



LCD271-070CTL1ARNTT

7" WUXGA High Bright Wide Gamut

In-Cell Touch

1200\*1920

111 Corning Road, Suite 116 • Cary, NC 27518

Approvals	
Model Number	LCD271-070CTL1ARNTT
Datasheet Revision	1.0
Drawing Revision	D

Lincoln Technology Solutions  
Confidential

Customer Approval	
Approved by: _____	Date: _____

## Table of Contents

Revision History.....	4
Document Revision.....	4
Hardware Revision .....	5
General Specifications.....	6
Block Diagram.....	7
Pin Out-LCD.....	8
Absolute Max Ratings - LCD.....	10
Absolute Max Ratings – PCAP - In Cell Touch .....	10
Electrical Characteristics - LCD .....	11
Electrical Characteristics – PCAP - In Cell Touch .....	11
Backlight Specifications.....	12
Timing Specifications - LCD.....	13
Timing Specifications – PCAP .....	13
ID Register Bit Definitions .....	14
MIPI Init.....	14
Reliability.....	15
Optical Characteristics .....	16
Packaging.....	20
Quality & Inspection Criteria.....	21
Terminologies:.....	21
Inspection Conditions.....	25
Acceptance Criteria Table.....	26
Appendix 1: Mechanical Drawing.....	28

## Revision History

### Document Revision

Date	Version #	Description	Created By	Checked By	Quality Approval By	Approved By
3.22.2024	0.1	Release	ST	RT	--	JH
3.27.2024	0.2	Revised LCD type and touch panel chip, corrected typo on LCD, added MIPI Init file reference	ST	RT	--	JH
10.8.2024	0.3	Revised Document Revision table to include Quality Approval column, corrected Pin Out LCD table, updated ID Register Bit Definitions, revised Optical Characteristics Note 1, updated packaging	ST	KV	--	JH
3.25.2025	0.4	Updated drawing, updated Document Revision version numbers, changed "Production Release" to "Prototype Release", updated Hardware Revision version number, added LED Lifetime to General Specifications table, updated Pin Out LCD table to VSN (-6V) and VSP (6V), updated Electrical Characteristics table: updated VSN and VSP typical values to -6V and +6V required for 2.2 gamma operation and added note, updated Supply Current maximum values IDD(IOVCC), IDD(VSN), and IDD(VSP), updated ID Register Bit Definitions table to Decimal year code, updated MIPI Init, updated Reliability High Temperature and Humidity Operation to 240 hrs, updated Optical Characteristics	ST	LH	--	JH
4.11.2025	0.5	Updated drawing, updated Hardware Revision from 0.2 to 0.3, updated outline dimensions thickness in General Specifications table	ST	LH	--	JH
5.30.2025	1.0	Production Release, updated drawing, updated hardware revision from 0.3 to 1.0, added LED Color and Quantum Dot Technology to General Specification table, updated Electrical Characteristics—PCAP table with max	ST	LH	TT	JH

		supply current IDD(VCC)				
--	--	-------------------------	--	--	--	--

### Hardware Revision

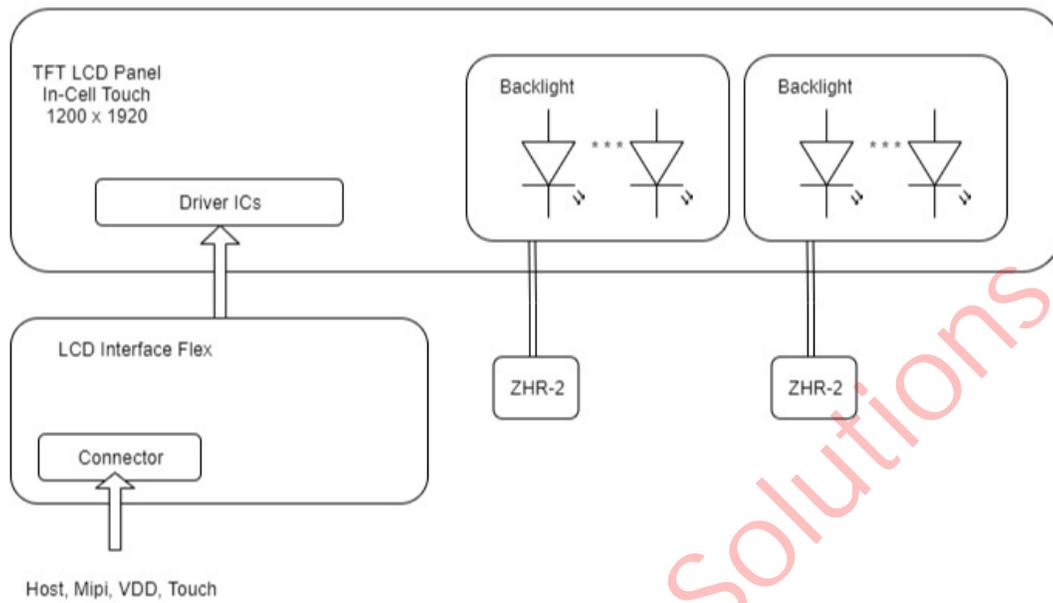
Date	Version #	Description
3.22.2024	0.1	Prototype Release
3.21.2025	0.2	Updates to frame, FOG, film stack
4.3.2025	0.3	Updates to light guide, LED rails, total panel thickness reduced, shifted AA
5.29.2025	1.0	Production Release

Lincoln Technology Solutions  
Confidential

## General Specifications

Item	Specification	Unit
Active Area	94.5 X 151.2	mm
Backlight Type	LED Wide Gamut	-
Display Size	7.02	inches
Interface	MIPI	-
LCD Color Depth	8bit + 2bit FRC	-
LED Color	Blue	
LED Lifetime (L50)	40,000	hrs
Luminance	3600	cd/m <sup>2</sup>
Number of Dots	1200 X 1920	-
Outline Dimensions	111.16(W) X 166.5(L) X 5.07(H)	mm
Pixel Pitch	0.07875 X 0.07875	mm
Quantum Dot Technology	QDEF	-
Surface Treatment	Cover Lens with Anti-Reflective and Anti-Fingerprint	-
Temperature (Operating)	-20 to 70	°C
Touch Panel	Capacitive Touch (In-Cell) – FT8206	-
Viewing Direction	Free	-

# Block Diagram



Lincoln Technology Solutions  
Confidential

## Pin Out-LCD

The interface connector is a 40 pin Zif with 0.5mm pitch. It accepts an FFC of 0.3mm thickness and gold-plated contacts. An example of the part mounted on the LCD flex is, Hirose FH28-40S-0.5SH(05)

