



晶發科技股份有限公司
GI FAR TECHNOLOGY CO., LTD.

No. 81, Dongfeng St, Shulin District, 23874, New Taipei City, Taiwan, R.O.C.



SPECIFICATIONS

CUSTOMER : _____
MODEL NO. : **GFTO101FA1280800V**
VERSION : **A**
DATE : **2018.01.08**
CERTIFICATION : **ROHS**
CUSTOMER SIGN : _____

QA Approved By	Approved By	Prepared By	Prepared By
	GIFAR 2018.01.08 Sidney	GIFAR 2018.01.08 Hazel	GIFAR 2018.01.08 Rita

晶發科技股份有限公司
GI FAR TECHNOLOGY CO., LTD.

新北市樹林區東豐街 81 號

No. 81, Dongfeng St, Shulin District, 23874, New Taipei City, Taiwan, R.O.C.

TEL: +886-2-8684-1188 FAX: +886-2-8684-8532



Quality Certified
ISO 9001:2008
Licence No: TA1062-QC-EC

[illegible]



CONTENTS

1. SPECIFICATIONS	
1.1 Features	4
1.2 Absolute Maximum Ratings	5
1.3 Electrical Characteristics	6
1.4 Optical Characteristics	9
1.5 Backlight Characteristics	11
2. MODULE STRUCTURE	12
2.1 Interface Pin Description	12
2.2 BLOCK DIAGRAM	13
2.3 Timing Characteristics of Input Signals	14
2.4 Color Data Reference	16
3. RELIABILITY TEST	17
4. LCM Drawing	18
5. Warranty	19



1. SPECIFICATIONS

GFTO101FA1280800V 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 16.2M colors by R.G.B signal input.

1.1 Features

ITEM	SPECIFICATION
Display Area (mm)	216.96 (H) x 135.6 (V) (mm)
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 White, TN
Number of Colors	16.2M (6bit + FRC)
Viewing Direction	6 o'clock (Max. contrast ratio, Gray level inversion)
Brightness (cd/m ²)	450 cd/m ² (typ.)
Response Time (ms)	25 ms (typ.)
Contrast Ratio	700 (typ.)
Viewing Angle (CR ≥ 10)	140 degree (H)
	130 degree (V)
Power Consumption (W)	(0.502) Typ
Interface Connection	LVDS
Module Size (mm)	230.9 (W)x154.3 (H)x 4.8 (D/max)
Module Weight (g)	210 g (MAX.)
Backlight Unit	LED
Surface Treatment	AG25%, Hardness:3H , Reflectance < 4.5%

The LCD Products listed on this document are not suitable for use of aerospace equipment, submarine cable, and nuclear reactor control system and life support systems. If customers intend to use these LCD products for applications listed above or those not included in the "Standard" list as follows, please contact our sales in advance.

Standard : Computer, office equipment, communication equipment, test and Measurement equipment, machine tool, industrial robot, audio and visual equipment, other consumer products.



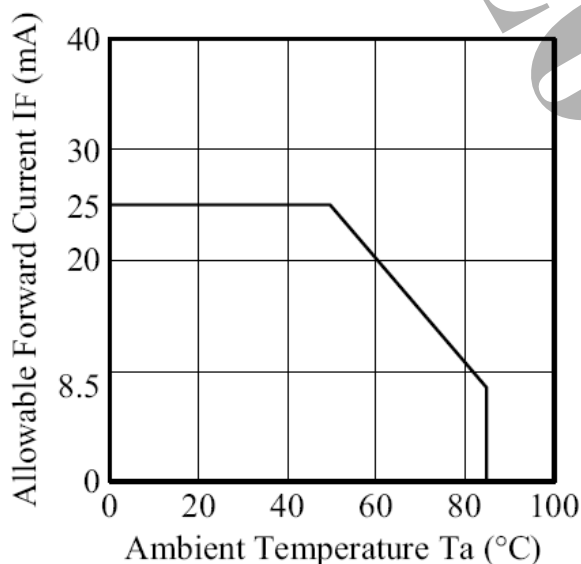
1.2 Absolute Maximum Ratings

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	4	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)	Ifp		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) Ifp 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

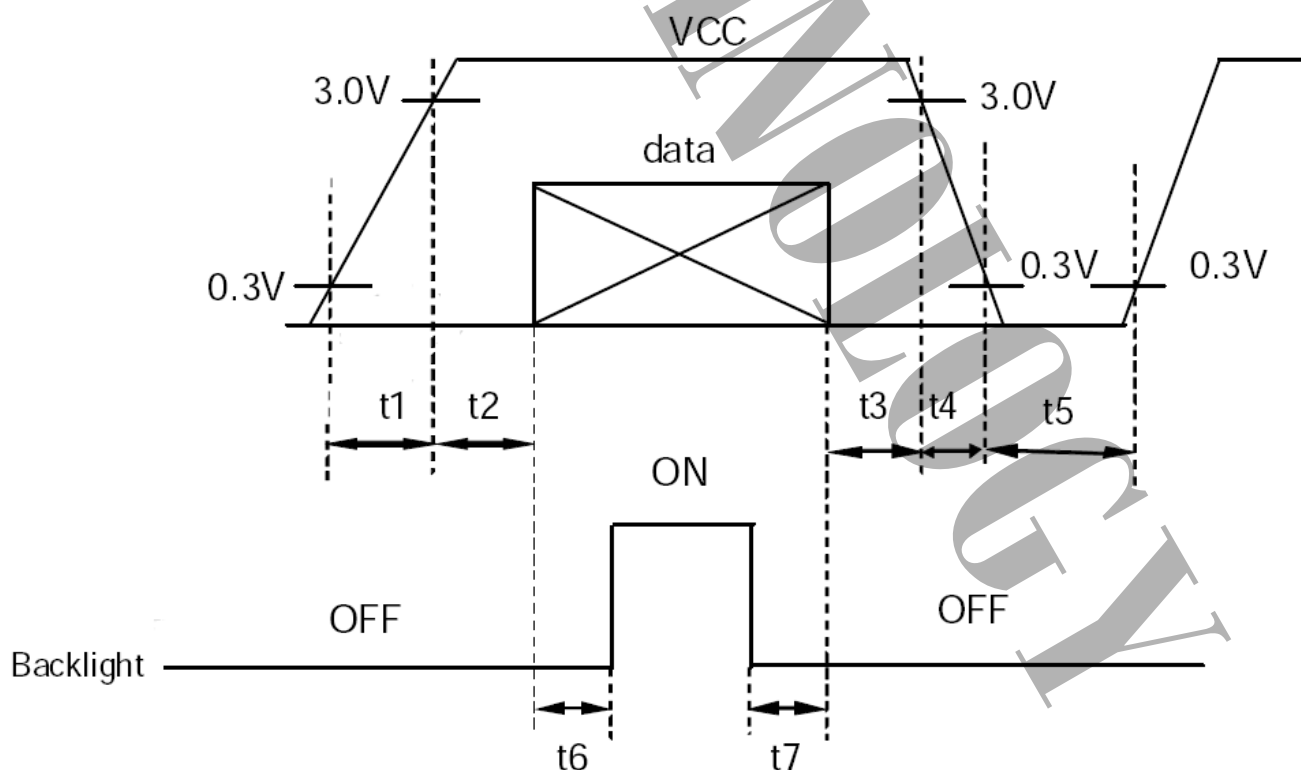
Ta=25°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LCD Power Voltage	VCC	3.0	3.3	3.6	V	*1)
LCD Power Current	ICC	-	(152)	(324.3)	mA	*2)
Rush Current	Irush	-	-	2	A	*4)
Logic Input Voltage (LVDS: IN+, IN-)	Common Voltage	$\frac{ VID }{2}$	-	$2.4 - \frac{ VID }{2}$	V	*3)
	Differential Input Voltage	VID	-	600	mV	*3)
	Threshold Voltage (HIGH)	VTH	-	100	mV	*3) When VCM = +1.2V
	Threshold Voltage (LOW)	VTL	-100	-	mV	

