



UST121SWLNCE00

12.1" IPS LCD-TFT MODULE SPECIFICATION

Key Specifications

Parameter	Specification
LCD Type	IPS TFT / Transmissive / Normally Black
Size (Diagonal)	12.1"
Viewing Direction	Full Viewing (All)
Outside Dimensions (W x H x D)	276.60 x 179.50 x 8.71 mm
Active Area (W x H)	260.35 x 162.72 mm
Pixel Pitch (W x H)	0.2034 x 0.2034 mm
Resolution	1280 x 800 (RGB)
Brightness	900 cd / m ² (typ.)
Contrast Ratio	1200:1 (typ.)
Color Depth	16.7 M
Pixel Arrangement	RGB Stripe
Interface	LVDS
With / Without Touch	With Capacitive Touch (CTP)
CTP Driver	ILI2520 (USB / I2C)
Operating / Storage Temp.	-20°C ~ +70°C / -30°C ~ +80°C
Weight	813 g

Revision Table

Rev.	Date	Description
1.0	2026-10-11	First issue
1.1	2026-10-12	Minor updates
1.2	2026-10-13	Improvement of the chapter layout

Contents

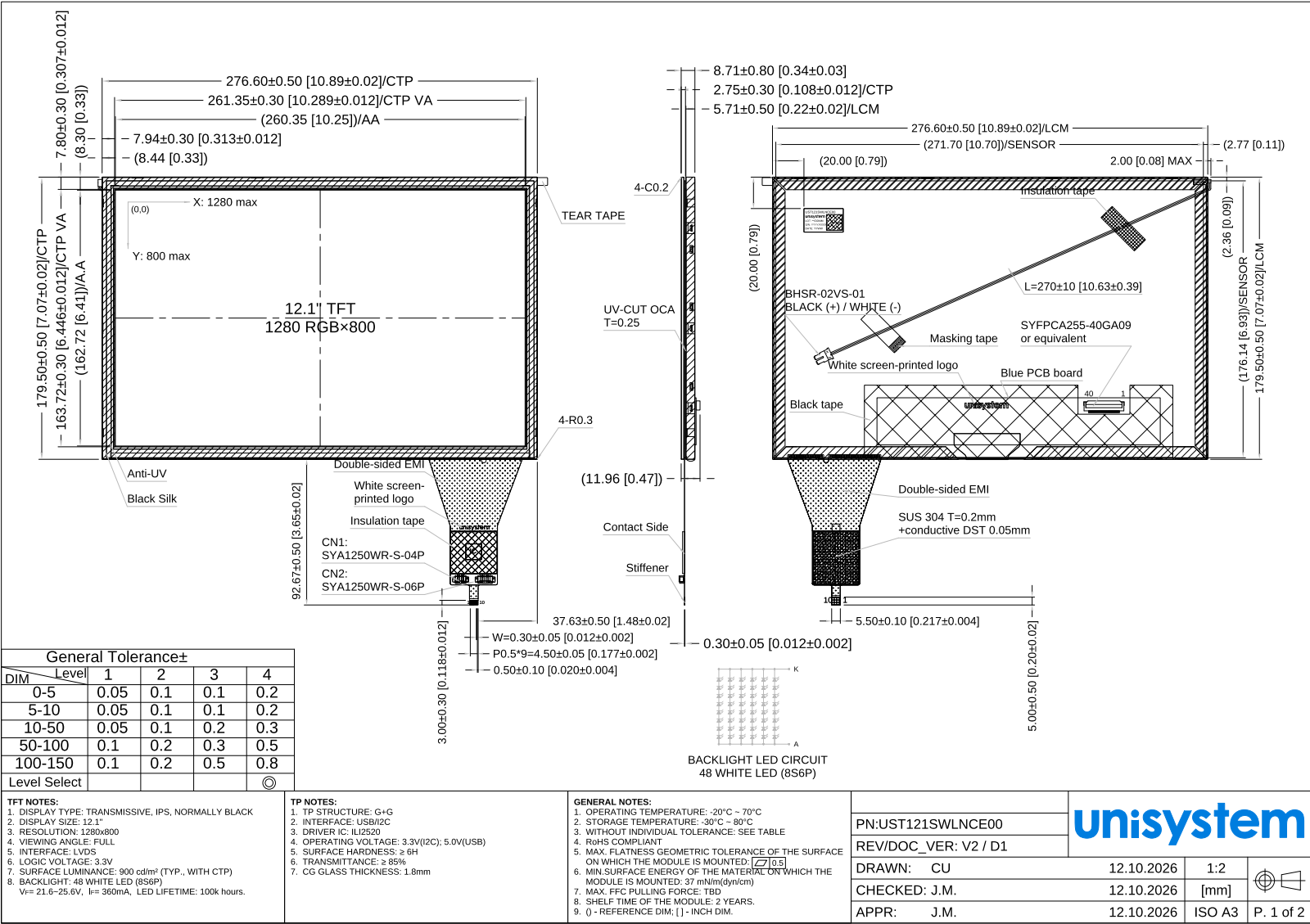
1. Coding System	4
2. Mechanical Drawing	5
3. Absolute Maximum Ratings	6
4. DC Characteristics	6
5. Backlight Characteristics	6
6. Touch Screen Panel Specifications	7
7. Optical Characteristics	8
7.1 Optical Specifications	8
7.2 Definition of Response Time	8
7.3 Definition of Contrast Ratio	9
7.4 Definition of Viewing Angles	10
7.5 Definition of Color Appearance	10
7.6 Definition of Surface Luminance, Uniformity and Transmittance	11
8. Block Diagram and Power Supply	12
9. Interface Pins Definition	12
10. Timing Characteristics	14
10.1 LVDS Input Timing Table	14
10.2 LVDS Data Input Format	15
10.3 LVDS AC Characteristics	15
11. Power ON / OFF Sequence	17
12. Quality Assurance	17
12.1 Purpose	17
12.2 Standard for Quality Test	18
12.3 Nonconforming Analysis & Disposition	18
12.4 Agreement Items	18
12.5 Standard of the Product Visual Inspection	18
12.6 Inspection Specification	19
12.7 Classification of Defects	25
12.8 Identification / Marking Criteria	25
12.9 Packing	25
13. Reliability Specification	26
14. Precautions	27
14.1 Safety	27
14.2 Handling	27
14.3 Storage	27
14.4 Operation	27
14.5 Static Electricity	27
15. Legal Information	28
16. Contact Information	29

1. Coding System

1	2	3	4	5	6	7	8	9	10
US	T	121	S	W	L	N	C	E	00

No.	Parameter	Options
1	Manufacturer	Unisystem
2	Display Type	T – TFT
3	Display Size	070 – 7", 101 – 10.1", 121 – 12.1", 156 – 15.6"
4	Model Series	S – “Core” Standard Brightness IPS, H – “Pro” High Brightness IPS, L – “Lite” IPS
5	Resolution	M – 800x480, S – 1024x600 (WSVGA), W – 1280x800 (WXGA), X – 1024x768 (XGA), F – 1920x1080 (FHD)
6	Interface	L – LVDS, M – MIPI DSI, R – RGB, D – eDP, H – HDMI and USB-C
7	Frame	F – With Mounting Metal Frame, N – Without Mounting Metal Frame
8	Touch Panel	N – Without Touch Panel, C – With Projected Capacitive Touch Panel
9	Cover Glass Specification	N – Without Cover Glass, E – Rectangular Glass with Optical Bonding, U – Rounded Glass with Optical Bonding
10	Version	00 – base series, 10 – improved series

2. Mechanical Drawing



3. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	V_{DD}	-0.3	3.6	V
Storage temperature	T_{STG}	-30	80	°C
Operating temperature	T_{OP}	-20	70	°C

Note 1: If T_a is below 50°C, the maximum humidity is 90%RH; if T_a is over 50°C, the absolute humidity shall not exceed that of 60%RH at 50°C.

