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# **RN2483\_Silica Documentation**

***Release 0***

**Silica**

**Dec 15, 2017**



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**Version** 1.00D

**Copyright** (C)2016 Avnet Silica company

**Date** 18 Oct 2016

**Reference name** EV-STM32F7CAM-DVK



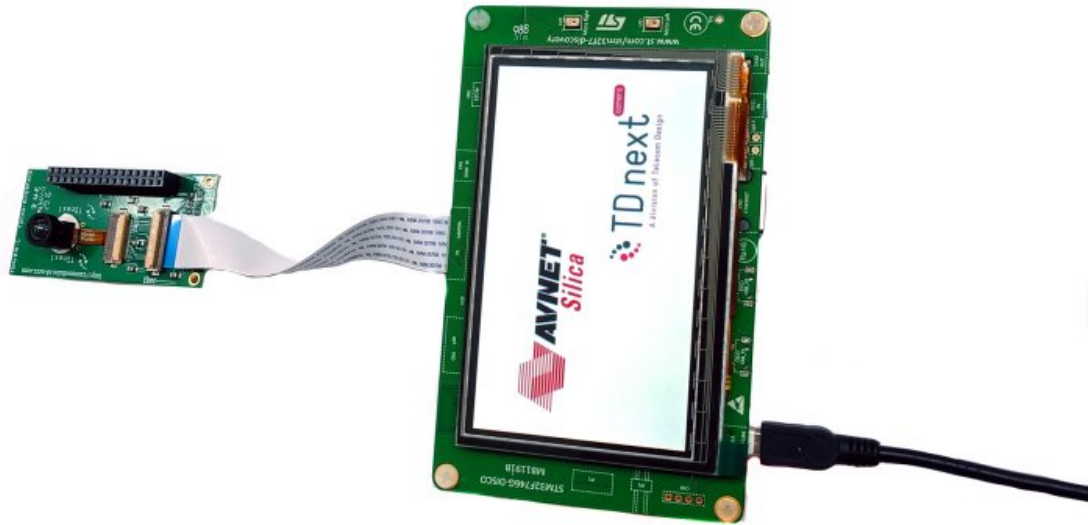
# CHAPTER 1

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## Embedded Vision ST

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*Embedded Vision STM32F7 Camera TD7740 Development Kit*

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**Note:** Visit [www.avnet-silica.com/embedded-vision](http://www.avnet-silica.com/embedded-vision) to buy this development kit

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<p><b>Warning:</b> The color of the adapter board in the kit can be different than the color on the images in the Quick Start Guide and Developing Guide. However this does not affect the functionality of the board</p>
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## CHAPTER 2

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### INTRODUCTION

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This Development Kit is a cost effective and flexible tool for video applications with the STM32 Cortex M7 MCU. **TD next** miniature camera modules interface with the **STM32F7** for high quality VGA or lower resolution video. The solution is a full development tool with examples to simplify development and to create your own application.



The Embedded Vision STM32F7 Camera Development Kit includes:

- STMicroelectronics STM32F746 Discovery kit
- TD next TD7740 adapter board
- TD next TD7740-FBAC VGA camera module
- USB mini cable
- Flexible flat cable
- Quick Reference Card

The **TD7740** Image sensor is based on Omnisvision 1/5" OV7740 CMOS VGA sensor.



- Solderless module: Camera Socket (SMK compatible) or Flex connector (FPC: Flat Pack Connector) 8 x 8 mm module mate on standard Camera Module Socket
- Active Image size VGA (640x480) 30 fps, and smaller
- Digital RGB 8/10 bits or YUV 8 bits output
- Lens Focal length 1.3 mm Field of view from H=66° to 128°
- Pixel size 4.2μm x 4.2μm
- Type of filter; dual filter for daylight and night vision, single filter for daylight vision, no filter for higher image quality
- Power supply Analog: 3 to 3.6 V I/O: 1.7 to 3.47 V Core: 1.5V +-5% (internal regulator)
- Typical power requirements Active: 48 mA Standby: 20 μA Core: 1.5V +-5% (internal regulator)
- Operating range -30°/70°C stable image 0°/50°C

## 2.1 Development tools

ST releases the **System Workbench for STM32** including support for the STM32F746 Discovery kit. Based on free, open-source software including Eclipse, GNU Compiler Collection (GCC), GNU Debugger (GDB), and others, the Kinetis Design Studio IDE offers designers a simple development tool with no code-size limitations.

Contents:

### 2.1.1 Quick Start Guide

This guide will show you how to run the demo. This demo allows you to immediately try the **TD7740** camera. This guide is written using **Windows** Operating System.

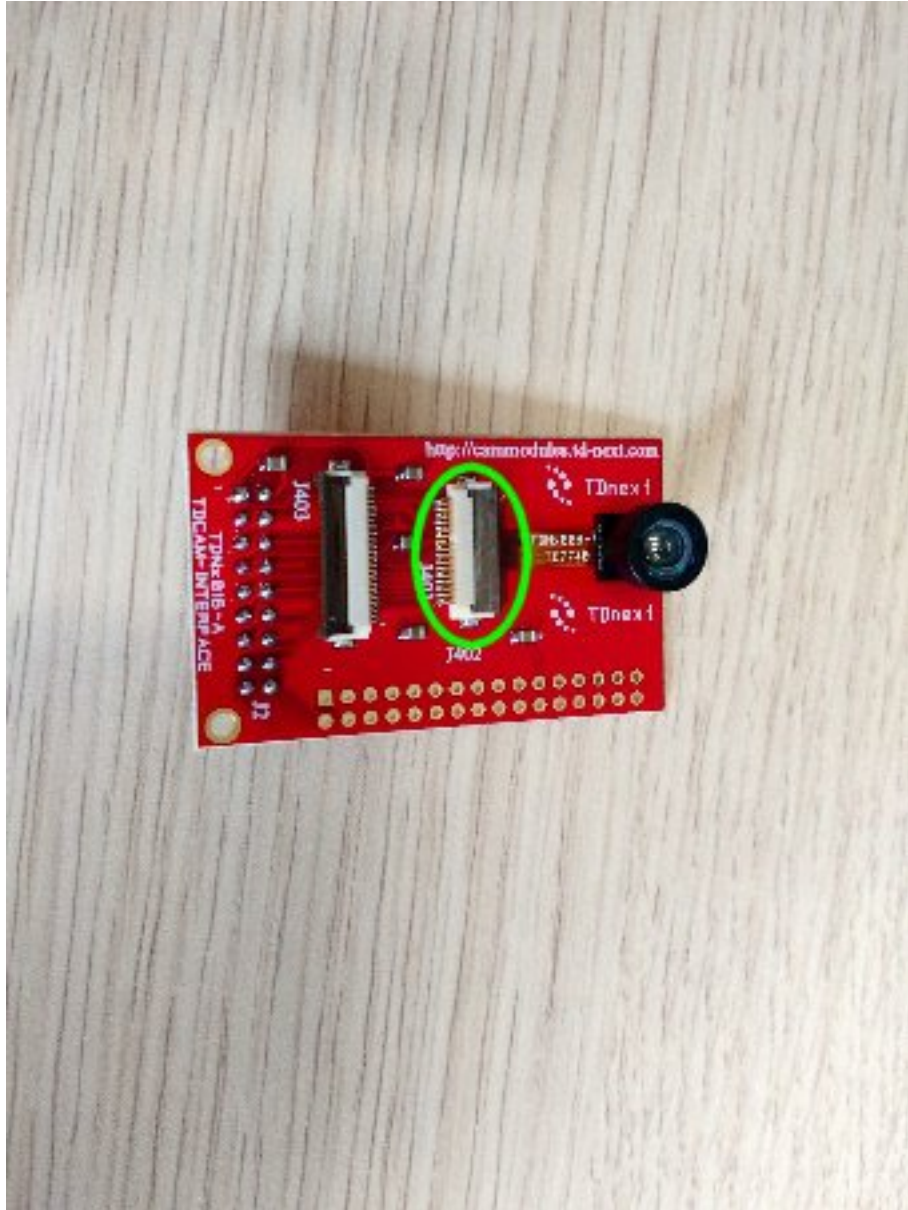
## Hardware necessary

- **TDNx016** Board
- **TD7740** camera
- **STM32F746G-DISCO** board
- 1 mini-USB cable
- PC with Windows

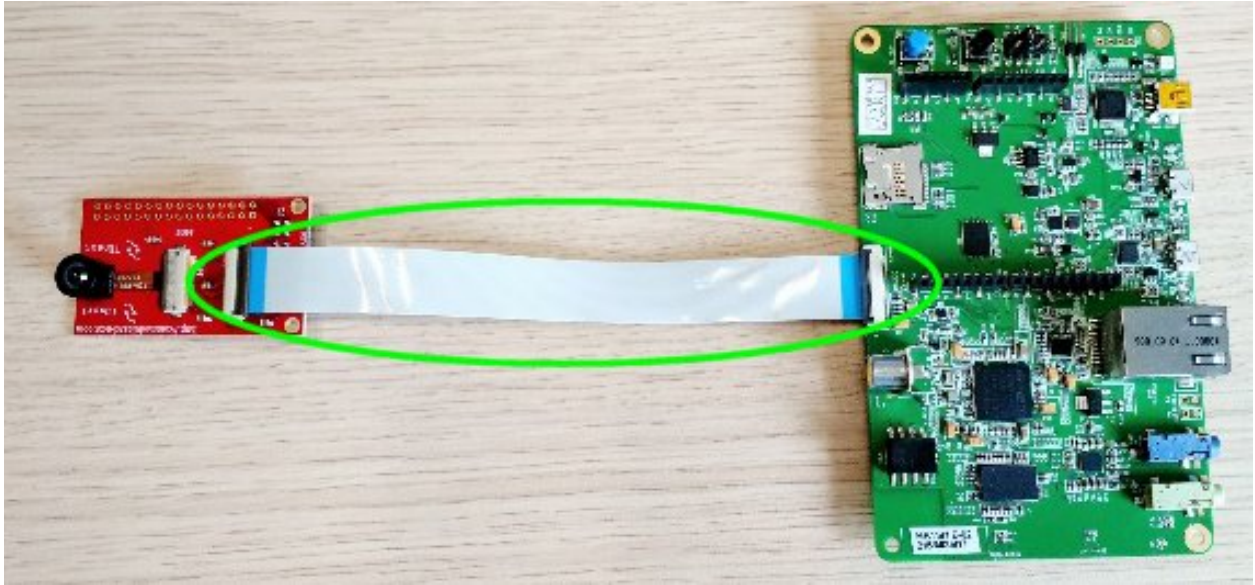
## Launching the Demo

The **EV-STM32F7CAM-DVK** is already programmed with the demo. All you need to do is to assemble and supply power.

