



SPECIFICATIONS

CUSTOMER : _____




MODEL NO. : **GFTO101FB1280800V**

VERSION : **A**

DATE : **2018.01.08**

CERTIFICATION : **ROHS**

CUSTOMER SIGN : _____

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Revision Record

Data(y/m/d)	Ver.	Description	Note	page
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1. SPECIFICATIONS

GFTO101FB1280800V is 10.1" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit and LED backlight. By applying 1280×800 images are displayed on the 10.1" diagonal screen. Display 16.7M colors by R.G.B signal input.

1.1 Features

ITEM	SPECIFICATION
Display Area (mm)	216.96(W) x 135.6 (H)
Number of Pixels	1280(H) × 3 (RGB) × 800(V)
Pixel Pitch (mm)	0.1695 (H) × 0.1695 (V) (mm)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally Black
Number of Colors	16.7M (6bit + HFRC)
Brightness (cd/m ²)	500 cd/m ² (typ.)/420 cd/m ² (min.)
Response Time (ms)	25 ms (typ.)/35ms (max.)
Contrast Ratio	1000(typ.)/800 (min.)
Viewing Angle (CR ≥ 10)	L/R/U/D=85/85/85/85 (typ.) · 80/80/80/80(min.)
Power Consumption (W)	1.30W(max)@White pattern /Logic · 2.45W(max)@ w/o Driver /BL · total 3.75W(max)
Interface connection	LVDS
Module Size (mm)	230.9 (W)x154.3(H)x 2.8(D) (typical w/o PCB)
Module Weight (g)	210g(typ)
Backlight Unit	LED
Surface Treatment	Anti-Glare



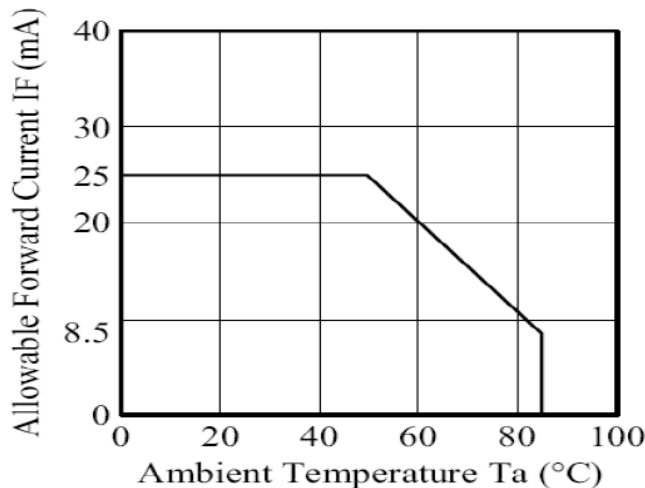
1.2 Absolute Maximum Ratings

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

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
LCD Power Voltage	VCC	0	3.96	V	
Signal Input Voltage	RxIN0+ ~ RxIN2+ RxIN0- ~ RxIN2- Rx CLK IN +/-	-0.3	Vcc + 0.3	V	
Operation Temperature	Top	-20	70	°C	*1). *2). *3). *4).
Storage Temperature	Tstg	-30	80	°C	*1). *2). *3)
Forward Current (per LED)	If		30	mA	
Reverse Voltage (per LED)	VR		5	V	
Pulse forward current (per LED)	I _{fp}		100	mA	*5). *6)

【 Note 】

- *1) The relative temperature and humidity range are as below sketch, 90%RH Max. ($T_a \leq 40^\circ\text{C}$)
- *2) The maximum wet bulb temperature $\leq 39^\circ\text{C}$ ($T_a > 40^\circ\text{C}$), and without dewing.
- *3) If product in environment which over the definition of the relative temperature and humidity out of range too long, it will affect visual of LCD.
- *4) If you operate LCD in normal temperature range, the center surface of panel should be under 50°C .
- *5) I_{fp} Conditions : Pulse Width $\leq 10\text{msec}$ and Duty $\leq 1/10$.
- *6) When LED shall be operated under following drawing (Ambient Temperature / Allowable Forward Current)





1.3 Electrical Characteristics

TFT LCD

Ta=25°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE	
LCD Power Voltage	VCC	3.0	3.3	3.6	V	*1)	
LCD Power Current	ICC	-	290	360	mA	*2)	
Rush Current	Irush	-	-	1	A	*3)	
Logic Input Voltage (LVDS: IN+,IN-)	Common Voltage	VCM	0.8	--	VCC-1.2	V	*4)
	Differential Input Voltage	VID	300	-	600	mV	*4)
	Threshold Voltage (HIGH)	VTH	-	-	100	mV	*4) When VCM = +1.2V
	Threshold Voltage (LOW)	VTL	-100	-	-	mV	
1 Data time	UI	-	tclk*1/7	-	tclk	*5)	
LVDS clock to data skew	tskew	-	-	0.2	- UI		
input data eye width	teyew	0.6	-	-	UI		

【Note】

*1) Power Sequence :

