

TITLE ME270QHB-NF0-ZD37**Product Specification****0**

APPROVED BY	
DATE	

Nanjing BOE Display Technology Co., Ltd

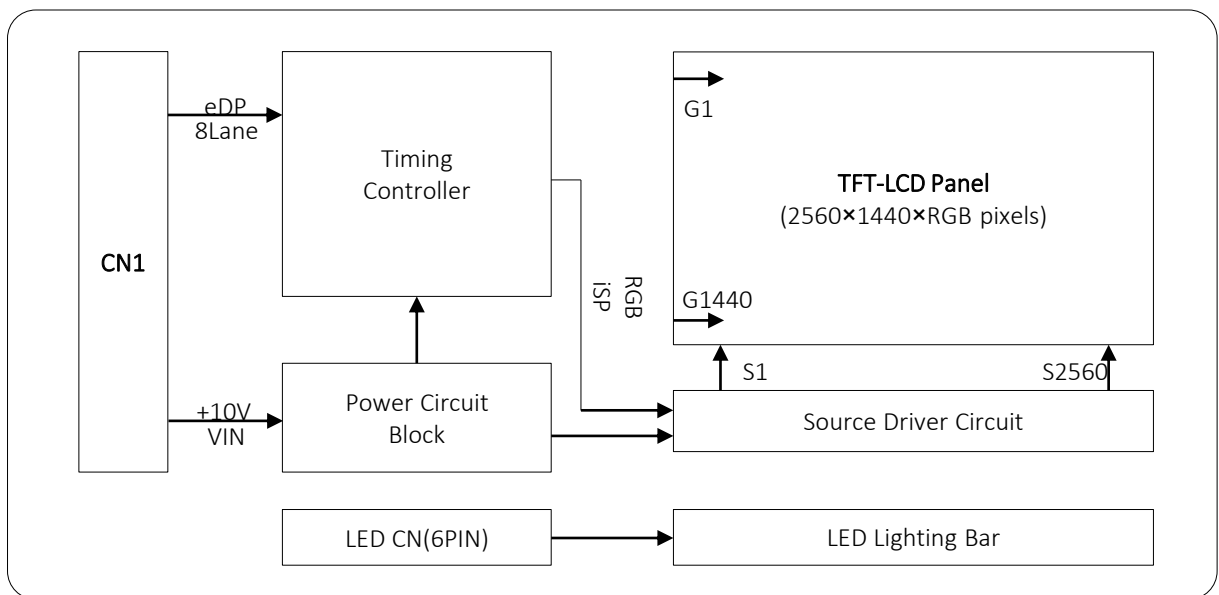
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1.0 GENERAL DESCRIPTION

1.1 Introduction

ME270QHB-NF0-ZD37 is a color active matrix TFT LCD module using oxide TFT's (Thin Film Transistors) as an active switching devices. This module has a 27 inch diagonally measured active area with QHD resolutions (2560 horizontal by 1440 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 1.07B colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



1.2 Features

- eDP Interface with 8Lane
- 10bit (input) color depth , display 1.07B colors (8bit+FRC output)
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) only
- RoHS/Halogen Free
- Compatible with Low Blue Light with TUV certificate
- ERP Lot 5, CEC compliant
- Gamma Correction
- Reverse type

1.3 Application

- Desktop Type of PC & Workstation Use
- Display Terminals for Control System
- Monitors for Process Controller

1.4 General Specification

The followings are general specifications at the model ME270QHB-NF0.

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	596.736(H) × 335.664(V)	mm	
Number of pixels	2560(H) × 1440(V)	pixels	
Pixel pitch	0.2331(H) × 0.2331(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	1.07B	colors	8bit+FRC output
Display mode	Normally Black		
Dimensional outline	608.536 (H) x 349.964(V)	mm	Detail refer to drawing
Weight	710	g	
Surface Treatment	Haze 25%, 3H		

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

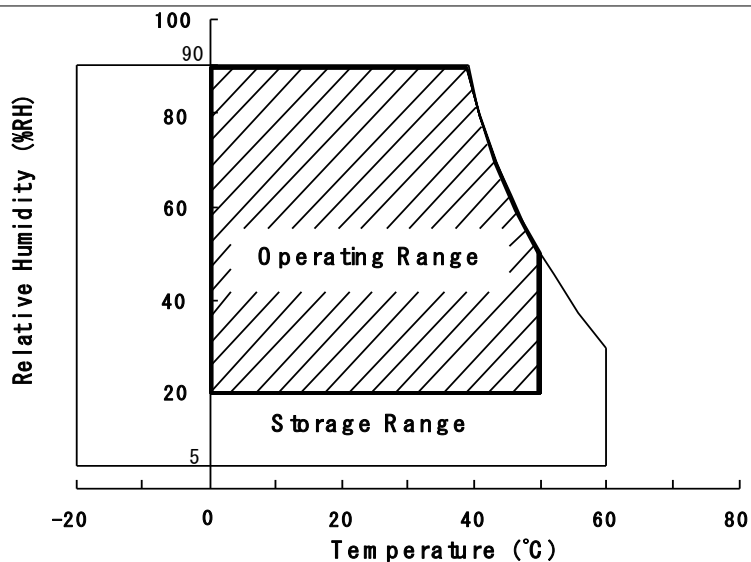
< Table 2. Absolute Maximum Ratings >

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{IN}	-0.3	+10.5	V	Ta = 25 °C
Bist Function Voltage ⁽³⁾	V_{BIST}	-0.3	3.3+0.3	V	
HPD Voltage	VHPD	-0.3	3.3+0.3	V	
Operating Temperature	T_{OP}	0	+50	°C	(1)
Storage Temperature	T_{ST}	-20	+60	°C	(1)
LCM Surface Temperature (Operation)	Tsurface	0	+65	°C	(2)

Note : (1) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be 39 °C max. and no condensation of water.

(2) Panel Surface Temperature should be Min. 0°C and Max. +65°C under the VIN = 10.0V, Frame rate =144Hz, 25°C ambient Temp. no humidity control and LED string current is typical value.



