APPLICATION		REVISION				
NEXT ASSY	USED ON	ECN NO	LTR	DESCRIPTION	DATE	APPROVED
	2006-07		X 1	Preliminary Specification		

TFT LCD Controller Board Specification of FSB-105X

RoHS Compliant.

APPROVAL		DATE
DRAWN		
CHECKED		
APPROVED		
QA		

FJN Display Inc.

TFT LCD Controller Board Ass'y
15" XGA
17"/ 19" SXGA

TABLE OF CONTENTS

Revision History

Date	Paragraph	Change Description
2006. 7. 10	Relase	1st Release

1. Description

FSB-105X Controller board is analog RGB,composite video and S-video interface board for TFT LCD - Panel that is providing cost-effective and high quality screen image. This controller board supports from VGA to SXGA panels; resolution at 60Hz refresh rate with expanding to full screen image on the different type of TFT - LCD; TTL 1ch or LVDS 2ch. It gives a lot of convenience to the user who wants to use different type of LCD panel with this controller and access the GUI.
It support world-wide video formats; NTSC/PAL/SECAM. To covert pregressive output, it doesn't use peri-chips for converting progressive output. Because of onechip solution, it can be apply to low-cost models.

2. General Specification

ITEM	DESCRIPTION	REMARKS
Model Name	FSB-150X	
LCD Module	VGA/SVGA/XGA TFT LCD with TTL Interface XGA&WXGA&WXGAplus&SXGA TFT LCD with LVDS Interface	Refer to the clause 4.1 Panel Compatibility
Input Signal	Analog RGB(seperated H/V sync) Composite Video & S-Video	
Input resolution	Hor : 35 to 80 KHz Ver : 50 to 77 Hz Analog RGB : VGA~SXGA CVBS & S-VIDEO : NTSC/PAL/SECAM	
Receptacle	DC Power Jack, D-SUB, VHS, SVHS	RS232
User Controls	8 Buttons Controls UART RS232	
Image Scaler	FLI8125_LF	GenesisMicrochip,Inc.
Audio	Not available	
Power Consumption	TBD	
Board Dimension	Controller Board : 115 X 100(mm) Key Board : 115 X 20(mm)	
Plug & Play	DDC 2B	VESA

3. Environmental and Reliability Specifications

3.1 Operating Conditions

3.1.1 Temperature : 0℃~ 60℃ (without panel, invert) *operating condistions depend on LCD panels.,
3.1.2 Humidity : 10% ~ 80%, non-condensing
3.1.3 Altitude : maximum 3,000m

3.2 Transportation Conditions

3.2.1 Temperature : -25℃~ 60℃
3.2.2 Humidity : 5% ~ 95%, non-condensing
3.2.3 Altitude : maximum 15,000m

3.3 Storage Conditions

3.3.1 Temperature : -20℃~ 80℃
3.3.2 Humidity : 5% ~ 95%, non-condensing
3.3.3 Altitude : maximum 3,000m

3.4 Reliability Specifications

3.4.1 MTBF : more than 50,000 hours at 90% confidence level, excluding LCD panel.
3.4.2 Reliability specification and items : refer to “Specification of reliability test for LCD monitor”

4. Electrical Specification

4.1 Panel Compatibility

FSB-105X supports various Panel with small change. If you want to know which Panel is available, please refer to the following Table. If you want to panel specification, please contact to panel maker or us.

Vendor	Panel Part no.	Deviation Contents									Remarks
SEC	LTM150XH										
	LTM170E04										
	LTM17E05										
	LTM190E1										
LG-PHILIPS	LM150X06										
	LM170E01										
	LM190E06										

4.2 Input Signal Characteristics

Input Signal	Description	Unit	Min	Typical	Max	Remarks
DC input	DC Voltage	Vdc	10	12	35	*Option
	Power Consumption	Watts		TBD		for full Option
15Pin D-Sub	R/G/B level	Vp-p		0.714(1.0)		75Ω Terminated
	Sync Voltage	Vp-p		5.0		
	Horizontal Frequency	kHz	35	64	80	Depends on Mode
	Vertical Frequency	Hz	50	75	77	Depends on Mode
CVBS	Video + Sync	Vp-p		1.0		NTSC/PAL/SECAM
S-VHS	LUMA Signal Input	Vp-p	0.339		0.961	NTSC/PAL/SECAM
	CHROMA Signal Input	Vp-p	0.339		0.961	

