TWN4 Palon

Technical Handbook

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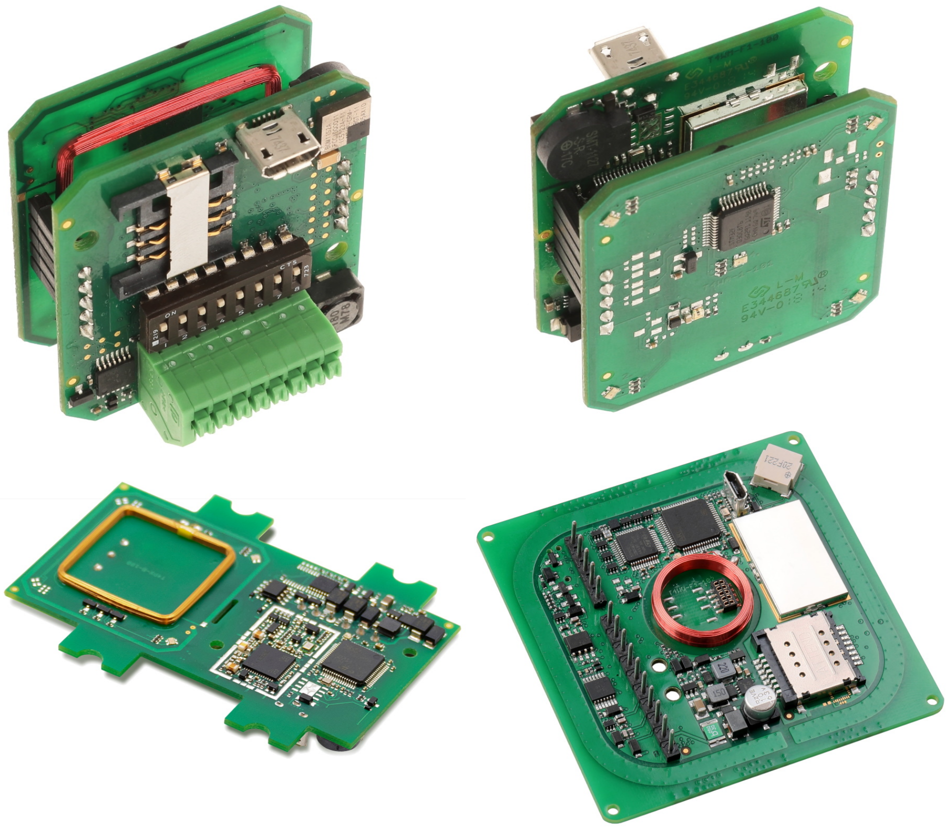

ELATEC GmbH

Contents

1 Introduction

TWN4 Palon is a family of innovative and configurable Reader/Writer for RFID transponders. This addition to the popular TWN4 line of multi-standard RFID readers is ideally suited for integration into devices and behind front panels. The module has both low (125kHz, 134.2kHz) and high (13.56MHz) frequency antennas, allowing the user access to a wide range of RFID standards. With the support of NFC and BLE, mobile phones can also be used for secure identification. A variety of interfaces are supported, including USB, RS485, RS232, Wiegand and Clock/Data. An optional OSDP protocol is additionally available. Up to five RGB LEDs can be freely programmed for optical signaling. Along with that, a SAM slot is provided for applications with enhanced security requirements.

This technical handbook provides the details needed to get started using the TWN4 Palon - a functional overview of the board, listing the features and interface options available.

A custom user app can be loaded onto the module using the AppBlaster software. For more information regarding the programming of the TWN4 module please see the dedicated User Guide for AppBlaster.

2 Versions

Various versions of TWN4 Palon are available. Table 2.1 lists the different features of the corresponding model.

Feature **Variant:**	**TWN4 Palon One LEGIC**	**TWN4 Palon Compact LEGIC (Light)**	**TWN4 Palon Compact (Light)**	**TWN4 Palon Square**
PCB type	Single board	Two stacked boards	Two stacked boards	Single board
HF Frontend	LEGIC	LEGIC	NXP	NXP
LF	√	√	√	√
HF	√	√	√	√
BLE	-	√ (-)	√ (-)	-
Nr of SAM-Slots	1	1	1	2
LEDs	2	5 RGB (1 RGB)	5 RGB (1 RGB)	1 RGB
IPE[1]	-	√ (-)	√ (-)	√
RS232	-	√ (-)	√ (-)	-
RS485	√	√	√	√
Tamper protection	switch	IR light barrier	IR light barrier	3 axis sensor
Connection	6 Pin / USB	8 Pin / USB	8 Pin / USB	10 / 5 Pin / USB

Table 2.1: Different features of TWN4 Palon Versions

1) IPE = **I**ntelligent **P**eripheral **E**xtender

Name	Variant	Article Number	Contains
TWN4 Palon One LEGIC		T4W1-B1B16	single PCB
TWN4 Palon Compact		T4W2-F01C7	Mainboard T4WM-F1C17, Antenna T4WA-1A16 or Antenna T4WA-5A16
TWN4 Palon Compact	Light	T4W2-F02B6	Mainboard T4WM-F1B16, Antenna T4WA-1A16 or Antenna T4WA-5A16
TWN4 Palon Compact LEGIC		T4W2-B01C7	Mainboard T4WM-B1C17, Antenna T4WA-1A16 or Antenna T4WA-5A16
TWN4 Palon Compact LEGIC	Light	T4W2-B02B6	Mainboard T4WM-B1C17, Antenna T4WA-1A16 or Antenna T4WA-5A16
TWN4 Palon Square		T4WQ-F1F26	single PCB

Table 2.2: Article Numbers of TWN4 Palon Versions

Note: Do not mix mainboards and antenna boards of different TWN4 Palon Compact versions and revisions.

3 Software Requirement for Non-USB Communication

If the TWN4 Palon is connected to RS232, RS485 or Wiegand / Clock & Data it is necessary to add the following code to the TWN4 App.

```
const unsigned char AppManifest[] = { EXECUTE_APP, 1, EXECUTE_APP_ALWAYS, TLV_END };
```

This enables the App to start without USB enumeration.

To use the Host communication routines like HostWriteByte() with RS232 or RS485 connection, also add following code to the TWN4 App.

```
SetHostChannel(CHANNEL_COM1);
```

A complete example of the TWN4 App is listed below.

```
#include "twn4.sys.h"
#include "apptools.h"

// necessary for Non-USB communication
const unsigned char AppManifest[] = { EXECUTE_APP, 1, EXECUTE_APP_ALWAYS, TLV_END };

int main(void)
{
	SetHostChannel(CHANNEL_COM1); // necessary only for RS232 or RS485 communication

	while (true)
	{
		// Do something
	}
}
```

4 TWN4 Palon One PCB

4.1 Functional Overview

The TWN4 Palon One is a complete RFID Reader system with a LEGIC HF frontend. It supports both low (125kHz, 134.2kHz) and high (13.56MHz) frequency transponders. For operation, it requires a 5.0V (via USB) or 9.0V - 30V (via connector X2) power source and connection to a host. The device can be connected to the host via USB or RS485 (RS232 optionally) interface. The TWN4 Palon One also offers a SAM slot and a speaker on board, as well as two RGB LEDs. For sabotage detection, the board is equipped with a micro tamper switch (SW2). A DIP switch can be used to set the address for RS485 operation.

