

Product Specification

Model No: 14793-06

3.4" Color Memory In Pixel LCD 2.0 Display Module with
Optical Bonding (OB) Capable Front Light Panel

Revision History

Rev.	Issued Date	Description	EC #	Updated By	Approver
A1	9/28/2023	Initial	2545	Tyler Jackson	Greg Kuchuris
A2	3/19/2024	Updated Section 6. Added details to Section 8, 9, 10, and 11.	2697	Tyler Jackson	Greg Kuchuris

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1. General Description

Azumo part number 14793-06 is a 3.4" color, reflective, active-matrix liquid crystal display (LCD) with integrated front light panel (FLP) compatible with optical bonding (OB).

Features

- Reflective 3.4" LCD with 64 colors and an active area consisting of 272 (H) x 451 (V) pixels
- This display features Memory in Pixel (MIP) functionality resulting in lower power usage than other LCD technologies
- The OB FLP is optical bonding capable making this display module assembly compatible with cover lens and touch panel bonding.
- The LCD system utilizes Serial Peripheral Interface (SPI) for communication
- The integrated FLP includes a thin flexible light guide film and a lightbar consisting of a LED module, flexible printed circuit (FPC) and integrated thermal management component inside
- Both 64 and 8 color modes with partial display update capabilities

Table 1. Typical specifications for LCD module.

Technical Specification	Nominal Value	Units	Comment
Resolution	272 (H) x 451 (V)	pixels	
Active Area	44.64 (H) x 74.01 (V)	mm	
PPI	155	-	
Display Colors	64	Colors	
LCD structure	LTPS (Memory in Pixel)		
Liquid Crystal Mode	MTN	-	
Display Mode	Normally Black		
Interface	SPI up to 7MHz	-	
Display Power Consumption (static image)	0.3	mW	Typical
Display Response Time (rise)	5	ms	From black to white
Display Response Time (fall)	6	ms	From white to black
Contrast Ratio with FLP On	11	-	Typical
Contrast Ratio with FLP Off	20	-	Typical
Color Gamut (NTSC) with FLP On	15	-	Typical
Storage Temperature	-30 to +80	° C	
Operating Temperature	-20 to +70	° C	

3. Electrical Specifications

3.1. Absolute Maximums

Table 2. Absolute maximum ratings for electrical specifications.

Item	Symbol	Value	Unit
FLP			
Electrical Power	P_D	0.45	W
Forward Current	I_F	150	mA
LCD			
Power supply voltage	VDD2_S	+5.1	V
	VDD2_L	+5.1	V
	VDD2_P	+5.1	V
	VDD1_L	+3.4	V
	VDD1_P	+3.4	V
Input control signal voltage	V_{IH}	VDD1_L	V
Input control signal voltage	V_{IL}	0	V

Note: Thermal derating must be considered for continuous operation. At the design thermal load the system can support at least 2000mA at continuous operation.

3.2. Electrical Characteristics

3.2.1. FLP and LCD Drive

Table 3. Recommended operating condition [$V(GND)=0V$, $T_a=+25^\circ C$]

Item	Symbol	Min.	Typ.	Max	Unit
FLP					
Forward Voltage	V_F	-	3.0	-	V
Forward current	I_F	-	100	-	mA
LCD					
Power supply voltage	VDD1	-	3.3	-	V
	VDD2	-	5.0	-	V
Ground	VSS	-	0	-	V
Input control signal	High- V_{IH}	VDD1	-	-	V
	Low- V_{IL}	-	-	VSS	V

3.2.2. Power consumption

Table 4. LCD Power Consumption [$T_a=+25^{\circ}\text{C}$, $V_{DD1}=3.3\text{V}$, $V_{DD2}=5.0\text{V}$, $V_{IH}=3.3\text{V}$, $V_{IL}=5\text{V}$, Data frequency=1Hz, COM frequency=60Hz]

Item	Display	Min.	Typ.	Max.	Unit
Data update mode	White	-	1.2	4	mW

Note: All figures are preliminary and pending final characterization

Table 5. FLP Power Consumption [$T_a=+25^{\circ}\text{C}$, $V_{LED}=3\text{V}$]

Item	Display	Min.*	Typ.	Max.	Unit
FLP LED Power consumption	White	18	300	450	mW

Note: All figures are preliminary and pending final characterization

* Minimum power consumption with FLP LED On is characterized as when the LED initially is visible.

3.2.3. LCD Input Signal Characteristics

Table 6. Recommended operating condition [$V_{DD1}=3.3\text{V}$, $V_{DD2}=5\text{V}$, $V_{IH}=3.3\text{V}$, $V_{IL}=0\text{V}$, $T_a=+25^{\circ}\text{C}$]

Item	Symbol	Min	Typ.	Max	Unit
Clock frequency	fSCLK			7	MHz
COM frequency	fCOM	45	60	70	Hz
EXTCOMIN frequency	fEXTCOMIN	90	-	140	Hz

3.3. Other Characteristics

Refer to AUO Product Specification (Doc. No. U340QBN01.0) for timing and power on and power off requirements.

3.4. Pin Assignment

A 20 circuit FPC connector with 0.5mm pitch is recommended for mating to the display FPC.

Table 7. Pin Assignment

Pin	ZIF Pin Define
20	VDD2_P
19	VSS_P
18	VDD1_P
17	EXTCOMIN
16	SCS
15	DISP
14	SI
13	SCLK
12	VDD1_L
11	VSS_L
10	VDD2_L
9	VSS_S
8	VDD2_S
7	NC
6	NC
5	NC
4	LED (+)
3	LED (+)
2	LED (-)
1	LED (-)

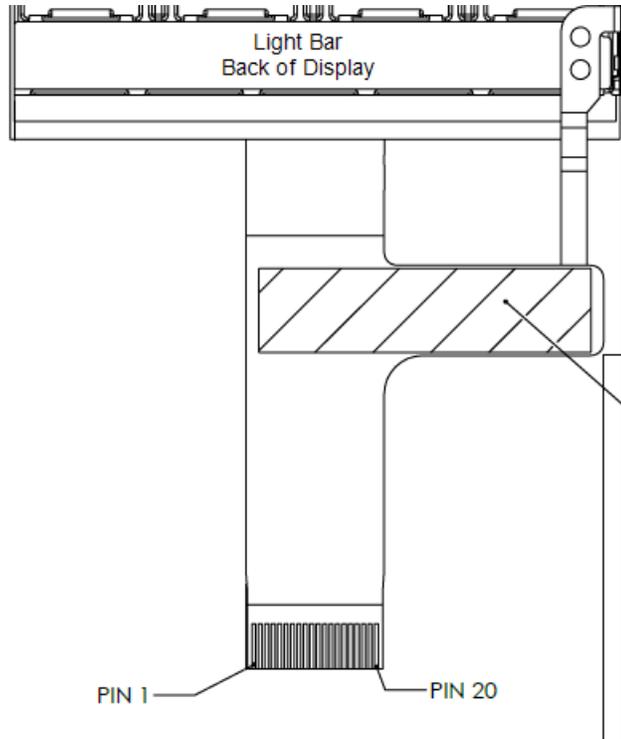


Figure 1. Detail of LCD FPC.

