

Fema Part Number

GM12801024A-190-TTX1NLW-H	
Description	19.0" Full Color TFT LCD
	LVDS Interface
	1280x1024 Resolution
	Brightness = 1500 nits (Typical)
	Optional Resistive or Projected Capacitive Touch Panel Available

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## 2. General Description

### 2.1, Overview

GM12801024A-190-TTX1NLW-H is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display, a driver circuit, and a backlight system. 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.

### 2.2 Features

- 1500nits sunlight readable high brightness
- LED backlight
- Long operation life
- RoHS Compliance

### 2.3 Application

Industrial Application.

## 2.4 Display Specifications

Items	Unit	Specification
Screen Diagonal	inch	19.0"
Active Area	mm	376.32(H) × 301.06(V)
Pixels H x V	pixels	1280 × 3(RGB) × 1024
Pixels Pitch	um	0.294(per one triad) × 0.294
Pixel Arrangement		RGB Vertical stripe
Display mode		TN mode, normally white
White luminance (center)	Cd/m <sup>2</sup>	1500 (Typ.)
Contrast ratio		1000 (Typ.)
Optical Response Time	msec	5 ms (Typ. on/off)
Normal Input Voltage VDD	Volt	5.0
Power Consumption (VDD Line + LED Line)	Watt	36 (Typ.) (VDD 4.7W, LED 31.3W)
Weight	Grams	1700 (Typ.)
Physical size	mm	396 (H) x 324 (V) x 17.8 (D) (Typ)
Electrical Interface		2 Chanel LVDS
Support Colors		16.7M colors (RGB 6-bits +Hi-FRC data)
Surface Treatment		Anti-Glare, 3H
Temperature range		
Operating	°C	-10 ~ 50
Storage (Shipping)	°C	-20 ~ 60
RoHS Compliance		RoHS Compliance

