



PHOENIX DISPLAY INTERNATIONAL, INC.

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SPECIFICATION FOR LCD MODULE

CUSTOMER	
PART NUMBER	PDI092MMDL-04
DESCRIPTION	9.2" 1280 * (RGB) * 320
VERSION	V1.0
ISSUE DATE	10-Jan-18

COMPANY ADDRESS:

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(1). General Feature

Item	Specification	Unit
Module Outline Dimension	239.63X70.3X6.20	mm
Active Screen Size(diagonal)	9.2	Inch
Active Area	226.56X56.64	mm
Resolution	1280RGB X 320	dot
Pixel Size	0.059X0.177	mm
Pixel Arrangement	R.G.B Vertical Stripe	/
Pixel Driving Element	a-Si	/
Viewing Direction	ALL	/
Gray Scale Inversion Direction	ALL	/
Weight (gram)	146	g
Suggested Driver IC	EK79202	/

(2). Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Conditions
Logic Supply Voltage	VDD	2.3	3.6	V	TA=25°C
Backlight input voltage	LEDA	28.0	34.0	V	
Operating Temperature	TOP	-30	80	°C	
Operating Humidity	HOP	-	90	%RH	
Storage Temperature	TST	-30	85	°C	
Storage Humidity	HST	-	90	%RH	

Note: The module may be destroyed and not be recovered while the absolute maximum rating values of this product have been exceeded

(3). Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is F62240-H1210B manufactured by Vigorconn.

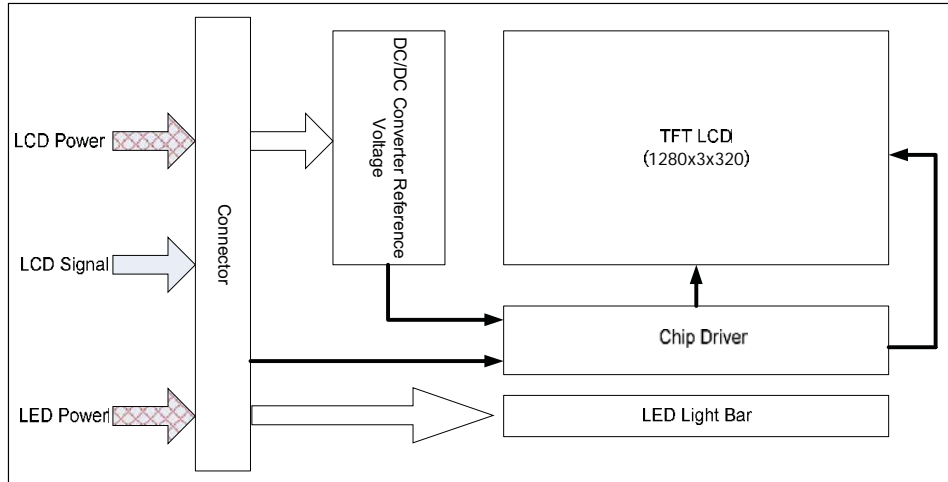
Pin No.	Symbol	Description	Remarks
1	NC	Not connect	
2-3	VDD	Power supply 3.3V	
4	NC	Not connect	
5	RESET	Global reset pin.	Note 1
6	NC	Not connect	
7	GND	Ground	
8	R0-	LVDS differential data input	
9	R0+	LVDS differential data input	
10	GND	Ground	
11	R1-	LVDS differential data input	
12	R1+	LVDS differential data input	
13	GND	Ground	
14	R2-	LVDS differential data input	
15	R2+	LVDS differential data input	
16	GND	Ground	
17	CLK-	LVDS differential data input	
18	CLK+	LVDS differential data input	
19	GND	Ground	
20	R3-	LVDS differential data input	
21	R3+	LVDS differential data input	
22	GND	Ground	
23-24	NC	Not connect	
25	GND	Ground	
26-27	NC	Not connect	
28	LVFMT	VESA modes(H) EIDA modes(L)	
29	NC	Not connect	
30	GND	Ground	
31-32	NC	Not connect	
33-38	NC	Not connect	
39-40	NC	Not connect	

Note 1.