1. Plug the **TD7740** camera to the **TDx016** adapter board:



2. Connect the adapter board to the Camera Connector of the **STM32F746G-DISCO** board via FFC cable:



3. Plug in the **USB Mini** cable from the PC to the **CN14** connector of the board

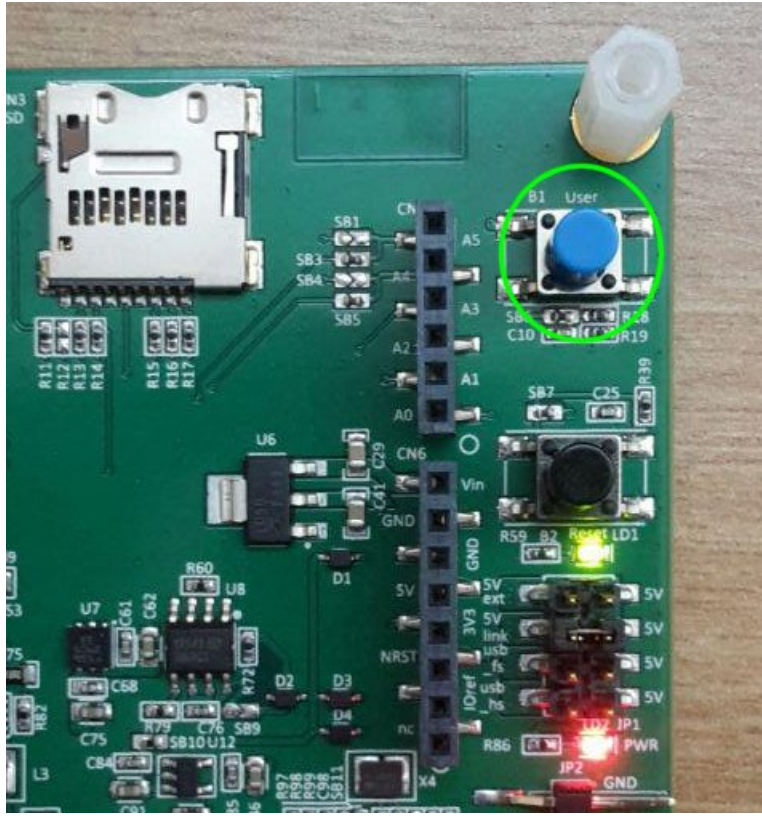




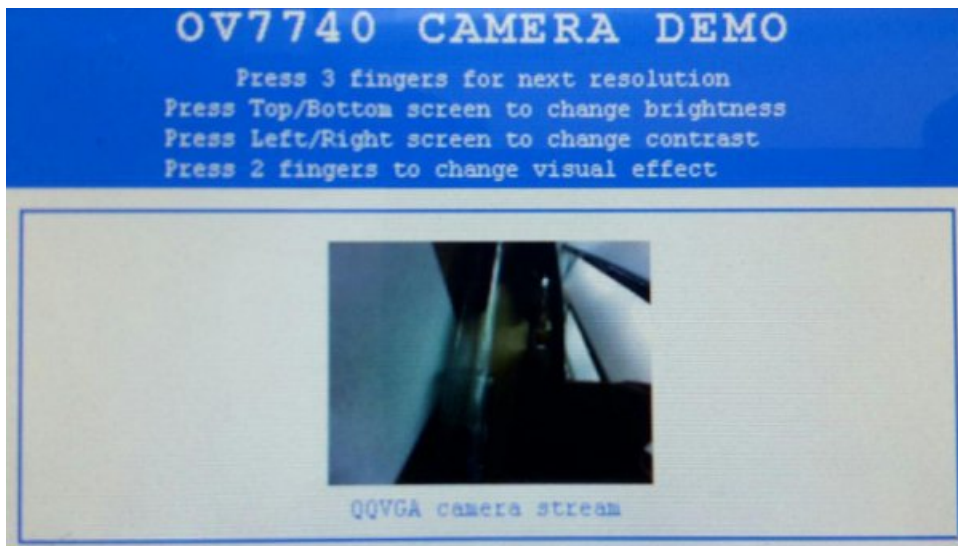
4. The demo will automatically start



4. Press the **User Button** to see the streaming video from the camera



5. The display is touch screen and by touching it in different ways you can interact with the demo



- Press the screen with three fingers to change resolution.
- Press the screen with two fingers to change the effect.
- Press the screen with one finger on the right or left of the screen to raise/decrease the brightness.
- Press the screen with one finger on the top or bottom of the screen to raise/decrease the contrast.

## Update the Demo

If the board is not programmed with the demo firmware you can upload it by yourself.

1. Download accepting the agreement of the **stsw-link009 USB driver** from the [ST website](#)

### GET SOFTWARE

Part Number ▲	Software Version ▼	Marketing Status ▼	Supplier ▼	Order from ST ▼
STSW-LINK009	1.01	Active	ST	<a href="#">Get Software</a>

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**Note:** In order to get the software it is necessary to have an account on my.st.com website. You can create it [here](#)

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2. Extract and install the driver launching **dpinst\_amd64.exe** if you have Windows 64-bit or **dpinst\_x86.exe** if your Windows is 32-bit. If you don't know it just go in **Control Panel -> System** to check the version or if you have Windows 10 go to **Settings -> System -> About**.
3. During the installation accept all the permission requests.
4. Download accepting the agreement of the **stsw-link004 STM32 ST-LINK utility** from the [ST website](#)

### GET SOFTWARE

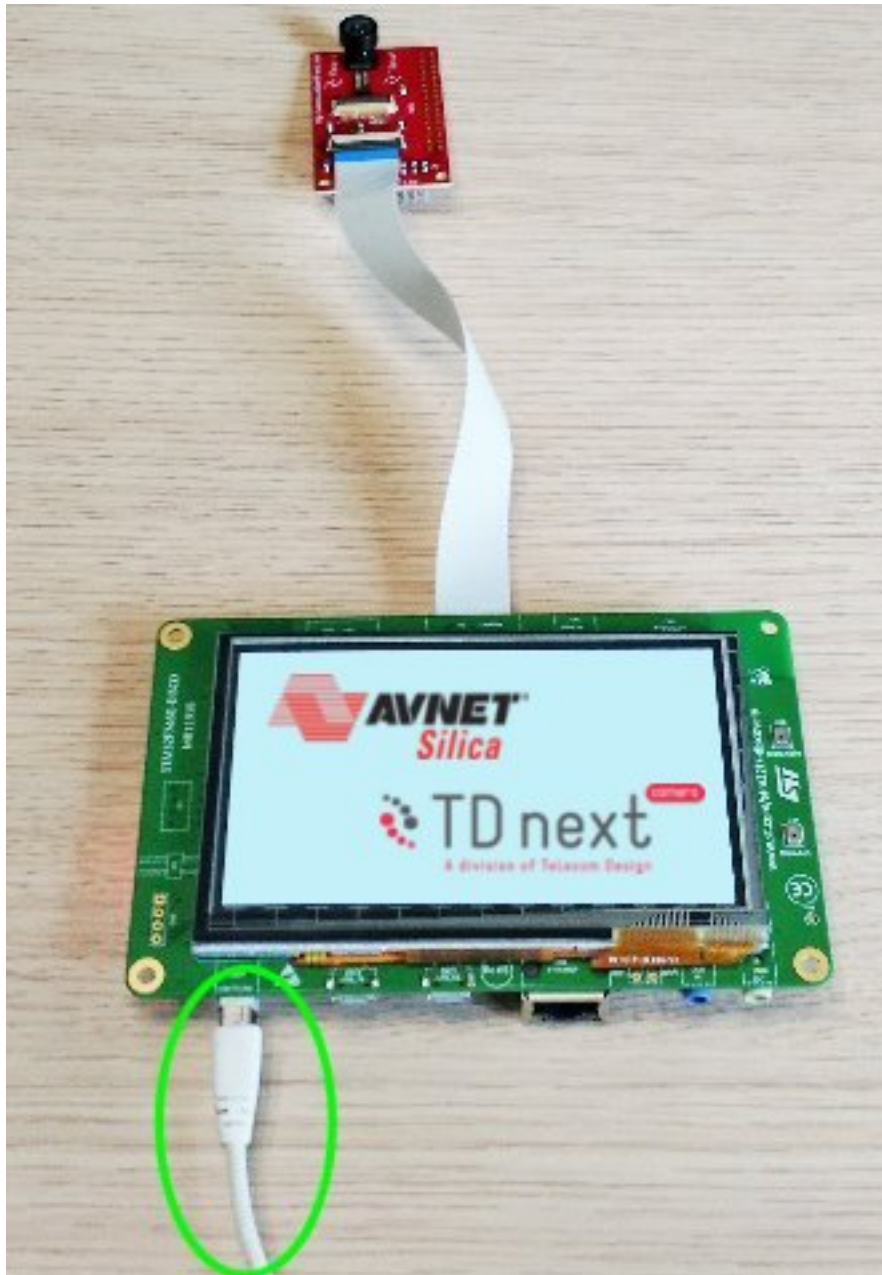
Part Number ▲	Software Version ▼	Marketing Status ▼	Supplier ▼	Order from ST ▼
STSW-LINK004	3.9.0	Active	ST	<a href="#">Get Software</a>

