Nemko Test Report:	6L0429RUS1
Applicant:	GoRadio, LLC 1914 Silver Street Garland, Texas 75042 USA
Equipment Under Test: (E.U.T.)	TR1000
In Accordance With:	**FCC Part 15, Subpart C** For Low Power Transmitters Operating Periodically In The Band 40.66 - 40.77 MHz And Above 70 MHz
Tested By:	Nemko USA, Inc. 802 N. Kealy Lewisville, TX 75057-3136

TESTED BY: _____ **DATE:** **24 October 2006**
David Light Wireless Engineer

APPROVED BY: _____ **DATE:** **26 October 2006**
Kevin Rose Wireless Engineer

Total Number of Pages: 21

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Section 1. Summary of Test Results

Manufacturer: GoRadio, LLC

Model No.: TR1000

Serial No(s): 0001, 0002, 0003

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 15.231. All tests were conducted using measurement procedure ANSI C63.4-2003. 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	Paragraph No.	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	NA
Alternate Field Strength Requirements	15.231(e)	NA
Powerline Conducted Emissions	15.207	NA

Footnotes:

The device does not operate in the band 40.66-40.70 MHz

The device is battery powered.

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

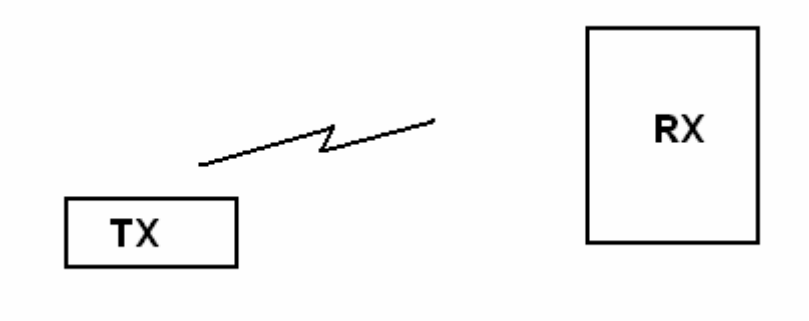
General Equipment Information

Frequency Range:	422.4 to 472.4
Operating Frequency(ies) of Sample:	422.4, 433.0, and 472.4 MHz
Type of Emission:	GFSK
Supply Power Requirement:	Two AA Batteries
Duty Cycle Correction Factor:	-21.5 dB

Description of E.U.T.

The GoRadio industrial remote controller design is based on a Nordic nRF9E5 chip with fully integrated microcontroller, RF transceiver, multiple input high resolution analog to digital converter (ADC), and internal voltage regulator. The industrial remote controller system consists of a “listen only” stationary receiver unit and mobile “transmit only” controller. Both units function as a complete system with programmable channels to prevent jamming during operation.

System Diagram



Section 3. Transmission Requirements

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: David Light	DATE: 23 October 2006

Minimum Standard:

15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

15.231(a)(3) Periodic transmissions at regular pre-determined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

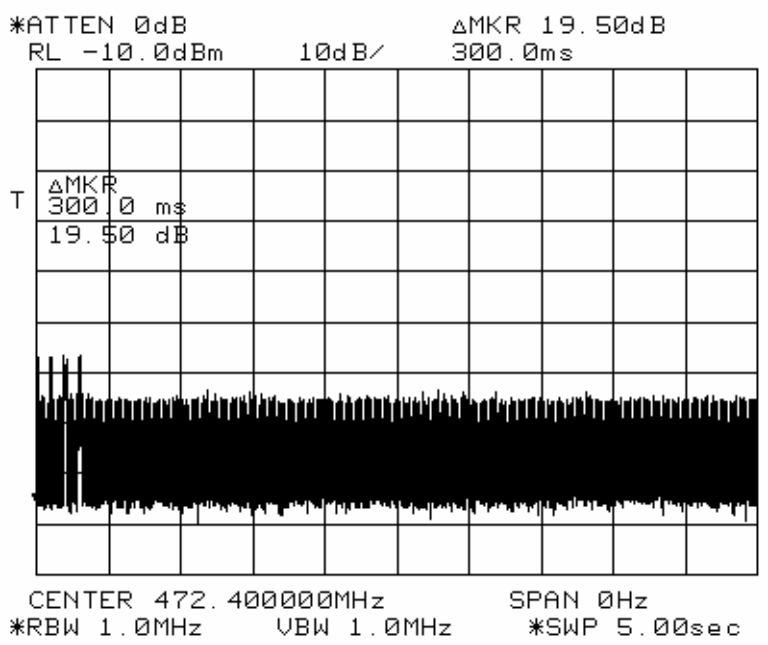
Test Results: Complies.