4.3 Output Signal Characteristics

Output Signal	Description	Unit	Min	Typical	Max	Remarks
Invertor Interface	DC Output Voltage	Vdc	10	12	35	
	Brightness Control	Vdc	0		5.0	
	ON/OFF Control	Vdc	0		5.0	
	Differential Output	mVp-p	250	350	450	
LVDS Interface	LCD Power	Vdc		3.3		
				5		
				12		

4.4 Power Management : VESA DPMS standard is applied for power management control.

Mode	HSync.	VSync.	Video signal	LED Indication	Power Consumption (nominal)
On	Active	Active	Active	Green LED	
Stand-by	Inactive	Active	Active	Red LED	
Suspend	Active	Inactive	Active	Red LED	
Off	Inactive	Inactive	Active	Ambor LED	

4.5 Connector Pin Assignment

4.5.1 CN4 : DC Input Option

Part No.	Pin No	CN4 Description	Remarks
DJ023 / PWR 4P	1 2 3 4	VCC(12V5A) GND GND	

4.5.2 CN1 : S-Video Input

Part No.	Pin No.	Description	Remarks
DJ-M404	1 2 3 4 5	GND GND CHROMA LUMA GND	

4.5.3 J1 : CVBS Input

Part No.	Pin No.	Description	Remarks
DC003Y	1 2 3	Composite Video GND GND	

4.5.4 P1 : Analog RGB Input

Part No.	Pin No.	Description	Remarks
DB15HD	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	RED GREEN BLUE GND GND (DDC RETURN) GND-RED GND-GREEN GND-BLUE NC GND-SYNC/SELF TEST GND DDC DATA HORIZONTAL SYNC VERTICAL SYNC DDC CLOCK	

4.5.5 CN3 : Interface Key Control

Part No.	Pin No.	Description	Remarks
12505WR9P (Yeonho)	1	LED_G	
	2	LED_R	
	3	KEY INPUT1	
	4	KEY INPUT2	
	5	x	
	6	GND	
	7	GND	
	8	+5V	
	9	+5V	

4.5.6 J4 : Output to Inverter

CN14 Part No.	Pin No.	.		Description	Remarks
12505WR12P (Yeonho)	1			GND	
	2			DIMMING	
	3			GND	
	4			BRT ON/OFF	
	5			GND	
	6			GND	
	7			NC	
	8			GND	
	9			GND	
	10			VDD	
	11			VDD	
	12			VDD	

4.5.7 CN2 & J2 : Output to Panel

Part No.	CN2 Pin No.	J2 Pin No.	CN2 Description	J2 Description	Remarks
12507WR30P (Yeon ho)	1	1	Panel power	RED0	
	2	2	Panel power	RED1	
	3	3	Panel power	RED2	
	4	4	NC	RED3	
	5	5	NC	RED4	
	6	6	NC	RED5	
	7	7	GND	RED6	
	8	8	RxE3+	RED7	
	9	9	RxE3-	GND	
	10	10	RxEC+	GND	
	11	11	RxEC-	GREEN0	
	12	12	RxE2+	GREEN1	
	13	13	RxE2-	GREEN2	
	14	14	GND	GREEN3	
	15	15	RxE1+	GREEN4	
	16	16	RxE1-	GREEN5	
	17	17	GND	GREEN6	
	18	18	RxE0+	GREEN7	
	19	19	RxE0-	GND	
	20	20	RxO3+	GND	
	21	21	RxO3-	BLUE0	
	22	22	RxOC+	BLUE1	
	23	23	RxOC-	BLUE2	
	24	24	GND	BLUE3	
	25	25	RxO2+	BLUE4	
	26	26	RxO2-	BLUE5	
	27	27	RxO1+	BLUE6	
	28	28	RxO1-	BLUE7	
	29	29	RxE0+	GND	
	30	30	RxE0-	GND	
		31		HSYNC	
		32		VSYNC	
		33		DEN	
		34		GND	
		35		DEN	
		36		DCLK	
		37		Panel power	
		38		Panel power	
		38		Panel power	
		40		Panel power	