Note 2: The response time will be extremely slow when the operating temperature is around -10°C or below, and the background will become darker during high-temperature operation.

4. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{DD}	3.0	3.3	3.6	V
Differential input high threshold voltage ($R_{XVCM} = 1.2V$)	R_{XVTH}	-	-	0.1	V
Differential input low threshold voltage ($R_{XVCM} = 1.2V$)	R_{XVTL}	-0.1	-	-	V
Input voltage range (single-ended)	R_{XVIN}	0.7	-	1.7	V
Differential input common mode voltage	R_{XVCM}	1	1.2	1.4	V
Differential input voltage	$ V_{ID} $	0.2	-	0.6	V
Current Consumption	I_{DD}	100	130	160	mA

Note: The current consumption is specified for $V_{DD} = 3.3V$, frame rate $f_V = 60Hz$ and clock frequency = 72.4MHz; Typ.: mosaic 8 x 6 pattern (L0 / L255), Max.: black pattern.

5. Backlight Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	$T_a = 25^{\circ}\text{C}$, $I_F = 60\text{mA}$ / LED	21.6	24.0	25.6	V
Forward Current	I_F	$T_a = 25^{\circ}\text{C}$, $I_F = 60\text{mA}$ / LED	-	360	-	mA
Power Dissipation	P_D	-		8640		mW
Uniformity	Avg	-	-	80	-	%
LED working life (25°C)	-		-	100000	-	Hrs
Drive method	Constant current					
LED Configuration	48 White LEDs (8 LEDs in one string and 6 groups in parallel)					

Note 1: LED lifetime is defined as the time until the brightness drops to 50% of its initial value.
The test is conducted under ambient air flow, at $T_a = 25 \pm 2^{\circ}\text{C}$, 60%RH $\pm$ 5%, $I_F = 60\text{mA}$ / LED.

6. Touch Screen Panel Specifications

Item	CTP Description	
1	IC	ILI2520
2	Interface	USB / I2C
3	Operating Voltage	5V / 3.3V
4	Interface Signal Voltage	3.3V / 3.3V
5	Surface Hardness	$\geq 6\text{H}$
6	Operating Temperature	$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$
7	Storage Temperature	$-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$
8	Strengthened Type	Chemical
9	Transmittance	$\geq 85\%$
10	Origin of Coordinates	Top Left
11	Resolution	1280 x 800

7. Optical Characteristics

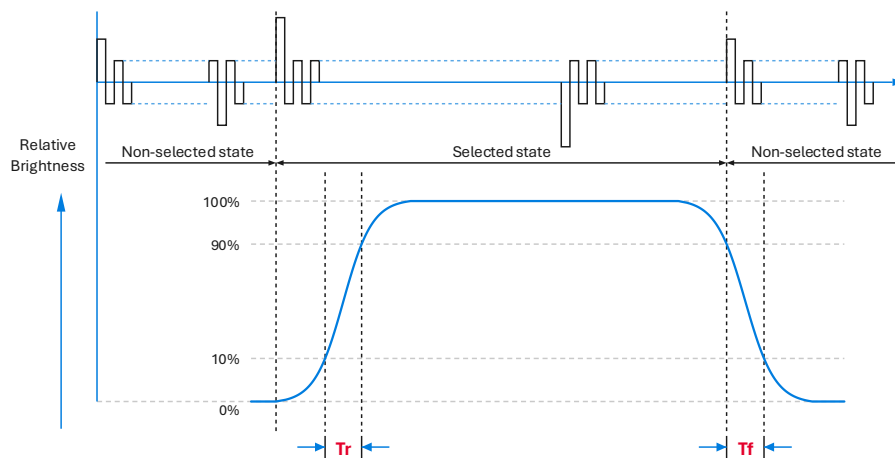
7.1 Optical Specifications

Ta = 25°C, V_{DD} = 3.3V

Backlight On (Transmissive Mode)	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
	Luminance with CTP (I _F = 60mA / LED)		L _V		-	900	-	cd / m ²
	Contrast ratio (See 7.3)		CR		-	1200	-	
	Response time (See 7.2)		T _R + T _F		-	-	30	ms
	Chromaticity Transmissive (See 7.5)	Red	X _R		0.582	0.632	0.682	-
			Y _R		0.297	0.347	0.397	
		Green	X _G		0.250	0.300	0.350	
			Y _G		0.576	0.626	0.676	
		Blue	X _B		0.082	0.132	0.182	
			Y _B		0.036	0.086	0.136	
		White	X _W		0.217	0.267	0.317	
			Y _W		0.261	0.311	0.361	
	Viewing Angle (See 7.4)	Horizontal	θ _{X+}	Center CR ≥ 10	-	85	-	Deg.
			θ _{X-}		-	85	-	
		Vertical	φ _{Y+}		-	85	-	
φ _{Y-}			-		85	-		
NTSC ratio (Color gamut)				-	70	-	%	

7.2 Definition of Response Time

7.2.1 Normally Black Type (Negative)

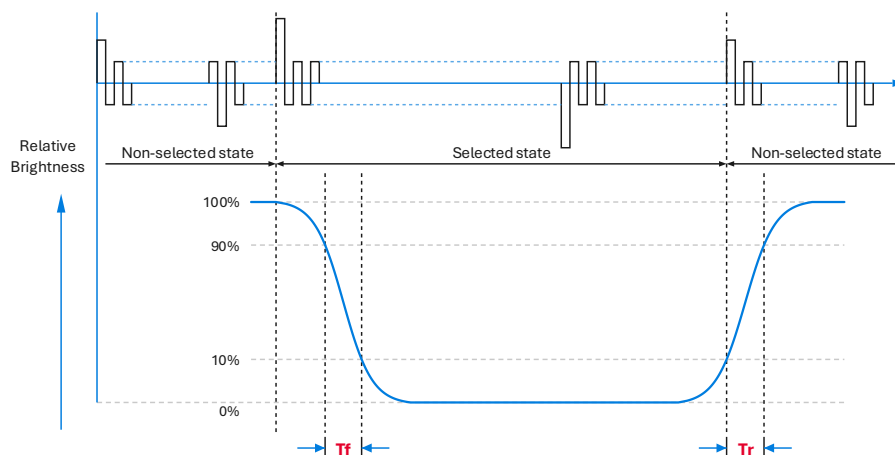


T_r is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;

T_f is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

Note: Measuring machine: LCD-5100

7.2.2 Normally White Type (Positive)



T_r is the time it takes to change from non-selected state with relative luminance 90% to selected state with relative luminance 10%;

T_f is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%.

Note: Measuring machine: LCD-5100 or equivalent

7.3 Definition of Contrast Ratio

Contrast is measured perpendicularly to the display surface in transmissive mode.

