LITEMAX
Sunlight Readable LCD!

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LITEMAX
CP0723E

Sunlight Readable 7” LED B/L LCD

+ LID07B01

All information is subject to change without notice.

Approved by	Checked by	Prepared by
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Record of Revision

Version and Date	Page	Old Description	New Description	Remark
Mar.09 2010 v.01	All		Preliminary Spec. (First Draft)	
Apr. 27 2010 v.02	All		Modify Optical Test Spec.	

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1.0 GENERAL DESCRIPTION

1.1 GENERAL SPECIFICATIONS

ITEM	SPECIFICATION
Display Area (mm)	153.6(H)×90(V)
Number of Pixels	1024(H)×3(RGB)×600(V)
Pixel Pitch (mm)	0.15(H)×0.15(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262,144
Viewing Direction	6 o´clock
Response Time (Tr+Tf)	20ms(typ.)
Brightness(cd/m^2)	450nit(typ) After Touch
Viewing Angle(BL on,CR≧10)	140 degree(H)，110degree(V)
Electrical Interface(data)	LVDS

1.2 ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
LCD input Voltage	Vcc	-0.3	4.0	V	
LED input Voltage	VLED	-0.3	6	V	
Signal Input Voltage	RxIN0+ ~ RxIN2+ RxIN0- ~ RxIN2- Rx CLK IN +/-	-0.3	Vcc+0.3	V	
Static Electricity	VESDc	-200	+200		
	VESDm	-15K	+15K	V	
ICC Rush Current	IRUSH	--	1	A	
Operation Temperature	T_{op}	-20	70	℃	
Storage Temperature	T_{stg}	-30	80	℃	

1.3 ELECTRICAL SPECIFICATION

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	
Power Supply Voltage For LED	VLED	4.5	5.0	5.5		
Logic Input Voltage (LVDS:IN+,IN-)	VCM	1.08	1.2	1.32	V	[Note1]
	| VID |	250	350	450	mV	[Note1]
	VTH	--	--	100	mV	[Note1]
	VTL	-100	--	--	mV	[Note1] When VCM=+1.2V
ADJ Input Voltage	VIH	3.0		3.3	V	
	VIL	GND		0.3	V	

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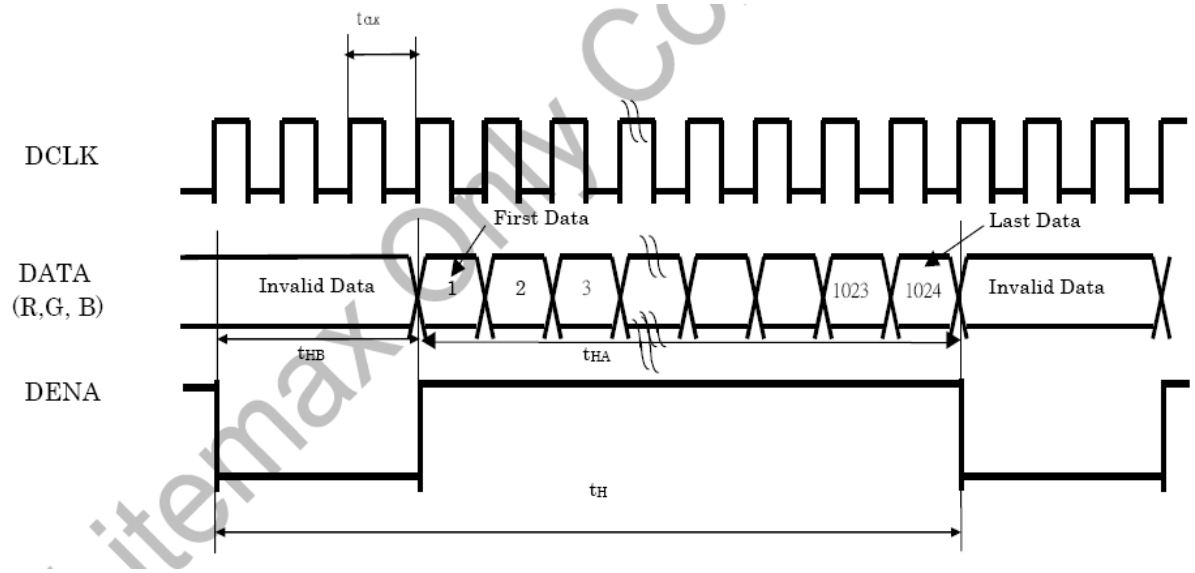
2.0 SIGNAL TIMING SPECIFICATIONS

