Nemko Test Report:	3L0107RUS1
Applicant:	Bosch Security Systems 130 Perinton Parkway Fairport, NY 14450 U.S.A.
Equipment Under Test: **(E.U.T.)**	DS840LSN 10.525 GHz
In Accordance With:	**FCC Part 15, Subpart C** For Operation Within The Bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, 24075-24175 MHz Intentional Radiators Used As Field Disturbance Sensors Excluding Perimeter Protection Systems
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	
	David Light, Production Manager
Date:	
Total Number of Pages:	21

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Bosch Security Systems

Model No.: DS840LSN

Serial No.: Sample No. 1

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 15.245. 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

F	D	S

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®

NVLAP LAB CODE: 100351-0

Summary Of Test Data

Name of Test	Paragraph Number	Results
Radiated Emissions	15.245	Complies
Powerline Conducted Emissions	15.207	Complies

Footnotes:

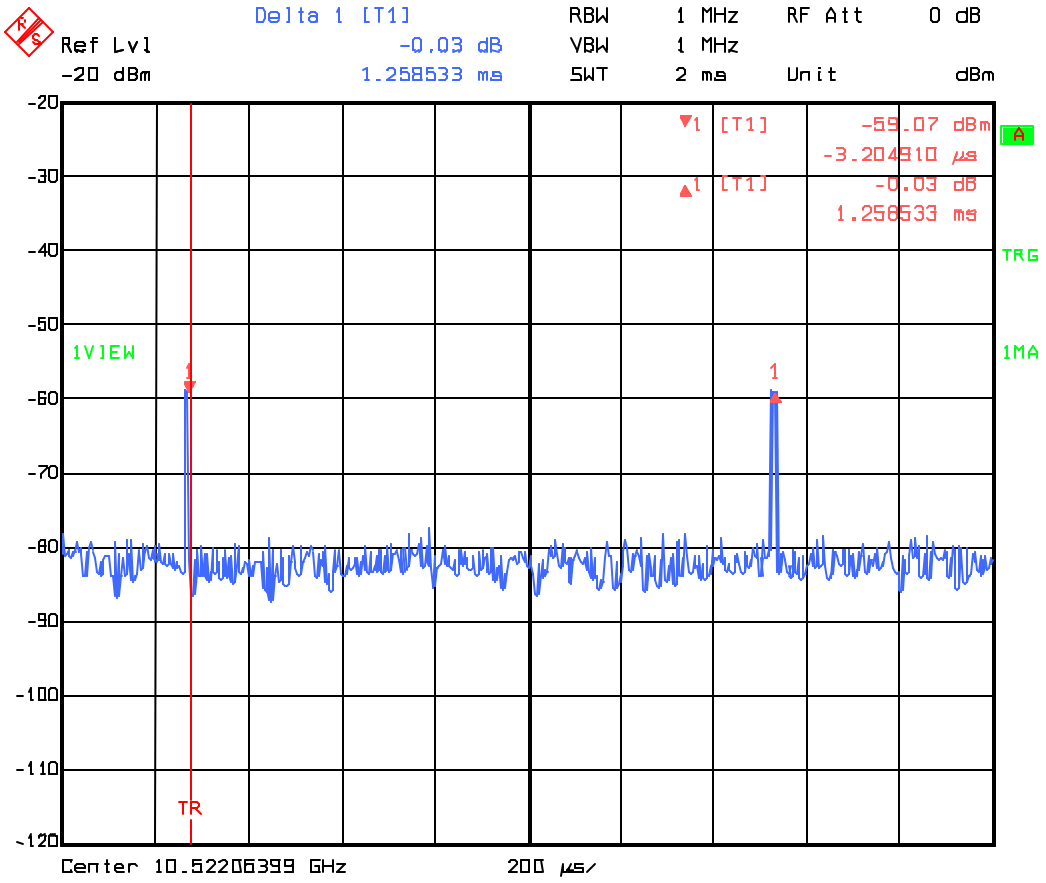
Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Range:	10.525 GHz
Operating Frequency(ies) of Sample:	10.525 GHz
Type of Emission:	P0N
Supply Power Requirement:	12 Vdc
Duty Cycle Calculation:	20 Log(80 x .0124/100) = -40 dB

The transmitter pulses once every 1.25 msec. Each pulse is 12.4 microseconds (.0124 msec.)
The pulse repetition frequency is 1/1.25 msec. = .8 kHz
In any 100 msec. period there are 100/1.25 = 80 pulses.
The maximum rf on-time is therefore:

20 Log(80 x .0124msec./100msec.) = -40 dB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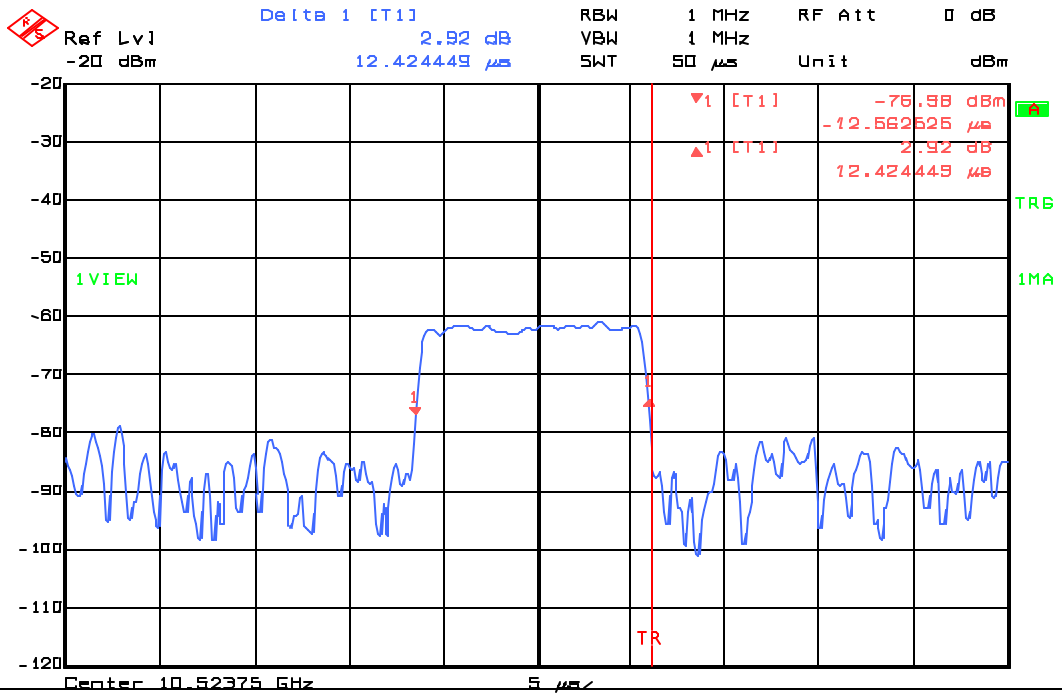
RBW 1 MHz
RF Att 0 dB
Ref Lvl
-0.03 dB
VBW 1 MHz
-20 dBm
1.258533 ms
SWT 2 ms
Unit dBm
1 [T1] -59.07 dBm
-3.204910 µs
1 [T1] -0.03 dB
1.258533 ms
TRG
1MA
1VIEW
TR
