

# OPTIGA™ Trust Charge

Product Version: V1

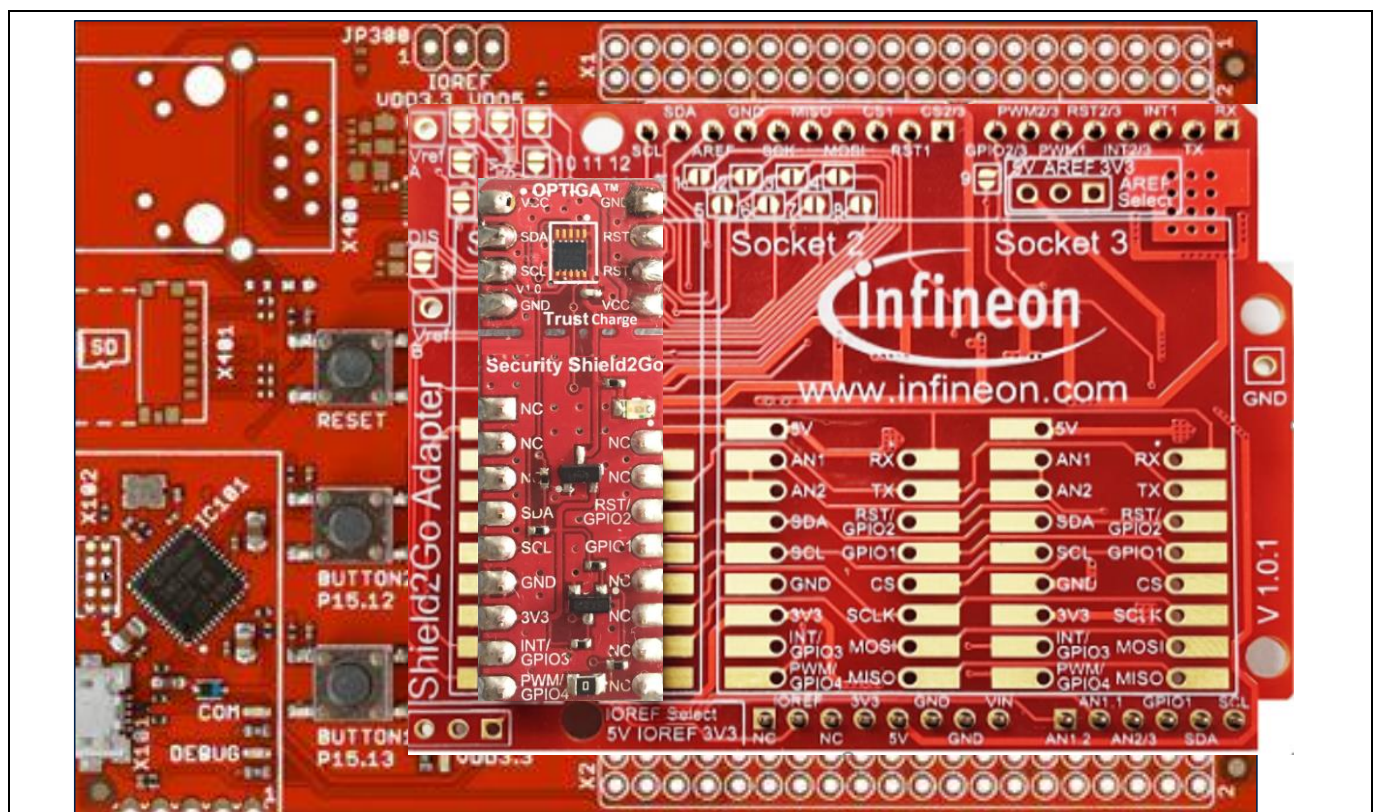
## About this document

### Scope and purpose

The purpose of this document is to guide a beginner to use the OPTIGA™ Trust Charge XMC4700 Relax kit. The scope is limited to OPTIGA™ Trust Charge XMC4700 Relax kit and its hardware and software components.

### Intended audience

This document addresses: customers, solution providers and system integrators.



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## Introduction

# 1 Introduction

This document describes how to setup the environment to run OPTIGA™ Trust Charge application and use the provided binaries.

## 1.1 References

**Table 1**      **References**

Definition	Source
[1] xmc4700_relaxkit_usermanual	Infineon
[2] Infineon_I2C_Protocol	Infineon

## 1.2 Abbreviations

**Table 2**      **Abbreviations**

Abbreviation	Definition
API	Application Programming Interface
CA	Certificate Authority
CHM	Microsoft Compiled HTML Help
CMOS	Complementary Metal Oxide Semiconductor
DAVE	Digital Application Virtual Engineer
ECC	Elliptic Curve Cryptography
HTML	Hyper Text Markup Language
HW	Hardware
I2C	Inter Integrated Circuit
IDE	Integrated Development Environment
IoT	Internet of Things
NIST	National Institute of Standards and Technology
OS	Operating System
PAL	Platform Abstraction Layer
PC	Personal Computer
RST	Reset
SCL	Serial Clock
SDA	Serial Data
SW	Software
TTL	Transistor Transistor Logic
USB	Universal Serial Bus
XMC	XMC4700 Relax Kit-V1.0

## 2 OPTIGA™ Trust Charge

OPTIGA™ Trust Charge is a security solution with a pre-programmed security controller built on Elliptic Curve Cryptography (ECC) with 256 and 384 bit curve length, SHA-256.

It supports secure data object update, hibernate and toolbox functionalities, which is used for secure communication, platform integrity, data store protection and lifecycle management for Connected Device Security.

### 2.1 OPTIGA™ Trust Charge XMC4700 Relax Kit

OPTIGA™ Trust Charge XMC4700 Relax Kit is designed to provide all the components required to setup the environment to demonstrate the features of the OPTIGA™ Trust Charge.

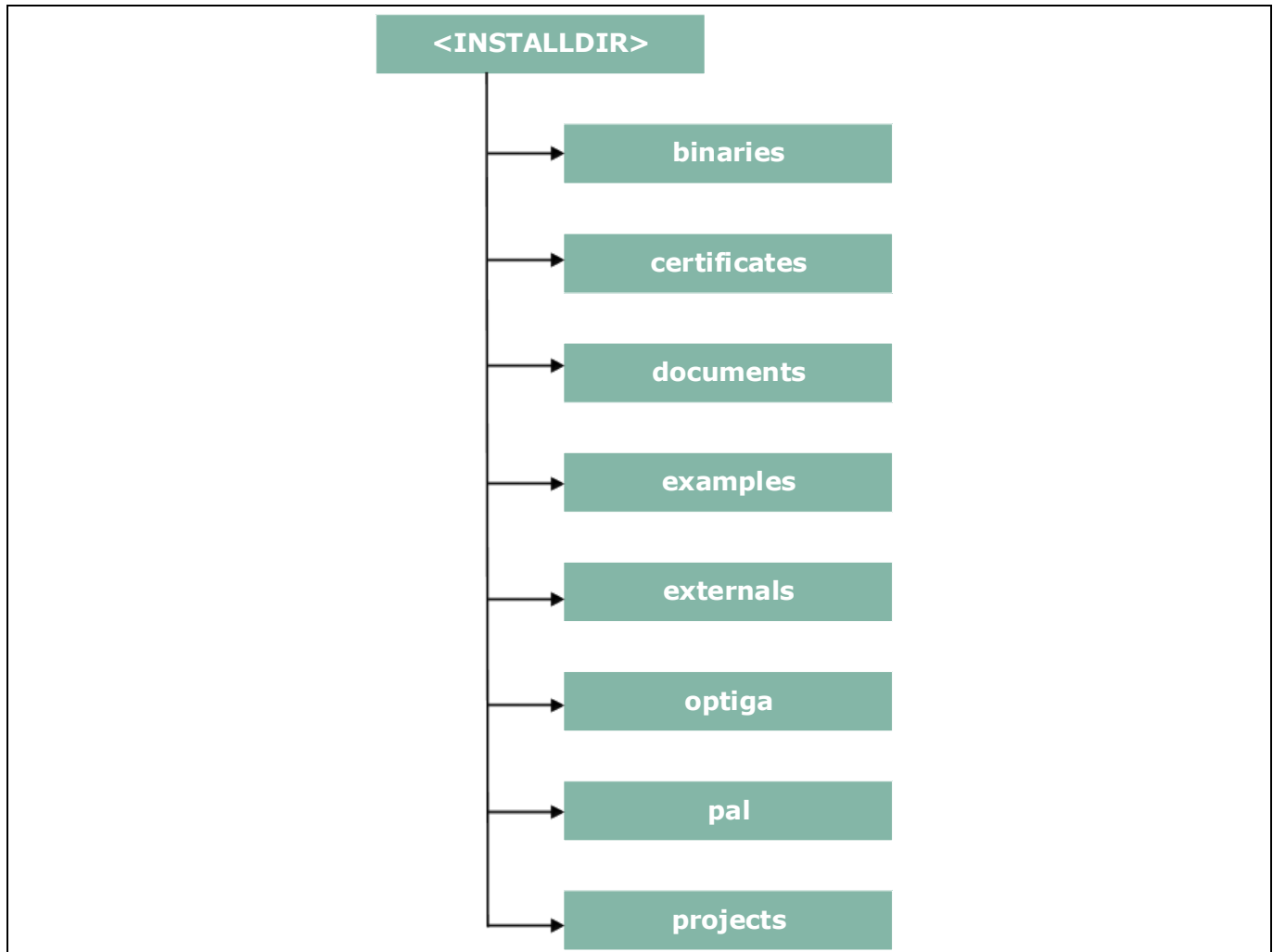
#### 2.1.1 Evaluation Kit Components

**Table 3** Evaluation Kit contents

No.	Item	Description
1	XMC4700 board	Hardware Evaluation board for XMC4700 microcontroller from Infineon. More details can be found on <a href="#">Infineon website</a> .
2	My IoT Adapter	Arduino compatible connector to add Shield2Go board on XMC4700 Relax Kit.
3	OPTIGA™ Trust Charge Security Shield2Go	Shield2Go board contains OPTIGA™ Trust Charge chip. It is compatible with Infineon's My IoT adapter.
4	Micro USB to USB cable	The cable provides DC supply to XMC4700 Relax Kit and to flash software.

## 2.2 Installed Software Components

The installed directory structure of OPTIGA™ Trust Charge setup software is shown below:



**Figure 1** Installed directory structure

<INSTALLDIR> is the root directory to which the release package contents are extracted. The following section explains the contents of each subdirectory under installed directory:

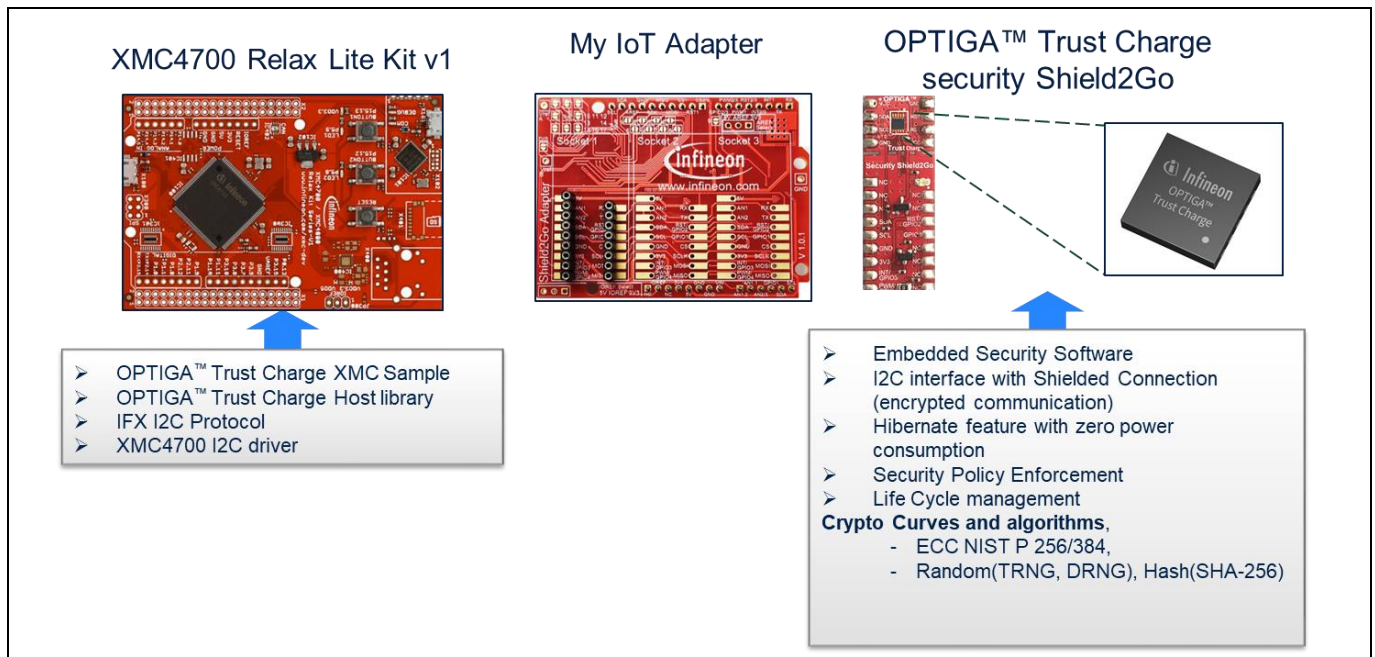
1. **binaries** -- binaries for OPTIGA™ Trust Charge example application.
2. **certificates** -- OPTIGA™ Trust Charge certificates.
3. **documents** -- Relevant OPTIGA™ Trust Charge documentation.
4. **examples** -- Example use cases for Toolbox features and a tool for generation of manifest for secure data object feature.
5. **externals** -- mbedTLS software crypto library.
6. **optiga** -- OPTIGA™ Trust Charge libraries.
7. **pal** -- PAL for XMC4700 device and PAL for mbedTLS software crypto library.
8. **projects** -- XMC4700 device example project in DAVE workspace.