5. Extract and launch the installer. During the installation accept all the permission requests.

Now your Windows is configured to upload the firmware of the **STM32F746G-DISCO** board

1. Download the firmware Demo from [Avnet Silica website](#)
2. Plug in the **USB Mini** cable from the PC to the **CN14** connector of the board





3. If all is ok the board will be mounted as a mass storage



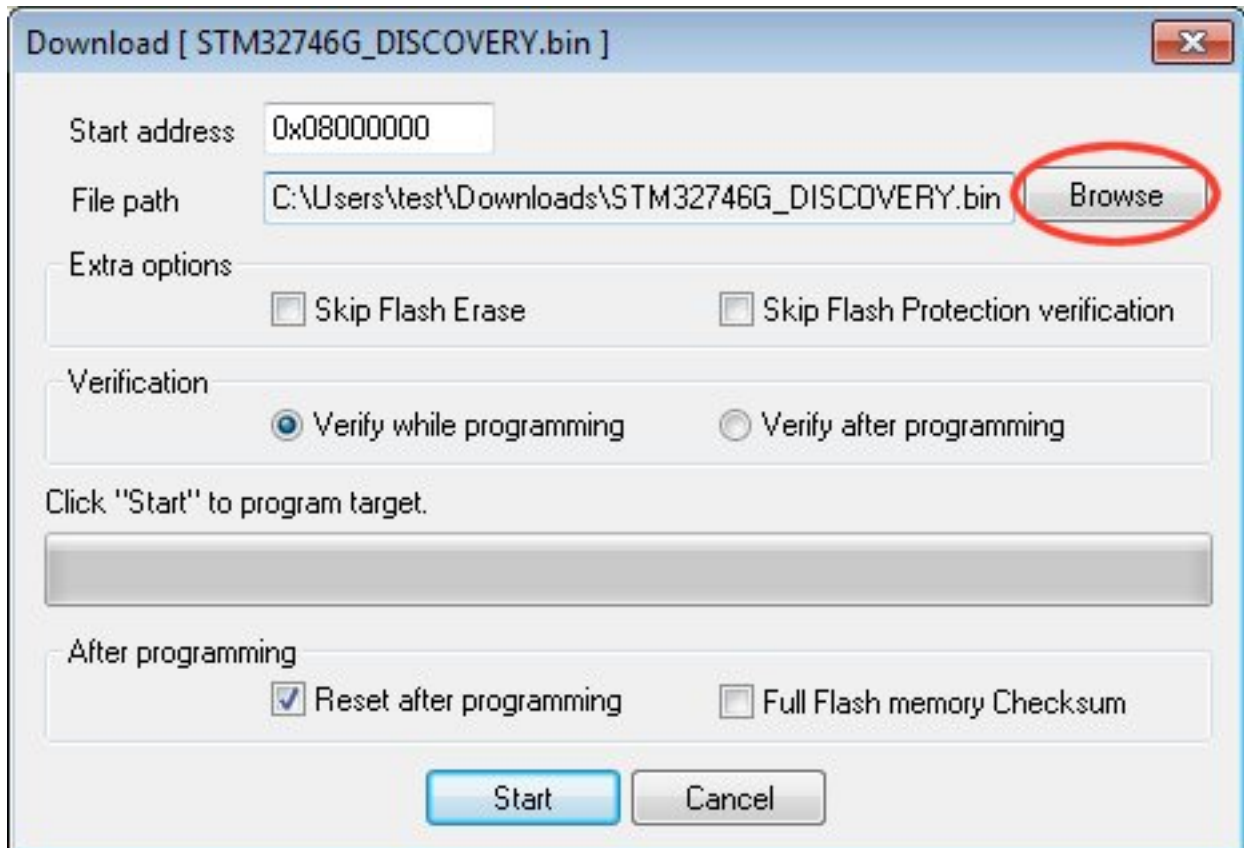
4. Launch the **STM32 ST-LINK Utility**, you can find it going to **Windows menu start->All Programs->stmicroelectronics**
5. Click on the **connect to the target icon** on the toolbar



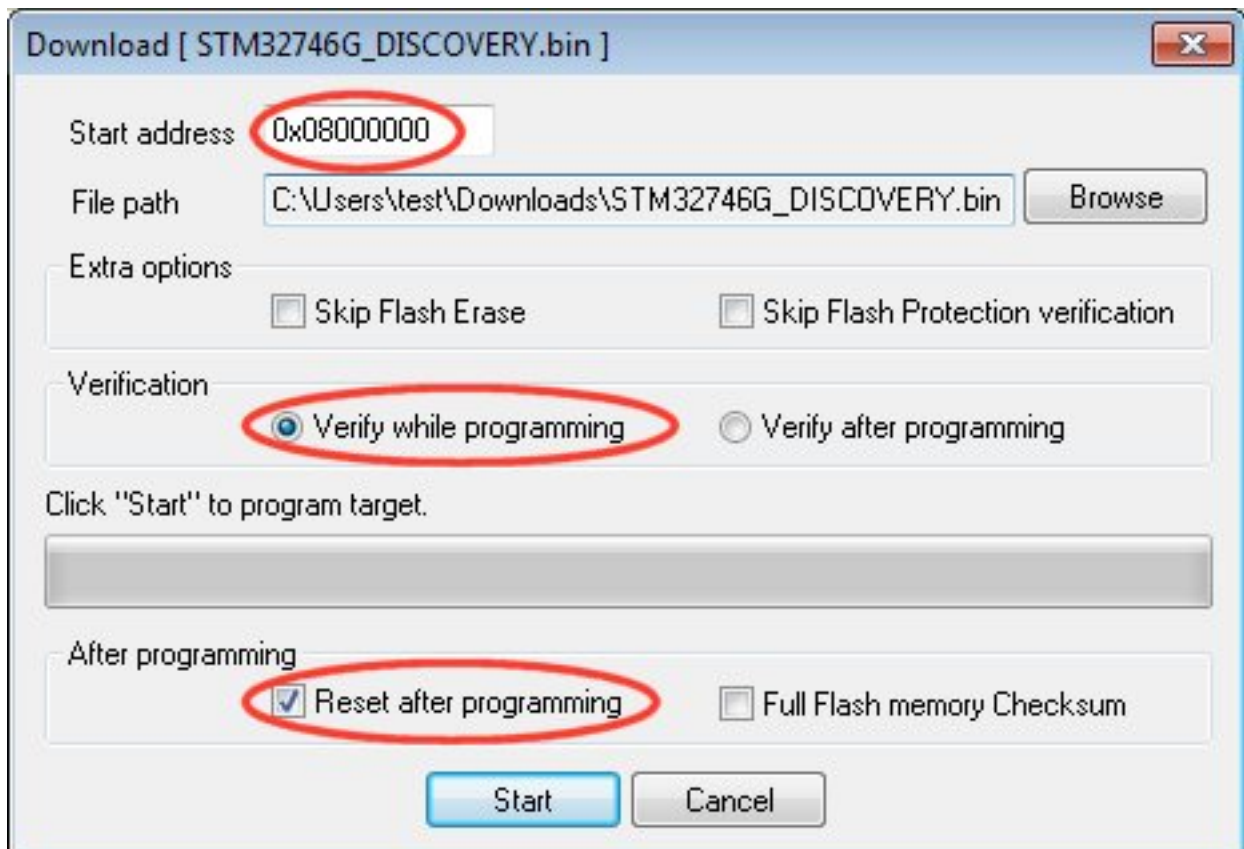
6. Once it is connected click on the **program verify** icon on the toolbar



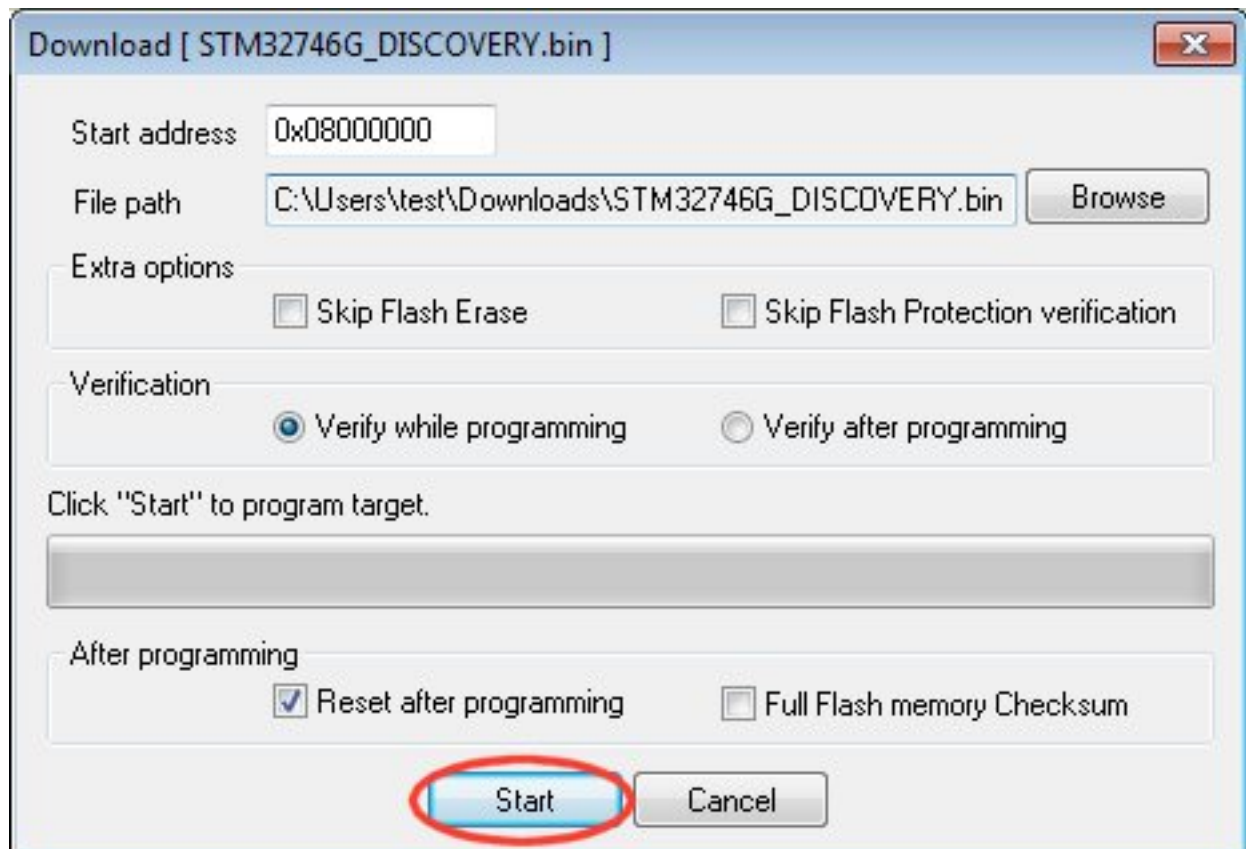
7. From the window click on the **Browse** button and find the **STM32746G\_DISCOVERY.bin** file.