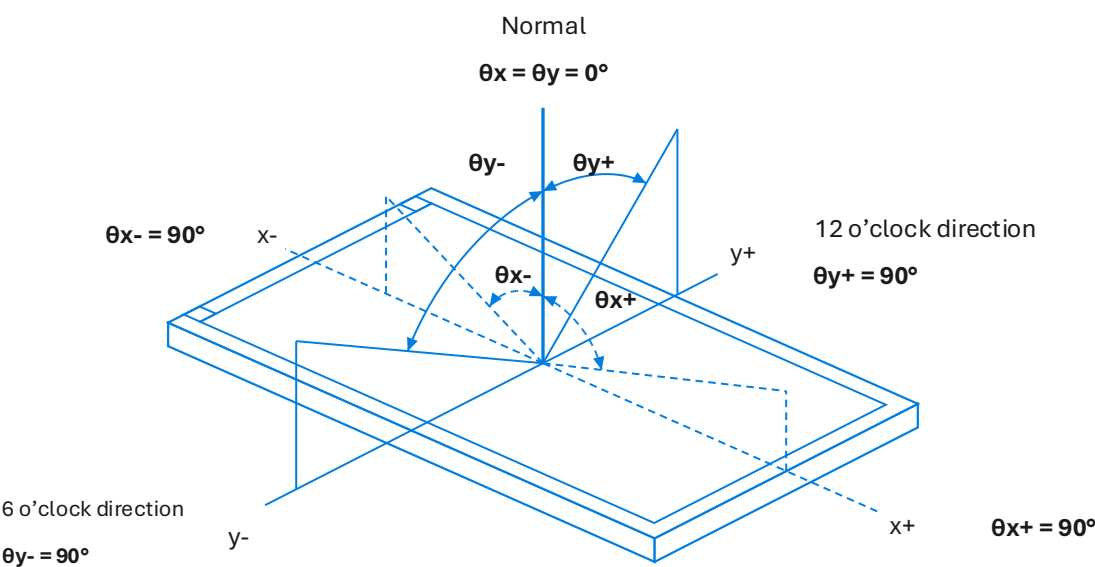
The measurement condition is:

Measuring Equipment	Eldim or equivalent
Measuring Point Diameter	3mm / 1mm
Measuring Point Location	Active Area center point
Test pattern	A: All pixels white
	B: All pixels black
Contrast setting	Maximum

Definition: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

7.4 Definition of Viewing Angles

Measuring machine: LCD-5100 or equivalent

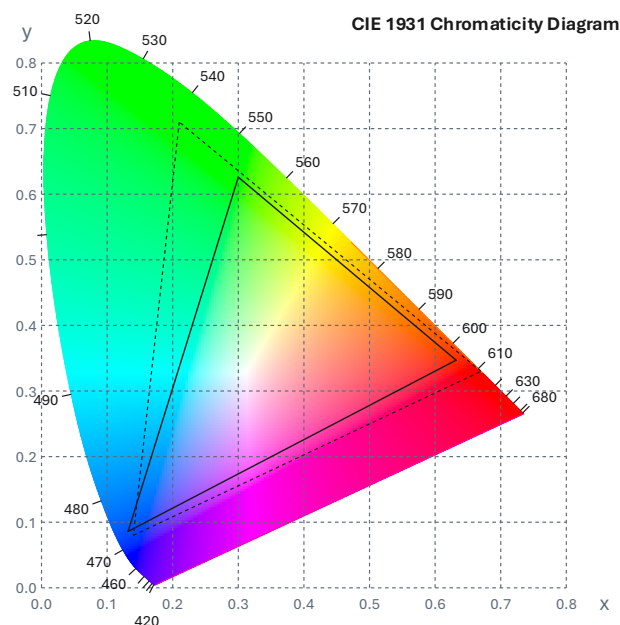


7.5 Definition of Color Appearance

R, G, B and W are defined by (x, y) coordinates on the CIE chromaticity diagram.

NTSC = area of RGB triangle / area of NTSC triangle x 100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



7.6 Definition of Surface Luminance, Uniformity and Transmittance

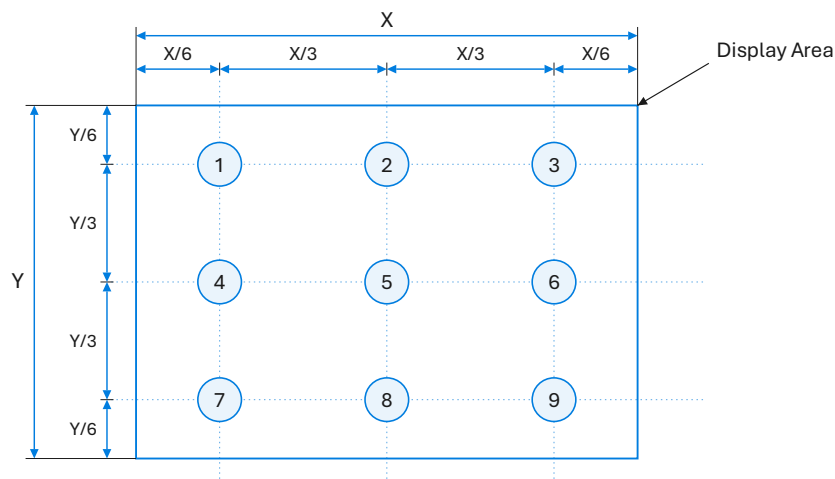
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

7.6.1 Surface Luminance: $L_v = \text{average } (L_{P1}:L_{P9})$

7.6.2 Uniformity = $\text{Minimum } (L_{P1}:L_{P9}) / \text{Maximum } (L_{P1}:L_{P9}) * 100\%$

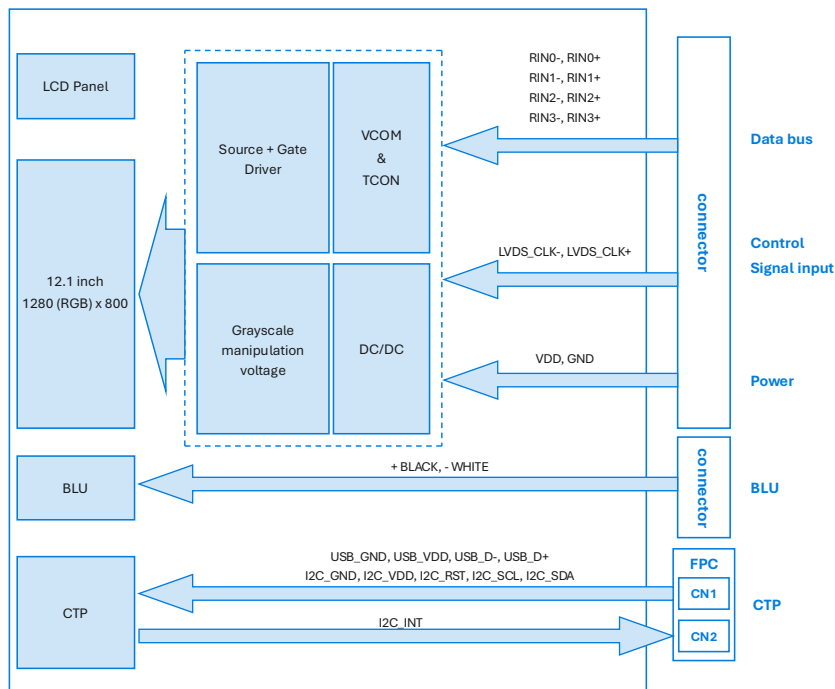
7.6.3 Transmittance = $L_v \text{ on LCD} / L_v \text{ on Backlight} * 100\%$

Note: Measuring machine: BM-7



Note: Test 3 brightness points for displays below 3.5 inches (points 2 / 5 / 8), 5 points for 3.5–7 inches (points 1 / 3 / 5 / 7 / 9) and 9 points above 7 inches (points 1 to 9).

