CKC LABORATORIES, INC. Testing the Future

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EMC/SAFETY

ASYST TECHNOLOGIES TEST REPORT

FOR THE

ADVANTAG 9100

FCC PART 15 SUBPART C SECTIONS 15.207 & 15.209

COMPLIANCE

DATE OF ISSUE: APRIL 7, 2003

PREPARED FOR:

Asyst Technologies
48761 Kato Road
Fremont, CA 94538

P.O. No.: 332081
W.O. No.: 80115

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: April 2-4, 2003

Report No.: FC03-022

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

DATE OF TEST:	April 2-4, 2003
DATE OF RECEIPT:	April 3, 2003
PURPOSE OF TEST:	To demonstrate the compliance of the ADVANTAG 9100 with the requirements for FCC Part 15 Subpart C Sections 15.207 & 15.209 devices.
TEST METHOD:	ANSI C63.4 (1992)
MANUFACTURER:	Asyst Technologies 48761 Kato Road Fremont, CA 94538
REPRESENTATIVE:	Saeed Taghipour
TEST LOCATION:	CKC Laboratories, Inc. 5473A Clouds Rest Mariposa, CA 95338

SUMMARY OF RESULTS

As received, the Asyst Technologies ADVANTAG 9100 was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart C Sections 15.207 & 15.209
- ANSI C63.4 (1992) method

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

QUALITY ASSURANCE:

Steve Behm, Director of Engineering Services and Quality Assurance

Joyce Walker, Quality Assurance Administrative Manager

Mike Wilkinson, Lab Manager

TEST PERSONNEL:

Randy Clark, EMC Engineer

15.31(e) Voltage Variations

Voltage Variation on Peak Power				
FREQUENCY kHz	CORRECTED READING dBµV/m 85%	CORRECTED READING dBµV/m 100%	CORRECTED READING dBµV/m 115%	SPEC LIMIT dBµV/m
134.205	12.5	12.6	12.5	25.0

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209/15.31(e)
Test Distance: 10 meters

15.31(m) Number Of Channels
This device operates on a single channel.

15.33(a) Frequency Ranges Tested
15.207 Conducted: 150 kHz – 30 MHz
15.209 Radiated: 9 kHz – 1000 MHz

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

15.203 Antenna Requirements
The antenna is removable and does not employ a unique connector, however the device is professionally installed and maintained. Therefore, the EUT complies with 15.203. For more information, refer to the installation/user's manual.

15.205 Restricted Bands
The fundamental operating frequency lies outside the restricted bands and therefore complies with the requirements of Section 15.205 of the FCC rules. Any spurious emission coming from the EUT was investigated to determine if any portion lies inside the restricted band. If any portion of a spurious emissions signal was found to be within a restricted band, investigation was performed to ensure compliance with Section 15.209.

Eut Operating Frequency
The EUT was operating at 134.2 kHz.

Temperature And Humidity During Testing
The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION
The EUT tested by CKC Laboratories was a production unit.
The following model was tested by CKC Laboratories:

RFID Reader, ATR-9100

Since the time of testing the manufacturer has chosen to use the following model name in its place. Any differences between the names does not affect their EMC characteristics and therefore complies to the level of testing equivalent to the tested model name shown on the data sheets:

ADVANTAG 9100

EQUIPMENT UNDER TEST

RFID Reader
Manuf: Asyst Technologies
Model: ADVANTAG 9100
Serial: C1
FCC ID: pending

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Power Supply
Manuf: Sola
Model: SLS-24-012T
Serial: 8869 0150
FCC ID: NA

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the EUT. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: 15.207 Six Highest Conducted Emission Levels

FREQUENCY	METER READING	CORRECTION FACTORS				CORRECTED READING	SPEC LIMIT	MARGIN	NOTES
		Lisn		Cable					
MHz	dBµV	dB	dB	dB	dB	dBµV	dBµV	dB	
0.150000	50.1	0.2		0.1		50.4	56.0	-5.6	W
17.309170	43.9	0.5		0.2		44.6	50.0	-5.4	W
18.507360	43.7	0.4		0.2		44.3	50.0	-5.7	W
20.119980	43.8	0.4		0.2		44.4	50.0	-5.6	W
21.192050	44.1	0.3		0.2		44.6	50.0	-5.4	W
21.327180	43.9	0.3		0.2		44.4	50.0	-5.6	W

Test Method: ANSI C63.4 (1992)

Spec Limit: FCC Part 15 Subpart C Section 15.207

NOTES: W = White Lead

COMMENTS: EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2 kHz. Frequency Range Investigated: 150 kHz to 30 MHz. Temperature 68ºF, Humidity 39%.

Table 2: 15.209 Fundamental Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB		Corr dB		CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
0.134	63.0	9.6		-60.0		12.6	25.0	-12.4	V
0.134	62.9	9.6		-60.0		12.5	25.0	-12.5	V
0.134	62.9	9.6		-60.0		12.5	25.0	-12.5	V
0.134	55.2	9.6		-60.0		4.8	25.0	-20.2	H

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2 kHz. Data is extrapolated to proper test distance for comparison to the applicable limit in accordance with 15.33, 40dB per decade. Frequency Range Investigated: 9 kHz to 30 MHz. Temperature 68°F, Humidity 37%.

Table 3: 15.209 Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
30.040	41.2	12.9	-27.3	0.7	10.0	37.5	40.0	-2.5	VQ
30.315	40.8	12.8	-27.3	0.7	10.0	37.0	40.0	-3.0	VQ
56.835	43.3	9.8	-27.3	1.1	10.0	36.9	40.0	-3.1	V
58.505	43.4	9.6	-27.3	1.1	10.0	36.8	40.0	-3.2	VQ
59.030	45.2	9.6	-27.3	1.1	10.0	38.6	40.0	-1.4	VQ
59.580	44.0	9.5	-27.3	1.1	10.0	37.3	40.0	-2.7	VQ

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

NOTES: Q = Quasi Peak Reading
V = Vertical Polarization

COMMENTS: EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2kHz. Temperature 68°F, Humidity 39%.

Frequency Range Investigated: 9 kHz to 30 MHz. Data is extrapolated to proper test distance for comparison to the applicable limit in accordance with 15.33, 40dB per decade. Data represent noise floor readings. No EUT readings were found below 30 MHz.

