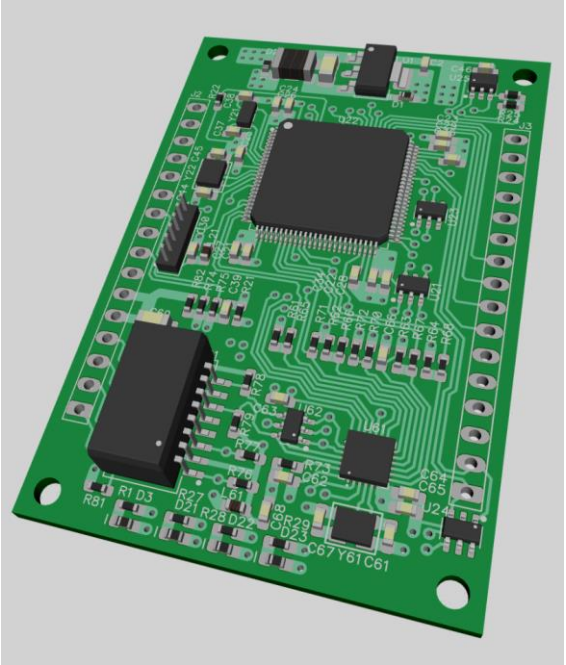
ProfiStack V1

Torocsik Technology

PROFINET – SPI gateway

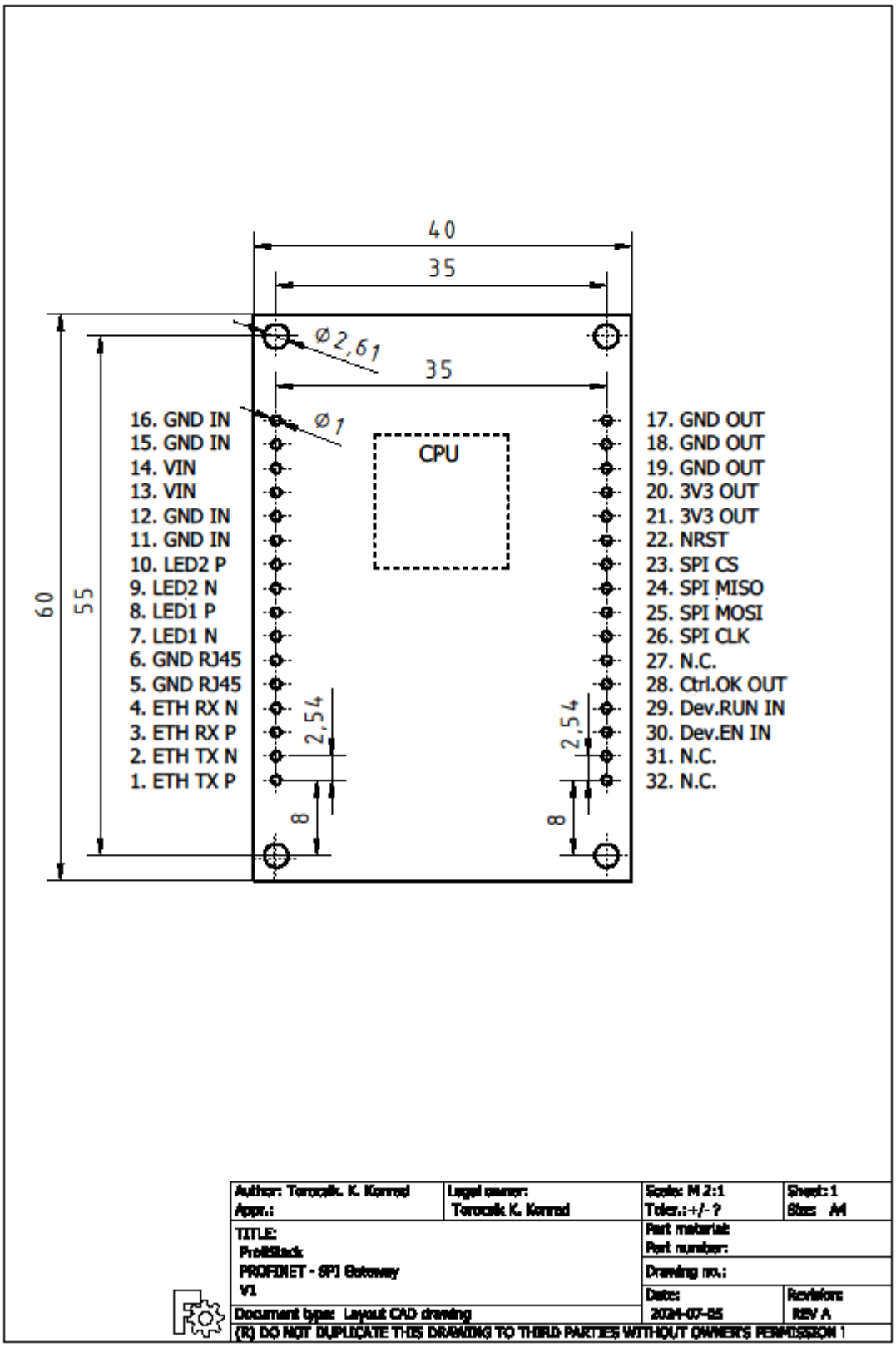
Features:

- With the ProfiStackV1 module, you can add to your product the functionality of a cutting-edge industrial communication protocol.
- With the ProfiStackV1 module, your electronic product can be integrated with Siemens PLC systems.
- Fully embeddable: it is only a PCB.
- Easy-to-use SPI slave interface: all you need is an SPI master microcontroller, and you can communicate with a high-tech protocol.
- 100 MB/s Ethernet output pre-programmed for PROFINET. Only the RJ45 connector needs to be placed externally.
- Built-in 3V3 LDO and EMI filtered GND as an output: you can supply your microcontroller from the board.
- Evaluation board is available.
- Developed and made in EU.



Contents:

1. Mechanical drawing:



2. Pinout

1.	ETH TX P	Ethernet TX+ pin Used for PROFINET communication
2.	ETH TX N	Ethernet TX- pin Used for PROFINET communication
3.	ETH RX P	Ethernet RX+ pin Used for PROFINET communication
4.	ETH RX N	Ethernet RX- pin Used for PROFINET communication
5.	GND RJ45	Ethernet connection GND Separated from other GND-s.
6.		
7.	LED1 N	Ethernet LED1 cathode No external resistor required.
8.	LED1 P	Ethernet LED1 anode No external resistor required.
9.	LED2 N	Ethernet LED2 cathode No external resistor required.
10.	LED2 P	Ethernet LED2 anode No external resistor required.
11.	GND IN	Input GND pin Separated from GND OUT with an EMI filter.
12.		
13.	VIN	Input voltage pin Recommended: 5V DC Minimum: 4,5V DC Maximum: 7V DC
14.		
15.	GND IN	Input GND pin Separated from GND OUT with an EMI filter.
16.		
17.	GND OUT	Output GND pin Separated from GND IN with an EMI filter
18.		
19.		
20.	3V3 OUT	3.3V Output Output of the built-in LDO
21.		
22.	NRST	Reset pin Set to GND to reset the board. There is an internal pull-up Res.

23.	SPI CS	SPI chip select pin. Input of the ProfiStack board.
24.	SPI MISO	SPI master-in slave-out pin Output of the ProfiStack board.
25.	SPI MOSI	SPI slave-in master-out pin Input of the Profistack board.
26.	SPI CLK	SPI clock pin Input of the ProfiStack board.
27.	N.C.	Do not connect. Reserved for future development.
28.	Ctrl.OK OUT	PROFINET Controller is connected.
29.	Dev.RUN IN	Set to 3V3 if the board got the right data from SPI, so it can be transferred to the PROFINET Controller.
30.	Dev.EN IN	Set to 3V3 if the board can be connected to the PROFINET Controller.
31.	N.C.	Do not connect. Reserved for future development.
32.	N.C.	Do not connect. Reserved for future development.

3. LED indicators

- ProfiStack has four LEDs for indicate the status of the board and the controller.
- White: Power supply is ON (not necessarily with the proper values).
- After start-up, all the LEDs are flashing once.
- When there is an internal error, Red LED is on.
- In the other cases:

Dev.EN	Dev.RUN	Ctrl.OK	Green LED	Yellow LED	Red LED
0	X	X	0	0	1
1	0	X	0	1	0
1	1	0	0	0	1
1	1	1	1	0	0

4. SPI communication:

- ProfiStack is an SPI slave module.
- Voltage level is 3V3.
- You can write 8 bytes input data to the PROFINET Controller (%Ix.x).
- You can read 8 bytes output data from the PROFINET Controller (%Ox.x).
- You can read back the input data, which is sent to the PROFINET Controller (%Ix.x).

1. byte					2. byte
Write data – PLC input					
1	0	1	0	Address (0-7)	Data (0-255)
Read data – PLC output					
0	1	0	1	Address (0-7)	Data (0-255)
Read data – PLC input					
0	1	1	0	Address (0-7)	Data (0-255)

5. PROFINET communication (with Siemens PLC and TIA Portal):

- ProfiStack is a PROFINET Device. You can handle it as any other PROFINET device.
- Every hardware component is placed on the board except for the RJ45 connector.
- GSDML file is available in the official website and at the end of the documentation.
- Step-by-step guide:
  1. Install the GSDML file in TIA portal
     - Options -> Manage general station description files
  2. Add your PLC to the project and configure it.
  3. Add the ProfiStack module to the project:
     - Device configuration -> Network view -> Hardware catalog -> Other field devices -> PROINET IO -> Gateway -> TOROCSIKTECH -> Torocsik ProfiStack -> Torocsik ProfiStack
  4. Set the IO addresses and IO update time (or you can leave the default values).
  5. Set the PROFINET address and IP address of the ProfiStack:
     - Online access -> (Ethernet connection name of your PC) -> Update accessible devices -> (your ProfiStack device will appear) -> Online and diagnostic -> Functions -> Assign IP address / Assign PROFINET device name
  6. Alternatively, you can set the IP address of the ProfiStack from the PLC Device configuration. Sometimes the IP address changing fails at the first time due to TIA Portal bug.

