



## Product Specification

Customer: \_\_\_\_\_

Model Name:                     H10BWX31I4505                    

Date:                                     2023.06.26                                    

Version:                                     A0                                    

Preliminary Specification

Final Specification

### For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by





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## 1. OVERVIEW

**H101BWX31I4505** is a 10.1" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) OLB module(finish outer lead bonding) composed of LCD panel, driver ICs (the backlight is not included in this OLB module).

The 10.1" screen produces 800×RGB (3) ×1280 resolution image. By applying R.G.B. input signal, 16.7M color images are displayed.

### 1.1 LCD Specifications

ITEM	SPECIFICATION
Display Area (mm)	135.36(H)x216.58(V)
Number of Pixels	800(H) x 3(RGB) x 1280(V)
Pixel Pitch (um)	169.2 (H) x169.2(V)
Color Pixel Arrangement	RGB Vertical stripe
Display Mode	Normally Black
Number of Colors	16.7M
Response Time (ms)	30 (typ)
Optimum Viewing Direction	whole view
Contrast Ratio	1000(typ)
Viewing Angle ( CR $\geq$ 10)	80°/80° / 80°/80°(Typ)
Interface connection	MIPI
Driver IC	JD9365DA-H3
Surface Treatment	-

■ Compatible with ROHS Standard



## 2. ABSOLUTE MAXIMUM RATINGS

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Item	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage for I/O	VDDIO	-0.3	3.6	V	
Power Supply Voltage for	VDD	-0.3	3.6	V	
Positive Voltage	-	-	-	V	
Negative Voltage	-	-	-	V	

Note1 : If users use the product out off the environmental operation range ( temperature and humidity) , it will have visual quality concerns.

## 3. ELECTRICAL CHARACTERISTICS

### 3.1 TFT LCD Power Supply Voltage

(GND=VSSA=VSSD=0V)

Ta=25°C

I/O Operating Voltage	VDDIO	1.7	1.8/3.3	3.6	V	
Analog Operatiog Voltage	VDD	3.0	3.3	3.6	V	
Analog Operatiog Voltage	-	-	--	-	V	
Input Signal Voltage	VIH	0.7* VDD	--	VDD	V	
	VIL	GND	--	0.3* VDD	V	
Output Signal Voltage	VOH	0.8* VDD	--	VDD	V	
	VOL	GND	--	0.2* VDD	V	

### 3.2 TFT-LCD Current consumption

(GND=VSSA=VSSD=0V)

Ta=25°C

ITEM	SYMBOL	Condition	MIN	TYPE	MAX	UNIT	NOTE
Current For Driving	I <sub>VDD</sub>	VDDIO	-	26	36	mA	
	I <sub>VBAT_SYS</sub>	VDD		130	160	mA	
Total Power Consumption	PC		-		592	mW	Note1

Note1: Typ. specification : : Gray-level test Pattern

Max. specification : White test Pattern



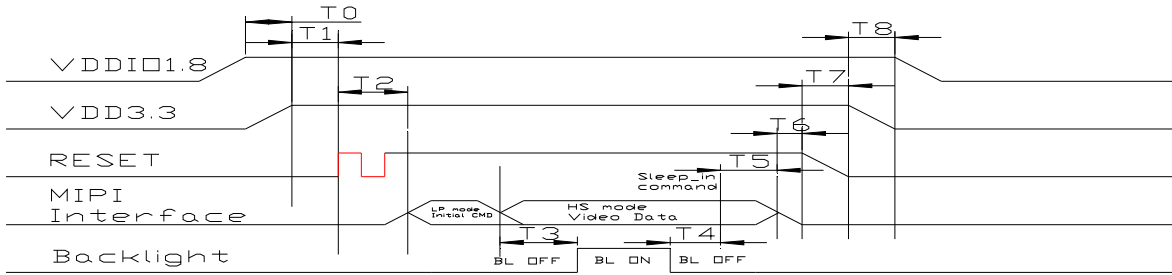
(a)Gray-level Pattern



(b)White Pattern



### 3.3 Power on/off sequence



Parameter	Min	Value		Unit	Remark
		Typ	Max		
T0				33000	
T1				33000	
T2				33000	
T3	100			33000	
T4	500			33000	
T5	100			33000	
T6				33000	
T7				33000	
T8				33000	