8. Block Diagram and Power Supply



9. Interface Pins Definition

No.	Symbol	Function
1	NC	Not connected
2-4	V _{DD}	Power supply
5	NC	Not connected
6-7	GND	Ground
8	RIN0-	LVDS Data differential signal input pins
9	RIN0+	LVDS Data differential signal input pins
10	GND	Ground
11	RIN1-	LVDS Data differential signal input pins
12	RIN1+	LVDS Data differential signal input pins
13	GND	Ground
14	RIN2-	LVDS Data differential signal input pins
15	RIN2+	LVDS Data differential signal input pins
16	GND	Ground
17	LVDS_CLK-	LVDS clock differential signal input pins
18	LVDS_CLK+	LVDS clock differential signal input pins
19	GND	Ground

No.	Symbol	Function
20	RIN3-	LVDS Data differential signal input pins
21	RIN3+	LVDS Data differential signal input pins
22	GND	Ground
23-24	NC	Not connected
25	GND	Ground
26-27	NC	Not connected
28	GND	Ground
29-30	NC	Not connected
31-33	GND	Ground
34-40	NC	Not connected

CTP PIN:

No.	Symbol	Function
1	USB_GND	Ground
2	USB_VDD	Power Supply
3	USB_D-	Data-
4	USB_D+	Data+
5	I2C_GND	CTP Ground
6	I2C_VDD	CTP Power Supply
7	I2C_RST	CTP Reset input signal, active low
8	I2C_SCL	CTP Clock input signal
9	I2C_INT	CTP Interrupt output signal
10	I2C_SDA	CTP Data input / output signal

CN1 PIN:

No.	Symbol	Function
1	USB_VDD	Power Supply
2	USB_D-	Data-
3	USB_D+	Data+
4	USB_GND	Ground

CN2 PIN:

No.	Symbol	Function
1	I2C_GND	CTP Ground
2	I2C_VDD	CTP Power Supply
3	I2C_RST	CTP Reset input signal, active low
4	I2C_SCL	CTP Clock input signal
5	I2C_INT	CTP Interrupt output signal
6	I2C_SDA	CTP Data input / output signal

BLU:

No.	Symbol	Function
1	LED+ (BLACK)	Backlight anode
2	LED- (WHITE)	Backlight cathode

10. Timing Characteristics

10.1 LVDS Input Timing Table

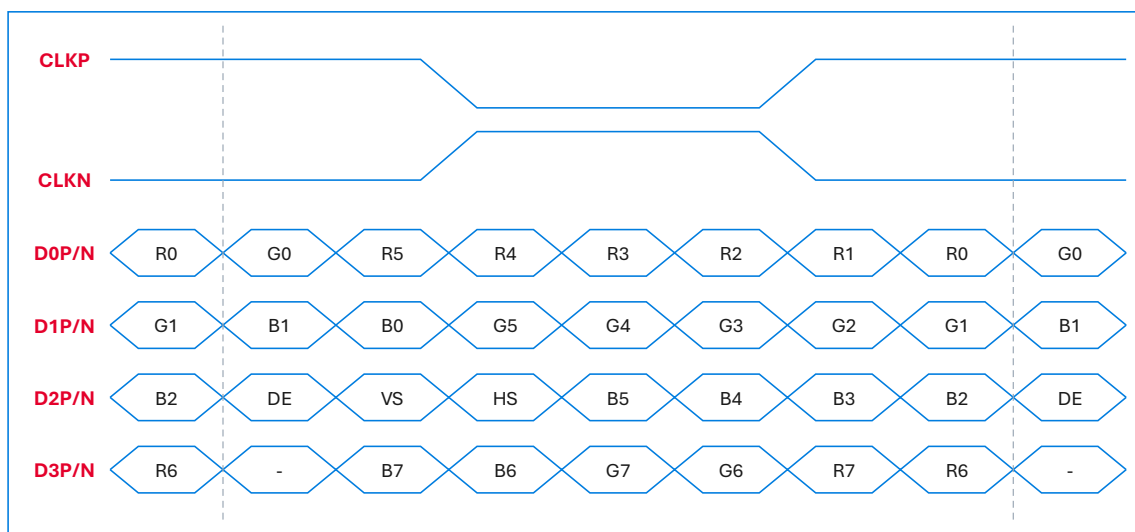
For 1280RGBx800 DE mode

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @ Frame rate = 60Hz (LVDS)	F _{DCLK}	69.7	75	80.9	MHz
Horizontal display area	T _{HD}	1280			DCLK
HSYNC period time	T _H	1380	1440	1500	DCLK
HSYNC blanking	T _{HBP} + T _{HFP}	100	160	220	DCLK
Vertical display area	T _{VD}	800			H
VSYNC period time	T _V	824	838	872	H
VSYNC blanking	T _{VBP} + T _{VFP}	24	38	72	H

Note:

1. DE only mode: while operating, the DE signal should have the same cycle. The input of HSYNC & VSYNC signals does not have an effect on normal operation.
2. The best operating clock frequency is 75 MHz.
3. Frequency = [H Total] * [V Total] * [Vertical frame rate]. H Total, V Total and frame rate should operate within the range between Frequency_Min and Frequency_Max.
4. Except for the best operating clock frequency, FOS (flicker, brightness, crosstalk, etc.) is not guaranteed.
5. The maximum main frequency is 80.9 MHz without spread spectrum.

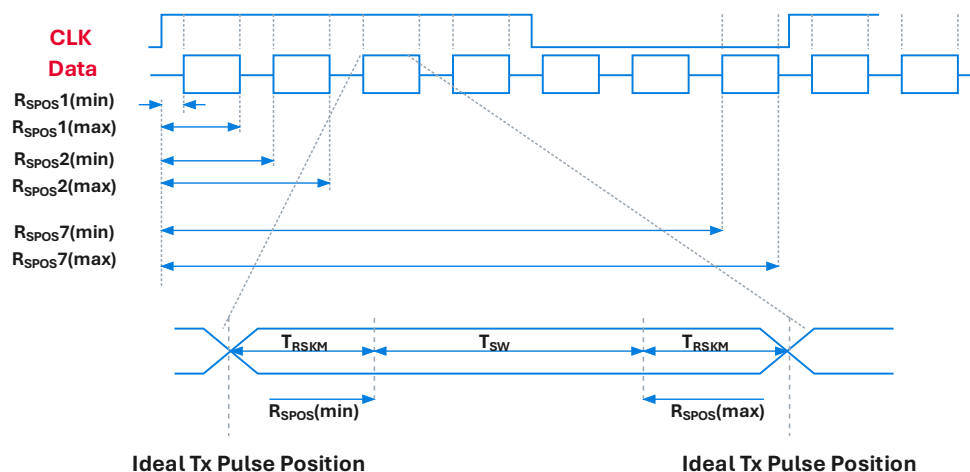
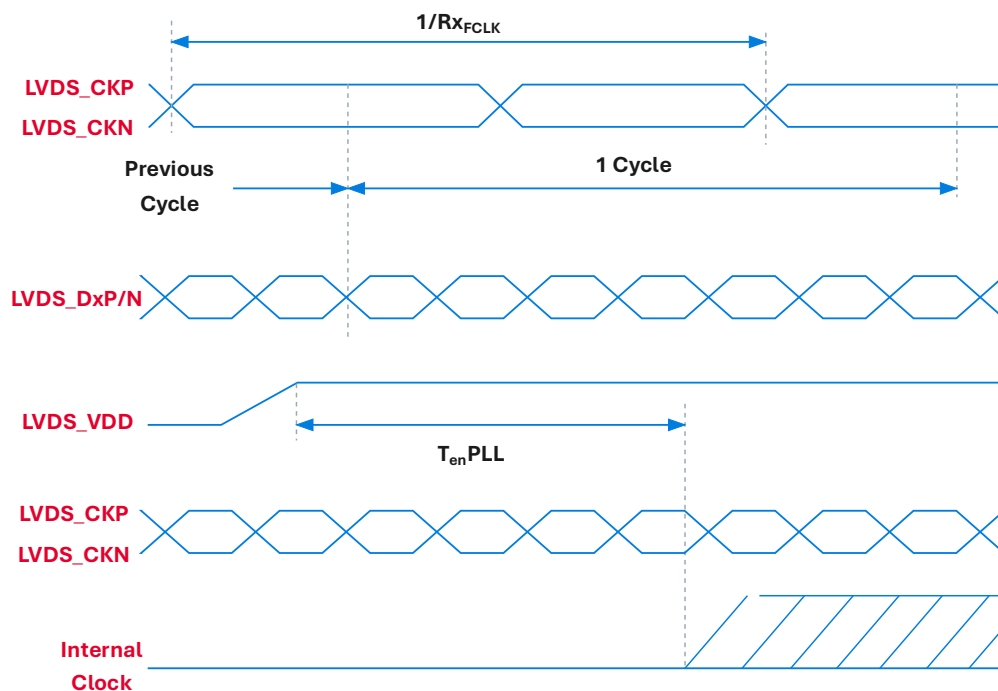
10.2 LVDS Data Input Format



