KTL Test Report:	8R01283
Applicant:	Digital Security Controls Ltd. 1645 Flint Road Downsview, Ontario M3J 2J6
Equipment Under Test: (E.U.T.)	Key Panel With Spread Spectrum Receiver
FCC ID:	F5399SSZ32
In Accordance With:	**FCC Part 15, Subpart B** Radio Receivers
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	T. Tidwell, Wireless Group Manager
Date:	23 March, 1999
Total Number of Pages:	26

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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 FCC Part 15, Subpart B. Measurement procedure ANSI C63.4-1992 was used for all tests. Radiated Emissions were measured on an open area test site.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

C	Y	Y	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

It is recommended that the margin of compliance be improved to allow for manufacturing tolerances.

TESTED BY: Kevin Carr DATE: 23 March 99
Kevin Carr, Technologist

Summary Of Test Data

Name Of Test	Para. No.	Results
Antenna Conducted Emissions	15.111	Not Applicable
Radiated Emissions	15.109	Complies
Powerline Conducted Emissions	15.107	Not Applicable

Footnotes For N/A's:

Test Conditions:

Indoor	Temperature:	Not Applicable
	Humidity:	Not Applicable
Outdoor	Temperature:	5 °C
	Humidity:	22 %

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

Manufacturer:	Digital Security Controls Ltd.
Model No.:	PC5516Z32-900
Serial No.:	FCC No. 1

Equipment Details

Frequency Range:	877.35 MHz (Fixed), Local Oscillator
Number of Channels:	1
Operating Frequency(ies) of Sample:	877.35 MHz
Crystal Frequency(ies):	13.708594 MHz
Primary Power Requirement:	12 Vdc
Bandwidth and Emission Designator:	N/A
Intermediate Frequency(ies):	N/A

Description of E.U.T.

The E.U.T. is a key panel and spread spectrum receiver for a wireless security system.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Theory of Operation

The Power 832 Key Panel is a spread spectrum receiver. It receives a signal from the peripheral transmitters and acts according to it's software programming. The device is powered via 12 Vdc.

Justification

The E.U.T. was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration:

(1) Vertically mounted.

Exercise Program

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise mode:

(1) Normal operation.

Section 3. Equipment Configuration

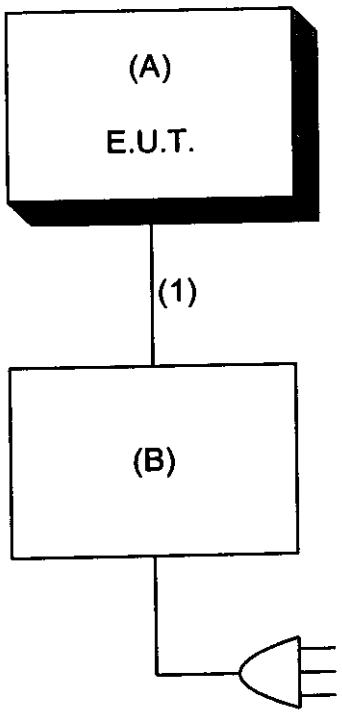
Equipment Configuration List:

Item	Description	Model No.	Serial.	Rev.
(A)	Key Panel (EUT)	PC5516Z32-900	FCC No. 1	
(B)	DC Power Supply – ASTRON	VS-50M	8405071	

Inter-connection Cables:

Item	Description	Length (m)
(1)	Twisted Pair	5.0

Configuration of the Equipment Under Test (E.U.T)



Section 4. Receiver Antenna Conducted Emissions

NAME OF TEST: Receiver Antenna Conducted Emissions	PARA. NO.: 15.111
TESTED BY:	DATE:

Test Results: Complies/Does Not Comply. See attached graphs and table.

Measurement Data: See attached graphs and table.

NOT APPLICABLE

Section 5(A). Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(a)
TESTED BY: Kevin Carr	DATE: February 4, 1999

Minimum Standard:

Frequency(MHz)	Field Strength (dBμV/m @ 3m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

Test Results: Complies. The worst-case emission level is 44.6 dBμV/m @ 3m at 877.35 MHz. This is 1.4 dB below the specification limit.

Measurement Data: See attached table.

For super-regenerative receivers the receiver is cohered using a signal generator and dipole antenna.

Handheld equipment and equipment not designed to be mounted in any fixed orientation, the E.U.T. is tested in three orthogonal axis to obtain worst case results.

Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP, H.P.8566B		RBW: 120 kHz, 1 MHz		Detector: CISPR, Q-Peak, 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)
877.35	E/D4	V			10.4	34.2			44.6	46.0	1.4
877.35	E/D4	H			6.2	34.2			40.4	46.0	5.6
1754.75	Hrn2	V			54.4	29.8	-43.0		41.2	54.0	12.8
1754.75	Hrn2	H			56.6	29.8	-43.0		43.4	54.0	10.6

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna. ( ) Denotes failing emission level.

(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RBW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

No emissions above 1754.75 MHz were observed.

