AGTechnologies
LCD Displays

SPECIFICATION

AGO 035B0-NN-N

Atualizada em 05/06/19.

Table of Contents

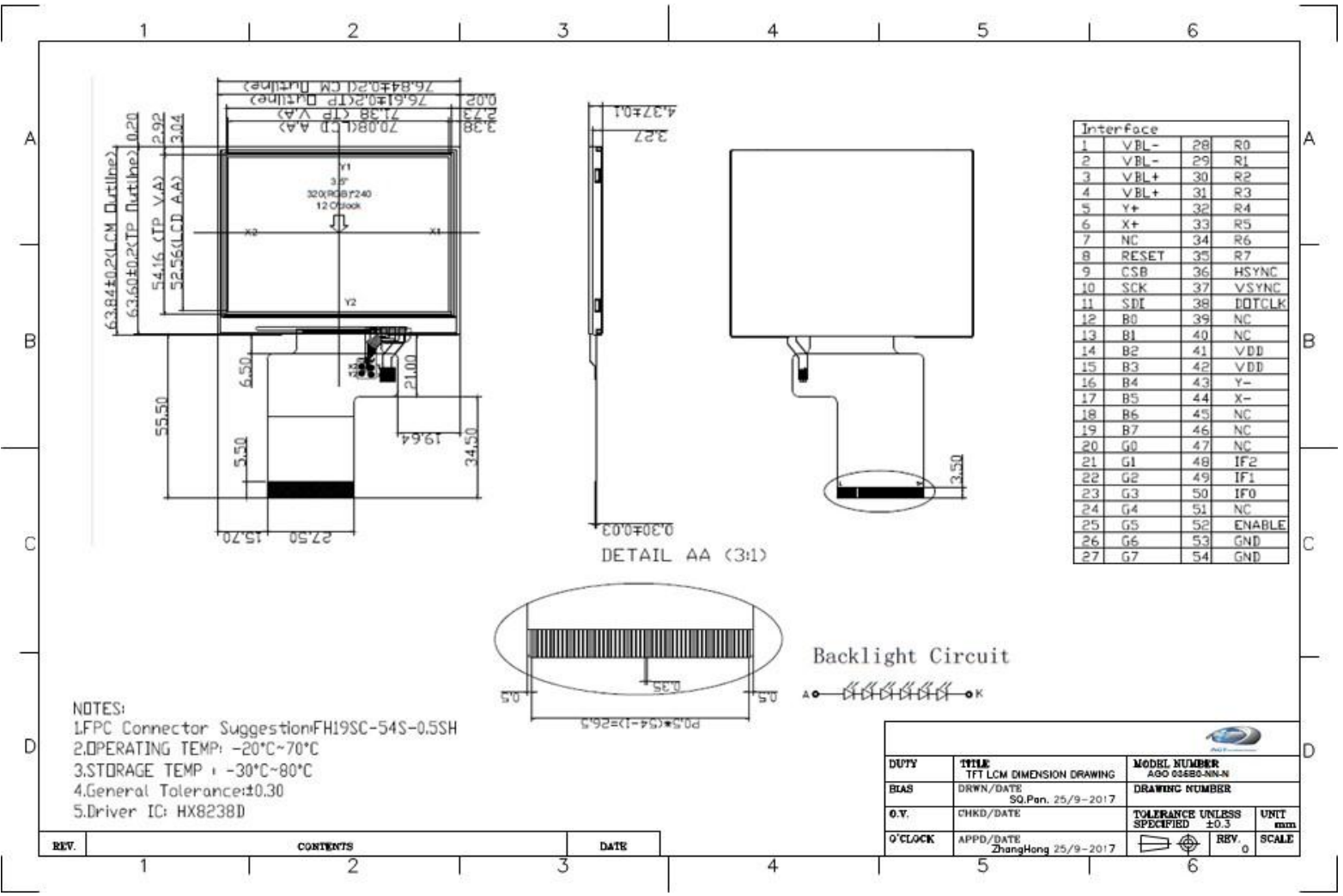
1. Revision History

Version	Summary	Date dd-mm-yy
A	Original	25/09-2017

2. Mechanical Description

Item	Contents	Unit
Outline Size	77.9 (W) * 64.6 (H) * 4.25(T)	mm
Module size	3.5 (A.A)	inch
Resolution	320(RGB)* 240 Pixels	---
Viewing size	70.08(W) * 52.56(H)	mm
Pixel size	0.153 * 0.153	mm
LCD Type	TFT (16.7M)/ Transmissive	---
Viewing Angle	12 H	---
Driver IC	HX8238D	---
Backlight Type	6 Serial LEDs	---
Interface Type	24 Bit RGB	---