8-bit LVDS input, VESA format

10.3 LVDS AC Characteristics

Signal	Symbol	Min.	Typ.	Max.	Unit	Description
Clock frequency	R_{xFCLK}	30		80.9	MHz	Refer to the input timing table (10.1) for each display resolution
Strobe width	T_{SW}	200	-	-	ps	$ V_{ID} = 200mV$ $R_{xVCM} = 1.2V$ $R_{xFCLK} = 81MHz$
Input data skew margin	T_{RSKM}	500	-	-	ps	$ V_{ID} = 200mV$ $R_{xVCM} = 1.2V$ $R_{xFCLK} = 81MHz$
Clock high time	T_{LVCH}	-	$4 / (7 \times R_{xFCLK})$	-	ns	-
Clock low time	T_{LVCL}	-	$3 / (7 \times R_{xFCLK})$	-	ns	
PLL wake-up time	T_{enPLL}	-		150	μs	



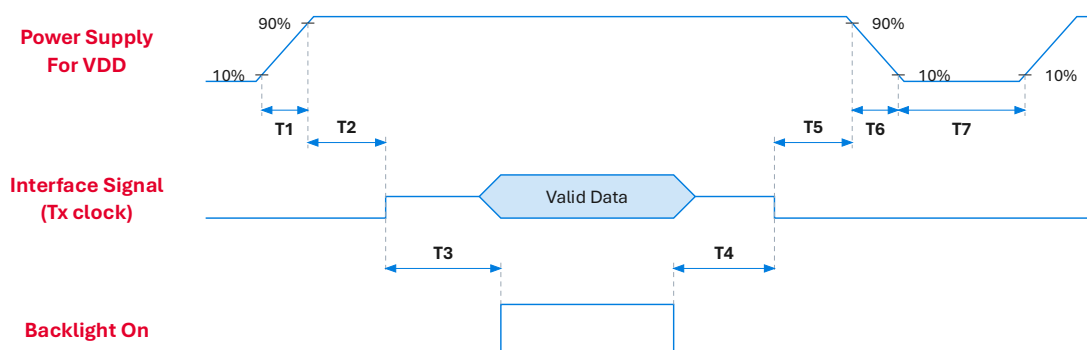
T_{SW} : Strobe width (Internal data sampling window)

R_{spos} : Receiver strobe position

T_{RSKM} : Receiver strobe margin

11. Power ON / OFF Sequence

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



Parameter	Min.	Typ.	Max.	Unit
T1	0.1	-	10	ms
T2	0.1	-	50	ms
T3	300	-	-	ms
T4	200	-	-	ms
T5	0.1	-	50	ms
T6	0.1	-	10	ms
T7	500	-	-	ms

Note 1: Even though T1 is over the specified value, there is no problem if the inrush current is within the specification.

Note 2: When the power supply V_{DD} is 0V, keep the input signals at low level or in high impedance. Avoid a floating state of the interface signals during the invalid period. When the power supply for LCD (V_{DD}) is off, be sure to pull down the valid and invalid data to 0V.

Note 3: T3 / T4 are recommended values; when they fail to meet the minimum specification, abnormal display may be shown. There is no reliability problem.

Note 4: T6: V_{DD} must decay smoothly after power-off without any rebounding voltage (the value is determined by the customer's system).

Note 5: T7 should be measured after the module has been fully discharged between power off and on period.

12. Quality Assurance

12.1 Purpose

This Quality Assurance standard ensures the quality of LCD module products supplied to the customer.

12.2 Standard for Quality Test

12.2.1 Sampling Plan:

GB/T2828.1-2012

Single sampling, general inspection level II

12.2.2 Sampling Criteria:

Visual inspection: AQL 1.5.

Electrical functional: AQL 0.65.

12.2.3 Reliability Test:

For detailed requirements refer to Section 13 Reliability Specification.

12.3 Nonconforming Analysis & Disposition

12.3.1 Nonconforming analysis:

12.3.1.1 The customer should provide complete information on the nonconforming sample for their complaints.

12.3.1.2 After receipt of detailed information from the customer, the analysis of nonconforming parts should usually be finished within one week.

12.3.1.3 If the analysis cannot be finished on time, the customer will be notified of the progress status.

12.3.2 Disposition of nonconforming products:

12.3.2.1 Nonconforming products exceeding the PPM level will be replaced.

12.3.2.2 The cause of nonconformance will be analyzed. Corrective action will be discussed and implemented.

12.4 Agreement Items

The following situations shall be negotiated with the customer:

12.4.1 Any discrepancy in the standard of quality assurance.

12.4.2 Additional requirements to be added to the product specification.

12.4.3 Any other special problem.

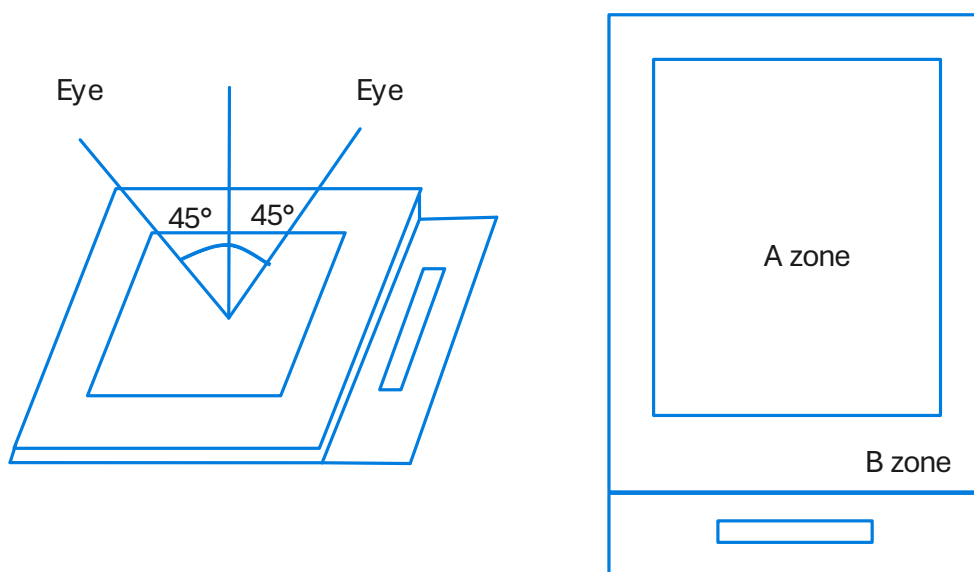
12.5 Standard of the Product Visual Inspection

12.5.1 Appearance inspection:

12.5.1.1 The inspection must be carried out under an illumination of about 1000 – 1500 lx, and the viewing distance must be 30 cm ± 2 cm.

12.5.1.2 The viewing angle should be 45° from the vertical line without reflected light, or follow the customer's viewing angle specifications.