Table 8. Recommended connector for LCD FPC.

Product Manufacturer	Series	Part Number	Remark
Molex	FS19 505278	5052782033	Bottom
Hirose	FH34SRJ	FH12-20S-0.5SH(55)	Top

4. Optical Specifications

Optical specifications listed below are measured with Konica Minolta CS100 Chroma Meter, unless otherwise noted:

Table 9. Optical performance when FLP is powered ON. Measurements performed @ Normal to the LCD panel, in a dark room (protective liner removed). [Ta=25 °C, VDD1=3.3V, VDD2=5.0V, COM frequency=60Hz, VIH=3.0V, VIL=0V, FLP LED forward current=100mA]

Item	Symbol	Min.	Typ.	Max	Unit	Remark
Brightness	L	-	85	-	nits	Note 4-4
Brightness uniformity	ΔL	-	60	-	%	Note 4-5
Contrast ratio	CR	-	12	-		Note 4-2
Color Gamut (NTSC)	--	-	15	-	%	
Viewing angle (CR > 2)	θ_L	-	50	-	deg	Horizontal; Note 4-1
	θ_R	-	50	-		
	θ_T	-	45	-		Vertical; Note 4-1
	θ_B	-	35	-		

Note: All figures are preliminary and pending final characterization

Table 10. Optical performance when FLP is powered OFF [Ta=25 °C, VDD1=3.3V, VDD2=5.0V, COM frequency=60Hz, VIH=3.0V, VIL=0V]

Item	Symbol	Min.	Typ.	Max	Unit	Remark
Contrast Ratio	CR	14	20	-		Note 4-2, Note 4-3
Color Gamut (NTSC)	--	16	19	-	%	
Reflectance		8	10	-		
Viewing angle (CR > 2)	θ_L	50	55	-	deg	Horizontal; Note 4-1
	θ_R	50	55	-		
	θ_T	50	60	-		Vertical; Note 4-1
	θ_B	50	60	-		

Note: All figures are based on native LCD prior to addition of front light panel. To be characterized and updated with front light panel.

Note 4-1: Definition of Viewing Angle

- Measured with Fourier Optics viewing angle instrument, Eldim EZ Contrast XL88

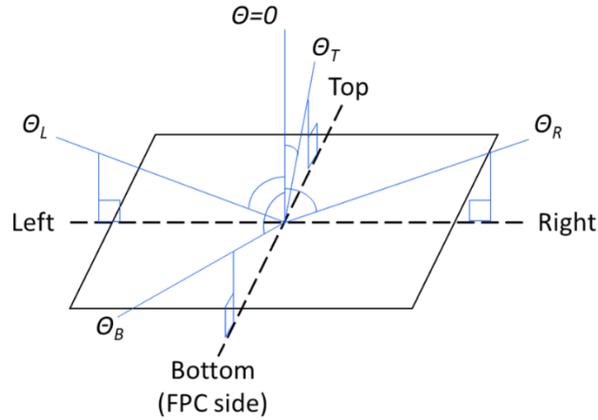


Figure 2. Definition of viewing angles relative to LCD display.

Note 4-2: Definition of contrast ratio

$$\text{Contrast Ratio (CR)} = \frac{\text{Reflection intensity in white display}}{\text{Reflection intensity in black display}}$$

Note 4-3: Measurement equipment for contrast ratio (CR).

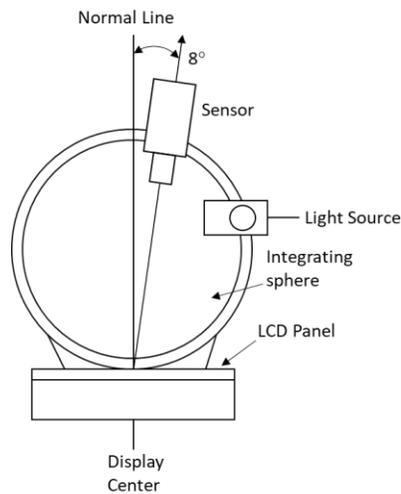


Figure 3. CM700d - Diagram of measurement equipment for contrast ratio.

Note 4-4: Definition of Brightness

Brightness (L) is the average measured luminance of 9 testing regions (Fig. 4) evenly distributed throughout the display.

Note 4-5: Definition of Brightness Uniformity

$$\text{Brightness Uniformity } (\Delta L) = \frac{L(\text{Min})}{L(\text{Max})} * 100$$

L (Max) = Maximum Luminance in 9 measured testing regions shown in Fig. 4

L (Min) = Minimum Luminance in 9 measured testing regions shown in Fig. 4

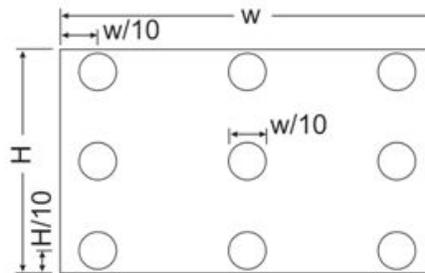


Figure 4. Testing regions for brightness and uniformity.

5. Reliability Test Requirements

Table 11. Reliability and Environmental Testing parameters.

	Test item	Test condition	Remark
1	High Temperature Storage	Ta = +80°C, 240hr (Non-operating)	
2	Low Temperature Storage	Ta = -30°C, 240hr (Non-operating)	
3	High Temperature Operation	Tp = 70°C, 240hr	Operating by applying 100mA (@3.0V) to LED FPC of FLP
4	Low Temperature Operation	Tp = -20°C, 240hr	Operating by applying 100mA (@3.0V) to LED FPC of FLP
5	High Temperature and High Humidity Operation	Tp = 40°C, 95%RH for 240hr	Operating by applying 100mA (@3.0V) to LED FPC of FLP
6	Heat Shock Test	Ta = -30°C (1 hour) → +80°C (1 hour) / cycle 5 cycles (Non-operating)	
7	Electrostatic Discharge (ESD)	Mode of discharge: Air; ±2kV discharge; (Non-operating); 6 positions on display (no FPC) – see Fig. 5	Use 5V power rail's max current (570µA) as the limit for current after ESD test. Signal pin power variation should be very low and/or negligible.
8	Vibration	1.15Grms ,1 Hz ~ 200Hz (per ISTA Proc. 1-G) (Non-operating)	

Note: Above are expected passing test criteria. To be updated.

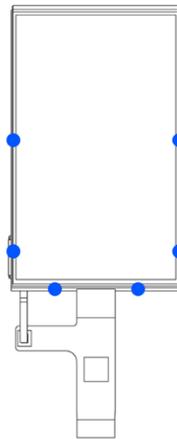


Figure 5. Positions for electrostatic discharge test.

