FCC COMPLIANCE TEST REPORT

for

Electromagnetic Emissions

of

ADVAN TAG RFID

Model Number: ATR 9000
Serial Number: Prototype
FCC ID: PMQATR9000

PROJECT #: 01SC04145

Prepared for:

ASYST TECHNOLOGIES, INCORPORATED

48761 Kato Road
Fremont, CA 94538

Prepared by:

Underwriters Laboratories, Incorporated

11825 Niles Canyon Road
Sunol, CA 94586
(925) 862-9051

REPORT DATE: MARCH 28, 2001

FCC COMPLIANCE TEST REPORT

FOR

ADVAN TAG RFID
MODEL ATR 9000

Prepared for:

ASYST TECHNOLOGIES, INC.
Fremont, CA 94538

Prepared by: Underwriters Laboratories, Inc.

	Signature	**Date**
TEST TECHNICIAN	Wayne Fisher	5/31/01
TEST SUPERVISOR	For Daryl Smith	5/31/01

LIST OF REVISIONS

REVISION NUMBER AND DATE	PAGE CHANGED	PAGE SUBSTITUTED	PAGE ADDED

REPRODUCTION CLAUSE

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LETTER OF AUTHORIZATION

ASYST

ASYST TECHNOLOGIES, INC.
48761 KATO ROAD
FREMONT, CA 94538

TEL: 510.661.5000
FAX: 510.661.5166

April 9, 2001

Dear Federal Communication Commission,

Please accept this letter as an attestation that neither Asyst Technologies, Inc. nor any of its officers, directors or persons holding 5% or more of the outstanding stock or shares, voting or non-voting, have been denied federal benefits under section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862 because of a conviction for possession or distribution of a controlled substance.

Sincerely,

Deborah A. Partridge
Vice President of Human Resources

VERIFICATION OF COMPLIANCE

Equipment Under Test:	Advan Tag RFID
Model Number:	ATR 9000
Serial Number:	Prototype
Company:	Asyst Technologies, Inc. 48761 Kato Rd. Fremont, CA 94538
Test Specification:	FCC (ANSI C63.4, 1992) Subpart C
Type of Test:	Radiated 30 MHz - 1 GHz
Performance Criteria:	Within limits found in CFR 47 Part 15 Subpart C 2000
Date Tested:	February 28, 2001
Tested By:	Wayne Fisher

The above equipment was tested by Underwriters Laboratories, Inc., for compliance with the requirements set forth in the FCC Rules and Regulations. This said equipment in the configuration described in the report, shows that maximum emission levels emanating from the equipment are within the compliance requirements.

GENERAL INFORMATION

Customer:	Asyst Technologies, Inc. 48761 Kato Rd. Fremont, CA 94538
Contact Person:	Carol Escano
Phone Number:	(510) 661-5000
Equipment Under Test:	Advan Tag RFID
Model Number:	ATR 9000
Serial Number:	Prototype
FCC ID Number:	PMQATR9000
Test Specification:	FCC (ANSI C63.4, 1992) Subpart C
Type of Test:	Radiated 30 MHz - 1 GHz
Performance Criteria:	Within limits found in CFR 47 Part 15 Subpart C 2000
Deviation:	None
Test Results:	Radiated--Radiated scans ranged from 30 MHz to 1 GHz in both the horizontal and the vertical antenna polarization. All radiated emissions were within the FCC requirements for compliance.

SYSTEM DESCRIPTION

Equipment Under Test

Advan Tag RFID

Support Equipment

Laptop Computer

EUT Test Program: "SECSIM.exe" was exercising the EUT by reading and writing data during testing to the ID.

PRODUCT INFORMATION

Description Equipment Under Test: Auto identification system consisting of an antenna and a transponder (microtag).

The EUT and/or support equipment was received at Underwriters Laboratories, Inc., in good condition, on February 28, 2001.

Housing Type: Plastic

Power Supply: External

DC Power Requirements: 12-24 VDC

Power Supply Manufacturer: Ault, Inc.

Power Supply Model: SW105

Power Supply Serial: KA-00-21-F-01

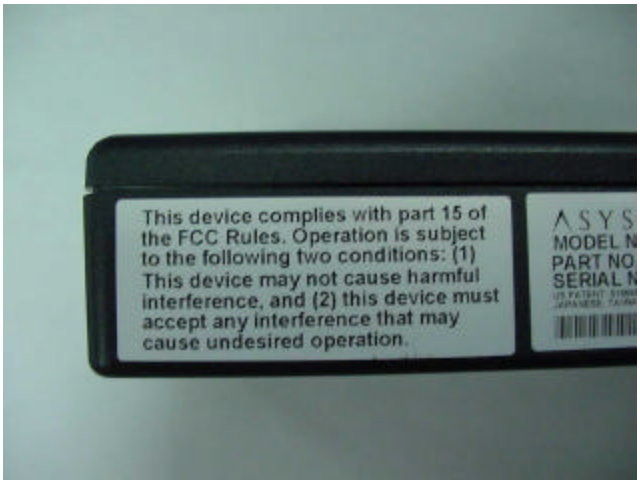
AC Line Cord from Outlet to Supply: Unshielded

OSC./Clock Frequencies: 1) 14.73 MHz **2)** 16 MHz

CPU Speed: 16 MHz

I/O PORT TYPE	QTY	TESTED WITH
1) Serial	1	1
2) BNC	1	1

FCC ID LABEL


This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

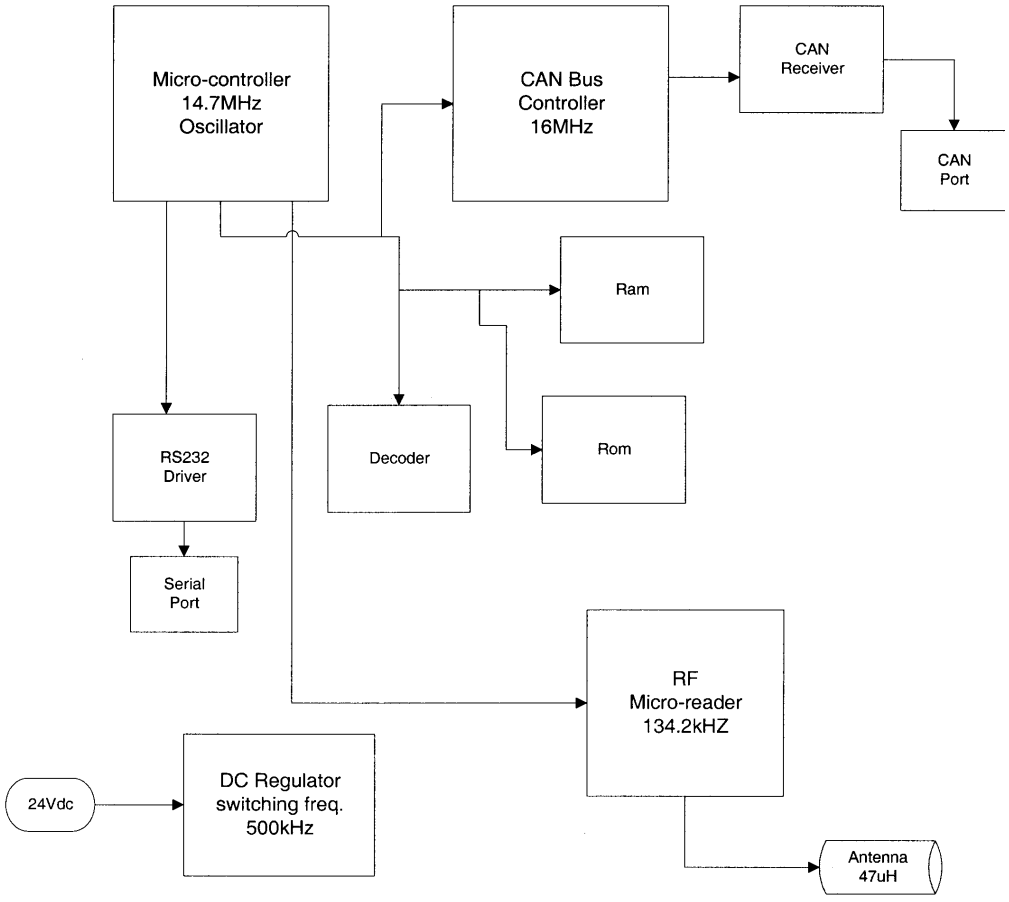

ASYST
FCC ID PMQATR9000
MODEL NO.: ATR-9000
PART NO.: 9700-6584-01
REV.000
SERIAL NO.: 00-0602-123457
US PATENT 5166884, 4974166, 5097421 CORRESPONDING EPC KOREAN, JAPANESE, TAIWANESE PATENTS PENDING OR ISSUED
PRODUCT