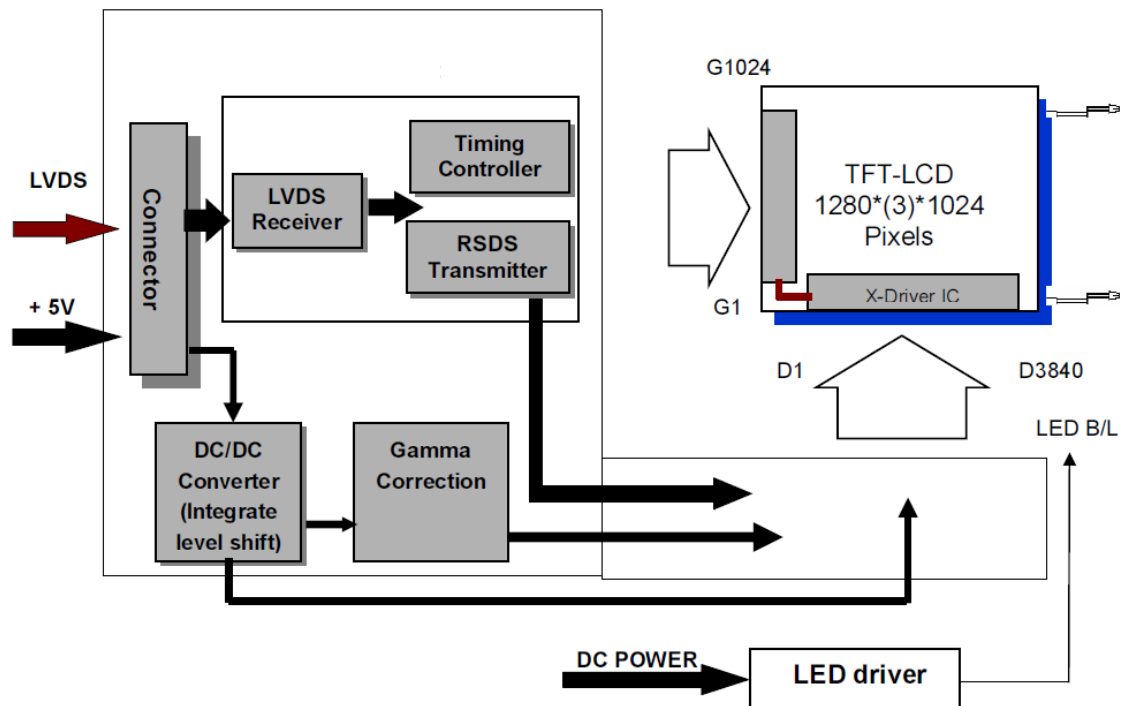
## 2.5 Optical Characteristics

The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing angle	Deg.	Horizontal (Right) CR=10 (Left)	160	170		2
		Vertical (Up) CR=10 (Down)	150	160		
Contrast Ratio		Normal Direction	800	1000		3
Response Time	msec	Raising time ( $T_{rR}$ )		3.6		4
		Falling time ( $T_{rF}$ )		1.4		
		Raising + Falling		5		
Color / Chromaticity Coordinates (CIE)		Red x	-0.04	0.64	+0.04	5
		Red y		0.34		
		Green x		0.29		
		Green y		0.61		
		Blue x		0.14		
		Blue y		0.07		
Color coordinates (CIE) White		White x		0.32		
		White y		0.36		
Center Luminance	Cd/m <sup>2</sup>		1200	1500		6
Luminance Uniformity	%			70		7
Crosstalk (in 60 Hz)	%				1	
Flicker	dB				-20	

### 3. Functional Block Diagram

The following diagram shows the functional block of the 19 inches Color TFT-LCD Module:



I/F PCB Interface:

FI-XB30SSL-HF15 / MSBKT2407P30HB

Mating Type:

FI-X30HL (Locked Type)

FI-X30H (Unlocked Type)

#### 4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

##### 4.1 TFT LCD Module

Items	Symbol	Min	Max	Unit	Conditions
Logic/ LCD drive voltage	V <sub>in</sub>	-0.3	5.5	Volt	Note 1, 2

##### 4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED Current	I <sub>LED</sub>		900	mA	Note 1, 2

##### 4.3 Absolute Ratings of Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T <sub>OP</sub>	-10	-	50	°C	Note 3
Operation Humidity	H <sub>OP</sub>	8		90	%	
Storage temperature	T <sub>ST</sub>	-20		60	°C	
Storage Humidity	H <sub>ST</sub>	8		90	%	

Note 1: With in T<sub>a</sub>= 25°C

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

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

Note 4: Some extra thermal conduction is necessary at top / bottom edge of panel for high temperature operation.