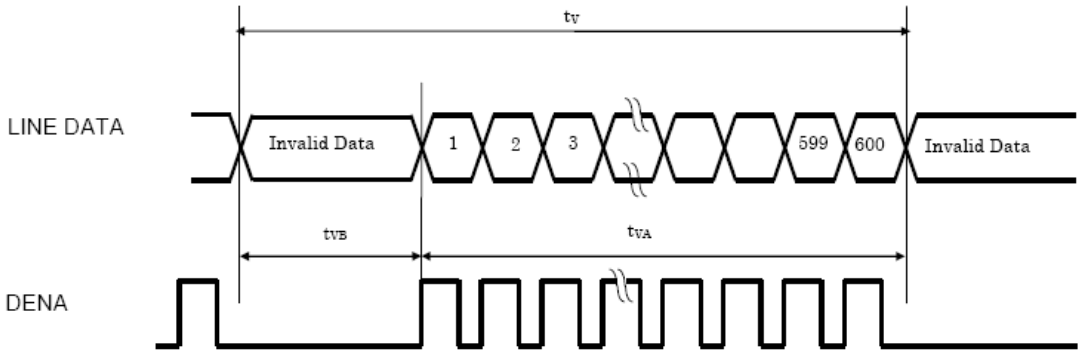
Timing Specifications

ITEM				SYMBOL	MIN.	TYP.	MAX.	UNIT
LVDS input signal sequence	CLK Frequency			fCLKin	39	45	52	MHz
LCD input signal sequence （Input LVDS Transmitter）	DENA	Horizontal	Horizontal total Time	t_H	1150	1200	1250	tCLK
			Horizontal effective Time	t_{HA}	1024			tCLK
			Horizontal Blank Time	t_{HB}	126	176	226	tCLK
		Vertical	Frame	fV	55	60	65	Hz
			Vertical total Time	t_V	610	625	640	t_H
			Vertical effectiveTime	t_{VA}	600			t_H
			Vertical Blank Time	t_{VB}	10	25	50	t_H

Horizontal Timing Sequence



Vertical Timing Sequence



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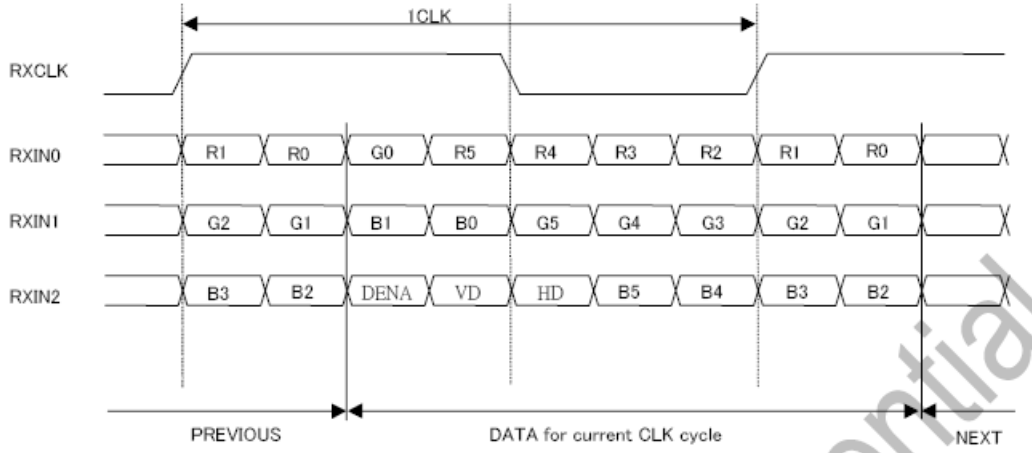
LVDS Input Data mapping



