AceProx

689-52 REV3 FSK Card Reader Module

Data Sheet

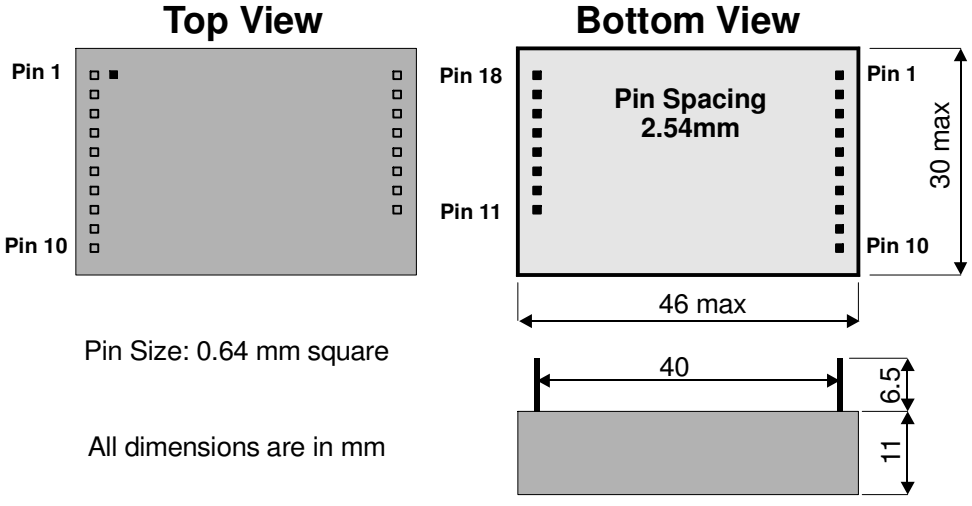
Overview

The 689-52 FSK proximity reader module is a fully-encapsulated device that will read the code from an HID H10301/4 transponder and output the code in one of many user selectable formats. The module contains all detection circuitry required to implement a proximity reader including an internal coil antenna. A larger external reader coil may be connected if greater reading range is required.

Specifications

- Power requirements: 5-12V dc. Current consumption is 70 mA when idle, 80mA peak while outputing a code which lasts between 20 and 50 ms and 10mA while in INHIBIT mode.
- RF Frequency: 125 kHz.
- Card types supported: HID H10301 (26 bit format), H10304 (37 bit format).
- Output formats supported: Wiegand, Mag Stripe emulation, Clock/Data, RS232 (9600,n,8,1) TTL levels/phase.
- Continuous (while tag in the field) or single transmission.
- Typical reading range of internal antenna: tag - 30mm, ISO card - 60mm
- Piezzo sounder control.
- Operating temperature range: -10ºC - +50ºC.
- Weight: <30 grams.

Pinout Description & Dimensions



Pin #	Pin name	Function
1	PRESENT	Pulses low when an RFID tag is detected. It stays low while the module output is active.
2	CLOCK/DATA0	Outputs RFID tag code in selected format.
3	DATA/DATA1/TX	Outputs RFID tag code in selected format.
4	CONTINUOUS	Connect to 0V for continuous transmission mode or leave disconnected for single transmission mode.
5	INVERT	Connect this pin to 0V to invert output on pins 1,2,3.
6	SELECT1	The user can connect to 0V or leave disconnected to select different output formats.
7	SELECT2	
8	SELECT3	
9	SELECT4	
10	Reserved	Leave disconnected.
11	COILA	External coil connection.
12	COILLINK	Link pins 11 and 12 to select internal coil.
13	COILB	External coil connection.
14	RAW DATA	Outputs the raw data stream detected from the tag.
15	BEEPER	Open collector output for connection to an external beeper.
16	NC	No connection
17	+5-12V	Connect +5V - +12V from power supply.
18	0V	Connect 0V from power supply.

