

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.

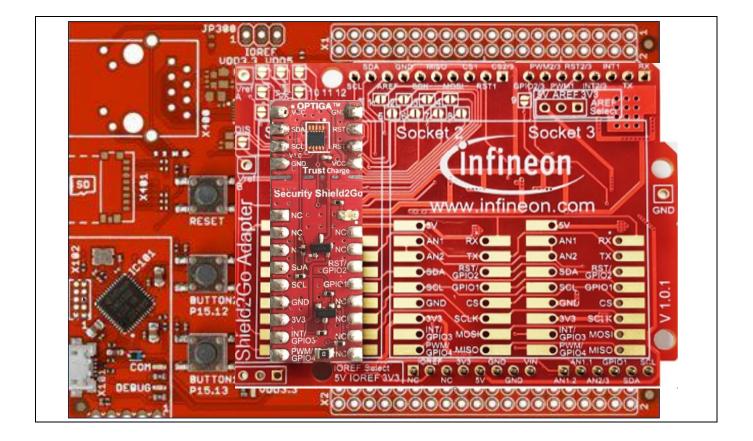




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1 Introduction

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 2Abbreviations

Abbreviation	Definition
API	Application Programming Interface
CA	Certificate Authority
СНМ	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
loT	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
ХМС	XMC4700 Relax Kit-V1.0



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

No.	Item	Description
1	XMC4700 board	Hardware Evaluation board for XMC4700 microcontroller from Infineon. More details can be found on <u>Infineon website.</u>
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.

Table 3Evaluation Kit contents



2.2 Installed Software Components

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

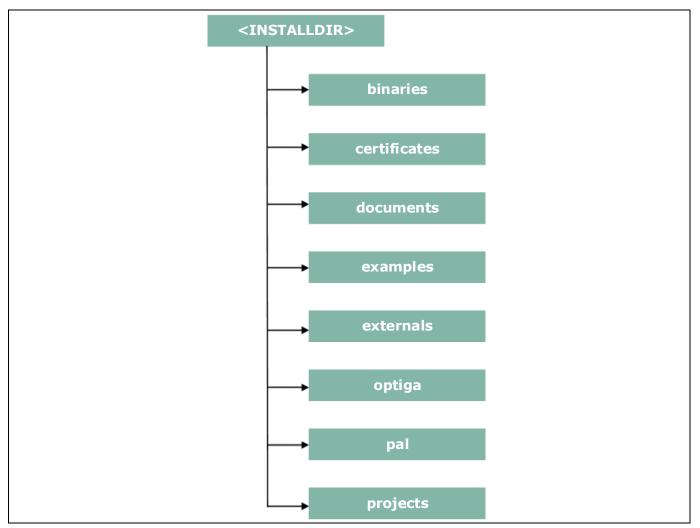


Figure 1 Installed directory structure

<*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.



3 System Setup

This section explains the basic components required for system setup.

3.1 System Overview

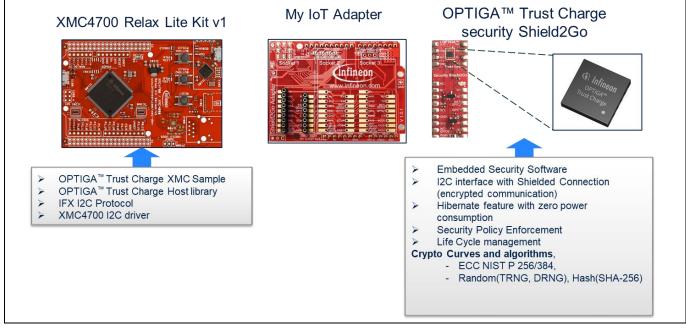


Figure 2 System Overview

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.



