

# **INNOLUX DISPLAY CORPORATION**

## **LCD MODULE**

### **SPECIFICATION**

Customer: \_\_\_\_\_  
 Model Name: **AT102TN03 V.8**  
 SPEC NO.: **A102-03-TT-83**  
 Date: **2009/12/11**  
 Version: **03**

- Preliminary Specification
- Final Specification

**For Customer's Acceptance**

Approved by	Comment

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### Record of Revision

Version	Revise Date	Page	Content
Pre-Spec. 01	2009/03/26		Initial Release
Final-Spec.01	2009/08/17		The First Final Specification
		1	Add LCM weight
Final-Spec.02	2009/09/17	6	Modify Power voltage
		7	Modify Power voltage
		7	Modify Input signal voltage
		8	Modify Current for Driver
Final-Spec.03	2009/12/11	5	Modify The Color Of Light bar Wire

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# 1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.2 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 × 3(RGB) × 480	
4	Display mode	Normally white, Transmissive	
5	Dot pitch	0.0925(W) × 0.276(H) mm	
6	Active area	222.0(W) × 132.48(H) mm	
7	Module size	235.0(W) × 145.8(H) × 6.1(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	1.86W(Typ.)	
12	Panel power consumption	0.25W(Typ.)	
13	Weight	332g(Typ.)	

Note 1: Refer to Mechanical Drawing.

## 2. Pin Assignment

### 2.1. TFT LCD Panel Driving Section

FPC connector is used for the module electronics interface. The recommended model is "AF 730L-A2G1T" manufactured by P-TWO.

Pin No.	Symbol	I/O	Function	Remark
1	POL	I	Polarity selection	
2	STVD	I/O	Vertical start pulse input when U/D= H	Note 1
3	OEV	I	Output enable	
4	CKV	I	Vertical clock	
5	STVU	I/O	Vertical start pulse input when U/D= L	Note 1
6	GND	P	Power ground	
7	EDGSL	I	Select rising edge or rising/falling edge	
8	V <sub>CC</sub>	P	Power supply for digital circuit	
9	V <sub>9</sub>	I	Gamma voltage level 9	
10	V <sub>GL</sub>	P	Gate OFF voltage	
11	V <sub>2</sub>	I	Gamma voltage level 2	
12	V <sub>GH</sub>	P	Gate ON voltage	
13	V <sub>6</sub>	I	Gamma voltage level 6	
14	U/D	I	Up/down selection	Note 1,2
15	V <sub>COM</sub>	I	Common voltage	
16	GND	P	Power ground	
17	AV <sub>DD</sub>	P	Power supply for analog circuit	
18	V <sub>14</sub>	I	Gamma voltage level 14	
19	V <sub>11</sub>	I	Gamma voltage level 11	
20	V <sub>8</sub>	I	Gamma voltage level 8	
21	V <sub>5</sub>	I	Gamma voltage level 5	
22	V <sub>3</sub>	I	Gamma voltage level 3	
23	GND	P	Power ground	
24	R <sub>5</sub>	I	Red data(MSB)	
25	R <sub>4</sub>	I	Red data	
26	R <sub>3</sub>	I	Red data	
27	R <sub>2</sub>	I	Red data	
28	R <sub>1</sub>	I	Red data	

29	R0	I	Red data(LSB)	
30	GND	P	Power ground	
31	GND	P	Power ground	
32	G5	I	Green data(MSB)	
33	G4	I	Green data	
34	G3	I	Green data	
35	G2	I	Green data	
36	G1	I	Green data	
37	G0	I	Green data(LSB)	
38	STHL	I/O	Horizontal start pulse input when R/L = L	Note 1
39	REV	P	Control signal are inverted or not	Note 3
40	GND	I	Power ground	
41	DCLK	I	Sample clock	
42	V <sub>CC</sub>	P	Power supply for digital circuit	
43	STHR	I/O	Horizontal start pulse input when R/L = H	Note 1
44	LD	I	Latches the polarity of outputs and switches the new data to outputs	
45	B5	I	Blue data (MSB)	
46	B4	I	Blue data	
47	B3	I	Blue data	
48	B2	I	Blue data	
49	B1	I	Blue data	
50	B0	I	Blue data (LSB)	
51	R/L	I	Right/ left selection	Note 1,2
52	V1	I	Gamma voltage level 1	
53	V4	I	Gamma voltage level 4	
54	V7	I	Gamma voltage level 7	
55	V10	I	Gamma voltage level 10	
56	V12	I	Gamma voltage level 12	
57	V13	I	Gamma voltage level 13	
58	AV <sub>DD</sub>	P	Voltage for analog circuit	
59	GND	P	Power ground	
60	V <sub>COM</sub>	I	Common voltage	

