CheFree

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High brightness color TFT-LCD module

Model: 7<‰$7@>@!$$&

Date: 5df.‰) th, **2012**

Note: This specification is subject to change
without notice

Customer： _____

Date： _____

Approved	Prepared
Date:	**Date:**

Contents

RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2012/04/15	All	First Edition for customer		
0.2 2013/07/15	All	Min. Brightness 450nits	Min. -> 400nits	

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, do not press the center of TFTLCD panel.

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.

2. General Description

2.1, Overview

CH190CLJL-002 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

- 500nits high brightness
- LED backlight, with driver on board
- Wide operation temperature
- RoHS Compliance

2.3 Application

Industrial Application.

2.4 Display Specifications

| Items	Unit	Specification
Screen Diagonal	inch	19.0" (482.6 mm)
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^2	500 (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 L Line)	Watt	20.5 (Typ.)
Weight	Grams	1860 (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	^{0}C	-20 ~ 50
Storage (Shipping)	^{0}C	-30 ~ 60
RoHS Compliance		RoHS Compliance

2.5 Optical Characteristics

The following optical characteristics are measured under stable condition at 25 ^{0}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		600	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			0.31		
		White y			0.33		
Center Luminance	Cd/m^2			400	500		6
Luminance Uniformity	%				70		7
Crosstalk (in 60 Hz)	%					1	
Flicker	dB					-20	

Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.
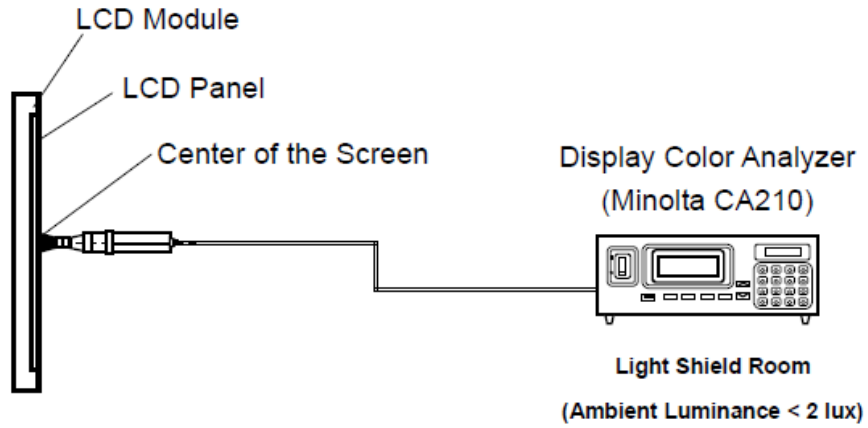

Note 2: Definition of viewing angle
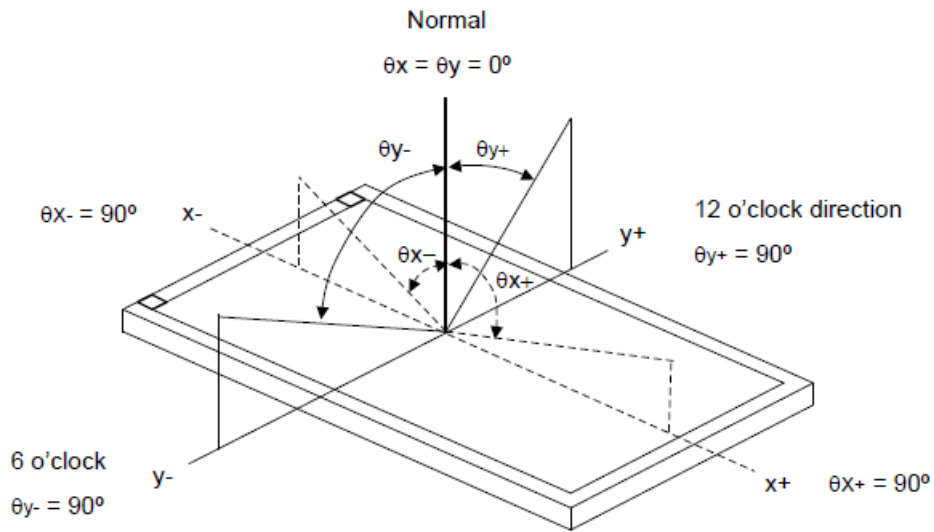
Note 3: Contrast ratio is measured by Topcon BM-7

