

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

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EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Section 1. Summary Of Test Results

Manufacturer: Digital Security Controls Ltd.

Model No.: WLS 912

Serial 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 FCC Part 15, Subpart C, Paragraph 15.247 for Direct Sequence Spread Spectrum devices.

- New Submission
- Class II Permissive Change
- | | | |
|---|---|---|
| D | S | S |
|---|---|---|

 Equipment Code
- Production Unit
- Pre-Production Unit
- Family Listing

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: Tom Tidwell DATE: 19 Nov. 1998
Tom Tidwell, Wireless Group Manager

TECHNICAL REVIEW: Russell Grant DATE: Nov 19, 98
Russell Grant, Technologist

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EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
 FCC ID: F5398SS12

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
Powerline Conducted Emissions	15.207 (a)	48 dB μ V	N/A	N/A
Occupied Bandwidth	15.247 (a)(2)	\geq 500 kHz	0.883 kHz	Complies
Peak Power Output	15.247 (b)	1 watt	0.0353 W	Complies
Spurious Emissions (Antenna Conducted)	15.247 (c)	-20 dBc	N/A	N/A
Spurious Emissions (Radiated)	15.247 (c)	Table 15.209 (a)	Table	Complies
Transmitter Power Density	15.247 (d)	\leq +8 dBm	+7.07 dBm	Complies
Processing Gain	15.247 (e)	\geq 10 dB	13.7 dB	Complies

Footnotes For N/A's:

- (1) The E.U.T. is battery powered.
- (2) The E.U.T. uses a non-detachable antenna.

Test Conditions:

Temperature: 20 °C
 Humidity: 26 %

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
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Section 2. General Equipment Specification

Transmitter

Power Input:	4.5 Vdc 3 x "AA" Batteries
Frequency Range:	924 MHz (Fixed)
6 dB Bandwidth:	0.883 MHz
Type of Modulation:	FSK (Direct Sequence Spread Spectrum)
Data Rate:	Not Applicable
Emissions Designator:	1M48F1D
RF Power Output (Rated):	Not Applicable
Duty Cycle:	17 dB
Channel Spacing:	Not Applicable
Operator Selection of Operating Frequency:	Not Selectable
Power Output Adjustment Capability:	Not Adjustable
Duty Cycle Factor:	$20 \text{ Log } \frac{13.8m \text{ sec}}{100m \text{ sec}} = -17.2 \text{ dB}$

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R00898

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Description of Modification for Modification Filing