3. Mechanical Drawing

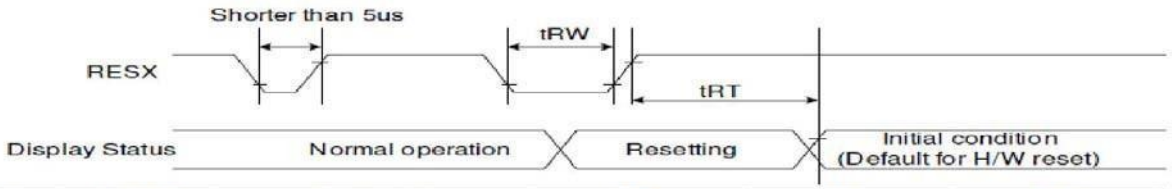


4. Interface Definition

PIN NO.	PIN Name	Funtion Description
1	VBL-	Power supply for backlight cathode input terminal.
2	VBL-	Power supply for backlight cathode input terminal.
3	VBL+	Power supply for backlight anode input terminal.
4	VBL+	Power supply for backlight anode input terminal.
5	Y+	Touch panel Y+ pin
6	X+	Touch panel X+ pin
7	NC	No connection
8	RESET	Reset signal input terminal. Active at 'L'.
9	CSB	Chip select signal input terminal
10	SCK	Clock pin of serial interface.
11	SDI	Data input pin in serial mode
12~19	B0~B7	Blue Data
20~27	G0~G7	Green Data
28~35	R0~R7	Red Data
36	HSYNC	Horizontal sync input in RGB mode. (Short to GND ifnot sued)
37	VSYNC	Vertical sync input in RGB mode. (Short to GND if notsued)
38	DCLK	Clock signal. Latching data at the rising edge.
39、40	NC	Not Connect
41、42	VCI	Digital Power(3.3V)
43	Y-	Touch panel Y- pin
44	X-	Touch panel X- pin
45~47	NC	Not Connect
48~50	input data	Control the input data format /floating (IF2, IF1, IF0 Control GND)
51	NC	Not Connect
52	ENABLE	Display enable pin from controller
53、54	GND	Power Ground