Test Data: Compliance was determined by verification of technical specifications and a functional test on the equipment.

Rationale for Compliance with Transmission Requirements

15.231(a)(1) **15.231(a)(2) :**	☒ Manual activation ☐ Automatic activation	TX deactivation time:
15.231(a)(3) :	☐ Regular, predetermined transmissions ☐ Polling or supervisory transmissions	TX rate and duration:
15.231(a)(4) :	☐ Alarm device operating during the pendancy of alarm condition	
	☒ Non-alarm device	

Test Data – Transmission Requirements



Release time = 300 mS

Analyzer set to trigger on RF power and shows start and stop of transmission.

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.231(b)
TESTED BY: David Light	DATE: October 23, 2006

Minimum Standard:

Permissible Field Strength Limits (Momentarily Operated Devices

Fundamental Frequency (MHz)	Field Strength of Fundamental Microvolts/Meter at 3 meters; (watts)	Field Strength of Unwanted Emissions Microvolts/Meter at 3 meters; (watts)
40.66 - 40.70	2,250	225
70-130	1, 250	125
130-174	1,250 to 3,750*	125 to 375
174-260 (note 1)	3,750	375
260-470 (note 1)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Any emissions that fall within the restricted bands of 15.205 shall not exceed the following 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

Test Results: Complies. The worst-case emission level is 76.4 dBμV/m @ 3m at 422.0 MHz. This 4 dB below the specification limit.

Test Data: See attached table(s).

Below 1000 MHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 100 kHz and video bandwidth was 100 kHz.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 1 MHz.

Test Data - Radiated Emissions

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.	QP readings Comment
422.4	H	-21.5	100.8	16.3	5.2	24.4	76.4	80.4	-4.0	Pass	Low channel
844.8	H	-21.5	56.4	23.2	8.0	24.6	41.5	60.4	-18.9	Pass	
422.4	V	-21.5	94	16.3	5.2	24.4	69.6	80.4	-10.8	Pass	
844.8	V	-21.5	63	23.2	8.0	24.6	48.1	60.4	-12.3	Pass	
433	H	-21.5	99.6	17.5	5.2	24.4	76.4	80.8	-4.4	Pass	Mid channel
866	H	-21.5	46	23.3	8.0	24.8	31.0	60.8	-29.8	Pass	
433	V	-21.5	94.3	17.5	5.2	24.4	71.1	80.8	-9.7	Pass	
866	V	-21.5	59	23.3	8.0	24.8	44.0	60.8	-16.8	Pass	
472.4	H	-21.5	73	17.3	5.2	24.5	49.5	82.0	-32.5	Pass	High Chaannel
844.8	H	-21.5	37	23.2	8.0	24.6	22.1	62.0	-39.9	Pass	
472.4	V	-21.5	71	17.3	5.2	24.5	47.5	82.0	-34.5	Pass	
844.8	V	-21.5	37	23.2	8.0	24.6	22.1	62.0	-39.9	Pass	

