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RD Systems Compliance

FCC Subpart C

Test Report

For :
Westinghouse Security Electronics
47102 Mission Falls Court
Fremont, CA 94539

Equipment Tested :
Access Sensor

Model:
DR4208S

Test Report Number:	WSE0009dr08sfcC
Date:	March 5, 2000

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GENERAL INFORMATION

Test Report Number:	WSE0009dr08sfcC
Date:	March 5, 2000
Applicant:	Westinghouse Security Electronics 47102 Mission Falls Court Fremont, CA 94539
Equipment Tested:	Access Sensor
Model:	DR4208S
Purpose Of Test:	To demonstrate the **compliance** of the Access Sensor, DR4208S with the requirements of FCC Part 15/ANSI C63.4-1992 Rules and Regulations **Subpart C** Limits.
Test Site Location: OATS	Atlas Compliance & Engineering 726 Hidden Valley Road Watsonville, California 95076
Tested for Compliance With:	FCC Part 15 Rules and Regulations for **Subpart C** to ANSI / C63.4-1992 procedures
Frequency Range Investigated:	10 kHz to 30 MHz
Date Product Tested:	March 1, 2000
Test Personnel:	Mario E. Baraona Sr. EMC Engineer

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TEST EQUIPMENT

The following test equipment was utilized in making the measurements contained in this report.

1. EMI Test Receiver 9 kHz - 2500 MHz, Rohde & Schwarz, Model No. ESPC, S/N - 845296/024, Date Calibration due, March 26, 2001, Calibration Cycle 1 year.
2. Pre amp, Hewlett Packard, Model No. 8447D, S/N - 2944A08506, Date Calibration due, June 25, 2000, Calibration Cycle 1 year.
3. Pre amp, Schaffner/Chase, Model No. CPA9231A, S/N - 3259, Date Calibration due, January 18, 2001, Calibration Cycle 1 year.
4. BiLog Antenna, Chase Electronics Limited, Model No. CBL6141, S/N - 4034, Date Calibration due, March 18,2001, Calibration Cycle 1 year.
5. Biconical Antenna, A.H. Systems, Model No. SAS 200/540, S/N - 272, Date Calibration due, January 26, 2001, Calibration Cycle 1 year.
6. Log Periodic Antenna, A.H. Systems, Model No. SAS 200/512, S/N - 061, Date Calibration due, January 27, 2001, Calibration Cycle 1 year.
7. LISN, Solar Electronic, Model No. 8012-50-R-24-BNC, Date Calibration due, January 18, 2001, Calibration Cycle 1 year.
8. LISN, EMCO, Model No. 3825/2, S/N - 9007-1683, Date Calibration due, January 18, 2001, Calibration Cycle 1 year.
9. LISN, EMCO, Model No. 4825/2, S/N - 1088, Date Calibration due, January 18, 2001, Calibration Cycle 1 year.
10. Temperature and Humidity meter, OMEGA Engineering, Model No. RH-20-F, S/N - 200-97-082591, Date Calibration due - January 27, 2001, Calibration Cycle 1 year.
11. Active Loop Antenna, EMCO, Model No. 6502, S/N - 9307-2839, Date Calibration due, November 7, 2000

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EQUIPMENT UNDER TEST CONFIGURATION

Customer: Westinghouse Security Electronics

Date: March 1, 2000

Specification: **FCC Part 15 Subpart C** ANSI C63.4-1992

EUT Description:

The EUT, DR4208S is an access control panel with a keypad. It was setup in a configuration to simulate a typical installation. The host equipment was placed 25 feet from the equipment under test. The DR4208S is a 6 Layer PCB and was constantly reading an access card. EUT clock at 11.059 MHz.

EUT Support Devices:

Model:	Description:	S/N	FCC ID#
4108	NexSentry, ACU	CAQL3180278	N/A
902-PI	Westinghouse, Power Supply	N/A	N/A

EUT Support Program:

The EUT and all support equipment were exercised in all operating modes for determination of worse case emission under typical operations. Data reported for conducted and radiated emissions reflects worse case conditions.

