

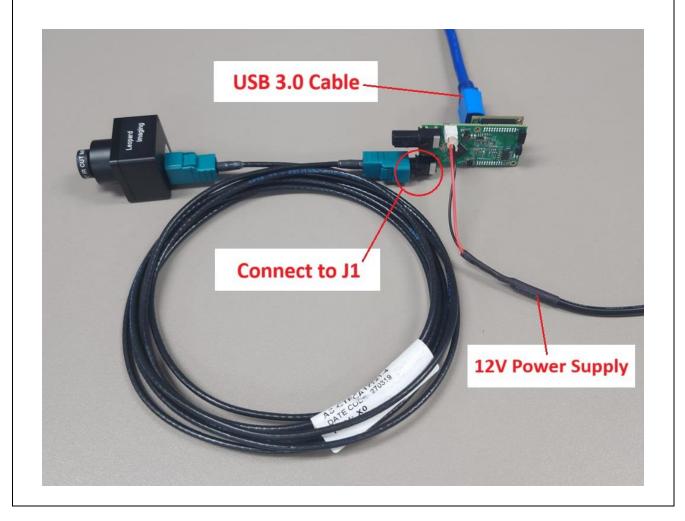
LI-USB30-IMX390-GMSL2_Firmware_Release_Note_20240418

* Copyright (c) 2024, Leopard Imaging Inc. All Rights Reserved.

Overview

This firmware is for LI-USB30-IMX390-GMSL2 camera. This firmware supports 1937 x 1217 @ 30 fps. This camera doesn't include ISP and output raw data.

Platform	Camera
1 x LI-GMSL2-USB	1 x LI-IMX390-GMSL2
Cable	Adapter/Carrier Board
1 x USB 3.0 Micro-B cable 1 x FAK-SMZSMZ Fakra cable	1 x 12VDC power supply





LI-USB30-IMX390-GMSL2_Firmware_Release_Note_20240418

Revision	SVN version	Release Date	Author	Tested By
2024_04_18		04/18/2024		Shelby Hache
Updates				
Revision		Description		Release Date
2020_04_18	First Release			04/18/2024
Known bugs				



Setup Procedure 1/3

- Hardware:

- 1. LI-IMX390-GMSL2 x 1
- 2. LI-GMSL2-USB Tester x 1
- 3. FAK-SMZSMZ Fakra cable x 1
- 4. USB 3.0 Micro-B cable x 1
- 5. LI-PS12-01 x 1

- Hardware Setup:

Connect the camera and USB 3.0 Tester board as the picture on the first page.

- Software:

This camera kit can be tested with any one of the below software:

1. Camera tool (Windows OS)

The Camera tool can be downloaded from the link below: https://www.dropbox.com/s/8daqfypyhnubjr5/CameraUSB30_3_2_20190622.7z?dl=0

It's better to use the 7-zip to uncompress the package: <u>http://www.7-zip.org/download.html</u>

And install the software below on your PC: https://www.dropbox.com/s/6uswl40z8rqh2et/vcredist_x86.exe?dl=0

If needed, you can also download the camera tool SDK: https://www.dropbox.com/s/j6ccl8cvt75gu2g/USB30 CameraTool SDK rev1440 20190622.7z?dl=0

2. Linux Camera tool (Linux OS)

The Linux camera tool can be downloaded from link below. https://www.dropbox.com/s/4m2efo696px9739/linux_camera_tool-master_20190624.zip?dl=0

For how to install it, please refer to the README.md in below link. (the latest version of Linux camera tool may have an issue, so please use above Linux camera tool) https://github.com/LI01/linux_camera_tool

Please follow the README.md in GitHub to install the Linux camera tool. There are instructions online for how to install the OpenCV on Ubuntu OS. Below is an example: https://www.learnopency.com/install-opency-3-4-4-on-ubuntu-18-04/



Run Camera 1/3

- Camera Tool (Windows OS)

- 1. Connect the camera to port J1 of USB 3.0 Tester. (refer to picture in page 1)
- 2. Plug in the 12V power supply to USB 3.0 Tester.
- 3. Connect the camera to your PC (USB3.0 port) using the USB 3.0 cable.
- 4. Open camera Tool.

Please make sure to complete these steps in numerical order. Steps 2 and 3 cannot be reversed.

