Version	Draft A
Total pages	16
Date	8. Dec, 2005

Product Specification

7.0″ Color TFT-LCD module

MODEL NAME: C070VW02 V0

(◆) Draft Specification

( ) Preliminary Specification

( ) Final Specification

Note: The content of this specification is subject to change.

Record of Revision

Version	Revise Date	Page	Content
0.0	8.Dec,2005		Draft specification

Contents

A. Summary

The AUO Color amorphous silicon Thin Film Transistor LCD module is an active matrix Liquid Crystal Display produced by making the most of AUO's expertise in Flat Panel Display technologies having a 16:9 aspect ratio which main application is Navigation HMI segment of automotive field.

B. Features

- 16:9 aspect ratio suitable in wide-screen systems.
- The 7.0" produces a higher resolution image that is composed of 384,000 pixel elements.
- Wide viewing angle technology is employed. The most suitable viewing direction is in the 6 o'clock direction.
- High contrast is realized by adopting Super Wide View technology.
- A robust module is accomplished through the use of COG mounting technology.
- Wide range of options input format by PCB design
- TN-normally white mode.
- High power LEDs backlight with Mercury-free solution

C. Physical specifications

NO.	Item	Specification	Remark
1	Display resolution(dot)	800 (W)×RGBx480 (H)	
2	Active area(mm)	152.4W)×91.44(H)	
3	Screen size(inch)	7.0"(Diagonal)	
4	Display Mode	Normally White	
5	Pixel pitch(mm)	0.0635(W)xRGB×0.1905 (H)	
6	Color configuration	R. G. B. stripe	
7	Overall dimension(mm)	165.0(W)×104.0(H)×5.5(D)	
8	Weight(g)	TBD	
9	Surface treatment	AG(25% haze) & with SWV film	
10	Backlight unit	High power LEDs	

D. Electrical specifications

1. Pin assignment

a. TFT-LCD panel driving section

Connector type: FH12-50S-0.5SH or compatible

Pin no	Symbol	I/O	Description	Remark
1	GND	P	Ground for gate drive	
2	VCC	P	Digital voltage for gate driver	
3	VGL	P	TFT low voltage	
4	VGH	P	TFT high voltage	
5	STVL	I/O	Start pulse signal input/output (Vertical)	
6	STVR	I/o	Start pulse signal input/output (Vertical)	
7	CKV	I	CLK (Vertical)	
8	U/D	I	Up or Down display control	
9	OEV	I	Output enable	
10	VCOM	I	VCOM voltage	
11	DIO1	I/O	Start pulse signal input/output (Horizontal)	
12	AVDD	P	Analog voltage for source driver	
13	AVSS	P	Analog ground for source driver	
14	GND	P	Digital ground for source driver	
15	VCC (DVDD)	P	Digital voltage for source driver	
16	EDGSL	I	Select raising edge or raising/falling edge	
17	CLK	I	Sample CLK	
18	SHL(R/L)	I	Right or Left display control	
19	R0	I	Red data	
20	R1	I	Red data	
21	R2	I	Red data	
22	R3	I	Red data	
23	R4	I	Red data	
24	R5	I	Red data	
25	G0	I	Green Data	
26	G1	I	Green Data	
27	G2	I	Green Data	
28	G3	I	Green Data	
29	G4	I	Green Data	
30	G5	I	Green Data	
31	V1	I	Reference voltage	
32	V2	I	Reference voltage	
33	V3	I	Reference voltage	
34	V4	I	Reference voltage	
35	V5	I	Reference voltage	

36	V6	I	Reference voltage	
37	V7	I	Reference voltage	
38	V8	I	Reference voltage	
39	V9	I	Reference voltage	
40	V10	I	Reference voltage	
41	B0	I	Blue Data	
42	B1	I	Blue Data	
43	B2	I	Blue Data	
44	B3	I	Blue Data	
45	B4	I	Blue Data	
46	B5	I	Blue Data	
47	LD (OEH)	I	Latch and switch data to output	
48	REV	I	Control data are inverted or not	
49	POL	I	Polarity selection	
50	DIO2	I/O	Start pulse signal input/output (Horizontal)	