6. Inspection Specification

The following document defines various performance parameters and describes the conditions under which the 14793-06 product should be inspected. This document also outlines deficiencies within the FLP which are recognized by Azumo and classify a unit as defective or non-conforming. There shall be no deviations from the following conditions without consent from Azumo.

Table 12. Details of parameters for inspection.

Inspection Parameters			
Item	Inspection Control	Specification/Definition	Specification
1	Room temperature	The temperature range within the inspection environment	15° - 30° C
2	Room Humidity	The humidity level within the inspection environment	60% +/- 20%
3	Front light panel	The current applied to LED during inspection to illuminate FLP	100 mA
	LCD	The voltage applied to the LCD during inspection	VDD1 @ 3.3 V VDD2 @ 5.0 V VCOM = 60 Hz

Table 13. Definition and frequency of optical inspection items.

Optical Inspection Frequency			
Item	Inspection Control	Specification/Definition	Inspection Frequency
1	Brightness	The average of measured luminance of 9 testing regions (pg. 11, Fig. 4)	100%
2	Brightness Uniformity	The ratio of minimum average luminance region to maximum average luminance region of 9 testing regions (pg. 11, Fig. 4)	100%
3	Contrast Ratio	The ratio of the display reflective intensity (white/black)	100%
4	Color Gamut (NTSC)	The color intensity and range which can be produced by the rLCD display in comparison to the NTSC standard.	Inspection method: Per ISO 2859-1 Inspection level: S-4, AQL = 1.0

The environment and inspection frequency defined above are followed when inspecting the optical performance of 14793-06 product line.

Table 14. Inspection conditions for Azumo LCD panels.

Inspection conditions			
Item	Inspection Control	Specification/Definition	Specification
1	Distance	The distance the unit is required to be from the eye during inspection.	450mm +/- 25mm
2	Angle	The maximum angle units should be tilted during inspection Note: The surface of the LCD and the eye of the inspector shall be at 90° ± 5° prior to rotation	30° Max from "normal" along viewing angles
3	Duration	The maximum time allowed for inspection	6 seconds
4	LCD State	The condition of the rLCD during inspection	100% white pixel
5	Active Area	The boundaries of the optical inspection with the rLCD display	44.64mm (H) x 74.01mm (V) (Refer to Section 8)
6	Ambient Light Level	The level of ambient light required within the environment during cosmetic inspection	200 lx +/- 25 lx
7	Ambient Light Level	The level of ambient light required within the environment during functional inspection	5 lx +/- 5 lx
8	Ambient light source	The light source utilized during inspection	Fluorescent tube

The environment and inspection characteristics outlined above are followed when inspecting the cosmetic and optical characteristics of the 14793-06 product line. All products inspected per the inspection condition defined above are with the protective cover on.

DEFECTS

Table 15. Definition of cosmetic defects for Azumo LCD panel.

Cosmetic Defects			
Item	Defect	Definition	Specification
1	Mechanical	Dimension not within part specification	Refer to Section 2
2	Chipped LCD	Damage to the LCD edge	Ref. Doc. X340QBN01 IIS
3	Cracked LCD	Visible ink bleed-out in the active area of the rLCD display	Not Allowed
4	Dent and pit	A physical impression or piercing of the FLP visible during inspection. (Reference inspection condition item 2)	Not Allowed
5	Particles	Foreign matter found in the FLP or rLCD	Ref. Doc. X340QBN01 IIS
6	Missing Tab	Units missing the removable tab laminated to the protective cover	Not Allowed

Table 16. Definition of functional defects for Azumo LCD panel.

Functional Defects			
Item	Defect	Definition	Specification
1	Dead or Static display	A display which does not turn on. A random dot pixel pattern which displays static (noise) when the rLCD is driven	Not Allowed
2	Dead or Faulty LED	A LED which does not illuminate the FLP. A LED which does not illuminate the FLP to the specified brightness level or illuminates the FLP intermittently.	Not Allowed
3	Non-Uniformity	A dark region within the active area covering more than 33% of the Active area. (Reference inspection condition item 5)	Not Allowed

Azumo only recognizes the characteristics mentioned above as defects for the 14793-06 product line. Every unit produced undergoes inspection according to the guidelines in the inspection conditions section of this document, with regards to the criteria specified in the defect section above. If a returned product does not match the defects listed or is inspected under different conditions, the Azumo quality team will evaluate and make an assessment on non-conformance.

7. Product Serial Code Spec

All Azumo LCD 2.0 products are printed with a 15-digit serial code for identification. The serial code is located on the back surface all Azumo LCD 2.0 products. The serial code can also be read by scanning the corresponding QR code.

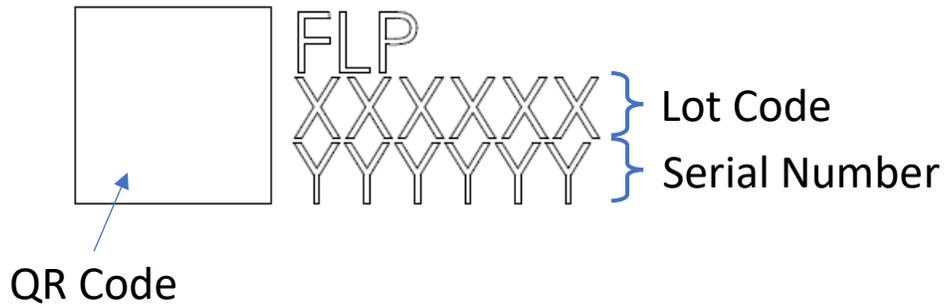


Figure 6. Details of Azumo product serial code.

8. Product Handling Guidelines

The Azumo LCD 2.0 product is composed of a reflective LCD panel (rLCD) and a front light panel (FLP) as shown in Fig. 7 below. The Azumo FLP is a highly engineered thin film light guide that requires knowledgeable handling to avoid unintended damage. The FLP is permanently bonded to the LCD panel through: 1) an optical bonding procedure of the FLP to the active area of the rLCD; 2) a separate roll procedure to bond the light bar to the LCD. Azumo uses different roll configurations to bond the lightbar to the rLCD as shown in Fig. 8. The final Azumo LCD 2.0 display panel is a complete assembly of the FLP to the rLCD as shown in Fig. 9 with the light bar laminated to the back of the LCD display panel. The following handling guide will address the proper handling of both the FLP and the LCD panel.

