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# Product Specification

## 7" COLOR TFT-LCD MODULE

**MODEL NAME: C070VW02 V1**

< >Preliminary Specification

< ◆ >Final Specification

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

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## A. General Description

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 15:9 aspect ratio which main application is Navigation segment of automotive field.

## B. Features

- 500nit high brightness that is suitable for Touch Sensor attached.
- 15:9 aspect ratio suitable in wide-screen systems.
- High resolution image composed of 384,000 pixel elements.
- Wide viewing angle film employed.
- PCB design with TCON circuit
- 6bits TTL signal input
- High power LED backlight with Mercury-free solution

### C. Physical Specifications

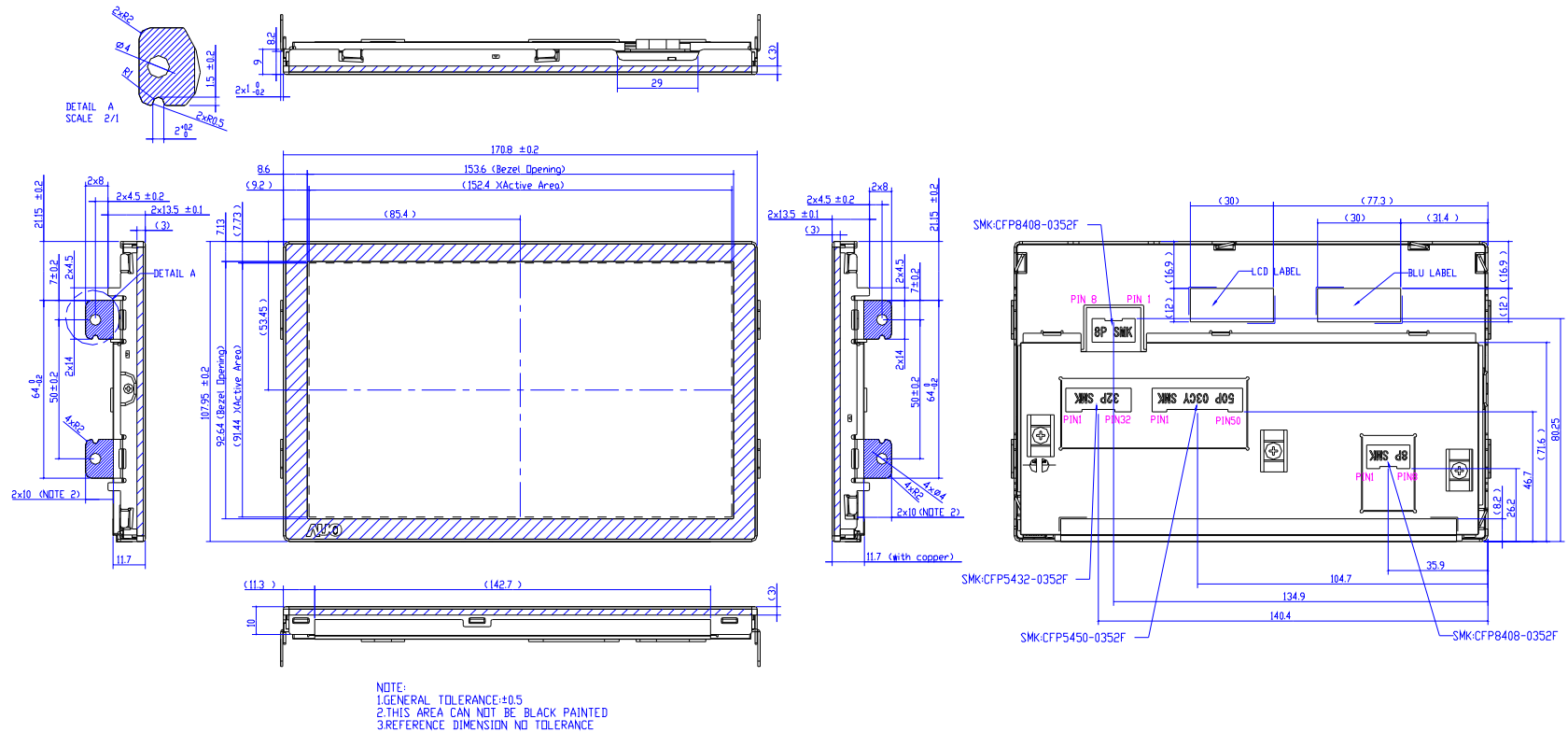
NO.	Item	Unit	Specification	Remark
1	Display resolution(dot)	dot	800 RGB (H)×480(V)	
2	Active area(mm)	mm	152.4(H)×91.44(V)	
3	Screen size(inch)	inch	7(Diagonal)	
4	Display Mode	--	Normally White(TN)	
5	Pixel pitch(mm)	mm	0.0635xRGB(W)×0.1905(H)	
6	Color configuration	--	RGB stripe	
7	Overall dimension(mm)	mm	170.8(H) ×107.95(V) ×11.6(T)	
8	Weight(g)	g	300+/-10%	
9	Surface treatment	--	AG(40% Haze), Hard coating : 3H	
10	Backlight unit		LED	



