



EBV-IoT – Infineon IoTConnect Secure Cloud connected solution

Prerequisites



Version: 1.2
Date: November 2023

Foreword

The EBV-IoT – Infineon IoTConnect Secure Cloud connected solution is a powerful and innovative system that brings together the latest advancements in IoT technology and cloud connectivity to provide a highly secure and reliable platform for businesses looking to embrace the benefits of the Internet of Things. This solution offers a range of features and capabilities that make it ideal for a wide range of applications, from smart homes and buildings to industrial automation and beyond. With its advanced security features, real-time data analytics, and flexible deployment options, the EBV-IoT – Infineon IoTConnect Secure Cloud connected solution is poised to become one of the leading solutions in the fast-growing IoT market.

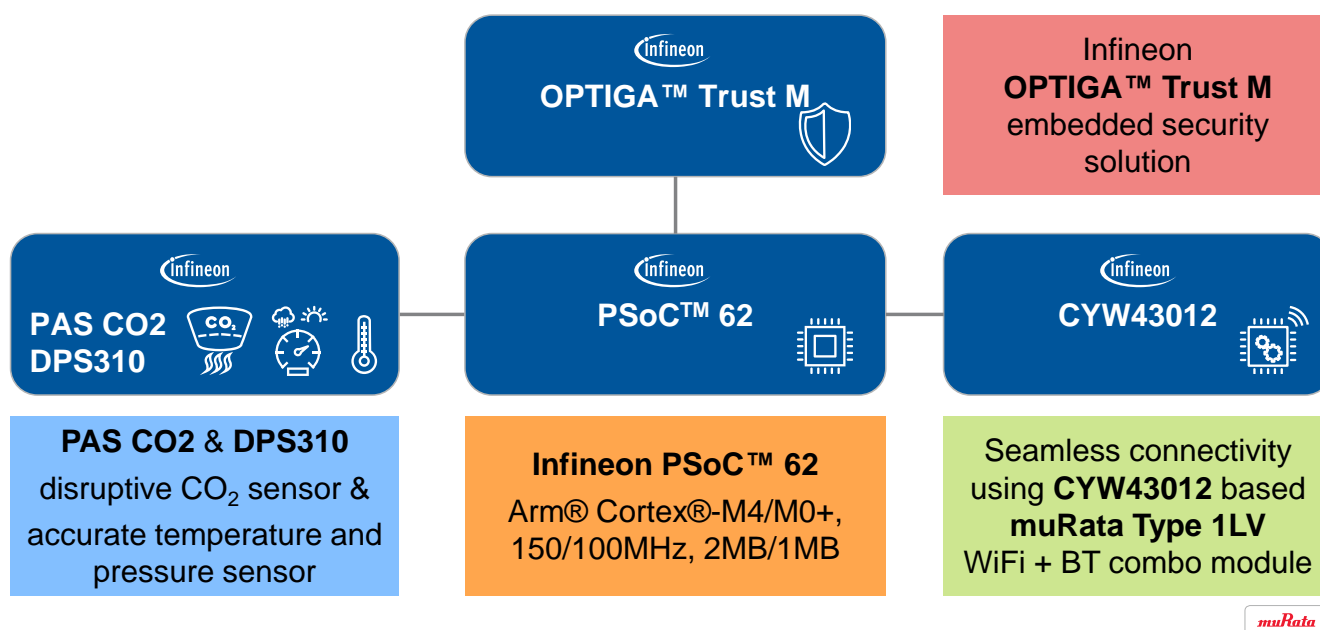
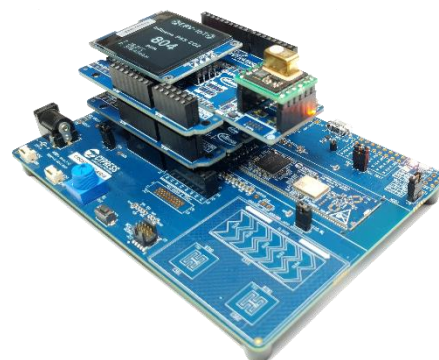


Figure 1: The solution high level overview block diagram

The solution was developed using internal expertise from EBV Elektronik and is built on a foundation of advanced hardware and software components, including Infineon PSoC™ MCU, AIROC™ CYW43012 based muRata Type 1LV WiFi/BT combo module, PAS CO2 and DPS310 pressure sensors using EBV internally developed PAS CO2 and OPTIGA Trust M evaluation shields, as well as the Avnet IoTConnect cloud platform.

The PAS CO2 evaluation shield is designed for seamless evaluation using standard hardware interface and to provide accurate and reliable CO2 monitoring for a wide range of applications, from indoor air quality monitoring to industrial automation. Similarly, the OPTIGA Trust M evaluation shield simplifies access to advanced security features that are critical for ensuring the integrity and confidentiality of data transmitted over the IoT network.

Finally, the Avnet IoTConnect cloud platform provides a highly scalable and flexible cloud infrastructure that enables the secure and efficient management of IoT devices and data. With its advanced analytics and visualization tools, as well as its powerful security features, the Avnet IoTConnect cloud platform is the perfect complement to the above hardware system.

Overall, the EBV-IoT – Infineon IoTConnect Secure Cloud connected solution represents a major leap forward in the world of IoT, providing businesses with a powerful and flexible platform for leveraging the full potential of this exciting technology.



