DATA IMAGE CORPORATION

TFT Module Specification

ITEM NO.: FG170000DSCWNG01

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
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Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	A	2008/12/30		20

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	30/DEC/08			Release Rev: A for production.

3 GENERAL DESCRIPTION

The display supports the SXGA (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.

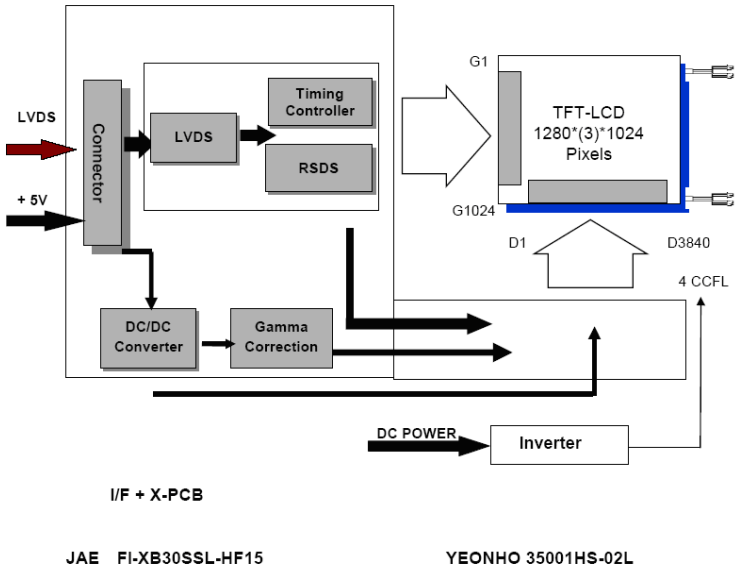
3.1 Display Characteristics

The following items are characteristics summary on the table under 25 ºC 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
Weight	[Grams]	1990 (Typ)
Physical Size (H x V x D)	[mm]	358.5(H) x 296.5(V) Typ. x 15.8(D) Max.
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)	 [ºC] [ºC]	 0 to +50 -20 to +60
RoHS Compliance		RoHS Compliance

3.2 Functional Block Diagram

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



4. ABSOLUTE MAXIMUM RATINGS

Absolute maximum ratings of the module is as following:

4.1 TFT LCD Module

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

4.2 Backlight Unit

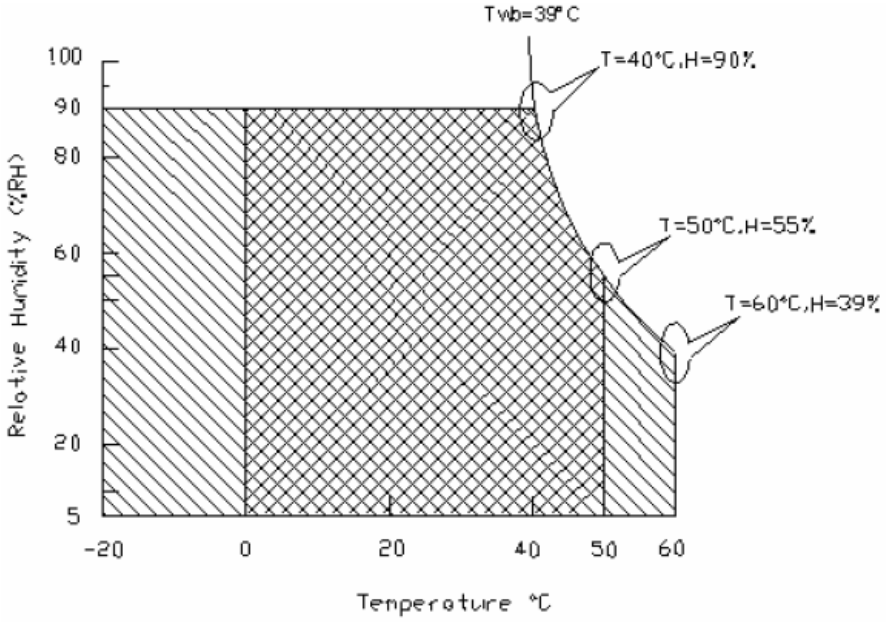
Item	Symbol	Min	Max	Unit	Conditions
CCFL Current	ICFL	-	8	[Ma]rms	Note 1,2

4.3 Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit	Conditions
Operating Humidity	HOP	5	90	[%RH]	
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



