Densitron

16.3” HMI

Product Specification

Customer			
Product Number	**DM-163GN-MPGR06 (8710000004)**		
Customer Part Number			
Customer Approval		**Date:**	

Internal Approvals		
Product Mgr	ME. Eng	Electr. Eng
Bazile Peter	Aesop Hung	Evan Huang
Date: May 12, 2020	**Date: May 12, 2020**	**Date: May 12, 2020**

Densitron

Revision Record

Rev.	Date	Page	Chapt.	Comment	ECR no.
0.1	Jan 16, 2020	-	-	Preliminary	-
0.2	Feb 26, 2020			Brightness info changed	20200226
0.3	Apr 27, 2020	10, 17~19	3.2, 7	Touch Controller Change (ILI2302 -> ILI2510)	20200420

Densitron

Table of Contents

Densitron

1. General Description

1.1 Introduction

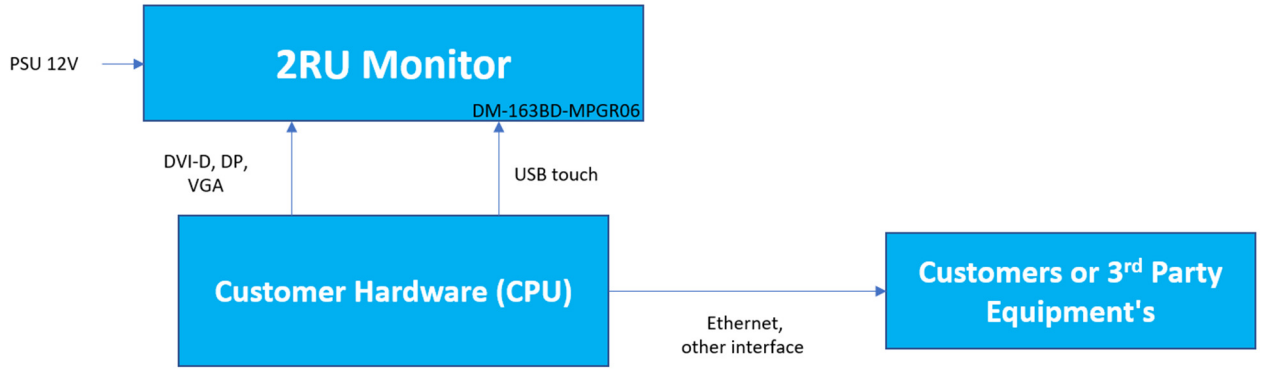
2U 19” Rack mount ready TFT display with capacitive touch for Broadcast applications. It can be used for signal and picture monitoring, or a control system with the help of multi-touch PCT, or a combination of both. Densitron provides a 16.3” high resolution (1920 x 285display, which allows multiple video picture monitor and audio level displays – side-by-side. Projected Capacitive Touch functionality allows the device to be interactive Common signal interfaces, such as: Display port, DVI and VGA are used for video signals; and USB for touch screen

