

FCC ID: BVCDMS915

COMPANY	Sensormatic Electronics Corp. 951 Yamato Road Boca Raton, Florida
PRODUCT TESTED	Digital Microwave System FCC ID: BVCDMS915
FCC RULES	15.207, 15.209
TEST DATE	October 3-27, 2000
SUBMITTED BY	Donald J. Umbdenstock

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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 5 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 DMS system is a composite system consisting of a 900 MHz frequency hopping radiator, a 111 kHz electrostatic field radiator and the electronics that drive these elements. This report addresses only the 111 kHz portion of the design.

The DMS system consists of a power pack and separate antennas. The power pack consists an RF module, IF FM Detector module, E-Field Generator module, Processor module, Alarm module and external low voltage transformer. The modules are enclosed in metallic cans that are virtually hermetically sealed and include port decoupling. This design feature reduces the spurious emissions into the noise floor.

The system produces an RF field and electrostatic field. The frequency hopping 900 MHz RF is propagated from a pair of antennas consisting of the following configurations: dual helixes, dish, or patch antennas. The electrostatic field is established between various radiating elements and ground. The installation configurations are fully described in the Set-Up and Service Guide exhibit.

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

15.203. The product is professionally installed and tuned, thus it is compliant with the requirements of this clause.

III. Conducted Emissions

Conducted emissions data are presented in Section VII "Data", Part A "Conducted Emissions". The product demonstrated compliance with the requirements of 15.207. The product was tested at 120 V, 60 Hz.

IV. Electrostatic Field Radiated Emissions

Of the several electrostatic field radiator configurations, the worst case configuration was determined to be the vortex bar. Radiated emissions data for this configuration are presented in Section VII “Data”, Part B1 “Electrostatic Field Radiated Emissions”. The product demonstrated compliance with the requirements of 15.209. Radiated emissions measurements were performed at 5 meters. Propagation loss was determined measuring the emissions at 5 and 10 meters and extrapolating the results to 300 meters as required.

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, perpendicular to the plane of the vortex bar.

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
X	3110B	Biconnical Antenna	Electro Metrics	1017
X	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 electrostatic field radiated emissions data, Part C is the Timco Report.

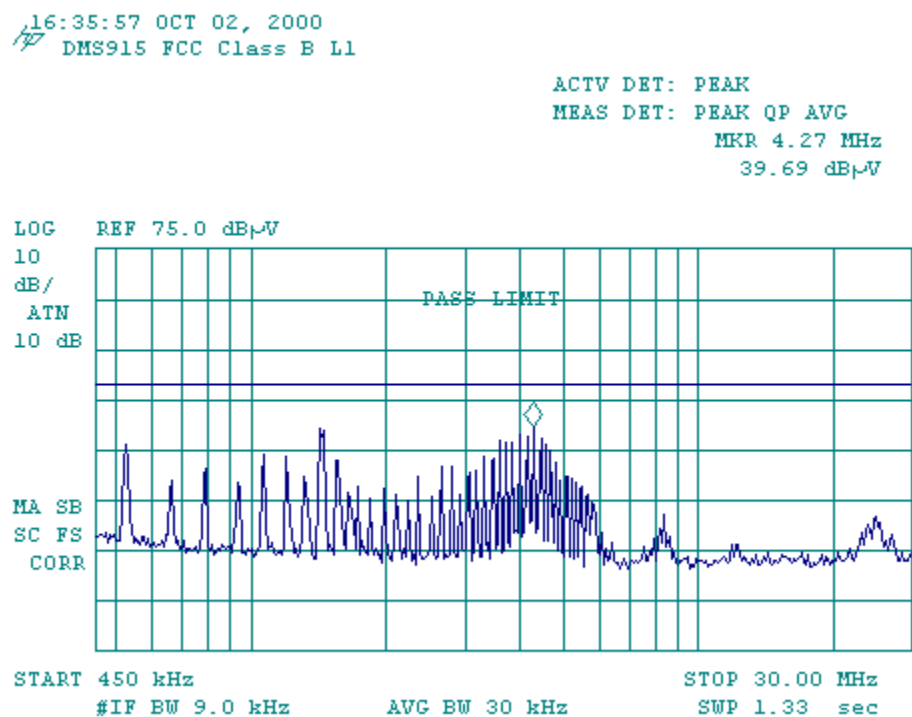
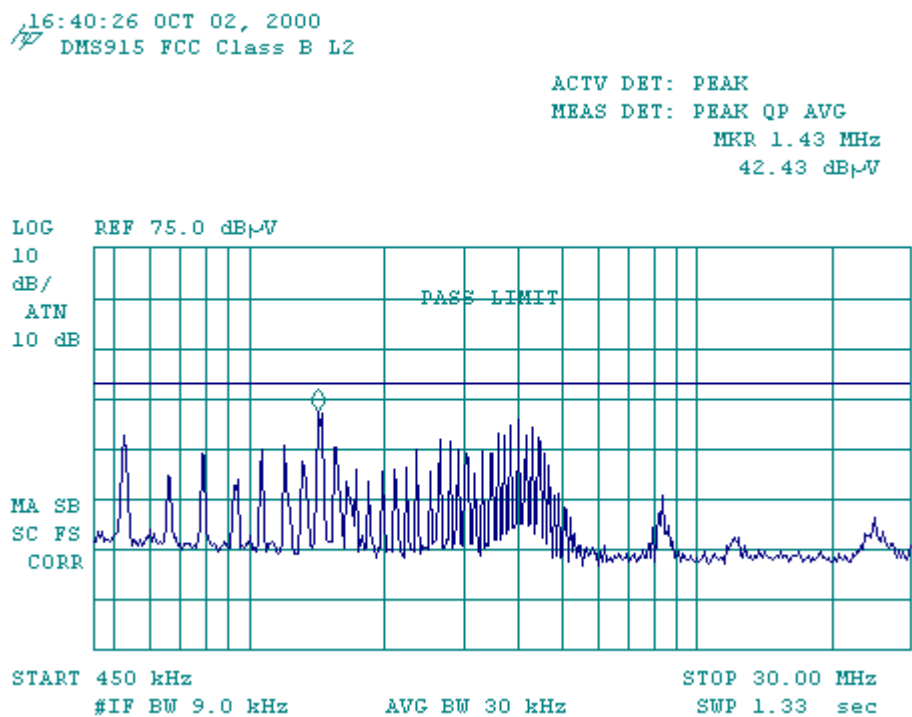
Part A

