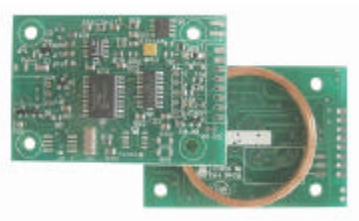
RFID TRANSPONDER **TECHNOLOGY**

DOC. 111-R9

TR-ISO/WIEGAND 125KHz READER



TR-ISO/WIE **TR-ISO/WIE-ONDA** **TR-ISO/WIE-SHELL**

1. FEATURES AND SPECIFICATIONS

- Easy switch of your actual magnetic into the new RFID technology.

The TR-ISO/WIE is a Front Side Tag Reader with **built-in Antenna**, operating with the following tags:

- **UNIQUE** **Read Only** **Model S**
- **Q5** **R/W** **(BLOCK1-2 USER AREA formatted Unique)** **Model S**
- **T5557/5567** **R/W** **(BLOCK 1-2 USER AREA formatted Unique)** **Model S**

  The S model automatically recognize any UNIQUE Format.

- **TITAN** **R/W** **(use only BLOCK32)** **Model K**

- **HITAG 1-2-S** **R/W** **(Read UID code)** **Model H**

  The H model automatically recognize the Tag Type. For HITAG2 use the Default Key.

- Three Outputs (TAG-PRESENT, DATA and STROBE) can be paralleled with other devices (i.e. magnetic card readers).

TR-ISO Two formats available:

CONVERTED: 10 Hex digit (TAG UID) converted to 13 Decimal digit data out:
Manufacturer Code (3 Decimal digits always 000)
Serial Code (10 Decimal digits in the range 0 to 4.294.967.295)
TRASPARENT: 10 Hex digit (TAG UID) converted to 10 Decimal couple of digits (00 to 15) data out. ISO-ABA-TRACK2.

TR-WIE Two formats available:

WIEGAND 26 bit or **WIEGAND 37 bit**.

- Dual voltage available 5VDC (standard) or 12VDC.
- Available **Case: PCB, SHELL, ONDA, TYPE H.**
- **DOUBLE ANTENNA** version emulates the ISO Card reading in forward and reverse mode (Recognize ENTER/EXIT).

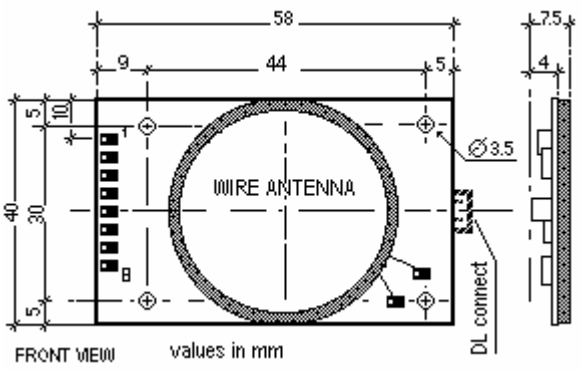
1.1 VERSIONS

-----UNIQUE/Q5/T5577-----	**-----TITAN-----**	**------HITAG1/2/S------**
TR-ISO-SS-5-(Case)	**TR-ISO-KS-5-(Case)**	**TR-ISO-HS-5-(Case)**
TR-ISO-ST-5-(Case)	**TR-ISO-KT-5-(Case)**	**TR-ISO-HT-5-(Case)**
TR-ISO-SS-12-TYPE H	**TR-WIE26-KT-5-(Case)**	**TR-WIE26-HT-5-(Case)**
TR-ISO-ST-12-TYPE H	**TR-WIE37-KT-5-(Case)**	**TR-WIE37-HT-5-(Case)**
TR-ISO-SS-5-D		
TR-ISO-SS-5-E147		
TR-ISO-ST-5-E147		
TR-WIE26-ST-5-(Case)		
TR-WIE37-ST-5-(Case)		
TR-WIE26-ST-12-TYPE H		
TR-WIE37-ST-12-TYPE H		

Glossary

TR= Transponder reader **ISO**=TTL ISO interface **WIE26**=WIEGAND26 **WIE37**=WIEGAND37
S= UNIQUE **K**=TITAN **H=**HITAG
S= CONVERTED MODE **T**=TRANSPARENT MODE
5/12= Power Supply
D=Double Antenna **Case**=SHELL/ONDA/TYPE H **E147=**external antenna 14x7cm

1.2 DIMENSIONS



2.0 ISO CONNECTION

The on-board connector is an **8 pin .1" (2.54mm) soldering type**.