NOT APPLICABLE

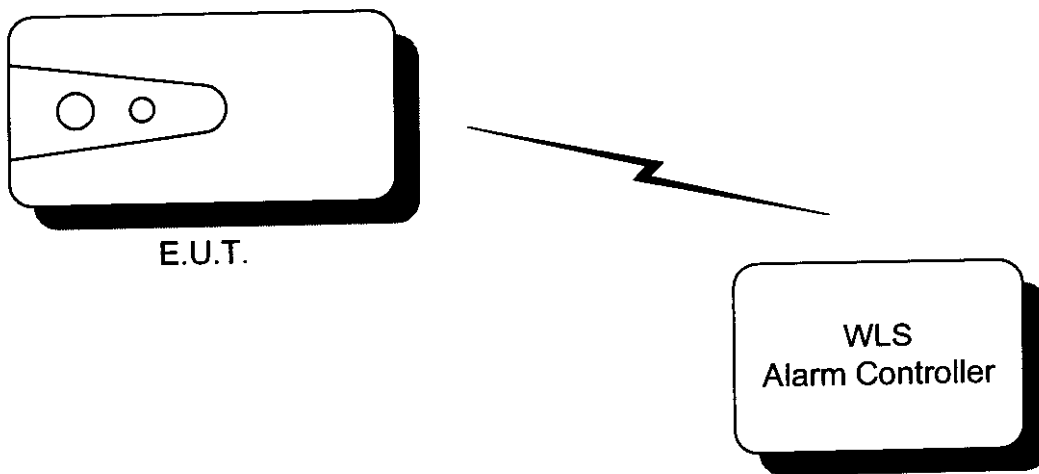
Family List Rational

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
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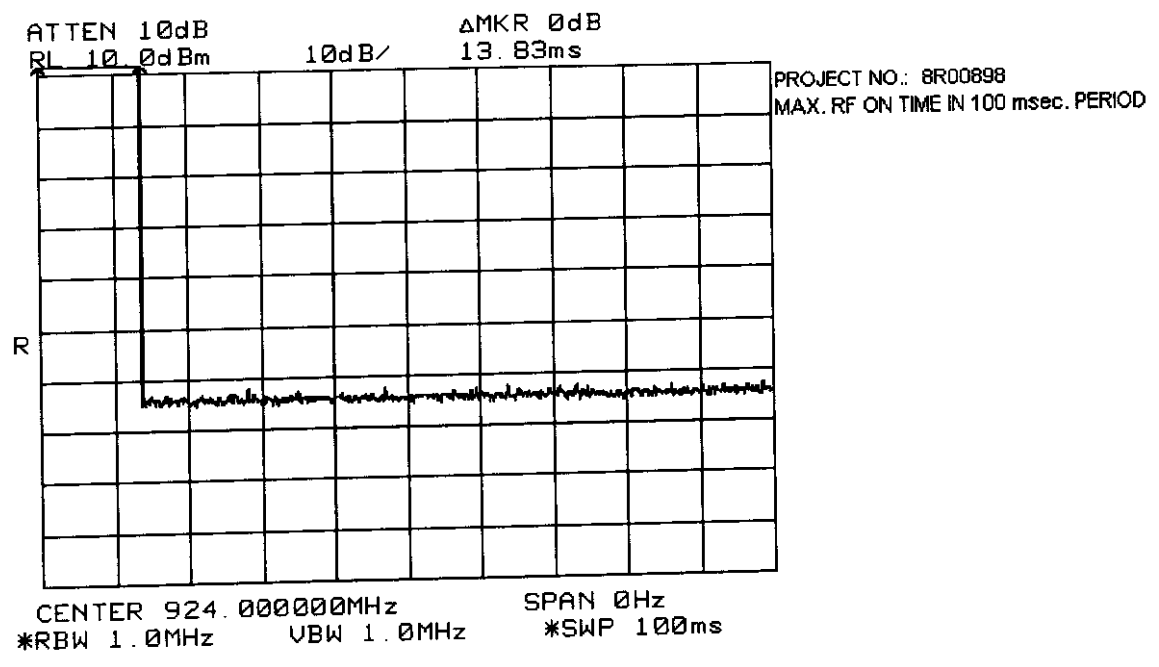
Theory of Operation

The E.U.T. is a wireless transmitter that operates with the WLS900 series of alarm devices. The WLS 912 is a glass break detector that, when triggered, sends a short data burst to the alarm controller reporting an alarm condition.

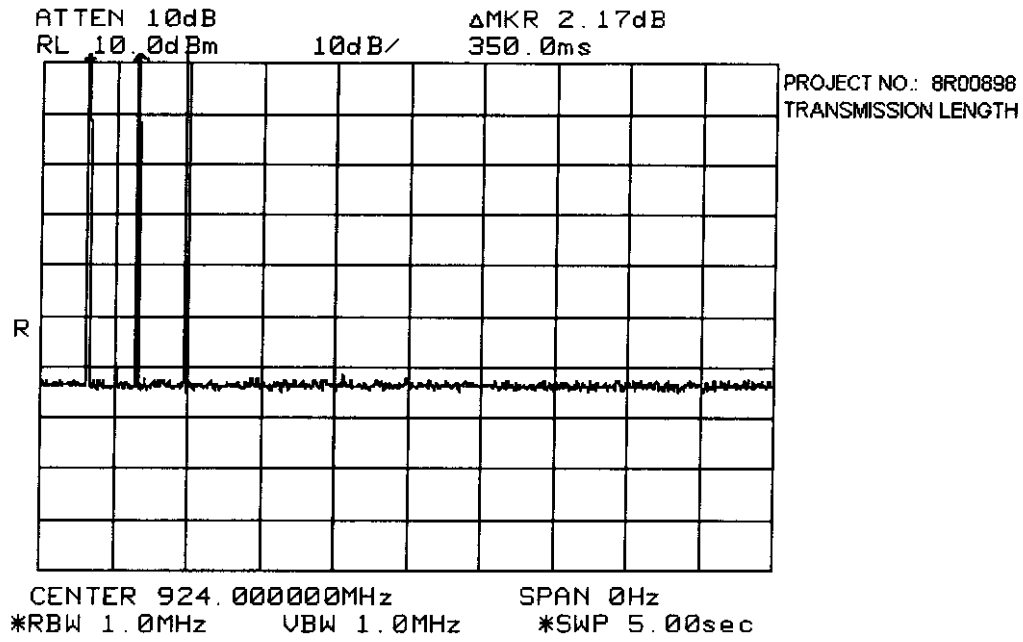
System Diagram



EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
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Section 3. Powerline Conducted Emissions

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

Test Results: Complies. See attached graph.

Measurement Data: See attached graph.