Color matrix:

You can adjust the color matrix in Options \rightarrow Configuration. Below is an example:

UPDATE Camera								CL	OSE
DefaultM	ode:	0		🗹 Fo	cusF	Proc)own:	Sample	e
RAW Interp	olation								
🗹 Gamma	Ena	Ga	mma	1.0					
🕗 RGBGa	ainOffs	etEna							
Red G	ain:	950		Red (Offse	et:	0		
Green	n Gain: 750			Green Offset: 0		0			
Blue G	iain:	950		Blue	Offse	et:	0		
RGB2F	RGBMa	trixEna							
	R	ed	G	reen		Blue	Э		
Red	256		0		0)			
Green	0		256		0	0			
Blue	0		0		2	256			
Capture									
CaptureN	um: 1			🗹 R/	٩W	\sim	BMP		

Register access function:

This camera supports register access function. The I2C address is 0x42Below is an example. 0x000C is the exposure register address.





Run Camera 2/3

Capture Image:

The images can be captured by clicking Options \rightarrow CaptureImage. Two images (RAW and BMP) will be saved to PC.

	rt			
CameraProperty				
CameraPropWin				
Capturelmage				
TriggerMode	•			
SoftTrigger				
AutoTrigger				
SetTriggerDelay				
PixelOrder	•			
MonoSensor				

Image type:	16-bit	Signed	•						
Width:	3840	pixels							
Height	2160	pixels							*
Offset to first image:	0	bytes	20	AL I	A.C.				
Number of images:	1					-			
Gap between images:	0	bytes						 Die-ett (. /
White is zero									
Little-endian byte	order						-		
Copen all files in f	older				III H Harrison	and the			
Use virtual stack							5 2		
	ок с	ancel Help					Provent and	 .u	-

Note: This camera tool supports Raw-to-RGB function which will reduce the display frame rate. You can click Options \rightarrow DisableDisplay to get actual frame rate from the sensor. You can also use other regular software (like AMcap) to get higher frame rate, but the video will be green (like below) due to lack of Raw-to-RGB conversion function.



o ×



Run Camera 3/3

- Camera Tool (Linux OS)

- 1. Connect the camera to J1 of USB 3.0 Tester. (refer to picture in page 1)
- 2. Plug in the 12V power supply to USB 3.0 Tester.
- 3. Connect the camera to PC (USB3.0 port) through USB 3.0 cable.
- 4. Open a terminal and use the command "leopard_cam" to open the camera.

Please make sure to complete these steps in numerical order. Steps 2 and 3 cannot be reversed.

Set the camera as below to get better image quality.

		cam		000
	Camera Control			
File Help				
Device: Leopard Imaging - LI-IMX390		EXIT		•
Sensor Datatype:	○ RAW10 ○ RAW12 ○ Y			
Raw Camera Pixel Format:	BGGR GBBR RGGE Enable auto white balance	 GRBG O MONO Enable auto brightness&contrast 	ITT	
Exposure:	558			TIL
Gain:	10		h.tt	I.I.I.
I2C Addr:	0x	🗆 Just sensor read/write		
Register Addr Width:	0 8-bit ○ 16-bit			
Register Value Width:	O 8-bit O 16-bit			
Reg Addr:	Ox	Read		
Reg Value:	Ox	Write		
Capture:	Capture bmp	Capture raw		
Gamma Correction:	1	Apply		
Trigger Sensor:	🗆 Enable	Shot 1 Trigger		
Black Level Correction:	0	Apply		
This camera tool can b	De used to write/re	ad registers and capture Ra	w and BMP images.	
I2C Addr:	0x42	Just sensor read/write		
Register Addr Width:	○ 8-bit ○ 16-bit			
Register Value Width:	O 8-bit O 16-bit			
Reg Addr:	0x000C	Read		
Reg Value:	0x002C	Write		
Capture:	Capture bmp	Capture raw		

Note: Since this camera doesn't include ISP and output raw data, the image quality should not be good as regular YUV video.



Note 1/3

This camera kit is pre-loaded with Firmware (in USB 3.0 Tester) and FPGA (in USB 3.0 Tester). If there are any new firmware and/or FPGA binary from Leopard Imaging, you can refer to below instructions to update them.

1. Firmware Update:

Please use the LP_USB3_FirmwareUpdateTool in the camera tool folder to update the firmware.

1) Click "Erase" to erase the old firmware.

2) Click "FW Update" button to select the lif file. (If the "FW_Update is unavailable, please install the WestBridge driver, check below)

3) The update process may take about 15 seconds.

4) If the process takes too long, please disconnect the USB and reconnect it to PC. Then try the update tool again.

-----Install WestBridge:

If the camera cannot be recognized after you update the firmware, and there is a device name "WestBridge" on the Device Manager, please download the driver from the link below and install it.

https://www.dropbox.com/s/4yx2p31b7qo2gjx/WestBridge_driver.zip?dl=0

1) Right click on "WestBridge" and select Update Driver Software.

2) Choose browse my computer for driver software.

