EN675
ECMT Manual

Version 2.1
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Document Description

This is the document to describe the ECMT Manual which is applied to EN675.

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# Contents

1. General Description

The Eyenix Control Management Tools (ECMT) is a Window GUI application platform used to access the sub-modules below, which allow for control of the ISP register for the EN675 chip set. To run and control EN675, the Eyenix dedicated USB Dongle V3.0 should be connected between the EN675 mounted board and the PC running ECMT. Most modules use the UART protocol, but Flash programming uses OpenOCD and OCDBridge.

Gamma Curve	ISP Menu Key	SW Parameter	UART Terminal	Flash Programming

ECMT

JTAG OpenOCD OCDBridge
UART

USB Dongle V3.0

Color Map	ISP Register	HW Parameter	Favorite Functions	Graph Viewer
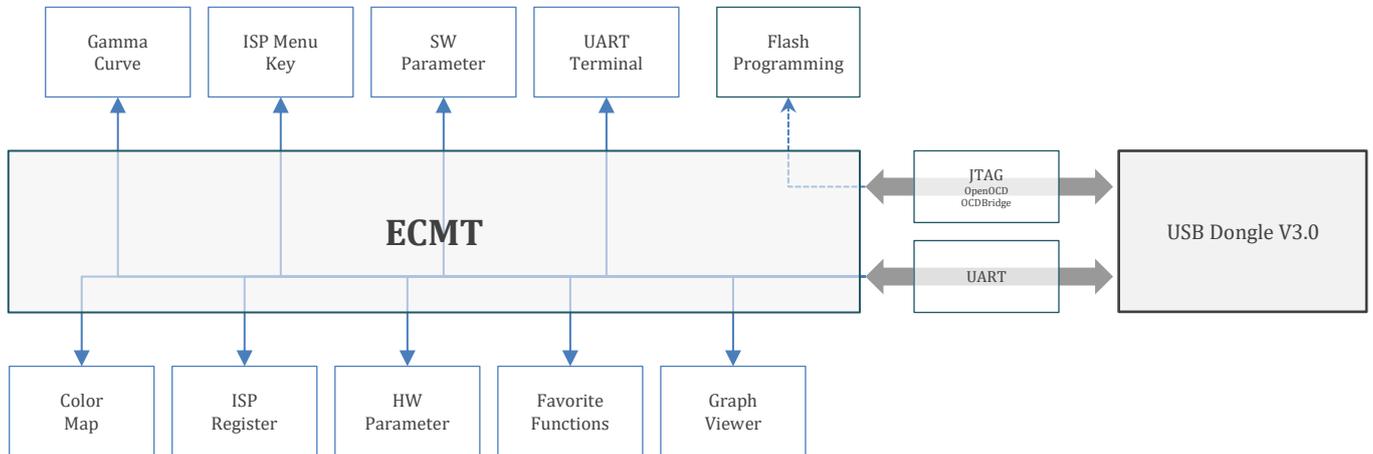
2. Environment Preparation

2.1. Board Connection

Before running the ECMT application, the Main Board, USB Dongle V3.0, and PC should be connected as following illustrative figure.
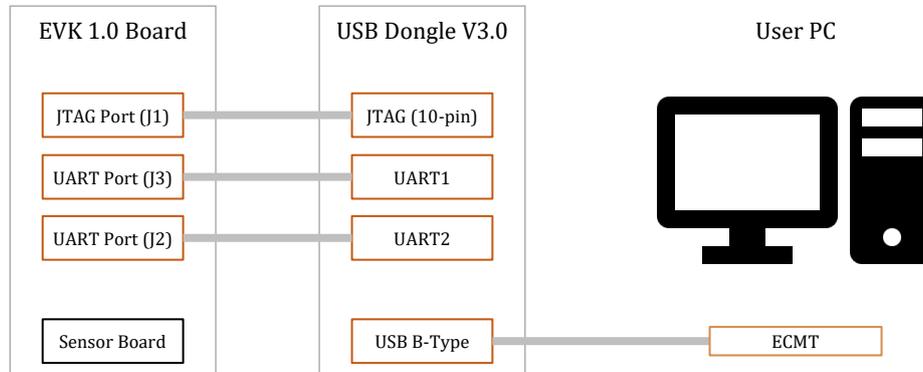
< An illustrative reference connection between EVK 1.0 and PC >

2.2. USB Dongle V3.0 Setup

The USB Dongle V3.0 will connect automatically if the USB is plugged into the PC with the latest version of Windows system. For the machine with older operating system and can't connect automatically, it is recommended to download and install FTDI driver via https://ftdichip.com/drivers/d2xx-drivers/

2.3. Zadig Installation

Before running ECMT, WinUSB driver should be downloaded and replaced with FTDI driver for development system. Currently, EN675 is relies on Zadig to make changes to USB driver installation. The Zadig can simply download from https://zadig.akeo.ie and this document follows the usage guide in that website. The following is the step-by-step instruction.

