Densitron

DM-169GN-MPGR01
PRODUCT SPECIFICATION

Version 1.0
Mar 23, 2021

Customer's Approval	
Signature	*Date*

Prepared by *Ryan Lin*
Approved by *Odin*

Densitron

Revision History

VERSION	DATE	DESCRIPTION	AUTHOR
1.0	Mar 23, 2021	Release official spec for MP	Ryan Lin

Legal Notice

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Table of Contents

1. General Description

1.1 Introduction

DM-169GN-MPGR01 TFT-LCD Monitor has been designed to drive up to 1920x624 @60Hz. Which is a high quality TFT-LCD display solution and support 10 points touch (PCAP). The 16.9” touch monitor is with 10 points PCAP touch and FHD (1920x624) resolution LCD Panel. The power shall be 12V DC power input.

1.2 Main Features

The 16.9” TFT-LCD monitor

Item	Contents
Display Type	TFT LCD
Screen Size	16.9” Diagonal
Display Format	1920 x 624 pixels
No. of Colour	16.7M (8-bit RGB)
Brightness/Backlight	700 nits (cd/m^2) (Typ.), 550 nits (cd/m^2) (min.)
Wide View Angle	178°/178° degree (Typ.)
Contrast Ration	800 (Typ.)
System I/O	DP*1, DVI*1, VGA*1, USB Type B*1 for touch
System OSD	Menu, Right, Power, Left, Auto
Input Voltage	DC In, 12V DC
Input Connector	DC Jack, Φ2.5
Power Consumption	<30 W
Power Management	Comply with the DPMS
Overall Dimensions	482.72 (W) x 176.1 (H) x48.13 (D) mm
Operating Temperature	0°C ~ +40°C
Storage Temperature	-10°C ~ +50°C (-4 ~ +122° F)
Humidity	20 ~ 80% @ 40° C, non-condensing
MTBF	50,000 hrs (typ.), 30000 hrs (Min.)
AD Board	GL122, FW: DS-169BC-01 AD Code GL122_120882020_V1.0-03

Item	Contents
DDC/CI	Support
Touch	DS-171_ILI2521_V7002_0002_20200925
Regulation	N/A
(Safety, EMC)	EN 55032:2015/AC:2016, Class A, EN 55035:2010+A1:2015 EN62368-1:2014
ROHS	Compliant to RoHS 2.0

1.3 Touch Features

Item	Contents
Touch Type	PCAP
COB Driver IC	ILItek 2521
Size and Dimension	437.92 mm x 161.95 mm
Touch Structure	Cover Glass + Film + Film
Total Thickness	2.0 mm
Cover Glass	1.8 mm
Touch Mode	Multi touch points (up to 10 fingers)
Report rate(points/sec)	＞100 Hz/ 10 fingers
Touch Accuracy	±1.5mm/VA: ±2.0mm
Interface	USB Type B
Touch Interface	USB Type B
Communication	USB HID Digitizer
OS Support	Windows 7/Android/Linux
F/W Version	DS-171_ILI2521_V7002_0002_20200925
USB VID/PID	VID: 0x0001 & PID: 0x222A
Treatment (Clear, Anti-Glare, Anti Smudge)	AG: Gloss 85±10
Light Transmission	85% (Min.)

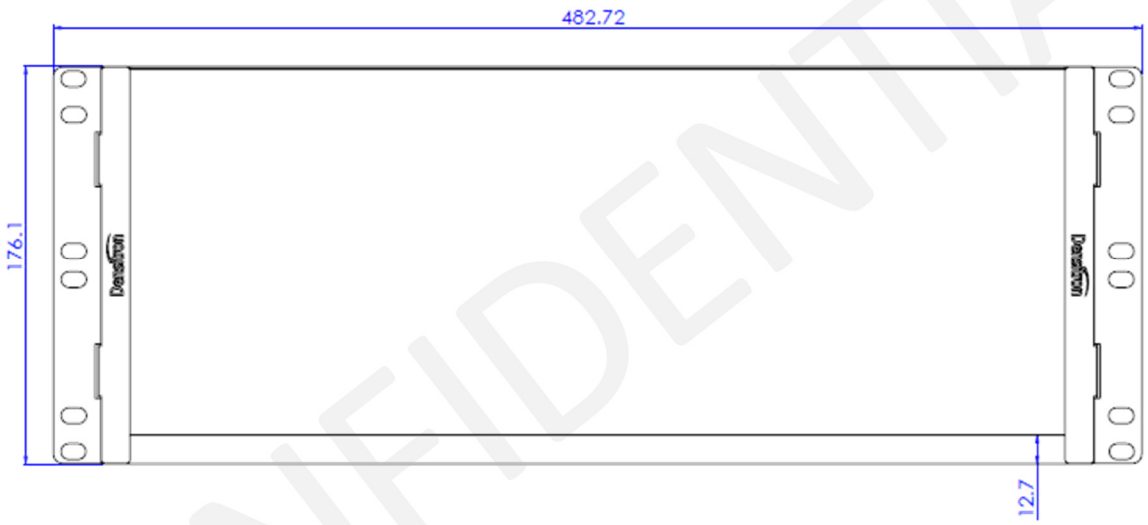
1.4 Key Component

Order Part No.	Description
DM-169GN-MPGR01	4 RU display, 1920*624, 700nits, GL122, tape bonding, PCAP, ILI 2521, closed frame

