

# **HDMI Display Module**

## **AN9134**

### **User Manual**



## Version Record

Version	Date	Release By	Description
Rev1.0	2019-11-10	Rachel Zhou	First Release

## Part 1: HDMI Display Module General Description

ALINX HDMI Display Output Module AN9134, use SIL9134 HDMI (DVI) coding chip of Sillion Image Incorporation. Supports maximum 1080P@60Hz output and 3D output. The module reserves a 40-pin female header that to connect FPGA development kit, a HDMI connector that to output HDMI video signal to HDMI Monitor

Figure 1-1: AN9134 module product photo as below:

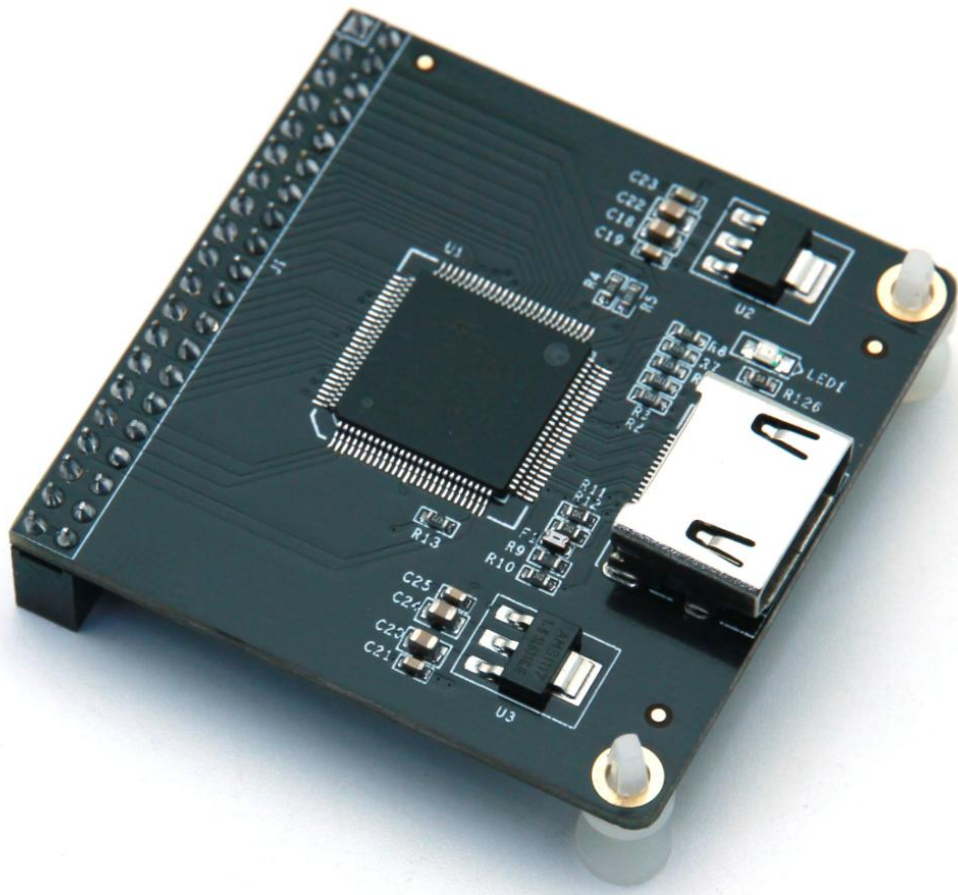


Figure 1-1: AN9134 module product photo

## **1.1 AN9134 Module Detail Parameter**

HDMI display module detail parameter listed in below:

- HDMI coding chip: Sil9134
- HDMI display channel: 1-channel
- HDMI interface display standard: HDMI 1.4
- Bus width: 24 bits RGB/YCbCr 4:4:4
- Max. Display resolution and frame rate: 1080P 60 Hz
- Display parameter configuration: I2C Interface
- Module Interface : 40-pin 0.1 spacing female header,  
download direction
- Ambient Temperature (with power applied): -0°~70°
- Output Interface: 1-channel HDMI standard output interface