## System Setup

### 3 System Setup

This section explains the basic components required for system setup.

#### 3.1 System Overview



**Figure 2 System Overview**

This system consists of the following components:

1. XMC4700 Relax Kit v1.0 from Infineon
  - The XMC4700 Relax Kit is an evaluation board with XMC4700 Microcontroller from Infineon. For more information refer document [\[1\]](#).
  - It is used as a reference platform to simulate the Host.
  - It interacts with secure element via I2C.
2. My IoT Adapter
  - It acts as a gateway to add Shield2Go boards onto XMC4700 Relax Kit V1.0.
3. OPTIGA™ Trust Charge Security Shield2Go
  - Shield2Go board contains OPTIGA™ Trust Charge chip. It is compatible with Arduino Connector along with Infineon's My IoT adapter.

The following interface/connection is done among the above components:

- Micro USB data cable (with Data line) from PC is connected to XMC to supply power.

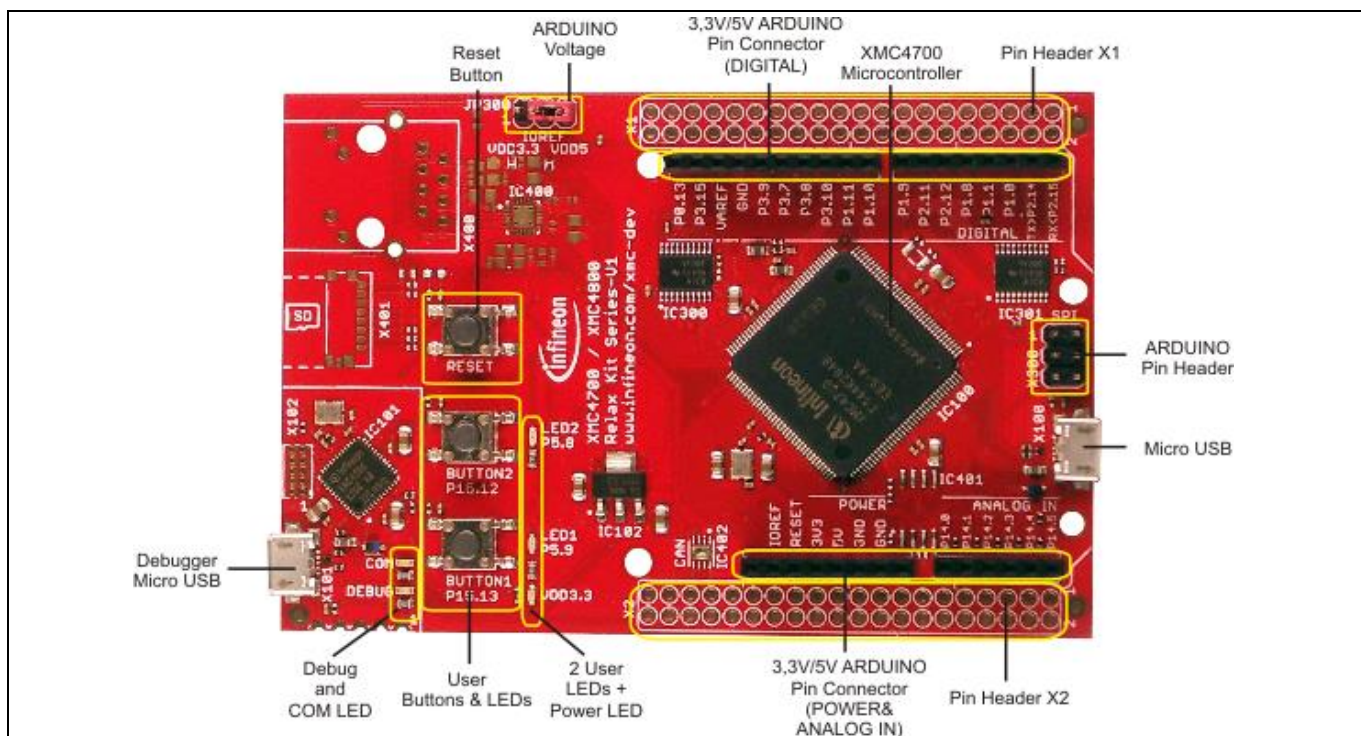
#### 3.2 Hardware Setup

The hardware required to run OPTIGA™ Trust Charge setup is described in this section.



## System Setup

### 3.2.1 XMC4700 Relax Kit



**Figure 3** XMC4700 Relax Kit

**Table 4** XMC4700 Relax Kit Components

No.	Item	Description
1	DC Supply	Power supply of 5V is provided by connecting to Micro USB connector.
2	Arduino compatible connector	External interface to connect to Arduino Shields.
3	On-board debug probe	Supports Serial Wire Debug and UART communication for debugging and logging purposes.

The pin headers for Arduino shields can be used for GPIOs or signal interface as well. Arduino compatible connector supports I2C, UART and SPI interfaces among others.

**Table 5** XMC4700 Relax Kit I2C Pin Information

No.	Description	Pin
1	I2C SCL	P0.13
2	I2C SDA	P3.15
3	RST	P1.11
4	VCC	P2.12
5	GND	GND

For more information about pin details of Arduino shield, refer document [\[1\]](#).

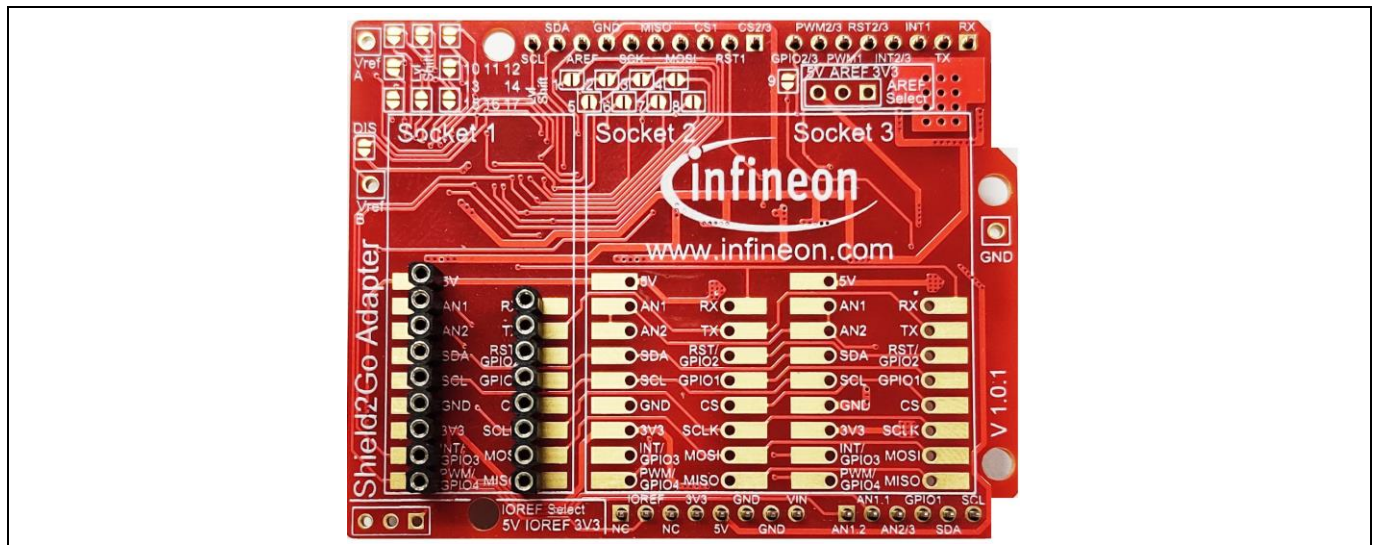
For more information about the XMC Specification, Architecture and Design/Schematic, refer document [\[1\]](#)

### 3.2.2 My IoT Adapter

The My IoT adapter is an evaluation board that allows users to easily combine different Shield2Go boards to Arduino compliant ecosystem, for fast evaluation of IoT systems. With its solderless connectors, it allows users

## System Setup

to easily stack Shield2Go boards instead of soldering it. The shield design is derived from XMC2Go evaluation board.



**Figure 4** My IoT adapter

My IoT adapter features are as follows:

- Provide power supply and connectivity for Shield2Go boards.
- Level shifting handling capabilities between CMOS 3.3V and TTL 5V.
  - Solder bridges to selectively deactivate level shifting.
  - Additional pins enable setting the reference voltages for level shifting.
- Separate power control switches for Socket 1 and Socket 2. Socket 1 is independently controllable while Socket 2 and 3 share pins to underlying control board.

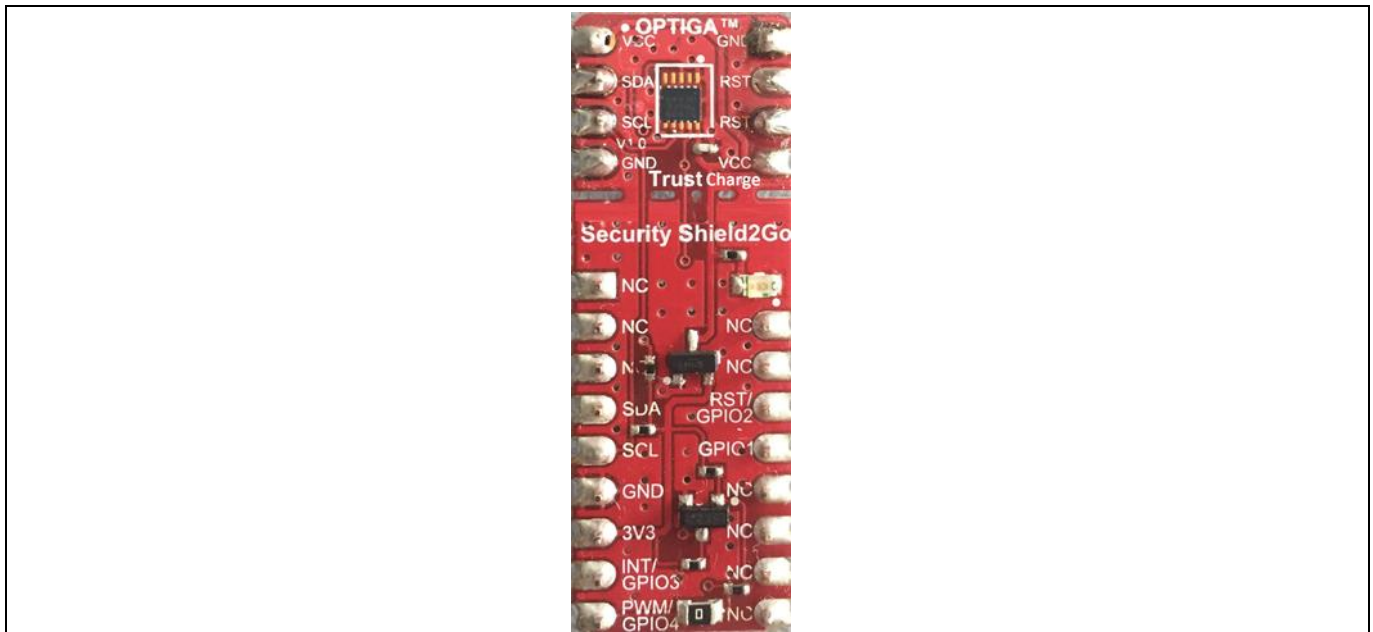
More information is available at [Infineon website](https://www.infineon.com).

