



Product Specification

LQ170E1LG21

Preliminary Specification
 Final Specification

Module 17" SXGA TFT-LCD Module
Module Name LQ170E1LG21

CUSTOMER:

Customer Approval
Note: This Specification is subject to change without notice

TAI XI:

Approved by	Prepared by

Date:



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1. Handling Precautions

- 1) Since front polarizer is easily damaged, please be cautious and not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or soft cloth.
- 5) Since the panel is made of glass, it may be broken or cracked if dropped or bumped on hard surface.
- 6) To avoid ESD (Electro Static Discharge) damage, be sure to ground yourself before handling TFT-LCD Module
- 7) Do not open nor modify the module assembly.
- 8) Do not press the reflector sheet at the back of the module to any direction
- 9) In case if a module has to be put back into the packing container slot after it was taken out from the container, do not press the center of the LED light bar edge. Instead, press at the far ends of the LED light bar edge softly. Otherwise the TFT Module may be damaged.
- 10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module
- 11) TFT-LCD Module is not allowed to be twisted & bent even force is added on module in very short time. Please design your display product well to avoid external force applying to module by end-user directly.
- 12) Small amount of materials without flammability grade are used in the TFT-LCD module. The TFT-LCD module should be supplied by power complied with requirements of Limited Power source (IEC60950 or UL 1950), or be applied exemption.
- 13) Severe temperature condition may result in different luminance, response time and lamp ignition voltage
- 14) Continuous operating TFT-LCD display under low temperature environment may accelerate lamp exhaustion and reduce luminance dramatically.
- 15) The data on this specification sheet is applicable when LCD module is placed in landscape position.
- 16) Continuous displaying fixed pattern may induce image sticking. It's recommended to use screen saver or shuffle content periodically if fixed pattern is displayed on the screen.

2. General Description

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LQ170E1LG21 is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD panel, driver circuit, and a backlight system. The screen format is intended to support the SXGA (1280(H) x 1024(V)) screen and 16.7M colors (RGB 6-bits + HiFRC data). All input signals are 2-channel LVDS interface.

2.1 Display Characteristics

The following items are characteristics summary on the table under 25 °C condition:

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	432 (17.0")
Active Area	[mm]	337.920(H) x 270.336(V)
Pixels H x V	-	1280 x 3(RGB) x 1024
Pixel Pitch	[mm]	0.264(per one triad) x 0.264
Pixel Arrangement	-	R.G.B. Vertical Stripe
Display Mode	-	Normally White
White Luminance (Center)	[cd/m ²]	1000 (Typ.)
Contrast Ratio	-	5:1 (Typ.)
Response Time	[msec]	12 (Typ., on/off)
Power Consumption (LCD Module + Backligh unit)	[Watt]	25.2 (Typ.) LCD module : PDD (Typ.)=3 @ Black pattern, Fv=60Hz Backlight unit : P _{BLU} (Typ.) 43.5 @ Is=480 mA
Weight	[Grams]	1200 (Typ.)
Outline Dimension	[mm]	358.5(H) x 296.5(V) x 10.5(D) (Typ.)
Electrical Interface	-	Dual Channel LVDS
Support Color	-	16.7M colors (RGB 6-bits +Hi-FRC data)
Surface Treatment	-	Anti-glare type, Hardness 3H
Temperature Range		
Operating	[°C]	0 to +50
Storage (Shipping)	[°C]	-20 to +60
RoHS Compliance	-	RoHS Compliance
TCO Compliance	-	TCO6.0 Compliance



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2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature). 1000

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right) (Left) CR = 10	70 70	80 80	-	2
		Vertical (Up) (Down) CR = 10	50 70	70 80	-	
Contrast Ratio		Normal Direction	450	1000	-	3
Optical Response Time	[msec]	Raising Time (TrR)	-			4
		Falling Time (TrF)	-	12		
		Rising + Falling	-			
Color / Chromaticity Coordinates (CIE)		Red x	0.578	0.628	0.678	5
		Red y	0.285	0.335	0.385	
		Green x	0.244	0.294	0.344	
		Green y	0.614	0.664	0.714	
		Blue x	0.093	0.143	0.193	
		Blue y	0.029	0.079	0.129	
		White x	0.265	0.295	0.325	
White y	0.306	0.337	0.367			
Central Luminance	[cd/m ²]		800	1000	-	6
Luminance Uniformity	[%]	9 Points	75	80	-	7
NTSC	[%]			72		