Frequency Range Investigated: 30 MHz to 1000 MHz. Data is extrapolated to 3 meters for comparison to the applicable limit in accordance with 15.33, 20dB per decade.

MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB
Conducted Emissions	+/- 1.56 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The 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 produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The radiated and conducted emissions data of the EUT was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

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

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated and conducted emissions data. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

TESTING

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

The LISNs used were 50 µH-/+50 ohms. Above 150 kHz, a 0.15 µF series capacitor was added in-line prior to connecting the analyzer to restore the proper impedance for the range. A 30 to 50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 500 kHz, and 500 kHz to 30 MHz. All readings within 20 dB of the limit were recorded, and those within 6 dB of the limit were examined with additional measurements using a slower sweep time.

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

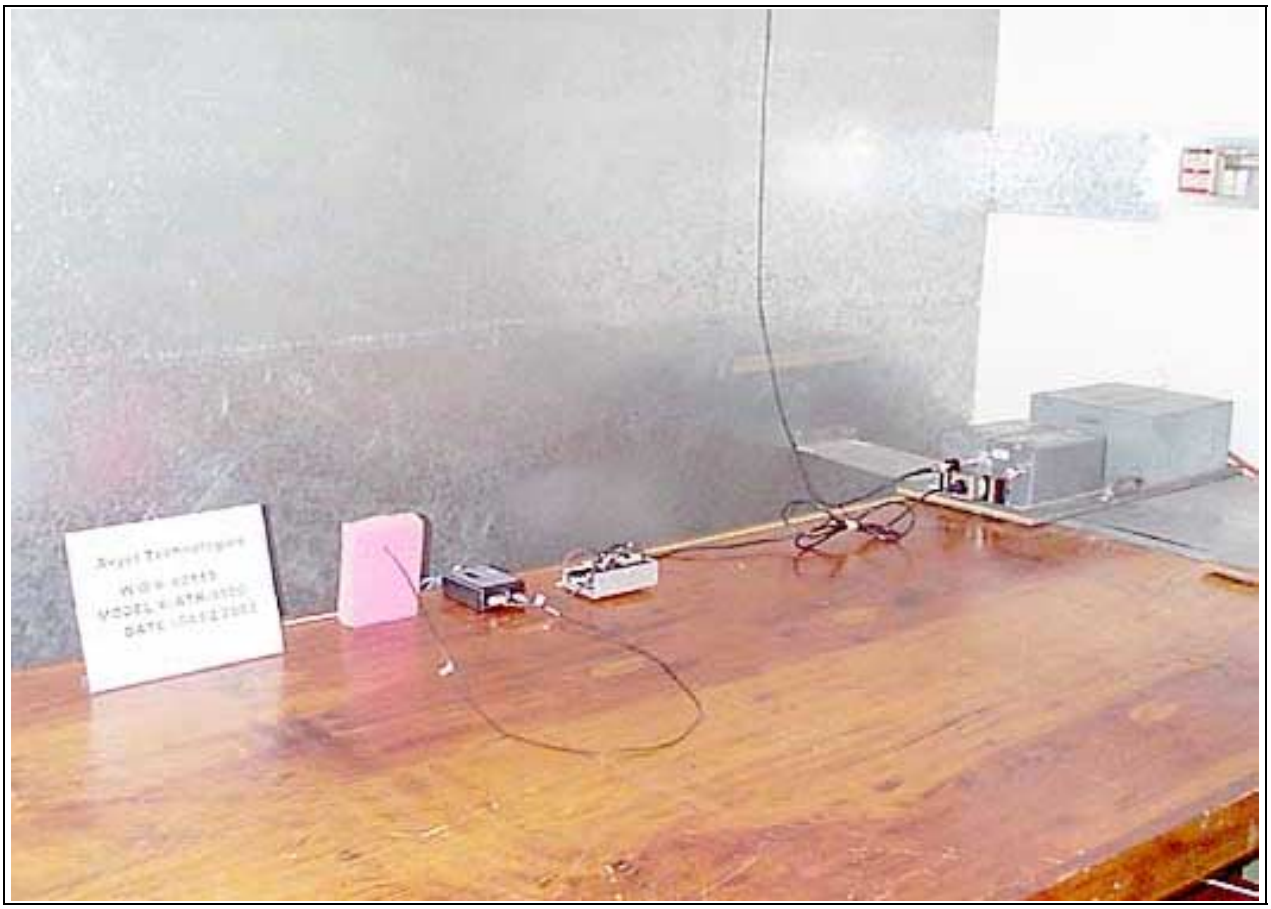
During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

