

14 Reference Information

14-1 Technical Terms

-TFT-LCD

Thin film Transistor Liquid Crystal Display

-ADC(Analog to Digital Converter)

This is a circuit that converts from analog signal to digital signals.

-PLL(Phase Locked Loop)

During progressing ADC, Device makes clock synchronizing HSYNC with Video clock

-Inverter

Device that supplies Power to LCD panel lamp. This device generates about 1,500~2,000V.

AC Adapter

Device that converts AC(90V~240V) to DC(+12V or 14V)

-SMPS(Switching Mode Power Supply)

Switching Mode Power supply. This design technology is used to step up/down the input power by switching on/off

-FRC(Frame Rate Controller)

Technology that changes the number of frames displayed on screen per second. TFT-LCD panel requires 60 frames per second. This technology is needed to convert input image to 60 frames per second regardless input frame quantity.

-Image Scaler

Technology that convert various input resolution to other resolution.(ex. 640* 480 to 1024*768)

-Auto Configuration(Auto adjustment)

This is an algorithm to adjust monitor to optimum condition by pushing one key.

-OSD(On Screen Display)

Customers can easily control the screen settings using the OSD.

-FINE

The "Fine" adjustment is used to adjust visibility by controlling phase difference.

-COARSE

This adjustment adjusts the display by tuning Video clock and PLL clock.

-L.V.D.S.(Low Voltage Differential Signaling)

A kind of transmission method for Digital. It can be used from Main PBA to Panel.

-DDC(Display data channel)

It is a communication method between a Host Computer and related equipment. It enables Plug and Play between PC and Monitor.

-EDID

Extended Display Identification Data PC can recognize monitor information, such as Product data, Product name, Display mode, Serial number, Signal source, etc. Data is recognized via DDC Line linking PC and Monitor.

-Dot Pitch

The image on a monitor is composed of red, green and blue dots. The closer the dots, the higher the resolution. The distance between two dots of the same color is called the 'Dot Pitch'. Unit: mm

-Vertical Frequency

The screen must be redrawn several times per second in order to create and display an image for the user. The frequency of this repetition per second is called Vertical Frequency or Refresh Rate. Unit: Hz Example: If the same light repeats itself 60 times per second, this is regarded as 60 Hz.

-Horizontal Frequency

The time to scan one line connecting the right edge to the left edge of the screen horizontally is called Horizontal Cycle. The inverse number of the Horizontal Cycle is called Horizontal Frequency. Unit: kHz

-Interlace and Non-Interlace Methods

Showing the horizontal lines of the screen from the top to the bottom in order is called the Non-Interlace method while showing odd lines and then even lines in turn is called the Interlace method. The Non-Interlace method is used for the majority of monitors to ensure a clear image. The Interlace method is the same as that used in TVs.

-Plug & Play

This is a function that provides the best quality screen for the user by allowing the computer and the monitor to exchange information automatically. This monitor follows the international standard VESA DDC for the Plug & Play function.

-Resolution

The number of horizontal and vertical dots used to compose the screen image is called 'resolution'. This number shows the accuracy of the display. High resolution is good for performing multiple tasks as more image information can be shown on the screen.

Example: If the resolution is 1280 x 1024, this means the screen is composed of 1280 horizontal dots (horizontal resolution) and 1024 vertical lines (vertical resolution).

14-2 Pin Assignments

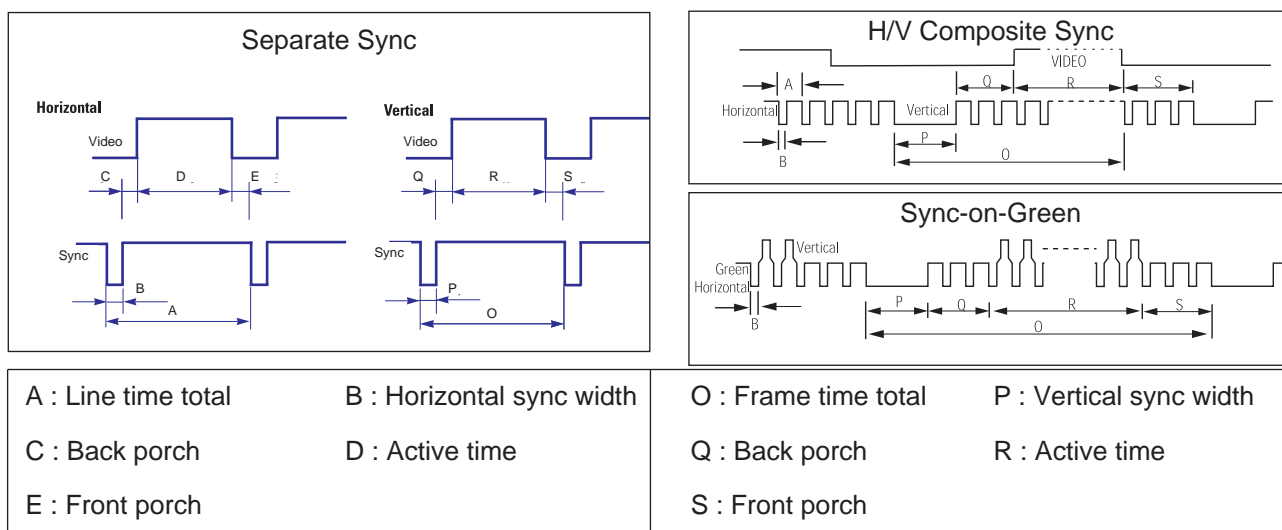
Pin No.	Sync Type	15-Pin D-Sub Signal Cable Connector	
		Separate	Sync-on-green
1		Red	Red
2		Green	Green + H/V Sync.
3		Blue	Blue
4		NC	NC
5		DDC Return (GND)	DDC Return (GND)
6		GND-R	GND-R
7		GND-G	GND-G
8		GND-B	GND-B
9		NC	NC
10		Cable Detect	Cable Detect
11		NC	NC
12		Bi-Dr Data (SDA)	Bi-Dr Data (SDA)
13		H-Sync.	Not Used
14		V-Sync.	Not Used
15		DDC Clock (SCL)	DDC Clock (SCL)

14-3 Timing Chart

- This section of the service manual describes the timing that the computer industry recognizes as standard for computer-generated video signals.

