

*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

NVLAP LAB CODE: 100351-0

TESTED BY:

Kevin Carr  
Kevin Carr, Technologist

DATE:

09 Feb 99

TECHNICAL REVIEW:

Tom Tidwell  
Tom Tidwell, Wireless Group Manager

DATE:

9 Feb. 1999

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**Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
Powerline Conducted Emissions	15.207 (a)	48 dB $\mu$ 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**

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

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**Receiver**

**Frequency Range:**

**Tunable Bands:**

**LO:**

**1<sup>st</sup> IF:**

**2<sup>nd</sup> 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*  
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**Description of Modification for Modification Filing**

**NOT APPLICABLE**

**Family List Rational**

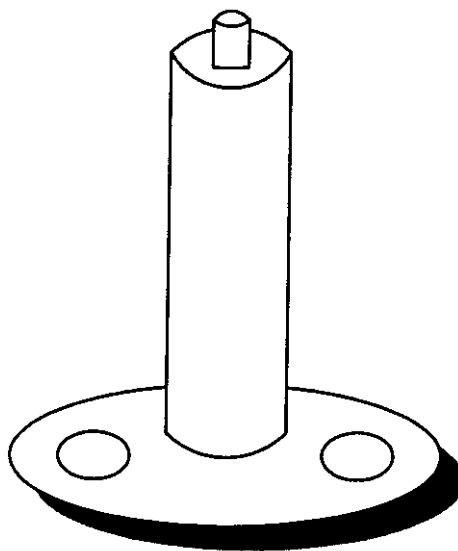
*EQUIPMENT: WLS 917 Wireless Door Contact*  
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### **Theory of Operation**

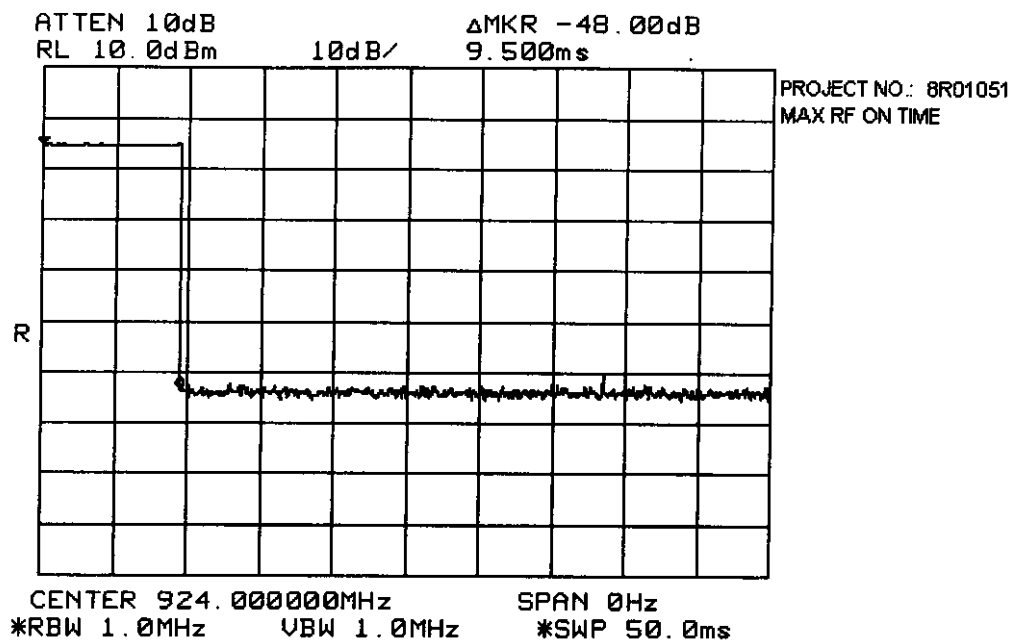
The E.U.T. is a wireless transmitter that operates with the WLS 900 series of alarm devices. The WLS 917 is a door contact relay that when triggered, sends a short data burst to the alarm controller reporting an alarm condition.