$0.50\text{ ms} \leq t1 \leq 10\text{ ms}$

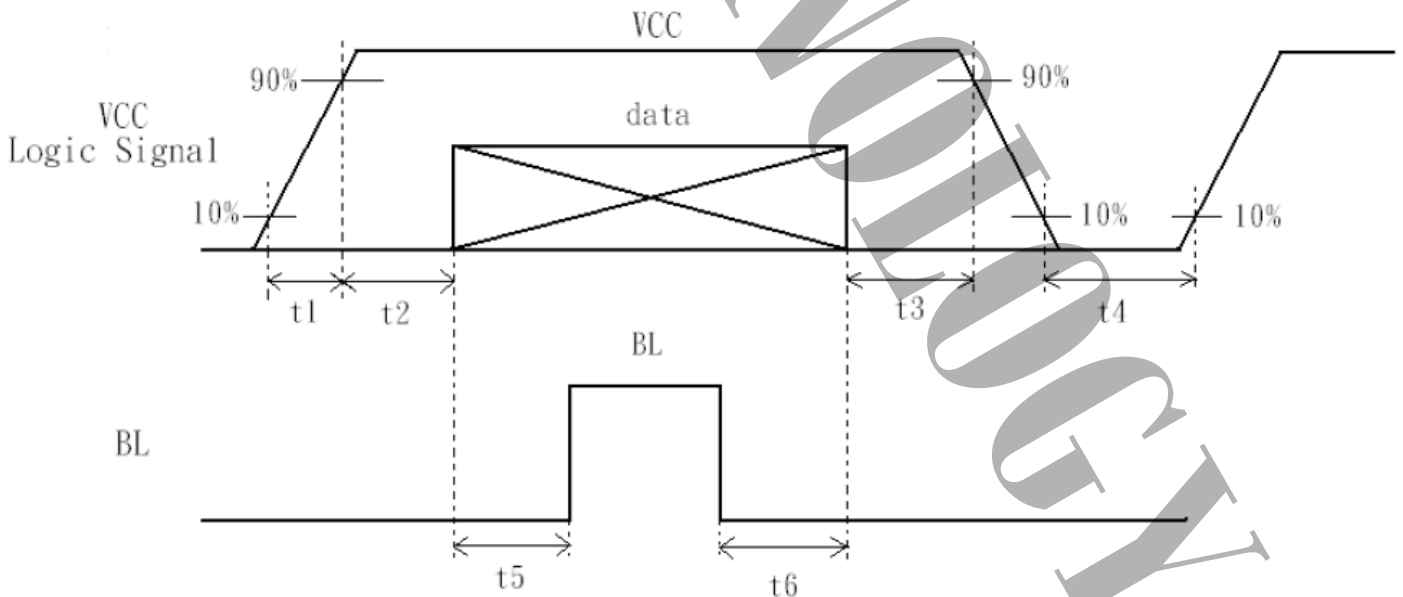
$0.01\text{ ms} < t2 \leq 50\text{ ms}$

$0.01\text{ ms} < t3 \leq 50\text{ ms}$

$500\text{ ms} \leq t4$

$200\text{ ms} \leq t5$

$200\text{ ms} \leq t6$

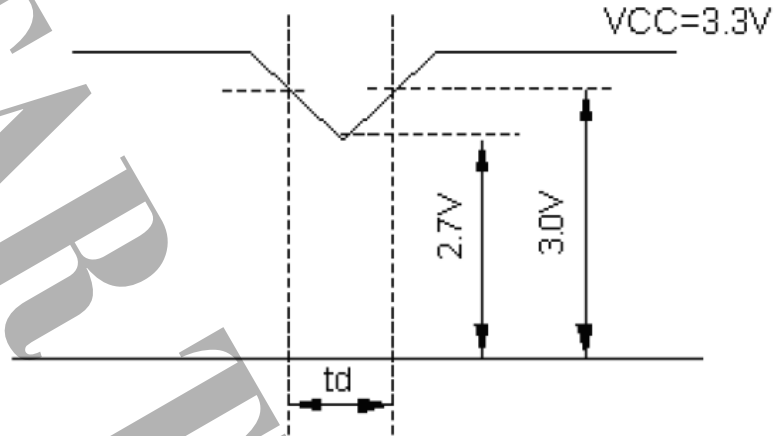




VCC-dip state

(1) when $3.0V > VCC \geq 2.7V$, $t_d \leq 10$ ms.

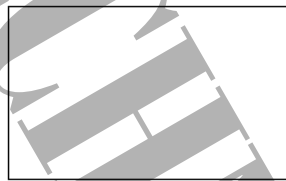
(2) when $VCC < 2.7V$, VCC-dip condition should as the VCC-turn-off condition.



*2) Typ. specification : Gray-level test Pattern (TYP Freq. @3.3V)
Max. specification : White test Pattern (TYP Freq. @3.3V)
The current is root mean square value (RMS)

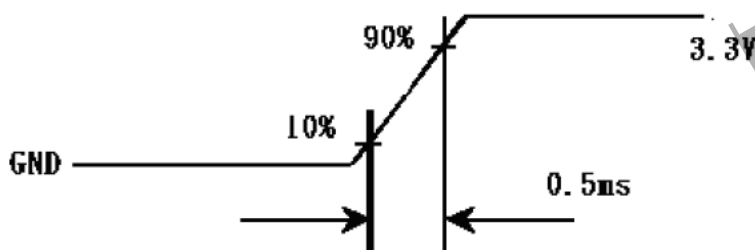
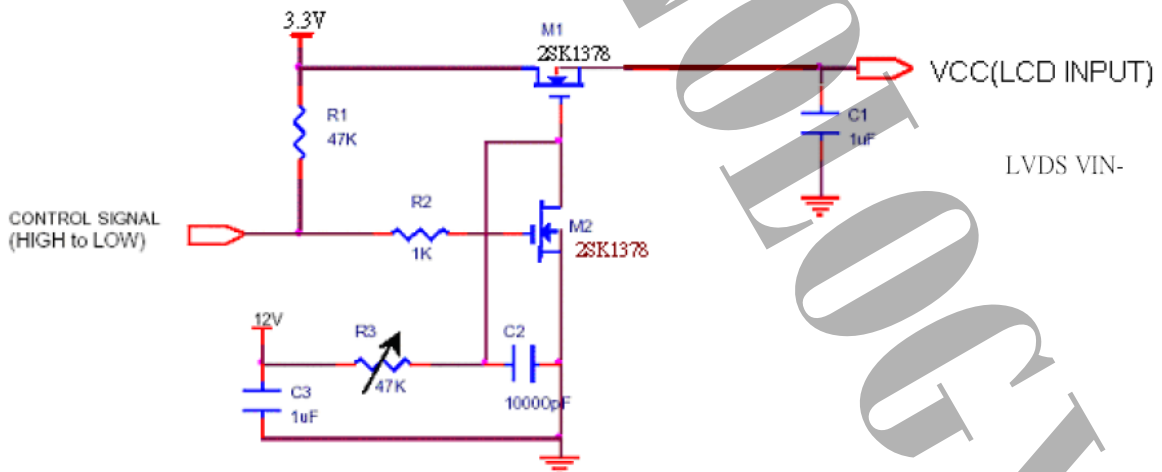


