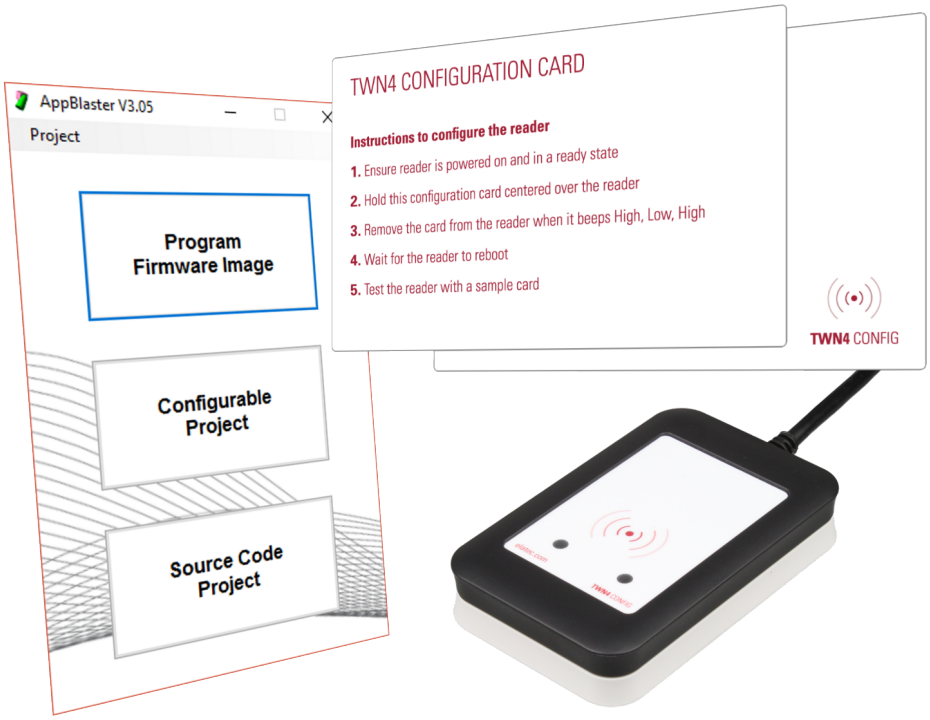
TWN4

AppBlaster User Guide

DocRev13, March 21, 2024



ELATEC GmbH

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1 Overview

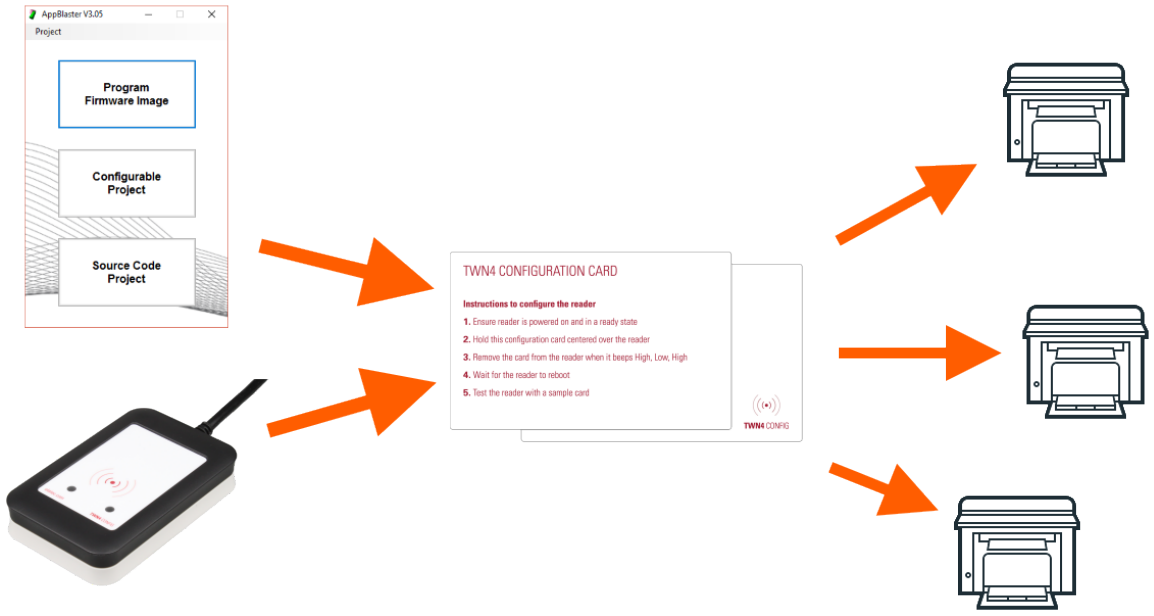
You received the AppBlaster as part of the developer pack for TWN4, which is distributed as a zip file.

AppBlaster is a program, which allows to configure and program TWN4 for a specific application.

There are three ways to prepare TWN4 for operation:

1. Directly program an appropriate firmware image into TWN4
2. Interactive configuration of TWN4 with AppBlaster
3. Write an App for TWN4 in programming language C

Moreover, TWN4 now can be configured with configuration cards via RF interface:



For usage of configuration cards, please see separate document "TWN4 Configuration Cards".

2 System Requirements

There are the minimum system requirements for a serious use of the TWN4 developer pack :

- Operating system: Microsoft Windows 7 or later, 32 or 64 bit
- Microsoft .NET Framework 4.7.2
- Processor (CPU): 2 GHz
- Hard Disk: 100 MB
- RAM: 4 GB

3 Installation

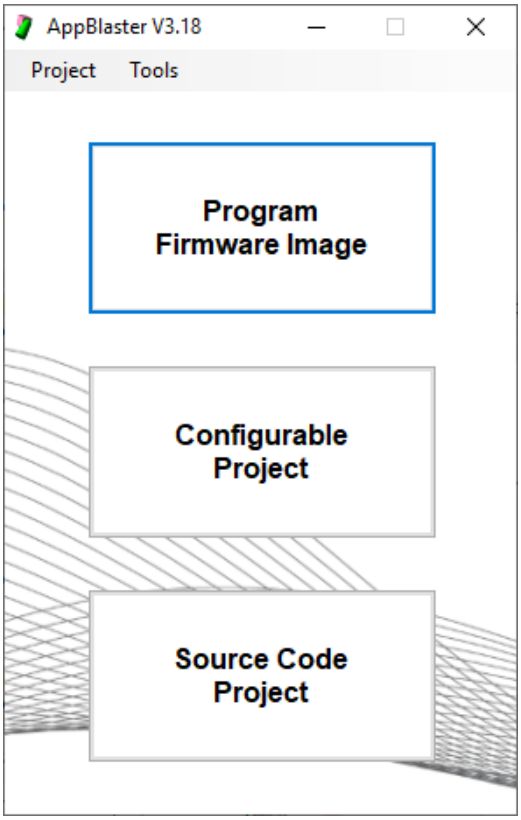
You received AppBlaster as part of the developer pack for TWN4, which is distributed as a zip file.

In order to install the package, please follow these steps:

- Create an empty directory on your hard disk
- Unzip the entire content of the zip file into this empty directory
- The program AppBlaster can be found in the top directory of the TWN4 developer pack.

4 Starting AppBlaster

In order to start AppBlaster, move to base directory of the installed TWN4 developer pack and execute program AppBlaster.exe. The start dialog appears:



The start dialog offers three choices.

Depending on the task being achieved, click appropriate button:

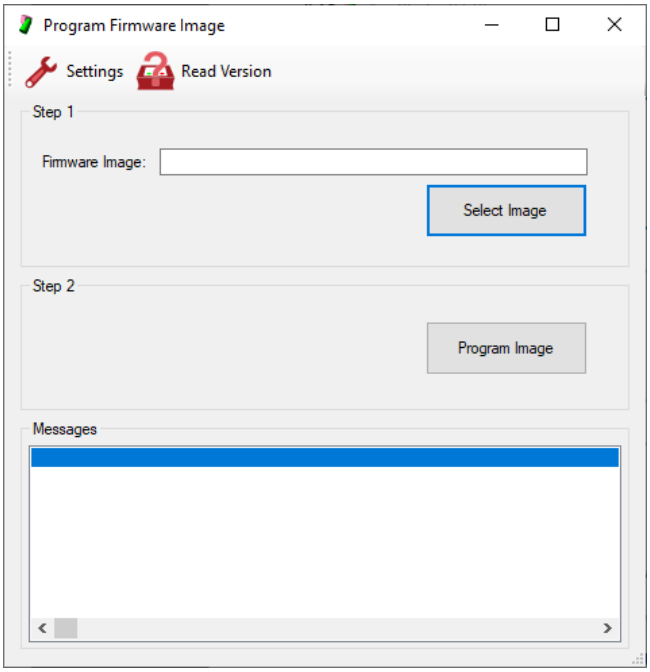
- Button "Program Firmware Image": Program TWN4 with a firmware image
- Button "Configurable Project": Start a new project for TWN4, where setup is done via an interactive configuration.
- Button "Source Code Project": Write your App for TWN4 in C programming language.

Additionally, an existing project can be loaded from disk via selection in the menu.

- Menu "Project - Load": Load a previously saved project. This might be either a configurable project or a source code project.

5 Programming Firmware Image

If you got a compiled firmware image, there is the possibility to program such files from within AppBlaster into a TWN4 device. In order to do this, click button "Program Firmware Image" in the start dialog. Another dialog opens:



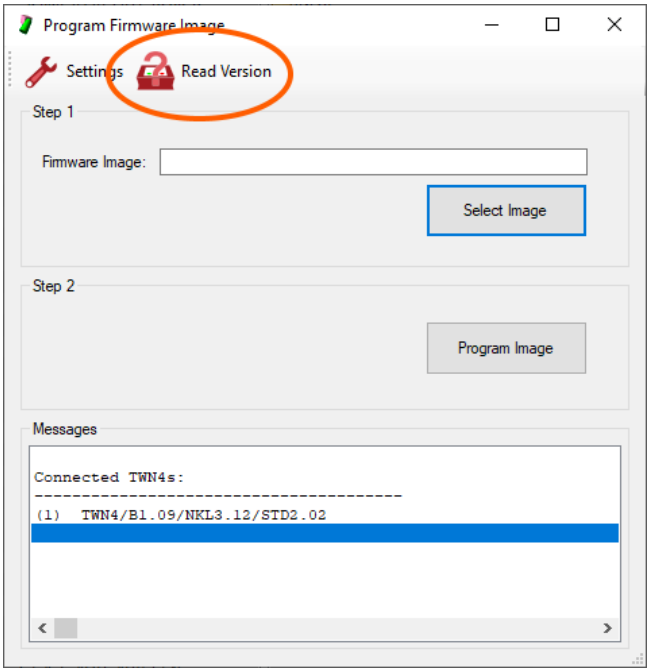
Follow these steps:

1. In "Step 1" choose the file of interest by clicking button "Select Image". Another way is to enter the known path and file name directly into the text box. The file extension for appropriate firmware images is ".bix".
2. In "Step 2" click button "Program Image". This will immediately start the programming sequence. After a few seconds, the step will be completed.