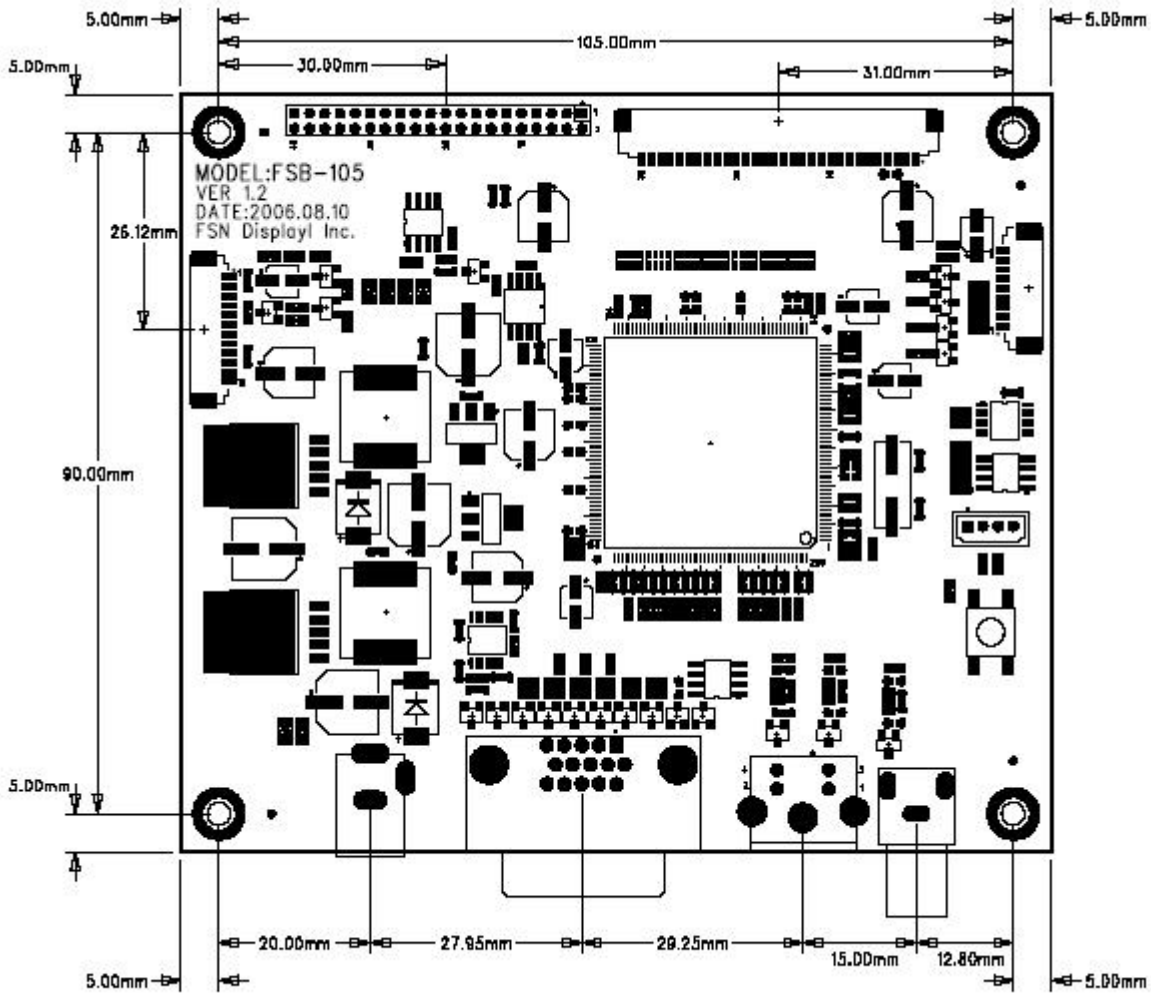
* Panel powers are 3.3V,5V,12V

* CN2 : LVDS 1ch/2ch

* J2 : TTL 24bits/18bits

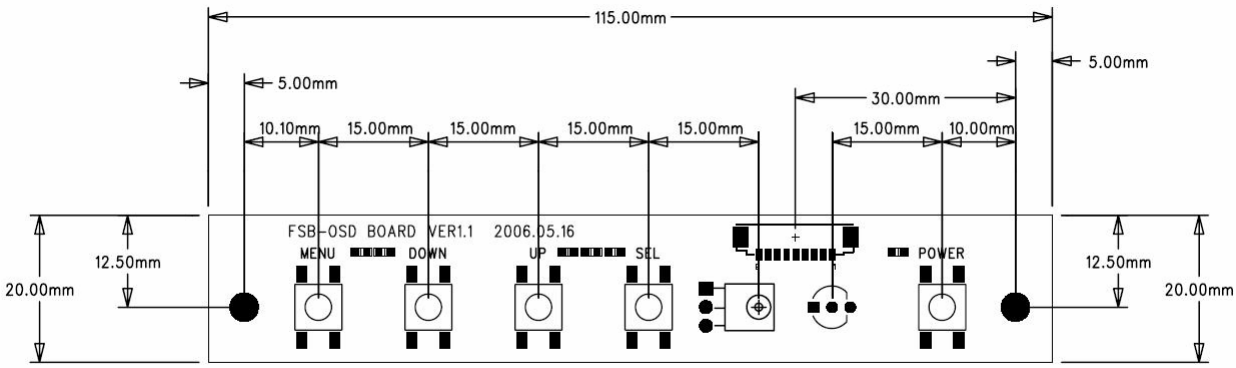
5. Mechanical Specification

5.1 Main Board Dimension



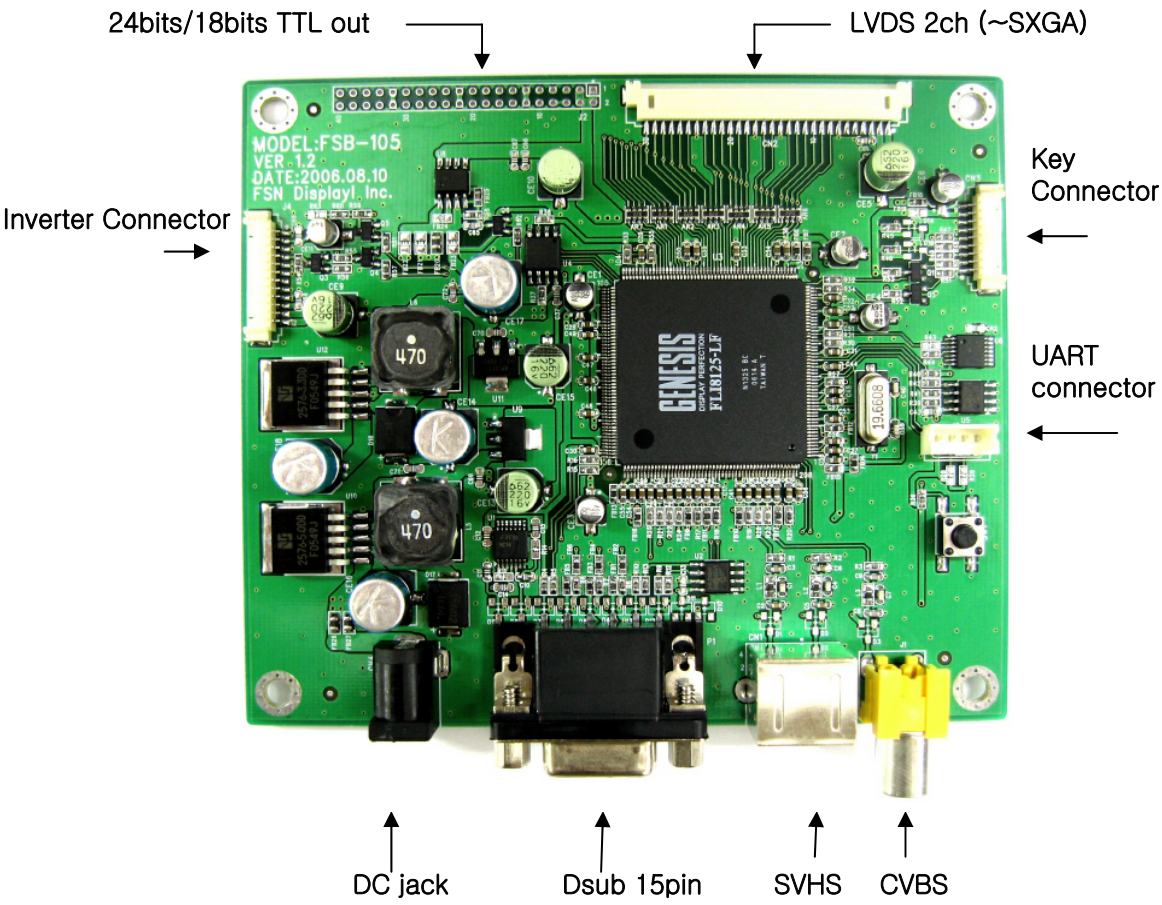
unit : mm
* Components Height : 15mm

5.2 Key Control Board Dimension



Button place from left to right:
MENU / DOWN / UP / SEL / POWER

5.3 Board Picture.



6. Operation Guide

6.1 Installation

This controller is designed for RGB/Video multi-function monitor using different size of LCD panels. This section provides some guidelines for assembly and preparation of a finished display solution. Before proceeding, it is important to familiarize yourself with the parts making up a system and the various connectors, mounting holes and general layout of the controller.
Please follow the below procedure.