Center 10.52206399 GHz
200 µs/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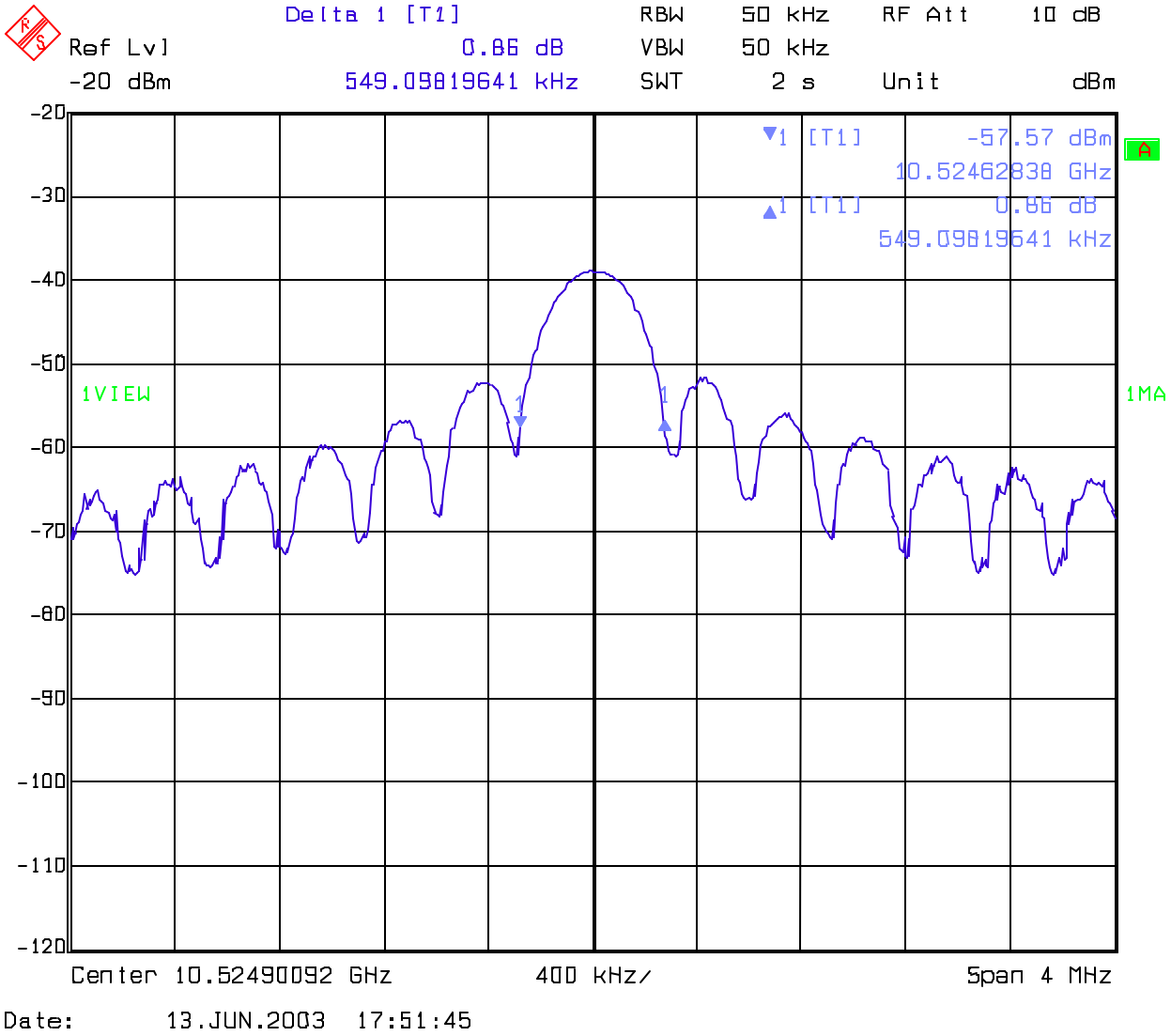
RBW 1 MHz
RF Att 0 dB
Ref Lvl
2.92 dB
VBW 1 MHz
-20 dBm
12.424449 µs
SWT 50 µs
Unit dBm
1 [T1] -76.98 dBm
-12.582626 µs
1 [T1] 2.92 dB
12.424449 µs
TRG
1MA
1VIEW
TR
Center 10.52375 GHz
5 µs/