## 1.2 AN9134 Module Parameter Description

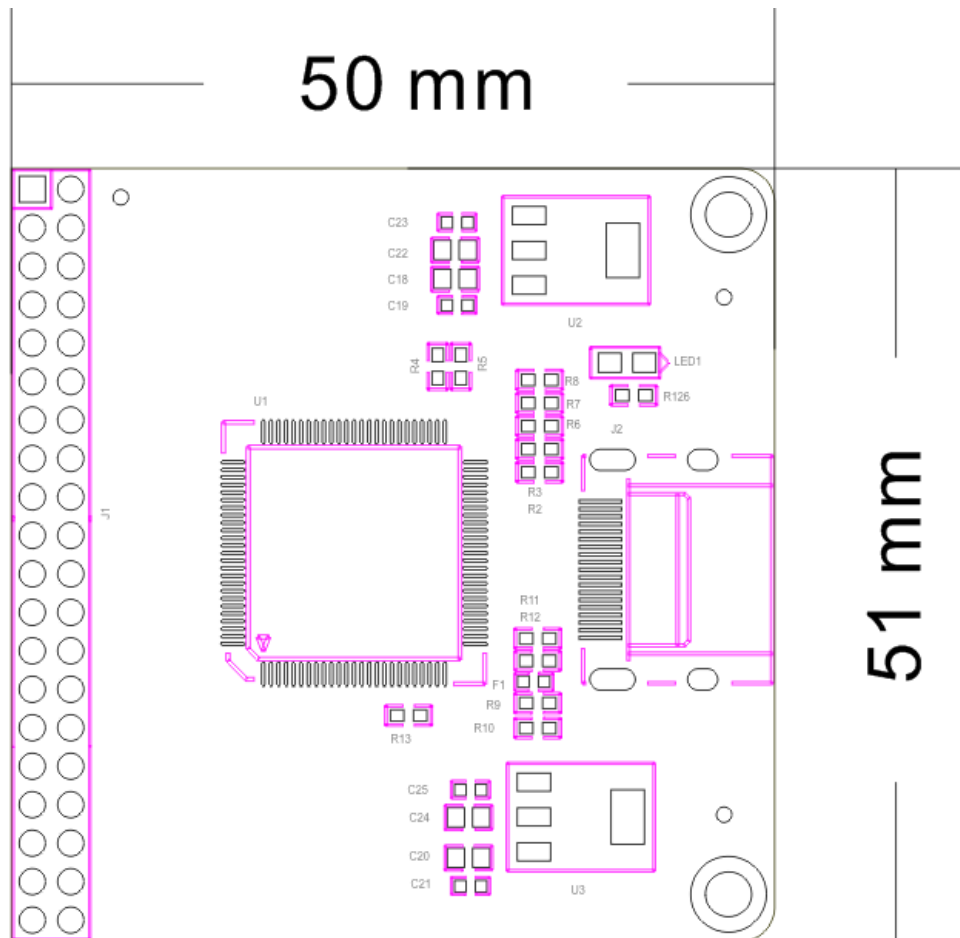


Figure 1-2: AN9134 Display Module Dimensions

## Part 2: HDMI Display Module Function Description

### 2.1 AN9134 Module Block Diagram

Figure 2-1: AN9134 Module Block Diagram as below:

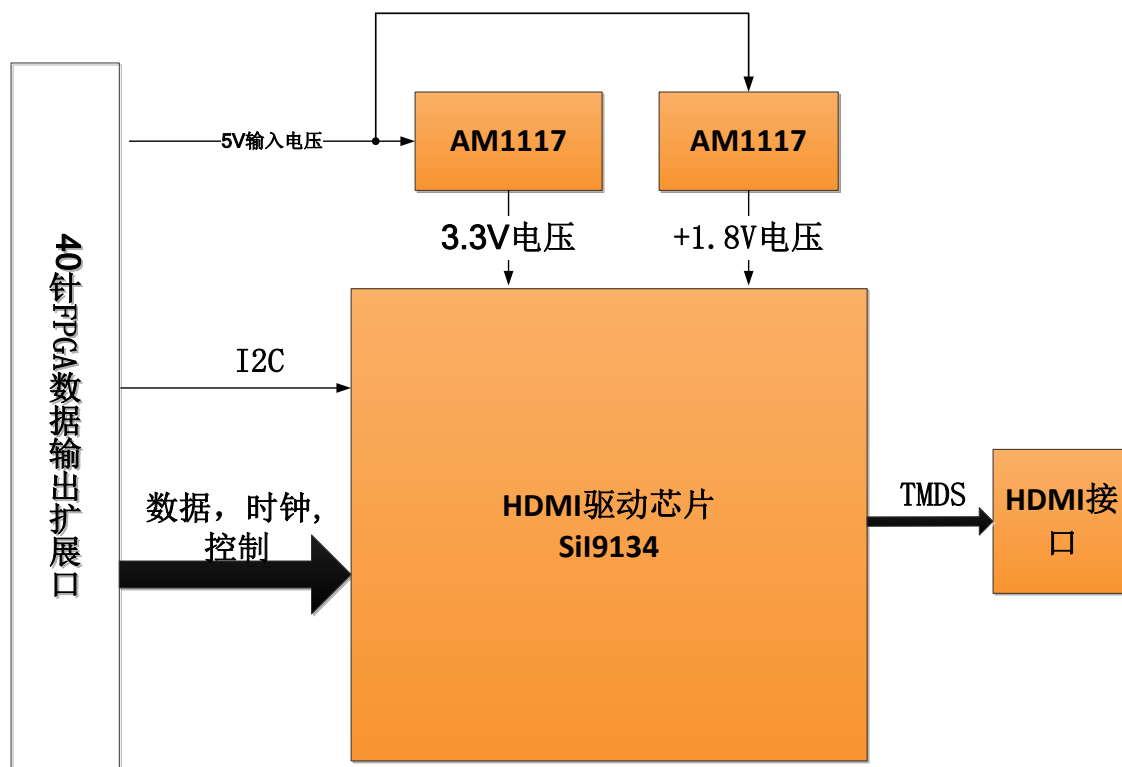


Figure 2-1: AN9134 Module Block Diagram

### 2.2 AN9134 Module 40-pin Female Header Pins Description

Pin	Pin Name	Description
1	GND	Digital Ground
2	+5V	5V power input
3	9134_SCL	9134 I2C clock

4	9134_SDA	9134 I2C data
5	9134_D22	bit 22 of date input to module
6	9134_D23	bit 23 of date input to module
7	9134_D20	bit 20 of date input to module
8	9134_D21	bit 21 of date input to module
9	9134_D18	bit 18 of date input to module
10	9134_D19	bit 19 of date input to module
11	9134_D16	bit 16 of date input to module
12	9134_D17	bit 17 of date input to module
13	9134_D14	bit 14 of date input to module
14	9134_D15	bit 15 of date input to module
15	9134_D12	bit 12 of date input to module
16	9134_D13	bit 13 of date input to module
17	9134_D10	bit 10 of date input to module
18	9134_D11	bit 11 of date input to module
19	9134_D8	bit 8 of date input to module
20	9134_D9	bit 9 of date input to module
21	9134_D6	bit 6 of date input to module
22	9134_D7	bit 7 of date input to module
23	9134_CLK	9134 clock signal
24	9134_D5	bit 5 of date input to module
25	9134_D3	bit 3 of date input to module

26	9134_D4	bit 4 of date input to module
27	9134_D1	bit 1 of date input to module
28	9134_D2	bit 2 of date input to module
29	9134_DE	date input enable signal
30	9134_D0	bit 0 of date input to module
31	9134_VS	Vertical sync input control signal
32	9134_HS	Horizontal sync input control signal
33	9134_nRESET	Reset signal of module
34	9134_INT	Interrupt signal of module
35	-	NC
36	-	NC
37	GND	Digital Ground
38	GND	Digital Ground
39	+3.3V	NC
40	+3.3V	NC