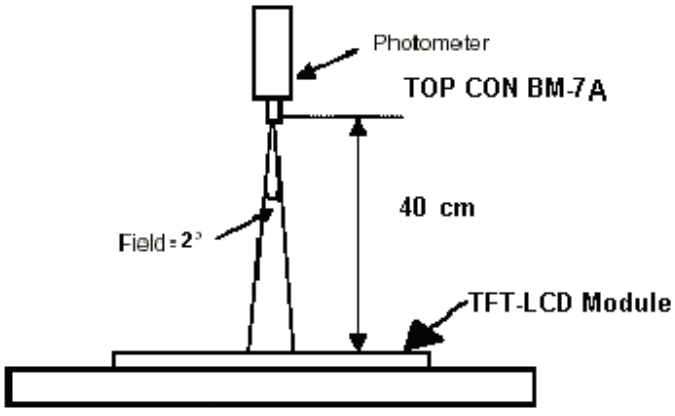
Operating Range Storage Range

5. OPTICAL CHARACTERISTICS

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_x+	Center CR≥10	70	80	--	deg	Note 1,4
		θ_x-		70	80	--		
	Vertical	θ_Y+		75	80	--		
		θ_Y-		75	80	--		
Contrast Ratio		CR	At optimized viewing angle	600	1000			Note 1,3
Response time	Rise	Tr	Center θx=θy =0°	-	1.5	3	ms	Note 1,6
	Fall	Tf		-	3.5	6	ms	
Uniformity		B-uni	θx=θy =0°	70	80	--	%	Note1,5
Brightness		L	IRCFL=7.5mA Center point θx=θy =0°	240	300	--	cd/m²	Note 1,2
Chromaticity		x_W	Center θx=θy =0°	0.283	0.313	0.343		Note 1,7
		y_W		0.299	0.329	0.359		
		x_R		0.618	0.648	0.678		
		y_R		0.309	0.339	0.369		
		x_G		0.262	0.292	0.322		
		y_G		0.573	0.603	0.633		
		x_B		0.113	0.143	0.173		
		y_B		0.040	0.070	0.100		
Image sticking		tis	2 hours			2	Sec	Note 8

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤1 lux, and at room temperature). The measurement must be taken after backlight warming up for 20 minutes. The operation temperature is 25°C±2°C. The measurement method is shown in Note1.

Note1: The method of optical measurement:

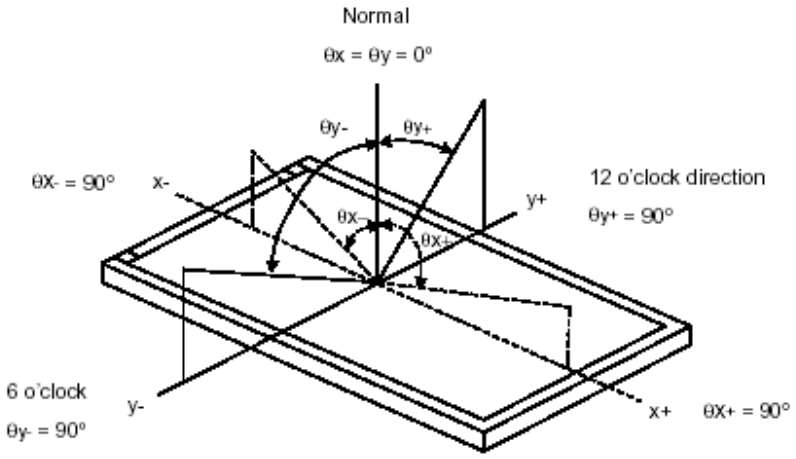


Note2: Measured at the center area of the panel and at the viewing angle of the $\theta x=\theta y=0°$

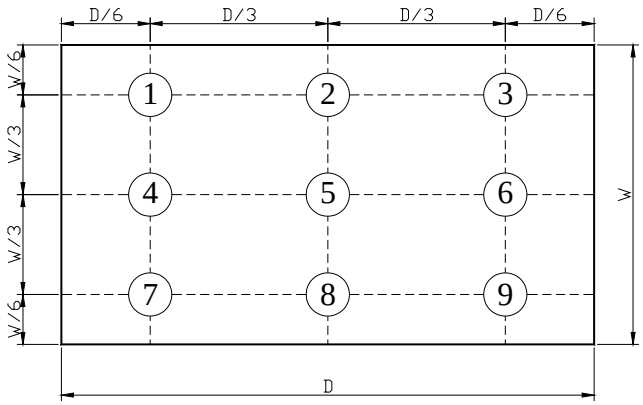
Note3: Definition of Contrast Ratio (CR):

$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in Black state}}$$

Note4: Definition of Viewing Angle



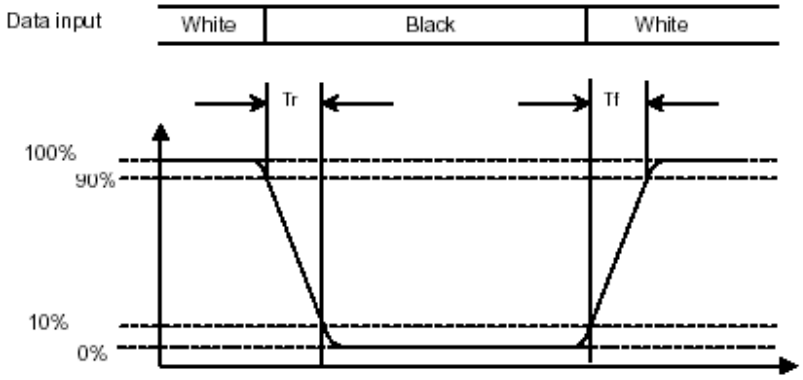
Note 5: Definition of Brightness Uniformity (B-uni):



$$\text{B-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9points}} \quad \text{(Note 5).}$$

Note6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure.