### 3.2.3 Shield2Go Security OPTIGA™ Trust Charge

Shield2Go boards are equipped with featured Infineon ICs and provide a standardized form factor and pin layout, allowing a 'plug and play' approach for easy prototyping.



## System Setup



**Figure 5** OPTIGA™ Trust Charge Shield2Go

The OPTIGA™ Trust Charge Shield2Go is equipped with OPTIGA™ Trust Charge security chip. It allows users to develop system solutions by combining Shield2Go with My IoT adapter and XMC.

*Note: Ensure no voltage supplied to any of the pins exceeds the absolute maximum rating of  $V_{cc} + 0.3\text{ V}$ .*

### 3.3 Software Setup

This section describes the software used in XMC to run the OPTIGA™ Trust Charge setup.

#### 3.3.1 Software Components

All the software components required on XMC are explained in the following sections.

##### 3.3.1.1 XMC4700 Relax Kit

1. OPTIGA™ Trust Charge Host Library consists of the following:

- Service Layer  
The layers (Util and Crypt) provide APIs to interact with OPTIGA™ for various use-case functionalities.
- Access Layer  
This layer manages the access to the command interface of OPTIGA™ security chip. It also provides the communication interface to the OPTIGA™.
- Platform Abstraction Layer  
This layer provides platform agnostic interfaces for the underlying HW and SW platform functionalities used by OPTIGA™ libraries.
- Platform Layer  
This layer provides the platform specific components and libraries for the supported platforms.

2. IFX I2C Protocol

This is an implementation as per document [\[2\]](#).

3. XMC4700 I2C Driver

## System Setup

These are low level I2C device driver for I2C communication from XMC to OPTIGA™ Trust Charge Security chip.

### 4. OPTIGA™ Trust Charge XMC Example

This Example Application demonstrates Secure Data Object, Hibernate feature, Cryptographic ToolBox Functionalities and Read/Write General Purpose Data use cases.

*Note: The binaries and the example application provided with the application note are meant for the XMC4700 Relax Kit v1. These binaries may not work as expected if executed on a different platform.*

## 3.3.2 PC Requirements and Configurations

### 3.3.2.1 PC Requirement

A 32-bit or 64-bit PC with Windows 7/10 Operating System with the below requirements need to be used for setting up the OPTIGA™ Trust Charge setup:

1. One USB port.
2. DAVE 4.4.2 and device feature 2.2.4, which can be downloaded from Infineon website.  
Link to download DAVE 4.4.2: [Dave Download](#)
3. Segger J-Link tool v6.00 or greater for flashing software on XMC.  
Link to download Segger: [J-Link tool Download](#)  
Link to download manual: [J-Link manual Download](#)

*Note: The path where DAVE tool is extracted is henceforth referred to as <DAVE\_PATH> in the document.*

*Note: All the tools mentioned in the above list are intended to be used with the binaries or source code given in the release package.*

## Using OPTIGA™ Trust Charge

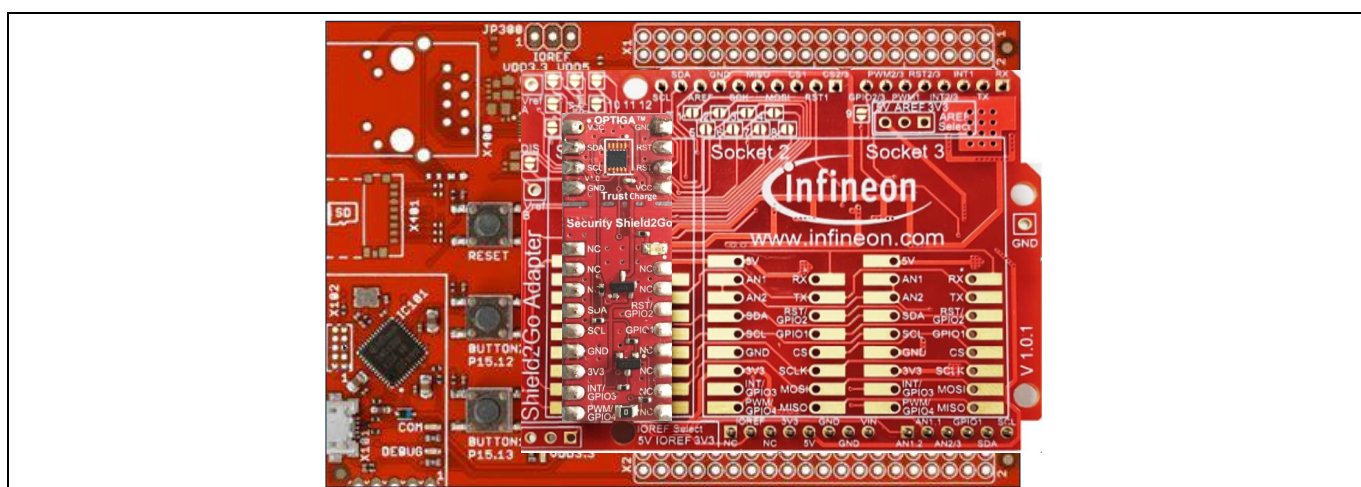
## 4 Using OPTIGA™ Trust Charge

### 4.1 Quick Setup

This section explains the steps to run OPTIGA™ Trust M example application.

#### 4.1.1 Running OPTIGA™ Trust Charge Example Application

1. Make the connections among XMC4700 Relax Kit, My IoT Adapter and OPTIGA™ Trust Charge Shield2Go as shown below



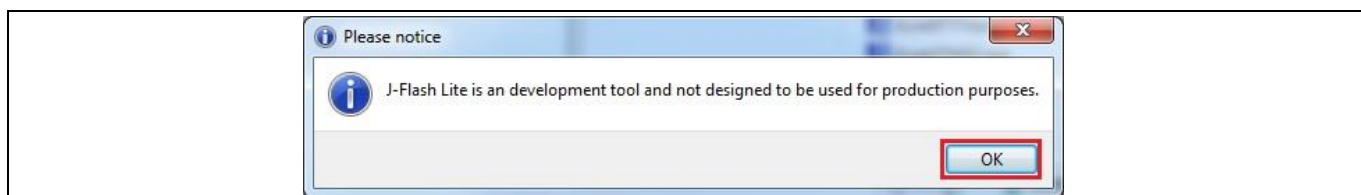
**Figure 6 XMC4700 Relax Kit, My IoT Adapter and OPTIGA™ Trust Charge Shield2Go connection**

2. Power up the kit by connecting Micro USB cable between PC and Debugger micro USB. For placement of Debugger micro USB refer Figure 3.
3. Download the OPTIGA™ Trust Charge example application using JFlashLite tool as described in section 4.1.2.1.  
Hex file location is <INSTALLDIR>\binaries\XMC4700\_relax\_kit\dave4\XMC4700\_optiga\_example.hex.
4. OPTIGA™ Trust Charge example application uses USB\_D\_VCOM for logging, refer section 4.1.3 for logging details.

