POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER	:	
SAMPLE CODE	:	SH192108T005-ZHC
MASS PRODUCTION CODE	:	PH192108T005-ZHC
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	004
DRAWING NO. (Ver.)	:	LMD-PH192108T005-ZHC (Ver.003)
PACKAGING NO. (Ver.)	:	PKG-PH192108T005-ZHC (Ver.002)

Customer Approved

Date:

Approved	Checked	Designer
廖志豪 Rex Liao	陳宗淇 Howard Chen	張慶源 Yuan Chang

POWERTIP
2023.10.26
TW RD APR

□ Preliminary specification for design input

■ Specification for sample approval

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History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
12/26/2022	01	001	Preliminary.	-	Ian
01/12/2023	01	002	Backlight Unit Characteristics Note	9	Ian
08/08/2023	01	003	First Sample Modify LED Connector Interface Modify DIM	- 13 Appendix	Yuan
10/25/2023	01	004	LCM Rotate 180 degree to display and Modify CTP starting location Modify Packaging Specifications	Appendix Appendix	Yuan

Contents

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Resolution	1920*3 (RGB) * 1080 Dots
LCD Type	a-Si TFT , Normally Black , Transmissive type
Viewing Direction	ALL
Screen size(inch)	15.6 inch
Color configuration	B.G.R. Vertical Stripe
Weight	1.6Kg
Interface	LVDS
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website: http://www.powertip.com.tw/news_detail.php?Key=1&cID=1

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	385.16 (L) * 234.59 (W) * 17 (H)	mm

LCD panel

Item	Standard Value	Unit
Active Area	344.16(L) * 193.59(W)	mm

Note: For detailed information please refer to LCM drawing.

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Logic Supply Voltage	VDD	GND=0V	-0.3	4.0	V	-
Operating Temperature	T_{OP} (Ts)	Note 1	-30	+85	°C	
Storage Temperature	T_{ST} (Ta)	Note 2	-30	+85	°C	
Operating Humidity	H_D	Ta ≦ 40 °C	-	90	%	

The absolute maximum rating values of this product are not allowed to be exceeded at any time. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 1: Ts is the temperature of panel's surface

Note 2: Ta is the ambient temperature of samples

1.4 DC Electrical Characteristics

Module GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for TFT Panel	VDD	GND=0V	3.0	3.3	3.6	V
VDD Current	IDD	VDD=3.3V White Pattern	-	0.4	0.6	A
VDD Power Consumption	PDD		-	-	2.2	W
Input Voltage for TFT Panel	V_{IH}	GND=0V	0.7VDD	-	VDD	V
	V_{IL}	GND=0V	0	-	0.3VDD	

1.5 Optical Characteristics

Optical Specification VDD=3.3V, Ta=25°C

Item	Symbol		Condition	Min.	Typ.	Max.	unit	
Response time	Tr+Tf		θx=θy=0°	-	25	35	ms	Note 2
Viewing angle	Top	θY+	CR ≥ 10	-	85	-	Deg.	Note 4
	Bottom	θY-		-	85	-		
	Left	θX-		-	85	-		
	Right	θX+		-	85	-		
Contrast ratio	CR		θx=θy=0° VLED=12V PWM="High" (Duty=100%)	700	1000	-	-	Note 3
Color of CIE Coordinate	White	X		0.25	0.30	0.35	-	Note1
		Y		0.31	0.36	0.41		
	Red	X		0.58	0.63	0.68		
		Y		0.29	0.34	0.39		
	Green	X		0.25	0.30	0.35		
		Y		0.62	0.67	0.72		
	Blue	X		0.07	0.12	0.17		
		Y		0.01	0.06	0.11		
Average Brightness Pattern=white display (With LCD)*1	IV			800	1000	-	cd/m^2	Note1
Uniformity (With LCD)*2	△B			75	80	-	%	Note1

Note 1:

*1: △B=B(min) / B(max) * 100%

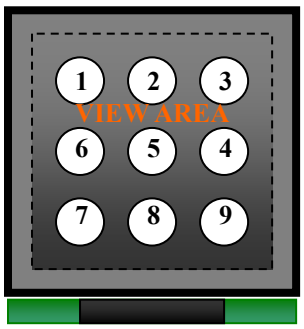
*2: Measurement Condition for Optical Characteristics:

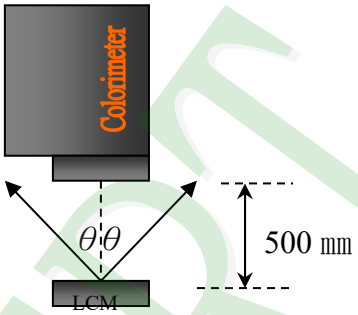
a: Environment: 25℃±5℃ / 60±20%R.H, no wind, dark room below 10 Lux at typical lamp current and typical operating frequency

b: Measurement Distance: 500 ± 50 ㎜, (θ= 0°)

c: Equipment: TOPCON BM-7 fast, (field 1°), after 10 minutes operation

d: The uncertainty of the C.I.E coordinate measurement ±0.01, Average Brightness ± 4%





Colorimeter=BM-7 fast

To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

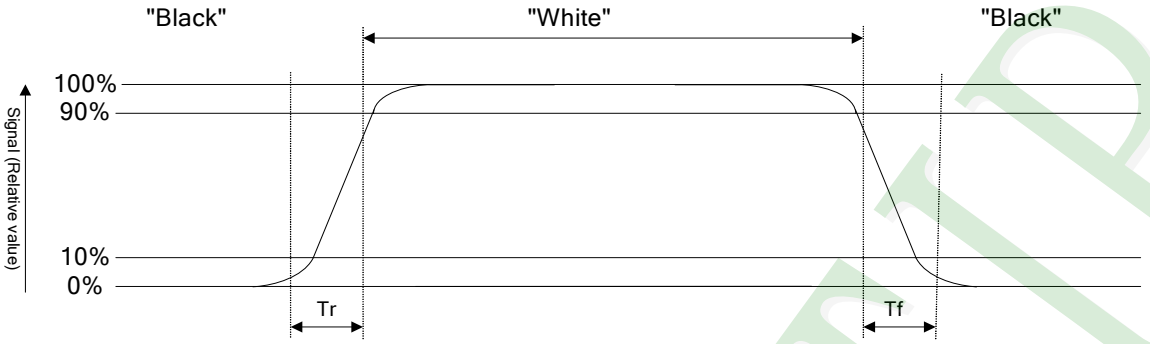
Note 2: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white” (falling time) and from “white” to “black” (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White

