Application Note

AN_435

FT602 UVC Chip Configuration Guide

Version 1.2

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This document provides a guide on how to use the FT602 Chip Configuration Programmer application for customizing the chip configuration.

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Table of Contents

1 Introduction

This document explains how to use the FT602 Series Chip Configuration Programmer, a utility application for customizing the chip configuration.

1.1 Pre-requisite

A PC running Windows 7 Operating System or later is required.

The PC should also be installed with the Microsoft Visual C++ 2013 Redistributable (x86) package. Follow the following steps to install it:-

1. Go to https://www.microsoft.com/en-us/download/details.aspx?id=40784
2. Click **'Download'** button
3. Check the **'vcredist_x86.exe'** and click **'Next'**.
4. After download completes, run **'vcredist_x86.exe'** to install the package

Install FT602 WinUSB driver:

1. Run 'FT602WinUSBInstallation.exe'
2. Click 'Extract' button
3. Check License Agreement and click 'Next'
4. Click 'Finish' button when the driver installation is completed.

2 User Interface

Below is a screenshot of the FT602 Chip Configuration Programmer application.

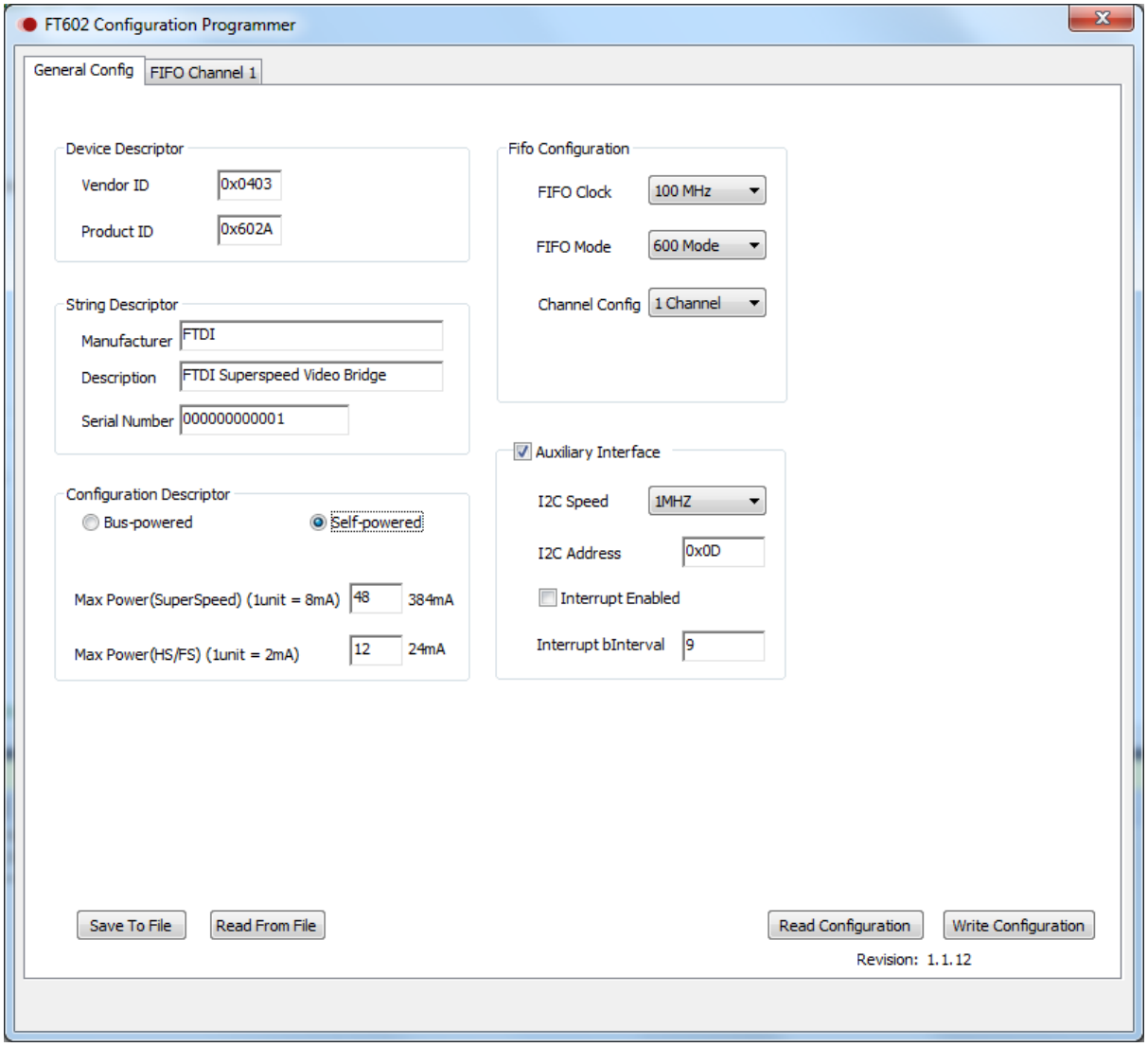

Figure 1 - Application Screenshot

The application allows the user to write and read the device configuration.

Main Buttons	Description
Write Configuration	The fields from the UI will be selected as a new configuration and written to the device.
Read Configuration	Clicking this button will show the current settings that the device is configured with.

Save To File	This option allows the user to save the configuration to a file.
Read From File.	This option allows the user to read a configuration from a file and populate the UI fields. Later if the user wishes to write this to the device, a "write configuration" can be done.

Table 1 - Main UI Controls Description

Channels pages of the FT602 Configuration Programmer application allow for setting buffer sizes and some advanced features.

