Infineon Flash Programmer Memtool for XMC1000 Family

XMC Microcontrollers
January 2016

Memtool: Overview and Features

Overview

- MemTool is a free of charge software designed for on-chip flash programming.
- MemTool V4 is supporting the XC800, XC166, XE166, XC2000, TriCore™, XMC4000 family and the XMC1000 family.
- MemTool V4 supports programming via UART (ASC) Boot loader for XMC4000 and XMC1000.

Features

- Erasing the entire memory module
- Erasing selected sectors of the memory module
- Loading Intel Hex files
- Programming all or selected portions of the file into the memory module
- Comparing all or selected portions of the file to the current contents of the memory module
- Setting and Resetting the Chip/Sector Protection (On-Chip only)
- BMI configuration

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About This Tutorial

- **Purposes**
  - Concentrates on usage of Memtool to program on-chip flash in XMC1000 family microcontrollers
  - Declares the options and functions provided in Memtool user-interface in details.
  - Declares the different target configurations and hardware setup.
  - Provides step-by-step how to use Memtool with example.
- **Contents**
  - Part 1: Memtool User Interface
  - Part 2: Target Configurations in Detail
  - Part 3: Examples
  - Part 4: Change BMI value in Memtool
  - Part 5: Problems and Solutions
- **Prerequisites to follow the tutorial**
  - Install Memtool v4.6.5 or higher

Download Memtool v4.6.5

Product Name	TriCore ™	Version
MemTool V4	X	v4.6.5

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Part 1:

Memtool User Interface

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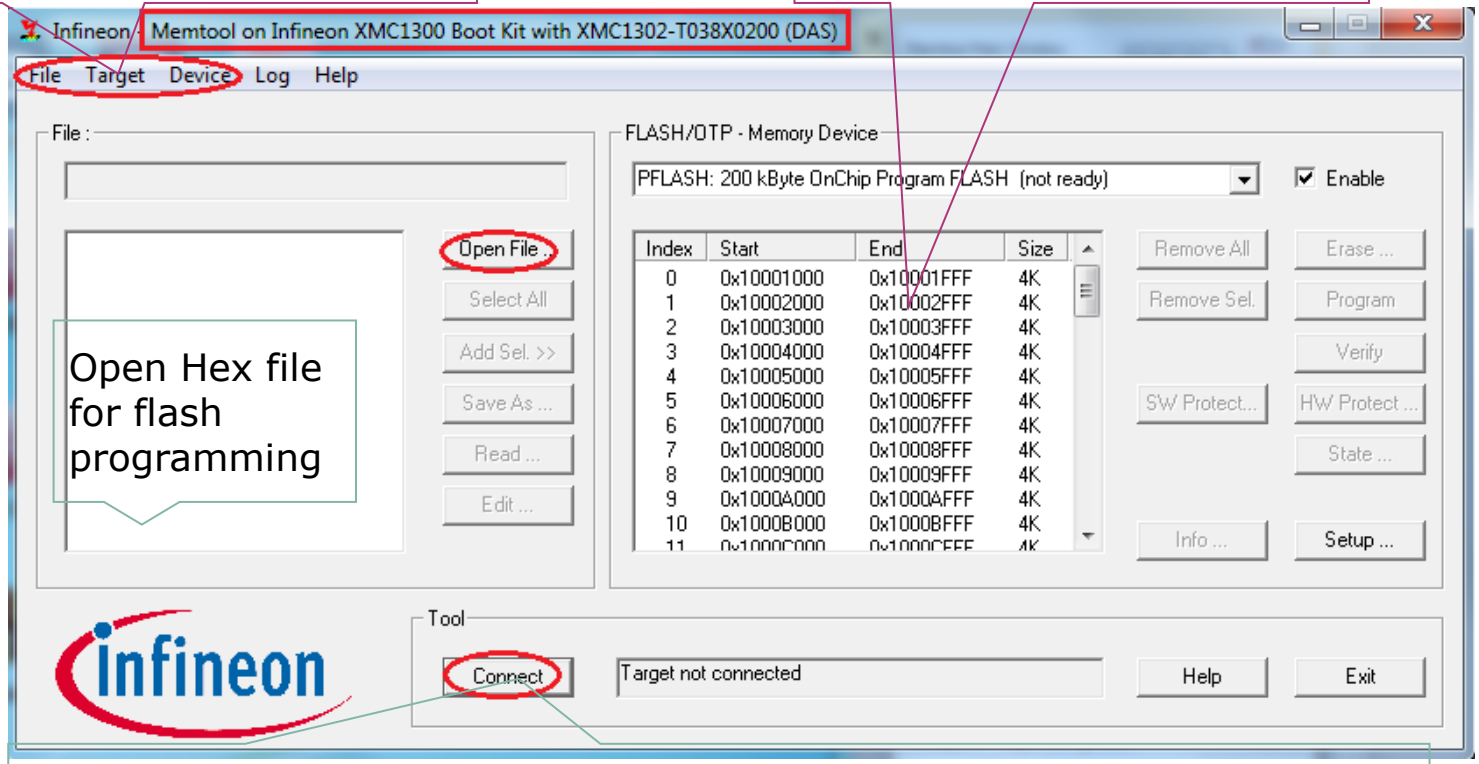
Memtool Main Window

After opening Memtool v4.6.5 following window is displayed:

File operation, Target/Device configuration

Information about target configuration



Connect target

Note: before click „Connect", the target and device must be configured.

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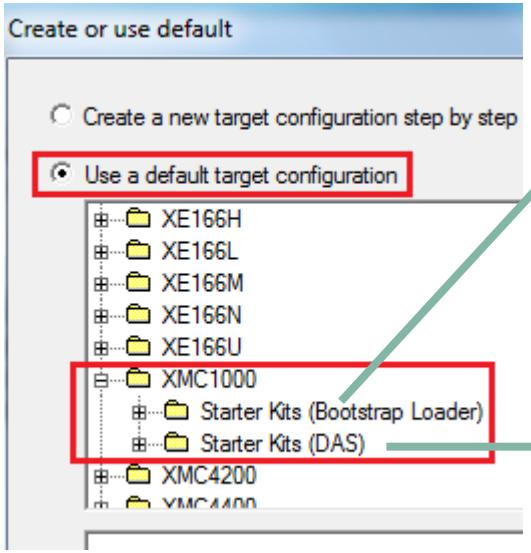
Target Configuration Options

Memtool provides 2 options to connect to the target :



UI in Memtool to select one of the 2 options

Using Bootstrap Loader:

- ASC BSL bootstrap mode (no debug)
- Hardware options
  - COM/VCOM adapter (OBD J-link, FTDI chip…)
  - DAP miniWiggler

Using Debug Interface

- SWD, SPD bootstrap mode (debug)
- Hardware option
  - DAP miniWiggler

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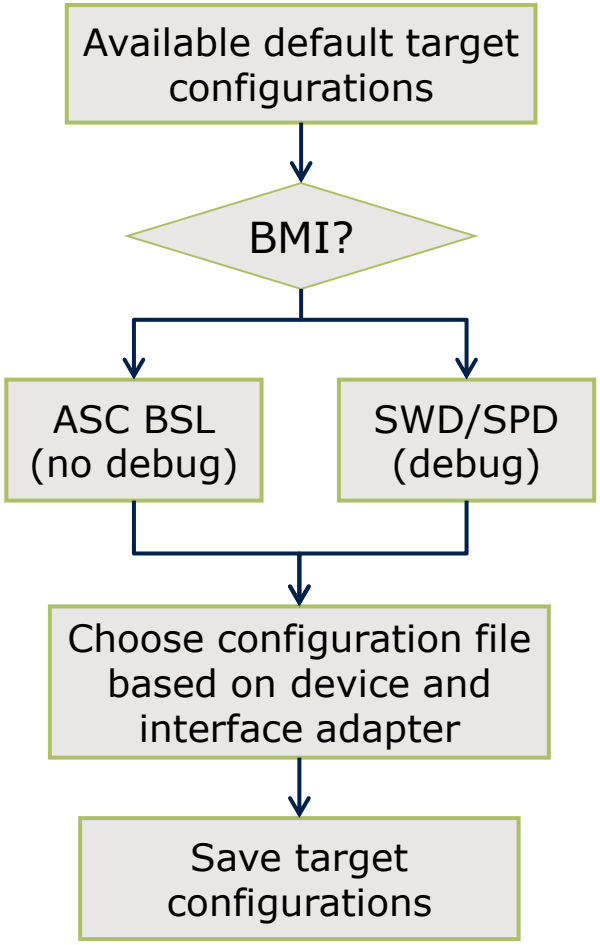
Concept for Target Configuration



- **For all target MCUs there are default target configurations available to be chosen**
- **The desired target configuration can be selected using two steps:**
  1. Firstly choose connection option according to BMI boot mode (ASC BSL or SWD) in MCU device
  2. Secondly choose the target configuration file based on target device and used interface adapter
- **Save the target configuration file**

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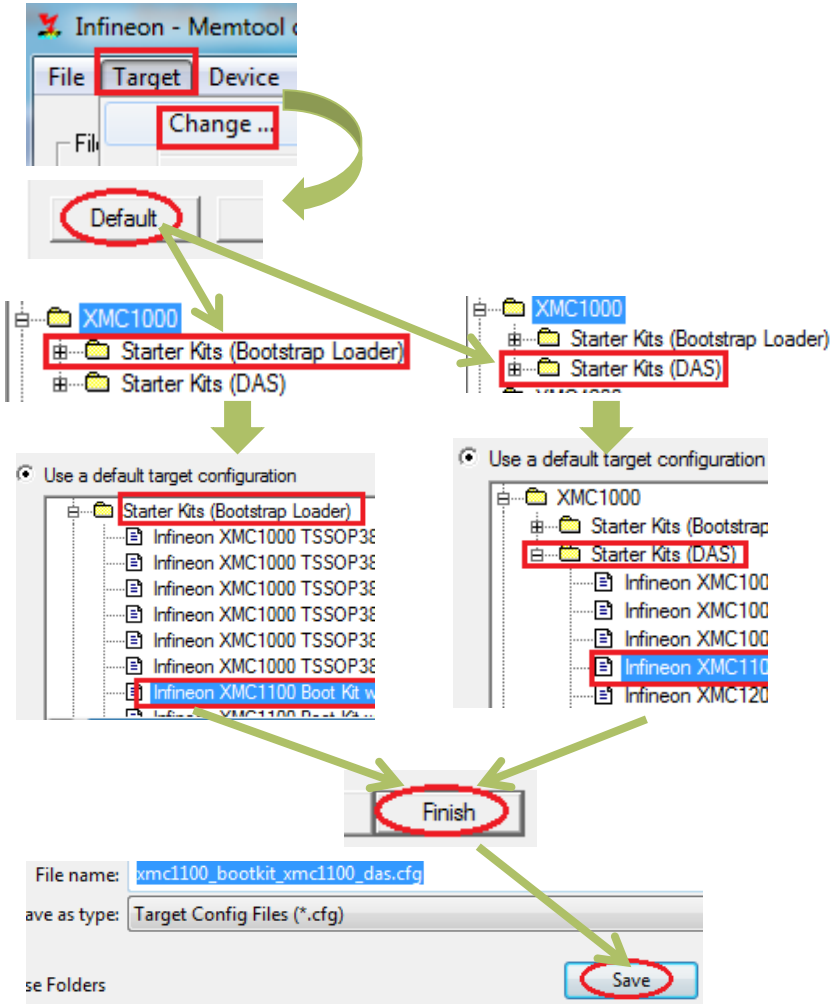
Flow of Target Configuration Selection