Product Features

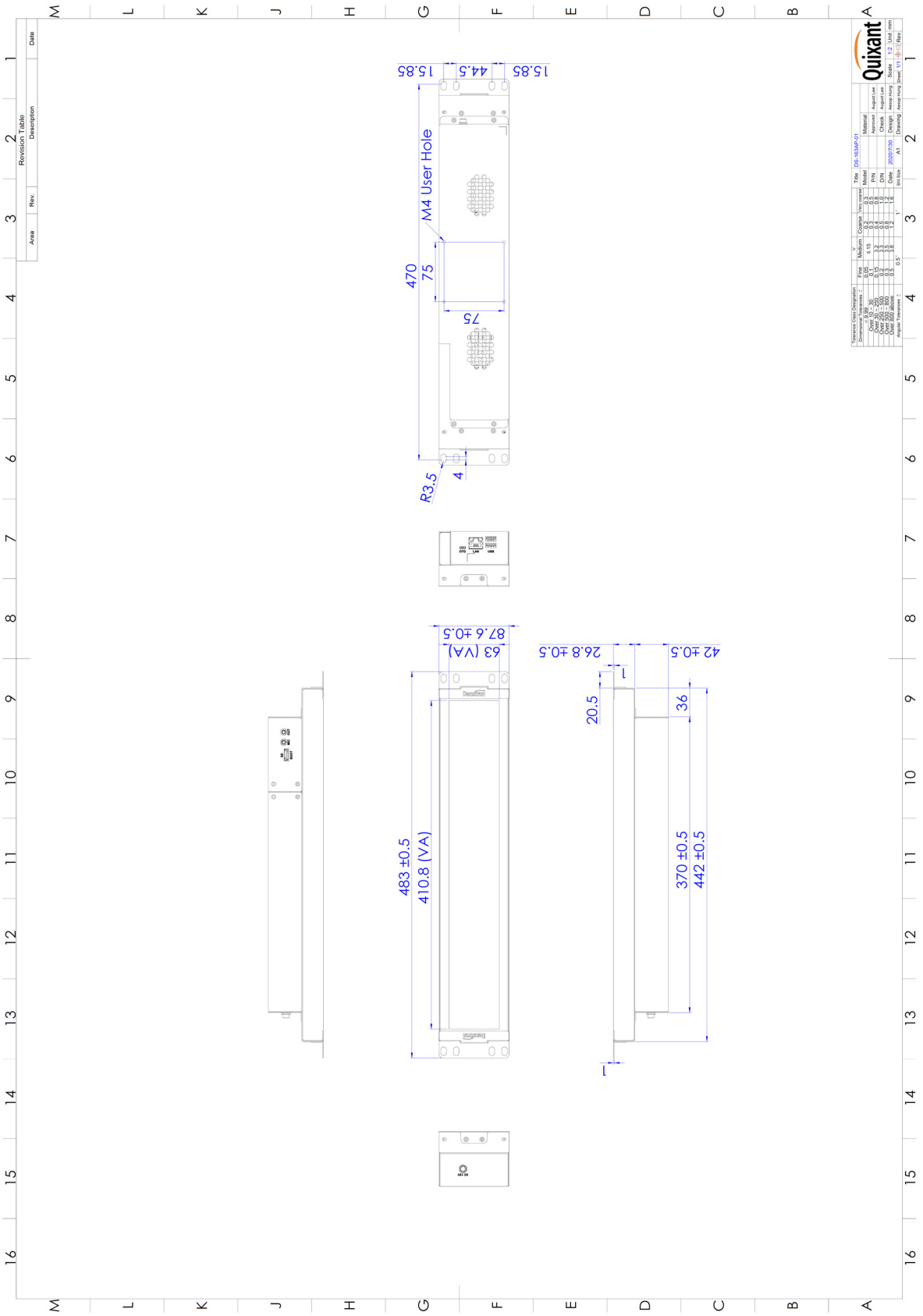
- Packaged into a single **2RU 19”** rack metal chassis
- Single 12V power supply
- Display resolution of **1920 x 285** pixels with 24-bit colour depth of 16.4M colours
- **700cd/m^2** peak luminance and adjustable backlight
- Utilising MVA technology which offers **89/89/89/89** symmetric viewing
- These TFT modules are designed to operate continuously with backlight half-life of **50k** hours and a temperature range of **0°C to +50°C**