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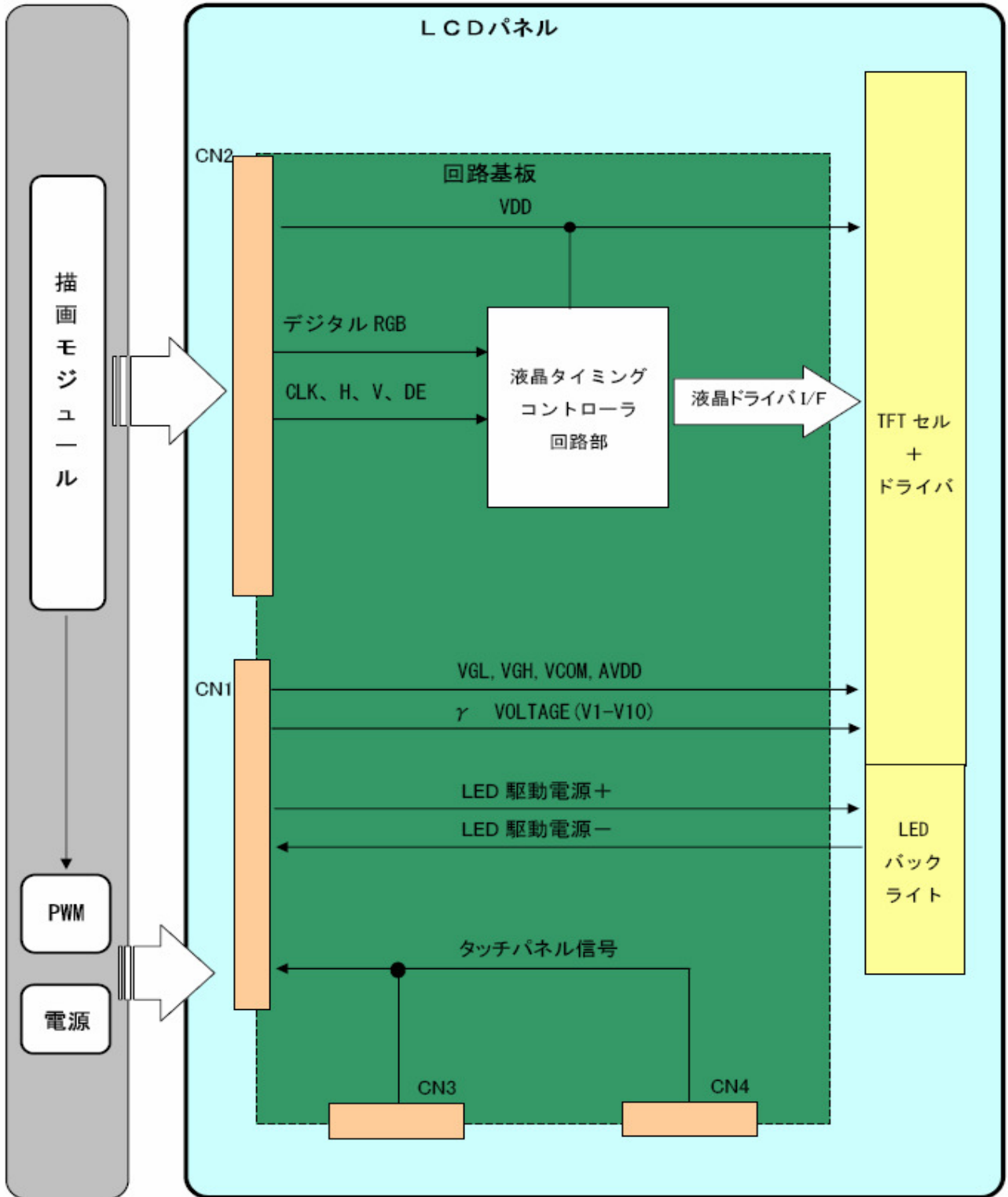
### D. Outline Dimension