- **Open "Target" menu and select "change"**
- **Select already existing target configuration by clicking "Default"**
- **Go to XMC1000 and open the menu**
- **Select target configuration option based on BMI value in device:**
  1. For **ASC BSL** mode, select "Starter Kits (Bootstrap Loader)"
  2. For **SWD/SPD** mode, select "Starter Kits (DAS)"
- **Select the target configuration file according to device and interface adapter (VCOM/miniWiggler)**
- **Finish and Save the target configuration file**

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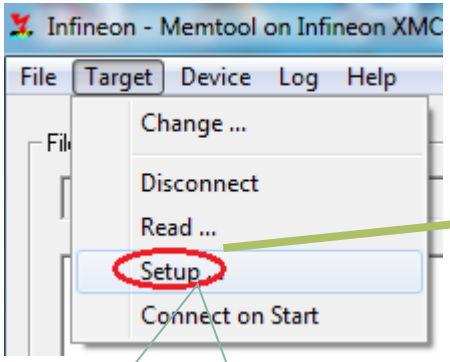
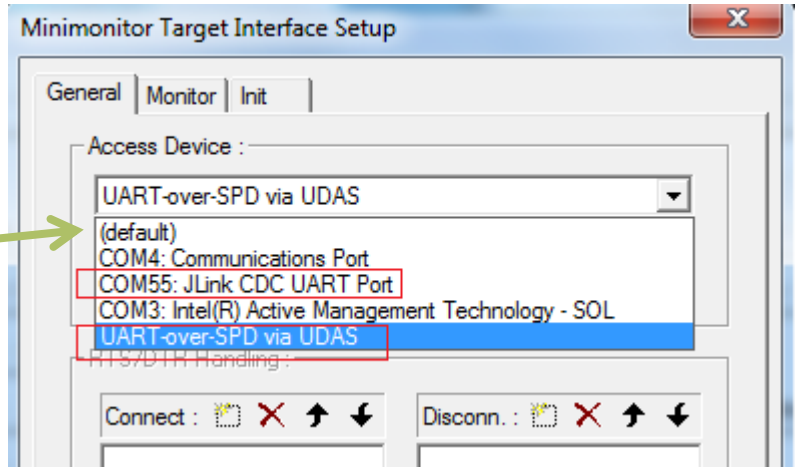
Set Hardware Connection Interface (1/2)

Starter Kits (Bootstrap Loader):





Set hardware connection interface: Target -> Setup

If **"Starter Kits (Bootstrap Loader)"** is selected as target configuration, there are **two** choices of hardware connection interfaces depending on hardware used:

1. **COM/VCOM** interface: JLink CDC UART Port
2. **DAP miniWiggler**: UART-over-SPD via UDAS

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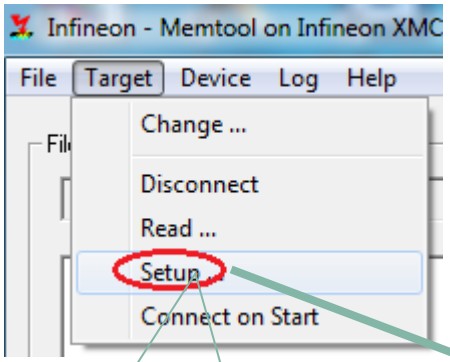
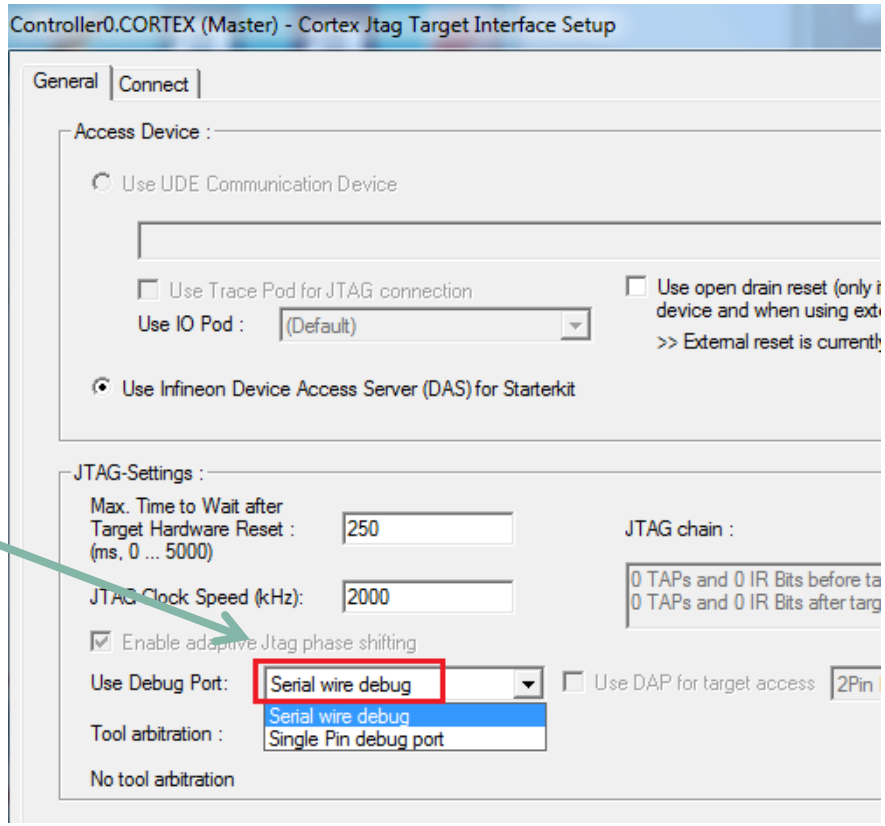
Set Hardware Connection Interface (2/2)

Starter Kits (DAS):



Set hardware connection interface: Target -> Setup



If **"Starter Kits (DAS)"** is selected as target configuration, **DAP miniWiggler** needs to be used:

- **Use Debug Port**: Serial wire debug

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Part 2:

Target Configurations in Detail

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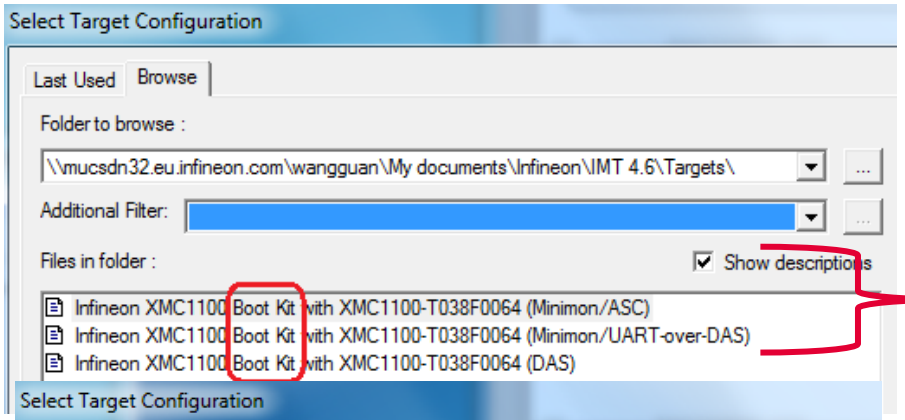
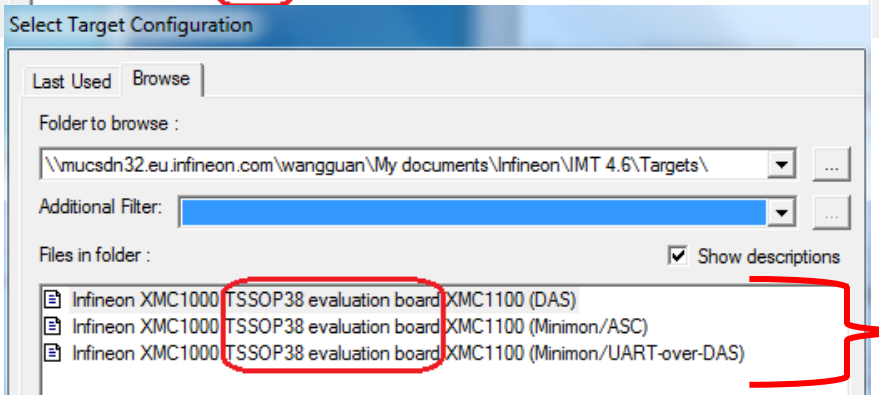
Target Configuration

Target configuration is the **key step** to make sure that the connection with board is successful. There are three configurations for each XMC1000 device depending on board kit used:

1. Boot Kit
2. Evaluation boards with TSSOP38 package





Configuration for Infineon **Boot Kit**

Configuration for Infineon Evaluation board with TSSOP38 package
Note: these configurations are redundant, und will be removed in new Memtool release.

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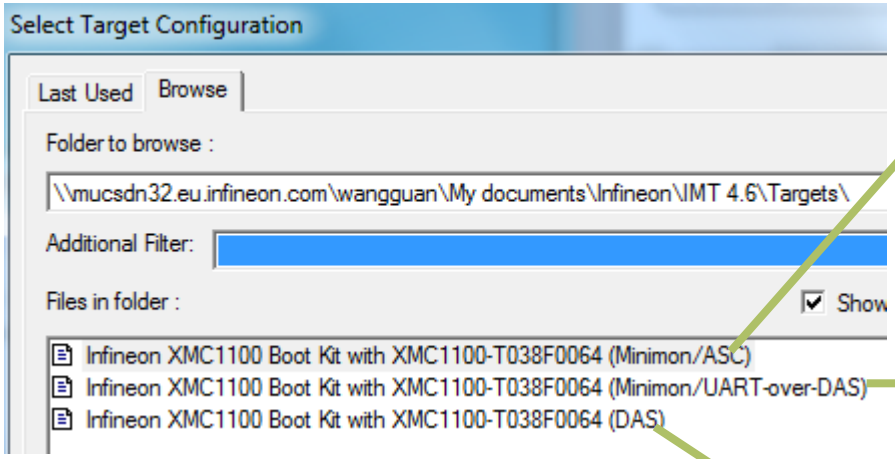
Target Configuration for XMC1100



Minimon/ASC:

1. Connect with target board using **ASC BSL** bootstrap loader
2. XMC1100 **must** be configured as **ASC BSL** bootstrap mode.
3. Connection interface: **VCOM** in OBD Segger debugger **or miniWiggler**

Minimon/UART-over-DAS:

1. Connect with target board using **ASC BSL** bootstrap loader
2. XMC1100 **must** be configured as **ASC BSL** bootstrap mode.
3. Connection interface: **miniWiggler**

DAS:

1. Connect with target board using **DAS** server
2. XMC1100 **must** be configured as **User Mode (Debug) SWD0/SWD1**.
3. Connection interface: **miniWiggler**