8. Check that the options are right



9. Click on the **Start** button to upload the firmware in the board



10. After programming the demo will start automatically



## 2.1.2 Developing Guide

This guide will provide instructions to install the development environment needed to compile and debug the demo firmware for the **STM32F746G-DISCO** board. This guide is written using Windows.

The main steps will be:

- Install stsw-link009 USB driver
- Install System Workbench for STM32
- Download & Install the project
- Import & build

- Debug

### Install stsw-link009 USB driver

1. Download accepting the agreement of the **stsw-link009 USB driver** from the [ST website](#)

#### GET SOFTWARE

Part Number ▲	Software Version ◆	Marketing Status ◆	Supplier ◆	Order from ST ◆
STSW-LINK009	1.01	Active	ST	<a href="#">Get Software</a>

**Note:** In order to get the software it is necessary have an account on my.st.com website. You can create it [here](#)

2. Extract and install the driver launching **dpinst\_amd64.exe** if you have Windows 64-bit or **dpinst\_x86.exe** if your Windows is 32-bit. If you don't know it just go in **Control Panel -> System** to check the version or if you have Windows 10 go to **Settings -> System -> About**.
3. During the installation accept all the permission requests.

### Install System Workbench for STM32


1. The ST System Workbench requires Java Runtime Environment. If you don't yet have it installed on your system please follow the next steps otherwise go to the step 5
2. Download the JavaSE JRE. Minimal version: **JavaSE 1.7.0\_45**. You can find it [here](#). We suggest to use the **offline** version.


Oracle Technology Network > Java > Java SE > Downloads

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Java SE 8u101 includes important security fixes. Oracle strongly recommends that all Java SE 8 users upgrade to this release. Java SE 8u102 is a patch-set update, including all of 8u101 plus additional features (described in the release notes).  
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- [Demos and Videos](#)
- [Forums](#)
- [Java Magazine](#)
- [Java.net](#)
- [Developer Training](#)
- [Tutorials](#)
- [Java.com](#)

- Accept the license agreement and download the installation file, **Windows x86** for 32-bit system or **Windows x64** for 64-bit system. If you don't know it just go in **Control Panel -> System** to check the version or if you have Windows 10 go to **Settings -> System -> About**.



## Java SE Runtime Environment 8 Downloads

Do you want to run Java™ programs, or do you want to develop Java programs? If you want to run Java programs, but not develop them, download the Java Runtime Environment, or JRE™.

If you want to develop applications for Java, download the Java Development Kit, or JDK™. The JDK includes the JRE, so you do not have to download both separately.

JRE 8u101 Checksum  
JRE 8u102 Checksum

**Java SE Runtime Environment 8u101**

You must accept the [Oracle Binary Code License Agreement for Java SE](#) to download this software.

☒ Accept License Agreement
 ☐ Decline License Agreement

Product / File Description	File Size	Download
Linux x86	54.79 MB	<a href="#">jre-8u101-linux-i586.rpm</a>
Linux x86	70.58 MB	<a href="#">jre-8u101-linux-i586.tar.gz</a>
Linux x64	52.68 MB	<a href="#">jre-8u101-linux-x64.rpm</a>
Linux x64	68.49 MB	<a href="#">jre-8u101-linux-x64.tar.gz</a>
Mac OS X	55.99 MB	<a href="#">jre-8u101-macosx-x64.tar.gz</a>
Mac OS X	64.32 MB	<a href="#">jre-8u101-macosx-x64.dmg</a>
Solaris SPARC 64-bit	52 MB	<a href="#">jre-8u101-solaris-sparcv9.tar.gz</a>
Solaris x64	49.85 MB	<a href="#">jre-8u101-solaris-x64.tar.gz</a>
Windows x86 Online	0.71 MB	<a href="#">jre-8u101-windows-i586-iftw.exe</a>
<b>Windows x86 Offline</b>	52.63 MB	<a href="#">jre-8u101-windows-i586.exe</a>
Windows x86	59.42 MB	<a href="#">jre-8u101-windows-i586.tar.gz</a>
<b>Windows x64 Offline</b>	59.17 MB	<a href="#">jre-8u101-windows-x64.exe</a>
Windows x64	62.77 MB	<a href="#">jre-8u101-windows-x64.tar.gz</a>

4. Launch the installation file and follow all the default options.

5. Download the ST System Workbench from its website <http://www.openstm32.org>. There are two versions, 32-bit or 64-bit. It depends what kind of version your windows is. If you don't know, just go in **Control Panel -> System** to check the version.

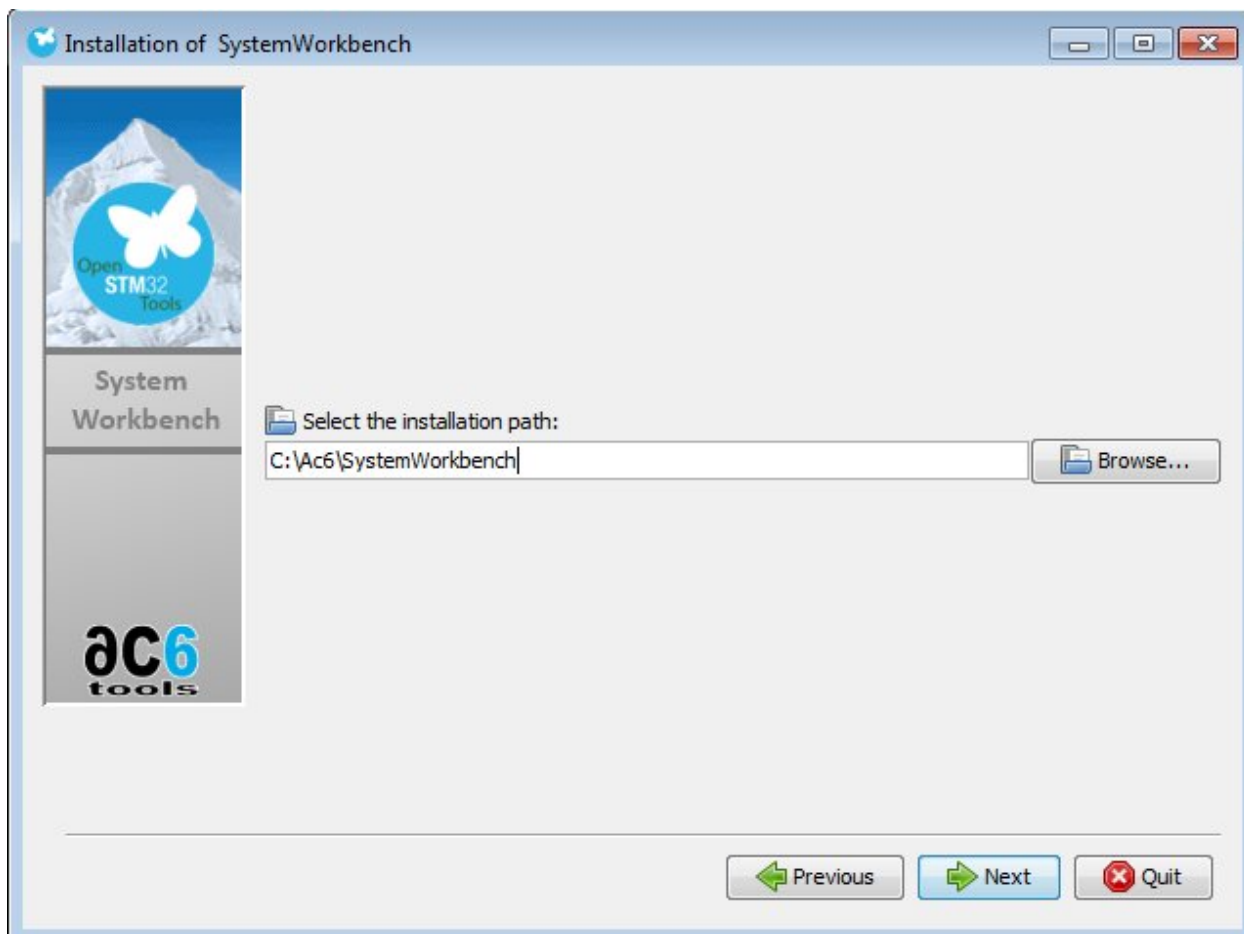
**Note:** In order to get the software it is necessary have an account on the openstm32 website. You can do it from [here](#).

### Windows 7

The Windows version is available for 32 and 64 bit systems. Note that we will need to install a device driver to communicate with the ST-Link debug probe, so you **must** select the installer that fits your system. Installing the 32 bit version on a 64 bit Windows system will **not** work. If you have problems downloading an executable file (.exe), try downloading and extracting the ZIP file.