6 Read Version of Connected USB Devices

Following steps:

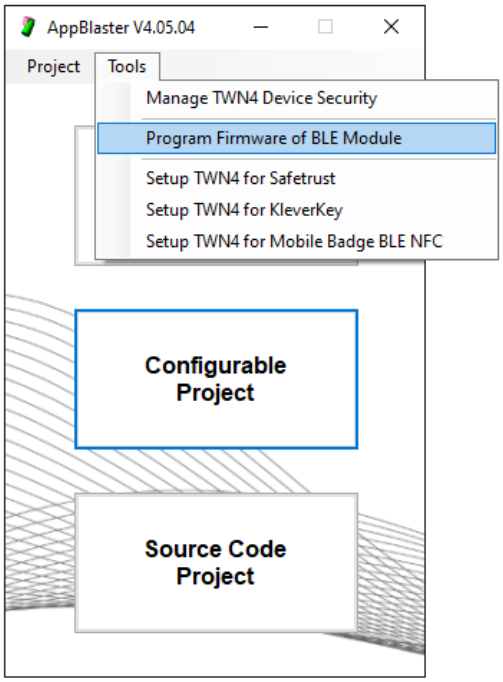
1. In the start dialog click button "Program Firmware Image". The dialog "Program Firmware Image" appears.
2. Click "Read Version" from the tool bar. AppBlaster lists all TWN4, which can be found on the USB bus.



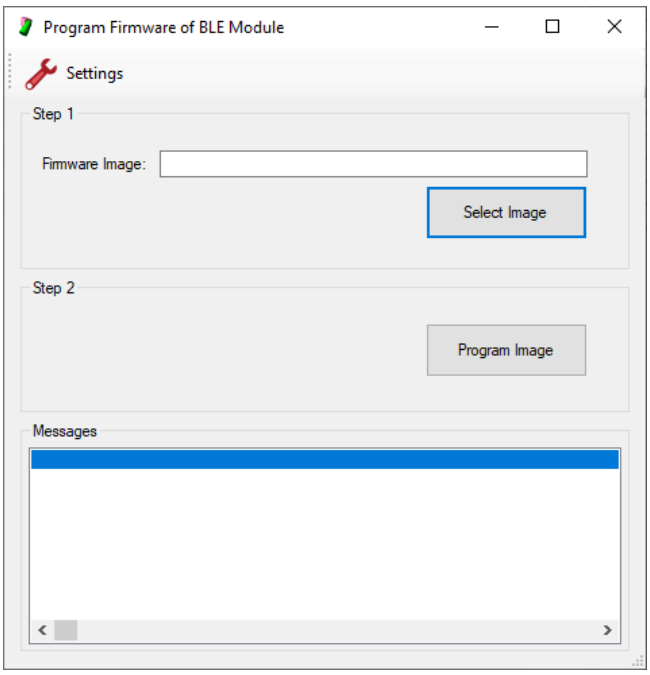
7 Programming Firmware of BLE Module

Following steps:

- In the start dialog select Tools - Program BLE Module. A dialog opens, which guids through the next steps.



- In "Step 1" choose the file of interest by clicking button "Select Image". Another way is to enter the known path and file name directly into the text box. The file extension for appropriate BLE firmware images is ".gbl".
- In "Step 2" click button "Program Image". This will immediately start the programming sequence. After a few seconds, the step will be completed.

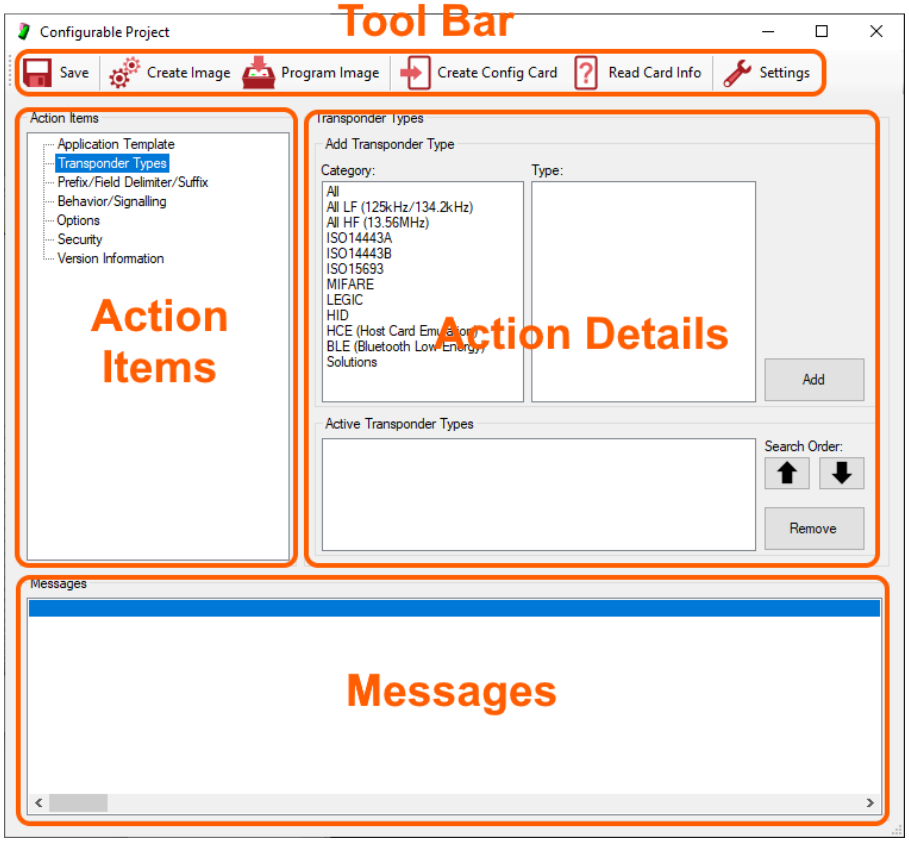


8 Configurable Project

In order to create a configurable project, click button "Configurable Project" in the start dialog. Another dialog appears, the project dialog.

This project dialog is separated into several sections, which allow user input and do output from the program:

- Tool Bar: Buttons in the tool bar let you start specific actions at any time
- Action Items: There are several action items, which can or must be done to complete a project
- Action Details: For every action item, there are details which can or must be entered
- Messages: AppBlaster is giving feedback on actions, which are started from the tool bar. Furthermore, error messages are displayed in this area.



Once a configured project has been started, there are several steps, which must or can be followed.

8.1 Step 1: Select an Application Template

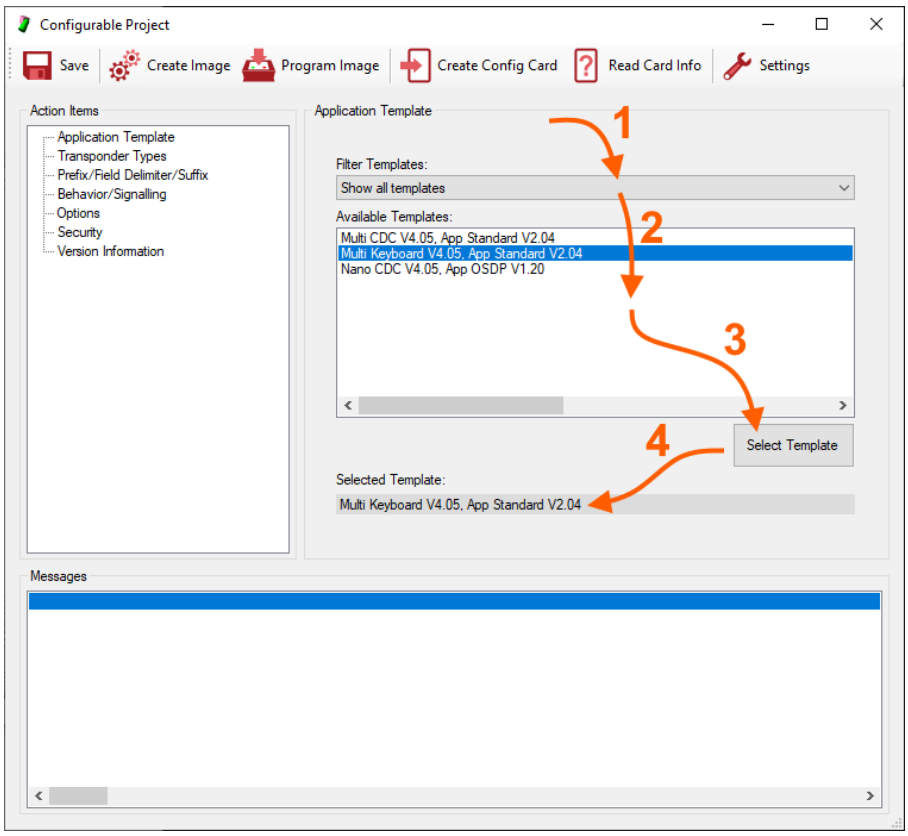
AppBlaster is delivered with several Application Templates ("template"). A template defines the type of application to be created. The selection of the template has an impact on the supported hardware and functionality. Even though, the selection must be done carefully, AppBlaster makes the choice of appropriate template easier, because the templates supplied with the latest developer pack do not distinguish between the supported type of hardware.

A template, which supports several types of hardware is called MultiBIX-template. It can be recognized by the word "Multi" in the file name instead of "Core", "Mini" or "Nano". If a template can only support a single type of hardware, it is still delivered as a normal template, e.g. "Nano" for the OSDP template, because the entire TWN Palon series is based on the Nano-type of hardware.