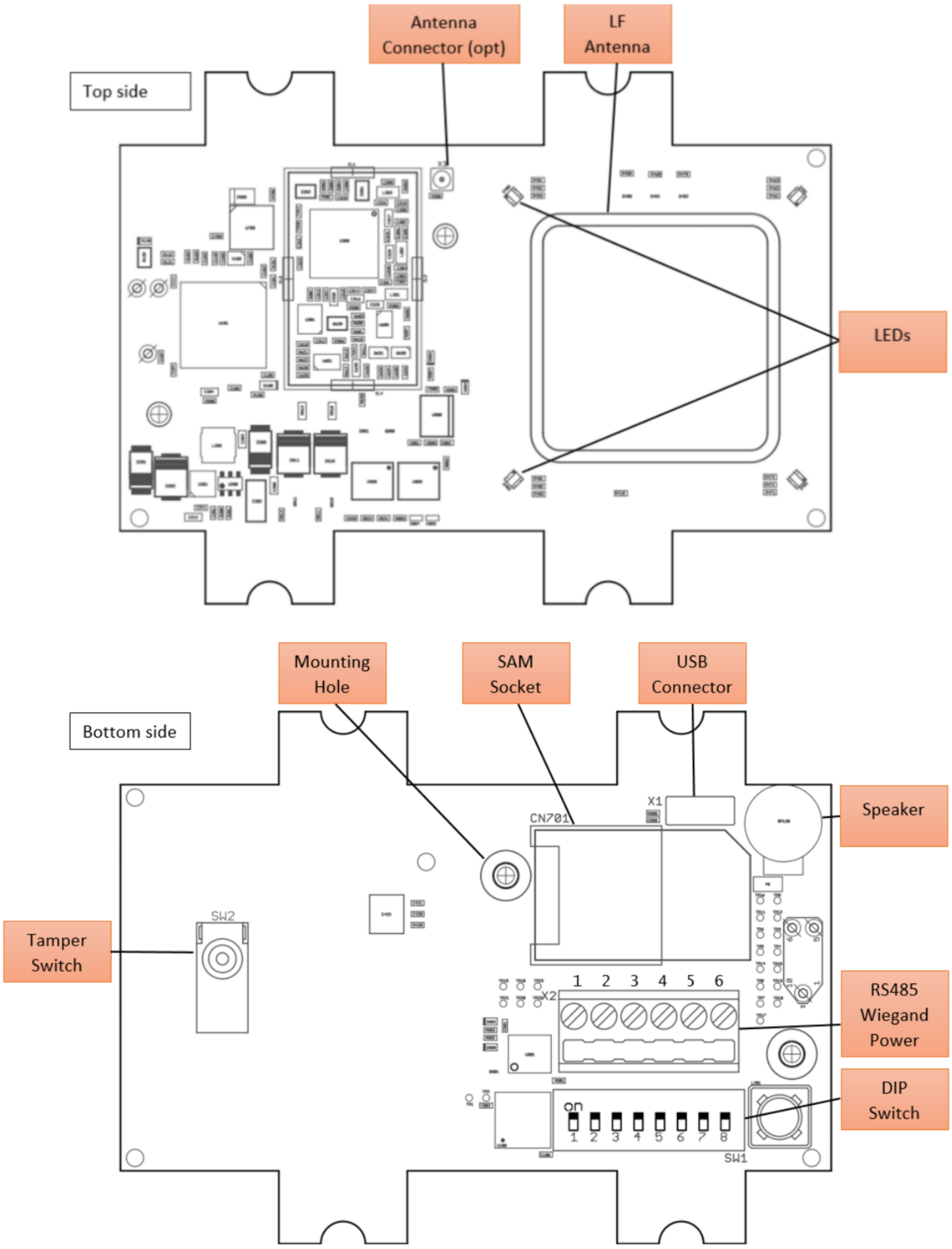

Figure 4.1: TWN4 Palon One Functional Overview

4.2 Dimensions and Pinout

Figure 4.2 provides the physical dimensions of the TWN4 Palon One. All dimensions in mm unless otherwise stated.