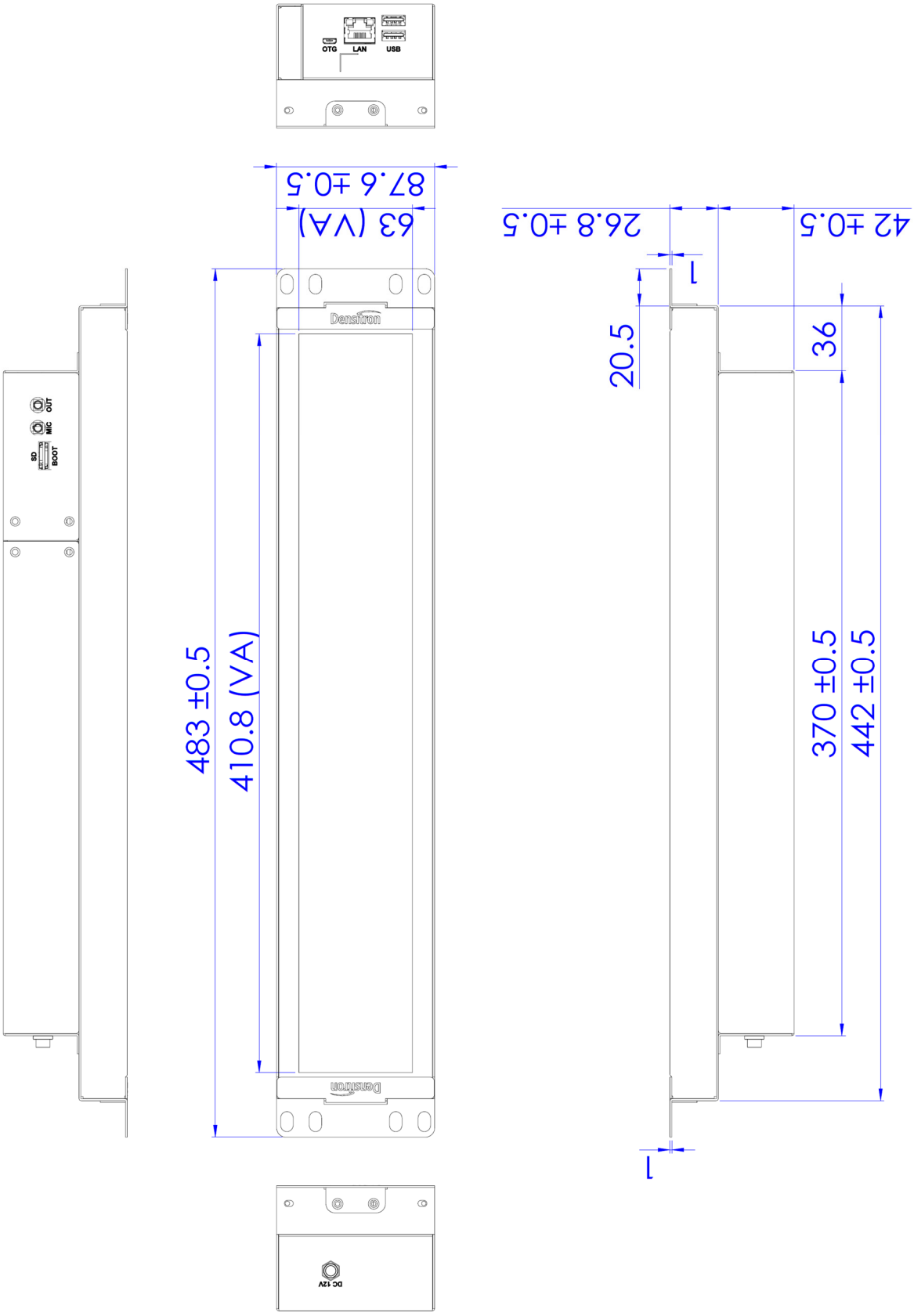
2. HMI Design

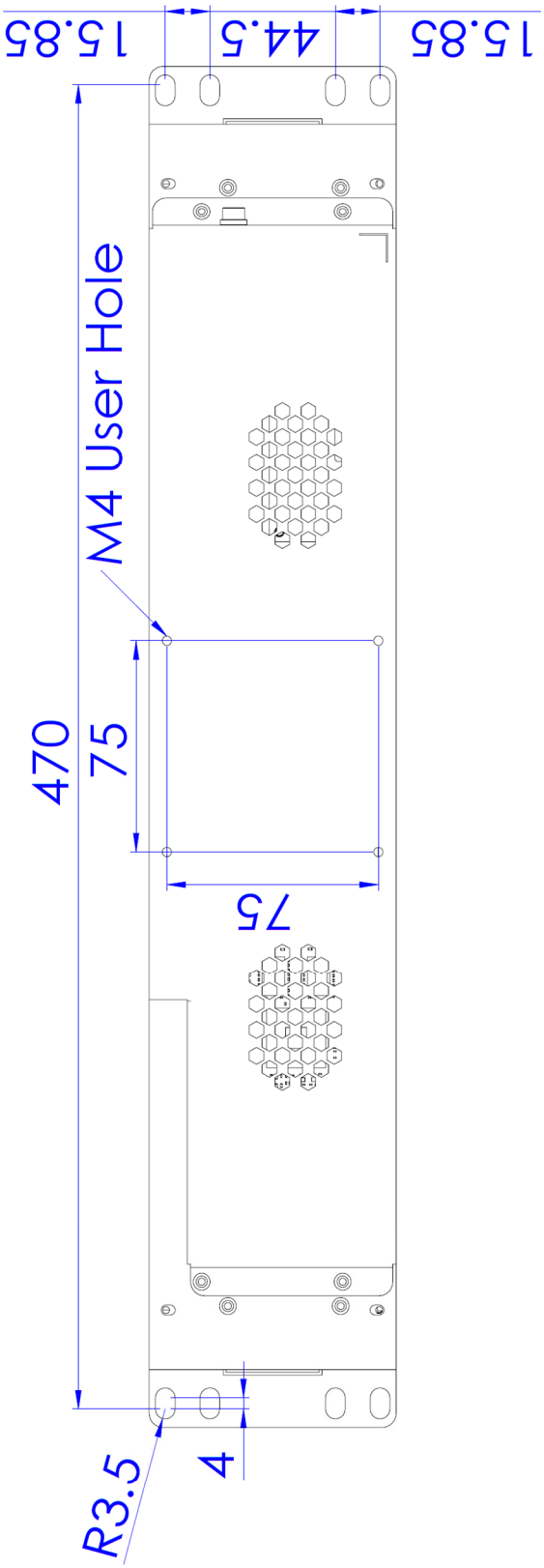
2.1 Product Application information



2.2 Mechanical Drawing







2.3 HMI Specification

Items	Contents
Type	TFT LCD
Viewing angle	178(H)/178(V)
Size	16.3” bar cut suitable for 19” rack
Resolution	1920*285 Pixels
PPI	119
Overall Dimensions	480.00 (W) x 87.55 (H) x 50.00 (D) mm
Active Area	408.96 (W) x 60.71 (H) mm
Pixel Pitch	0.213mm (W) x 0.213 (H) mm
Viewing Angle	L/R: 178° (Typ.)U/D: 178° (Typ.)
Contrast Ratio	1000: 1 (Typ.)
Brightness	700 cd/m2 (Typ.)
I/O	1 x VGA, 1 x DVI-D, 1 x DP
Backlight	LED
Mechanism	Bezel Frame (Chassis Frame)
Plug & Play	DDC2B (VESA Standard)
Response Time	20 msec (Rising + Falling)
Type	PCAP multi touch
Touch Interface	USB (B Type)

2.4 Mechanical Specification

Mechanical Specification	
Structure	Closed frame monitor
Chassis	2U Rack mount HMI
Mounting	Rack mount
Thermal	Fan less
Dimension	480.00 (W) x 87.55 (H) x 50.00 (D) mm
Weight	2 KG
VESA	75x75

2.5 Touch Specification

Touch Type	PCAP
Touch Structures	Cover glass + Glass(G/G)
Cover Glass	1.1 mm
Touch point	Multi touch points (up to 10 fingers)
Interface	USB HID
Surface Hardness	6H