## Part 3 HDMI Display Module Program Description

We provide the HDMI driver programs of ALINX Series FPGA development board. In these driver demos, the FPGA drives the output display of SiI9134 by Internally generating HDMI timing and testing data. The different resolution of testing image can be generate by modifying



the output clock timing of HDMI. Press the button KEY1 to switch the testing images. The function diagram of the testing programs (Figure 3-1) as below:

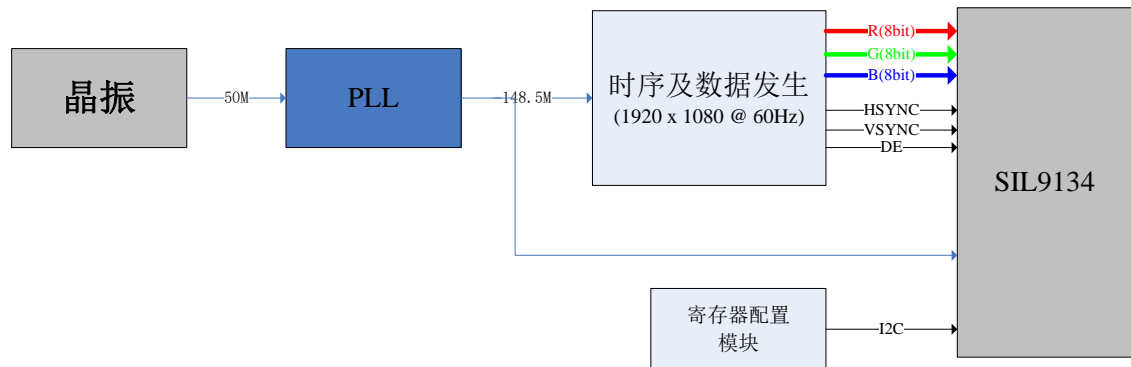


Figure 3-1: The function diagram of the testing programs

Below is the brief instruction to the functions of each module used in the FPGA driver programs

### 1. mv\_pattern.v

This module is used to generate different testing images and HDMI Vertical/ Horizontal sync signals. It generated 7 patterns testing images, included 8-color horizontal strip, 8-color vertical bar, scrolling gradient, black and white square, all blue, color gradient, frame. The Vertical/ Horizontal sync signals of HDIM generated by the parameter defined by TOP layer, that are the timing required by HDMI.

### 2. ax\_debounce.v

This module is used to detect the action of press the button, detect the falling edged of button. The function of button debounce

is also added in the programs.

### **3. i2c\_config.v**

This module is used to registers the Sil9134 chip by calling the I2C communication module, the configured register address and value are defined in the lut\_9134.v file. The specific registers meaning, please refer to the instruction manual of Sil9134 chip.

### **4. reset\_power\_on.v**

This modules is used to generate a software reset to initialize others modules after power-on.

## **Part 4 Hardware connection and Testing**

The hardware connection between the AN9134 module and FPGA development are easy. The 40-pin female headers of module plug into the expansion board of FPGA development kit, and then connect the HDMI connector to the monitor. The figure 4-1 is the expansion IOs J1 of ALINX Series FPGA development kit AX301 and the AN9134 HDMI module hardware connection as below: (if connected to the expansion IOs J2, need to re-assign the pins)