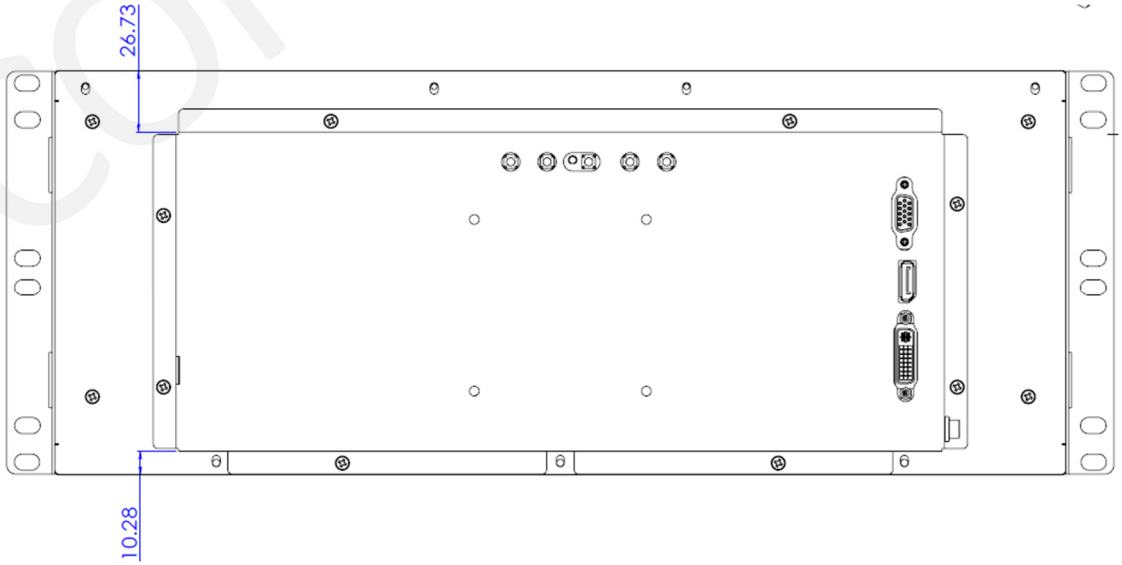
2. Mechanical Specification

2.1 Mechanical Drawing

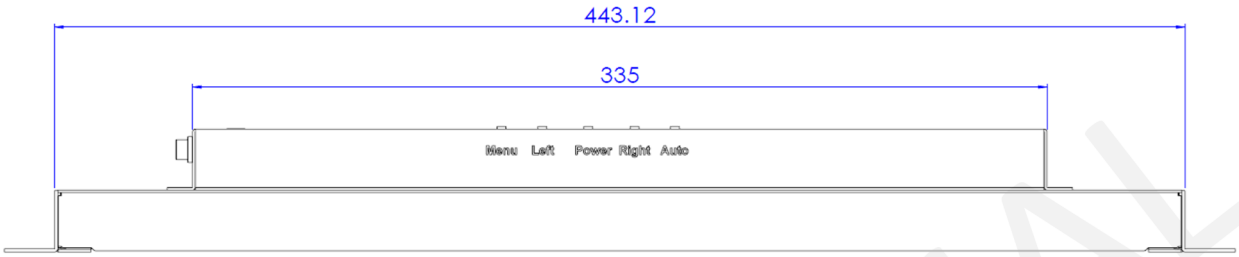
Front View

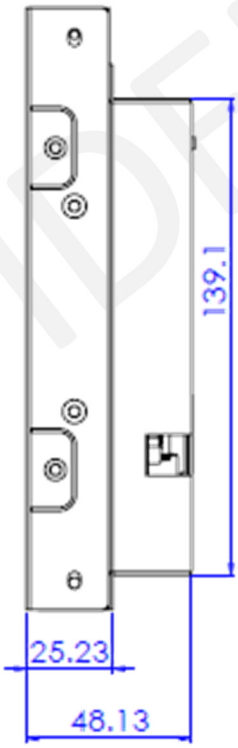


Rear View



Side View Top





2.2 Mechanical Characteristics

Item	Characteristic	Unit
Display Format	1920 x 624	Dots
Overall Dimensions	482.72 (W) x 176.1 (H) x 48.13 (D)	mm
Viewing Area	413 (W) x 137 (H)	mm
Active Area	408.96 (W) x 133 (H)	mm
Weight	3.3	kg
Mounting	User Hole for M4 Screw, VESA 75 * 75	
IK	6	

3. Electrical Specification

3.1 Power

Condition	Max Power Consumption (W)
Monitor on with Max Brightness	< 30 Watt
Off Mode	< 1 Watt

3.2 LCD Integration Tests

3.2.1 LCD Panel Power Sequence Test

Verify that the power-on sequence of the LCD Power, LCD Clock, and Backlight On signals meets the LCD Panel specification (If panel SPEC defines more power sequence timing, need to follow it).

3.2.2 LCD Panel V_{DD} Inrush Current

Verify that the panel V_{DD} Inrush Current meets the LCD Panel specification at cold start.

3.2.3 LED Backlight Waveform

For backlight current and voltage waveform measurements, use the multimeter, oscilloscope. Perform the following

setup before making any measurements:

-Let the LED backlight warm up for 20 minutes.

