

<b>COMPANY</b>	Sensormatic Electronics Corp. 951 Yamato Road Boca Raton, Florida
<b>PRODUCT TESTED</b>	ACD/RM -120K reader FCC ID: BVCACDRM-120K
<b>FCC RULES</b>	15.207, 15.209
<b>TEST DATE</b>	January 23-26, 2001
<b>SUBMITTED BY</b>	Donald J. Umbdenstock

## INDEX

<b>I.</b>	<b>SUMMARY OF RESULTS</b>	3
<b>II.</b>	<b>GENERAL INFORMATION</b>	3
	Test Methodology	3
	Test Facility	3
	System Description	4
	15.203 Compliance	4
<b>III.</b>	<b>CONDUCTED EMISSIONS TESTING, 15.207</b>	4
<b>IV.</b>	<b>RADIATED EMISSIONS TESTING, 15.209</b>	5
<b>V.</b>	<b>(This section intentionally blank)</b>	5
<b>VI.</b>	<b>LIST OF MEASUREMENT EQUIPMENT</b>	6
<b>VII.</b>	<b>DATA</b>	7
	Part A1 – Hughes Reader Conducted Emissions	7
	Part A2 – Motorola / Indala Reader Conducted Emissions	8
	Part B1 – Hughes Reader Radiated Emissions	9
	Part B1 – Motorola / Indala Reader Radiated Emissions	10

## I. Summary of Results

47 CFR 15.207	CONDUCTED EMISSIONS	COMPLIES
47 CFR 15.209	RADIATED EMISSIONS	COMPLIES

## II. General Information

### 1.1 Test Methodology

Both conducted and radiated emissions testing were performed according to the procedures in ANSI C63.4-1992, and the requirements of 15.31, 15.33, 15.35, 15.207, and 15.209. Radiated emissions measurements below 30 MHz were performed at a distance of 3 meters and the results extrapolated to the distance specified per 15.31 and 15.209.

### 1.2 Test Facility

Measurements per 15.207 and 15.209 were performed at Sensormatic Electronics Corporation.

The shielded room conducted emissions measurement facility is located at Sensormatic Electronics Corporation Headquarters at 951 Yamato Road, Boca Raton, Florida, 33431. The radiated emissions Open Area Test Site is located at Sensormatic Electronics Corporation manufacturing location, 6600 Congress Avenue, Boca Raton, Florida 33487. These sites have been found acceptable by and are on file with the FCC per FCC letter 31040/SIT 1300F2.

### 1.3 Test System Description.

The ACD/RM-120K reader consists of a 3<sup>rd</sup> party transmitting element not covered by the FCC “modular approach” and digital interface circuitry. The reader transmits a pulse at 125 kHz, then receives a signal from an access control card in close proximity to the reader. DC Power to energize the reader is provided by a host access control panel.

The product tested was a pre-production unit built to production drawings.

15.203. The antenna is contained internally and is permanently attached, thus it is compliant with the requirements of this clause.

## **III. Conducted Emissions**

Conducted emissions data are presented in Section VII “Data”, Part A1, Hughes Conducted Emissions, and Part A2, Motorola/Indala Conducted Emissions. The product demonstrated compliance with the requirements of 15.207. The product was tested at 120 V, 60 Hz.

#### **IV. Radiated Emissions**

Radiated emissions data for this product are presented in Section VII “Data”, Part B1, Hughes Radiated Emissions, and Part B2, Motorola / Indala Radiated Emissions. The product demonstrated compliance with the requirements of 15.209. Radiated emissions measurements were performed at 3 meters. Propagation loss was determined measuring the emissions at 3 meters and extrapolating the results to 300 meters as allowed using square law extrapolation per 15.31(f)(2).

Maximum radiation was determined by first assessing symmetry while applying incremental rotation of the turntable. The product exhibited quadrant symmetry. Measurements were taken at radials of 22.5° throughout one quadrant; the measurement antenna was rotated for maximum pickup about the vertical axis of the measurement antenna at each radial. The maximum emission was determined to be with the measurement loop antenna in the vertical polarization, parallel to the plane of the transmit antenna.

The product was tested at input voltages to the transformer ranging from 102 – 138 V, 60 Hz with no measurable change in transmitter output.