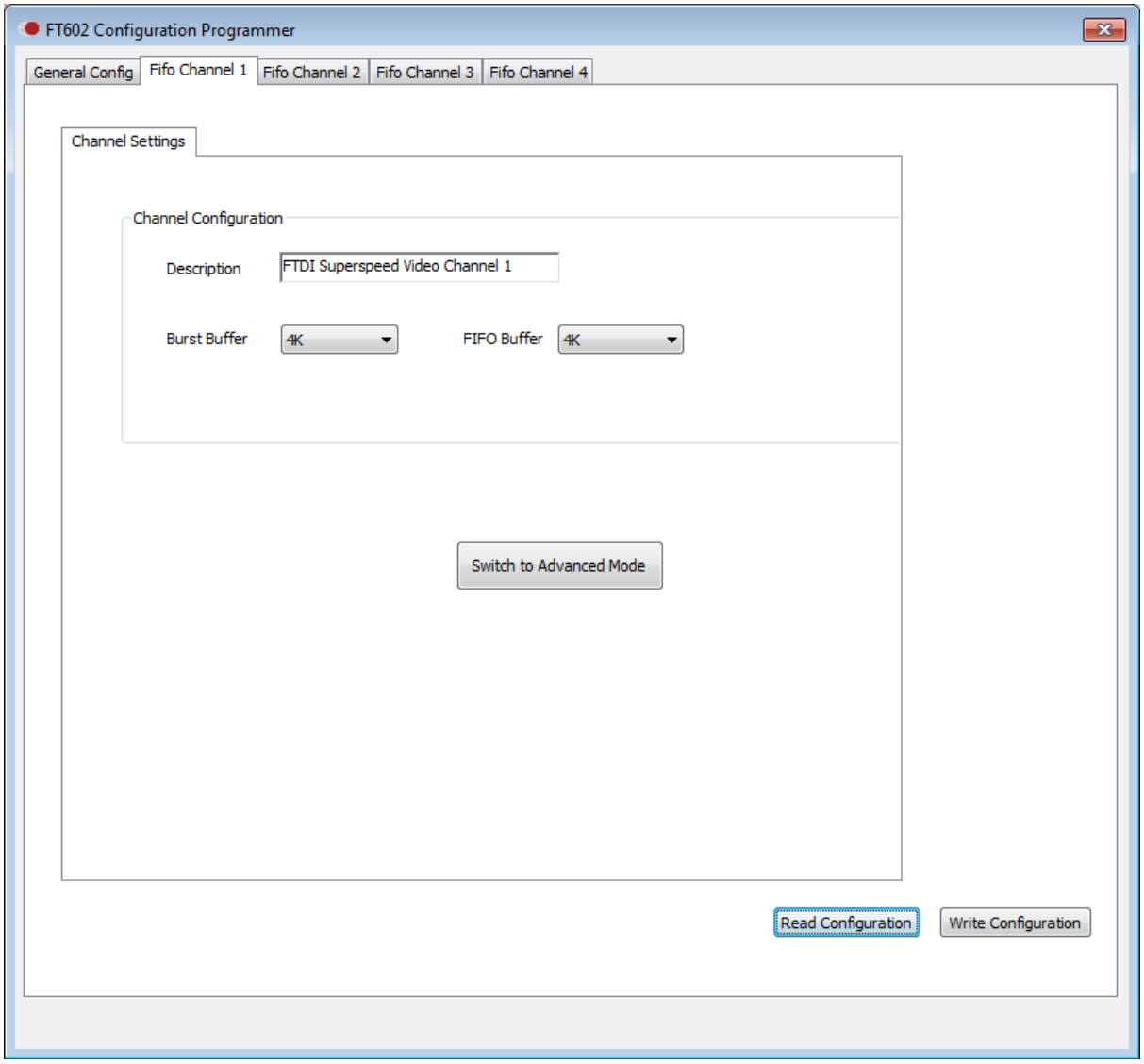

Figure 2 – Channels Page

3 Chip Configuration: Common Configuration

Controls		Default Value	Description
Vendor ID		0x0403	Vendor identification as specified in the idVendor field of the USB Device Descriptor
Product ID		0x602D	Product identification as specified in the idProduct field of the USB Device Descriptor Default is 0x602D for 4 channels. This will be changed automatically as and when the number of channels configured has been changed.
Strings	Manufacturer	FTDI	Name of Manufacturer as specified in the USB Device Descriptor
	Product Description	FTDI SuperSpeed Video Bridge	Product name as specified in the USB Device Descriptor
	Serial Number	000000000001	Serial Number as specified in the USB Device Descriptor
	Channel Description	FTDI SuperSpeed Video Channel	Each channel is a function and each function can have its own string to differentiate it from the others. This option is available in the channels page of the application.
Bus-powered/Self-powered		Self-powered	Bus-powered or self-powered capability as specified in Bit 6 of the bmAttributes field of the USB Configuration Descriptor
Remote Wakeup		Disabled	Remote wakeup capability as specified in the bmAttributes field of the USB Configuration Descriptor
Max Power (SuperSpeed)		48 (384mA)	Maximum power consumption derived from the bMaxPower field of the USB Configuration Descriptor. This value is equivalent to bMaxPower/8 if USB 3.0 and bMaxPower/2 if USB 2.0.
Max Power (HS/FS)		12 (24mA)	Maximum power consumption derived from the bMaxPower field of the USB Configuration Descriptor. This value is equivalent to bMaxPower/8 if USB 3.0 and bMaxPower/2 if USB 2.0.
FIFO Clock		100 MHz	Clock speed of the FIFO in MHz

Controls	Default Value	Description
FIFO Mode	600 Mode	Mode of the FIFO (245 mode or 600 mode) Note that theFIFO mode selected should match the protocol used by the external FIFO master. Data transfer will not work if the FIFO protocol used does not match.
Channel Configuration	4 Channels	One channel is one UVC interface. When 4 channels are selected, there will be 4 UVC interfaces.
FIFO Buffer	4K (Per Channel)	Total size of the FIFO buffer is 16K. As 4 Channels are selected in default configuration the default FIFO buffer per channel is 4K. This option is available in the channels page.
Burst Buffer	4K (Per Channel)	Max Burst is 16K. Hence the default is 4K per channel as 4 channels are selected by default. This option is available in the channels page.
I^2C Speed	1MHZ	Supports 1MHz, 400KHz and 100KHz. 1MHz is the default.
I^2C Address	0x0D	I^2C Slave address to which device sends the initialization parameters and UVC specific commands
Interrupt Enabled.	Set	Enables an interrupt. GPIO 2 is used for interrupt. This is active low. Host application running on Auxiliary interface will get a notification.
Interrupt Latency (bInterval)	9	Minimum latency is 2**(bInterval-1) USB frames. Default value of 9, will give a latency of 2**(9-1) USB frames. That is 256 frames. As 1 frame is 125us, this gives a latency of 32ms. bInterval can be modified to reduce or increase this latency. Minimum value is 1 and the max is 16.

Table 2 – User Configurable Common Configuration - Description

Note: When calculating the maximum string length of a string descriptor the following rules must be applied:

Each string descriptor requires a 2 byte header therefore of the maximum 128 bytes there is 128-6=122 bytes available.

As the data is sent in Unicode, this then divides down to 122/2=61 bytes.

Additional restrictions are also applied:

Max size for SerialNumber is 16 characters

Max size for Description is 32 characters

Max size for Manufacturer is 61-32-16=13 characters when Description and SerialNumber are maxed out.

3.1 Buffer Configuration

Whenever there is a channel configuration change, or FIFO buffer or burst buffer selection change, another configuration pop up will be shown so that buffers for all the channels can be configured at once.

Note: Whenever there is a change in buffer size, the total buffer size must be 16K. Otherwise the tool won't let the user program the configuration changes.

The picture below shows a configuration for two channels.

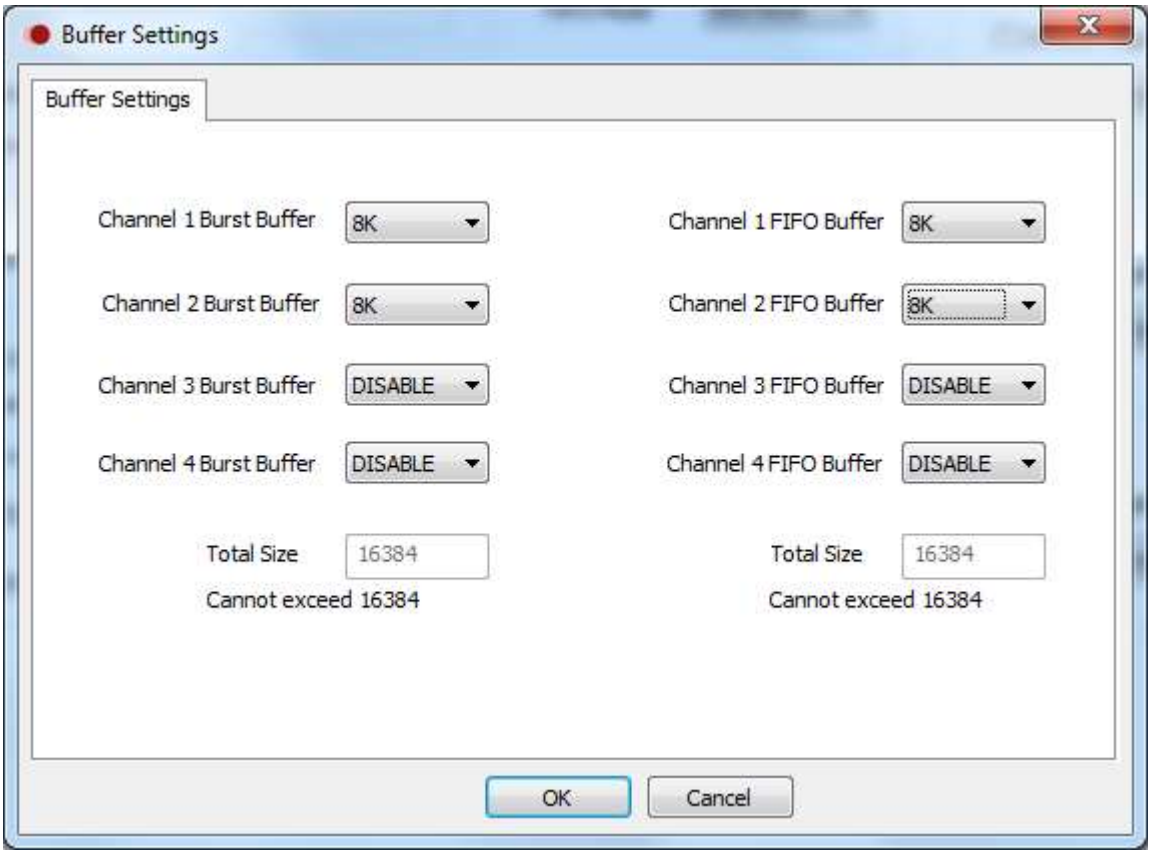

Figure 3 –Buffer Management

4 Advance configuration Settings

There are some advance settings available for expert users to configure the UVC terminal and processing controls.