【Note】

*1) Power Sequence :

$$\begin{aligned}
 0.5 < t_1 &\leq 10\text{ms} & 500\text{ms} &\leq t_5 \\
 0 < t_2 &\leq 50\text{ms} & 200\text{ms} &\leq t_6 \\
 0 < t_3 &\leq 50\text{ms} & 200\text{ms} &\leq t_7 \\
 0 < t_4 &\leq 10\text{ms}
 \end{aligned}$$



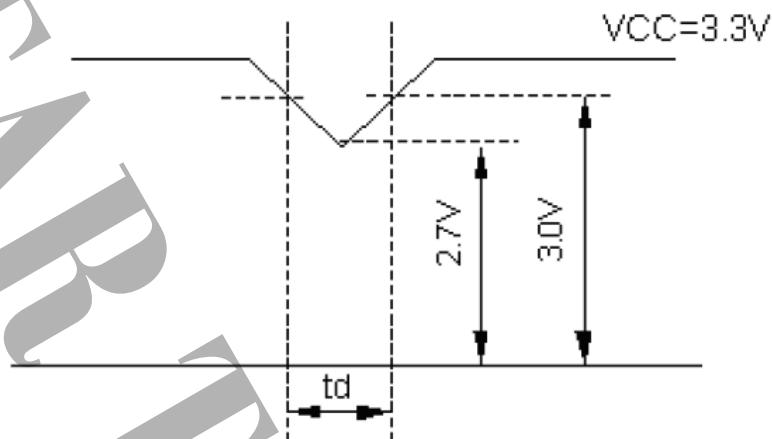
Data: LVDS Signal & CLK



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

Max. specification : Black test Pattern

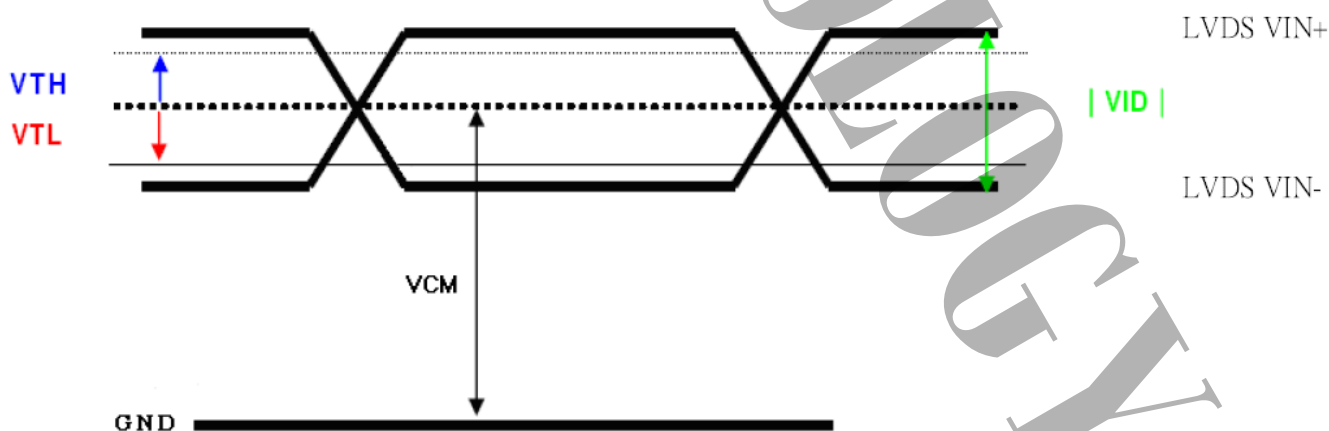


(a) Gray-level Pattern



(b) Black Pattern

*3) LVDS Signal Definite :