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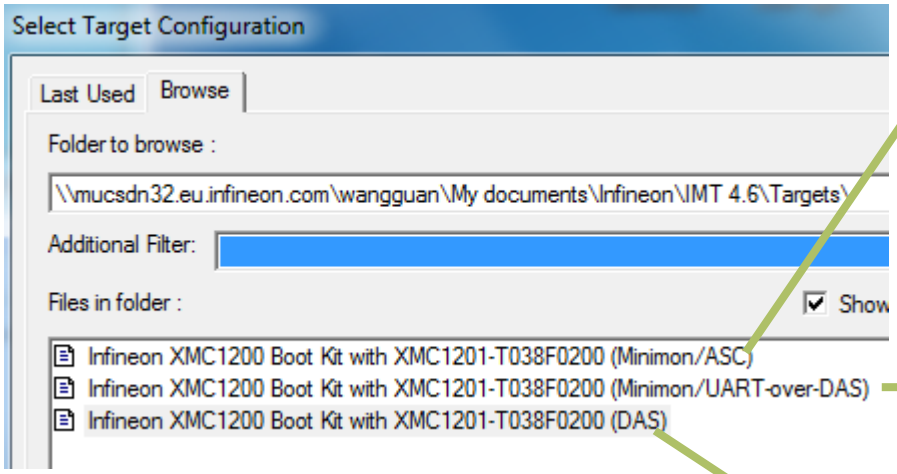
Target Configuration for XMC1200



Minimon/ASC:

1. Connect with target board using **ASC BSL** bootstrap loader
2. XMC1200 **must** be configured as **ASC BSL** bootstrap mode.
3. Connection interface: **VCOM** in OBD Segger debugger **or miniWiggler**

Minimon/UART-over-DAS:

1. Connect with target board using **ASC BSL** bootstrap loader
2. XMC1200 **must** be configured as **ASC BSL** bootstrap mode.
3. Connection interface: **miniWiggler**

DAS:

1. Connect with target board using **DAS** server
2. XMC1200 **must** be configured as **User Mode (Debug) SWD0/SWD1**.
3. Connection interface: **miniWiggler**

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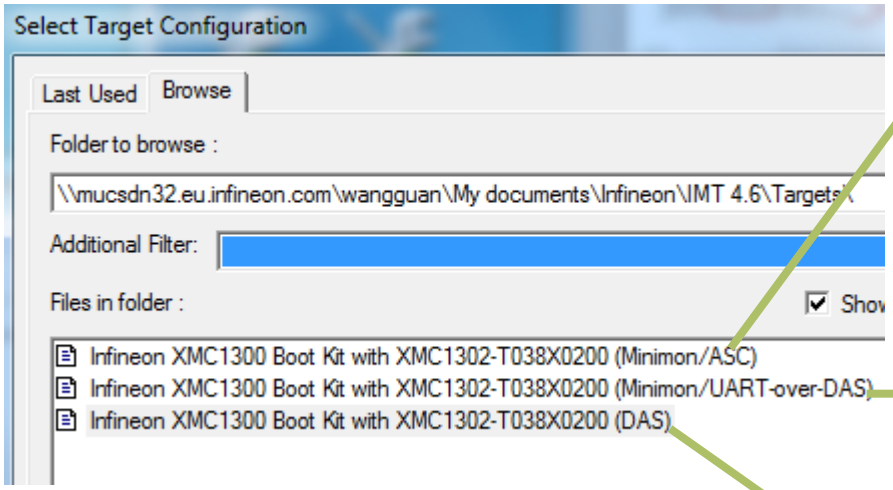
Target Configuration for XMC1300



Minimon/ASC:

1. Connect with target board using **ASC BSL** bootstrap loader
2. XMC1300 **must** be configured as **ASC BSL** bootstrap mode.
3. Connection interface: **VCOM** in OBD Segger debugger **or miniWiggler**

Minimon/UART-over-DAS:

1. Connect with target board using **ASC BSL** bootstrap loader
2. XMC1300 **must** be configured as **ASC BSL** bootstrap mode.
3. Connection interface: **miniWiggler**

DAS:

1. Connect with target board using **DAS** server
2. XMC1300 **must** be configured as **User Mode (Debug) SWD0/SWD1**.
3. Connection interface: **miniWiggler**

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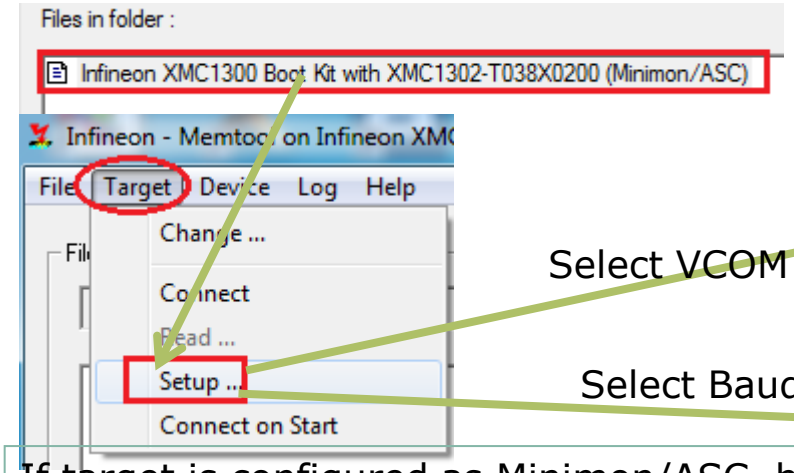
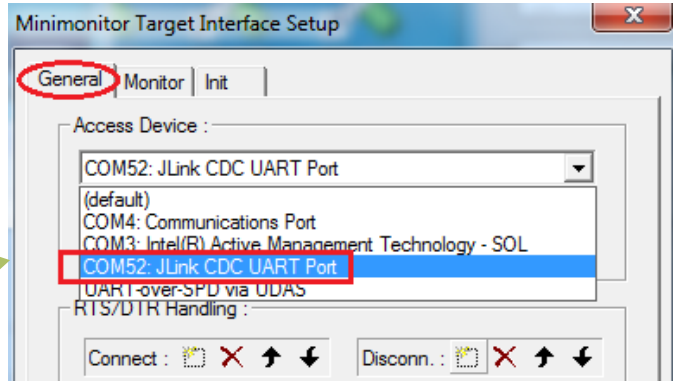
Setup Connection: Minimon/ASC with VCOM

› Connection hardware setup: Minimon/ASC with **VCOM** interface on board

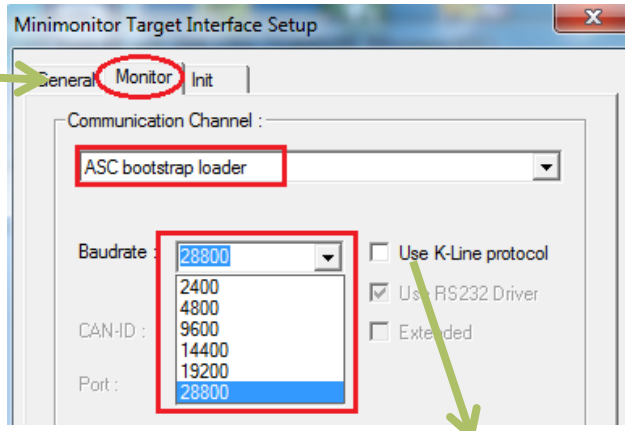
Target configuration: Minimon/ASC



Select VCOM



Select Baudrate



If target is configured as Minimon/ASC, both JLink VCOM and miniWiggler can be used to connect with target board. If **VCOM** is used, "Jlink CDC UART Port" must be selected. Click "Refresh" to see the VCOM port. **Note:**

- if VCOM is selected, miniWiggler is **not allowed** to connect with board.
- Device must be configured as **ASC BSL Mode**.
- Before clicking "connect" the board must be **reset** by power-off and power-on.

Note: maximal baudrate is 28800. K-Line is not supported for XMC

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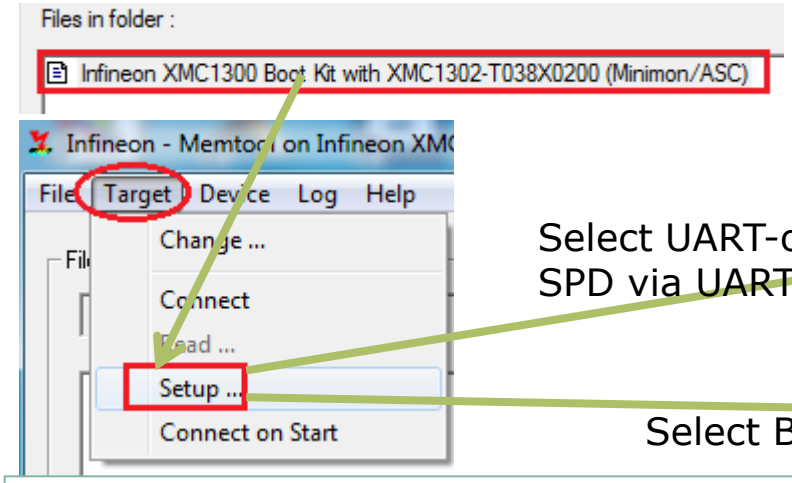
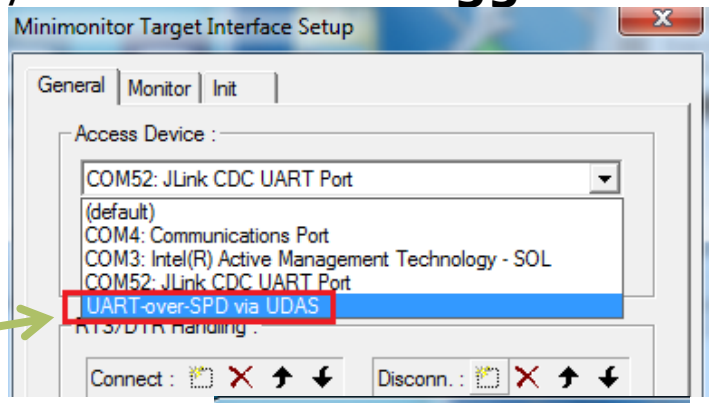
Setup Connection: Minimon/ASC with miniWiggler

› Connection hardware setup: Minimon/ASC with **miniWiggler**

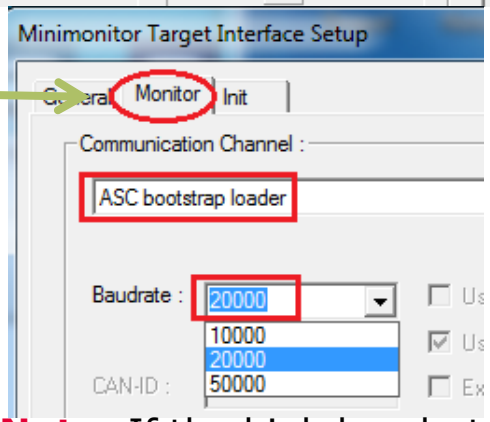
Target configuration: Minimon/ASC



Select UART-over-SPD via UART



Select Baudrate



If target is configured as Minimon/ASC, both JLink VCOM and miniWiggler can be used to connect with target board. If **miniWiggler** is used, "UART-over-SPD via UDAS" must be selected. **Note:**

› Device must be configured as **ASC BSL Mode**.
› Before clicking "connect", the board must be **reset** by power-off and power-on.
› An adapter needs to used to connect with minWiggler.

Note: If the high baudrate has connection problem, the lower baudrate should be used.