12.5.1.3 Definition of area: A Zone: Active Area, B Zone: Viewing Area.

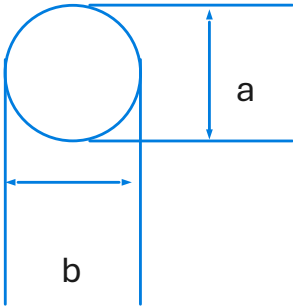


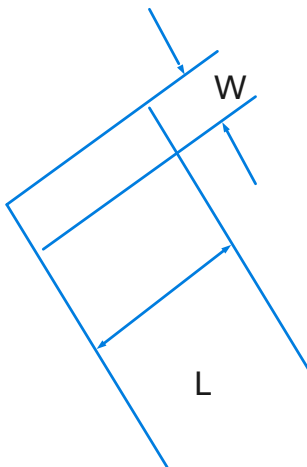
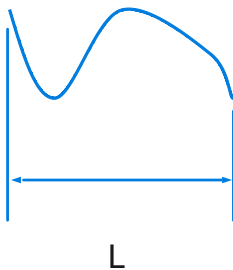
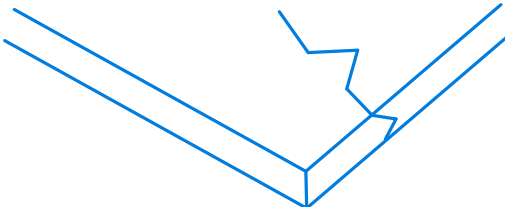
12.5.2 Basic principle:

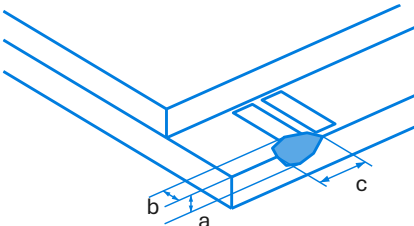
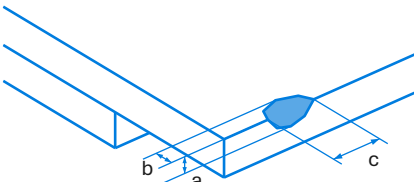
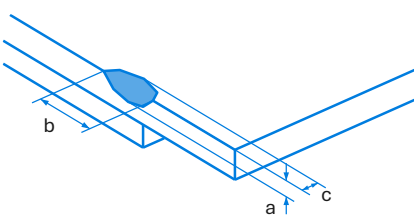
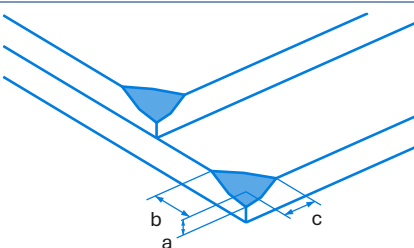
12.5.2.1 A set of samples to indicate the limit of acceptable quality level must be discussed by both us and the customer when a dispute occurs.

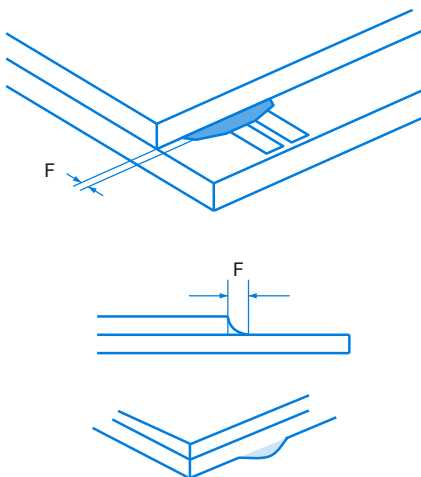
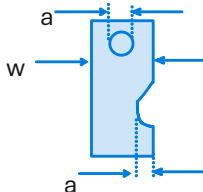
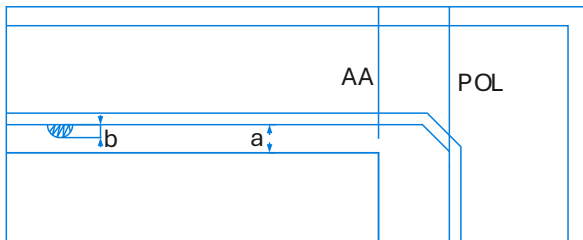
12.5.2.2 New items must be added when necessary.

12.6 Inspection Specification

No.	Item	Criteria (Unit: mm)									
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)		<table><tr><th>Size \ Area</th><th>Acc. Qty</th></tr><tr><td>$\phi \leq 0.20$</td><td>Ignore</td></tr><tr><td>$0.20 < \phi \leq 0.50$</td><td>$N \leq 3$</td></tr><tr><td>$0.50 < \phi$</td><td>0</td></tr></table>	Size \ Area	Acc. Qty	$\phi \leq 0.20$	Ignore	$0.20 < \phi \leq 0.50$	$N \leq 3$	$0.50 < \phi$	0
			Size \ Area	Acc. Qty							
			$\phi \leq 0.20$	Ignore							
			$0.20 < \phi \leq 0.50$	$N \leq 3$							
$0.50 < \phi$	0										
$\phi = (a + b) / 2$											
The distance between 2 defects should be more than 5 mm.											

No.	Item	Criteria (Unit: mm)			
02	Electrical Defect (Major defect)	Bright dot	Display Area	Total	Note 1
			$N \leq 2$	$N \leq 2$	
		Dark dot	$N \leq 4$	$N \leq 4$	
		Total dot	$N \leq 4$	$N \leq 4$	
		Mura	Not visible through 5% ND filters.		Note 2
Remark: 1. A bright dot caused by a scratch or a foreign object is judged according to item 01.					
03	Black and White line Scratch Foreign material (Line type) (Minor defect)				
					
		Length	Width	Acc. Qty	
		/	$W \leq 0.1$	Ignore	
		$L \leq 2.5$	$0.1 < W \leq 0.2$	3	
$L > 2.5$	$0.2 < W$	0			
Total			3		
The distance between 2 defects should be more than 3 mm. Scratches not viewable through the back of the display are acceptable.					
04	Glass Crack (Major defect)				
		Cracks of any type are not allowed, as a crack may enlarge.			

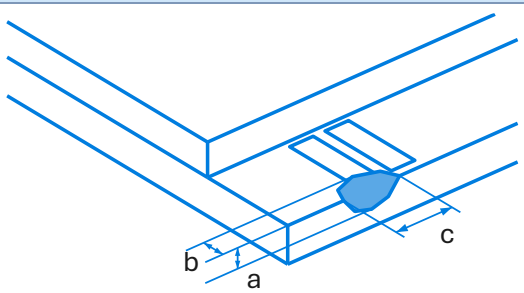
No.	Item	Criteria (Unit: mm)										
05	Glass Chipping Pad Area: (Minor defect)	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>3</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	3	$a < \text{Glass Thickness}$			
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	3											
$a < \text{Glass Thickness}$												
06	Glass Chipping Rear of Pad Area: (Minor defect)	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
07	Glass Chipping Except Pad Area: (Minor defect)	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
08	Glass Corner Chipping: (Minor defect)	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c < 3.0, b < 3.0$</td><td>Ignore</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c < 3.0, b < 3.0$	Ignore	$a < \text{Glass Thickness}$					
Length and Width	Acc. Qty											
$c < 3.0, b < 3.0$	Ignore											
$a < \text{Glass Thickness}$												

