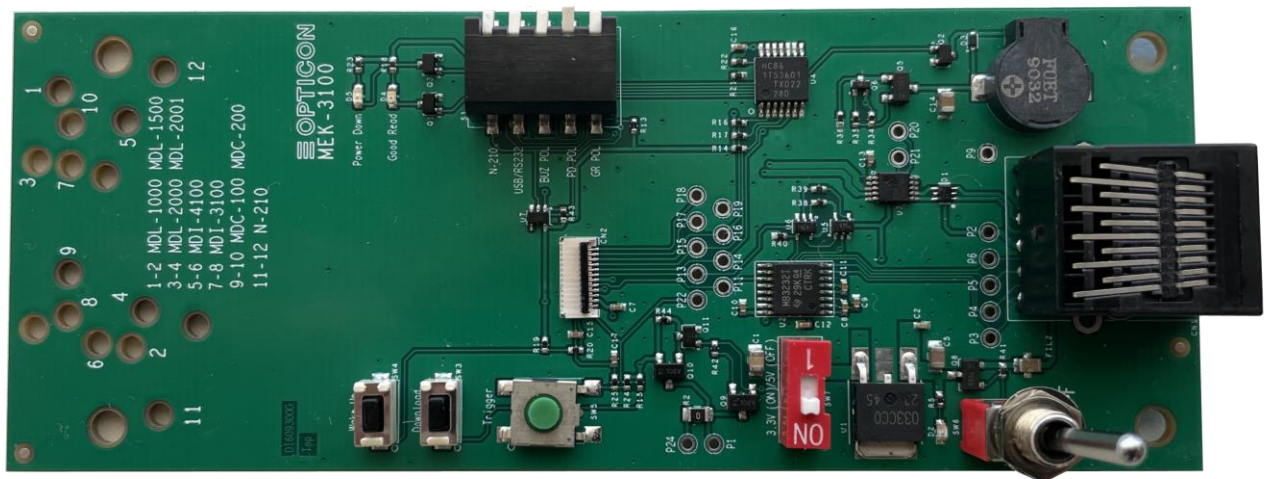


## MEK-3100

Scan Engine Development Board



The information in this document is subject to change without notice.

## Document History

Model Number:	MEK-3100	Specification Number:	P1609300
Edition:	3rd	Original Spec Number:	
Date:	7-Feb-2023		

## © 2023 Opticon Sensors Europe B.V. All rights reserved.

This manual may not, in whole or in part, be copied, photocopied, reproduced, translated or converted to any electronic or machine-readable form without prior written consent of Opticon Sensors Europe B.V.

## Limited Warranty and Disclaimers.

Opticon Sensors Europe B.V. (OSE) provides the enclosed product under the following conditions: This development board is intended for use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by OSE to be a finished end-product fit for general consumer use. Persons handling the product must have electronics training and observe good engineering practice standards. As such, the goods being provided are not intended to be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety and environmental measures typically found in end products that incorporate such semiconductor components or circuit boards. This development board does **not** fall within the scope of the European Union directives regarding electromagnetic compatibility, RoHS, WEEE, FCC or CE and therefore may not meet the technical requirements of these directives or other related directives. Should this development board not meet the specifications indicated in this user guide, this development board may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies OSE from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. **EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

OSE currently deals with a variety of customers for products and therefore our arrangement with the user is not exclusive. OSE assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. No license is granted under any patent right or other intellectual property right of OSE covering or relating to any machine, process, or combination in which such OSE products or services might be or are used.

## FCC Warning

This development board is intended for use for **ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY** and is not considered by OSE to be a finished end-product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

## Serial Number

A serial number appears on all Opticon products. This official registration number is directly related to the device purchased. Do not remove the serial number from your Opticon device. Removing the serial number voids the warranty.

## Warranty

Unless otherwise agreed in a written contract, all Opticon products are warranted against defects in materials and workmanship for two years after purchase excluding batteries. Opticon will repair or, at its option, replace products that are defective in materials or workmanship with proper use during the warranty period. Opticon is not liable for damages caused by modifications made by a customer. In such cases, standard repair charges will apply. If a product is returned under warranty and no defect is found, standard repair charges will apply. Opticon assumes no liability for any direct, indirect, consequential or incidental damages arising out of use or inability to use both the hardware and software, even if Opticon has been informed about the possibility of such damages.

## Packaging

The packing materials are recyclable. We recommend that you save all packing material to use should you need to transport your data collector or send it for service. Damage caused by improper packaging during shipment is not covered by the warranty.

## Trademarks

Trademarks used are the property of their respective owners.

Opticon Sensors Europe B.V. is a wholly owned subsidiaries of OPTOELECTRONICS Co., Ltd., 12-17, Tsukagoshi 4-chome, Warabi-shi, Saitama, Japan 335-0002. TEL +81-(0) 48-446-1183; FAX +81-(0) 48-446-1184

## SUPPORT

### USA

Phone: 800-636-0090

Email: [support@opticonusa.com](mailto:support@opticonusa.com)

Web: [www.opticonusa.com](http://www.opticonusa.com)

### Europe

Phone: +31235692728

Email: [support@opticon.com](mailto:support@opticon.com)

Web: [www.opticon.com](http://www.opticon.com)

## Revision History

Document Name: MEK-3100 User Guide

Edition	Date	Page	Section	Description of Changes
1st	30/11/2016	-	-	Initial release
2 <sup>nd</sup>	1/5/2017	2	Introduction	Added disclaimer to the legal section
3 <sup>rd</sup>	7/2/2023			Added support for the N-210