Output Mode Selection

The module has four mode selection pins (SELECT1 ... SELECT4). These pins are internally pulled high in the module. To select the different modes the SELECT pins may be tied to 0V (indicated as 0) or left unconnected (indicated as 1) according to the following table:

SELECT4	SELECT3	SELECT2	SELECT1	Output Mode
0	0	0	0	**Inhibit - turn off coil**
0	0	0	1	*Unused*
0	0	1	0	*Unused*
0	0	1	1	**RS232-TTL - long number format**
0	1	0	0	*Unused*
0	1	0	1	*Unused*
0	1	1	0	*Unused*
0	1	1	1	**RS232-TTL - site/card format**
1	0	0	0	**Mag Stripe - fast**
1	0	0	1	*Unused*
1	0	1	0	*Unused*
1	0	1	1	**Mag Stripe - slow**
1	1	0	0	**Basic Clock/Data**
1	1	0	1	*Unused*
1	1	1	0	*Unused*
1	1	1	1	**Wiegand**

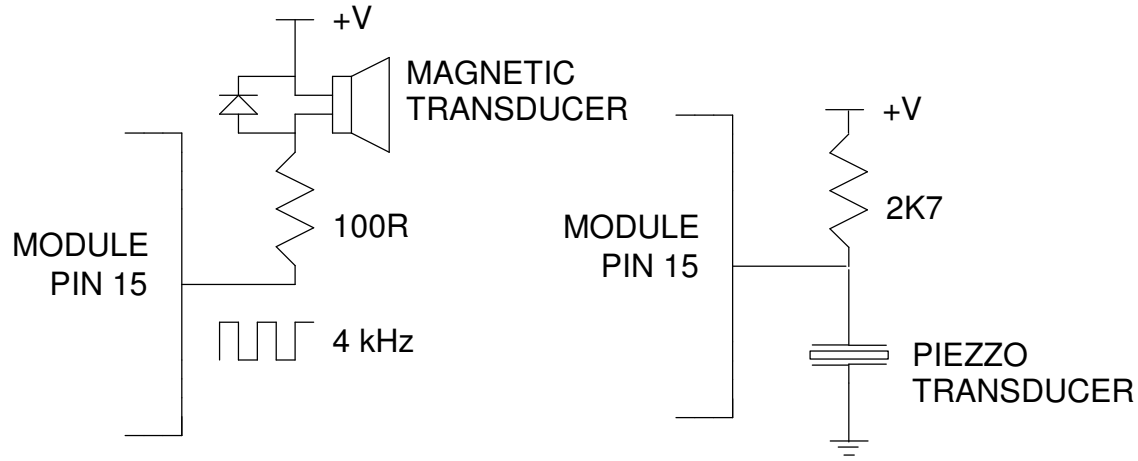
Power Connections

Connect 5-12V across pin 17 (+V) and pin 18 (0V). The module has an internal low dropout voltage regulator providing +5V to the circuit. **Do not exceed +12V on this pin.**

Note: The supply voltage does not affect the reading distance.

External Beeper Connection

The module pin 15 (BEEPER) is an open collector output. It outputs a frequency of 4 kHz for 60 ms when a tag is read. Two typical circuits are:



Coil Connection

The module has an internal coil which may be suitable for many applications. The internal coil is selected by connecting pin 11 (COILA) to pin 12 (COILLINK).

If an **external** coil is required to obtain a greater reading range, a coil of 486 µH-508µH must be connected between pin 11 (COILA) and pin 13 (COILB). Pin 12 (COILLINK) must be left unconnected. No other external components are required.