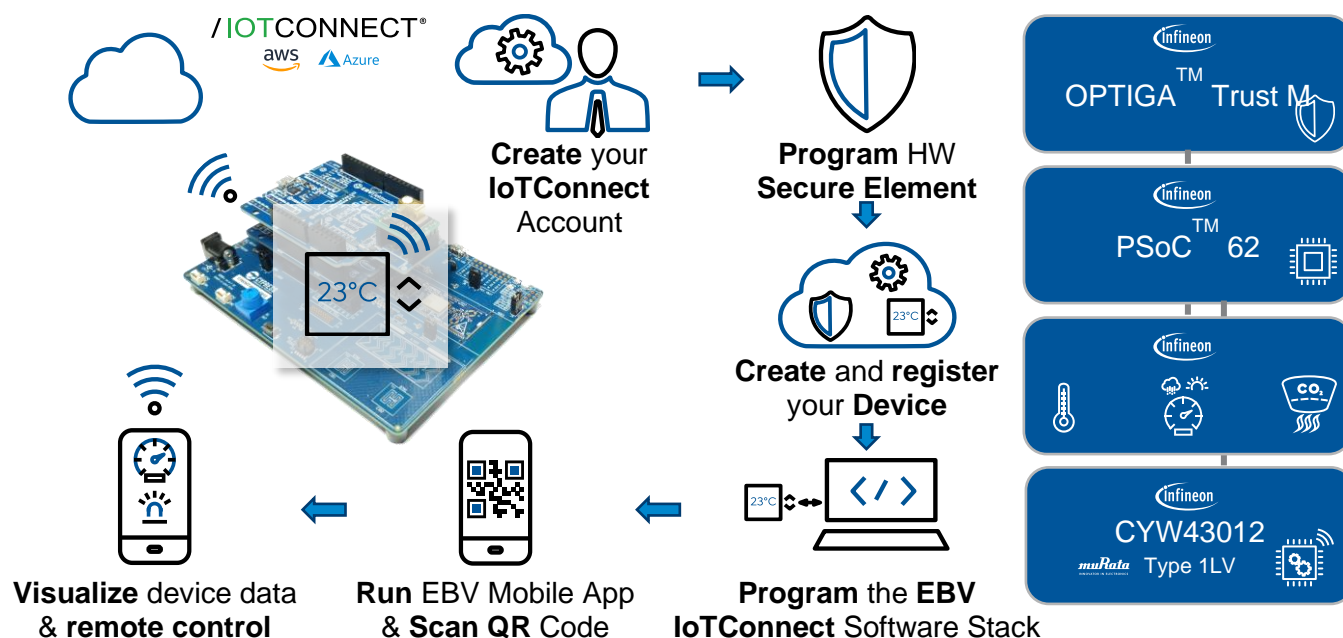
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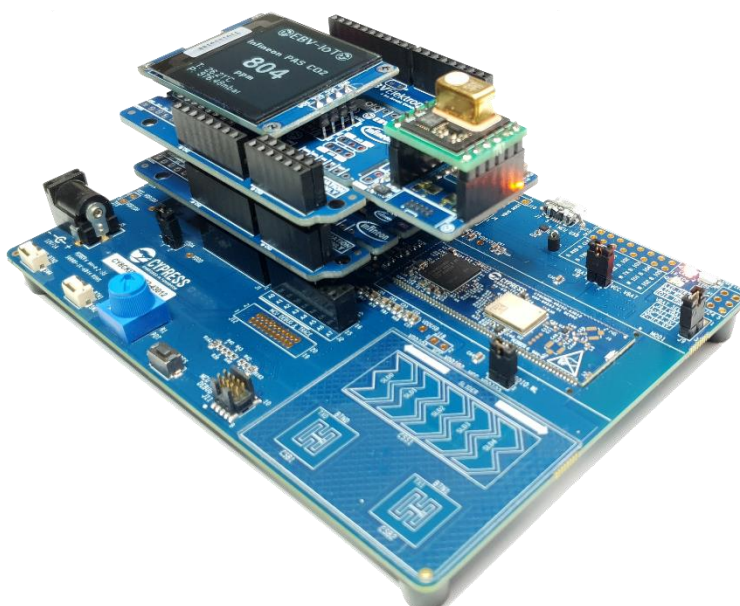


1. Introduction

EBV Elektronik has designed a complete onboarding flow on top of Avnet IoTConnect cloud to simplify device onboarding and cloud platform evaluation. From building a complete cloud environment in an instant, leveraging the challenge of building state of the art secured IoT device (using EBV Elektronik hardware and software), to bringing data to end user via the EBV Mobile App. This cloud ecosystem aims at offering a fast, innovative, and scalable platform which provides real product differentiation to customers at minimal cost.



The goal of this training is to connect the demo setup to the Avnet IoTConnect cloud using one of the best-in-class hardware security thanks to Infineon OPTIGA™ Trust M secure element. As main platform we will be using Infineon PSoC 62 MCU and CYW43012 based Wi-Fi/BT combo connectivity module. A set of Infineon Xensiv™ sensors will complete the device hardware setup to provide a more advanced product.



This training manual will guide you through a hands-on session following every step on the device secure cloud connection path. The training demonstrates how to build, develop and deploy an affordable, state of the art, end-to-end secured solution.



The following topics will be covered:

- Infineon PSoC 62 Programming & JTAG Debugging.
- Infineon OPTIGA Trust M provisioning for IoTConnect Cloud.
- Connecting the demo setup to IoTConnect Cloud.
- Remote Control from the EBV Mobile App.

1.1. Deliverables

The training material is provided during the Training sessions and comes as:

- EBV-IoTC Training Zip (.zip file)
- EBV-IoTC Training no MTB Zip (.zip file without ModusToolbox)

The different resources needed to complete this training (hands-on documentation, datasheets, application notes, software & tools) are included in the delivery. However, the training manual always refer you to latest documentation provided by the manufacturers on their respective websites.

The training Zip is composed of following main folders:

- **EBV Documentation:** documentation and related information for EBV-IoT products
- **Firmware:** PSoC executable for IoTConnect demo
- **Infineon documentation:** documentation and related information for Infineon products
- **MobileApp:** source code for EBV-IoT Mobile Application
- **MTB Project:** ModusToolbox project used to build the IoTConnect Secured Solution
- **Scripts:** Python scripts for Optiga management
- **Sources:** source files for ModusToolbox projects to be used with the training
- **Template:** IoTConnect device template to upload to the cloud.
- **Tools:** installation files for the tools to be used during this training.

In the 'root' folder there are this **training manual** and **training overview**.

1.2. Icon key identifiers

Icons are used to notify about valuable information or point out important steps to follow. These icons are:



Note: Provides valuable information about a specific topic



Tip: Indicates useful tips and techniques



To Do: Highlights objectives to be completed and possible extensions



Task accomplished: Highlights the expected results of the specific task



Important: Indicates important information



1.3. Document conventions

Table 1: Document Conventions for the manual

Convention	Usage
<i>Italic</i>	In document referenced link
<i>Italic-Bold</i>	Externally referenced link
Bold	Clickable menu item
Bold Squared	Clickable web page or menu item to be clicked during the tasks
Conso <code>las</code>	Commands to be executed or messages displayed in terminal

1.4. Hardware prerequisites



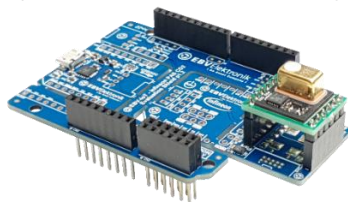
Important: To run the complete workshop hands on part a computer with admin/root rights should be used. Windows OS is preferred, while for Linux should be able to run as well.

