Brief Specification

(●) Preliminary Specification

Title	7.0” (480 X RGB X 234)TFT LCD

BUYER	
MODEL	

SUPPLIER	LG.Philips LCD CO., Ltd.
MODEL	LB070W01
SUFFIX	A1

SIGNATURE	DATE
/	
/	
/	

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LG. Philips LCD Co., Ltd

Contents

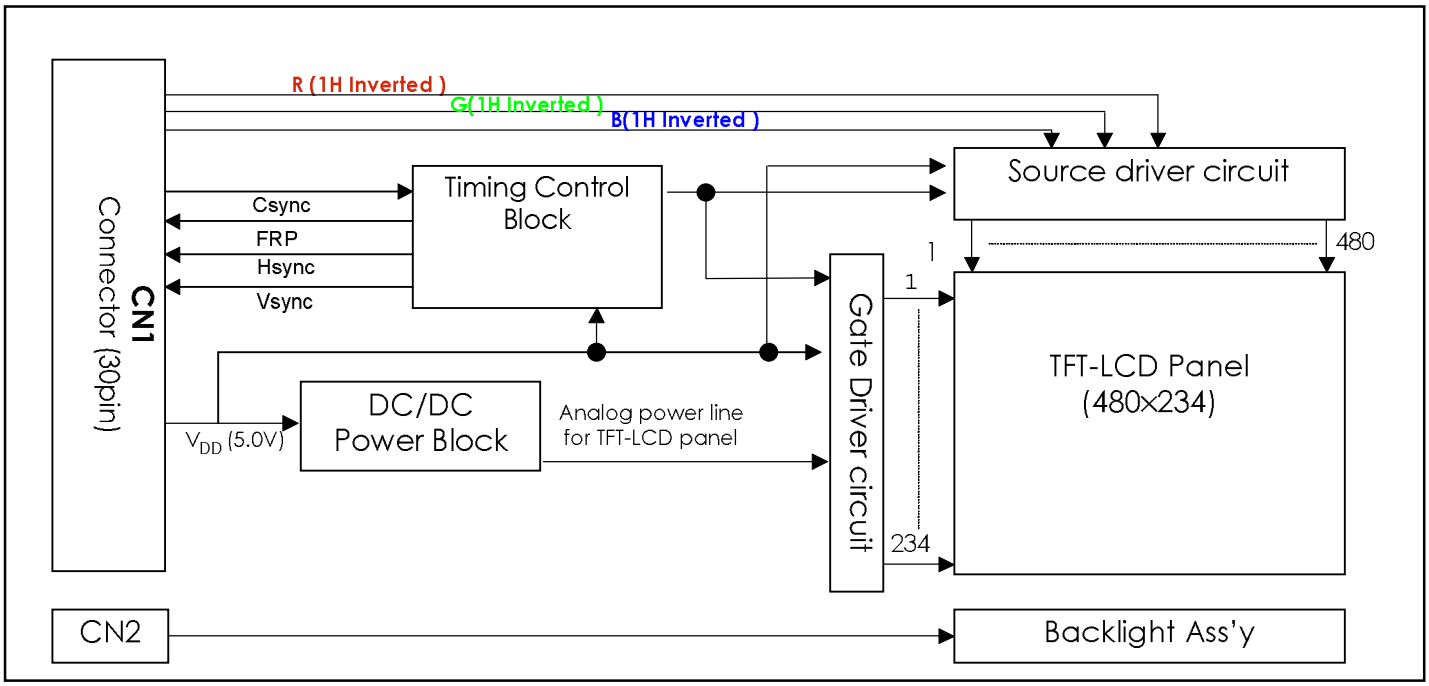
RECORD OF REVISIONS

Revision No	Revision Date	Page	DESCRIPTION
0.0	Aug. 20, 2002	-	First Draft

1. General Description

The LB070W01-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 a 7.0 inch diagonally measured active display area with QVGA resolution(234 vertical by 480 horizontal pixel array) Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes.

This applications of LB070W01-A1 are Car TV,Portable DVD and Multimedia applications.