VIN+ : Positive differential DATA & CLK Input

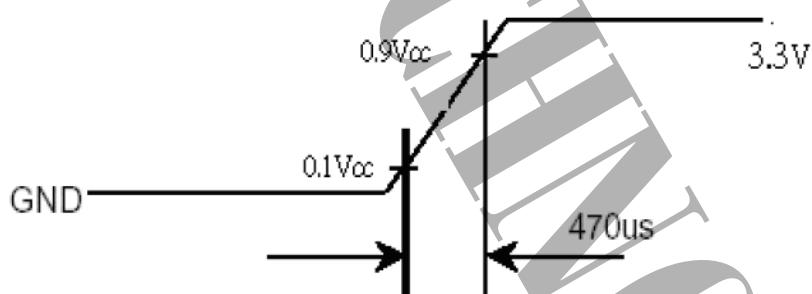
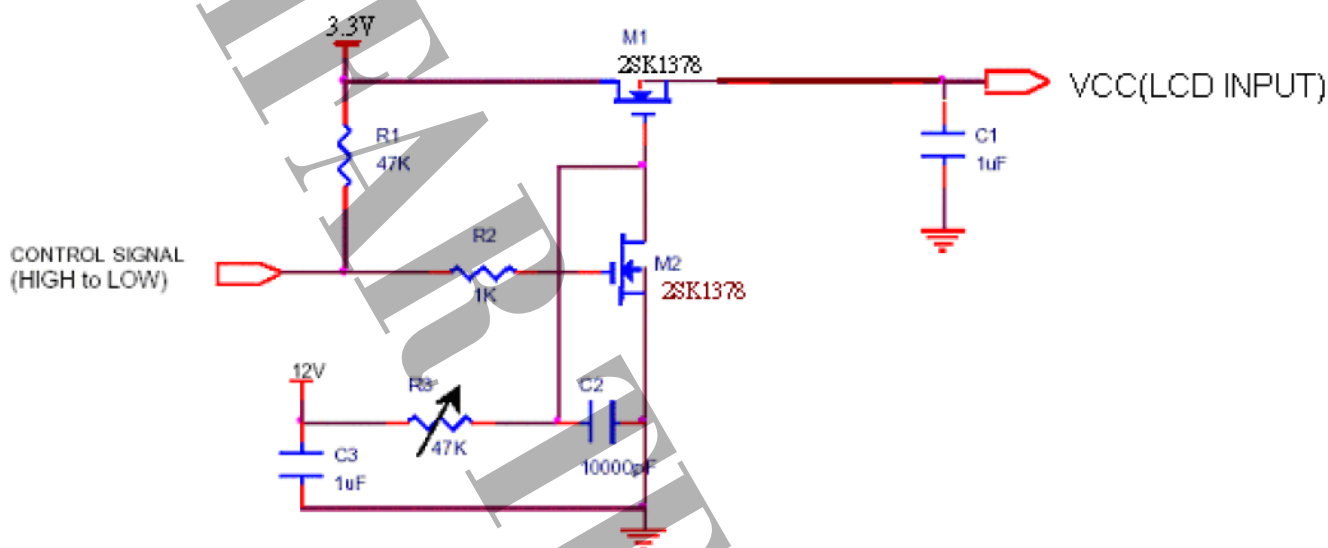
VIN- : Negative differential DATA & CLK Input



*4) Irush measure condition

Control signal: High(+3.3V)→Low(GND)

Supply Voltage of rising time should be from R3 and C2 tune to 470 us.





1.4 Optical Characteristics

$T_a=25^{\circ}\text{C}$, $V_{cc}=3.3\text{V}$

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK
Contrast Ratio	CR	Point-5	500	700		--	*1) 2)
Luminance	L_w	Point-5	380	450		cd/m ²	*1) 3)
Luminance Uniformity	ΔL		80			%	*1) 3)
Response Time (White - Black)	$T_r + T_f$	Point-5		25	35	ms	*5)
NTSC	--	Point-5	45	50		%	*1) 4)
Viewing Angle	Left	(ϕ)	Point-5 $CR \geq 10$	60	70		*1) 4)
	Right	(ϕ)		60	70		*1) 4)
	Upper	(θ)		60	70		*1) 4)
	Lower	(θ)		50	60		*1) 4)
Color Coordinate	White	x	$\theta = \phi = 0^{\circ}$	(0.275)	(0.315)	(0.355)	*1) 3)
		y		(0.302)	(0.342)	(0.382)	
	Red	x	$\theta = \phi = 0^{\circ}$	(0.551)	(0.591)	(0.631)	
		y		(0.294)	(0.334)	(0.374)	
	Green	x	$\theta = \phi = 0^{\circ}$	(0.303)	(0.343)	(0.383)	
		y		(0.554)	(0.594)	(0.634)	
	Blue	x	$\theta = \phi = 0^{\circ}$	(0.117)	(0.157)	(0.197)	
		y		(0.093)	(0.133)	(0.173)	

Color coordinate and color gamut are measured by SRUL1R, response time is measured by TRD-100, and all the other items are measured by BM-5A (TOPCON). All these items are measured under the dark room condition (no ambient light).

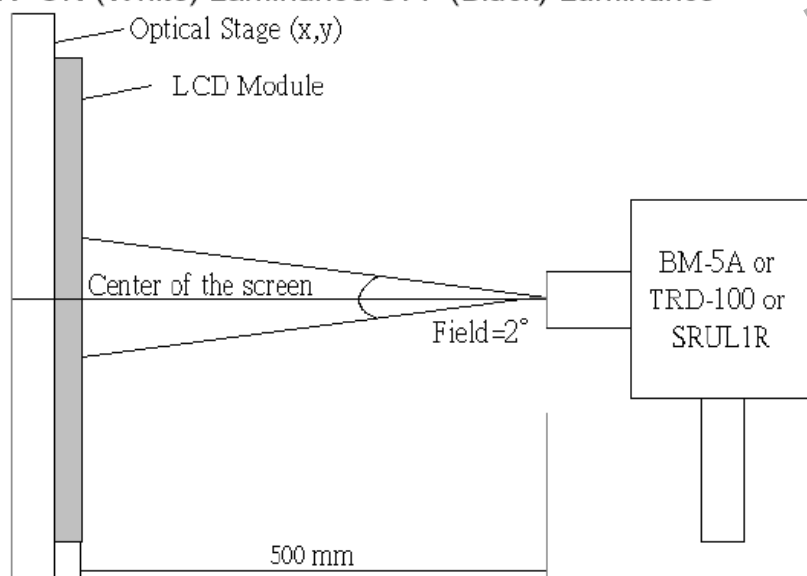
Definition of these measurement items is as follows:

*1) Setup of Measurement Equipment

The LCD module should be turn-on to a stable luminance level to be reached. The measurement should be executed after lighting Backlight for 20 minutes and in a dark room.