I/O Ports and Cables:

EUT:

I/O Port	Cable Type	Length	Connector	Termination
RS485	shielded - foil	25 feet	Phoenix - 5 pin	DR4208S

Host:

I/O Port	Cable Type	Length	Connector	Termination
RS485	shielded - foil	2 meter	Phoenix - 5 pin	DR4208S
Power	Unshielded	6 feet	IEC	power mains

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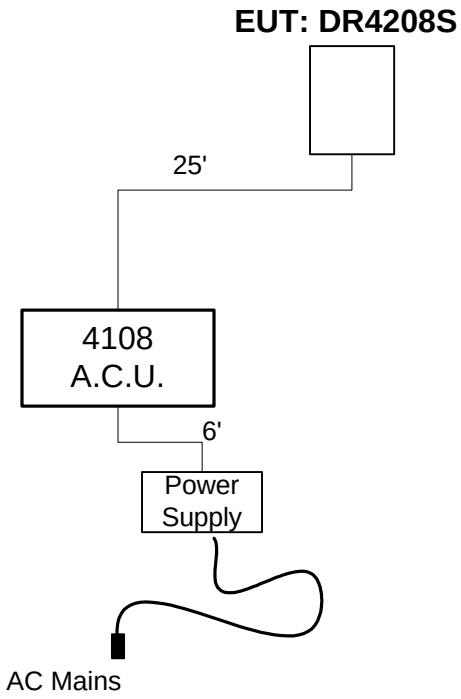
EQUIPMENT BLOCK DIAGRAM



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EQUIPMENT UNDER TEST

The Photographs below show the condition of the EUT for test.

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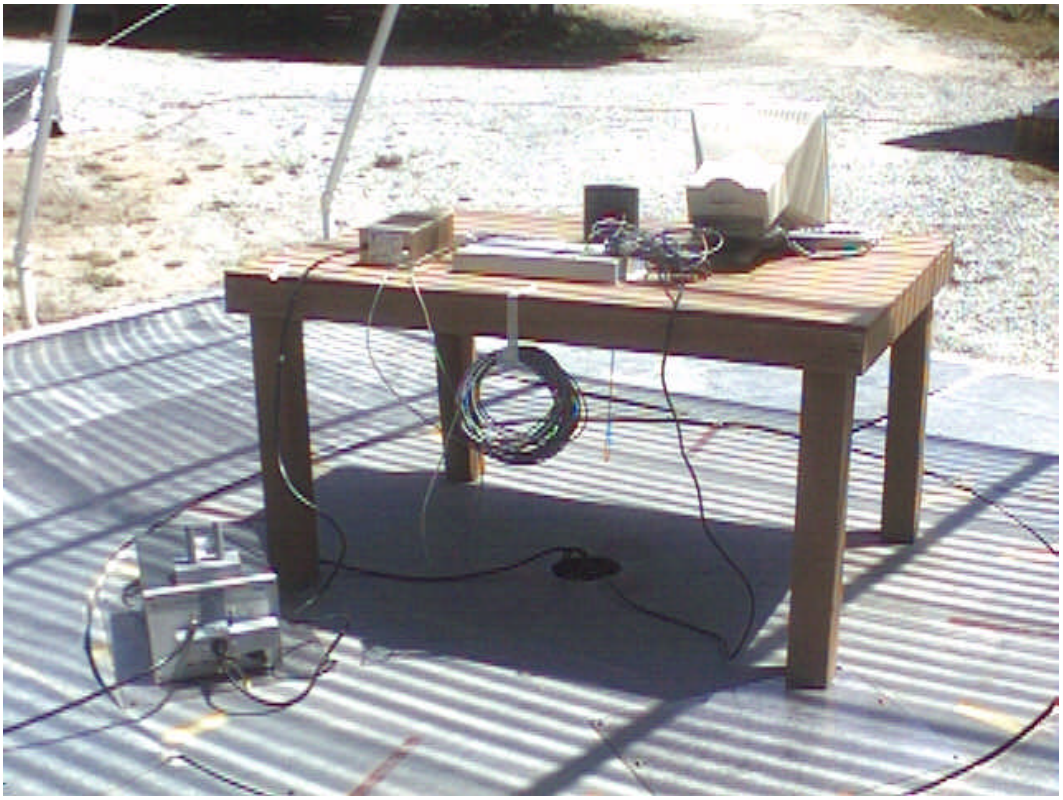
TEST SETUP (Conducted)

The Photographs below show worst case setup for Line Conducted.



