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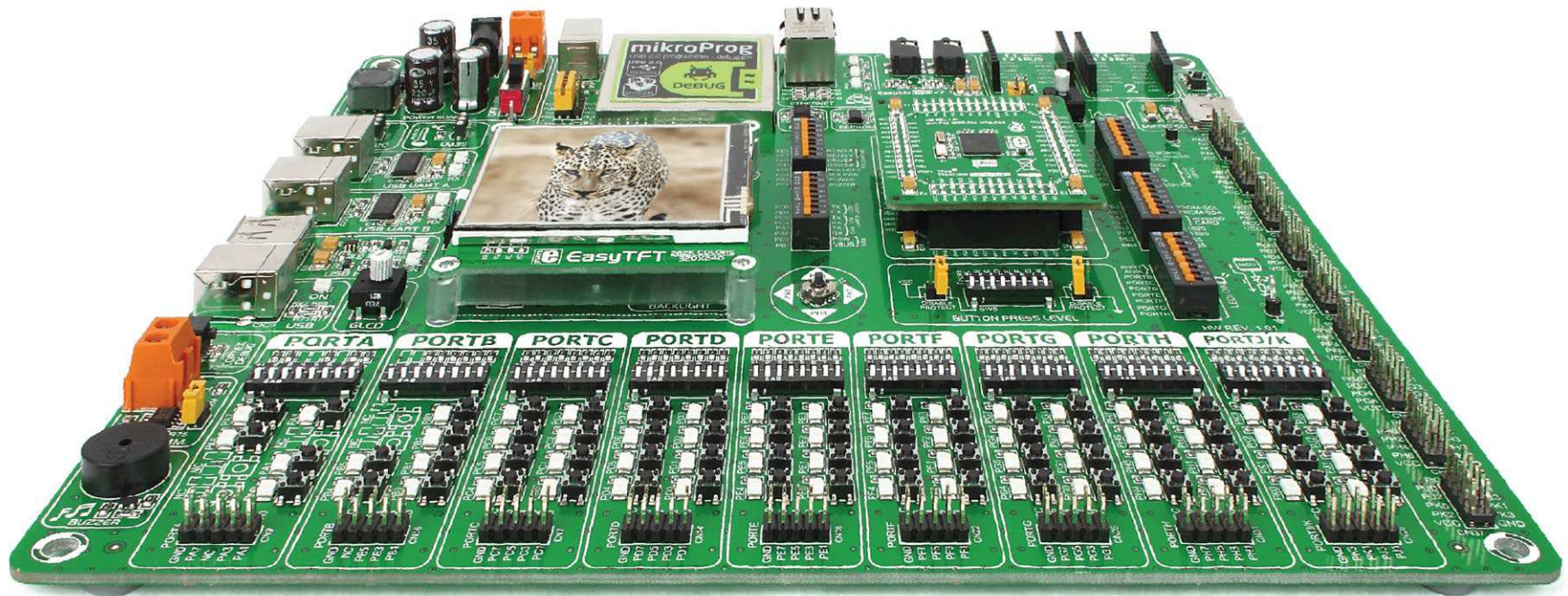
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EasyMx PRO™ v7

for Tiva™ C Series



55

microcontrollers supported
The ultimate Tiva™ board



Many on-board modules
Multimedia peripherals



Easy-add extra boards
mikroBUS™ sockets

connectivity



Two connectors for each port
Amazing Connectivity



Fast USB 2.0 programmer and
In-Circuit Debugger

To our valued customers

From day one, we in MikroElektronika set ourselves the highest possible goals in pursuit of excellence. That same day, the idea for Easy development boards was born. In its each and tiniest piece we had put all our energy, creativity, and sense of what's best for an engineer.

We present you with the 7th generation of our boards, which bring us some exciting new features. We hope that you like it as much as we do.

Use it wisely and have fun.



Nebojsa Matic,
Owner and General Manager
of MikroElektronika

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Communication

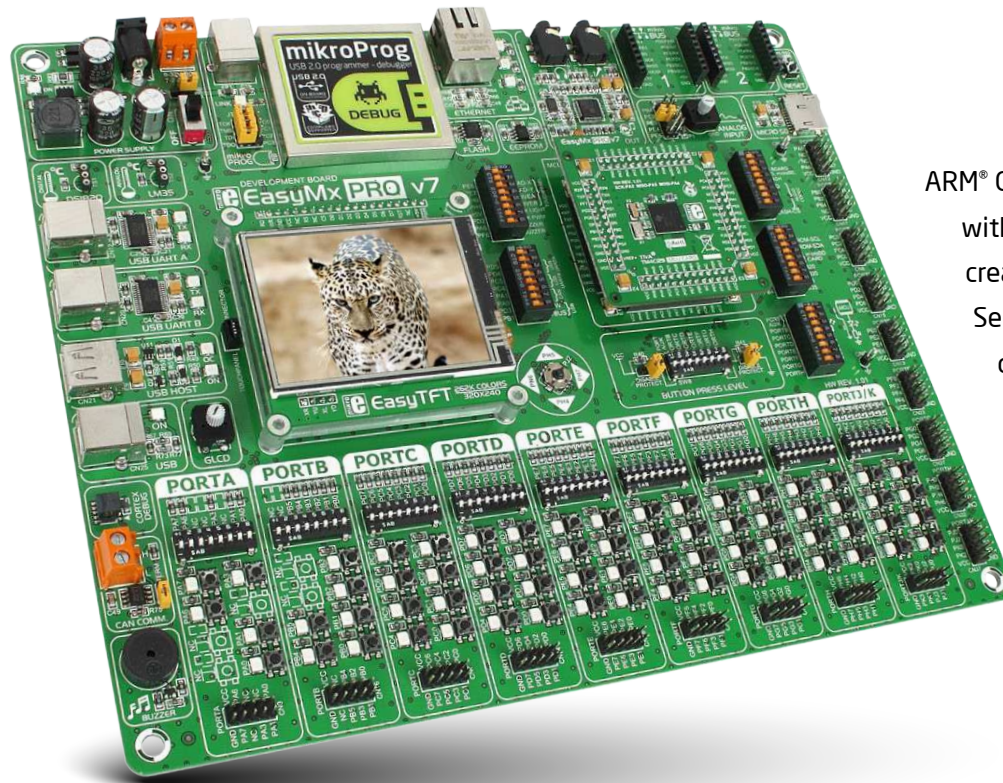
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Introduction

ARM® Cortex™-M4 are increasingly popular microcontrollers. They are rich with modules, with high performance and low power consumption, so creating a development board the size of EasyMx PRO™ v7 for Tiva™ C Series was really a challenge. We wanted to put as many peripherals on the board as possible, to cover many internal modules. We have gone through a process of fine tuning the board's performance, and used 4-layer PCB to achieve maximum efficiency. Finally, it had met all of our expectations, and even exceeded some. We present you the board which is powerful, well organized, with on-board programmer and debugger and is ready to be your strong ally in development.

EasyMx PRO™ v7 development Team

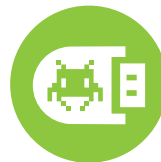
Two connectors for each port Amazing connectivity

EasyMx PRO™ v7 for Tiva™ C Series is all about connectivity. Having two different connectors for each port, you can connect accessory boards, sensors and your custom electronics easier than ever before.



Everything is already here mikroProg™ on board

Powerful on-board mikroProg™ programmer and hardware debugger can program and debug over 55 Tiva™ C Series microcontrollers. You will need it, whether you are a professional or a beginner.



Ready for all kinds of development Multimedia peripherals

TFT 320x240 with touch panel, stereo mp3 codec, audio input and output, navigation switch and microSD card slot make a perfect set of peripherals for multimedia development.



For easier connections mikroBUS™ support

Just plug in your click™ board, and it's ready to work. We picked up a set of the most useful pins you need for development and made a pinout standard you will enjoy using.

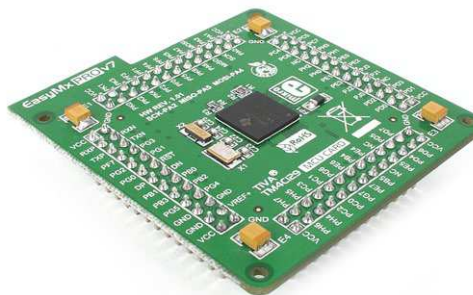


It's good to know

TM4C129XNCZAD is the default microcontroller

TM4C129XNCZAD is the default chip of EasyMx PRO™ v7 for Tiva C Series. It belongs to ARM® Cortex™-M4 family. It operates at **120MHz**, has **1024 KB** of Flash memory, **256 KB** of single-cycle System SRAM, integrated Ethernet controller with PHY, **USB 2.0** (OTG, Host, Device), 140 General purpose **I/O pins**, 7x16/32-bit **timers**, 2x12-bit **A/D** (24 channels), a 12-bit **D/A**, 8x**UARTs**, internal Real time clock (**RTC**), 10x**I2C**, 4x**SPI** and 2x**CAN** controllers. It has Serial wire debug (SWD) and JTAG interfaces for programming and debugging.

- Great choice for both beginners and professionals
- Rich with modules
- Comes with examples for mikroC, mikroBasic and mikroPascal compilers



System specification



power supply
7-23V AC or 9-32V DC
or via USB cable (5V DC)



power consumption
~76mA when all peripheral modules are disconnected



board dimensions
266 x 220mm (10.47 x 8.66 inch)

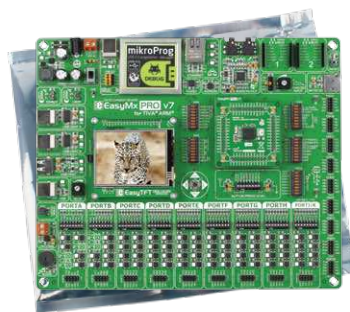


weight
~500g (1.1 lbs)