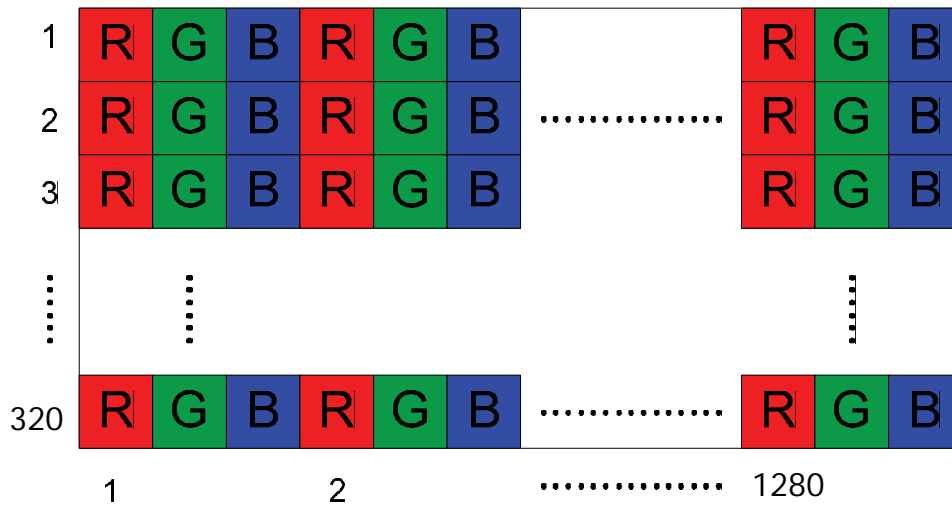
RESETB	Function
H	Normal operation
L	The controller is in reset state

Suggest to connecting with an RC reset circuit for stability.

(4). Function Block Diagram



Pixel Format



:

(5). Operation Specification

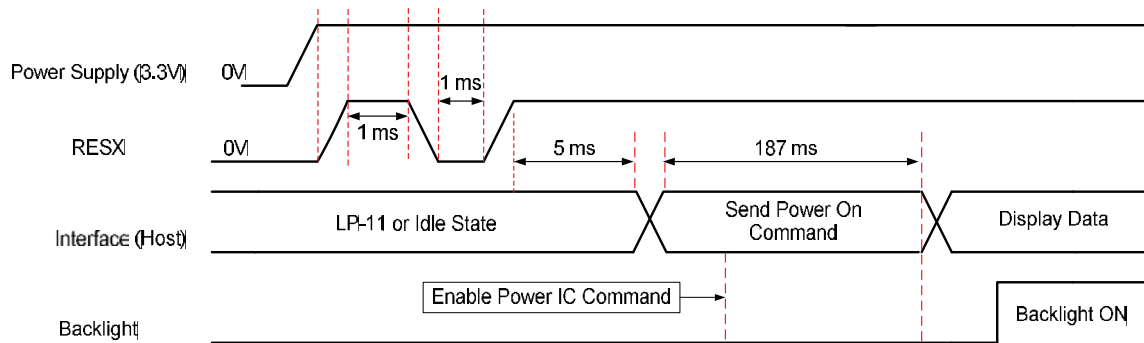
5.1 General Input Condition

($T_A=25^{\circ}\text{C}$)