### **System Diagram**





EQUIPMENT: WLS 917 Wireless Door Contact  
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*EQUIPMENT: WLS 917 Wireless Door Contact*  
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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**

*EQUIPMENT: WLS 917 Wireless Door Contact*  
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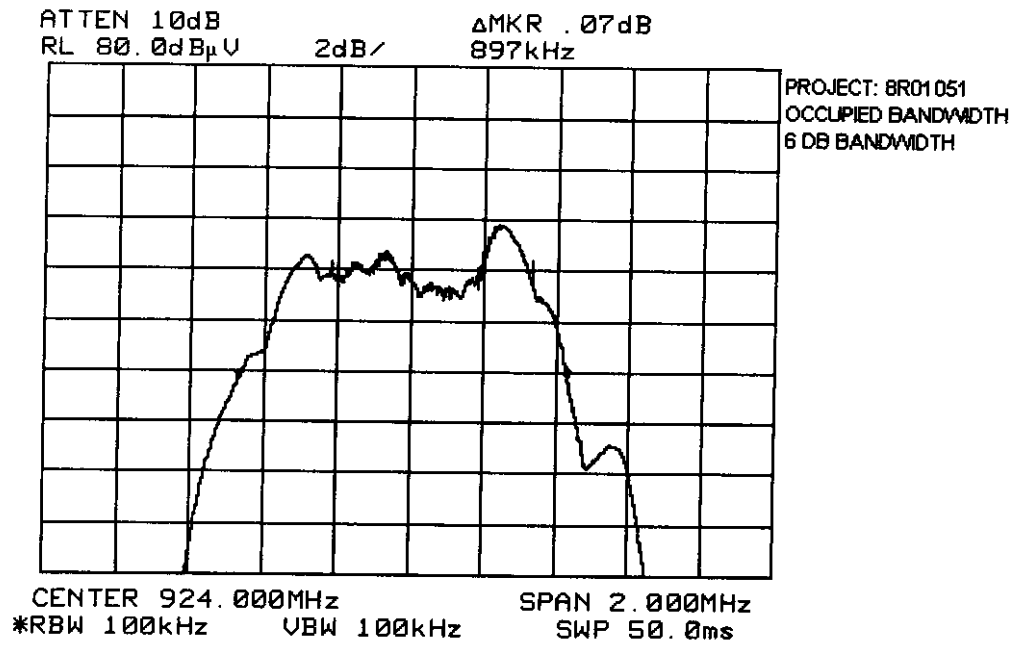
**Section 4.      Occupied Bandwidth**

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 $\mu$ V/m @ 3m or 0.327 V/m @ 3m.

**EQUIPMENT:** WLS 917 Wireless Door Contact  
**FCC ID:** F5398SS17

### Peak Power Output

[illegible]

*EQUIPMENT: WLS 917 Wireless Door Contact*  
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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 graph

**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 $\mu$ V/m @ 3m  
at 4621.3 MHz. This is 2.5 dB below the specification  
limit.

**Measurement Data:**              See attached graphs.



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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.

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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

*EQUIPMENT: WLS 917 Wireless Door Contact*  
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**Radiated Photographs (Worst Case Configuration)**

FRONT VIEW

REAR VIEW

*EQUIPMENT: WLS 917 Wireless Door Contact*  
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**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 $\mu$ V/m  
E.I.R.P.: 1.22 mW  
E.I.R.P.: 0.864 dBm

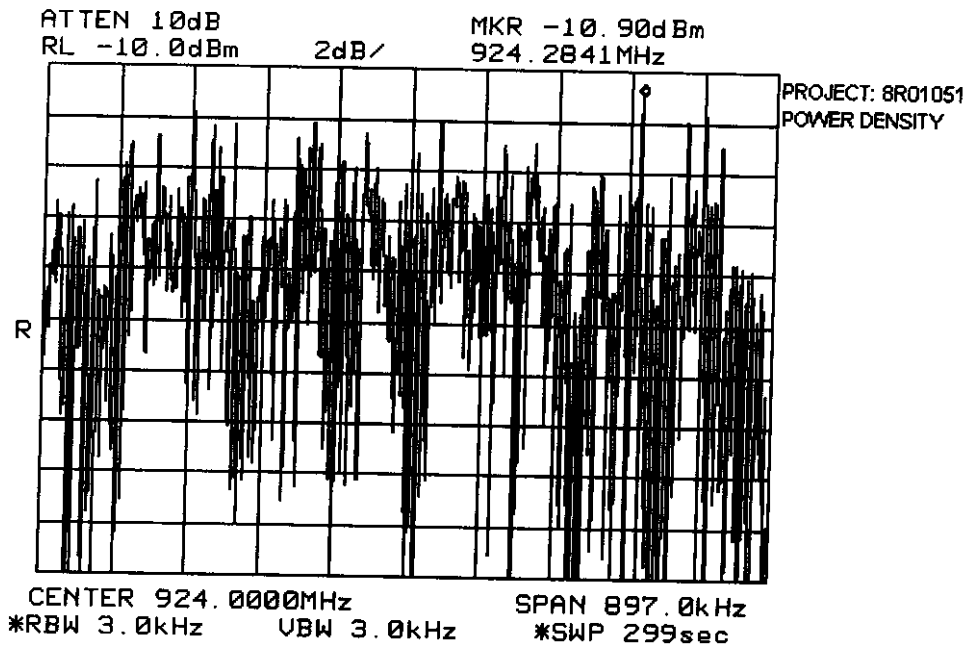
NOTE: The attached graph is intended to be read in field strength. The trace is compensated for cable loss and antenna factor.