Color Data Assignment

COLOR	INPUT DATA	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		MSB					LSB	MSB					LSB	MSB					LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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3.0 INTERFACE CONNECTION

Electrical Interface Connection

CN1 : STARCONN P/N (089N30-00R00-G2)

Pin NO.	SYMBOL	DESCRIPTION
1	AVSS	Power Ground
2	VCC	Power Supply for Digital circuit
3	VCC	Power Supply for Digital circuit
4	V_EDID	Power Supply for EDID circuit
5	ADJ	Adjust for LED brightness
6	CLK_EDID	EDID clock inputs
7	DATA_EDID	EDID data inputs
8	RXIN0-	Negative LVDS differential data inputs
9	RXIN0+	Positive LVDS differential data inputs
10	AVSS	Power Ground
11	RXIN1-	Negative LVDS differential data inputs
12	RXIN1+	Positive LVDS differential data inputs
13	AVSS	Power Ground
14	RXIN2-	Negative LVDS differential data inputs
15	RXIN2+	Positive LVDS differential data inputs
16	AVSS	Power Ground
17	RXCLK-	Negative LVDS differential clock inputs
18	RXCLK+	Positive LVDS differential clock inputs
19	AVSS	Power Ground
20	NC	NC
21	NC	NC
22	LR	Left / Right Display Control
23	UD	Up / Down Display Control
24	VLED	Power Supply for LED(Vled=5.0±0.5)
25	VLED	Power Supply for LED(Vled=5.0±0.5)
26	VLED	Power Supply for LED(Vled=5.0±0.5)
27	NC	NC
28	NC	NC
29	NC	NC
30	NC	NC

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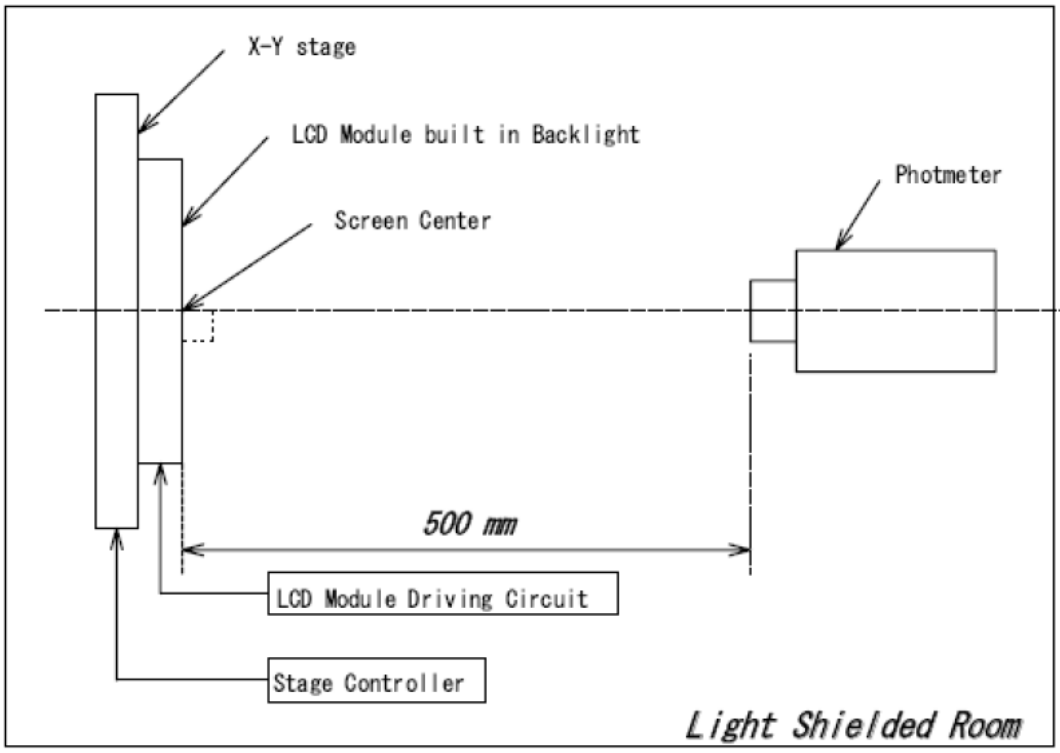
4.0 OPTICAL SPECIFICATION

