

**(V) Preliminary Specification****() Final Specification**

Module	TFT-LCD 7" WVGA LED Backlight
Model Name	FT070-EDC02 V.0 (G070VW01 V0)

Customer	Date
_____	_____
Approved by	
_____	_____

Checked & Approved by	Date
_____	_____
Prepared by	
Ansi	
_____	_____

Note: This Specification is subject to change
without notice.



Contents

1. Handling Precautions.....	4
2. General Description	5
2.1 Display Characteristics	5
2.2 Optical Characteristics	6
3. Functional Block Diagram	9
4. Absolute Maximum Ratings.....	10
4.1 Absolute Ratings of TFT LCD Module	10
4.2 Absolute Ratings of Backlight Unit.....	10
4.3 Absolute Ratings of Environment.....	10
5. Electrical characteristics	11
5.1 TFT LCD Module	11
5.2 Backlight Driving Conditions.....	13
6. Signal Characteristic.....	14
6.1 Pixel Format Image.....	14
6.2 Signal Description.....	15
6.3 The Input Data Format.....	16
6.4 Interface Timing	17
6.5 Power ON/OFF Sequence.....	18
7. Connector & Pin Assignment	19
7.1 TFT LCD Module	19
7.2 Backlight Unit.....	19
8. Mechanical Characteristic	21



Record of Revision

Version & Date	Page	Old Description	New Description	Remark
V.0 2010/03	All	First Edition	All	



1. Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention 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 other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, please press at the far ends of the LED light bar reflector 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) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
- 12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.



2. General Description

A Color Active Matrix Liquid Crystal Display composed of a TFT-LCD panel, a driver circuit, and backlight system. The screen format is intended to support the WVGA (800(H) x 480(V)) screen and 16.2M colors (RGB 8-bits) or 262k colors (RGB 6-bits). All input signals are LVDS interface compatible. Driver board of backlight is not included. From modification by AUO G070VW01 V.0 .

2.1 Display Characteristics

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

Items	Unit	Specifications
Screen Diagonal	[inch]	7.0 (177.8mm)
Active Area	[mm]	152.40(H) x 91.44(V)
Pixels H x V		800x3(RGB) x 480
Pixel Pitch	[mm]	0.1905x 0.1905
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN, Normally White
Nominal Input Voltage VDD	[Volt]	3.3 typ.
Typical Power Consumption	[Watt]	3.86 (PDD=0.8+PLED=3.06)
Weight	[Grams]	165 (typ.)
Physical Size	[mm]	170.0(W) x 111.0(H) x 7.5(D) (typ.)
Electrical Interface		1 channel LVDS
Surface Treatment		Anti - Glare , Hardness 3H
Support Color		262K(6-bit) / 16.2M(8-bit)
Temperature Range		
Operating	[°C]	-30 to +85
Storage (Non-Operating)	[°C]	-30 to +85
RoHS Compliance		RoHS Compliance



