

PRODUCT SPECIFICATION

Customer	
Project	
Part No.	Z32002-Palpal32-ZC1
Remarks	<input type="checkbox"/> APPOVAL FOR SPECIFICATION ONLY <input checked="" type="checkbox"/> APPOVAL FOR SPECIFICATION AND SAMPLE

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Revision Record

Rev. No.	Date	Description
V1.0	2025-08-16	Preliminary Specification Release.

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1. General Specifications

No.	Item	Specification	Unit
1	Display Size (Diagonal)	3.2	inch
2	Display Resolution	240 (H) × RGB × 320 (V)	pixels
3	Pixel Pitch	202.5 (H) × 202.5 (V)	um
4	LCD Module Dimension (Without FPC)	55.05 (W) × 75.2 (H) × 2.5 (T)	mm
5	Touch Display Dimension (Without FPC)	61.83 (W) × 80.9 (H) × 3.57 (T)	mm
6	LCD Active Area	48.6(H) × 64.8(V)	mm
7	View Direction (Gray Inversion)	FULL VIEW	-
8	LCM Driver IC	ST7789P3-G6	-
9	Pixel Arrangement	RGB-Stripe	-
10	Display Mode	Normal Black	-
11	FPC Version	Z32002-Palpal32 V1	-
12	TFT Display Interface	8BIT MCU	-
13	TP Interface	I2C	-
14	PCAP Multi Touch	5	point
15	Touch Screen Report Rate	100	Hz
16	Operating Temperature	-20°C~ 70°C	-
17	Storage Temperature	-30°C~ 80°C	-
18	Backlight Arrangement	LED/1 Series 5 Parallel (5 lights in total)	-
19	Display+Touch Luminance	Typ.: 350	nit
20	Weight	TBD	kg