## 5. Electrical characteristics

### 5.1 TFT LCD Module

#### 5.1.1 Power Specification

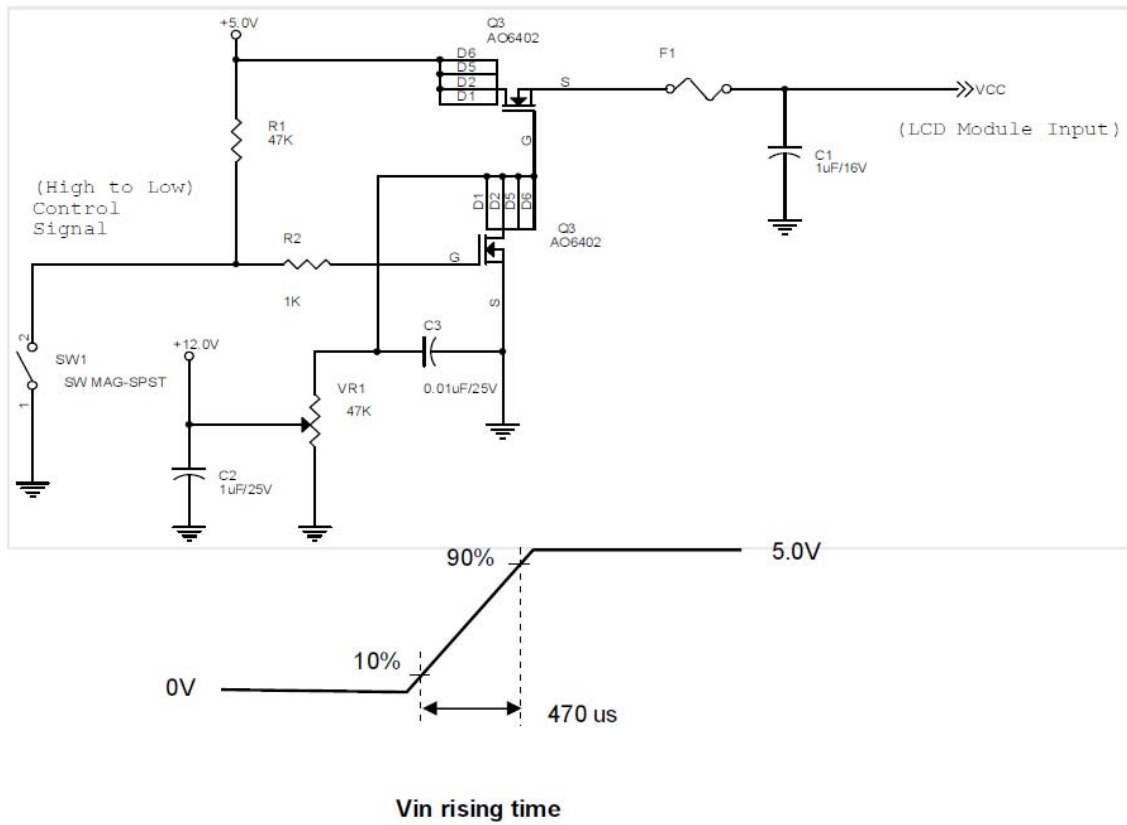
Input power specifications are as follows

Symble	Parameter	Min.	Typ.	Max.	Unit	Condition
VCC	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	± 10%
ICC	Input Current	-	0.94	1.1	[A]	Vin=5V , All Black Pattern, at 60Hz
IRush	Inrush Current	-	2.1	2.5	[A]	Note 2
PCC	VCCPower	-	4.7	5.5	[Watt]	Vin=5V , All Black Pattern, at 60Hz
VCCrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	300	[mV] p-p	With panel loading

Note 1: The H-Stripe pattern is defined as below :

	1	2	3	•	•	•	1278	1279	1280		R →	Gray level = L255
1st Line	R	G	B	R	G	B	R	G	B	R	G	B
	R	G	B	R	G	B	R	G	B	R	G	B
•				•	•	•						
	R	G	B	R	G	B	R	G	B	R	G	B
•												
•												
•												
	R	G	B	R	G	B	R	G	B	R	G	B
	R	G	B	R	G	B	R	G	B	R	G	B
1024th Line				•	•	•						
	R	G	B	R	G	B	R	G	B	R	G	B

Note 2: Measurement conditions:





## 5.2 Backlight Unit

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

Parameter	Min	Typ	Max	Unit	Note
LED voltage (VL)		37.2		[V]	2
LED current (IL)		420		[mA]	2,
BL power consumption		31.3		W	
LED Life Time(LTLED)		50,000		[Hour]	1

Note 1: The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 420 mA .

Note 2: The LED driving condition is defined for each LED module.

Note 3: The variance of LED Light Bar power consumption is  $\pm 10\%$ . Calculator value for reference ( $IL \times VL \times 2 = PLED$ )