Number	Pin Name	I/O	Description
1	NC	-	No connection – Must not connect
2	IOVCC	P	Power supply for system (1.8V)
3	IOVCC	P	Power supply for system (1.8V)
4	GND	P	Ground
5	LCD_RSTN	I	LCD reset signal, Active Low
6	NC	-	No connection
7	GND	P	Ground
8	MIPI_0N	I	MIPI Negative data inputs
9	MIPI_0P	I	MIPI Positive data inputs
10	GND	P	Power ground
11	MIPI_1N	I	MIPI Negative data inputs
12	MIPI_1P	I	MIPI Positive data inputs
13	GND	P	Power ground
14	MIPI_CKN	I	MIPI Negative clock inputs
15	MIPI_CKP	I	MIPI Positive clock inputs
16	GND	P	Power ground
17	MIPI_2N	I	MIPI Negative data inputs
18	MIPI_2P	I	MIPI Positive data inputs
19	GND	P	Power ground
20	MIPI_3N	I	MIPI Negative data inputs
21	MIPI_3P	I	MIPI Positive data inputs

22	GND	P	Power ground
23	TP_SCL	I	TP I2C Clock 1.8V
24	TP_SDA	I/O	TP I2C Data 1.8V
25	GND	P	Power ground
26	NC	-	No connection
27	PWMO	O	PWM control signal for LED driver (CABC)
28	TP_INT	O	Touch Interrupt 1.8V
29	TP_RST	I	TP reset signal 1.8V
30	GND	P	Power ground
31	NC	-	No connection – Must not connect
32	NC	-	No connection – Must not connect
33	NC	-	No connection
34	VSN	P	Analog supply negative voltage (-5~-6V)
35	VSN	P	Analog supply negative voltage (-5~-6V)
36	NC	-	No connection
37	VSP	P	Analog supply positive voltage (5~6V)
38	VSP	P	Analog supply positive voltage (5~6V)
39	NC	-	No connection – Must not connect
40	NC	-	No connection – Must not connect

## Absolute Max Ratings - LCD

Item	Symbol	Value	Unit
Power Supply Voltage for Logic	IOVCC	-0.3 - 4.5	V
Power for Analog Negative	VSN	0 ~ -6.6	V
Power for Analog Positive	VSP	0 ~ +6.6	V
Operating Temperature	Topr	-20 to 70	°C
Storage Temperature	Tstg	-30 to 80	°C

## Absolute Max Ratings – PCAP - In Cell Touch

Item	Symbol	Value	U
Power Supply Voltage for Logic	VCC	-0.3 – 3.47	V
Signal IO	VCC_IO	-0.3 – 3.47	V

Lincoln Technology Solutions  
Confidential

## Electrical Characteristics - LCD

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Operating Voltage	IOVCC	1.65	1.8	1.95	V	-
Voltage for Analog Negative	VSN	-6.5	-6.0	-4.5	V	-
Voltage for Analog Positive	VSP	4.5	6.0	6.5	V	-
Supply Current	IDD(IOVCC)	-	-	50	mA	Ta = 25 °C
Supply Current	IDD(VSN)	-	-	75	mA	Ta = 25 °C
Supply Current	IDD(VSP)	-	-	75	mA	Ta = 25 °C
Input Voltage	Vih	0.7IOVCC	-	IOVCC	V	-
	Vil	0	-	0.3IOVCC	V	-
Input Leakage Current	IiL	-1.0	-	1.0	μA	Vin = IOVCC

Note: +/- 6V necessary for 2.2 gamma. Panel operates properly with lower voltage, but gamma will increase.

## Electrical Characteristics – PCAP - In Cell Touch

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Operating Voltage	VCC	1.65	1.8*	3.3	V	-
Operating Voltage IO	VCC_IO	1.8	1.8*	3.3	V	-
Supply Current	IDD(VCC)	-	8	14.5	mA	Ta = 25
Input Voltage	Vih	0.7VCC_IO	-	VCC_IO	V	-
	Vil	GND	-	0.3VCC_IO	V	-

\*IOVCC powers the PCAP circuitry which is powered at 1.8V

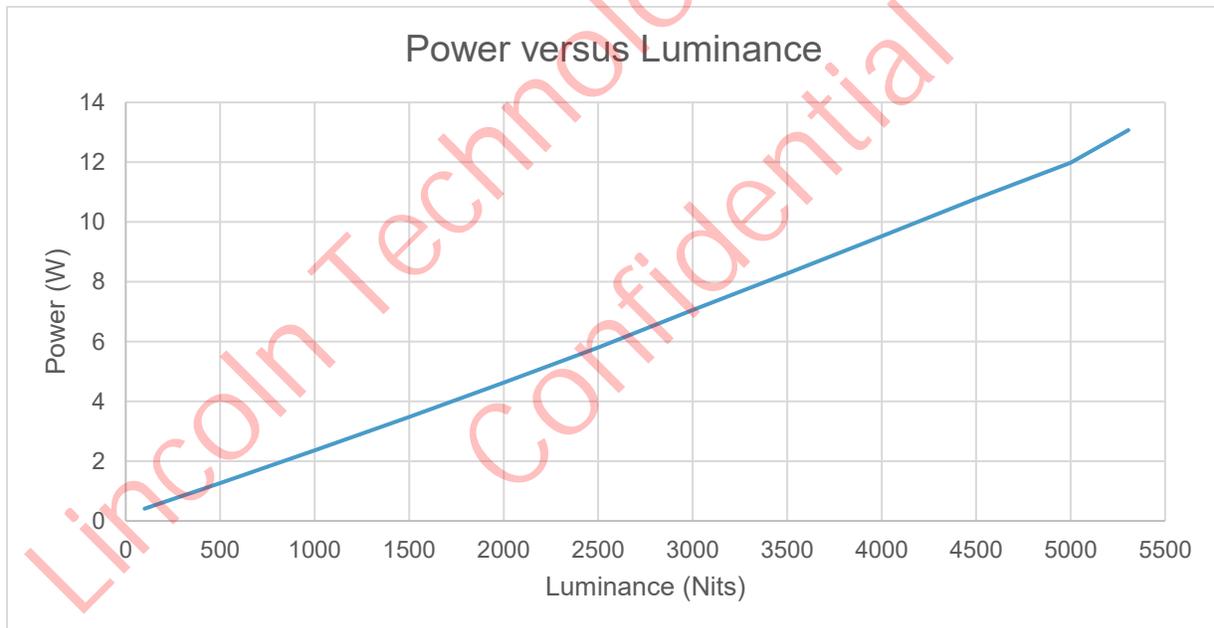
## Backlight Specifications

The backlight wiring is 28AWG and has been pinned into a JST-ZH series connector. The part number is ZHR-2. An example mating part number is, S2B-ZR-SM2-TF. This design has 2 LED rails to achieve maximum brightness. The supply current mentioned below is the sum, i.e., 125mA per backlight connector is required for a total of 250mA(typical).