Package contains



1 Damage resistant protective box



2 EasyMx PRO™ v7 for Tiva™ C Series board in antistatic bag

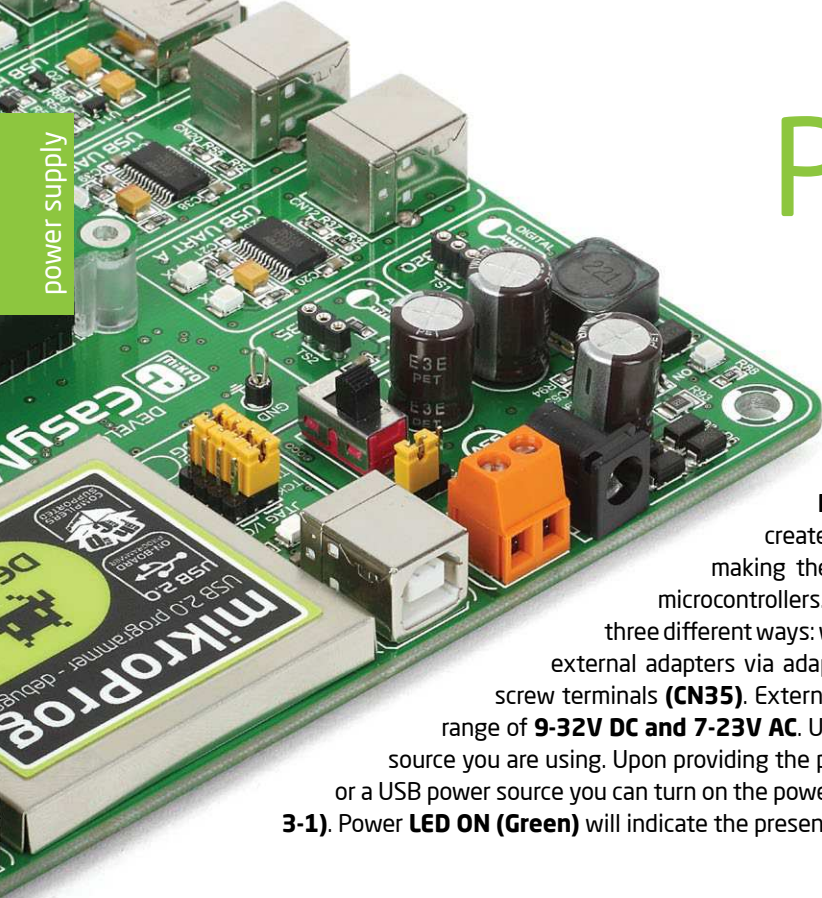


3 USB cable



4 User Manuals and Board schematics

Power supply

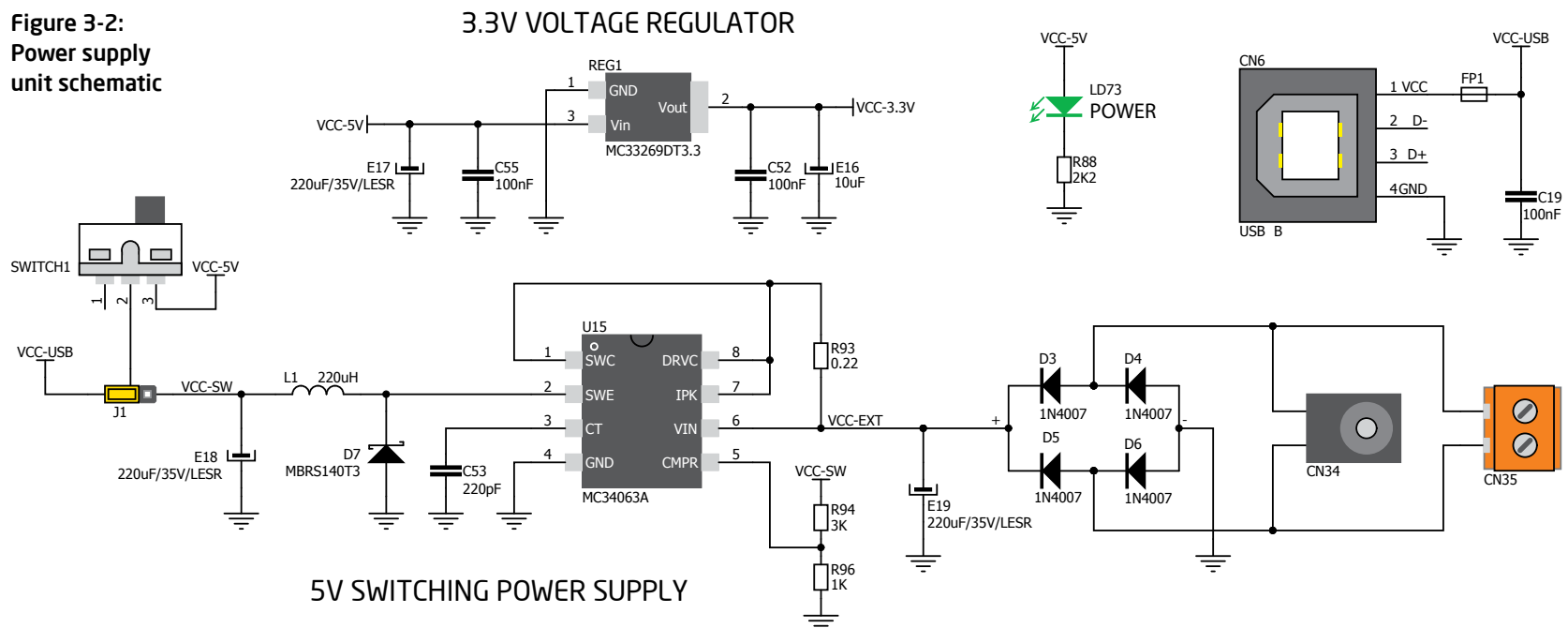


Board contains a switching power supply that creates stable voltage and current levels necessary for powering each part of the board. The power supply section contains a specialized **MC34063A** power regulator which creates a **VCC-3.3V** power supply, thus making the board capable of supporting 3.3V microcontrollers. Power supply unit can be powered in three different ways: with **USB power supply (CN6)**, using external adapters via adapter connector (**CN34**) or additional screw terminals (**CN35**). External adapter voltage levels must be in range of **9-32V DC and 7-23V AC**. Use jumper **J1** to specify which power source you are using. Upon providing the power using either external adapters or a USB power source you can turn on the power supply by using **SWITCH 1 (Figure 3-1)**. Power LED **ON (Green)** will indicate the presence of power supply.



Figure 3-1: Power supply unit of EasyMx PRO™ v7 for Tiva™ C Series

Figure 3-2: Power supply unit schematic





The board's power supply unit creates a stable 3.3V voltage necessary for the operation of the microcontroller and all on-board modules.

Power supply:

via DC connector or screw terminals (7V to 23V AC or 9V to 32V DC), or via USB cable (5V DC)

Power capacity:

up to 500mA with USB, and up to 600mA with external power supply

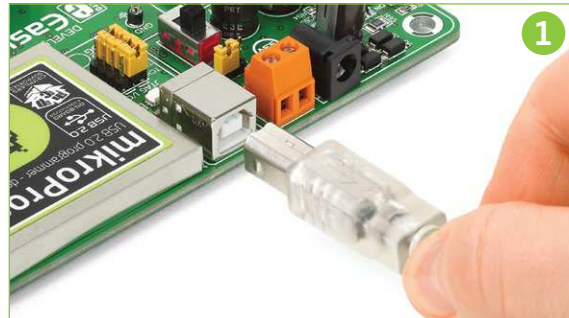
How to power the board?

1. With USB cable



Set J1 jumper to USB position

To power the board with a USB cable, place jumper J1 in USB position. You can then plug in the USB cable as shown on images 1 and 2, and turn the power switch ON.



2. With adapter



Set J1 jumper to EXT position

To power the board with an adapter connector, place jumper J1 in EXT position. You can then plug in the adapter cable as shown on images 3 and 4, and turn the power switch ON.

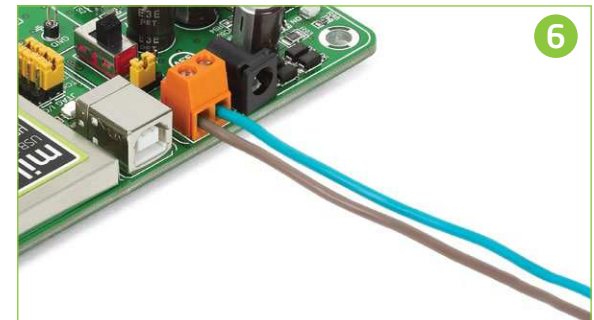
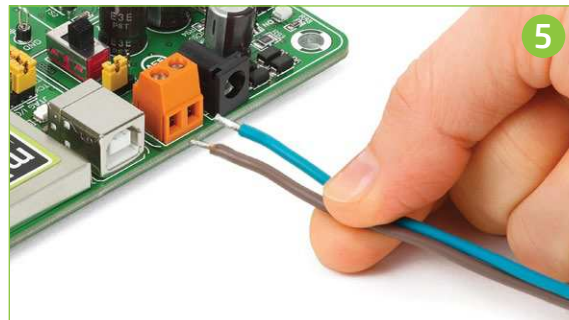


3. With laboratory power supply



Set J1 jumper to EXT position

To power the board using screw terminals, place jumper J1 in EXT position. You can then screw-on the cables in the screw terminals as shown on images 5 and 6, and turn the power switch ON.



Default MCU card

Microcontrollers are supported using specialized 104-pin MCU cards that can be inserted into the on-board MCU socket. There are several types of cards which cover all microcontroller families of Tiva™ C Series Cortex™-M4. The **Default MCU card** that comes with the EasyMx PRO™ v7 for Tiva™ C Series package is shown on **Figure 4-1**. It contains the **TM4C129XNCZAD** microcontroller with on-chip peripherals and is a great choice for both beginners and professionals. After testing and building the final program, this card can also be taken out of the board socket and used in your final device.

- 1 **TM4C129XNCZAD** is the default chip of EasyMx PRO™ v7 for Tiva™ C Series. It belongs to ARM® Cortex™-M4F family. It operates at **120MHz**, has **1024 KB** of Flash memory, **256 KB** of single-cycle System SRAM, integrated Ethernet controller with PHY, **USB 2.0** (OTG, Host, Device), 140 General purpose **I/O pins**, 7x16/32-bit **timers**, 2x12-bit **A/D** (24 channels), a 12-bit **D/A**, 8x**UARTs**, internal Real time clock (**RTC**), 10x**I2C**, 4x**SPI** and 2x**CAN** controllers. It has Serial wire debug (SWD) and JTAG interfaces for programming and debugging.
- 2 **25MHz crystal oscillator**. We carefully chose the most convenient crystal value that provides clock frequency which can be used directly, or with the PLL multipliers to create higher MCU clock value. MCU card also contains 32.768 kHz crystal oscillator which provides external clock for RTCC module.
- 3 **32.768-kHz external crystal oscillator** which provides external clock for the internal hibernation module.