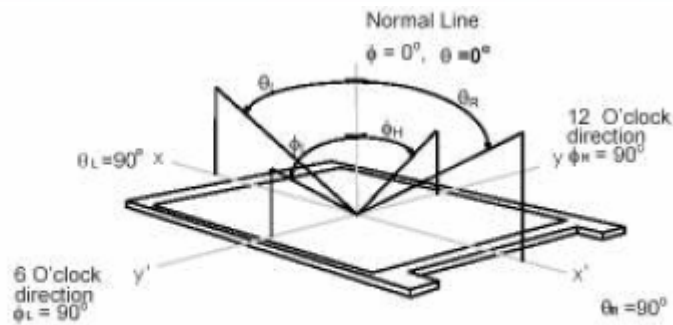
2.2 Optical Characteristics

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

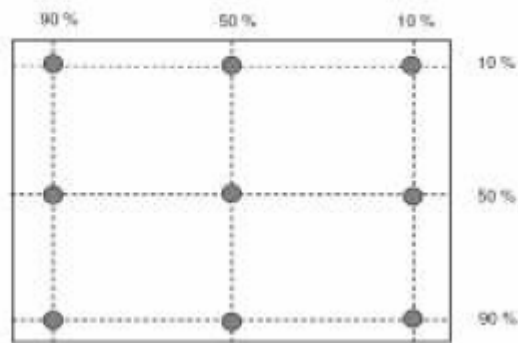
Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right) CR = 10 (Left)	70	80 80	-	1
		Vertical (Upper) CR = 10 (Down)	70	80 80	-	
Luminance Uniformity	[%]	9 Points	80	85	-	2, 3
Optical Response Time	[msec]	Rising	-	20	30	5
		Falling	-	10	20	
		Rising + Falling	-	30	50	
Color/Chromaticity Coordinates (CIE 1931)		White x	-	0.3162	-	4
		White y	-	0.3265	-	
Color Temp.	K		6000	6500		
White Luminance(Center)	[cd/m ²]		900	1000	-	4
Contrast Ratio			900	1000	-	4

Note 1: Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥ 10 , at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 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 to its center to develop the desired measurement viewing angle.



Note 2: 9 points position

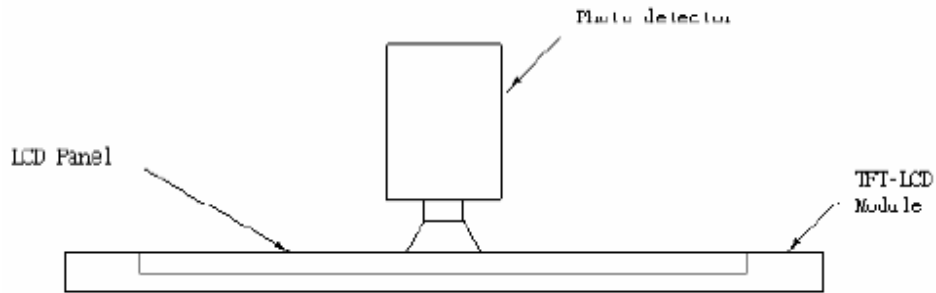


Note 3: The luminance uniformity of 9 points is defined by dividing the maximum luminance values by the minimum test point luminance

$$\frac{\text{Luminance of 9 points} - \text{Minimum Luminance of 9 points}}{\text{Luminance of 9 points} - \text{Maximum Luminance of 9 points}} = \frac{L_{\text{min}}}{L_{\text{max}}}$$

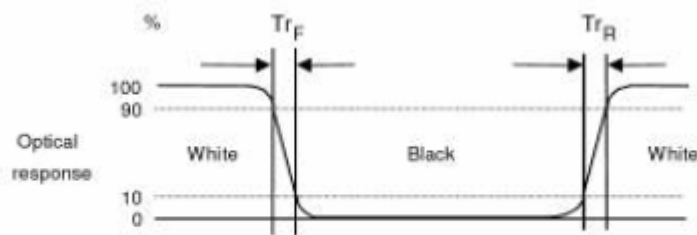
Note 4: Measurement method

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. Optical Equipment: DT-100, or equivalent .



Note 5: Definition of response time:

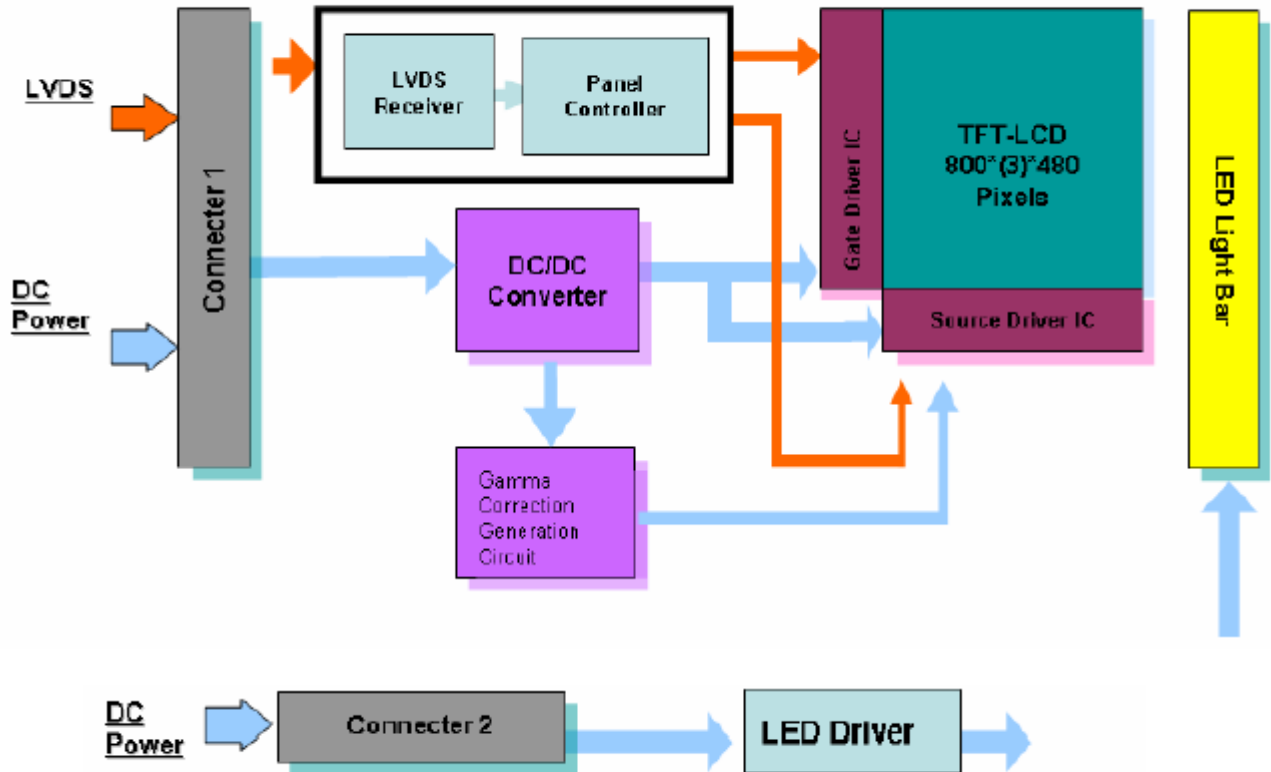
The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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





3. Functional Block Diagram

The following diagram shows the functional block of the 7 inches Color TFT-LCD Module :





4. Absolute Maximum Ratings

Absolute maximum ratings of the module is as following:

4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	V _{in}	-0.3	+3.6	[Volt]	Note 1, 2

4.2 Absolute Ratings of Backlight Unit

Item	Symbol	Min.	Max.	Unit	Conditions
LED Light Bar Current	I _{Led}	-	170	[mA]	Note 1, 2

4.3 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	-30	+85	[°C]	Note 3
Operation Humidity	HOP	8	95	[%RH]	
Storage Temperature	TST	-30	+85	[°C]	
Storage Humidity	HST	5	95	[%RH]	

Note 1: With in Ta= 25°C

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).



5. Electrical characteristics

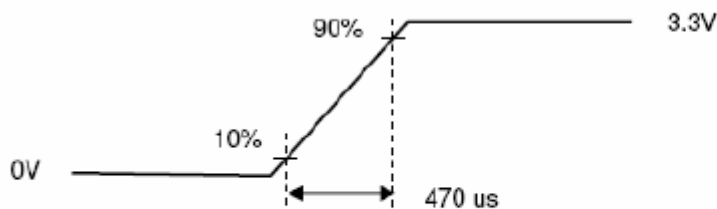
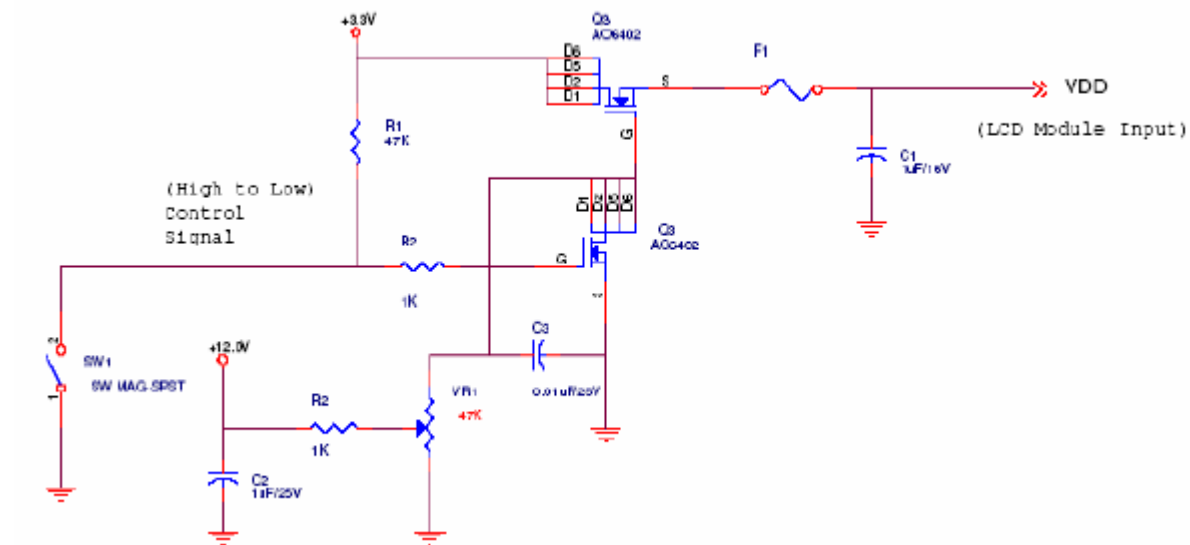
5.1 TFT LCD Module :