5. Interface Timing：

5.1 Reset Timing



Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

5.2 RGB Interface Timing

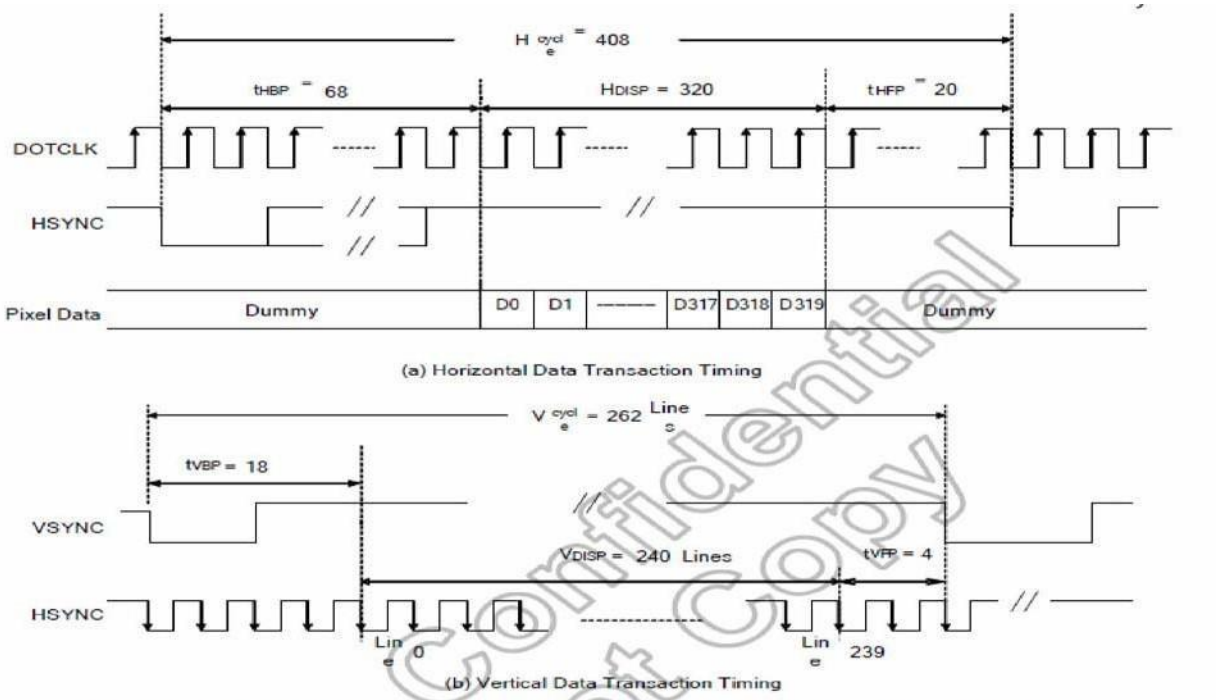


Figure 12. 2 Data Transaction Timing in Parallel RGB (24 bit) Interface (SYNC Mode)

Characteristics		Symbol	Min.		Typ.		Max.		Unit
			24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency		fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period		tDOTCLK	100	33.3	154	51.3	-	-	ns
Horizontal Frequency (Line)		fH	-		14.9		22.35		KHz
Vertical Frequency (Refresh)		fV	-		60		90		Hz
Horizontal Back Porch		tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Front Porch		tHFP	-	-	20	60	-	-	tDOTCLK
Horizontal Data Start Point		tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Blanking Period		tHBP + tHFP	-	-	88	264	-	-	tDOTCLK
Horizontal Display Area		HDISP	-	-	320	960	-	-	tDOTCLK
Horizontal Cycle		Hcycle	-	-	408	1224	450	1350	tDOTCLK
Vertical Back Porch		tVBP	-		18		-		Lines
Vertical Front Porch		tVFP	-		4		-		Lines
Vertical Data Start Point		tVBP	-		18		-		Lines
Vertical Blanking Period		tVBP + tVFP	-		22		-		Lines
Vertical Display Area	NTSC	VDISP	-		240		-		Lines
	PAL				280(PALM=0)				
	PAL				288(PALM=1)				
Vertical Cycle	NTSC	Vcycle	-		262		350		Lines
	PAL				313				