#### **V. (This section intentionally left blank)**

## VI. LIST OF MEASURING EQUIPMENT

The equipment used for determining compliance of the Ultra Post system with the requirements of 15.207 and 15.209 is marked with an “X” in the first column of the table below.

	<u>Model</u>	<u>Description</u>	<u>Vendor</u>	<u>Serial #</u>
X	ALP -70	Loop Antenna	Electro Metrics	163
	3110B	Biconnical Antenna	Electro Metrics	1017
	3146	Log Periodic Antenna	EMCO	3909
	3825/2	Line Imp Stable Network	EMCO	1562
X	3816/2NM	Line Imp Stable Network	EMCO	9703 1064
	6060B	Frequency Generator	Giga-tronics	5850202
	FM2000	Isotropic Field Monitor	Amplifier Research	15171
	FP2000	Isotropic Field Probe	Amplifier Research	15214
	888	Leveler	Amplifier Research	14998
	75A220	Low Band Amplifier	Amplifier Research	15208
	10W1000A	High Band Amplifier	Amplifier Research	15138
	PEFT Junior	EFT Generator	Haefely Trench	083 180-16
	PEFT Junior	Capacitive Cable Clamp	Haefely Trench	083-078-31
	NSG435	ESD Simulator	Schaffner	1197
	NSG431	ESD Simulator	Schaffner	1267
X	HP8591EM	EMC Analyzer	Hewlett - Packard	3520A00190
		Power Source	Pacific Instruments	
	F-2031	EM Injection Clamp	Fischer Cust. Comm.	30
	FCC-801-M3-16	Coupling Decoupling Nwk	Fischer Cust. Comm.	58
	FCC-801-M3-16	Coupling Decoupling Nwk	Fischer Cust. Comm.	59
	F-33-1	RF Current Probe	Fischer Cust. Comm.	304
	EM 7600	Transient Limiter	Electro-Metrics	187
	Roberts Ant	Tunable Dipole Set	Compliance Design	003282
	Roberts Ant	Tunable Dipole Set	Compliance Design	003283
	HP8594E	Spectrum Analyzer	Hewlett Packard	3246A00300
X	HP8447F Opt 64	Dual Preamplifier	Hewlett Packard	2805A03473

## VII. Data

Part A contains conducted emissions data; Part B contains magnetic field radiated emissions data.

### Part A

### Conducted Emissions

	Frequency MHz	Detector	Measurement dBuB	Limit dBuV
Hughes	12.84 MHz	Peak	40.5	48
Motorola	12.84 MHz	Peak	41.8	48

#### Part A1 -- Hughes Reader Conducted Emissions.

Project Name	Conducted Emissions FCC Class B	Filename	Hugh-Rdr_CondEMI_FCC_1-22-01.doc
EUT Name	Hughes Reader + apC/8X	Serial Number	1252149750
Engineer	Ray Kozak	Part Number	RM2L-PH Rev E
Date of Test	01/22/2001 5:27:19 PM	Test Name	Conducted Emission
Reg. Staff	Stephen Krizmanich/Don Umbdenstock		

Comments	Line In 120vac 60Hz
----------	---------------------

Figure 1. L1 Full Range

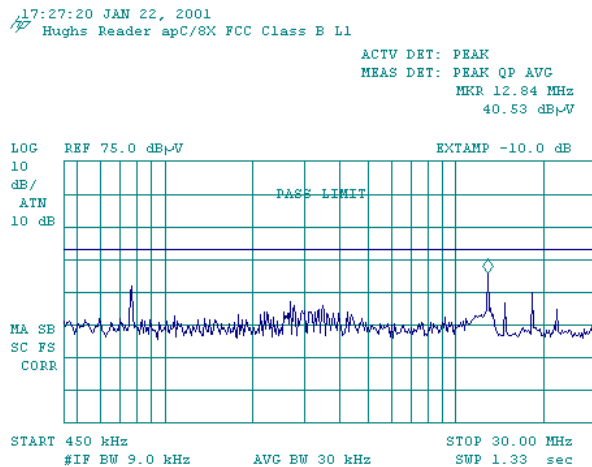
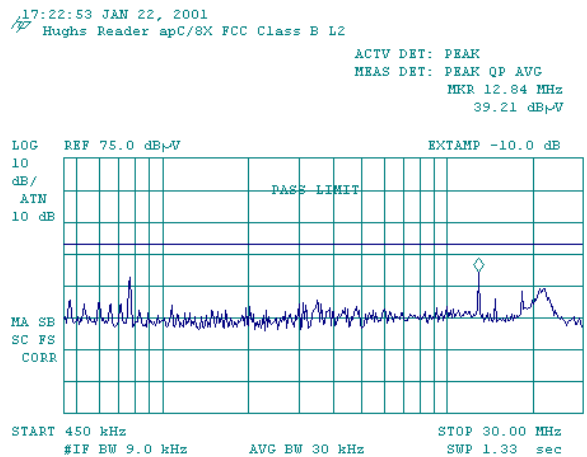


