



Nemko

Test Report:

2W06001

Applicant:

Digital Security Controls Ltd.
3301 Langstaff Road
Vaughan, Ontario
L4K 4L2

**Equipment Under Test:
(EUT)**

WLS 916-433
433MHz Wireless Smoke Alarm

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 Canada Inc.
303 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By:

J. Harrington, RF Group Manager

Date:

13 May 2002

Total Number of Pages:

21

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EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 1. Summary of Test Results

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 C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission



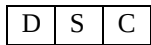
Production Unit



Class II Permissive Change



Pre-Production Unit



Equipment Code

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: 100351-0

TESTED BY: Glen Westwell, Wireless Technologist

DATE: 13 May 2002

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This report applies only to the items tested.

EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Summary Of Test Data

Name of Test	Para. Number	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	N/A
Periodic Alternate Field Strength Requirements	15.231(e)	N/A
Powerline Conducted Emissions	15.207	N/A

Footnotes For N/A's:
Alarm.

The EUT is battery operated 433MHz Wireless Smoke

Test Conditions:**Indoor** Temperature: 23 °C
 Humidity: 50 %**Outdoor** Temperature: 11 °C
 Humidity: 53 %

EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 2. Equipment Under Test (EUT)

General Equipment Information

Manufacturer: Digital Security Controls Ltd.

Model No.: WLS 916-433

Serial No.: Unit#2

Date Received In Laboratory: April 11 2002

Nemko Identification No.: Item #3

Frequency Range: 433 MHz

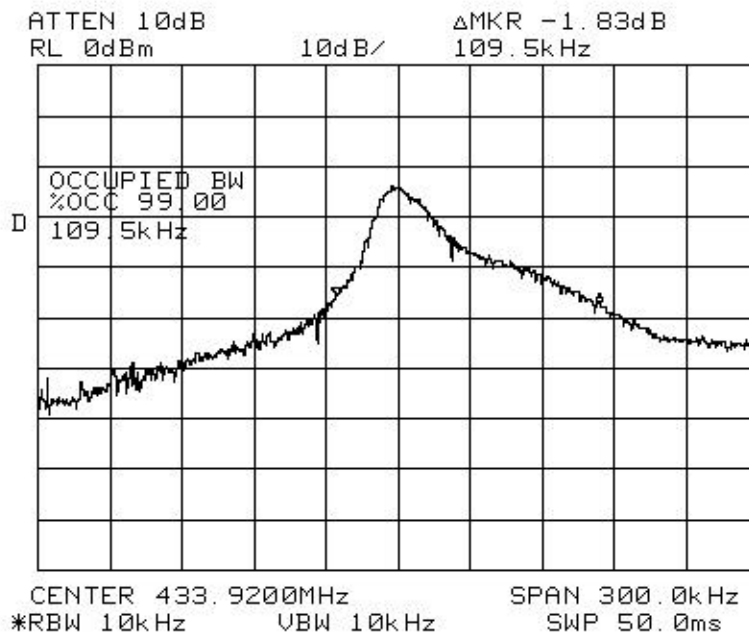
Operating Frequency(ies) of Sample: 433.92 MHz