-Turn on and set the oscilloscope to be DC-coupled.

-Set the oscilloscope bandwidth to 20MHz.

-Set the oscilloscope to measure Vrms, Vmin, and Vmax. The Vrms measurement should be gated for waveform cycles (preferably using vertical bars), not for the oscilloscope window or oscilloscope sample.

-Set the multimeter to the m Ampere coupled.

3.2.3.1 Measure each of the monitor's driving board's current outputs. (series connection)

3.2.3.2 Measure each of the monitor's driving board voltage outputs.

3.2.3.3 Measure driving board power Mosfet D-S voltage.

3.2.3.4 Measure the most critical component's temperature on driving board, the temperature must be less than 80% max operator temperature.

3.2.4 AD Board PWM Test

Measure the PWM frequency and duty cycle range of AD board.

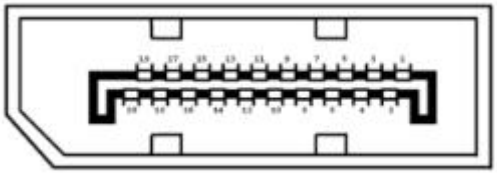
3.3 Interface Connectors

3.3.1 Power Connector

The AC converter shall have an IEC320 type male power receptacle for connection to AC mains power.

3.3.2 Video Signal Connector

Display Port (1.2)



Location J4 – Display Port CONNECTOR

Pin Assign and Definition

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
1	LANE3-	8	GND	15	AUX_CHP
2	GND	9	LANE1+	16	DP DET
3	LANE3+	10	LANE0-	17	AUX_CHN
4	LANE2-	11	GND	18	HPD
5	GND	12	LANE0+	19	RETURN
6	LANE2+	13	GND	20	DP_3.3V
7	LANE1-	14	GND	-	-

DVI-I (Dual Link)

Location J3 – DVI-I CONNECTOR

Pin Assign and Definition

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
1	DATA2-	9	DATA1-	17	DATA0-
2	DATA2+	10	DATA1+	18	DATA0+
3	GND	11	GND	19	GND
4	NC	12	NC	20	NC
5	NC	13	NC	21	NC
6	DDC_SCL	14	DVI5V	22	GND
7	DDC_SDA	15	DVI DET	23	CLK+
8	NC	16	DVI HPD	24	CLK-

3.3.3 Applicable Graphic Mode Support Resolution Timing Table

Item	Description	H-Freq. (KHz)	V-Freq. (Hz)
1	1920 x 624	37.8	60

3.3.4 Color Coordinates

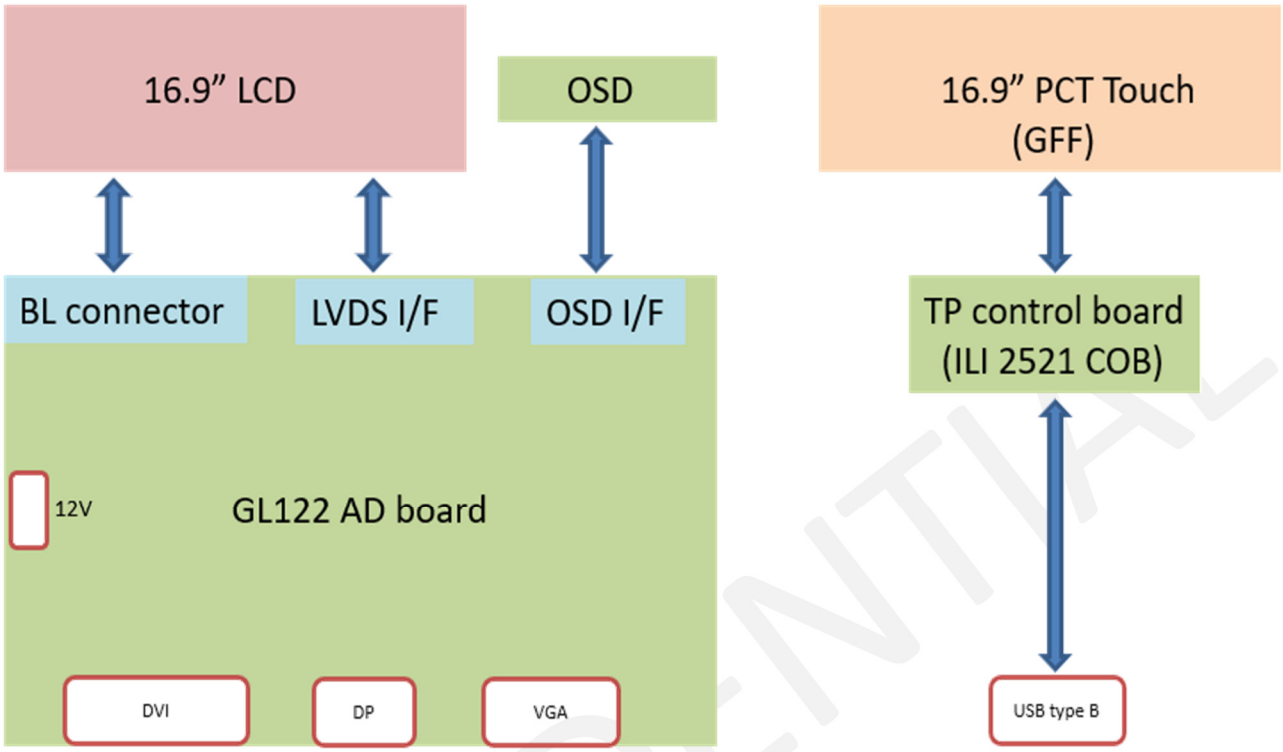
Color/Chromaticity	Specification
Off Mode	x:0.279, y:0.315 (±0.05), Panel Native
Red Color Coordinates	Depend on Panel Spec (R/G/B) (only record value, no criterial)
Green Color Coordinates	
Blue Color Coordinates	
Gamma Curve	Panel Native

This product does not implement color calibration.

