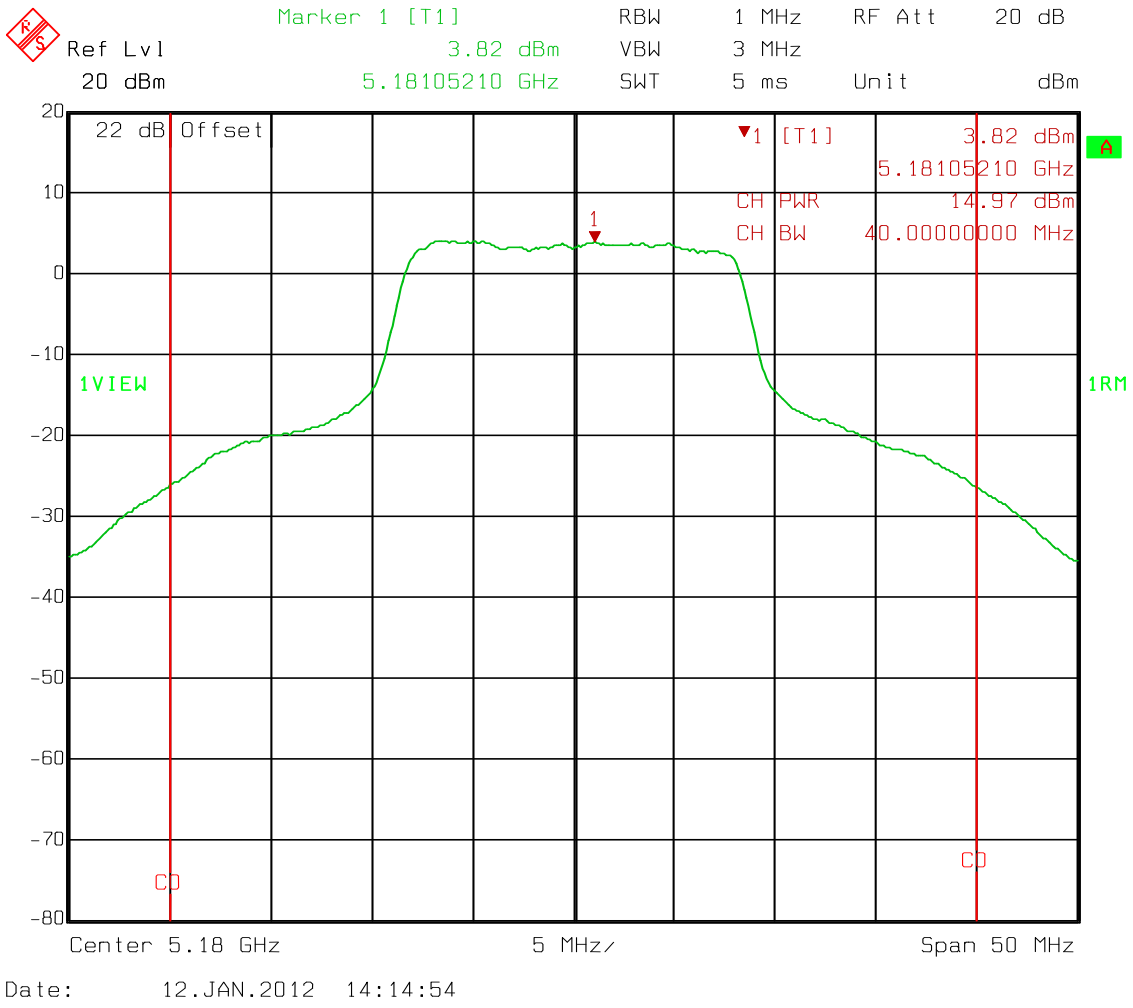
Measurement Uncertainty: +/-1x10^{-7} ppm

