

# 684-52 OEM Proximity Reader

## with selectable outputs

The 684-52 OEM proximity reader consists of three parts: a potted unit containing the electronics, a front cover, and an optional spacer plate. A fixed 10 way colour coded cable protrudes from the back of the potted unit.

The reader will read the code from an RFID transponder and output the code in one of many user selectable formats.

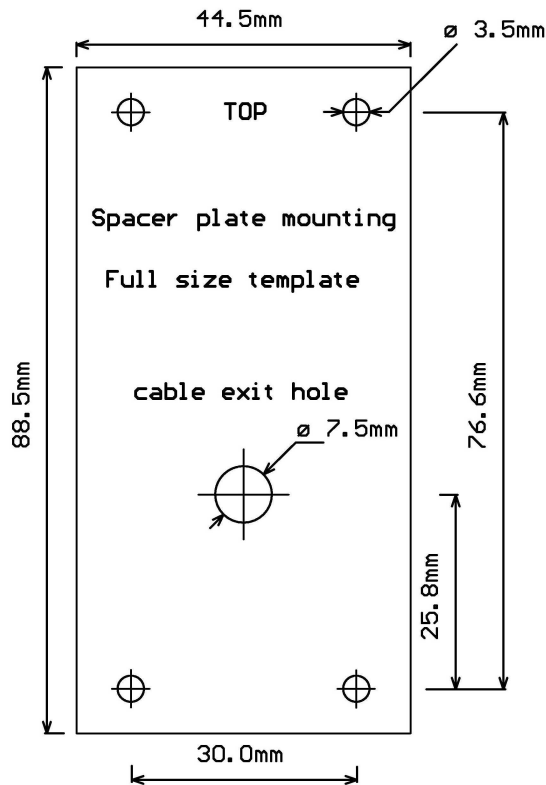
The unit also allows the user control of the three LEDs and beeper. A 6 way DIP switch under the front cover is used to select the required output format and LED operational modes.



### Specifications

- Power requirements: +5.0 V to +13.6 V DC. Current consumption 100 mA (typical)
- Operating Frequency: 125 kHz
- 40 bit read only transponders supported: EM4001 family, TEMIC e5550 and equivalent devices
- Output formats supported: Wiegand (42 bit, 34 bit, and 26 bit), Mag stripe emulation, Clock/Data, RS232 (9600,n,8,2) with both EIA compatible levels and TTL levels
- Continuous output with tag in field or single transmission
- Typical read range: 150 mm for ISO cards, 80 mm for keyring tags
- 3 indicator LEDs (RED, YELLOW, GREEN), controlled by user
- Beeper (4 kHz tone) controlled by user, additionally emits a 50 ms beep when card is read
- Operating temperature range: -20 °C to +60 °C
- 10 way cable: 1 m long
- Weight: 105 grams
- Dimensions: Reader 89 x 45 x 17 mm, optional spacer plate 89 x 45 x 7 mm

## Physical Dimensions and Mounting Details



If the spacer plate is used the reader cable may be brought out of one of four exit points on the spacer: top, bottom, left or right. This enables the cable to be run on the surface of the wall. If no spacer plate is used a minimum hole size of 7.5 mm must be drilled in the wall at the cable exit position to allow the cable to exit perpendicular to the reader.

The optional spacer plate may also be used when mounting the reader on a metal surface to reduce the negative effects of metal on the read range.

## Wire Connections

The table below details the function of each wire.

Colour	Name	Function
GREY	PRESENT	Open collector output, drives low for duration of output transmission (Note 1)
WHITE	CLOCK/DATA0/ TTL TX	Open collector output, outputs tag code in selected format (Note 1)
BROWN	DATA/DATA1	Open collector output, outputs tag code in selected format (Note 1)
YELLOW	YELLOW LED	Input, controls YELLOW LED in LED Mode 1, active low (Note 2)
ORANGE	RED LED	Input, controls RED LED in LED Mode 1, active low (Note 2)
GREEN	GREEN LED	Input, controls GREEN LED in LED Mode 1 and both RED and GREEN LEDs in LED Mode 2, active low (Note 2)
BLUE	BEEPER	Input, controls BEEPER, active low (Note 1)
PURPLE	RS232 TX	Output, RS232 Tx, EIA compatible levels/polarity
RED	+VDC	Power, connect to positive of power supply (+5V to +13.6V) (Note 3)
BLACK	0V	Power, connect to 0V of power supply

**Note 1.** Open collector outputs are pulled high internally to +5V through 10k resistors.

**Note 2.** Inputs are pulled high internally and require to be taken low to control the beeper and LEDs, they may be left floating if unused.