# Contents

<b>1</b>	<b>Getting Started.....</b>	<b>7</b>
1.1	What is in the box.....	7
1.2	Required accessories and software .....	7
1.3	Initial setup .....	7
<b>2</b>	<b>Board description.....</b>	<b>8</b>
<b>3</b>	<b>Setup.....</b>	<b>9</b>
3.1	Scan engine .....	9
3.1.1	The various scan engines.....	9
3.1.2	Scan engine mounting holes .....	10
3.2	FFC cable.....	10
3.2.1	FFC type .....	10
3.2.2	FFC orientation .....	11
3.3	Host interface cable.....	12
3.3.1	RS232 Interface cable .....	12
3.3.2	USB Interface cable.....	12
<b>4</b>	<b>Usage.....</b>	<b>13</b>
4.1	Operation.....	13
4.1.1	RS232.....	13
4.1.2	USB-COM.....	14
4.1.3	USB-HID .....	14
4.2	Appload .....	15
4.2.1	Local echo and Format.....	15
4.3	RS232 <-> USB switch.....	15
<b>5</b>	<b>Firmware download.....</b>	<b>16</b>
<b>6</b>	<b>Schematics.....</b>	<b>17</b>
<b>7</b>	<b>PCB Layout .....</b>	<b>18</b>

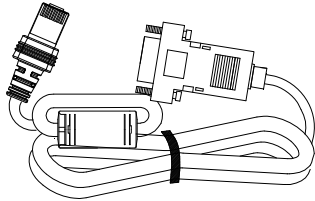
## 1 Getting Started

This is the user manual for the MEK-3100 development kit, the development tool for all Opticon scan engines and imagers. It describes how to mount the scan engine, how to connect it to the board and how to switch interfaces (USB or RS232).

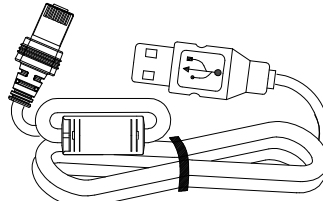
### 1.1 What is in the box

The MEK-3100 comes with the parts described below. Please check carefully if all parts are in the box and contact your Opticon dealer if parts are missing.

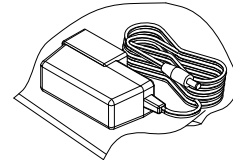
RS232 interface cable



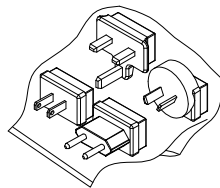
USB interface cable



Power supply

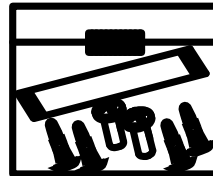


Power supply Plugs



A bag containing:

- 1 FFC cable with contacts on the same side
- 2 screws M2x5
- 4 PCB standoffs



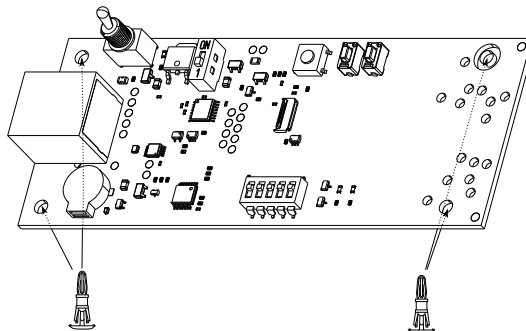
### 1.2 Required accessories and software

This development kit contains everything that is needed to connect an Opticon scan engine to a computer. Therefore, no extra accessories are needed.

The software that goes with this development board is called Appload and can be downloaded from the Internet. Appload can be used to show the data that comes from the scan engine but can also be used to update the firmware of an engine. Please go to the support section on the Opticon website to download the latest version of Appload.

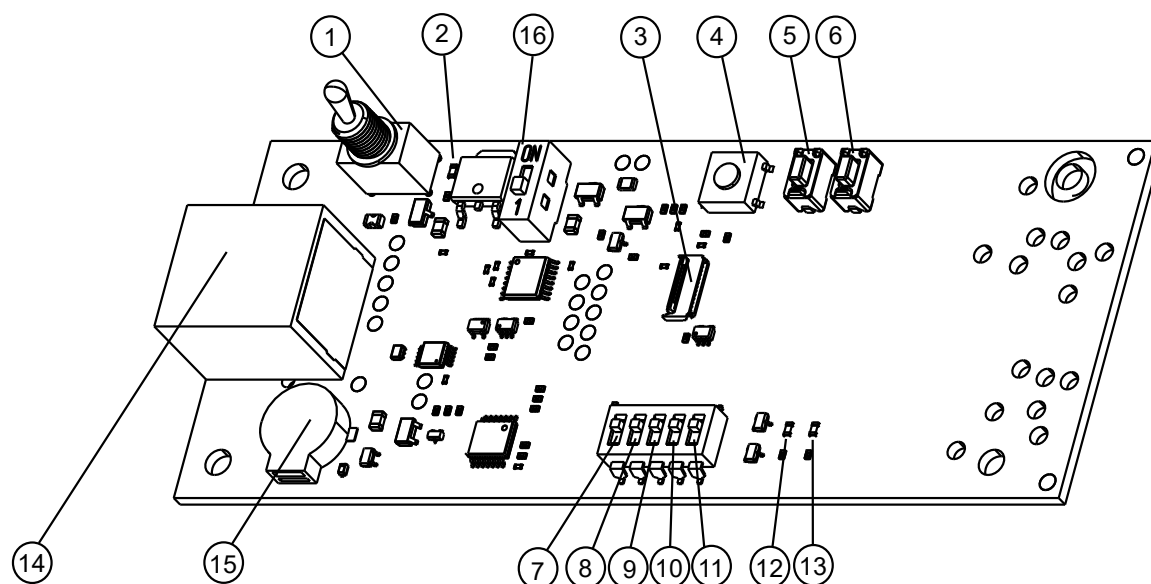
### 1.3 Initial setup

Firmly press the four standoffs into the holes in the corner of the PCB. Insert them from the bottom of the PCB so that the components face upwards.



## 2 Board description

The MEK-3100's various items are described below. Please note the ERRATA section in this manual.