NOT APPLICABLE

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R00898

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

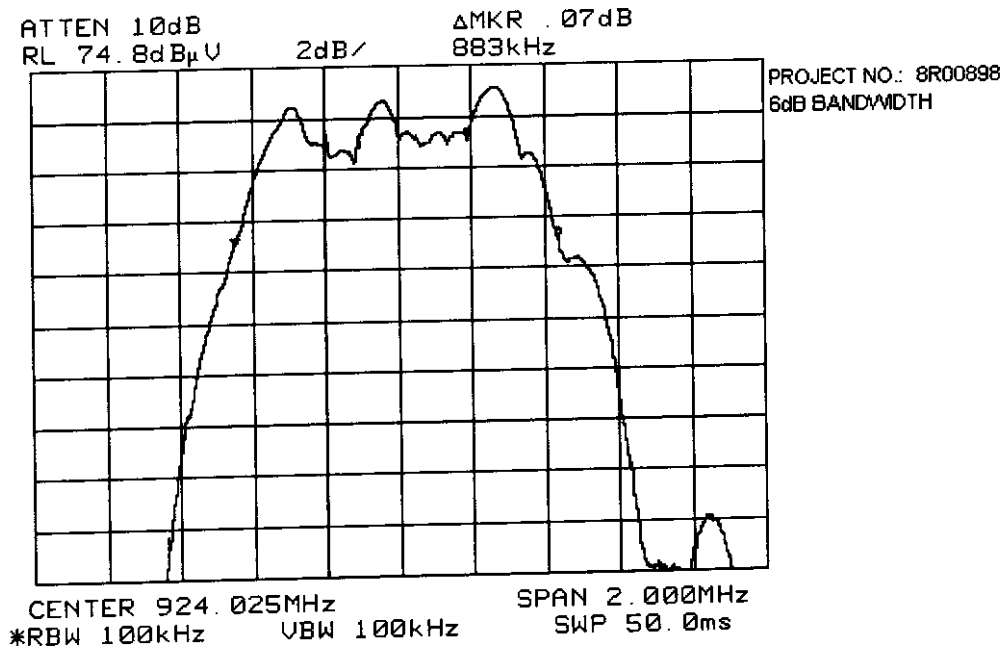
Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: Tom Tidwell	DATE: November 13, 1998

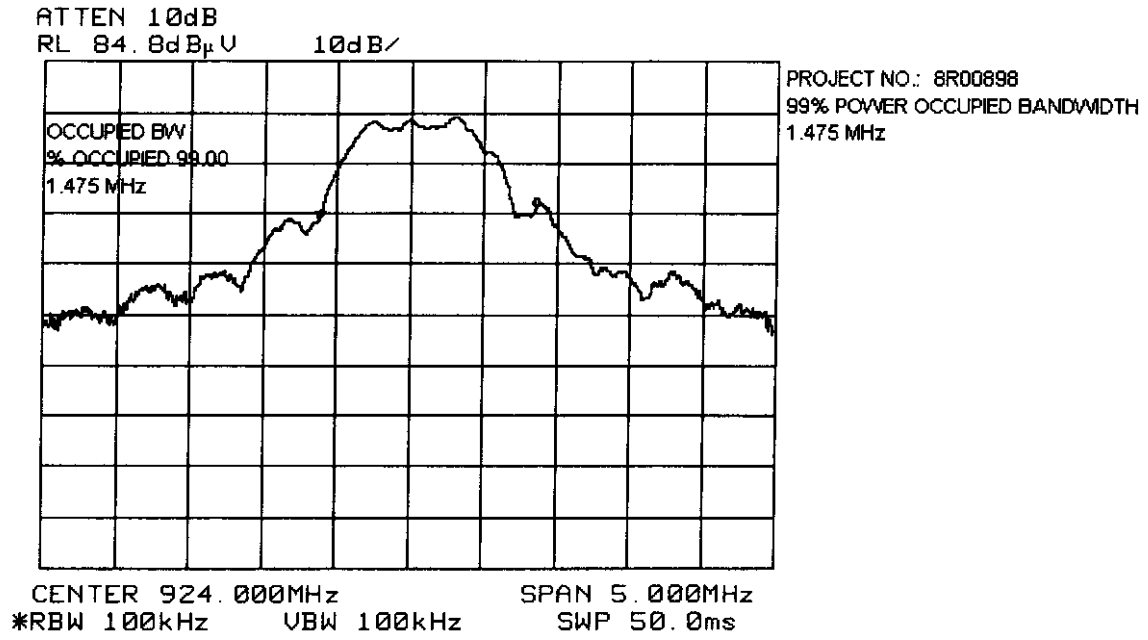
Test Results: Complies. The 6 dB bandwidth is 0.883 MHz.
See attached graph.

Measurement Data: See attached graph.

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Section 5. Peak Power Output

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247 (b)
TESTED BY: Tom Tidwell	DATE: November 13, 1998

Test Results: Complies. The maximum peak power output of the transmitter is 0.0353 watts

Measurement Data: Detachable antenna? Yes No
If yes, state the type of non-standard connector used at the antenna port: N/A

Directional Gain of Antenna: 0 dBi or 1 Numeric.
Peak Power Output: 0.0353 watts.
Field Strength: 110.7 dBµV/m @ 3m or 0.343 V/m @ 3m.

$$P = \frac{0.343^2 \times 9}{30}$$

$$P = 0.0353 \text{ watts}$$

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
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Peak Power Output

Test Distance (meters) : 3		Range: A Tower		Receiver: 8566 B		RBW(kHz): 120		Detector: PEAK			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
924.0	T/D3	V			75.1	35.6			110.7	110.7	0.0
924.0	T/D3	H			75.0	35.6			110.6	110.7	0.1

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.