**Note 3.** For maximum read range the supply voltage should be greater than +5.5V. For voltages in the range +5.0V to +5.5V the DC supply needs to be externally regulated.

## Output Mode Selection

The 6 way switch is used to select the output format and LED mode.

SW1	SW2	SW3	SW4	Output format
ON	ON	ON	ON	Custom format 2
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	Custom format 1
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
OFF	OFF	ON	OFF	Wiegand 26 bit
OFF	OFF	OFF	ON	Wiegand 34 bit
OFF	OFF	OFF	OFF	Wiegand 42 bit

## LED Mode Selection

LED Mode	SW5	Function
1	ON	3 Individual LEDs each controlled by their own input
2	OFF	RED/GREEN with single control line (GREEN LED)

**Note.** In LED Mode 2, both RED and GREEN LEDs are controlled by the GREEN LED input: when the GREEN LED input is floating or pulled high, the RED LED is on and the GREEN LED is off; when the GREEN LED 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 Selection

Mode	SW6	Function
Continuous	ON	While a tag is in the field the reader continuously transmits the code in the format selected by the DIP switches 1-4. Repetition rate is format dependant but varies between 80ms to 260ms
Single	OFF	When a tag enters the field the code is transmitted once only. The tag must be removed from the field for at least 1 second before the same tag can be re-read and it's code re-transmitted.

## RS232 Output modes

There are two RS232 outputs from the reader. The purple RS232 wire outputs EIA compatible voltage levels: -V for binary '1' and +5V for binary '0'. This output is suitable to connect directly to a computer serial comm port or serial to USB adapter. The white TX wire outputs TTL levels: +5V for binary '1' and 0V for binary '0'. This output is suitable to connect directly to the USART of a microprocessor. RS232 format data is output on both wires when an RS232 mode is selected.

The format is 9600 baud, 8 data bits, no parity, and 2 stop bits.

The code is output in the following structure:

STX(02h)	DATA(ASCII)	CR(0Dh)	LF(0Ah)	ETX(03h)
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The data bytes vary according to the number of bits being output:

### 40 bit mode

DATA = 10 ASCII characters representing the 40 bit hexadecimal number of the tag code, 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 code converted to decimal, e.g. '0280162602' (30 32 38 30 31 36 32 36 30 32 hex)

### 24 bit mode

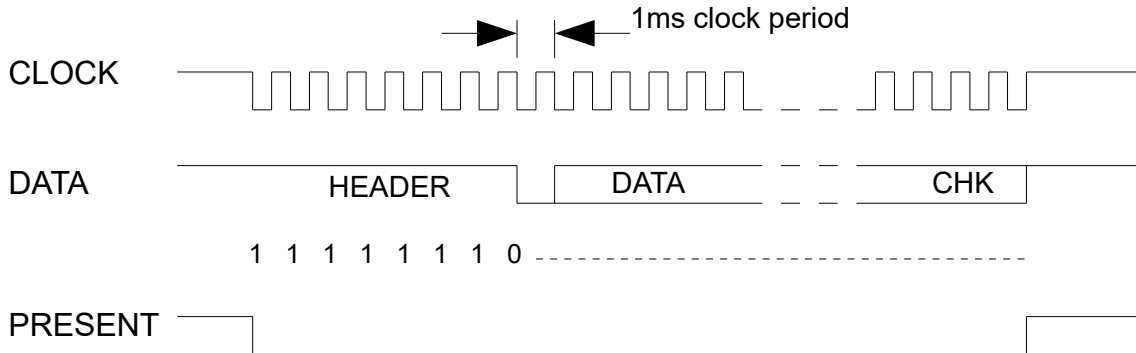
DATA = 8 ASCII characters representing the least significant 24 bits of the tag code converted to decimal, e.g. '11727146' (31 31 37 32 37 31 34 36 hex)

### Clock/Data Mode

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

HEADER (11111110)	DATA (40 bits)	CHECKSUM
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The HEADER is hex FE. The DATA consists of 40 tag code bits sent MSB first. The checksum is the byte addition of the 5 bytes of DATA bits, e.g. tag code 0410B2F12Ah has the checksum 04h+10h+B2h+F1h+2Ah=E1h

