Ver.: 1.04

TFT LCD Specification

Model Name: TD141TGCB1

Customer Signature
Date

This technical specification is subjected to change without notice

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Table of Contents

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Record of Reversion

Rev	Issued Date	Description
1.00	Jul 03, 2003	New Release
1.01	Sep 09,2003	Modify 12. Module Label Drawing & Definition
1.02	Nov 24,2003	Modify 7.1 Optical Specification Luminance of White (5 Point): From MIN / 130; TYP / 160 cd/m^2 => Change to MIN / 120; TYP / 150 cd/m^2
1.03	Jan 29,2004	Modify MECHANICAL DRAWING: Module Label position change Modify & add 12. Module & Carton Label Drawing & Definition
1.04	May 24,2004	1. Modify 11 Packing Drawing 2. Modify 12.1 The module Label Drawing & Definition 3. Add 12.3 Delivery of Label & Definition illustration

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1. FEATURES

(1) 14.1” XGA (1024x768 pixels) display size for notebook PC

(2) LVDS interface system

(3) Thin and light weight

(4) High contrast ratio

(5) Low power consumption.

2. GENERAL SPECIFICATION

Item	Description	Unit
Display Size (Diagonal)	14.1 (35.8cm)	inch
Driver Element	LTPS TFT Active Matrix	
Active Area (HxV)	285.696 (H) x 214.272 (V)	mm
Number of Dots (HxV)	1024 x RGB x 768	dot
Pixel Pitch (HxV)	0.279 x 0.279	mm
Color Arrangement	RGB Vertical Stripe	
Color Numbers	262,144 (6 bits)	
Outline Dimension (HxVxT)	298.5x226.5x5.10(Typ)；5.65 (max)	mm
Weight	445(Typ) ±15	g
Display Mode	Normally White	
Surface Treatment	Anti Glare and Hard-Coating（3H）	

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3. INPUT/OUTPUT TERMINALS

3.1 TFT LCD Panel

Recommend Connector Type:

HRS DF19KR-14P-1H or Compatible

Mating Connector Type:

Single Cable: HRS DF19G-14S-1C or Compatible

FPC: HRS DF19G-14S-1F and HRS DF19G-14S-1F-GND or Compatible

Coaxial Cable: HRS DF19G-14S-1SD and HRS DF19G-14S-1F-GND or Compatible

Pin No	Symbol	Function	Polarity	Remark
1	VDD	Power supply +3.3 v		
2	VDD	Power supply +3.3 v		
3	GND	Ground		
4	GND	Ground		
5	RxIN0-	LVDS differential data input	Negative	R0~R5 G0
6	RxIN0+	LVDS differential data input	Positive	
7	RxIN1-	LVDS differential data input	Negative	
8	RxIN1+	LVDS differential data input	Positive	G1~G5 B0~B1
9	RxIN2-	LVDS differential data input	Negative	
10	RxIN2+	LVDS differential data input	Positive	
11	RxCLKIN-	LVDS differential data input	Negative	B2~B5, DE Hsync, Vsync
12	RxCLKIN+	LVDS differential data input	Positive	
13	GND	Ground		
14	GND	Ground		

3.2 Light Source

Light Source Type: CCFL Back Light

Recommend Connector Type：JST BHSR – 02VS - 1

Pin NO.	Symbol	Color	Function
1	V_H	Pink	High Voltage
2	V_L	White	Low Voltage

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4. ABSOLUTE MAXIMUM RATINGS

GND =0V

Item	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	Vcc	Vss-0.3	4.0	V	
Logic Input Voltage	Vin	Vss-0.3	(Vss+0.3)	V	
Lamp Current	I_L	2.0	7.0	mA rms	
Lamp Frequency	F_L	50	80	KHz	
Operating Temperature	Topr	0	+50	℃	
Storage Temperature	Tstg	-25	+60	℃	
Storage Humidity	Hstg	10	90	%RH	Note 4-1

Note 4-1: Maximum wet – bulb temperature at 39℃ or less. (Ta＞40℃) No condensation

5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module

Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Voltage of power supply		V_{DD}	3.0	3.3	3.6	V	
Differential Input Threshold Voltage	High	V_{HIH}	--	--	100	mV	V_{CM} = +1.2V
	Low	V_{HIL}	-100	--	--	mV	
Rush Current	I_{RUSH}	--	--	--	1.5	A	
Vsync Frequency		f_V		60		Hz	
Hsync Frequency		f_H		48.2		KHz	
Main Frequency		f_{DCLK}	63.4	65	66.6	MHz	
Rush Current		I_{RUSH}	--	--	1.5	A	
Current of Power Supply		White	--	330	--	mA	
		Mosaic	--	350	--	mA	
		Max Pattern (One dot inversion)	--	380	450	mA	

