LITEMAX

Sunlight Readable LCD!

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DURApixel™ by LITEMAX Wide Temp LED Backlight

RoHS·WEEE LITEMAX COMPLIANT

LITEMAX DLF/DLH1744

Sunlight Readable 17” LED B/L LCD

(1st Edition 6/3/2007)
All information is subject to change without notice.

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Record Revision

Version and Date	Page	Old Description	New Description	Remark

Contents

Handling Precautions

1) Since front polarizer is easily damaged, be extremely careful when handling panel.
2) Be sure to turn off power supply when inserting or disconnecting from input connectors.
3) Wipe off water immediately. Long contact with water may cause discoloration or spots.
4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
5) Since the panel is made of glass, it may break or crack if dropped or bumped on a hard surface.
6) Since CMOS LSI is used in this module, be careful of static electricity by grounding those handling the display.
7) Do not open nor modify the module assembly.
8) Do not press or touch the panel surface with hands or tools.
9) Do not press or move the reflector sheet at the back of the module in any direction.
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) After installation of the TFT module into an enclosure (Desktop monitor Bezel, for example), do not twist nor bend the TFT Module even momentarily. Design the enclosure so that no bending/twisting forces are applied to the TFT module. Otherwise the TFT module may be damaged.

General Description

This specification applies to the 17 inch Color TFT-LCD Module M170EG01 VD.

The display supports the WSXGA+ (1280(H) x 1024(V)) screen format and 16.7M colors (RGB 6-bits+Hi-RFC data).All input signals are 2 Channel LVDS interface compatible. This module does not contain an LED driving board for backlight.

Display Characteristics

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

Items	Unit	Specifications
Screen Diagonal	[mm]	432 (17.0")
Active Area	[mm]	337.920(H) ×270.336(V)
Pixels H x V		1280 × 3(RGB) ×1024
Pixel Pitch	[mm]	0.264(per one triad) ×0.264
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		Normally White
White Luminance	[cd/m_2]	1000 (center,Typ)
Contrast Ratio		1000 : 1 (Typ)
Optical ResponseTime	[msec]	5 (Typ)
Nominal Input Voltage VDD	[Volt]	+5.0 (Typ)
Power Consumption	[Watt]	34.5W (Typ) (PDD=6W, PBL=28.5W)
Weight	[Grams]	2120
Physical Size (H x V x D)	[mm]	358.5*296.5*15.8
Electrical Interface		Dual Channel LVDS
Surface Treatment		Anti-glare type, Hardness 3H
Support Color		16.7M colors (RGB 6-bits + FRC data)
Temperature Range Operating Storage (Non-Operating)	[$_o$C] [$_o$C]	0 to +50 -20 to + 60
RoHS Compliance		RoHS Compliance

Optical Characteristics

The optical characteristics are measured under stable conditions at 25℃(Room Temperature):

Optical Test

Optical

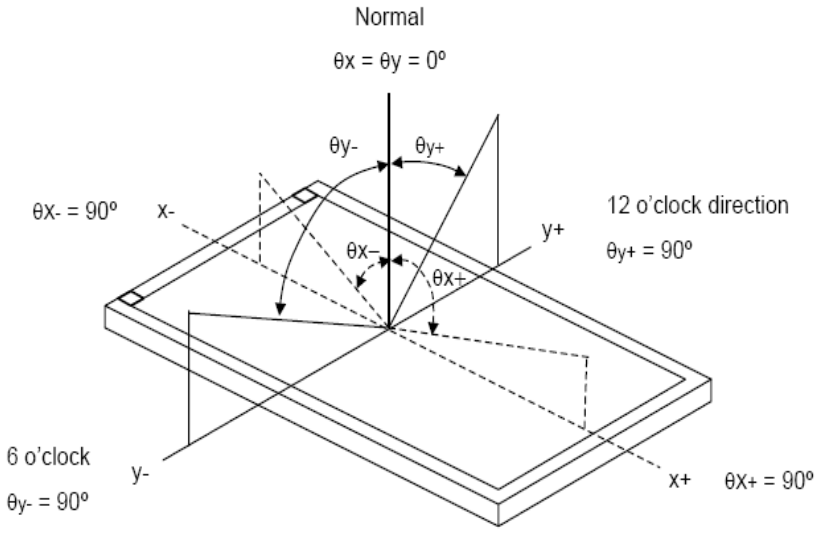
Item		Symbol	Condition	Data	Unit	Note
Color chromaticity	Red	Rx	θx=0 θy=0 BM-7	0.6386	-	Test Mode： （1）（2）（3）
		Ry		0.3548	-	
	Green	Gx		0.3356	-	
		Gy		0.598	-	
	Blue	Bx		0.1438	-	
		By		0.0724	-	
	White	Wx		0.3236	-	
		Wy		0.3533	-	
Center Luminance of White		Lc		1060	cd/㎡	
Average		La		880	cd/㎡	
Uniform		Lu		76	%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10	1000	-	Test Mode： （1）（4）
Color Saturation		NTSC		75	%	
Viewing Angle	Horizontal	θx+	CR≧10	80	Deg	Test Mode： （1）（3）
		θx-		80		
	Vertical	θy+		80		
		θy-		80		