(a) Gray-level Pattern



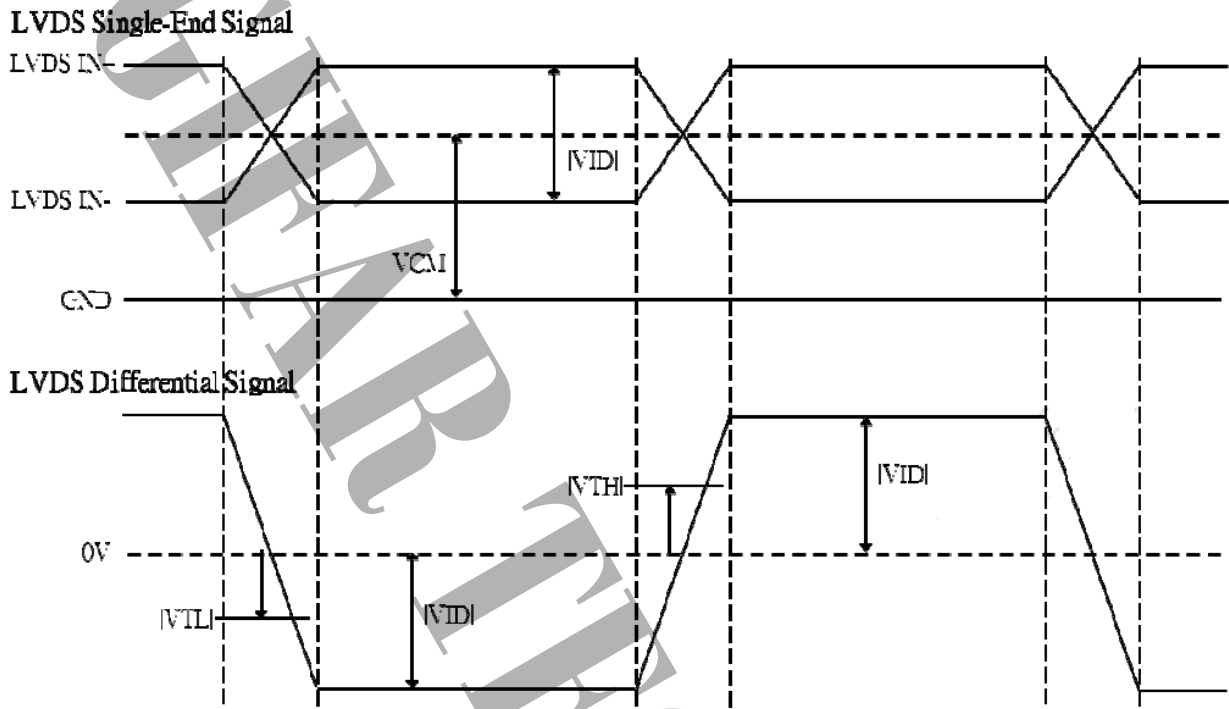
(b) White Pattern

*3) Irush measure condition



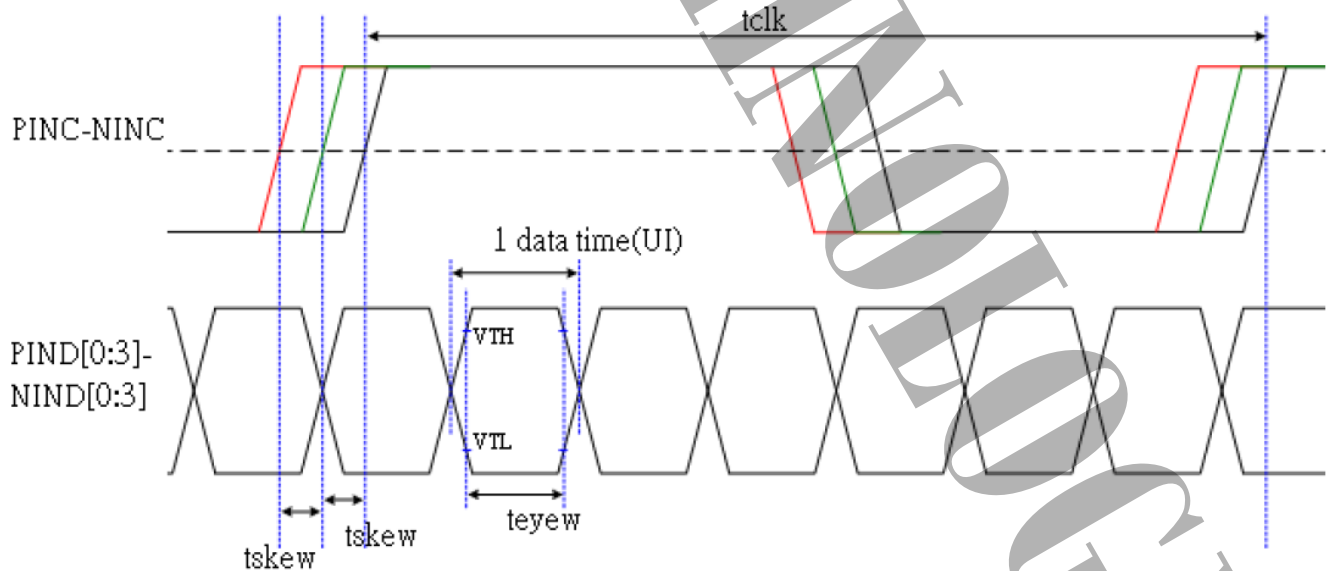


*4) LVDS Signal Definite :



VIN+ : Positive differential DATA & CLK Input
VIN- : Negative differential DATA & CLK Input

*5) LVDS SKEW & eye width





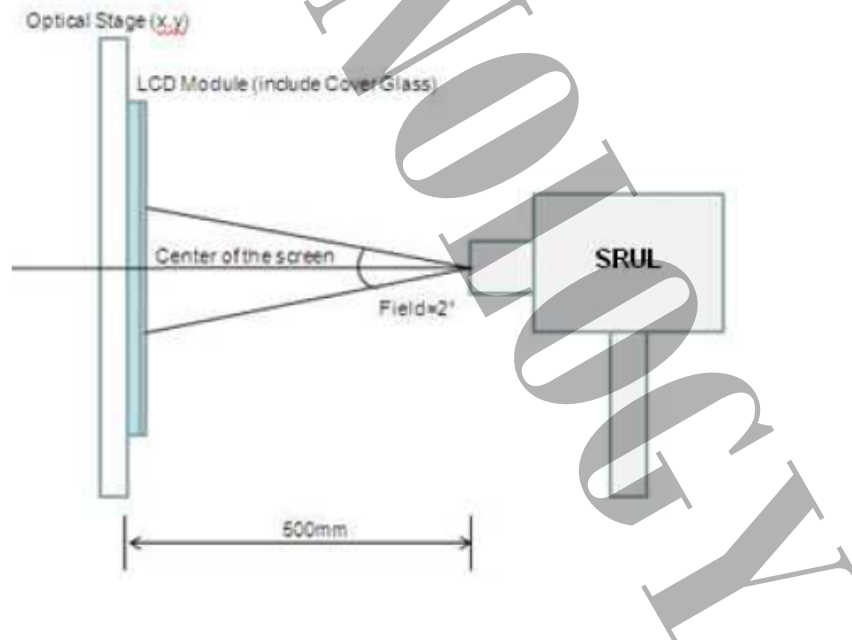
1.4 Optical Characteristics

(contrast ratio, Luminance, Luminance Uniformity, response time, viewing angle results are using CPT LC(Vlc>5.3V) + CPT Polarizer + Corresponding Backlight, reference only)