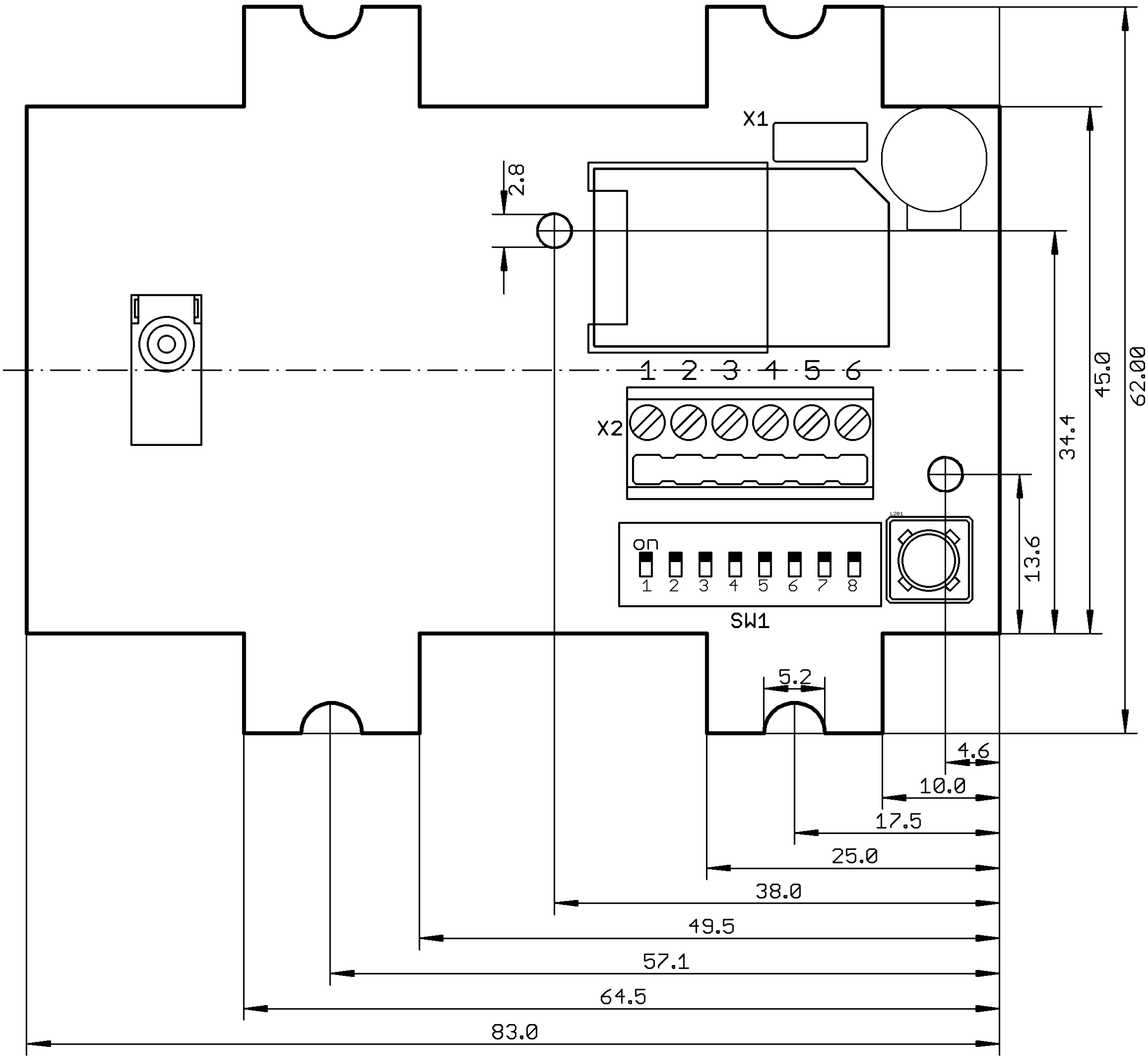

Figure 4.2: PCB Dimensions

4.3 Pinout Main Connector

While the module can be connected via USB port, its main host connection is RS485. The RS485 interface is accessable via X2. Table 4.1 shows the pinout of X2, figure 4.2 shows the polarity of the pins.

Pin	Name	IO of MCU
1	RS485_A	COM1
2	RS485_B	COM1
3	D0 or DATA	GPIO5
4	D1 or CLK	GPIO6
5	GND	-
6	UIN	-

Table 4.1: X2 Pinout

4.4 DIP Switch

For RS485, the address of each module must be adjustable. This can be done with the DIP switches. Furthermore, the RS485 bias and termination can be set. Table 4.2 shows the assignment of the DIP switches.

DIP	Assignment	IO (I2C)
1	RS485 address 0 (LSB)	0
2	RS485 address 1	1
3	RS485 address 2	2
4	RS485 address 3 (MSB)	3
5	RS485 bias	4
6	RS485 baud rate (LSB)	5
7	RS485 baud rate (MSB)	6
8	RS485 Termination 120 Ohm	-

Table 4.2: DIP switches

The behaviour of the DIP switches 1-7 is controlled by firmware and may change in future.
When switch 5 / RS485 bias is switched on, a pull-up resistor is connected to RS485_A and a pull-down resistor is connected to RS48_B signal. This prevents an undefined state of the bus when no transmitter is active.
Switch 8 / RS485 Termination 120 Ohm connects a 120 Ohm resistor between RS485_A and RS485_B signal, which prevents reflections on the bus.

The resulting RS485 address is shown in table 4.3.

DIP4	DIP3	DIP2	DIP1	RS485 address
OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	ON	1
OFF	OFF	ON	OFF	2
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	4
OFF	ON	OFF	ON	5
OFF	ON	ON	OFF	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
ON	OFF	OFF	ON	9
ON	OFF	ON	OFF	10
ON	OFF	ON	ON	11
ON	ON	OFF	OFF	12
ON	ON	OFF	ON	13
ON	ON	ON	OFF	14
ON	ON	ON	ON	15

Table 4.3: DIP switches for RS485 address

Table 5.5 shows the selectable baud rates with DIP6 and DIP7.

DIP7	DIP6	Baud rate
OFF	OFF	9600
OFF	ON	19200
ON	OFF	38400
ON	ON	N/A

Table 4.4: DIP switches for RS485 baud rate

5 TWN4 Palon Compact

5.1 Functional Overview

The TWN4 Palon Compact is a complete RFID Reader system with either MIFARE or LEGIC HF frontend. It supports both low (125kHz, 134.2kHz) and high (13.56MHz) frequency transponders. For operation, it requires a 5.0V (via USB) or 9.0V - 30V (via connector X2) power source and connection to a host. The device can be connected to the host via USB, RS485 or RS232 interface. The TWN4 Palon Compact also offers a SAM slot and a speaker on board, as well as up to five RGB LEDs. For sabotage detection, the board is equipped with a reflection sensor. A DIP switch can be used to set the address for RS485 operation.

The TWN4 Palon Compact can interact with the user via Bluetooth Low-Energy interface. This development pack contains documentation of BLE API implemented on the module.

TWN4 Palon Compact consist of two stacked PCBs which are connected via pin headers.

Note: Do not mix mainboards and antenna boards of different TWN4 Palon Compact versions and revisions.

The TWN4 Palon Compact Light has a reduced feature set, some functionalities are omitted.