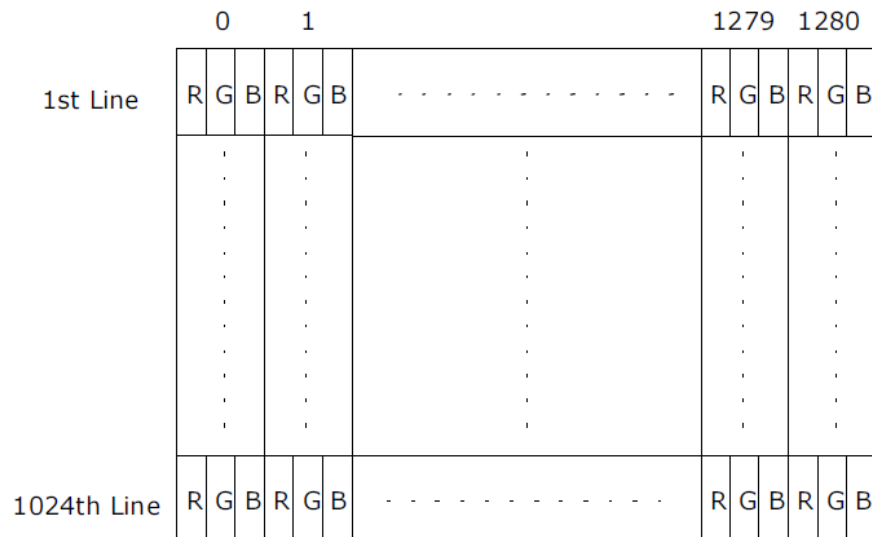
Note 4: LED Light Bar Connector is used for the integral backlight system. The recommended model is BHSR-02VS-1 manufactured by JST

Note 5: Long lifetime operation mode suggestion:

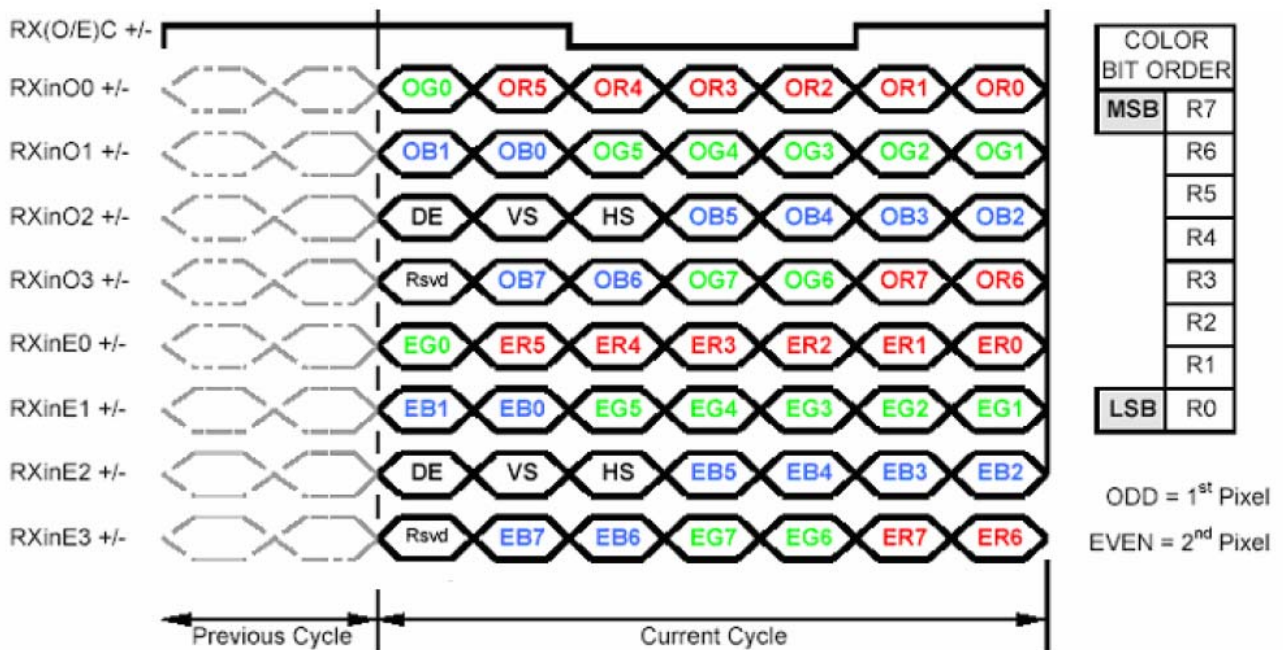
## 6. Signal Characteristic

### 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 mode only. VS and HS on EVEN channel are not used.

Note2: Please follow VESA.