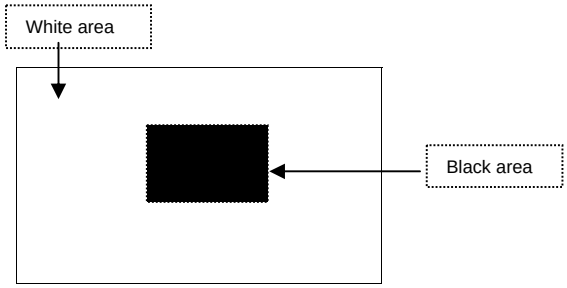
Note 7: Definition of Chromaticity:

The color coordinates (x_W,y_W),(x_R,y_R),(x_G,y_G),and (x_B,y_B) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

Note 8: Definition of Image sticking (tis):

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

Image sticking pattern



6. ELECTRICAL CHARACTERISTICS

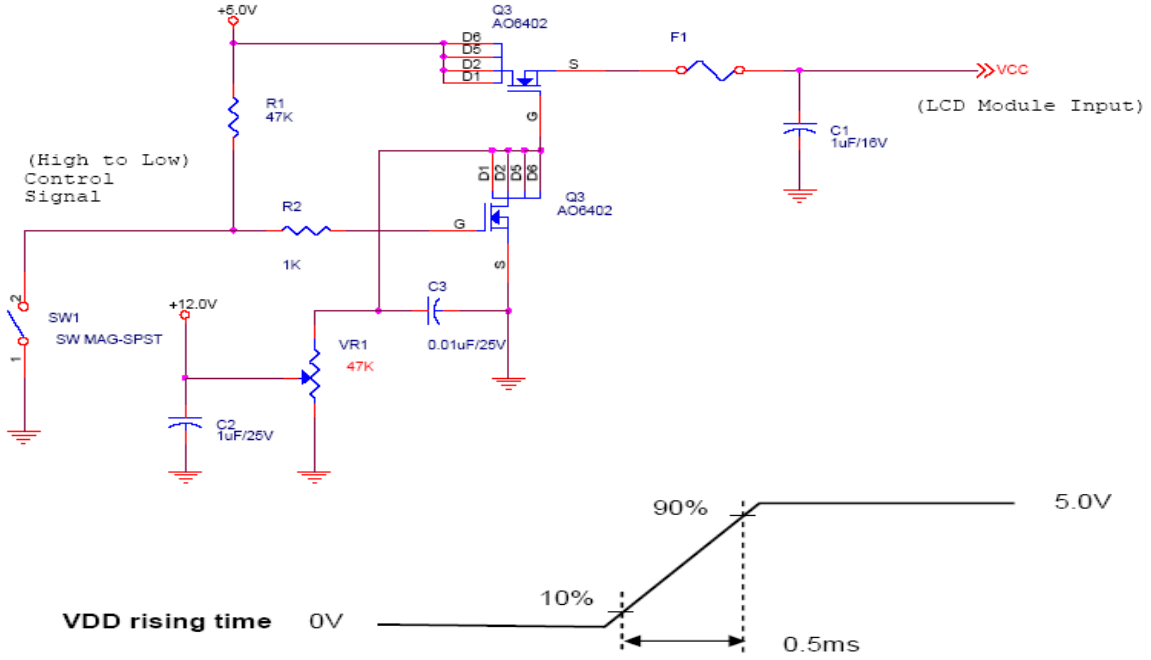
6.1 TFT LCD Driving Conditions

6.1.1 Power Specification

Input power specifications are as follows:

Symbol	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	VCC Power	-	6	7.8	[Watt]	Vin=5V , All Black Pattern, at 75Hz

Note: Measurement conditions:

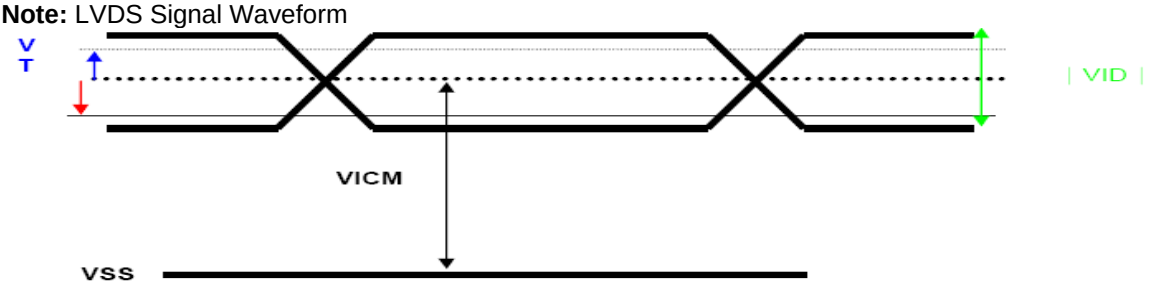


6.1.2 Signal Electrical Characteristics

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 Threshold Input High	-	-	+100	[mV]	VICM = 1.2V Note
VTL	Differential Threshold Input Low	-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



6.2 Backlight driving conditions

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
ISCFL	CCFL standard current	7.0	7.5	8.0	[mA] rms	(Ta=25℃) Note 2
IRCFL	CCFL operation range	3.0	7.5	8.0	[mA] rms	(Ta=25℃) Note 2
FCFL	CCFL Frequency	40	60	80	[KHz]	(Ta=25℃) Note 3,4
ViCFL (0℃)	CCFL Ignition Voltage (End of the lamp wire connector)	1500	-		[Volt] rms	(Ta=0℃) Note 5
ViCF (25℃)	CCFL Ignition Voltage (End of the lamp wire connector)	1150	-		[Volt] rms	(Ta=25℃) Note 5
VCFL	CCFL Operation Voltage	TBD	660 @7.5mA	700 @7.5mA	[Volt] rms	(Ta=25℃) Note 6
PCFL	CCFL Power consumption (for reference)	-	19.8	21.8	[Watt]	(Ta=25℃) Note 6
LTCFL	CCFL life time	40,000	50,000	-	[Hour]	(Ta=25℃)

Note 1:

*1: In case of using an inverter other than listed, it is recommended to check the inverter carefully.
Sometimes, interfering noise stripes appear on the screen, and substandard luminance or flicker at low power may happen.

*2: In designing an inverter, it is suggested to check safety circuit very carefully. Impedance of CCFL, for instance, becomes more than 1 [M ohm] when CCFL is damaged.

*3: Generally, CCFL has some amount of delay time after applying kick-off voltage. It is recommended to keep on applying kick-off voltage for 1 [Sec] unit discharge.

*4: Reducing CCFL current increases CCFL discharge voltage and generally increases CCFL discharge frequency. 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.

Note 2: It should be employed the inverter which has “Duty Dimming”, if IRCFL is less than 3mA.

Note 3: CCFL discharge frequency should be carefully determined to avoid interference between inverter and TFT LCD.

Note 4: The frequency range will not affect to lamp life and reliability characteristics.

Note 5: CCFL inverter should be able to give out a power that has a generating capacity of over 1,500 voltage. Lamp units need 1,500 voltage minimum for ignition.

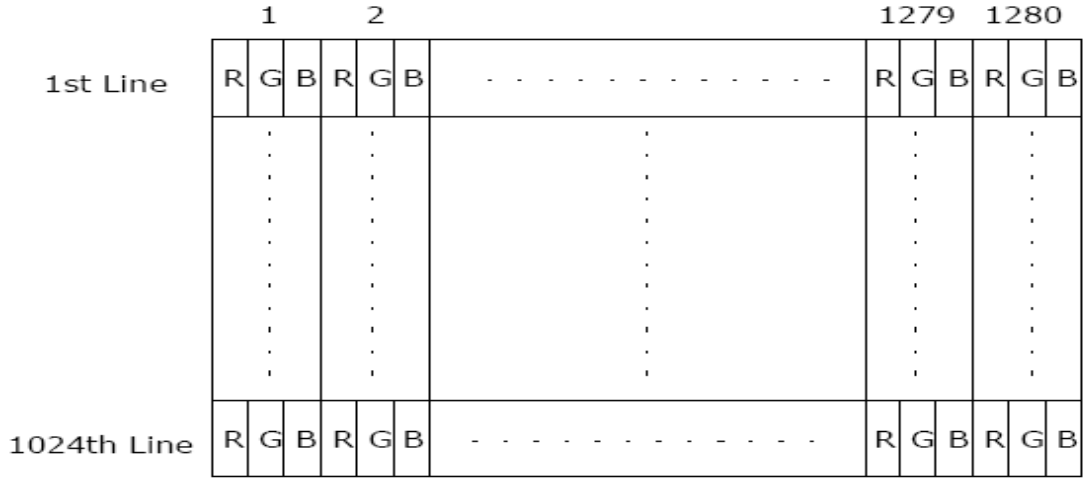
Note 6: The variance of CCFL power consumption is ±10%. Calculator value for reference (ISCFLxVCFLx4=PCFL)

Note 7: Definition of Life time: Brightness becomes 50%. The typical life time CCFL in on the condition at 7.5mA lamp current.