3.3.5 EDID Data

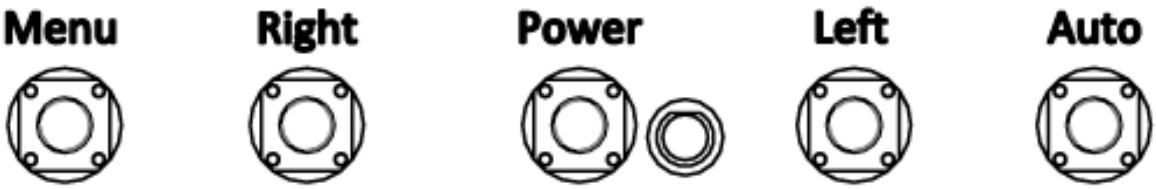
Color/Chromaticity	Specification
ID Manufacturer name	DEN
ID Product code	DEN169A
ID Serial number	00000001 (do not care)
Week of Manufacture	Mfg Week according to production date of monitors
Year of Manufacture	Mfg Year according to production date of monitors
Display product name	DM169GN-DEN for touch model

3.4 Block Diagram



4. OSD Function

4.1 Key Button Function



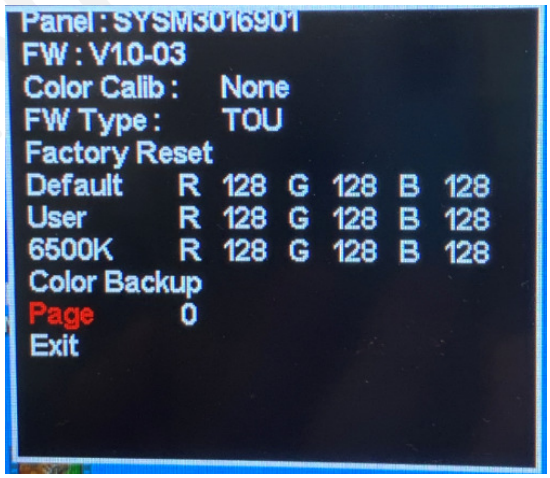
Number	Function	Description
1	Menu	Activates OSD main menu
2	Right (Down)	Right / Down arrow
3	Power	Power On / Off
4	Left (Up)	Left / Up arrow
5	Auto/Exit	Exit / Return Key
6	LED	Blue: ON Red: OFF

4.2 OSD Structure (OSD Menu)

Main Menu	Sub-Menu	Range	Default	Note
PIC TURE	Brightness	0~100	100	-
	Contrast	0~100	50	-
COLOR Temp.	Gamma	Off, 2.4, 2.2, 2.0, 1.8	2.2	-
	Color Temp	Off, User, 6500K	User	-
Rotate	Rotate State	Enable	-	-
		Disable	-	Default: Disable
Exit	-	-	-	-