I: input, O: output, P: Power

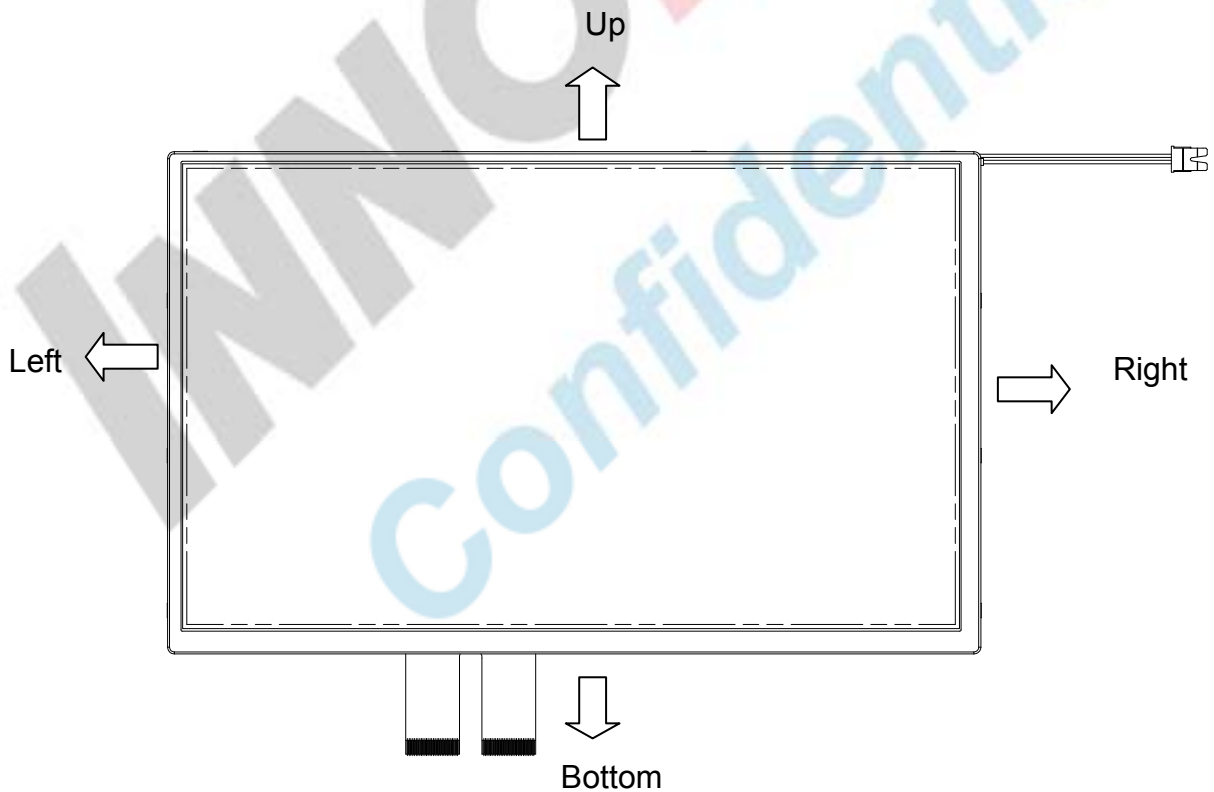
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Note 1: Selection of scanning mode

Setting of scan control input		IN/OUT state for start pulse				Scanning direction
U/D	R/L	STVD	STVU	STHR	STHL	
GND	V <sub>CC</sub>	O	I	I	O	Up to down, left to right
V <sub>CC</sub>	GND	I	O	O	I	Down to up, right to left
GND	GND	O	I	O	I	Up to down, right to left
V <sub>CC</sub>	V <sub>CC</sub>	I	O	I	O	Down to up, left to right

Note 2: Definition of scanning direction.  
Refer to the figure as below:



Note 3: When REV="L" , normally  
REV="H" , these data will be inverted.