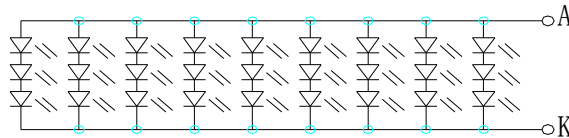
### 3.4 Backlight

Ta=25 °C

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25°C	--	180	--	mA	
LED voltage	VL	Ta=25°C	8.7	9.0	10.2	V	
Power consumption	WL	Ta=25°C	--	1.728	--	W	
LED Lifetime	-	Ta=25°C	--	15000	--	Hr	

**【Note】**

\*1)LED Circuit Diagram:



Backlight LED Circuit IF=180mA; Vf=9V

\*2) Calculator value for reference  $I_F \times V_F \times N = P_{LED}$

\*3) Life time means that estimated time to 50% degradation of initial luminous intensity.

\*4) In order to prevent module brightness or screen display unstable, LED shall be controlled under constant current.

## 4. INTERFACE CONNECTION

CN (Interface signal)

Connector type: FP0515-04000ZM or compatible

Pin No.	Pin Name	Description
1	LED+	Power supply for LED[Anode]
2	LED+	Power supply for LED[Anode]
3	LED+	Power supply for LED[Anode]
4	NC	No Connect
5	LED-	Power supply for LED[Cathode]
6	LED-	Power supply for LED[Cathode]
7	LED-	Power supply for LED[Cathode]
8	LED-	Power supply for LED[Cathode]
9	GND	Ground
10	GND	Ground
11	MIPI_2P	MIPI data positive signal(2P)
12	MIPI_2N	MIPI data negative signal(2N)
13	GND	Ground



14	MIPI_1P	MIPI data positive signal(1P)
15	MIPI_1N	MIPI data positive signal(1N)
16	GND	Ground
17	MIPI_CLKP	MIPI CLK positive signal(CLKP)
18	MIPI_CLKN	MIPI CLK positive signal(CLKN)
19	GND	Ground
20	MIPI_0P	MIPI data positive signal(0P)
21	MIPI_0N	MIPI data positive signal(0N)
22	GND	Ground
23	MIPI_3P	MIPI data positive signal(3P)
24	MIPI_3N	MIPI data positive signal(3N)
25	GND	Ground
26	NC	NC
27	RESET	Reset Pin (1.8V)
28	NC	NC
29	VDDIO	Logic power 1.8V
30	VDD	Logic power 3.3V
31	VDD	Logic power 3.3V
NOTE:1		
27	RESET	Reset Pin (H=1.8V)
29	VDDIO	Logic power(cannot to 1.8V)
NOTE:2		
27	RESET	Reset Pin (H=3.3V)
29	VDDIO	Logic power(cannot to 3.3V)

## 5. INTERFACE TIMING CHART

### 5.1 MIPI Interface Timing Sequence

#### (a) MIPI interface DC characteristic

##### DC characteristics for MIPI LP mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Logic 1 input voltage	$V_{IH}$	880	-	-	mV
Logic 0 input voltage	$V_{IL}$	0	-	550	mV
Logic 1 output voltage	$V_{OH}$	1.1	1.2	1.3	V
Logic 0 output voltage	$V_{OL}$	-50	-	50	mV

##### DC characteristics for MIPI HS mode

Parameter	Symbol	Min.	Spec.		Unit
			Typ.	Max.	
Common-mode voltage HS Receive mode	$V_{CMRXDC}$	70	-	330	mV
Differential input high threshold <sup>(1)</sup>	$V_{IDTH}$	-	-	70	mV
Differential input low threshold <sup>(1)</sup>	$V_{IDTL}$	-70	-	-	mV
Single-ended input high voltage	$V_{IHHS}$	-	-	460	mV
Single-ended input low voltage	$V_{ILHS}$	-40	-	-	mV
Differential input impedance	$Z_{ID}$	80	100	125	$\Omega$
HS transmit differential voltage (VDP-VDN)	VOD	140	200	270	mV