1) Open zadig-x.x.exe, choose **Options** -> **List All Devices.**
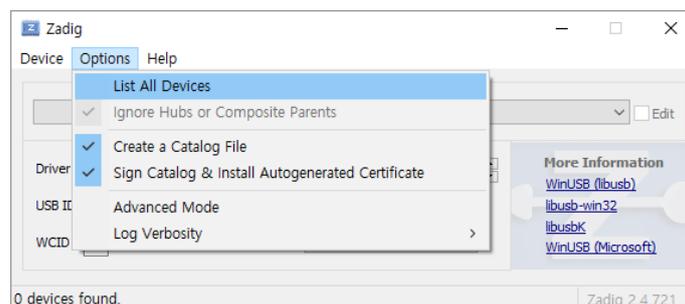
2) Choose the **USB <-> Serial Converter (Interface 0).**
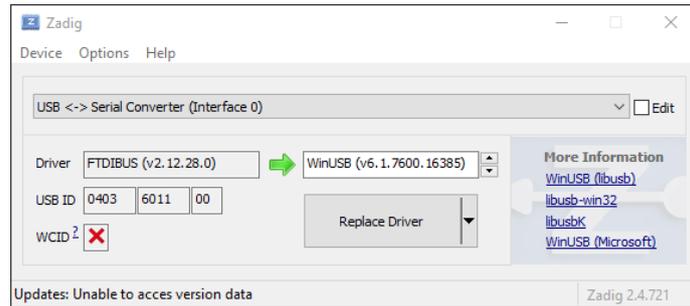
3) Click **Replace Driver** button.
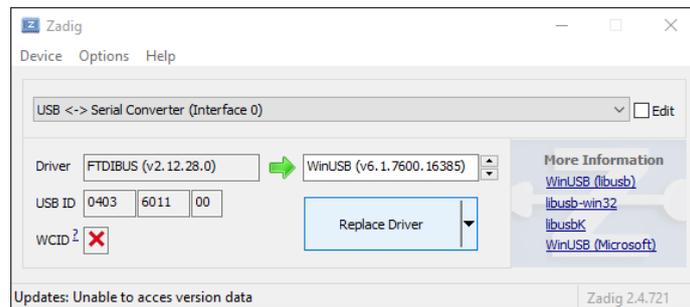
4) The **Driver Installation** dialog box will be pop-up to show the installation status.
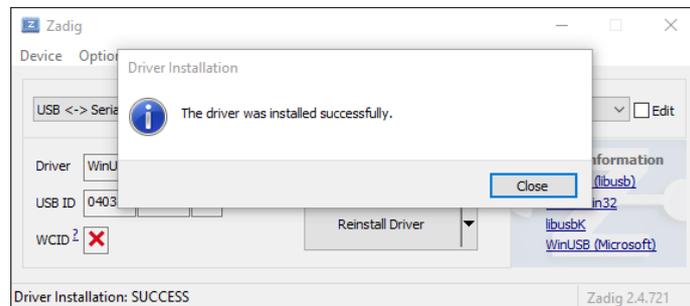
5) Open the **Device Manager** window to check if the drivers are installed properly in **Universal Serial Bus devices** category. If the connection is successful, 3 more ports are added. Among these, the port marked as USB Serial Converter C is the ISP UART, and the port marked as USB Serial Converter D is the LINUX UART. You can check port location at properties.

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3. Typical Usage

3.1. ECMT Main

This ECMT Main window allows you to set up the UART COM port and connect to the specified port to communicate with the ISP. You can also access the sub-windows below.
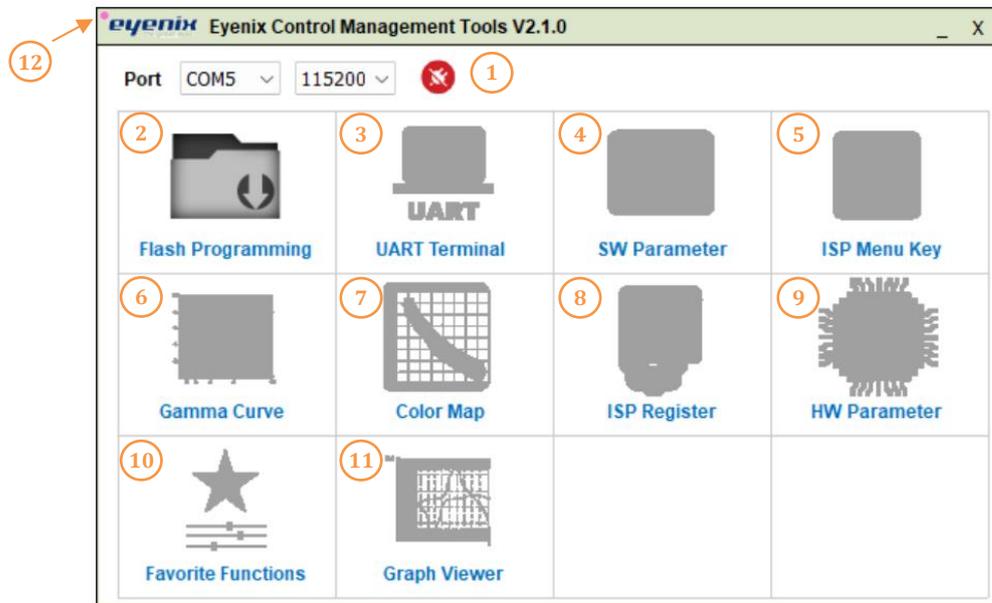

1) **COM Port Setting**: Set the COM port connected with ISP UART and specify the baud rate. Connect or disconnect to the specified COM port.
2) **Flash Programming** : Open or close the **Flash programming** window to write .bin, .gz, .img files.
3) **UART Terminal**: Open or close the **UART terminal** window to check the ISP logs.
4) **SW Parameter**: Open or close the **SW Parameter** window to control more detailed parameters.
5) **ISP Menu Key**: Open or close the **ISP Menu Key** window to control the EN675 with the OSD menu.
6) **Gamma Curve**: Open or close the **Gamma Curve** window to read or adjust gamma.
7) **Color Map**: Open or close the **Color Map** window to read or adjust color parameter of the ISP.
8) **ISP Register**: Open or close the **ISP Register** window to access the ISP registers and control the parameters.
9) **HW Parameter**: Open or close the **HW Parameter** window to load videocore_hw.par file, set some additional configuration about hardware parameters for the EN675, and save it.
10) **Favorite Functions**: Open or close the **Favorite Functions** window to control main ISP parameters(exposure, color, image quality).
11) **Graph Viewer**: Open or close the **Graph Viewer** to view the graph of specific variables frame by frame.
12) **ECMT process Indicator:** You can run up to three processes starting from V2.1.0.