Reliability

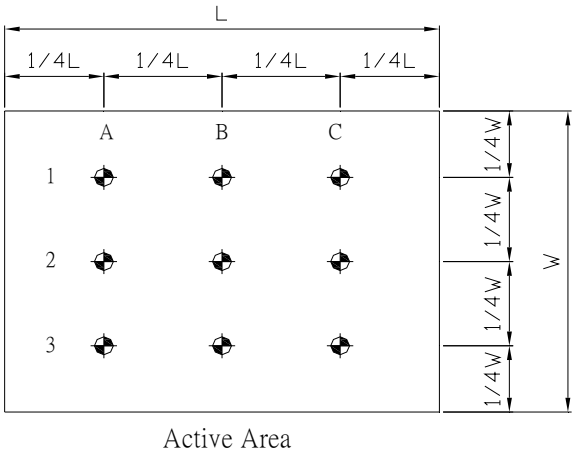
Item	Fill the Bill	Note
torage Temperature	Max：60℃ Time：24hours Min：-20℃ Time：24hours	Test Mode：（5）
Operating Temperature	Max：50℃ Time：24hours Min：-10℃ Time：24hours	
High Temperature & Humidity	50℃，RH 80%，24 hours	
Thermal Shock	-20℃，0.5hour to 60℃，0.5hour 100cycle，1hour/cycle	
Life	-----℃--------hours	Test Mode（6）
Vibration	1.5G，10-200-10Hz，30Min each Axis (X,Y,Z)	Test Mode：（7）
Shock（white carton）	50G，20ms , Half-sine wave (X,Y,Z)	Test Mode：（7）
Drop （white carton）	Height: 60 cm 1corner,3edges,6surfaces (ASTMD4169-I)	

Test Mode：

（1） （θx，θy）/Definition of Viewing Angle（θx，θy）：

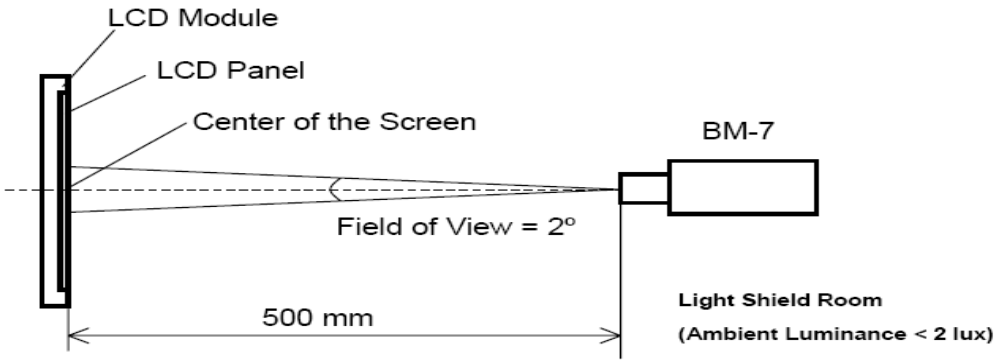


（**2**） Definition of Test Point：

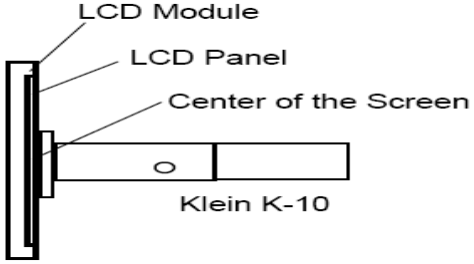


Active Area

（3）BM-7 Measurement Setup:



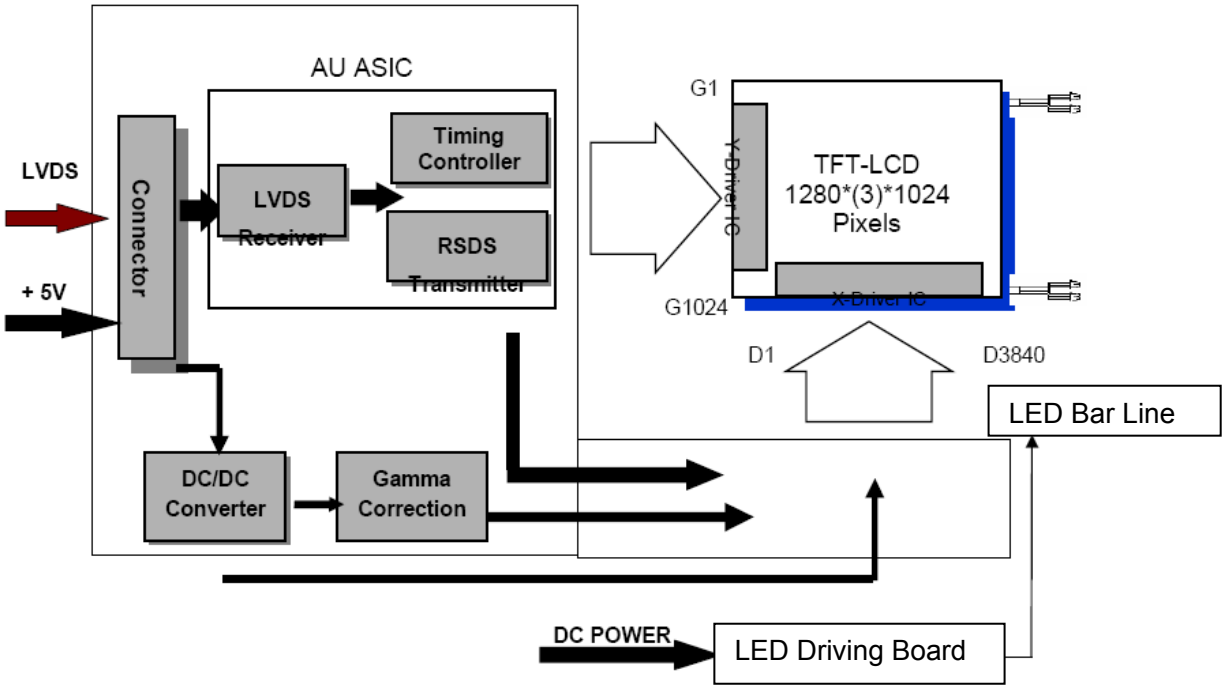
（4）Klein K-10 Measurement Setup:



Functional Block Diagram

The following diagram shows the functional block of the 17.0 inches Color TFT-LCD Module:

LLL



Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive	VIN	-0.3	6	[Volt]	*Note 1,2*

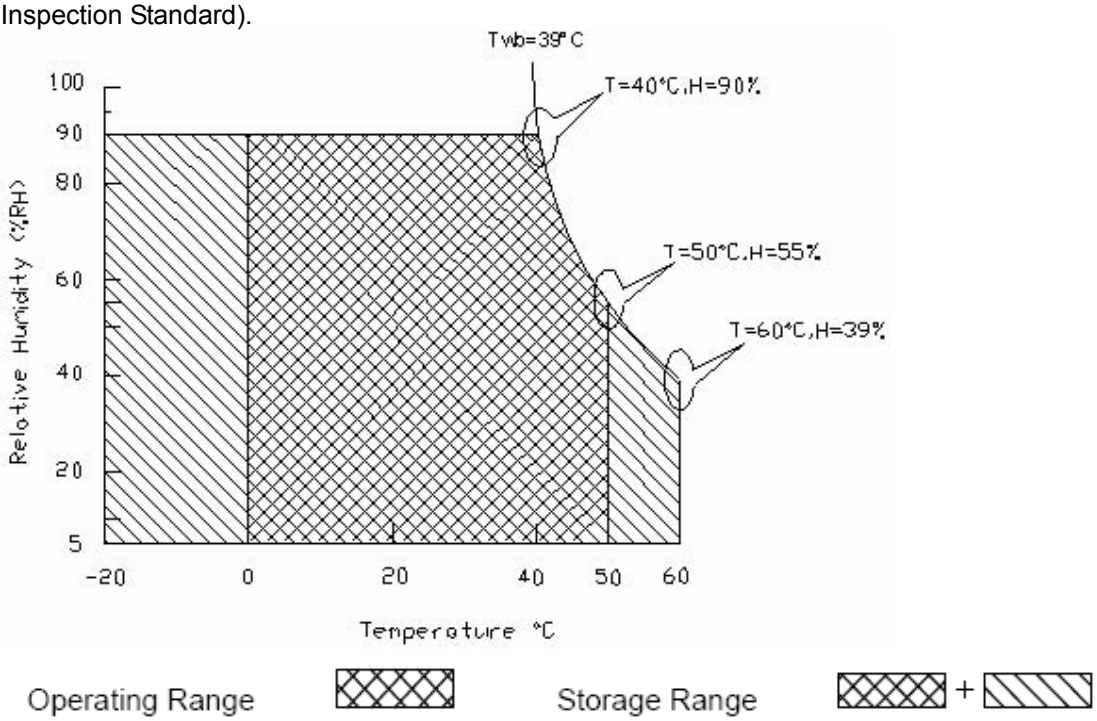
Backlight Unit

Item	Symbol	Min	Max	Unit	Conditions
LED Light bar Current	ILED	-	800	[mA] rms	*Note 1,2*

Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit	Conditions
Operating Humidity	HOP	5	90	[%RH]	*Note 3*
Storage Temperature	TST	-20	+60	[oC]	
Storage Humidity	HST	5	90	[%RH]	

Note 1: With in Ta (25℃)*Note 2:* Permanent damage to the device may occur if exceed maximum values*Note 3:* For quality performance, please refer to AUO IIS (Incoming Inspection Standard).



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

Note 3: For quality performance, please refer to LiteMax IIS (Incoming Inspection Standard).