General Features

Active screen size	7.0 inches(154.08(H) × 86.58(V)mm) diagonal
Outline Dimension	170.0(H) x 102.0(V) x 12.0(D) mm(Typ.)
Dot Pitch	0.107(H)mm x 0.370(V)mm
Pixel format	480 horiz. By 234 vert. Pixels RGB strip arrangement
Color depth	Full Color
Luminance, white	400 cd/m^2(Typ.)
Power Consumption	TBD
Weight	210g(Typ.)
Display operating mode	Transmissive mode, normally white
Surface treatments	Hard coating(3H) Anti-glare treatment of the front polarizer,

2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	symbol	Values		Units	Notes
		Min.	Max.		
Power Input Voltage	VDD	-0.3	5.8	V	At 25 ± 5 ° C
Analog Input Signals	VR,VG,VB	-0.3	VDD	Vp-p	
Digital Input Signals		-0.5	VDD	V	
Operating Temperature	T_{OP}	-20	70	° C	
Storage Temperature	T_{ST}	-30	85	° C	
Operating Ambient Humidity	H_{OP}	10	90	%RH	
Storage Humidity	H_{ST}	10	90	%RH	

3. Electrical Specifications

3-1. Electrical Characteristics

The LB070W01-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 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Values			Units	Notes
		Min.	Typ.	Max.		
MODULE :						
Power Supply Input Voltage	VDD	4.5	5.0	5.5	Vdc	
Power Supply Input Current	I_{DD}		TBD		A	1
LAMP :						
Operating Voltage	V_{BL}	827(7mA)	870(6mA)	1110(3mA)	V_{RMS}	2
Operating Current	I_{BL}	3.0	6.0	7.0	mA	
Established Starting Voltage	V_S					3
at 25 °C		-	-	1630	V_{RMS}	
at 0 °C		-	-	2120	V_{RMS}	
Operating Frequency	f_{BL}	45	60	80	kHz	4
Discharge Stabilization Time	T_S			3	Minutes	3
Power Consumption	P_{BL}	3.33	5.28	5.81	Watts	6
Life Time		20,000	-	-	Hrs	5,,7

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 you instrument.

1. The specified current and power consumption are under the VDD=5.0V, 25° C, whereas 8Gary pattern is displayed.
2. The variance of the voltage is ± 10%.
3. 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.

4. 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 interface 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.
5. 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%.
6. The lamp power consumption shown above does not include loss of external inverter.
   The used lamp current is the lamp typical current.
7. The life 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 $25 \pm 2\,^{\circ}C$.

- 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.

3-2. Interface Connections

This LCM has two interface connections, a 30 pin connector is used for the module electronics and, Other 2 pin connector is used for the integral back light system.
The interface pin configuration for the connector is shown in the table below.

Table 3. MODULE CONNECTOR PIN CONFIGURATION

Pin	Symbol	Description	Notes
1	GND	GND	LCD Connector : GF053-20S-LSS-I(LG Cable) or, 6210-30P (Elco)
2	VR	Red Video Signal(1H inverted)	
3	VG	Green Video Signal(1H inverted)	
4	VB	Blue Video Signal(1H inverted)	
5	GND	GND	
6	CSY	Composite Sync Signal	
7	NC	NC	
8	NC	NC	
9	NC	NC	
10	NC	NC	
11	Mode1	Display Mode1	
12	Mode2	Display Mode2	
13	Mode3	Display Mode3	
14	GND	Ground	
15	NC	NC	
16	HSY	Horizontal Sync Input	
17	VSY	Vertical Sync Input	
18	GND	GND	
19	NC	NC	
20	FRP	Video Polarity Control Signal	
21	GND	GND	
22	UDS	UDS	
23	LRS	LRS	
24	NC	NC	
25	VDD	Power Supply(+5V)	
26	VDD	Power Supply(+5V)	
27	GND	GND	
28	GND	GND	
29	NC	NC	
30	NC	NC	

The backlight interface connector is a model BHSR-02VS-1, manufactured by JST.
The mating connector part number is SM02(8.0)B-BHS-1-TB or equivalent.

Table 4. BACKLIGHT CONNECTOR PIN CONFIGURATION(CN2,CN3)

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. The low voltage side terminal is white

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25 °C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0 °.

FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

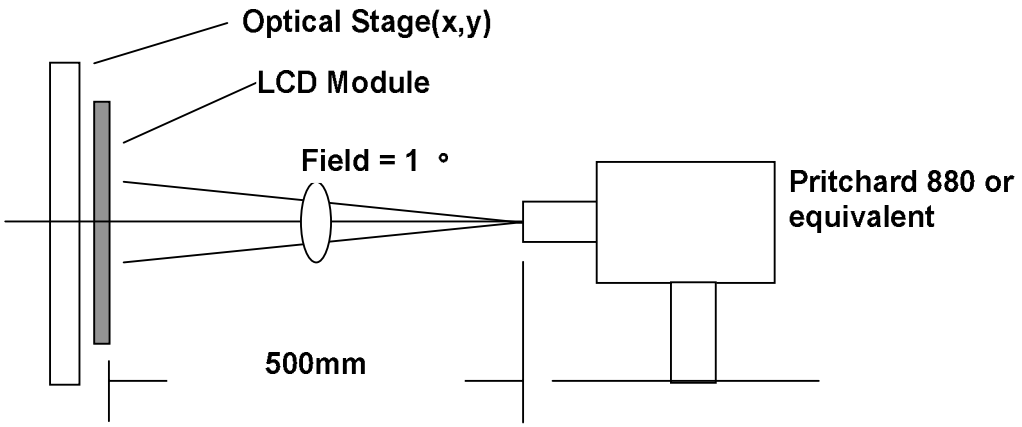


Table 7. OPTICAL CHARACTERISTICS (Ta=25 °C, VDD=5.0V, I_{BL}=6mA)

Parameter	Symbol	Values			Units	Notes
		Min.	Typ.	Max.		
Contrast Ratio	CR	100	-	-		1
Surface Luminance, white	L_{WH}	350	400	-	cd/m^2	2
Response Time	Tr				ms	3
Rise Time	Tr_R	TBD	TBD	TBD		
Decay Time	Tr_D	TBD	TBD	TBD		
CIE Color Coordinates						
White	Wx	TBD	0.313	TBD		
	Wy	TBD	0.329	TBD		
Viewing Angle						4
x axis, right(ϕ=0 °)	θr	55	60	-	Degree	
x axis, left (ϕ=180°)	θl	55	60	-	Degree	
y axis, up (ϕ=90 °)	θu	40	45	-	Degree	
y axis, down (ϕ=270 °)	θd	40	45	-	Degree	

Notes : 1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the LCD surface 50cm from the surface with all pixels displaying white.
When I_{BL}=6mA, $L_{WH=}$350cd/m^2(Min.) 400cd/m^2(Typ.)

3. Response time is the time required for the display to transition from to black(Rise Time, Tr_R) and from black to white(Decay Time, Tr_D).