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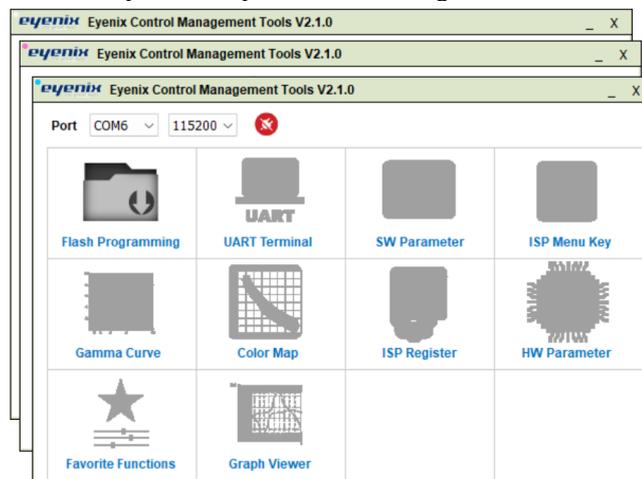
3.2. UART Connection

You'll see that the functions except the **Flash Programming** are disabled when you run ECMT because they require the UART Port. Therefore, you must first connect the UART COM port to debug and control the ISP.
Here's how to connect to UART:
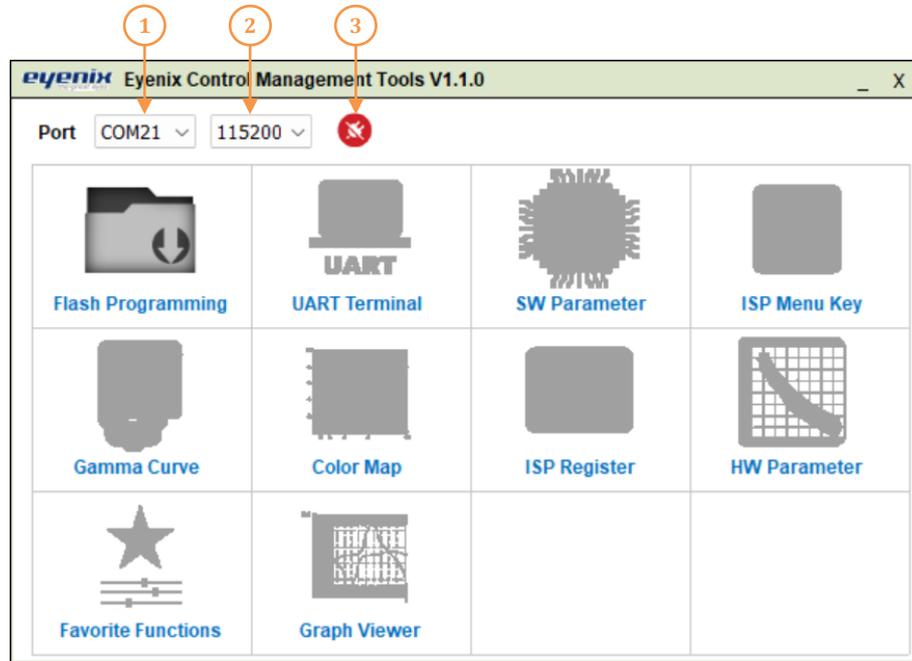
1) Select COM port that is connected to the ISP UART.
2) Choose baud rate (default: 115200).
3) Click Connection icon button. If connection is successful, the icon will turn green, and all previously sub-windows will now be enabled.

Notice :
①   Even if UART connection is successful, the **ISP Register** or other sub-modules may not work when video core isn't running. And since ECMT's **UART Terminal** is dedicated to ISP, use another terminal program to connect with the EN675 LINUX.

②   If there is no response to **ISP Menu Key** or **SW Parameter** even though UART is connected, check the Dongle connection and clicked **Board Reset** in **Flash Programming**. (Not EVK reset button, only JTAG reset)

3.3. Flash Programming

This window allows you to operate Flash memory mounted on EVK. There are three functions available: write, read, and erase, with individually user-defined partitions. All functions are interfaced with JTAG, therefore, be sure to verify the connection status before executing any function. The detailed usage is described in the following sections.

3.3.1. Flash Write

Flash Write operates in the following order: Read & Compare, Erase, Write, and Verify.
To use **Flash Write**, follow these steps:

1) Select the Flash memory chip type(NOR or NAND).
2) Click the folder icon to select image you want to write.
3) Check the select box. Multiple selections are available.
4) To write an image by dedicated address, enter the **Start Address**. The **End address** will be automatically calculated based on the volume of the image file.
5) Click the **Flash Write** button.
6) The Processing Log window displays the status of the **Flash Write** operation.
7) Click the **Board Reset** when you want to reset EN675 by JTAG.
8) Click the **Settings** menu if you want to toggle show/hide server window, change the chipset or set MAC base address.
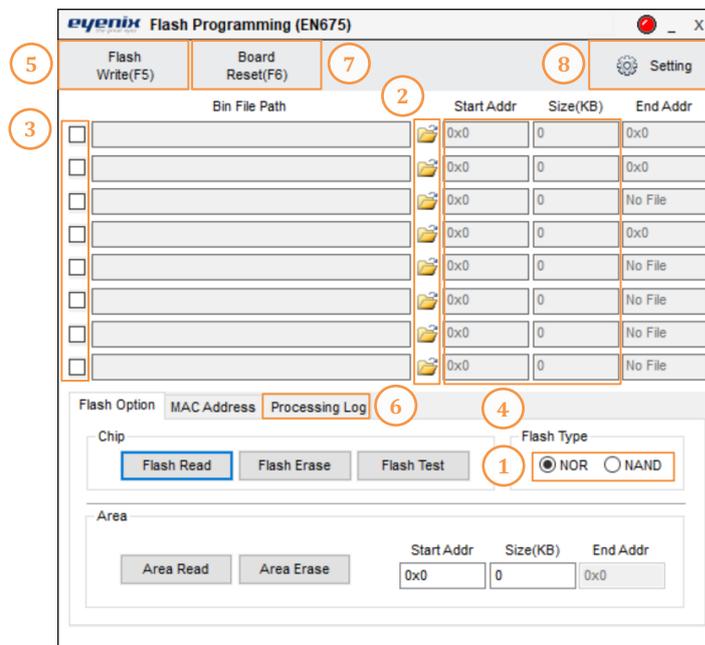
Notice : Decide the start address of the u-boot.en675.bin, kernel.en675.gz, videocore.gz, and app.img files by referring to "chapter 1 Overview" of the EN675_SDK_Start_Guide.pdf document. The default start addresses are as follows, and it may be different if the user builds with changes in (bsp)/conf/board.cfg. Also, in the case of "app.img", specially, the size must be fixed as follows to be applied properly.