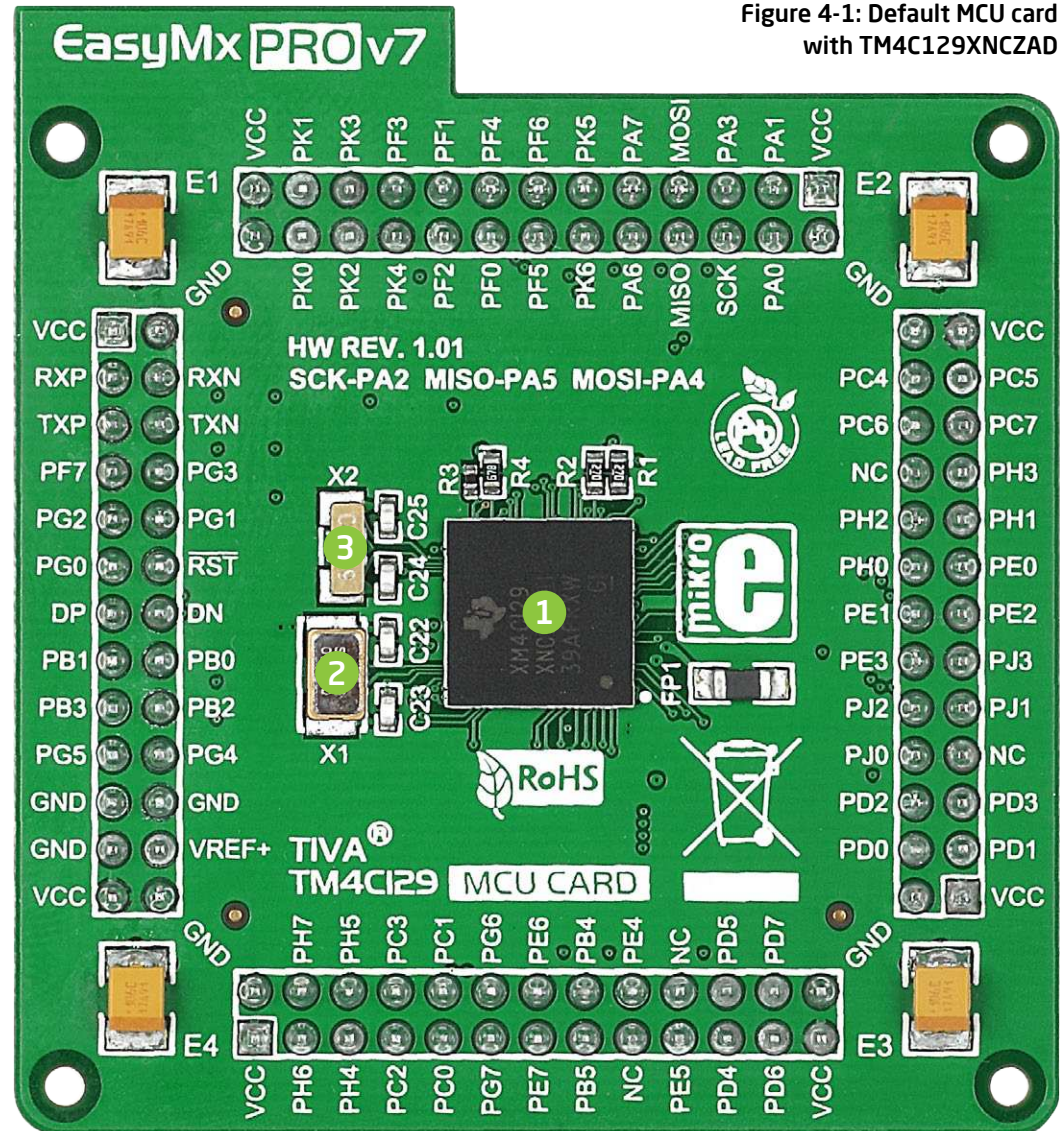


Figure 4-1: Default MCU card with TM4C129XNCZAD

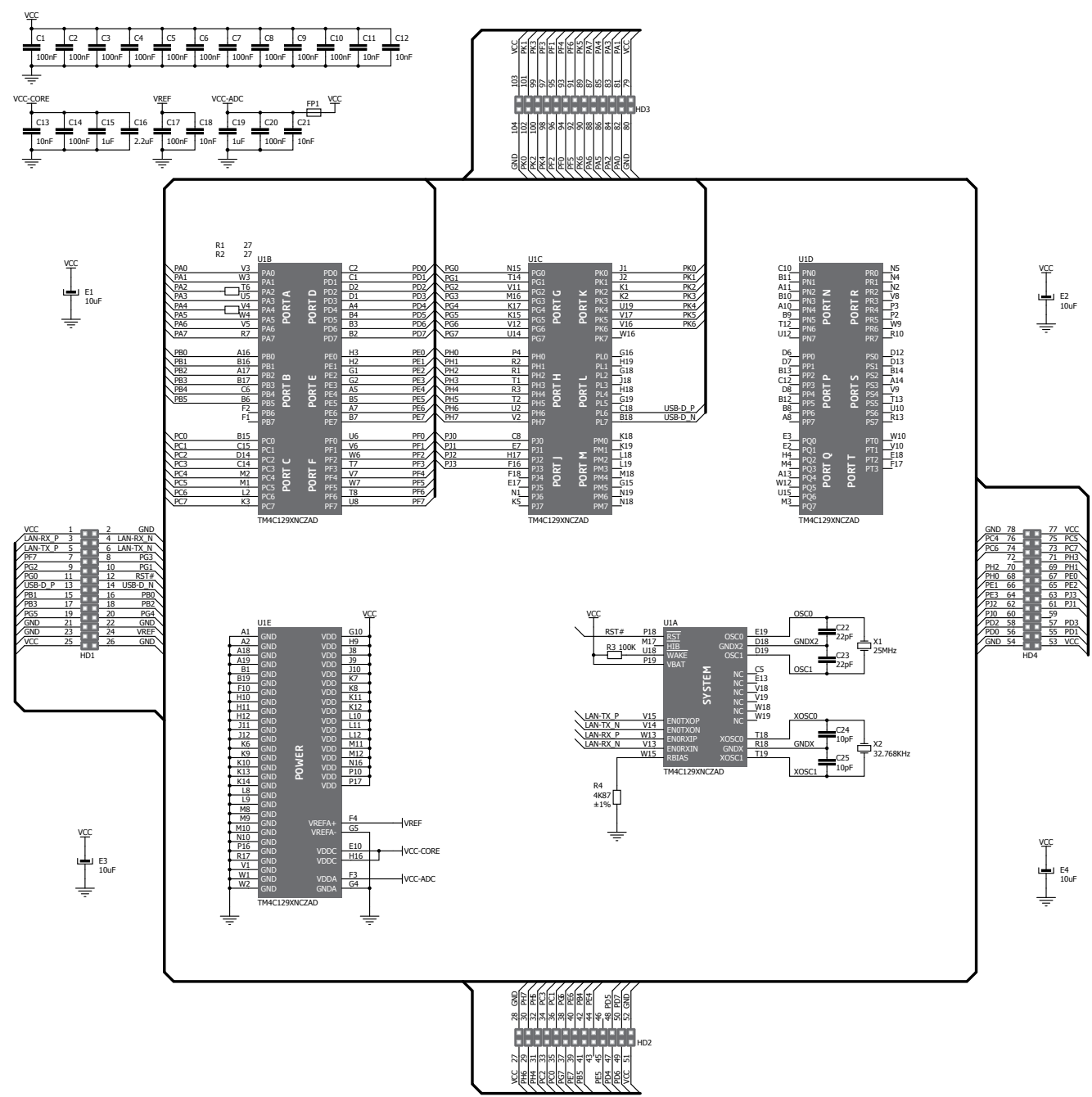


Figure 4-2: Default MCU card and boot configuration schematic

How to properly insert your MCU card into the socket?

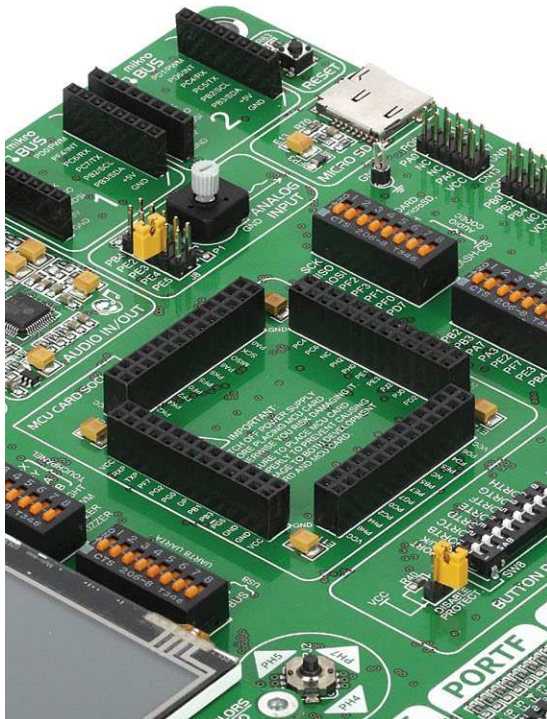
Before you plug the microcontroller card into the socket, make sure that the **power supply is turned off**. Images below show how to correctly plug in the card. First make sure that the MCU card orientation matches the silkscreen outline

on the EasyMx PRO™ v7 Tiva™ C Series board MCU socket. Hold the MCU card over the socket, so each header is properly aligned with the socket, as shown in **Figure 4-4**. Then put the MCU card slowly down until all the pins slide into the socket.

Check again if everything is placed correctly and press the MCU card until it is completely plugged into the socket as shown in **Figure 4-5**. If done correctly all pins should be fully inserted. Only now you can turn on the power supply.

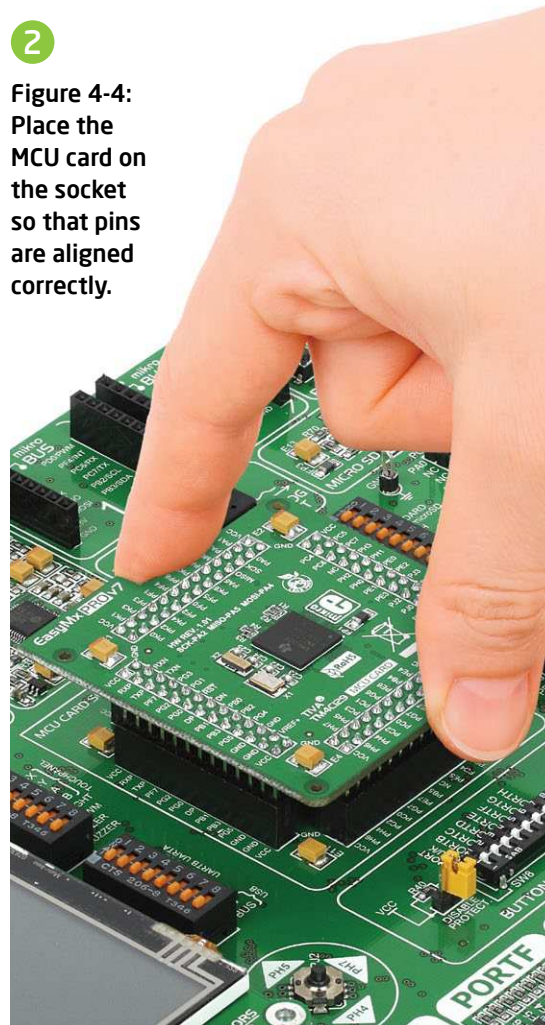
1

Figure 4-3: On-board MCU socket has silkscreen markings which will help you to correctly orient the MCU card before inserting.