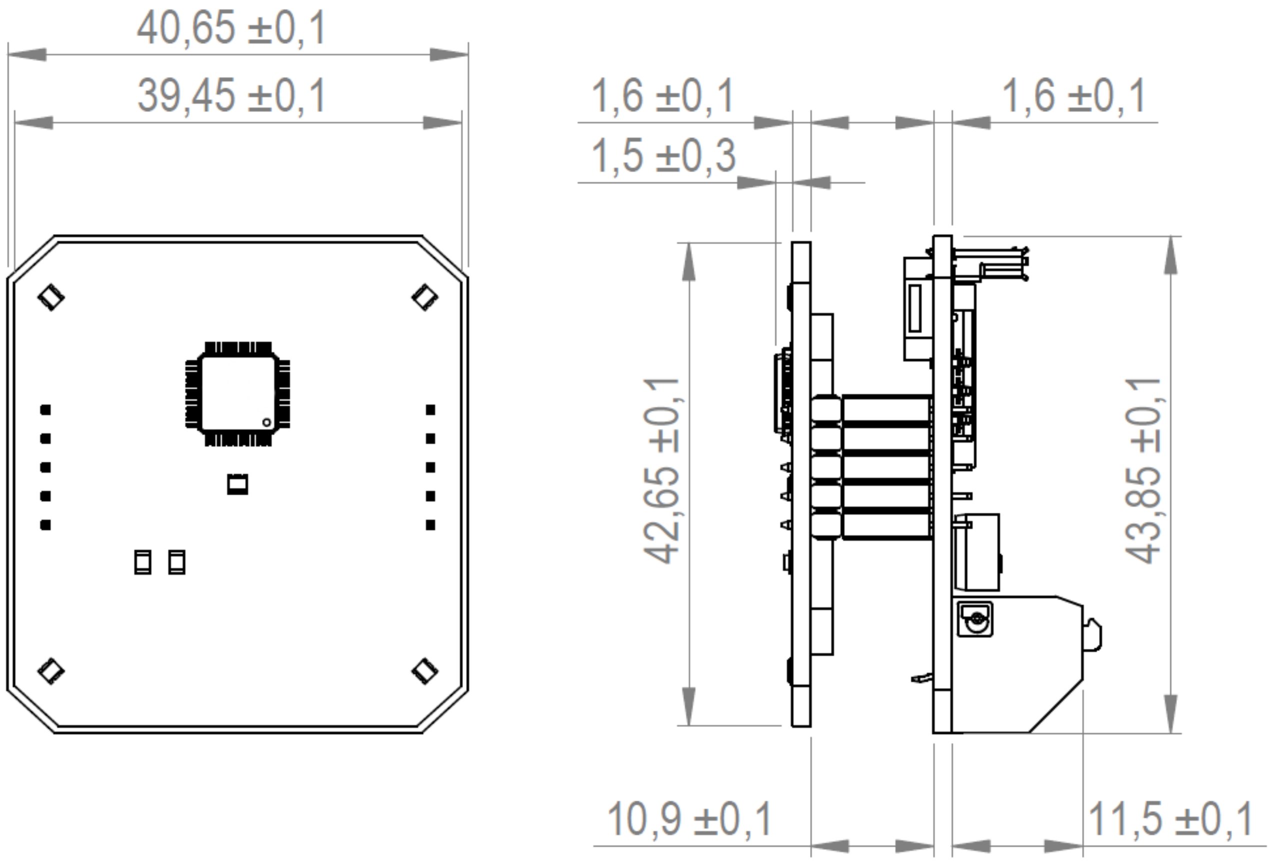

Figure 5.1: Palon Compact Dimensions

All dimensions in mm unless otherwise stated.

Please note, that the antenna shield PCB is smaller than the mainboard PCB, which is related to the housing.

5.2 Antenna PCB T4WA

The antenna is one of two parts of the twin PCB unit T4W2 (Palon Compact) and is connected to the mainboard via two 6-pin headers.

5.2.1 Functional Overview

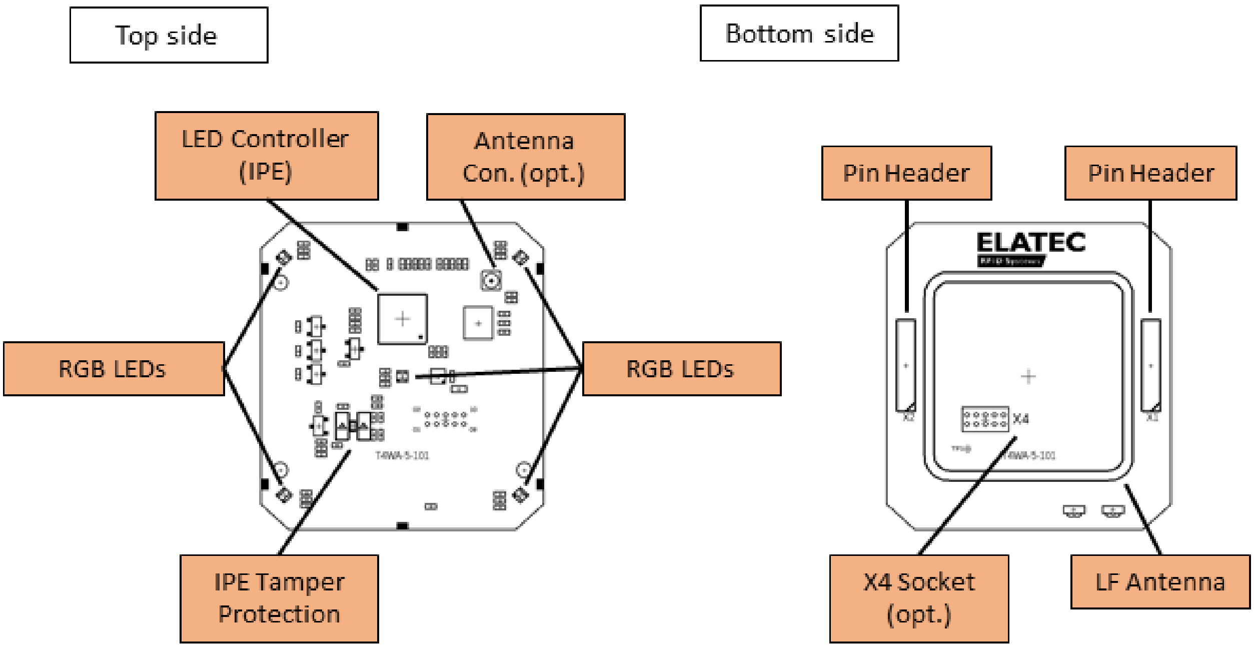

Figure 5.2: TWN4 Palon Compact Antenna Functional Overview

Note: The pin headers X1 and X2 are only for internal connection of antenna PCB and mainboard.

5.2.2 Dimensions

Figure 5.3 provides the physical dimensions of the TWN4 Palon antenna PCB. All dimensions in mm unless otherwise stated.

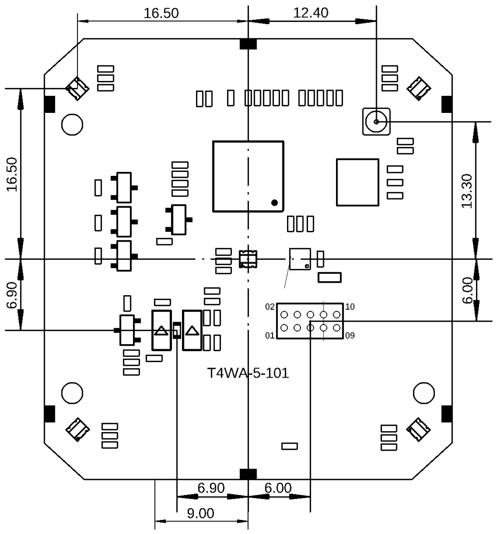

Figure 5.3: PCB Dimensions T4WA-5

5.2.3 Pinout

X4 of the board T4WA-5 has an optional expansion connector for plug-in boards on the front (e.g. touch screen). The pinout is shown in Table 5.1.

Pin	Name
1	Output +5V
2	GND
3	I2C_SDA
4	I2C_SCL
5	OUTPUT Reset
6	INPUT Interrupt
7	GND
8	GND
9	RFU
10	RFU

Table 5.1: X4 Pinout

5.3 Main PCB

The mainboard is the second of two parts of the twin PCB unit T4W2 (Palon Compact) and is connected to the antenna PCB via two 6-pin headers. There is a MIFARE and a LEGIC version available.

