

Documnt Number: DDS-13-017

DRV097-CV-R03 CVBS Drive Board

User manual

Ver 1.0

For Products:

SVGA097SC — Full Color

SVGA097SW — Monochrome White

SVGA097SG — Monochrome Green

Ecor Tech Co.,.Ltd

November 1, 2013

Record of Revision

Revision	Revise Date	Page	Content
Ver 1.0	November 1,2013		

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User manual

Features

- Multi-format composite video input (default is PAL)
- Low power consumption
- Industrial temperature grade ($-40^{\circ}\text{C} \sim +65^{\circ}\text{C}$)
- Wide power supply (5V & 5.5V ~ 17V)
- Custom Re-configurable

General description

DRV097-CV-R03 is an analog composite video input driver board for SVGA097 OLED microdisplay. The low power consumption decoder can automatically detect and convert standard analog baseband television signals compatible with worldwide NTSC, PAL, and SECAM standards into digital YCbCr4:2:2 component video data compatible with the 8-bit ITU-R BT.656 interface standard. Default driver board setting is PAL input, and the resolution is 768×576 , support mono or color signal.

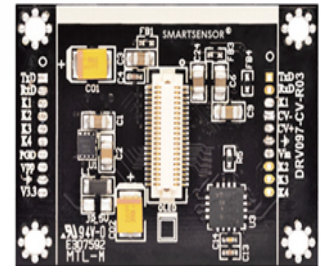
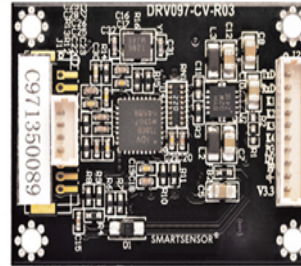
The display center is accord to the driver PCB center, convenient for design and set up optical system.

The six input pins allow user to adjust the brightness, contrast of the display. One CMOS standard serial communication interface allow user to configure all register of the Decoder and Display. So user can re-configure the driver board flexible.

Low-noise, low-dropout DC/DC convertor can support 5V-17V wide input voltage..

Power and consumption

Input voltage	DC 5V & 5.5V ~ 17V
Typical power consumption	500mW (Include display)



Input video signal

Video signal	Composite video
Voltage level	0 ~ 1.0 Vpp
Input resistor	75Ω
Output (PAL)	768 × 576

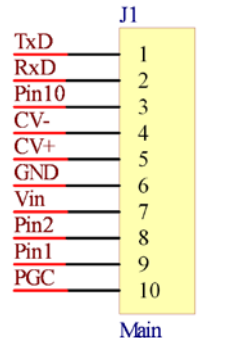
Interface (3.3V CMOS standard)

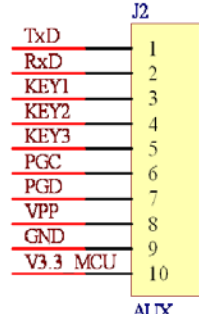
I/O definition (active low)	Function
KEY1	Reduce Signal Contrast(--)
KEY2	Increase Brightness(++)
KEY3	Reduce Brightness(--)
KEY4	Increase Signal Contrast(++)
TxD/RxD	CMOS 3.3V RS232 interface
COMS Setting	9600/N/8/1

Mechanic dimension

Dimension (L × W)	36mm × 26mm
Display center is accord to drive PCB center	

Interface and pin definition

No.	Name	Function	Voltage level	
1	TxD	RS232 Send Pin	0/3.3V	
2	RxD	RS232 Received Pin	0/3.3V	
3	KEY1	ReduceSignal Contrast	0/3.3V	
4	CV-	Video input-	0v	
5	CV+	Video input+	0~1.0Vpp	
6	GND	Power ground	0V	
7	Vin	Power input	5~17V	
8	KEY2	Increase Brightness	0/3.3V	
9	KEY3	Reduce Brightness	0/3.3V	
10	PGCLK/KEY4	Increase Signal Contrast	0/3.3V	