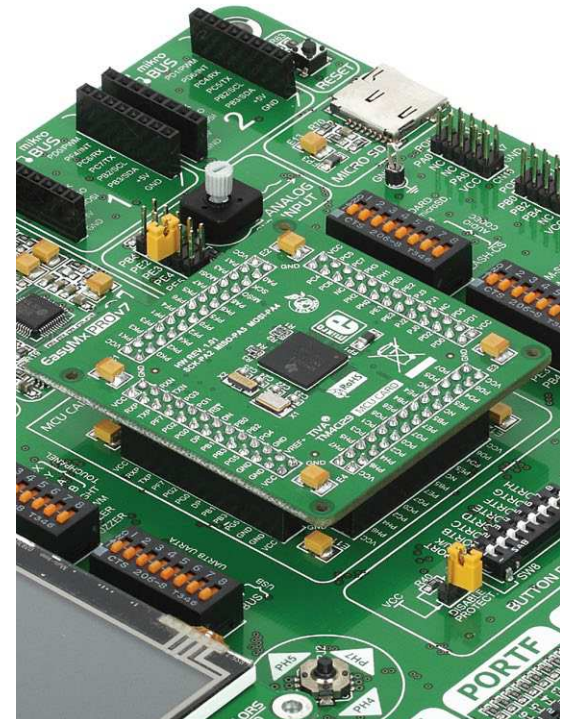
2

Figure 4-4: Place the MCU card on the socket so that pins are aligned correctly.



3

Figure 4-5 Properly placed MCU card.



Other supported MCU cards

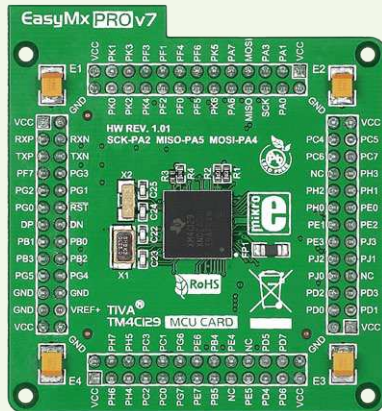
MikroElektronika currently offers a total of three populated MCU cards for the EasyMX for Tiva™ C Series: **TM4C129XNCZAD** microcontroller (default), **TM4C123GH6PZ** microcontroller and **TM4C123GH6PM** microcontroller. You can also purchase empty PCB cards that you can populate on

your own and solder any supported microcontroller you need in your development. There are a total of three empty PCB cards available. This way your EasyMx PRO™ v7 for Tiva™ C Series board becomes truly flexible and reliable tool for almost any of your Tiva™ C Series projects. MCU cards can also be used

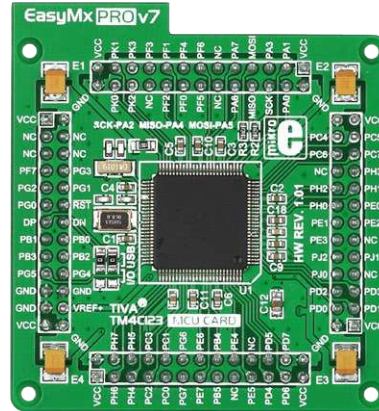
in your final devices. For a complete list of currently available MCU cards, please visit the board webpage:



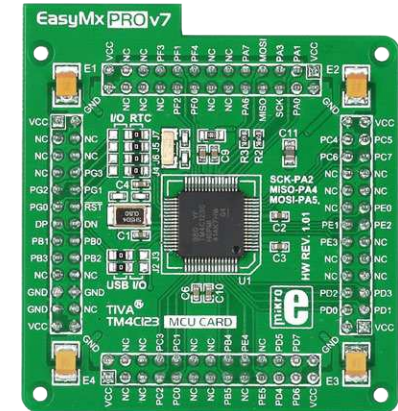
<http://www.mikroe.com/easymx-pro/tiva/>



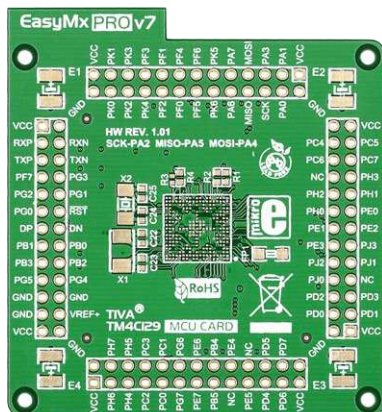
Default 212-pin MCU card with **TM4C129XNCZAD**



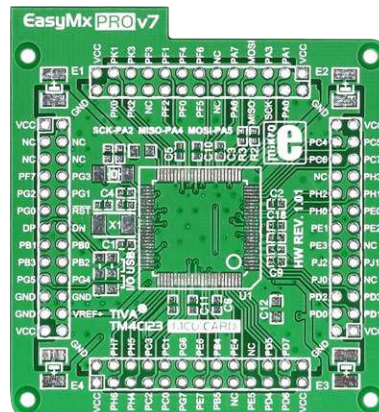
Standard 100-pin MCU card with **TM4C123GH6PZ**



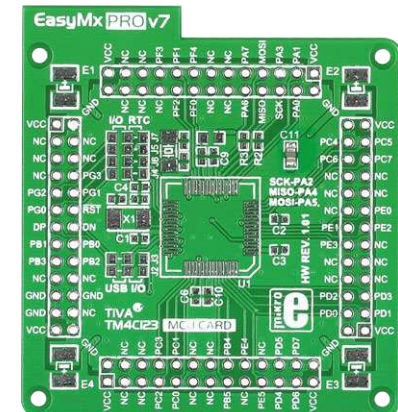
Standard 64-pin MCU card with **TM4C123GH6PM**



Empty MCU card for 212-pin **TM4C129** MCUs



Empty MCU card for 100-pin **TM4C123** MCUs



Empty MCU card for 64-pin **TM4C123** MCUs

On-board programmer

What is mikroProg™?

mikroProg™ is a fast programmer and debugger which is based on TI ICDI debugger. Smart engineering allows mikroProg™ to support over 55 ARM® Cortex™-M4 devices from Tiva™ C Series in a single programmer. It also features a powerful debugger which will be of great help in your development. Outstanding performance and easy operation are among its top features.

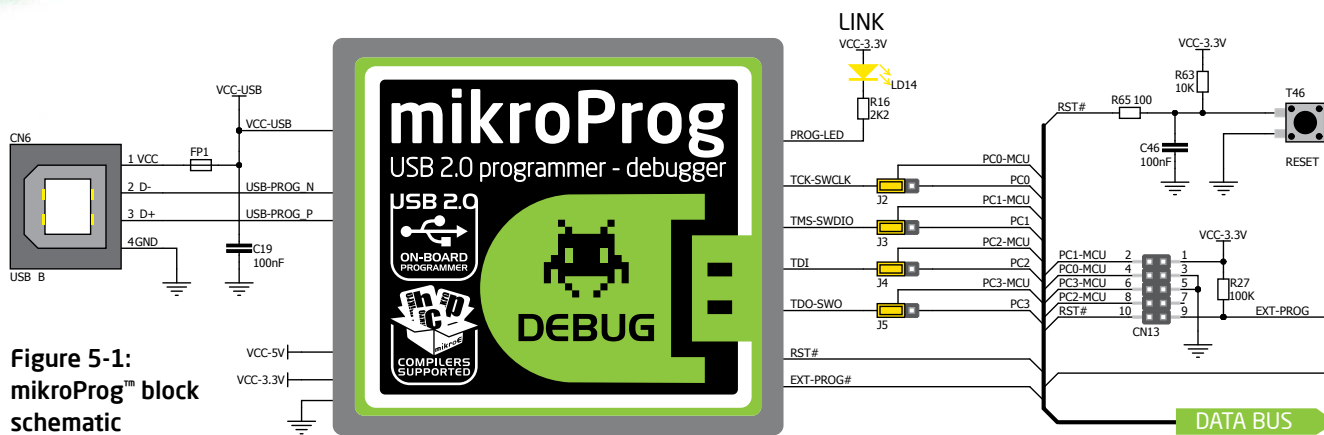


Figure 5-1: mikroProg™ block schematic

Cortex Debug



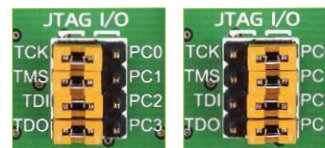
In addition to the on-board mikroProg programmer, there's also a Cortex Debug connector that supports JTAG debug, Serial Wire debug and Serial Wire Viewer operations.

How do I start?

In order to start using mikroProg™ and program your microcontroller, you just have to follow two simple steps:

- 1. Install the necessary software**
 - Install programmer drivers
 - Install mikroProg Suite™ for ARM® software
- 2. Power up the board, and you are ready to go**
 - Plug in the programmer USB cable
 - LINK LED should light up

Enabling mikroProg™



Five jumpers below the programmer USB connector are used to specify whether programming lines should be connected to programmer, or used as general purpose I/Os. If placed in **JTAG/SWD position**, jumpers connect **PC0-PC3** pins to TCK, TMS, TDI and TDO programming lines respectively and are cut off from the rest of the board.

Tiva™ C Series ARM® Cortex™ -M4 microcontrollers supported with mikroProg™

TM4C1230C3PM	TM4C1232H6PM	TM4C1237E6PZ	TM4C123GH6PZ
TM4C1230D5PM	TM4C1233C3PM	TM4C1237H6PM	TM4C1290NCZAD
TM4C1230E6PM	TM4C1233D5PM	TM4C1237H6PZ	TM4C1292NCZAD
TM4C1230H6PM	TM4C1233D5PZ	TM4C123AE6PM	TM4C1294NCZAD
TM4C1231C3PM	TM4C1233E6PM	TM4C123AH6PM	TM4C1297NCZAD
TM4C1231D5PM	TM4C1233E6PZ	TM4C123BE6PM	TM4C1299KCZAD
TM4C1231D5PZ	TM4C1233H6PM	TM4C123BE6PZ	TM4C1299NCZAD
TM4C1231E6PM	TM4C1233H6PZ	TM4C123BH6PM	TM4C129CNCZAD
TM4C1231E6PZ	TM4C1236D5PM	TM4C123BH6PZ	TM4C129DNCZAD
TM4C1231H6PM	TM4C1236E6PM	TM4C123FE6PM	TM4C129ENCZAD
TM4C1231H6PZ	TM4C1236H6PM	TM4C123FH6PM	TM4C129LNCZAD
TM4C1232C3PM	TM4C1237D5PM	TM4C123GE6PM	TM4C129XKCZAD
TM4C1232D5PM	TM4C1237D5PZ	TM4C123GE6PZ	TM4C129XNCZAD
TM4C1232E6PM	TM4C1237E6PM	TM4C123GH6PM	

About Texas Instruments Tiva™ C Series

Building on more than 20 years of experience developing leading microcontroller technology and ARM®-based processors, Texas Instruments launched the Tiva™ ARM® MCU platform in 2013, with Tiva™ C Series TM4C123x ARM Cortex-M4 MCUs.

These are the first Cortex-M-based MCUs to be built on 65 nanometer flash process technology, setting the roadmap to higher speeds, larger memory and lower power. The Tiva™ C Series TM4C123x MCUs are ideal for home, building and industrial automation.

The ARM Cortex-M4 floating-point core Tiva™ C Series MCUs strike a perfect balance between performance and power consumption. They eliminate performance tradeoffs with 12-bit ADC accuracy, achievable at the full 1 MSPS rating without any hardware averaging. And with low-power standby currents as low as 1.6 uA, they enable longer battery life and support constrained power budgets.