Note: (1) VIDTH and VIDTL only for reference, related to power and ground noise, this spec need to check on panel performance to fine tune

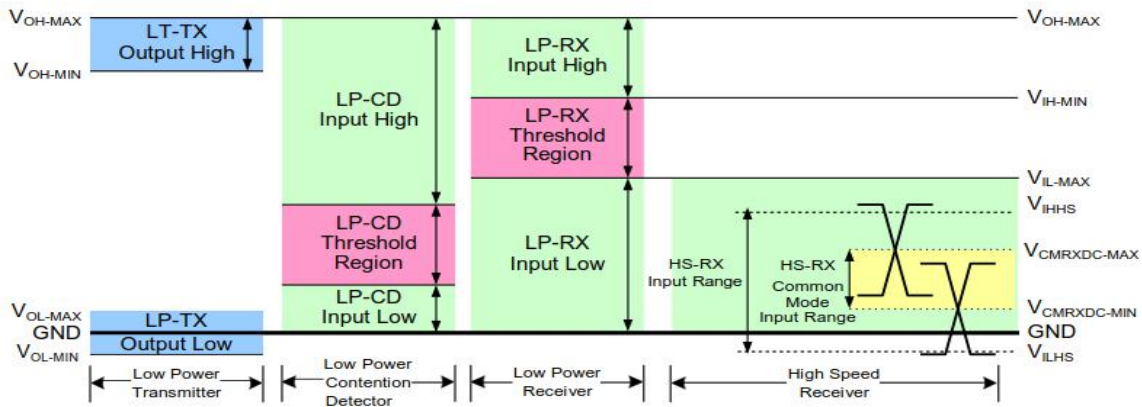


Figure. MIPI signaling and contention voltage levels

(b) MIPI interface AC characteristics

MIPI data-clock timing specification

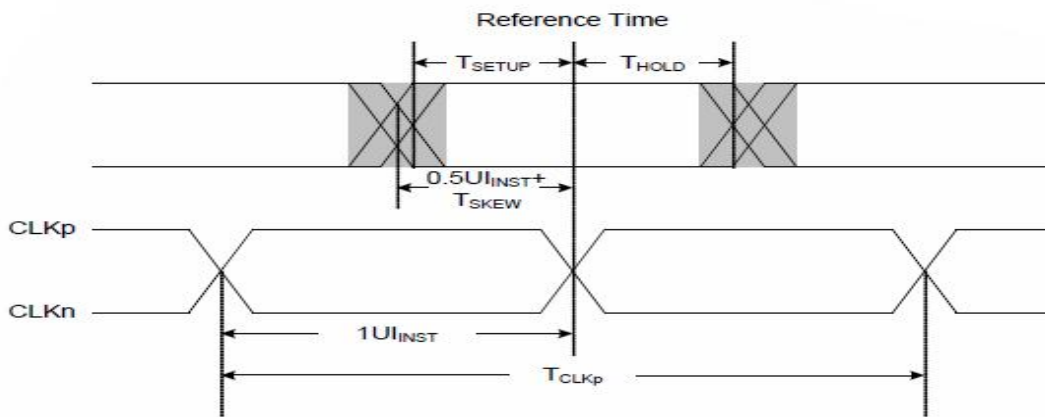


Figure 8.5 : Data to clock timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
UI instantaneous	$UI_{INST}$	1.0	-	12.5 <sup>(1)</sup>	ns
Data to clock setup time	$T_{SETUP}$	0.15 <sup>(2)</sup>	-	-	$UI_{INST}$
Data to clock hold time	$T_{HOLD}$	0.15 <sup>(2)</sup>	-	-	$UI_{INST}$

Note: (1) This value corresponds to a minimum 80 Mbps data rate.  
(2) Total SETUP and HOLD window for receiver of  $0.3 \cdot UI_{INST}$