I：Input．O：Output．VI：voltage input．VO：voltage output．P：Power．

b. Backlight driving section

Connector type: TBD

No.	Symbol	I/O	Description	Remark
1	HI	I	Power supply for backlight unit (High voltage)	--
2	GND	-	Ground for backlight unit	--

2. Absolute maximum ratings

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	Vcc	-0.3		5	V
	AVDD	-0.5		12	V
	VGH	-0.3		18	V
	VGL	-15		0.3	V
	VGH-VGL			33	V
Input Signal Voltage	Vi	-0.3		Vcc+0.3	V
	Vref(V1~V5)	0.4AVDD		AVDD+0.3	V
	Vref(V6~V10)	-0.3		0.6AVDD	V
	VCOM		4.6		V
Operating Temperature	Topa	-30		85	℃
	Tsurface	-10		60	℃
Storage Temperature	Tstg	-40		85	℃
LED	Vf		15	TBD	V
	If		150	200	mA

3. Electrical characteristics

a. Typical operating conditions

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	VCC	3.0	3.3	3.6	V
	AVDD	10.3	10.4	10.5	V
	VGH	14.0	15.0	16.0	V
	VCOM		4.6		V
	VGL	-6.5	-7	-7.5	V
Input Reference Voltage	V1~V5	0.4AVDD	—	AVDD-0.2	V
	V6~V10	0.2	—	0.6AVDD	V
Input H/L levelVoltage	VIH	0.8VCC	—	VCC	V
	VIL	0	—	0.2VCC	V

(All value should be measured under the condition of GND=AVss=0V)

b. Current consumption

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current For Driver	IGH	VGH=15V		100	150	uA
	IGL	VGL=-7V		-100	-150	uA
	ICC	VCC=3.3V		3.5	5	mA
	IDD	AVDD=10.4V		20	30	mA

c. LED Backlight driving conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Voltage	Vf			15	TBD	Vrms
Current	If			150	200	mA
LED life time		Note 2	TBD	-		Hrs

Note 1: Panel surface temperature should be kept less than content of “D.2. Absolute maximum ratings"

Note 2:The ”LEd life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃, I_L=150mA

d. AC Timing Conditions

Characteristics (VCC=3.3V, AVDD=10.4V, AVSS=GND=0V, TA=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	Fclk		40	42	MHz
CLK pulse width	TCW	8			ns
Data set-up time	Tsu	4			ns
Data hold time	Thd	2			ns
Propagation delay of DIO2/1	Tphl	6	10	15	ns
Time that the last data to LD	Tld	1			Tcw
Pulse width of LD	Twld	2			Tcw
Time that LD to DIO1/2	Tlds	5			Tcw
POL set-up time	Tpsu	6			ns
POL hold time	Tphd	6			ns
OEV pulse width	TOEV		12		Tcw
CKV pulse width	TCKV	16	28	40	Tcw
Horizontal display start	TSH		0		Tcw/3
Horizontal display timing range	TDH		800		Tcw/3
STV setup time	TSUV	400			ns
STV hold time	THDV	400			ns
STV pulse width	TSTV			1	TDH
Horizontal lines per field	TV	512	525	610	TDH
Vertical display start	TSV		3		TDH
Vertical display timing range	TDV		480		TDH

e. DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	Vcc	2.7	3.3	3.6	V
Low Level Input Voltage	Vil	0	-	0.3*Vcc	V
High Level Input Voltage	Vih	0.7*Vcc	-	Vcc	V
High Level Output Voltage	Voh	Vcc-0.4	-	-	V
Low Level Output Voltage	Vol	GND	-	GND+0.4	V
Supply Voltage	AVDD	10.3	10.4	10.5	V
Sinking Current of Outputs	IOL	|-80|	-	-	uA
Driving Current of Outputs	IOH	80	-	-	uA