Electrical characteristics

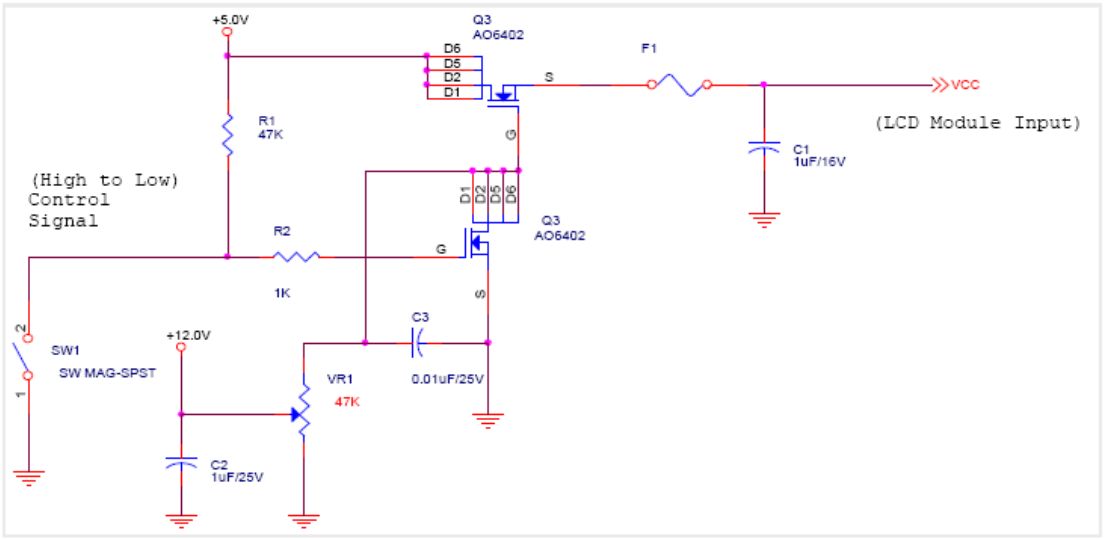
TFT LCD Module

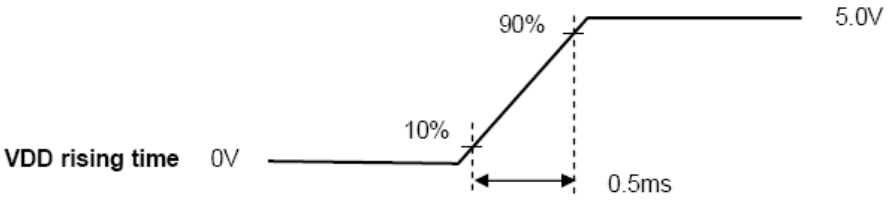
Power Specification

Input power specifications are as follows:

Symble	Parameter	Min.	Typ.	Max.	Unit	Condition
VCC	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	±10%
ICC	Input Current	-	1.2	1.56	[A]	Vin=5V , All Black Pattern, at 75Hz
IRush	Inrush Current	-	-	3.0	[A]	Note
PCC	VCCPower	-	6	7.8	[Watt]	Vin=5V , All Black Pattern, at 75Hz

Note: Measurement conditions:



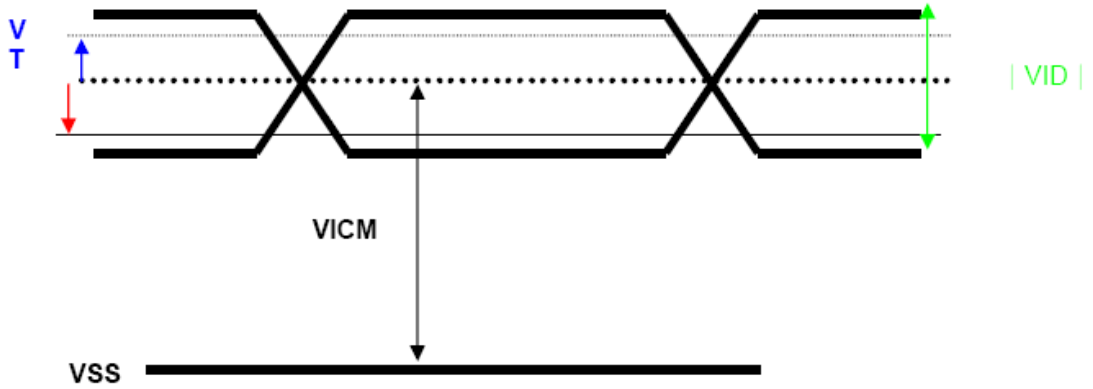


Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when Vin is off It is recommended to refer the specifications of SN75LVDS82DGG (Texas Instruments) in detail.
Each signal characteristics are as follows;

Symbol	Parameter	Min	Typ	Max	Units	Condition
VTH	Differential Input High Threshold	-	-	+100	[mV]	VICM = 1.2V *Note*
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VICM = 1.2V *Note*
| VID |	Input Differential Voltage	100	400	600	[mV]	*Note*
VICM	Differential Input Common Mode Voltage	+1.0	+1.2	+1.5	[V]	VTH/VTL = ± 100MV *Note*

