

Technical Reference Specification

**MULTI INTERFACE CONTROLLER
FOR TFT LCD**

Model: HDL-00TS

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1. FEATURES

- State of the art high performance picture quality and low cost design
- Supports DVI input format
- Supports Analog RGB Input format
- Full CRT multi-sync monitor compatibility
- Multi-sync capability up to SXGA resolution @ 75Hz(DVI @60Hz), compatible standard
- DOS, VGA, SVGA, XGA and SXGA VESA timing
- Expand DOS, VGA, SVGA and XGA,SXGA,UXGA,WUXGA(option) to full screen display
- True color (16.7M) data processing and display driving
- Single control operated On-Screen-Display (hereafter "OSD") user interface
- Full control of all relevant display and interface parameters via OSD
- Multi language support
- VESA DDC 1/2B compliant
- Compatible with VESA DPMS power saving modes
- Low power consumption: operating 45W, power save 2W
- Small form factor: 110 x 75 mm
- +12VDC single power: 54 watts AC/DC power adapter recommended
- Operation temperature: 0 to 50 °C
- Operating Stereo 2W+2W Audio(Optional)

2. GENERAL DESCRIPTION

VS-00TS is an advanced TFT LCD Monitor Control Board.

This design enables a full conventional CRT monitor replacement with a large size Active Matrix LCD module.

It is suitable for video resolution up to WUXGA @ 60Hz(DVI @60Hz) in all video modes the full display area of the module is used.

The design is implemented as a single printed circuit board.

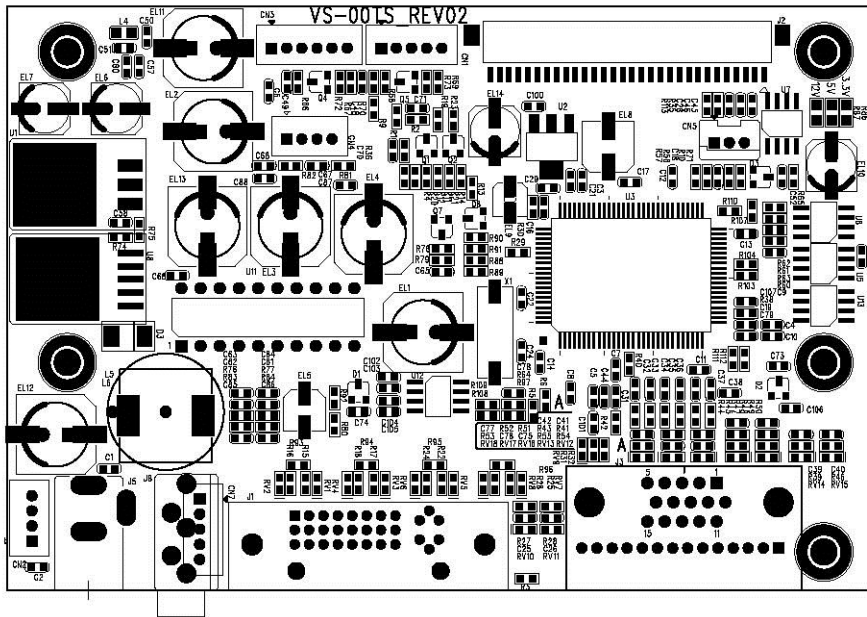
As the VS-00TS is designed to act as a full monitor interface besides the main functionality of an analog also various appealing On-Screen-Display Menu layouts are possible on customer's request.

It is VS-00TS designed to support various TFT LCD under the WUXGA resolution by BIOS option, customer's line-up their monitors with their own identity with following options.

