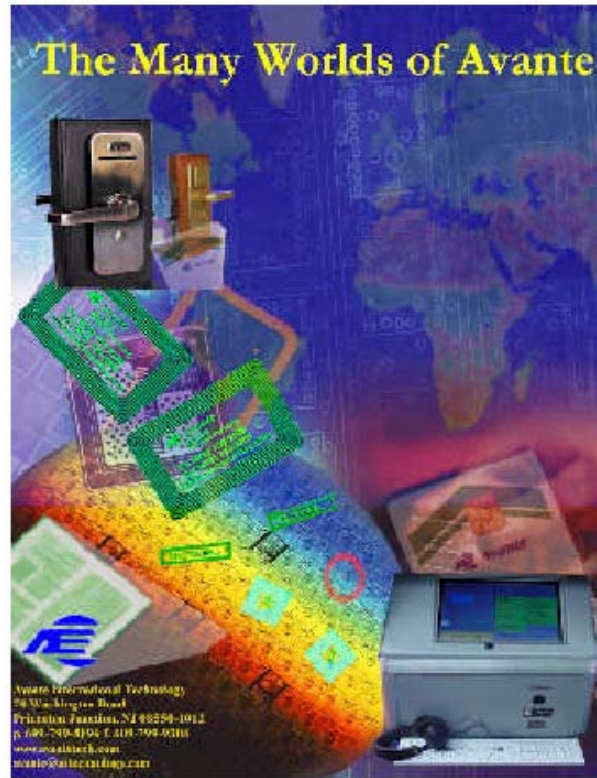


SMART-TRAKKER™



Avante International Technology, Inc.

RFID Long Range Reader

Model SR3002

Version 1.1.0

August 23, 2005

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Table of Contents

1. INTRODUCTION	4
2. SYSTEM HARDWARE	5
2.1 Overview	5
2.2 Smart-Tags®	5
2.3 Host	5
2.4 I/O Ports	5
2.5 Antenna	6
2.6 Power Supply	6
3. DESCRIPTION	7
3.1 Block Diagram	7
3.1.1 Power Supply	7
3.1.3 Clock Generator	7
3.1.4 Modulator, Transmitter Amplifier	7
3.1.5 Modulation Index, RF Power Regulation	7
3.1.6 Receiver, Filter, Demodulator and ADC	7
3.1.7 Optocouplers	7
3.1.7 Microcontroller	8
3.1.8 RS232 Interface	8
4. SPECIFICATIONS	9
4.1 Electrical	9
4.1.1 Power Supply	9
4.1.2 Reader	10
4.2 Mechanical	11
4.2.1 Dimensions	11
4.2.2 Connectors	13

5. TROUBLESHOOTING	14
6. OPERATING CONSIDERATIONS	15
6.1 Supply Voltage	15
6.2 Antenna Opens or Shorts	15

1. INTRODUCTION

The Avante SMART-TRAKKER™ Model SR3002 RFID Long Range Reader was designed to communicate with Avante SmartTag® RFID tags based on the ICODE IC. Read/write functionality and methods to use the anticollision capability of ICODE are included.

The primary focus is on the long-range capability, which makes the reader suitable for gate antennas and tunnel applications.

Should there be any questions about this manual, please visit the user section of

www.avantetech.com

or call the technical support center of

Avante International Technology, Inc.

1-800-735-5040.

Basic features of the SR-3002 Long Range Reader

- 24VDC power supply input
- 13.56 MHz carrier frequency
- RS323 serial interface, 115.2 or 57.6 KBaud data rate
- Regulated RF output power, software adjustable from 2 to 10 W @ 50 ohm
- Software adjustable modulation index (10%-20%)
- RS232 upgradable firmware
- Anticollision capability
- Standard and Fast Mode support
- BAPT and FCC approval
- CE compliant