Note 4: 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.
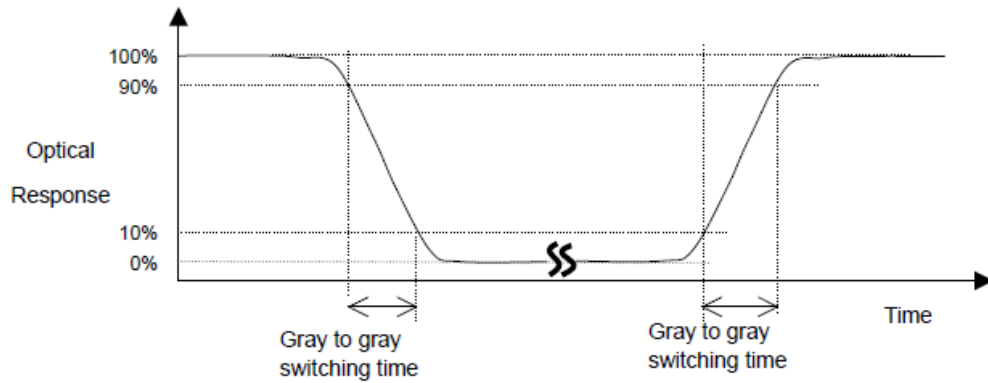
Note 5: Color chromaticity and coordinates (CIE) is measured by Topcon BM-7

Note 6: Center luminance is measured by Topcon BM-7

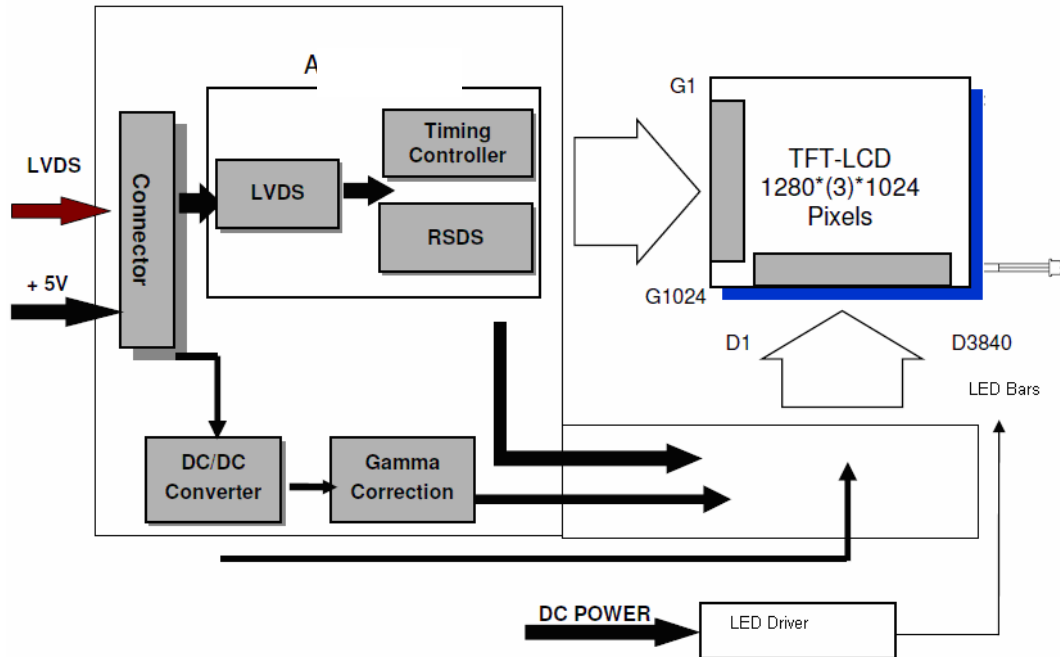Note 7: Luminance uniformity of these 5 points is defined as below and measured by Topcon BM-7
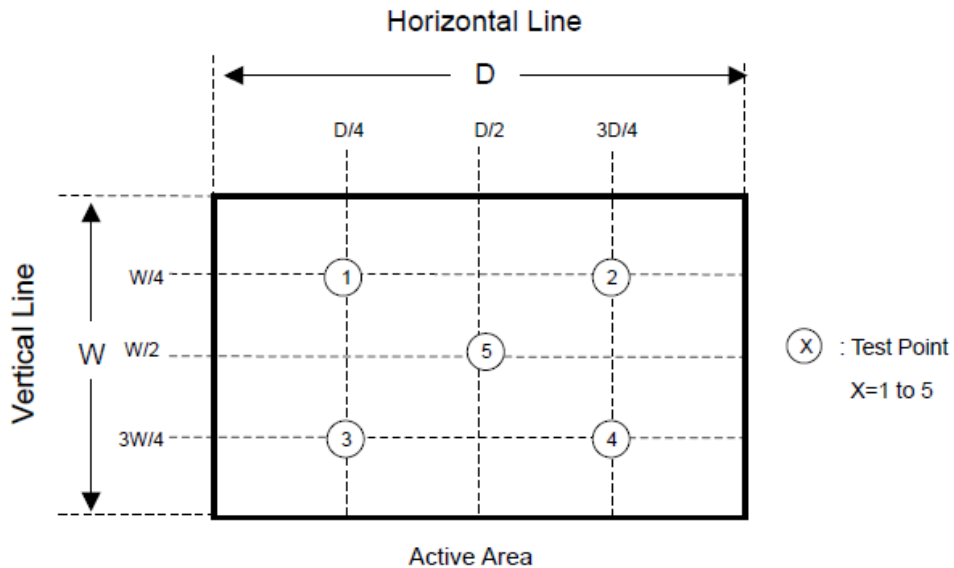
Uniformity = (Min. Luminance of 5 points) / (Max. Luminance of 5 points)