FCC ID LABEL PLACEMENT

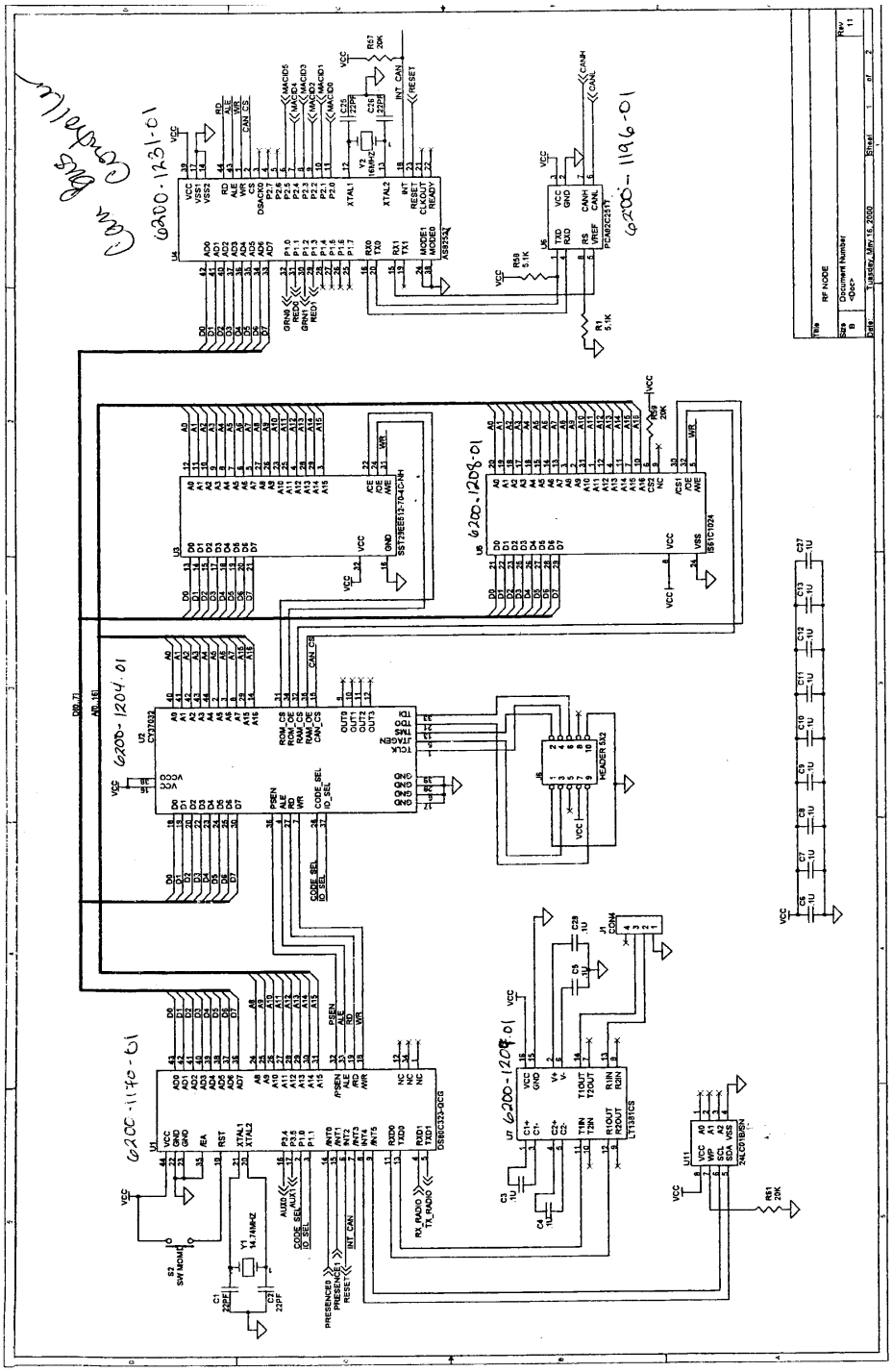

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.
ASYST FCC ID PMQATR9000
MODEL NO.: ATR-9000
PART NO.: 9700-6584-01 REV.000
SERIAL NO.: 00-0602-123457
PRODUCT
READ / WRITE
HOST COMM
OPERATOR ID
POWER
REMOTE ANTENNA
ASYST
ADVANTAG
RFID
RESET
ADDRESS
REMOTE I/O
RS232 COMM
POWER IN

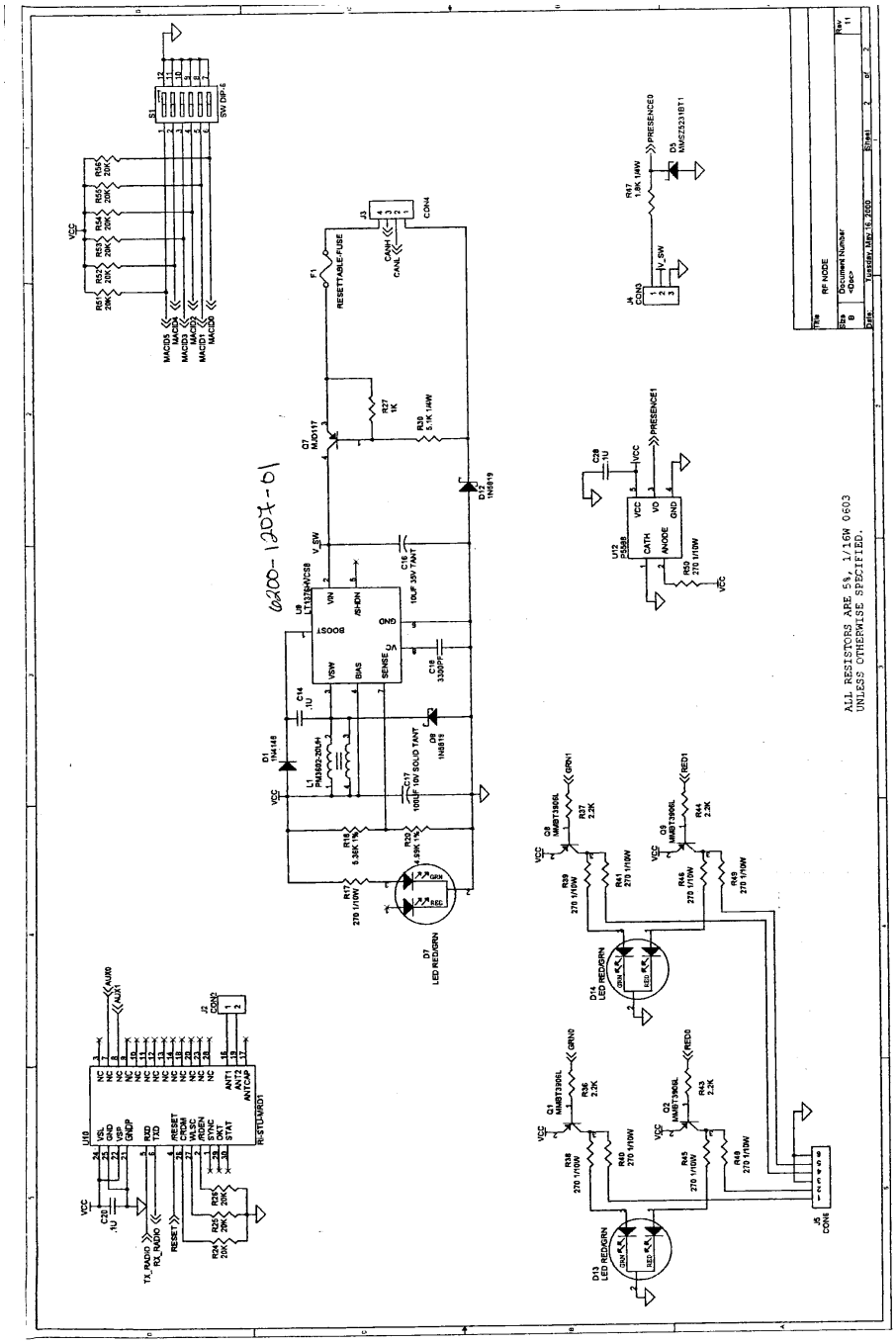
BLOCK DIAGRAM(S)

Advantag Block Diagram



SCHEMATICS




6200-1201-01
ALL RESISTORS ARE 5%, 1/16W 0603
UNLESS OTHERWISE SPECIFIED.

