Document Number：

DRV060-HDMI-R02 Driver Board
User manual
Pre_Spec V0.2

For Products:

SXGA060 SC — Full Color

SXGA060 SW — Monochrome White

SXGA060 SG — Monochrome Green

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Record of Revision

Revision	Revise Date	Page	Content
Pre_Spec V0.1	Aug 08,2014		Prerelease.
Pre_Spec V0.2	Sep 05,2014	P5	Corrected the response format of the read command.

DRV060-HDMI-R02 Driver Board

User manual

Features

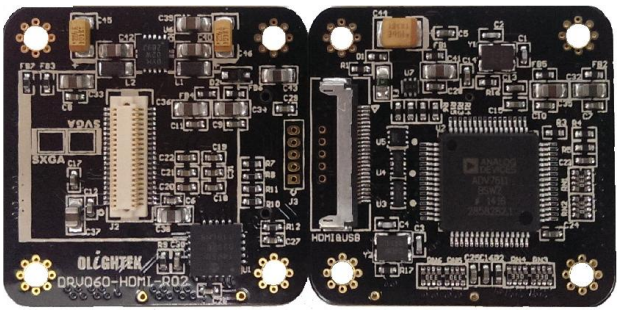
- **High-Definition Multimedia Interface(HDMI)**
- **Internal E-EDID map(128 Bytes)**
- **USB&USART communication port supported**
- **USB&HDMI Hot Plug**
- **Industrial temperature grade(-40℃~+65℃)**
- **Automatic temperature compensation**
- **Low power consumption**
- **High resolution**

General description

DRV060-HDMI-R02 is a HDMI input driver board for SXGA060 series Micro-OLED display. Low power consumption decoder can automatically detects and converts TMDS signals into digital RGB 4:4:4 video data compatible with the 24-bit ITU-R BT.601 interface standard, the default resolution is 1280×1024@60Hz.

One USB and one USART communication port allow user to flexibly configure all registers of the decoder and display.

Display center is according to the drive board center, convenient for physical design and optical design。



Power and consumption

Input voltage	DC 5V±0.2V or USB 5V
Typical power consumption	950mW (Include display)

Note: Cooling process should be needed if the resolution higher than 800×600@60Hz

Input video signal

Video signal	TMDS
Input resistor	50Ω
Output	1280×1024@60Hz(SXGA)

Communication Interface

Main port	USB(CDC virtual COM)
Second port	USART(CMOS 3.3V)
Port Settings	9600/n/8/1

Note: The USB should be the main communication port. If there is no USB port the USART can instead.

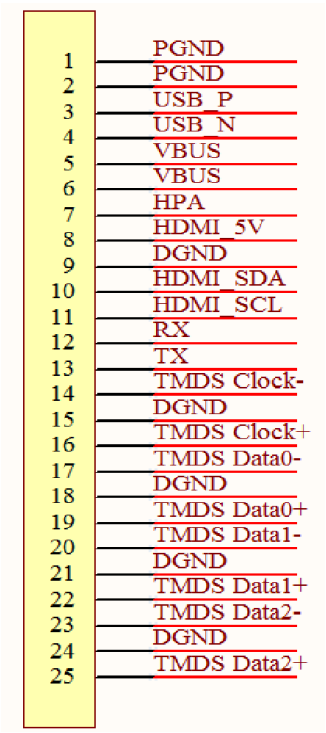
Mechanic dimension

Dimension (L×W)	31mm×31mm
Display center is accord to driver board center	

Note: Only applies to the SXGA series.