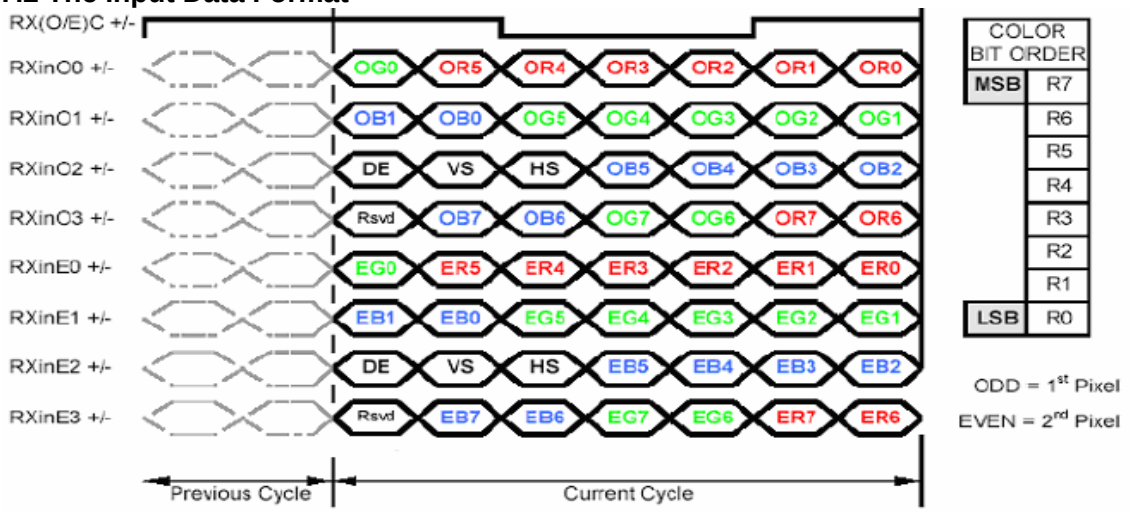
7. SIGNAL CHARACTERISTICS

7.1 Pixel Format Image

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



7.2 The Input Data Format



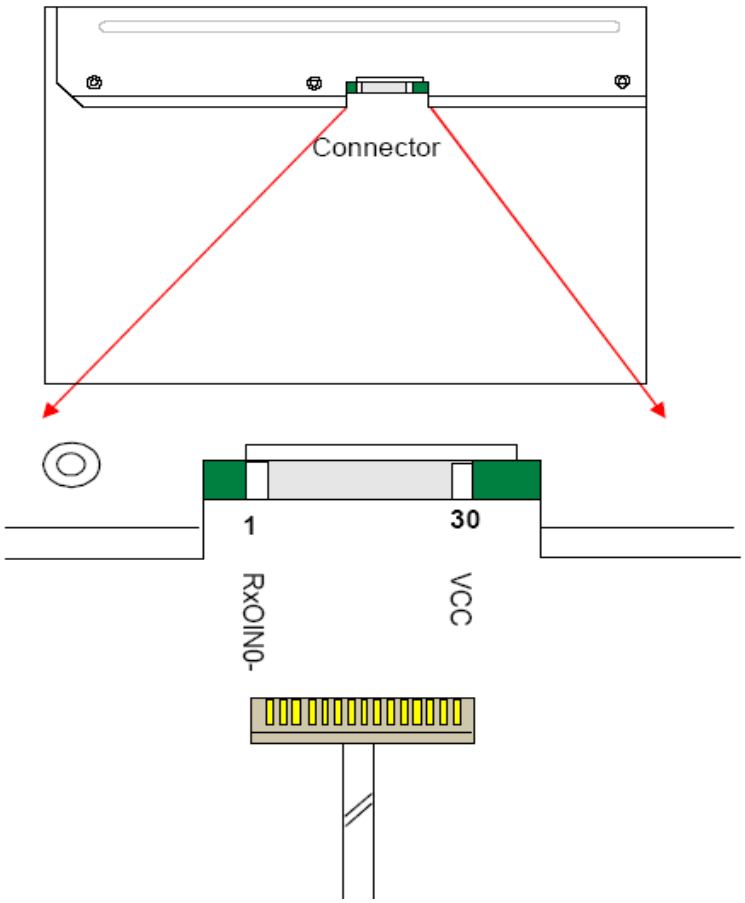
Note1: Normally, DE, VS, HS on EVEN channel are not used.
Note2: Please follow PSWG.
Note3: 8-bit in

7.3 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)
5	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)
10	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
15	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)
20	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
25	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.

