OPTICON

MEK-3100

Scan Engine Development Board

User Guide

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Document History

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SUPPORT

USA

Phone: 800-636-0090
Email: support@opticonusa.com
Web: www.opticonusa.com

Europe

Phone: +31235692728
Email: support@opticon.com
Web: www.opticon.com

Revision History

Document Name: MEK-3100 User Guide

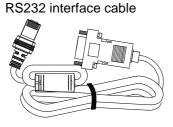| Edition	Date	Page	Section	Description of Changes
1st	30/11/2016	-	-	Initial release
2nd	1/5/2017	2	Introduction	Added disclaimer to the legal section

Contents

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).
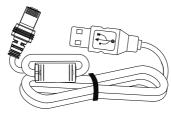
1.1   What is in the box

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.
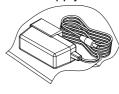
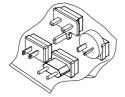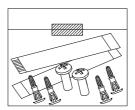RS232 interface cable   USB interface cable   Power supply

Power supply Plugs

A bag containing:
>   1 FFC cable with contacts on opposite sides
>   1 FFC cable with contacts on the same side
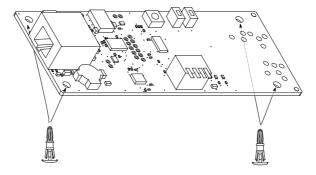>   2 screws M2x5
>   4 PCB standoffs

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.
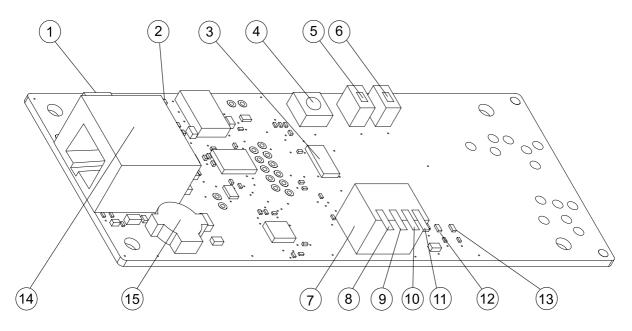
1.3   Initial setup

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.

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.[1]
6	Aim/Wake switch	Please refer to the manual of the scan engine for details.
7	Config switch	With this switch the board can be configured. See items 8~11 below
8	GR POL	When this switch is in the up 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)
9	PD POL	When this switch is in the up 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)
10	Buzzer POL	When this switch is in the up 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). [2]
11	Interface	This switch is used to select either USB or RS232C interface. When in the up position, RS232C interface is selected, USB otherwise.
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.

[1] 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.

[2] 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		
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.

3.1.2 Scan engine mounting holes

Most of these scan engines can be mounted on the development board. It therefore has 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 table below describes which mounting holes should be used.
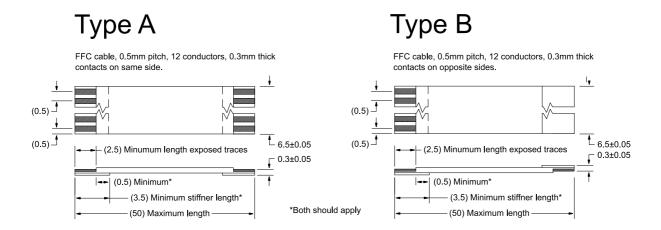
Engine #	Engine name	Mounting holes
1	MDC-100	9 & 10
2	MDC-200	9 & 10
3	MDL-100	1 & 2
4	MDL-1000	1 & 2
5	MDL-1500	1 & 2
6	MDL-2001	3 & 4
7	MDL-4000	Cannot be mounted.
8	MDI-3000	Cannot be mounted.
9	MDI-3100	7 & 8
10	MDI-3200	Cannot be mounted.
11	MDI-3300	7 & 8
12	MDI-4000	Cannot be mounted.
13	MDI-4100	5 & 6

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.
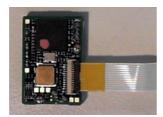
3.2.1 FFC type

Included in the development kit, there are two FFC cables 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 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 also in a real application.

Type A

FFC cable, 0.5mm pitch, 12 conductors, 0.3mm thick contacts on same side.

(0.5)
(0.5)
(2.5) Minumum length exposed traces
6.5±0.05
0.3±0.05
(0.5) Minimum*
(3.5) Minimum stiffner length*
(50) Maximum length
*Both should apply

Type B

FFC cable, 0.5mm pitch, 12 conductors, 0.3mm thick contacts on opposite sides.

(0.5)
(0.5)
(2.5) Minumum length exposed traces
6.5±0.05
0.3±0.05
(0.5) Minimum*
(3.5) Minimum stiffner length*
(50) Maximum length

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.