Number	Pin Name	I/O	Description
1	LEDA	P	LED Anode + connection
2	LEDK	P	LED Cathode - connection

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Voltage	Vf	-	33.0	39.6	v	If = 250mA
Supply Current	If	-	250	400*	mA	

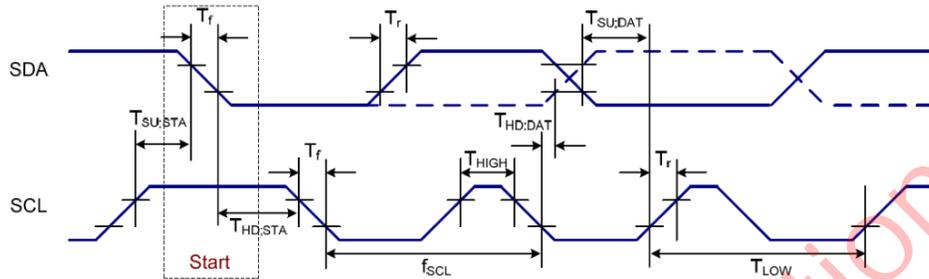
\*Thermal management may be required



## Timing Specifications - LCD

Refer to Focal Tech FT8206

## Timing Specifications – PCAP



Symbol	Parameter	Min	Typ	Max	Unit
$f_{SCLK}$	SCL clock frequency	10	-	400	kHz
$T_{LOW}$	SCL clock LOW period	1.2	-	-	us
$T_{HIGH}$	SCL clock HIGH period	0.6	-	-	us
$T_{SU; DATA}$	Data set-up time	250	-	-	ns
$T_{HD; DATA}$	Data hold time	0	-	0.9	us
$T_r$	SCL and SDA rise time	20	-	300	ns
$T_f$	SCL and SDA fall time	20	-	300	ns
$T_f$	SDA fall time for read out	20	-	1000	ns
$C_b$	Capacitive load represented by each bus line	-	-	400	pF
$T_{SU; STA}$	Setup time for a repeated START condition	0.6	-	-	us
$T_{HD; STA}$	START condition hold time	0.6	-	-	us
$T_{SU; STO}$	Setup time for STOP condition	0.6	-	-	us
$T_{SW}$	Tolerable spike width on bus	-	-	50	ns
$T_{BUF}$	BUS free time between a STOP and START condition	4.7	-	-	us

## ID Register Bit Definitions

Example:

ID registers can be read using the DCS 0xA1 command.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ID0	X	X	X	X	X	X	X	X
	Decimal year code (0x00~0x99)							
ID1	0	0	1	0	0	0	X	X
	Decimal week code						LCD P/N [9:8]	
ID2	X	X	X	X	X	X	X	X
	LCD P/N [7:0]							

## MIPI Init

The MIPI initialization sequence consists of 2 commands. This initializes touch and graphics.

```
DCS_NoParam(0x11); //Sleep out
delay(300); //Delay 300ms
DCS_NoParam(0x29); //Display on
delay(200); //Delay 200ms
```

## Reliability

The reliability test items and conditions are specified in the table below.

Criteria includes:

- 1) Samples shall be functional with no safety-related failures such as fire, smoke or electrical shock during and after the test.
- 2) No screen quality deterioration at interim functional checks and after the tests monitoring
  - a. Luminance > 50% of initial turn on luminance
  - b. Uniformity within 25% of initial sample
  - c. Passing visual test
- 3) No cosmetic deterioration at interim check and after test
- 4) No mechanical or physical damage

Item	Test	Conditions - Typical
1	High Temperature Operation	70°C 240Hr
2	Low Temperature Operation	-20°C 240Hr
3	High Temperature Storage	80°C 240Hr
4	Low Temperature Storage	-30°C 240Hr
5	Thermal Shock	-40°C & 80°C, 1hr/cycle for 100 cycles
6	High Temperature and Humidity Operation	60°C 90%RH 240Hr
7	Vibration - Structural	1.5G Peak Acceleration, 10Hz-500Hz-10Hz (0.75 Oct/min logarithmic), 3 mutually perpendicular axes X, Y, and Z
8	ESD	+/- 2kV to +/- 8kV Air +/- 2kV to +/- 6kV contact; Note 1

**Note 1: ESD Criteria**

Unit may have temporary graphical artifacts during shock.

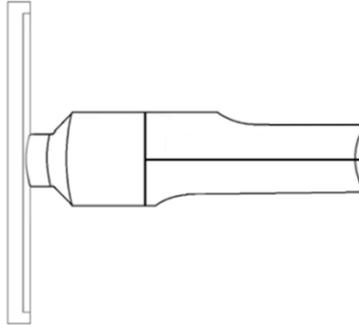
## Optical Characteristics

All measurements taken after minimum runtime of 25 minutes.

Item	Symbol	Conditions	Specification			Unit	Note	
			Min	Typ	Max			
Response Time	Tr Tf	Ta = 25°C	-	25	-	ms	(1)(4)	
Contrast Ratio	CR	Normal Viewing Angle	1200	1500	-	-	(1)(3)(5)	
Viewing Angle	Hor.	X-	CR>10	75	80	-	Deg	(3)(5)
		X+		75	80	-	Deg	
	Ver.	Y+		75	80	-	Deg	
		Y-		75	80	-	Deg	
Chromaticity	Red	Rx	Ta = 25 °C	-	.6794	-	-	
		Ry		-	.3185	-	-	
	Green	Gx		-	.2700	-	-	
		Gy		-	.7000	-	-	
	Blue	Bx		-	.1502	-	-	
		By		-	.0503	-	-	
	White	Wx		-	.3425	-	-	
		Wy		-	.3521	-	-	
Luminance	L	Ta = 25 °C	-	3600	-	cd/m2	(1)	
Color Gamut Ratio			-	103	-		DCI-P3	
Color Gamut Coverage			-	99	-		DCI-P3	
Uniformity	U		-	96	-	%	(2)	

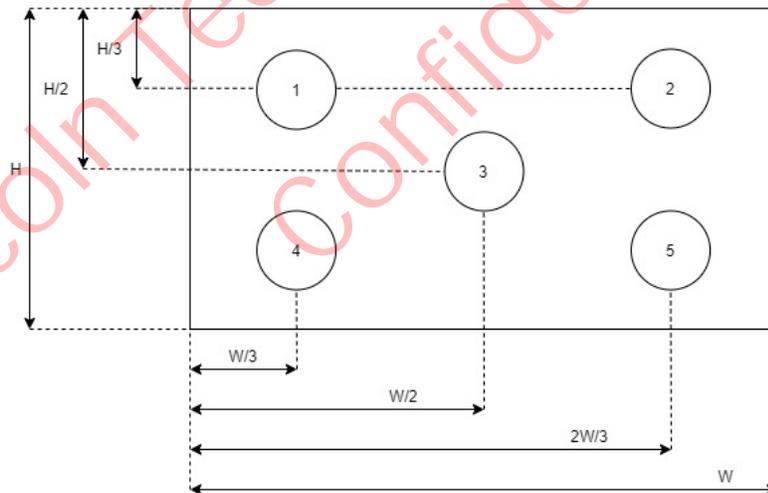
**Note 1: Measurement setup**

The LCD module should be stabilized at a given temperature for 25 minutes to avoid abrupt temperature change during measurement. After temperature saturation, measurement should be executed. Measurements are conducted with a colorimeter with the aperture in contact with the display.