1) LCD Panel Connection
Please check the Panel Power, Interface type and Inverter. Refer to the clause 4.1 Panel Compatibility and check if the controller board is matching with panel or not. Connect the inverter and controller board to the panel.

2) Inverter Connection
Each LCD panel has their own inverter to obtain optimum performance and long lifetime. The controller board just supplies the power for inverter logic and controls On/Off signal and brightness control signal. So, it is important to use the proper inverter that has proper driving capacity and control input signal. Refer to the clause 4.5 Connector Pin Assignment and connect the inverter cable to inverter and controller board.

3) Key Control Board Connection
Refer to the 4.5 Connector Pin Assignment and connect the key control cable to key control cable and controller board.

4) Signal Inputs Connection
Analog input,CVBS and S-Video Signal is available. Please refer to the clause 4.5 Connector Pin Assignment and connect the signal what you want to apply to the controller board.
Especially, the Analog RGB and DVI cable may affect the visual characteristics and regulatory emission test. So, a suitably shielded cable should be used.

5) Power Input Connection
Refer to the 4.5 Connector Pin Assignment and connect the power input cable to the controller board. Every connection is done but you should consider electrical insulation, grounding, EMI shielding and heat & ventilation.

6) Apply Power
Apply power and turn on the monitor and refer to the following clause.

6.2 OSD Adjustment

FSB105X gives various and very easy graphic user interface. User can easily access to the function that user wants. Be sure that your system power and LED is turned on before operating key board.

6.2.1 Key Name and Function

Key Name	Description
Power	Turns ON/OFF the system
Menu	Activates the OSD menu or goes to previous menu
AUTO	Auto-adjustment in RGB
Down	Moves the highlight icon up to the function that user wants
Up	Moves the highlight icon down to the function that user wants
Left	Decreases the adjustment of the selected function
Right	Increases the adjustment of the selected function
Source	Selects the Input Signal among analog RGB/CVBS/SVHS

Accessing the menu system

1. With the OSD off, push the Menu button to activate the main OSD menu.

2. Use the **Up** or **Down** buttons to move from one function to another. As you move from one icon to another, the function name changes to reflect the function or group of functions represented by that icon. Please refer to the following clause on the next page to view a complete list of all of the functions available for the driver board.

3. Press the AUTO to adjust clock,phase,position of PC input

4. Press the **Menu** button once to return to the main menu to select another function or press twice to exit from the OSD.

5. Press **Left/Right** keys to change values over main-menu display.

6.2.2 OSD Adjustment

MENU Items:

IMAGE >> Brightness / Contrast / Hue / Saturation / Sharpness / Color

COLOR sub-menu>> AUTO Color / Color Temperature / sRGB / RED / GREEN / BLUE

DISPLAY>> Auto Configuration / Phase / Clock /Scheme / Highlight Windwo

SYSTEM>> Input Select / Language / Misc

Misc sub-menu>> OSD Timer / OSD Postion / Backlight / Factory Reset

6.2.3 Functions on OSD Menu

Image Menus:

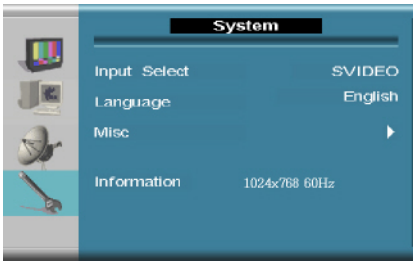
- Brightness : adjust the brightness of the screen
- Contrast : adjust the contrast of the screen
- Hue : adjust the hue of the video(Enabled in video function)
- Saturation : adjust the color saturation of the video(Enabled in video function)
- Sharpness : adjust the sharp of image
- Color : adjust the color items of screen, it goes the sub osd menu.(Enabled in RGB function)
- Auto Color : Calibrate input pixels; it expands dynamic range
- Color Temperature : Adjust the color temp; 9300K,7500K,6500K,5000K,4200K,User Mode
- sRGB : On/Off the sRGB function.
- RED : Adjust the Red gain-value(Enabled in User Mode)
- GREEN : Adjust the Green gain-value(Enabled in User Mode)
- Blue : Adjust the Blue gain-value(Enabled in User Mode)