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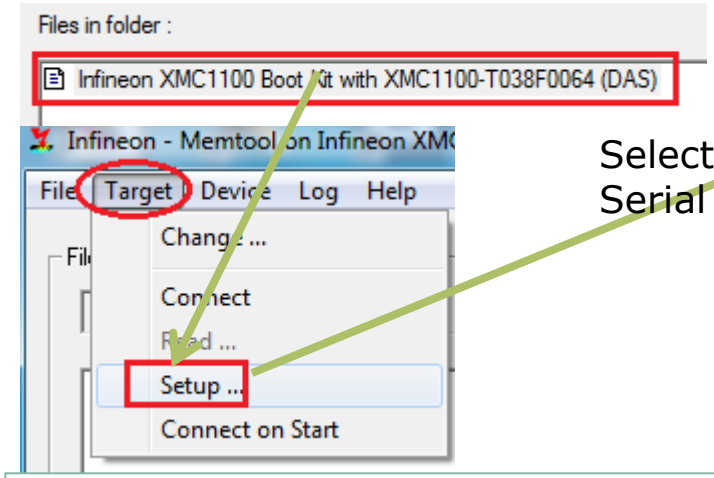
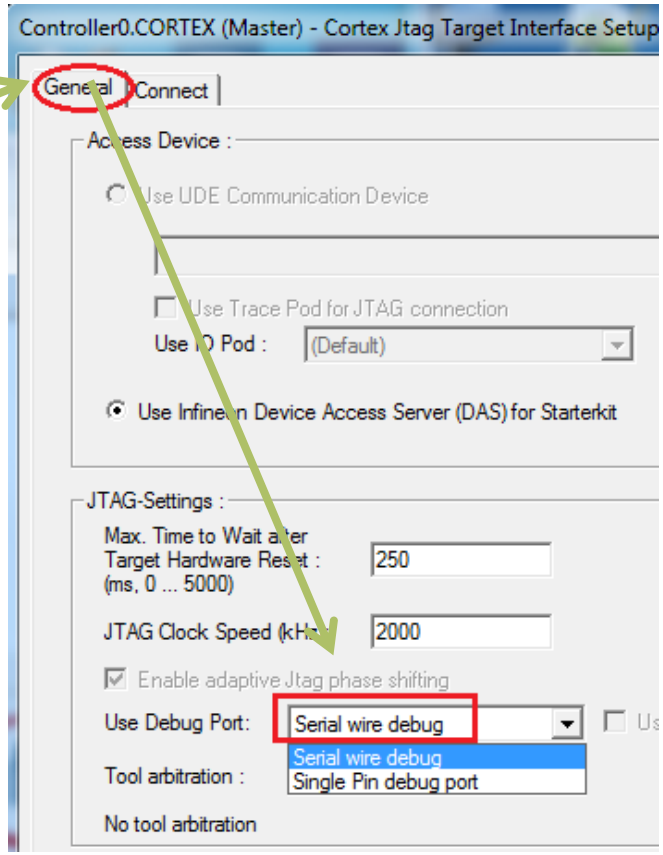
Setup Connection: DAS with miniWiggler

› Connection hardware setup: DAS with **miniWiggler**

Target configuration: DAS



Select
Serial wire debug



If target is configured as **DAS**, **only miniWiggler** can be used to connect with target board.

Note:

› Device must be configured as **User Mode (Debug) SWD0/SWD1**.

› Before clicking "connect", the board must be **reset** by power-off and power-on.

› An adapter needs to used to connect with minWiggler.

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Part 3:

Examples

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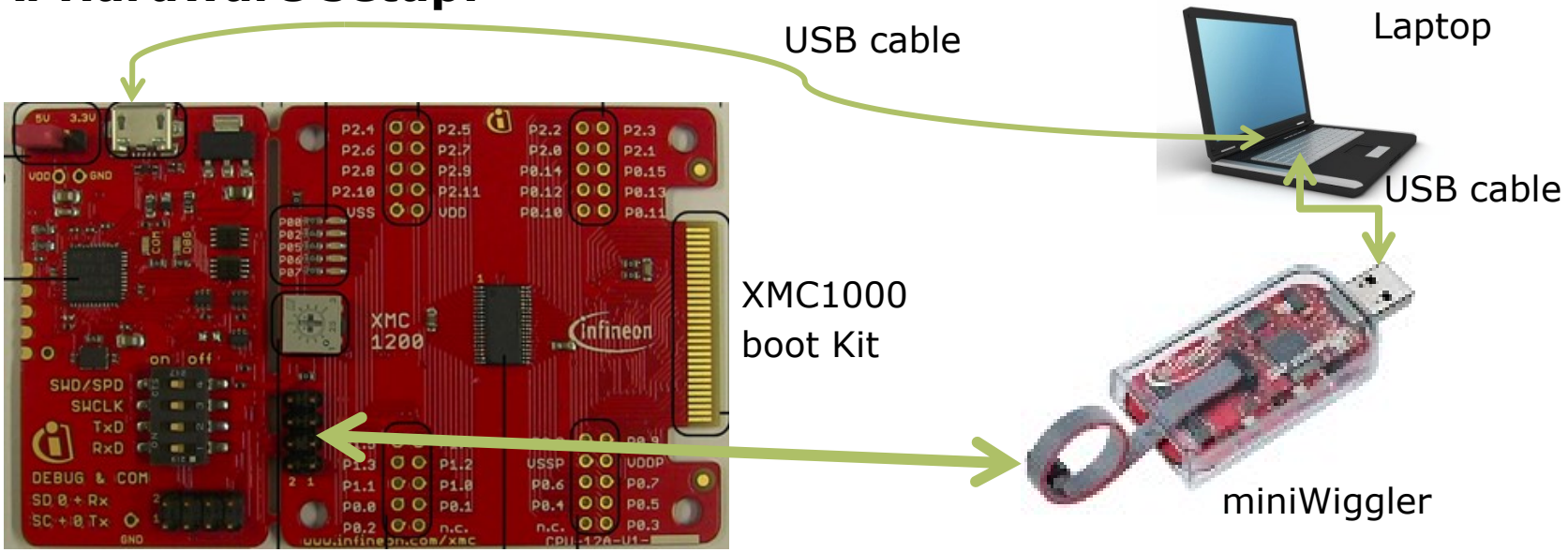
Prerequisites to Follow Examples

A. Hardware setup:



B. Install Memtool v4.6.5:

Product Name	TriCore ™	Version
MemTool V4	X	v4.6.5

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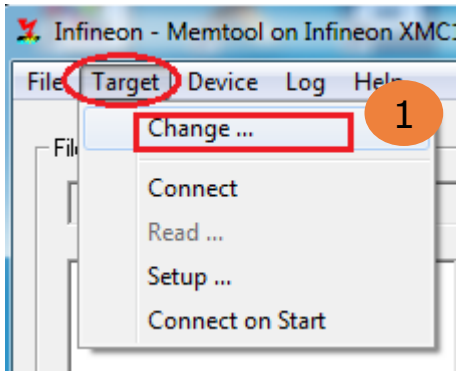
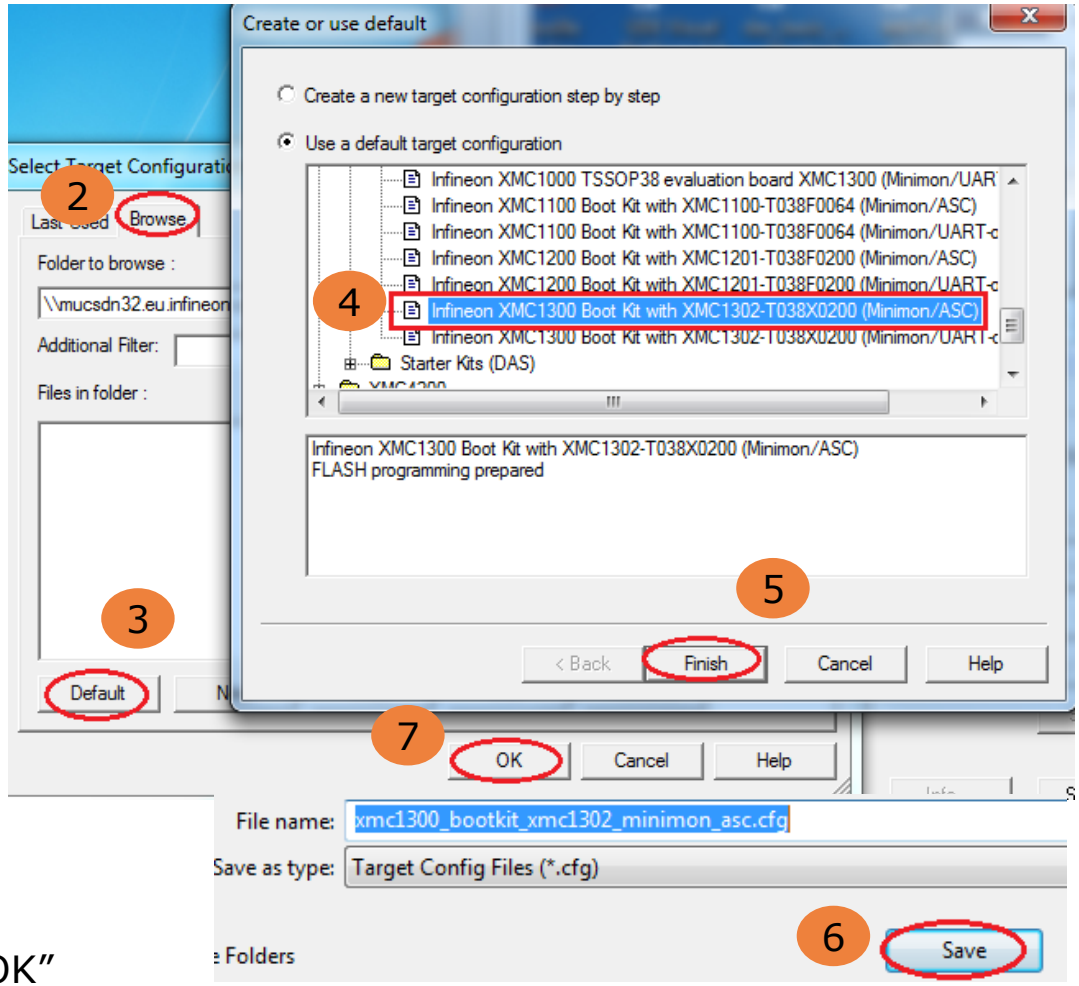
Example 1: ASC with VCOM (1/4)

› Target configuration





1. Click “Target->change”
2. Go to “Browse”
3. Click “Default”
4. Select “Infineon XMC1300 Boot Kit … (Minimon/ASC)”
5. Click “Finish”
6. Click “Save”
7. Click “OK”