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	Vin	-0.3	5.5	Volt	Note 1, 2

4.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED Current	I LED		1205	mA	Note 1, 2

4.3 Absolute Ratings of Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T_{OP}	-20	-	50	^{0}C	Note 3
Operation Humidity	H_{OP}	8		90	%	
Storage temperature	T_{ST}	-30		60	^{0}C	
Storage Humidity	H_{ST}	8		90	%	

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 IIS (Incoming Inspection Standard).

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

Note 2: Measurement conditions

5.2 Backlight Unit

Following characteristics are measured under a stable condition at 25 ^{0}C

Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
VCC	Input Voltage		12		[Volt]	
I_{VCC}	Input Current		1.15	1.25	[A]	100% PWM Duty
P_{VCC}	Power Consumption		13.8	15	[Watt]	100% PWM Duty
Irush LED	Inrush Current	-	2.1	2.5	[A]	at rising time=470us
F_{PWM}	Dimming Frequency		0.2	20	[kHz]	
	Swing Voltage	-	3.3	-	V	
	Dimming Duty Cycle	10	-	100	%	
I_F	LED Forward Current		80		mA	Ta = 25°C
V_F	LED Forward Voltage	-	-	-	Volt	
		-	3.5	4	Volt	I_F =80mA, Ta = 25°C
		-	-	-		
P_{LED}	LED Power Consumption	-	12	14.4	Watt	I_F =80 mA, Ta = 25°C
Operation Lifetime		50,000			Hrs	I_F=80mA, Ta= 25°C

Note 1: Ta means ambient temperature of TFT-LCD module.

Note 2: VCC, Ivcc, Pvcc , Irush LED are defined for LED B/L.(100% duty of PWM dimming)

Note 3: IF, VF , PLED are defined for LED Light Bar.