Treatment	Chemical Hardening, Anti-Glare

3. Electrical Specification

3.1 Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
Supply Voltage for Operation	V_{CC}	10.8	13.2	V	-
Operating Current for VCC	ICC	-	2.5	A	1
Operating Temperature	Top	0	50	˚C	-
Static Electricity	IEC 61000-4-2				-

Note:

1) Maximum operating current is determined with the stress test software running and no external devices connected. Reference PSU (Power Supply Unit) Stontronics TS877ST.

3.2 AD Board

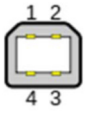
1 : +12V
2 : GND

Power Input

Item	Remark
Normal Input Voltage Range	12V DC ± 10%
Power Consumption	18.42W (Typ.) @Set

3.3 Touch interface

USB Connector (B Type)



Type B

1 VCC
2 D-
3 D+
4 GND

Parameters	Symbol	Min	Max
USB 5V power input	VDD5V	4.4	5.5
VDD3A Reference GND	VDD3A	3.0	3.6
VDD3D Reference GND	VDD3D	3.0	3.6
VDDIO Reference GND	VDDIO	1.8	3.6

3.4 Interface Pin Assignment

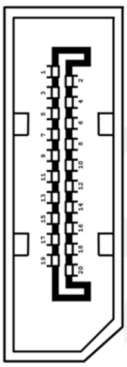
3.4.1 Analog RGB Cable (15pin D-SUB Connector)

Pin No.	SYMBOL	Pin No.	SYMBOL	Pin No.	SYMBOL
1	RED	6	RED GND	11	GND
2	GREEN	7	GREEN GND	12	DDC_SDA
3	BLUE	8	BLUE GND	13	H-Sync
4	GND	9	VGA 5V	14	V-Sync
5	VGA DET	10	GND	15	DDC_SCL

