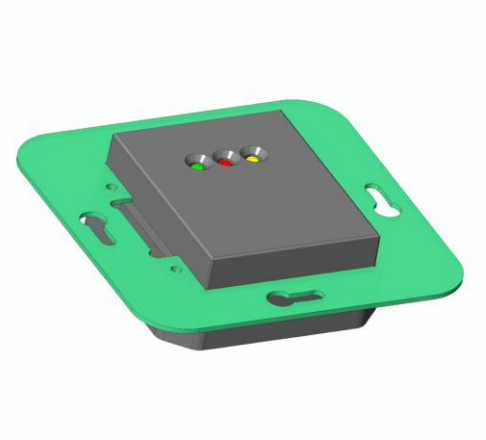
685-53 OEM Proximity Reader

Switchbox Mount

Data Sheet

Overview

The 685-53 OEM Proximity reader is a fully potted unit containing all the electronics required to read the ID from an EM card and output the ID in one of several formats. The format is selected on a 6-way DIP switch on the back of the unit.



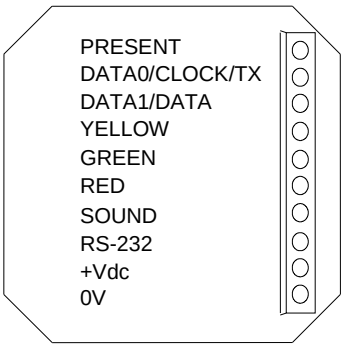
A 10-way pull-off connector on the back of the unit is provided to connect the unit to a controller.

The unit also allows for user control of all three LEDs and the sounder.

Specifications

- Power requirements: 5.0-13.6V dc. Current consumption is 100 mA typical.
- RF Frequency: 125 kHz.
- Card types supported: 40-bit read only transponders in the EM4001 family, TEMIC e5550 and equivalent.
- Output formats: Wiegand (42-bit, 34-bit, and 26-bit), Mag Stripe emulation, Clock/Data, RS232 (9600,n,8,1) EIA and TTL levels, Crosspoint card decoding.
- Continuous (while tag in the field) or single transmission.
- Typical reading range: keyring tag - 50mm, ISO card – 100mm.
- 3 LEDs (GREEN, RED, YELLOW).
- Sounder emits a 60ms beep at 4 kHz when a transponder is read. In addition sounder operates while SOUND input is pulled low.
- Operating temperature range: -20 °C to +60 °C.
- Weight: 90 grams.
- Housing - ABS plastic - potted IP65.
- Dimensions: 48 mm x 48 mm x 37mm (excluding mounting plate)
- Suitable for installation into a 55mm switchbox.

Connections



The table below details the function of each connection:

Name	Function
PRESENT	Pulses low when an RFID tag is detected. It stays low while the module output is active.
DATA0/CLOCK/TX	Outputs RFID tag code in selected format.
DATA1/DATA	Outputs RFID tag code in selected format.
YELLOW	Controls Yellow LED in LED Mode 1.
GREEN	Controls Green LED in LED Mode 1 and both Red and Green LEDs in LED Mode 2.
RED	Controls Red LED in LED Mode 1.
SOUND	Controls Sounder
RS-232	RS-232 output
+Vdc	Connect +5V - +13.6V from power supply.
0V	Connect 0V from power supply.

Note: The YELLOW, GREEN, RED and BEEP inputs are active low. The input is internally pulled high and may be pulled low by an open collector transistor or driven low by the output of a 5V CMOS or TTL gate.

Output Mode Selection

The 6-way switch is used to select the output format and LED mode. The required setting is selected from the following tables:

Output Format Table

SW 1	SW 2	SW 3	SW 4	Output Format
ON	ON	ON	ON	Inhibit - turn off coil
ON	ON	ON	OFF	RS232 - 24 bit
ON	ON	OFF	ON	RS232 - 32 bit
ON	ON	OFF	OFF	RS232 - 40 bit
ON	OFF	ON	ON	*Unused*
ON	OFF	ON	OFF	Fast Mag Stripe - 8 digit
ON	OFF	OFF	ON	Crosspoint
ON	OFF	OFF	OFF	Gen-Scan clock/data - 32 bit
OFF	ON	ON	ON	Fast Mag Stripe - 40 bit
OFF	ON	ON	OFF	Mag Stripe - 24 bit
OFF	ON	OFF	ON	Mag Stripe - 32 bit
OFF	ON	OFF	OFF	Mag Stripe - 40 bit
OFF	OFF	ON	ON	Basic Clock/Data - 56 bit
OFF	OFF	ON	OFF	Wiegand - 26 bit
OFF	OFF	OFF	ON	Wiegand - 34 bit
OFF	OFF	OFF	OFF	Wiegand - 42 bit

LED Mode Table

Mode #	SW 5	LED Mode
1	ON	3 Individual LEDs each controlled by their own input
2	OFF	RED/GREEN with single control line (GRN-LED)

Note

1. In LED Mode 2, both RED and GREEN leds are controlled by the GREEN input. When the GREEN input is floating or pulled high, the RED led is on and the GREEN led is off. When the GREEN input is pulled low (connected to 0V) the GREEN led is on and the RED led is off. The YELLOW led is always off.