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APPENDIX A: EUT Setup and Requirements

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Radiated Emissions

In general, the equipment under test (EUT) and the peripherals listed were setup in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 for radiated emission, and Table 2 for conducted emissions. Additionally a complete description of all ports and I/O cables is included in the configuration page.

During radiated emission testing, the EUT was placed on a nonconductive rotating table .8 meter above the conductive grid. The nonconductive table dimensions were 1 meter deep by 1.5 meters wide at .8 meter high. This configuration is typical for radiated emission testing of table top devices.

Conducted Emission

During conducted emission testing the EUT, was located on a wooden test bench measuring .8 meter high, 1 meter deep, and 1.5 meters in width. The EUT was placed on the wooden test bench surface. Alternatively, conducted emission testing is performed with the test bench on the top of the metal turntable and by placing the metal frame of the LISN on top of the conductive horizontal ground plane.

The metal plane used for conducted emission testing was grounded to the earth through the green wire safety ground. Power to the EUT was provided from a filter grounded to the metal plane to a LISN. The LISN was also grounded to the plane. All other objects were kept a minimum of 1 meter away from the EUT during the conducted test.

EUT Configuration

The AC power line and I/O cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. This configuration was precisely noted in the test report. I/O cables were of the type and length specified in the individual requirements. If the length could be varied, the length which produced maximum emissions was selected.

Where there are multiple I/O ports all of the same type, connecting a cable to just one of the ports is sufficient if it can be shown that additional cables would not significantly affect the results.

If the length of cable between pieces of equipment, and the manufacturer did not provide specifications on their spacing, the interval between different pieces of equipment was about 10 centimeters.

If the length of cable between pieces of equipment was longer than necessary, all excessive cable was bundled with 30-40 cm lengths in a serpentine fashion. If the cable could be bundled in this fashion, it was arranged around the EUT. For more detail on the disposition of the

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cables during the test, refer to the information contained in the configuration page and on worst case photographs on the test setup page respectively.

Test Methods

The radiated and conducted emission data of the EUT was taken with the HP Spectrum Analyzer. Incorporating the application correction factors for distance, antenna, cable loss, and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to **the FCC Part 15 Subpart C** emission limits to determine compliance.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

Measurement Uncertainty

Measurement uncertainty is caused by random effects and imperfect correction of systematic effects. The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with a confidence level of 95%.

Total Uncertainty at 95% confidence probability = ±3.4dB

Sample Calculations

An example of how the spectrum analyzer reading is converted using correction factors is given for the six highest emissions recorded in Table 1 and 2. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV is corrected by using the following formula:

Meter Reading (dBµV)
+ Antenna Factor (dB)
+ Cable Loss (dB)
- Pre-amplifier Gain (dB)
= Corrected Reading (dBµV/m)

This reading is then compared to the applicable specification limits and the difference will determine compliance. For conducted emissions, no correction factors are needed when a 50 µH LISN is used.

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Radiated Emission Testing (Electric Field)

For the final radiated scan, the equipment was scanned using EMCO Active Loop antenna to any frequency within 6 dBµV of the limit, and a thorough scan of all frequency using a small frequency span was manually made. The turntable was rotated as needed. Using the peak readings from both scans as a guide, the test engineer then maximizes the readings with respect to the table rotation, antenna height and configuration of the peripherals and cables. The EUT components and cables were being moved and arranged on the EUT for maximum emissions. Figures and photographs showing the final worst case configuration of the EUT are contained in the Test Setup Page. The results of the Radiated Emissions Test are shown in Table 2.

Conducted Emission Testing

For conducted emissions testing a 30-50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 30 MHz. All readings within 20 dB of the limits were recorded, and those within 6 dB of the limit were examined with additional measurements using a slower sweep time. The results of the conducted emissions test are shown in Table 1.