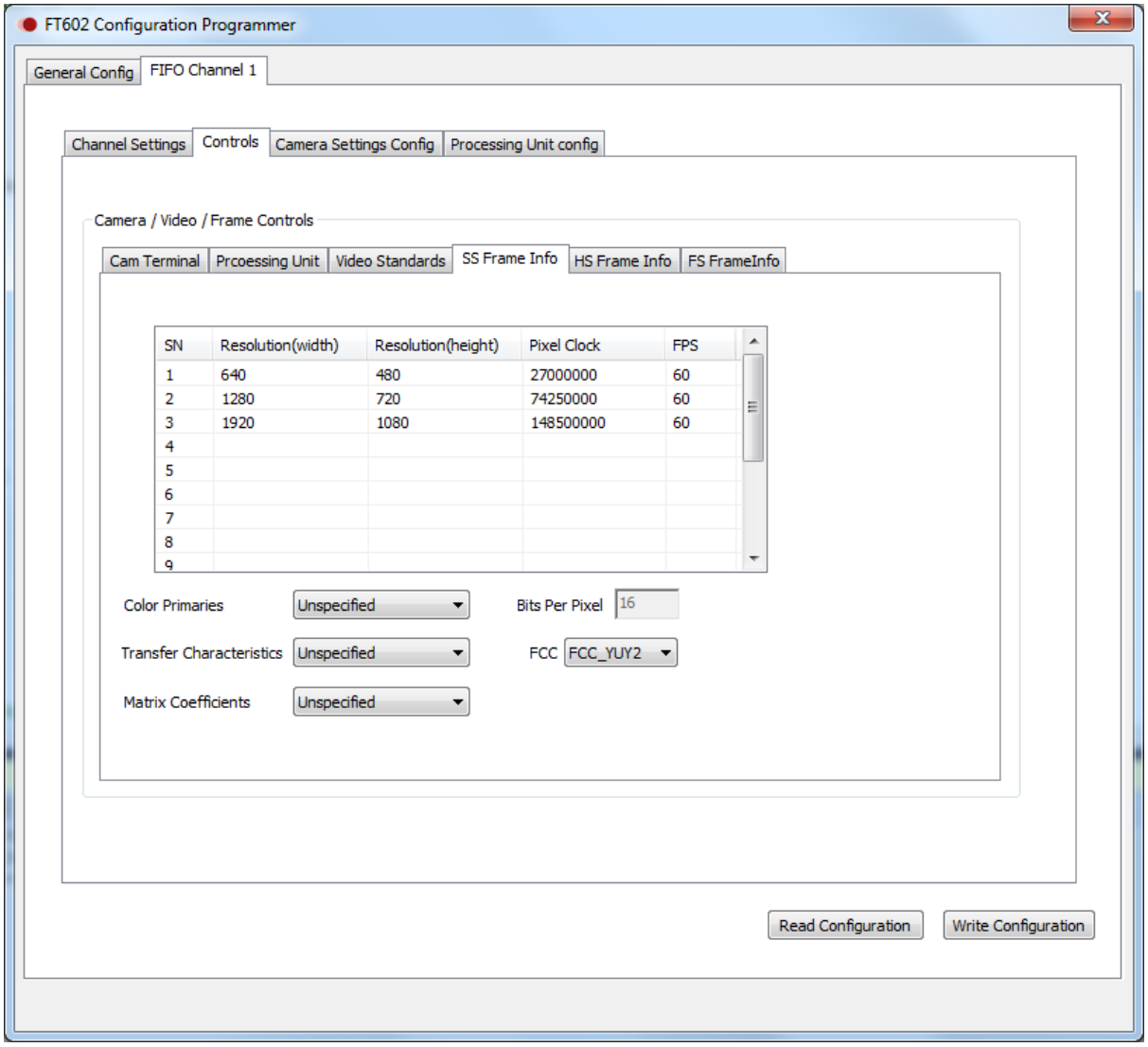

Figure 4 –Advanced UVC Settings

Controls	type	Description
Camera Terminal Controls	Bitmap	Refer to the USB Video Class 1.1 specification, section **3.7.2.3 Camera Terminal Descriptor** for more details. This bitmap is used to enable or disable certain controls for the camera. When one of the read or write option is set, it indicates that the mentioned Control is supported for the video stream. When the 'Read' option is set, then all the GET control commands mentioned in the section **4.2.2** of the specification is supported. Similarly when the 'Write' option is set, SET command is supported. Following controls are available for user configuration. ○ Auto-Exposure Mode ○ Auto-Exposure Priority ○ Exposure Time (Absolute) ○ Exposure Time (Relative) ○ Focus (Absolute) ○ Focus (Relative) ○ Iris (Absolute) ○ Iris (Relative) ○ Zoom (Absolute) ○ Zoom (Relative) ○ PanTilt (Absolute) ○ PanTilt (Relative) ○ Roll (Absolute) ○ Roll (Relative) ○ Focus, Auto
Processing Unit Controls	Bitmap (bmControls)	Refer to the USB Video Class 1.1 specification, section 3.7.2.5 Processing Unit Descriptor for more details. This indicates the availability of certain processing Controls for the video stream. When any of the read or write option is set, it indicates that the mentioned Control is supported for the video stream. When the 'Read' option is set, then all the GET control commands mentioned in the section **4.2.2** of the specification is supported. Similarly when the 'Write' option is set, SET command is supported. Following controls are available for user configuration. ○ Brightness ○ Contrast

Controls	type	Description
		○ Hue ○ Saturation ○ Sharpness ○ Gamma ○ White Balance Temperature ○ White Balance Component ○ Backlight Compensation ○ Gain ○ Power Line Frequency ○ Hue, Auto ○ White Balance Temperature, Auto ○ White Balance Component, Auto ○ Digital Multiplier ○ Digital Multiplier Limit ○ Analog Video Standard
	Bitmap (bmVideoStandards)	A bitmap of all analog video standards supported by the Processing Unit. A value of zero indicates that this bitmap should be ignored. Following options are available for user configuration. ○ None ○ NTSC – 525/60 ○ PAL – 625/50 ○ SECAM – 625/50 ○ NTSC – 625/50 ○ PAL – 525/60
Frame Info	Resolution	Width * Height in pixels.
	Frame Interval	This value indicates the number of frames per second. For example, for a 60fps, the value should be 60.
	Color Primaries	This defines the color primaries and the reference white. Following options are available to choose. 0: Unspecified (Image characteristics unknown) 1: BT.709, sRGB (default) 2: BT.470-2 (M) 3: BT.470-2 (B, G) 4: SMPTE 170M 5: SMPTE 240M Please refer to 3.9.2.6 Color Matching Descriptor of UVC specification 1.1.

Controls	type	Description
	Transfer Characteristics	This field defines the optoelectronic transfer characteristic of the source picture also called the gamma function. Following options are available for selection. 0: Unspecified (Image characteristics unknown) 1: BT.709 (default) 2: BT.470-2 M 3: BT.470-2 B, G 4: SMPTE 170M 5: SMPTE 240M 6: Linear (V = Lc) 7: sRGB (very similar to BT.709) Refer to 3.9.2.6 Color Matching Descriptor of UVC specification 1.1.
	Matrix Coefficients	Matrix used to compute luma and chroma values from the color primaries. 0: Unspecified (Image characteristics unknown) 1: BT. 709 2: FCC 3: BT.470-2 B, G 4: SMPTE 170M (BT.601, default) 5: SMPTE 240M Refer to 3.9.2.6 Color Matching Descriptor of UVC specification 1.1.
	FCC (Four Character Code).	It's a sequence of 4 bytes used to uniquely identify data formats. Please visit http://www.fourcc.org/ for more information. Following option formats are available. ○ YUY2 ○ YUYV ○ Y41P ○ YUVP ○ YUV4 ○ IYU2 ○ AYUV ○ NV12 ○ NV16

Controls	type	Description
		○ NV24 ○ YV12 ○ GREY ○ Y16 ○ RGBP ○ RGB3 ○ RGB4 ○ BA24 ○ BY8 ○ BYR2
	Bits Per Pixel (Read only)	This is read only. And gets generated based on the FCC selected.

Table 3 – Camera Terminal, Processing Unit & Frame Information

4.1 Camera Terminal Controls

A separate tab named "*Camera Setting config*" is provided in the tool in the channels page .This allows the user to define the default values, steps (Resolution), min and max values of each control.

Refer to the section 4.2.2.1 Camera Terminal Control Requests of UVC specification 1.1.