3.2.1 XMC4700 Relax Kit

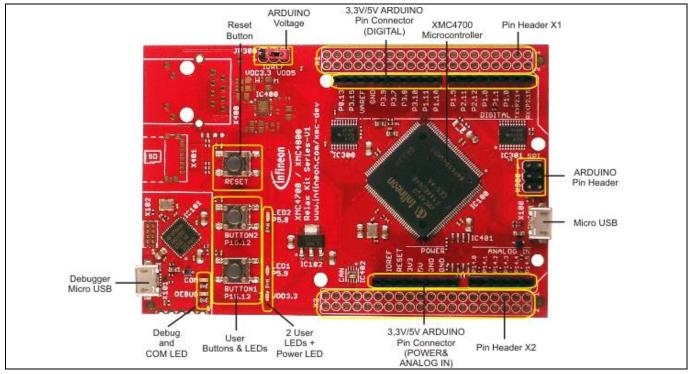


Figure 3 XMC4700 Relax Kit

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		
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 **Getting Started Guide** 7 1.30



System Setup

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

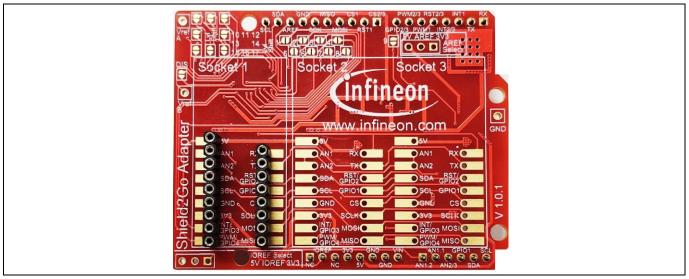


Figure 4 My IoT adapter

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 <u>Infineon website</u>.

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



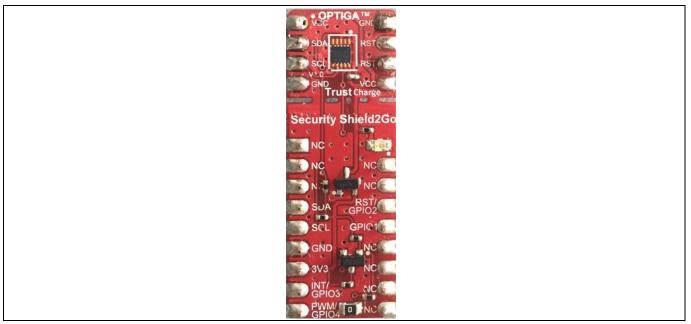


Figure 5 OPTIGA[™] Trust Charge Shield2Go

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 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





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: <u>Dave Download</u>
- Segger J-Link tool v6.00 or greater for flashing software on XMC. Link to download Segger: <u>J-Link tool Download</u> Link to download manual: <u>J-Link manual Download</u>

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.



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 USBD_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.

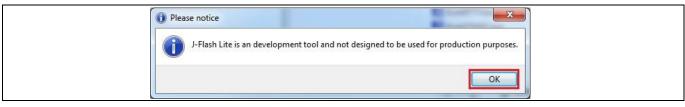


Figure 7 JFlashLite launch window

2. Click on Device to select a target device.

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Target Device	Interface	Speed	
unspecified	SWD 👻	1000 - <u>O</u> K	

Figure 8

JFlashLite select a device

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

Manufacturer	Device	Core	Flash Size Ra 🔦
Infineon	XMC4500-1024	Cortex-M4	1 MB
Infineon	XMC4502-768	Cortex-M4	768 KB
Infineon	XMC4504-512	Cortex-M4	512 KB
Infineon	XMC4700-1536	Cortex-M4	1536 KB
Infineon	XMC4700-2048	Cortex-M4	2 MB .
Infineon	XMC4800-1024	Cortex-M4	1 MB 💠
Infineon	XMC4800-1536	Cortex-M4	1536 KB
Infineon	XMC4800-2048	Cortex-M4	2 MB 🛛 👻
•		III	4
		C	Close
E SEGO	GER J-Flash Lite 6.00d		
Targe	t		
Devic		Interface	d
I XMC	4700-2048	SWD - 1000	

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.