## 2.2. Backlight Unit Section

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

Pin No.	Symbol	I/O	Function	Remark
1	V <sub>LED+</sub>	P	Power for LED backlight anode	Pink
2	V <sub>LED-</sub>	P	Power for LED backlight cathode	White

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### 3. Operation Specifications

#### 3.1. Absolute Maximum Rating

( Note 2)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V <sub>CC</sub>	-0.3	5	V	
	AV <sub>DD</sub>	-0.5	12	V	
	V <sub>GH</sub>	13	19	V	
	V <sub>GL</sub>	-12	-2	V	
	V <sub>GH</sub> -V <sub>GL</sub>	-	31	V	
Input signal voltage	V1~V7	0.4 AV <sub>DD</sub>	AV <sub>DD</sub> -0.1	V	Note 1
	V8~V14	-0.3	0.6AV <sub>DD</sub>	V	
Operation temperature	T <sub>OP</sub>	-30	85	°C	
Storage temperature	T <sub>ST</sub>	-30	85	°C	
LED Reverse Voltage	V <sub>r</sub>	-	1.2	V	Each LED Note 3
LED Forward Current	I <sub>f</sub>	-	25	mA	Each LED

Note 1: AV<sub>DD</sub> - 0.1 ≥ V1 ≥ V2 ≥ V3 ≥ V4 ≥ V5 ≥ V6 ≥ V7 ≥ V8 ≥ V9 ≥ V10 > V11 ≥ V12 ≥ V13 ≥ V14 ≥ AVSS + 0.1

Note 2: The absolute maximum rating values of the module should not be exceeded. Once exceeded absolute maximum rating values, the characteristics of the module may not be recovered. Even in an extreme condition, may result in module permanently destroyed.

Note 3: Vr conditions: Zener Diode 20mA.

**3.1.1 Typical Operation Conditions**

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V <sub>CC</sub>	3.0	3.3	3.6	V	
	AV <sub>DD</sub>	9.0	9.2	9.4	V	
	V <sub>GH</sub>	15.3	16.0	16.7	V	
	V <sub>GL</sub>	-7.7	-7.0	-6.3	V	
Input signal voltage	V <sub>COM</sub>	3.65	3.85	4.05	V	(V1+V14)/2 =4.5V
	V1~V7	0.4 AV <sub>DD</sub>	-	AV <sub>DD</sub> -0.1	V	
	V8~V14	0.1	-	0.6 AV <sub>DD</sub>	V	
Input logic high voltage	V <sub>IH</sub>	0.7V <sub>CC</sub>	-	V <sub>CC</sub>	V	
Input logic low voltage	V <sub>IL</sub>	0	-	0.3V <sub>CC</sub>	V	

Note 1: Be sure to apply GND, V<sub>CC</sub>, and V<sub>GL</sub>, to the LCD first, and then apply V<sub>GH</sub>.

**3.1.2 Current Consumption**

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I <sub>GH</sub>	-	0.3	0.5	mA	V <sub>GH</sub> =16V
	I <sub>GL</sub>	-	0.2	1.0	mA	V <sub>GL</sub> = -7V
	I <sub>CC</sub>	-	4	10	mA	V <sub>CC</sub> =3.3V
	I <sub>AVDD</sub>	-	25	50	mA	AV <sub>DD</sub> =9.2V

**3.1.3 Backlight Driving Conditions**

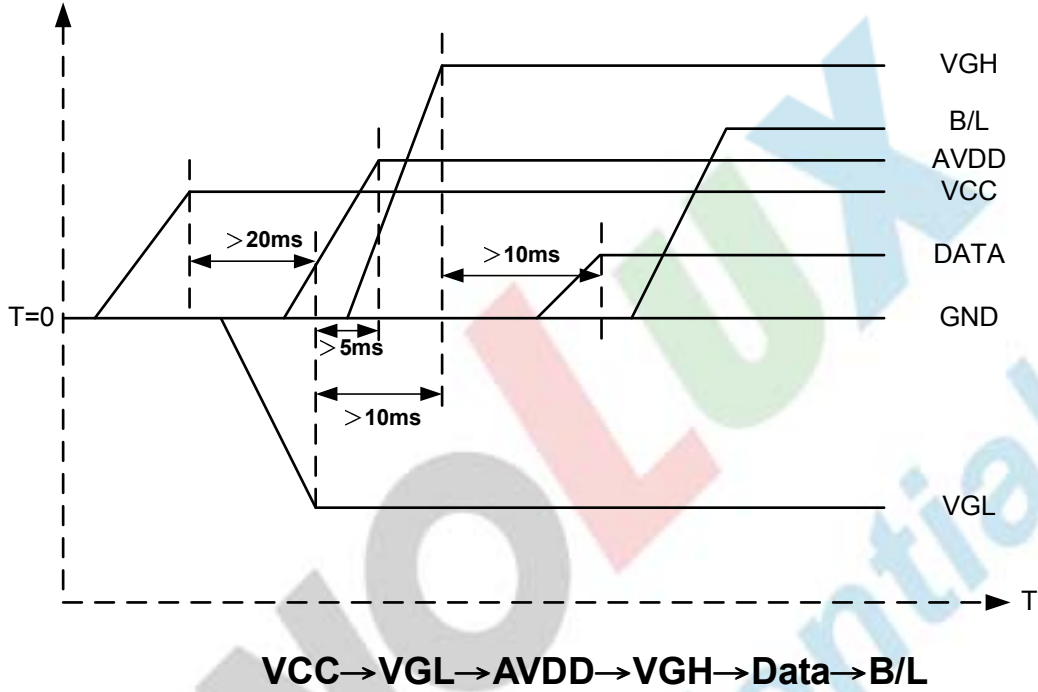
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LED forward voltage	V <sub>L</sub>	8.4	9.3	10.5	V	Note 1
LED forward current	I <sub>L</sub>	180	200	220	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I<sub>L</sub> =200mA.