For the conducted emissions, the LISN is manufactured by Solar Electronics, Model Type 8028-50-TS-24-BNC, 50 µH-/+5 ohms. The coupling capacitor in the Solar LISN is then changed to a value of 0.25 µf. Above 150 kHz, a 0.15 µf series capacitor is then added in-line prior to connecting the analyzer to restore the proper Impedance for the range.

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FCC PART 15 LIMITS

RADIATED LIMITS SECTION 15.209

Frequency MHz	Limit µV/m	Measurement Distance meters
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/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

POWER LINE CONDUCTED LIMITS(e)

Frequency MHz	CISPR 22 **B** Limit Quasi-Peak dBµV	CISPR 22 **B** Limit Average dBµV
.15-0.5	66-56*	56-46*
0.5-5	56	46
0.5-30	60	50

NOTE

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

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APPENDIX B: Measurement Data

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Report Of Measurements Radiated Data

The following table reports the results of the radiated measurements for the Access Sensor, DR4208S.

Table 1 - Six Highest Radiated Emission Levels

Frequency MHz	QP Level dBµV	QP Limit dBµV	Margin dB	Azimuth, Height	Antenna, Polarization
.1383	60.98	84.80	-23.82	0, Fundamental	Loop
.2764	33.41	78.77	-45.36	0	Loop
.4148	45.23	75.25	-30.02	0	Loop
				Below Noise Floor	
				Below Noise Floor	
				Below Noise Floor	

Test Method: C63.4-1992
Spec Limit: Part 15.209
Test Distance: 10 Meters
Height in meters, Azimuth in degrees.
Polarization: V = vertical, H = horizontal

COMMENTS: System continuously running, Measurements made to 30 MHz. Power source 115 VAC. Ambient temperature 71° F and relative humidity of 39%.

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REPORT OF MEASUREMENTS CONDUCTED DATA

The following table reports the results of the conducted measurements for Proximity Reader, DR4208S.

Table 2 - Six Highest Conducted Emission Levels

Frequency MHz	QP Level dBµV	CISPR Limit dBµV	Margin dB	Note	PE Termination
28.64	40.39	60.00	-19.61	L1	gnd
0.55	35.63	56.00	-20.37	L2	gnd
0.7	33.23	56.00	-22.77	L1	gnd
0.4	34.80	57.85	-23.05	L2	gnd
2.15	32.45	56.00	-23.55	L1	gnd
1.65	31.89	56.00	-24.11	L2	gnd

Test Method: CISPR 16
Spec Limit: EN 55022 Class B

NOTES: L1 = Neutral side
L2 = Hot side

COMMENTS: System continuously running, power source 110 VAC. Ambient temperature 68° F and relative humidity of 47%.

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Radiated Data for FCC Subpart C

The following table reports the results of the radiated measurements for the Access Sensor, DR4208S per the requirements of Part 15 Subpart C 15.209. Measurements were taken using an EMCO Active Loop antenna, model 6502, calibration due November 1999. The test distance was 10 meters and the antenna height was 1 meter. The turntable was rotated to maximize the emissions.

Frequency MHz	EUT dBµV	Spec Limit	Margin dB	Azimuth
.1383	60.98	84.80	-23.82	0
.2764	33.41	78.77	-45.36	0
.4148	45.23	75.25	-30.02	0

Test Method: C63.4-1992 Spec Limit: 15.209
Test Distance: **10 Meters**

Frequency MHz	EUT dBµV	Spec Limit	Margin dB	Azimuth
.1383	85.09	104.80	-19.71	0
.2764	57.67	98.77	-41.10	0
.4148	69.61	95.25	-25.64	0
.6916	36.77	90.79	-54.02	0

Test Method: C63.4-1992 Spec Limit: 15.209
Test Distance: **3 Meters**

COMMENTS: System continuously running, power source 12 VDC. EUT dBµV is the emission measurement at a test distance of 10 meters. Spec limit is the specified limit from FCC Part 15 Subpart C section 15.209 as stated for the required measurement distance. A 40 dB/decade falloff extrapolation was calculated and algebraically added with the antenna factor and cable loss for the measured frequency to calculate the site CF. For frequencies from 9 kHz to 490 kHz the spec limit is stated at a test distance of 300 meters and the site CF is extrapolated to that distance. For frequencies from 490 kHz to 30 MHz the spec limit is stated at a test distance of 30 meters and the site CF is extrapolated to that distance.