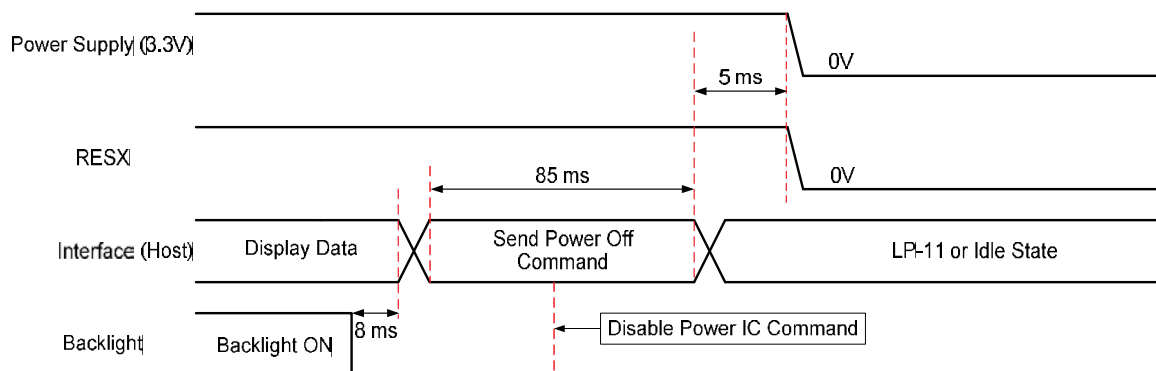
Item	Symbol	Values				Conditions
		Min.	Typ.	Max.	Unit	
Power supply voltage	V_{DD}	2.3	3.3	3.6	V	GND=0V
Backlight power voltage	LED+	28.0	32.0	34.0	V	
Power supply current	I_{VDD}	-	200	-	mA	VDD=3.3V
Backlight supply current	I_{LED}	-	360	-	mA	

5.2 Power Sequence

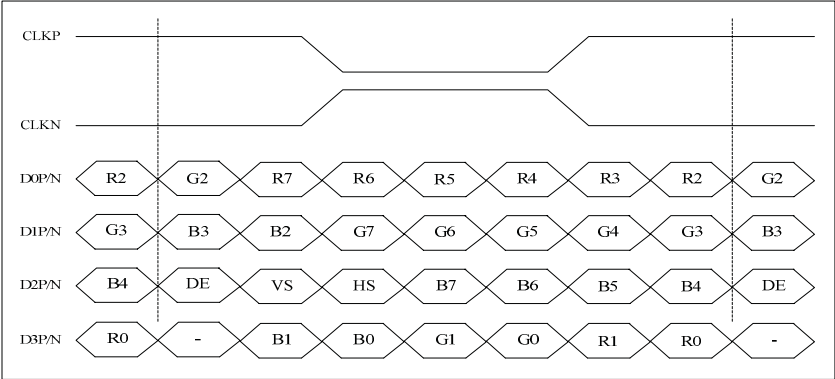
*Power on:



*Power off:



5.3 Input Data Characteristics



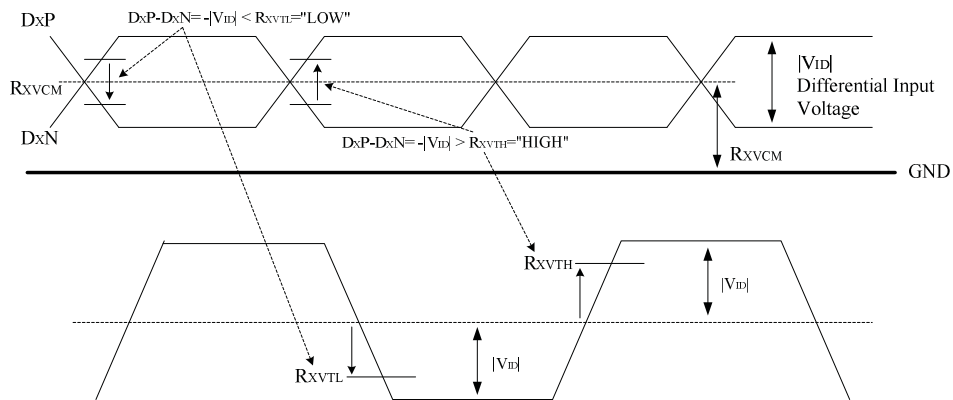
Data Mapping for JEIDA Format

LVDS DC electrical characteristics

(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS_IF=0V, TA=-20 to +85°C)