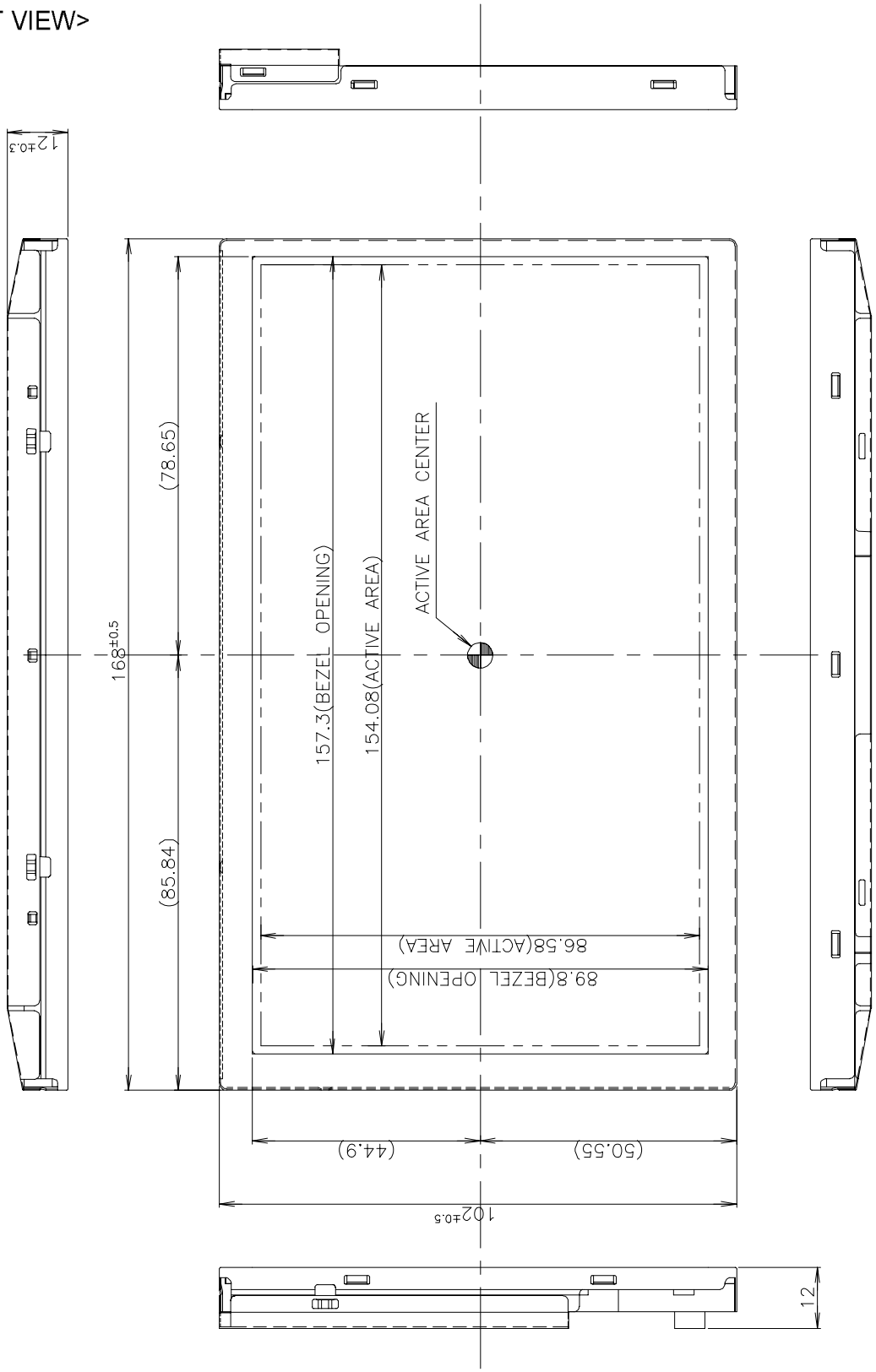
4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