3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical specifications >

[Ta =25±2 °C]

Parameter.		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	9.5	10.0	10.5	V	
Power Supply Current	$I_{DD \text{ Typ.}}$	-	580	640	mA	Note1
	$I_{DD \text{ max}}$	-	1310	1570	mA	
In-Rush Current	I_{RUSH}	-	2.0	6.0	A	Note 2
Permissible Input Ripple Voltage	V_{RF}	-	-	300	mV	Note1,3
Power Consumption	$P_{D \text{ Typ}} -60\text{Hz}$	-	5.8	6.4	W	Note1,5
	$P_{D \text{ Typ}} -200\text{Hz}$	-	7.1	7.8	W	
	$P_{D \text{ white}} -60\text{Hz}$	-	5.8	6.4	W	
	$P_{D \text{ white}} -200\text{Hz}$	-	7.2	7.9	W	
	$P_{D \text{ Max}} -60\text{Hz}$	-	7.7	8.5	W	
	$P_{D \text{ Max}} -200\text{Hz}$	-	13.1	15.7	W	Note 4

Note : 1. The supply voltage is measured and specified at the interface connector of LCM.
 The current draw and power consumption specified is for VDD=10.0V, Frame rate=60Hz
 Clock frequency 124.2MHz. Test Pattern of power supply current is



a) Typ : Color Test

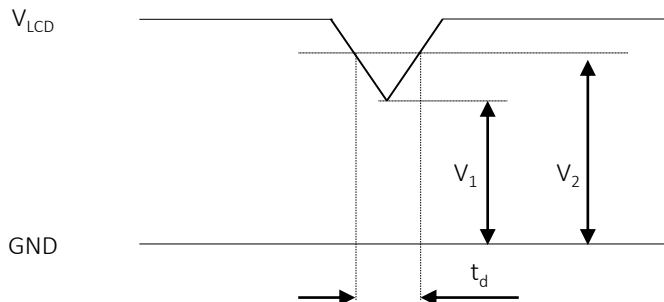


b) Full white



c) Max : H1line 255

2. Duration of rush current is about 2 ms and rising time of VDD is $520 \mu s \pm 20\%$.
3. Ripple Voltage should be covered by Input voltage Spec.
4. Calculated value for reference (Input pins*VPIN × IPIN) excluding inverter loss.
5. For logic power consumption, it is measured under patterns of Note 1.
6. Test measure refer to Energy Star 8.0 Program Requirements@200nit.
7. For proper operation, stable power supply of VDD is necessary and power dip is allowed only in below condition. Except this condition, power on/off should follow power sequence specification exactly.



V₁ = 8V, V₂ = 9.5V, t_d = 20ms.

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25 \pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCONE PR730) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta_{\phi=0} (= \theta_3)$ as the 3 o'clock direction (the "right"), $\theta_{\phi=90} (= \theta_{12})$ as the 12 o'clock direction ("upward"), $\theta_{\phi=180} (= \theta_9)$ as the 9 o'clock direction ("left") and $\theta_{\phi=270} (= \theta_6)$ as the 6 o'clock direction ("bottom"). While scanning θ and/or ϕ , the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VIN shall be 10.0V $\pm 5\%$ at 25°C . Optimum viewing angle direction is 6 o'clock.

4.2 Optical Specifications

[VIN = typ 10V, Frame rate = 60Hz, Clock = 124.2MHz]

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
Viewing Angle range	Horizontal	θ_3	CR > 10	85	89	-	Deg.	Note (1)
		θ_9		85	89	-	Deg.	
	Vertical	θ_{12}		85	89	-	Deg.	
		θ_6		85	89	-	Deg.	
Luminance Contrast ratio		CR		-	1000			Note (2)
Transmission		Tr		5.0	5.5		%	@DPP BLU
Reproduction of color	White	W_x	$\theta = 0^\circ$ (Center) Normal Viewing Angle	0.283	0.313	0.343	-	@BOE B/L Note (5)
		W_y		0.299	0.329	0.359	-	
	Red	R_x		0.641	0.671	0.701	-	
		R_y		0.295	0.325	0.355	-	
	Green	G_x		0.243	0.273	0.303	-	
		G_y		0.629	0.659	0.689	-	
	Blue	B_x		0.112	0.142	0.172	-	
		B_y		0.027	0.057	0.087	-	
Response Time	GTG	T_g			5	8	ms	Note (6)

Note: (1) Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.

(2) Contrast measurements shall be made at viewing angle of $\theta = 0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

(3) Center Luminance of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

(4) The White luminance uniformity on LCD surface is then expressed as :
 $\Delta Y = (\text{Minimum Luminance of 9points} / \text{Maximum Luminance of 9points}) * 100$ (See FIGURE 2 shown in Appendix).

(5) The color chromaticity coordinates specified in Table 4. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

(6) Response time Tg is the average time required for display transition by switching the input signal as below table and is based on Frame rate fV =60Hz to optimize.

Measured Response Time		Target				
		0	63	127	191	255
Start	0					
	63					
	127					
	191					
	255					

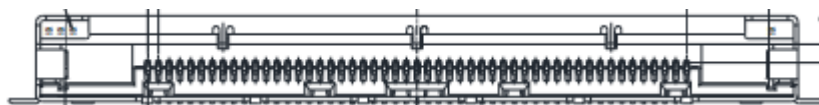
5.0 INTERFACE CONNECTION.