Emission Designator: 109K5L1D

Supply Power Requirement: 2 x 3V Lithium Battery

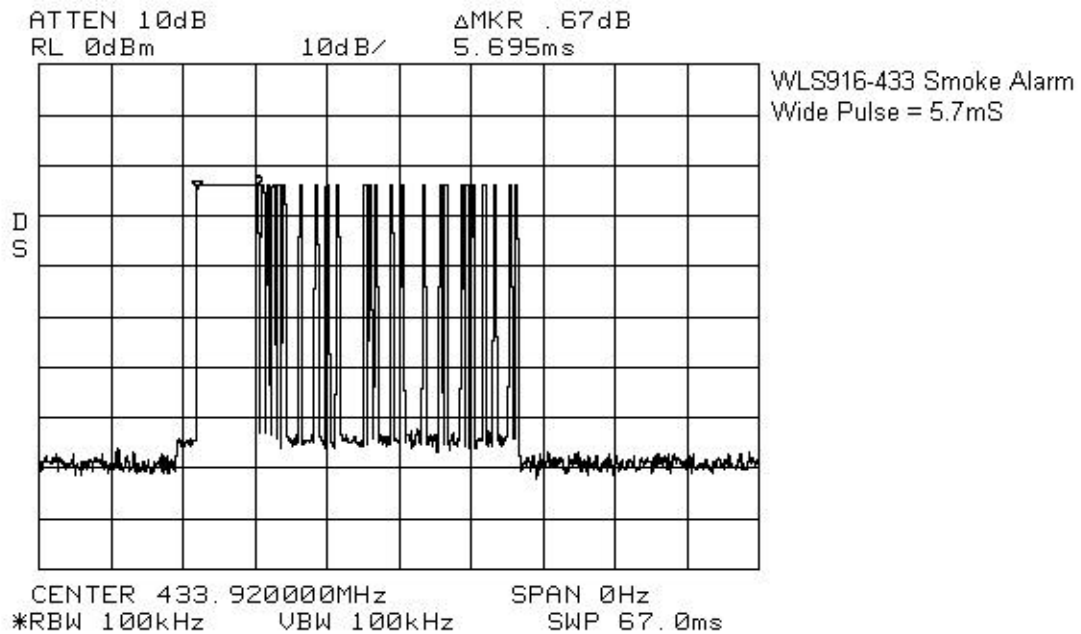
Duty Cycle Calculation: $20 \log \frac{11.3\text{ms}}{100 \text{ ms}} = -18.9\text{dB}.$

EQUIPMENT: WLS 916, 433MHz Smoke Alarm



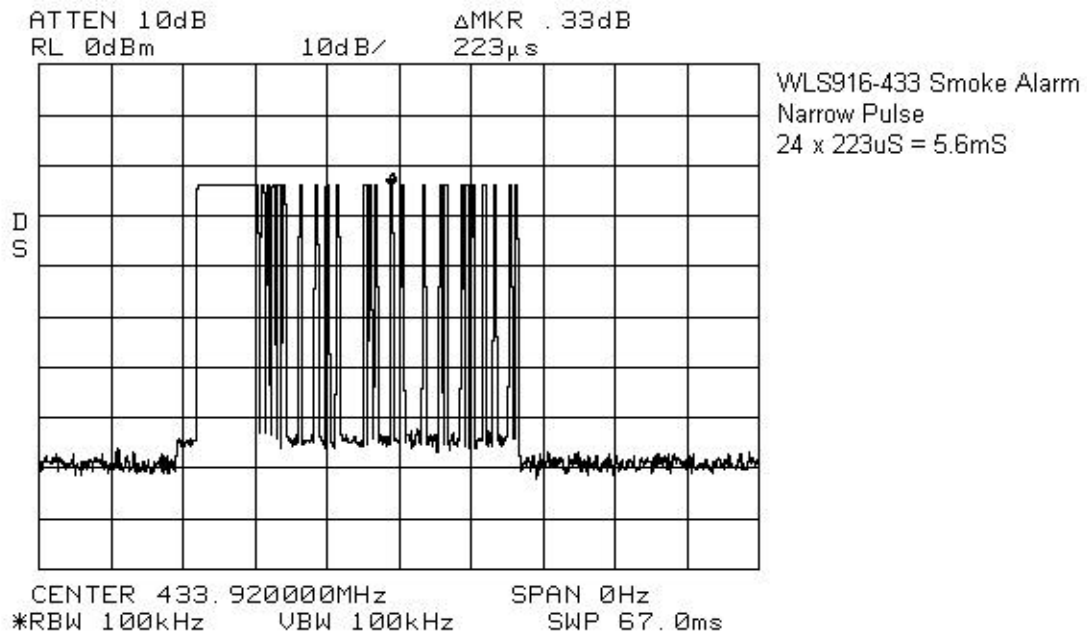
EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Wide Pulse On Time