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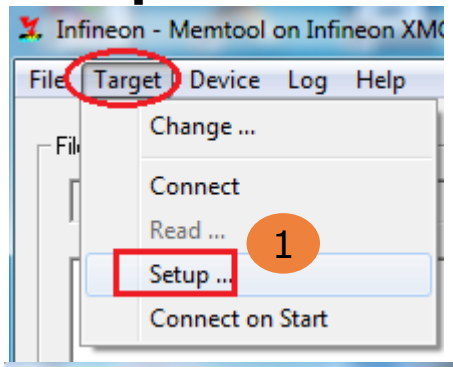
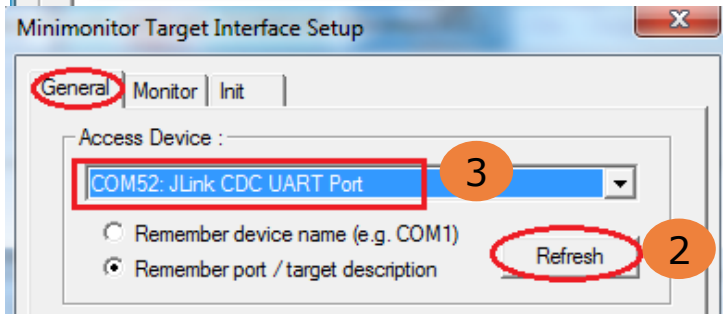
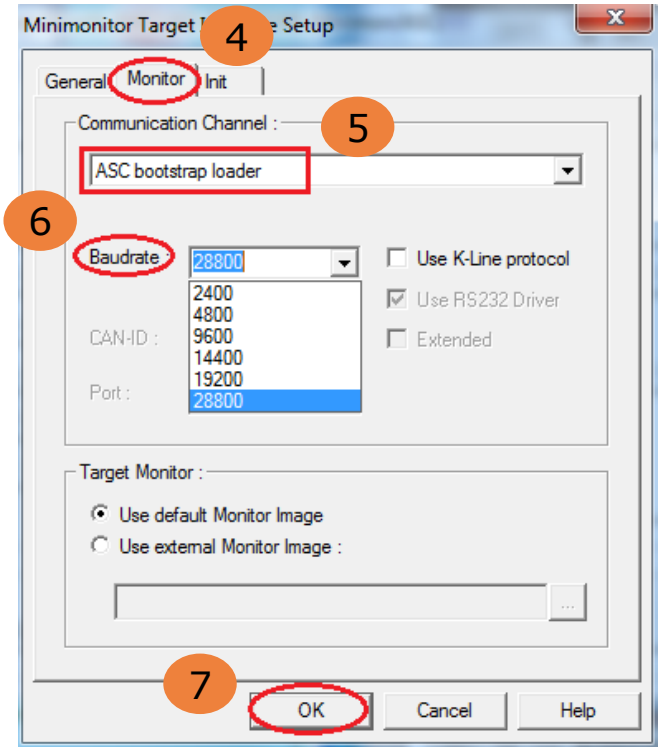
Example 1: ASC with VCOM (2/4)

› Setup connection interface







1. Click "Target->Setup"
2. Click "Refresh"
3. Select "Jlink CDC UART Port"
4. Open "Monitor"
5. Select "ASC bootstrap loader"
6. Select baudrate
7. Click "OK"

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Example 1: ASC with VCOM (3/4)

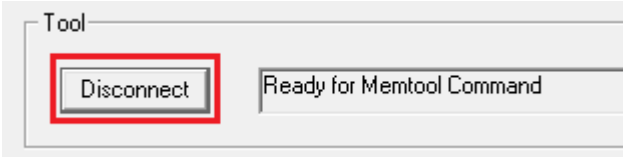
› Connect with target board



1 **Before clicking "Connect" please do follows:**

- › **Disconnect** miniWiggler from target board
- › Make sure that the device is configured as **ASC BSL Mode**
- › Reset board through power-off and power-on board

After doing as described above, click "**Connect**"



After the target board is successfully connected, it will be showed "Ready for Memtool Command" (Disconnect)

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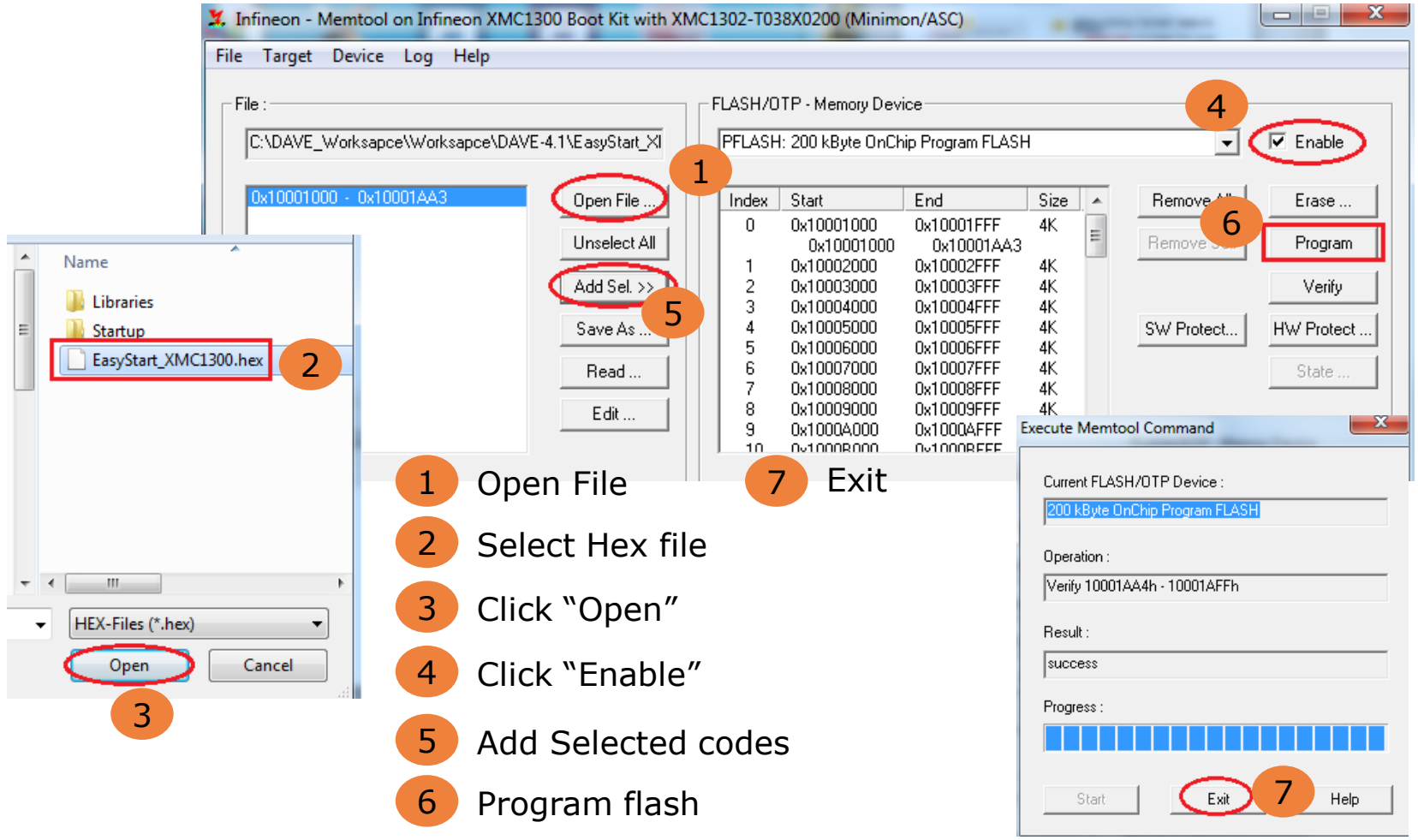
Example 1: ASC with VCOM (4/4)

› **Open Hex file to program**



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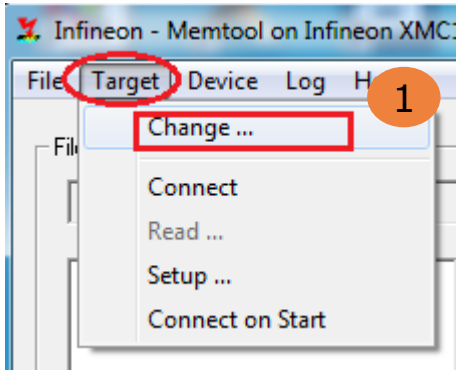
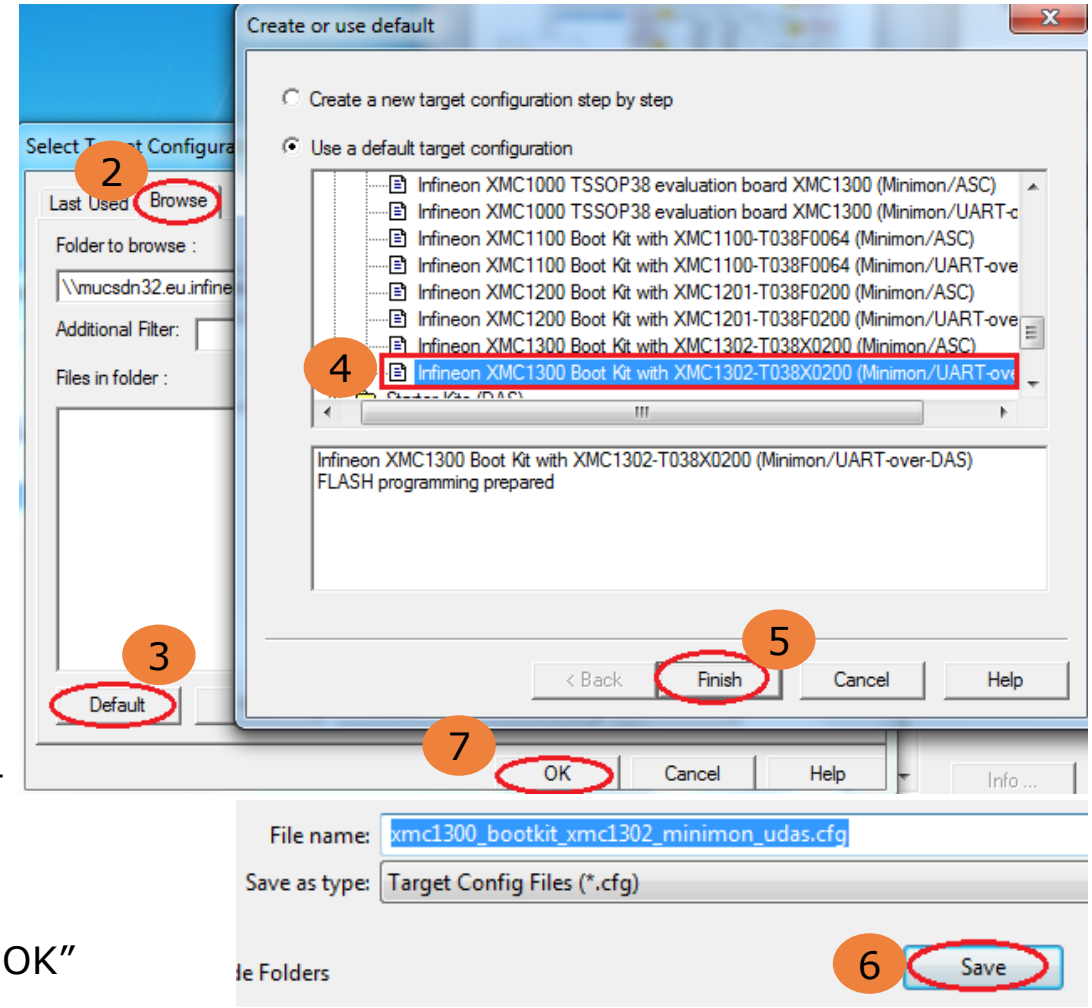
Example 2: ASC with miniWiggler (1/4)

› Target configuration



1. Click "Target->change"
2. Go to "Browse"
3. Click "Default"
4. Select "Infineon XMC1300 Boot Kit … (Minimon/UART-over-SPD via UDAS)"
5. Click "Finish"
6. Click "Save"
7. Click "OK"