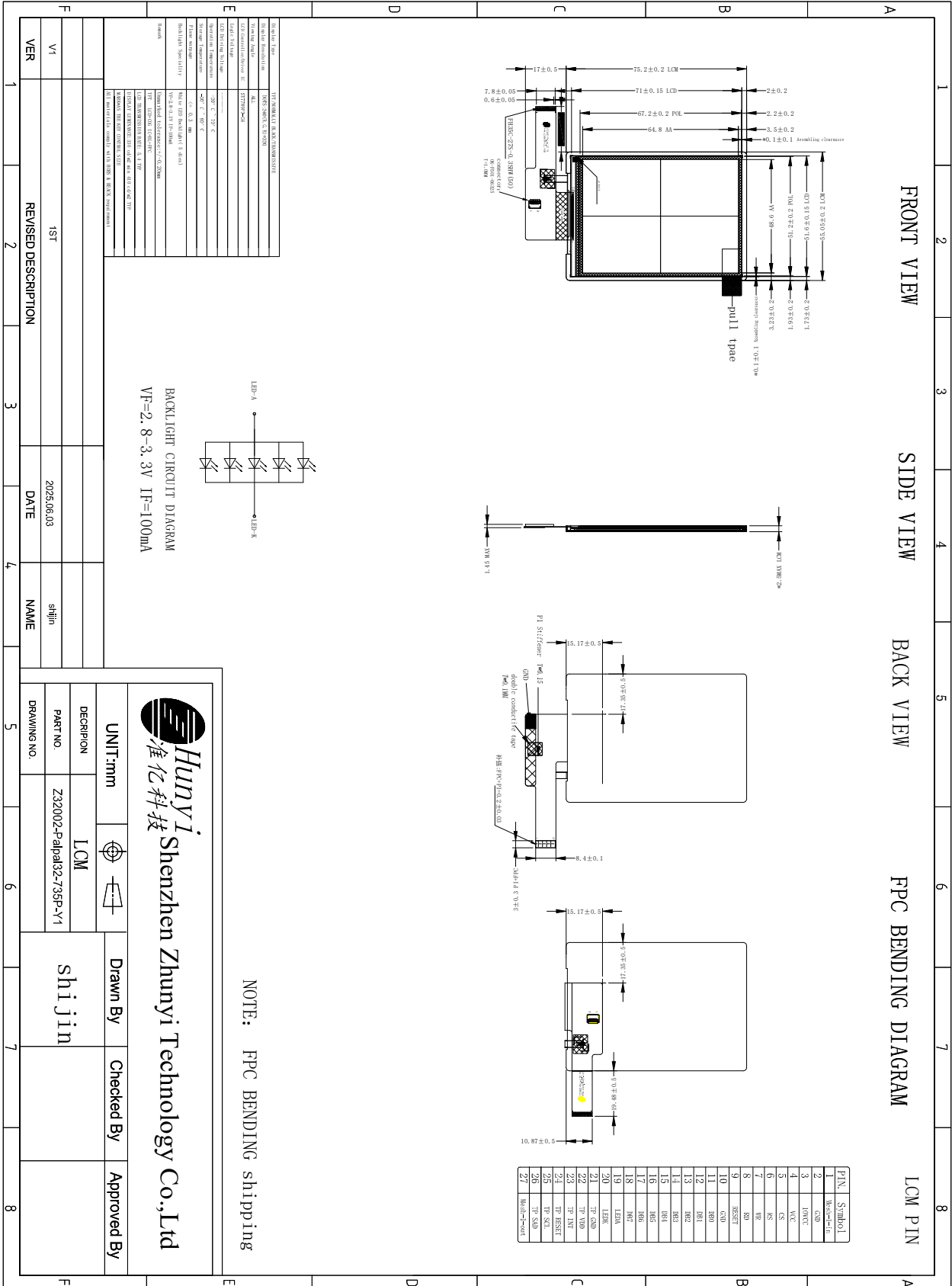
2. Interface Definition Description

PIN NO.	PIN SYMBOL	FUNCTION DESC.
1	Mesh-1-in	Mesh input pin
2	GND	Ground
3	IOVCC	I/O POWER SUPPLY(1.65~3.3V)
4	VCC	POWER SUPPLY(2.5~3.3V)
5	CS	Chip selection pin
6	RS	Display data/command selection pin
7	WR	Write enable in MCU parallel interface.
8	RD	-Read enable in MCU parallel interface.
9	RESET	LCM RESET PIN
10	GND	Ground
11	DB0	Data bus input pin
12	DB1	
13	DB2	
14	DB3	
15	DB4	
16	DB5	
17	DB6	
18	DB7	
19	LEDA	POWER SUPPLY- FOR BACKLIGHT ANODE
20	LEDK	POWER SUPPLY- FOR BACKLIGHT CATHODE
21	TP_GND	Ground
22	TP_VDD	TP POWER SUPPLY(3.3V)
23	TP_INT	TP Interrupt PIN(1.8V)
24	TP_RESET	TP Reset PIN(1.8V)
25	TP_SCL	TP I2C clock (SCL) clock (SCLK)(1.8V)
26	TP_SAD	TP I2C data (SDA) data input (MOSI)(1.8V)
27	Mesh-1-out	Mesh output pin