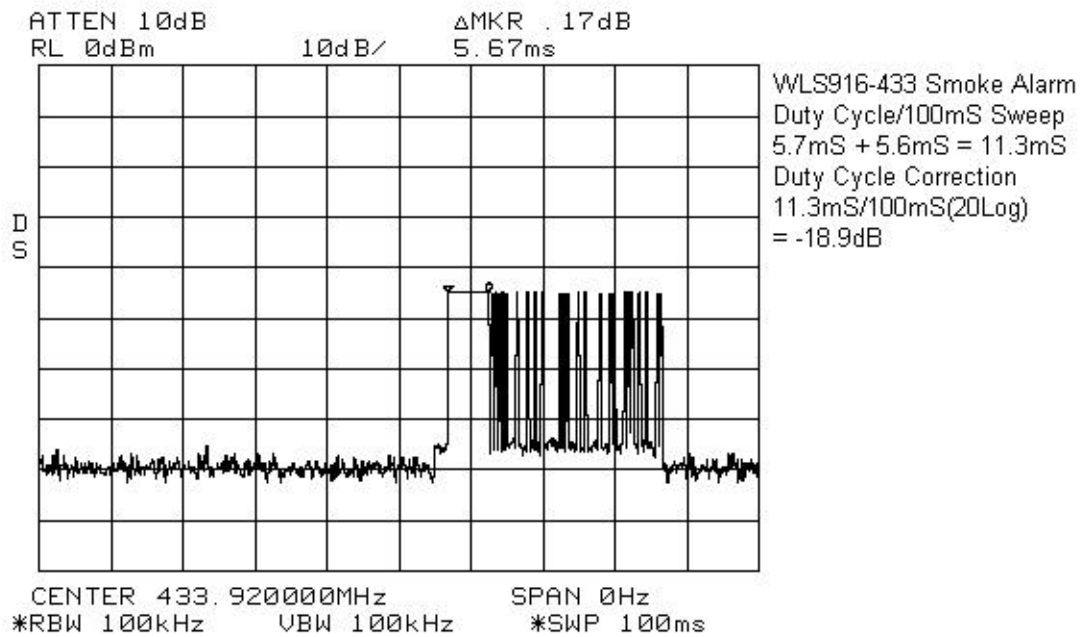
EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Narrow Pulse On Time



EQUIPMENT: WLS 916, 433MHz Smoke Alarm

On Time In 100ms



EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 3. Transmission Requirements

Para. No.: 15.231(a)

Test Performed By: Glen Westwell	Date of Test: 9 May 2002
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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.

EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Rationale for Compliance with Transmission Requirements

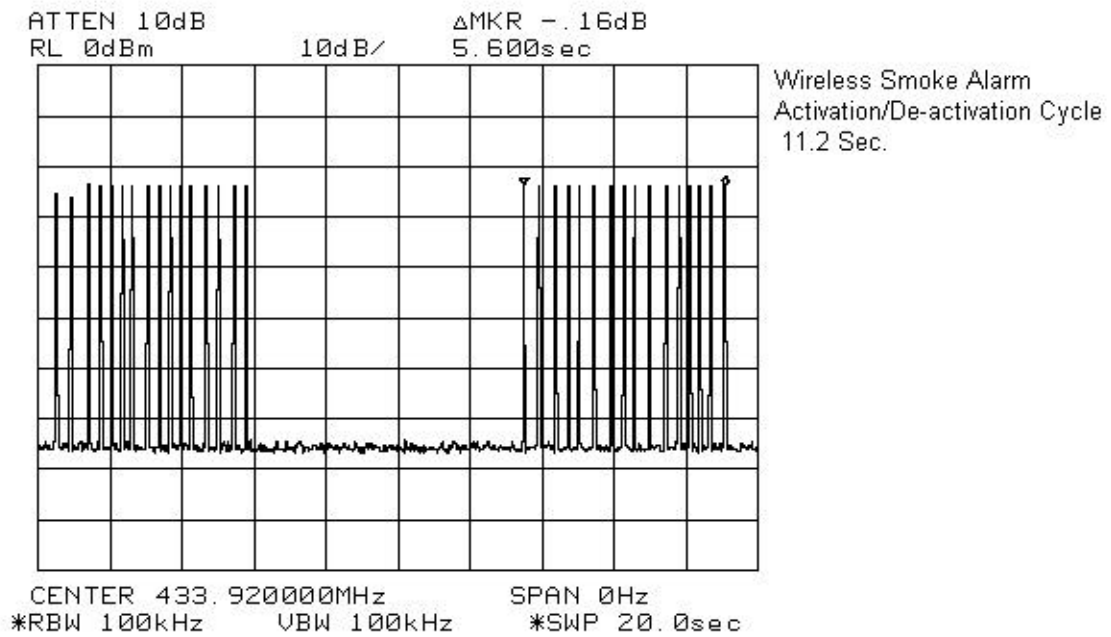
15.231(a)(1) : N/A.