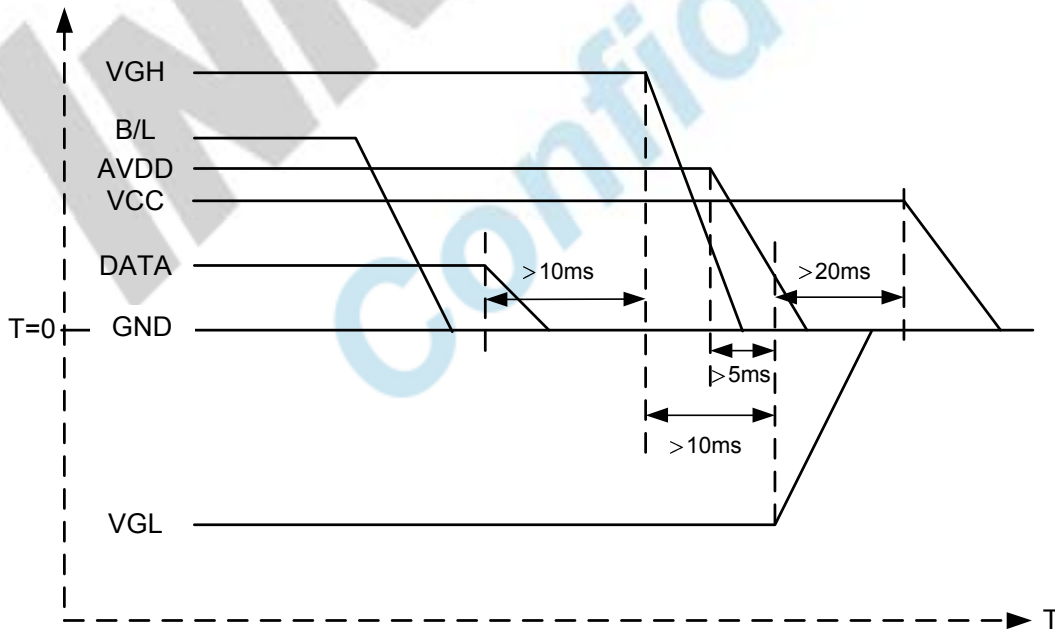
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I<sub>L</sub> =200mA. The LED lifetime could be decreased if operating I<sub>L</sub> is larger than 200 mA.

### 3.2 Power Sequence

#### 3.2.1 Power on:



#### 3.2.2 Power off:



Note: Data includes POL, STVD, OEV, CKV, STVU, EDGSL, STHL, REV, DCLK, , STHR, LD.

### 3.3 Timing Characteristics

#### 3.3.1 Timing Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
DCLK frequency	$F_{dclk}$	-	40	45	MHz	
DCLK cycle	$T_{cph}$	22	25	-	ns	
DCLK pulse width	$T_{cw}$	8	-	-	ns	
Data set-up time	$T_{su}$	4	-	-	ns	
Data hold time	$T_{hd}$	2	-	-	ns	
Time that the last data to LD	$T_{ld}$	1	-	-	Tcph	
Pulse width of LD	$T_{wld}$	2	-	-	Tcph	
Time that LD to STHL/R	$T_{lds}$	5	-	-	Tcph	
POL set-up time	$T_{psu}$	6	-	-	ns	
POL hold time	$T_{phd}$	6	-	-	ns	
CKV frequency	$F_{vclk}$	-	-	200	KHz	
CKV rise time	$T_{rck}$	-	-	100	ns	
CKV falling time	$T_{fck}$	-	-	100	ns	
CKV pulse width	$P_{WCLK}$	500	-	-	ns	
Horizontal display timing range	$T_{dh}$	-	800	-	Tcph	
Horizontal timing range	$T_h$	-	1056	-	Tcph	
STVU/D setup time	$T_{suv}$	200	-	-	ns	
STVU/D hold time	$T_{hdv}$	300	-	-	ns	
STVU/D delay time	$T_{dt}$	-	-	500	ns	
Driver output delay time	$T_{do}$	-	-	900	ns	
Output rise time	$T_{tlh}$	-	500	1000	ns	
Output falling time	$T_{thl}$	-	400	800	ns	
OEV pulse width	$T_{wcl}$	1	-	-	us	
OEV to Driver output delay time	$T_{oe}$	-	-	900	ns	
Horizontal lines per field	$T_v$	512	525	610	Line	
Vertical display timing range	$T_{vd}$	-	480	-	Line	