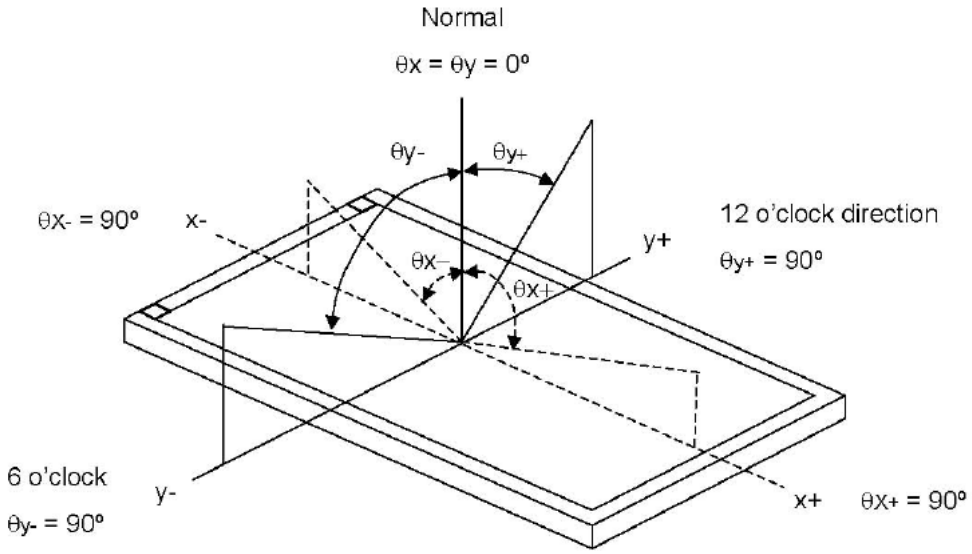
Optical						
Item		Symbol	Condition	Data	Unit	Remarks
Color chromaticity	Red	Rx	θx=0 θy=0 BM-7	0.533	-	
		Ry		0.323	-	
	Green	Gx		0.325	-	
		Gy		0.562	-	
	Blue	Bx		0.148	-	
		By		0.097	-	
	White	Wx		0.274	-	
		Wy		0.286	-	
Center Luminance of White		Lc		600±10%	cd/㎡	Panel only
Average Luminance		La		600±10%	cd/㎡	Panel only
Average Luminance After Touch		La		450±10%	cd/㎡	AMT AS-70060-01
Uniformity		Lu		80	%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10	565	-	
Color Saturation		NTSC		54	%	
Viewing Angle	Horizontal	θx+	CR≧10	70	Deg	
		θx-		70		
	Vertical	θy+		55		
		θy-		55		
LED Life Time		N/A	25°C	30,000	Hours	Defined as module brightness decay of 50% in 25°C ambient.

5.0 MEASURING METHOD

MEASURING SYSTEM



(1) The measurement point is the center of the active area except the measurement of Luminance Uniformity.
(2) Photometer : BM-7
(3) Definition of φ and θ :



MEASURING METHODS

Luminance:

The luminance of the center on a white raster (gray scale level L63) shall be measured.
Measurement shall be executed 30 minutes after the lamp is lit up.