Optical Equipment: BM-5A, BM-7, PR880, or equivalent

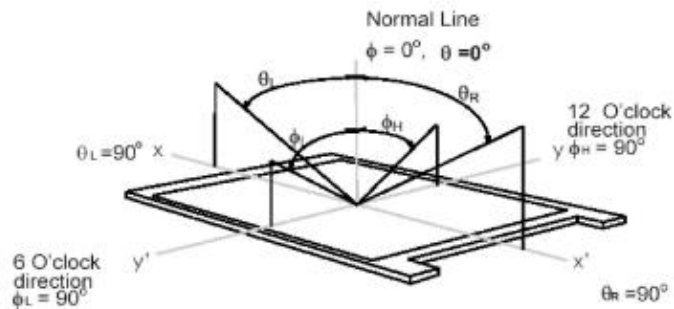
Note 1: Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥ 10 , or ≥ 5 , at the screen center, over a 180° horizontal and

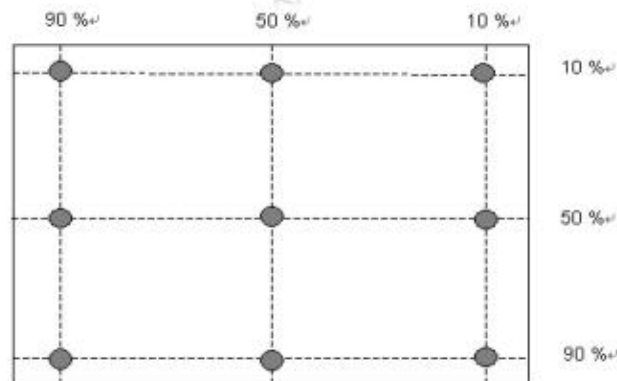
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180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90° (θ) horizontal left and right and 90° (ϕ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.



Note 2: 9 points position



Note 3:

$$\text{Uniformity} = \frac{\text{Minimum Luminance in 9 points (1-9)}}{\text{Maximum Luminance in 9 Points (1-9)}}$$

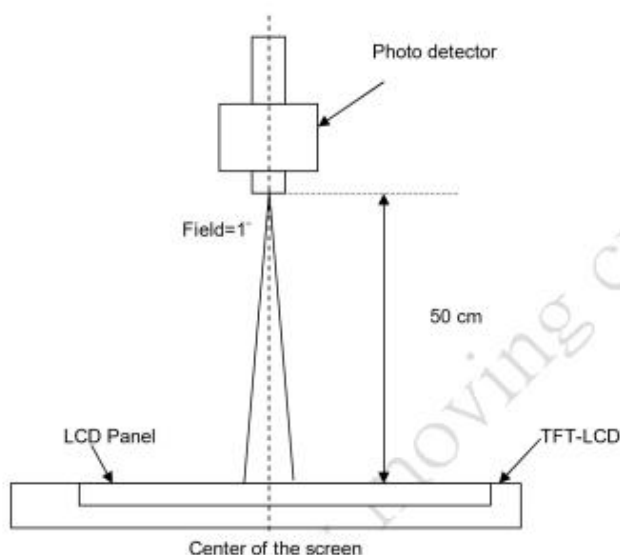
Note 4: Measurement method



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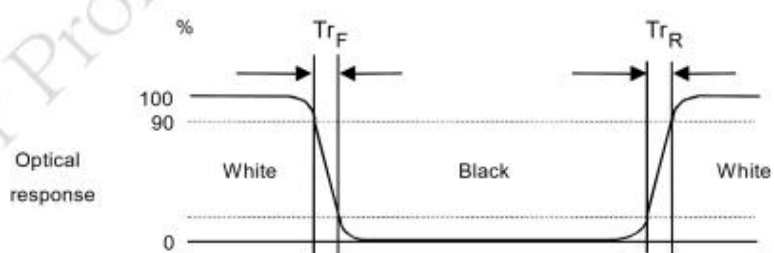
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The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.



Note 5: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as below.