5.3.1 Functional Overview MIFARE

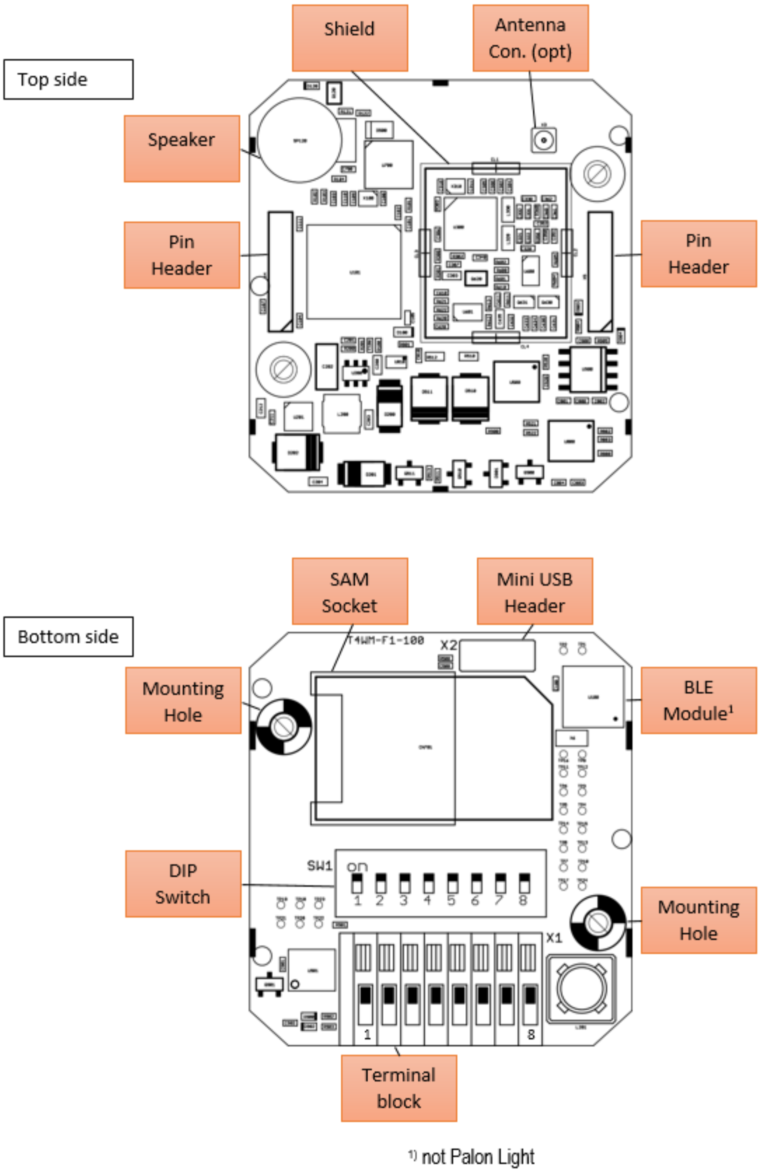

Figure 5.4: TWN4 Palon Compact Main PCB Functional Overview

Note: The pin headers X1 and X2 are only for internal connection of antenna PCB and mainboard.

5.3.2 Dimensions MIFARE

Figure 5.5 provides the physical dimensions of the TWN4 Palon MIFARE mainboard. All dimensions in mm unless otherwise stated.

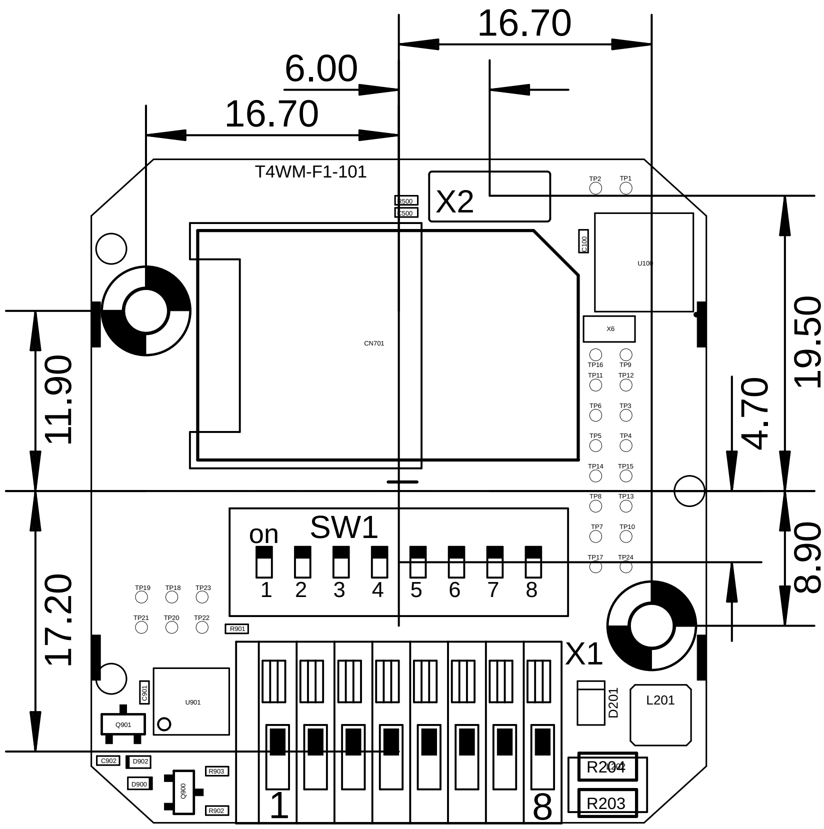

Figure 5.5: PCB Dimensions

5.3.3 Functional Overview LEGIC

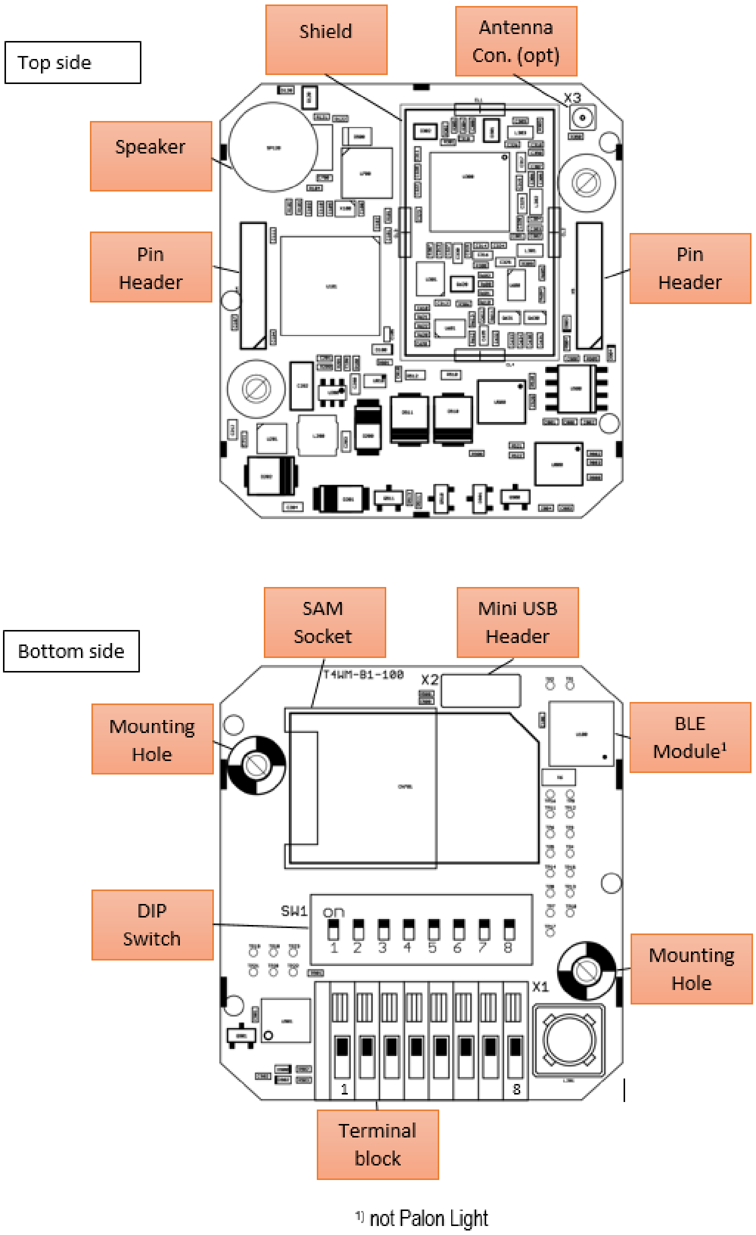

Figure 5.6: TWN4 Palon Compact Main PCB Functional Overview

Note: The pin headers X1 and X2 are only for internal connection of antenna PCB and mainboard.