5.2 Timing Chart

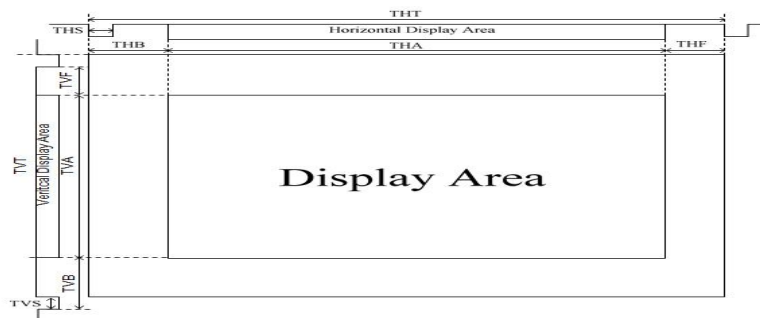
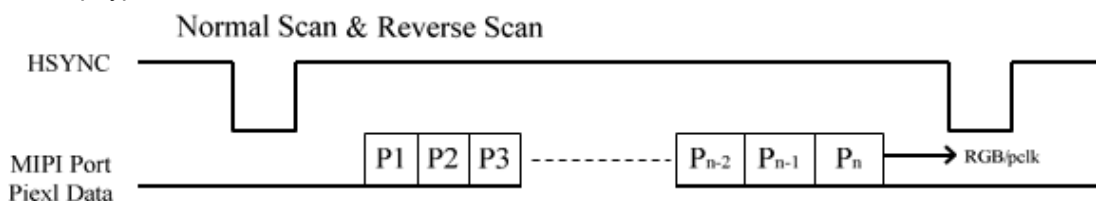


Figure: MIPI video input timing

MIPI Multi-Drop type when normal or reverse scan.

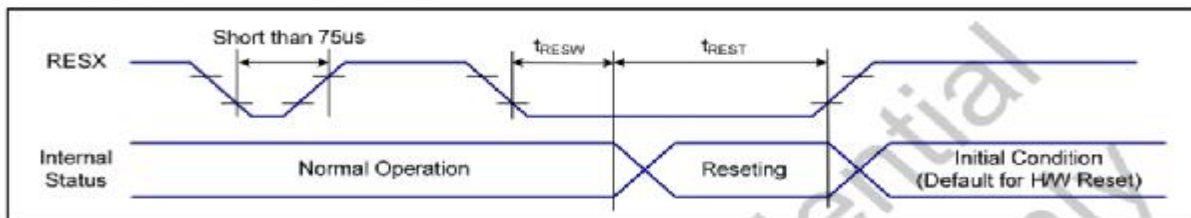




Input Timing	Symbol	800RGBx1280			Unit
		Min.	Typ.	Max.	
PCLK Frequency	-	-	67		MHz
Horizontal Total	THT		854		DCLK
Horizontal Synchronization	THS		18		DCLK
Horizontal Back Porch	THB		18		DCLK
Horizontal Address	THA		800		DCLK
Horizontal Front Porch	THF		18		DCLK
Vertical Frequency	-		60		Hz
Vertical Total(1)	TVT		1316		THT
Vertical Synchronization	TVS		4		THT
Vertical Back Porch	TVB		8		THT
Vertical Address	TVA		1280		THT
Vertical Front Porch	TVF		24		THT

### 5.3 Reset Input Timing

$t_{RESW}$  shorter than 75us, Reset will be rejected.