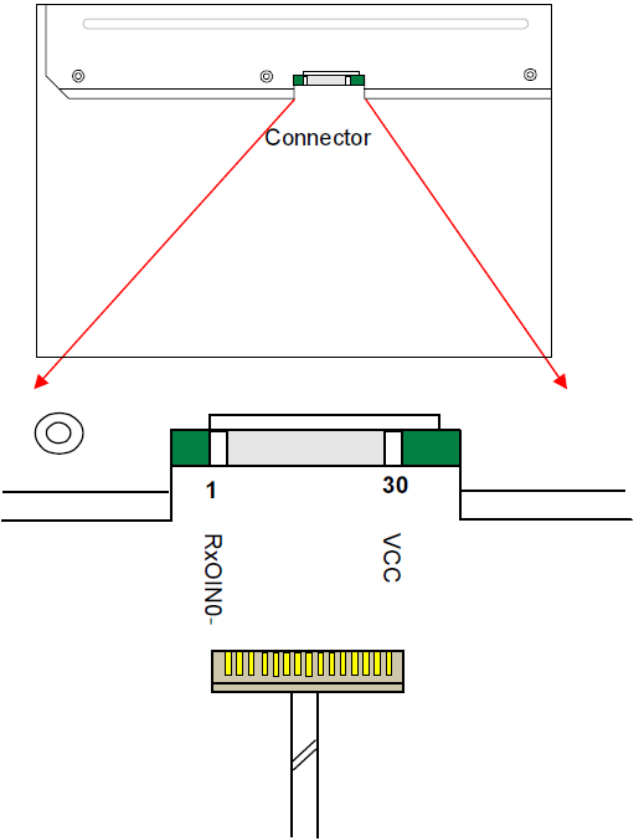
Note3: 8-bit in

### 6.3 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	RxOIN0-	Negative LVDS differential data input (Odd data)
2	RxOIN0+	Positive LVDS differential data input (Odd data)
3	RxOIN1-	Negative LVDS differential data input (Odd data)
4	RxOIN1+	Positive LVDS differential data input (Odd data)
5	RxOIN2-	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RxOIN2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	VSS	Power Ground
8	RxOCLKIN-	Negative LVDS differential clock input (Odd clock)
9	RxOCLKIN+	Positive LVDS differential clock input (Odd clock)
10	RxOIN3-	Negative LVDS differential data input (Odd data)
11	RxOIN3+	Positive LVDS differential data input (Odd data)
12	RxEIN0-	Negative LVDS differential data input (Even data)
13	RxEIN0+	Positive LVDS differential data input (Even data)
14	VSS	Power Ground
15	RxEIN1-	Negative LVDS differential data input (Even data)
16	RxEIN1+	Positive LVDS differential data input (Even data)
17	VSS	Power Ground
18	RxEIN2-	Negative LVDS differential data input (Even data)
19	RxEIN2+	Positive LVDS differential data input (Even data)
20	RxECLKIN-	Negative LVDS differential clock input (Even clock)
21	RxECLKIN+	Positive LVDS differential clock input (Even clock)
22	RxEIN3-	Negative LVDS differential data input (Even data)
23	RxEIN3+	Positive LVDS differential data input (Even data)
24	VSS	Power Ground
25	VSS	Power Ground
26	NC	Do not connect ( for AUO test)
27	VSS	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 VESA.