2. SYSTEM HARDWARE

2.1 OVERVIEW

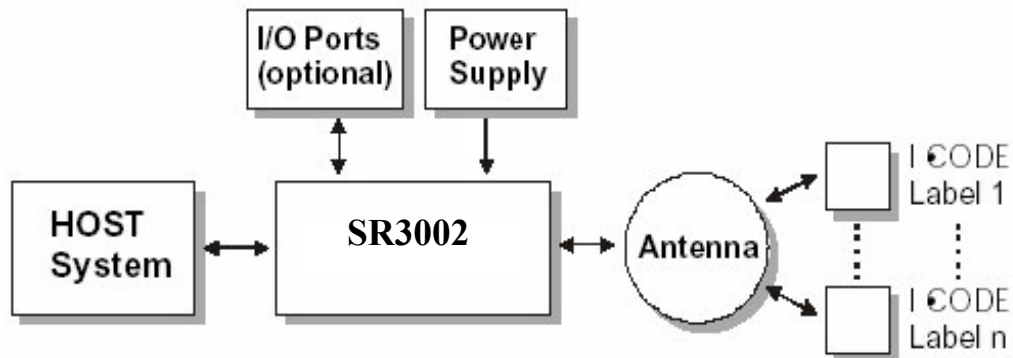
The SMART-TRAKKER™ in a complete RFID system:

2.2 SMART-TAGS®

The SMART-TRAKKER™ can communicate with the ICODE™ series, Avante I-code Smart-Tag

2.3 HOST

Any PC or Laptop computer running Windows 95/98/2000/XP Operating System with the Smart-Trakker™ Software installed and having an RS232 serial port will serve as the host.



2.4 I/O PORTS

The Smart-Trakker microcontroller board has 6 input ports, 4 output ports and one EAS signal output port all software addressable. The ports are not ESD protected, since they are not fed through the metal housing. The data transmission connection between the Smart-Trakker™ and the Host computer is through an RS232 serial port and cable. See the section on [Reader to Host Protocol](#) for the communication protocol

2.5 ANTENNA

Any Avante Smart-Trakker™ 50-ohm antenna designed for the reader can be used. A 50-ohm coaxial cable terminating in a 50-ohm BNC connector transmits data from the antenna to the reader

2.6 POWER SUPPLY

A linear regulated power supply of 24 VDC at a maximum of 2.0A is included.

3. DESCRIPTION

3.1 BLOCK DIAGRAM

See Attachment.

3.1.1 Power Supply

Generates 24 VDC power from 120 VAC line voltage.

3.1.2 Voltage Regulation

Generates all necessary voltages for the Smart-Trakker from the 24 VDC power supply voltage.

3.1.3 Clock Generator

Generates the 13.56 MHz clock for the transmitter amplifier. A divided clock signal synchronizes the microcontroller.

3.1.4 Modulator, Transmitter Amplifier

Modulates the carrier with a digital signal from the microcontroller for data transmission. The Transmitter Amplifier amplifies the modulated carrier.

3.1.5 Modulation Index, RF Power Regulation

Keeps the Antenna Output Voltage to a software adjustable value. The Modulation Index is software adjusted after any change in the RF-output power and at large temperature variations.

3.1.6 Receiver, Filter, Demodulator and ADC

The SmartTag IC sends an AM signal. This signal is converted for digital processing by the 12-bit ADC after filtering, demodulation, and amplification.

3.1.7 Optocouplers

All internal signals are galvanically decoupled by optocouplers.

3.1.7 Microcontroller

Processes the communication protocol between the SmartTag IC and the Smart-Trakker reader. The serial interface signals are converted so that the tag IC can process them and signals from the tag are converted to serial interface compatible signals.

3.1.8 RS232 Interface

Communication to the host is via a serial interface with a jumper selectable baud rate of 57.6 or 115.2 kbaud.

4. SPECIFICATIONS

4.1 ELECTRICAL

4.1.1 Power Supply

The power supply supplies voltage with the following basic specifications. Although the circuit performs some filtering of the power supplied, the input power must meet some minimum ripple standards.

Output Voltage	+24 VDC	Nominal
Current	2 A	Maximum
Ripple freq.	50Hz to 10 MHz	100 mV max. Amp.
	10 MHz to 20 MHz	50 mV max. Amp.
	20 MHz +	100 mV max. Amp.

4.1.2 Reader

ABSOLUTE MAXIMUM RATINGS¹

SYMBOL	PARAMETER	TEST CONDITIONS	RATING	UNIT
T _{stg}	Storage Temperature Range		- 25 to +85	°C
V _{dd}	Maximum Supply Peak Voltage		+27 / -0.6	V

NOTES:

- Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any conditions other than those described in the Operating Conditions and Electrical Characteristics section of this specification is not implied.