5.1 LCD input

CN1 Module Side Connector : IS050-C51B-C39-S or Equivalent

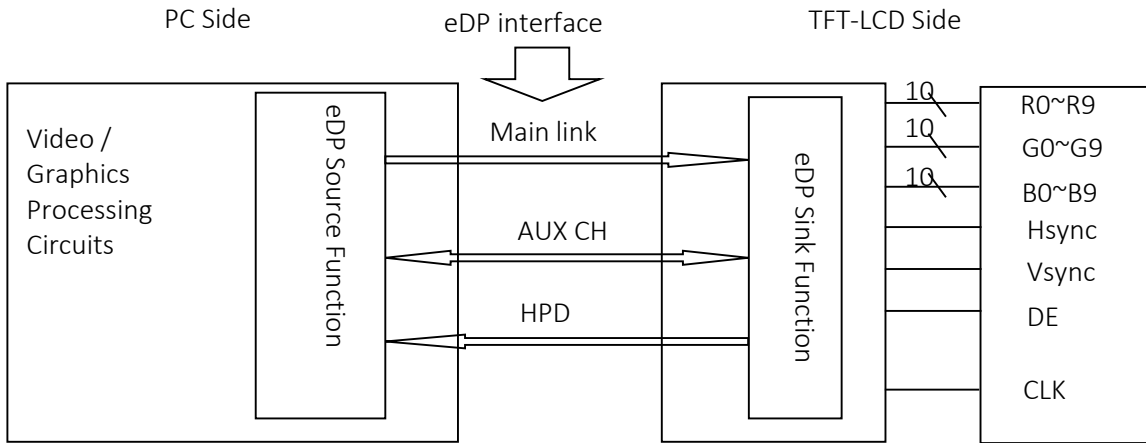
No.	Symbol	Description	No.	Symbol	Description
1	VDD	Power Supply +10.0v	27	Lane3P	Signal Sink Lane
2	VDD	Power Supply +10.0v	28	Lane3N	Signal Sink Lane
3	VDD	Power Supply +10.0v	29	GND	Ground
4	VDD	Power Supply +10.0v	30	AUX_CHN	Component Signal for Auxiliary Channel
5	VDD	Power Supply +10.0v	31	AUX_CHP	True Signal for Auxiliary Channel
6	VDD	Power Supply +10.0v	32	GND	Ground
7	VDD	Power Supply +10.0v	33	HPD	Hot Plug Detect Signal
8	VDD	Power Supply +10.0v	34	GND	Ground
9	VDD	Power Supply +10.0v	35	S_Lane0P	Slave Signal Sink Lane
10	NC	No Connection	36	S_Lane0N	Slave Signal Sink Lane
11	BIST	BIST Function	37	GND	Ground
12	GND	Ground	38	S_Lane1P	Slave Signal Sink Lane
13	NC	No Connection	39	S_Lane1N	Slave Signal Sink Lane
14	SDA	Reserved for LCD manufacturer's use (SDA)	40	GND	Ground
15	SCL	Reserved for LCD manufacturer's use (SCL)	41	S_Lane2P	Slave Signal Sink Lane
16	GND	Ground	42	S_Lane2N	Slave Signal Sink Lane
17	GND	Ground	43	GND	Ground
18	Lane0P	Signal Sink Lane	44	S_Lane3P	Slave Signal Sink Lane
19	Lane0N	Signal Sink Lane	45	S_Lane3N	Slave Signal Sink Lane
20	GND	Ground	46	GND	Ground
21	Lane1P	Signal Sink Lane	47	S_AUX_CHN	Slave Component Signal for Auxiliary Channel
22	Lane1N	Signal Sink Lane	48	S_AUX_CHP	Slave True Signal for Auxiliary Channel
23	GND	Ground	49	GND	Ground
24	Lane2P	Signal Sink Lane	50	HPD1	Slave Hot Plug Detect Signal
25	Lane2N	Signal Sink Lane	51	GND	Ground
26	GND	Ground			

#1

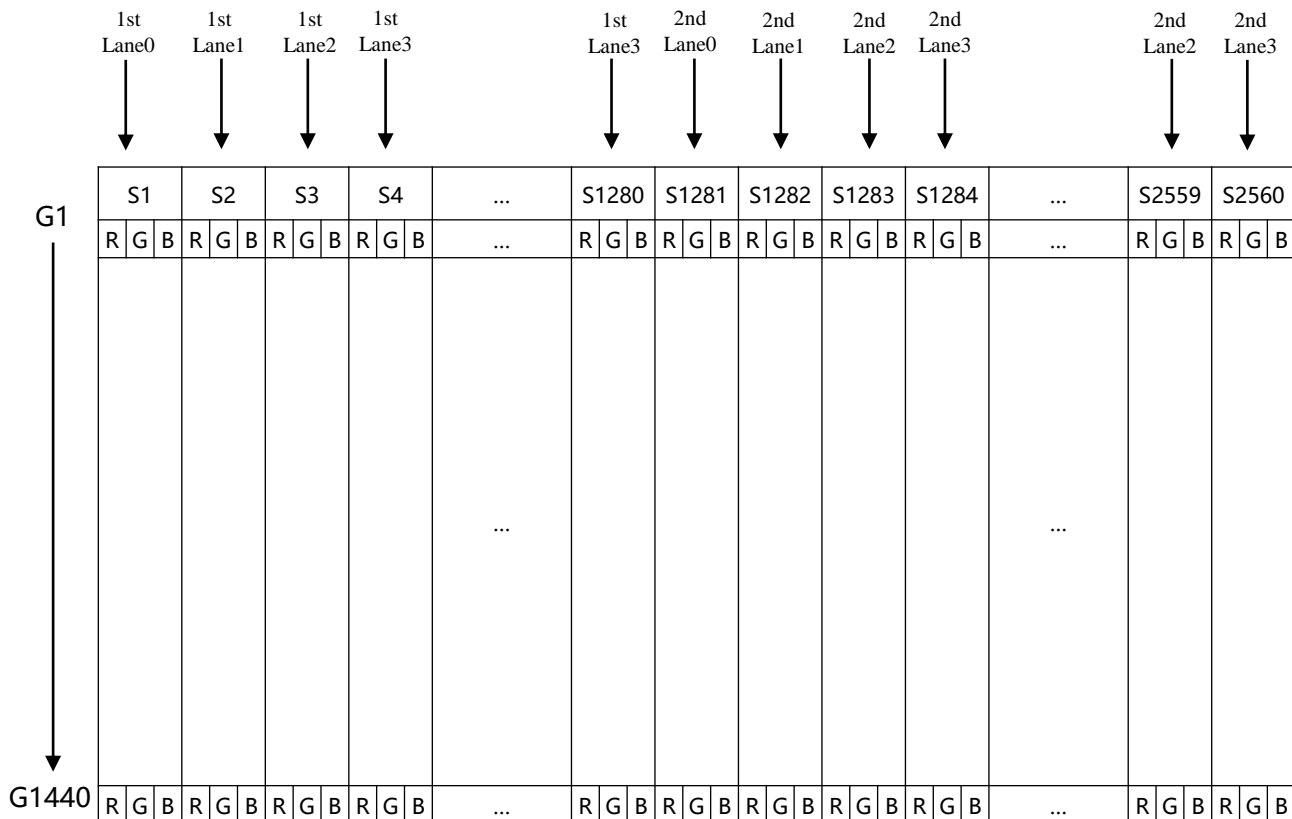


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5.2.eDP Interface



5.3 eDP Pixel Format



Note:

1st Lane0 : 1, 5,, 1277 Pixel →4n+1 N=0~319

1st Lane1 : 2, 6,, 1278 Pixel →4n+2 N=0~319

1st Lane2 : 3, 7,, 1279 Pixel →4n+3 N=0~319

1st Lane3 : 4, 8,, 1280 Pixel →4n+4 N=0~319

2nd Lane0 : 1281, 1285,, 2557 Pixel →4n+1281 N=0~319

2nd Lane1 : 1282, 1286,, 2558 Pixel →4n+1282 N=0~319

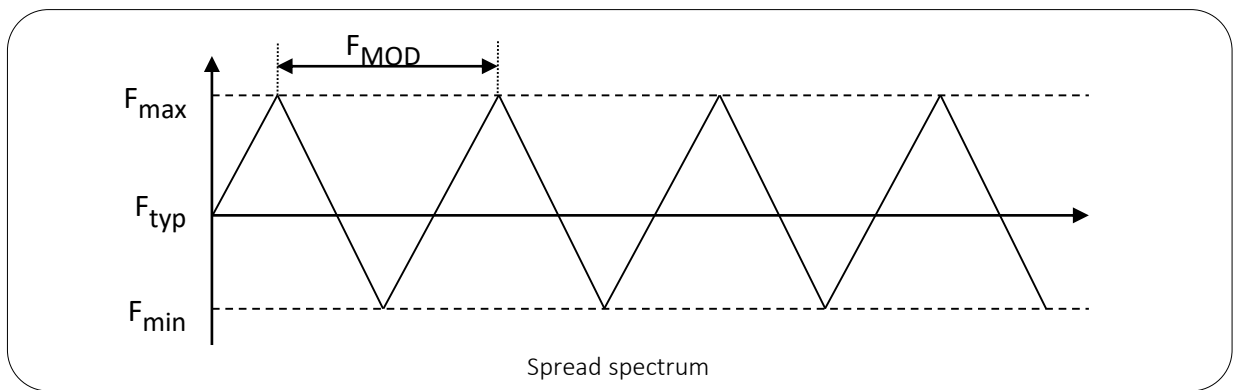
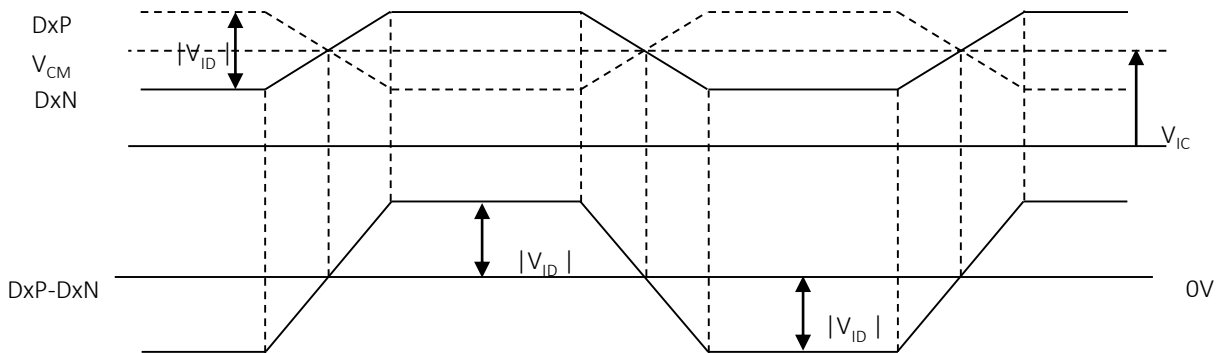
2nd Lane2 : 1283, 1287,, 2559 Pixel →4n+1283 N=0~319

2nd Lane3 : 1284, 1288,, 2560 Pixel →4n+1284 N=0~319

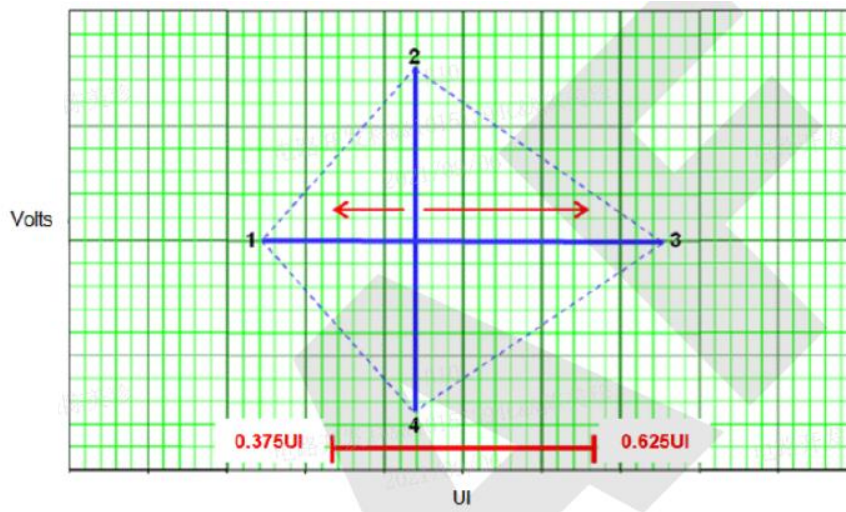
5.4 eDP Rx Interface Timing Parameter

5.4.1 Main link Signal

Item	Symbols	Min	Typ	Max	Unit	Remark
Spread spectrum clock	SSC	-0.5	-	0	%	
Module Frequency	F _{MOD}	30	-	33	KHz	
Main link swing voltage	V _{ID}	50	-	660	mv	
Main link common mode voltage	V _{IC}	0	-	2.0	V	