Note 4: If VM19B6 V2 module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

Note 5: Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.
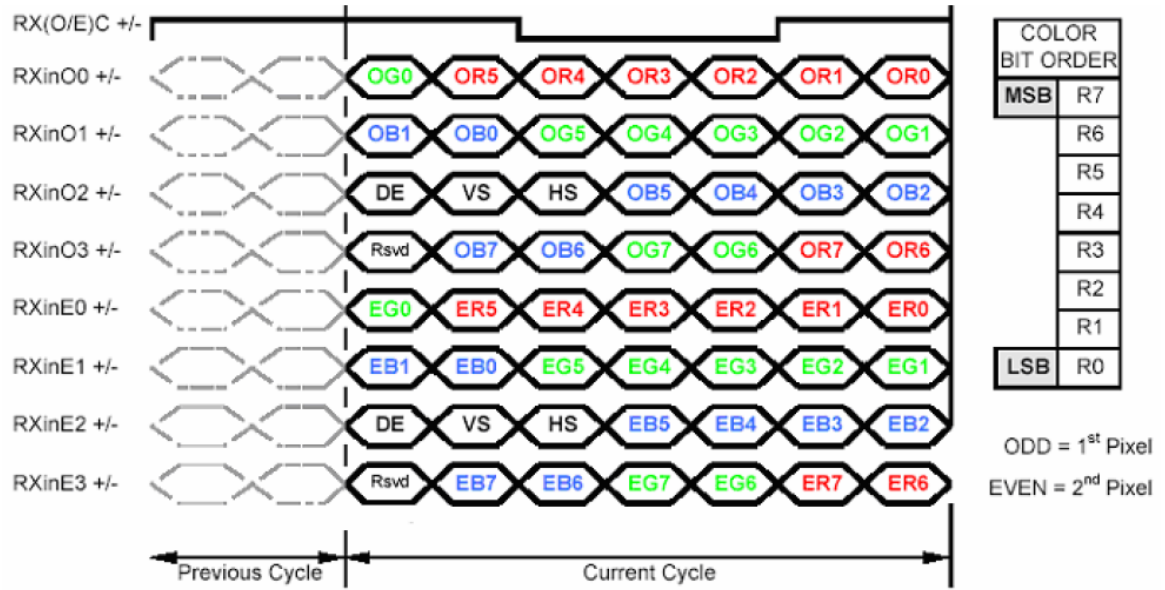
6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.
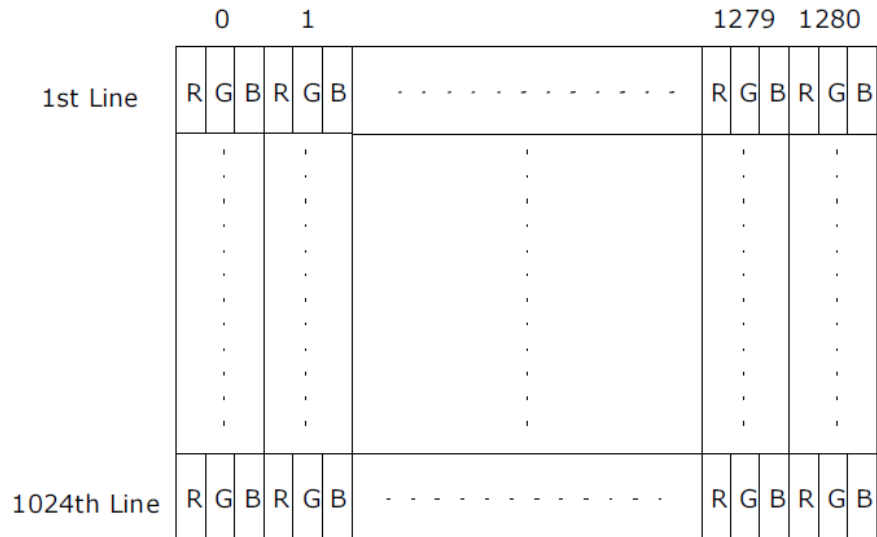
6.2 The Input Data Format