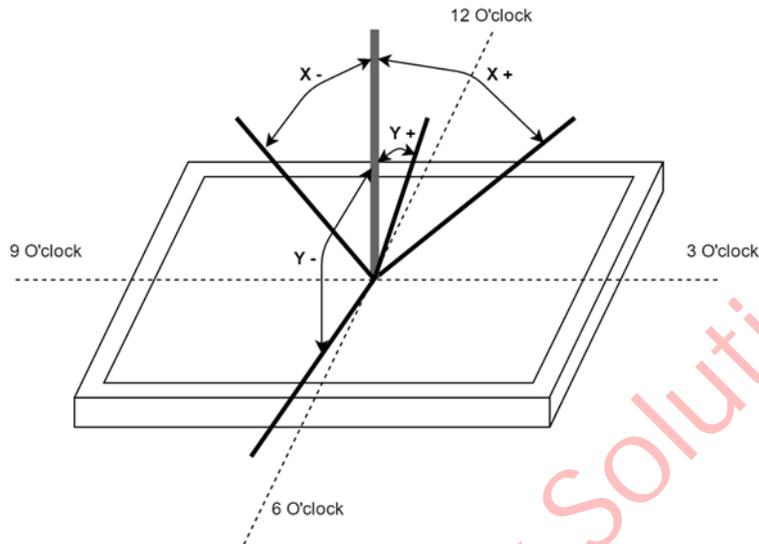
**Note 2: Brightness Uniformity**

Brightness uniformity = (Minimum Luminance of 5 points / Max Luminance of 5 points) \* 100



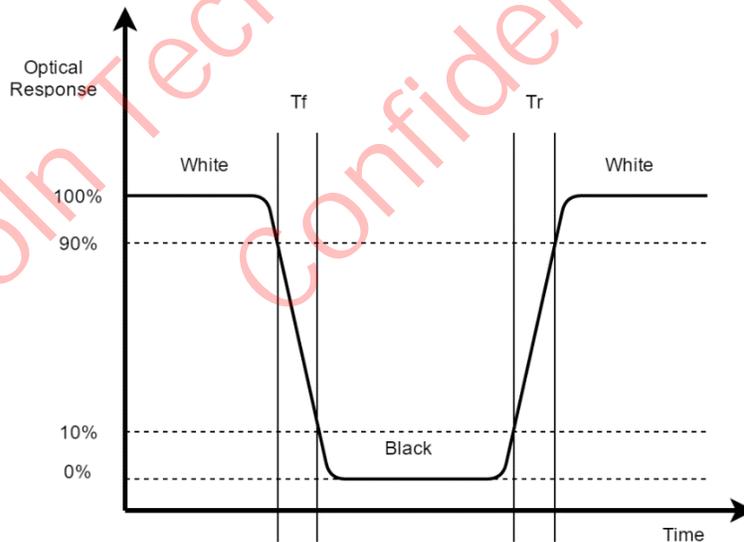
**Note 3: Viewing Angle**

Definition of viewing angle for Y+/- and X+/- is as follows.



**Note 4: Response Time**

Definition of response time as follows below.



**Note 5: Contrast Ratio**

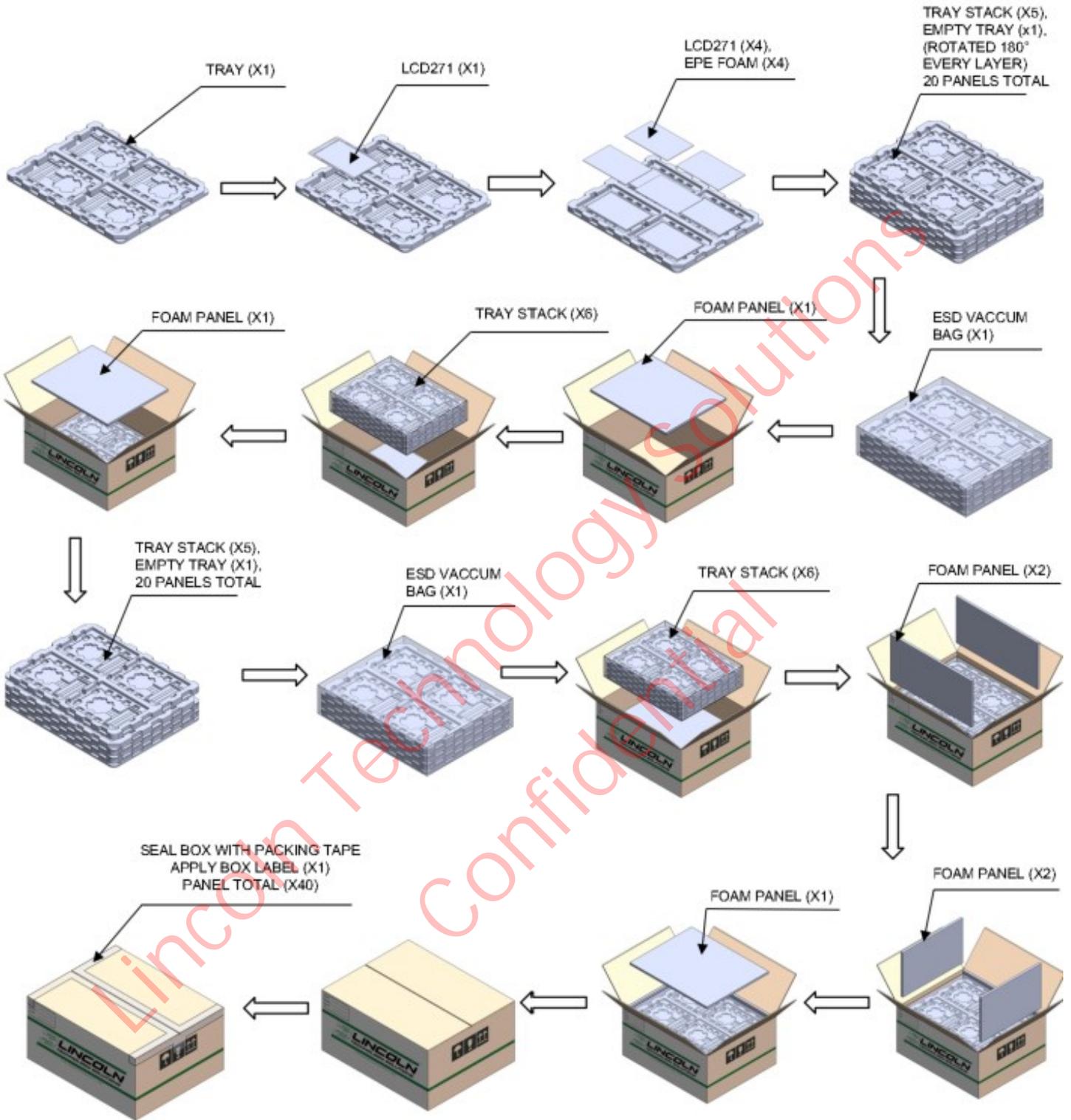
Definition of Contrast Ratio is as follows.