Continuous/Single Transmission Mode Table

Mode	SW 6	Operation
Continuous	ON	While a tag is in the reader's field the reader will continuously transmit the code in the format chosen by DIP switches 1-4. The repetition period is dependent on the format chosen but varies between 65ms and 230ms.
Single	OFF	Single transmission when tag is brought into the field. Tag must be removed from field for at least 1 second before a read of this tag is possible again.

Power Connections

The reader has an internal low dropout 5V regulator and so for maximum performance the input voltage must be smooth DC between 5.5V and 13.6V. The reading distance is unchanged for input voltages between 5.5V and 13.6V. For input voltages below 5.5V the read range drops off slightly as given in the specifications earlier. If 5V is supplied to the reader this should be noise-free to achieve maximum possible read ranges.

RS232 Output modes

There are two RS232 outputs from the reader. The RS-232 connection outputs EIA voltage levels: -5V for a binary '1' state and +5V for a binary '0' state. This output is suitable to connect directly to the serial COM port of a PC. The TX connection outputs TTL levels: +5V for a binary '1' state and 0V for a binary '0' state. This output is suitable to connect directly to the USART of a microprocessor. RS232 format data is outputted from both connections when the RS232 modes are selected.

The baud rate is 9600. Data format is 8 bits, no parity, and 1 stop bit.

The tag code is output in the following structure:

STX (02h)	DATA (ASCII)	CR (0Dh)	LF (0Ah)	ETX (03h)

The DATA bytes vary according to the number of bits being output:

40 bit mode

DATA = 10 ASCII characters representing the 40 bit hexadecimal code of the tag e.g. '0410B2F12A' (30 34 31 30 42 32 46 31 32 41 hex)

32 bit mode

DATA = 10 ASCII characters representing the least significant 32 bits of the tag converted to a decimal number e.g. '0280162602' (30 32 38 30 31 36 32 36 30 32 hex)

24 bit mode

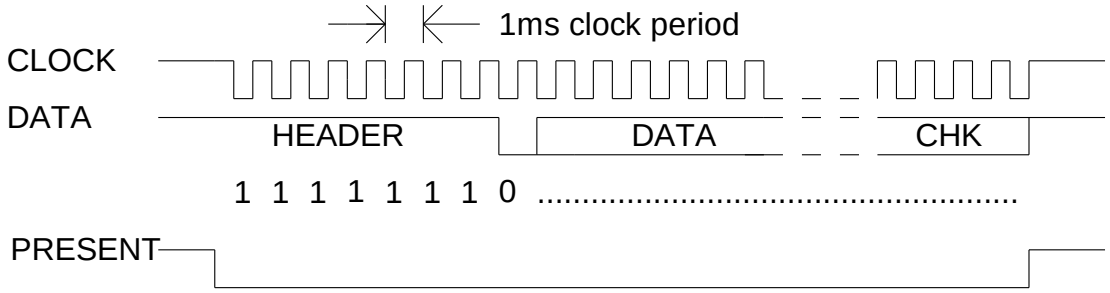
DATA = 8 ASCII characters representing the least significant 24 bits of the tag converted to a decimal number e.g. '11727146' (31 31 37 32 37 31 34 36 hex)

Clock/Data Mode

In this mode all 40 bits of the tag are clocked out with an eight bit header and an eight bit checksum.

Header (11111110)	Data (56 bits)	Checksum

The header is hex FE. The data consists of 40 tag bits sent MSB first. The checksum is a byte addition of the 5 bytes of tag data e.g tag 0410B2F12A has a checksum of 04+10+B2+F1+2A=E1.

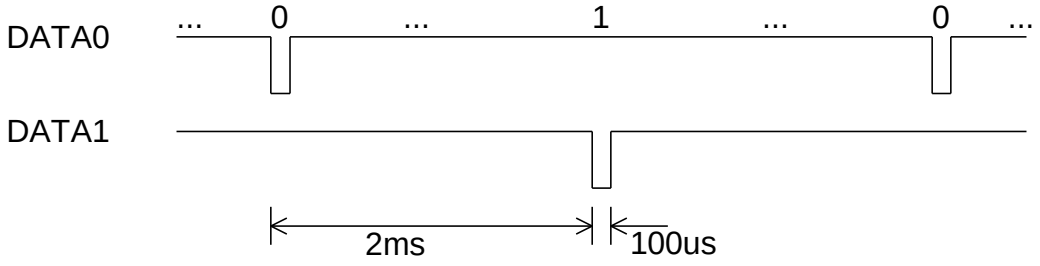


Data is set up on the falling edge of the clock and is stable on the rising edge of the clock.