Section 5(B). Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(b)
TESTED BY:	DATE:

NOT APPLICABLE

Minimum Standard: Equipment manufactured or imported prior to June 23, 1999 is permitted the following limits:

Frequency (MHz)	Field Strength (dBμV/m @ 3m)
[illegible]	320 (50.1 dBμV/m)
70-130	500 (54.0 dBμV/m)
130-174	500 - 1500 dBμV/m)
174-260	1500 (63.5 dBμV/m)
260-470	1500 - 5000 (linear interpolation)
Above 470	5000 (74.0 dBμV/m)

Test Results: Complies / Does Not Comply. The worst-case emission level is _____ dBμV/m @ 3m at _____ MHz. This is _____ dB above/below the specification limit.

Measurement Data: See attached table.

Test Data - Radiated Emissions

Test Distance (meters) :		Range:		Receiver:		RBW(kHz):		Detector:			
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 (dBµ	Limit (dBµV/m)	Margin (dB)

NOT APPLICABLE

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna. ( ) Denotes failing emission level.
(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RBW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

Radiated Photographs (Worst Case Configuration)

FRONT VIEW

NOT APPLICABLE

REAR VIEW

Section 6. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.107
TESTED BY:	DATE:

Minimum Standard: The RF energy feed back into the power lines shall not exceed 48 dBµV on any frequency between 0.45 MHz and 1.6 MHz inclusive.

Test Results: Complies / Does Not Comply. See attached graphs.

Measurement Data: See attached graphs.

NOT APPLICABLE

Powerline Conducted Photographs (Worst Case Configuration)

FRONT VIEW

NOT APPLICABLE

REAR VIEW

Section 7. Additional Information (Processing Gain)

NAME OF TEST: Processing Gain	PARA. NO.: 15.247(e)
TESTED BY: Customer Supplied	DATE: March 22, 1999

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

Measurement Data: See attached data.

BER:
S/N_{out}:
J/S Ratio: 10.3 dB
L_{sys}: 2.0 dB
Data Rage: 10 Kbits/sec or 100μs/bit
PN Rate: 902 Kbits/sec or 1.1μs/bit

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

Section 8. Sample Calculations

Conducted Emissions:

If the Quasi-Peak to Average ratio is greater than 6 dB, then the emission is classified as broadband and its Quasi-Peak level is reduced by 13 dB for comparison to the limit.

i.e. Quasi-Peak level = 40 dBµV
Average level = 34 dBµV
Corrected level = 40 - 13 = 27 dBµV

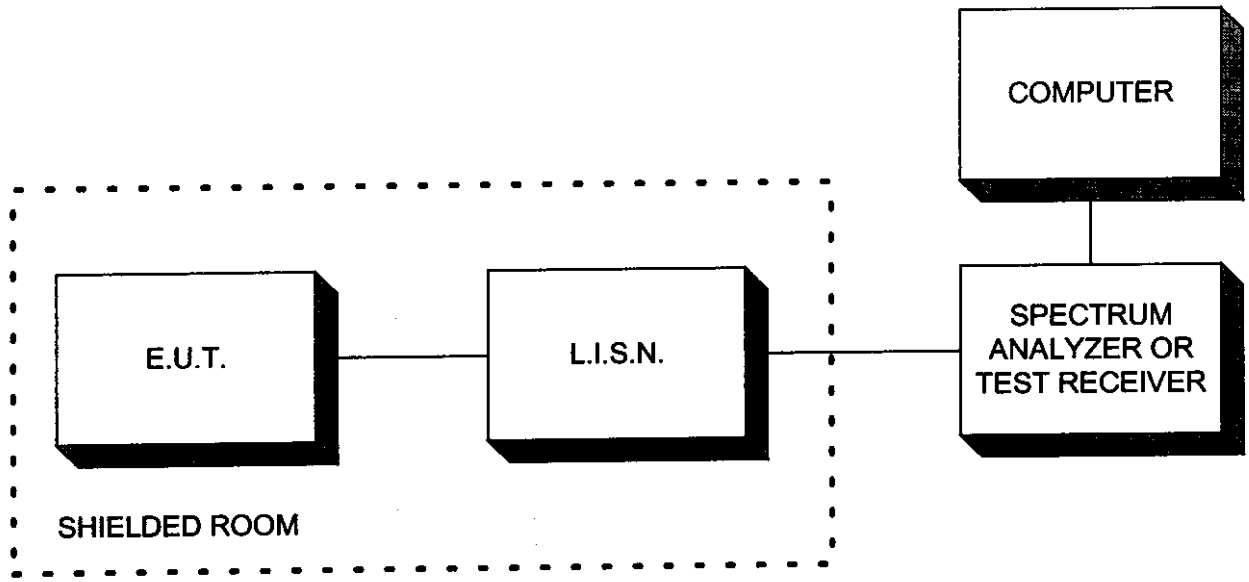
Radiated Emissions

Emissions are measured at a distance of 3 meters and corrected for antenna factor and cable loss.