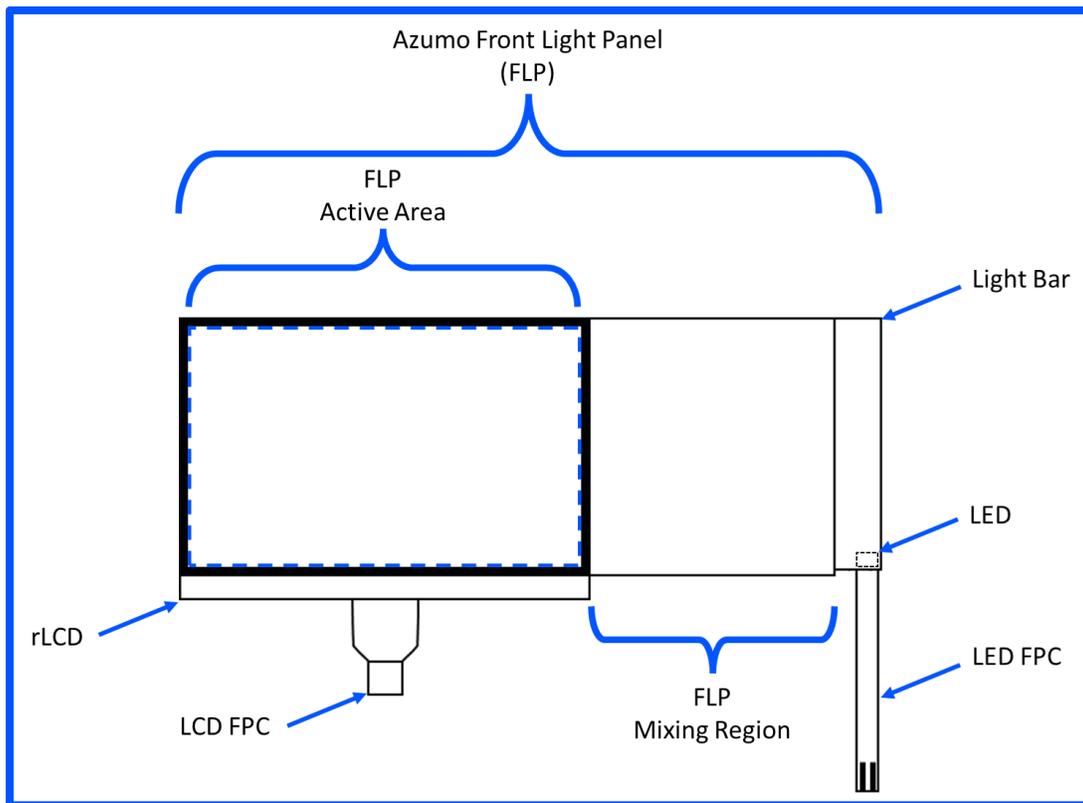


Figure 7. Diagram of Azumo LCD 2.0 FLP in unrolled state.

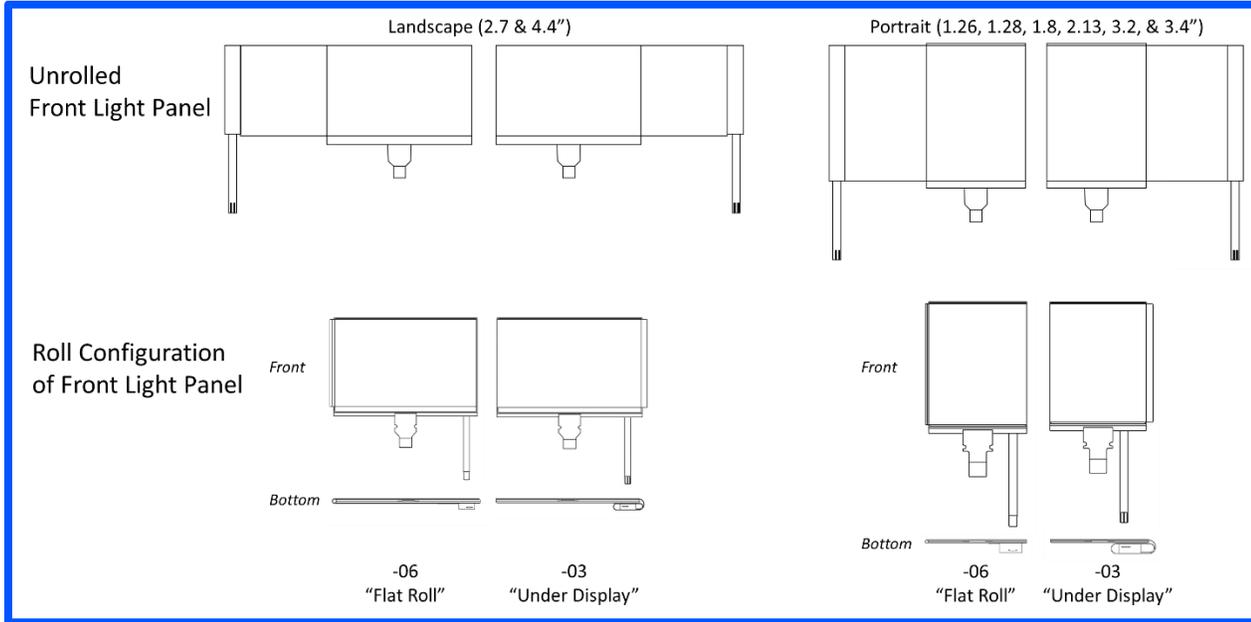


Figure 8. -06 and -03 roll configurations of the Azumo LCD 2.0 FLP

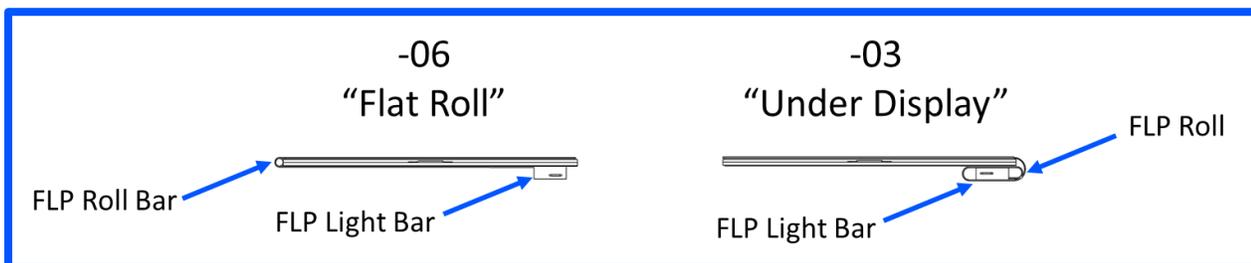


Figure 9. Bottom view of Azumo LCD 2.0 showing different roll configurations.

General Precautions

1. The application examples in this spec are provided to explain the application and are not intended to guarantee any industrial property right or other rights or license you to use them.
2. Azumo reserves the right to make changes in the specifications, characteristics, data, materials, structures, and other contents described herein at any time without notice to improve design or reliability of the Azumo product.
3. Azumo takes no responsibility for damage caused by improper use of the device.
4. The appropriate design measures should be taken to ensure reliability and safety when Azumo's devices are used.
5. Azumo assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these specs sheets.

Front Light Panel Handling Guide

Failure to follow the guidelines outlined below may result in diminished brightness, non-uniform brightness, unintended effects to optical performance, increased power consumption, or a fully inoperable unit.