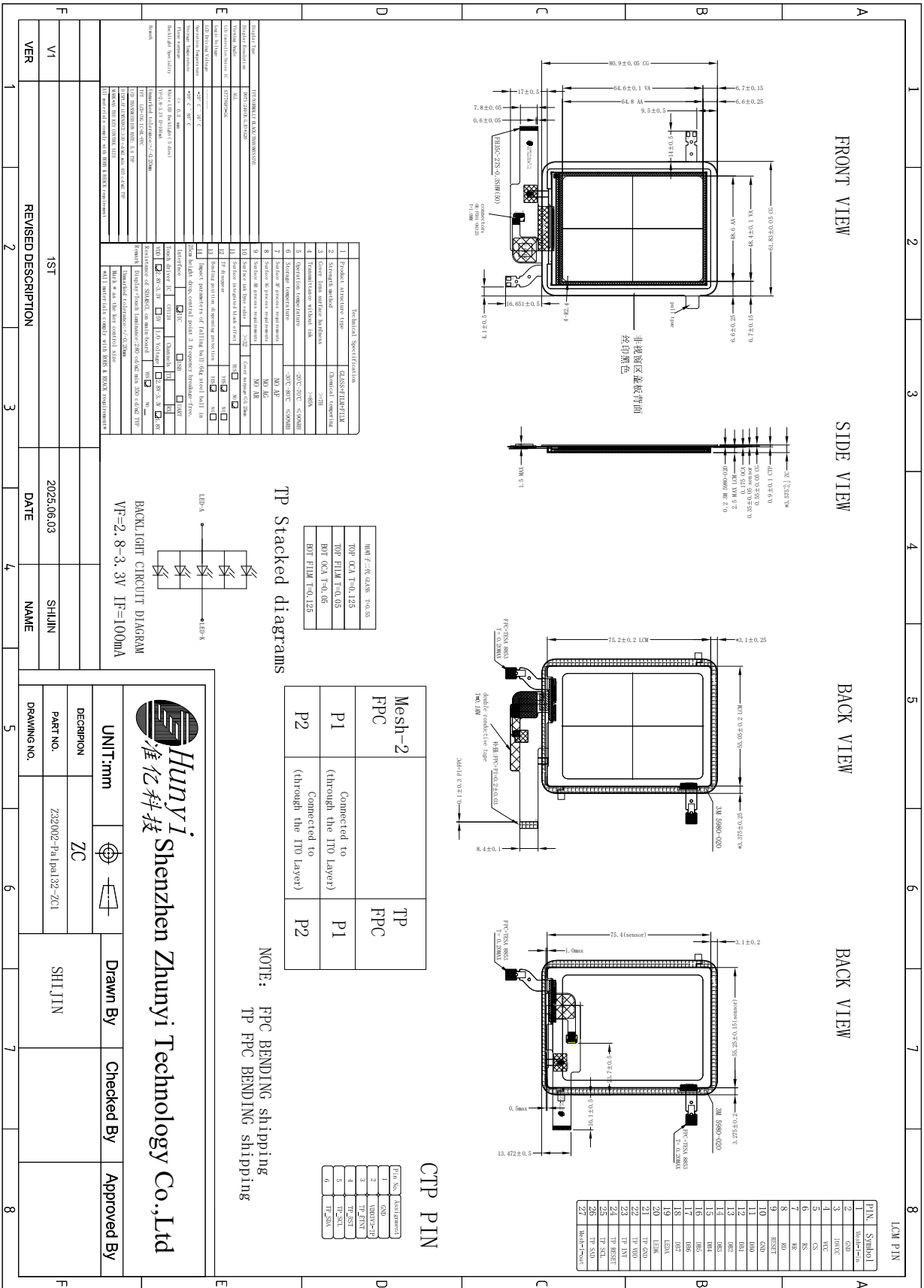
RESET voltage should be consistent with iovcc voltage, or there probably is black screen fault when power on.

3. Mechanical Drawing

3.2 LCM



3.3 TP+LCM



4. Electrical Specifications

4.1. LCD Optical Characteristics

Item	Symbol	Conditions	Specification			Unit	Note
			Min.	Typ.	Max.		
Transmittance (With PL)	T(%)	Viewing normal angle $x = y = 0$	4.59	5.4	-	%	-
Contrast Ratio	CR		-	1200	-	-	-
Response Time	TR+TF		-	30	35	ms	-
Viewing Angle	Hor.	Θ_{x+}	-	80	-	deg.	-
		Θ_{x-}	-	80	-		
	Ver.	Θ_{y+}	-	80	-		
		Θ_{y-}	-	80	-		

4.2. Electrical Characteristics

Item	Symbol	Specification			Unit
		Min.	Typ.	Max.	
Power For Analog Circuit	AVDD	-	-	-	V
TFT Gate On Voltage	VGH	-	14	-	V
TFT Gate Off Voltage	VGL	-	-12	-	V
TFT Common Electrode Voltage	Vcom	-	0	-	V

4.3. Typical Operating Conditions

Item	Symbol	Min.	Typ.	Max.	Unit
Analog Supply Voltage	VCI	2.5	2.8	3.3	V
I/O Supply Voltage	IOVCC	1.65	-1.8	3.3	V

4.4. Backlight Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Current	I _B	-	60	-	mA	-
Voltage	V _f	2.8	3.2	3.3	V	-
LCM Uniformity	-	80	-	-	%	If=60mA
Life Time	-	30000	-	-	Hr.	
Power Consumption	PBL	-	180	-	mW	
LCM Chromaticity Coordinate	Red	R _x	-	-	-	Average the brightness EV at 9 points, Optical Instrument BM-7
		R _y	-	-	-	
	Green	G _x	-	-	-	
		G _y	-	-	-	
	Blue	B _x	-	-	-	
		B _y	-	-	-	
	White	W _x	-	-	-	
		W _y	-	-	-	