Note 1: Due to panel is a passive component and no leakage current request for better performance, it's may need extra circuit to make sure the TFT LCD panel storage capacitor's shorter discharge time when system power off. Customers should study the discharge circuit according themselves system design.

f. Timing diagrams:

■ Timing Diagram 1 (CHNSL="1" , Default)

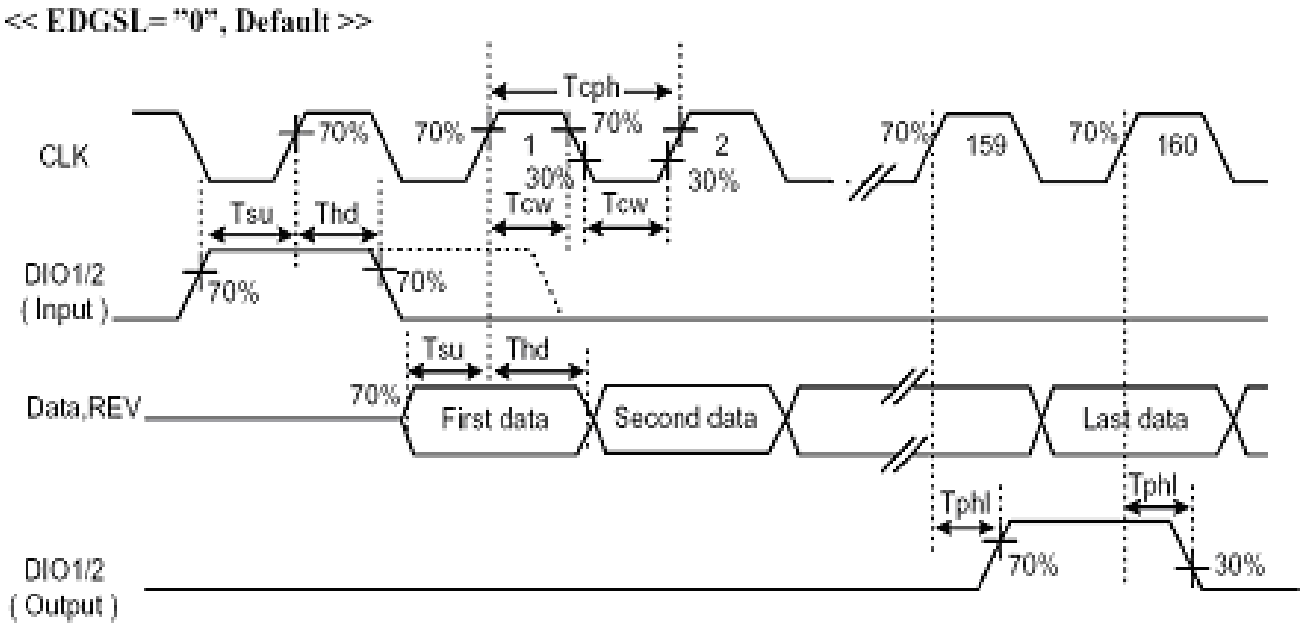


Figure 1 **Operation Mode 1**

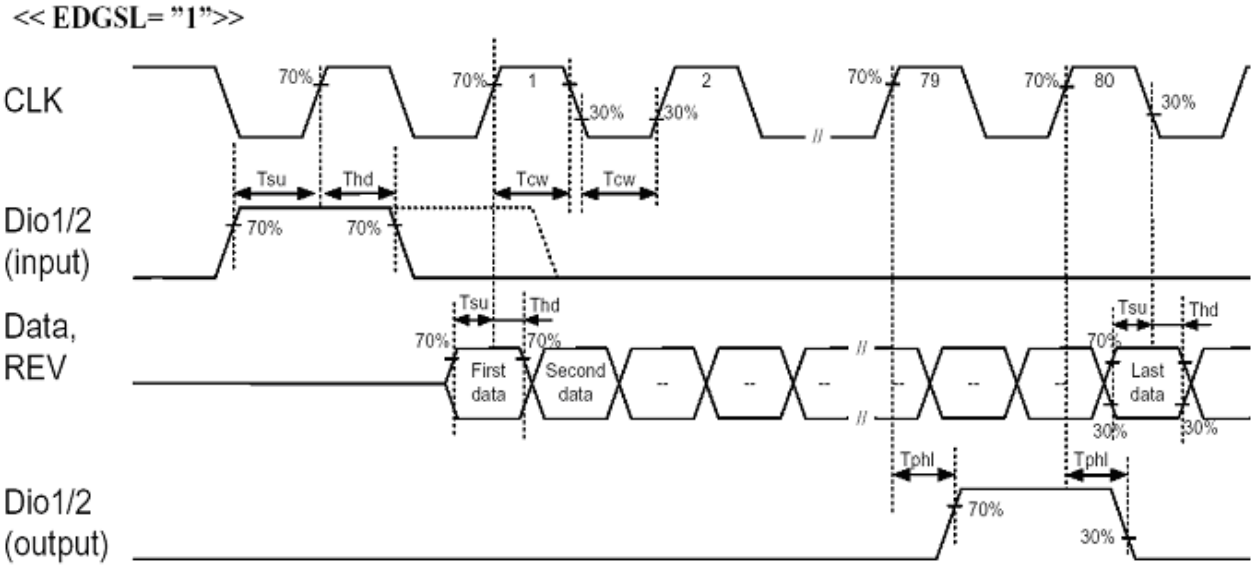


Figure 2 **Operation Mode 1**

■ **Timing Diagram 2**

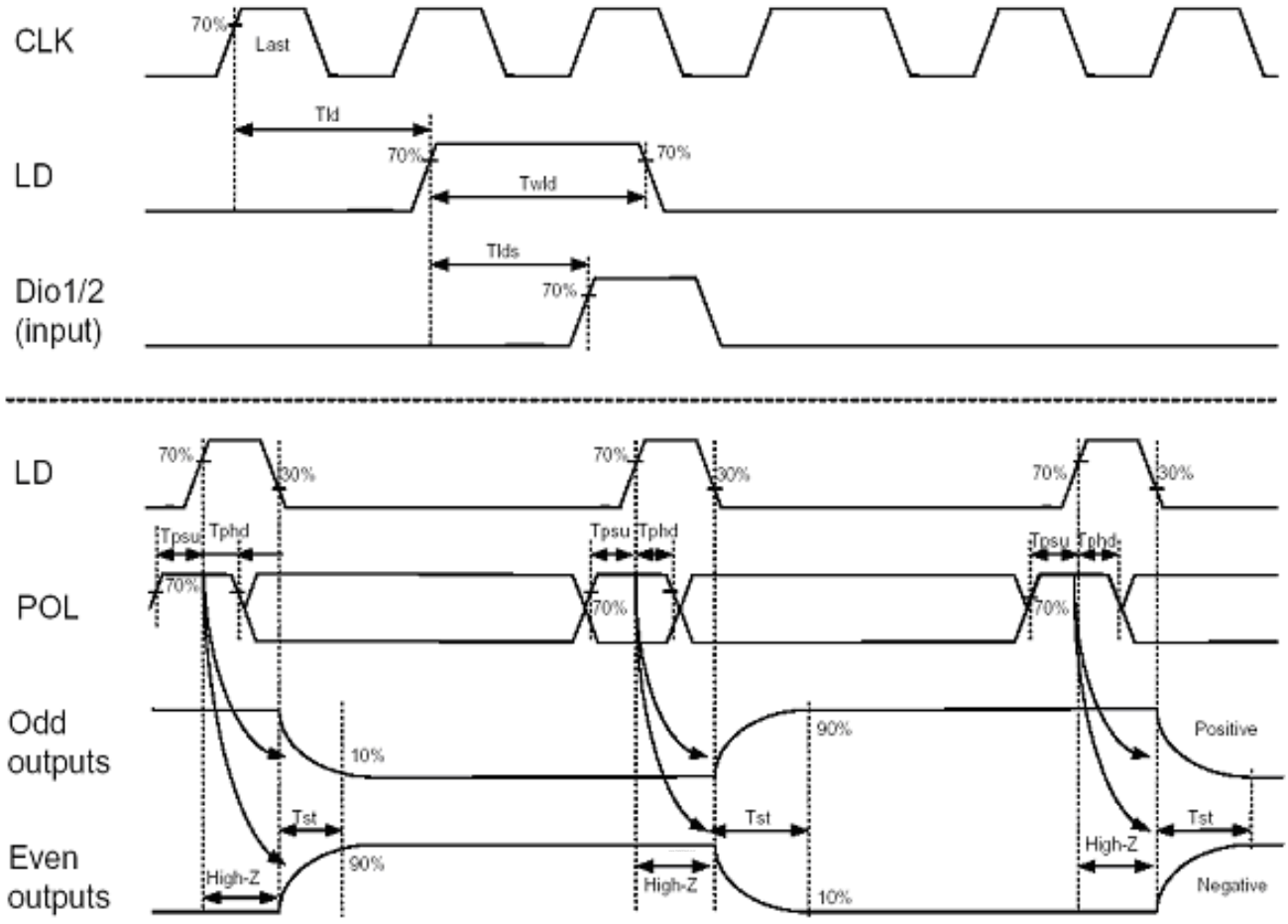


Figure 3 **Horizontal timing**