5.3.4 Dimensions LEGIC

Figure 5.7 provides the physical dimensions of the TWN4 Palon LEGIC mainboard. All dimensions in mm unless otherwise stated.

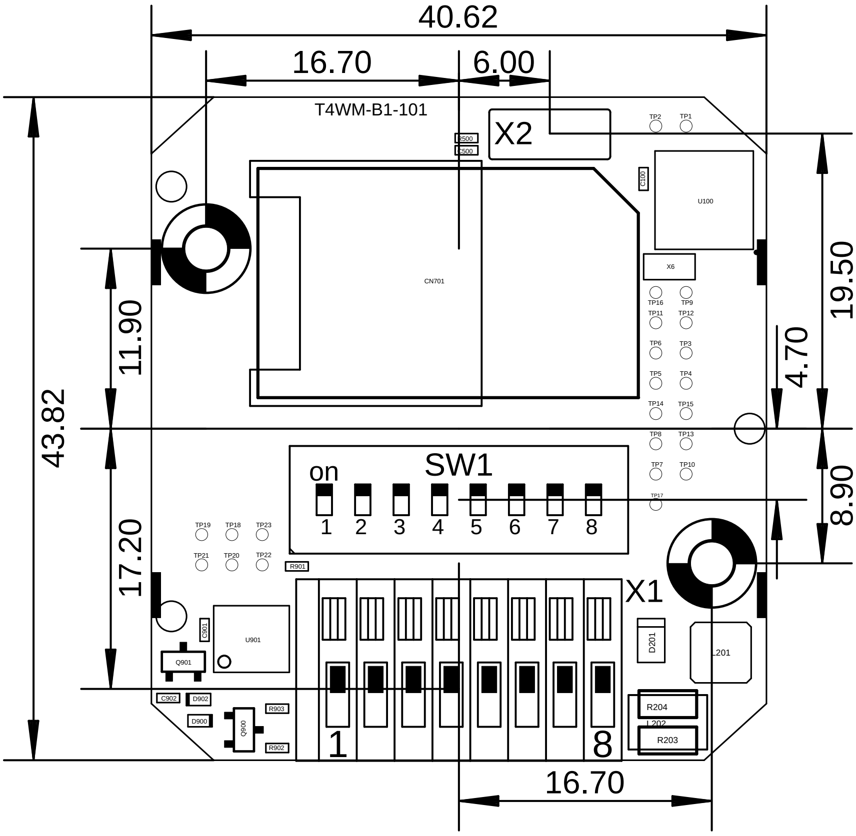

Figure 5.7: PCB Dimensions LEGIC

5.3.5 Pinout Main Connector

While the module can be connected via USB port, its main host connection is either RS485 or RS232. The RS485 / RS232 interface is accessable via X1. Table 5.2 shows the pinout of X1, figure 5.6 shows the polarity of the pins.

Pin	Name	IO of MCU
1	RS232_RX (Light: N/A)	COM1_RX
2	RS232_TX (Light: N/A)	COM1_TX
3	RS485_A	COM1
4	RS485_B	COM1
5	Wiegand D0 or DATA	GPIO5
6	Wiegand D1 or CLK	GPIO6
7	VIN 9-30V	-
8	GND	-

Table 5.2: X1 Pinout

5.4 DIP Switch

For RS485, the address of each module must be adjustable. This can be done with the DIP switches. Furthermore, the RS485 bias and termination can be set. Table 5.3 shows the assignment of the DIP switches.

DIP	Assignment	IO (I2C)
1	RS485 address 0 (LSB)	0
2	RS485 address 1	1
3	RS485 address 2	2
4	RS485 address 3 (MSB)	3
5	RS485 bias	4
6	RS485 baud rate (LSB)	5
7	RS485 baud rate (MSB)	6
8	RS485 Termination 120 Ohm	-

Table 5.3: DIP switches

The assignment of DIP switches relates to version with RS485. For RS232, Wiegand, Clock/Data and the DIP switches are not in use.

The behaviour of the DIP switches 1-7 is controlled by firmware and may change in future.
When switch 5 / RS485 bias is switched on, a pull-up resistor is connected to RS485_A and a pull-down resistor is connected to RS48_B signal. This prevents an undefined state of the bus when no transmitter

is active.
Switch 8 / RS485 Termination 120 Ohm connects a 120 Ohm resistor between RS485_A and RS485_B signal, which prevents reflections on the bus.

The resulting RS485 address is shown in table 5.4.

DIP4	DIP3	DIP2	DIP1	RS485 address
OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	ON	1
OFF	OFF	ON	OFF	2
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	4
OFF	ON	OFF	ON	5
OFF	ON	ON	OFF	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
ON	OFF	OFF	ON	9
ON	OFF	ON	OFF	10
ON	OFF	ON	ON	11
ON	ON	OFF	OFF	12
ON	ON	OFF	ON	13
ON	ON	ON	OFF	14
ON	ON	ON	ON	15

Table 5.4: DIP switches for RS485 address

Table 5.5 shows the selectable baud rates with DIP6 and DIP7.

DIP7	DIP6	Baud rate
OFF	OFF	9600
OFF	ON	19200
ON	OFF	38400
ON	ON	N/A

Table 5.5: DIP switches for RS485 baud rate

5.4.1 Cable for RS232 and RS485

For connection of RS232 and RS485, we recommend a shielded twisted pair cable, e.g. Belden 8723.

5.4.2 IPE

The IPE[1] (**I**ntelligent **P**eripheral **E**xtender) is an independent microcontroller used for individually controlling the LEDs (color and brightness). It also manages the tamper protection.
For information about programming the IPE, please see document *TWN4 IPE API Reference*

[1] not Palon Light

6 TWN4 Palon Square PCB

6.1 Functional Overview

The TWN4 Palon Square is a complete RFID Reader system with MIFARE frontend. It supports low (125kHz, depending on model) and high (13.56MHz) frequency transponders. For operation, it requires a 5.0V (via USB, equipped socket depending on model) or 9.0V - 30V (via connector X1 or soldered on cable) power source and connection to a host. The device can be connected to the host via USB or RS485 interface. The address for RS485 is configured by software. A bidirectional OneWire port is integrated for special customer requirements. The TWN4 Palon Square also offers a dual SAM slot (depending on model) and a speaker on board, as well as up to five RGB LEDs. For sabotage detection the board is equipped with a sabotage button depending on the model.