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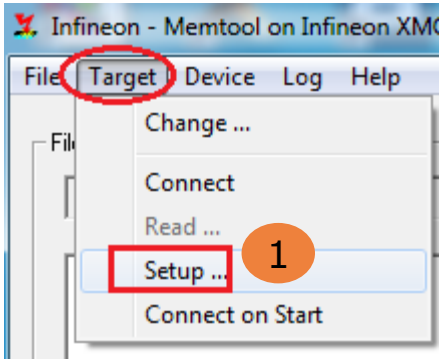
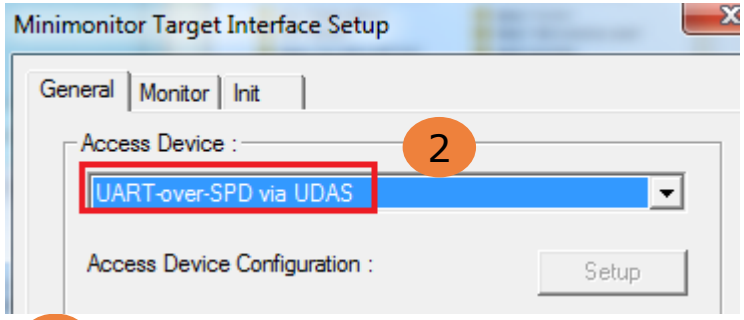
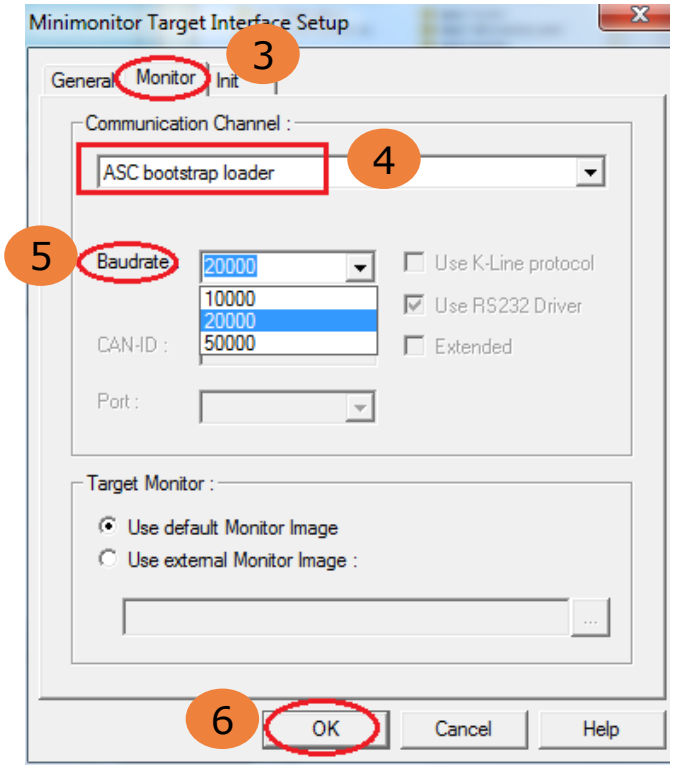
Example 2: ASC with miniWiggler (2/4)

› Setup connection interface







1. Click “Target->Setup”
2. Select “UART-over-SPD via UDAS”
3. Open “Monitor”
4. Select “ASC bootstrap loader”
5. Select baudrate
6. Click “OK”

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Example 2: ASC with miniWiggler (3/4)

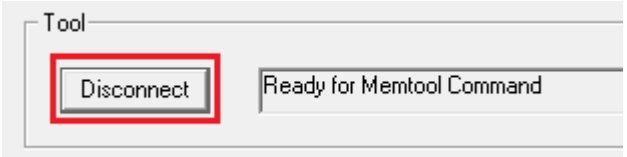
› **Connect with target board**



1 **Before clicking "Connect" please do follows:**

- › **Connect** miniWiggler with target board
- › Make sure that the device is configured as **ASC BSL Mode**
- › Reset board through power-off and power-on board

After doing as described above, click "**Connect**"



After the target board is successfully connected, it will be showed "Ready for Memtool Command" (Disconnect)

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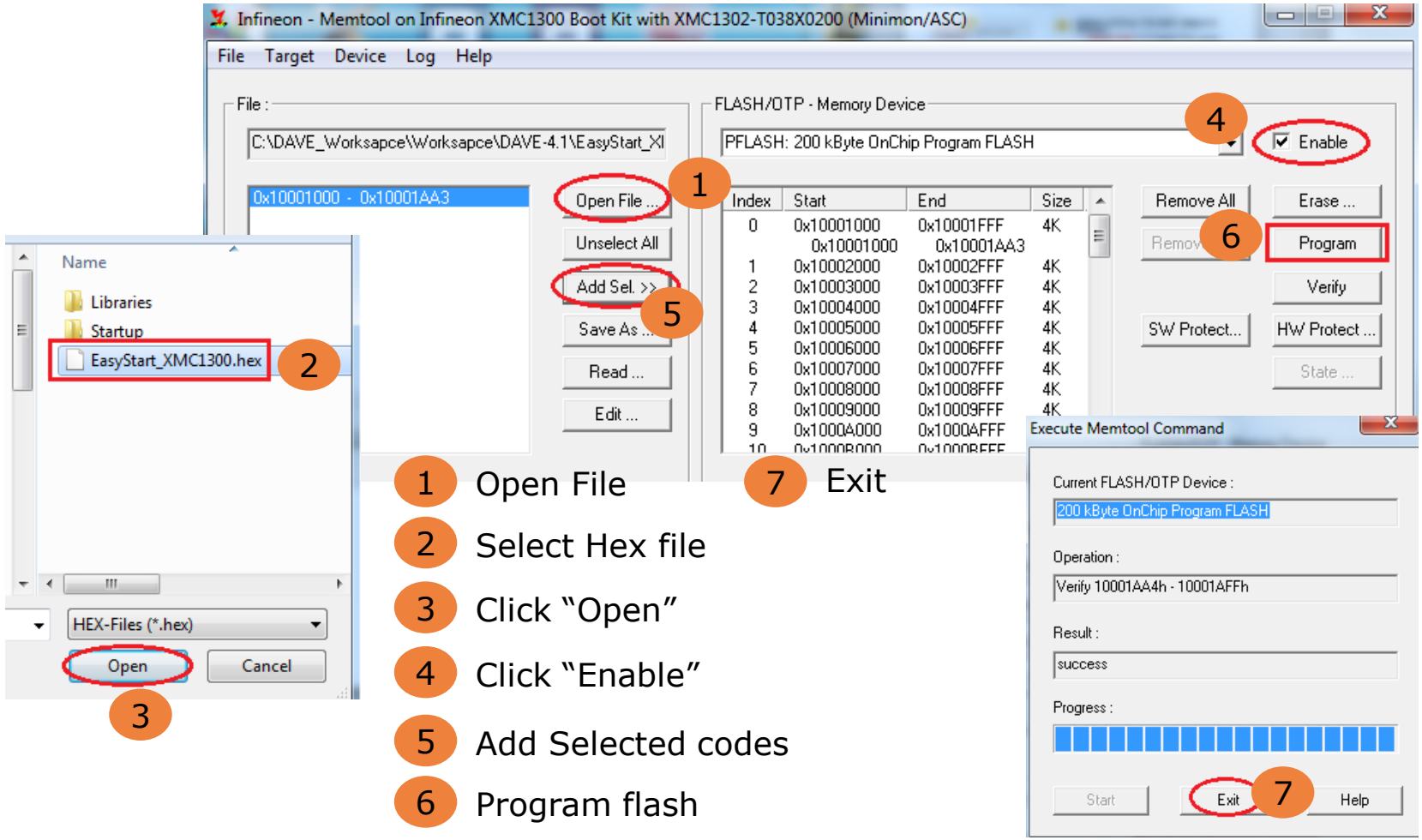
Example 2: ASC with miniWiggler (4/4)

› **Open Hex file to program**



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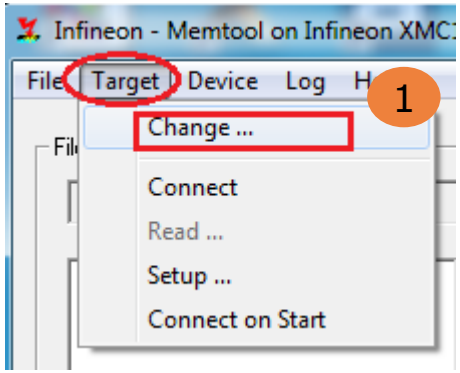
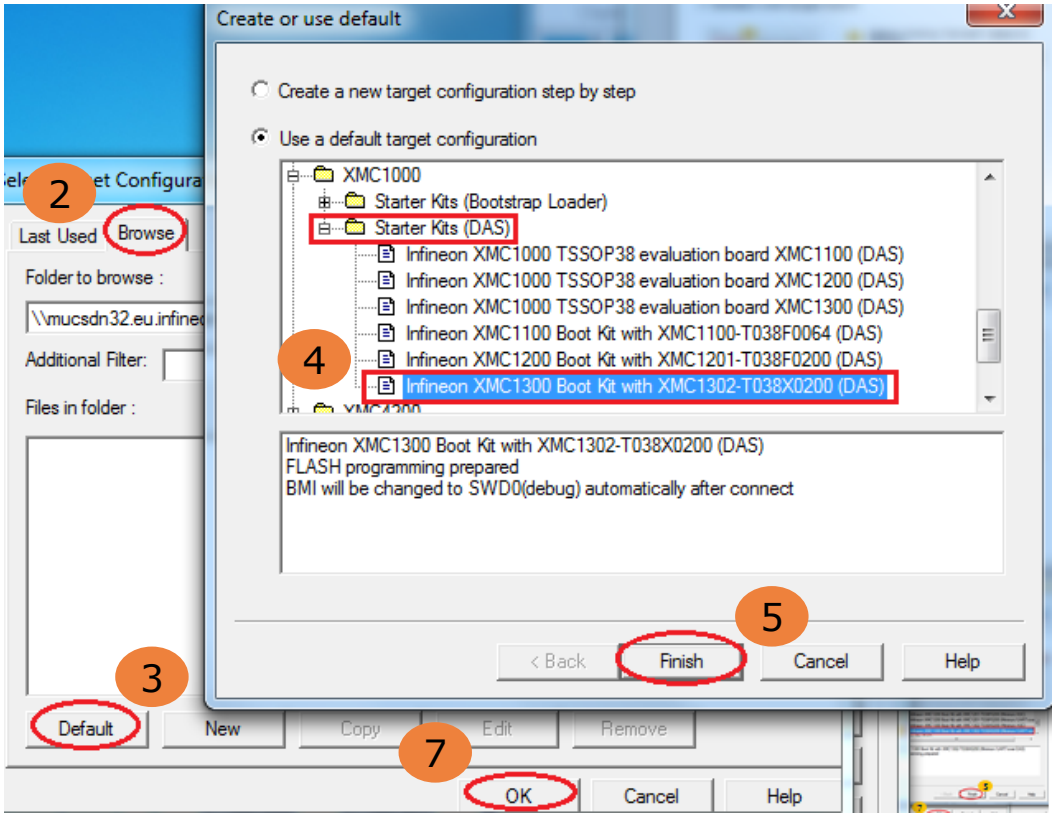
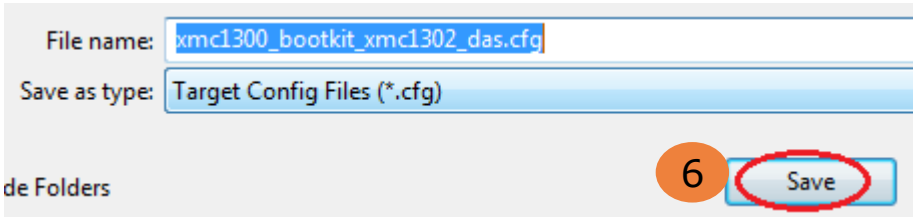
Example 3: DAS with miniWiggler (1/4)