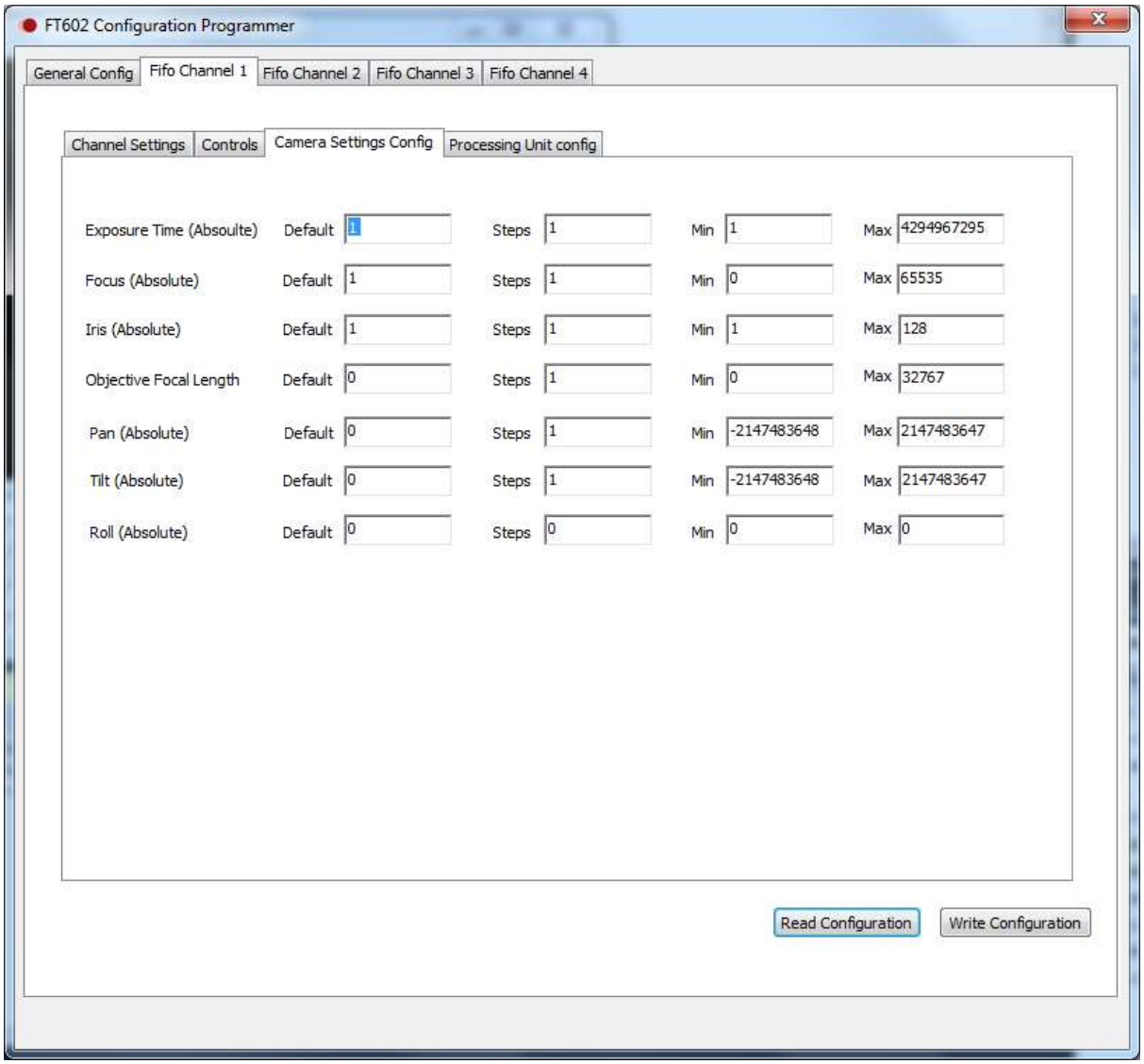

Figure 5 –Camera Terminal Configurable Options

The table below shows each configurable control where the user is allowed to define the values.

Controls	Description
Exposure Time (Absolute)	Refer to Section 4.2.2.1.4 Exposure Time (Absolute) Control of UVC 1.1 for more information. The Exposure Time (Absolute) Control is used to specify the length of exposure. This value is expressed in 100µs units, where 1 is 1/10,000th of a second, 10,000 is 1 second, and 100,000 are 10 seconds. A value of zero (0) is undefined. Note that the manual exposure control is further limited by the frame interval, which always has higher precedence. If the frame interval is changed to a value below the current value of the Exposure Control, the Exposure Control value will automatically be changed. The default Exposure Control value will be the current frame interval until an explicit exposure value is chosen The setting for the attribute of the addressed Exposure Time (Absolute) Control: 0: Reserved 1: 0.0001 sec … 100000: 10 sec …
Focus (Absolute)	Refer to section 4.2.2.1.6 Focus (Absolute) Control of UVC 1.1 for more information. The Focus (Absolute) Control is used to specify the distance to the optimally focused target. This value is expressed in millimeters. The default value is implementation-specific.
Iris (Absolute)	Refer to section 4.2.2.1.9 Iris (Absolute) Control of UVC 1.1 The Iris (Absolute) Control is used to specify the camera's aperture setting. This value is expressed in units of f_{stop}* 100. The default value is implementation-specific.
Objective Focal Length / Zoom (Absolute)	Refer to the section 4.2.2.1.11 Zoom (Absolute) Control of UVC 1.1 The Zoom (Absolute) Control is used to specify or determine the Objective lens focal length. This control is used in combination with the wObjectiveFocalLengthMin and wObjectiveFocalLengthMax fields in the Camera Terminal descriptor to describe and control the Objective lens focal length of the device (see section 2.4.2.5.1 "Optical Zoom").The MIN and MAX values are sufficient to imply the resolution, so the RES(steps) value must always be 1. The MIN, MAX and default values are implementation dependent.

Controls	Description
Pan (Absolute)	Refer to section 4.2.2.1.13 PanTilt (Absolute) Control of UVC 1.1 The dwPanAbsolute is used to specify the pan setting in arc second units. 1 arc second is 1/3600 of a degree. Values range from –180*3600 arc second to +180*3600 arc second, or a subset thereof, with the default set to zero. Positive values are clockwise from the origin (the camera rotates clockwise when viewed from above), and negative values are counterclockwise from the origin.
Tilt (Absolute)	Refer to section 4.2.2.1.13 PanTilt (Absolute) Control of UVC 1.1 for more information. The dwTiltAbsolute Control is used to specify the tilt setting in arc second units. 1 arc second is 1/3600 of a degree. Values range from –180*3600 arc second to +180*3600 arc second, or a subset thereof, with the default set to zero. Positive values point the imaging plane up, and negative values point the imaging plane down
Roll (Absolute)	Refer to section 4.2.2.1.15 Roll (Absolute) Control of UVC 1.1 for more information. The Roll (Absolute) Control is used to specify the roll setting in degrees. Values range from – 180 to +180, or a subset thereof, with the default being set to zero. Positive values cause a clockwise rotation of the camera along the image viewing axis, and negative values cause a counterclockwise rotation of the camera.

Table 4 – Camera Terminal Control Options

4.2 Processing Unit Control

A separate tab named "*Processing Unit config*" is provided in the tool in the channels page. This allows the user to define the default values, steps (Resolution), min and max values of each control.

Refer to section 4.2.2.3 Processing Unit Control Requests of the UVC specification 1.1.

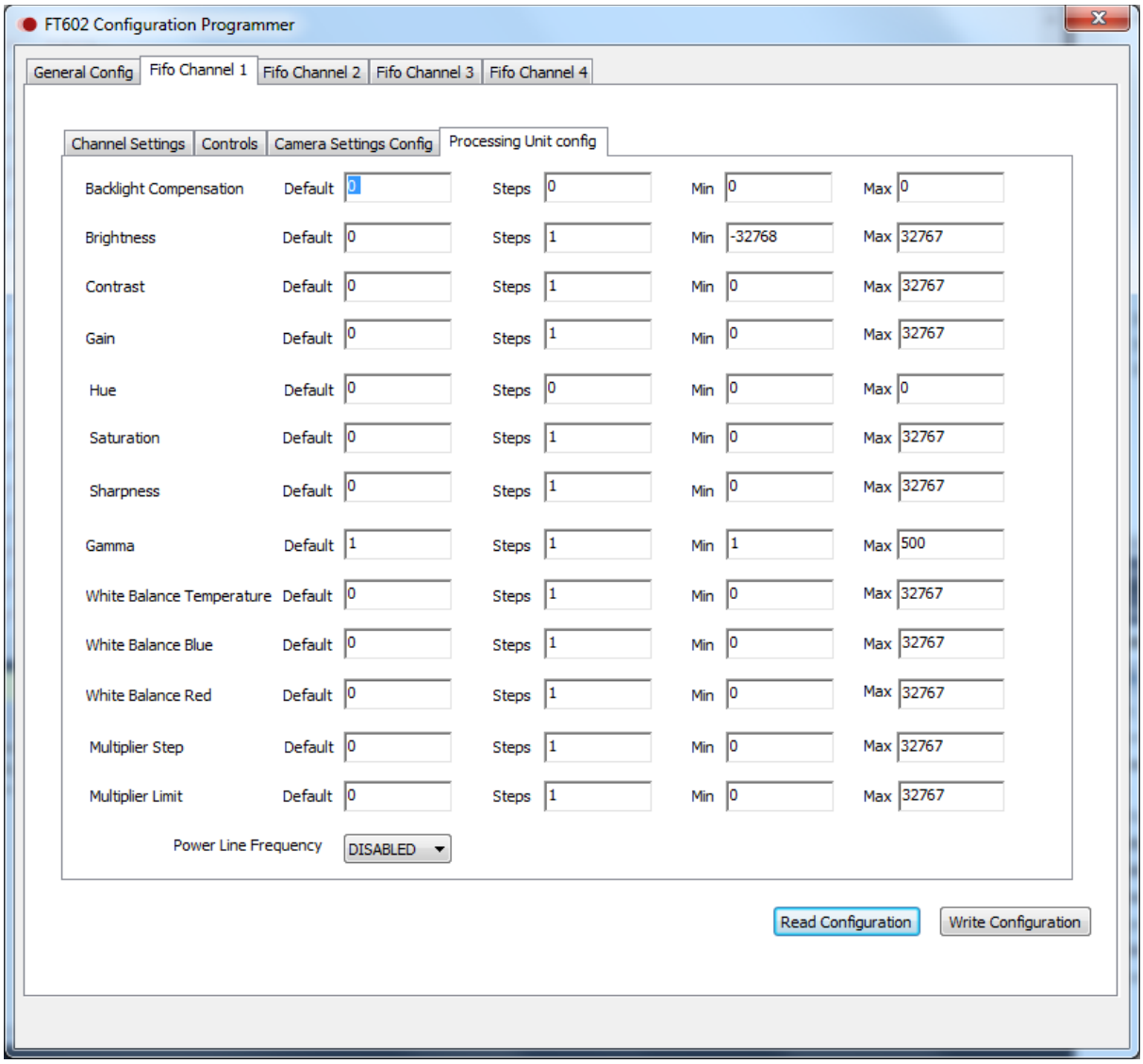

Figure 6 –Processing Unit Control Options

The following table presents a detailed description of all possible Controls a Processing Unit can incorporate. For each Control, the layout of the parameter block together with the appropriate Control Selector is listed for all forms of the Get/Set Processing Unit Control request. All values are interpreted as unsigned unless otherwise specified.