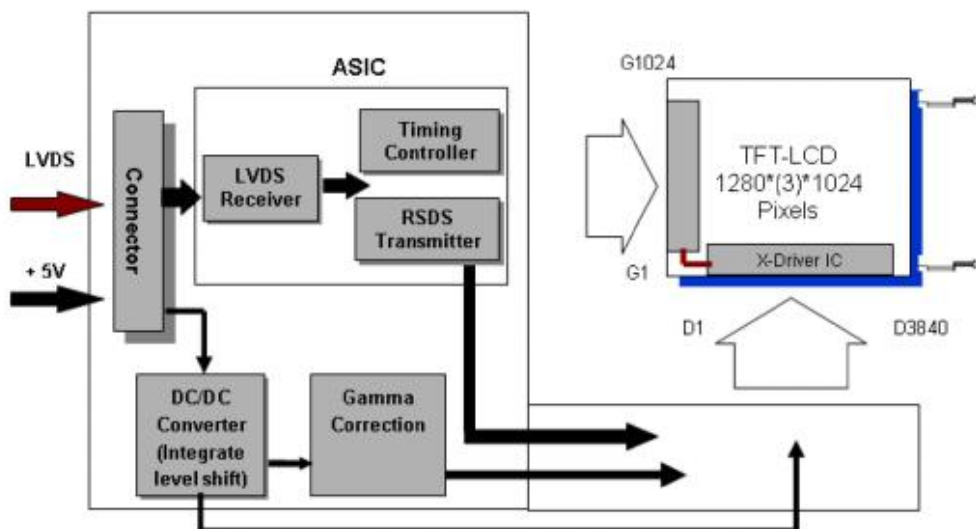
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3 TFT-LCD Module

3.1 Block Diagram

The following shows the block diagram of the 17 inch Color TFT-LCD Module.





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4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

4.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+6.0	[Volt]	Note 1,2

4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	[°C]	Note 3
Glass surface temperature (operation)	TGS	0	+65	[°C]	Note 3, Note 4
Operation Humidity	HOP	5	90	[%RH]	Note 3
Storage Temperature	TST	-20	+60	[°C]	
Storage Humidity	HST	5	90	[%RH]	

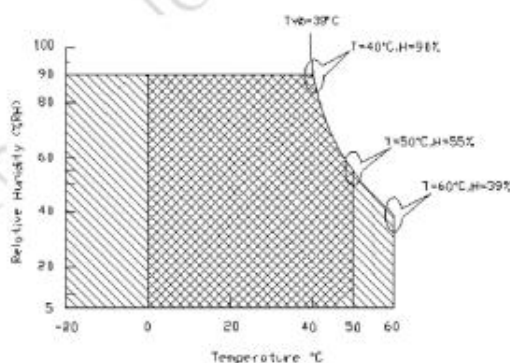
Note 1: With in Ta (25°C)

Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: Temperature and relative humidity range are shown as the below figure.

- 90% RH Max (Ta ≤ 39°C)
- Max wet-bulb temperature at 39°C or less. (Ta ≤ 39°C)
- No condensation

Note 4: Function Judged only



Operating Range Storage Range +



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5. Electrical characteristics

5.1 TFT LCD Module

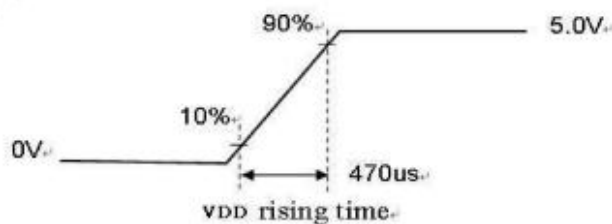
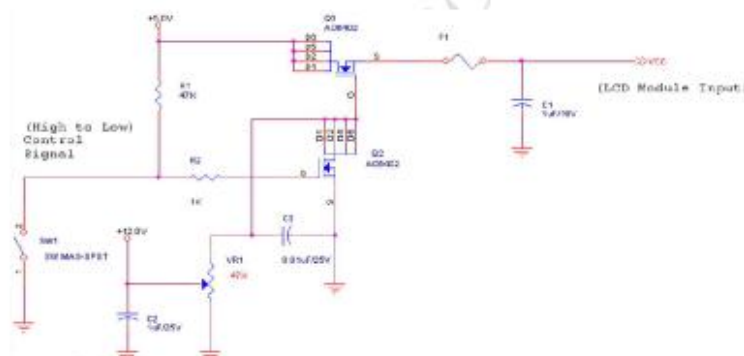
5.1.1 Power Specification