Contrast measurements shall be made at a viewing angle of 0° at the center of the surface.

$$CR = \frac{\text{Luminance when displaying White}}{\text{Luminance when displaying Black}}$$

Lincoln Technology Solutions  
Confidential

## Packaging

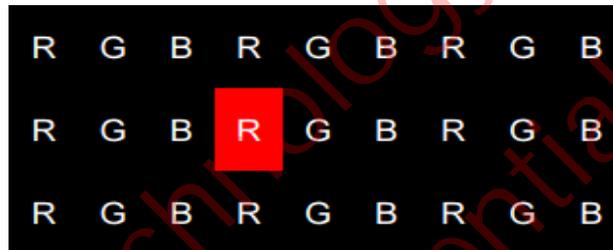
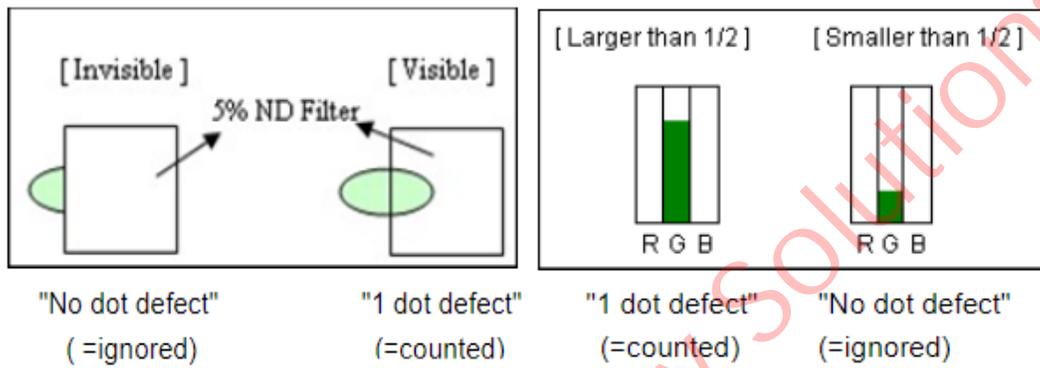


## Quality & Inspection Criteria

### Terminologies:

**LCD:** Liquid Crystal Display; Each pixel contains three dots of R, G, and B (sub-pixel).

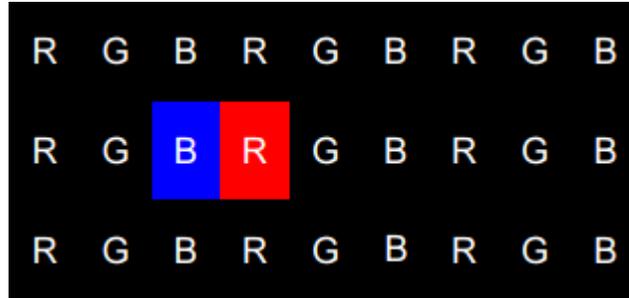
**Bright Dot:** 1 sub-pixel is a dot. Defects should be larger than 1/2 of a sub-pixel. Dots that are not visible through a 5% ND Filter or smaller than 1/2 of sub-pixel size will not be counted as a dot defect.



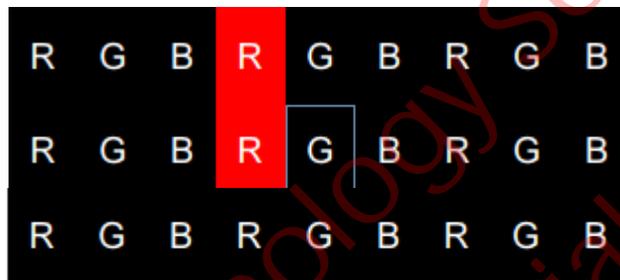
**Dark Dot:** Any single sub-pixel that does not light up in a white screen or another non-black screen is called a dark dot.



**Two adjacent dots (horizontal direction):** Use the bright dot illustration as an example to demonstrate two horizontal consecutive dots.



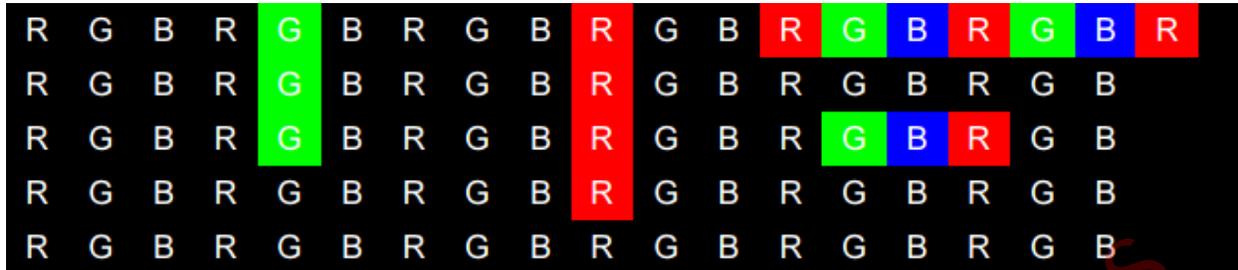
**Two adjacent dots (vertical direction):** Use the bright spot illustration as an example to demonstrate two vertical consecutive dots.



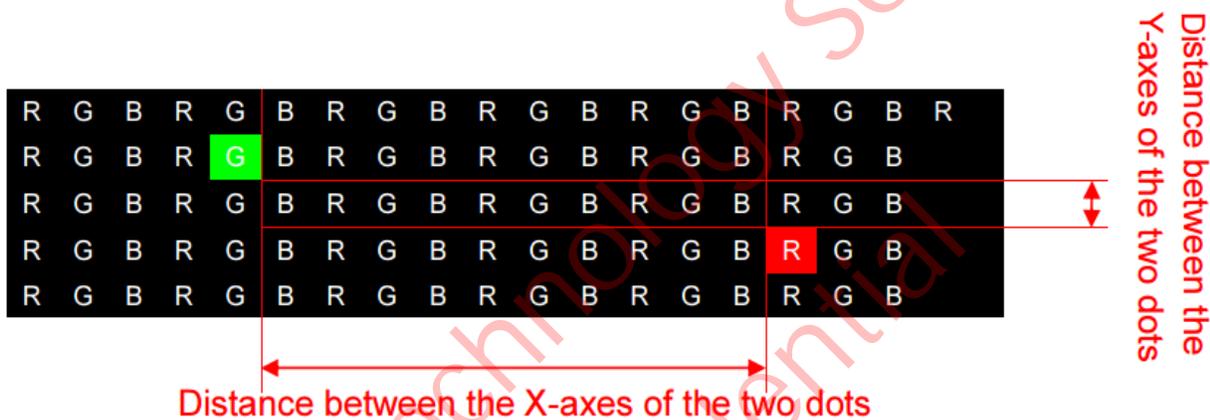
**Two adjacent dots (bevel direction):** Use the bright spot illustration as an example to demonstrate two consecutive dots in the bevel direction.