Test Equipment Used: 1472-1082-1036

Detector: Max Pk

Test Data – Output Power and Peak Power Spectral Density

Lowest channel

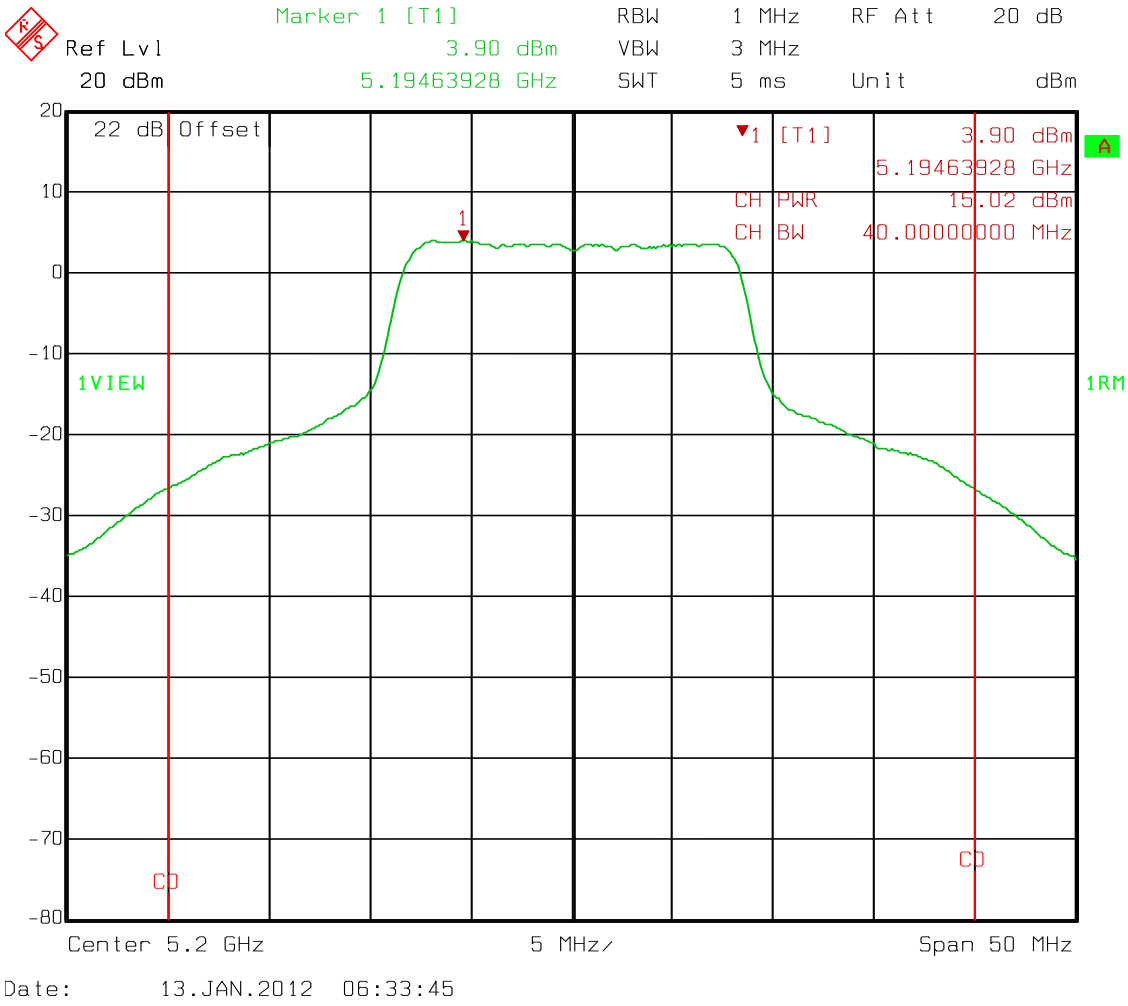


Output Power = +14.97 dBm (31 mW)