6. GSDML file:

- Everything is pre-programmed with unique MAC address, serial number, revision number and the data of the Vendor. You cannot change these data.
- Filename: gsdml-v2.1-torocsiktech-20240227.xml

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<!-- edited by Torocsik K. Konrad - ELI-HU Nonprofit Kft -->
<ISO15745Profile xsi:schemaLocation="http://www.profibus.com/GSDML/2003/11/DeviceProfile
..\XSD\GSDML-DeviceProfile-v2.1.xsd"
            xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xmlns="http://www.profibus.com/GSDML/2003/11/DeviceProfile">
  <ProfileHeader>
    <ProfileIdentification>PROFINET Device Profile</ProfileIdentification>
    <ProfileRevision>1.00</ProfileRevision>
    <ProfileName>Device Profile for PROFINET Devices</ProfileName>
    <ProfileSource>PROFIBUS Nutzerorganisation e.V. (PNO)</ProfileSource>
    <ProfileClassID>Device</ProfileClassID>
    <ISO15745Reference>
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      <ISO15745Edition>1</ISO15745Edition>
      <ProfileTechnology>GSDML</ProfileTechnology>
    </ISO15745Reference>
  </ProfileHeader>
  <ProfileBody>
    <DeviceIdentity DeviceID="0x0001" VendorID="0x000">
      <InfoText TextId="DevDescription"/>
      <VendorName Value="TOROCSIKTECH"/>
    </DeviceIdentity>
    <DeviceFunction>
      <Family ProductFamily="Torocsik ProfiStack" MainFamily="Gateway"/>
    </DeviceFunction>
    <ApplicationProcess>
      <DeviceAccessPointList>
        <DeviceAccessPointItem AddressAssignment="DCP" ObjectUUID_LocalIndex="1"
                    FixedInSlots="0" DNS_CompatibleName="torocsik-pn"
                    PhysicalSlots="0..1" ID="DAP" MinDeviceInterval="32"
                    ModuleIdentNumber="0xA0000000">
          <ModuleInfo>
            <Name TextId="Torocsik-ProfiStack"/>
            <InfoText TextId="DevDescription"/>
            <VendorName Value="TOROCSIKTECH"/>
          </ModuleInfo>
          <IOConfigData MaxOutputLength="1024" MaxInputLength="1024"/>
          <UseableModules>
            <!-- References to the ModuleList-->
            <ModuleItemRef AllowedInSlots="1..1" ModuleItemTarget="M8IO" FixedInSlots="1"/>
          </UseableModules>
          <VirtualSubmoduleList>
            <VirtualSubmoduleItem ID="UG" SubmoduleIdentNumber="0x00000001">
              <IOData IOCS_Length="1" IOPS_Length="1"></IOData>
            </VirtualSubmoduleItem>
          </VirtualSubmoduleList>
```

```
      </DeviceAccessPointItem>
    </DeviceAccessPointList>
    <ModuleList>
      <ModuleItem ModuleIdentNumber="0x00080008" ID="M8IO"> <!-- 32 bytes I/O: 0x00200020 -->
        <ModuleInfo CategoryRef="BIDIR Module">
          <Name TextId="M8IO01" />
          <InfoText TextId="M8IO01" />
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              <Output Consistency="All items consistency">
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              </Output>
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        </VirtualSubmoduleList>
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    </GraphicsList>
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    </CategoryList>
    <ExternalTextList>
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        <Text TextId="DevDescription" Value="Profinet Gateway for custom product developement by
Torocsik"/>
        <Text TextId="Torocsik-ProfiStack" Value="Torocsik-ProfiStack"/>
        <Text TextId="BIDIR Module" Value="Bidirectional Modules" />
        <Text TextId="INPUT" Value="INPUT"/>
        <Text TextId="OUTPUT" Value="OUTPUT"/>
        <Text TextId="M8IO01" Value="M8IO01 : 8 bytes"/>
      </PrimaryLanguage>
    </ExternalTextList>
  </ApplicationProcess>
 </ProfileBody>
</ISO15745Profile>
```

7. Revision

- Supervisor: Törőcsik K. Konrád
- Place and date: Szeged, 2024.07.08.
- Webpage: https://torocsiktech.hu
- E-mail: info@torocsiktech.hu