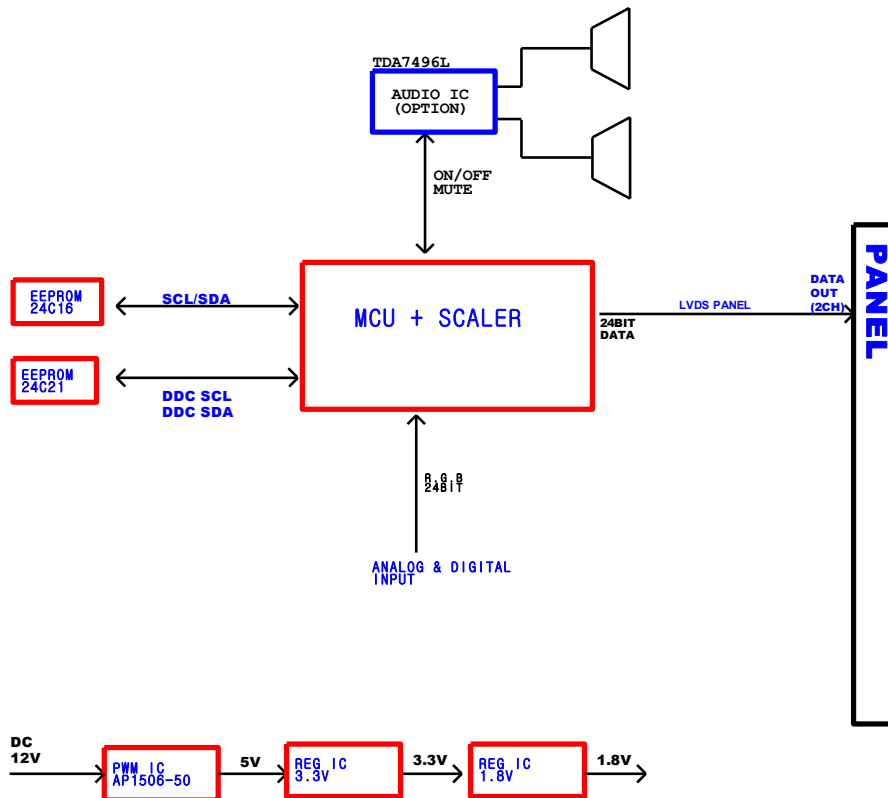
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3. PICTURES