ſ	SEGGER J-Flash Lite 6.00d			
	<u>F</u> ile <u>H</u> elp			
	Target			
	Device	Interface	Speed	
	XMC4700-2048	SWD	1000	
	Data File ex .mot .s .s19 .srec	.bin / Erase Start	Erase Chip	
		Program Device		
	Log			
	Ready			
ĺ	SEGGER J-Link V6.00d - Flash do	wnload (128 KB)		1
	Compare	100.0%	0.006s	
	Erase	100.0%	2.707s	
	Program	35.9%	0.913s	
	Verify	0.0%		
	Programming range 0x	0C008800 - 0x0C008FFF (2 K	3) 3.626s	

Figure 10 JFlashLite Hex file selection and programming progress window

6. Flash download completed.



SEGGER J-Flash Lite 6.00d	
<u>F</u> ile <u>H</u> elp	
Target	
Device Interface Speed	
XMC4700-2048 SWD 1000	
Data File	
C:\Users\CSpatil_Project\Wor 0xc000000 Erase Chip	
Program Device	
Log J-Link: Flash download: Flash download skipped. Flash contents already match	
Programming Thread exited Programming done	
 Ready	

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\

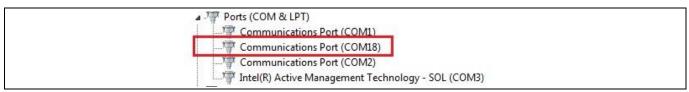


Figure 12 Discovery of USB Serial Device COM port

4. Configure COM port with 9600 8N1.



Using OPTIGA™ Trust Charge

ſ	Tera Term: Serial port set	up	×
	Port:	COM18 •	ок
	<u>B</u> aud rate: <u>D</u> ata:	9600 • 8 bit •	Cancel
	P <u>a</u> rity:	none • 1 bit •	Help
	<u>S</u> top: <u>F</u> low control:	1 bit • none •	
	Transmit dela O mse	oy c <u>(c</u> har 0 msec)	line

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.

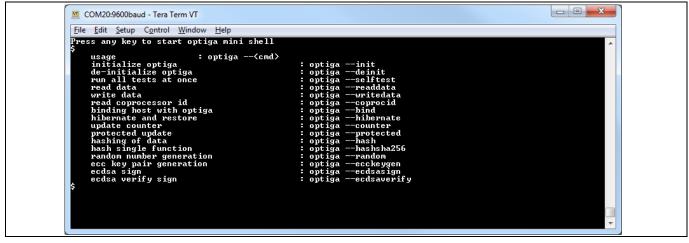


Figure 14 TeraTerm log of example application

- 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.



r -			
I	COM20:9600baud - Tera Term VT		
F	ile Edit Setup Control Window Help		
	ress any key to start optiga mini shell		
\$		<u>^</u>	
	usage : optiga <cmd> initialize optiga : optigainit</cmd>		
	de-initialize optiga		
	run all tests at once : optigaselftest		
	read data : optigareaddata write data : optigawritedata		
	write uata - optigavorteuata		
	binding host with optiga		
	hibernate and restore : optigahibernate		
	update counter : optigacounter protected update : optigaprotected		
	hashing of data : optigahash		
	hash single function : optigahashsha256		
	random number generation : optigarandom ecc key pair generation : optigaecckeygen		
	ecdsa sign : optigaecdsasign		
	ecdsa verify sign : optigaecdsaverify		
100	optiga ——init optiga example] : Initializing OPTIGA for example demonstration		
Ea	optiga shell] : Initializing OPTIGA completed		
Ec	optiga shell] : Begin pairing of host and OPTIGA		
[a	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		
E a	optiga shell] : Starting OPTIGA example demonstration		
Γe	optiga example] : Example takes 95 msec		
Şo	optigarandom		
	optiga shelll : Starting Generate Random Example optiga shelll : 1 Step: Generate 32 bytes random		
Ed	optiga example] : example_optiga_crypt_random		
	optiga example] : Passed		
La	optiga example] : Example takes 12 msec		
\$			
		Ŧ	

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.