Following evaluation hardware is going to be used during the training:

- The PSoC™ 62S2 Wi-Fi BT Pioneer Kit (CY8CKIT-062S2-43012)
- EBV-IoT – Infineon PAS CO2 Evaluation Shield
- EBV-IoT – Infineon OPTIGA Trust M Evaluation Shield
- 128x128 pixels OLED display (optional)



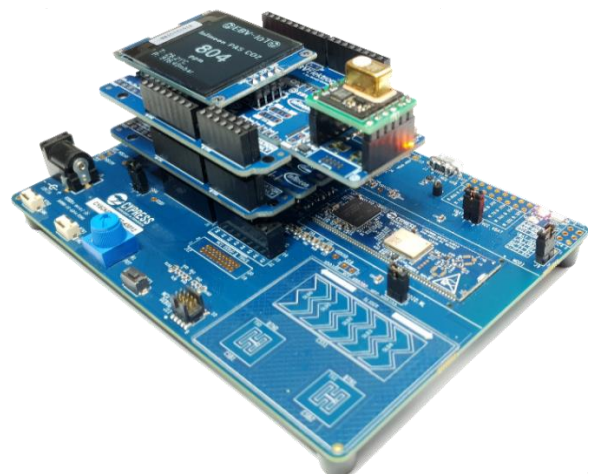
The PSoC™ 62S2 Wi-Fi BT Pioneer Kit
(CY8CKIT-062S2-43012)



EBV-IoT – Infineon PAS CO2 Evaluation Shield



EBV-IoT – Infineon OPTIGA Trust M Evaluation Shield



1.5. Software prerequisites

1.5.1 Installing ModusToolbox™



Note: For the “Quick Start” version of the Infineon IoTConnect Cloud connected solution ModusToolbox™ is not required and you can skip to Sub-section 1.5.2 *Installing ModusToolbox™ Programmer*. However, if you would like to get familiar with Infineon ModusToolbox™, we still recommend installing it for your reference.

Please refer to the Infineon’s **ModusToolbox™ Software** pages for application download and “Installation guide” ([link](#)).



Note: It is strongly recommended to install the tool into the root of any of your disk drives e.g. “D:/Infineon”. Please do keep the name as short as possible and do not use spaces or any special characters.

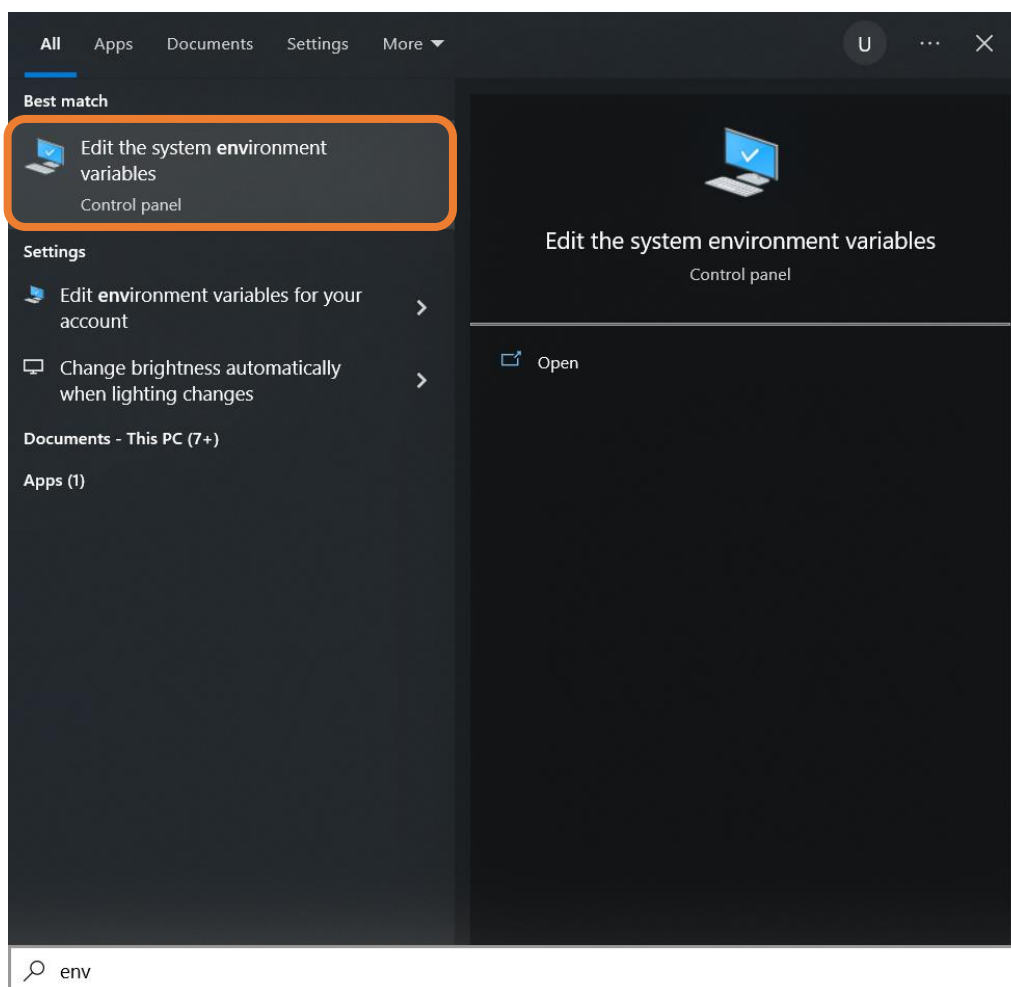
Default location of installation directory for the Eclipse IDE is:

```
<install_path>ModusToolbox\ide_<version>\eclipse\
```

