

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

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EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

Section 1. Summary Of Test Results

Manufacturer: Digital Security Controls Ltd.

Model No.: WLS 917

Serial No.: FCC #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.

- | | | | |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input checked="" type="checkbox"/> | New Submission | <input type="checkbox"/> | Production Unit |
| <input type="checkbox"/> | Class II Permissive Change | <input checked="" type="checkbox"/> | Pre-Production Unit |
| <input type="checkbox"/> | Equipment Code | <input type="checkbox"/> | 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: Kevin Carr DATE: 09 Feb 99
Kevin Carr, Technologist

TECHNICAL REVIEW: Tom Tidwell DATE: 9 Feb. 1999
Tom Tidwell, Wireless Group Manager

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EQUIPMENT: WLS 917 Wireless Door Contact
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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	897 kHz	Complies
Peak Power Output	15.247 (b)	1 watt	0.0321 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)	Chart	Complies
Transmitter Power Density	15.247 (d)	\leq +8 dBm	-12.3 dBm	Complies
Processing Gain	15.247 (e)	\geq 10 dB	Data	Complies

Footnotes For N/A's:**Test Conditions:** Temperature: 22 °C
 Humidity: 29 %

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Section 2. General Equipment Specification

Transmitter

Power Input:	3 Vdc Lithium Battery
Frequency Range:	924 (Fixed)
Tunable Bands:	1
6 dB Bandwidth:	0.897 MHz
Type of Modulation	FSK (Direct Sequence Spread Spectrum)
Data Rate:	Not Applicable
Internal / External Data Source:	Internal
Emissions Designator:	900KF1D
Output Impedance:	Not Applicable
RF Power Output (Rated):	Single: Not Applicable
Duty Cycle:	20 dB
Channel Spacing:	Not Applicable
Operator Selection of Operating Frequency:	No Operator Control
Power Output Adjustment Capability:	No Operator Control
Duty Cycle Calculation:	
	Maximum RF ON Time: 9.5 msec.
	Duty Cycle Factor (dB) = $20 \text{ Log } \frac{9.5}{100}$
	Duty Cycle Factor (dB) = 20.4 dB

EQUIPMENT: WLS 917 Wireless Door Contact
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Receiver

Frequency Range:

Tunable Bands:

LO:

1st IF:

2nd IF:

Bandwidth:

Type of Modulation:

Operator Selection of Operating Frequency

NOT APPLICABLE

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R01051

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

Description of Modification for Modification Filing

NOT APPLICABLE

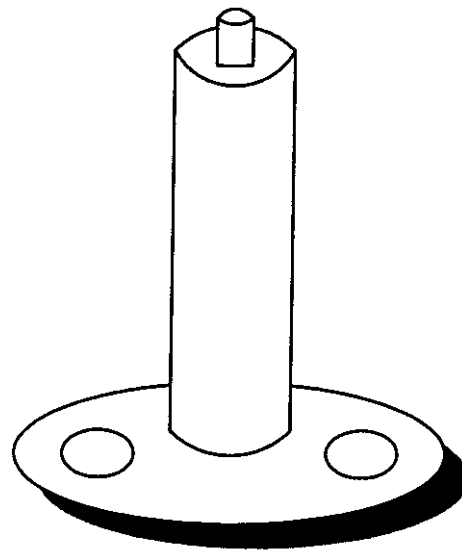
Family List Rational

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

Theory of Operation

The E.U.T. is a wireless transmitter that operates with the WLS 900 series of alarm devices. The WLS 917 is a door contact relay that when triggered, sends a short data burst to the alarm controller reporting an alarm condition.