The HF antenna is part of the reader board and the LF antenna (see Figure 6.1, thick black ring in the middle) is optionally mounted on the board.

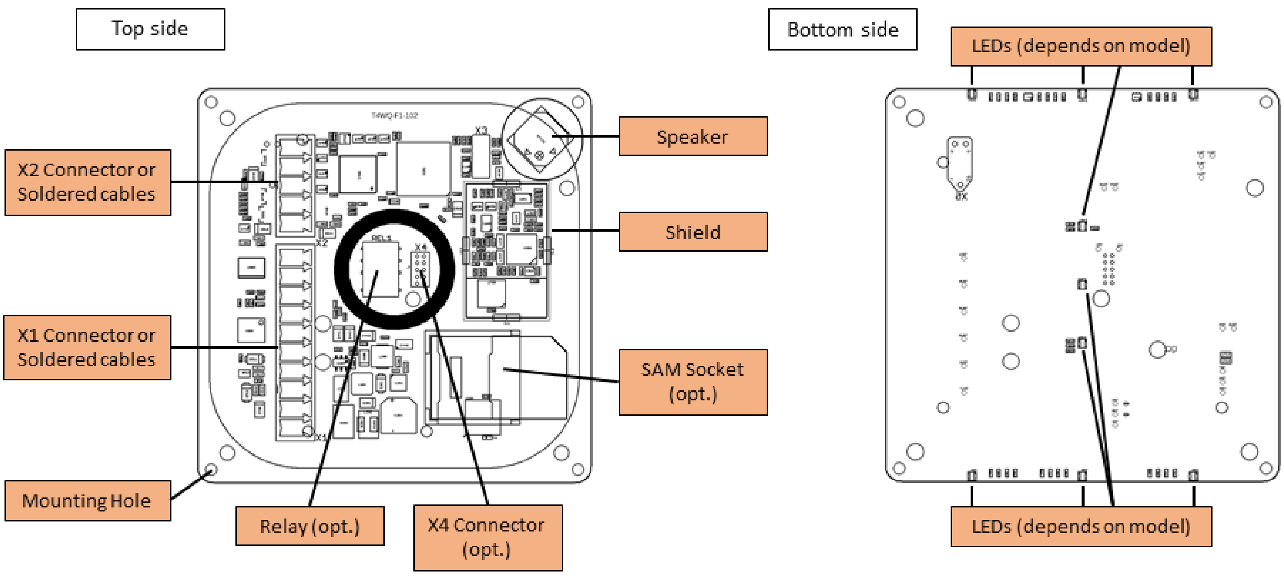

Figure 6.1: TWN4 Palon Square Functional Overview

6.2 Dimensions

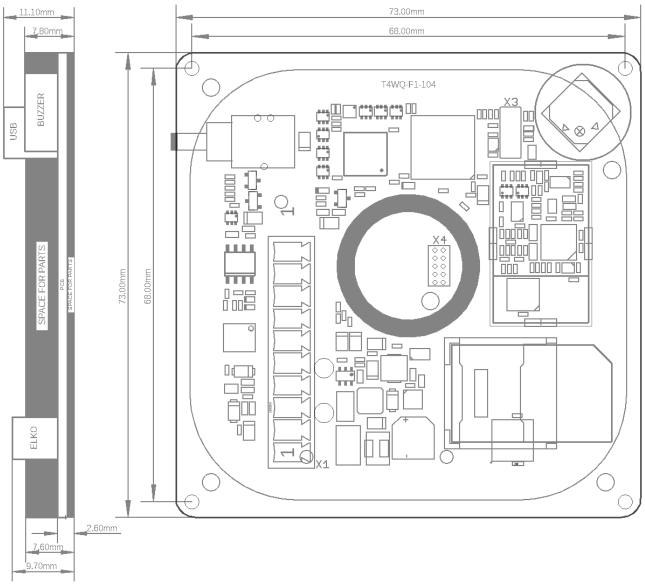

Figure 6.2: Palon Square Dimensions

6.3 Pinout

While the module can be connected via USB port, its main host connection is RS485. The RS485 interface is accessable via X1. Table 6.1 shows the pinout of X1.
The address for RS485 is set by software. The RS485 bias and termination cannot be set on this model. This must be wired externally.

The relay (REL1) is optionally equipped depending on the model. Table 6.2 shows the pinout of X2.

X3 is a standard USB connector with micro USB.

X4 is an optional expansion connector for plug-in boards on the front (e.g. touch screen). The pinout is shown in Table 6.3.

Pin	Name	IO of MCU
1	GND	-
2	VIN 9-30V	-
3	One Wire Bus	IPE
4	Wiegand D0 or DATA	GPIO5
5	Wiegand D1 or CLK	GPIO6
6	Digital Input 1	IPE
7	Digital Input 2	IPE
8	Digital Input 3	IPE
9	RS485_A	COM1
10	RS485_B	COM1

Table 6.1: X1 Pinout

Pin	Name
1	Relay normally open
2	Relay common
3	Relay normally close
4	Digital Input 4 (Sabotage contact)
5	GND

Table 6.2: X2 Pinout

Pin	Name
1	Output +5V
2	GND
3	I2C_SDA
4	I2C_SCL
5	OUTPUT Reset
6	INPUT Interrupt
7	GND
8	GND
9	RFU
10	RFU

Table 6.3: X4 Pinout

7 Bluetooth Low Energy (BLE) Feature

The traditional Bluetooth standard is convenient for constant-flow media transfer applications such as video streaming. The Bluetooth Low Energy standard was introduced for applications requiring a lower power consumption profile. Data is sent in bursts, followed by periods of idle phases.

The TWN4 Palon Compact uses the BGM11S module from Silicon Labs. The chip implements the Physical, Link and L2CAP Layers of the BLE Protocol. The API is implemented within the firmware of the main TWN4 microcontroller. The two chips interact via the COM2 port and GPIO7 (connected to Reset of BGM11S) of the TWN4 microcontroller, thereby making COM2 and GPIO7 unavailable for custom user functions.

For more information regarding the Bluetooth Low Energy Standard please see document *"Designing for Bluetooth Low Energy"* from Silicon Labs.

For the description of all the BLE-related commands available, please see the TWN4 API document.

