

MSR112

Magnetic Stripe Card Reader

RS232 Interface

Programmer's Manual

UIC EC/DC Document PM019

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AGENCY APPROVED

This Equipment, MSR112, had been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the 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. Operation of this equipment in a residential area is also likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This MSR112 also had been tested and found to comply with the agency requirements of specification for CE mark Class A and UL, cUL.

WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void user's authority to operate the equipment.

WARRANTY

This product is served under one-year warranty of defects in material and functionality to the original purchasers. Within the warranty period, if the product found to be defective will be repaired or replaced. This warranty applies to the products only under the normal use of the original purchasers, and in no circumstances covers incidental or consequential damages through consumers' misuse or modification of the product.

PREFACE

This manual provides detailed information relating to the overall operational, electrical, mechanical, environmental and functional aspects of the MSR112. This document should be read and understood prior to initial operation of the product.

For ease of installation and programming use, we have addressed everything from its attractive features to its various configurations.

When designing the MSR112, we selected what we feel are the most useful features and functions. If in some cases you find that your specific needs differ from our existing products, we welcome your comments and suggestions.

Custom-designed models are also available.

If further questions do arise, call UIC to ask for technical support. The FAE of UIC will assist you in any way we can.

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Section 1 General Description

This section presents general information about the basic characters of the MSR112 Series.

➤ **Features**

The MSR112 provides the following features:

1	Light weight: 208g
2	Low noise
3	Compact size: 100L*34W*28H (mm)
4	Low power consumption
5	Single, dual, or triple track versions allow for reading all types of magnetic cards, including credit cards and drivers licenses.
6	No extra power supply is needed.

➤ **Application**

This Magnetic Stripe Reader is design to read high or low coercive magnetic cards. It can decode/verify up to 3 tracks of data simultaneously. This product communicates with a host computer or other terminal using a standard RS-232 interface. Because of the transmitting protocol of MSR112 is more precise, it is suitable for using in financial industry.

➤ **Function**

Self Test

Whenever the reader experiences a reset cycle, a self-test is performed. The reader will respond a string that includes the firmware version number (8-digit) and track configuration accordingly if the entire test is successful. Otherwise, no response will be generated.

Reading

The reader can read magnetic data form any available track encoded per ISO 7810, 7811. Besides, the data can be read in customized format that explain below.

Reading Customized Data

The host can read data from the reader as customized format by sending 2-bytes command. For details and examples of commands and responses, refer to Section 4. Prior to transmitting customized data to the host, the data is not verified and it is not formatted into ASCII characters either.

Configuration Mode

There are two configuration modes provided as “self-arm” and “host-pollled” modes.

The default configuration mode of the reader is the "self-arm mode" that reports card data to the host automatically after swiping without any command instruction; however, the reader still can accept commands from host to instruct reader sending out card data.

The reader can be configured to another one as "host-pollled mode" which is passive mode that all actions follow the command sent from host.

➤ **Part Number Description**

The brief configuration of MSR112 part number are shown as below:

MSR112-12 Dual track 1&2

MSR112-23 Dual track 2&3

MSR112-33 Triple track 1&2&3

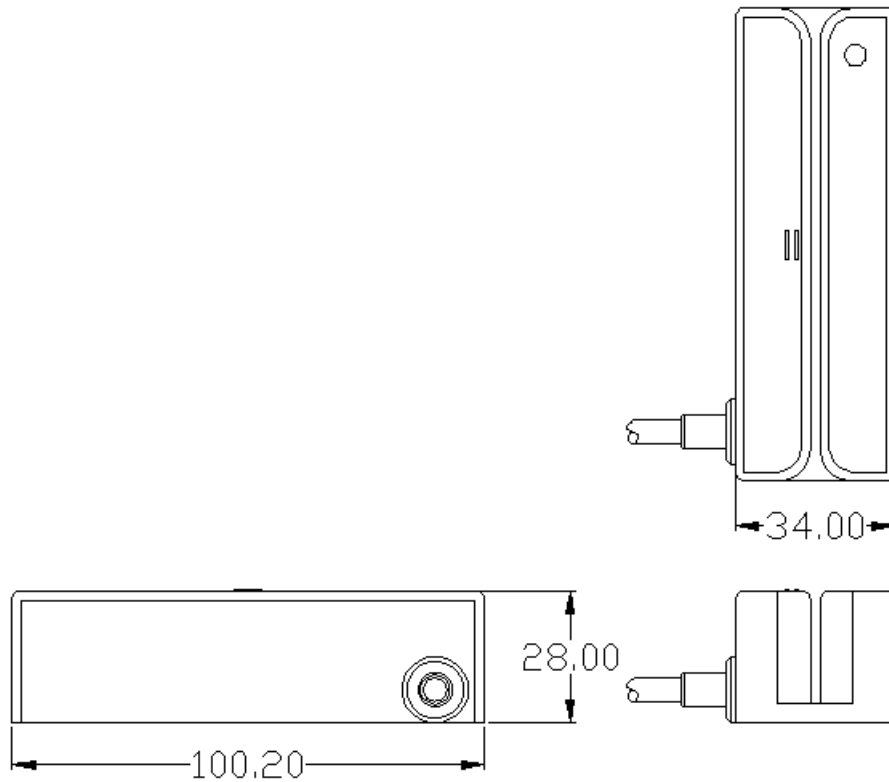
Note: Optional configuration is available.

Section 2 Configurations

This section shows the dimensions and accessories for the MSR112.

➤ Dimensions of MSR112

Figure 2-1 Dimensions of MSR112



➤ Accessories of MSR112

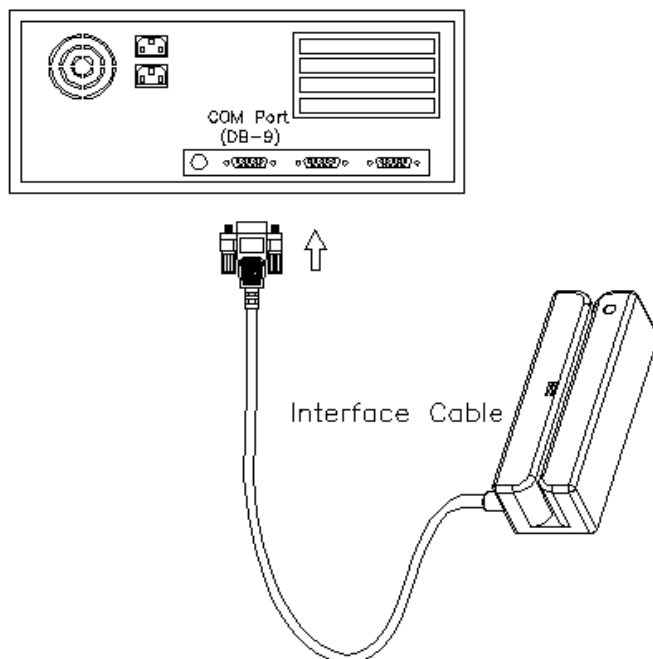
The following accessories should be enclosed in your package.

1. Interface cable (DB9 male connector, 1.5M)
2. Programmer's manual or simple manual

➤ Installation

1. Turn OFF power to your computer.
2. Connect MSR112 DB9 of interface cable to a free serial port of the computer.
3. Turn ON power to the computer.

Figure 2-2 Installation



Section 3 Technical Specifications

➤ **Card Specifications**

Card Type

ISO standard card

CA old DMV

AAMVA

JIS II

Read high or low coercivity magnetic stripes (300-4000oe)

Thickness

0.76 mm ±0.08 mm

Card Format

Track 1 & 3:210 bpi

Track 2: 75 bpi

Card Operation Speed

Table 3-1. Card Operation Speed

Test Card	Speed (IPS)
ISO standard card	5-55
* Jitter	5-50
** Low Amplitude	5-50

*Note: *Jitter card: Reliable reading of magnetic stripes encoded with bit cell length variations within +/-12% of normal as defined by ISO 7811.*

*** Low amplitude: Reliable reading of magnetic stripes encoded at 60% or more of the encoding amplitude as defined by ISO 7811.*