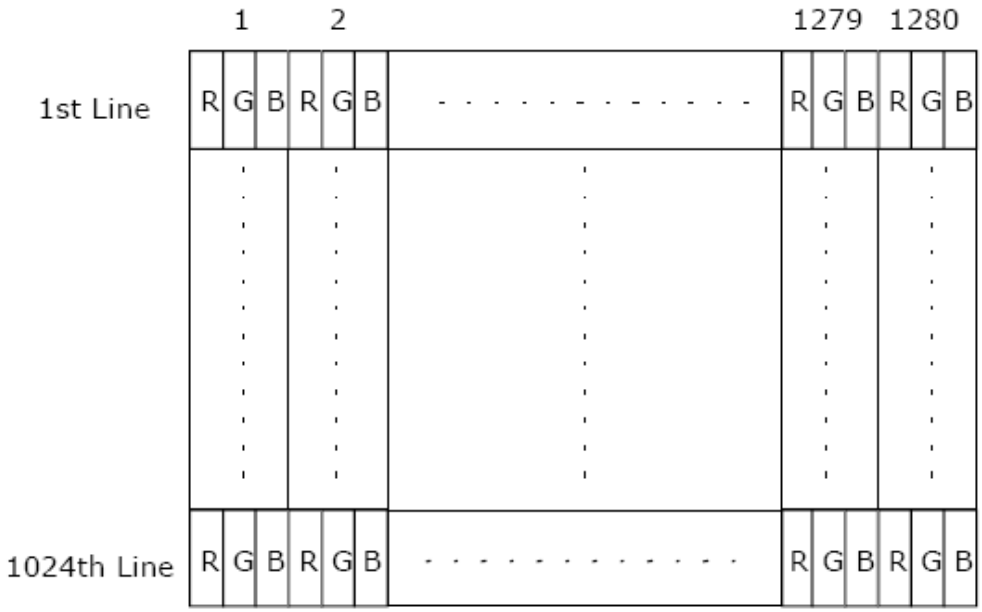
Note: LVDS Signal Waveform



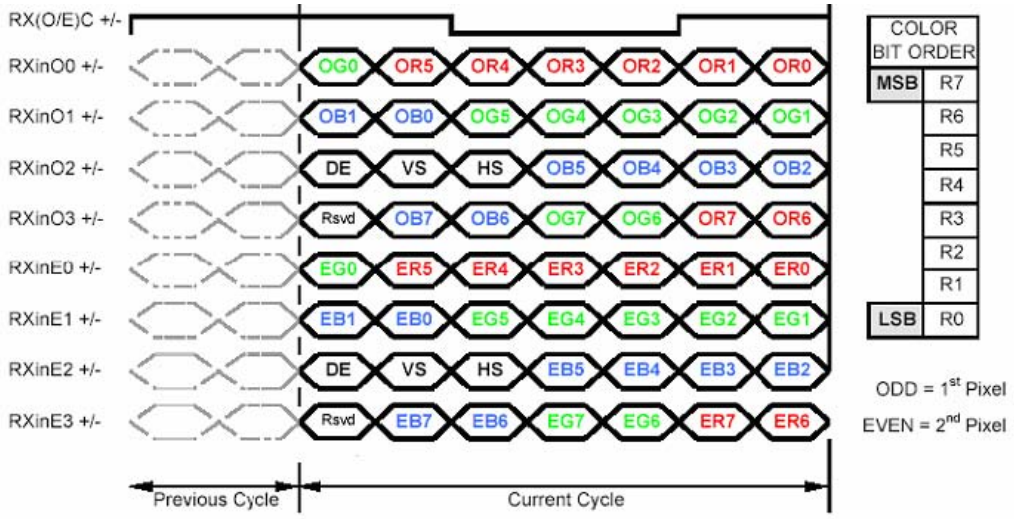
Signal Characteristic

Pixel Format Image

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



The Input Data Format



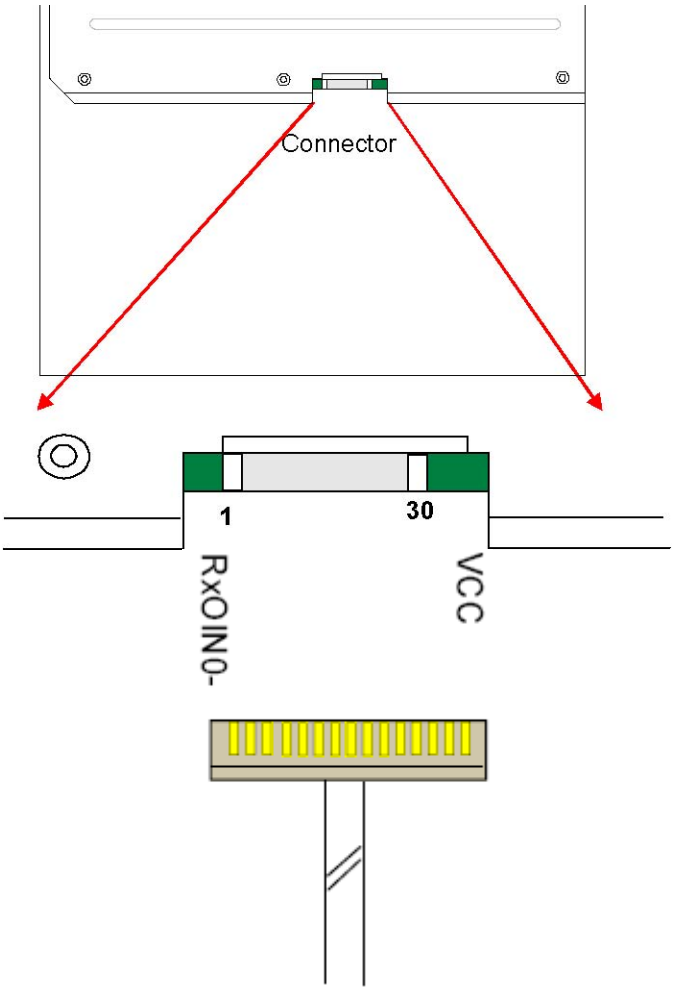
Note1: Normally, DE, VS, HS on EVEN channel are not used.
Note2: Please follow PSWG.
Note3: 8-bit in