Table 1 Timing Chart

No	Name	Timing ID	dot_clk (MHz)	h_freq (kHz)	v_freq (Hz)
1	IBM 640*350/70Hz	640*350/70Hz	25.175	31.469	70
2	IBM 720*400/70Hz	720*400/70Hz	28.322	31.469	70
3	IBM 640*480/60Hz	640*480/60Hz	25.175	31.469	60
4	MAC 640*480/67Hz	640*480/67Hz	30.240	35.000	66.7
5	VESA 640*480/72Hz	640*480/72Hz	31.500	37.861	72
6	VESA 640*480/75Hz	640*480/75Hz	31.500	37.500	75
7	VESA 800*600/56Hz	800*600/56Hz	36.000	35.156	56
8	VESA 800*600/60Hz	800*600/60Hz	40.000	37.879	60
9	VESA 800*600/72Hz	800*600/72Hz	50.000	48.077	72
10	VESA 800*600/75Hz	800*600/75Hz	49.500	46.875	75
11	MAC 832*624/75Hz	832*624/75Hz	57.284	49.726	75
12	VESA 1024*768/60Hz	1024*768/60Hz	65.000	48.363	60
13	VESA 1024*768/70Hz	1024*768/70Hz	75.000	56.476	70
14	VESA 1024*768/75Hz	1024*768/75Hz	78.750	60.023	75
15	VESA 1152*864/75Hz	1152*864/75Hz	108.000	67.500	75
16	MAC 1152*870/75Hz	1152*870/75Hz	100.000	68.681	75
17	VESA 1280*1024/60Hz	1280*1024/60Hz	108.000	63.981	60
18	VESA 1280*1024/75Hz	1280*1024/75Hz	135.000	79.976	75



14-4 Preset Timing Modes

- If the signal transferred from the computer is the same as the following Preset Timing Modes, the screen will be adjusted automatically. However, if the signal differs, the screen may go blank while the power LED is on. Refer to the video card manual and adjust the screen as follows.

TIMING	FH(KHZ) FV(HZ)	SYNC POLARITY	TOTAL (DOT/LINE)	ACTIVE (DOT/LINE)	SYNC WIDTH (DOT/LINE)	FRONT PORCH (DOT/LINE)	BACK PORCH (DOT/LINE)	PIXEL FOREQ (MHZ)
IBM 640*350@70Hz	31.469 70	+ -	800 449	640 350	96 2	8 31	40 54	25.175
IBM 720*400@70Hz	31.469 70	- +	900 449	720 400	108 2	9 6	45 27	28.322
IBM 640*480@60Hz	31.469 60	- -	800 525	640 480	96 2	8 2	40 25	25.175
MAC 640*480@67Hz	35 66.7	- -	864 525	640 480	64 3	64 3	96 39	30.24
VESA 640*480@72Hz	37.861 72	- -	832 520	640 480	40 3	16 1	120 20	31.5
VESA 640*480@75Hz	37.5 75	- -	840 500	640 480	64 3	16 1	120 16	31.5
VESA 800*600@56Hz	35.156 56	+ +/-	1024 625	800 600	72 2	24 1	128 22	36
VESA 800*600@60Hz	37.879 60	+ +	1056 628	800 600	128 4	40 1	88 23	40
VESA 800*600@72Hz	48.077 72	+ +	1040 666	800 600	120 6	56 37	64 23	50
VESA 800*600@75Hz	46.875 75	+ +	1056 625	800 600	80 3	16 1	160 21	49.5
MAC 832*624@75Hz	49.726 75	- -	1152 667	832 632	64 3	32 1	224 39	57.284
VESA 1024*768@60Hz	48.363 60	- -	1344 806	1024 768	136 6	24 3	160 29	65
VESA 1024*768@70Hz	56.476 70	- -	1328 806	1024 768	136 6	24 3	144 29	75
VESA 1024*768@75Hz	60.023 75	+ +	1312 800	1024 768	96 3	16 1	176 28	78.75
VESA 1152*864@75Hz	67.5 75	+ +	1600 900	1152 864	128 3	64 1	256 32	108
MAC 1152*870@75Hz	68.681 75	- -	1456 915	1152 870	128 3	32 3	144 39	100
VESA 1280*1024@60Hz	63.981 60	+ +	1688 1066	1280 1024	112 3	48 1	248 38	108
VESA 1280*1024@75Hz	79.976 75	+ +	1688 1066	1280 1024	144 3	16 1	248 38	135

Horizontal Frequency

The time to scan one line connecting the right edge to the left edge of the screen horizontally is called Horizontal Cycle and the inverse number of the Horizontal Cycle is called Horizontal Frequency. Unit: kHz

Vertical Frequency

Like a fluorescent lamp, the screen has to repeat the same image many times per second to display an image to the user. The frequency of this repetition is called Vertical Frequency or Refresh Rate. Unit: Hz

14 Reference Information

14-5 Panel Description

Maker	VENDOR P/N	PANEL_CODE	PANEL_ABB	STICKER_CODE	Remarks
INL CPT	631102071830r 631102070680r				LCD PANEL 17" MT170EN01 LCS PANEL 17" CLAA170EA07Q(CPT)