4.5. LCD Power Consumption

Mode	Symbol	Typ.	Max.	Unit
Normal Mode	VCC+IOVCC	-	-	mA
Test Condition: VCC=2.8V.				
Interface Drive Type: row flipping or column flipping.				
IPS Type LCD Panel => All Black Pattern.				
TN Type LCD Panel => All White Pattern.				
Temperature: 25°C.				
Mode	Symbol	Typ.	Max.	Unit
Sleep Mode	VCC+IOVCC	-	-	μA
Test Condition: VCC=2.8V.				

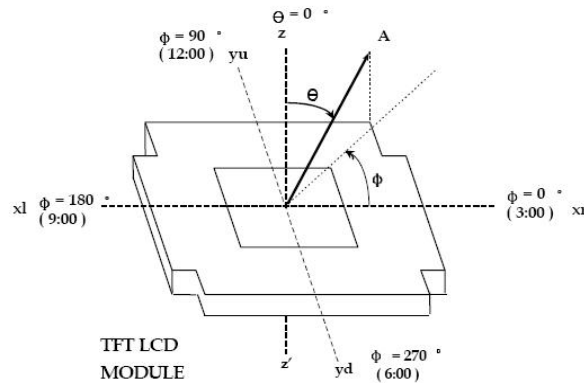
DC/DC converter is enabled. Internal oscillator is started and panel scanning is started.

Except for the IC internal crystal oscillator and panel scanning, other functions are suspended.

Temperature: 25°C.

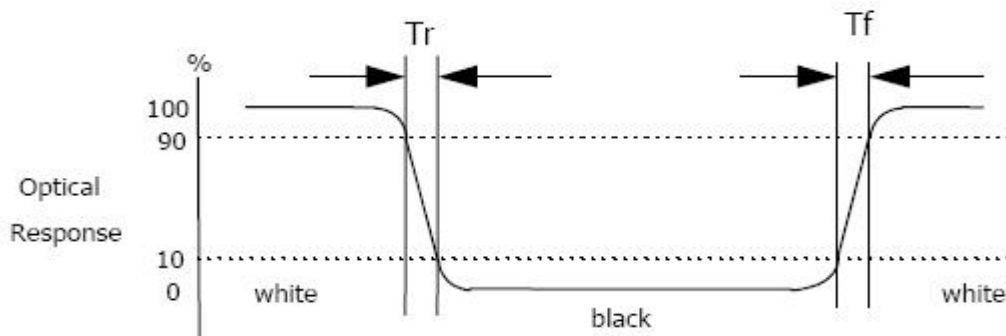
4.6. Measuring System

4.6.1. LCM Viewing Angle



Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

4.6.2. Response Time



Response time is the time required for the display to transition from white to black (Rising time, T_r) and from black to white (Falling time, T_f) for additional information.

4.6.3. Contrast Ratio (CR)

Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white.