Notes:

- If a MultiBIX-template is selected, the resulting firmware image is also a MultiBIX firmware image and therefore can be installed on multiple types of TWN4 hardware.
- Please contact ELATEC GmbH, if non-MultiBIX-templates are required for special purposes, e.g. programming TWN4 with older tools, which cannot be replaced easily.

The list of available templates can be filtered by the support of a specific type of hardware. This is accomplished by the selection in the combo box "Filter Templates".



1. Select appropriate template in the list box "Available Templates". Currently, there are three templates available:
   - USB CDC (virtual COM port) with configurable standard app

- USB Keyboard with configurable standard app
- USB CDC with configurable OSDP stack (typically programmed via USB and normal operation with built-in RS-485 interface).

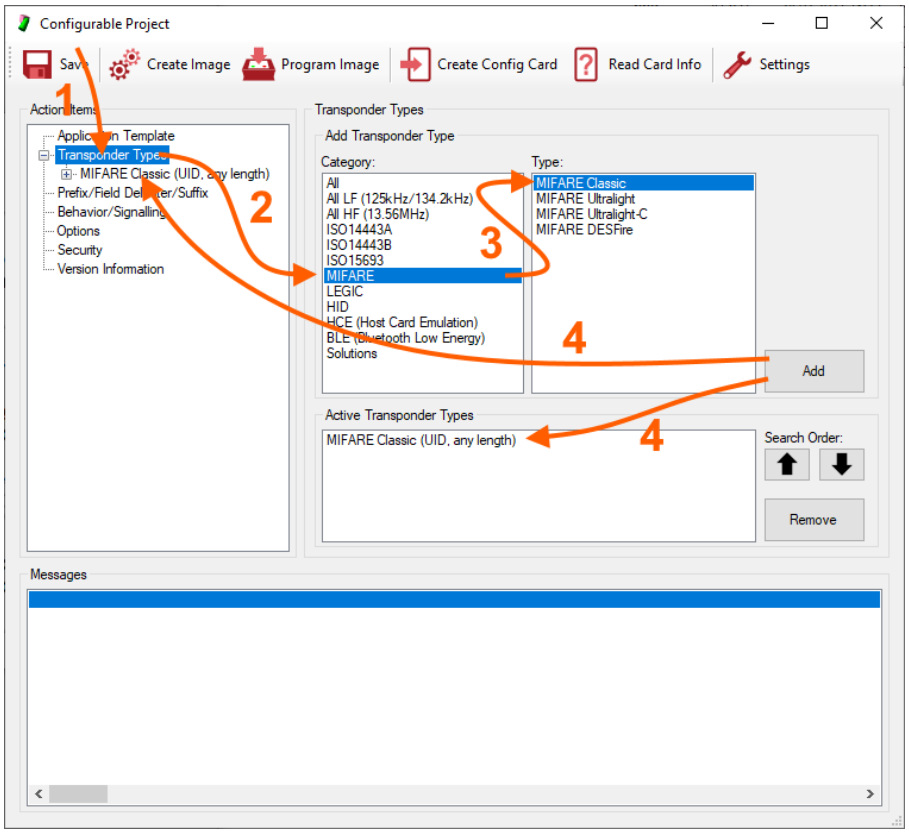
2. Double click template or click button "Select Template"
3. The selected template is displayed in a text box.

Note:

- If you would like to operate TWN4 via RS-232, selecting CDC or keyboard makes no difference. RS-232 is supported by both types of templates identically.

8.2 Step 2: Add Transponder Types

In your specific application, one, two or even more types of transponders might be involved. Here are the typical steps through the dialog in order to add one type of transponder:



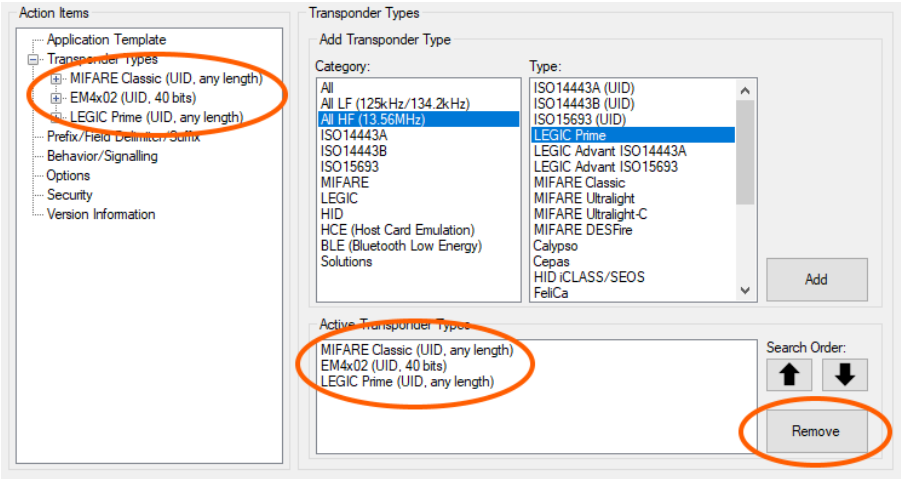
Following (sub-)steps:

1. Select "Transponder Types" from "Action Items".
2. The list box "Category" divides all technologies ("types") supported by TWN4 into several criteria. A supported technology can be listed under several positions depending on their properties. E.g. "MIFARE Classic" can be found under "All", "All HF (13.56MHz)", "ISO14443A" and "MIFARE".
3. Selecting a specific category lists all available technologies belonging to that category in the list box "Type".
4. Once the wanted type is selected, the button "Add" can be clicked. As a result, the selected type is added at two places in the dialog:
   a) In the list of "Active Transponder Types"
   b) In the list of "Transponder Types in "Action Items"

Continue with item 2, if the application requires more types of transponder to deal with.

8.2.1 Remove Transponder Types

If a transponder type was added unintentionally, it can be removed.



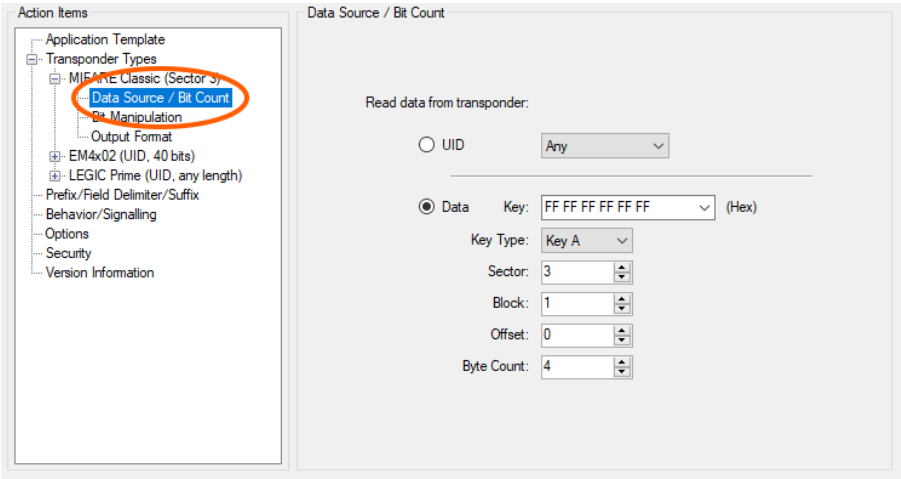
1. Select "Transponder Types" from "Action Items".
2. In the list box "Active Transponder Types" select transponder type to be removed.
3. Finally, click button "Remove" to remove the transponder type in question.

8.3 Step 2a: Specify Data Source

The data source specifies the place on a transponder, where data in question is stored. Depending on the type of transponder such storage places are called UID, sector, block, segment, page, file or something similar. In many cases, simply the UID should be read ("data source") from the transponder. It is the default setup, once a transponder type is added.

The specification of the data source depends on the selected type of transponder. In many cases and by default, the UID is treated as data source.

Here is an example, how a block within a sector of MIFARE Classic can be used as data source:

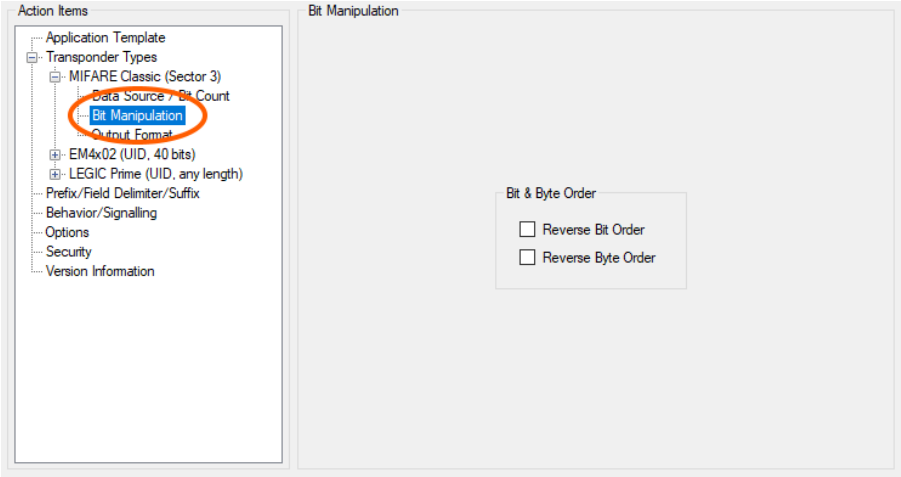


- Instead of reading UID choose "Data", which means read data from a specific block in a sector of MIFARE Classic.
- Specify the key, which gains access to the sector in question. There are some well-known default keys, which can be selected directly from the combo box.
- Select the sector number (0 to 15) in question.
- Select the block number (0 to 3) within the sector.
- Select offset within the block, where the data is stored.
- Finally, select the number of bytes, which data in question occupies. Depending on the specified offset, this can be up to 16 bytes (the size of a MIFARE block).