OPERATION MANUAL

* SEE SEPARATE ENCLOSURE FOR THE OPERATION MANUAL.

The enclosed manual is for the EUT name. As you will notice on Page ? of this manual is the FCC WARNING about radio and television interference as per the requirement set forth in Part 15 of the FCC Rules.

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DRAFT

ASYST TECHNOLOGIES, INC.

Advan Tag Reader Application Note

OVERVIEW

The Advan Tag Reader ATR 9000 (Figure 1) is part of Asyst's radio-frequency auto ID system, *Advan Tag,* which conforms to SEMI standard E99. It is a device that reads and writes to Asyst MicroTags (Figure 2) which are embedded in wafer cassettes, pods, FOUPs, reticle boxes, etc. The main component of this unit is a transmitter that generates radio waves through an antenna. This low-frequency (134.2 kHz), low-power RF energy is used to read from or write to a transponder near the antenna. The RFID Reader/Writer also provides serial communication with a host through an RS-232 port, using either SECS or ASCII protocols. Power is supplied by an external source.

This unit is designed for versatile installation in many different situations; it can be installed within OEM tools, or within loadports, or inside stockers, or on tabletops, etc. Simply connect a power source, an external antenna and a communication cable. Then set the reader's address (TargetID and DeviceID as described below in COMMUNICATIONS) and start sending Stream 18 SECS messages or ASCII messages (depending on the protocol being used).

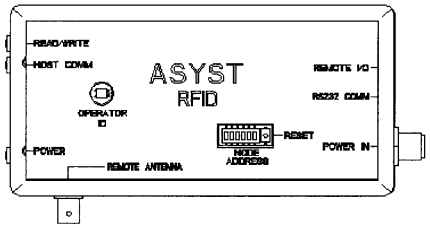

Figure 1.

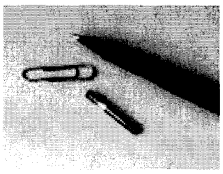

Figure 2.

DRAFT

DESCRIPTION

The Reader unit is approximately 6.7" (170 mm) x 3.35" (85 mm) x 1.38" (35 mm). There are four external ports.

- The port labeled POWER IN is for a power supply of 12VDC-24VDC. Asyst can supply a 120V adapter (see Table 1) or the OEM can supply this power.
- The port labeled RS232 COMM is for RS232 communication. A cable which connects the Reader to a PC is available from Asyst (see Table 1).
- The port labeled REMOTE ANTENNA is for an external antenna. See Table 1 for available antennas.
- The port labeled REMOTE I/O is for an external presence sensor.

There are three LEDs to signify activity, an operator ID sensor, a RESET button, and a switch panel for specifying the unit's address (TargetID). See below for more details. On the back, there are four M3-.5 x 25mm holes that can be used for mounting. An installation kit for mounting the unit to an Asyst 300mm Frontload is available and listed in Table 1.

DETAILS

POWER IN: 5-pin circular style receptacle, 12-24VDC (+/- 10%), 140mA typical, 750mA maximum.

Pin	1	2	3	4	5
Signal	Drain (N/C)	V+	V-	CAN-H	CAN-L

RS232 COMM: Shielded RJ45 socket.

Pin	4	5	6
Signal	Ground	Tx Data	Rx Data

REMOTE ANTENNA: BNC socket; please use only Asyst antennas (see Table 1).

REMOTE I/O: Shielded RJ45 socket; for external presence sensor.

Pin	1	2	4
Signal	12-24 VDC+	Presence	Ground

POWER LED:

OFF	GREEN
no power	power on

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READ/WRITE LED:

OFF	GREEN	RED	AMBER
radio off	successful read/write	read/write failure[1]	communication error[2]

[1]Due to MicroTag not present or out-of-range.
[2]Due to:

- the MicroTag page being locked, or
- attempted to read multiple pages of a single-page MicroTag, or
- multiple MicroTags are in range, or
- attempted a write operation on a read-only MicroTag.

HOST COMM LED: Green/Red/Amber, controllable by host command (on/off/blinking).

OPERATOR ID: Optical presence sensor for detecting an operator and initiating an antenna read; the antenna read may be disabled through an attribute setting.

RESET: Press this button to reset the unit. This will set the baud rate to 9600 and the SECS DeviceID to match the TargetID.

NODE ADDRESS: Used to specify the unit's address or TargetID. The switches represent powers of binary digits: switch 6 = 1, switch 5 = 2, switch 4 = 4, switch 3 = 8, switch 2 = 16, switch 1 = 32. The ON setting represents 0 and the OFF setting represents 1. For example, to set the address to '3', set switches 5 and 6 OFF and the rest ON.

COMMUNICATIONS

Please refer to the specific protocol documentation concerning either Stream 18 SECS messages or Asyst ASCII messages for details. The basic functions available are to read and write attributes, read and write material IDs (MIDs), read and write data, and various subsystem commands such as turning an LED on or off. Note that the single-page transponders hold an 8 byte MID only and the multi-page transponders hold a 16-byte MID and 120 bytes of data.

The TargetID (as described in the SEMI E99 and E5 standards) can be set with the NODE ADDRESS switches; default value is 3. The SECS I DeviceID can be set through an attribute or the Reset button. When Reset, the DeviceID is automatically changed to match the TargetID; the baud rate will be changed to the default 9600 as well. The baud rate can also be set through an attribute setting. Byte format is 8 data bits, 1 stop bit and no parity. The SECS I timeouts and retries can be set through attribute settings; defaults are T1 = 0.5 secs, T2 = 10 secs, T3 = 45 secs, T4 = 45 secs, Retries = 3.

DRAFT

COMPONENTS AVAILABLE

Table 1 lists the Advan Tag components that are currently available from Asyst and their part numbers.

Table 1

Component	Part No.
Advan Tag Reader (SECS protocol)	9700-6584-01
120V Power adapter	9700-6697-01
RS232 Cables to PC (DB9F)	9700-4859-01/05/10/20/30 (length in feet)
RS232 Cables to SMART-Comm	9700-7008-05/10/15/20/30 (length in feet)
RS232 Cable to SMART-Comm w/ power	9700-7009-05/10/15/20/30 (length in feet)
Coil Antenna, metallic environment (Asyst Frontload) w/ 6' cable	9700-6225-01
Tubular Antenna, non-metallic environments w/ 6' cable	9700-6224-01
Tubular Antenna, metallic environments w/ 6' cable	9700-6224-02
Single-page glass MicroTag	1420-214
Multi-page glass MicroTag	1420-210
Single-page card MicroTag	1420-211
Mounting Kit for 300mm Frontload (includes a Reader)	9700-6699-01

ADDITIONAL INFORMATION

If you require additional information or have questions regarding STS compatibility, please contact the SMART-Traveler System Product Marketing group at (800) 345-7643.

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RFID
Product Design Specification

10/25/99
Rev. XX

PRELIMINARY

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1. SYSTEM ARCHITECTURE

A modular architecture is used so that the system is adaptable to each application, yet uses only a few standard components. In contrast to the previous generation RFID system (FlouroTrac), this system is not confined to fixed numbers of readpoints. Instead the system uses the modular concept to provide expandability from one to 64 readpoints.