Peak Power Spectral Density = +3.82 dBm

Test Data – Output Power and Peak Power Spectral Density

Mid Channel

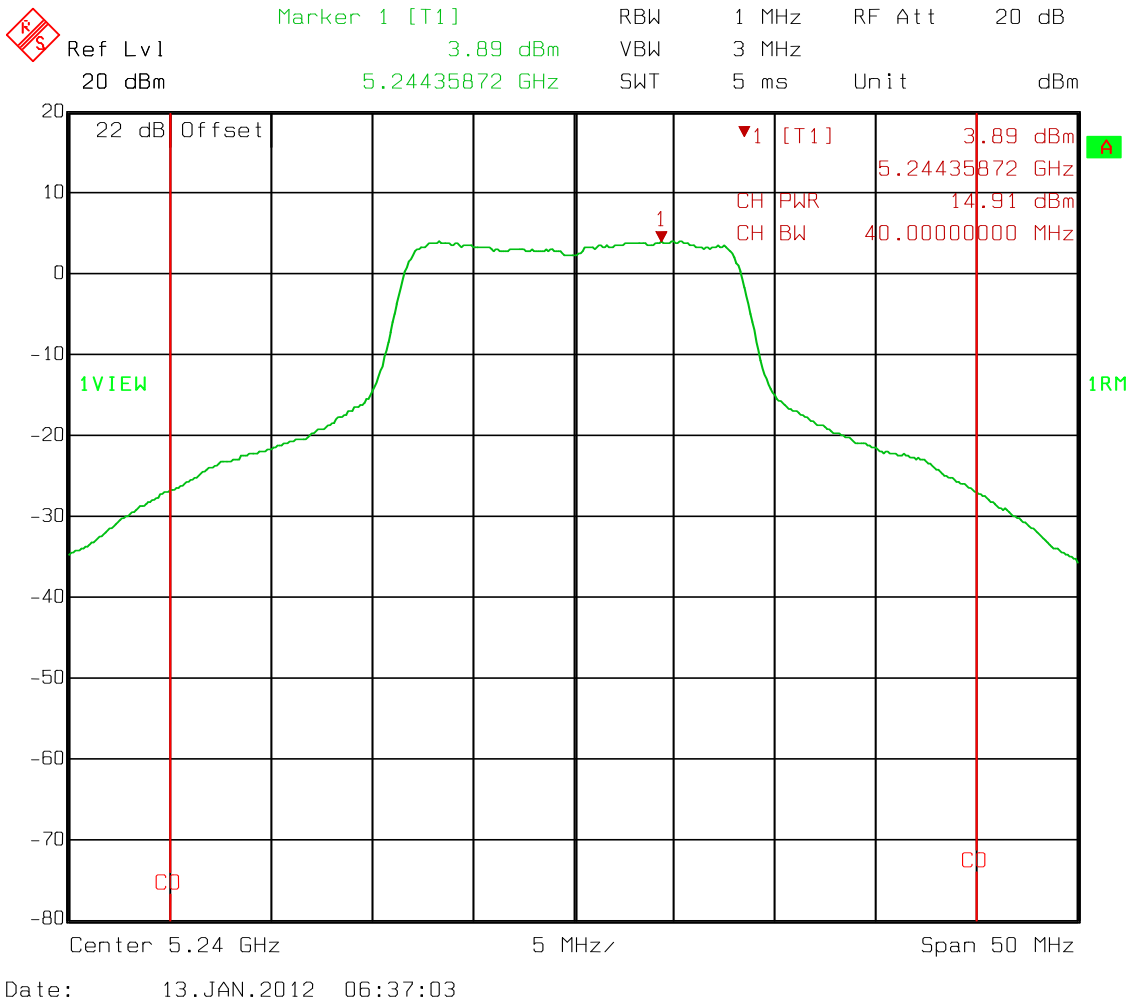


Output Power = +15.02 dBm (32 mW)