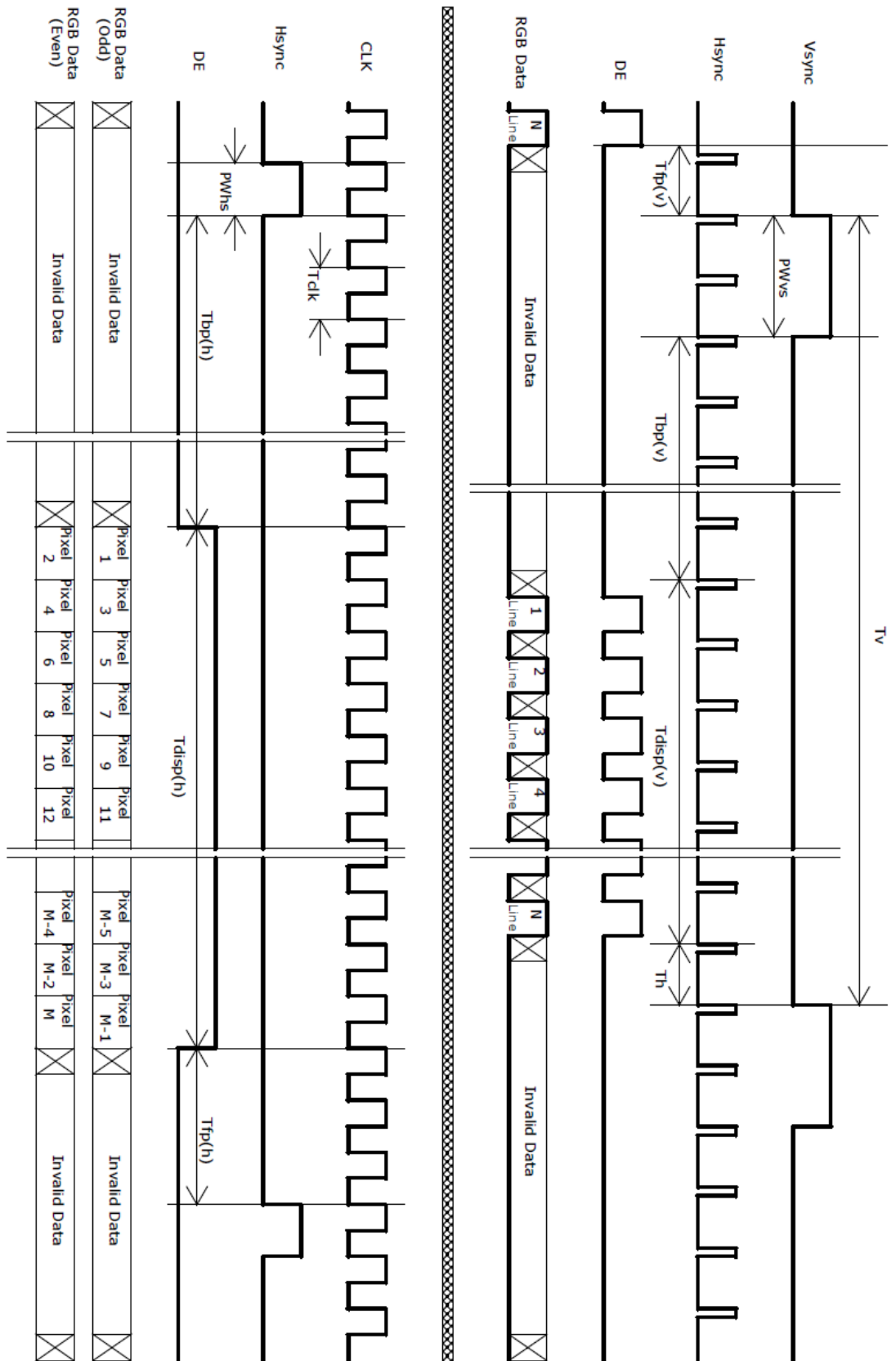
## 6.4 Interface Timing

### 6.4.1 Timing Characteristics

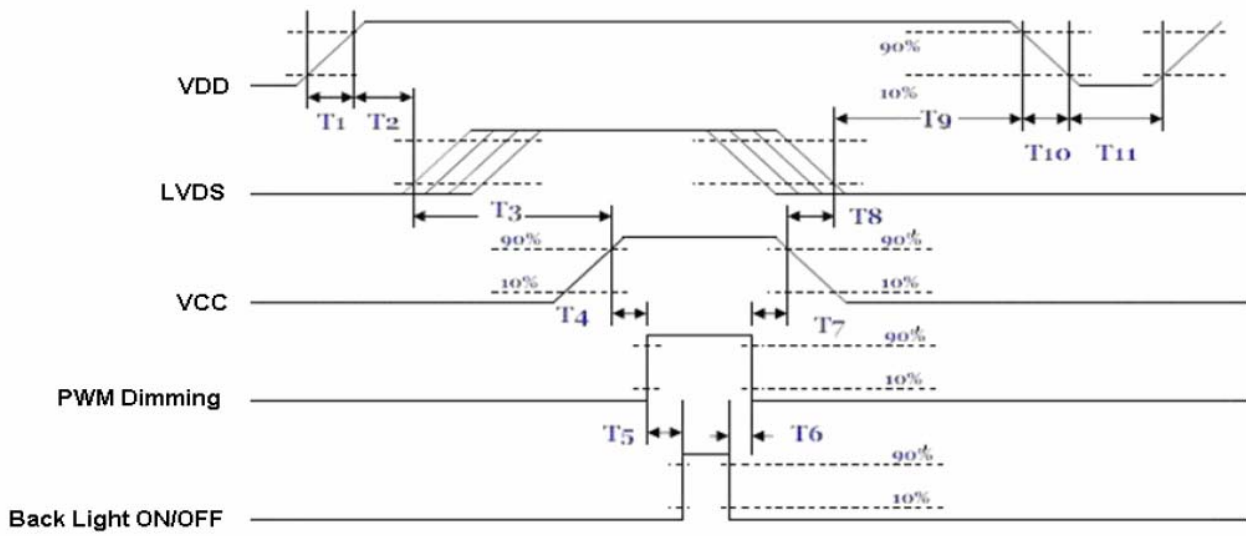
Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	$T_v$	1032	1066	1150	Th
	Active	$T_{disp(v)}$	1024	1024	1024	Th
	Blanking	$T_{bp(v)}+T_{fp(v)}+PW_{vs}$	8	42	126	Th
Horizontal Section	Period	$T_h$	780	844	2047	Tclk
	Active	$T_{disp(h)}$	640	640	640	Tclk
	Blanking	$T_{bp(h)}+T_{fp(h)}+PW_{hs}$	140	204	-	Tclk
Clock	Period	$T_{clk}$	22.2	18.52	14.81	ns
	Frequency	Freq.	45	54	67.5	MHz
Frame Rate	Frequency	$1/T_v$	50	60	75	Hz

Note: DE mode only

### 6.4.2 Timing Diagram



## 6.5 Power ON/OFF Sequence



Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
<b>T1</b>	0.5	-	10	[ms]
<b>T2</b>	30	40	50	[ms]
<b>T3</b>	175	-	-	[ms]
<b>T4</b>	10	-	-	[ms]
<b>T5</b>	10	-	-	[ms]
<b>T6</b>	0	-	-	[ms]
<b>T7</b>	10	-	-	[ms]
<b>T8</b>	100	-	-	[ms]
<b>T9</b>	0	16	50	[ms]
<b>T10</b>	-	-	10	[ms]
<b>T11</b>	1000	-	-	[ms]

## 7.0 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

#### Connector

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	JAE / STM
Type Part Number	FI-XB30SSL-HF15 / MSBKT2407P30HB
Mating Housing Part Number	FI-X30HL

#### Pin Assignment

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

### 7.2 Backlight Unit: LED Connector

Pin No.	Symbol	I/O	Function	Remark
1	VLED+	P	Power for LED backlight anode	White
2	VLED-	P	Power for LED backlight cathode	Black

LED Light Bar Connector is used for the integral backlight system. The recommended model is BHSR-02VS-1 manufactured by JST.

