

1.1 Description

MD12-W is a RFID Proximity card reader module for PCB mounting for general application in the 125KHz range. The reader implements proximity EM4002 RFID transponders or compatible.

The reader outputs the Data via 3 pins as Magstripe Emulation, ABA Track 2.

1.2 Futures

- Magstripe Emulation, ABA Track 2
- Easy replacing of magnetic cards reader
- Very small dimensions
- **Radio Frequency (RF)** 100kHz to 150kHz
- Operation Voltage: 5VDC

2.1 Definitions and Glossary

Card A portable media that carries data that is associated with the identity of an individual or property. The media may include a photo, printed matter, bar code, magnetic stripe, but must have radio frequency identification device EM4002 or compatible.

Common Signal Ground The voltage reference used to determine all signal/data voltage measurements.

Control Panel A device that accepts and process data from a reader and controls any or all input devices contained in a reader.

Clock The signal line that is designated as the output that delivers the clock pulses that synchronized the data information.

Data The signal line that is designated as the output that delivers the pulses that are interpreted as binary zeros and ones data

Card Presence The signal line that is designated as the output that delivers the signal that a card is present to the reader.

Clock Pulse Interval Time (Cpd) The time interval between two following clock pulses. The interval is determined from when the signal reaches the lower threshold for the high voltage level (V_{oh}) until the signal reaches the upper threshold for the low voltage level (V_{ol}).

Time to End Data (Cpe) The time interval between the end of data signal to the next rising edge of the clock. The interval is determined from when the signal reaches the upper threshold for low voltage level (Vol) until the signal reaches the lower threshold for the high voltage level (Voh).

ABA Track 2 The electrical and physical definition of the connection between a reader and control panel. The electrical characteristics are loosely based on the ABA Track 2 standard for magnetic cards reader.

Reader A device that decodes data from a portable data carrying media (card).

3.1 Connector

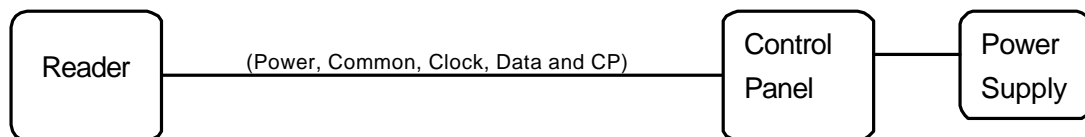
The reader and panel are connected with a five conductors pin header.

<u>PIN NUMBER</u>	<u>FUNCTION</u>
1	Power
2	Common or Data Return
3	Clock
4	Data
5	Card Presence

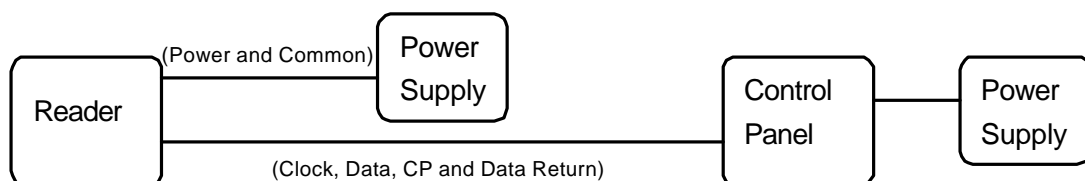
3.2 Conductor Definition

3.2.1 Pin 1 - Power

This conductor provides power from the panel to the reader (unless the reader is powered separately). The voltage on this conductor will be 5VDC. The reader may accept a range of voltages but must specify, on a label and the installation instructions, the voltage(s) or voltage range and current for the unit. This specification applies to configurations that employ the control panel's power supply to provide power to the reader as well as configurations that require a separate power supply. If power is supplied locally at the reader, then the power conductor is not connected at the panel. See figure below



Power to the Reader supplied by the Control Panel



Power to the Reader supplied by a separate Power Supply

3.2.2 PIN 2 - Common

Provides electrical common (data return) between the reader and the panel. All other voltage levels are compared against this conductor.

3.2.3 PIN 3 - Clock

This is a signal from the reader to the panel. A pulse on this conductor indicates a data bit the data is stable on the falling edge of this pin.

The data is change on the rising edge of the clock and stable in the falling edge of the clock.

3.2.4 PIN 4 - Data

This is a signal form the reader to the panel. A level of this conductor indicates a data bit. Data '1' is low line and Data '0' is high line.

3.2.4 PIN 5 – CP (Card Presence)

This is a signal form the reader to the panel. A low level of this conductor indicates a card is present to the reader.

4. Electrical Interface

4.1 Power

The control panel shall provide power to the readers at 5 VDC linear type recommended.