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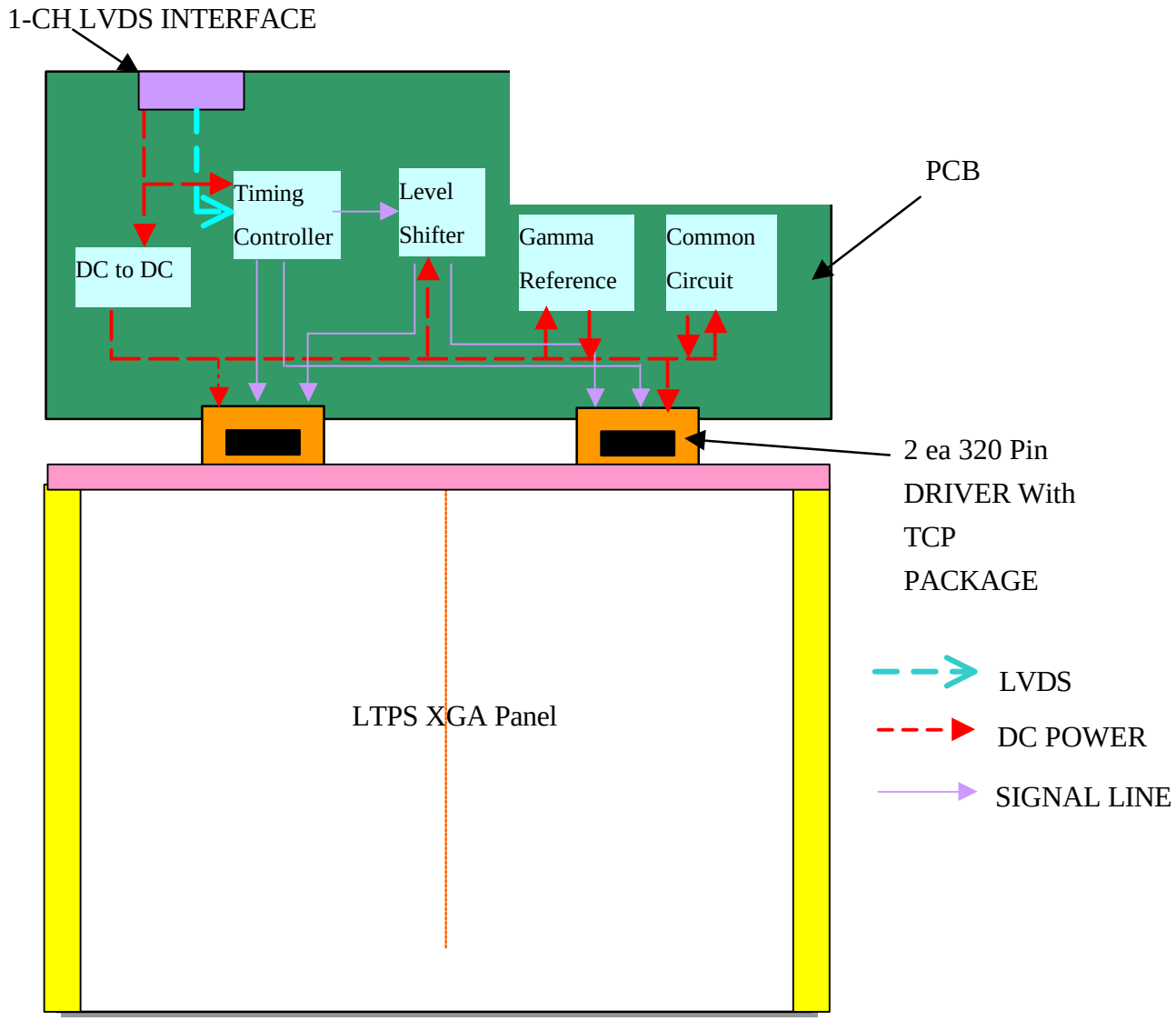
5.1.1 Driving TFT LCD Module Block Diagram



5.2 Driving Backlight

The backlight system is an edge – lighting type with a single CCFL (Cold Cathode Fluorescent Tube).

The characteristics of a single lamp are shown in the following tables.

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Lamp Current	I_L	3.0	6.0	6.5	mArms	Note 5-1
Lamp Voltage	V_L	--	660	--	Vrms	I_L=6mA
Power Consumption	P_L	--	3.96	--	W	Note 5-2
Frequency	F_L	50	60	80	kHz	Note 5-3
Operating Life time	Hr	10,000	--	--	Hour	Note 5-4
Lamp starting voltage	Vs	--	--	1160（25℃） 1450（0℃）	Vrms	Note 5-5

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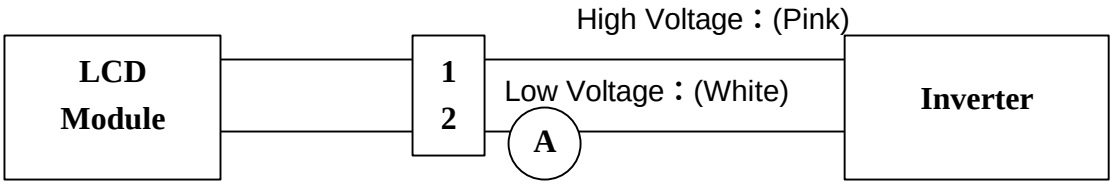
Note 5-1: Lamp current is measured with a high frequency current meter as show below.



Switching Frequency：(50~80)KHz

Note 5-2: $W = I_L \times V_L$

Note 5-3: Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

Note 5-4: Brightness is decreased to the 50% of the initial value.

Note 5-5: Above this value should be applied to the lamp for more than 1 second to startup, otherwise the lamp may not be turned on.

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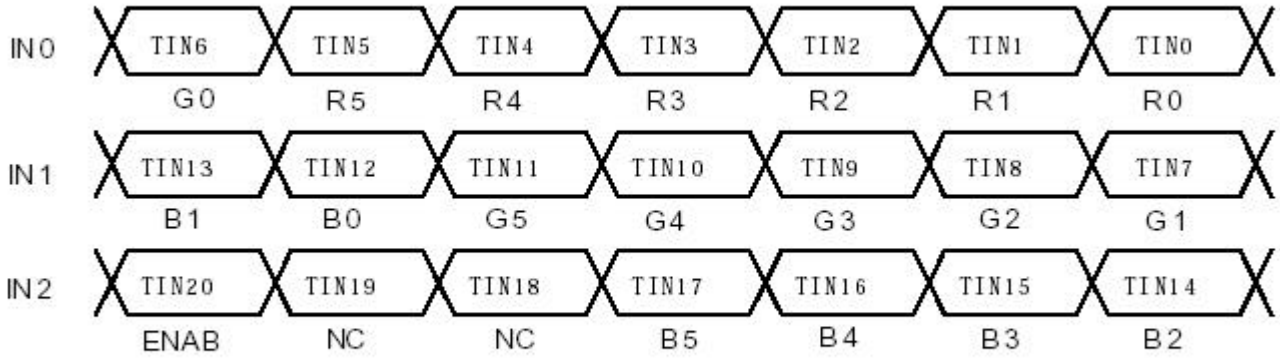
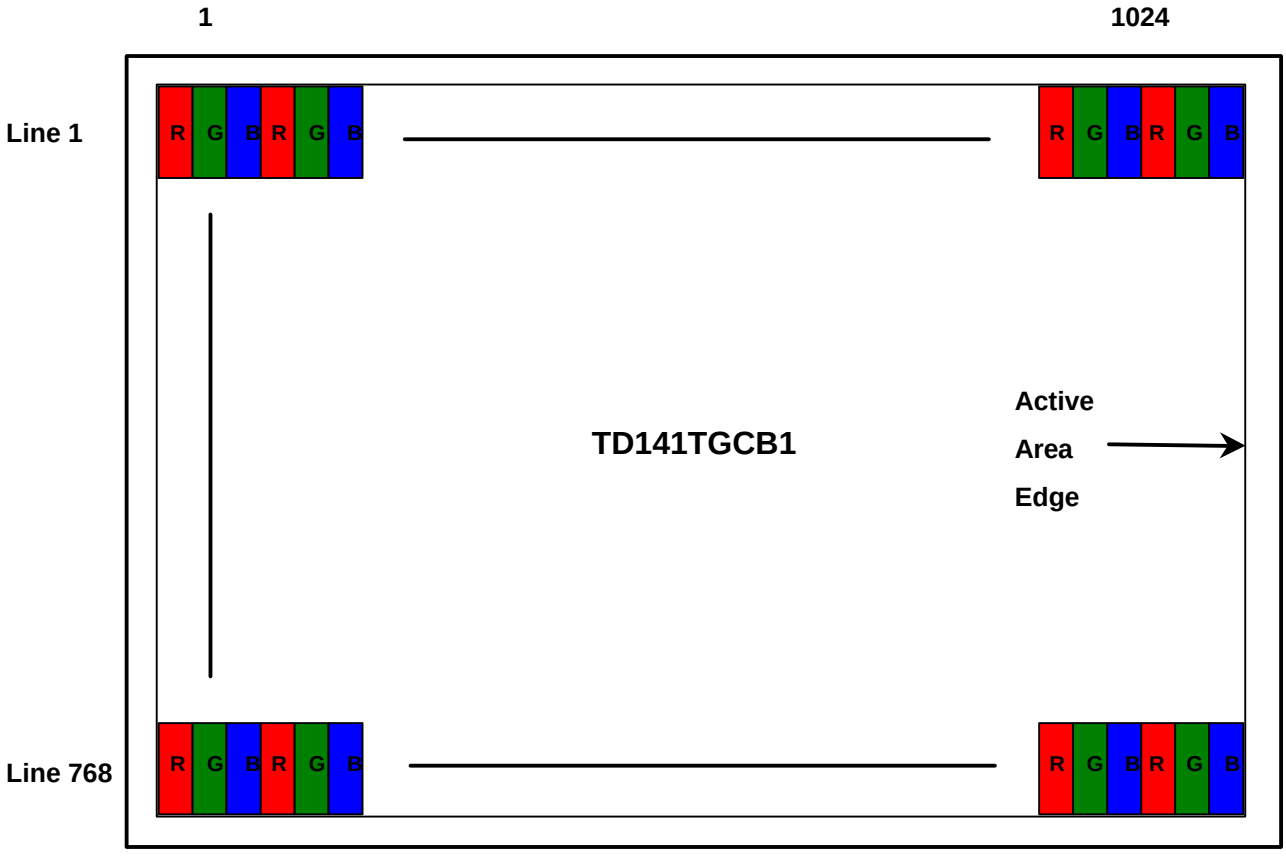
6. TIMING CHART