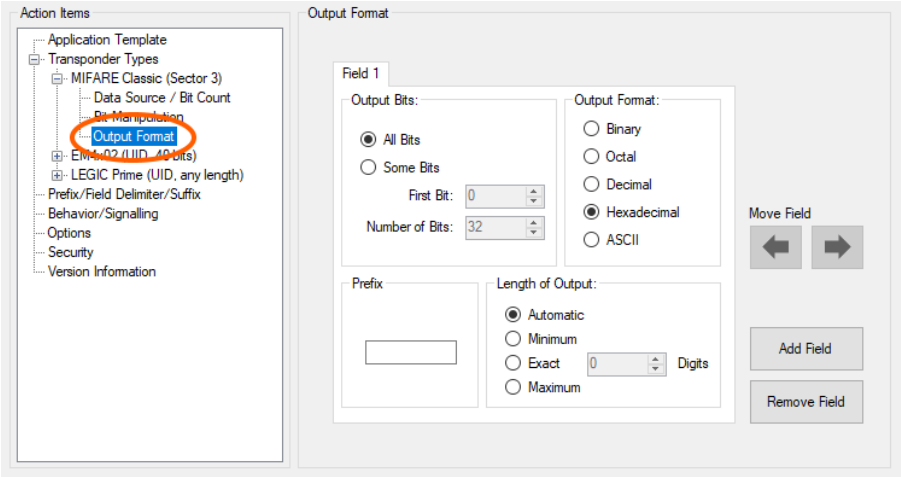
Notes:

- For other types of transponders, the specification of the data source can be different but works in similar manner.
- Many transponders do allow specification of UID as the only source of data.

8.4 Step 2b: Specify Bit Manipulation



8.5 Step 2c: Specify Output Format



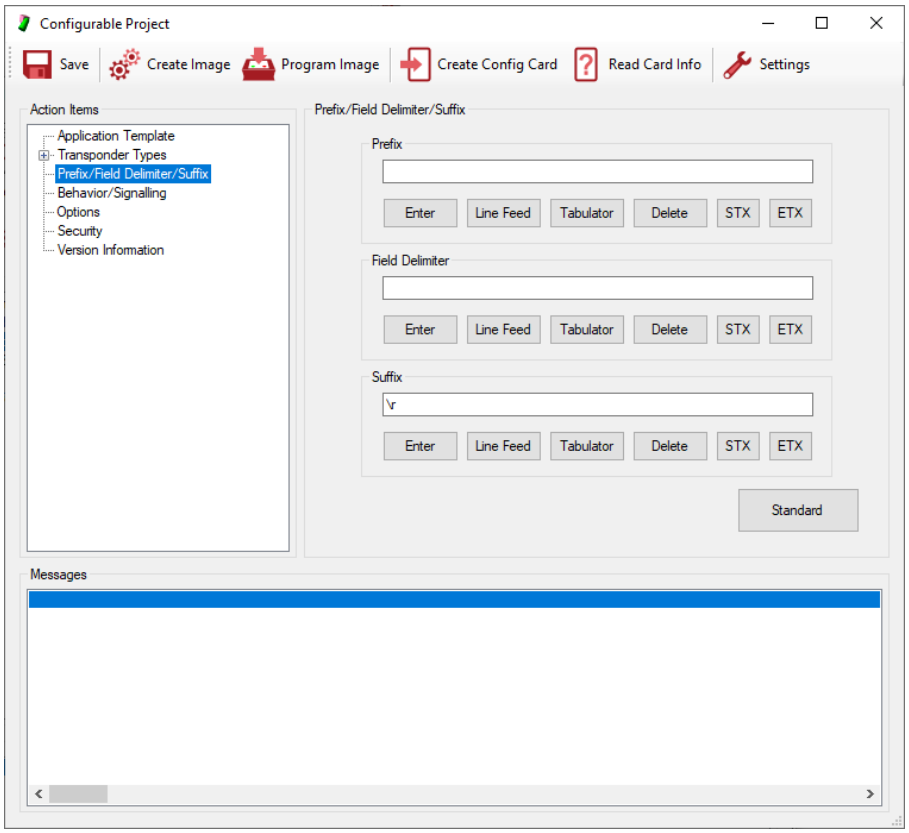
8.6 Step 3: Specify Prefix, Delimiter, Suffix (Optional)

AppBlaster allows to specify prefix, delimiters and suffix for the output data. There are several special characters available, which might be helpful for the specific project. By default, there is no prefix sent, no delimiters and "Enter" is sent as the suffix. Delimiters separate fields specified in the output format. Two or more fields are needed for a delimiter being sent.

Note: Due to the nature of AppBlaster, which passes the data entered in this dialog to a C compiler, all non-printable characters must be entered with a backslash as preceding character. Following escape sequences are supported:

Escape Sequence	Hex Value	Character Represented
\a	0x07	Alert (Beep, Bell)
\b	0x08	Backspace
\e	0x1B	Escape character
\f	0x0C	Formfeed Page Break
\n	0x0A	Newline (Line Feed)
\r	0x0D	Carriage Return
\t	0x09	Horizontal Tab
\v	0x0B	Vertical Tab
\\	0x5C	Backslash
\’	0x27	Apostrophe or single quotation mark
\"	0x22	Double quotation mark
\nnn	any	The byte whose numerical value is given by nnn interpreted as an octal number
\xhh...	any	The byte whose numerical value is given by hh... interpreted as a hexadecimal number. The sequence of hexadecimal numbers is terminated by a non-hexadecimal character or end of the string

Source: Wikipedia, Escape sequences in C


Configurable Project
Save
Create Image
Program Image
Create Config Card
Read Card Info
Settings
Action Items
Application Template
Transponder Types
Prefix/Field Delimiter/Suffix
Behavior/Signalling
Options
Security
Version Information
Prefix/Field Delimiter/Suffix
Prefix
Enter
Line Feed
Tabulator
Delete
STX
ETX
Field Delimiter
Enter
Line Feed
Tabulator
Delete
STX
ETX
Suffix
\r
Enter
Line Feed
Tabulator
Delete
STX
ETX
Standard
Messages

8.7 Step 4: Signalling/Behaviour (Optional)

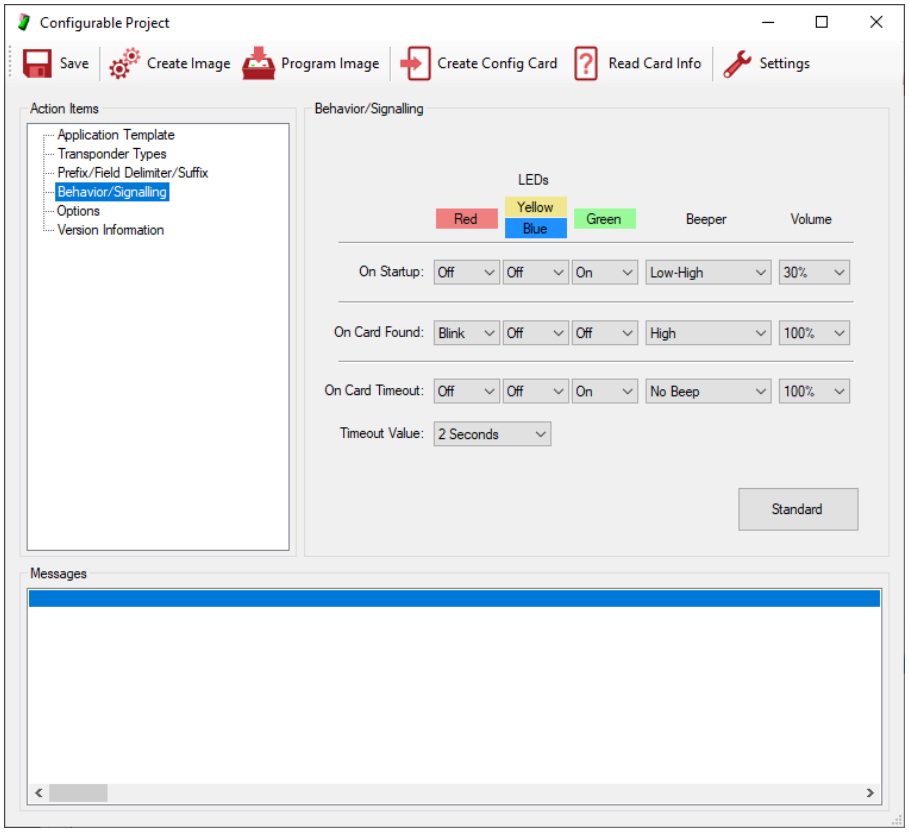
During operation of TWN4, there are several types of events, where action can take place. These events are

- Startup
  When TWN4 is turned on or performs a reset, the event occurs.
- Found Card/Transponder
  When a transponder enters the RF field of TWN4, the event occurs.
- Card/Transponder Timeout
  When a transponder leaves the RF field for a specific time, the event occurs. The timeout value can be adjusted.

By default, following actions take place:

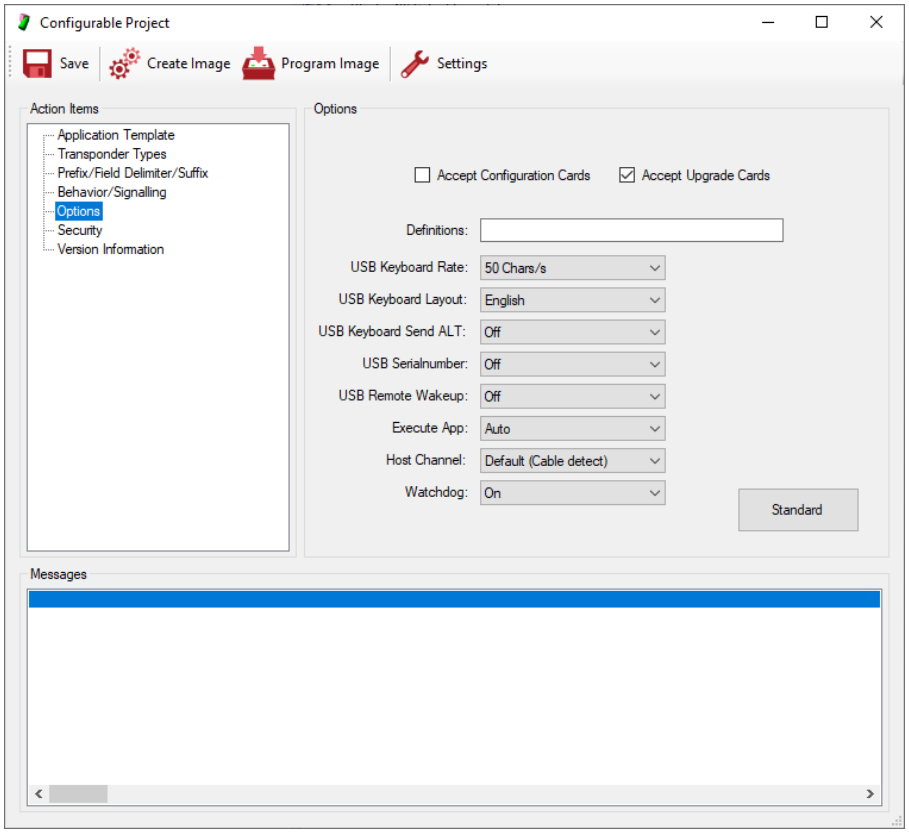
- Startup
  Turn off red LED, turn on green LED, sound a low/high beep at 30% volume
- Found Card/Transponder
  Let red LED blink, turn off green LED, sound a high beep at 100% volume
- Card/Transponder Timeout
  Turn off red LED, turn on green LED. The timeout value is set to 2 seconds.