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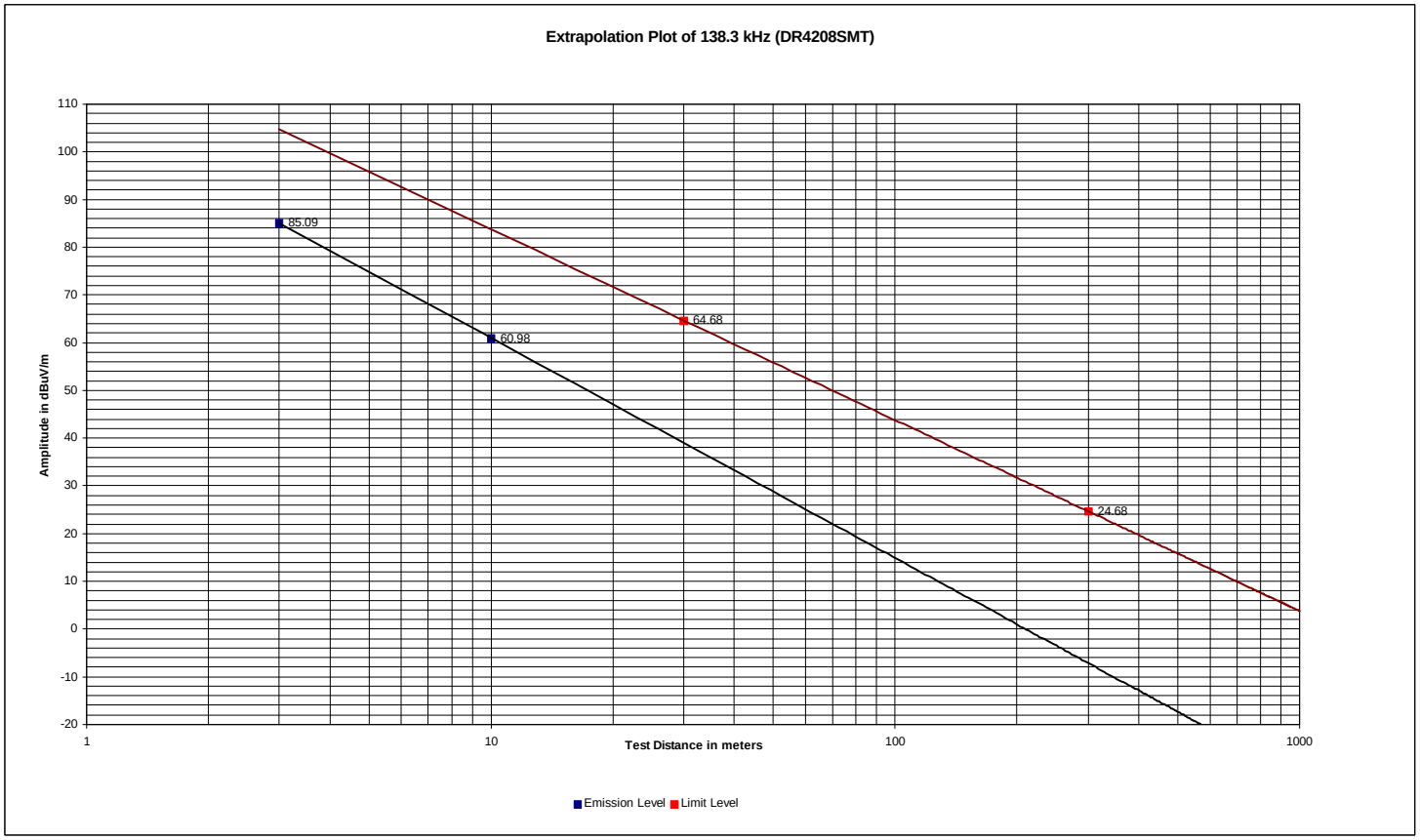
Extrapolation Plot for FCC Subpart C Data