**Three or more adjacent dots (horizontal):** Use the bright spot illustration as an example to demonstrate three or more consecutive horizontal and vertical dots.



**Illustration of spacing between two dots:** (Distance is the relative distance between the X-axes of the two dots or the relative distance between the Y-axes of the two dots, whichever is larger)



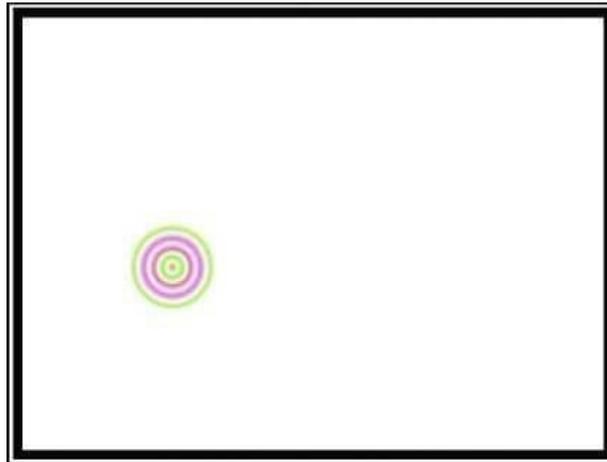
**Functional Test**

The LCD display testing program should display the following screens in order: all red, all green, all blue, all white, all gray, all black.

**Inspection Requirements**

After booting the system (single illumination), there are no non-display, unlit backlight, dark backlight, blinking, or other abnormal signs, and there are no bright lines, dark lines, or bright rims/leakage of light close to the LCD bezel.

### Newton's Ring



Under high temperature and high humidity conditions, uneven deformations caused by heat in different layers of the LCD module will result in the display of an all-white screen. However, this condition can be recovered when temperature is resumed under normal circumstances. A specific determination can be conducted according to the operating conditions and storage conditions defined in the product's technical specifications. Any exception will be negotiated and mutually agreed by both parties. (Ripples are not permitted at fixed locations. For ripples at non-fixed locations, they are OK if they disappear within two seconds.)

### LCD blaze

Uneven internal LCD installation, surface deformation of the LCD polarizer, internal structural interference of the LCD module, damaged LCD backlight plates, and other factors may cause partial fading of color on the LCD display. When observed from a certain incident angle (upper 10°, lower 3°, 40° on both sides), they will appear as white cicatrices, typically about the size of a grain of rice. In serious cases, they accumulate in large patches or stripes, appear in different degrees under various colors (red, blue, green, black, gray, white), and are especially obvious under an all-gray screen. Blazes with diameters  $\geq 0.5\text{mm}$  are not allowed: for those with diameters under 0.5 mm, 2 are acceptable if the space between them is  $\geq 15\text{mm}$ . Card chromatic aberration ratio versus ND Filter:  $1.0 + 0.3 \text{ standard} = 5\% \text{ ND Filer}$  (see definition of Mura).

**Mura**

Mura refers to the unevenness and irregularity that is visible in the image. It is difficult for visual inspection to recognize the non-uniform brightness or mura. Mura detection is subjective and therefore doesn't have pass/fail criteria. There are several precautions to take which can avoid mura. Avoid high ambient temperatures around the module, frame warpage and high temperature operation over long periods of time. Utilize screen savers to avoid mura.

**Inspection Conditions**

Inspection distance should be 35cm ± 5cm with a Fujifilm ND-LCD 5% filter approximately 5cm from the backlight surface.

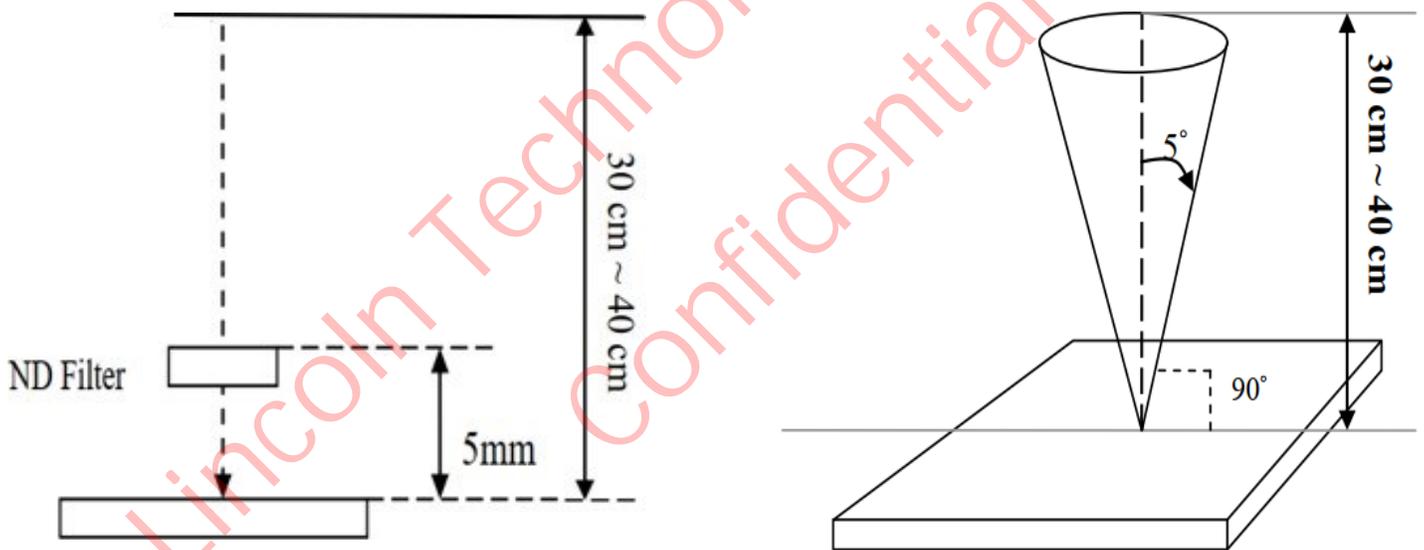
Viewing angle: 90° ± 5°.