*2) Definition of Contrast Ratio

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





*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

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

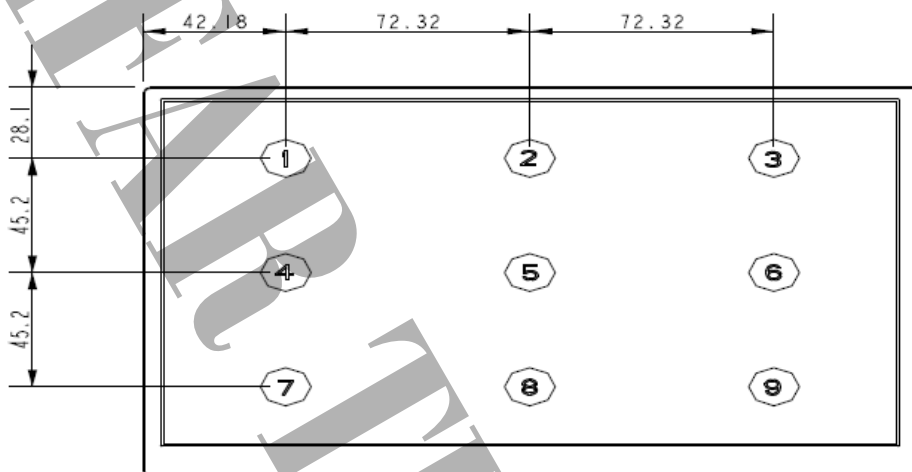
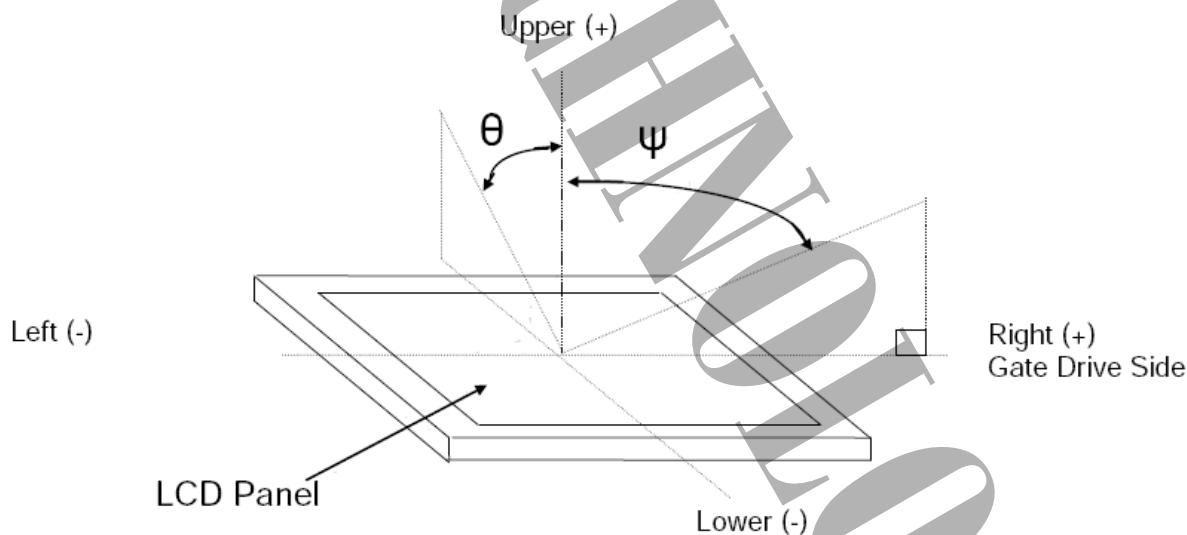
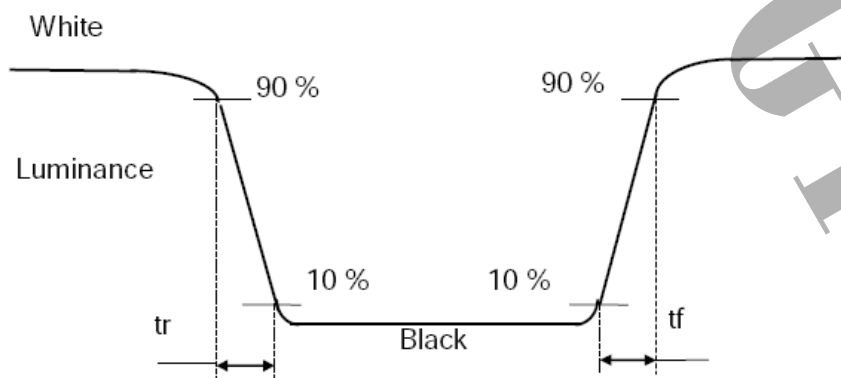


figure.7-1 Measuring point

*4) Definition of view angle(θ , ψ)



*5) Definition of response time





1.5 Backlight Characteristics

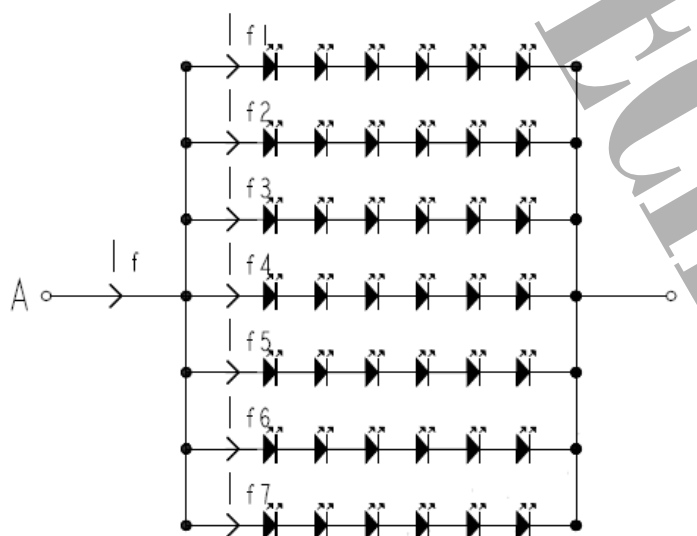
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Total Input Voltage	VBL+	16.2	17.1	18	V	
LED Total Input Current	IBL+	-	140	-	mA	
Forward Voltage per LED	VF	2.7	2.85	3	V	
Forward Current per LED	IF	-	20	-	mA	*1)
Power consumption	PLED	-	-	2.52	W	*3)