- Latest Windows 7 64 bit installer (Version v1.8, updated on Wednesday, May 4, 2016 at 16:25:43 CEST): [install\\_sw4stm32\\_win\\_64bits-v1.8.exe](#) or [install\\_sw4stm32\\_win\\_64bits-v1.8.zip](#)
  - The latest installer can always be retrieved from [install\\_sw4stm32\\_win\\_64bits-latest.exe](#) or [install\\_sw4stm32\\_win\\_64bits-latest.zip](#)
- Latest Windows 7 32 bit installer (Version v1.8, updated on Tuesday, May 3, 2016 at 18:59:31 CEST): [install\\_sw4stm32\\_win\\_32bits-v1.8.exe](#) or [install\\_sw4stm32\\_win\\_32bits-v1.8.zip](#)
  - The latest installer can always be retrieved from [install\\_sw4stm32\\_win\\_32bits-latest.exe](#) or [install\\_sw4stm32\\_win\\_32bits-latest.zip](#)

6. Launch the installer, accept the terms and install it. We have used this path:



7. During the installation it will install the ST drivers, if necessary **accept** all the permissions.

### Download & Install the project

1. Download the project [evSTM32f7v01.zip](#)
2. Download STM32CubeF7\_1 from the [ST website](#) accepting the agreement.

#### GET SOFTWARE

Part Number ▲	Software Version ◆	Marketing Status ◆	Supplier ◆	Order from ST ◆
STM32CubeF7	1.4.0	Active	ST	<a href="#">Get Software</a>

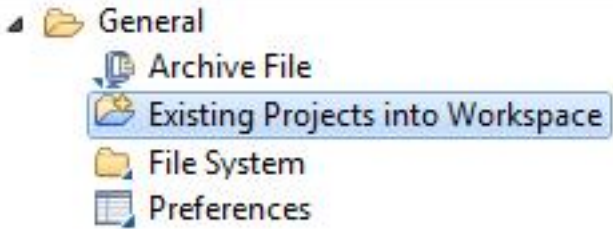
**Note:** In order to get the software it is necessary have an account on my.st.com website. You can create it [here](#)

3. Extract STM32CubeF7 package, in our example we have installed it in **C:\Ac6\STM32Cube\_FW\_F7\_V1.4.0**
4. Copy the provided folder **CameraDemo\_DriverTD7740\_STM32f7** to **C:\Ac6\STM32Cube\_FW\_F7\_V1.4.0\Projects\STM32746G-Discovery\Examples\**.

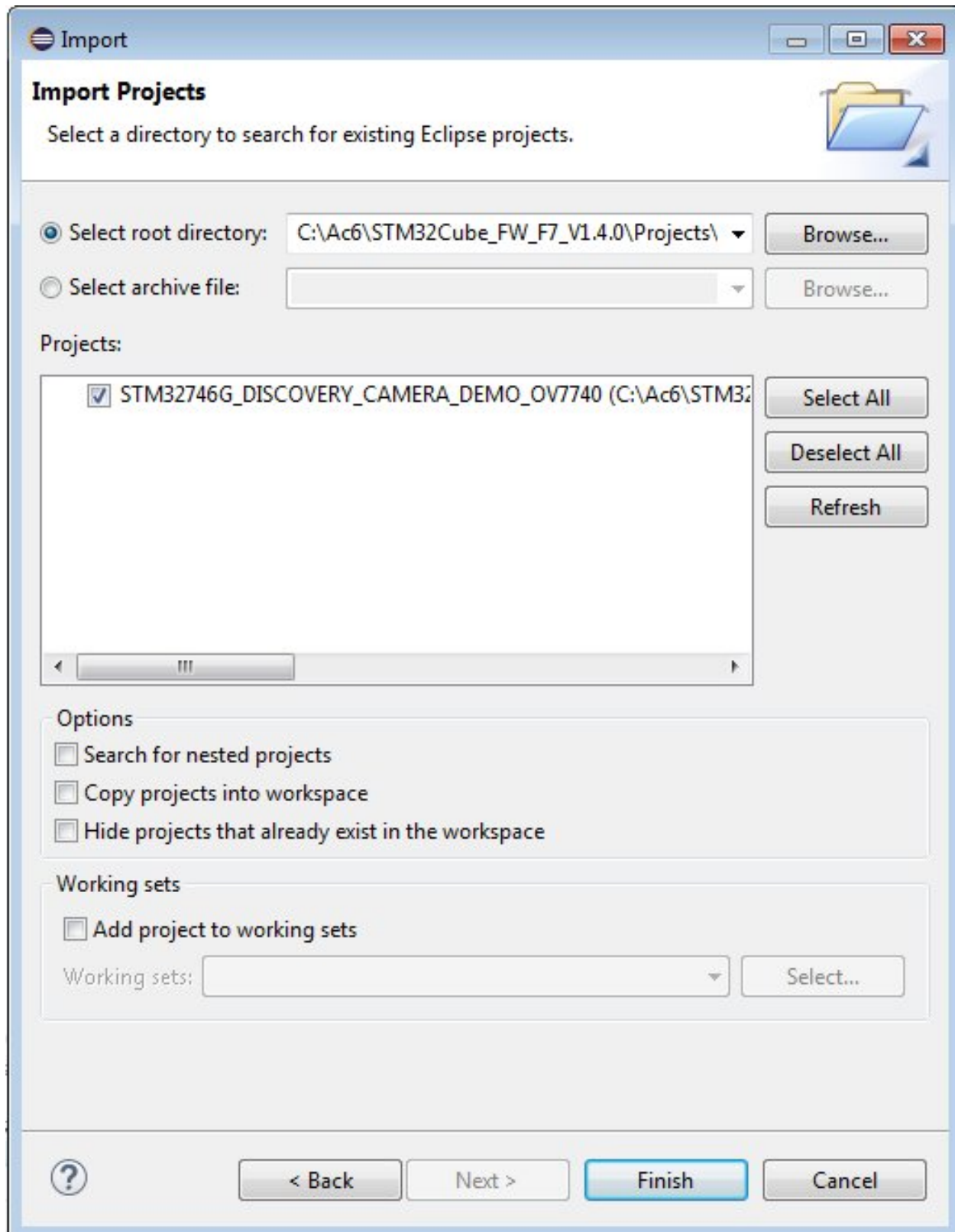


## Import & build

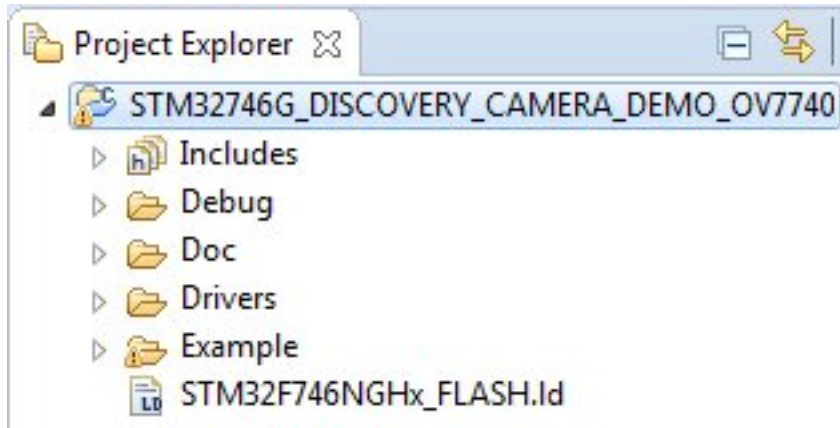
1. Launch the System Workbench for STM32
2. Select **File -> import** and choose **General -> Existing Projects into Workspace**



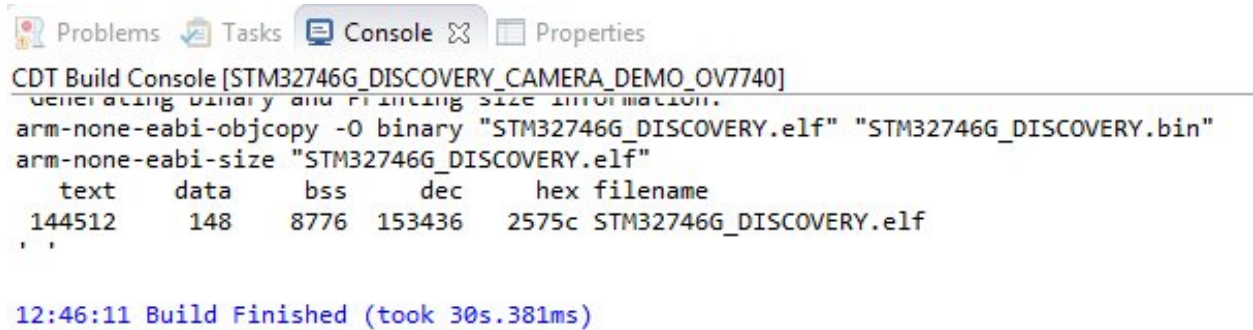
3. In Select root directory, click on Browse and select the path: **C:\Ac6\STM32Cube\_FW\_F7\_V1.4.0\Projects\STM32746G-Discovery\Examples\CameraDemo\_DriverTD7740\_ST**



4. The project should be automatically detected and selected. Click on **Finish** button.
5. Select the project **STM32746G\_DISCOVERY\_CAMERA\_DEMO\_OV7740**