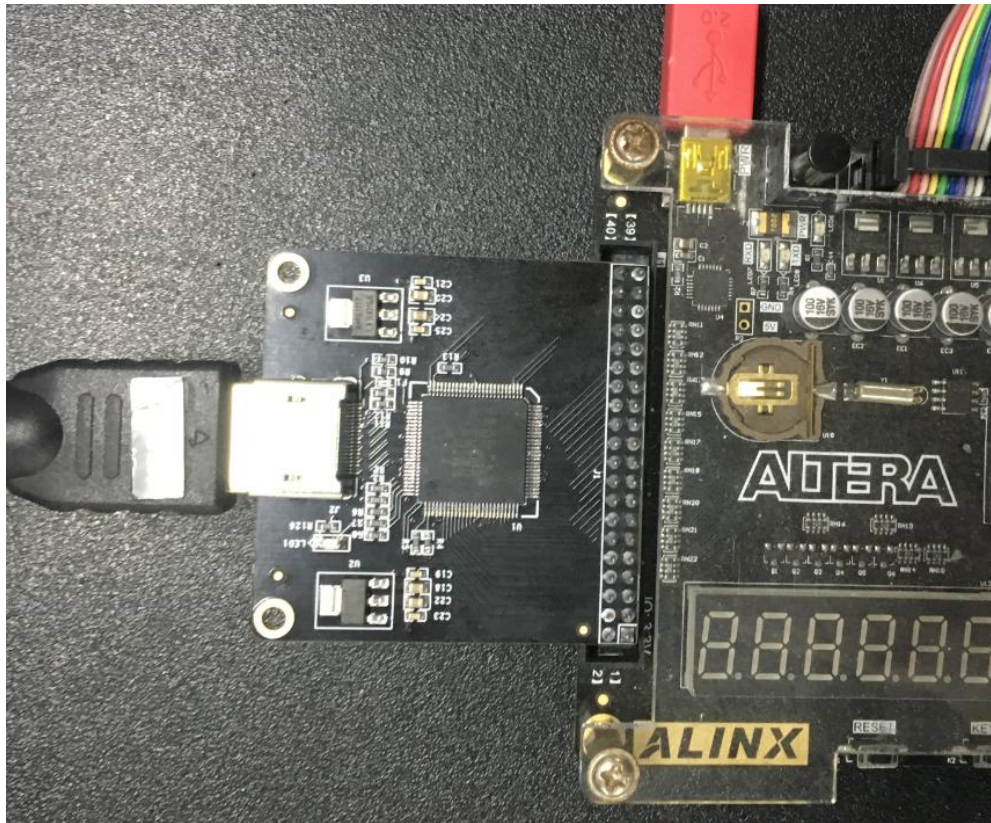


Figure 4-1: Hardware connection to ALINX Series FPGA Board

Power on the FPGA development kit, download the programs, and then the 8-color vertical bar testing image display in HDMI monitor.

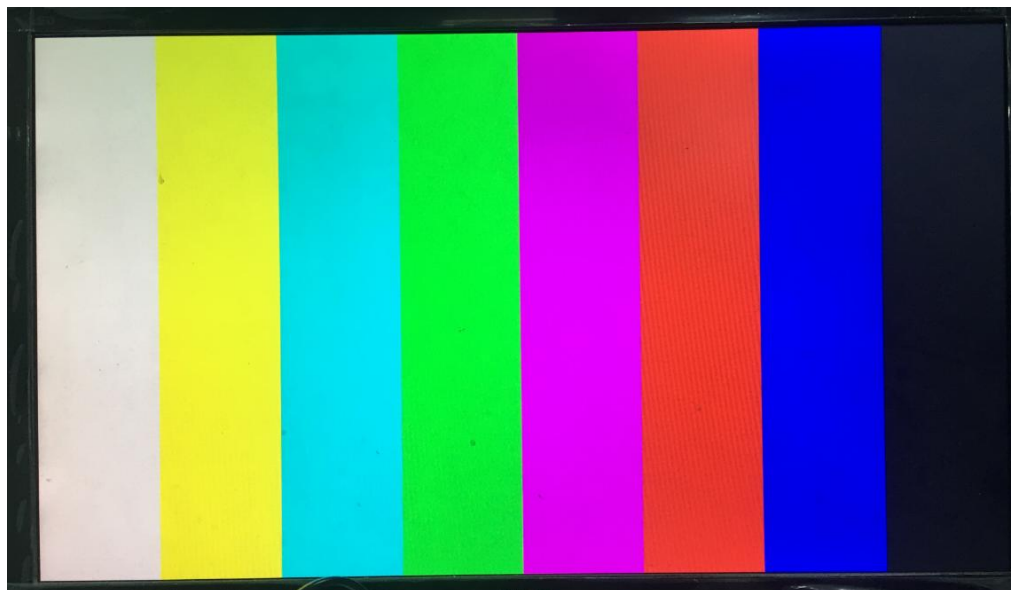


Figure 4-2: 8-color vertical bar display in HDMI monitor

Switch the testing image by press Button KEY1:



Figure 4-3: Scrolling grayscale bar display in HDMI monitor



Figure 4-4: colored gray bars display in HDMI monitor

If the users to modify the output image resolution, just need to modify two places:

1. an9134\_test (Modify the resolution in the top file)

```

41     output hdmi_de,
42     output[23:0] hdmi_d
43 ).
44 `define VIDEO_1920_1080
45 //video timing parameter definition
46 `ifdef VIDEO_1280_720
47     parameter H_ACTIVE = 16'd1280;           //horizontal
48     parameter H_FP = 16'd110;                //horizontal
49     parameter H_SYNC = 16'd40;               //horizontal

```

Figure 4-5: Modify the resolution in top file

2. Modify the output clock frequency of PLL, the default output clock frequency is 1080P (148.5M) , you need to modify the value marked in Figure 4-6. The output clock frequency of different resolution remarked in the programs.

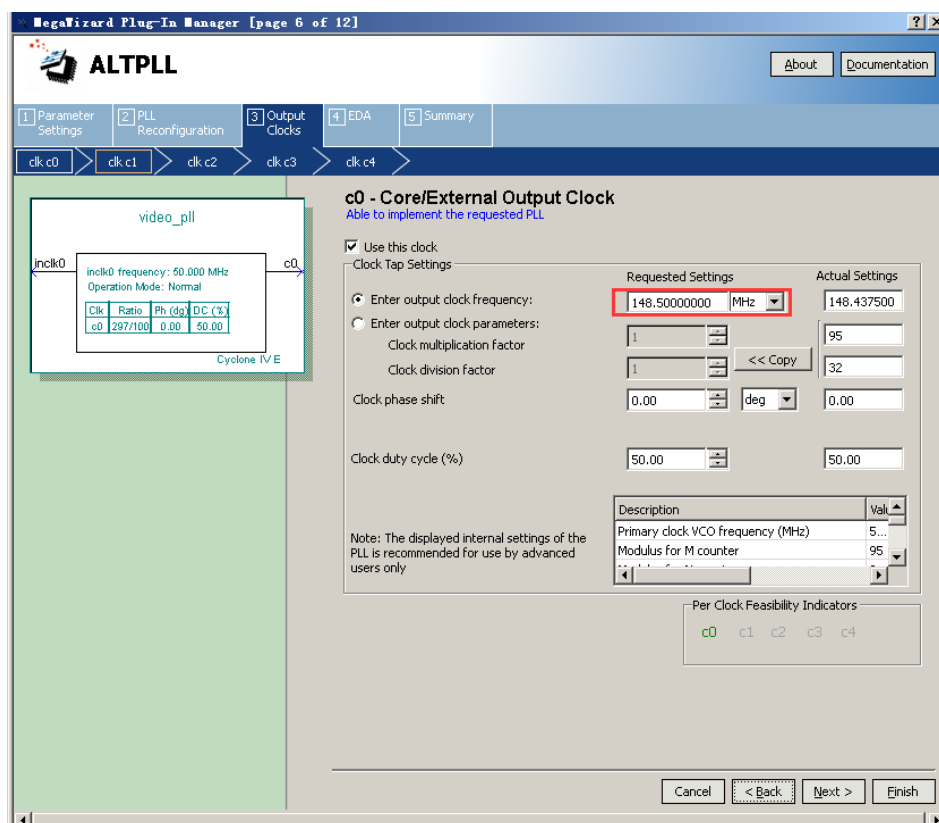


Figure 4-6: Modify the output clock frequency of PLL