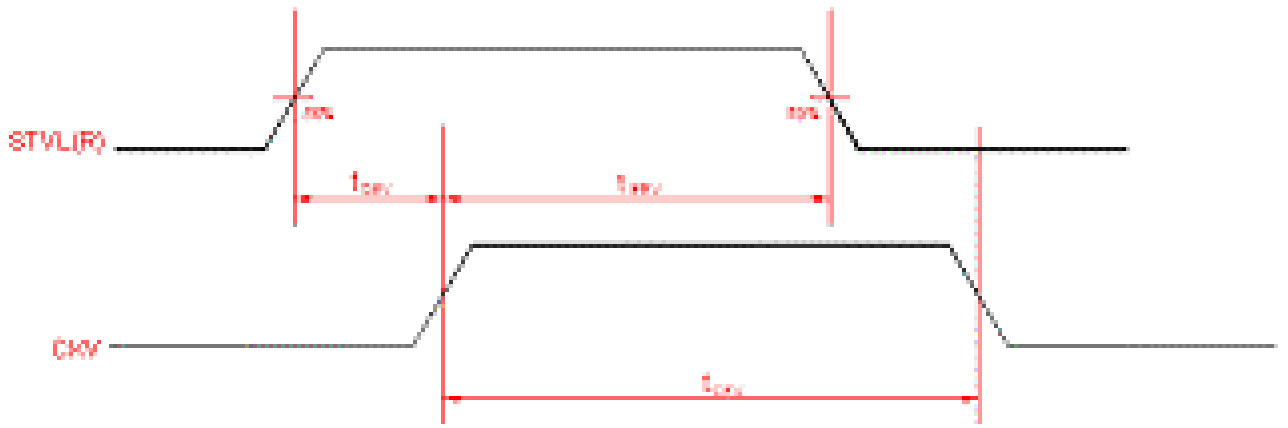


Figure 4 Vertical shift clock timing

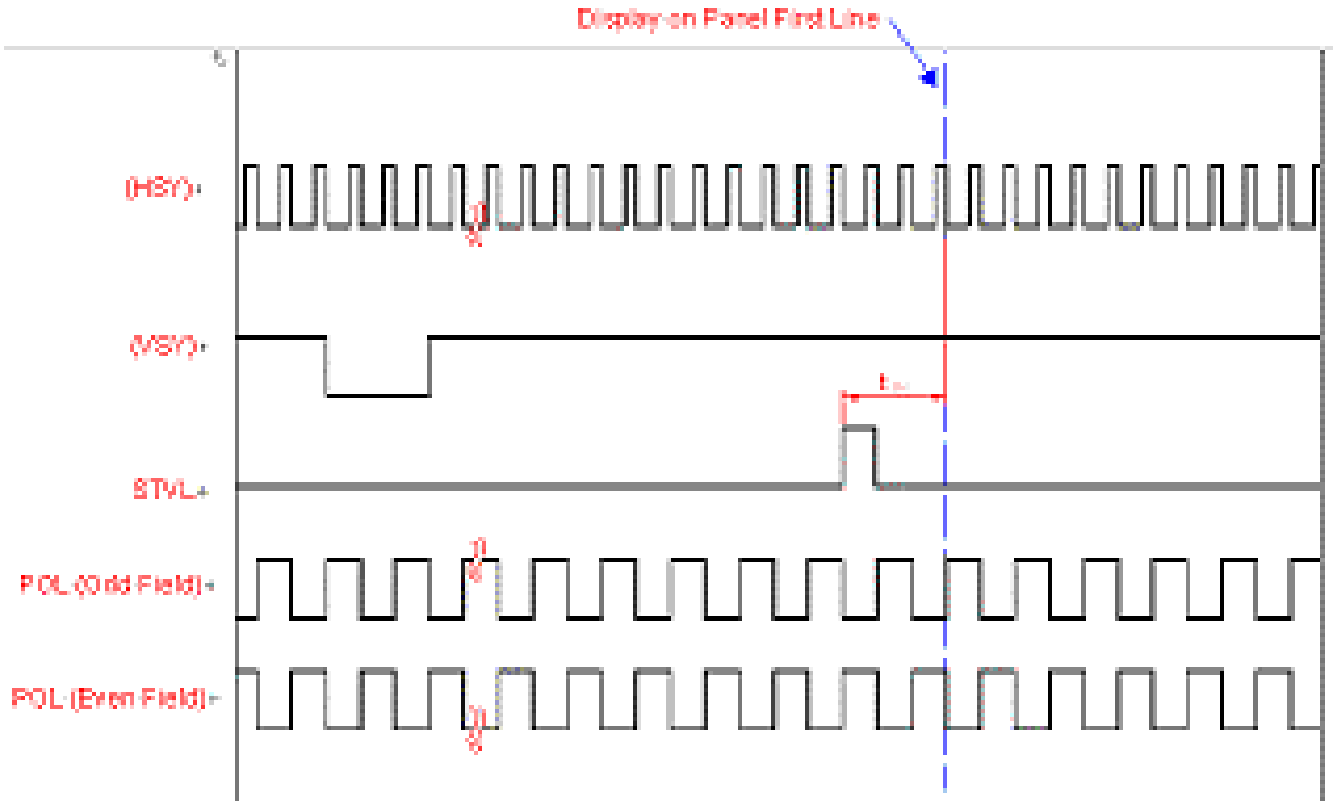


Figure 5 Vertical timing (from up to down)

E. Optical specifications

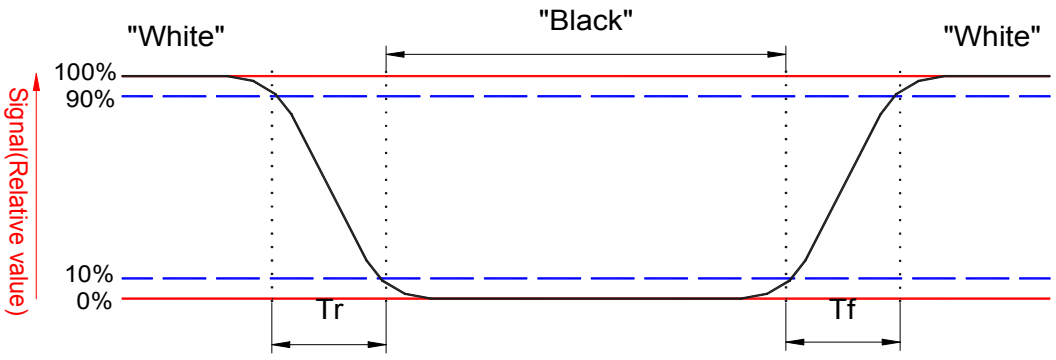
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Rise Fall	Tr Tf	θ =0°	- -	TBD TBD		ms ms	Note 3,5
Contrast ratio		CR	At optimized Viewing angle	200	300	-		Note 4, 5
Viewing angle	Top Bottom Left Right		CR≧10	TBD		- - - -	deg.	Note 5
Viewing angle	Top Bottom Left Right		CR≧5	TBD		- - - -	deg.	Note 5
Brightness		Y_L	I_L=150mA, 25℃	300	400	-	nit	Note 6
White chromaticity		x	θ =0°		TBD			Note 6
		y	θ =0°		TBD			