Controls	Description
Backlight compensation	Refer to section 4.2.2.3.1 Backlight Compensation Control of the UVC spec 1.1 for more information. The Backlight Compensation Control is used to specify the backlight compensation. A value of zero indicates that the backlight compensation is disabled. A non-zero value indicates that the backlight compensation is enabled. The device may support a range of values, or simply a binary switch. If a range is supported, a low number indicates the least amount of backlight compensation. The default value is implementation-specific, but enabling backlight compensation is recommended.
Brightness	Refer to section 4.2.2.3.2 Brightness Control of the UVC spec 1.1 for more information. This is used to specify the brightness. This is a relative value where increasing values indicate increasing brightness. The MIN and MAX values are sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation dependent.
Contrast	Refer to section 4.2.2.3.3 Contrast Control of the UVC spec 1.1 for more information. This is used to specify the contrast value. This is a relative value where increasing values indicate increasing contrast. The MIN and MAX values are sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation dependent.
Gain	Refer to section 4.2.2.3.4 Gain Control of the UVC spec 1.1 for more information. This is used to specify the gain setting. This is a relative value where increasing values indicate increasing gain. The MIN and MAX values are sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation dependent.
Hue	Refer to section 4.2.2.3.6 Hue Control of the UVC spec 1.1 for more information. This is used to specify the hue setting. The value of the hue setting is expressed in degrees multiplied by 100. The required range must be a subset of -18000 to 18000 (-180 to +180 degrees). The default value must be zero.
Saturation	Refer to section 4.2.2.3.8 Saturation Control of the UVC spec 1.1 for more information. This is used to specify the saturation setting. This is a relative value where increasing values indicate increasing saturation. A Saturation value of 0 indicates grayscale. The MIN and MAX values are

Controls	Description
	sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation-dependent
Sharpness	Refer to section 4.2.2.3.9 Sharpness Control of the UVC spec 1.1 for more information. This is used to specify the sharpness setting. This is a relative value where increasing values indicate increasing sharpness, and the MIN value always implies "no sharpness processing", where the device will not process the video image to sharpen edges. The MIN and MAX values are sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation-dependent
Gamma	Refer to section 4.2.2.3.10 Gamma Control of the UVC spec 1.1 for more information. This is used to specify the gamma setting. The value of the gamma setting is expressed in gamma multiplied by 100. The required range must be a subset of 1 to 500, and the default values are typically 100 (gamma = 1) or 220 (gamma = 2.2).
White Balance Temperature	Refer to the section 4.2.2.3.11 White Balance Temperature Control of the UVC spec 1.1 for more information. This is used to specify the white balance setting as a color temperature in degrees Kelvin. This is offered as an alternative to the White Balance Component control. Minimum range should be 2800 (incandescent) to 6500 (daylight) for webcams and dual-mode cameras. The supported range and default value for white balance temperature is implementation-dependent.
White Balance Blue	Refer to section 4.2.2.3.13 White Balance Component Control of the UVC spec 1.1 for more information. The setting for the blue component of the addressed White Balance Component control.
White Balance Red	Refer to section 4.2.2.3.13 White Balance Component Control of the UVC spec 1.1 for more information. The setting for the red component of the addressed White Balance Component control.

Controls	Description
Digital Multiplier Step	Refer to section 4.2.2.3.15 Digital Multiplier Control of the UVC spec 1.1 for more information. This is used to specify the amount of Digital Zoom applied to the optical image. This is the position within the range of possible values of multiplier m, allowing the multiplier resolution to be described by the device implementation. The MIN and MAX values are sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation dependent. If the Digital Multiplier Limit Control is supported, the MIN and MAX values shall match the MIN and MAX values of the Digital Multiplier Control.
Digital Multiplier Limit	Refer to section 4.2.2.3.16 Digital Multiplier Limit Control of the UVC spec 1.1 for more information. This is used to specify an upper limit for the amount of Digital Zoom applied to the optical image. This is the maximum position within the range of possible values of multiplier m. The MIN and MAX values are sufficient to imply the resolution, so the RES value must always be 1. The MIN, MAX and default values are implementation dependent. A value specifying the upper bound for Z'cur (see section 2.4.2.5.2 "Digital Zoom" of UVC spec 1.1.)
Power Line Frequency	Refer to the section 4.2.2.3.5 Power Line Frequency Control of the UVC spec 1.1 for more information. This control allows the host software to specify the local power line frequency, in order for the device to properly implement anti-flicker processing, if supported. The default is implementation-specific. The setting for the attribute of the addressed Power Line Frequency control: 0: Disabled 1: 50 Hz 2: 60 Hz

Table 5 – Processing Control & Description

4.3 Enabling UVC Controls

The camera and processing unit controls which were discussed above, are by default disabled. To get or set a value for a control using video capture applications such as amCap, read and write options for that control shall first be enabled.

An example picture is as shown below. Read and write options have to be selected (tick-ed) to enable the corresponding control.

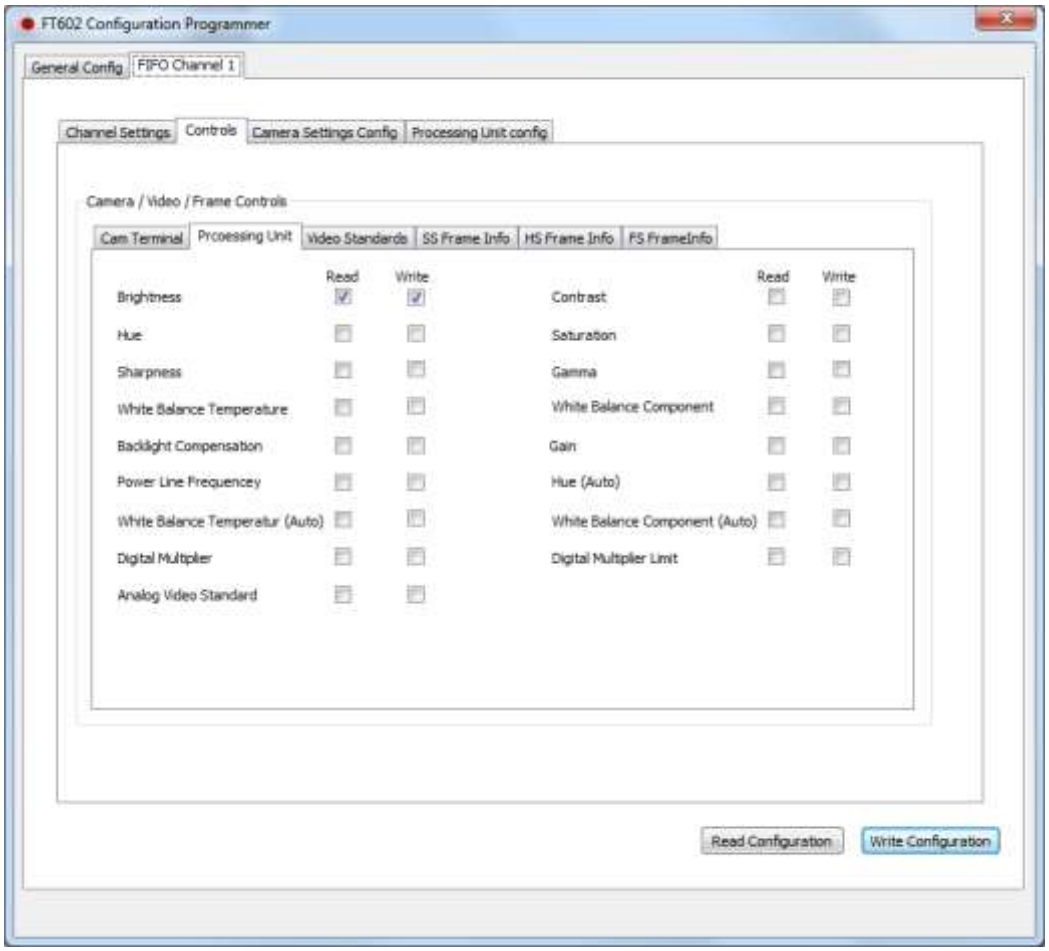

Figure 7 Processing Unit Control

4.4 UVC Control in Video Capture applications

Once the read and write permissions are set in the configuration, video capture applications can change the values of these controls. A sample picture from amCap application is shown below.