## 8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃ , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 50℃ , 50%RH, 240hours	3
Low Temperature Operation (LTO)	Ta= -10℃ , 240hours	
High Temperature Storage (HTS)	Ta= 60℃ , 240hours	
Low Temperature Storage (LTS)	Ta= -20℃ , 240hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 70℃/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: $\pm$ 8KV, 150pF(330 $\Omega$ ) 1sec, 9 points, 25 times/ point.	2
	Air Discharge: $\pm$ 15KV, 150pF(330 $\Omega$ ) 1sec 9 points, 25 times/ point.	2

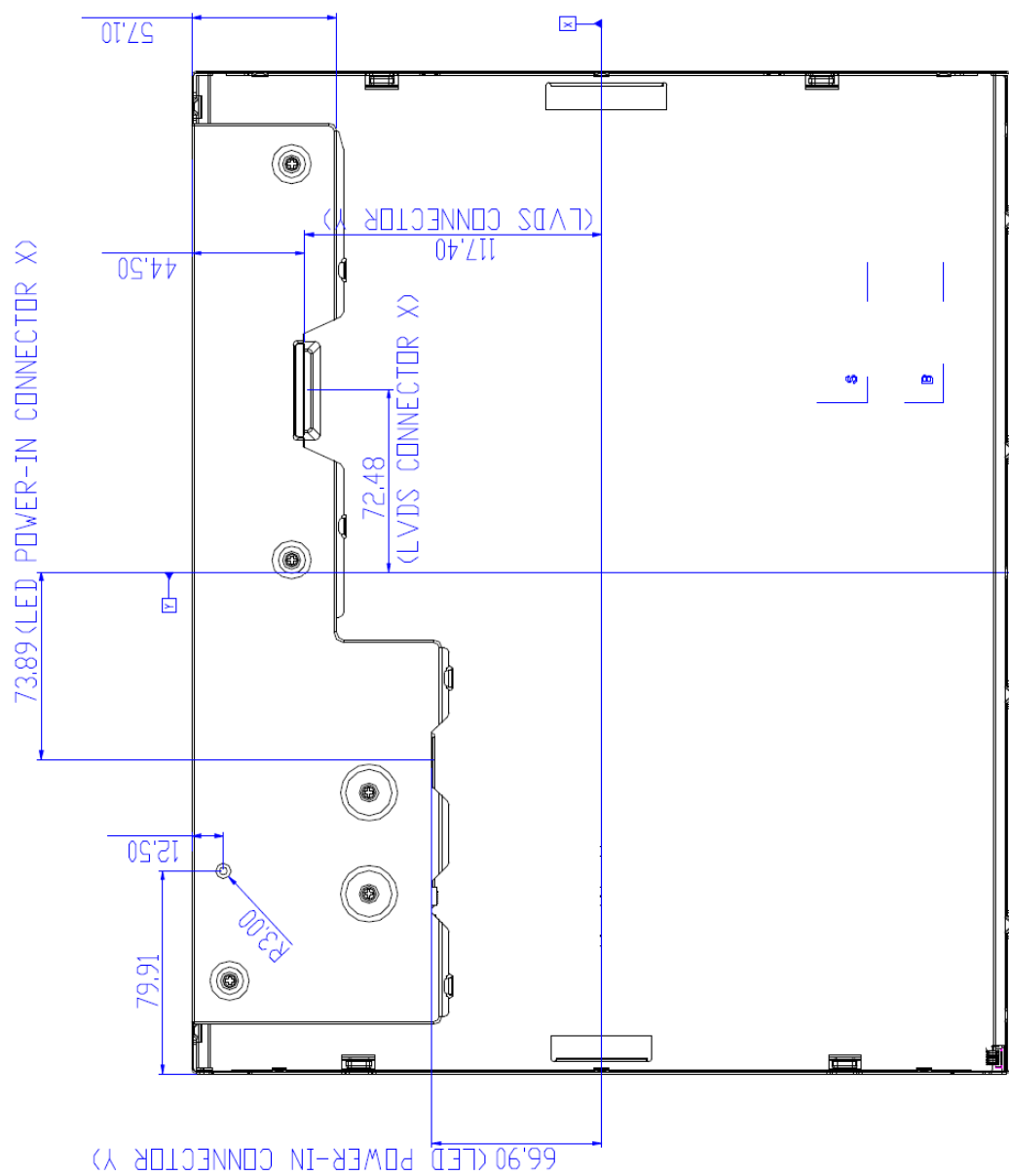
Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20℃ to 60℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed 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.

Note 3: The test items are tested by open frame type chassis.



[illegible]



(NOTE: Two LED backlight power cables are not shown)