System Diagram



EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

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

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

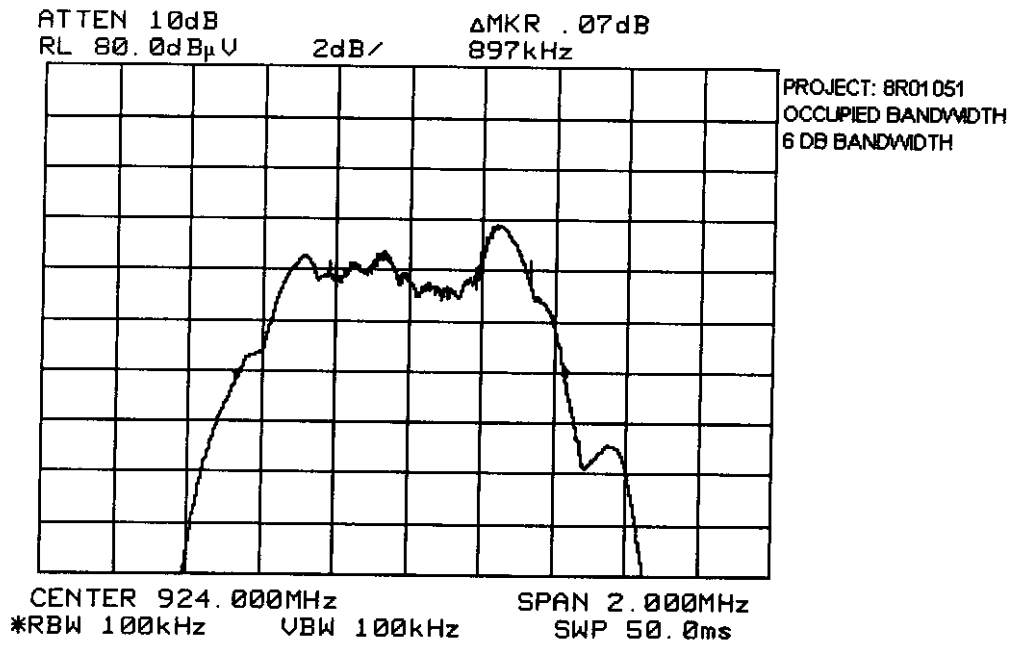
Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: Kevin Carr	DATE: December 10, 1998

Test Results: Complies. The 6 dB bandwidth is 0.897 MHz.
See attached graph.

Measurement Data: See attached graph.

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EQUIPMENT: WLS 917 Wireless Door Contact
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Section 5. Peak Power Output

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247 (b)
TESTED BY: Kevin Carr	DATE: December 8, 1998

Test Results: Complies. The maximum peak power output of the transmitter is 0.0321 watts.

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

Directional Gain of Antenna: 0.0 dBi or 1 Numeric.
Peak Power Output: 0.0321 watts.
Field Strength: 110.3dB μ V/m @ 3m or 0.327 V/m @ 3m.

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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 _____ above / below the specification limit.

Measurement Data: See attached graphs.

NOT APPLICABLE

EQUIPMENT: WLS 917 Wireless Door Contact
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Section 7. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(c)
TESTED BY: Kevin Carr	DATE: December 8, 1998

Test Results: Complies. The worst-case emission level is 71.5dB μ V/m @ 3m at 4621.3 MHz. This is 2.5 dB below the specification limit.

Measurement Data: See attached graphs.

EQUIPMENT: WLS 917 Wireless Door Contact
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Test Data - Radiated Emissions (PEAK)

Distance: 3m		A tower		Receiver: 8566B		Detector: Peak		RBW: 1 MHz		VBW: 3 MHz	
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	E/D4	V			75.2	35.1			110.3	110.3	0.0
924.0	E/D4	H			65.9	35.1			101.0	110.3	9.3
1847.0	Hrn2	V			88.6	30.2	-44.5		74.3	90.3	16.0
1847.3	Hrn2	H			84.9	30.2	-44.5		70.6	90.3	19.7
2772.7	Hrn2	V			82.0	32.0	-45.0		69.0	74.0	5.0
2771.0	Hrn2	H			82.2	32.0	-45.0		69.2	74.0	4.8
3696.6	Hrn2	V			69.8	35.6	-42.3		63.1	74.0	10.9
3696.96	Hrn2	H			71.5	35.6	-42.3		64.8	74.0	9.2
4621.3	Hrn2	V			77.4	37.7	-43.6		71.5	74.0	2.5
4618.7	Hrn2	H			74.1	37.7	-43.6		68.2	74.0	5.8
5545.4	Hrn2	V			81.4	40.3	-43.4		78.3	90.3	12.0
5542.1	Hrn2	H			71.6	40.3	-43.4		68.5	90.3	21.8
6465.5	Hrn2	V			68.3	42.8	-40.8		70.3	90.3	20.0
6465.4	Hrn2	H			64.4	42.8	-40.8		66.4	90.3	23.9
7393.0	Hrn2	V			65.4	44.7	-42.1		68.0	74.0	6.0
7393.8	Hrn2	H			60.1	44.7	-42.1		62.7	74.0	11.3
8317.0	Hrn2	V			62.5	48.3	-44.0		66.8	74.0	7.2
8314.1	Hrn2	H			55.4	48.3	-44.0		59.7	74.0	14.3
9238.1	Hrn2	V			51.6	50.5	-43.4		58.7	74.0	15.3
9238.0	Hrn2	H			45.4	50.5	-43.4		52.5	74.0	21.5