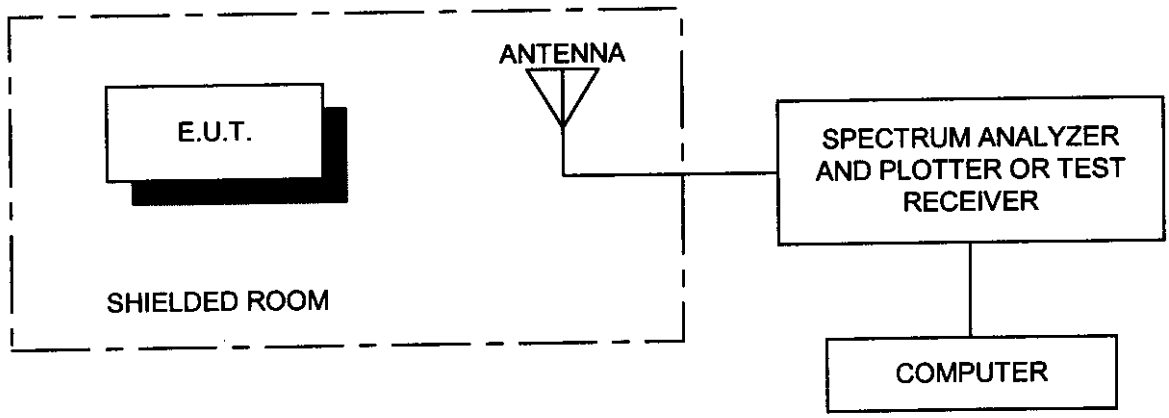
i.e. Received Signal = 25 dBµV @ 100 MHz
Antenna Factor & Cable Loss = 9.8 dB
Field Intensity = 25 + 9.8 = 34.8 dBµV/m @ 3 m

Section 9. Block Diagrams

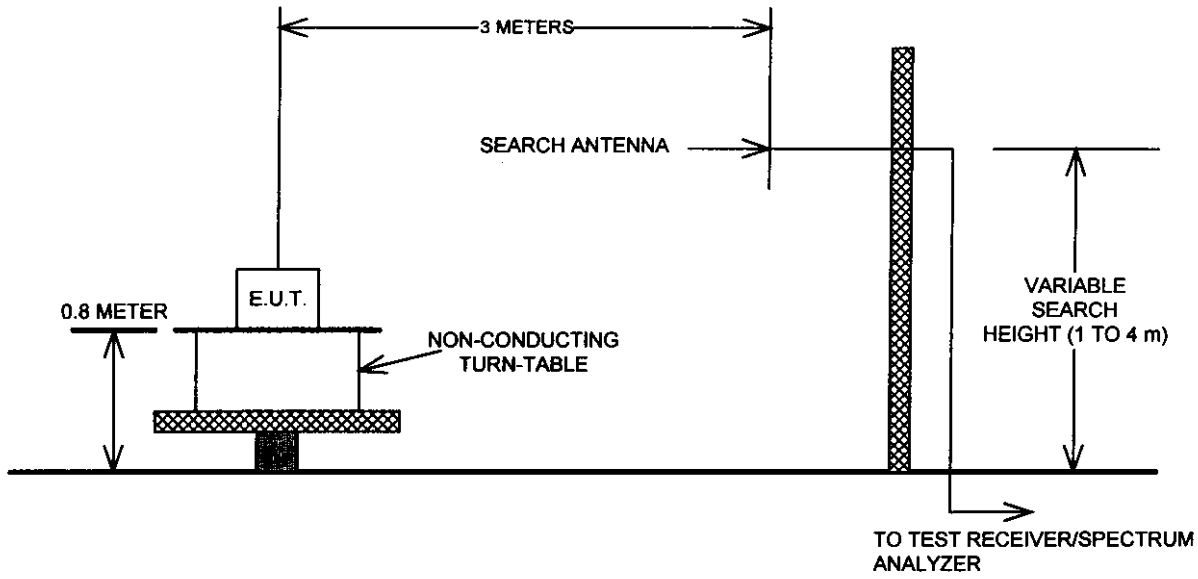
Conducted Emissions



Radiated Prescan



Outdoor Test Site For Radiated Emissions



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

Section 10. Test Equipment List

Equipment List - Conducted Emissions - Shielded Room #1

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
1Year	Spectrum analyzer	Hewlett-Packard	8566B	2311A02238	Oct. 22/98	Oct. 22/99
1Year	Spectrum analyzer display	Hewlett-Packard	8566B	2314A04759	Oct. 22/98	Oct. 22/99
1Year	Quasi-peak adapter	Hewlett-Packard	85650A	2043A00302	Oct. 22/98	Oct. 22/99
	Plotter	Hewlett-Packard	7550A	28484 15123	N/A	N/A

Equipment List - Radiated Emissions

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
1Year	Dipole Antenna Set	EMCO	3121C	1029	Nov. 18/98	Nov. 18/99
1Year	Receiver	Rohde & Schwarz	ESVP	892661/014	Mar. 31/98	Mar. 31/99
2 Year	Horn Antenna	EMCO	3115	4336	Oct. 30/97	Oct. 30/99
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

Note: N/A = Not Applicable
NCR = No Cal Required