COM20:9600baud - T			
<u>File Edit S</u> etup C <u>o</u> r			
Press any key to s	start optiga mini she	211	· · · · · · · · · · · · · · · · · · ·
usage	: optiga<		
initialize op de-initialize	tiga optiga	: optigainit : optigadeinit	
run all tests	at once	: optigaselftest	
read data		: optigareaddata	
write data read coproces	sor id	: optigawritedata : optigacoprocid	
binding host	with optiga	: optigacoprocid : optigabind	
hibernate and update counte		: optigahibernate : optigacounter	
protected upd	ate	: optigaprotected	
ĥashing of da hash single f	ta unction	= optigahash = optigahashsha256	
random number	generation	 optigacounter optigaprotected optigahash optigahashsha256 optigarandom optigaecckeygen optigaecckeygen 	
ecc key pair ecdsa sign	generation	: optigaecckeygen : optigaecdsasign	
ecdsa verify	sign	: optigaecdsaverify	
\$optigaselftes [optiga example]	t : Initializing OPTI(GA for example demonstration	
Loptiga shelll :	Initializing OPTIGA	completed	
Loptiga shell] : [ontiga example]	Begin pairing of hos	and OPTIGA	
[optiga example]	: Passed		
Loptiga shelll : [ontiga shell] :	Pairing of host and Setting current lim	_and_optiga_using_pre_shared_secret OPTIGA completed itation to maximum mple demonstration	
[optiga shell]	Starting OPTIGA exam	nple demonstration	
	Example takes 93 mse		
Loptiga shell] [optiga shell]	Starting Read Data/ 1 Step: Read Certif:	icate	
[optiga shell]	1 Step: Read Certif: 2 Step: Read Certif:	icate Metadata	
[optiga example] [optiga example]	<pre>: example_optiga_ut: : Passed</pre>	11_read_data	
[optiga shell] :	Example takes 127 m	sec	
[ontiga_shell] :	Starting Write Data	/Metadata Example	
[optiga shell]	1 Step: Write Sample	e Certificate in Trust Anchor Data Object	
loptiga shell] : [optiga example]	2 Step: Write new Me : example optiga ut;	′Metadata Example 2 Certificate in Trust Anchor Data Object stadata il_write_data	
Loptiga examplei	- Passea		
Loptiga shelll :	Example takes 93 mse		
		Coprocessor ID and displaying it's individual	components Example
[optiga example]	: example_read_copre	essor UID from OID(0xE0C2) ocessor_id	
[optiga example]	: Coprocessor UID co	omponents are mentioned below:	
[optiga example]	: CIM Identifier	: CD	
[optiga example]	: Platform Identific : Model Identifier	er : 16 - 22	
[optiga example] [optiga example]	: ROM mask ID	: 33 : A5 00	
[optiga example] [optiga example]	: Chip type : Batch number	: A5 00 : 00 1E 00 01 00 00 : 00 AC 0A 00 19	
[optiga example]	: Chin nosition on u	vafer: X-coordinate : 00 5B	
[optiga example]	: Chip position on v : Firmware Identifie	wafer: Y-coordinate : 00 3D er : 80 10 01 70	
[optiga example] [optiga example]	: ESW build number,	BCD coded = 08 09	
[optiga example]			
	Example takes 32 ms	ec	
[optiga shell]	1 Step: Read and Che	Host and Trust M Example eck existing Metadata for the Binding Secret idom for the new Binding Secret	
Loptiga shell] [optiga shell]	-2 Step: Generate Ran -3 Step: Write new B	ndom for the new Binding Secret	
[optiga shell]	4 Step: Store new B	inding Secret inding Secret on the Host	
[optiga example] [optiga example]	<pre>: example_pair_host_ : Passed</pre>	_and_optiga_using_pre_shared_secret	
[optiga shell] :	Example takes 57 ms	36	
[optiga_shell] :	Starting Update Cou	nter Example	
[optiga shell]	Starting Update Cour 1 Step: Write Initi: 2 Step: Increase Cou : example_optiga_ut: : Passed	al Counter Value	
Loptiga shelll : [optiga example]	2 Step: Increase Cou : example_ontiga_ut;	il update count	
[optiga example]	: Passed		
Loptiga shelll :	Example takes 41 mse		

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.