5.1.1 Power Specification

Input power specifications are as follows:

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	±10%
IDD	Input Current	-	240	260	[mA]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
PDD	VDD Power	-	0.8	0.96	[Watt]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
IRush	Inrush Current	-	-	3	[A]	Note 1

Note 1: Measurement condition:



VDD rising time

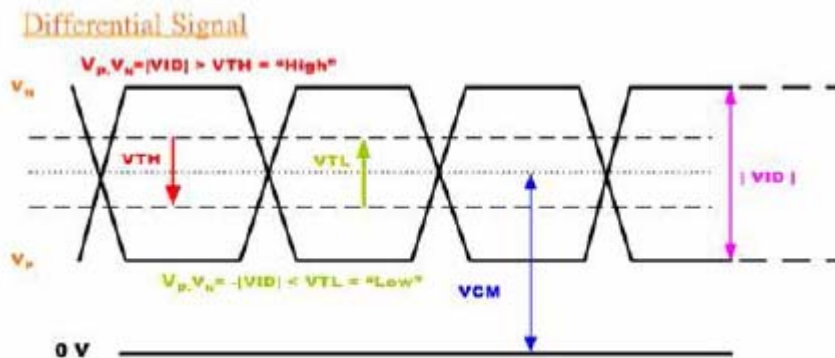


64 Gray pattern

**5.1.2 Signal Electrical Characteristics**

Input signals shall be low or Hi-Z state when VDD is off.

Symble	Parameter	Min.	Typ.	Max.	Unit	Condition
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VCM=1.2V
VID	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.1	-	1.6	[V]	VTH / VTL = $\pm 100\text{mV}$

Note: LVDS Signal Waveform.



5.2 Backlight Driving Conditions

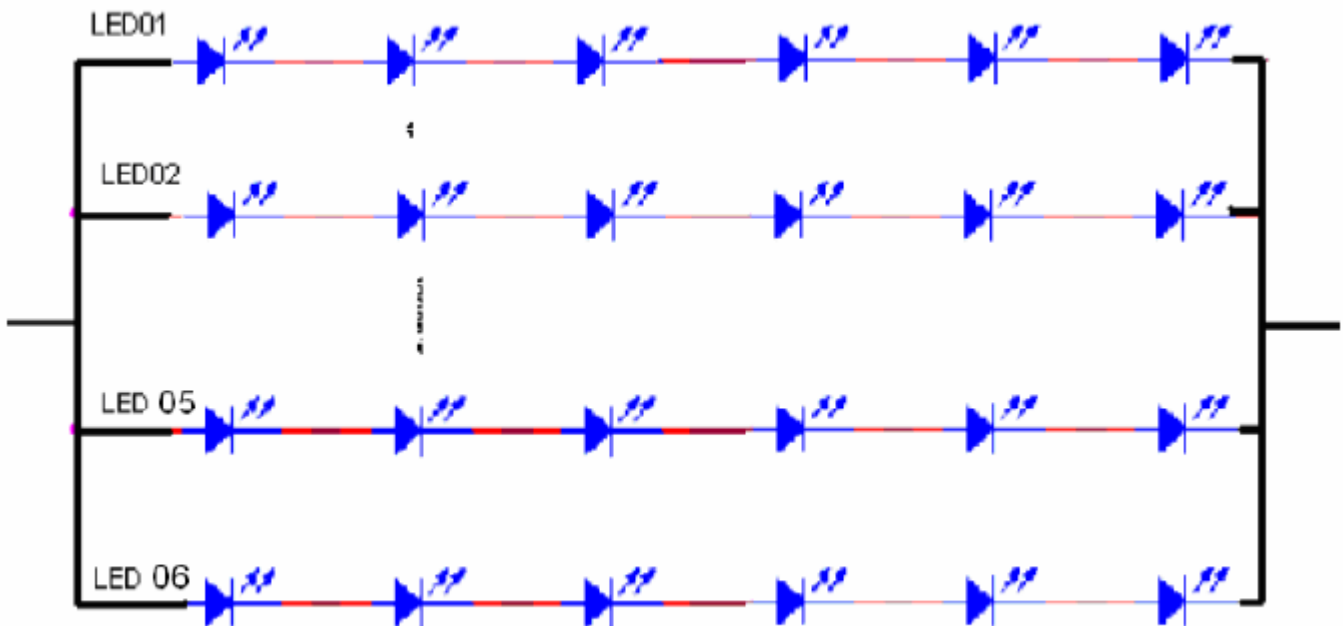
Parameter guideline for LED Light Bar Driver is under stable conditions at 25°C (Room Temperature):