4.3 Factory Menu Structure

Start factory menu: Press Left + Auto 5 sec

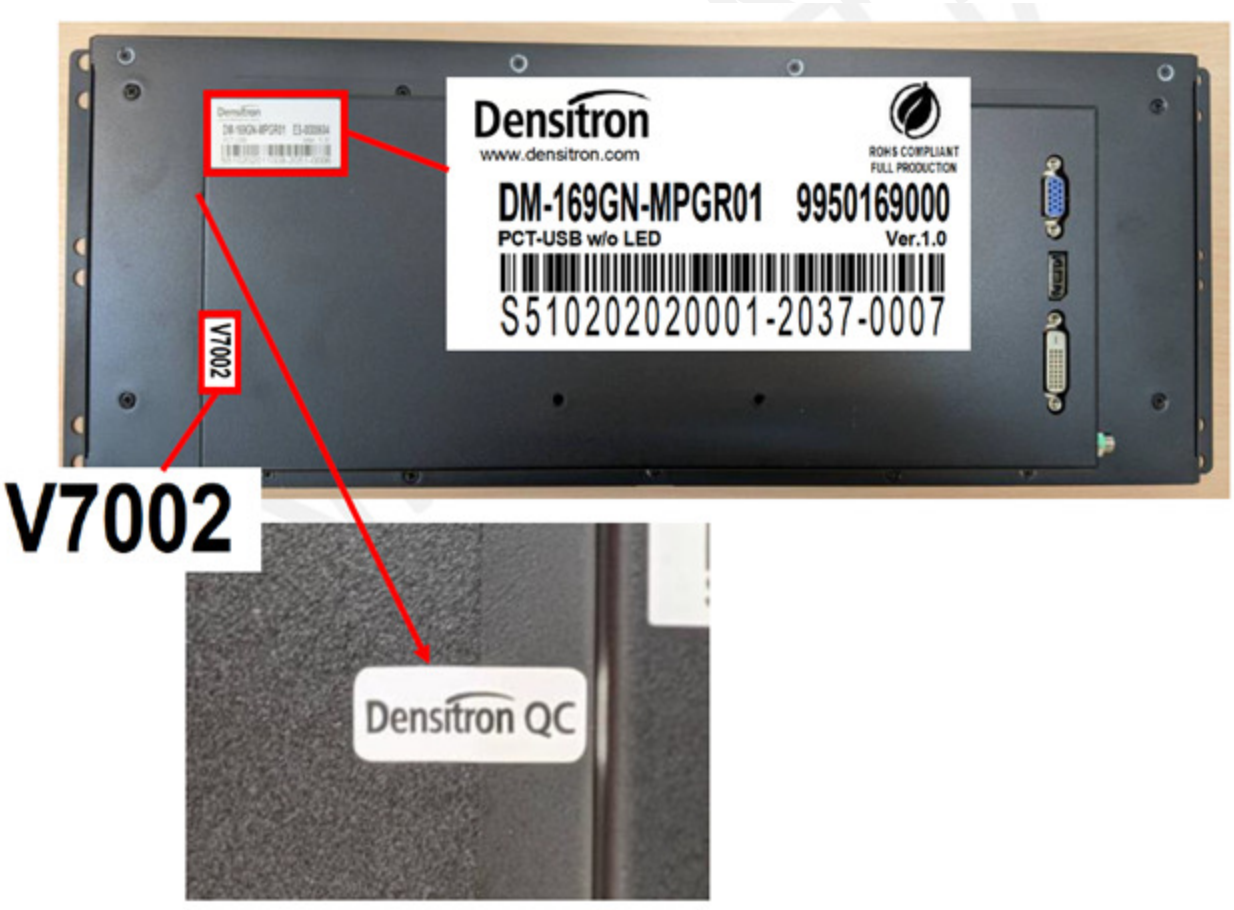


5. System (Monitor) Dimension

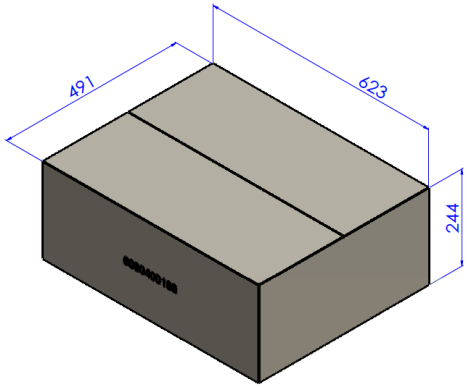
Monitor Only (Set Size)			Monitor with Carton (Carton Size), 2 de		
Length	482.72	mm	Length	618	mm
Width	48.13	mm	Width	230	mm
Height	176.1	mm	Height	485	mm
Weight	3.3	KG	Weight	9.5	KG

