LG.PHILIPS LCD

Product Specification

1. General Description

The LP141E04-A1 is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent Lamp(CCFL) backlight system. The matrix employs a-Si Thin Film Transistor as the active element.
It is a transmissive type display operating in the normally white mode. This TFT-LCD has 14.1 inches diagonally measured active display area with SXGA+ resolution(1050 vertical by 1400 horizontal pixel array)
Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes.
Gray scale or the brightness of the sub-pixel color is determined with a 6-bit gray scale signal for each dot, thus, presenting a palette of more than 262,144 colors.
The LP141E04-A1 has been designed to apply the interface method that enables low power, high speed, low EMI.
The LP141E04-A1 is intended to support applications where thin thickness, low power are critical factors and graphic displays are important. In combination with the vertical arrangement of the sub-pixels, the LP141E04-A1 characteristics provide an excellent flat display for office automation products such as Notebook PC.
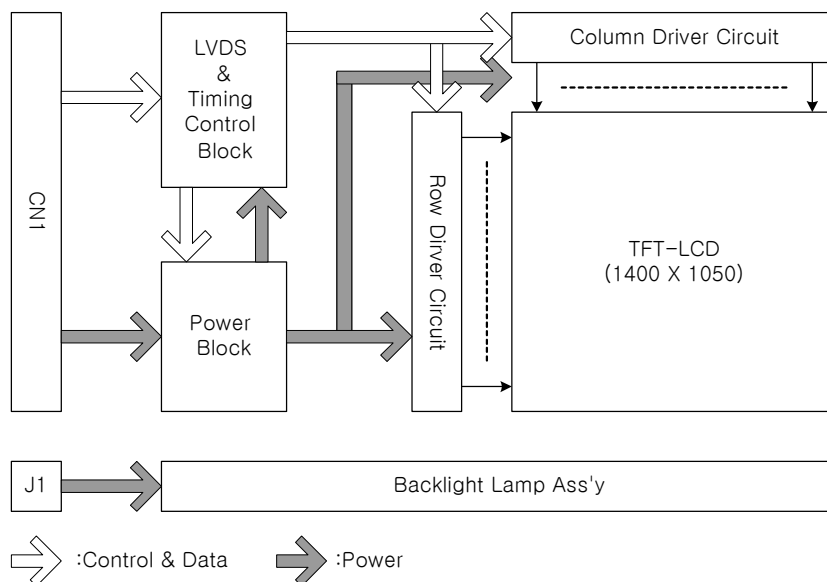
General Features

Active Screen Size	14.1 inches(35.7cm) diagonal
Outline Dimension	298.0(H) x 226.5(V) x 5.4(D) mm(Typ.)
Pixel Pitch	0.204(H) x 0.204(V) mm
Pixel Format	1400 horiz. By 1050 vert. Pixels RGB strip arrangement
Color Depth	6-bit, 262,144 colors
Luminance, White	200 cd/m²(Typ.)
Power Consumption	5.5 Watt(Typ.)
Weight	450 g (typ.)
Display Operating Mode	Transmissive mode, normally white
Surface Treatment	Hard coating(3H) Anti-reflection treatment of the front polarizer Maker: NITTO,Model Number : LNC-TEGAG150-E120T

2. Electrical Specifications

The LP141E04-A1 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the CCFL, is typically generated by an inverter. The inverter is an external unit to the LCD.

Table 1. ELECTRICAL CHARACTERISTICS

| Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
MODULE :						
Power Supply Input Voltage	VCC	3.0	3.3	3.6	Vdc	
Power Supply Input Current Window	I_{CC}	-	470	540	mA	1
Full Black	-	-	490	560	mA	
2 by 2 Vertical Line	-	-	600	680	mA	
Power Consumption Window	Pc	-	1.6	2.0	Watt	1
Differential Impedance	Zm	90	100	110	ohm	2
LAMP :						
Operating Voltage	V_{BL}	613(6.5mA)	619(6.3mA)	845(2.0mA)	V_{RMS}	3
Operating Current	I_{BL}	2.0	6.3	6.5	mA_{RMS}	4
Established Starting Voltage	Vs					5
at 25 °C		-	-	1140	V_{RMS}	
at 0 °C		-	-	1370	V_{RMS}	
Operating Frequency	f_{BL}	50	65	80	kHz	6
Discharge Stabilization Time	T_S	-	-	3	Min	7
Power Consumption	P_{BL}	-	3.9	4.3	Watt	8
Life Time		10,000	-	-	Hrs	9

Note)
  The design of the inverter must have specifications for the lamp in LCD Assembly. The performance of the Lamp in LCM, for example life time or brightness, is extremely influenced by the characteristics of the DC-AC inverter. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter. When you design or order the inverter, please make sure unwanted lighting caused by the mismatch of the lamp and the inverter(no lighting, flicker, etc) never occurs. When you confirm it, the LCD Assembly should be operated in the same condition as installed in your instrument.