5.4.2 Main Link Eye Diagram

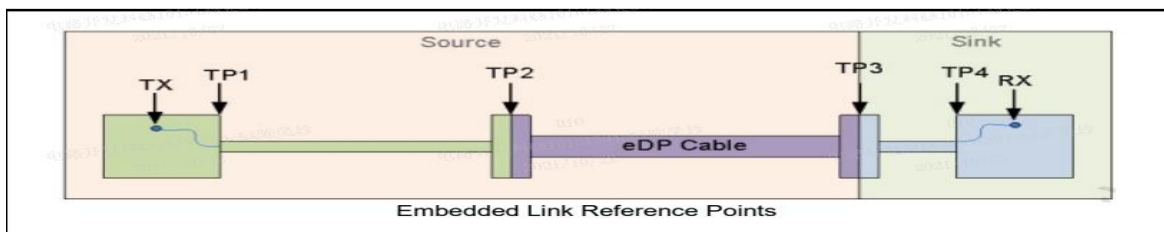


[TP3_EQ EYE Mask]

Point	HBR2@ TP3_EQ EYE Mask Vertices	Voltage(V)
1	Any UI location(x),where the EYE width is open from x to x+0.5UI	0.0000
2	Any passing UI location between 0.375 and 0.625UI	0.045
3	Ponit 1+0.5UI	0.0000
4	Same as Point 2	-0.045

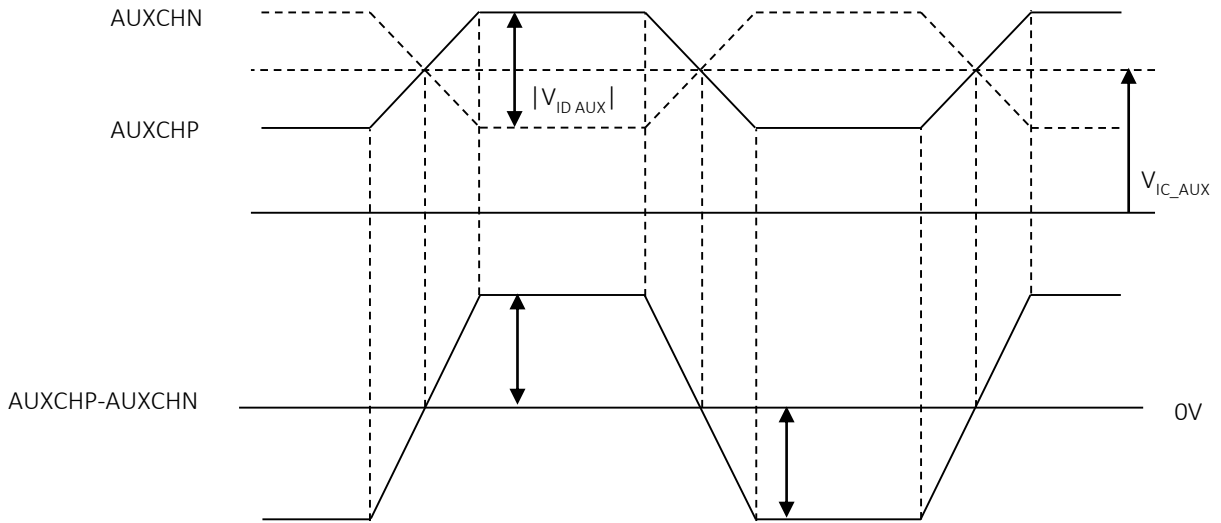
[eDP TP3_EQ EYE Mask Vertices]

Remark: TP3_EQ-After Reference RX Equalizer



5.4.3 AUX_CH Signal

Item	Symbols	Min	Typ	Max	Unit	Remark
AUX Peak-to-peak voltage at Connector Pins of Receiving	$ V_{ID_AUX} $	0.18	-	0.68	V	
AUX DC common mode voltage	V_{AUX-CM}	0	-	2	V	



5.4.4 HDP Signal

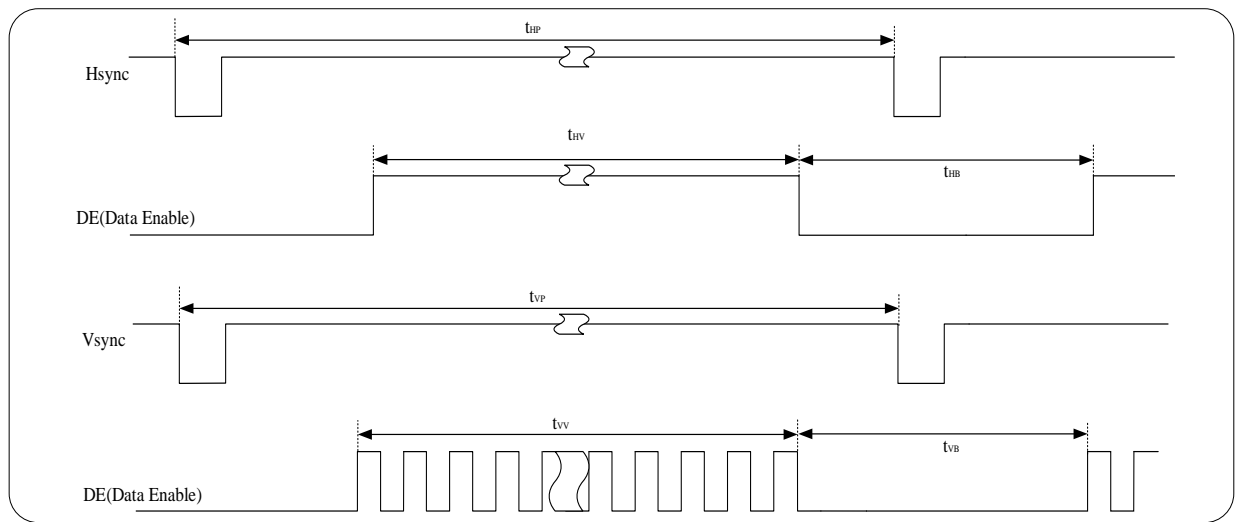
Item	Symbols	Min	Typ	Max	Unit	Remark
HPD Voltage	VHPD	3.135	3.3	3.465	V	