Input power specifications are as follows:

Symbol	Description	Min	Typ	Max	Unit	Remark
VDD	Power supply Input voltage	4.5	5.0	5.5	[Volt]	
IDD	Power supply Input Current (RMS)	-	0.6	0.72	[A]	VDD= 5.0V, Black Pattern, Fv=60Hz
		-	0.72	0.87	[A]	VDD= 5.0V, Black Pattern, Fv=75Hz
PDD	VDD Power Consumption	-	3	3.6	[Watt]	VDD= 5.0V, Black Pattern, Fv=60Hz
		-	3.6	4.32	[Watt]	VDD= 5.0V, Black Pattern, Fv=75Hz
IRush	Inrush Current	-	-	3.0	[A]	Note 3-1
VDDrp	Allowable VDD Ripple Voltage	-	-	500	[mV]	VDD= 5.0V, Black Pattern, Fv=75Hz

Note 1: Measurement conditions:

The duration of rising time of power input is 470us.





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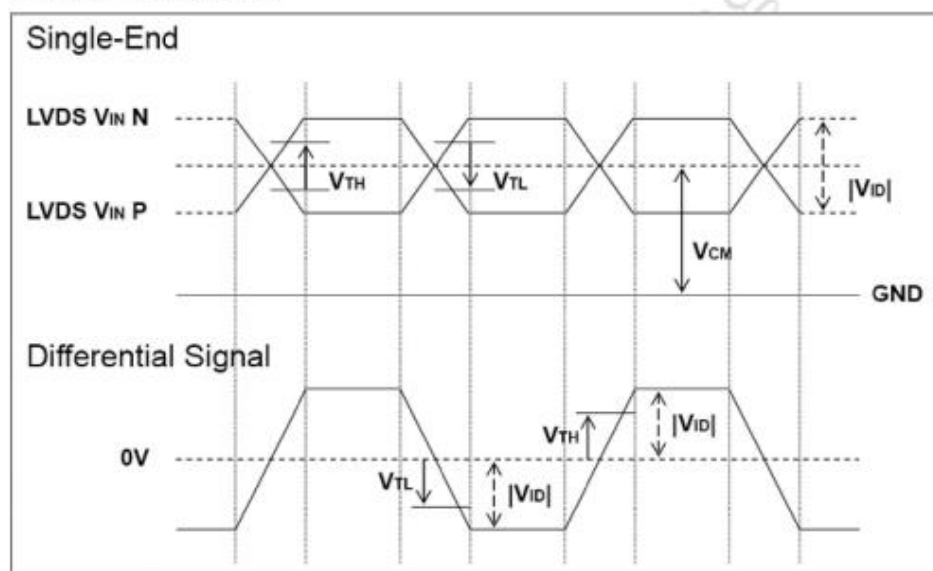
5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off. Please refer to specifications of SN75LVDS82DGG (Texas Instruments) in detail.

Each signal characteristics are as follows;

Symbol	Parameter	Min	Typ	Max	Units	Condition
V_{TH}	Differential Input High Threshold	-	-	+100	[mV]	$V_{CM} = 1.2V$ Note 1
V_{TL}	Differential Input Low Threshold	-100	-	-	[mV]	$V_{CM} = 1.2V$ Note 1
$ V_D $	Input Differential Voltage	100	400	600	[mV]	Note 1
V_{CM}	Differential Input Common Mode Voltage	+1.0	+1.2	+1.5	[V]	$V_{TH}-V_{TL} = 200mV$ (max) Note 1

Note1: LVDS Signal Waveform



5.1.3 Backlight unit



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Parameter guideline for LED driving is under stable conditions at 25°C (Room Temperature):

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
$I_{R_{LED}}$	LED Operation Current	-	480	-	[mA] Note 1	Operating with fixed driving current
V_{LB}	Light Bar Operation Voltage (for reference)	43.5	-	52.5	[Volt] Note 2	
P_{BLU}	BLU Power consumption (for reference)	-	25.2	-	[Watt]	
LT_{LED}	LED life Time (Typical)	25,000	30,000	-	[Hour] Note 3	

Note 1 : The specified current is input LED chip 100% duty current.