The primary components are the Radio Frequency Node (RFN), the Multiple Readpoint controller (MRP), the antenna, and the presence sensor. These components provide all the functionality for single or multiple readpoint configurations. Additional functionality may be added later by designing new components that utilize the system's Controller Area Network (CAN) bus. The CAN bus also allows the RFID system to easily integrate with new Asyst products which will incorporate a CAN bus.

Figure 1.1 shows a typical single readpoint configuration. The RFN along with an antenna and presence sensor create a stand-alone single readpoint with SECS, FTRP, or DeviceNet protocols available for communications to the host. If the HSMS protocol is required, a MRP module would be added to the system.

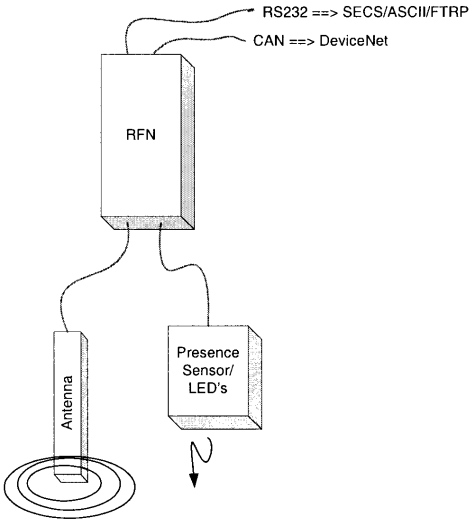

Figure 1.1: A typical single readpoint configuration

Figure 1.2 show a typical multi-readpoint configuration. The MRP is added and the CAN bus is used to network all the RFN's together. When a CAN equipped Asyst I/O product

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is available in the future, multiple readpoints can be connected directly to the equipment's CAN bus and the MRP would not be need for that configuration.

For backward compatibility and certain applications, it is desirable for one antenna to read two different sources (i.e. a pod and an operator ID card). This capability will be achieved by providing two presence sensor inputs on the RFN.

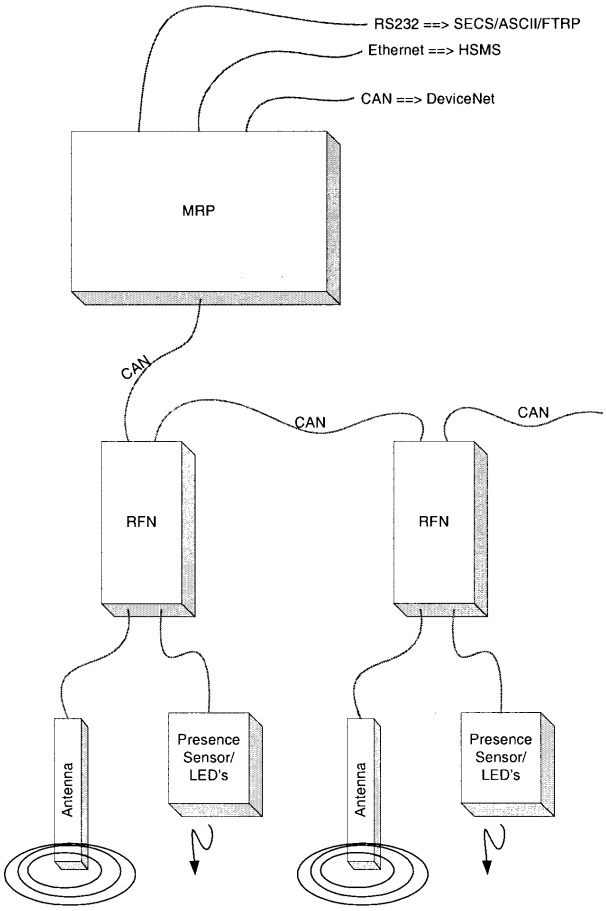

Figure 1.2: A typical multi-readpoint configuration

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2. ELECTRICAL SPECIFICATIONS

RFN

The Radio Frequency Node (RFN) is the basic RFID readpoint for both single and multiple readpoint systems. In single readpoint applications, the RFN is a standalone readpoint that reads and writes the tags, detects the presence of pods or operator ID cards, and communicates with the host. When the RFN is used in multiple readpoint applications, all RFN's are networked to an MRP using the CAN bus. The functional blocks of the RFN are the microcontroller, RFID radio and the presence sensor/LED interface.

Table 2.1: RFN Specifications

Tag Compatibility	TIRIS R/O and R/W
Power	24V
Size	5"x1.5"x1" (estimate)
Processor	8051 type microcontroller
Communication Physical Layers	RS232 and CAN
Sensors/LEDs	Connector for external (2 sensors and 3 LED's)

Microcontroller

The RFN will be based on an 8051-type microcontroller using external program and data memory. The DS80C323 has been chosen because of Asyst's previous experience with this device. The microcontroller will operate from 5V and will run at 16MHz, which is 89% of its maximum clock rate. The 8051's two on-chip UART's will be used for RS232 host communications and for communication to the RFID radio module. An 82527 CAN controller will connect via to the 8051's multiplexed bus to provide the CAN communication.

Memory

Program memory will consist of 1Mb of SRAM to provide 128KB of data space. The 8051 architecture only allows access of up to 64KB of program space, so a paged memory scheme will be used to access the entire 128KB. Page selection will be implemented using one I/O pin from the 8051. In order to allow for code upgrades via CAN or RS232 downloads, the program and data memory will need to be swapped via software control. Programmable logic driven by an I/O pin from the 8051 will perform the memory swap. This technique has been used successfully on the ST-8400 tag.

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Configuration Data

The RFN will contain a 1Kb serial EEPROM which will be to store configuration data. The will access the EEPROM for reading and writing by using three I/O pins.

Table 2.2: RFN Microcontroller specifications

MCU	DS80C323
Program memory	64KB FLASH
Data memory	128KB SRAM
Config. memory	128Bytes EEPROM
Radio interface	on-chip UART
RS232 host interface	on-chip UART
CAN host intake	82527
Clock speed	16MHz

Interface Logic

Several IC interfacing functions are required to complete the control electronics. These functions are:

1) Demultiplex the 8051 bus to interface with the non-multiplexed SRAM and Flash buses.
2) Create I/O space to map the CAN registers to so that memory space is not used.
3) Create additional general purpuse I/O's in the I/O space.
4) Create a paging mechanism to access all 128KB of SRAM from the 8051's 64KB memory space.

All of the this functionality will be implemented with a Flash CPLD. The Flash technology allows in-circuit programmability which facilitates development, production, and field upgrades of the CPLD code.

MAC ID and Network Termination

An eight position DIP switch will be used to set the DeviceNet MAC ID and select 120Ohm network termination resistor. Positions one through six will represent the binary digits of the MAC ID, giving 64 possible ID's. The eighth position will select the network termination resistance. If the RFN is the node of a CAN network than switch eight should be turn on, otherwise it should be off.

Radio

The RFID radio will initially read and write TIRIS tags since this is currently the most popular tag in the industry. The radio portion of the RFN will be on a detachable module to facilitate radio changes as the industry evolves. The TIRIS Microreader is a popular TIRIS radio with an appropriate form-factor, however the Microreader probably cannot achieve the desired read range with an acceptable antenna size. If this is the case, a custom radio will be built. It will maintain the Microreader form-factor and pinout so

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that the Microreader could be used if desired. The radio will interface to the 8051 using asynchronous serial communications and protocol compatible with the Microreader.

The custom radio module would be based on the TIRIS radio ASIC, RI45538NS. This ASIC handles the transmit logic, the receiver amplification and the receiver demodulation. The remaining components to complete the radio module are the tuning circuitry, the transmit amplifier, and a small microcontroller to provide the serial interface to the 8051. A Microchip PIC16C621 is a good choice for the microcontroller since it is low-cost and contains on-chip RAM, ROM, and UART. This is the same microcontroller used by the Mircoreader.