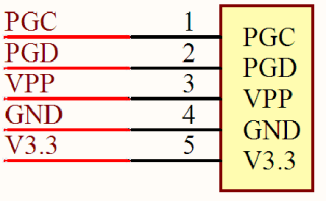
Interface and pin definition

No.	Name	Function	Voltage level
1,2	PGND	Power Ground	0V
3	USB_P	USB Data+	0~3.3V
4	USB_N	USB Data-	0~3.3V
5,6	VBUS	Power Input	5V
7	HPA	Hot Plug Detect	0/5V
8	HDMI_5V	HDMI 5V Power	5V
9	DGND	Digital Ground	0V
10	HDMI_SDA	DDC Data	0/5V
11	HDMI_SCL	DDC Clock	0/5V
12	RX	USART Receive	0/3.3V
13	TX	USART Transmit	0/3.3V
14	TMDS Clock-	Clock- Input-	0~3.3V
15	DGND	Digital Ground	0V
16	TMDS Clock+	Clock+ Input+	0~3.3V
17	TMDS Data0-	Data0 Input-	0~3.3V
18	DGND	Digital Ground	0V
19	TMDS Data0+	Data0 Input+	0~3.3V
20	TMDS Data1-	Data1 Input-	0~3.3V
21	DGND	Digital Ground	0V
22	TMDS Data1+	Data1 Input+	0~3.3V
23	TMDS Data2-	Data2 Input-	0~3.3V
24	DGND	Digital Ground	0V
25	TMDS Data2+	Data2 Input+	0~3.3V



HDMI&USB

No.	Name	Function	Voltage level
1	PGC	Programming Clock	0/3.3V
2	PGD	Programming Data	0/3.3V
3	VPP	Programming Power	0/3.3V
4	GND	Power Ground	0V
5	V3.3	3.3V Power Output	3.3V



J1

*Note：1. The type of HDMI&USB connector is **I-PEX CABLINE-V-25pin**.*

2. J1 is not soldering.

Communication description

User should not connect the USART port to the PC directly since it works in CMOS 3.3V standard. User can get the PC's USB device driver from our marketing department.

USB&USART communication interface support master controller to modify the registers of the display, decoder and EEPROM. The changes of the decoder and display will effect immediately, but it will not saved, unless modify the configurations saved in the EEPROM.

*Every command must be sent in 200ms (USB)/400ms (USART) and total bytes must be less than **37 bytes**.*

Communication mnemonic symbol

	HEX Code	Signification
Command	10H	Read version
	11H	Read IIC slave
	12H	Read Gamma
	13H	Read EEPROM
	21H	Write IIC slave
	22H	Write Gamma
	23H	Write EEPROM
	24H	Adjust Vcom
	40H	TC Switch
	55H	Reset
	80H	Restore
	AAH	Boot mode
Display Address	1EH	SXGA Series
Gamma Channels	11H	Red Channel
	14H	Green Channel
	17H	Blue Channel
Decoder Address	98H	IOMAP
	80H	CECMAP
	7CH	INFOMAP
	6CH	EDIDMAP
	68H	HDMIMAP
	64H	KSVMAP
	4CH	DPLLMAP
	44H	CPMAP

Mnemonic		Signification
Symbol	HEX code	
STX	02H	Start code
ETX	03H	End coder
ACK	06H	Command success
NAK	07H	Command fail
cErr_Head	F0H	Start code error
cErr_End	F1H	End code error
cErr_CMD	F2H	Unknown command
cErr_DataLen	F3H	Command length error
cErr_Frame	F4H	Command Structure error
cErr_TimeOut	F5H	Command over time
cErr_SlaveAddr	F6H	Unknown IIC address
cErr_GammaCH	F7H	Unknown gamma channel

Note：Before sending command, user should check whether the last one had been completed (whether the master controller received the ETX from the MCU).

Command usage

1. Read command

STX＋CMD＋Length＋SlaveAddr＋RegAddr＋DataLen＋ETX

Length

1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
STX	CMD	Length	SlaveAddr	RegAddr	DataLen	ETX
02	10/11/12/13	04	00~FF	00~FF	00~FF	03

Note:

a) SlaveAddr should be the IIC slave address when CMD is 0x11, otherwise it must be 0x00;

b) RegAddr should be the Gamma channel when CMD is 0x12,one channel per command ;

c) It means 256 bytes when DataLen is 0x00.

Example:

Read version → 02 10 04 00 xx xx 03

Read display → 02 11 04 1E RegAddr DataLen 03

Read IOMAP → 02 11 04 98 RegAddr DataLen 03

Read Gamma → 02 12 04 00 RegAddr xx 03

Read EEPROM → 02 13 04 00 RegAddr DataLen 03

Response:

STX＋CMD＋ACK＋(SlaveAddr)＋DataLen＋$Data_0$＋……＋$Data_N$＋ETX

DataLen

1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	…	1Byte	1Byte
STX	CMD	ACK	SlaveAddr	DataLen	Data0	…	DataN	ETX
02	10/11/12/13	06	00~FF	00~FF	00~FF	…	00~FF	03

Note:

a) It will return the IIC slave address when CMD is 0x11, otherwise no return;

b) The data is composed of two bytes when CMD is 0x12;

c) It means 256 bytes when DataLen is 0x00.