5. Mechanical Characteristics

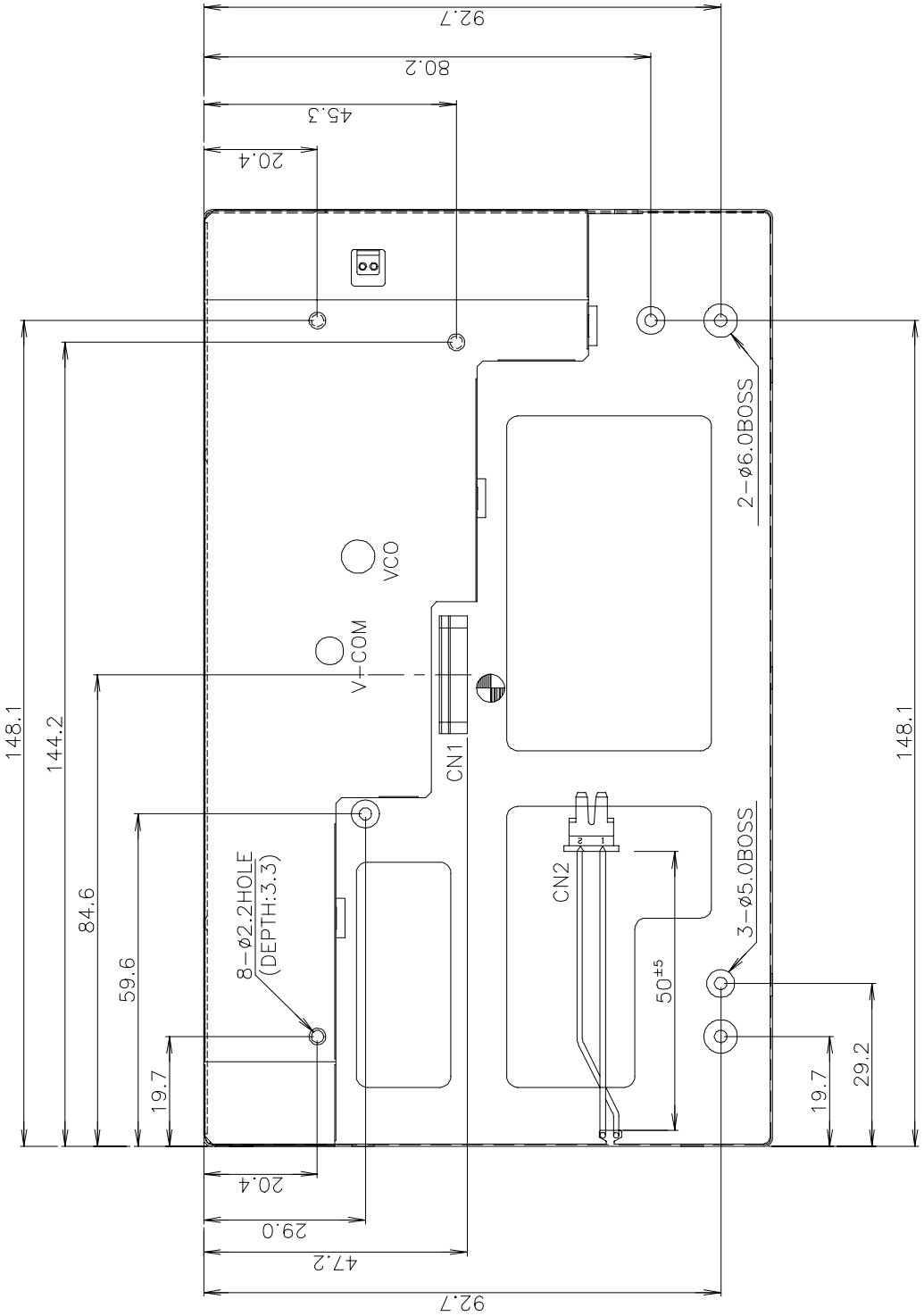
The contents provide general mechanical characteristics for the model LB070W01-A1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outside dimensions	Horizontal	168 ± 0.5mm
	Vertical	102 ± 0.5mm
	Depth	12.0 ± 0.5mm
Bezel area	Horizontal	157.3 ± 0.5mm
	Vertical	59.8 ± 0.5mm
Active display area	Horizontal	154.08mm
	Vertical	86.58mm
Weight(approximate)	210g(Typ.),	
Surface Treatment	Hard coating(3H) Anti-glare treatment of the front polarizer	

<FRONT VIEW>


12±0.3
(78.65)
168±0.5
(85.84)
157.3(BEZEL OPENING)
154.08(ACTIVE AREA)
ACTIVE AREA CENTER
86.58(ACTIVE AREA)
89.8(BEZEL OPENING)
(44.9)
(50.55)
102±0.5
12