General Guidelines

1. When removing the Azumo LCD 2.0 product from the packaging tray be careful to:
 - a. Lift Azumo LCD 2.0 product at finger slot (refer to Figure 10).
 - b. Avoid applying excessive pressure to the FLP roll and roll bar
 - c. Avoid direct contact with the FLP active area.
 - d. Avoid bending the LED FPC.
 - e. Avoid bending the LCD FPC.

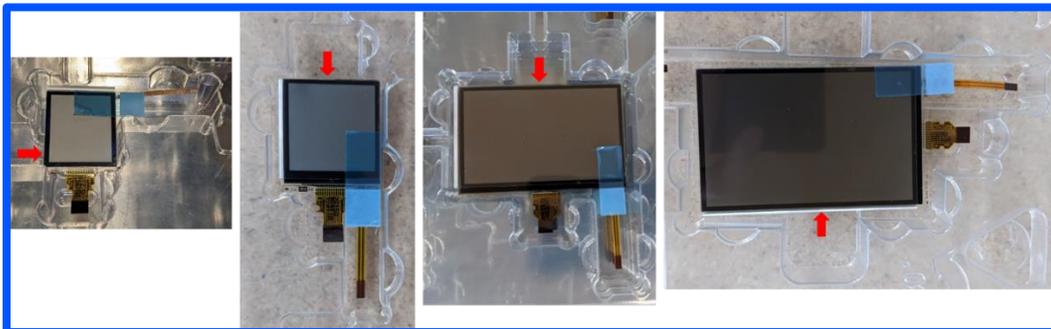


Figure 10. Image of typical packaging tray (1.26", 1.8", 2.7", 3.2") showing finger slot location.

- The protective liner should remain on the front lit display until its removal is necessary for final installation (refer to Figure 11).

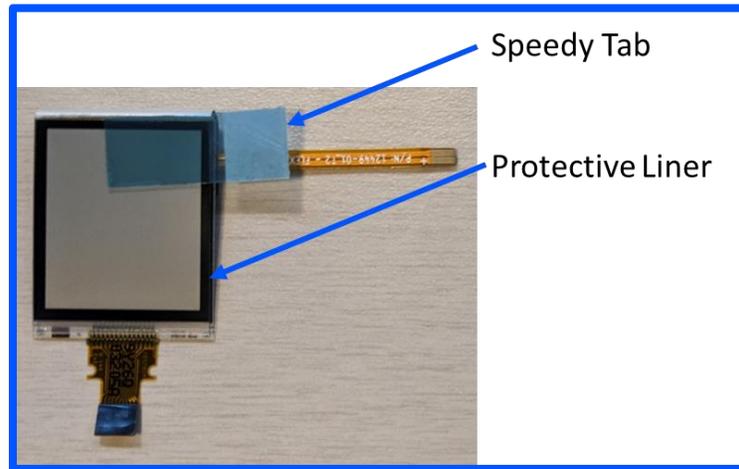


Figure 11. Identification of protective line and speedy tab.

- Do not reapply or reuse the protective liner once removed from the product
- Once the protective liner is removed, do not touch the exposed top layer of the front light film.
- Remove the protective film slowly, using the speedy tab, pulling at a $\sim 30^\circ$ angle from display surface. Remove under an ESD control device, like an ion blower, in a $>50\%$ RH environment to reduce the risk of static charge. Refer to Figure 12.

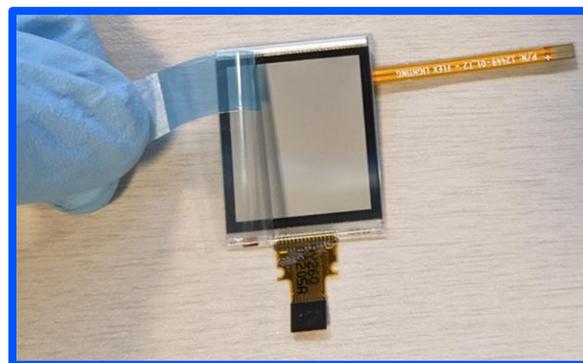


Figure 12. Removal of protective liner using speedy tab.

- Transfer of particulate matter or liquids, particularly oils, to the top layer of the front light film can result in uneven lighting performance.
- Clean room grade gloves are recommended when handling units.
- When handling the product, grasp onto the LCD edges that are not covered by the FLP (see Fig. 13).
- The Azumo LCD 2.0 product should never be held/carried/handled by either the LED or LCD FPC.

10. Avoid resting the Azumo LCD 2.0 product on the top layer of the FLP (active area).

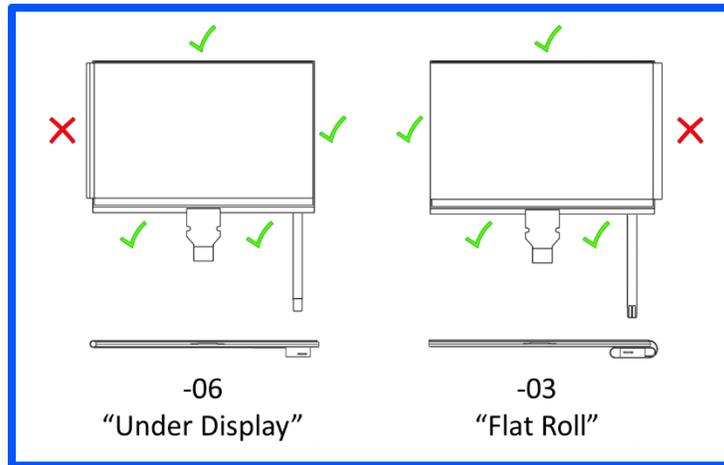


Figure 13. Identification of edges to be used for handling and mounting Azumo LCD 2.0 in final product.

ESD Precautions

1. Standard ESD precautions should be followed when handling Azumo front lit displays.
2. Both the front light LED and the LCD are susceptible to ESD damage if handled improperly.

Handling Precautions for thin film light panel

1. Ensure there is adequate clearance within the intended device for the rolled portion of the front light film. The film is flexible and can be rolled or curved to fit into custom applications, but hard creases or physical damage can reduce optical performance.
2. Avoid creating deep scratches or gouges in the FLP, which can negatively impact brightness and uniformity.