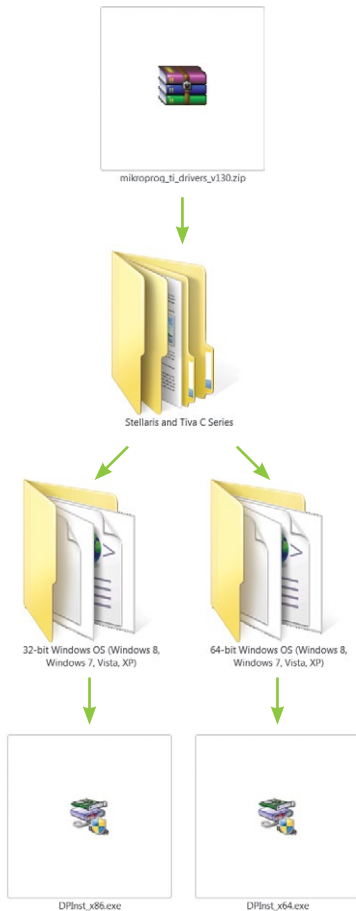
Installing programmer drivers

On-board mikroProg™ requires drivers in order to work. Drivers are located on the link below:



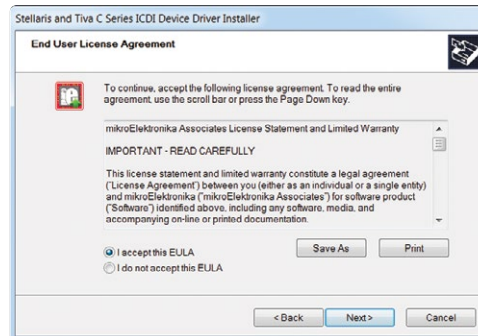
www.mikroe.com/downloads/get/1810/mikroprog_ti_drivers_v130.zip

When you locate the drivers, please extract the setup file from the ZIP archive. You should be able to locate the driver setup file. Double click the setup file to begin the installation of the programmer drivers.



Step 1 - Start installation

Welcome screen of the installation. Just click **Next** to proceed.



Step 2 - Accept EULA

Make sure to understand and accept End User License Agreement before moving to next step.



Step 3 - Finish installation

You will be informed if the drivers are installed correctly. Click **Finish** to end the installation process.

Programming software

mikroProg Suite™ for ARM®

On-board mikroProg™ for Tiva™ C Series programmer requires **special programming software** called mikroProg Suite™ for ARM®. This software is used for programming all Tiva™ C Series microcontrollers. It features an intuitive interface and Single Click™ programming technology. Software installation is available on following link:



http://www.mikroe.com/downloads/get/1809/mikroprog_suite_for_arm_v130.zip

After downloading, extract the package and double click the executable setup file to start the installation.

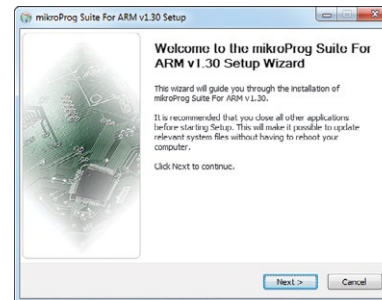


Quick guide

- 1 Click the **Detect MCU** button in order to recognize the device ID.
- 2 Click the **Read** button to read the entire microcontroller memory. You can click the **Save** button to save it to target HEX file.
- 3 If you want to write the HEX file into the microcontroller, first make sure to load the target HEX file using the **Load** button. Then click the **Write** button to begin programming.
- 4 Click the **Erase** button to clear the microcontroller memory.

Figure 5-2: mikroProg Suite™ for ARM® window

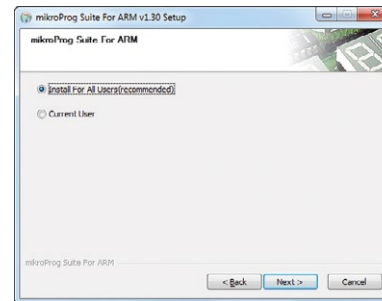
Installation wizard - 6 simple steps



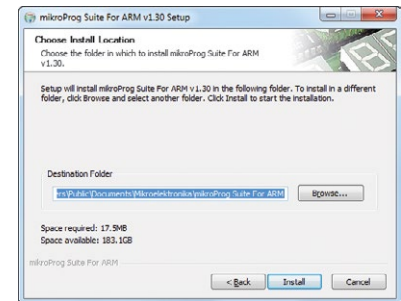
Step 1 - Start installation



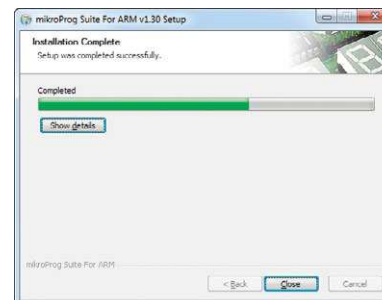
Step 2 - Accept EULA and continue



Step 3 - Install for all users or current user



Step 4 - Choose destination folder



Step 5 - Installation in progress



Step 6 - Finish installation

Hardware debugger

What is debugging?

Every developer comes to a point when it's necessary to monitor code execution in order to find errors in the code, or simply to see if everything is going as planned. This hunt for bugs or errors in the code is called **debugging**. There are two ways to do this: one is **software simulation**, which enables you to simulate what is supposed to be happening on the microcontroller as your code lines are executed, and the other, more reliable one, is monitoring the code execution on the chip itself. And this latter one is called **hardware debugging**. "Hardware" means that it is the real deal - code executes right on the target device.

What is a hardware debugger?

The on-board **mikroProg™** programmer supports **hardware debugger** - a highly effective tool for **Real-Time debugging** on hardware level. The debugger enables you to execute your program on the host Tiva™ C Series microcontroller and view variable values, Special Function Registers (SFR), RAM, CODE and EEPROM memory along with the code execution on hardware. Whether you are a beginner or a professional, this powerful tool, with an intuitive interface and a convenient set of commands will enable you to track down bugs quickly. mikroProg debugger is one of the fastest, and most reliable debugging tools on the market.

Supported compilers

All MikroElektronika compilers, **mikroC™**, **mikroBasic™** and **mikroPascal™** for ARM®, natively support mikroProg™ for Tiva™ C Series, as well as other compilers, including KEIL®, IAR®. Specialized DLL module allows compilers to exploit the full potential of fast hardware debugging. Along with compilers, make sure to install the appropriate **programmer drivers** and **mikroProg Suite™ for ARM®** programming software, as described on **pages 14** and **15**.

How do I use the debugger?

When you build your project for debugging, and program the microcontroller with this HEX file, you can start the debugger using **[F9]** command. The compiler layout will switch to Debugging View, and a blue line will mark where code execution is currently paused. Use the **debugging toolbar** in the **Watch Window** to guide the program execution, and stop anytime. Add the desired variables to the Watch Window and monitor their values.

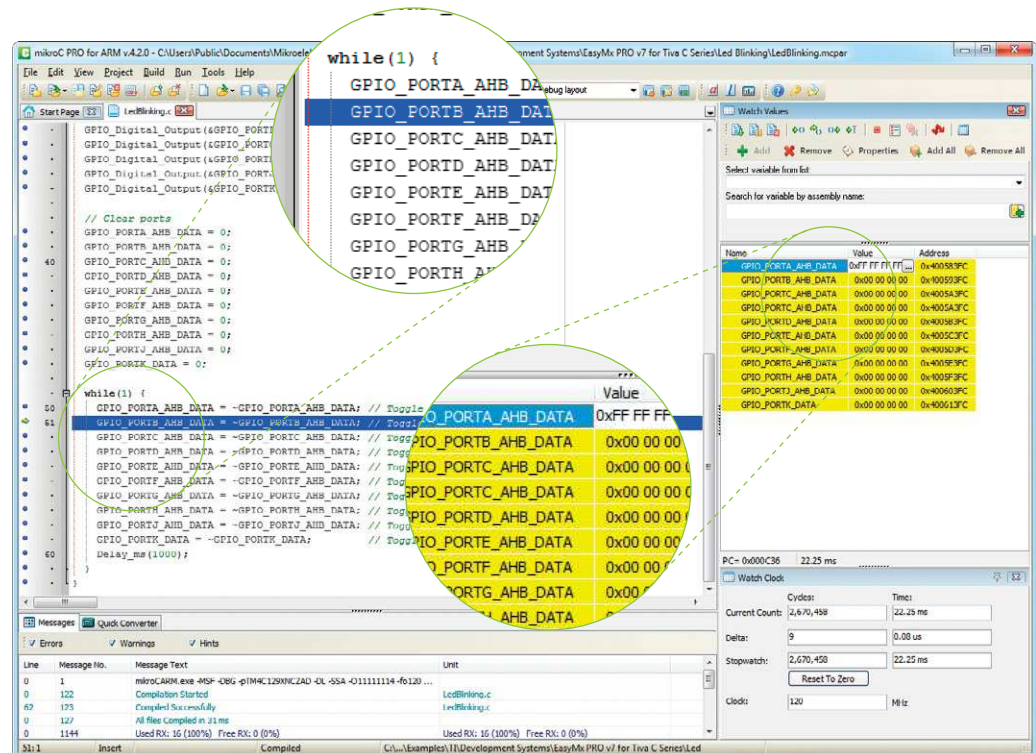


Figure 5-3: mikroC PRO for ARM® compiler in debugging view, with SFR registers in Watch Window



Debugger commands



Here is a short overview of which debugging commands are supported in MikroElektronika compilers. You can see what each command does, and what are their shortcuts when you are in debugging mode. It will give you a general picture of what your debugger can do.

Toolbar Icon	Command Name	Shortcut	Description
	Start Debugger	[F9]	Starts Debugger.
	Run/Pause Debugger	[F6]	Run/Pause Debugger.
	Stop Debugger	[Ctrl + F2]	Stops Debugger.
	Step Into	[F7]	Executes the current program line, then halts. If the executed program line calls another routine, the debugger steps into the routine and halts after executing the first instruction within it.
	Step Over	[F8]	Executes the current program line, then halts. If the executed program line calls another routine, the debugger will not step into it. The whole routine will be executed and the debugger halts at the first instruction following the call.
	Step Out	[Ctrl + F8]	Executes all remaining program lines within the subroutine. The debugger halts immediately upon exiting the subroutine.
	Run To Cursor	[F4]	Executes the program until reaching the cursor position.
	Toggle Breakpoints	[F5]	Toggle breakpoints option sets new breakpoints or removes those already set at the current cursor position.
	Show/Hide breakpoints	[Shift+F4]	Shows/Hides window with all breakpoints
	Clears breakpoints	[Shift+Ctrl+F5]	Delete selected breakpoints
	Jump to interrupt	[F2]	Opens window with available interrupts (doesn't work in hardware debug mode)

Input/Output group

One of the most distinctive features of EasyMx PRO™ v7 for Tiva™ C Series are its Input/Output PORT groups. They add so much to the connectivity potential of the board.