› Target configuration



1. Click "Target->change"
2. Go to "Browse"
3. Click "Default"
4. Select "Infineon XMC1300 Boot Kit … (DAS)"
5. Click "Finish"
6. Click "Save"
7. Click "OK"





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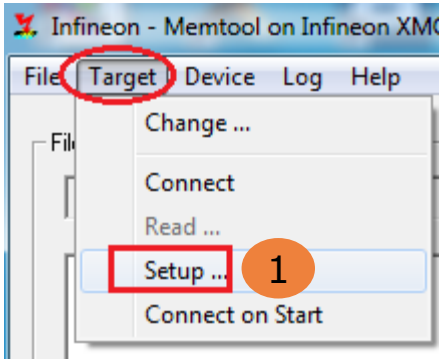
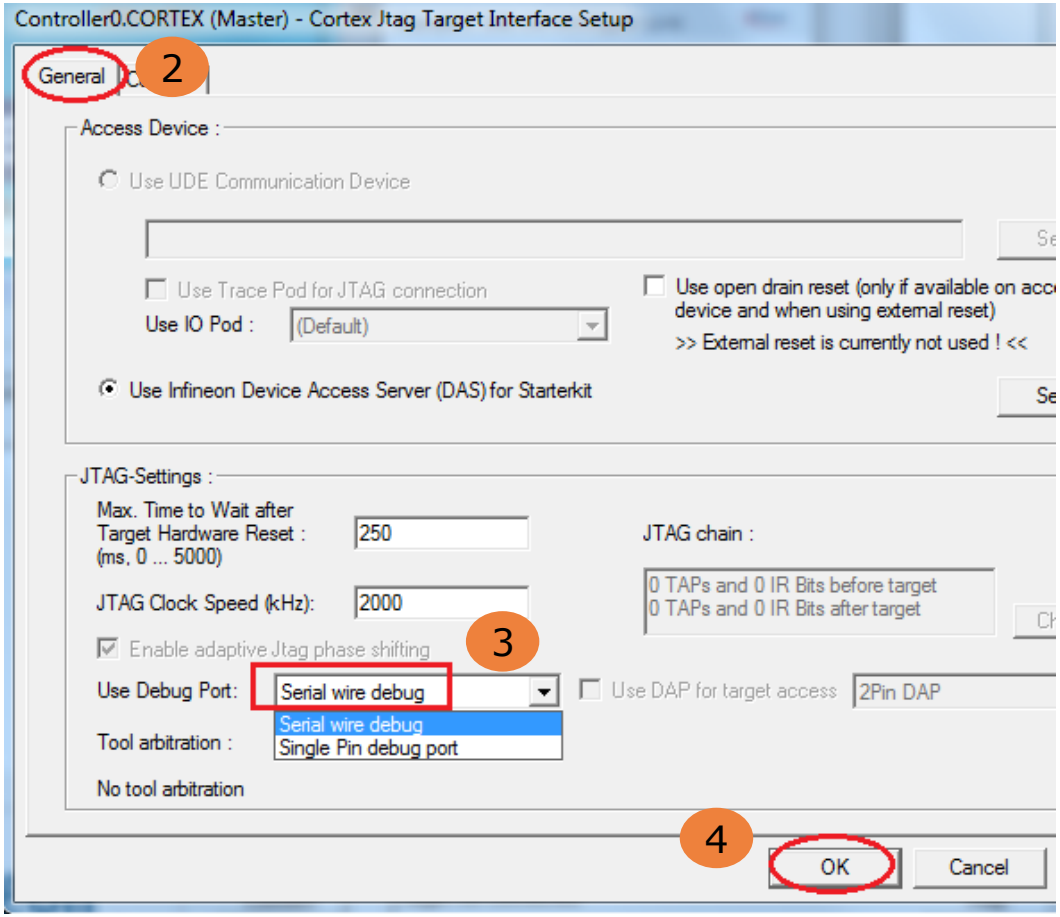
Example 3: DAS with miniWiggler (2/4)

› Setup connection interface



1. Click "Target->Setup"
2. Open "General"
3. Select ""Serial wire debug"
2. Click "OK"



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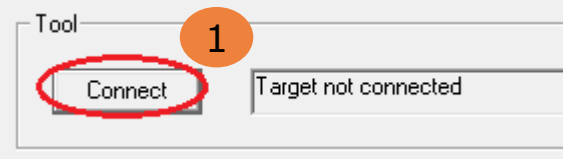
Example 3: DAS with miniWiggler (3/4)

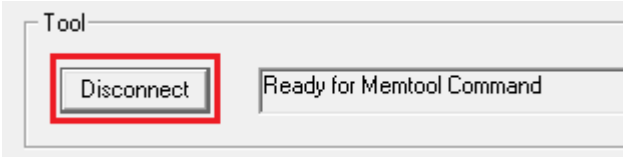
› **Connect with target board**



1 **Before clicking "Connect" please do follows:**

- › **Connect** miniWiggler with target board
- › Make sure that the device is configured as **User Mode (Debug) SWD0/SWD1**
- › Reset board through power-off and power-on board

After doing as described above, click "**Connect**"



After the target board is successfully connected, it will be showed "Ready for Memtool Command" (Disconnect)

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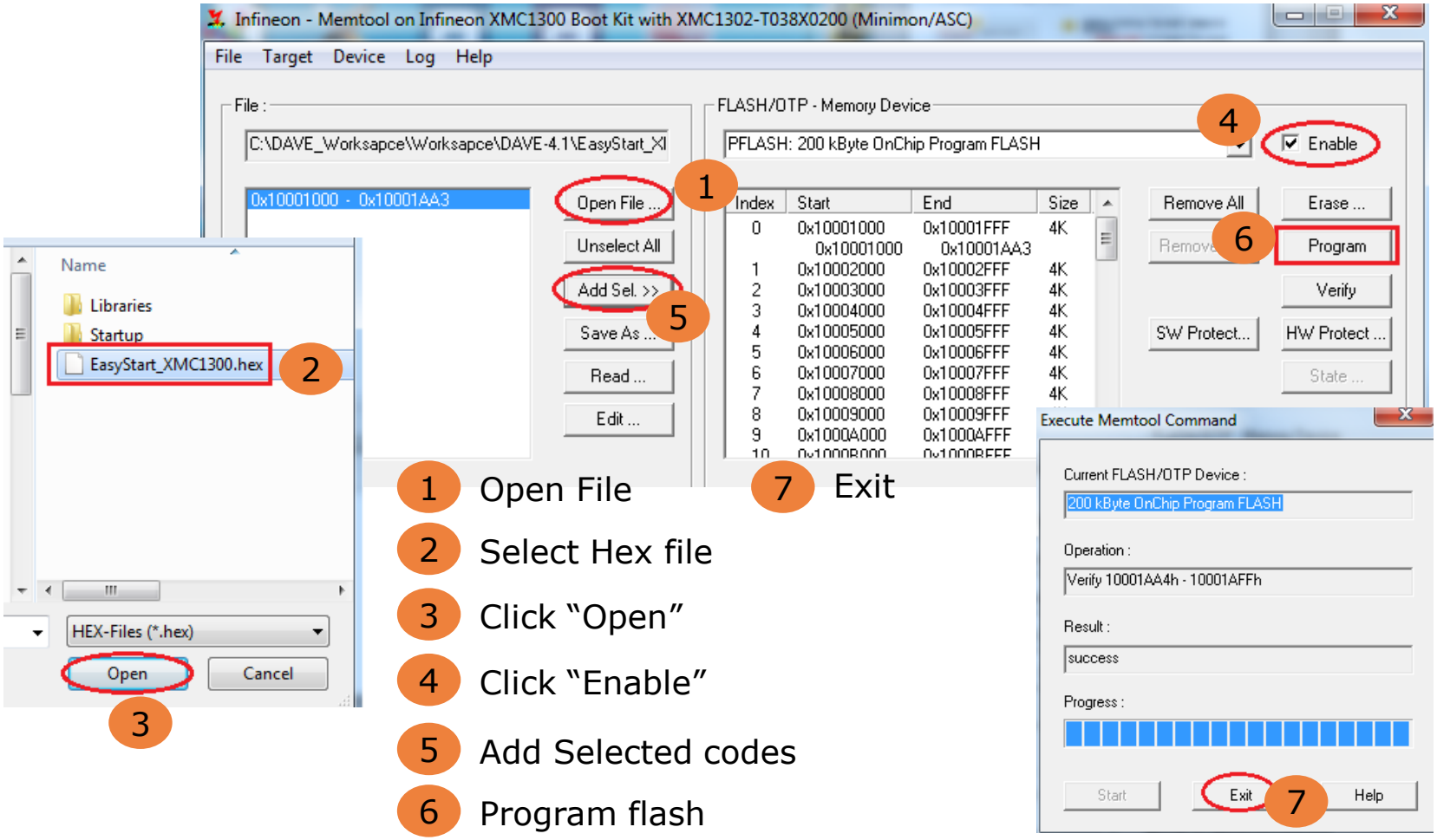
Example 3: DAS with miniWiggler (4/4)

› **Open Hex file to program**



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Part 4:

Changing BMI Value in Memtool

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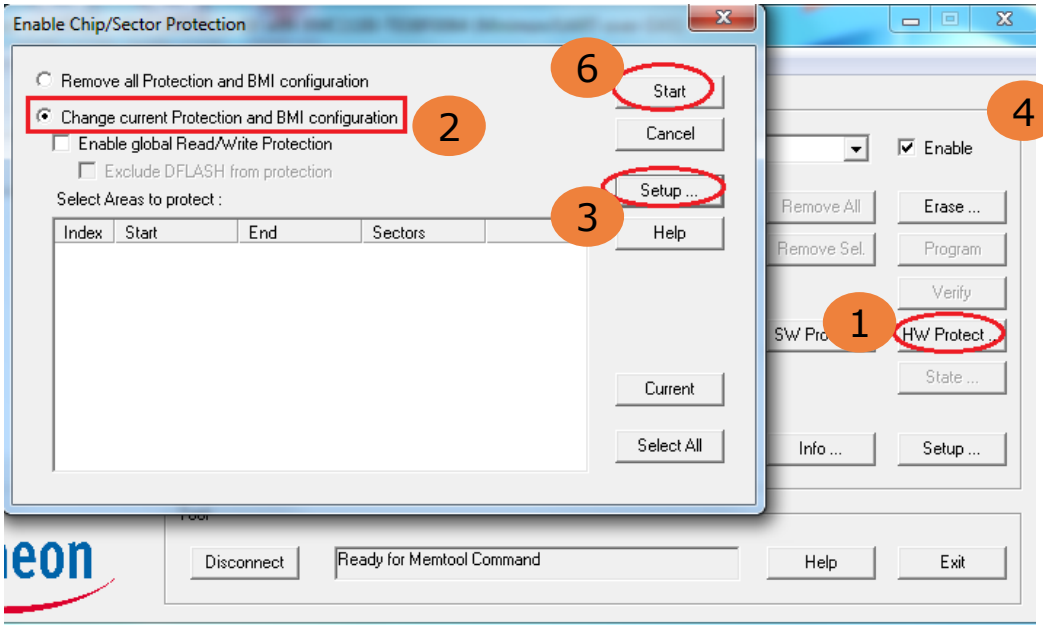
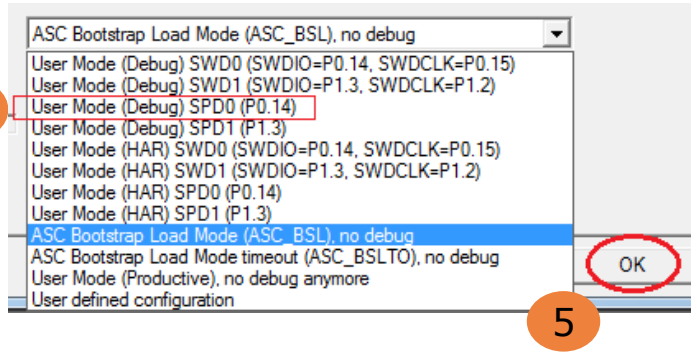
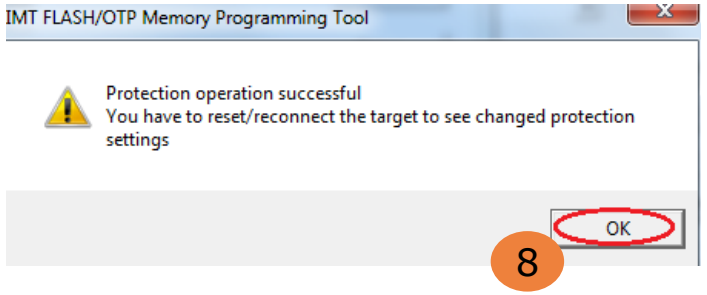
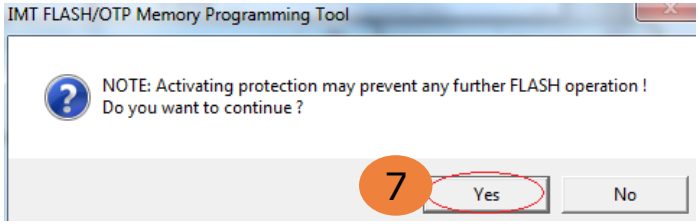
Changing BMI Value

› Memtool can be used as BMI set tool to change the BMI bootstrap mode in XMC1000 devices. To change the BMI value connect firstly to target board, then follow the following steps:









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Reconnect to Target after BMI change

- After the BMI value is changed the connection to target will be **lost** because of a reset operation in BMI changing process. To reconnect to target board a **new target configuration** may be required depending on bootstrap mode being changed.
- If BMI is changed from "ASC Bootstrap Load Mode (ASC_BSL), no debug" to "User Mode (Debug) SWD0", before reconnection the target needs to be configured as "**DAS**", because just DAS configuration can connect to target device under "User Mode". For DAS configuration please reference **Example 3** in Part of examples.
- If BMI is changed from "User Mode (Debug) SWD0" to "ASC Bootstrap Load Mode (ASC_BSL), no debug", before reconnection the target needs to be configured as "**minmon/ASC**" or "**minimon/UART-over-DAS**", because just these two configurations are able to connect with target device under "ASC BSL Mode". For "minmon/ASC" and "minimon/UART-over-DAS" configurations please reference **Example 1** or **Example 2** in Part of examples, respectively.

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Part 5:

Problem and Solution

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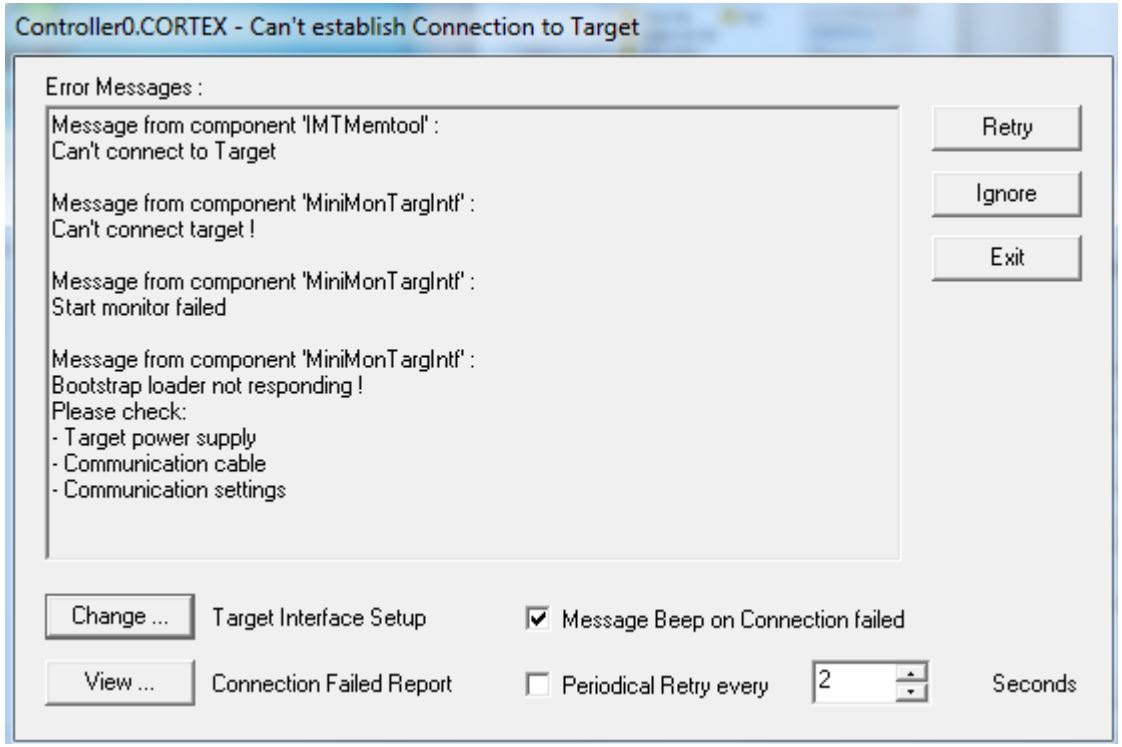
Problems

› The most commonly met problem by using Memtool is "**Can't establish Connection to Target**" like:



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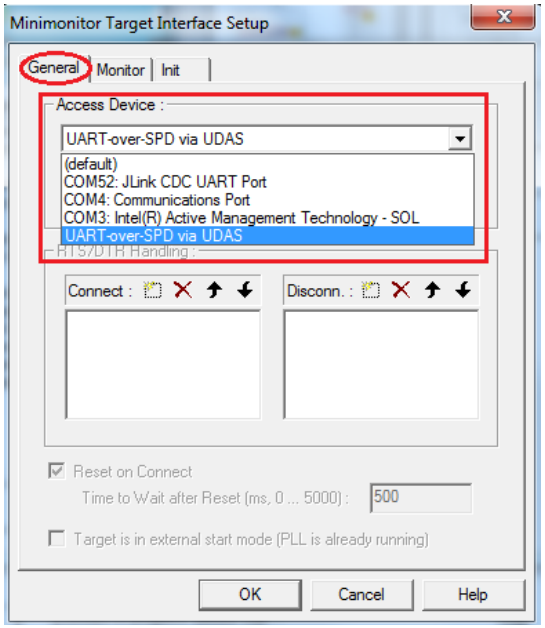
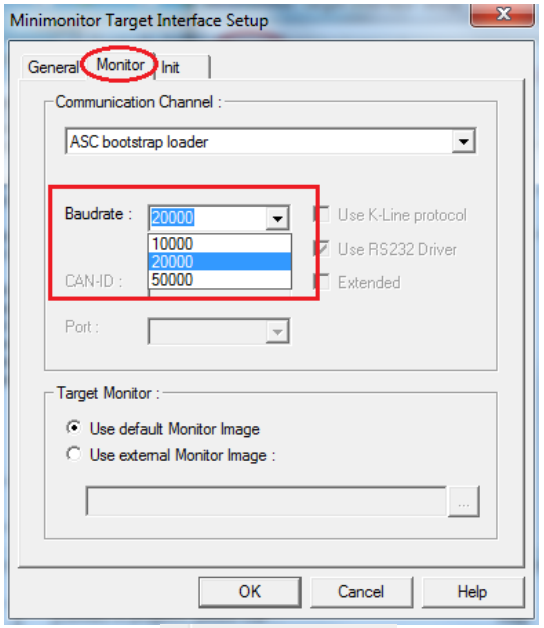
Solutions (1/2)

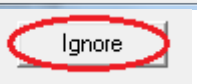
- **Solutions**:
  - **Step 1**: Click "Change" to check the connection setup
  - **Step 2**: Check if **Access Device** is correctly chosen:
    - For miniWiggler select "UART-over-SPD via UDAS"
    - For VCOM select Jlink CDC UART Pot







- **Step 3**: Click "Ignore" to leave connect setup



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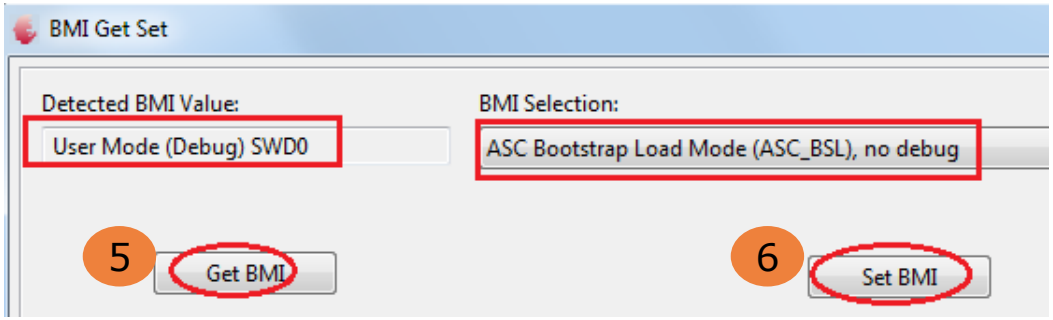
Solutions (2/2)

- **Step 4**: Check if bootstrap mode is correctly configured using a BMI tool, e.g. BMI tool in DAVE3. This is the **key step** for solving the connection problem. **Note**: miniWiggler must be **disconnected** from board if DAVE BMI tool is used.



- **Step 5**: click "Get BMI" to get the **current** BMI value in device and check if the BMI value is correct:
  - If target configuration is "**DAS**", BMI must be **User Mode (debug) SWD0**.
  - If target configuration is "**Minimon/ASC**" or "**Minimon/UART-over-DAS**", BMI must be **ASC BSL Mode (no Debug).**



- **Step 6**: if BMI change is required, click "Set BMI" to set correct BMI value.
- **Step 7: Reset** device after changing the BMI value
- **Step 8**: click "Connect" in Memtool main window to reconnect the device



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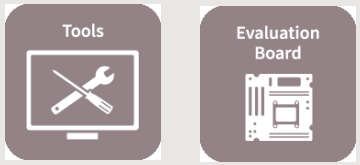
Technical Material 	› Application Notes › Technical Articles › Simulation Models › Datasheets, MCDS Files › PCB Design Data	› www.infineon.com/XMC › Kits and Boards › DAVE™ › Software and Tool Ecosystem
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Glossary abbreviations

ASC	Asynchronous Serial Interface
BSL	Bootstrap Loader
BMI	Boot Mode Index
DAS	Debug Access Server
JTAG	Joint Test Action Group
SWD	Serial Wire Debug
VCOM	Visual Communications

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