<REAR VIEW>

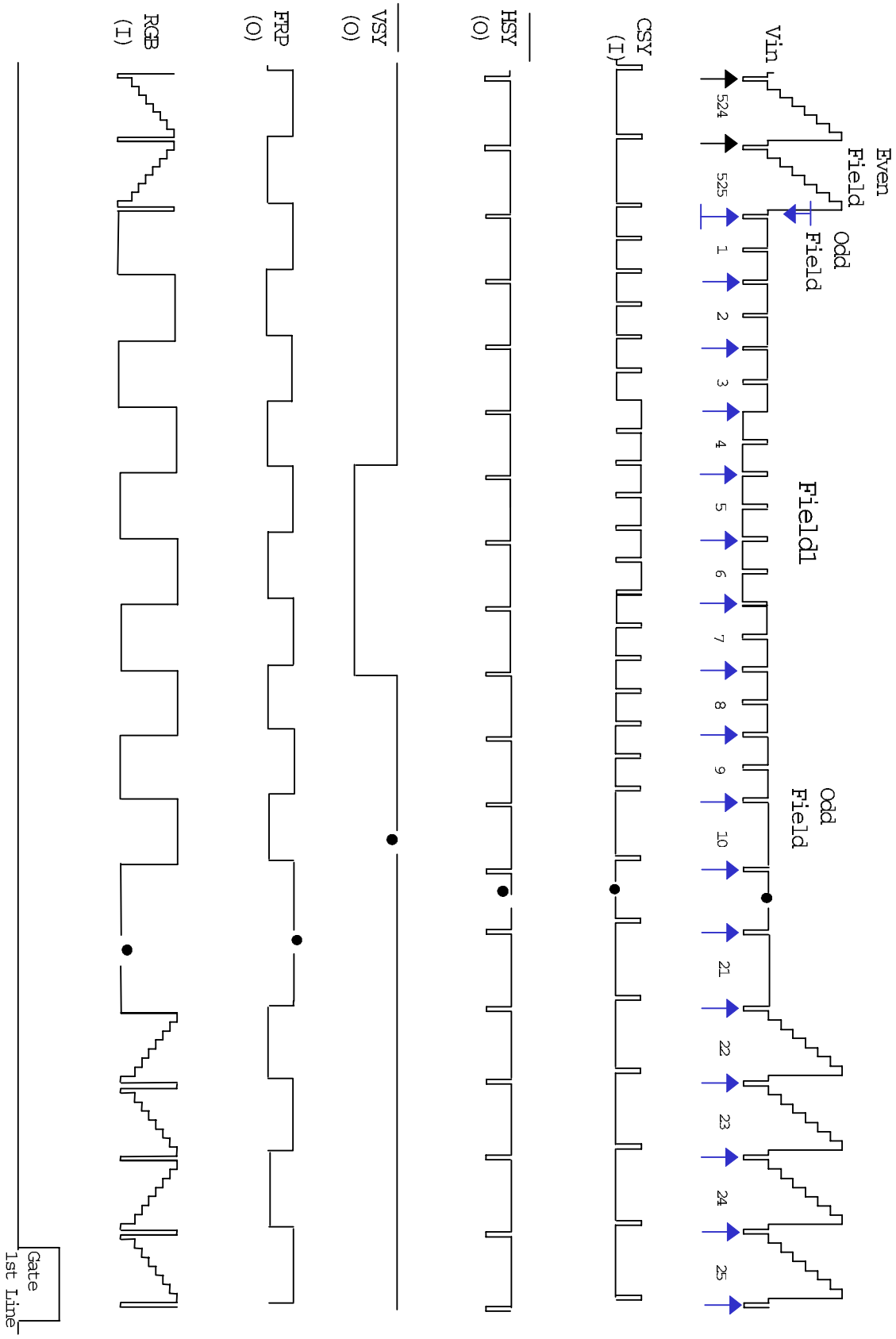

92.7
80.2
45.3
20.4
2-ø6.0BOSS
VCO
V-COM
CN1
CN2
148.1
144.2
84.6
59.6
19.7
8-ø2.2HOLE
(DEPTH:3.3)
3-ø5.0BOSS
50±5
29.2
20.4
29.0
47.2
92.7