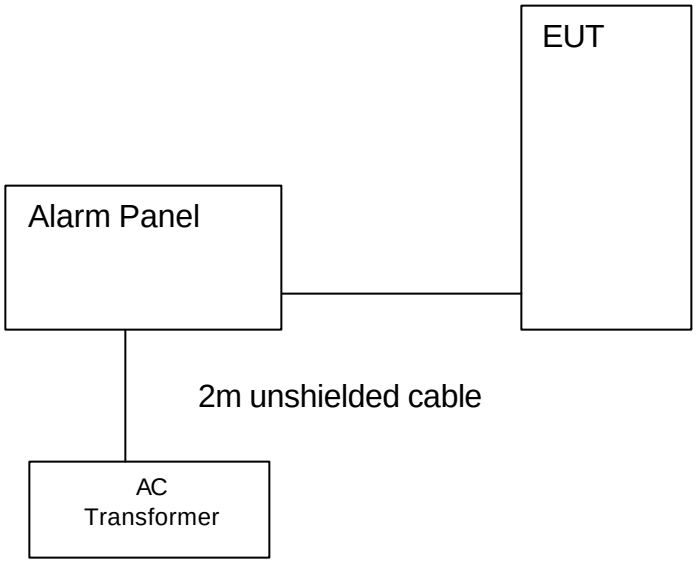
Description of E.U.T.

The EUT is a microwave motion detector operating at 10.525 GHz. The detector operates on 12 Vdc supplied from an alarm control panel.



OCCUPIED BANDWIDTH OF MAIN LOBE

Section 3. Equipment Configuration



Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.245
TESTED BY: Tom Tidwell	DATE: 26 May, 2003

Minimum Standard: See Annex B

Test Results: Complies.

Test Data: See attached table.

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.