Default addr	NOR	NAND
u-boot.en675.bin	0	0
kernel.en675.gz	0x80000	0x100000
videocore.gz	0x880000	0xb00000
app.img	0x990000 (size : 22976KB)	0xd20000 (size : 49152KB)

3.3.2. Flash Read

The ECMT supports **Flash Read** operations with full chip or dedicated areas. After click the each of Flash read button, user can save the content in Flash memory to binary file with specified name. User can verify the status of current operation by analyze the window of Processing Log.
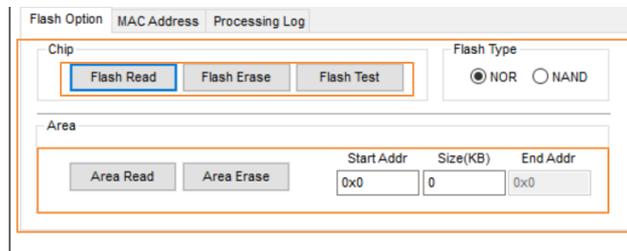
3.3.3. Flash Erase

Same as **Flash Read** operation, The ECMT also supports **Flash Erase** operation with two types, full chip or dedicated areas. These operations can be executed according to the users demand and the window of processing log will show the status of current operation.

3.3.4. Flash Test

The ECMT supports **Flash Test** operations with full chip dedicated. After click the Flash test button, user can test the Flash memory. User can verify the status of current operation by analyze the window of Processing Log.

3.3.5. MAC Address

In the **MAC Address** tab, you can read or write the MAC address.
When **Read** is executed, the data written in flash memory is read and displayed on the UI. If you execute **Write** after entering the MAC address you want to change, the specified MAC address will be written to the flash memory.
Flash Address means the address of serial flash where MAC address is stored.
The value of **Flash Address** can be changed in **Setting**, and the value may vary depending on **Flash Type** and **Chipset**.
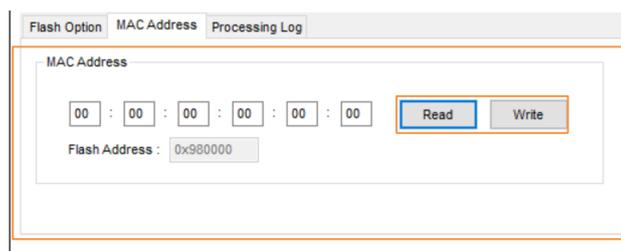
3.4. UART Terminal

This window allows you to display the log related to the UART output of only VideoCore. According to the log displayed in window, user can determine the status of the current system.

3.5. SW Parameter

This window allows you to read and write the Parameter of EN675. It operates on ISP UART so check status of UART connection. (Also check that video core is running.) In order to control the parameters, please load (bsp)/conf/videocore_sw.par file first. User can refer to description to control each parameter.

Each parameter can be controlled by VISP of API as well. Please refer to EN675_VideoCore_SW_Parameter document.
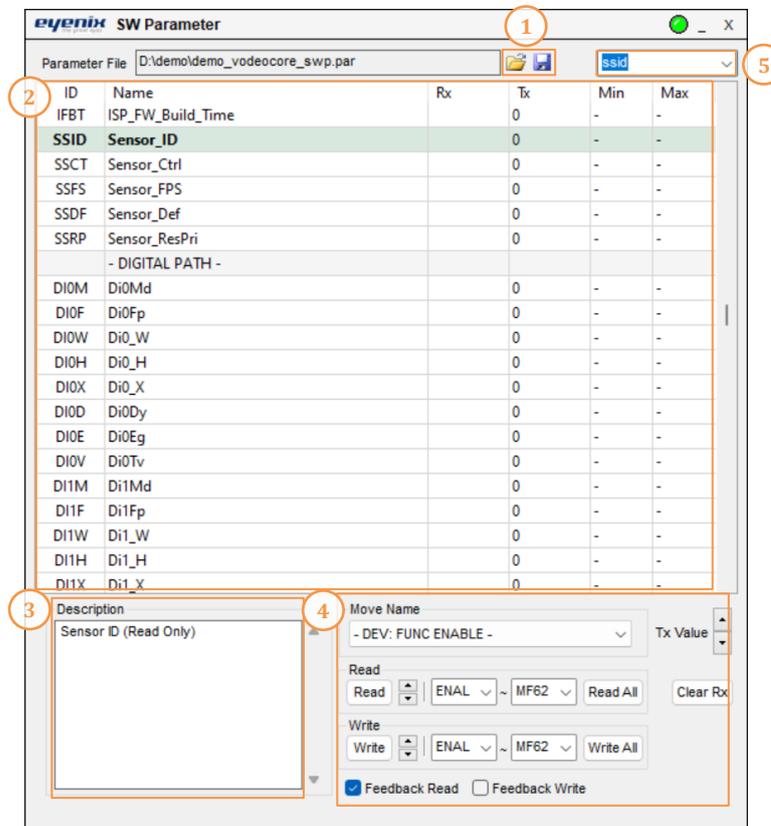
1) Load, Save videocore_sw.par file.
2) List up all SW parameters. User can transmit value by writing value in TX tap.
3) Display Descriptions. Each parameter has its own description that explains features.
4) Control parameters. Move by title name, Read/Write value by UART Transmit.
   - Feedback Read : When user read parameter, change TX value.
   - Feedback Write : When user write parameter, update RX value
5) Search parameter ID or name by combobox.

Notice:

① User can undo writing parameter by pressing Ctrl + Z keys.

② The save button only save parameter to the videocore_sw.par file, not the EN675 board. Therefore, when user resets the board, all parameter values return to their default values. To keep the parameter values even when power is off, build vidocore.gz with the modified videocore_sw.par file and download it to EN675 board.