6.1 LVDS Channel Interface Data Mapping Diagram



6.2 Pixel Format in Display



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6.3 Input Signals, Basic Display Color and Gray Scale of Each Color

Input Signals, Basic Display Colors and Gray Scale of Each Color

COLOR	DISPLAY	DATA SIGNAL																		GRAY SCALE LEVEL
		RED						GREEN						BLUE						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5	
COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	-
	RED	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	-
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	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	-
GRAY SCALE OF **RED**	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	DARK ↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓ LIGHT	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
		0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R62
	RED	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R63
GRAY SCALE OF **GREEN**	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	DARK ↑	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	G1
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	G2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓ LIGHT	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
		0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	G62
	GREEN	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	G63
GRAY SCALE OF **BLUE**	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	DARK ↑	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	B1
		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B60
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓ LIGHT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
		0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	B62
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	B63

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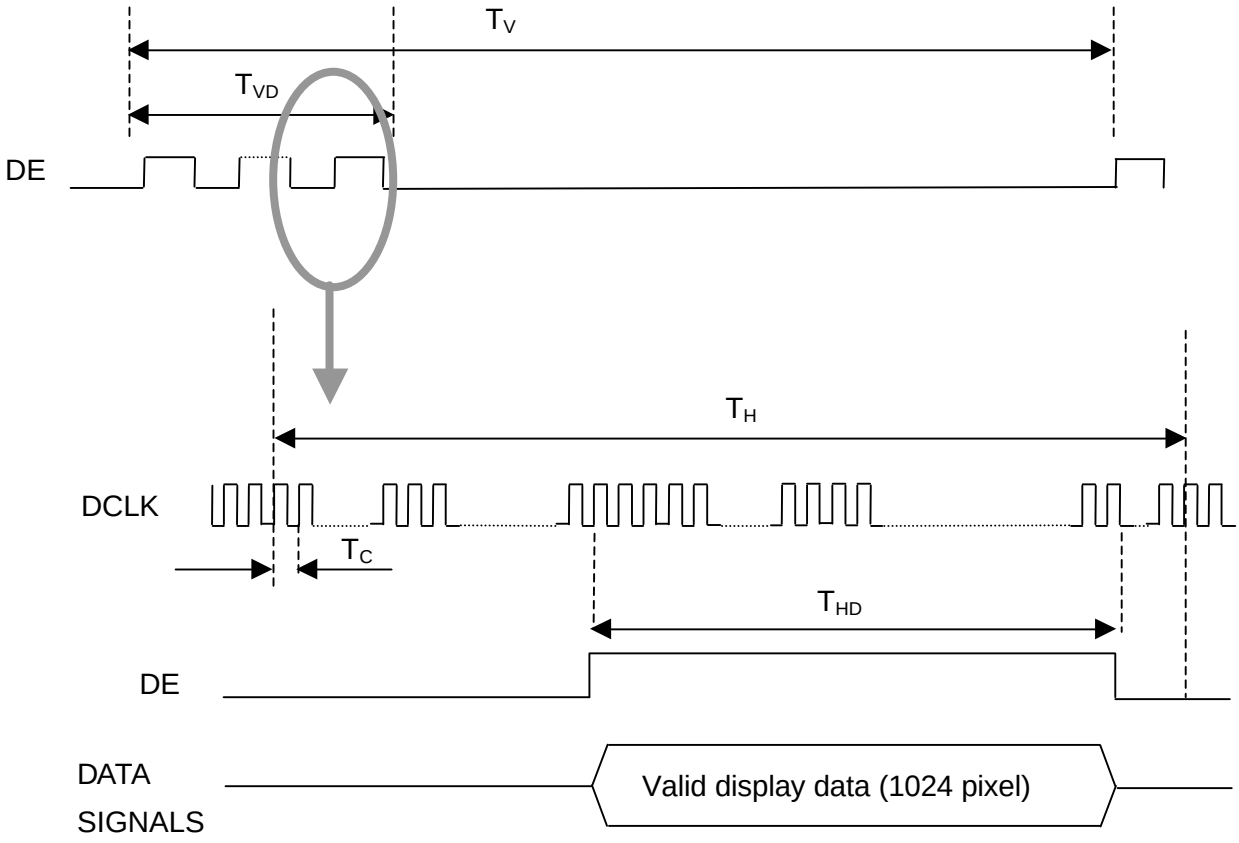
6.4 Interface Timing