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## E. Electrical Specifications

### 1. Block Diagram



## 2. Pin Assignment

### 1) CN 1 Signal Description

Item	Signal Details	I/O	Remark
Power	DC -7, 15, 9.9V	P	
VCOM	DC4.2V	I	
LED driver	LED driver power +/-	I/O	
Gamma	V1~V10	I	

### 2) CN1 Pin Assignment

Connector type : CFP-5432-0352F (SMK)

Pin no	Symbol	I/O	Description
1	NC	-	NC
2	NC	-	NC
3	Y2	-	Y coordinate signal 2, connect to pin7, 8 of CN3, 4
4	X2	-	Y coordinate signal 1, connect to pin5, 6 of CN3, 4
5	Y1	-	X coordinate signal 2, connect to pin3, 4 of CN3, 4
6	X1	-	X coordinate signal 1, connect to pin1, 2 of CN3, 4
7	NC	-	NC
8	L04	O	LED driver power -
9	L03	O	LED driver power -
10	L02	O	LED driver power -
11	L01	O	LED driver power -
12	NC	-	NC
13	HI	I	LED driver power +
14	NC	-	NC
15	V10	I	Reference voltage
16	V9	I	Reference voltage
17	V8	I	Reference voltage
18	V7	I	Reference voltage
19	V6	I	Reference voltage
20	V5	I	Reference voltage
21	V4	I	Reference voltage
22	V3	I	Reference voltage
23	V2	I	Reference voltage
24	V1	I	Reference voltage
25	AVDD	P	Analog voltage for source driver
26	AVDD	P	Analog voltage for source driver
27	AVSS	P	GND
28	AVSS	P	GND
29	VCOM	I	Common voltage (4.2V)
30	VCOM	I	Common voltage (4.2V)
31	VGH	I	TFT high voltage
32	VGL	I	TFT low voltage

### 3) CN2 Signal Description

Item	Signal Details	I/O	Remark
Power	DC 3.3V	P	
GND	GND	I	
Video signal	Digital R.G.B	I/O	
Sync signal	DCLK, Enable, HS/VS	I	



#### 4) CN2 Pin Assignment

Connector type : CFP450-0352F (SMK)