Display Menus:

Display Menus(cont'd):

- Auto Configuration : Adjust the clock/phase/position of display automatically(Enabled in RGB function)
- Phase : Adjust the phase of the input display(Enabled in RGB function)
- clock : Adjust the clock(frequency) of the input display(Enabled in RGB function)
- Scheme : Adjust environment image of the screen; Normal, Vivid, Cinema
- Highlight Window : On/Off the color enhancement function.

System Menus:



- Input Select : Selects the input signal (RGB-COMPOSITE-SVIDEO)
- Language : Adjust the OSD language.
- Misc : It goes to Misc,. sub-menus.

<<Information 1024x768@100Hz>> display the input mode.

- OSD Timer : Adjust the OSD off timer (Off-6sec-9sec-12sec)
- OSD Position : Adjust the OSD position
- Backlight : Adjust the dimming voltage.
- Factory Reset : Initialize the mene value.

7.Appendix

7.1 Standard Timing Chart

Resolution / Timing Item	640x350 @70Hz	720x400 @70Hz	640x480 @60Hz	640x480 @75Hz	800x600 @60Hz	800x600 @75Hz	1024x768 @60Hz
Pixel Clock (MHz)	25.175	28.324	25.175	31.500	40.000	49.500	65.000
Sync Polarity(H/V)	P/N	N/P	N/N	N/N	P/P	P/P	N/N
Scaning Type	Progressive	Progressive	Progressive	Progressive	Progressive	Progressive	Progressive
-Hor Frequency(kHz)	31.468	31.469	31.469	37.500	37.879	46.875	48.363
-Period(us)	31.778	31.780	31.778	26.667	26.400	21.333	20.677
-Active time(us)	25.418	25.420	25.422	20.317	20.000	16.162	15.754
-Front porch(us)	0.638	0.640	0.636	0.508	1.000	0.323	0.369
-Sync width(us)	3.823	3.810	3.813	2.032	3.200	1.616	2.092
-Back porch(us)	1.909	1.906	1.907	3.810	2.200	3.232	2.462
-Ver Frequency(Hz)	70.090	70.082	59.940	75.000	60.317	75.000	60.004
-Period(ms)	14.268	14.270	16.683	13.333	16.579	13.333	16.666
-Active time(ms)	11.122	12.710	15.253	12.800	15.840	12.800	15.880
-Front porch(ms)	0.381	0.413	0.064	0.027	0.026	0.021	0.062
-Sync width(ms)	0.064	0.064	0.064	0.080	0.106	0.064	0.124
-Back porch(ms)	1.111	1.080	0.794	0.427	0.626	0.448	0.600

Resolution / Timing Item	1024x768 @75Hz	1280x1024 @60Hz	1280x1024 @75Hz	1152x864 @60Hz	1152x864 @75Hz		
Pixel Clock (MHz)	78.750	108.50	135.00	80.000	108.00		
Sync Polarity(H/V)	P/P	P/P	P/P	P/P	P/P		
Scaning Type	Progressive	Progressive	Progressive	Progressive	Progressive		
-Hor Frequency(kHz)	60.023	63.974	79.976	54.348	67.500		
-Period(us)	16.660	15.631	12.504	18.400	14.815		
-Active time(us)	13.003	11.797	9.481	14.400	10.667		
-Front porch(us)	0.203	0.590	0.119	0.400	0.593		
-Sync width(us)	1.219	1.180	1.067	1.200	1.185		
-Back porch(us)	2.235	2.065	1.837	2.400	2.370		
-Ver Frequency(Hz)	75.029	60.013	75.025	60.053	75.029		
-Period(ms)	13.328	16.663	13.329	16.652	13.333		
-Active time(ms)	12.795	16.006	12.804	15.898	12.800		
-Front porch(ms)	0.017	0.016	0.013	0.017	0.015		
-Sync width(ms)	0.050	0.047	0.038	0.055	0.044		
-Back porch(ms)	0.466	0.594	0.475	0.681	0.474		