OPERATING CONDITIONS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP ¹	MAX	UNIT
T _{amb}	Operating Ambient Temperature		0		+ 70	°C
T _I	Operating Incase Temperature		0		+ 85	°C
V _{dd}	Supply Voltage		+23	+24	+25	VDC

NOTES:

- Typical ratings are not guaranteed. These values listed are at 100m temperature.

ELECTRICAL CHARACTERISTICS

T_{amb} = 0 to +70 °C, 50 Ω Antenna Load

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP ¹	MAX	UNIT
I _{dd4W}	Current Consumption ⁴	R ^F Output Power = 4 W		0.975	1.100	A
I _{dd8W}	Current Consumption ⁴	R ^F Output Power = 8 W		1.215	1.350	A
P _{min}	Minimum RF Output Power ³			2	4 ²	W
P _{max}	Maximum RF Output Power ³		8	10		W
m	Adjustable Modulation Index (ASK)	$m = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$	10	15 ²	20	%

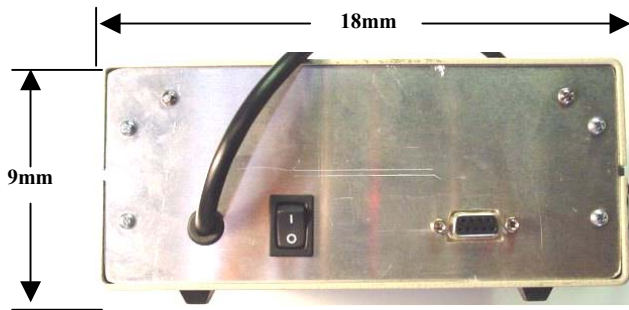
NOTES:

- Typical ratings are not guaranteed. These values listed are at 100m temperature.
- Default values adjusted at delivery.
- Calculated from the measured RF-output voltage on 50 Ω load, RF output voltage measured with Tektronix TDS520B oscilloscope.
- Values listed above are continuous currents, peak value can be up to 650 mA higher by switching or modulating the RF-carrier.

4.2 MECHANICAL

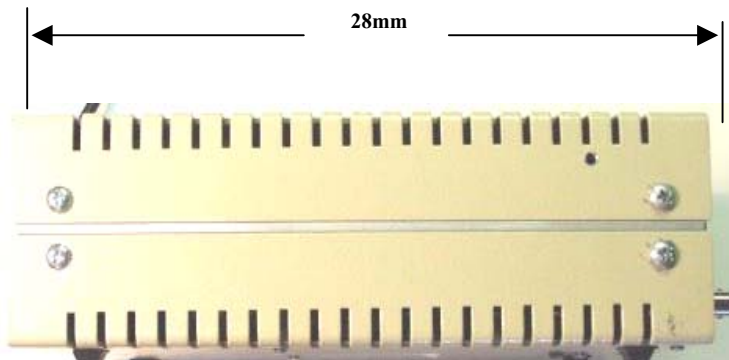
4.2.1 Dimensions

4.2.1. 1 Housing



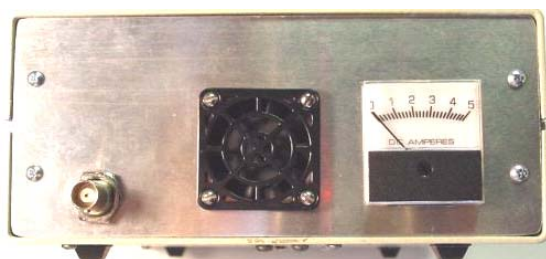
Back View:

- Power Cord
- On/Off Switch (SW)
- RS232 Connector



Side View:

- Ventilation Slots

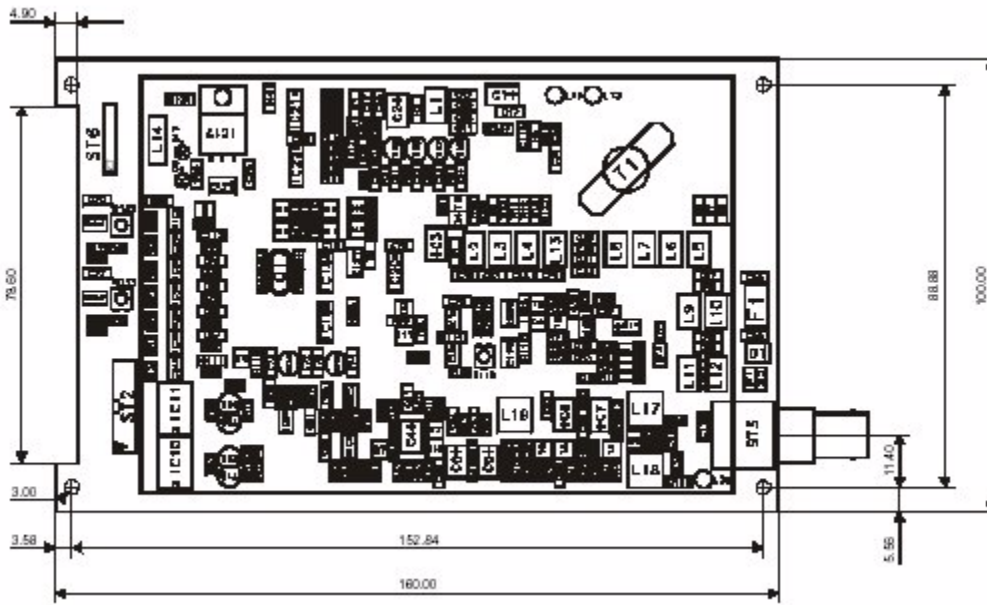


Front View:

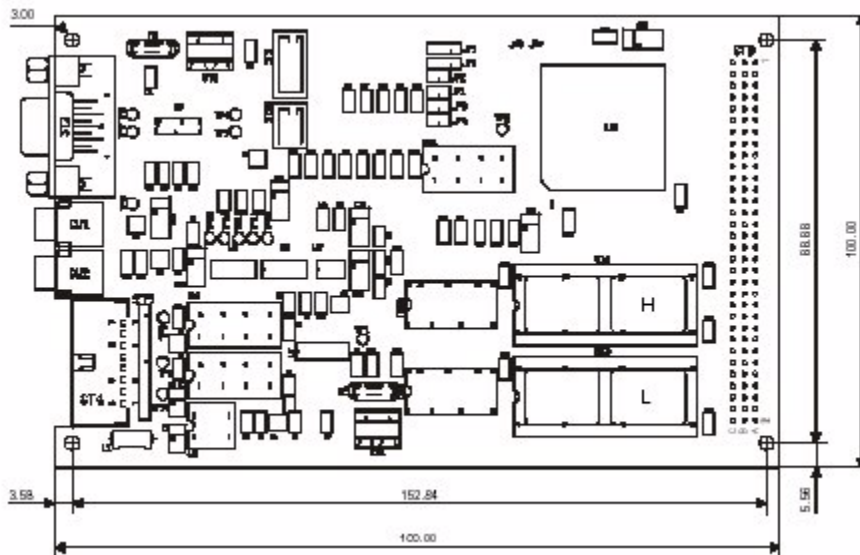
- Power Meter
- Cooling Fan
- Antenna Connector

4.2.1.2 PCBs

4.2.1.2.1 RF Board

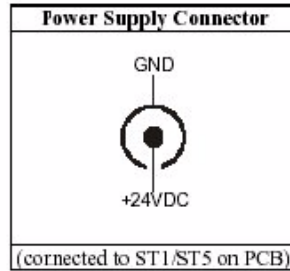
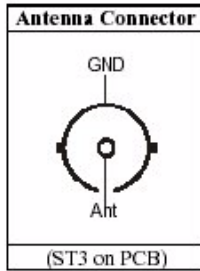


4.2.1.2.2 Microcontroller Board



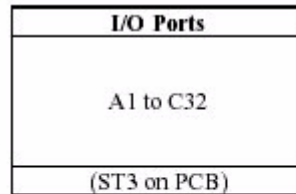
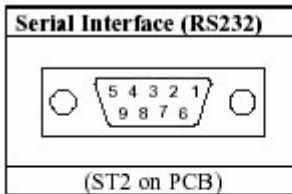
4.2.2 Connectors

