

FMC HDMI Display Module FL9134

User Manual



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Part1: FMC HDMI Module FL9134 General Description

The ALINX FMC HDMI Module FL9134 includes one HDMI video input and one HDMI video output. The HDMI input uses Silicon Image's SIL9013 HDMI decoder chip, which supports up to 1080P@60Hz input and supports data input in different formats. The HDMI output uses Silicon Image's SIL9134 HDMI (DVI) encoding chip, which supports up to 1080P@60Hz output and supports 3D output.

The module has a standard LPC FMC interface for connecting to the FPGA development board. The FMC connector model is: ASP_134604_01



Figure 1-1: FL9134 module product photo

Part 1.1: FL9134 FMC HDMI Display Module Detail Parameter

FL9134 FMC HDMI Display Module detail parameter:

- HDMI output coding chip: SiI9134
- HDMI input coding chip: SiI9013
- HDMI input and output channels: 1 channel input, 1 channel output
- HDMI interface standard: HDMI 1.4
- Data width: 24 bits RGB/YCbCr 4:4:4
- HDMI input and output maximum resolution and refresh rate:
1080P 60 frames
- Parameter configuration: I2C interface configuration
- Module interface: standard FMC LPC connector
- Working temperature: -40 °C ~ 85 °C

Part 1.2: FL9134 Module Size Dimension

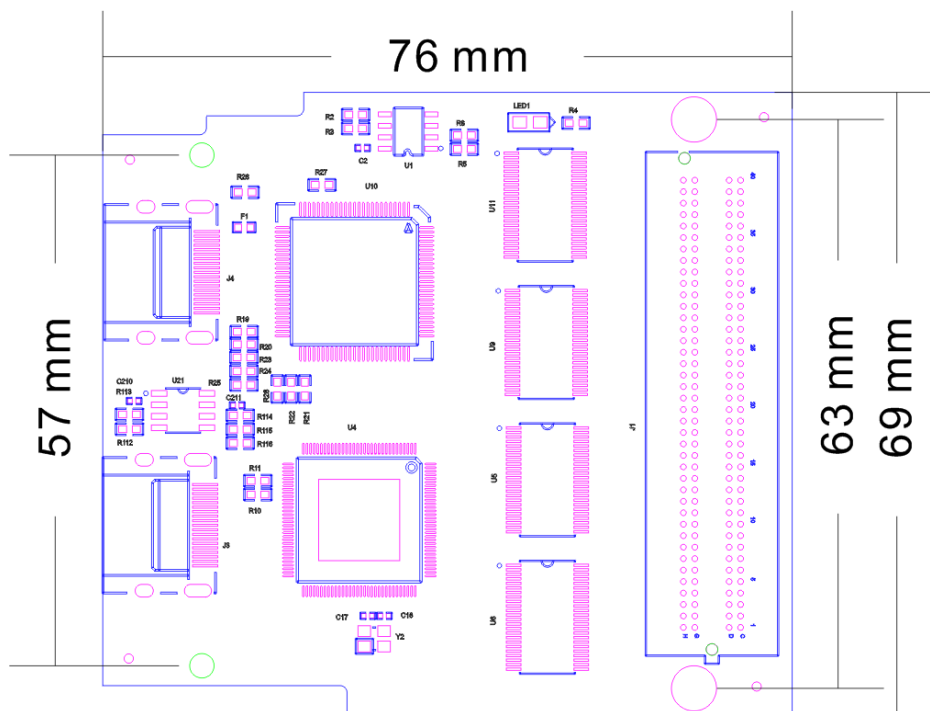


Figure 1-2: FL9134 Module Size Dimensions

Part 2: FL9134 Module Function Description

Part 2.1 FL9134 Module Block Diagram

Figure 2-1: FL9134 Module Block Diagram as below:

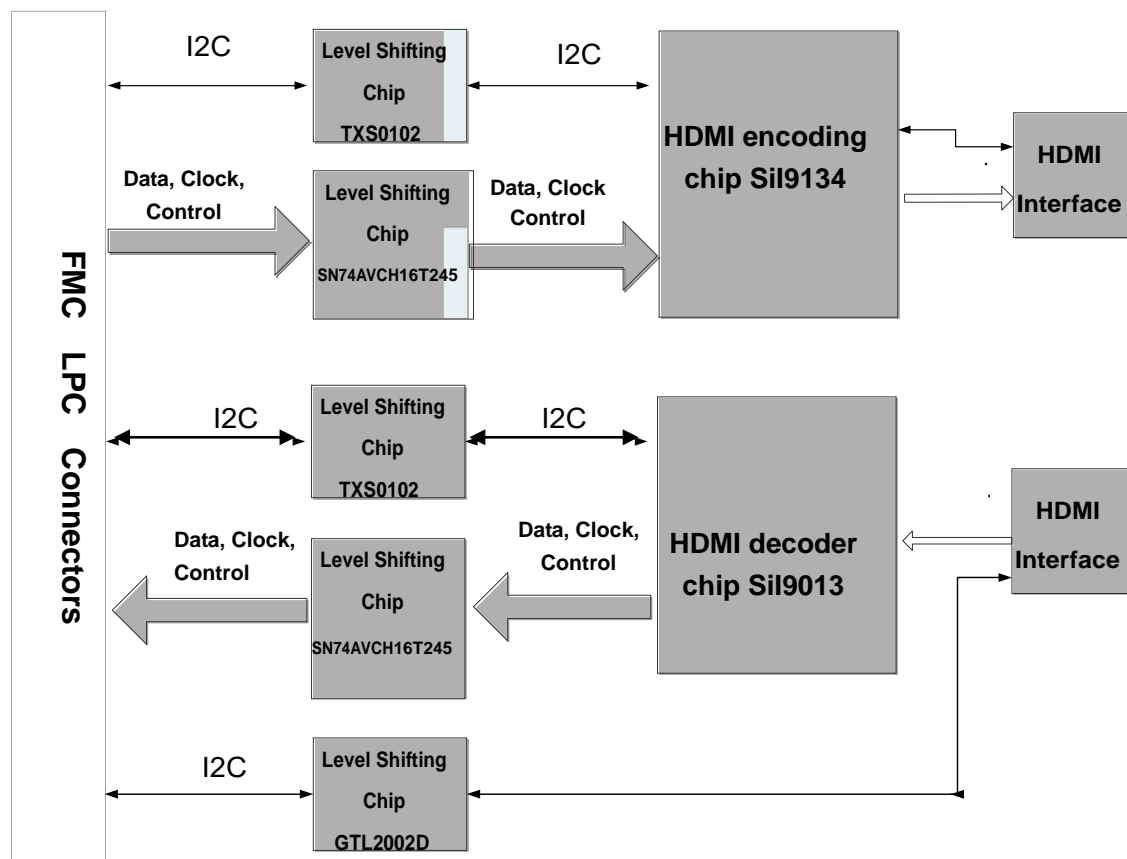


Figure 2-1: FL9134 Module Block Diagram

Part 2.2: FL9134 Module FMC LPC pin assignment

Only the signals of the power supply and the AD chip interface are listed below, and the signal of the GND is not listed. For the detail, refer to the schematic diagram.