Normally Black



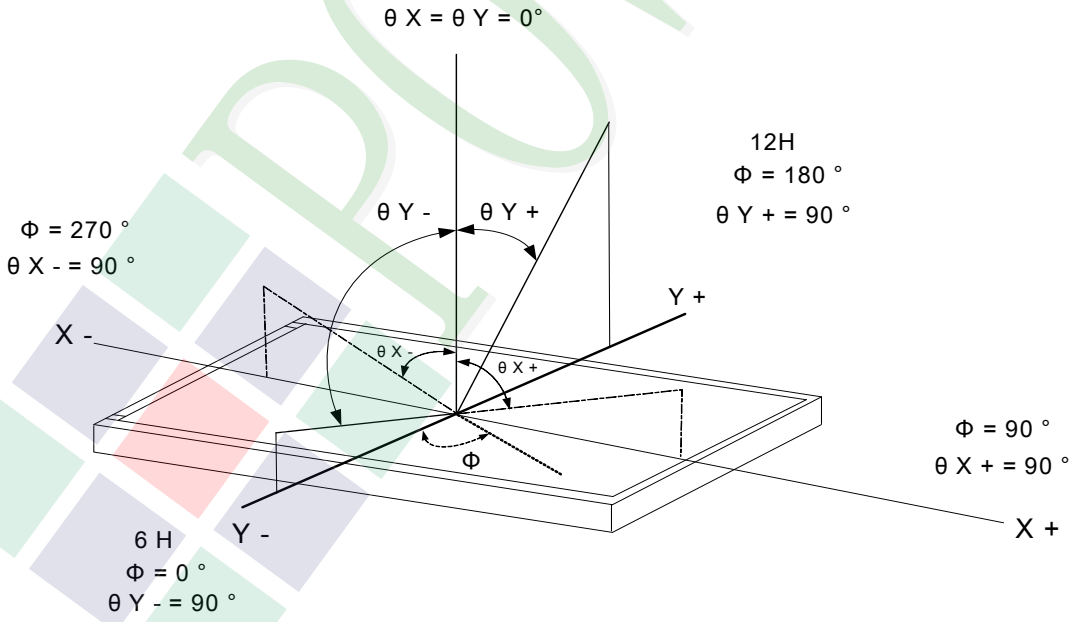
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at “White” state}}{\text{Photo detector output when LCD is at “Black” state}}$$

Note 4: Definition of viewing angle:

Refer to figure as below:



1.6 Backlight Unit Characteristics

Electrical / Optical Characteristics Ta = 25°C

Item	Symbol	Min.	Typ.	Max.	Unit	
LED Input Voltage	V_{LED}	10.8	12	13.2	V	Note (1)
LED Power Consumption	P_{LED}	-	-	26.3	W	
PWM Signal Voltage	V_{IH}	1.2	-	5.5	V	
	V_{IL}	0	-	0.5		
LED Enable Voltage	V_{IH}	1.5	-	5.5	V	
	V_{IL}	0	-	0.5		
Input PWM Frequency	F_{PWM}	100		1000	Hz	Note (2)
Duty Ratio	PWM	10		100	%	Note (3)
LED life time	-	50,000	-	-	H_r	Note (4)

Note (1) The power consumption of LED Driver are under the VLED = 12.0V, Dimming of Max luminance.

Note (2) Although acceptable range as defined, the dimming ratio is not effective at all conditions. The PWM frequency should be fixed and stable for more consistent luminance control at any specific level desired.

Note (3) The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue.

Note (4) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

1.7 Touch Panel Unit Characteristics

Features

Item	Standard Value
Touch Panel Size	15.6”
Surface Treatment	AF
Touch type	Projective capacitive touch panel
Input Method	Finger or Conductive Pen
Support Operation	10 Points touch
Output Interface	I²C、USB
IC	ILI2521

I²C Address

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	0	0	0	0	0	1	**R/W**

R/W: 1 : Read

0 : write

DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	unit
Power Supply Voltage(I²C)	VI2C	-	-	3.3	-	V
Power Supply Voltage(USB)	VUSB	-	-	5	-	V

Optical Characteristics

Item	Standard Value	unit
Total light transmittance	85% or more	-
Haze	3% or less	-