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

EQUIPMENT: DS840LSN

Radiated Emissions

Page 1 of 1

Job No.: 3L0107R Date: 5/26/2003
Specification: CFR 47, Part 15.245 Temperature(°C): 24
Tested By: Tom Tidwell Relative Humidity(%) 60
E.U.T.: DS840LSN-C
Configuration: Full transmit power
Sample Number: 1
Location: AC 3 RBW: 1 MHz
Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna: 1304 Directional Coupler: #N/A
Pre-Amp: 983 Cable #1: 1627
Filter: #N/A Cable #2:
Receiver: 1464 Cable #3: #N/A
Attenuator #1 #N/A Cable #4: #N/A
Attenuator #2: #N/A Mixer: #N/A

Additional equipment used:
Measurement Uncertainty: +/-3.6 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Distance Correction (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
10.525	61.7	39.2	1.1	0.0	-9.5	92.5	128	-35.5	Vertical @ 1m
10.525	76.8	39.2	1.1	0.0	-9.5	107.6	128	-20.4	Horizontal @ 1m
21.050	73.6	40.3	0.0	40.0	-9.5	64.4	74	-9.6	Vertical @ 1 m
21.050	71.2	40.3	0.0	40.0	-9.5	62.0	74	-12.0	Horizontal @ 1 m
31.575	42.0	43.5	0.0	0.0	-29.5	56.0	74	-18.0	Vertical @ .1 m
31.575	42.0	43.5	0.0	0.0	-29.5	56.0	74	-18.0	Horizontal @ .1 m
42.100	39.0	38.8	0.0	0.0	-29.5	48.3	74	-25.7	Vertical @ .1 m
42.100	39.0	38.8	0.0	0.0	-29.5	48.3	74	-25.7	Horizontal @ .1 m
52.685	46.0	40.7	0.0	0.0	-29.5	57.2	74	-16.8	Vertical @ .1 m
52.685	46.0	40.7	0.0	0.0	-29.5	57.2	74	-16.8	Horizontal @ .1 m
63.150	43.5	42.3	0.0	0.0	-29.5	56.3	74	-17.7	Vertical @ .1 m
63.150	43.5	42.3	0.0	0.0	-29.5	56.3	74	-17.7	Horizontal @ .1 m
73.675	42.5	43.6	0.0	0.0	-29.5	56.6	74	-17.4	Vertical @ .1 m
73.675	42.5	43.6	0.0	0.0	-29.5	56.6	74	-17.4	Horizontal @ .1 m
84.200	47.5	44.8	0.0	0.0	-35.6	56.7	74	-17.3	Vertical @ .05 m
84.200	47.5	44.8	0.0	0.0	-35.6	56.7	74	-17.3	Horizontal @ .05 m
94.725	49.0	45.8	0.0	0.0	-35.6	59.2	74	-14.8	Vertical @ .05 m
94.725	49.0	45.8	0.0	0.0	-35.6	59.2	74	-14.8	Horizontal @ .05m
105.250	48.5	46.7	0.0	0.0	-35.6	59.6	74	-14.4	Vertical @ .05 m
105.250	48.5	46.7	0.0	0.0	-35.6	59.6	74	-14.4	Horizontal @ .05 m

Notes: **Peak**

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Radiated Emissions

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Job No.: 3L0107R Date: 5/26/2003
Specification: CFR 47, Part 15.245 Temperature(°C): 24
Tested By: Tom Tidwell Relative Humidity(%) 60
E.U.T.: DS840LSN
Configuration: Full transmit power
Sample Numbe 1
Location: AC 3 RBW: 1 MHz
Detector Type: Peak VBW: 1 MHz

Note: The measurement instrument was set to peak and the duty cycle correction factor was added.

Test Equipment Used

Antenna: 1304 Directional Coupler: #N/A
Pre-Amp: 983 Cable #1: 1627
Filter: #N/A Cable #2:
Receiver: 1464 Cable #3: #N/A
Attenuator #1 #N/A Cable #4: #N/A
Attenuator #2: #N/A Mixer: #N/A