Test Data - Radiated Emissions

Low Channel

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Cable dB	Cable dB	Pre-A Duty dB	Horn dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	1267.200M	69.8	+0.1	+1.5	-31.3 -21.5	+23.6	+0.0	42.2	60.4	-18.2	Vert
2	1689.600M	60.8	+0.7	+2.0	-31.9 -21.5	+26.0	+0.0	36.1	54.0	-17.9	Vert
9	1267.200M	70.7	+0.1	+1.5	-31.3 -21.5	+23.6	+0.0	43.1	60.4	-17.3	Horiz
10	1689.600M	74.3	+0.7	+2.0	-31.9 -21.5	+26.0	+0.0	49.6	54.0	-4.4	Horiz

Mid Channel

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Cable dB	Cable dB	Pre-A Duty dB	Horn dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	1299.000M	72.3	+0.2	+1.6	+31.4 -21.5	+23.7	+0.0	44.9	60.4	-15.5	Horiz
2	1732.000M	71.8	+0.7	+2.0	+31.8 -21.5	+26.4	+0.0	47.6	60.4	-12.8	Horiz
10	1732.000M	65.2	+0.7	+2.0	+31.8 -21.5	+26.4	+0.0	41.0	60.4	-19.4	Vert

High Channel

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Cable dB	Cable dB	Pre-A Duty dB	Horn dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
10	2362.200M	58.5	+0.7	+2.2	-32.9 -21.5	+28.9	+0.0	35.9	54.0	-18.1	Horiz
11	2834.400M	45.8	+0.8	+2.8	-32.6 -21.5	+29.5	+0.0	24.8	54.0	-29.2	Horiz

The spectrum was searched from 30 MHz to the 10th harmonic per 15.33

In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

Test Equipment Used: 1464-1484-1485-1016-993-1195-1034-1036-791

Radiated Photographs

Section 5. Occupied Bandwidth

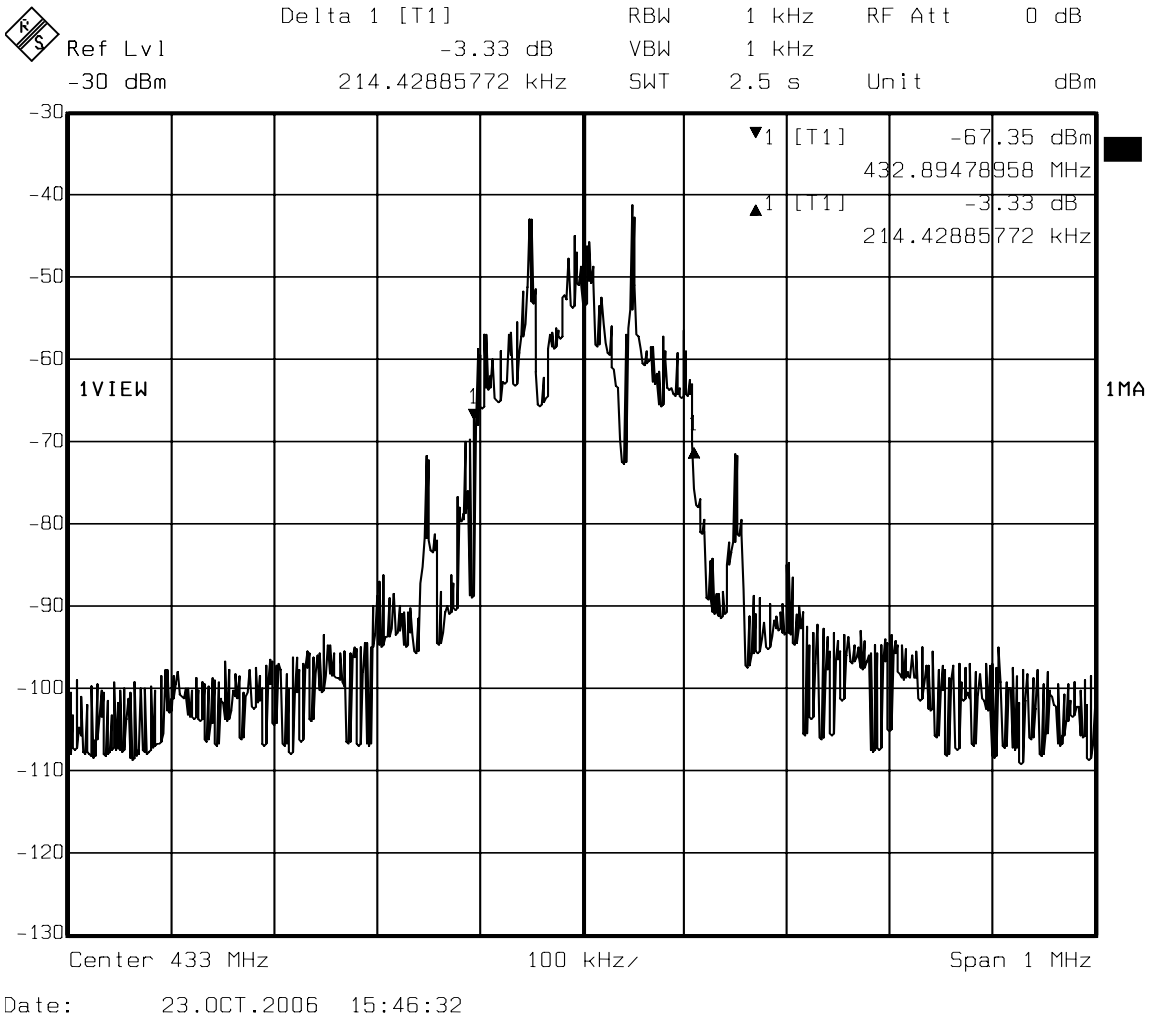
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.231(c)
TESTED BY: David Light	DATE: October 23, 2006

Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Complies. See attached graph.

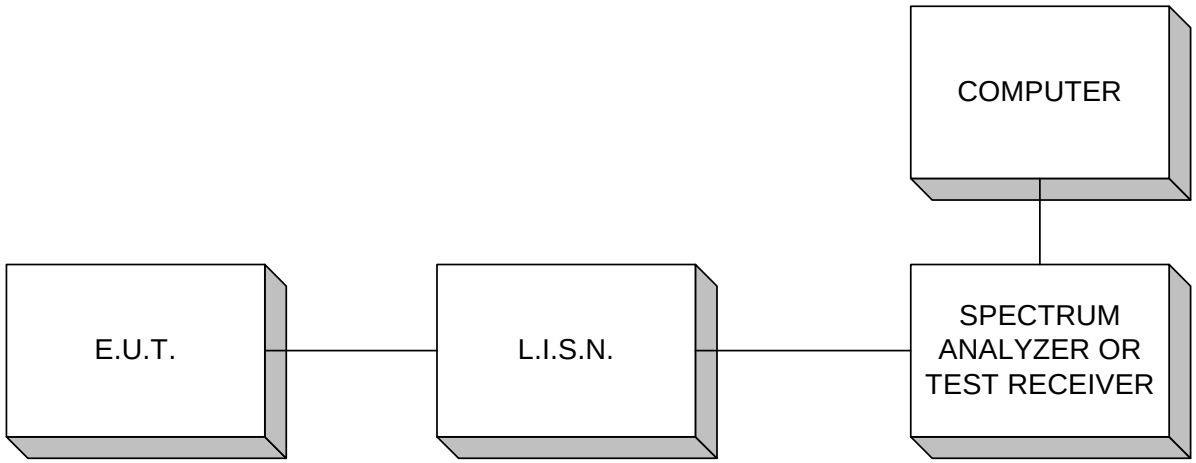
Test Data: See attached graph.