#### 4.1.2 Steps to download example hex file to XMC4700 Relax Kit

##### 4.1.2.1 Using JFlashLite tool

1. Run JFlashLite.exe from JLink installation folder. It shows a notice window. Click OK.



**Figure 7 JFlashLite launch window**

2. Click on Device to select a target device.

## Using OPTIGA™ Trust Charge

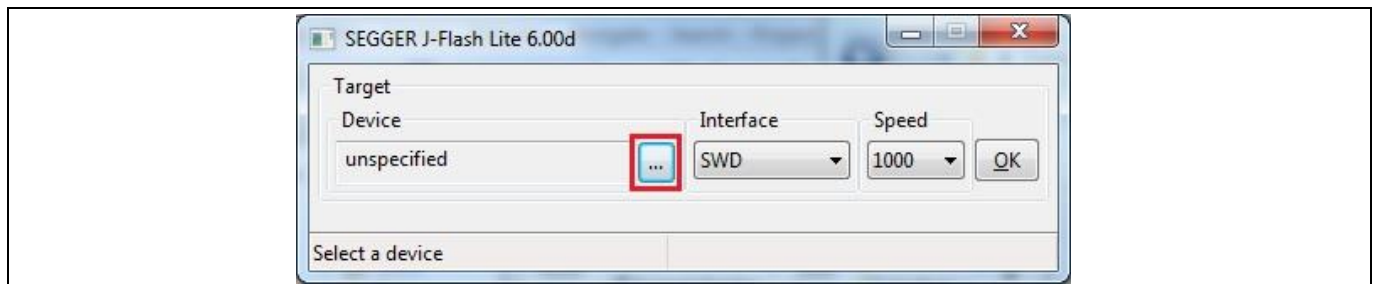


Figure 8 JFlashLite select a device

3. Select Infineon as Manufacturer and Device as XMC4700-2048, and then click OK.

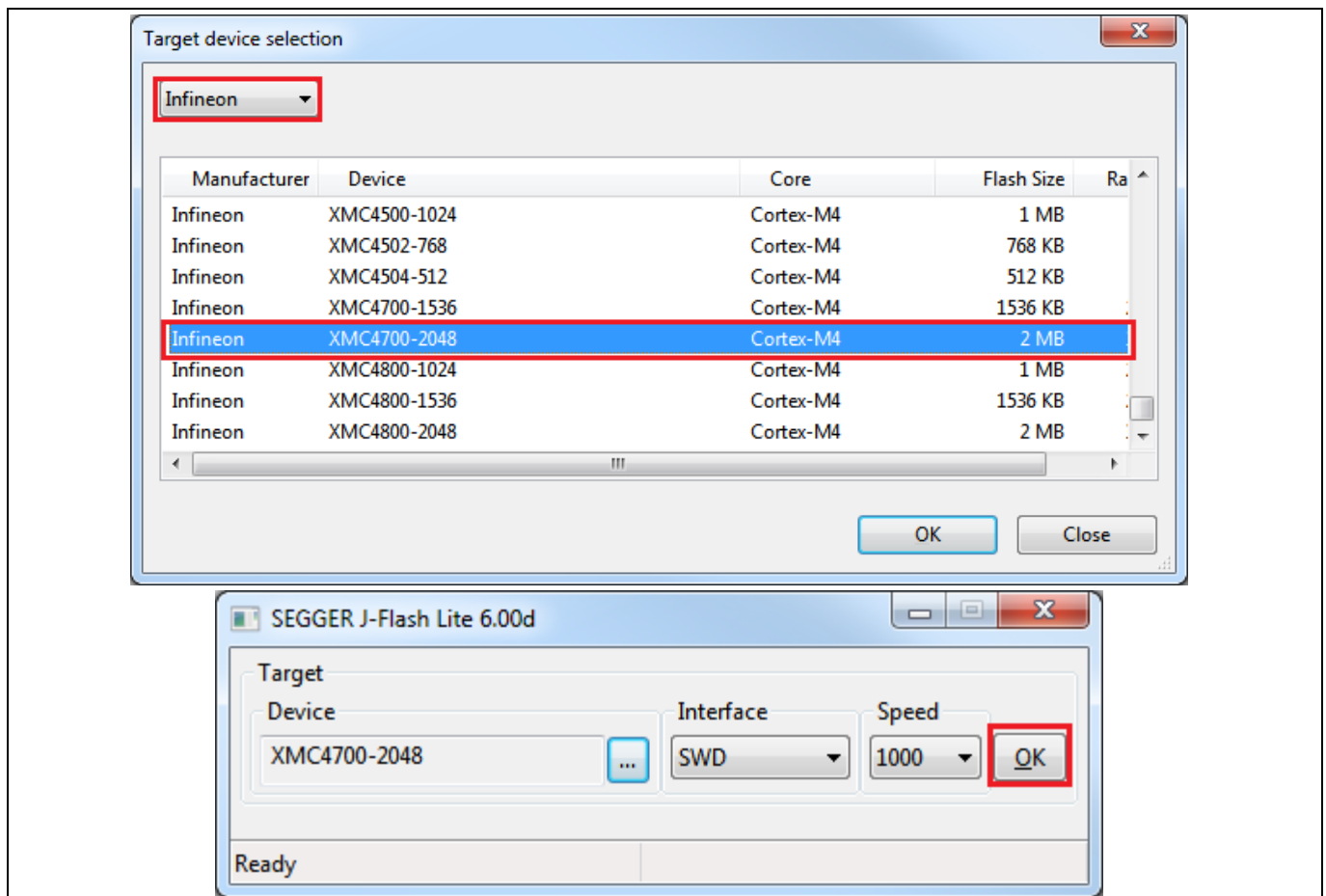
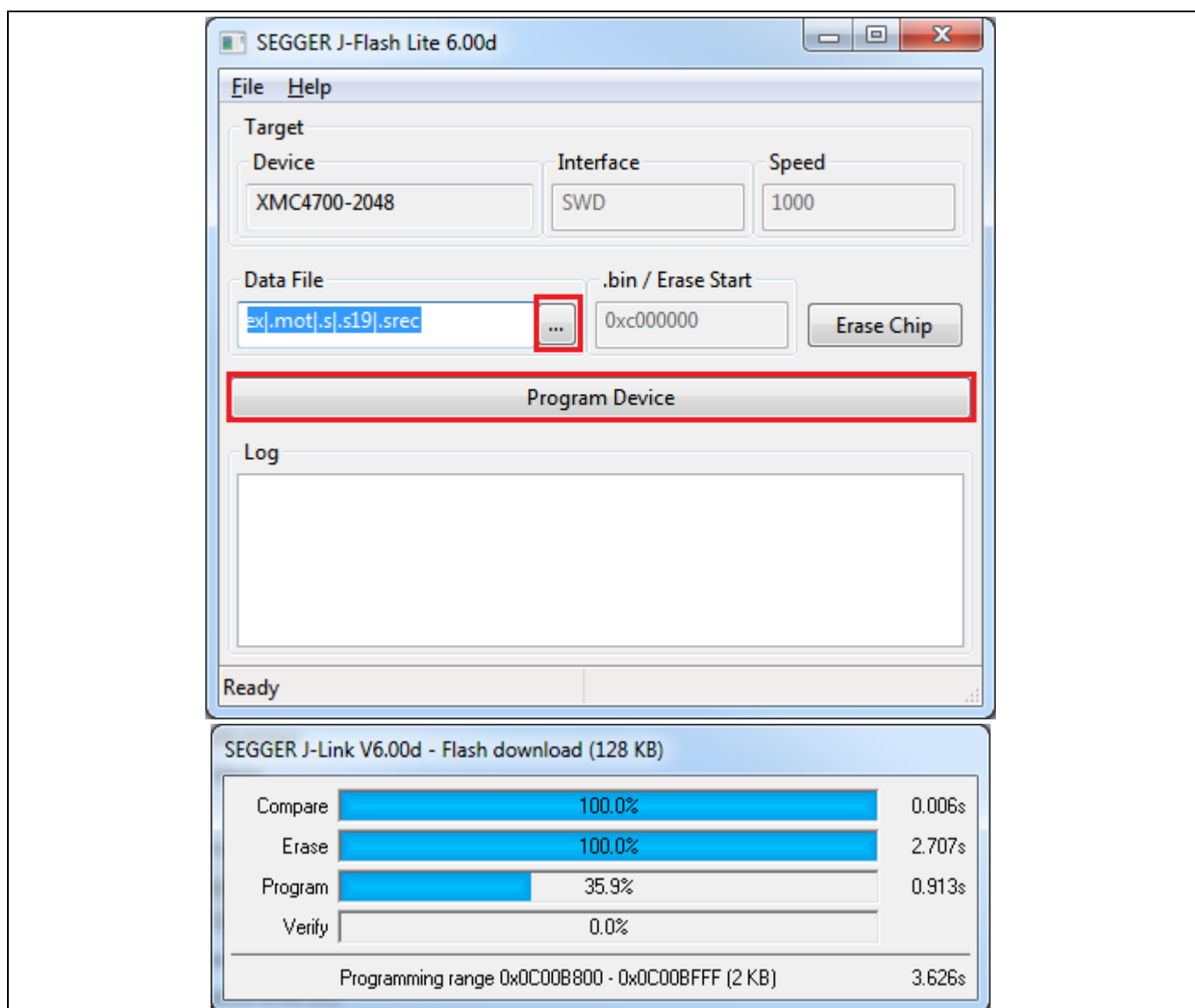


Figure 9 JFlashLite Target device selection

4. After target device selection, click OK on window shown in Figure 9.
5. Select hex file to be flashed under Data File and click on Program Device. It then shows the programming progress window.

## Using OPTIGA™ Trust Charge



**Figure 10** JFlashLite Hex file selection and programming progress window

6. Flash download completed.



## Using OPTIGA™ Trust Charge

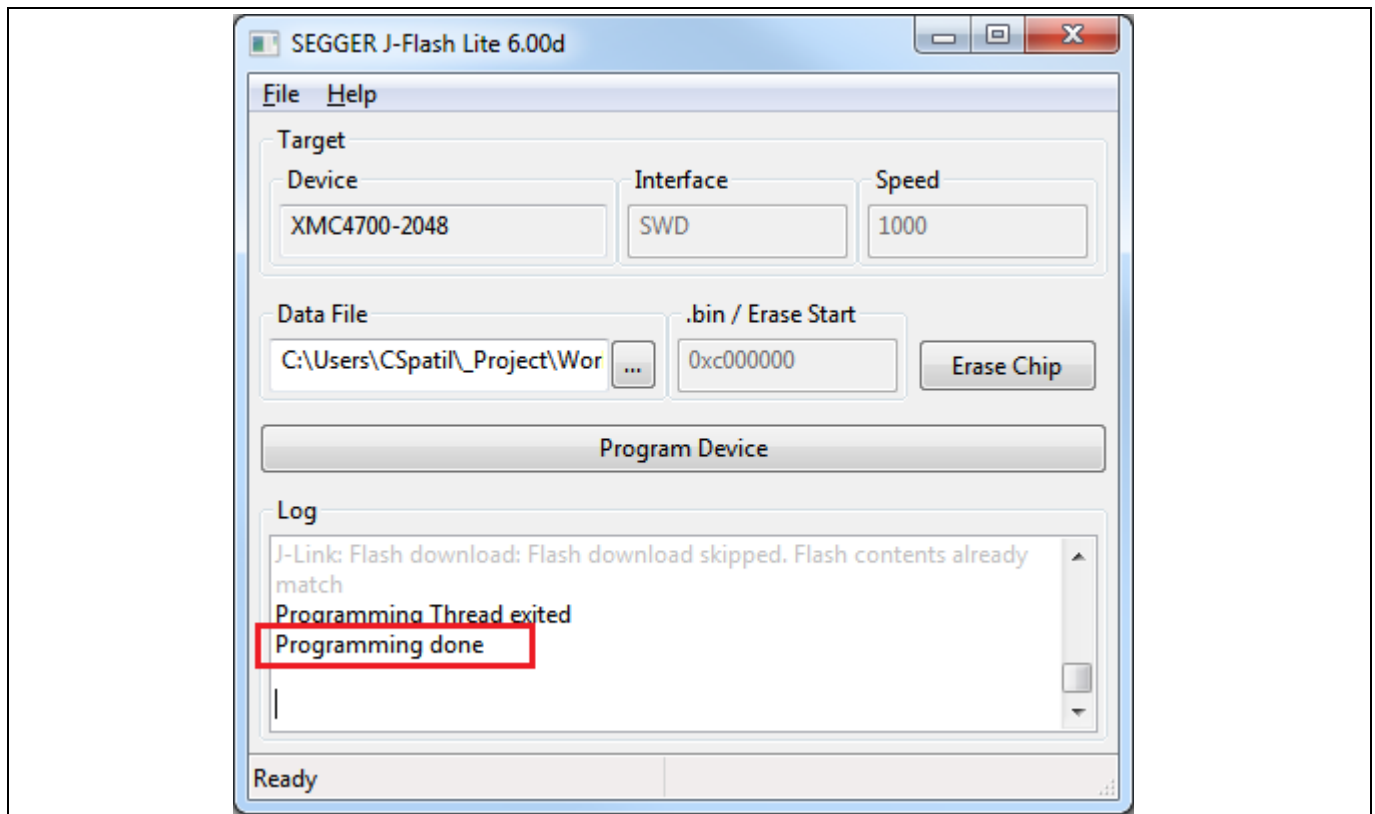


Figure 11 JFlashLite programming completion window

### 4.1.3 Logger

#### 4.1.3.1 Logger setup

1. Connect the micro USB cable between PC and micro USB. For placement of micro USB refer Figure 3.
2. Reset the XMC4700 by pressing the reset button.
3. Select the COM port with name "Communications Port" which gets detected after XMC4700 reset.

*Note:* For binding the Windows serial driver(usbser.sys) with USBD\_VCOM device user has to point to the driver.inf file in the folder path:

<INSTALLDIR>\projects\XMC4700\_relax\_kit\common\Dave\Generated\USBD\_VCOM\inf\

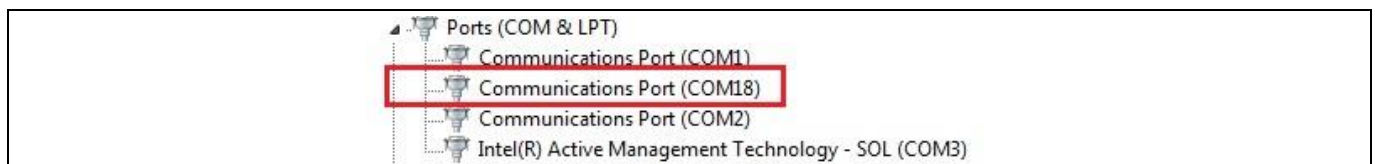


Figure 12 Discovery of USB Serial Device COM port

4. Configure COM port with 9600 8N1.

## Using OPTIGA™ Trust Charge

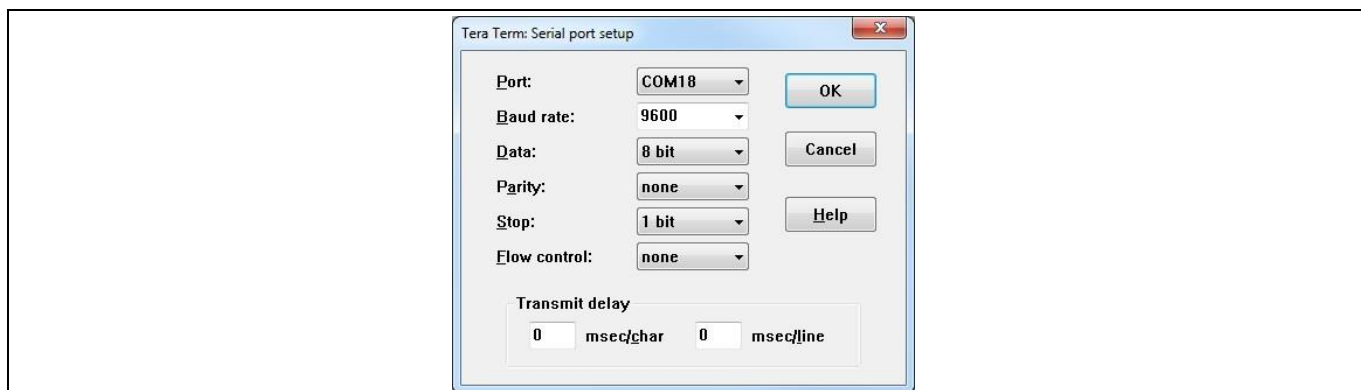


Figure 13 TeraTerm terminal serial configuration

5. Once connected, the terminal displays the text “Press any key to start optiga mini shell”.
6. It will list down the available optiga commands.