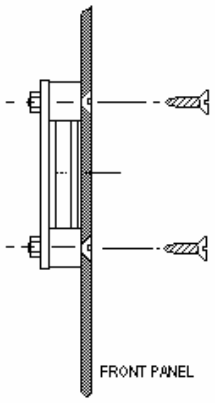
PIN	DESCRIPTION
1	+5VDC (suffix-5)
2	GND
3	TAG Present TTL output
4	Data TTL output.
5	Strobe TTL output.
6	No connect TTL input.
7	Out1 Open Collector output.
8	LED-OUT TTL output trough internal 1k?

2.0.1 WIEGAND CONNECTION

The on-board connector is an **8 pin .1" (2.54mm) soldering type**.

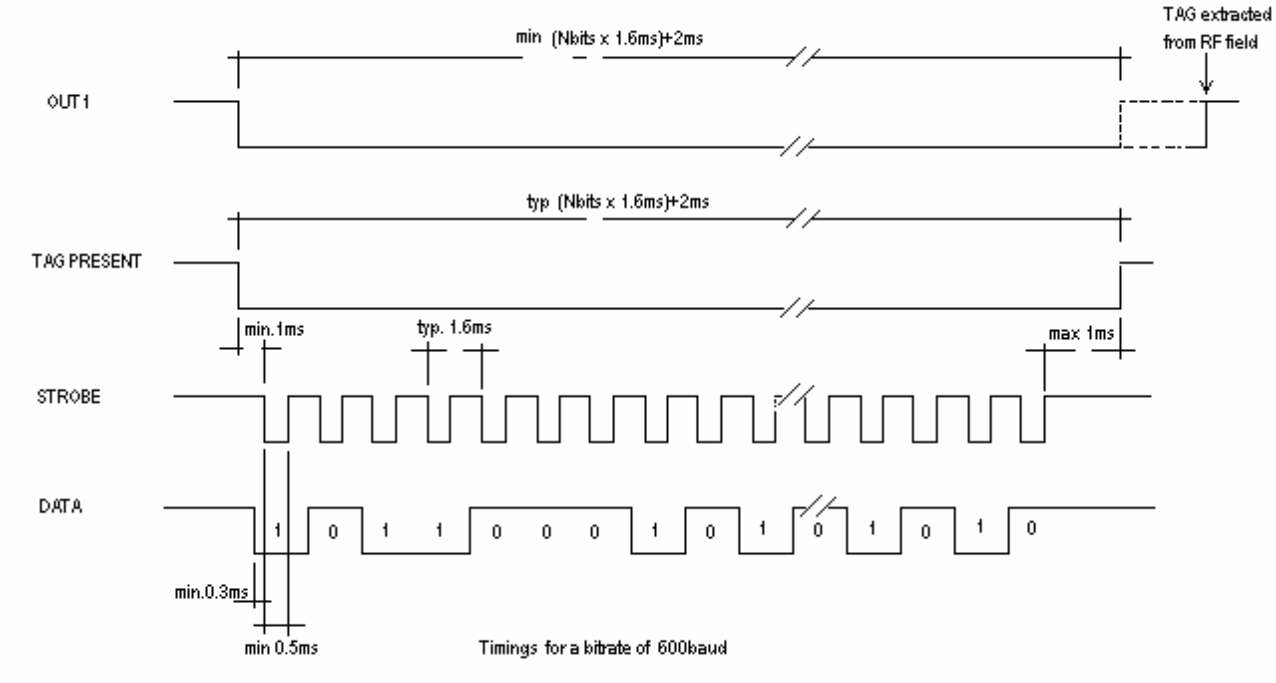
PIN	DESCRIPTION
1	+5VDC (suffix-5)
2	GND
3	No connect
4	Data-1 TTL/TRISTATE output. Ext. pull up at 5V min. value 2 K
5	Data-0 TTL/TRISTATE output. Ext. pull up at 5V min. value 2 K
6	No connect TTL input.
7	Out1 Open Collector output.
8	LED-OUT TTL output trough internal 1k?

2.1 MOUNTING



Due to the Radio Frequency emissions of the Reader Antenna is important to avoid the usage of metal panels in front, rear and lateral sides of the Reader.
Although the TR-ISO provides an high resistance to EMC corruption, avoid to install it in high RF emission environments, the reading distance may result reduced.