Measurements were taken at the fundamental frequency of the intentional radiator with the EMCO 6502 loop antenna at test distances of 10 and 3 meters. The antenna was placed at a fixed height of 1 meter. Measurements were taken in **three orthogonal orientations to find the maximum emissions, vertical was observed to be worse case**. The turntable was rotated to maximize the emission. The first measurement was taken at 3 meters, then the antenna was moved to 10 meters and the emission was measured. These readings were then plotted to extrapolate the corrected reading at a test distance of 30 and 300 meters. The limit was then calculated using 40 dB/decade falloff rate to show the corrected limit at a test distance of 30 meters. These limits were then plotted on the graph to extrapolate the limit at 10 and 3 meters. Reference measurement standards Part 15 section 15.31(f)(2)



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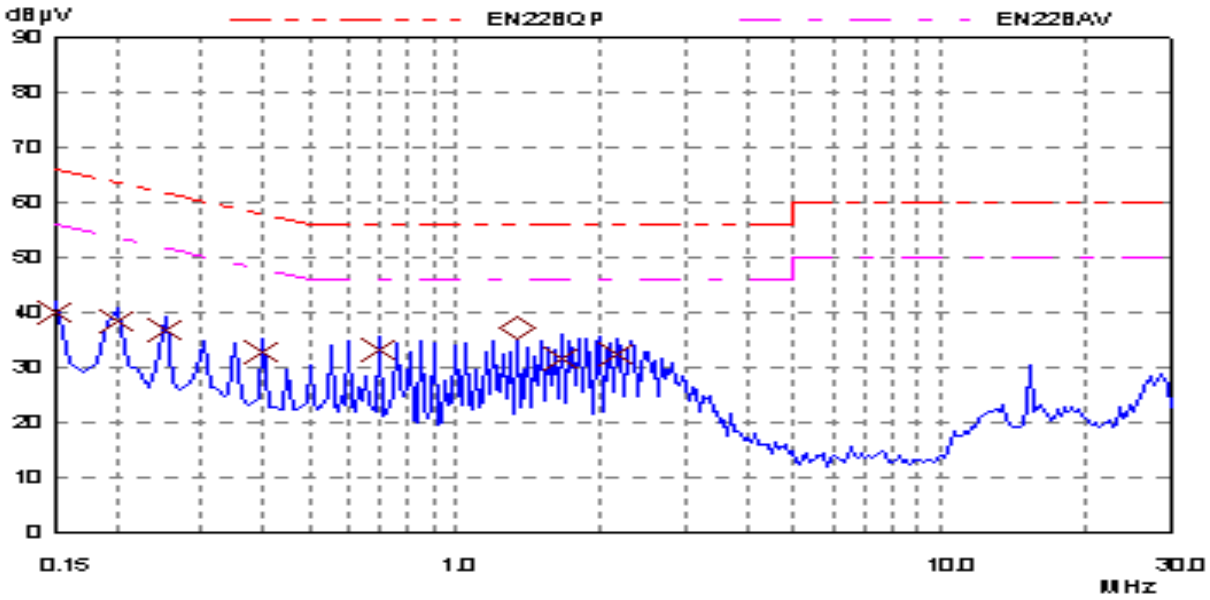
Conducted Data Neutral Side Scan

Figure 1 – Neutral side scan



Scan Settings:

Start Freq.	Stop Freq.	Step	IF BW	Detector	Scan-Time	Atten.	Op. Range
150kHz	30MHz	10kHz	10kHz	PK	20msec	Auto	60dB

Final Measurement: X = QP 2sec

Table 3, Neutral side scan

Freq. MHz	QP Level dBµV	QP Limit dBµV	Margin dB	Phase	PE
0.15	39.91	66.00	-26.09	L1	gnd
0.2	38.34	63.61	-25.27	L1	gnd
0.25	36.92	61.76	-24.84	L1	gnd
0.4	32.97	57.85	-24.88	L1	gnd
0.7	33.23	56.00	-22.77	L1	gnd
1.65	31.75	56.00	-24.25	L1	gnd
2.15	32.45	56.00	-23.55	L1	gnd
28.64	40.39	60.00	-19.61	L1	gnd