Item	Item name	Description
1	Power switch	Pushbutton to toggle the power.
2	Power LED	Indicates when the board is powered.
3	Module connector	12-pin FFC connector for the connection to the scan engine.
4	Trigger switch	Press this button to trigger the scan engine.
5	Download switch	Press and hold this button while powering up forces the scan engine into firmware download mode. <sup>1</sup>
6	Aim/Wake switch	Please refer to the manual of the scan engine for details.
7	GR POL	When this switch is in the up/on position, the board assumes the good read signal that comes from the barcode module to be active low. When pressed, it assumes active high. This is used to drive the good read LED (#12)
8	PD POL	When this switch is in the up/on position, the board assumes the power down signal that comes from the barcode module to be active high. When pressed, it assumes active low. This is used to drive the power down LED (#13)
9	Buzzer POL	When this switch is in the up/on position, the board assumes the buzzer signal that comes from the barcode module to be high when idle. When pressed, it assumes low when idle. This is used to drive the buzzer (#15). <sup>2</sup>
10	Interface	This switch is used to select either USB or RS232C interface. When in the up/on position, RS232C interface is selected, USB otherwise.
11	N-210	When this switch is in the up/on position the board is configured for the N-210 scan engine. Please note that the N-210 only supports 5V
12	Good Read LED	This LED lights up after a good read.
13	Power Down LED	The LED lights up when the scan engine is in low power mode.
14	Interface Connector	Connect either a USB interface cable or an RS232C cable to this connector.
15	Buzzer	A small electromechanical buzzer.
16	Voltage Selector	When this switch is in the ON position, the voltage for the engine is set to 5V. It is 3.3V otherwise.

<sup>1</sup> With Appload it is then possible to install new firmware into a module. Usually, it is not required to use this switch as Appload sends a series of commands that sets the module in download mode.

<sup>2</sup> Note that setting this switch wrong increases the current consumption considerably because of the idle current that flows through the buzzer. The up position is usually the correct position.




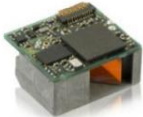






## 3 Setup

### 3.1 Scan engine

#### 3.1.1 The various scan engines

To use the MEK-3100 board, first install the scan engine. The following table describes the modules available from Opticon at this time. Each scan module has a zero-insertion force type connector (ZIF) used to house a flat flex cable (FFC) which is included with the development board.

Some modules have the capability of both serial and USB communication modes and can change their interface by scanning a special configuration barcode. Those modules are noted with a \*. The development board must be configured to match the interface with that of the module which can be done with the by flipping the interface switch. Additionally, the correct interface cable should be used between the development board and the host computer.

1 MDC-100	2 MDC-200	3 MDL-100	4 MDL-1000
			
CCD (1D)*	CCD (1D)*	Laser (1D)*	Laser (1D)***
5 MDL-1500	6 MDL-2001	7 MDL-4000	
			
Laser (1D)*	Laser (1D)***	Laser (1D) **	
8 MDI-3000	9 MDI-3100	10 MDI-3200	11 MDI-3300
			
CMOS (1D/2D)*	CMOS (1D/2D)*	CMOS (1D/2D)*	CMOS (1D/2D)*
12 MDI-4000	13 MDI-4100	14 N-210	
			
CMOS (1D/2D)*	CMOS (1D/2D)*	CMOS (1D/2D)****	

\* The interface of these scan engines can be configured as USB or as serial with some setup barcodes.

\*\* This scan engine is available in two versions. A serial version and a USB version. It cannot switch the interface.

\*\*\* This scan engine is only available with a serial interface.

\*\*\*\* This engine only runs on 5V



### 3.1.2 Scan engine mounting holes

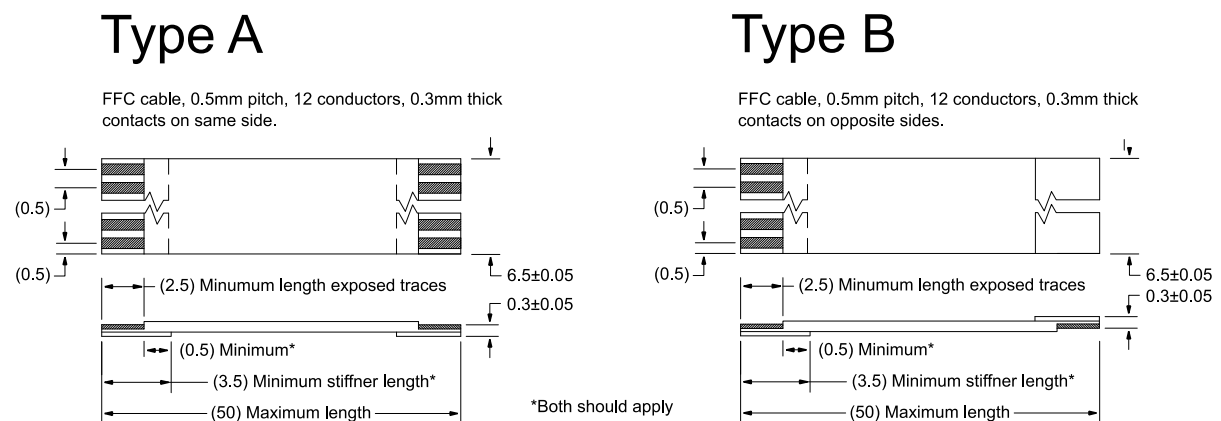
Most of these scan engines can be mounted on the development board. It therefore has a number of mounting holes located at specific positions so that the engine can be screwed to the board. The two screws included in the development kit can be used for this. The various holes are clearly numbered on the PCB and a small description is added there as well to make it clear how to mount the various engines. While most engines can be screwed to the PCB, a few cannot, but they are supported by this board. These are: MDL-4000, MDI3000, MDI-3200, MDI-4000 and MDI-5xxx series.

## 3.2 FFC cable

This section describes what flat flexible cable should be used for a particular scan engine and how it should be connected to the engine and the MEK-3100 board.

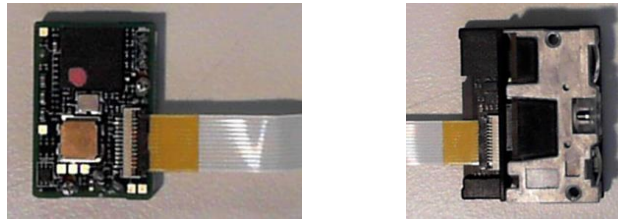
### 3.2.1 FFC type

There are two different types of FFC cable that both can be used to connect the scan module to the MEK-3100 board. Below is a description of the two cables. The main difference is that type A (included in the box) has contacts left/right on the same side where type B has them on opposite sides. It is recommended to use a cable with the below specifications in a real application.