Item	Symbol	Values			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	-		18	V	Note 2
LED Current	IL	-		170	mA	Note 2
LED life time	-	70,000	-	-	Hr	Note 1

Note 1: The "LED lift time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 170mA.

Note 2: The LED driving condition is defined for each LED module.(6 LED Serial, a LED includes 1Chip)

Note 2: The LED driving condition is defined for each LED module.(6 LED Serial, a LED includes 1Chip)



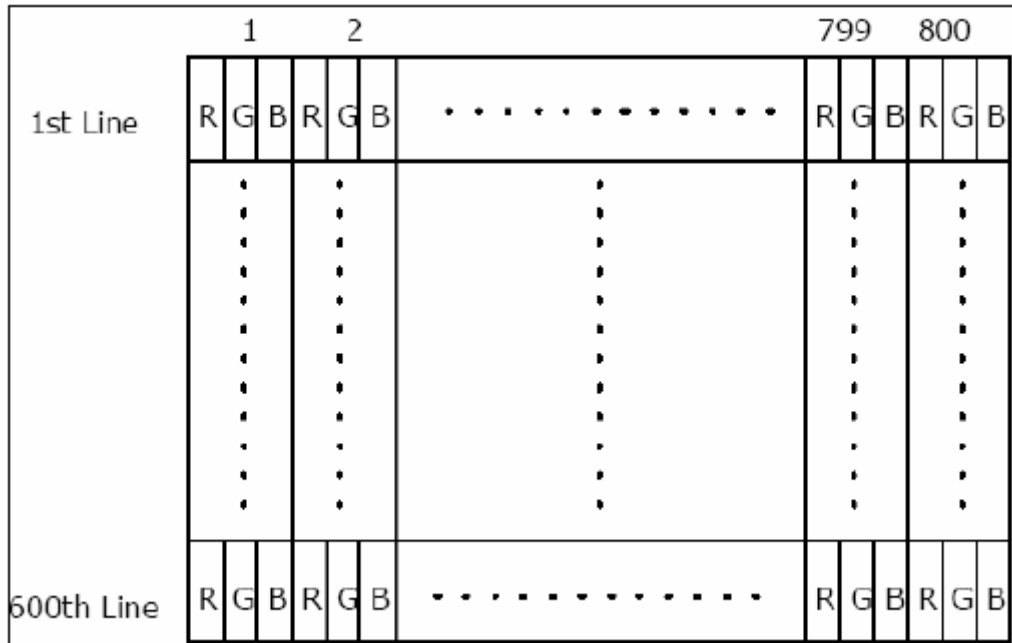
Note 3: The variance of LED Light Bar power consumption is $\pm 10\%$. Calculator value for reference ($IL \times VL = P_{LED}$)



6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.





6.2 Signal Description

LVDS is a differential signal technology for LCD interface and high speed data transfer device. The connector pin definition is as below.