Everything is grouped together

PORT **headers**, PORT **buttons** and PORT **LEDs** are next to each other and grouped together. This layout gives the EasyMX PRO for Tiva™ C Series a clean, well organized look and it makes development easier. We have also provided **additional PORT headers** on the right side of the board, so you can access any pin you want from that side of the board too.

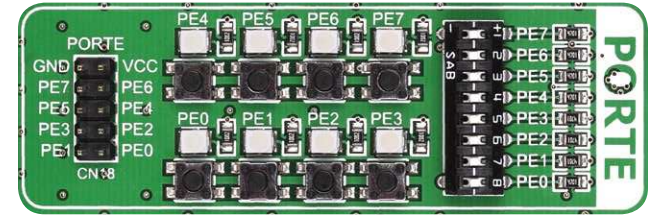


Figure 6-1: I/O group contains PORT header, tri-state pull up/down DIP switch, buttons and LEDs all in one place

Tri-state pull-up/down DIP switches

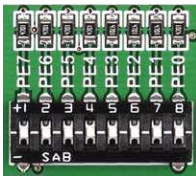
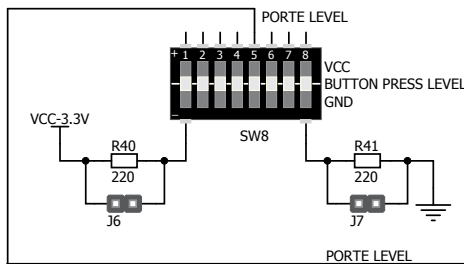


Figure 6-2: Tri-state DIP switch on PORTE

Tri-state DIP switches, like SW7 on **Figure 6-2**, are used to enable 4K7 pull-up or pull-down resistor on any desired port pin. Each of these switches has three states:

1. **middle position** disables both pull-up and pull-down feature from the PORT pin
2. **up position** connects the resistor in pull-up state to the selected pin
3. **down position** connects the resistor in pull-down state to the selected PORT pin.



Button press level tri-state DIP switch is used to determine which logic level will be applied to port pins when buttons are pressed

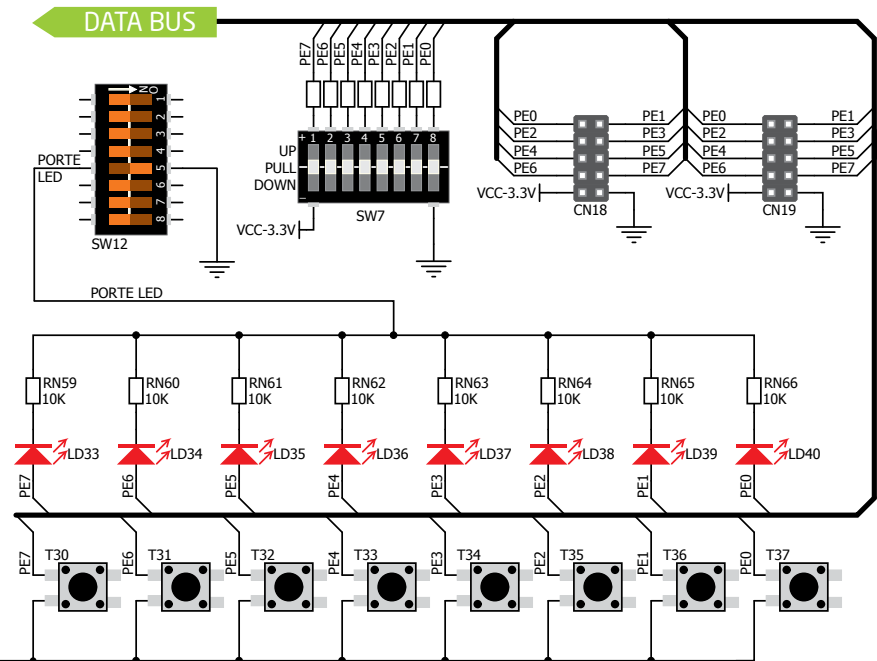
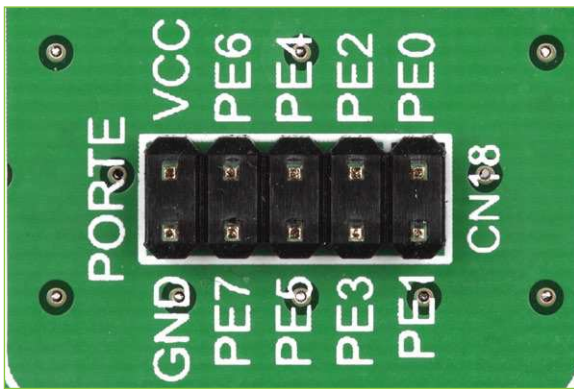


Figure 6-3: Schematic of the single I/O group connected to microcontroller PORTE



Headers

Enhanced connectivity is one of the key features of EasyMx PRO™ v7 for Tiva™ C Series. That's why we have provided **two connection headers for each PORT**. I/O PORT group contains one IDC10 header (like **CN18** **Figure 6-3**). There is **one more IDC10 header** available on the right side of the board, next to DIP switches (like **CN19** on **Figure 6-3**). These headers can be used to connect accessory boards with IDC10 sockets.

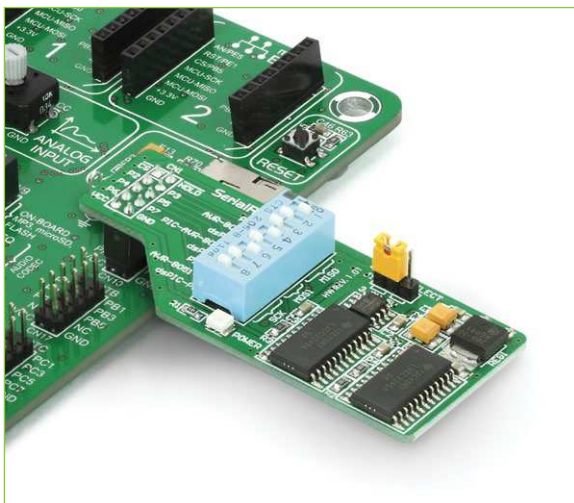
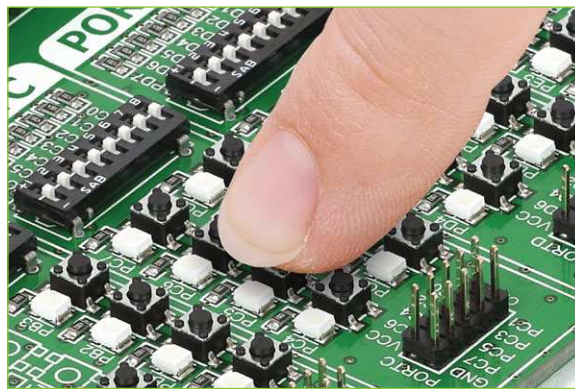


Figure 6-4: IDC10 headers enable easy connection with MikroElektronika accessory boards



Buttons

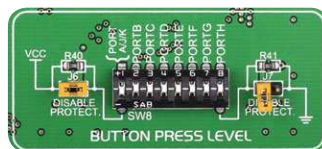
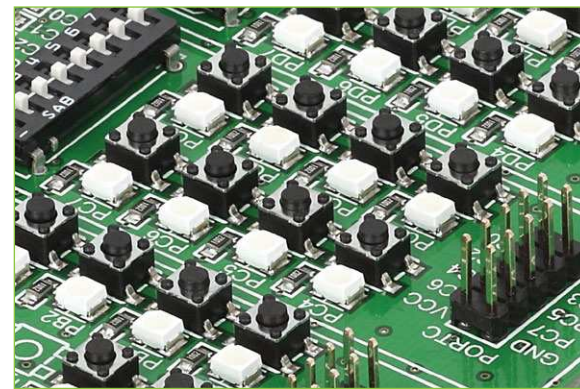


Figure 6-5: Button press level DIP switch (tri-state)

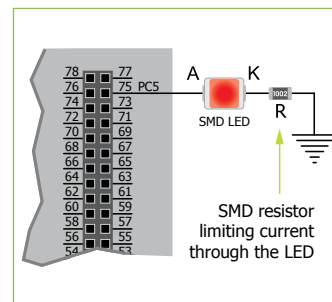
The logic state of all microcontroller digital inputs may be changed using **push buttons**. Tri-state DIP switch **SW8** is available for selecting which logic state will be applied to corresponding MCU pin when button is pressed, for each I/O port separately. If you, for example, place **SW8.5** in **VCC** position, then pressing of any push button in PORTE I/O group will apply logic one to the appropriate microcontroller pin. The same goes for **GND**. If DIP switch is in the middle position neither of two logic states will be applied to the appropriate microcontroller pin. You can disable pin protection 220ohm resistors by placing jumpers **J6** and **J7**, which will connect your push buttons directly to VCC or GND. Be aware that by doing so you may accidentally damage MCU in case of wrong usage.

Reset button

In the far upper right section of the board, there is a **RESET button**, which can be used to manually reset the microcontroller.



LEDs



LED (Light-Emitting Diode) is a highly efficient electronic light source. When connecting LEDs, it is necessary to place a current limiting resistor in series so that LEDs are provided with the current value specified by the manufacturer. The current varies from 0.2mA to 20mA, depending on the type of LED and the manufacturer. The EasyMx PRO™ v7 for Tiva™ C Series board uses low-current LEDs with typical current consumption of 0.2mA or 0.3mA. Board contains 67 LEDs which can be used for visual indication of the logic state on PORT pins. An active LED indicates that a logic high (1) is present on the pin. In order to enable PORT LEDs, it is necessary to enable the corresponding DIP switch on **SW12** (**Figure 6-6**).