Ambient condition : 25 ± 2°C · 60 ± 10% RH · under 10 Lux in the darkroom

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK
Constrast Ratio	CR	Point-5	800	1000		--	Note1, 2
Luminance	Lw	Point-5	420	500		cd/m2	Note3
Luminance Uniformity	ΔL		80			%	Note3
Response Time (White - Black)	Tr+ Tf	Point-5		25	35	ms	Note4
NTSC	--	Point-5	45	50		%	Note6
Viewing Angle	Left	(φ)	75	85			Note5
	Right	(φ)	75	85			
	Upper	(θ)	75	85			
	Lower	(θ)	75	85			
Color Coordinate	White	x	0.275	0.315	0.355		Note6
		y	0.302	0.342	0.382		
	Red	x	(0.574)	(0.614)	(0.654)		
		y	(0.302)	(0.342)	(0.382)		
	Green	x	(0.300)	(0.340)	(0.380)		
		y	(0.524)	(0.564)	(0.604)		
	Blue	x	(0.133)	(0.173)	(0.213)		
		y	(0.079)	(0.119)	(0.159)		

Note 1. Measure device : SRU , viewing cone = 2° , I_L = 20mA



Note 2. Definition of Contrast Ratio :

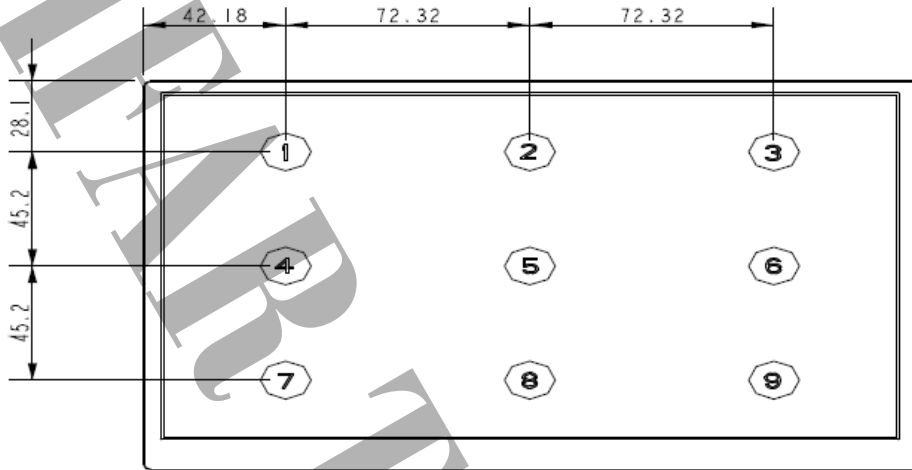
$$CR = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$



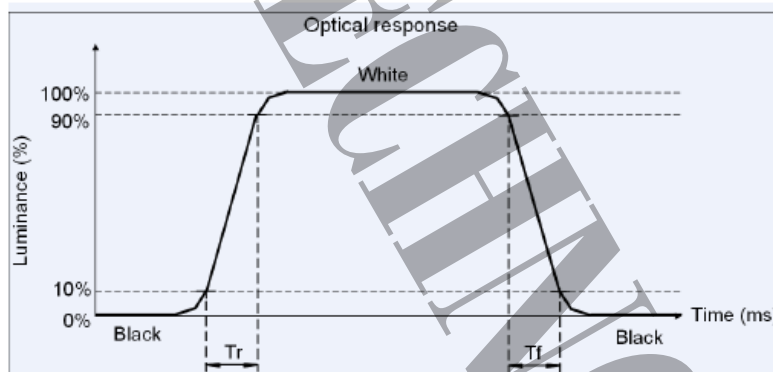
Note 3. Definition of luminance : Measure white luminance on the point 5 as figure.7-1

Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.7-1

$$\Delta L = [L(\text{MIN})/L(\text{MAX})] \times 100\%$$

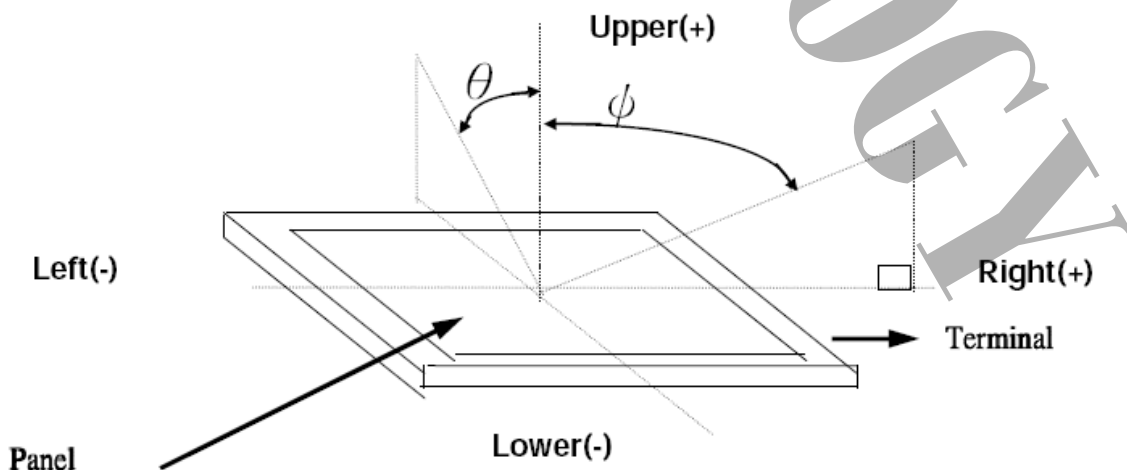


Note 4. Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



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.