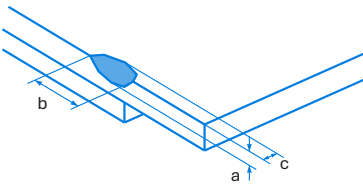
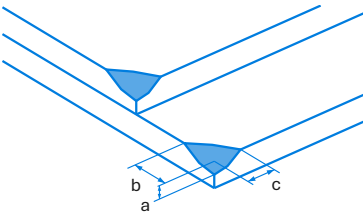
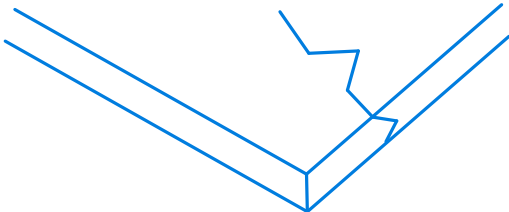
No.	Item	Criteria (Unit: mm)								
09	Glass Burr: (Minor defect)	 <table><tr><th>Length</th><th>Acc. Qty</th></tr><tr><td>$F < 1.0$</td><td>Ignore</td></tr></table> Glass burr must not affect assembly and module dimensions.	Length	Acc. Qty	$F < 1.0$	Ignore				
Length	Acc. Qty									
$F < 1.0$	Ignore									
10	FPC Defect: (Minor defect)	 10.1 Dent, pinhole width $a < w / 3$. (w: circuitry width.) 10.2 Open circuit is unacceptable. 10.3 No oxidation, contamination and distortion.								
11	Bubble on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$\phi \leq 0.30$</td><td>Ignore</td></tr><tr><td>$0.30 < \phi \leq 0.50$</td><td>$N \leq 2$</td></tr><tr><td>$0.50 < \phi$</td><td>$N = 0$</td></tr></table>  $b < 1 / 2a$ Note: In high-temperature and high-humidity experiments, bubbles do not disperse.	Diameter	Acc. Qty	$\phi \leq 0.30$	Ignore	$0.30 < \phi \leq 0.50$	$N \leq 2$	$0.50 < \phi$	$N = 0$
Diameter	Acc. Qty									
$\phi \leq 0.30$	Ignore									
$0.30 < \phi \leq 0.50$	$N \leq 2$									
$0.50 < \phi$	$N = 0$									

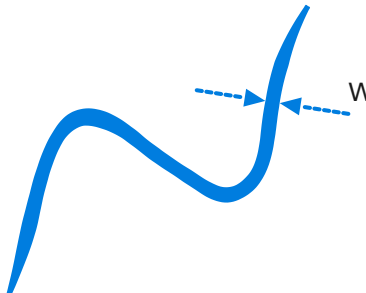
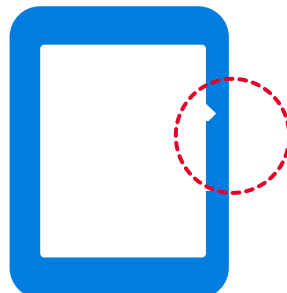
No.	Item	Criteria (Unit: mm)	
12	Dent on Polarizer (Minor defect)	Diameter	Acc. Qty
		$\phi \leq 0.25$	Ignore
		$0.25 < \phi \leq 0.50$	$N \leq 4$
		$0.50 < \phi$	None
13	Bezel	13.1 No rust or distortion on the bezel. 13.2 No visible fingerprints, stains or other contamination.	
14	PCB	14.1 No distortion or contamination on PCB terminals. 14.2 All components on the PCB must be the same as documented on the BOM / component layout. 14.3 Follow IPC-A-600F.	
15	Soldering	Follow the IPC-A-610C standard.	
16	Electrical Defect (Major defect)	The following defects must be rejected: 16.1 Missing vertical / horizontal line. 16.2 Abnormal Display. 16.3 No function or no display. 16.4 Current exceeds product specifications. 16.5 LCD viewing angle defect. 16.6 No Backlight. 16.7 Dark Backlight. 16.8 Touch panel not functioning.	

Remark: A broken LCD panel shall be rejected. Defects outside the LCD viewing area are acceptable.

Inspection Specification for the Capacitive Touch Panel

No.	Item	Criteria (Unit: mm)
01	Chipping Pad Area (cover lens not included): (Major defect)	 Chipping of any type is not allowed, as it seriously affects the product's function.

No.	Item	Criteria (Unit: mm)																		
02	Chipping Except Pad Area (cover lens not included): (Minor defect)	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c < 1.5, b < 1$</td><td>$N \leq 5$</td></tr><tr><td colspan="2">$a < 1 / 2$ Glass Thickness</td></tr></table>	Length and Width	Acc. Qty	$c < 1.5, b < 1$	$N \leq 5$	$a < 1 / 2$ Glass Thickness													
Length and Width	Acc. Qty																			
$c < 1.5, b < 1$	$N \leq 5$																			
$a < 1 / 2$ Glass Thickness																				
03	Corner Chipping (cover lens not included): (Minor defect)	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c < 1.5, b < 0.5$</td><td>Ignore</td></tr><tr><td colspan="2">$a < 1 / 2$ Glass Thickness</td></tr></table>	Length and Width	Acc. Qty	$c < 1.5, b < 0.5$	Ignore	$a < 1 / 2$ Glass Thickness													
Length and Width	Acc. Qty																			
$c < 1.5, b < 0.5$	Ignore																			
$a < 1 / 2$ Glass Thickness																				
04	Crack: (Minor defect)	 Cracks of any type are not allowed, as a crack may enlarge.																		
05	Cover lens must be without any chips, cracks or other damage when viewed from the front.																			
06	Same / Different color spot 	D: diameter, W: width, L: length <table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$D < 0.1$</td><td>Ignore</td></tr></table> Active Area: <table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$0.1 < D \leq 0.3$</td><td>3</td></tr><tr><td>$D > 0.3$</td><td>NG</td></tr></table> Viewing Area: <table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$D < 0.1$</td><td>Ignore</td></tr><tr><td>$0.1 < D \leq 0.3$</td><td>3</td></tr><tr><td>$D > 0.3$</td><td>NG</td></tr></table> The distance between 2 defects should be more than 15 mm.	Diameter	Acc. Qty	$D < 0.1$	Ignore	Diameter	Acc. Qty	$0.1 < D \leq 0.3$	3	$D > 0.3$	NG	Diameter	Acc. Qty	$D < 0.1$	Ignore	$0.1 < D \leq 0.3$	3	$D > 0.3$	NG
Diameter	Acc. Qty																			
$D < 0.1$	Ignore																			
Diameter	Acc. Qty																			
$0.1 < D \leq 0.3$	3																			
$D > 0.3$	NG																			
Diameter	Acc. Qty																			
$D < 0.1$	Ignore																			
$0.1 < D \leq 0.3$	3																			
$D > 0.3$	NG																			

No.	Item	Criteria (Unit: mm)															
07	Cover lens line scratch 	<table><thead><tr><th>Length</th><th>Width</th><th>Acc. Qty</th></tr></thead><tbody><tr><td>/</td><td>$W \leq 0.03$</td><td>Ignore</td></tr><tr><td>$L \leq 5$</td><td>$0.03 < W \leq 0.05$</td><td>3</td></tr><tr><td>-</td><td>$W > 0.05$</td><td>NG</td></tr><tr><td>$L > 5$</td><td>-</td><td>NG</td></tr></tbody></table>	Length	Width	Acc. Qty	/	$W \leq 0.03$	Ignore	$L \leq 5$	$0.03 < W \leq 0.05$	3	-	$W > 0.05$	NG	$L > 5$	-	NG
		Length	Width	Acc. Qty													
		/	$W \leq 0.03$	Ignore													
		$L \leq 5$	$0.03 < W \leq 0.05$	3													
		-	$W > 0.05$	NG													
		$L > 5$	-	NG													
The distance between 2 defects should be more than 15 mm.																	
08	Printing sawtooth 	<table><thead><tr><th>Length</th><th>Width</th><th>Acc. Qty</th></tr></thead><tbody><tr><td>/</td><td>$W \leq 0.2$</td><td>2</td></tr><tr><td>$L \leq 2$</td><td>$0.2 < W \leq 0.3$</td><td>1</td></tr><tr><td>$L \leq 2$</td><td>$W > 0.3$</td><td>NG</td></tr></tbody></table>	Length	Width	Acc. Qty	/	$W \leq 0.2$	2	$L \leq 2$	$0.2 < W \leq 0.3$	1	$L \leq 2$	$W > 0.3$	NG			
		Length	Width	Acc. Qty													
		/	$W \leq 0.2$	2													
		$L \leq 2$	$0.2 < W \leq 0.3$	1													
		$L \leq 2$	$W > 0.3$	NG													
09	Falling ball experiment	CTP test (with bonded sensor): steel ball 64 g, height 70 cm, three impacts at the center area, no damage.															