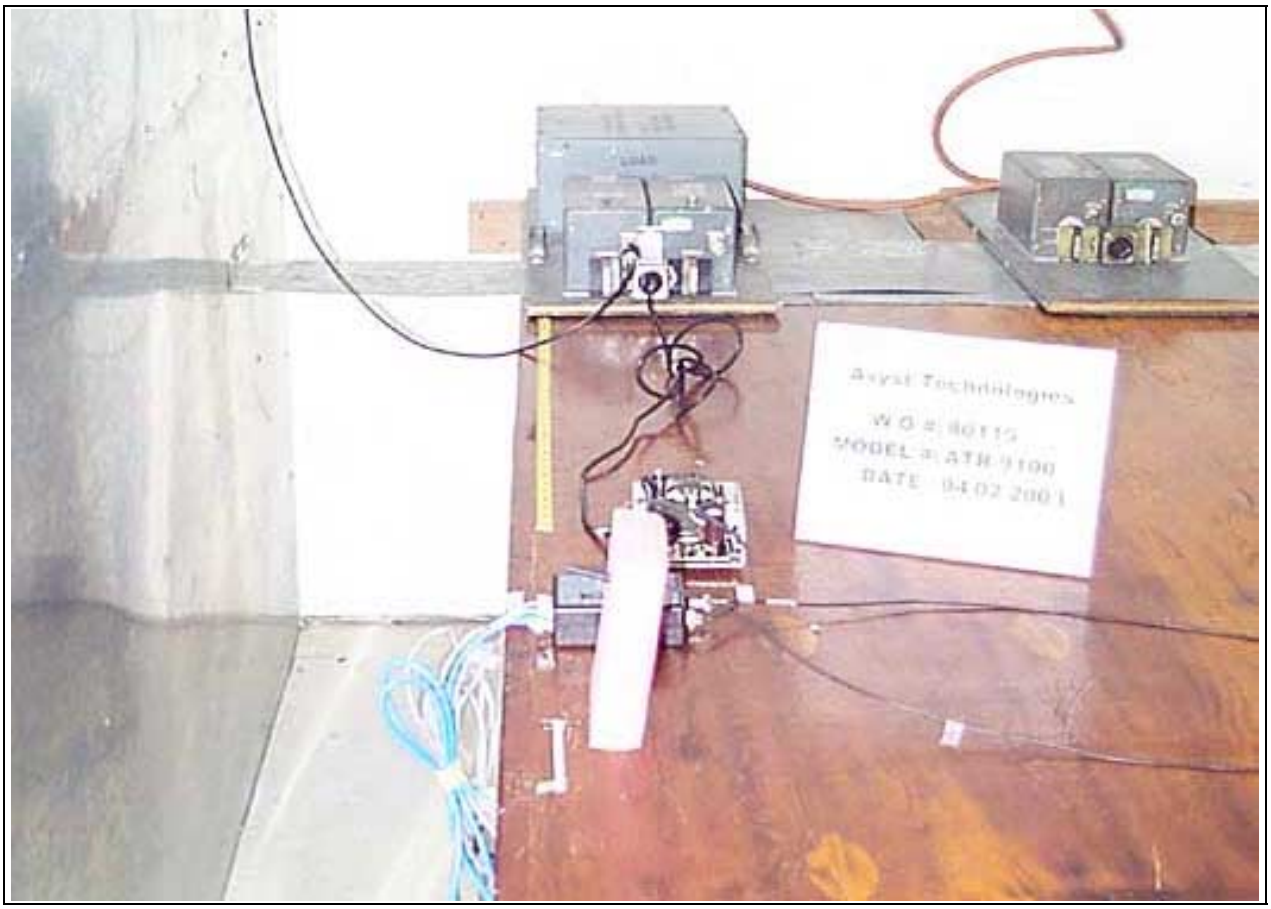
TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



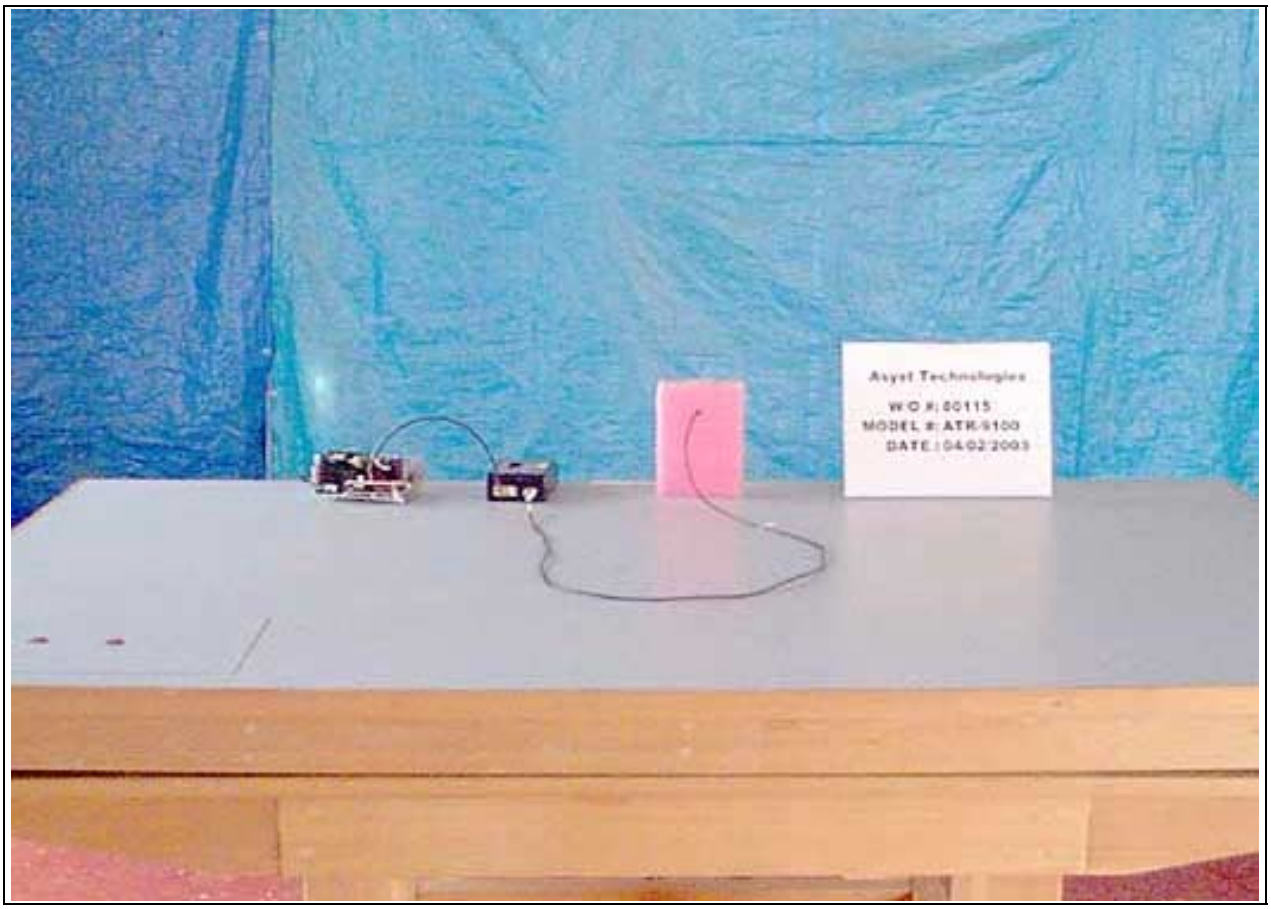
Mains Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