VSS=0V, VDDI=1.65V to 1.95V, Ta = -30°C to 70°C

Symbol	Parameter	MIN	TYP	MAX	Note	Unit
$t_{RESW}$	*1) Reset low pulse minimum width	150	-	-	Reset signal recognized	us
$t_{REST}$	*2) Reset complete time	5	-	120	Reset action complete	ms



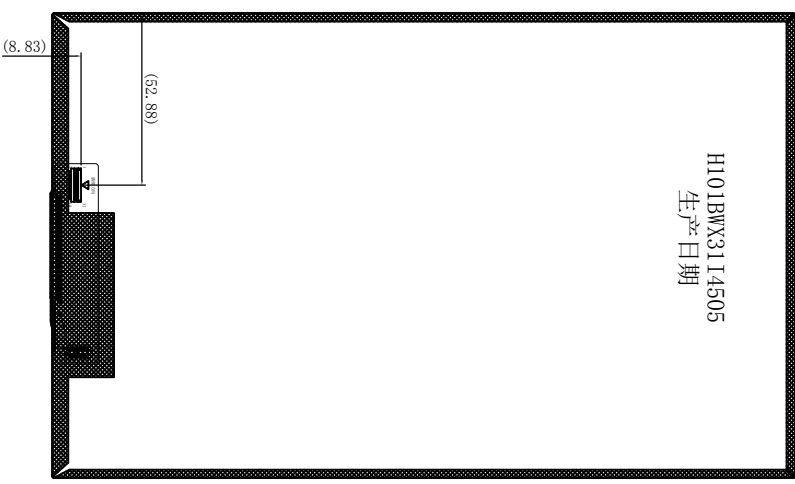
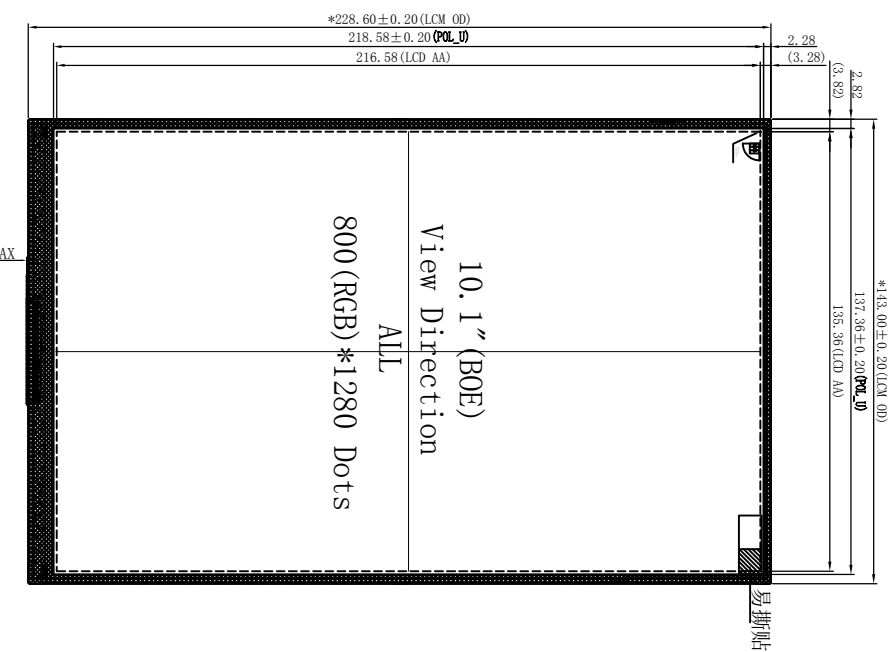
## 5.4 DATA mapping

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	GREEN(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
	GREEN(255)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0		
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		

**【Note】**

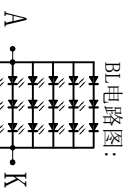
- 1) Gray level:  
Color(n) : n is level order; higher n means brighter level.
- 2) DATA:  
1: high · 0: low

## 6. MECHANICAL DIMENSION



Pad No.	Pad Nail
1	LED+
2	LED+
3	LED+
4	NC
5	LED-
6	LED-
7	LED-
8	LED-
9	GND
10	GND
11	MPI_2P
12	MPI_2N
13	GND
14	MPI_1P
15	MPI_1N
16	GND
17	MPI_CLK
18	MPI_CLK
19	GND
20	MPI_0P
21	MPI_0N
22	GND
23	MPI_3P
24	MPI_3N
25	GND
26	NC
27	RESET
28	NC
29	VDDIO
30	VDD
31	VDD