LED LIFE – TIME

ITEM	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Life Time	IF=20mA · Ta=25°C		15000		hrs	*2)

【Note】

*1) LED Circuit Diagram :



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



2. MODULE STRUCTURE

2.1 Interface Pin Description

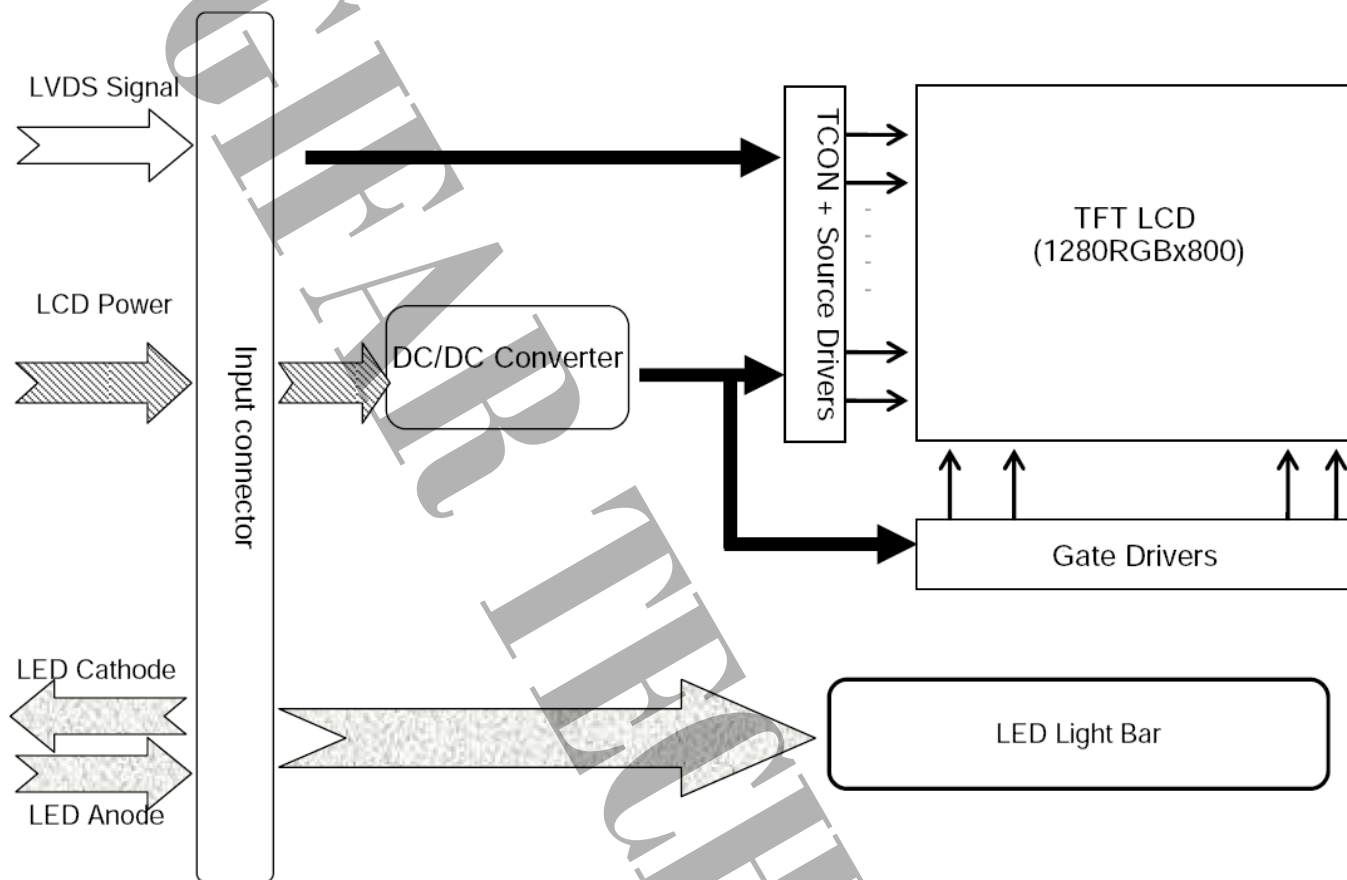
CN1 (Input Signal)

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)