Note 5. Definition of view angle(θ , ϕ) :





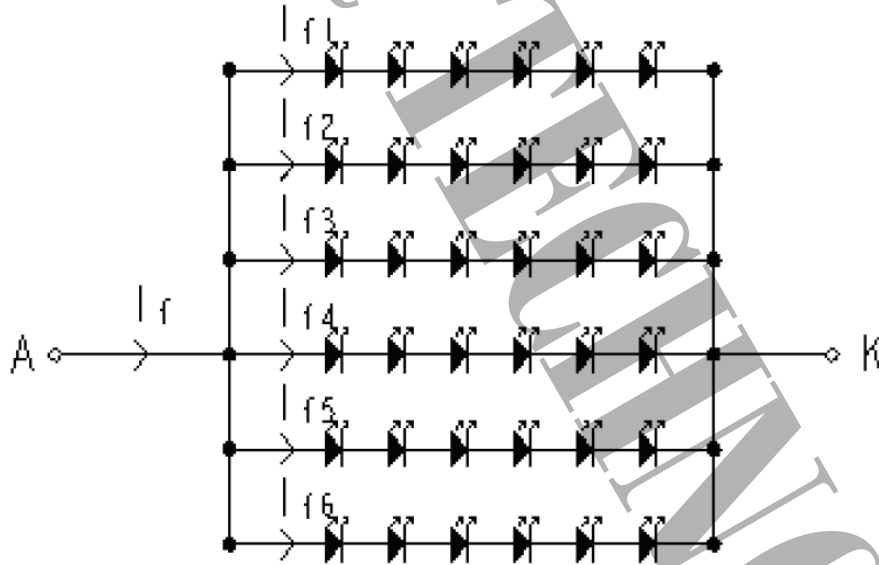
1.5 Backlight Characteristics

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25°C (20mA/serise)	--	120	--	mA	
LED voltage	VL	Ta=25°C (20mA/serise)	16.2	18	20.4	V	
Power consumption	WL	Ta=25°C (20mA/serise)	--	2.16	--	W	
LED Lifetime	-	Ta=25°C IF=20mA		15000		Hr	

Remarks :

*1)LED Circuit Diagram



*2) A : Anode(+), K : Cathode(-)

*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

*4) Definition of Led lifetime : Luminance < Initial luminance 50%.



2. MODULE STRUCTURE

2.1 Interface Pin Description

CN1 (Input Signal)

PIN NO.	SYMBOL	FUNCTION	REMARK
1	Anode	LED Output	
2	Anode	LED Output	
3	Anode	LED Output	
4	NC	NC (Please let it floating for test only)	
5	NC	NC (Please let it floating for test only)	
6	NC	NC (Please let it floating for test only)	
7	NC	NC (Please let it floating for test only)	
8	Cathode	LED Feedback	
9	Cathode	LED Feedback	
10	Cathode	LED Feedback	
11	NC	NC (Please let it floating for test only)	
12	NC	NC (Please let it floating for test only)	
13	GND	Ground	
14	NC	NC (Please let it floating for test only)	
15	NC	NC (Please let it floating for test only)	
16	GND	Ground	
17	NC	NC (Please let it floating for test only)	
18	NC	NC (Please let it floating for test only)	
19	GND	Ground	
20	RXIN3+	LVDS Signal(+)—channel 3	
21	RXIN3-	LVDS Signal(-)—channel 3	
22	GND	Ground	
23	RXCLKIN+	LVDS Clock Signal(+)	
24	RXCLKIN-	LVDS Clock Signal(-)	
25	GND	Ground	
26	RXIN2+	LVDS Signal(+)—channel 2	
27	RXIN2-	LVDS Signal(-)—channel 2	
28	GND	Ground	
29	RXIN1+	LVDS Signal(+)—channel 1	
30	RXIN1-	LVDS Signal(-)—channel 1	
31	GND	Ground	
32	RXIN0+	LVDS Signal(+)—channel 0	
33	RXIN0-	LVDS Signal(-)—channel 0	
34	GND	Ground	
35	NC	NC (Please let it floating for test only)	
36	NC	NC (Please let it floating for test only)	
37	NC	NC (Please let it floating for test only)	
38	VCC	+3.3V Power	
39	VCC	+3.3V Power	
40	NC	NC (Please let it floating for test only)	