4.7. Interface Timing Characteristics

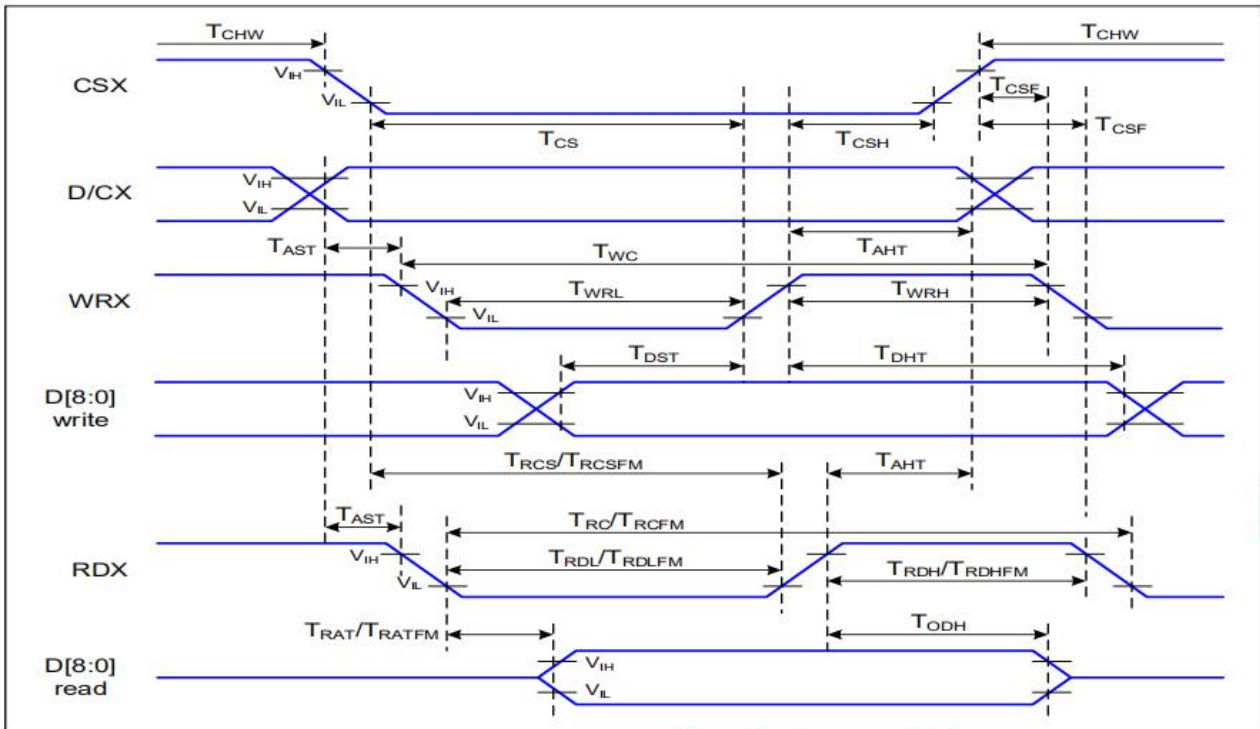


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25 °C

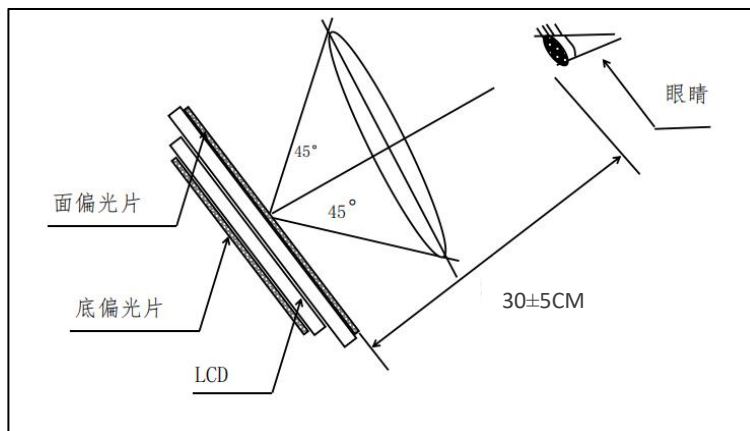
Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T _{AST}	Address setup time	0	-	ns	-
	T _{AHT}	Address hold time (Write/Read)	10	-	ns	
CSX	T _{CHW}	Chip select "H" pulse width	0	-	ns	-
	T _{CS}	Chip select setup time (Write)	15	-	ns	
	T _{RCS}	Chip select setup time (Read ID)	45	-	ns	
	T _{RCSFM}	Chip select setup time (Read FM)	355	-	ns	
	T _{CSF}	Chip select wait time (Write/Read)	10	-	ns	
	T _{CSH}	Chip select hold time	10	-	ns	
WRX	T _{WC}	Write cycle	66	-	ns	-
	T _{WRH}	Control pulse "H" duration	15	-	ns	
	T _{WRL}	Control pulse "L" duration	15	-	ns	
RDX (ID)	T _{RC}	Read cycle (ID)	160	-	ns	When read ID data
	T _{RDH}	Control pulse "H" duration (ID)	90	-	ns	
	T _{RDH}	Control pulse "L" duration (ID)	45	-	ns	
RDX (FM)	T _{RCFM}	Read cycle (FM)	450	-	ns	When read from frame memory
	T _{RDHFM}	Control pulse "H" duration (FM)	90	-	ns	
	T _{RDLFM}	Control pulse "L" duration (FM)	350	-	ns	
D[8:0]	T _{DST}	Data setup time	10	-	ns	For CL=30pF