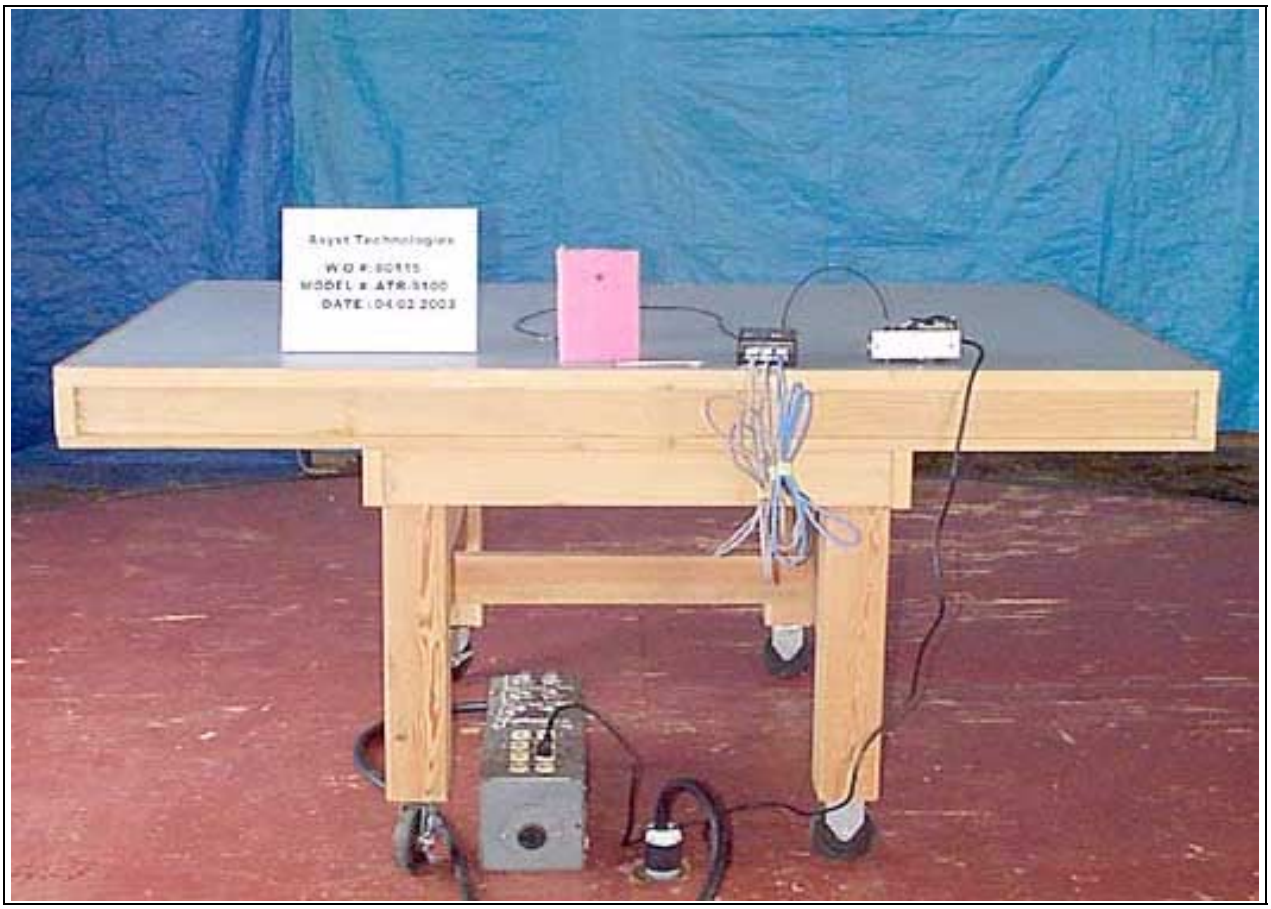
Mains Conducted Emissions - Side View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

APPENDIX B

TEST EQUIPMENT LIST

15.207 Conducted Emissions

Description	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
LISN's Set	Solar	8028-50-TS-24-BNC	855996, 992	02055	6/5/02	6/5/03
Spectrum Analyzer 100Hz - 22.5GHz	HP	8566B	2209A01404	00490	2/26/03	2/26/04
Spectrum Analyzer Display	HP	8566B	2403A08241	00489	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	HP	85650A	2811A01267	00478	2/26/03	2/26/04

15.209 Radiated Emissions >30 MHz

Description	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Antenna, Bicon	A&H	SAS-200/542	156	00225	12/2/02	12/2/03
Antenna, Log Periodic	A&H	SAS-200/510	154	01330	6/19/02	6/19/03
Spectrum Analyzer 100Hz - 22.5GHz	HP	8566B	2209A01404	00490	2/26/03	2/26/04
Spectrum Analyzer Display	HP	8566B	2403A08241	00489	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	HP	85650A	2811A01267	00478	2/26/03	2/26/04
Preamp	HP	8447D	1937A02604	00099	3/7/03	3/6/04

15.209 Radiated Emissions <30 MHz

Description	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
LISN's Set	Solar	8028-50-TS-24-BNC	855996, 992	02055	6/5/02	6/5/03
Spectrum Analyzer 100Hz - 22.5GHz	HP	8566B	2209A01404	00490	2/26/03	2/26/04
Spectrum Analyzer Display	HP	8566B	2403A08241	00489	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	HP	85650A	2811A01267	00478	2/26/03	2/26/04
Antenna, Loop	EMCO	6502	2078	00432	6/5/02	6/5/03
Power Supply, DC (Programmable)	Leader	LPS-2801	6030090	P01889	6/5/02	6/5/03

APPENDIX C:

MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 800-500-4362

Customer: **Asyst Technologies**
Specification: **FCC 15.207 - AVE**
Work Order #: **80115** Date: 04/03/2003
Test Type: **Conducted Emissions** Time: 09:13:45
Equipment: **RFID Reader** Sequence#: 22
Manufacturer: Asyst Technologies Tested By: Randal Clark
Model: ATR-9100 120V 60Hz
S/N: C1

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Reader*	Asyst Technologies	ATR-9100	C1

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Sola	SLS-24-012T	8869 0150

Test Conditions / Notes:

EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2 kHz. Frequency Range Investigated: 150 kHz to 30 MHz. Temperature 68°F, Humidity 39%.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n474