2.2. BLOCK DIAGRAM





2.3. Timing Characteristics of Input Signals

Ta=25°C

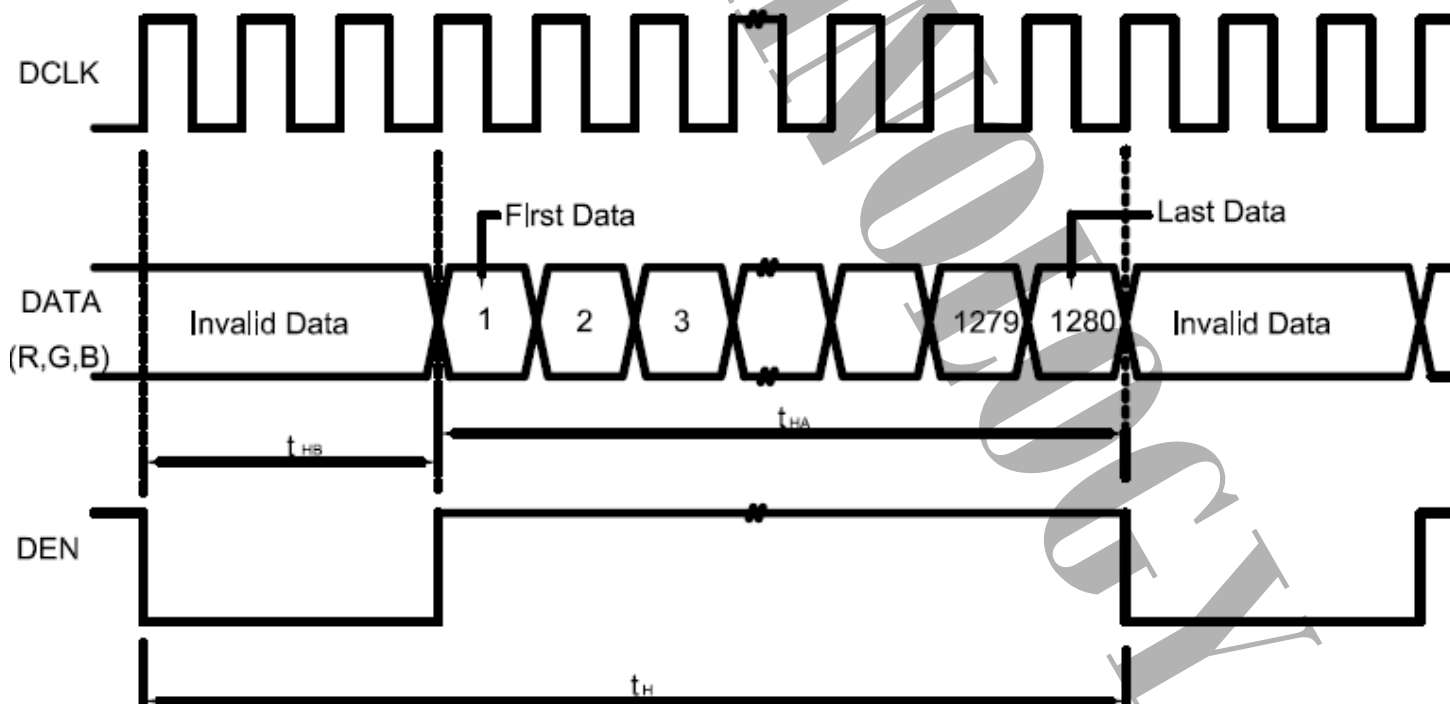
ITEM				SYMBOL	MIN	TYP	MAX	UNIT
LVDS input signal sequence	CLK Frequency			tclk	66.6	72.40	78.9	MHz
LCD input signal sequence (Input LVDS Transmitter)	DENA	Horizontal	Horizontal total Time	t _H	1370	1440	1500	tCLK
			Horizontal effective Time	t _{HA}	1280			tCLK
			Horizontal Blank Time	t _{HB}	90	160	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

【Note】

- *1) DENA (DATA ENABLE) usually is positive.
- *2) During the whole blank period, DCLK should keep input.

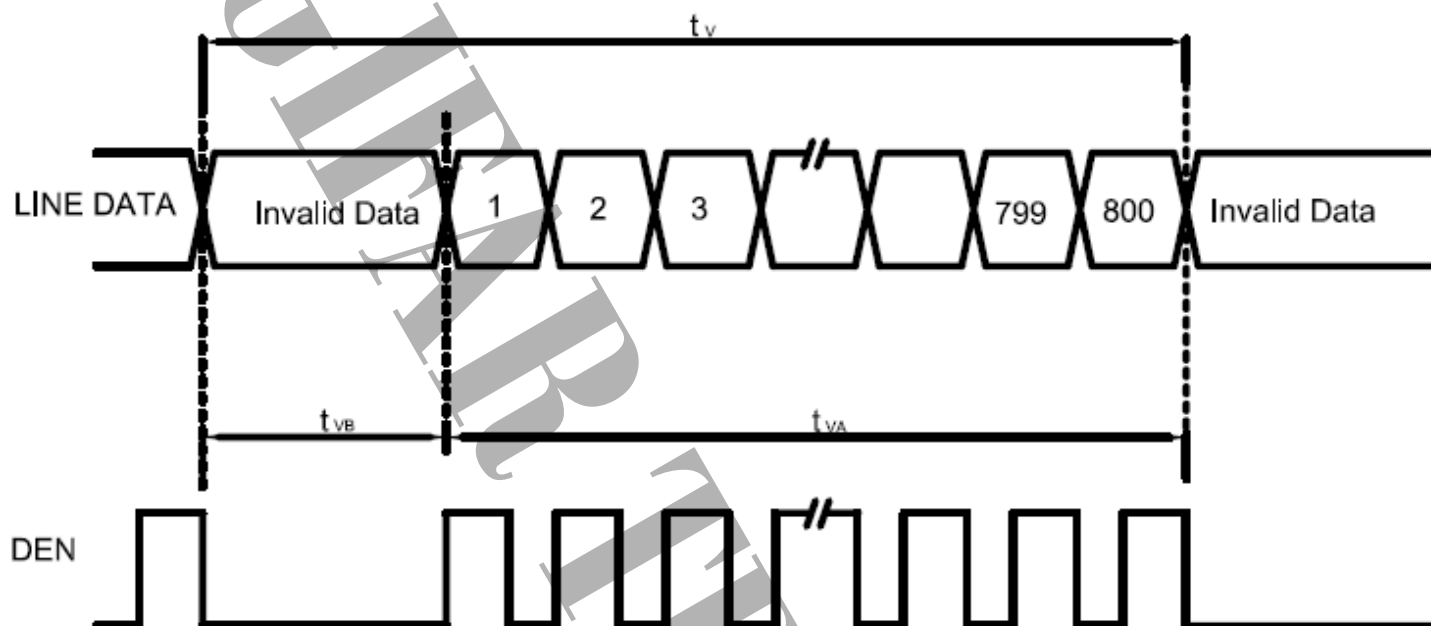
2.3.1 Timing Sequence(Timing Chart)