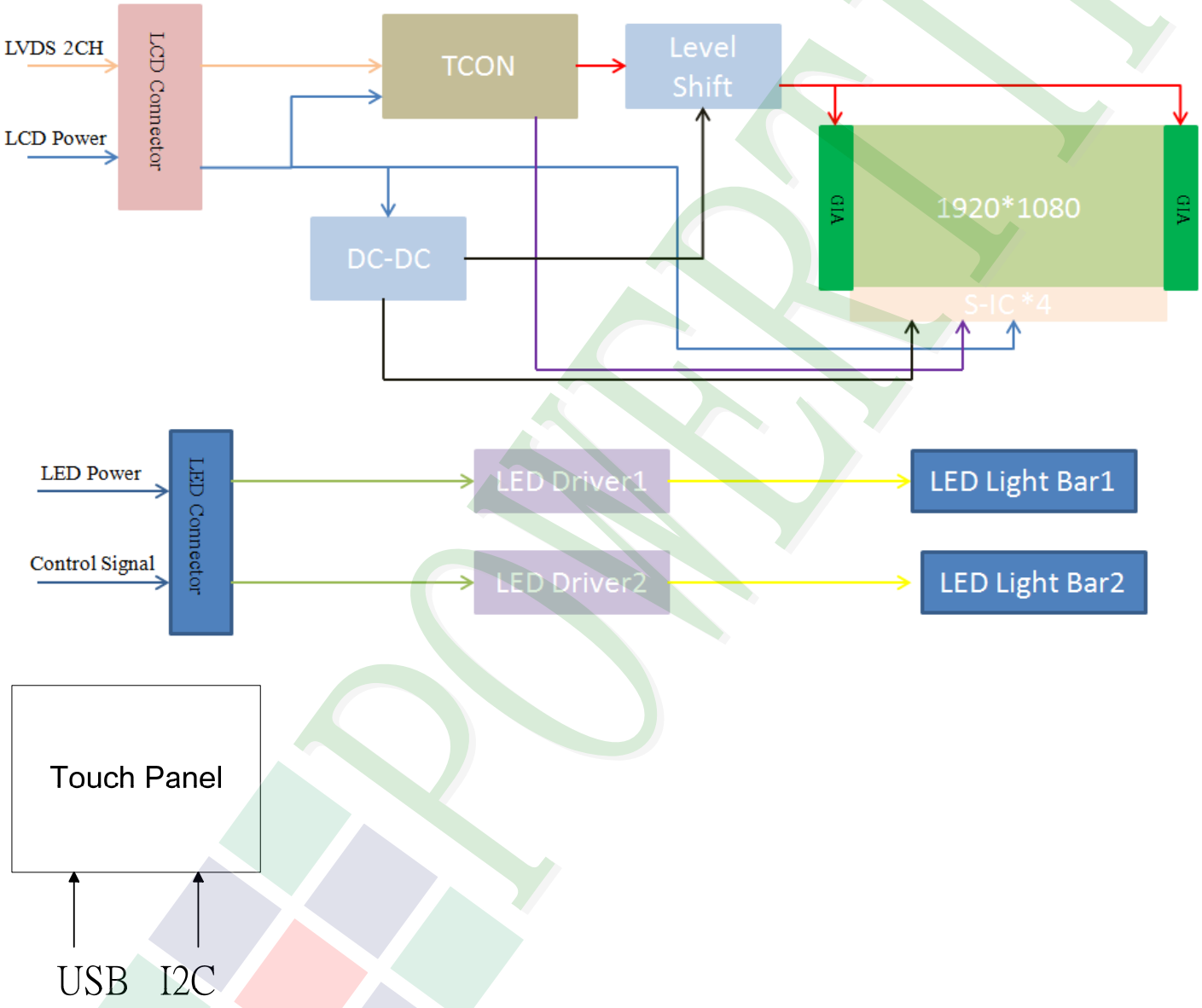
2. Module Structure

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

TFT LCM Interface

Pin No.	Symbol	Function
1	RxO0-	Negative LVDS differential data input (Odd data)
2	RxO0+	Positive LVDS differential data input (Odd data)
3	RxO1-	Negative LVDS differential data input (Odd data)
4	RxO1+	Positive LVDS differential data input (Odd data)
5	RxO2-	Negative LVDS differential data input (Odd data)
6	RxO2+	Positive LVDS differential data input (Odd data)
7	GND	Ground
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)
10	RxO3-	Negative LVDS differential data input (Odd data)
11	RxO3+	Positive LVDS differential data input (Odd data)
12	RxE0-	Negative LVDS differential data input (Even data)
13	RxE0+	Positive LVDS differential data input (Even data)
14	GND	Ground
15	RxE1-	Negative LVDS differential data input (Even data)
16	RxE1+	Positive LVDS differential data input (Even data)
17	GND	Ground
18	RxE2-	Negative LVDS differential data input (Even data)
19	RxE2+	Positive LVDS differential data input (Even data)
20	RxECLK-	Negative LVDS differential clock input (Even clock)
21	RxECLK+	Positive LVDS differential clock input (Even clock)
22	RxE3-	Negative LVDS differential data input (Even data)
23	RxE3+	Positive LVDS differential data input (Even data)
24	GND	Ground
25	Bist	LCD Panel Self Test Enable(3.3V Typ) For POWERTIP use,When it is not used, Connecting to GND or Floating is recommended
26	NC	No Connection
27	NC	No Connection
28	VDD	Power Supply Input Voltage(3.3V)
29	VDD	Power Supply Input Voltage(3.3V)
30	VDD	Power Supply Input Voltage(3.3V)

LED Connector Interface

Pin No.	Symbol	Function
1	V_{LED}	Power Supply(12V Typ)
2	V_{LED}	Power Supply(12V Typ)
3	V_{LED}	Power Supply(12V Typ)
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	EN	LED Backlight control on/off control(3.3V Typ)
8	PWM	System PWM Signal Input for Dimming (3.3V Typ)

TP Connector Interface

USB

Pin No.	Symbol	Function
1	VUSB	Power Supply Voltage (5V)
2	USB_DN	Negative Data
3	USB_DP	Positive Data
4	GND	Ground.
5	GND	Ground.

I^2C

Pin No.	Symbol	Function
1	GND	Ground.
2	I^2C_SDA	I^2C Data
3	I^2C_SCL	I^2C Clock
4	I^2C_INT	Active Low
5	I^2C_RST	Active low global reset signal input.
6	VI2C	Power Supply Voltage (3.3V)