a. Timing Parameters

Signal	Item	Symbol	MIN	TYP	MAX	Unit	Note
Frame Frequency	Cycle	T_V	-	806	-	Lines	
Vertical Active Display Term	Display Period	T_{VD}	-	768	-	Lines	
One Line Scanning Time	Cycle	T_H	-	1344	-	Clocks	
Horizontal Active Display Term	Display Period	T_{HD}	-	1024	-	Clocks	

b. Timing Diagrams Of Interface Signal



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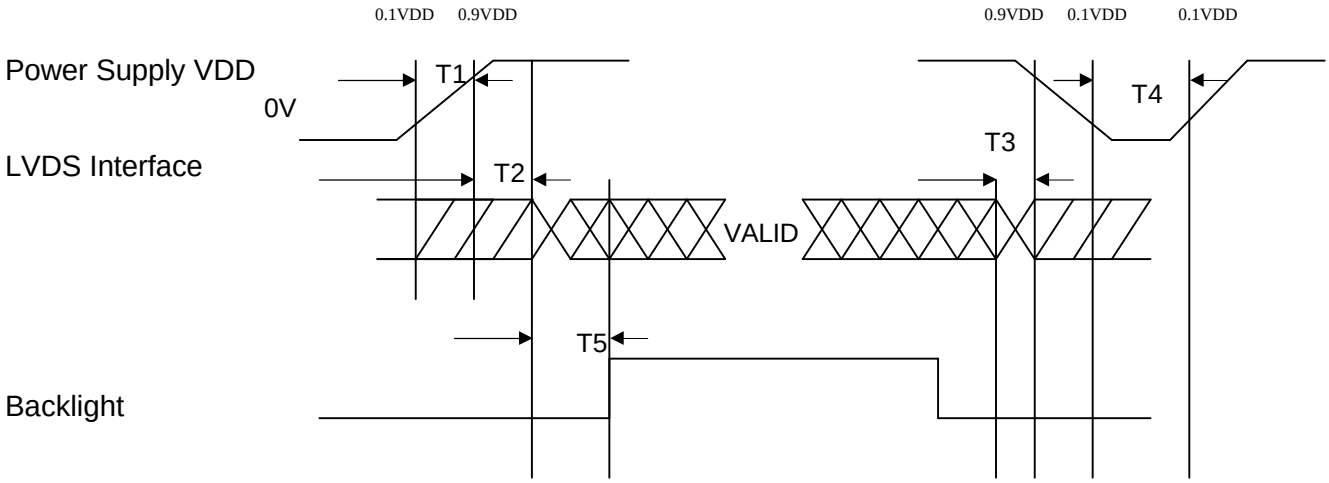
6.5 Power ON/OFF Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



T1≦10ms　　0≦T2≦50ms　　0≦T3≦50ms　　400ms≦T4　　200ms≦T5

T1: VDD rising time from 0.1VDD to 0.9VDD.

T2: The time from 0.9VDD to valid data at power ON.

T3: The time from 0.9VDD to valid data at power OFF.

T4: VDD off time for window restarts.

T5: The time from valid data to B/L enable at POWER ON.

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7. OPTICAL CHARACTERISTICS

7.1 Optical Specification

Ta=25℃

Item		Symbol	Condition	MIN	TYP	MAX	Unit	Remarks
Viewing Angle	Hor.	Θ11	CR=10 (At center point)	-	45	-	degree	Note 7-1
		Θ12		-	45	-		
	Ver.	Θ21		-	15	-		
		Θ22		-	35	-		
Contrast ratio (5 Point)		CR	Θ=0° Φ=0° Normal Viewing Angle	200	300	-		Note 7-2
Response time	Rising	Tr		-	8	10	ms	Note 7-4
	Falling	Tf		-	15	20		
Luminance of White (5 Point)		Y_L		120	150	-	cd/m^2	Note 7-5
Color Chromaticity (CIE1931)	Red	R_X		0.55	0.58	0.61		Note 7-6
		R_Y		0.33	0.36	0.39		
	Green	G_X		0.26	0.29	0.32		
		G_Y		0.53	0.56	0.59		
	Blue	B_X		0.12	0.15	0.18		
		B_Y		0.08	0.11	0.14		
	White	W_X		0.28	0.31	0.34		
		W_Y		0.30	0.33	0.36		
13 Points White Variation		δ_L		0.65	-	-		Note 7-3

7.2 Basic measure condition

(1) Ambient temperature: Ta=25℃

(2) Vcc = 3.3V °

(3) Fv = 60Hz

(4) f_{DCLK} = 65MHz

(5) I_L = 6mA

(6) Inverter model: HIU-766 (62K)