Conducted Emissions

Project Name	Conducted Emissions FCC Class B	Filename	DMS915_CondEMI_10-2-00.doc
EUT Name	DMS 915	Serial Number	3407574
Engineer	Guillermo Padula	Part Number	0309-0047-01 Rev C0
Date of Test	10/02/2000 5:06:35 PM	Test Name	Conducted Emissions
Reg. Technician	Stephen Krizmanich	Reviewer	Don Umbdenstock
Comments	Line In 120Vac, 60hz; FCC Class B 48dBuV Limit: Domestic Universal Xfmr with 2' line cord; Xfmr is placed on 4" insulator on chamber floor beneath table; low voltage line cord is 40'; E-Field voltage is 1200VPP. DMS alarm is connected.		

Signal List

Signal	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	Avg Amp (dBuV)	FCC Class B Limits (dBuV)	Comments
1	4.000550	40.83	39.87	30.70	48.00	Complies
2	4.267623	40.65	39.46	28.93	48.00	Complies
3	1.438270	39.44	38.76	31.96	48.00	Complies
4	4.399678	38.81	37.38	25.54	48.00	Complies
5	4.133968	39.27	37.32	26.34	48.00	Complies
6	3.866980	38.60	36.73	24.81	48.00	Complies

Figure 1. L1 Full Range**Figure 2. L2 Full Range**

Part B-1
Radiated Emissions <30 MHz

Frequency (kHz)	Reading dB	Ant Fac dB	DCF dB	Actual dBuV/m	Limit dBuV/m	Comments
111.5	25.5					Antenna @ 5m
111.5	10.5					Antenna @ 10m
111.5	28.2	57.8	-92.5	-6.5	26.7	Antenna @ 5m
223	NF	52.1	-92.5	NF	20.6	Antenna @ 5m
334.5	NF	48.6	-92.5	NF	17.1	Antenna @ 5m
446	NF	46	-92.5	NF	14.6	Antenna @ 5m
557.5	Ambient	44	-40.5	Ambient	32.7	Antenna @ 5m
669	Ambient	42.6	-40.5	Ambient	31.1	Antenna @ 5m
780.5	Ambient	41.4	-40.5	Ambient	29.8	Antenna @ 5m
892	Ambient	41	-40.5	Ambient	28.6	Antenna @ 5m
1003.5	Ambient	40.9	-40.5	Ambient	27.6	Antenna @ 5m

Notes: Measurements taken in peak detector, 9 kHz BW, 48 kHz Span
 NF = noise floor, < -2 dB

Dist_Corr_Factor = $20 \log(\text{Test Dist} / 300)P = 20 P \log(\text{Test Dist} / 300)$
 DCF(300) = -92.5
 DCF(30) = -40.5

Where P is the roll-off exponent. P is found as follows:
 $P = (\text{Level(at Distance 1)} - \text{Level(at Distance 2)}) / 20 \log(\text{Distance 2} / \text{Distance 1})$
 $= (25.5 - 10) / (20 * \log(10/5))$
 $= 2.6$

Project Name	DMS 915 R
Engineer	Guillermo Padula
Date of Test	09/14/2000
Type of Test	Radiated Emissions 47CFR15.209
Reg. Technician	Claude Daoust
Proj. Ldr	Don Umbdenstock

Part B-2**Radiated Emissions >30 MHz**

In the frequency band of 30-1000 MHz, no spurious emissions were found. The plot below from an uncalibrated chamber graphically depicts that the only emission present was the carrier; the rest of the band is the noise floor. This is the same result achieved on the OATS. The emissions in the frequency band > 1GHz is presented in the Timco Report in Part C.

Project Name	Radiated Emissions Class A +10dB	Filename	DMS915_RadEMI_Chamber_10-3-00.doc
EUT Name	DMS915	Serial Number	3407574
Engineer	Guillermo Padula	Phone Number	0309-0047-01 Rev C0
Date of Test	10/03/2000 10:56:20 AM	Test Name	Radiated Emissions
Reg. Technician	Stephen Krizmanich		
Comments	45dB Filter @ 905Mhz Placed in receive Antenna line before amplifier. E-Field voltage 1216VPP.		

Figure 1.