Note 1 : Ambient temperature =25℃, and lamp current I_L = 150 mA. To be measured in the dark room.

Note 2 :To be measured on the center area of panel with a viewing cone of 1°by Topcon luminance meter BM-5A, after 10 minutes operation.

Note 3. Definition of response time:

The response time is defined as the time interval between the 10% and 90% of amplitudes. The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time).



Note 4. Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at “White” state}}{\text{Photo detector output when LCD is at “Black” state}}$$

Note 5. White $Vi=V_{i50} + 1.5V$

Black $Vi=V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with V_{COM} signal.

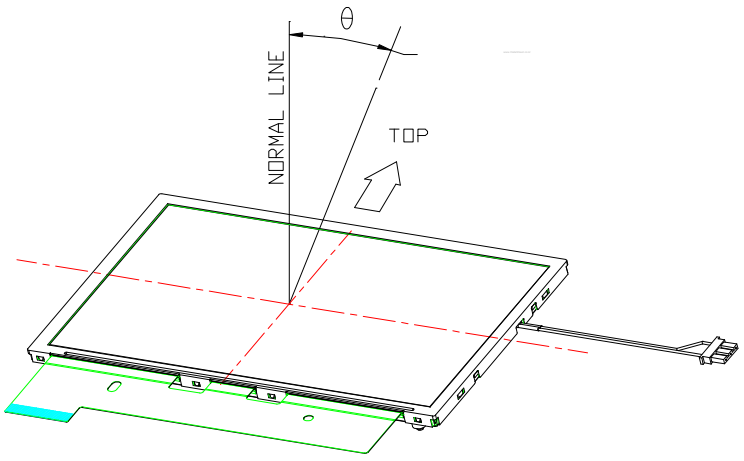
“ ” means that the analog input signal swings out of phase with V_{COM} signal.

V_{i50} : The analog input voltage when transmission is 50%

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 7. Definition of viewing angle, Refer to figure as below.



Note 8. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

F. Reliability test items

No.	Test items	Conditions	Remark
1	High temperature storage	Ta= 85℃ 240Hrs	
2	Low temperature storage	Ta= -40℃ 240Hrs	
3	High temperature operation	Ta= 85℃ 240Hrs	
4	Low temperature operation	Ta= -30℃ 240Hrs	
5	High temperature and high humidity	Ta= 60℃, 90% RH 240Hrs	Operation
6	Heat shock	-30℃~85℃/100 cycles 1Hrs/cycle	Non-operation
7	Electrostatic discharge	±200V,200pF(0Ω), once for each terminal	Non-operation
8	Vibration	Frequency range : 10~55Hz Stoke : 1.5mm Sweep : 10 ~ 55 ~ 10Hz 2 hours for each direction of X,Y,Z (6 hours for total)	
9	Mechanical shock	100G, 6ms, ±X,±Y,±Z 3 times for each direction	
10	Vibration (with carton)	Random vibration: 015G^2/Hz from 5~200Hz –6dB/octave from 200~500Hz	
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	

Note 1: Ta: Ambient temperature.

Note 2: In the standard conditions, there is not display function failure issue occurred. All the cosmetic specification is judged before the reliability stress.