Environmental illumination: = 10 Lux

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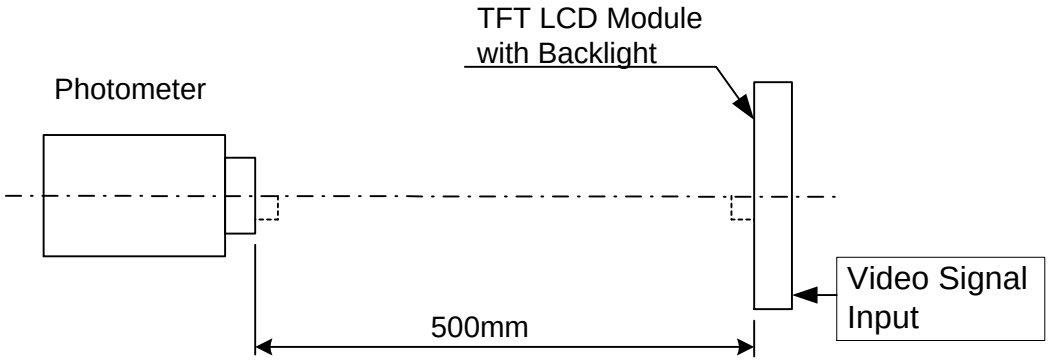
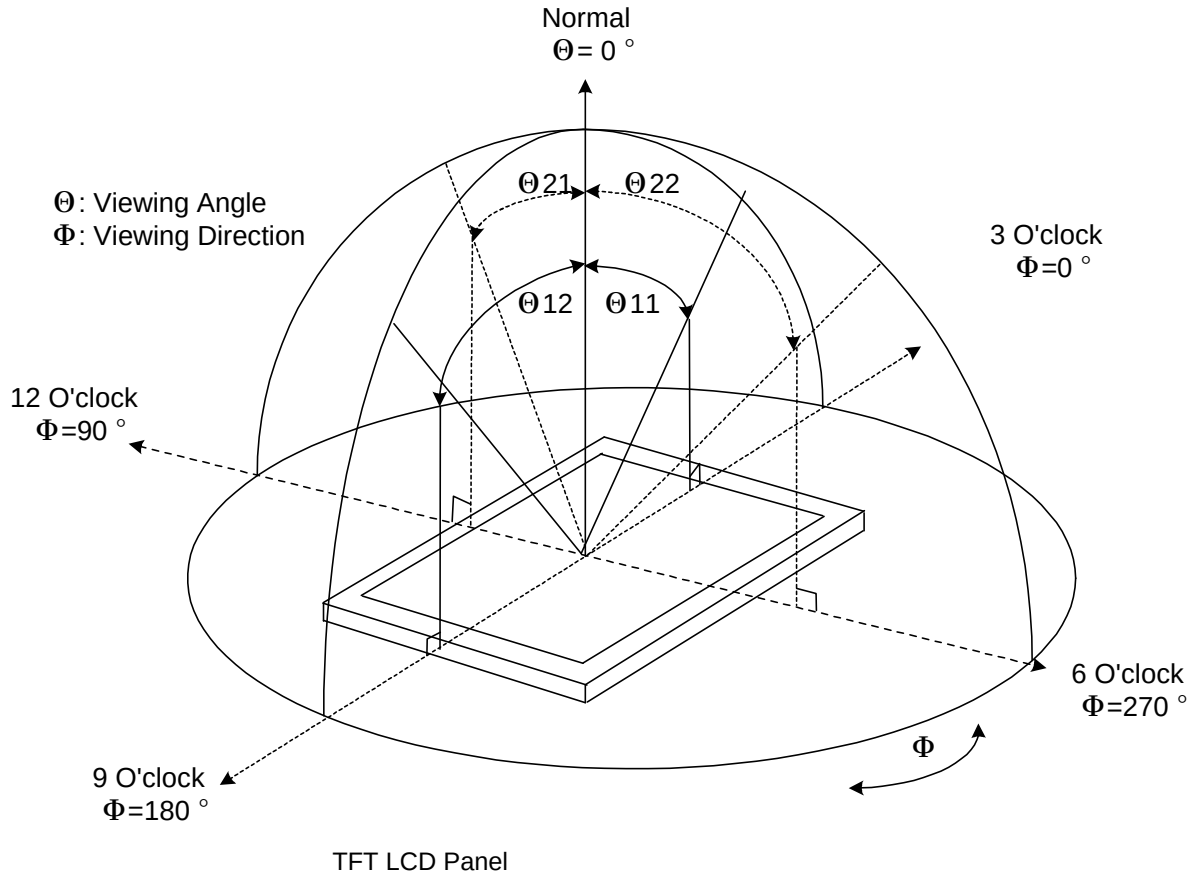
(7) Testing facility



Note 7-1: Viewing angle diagrams:



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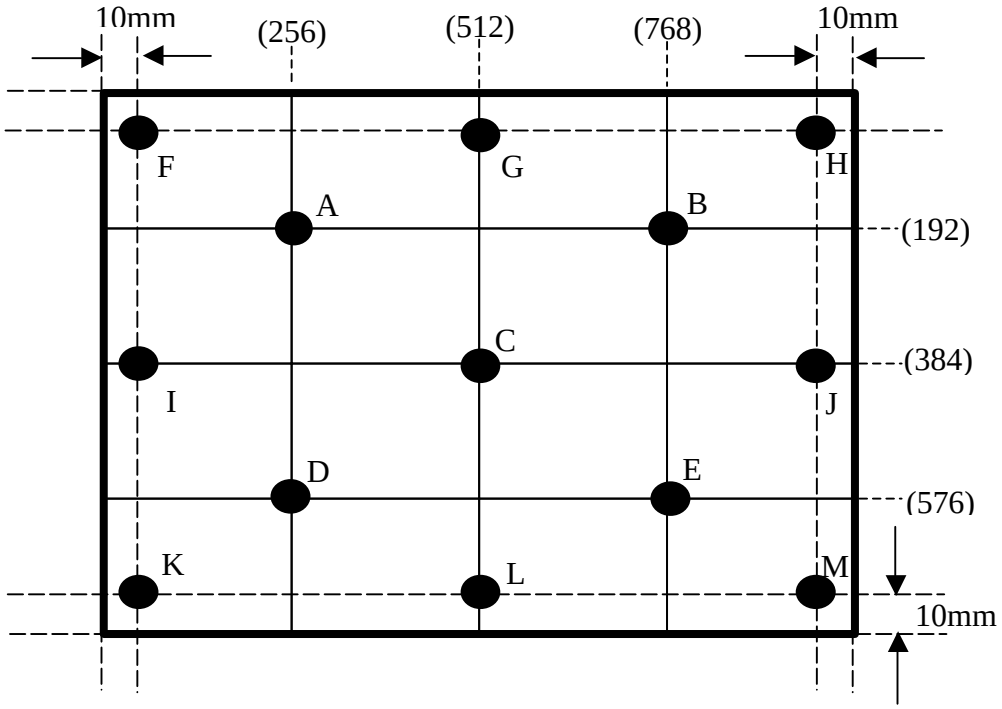
Note 7-2: Definition of Contrast ratio：Ratio of gray max (Gmax), gray min (Gmiin) at 5 point

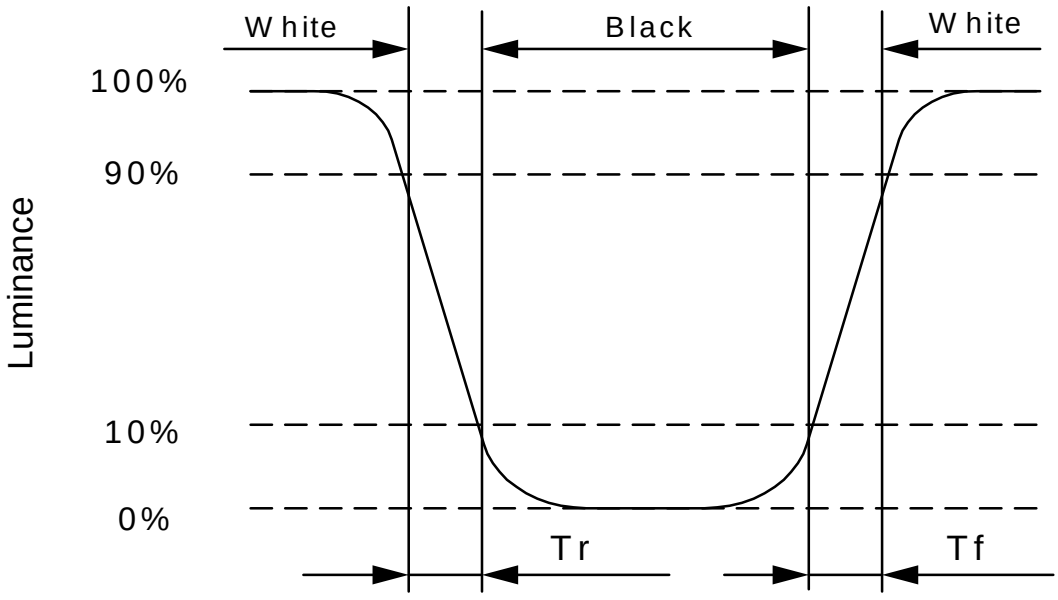
$$CR = \frac{CR(A) + CR(B) + CR(C) + CR(D) + CR(E)}{5}$$