Note1: Normally DE mode only. VS and HS on EVEN channel are not used.
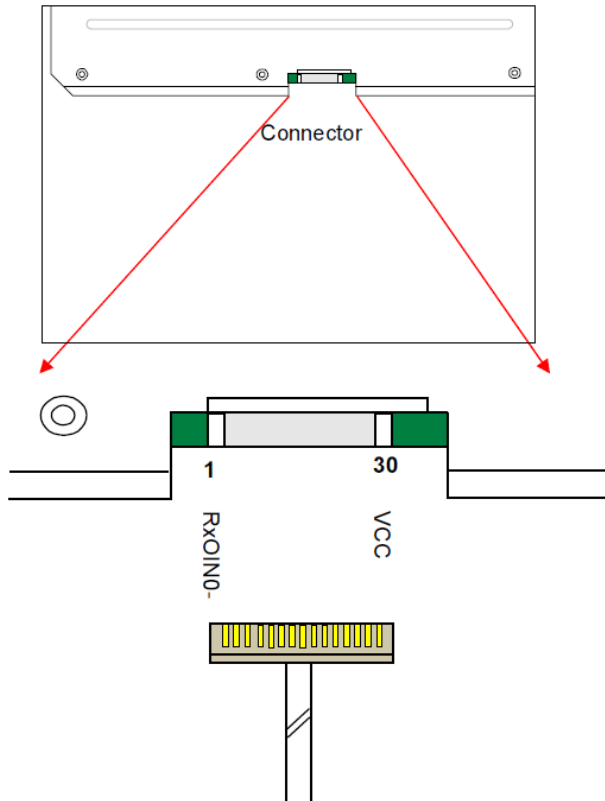
Note2: Please follow VESA.

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	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