- NOTES:
1. Display mode: 10.1" IPS/NORMALLY BLACK
  2. Viewing Direction: ALL 0° clock
  3. OPERATING TEMP: -10° C~+60° C
  4. STORAGE TEMP: -20° C~+70° C
  5. Backlight color: 27 CHIP WHITE LED
  6. RESOLUTION: 800xRGBx1280
  7. LCD IC: JD9365DA-H3
  8. "()" reference dimension. "\*" critical dimension
  9. RoHS2.0 Compliant
  10. LCM Luminance: 430cd/m2 (MIN), 480cd/m2 (TYP)



BL电路图:  
27颗灯 3串9并  
BACKLIGHT CIRCUIT DIAGRAM:  
If=180mA, Vf=8.7V~10.2V

INTERFACE	MPI Interface	MODEL NAME TFT Display Module	PART NO. H101BW3114505
	FPC Connector		
VIEWING DIRECTION	ALL	CHKD	TOLERANCE UNLESS SPECIFIED
Gray Scale DIRECTION	FREE	PROJECTION 3RD ANGLE	SCALE ±0.1
		UNIT	SCALE 1:1



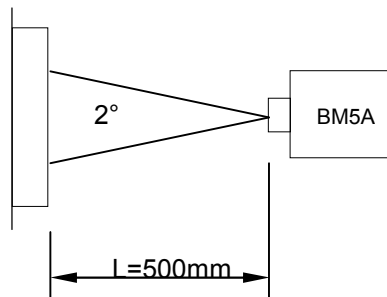


## 7. OPTICAL CHARACTERISTICS

Ta = 25°C, VCC=3.3V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE		
Luminance	L		430	480	--	cd/m <sup>2</sup>	Note 1		
Contrast	CR		800	1000	--	--	Note2		
Response Time	Tr+Tf	$\theta=\phi= 0^\circ$	--	30	35	ms	Note 3		
Viewing Angle	Vertical	U	CR $\geq 10$	75	80	--	degree	Note 4	
		D		75	80	--	degree		
	Horizontal	L		75	80	--	degree		
		R		75	80	--	degree		
Color Filter Chromaticity	W	x	$\theta=\phi= 0^\circ$	0.288	0.318	0.348	--	Note 5	
		y		0.311	0.341	0.371	--		
	R	x		0.593	0.623	0.653	--		
		y		0.335	0.373	0.393	--		
	G	x		0.307	0.337	0.367	--		
		y		0.565	0.595	0.625	--		
	B	x		0.124	0.154	0.184	--		
		y		0.075	0.105	0.135	--		
	NTSC				52	56	---		%
	Flicker					-30	-15		dB
Crosstalk				2	3	%			

Note1: Measure condition : 25°C±2°C , 60±10%RH , under10 Lux in the dark room.BM-7 (TOPCON) , viewing angle2° , IL=90mA (Backlight current) measurement after lighting on 10 mins.



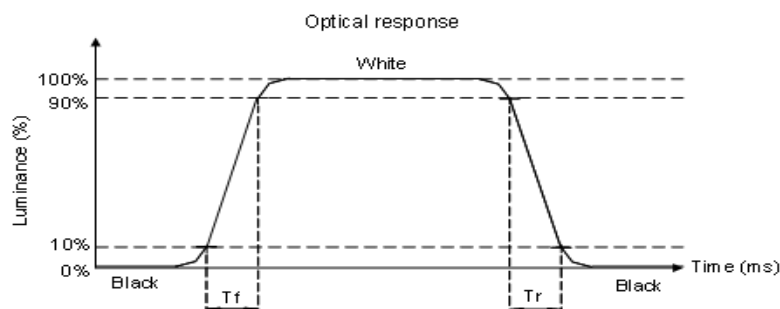
Note 2 Definition of Contrast Ratio :

Contrast ratio is calculated with the following formula.