5. Inspection Criterion

5.1. Quality Inspection Environmental Conditions

5.1.1. Viewing distance: the normal viewing distance between the screen and the inspector is $30\pm 5\text{cm}$; Inspection Angle: $90^\circ\pm 45^\circ$ (90° indicates that the inspector's perspective is perpendicular to the product to be inspected).

5.1.2. Visual inspection illumination: $1000\pm 200\text{LUX}$; Electrical inspection illumination: $200\pm 100\text{LUX}$; Ambient temperature $25\pm 5^\circ\text{C}$, ambient humidity $55\pm 15\%\text{RH}$.



5.2. Quality Inspection Standard

No.	Defect	Standard		Defect Grade	Result
1	Spot Defect (including bright spot / color spot / bubble / dark spot, etc.)	< 7 inches	$\Phi \leq 0.10\text{mm}$	Ignore	OK
			$0.10\text{mm} < \Phi \leq 0.20\text{mm}$ $DS \geq 10\text{mm}$	Minor Defect	OK
			$\Phi > 0.20\text{mm}$	Serious Defect	NG
		≥ 7 inches	$\Phi \leq 0.15\text{mm}$	Ignore	OK
			$0.15\text{mm} < \Phi \leq 0.25\text{mm}$ $DS \geq 10\text{mm}$	Minor Defect	OK
			$\Phi > 0.25\text{mm}$	Serious Defect	NG
		Φ : defect diameter. DS: spacing.			
2	Linear Defect	< 7 inches	$W \leq 0.02\text{mm}$,	Ignore	OK

	(scratches, filaments, etc.)		L: unlimited			
			0.02mm < W ≤ 0.03mm L ≤ 5mm		Minor Defect	OK
			W > 0.03mm		Serious Defect	NG
		≧ 7 inches	W ≤ 0.03mm L: unlimited		Ignore	OK
			0.03mm < W ≤ 0.05mm L ≤ 5mm		Minor Defect	OK
			W > 0.05mm		Serious Defect	NG
W: defect width. L: defect length. DS: spacing.						
3	Polarizer Bubble	Display Area	Judge by Spot Defect			
		Black Edge Area	The distance from the edge of the display area is greater than 0.5mm.		Minor defect	OK
			The distance from the edge of the display area is less than 0.5mm.		Judge by Spot Defect	
4	Polarizer Bump (Mark)	Display Area / Black Edge Area	Invisible when the touch screen or cover plate is assembled.		Minor Defect	OK
5	Color and Luminance	Item	Method	Instrument	Median	Tolerance Range
		Color	x, y Color Coordinate	Optical Instrument BM-7	According to the actual test on the sample confirmed by the customer.	± 0.04
		Luminance	Average the brightness EV at 9 points	Optical Instrument BM-7	According to the actual test on the sample confirmed by the customer.	± 20%

6	Other Standards	Subject to the negotiation by both parties.
7	Warranty Period	One year after sale.
8	Guarantee	ROHS、REACH
9	Websites	English Web: www.zhunyiyeji.com

6. Reliability Test

Item	Condition	Result Determination
High-Temperature Storage	80°C 120H	After the test, leave the LCD samples indoors at normal temperature and humidity for 2H for function and appearance inspection. The sample should meet the requirements on electrical performance, but be free from the following defects: 1. Air bubble in the module, 2. No display, 3. Glass crack.
Low-Temperature Storage	-30°C 120H	
High-Temperature Operation	70°C 120H	
Low-Temperature Operation	-20°C 120H	
High-Temperature and High-Humidity	60°C 90%RH 120H	
Thermal shock	-20°C/0.5H ~ +70°C/0.5H 100 cycles in total	
Vibration Test	Frequency: 10Hz ~ 55Hz ~ 10Hz Amplitude: 0.75mm Cycle once a minute, 30 cycles in total (Packing Condition)	
ESD Test	±4kV Human Body Mode 150pF/330Ω ±8kV Air Mode 150pF/330Ω	

Note:

- 1) Each module under test can only be used for one of the test items.
- 2) The quantity of samples for each test item is 2.
- 3) Fault Judgment Criterion: Basic Specifications, Electrical Specifications, Mechanical Specifications, Optical Specifications.