15.231(a)(2) : Involves fire, security and safety of life.

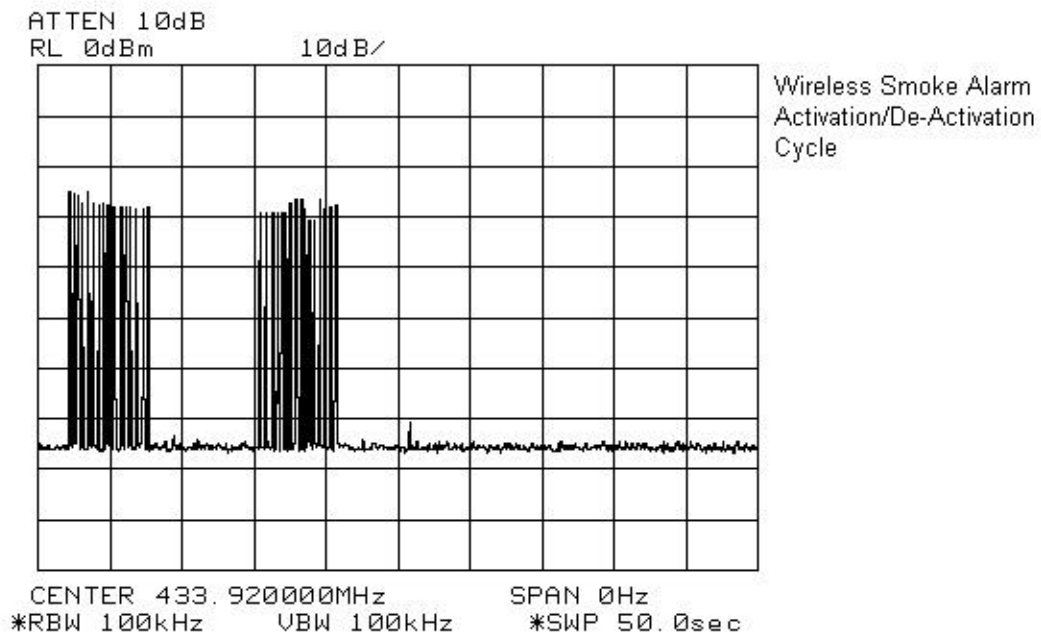
15.231(a)(3) : N/A

15.231(a)(4) : When activated the EUT transmits for a total of 11.2 seconds.

EQUIPMENT: WLS 916, 433MHz Smoke Alarm



EQUIPMENT: WLS 916, 433MHz Smoke Alarm



EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 4. Radiated Emissions

Para. No.: 15.231(b)

Test Performed By: Glen Westwell	Date of Test: 9 May 2002
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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

Notes:

# Use quasi-peak or averaging meter.	For 130 - 174 MHz: $FS \text{ (microvolts/m)} = (56.82 \times F) - 6136$
* Linear interpolation with frequency F in MHz	For 260 - 470 MHz: $FS \text{ (microvolts/m)} = (41.67 \times F) - 7083$

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

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ @ 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.**Test Data:** See attached table.