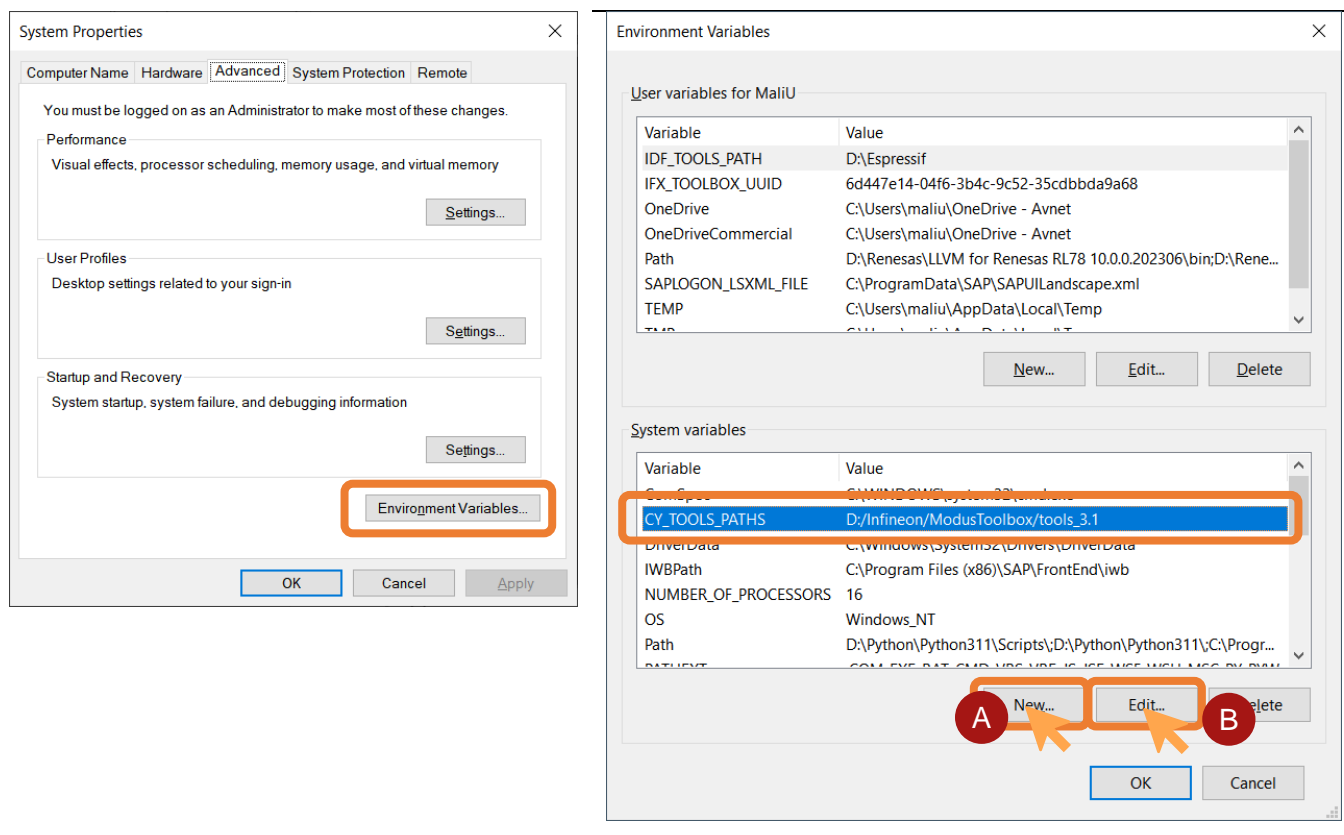


Important: If the software is installed in any other than default location you have to set an environment variable. Please follow the **ModusToolbox installation guide** or follow next steps.

To check for ModusToolBox environmental variable setting, under Windows **Start menu** or **Windows search** type in “env”... . The **Edit the system variables** should soon be listed on top as shown on Figure below.

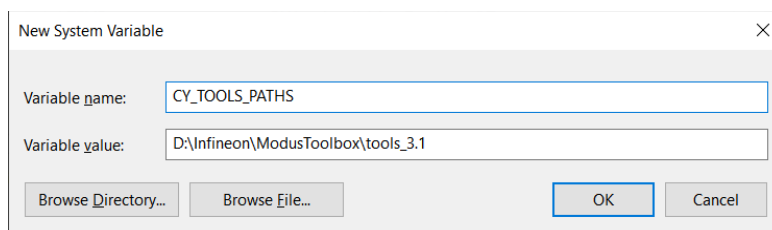


Now click on **Environmental Variables** and look for “System Variable” CY_TOOLS_PATHS.

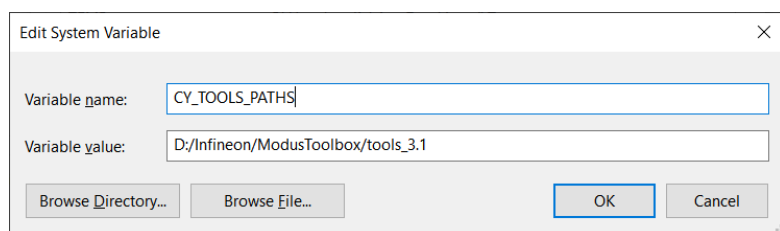


Please proceed accordingly:

- A. If the variable does not exist, then in “Environment Variables” window click **New**, then in new pop-up window “New System Variable” at “Variable name” type CY_TOOLS_PATHS and in “Variable value” put your ModusToolBox path or browse using **Browse Directory**. Then click **OK** as well as click **OK** in “Environment Variables” window.



- B. If the variable exist, then in “Environment Variables” window click **Edit**, then in new pop-up window “Edit System Variable” check if “Variable name” matches to CY_TOOLS_PATHS and “Variable value” matches to your ModusToolBox path or browse using **Browse Directory**. Then Click **OK** as well as click **OK** in “Environment Variables” window.



After successful installation you should be able to see the tools installed in your start menu under “ModusToolbox 3.1 (Current user)”.



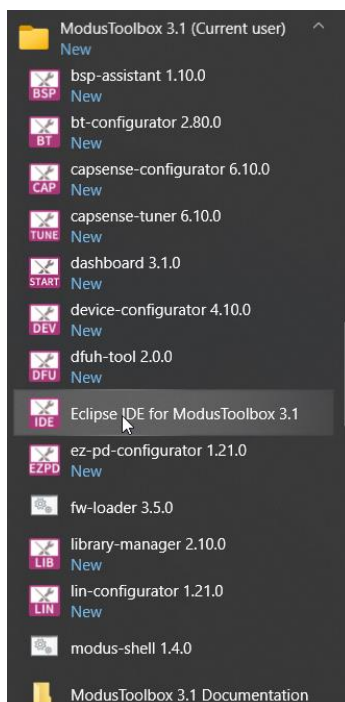
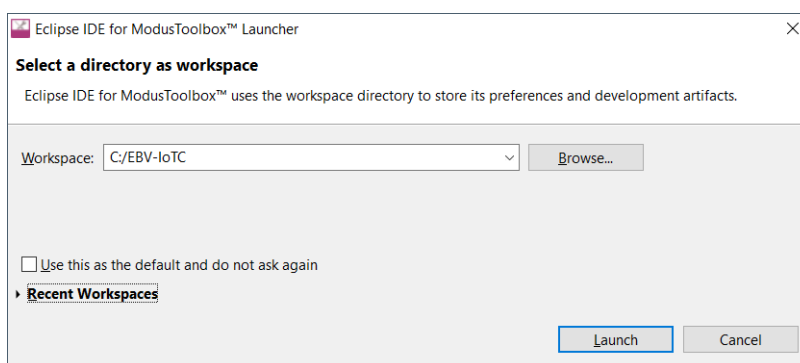


Figure 2: Start menu with ModusToolbox installed

If clicked on **Eclipse IDE for ModusToolBox 3.1** you will see a “Launcher” window popping out.