7. Precautions

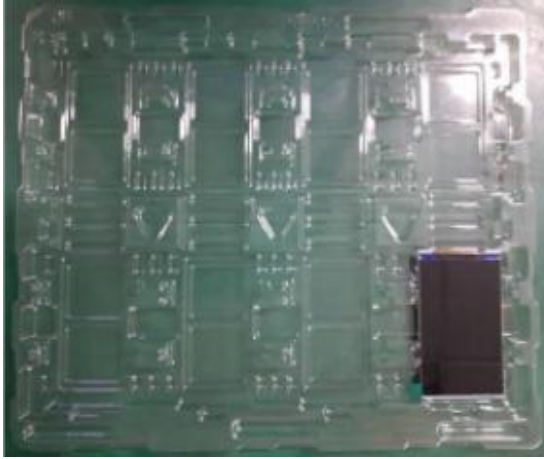
- 7.1. The display screen consists of glass and polarizer. Since the glass is fragile, the user must pay special attention to the edge area, and protect it from falling, vibration, or mechanical impact.
- 7.2. If the display screen is damaged and the liquid crystal material leaks, be sure not to get any in the mouth. If the liquid crystal material contacts the skin or clothes, flush off with soap and water.
- 7.3. Do not apply excessive force to the display screen or the joint part, or the color will change. Do not touch the display screen with bare hands, which will stain the display area and degraded insulation between terminals (some of the appearance is determined by the polarizer).
- 7.4. The polarizer covering the display panel of the LCD module is soft and easy to be scratched, be sure to handle carefully. Do not touch, impact, press, or rub the exposed polarizers with anything harder than an HB pencil lead (e.g.: glass, tweezers, etc.). Do not place or attach anything onto the display area to avoid leaving marks. The condensed material on the surface or terminals due to cold will damage or stain the polarizer. After the test in low temperature environment, the product must be warmed up in a container before put into the room temperature environment.
- 7.5. If the display panel is stained, blow warm air onto the surface and gently wipe it with a soft and dry cloth. If it is seriously contaminated, wipe it with a wet cloth dipped in one of the following solvents:
 - glycerol
 - ethyl AlcoholDo not scrub, and avoid damaging the display panel.
- 7.6. Solvents other than those mentioned above may damage the polarizer. In particular, never use any of the following solvents:
 - water
 - ketone
 - areneWipe off saliva or water drop immediately, the contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil or grease.
- 7.7. Special note: minimize electrode corrosion. Because electrode corrosion can be accelerated by water

- droplets, condensation of humidity, or electrification in a high humidity environment.
- 7.8. Assemble the LCD Module by the mounting holes. Make sure the LCD module make sure there is no bending, distortion, or deformation. Do not forcibly pull or bend the transmission wire or the backlight wire.
 - 7.9. Do not disassemble the LCD module.
 - 7.10. NC terminal should be disconnected. Do not connect any device.
 - 7.11. If the logic circuit power supply is off, do not send the input signal.
 - 7.12. Since the LCD module is integrated with CMOS, pay special attention to the modules. To prevent electrostatic damage, be careful to maintain an suitable work environment.
 - Make sure the module has the same potential as the human body before take the LCD module out of the packing box for assembly. The reliable grounding is necessary during module processing.
 - The required tool, such as the electric soldering iron, must be reliably grounded. Make sure the it is connected to AC power supply, and no electric leakage. When fixing the module with electric screwdriver, it must be grounded, to reduce the electromagnetic wave generated by the electric commutator spark as much as possible.
 - Do not assemble or operate under dry condition to reduce the static electricity. To reduce static electricity, the workplace must not be too dry. The recommended relative humidity is 50 - 60%. Keep your work clothes and work table grounded as much as possible
 - The LCD module is coated with a film to protect the display surface. Be careful when peeling off the film to reduce the generated static electricity.
 - 7.13. Since the LCD module has high precision assembly and regulation, try to avoid excessive impact on the module or making any changes:
 - Do not change the shape of the tab on the metal frame.
 - Do not drill any extra hole, modify the shape, or change the position of component on the printed circuit board.
 - Do not change or damage the pattern on the printed circuit board.
 - Never modify the zebra strip (conductive rubber) or heat seal connector.
 - Do not make any change with the electric soldering iron except for the joint.
 - Do not throw, bend or twist.