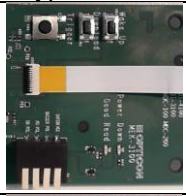
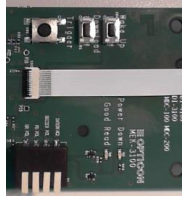


### 3.2.2 FFC orientation

Regardless of the FFC type, the contacts should always face down (relative to the connector) on the engine side, like here on an MDL-4000 engine (left) and an MDI-4100 engine (right):



On the side of the MEK-3100 board, the orientation of the FFC cable depends on both the engine and the type of FCC. The table below shows how the cable should be mounted in the MEK-3100 connector.

Engine #	Engine Name	Orientation of the FFC		Picture with type A FFC
		Type A	Type B	
3	MDL-100	Facing down	Facing up	
4	MDL-1000	Facing down	Facing up	
5	MDL-1500	Facing down	Facing up	
6	MDL-2001	Facing down	Facing up	
7	MDL-4000	Facing down	Facing up	
1	MDC-100	Facing up	Facing down	
2	MDC-200	Facing up	Facing down	
8	MDI-3000	Facing up	Facing down	
9	MDI-3100	Facing up	Facing down	
10	MDI-3200	Facing up	Facing down	
11	MDI-3000	Facing up	Facing down	
12	MDI-4000	Facing up	Facing down	
13	MDI-4100	Facing up	Facing down	
14	N-210	Facing up	Facing down	

The most common FFC connector is one with bottom contacts, so it might be best to use an FCC cable that allows for such a connector on both the engine as well as on the MEK-3100 board. In the table above the cells that are marked green are therefore the preferred engine/FFC combination. Please note that the MEK-3100 has an FFC connector that has both bottom contacts as well as top contacts.

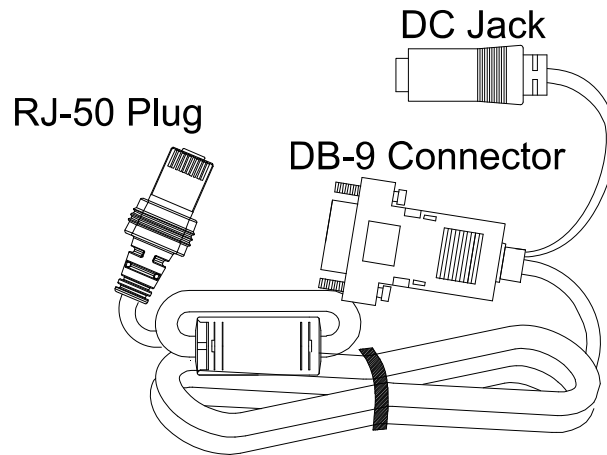
### 3.3 Host interface cable

Most engines have both a serial interface as well as a USB interface and can switch their interface by reading a configuration barcode. The interface cable to the host computer must match the (configured) interface of the scan engine. Simply plug in the interface cable in the RJ-50 connector on the MEK-3100 (item 14 in the detailed drawing)

#### 3.3.1 RS232 Interface cable

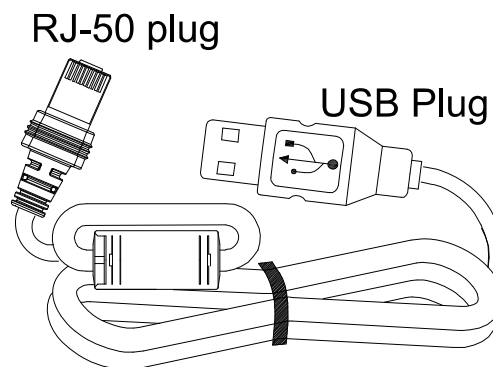
Connect the RJ-50 plug into the MEK-3100 interface connector and then connect the DC Power supply to the DC jack. Next, plug the DB-9 RS232C connector into a PC to complete the connection.

**Warning: Only use the AC adapter that is included in the box.**



#### 3.3.2 USB Interface cable

When the USB interface cable is used, the MEK-3100 board gets power from the PC, so in this case the power supply is not needed. Simply put the USB plug into a free port on the PC and then plug the RJ-50 connector in the MEK-3100 board.



## 4 Usage

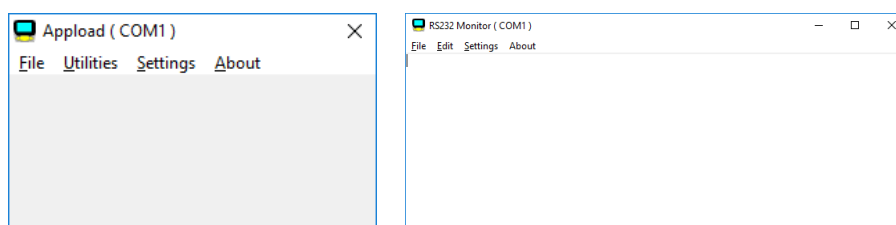
Connect the scan engine to the MEK-3100 board as described in the previous chapter and connect the desired interface cable between the board and the PC. Once everything is installed, make sure that the MEK-3100 interface switch (item #11 in the detailed drawing) is set to the correct position. When up, the RS232 interface is selected, and when down USB.

\* Note: By default, a scan engine comes with its RS232 interface enabled so most likely an RS232 interface cable is needed and the interface switch on the MEK-3100 should be left in the up position.

### 4.1 Operation

Press the power switch on the MEK-3100 board and check that the red power LED lights up. Next press the trigger button and verify that the scan engine starts to work (observe that e.g., the laser is switched on or that the aiming LED lights up).