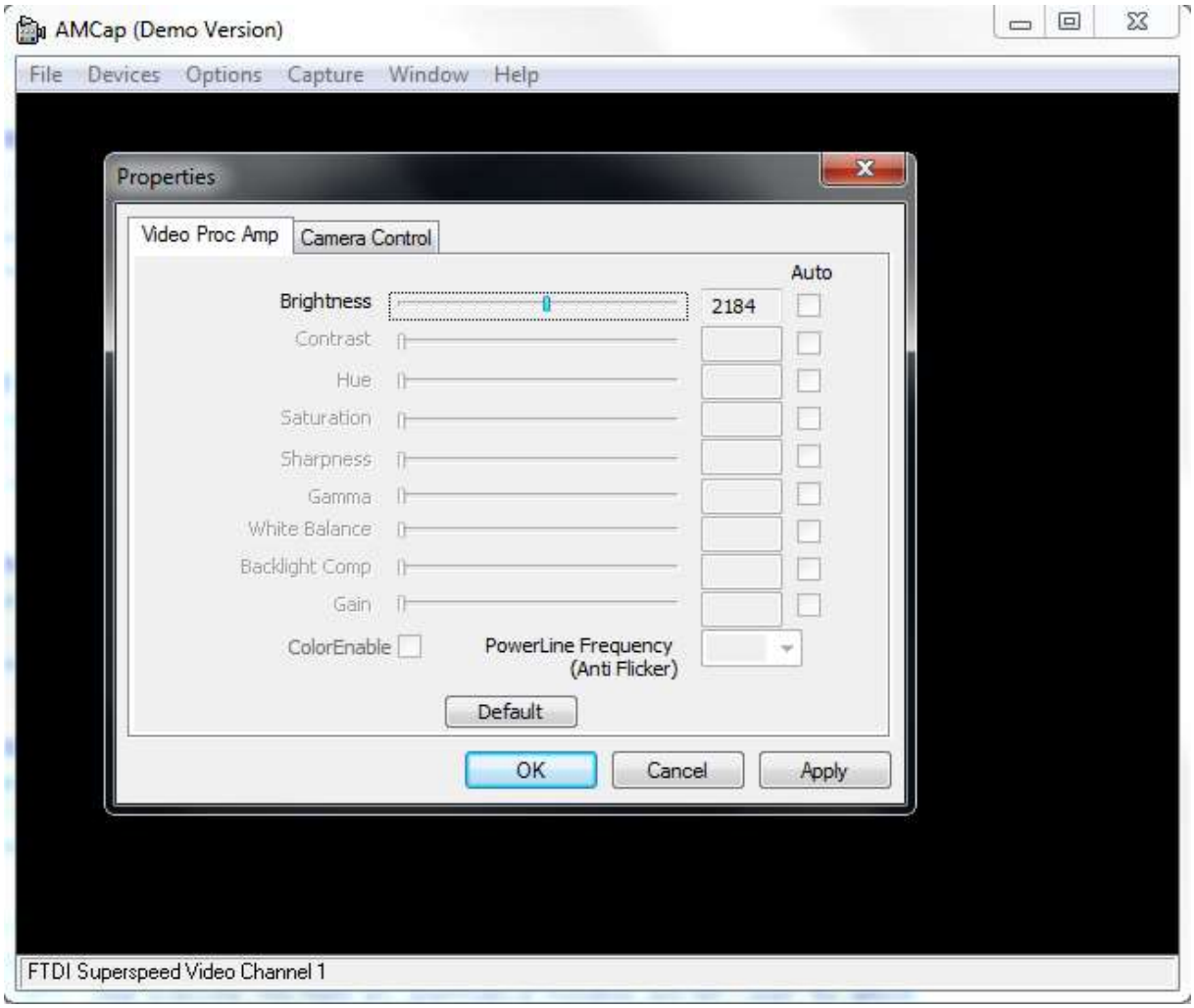

Figure 8 Application adjusting a UVC control

5 Auxiliary Interface

The FT602 Chip Configuration Programmer application uses the auxiliary interface to communicate with the device. There is an auxiliary interface in addition to the UVC interface, as seen in the picture below.

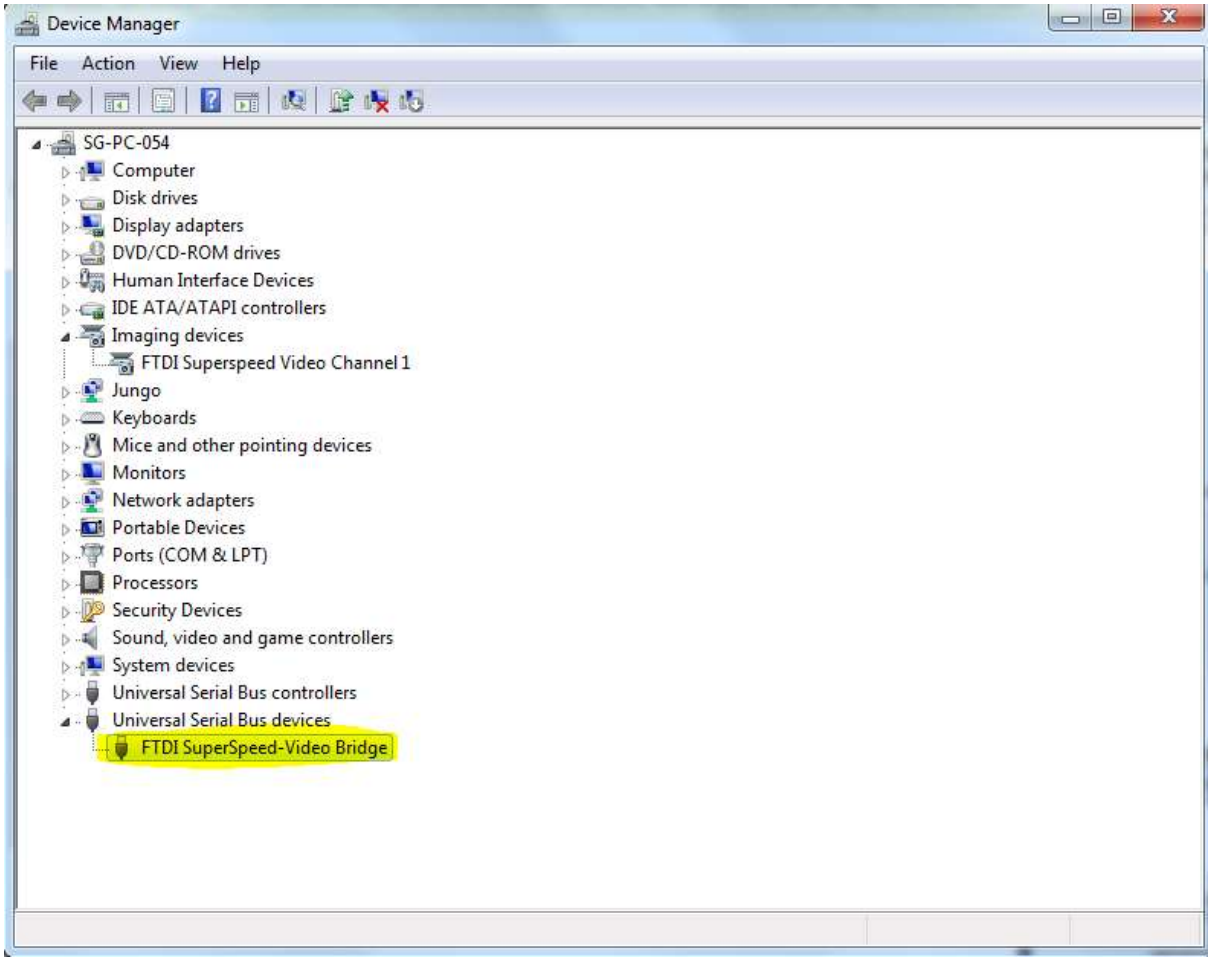

Figure 9 Auxiliary interface highlighted

When this auxiliary interface is enumerated, in most of the cases, Windows is able to successfully install the WinUSB drivers. However, depending on certain versions of the Windows operating system, drivers for this interface may not load or install successfully. In such cases, configuration programmer cannot run as it fails to identify the interface and WinUSB installation has to be performed manually

Follow the below steps to install WinUSB driver.