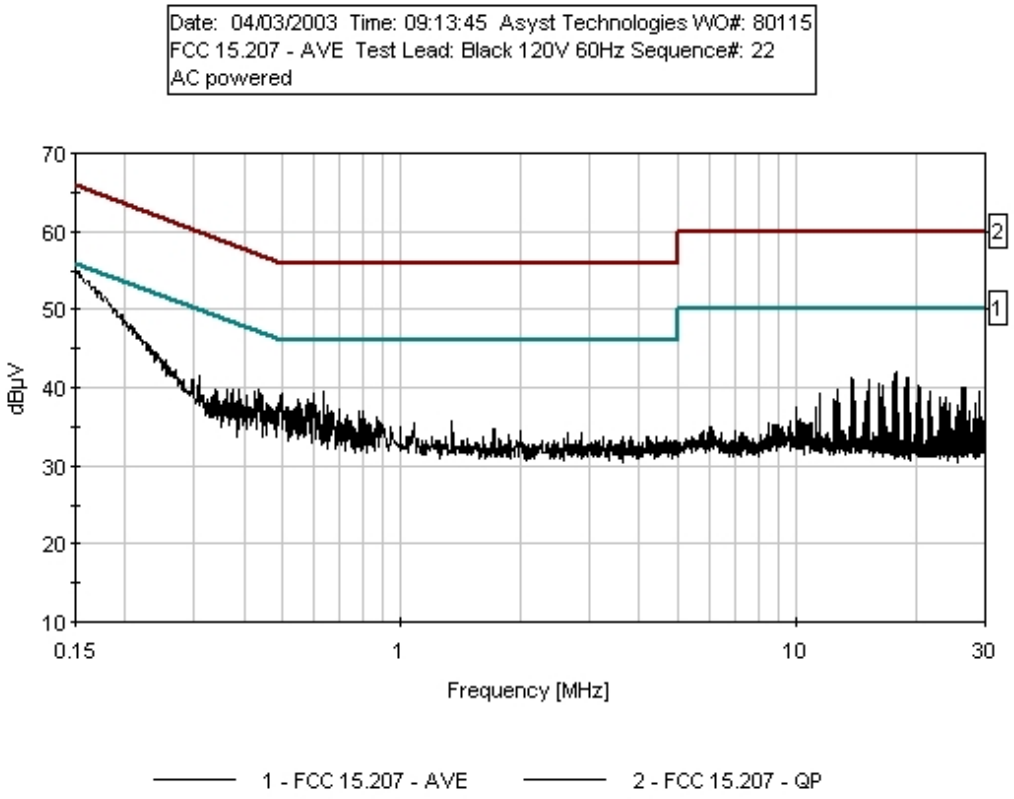
Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	637.951k	39.2	+0.1	+0.1			+0.0	39.4	46.0	-6.6	Black
2	601.591k	39.1	+0.1	+0.1			+0.0	39.3	46.0	-6.7	Black
3	501.238k	39.1	+0.1	+0.0			+0.0	39.2	46.0	-6.8	Black
4	547.051k	38.5	+0.1	+0.0			+0.0	38.6	46.0	-7.4	Black
5	577.594k	38.3	+0.1	+0.1			+0.0	38.5	46.0	-7.5	Black
6	555.778k	37.9	+0.1	+0.1			+0.0	38.1	46.0	-7.9	Black
7	17.976M	41.8	+0.2	+0.1			+0.0	42.1	50.0	-7.9	Black

8	589.956k	37.7	+0.1	+0.1		+0.0	37.9	46.0	- 8.1	Black
9	17.697M	41.4	+0.2	+0.2		+0.0	41.8	50.0	- 8.2	Black
10	389.976k	39.7	+0.1	+0.0		+0.0	39.8	48.1	- 8.3	Black
11	648.859k	37.5	+0.1	+0.1		+0.0	37.7	46.0	- 8.3	Black

12	307.802k	41.4	+0.1	+0.1	+0.0	41.6	50.0	8.4	-	Black
13	543.415k	37.4	+0.1	+0.0	+0.0	37.5	46.0	8.5	-	Black
14	563.050k	37.1	+0.1	+0.1	+0.0	37.3	46.0	8.7	-	Black
15	700.490k	37.2	+0.0	+0.1	+0.0	37.3	46.0	8.7	-	Black
16	13.832M	40.6	+0.2	+0.5	+0.0	41.3	50.0	8.7	-	Black
17	18.913M	41.0	+0.2	+0.1	+0.0	41.3	50.0	8.7	-	Black
18	516.509k	37.1	+0.1	+0.0	+0.0	37.2	46.0	8.8	-	Black
19	538.325k	37.1	+0.1	+0.0	+0.0	37.2	46.0	8.8	-	Black
20	19.174M	40.9	+0.2	+0.1	+0.0	41.2	50.0	8.8	-	Black
21	456.151k	37.8	+0.1	+0.0	+0.0	37.9	46.8	8.9	-	Black
22	15.291M	40.6	+0.2	+0.3	+0.0	41.1	50.0	8.9	-	Black
23	362.342k	39.6	+0.1	+0.0	+0.0	39.7	48.7	9.0	-	Black
24	525.962k	36.9	+0.1	+0.0	+0.0	37.0	46.0	9.0	-	Black
25	664.130k	36.8	+0.1	+0.1	+0.0	37.0	46.0	9.0	-	Black
26	784.118k	36.8	+0.0	+0.1	+0.0	36.9	46.0	9.1	-	Black
27	800.844k	36.8	+0.0	+0.1	+0.0	36.9	46.0	9.1	-	Black
28	17.570M	40.4	+0.2	+0.2	+0.0	40.8	50.0	9.2	-	Black
29	16.228M	40.1	+0.2	+0.3	+0.0	40.6	50.0	9.4	-	Black
30	150.000k Ave	38.8	+0.1	+0.0	+0.0	38.9	56.0	17.1	-	Black

^							55.0	56.0	-	Black
	150.000k	54.9	+0.1	+0.0		+0.0			1.0	


Date: 04/03/2003 Time: 09:13:45 Asyst Technologies WO#: 80115
FCC 15.207 - AVE Test Lead: Black 120V 60Hz Sequence#: 22
AC powered
70
60
50
40
30
20
10
dBµV
0.15
1
10
30
Frequency [MHz]
2
1
1 - FCC 15.207 - AVE
2 - FCC 15.207 - QP

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 800-500-4362

Customer: **Asyst Technologies**
Specification: **FCC 15.207 - AVE**
Work Order #: **80115** Date: 04/03/2003
Test Type: **Conducted Emissions** Time: 09:18:25
Equipment: **RFID Reader** Sequence#: 23
Manufacturer: Asyst Technologies Tested By: Randal Clark
Model: ATR-9100 120V 60Hz
S/N: C1

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Reader*	Asyst Technologies	ATR-9100	C1

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Sola	SLS-24-012T	8869 0150

Test Conditions / Notes:

EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2 kHz. Frequency Range Investigated: 150 kHz to 30 MHz. Temperature 68°F, Humidity 39%.