The EUT is rotated in three planes to obtain worst-case results.

EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP/HP8565E		RBW(kHz): 120kHz / 1MHz		Detector: Peak	
Freq. (MHz)	Ant.	Pol. (V/H)	RCVD Signal (dBμV)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
433.92	LP1	V	61.0	19.2		-18.9	61.3	80.8	19.5
433.92	LP1	H	70.5	19.2		-18.9	70.8	80.8	10
427.1	LP1	V	16.3	19.0		-18.9	16.4	60.8	44.4
427.1	LP1	H	17.0	19.0		-18.9	17.1	60.8	43.7
413.3	LP1	V	15.7	18.8		-18.9	15.6	60.8	45.2
413.3	LP1	H	19.0	18.8		-18.9	18.9	60.8	41.9
488.16	LP1	V	23.0	20.9		-18.9	25.0	60.8	35.8
488.16	LP1	H	23.3	20.9		-18.9	25.3	60.8	35.5
542.4	LP1	V	21.1	21.7		-18.9	23.9	60.8	36.9
542.4	LP1	H	21.7	21.7		-18.9	24.5	60.8	36.3
867.84	LP1	V	27.8	27.2		-18.9	36.1	60.8	24.7
867.84	LP1	H	34.2	27.2		-18.9	42.5	60.8	18.3
HP8565E									
1301.76	Hrn 1	V	54.7	28.4	-48.1	-18.9	16.1	54.0	37.9
1301.76	Hrn 1	H	52.2	28.4	-48.1	-18.9	13.6	54.0	40.4
1735.68	Hrn 1	V	58.8	30.8	-48.4	-18.9	21.9	60.8	38.9
1735.68	Hrn 1	H	57.4	30.8	-48.4	-18.9	20.9	60.8	39.9
2169.60	Hrn 1	V	65.0	33.3	-58.5	-18.9	20.9	60.8	39.9
2169.60	Hrn 1	H	64.1	33.3	-58.5	-18.9	20.0	60.8	40.8
Notes: B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole * Re-measured using dipole antenna. ** Includes cable loss when amplifier is not used. *** Includes cable loss. () Denotes failing emission level. N.D. = Not Detected Measurements over 1000MHz on HP8565E Spectrum Analyzer Measurements under 1000MHz done on R&S ESVP Receiver									

All spurious and harmonic emissions were searched up to the 10th harmonic.

EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Radiated Photographs (Worst Case Configuration)

Front View



EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 5. Occupied Bandwidth

Para. No.: 15.231(c)

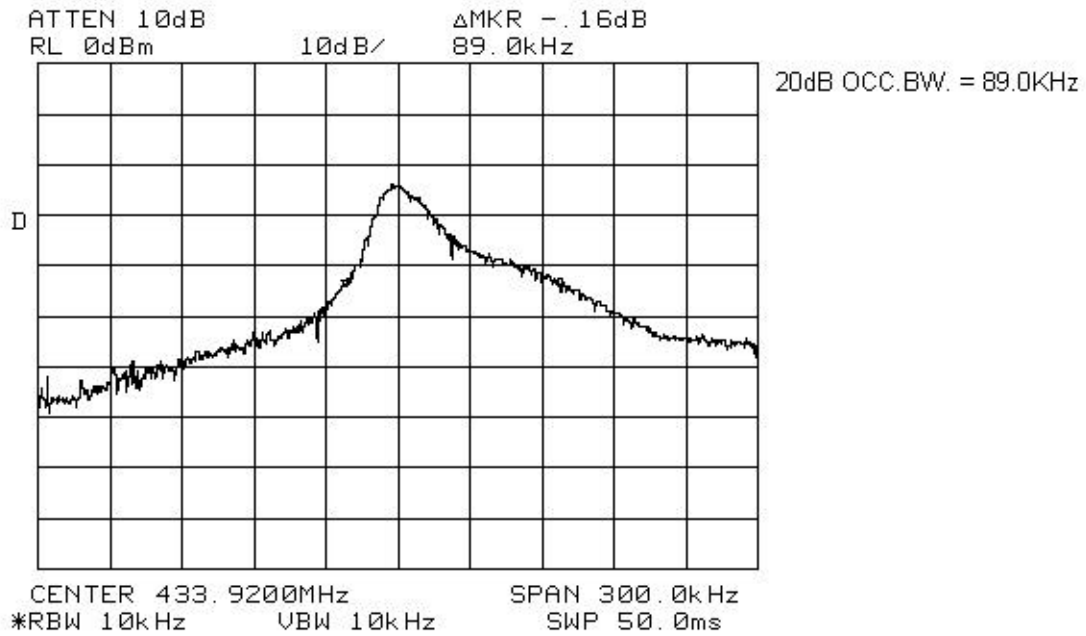
Test Performed By: Glen Westwell	Date of Test: 10 May 2001
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Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 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.