The behaviour can be adjusted to specific requirements coming from the application. A simple modification could be to suppress any output from the beeper. In this case, select "No Beep" for all three types of events.



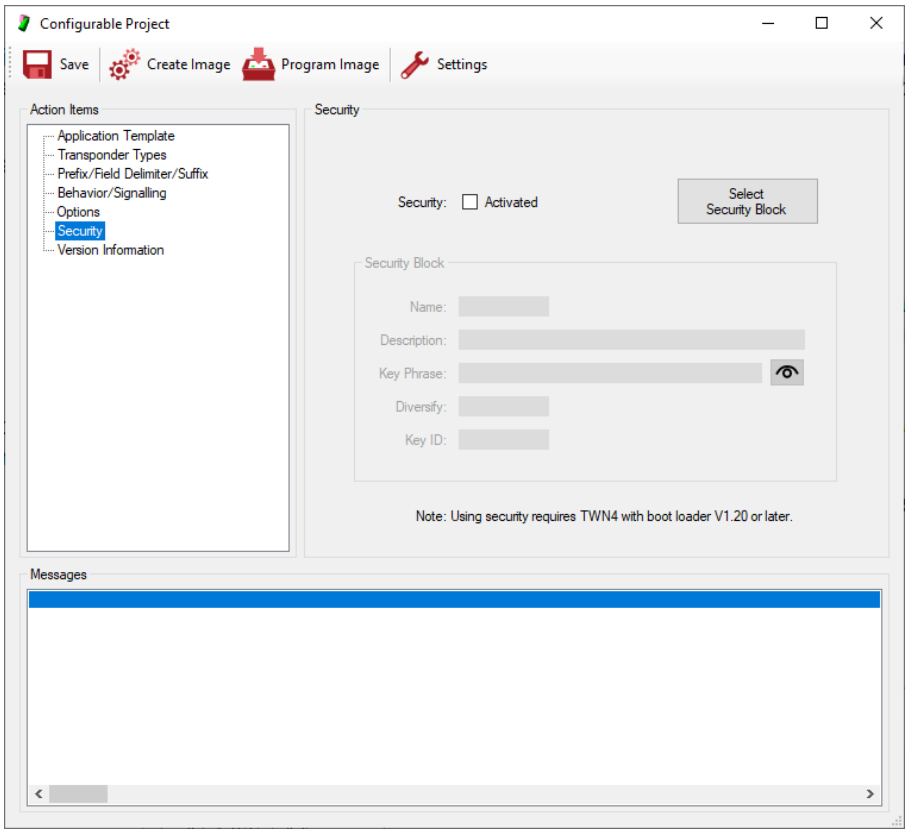
8.8 Step 5: Specify Options (Optional)

In this section some special requirements for the application can be set up.



8.9 Step 6: Specify Security Information

With AppBlaster V4, the concept of TWN4 Device Security is introduced. There is a separate document "TWN4 Device Security", which explains the subject in detail.



8.10 Step 7: Specify Version Information (Recommended)

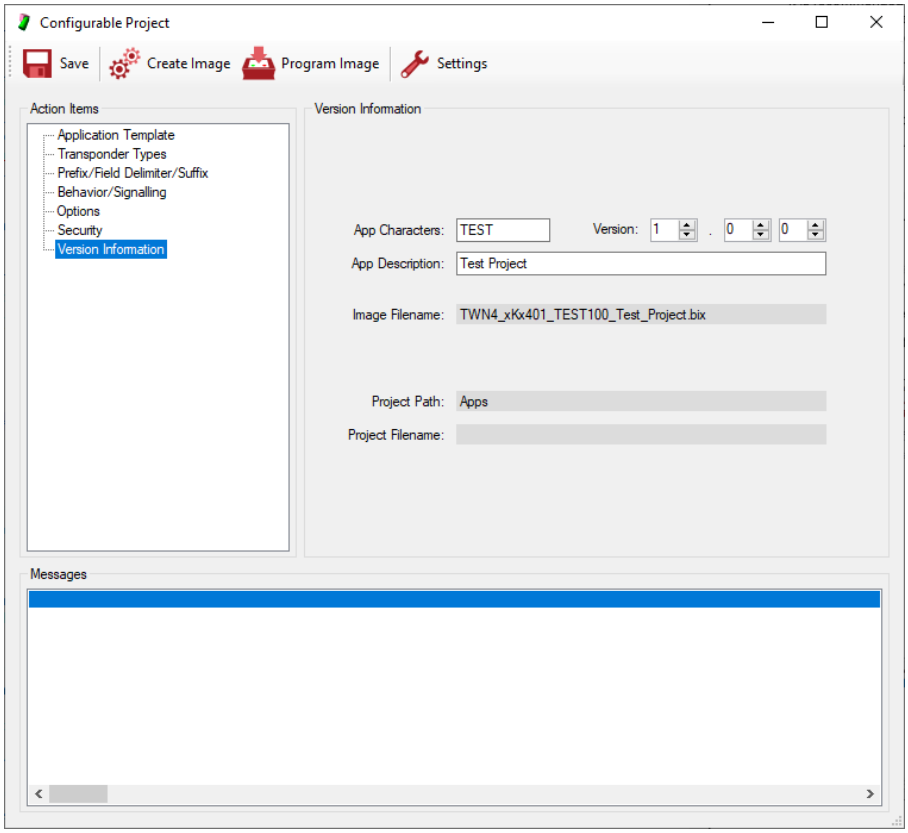
It is recommended to use a standard naming scheme for the firmware image. The information contained in the file name of the firmware image will be used at several places and allows recognition of correct version of a firmware image or TWN4.

Version information of TWN4 is therefore identical under following conditions:

- The name of the firmware image file itself.
- Information contained on the label of TWN4.
- Version information returned by the application running on TWN4. This is applicable for firmware, which allows request for the firmware version and is achieved via the system function `GetVersionString`.
- Version information returned by USB as product string

AppBlaster supports the naming scheme by offering a dialog, where appropriate information can be entered:

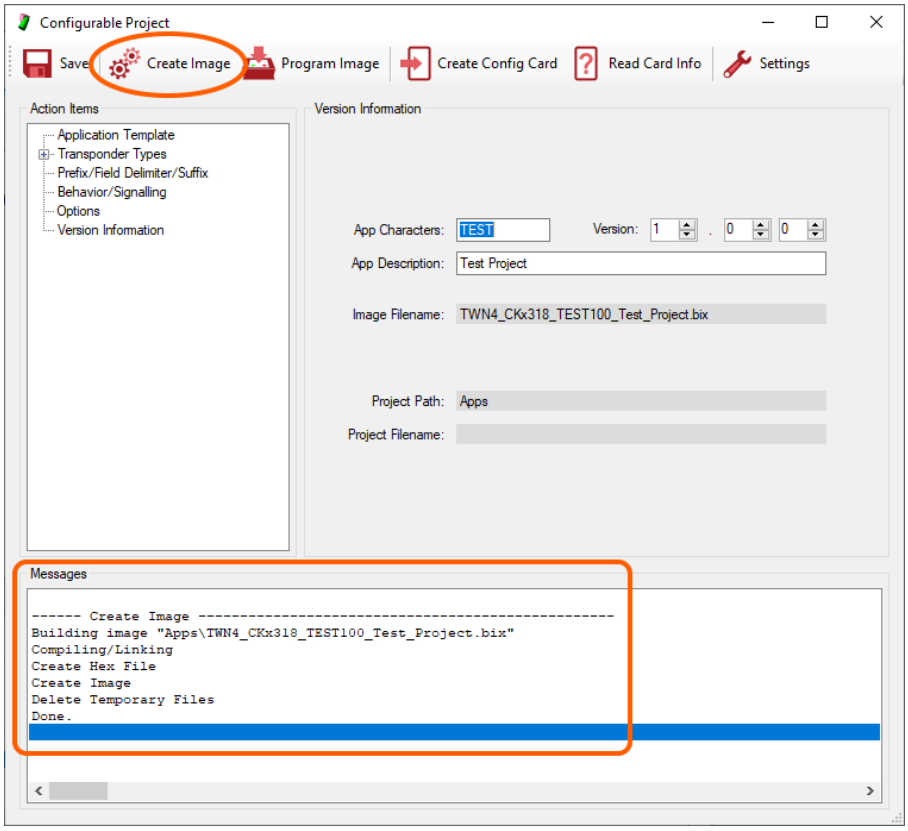
- App Characters: These characters are 1 to 4 letters ('A'-'Z') or digits ('0'-'9'). Please use at least 2 characters which identify the project.
- Version: The version always consists out of 3 digits, which can be set up here.
- App Description: You may do a short description of the project here.



8.11 Step 8: Create Image

Before a configuration can be tested, the firmware image must be created.