2.2 ISO TIMING



2.2.1 TAG PRESENT
The Tag Present signal goes low when a TAG/CARD is moved in the RF-Field and data are correctly read.
Remains low for all data transmission. It will goes high at the end of data transmission.
2.2.2 DATA
The Data signal is valid while the strobe is low. The Data level high indicates a bit value of Zero.
2.2.3 STROBE
The strobe signal indicates when valid data are present.
It is recommended that Data be loaded with the falling edge (negative transition) of the Strobe.
2.2.4 LED-OUT
The LED-OUT is a TTL output, active high, with a 2.2k? internal series resistor suitable to drive an external LED connected to GND.
It will turn ON when a KEY/CARD is moved in the RF-Field and is correctly read.
It will turn OFF when the KEY/CARD is removed by the RF-Field.
2.2.5 OUT1
The Out1 is an Open Collector output, active low, driving a max. load of 80 ma at 12VDC.
It will turn ON when a KEY/CARD is moved in the RF-Field and is correctly read.
It will turn OFF when the KEY/CARD is removed by the RF-Field.

3.0 FORMAT TR-ISO-SS/KS/HS CONVERTED

The data read from the TAG are **Hex-Dec math** converted into two blocks: Manufacturer Code (1 Hex = 3 Dec) and Serial Code (4 Hex = 10 Dec).
The TR-ISO-XS is formatted in ISO mode sending 3+10 decimal digits to the HOST, as described below.

TRANSMITTED DATA					
DATA BITS				**PARITY – PE**	**DESCRIPTION**
(**first bit output**) 0 - 0 - 0 - 0 - 0 - 0 - 0 – 0 - 0					PREAMBLE (9 zeroes)
1	1	0	1	0	START CODE (B hex)
MC0-0	MC0-1	MC0-2	MC0-3	PE-MC0	1st digit (**msd**) MC CODE
MC1-0	MC1-1	MC1-2	MC1-3	PE-MC1	2nd digit MC CODE
MC2-0	MC2-1	MC2-2	MC2-3	PE-MC2	3rd digit (**lsd**) MC CODE
SC0-0	SC0-1	SC0-2	SC0-3	PE-SC0	1st digit (**msd**) SC CODE
SC1-0	SC1-1	SC1-2	SC1-3	PE-SC1	2nd digit SC CODE
SC2-0	SC2-1	SC2-2	SC2-3	PE-SC2	3rd digit SC CODE
SC3-0	SC3-1	SC3-2	SC3-3	PE-SC3	4th digit SC CODE
.....				.....	
SC9-0	SC9-1	SC9-2	SC9-3	PE-SC9	10th digit (**lsd**) SC CODE
1	1	1	1	1	END CODE (F hex)
LCR0	LCR1	LCR2	LCR3	PE-LCR	LCR CODE
0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 (**last bit output**)					POSTAMBLE (9 zeroes)

Glossary:
msd = Most significant digit
lsd = Least significant digit
MC = Manufacturer Code (3 decimal digits in the range 000 to 255)
SC = Serial Code (10 decimal digits in the range 0 to 4.295.000.000)
PE = Parity Even

PE-PARITY EVEN
Any digit have length 4 bit + 1 bit parity as descriptor below.

Bit 0	**Bit 1**	**Bit 2**	**bit 3**	**PE**	**Digit**
0	0	0	0	**1**	0
1	0	0	0	**0**	1
0	1	0	0	**0**	2
1	1	0	0	**1**	3
0	0	1	0	**0**	4
1	0	1	0	**1**	5
0	1	1	0	**1**	6
1	1	1	0	**0**	7
0	0	0	1	**0**	8
1	0	0	1	**1**	9
0	1	0	1	**1**	A
1	1	0	1	**0**	B
0	0	1	1	**1**	C
1	0	1	1	**0**	D
0	1	1	1	**0**	E
1	1	1	1	**1**	F

LCR
LCR is calculated as the XOR of any digit (excluded PE) from the **START CODE** to the **END CODE** (included).
The PE of LCR is calculated at the same mode of the other digits.
Example of stream with: **MC= 012 SC= 1234567890 LCR=6** PE (in parenthesis)

Preamble START MC 0' MC 1' MC 2' SC 1' SC 2' SC 3' SC 4' SC 5'
000000000-1101(0) - 0000(1) -1000(0) - 0100(0) - 1000(0) - 0100(0) -1100(1) - 0010(0) -1010(1)
SC 6' SC 7' SC 8' SC 9' SC 10' END LCR Postamble
-0110(1) - 1110(0) - 0001(0) - 1001(1) – 0000(1) - 1111(1) - 0110(1) – 000000000