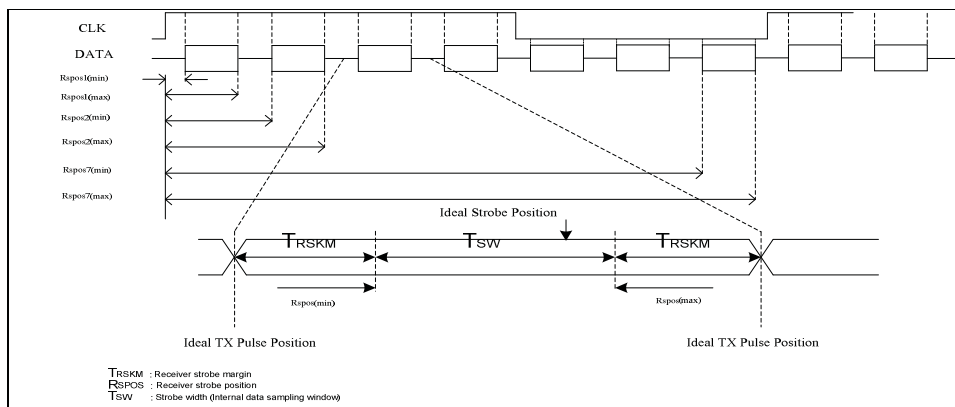
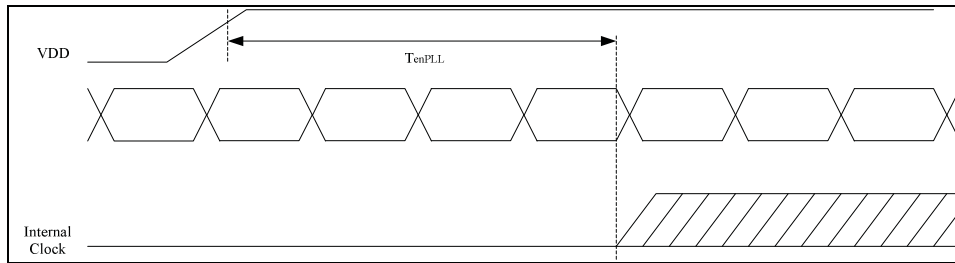
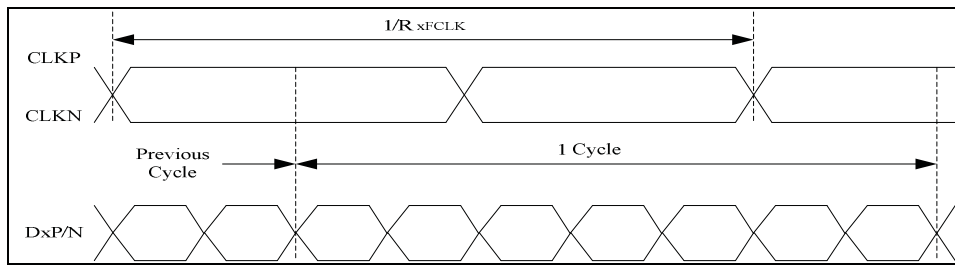
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{XVTH}	+0.1	0.2	0.3	V	$R_{XVCM}=1.2V$
Differential input low threshold voltage	R_{XVTL}	-0.3	-0.2	-0.1	V	
Input voltage range (singled-end)	R_{XVIN}	0.7	-	1.7	V	
Differential input common mode voltage	R_{XVCM}	1	1.2	1.4	V	$ V_{ID} =0.2$
Differential input impedance	Z_{ID}	80	100	125	ohm	
Differential input voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	I_{LCLVDS}	-10	-	+10	uA	
LVDS Digital Operating Current	I_{VDD}	-	15	20	mA	$F_{DCLK}=80MHz, VDD=3.3V,$ Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{ST}	-	-	250	uA	Clock & all Functions are stopped

Single-end Signals



LVDS mode AC electrical characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R _x FCLK	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	T _{RSKM}	500	-	-	ps	VID = 200mV RxVCM = 1.2V RxFCLK = 81MHz
Clock high time	T _{LVCH}	-	4/(7* R _x FCLK)	-	ns	
Clock low time	T _{LVCL}	-	3/(7* R _x FCLK)	-	ns	
PLL wake-up time	T _{enPLL}	-	-	150	us	