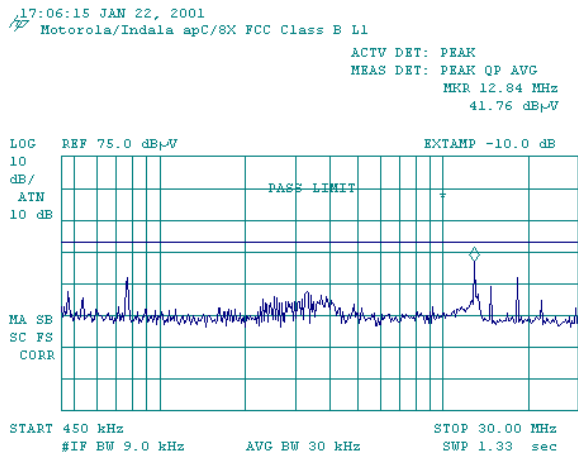
Figure 2. L2 Full Range



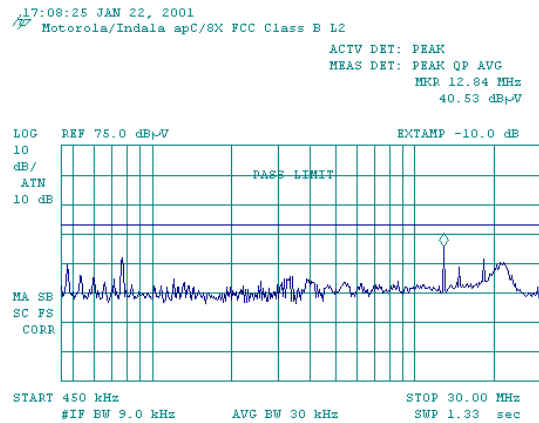
**Part A2 – Motorola / Indala Reader Conducted Emissions**

Project Name	Conducted Emissions FCC Class B	Filename	Mot-Ind_Rdr_CondEMI_FCC_1-22-01.doc
EUT Name	Motorola/Indala Reader + apC/8X	Serial Number	0951812437 Rev E
Engineer	Ray Kozak	Part Number	RM2L-P126
Date of Test	01/22/2001 5:08:24 PM	Test Name	Conducted Emission
Reg. Staff	Stephen Krizmanich/Don Umbdenstock		
Comments		Line In 120vac 60Hz	

**Figure 1. L1 Full Range**



**Figure 2. L2 Full Range**





## Part B1 -- Hughes Reader Radiated Emissions

Date Tested: 01/24/01

Hughes Reader was placed on 1m high tabletop. (A box concrete block was placed on tabletop). An apc/8X panel (placed on turntable) powered the reader at 120vac 60hz for FCC readings. A plug-in transformer was used to power the reader at 230vac50hz for ETSI readings. Test was performed at OATS. The loop antenna (ALP70) was placed on a tripod 1m from floor to center of loop for FCC measurements and 1m from floor to bottom of loop for ETSI. A distance of 3m was maintained between antenna and EUT. A N-S orientation was used.