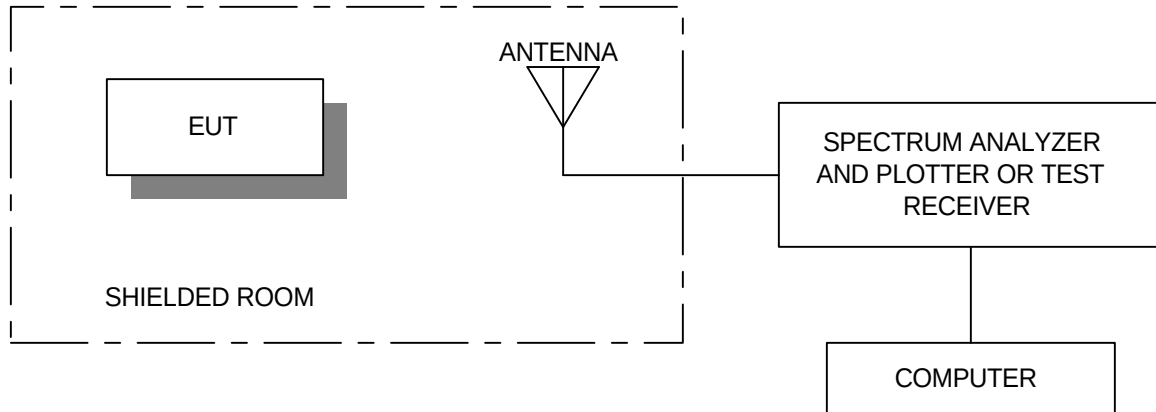
EQUIPMENT: WLS 916, 433MHz Smoke Alarm



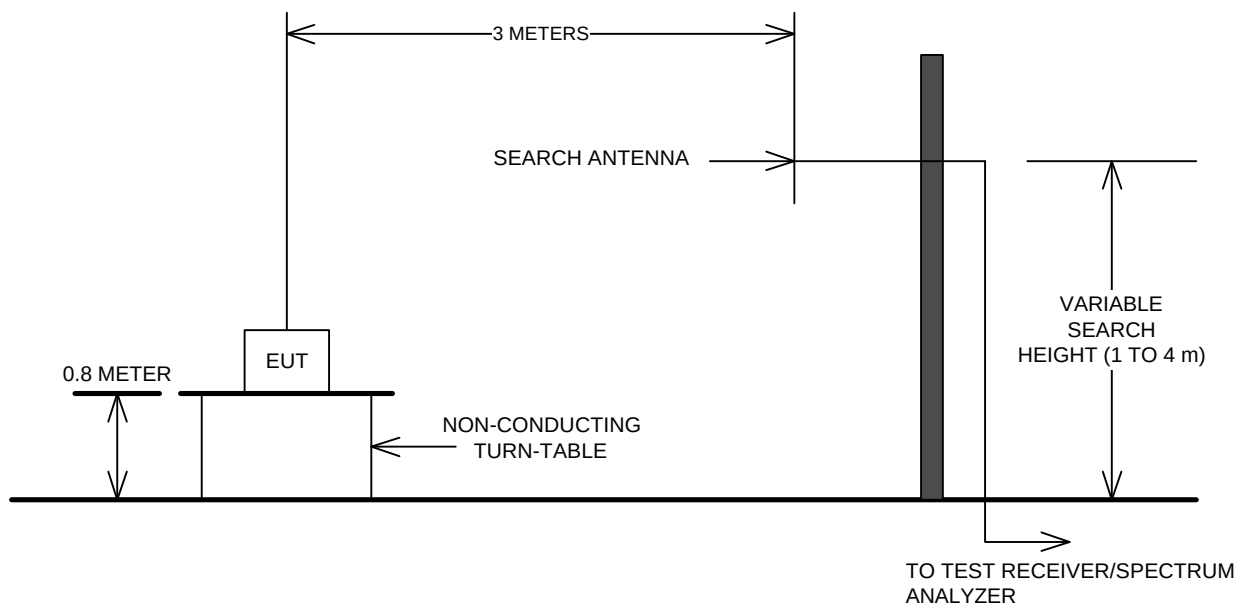
EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 6. Block Diagrams