12.7 Classification of Defects

12.7.1 Visual defects (except missing / wrong label) are treated as minor defects, and electrical defects as major defects.

12.7.2 Two minor defects are equal to one major defect in lot sampling inspection.

12.8 Identification / Marking Criteria

Any unit with illegible, wrong, double or missing marking / label shall be rejected.

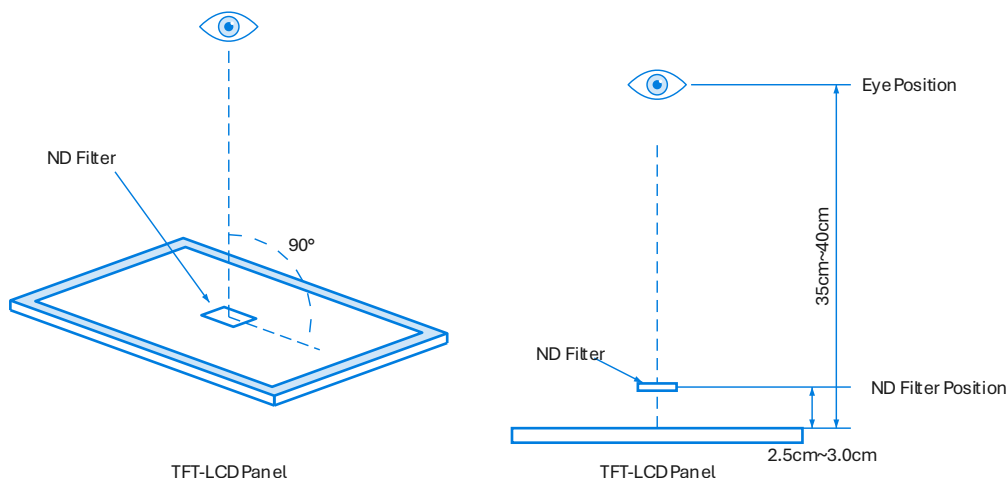
12.9 Packing

12.9.1 There should be no damage to the outer carton box; each packaging box should have one identical label.

12.9.2 Modules inside the package box should have a compliance mark.

12.9.3 All direct package materials shall offer ESD protection.

Note 1: Bright dot is defined as a dot whose defective area is larger than 50% of one sub-pixel area.



Bright dot: a dot-size bright defect on a black display pattern. It can be recognized through a 2% transmittance filter at an eye-to-panel distance of 350 mm $\pm$ 50 mm.

Dark dot: a cyan, magenta or yellow dot-size defect on a white display pattern. It can be recognized through a 5% transmittance filter at an eye-to-panel distance of 350 mm $\pm$ 50 mm.

Note 2: Mura — areas of the display that appear darker / brighter than the surrounding background.

13. Reliability Specification

No.	Item	Condition	Quantity	Criteria
1	High Temperature Operating	70°C, 96Hrs	2	GB/T2423.2-2008
2	Low Temperature Operating	-20°C, 96Hrs	2	GB/T2423.1-2008
3	High Humidity Storage	60°C, 90%RH, 96Hrs	2	GB/T2423.3-2016
4	High Temperature Storage	80°C, 96Hrs	2	GB/T2423.2-2008
5	Low Temperature Storage	-30°C, 96Hrs	2	GB/T2423.1-2008
6	Thermal Cycling Test Storage	-20°C, 60 min ~ 60°C, 60 min, 20 cycles.	2	GB/T2423.22-2012
7	Packing vibration	Frequency range: 10Hz ~ 50Hz Acceleration of gravity: 1.5G X, Y, Z: 30 min for each direction.	-	GB/T5170.14-2009
8	Electrostatic Discharge	Air: $\pm$ 4kV, 150pF / 330 Ω , 5 times Contact: $\pm$ 2kV, 150pF / 330 Ω , 5 times	2	GB/T17626.2-2018
9	Drop Test (Packaged)	Height: 80 cm, 1 corner, 3 edges, 6 surfaces.	-	GB/T2423.7-2018

Note 1: No cosmetic defects and no loss of operational function are allowed.

Note 2: The total current consumption should be below twice the initial value.

14. Precautions

14.1 Safety

14.1.1 The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

14.1.2 Since the liquid crystal cells are made of glass, do not subject them to strong impacts. Handle with care.

14.2 Handling

14.2.1 Store and use within ratings in order to keep performance and prevent damage.

14.2.2 Do not wipe the cover glass with a dry cloth, as it might cause scratches. If the surface of the cover glass needs to be cleaned, wipe it swiftly with cotton or another soft cloth soaked with IPA or petroleum benzine; do not use other chemicals.

14.3 Storage

14.3.1 Do not store the LCD module beyond the specified temperature ranges.

14.3.2 Strong light exposure causes degradation of the polarizer and color filter.

14.4 Operation

14.4.1 Response time will increase at lower temperatures.

14.4.2 The display may change color at different temperatures.

14.4.3 Mechanical disturbance during operation, such as pressing on the display area, may cause temporary display non-uniformity.

14.4.4 Do not connect or disconnect the LCM to or from the system when power is on.

14.4.5 Never use the LCM under abnormal conditions of high temperature and high humidity.

14.4.6 The module has high-frequency circuits. Sufficient suppression of electromagnetic interference shall be provided by the system manufacturer. Grounding and shielding methods may be important to minimize the interference.

14.4.7 Do not display a fixed pattern for a long time (we recommend no longer than one hour), as it may cause image sticking due to the TFT structure.

14.5 Static Electricity

14.5.1 This unit contains CMOS LSIs, so care must be taken to avoid electrostatic charge, e.g. by grounding the human body.

14.5.2 The normal static prevention measures should be observed for work clothes and benches.

14.5.3 The module should be kept in anti-static bags or other containers resistant to static for storage.

15. Legal Information

CE Marking

CE marking is obligatory only for complete end products. Unisystem display modules are semifinished goods designed to be integrated into finished devices and, therefore, are not CE marked.

Warranty

Unisystem grants a warranty for the proper operation of the goods for a period of 24 months from the date of delivery. If, as a result of a warranty claim, the customer receives a defect-free item as a replacement, the warranty period shall start anew from the moment the replacement is received.

Right to Change Specifications

Unisystem reserves the right to make changes to the product specifications, dimensions, and materials without prior notice in order to improve reliability, function, or design. It is the buyer's responsibility to verify that the datasheet is current before placing an order.

Intellectual Property

This document and the technical information herein are the exclusive property of Unisystem and may be subject to pending or granted patents. Reproduction or disclosure of this document without prior written permission is strictly prohibited. No intellectual property licenses are implicitly conveyed.

Limitation of Liability

Images and graphics used in this document are for illustrative purposes only. Unisystem shall not be liable to the buyer or any third party for any indirect, incidental, special, or consequential damages (including, without limitation, lost profits or business opportunities) arising from the use of its products or services.

High-Risk Applications Disclaimer

Unisystem products are not designed, intended, or authorized for use in safety-critical or high-risk applications where failure could directly result in personal injury, death, or severe environmental damage (e.g., life support machines, aerospace navigation, nuclear facilities). Using Unisystem products in such high-risk activities is entirely at the buyer's risk, and the buyer agrees to fully indemnify and hold Unisystem harmless from any damages or claims resulting from such unauthorized use.

16. Contact Information

unisystem

UNISYSTEM SP. Z O.O.

Nowy Świat 36
80-299 Gdańsk
Poland

+48 58 761 54 20
office@unisystem.com

EU VAT No.:
PL5842741076