Contrast Ratio:

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR)=L63/ L0

L63 : Luminance on the white raster (gray scale level L63)
L 0 : Luminance on the black raster (gray scale level L0)

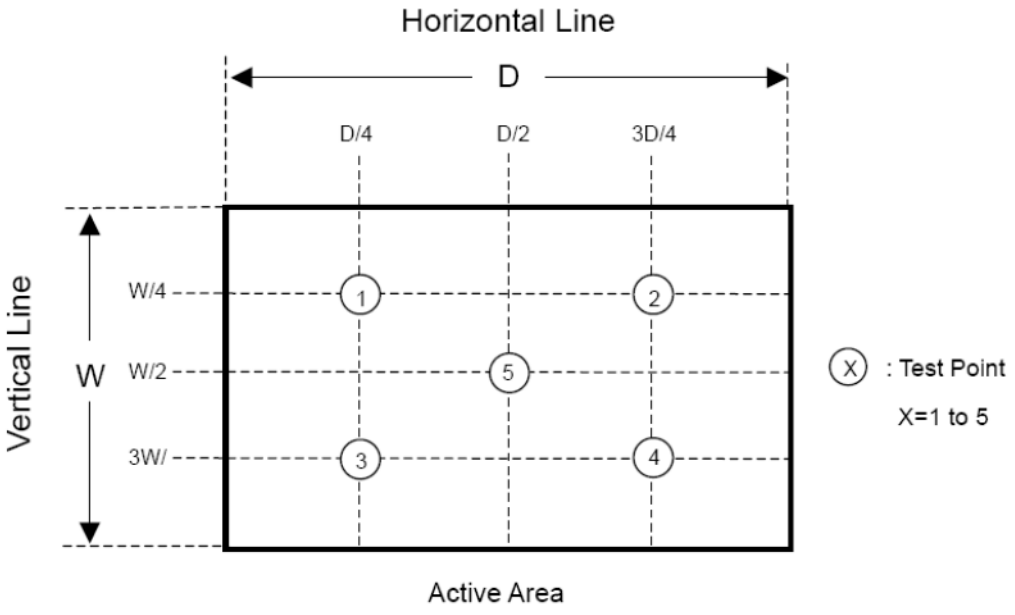
Viewing Angle:

Viewing angle is defined as the angles(T,I), in which specified contrast ratio can be obtained.
(Refer to Measuring Method (3) for the axes.)

(4) Luminance Uniformity:

The Luminance should be measured at 5 positions on white raster(gray scale level L63).
Uniformity can be calculated by the following expression.

$$\text{Luminance Uniformity} = \frac{\text{Minimum Luminance}}{\text{Maximum Luminance}} \text{ X100\%}$$

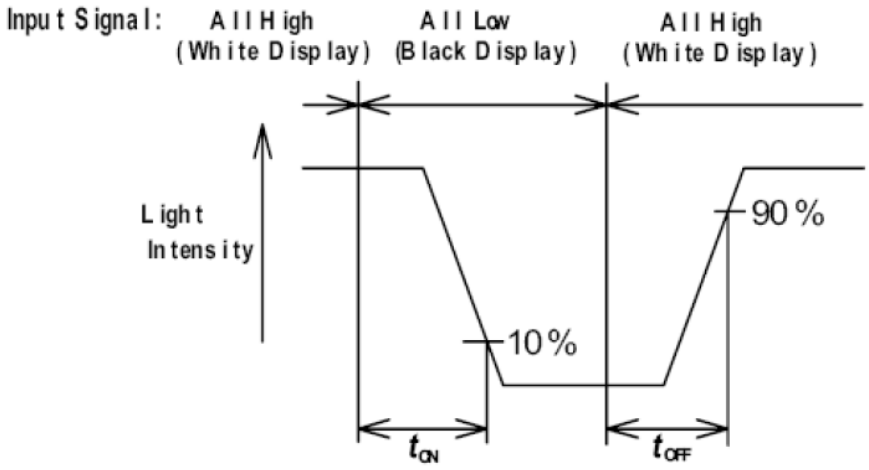


(5) Chromaticity :

The values(x,y) of chromaticity coordinates should be measured for the White, Red, Green and Blue Raster(gray scale level L63) each with a photometer.