3.6. ISP Menu Key

This window allows you to control the OSD in EN675 via UART interface. If you give the focus to ISP Menu Key window, it also operates on arrow, enter and ESC keys too.
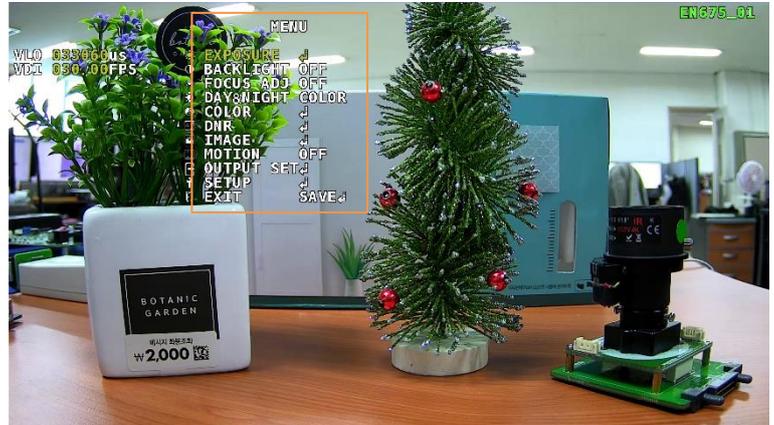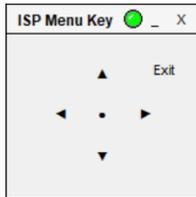
- Arrow keys : Move menu, Change value
- Enter key : Enter sub menu, Do action
- ESC key (Exit) : Exit menu

3.7. Gamma Curve

This window allows you to read and adjust the gamma curve.
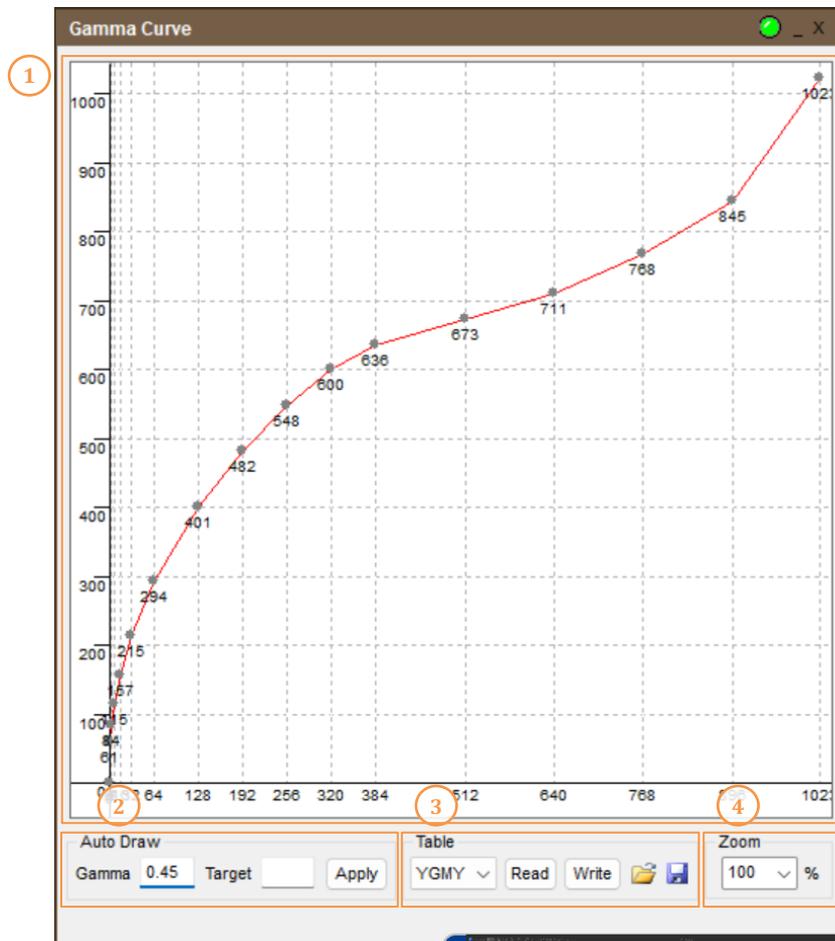
1) Graph area: Display the graph for the values from the connected board or the value in the Auto draw
2) Auto Draw: Set the values for the desired gamma, target and click the 'Apply' button to display the gamma graph in the graph area.
3) Table
   A.   Read: Read the data for the selected item(YGamma or CGamma) from the board, and display those.
   B.   Write: Write the displayed data for the selected item(YGamma or CGamma) onto the board.
   C.   Load from file: Load the data from the file.
   D.   Save to file: store the data displayed to the file.
4) Zoom: Zoom in x1, x2, x4, x6. You can also use this by a mouse wheel.