Room temperature: 23+/- 2°C

Humidity: 60 +/- 10%

Inspection Ambient Illumination: 300-700 LUX

Viewing Distance: 30-40 CM



## Acceptance Criteria Table

There should be no corrosion or cracking, or an uneven coating layer on LCD display surface, and there should be no sign of coagulation, flaking, cracking, or wear. The definition of minor defects and acceptance criteria are shown in the following table:

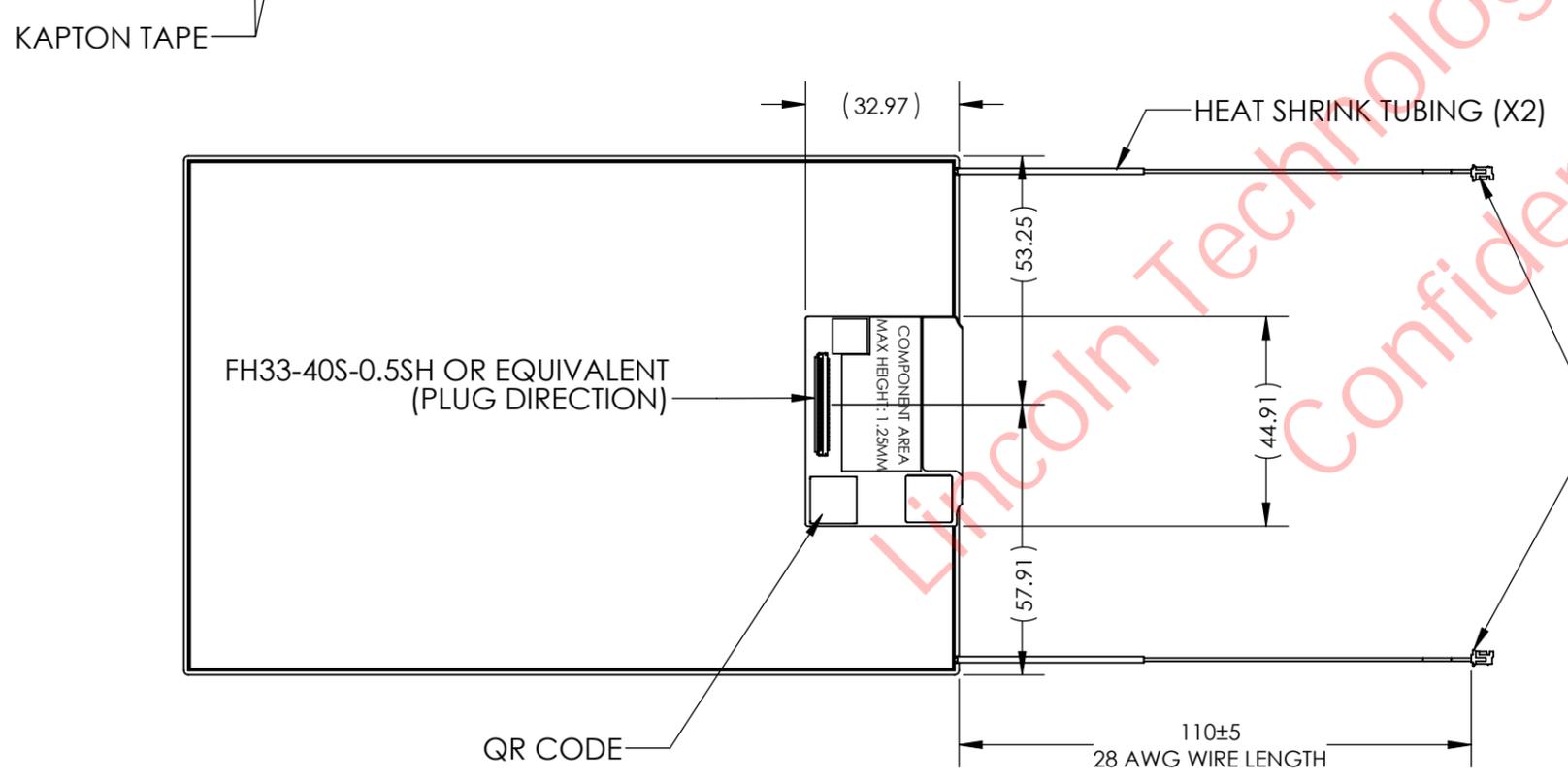
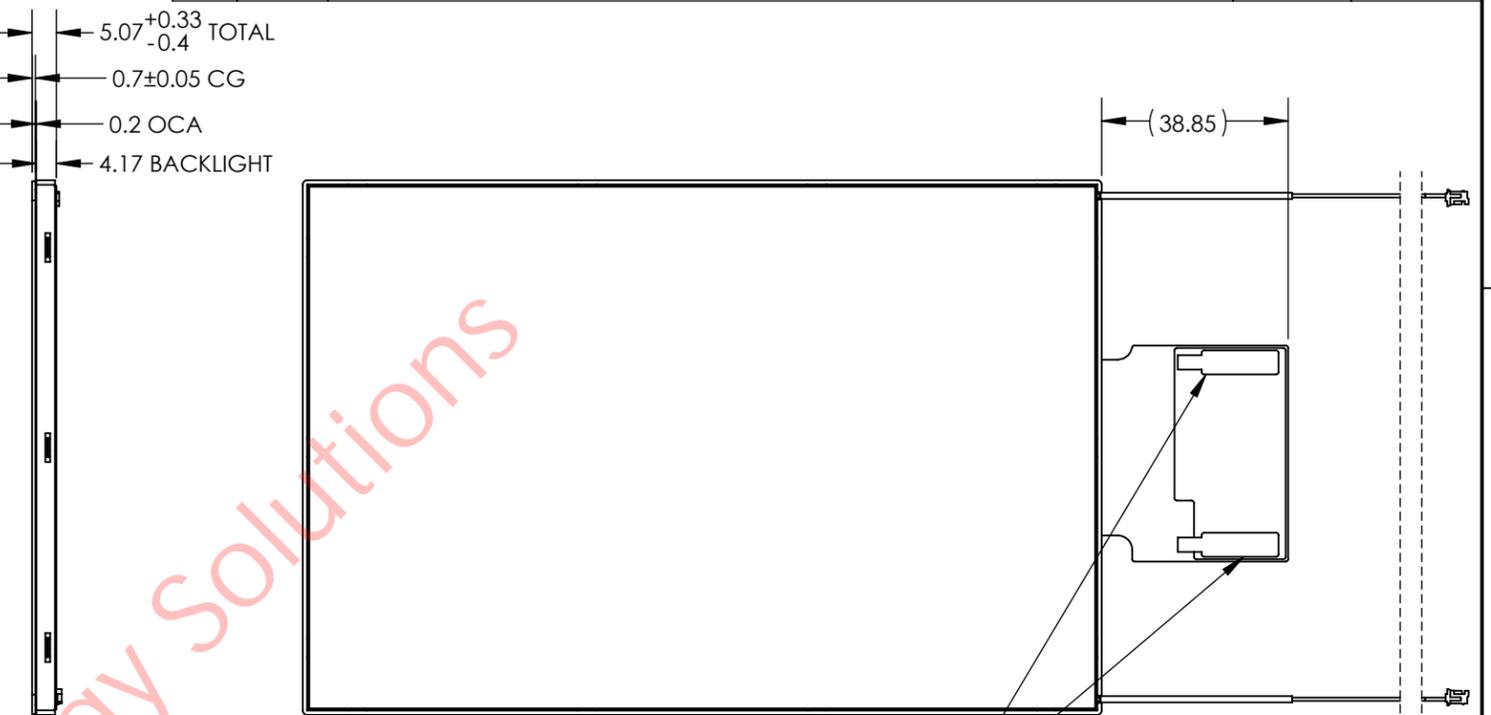
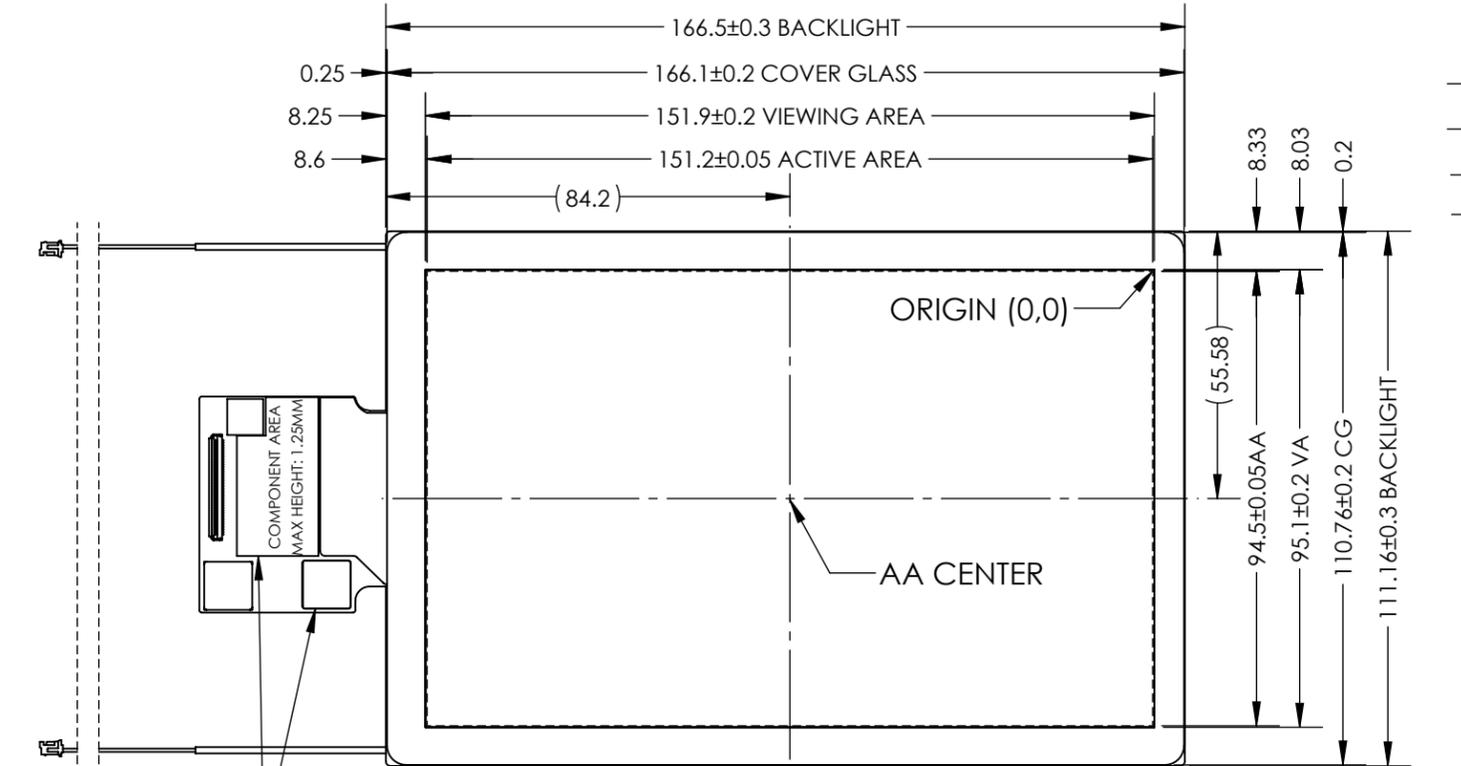
Item	Size	Unit	Acceptance Qty.
Unfelt scratch visible with backlight off.	W < 0.05	mm	Ignore
	W > .05 and < .10 L > .3 and < 3.0	mm	4
	W > .10 or L > 3.0	mm	none
	Visible with backlight on		none
Felt scratch	None allowed		
Dent visible with backlight off	D < .2	mm	Ignore
	D > .2 and < .5	mm	5
	Spacing between defects must be > 30mm		
	D > .5	mm	none
	Visible with backlight on		none
Bubble visible with backlight off	D < .2	mm	Ignore
	D > .2 and < .5	mm	5
	D > .5	mm	none
	Visible with backlight on		none