Horizontal Timing Sequence

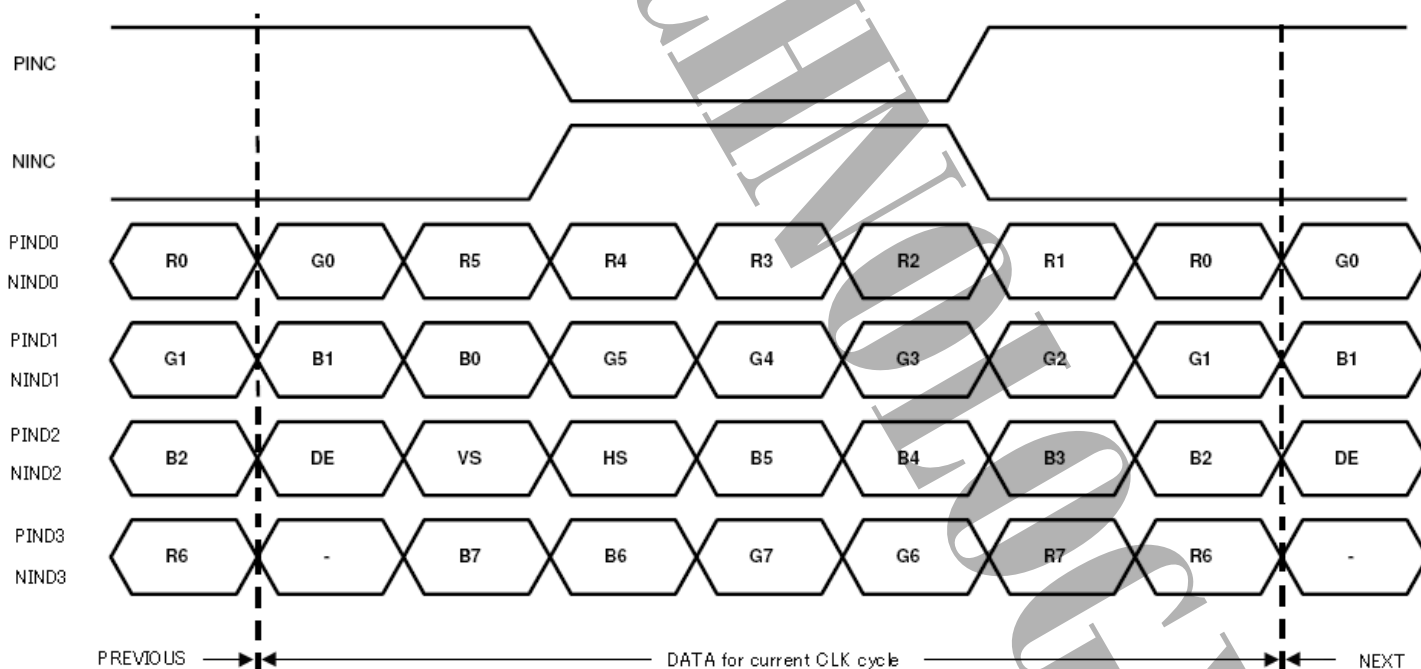




Vertical Timing Sequence



LVDS Input Data Mapping





2.4 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	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	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	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	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	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	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	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	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	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	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	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	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	0
	GREEN(1)	0	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	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	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	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	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	0
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	BLUE(254)	0	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	0	1	1	1	1	1	1	1	1



3. RELIABILITY TEST

3.1 Temperature and humidity

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

Note 1. :

Condition of Image Sticking test : 25 ℃± 2 ℃

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

After 5 mins, the mura must be disappeared completely .

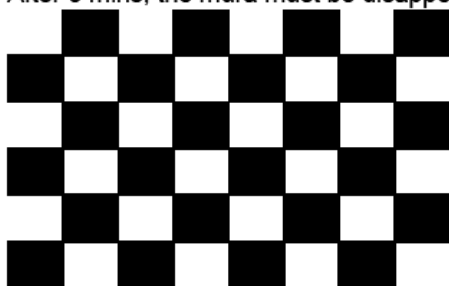


Image Sticking -pattern



Mid-Gray pattern

3.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	● 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)	● 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	150pF , 330Ω , ±8kV&±15kV air & contact test	1,3
	200pF , 0Ω , ±200V contact test	2,3

Note 1: LCD glass and metal bezel

Note 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.