6. Packaging

6.1 Label



6.2 Carton

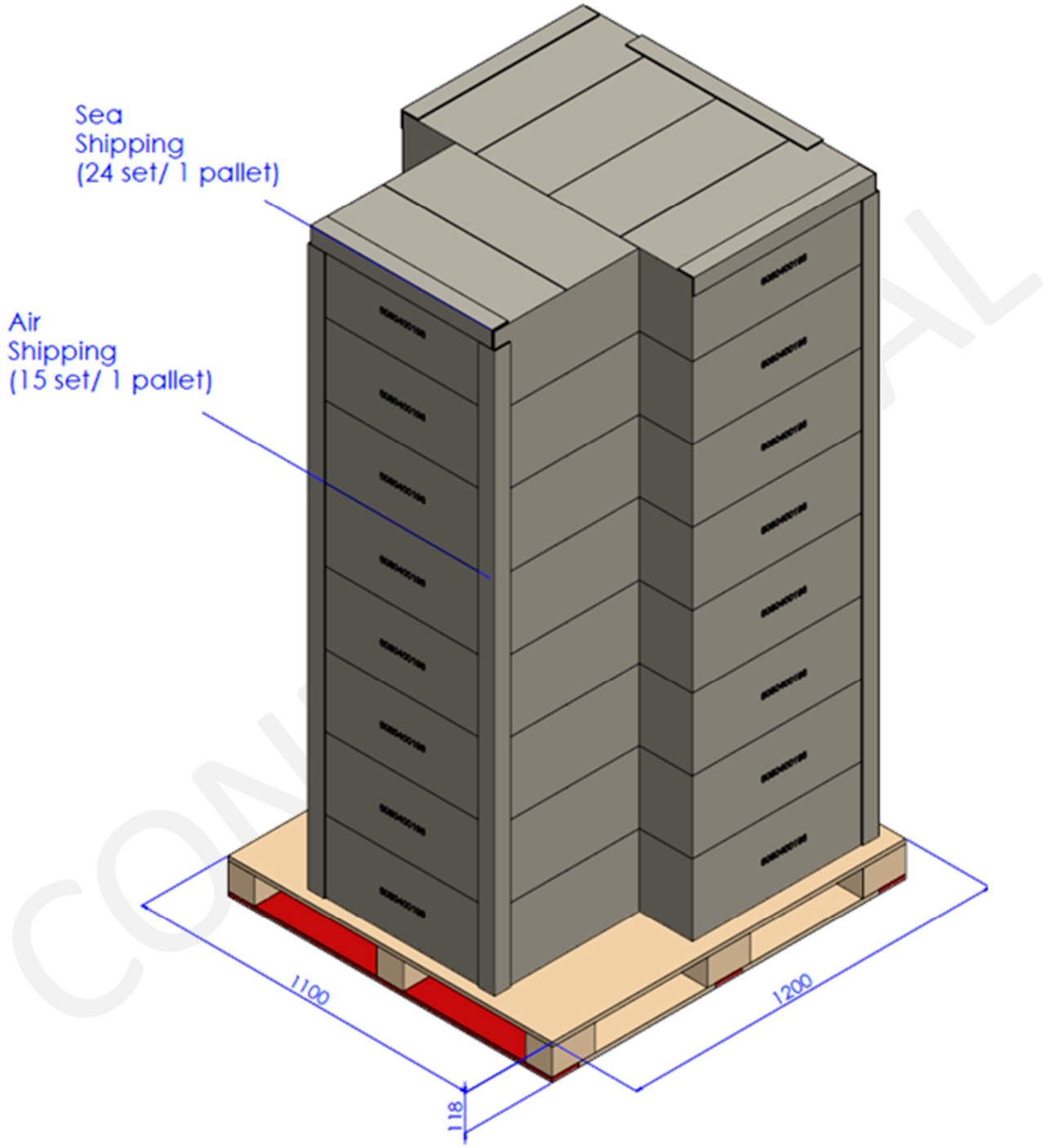


Carton

Accessary box

P/N	Quantity	Component
3325639645	1	DVI to HDMI cable
7211500017	1	60 W power supplier
3325639644	1	USB2.0-A(M) - USB2.0-B(M) cable

6.3 Pallet Loading



7. Environmental Specification

7.1 Operating and Non-Operating Temperature Ranges

Portrait and Landscape Mode

Item	Remark
Operating Temperature (Independent of altitude)	0°C to 40°C
Non-Operating Temperature (Independent of altitude)	-10°C to 50°C

Table Top Mode

Item	Remark
Operating Temperature (Independent of altitude)	0°C to 40°C
Non-Operating Temperature (Independent of altitude)	-10°C to 50°C

7.2 Humidity

Item	Remark
Operating (Non-Condensing)	20% to 80% RH non-condensing
Non-Operating (38.7Deg maximum wet bulb temperature)	10% to 90% RH non-condensing

7.3 Unpackaged Shock and Vibration

Operational and Non-Operational

Item	Remark
Sinusoidal Sweep	one sweep from 10Hz to 500Hz, 0.5 octave/minute sweep rate, 0.25G
Sinusoidal Dwell	0.25G for 30 minutes at the touchscreen center's most resonant frequency detected from the Sinusoidal Sweep
Random Vibration	0.004 G2/Hz, 10 to 500Hz
Half-sine Wave Shock	30G-peak acceleration for 2 milliseconds duration, in both + and – directions.

7.4 ISTA-2A (Packaged Drop and Vibration) Testing

Perform ISTA-2A Random Vibration testing and Drop testing

8. Quality Assurance Specification

8.1 Conformity

The performance, function and reliability of the shipped products conform to the Product Specification.

8.2 Reliability

The MTBF of the monitor should be 30,000 hours. The MTBF shall be calculated according to demonstration. The calculation shall be performed for a primary test/preset mode under ambient temperature of 25℃.

8.3 Agency Approvals

This unit should meet following agency requirement.

8.3.1 Safety

EN62368-1:2014

8.3.2 EMC

EN 55032:2015/AC:2016, Class A,

EN 55035:2010+A1:2015

8.3.3 IIS

1. Purpose: General inspection criteria for gaming monitor finished product.
2. Exceptions:
   2.1 The inspection needs to follow the requirement of SOP and SIP, if there's any item against or not include in this document with SOP and SIP, please follow SOP and SIP as the primary inspection rule.
   2.2 If there's specific product specification for the model, please refer to product specification as the primary inspection standard. Only if there's item that doesn't specify in product specification then refer to this document.
3. Sample plan:
   The sampling plan will follow MIL STD 105E with AQL 0.65 as shown in the following Figure.

表 11-5 正常檢驗之主抽樣表——單次抽樣計畫 (MIL STD 105E，表 II -A)

樣本大小代字	樣本大小	AQL（正常檢驗）																															
		0.010		0.015		0.025		0.040		0.065		0.10		0.15		0.25		0.40		0.65		1.0		1.5		2.5		4.0		6.5		10		15	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
B	3	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
C	5	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
D	8	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
E	13	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
F	20	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
G	32	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
H	50	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
J	80	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
K	125	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
L	200	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
M	315	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
N	500	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
P	800	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
Q	1250	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
R	2000	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	

樣本大小代字	樣本大小	25		40		65		100		150		250		400		650		1000	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
B	3	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
C	5	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
D	8	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
E	13	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
F	20	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
G	32	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
H	50	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
J	80	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
K	125	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
L	200	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
M	315	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
N	500	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
P	800	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
Q	1250	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	
R	2000	⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	

⇩ = 用箭頭下的第一抽樣法，若樣本大小等於或超過批量，則做 100% 檢驗。
⇧ = 用箭頭上的第一個抽樣法。
Ac = 允收數。
Re = 拒收數。

8.3.4 Inspection Condition

Customer's test & measurement are required to be conducted under the following conditions:

Illumination: 300~700Lux

Viewing Distance: 45cm to the inspection item and last for 10 seconds

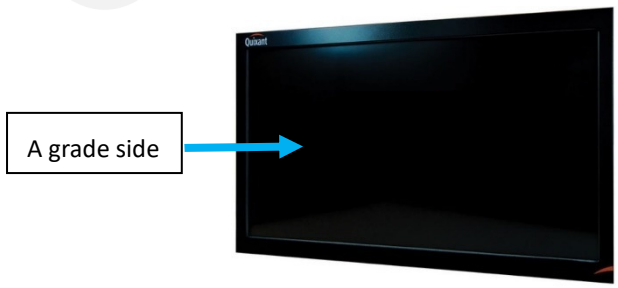
Inspection Angle:

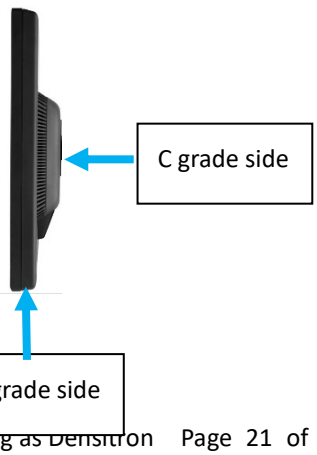
Inclination	Angle
Place the product in hands in normal inclination of ≧30°	Visual inspection in 90° angle

Finger glove (or finger cover) must be worn by the inspector.

Inspection table or jig must be anti-electrostatic.

8.3.5 Inspection Area





A grade side: Front side of the monitor.
B grade side: Side face of the monitor.
C grade side: Back side of the monitor.

8.3.6 Inspection Item (Apply for A grade Side)

The inspection needs to proceed while running the color program for the viewing area. (Black, white, red, green, blue)

<table>
<tr><th>No</th><th>Item</th><th colspan="3">Criteria</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Bright and Dark Dots</td><td>Bright Dots≦2</td><td colspan="2" rowspan="2">Total dot defect of bright and dark ≦ 5</td></tr>
<tr><td>Dark Dots ≦5</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Scratch / Particle / Bubble /Dent</td><td>Linear</td><td>Over L 15mm*W 2 mm is not allowed.</td><td rowspan="3">Total linear and dot defect ≦7</td></tr>
<tr><td>Dot</td><td>Over 5mm is not allowed
Smaller than 0.15mm, Ignore</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Foreign Objects</td><td>Linear</td><td>Over L 15mm*W 2mm is not allowed.</td></tr>
<tr><td>Dot</td><td>Over 1.0mm is not allowed.
Smaller than 0.4mm, Ignore</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Panel Edge</td><td>Edge & Corner Chipping</td><td colspan="2">Corner: Unacceptable
Edge:
X≦1.0, Y≦0.3, Z≦0.5 Acceptable
1.0≦X≦2.0, 0.3≦Y≦0.8, 0.5≦Z≦1, Acceptable if N ≦ 6</td></tr>
<tr><td>Plate Progressive Crack Defect</td><td colspan="2">Not allowed</td></tr>
</table>

8.3.7 Mechanical Parts Inspection

8.3.7.1 Inspection Area

Back Side of the Monitor

8.3.7.2 Inspection Items

No	Item	Criteria	
		B Grade Area	C Grade Area
1	Dent	Not Allowed	
2	Scratch (Painting Surface)	L 15 mm*W 1 mm, N≦5, D>25mm Exposed base material is not allowed.	Exposed base material is not allowed.
3	Rusty	Cutting edge: Over 1/3 area is not allowed. Other area is not allowed.	
4	Text Printing	Incomplete printing or wrong text is not allowed	
5	Burr or Rough Surface	If possible, to cut the hand during handling, it is not allowed.	
6	Deformation	No allowed	
7	Assembly	Label content must be correct as SOP required.	
		Sponge needs to be installed correctly without tilt up, and shedding.	
		Screw needs to be installed correctly, and no missing.	
		Mechanical hook needs to be installed correctly.	

8.4 Dealing with Customer Complaints

8.4.1 Non-conforming Analysis

Purchaser should supply Densitron with detailed data of non-conforming sample.

After accepting it, Densitron should complete the analysis in two weeks from receiving the sample.
If the analysis cannot be completed on time, Densitron must inform the purchaser.

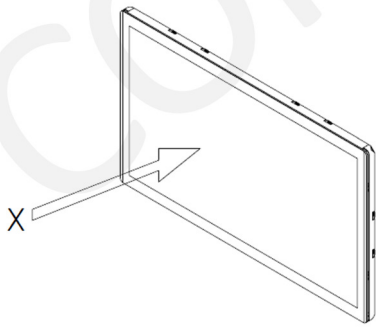
8.4.2 Handling of Non-conforming Displays

If any non-conforming displays are found during customer acceptance inspection which Densitron is clearly responsible for, return them to Densitron.
Both Densitron and customer should analyse the reason and discuss the handling of non-conforming displays when the reason is not clear.
Equally, both sides should discuss and come to agreement for issues pertaining to modification of Densitron quality assurance standard.