3.1 FORMAT TR-ISO-ST/KT/HT TRANSPARENT

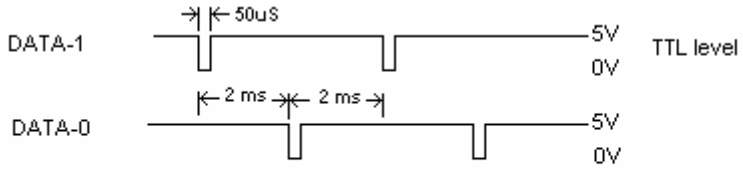
The data read from the TAG are transparently transmitted to the HOST.
To be ISO formatted, the TAG data content is formatted in 20 decimal digits to the HOST , as described below.

Data from **0 Hex to 9 Hex** are converted as **00 Dec to 09 Dec.**
Data from **A Hex to F Hex** are converted as **10 Dec to 15 Dec.**
The other terms are the same as previously described in par. 2.3.7.

Example:
If TAG contains an Hex code : **02 80 B6 83 4E**
The data will be so converted in Dec code: **00 02 08 00 11 06 08 03 04 14**
The stream transmitted will be:

Preamble	**START**	**0'**	**0'**	**0'**	**2'**	**0'**	**8'**	**0'**	**0'**	**1'**	**1'**	**0'**
000000000 -	1101(0) -	0000(1) -	0000(1) -	0000(1) -	0100(0) -	0000(1) -	0001(0) -	0000(1) -	0000(1) -	1000(0) -	1000(0) -	0000(1)
6'	**0'**	**8'**	**0'**	**3'**	**0'**	**4'**	**1'**	**4'**	**END**	**LCR**	**Postamble (20 bit)**	
- 0110(1) -	0000(1) -	0001(0) -	0000(1) -	1100(1) -	0000(1) -	0010(0) -	1000(0) -	0010(0) -	1111(1) -	0100(0) –	00000000000000000000	

3.2 FORMAT WIEGAND26/37 PROTOCOL & TIMINGS



WIEGAND TIMING

The Wiegand Protocol is 26 bit mode so formatted:
The three low significant bytes on the Unique format has sent to the Host
Example: an UNIQUE CODE is : **C0-80-52-35-1A**
Only the variable part **52-35-1A** has sent to the HOST.
The Wiegand format is:

E Bit0 …… Bit11 Bit12.....Bit23 O

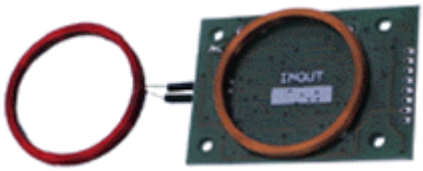
E= Parity even. If the number of ones in the Bits 1 to 11 is odd, then E=1, otherwise is 0.
O= Parity Odd. If the number of ones in the Bits 12 to 23 is even, then O=1, otherwise is 0.

In the example the bit are so structured:

E	**B0**	**B11**	**B12**	**B23**	**O**
1	**0101 0010 0011**		**0101 0001 1010**		**0**

3.2.1 DATA-0 and DATA-1
The Data signal indicating the logic value 1 or 0.
3.3.2 LED-OUT
The LED-OUT is a TTL output, active high, with a 2.2k? internal series resistor suitable to drive an external LED connected to GND.
It will turn ON when a KEY/CARD is moved in the RF-Field and is correctly read.
It will turn OFF when the KEY/CARD is removed by the RF-Field.
3.2.3 OUT1
The Out1 is an Open Collector output, active low, driving a max. load of 80 ma at 12VDC.
It will turn ON when a KEY/CARD is moved in the RF-Field and is correctly read.
It will turn OFF when the KEY/CARD is removed by the RF-Field.

4.0 TR-ISO-SS/T-5-D DOUBLE ANTENNA



Mechanical dimensions are the same as for the other TR-ISO models.
Is delivered with the FIRST ANTENNA mounted on the board and a SECOND ANTENNA in two versions:
- **D** SECOND ANTENNA as a spare part to be soldered to connector pin.
- **DL** SECOND ANTENNA connected with a cable to an on board two pole connector. The cable max length 1mt..

When a TAG/CARD has read from the FIRST antenna the DATA FORMAT is described in par 3.0.
When a TAG/CARD has read from the SECOND antenna the data are totally reversed, the first data out is the last bit (POSTAMBLE) of the DATA FORMAT described in par 3.0 for TR-ISO-SS and par 3.1 for TR-ISO-ST.
The use of this model is **to emulate the forward /reverse action of the magnetic ISO card readers**.
A time coverage and an internal comparison avoids the FIRST and SECOND antenna to be operated at the same time on the same card code.