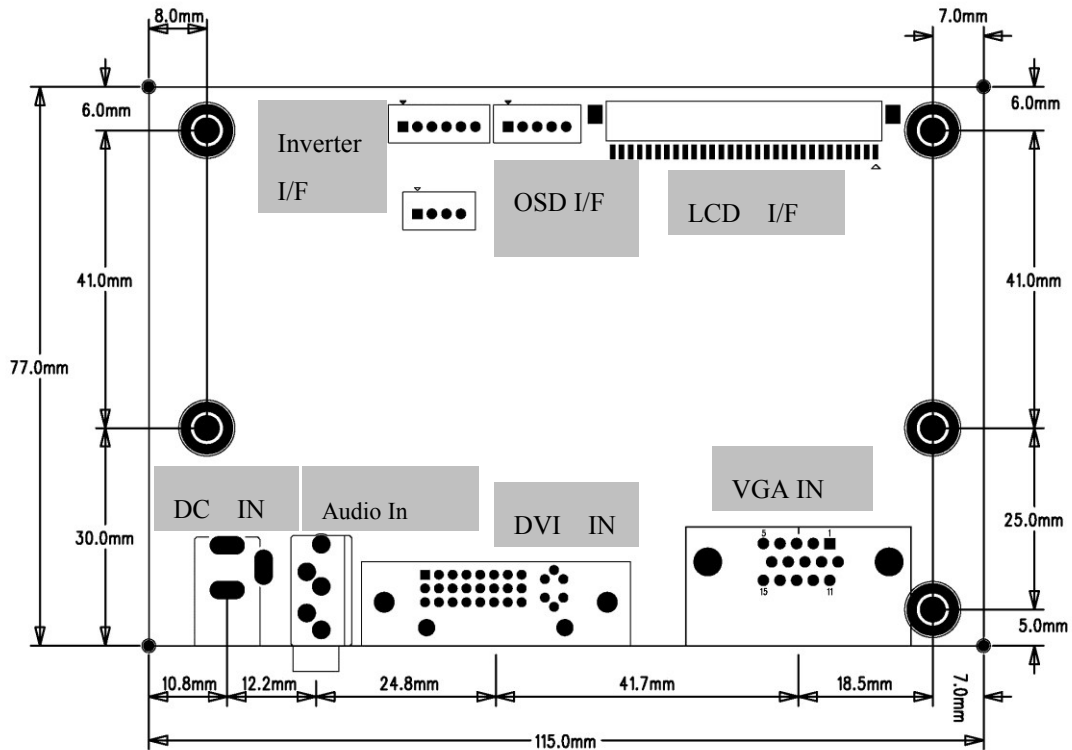


4. BLOCK DIAGRAM



5. PINNING INFORMATION

5.1. DIMENSION & CONNECTORS



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5.2. ELECTRICAL CONNECTORS

NO	Service	Maker	Part number	Description	Mating Housing
5.3.1	LCD I/F(LVDS)	YEON HO	12507WR-30P	1.25mm, 30P, R/A	YEON HO / 12507HS-30
5.3.2	VGA IN	P.D	PD526A-151100	15p R/A	Standard VGA cable(Male)
5.3.3	DC IN	S.C	PD527A-2111	2.5Ø,DC-JACK	2.5pi, DC Adapter
5.3.4	OSD I/F	YENHO	SMW200-05	2mm, 5PIN S/T	YENHO / SMH200-05
5.3.5	INVERTER I/F	YENHO	SMW200-06	2mm, 6PIN S/T	YENHO / SMH200-06
5.3.6	AUDIO IN	S.C	PJ324B-5P	3.5 Ø ,5PIN R/A	PHONE JACK
5.3.7	DVI IN	LEOCO	DVI-(24+1)-R	24PIN R/A	Standard DVI cable(Male)
5.3.8	SPEAKER OUT	YENHO	20017WS-04	2mm,04P ,S/T	YENHO / 20017HS-05
5.3.9	TOUCH VCC	YENHO	SMW200-02	2mm, 02PIN S/T	YENHO / SMH200-02
5.3.10	VCC IN	YENHO	SMW200-04	2mm, 04PIN S/T	YENHO / SMH200-04
5.3.11	AUDIO IN	YENHO	SMW200-04	2mm, 04PIN S/T	YENHO / SMH200-04

5.3. PIN CONNECTIONS

5.3.1 LCD I/F (LVDS) – CN201

Pin no.	Function	Pin no.	Function	Pin no.	Function
1	Vcc	11	Clock OUT_M(ODD)	21	Y3M(EVEN)
2	Vcc	12	Y2P(ODD)	22	Clock OUT_P(EVEN)
3	Vcc	13	Y2M(ODD)	23	Clock OUT_M(EVEN)
4	NC	14	GND	24	GND
5	NC	15	Y1P(ODD)	25	Y2P(EVEN)
6	GND	16	Y1M(ODD)	26	Y2M(EVEN)
7	GND	17	GND	27	Y1P(EVEN)
8	Y3P(ODD)	18	Y0P(ODD)	28	Y1M(EVEN)
9	Y3M(ODD)	19	Y0M(ODD)	29	Y0P(EVEN)
10	Clock OUT_P(ODD)	20	Y3P(EVEN)	30	Y0M(EVEN)

5.3.2 VGA IN – J301

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	RED	6	GND	11	NC
2	GREEN	7	GND	12	DDC_SDA
3	BLUE	8	GND	13	HSYNC
4	NC	9	NC	14	VSYNC
5	GND	10	CHECK SIGNAL	15	DDC_SCL

5.3.3 DC-IN – J101

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	GND	2	12V	3	GND

5.3.4 OSD I/F – CN301

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	RED	3	GND	5	KEY0
2	GREEN	4	KEY1		

5.3.5 INVERTER IN – CN102

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	12V	3	GND	5	On/off
2	5V	4	GND	6	GND

5.3.6 AUDIO IN – J401

Pin no.	Function	Pin no.	Function	Pin no.	Function	Pin no.	Function	Pin no.	Function
1	GND	2	AUDIO-L	3	GND	4	AUDIO-R	5	GND