Connector Part Name : 5-2069716-3 (TYCO) / I-PEX 20455-040E-12

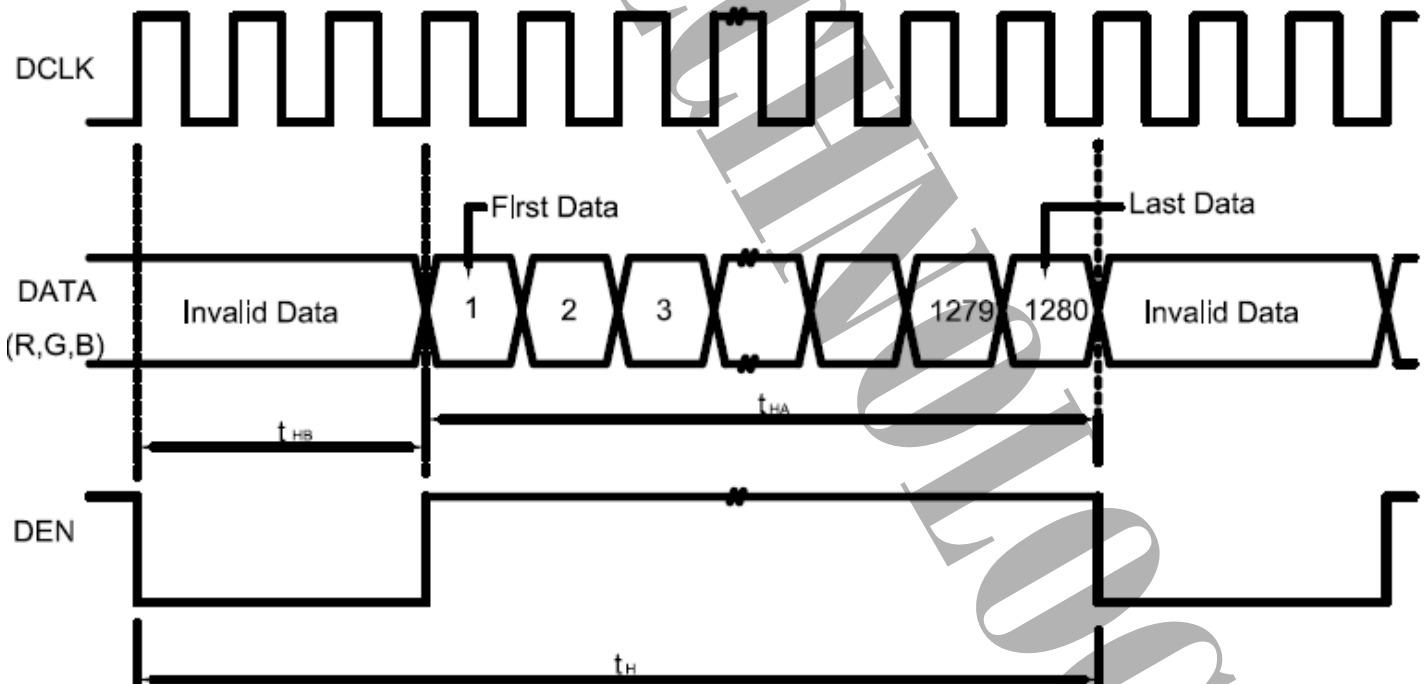


2.2. Timing Characteristics of Input Signals

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	
LVDS input signal sequence	CLK Frequency	tclk	70.5	74.4	78.9	MHz	
LCD input signal sequence (Input LVDS Transmitter)	Horizontal	Horizontal total Time	t_H	1450	1480	1500	tCLK
		Horizontal effective Time	t_{HA}	1280			tCLK
		Horizontal Blank Time	t_{HB}	170	200	220	tCLK
	Vertical	Vertical total Time	t_V	810	838	877	t_H
		Vertical effective Time	t_{VA}	800			t_H
		Vertical Blank Time	t_{VB}	10	38	77	t_H

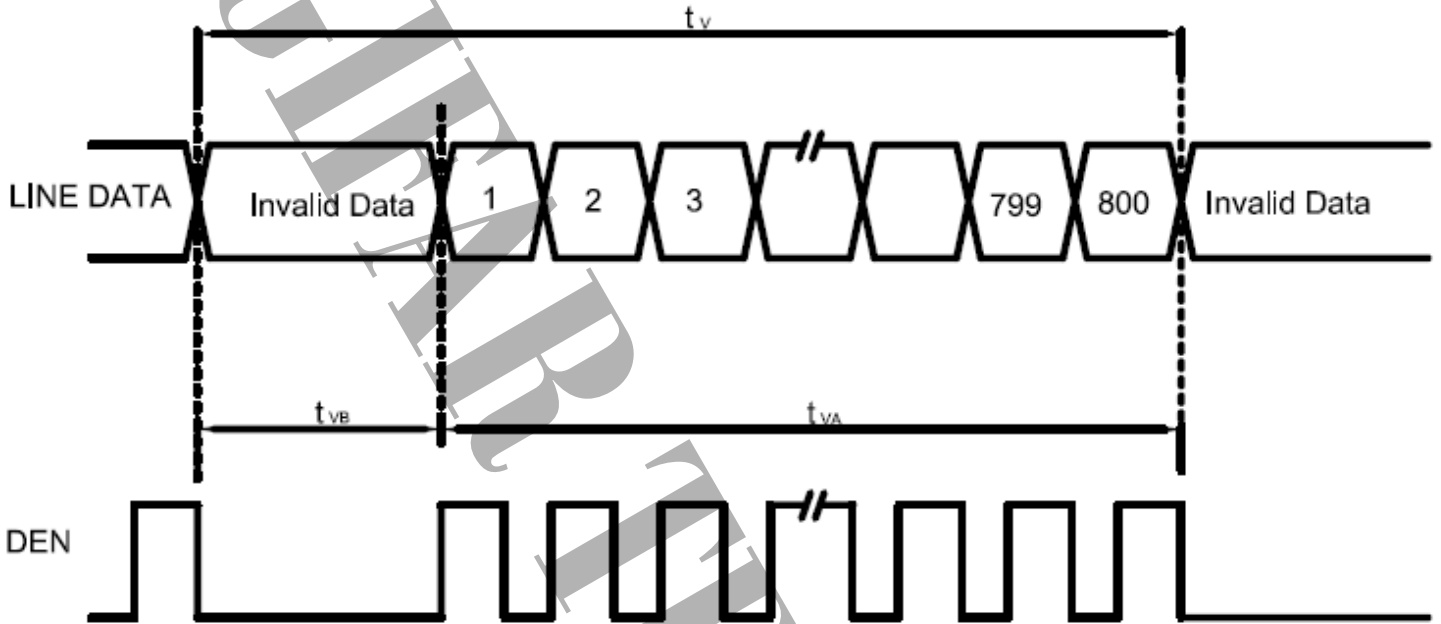
2.2.1 Timing Sequence (Timing Chart)