3.8. Color Map

This window allows you to see color map data from the ISP register or set the data with the desired AWB Window mode, and desired threshold value about the Y clip and slice to the ISP register.
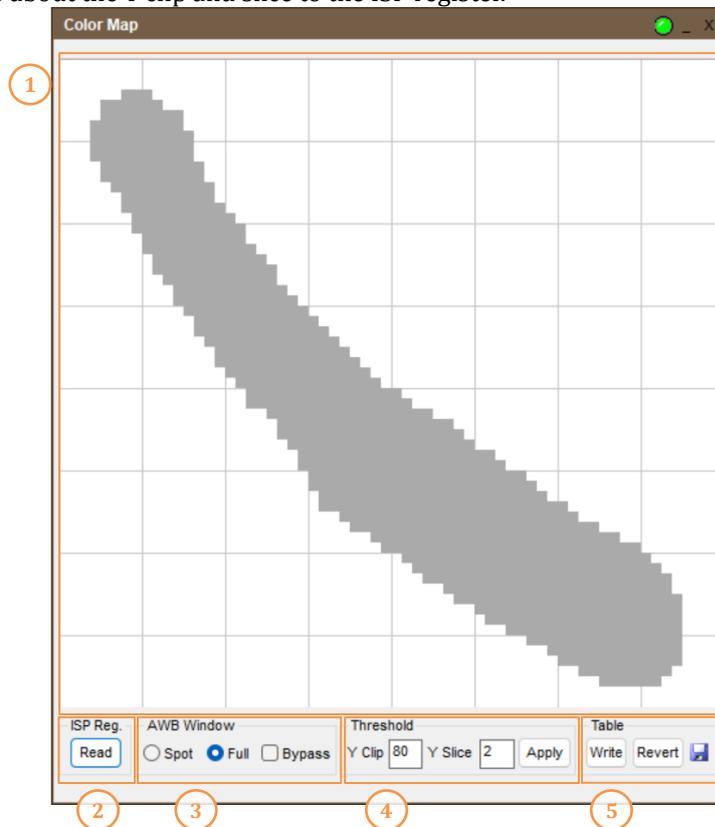
1) Display the color map.
2) ISP Reg.: Read the colormap data from the ISP register.
3) AWB(Auto White Balance) Window
    A. Spot: Set the AWB window as a spot mode
    B. Full: Set the AWB window as a full mode
    C. Bypass: Set the AWB as a bypass mode
4) Threshold
    A. Set the desired value of the Y Clip value of the AWB Window to apply.
    B. Set the desired value of the Y Slice value of the AWB Window to apply.
5) Table
    A. Write: Write the colormap data displaced to the board
    B. Revert: Revert the data that is read by the 'Read' button.
    C. Save: Save the colormap data to a file.

3.9. ISP Register

This window allows you to access the ISP registers and control the various parameters.
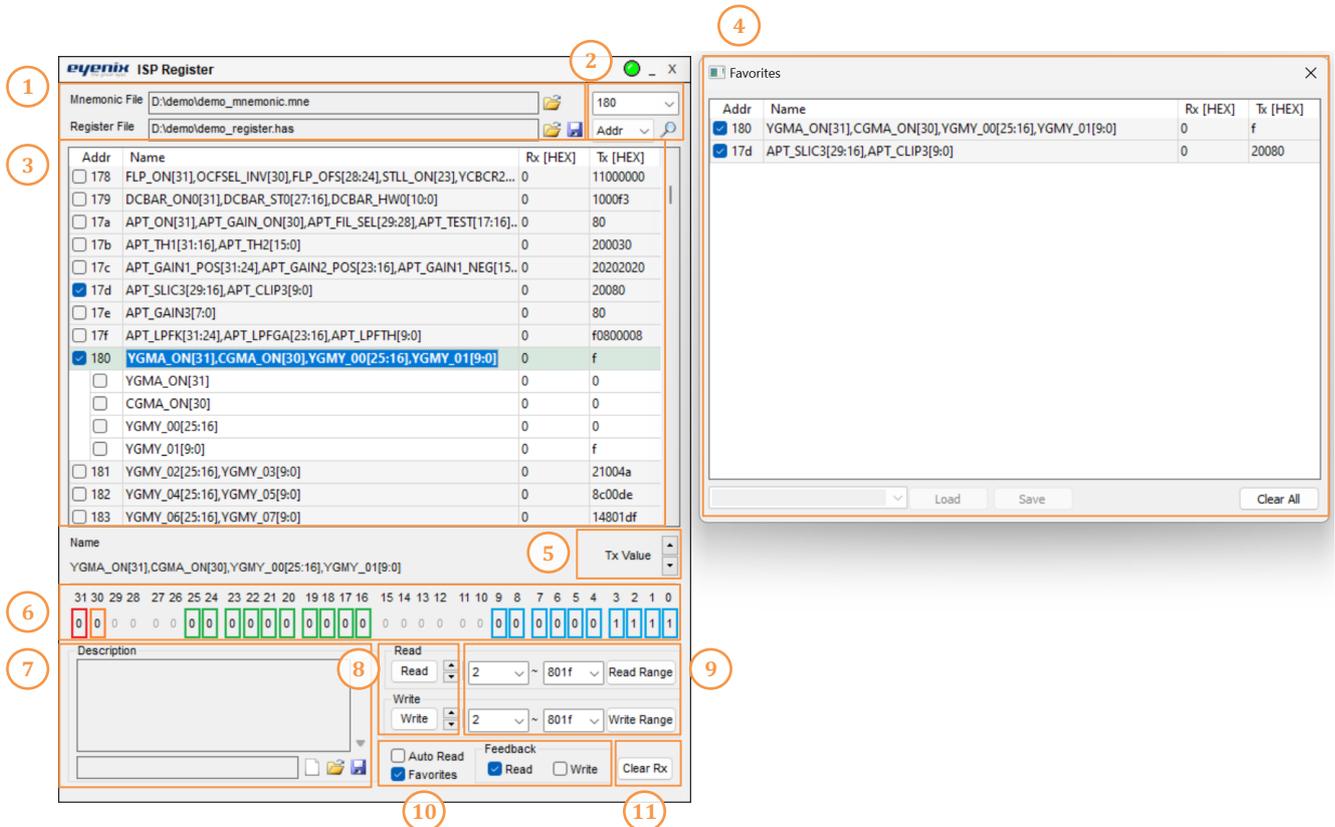
1) Load or save files
   A. Load the mnemonic file that it's stored the data about the addresses and name.
   B. Load the register file or save the data to the file.
2) Find the specified address or the name.
   You can also use it with the shortcuts below.
   A. Ctrl + A: Search by address
   B. Ctrl + N: Search by name
   C. Ctrl + F: search while toggling between address and name
3) Display the register's Rx and Tx value.
   A. You can expand the child item by double-clicking mouse.
   B. You can add the item you want in the favorite window by checking the checkbox you want.
4) You can also control register in the favorites window.
5) Increase or decrease the value of Tx by spin control.
6) View and Control the value in bits.
7) Take notes(incomplete).
8) Read or write the selected register.
9) Read or write the registers in the specified range.
10) Additional functions
    A. Auto Read: If this checkbox is checked, read the selected register automatically whenever the selected register changes.
    B. Favorites: If you check the checkbox of the register you select while this checkbox is checked, the register is added favorites window.
    C. Feedback Read: Each time the specified register(s) is read while the 'Write' checkbox is checked, the value in the Rx is copied to Tx,
    D. Feedback Write: Each time the specified register(s) is written while the 'Read' checkbox is checked, it reads the register(s) and display the value(s) in Rx.
11) Clear all the Rx values displayed.