Pin Number	Signal Name	Description
C35	+12V	12V Power Input
C37	+12V	12V Power Input
D32	+3.3V	3.3V Power Input
C34	GA0	Bit0 of EEPROM address
D35	GA1	Bit1 of EEPROM address
D8	HDMI_9013_CLK	HDMI Input clock
G18	HDMI_9013_D00	HDMI Input date Bit 0
D18	HDMI_9013_D01	HDMI Input date Bit 1
H17	HDMI_9013_D02	HDMI Input date Bit 2
G16	HDMI_9013_D03	HDMI Input date Bit 3
H16	HDMI_9013_D04	HDMI Input date Bit 4
G15	HDMI_9013_D05	HDMI Input date Bit 5
D17	HDMI_9013_D06	HDMI Input date Bit 6
H14	HDMI_9013_D07	HDMI Input date Bit 7
G13	HDMI_9013_D08	HDMI Input date Bit 8
H13	HDMI_9013_D09	HDMI Input date Bit 9
G12	HDMI_9013_D10	HDMI Input date Bit 10
D15	HDMI_9013_D11	HDMI Input date Bit 11
H11	HDMI_9013_D12	HDMI Input date Bit 12
G10	HDMI_9013_D13	HDMI Input date Bit 13
H10	HDMI_9013_D14	HDMI Input date Bit 14
G9	HDMI_9013_D15	HDMI Input date Bit 15
D14	HDMI_9013_D16	HDMI Input date Bit 16
H8	HDMI_9013_D17	HDMI Input date Bit 17
G7	HDMI_9013_D18	HDMI Input date Bit 18
H7	HDMI_9013_D19	HDMI Input date Bit 19
G6	HDMI_9013_D20	HDMI Input date Bit 20
D9	HDMI_9013_D21	HDMI Input date Bit 22
C10	HDMI_9013_D22	HDMI Input date Bit 22
C11	HDMI_9013_D23	HDMI Input date Bit 23
H19	HDMI_9013_DE	HDMI input data Enable
G19	HDMI_9013_HS	HDMI input image line sync
C23	HDMI_9013_NRESET	9013 chip reset signal
C18	HDMI_9013_SCL	9013 chip I2C clock
C19	HDMI_9013_SDA	9013 chip I2C data
H20	HDMI_9013_VS	HDMI input image column sync
H32	HDMI_9134_CLK	HDMI output clock
G36	HDMI_9134_D00	HDMI Output date Bit 0
H35	HDMI_9134_D01	HDMI Output date Bit 1
G34	HDMI_9134_D02	HDMI Output date Bit 2
H34	HDMI_9134_D03	HDMI Output date Bit 3
G33	HDMI_9134_D04	HDMI Output date Bit 4
G31	HDMI_9134_D05	HDMI Output date Bit 5

H31	HDMI_9134_D06	HDMI Output date Bit 6
G30	HDMI_9134_D07	HDMI Output date Bit 7
D27	HDMI_9134_D08	HDMI Output date Bit 8
H29	HDMI_9134_D09	HDMI Output date Bit 9
G28	HDMI_9134_D10	HDMI Output date Bit 10
H28	HDMI_9134_D11	HDMI Output date Bit 11
G27	HDMI_9134_D12	HDMI Output date Bit 12
D24	HDMI_9134_D13	HDMI Output date Bit 13
H26	HDMI_9134_D14	HDMI Output date Bit 14
G25	HDMI_9134_D15	HDMI Output date Bit 15
H25	HDMI_9134_D16	HDMI Output date Bit 16
D23	HDMI_9134_D17	HDMI Output date Bit 17
G24	HDMI_9134_D18	HDMI Output date Bit 18
H23	HDMI_9134_D19	HDMI Output date Bit 18
G22	HDMI_9134_D20	HDMI Output date Bit 20
H22	HDMI_9134_D21	HDMI Output date Bit 21
G21	HDMI_9134_D22	HDMI Output date Bit 22
D20	HDMI_9134_D23	HDMI Output date Bit 23
H37	HDMI_9134_DE	HDMI Output data Enable
G37	HDMI_9134_HS	HDMI Output image line sync
C22	HDMI_9134_INT	9134 chip interrupt signal
D26	HDMI_9134_NRESET	9134 chip Reset signal
C26	HDMI_9134_SCL	9134 chip I2C clock
C27	HDMI_9134_SDA	9134 chip I2C data
H38	HDMI_9134_VS	HDMI output image column sync
D11	HDMI_DSCL	HDMI EDID clock
D12	HDMI_DSDA	HDMI EDID data
D21	HPDET_EN	HOT PLUG detection signal enable
C30	SCL	EEPROM I2C clock
C31	SDA	EEPROM I2C data
G39	VADJ	VADJ power input
H40	VADJ	VADJ power input

Part 3: HDMI DEMO program description

We provide an HDMI loop test routine for the ALINX FPGA development board, in which the video image of the HDMI input is looped directly to the HDMI output image. In addition, the register configuration and EDID information of the Sil9013 and Sil9134 chips are generated in the program.