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Section 6. Spurious Emissions (Antenna Conducted)

NAME OF TEST: Spurious Emissions (Antenna Conducted)	PARA. NO.: 15.247(c)
TESTED BY:	DATE:

Test Results: Complies. The worst-case emission level is _____ dBm at _____ MHz. This is _____ dB above/below the specification limit.

Measurement Data: See attached graphs.

NOT APPLICABLE

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
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Section 7. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(c)
TESTED BY: Tom Tidwell	DATE: November 13, 1998

Test Results: Complies. The worst-case emission level is 69.2 dB μ V/m @ 3m at 3696 MHz. This is 4.8 dB below the specification limit.

Measurement Data: See attached graphs.

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
 FCC ID: F5398SS12

Test Data - Radiated Emissions (PEAK)

Test Distance (meters) : 3		Range: A Tower		Receiver: 021		RBW(kHz): 1 MHz RBW, 3 MHz VBW		Detector: PEAK			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle Corr.	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
924.0	T/D3	V			75.1	35.6			110.7	110.7	0.0
924.0	T/D3	H			75.0	35.6			110.6	110.7	0.1
1848.0	Hrn2	V			83.0	31.1	-45.8		68.3	90.7	22.4
1848.0	Hrn2	H			72.1	31.1	-45.8		57.4	90.7	33.3
2772.0	Hrn2	V			76.2	34.2	-45.8		64.6	74.0	9.4
2772.0	Hrn2	H			80.4	34.2	-45.8		68.8	74.0	5.2
3696.0	Hrn2	V			73.9	40.2	-45.3		68.8	74.0	5.2
3696.0	Hrn2	H			74.3	40.2	-45.3		69.2	74.0	4.8
4620.0	Hrn2	V			59.0	40.1	-45.7		53.4	74.0	20.6
4620.0	Hrn2	H			64.3	40.1	-45.7		58.7	74.0	15.3
5544.0	Hrn2	V			54.0	42.7	-45.6		51.1	90.7	39.6
5544.0	Hrn2	H			58.6	42.7	-45.6		55.7	90.7	35.0
6468.0	Hrn2	V			53.8	44.9	-45.2		53.5	90.7	37.2
6468.0	Hrn2	H			58.0	44.9	-45.2		57.7	90.7	33.0

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.

RADIATED PHOTOGRAPHS (Worst Case)

FRONT VIEW



EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Section 8. Transmitter Power Density

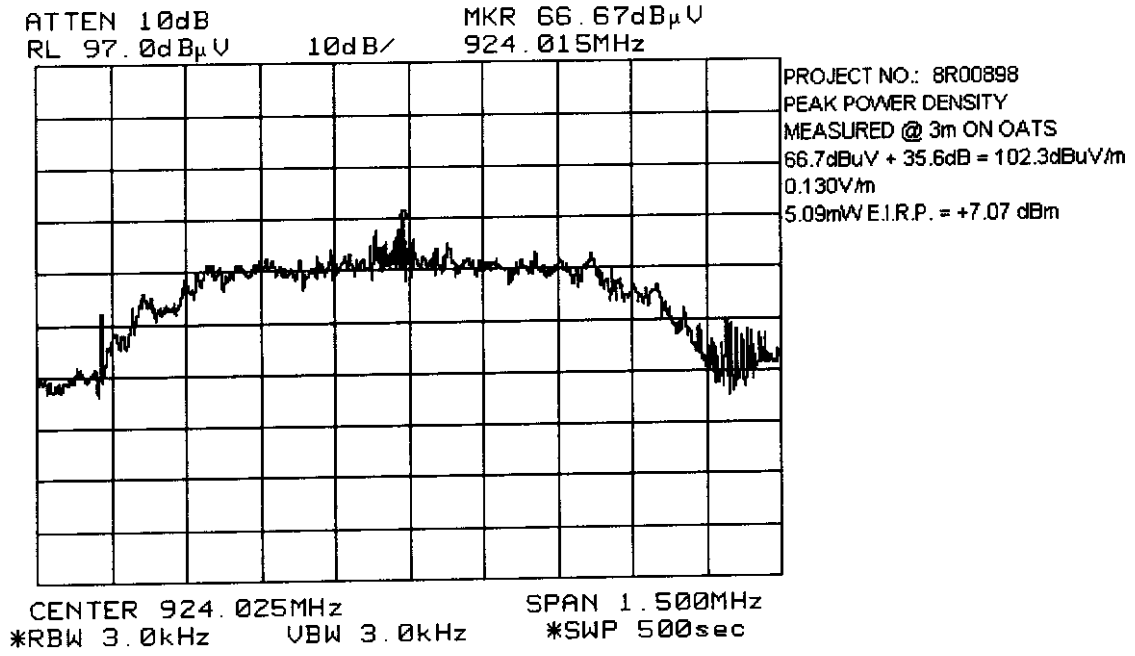
NAME OF TEST: Transmitter Power Density	PARA. NO.: 15.247(d)
TESTED BY: Tom Tidwell	DATE: November 13, 1998

Test Results: Complies.