7.4 Timing Characteristics

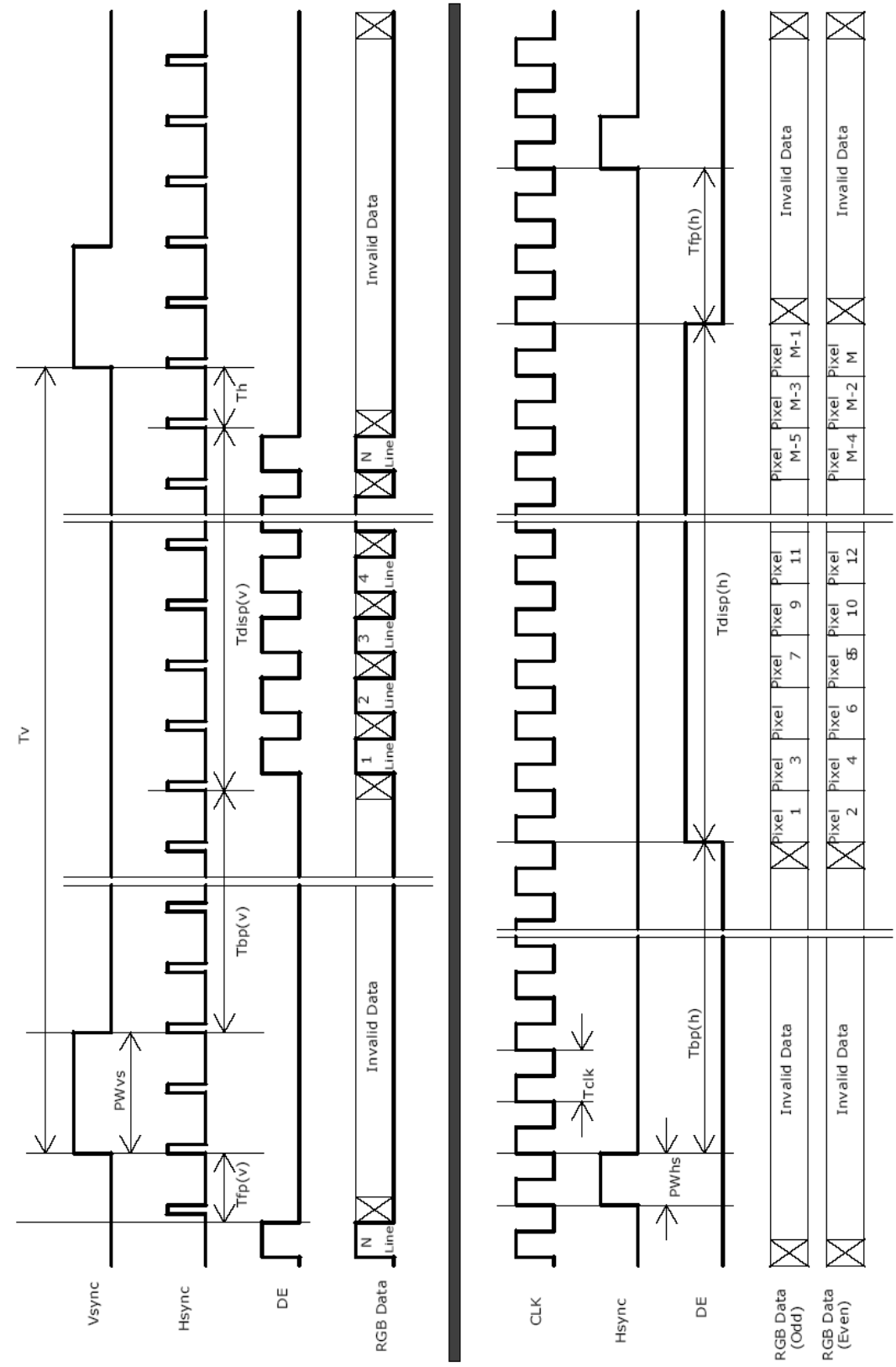
7.4.1 Timing Characteristics

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

7.4.2 Timing Diagram



7.5 Backlight Unit

7.5.1 Lamp connector

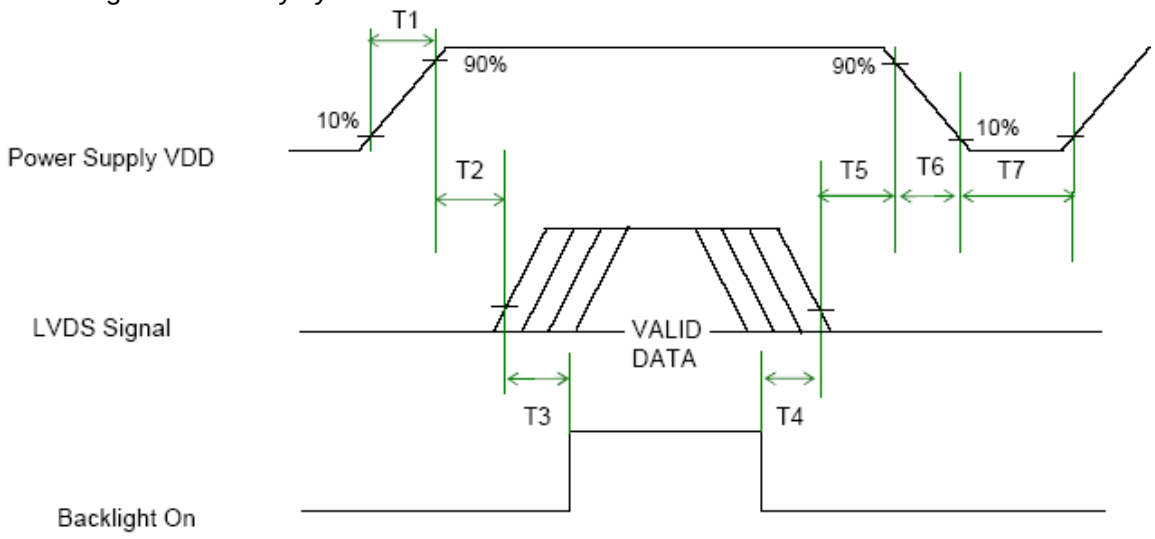
Connector Name / Designation	**Lamp Connector / Backlight lamp**
Manufacturer	**YEONHO**
Type Part Number	**35001HS-02L**
Mating Type Part Number	**35001WR-00LS00**

7.5.2 Signal for Lamp connector

	Connector No.	Pin No.	Input	Color	Function
Upper	CN1	1	Hot 1	Pink	High Voltage (Lamp 1)
		2	Cold 1	White	Low Voltage (Lamp 1)
	CN2	1	Hot 2	Blue	High Voltage (Lamp 2)
		2	Cold 2	Black	Low Voltage (Lamp 2)
Lower	CN3	1	Hot 1	Pink	High Voltage (Lamp 3)
		2	Cold 1	White	Low Voltage (Lamp 3)
	CN4	1	Hot 2	Blue	High Voltage (Lamp 4)
		2	Cold 2	Black	Low Voltage (Lamp 4)

7.6 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.



7.7 Power Sequence Timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	-	10	ms
T3	300	-	-	ms
T4	100	-	-	ms
T5	0	16	50	ms
T6	-	-	10	ms
T7	1000	-	-	ms

Note: The values of the table are follow PSWG.

8. CONNECTOR & PIN ASSIGNMENT

8.1 TFT LCD Module

8.1.1 Input 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

8.1.2 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