Additional equipment used:
Measurement Uncertainty: +/-3.6 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Dist. Corr. (dB)	Duty Cycle Corr. (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
10.525	61.7	39.2	1.1	0.0	-9.5	-40.0	52.5	128	-75.5	Vertical @ 1m
10.525	76.8	39.2	1.1	0.0	-9.5	-40.0	67.6	128	-60.4	Horizontal @ 1m
21.050	73.6	40.3	0.0	40.0	-9.5	-40.0	24.4	54	-29.6	Vertical @ 1 m
21.050	71.2	40.3	0.0	40.0	-9.5	-40.0	22.0	54	-32.0	Horizontal @ 1 m
31.575	42.0	43.5	0.0	0.0	-29.5	-40.0	16.0	54	-38.0	Vertical @ .1 m
31.575	42.0	43.5	0.0	0.0	-29.5	-40.0	16.0	54	-38.0	Horizontal @ .1 m
42.100	39.0	38.8	0.0	0.0	-29.5	-40.0	8.3	54	-45.7	Vertical @ .1 m
42.100	39.0	38.8	0.0	0.0	-29.5	-40.0	8.3	54	-45.7	Horizontal @ .1 m
52.685	46.0	40.7	0.0	0.0	-29.5	-40.0	17.2	54	-36.8	Vertical @ .1 m
52.685	46.0	40.7	0.0	0.0	-29.5	-40.0	17.2	54	-36.8	Horizontal @ .1 m
63.150	43.5	42.3	0.0	0.0	-29.5	-40.0	16.3	54	-37.7	Vertical @ .1 m
63.150	43.5	42.3	0.0	0.0	-29.5	-40.0	16.3	54	-37.7	Horizontal @ .1 m
73.675	42.5	43.6	0.0	0.0	-29.5	-40.0	16.6	54	-37.4	Vertical @ .1 m
73.675	42.5	43.6	0.0	0.0	-29.5	-40.0	16.6	54	-37.4	Horizontal @ .1 m
84.200	47.5	44.8	0.0	0.0	-35.6	-40.0	16.7	54	-37.3	Vertical @ .05 m
84.200	47.5	44.8	0.0	0.0	-35.6	-40.0	16.7	54	-37.3	Horizontal @ .05 m
94.725	49.0	45.8	0.0	0.0	-35.6	-40.0	19.2	54	-34.8	Vertical @ .05 m
94.725	49.0	45.8	0.0	0.0	-35.6	-40.0	19.2	54	-34.8	Horizontal @ .05m
105.250	48.5	46.7	0.0	0.0	-35.6	-40.0	19.6	54	-34.4	Vertical @ .05 m
105.250	48.5	46.7	0.0	0.0	-35.6	-40.0	19.6	54	-34.4	Horizontal @ .05 m

Notes: **Average**

Section 5. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: T. Tidwell	DATE: 7/25/03

Minimum Standard:

Frequency (MHz)	Maximum Powerline Conducted RF Voltage	
	Average (dB?V)	Quasi-Peak (dB?V)
.150 - .5	57	67
.5 – 5	47	57
5 – 30	50	60

Test Results: Complies. See attached graphs and table.

Test Data: See attached table and graphs.

Method Of Measurement: (Procedure ANSI C63.4-1992)

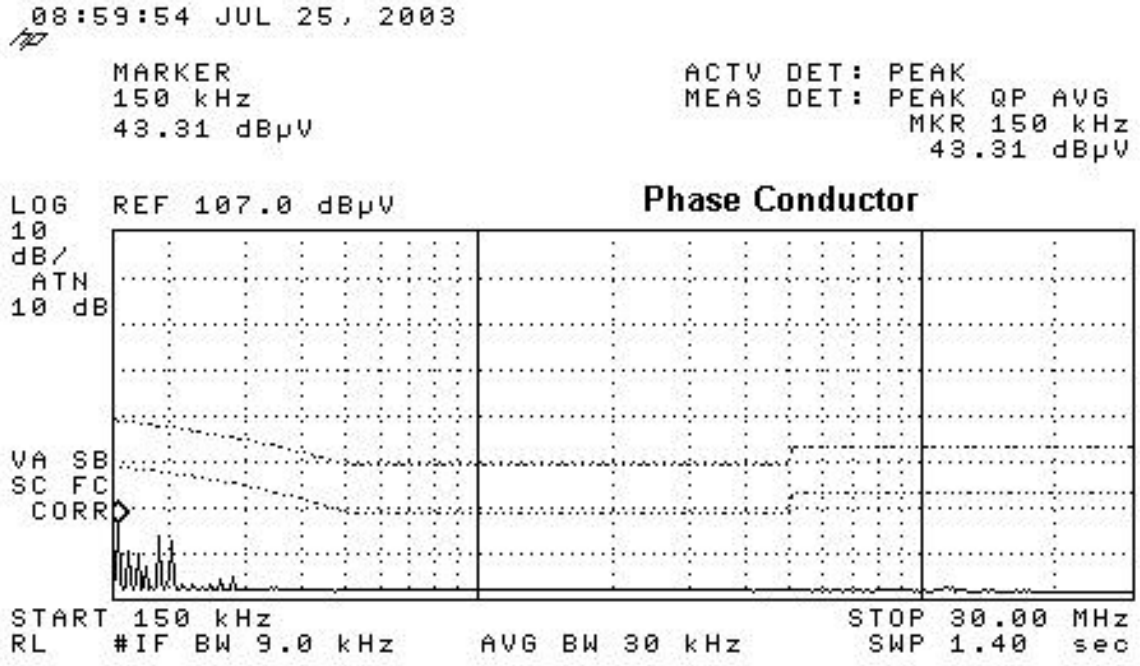
Measurements were made using a spectrum analyzer with 9 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 9 kHz bandwidth, CISPR Quasi-Peak detector.