Task accomplished: If you can run “Eclipse IDE for ModusToolbox™ Launcher” and a workspace selection window is opening, you are good to proceed to a next step.

1.5.2 Installing ModusToolbox™ Programmer



Note: For the “Full” version of the Infineon IoTConnect Cloud connected solution ModusToolbox™ Programmer is not required and you can skip to Sub-section 1.5.3 *Running Python* (“modus-shell”)

Please refer to the Infineon’s **ModusToolbox™ Programmer Software** pages for application download and “ModusToolbox™ Programming GUI user guide” ([link](#)) for installing instructions.

After successful installation you should be able to see the tools installed in your start menu under:

1. “Recently added→mtb-programmer x.x”, or
2. “Infineon technologies→mtb-programmer x.x”

where x.x denotes version of the installed tool.



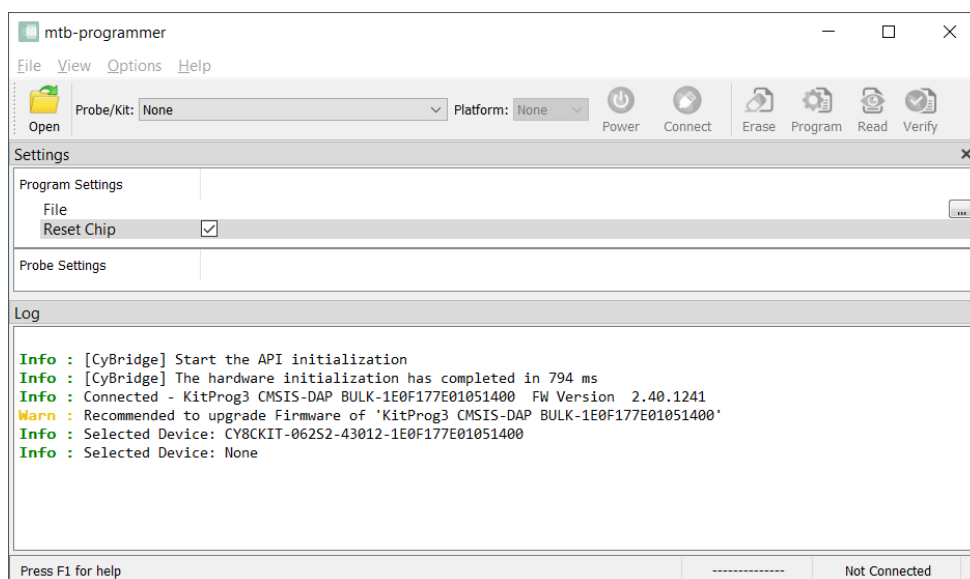
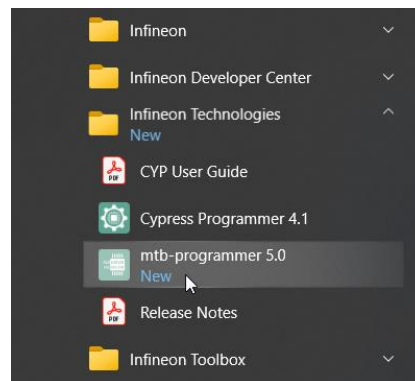
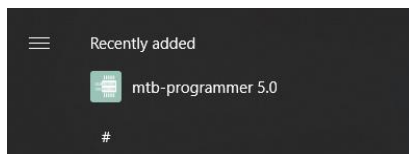


Figure 3: ModusToolbox™ Programmer



Task accomplished: If you can run “mtb-programmer” as depicted in *Figure 3: ModusToolbox™ Programmer* you are good to proceed to a next step.

1.5.3 Running Python (“modus-shell”)

Python is required for OPTIGA™ Trust M provisioning.



Note: If you have Python already installed you can proceed to a step *1.5.4 Installing “optigatrust” Python module.*



If you do not have Python nor ModusToolbox™ (as one of the prerequisites of the “Full” version of the workshop) installed, you can either:

1. Install Python from the “python.org” pages ([link](#)), or
2. Install ModusToolbox™ (as in Sub-section 1.5.1 *Installing ModusToolbox™*) which comes with “modus-shell” Python instance as part of the installation

Having ModusToolbox™ installed, the easiest way of running “modus-shell” is to look for it under Windows search by typing in “modus”... . The application should soon be listed on top as shown on *Figure 4*. Click on the “App” to run the application.