Table 2.3: Radio Module Specifications

Tag Compatibility	TIRIS R/O and R/W
Size	1.2"x1.5"x0.25" (Microreader Compatible)
Power	5V, ??A
Frequency	134.2KHz
Host interface	Asynchronous serial
Protocol	MicroReader Compatible

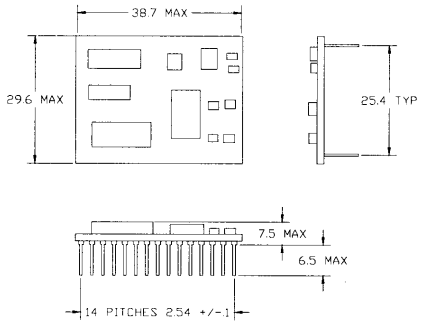

Figure 2.1: Radio module dimensions

Presence Sensor and LED Interface

The RFN will read up to two presence sensors to initiate a read and/or notify the host. Three status LED's will provide visual feedback of the RFN's operation. The presence sensors and LED's will be built as separate module that connects to the RFN with a single cable. The RFN's presence sensor input will be TTL compatible with weak pull-ups so it can be used with a variety of presence sensors technologies. The status light

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output circuitry will have transistor switches and current limiting resistors so that LED's can be driven directly from the output signal.

ANTENNA

If possible, the radio will be compatible with the current FlouroTrac antennas.

Table 2.4: Antenna Specifications

Inductance	~~1.5uH~~ 4.7uH
Q	~~15-20~~ 10 - 20.

MRP

The MRP connects up to 64 RFN's on a CAN bus, allowing a to access all readpoints with only one communications connection. The MRP will have at least one RS232 port, two CAN ports, and ethernet. This allows the MRP to provide SECS, FTRP, ASCII, DeviceNet, and HSMS protocols for the host communications.

DeviceNet

The MRP will contain three LED's to indicate the status of the CAN bus as specified by the DeviceNet protocol.

Table 2.5: MRP Specifications

CPU	486, 133MHz
Size	2"x6.5"x8"
RAM	16MB
ROM	Minimum 8MB disk-on-chip
Serial ports	2 UARTs
CAN	2 CAN controllers
LAN	Ethernet, 10BaseT
Power	24VDC (optional external P/S for 110VAC operation)

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Specifications for RFID Antennas
(For Use With Asyst ATR 9000 Readers)

Part Number: 9700-6224-01
Part Description: ASSY,ANT,T2.5,6FT CABLE,RFN
Specifications:
- **Cable length:** 72.0 inches ± 1.0 inches
- **Connector:** BNC
- **Case OD:** 12.7mm ±0.25mm
- **Case Length:** 62mm ±3mm (must be able to fit in a 70mm space including cable bend)

Summary Description: Tubular antenna designed to be attached to the external antenna connector of the ATR 9000 and optimized for use in non-metallic environments (air/plastic). Estimated read range is 4.25". Write range is approximately 50% of read range. Read and write ranges are dependent upon actual installed environment. See figure 2 for picture.

Part Number: 9700-6224-02
Part Description: ASSY,ANT,T2.5,RFN-FL,6' CABLE
Specifications:
- **Cable length:** 72.0 inches ± 1.0 inches
- **Connector:** BNC
- **Case OD:** 12.7mm ±0.25mm
- **Case Length:** 62mm ±3mm (must be able to fit in a 70mm space including cable bend)

Summary Description: Tubular antenna designed to be attached to the external antenna connector of the ATR 9000 and optimized for use in a metallic environment such as a 300mm Front Load. Estimated read range in air is 3.5". Write range is approximately 50% of read range. Read and write ranges are dependent upon actual installed environment. See figure 2 for picture.

Part Number: 9700-6225-01
Part Description: ASSY,ANT,COIL 1.3, 4.5FT CABLE,RFN
Specifications:
- **Cable length:** 54.0 inches ± 1.0 inches
- **Connector:** BNC
- **Coil ID:** 0.525 inches + 0.010 inches, -0.015 inches
- **Coil OD:** 1.30 inches + 0.02 inches, -0.01 inches
- **Coil Height:** 0.220 inches + 0.025 inches, -0.010 inches
- **Cable Jnctn:** 0.375 inches ± 0.125 inches

Summary Description: Coil antenna designed to be attached to the external antenna connector of the ATR 9000 and optimized for use in metallic environments such as a 300mm Front Load. Estimated read range is 3.0". Write range is approximately 50% of read range. Read and write ranges are dependent upon actual installed environment. See figure 1 for picture.

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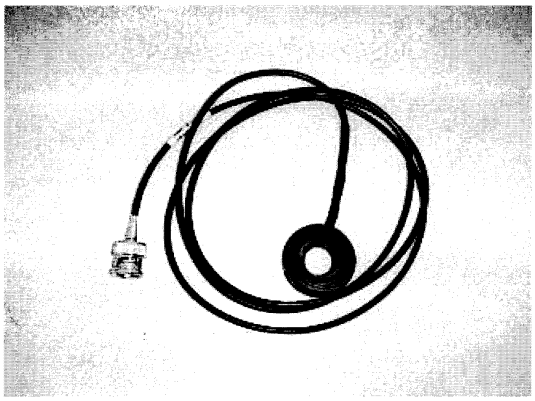


Figure 1 Coil Antenna

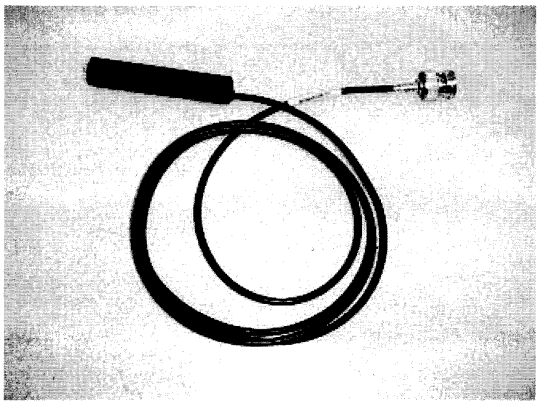


Figure 2 Tubular Antenna

SUPPORT EQUIPMENT

Equipment Type: Laptop Computer

Model Number: 1456VQL10H (INT) (Armada M700)

Serial Number: PTC211/99/119

FCC ID Number: Part 68, subpart D, FCC rules

Manufacturer: Compaq

Power Line Cord Type: AC Adapter

I/O PORT TYPE	TERMINATED TO
Com 1 (serial)	EUT

Note: This device was used to exercise EUT (read/write).

PRODUCT CABLING INFORMATION

Equipment Under Test (EUT): Advan Tag RFID

Cable: Serial		**Shielded**
Used	**From:** Serial	**Port On:** Laptop Computer
	To: Serial	**Port On:** EUT
Connector Type: DB-9		**Length:** 10 Feet

Cable used during test was unbundled.

Cable: Antenna		**Shielded**
Used	**From:** Antenna	**Port On:** EUT
	To: Fixed	**Port On:** Antenna
Connector Type: BNC		**Length:** 1 Meter

Cable used during test was unbundled.

SUMMARY

Company: Asyst Technologies, Inc.