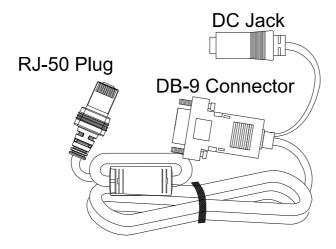| Engine #	Engine Name	Orientation of the FFC		Picture with type A FFC
		Type A	Type B	
3	MDL-100	Facing down	Facing up	
4	MDL-1000	Facing down	Facing up	
5	MDL-1500	Facing down	Facing up	
6	MDL-2001	Facing down	Facing up	
7	MDL-4000	Facing down	Facing up	
1	MDC-100	Facing up	Facing down	
2	MDC-200	Facing 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	

The most common FFC connector is one with bottom contacts, so it might be best to use a 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 is therefore the preferred engine/FFC combination. Please note that the MEK-3100 has a 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)
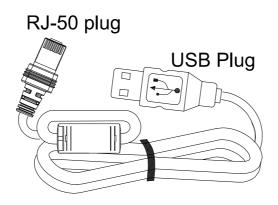
3.3.1   RS232 Interface cable

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. **Waning: 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.
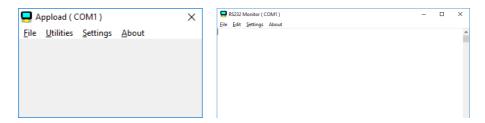
4 Usage

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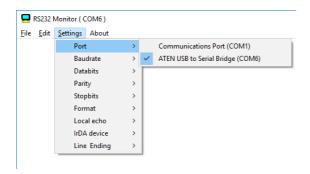
Now start Appload on the PC (or download it first from the Opticon website). Appload is a program that can be used to show data coming from the engine on the screen of the PC and it can also be used to send data to the engine. The start screen of Appload is shown below on the left.

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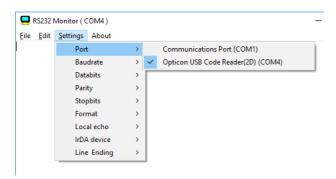
4.1.1 RS232

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 send 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.

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4.2 **Appload**

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)	RS232 Monitor (COM6)	RS232 Monitor (COM6)
File Edit Settings About	File Edit Settings About	File Edit Settings About
5410013109679	5410013109679	5410013109679<CR>
5410013109679	5410013109679	5410013109679<CR>
5410013109679	5410013109679	5410013109679<CR>
5410013109679	5410013109679	5410013109679<CR>
BD01J02	Z1	<ESC>Z1<CR>
	BD01J02	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.
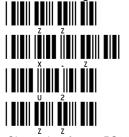
Interface configuration labels 2D.

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.

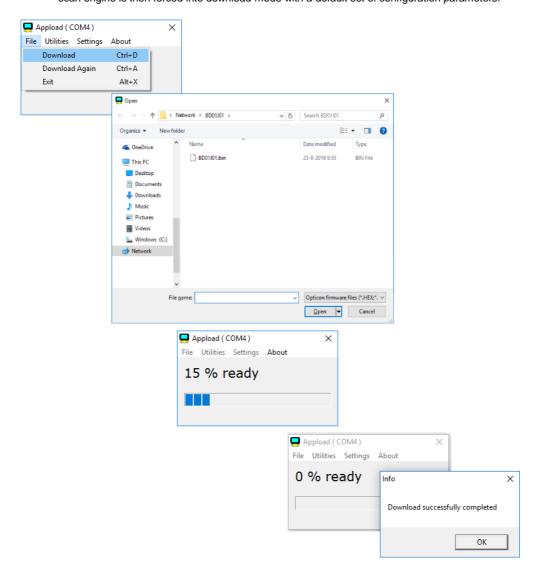To upgrade a module, please follow the steps below:

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.
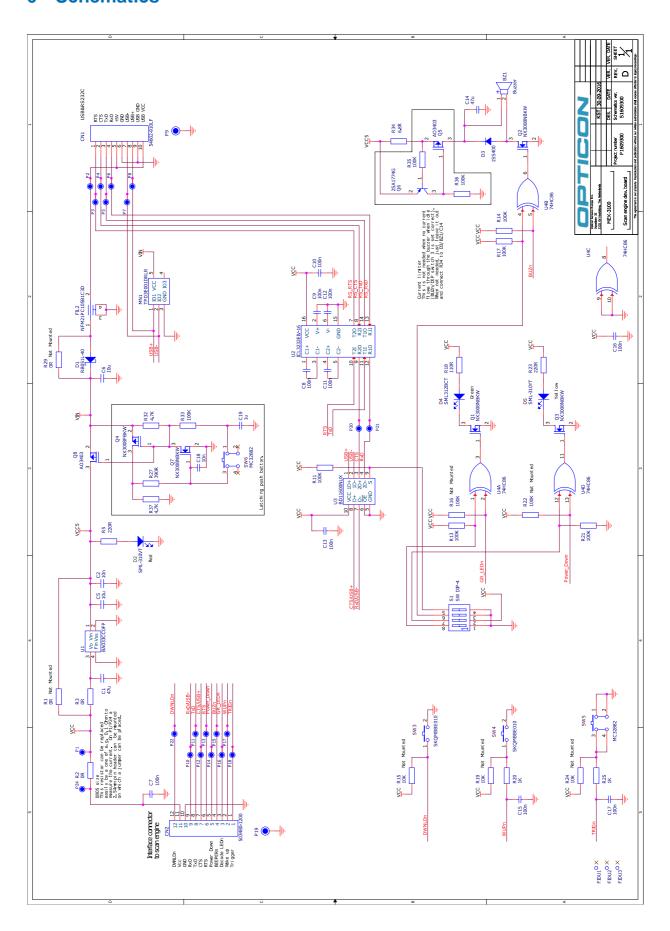
When the engine is connected and Appload is configured properly, then the new firmware can be installed. To do that, select File > Download and then select the firmware file in the file dialog that opens. Appload will then start loading the firmware into the scan engine and show a progress bar. When 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.
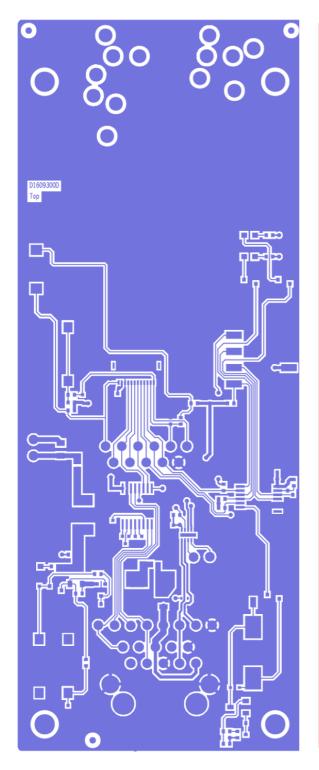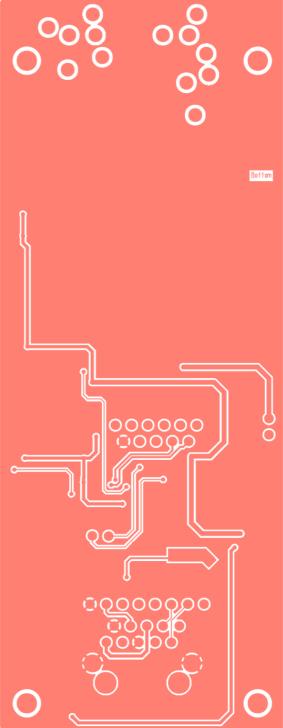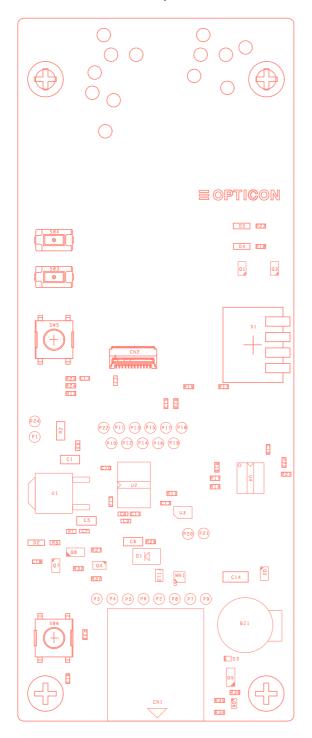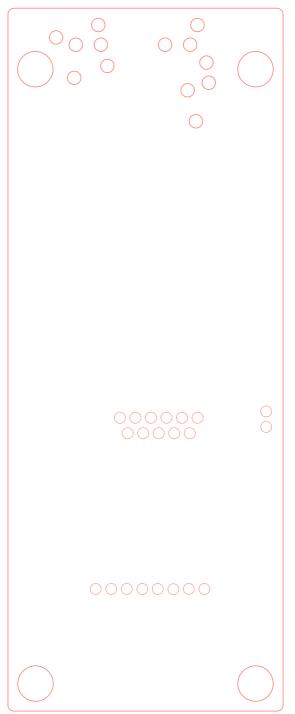
6 Schematics

7 PCB Layout

Top copper   Bottom copper

Top

Bottom

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

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