Transducer Legend:

T1=Cable & Cap (Bench) T2=LISN Insertion Loss s/n493

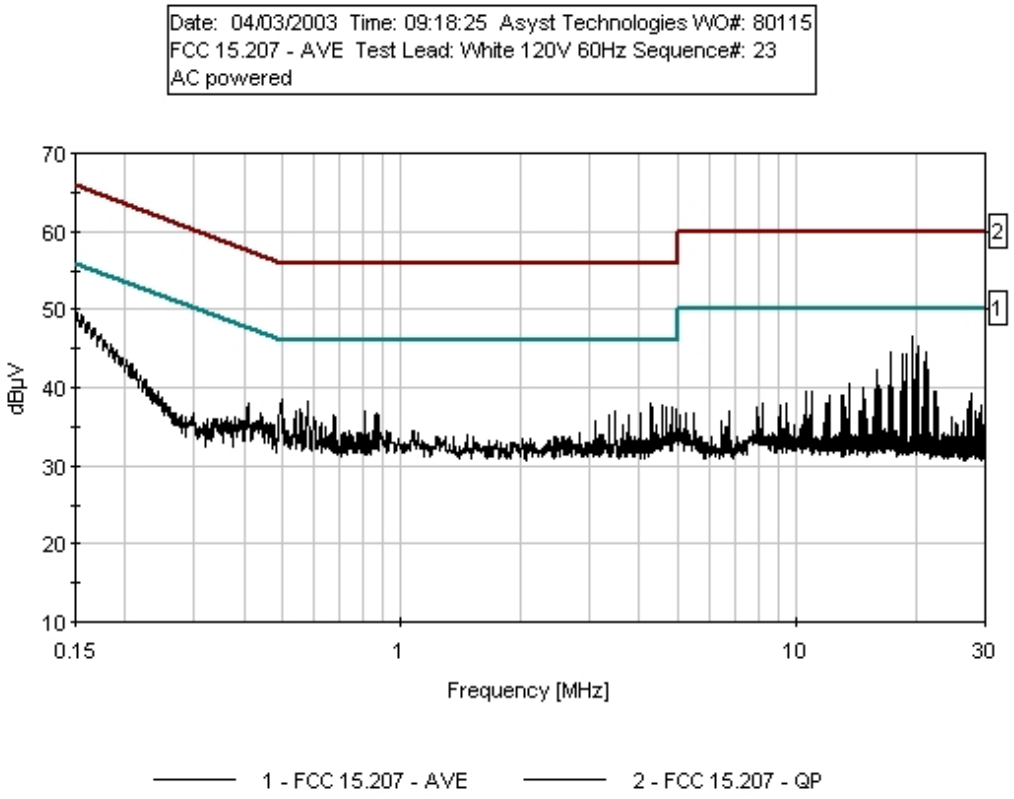
Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	17.309M	43.9	+0.2	+0.5			+0.0	44.6	50.0	-5.4	White
2	21.192M	44.1	+0.2	+0.3			+0.0	44.6	50.0	-5.4	White
3	150.000k	50.1	+0.1	+0.2			+0.0	50.4	56.0	-5.6	White
4	20.120M	43.8	+0.2	+0.4			+0.0	44.4	50.0	-5.6	White
5	21.327M	43.9	+0.2	+0.3			+0.0	44.4	50.0	-5.6	White
6	18.507M	43.7	+0.2	+0.4			+0.0	44.3	50.0	-5.7	White
7	18.922M	43.6	+0.2	+0.4			+0.0	44.2	50.0	-5.8	White

8	20.913M	42.8	+0.2	+0.4	+0.0	43.4	50.0	- 6.6	White
9	497.602k	38.3	+0.1	+0.2	+0.0	38.6	46.0	- 7.4	White
10	579.048k	38.0	+0.1	+0.2	+0.0	38.3	46.0	- 7.7	White
11	15.958M	41.5	+0.2	+0.5	+0.0	42.2	50.0	- 7.8	White

12	21.462M	41.7	+0.2	+0.3	+0.0	42.2	50.0	7.8	White
13	4.288M	37.1	+0.1	+0.8	+0.0	38.0	46.0	8.0	White
14	4.556M	36.5	+0.1	+1.2	+0.0	37.8	46.0	8.2	White
15	4.824M	35.9	+0.1	+1.6	+0.0	37.6	46.0	8.4	White
16	4.692M	35.9	+0.1	+1.4	+0.0	37.4	46.0	8.6	White
17	555.050k	36.9	+0.1	+0.2	+0.0	37.2	46.0	8.8	White
18	4.956M	35.4	+0.1	+1.7	+0.0	37.2	46.0	8.8	White
19	19.850M	40.5	+0.2	+0.4	+0.0	41.1	50.0	8.9	White
20	19.985M	40.5	+0.2	+0.4	+0.0	41.1	50.0	8.9	White
21	21.048M	40.6	+0.2	+0.3	+0.0	41.1	50.0	8.9	White
22	811.025k	36.8	+0.0	+0.2	+0.0	37.0	46.0	9.0	White
23	544.142k	36.6	+0.1	+0.2	+0.0	36.9	46.0	9.1	White
24	3.488M	36.5	+0.1	+0.3	+0.0	36.9	46.0	9.1	White
25	4.020M	36.4	+0.1	+0.3	+0.0	36.8	46.0	9.2	White
26	18.778M	40.2	+0.2	+0.4	+0.0	40.8	50.0	9.2	White
27	862.656k	36.5	+0.0	+0.2	+0.0	36.7	46.0	9.3	White
28	3.352M	36.2	+0.1	+0.2	+0.0	36.5	46.0	9.5	White
29	19.737M Ave	35.8	+0.2	+0.4	+0.0	36.4	50.0	13.6	White
^	19.737M	44.6	+0.2	+0.4	+0.0	45.2	50.0	4.8	White