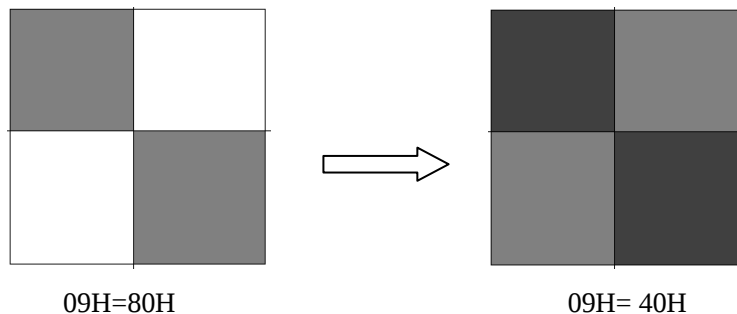
No.	Name	Function	Voltage level	
1	TxD	RS232 Send Pin	0/3.3V	
2	RxD	RS232 Received Pin	0/3.3V	
3	KEY1	ReduceSignal Contrast	0/3.3V	
4	KEY2	Increase Brightness	0/3.3V	
5	KEY3	Reduce Brightness	0/3.3V	
6	PGCLK/ KEY4	Increase Signal Contrast	0/3.3V	
7	PGDATA	Reserved	0/3.3V	
8	Reset	MCU reset	0/3.3V	
9	GND	I/O Gnd	0V	
10	Vcc(3.3V)	3.3V Power Output	3.3V	

Note: It remarks the first pin as “○” in the Connector

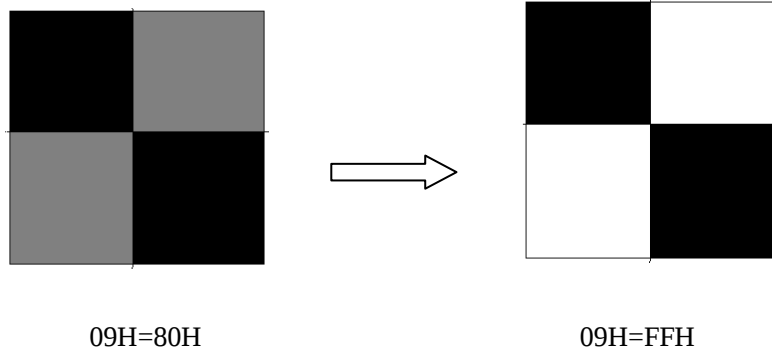
Function key description

All of the Keys are active low pulse, and must be not less than 20ms. If the low pulse is more than 20ms, MCU will do the same operate continually by every 20ms.

KEY1: Decrease display 09H register: (09H) --, adjust range is 00H~ FFH. It's effect to adjust the brightness of input video signal, from brightest to darkest.



The comparison picture of reducing contrast



The comparison picture of increasing contrast

KEY2: Only when temperature compensation disabled, Decrease Display 19H register value: (19H)--, adjust range is 30H~ FFH. If (19H) less than 30H, then recover to FFH. It's effect to adjust Display common cathode voltage, and make the Display brightness change from darkest (FFH) to brightest (30H).

KEY3: Only when temperature compensation disabled, Increase Display 19H register value: (19H)++, adjust range is 30H~ FFH. If (19H) less than 30H, then recover to FFH. It's effect to adjust Display common cathode voltage, and make the Display brightness change from brightest (30H) to darkest (FFH).

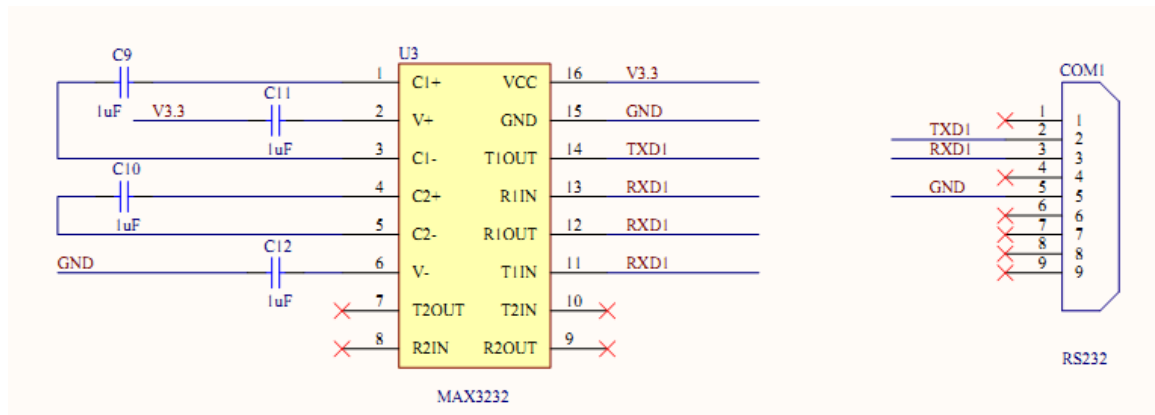
KEY4: Increase display 09H register: (09H) ++, adjust range is 00H~ FFH. It's effect to adjust the brightness of input video signal, from darkest to brightest.

$$\text{Output} = \text{Input} \times (\text{Reg}(09\text{H}) / 80\text{H})$$

Reg(09H)	Result
00H	Black screen
80H	Signal is no change
FFH	Twice the gain of signal contrast

Communication description

Communication interface support master controller to read/write the register value of Display, Decoder and EEPROM. The change of the Decoder and Display will effect immediately, but when power down or reset, it will lost. The change of the EEPROM is equal to modify the default setting, will effect after power up in next time or reset. We have to make a board which used for voltage transform like below max3232 :



Note: RxD and TxD pin are work in COMS 3.3V standard, it cannot connect to PC RS232 port directly.