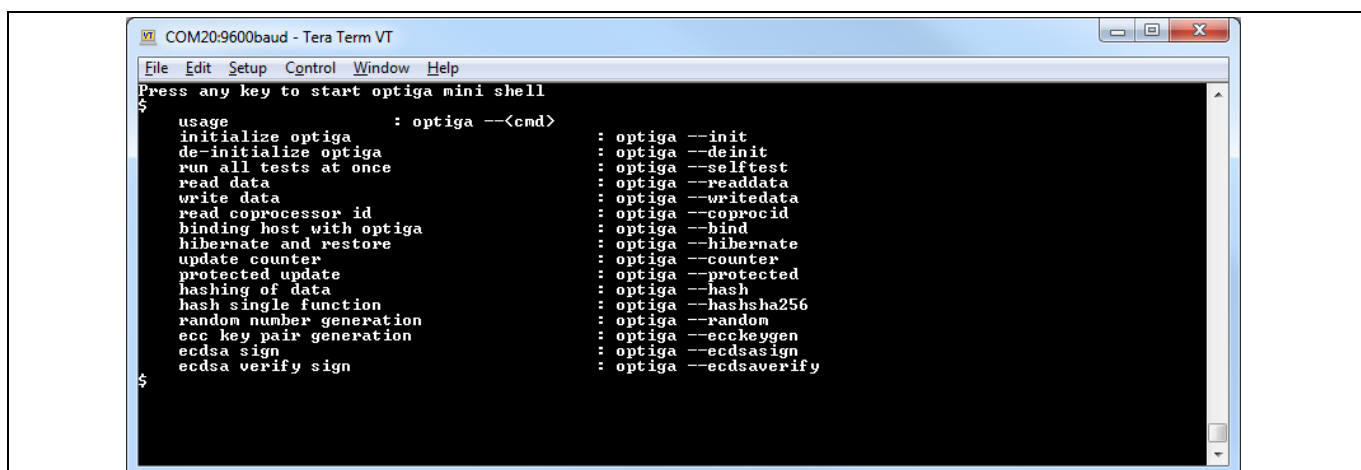
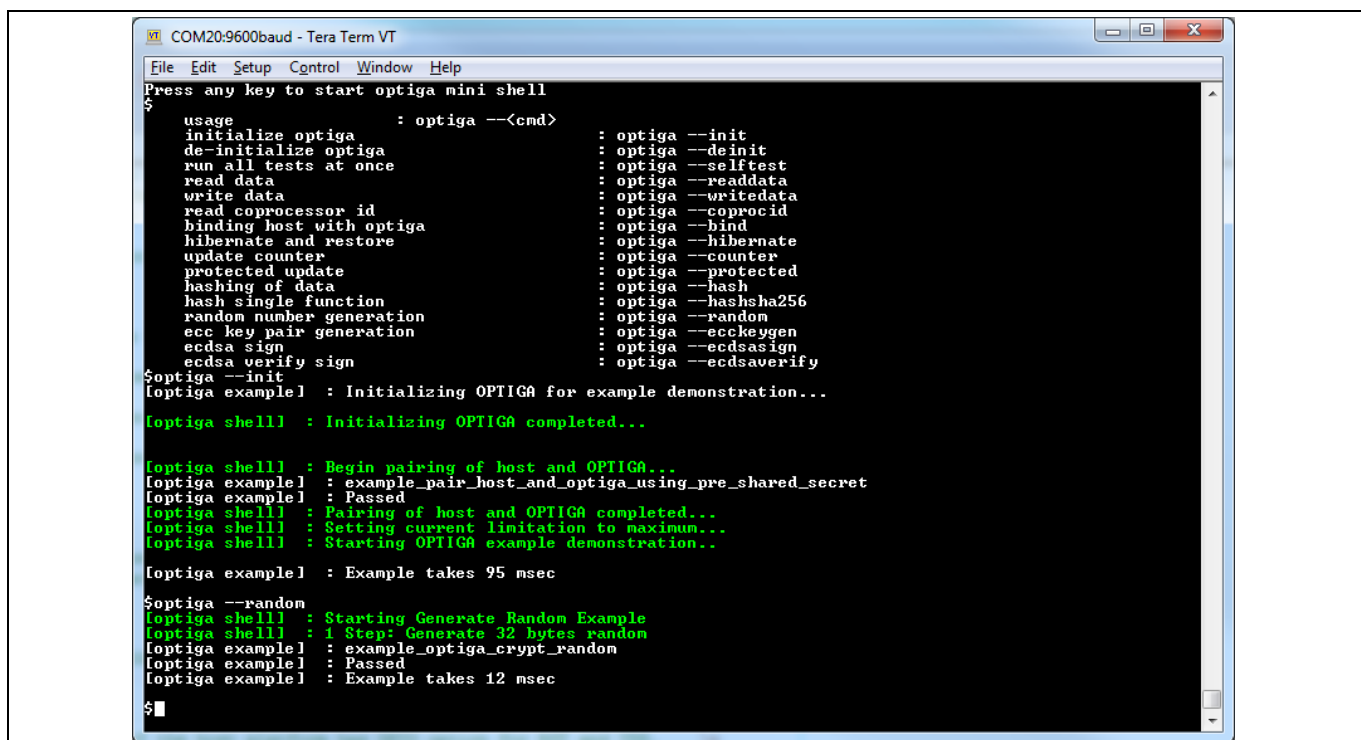


Figure 14 TeraTerm log of example application

7. Enter optiga command in format of “optiga --<cmd>”.

*Note: Execution of optiga --init is must before executing any other commands. Except for optiga --selftest command.*

## Using OPTIGA™ Trust Charge



```

COM20:9600baud - Tera Term VT
File Edit Setup Control Window Help
Press any key to start optiga mini shell
$
usage                : optiga --<cmd>
initialize optiga    : optiga --init
de-initialize optiga : optiga --deinit
run all tests at once : optiga --selftest
read data            : optiga --readdata
write data           : optiga --writedata
read coprocessor id  : optiga --coprocid
binding host with optiga : optiga --bind
hibernate and restore : optiga --hibernate
update counter       : optiga --counter
protected update     : optiga --protected
hashing of data      : optiga --hash
hash single function : optiga --hashsha256
random number generation : optiga --random
ecc key pair generation : optiga --ecckeygen
ecdsa sign           : optiga --ecdsasign
ecdsa verify sign    : optiga --ecdsaverify

$optiga --init
[optiga example] : Initializing OPTIGA for example demonstration...
[optiga shell]   : Initializing OPTIGA completed...

[optiga shell]   : Begin pairing of host and OPTIGA...
[optiga example] : example_pair_host_and_optiga_using_pre_shared_secret
[optiga example] : Passed
[optiga shell]   : Pairing of host and OPTIGA completed...
[optiga shell]   : Setting current limitation to maximum...
[optiga shell]   : Starting OPTIGA example demonstration...

[optiga example] : Example takes 95 msec

$optiga --random
[optiga shell]   : Starting Generate Random Example
[optiga shell]   : 1 Step: Generate 32 bytes random
[optiga example] : example_optiga_crypt_random
[optiga example] : Passed
[optiga example] : Example takes 12 msec

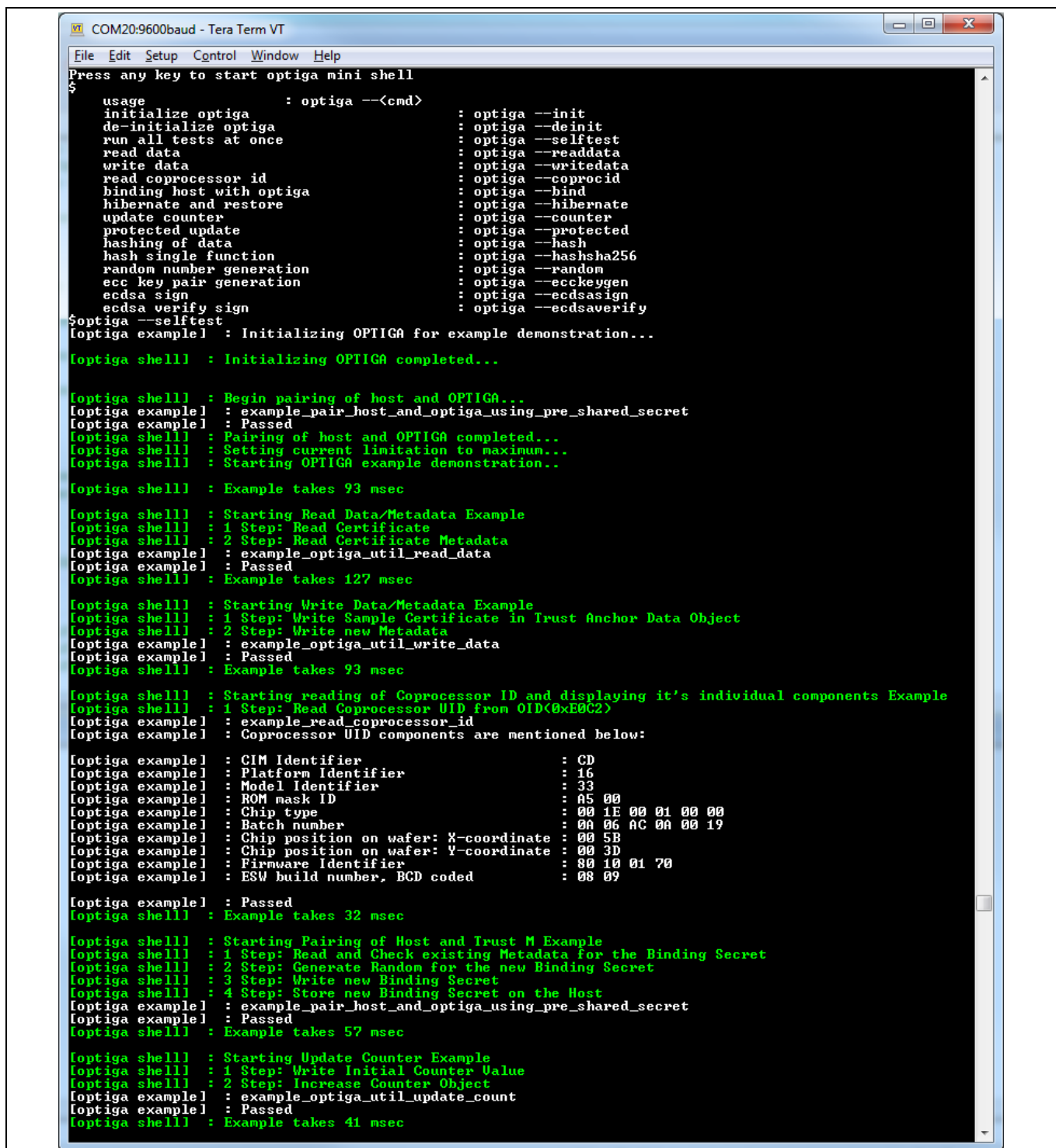
$