Wiegand Output Modes

In this mode the tag code is pulsed out on DATA0 and DATA1. Both are normally high. When a tag is presented to the reader 26/34/42 bits are transmitted in the following way:

A binary 1 is represented by a 100us pulse low on DATA1. A binary 0 is represented by a 100us pulse low on DATA0. There is a 2ms inter bit delay.



42 bit mode

42 pulses are transmitted:

- The first bit is the even parity of tag bits 1-20.
- All 40 bits of the tag code (MSB first).
- The last bit is the odd parity of tag bits 25-40.

34 bit mode

34 pulses are transmitted:

- The first bit is the even parity of tag bits 9-24.
- The least significant 32 bits of the unique ID (MSB first).
- The last bit is the odd parity of tag bits 25-40.

26 bit mode

26 pulses are transmitted:

- The first bit is the even parity of tag bits 17-28.
- The least significant 24 bits of the unique ID (MSB first).
- The last bit is the odd parity of tag bits 29-40.

Mag Stripe Modes

In this mode the decimal tag number is clocked out on CLOCK and DATA at 100 characters per second. The format is standard as found on Track 2 of a magnetic card:

10 leading 0's	SS	DATA	ES	LRC	5 trailing 0's

SS = start sentinel (B hex).
ES = end sentinel (F hex).
LRC = longitudinal redundancy check.
DATA varies according to the number of bits selected:

40 bit mode

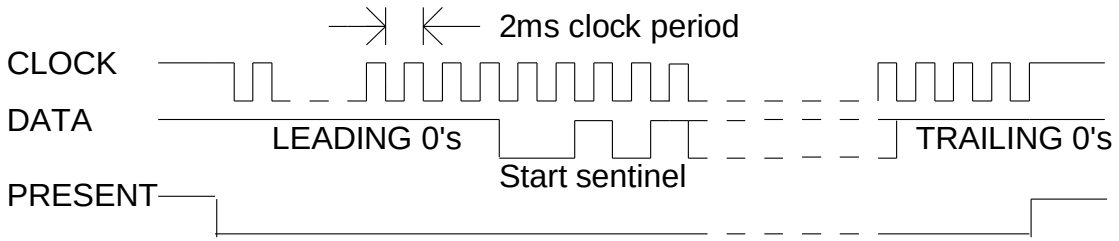
DATA = 13 decimal digits with leading zeros. The most significant decimal digit is transmitted first.

32 bit mode

DATA = 10 decimal digits with leading zeros. The most significant decimal digit is transmitted first.

24 bit mode

DATA = 8 decimal digits with leading zeros. The most significant decimal digit is transmitted first.



Each character is 5 bits long. The first four bits are the hex digit (0-F) least significant bit first. The fifth bit is an odd parity bit. A 0 is represented by a high level on the DATA connection and a 1 is represented by a low level on the DATA connection. Data is set up on the falling edge of the clock and is stable on the rising edge of the clock. The PRESENT output goes low for the duration of the transmission simulating the CARD PRESENT from a mag card reader.

Fast 40 bit mode

This mode differs from the standard 40bit magstripe mode in the following ways:

- DATA=14 decimal digits with leading zeros.
- The clock period is 250us.
- 10 trailing 0's

All other aspects of this format are the same as the other magstripe formats.

Fast 8-digit mode

This mode differs from the standard 40bit magstripe mode in the following ways:

- DATA=8 decimal digits (which are the bottom 8 digits of the full decimal number of the card).
- The clock period is 250us.
- 10 trailing 0's

All other aspects of this format are the same as the other magstripe formats.

Gen-Scan mode

In this mode the decimal 32 bit tag number is clocked out on CLOCK and DATA:

20 leading 0's	SS	DATA	CHK	SEP	ES	LRC

SS = start sentinel (B hex).
SEP = separator (D hex).
ES = end sentinel (F hex).
LRC = longitudinal redundancy check.
DATA consists of 18 decimal digits with leading zeros. The most significant decimal digit is transmitted first.
CHK is a check digit derived from the DATA using the "modulus-10" algorithm.

Clock period = 1.5 ms. Data is clocked on the falling edge of the clock. The data is set up 500us before the falling edge of the clock, and returns to a high level on the rising edge of the clock.

Crosspoint mode

In this mode the reader assumes the card is encoded as per the Crosspoint bit scrambling algorithm. The unscrambled decimal tag number is clocked out on CLOCK and DATA at 800 characters per second. The clock period is 250us. The format is standard as found on Track 2 of a magnetic card:

10 leading 0's	SS	DATA	ES	LRC	10 Trailing 0's

SS = start sentinel (B hex).
ES = end sentinel (F hex).
LRC = longitudinal redundancy check.

DATA = 9 decimal digits with leading zeros. The most significant decimal digit is transmitted first.