Measurement Data: See attached graphs.

Received Signal: 66.7 dB μ V/m
Antenna Factor: 35.6 dB μ V/m
Field Strength: 102.3 dB μ V/m
Field Strength: 0.130 V/m
E.I.R.P.: 5.09 mW
E.I.R.P.: +7.07 dBm

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12



EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Section 9. Processing Gain

NAME OF TEST: Processing Gain	PARA. NO.: 15.247(e)
TESTED BY: Tom Tidwell	DATE: January 19, 1998

Test Results: Complies. The processing gain of the system is 13.7 dB.

Measurement Data: See attached data.

BER: 2.5×10^{-1}
S/N_{out}: 1.42 dB
J/S Ratio: 10.3 dB
L_{sys}: 2 dB
10.3 dB + 1.42 dB + 2 dB = 13.7 dB
Measured with WLS 920 Receiver

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Processing Gain Data

Frequency (MHz)	Jamming Signal Level (dBm)	Transmitter Signal Level (dBm)	Jamming Margin (dB)	Processing Gain (Gp)	20% Ignored
923.25	-4.7	-20.0	15.3	18.7	
923.30	-6.3	-20.0	13.7	17.1	
923.35	-7.2	-20.0	12.8	16.2	
923.40	-6.1	-20.0	13.9	17.3	
923.45	-8.3	-20.0	11.7	15.1	
923.50	-7.5	-20.0	12.5	15.9	
923.55	-9.7	-20.0	10.3	13.7	
923.60	-6.4	-20.0	13.6	17.0	
923.65	-7.3	-20.0	12.7	16.1	
923.70	-6.0	-20.0	14.0	17.4	
923.75	-5.7	-20.0	14.3	17.7	
923.80	-8.1	-20.0	11.9	15.3	
923.85	-9.3	-20.0	10.7	14.1	
923.90	-7.0	-20.0	13.0	16.4	
923.95	-10.5	-20.0	9.5	12.9	*
924.00	-14.2	-20.0	5.8	9.2	*
924.05	-15.6	-20.0	4.4	7.8	*
924.10	-13.0	-20.0	7.0	10.4	*
924.15	-10.0	-20.0	10.0	13.4	*
924.20	-9.7	-20.0	10.3	13.7	*
924.25	-11.3	-20.0	8.7	12.1	*
924.30	-10.9	-20.0	9.1	12.5	*
924.35	-9.6	-20.0	10.4	13.8	
924.40	-7.0	-20.0	13.0	16.4	
924.45	-7.2	-20.0	12.8	16.2	
924.50	-6.8	-20.0	13.2	16.6	
924.55	-7.4	-20.0	12.6	16.0	
924.60	-6.4	-20.0	13.6	17.0	
924.65	-6.0	-20.0	14.0	17.4	
924.70	-7.3	-20.0	12.7	16.1	
924.75	-5.0	-20.0	15.0	18.4	

Worst-case Gp of remaining 80% = 13.7 dB

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
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Section 10. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
1 Year	Spectrum Analyzer-2	Hewlett Packard	8566B	1950A00400	July 22/98	July 22/99	
1 Year	Spectrum Analyzer Display-2	Hewlett Packard	85662A	1950A01177	July 22/98	July 22/99	
1 Year	Quasi Peak Adaptor-2	Hewlett Packard	85650A	2251A00620	July 22/98	July 22/99	
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	Mar. 31/98	Mar. 31/99	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Dipole Antenna	Roberts Inst.	N/A	FA000747	June 8/98	June 8/99	
1 Year	50 ohm Combiner Pad	Mini Circuits	ZFC-3-4	922603	Dec. 5/97	Dec. 5/98	
1 Year	Signal Generator	Hewlett Packard	8660C	2044A03304	July 21/98	July 21/99	

NA: Not Applicable
NCR: No Cal Required

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R00898
ANNEX A

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

ANNEX A
TEST METHODOLOGIES

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R00898
ANNEX A

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

NAME OF TEST: Powerline Conducted Emissions

PARA. NO.: 15.207(a)

Test Conditions: Standard Temperature and Humidity
Standard Test Voltage

Minimum Standard: The R.F. that is conducted back onto the AC power line on any frequency within the band 0.45 to 30 MHz shall not exceed 250 μ V (48 dB μ V) across 50 ohms.

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
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Test Conditions: Standard Temperature and Humidity
Standard Test Voltage

Minimum Standard: The minimum bandwidth shall be at least 500 kHz.

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: 100 kHz
VBW: 100 kHz
Span: >RBW
LOG dB/div.: 2 dB
Sweep: Auto

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

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
 FCC ID: F5398SS12

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247(b)
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Test Conditions: Standard Temperature and Humidity
 Standard Test Voltage

Minimum Standard: The maximum peak power output shall not exceed 1 watt.
 If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load.