5.4 Timing requirements for RESET

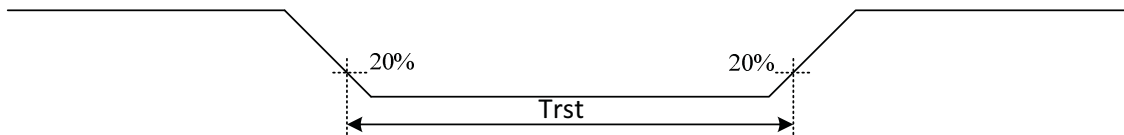
When RESETB of the reset pin equals to Low, it will be in the condition of reset. When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

(Test condition: VDDIO=2.3V~3.6V, VSS=0V, T_A=-20 ~+85)

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max	
Reset low pulse width	Trst		20	-	-	μs



5.5 Back-Light Unit

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	LEDA	28.0	32.0	34.0	V	Note 1
Current for LED backlight	I _{LED}	---	360	---	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at T_a=25°C and I_{LED} =360mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at T_a=25°C and I_{LED}=360mA. The LED lifetime could be decreased if operating I_{LED} is larger than 360mA.

5.6 Input Signal Timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)	F _{DCLK}	66.3	72.4	78.9	MHz
HSYNC period time	T _H	1380	1460	1500	DCLK
Horizontal display area	T _{HD}	1280			DCLK
HSYNC pulse width	T _{HPW}	Min.	2		
		Typ.	20		
		Max.	40		
HSYNC back porch(with pulse width)	T _{HBP}	80	80	80	DCLK
HSYNC front porch	T _{HFP}	12	80	148	DCLK
VSYNC period time	T _V	346	360	374	H
Vertical display area	T _{VD}	320			H
VSYNC pulse width	T _{VPW}	Min.	2		H
		Typ.	2		H
		Max.	20		
VSYNC back porch(with pulse width)	T _{VBP}	19	19	19	H
VSYNC front porch	T _{VFP}	1	19	37	H

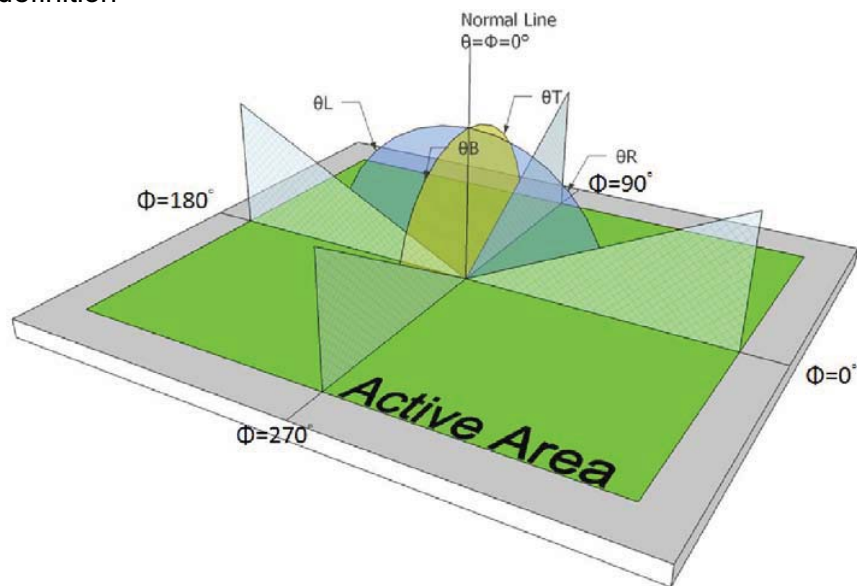
Note : Blanking setting must be even numbers.