Radiated Prescan



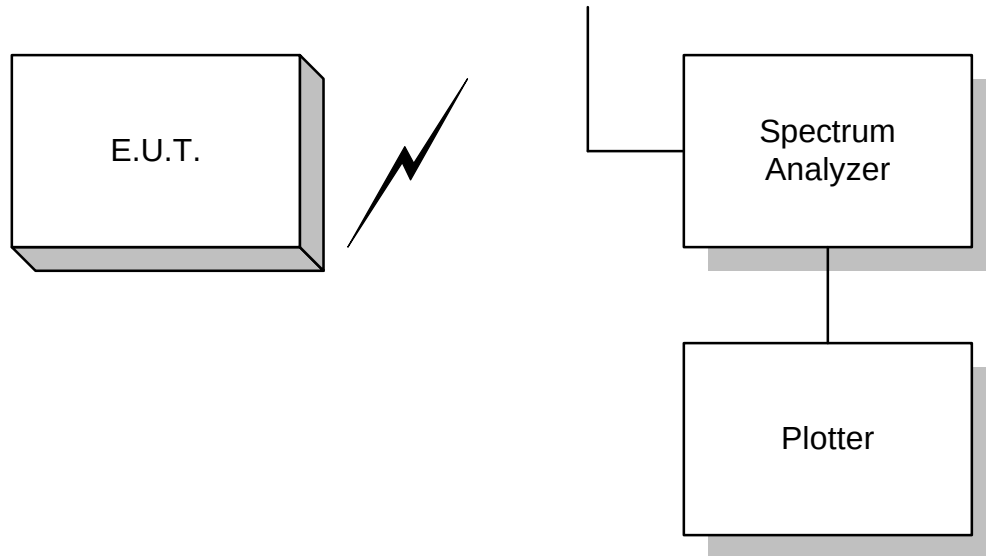
Outdoor Test Site For Radiated Emissions



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

EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Occupied Bandwidth



EQUIPMENT: WLS 916, 433MHz Smoke Alarm

Section 7. Test Equipment List

CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
1 Year	Receiver	Rohde & Schwarz	ESVP	FA000871	May 02/02	May 02/03
1 Year	Spectrum Analyzer	Hewlett-Packard	8565E	FA000981	June 08/01	June 08/02
1 Year	Log Periodic 1	EMCO	LPA-25	1141	28 Aug 01	28 Aug 02
1 Year	Horn Antenna #1	EMCO	3115	FA000649	Dec. 01/01	Dec 01/02
1 Year	Spectrum Analyzer-1	Hewlett Packard	8566B	2311A02238	Nov. 27/01	Nov. 27/02
1 Year	Spectrum Analyzer Display-1	Hewlett Packard	8566B	2314A04759	Nov. 27/01	Nov. 27/02

Note: N/A = Not Applicable
NCR = No Cal Required
COU = CAL On Use
OUT = Out For CAL/Repair