Signal Description

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

PIN #	SIGNAL NAME	DESCRIPTION
1	RxO0	Negative LVDS differential data input (Odd data)
2	RxO0+	Positive LVDS differential data input (Odd data)
3	RxO1	Negative LVDS differential data input (Odd data)
4	RxO1+	Positive LVDS differential data input (Odd data)
	RxO2	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RxO2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	GND	Power Ground
8	RxOC-	Negative LVDS differential clock input (Odd clock)
9	RxOC+	Positive LVDS differential clock input (Odd clock)
	RxO3	Negative LVDS differential data input (Odd data)
11	RxO3+	Positive LVDS differential data input (Odd data)
12	RxE0	Negative LVDS differential data input (Even clock)
13	RxE0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
	RxE1	Positive LVDS differential data input (Even data)
16	RxE1+	Negative LVDS differential data input (Even data)
17	GND	Power Ground
18	RxE2	Negative LVDS differential data input (Even data)
19	RxE2+	Positive LVDS differential data input (Even data)
	RxEC-	Negative LVDS differential clock input (Even clock)
21	RxEC+	Positive LVDS differential clock input (Even clock)
22	RxE3	Negative LVDS differential data input (Even data)
23	RxE3+	Positive LVDS differential data input (Even data)
24	GND	Power Ground
	GND	Power Ground
26	NC	No contact (For AUO test only)
27	GND	Power Ground
28	VCC	+5.0V Power Supply
29	VCC	+5.0V Power Supply
30	VCC	+5.0V Power Supply

Note1: Start from left side



Note2: Input signals of odd and even clock shall be the same timing. Note3: Please follow PSWG.

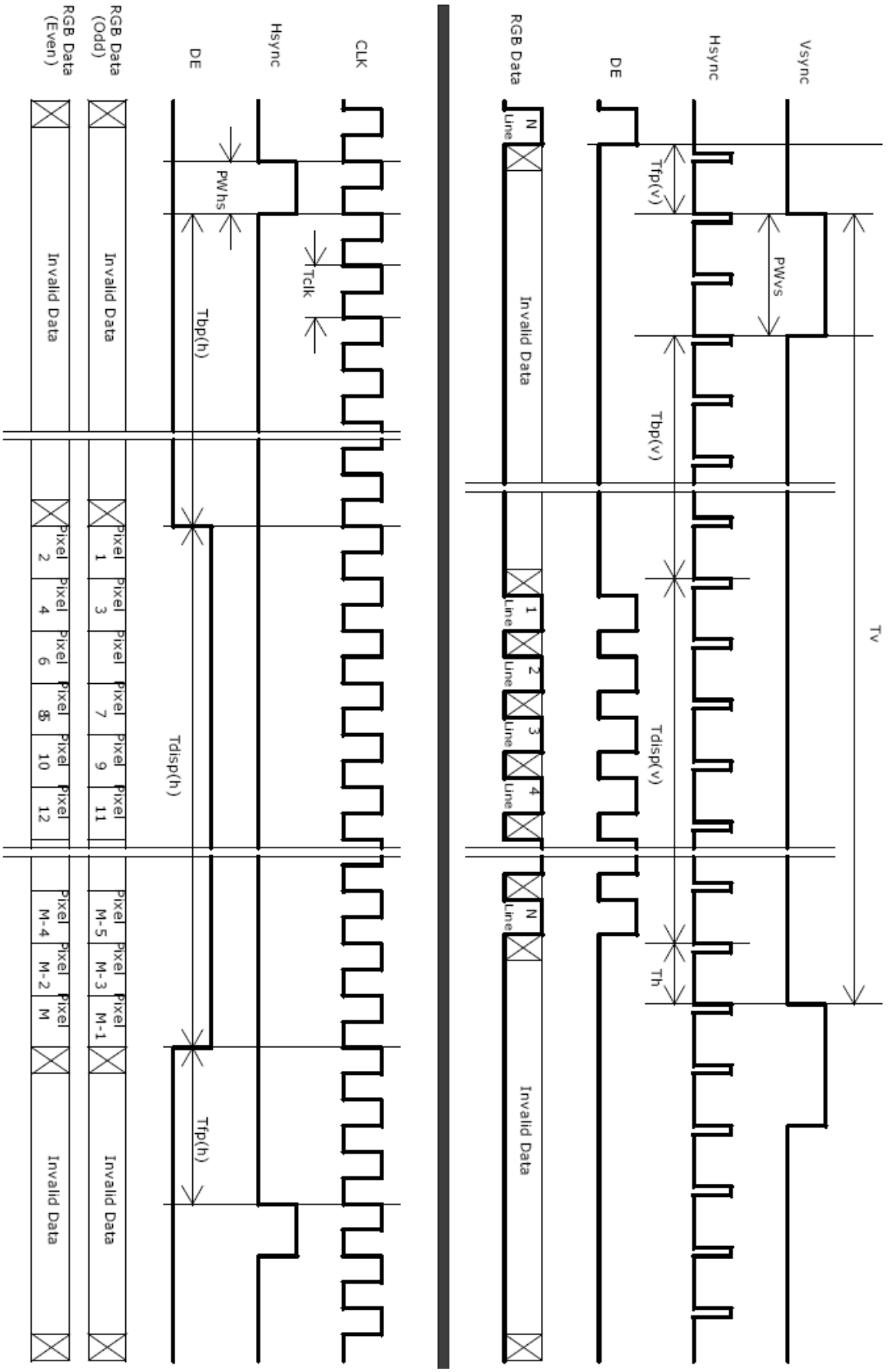
Timing Characteristics

Basically, interface timings described here is not actual input timing of LCD module but output timing of SN75LVDS82DGG (Texas Instruments) or equivalent.

Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	Tv	1032	1066	2048	Th
	Active	Tdisp(v)	1024	1024	1024	Th
	Blanking	Tbp(v)+Tfp(v)+PWvs	8	42	1024	Th
Horizontal Section	Period	Th	680	844	2048	Tclk
	Active	Tdisp(h)	640	640	640	Tclk
	Blanking	Tbp(h)+Tfp(h)+PWhs	40	204	1408	Tclk
Clock	Period	Tclk	14.81	18.52	-	ns
	Frequency	Freq	40	54	70	MHz
Frame rate	Frame rate	F	49	60	76	Hz

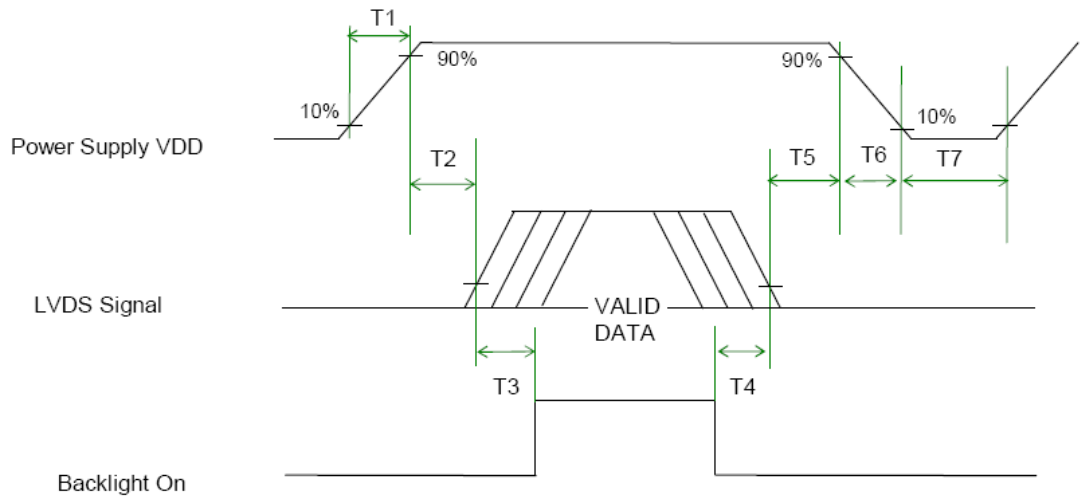
Note : DE mode only

Timing Diagram



Power ON/OFF Sequence

VDD power and lamp on/off sequence is 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.



Power Sequence Timing

Parameter		Value		Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	-	10	[ms]
T3	200	-	-	[ms]
T4	100	-	-	[ms]
T5	0	16	50	[ms]
T6	-	-	10	[ms]
T7	1000	-	-	[ms]

Note: The values of the table are following PSWG.

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.

TFT LCD Module

Connector

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	JAE / Hirose or compatible
Type Part Number	FI-XB30SSL-HF15 / MDF76TW-30S-1H(58)
Mating Housing Part Number	JAE FI-X30HL

Pin Assignment

Pin#	Signal Name	Pin#	Signal Name
1	RxOIN0	2	RxOIN0+
3	RxOIN1	4	RxOIN1+
5	RxOIN2	6	RxOIN2+
7	GND	8	RxOCLKIN-
9	RxOCLKIN+	10	RxOIN3-
11	RxOIN3+	12	RxEIN0-
13	RxEIN0+	14	GND
15	RxEIN1	16	RxEIN1+
17	GND	18	RxEIN2-
19	RxEIN2+	20	RxECLKIN-
21	RxECLKIN+	22	RxEIN3-
23	RxEIN3+	24	GND
25	NC	26	NC
27	NC	28	VCC
29	VCC	30	VCC

Backlight Unit

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

Connector Name / Designation	Lamp Connector / Backlight lamp
Manufacturer	JST
Type Part Number	EHR-2 or Compatible
Mating Type Part Number	S2B-EH or Compatible

Signal for LED Backlight connector

Connector No.	Pin No.	Input	Color	Function
CN1	1	Vcc	RED	Positive pole
	2	Gnd	Black	Negative pole
CN2	1	Vcc	RED	Positive pole
	2	Gnd	Black	Negative pole

Reliability Test

Environment test conditions are listed as following table.

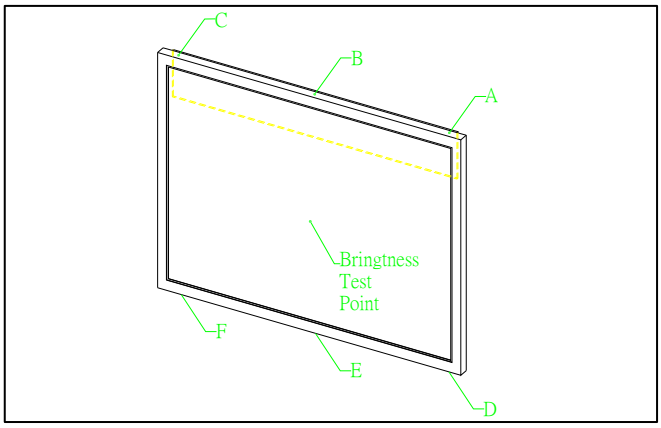
Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50℃, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0℃, 300hours	
High Temperature Storage (HTS)	Ta= 60℃, 300hours	
Low Temperature Storage (LTS)	Ta= -20℃, 300hours	
Vibration 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	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ±8KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	2
	Air Discharge: ±15KV, 150pF(330Ω) 1sec 8 points, 25 times/ point.	
Altitude Test	Operation:10,000 ft Non-Operation:30,000 ft	