Note 2 : The value showed in the table is one light bar's operation voltage.

Note 3 : Definition of life time : brightness becomes 50% of its original value. The minimum life time of LED unit is on the condition of $I_{R_{LED}} = 60mA$ and $25 \pm 2^{\circ}C$ (Room temperature).

Note 4 : Each LED light bar consists of 60PCS LED package (4 strings * 15PCS/string)



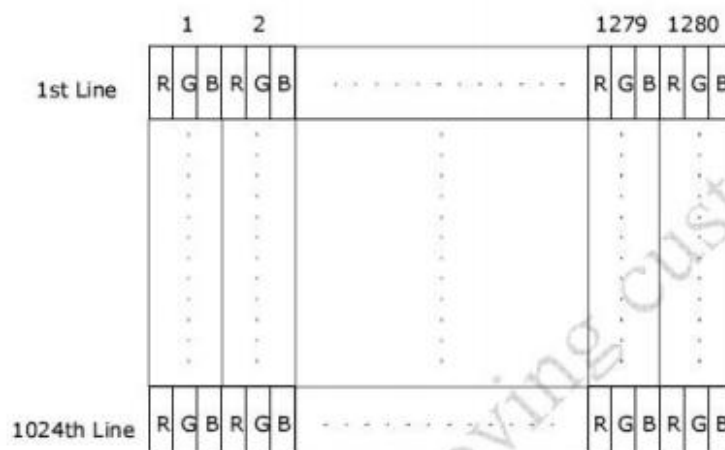
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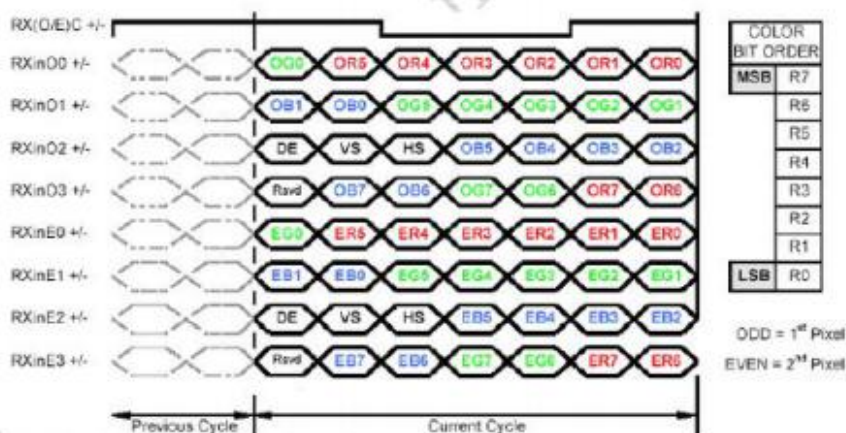
6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.



6.2 The Input Data Format



Note1: Normally, DE, VS, HS on EVEN channel are not used.

Note2: Please follow PSWG.

Note3: 8-bit in



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6.3 Signal Description

The module using one LVDS receiver SN75LVDS82(Texas Instruments). LVDS is a differential signal technology for LCD interface and high speed data transfer device. LVDS transmitters shall be SN75LVDS83(negative edge sampling). The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