EDID describes the display information and is an important part of the video system, indicating the format supported by the HDMI Receiver section of the HDMI module. The general EDID is the I2C interface, and the information is stored in the EEPROM. However, in this design, the EDID information is stored in the FPGA chip and implemented by the program. The external master device can access the EDID information of the HDMI module through I2C.

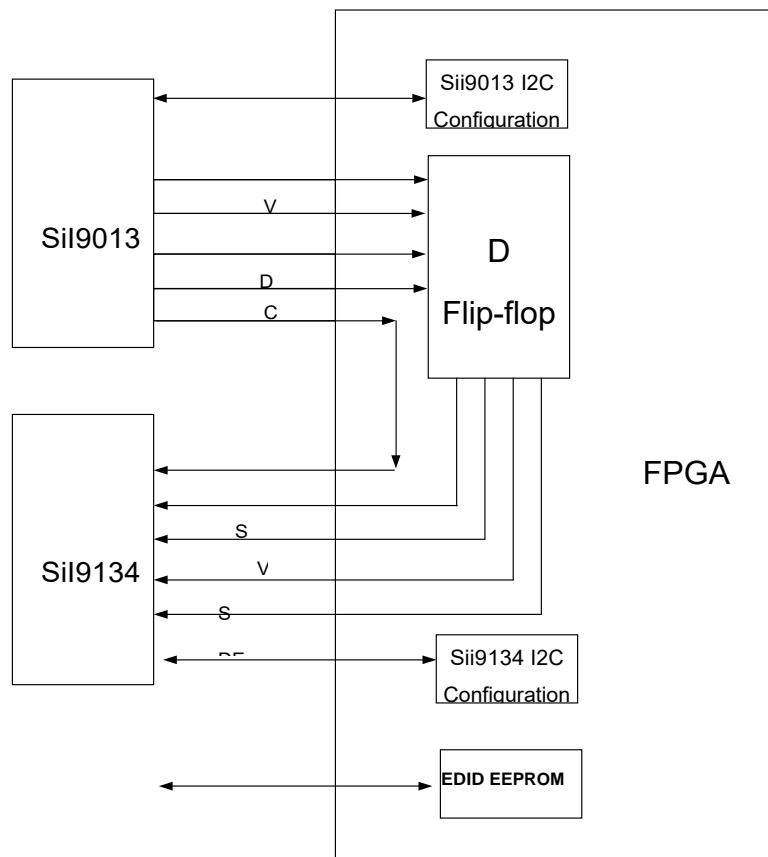


Figure 3-1: FPGA loop test

Here's a brief introduction to the various modules used in the FPGA program:

1) hdmi_loop.v

TOP program module, instantiate several sub-modules, and perform 2-level latching on the video signal of HDMI input

2) i2c_config.v

This module configured the register of the Sil9134 chip and Sil9013 by calling the I2C communication module. The configured register address and value are defined in the **lut_data** register. The specific register meanings refer to the chip manuals of Sil9134 and Sil9013.

3) i2c_config.v

Power-on reset module, after power-on, generates a software reset to initialize other modules

4) EEPROM_8b.v

The EDID slave device of the analog EEPROM, the external display master device can read the EDID information through the I2C bus. An EEPROM register is defined in the program for storing the EDID information. The EDID information is initialized by reading the .txt file when the power is turned on. Users can modify different .EDED.txt files to achieve different video input formats. By default, we choose to support 1080P input format.

```
4 |
5 | EEPROM_8b#
6 | (
7 |     .kSampleClkFreqInMHz(50),
8 |     .kInitFileName("1080_edid.txt")
9 | )
10 |
```

Part 4: Hardware connection and testing

The hardware connection between the FL9134 module and the FPGA development board is very simple. Simply plug the FL0214 FMC interface into the FMC interface of the FPGA development board and fix it with screws. The following is the hardware connection diagram of the ALINX AX7350 development board and FL9134



After the FPGA development board is powered on, the download program can display the computer output or the video image of the set-top box on the HDMI display (in the experiment, the HDMI input is connected to the video output of the set-top box, so the HDMI display shows the video image output by the set-top box) .