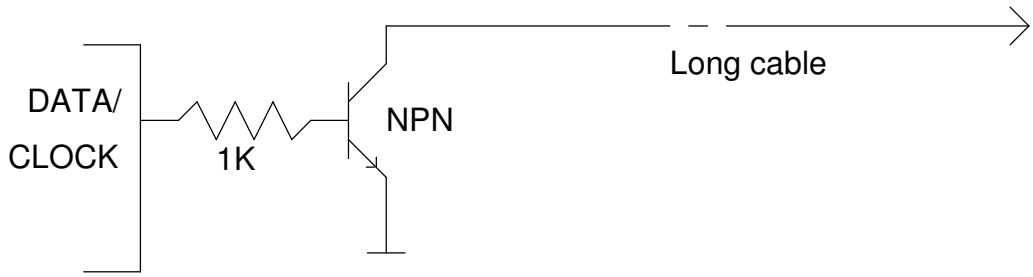
Note. This is a self resonant circuit and the inductance of the coil will affect the frequency.

Warning. The voltage across the external coil must not exceed 75Vpp, this can be limited with a small value series resistor.

INVERT pin

The polarity of PRESENT (pin1), CLOCK/DATA0 (pin2) and DATA/DATA1/TX (pin3) may be inverted by connecting INVERT (pin 5) to 0V.

In all modes the idle level of the signal pins 1,2 and 3 is high. This is acceptable when connecting the module directly to the receiving equipment over a short cable (<15m). However when a long cable exists between module and receiving equipment it is desirable to include an open collector transistor stage between the module and the long cable as shown below:



To ensure that the idle state of the transistor is off, the idle level from the module signal pins must be low. To achieve this connect INVERT to 0V.

RS232-TTL output mode

The RS232-TTL output from the module is on pin 3 (DATA/DATA1/TX). This output is suitable to connect directly to the UART of a microprocessor. The idle level is high. The baud rate is 9600. Data format is 8 bits, no parity, and 1 stop bit.

To achieve true RS232 levels/phase the module output should be connected to an RS232 line driver/receiver IC (e.g. MAX232).

Long number format

The tag code is output in the following structure:

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

The DATA bytes vary depending on the type of card presented to the reader:

H10301 (26 bit format)

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

H10304 (37 bit format)

DATA = 11 ASCII characters representing the 35 data bits of the tag converted to a decimal number
e.g. '10280162602' (31 30 32 38 30 31 36 32 36 30 32 hex)

Site/card number format

The tag code is output in the following structure:

STX (02h)	SITE CODE (ASCII)	SPACE (20h)	CARD NUMBER (ASCII)	CR (0Dh)	LF (0Ah)	ETX (03h)

The SITE CODE and CARD NUMBER bytes vary depending on the type of card presented to the reader:

H10301 (26 bit format)

SITE CODE = 3 ASCII characters representing the upper 8 bits of the tag code converted to a decimal number.
CARD NUMBER = 5 ASCII characters representing the lower 16 bits of the tag code converted to a decimal number.
The two numbers are separated by a SPACE = 20h ASCII

Example: a card with the following 24 data bits: 101100101111000100101010
Outputs: '178 61738' (31 37 38 20 36 31 37 33 38 hex)

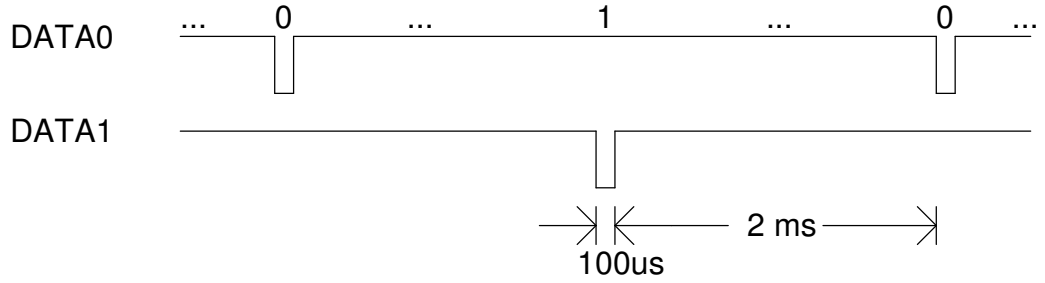
H10304 (37 bit format)