Table 12. 2 Data Transaction Timing in Normal Operating Mode

5.3 AC Timing Diagram

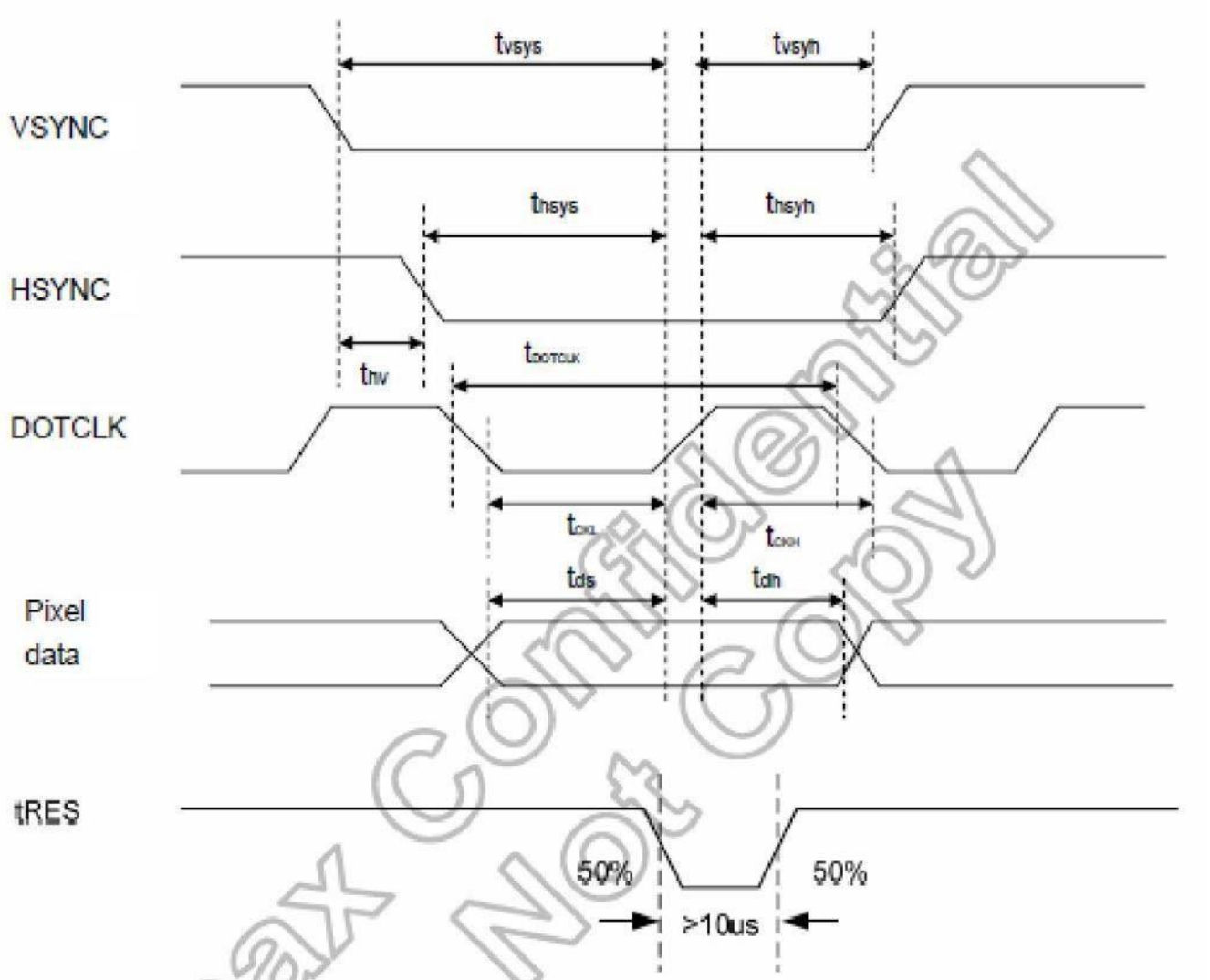


Figure 12. 1 Pixel Timing

Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Vertical Sync Setup Time	tvsys	20	10	-	-	-	-	ns
Vertical Sync Hold Time	tvsyh	20	10	-	-	-	-	ns
Horizontal Sync Setup Time	thsys	20	10	-	-	-	-	ns
Horizontal Sync Hold Time	thsyh	20	10	-	-	-	-	ns
Phase difference of Sync Signal Falling Edge	thv	1		-		240		tDOTCLK
DOTCLK Low Period	tCKL	50	15	-	-	-	-	ns
DOTCLK High Period	tCKH	50	15	-	-	-	-	ns
Data Setup Time	tds	12	10	-	-	-	-	ns
Data hold Time	tdh	12	10	-	-	-	-	ns
Reset pulse width	tRES	10		-		-		µs

Note: External clock source must be provided to DOTCLK pin of HX8238-D. The driver will not operate if absent of the clocking signal.

Table 12. 1 Pixel Timing

6. Absolute Maximum Ratings：

Name	symbol	Min	Type	Max	Unit
Operation Temperature	TOP	-10	-	60	℃
Storage Temperature	TST	-20	-	70	℃

7. DC Characteristics

Name	Symbol	Min	Type	Max	Unit
Logical Voltage	VDD	1.8	2.8	3.3	V
Input High Voltage	VIH	0.8IOVCC	-	IOVCC	V
Input Low Voltage	VIL	-0.3	-	0.2IOVCC	V
Output High Voltage	VOH	0.8IOVCC	-	-	V
Output Low Voltage	VOL	-	-	0.2IOVCC	V
Current Consumption	IDD	-	TBD	-	mA

8.Blacklight：

Name	Min	Type	Max	Unit
Current	15	20	25	mA
Voltage	18.0	19.2	22.0	V
Power Consumption	300	384	450	mW
luminance	300	350	-	CD/M^2 (Note1)
Luminance uniformity	75%	80%	-	(Note2)
X Color Coordinates	0.27	0.28	0.31	-
Y Color Coordinates	0.27	0.28	0.31	-

Note1: This luminance is tested with assembling the LCD.
Note2: Definition of Luminance Uniformity.