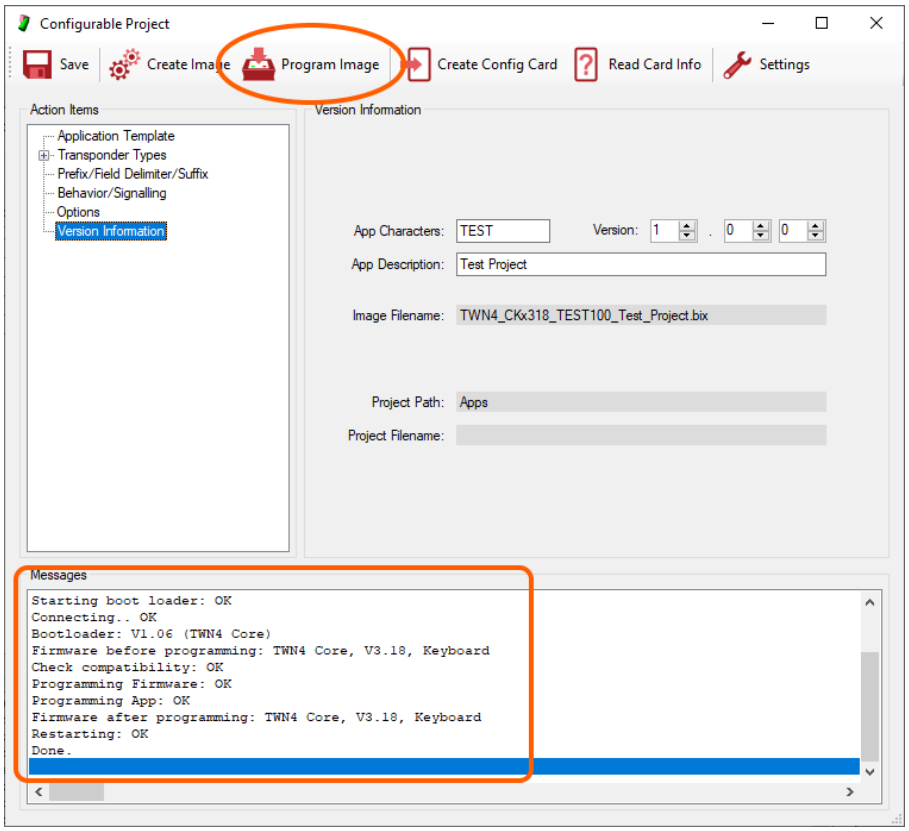
In order to create the firmware image, click button "Create Image". If the project never was saved before, the project will be created in the sub directory "Apps". Otherwise, it will be created, where the project file resides.



8.12 Step 9: Program Image

If the firmware image was created successfully it can be programmed into TWN4.

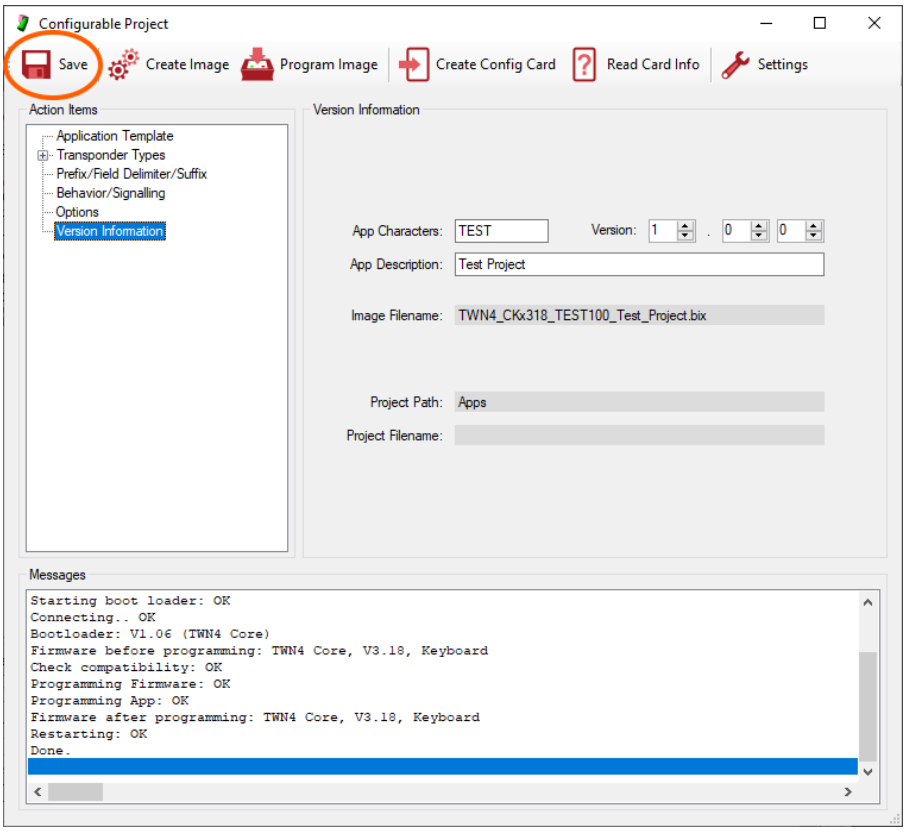
In order to program firmware image, click button "Program Image".



8.13 Step 10: Save Project (Recommended)

After finishing work, you may save entire information in a project file. Compared to the production image, the project file allows to modify settings of the configuration later, the production image does not.

As a suggestion, AppBlaster will choose the name for the project file identical to the name of the production image.



9 Configurable Project (OSDP)

The chapter above explained, how to configure a standard App. Additionally, there is the possibility to create an OSDP App.

There are some difference between standard App and OSDP App:

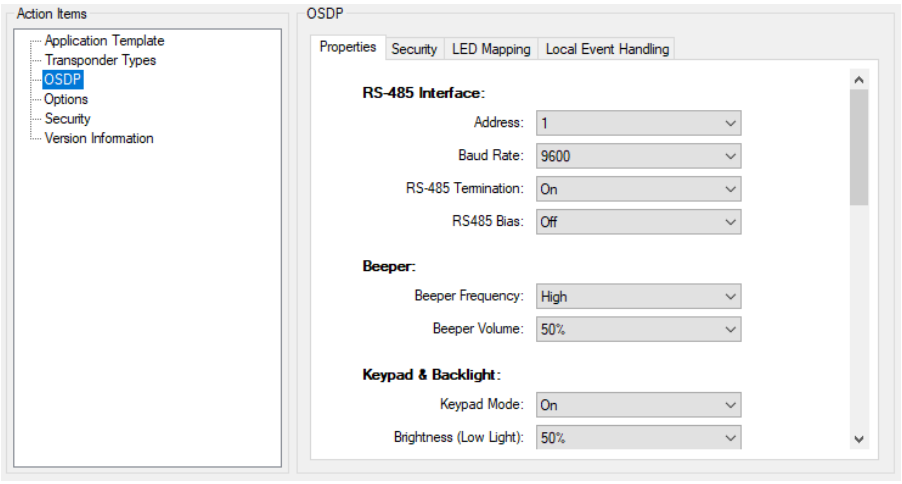
- While the standard App allows to configure signalling and behaviour, this is not possible in a OSDP App, because behaviour and signalling is fully under control of the host, the TWN4 is connected to.
- There are only limited possibilities to configure the output format of a OSDP App, because data is transferred binary. On the other hand, this simplifies configuration of an OSDP App.
- For the same reason, prefix, delimiter and suffix can not be configured in a OSDP App.

For the reasons mentioned above, selection of prefix, delimiter and suffix and signalling/behaviour is replaced by another sheet called "OSDP", which allows to select OSDP-specific options. The OSDP-options are separated into three tab sheets:

Please note: Even though, it is possible to install an OSDP Application on other reader models, it is only supported by devices, which are part of the TWN4 Palon family.

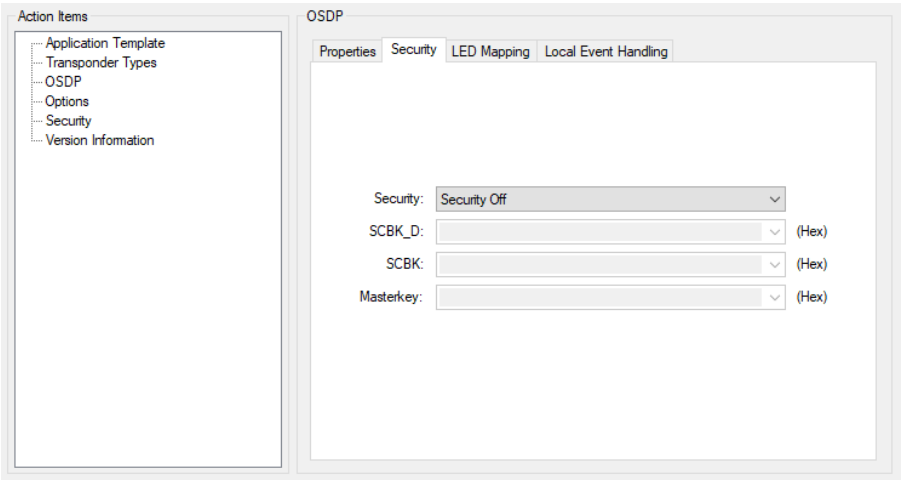
9.1 OSDP Properties

Setup properties of TWN4 according to your requirements:



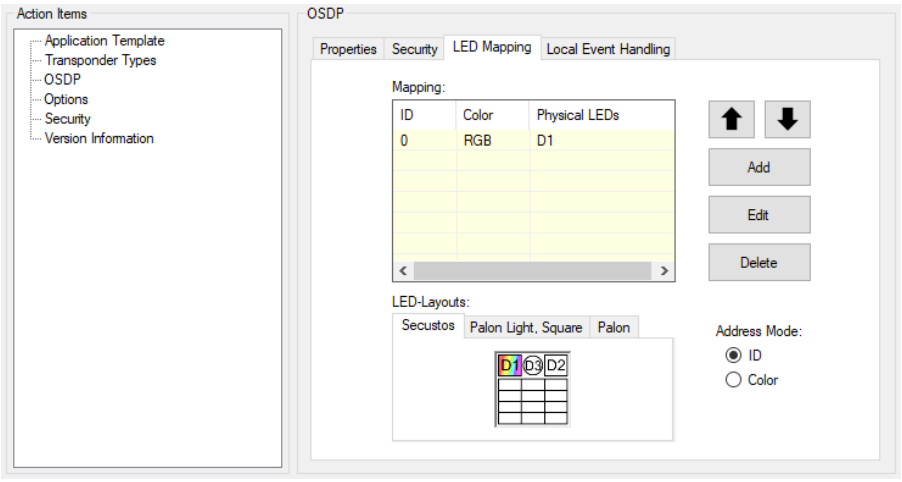
9.2 OSDP Security

Setup security of TWN4 according to your requirements:



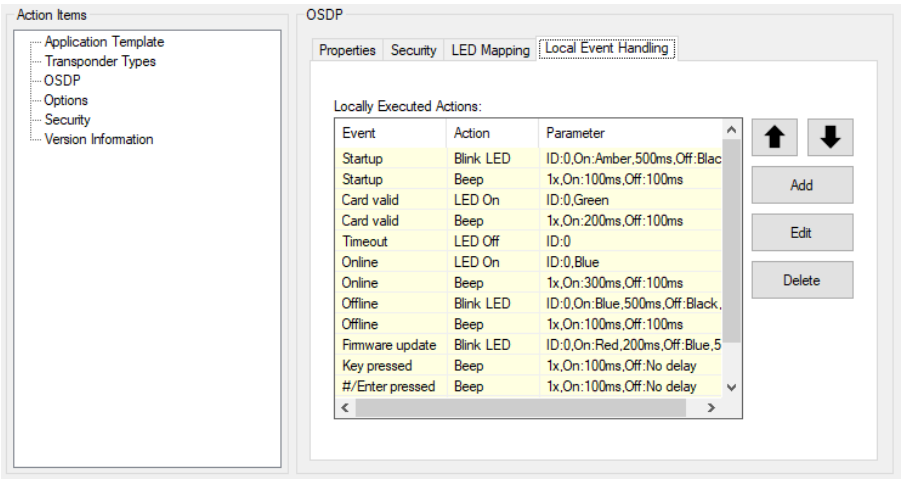
9.3 OSDP LED Mapping

Setup LED mapping of TWN4 according to your requirements:



9.4 OSDP Local Event Handling

Setup local event handling of TWN4 according to your requirements:



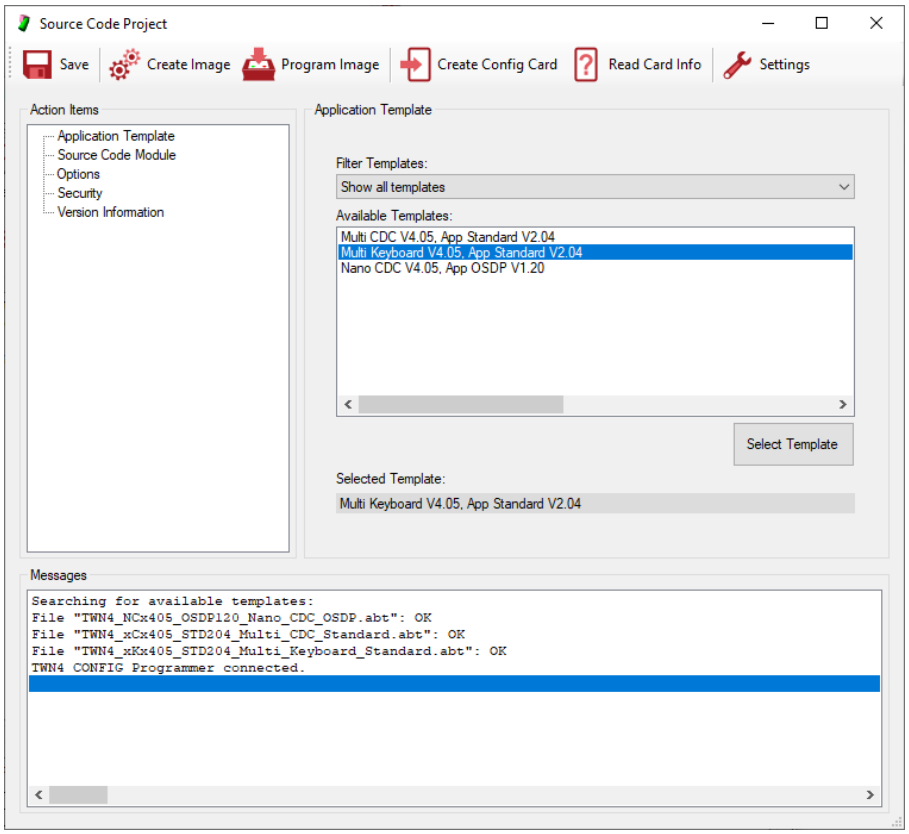
10 Source Code Project

For several reasons, there might be a need for creating a configuration, which is not covered by a configurable project:

- There is some source code, you got from 3rd party.
- You have some specific requirements for reading data from a transponder, where data is in some tricky data section of the transponder or some kind of special authentication is required to do reading of data.
- There is a requirement to change entire behaviour of TWN4. This could be e.g. implementing some kind of host based communication, modifying behaviour of beeper, LEDs or doing input/output via other interfaces of TWN4.

The way out of this situation, which is offered by AppBlaster, is to create a project based on custom source code. This is called source code project.

In order to create a source code project, click button "Source Code Project" in the start dialog. The project dialog appears in a somewhat reduced version because - compared to a configurable project - most of setup is not needed here.

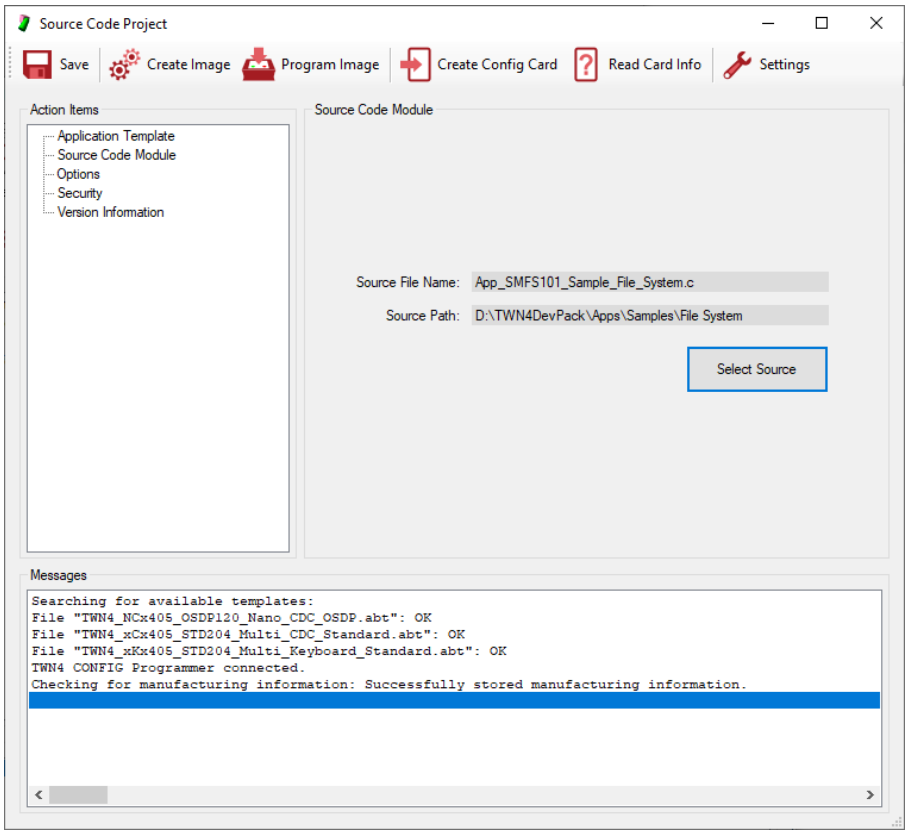


10.1 Step 1: Specify Type of USB

TWN4 can be programmed to act as several different type of USB. Select action item "Type of USB (Template)" in order to select appropriate operating mode.

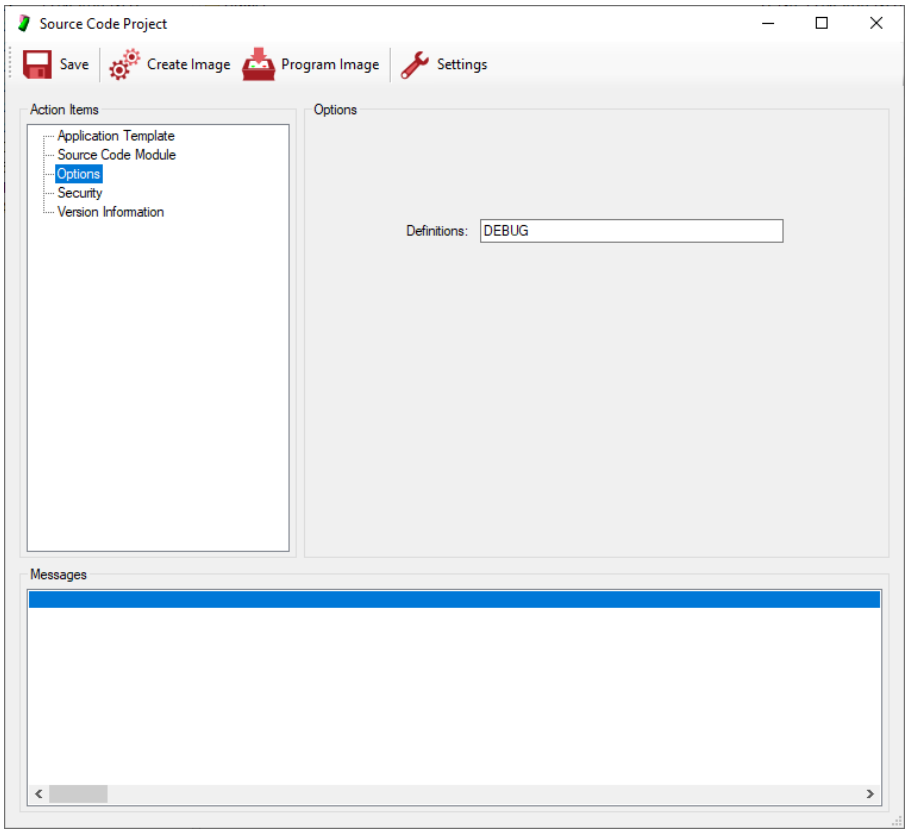
10.2 Step 2: Specify Source Code Module

Click button "Select Source" to select the file, which contains the source code in question.