2.3 Timing Characteristics

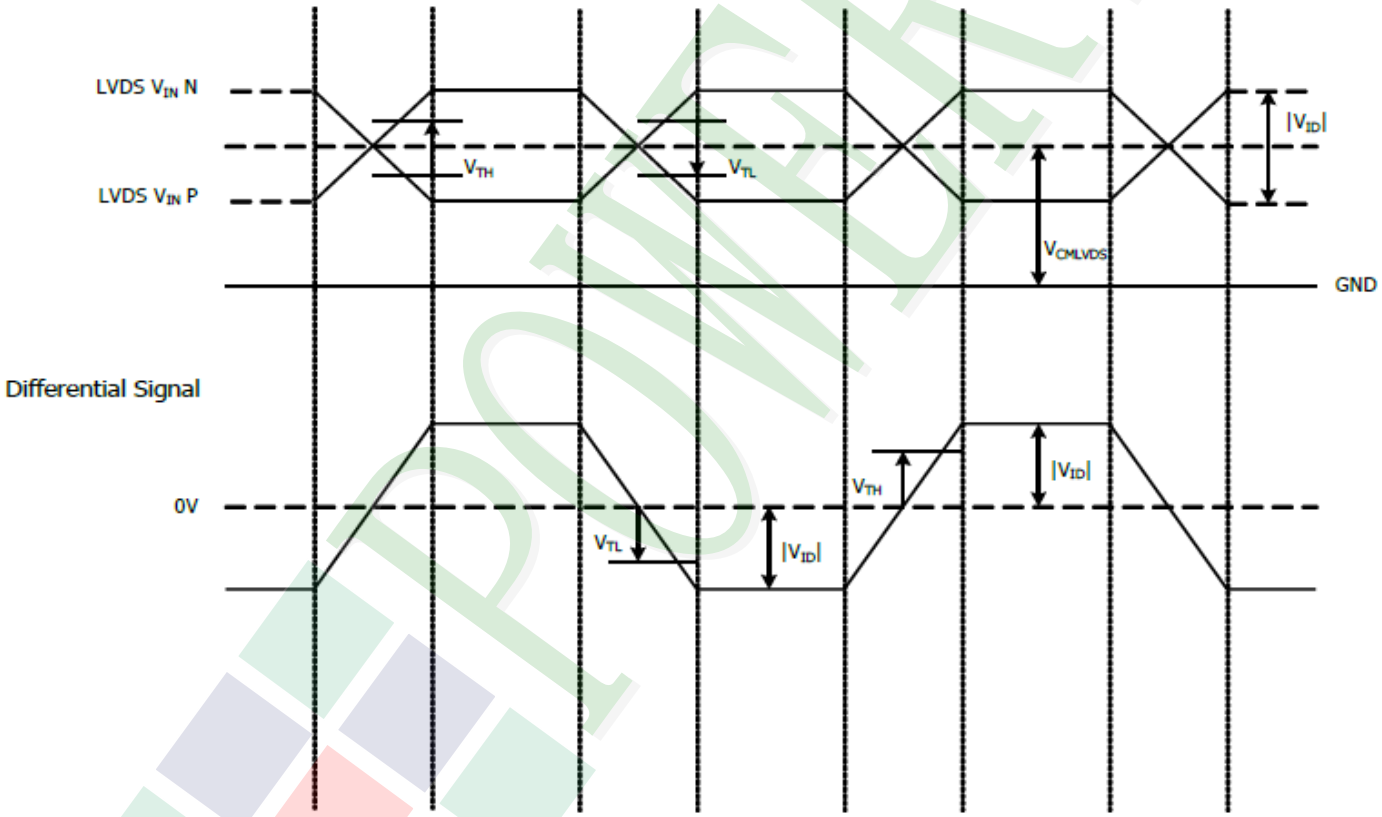
2.3.1 Signal Electrical Characteristics For LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	(+100)	mV	V_{CM}=1.2V
Differential Input Low Threshold	Vtl	(-100)	-	-	mV	V_{CM}=1.2V
Magnitude Differential Input Voltage	$\|V_{ID}\|$	(100)	-	(600)	mV	-
Common Mode Voltage	V_{CM}	(0.7)	-	(1.6)	V	-

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at theinterface connector of LCD.



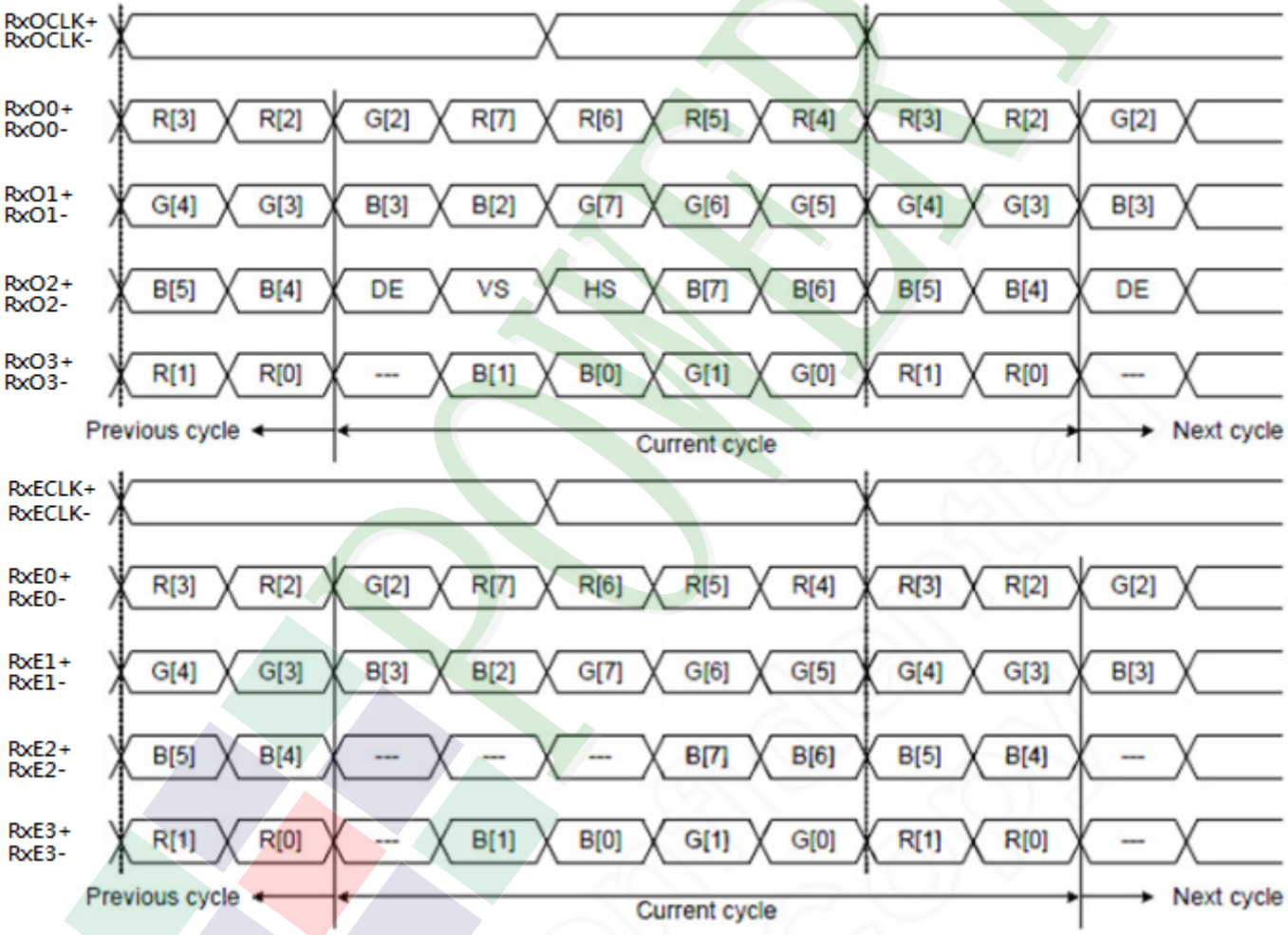
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock Period	TLVCP	-	(T)	-	ns
Clock High Time	TLVCH	-	(4T/7)	-	ns
Clock Low Time	TLVCL	-	(3T/7)	-	ns