Example:

Read version → 02 10 06 DataLen $Data_0$ … $Data_N$ 03

Read slave → 02 11 06 SlaveAddr DataLen $Data_0$ … $Data_N$ 03

Read gamma → 02 12 06 DataLen $Data_0$ … $Data_N$ 03

($Highbyte_0$, $Lowbyte_0$) ($Highbyte_N$, $Lowbyte_N$)

Read EEPROM → 02 13 06 DataLen $Data_0$ … $Data_N$ 03

2. Write command

STX＋CMD＋Length＋SlaveAddr＋Add_0＋$Data_0$＋…＋Add_N＋$Data_N$＋ETX

Length

1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	…	1Byte	1Byte	1Byte
STX	CMD	Length	SlaveAddr	Add0	Data0	…	AddN	DataN	ETX
02	21/22/23/24	04~21	00~FF	00~FF	00~FF	…	00~FF	00~FF	03

Note:

a) SlaveAddr should be the IIC slave address when CMD is 0x21, otherwise it must be 0x00;

b) When CMD is 0x22, the gamma value=(Add0,Data0);

c) When CMD is 0x24, Add0 is the virtual value.

Example:

Write display → 02 21 Length 1E Add_0 $Data_0$ Add_1 $Data_1$ … Add_N $Data_N$ 03

Write IOMAP → 02 21 Length 98 Add_0 $Data_0$ Add_1 $Data_1$ … Add_N $Data_N$ 03

Write gamma → 02 22 04 00 Highbyte LowByte 03

Write EEPROM → 02 23 Length 00 Add_0 $Data_0$ Add_1 $Data_1$ … Add_N $Data_N$ 03

Write Vcom → 02 24 04 00 Value xx 03

Response:

STX＋CMD＋Length＋ACK＋ETX

Length

1Byte	1Byte	1Byte	1Byte	1Byte
STX	CMD	Length	ACK	ETX
02	21/22/23/24	02	06	03

Example:

Write slave → 02 21 02 06 03

Write gamma → 02 22 02 06 03

Write EEPROM → 02 23 02 06 03

Write Vcom → 02 24 02 06 03

3. Other Command

1) Temperature compensation switch

Command → 02 40 04 xx xx Switch 03

Response → 02 40 02 06 03

Note: Turn on: Switch = 01H Turn off: Switch = 00H

2) Reset

Command → 02 55 04 00 xx xx 03

Response → 02 55 02 06 03

3) Restore

Command → 02 80 04 00 xx xx 03

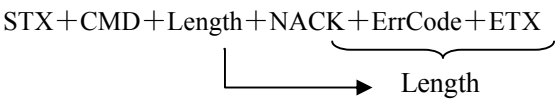
Response → 02 80 02 06 03

4) Bootloader

Command → 02 AA 04 00 55 55 03

Response → 02 AA 02 06 03

4. Error response



1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
STX	CMD	Length	NACK	ErrCode	ETX
02	XX	03	07	F0~F7	03

Example:

Start code error → 02 CMD 03 07 F0 03

End code error → 02 CMD 03 07 F1 03

Unknown command → 02 CMD 03 07 F2 03

Command length error → 02 CMD 03 07 F3 03

Command structure error → 02 CMD 03 07 F4 03

Command over time → 02 CMD 03 07 F5 03

Unknown IIC address → 02 CMD 03 07 F6 03

Unknown gamma channel → 02 CMD 03 07 F7 03

MECHANICAL CHARACTERISTICS

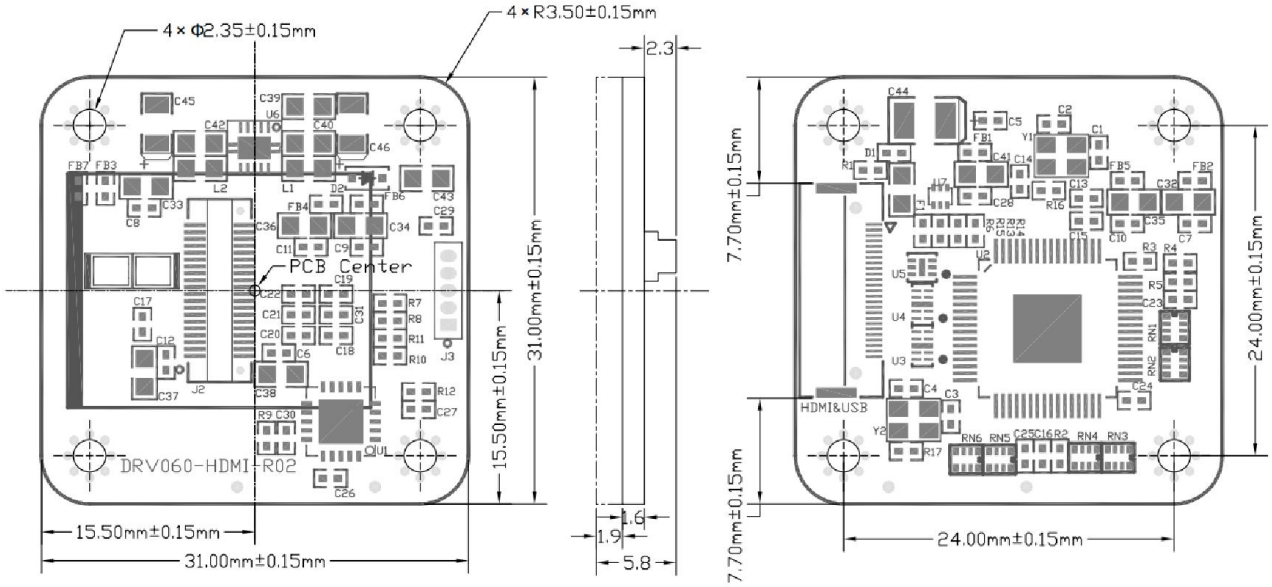
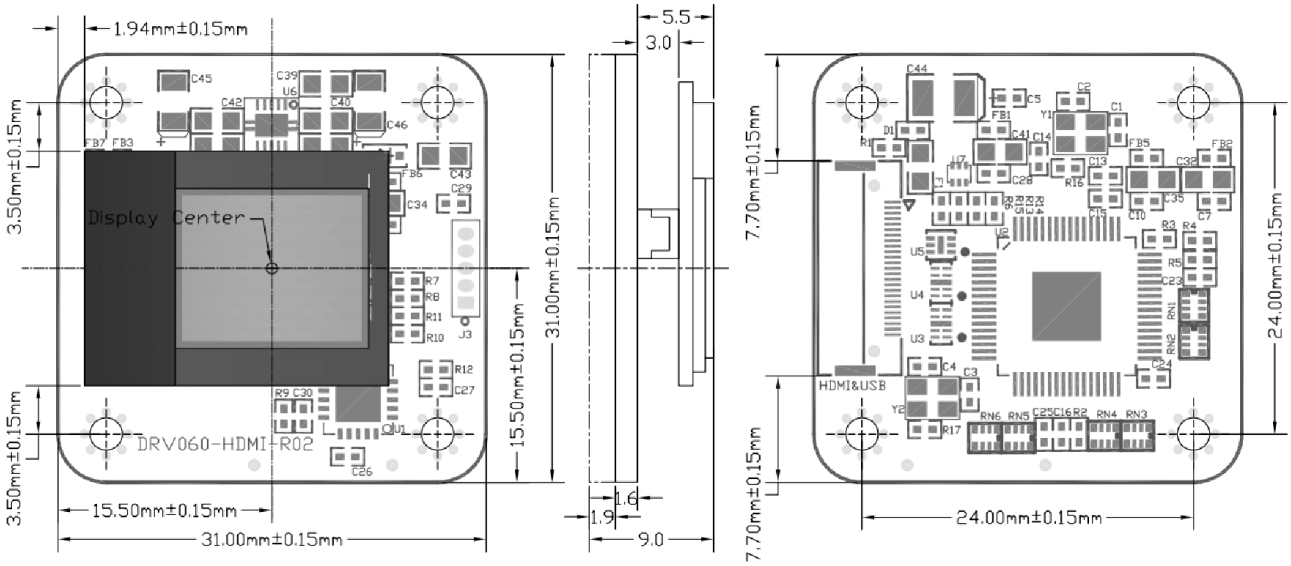


Diagram of mechanism



Installation diagram with SXGA060 OLED

Accessories

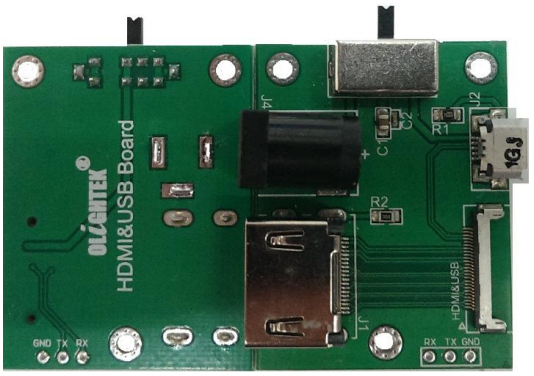
1. 25Way Cable (Necessary)

The type of the cable is *I-PEX 200mm CABLINE-V 25Way*. It is necessary for all users.