Calculation Of EIRP For Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

- P = the equivalent isotropic radiated power in watts
- E = the maximum measured field strength in V/m
- R = the measurement range (3 meters)
- G = the numeric gain of the transmit antenna in relation to an isotropic radiator

The RBW of the spectrum analyzer shall be set to a value greater than the measured 6 dB occupied bandwidth of the E.U.T.

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

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

NAME OF TEST: Spurious Emissions at Antenna Terminal	PARA. NO.: 15.247(c)
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Test Conditions: Standard Temperature and Humidity
 Standard Test Voltage

Minimum Standard: In any 100kHz bandwidth outside the 902 - 928 MHz bands emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (μ 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

The spectrum was searched to the 10th harmonic.

Method Of Measurement:

Upper Band Edge

RBW: At least 1% of span/div.
 VBW: >RBW
 Span: As necessary to display any spurious at band edge.
 Sweep: Auto
 Center Frequency: 928 MHz
 Marker: Peak of fundamental emission
 Marker Δ : Peak of highest spurious level above 928 MHz

Lower Band Edge

RBW: At least 1% of span/div.
 VBW: >RBW
 Span: As necessary to display any spurious at band edge.
 Sweep: Auto
 Center Frequency: 902 MHz
 Marker: Peak of fundamental emission
 Marker Δ : Peak of highest spurious level below 902 MHz

30 MHz - 10th Harmonic Plot

RBW: 100 kHz
 VBW: 300 kHz
 Sweep: Auto
 Display line: -20 dBc

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

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

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

Test Conditions: Standard Temperature and Humidity
 Standard Test Voltage

Minimum Standard: In any 100kHz bandwidth outside the 902 - 928 MHz bands
 emissions shall be at least 20 dB below the fundamental emission
 or shall not exceed the following field strength limits. *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

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

NAME OF TEST: Transmitter Power Density	PARA. NO.: 15.247(d)
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Test Conditions: Standard Temperature and Humidity
 Standard Test Voltage

Minimum Standard: The transmitted power density averaged over any 1 second interval shall not be greater than +8 dBm in any 3 kHz bandwidth.

Method Of Measurement: The spectrum analyzer is set as follows:

- RBW: 3 kHz
- VBW: >3 kHz
- Span: => measured 6 dB bandwidth
- Sweep: Span(kHz)/3 (i.e. for a span of 1.5 MHz the sweep rate is 1500/3 = 500 sec.
- LOG dB/div.: 2 dB

Note: For devices with spectrum line spacing =< 3 kHz, the RBW of the analyzer is reduced until the spectral lines are resolved. The measurement data is normalized to 3 kHz by summing the power of all the individual spectral lines within a 3 kHz band in linear power units.

For Devices With Integral Antenna:

For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent isotropic radiated power using the same method as described for Peak Power output.

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

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

NAME OF TEST: Processing Gain	PARA. NO.: 15.247(e)
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Test Conditions: Standard Temperature and Humidity
Standard Test Voltage

Minimum Standard: The processing gain shall be at least 10 dB.

Method Of Measurement: The CW jamming margin method was used to determine the processing gain. A CW signal generator is stepped across the passband of the receiver in 50 kHz increments. At each point the signal generator level required to obtain the recommended bit error rate is recorded. The jammer to signal ratio (J/S) is then calculated. The worst 20% of the J/S points is discarded. The lowest remaining J/S ratio is used to calculate the processing gain.

Calculation Of Processing Gain:

The processing gain was determined by measuring the jamming margin of the E.U.T. and using the following formula:

$$\text{Jamming Margin} = G_p - (S/N)_{\text{out}} - L_{\text{sys}}$$

For a receiver using non-coherent detection the value $(S/N)_{\text{out}}$ is calculated using the formula:

$P_e = (1/2)\text{EXP}\{-E/2N_o\}$ where P_e is the probability of error (minimum Bit Error Rate required for proper operation).

E/N_o is $(S/N)_{\text{out}}$
for example, for a bit error rate of 10^{-4} a S/N ratio of 12.3 dB is required.

L_{sys} (system losses) is assumed to be 2 dB.

Therefore $G_p = M_j + (S/N)_{\text{out}} + L_{\text{sys}}$

Measurement performed at 915 MHz.