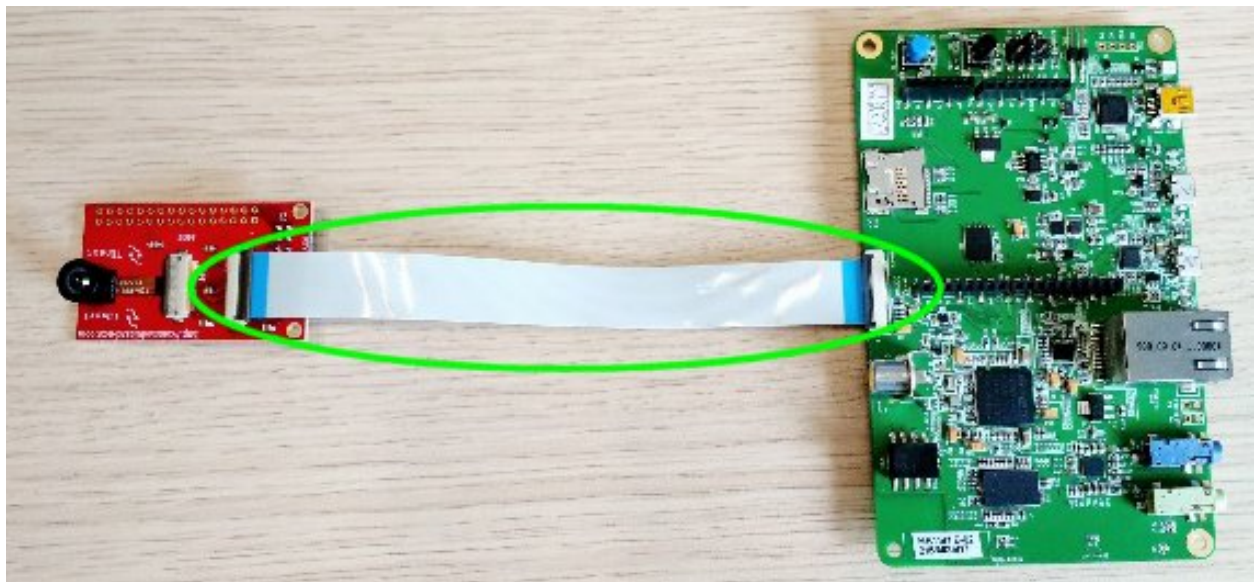


6. Press **F5** key to refresh the project tree
7. Build the project selecting **Project -> Build All**
8. The building will finish generating the **STM32746G\_DISCOVERY.bin** and **STM32746G\_DISCOVERY.elf** files

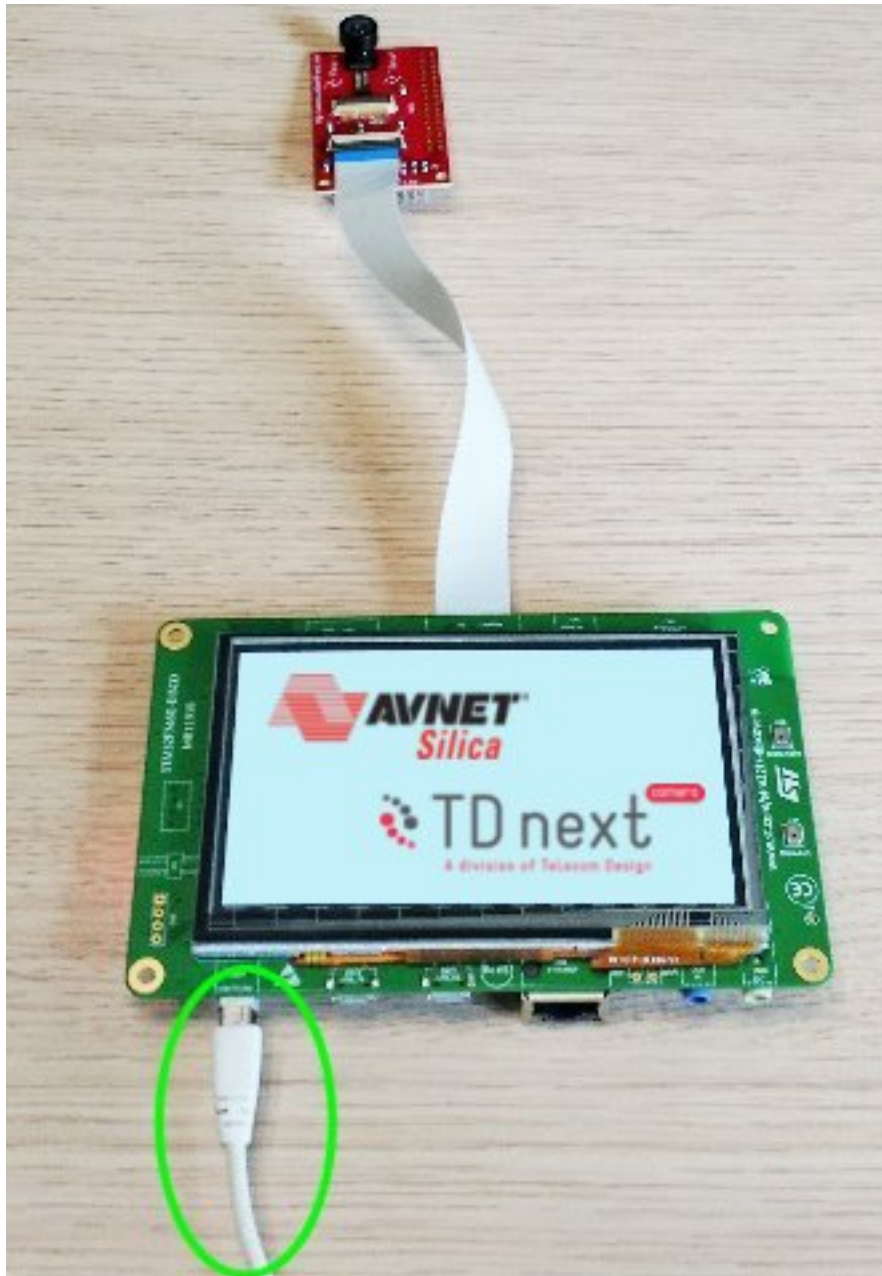


## Debug

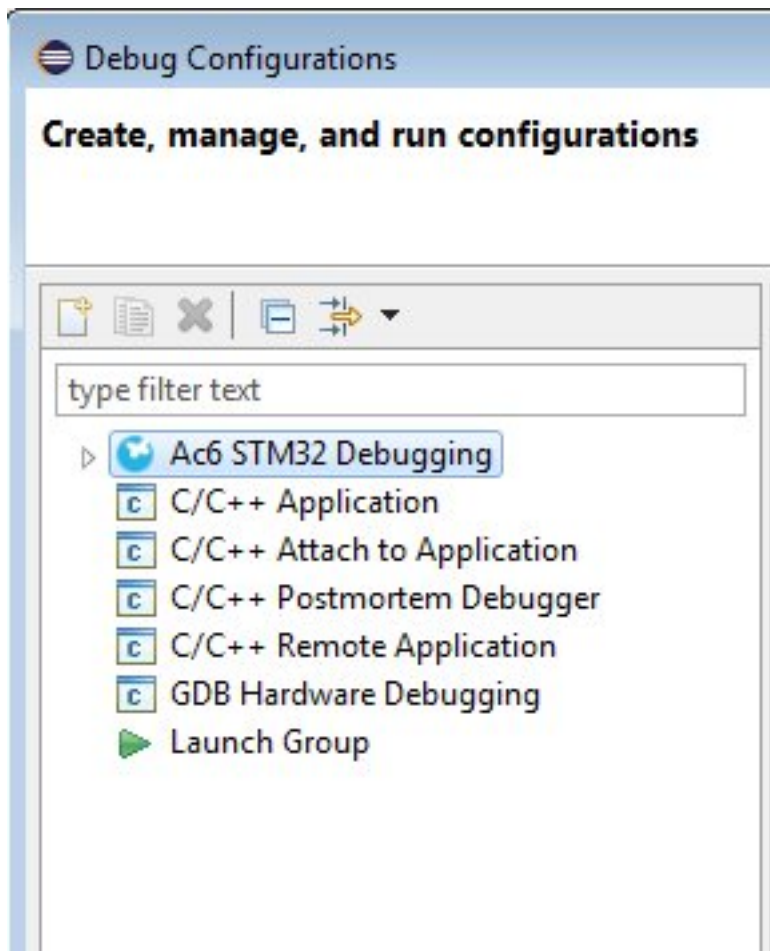
1. Connect the adapter board to the Camera Connector of the **STM32F746G-DISCO** board via FFC cable:



2. Plug in the **USB Mini** cable from the PC to the **CN14** connector of the board

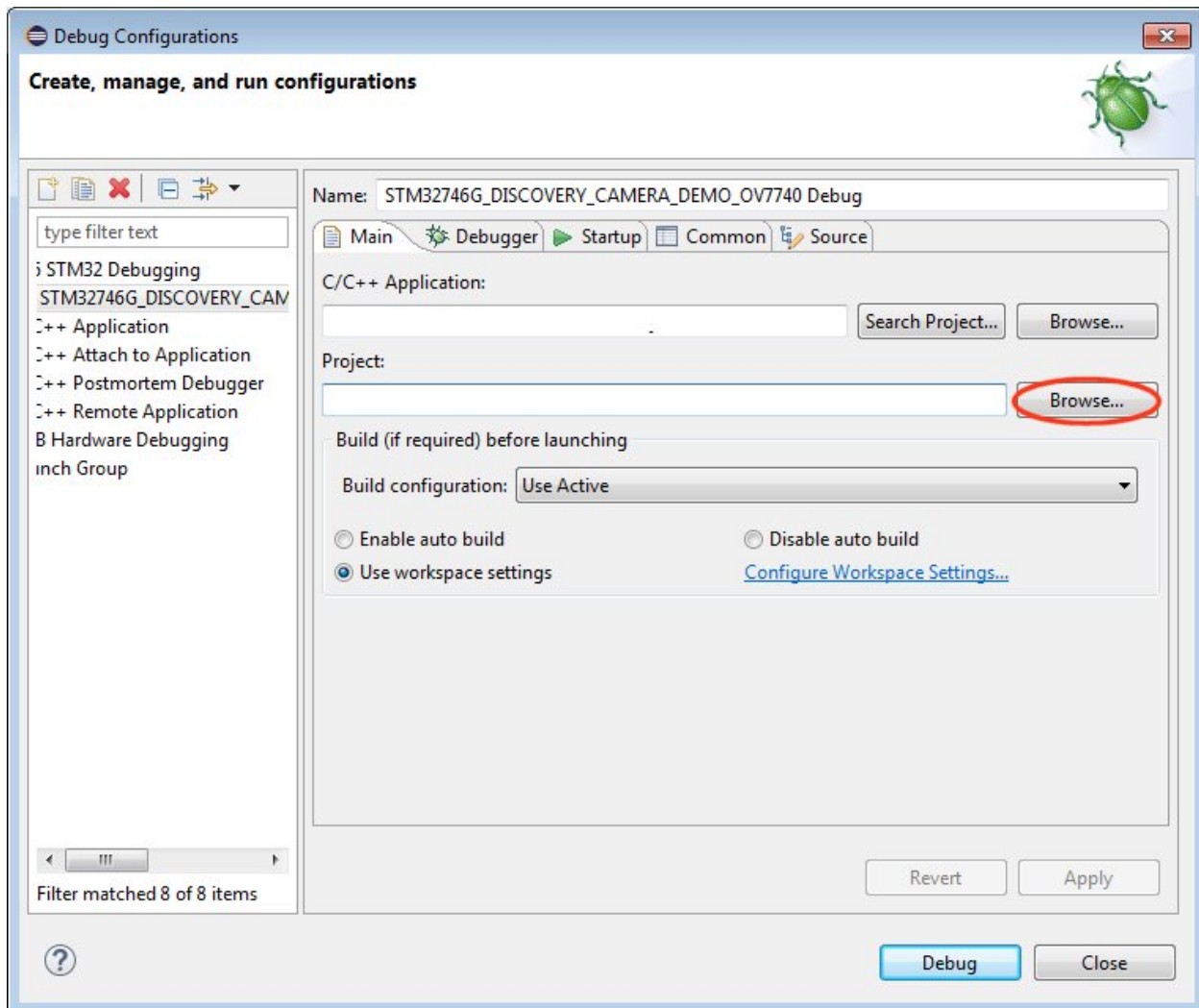


3. From the menu go to **Run -> Debug Configurations**
4. Double click on **Ac6 STM32 Debugging**

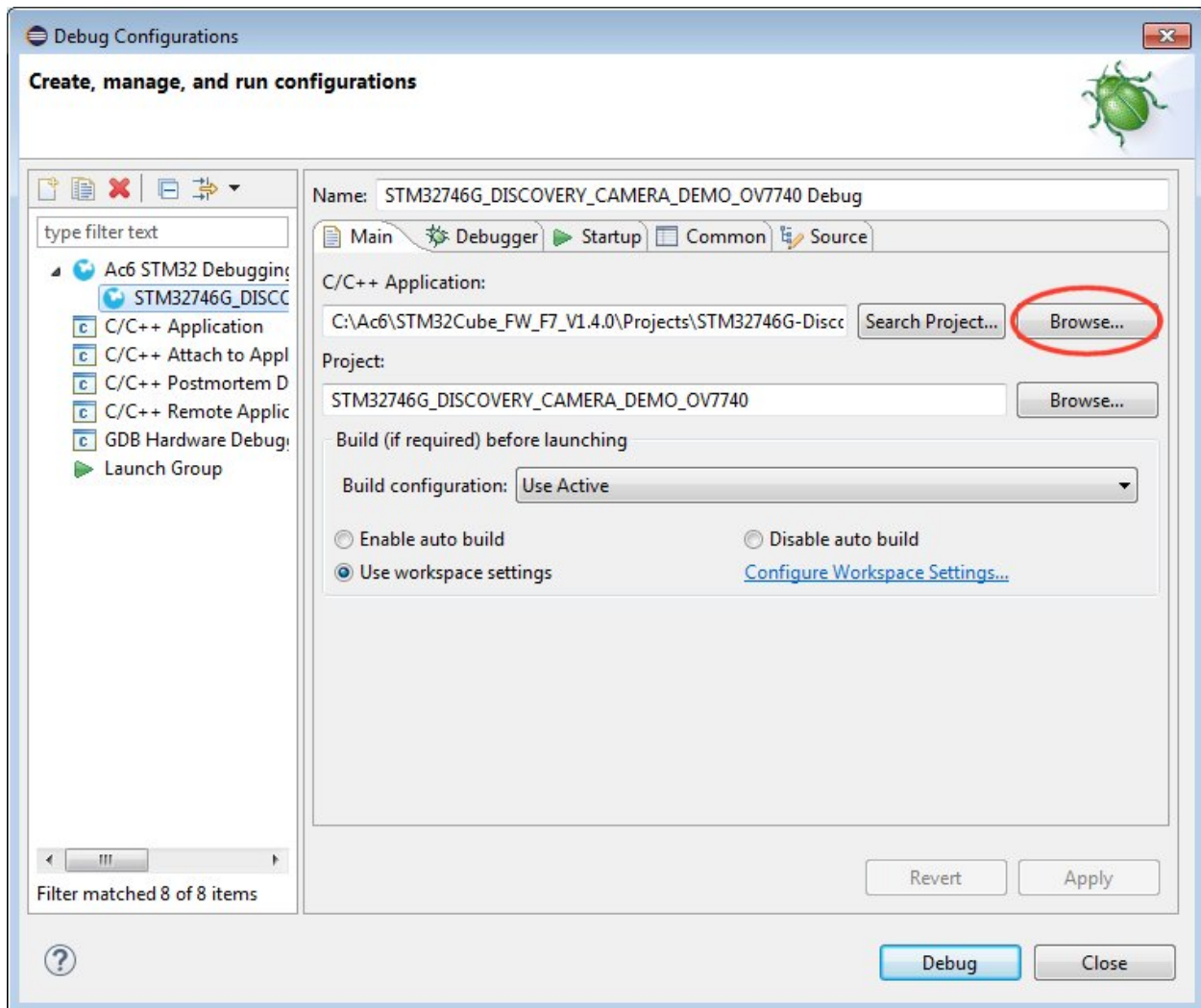


5. Click on **Browse...** button and select the project **STM32746G\_DISCOVERY\_CAMERA\_DEMO\_OV7740**

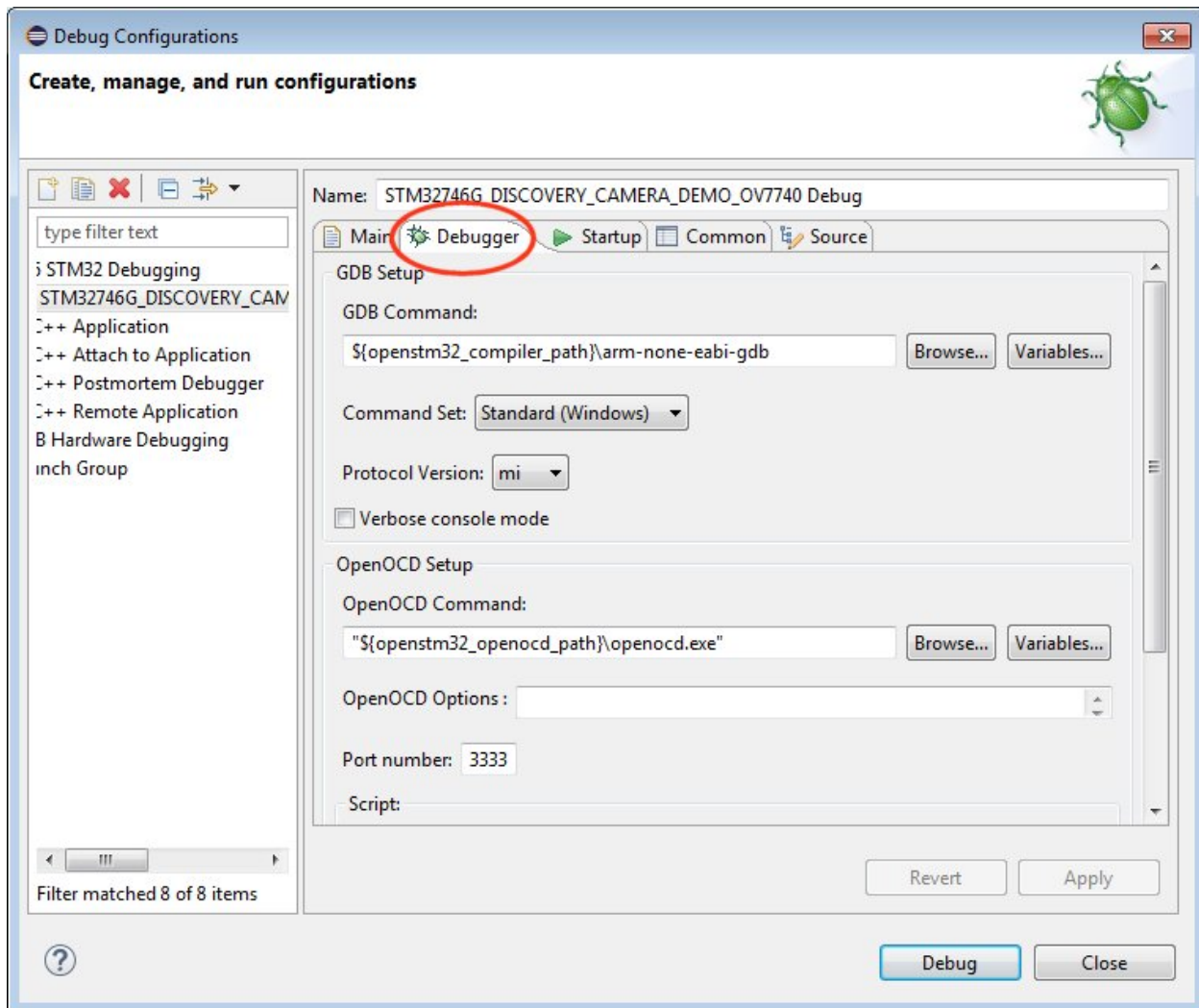




6. Click on **Browse...** button and find the elf file, using our path it will be `C:\Ac6\STM32Cube_FW_F7_V1.4.0\Projects\STM32746G-Discovery\Examples\CameraDemo_DriverTD7740_STM32f7`