(6). Optical Specification

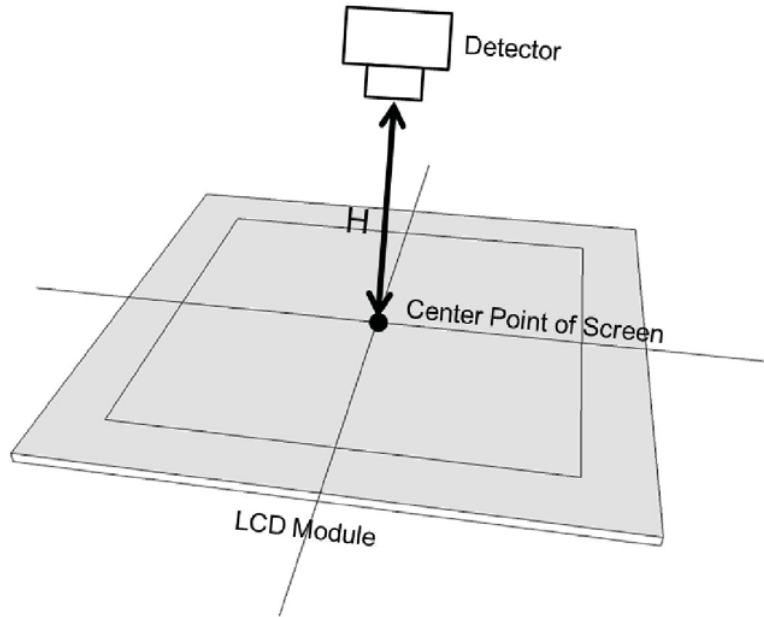
Item	Symbol	Values				Conditions
		Min.	Typ.	Max.	Unit	
View angle(CR≥10)	θ_L	80.0	85.0	-	degree	Note 1
	θ_R	80.0	85.0	-		
	θ_T	80.0	85.0	-		
	θ_B	80.0	85.0	-		
Response time	$T_{on} + T_{off}$	-	30	35	ms	Note 1
Contrast ratio	CR	800	1000	-		
Color chromaticity	WX	0.274	0.314	0.354		
	WY	0.284	0.324	0.364		
Luminance	L	3000	3500	-	cd/m ²	BL=300mA
Luminance uniformity	YU	75	-	-	%	Note 2
Response time	$T_{on} + T_{off}$	-	450	-	ms	-30°C

Note 1:

*View angle definition



*Measurement system



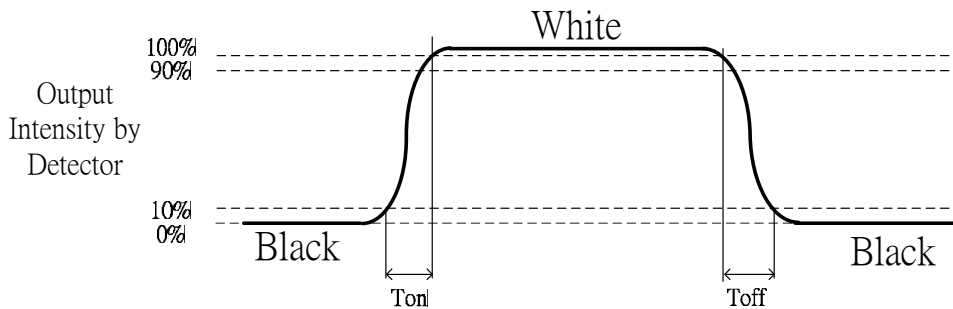
The module should be measured in dark room after 30 minutes operation and focus on center point of the LCD.