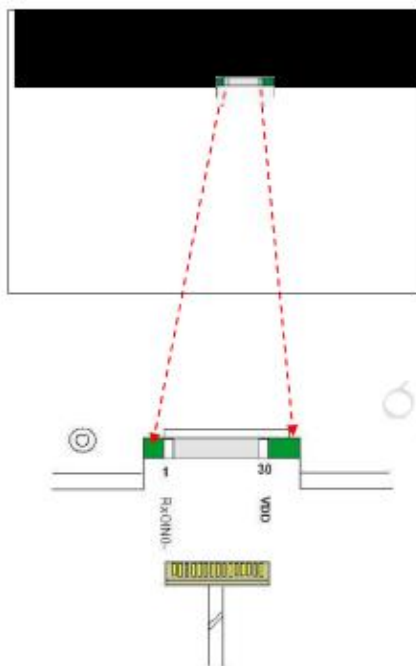
1	RAIN0-	LVDS receiver signal Odd CH0 (-)	LVDS
2	RAIN0+	LVDS receiver signal Odd CH0 (+)	LVDS
3	RAIN1-	LVDS receiver signal Odd CH1 (-)	LVDS
4	RAIN1+	LVDS receiver signal Odd CH1 (+)	LVDS
5	RAIN2-	LVDS receiver signal Odd CH2 (-)	LVDS
6	RAIN2+	LVDS receiver signal Odd CH2 (+)	LVDS
7	GND	GND	
8	RACLKIN-	LVDS receiver signal Odd CK (-)	LVDS
9	RACLKIN+	LVDS receiver signal Odd CK (+)	LVDS
10	RAIN3-	LVDS receiver signal Odd CH3 (-)	LVDS
11	RAIN3+	LVDS receiver signal Odd CH3 (+)	LVDS
12	RBIN0-	LVDS receiver signal Even CH0 (-)	LVDS
13	RBIN0+	LVDS receiver signal Even CH0 (+)	LVDS
14	GND	GND	
15	RBIN1-	LVDS receiver signal Even CH1 (-)	LVDS
16	RBIN1+	LVDS receiver signal Even CH1 (+)	LVDS
17	GND	GND	
18	RBIN2-	LVDS receiver signal Even CH2 (-)	LVDS
19	RBIN2+	LVDS receiver signal Even CH2 (+)	LVDS
20	RBCLKIN-	LVDS receiver signal Even CK (-)	LVDS
21	RBCLKIN+	LVDS receiver signal Even CK (+)	LVDS
22	RBIN3-	LVDS receiver signal Even CH3 (-)	LVDS
23	RBIN3+	LVDS receiver signal Even CH3 (+)	LVDS
24	GND	GND	
25	GND	GND	
26	GND	GND	
27	GND	GND	
28	VCC	+5.0V Power supply	
29	VCC	+5.0V Power supply	
30	VCC	+5.0V Power supply	



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Note1: Start from left side



Note2: Input signals of odd and even clock shall be the same timing.

6.4 Interface Timing

6.4.1 Timing Characteristics



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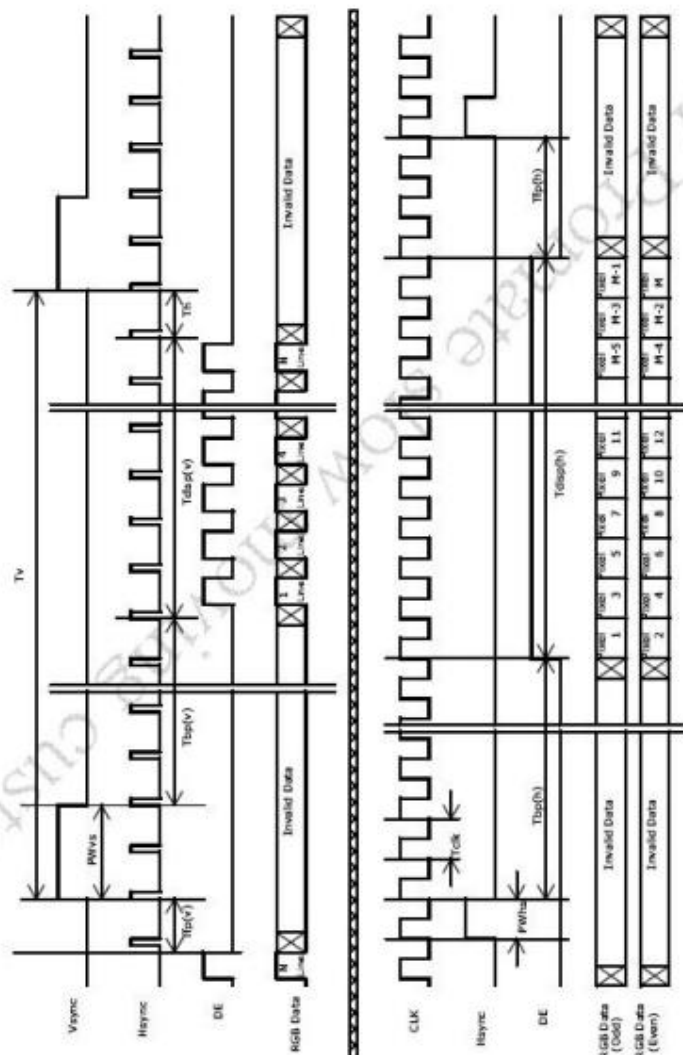
Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	Tv	1032	1066	1150	Th
	Active	Tdisp(v)	1024	1024	1024	Th
	Blanking	Tbp(v)+Tfp(v)+PWvs	8	42	126	Th
Horizontal Section	Period	Th	780	844	2047	Tclk
	Active	Tdisp(h)	640	640	640	Tclk
	Blanking	Tbp(h)+Tfp(h)+PWhs	140	204	-	Tclk
Clock	Period	Tclk	22.2	18.52	14.81	ns
	Frequency	Freq.	45	54	67.5	MHz
Frame Rate	Frequency	1/Tv	50	60	75	Hz