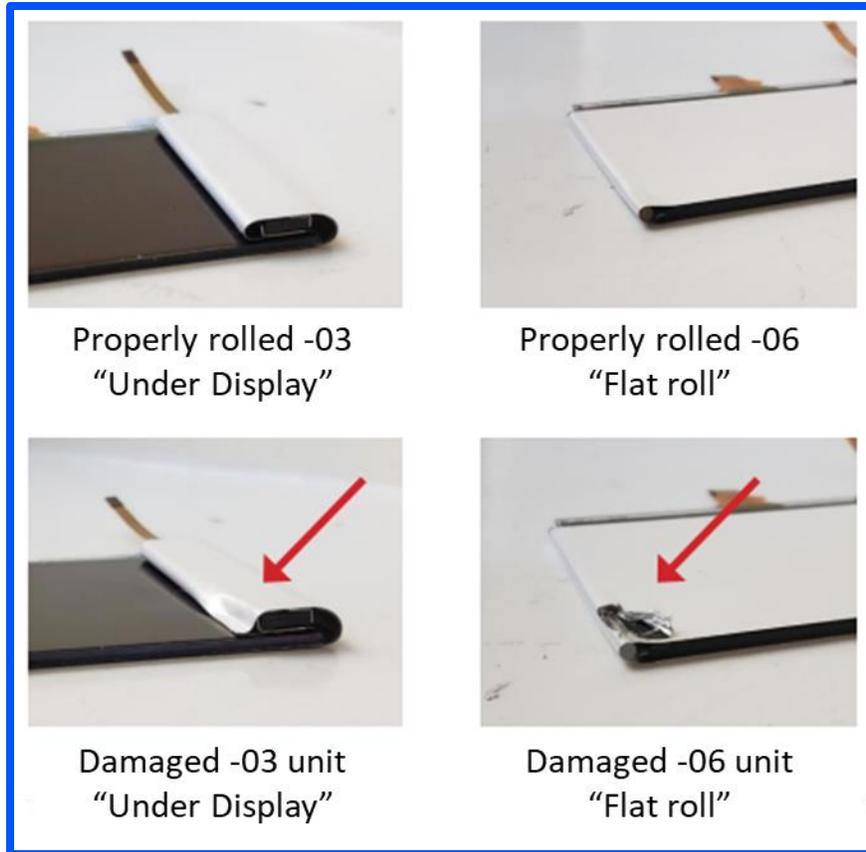


Figure 14. Examples of damage to FLP roll.

Handling Precautions for LED FPC

1. The LED flexible printed circuit (FPC) is a simple flexible circuit with a single LED soldered to its end as shown in Fig. 15. Extreme care should be employed when handling the LED FPC as excessive pulling, bending, or twisting can cause the FPC to become detached from the lightbar.



Figure 15. Azumo LCD 2.0 FLP LED FPC

2. Refer to the Azumo data sheet for LED FPC polarity, max current ratings, and connector options.
3. Avoid twisting the LED FPC in such a way that would strain the LED FPC connection to the lightbar

4. Avoid pulling on the LED FPC in such a way that would strain the LED FPC connection to the lightbar.
5. When designing a connector layout for the LED FPC, avoid routing the LED FPC in such a way that produces strain at the lightbar connection. It is recommended to provide the LED FPC ample strain relief as close to the light bar connection as possible. Refer to Fig. 16.
6. At the insertion or removal of the LED FPC from its connector in the final assembly, do not excessively rotate, twist, tilt, or bend the LED FPC. The attachment of the LED FPC at the FLP light bar is very sensitive and improper handling may cause FLP failure.

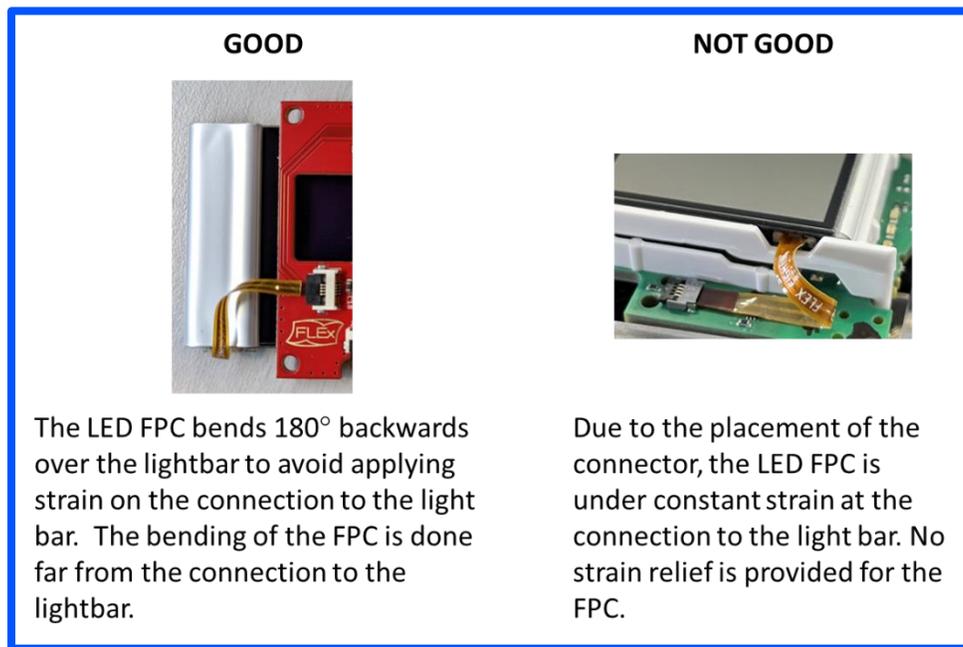


Figure 16. Recommended connector layout and routing for LED FPC.

Other Notes

1. Operation outside specified environmental conditions cannot be guaranteed.
2. Operating outside specified environmental conditions may affect optical performance of Azumo LCD 2.0.
3. LED thermal derating curves should be employed when operating outside specified environmental conditions.
4. Do not operate the LCD panel outside of electrical specification, otherwise, the LCD panel may be damaged.
5. To avoid unintended damage to the front light film, only use blunt tipped tools around LCD panel.
6. To ensure product performance within stated specifications, use product within warranty period.
7. Avoid extended exposure to direct sunlight.
8. Do not expose FLP to oils, water, fluids, epoxies, etc.
9. Do not expose FLP to VOCs.
10. Do not delaminate the FLP from the LCD display panel.
11. Do not adjust the position of the lightbar or any components of the FLP.

12. Do not pull on any part of FLP roll or reorient the FLP film in any way.
13. Disassembling the LCD module will cause permanent damage to the module. Do not disassemble the module. Do not pry components apart.
14. Avoid contact with the active area of the product.
15. Do not rest the product on its face or allow any contact of the face with other objects.
16. To avoid build up of static electricity, the protective liner should be removed slowly.

Final product integration

1. Avoid close proximity of Azumo LCD 2.0 assembly to concentrated heat sources while always adhering to the environmental requirements.
2. Do not bond to lightbar.
3. Do not apply epoxy or any other adhesive to the Azumo LCD 2.0 assembly.
4. Follow the specifications outlined in the LCD display panel manufacturer's data sheet for proper handling of the LCD FPC.
5. Mounting of the Azumo LCD 2.0 product:
 - a. Non "OB" Display Assemblies: Mount the Azumo LCD 2.0 product within its final assembly by providing support along the back of the LCD panel and/or along the hard edges of the LCD panel glass not covered by the FLP, as shown in Fig. 13. Avoid mechanical contact with FLP.
 - b. "OB" Display Assemblies: For "OB" Display Assemblies, mounting can be provided in the same way as for non-"OB" displays. However, since an "OB" display assembly can be optically bonded, the typical mounting method will be through bonding to a cover lens. When bonded to a cover lens, no additional mechanical support would be required.
6. The product should be integrated behind a transparent protective plate (cover glass) to protect the FLP and LCD in the final product. "OB" products can be optically bonded to the protective plate. Non "OB" products should have an air gap that separates the product from the protective plate.
7. Mechanical support of the LCD panel in the final product should be carefully designed to avoid stresses that exceed specifications on glass surface.
8. The Azumo LCD 2.0 product should be installed flat, without twisting or bending.
9. Do not allow the LCD display panel to be contacted with excessive pressure in any direction.