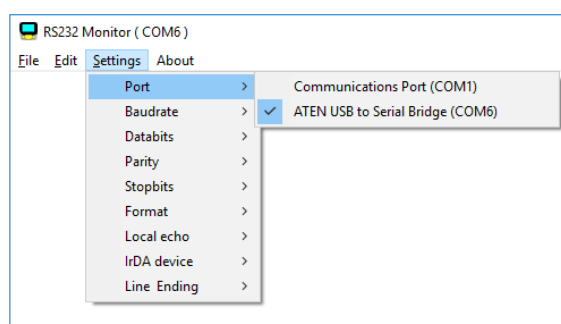
Now start Appload on the PC (or download it first from the Opticon website). Appload is a program that can be used to show data coming from the engine on the screen of the PC and it can also be used to send data to the engine. The start screen of Appload is shown below on the left.



Now select “Utilities” from the menu bar and then “Show RS232 data”. Once done, the screen looks like the picture above on the right.

#### 4.1.1 RS232

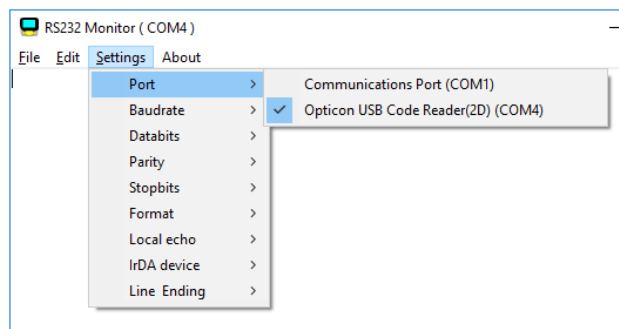
Now the communication parameters need to be configured. Those are: Port, baudrate, the number of data bits and stop bits, and the type of parity. The port parameter may be a bit tricky, especially when a USB port is used, but the program helps by showing the port names in the port menu. When the interface cable is plugged into a ‘real’ RS232 port, then the port number is usually COM1. When a USB to serial cable is used, then look for the name of the cable when the port is configured, like in the example below, where an Aten USB to serial cable was used.



### 4.1.2 USB-COM

For USB-COM, it might be necessary to install a driver. For Windows this will be done automatically and the more recent Linux kernels also have the driver readily available. In case this is not done automatically, please download the driver from the support section of the Opticon website.

Other than the driver, almost no configuration options are required in Appload. The baudrate, number of data bits, etc. are all ignored. The only important option to configure is the port number, via the settings menu. Appload helps to make the right configuration by showing the port names as well in the port menu. Below is an example with the MDI-4100.



### 4.1.3 USB-HID

For HID, no configuration is needed. The data that comes from the engine is sent to the computer as if it comes from a keyboard so when e.g. a text editor is opened, the data will appear there.

\* Note: When an engine is in HID mode, it cannot receive commands and neither can it be upgraded with new firmware. Configure the engine to USB-COM if that is required.

## 4.2 Apload

When the communication parameters and the port number is set the data that comes from the engine, like when a barcode is scanned, will be shown on the screen.

```

RS232 Monitor ( COM6 )
File Edit Settings About
5410013109679
5410013109679
5410013109679
5410013109679
BD01J02

```

```

RS232 Monitor ( COM6 )
File Edit Settings About
5410013109679
5410013109679
5410013109679
5410013109679
Z1
BD01J02

```

```

RS232 Monitor ( COM6 )
File Edit Settings About
5410013109679<CR>
5410013109679<CR>
5410013109679<CR>
5410013109679<CR>
<ESC>Z1<CR>
BD01J02<CR>

```

### 4.2.1 Local echo and Format

Any data that is typed on the keyboard is sent to the scan engine. To also show that data on the screen, go to 'Settings' and then set 'Local Echo' to 'on'. The keyboard data is then shown in red, like on the picture in the middle.

Special characters like carriage return or escape are normally not shown. To show those, go to 'Settings' and then set 'Format' to 'ASCII'. The screen then looks like the picture on the right. It is also possible to show all characters as hexadecimal values by setting the 'Format' value to 'HEX'

## 4.3 RS232 <-> USB switch

Most engines have both a serial and a USB interface and so it is possible to configure the required interface. The easiest way to do that is by reading a 2D configuration barcode. Of course, 1D laser and CCD engines cannot read those labels, so for those a few 1D barcodes need to be scanned.

Interface configuration labels 2D.



Change interface to RS232

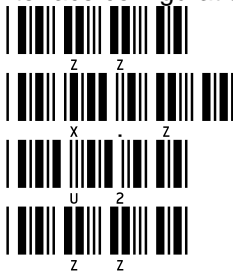


Change interface to USB-COM

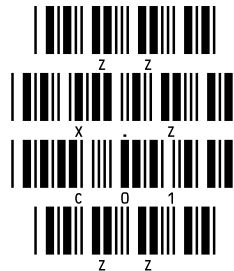


Change interface to USB-HID

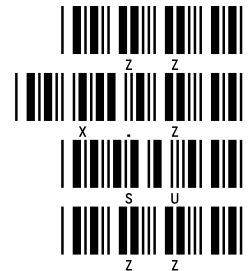
Interface configuration labels 1D.



Change interface to RS232



Change interface to USB-COM



Change interface to USB-HID

\* Note: In case USB is required, make sure that the scan engine physically has this interface. All 2D engines as well as the MDC-x00 and MDL-1500 have both USB and serial interfaces. For other engines please check the documentation to see if they support USB.

\* Note: It is advised to configure the interface of the scan engine via the above config barcodes before changing the interface cable and flipping the interface switch. Some engines may not properly start up when they have the USB interface configured but when the MEK-3100 has the RS232 interface selected. When a scan engine doesn't respond because of this, it may also be possible to power up the board with the trigger switch pressed and then keeping it pressed for at least 10 seconds.

## 5 Firmware download

Opticon constantly tries to improve the reading performance of its engines and new options are added to the firmware all the time. Therefore, new firmware versions are released regularly. Please check the Opticon website to see if a new version is available.