Peak Power Spectral Density = +3.90 dBm

Test Data – Output Power and Peak Power Spectral Density

High Channel

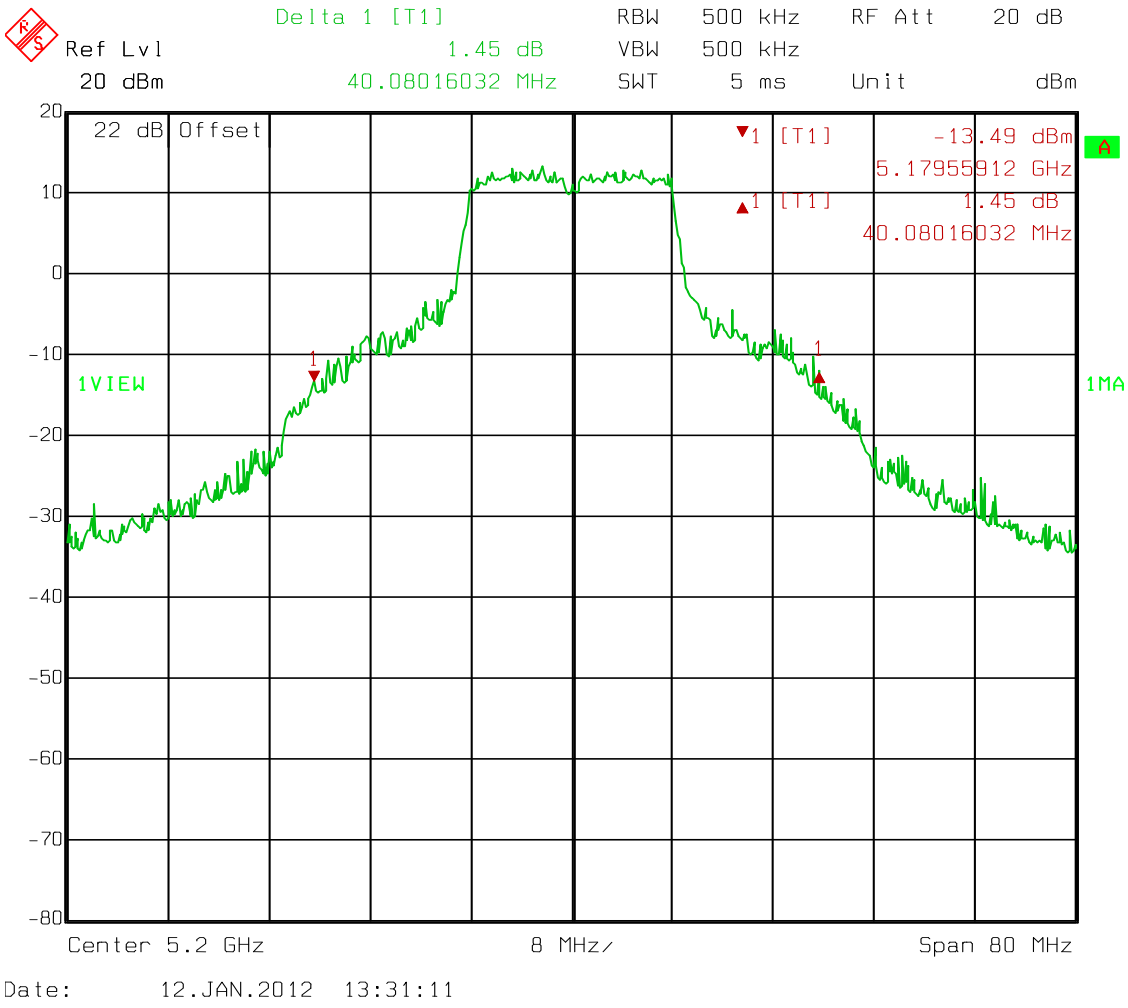


Output Power = +14.91 dBm (31 mW)

Peak Power Spectral Density = +3.89 dBm

Test Data – Output Power and Peak Power Spectral Density

26 dB Bandwidth



Section 4. Peak Excursion

NAME OF TEST: Peak Excursion	PARA. NO.: 15.407(a)(6)
TESTED BY: David Light	DATE: 13 January 2012

Test Results: Complies.

Measurement Data: See plots below.

Test Conditions: 48 %RH
22 °C

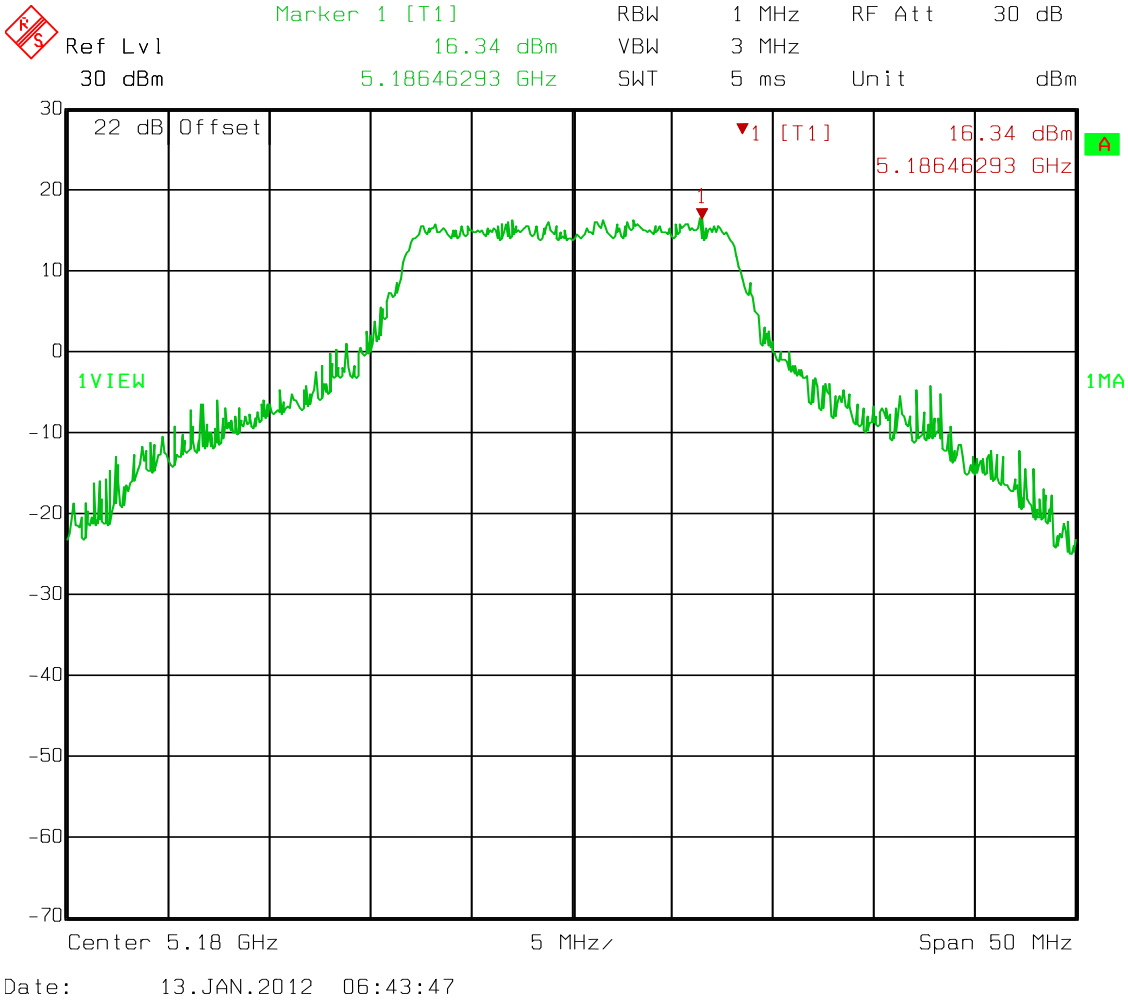
Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1036-1082-1472