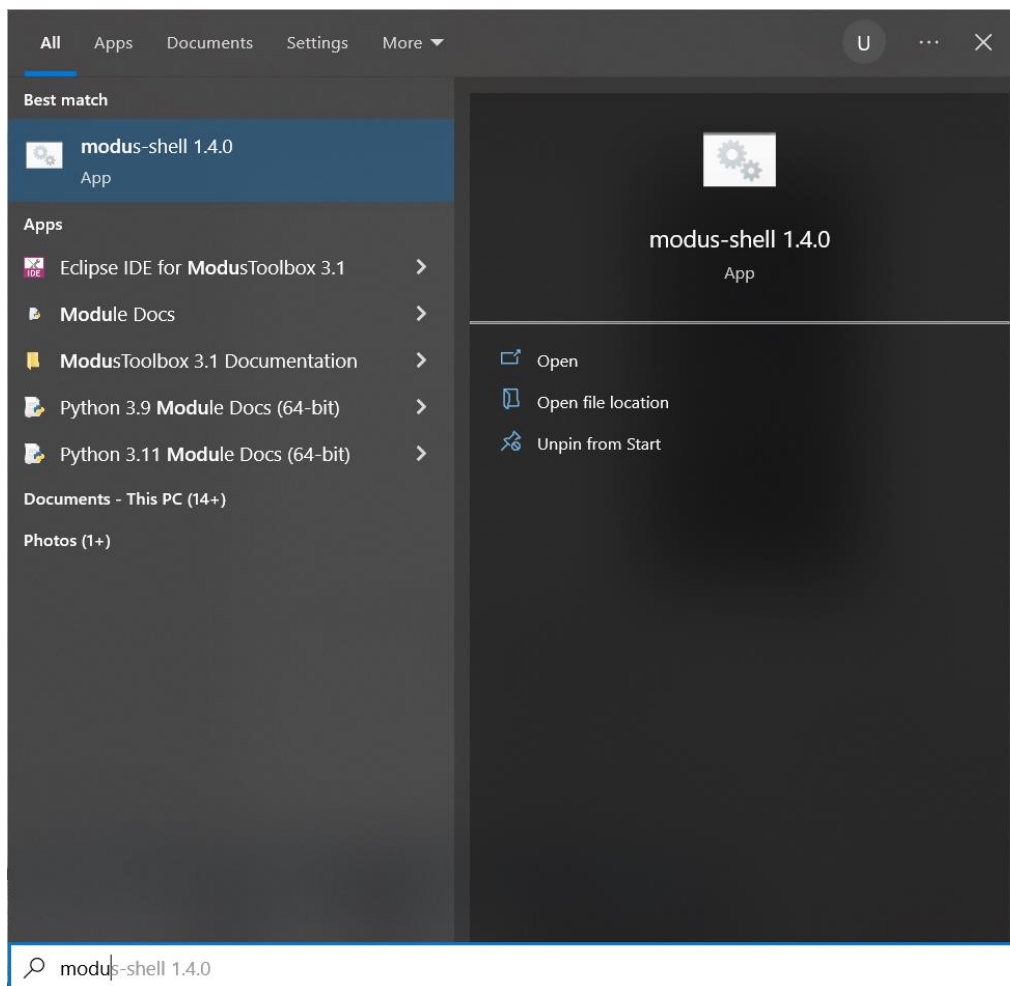


Figure 4: Starting “modus-shell”

Now run either your instance of Python or “modus-shell” Python instance. Please check whether “optigatrust” Python module is installed. Type “optigatrust.exe” into the terminal. If your replay is “bash: optigatrust.exe: command not found”, please proceed to Sub-section 1.5.4 *Installing “optigatrust” Python module* otherwise proceed to Sub-section 1.5.5 *Installing other Python modules*.

```

user@computer_name ~
$ optigatrust.exe
bash: optigatrust.exe: command not found

user@computer_name ~
$
  
```

1.5.4 Installing “optigatrust” Python module

Please install the “optigatrust” Python module by executing “pip install optigatrust”. Installation is successful if “Successfully installed...” message appears.



```

user@computer_name ~
$ pip install optigatrust
Collecting optigatrust
  Downloading optigatrust-1.3.7-py3-none-any.whl (493 kB)
    |#####| 493 kB 2.2 MB/s
Requirement already satisfied: cryptography in d:\infineon\modustoolbox\tools_3.0\python\lib\site-
packages (from optigatrust) (36.0.1)
Requirement already satisfied: click in d:\infineon\modustoolbox\tools_3.0\python\lib\site-packages
(from optigatrust) (8.0.4)
Collecting jinja2
  Downloading Jinja2-3.1.2-py3-none-any.whl (133 kB)
    |#####| 133 kB 6.8 MB/s
Collecting pyserial
  Using cached pyserial-3.5-py2.py3-none-any.whl (90 kB)
Collecting asn1crypto
  Downloading asn1crypto-1.5.1-py2.py3-none-any.whl (105 kB)
    |#####| 105 kB 6.4 MB/s
Requirement already satisfied: colorama in d:\infineon\modustoolbox\tools_3.0\python\lib\site-
packages (from click->optigatrust) (0.4.5)
Requirement already satisfied: cffi>=1.12 in d:\infineon\modustoolbox\tools_3.0\python\lib\site-
packages (from cryptography->optigatrust) (1.15.1)
Requirement already satisfied: pycparser in d:\infineon\modustoolbox\tools_3.0\python\lib\site-
packages (from cffi>=1.12->cryptography->optigatrust) (2.21)
Collecting MarkupSafe>=2.0
  Downloading MarkupSafe-2.1.2-cp38-cp38-win_amd64.whl (16 kB)
Installing collected packages: MarkupSafe, pyserial, jinja2, asn1crypto, optigatrust
Successfully installed MarkupSafe-2.1.2 asn1crypto-1.5.1 jinja2-3.1.2 optigatrust-1.3.7 pyserial-3.5
WARNING: You are using pip version 21.1.3; however, version 23.0.1 is available.
You should consider upgrading via the 'D:\Infineon\ModusToolbox\tools_3.0\python\python.exe -m pip
install --upgrade pip' command.

user@computer_name ~
$
  
```

Quick check for proper “optigatrust” Python module installation is to run “optigatrust” or “optigatrust.exe” command. We should see a replay with short usage instructions.

```

user@computer_name ~
$ optigatrust.exe
Usage: optigatrust [OPTIONS] COMMAND [ARGS]...

Options:
  --version  Show the version and exit.
  --help     Show this message and exit.

Commands:
  create-keys  Generate a keypair
  object       Manages objects data and metadata
  update       Use protected update feature
  update-wizard  Guide through the protected update preparation for a...

user@computer_name ~
$
  
```

1.5.5 Installing other Python modules

To run all the steps related to secure element interfacing using Python scripts, we need to add OpenSSL, QrCode and image related modules. Please install the modules using following commands:

- “pip install pyopenssl”
- “pip install pillow”
- “pip install qrcode”



```

user@computer_name ~
$ pip list
Package            Version
-----
appdirs             1.4.4
.
openssl-python     0.1.1
optigatrust         1.3.7
Pillow              9.5.0
.
pyOpenSSL           23.1.1
.
qrcode              7.4.2
.
WARNING: You are using pip version 21.1.3; however, version 23.1.2 is available.
You should consider upgrading via the 'D:\Infineon\ModusToolbox\tools_3.0\python\python.exe -m pip
install --upgrade pip'

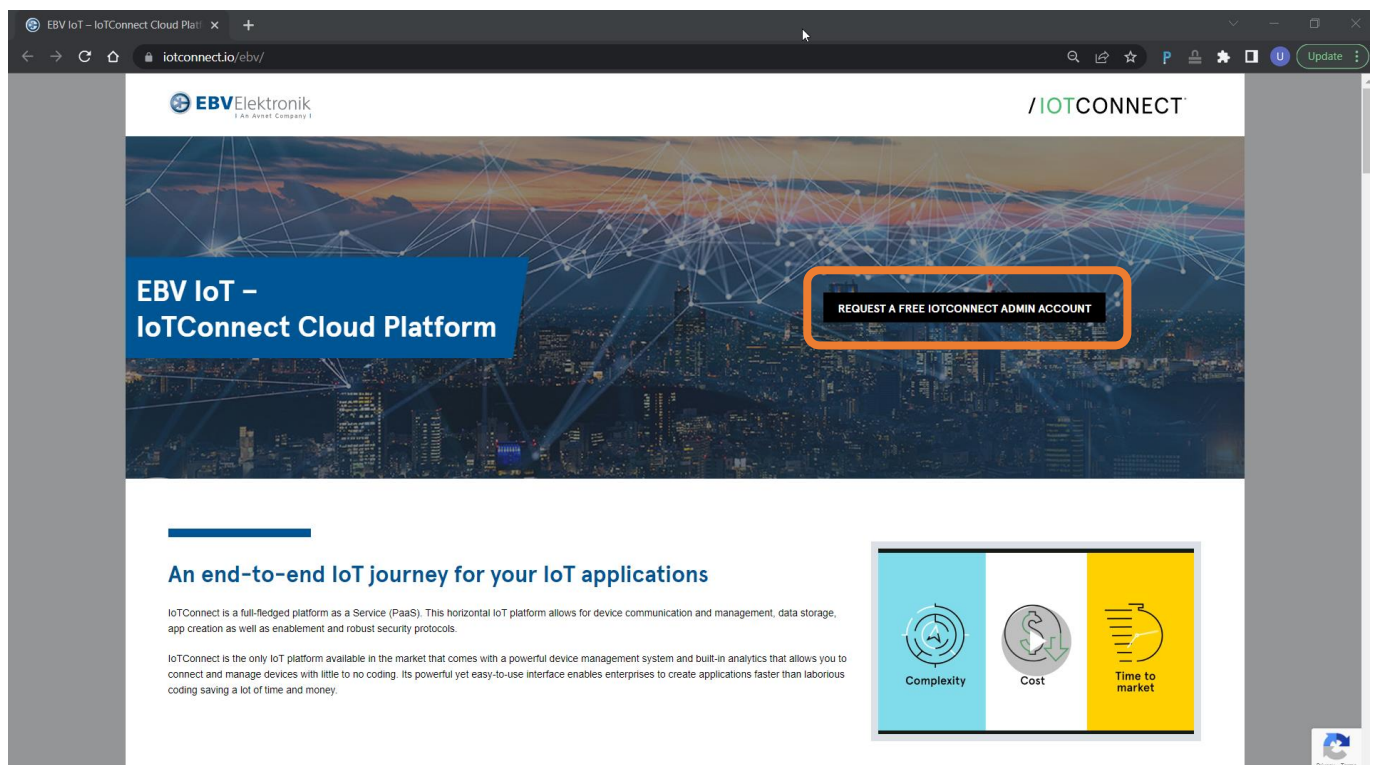
command.user@computer_name ~
$
  
```



Task accomplished: If your “pip list” is listing “optigatrust”, “pyopenssl”, “pillow”, and “qrcode” you are fulfilling Python related requirements.

1.6. Create IoTConnect cloud account

As a first step in every cloud platform it is to create your cloud access account. Use your favourite browser to access EBV IoTConnect website at <https://iotconnect.io/ebv> and click **“Request a Free IoTConnect Account”**:



Enter your details and make sure your email address is valid then click **Submit** button:

Request a Free IoTConnect Admin Account

FIRST NAME *

LAST NAME *

EMAIL *

PASSWORD *

COMPANY NAME *

COUNTRY CODE * PHONE *

ADDRESS *

COUNTRY *
Select Country

STATE *
Select State

TIMEZONE *
(UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna

CITY NAME *

POSTAL CODE *

SUBMIT



Important: Password must contain at least 1 upper case and special character.

If the provided information is correct, a confirmation popup invites you to check your emails for an email with a link to validate your email address. Press **OK** button: Usually, the browser returns you to the beginning of the page.

iotconnect.io says

Your details have been saved successfully. Please check your inbox to verify your email address and complete registration process.

OK

Please check your mailbox. You should be receiving email with a content like one bellow. Click on **Verify Email Now**.

Hello Uros Mali,

Welcome to IoTConnect!

Please click below link to verify your email address and complete the registration process for your free IoTConnect account.

[Verify Email Now](#)

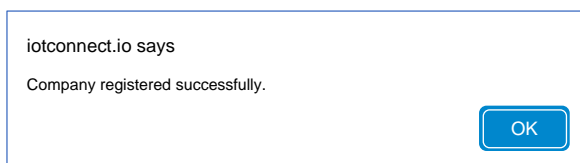
Best Regards,
The IoTConnect team

ssc@ebv.com

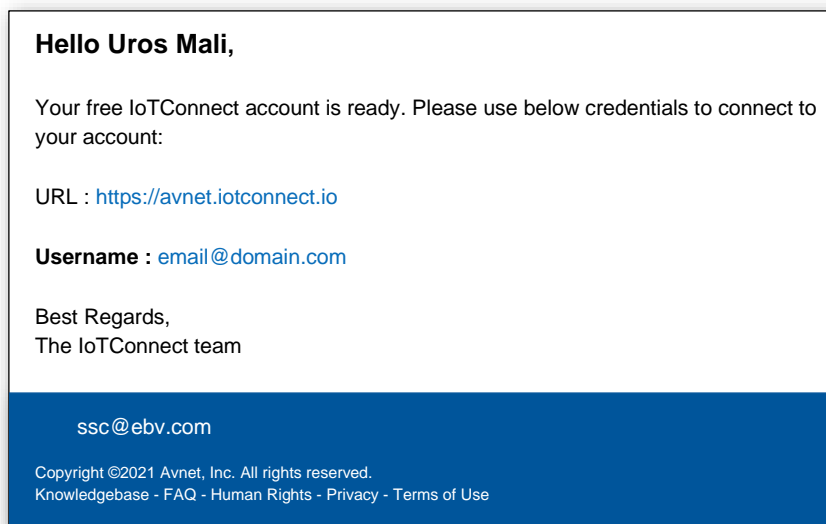
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Knowledgebase - FAQ - Human Rights - Privacy - Terms of Use