Pin no	Symbol	I/O	Description
1	VSS	P	GND
2	VSS	P	GND
3	VSS	P	GND
4	VSS	P	GND
5	VSS	P	GND
6	VSS	P	GND
7	VSS	P	GND
8	DCLK	I	Sampling Clock
9	VSS	P	GND
10	VSS	P	GND
11	R/L	I	Right or Left display control
12	R0	I	Red Data
13	R1	I	Red Data
14	R2	I	Red Data
15	VSS	P	GND
16	R3	I	Red Data
17	R4	I	Red Data
18	R5	I	Red Data
19	VSS	P	GND
20	G0	I	Green Data
21	G1	I	Green Data
22	G2	I	Green Data
23	VSS	P	GND
24	G3	I	Green Data
25	G4	I	Green Data
26	G5	I	Green Data
27	VSS	P	GND
28	B0	I	Blue Data
29	B1	I	Blue Data
30	B2	I	Blue Data
31	VSS	P	GND
32	B3	I	Blue Data
33	B4	I	Blue Data
34	B5	I	Blue Data
35	VSS	P	GND
36	U/D	I	Up or Down display control
37	VSS	P	GND
38	HS	I	Horizontal SYNC
39	VSS	P	GND
40	DE	I	Data Enable
41	VS	I	Vertical SYNC
42	VDD	P	DC3.3V
43	VDD	P	DC3.3V
44	VDD	P	DC3.3V
45	VDD	P	DC3.3V
46	NC	-	NC
47	VSS	P	GND
48	VSS	P	GND
49	VSS	P	GND
50	VSS	P	GND

### 5) CN3, 4 Pin Assignment

Connector type : CFP8408-0352F (SMK)

Pin no	Symbol	I/O	Description
1	X1	-	X coordinate signal 1, connect to pin27 of CN1
2	X1	-	X coordinate signal 1, connect to pin27 of CN1
3	Y1	-	Y coordinate signal 1, connect to pin28 of CN1
4	Y1	-	Y coordinate signal 1, connect to pin28 of CN1
5	X2	-	X coordinate signal 2, connect to pin29 of CN1
6	X2	-	X coordinate signal 2, connect to pin29 of CN1
7	Y2	-	Y coordinate signal 2, connect to pin30 of CN1
8	Y2	-	Y coordinate signal 2, connect to pin30 of CN1

### 3. Absolute Maximum Ratings

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	VDD	-0.3		3.6	V
	AVDD	-0.5		12	
	VGH	-0.3		18	
	VGL	-15		0.3	
	VGHVGL			33	
Input Signal Voltage	Vi	-0.3		VDD+0.3	V
	Vref(V1 ~V5)	0.4AVDD		AVDD+0.3	V
	Vref(V6 ~V10)	-0.3		0.6AVDD	V
	VCOM	-0.3		7	V
Operating frequency	DCLK	25	—	40	MHz
Operating Temperature	Topr	-40		85	°C
Storage Temperature	Tstg	-40		95	°C
LED Backlight	If			480	mA

### 4. Electrical Characteristics

The following items are measured under the condition : GND=VSS=0V

#### a. TFT- LCD Panel

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	VDD	3.0	3.3	3.6	V
	AVDD	9.7	9.8	9.9	V
	VGH	14.3	15	15.7	V
	VGL	-7.4	-7	-6.6	V
Current	IVDD			80	mA
	IAVDD			30	mA
	IVGH			150	uA
	IVGL			150	uA
Input Signal Voltage	V1~V5	0.4AVDD	—	AVDD-0.1	V
	V6~V10	0.1	—	0.6AVDD	V
	VCOM	4.0	4.2	4.4	V
Input H/L level Voltage	VIH	0.8VDD	—	VDD	V
	VIL	0	—	0.2VDD	V

### b. Backlight Driving Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Voltage	Vf		12.8	14	15.2	V
Voltage difference	$\Delta V_f$				1.0	V
Current	I <sub>f</sub>			320	400	mA
LED life time		Note 2	10,000	-		Hrs

Note 1: Panel surface temperature should be kept less than content of “E.3 Absolute maximum ratings”.