Broadband emissions are identified by switching the receiver detector function from Quasi-Peak to Average. If the amplitude of the emission drops by 6 dB or more then the emission is classified as broadband and the Quasi-Peak level is reduced by a factor of 13 dB.

All emissions within 10 dB of limit have been recorded.

Measurement Data:

Note: Top line represents quasi-peak limit. Bottom line represents average limit.



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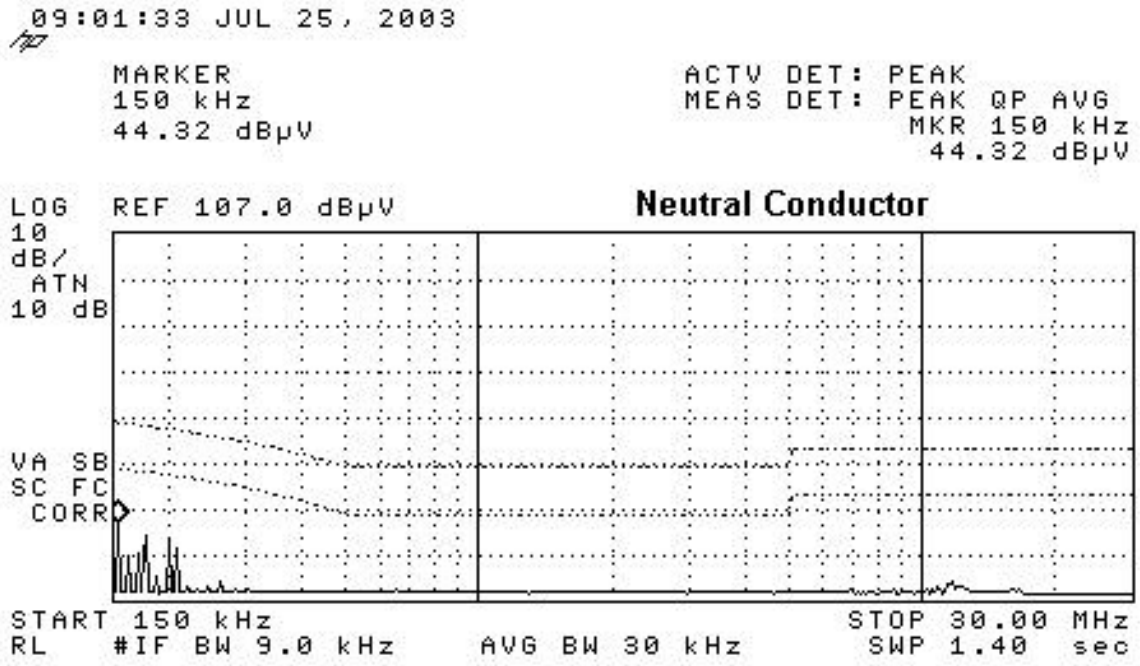
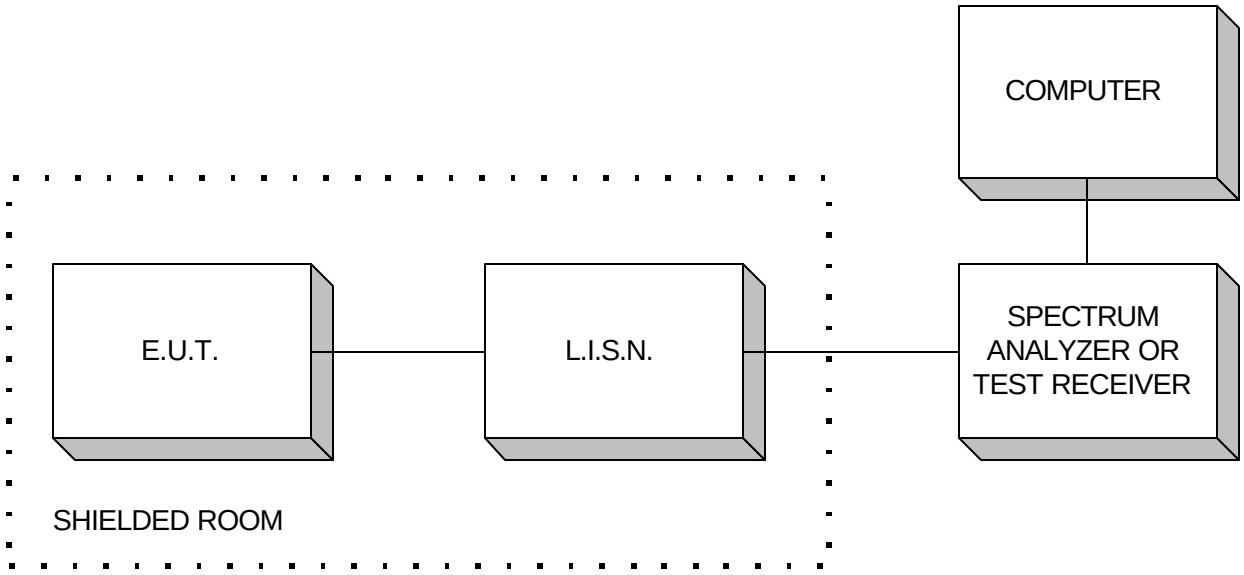
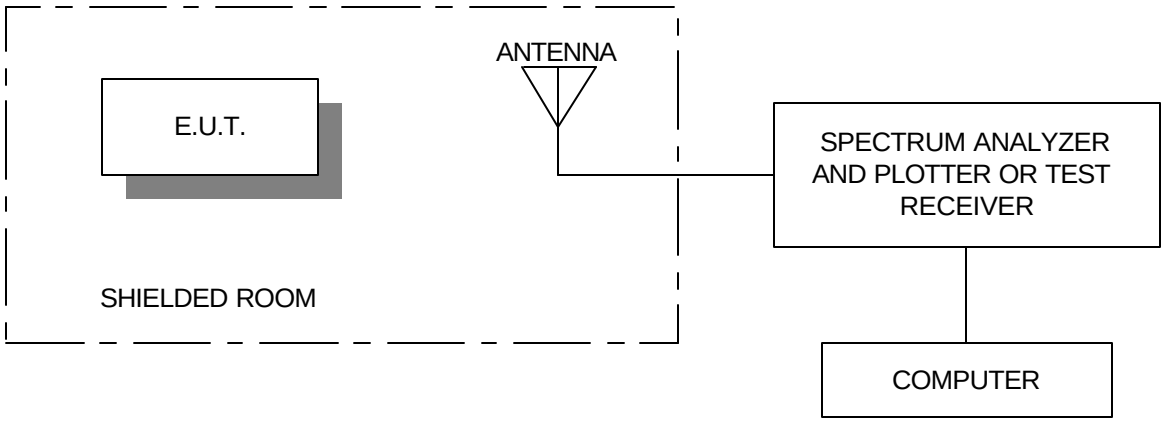