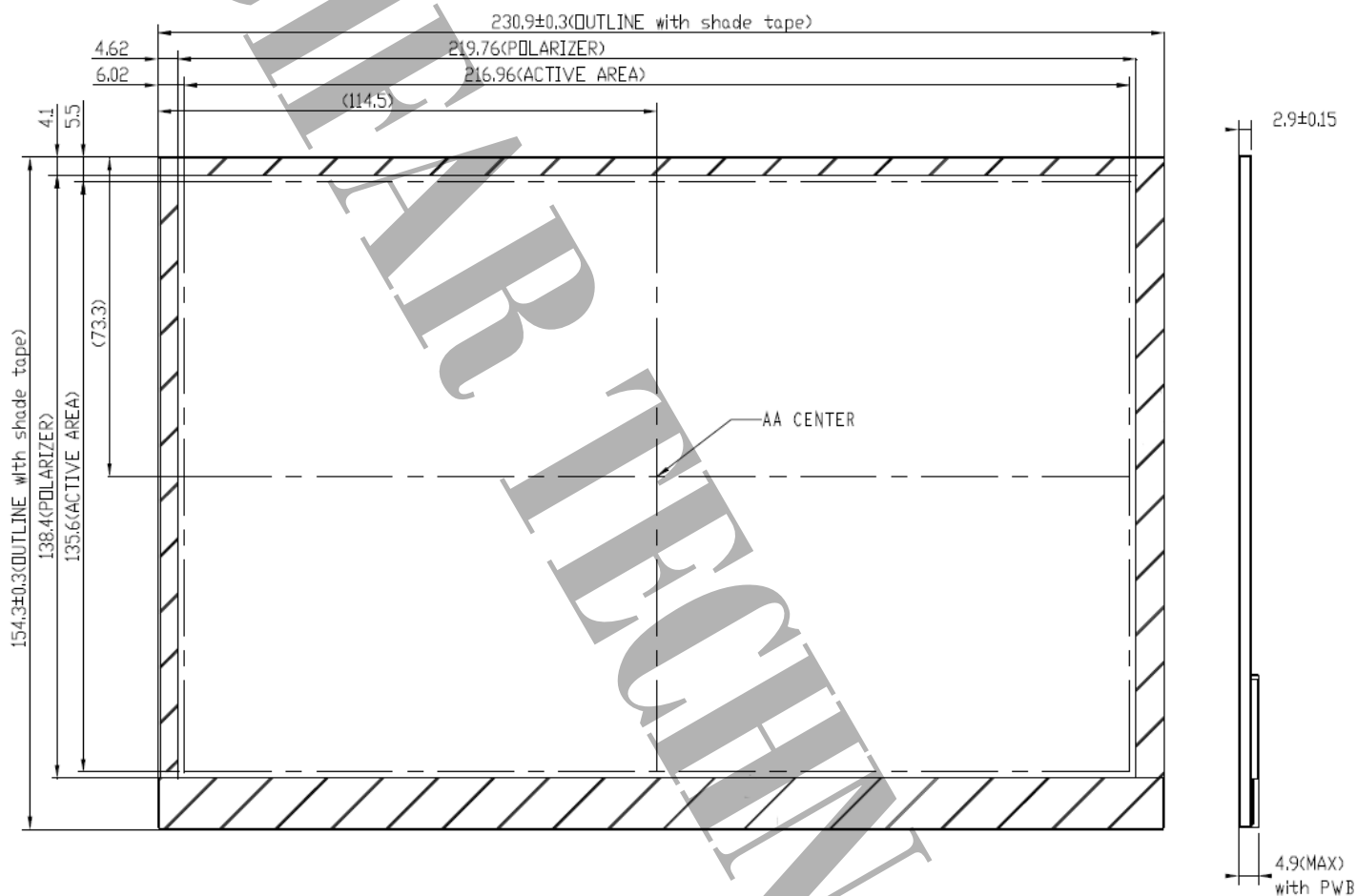
Fail: No display image, function NG, or line defects.



4. LCM Drawing

4.1 Front Side

[Unit : mm]

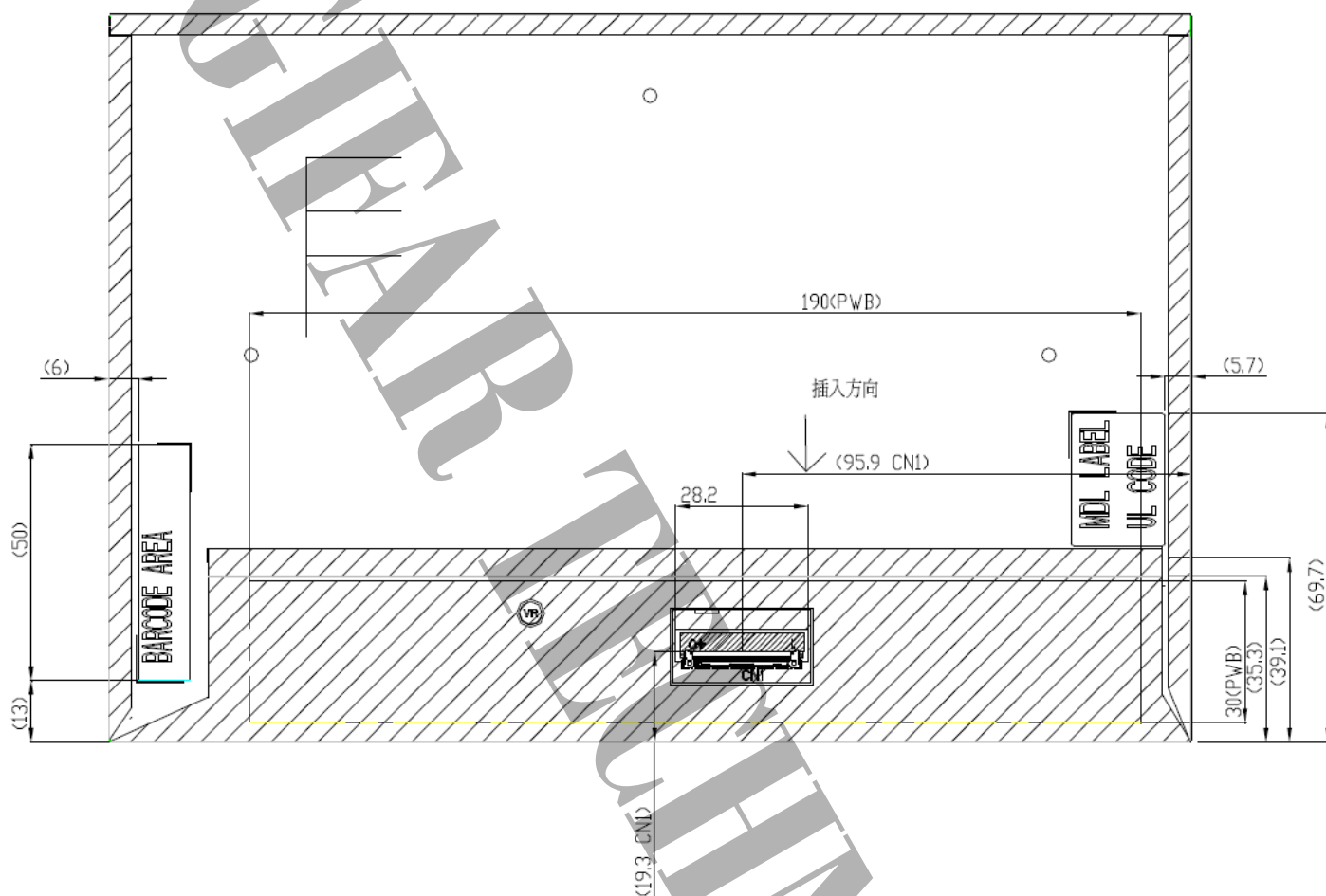


【Note】 : Tolerance is ±0.3mm unless noted



4.2 Rear Side

[Unit : mm]



【Note】: Tolerance is $\pm 0.3\text{mm}$ unless noted

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.