Horizontal Timing Sequence

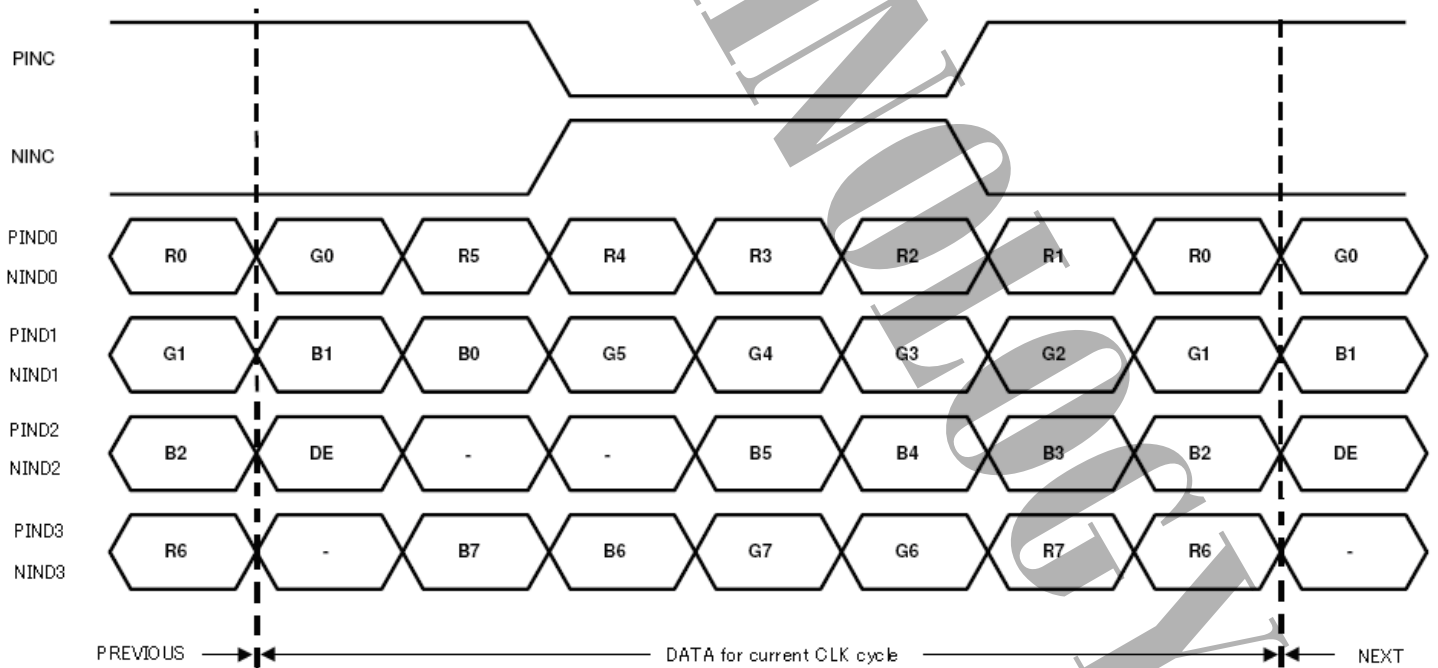




Vertical Timing Sequence



LVDS Input Data Mapping





2.3 Color Data Reference

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	1	0	0	0	0	0	0	0	
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	1	1	1	1	1	1	1	
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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	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	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	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	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	GREEN(0)	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	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	0	1	0	0	0	0	0	0	0	0	
	GREEN(254)	0	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	0	1	1	1	1	1	1	1	1	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	0	
	BLUE(1)	0	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	0	0	1	
	BLUE(254)	0	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	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



3. RELIABILITY TEST

3.1 Temperature and humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70°C ;240hrs	
High Temperature Storage	80°C ; 240hrs	
High Temperature High Humidity Operation	60°C ; 90%RH ;240hrs	No condensation
Low Temperature Operation	-20°C ; 240hrs	Backlight unit always turn on
Low Temperature Storage	-30°C ; 240hrs	
Thermal Shock	-30°C(0.5hr) ~ 80°C(0.5hr) ; 200 Cycles	
Image Sticking	25 °C± 2 °C ; 4hrs	Note 1

Note 1. :

Condition of Image Sticking test : 25 °C± 2 °C

Operation with test pattern sustained for 4hrs, then change to gray pattern immediately.

After 5 mins, the mura must be disappeared completely .

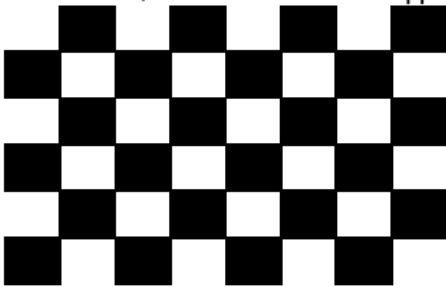


Image Sticking -pattern



Mid-Gray pattern

3.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	<ul style="list-style-type: none"> ● Shock level: 980m/s²(equal to 100G). ● Waveform: half sinusoidal wave,6ms. ● Number of shocks: ±X,±Y,±Z axes for a total of six shock inputs.
Vibration (Non-operation)	<ul style="list-style-type: none"> ● Frequency range:8~33.3Hz ● Stoke : 1.3 mm ● Vibration: sinusoidal wave, perpendicular axis(both x, z axis: 2hrs ,y axis: 4hrs). ● Sweep: 2.9G,33.3 Hz -400 Hz ● Cycle time: 15 min

3.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	Note
ESD (Power Off)	HM Air & contact: 150pF · 330Ω · ±8kV&±15kV	1
	MM Connector: 200pF · 0Ω (±200V, once for each terminal)	2

【Note】 Measure

1: LCD glass and metal bezel

2: IF connector pins

3.4. Judgment standard

The Judgment of the above test should be made as follow:

Pass: Normal display image and no line defect.