Note : T=1/Fclk

2.3.2 Interface Timings

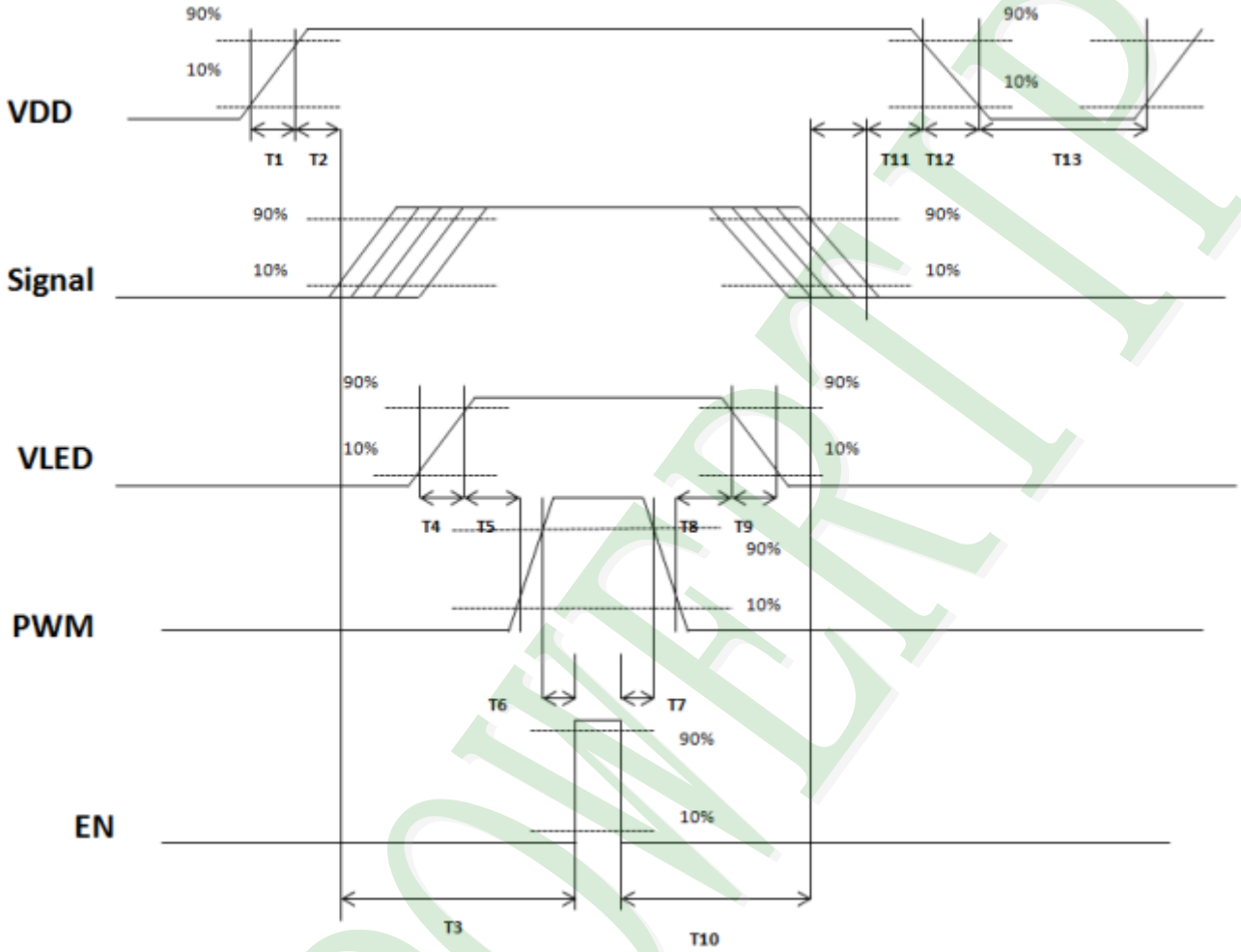
Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	(69.5)	(70.5)	(73)	MHz
H Total Time	HT	(1104)	(1116)	(1080+A)	Clocks
H Active Time	HA		1080		-
V Total Time	VT	(1050)	(1052)	(960+B)	Lines
V Active Time	VA		960		-
Frame Rate	FV	-	(60)	-	Hz