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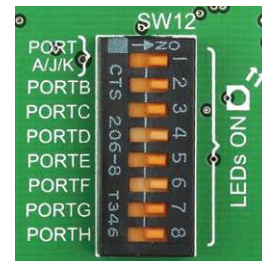


Figure 6-6: SW12.1 through SW12.8 switches are used to enable PORT LEDs

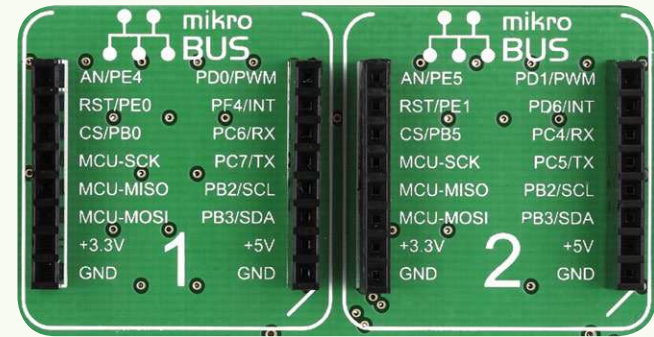
mikroBUS™ sockets

Easier connectivity and simple configuration are imperative in modern electronic devices. Success of the USB standard comes from its simplicity of usage and high and reliable data transfer rates. As we in MikroElektronika see it, plug-and-play devices with minimum settings are the future in the embedded world too. That is why our engineers came up with a simple, but brilliant pinout with lines that most of today's accessory boards require, which almost completely eliminates the need for additional hardware settings. We called this new standard the **mikroBUS™**. EasyMx PRO™ v7 for Tiva™ C Series supports mikroBUS™ with two on-board sockets. As you can see, there are no additional DIP switches, or jumper selections. Everything

is already routed to the most appropriate pins of the microcontroller sockets.

mikroBUS™ host connector

Each mikroBUS™ host connector consists of two 1x8 female headers containing pins that are most likely to be used in the target accessory board. There are three groups of communication pins: **SPI**, **UART** and **I²C** communication. There are also single pins for **PWM**, **Interrupt**, **Analog input**, **Reset** and **Chip Select**. Pinout contains two power groups: **+5V** and **GND** on one header and **+3.3V** and **GND** on the other 1x8 header.



mikroBUS™ pinout explained

AN - Analog pin	PWM - PWM output line
RST - Reset pin	INT - Hardware Interrupt line
CS - SPI Chip Select line	RX - UART Receive line
SCK - SPI Clock line	TX - UART Transmit line
MISO - SPI Slave Output line	SCL - I ² C Clock line
MOSI - SPI Slave Input line	SDA - I ² C Data line
+3.3V - VCC-3.3V power line	+5V - VCC-5V power line
GND - Reference Ground	GND - Reference Ground

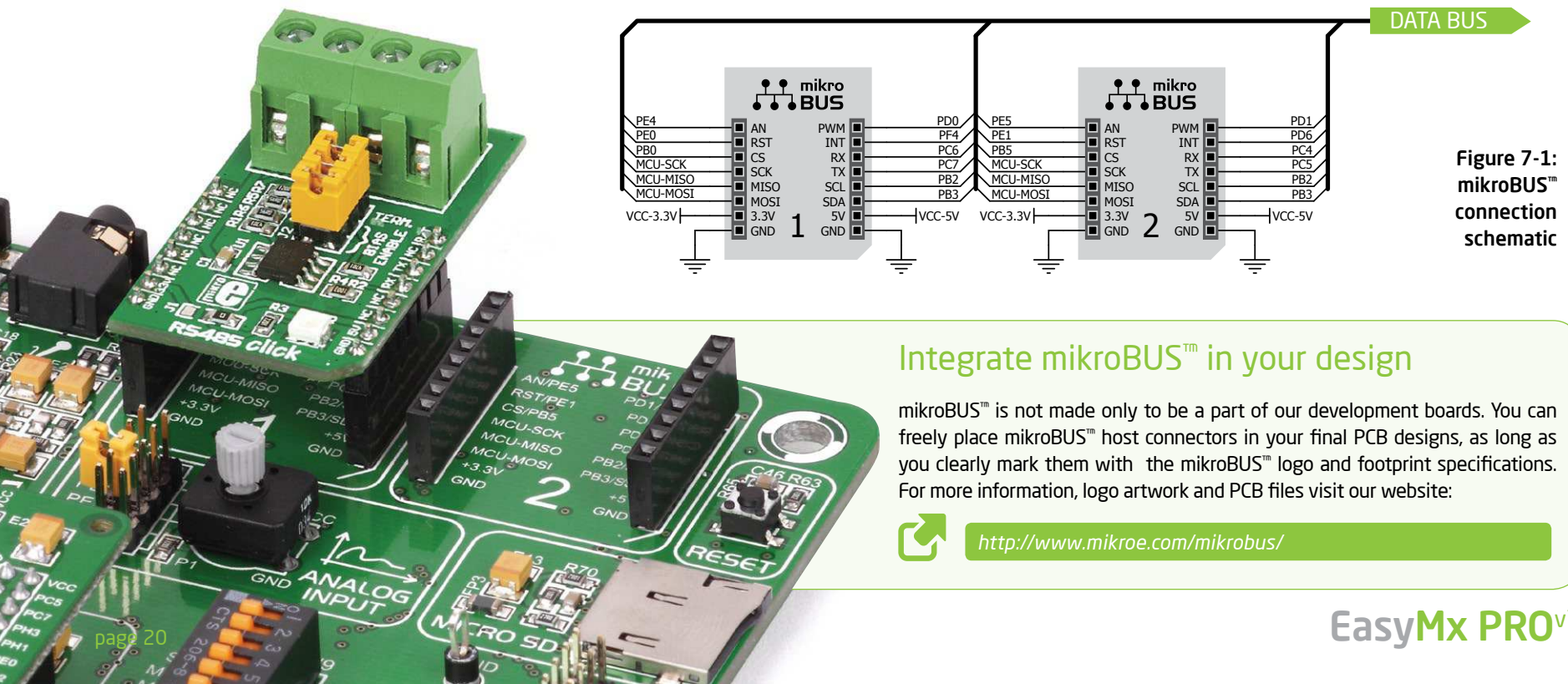


Figure 7-1:
mikroBUS™
connection
schematic

Integrate mikroBUS™ in your design

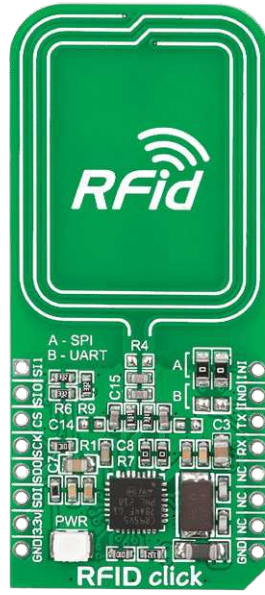
mikroBUS™ is not made only to be a part of our development boards. You can freely place mikroBUS™ host connectors in your final PCB designs, as long as you clearly mark them with the mikroBUS™ logo and footprint specifications. For more information, logo artwork and PCB files visit our website:



<http://www.mikroe.com/mikrobus/>



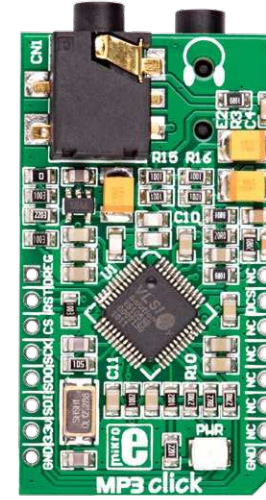
CC3000 click™



RFID click™



Bluetooth click™



MP3 click™



GSM click™

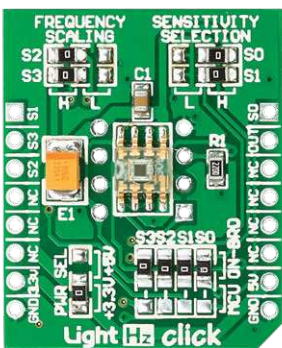
click™ boards are plug-and-play!

MikroElektronika's portfolio of over 200 accessory boards is now enriched by an additional set of mikroBUS™ compatible **click™ boards**. Almost each month several new click™ boards are released. It is our intention to provide the community with as much of these boards as possible, so you will be able to expand your EasyMX™ PRO v7 for Tiva™ C Series with additional functionality with literally

zero hardware configuration. Just plug and play. Visit the click™ boards webpage for the complete list of available boards:



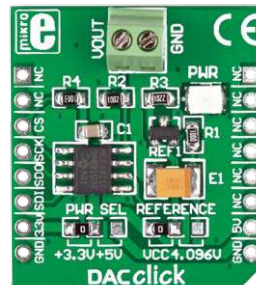
<http://www.mikroe.com/click/>



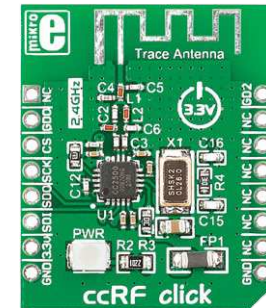
LightHz click™



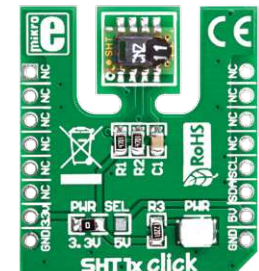
microSD click™



DAC click™



ccRF click™

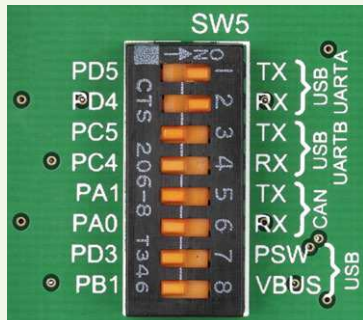


SHT1x click™

USB-UART A



Enabling USB-UART A



In order to enable USB-UART A communication, you must push **SW5.1** (PD5) and **SW5.2** (PD4) to **ON** position. This connects the **RX** and **TX** lines to **PD5** and **PD4** microcontroller pins.

The **UART** (universal asynchronous receiver/transmitter) is one of the most common ways of exchanging data between the MCU and peripheral components. It is a serial protocol with separate transmit and receive lines, and can be used for full-duplex communication. Both sides must be initialized with the same baud rate, otherwise the data will not be received correctly.

Modern PC computers, laptops and notebooks are no longer equipped with RS-232 connectors and UART controllers. They are nowadays replaced with USB connectors and USB controllers. Still, certain technology enables UART communication to be done via USB connection. Controllers such as **FT232RL** from FTDI® convert UART signals to the appropriate USB standard.

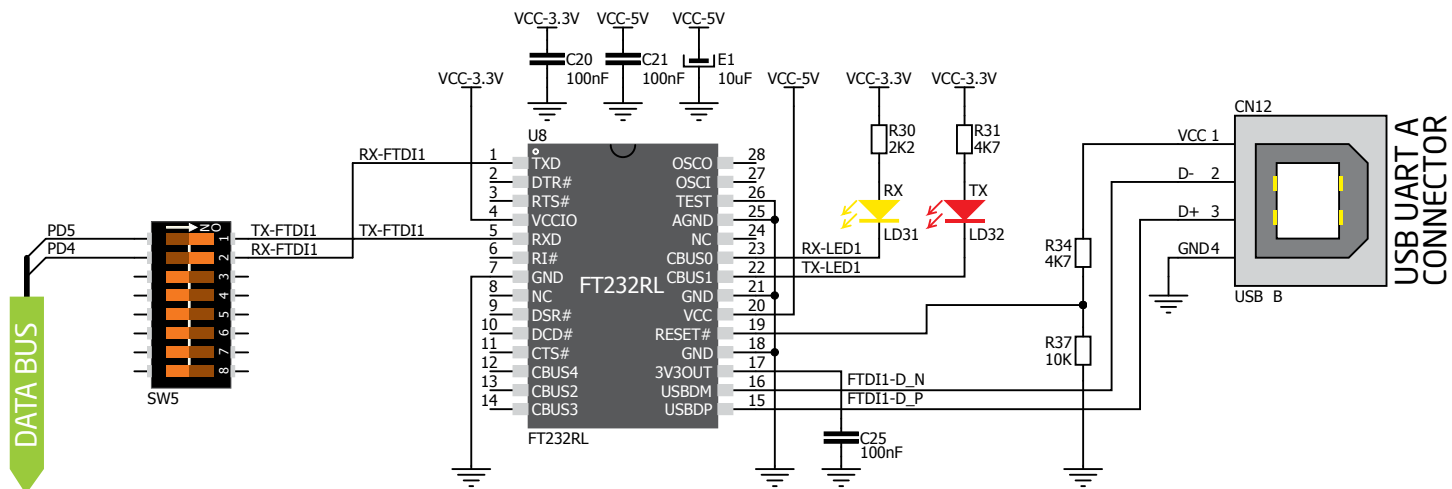
USB-UART A communication is realized through a FT232RL controller, USB connector (**CN12**), and the microcontroller UART module. To establish this connection, you must connect **TX** and **RX** lines of the FT232RL to the appropriate pins of the microcontroller. This selection is done using DIP switches **SW5.1** and **SW5.2**.