Note 2: The “Voltage difference” is defined as the difference in Vf of each string in backlight (4 strings) at Ta=25°C

Note 3: The “LED life time” is defined as the module brightness decrease to 50% of original brightness at Ta=25°C, I<sub>f</sub>=320mA, I<sub>f</sub> is total current for backlight (4 strings).

## 5. AC Timing

### a. DE mode

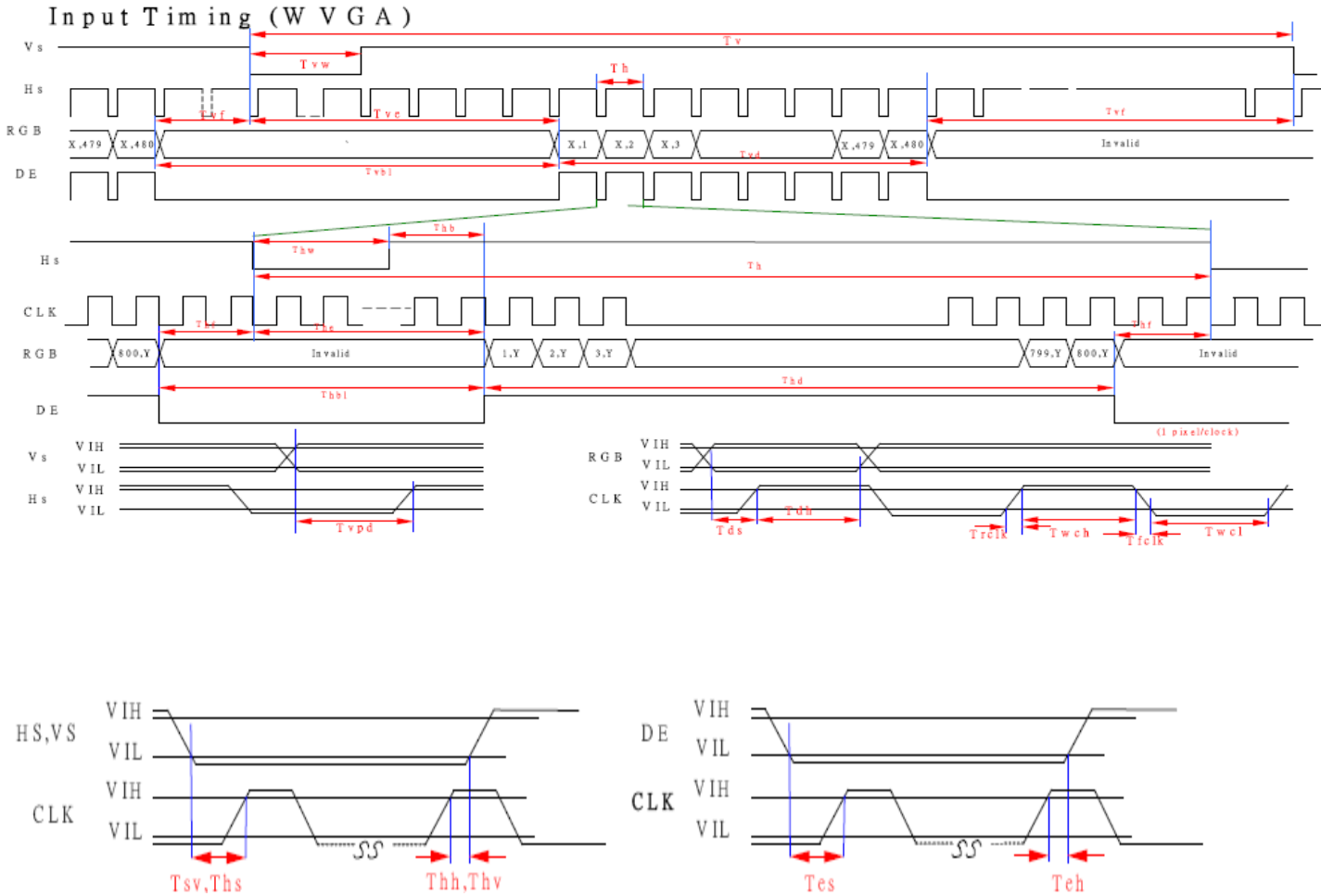
Item	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	Fck	20	33.3	42	MHz	
Clock High time	Twcl	8	—	—	ns	
Clock Low time	Twch	8	—	—	ns	
Clock rising time	Trclk	—	—	1	ns	
Clock falling time	Tfclk	—	—	1	ns	
Horizontal blanking	Thbl	95	128	280	Clk	
Vertical blanking	Tvbl	32	45	184	Th	
DE setup time	Tes	5	-	-	ns	
DE hold time	Teh	10	-	-	ns	