Note (1) SCC can only be driven to 2%



2.3.3 Power ON/OFF Sequence

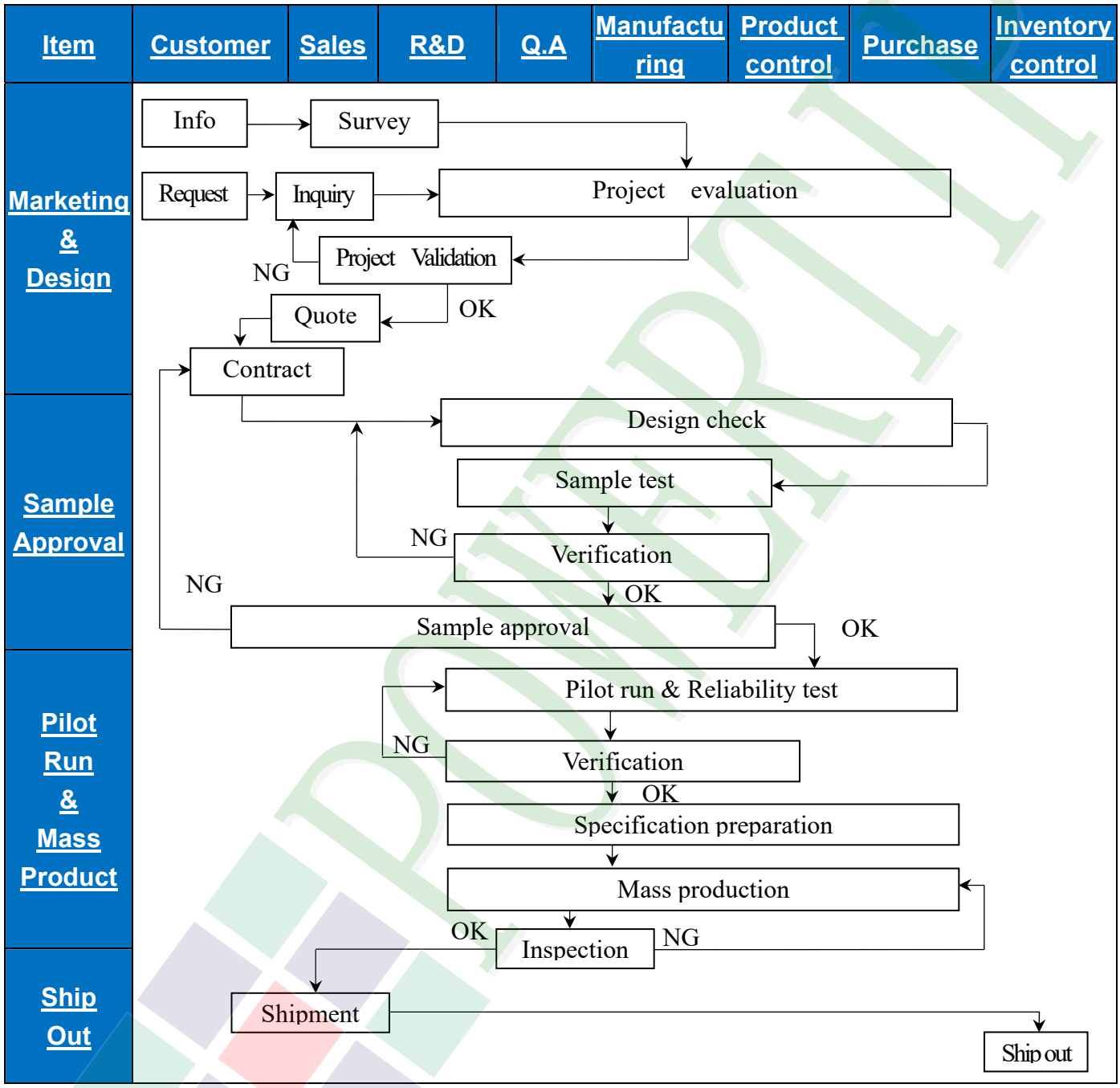
Interface signals are also shown in the chart. Signals from any system shall be Hi- resistance state or low level when VDD voltage is off.

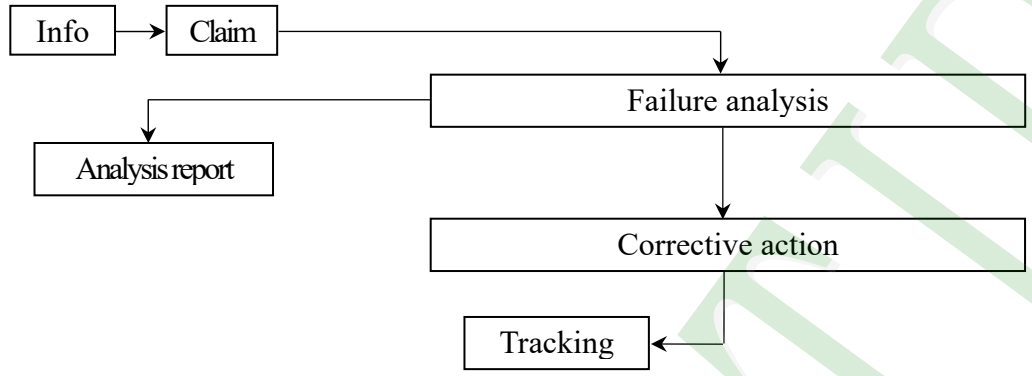


Parameter	Min.	Typ.	Max.	Unit
T1	(0.5)	-	(10)	ms
T2	(30)	(40)	(50)	ms
T3	(200)	-	-	ms
T4	(0.5)	-	(10)	ms
T5	(10)	-	-	ms
T6	(10)	-	-	ms
T7	(0)	-	-	ms
T8	(10)	-	-	ms
T9	-	-	(10)	ms
T10	(110)	-	-	ms
T11	(0)	(16)	(50)	ms
T12	-	-	(10)	ms
T13	(1,000)	-	-	ms

3. Quality Assurance System

3.1 Quality Assurance Flow Chart



Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

4. RELIABILITY TEST

4.1 Reliability Test Condition (Ver.01)

TEST ITEM	TEST CONDITION		Note
High Temperature Operating Test	Tgs = 85℃, 300 hours		(1),(2),(3),(4)
High Temperature Storage Test	Tgs = 85℃, 300 hours		(1),(2),(3),(4)
Low Temperature Operating Test	Tgs = -30℃, 300 hours		(1),(2),(3),(4)
High Temperature/High Humidity Operating Test	Tgs = 40℃, 90%RH, 300 hours		(1),(2),(3),(4)
Thermal Shock Non-operation Test	-20℃~60℃, 1hr/each cycle ,100cycles		(1),(3),(4)
Shock Non-operating Test	100G, 6ms, X Y Z * 2faces * 3times		(1),(3),(5)
Vibration Non-operating Test	half-sine Frequency: 8Hz ~ 33Hz Stroke: 1.3mm Sweep: 2.9G 33.3Hz ~ 400Hz X, Z Cycle: 15 minutes 2 hours for each direction of X, Z; 4 hours for Y direction		
ESD Test	Air ± 15 KV, 150pF(330Ohm)	Contact ± 8 KV, 150pF(330Ohm)	(1),(2),(6)

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the IVO document before reliable test. Only check the function of the module after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test.

Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the module from static electricity.

Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃ , Humidity: 55± 10%RH. Ta= Ambient Temperature, Tgs= Glass Surface Temperature.

Note (5) The module should be fixed firmly in order to avoid twisting and bending.