In order to use USB-UART A module on EasyMx PRO™ v7 for Tiva™ C Series, you must first install FTDI drivers on your computer. Drivers can be found on link below:



<http://www.ftdichip.com/Drivers/VCP.htm>

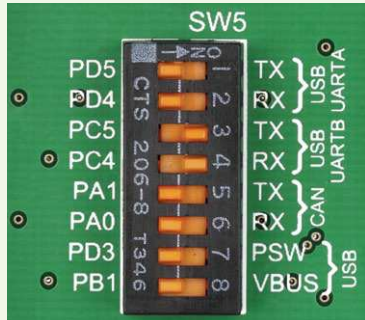
Figure 8-1:
USB-UART A
connection
schematic



USB-UART B



Enabling USB-UART B



In order to enable USB-UART B communication, you must push **SW5.3** (PC5) and **SW5.4** (PC4) to **ON** position. This connects the **TX** and **RX** lines to **PD5** and **PD6** microcontroller pins.

If you need to use more than one USB-UART in your application, there's a second connector, **USB-UART B**, available on the board as well. Both available USB-UART modules can operate at the same time, because they are routed to separate microcontroller pins.

USB-UART B communication is realized through a FT232RL controller, USB connector (**CN20**), and microcontroller UART module. To establish this connection, you must connect **TX** and **RX** lines of the FT232RL to the appropriate pins of the microcontroller. This selection is done using DIP switches **SW5.3** and **SW5.4**

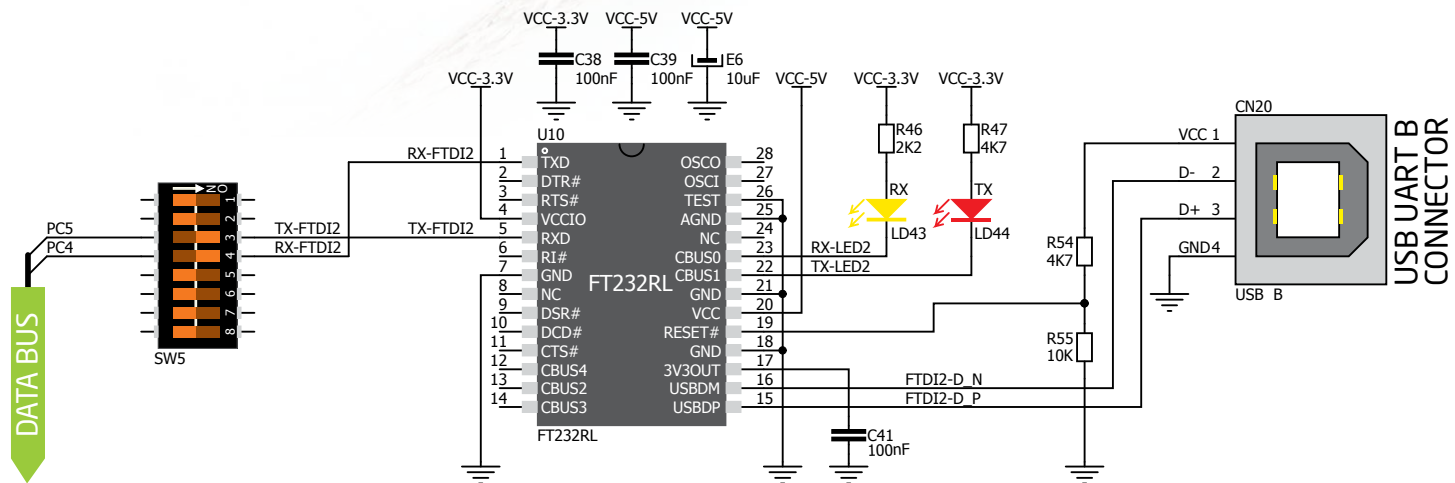
When using either USB-UART A or USB-UART B, make sure to disconnect all devices and additional boards that could interfere with the signals and possibly corrupt the sent or received data.

In order to use USB-UART B module on EasyMx PRO™ v7 for Tiva™ C Series, you must first install FTDI drivers on your computer. Drivers can be found on link below:



<http://www.ftdichip.com/Drivers/VCPhm>

Figure 9-1: USB-UART B connection schematic



USB Host communication

USB is the acronym for **Universal Serial Bus**. This is a very popular industry standard that defines cables, connectors and protocols used for communication and power supply between computers and other devices. EasyMx PRO™ v7 for Tiva™ C Series contains USB Host connector (**CN21**) for a USB Standard Type A plug, which enables microcontrollers that support USB communications

to establish a connection with a target device (such as a USB Keyboard, a USB Mouse and so forth). USB Host also provides the necessary 5V power supply to the target via **TPS2041B** IC. Detecting whether the USB device is connected to the Host connector or not can be done through the **VBUS** line. Connection of USB Host is established when **SW5.7** and **SW5.8** are on.

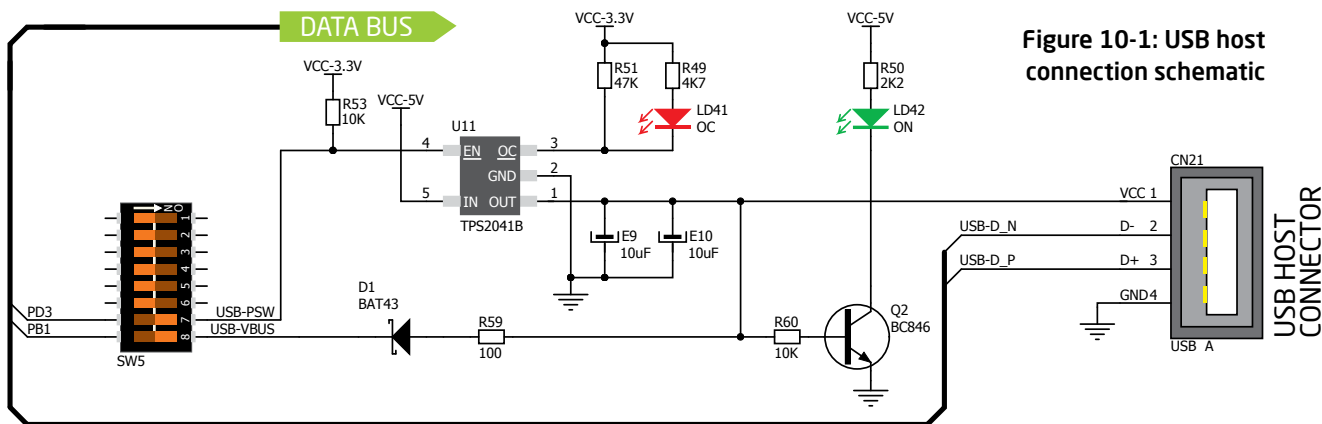


Figure 10-1: USB host connection schematic



Powering USB device

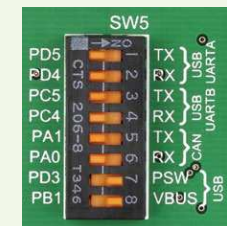


Figure 10-2: Powering USB device through PSW line

You can enable or disable power supply to USB device connected to Host, through microcontroller **PD3** and **BP1** pins. In order to connect EN TPS2041B IC pin to microcontroller, you must push **SW5.7** and **SW5.8** to **ON** position.

USB Device communication

EasyMx PRO™ v7 for Tiva™ C Series also contains a USB Device connector (**CN25**) which enables microcontrollers that support USB communications to establish a connection with a target host (such as PC, Laptop, and so forth). It lets you build a slave USB device (HID, Composite, Generic, and others). Connector supports a USB Standard

Type B plug. Detecting whether the USB device is connected to the host or not can be done through the **VBUS** line. This line is traced to microcontroller **PB1** pin. Connection of USB Device is established when **SW5.8** DIP switch is in ON position. When connected to a host a dedicated amber-colored power LED will light up as well. This VCC line cannot be used for powering the board. It's only used for detecting a connection.

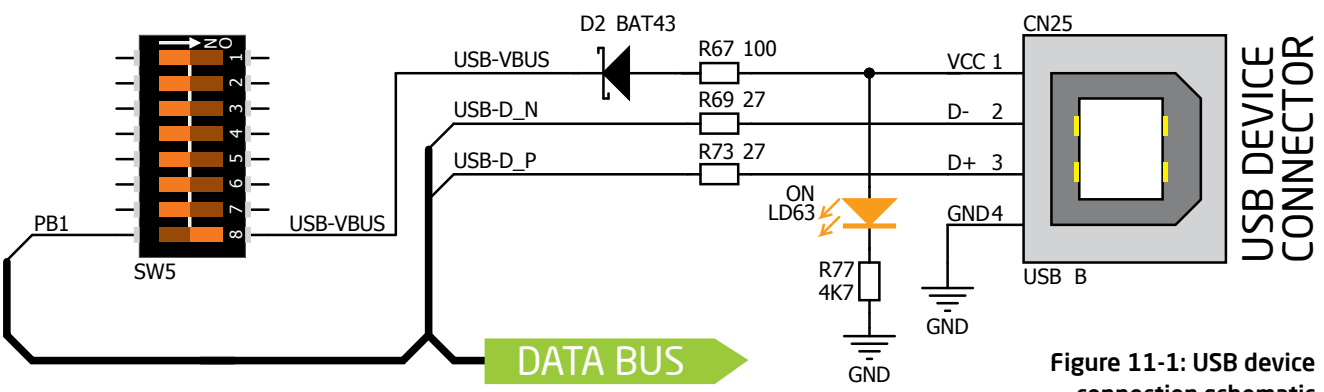


Figure 11-1: USB device connection schematic



Detecting connection

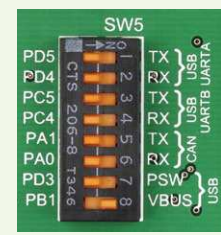


Figure 11-2: Enabling USB DEVICE detection via VBUS line

You can detect whether USB device is plugged into the USB device connector using **VBUS** power detection line (**PB1**). Before using this feature, you must connect **PB1** pin to USB connector using **SW5.8** DIP switch.