  1. VCC=3.3V, 25°C, f_V (frame frequency) = 50Hz condition.
  2. This impedance value is needed to proper display and measured from LVDS T_X to the mating connector.
  3. The variance of the voltage is ± 10%.
  4. The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics.

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5. The voltage above V_S should be applied to the lamps for more than 1 second for start-up. Otherwise, the lamps may not be turned on. The used lamp current is the lamp typical current.

6. The output of the inverter must have symmetrical(negative and positive) voltage waveform and symmetrical current waveform.(Unsymmetrical ratio is less than 10%) Please do not use the inverter which has unsymmetrical voltage and unsymmetrical current and spike wave.
   Lamp frequency may produce interference with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.

7. Let's define the brightness of the lamp after being lighted for 5 minutes as 100%.
   T_S is the time required for the brightness of the center of the lamp to be not less than 95%.

8. The lamp power consumption shown above does not include loss of external inverter.
   The used lamp current is the lamp typical current.

9. The life time is determined as the time at which brightness of the lamp is 50% compared to that of initial value at the typical lamp current on condition of continuous operating at $25 \pm 2°C$.

∗ Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp, are following. It shall help increase the lamp lifetime and reduce leakage current.

      a. The asymmetry rate of the inverter waveform should be less than 10%.

      b. The distortion rate of the waveform should be within $\sqrt{2} \pm 10\%$.

     * Inverter output waveform had better be more similar to ideal sine wave.
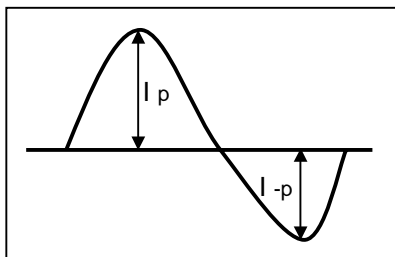
* Asymmetry rate:

$$| I_p - I_{-p} | / I_{rms} * 100\%$$

* Distortion rate

$$I_p \text{ (or } I_{-p}) / I_{rms}$$

∗ Do not attach a conducting tape to lamp connecting wire.
If the lamp wire attach to a conducting tape, TFT-LCD Module has a low luminance and the inverter has abnormal action. Because leakage current is occurred between lamp wire and conducting tape.
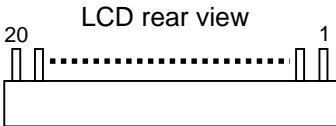
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3. Interface Connections

This LCD employs two interface connections, a 20 pin connector is used for the module electronics interface and the other connector is used for the integral backlight system.
The electronics interface connector is a model DF19K-20P-1H manufactured by HIROSE or equivalent.

Table 2. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description	Notes
1	VCC	Power Supply, 3.3V Typ.	[LVDS Transmitter]
2	VCC	Power Supply, 3.3V Typ.	THINE, THC63LVD823
3	GND	Ground	
4	GND	Ground	[LVDS Receiver] THINE, THC63LVD824
5	R_{IN} 0-	Negative LVDS differential data input (R0~R5,G0)	
6	R_{IN} 0+	Positive LVDS differential data input (R0~R5,G0)	[Connector] DF19K-20P-1H , HIROSE
7	GND	Ground	
8	R_{IN} 1-	Negative LVDS differential data input (G1~G5,B0~B1)	
9	R_{IN} 1+	Positive LVDS differential data input (G1~G5,B0~B1)	[Connector pin arrangement]
10	GND	Ground	
11	R_{IN} 2-	Negative LVDS differential data input (B2~B5,HS,VS,DE)	
12	R_{IN} 2+	Positive LVDS differential data input (B2~B5,HS,VS,DE)	
13	GND	Ground	
14	CLK-	Clock -	
15	CLK+	Clock +	
16	GND	Ground	
17	NC	Reserved	
18	NC	Reserved	
19	NC	Reserved	
20	NC	Reserved	

The backlight interface connector is a model BHSR-02VS-1, manufactured by JST. The mating connector part number is SM02B-BHSS-1 or equivalent.