31							34.8	50.0	-	White
	20.273M	34.2	+0.2	+0.4		+0.0			15.2	
	Ave									
^							44.2	50.0	-	White
	20.273M	43.6	+0.2	+0.4		+0.0			5.8	


Date: 04/03/2003 Time: 09:18:25 Asyst Technologies WO#: 80115
FCC 15.207 - AVE Test Lead: White 120V 60Hz Sequence#: 23
AC powered
70
60
50
40
30
20
10
dBµV
0.15
1
10
30
Frequency [MHz]
2
1
1 - FCC 15.207 - AVE
2 - FCC 15.207 - QP

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 800-500-4362

Customer: **Asyst Technologies**
Specification: **FCC 15.209**
Work Order #: **80115** Date: 04/04/2003
Test Type: **Radiated Scan** Time: 14:54:19
Equipment: **RFID Reader** Sequence#: 27
Manufacturer: Asyst Technologies Tested By: Randal Clark
Model: ATR-9100
S/N: C1

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Reader*	Asyst Technologies	ATR-9100	C1

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Sola	SLS-24-012T	8869 0150

Test Conditions / Notes:

EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2 kHz. Data is extrapolated to proper test distance for comparison to the applicable limit in accordance with 15.33, 40dB per decade. Frequency Range Investigated: 9 kHz to 30 MHz. Temperature 68°F, Humidity 37%.

Transducer Legend:

T1=Mag Loop A/N 00432, S/N 2078 T2=15.31 10m 40dB/Dec Correction

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	134.198k	63.0	+9.6	-60.0			+0.0	12.6	25.0	-12.4	Vert
2	134.205k	62.9	+9.6	-60.0			+0.0	12.5	25.0	-12.5	Vert
									Nominal Voltage +15%		
3	134.205k	62.9	+9.6	-60.0			+0.0	12.5	25.0	-12.5	Vert
									Nominal Voltage -15%		
4	134.222k	55.2	+9.6	-60.0			+0.0	4.8	25.0	-20.2	Horiz

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 800-500-4362

Customer: **Asyst Technologies**
Specification: **FCC 15.209**
Work Order #: **80115** Date: 04/04/2003
Test Type: **Radiated Scan** Time: 09:35:36
Equipment: **RFID Reader** Sequence#: 25
Manufacturer: Asyst Technologies Tested By: Randal Clark
Model: ATR-9100
S/N: C1

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Reader*	Asyst Technologies	ATR-9100	C1

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Sola	SLS-24-012T	8869 0150

Test Conditions / Notes:

EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2 kHz. Data is extrapolated to 3 meters for comparison to the applicable limit in accordance with 15.33, 20dB per decade. Frequency Range Investigated: 30 MHz to 1000 MHz. Temperature 68°F, Humidity 39%.

Transducer Legend:

T1=Amp - S/N 604 T2=Bicon 156
T3=Cable - 10 Meter

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	59.030M QP	45.2	27.3	+9.6	+1.1		+10.0	38.6	40.0	-1.4	Vert
^	59.030M	46.6	27.3	+9.6	+1.1		+10.0	40.0	40.0	+0.0	Vert
3	30.040M QP	41.2	27.3	+12.9	+0.7		+10.0	37.5	40.0	-2.5	Vert
^	30.040M	41.6	27.3	+12.9	+0.7		+10.0	37.9	40.0	-2.1	Vert
5	59.580M QP	44.0	27.3	+9.5	+1.1		+10.0	37.3	40.0	-2.8	Vert
^	59.530M	46.2	27.3	+9.5	+1.1		+10.0	39.5	40.0	-0.5	Vert
7	30.315M QP	40.8	27.3	+12.8	+0.7		+10.0	37.0	40.0	-3.0	Vert

^	30.335M	41.0	- 27.3	+12.8	+0.7	+10.0	37.2	40.0	- 2.8	Vert
9	56.835M	43.3	- 27.3	+9.8	+1.1	+10.0	36.9	40.0	- 3.1	Vert

10	58.505M	43.4	- 27.3	+9.6	+1.1	+10.0	36.8	40.0	- 3.2	Vert QP
^	58.445M	45.5	- 27.3	+9.6	+1.1	+10.0	38.9	40.0	- 1.1	Vert
^	58.585M	42.2	- 27.3	+9.6	+1.1	+10.0	35.6	40.0	- 4.4	Vert
^	58.585M	40.2	- 27.3	+9.6	+1.1	+10.0	33.6	40.0	- 6.4	Vert
14	57.370M	42.9	- 27.3	+9.7	+1.1	+10.0	36.4	40.0	- 3.6	Vert
15	50.870M	41.6	- 27.3	+10.3	+1.0	+10.0	35.6	40.0	- 4.4	Vert
16	50.440M	41.0	- 27.3	+10.4	+1.0	+10.0	35.1	40.0	- 4.9	Vert
17	51.200M	40.7	- 27.3	+10.3	+1.0	+10.0	34.7	40.0	- 5.3	Vert
18	35.474M	39.9	- 27.3	+11.3	+0.8	+10.0	34.7	40.0	- 5.3	Vert
19	49.585M	40.5	- 27.3	+10.4	+1.0	+10.0	34.6	40.0	- 5.4	Vert QP
^	49.570M	42.7	- 27.3	+10.4	+1.0	+10.0	36.8	40.0	- 3.2	Vert
21	34.475M	39.5	- 27.3	+11.5	+0.8	+10.0	34.5	40.0	- 5.5	Vert
22	50.175M	40.3	- 27.3	+10.4	+1.0	+10.0	34.4	40.0	- 5.6	Vert
23	34.690M	38.9	- 27.3	+11.4	+0.8	+10.0	33.8	40.0	- 6.2	Vert
24	33.735M	38.3	- 27.3	+11.7	+0.8	+10.0	33.5	40.0	- 6.5	Vert
25	31.525M	37.2	- 27.3	+12.4	+0.7	+10.0	33.0	40.0	- 7.0	Vert
26	36.713M	38.2	- 27.3	+11.2	+0.8	+10.0	32.9	40.0	- 7.1	Vert
27	32.505M	37.3	- 27.3	+12.1	+0.8	+10.0	32.9	40.0	- 7.1	Vert
28	60.330M	39.6	- 27.3	+9.4	+1.1	+10.0	32.8	40.0	- 7.2	Vert