9. QUALITY ASSURANCE

9.1 Test Condition

9.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C
Humidity : 65 ± 5%

9.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

9.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

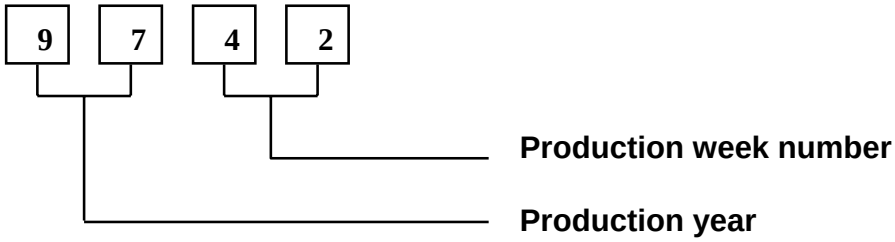
9.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

9.1.5 Test Method

Reliability Test Item & Level		Test Level
No.	Test Item	
1	High Temperature Storage Test	T=60°C,240hrs
2	Low Temperature Storage Test	T=-20°C,240hrs
3	High Temperature Operation Test	T=50°C,240hrs
4	Low Temperature Operation Test	T=0°C,240hrs
5	High Temperature and High Humidity Operation Test	T=50°C,80%RH,240hrs
6	Thermal Cycling Test (No operation)	0°C → +25°C → +50°C ,100 Cycles 30 min 5 min 30 min
7	Vibration Test (No operation)	Acceleration: 1.5G Wave: Random Frequency: 10-200-10Hz Sweep: 30Minutes each Axis(X,Y,Z)
8	Shock Test (No operation)	Acceleration: 50G Wave: Half-sine Active Time: 20ms Direction：± X,± Y,± Z(one time for each Axis)

10. LOT NUMBERING SYSTEM



11. LCM NUMBERING SYSTEM

FG 170000 D S C W N G 01

VERSION :01

RoHS

View direction & Temp. Range

A – Bottom view 6H & Normal temp.

B – Bottom view 6H & Wide temp.

C–Top View & Normal temp

D–Top View & Wide temp.

N– Wide view Angle & Normal temperature.