CABLINE-V 25Way

2. HDMI&USB board (Optional)

It is mainly used to test the driver board. Users can easily switch in the HDMI and USB bus. It also supports to select power supply between DC 5V and USB.

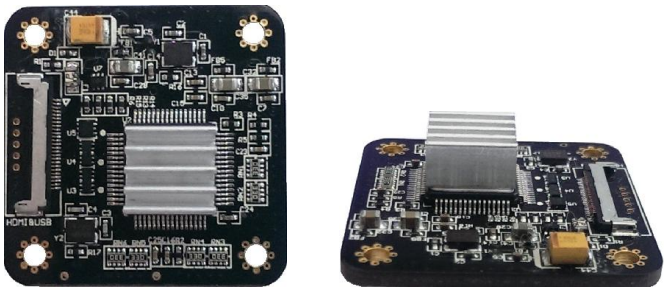


HDMI&USB board

Note: it will not apply to the DRV060-HDMI-R01 driver board.

3. Heat sink (Optional)

Heat sink can volatilize heat effectively. It need to apply especially when the resolution higher than 800×600@60Hz.

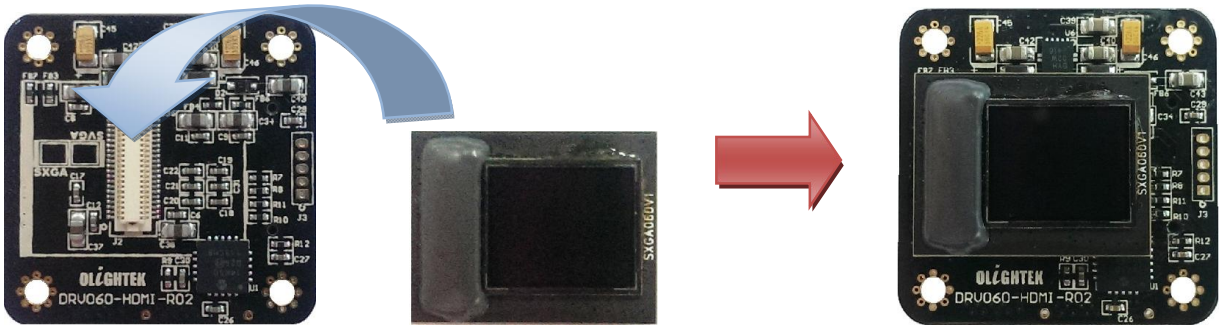


Heat sink

Note: 1.The heat sink size: 8.8mm×8.8mm×5mm.

Accessories Usage

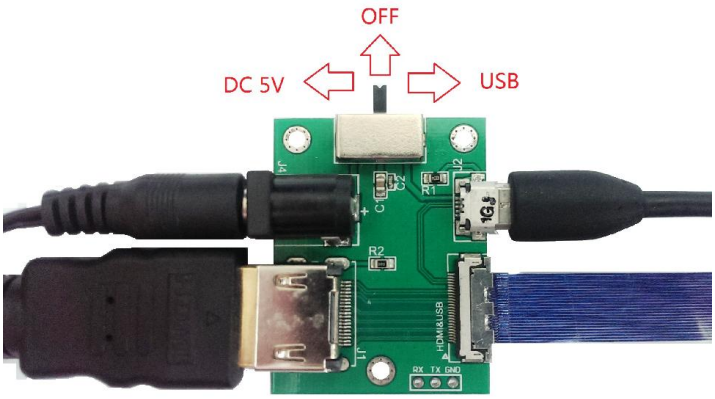
1. Display installation



Installation diagram

Note: Only applies to SXGA and DRV060-HDMI-R02 driver board

2. HDMI&USB board



Using diagram

Note: The TxD and RxD of USART have been reserved on the HDMI&USB board.