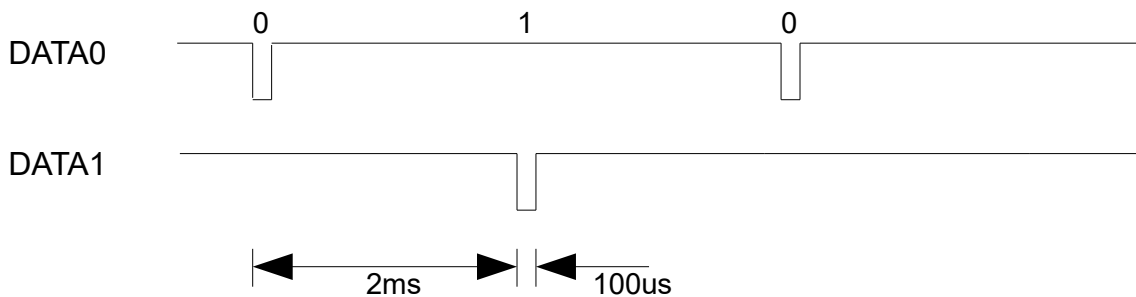


Data is set up on the falling edge of the clock and is stable on the rising edge of the clock.

### Wiegand Output Modes

In this mode the tag code is pulsed out on DATA0 (white wire) and DATA1 (brown wire). Both are normally high. When a tag is presented to the reader, one of 26, 34, or 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 the tag bits 21-40

### 34 bit mode

34 pulses are transmitted:

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

### 26 bit mode

26 pulses are transmitted:

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

### Mag Stripe Modes

In this mode the decimal tag number is clocked out on CLOCK (white wire) and DATA (brown wire) 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
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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

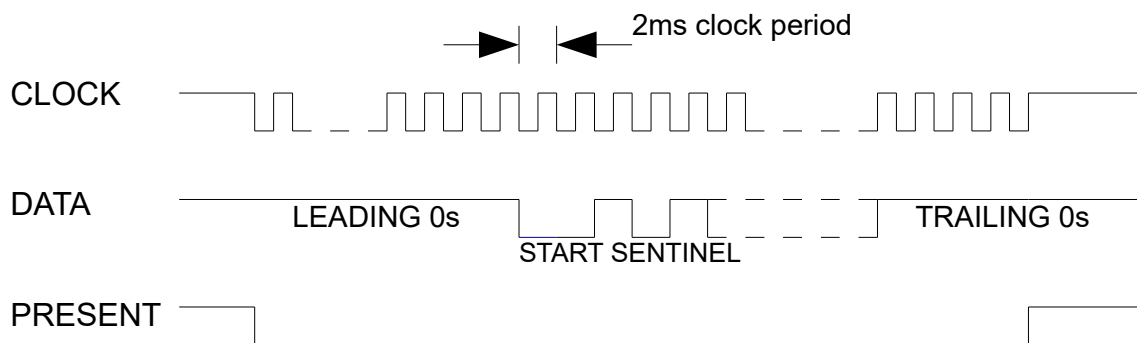
DATA = 13 decimal digits with leading zeros. The most significant decimal digit is transmitted first.

#### 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 the odd parity bit. A 0 is represented by a high level on the DATA wire and a 1 is represented by a low level on the DATA wire. 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 40 bit magstripe mode in the following ways:

- DATA = 14 decimal digits with leading zeros
- the clock period is 250us
- ends with 10 trailing zeros

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

### Fast 8-digit mode

This mode differs from the standard 40 bit 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
- ends with 10 trailing zeros

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

### Custom format 1

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

- DATA = 20 decimal digits, made up of 12 leading zeros and 8 digits for the card number
- the clock period is 150us
- custom leading and trailing zero format

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

### Custom format 2

This mode follows the standard 32 bit magstripe mode in all respects except the card number has a custom format.

### Gen-Scan mode

In this mode the decimal 32 bit tag number is clocked out on the CLOCK (white wire) and DATA (brown wire)

20 leading zeros	SS	DATA	CHK	SEP	ES	LRC
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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 = 1.5ms. 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 the CLOCK (white wire) and DATA (brown wire) at 800 characters per second. The clock is 250us. The format is standard as found on Track 2 of a magnetic card:

20 leading zeros	SS	DATA	ES	LRC	10 trailing 0's
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SS = start sentinel (B hex)

ES = end sentinel (F hex)

LRC = longitudinal redundancy check

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