Handling Precautions for Storage

1. Do not stack more than 2 boxes high.
2. Boxes should always be oriented properly as indicated on the outside of the box.
3. Packaging trays should always be oriented 180° from the trays above and below.
4. Do not leave LCD panels in the packaging trays longer than the warranty period.
5. After opening the package, do not leave the LCD panel in direct sun or under strong ultraviolet light. Store in dark place and protect the LCD from direct sunlight or fluorescent light.
6. Store in normal room temperature and humidity as much as possible.
7. Storage in the environment of oxidation or deoxidation gas and the use of such materials as reagent, solvent, adhesive, resin, etc. may cause corrosion and discoloration of Azumo LCD 2.0 products.
8. Always store the Azumo LCD 2.0 products so that it is free from external pressure.

9. The polarizer surface should not come in contact with any other objects. It is advised to store the Azumo LCD 2.0 products in the trays in which they were shipped.
10. Store the display in a clean environment, free from dust, organic solvents and corrosive gases.
11. Avoid storing the Azumo LCD 2.0 product on its face (active area).
12. Do not crash, shake or jolt the Azumo LCD 2.0 assembly.

LCD Display Panel Handling Guide

General Guidelines

1. Handle with care. Dropping or contact against hard objects may cause cracks or chips in the glass. Avoid strong vibration and shock.
2. Special care should be employed when handling the sharp edges of the LCD display panel.
3. Do not scratch the surface of the polarizer. Prevent touching it with any hard material, and from being pushed or rubbed.
4. When handling the LCD display panel use fingerstalls or protective gloves to maintain optimal quality of LCD display panel.
5. Water droplets on the polarizer must be wiped off immediately. Clean condensation or moisture from any source immediately. Sudden temperature changes can cause condensation on the LCD.
6. Do not leave the LCD display panel in direct sun or under ultraviolet light.
7. To clean LCD panel surface, wipe clean with absorbent cotton or soft cloth. If further cleaning is needed, use IPA and wipe clean lightly on surface only.
8. Do not use organic solvents on the LCD panel. Do not directly touch the LCD panel with finger. When the terminals need cleaning, they should be wiped by a soft cloth or cotton swab without directly touching by hand.
9. Avoid contact with oil or any greasy substances.
10. Do not put or attach anything to the LCD panel active area to avoid leaving marks.
11. Do not touch the display with bare hands.
12. Avoid exposure of LCD FPC to light. When mounting the LCD module in the final product, the enclosure should shield the LCD FPC from direct light.
13. Exercise care to minimize corrosion of the LCD FPC. Do not touch LCD FPC with bare hands.
14. Do not put a seal or an adhesive material on the panel surface.
15. Do not use chloroprene rubber in close proximity to the LCD panel. Acetic acid or chlorine compounds should be avoided.
16. The LCD panel is susceptible to mechanical stress. Place the panel on a flat surface to avoid stress caused by twist, bend, etc. When transporting the LCD panels, secure them on a flat tray to avoid mechanical stress.
17. Avoid pressing LCD panel in any direction.
18. Avoid displaying a fixed pattern on the LCD for a long period of time.
19. Follow the correct power sequence while operating. Do not apply an invalid signal. Be sure to turn off the power when connecting or disconnecting the circuit. Avoid excess EMI when operating the LCD.

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20. As this LCD panel is composed of electronic circuits, it is sensitive to electrostatic discharge. Handle with care using caution for the following:
- a. Protect the LCD panel from static electricity.
 - b. Since this module uses CMOS LSI, give the same careful attention to the ESD as you would for an ordinary CMOS IC.
 - c. Any unused input terminal should be connected to Vdd or Vss. Do not input any signals before power is turned on, and ground your body, work/assembly area, and assembly equipment to protect against static electricity.
 - d. Operators must wear anti-static clothing to prevent electrostatic charge up to and discharge from human body. Operators should wear ground straps.
 - e. Process equipment such as conveyors, soldering iron, working bench, and containers may generate electrostatic charge up and discharge. Equipment must be grounded through 100Mohms resistance. Use ion blower.
 - i. When soldering the terminal of the LCD module, make sure the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach the LCD module, the screwdriver should be of ground potentiality.
 - f. To reduce the generation of static electricity, be careful that the air in the working environment is not too dry. (A relative humidity of 50-60% is recommended).

Handling Precautions for LCD FPC

1. Refer to LCD display panel manufacturer's data sheet for LCD FPC minimum bend radius as well as bending direction and cycle restrictions.
2. At the insertion or removal of the LCD FPC from its connector in the final assembly, be sure not to excessively rotate, tilt, or bend the LCD FPC. The traces on the LCD FPC are very sensitive and improper handling may cause LCD failure.

9. Packaging Specification

General Specifications

12 display assemblies / tray

(10 [populated] + 1 [empty]) trays / folded packing sleeve

2 folded packing sleeves / carton

Total 120 displays / carton

Tray Dimensions (W x L x H): 360.05mm x 468.68mm x 14mm [14.17" x 18.45" x 0.55"]

Carton Dimensions (W x L x H): 406.4mm x 508mm x 254mm [20" x 16" x 10"]

WARNING: Every other tray should be rotated 180 ° (see Figure 17). The corners of appropriately stacked trays should alternate from a convex to concave shape every tray, as shown. A stack of trays will be significantly shorter if the trays are not stacked appropriately. Failure to follow this procedure may result in damage to products.