Note 7-3: Definition of uniformity; 13 point, Test point as Note 7-2

$$\delta_L = \frac{\text{Minimum Luminance of 13 point}}{\text{Maximum Luminance of 13 point}}$$

Note 7-4: Definition of response time:



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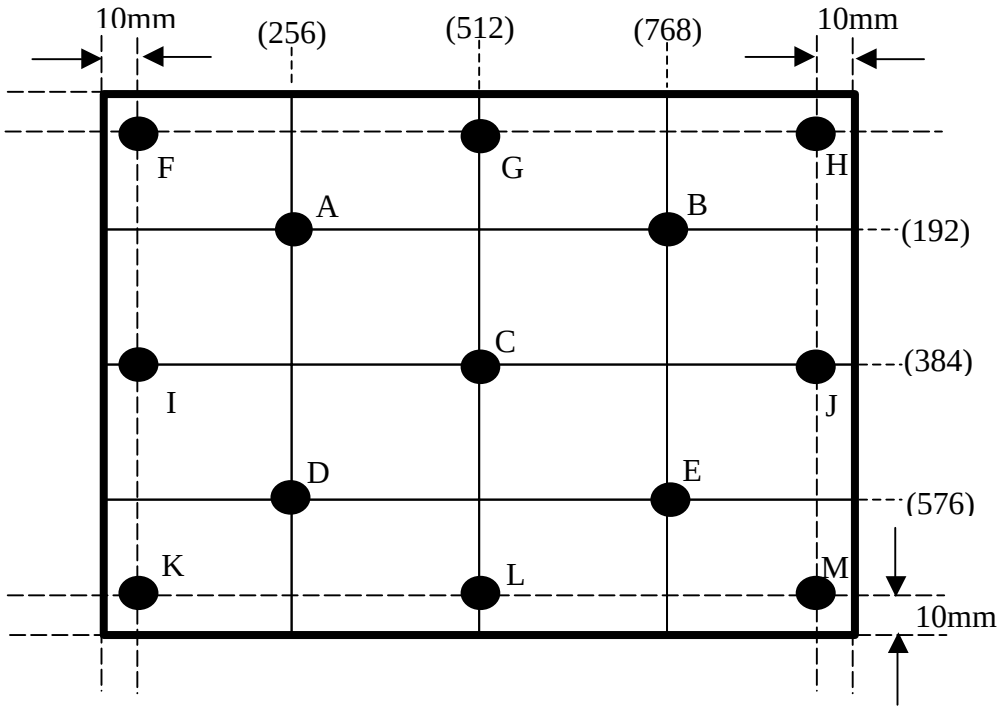
Note 7-5: Definition of Average Luminance of White：measure the luminance of white at 5 points.

Luminance of White (5 Point) ($Y_{L,AVE}$)

$$Y_{L,AVE} = \frac{Y_A + Y_B + Y_C + Y_D + Y_E}{5}$$



Note 7-6: To be measured in dark room environment and after lighting the backlight for 30 minutes.

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8. RELIABILITY

No	Test Item	Condition
1	High Temperature Operation	Ta=+50℃, 240hrs
2	High Temperature & High Humidity Operation No Condensation	Ta=+40℃, 90% RH, 240hrs
3	Low Temperature Operation	Ta=0℃, 240hrs
4	High Temperature Storage	Ta=+60℃, 240hrs
5	Low Temperature Storage	Ta=-25℃, 240hrs
6	Surface Discharge (non-operation)	C=150pF, R=330Ω; Discharge: Air: ±5kV; Contact: ±5kV 5 Times / Point; 5 Points / Panel
7	Vibration (non-operation)	Frequency: 10~300~10Hz 1.5 x 9.8m/s^2 constant Amplitude: 1.5mm; Sweep Time: 15min Test Time: 0.5 hr for each direction of X, Y, Z
8	Shock (non-operation)	Half-sine wave 220 G, 2ms, ±X, ±Y, ±Z (Once for each direction)

Ta: Ambient Temperature

Note 8.1: Evaluation should be tested after one hour of room temperature storage.

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9. HANDLING CAUTIONS

9.1 Module assembly working environment should in the clean room.

9.2 The polarizer is easy damaged, handle it carefully and do not press or scratch the surface by sharp material.

9.3 Panel has polarizer protective film in the surface please remove the protection film of polarizer slowly to prevent the electrostatic discharge.

9.4 It is not permitted the pressure or impulse on the module, it may cause LCD panel or Backlight damaged.

9.5 Turn off the power supply before connecting and disconnecting signal input cable.

9.6 The lamp wire is very weak, do not handle panel only by lamp wire.

9.7 As the packing bag open, watch out the environment of the panel storage. High temperature and high humidity environment is prohibited.

9.8 Please to storage the LCD module within the specification condition. High temperature or high humidity environment may reduce the module performance.

9.9 Do not disassemble the module.

9.10 Do not touch the backlight connecter. The backlight start voltage about 1000Volts.it may cause electrical shock.

9.11 Do not adjust the variable resistor that is located on the module back side.

9.12 I/F connector pins shall not to be touched directly with bare hands.

9.13 When the TFT LCD module is broken or liquid crystal leaks from the panel, it should be keep always from the eyes or month. If your hand touches liquid crystal, wash your hand cleanly by water and soap as soon as possible.