Item	Size	Unit	Acceptance Qty.
Foreign material (line shape) visible with backlight on	W < .05	mm	Ignore
	W > .05 and < .10 L > .3 and < 2.0	mm	4
	W > .10 or L > 2.0	mm	none
Foreign material (dot shape) visible with backlight on	D < .2	mm	Ignore
	D > .2 and < .5	mm	5
	D > .5	mm	none
Bright dot defect (lit)	1 dot	-	4
	2 adjacent dots	-	0
Dark dot defect (not lit)	1 dot	-	5
	2 adjacent dots	-	2
	3 adjacent dots	-	0

## Appendix 1: Mechanical Drawing

Lincoln Technology Solutions  
Confidential

REV.	HW REV.	DESCRIPTION	DATE	APPROVED
A	0.1	INITIAL RELEASE	3/22/2024	JH
B	0.2	UPDATES TO FRAME, FOG, FILM STACK; CORRECTION TO HW REVISIONS	3/21/2025	JH
C	0.3	CHANGED TO THINNER LIGHT GUIDE, THINNER FRAMES, NARROWER LED RAIL: TOTAL PANEL THICKNESS REDUCED BY 0.3MM. SHIFTED AA RELATIVE TO FRAME BY 0.05MM TOWARDS FPC	4/3/2025	JH
D	1.0	PRODUCTION RELEASE	5/29/2025	JH



GENERAL TOLERANCE TABLE (±MM)	
L ≤ 20	0.1
20 < L ≤ 50	0.2
50 < L ≤ 100	0.25
100 < L ≤ 200	0.3
200 < L	0.5
SCALE: 2:3	SHEET 1 OF 1
DO NOT SCALE DRAWING	

DRAWN BY: LH	DATE 5/29/2025
CHECKED BY: JH	DATE 5/29/2025



MATERIAL:  
N/A

FINISH:  
N/A

COMMENTS:  
ALL DIMENSIONS ARE IN MILLIMETERS

DESCRIPTION 7" WUXGA HIGH BRIGHT WIDE GAMUT		
PART NO. LCD271-070CTL1ARNIT	HW REV. 1.0	DRW REV. D
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF LINCOLN TECHNOLOGY SOLUTIONS (LTS) AND SHALL NOT BE REDISTRIBUTED. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF LTS IS PROHIBITED.		