G. Outline dimension

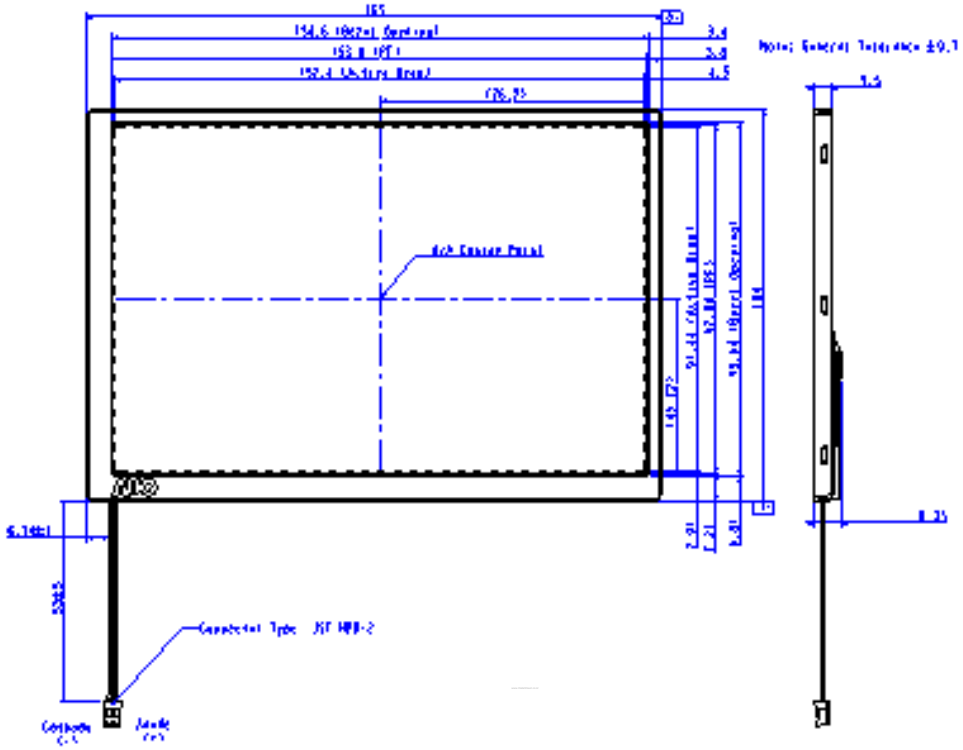


Figure 6 : Front view

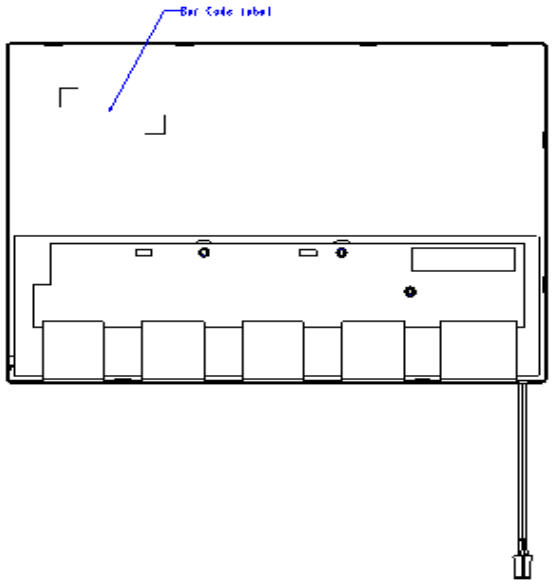


Figure 7 : Back View

H. Packing form

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I. Application notes

1. Input data timing

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2. Typical application circuit

Gamma circuit:

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3. Power On/Off sequence

Panel Gate IC is a high-voltage LCD driver, so it may be damaged by a large current flow if an incorrect power sequence is used. Connecting the drive powers, VGL & VGH, after the logical power, VCC, is the recommended sequence. When shutting off the power, shut off the drive power and then the logic system or turn off all powers simultaneously.