To upgrade a module, please follow the steps below:

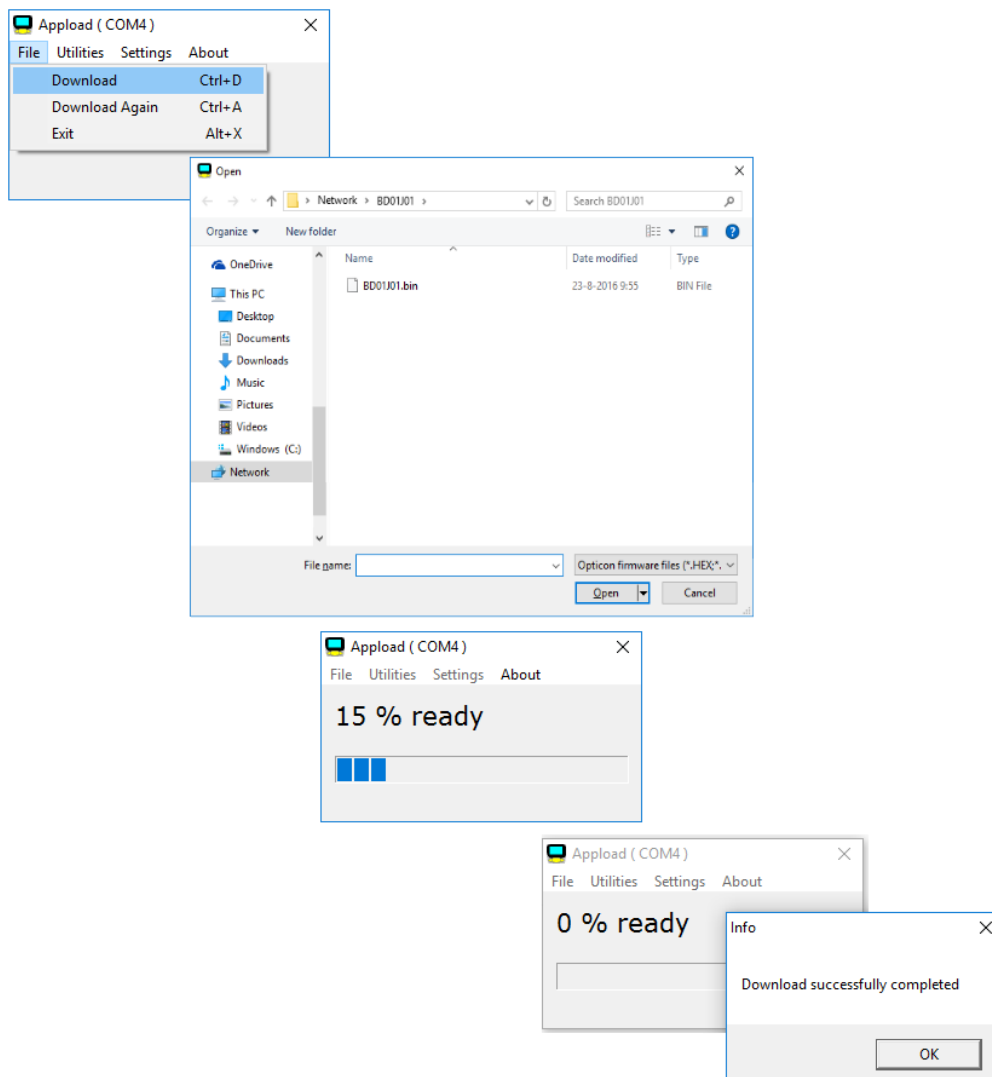
Connect the scan engine to the MEK-3100 board and use a USB or serial cable as described in chapter 3 (page 9). Then power the board and start Appload. Next, set the communication parameters and configure the port as described in chapter 4 (page 13)

\*Note: In case the engine is configured to USB-HID then please switch to USB-COM as described on page 15.

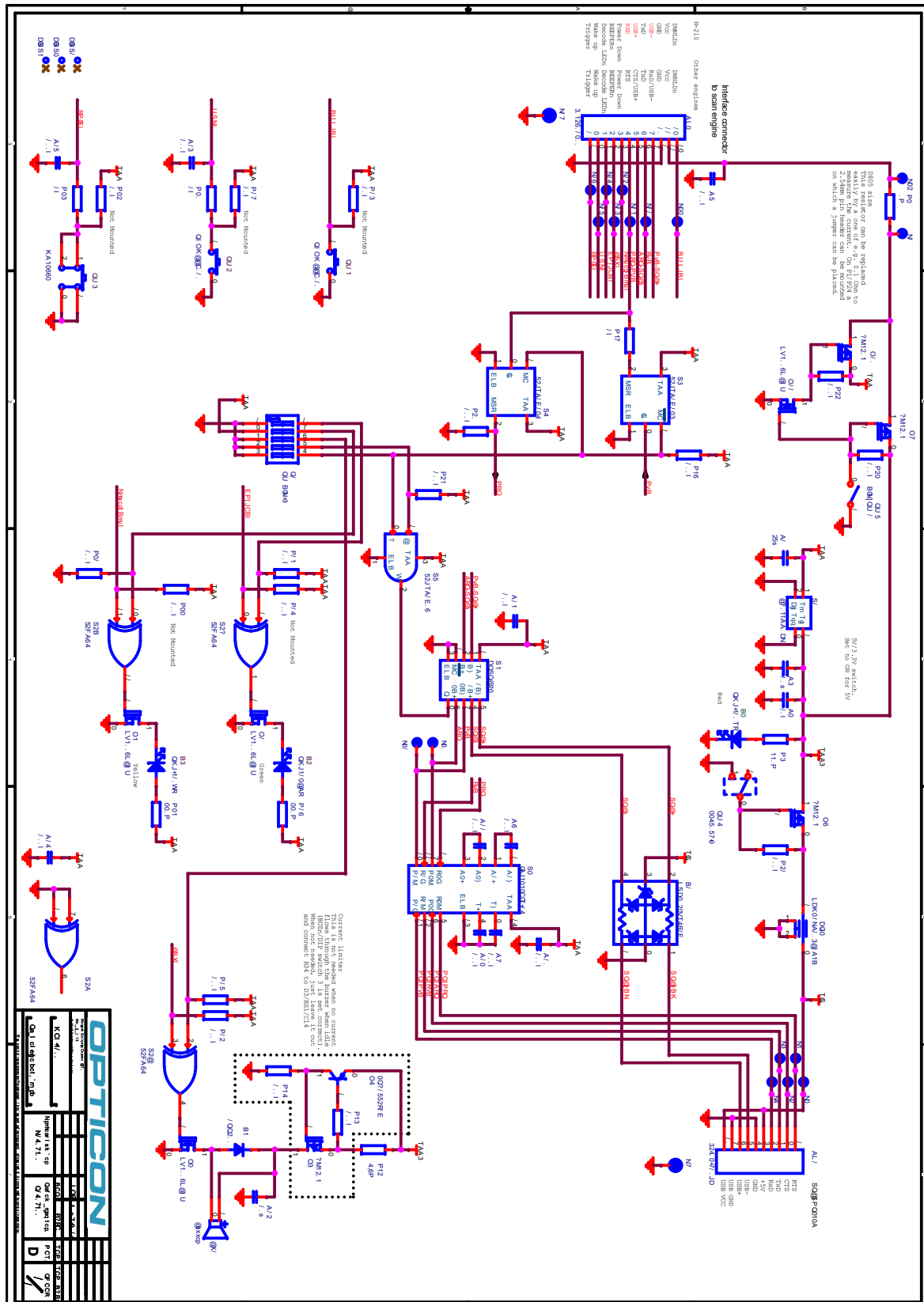
When the engine is connected and Appload is configured properly, then the new firmware can be installed. To do that, select File > Download and then select the firmware file in the file dialog that opens. Appload will then start loading the firmware into the scan engine and show a progress bar. When the update is completed at 100% a pop up message indicate that the update was successful.