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

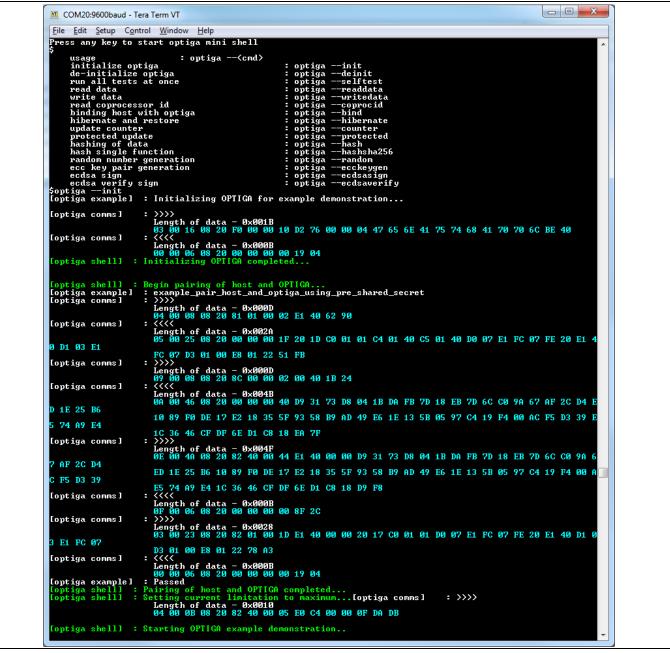


Figure 17 Logging data with only COMMS layer enabled

Note:Execution time of example increase if more logging information is printed.Getting Started Guide18



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:

DAVE™	Cinfineon	
Loading org-eclipse.ltk.uitrefactoring	Component based programming with DAVE [™] APPs zelipse Version 4.4.2	

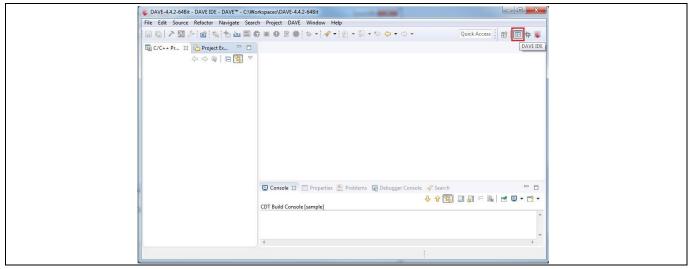


3. Eclipse Launcher will pop-up. Select the workspace for DAVE[™].

😜 Eclipse Launcher	×
Select a directory as workspace DAVE [™] uses the workspace directory to store its preferences and development artifacts.	
Workspace: C\Workspaces\DAVE-4.4.2-64Bit	<u>B</u> rowse
 Use this as the default and do not ask again Recent Workspaces 	
ОК	Cancel

Figure 19 Select workspace

4. DAVE IDE enabled window.







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**.

💗 Import	
Select Create new projects from an archive file or directory.	2
Select an import wizard: type filter text General Archive File Existing Projects into Workspace File System Freferences Projects from Folder or Archive Projects from Folder or Archive C/C++ Infineon Install Plug-in Development Run/Debug Team XML 	
Image: Section 2 Next > Einish	Cancel

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.

Jmport	- • • ×		DAVE-4.4.2-64Bit - DAVE IDE - DAVE™ - C:\Workspac	tes\DAVE-4.4.2-64Bit
Import Projects Select a directory to search for existing Eclipse projects.				● ② ● ○ ☆ • ○ ♂ • ○ ○ ● ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
Select root directory: <pre>rrce\host\projects\vmc4700_relax_kit\dave{ Select grchive file: </pre> Projects: <pre>oject\Workspace\TrustQNSource\host\projects\vmc4700_relax_kit\dave4} </pre> <pre> Options Search for nested projects Copy projects into workspace Hide projects that already exist in the workspace </pre>	Browse Browse Select All Deselect All Refresh		Q(C++ Proje ≥ Project Explo □ C xmc4700.optiga.example (Active - Debug) >)) Inclus > (a) samples > (b) aninymc4700_examples > (c) aniny	
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(?) < <u>Back</u> Next > Finish	Cancel	/xr	nc4700_optiga_example	(* · · · ·

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Figure 22 Import a example project

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

	Import Export	
	Set Active Project	
S.	Refresh Close Project	
	D A.	