Pin No.	Signal	Description
1	VDD	Power supply 3.3V(Typical)
2	VDD	Power supply 3.3V(Typical)
3	UD	Vertical reverse scan control Low or NC→ Normal mode High → Vertical reverse scan(Note)
4	LR	Vertical reverse scan control Low or NC→ Normal mode High → Vertical reverse scan(Note)
5	RxIN0-	LVDS differential data input Pair 0
6	RxIN0+	
7	GND	Ground
8	RxIN1-	LVDS differential data input Pair 1
9	RxIN1+	
10	GND	Ground
11	RxIN2-	LVDS differential data input Pair 2
12	RxIN2+	
13	GND	Ground
14	RXCLKIN-	LVDS differential Clock input Pair
15	RXCLKIN+	
16	GND	Ground
17	SEL68	LVDS 6/8bit select function control Low or NC→ 6 bit input mode High → 8 bit input mode(Note)
18	NC	NC
19	RxIN3-	LVDS differential data input Pair 3
20	RxIN3+	

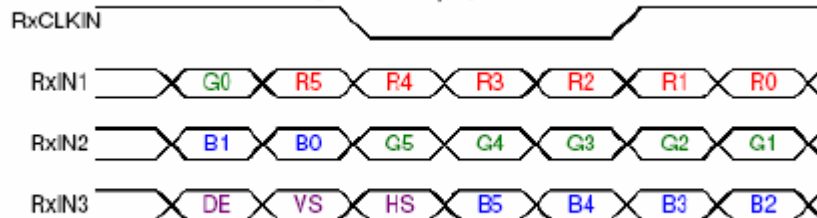
Note : "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected."



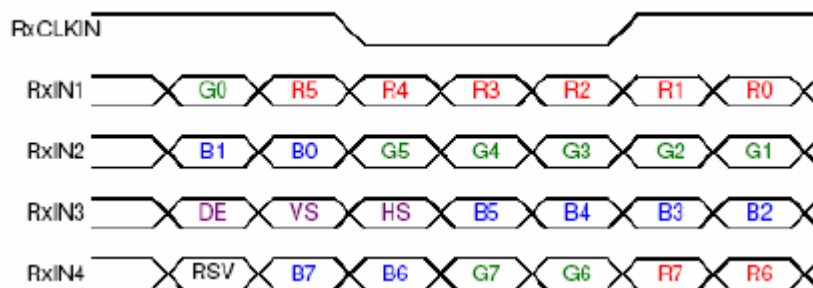
6.3 The Input Data Format

6.3.1 SEL68

SEL68 = "Low" or "NC" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input



Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	
G6	GreenData 6	
G5	GreenData 5	
G4	GreenData 4	
G3	GreenData 3	
G2	GreenData 2	
G1	GreenData 1	
G0	GreenData 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