### b. HV mode

Item	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	Fck	20	33.3	42	MHZ	
Clock High time	Twcl	8	—	—	ns	
Clock Low time	Twch	8	—	—	ns	
Clock rising time	Trclk	—	—	1	ns	
Clock falling time	Tfclk	—	—	1	ns	
Hsync period	Th	895	1056	1088	Clk	
Hsync pulse width	Thw	4	-	81	Clk	
Hsync front porch	Thf	7	40	—	Clk	
Hsync back porch	Thb	7	60	84	Clk	
Hsync width + back porch	Thw +Thb	—	88	—	Clk	
Hsync blanking	Thbl	95	128	280	Clk	
Hsync setup time	Ths	5			ns	
Hsync hold time	Thh	10			ns	
Vsync period	Tv	512	525	610	Th	
Vsync pulse width	Tvw	1	3	—	Th	
Vsync front porch	Tvf	—	13	—	Th	
Vsync blanking	Tvbl	32	45	184	Th	
Hsync/Vsync phase shift	Tvpd	2	320	—	Clk	
Vsync setup time	Tsv	0			ns	
Vsync hold time	Thv	2			ns	
Data setup time	Tds	5			ns	
Data hold time	Tdh	10			ns	

Item	Symbol	Value	Unit	Description
Horizontal display start	The	88	Clk	After falling edge of Hsync, counting 88 clk, then getting valid data from 89 th clk's data.
Vertical display start	Tve	32	Th	After falling edge of Vsync, counting 32 Th, then getting 33 th Th's data.

### c. Timing Diagram



### F. Optical specifications

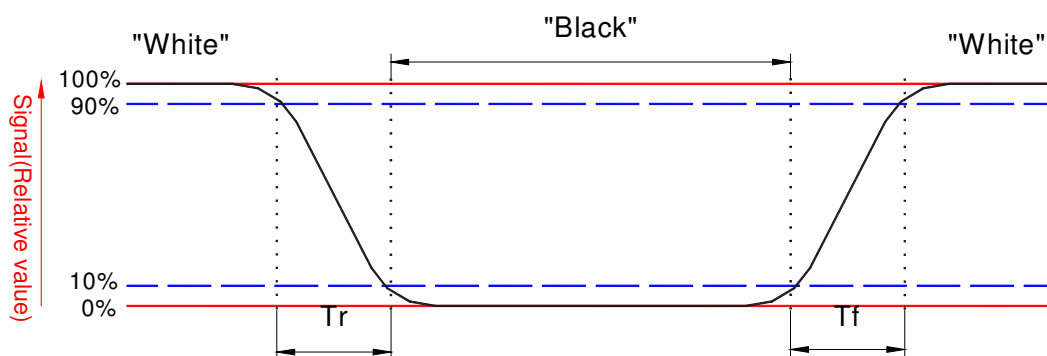
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Rise	Tr	$\theta = 0^\circ; 25^\circ\text{C}$	-	-	20	ms	Note 3
	Fall	Tf		-	-	30		
Contrast ratio		CR	At optimized Viewing angle	150	300	-		Note 4
Viewing angle	Top		$CR \geq 10$	30	40	-	deg.	Note 5
	Bottom			50	60	-		
	Left			50	60	-		
	Right			50	60	-		
Brightness	Perpendicular	$Y_L$	$I_f=80\text{mA}, 25^\circ\text{C}$	350	-	-	nit	Note 5
White chromaticity		$W_x$	$\theta = 0^\circ$	0.270	0.300	0.330		Note 5
		$W_y$	$\theta = 0^\circ$	0.300	0.330	0.360		