6.4.2 Timing Diagram
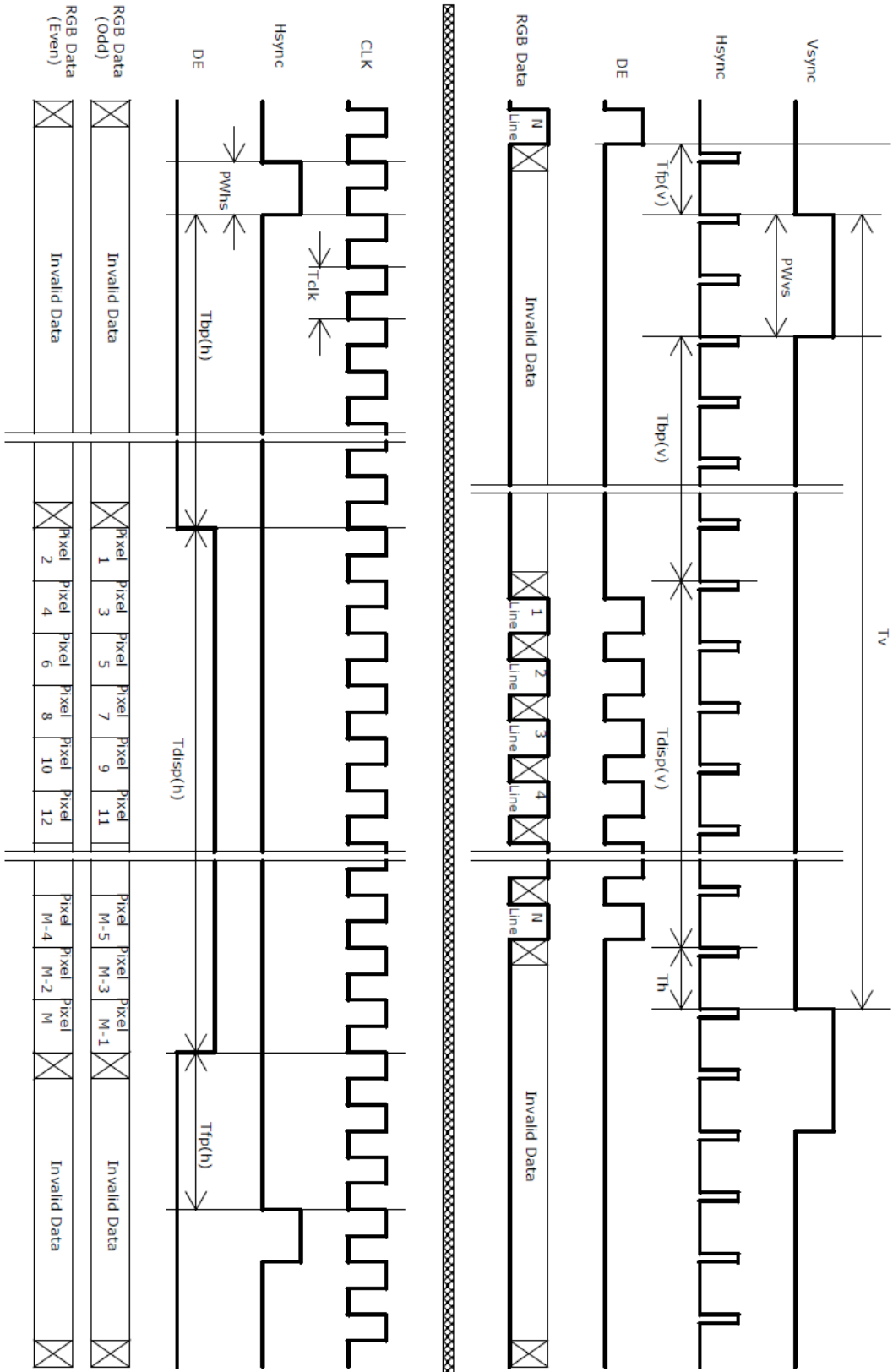
6.5 Power ON/OFF Sequence
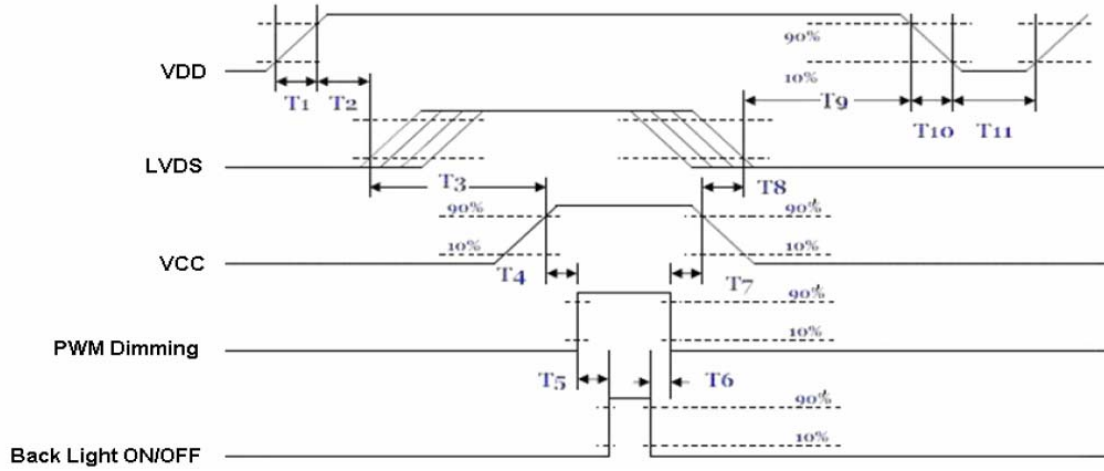
Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	175	-	-	[ms]
T4	10	-	-	[ms]
T5	10	-	-	[ms]
T6	0	-	-	[ms]
T7	10	-	-	[ms]
T8	100	-	-	[ms]
T9	0	16	50	[ms]
T10	-	-	10	[ms]
T11	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 / P-TWO
Type Part Number	FI-XB30SSLA-HF15 / 187034-30091
Mating Housing Part Number	FI-X30HL FI-X30H (Unlocked Type)

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

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 Connector / Backlight
Manufacturer	STM
Type Part Number	MS24019R
Mating Type Part Number	P24019

7.2.1 Signal for LED connector

Pin #	Symbol	Pin Description
1	+12V	Power +12V
2	+12V	Power +12V
3	+12V	Power +12V
4	NC	NC
5	GND	GND
6	GND	GND
7	GND	GND
8	EN	Enable
9	Dimming	PWM (duty 10%~ 100%)