29	59.570M	39.1	- 27.3	+9.5	+1.1	+10.0	32.4	40.0	- 7.6	Horiz
30	54.300M	38.5	- 27.3	+10.0	+1.0	+10.0	32.2	40.0	- 7.8	Vert
31	58.730M	38.8	- 27.3	+9.6	+1.1	+10.0	32.2	40.0	- 7.8	Horiz
32	53.900M	38.4	- 27.3	+10.0	+1.0	+10.0	32.1	40.0	- 7.9	Vert
33	51.645M	38.2	- 27.3	+10.2	+1.0	+10.0	32.1	40.0	- 7.9	Vert
34	54.420M	38.2	- 27.3	+10.0	+1.0	+10.0	31.9	40.0	- 8.1	Vert

35	59.110M	38.5	27.3	+9.6	+1.1	+10.0	31.9	40.0	- 8.1	Horiz
36	52.045M	37.8	27.3	+10.2	+1.0	+10.0	31.7	40.0	- 8.3	Vert
37	59.550M	38.2	27.3	+9.5	+1.1	+10.0	31.5	40.0	- 8.5	Horiz
38	232.145M	35.0	26.5	+16.3	+2.6	+10.0	37.4	46.0	- 8.6	Horiz
39	233.710M	34.7	26.5	+16.3	+2.6	+10.0	37.1	46.0	- 8.9	Horiz
40	57.670M	37.6	27.3	+9.7	+1.1	+10.0	31.1	40.0	- 8.9	Horiz
41	62.550M	37.5	27.3	+8.9	+1.2	+10.0	30.3	40.0	- 9.7	Horiz
42	233.100M	33.8	26.5	+16.3	+2.6	+10.0	36.2	46.0	- 9.8	Horiz
43	234.290M	33.8	26.5	+16.2	+2.6	+10.0	36.1	46.0	- 9.9	Horiz
44	231.590M	33.6	26.5	+16.3	+2.6	+10.0	36.0	46.0	- 10.0	Horiz
45	221.690M	33.5	26.5	+16.5	+2.5	+10.0	36.0	46.0	- 10.0	Vert
46	230.690M	33.5	26.5	+16.3	+2.5	+10.0	35.8	46.0	- 10.2	Horiz
47	219.290M	33.2	26.5	+16.6	+2.5	+10.0	35.8	46.0	- 10.2	Vert
48	231.335M	33.3	26.5	+16.3	+2.6	+10.0	35.7	46.0	- 10.3	Horiz
49	221.170M	33.1	26.5	+16.6	+2.5	+10.0	35.7	46.0	- 10.3	Vert
50	63.030M	36.9	27.3	+8.8	+1.2	+10.0	29.6	40.0	- 10.4	Horiz
51	222.770M	33.1	26.5	+16.5	+2.5	+10.0	35.6	46.0	- 10.4	Vert
52	218.730M	33.0	26.5	+16.6	+2.5	+10.0	35.6	46.0	- 10.4	Vert
53	55.730M	35.7	27.3	+9.9	+1.1	+10.0	29.4	40.0	- 10.6	Horiz

54	220.310M	32.6	- 26.5	+16.6	+2.5	+10.0	35.2	46.0	- 10.8	Vert
55	232.705M	32.5	- 26.5	+16.3	+2.6	+10.0	34.9	46.0	- 11.1	Horiz
56	56.110M	35.3	- 27.3	+9.8	+1.1	+10.0	28.9	40.0	- 11.1	Horiz

57	230.170M	32.4	- 26.5	+16.3	+2.5	+10.0	34.7	46.0	- 11.3	Horiz
58	65.510M	36.5	- 27.2	+8.2	+1.2	+10.0	28.7	40.0	- 11.3	Horiz
59	56.490M	34.8	- 27.3	+9.8	+1.1	+10.0	28.4	40.0	- 11.6	Horiz
60	52.240M	32.9	- 27.3	+10.2	+1.0	+10.0	26.8	40.0	- 13.2	Vert

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 800-500-4362

Customer: **Asyst Technologies**
Specification: **FCC 15.209**
Work Order #: **80115** Date: 04/04/2003
Test Type: **Radiated Scan** Time: 11:17:53
Equipment: **RFID Reader** Sequence#: 29
Manufacturer: Asyst Technologies Tested By: Randal Clark
Model: ATR-9100
S/N: C1

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Reader*	Asyst Technologies	ATR-9100	C1

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Sola	SLS-24-012T	8869 0150

Test Conditions / Notes:

EUT is an RFID reader. Each I/O port is terminated its characteristic impedance. The EUT is powered through a standard DC power supply representative of one used in normal installation. An RFID tag is present in the field. The transmitter is operating continuously at 134.2kHz. Data is extrapolated to proper test distance for comparison to the applicable limit in accordance with 15.33, 40dB per decade. **Data represent noise floor readings. No EUT readings were found below 30 MHz.** Frequency Range Investigated: 9 kHz to 30 MHz. Temperature 68°F, Humidity 37%.

Transducer Legend:

T1=Mag Loop A/N 00432, S/N 2078 T2=Cable - 10 Meter
T3=15.31 10m 40dB/Dec Correction

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	536.830k	25.7	+9.5	+0.0	20.0	-	+0.0	15.2	33.0	-17.8	Horiz
2	939.458k	17.6	+10.0	+0.2	20.0	-	+0.0	7.8	28.1	-20.3	Horiz
3	671.040k	18.9	+9.7	+0.0	20.0	-	+0.0	8.6	31.1	-22.5	Horiz
4	805.260k	12.3	+9.9	+0.1	20.0	-	+0.0	2.3	29.5	-27.2	Horiz
5	402.620k	22.3	+9.4	+0.1	60.0	-	+0.0	-28.2	15.5	-43.7	Horiz
6	267.810k	20.8	+9.0	+0.1	60.0	-	+0.0	-30.1	19.0	-49.1	Horiz