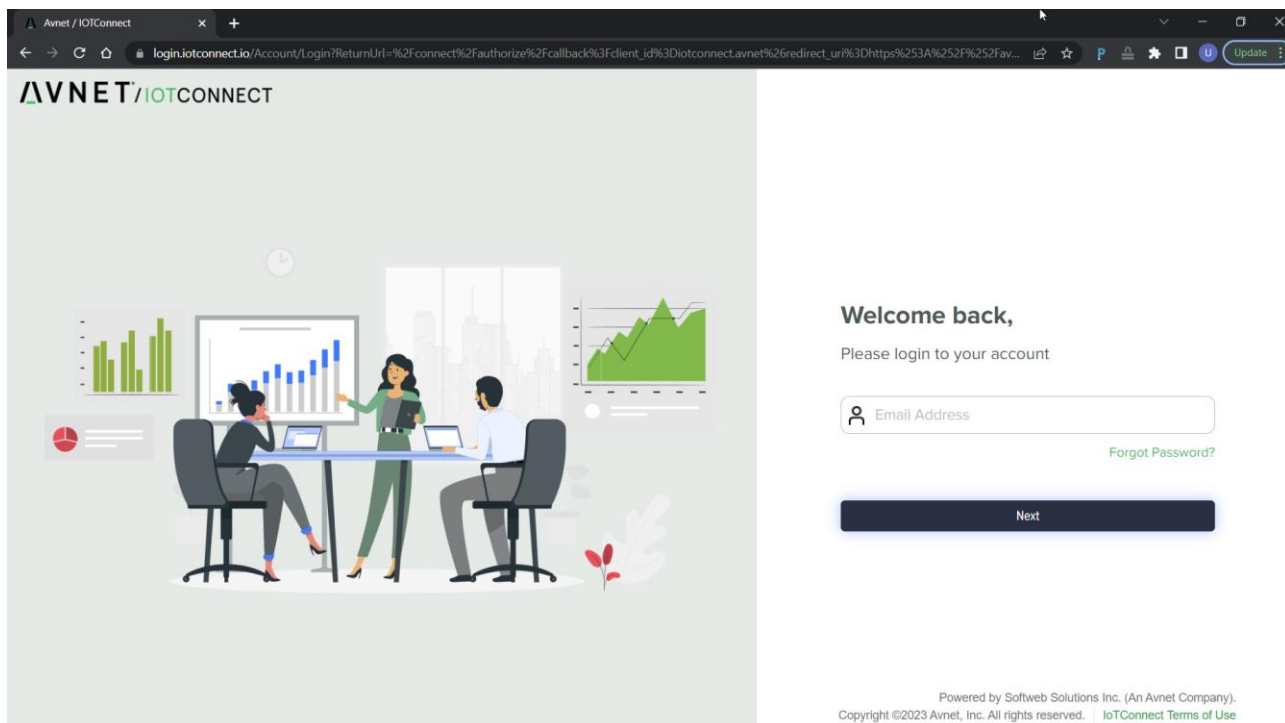
The webpage loads again and process the creation of your account in the background. Once complete, below popup should open to confirm your IoTConnect account has been created successfully. Click **OK** button:



Please check your mailbox. You should now get confirmation email with a link the cloud platform.



Login to the cloud using email and password you provided during registration process.



If it happens you forgot your password, you can reset the password by clicking **Forgot Password?** at login page.



Reset your password by providing new one and confirmation of the same password and click **Submit**.



Important: Password must contain at least 1 upper case and special character.

Avnet / IoTConnect

login.iotconnect.io/Account/resetpassword?returnUrl=%2Fconnect%2Fauthorize...

AVNET / **IOTCONNECT**

Welcome back,
Reset your password

Password

Confirm Password

Submit

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You should be now seeing “Welcome back” page.

Avnet / IoTConnect

login.iotconnect.io/Account/login?returnUrl=%2Fconnect%2Fauthorize%2Fcallback...

AVNET / **IOTCONNECT**

Password changed successfully.

Welcome back,
Please login to your account

Email Address

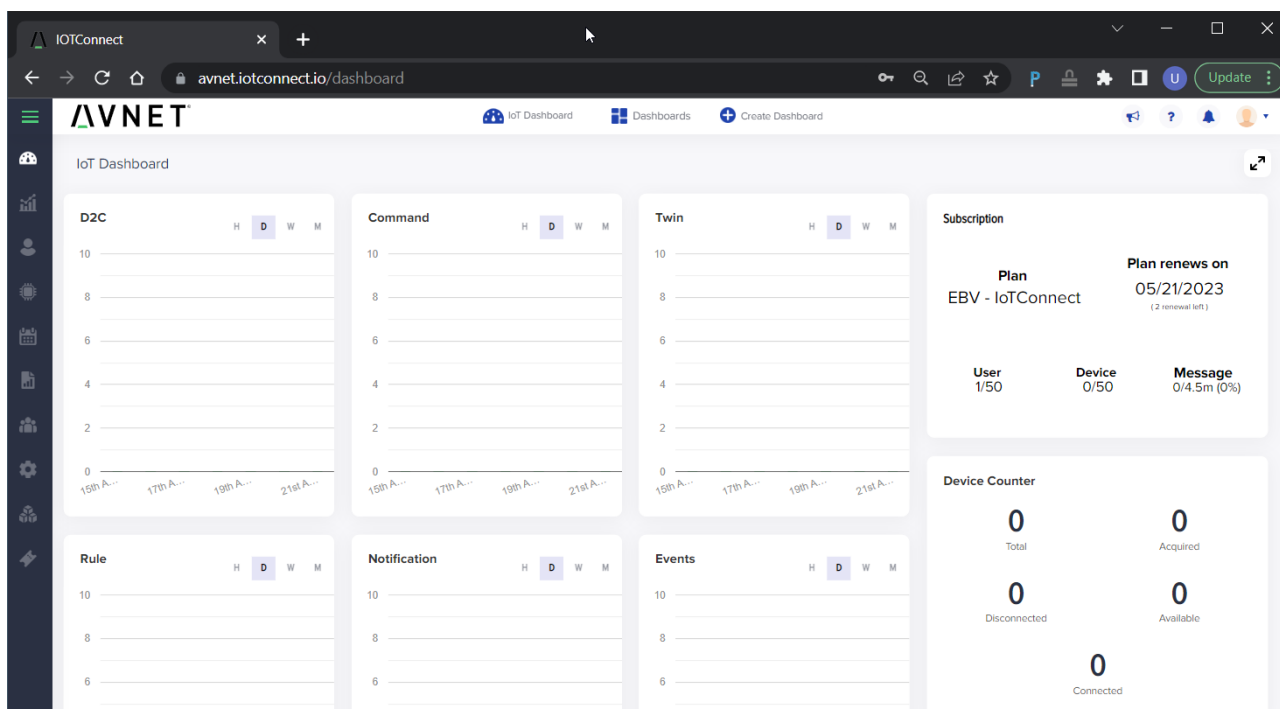
[Forgot Password?](#)

Next

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After a successful login, the IoTConnect backend will land to the Dashboard page showing information related to device activities (device to cloud messages, command, twin properties, rule, notification, events, etc) and the current subscription plan:



Task accomplished: Congratulations, you have just created your free Avnet IoTConnect cloud account. Save your IoTConnect login credentials securely for your next use.



Revision history

Revision	Date	Notes
0.1	April 18 th , 2023	First draft
1.0	May 23 rd , 2023	Initial release
1.1	September 8 th , 2023	Minor corrections, removed source changes, update for MTB 3.1,
1.2	November 30 th , 2023	Extension for “Full” + “Quick start” versions



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