8. Packing and Storage

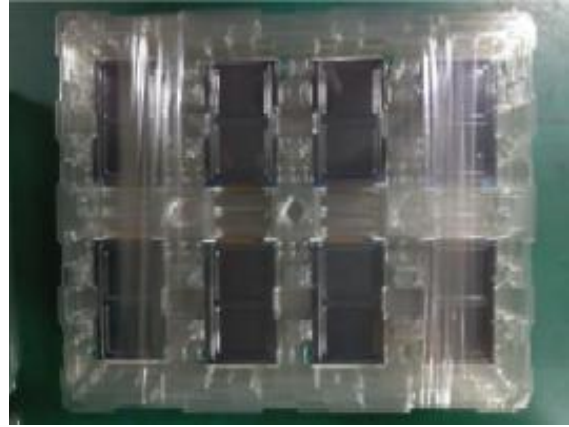
8.1. Packing Method

Step 1



Take 1pcs of the product, put it into a anti-static bag.

Step 2



Take 2 bags of product to place into the carton, make sure they are surface to surface. Put a piece of EPE pad between the carton and the separator to protect the products.

Step 3



Put the products into cartons one by one, each carton contains 60 pieces of products.

Step 4



The cartons should be taped and shipped with labels.

8.2. Storage Method

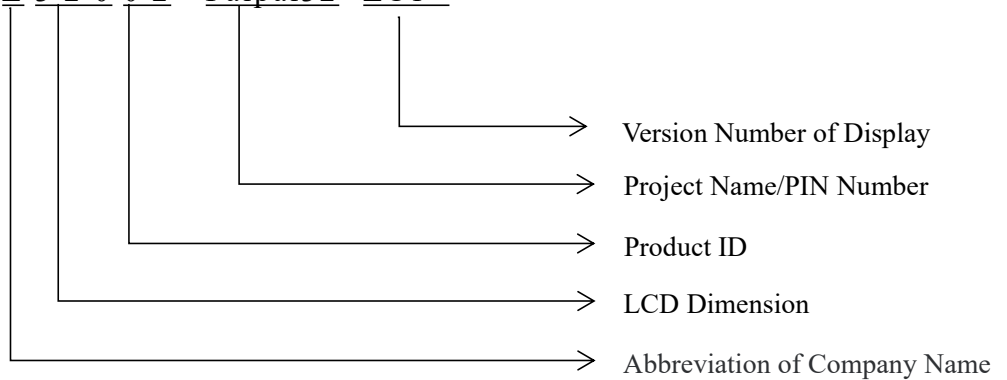
Store in an ambient temperature of $23\pm 5^{\circ}\text{C}$, and in a relative humidity of $60\pm 15\%$. The storage period should not exceed 12 months. Do not expose to the sun for a long period of time.

8.2.1. Store in clean environment, free from dust, active gas, or solvent.





8.2.2. Store in anti-static environment.

8.3. Nomenclature



PART NO: Z 3 2 0 0 2 - Palpal32 - ZC1



8.4. Label

Shenzhen Zhunyi Technology Co., Ltd.	
Product: Display Screen	LEVEL:3
Spec.:	  
P/N:	
Lot:	
D/C	
Qty.:	
Supplier Code:	
PO	
R/K	
Version: A	XXXXXXXX, YYYY-0000000000000000, KKKK, WWWW, AAAAA.

8.5. Product appearance identification

Item	Description	Production QR Code Position Display
 QR Code Content	English Web: www.zhunyikeji.com	
Printing Code appearance and content	Z32002-Palpal32-ZC1 YYMMDD+Time+5 digits serial number	
1. Customer have detail position and direction requirements(Refer to right picture for details) . 2. Control content,format,position of the QR Code strictly.		