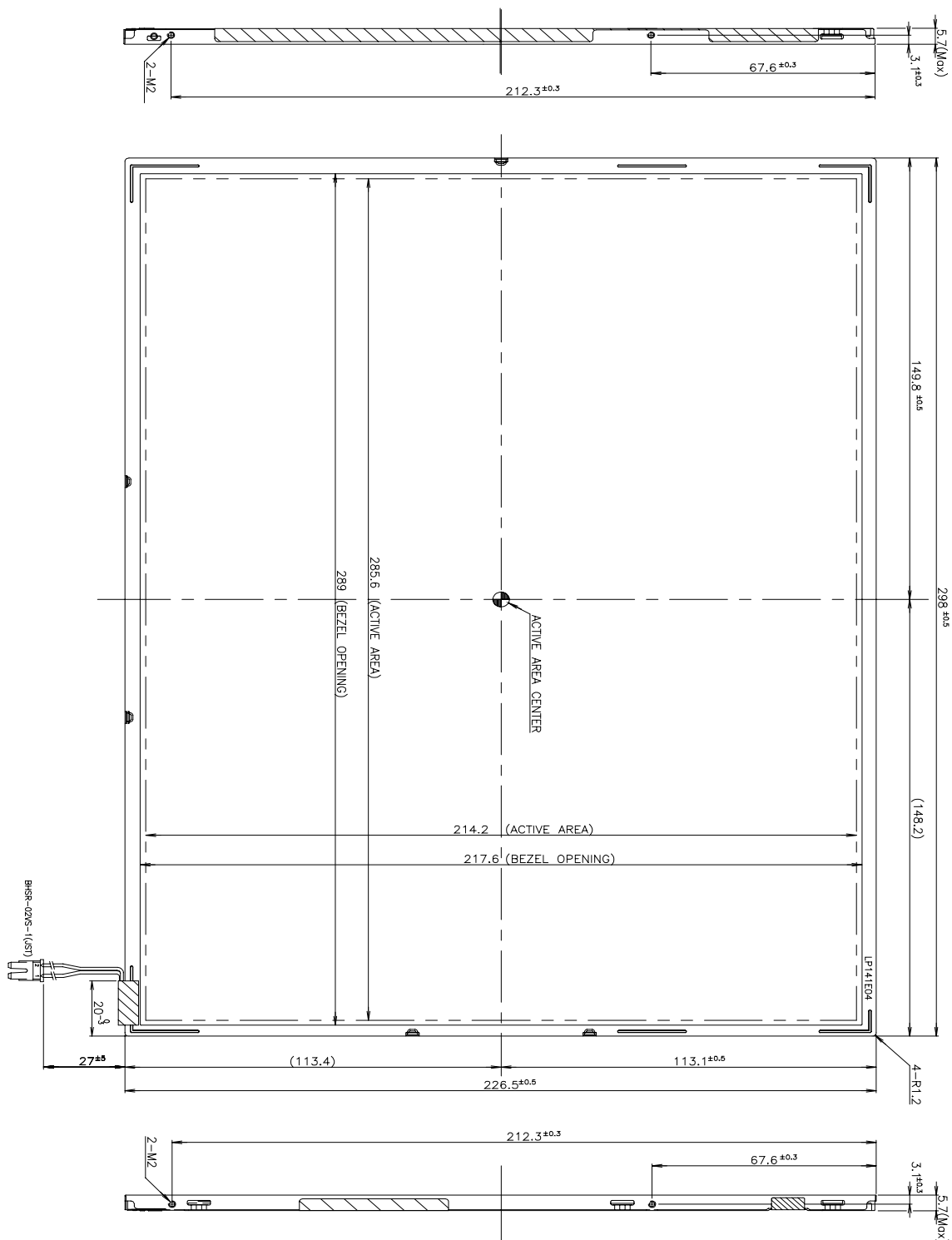**Table 3. BACKLIGHT CONNECTOR PIN CONFIGURATION (J1)**

Pin	Symbol	Description	Notes
1	HV	Power supply for lamp (High voltage side)	1
2	LV	Power supply for lamp (Low voltage side)	1