6.0 SIGNAL TIMING SPECIFICATION

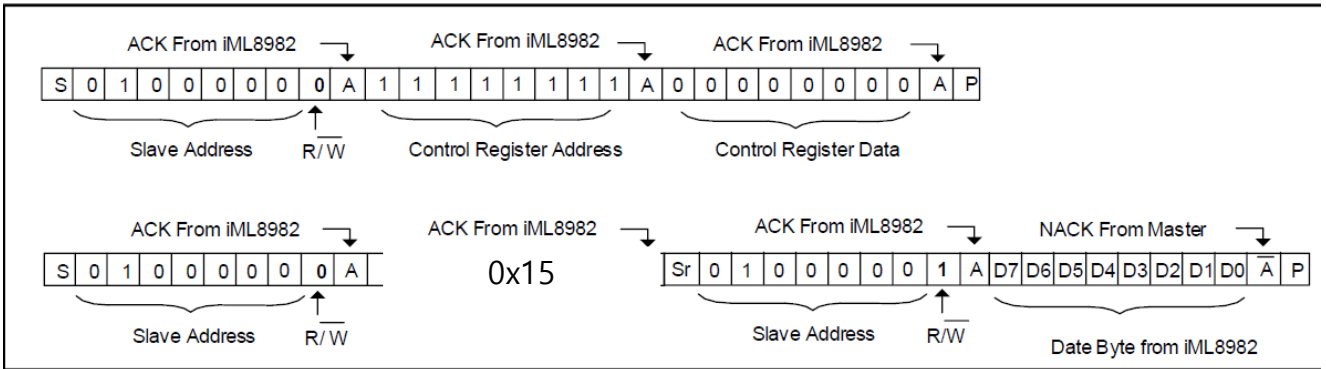
6.1 The ME270QHM-NF0 is operated by the DE only.

Item	Symbols		Min	Typ	Max	Unit	Remark
DCLK	Period	tCLK	2.41	3.35	5	ns	
	Frequency	-	200	298.08	414	MHz	
Hsync	Period	tHP	1345	1380	1480	tCLK	
	Horizontal Valid	tHV	1280			tCLK	
	Horizontal Blank	tHB	65	100	200		
	Frequency	fH	72	216	300	KHz	
Vsync	Period	tVP	1500	1500	6300	tHP	
	Vertical Valid	tVV	1440			tHP	
	Vertical Blank	tVB	60	60	4860	tHP	
	Frequency	fV	48	144	200	Hz	