Equipment Under Test: Advan Tag RFID **Model Number:** ATR 9000

Test Specification: FCC Part 18, Subpart C

Test Type: Radiated **Location:** 10 Meter Test Site #1

Tested By: Wayne Fisher

EUT was scanned in the following setup(s): Mode: 1) Read/Write via Tx/Rx

Configuration: 1) Connected to Laptop with both loop tubular antennas

Support Equipment: Laptop Computer

EUT Power: 120 VAC/60 Hz **Power Cord:** Unshielded

Modification(s) made to EUT: None

Test Results: Passed

(The chart below shows the six highest readings taken from the final data)

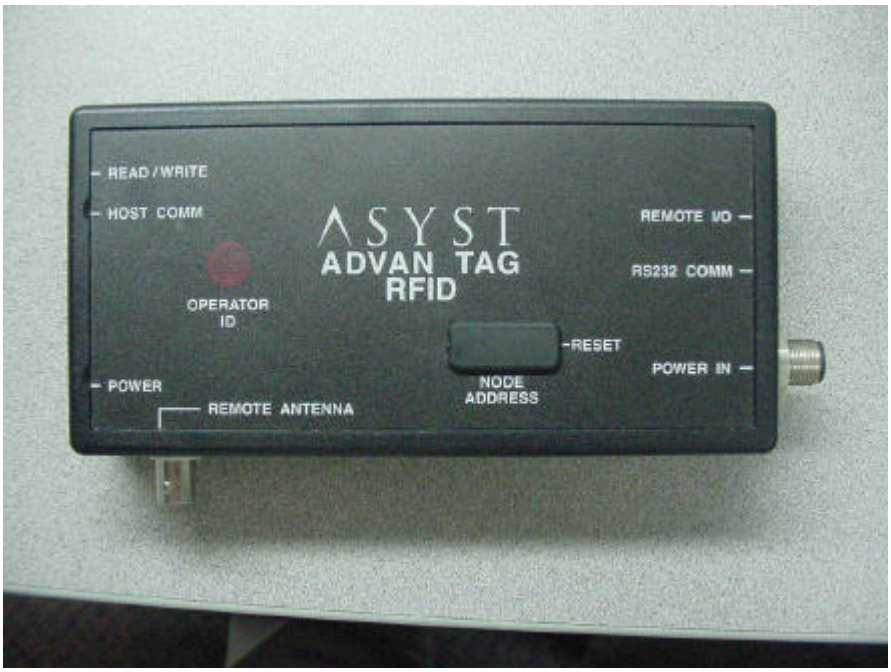
FREQ MHz	CORR'D dBµV/m	SITE CF	LIMIT		MARGIN		NOTE
			QP	AVG	QP	AVG	
120.00	32.4 PK	+13.5	43.5		-11.1		Vertical
295.66	31.1 PK	+22.1	46.5		-15.4		Vertical
120.11	30.4 PK	+13.4	43.5		-13.1		Vertical
120.11	30.4 PK	+13.4	43.5		-13.1		Horizontal
128.00	31.0 PK	+13.0	43.5		-12.5		Horizontal
350.21	30.7 PK	+17.6	46.5		-15.8		Horizontal