(6) Response Time :

The response time (t_{ON}, t_{OFF}) is measured with a photo detector (photodiode) which measures the light intensity of the pixels.



t_{ON} : Turn on time is the time for a photo detector output waveform to go from its maximum value to 10% of its maximum.

t_{OFF} : Turn off time is the time for a photo detector output waveform to go from zero to 90% of its maximum.

Photodiode : S1223-01 HAMAMATSU PHOTONICS K.K.
White Display : White Raster (gray scale level L63)
Black Display : Black Raster (gray scale level L0)

6.0 LED DRIVING BOARD SPECIFICATION

1. LED Application

This specification is applied to LED converter unit for 7 ”(CPT CP0723) 40pcs LED backlight

2. Operating Characteristics

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		4.75	5	5.25	V	DC
Input Current (Low Brightness)	IinL	VIN=5V,Vadj=PWM 0%	0.0	-----	-----	mA	
Input Current (High Brightness)	IinH	VIN=5V,Vadj= PWM 100%	625	585	555	mA	
LED Current (Low Brightness)	IoutL	VIN=5V,Vadj==PWM 0%	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	VIN=5V,Vadj= PWM 100%	101	101	101	mA	
Working Frequency	Freq	VIN=5V,Vadj=PWM 100%	990	1000	1010	KHZ	
PWM Frequency	Freq	VIN=5V	180	200	220	HZ	
Brightness Control(PWM)	Vadj	Connection of PWM	0%	-----	100%	V	DUTY
ON/OFF Control	Von/off	Normal Operation	4.75	-----	5.25	V	DV(Input voltage control
Output Voltage	Vout	VIN=5V,Vadj= PWM 100%	24.63	24.65	24.57	V	DC
Efficiency	η	VIN=5V,Vadj= PWM 100%	83.79	85.12	85.17	%	Note 1

Note 1:Efficiency＝[(IoutH＊ Vout)/(IinH＊ Vin)] ＊ 100%,Tolerance ±0.5%

3. Environment

Operation Temperature	-20 ~ 85℃	
Operation Humidity	83.79% Max.RH	Note: Examine CONVERTER & LED efficiency for 16 hours under 25 degrees.
Storage Temperature	-40 ~ 85℃	
Storage Humidity	83.79% Max.RH	Note: Examine CONVERTER & LED efficiency for 16 hours under 25 degrees.

4. Connector Socket

4-1. Input Connector: J2 (CST CSF-0782-051R or Molex 52207-0519 Compatible)

:

PIN No	Symbol	Description
1	Vin	DC+5V
2	Vin	DC+5V
3	Brightness	Brightness PWM Control
4	GND	Ground
5	GND	Ground