Note 1: Measurement should be performed in the dark room, ambient temperature  $=25^\circ\text{C}$ , and backlight current  $I_L=80\text{ mA}$

Note 2: To be measured on the center area of panel with a field angle of  $1^\circ$  by Topcon luminance meter BM-5A, after 30 minutes operation.

Note 3: Definition of response time:

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), respectively.



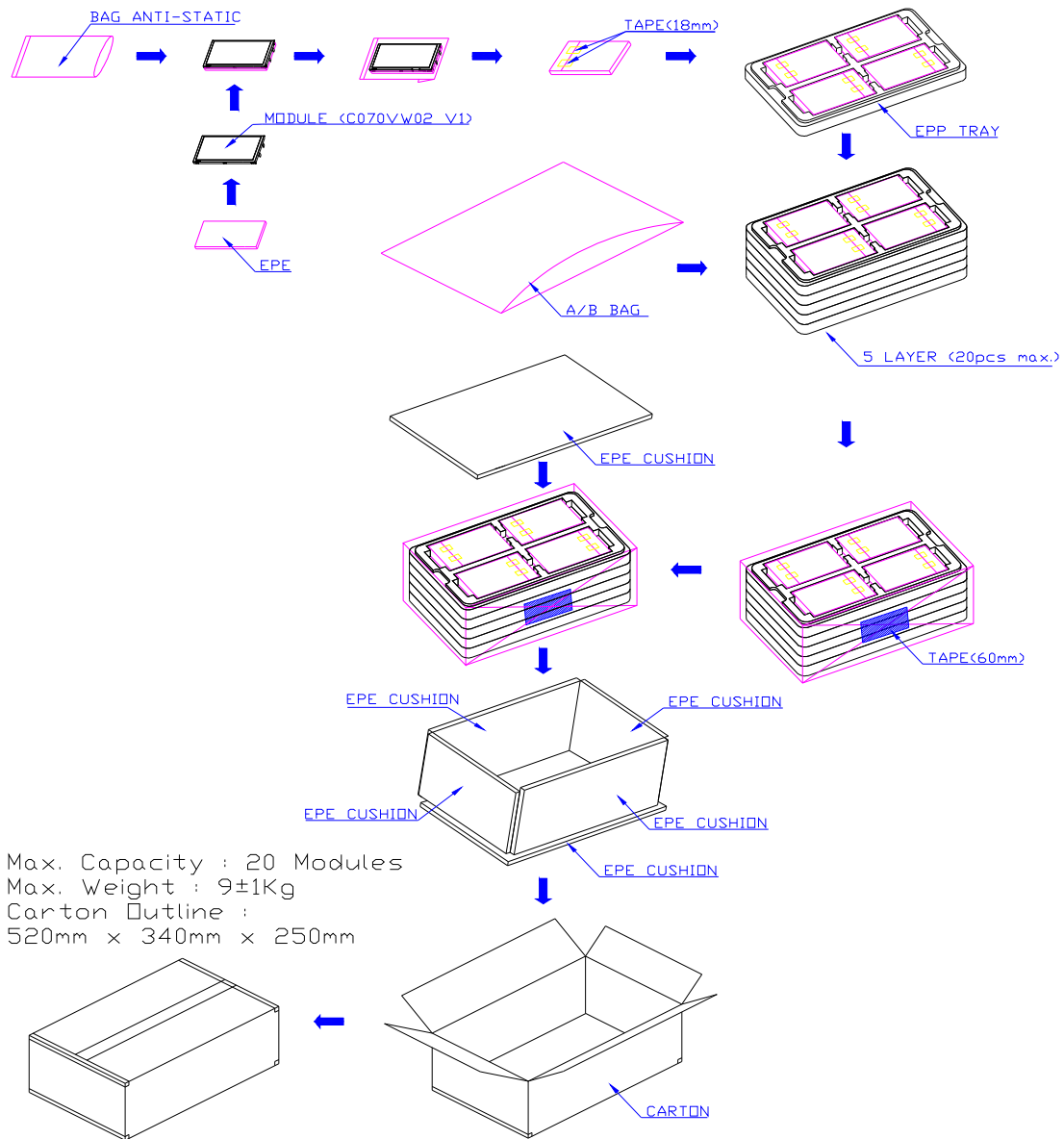
Note 4. Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 5. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