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.

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	New	•			
 ▷ ▷ ▷ ☑ main_xmc4700_example. ☑ linker_script.ld 	Go Into Open in New Window Index				
	Build Targets Build Configurations	•	Set Active	✓ 1 Deb	
	Build Project Clean Project		Manage	2 Rele	-
			Build All		

Figure 24 Build configuration selection

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

Eile Edit Source Refactor Navigate
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😼 C/C++ Pr 🕱 🏠 Project Ex 🗁

Figure 25 Example build in debug

 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:

String Substitution	
Create and configure string	substitution variables.
Variable	Value
jlink_gdbserver	JLinkGDBServerCL.exe
jlink_path	C:/Program Files (x86)/SEGGER/JLink_V600d
org.eclipse.wst.jsdt.chr	localhost

Figure 26 J-Link variable mapping

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



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Image: Image	File Edit Source Refactor Navigate Search Project DAVE Window He	lp
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	🌆 C/C++ Projects 🕱 🎦 Project Explorer 🛛 🗇 🗟 📄 🔄 🗢 🗖	Debug Configurations

Figure 27 Debugger launch

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

😻 Debug Configurations	×		😻 Debug Configurations				×
Create, manage, and run configurations	The second secon		Create, manage, and run configurations				Ť.
Image: The second se	Configure launch settings from this dialog: • Press the 'New' button to create a configuration of the selected type. • Press the 'Duplicate' button to copy the selected configuration. • Press the 'Duplicate' button to remove the selected configuration. • Press the 'Delete' button to remove the selected configuration. • Press the 'Delete' button to configure filtering options. • Press the 'Filter' button to configuration by selecting it. Configure launch perspective settings from the 'Perspectives' preference page.	-	Image: Second	Name: xmc4700_opti Main 参 Debu Project: xmc4700_optiga_exa C/C++ Application: Debug\xmc4700_opt Build (if required) b Build Configuration © Enable auto built © Use workspace so	gger Startu mple Uariables garables efore launching Select Autom	p to Source Con	Browse Browse
0	Debug Close		0			<u>D</u> ebug	Close

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.

Confirm Perspective Switch	
This kind of launch is associated with the Debug perspective. This Debug perspective is designed to support application debugging. It incorporates views for displaying the debug stack, variables and breakpoint management. Do you want to open this perspective now? Emember my decision	
<u>Y</u> es <u>No</u>	

Figure 29 Confirm perspective switch

12. Start the debugger.



P: • • • • • • • • • • • • • • • • • • •
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can be replaced with an user err
- D Memory 🕄 🔤 C/C++ Projects - I
Image: Second secon

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.** Doubleclick 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.

😻 Run Configurations	×	😻 Run Configurations		>
reate, manage, and run configurations		Create, manage, and run configurations		
Yope filter text COB SEGGER I-Link Debugging C Mnc4700_optiga_example Debug	Configure launch settings from this dialog: • Press the 'New' button to create a configuration of the selected type. • Press the 'Duplicate' button to copy the selected configuration. • Press the 'Duplicate' button to remove the selected configuration. • Press the 'Delete' button to remove the selected configuration. • Press the 'Delete' button to configure filtering options. • Press the 'Filter' button to configuration by selecting it. Configure launch perspective settings from the 'Perspectives' preference page.	 Image: Second secon	C/C++ Application: Release/xmc4700_optiga_example.elf	owse owse >
Filter matched 2 of 19 items		Filter matched 3 of 20 items	Re <u>v</u> ert A	Apply
?	Run Close	(?)	Dura	Close

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.

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

Figure 32 OPTIGA_COMMS_SHIELDED_CONNECTION disable

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



5 Troubleshooting

Table 6Troubleshooting

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

Table 7

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

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