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

EQUIPMENT: WLS 917 Wireless Door Contact  
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*EQUIPMENT: WLS 917 Wireless Door Contact*  
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## **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:  $2.5 \times 10^{-1}$   
 $S/N_{out}$ : 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  
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**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

*EQUIPMENT: WLS 917 Wireless Door Contact*  
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**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*

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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 $\mu$ V (48 dB $\mu$ V) across 50 ohms.

*EQUIPMENT: WLS 917 Wireless Door Contact*  
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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:

<b>Tuning Range</b>	<b>Number Of Channels Tested</b>	<b>Channel Location In Band</b>
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)

**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 ( $\mu$ 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 10<sup>th</sup> harmonic.***Method Of Measurement:****Upper Band Edge**

RBW: At least 1% of span/div.

VBW: &gt;RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz

Marker: Peak of fundamental emission

Marker  $\Delta$ : Peak of highest spurious level above 928 MHz**Lower Band Edge**

RBW: At least 1% of span/div.

VBW: &gt;RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz

Marker: Peak of fundamental emission

Marker  $\Delta$ : 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)

**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 10<sup>th</sup> 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)

**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: &gt;3 kHz

Span: =&gt; 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  $\leq 3$  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)

**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.

$L_{\text{sys}}$  (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.

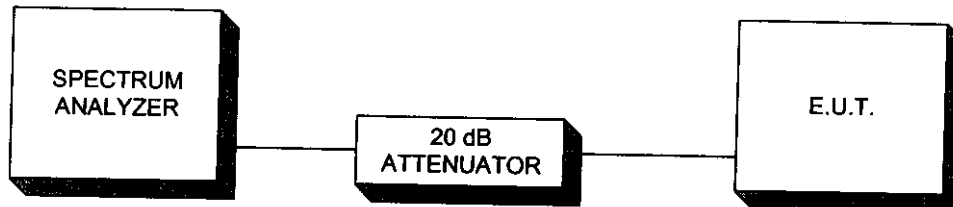
*EQUIPMENT: WLS 917 Wireless Door Contact*  
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**ANNEX B**  
**BLOCK DIAGRAMS**

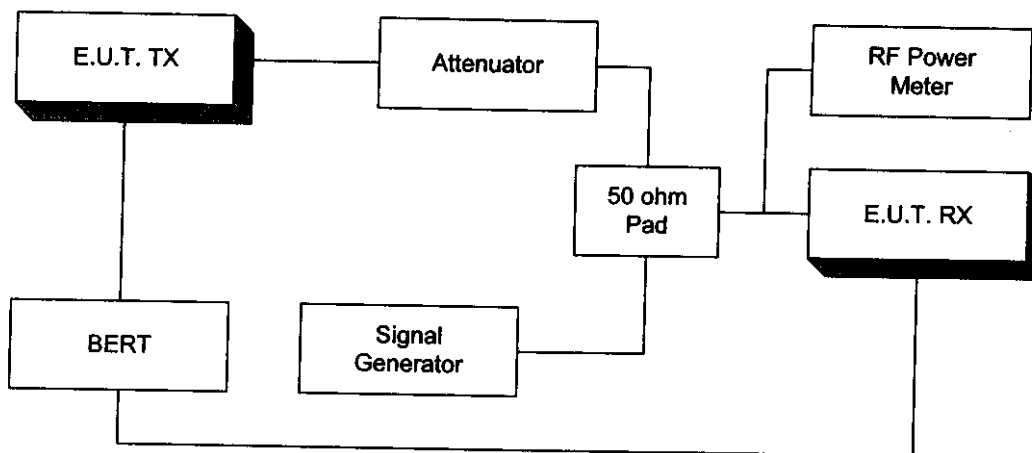
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### Transmitter Power Density & Peak Power At Antenna Terminals



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.