9. Handling Precautions

9.1 Handling Precautions

1) Since the display panel is being made of glass, do not apply mechanical impacts such us dropping from a high position.
2) If the display panel is broken by some accident and the internal organic substance leaks out, be careful not to inhale nor lick the organic substance.
3) If the liquid crystal touches your skin or clothes, wash it off immediately using soap and plenty of water
4) If pressure is applied to the display surface or its neighbourhood of the display module, the cell structure may be damaged and be careful not to apply pressure to these sections.
5) The polarizer covering the surface of the display module is soft and easily scratched. Please be careful when handling the display module.
6) When the surface of the polarizer of the display module has soil, clean the surface. It takes advantage of by using following adhesion tape.
   a. Scotch Mending Tape No. 810 or an equivalent
   b. Never try to breathe upon the soiled surface nor wipe the surface using cloth containing solvent such as ethyl alcohol, since the surface of the polarizer will become cloudy.
   c. Also, pay attention that the following liquid and solvent may spoil the polarizer:
      - Water
      - Ketone
      - Aromatic Solvents
7) Hold the display module very carefully when placing it into the system housing. Do not apply excessive stress or pressure to display module. And, do not over bend the film with electrode pattern layouts. These stresses will influence the display performance. Also, secure sufficient rigidity for the outer cases.



8) Do not apply stress to the LSI chips and the surrounding molded sections.
9) Do not disassemble nor modify the display module.
10) Do not apply input signals while the logic power is off.
11) Pay sufficient attention to the working environments when handing display modules to prevent occurrence of element breakage accidents by static electricity.

a. Be sure to make human body grounding when handling display modules.
b. Be sure to ground tools to use or assembly such as soldering irons.
c. To suppress generation of static electricity, avoid carrying out assembly work under dry environments.
d. Protective film is being applied to the surface of the display panel of the display module. Be careful since static electricity may be generated when exfoliating the protective film.

12) Protection film is being applied to the surface of the display panel and removes the protection film before assembling it. If the display module has been stored for a long period of time, residue adhesive material of the protection film may remain on the surface of the display panel after removed of the film. In such case, remove the residue material by the method introduced in the above Section 5).
13) If electric current is applied when the display module is being dewed or when it is placed under high humidity environments, the electrodes may be corroded and be careful to avoid the above.

9.2 Storage Precautions

1) When storing display modules, put them in static electricity preventive bags avoiding exposure to direct sun light nor to lights of fluorescent lamps, etc. and, also, avoiding high temperature and high humidity environments or low temperature (less than 0°C) environments. (We recommend you to store these modules in the packaged state when they were shipped from Densitron) At that time, be careful not to let water drops adhere to the packages or bags nor let dewing occur with them.
2) If electric current is applied when water drops are adhering to the surface of the display module, when the display module is being dewed or when it is placed under high humidity environments, the electrodes may be corroded and be careful about the above.

9.3 Designing Precautions

1) The absolute maximum ratings are the ratings which cannot be exceeded for display module, and if these values are exceeded, panel damage may be happen.
2) To prevent occurrence of malfunctioning by noise, pay attention to satisfy the VIL and VIH specifications and, at the same time, to make the signal line cable as short as possible.
3) We recommend you to install excess current preventive unit (fuses, etc.) to the power circuit (VDD). (Recommend value: 0.5A)
4) Pay sufficient attention to avoid occurrence of mutual noise interference with the neighbouring devices.
5) As for EMI, take necessary measures on the equipment side basically.
6) When fastening the display module, fasten the external plastic housing section.
7) If power supply to the display module is forcibly shut down by such errors as taking out the main battery while the display panel is in operation, we cannot guarantee the quality of this display module.

9.4 Operation Precautions

1) It is indispensable to drive the display within the specified voltage limit since excessive voltage shortens its life.
2) Direct current causes an electrochemical reaction with remarkable deterioration of the display quality. Give careful consideration to prevent direct current during ON/OFF timing and during operation.
3) Response time is extremely delayed at temperatures lower than the operating temperature range while, at high temperatures, displays become dark. However, this phenomenon is reversible and does not mean a malfunction or a display that has been permanently damaged.
4) To protect display modules from performance drops by static electricity rapture, etc., do not touch the following sections whenever possible while handling the display modules.
   a. Pins and electrodes
   b. Pattern layouts such as the FPC
5) When the driver is being exposed (COG), semiconductor elements change their characteristics when light is radiated according to the principle of the solar battery. Consequently, if the driver is exposed to light, malfunctioning may occur.
   a. Design the product and installation method so that the driver may be shielded from light in actual usage.
   b. Design the product and installation method so that the driver may be shielded from light during the inspection processes.
6) Although the display module stores the operation state data by the commands and the indication data, when excessive external noise, etc. enters into the module, the internal status may be changed. It therefore is necessary to take appropriate measures to suppress noise generation or to protect from influences of noise on the system design.
7) We recommend you to construct its software to make periodical refreshment of the operation statuses (re-setting of the commands and re-transference of the display data) to cope with catastrophic noise.

9.5 Other Precautions

1) Request the qualified companies to handle industrial wastes when disposing of the display modules. Or, when burning them, be sure to observe the environmental and hygienic laws and regulations.

Densitron

10. Customer Approval Sheet

DS-169BC-01

OPN: DM-169GN-MPGR01

Monitor Specification

Customer Approved by		**Signature**	
Release Version	1.0	**Release Date**	2021/4/15