For information about programming the BLE module see *TWN4 AppBlaster Config Cards User Guide*

8 Power states and current consumption breakdown

8.1 TWN4 Palon One

Host Connection	**USB**	**RS485**
Typical Consumption in Base System States		
Normal Idle	70	65
Sleep	28	19
Sleep LPCD Option	N/A	N/A
Stop	N/A	12
Stop LPCD Option	N/A	N/A
Maximum Consumption by Function wrt. Normal Idle System State		
SearchTag-HF	+80	
SearchTag-LF	+18	
Speaker Constant Tone	+80	
LED (2 Red)	+14	
LED (2 Green)	+7	

Table 8.1: Current Consumption Breakdown given +5V DC Supply (mA)

8.2 TWN4 Palon Compact

8.2.1 TWN4 Palon Compact

Host Connection	USB	RS485
Typical Consumption in Base System States		
Normal Idle	71	65
Sleep	25	16
Sleep LPCD Option	26	17
Stop	N/A	11
Stop LPCD Option	N/A	12
Maximum Consumption by Function wrt. Normal Idle System State		
SearchTag-HF	+86	
SearchTag-LF	+15	
BLE Active Transmission (1 dBm output power)	+11	
BLE Active Transmission (8 dBm output power)	+21	
Speaker Constant Tone	+89	
LED (5 Red)	+36	
LED (5 Green)	+25	
LED (5 Blue)	+15	

Table 8.2: Current Consumption Breakdown given +5V DC Supply (mA)

8.2.2 TWN4 Palon Compact Light

Host Connection	**USB**	**RS485**
Typical Consumption in Base System States		
Normal Idle	83	76
Sleep	38	29
Sleep LPCD Option	39	29
Stop	N/A	23
Stop LPCD Option	N/A	24
Maximum Consumption by Function wrt. Normal Idle System State		
SearchTag-HF	+80	
SearchTag-LF	+16	
BLE Active Transmission (1 dBm output power)	N/A	
BLE Active Transmission (8 dBm output power)	N/A	
Speaker Constant Tone	+89	
LED (Red)	+8	
LED (Green)	+6	
LED (Blue)	+4	

Table 8.3: Current Consumption Breakdown given +5V DC Supply (mA)

8.3 TWN4 Palon Compact LEGIC

8.3.1 TWN4 Palon Compact LEGIC

Host Connection	USB	RS485
Typical Consumption in Base System States		
Normal Idle	76	70
Sleep	33	26
Sleep LPCD Option	N/A	N/A
Stop	N/A	20
Stop LPCD Option	N/A	N/A
Maximum Consumption by Function wrt. Normal Idle System State		
SearchTag-HF	+80	
SearchTag-LF	+16	
BLE Active Transmission (1 dBm output power)	+11	
BLE Active Transmission (8 dBm output power)	+21	
Speaker Constant Tone	+89	
LED (5 Red)	+36	
LED (5 Green)	+25	
LED (5 Blue)	+15	

Table 8.4: Current Consumption Breakdown given +5V DC Supply (mA)

8.3.2 TWN4 Palon Compact LEGIC Light

Host Connection	**USB**	**RS485**
Typical Consumption in Base System States		
Normal Idle	88	81
Sleep	46	39
Sleep LPCD Option	N/A	N/A
Stop	N/A	32
Stop LPCD Option	N/A	N/A
Maximum Consumption by Function wrt. Normal Idle System State		
SearchTag-HF	+80	
SearchTag-LF	+16	
BLE Active Transmission (1 dBm output power)	N/A	
BLE Active Transmission (8 dBm output power)	N/A	
Speaker Constant Tone	+89	
LED (5 Red)	+36	
LED (5 Green)	+25	
LED (5 Blue)	+15	

Table 8.5: Current Consumption Breakdown given +5V DC Supply (mA)

8.4 TWN4 Palon Square

Host Connection	USB	RS485
Typical Consumption in Base System States		
Normal Idle	71	65
Sleep	25	16
Sleep LPCD Option	26	17
Stop	N/A	11
Stop LPCD Option	N/A	12
Maximum Consumption by Function wrt. Normal Idle System State		
SearchTag-HF	+86	
SearchTag-LF	+15	
BLE Active Transmission (1 dBm output power)	N/A	
BLE Active Transmission (8 dBm output power)	N/A	
Speaker Constant Tone	+65	
LED (5 Red)	+36	
LED (5 Green)	+25	
LED (5 Blue)	+15	

Table 8.6: Current Consumption Breakdown given +5V DC Supply (mA)

9 OSDP Test

Open Supervised Device Protocol (OSDP) is a communication standard for access control developed by the Security Industry Association (SIA). OSDP was adopted as an international standard by the International Electrotechnical Commission in May 2020 and published as IEC 60839-11-5. The standard itself and a detailed overview of the OSDP commands can be purchased from SIA (see https://www.securityindustry.org/).

Please Note:
Elatec GmbH is not allowed to pass on documents concerning the OSDP standard. They must be obtained directly from SIA.

The readers of type Palon as Elatec's answer to Physical Access applications support this free RS-485 protocol. Since most modern computers rarely have built-in serial ports, a thorough functional test of Palons with OSDP protocol requires some preparation.

1. Hardware
   - RS-485 - USB Connector (see section 9.1)
   - A shielded cable with at least 4 wires (see section 9.2)
   - A Computer with free USB-Port available
2. Software
   - An OSDP test program
     - Conformance Tester from Security Industry Association:
       https://github.com/Security-Industry-Association/libosdp-conformance
3. Correctly configured Elatec reader
   The OSDP template must be selected for the Palon via AppBlaster. For testing purposes it's best to start without OSDP encryption enabled.

9.1 Connector

In order to establish a connection with the PC, at least an RS-485 to USB converter is required. Today, newer PCs rarely have native serial interfaces. However, so-called converters can be purchased inexpensive in electronics stores. A good choice are units with the so-called CH340 chip. Devices with this module work reliably as test modules.

Please Note:
It is important to pay attention that it is a RS-485 converter and not a RS-232 converter!

9.2 Cable

For a short functional test, there are no special requirements for the cable. However, the longer the cable is selected, the better the shielding of the cores should be. The shielding only becomes relevant after quite a few meters when communicating at high speed.

However, the cable itself should have at least 2 cores.

1. RS-485 - Line A
2. RS-485 - Line B

If the reader is not supplied with power via the micro USB port, but via the terminal strip, then two more wires should be provided. In sum 4 wires:

1. GND
2. VCC
3. RS-485 - Line A
4. RS-485 - Line B

Please see the respective hardware description.

9.3 Test Program

9.3.1 Conformance Tester

A tester is also available from the Security Industry Association. You can download it from the link:https://github.com/Security-Industry-Association/libosdp-conformance Then follow the installation instructions under the folder "doc".

Please Note:
This program is only available for Linux Debian.

9.4 Connection

Connect the RS-485-USB converter to the computer running the OSDP test program. Connect two of the wires from the cable to the converter's connector for the A and B lines. Then connect the wire for line A to pin 3 on the main connector of the Palon reader. Repeat the same with wire B for line B but this time connect it to pin 4 on the main connector. Connect the Palon also via the Micro-USB Connector to the computer as power supply. Alternatively, PIN 7 (V_{cc}) and PIN 8 (GND) of the main connector can be used. The converter registers itself as a serial port on the computer. Specify this port in the test program and start the test. The test device starts polling the reader depending on the test routine. The reader acknowledges this with a signal tone. The connection was successful. You can now start sending OSDP messages via this port and thus control the reader.

Please note:
If the reader does not receive poll messages regularly, then it will go into standby mode. This happens after 8 seconds. The reader will signal this with a beep.

10 Disclaimer

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