Note (1) The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20℃ to 60℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

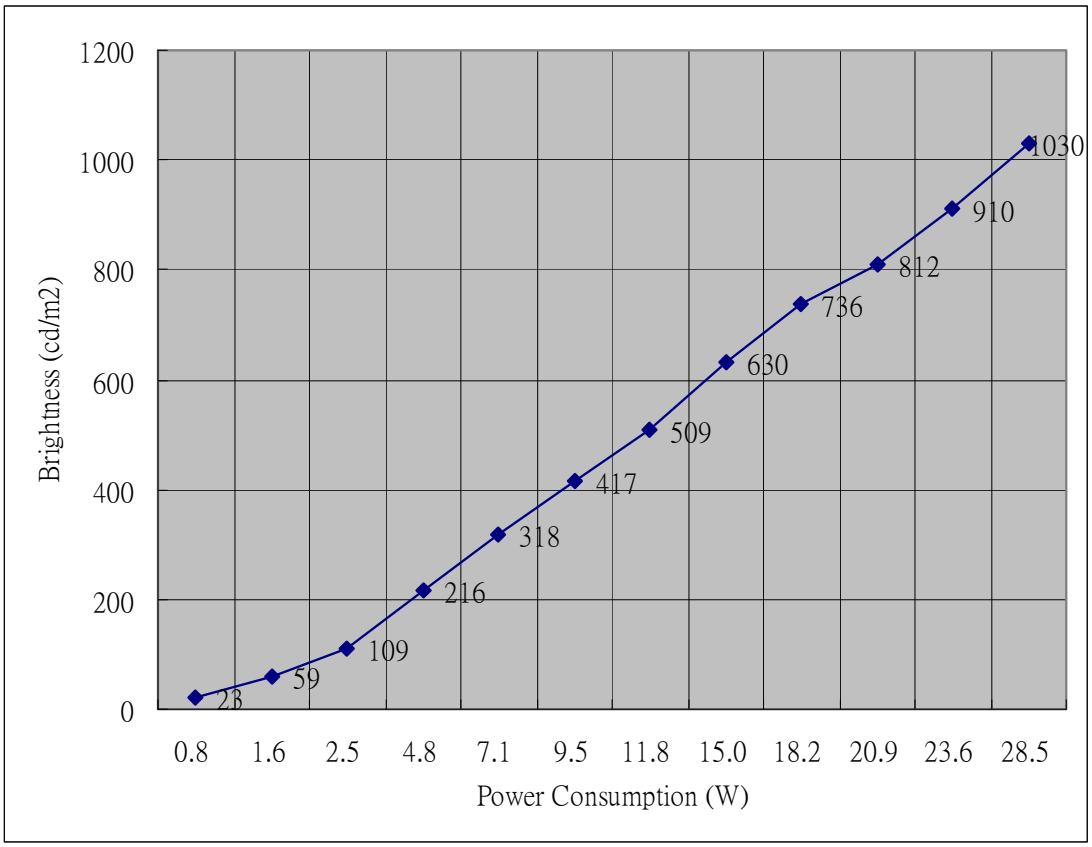
Note (2) According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

LED Backlight Dimming & Power Consumption and Temperature Relationship Test Report

Test Model	AU1744E (M170EG01-VD)
Test Date	2008/4/3
Room Temperature	25° C ± 2
Test Engineer	Jacky_Kuo
A/D Board Model	AD5621GA
Brightness & Contrast	B：100% / C：100% / (R、G、B：100%)
Teat Equipment	DC Power Supply , BM-9 Brightness Meter , PT-3S IR Thermal Meter



cd/㎡	Vin(V)	Iin(A)	W	Temp A	Temp B	Temp C	Temp D	Temp E	Temp F
23	15.2	0.05	0.8	31.2	31.4	31.4	23.6	23.1	23.1
59	15.5	0.1	1.6	32.5	32.9	32.5	23.5	23.7	23.1
109	15.7	0.16	2.5	33.7	34.2	33.2	25.5	24.5	24.2
216	16.1	0.3	4.8	33.8	33.8	33.8	25.6	25.3	25.3
318	16.4	0.43	7.1	37.2	37.8	36.4	28.9	28.6	27.3
417	16.6	0.57	9.5	40.4	40.3	38.9	29.3	28.9	28.3
509	16.8	0.7	11.8	41.3	40.5	39.2	31.4	30.5	28.9
630	17	0.88	15.0	43.4	42.7	42.1	35.7	35.1	33.3
736	17.3	1.05	18.2	44.5	44.5	44.6	37.3	38.5	37
812	17.4	1.2	20.9	47.1	47	47	37	37.1	35.3
910	17.5	1.35	23.6	47	43	41	40	40	37
1030	17.8	1.6	28.5	45.7	47.2	44.4	37.7	37.4	37.8


1200
1000
800
600
400
200
0
Brightness (cd/m2)
23
59
109
216
318
417
509
630
736
812
910
1030
0.8
1.6
2.5
4.8
7.1
9.5
11.8
15.0
18.2
20.9
23.6
28.5
Power Consumption (W)

Mechanical Characteristics

Module Size	358.5*296.5*15.8 ㎜	Weight	2120gw
Connector Part	JAE FI-XB30SSL(LCD) JST HER-2 or Compatible(B/L)	User's Connector Part	JAE FI-X30HL(LCD) JST S2B-EH or Compatible