5.0 TR-ISO/WIE-SS/ST-12-H MIDRANGE ANTENNA TYPE-H

The module TR is inserted into a plastic enclosure mounted on a Midrange Antenna plastic support.
Has the same electrical functions of the standard TR-ISO.
Is particularly hardened for use in high noise environments.
A 6 wire 0,25mm cable connect all the signals. The cable length is 50cm.
The TR is protected against polarity inversion.
The antenna and the circuit are fully covered by resin to obtain a waterproof feature.

H MODEL **MECHANICAL**

Dimensions	Length	178 mm
	Width	70 mm
	Height	15 mm
Weight		Typ 400g
Material		PVC GREY COLOR CLASS V0

OPERATING

Power Requirements	**12VDC +-2% stabilized current max. 100ma**
Reading Distance (with TAG in center of RF field)	CARD UNIQUE typ 230 mm

ENVIRONMENTAL

Temperature	Operating	-15°C to 60°C
	Storage	-30°C to 70°C
Protection	Operating	Fully waterproof IP66
	Storage	idem

H MODEL **CABLE FUNCTION**

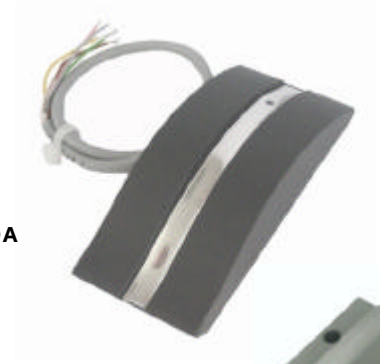
WIRE	COLOR	ISO	WIEGAND
1	WHITE	+12VDC	+12VDC
2	BROWN	GND	GND
3	YELLOW	TAG PRESENT	DATA-1
4	GREEN	DATA	DATA-0
5	GREY	CLOCK	GND
6	PINK	OUT1	OUT1

6.0 TR-ISO/WIE - ONDA/SHELL

The module TR-ISO/WIE is inserted into a plastic enclosure.
Has the same electrical functions of the standard TR-ISO/WIE.
A 6 wire 0,25mm cable connect all the signals. The cable length is 50cm.
The TR is protected against polarity inversion.(not for the 5V model)
The antenna and the circuit are fully covered by resin to obtain a waterproof feature.

Dimension SHELL	H 77 x L 112 x D 30 mm
Dimension ONDA	H 51 x L 115 x D 24 mm

ONDA



CABLE FUNCTION

WIRE	COLOR	ISO	WIEGAND
1	WHITE	+5/12VDC	+5/12VDC
2	BROWN	GND	GND
3	YELLOW	TAG PRESENT	DATA-1
4	GREEN	DATA	DATA-0
5	GREY	GND	GND
6	PINK	OUT1	OUT1

SHELL

7.0 TR-ISO/WIE-SS/T-5-E147 (14cm x 7cm) MIDRANGE EXTERNAL ANTENNA

The module TR-ISO can be externally connected to one midrange antenna to obtain more reading distance.

E-147 Reading Distance (with TAG in center of RF field)	CARD UNIQUE typ 150mm

The antenna is furnished with tinned copper wires for direct soldering on the TR-ISO module board.
The antenna wires can be lengthened to a maximum of 2 meters.

8.0 SPECIFICATIONS

OPERATING

Power Requirements	TR-...5 Version: 5 VDC ? 5% at max.40mA max. Ripple 10mVp-p
Output Signal Level TTL Interface	Vol = 1 VDC max at 6mA Voh = 3.5 VDC min at 6mA
Speed ISO Speed WIEGAND	600 bits per second 500 bits per second
Reading Distance (with TAG in center of RF field)	TAG typ 30mm CARD typ 80mm

MECHANICAL

Dimension electronic board	Height 40 x Length 58 x depth 7.5 mm
Dimension SHELL	Height 77 x Length 112 x depth 30 mm
Dimension ONDA	Height 51 x Length 115 x depth 24 mm

ENVIRONMENTAL

Temperature	Operating Storage	-10 C to 50 C -40 C to 80 C
Humidity	Operating Storage	10% to 90% non condensing 0% to 95% non condensing

INOUT RFID srl Via Milano,14/H 20064-Gorgonzola (Italy)
Phone:+39 02.95138.139 **Fax:**+39 02.95.158.694
Email: info@inoutsrl.it Web: www.inoutsrl.it