5.3.7 DVI IN – J302

Pin no.	Function	Pin no.	Function	Pin no.	Function	Pin no.	Function
1	DATA2-	7	DDC2 SDA	13	NC	19	GND
2	DATA2+	8	NC	14	+5V	20	NC
3	GND	9	DATA1-	15	GND	21	NC
4	NC	10	DATA1+	16	NC	22	GND
5	NC	11	CABLE DET	17	DATA0-	23	CLK-
6	DDC2 SCL	12	NC	18	DATA0+	24	CLK+

5.3.8 AUDIO OUT – CN401

Pin no.	Function	Pin no.	Function	Pin no.	Function	Pin no.	Function
1	OUT-L	2	GND	1	OUT-R	2	GND

5.3.9 TOUCH VCC – CN103

Pin no.	Function	Pin no.	Function
1	GND	2	VCC-5V

5.3.10 VCC IN – CN101

Pin no.	Function	Pin no.	Function	Pin no.	Function	Pin no.	Function
1	12V	2	12V	3	GND	4	GND

5.3.11 AUDIO IN – CN3

Pin no.	Function	Pin no.	Function	Pin no.	Function	Pin no.	Function
1	AUDIO-L	2	GND	3	AUDIO-R	4	GND

6. REFERENCE DATA

6.1. LIMITING VALUES

Symbol	Description	Min	Max	Unit
VDD	+12V DC Power supply	11.4V	12.6V	V
IDD	Input current	0.0	+4.5	A
V _i (RGB)	Video input signal	-0.3	+3.0	VDC

6.2. FEATURES

Parameter	Value	Unit
Overall dimensions		
Width	110	mm
height	75	mm
Depth (from PCB bottom)	15.5	mm
Max. output resolution	1920 x 1200	pixel
Data processing	8 x 3	bits
Input impedance		
Video	75	ohm
Sync	-	ohm
Sync polarities	+/-	
Sync levels	LVDS	
Supply voltage	12.0V	V DC
Max. number of colors	16.7M	colors
Operating temperature	0 ~ 50	°C
Storage temperature	-20 ~ 70	°C