➤ **Mechanical Specifications**

Body Material

ABS 94V-0

Dimension

Length: 100mm

Width: 34mm

Height: 28mm

Weight

208g

Magnetic Head Life

500K Min., 1M optional

➤ **Electrical Specifications**

Power Required

3.3VDC

Power Consumption

4.9mA in idle mode; 5.9mA in operating mode

Communication

Standard RS232 signal levels

➤ **Environmental Specifications**

Temperature

Operating: -10-50°C

Storage: -30-70°C

Humidity

Operating: 10-85% (non condensing)

Storage: 10-90% (non condensing)

➤ Pin Assignment

Table 3-2. Pin Assignment

DB9	SIGNAL	DIRECTION	PCB-J1	SIGNAL
4	DTR	→ Data Terminal Ready	*1	DTR
6	DSR	(Reserved)	2	DSR
8	CTS	(Reserved)	3	CTS
3	TxD	← Serial data to host	4	TxD
7	RTS	→ Request to Send	*5	RTS
2	RxD	→ Serial data from host	6	RxD
	SHIELD		7	SHIELD
5	GND		8	GND

➤ Communication

Synchronization

The interface receives and transmits serial asynchronous data at voltage levels compatible with the RS232 specification.

Signal

Logic 1 = -3 volts to -15 volts

Logic 0 = +3 volts to +15 volts

Baud Rate

Default: 9600

Word Length

Default: 8 data bits

Parity

Default: none

Stop Bit

One

➤ Transmission Format

Data output format

Single track	<STX><SS>< TRACK 1 or 2 or 3 DATA><ES><ETX>
Dual track	<STX><SS>< TRACK 1 or TRACK 2 DATA><ES><DLE>
	<SS><TRACK 2 or TRACK 3 DATA><ES><ETX>
Triple track	<STX><SS><TRACK 1 DATA><ES><DLE><SS><TRACK 2 DATA><ES>
	<DLE><SS><TRACK 3 DATA><ES><ETX>

Remarks:

SS = START SENTINEL

TRACK1= “%” (ISO, DMV & AAMVA)

TRACK2= “;” (ISO, DMV & AAMVA)

TRACK3= “;” (ISO) “%” (AAMVA) “!” (CA old DMV)

Note: TK3 SS can be replaced to + for ISO, # for AAMVA, and ! for CA old DMV while SS is enable.

ES = END SENTINEL

TRACK1, 2 & 3= “?” (ISO, CA old DMV & AAMVA)

Note: 1. If read error, the default output data format is <STX><SS>E<ES><ETX> and it can be replaced as either <STX><SS>F<ES><ETX> or output nothing.

2. If no data is read, then display <STX><SS>N<ES><ETX> as default and it can be replaced as output nothing.

3. <STX>, <ETX>, <DLE>, SS (start sentinel), ES (end sentinel) and LRC are optional.

The <DLE> is programmable by command setting.

4. The SS, ES or LRC are optional for each track.

Section 4 Commands and Responses

This section describes the commands and responses available for the MSR112 series. Each item includes the ASCII, hexadecimal codes and comments paragraph that provide an explanation of the command. The letter 'x' indicates a variable and the letter 'h' is an abbreviation of 'hexadecimal'.

➤ **Command — Host to Reader**

P (50h) — Ready to Read

Comments

1	Clear buffers
2	Transmit "ACK"
3	Expect for card insert or eject
4	Transmit "ACK" after reading card (Response "^" when detecting signal or response ">" if no signal)

After the "Ready to Read" command is received and acknowledged, the only valid command that will be accepted for execution is "Abort" <ESC>.

Q (51h) — Transmit Standard Data, Track 1

R (52h) — Transmit Standard Data, Track 2

S (53h) — Transmit Standard Data, Track 3

Comments

1	Process data in the read buffer for the specified track according to ISO, AAMVA and DVM format.
2	Transmit data in ASCII.
3	If error is detected, refer to "transmission format" in section 3 for details.