3.10. HW Parameter

   This window allows you to set the pin MUX and generate videocore_hw.par file. This menu helps user to set ISP hardware options more easily with visible pin map. Notice that GPIO 56, 57 are fixed as Linux UART, so do not modify these with any other functions.

   User can control this menu after open (bsp)/conf/videocore_hw.par file. And, To apply the modifications, user need to save videocore_hw.par, build and download videocore.gz with "make firmware" command.
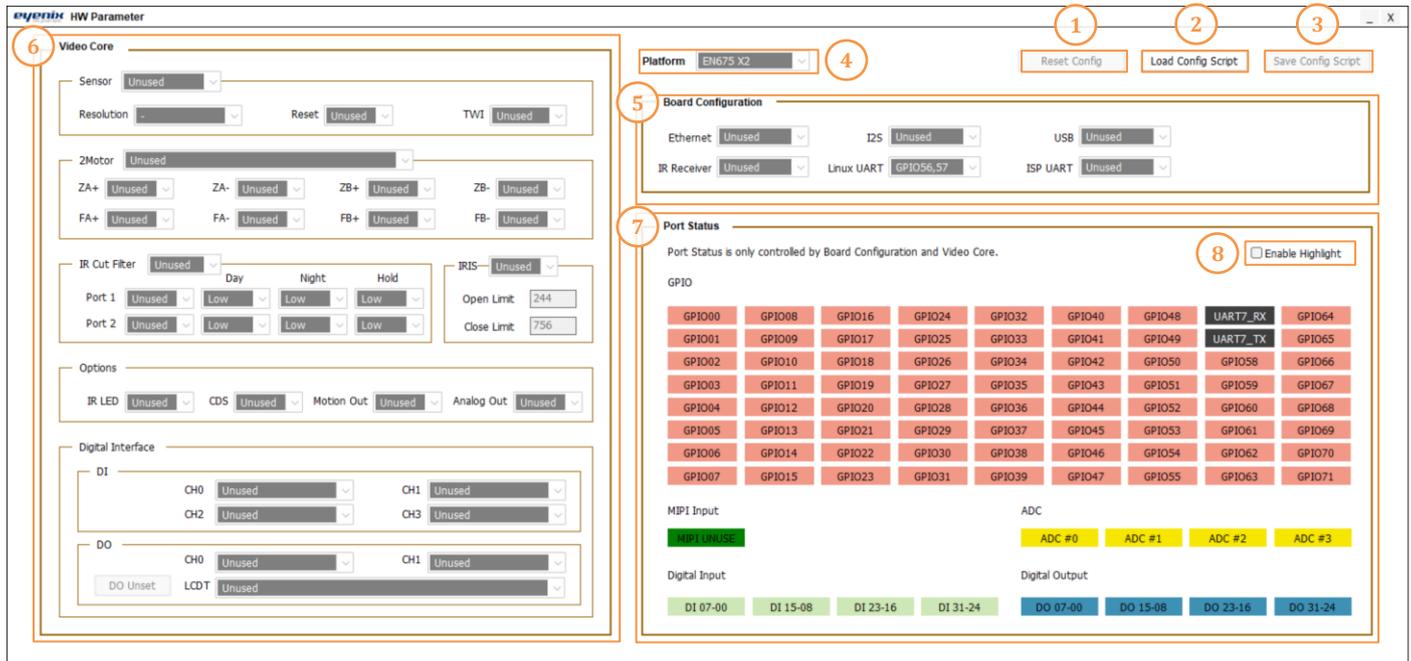
1) Reset Config : Reset all comboboxes and port status.
2) Load Config Script : Load videocore_hw.par file and apply it to the port status.
3) Save Config Script : Save port status as videocore_hw.par file.
4) Platform : Select platform which user is using. It affects the availability of input/output channels and Sensors.
5) Board Configuration : Select options and pin mux which user wants. Notice that Board Configuration options are not savable, these just verify that pin functions are not overlapped with video core functions.
6) Video Core : Select options and pin mux which user wants.
7) Port Status : Show what function is assigned to all pins. Ports which color is black mean they are already in use.
8) Enable Highlight : Highlight port which matches with focused combobox item. This feature may take some load, so user can toggle feature on/off.

Notice:

① Sensor and 2Motor is affected by videocore_hw.par file, so do not modify it.

② For more information about Digital Interface, please refer to EN675_Video_Interface.pdf.

3.11. Favorite Functions

This window allows you to easily control parameters for exposure, color, image quality of the SW parameters. Changing value here is reflected in corresponding SW Parameters.
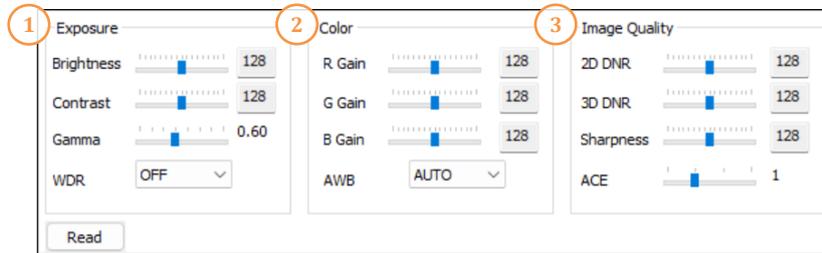
1) Exposure
   A. Adjust the brightness, contrast, gamma and WDR
   B. You can select one of the four modes(OFF, FRAME, 2P HDR and 3P HDR) for WDR.
2) Color
   A. Adjust R/G/B Gain
   B. You can select one of the four modes(AUTO, AUTOext, PRESET, MANUAL) for AWB.
3) Image Quality
   A. Adjust 2D/3D DNR, Sharpness, and ACE.
4) Read: Read the data from the register the parameters above.