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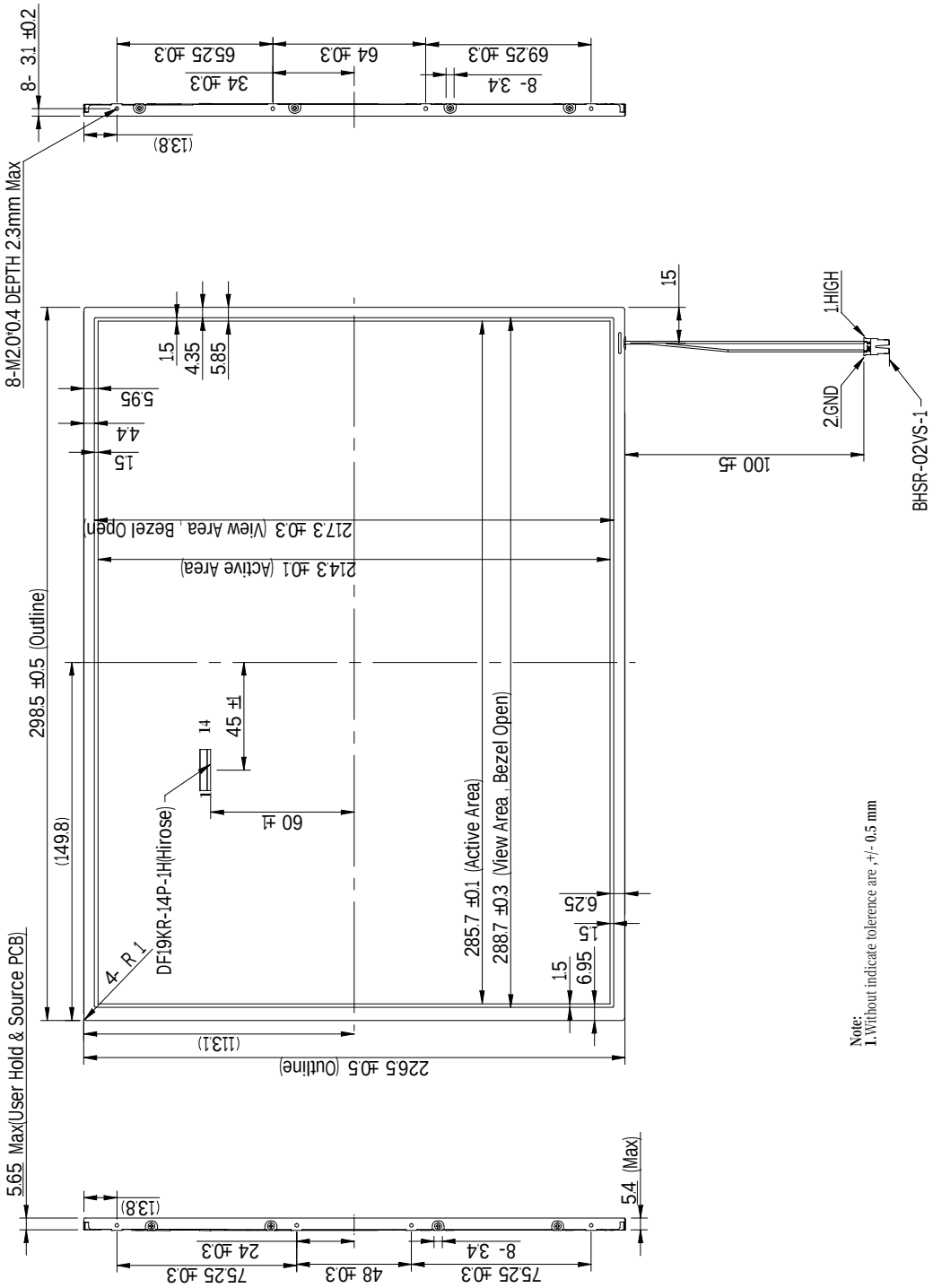
10. MECHANICAL DRAWING



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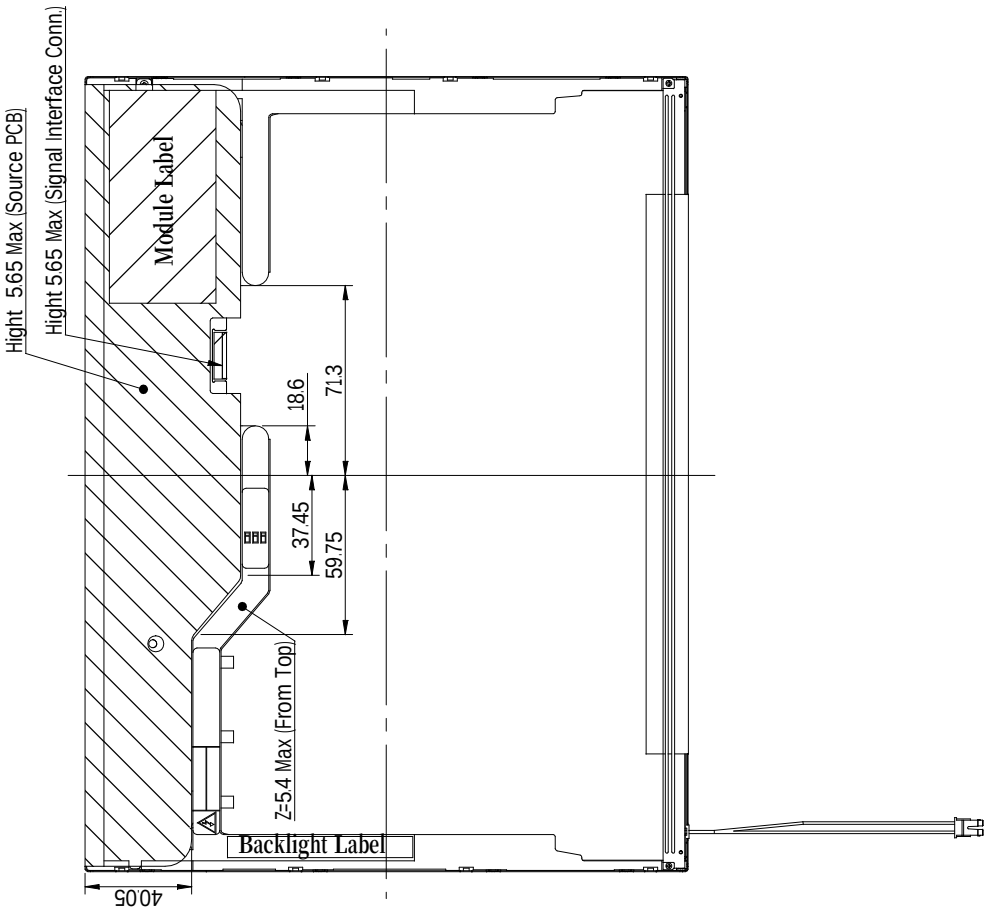