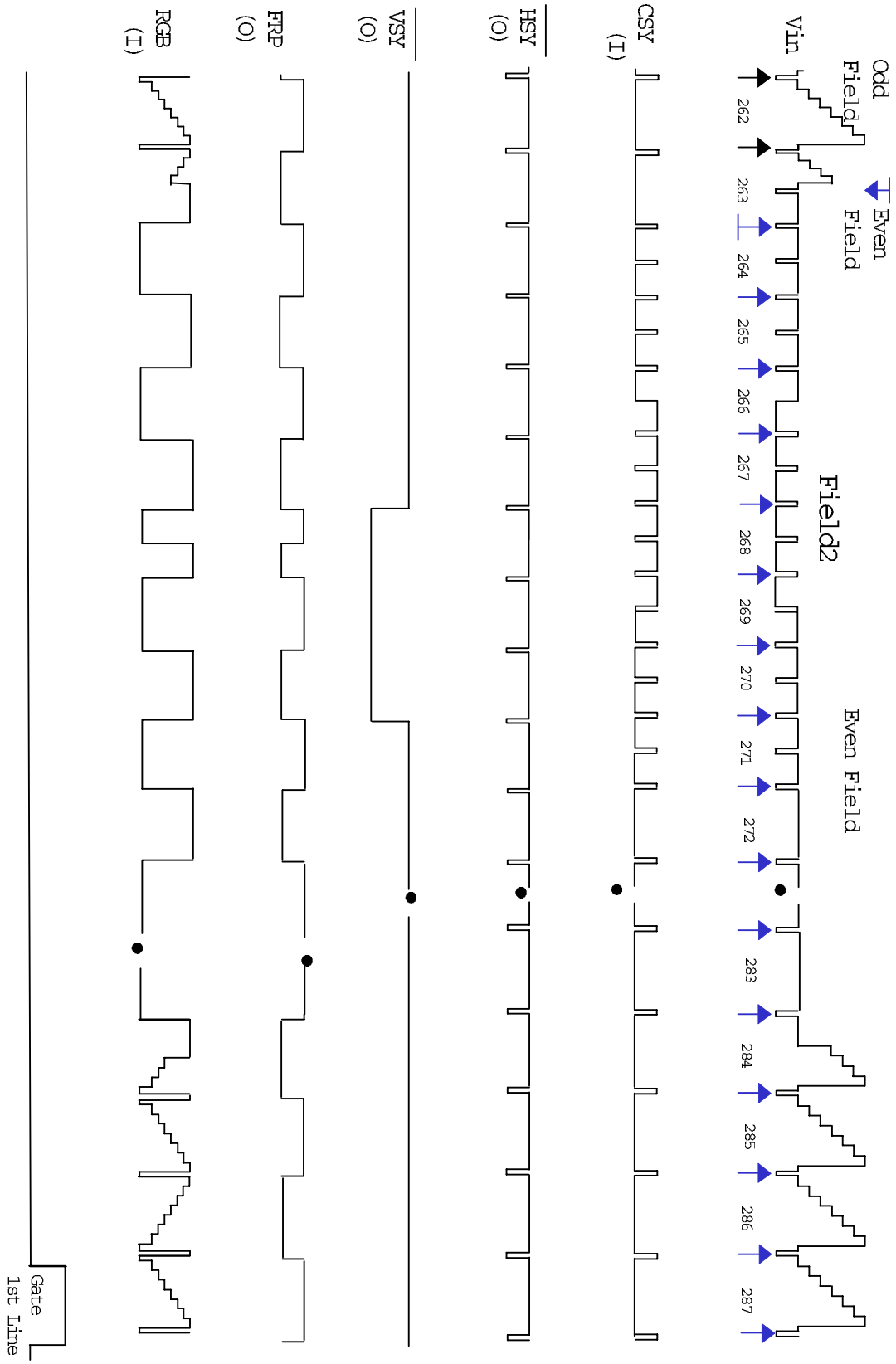
6. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 85 °C 240h
2	Low temperature storage test	Ta= -30 °C 240h
3	High temperature operation test	Ta= 70 °C 50%RH 240h
4	Low temperature operation test	Ta= -20 °C 240h
5	Vibration test (non-operating)	Wave form:random Vibration level:1.0G RMS Bandwidth:10-500Hz Duration:X,Y,Z, 20 min One time each direction
6	Shock test (non-operating)	Shock level:100G Waveform:half sine wave, 6ms Direction: ±X, ±Y, ±Z One time each direction
7	Altitude operating storage / shipment	 0 - 10,000 feet(3048m) 0 - 40,000 feet(12,192m)

Appendix) NTSC Signal Reference




Vin
Odd Field
Even Field
262
263
264
265
266
267
268
269
270
271
272
283
284
285
286
287
Field2
Even Field
CSY (I)
HSY (O)
VSY (O)
FRP (O)
RGB (I)
Gate 1st Line