(1)Luminance: Detector:BM-5A, H:500mm

(2)Response time: Detector: BM-7

T_{on} : time between intensity 10% to 90%

T_{off} : time between intensity 90% to 10%

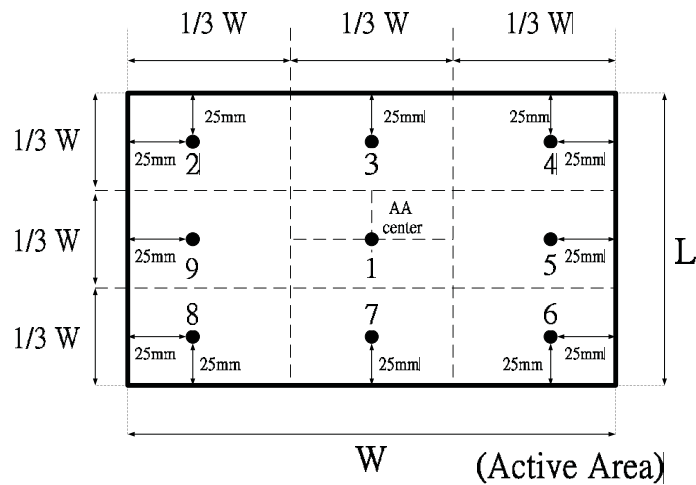


Note 2:

*Lum. Uniformity Definition

Measure the Lum. of gray level 63 at 9 points

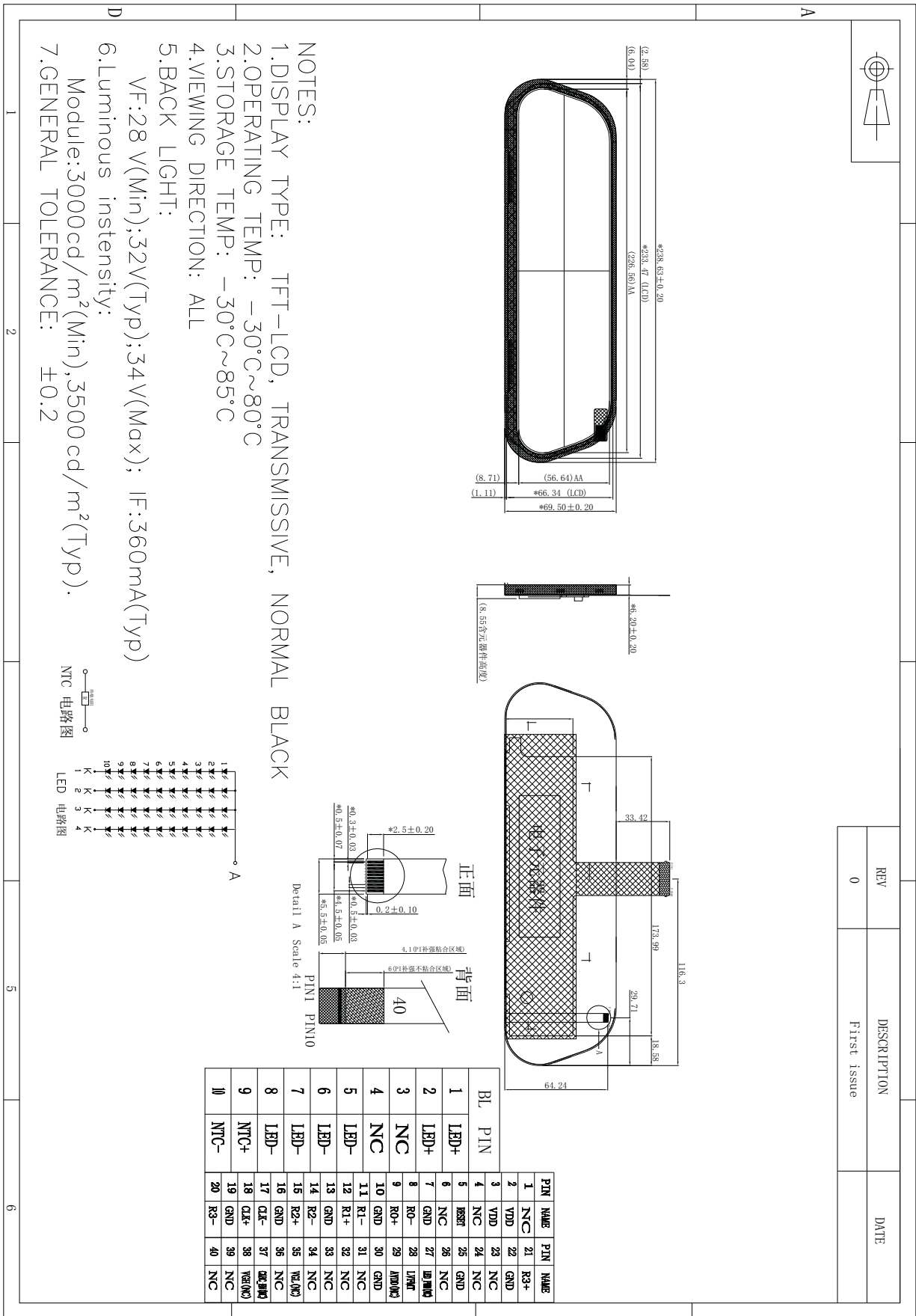
$YU = (\text{Min. brightness of point 1~9} / \text{Max. brightness of point 1~9}) * 100\%$