KTL Ottawa

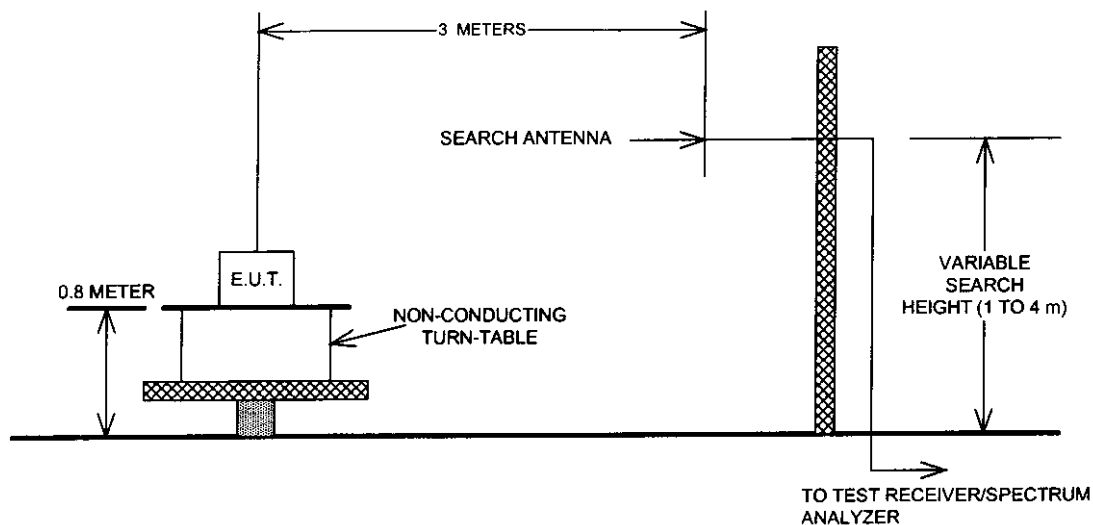
FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R00898
ANNEX B

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

ANNEX B
BLOCK DIAGRAMS

EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Test Site For Radiated Emissions



Below 1 GHz

Peak detector.
RBW = 100 kHz

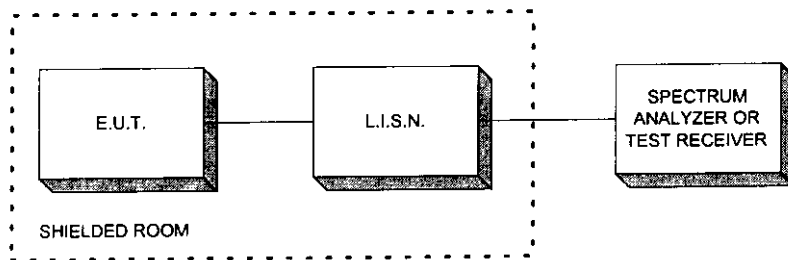
Above 1 GHz For Peak Emission Levels

Peak detector
RBW = 1 MHz
VBW = >RBW

Above 1 GHz For Average Emission Levels

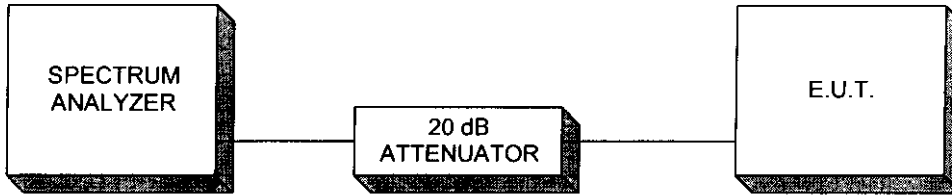
Peak detector
RBW = 1 MHz
VBW = 10 Hz

Conducted Emissions



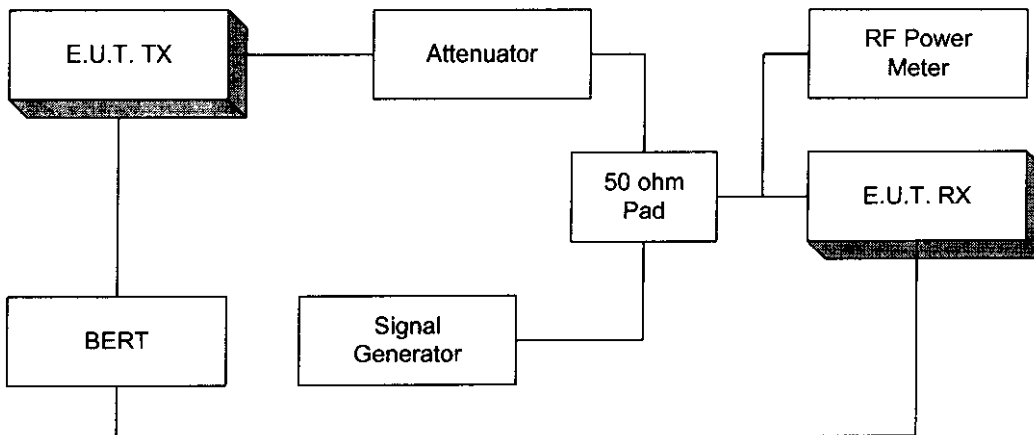
EQUIPMENT: WLS 912 WRLS Acuity Glass Break Detector
FCC ID: F5398SS12

Transmitter Power Density & Peak Power At Antenna Terminals



If the E.U.T. has an integral (non-detachable) antenna, the above test is performed as a radiated measurement and the result is reported as EIRP.