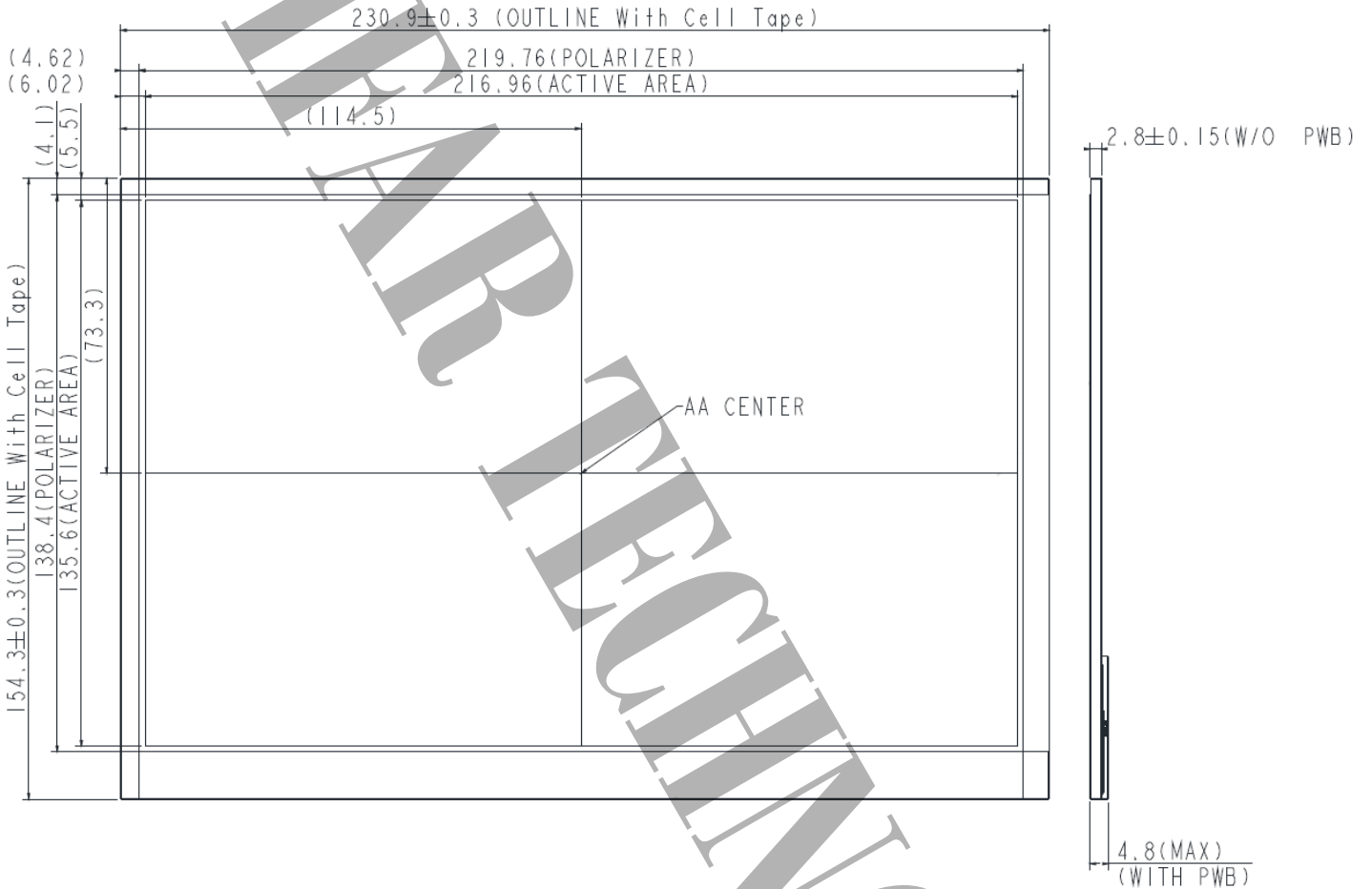
Fail: No display image, function NG, or line defects.



4. LCM Drawing

4.1 Front Side

[Unit : mm]



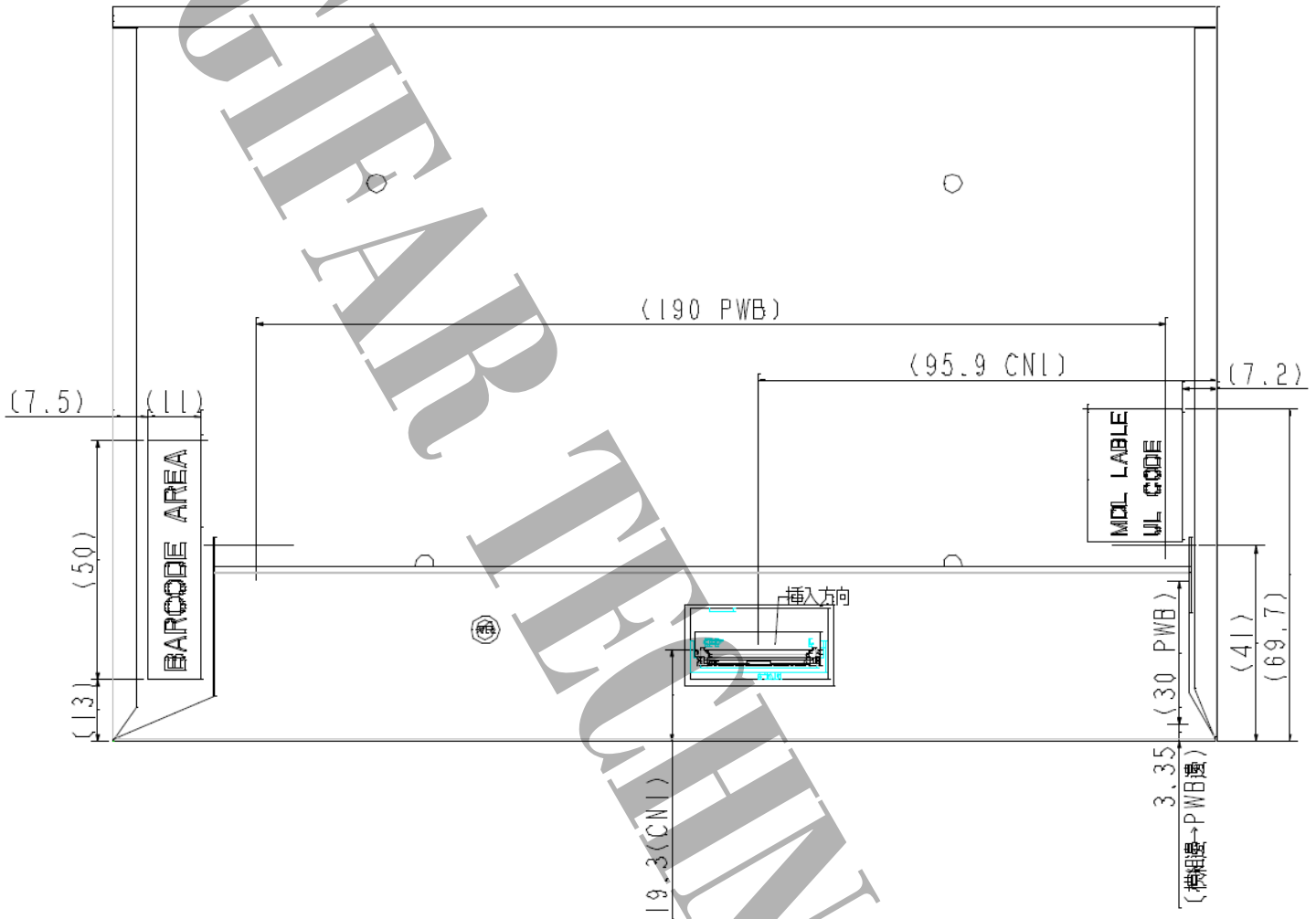
[Unit : mm]

[Note]: General Tolerance = ± 0.3 mm



4.2 Rear Side

[Unit : mm]



[Note]: General Tolerance = $\pm 0.3\text{mm}$

5. WARRANTY

- 5.1 The period is within 12 months since the date of shipping out under normal using and storage conditions.
- 5.2 The warranty will be avoided in case of defect induced by customer.