U (55h) — Transmit Customized Data, Track 1

V (56h) — Transmit Customized Data, Track 2

W (57h) — Transmit Customized Data, Track 3

Comments

1	To request customized data that no "nulls" is allowed. It uses the two bytes command: "Transmit customized data" command followed by an ASCII number (3-8) that specifies the number of bits per customized character.
2	For each specific track, based upon the "number of bits" to process data in the read buffer, then send out in hex format.

A (41h) — Transmit Standard Data, all Tracks

Comments

1	Process data in the read buffer for all tracks according to ISO, AAMVA and DVM format.
---	--

2	Transmit data in ASCII.
3	If error is detected, refer to "transmission format" in section 3 for details.

T (54h) — Card Type Report

Comments

Transmit a byte, which represent the swiping card type.

1 (31H)	CA old DMV
2 (32H)	AAMVA
3 (33H)	ISO
4 (34H)	JIS II
0 (30H)	No data (sending T command just right after power on)

ESC (1Bh) — Abort

Comments

1	Abort command is issued after the reader has responded to command "P". (Reader would be waiting for card read).
2	No response to "Abort" command if the reader just power on and no command is received before.

9 (39h) — Version Report

Comments

Transmit a string that includes the version number (8-digit) and its date (DD-MMM-YYYY).

CAN (18h) — Warm Reset

Comments

Abort all current actions and cause the device to execute all initialization functions (device will respond exactly as it would for a "power on" cycle that the firmware version number (8-digit) and track configuration will be reported accordingly).

Note: This command byte is not recognized as a command within data strings.

➤ **Response— Reader to Host**

^ (5Eh) — ACK

Comments

Last command has been completed without an error condition, and ready for the next command.

! (21h) — Invalid Command

Comments

The command is not recognized or won't accept.

~ (7Eh) — Cannot Execute

Comments

Read or encode command cannot be executed due to lack of hardware in the device.

Section 5 Configuration Commands

This section describes the internal configuration commands available for the MSR112 series. Each item includes ASCII, hexadecimal codes and an explanation of the command. The letter “x” indicates a variable and the letter “h” is an abbreviation of “hexadecimal”.

SSx (53h 53h x) — SS Enable/Disable

x = E (45h enable) or D (44h disable)

Note: SS stands for Start Sentinel, refer to “transmission format” in section 3 for details.

SSr (53h 53h 72h) — Switch SS setting

TK3 SS can be replaced to + for ISO, # for AAMVA, and ! for CA old DMV while SS is enable.

Pls refer to “transmission format” in section 3 for details.

ESx (45h 53h x) — ES Enable/Disable

x = E (45h enable) or D (44h disable)

Note: ES stands for End Sentinel, refer to “transmission format” in section 3 for details.

LCx (4Ch 43h x) — LRC Enable/Disable

x = E (45h enable) or D (44h disable)

SAX (53h 41h x) — Self -Arm Mode Enable/Disable

x = E (45h enable) or D (44h disable)

Default is in self-arm mode that card data should be sent out after swiping.

If the self-arm mode is disabled, it is in host-pollled mode that card data should be sent out per command.

SPx (53h 50h x) — Set Track Separator

The x is a variable from 00h to 7Eh.

Command Form (Hex)	Track Separator
53h 50h 10h	<DLE> (default)
Example of Track Separator Setting	
53h 50h 0Dh	0Dh, <CR>
53h 50h 2Bh	2Bh, <+>
53h 50h 3Bh	3Bh, <,>

NDx (4Eh 44h x) — Set output data format while no data is read

x = N (4Eh enable) or D (44h disable, no data is output). Default setting is N.

Please refer to “transmission format” in section 3 for details.

EDx (45h 44h x) — Set output data format while read error.

x = E or F (4Eh or 4Fh enable) or D (44h disable, no data is output). Default setting is E.

Please refer to “transmission format” in section 3 for details.

STx (53h 54h x) — STX Enable/Disable

x = E (45h enable) or D (44h disable)

Please refer to “transmission format” in section 3 for details.

ETx (53h 54h x) — ETX Enable/Disable

x = E (45h enable) or D (44h disable)

Please refer to “transmission format” in section 3 for details.