Section 6. Block Diagrams

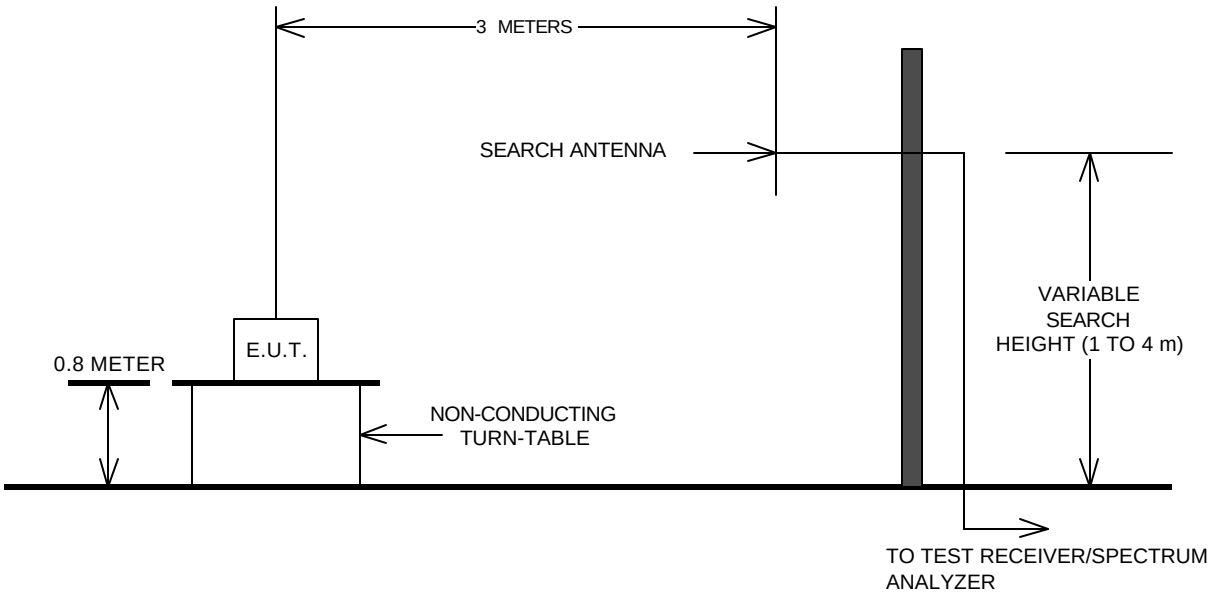
Conducted Emissions



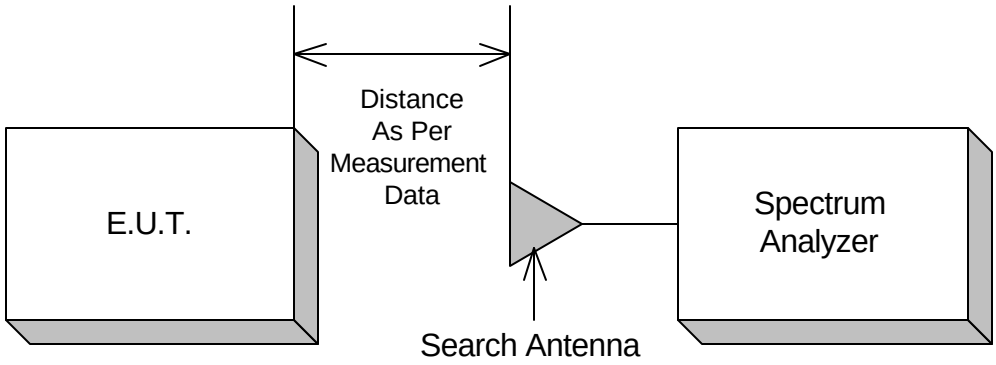
Radiated Prescan



Outdoor Test Site For Radiated Emissions



Indoor Measurement Setup for Emissions Above 10 GHz



Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
983	PRE-AMP, 18-40 GHz	KTL BB1	1	01/18/03	01/18/04
984	HORN ANTENNA	MILLITECH NONE	NONE	CNR	N/A
985	HORN ANTENNA	MILLITECH NONE	NONE	CNR	N/A
986	HARMONIC MIXER	Hewlett Packard 11970V	2521A01222	01/00/00	N/A
987	HARMONIC MIXER	Hewlett Packard 5356D	2521A00583	01/00/00	N/A
988	HARMONIC MIXER	Hewlett Packard 11970A	2332A01929	01/00/00	N/A
989	HARMONIC MIXER	Hewlett Packard 11970U	2332A00116	01/00/00	N/A
990	HORN ANTENNA	MILLITECH NONE	NONE	CNR	N/A
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/31/03
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	CBU	N/A

Annex A - Restricted Bands

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			

Annex B - Radiated Emission Limits

Radiated Emission Limits

§15.245 Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz and 24075-24175 MHz.

(a) Operation under the provision of this section is limited to intentional radiators used as field disturbance sensors, excluding perimeter protection systems.

(b) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength Of Fundamental (millivolts/meter)	Field Strength of Harmonics (millitvolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For field disturbance sensors designed for use only within a building or to open building doors, 25 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment; vehicles such as fork-lifts that are intended primarily for use indoors or for very specialized operations. Or railroad locomotives, railroad cars and other equipment which travel on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is

limited to specific activities of limited duration (e.g. putting a vehicle in reverse gear, activating a turn signal, etc.).

§15.245, continued

(2) Field strength limits are specified at a distance of 3 meters.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

§15.209 Radiated Emission Limits, General Requirements

(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 (millivolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	2400/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