Test Data – Occupied Bandwidth

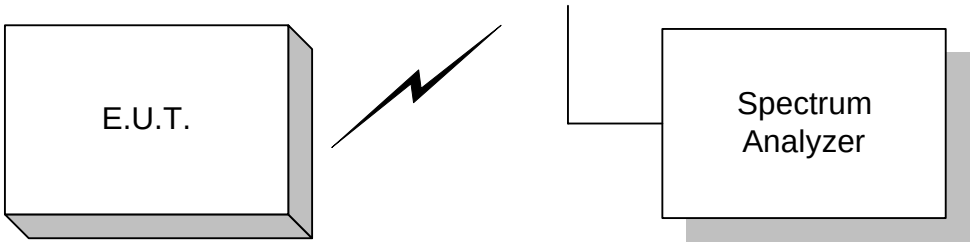


Section 6. Block Diagrams

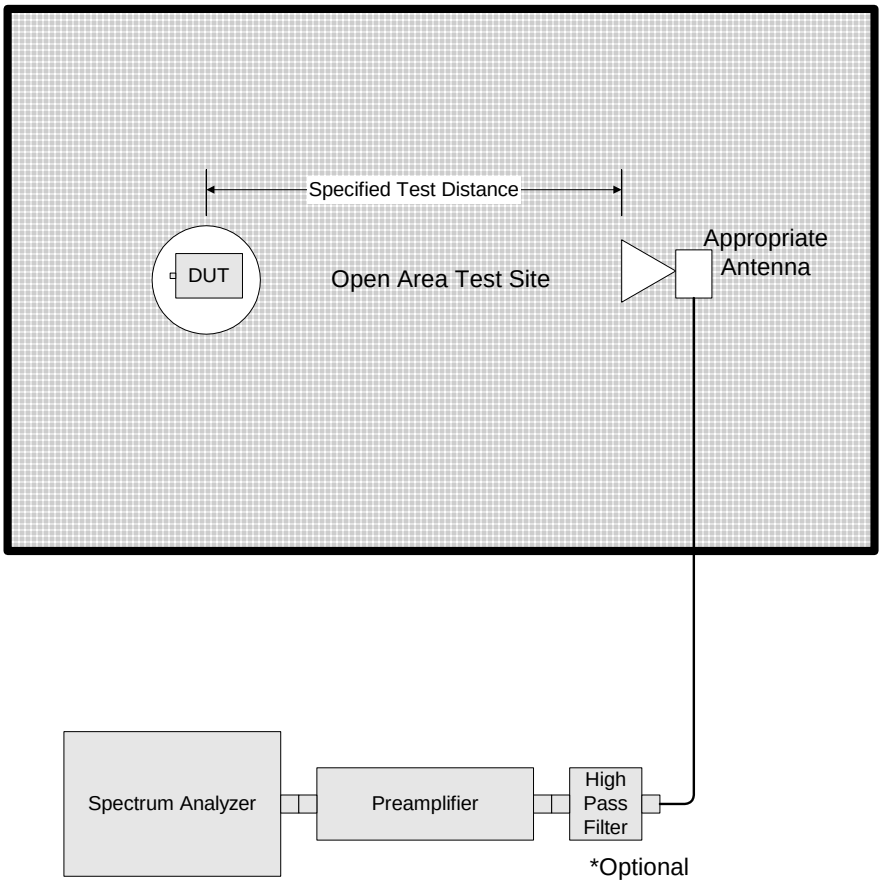
Conducted Emissions



Occupied Bandwidth, Duty Cycle

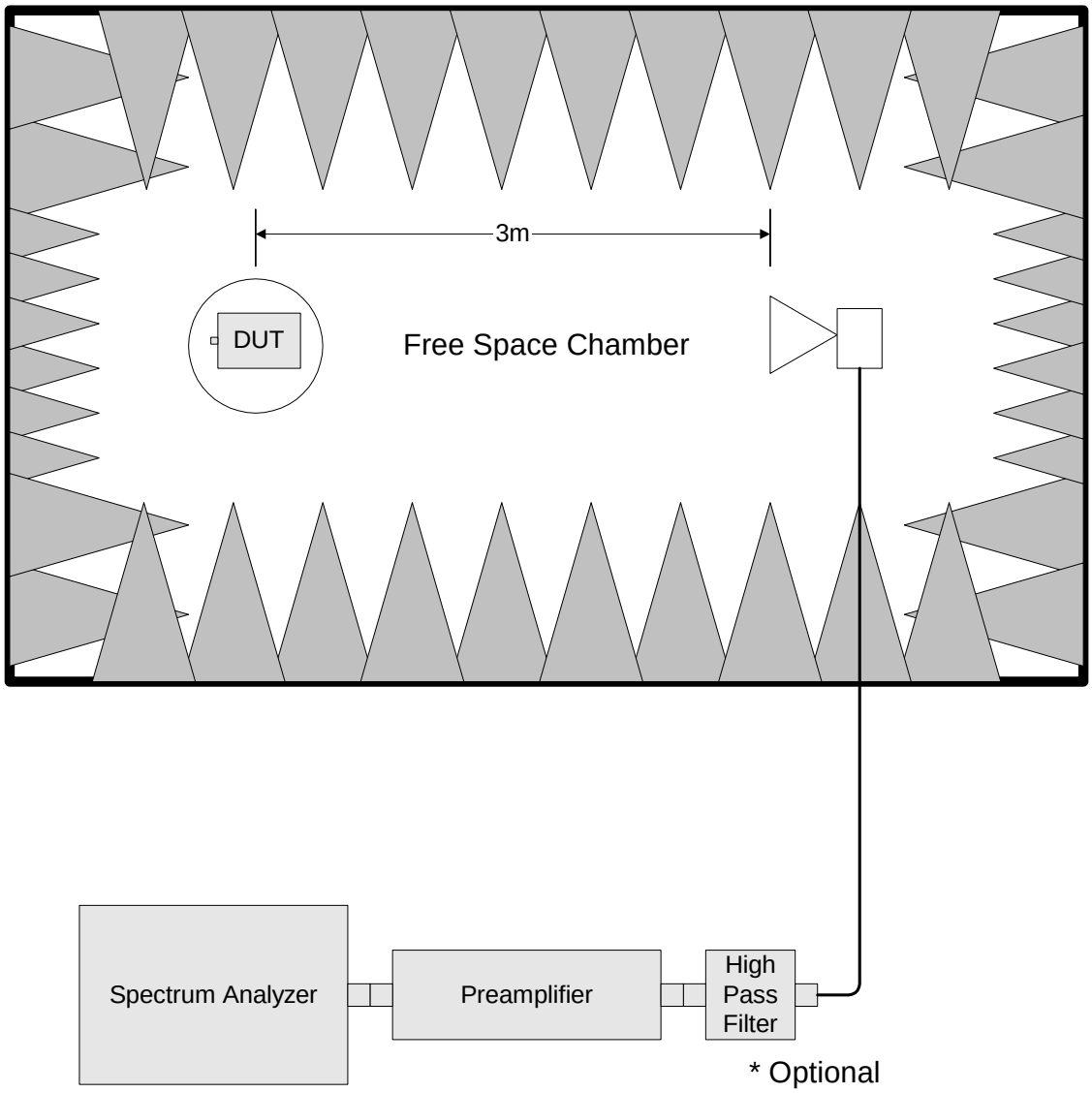


Outdoor Test Site For Radiated Emissions



Radiated Emissions 30 MHz - 1 GHz

The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.



Radiated Emissions above 1 GHz

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
1484	Cable	Storm PR90-010-072	N/A	10/02/06	10/02/07
1485	Cable	Storm PR90-010-216	N/A	10/02/06	10/02/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	04/20/06	04/20/07
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
1195	ANTENNA,BICONICAL	A.H. SYSTEMS SAS-200/542	235	02/10/06	02/10/07
1034	ANTENNA,LP	A.H. SYSTEMS SAS-200/510	121	03/13/06	03/13/07
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	05/26/06	05/26/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	04/20/06	04/20/07

ANNEX A - RESTRICTED BANDS

Annex A Restricted Bands of Operation

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	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			