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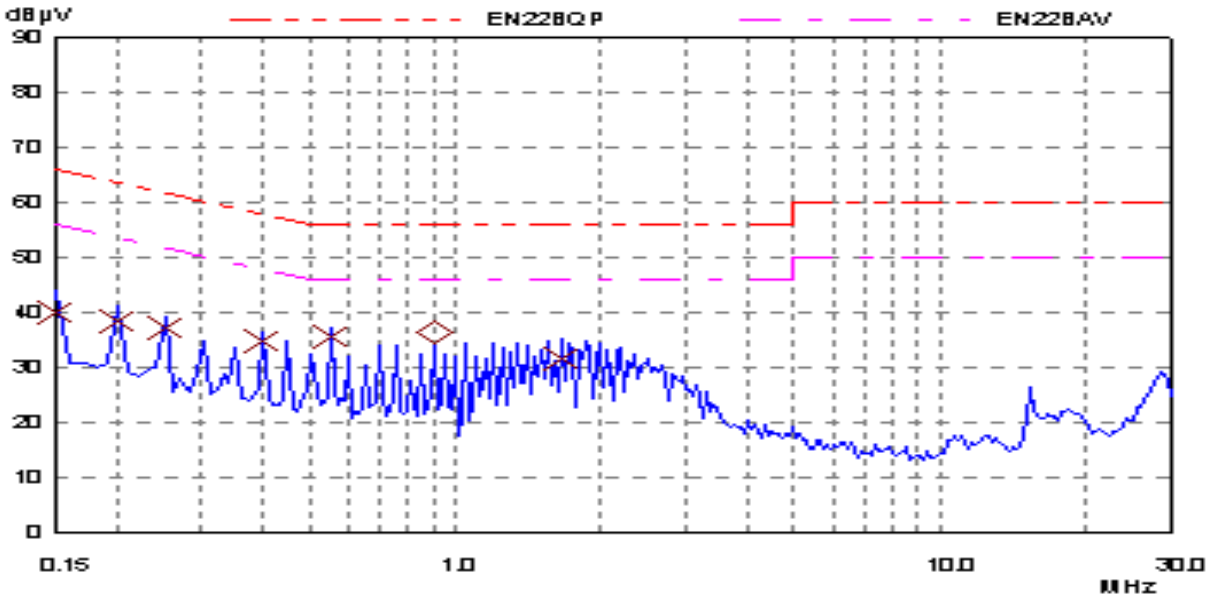
Conducted Data Line Side Scan

Figure 2 - Line 2 scan



Scan Settings:

Start Freq.	Stop Freq.	Step	IF BW	Detector	Scan-Time	Atten.	Op. Range
150kHz	30MHz	10kHz	10kHz	PK	20msec	Auto	60dB

Final Measurement: X = QP 2sec

Table 4, Line scan data

Freq. MHz	QP Level dBµV	QP Limit dBµV	Margin dB	Phase	PE
0.15	40.01	66.00	-25.99	L2	gnd
0.2	38.68	63.61	-24.93	L2	gnd
0.25	37.22	61.76	-24.54	L2	gnd
0.4	34.80	57.85	-23.05	L2	gnd
0.55	35.63	56.00	-20.37	L2	gnd
1.65	31.89	56.00	-24.11	L2	gnd
28.63	32.81	60.00	-27.19	L2	gnd

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COMPLIANCE VERIFICATION REPORT

Test Certificate

APPLICANT:	Westinghouse Security Electronics 47102 Mission Falls Court Fremont, CA 94539
Equipment Tested:	Access Sensor
Model:	DR4208S

I HEREBY CERTIFY THAT:

The measurements shown in this report were made in accordance with the procedures indicated and that the energy emitted by this equipment was found to be within the **FCC Part 15 Subpart C.**

I FURTHER CERTIFY THAT:

On the basis of the measurements taken at the test site, that the equipment tested per the procedures of ANSI C63.4-1992 is capable of operation for **the compliance of the requirements set forth in FCC CFR 47 Part 15.207 and 15.209**.

On this Date: March 5, 2000

Mario E Baraona Sr

Mario E. Baraona Sr.
RD Systems Compliance

_____
Printed Name

_____
Signature
Westinghouse Security Electronics Representative