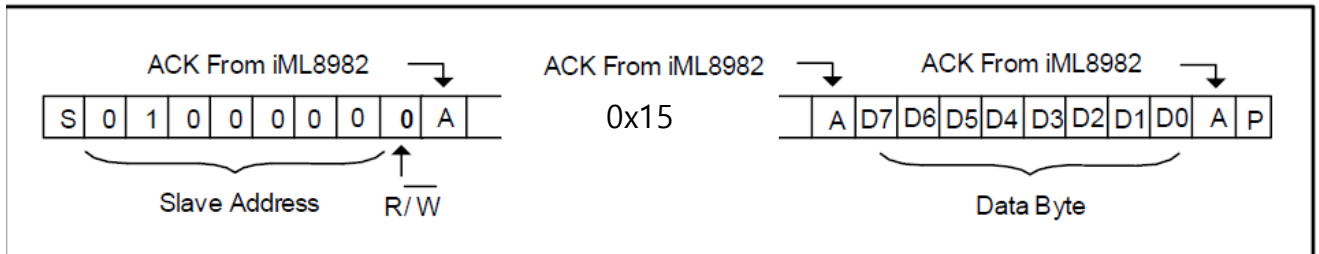
6.2 SIGNAL TIMING WAVEFORMS



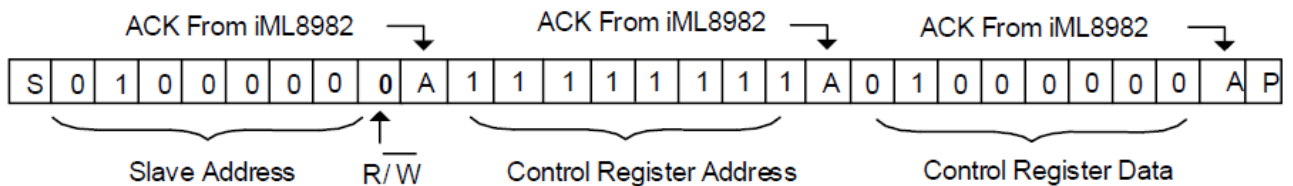
STEP1 READ VCOM



STEP2 ADJUST VCOM

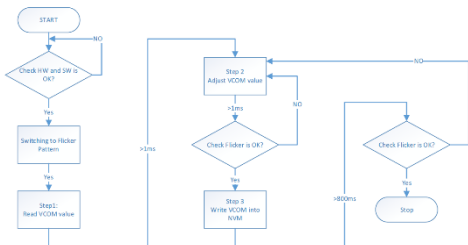


STEP2 WRITE VCOM



Interval of Step to Step

Step to step interval must follow below figure



S indicates START

P indicates STOP

A indicates ACKNOWLEDGEMENT

NA indicates NO ACKNOWLEDGEMENT

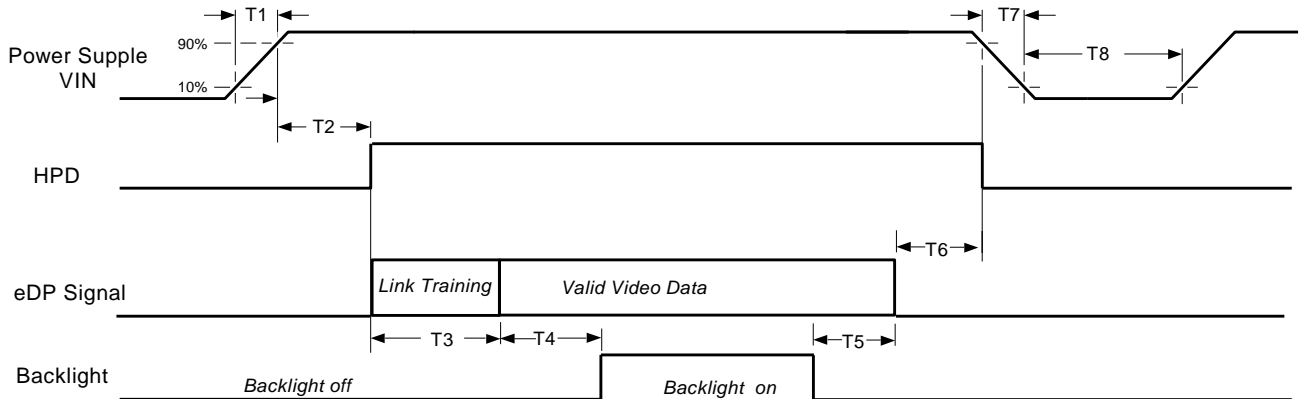
SR indicates REPEAT START

R indicates READ

W indicates WRITE

8.0 POWER SEQUENCE

VIN power, eDP signal and backlight on/off sequence are as following. eDP signals from any system shall be Hi-Z state when VIN is off.



Timing Parameter	Value			Remarks
	Min.	Typ.	Max.	
T1	0.5ms	-	10ms	
T2	0ms	-	200ms	
T3	0ms	-	-	During T3 Period, eDP link training time by customer's system.
T4	500ms	-	-	
T5	100ms	-	-	
T6	0ms	-	50ms	Recommend setting T6=0ms to avoid electronic noise when VIN is off. During T6 period, please keep the level of input eDP signals with Hi-Z state.
T7	0ms	-	200ms	T7 decreases smoothly, there is none re-bouncing voltage.
T8	1000ms	-	-	

Notes:

1. When the power supply VIN is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.

9.0 MECHANICAL CHARACTERISTICS

9.1 Dimensional Requirements

FIGURE 6 (located in Appendix) shows mechanical outlines for the model ME270QHB-NF0.

Other parameters are shown in Table 4.

<Table 4. Dimensional Parameters>

Parameter	Specification	Units
Dimensional outline	608.536 (H) x 349.964(V)	mm
Weight	710	gram
Active area	596.736(H) × 335.664(V)	mm
Pixel pitch	0.2331H) x 0.2331(V)	mm
Number of pixels	2560(H) × 1440(V)(1 pixel = R + G + B dots)	pixels

9.2 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

10.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 5. Reliability Test Parameters >

No	Test Items	Conditions	
1	High temperature storage test	Ta = 60 °C, 240 hrs	
2	Low temperature storage test	Ta = -20 °C, 240 hrs	
3	High temperature & high humidity operation test	Ta = 50 °C, 80%RH, 240hrs	
4	High temperature operation test	Ta = 50 °C, 240hrs	
5	Low temperature operation test	Ta = 0°C, 240hrs	
6	Thermal shock	Ta = -20 °C ↔ 60 °C (0.5 hr), 100 cycle	
7	Vibration test (non-operating)	Frequency	Random, 10 ~ 300 Hz,
		Gravity \ AMP	1.0 Grms
		Period	60minutes each Axis(X,Y,Z)
8	Drop test (non-operating)	1 angle, 3 edge, 6 side, follow ISTA(1A) height define	
9	Electro-static discharge test	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV	
10	High temperature storage test	Ta = 60 °C, 240 hrs	
11	Low temperature storage test	Ta = -20 °C, 240 hrs	

11.0 HANDLING & CAUTIONS

(1) Cautions when taking out the panel

- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module

- As the electrostatic discharges may break the LCD panel, handle the LCD panel with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD panel should be avoided
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD panel is operating.
- Put the panel down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation

- When the panel is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the panel would be damaged.
- Ultra-violet ray filter is necessary for outdoor operation
- If the product will be used in extreme conditions such as high temperature, humidity, display patterns, operation time, etc., it is strongly recommended to contact BOE for application engineering device. Otherwise, the reliability and function of the module may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stocks, markets, and controlling systems.

(4) Cautions for the atmosphere

- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD panel in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

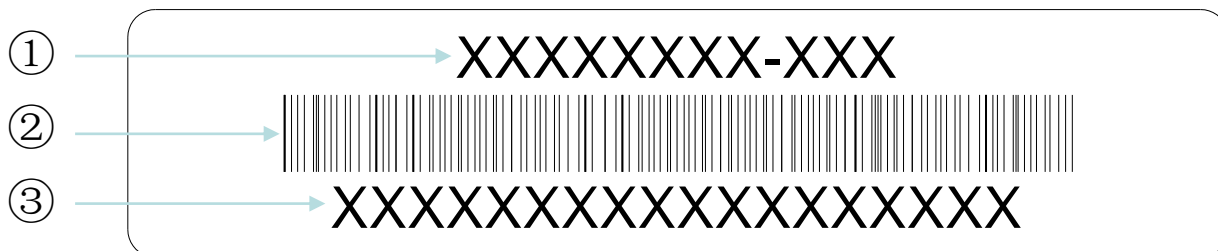
(5) Cautions for the panel characteristics

- Do not apply fixed pattern data signal to the LCD panel at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions

- Do not disassemble and/or re-assemble LCD panel.
- Do not re-adjust variable resistor or switch etc.
- When returning the panel for repair or etc., Please pack the panel not to be broken. We recommend to use the original shipping packages.
- When this reverse panel is used as a forward-type panel (PCB on top side), BOE can not guarantee any defects of LCM.
- If LCD panel containing system is out of BOE 's operating or storing condition, BOE can not guarantee LCD panel operating properly.