Note (6) It could be regarded as pass, when the module recovers from function fault caused by ESD after resetting.

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 Using Restriction

This product is not authorized for using in life supporting systems, aircraft navigation control systems, military systems and any other appliance where performance failure could be life-threatening or lead to be catastrophic.

5.2 Operation Precaution

(1)The LCD product should be operated under normal conditions.

Normal conditions are defined as below:

Temperature: 25℃

Humidity: 55±10%

Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the module. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the module.

(5) Do not adjust the variable resistor located on the module.

(6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.

(7) Image sticking may occur when the module displayed the same pattern for long time.

(8) Do not connect or disconnect the module in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”

(9) Ultra-violet ray filter is necessary for outdoor operation.

5.3 Mounting Precaution

(1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel clean during the incoming inspection and the process of assembly.

(2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.

(3) The case on which a module is mounted should have sufficient strength so that external force is not transmitted to the module directly.

(4) It is obvious that you should adopt radiation structure to satisfy the temperature specification.

(5) It should be attached to the system tightly by using all holes for mounting, when the module is assembled. Be careful not to apply uneven force to the module, especially to the PCB on the back.

(6) A transparent protective film needs to be attached to the surface of the module.

(7) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don’t touch the pin exposed with bare hands directly.

(8) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.

(9) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.

(10) Clean the panel gently with absorbent cotton or soft cloth when it is dirty. Ethanol(C2H5OH) is allowed to be used. Ketone (ex. Acetone), Toluene, Ethyl acid, Methyl chloride, etc are not allowed to be used for cleaning the panel, which might react with the polarizer to cause permanent damage.

(11) Do not disassemble or modify the module. It may damage sensitive parts in the LCD module, and cause scratches or dust remains. IVO does not warrant the module, if you disassemble or modify the module.

5.4 Handling Precaution

(1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding area.

(2) The protection film is attached to the polarizer with a small amount of glue. When the module with protection film attached is stored for a long time, a little glue may remain after peeling.

(3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

5.5 Storage Precaution

When storing modules as spares for long time, the following precautions must be executed.

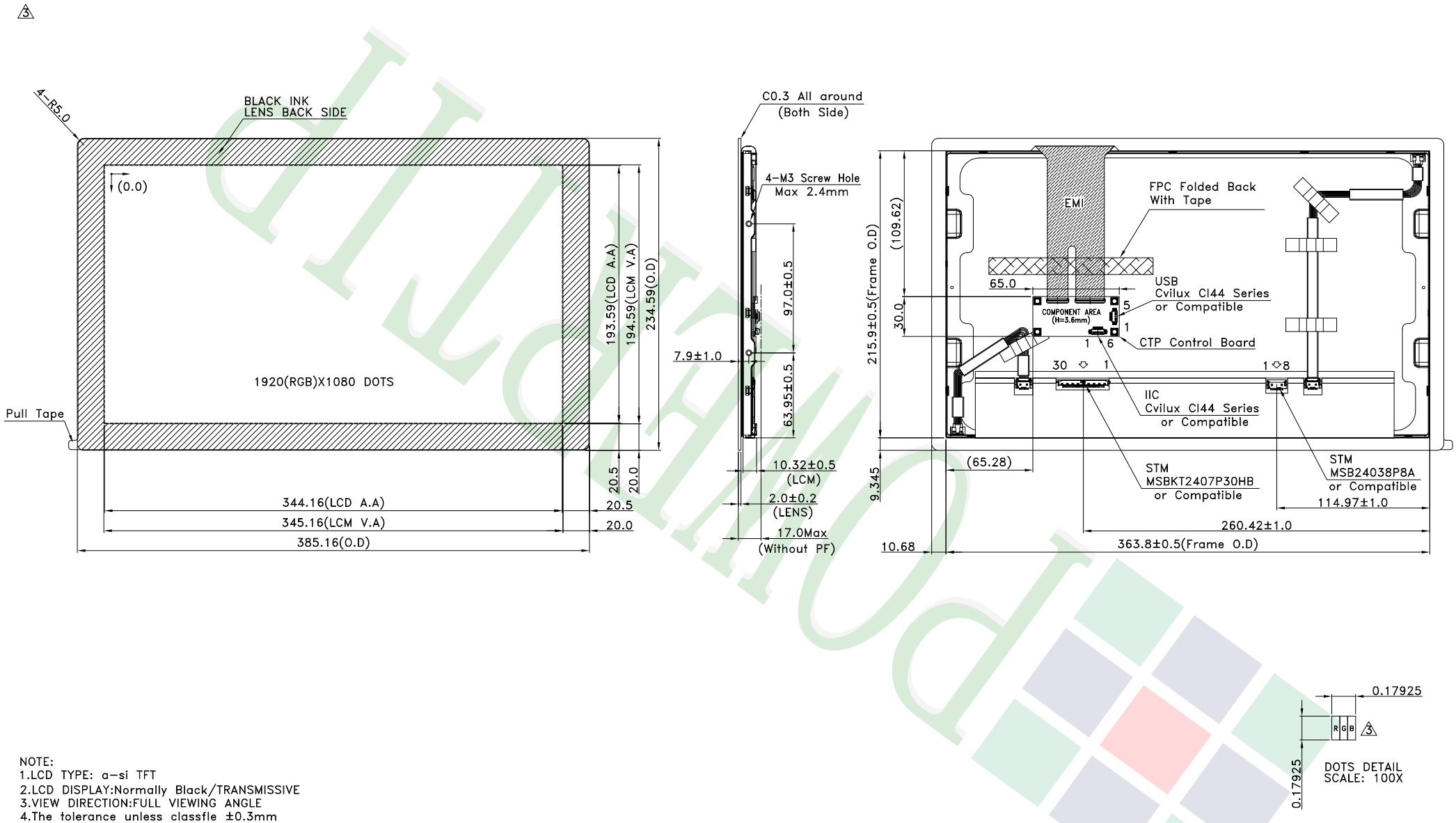
(1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

(3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quali

5.6 Others

When disposing LCD module, obey the local environmental regulations



NOTE:
1.LCD TYPE: a-si TFT
2.LCD DISPLAY:Normally Black/TRANSMISSIVE
3.VIEW DIRECTION:FULL VIEWING ANGLE
4.The tolerance unless classfle ±0.3mm