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= -20℃, 240hours	
High Temperature Storage (HTS)	Ta= 60℃, 240hours	
Low Temperature Storage (LTS)	Ta= -30℃, 240hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 50℃/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 9 points, 25 times/ point.	2
	Air Discharge: ± 15KV, 150pF(330Ω) 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.
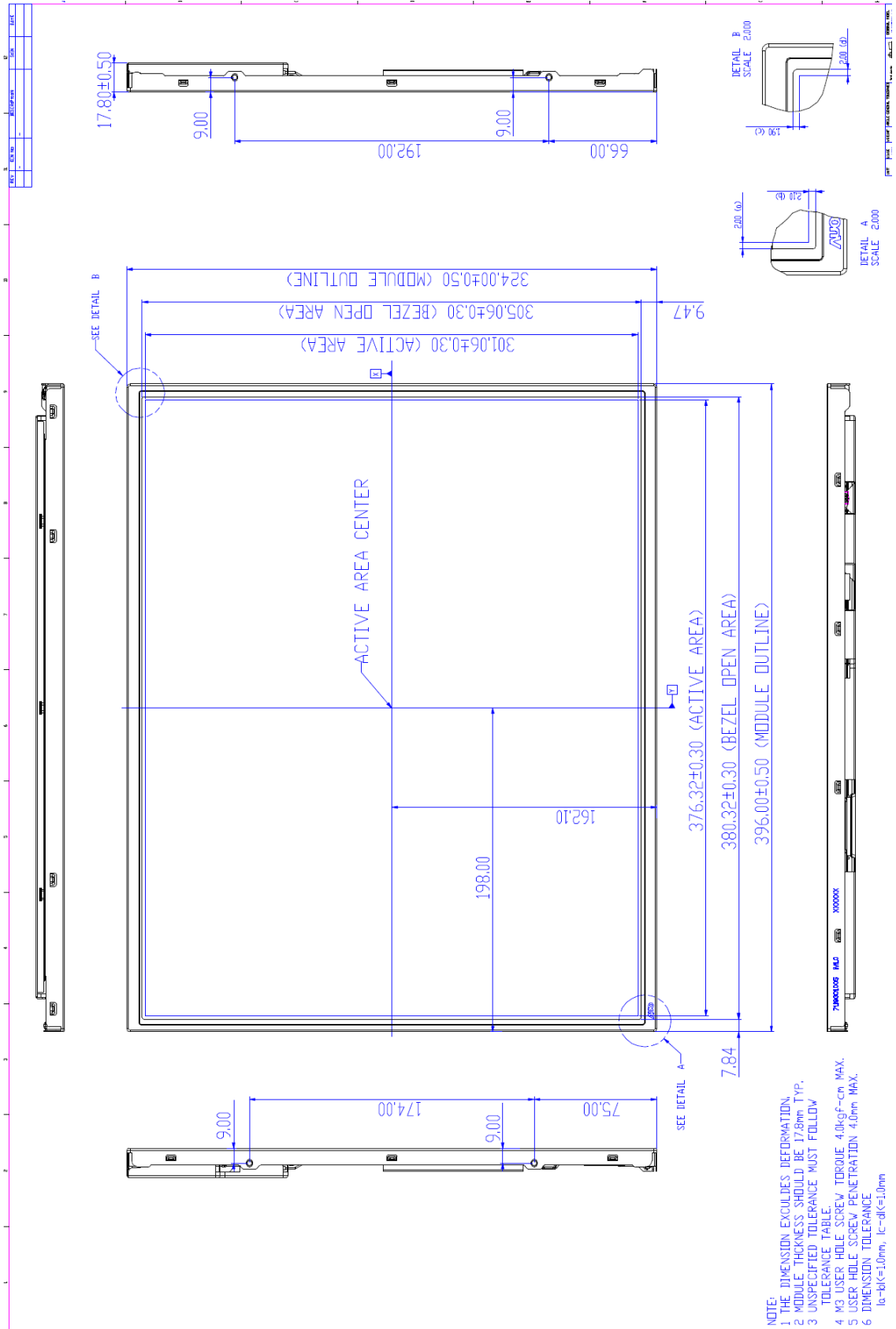
Note 3: The test items are tested by open frame type chassis.
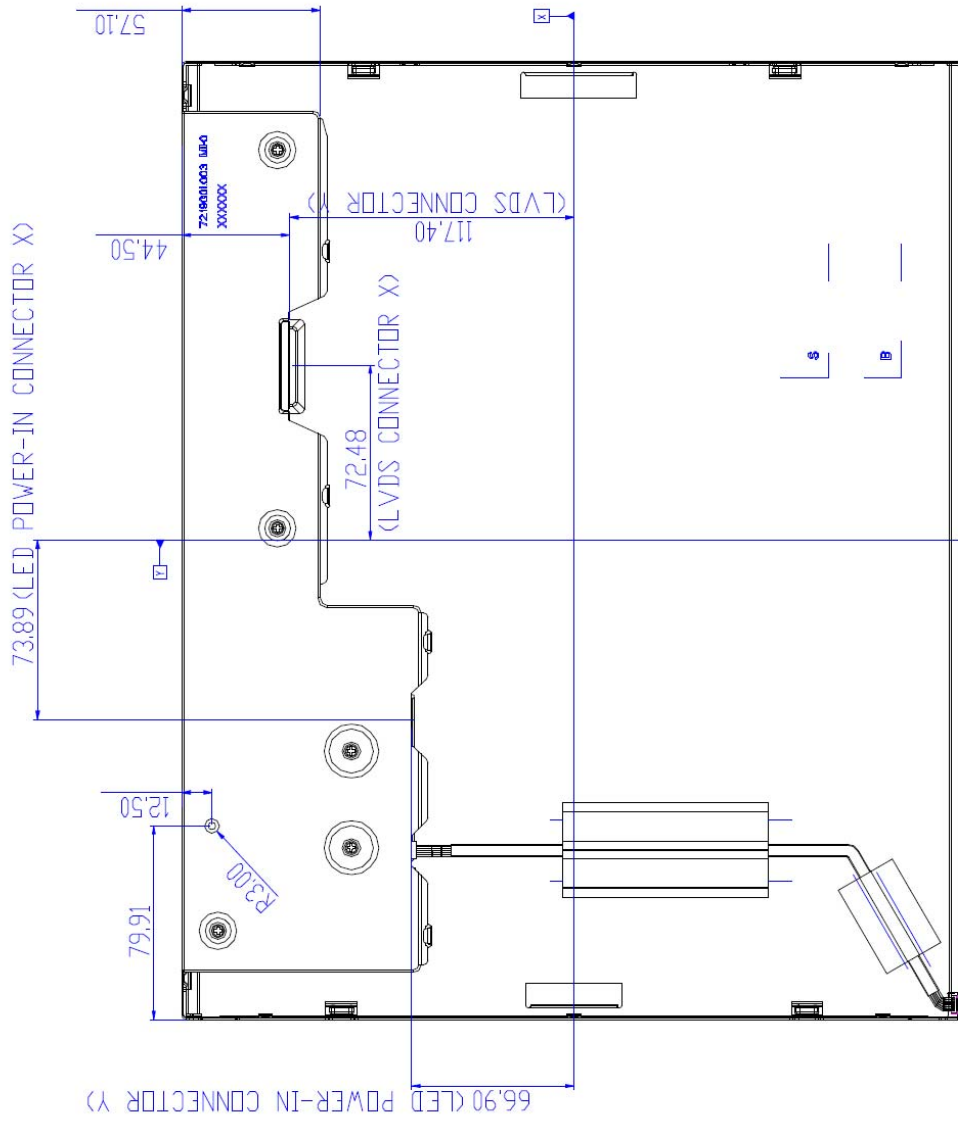
9. Shipping Label & Package
(TBD)

10. Mechanical Characteristic

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