APPENDIX A

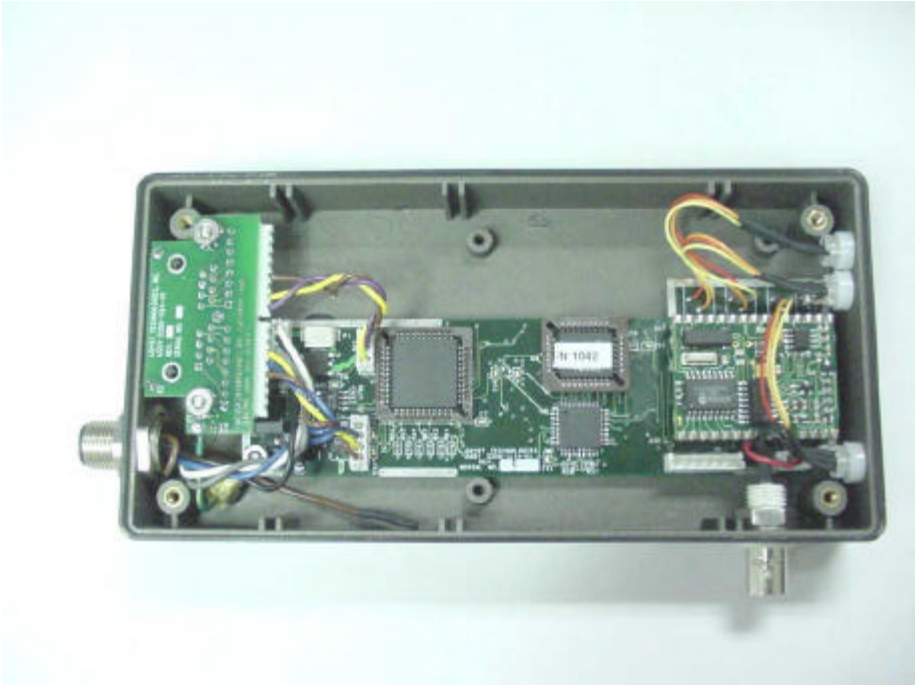
PHOTOGRAPHS

Asyst Technologies, Inc

1. Front View



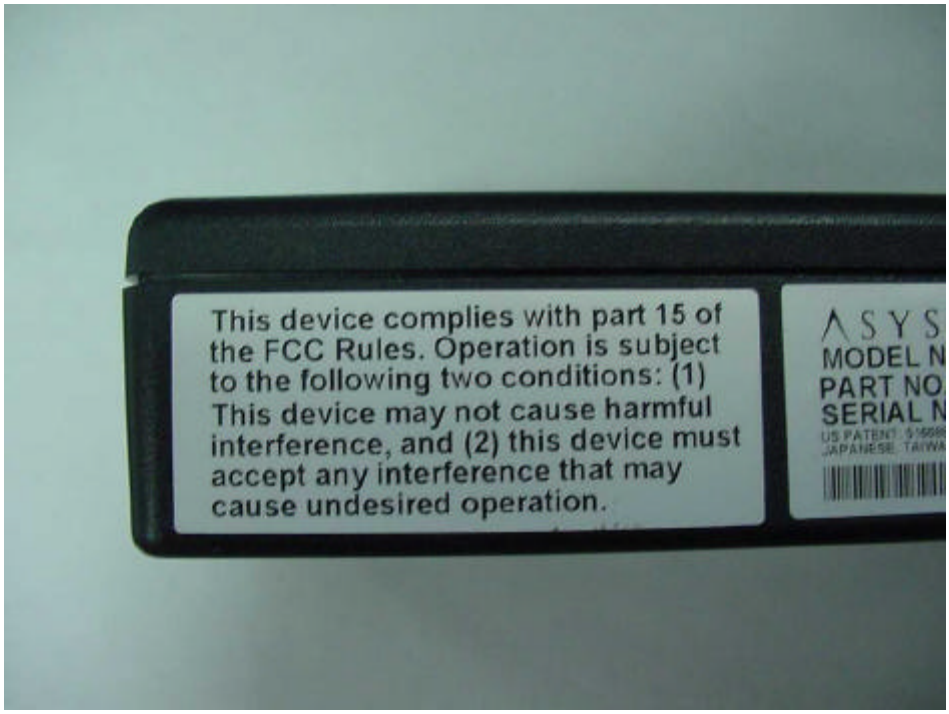
2. Internal View



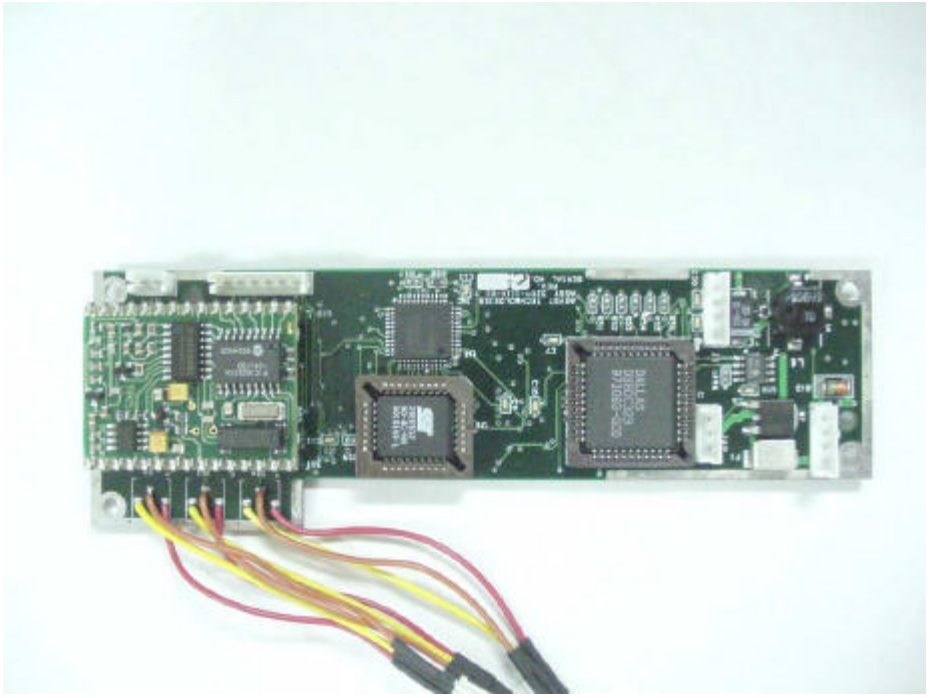
3. Label Location

4. Serial Number Label

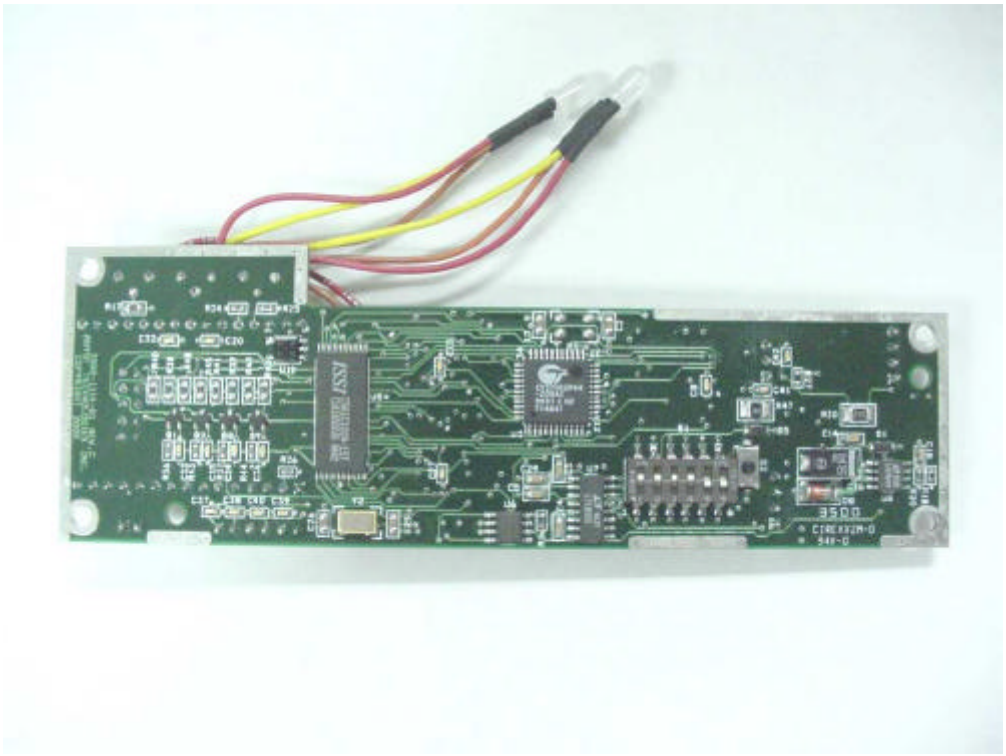
Conformity Label



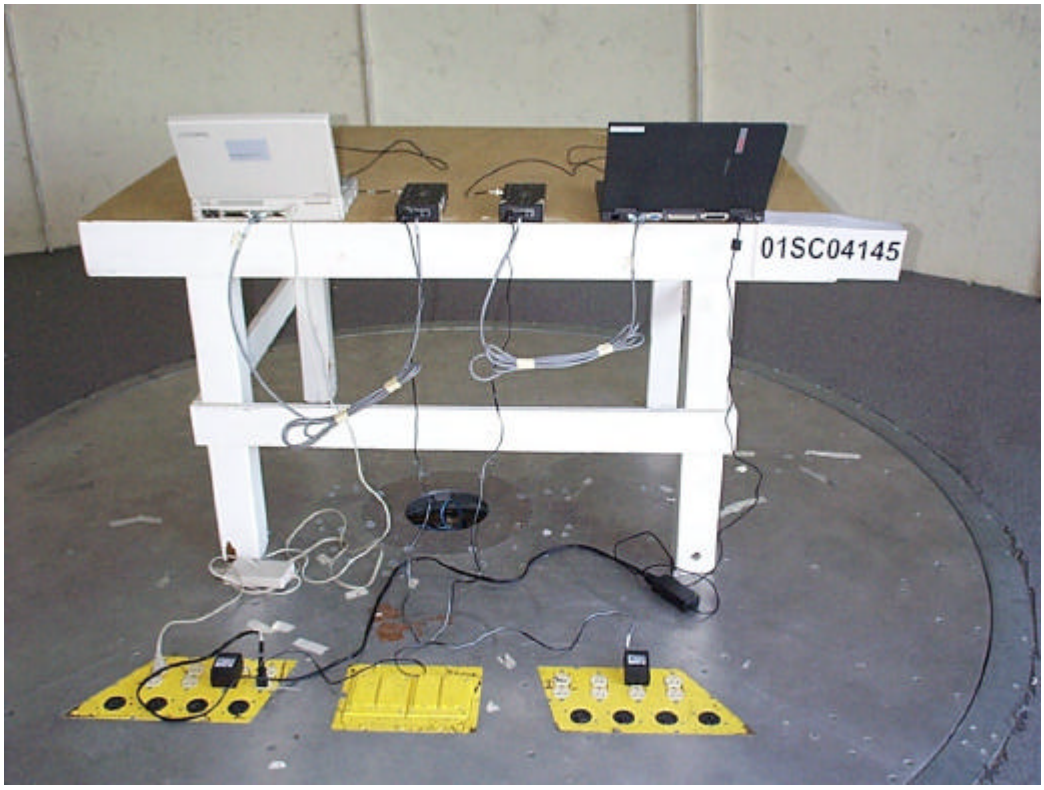
Top View of PCB



Bottom View of PCB



Radiated



Site 1 / 3 Meters

Site 1 / 10 Meters

APPENDIX B

TEST FACILITY

TEST FACILITY

Location: 11825 Niles Canyon Road
Sunol, CA 94586

Description: At the Sunol facility, there are four 3/10 m open area test sites, two line conducted labs and two indoor conducted/radiated engineering labs. The OATS and the LC labs are constructed and calibrated to meet the FCC requirements in documents OST-55/MP-4 and ANSI C63.4 1992.

FCC has also accepted Underwriters Laboratories, Inc., facility site for filing applications for certification and notification.

Certification: Underwriters Laboratories, Inc., has the following test/lab sites certified by VCCI and Industry Canada (IC):

Open Area Test Site #1: VCCI No. R-802 and IC 2816-1

Open Area Test Site #2: VCCI No. R-376 and IC 2816-2

Open Area Test Site #3: VCCI No. R-377 and IC 2816-3

Open Area Test Site #4: VCCI No. R-378 and IC 2816-4

Line Conducted Lab #1: VCCI No. C-392

Line Conducted Lab #2: VCCI No. C-427

APPENDIX C

TEST EQUIPMENT

MEASURING INSTRUMENT SETTINGS

TEST TYPE	DETECTOR	FREQUENCY RANGE	RESOLUTION BANDWIDTH	VIDEO BANDWIDTH
Conducted	Peak/Avg	10 kHz-150 kHz	300 Hz/3 kHz	100 kHz/3 kHz
Conducted	Peak/QP/Avg	150 kHz-30 MHz	10 kHz/100 kHz	100 kHz
Radiated	Peak/Avg	60 Hz-1 kHz	10 Hz	100 kHz
Radiated	Peak/Avg	1 kHz-10 kHz	100 Hz	100 kHz
Radiated	Peak/Avg	10 kHz-150 kHz	300 Hz	100 kHz/300 Hz
Radiated	Peak/QP/Avg	150 kHz-30 MHz	10 kHz	100 kHz/10 kHz
Radiated	Peak/QP/Avg	30 MHz-1 GHz	100 kHz	100 kHz/10 kHz
Radiated	Peak/Avg	Above 1 GHz	1 MHz	1 MHz/300 kHz

Note: All readings on data pages are taken with the detector in peak mode unless otherwise stated.