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003	LCM Rotate 180 degrees to display & Modify CTP starting location	Jason	2023/10/25
002	Modify Dim	Jason	2023/06/14
001	NEW DRAWING	Jason	2023/01/06

PART NO: PH192108T005-ZHC

DRAWING NAME : LMD-PH192108T005-ZHC

TITLE: LCD MODULE DRAWING

久正光電股份有限公司
POWERTIP TECHNOLOGY CORPORATION

Design	Jason Chang	(3)	Surface		
Check	Tina Chen	Unit	MM	Material	
Approve	Bright Chiang	Scale	FIT	Thickness	
		Page	1/1	Quantity	

Length(Min) (mm) \ Tolerance \ Precision	Precision Level
1 ~ 4	-
4 ~ 16	-
16 ~ 63	-
63 ~ 250	-
250 ~ 1000	-

Ver.002				
Documents NO.	PKG-PH192108T005-ZHC	Packaging Specifications	Approve	Check	Contact
			Bright	Tina	Jason

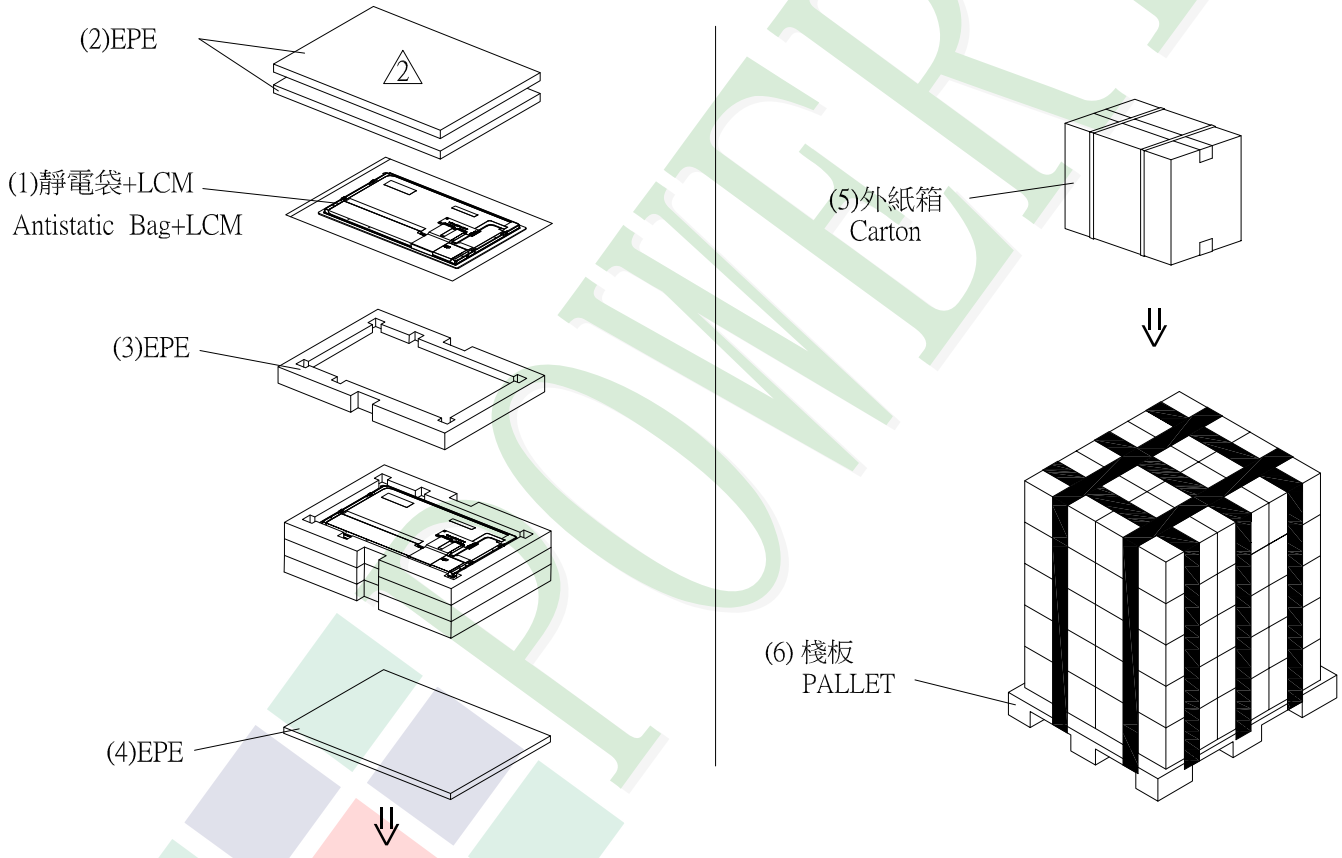
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	模組 (LCM)	PH192108T005-ZHC	385.16 X 234.56 X 17.0	1.50	120	180.0
2	抗靜電袋(1)Antistatic Bag	BAG0000000053	350 X 450	0.02	120	2.4
3	舒美墊(2) EPE	FOAM000000280	460 X 335 X 20	0.05	30	1.5
4	舒美墊(3) EPE	FOAM000000279	460 X 335 X 40	0.11	120	13.2
5	舒美墊(4) EPE	FOAM000000281	460 X 335 X 15	0.075	60 △2	4.5 △2
6	外紙箱(5)Carton	BX47334524CCBA	473X 345 X 240	1.0	30	30.0
7	棧板(6)PALLET	OTPALLET005ABA	1200 X 1000 X 140	8.0	1	8.0
8						

2.一 整箱總重量 (Total LCD Weight in carton) : △2 239.60 Kg±10%

3.單箱數量規格表 (Packaging Specifications and Quantity) :

(1)LCM quantity in carton : quantity per EPE	1	x no of carton	4	=	4
(2)Total LCM quantity in pallet : quantity per carton	4	x no. of cartons	30	=	120



特 記 事 項 (REMARK)

4.外箱擺放方式:一層擺放6箱外箱，
共5層。
6箱 X 5層 =30箱外箱

5.不滿一棧板之尾數箱，需用棧板出貨。

6.外圍加打包帶及外部封塑膠膜。