Engineer: Ray Kozak

EMC Staff: S. Krizmanich / Don Umbdenstroch

Freq (kHz)	Dist (meters)	Detecto r	BW	Reading (dB)	Dist CF (dB)	HPF CF (dB)	Ant CF (dBuV)	Measured Value (dBuV)	Limit (dBuV)	Spec Dist (meters)
125.0	3	Pk	9k	34.7	-80	-	57.9	12.6	25.7	300
125.0	3	Pk	9k			-	57.9			
125.0	3	Pk	9k			-	57.9			
250	3	Pk	9k	nf	-80	1.5	50	nf	19.6	300
375	3	Pk	9k	5.9	-80	0.8	46.7	-26.6	16.1	300
500	3	Pk	9k	nf	-40	0.3	44.8	nf	33.6	30
625	3	Pk	9k	amb	-40	0.3	43.2	amb	31.7	30
750	3	Pk	9k	amb	-40	0.2	42.1	amb	30.1	30
875	3	Pk	9k	amb	-40	0.1	41.2	amb	28.8	30
1000	3	Pk	9k	amb	-40	0.2	40.7	amb	27.6	30
1125	3	Pk	9k	nf	-40	0.2	40.7	nf	26.6	30
1250	3	Pk	9k	nf	-40	0.1	40.7	nf	25.7	30

Measure fundamental at 22-degree radials to find maximum emission.

$$\text{Dist CF} = \text{Distance Correction Factor} = 20 \log(\text{Test Dist} / \text{Spec Dist})^P = 20 P \log (\text{Test Dist} / \text{Spec Dist})$$

Where P is the roll-off exponent; Square law is assumed, therefore P=2

$$\text{DCF} = 40 \log (\text{Test Dist} / \text{Spec Dist})$$

HPF CF = High Pass Filter Correction Factor (Insertion loss)

Ant CF = Antenna Correction Factor

$$\text{Measured Value} = \text{Reading} + \text{Dist CF} + \text{HPF CF} + \text{Ant CF}$$

nf = noise floor

amb. = ambient

## Part B2 – Motorola / Indala Reader Radiated Emissions

**Date Tested:** 01/24/01

**Motorola/Indala Reader** was placed on 1m high tabletop. (A box concrete block was placed on tabletop). An apc/8X panel (placed on turntable) powered the reader at 120vac 60hz for FCC readings. A plug-in transformer was used to power the reader at 230vac50hz for ETSI readings. Test was performed at OATS. The loop antenna (ALP70) was placed on a tripod 1m from floor to center of loop for FCC measurements and 1m from floor to bottom of loop for ETSI. A distance of 3m was maintained between antenna and EUT. A N-S orientation was used.

**Engineer:** Ray Kozak

**EMC Staff:** S. Krizmanich / Don Umbdenstock

Freq (kHz)	Distance (meters)	Detector	BW	Reading (dB)	Dist CF (dB)	HPF CF (dB)	Ant CF (dBuV)	Measured Value (dBuV)	Limit (dBuV)	Spec Dist (meters)
125.0	3	Pk	9k	28.0	-80	-	57.9	5.9	25.7	300
125.0	3	Pk	9k			-	57.9			
125.0	3	Pk	9k			-	57.9			
250	3	Pk	9k	nf	-80	1.5	50	nf	19.6	300
375	3	Pk	9k	nf	-80	0.8	46.7	nf	16.1	300
500	3	Pk	9k	nf	-40	0.3	44.8	nf	33.6	30
625	3	Pk	9k	amb	-40	0.3	43.2	amb	31.7	30
750	3	Pk	9k	amb	-40	0.2	42.1	amb	30.1	30
875	3	Pk	9k	amb	-40	0.1	41.2	amb	28.8	30
1000	3	Pk	9k	amb	-40	0.2	40.7	amb	27.6	30
1125	3	Pk	9k	nf	-40	0.2	40.7	nf	26.6	30
1250	3	Pk	9k	nf	-40	0.1	40.7	nf	25.7	30

Measure fundamental at 22-degree radials to find maximum emission.

Dist CF = Distance Correction Factor =  $20 \log (\text{Test Dist} / \text{Spec Dist})^P = 20 P \log (\text{Test Dist} / \text{Spec Dist})$

Where P is the roll-off exponent; Square law is assumed, therefore P=2

DCF =  $40 \log (\text{Test Dist} / \text{Spec Dist})$

HPF CF = High Pass Filter Correction Factor (Insertion loss)

Ant CF = Antenna Correction Factor

Measured Value = Reading + Dist CF + HPF CF + Ant CF

nf = noise floor  
amb = ambient