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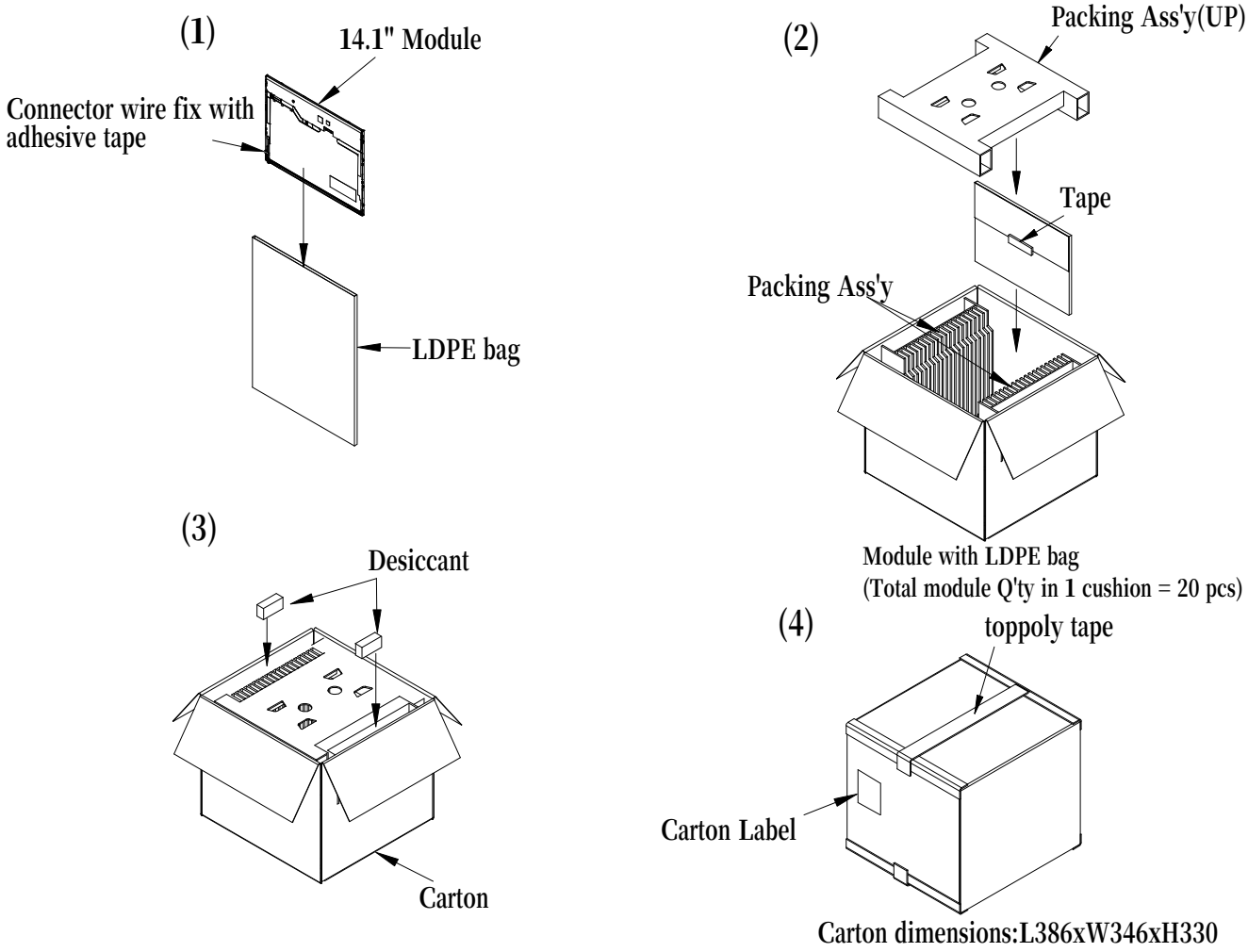
11. PACKING DRAWING



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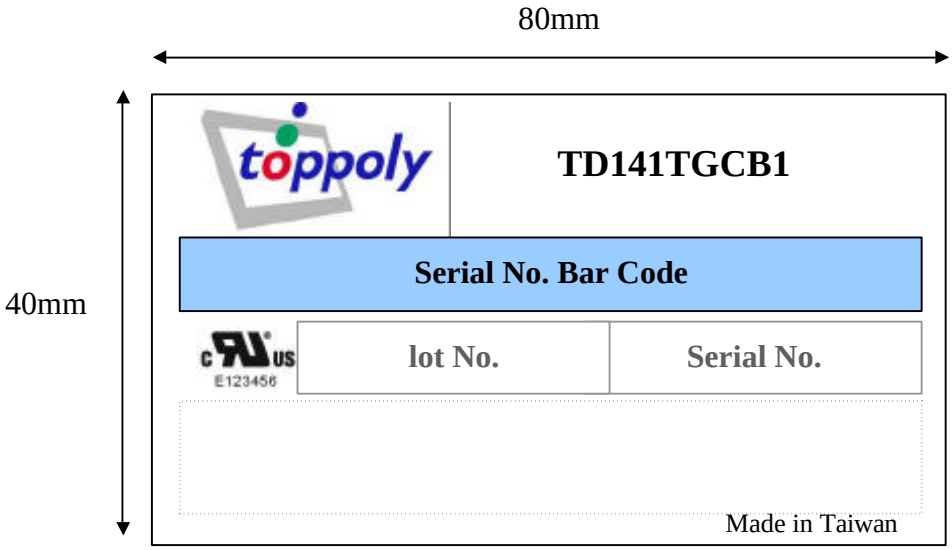
12. Module & Carton Label Drawing & Definition

12.1 The module Label Drawing & Definition illustration as below:



(a) Product Name: TD141TGCB1

(b) Serial No.: There are 14 symbols as below, Year + Week + Factory + Version + Grade + Customer + Sequential Number

(1) Y Year is the last number of A.D

(2) The expression of Week is 01 53 in order.

(3) The expression of Factory is one English letter, T for TP01 and N for NJ.

(4) The expression of Version is two letters: Version of BOM

(5) The expression of Grade is one letter: Product grade level

(6) The expression of Customer is one letter: Customer service beforehand byte

(7) The order of sequential number is 000001~999999➔A00001~A99999➔ B00001~B99999➔ and so on

(c) Made in Taiwan or Made in China (Module only).

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12.2 The Packing Carton Label Drawing & Definition illustration as below:

Product ID	**TD141TGCB1**		**QA Check**
Carton ID	**TM41000001** **Bar Code**		
Serial No.	**From**	TD141TGCB1 333T2D11000001	
	To	TD141TGCB1 333T2D11000010	
Quantity	20 pcs		
Lot ID	A310005601.01		
Made in Taiwan			

12.3 Toppoly Delivery Of Label & Definition illustration as below:

Toppoly Delivery of Label

Customer Name :_____ **Delivery Date :**_____

Customer P/N :_____ **PO number :**_____

Name of things :_____ **Inspector :**_____

Delivery Total Q'ty :_____ **Delivery Total Box :**_____

Box of Number :_____ **One Box of Q'ty :**_____

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