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 917 Wireless Door Contact
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Test Data - Radiated Emissions (AVERAGE)

Test Distance (meters) : 3		Range: A Tower		Receiver: HP8566B		RBW: 1 MHz		VBW: 10 Hz		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)
2771.8	Hrn2	V			72.1	32.0	-45.0	-20.0	39.1	54.0	14.9
2772.0	Hrn2	H			73.2	32.0	-45.0	-20.0	40.2	54.0	13.8
3696.6	Hrn2	V			62.8	35.6	-42.3	-20.0	36.1	54.0	17.9
3696.6	Hrn2	H			58.6	35.6	-42.3	-20.0	31.9	54.0	22.1
4620.5	Hrn2	V			62.2	37.7	-43.6	-20.0	36.3	54.0	17.7
4620.5	Hrn2	H			54.6	37.7	-43.6	-20.0	28.7	54.0	25.3
7389.4	Hrn2	V			48.6	44.7	-42.1	-20.0	31.2	54.0	22.8
7389.4	Hrn2	H			46.1	44.7	-42.1	-20.0	28.7	54.0	25.3
8318.2	Hrn2	V			51.9	48.4	-44.0	-20.0	36.3	54.0	17.7
8318.4	Hrn2	H			41.8	48.4	-44.0	-20.0	26.2	54.0	27.8

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.

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R01051

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Radiated Photographs (Worst Case Configuration)

FRONT VIEW

REAR VIEW

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

Section 8. Transmitter Power Density

NAME OF TEST: Transmitter Power Density	PARA. NO.: 15.247(d)
TESTED BY: Kevin Carr	DATE: December 8, 1998

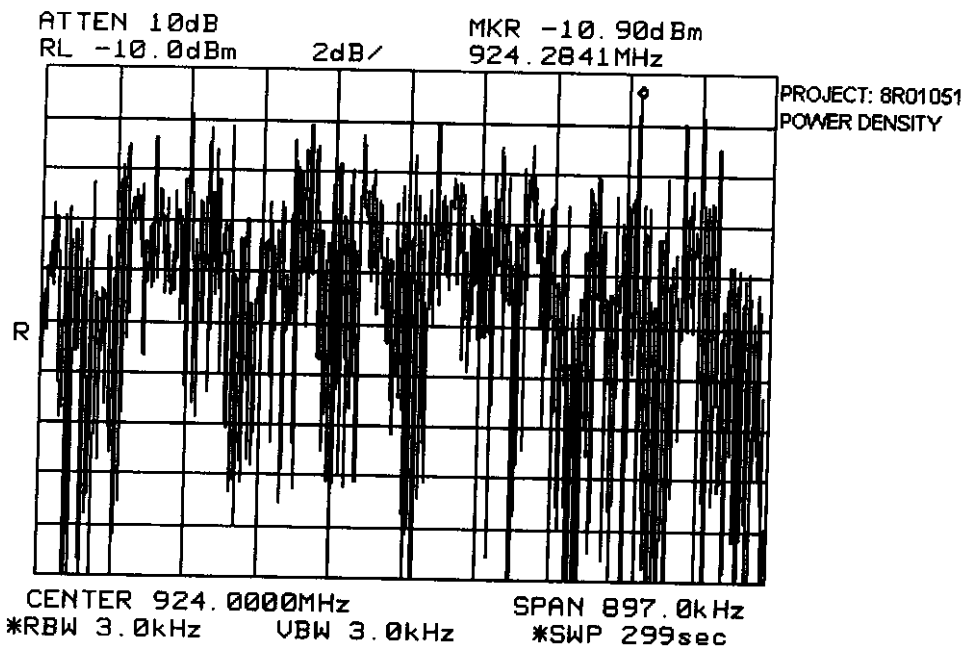
Test Results: Complies.

Measurement Data: See attached graphs.

Field Strength: 96.1 dB μ V/m
E.I.R.P.: 1.22 mW
E.I.R.P.: 0.864 dBm

NOTE: The attached graph is intended to be read in field strength. The trace is compensated for cable loss and antenna factor.