1. Double click FT602WinUSBInstallation.exe.
2. Click on the 'extract' button to unpack the installer.

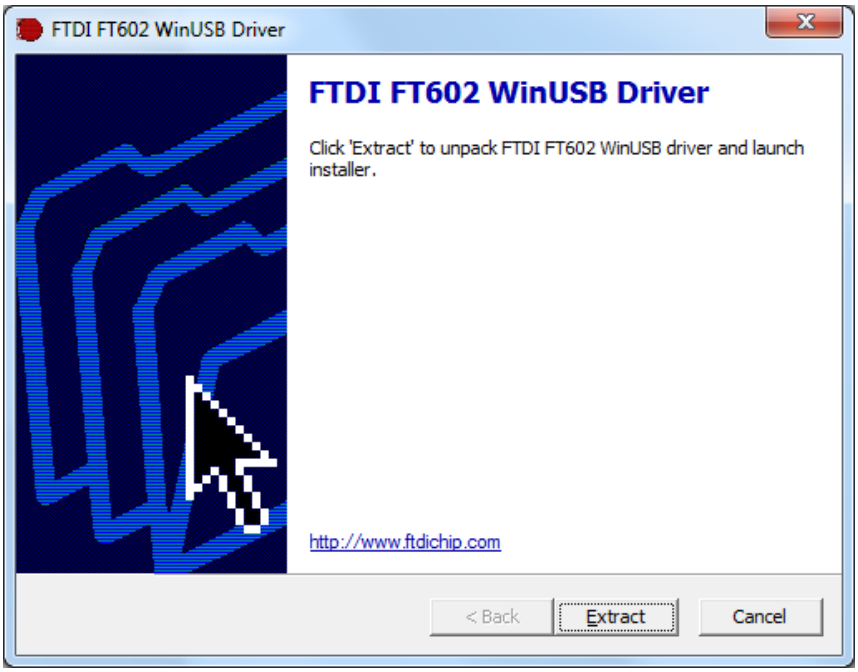

Figure 10 WinUSB Setup Procedure

3. Click Next.

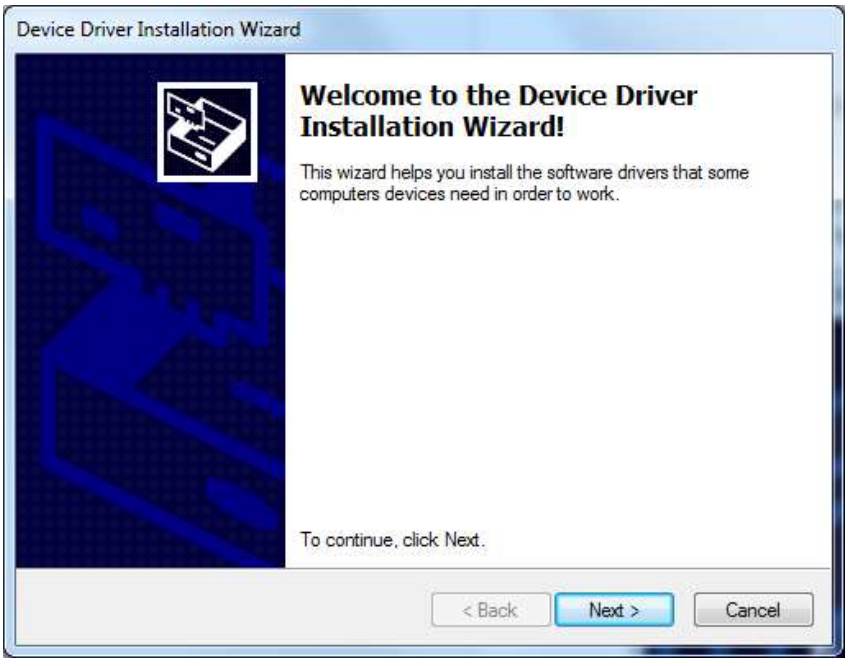

Figure 11 WinUSB Setup Procedure

4. Select 'I accept this agreement' and click Next.

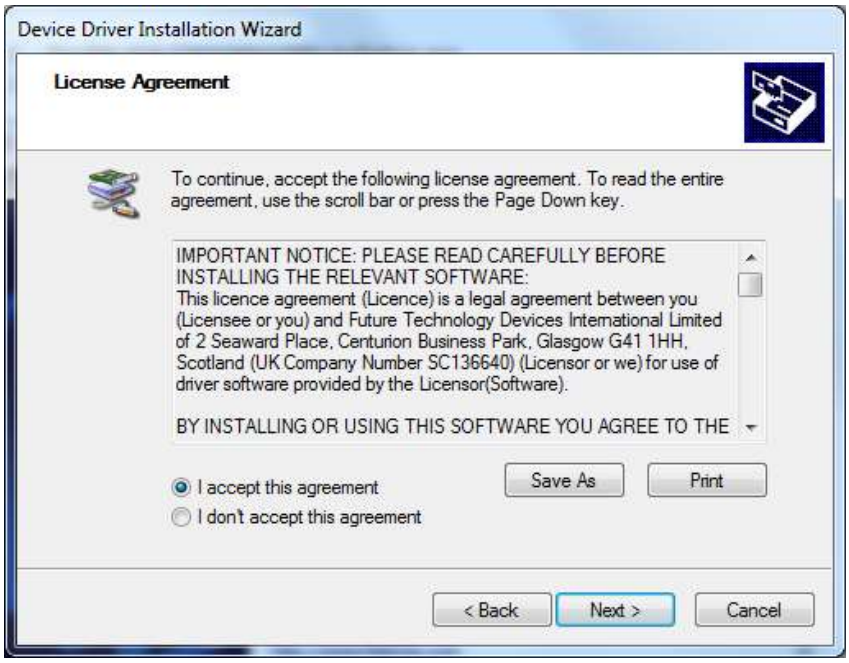

Figure 12 WinUSB Setup Procedure

5. Click on Finish button. Installation is completed.

Figure 13 WinUSB Setup Procedure

5.1 Hiding Auxiliary interface

When the product is ready to be deployed, the auxiliary interface may be removed. This shortens the time taken to install device drivers in the system and removes the reliance on WinUSB driver in end user systems.

Using the Configuration Programmer, uncheck the auxiliary interface check box and click the write configuration button. This will re-enumerate the device without auxiliary interface.

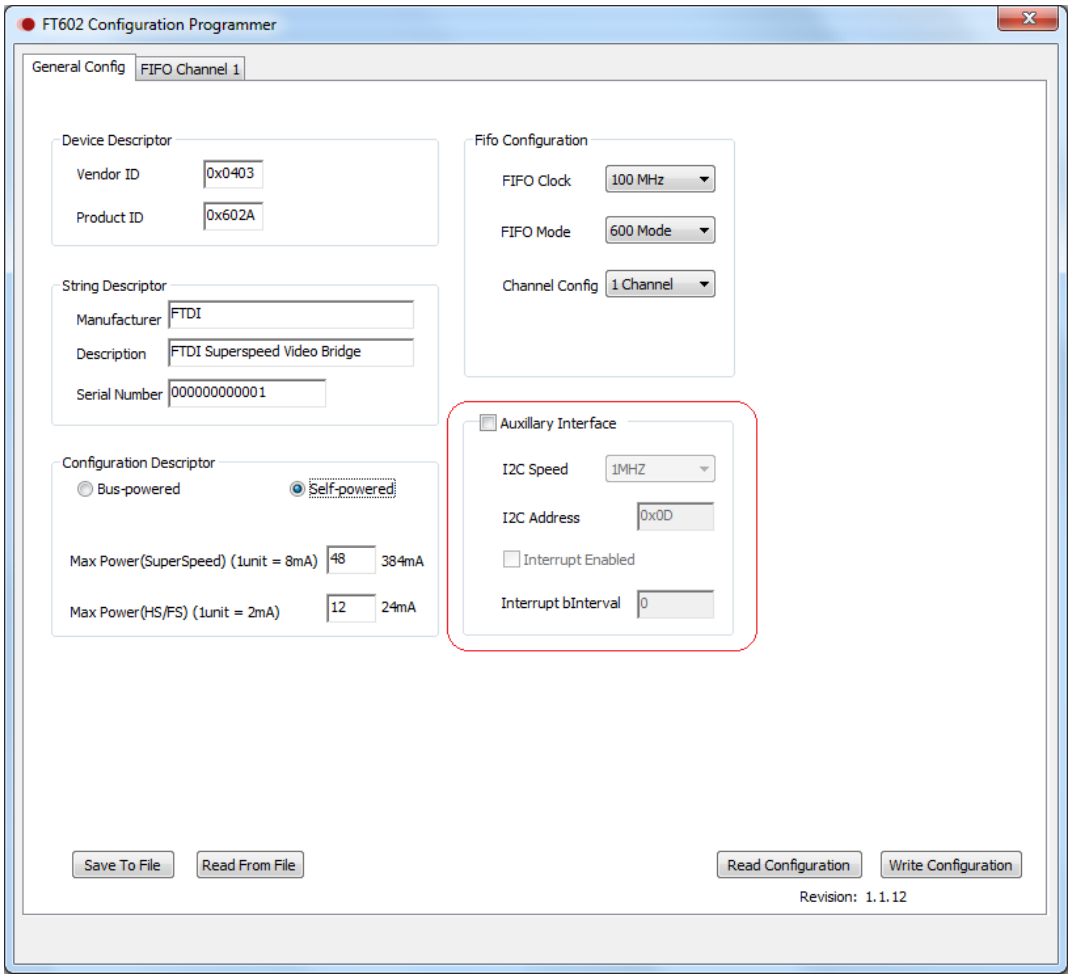

Figure 14 Disable Auxiliary Interface

5.2 Re-enable Auxiliary interface

To bring back the auxiliary interface, check the auxiliary interface box in the configuration programmer. This will re-enable the interface and populate the fields in the UI. Write the configuration to save the settings permanently.

Disabling and enabling auxiliary interface may reset I^2C related configuration hence the I^2C related fields such as speed, address, and bInterval need to be re-programmed.

6 I²C Interface

The FT602 provides an I²C bus which operates as master with a default transmission speed of 1Mb/s. This speed is configurable and may be chosen from amongst 100Kb/s, 400Kb/s and 1Mb/s through the configuration programmer

When using video capture applications, when any of the UVC control value is changed, a UVC control message is sent to the UVC device. The device, in turn, relays the message to the FPGA using theI²C Interface. The I²C slave address to be used for this communication is set via the Configuration Programmer. The I²C slave (e.g. FPGA or FIFO Master) shall implement the registers described in the next sections.