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width

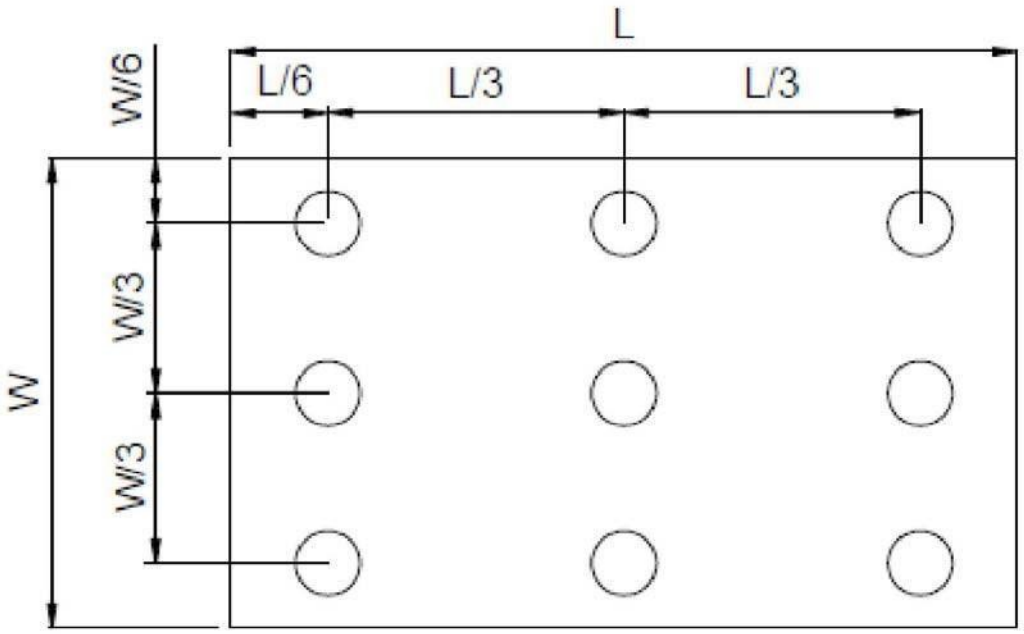


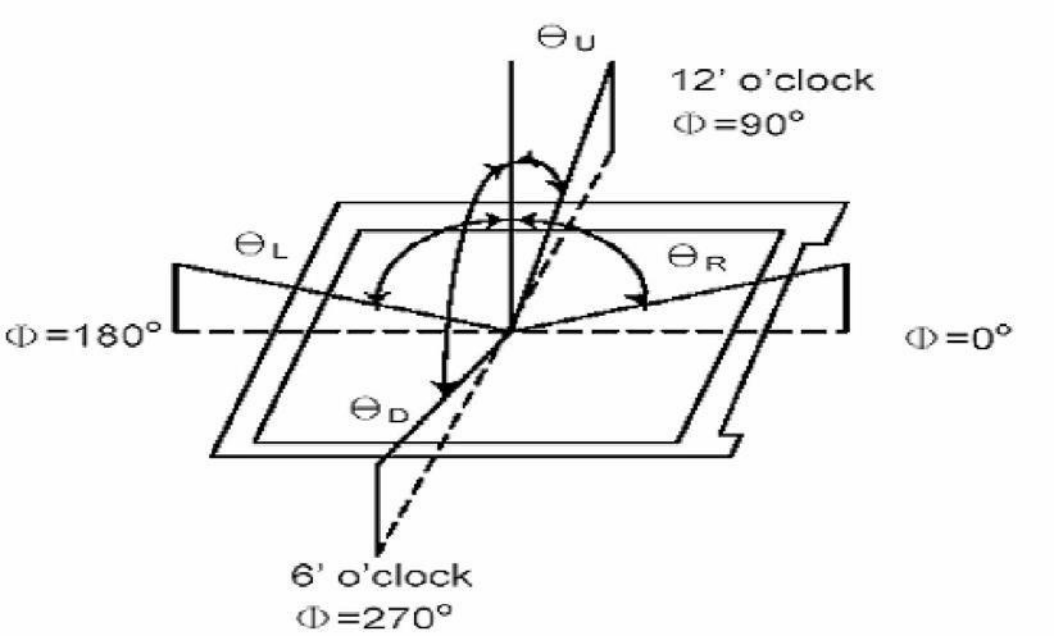
Fig. 4-4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.
B_{min}: The measured minimum luminance of all measurement position.

9. Optical Specification

Name	Symbol	Min	Type	Max	Unit
Transmittance rate	T(%)	-	4.6	-	%
Contrast ratio	C/R	-	400	-	-
Response time	Tr+Tf	-	35	-	ms
Viewing Angle	θU	-	35	-	degree (C/R>10)
	θD	-	15	-	
	θL	-	45	-	
	θR	-	45	-	