Note: DE mode only



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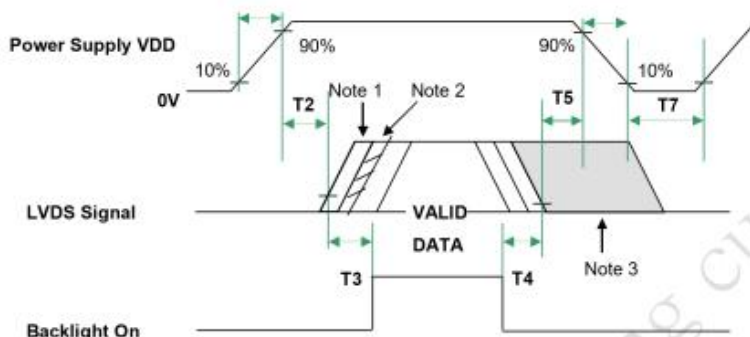
6.5 Power ON/OFF Sequence

VDD power and lamp on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



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Note1: insert a white pattern 360ms

Note2: insert a black pattern

Note3: insert a white pattern after valid data and last until VDD falls to 10%.

Note4: when AC on/off, timing rule of logo power on/off is the same as above.

Power Sequence Timing				
Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	40	50	
T3	500	-	-	
T4	300	-	-	
T5	40	1500	-	
T6	-	-	-	
T7	1000	-	-	

7. Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.



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7.1 TFT LCD Module

7.1.1 Connector

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	P-TWO / JAE
Type Part Number	187034-30091 / FI-XB30SSLA-HF15
Mating Housing Part Number	FI-X30HL FI-X30H (Unlocked Type)

7.1.2 Pin Assignment

Pin#	Signal Name
1	RAIN0-
2	RAIN0+
3	RAIN1-
4	RAIN1+
5	RAIN2-
6	RAIN2+
7	GND
8	RACLKIN-
9	RACLKIN+
10	RAIN3-
11	RAIN3+
12	RBIN0-
13	RBIN0+
14	GND
15	RBIN1-

Pin#	Signal Name
16	RBIN1+
17	GND
18	RBIN2-
19	RBIN2+
20	RBCLKIN-
21	RBCLKIN+
22	RBIN3-
23	RBIN3+
24	GND
25	GND
26	GND
27	GND
28	VCC
29	VCC
30	VCC



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8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50℃, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0℃, 300hours	
High Temperature Storage (HTS)	Ta= 60℃, 300hours	
Low Temperature Storage (LTS)	Ta= -20℃, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 G Wave: Random Frequency: 10 - 200 - 10 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 9 points, 25 times/ point.	1
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 9 points, 25 times/ point.	
Altitude Test	Operation:10,000 ft Non-Operation:30,000 ft	

Note1: According to EN61000-4-2, ESD class B: Some performance degradation allowed. No data lost
Self-recoverable. No hardware failures.

Note2:

- Water condensation is not allowed for each test items.
- Each test is done by new TFT-LCD module. Don't use the same TFT-LCD module repeatedly for reliability test.
- The reliability test is performed only to examine the TFT-LCD module capability.
- To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.
- No function failure occurs.



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9. Label and Packing


9.1 Shipping Label

The label is on the panel as shown below:



Note 9-1 For Pb Free products, SHARP will add  for identification.

Note 9-2 For RoHS compatible products, SHARP will add  for identification.

Note 9-3 For China RoHS compatible products, SHARP will add  for identification.

Note 9-4 The Green Mark will be presented only when the green documents have been ready by SHARP Internal Green Team.

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