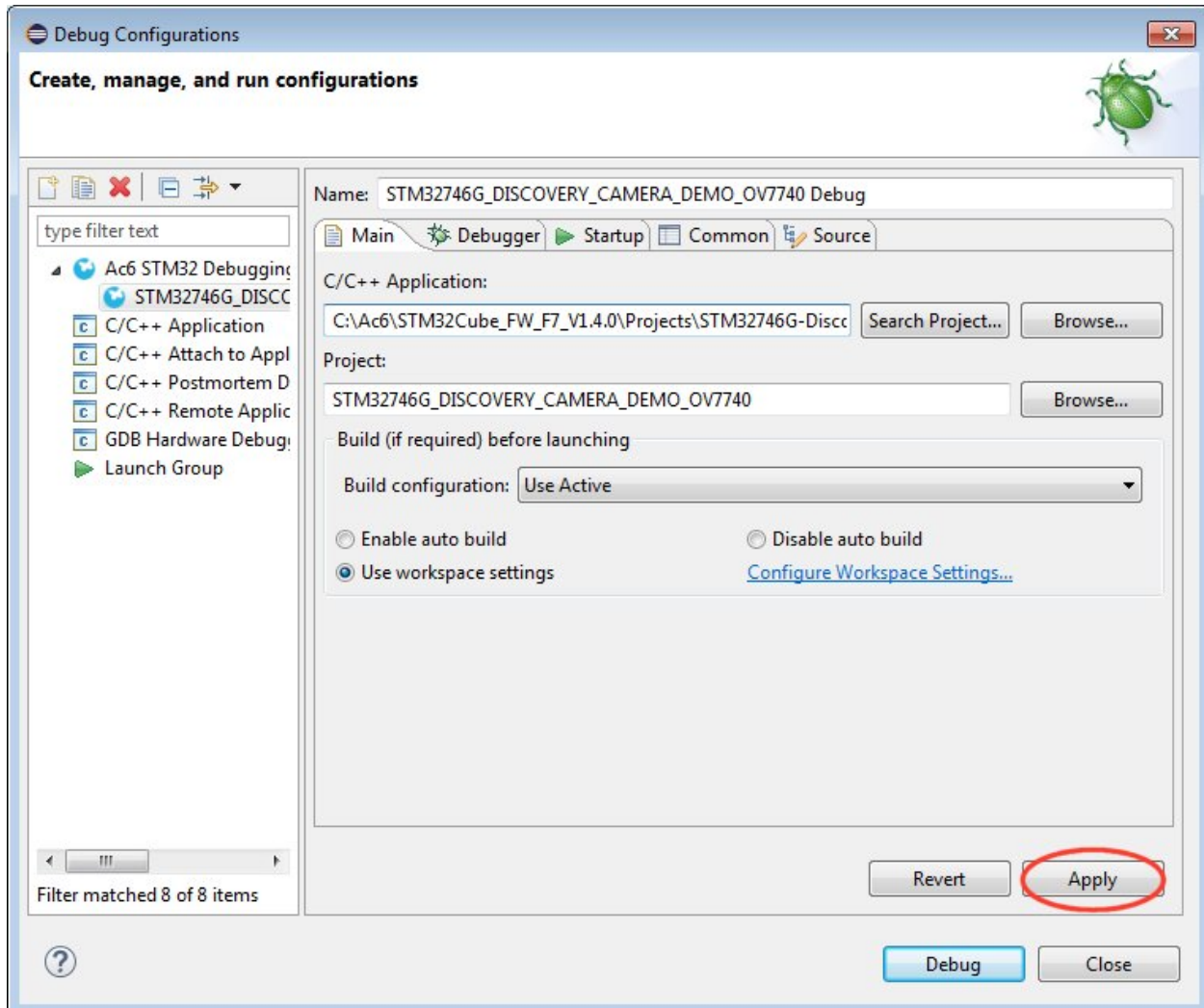


7. Check the **Debugger** tab if all the options are right

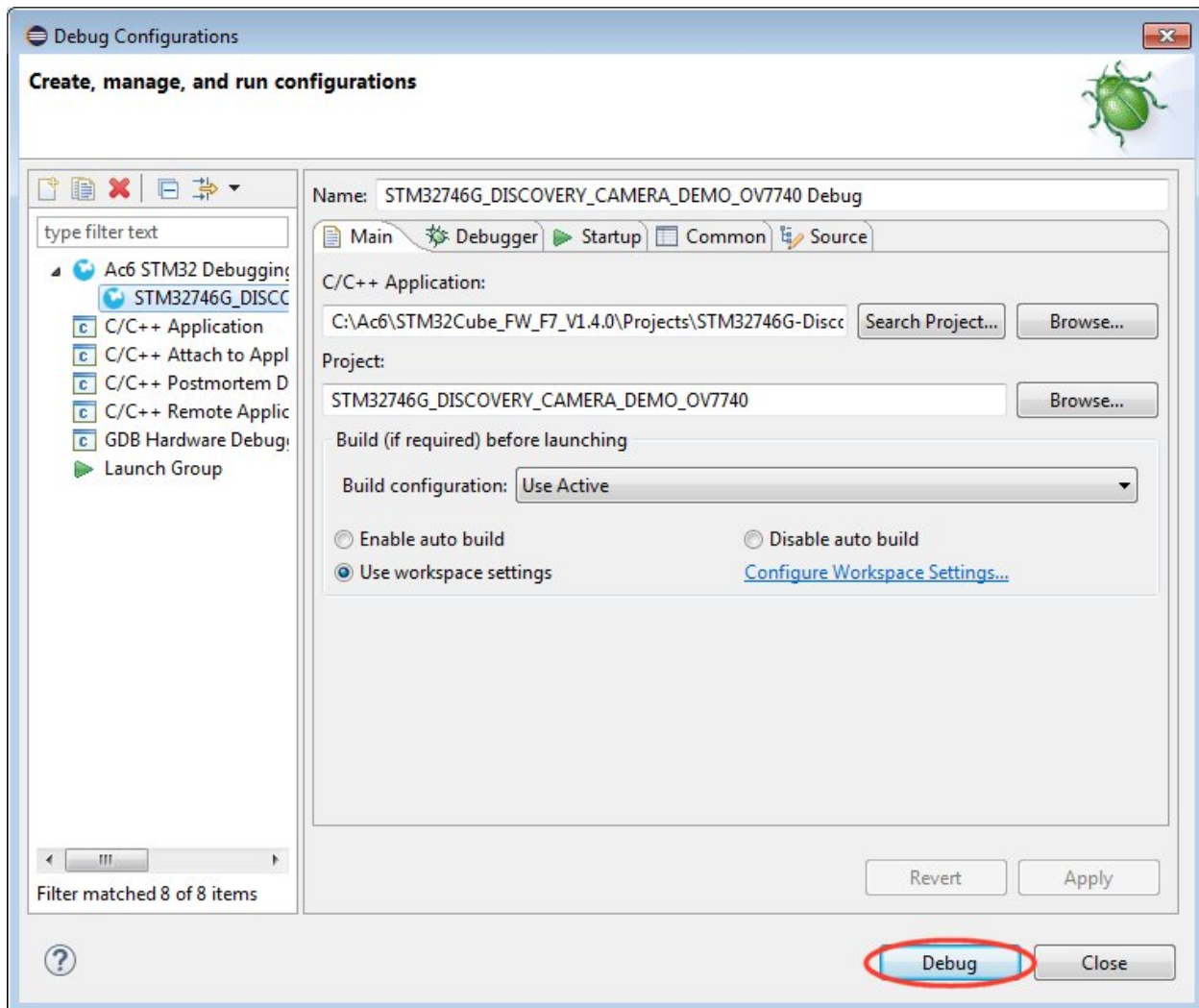


8. Apply the changes clicking on **Apply** button

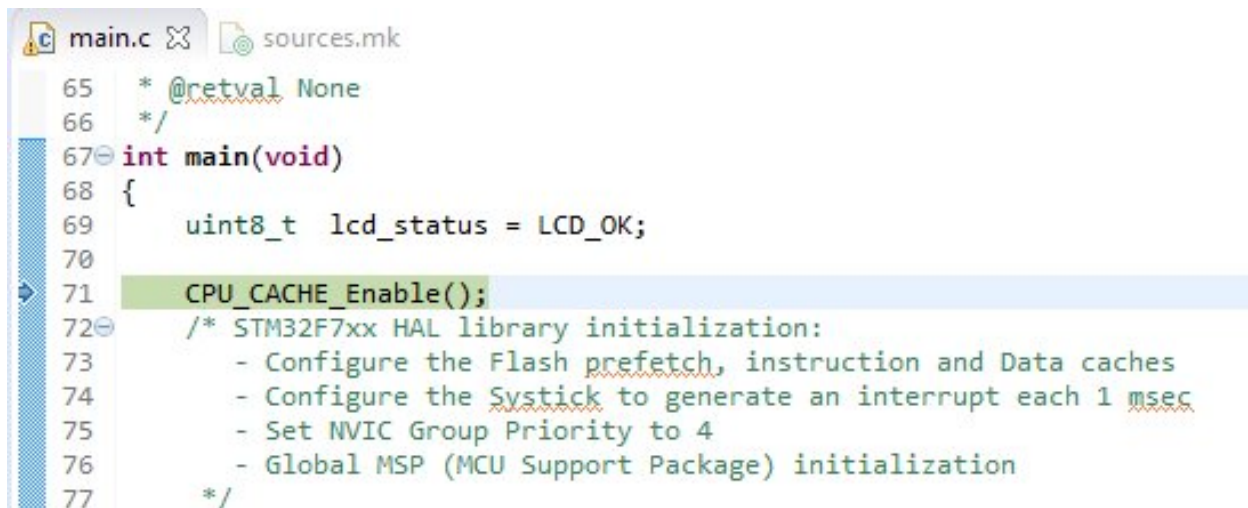




9. Then click on the **Debug** button



10. Accept the **debug perspective** and the debug will start on the **main** entry point



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