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3.3.2 Timing Diagram

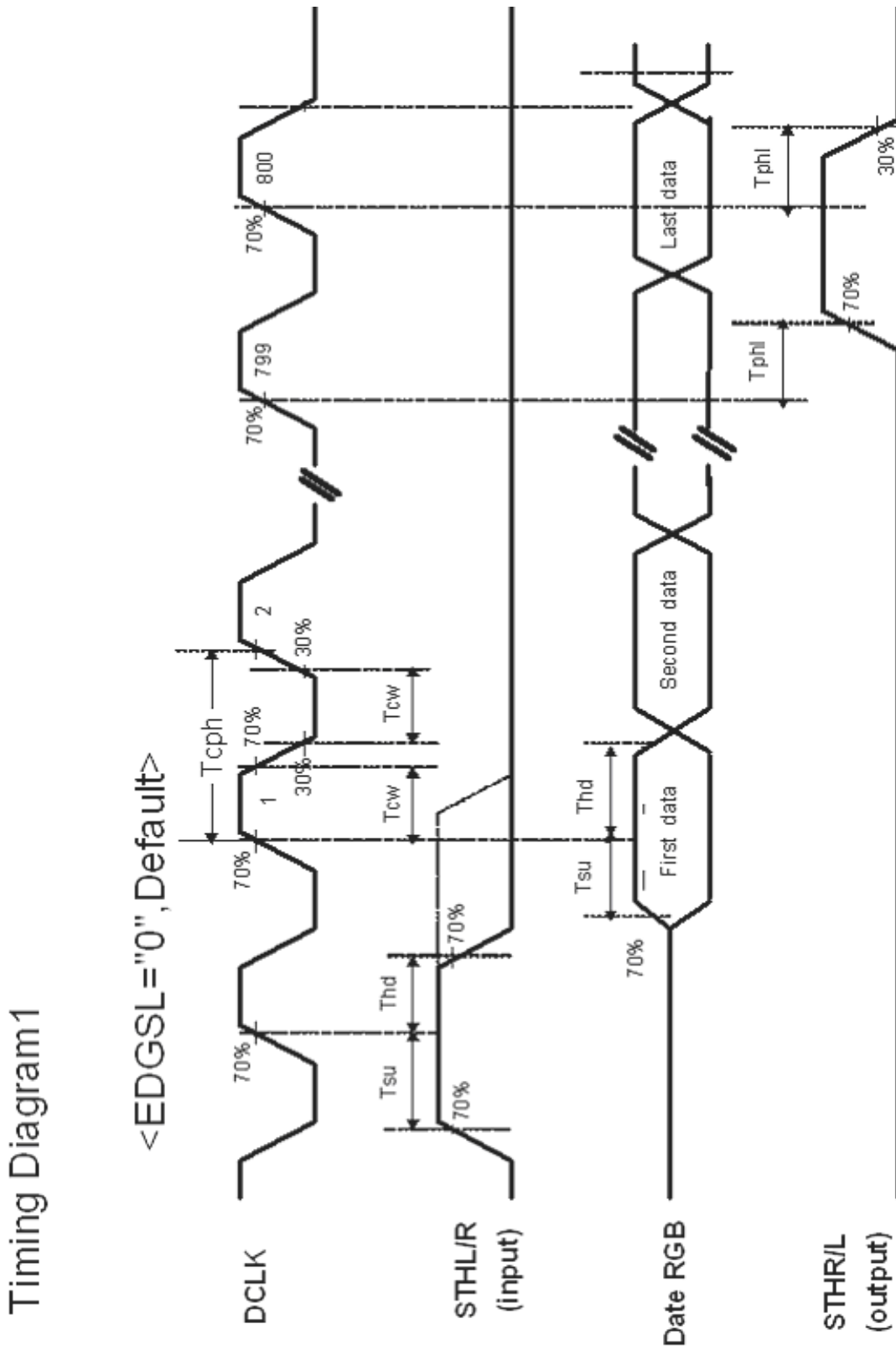


Fig.3-1 operation model 1

