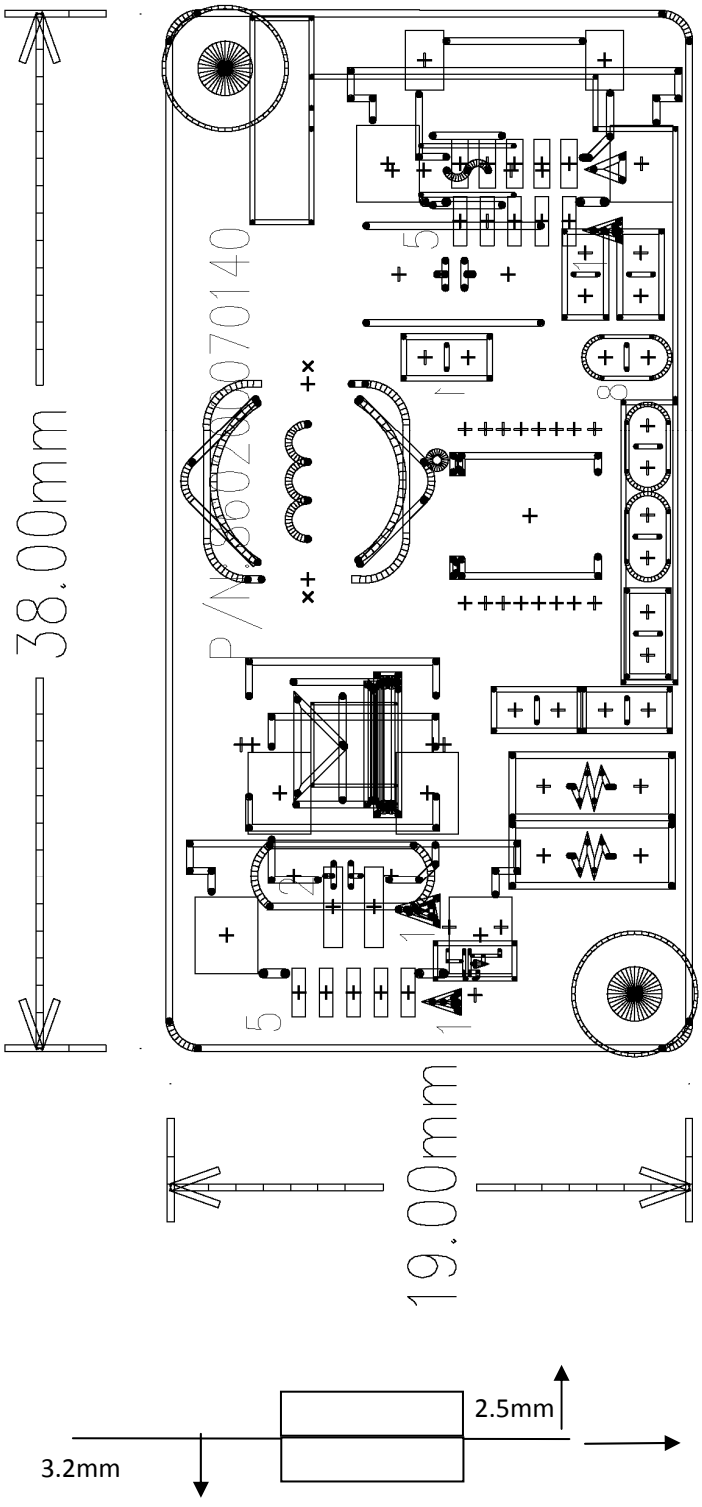
4-2 .Output Connector: J1 (CST CSF-0782-051R or Molex 52207-0519 Compatible)

:

PIN NO	Symbol	Description
1	Output	LED High Voltage(+)
2	Output	LED High Voltage(+)
3	NC	NC
4	Output	LED Low Voltage (-)
5	Output	LED Low Voltage (-)