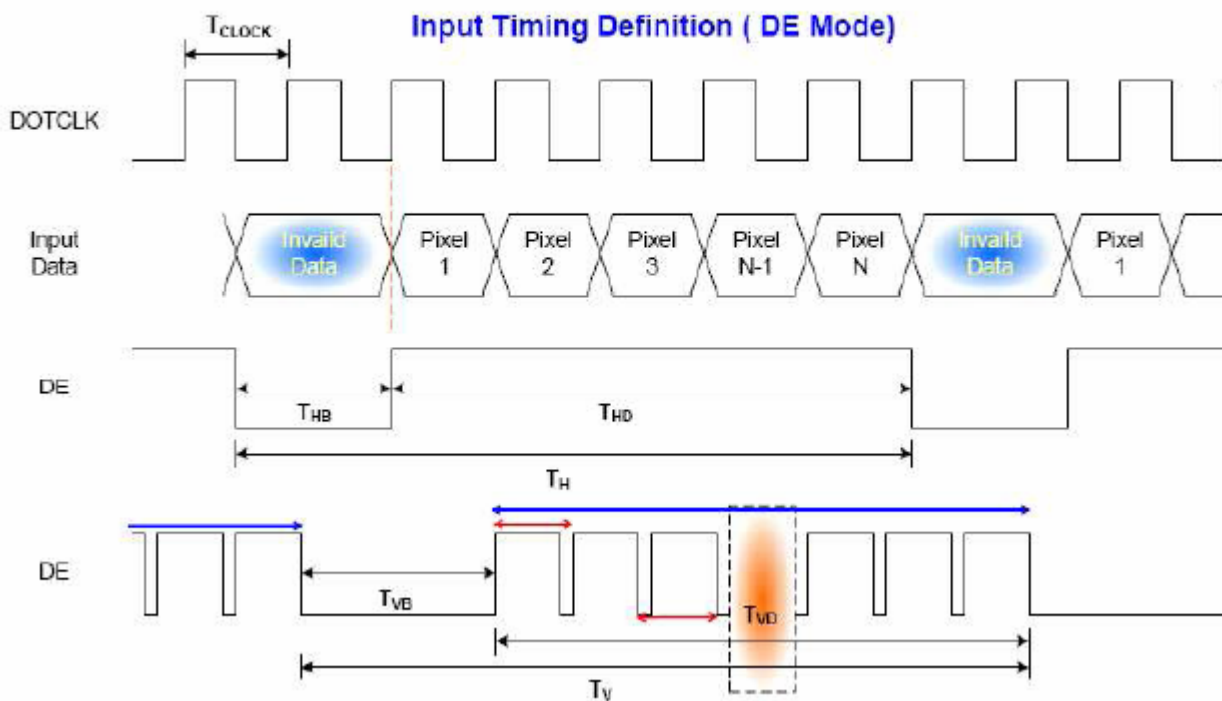


6.4 Interface Timing

6.4.1 Timing Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency		$1/T_{Clock}$	33.6	39.8	48.3	MHz	
Vertical Section	Period	T_V	608	628	650	T_H	
	Active	T_{VD}	600	600	600		
	Blanking	T_{VB}	8	28	50		
Horizontal Section	Period	T_H	920	1056	1240	T_{Clock}	
	Active	T_{HD}	800	800	800		
	Blanking	T_{HB}	120	256	440		

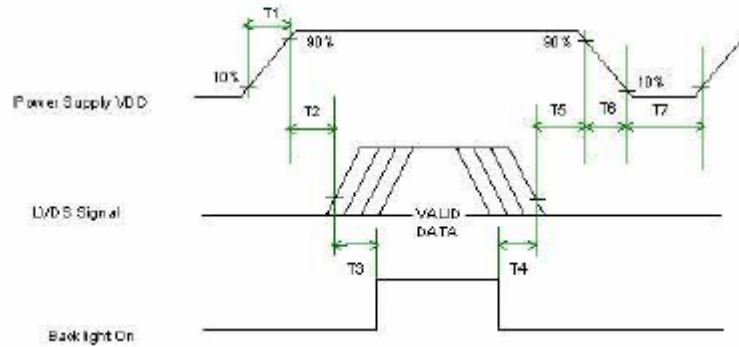
6.4.2 Input Timing Diagram





6.5 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	40	50	[ms]
T3	200	-	-	[ms]
T4	200	-	-	[ms]
T5	0	16	50	[ms]
T6	-	-	10	[ms]
T7	1000	-	-	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.



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.

7.1 TFT LCD Module

7.1.1 Connector

Connector Name / Designation	Signal Connector
Manufacturer	STM
Connector Model Number	MSB24013P20 or compatible.
Adaptable Plug	P24013P20

7.1.2 Pin Assignment

Pin No.	Signal Name	Pin No.	Signal Name
1	VDD	2	VDD
3	UD	4	LR
5	RxIN0-	6	RxIN0+
7	GND	8	RxIN1-
9	RxIN1+	10	GND
11	RxIN2-	12	RxIN2+
13	GND	14	CKIN-
15	CKIN+	16	GND
17	SEL68	18	NC
19	RxIN3+	20	RxIN3-

7.2 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	LED Light Bar Connector / Backlight lamp
Manufacturer	TKP TERMINAL/ TKP HOVSING
Type Part Number	TKP TERMINAL 8820T/ TKP HOVSING 8821-03
Mating Type Part Number	Wire VL 1007 24 AWG

7.2.1 Signal for LED light bar connector

	Connector No.	Pin No.	Input	Color	Function
Lower	CN1	1	HI 2	Red	Power supply for backlight unit
		2	GND 2	Black	Ground for backlight unit



REAR VIEW :