12.0 PRODUCT SERIAL NUMBER



打印内容, 说明如下:

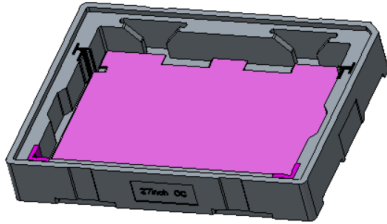
- ① FG-CODE 前12位 (有 "-" 示例: ME270QHB-NF0)
- ② Module ID 条码 (前17位) Barcode (Code128规则)
- ③ Module ID 明码 (18位) Barcode (Code128规则)

Module ID 编码原则:

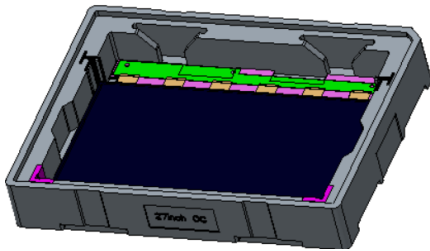
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Code	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Description	Product Code/ GBN 绑定FG -CODE		Grade 大等级	Line B 18 -Z	Year 年份后 两位		Month ≥1 0 XY Z	Model Extension Code (Last 4 Digits of F G-CODE)				Serial NO. Hex-Decimal 00000-FFFFFF 16进制 (A~F 表示10 ~15)					Grade版本 (例如:AN- N;A0-0)	

13.0 Packing

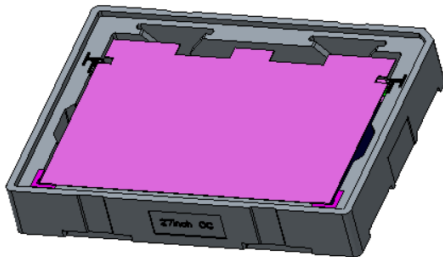
13.1 Packing Order



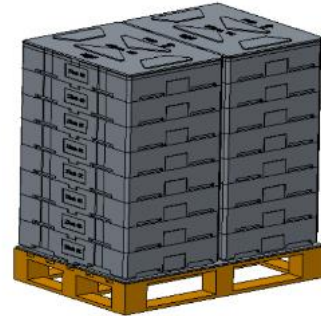
1. Put 1pcs 2.5t EPE pad in the box



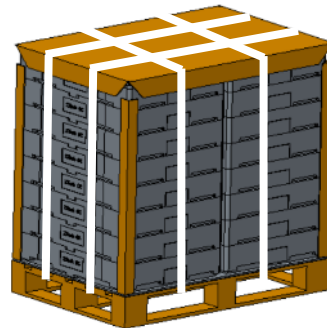
2. Put one open cell on EPE pad.



3. Put 1pcs open cell, 1pcs EPE pad , ... ,
totally 15pcs open cell and 16pcs EPE pad
in one box.



4. Put 8 boxes & 1 cover per row, totally
2 rows per pallet (16ea boxes & 2 cover).



5. Pack with 4 packing belts , then wrapping
pallet with Stretch film

13.2 Packing Note

- Box Dimension : 720mm(W) × 540mm(L) × 123mm(H)
- Package Quantity in one Box : 15pcs

13.3 Box label

- Label Size : 100 mm (L) × 50 mm (W)
- Contents
 - ① FG-Code (Before12 bit)
 - ②.Product Quantity(XX pcs/Carton)
 - ③.BOX ID
 - ④.Date of Packing
 - ⑤.BOX ID Serial number Barcode
 - ⑥FG-Code After four



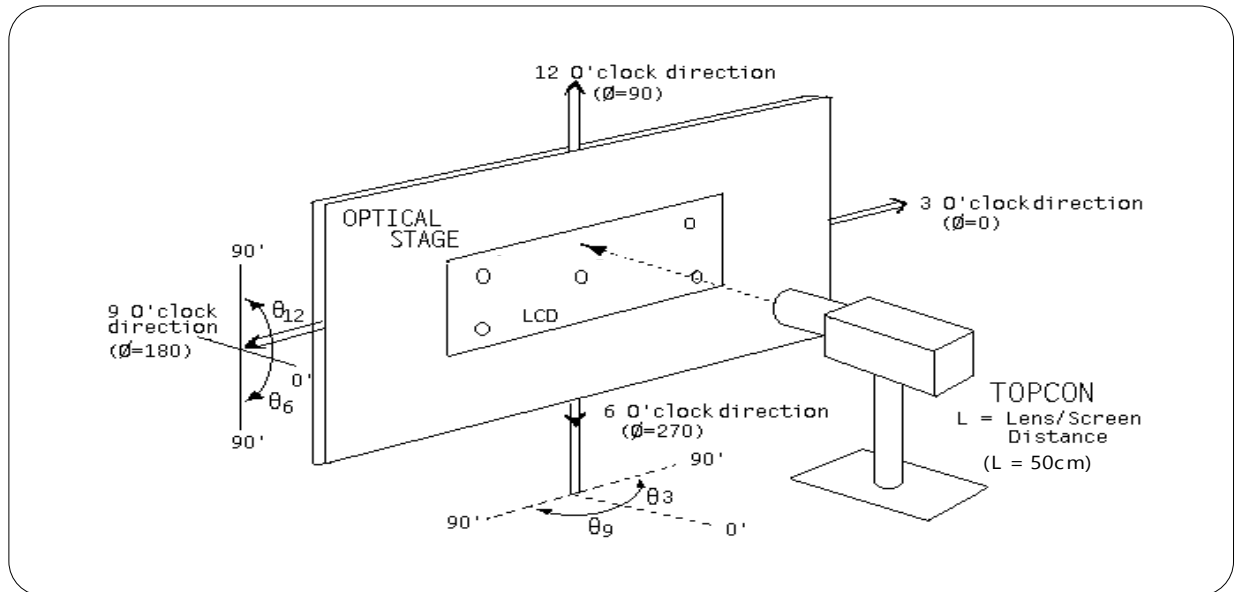
BOX ID Naming:

Digit	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	X	X	X	X	X	X	X	X	X	X	X	X	X
Description	Product Name		Product Grade	Facility Code	Year	Month	Revision	Box Serial NO.					

<Table 6. BOX ID Naming Rule>

14.0 APPENDIX

Figure 1. Measurement Set Up



The Gray to Gray response time is defined as the following figure and shall be measured by switching the input signal for “Gray To Gray “.

- Gray step : 5 Step
- TGTG_AVR is the total average time at rising time and falling time for “Gray To Gray “.

<Table 7. GTG Gray Table>

Measured Response Time		Target				
		0	63	127	191	255
Start	0					
	63					
	127					
	191					
	255					

Each time in below table is defined as Figure 3 and shall be measured by switching the input signal for “any level of gray(bright)”and “any level of gray(dark)”.

Figure 2. Response Time Testing