Notes)
1. The high voltage side terminal is colored pink and the low voltage side terminal is white.
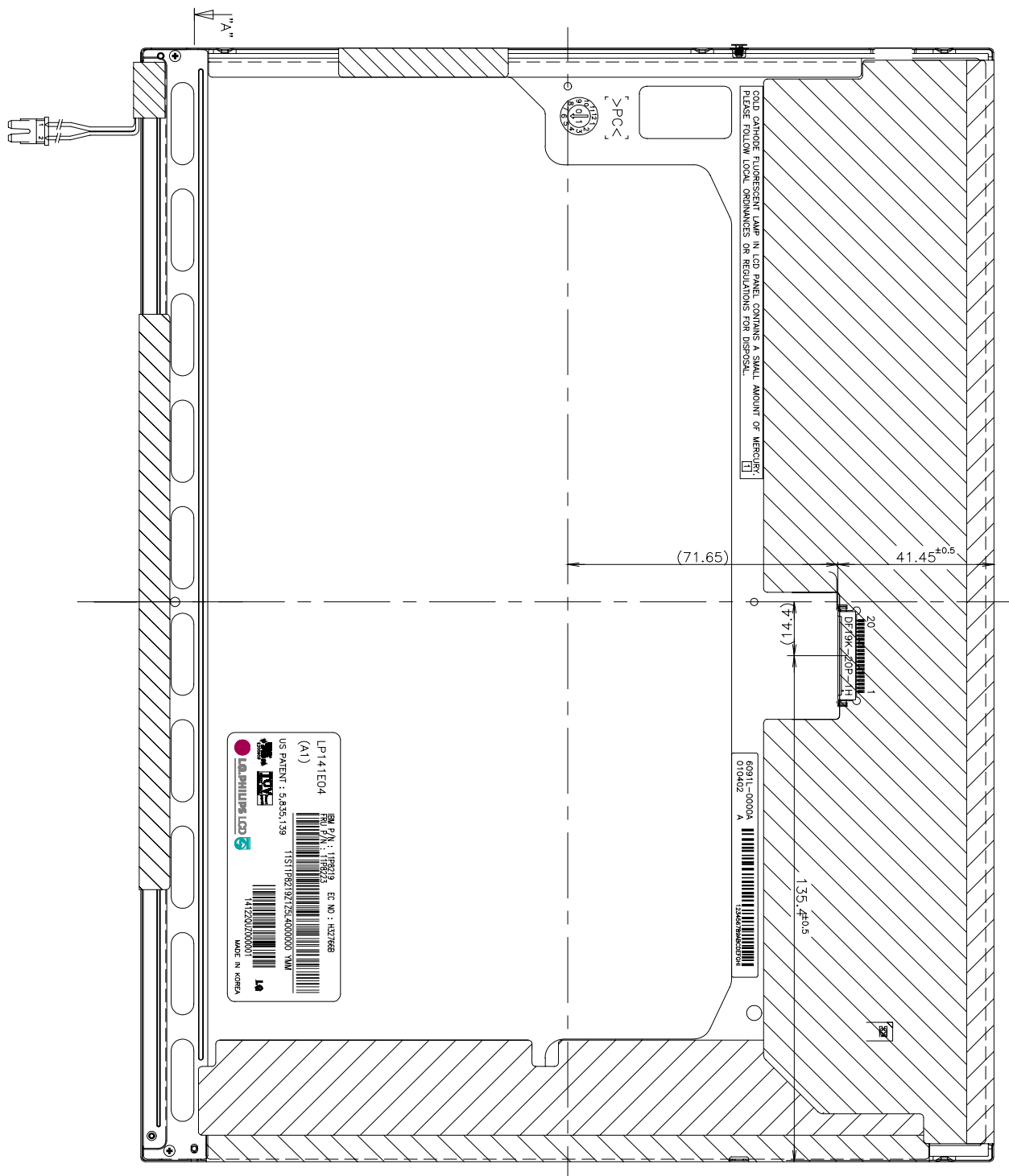
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<FRONT VIEW>

Note) Unit:[mm], General tolerance: ± 0.5mm

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<REAR VIEW>

COLD CATHODE FLUORESCENT LAMP IN LCD PANEL CONTAINS A SMALL AMOUNT OF MERCURY,
PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR DISPOSAL.

>PC<

(71.65)   41.45±0.5

(14.4)

D/79K-20P-7H

135.4±0.5

60311-0000A
010402

LP141E04
(A1)
US PATENT : 5,835,139
IBM P/N : 11P8319
FRU P/N : 11P8323
EC NO : H327668
MADE IN KOREA

Note) Unit:[mm], General tolerance: ± 0.5mm

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4. PRECAUTIONS

The LCD Products listed on this documents are not suitable for use of Military, Industry, Medical etc.
System.
If customers intend to use these LCD products for above application, Please contact our sales people
In advance.