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17



EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

Section 9. Processing Gain

NAME OF TEST: Processing Gain	PARA. NO.: 15.247(e)
TESTED BY: Tom Tidwell	DATE: January 14, 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

$10.3 \text{ dB} + 1.42 \text{ dB} + 2 \text{ dB} = 13.7 \text{ dB}$
Measured with WLS 920 receiver.

EQUIPMENT: WLS 917 Wireless Door Contact
 FCC ID: F5398SSI7

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

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
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Additional Data

NOT APPLICABLE

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

Section 10. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
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	
2 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 18/98	Nov. 18/99	
1 Year	Dipole Antenna Set	EMCO	3121C	1029	Nov. 18/98	Nov. 18/99	
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Aug. 4/98	Aug. 4/99	
1 Year	Low Noise Amplifier	DBS Microwave	DWT-13035	9623	Aug. 4/98	Aug. 4/99	

NA: Not Applicable
 NCR: No Cal Required

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R01051
ANNEX A

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

ANNEX A
TEST METHODOLOGIES

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FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R01051
ANNEX A

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
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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 917 Wireless Door Contact
FCC ID: F5398SS17

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 917 Wireless Door Contact
FCC ID: F5398SS17

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 917 Wireless Door Contact
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NAME OF TEST: Spurious Emissions at Antenna Terminal 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.

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 917 Wireless Door Contact
 FCC ID: F5398SS17

NAME OF TEST: Radiated Spurious Emissions	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 ($\mu\text{V/m @ 3m}$)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

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 917 Wireless Door Contact
FCC ID: F5398SS17

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 917 Wireless Door Contact
FCC ID: F5398SS17

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

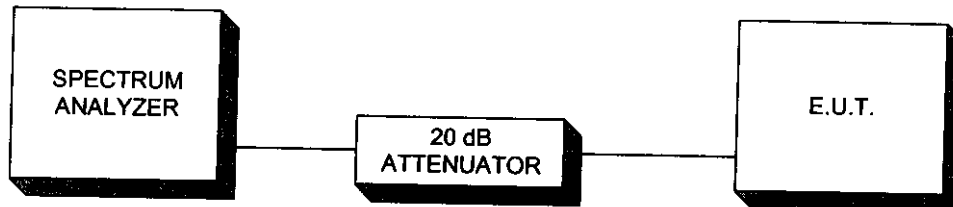
FCC PART 15, SUBPART C
DIRECT SEQUENCE TRANSMITTERS
PROJECT NO.: 8R01051
ANNEX B

EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

ANNEX B
BLOCK DIAGRAMS

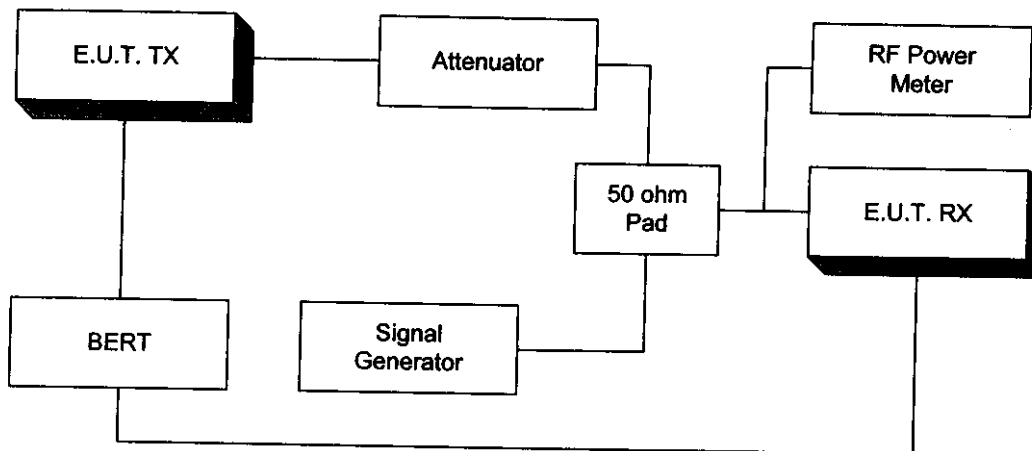
EQUIPMENT: WLS 917 Wireless Door Contact
FCC ID: F5398SS17

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.