Every command must be sending in 600ms and total bytes must be less than 64 bytes, otherwise, will receive the error code.

Common Command

(1) Read display brightness 02 11 03 19 01 03

Succeed Response 02 11 03 06 XX 03 (XX is the brightness value)

(2) Modify the display contrast 02 21 03 09 XX 03

(XX is the value which we want to set, adjust range is 00H~FFH)

(3) Modify the brightness of display 02 24 03 00 XX 03

(XX is the value which we want to set, Adjust range is 00H~FFH, and the 00H is more dark than FFH.)

Note: After send this command, the brightness change of the Display will effect immediately, it save the setting in EEPROM at the same time.

(4) Modify the display scan direction 02 21 03 10 XX 03

(XX is the value which we want to set, adjust range is 00H~03H, the default setting is 00H)

Up-Down mirror 02 21 03 10 02 03

Left-Right mirror 02 21 03 10 01 03

Up-Down and Left-Right mirror 02 21 03 10 03 03

(5) Open temperature compensation(TC) 02 43 03 01 00 03

Close temperature compensation (TC) 02 43 03 00 00 03

Note: The setting will effect immediately, but when power down or reset, it will lost. If you want to save the setting of TC, please modify the register DEH and D0H, D0H is the checksum register. The default setting is open TC.)

(6) Resume the factory setting 02 80 03 00 00 03

(7) Reset 02 55 03 00 00 03

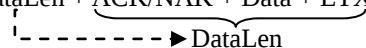
Note: If you want to set other registers and save the setting in EEPROM, you must modify the checksum register. we do not propose to adjust the other registers.

Communication mnemonic symbol

Mnemonic	Code(Hex)	Signification	Error Code		Signification
			Mnemonic	Code(Hex)	
STX	02h	Start symbol	Err_Head	F0h	Start symbol error
ETX	03h	End symbol	Err_End	F1h	End symbol error
ACK	06h	ACK symbol	Err_CMD	F2h	CMD symbol error
NAK	07h	NAK symbol	Err_DataLen	F3h	Data Length error
CMD	00h	Read soft version	Err_Frame	F4h	Frame error
	11h	Read Display	Err_FIFO	F5h	FIFO overflow
	12h	Read Decoder	Err_RxProc	F6h	CMD process error
	13h	Read EEPROM	Err_TimeOut	F7h	CMD timeout
	21h	Write Display	Err_Waiting	F8h	CMD not finished
	22h	Write Decoder	Err_Unknow	FFh	Unknown CMD
	23h	Write EEPROM			
	24h	Write Brightness of display			
	30h	Switch PAL to NTSC			
	31h	Switch NTSC to PAL			
	41h	Reset display			
	42h	Reset decoder			
	43h	Open/Close temperature compensation			
	55h	Reset			
	80h	Resume factory setting			

Communication command formatting

Send: STX + CMD + DataLen + Data + ETX


Response: STX + CMD + DataLen + ACK/NAK + Data + ETX


Command usage

1. Read command (All command are fixed in 6 bytes)

Send:

STX	CMD	Length	Add0	ReadLen	ETX
02	00/11/12/13	03	00~FF	01~FF	03

SucceedResponse:

STX	CMD	Length	ACK	Data0		Datan	ETX
02	00/11/12/13	03~FF	06	00~FF		00~FF	03

Error Response:

STX	ErrCode	Length	NAK	ETX
02	F0~FF	02	07	03

Read command examples:

Read Display register from 00H to 0FH: 02 11 03 00 10 03

Read Decoder register from 00H to 20H: 02 12 03 00 21 03

2. Write Command ($6 \leq \text{Total Bytes} \leq 64$)

Send:

STX	CMD	Length	Add0	Data0		Addn	Datan	ETX
02	21/22/23	03~3C	00~FF	00~FF		00~FF	00~FF	03

SucceedResponse:

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

Error Response:

STX	ErrCode	Length	NAK	ETX
02	F0~FF	02	07	03

Write command example:

Write Display register (01H) = 41H, (19H) = A0H: 02 21 05 01 41 19 A0 03

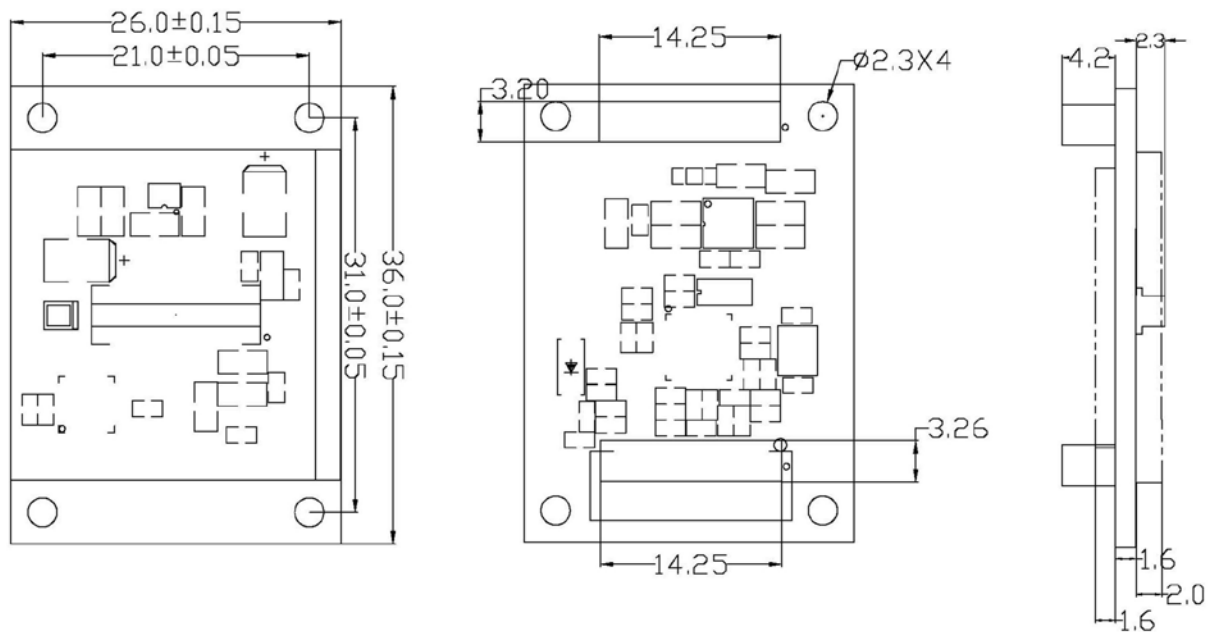
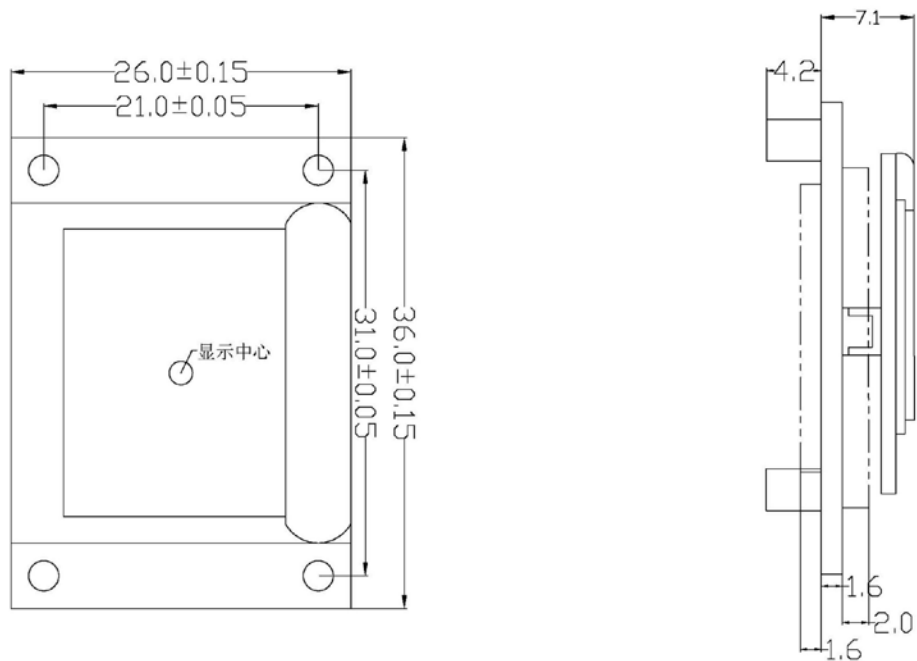
MECHANICAL CHARACTERISTICS

Diagram of mechanism



Installation diagram with SVGA097 OLED