4.2.2.1 RF Board



Pin	Type	Description	Comment
Ant	RF-OUT	antenna connector	BNC (female)
GND	GND		
+24VDC	PWR-IN	power supply connector	DC-Jack (∅ 2.1 mm)
GND	GND		

4.2.2.2 Microcontroller Board



ST2 Pin	Type	Description	Comment
1, 4, 6	IN/OUT	internal connected for DCE	serial interface
2	OUT	TxD	RS232 standard
3	IN	RxD	
5	GND	GND	DSUB-9
7, 8	IN/OUT	internal connected for DCE	(female)
9	NC	not connected	

ST3 Pin	Type	Description	Comment
A1 to A31	NTC	not to connect	for the electrical characteristics of all input/output ports please refer to the SAB-C167CR-LM Specification
A32	GND	GND	
B1 to B32	NTC	not to connect	
C1 to C3	NTC	not to connect	
C4	IN5	programmable input ports	
C5	IN4	IN0 ... IN5	
C6	IN3		
C7	IN2		
C8	IN1		
C9	IN0		
C10 to C13	NTC	not to connect	for programming of the input/output ports please refer to "Data Sheet SL RM900 I-CODE Long Range Reader Module Protocol, Reader – Host"
C14	OUT3	programmable output ports	
C15	OUT2	OUT0 ... OUT3	
C16	OUT1		
C17	OUT0		
C18 to C24	NTC	not to connect	
C25	EAS OUT	programmable EAS alarm signal	
C26 to C31	NTC	not to connect	
C32	OUT	GND	

4.2.2.2.1 Switch

SW	ON/OFF	Connects 120VAC to Power Supply, providing power to the unit.
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4.2.2.2.2 Pushbuttons

Name	Type	Description
SW1	RST	To reset the I CODE Long Range Reader, all programmable parameters will be preset to their default values described in "Data Sheet SL RM900 I CODE Long Range Reader Module, Protocol Reader – Host", except of stored RF-output power and modulation index. The Reader will restart with the mode selected by Jumper JP3
SW2	NMI	To change from the default startup mode to the alternative mode (see description Jumper JP3). For switching back to default startup mode press button RST (SW1).

4.2.2.2.3 Microcontroller Board Jumper Settings

Name	Type	Setting	Description
JP2	Bootstrap Loader Mode	not set	Bootstrap Loader Mode disabled (default).
		set	For Firmware update via RS232.
JP3	Startup Mode	not set	PC Mode (default). The reader starts up expecting commands from the host.
		set	Standalone EAS Mode. The reader is transmitting EAS commands continuously after startup. If a Label with EAS bits set is detected, the EAS OUT port will change to high level.
JP4	Baudrate	not set	Serial communication interface baudrate 57.6 KBaud (default).
		set	Serial communication interface baudrate 115.2 KBaud.

The settings of JP1, JP5 and JP6 must not be changed!

5. TROUBLESHOOTING

For any problems (reduced communication distances, errors or failures), check the following list:

- Power at the outlet source.
- Power supply cable not properly plugged in to the power supply or loose.
- Serial interface cable not plugged in or loose.
- Serial interface cable, power supply cord or antenna cable are too close to the antenna.
- Interference to the antenna from an external source.
- Antenna mounted on or too close to a metal environment.

6. OPERATING CONSIDERATIONS

6.1 SUPPLY VOLTAGE

The Smart-Trakker Reader is protected against supply peaks and incorrect polarity for short periods of time. Longer periods of out-of-spec supply power will result in permanent damage to the reader.

6.2 ANTENNA OPENS OR SHORTS

The Smart-Trakker can withstand short periods of open circuit or shorting at the antenna. Permanent damage will result from a longer uncorrected fault.

FCC Information

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 interface, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for CLASS B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try correct the interference by one or more of the following measures:

- 1.1. Reorient or relocate the receiving antenna.
- 1.2. Increase the separation between the equipment and receiver.
- 1.3. Connect the equipment into an outlet on a circuit different from that to which receiver is connected.
- 1.4. Consult the dealer or experienced radio/TV technician for help.

WARNING

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.