SITE CODE = 5 ASCII characters representing the upper 16 bits of the tag code converted to a decimal number.
CARD NUMBER = 6 ASCII characters representing the lower 19 bits of the tag code converted to a decimal number.
The two numbers are separated by a SPACE = 20h ASCII
Example: a card with the following 35 data bits: 01001100100101111101101010100101010
Outputs: '19607 447786' (31 39 36 30 37 20 34 34 37 37 38 36 hex)

Wiegand Output Modes

In this mode the tag code is pulsed out on DATA0 (pin 2) and DATA1 (pin 3). Both are normally high. When a tag is presented to the reader 26/37 bits are transmitted in the following way:

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



H10301 (26 bit format)

All 26 bits of the card are transmitted.

H10304 (37 bit format)

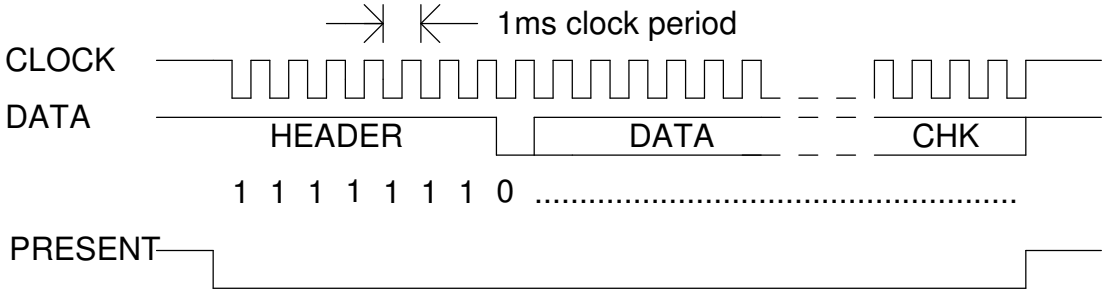
All 37 bits of the card are transmitted.

Clock/Data Mode

In this mode 40 data bits are clocked out with an eight bit header and an eight bit checksum.

Header (11111110)	Data (40 bits)	Checksum

The header is hex FE. The data consists of all 40 data bits sent MSB first. The checksum is a byte addition of the 5 bytes of data e.g tag 07FFFFFFFF has a checksum of 07+FF+FF+FF+FF=03.



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

When a H10301 card is presented to the reader the data bits will consist of 16 zero bits and 24 card data bits.

When a H10304 card is presented to the reader the data bits will consist of 5 zero bits and 35 card data bits.

Slow Mag Stripe Mode

In this mode the decimal tag number is clocked out on CLOCK (pin 2) and DATA (pin 3) 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.

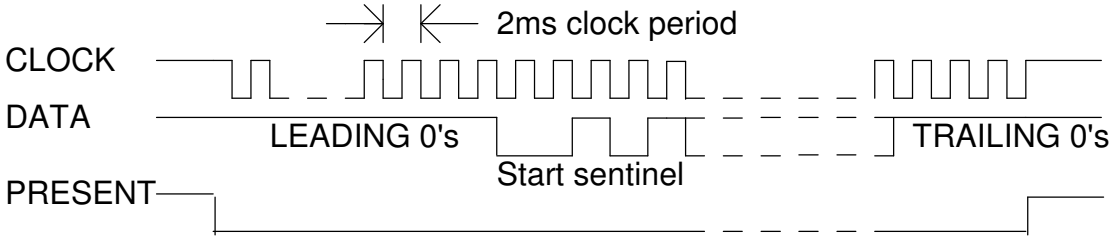
The DATA varies depending on the type of card presented to the reader:

H10301 (26 bit format)

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

H10304 (37 bit format)

DATA = 11 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 zero is represented by a high level on the DATA wire and a one 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 Mag Stripe Mode

This mode differs from the slow magstripe mode in the following way:

- The clock period is 250us.
- 10 trailing 0's

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