TEST EQUIPMENT LIST

EQUIPMENT TYPE	* MFR	MODEL NUMBER	SERIAL NUMBER	LAST ** CAL.	CAL. DUE
Biconical Antenna	EMCO	3110	9210-1581	09-05-00	09-05-01
Log Periodic Antenna	Schwarzbeck	UHALP 9107	9107384	10-10-00	10-10-01
RF Filter Section	HP	85460A	3704A00417	06-26-00	06-26-01
Spectrum Analyzer Display	HP	85662A	2403A06604	06-26-00	06-26-01

*** MFR** = Manufacturer
**** CAL.** = Calibration

APPENDIX D

TEST METHODS

TEST METHODS (LINE CONDUCTED TEST)

1) The equipment will be set up according to the test specification to simulate typical actual usage. When the EUT is a table-top system, a wooden table with a height of 0.8 meters is used which is placed on the ground plane according to the test specification. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm covering to insulate the EUT from the ground plane.
2) Support equipment, if needed, will be placed according to the test specification.
3) All I/O cables are positioned to simulate typical actual usage according to the test specification.
4) The EUT receives AC power through a Line Impedance Stabilization Network (LISN) which is grounded to the ground plane.
5) Support equipment, if used, will receive AC power through a second LISN.
6) Emissions are measured on each current carrying line of the EUT using a spectrum analyzer connected to the LISN powering the EUT.
7) During the emission measurement, the I/O cable placement position is adjusted in order to maximize the emission measurement level.
8) Emission frequency and amplitude are recorded into a computer in which correction factors are used to calculate the emission level and compare the reading to the applicable limit.

Data Sample:

Freq. MHz	Corr'd dBµV	Site CF	Limit dBµV	Margin dBµV	Line
2.47	46.0	6.0	48.0	-2.0	L1

Freq. = Emission frequency in MHz
Corr'd dBµV = RAW reading converted to dBµV and CF added
Site CF = Correction Factors for pad/cable losses
Limit dBµV = Limit stated in standard
Margin dBµV = Reading in reference to limit
Note = Current carrying line of reading

TEST METHODS (RADIATED TEST)

1) The equipment will be set up according to the test specification to simulate typical actual usage. When the EUT is a table-top system, a wooden table with a height of 0.8 meters is used which is placed on the ground plane according to the test specification. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm covering to insulate the EUT from the ground plane.

2) Support equipment, if needed, will be placed according to the test specification.

3) All I/O cables are positioned to simulate typical actual usage according to the test specification.

4) The antenna is placed at some given distance away from the EUT as stated in the test specification. The antenna connects to the analyzer via a cable and at times a preamp is used.

5) Emissions are scanned and measured rotating the EUT to 360 degrees, positioning cable placement, and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarizations in order to maximize the emission reading level.

6) Emission frequency, amplitude, antenna position, polarization, and table position are recorded into a computer in which correction factors are used to calculate the emission level and compare the reading to the applicable limit.

Data Sample:

Freq. MHz	Corr'd dBµV	Site CF	Limit dBµV	Margin dBµV	Table Pos.	Ant Pos.
76.57	44.2	-12.8	40.0	-5.3	180	1.5V

Freq.	= Emission frequency in MHz
Corr'd dBµV	= RAW reading converted to dBµV and CF added
Site CF	= Correction Factors for pad/cable losses
Limit dBµV	= Limit stated in standard
Margin dBµV	= Reading in reference to limit
Table Position	= EUT placement in reference to antenna
Antenna Position	= Antenna polarization and height above ground plane

APPENDIX E

CLASS TYPES

FCC CLASS TYPES

CLASS A COMPUTING DEVICE

A computing device which is marketed for use in a commercial or business environment; exclusive of a device which is marketed for use by the general public, or which is intended to be used in the home. Reference: Section 15.3 (h).

CLASS B COMPUTING DEVICE

A computing device that is marketed for use in a residential environment notwithstanding use in a commercial, business, or industrial environment. Examples of such devices include, but are not limited to: electronic games, personal computers, calculators, and similar devices that are marketed for the general public. Reference: Section 15.3 (i).

NOTE: A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B computing device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B computing device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a computing device as a Class B computing device, regardless of its intended use.

APPENDIX F

LABELING REQUIREMENTS

FCC CLASS B LABELING REQUIREMENT

Section 15.19 of the Code of Federal Regulation

A) The Class B computing device subject to **certification** by the Commission shall be identified pursuant to par. 2.925 et seq of this Chapter. In addition, the label shall include the following statement:

FCC ID: PMQATR9000 THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

B) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified in this Section is required to be affixed only to the main control unit.

C) When the device is so small or for such use that it is not practicable to place the statement specified in this Section on it, the information required by these paragraphs shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

D) The label shall not be a stick-on paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase. "Permanently affixed" means that the label is etched, engraved, stamped, silkscreened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or use of a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

APPENDIX G

DATA READINGS

FCC CLASS A

RADIATED EMISSION DATA

COMPANY: Asyst Technologies Inc.
EQUIP. UNDER TEST: ADVAN TAG RFID

MODEL NUMBER: TFR9000
TEST PROCEDURE: FCC Class A
SUPPORT EQUIPMENT: (2)Laptop Computers

TESTED BY: Wayne Fisher TEST SITE 1
DATE: February 28 2001

TIME: 14:28 Control RM Temp: 72 Deg.F Humidity: 29 %RH
EUT Room Temp: 65 Deg.F Humidity: 25 %RH

10KHz TO 30MHz Rod Antenna Antenna at 3 meters Vert.

FREQ KHz	RAW dBuV	SITE CF	CORR'D dBuV/m	LIMIT A	LIMIT B	MARGIN A	MARGIN B	POSITION TBL	POSITION ANT
Fundamental Frequency Reading									
134.18	+62.2PK	+20.0	82.2					1	0.00
Fundamental Frequency Reading for Loop Antenna.									
134.20	+59.2PK	+20.0	79.2					1	0.00
Both Antennas - Loop and Tubular are transmitting/recieving.									
30MHz TO 300MHz Biconical Antenna at 10 meters Vert.									
120.00	+18.9PK	+13.5	32.4	43.5	33.0	-11.1	-0.6	183	3.90
232.04	+9.6PK	+19.7	29.3	46.5	35.5	-17.2	-6.2	164	3.90
295.66	+9.0PK	+22.1	31.1	46.5	35.5	-15.4	-4.4	199	3.90
120.11	+17.0PK	+13.4	30.4	43.5	33.0	-13.1	-2.6	141	1.00
30MHz TO 300MHz Biconical Antenna at 10 meters Horz.									
120.11	+17.0PK	+13.4	30.4	43.5	33.0	-13.1	-2.6	141	1.00
128.00	+18.0PK	+13.0	31.0	43.5	33.0	-12.5	-2.0	125	1.00
300MHz to 1000MHz Log Periodic Antenna at 10 meters Horz.									
350.21	+13.1PK	+17.6	30.7	46.5	35.5	-15.8	-4.8	233	3.40
622.21	+4.9PK	+22.0	26.9	46.5	35.5	-19.6	-8.6	166	3.96

FCC CLASS A

RADIATED EMISSION DATA

COMPANY: Asyst Technologies Inc.
EQUIP. UNDER TEST: ADVAN TAG RFID

MODEL NUMBER: TFR9000
TEST PROCEDURE: FCC Class A
SUPPORT EQUIPMENT: (2)Laptop Computers

TESTED BY: Wayne Fisher TEST SITE 1
DATE: February 28 2001

TIME: 4:20pm Control RM Temp: 72 Deg.F Humidity: 29 %RH
EUT Room Temp: 65 Deg.F Humidity: 25 %RH

300MHz to 1000MHz Log Periodic Antenna at 10 meters Horz.

FREQ	RAW	SITE	CORR'D	LIMIT		EUT MARGIN		POSITION	
MHz	dBuV	CF	dBuV/m	A	B	A	B	TBL	ANT
Both Antennas - Loop and Tubular are transmitting/recieving.									
300.00	+5.7PK	+16.6	22.3	46.5	35.5	-24.2	-13.2	206	1.36

========== END OF RADIATED TEST ==========

APPENDIX H

TEST PROCEDURES

For a Copy Contact:

ASYST TECHNOLOGIES, INCORPORATED
48761 Kato Road
Fremont, CA 94538