Operating Voltage Range:

4.5 – 5.5 VDC

Absolute Maximum (Not Operating):

5.8 VDC

Current @ 5V:

Standby: 20mA

Read: 25mA

Card Read Distance

2" (5cm)

Operating Temperature Range:

32° F to 145° F (0° C to 63° C)

Operating Humidity:

0 – 95% (non condensing)

Mechanical Dimensions:

Diameter: 23.5mm

Height: 9mm

4.2 Signal Levels

The Clock, Data, and CP conductors provide logic signals between the reader and the panel. The logic voltage levels are measured at the reader.

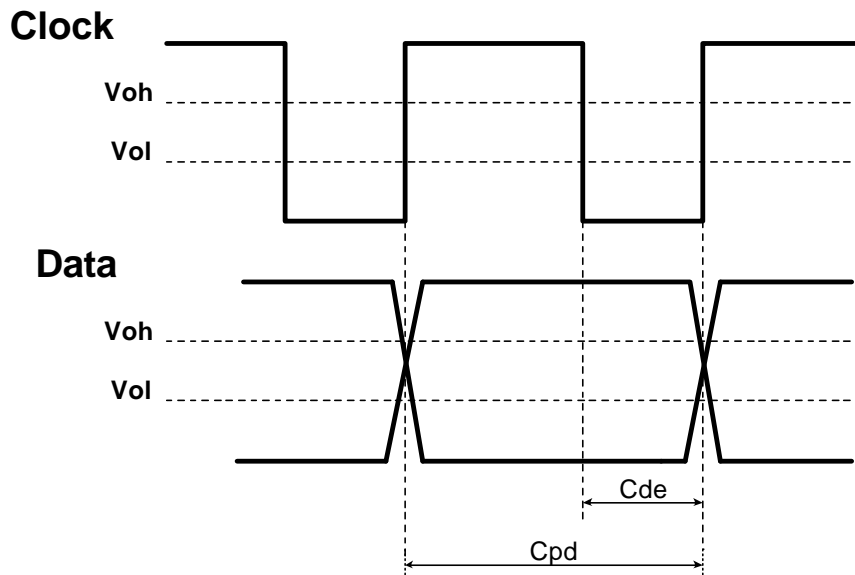
The logic voltage levels are defined as follows:

Voltage Levels	Outputs	
	Minimum	Maximum
Voh	Power Supply - 0.7	- V
Vol	-	0.7 V
Ioh	4.5	5.5 mA
Iol	-1.0	-10 μ A

4.3 Data Pulses

The Clock, Data and CP are normally held at a logic high level until the reader is ready to send a data stream. The reader places synchronous low going pulses on the CP line to indicate start of Data. The first clock pulse starts 1 mSec after the falling edge of the CP.

Data line transmit the data stream to the panel in synchronous with the clock pulses. The following timing parameters shall be observed:



<u>SYMBOL</u>	<u>DESCRIPTION</u>	<u>MINIMUM</u>	<u>MAXIMUM</u>
Cpd	Time of Clock Pulse	850 μ s	1150 μ s
Cpe	Time to data end	500 μ s	700 μ s

4.4 Data Sampling algorithm topics

- Wait for falling edge of CP
- Wait for Falling edge of the clock
- Sample the data and store in memory.
- Wait for SS (see section 5) reception
- Sample data in 5 bit length and check the parity-received bit. Calculate the LRC (see section 5)
- Wait for ES (see section 5) reception
- Compare the received LRC with calculated one
- Wait for High logic in CP line

5.1 Data Format

MD12-C output data as Magstripe Emulation, ABA Track 2 form.

20 leading Zeros	SS	Data (14 digits)	ES	LRC	50 Trailing Zeros
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The 20 leading zeros prepare the host system to receive the Data. The Data is 14 BCD digits long.

SS is the Start Sentinel consisting of 11010. (B with odd parity bit)

ES is the End Sentinel consisting of 11111. (F with odd parity bit)

LRC is the Longitudinal Redundancy Check character (Xor of all characters).

Lastly there are 50 trailing zeros.

The hexadecimal data from the proximity card is converted to denary string before transmission.

LSB of character is transmitted first and the odd parity is the last one.

Example:

Code number of the proximity card is: 5 7 0 1 9 3 5 1

SS	0 1 0 1 1
5	1 0 1 0 1
7	0 0 1 1 1
0	1 0 0 0 0
1	0 0 0 0 1
9	1 1 0 0 1
3	1 0 0 1 1
5	1 0 1 0 1
1	0 0 0 0 1
ES	1 1 1 1 1
LRC	1 1 0 0 1