Detector: Max Pk

Test Data - Peak Excursion

Low Channel

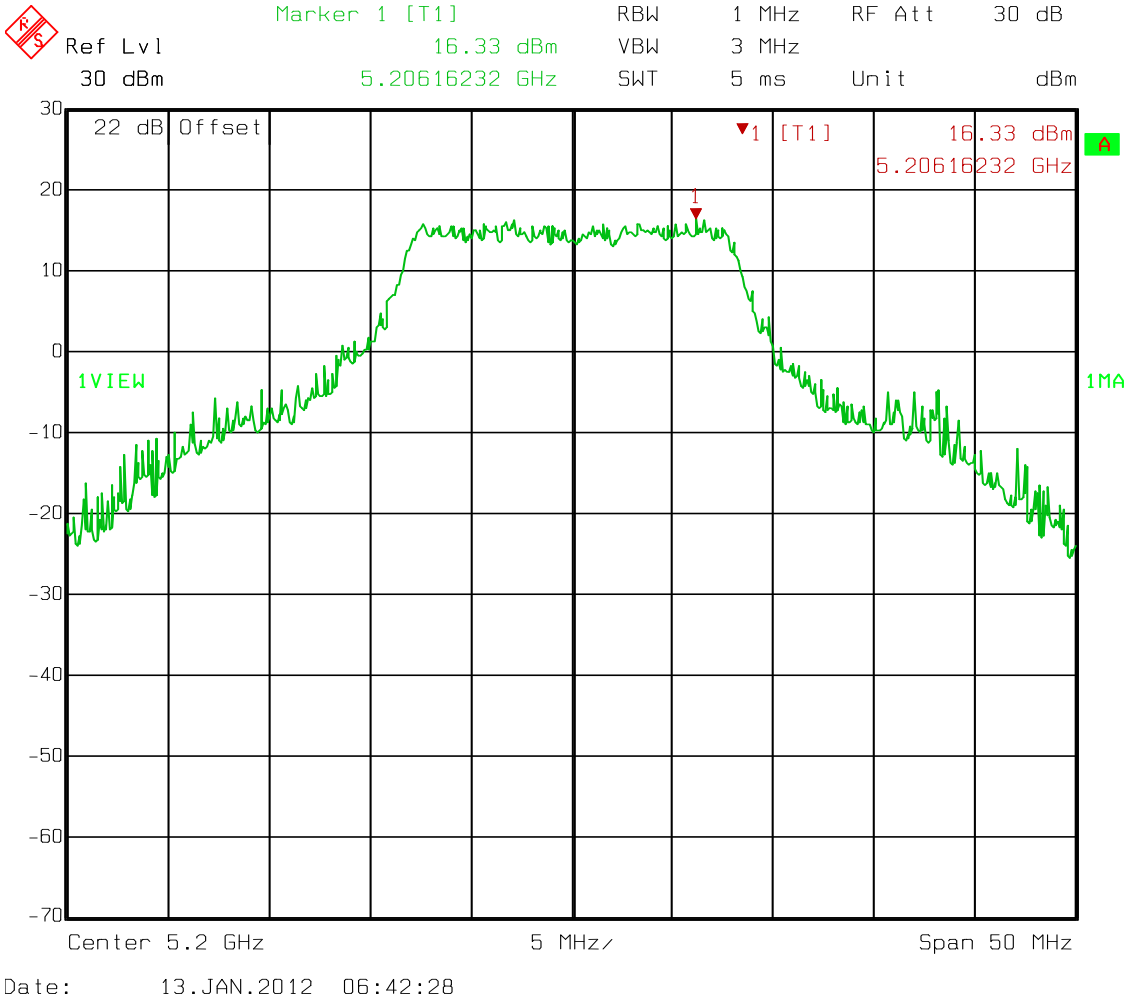


Density = 3.82 dBm

Peak Excursion = 12.52 dB

Test Data - Peak Excursion

Mid Channel

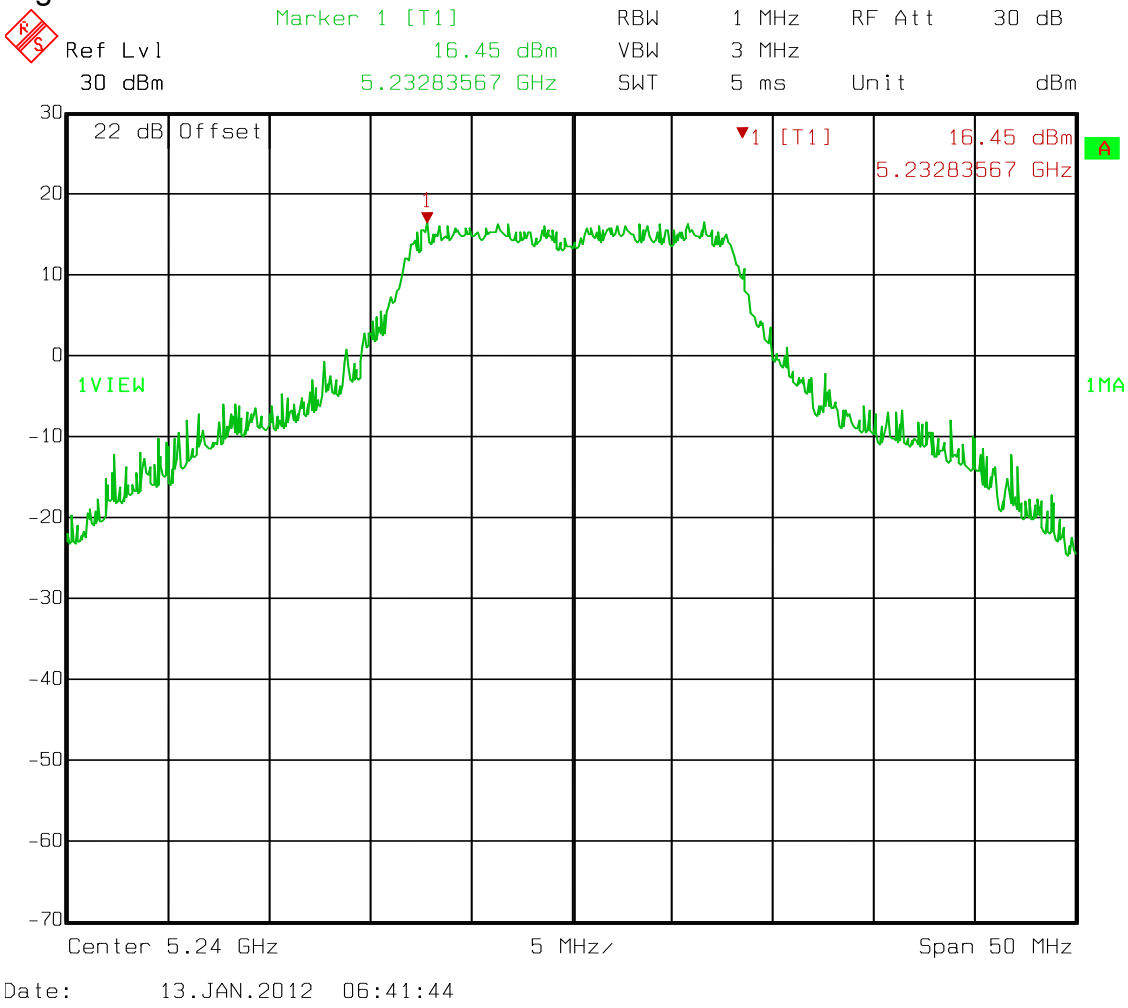


Density = 3.90 dBm

Peak Excursion = 12.43 dB

Test Data - Peak Excursion

Highest Channel



Density = 3.89 dBm

Peak Excursion = 12.56 dB

Section 5 Undesirable Emissions

NAME OF TEST: Undesirable Emissions	PARA. NO.: FCC 15.407(b)(1)15.209 RSS-210 A9.2(1)
TESTED BY: David Light	DATE: 13 January 2012

Test Results: Complies.

Test Data: There were no emissions detected within 20 dB of the specification limit. Band edge data is presented below. The spectrum was searched from 30 MHz to 60 GHz.

Test Conditions: 48 %RH
22 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 1464-1783-1016-1480-1025-993

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
											Tx 5180
5150	V	0.0	62.0	33.8	4.3	31.0	69.1	74.0	-4.9	Pass	19 dBm
5150	V	0.0	45.6	33.8	4.3	31.0	52.7	54.0	-1.3	Unc.	
5150	H	0.0	49.0	33.8	4.3	31.0	56.1	74.0	-17.9	Pass	
5150	H	0.0	35.8	33.8	4.3	31.0	42.9	54.0	-11.1	Pass	

Peak Measurements: RBW/VBW = 1 MHz Peak detector
Average Measurements: RBW = 1 MHz, VBW = 1 kHz Peak detector

Section 6. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: FCC 15.207(a) RSS-Gen 7.2.4
TESTED BY: David Light	DATE: 13 January 2012

Test Results: Complies.