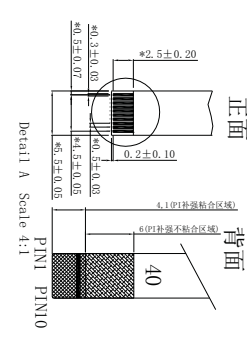
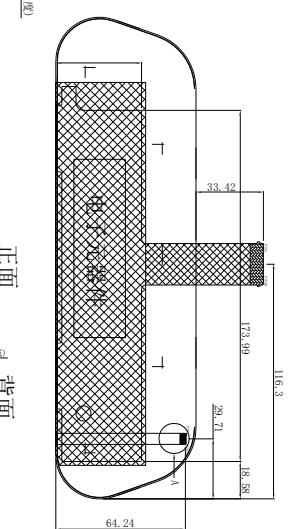
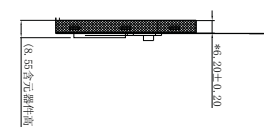
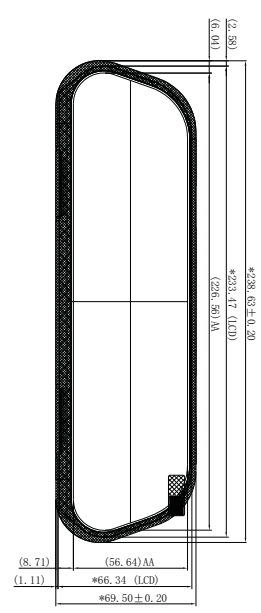
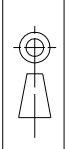


(7). Reliability Test Items

Item	Condition
High Temperature Storage	85°C 240hrs
Low Temperature Storage	-30°C 240hrs
High Temperature Operation	80°C 240hrs BL ILED<200mA
Low Temperature Operation	-30°C 240hrs
Operation High Temperature/Humidity	+60°C, 90%RH 96 hrs
Thermal Shock(Storage)	-30°C/30 min ~ +80°C/30 min ,100 cycles
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)
Mechanical Shock	100G, 6ms,±X, ±Y, ±Z 3 times for each direction
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)
Package Drop Test	Height:80 cm 1 corner, 3 edges, 6 surfaces
Electro Static Discharge	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV Class B(EN 61000-4-2)

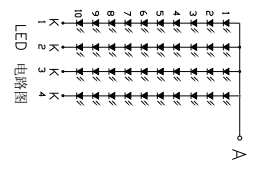
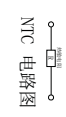
8).Outline Dimension





Detail A Scale 4:1

- NOTES:
- 1.DISPLAY TYPE: TFT-LCD, TRANSMISSIVE, NORMAL BLACK
 - 2.OPERATING TEMP: -30°C~80°C
 - 3.STORAGE TEMP: -30°C~85°C
 - 4.VIEWING DIRECTION: ALL
 - 5.BACK LIGHT: VF:28 V(Min);32V(Typ);34V(Max); IF:360mA(Typ)
 - 6.Luminous instensity: Module:3000cd/m²(Min),3500 cd/m²(Typ).
 - 7.GENERAL TOLERANCE: ±0.2



(9).Package
TBD