5. Mechanical Characteristics
Dimension: 38mm*19mm*6.5mm

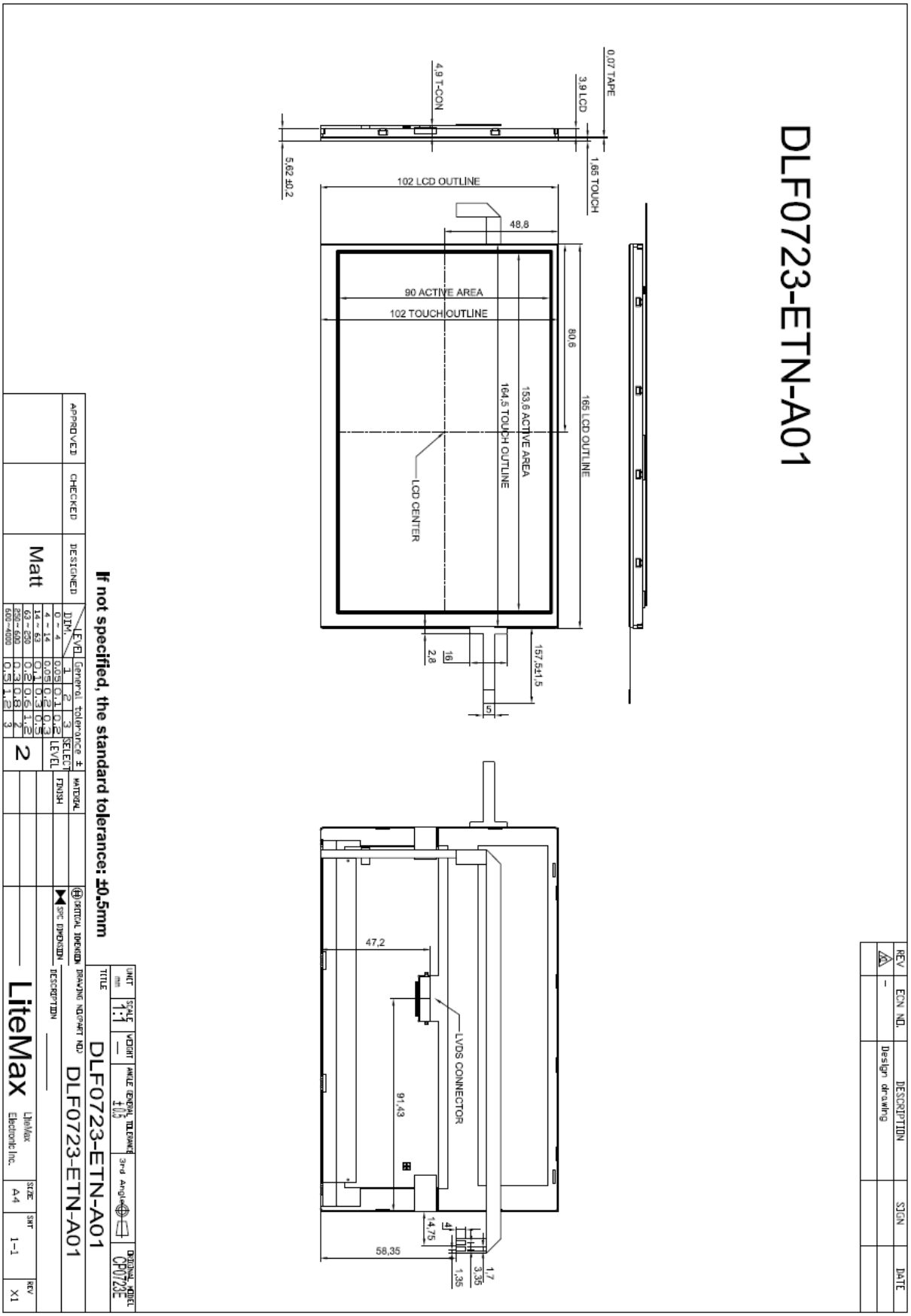
INPUT CONNECTOR
J2:
PIN1:VIN
PIN2:VIN
PIN3:BRIGHTNESS
PIN4: GND
PIN5:GND



PCB= 1mm

7.0 MECHANICAL DRAWING

CP0723 Taped WITH TOUCH



8.0 PRECAUTIONS

HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
(9) Do not disassemble the module.
(10) Do not pull or fold the lamp wire.
(11) Pins of I/F connector should not be touched directly with bare hands.

STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

OPERATION PRECAUTIONS

(1) Do not pull the I/F connector in or out while the module is operating.
(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.