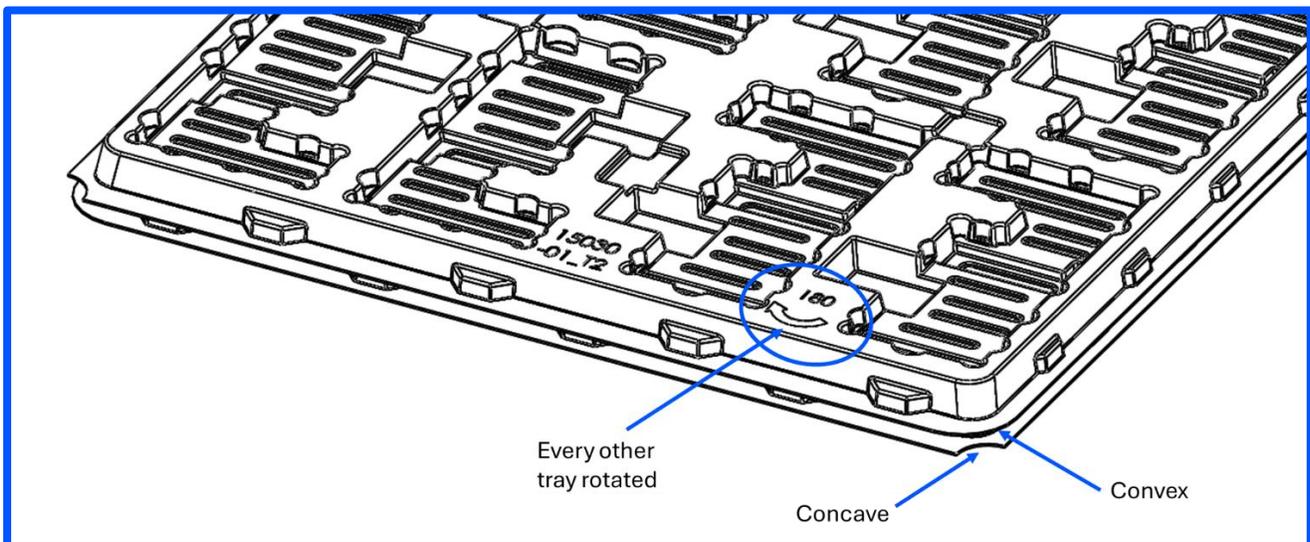


Figure 17. Required rotation of every other tray to avoid damage to products.

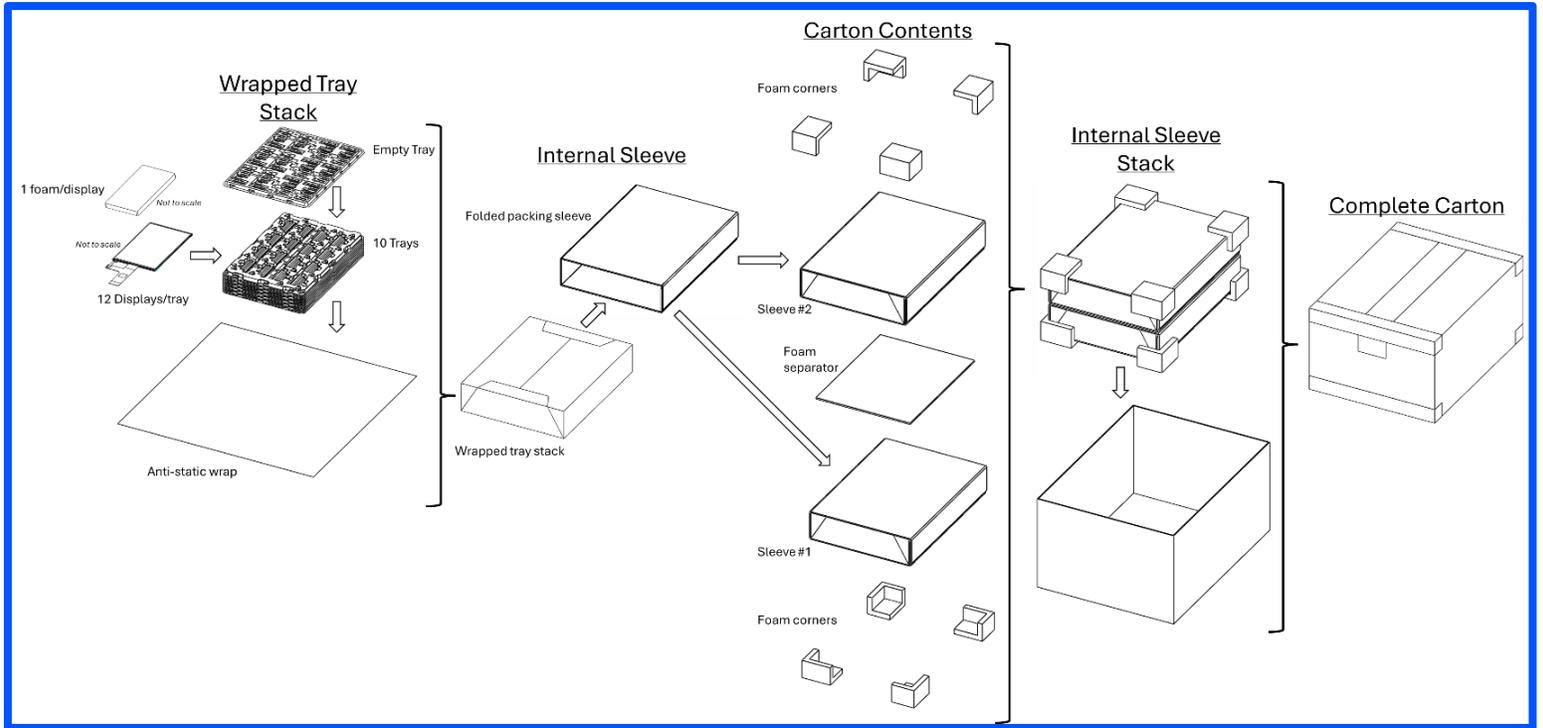


Figure 18. Packaging condition for 14793-06.

10. Product Return (RMA) Policy

When returning product to Azumo, the packaging of the product is particularly important to ensure the product arrives to Azumo in the same condition that it left the customer's facility. The packaging is specially designed to protect the product from damage encountered in transit, such as foreign particulates, impressions, or electrostatic shock. Please follow the listed shipping and packaging instructions to streamline the returns and inspection processes.

- All units are to have their original protective liner in place with the pull tab attached. The flexible printed circuit (FPC) of both the display and the front light should lay flat and have no curvature. Any unit that is attached to a customer housing or assembly will not be accepted for return. Refer to Section 8, Product Handling Guidelines.
- All products should be returned in the original provided tray in the correct orientation with an empty tray on top of the stack. Any products that are returned in a modified tray will not be accepted for return. Refer to Section 9, Packaging Specification.
- Packaging trays need to be oriented 180° in relation to the tray below. Prior to shipping, verify correct orientation via alternating convex/concave corners of the packaging trays. Refer to Section 9, Packaging Specification.
- Filled product trays should be stacked a maximum of 10 trays high.
- Stacked product trays should be wrapped in anti-static film and housed in a cardboard sleeve.
- To minimize movement during shipping, cardboard or foam corners should be used around the sleeve when placed in shipping carton.
- Any products which have been modified or damaged by the customer will not be accepted for return.
- When returning product to Azumo, include the Return Material Authorization (RMA) provided by Azumo.
- Refer to the RMA form provided by Azumo for details regarding shipping address and contact information for returned product

Azumo appreciates your business and will immediately notify you of the status of the return once received and inspected. If you have any questions, please contact your Azumo sales representative or Azumo's Quality Manager.

11. Product Warranty

Link: <https://www.azumotech.com/terms-conditions/>