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3.12. Graph Viewer

This window allows you to see how the data changes frame by frame for VideoCore variables. It is used to see the shape of the value like the IRIS function.
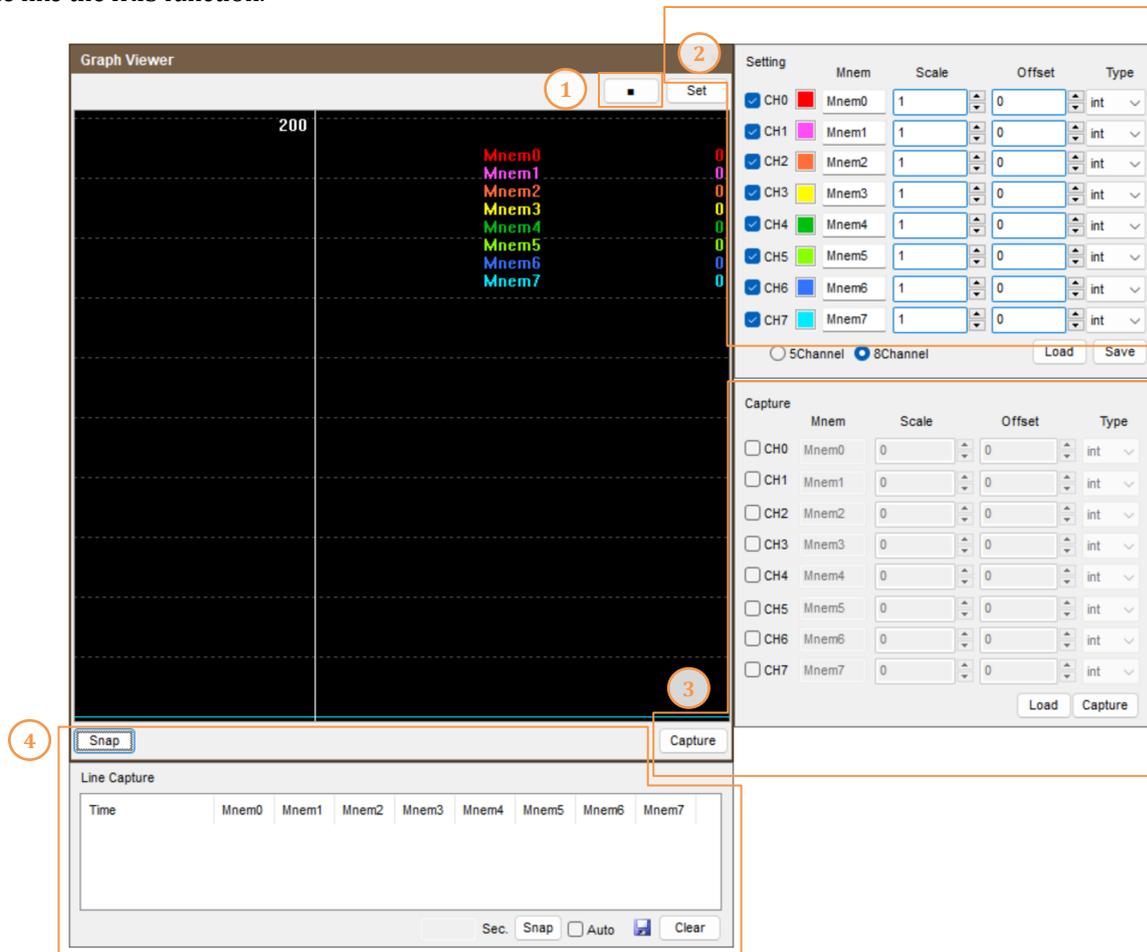
1) Stop/Start: Stop tracking or track the specified channel(s).
2) Set
    A. Channel settings. You can set the name, scale, offset, and data type of the channel(s).
    B. You can choice five or eight channels.
    C. Load the settings from the file, or save the settings to the file.
3) Capture
    A. Capture the data of the channel selected by the 'Capture' button
    B. Load the data of the channel from the file and display those.
4) Snap
    A. Get the data for the specified time of the specified channel when the 'Snap' button is clicked.
    B. Get the data of the specified channel every the time you set in seconds while the 'Auto' checkbox is checked.

Document Revision History

Version	Date	Description	Modified by
0.1	Oct. 16, 2020	Initial draft	HS. Lee
0.2	Oct. 19, 2020	The structure of document has been revised	CL Li
0.2.1	Dec. 01, 2020	Added UART Operation	HS. Lee
0.3	Dec. 30, 2020	The document is fully revised according the ECMT program	HJ Lee, CL Li
0.4	Feb. 24, 2021	Applied new GUI style	MS. Kim
1.0	Mar. 23, 2021	Added SPI NAND Download, Board Configuration, Parameter Control	MS. Kim
1.0.1	Apr. 16, 2021	Added main window guide, Modify several descriptions, Changed Board Configuration to VideoCore HW configuration	MS. Kim
1.1	Apr. 28, 2021	Updated GUI images	MS. Kim
1.2	Jun. 21, 2021	Updated GUI images, Modified some descriptions	MS. Kim
1.2.1	Jul. 22, 2021	Added notices for frequently asked questions	MS. Kim
1.2.2	Sep. 8, 2021	Changed Parameter Control to Videocore SW Parameter, VideoCore HW Configuration to Videocore HW Parameter	MS. Kim
1.2.3.	Feb. 23, 2022	Added Flash Test Function.	YJ. Lee
1.2.4.	Nov. 14, 2022	Updated GUI Image, Modify some description about 3.5 Videocore HW Parameter	NH. Kim
1.2.5	Mar. 15, 2023	Added MAC Read/Write Function.	YJ. Lee
2.0	Mar, 23, 2023	Organized the documents by updating main GUI to add some modules including ISP Register, Gamma Curve, Color Map, and Graph Viewer.	NH. Kim
2.1	Jun, 29, 2023	Added a description for Multi-ECMT(3.1).	NH. Kim