## G. Reliability Test Items

## H. Packing Form

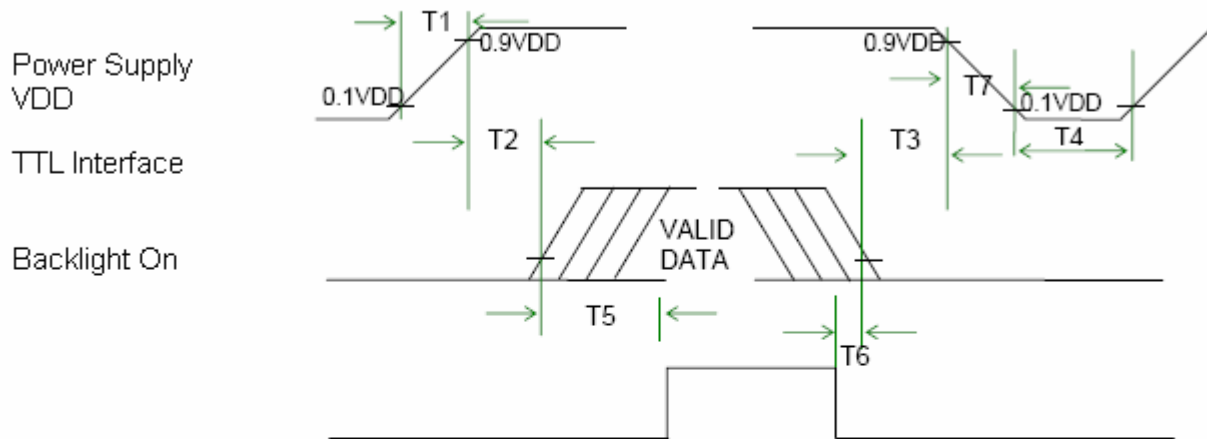


Pallet size: 1050x1050x135mm    Weigh: 13kg  
 Pallet (with Carton) size: 1050x1050x(250xn+135)mm , n=1~5

Packing Materials:  
 Anti-static Bag : LDPE  
 Tape: PP  
 Cushion: Corrugated Paper  
 Cover Plate: Corrugated Paper  
 Carton: Corrugated Paper  
 Carton Label: Paper

## I. Application Notes

### Power on/off Sequence



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	-	50	[ms]
T3	0	-	50	[ms]
T4	400	-	-	[ms]
T5	200	-	-	[ms]
T6	200	-	-	[ms]
T7	0	-	10	[ms]

**Recommended Values for Gamma Voltage**

	Red Curve	Blue Curve
AVDD	9.8	9.9
VCOM	4.2	4.5
V1	9.5	9.8
V2	8.23	8.51
V3	7.72	7.94
V4	7.35	7.58
V5	6.58	6.68
V6	3.9	4.28
V7	2.87	3.18
V8	2.42	2.74
V9	1.83	2.11
V10	0.4	0.7