6.1 Writing to a slave on the I²C bus.

To write on the I²C bus, the master will send a start condition on the bus with the slave's address as well as the R/W bit set to 0 which signifies a write. After slave responds with an acknowledgement, the master will then send the register address it wishes to write to and the slave acknowledges again. After this, the master shall send the data to the slave and at end of data, the master shall terminate the transmission with a stop condition.

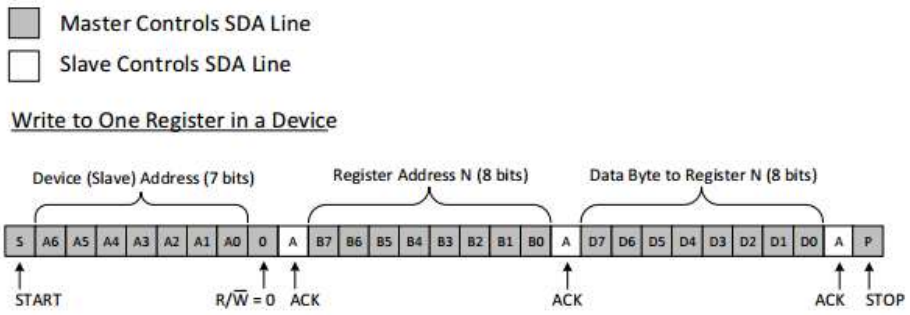

Figure 15 Example I²C write to slave's register.

6.2 Reading from a slave on the I²C Bus

To read from a slave, the master starts with an instruction to the slave which register it wishes to read from. This is done by sending the address with the R/W bit set to 0 (indicates a write), followed by the register address it wishes to read from. Once the slave acknowledges this register address, the master will send a START condition again followed by the slave address with R/W bit set to 1 (indicates read). The master will continue sending out the clock pulses so that the slave can transmit data.

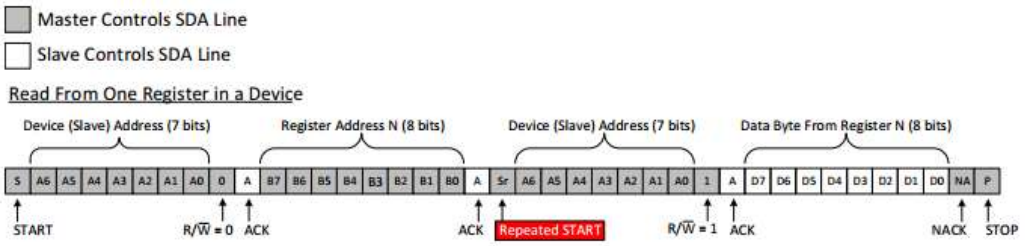

Figure 16 **Example I²C Read from slave register**

6.3 I²C Slave Device Registers

The I²C master currently supports registers listed in the below table. These are optional registers. The slave need not implement all of them. It can selectively implement the ones it wants to support.

Register address	Name	Access	Size (Byte)	Description
0x0	FT602 configuration(device reset)	W	1	bit[7:4]: reserved bit[3]: I²C interrupt, 0 = disable, 1 = enable bit[2:1]: 2'b00 = unknown speed 2'b01 = Super Speed 2'b10 = High Speed 2'b11 = Full Speed B[0]: FIFO Mode, 0 = FT245, 1 = FT600
0x1	FT602 power status	W	1	0 = Wakeup, 1 = Suspend, 2 = PowerOff, (Host PC state) Others = Reserved
0x40 ~ 0x5F	UVC channel 1 controls	RW	-	Camera and Processing Unit Controls (as per UVC spec)
0x60	Channel 1 start streaming	W	9	Byte [8]: 0 based resolution index. Byte [7:4]: Clock Frequency in Hz. Byte [3:2]: Height Byte [1:0]: Width

0x70 ~ 0x8F	UVC channel 2 controls	RW	-	Camera and Processing Unit Controls (as per UVC spec)
0x90	Channel 2 start streaming	W	9	Byte [8]: 0 based resolution index. Byte [7:4]: Clock Frequency in Hz. Byte [3:2]: Height Byte [1:0]: Width
0xA0 ~ 0xBF	UVC channel 3 controls	RW	-	Camera and Processing Unit Controls (as per UVC spec)
0xC0	Channel 3 start streaming	W	9	Byte [8]: 0 based resolution index. Byte [7:4]: Clock Frequency in Hz. Byte [3:2]: Height Byte [1:0]: Width
0xD0 ~ 0xEF	UVC channel 4 controls	RW	-	Camera and Processing Unit Controls (as per UVC spec)
0xF0	Channel 4 selected frame info	W	9	Byte [8]: 0 based resolution index. Byte [7:4]: Clock Frequency in Hz. Byte [3:2]: Height Byte [1:0]: Width

Table 6 I²C Slave Registers

UVC Control Register Address				Register Name	Description
Channel 1	Channel 2	Channel 3	Channel 4		
40	70	A0	D0	REG_CT_AE_MODE	Auto Exposure Mode
41	71	A1	D1	REG_CT_AE_PRIORITY	Auto Exposure Priority
42	72	A2	D2	REG_CT_EXPOSURE_TIME_ABSOLUTE	Exposure Time Absolute
43	73	A3	D3	REG_CT_EXPOSURE_TIME_RELATIVE	Exposure Time Relative
44	74	A4	D4	REG_CT_FOCUS_ABSOLUTE	Focus Absolute
45	75	A5	D5	REG_CT_FOCUS_RELATIVE	Focus Relative
46	76	A6	D6	REG_CT_FOCUS_AUTO	Focus, Auto.
47	77	A7	D7	REG_CT_IRIS_ABSOLUTE	IRIS Absolute
48	78	A8	D8	REG_CT_IRIS_RELATIVE	IRIS Relative.
49	79	A9	D9	REG_CT_ZOOM_ABSOLUTE	Zoom Absolute
4A	7A	AA	DA	REG_CT_ZOOM_RELATIVE	Zoom Relative
4B	7B	AB	DB	REG_CT_PANTILT_ABSOLUTE	Pan-tilt Absolute
4C	7C	AC	DC	REG_CT_PANTILT_RELATIVE	Pan-tilt Relative
4D	7D	AD	DD	REG_CT_ROLL_ABSOLUTE	Roll Absolute
4E	7E	AE	DE	REG_CT_ROLL_RELATIVE	Roll Relative
4F	7F	AF	DF	REG_PU_BACKLIGHT_COMPENSATION	Backlight Compensation
50	80	B0	E0	REG_PU_BRIGHTNESS	Brightness
51	81	B1	E1	REG_PU_CONTRAST	Contrast
52	82	B2	E2	REG_PU_GAIN	Gain
53	83	B3	E3	REG_PU_POWER_LINE_FREQUENCY	Power line frequency
54	84	B4	E4	REG_PU_HUE	Hue
55	85	B5	E5	REG_PU_SATURATION	Saturation

56	86	B6	E6	REG_PU_SHARPNESS	Sharpness
57	87	B7	E7	REG_PU_GAMMA	Gamma
58	88	B8	E8	REG_PU_WHITE_BALANCE_TEMPERATURE	White Balance Temp.
59	89	B9	E9	REG_PU_WHITE_BALANCE_TEMPERATURE_AUTO	White Balance Auto.
5A	8A	BA	EA	REG_PU_WHITE_BALANCE_COMPONENT	White Balance Component.
5B	8B	BB	EB	REG_PU_WHITE_BALANCE_COMPONENT_AUTO	White Balance Component Auto.
5C	8C	BC	EC	REG_PU_DIGITAL_MULTIPLIER	Digital Multiplier
5D	8D	BD	ED	REG_PU_DIGITAL_MULTIPLIER_LIMIT	Digital Multiplier Limit
5E	8E	BE	EE	REG_PU_HUE_AUTO	Hue Auto.
5F	8F	BF	EF	REG_PU_ANALOG_VIDEO_STANDARD	Analog Video Standard.

Table 7 UVC Registers

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Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Appendix A – References

Document References

USB_Video_Class_1.1.pdf

FT602 USB 3.0 SuperSpeed UVC bridge IC datasheet

UMFT602X development module datasheet

https://www.fourcc.org/fourcc.php

Acronyms and Abbreviations

Terms	Description
FIFO	First In First Out
ID	Identification
UI	User Interface
USB	Universal Serial Bus
UVC	USB Video Class.
VID	Vendor Identification
I^2C	Inter-Integrated Circuit

Appendix B – List of Tables & Figures

List of Tables

List of Figures

Appendix C – Revision History

Document Title: AN_435_FT602 UVC Chip Configuration Guide
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Document Feedback: Send Feedback

Revision	Changes	Date
1.0	Initial Release	2017-03-23
1.1	Updated Section 1.1 Pre-requisite (WINUSB driver pre-installation descriptions added)	2017-04-18
1.2	Added the following section/information – Auxiliary Interface section WinUSB Setup Procedure. I^2C related information I^2C register related tables. Updated the screenshots with new UI	2017-12-08