```

Figure 15 Optiga random command execution using shell application

8. The logs of the example execution are displayed along with status of each example as Passed or Failed.

## Using OPTIGA™ Trust Charge



```

COM20:9600baud - Tera Term VT
File Edit Setup Control Window Help
Press any key to start optiga mini shell
$
usage           : optiga --<cmd>
initialize optiga      : optiga --init
de-initialize optiga   : optiga --deinit
run all tests at once  : optiga --selftest
read data             : optiga --readdata
write data            : optiga --writedata
read coprocessor id    : optiga --coprocid
binding host with optiga : optiga --bind
hibernate and restore  : optiga --hibernate
update counter        : optiga --counter
protected update      : optiga --protected
hashing of data       : optiga --hash
hash single function   : optiga --hashsha256
random number generation : optiga --random
ecc key pair generation : optiga --ecckeygen
ecdsa sign            : optiga --ecdsasign
ecdsa verify sign     : optiga --ecdsaverify
$optiga --selftest
[optiga example] : Initializing OPTIGA for example demonstration...
[optiga shell]  : Initializing OPTIGA completed...

[optiga shell]  : Begin pairing of host and OPTIGA...
[optiga example] : example_pair_host_and_optiga_using_pre_shared_secret
[optiga example] : Passed
[optiga shell]  : Pairing of host and OPTIGA completed...
[optiga shell]  : Setting current limitation to maximum...
[optiga shell]  : Starting OPTIGA example demonstration...

[optiga shell]  : Example takes 93 msec

[optiga shell]  : Starting Read Data/Metadata Example
[optiga shell]  : 1 Step: Read Certificate
[optiga shell]  : 2 Step: Read Certificate Metadata
[optiga example] : example_optiga_util_read_data
[optiga example] : Passed
[optiga shell]  : Example takes 127 msec

[optiga shell]  : Starting Write Data/Metadata Example
[optiga shell]  : 1 Step: Write Sample Certificate in Trust Anchor Data Object
[optiga shell]  : 2 Step: Write new Metadata
[optiga example] : example_optiga_util_write_data
[optiga example] : Passed
[optiga shell]  : Example takes 93 msec

[optiga shell]  : Starting reading of Coprocessor ID and displaying it's individual components Example
[optiga shell]  : 1 Step: Read Coprocessor UID from OID(0xE0C2)
[optiga example] : example_read_coprocessor_id
[optiga example] : Coprocessor UID components are mentioned below:
[optiga example] : CIM Identifier           : CD
[optiga example] : Platform Identifier          : 16
[optiga example] : Model Identifier             : 33
[optiga example] : ROM mask ID                 : A5 00
[optiga example] : Chip type                   : 00 1E 00 01 00 00
[optiga example] : Batch number                 : 0A 06 AC 0A 00 19
[optiga example] : Chip position on wafer: X-coordinate : 00 5B
[optiga example] : Chip position on wafer: Y-coordinate : 00 3D
[optiga example] : Firmware Identifier         : 80 10 01 70
[optiga example] : ESW build number, BCD coded  : 08 09

[optiga example] : Passed
[optiga shell]  : Example takes 32 msec

[optiga shell]  : Starting Pairing of Host and Trust M Example
[optiga shell]  : 1 Step: Read and Check existing Metadata for the Binding Secret
[optiga shell]  : 2 Step: Generate Random for the new Binding Secret
[optiga shell]  : 3 Step: Write new Binding Secret
[optiga shell]  : 4 Step: Store new Binding Secret on the Host
[optiga example] : example_pair_host_and_optiga_using_pre_shared_secret
[optiga example] : Passed
[optiga shell]  : Example takes 57 msec

[optiga shell]  : Starting Update Counter Example
[optiga shell]  : 1 Step: Write Initial Counter Value
[optiga shell]  : 2 Step: Increase Counter Object
[optiga example] : example_optiga_util_update_count
[optiga example] : Passed
[optiga shell]  : Example takes 41 msec

```

Figure 16 TeraTerm log of example application

## 4.1.3.2 Logger control

By default only logging from example is enabled in the release package.

Further control for OPTIGA™ Trust M host code logging is available in `optiga_lib_config.h`.

## Using OPTIGA™ Trust Charge

The macro `OPTIGA_LIB_ENABLE_LOGGING` provides complete control to enable/disable logging at host code. In addition, logging at UTIL, CRYPT, CMD and COMMS layer can be controlled using the following macros,

- OPTIGA\_LIB\_ENABLE\_UTIL\_LOGGING
- OPTIGA\_LIB\_ENABLE\_CRYPT\_LOGGING
- OPTIGA\_LIB\_ENABLE\_CMD\_LOGGING
- OPTIGA\_LIB\_ENABLE\_COMMS\_LOGGING

For Example,

1. To enable logging for only COMMS layer, enable `OPTIGA_LIB_ENABLE_COMMS_LOGGING` and disable rest all layer macros.
2. Build and run the project as described in section 4.1.1

```

COM20:9600baud - Tera Term VT
File Edit Setup Control Window Help
Press any key to start optiga mini shell
$
  usage                : optiga --<cmd>
  initialize optiga     : optiga --init
  de-initialize optiga  : optiga --deinit
  run all tests at once : optiga --selftest
  read data             : optiga --readdata
  write data            : optiga --writedata
  read coprocessor id   : optiga --coprocid
  binding host with optiga : optiga --bind
  hibernate and restore : optiga --hibernate
  update counter        : optiga --counter
  protected update      : optiga --protected
  hashing of data       : optiga --hash
  hash single function  : optiga --hashsha256
  random number generation : optiga --random
  ecc key pair generation : optiga --ecckeygen
  ecdsa sign            : optiga --ecdsasign
  ecdsa verify sign     : optiga --ecdsaverify

$optiga --init
[optiga example] : Initializing OPTIGA for example demonstration...

[optiga comms] : >>>>
                Length of data - 0x001B
                03 00 16 08 20 F0 00 00 10 D2 76 00 00 04 47 65 6E 41 75 74 68 41 70 70 6C BE 40
[optiga comms] : <<<<
                Length of data - 0x000B
                00 00 06 08 20 00 00 00 00 19 04
[optiga shell] : Initializing OPTIGA completed...

[optiga shell] : Begin pairing of host and OPTIGA...
[optiga example] : example_pair_host_and_optiga_using_pre_shared_secret
[optiga comms] : >>>>
                Length of data - 0x000D
                04 00 08 08 20 81 01 00 02 E1 40 62 90
[optiga comms] : <<<<
                Length of data - 0x002A
                05 00 25 08 20 00 00 00 1F 20 1D C0 01 01 C4 01 40 C5 01 40 D0 07 E1 FC 07 FE 20 E1 4
0 D1 03 E1
                FC 07 D3 01 00 E8 01 22 51 FB
[optiga comms] : >>>>
                Length of data - 0x000D
                09 00 08 08 20 8C 00 00 02 00 40 1B 24
[optiga comms] : <<<<
                Length of data - 0x004B
                0A 00 46 08 20 00 00 00 40 D9 31 73 D8 04 1B DA FB 7D 18 EB 7D 6C C0 9A 67 AF 2C D4 E
D 1E 25 B6
                10 89 F0 DE 17 E2 18 35 5F 93 58 B9 AD 49 E6 1E 13 5B 05 97 C4 19 F4 00 AC F5 D3 39 E
5 74 A9 E4
                1C 36 46 CF DF 6E D1 C8 18 EA 7F
[optiga comms] : >>>>
                Length of data - 0x004F
                0E 00 4A 08 20 82 40 00 44 E1 40 00 00 D9 31 73 D8 04 1B DA FB 7D 18 EB 7D 6C C0 9A 6
7 AF 2C D4
                ED 1E 25 B6 10 89 F0 DE 17 E2 18 35 5F 93 58 B9 AD 49 E6 1E 13 5B 05 97 C4 19 F4 00 A
C F5 D3 39
                E5 74 A9 E4 1C 36 46 CF DF 6E D1 C8 18 D9 F8
[optiga comms] : <<<<
                Length of data - 0x000B
                0F 00 06 08 20 00 00 00 00 8F 2C
[optiga comms] : >>>>
                Length of data - 0x0028
                03 00 23 08 20 82 01 00 1D E1 40 00 00 20 17 C0 01 01 D0 07 E1 FC 07 FE 20 E1 40 D1 0
3 E1 FC 07
                D3 01 00 E8 01 22 78 A3
[optiga comms] : <<<<
                Length of data - 0x000B
                00 00 06 08 20 00 00 00 00 19 04
[optiga example] : Passed
[optiga shell] : Pairing of host and OPTIGA completed...
[optiga shell] : Setting current limitation to maximum...[optiga comms] : >>>>
                Length of data - 0x0010
                04 00 0B 08 20 82 40 00 05 E0 C4 00 00 0F DA DB
[optiga shell] : Starting OPTIGA example demonstration..

```

**Figure 17** Logging data with only COMMS layer enabled

*Note: Execution time of example increase if more logging information is printed.*



## Using OPTIGA™ Trust Charge

### 4.2 Advanced Setup

This section explains the steps to build and run OPTIGA™ Trust Charge example application.

#### 4.2.1 Setting up DAVE™ IDE on PC

1. Refer to the installation guide in <DAVE\_PATH> to install DAVE™ on your PC.
2. Start DAVE™ from <DAVE\_PATH>\eclipse\DAVE.exe. The following splash screen will appear:

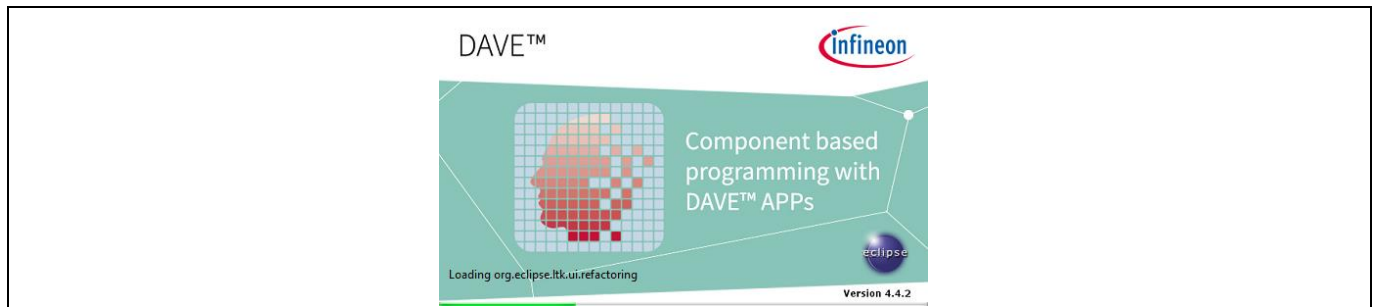


Figure 18 Opening DAVE™

3. Eclipse Launcher will pop-up. Select the workspace for DAVE™.

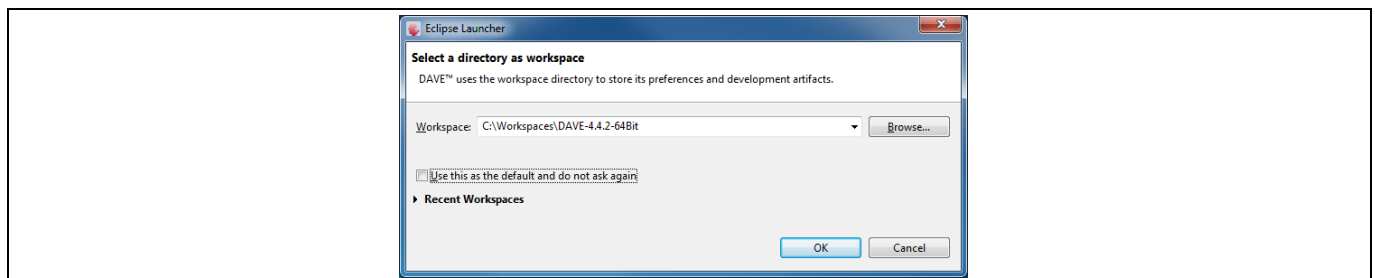


Figure 19 Select workspace

4. DAVE IDE enabled window.

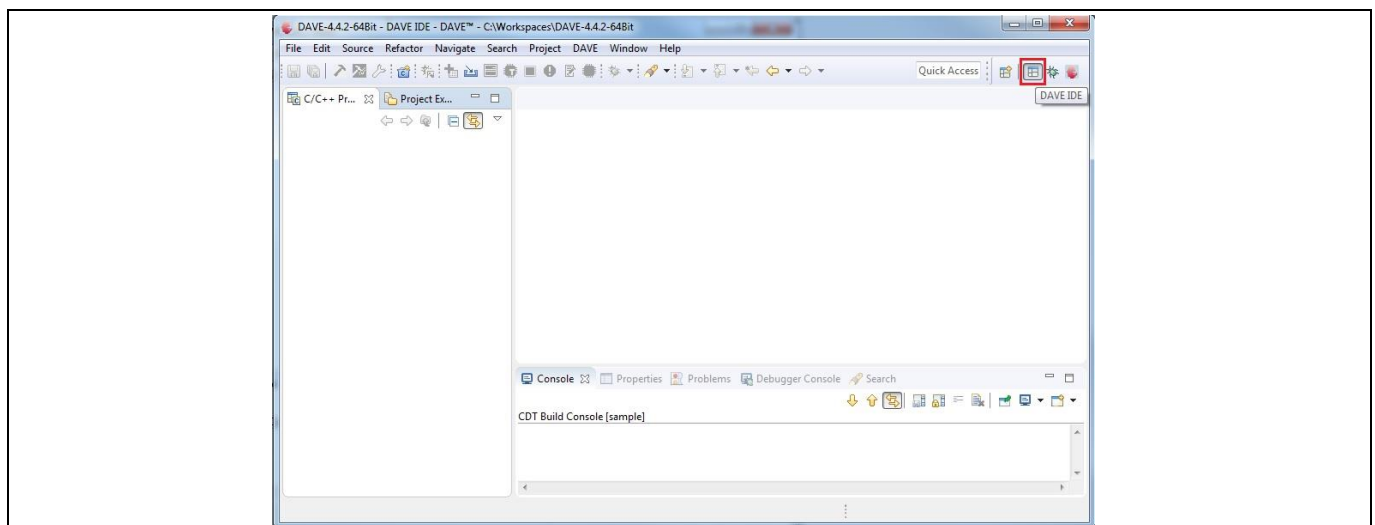
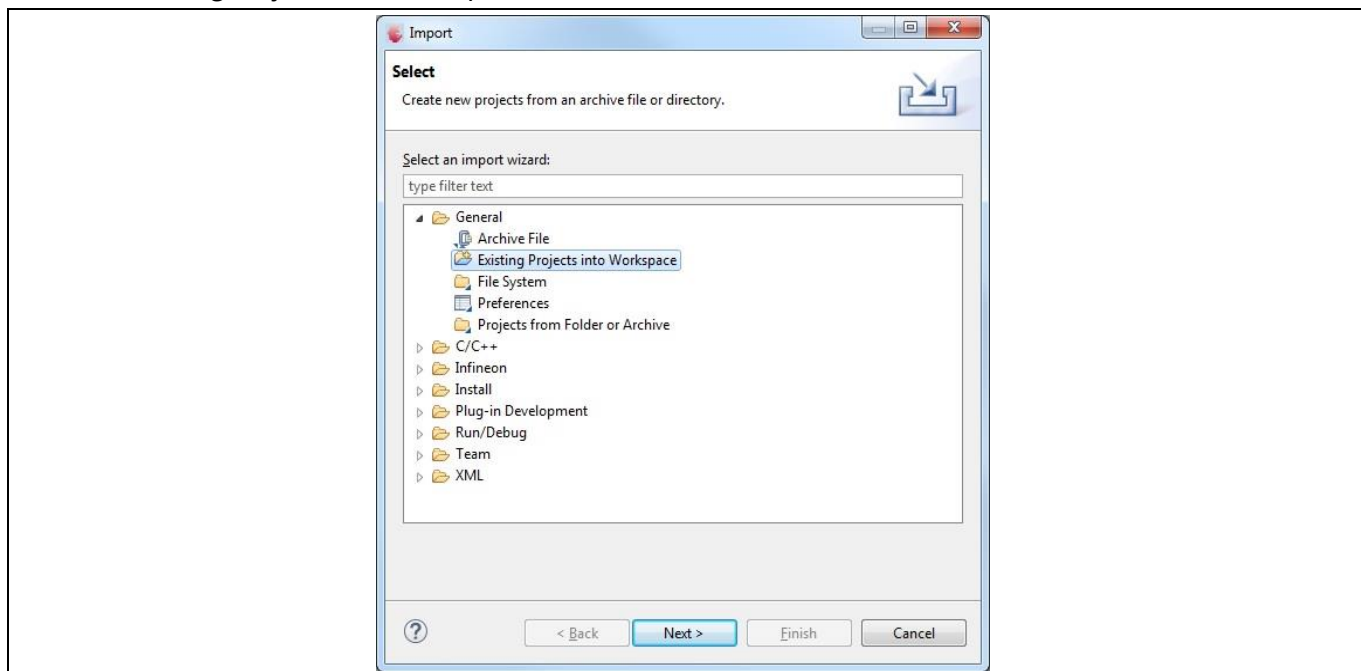


Figure 20 DAVE IDE Perspective window

## Using OPTIGA™ Trust Charge

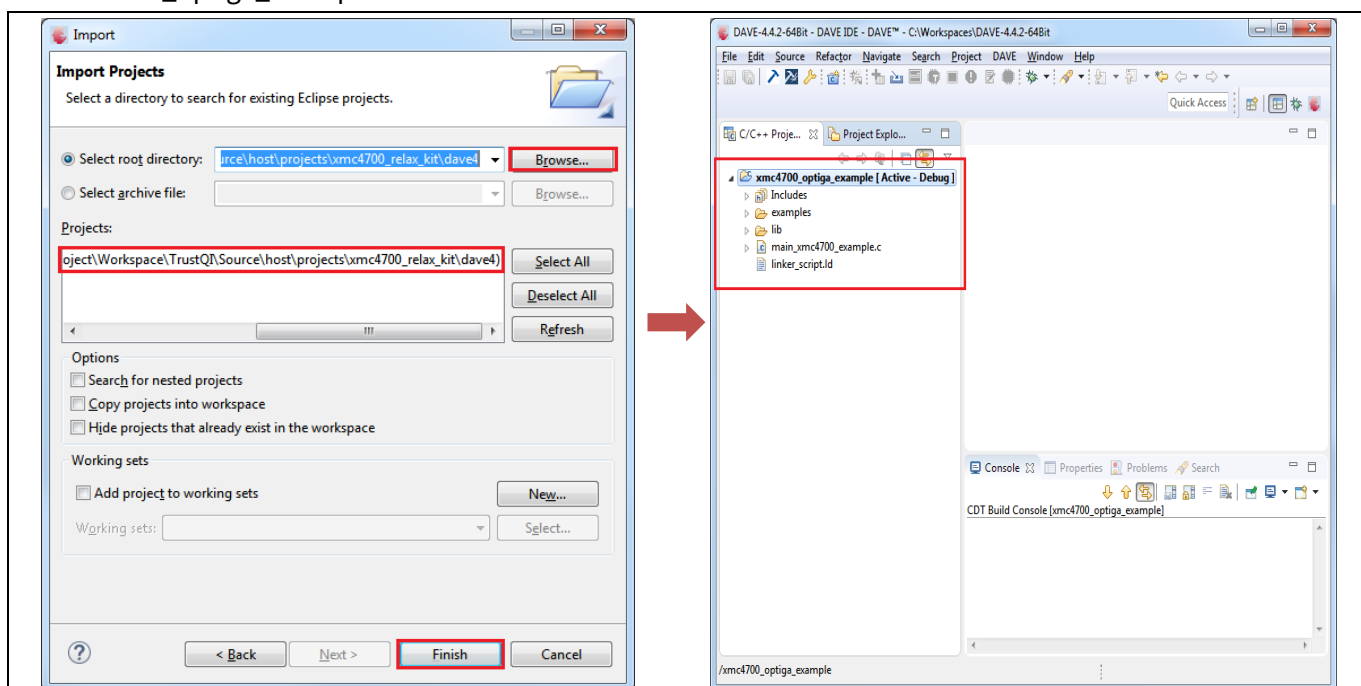
### 4.2.2 Running OPTIGA™ Trust Charge Example Application Project with DAVE™

1. Make the connections among XMC4700 Relax Kit, My IoT Adapter and OPTIGA™ Shield2Go.
2. Power up the kit by connecting Micro USB cable between PC and Debugger micro USB. For placement of Debugger micro USB refer Figure 3.
3. Import example application project into DAVE IDE, by navigating through **File -> Import**. In Import pop-up, select Existing Projects into Workspace under General and then click **Next**.



**Figure 21 Import DAVE project window**

4. Browse to <INSTALLDIR>\projects\XMC4700\_relax\_kit\dave4 for Select root directory, select XMC4700\_optiga\_example and then click Finish.



## Using OPTIGA™ Trust Charge

Figure 22 Import a example project

5. Set example project as an active project by right-click on project and select **Set Active Project**.

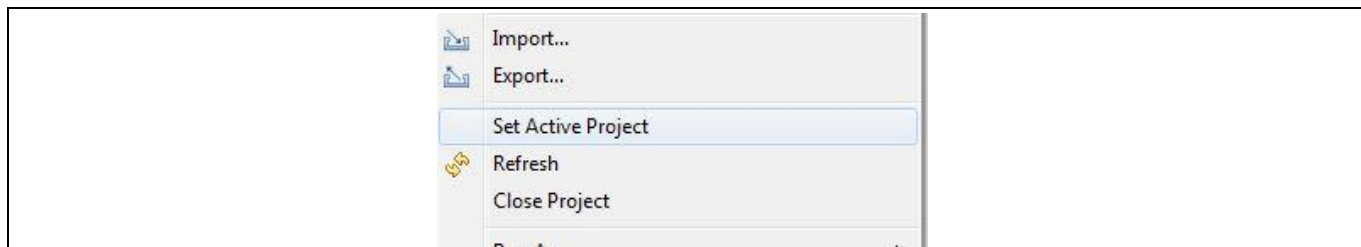


Figure 23 Example project set as active project

6. Select the build configuration by right-click on example project and then select **Build Configurations -> Set Active -> Debug**.

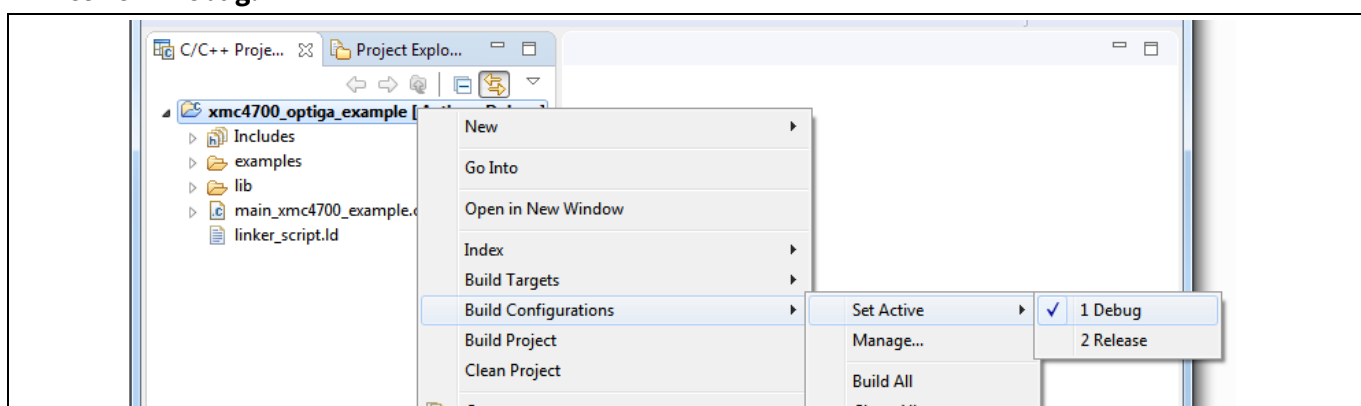


Figure 24 Build configuration selection

7. Build the project in debug configuration. It should be error free.



Figure 25 Example build in debug

8. Before launching the debugger, ensure that values are properly updated for variables like jlink\_gdbserver and jlink\_path. Navigate through **Window -> Preferences -> Run/Debug -> String Substitution** and update values as shown in the figure below:

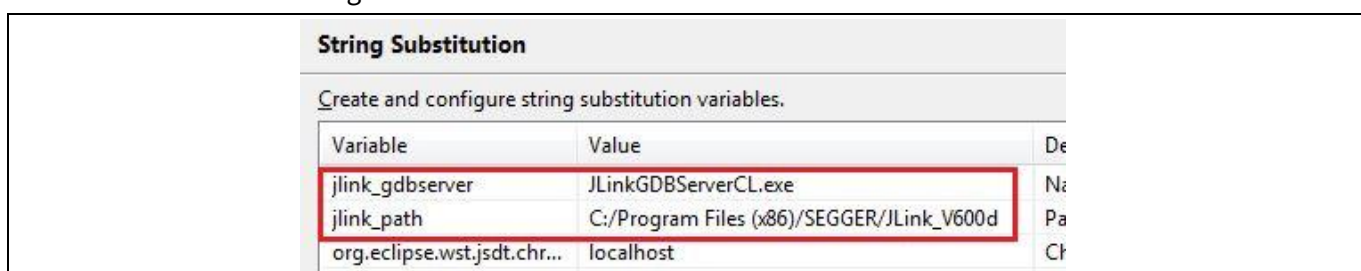


Figure 26 J-Link variable mapping

9. Launch debugger for debug of example application by clicking on bug symbol.

## Using OPTIGA™ Trust Charge

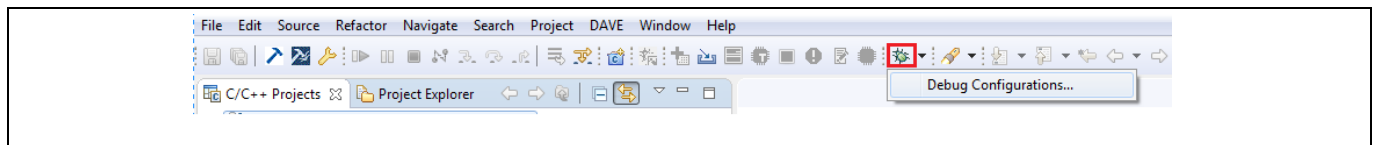


Figure 27 Debugger launch

10. Create a debug configuration and then click on Debug.

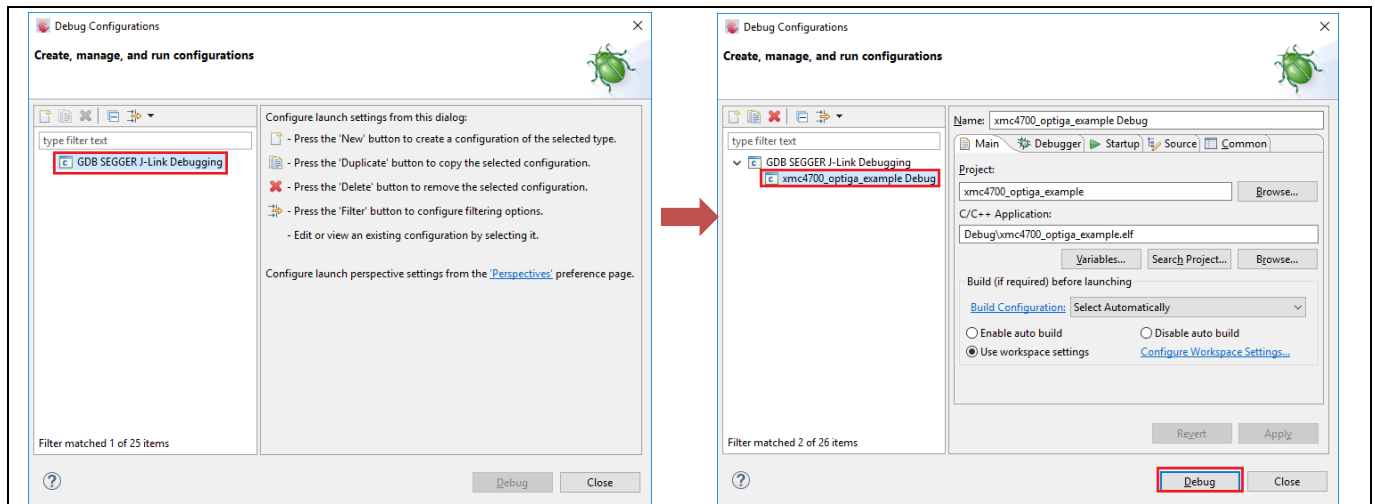


Figure 28 Creating a example debug configuration

11. If a window prompts to confirm the perspective switch, check the Remember my decision, and click yes.

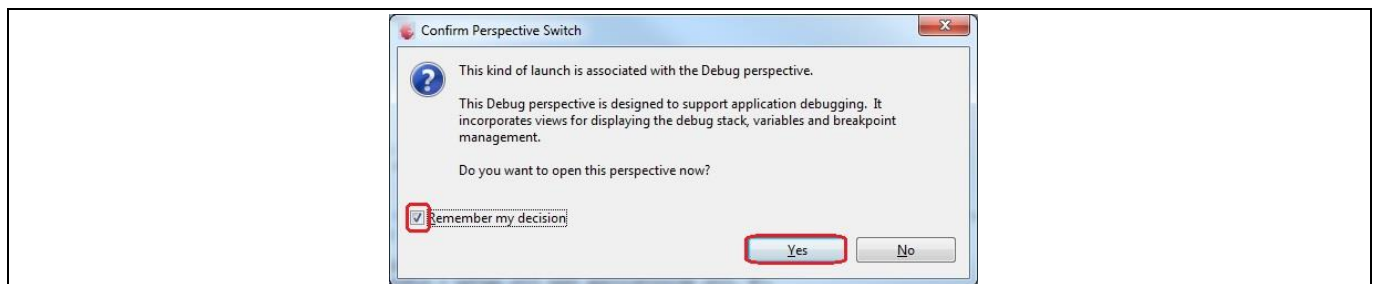


Figure 29 Confirm perspective switch

12. Start the debugger.

## Using OPTIGA™ Trust Charge

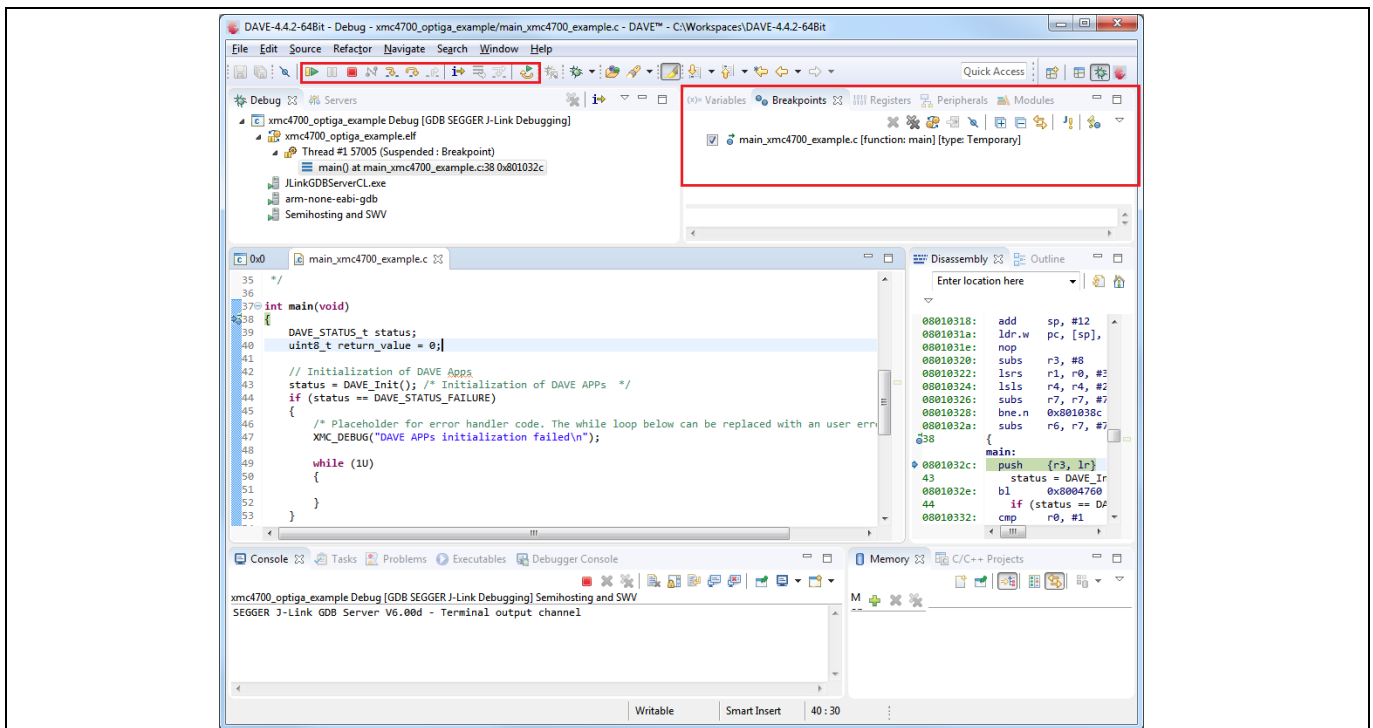


Figure 30 Starting a debug session

13. Refer section 4.1.3.1 to setup USBD\_VCOM for logger.
14. Example logs can be seen on terminal as shown in Figure 14.
15. To build project in release configuration, select the build configuration as **Release** as shown in Figure 24 and build the project again.
16. Create a new configuration by right-click on example project and **Run As -> Run Configurations**. Double-click on GDB SEGGER J-Link Debugging and select Release configuration then click on Run. The logs of the executing example can be seen on the terminal as shown in Figure 14.

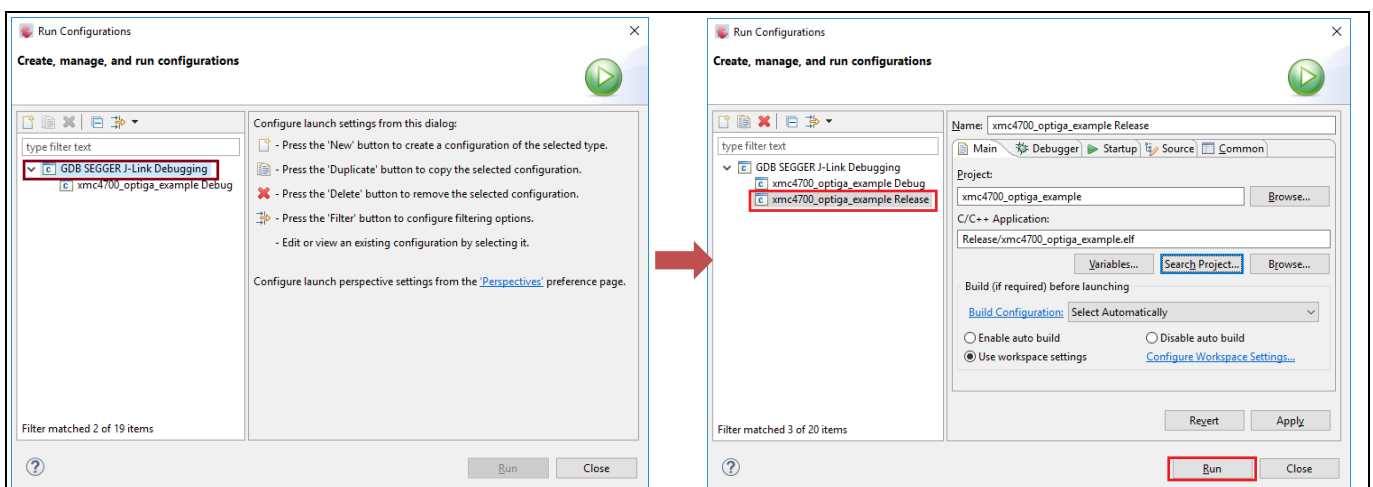


Figure 31 Run example with release configuration

17. To execute the example without shielded connection, disable the macro OPTIGA\_COMMS\_SHIELDED\_CONNECTION in file optiga\_lib\_config.h.



### Using OPTIGA™ Trust Charge

```
/** @brief OPTIGA COMMS shielded connection feature.  
 *      To disable the feature, undefine the macro  
 */  
// #define OPTIGA_COMMS_SHIELDED_CONNECTION
```

**Figure 32** OPTIGA\_COMMS\_SHIELDED\_CONNECTION disable

18. To run example application with logging for different layers refer to section 4.1.3.2.

## Troubleshooting

### 5 Troubleshooting

**Table 6** Troubleshooting

No	Problem	Reason	Solution
1	The Green LED light is “Not on” on XMC4700 Relax kit	No power supply	Verify that power supply is connected to XMC4700 Relax kit.
2	CDC port not detected	SW not correctly installed	In device manager, click on the malfunctioning CDC port and select to manually install the driver. Provide directory as C:\ for path to install the driver.
3	Problem occurred during debugger launch	Debug session is not terminated	Go to Debug perspective and remove all terminated launches.

## Revision History

### Revision History

Table 7

Document version	Date of release	Description of changes
1.30	27-07-2020	Engineering Sample Release

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