Backlight Color

W –White Y – Yellow Green

G - green

Backlight

C–CCFL B/L

S/LED B/L

LCD Polarize type

N–Negative S – Super wide view

M–transmissive F– transflective

LCD type

A –TFT analog

D –TFT digital

Series code

170000–, 17 inch

Model type

FG–Standard TFT Module

FX–Custom TFT Module

12. PRECAUTION IN USE LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel off or bubble.

(2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.

(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

(4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.

(5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

(1). Do not tamper in any way with the tabs on the metal frame.

(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.

(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).

(4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting . Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

(1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.

(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.

(3). Only properly grounded soldering irons should be used.

(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3 Soldering

(1). Solder only to the I/O terminals.

(2). Use only soldering irons with proper grounding and no leakage.

(3). Soldering temperature : 280°C ± 10°C

(4). Soldering time: 3 to 4 sec.

(5). Use eutectic solder with resin flux fill.

(6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

2.4 Operation

(1). Driving voltage should be kept within specified range; excess voltage shortens display life.

(2). Response time increases with decrease in temperature.

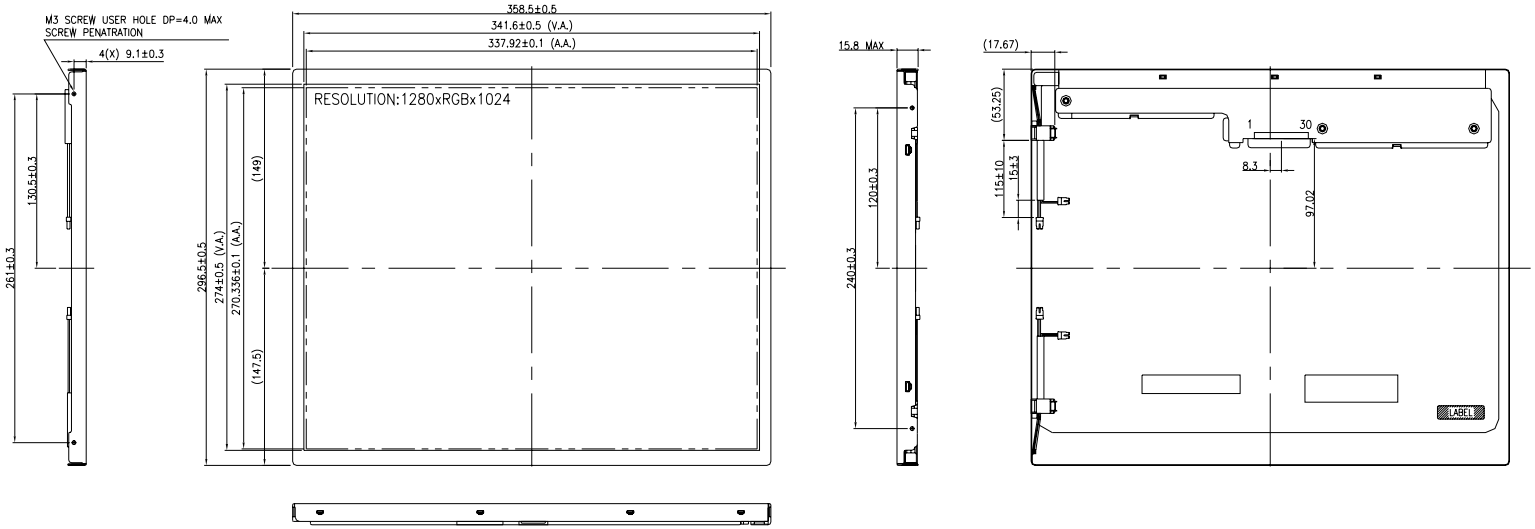
(3). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".

(4). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

2.5 Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

13. OUTLINE DRAWING



NOTE:

1. FOR RoHS.
2. Brightness: 240 cd/m² (Min)
3. I/F CONNECTOR : HRS MDF76TW-30S-1H(58) OR JAE FI-XB30SSL-HF15.
   MATING CONNECTOR : JAE FI-X30HL.
4. CCFL CONNECTOR TO BE YEONHO 35001HS-02L OR EQUIVALENT.
   MATING CONNECTOR : 35001WR-00LS00.
5. TOLERANCE WITHOUT SPECIFIED TO BE 0.5 mm.
6. THIS DIMENSION EXCLUDES DEFORMATION.
7. TORQUE OF M3 USER HOLE SHOULD BE WITHIN 4 KGF-CM
   AND RE-SCREW 10 TIMES.

PIN FUNCTION

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

AUTH	DESCRIPTION	DATE	APPROVED
	Change FG170000C-G01 from rev: 1 to rev : A.	12/26/08'	

REVISIONS

DATE:	12/15/08'
DRAWN:	
CHECK:	
APPROVE:	

TITLE: LCM OUTLINE DIMENSION

DWG. NO.	FG170000C-G01		
UNITS M M		REV.	A
SCALE 1 / 1	SHEET 1 OF 1		

DATA IMAGE