6.3. ELECTRICAL PARAMETERS

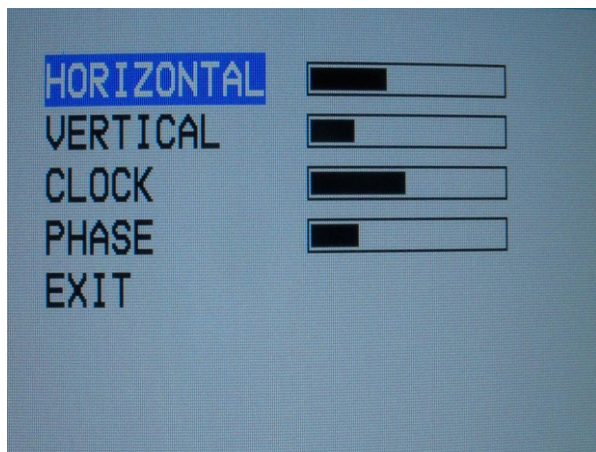
6.3.1 General Description

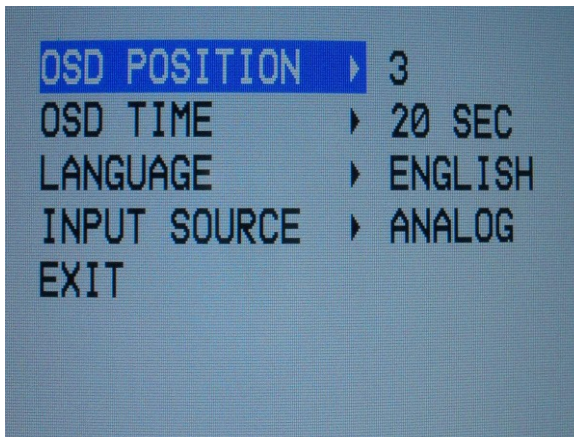
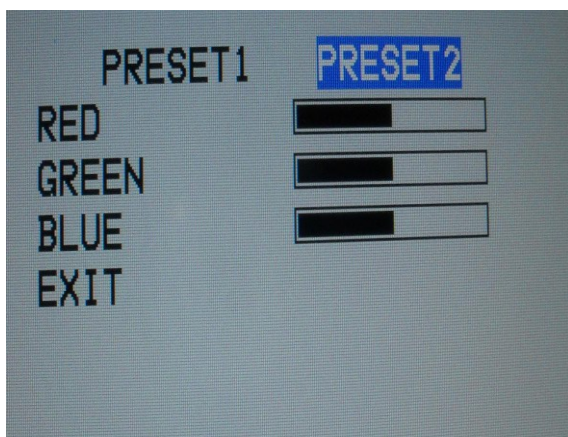
Symbol	Description	Min	Typ	Max	Unit
VDD	+12V DC Power supply	10	12	14	V
V I(RGB)	Video input signal(w.r.t. GND)	0.5	0.7	1.0	Vpp
fS	Video sample rate			135	MHz
fHS	Horizontal sync frequency	30		81	KHz
fVS	Vertical sync frequency	50		75	Hz
FSIH	Sync input high level	3.3			V
VSIL	Sync input low level			0.8	V
IDD1	Supply current +12V(w/o inverter, w/o LCD,AUDIO ON)		56		W
IDD2	Supply current +12V (with LCD & inverter, AUDIO ON)		32		W
IDDPS1	Supply current (w/o LCD & inverter, power save)		2.4		W
IDDPS2	(with LCD & inverter, power save)		2.6		W

7. Setup for Operation

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 5 buttons OSD operation as a standard. The control functions defined on OSD operation are as below.

1) Functions on OSD Menu

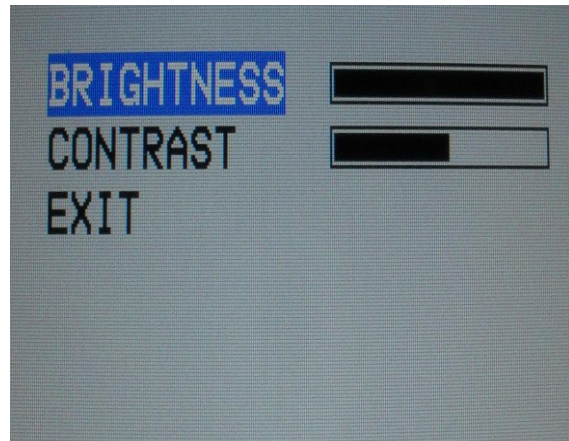




OSD MENU	Description
Auto Adjustment	Automatically adjust the Horizontal position, Vertical position, Horizontal size, and Phase Window's background or characters should be displayed on your Full screen prior to proceed this function.
Horizontal Position	Adjust the horizontal position of the screen's image
Vertical Position	Adjust the vertical position of the screen's image
Horizontal Size(Clock)	Adjust the horizontal size of the screen's image
Phase	Adjust the focus of the screen's image
Brightness	Adjust the brightness of the screen
Contrast	Adjust the contrast of the screen
Color	9300 and 6500 Temperature and user Temperature, Red, Green & Blue
Language	Select one of the 5 'th language (Korean, English, French, German, Spanish)
Audio	Adjust the volume of the screen

2) Hotkey Function Definition

DOWN	Brightness
UP	Volume
SELECT	Auto Adjustment / DVI & VGA Change / Select
MENU	OSD Menu / Exit



8. Applicable Graphic Mode

The microprocessor measures the H-sync, V-sync and V-sync/H-sync polarity for RGB inputs, and uses this timing information to control all of the display operation to get the proper image on a screen.

This board can detect all VESA standard and MAC Graphic modes shown on the table below and provide more clear and stable image on a screen.