Measurement Data: See attached plots.

Test Conditions: 35 %RH
24 °C

Measurement Uncertainty: +/-1.7 dB

Test Equipment Used: 703-811-749-704-1663-674

Detector: Peak or Avg.
RBW: 10 kHz
VBW: 10 kHz

Test Data – Powerline Conducted Emissions

Line 1 Final QP/AVG

Frequency	FCC B QP	FCC B AVG	AVG	AVG	QP	QP
MHz	LIMIT	LIMIT	Meas	Margin	Meas	Margin
0.152	65.9	55.9	41.8	-14.1	55.8	-10.1
0.167	65.5	55.5	23.4	-32.1	44.8	-20.8
12.939	60.0	50.0	47.8	-2.2	49.5	-10.5
13.024	60.0	50.0	47.8	-2.2	49.3	-10.7
13.026	60.0	50.0	47.8	-2.2	49.4	-10.6
13.092	60.0	50.0	47.7	-2.3	49.6	-10.4
13.097	60.0	50.0	47.5	-2.5	49.6	-10.4
13.105	60.0	50.0	47.6	-2.4	49.7	-10.3
13.185	60.0	50.0	47.4	-2.6	49.5	-10.5
13.186	60.0	50.0	47.6	-2.4	49.6	-10.4

Line 2 Final QP/Avg

Frequency	FCC B QP	FCC B AVG	AVG	AVG	QP	QP
MHz	Limit	Limit	Meas	Margin	Meas	Margin
0.151	66.0	56.0	41.3	-14.6	55.3	-10.6
0.157	65.8	55.8	38.4	-17.4	52.3	-13.5
13.042	60.0	50.0	46.9	-3.1	49.0	-11.0
13.046	60.0	50.0	46.9	-3.1	48.9	-11.1
13.048	60.0	50.0	47.0	-3.0	48.9	-11.1
13.131	60.0	50.0	46.8	-3.2	49.0	-11.0
13.202	60.0	50.0	46.8	-3.2	49.2	-10.8
13.207	60.0	50.0	46.8	-3.2	49.2	-10.8
13.209	60.0	50.0	46.9	-3.1	49.1	-10.9
13.287	60.0	50.0	46.8	-3.2	49.1	-10.9

Section 7. Test Equipment List

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
674	Limiter	Hewlett Packard	11947A	3107A02200	01-Nov-2011	01-Nov-2012
703	LISN	Rohde & Schwarz	ESH2-Z5	871884/048	13-Jul-2011	13-Jul-2012
704	Filter, High Pass, 5KHz	Solar Electronics	7930-5.0	933126	01-Nov-2011	01-Nov-2012
749	Cable	Nemko USA, Inc.	RG223		25-Feb-2011	25-Feb-2012
993	Antenna, Horn	A.H. Systems	SAS-200/571	162	22-Sep-2011	22-Sep-2013
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	20-Jul-2011	20-Jul-2012
1025	Preamplifier, 25dB	Nemko USA, Inc.	LNA25	399	23-Feb-2011	23-Feb-2012
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	06-Jan-2012	06-Jan-2014
1082	Cable	Astrolab	32027-2-29094-72TC		N/R	
1464	Spectrum Analyzer	Hewlett Packard	8563E	3551A04428	16-May-2011	16-May-2013
1472	Attenuator,	Omni Spectra	20600-20db		N/R	
1480	Antenna, Bilog	Schaffner-Chase	CBL6111C	2572	19-Jan-2011	19-Jan-2012
1663	Spectrum Analyzer	Rohde & Schwartz	FSP3	100073	02-Sep-2011	02-Sep-2013
1783	Cable Assy, r	Nemko	Chamber		26-Sep-2011	26-Sep-2012
811	Cable Assy	Nemko USA	RG223		25-Feb-2011	25-Feb-2012

ANNEX A - TEST DETAILS

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

Minimum Standard: §15.207 Conducted limits.

(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 mH/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.

Frequency of Conducted Emission (MHz)	Limit (dBmV) 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.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §§15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

NAME OF TEST: Conducted Output Power and Peak Power Spectral Density	PARA. NO.: 15.407(a)(1)

Minimum Standard: For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Method:

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW □ 3 MHz.
- Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode
- Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.
- Trace average 100 traces in power averaging mode.
- Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

NAME OF TEST: Peak Excursion	PARA. NO.: 15.407(a)(6)

Minimum Standard: The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

NAME OF TEST: Undesirable Emissions	PARA. NO.: 15.407(b)(1)

Minimum Standard: For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.