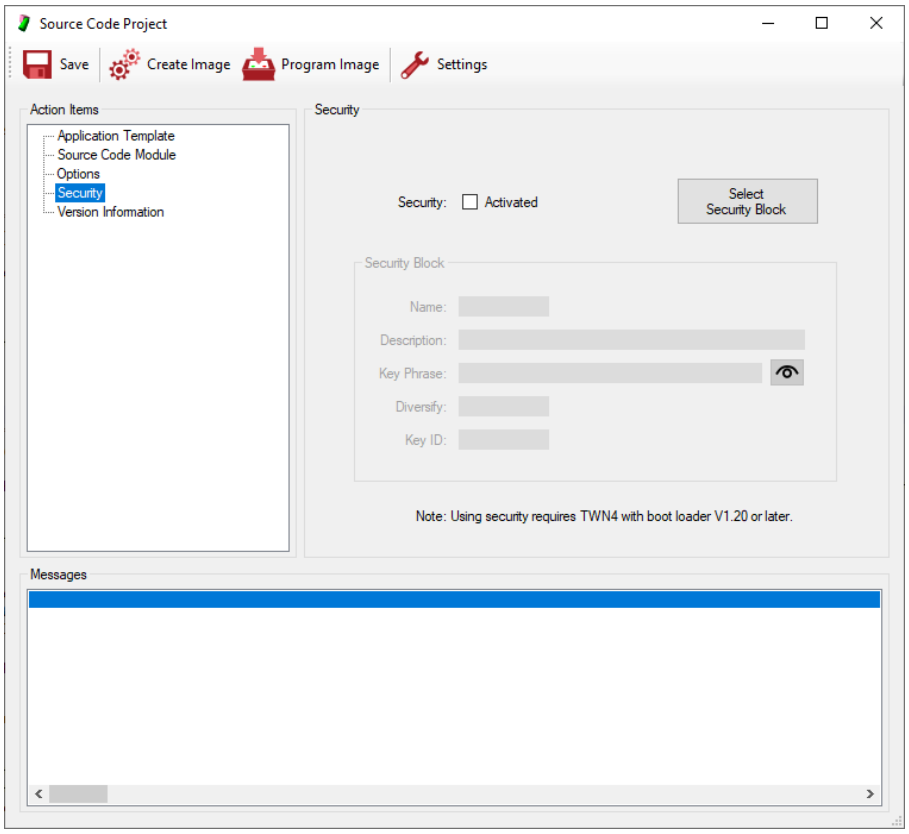
10.3 Step 3: Specify Options (Optional)

In this section, you may specify definitions, which are needed to compile the application for a specific purpose. A typical use-case is e.g. the definition of DEBUG, which activates additional diagnostic output by the App. The specific behavior itself must be implemented by the programmer.



10.4 Step 4: Specify Security Information

With AppBlaster V4, the concept of TWN4 Device Security is introduced. There is a separate document "TWN4 Device Security", which explains the subject in detail.



10.5 Step 5: Specify Version Information (Recommended)

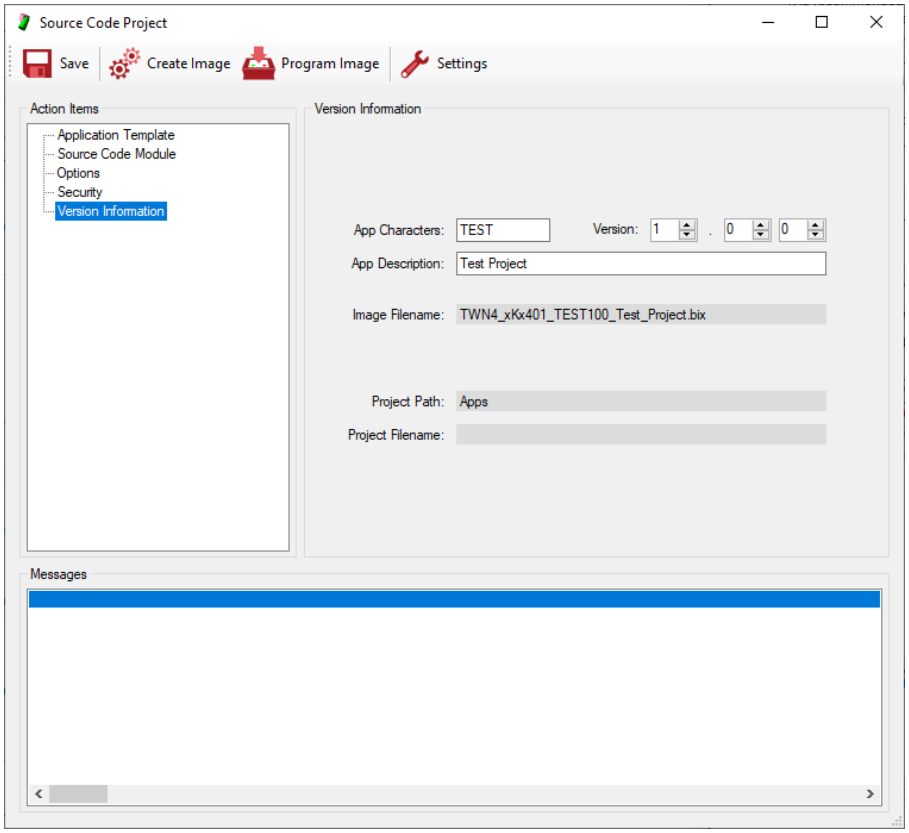
It is recommended to use a standard naming scheme for the firmware image. The information contained in the file name of the firmware image will be used at several places and allows recognition of correct version of a firmware image or TWN4.

Version information of TWN4 is therefore identical under following conditions:

- The name of the firmware image file itself.
- Information contained on the label of TWN4.
- Version information returned by the application running on TWN4. This is applicable for firmware, which allows request for the firmware version and is achieved via the system function `GetVersionString`.
- Version information returned by USB as product string

AppBlaster supports the naming scheme by offering a dialog, where appropriate information can be entered:

- App Characters: These characters are 1 to 4 letters ('A'-'Z') or digits ('0'-'9'). Please use at least 2 characters which identify the project.
- Version: The version always consists out of 3 digits, which can be set up here.
- App Description: You may do a short description of the project here.



10.6 Step 6: Create Image

Before a configuration can be tested, the firmware image must be created.

In order to create the firmware image, click button "Create Image". If the project never was saved before, the project will be created in the sub directory "Apps". Otherwise, it will be created, where the project file resides.

10.7 Step 7: Program Image

If the firmware image was created successfully it can be programmed into TWN4.

In order to program firmware image, click button "Program Image".

10.8 Step 8: Save Project (Recommended)

After finishing work, you may save entire information in a project file. Compared to the production image, the project file allows to modify settings of the configuration later, the production image does not.

As a suggestion, AppBlaster will choose the name for the project file identical to the name of the production image.

11 Creation of Apps with make

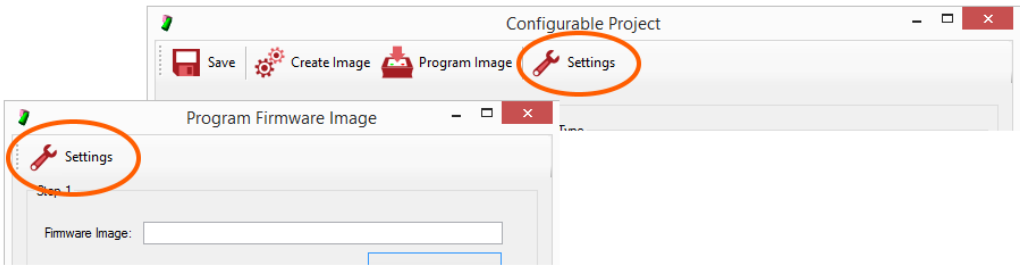
Within AppBlaster there are limitations, which might not be acceptable by advanced users, such as:

- Only one file which contains the source code for the entire App. Especially bigger projects do have a demand for splitting source code into several source and header files.
- Requirement to compile entire source code even in case of small changes.
- AppBlaster is a solution, which is away from well-known programming environments such as Eclipse.

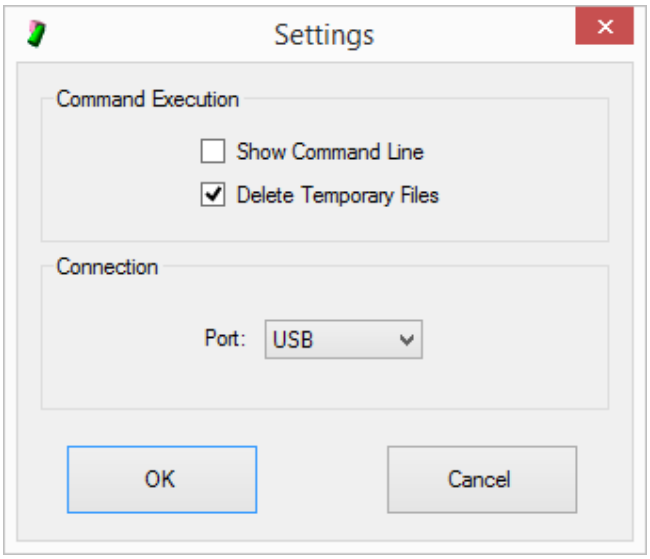
The tools for creation of an App from a command line are part of the TWN4 developer pack. AppBlaster is a graphical user interface (GUI) for the tool chain which resides in the subdirectory `Tools`. In order to become more convenient with how an App is built, there is an option to display the command line parameters during creation of an App. This option can be found in "Settings" of AppBlaster.

12 Setting Up AppBlaster

There are a few settings, which can be made for AppBlaster. The settings can be accessed from both a project dialog or dialog for programming firmware:



- "Command Execution - Show Command Line": By activating this option, the commands, which are used for creation of images are displayed in the protocol section. This is helpful, if you plan to set up a project using make.
- "Command Execution - Delete Temporary Files": Turn this option off, if you are interested in temporary files, which are part of the compilation process.
- "Connection - Port": Use USB as long as TWN4 is connected via USB to the host (even virtual COM port). If you are using TWN4 RS232, please select appropriate COM port here.



13 Disclaimer

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