Table 8.1) ANALOG RGB Input format

Spec. Mode	Pixel Freq. MHz	Horizontal Timing				Vertical Timing			
		Sync Polar	Freq.	Total	Active	Sync Polar	Freq.	Total	Active
			KHz	Pixel	Pixel		Hz	Line	Line
640x350 @70Hz VESA	25.144	P	31.430	800	640	N	70.000	449	350
720x400 @70Hz VESA	28.287	N	31.430	900	720	P	70.000	449	400
640x480 @60Hz MAC	25.175	N	31.469	800	640	N	59.940	525	480
640x480 @60Hz VESA	25.175	N	31.469	800	640	N	59.940	525	480
640x480 @67Hz MAC	30.240	N	35.000	864	640	N	66.667	525	480
640x480 @72Hz VESA	31.500	N	37.861	832	640	N	72.809	520	480
640x480 @75Hz VESA	31.500	N	37.500	840	640	N	75.000	500	480
832x624 @75Hz MAC	57.284	N	49.726	1152	832	N	74.551	667	624
800x600 @56Hz VESA	36.000	P	35.156	1024	800	P	56.250	625	600
800x600 @60Hz VESA	40.000	P	37.879	1056	800	P	60.317	628	600
800x600 @72Hz VESA	50.000	P	48.077	1040	800	P	72.188	666	600
800x600 @75Hz VESA	49.500	P	46.875	1056	800	P	75.000	625	600
1024x768 @60Hz VESA	65.000	N	48.363	1344	1024	N	60.005	806	768
1024x768 @60Hz MAC	64.000	N	48.780	1312	1024	N	60.001	813	768
1024x768 @70Hz VESA	75.000	N	56.476	1328	1024	N	70.070	806	768
1024x768 @75Hz MAC	80.000	N	60.241	1328	1024	N	74.927	804	768
1024x768 @75Hz VESA	78.750	P	60.023	1312	1024	P	75.030	800	768
1280x1024 @60Hz VESA	108.000	P	63.981	1688	1280	P	60.020	1066	1024
1280x1024 @70Hz VESA	125.000	N	74.405	1680	1280	N	69.995	1063	1024
1280x1024 @75Hz VESA	135.000	P	79.976	1688	1280	P	75.025	1066	1024

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Table 8.2) DVI RGB Input format

Mode \ Spec.	Pixel Freq.	Horizontal Timing				Vertical Timing			
		Sync Polar	Freq.	Total	Active	Sync Polar	Freq.	Total	Active
	MHz		KHz	Pixel	Pixel		Hz	Line	Line
640x480 @60Hz VESA	25.175	N	31.469	800	640	N	59.940	525	480
800x600 @56Hz VESA	36.000	P	35.156	1024	800	P	56.250	625	600
800x600 @60Hz VESA	40.000	P	37.879	1056	800	P	60.317	628	600
1024x768 @60Hz VESA	65.000	N	48.363	1344	1024	N	60.005	806	768
1280x1024 @60Hz VESA	108.000	P	63.981	1688	1280	P	60.020	1066	1024

9. Appendix

This board can support various LCD panels, which has VGA, SVGA and XGA, SXGA, WUXGA resolution. The table below shows the model names of LCD panel, jumper setting for LCD power for each LCD panel that can work with This B/D, up to the "updated date". And We will try continuously to add the model names of the LCD panel that have been tested.

Table 9.1) Tested LCD Panel List

N0	Model Name	LCD Vendor	VCC	Remarks
1	LM170E01-(TLA5)	LG.PHILIPS	+5V	17.0Inch,2CH,LVDS
2	LM190E03-(TLBA)	LG.PHILIPS	+5V	19.0Inch,2CH,LVDS
3	LTM190EX-L01	SAMSUNG	+5V	19.0Inch,2CH,LVDS ("S" TYPE)
4	LTM190EX-L04	SAMSUNG	+5V	19.0Inch,2CH,LVDS
5	M170EG01	AUO	+5V	17.0Inch,2CH,LVDS
6	LB121S01	LG.PHILIPS	+3.3V	12.1Inch,1CH,LVDS
7	LTA150XH-I06	SAMSUNG	+3.3V	15.0Inch,1CH,LVDS
8	M150XN07	AUO	+3.3V	15.0Inch,1CH,LVDS
9	M190EG02	AUO	+5V	19.0Inch,2CH,LVDS
10	LTM190ET01	SAMSUNG	+5V	19.0Inch,2CH,LVDS
11	LTM170ET01	SAMSUNG	+5V	19.0Inch,2CH,LVDS
12	LB104S01	LG.PHILIPS	+3.3V	10.4Inch,1CH,LVDS
13	LTA260AA01	SAMSUNG	+5V	26.0Inch,1CH,LVDS