Processing Gain



NOTE: This is a typical setup. The setup may vary slightly since many devices have BER test functions built into the device.

Dennis Cecic, P. Eng. - DSC Ltd.

Wireless ACUITY Glass Break Detector (WLS912) Specification

- PRELIMINARY SPECIFICATION -

Contents:

1. General Specifications
2. Theory of Operation
3. Circuit Description
4. Battery Life Calculations

MT 43L

1. General Specifications:

System:

Operating Voltage:	4.5 Volt Alkaline (three AA's)
Operating Voltage Range:	4.5 V - 3.0 V
Average Standby Current:	50 uA
Battery Service Life:	3 Years
RF System Device "Type" Def'n:	PIR, type 03
Alarm Duration:	2 Seconds
Dimensions (APPROXIMATE):	5.250" X 2.250" x 1.375"
Self Diagnostics:	Self-Test for Low Battery Voltage Status indication on all TX's
Environmental:	0C - 50C (32F - 120F) 0 - 85% RH, non-condensing

Glass Break Sub-System:

Operating Voltage:	2.7 Volt
Average Standby Current:	33 uA
Operating Modes:	Normal / Installer Test
Sensitivity:	Adjustable - Level1 (normal) / Level2 (low)
Microphone Type:	Omnidirectional Electret Condenser

Range:

Glass Type	Thickness	Size (lxw)	Level 1 Range	Level 2 Range
Plate	1/8"-1/4" 3-6mm			
Tempered	1/8"-1/4" 3-6mm			
Wired	1/4" 6mm			
Laminated	1/4" 6mm			

Dennis Cecic, P. Eng. - DSC Ltd.

Wireless ACUITY Glass Break Detector (WLS912) Specification

- PRELIMINARY SPECIFICATION -

Digital Controller Sub-System:

Operating Voltage:	2.7 Volts
Average Standby Current:	7 uA

RF Transmitter Sub-System:

Type:	BFSK Direct Sequence Spread Spectrum
Operating Voltage:	3.0 Volts
Averaged Standby Current **:	10uA
Peak Operating Current:	120mA
Transmitter Power:	
Transmitter Range:	

** 4-15mS, 120mA current bursts every 12 minutes.

Dennis Cecic, P. Eng. - DSC Ltd.

Wireless ACUITY Glass Break Detector (WLS912) Specification

- PRELIMINARY SPECIFICATION -

2. Theory Of Operation

The model WLS912 is a battery operated acoustic glass break sensor, designed to detect the sound produced by the shattering of a framed piece of glass. The glass may be of the plate, tempered, laminated or wired type. Equipped with an RF transmitter, the WLS912 establishes a supervised, one-way communications link with the 900MHz System Controller. The controller monitors transmissions from the WLS912 for Trouble (low battery), Alarm Activation, or Detector Tamper (detector removal from base plate). If the controller does not detect a supervisory transmission from the WLS912 for a period of time, it will indicate that a fault condition exists with the WLS912.

The basic working principle for this sensor is identical to that of the ACUITY AC-100 series glass break sensor. The impact and subsequent shattering of a framed piece of glass produces short duration sound energy having frequencies spanning the infrasonic (below that of human hearing) through to the ultrasonic (above that of human hearing) and beyond. The WLS912 issues an alarm upon detecting a short-duration, broad-band sound source. The vast majority of sounds in a typical environment are narrow-band in nature (i.e few frequencies are produced by door bells, telephones, clanging dishes, etc.). WLS912 also has built in protection against loud, constant amplitude "white" noise sources which could trip the sensor.

The major difference between the ACUITY AC-100 and the WLS912 is the electrical energy requirements. WLS912 achieves its performance while consuming 1000x less power than the AC-100.

05/04/98

Dennis Cecic, P. Eng. - DSC Ltd.

Wireless ACUITY Glass Break Detector (WLS912) Specification

- PRELIMINARY SPECIFICATION -

3. Circuit Description (refer to attached schematic "UA040 revX4")
The WLS912 circuit is essentially a ultra low power acoustic glass break sensor, coupled to the SLTX rev02 RF transmitter.

05/04/98



Digital Security Controls Ltd.
1645 Flint Road, Downsview
Ontario, Canada M3J 2J6
Tel. (416) 665-8460 • Fax (416) 665-7498 • Toll Free 1-888-888-7838

STATEMENT OF QUANTITY (CFR47, 2.983 (c))

The WLS912 Wireless GlassBreak Detector will have production planned for more than one unit.

Marshall Pye

Date: NOVEMBER 20, 1998

MARSHALL PYE

Publishing and Approvals Manager



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MANUFACTURER'S ATTESTATION

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample (s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by Certelecom Laboratories Inc.

A handwritten signature in cursive script that reads 'Marshall Pye'.

MARSHALL PYE

Approvals Manager

Date: NOVEMBER 20, 1996