Method Of Measurement:

The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

NAME OF TEST: Radiated Spurious Emissions PARA. NO.: 15.247(c)

Minimum Standard: The provisions of §15.205 apply to intentional radiators operating under this section.

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (μV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

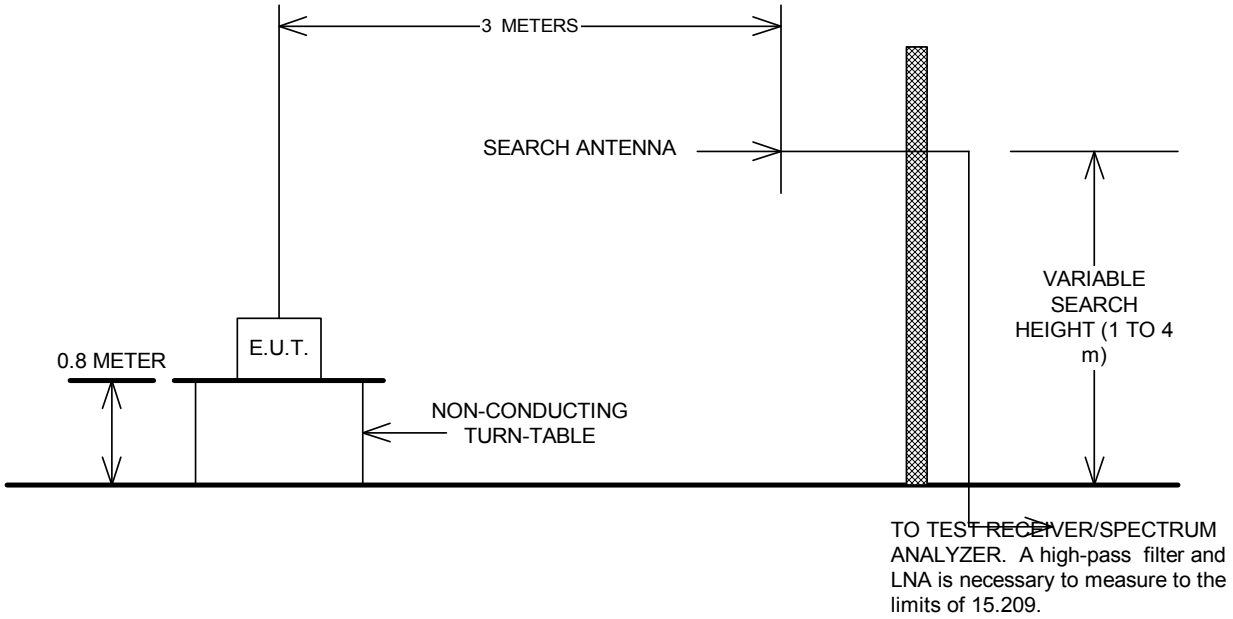
MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

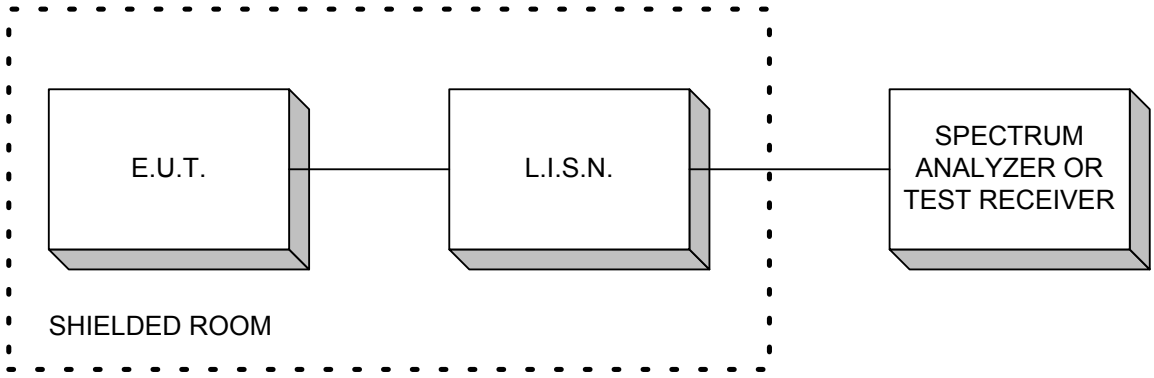
Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

ANNEX B - TEST DIAGRAMS

Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals
Minimum 6 dB Bandwidth
Peak Power Spectral Density
Spurious Emissions (conducted)