\*Note: If the scanner was using the USB-HID interface, you can switch it back to USB-HID as described on page 15.

\*Note: Usually Appload can install a new firmware automatically and no actions are needed on the MEK-3100 board. However, in some rare cases it might be necessary to press the download button on the MEK-3100 while powering the board. The scan engine is then forced into download mode with a default set of configuration parameters.



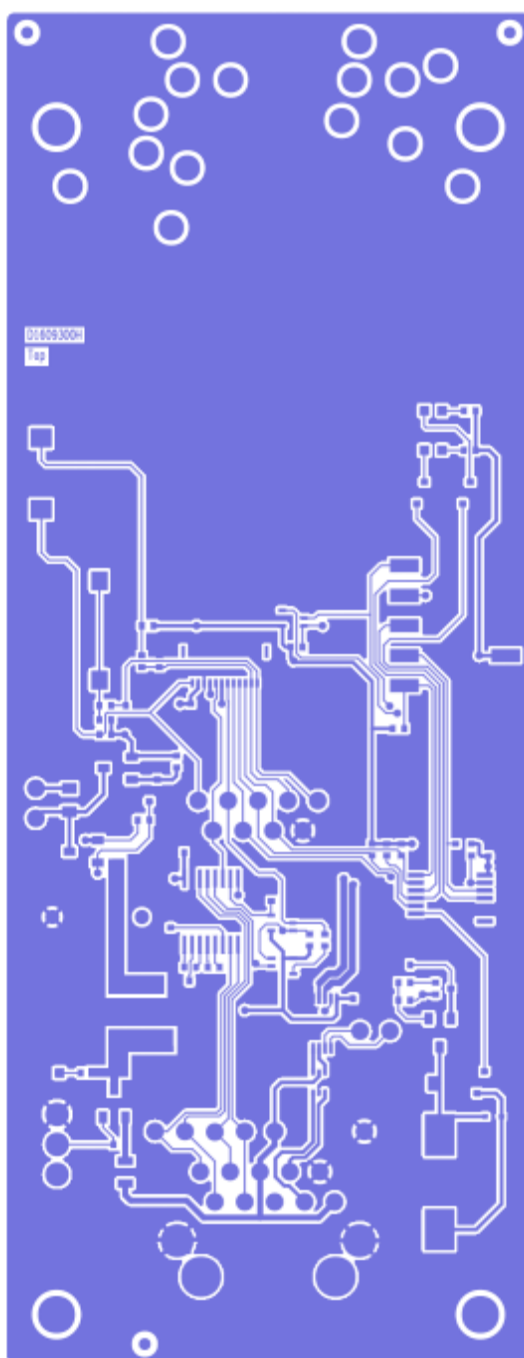
## 6 Schematics



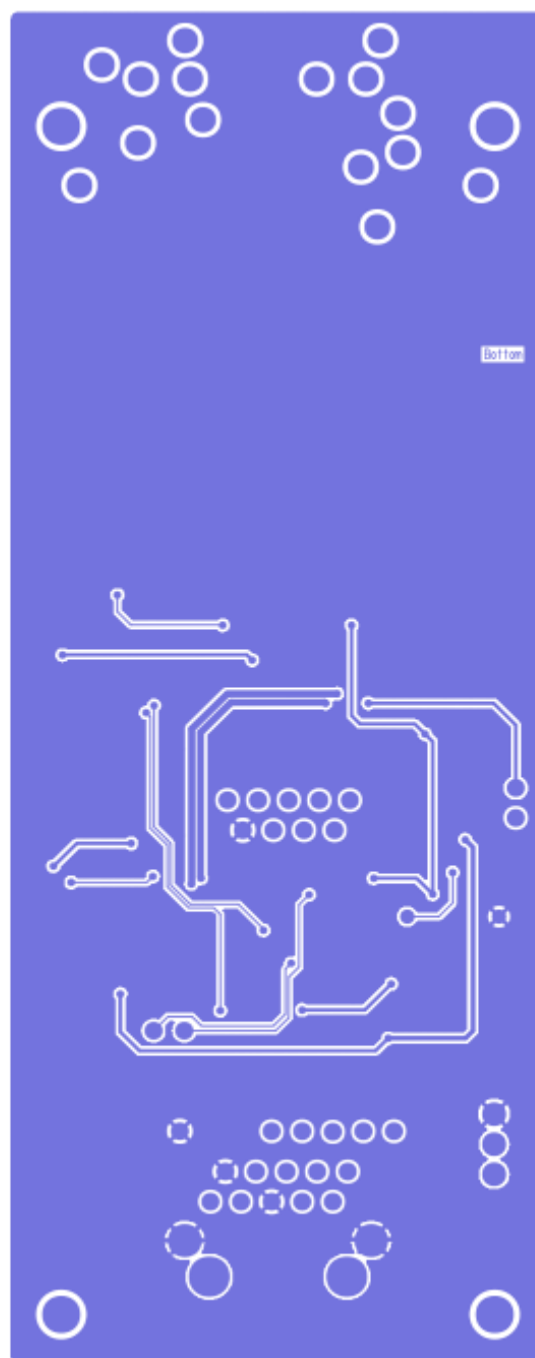