3) Click Browse, locate the driver at the downloaded and unzipped folder. (C:\temp\driver\bin\ for example)

If your PC has Win7 or later version, please select the folder "win7".

4) Click next and complete the installation process.

After install the driver, please update the firmware again.



LI-USB30-IMX390-GMSL2_Firmware_Release_Note_20240418

Note 2/3

2. FPGA Update:

FPGA Binary: Radar_USB3_top_top_Radar_USB3_top_top.rbt

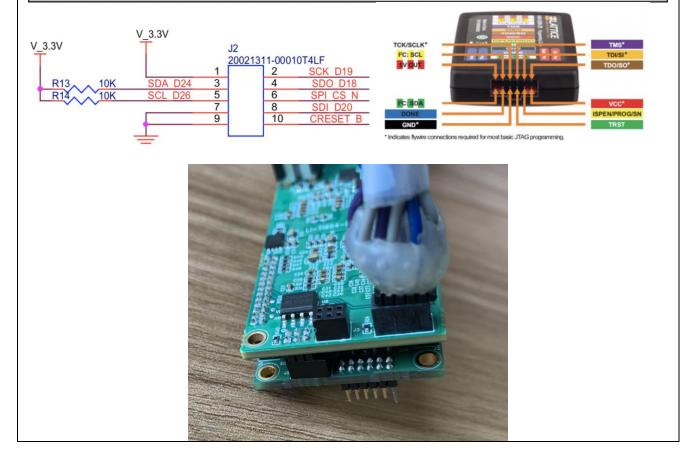
1) Download the Lattice programmer tool software **Programmer Standalone 3.10 64-bit for Windows** from link below and install it to your PC.

http://www.latticesemi.com/programmer

2) Connect the HW-USBN-2A or HW-USBN-2B to J2 of LI-TI954-DESER board. Below is the pinout. You may need to build an adapter cable for the programmer tool and J2. J2 is a 1.27mm pitch interface. Below pins in red need to be connected.

Only below pins in red need to be connected:

TI954 Board <> HW-USBN-2B	TI954 Board <> HW-USBN-2B
Pin1: V_3.3V <> VCC	Pin2: SCK_D19 <> TCK/SCLK
Pin3: N/A	Pin4: SDO_D18 <> TDO/SO
Pin5: N/A	Pin6: SPI_CS_N <> ISPEN/PROG
Pin7: GND <> GND	Pin8: SDI_D20 <> TDI/SI
Pin9: N/A	Pin10: CRESET_B <> TRST





Note 3/3 3) Connect the USB3.0 Tester to your PC via USB 3.0 cable. 4) Open LP_USB3_FirmwareUpdateTool in the camera tool folder and click "Erase" to erase the firmware. 5) Open Lattice software (which you installed in 1). The Device name should be "LIF-MD6000". Set the settings of "Operation" as below and click "OK". 🧶 D mer - Untitl \times File Edit View Design Help Enable Status Device Family Device Operation File Name Cable Settings 1 🗹 LIFMD LIF-MD6000 Fast Program Detect Cable 😂 LIFMD - LIF-MD6000 - 🗖.. × Cable: HW-US · EzUSB- * Port: General Device Information Custom p Device Operation Programming Speed S Access mode: SPI Flash Programming Use default Cloc Operation: SPI Flash Erase, Program, Veril O Use custom Clor Programming Options TCK Div 1 🗘 9 Programming file: vds2mipi_top.rbt . pue I/O Settings Cable Device Options Use default I/O Reinitialize part on program error O Use custom I/O SPI Flash Options INITN pin co DONE pin co Family: SPI Serial Flash TRST pin co Vendor: Micron Set TRS' Device: SPI-M25P16 -O Set TRS Package: 8-pin SOIC SPI Programming Data file siz 163466 Load from Fi Output Lattice VM Drivers detected (HW-DLN-3C (Parallel), HW-U Programmer device database loaded INFO - Scanning USB Port E2USB-0... INFO - Scan completed successfully. Message INFO - Scanning USB Port EzUSB-0... | | Secure SPI flash golden pattern INFO - Scan completed successfully WARNING - Cannot identify detected device on row 1. Ple < Tcl Console Output OK Cancel ng* Info* Ready 6) Click program icon. Diamond Programmer - Untitled * File Edit View Design Help 🎦 🖆 🔚 🛛 😂 🥔 🥔 🐼 Enable Status **Device Family** 7) It may take 9s to program the FPGA. Output Disabling... Verifying... Finalizing... INFO - Execution time: 00 min : 09 sec INFO - Elapsed time: 00 min : 09 sec INFO - Operation: successful. Output Tcl Console 8) Refer to the "Firmware Update" section to install the firmware.