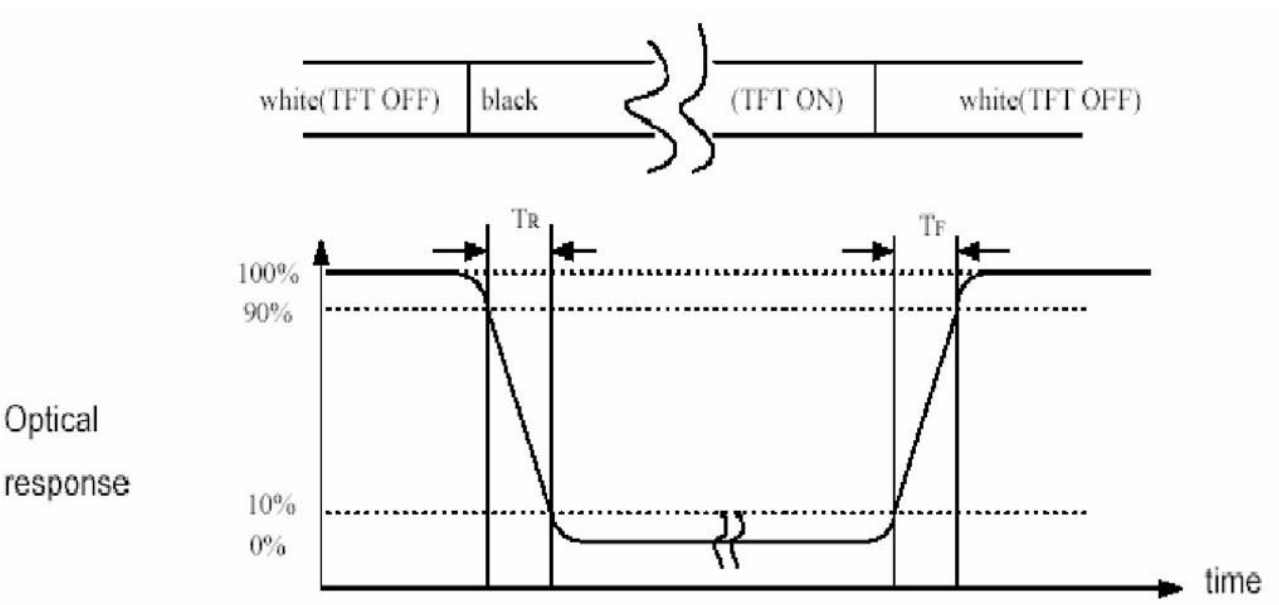
*Viewing angle descriptin:



*Contrast rate description(CR) :
Tested in the center of the LCM panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

*Response time description : Sum of TR and TF



10. Reliability testing：

Item No	Name	Condition	Remark
1	High temperature Operating	70° C , 168Hours	Finish product (With polarizer)
2	Low temperature Operating	-20° C , 168 Hours	Finish product (With polarizer)
3	High temperature Storage	80° C , 168 Hours	Finish product (With polarizer)
4	Low temperature Storage	-30° C , 168 Hours	Finish product (With polarizer)
5	High temperature & humidity Storage	60° C , 90%RH, 168 Hours	Finish product (With polarizer)
6	Thermal Shock Storage (No operation)	-20° C , 30min. <=> 70° C , 30min. 10 Cycles	Finish product (With polarizer)
7	ESD test	Voltage:+8KV R:330 ohm, C:150pF Air discharge, 10 times	Finish product (With polarizer)
8	Vibration test	10 => 55 =>10 => 55 => 10 Hz, within 1 minute; Amplitude:1.5mm. 15 minutes for each Direction (X, Y, Z)	Finish product (With polarizer)
9	Drop test	Packed, 100CM free fall 6 sides, 1 corner, 3edges	Finish product (With polarizer)

*One single product test for only one item.

* Judgment after test: keep in room temperature for more than 2 hours.

- Current consumption < 2 times of initial value
- Contrast > 1/2 initial value
- Function: work normally

11. Precaution

11.1 Handling

(1) Protect the panel from static, it may cause damage to the CMOS Gate Array IC.

(2) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(3) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

(4) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Don't use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(5) Pins of I/F connector shall not be touched directly with bare hands.

(6) Refrain from strong mechanical shock and / or any force to the panel. In addition to damage, this may cause improper operation or damage to the panel.

(7) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a B pencil lead.

(8) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.

(9) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

11.2 Storage

(1) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the panel with temperature from 0 to 35℃ and relative humidity of less than 70%.

(2) The panel shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

11.3 Operation

(1) The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.

(2) Do not exceed the absolute maximum rating value. (the supply voltage variation, Input voltage variation in part contents and environmental temperature and so on).Otherwise the panel may be damaged.

(3) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image" Sticks" to the screen.