## 7 PCB Layout

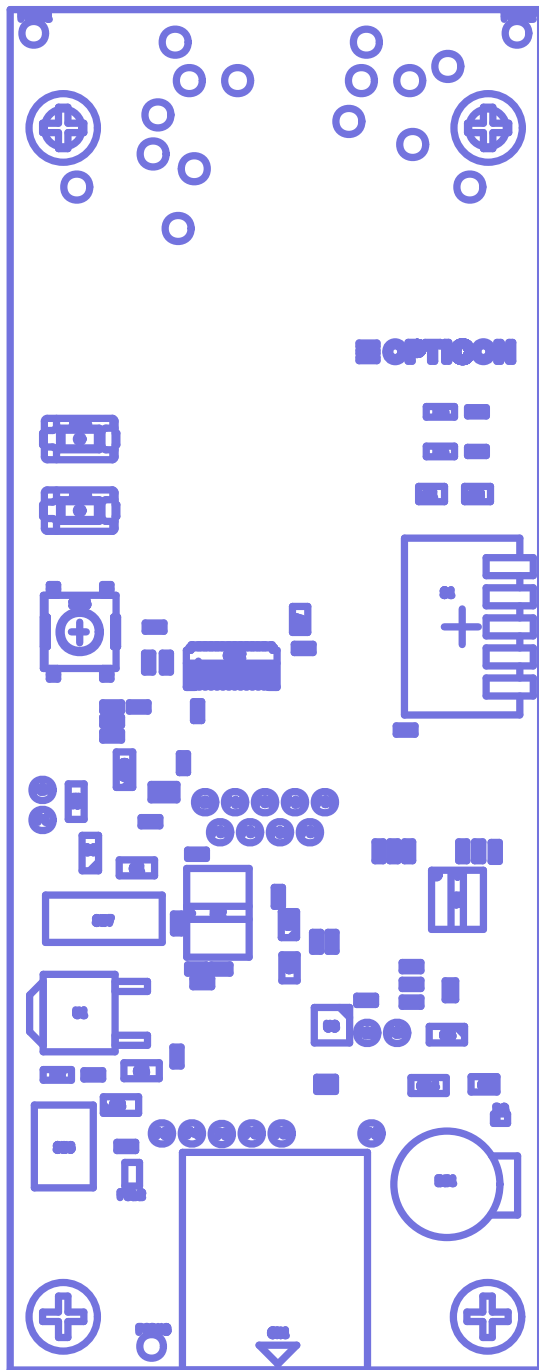
Top copper



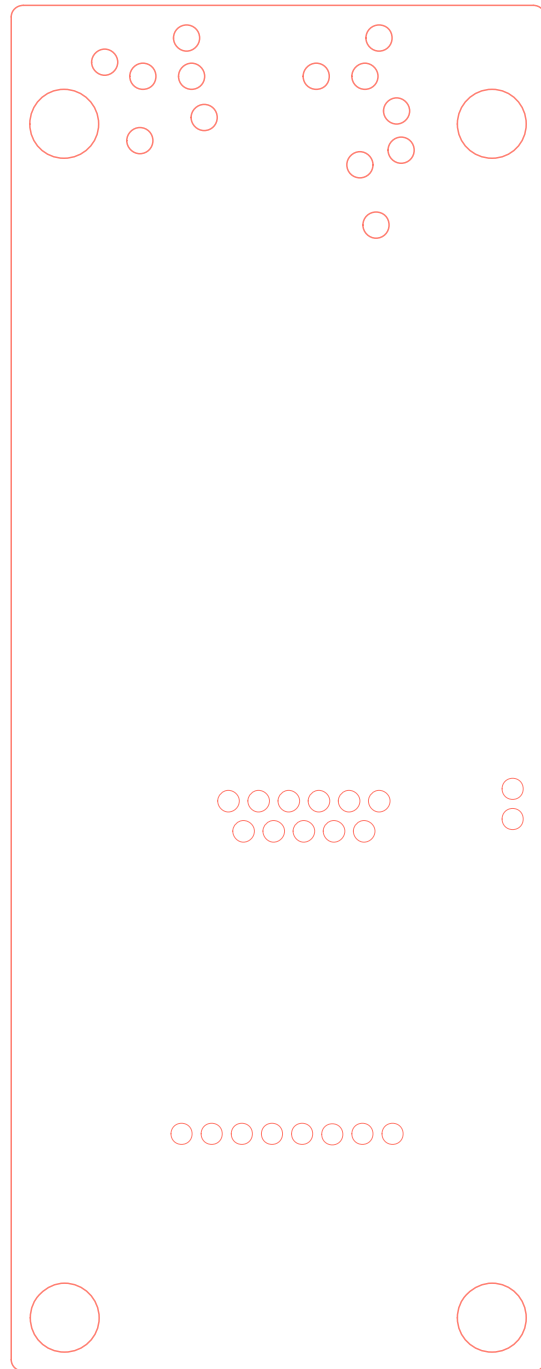
Bottom copper



Top



Bottom



## 8 Errata

PCB Version D1609300G has the following issues:

- The switches for GR\_POL and Interface are swapped.
- The text next to the “Voltage Selector” switch is wrong. It should be “3.3V (OFF)/5V (ON)”

For the user manual, schematics and other design materials,  
please visit:

<ftp://ftp.opticon.com/pub/MEK-3100>



For the user manual, schematics and other design materials,  
please visit:

<ftp://ftp.opticon.com/pub/MEK-3100>

...