Contrast ratio (CR)= White Luminance (ON) / Black Luminance (OFF)

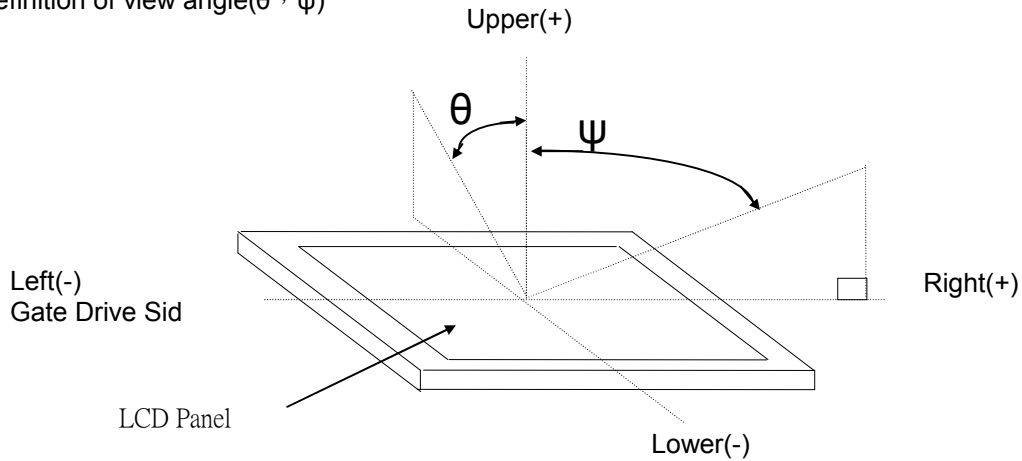
Note 3 Definition of response time

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





Note 4 Definition of view angle( $\theta$  ·  $\psi$ )



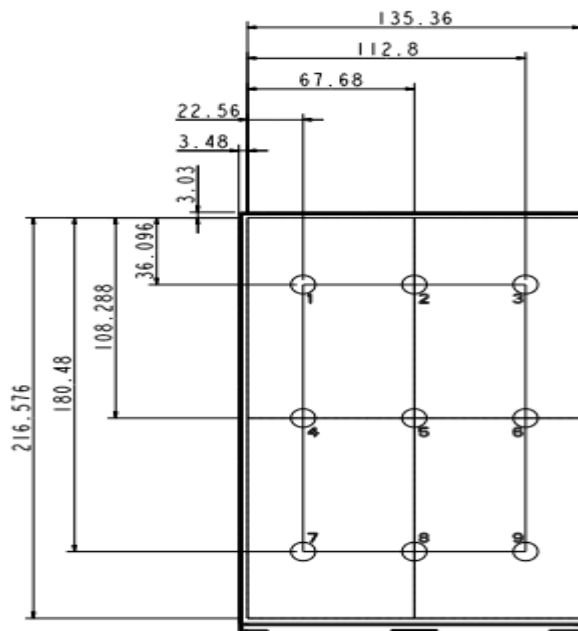
Note 5. (a) CF Glass light source: C light.

(b) Chromaticity & NTSC spec is for reference. ( Different polarizer & backlight will both affect the MODULE chromaticity. )

Note 6. Definition of Luminance and Luminance uniformity

Central luminance: The white luminance is measured at the center position “5” on the screen, see Fig below.

9P Uniformity:  $\Delta L = (L_{min} / L_{max}) \times 100\%$  at measuring points 1 & 9 see Fig below.



## 8. RELIABILITY TEST

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	60°C,96hrs	1
High Temperature Storage	70°C,96hrs	1
High Temperature High Humidity Operation	50°C,90%RH,96hrs	No condensation
Low Temperature Operation	-10°C,96hrs	1
Low Temperature Storage	-20°C,96hrs	1
Thermal Shock	-20°C(0.5hr) ~ 70°C(0.5hr) ,20 Cycles	Non-Operating

### NOTE

- All judgement of display are performed after temperature of panel return to room temperature.
- Display function should be no change under normal operating condition.
- Under no condensation of dew.
- HNH only guarantee the above 6 test items, and without guarantee the others.