3.4.2 DVI Cable (DVI-D Connector)

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-

3.4.3 Display Port Input



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		

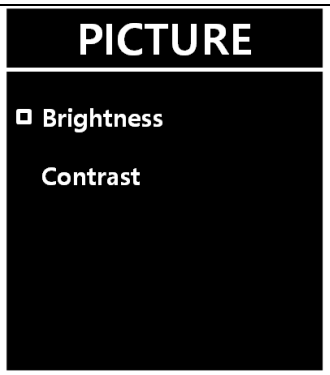
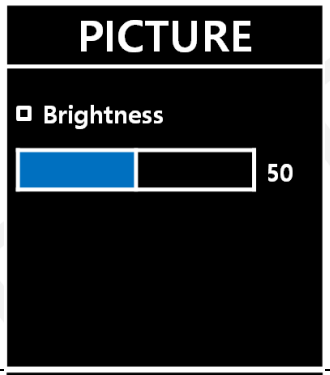
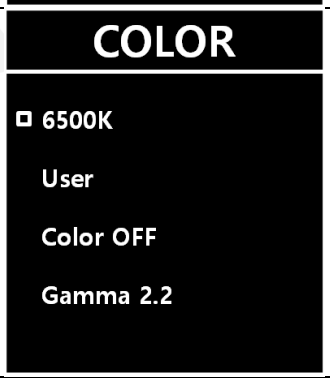
5. OSD Function

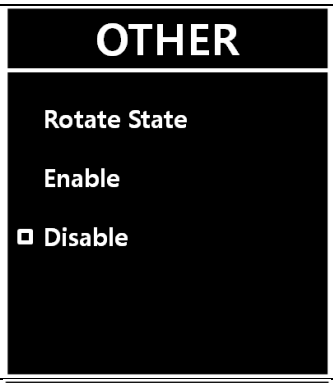
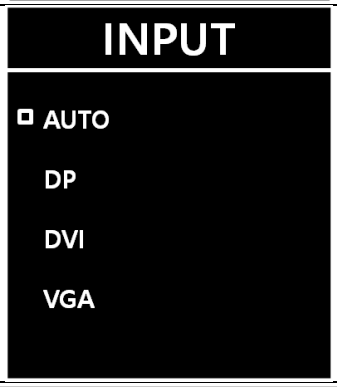
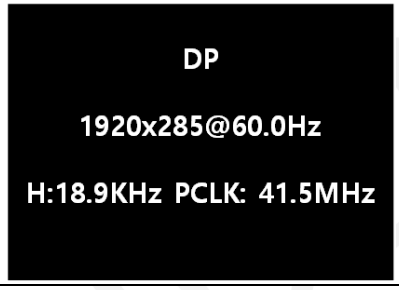
5.1 Key Button Function

LED | Power | Menu (Select) | Up | Down (Source) | Exit (Auto)

Item	Remark
Power	Turns On/Off the system
Menu / Select	Actives the OSD menu or Previous Menu, Exit
	Sub Menu select
Up / Information	Adjust Button/ Brightness & Contrast menu on Move the bar right to increase the Adjustment Move the main menu or sub menu Brightness & Contrast menu on Information menu on(Hotkey)
Down / Source	Adjust Button/ Brightness & Contrast menu on Move the bar left to increase the Adjustment Move the main menu or sub menu Input Select (Hotkey)
Exit / Auto	Adjustments of RGB (Hotkey), disabled main menu
Power Consumption	18.42W (Typ.) @Set

5.2 OSD Structure

Menu	Pictures	Function
Menu		Adjustment menu contents
Picture	 	• Brightness: Adjust Back Light Brightness • Contrast: Adjust the Contrast
Color		• Adjust the color temperature: 6500K, USER, Color Off • User Preset: Adjust color gain Red/Green/Blue • Gamma : Off/1.8/2.0/2.2/2.4

Other		Display rotate
INPUT		Input Select: Auto, DP, DVI, VGA
Information		Displays information regarding the current input signal

6. Standard Display Mode

6.1 VGA, DVI, DP Signal Resolution (PC)

No.	Resolution	V-Frequency [Hz]	Proposed
1	640 x 480	60.00/72.00/75.00	-
2	800 x 600	56.00/60.00/72.00/75.00	-
3	1024 x 768	60.00/70.00/75.00	-
4	1280 x 1024	60.00/75.00	-
5	1920 x 285	60.00	-
6	1920 x 1080	60.00	

7. Optical Specification

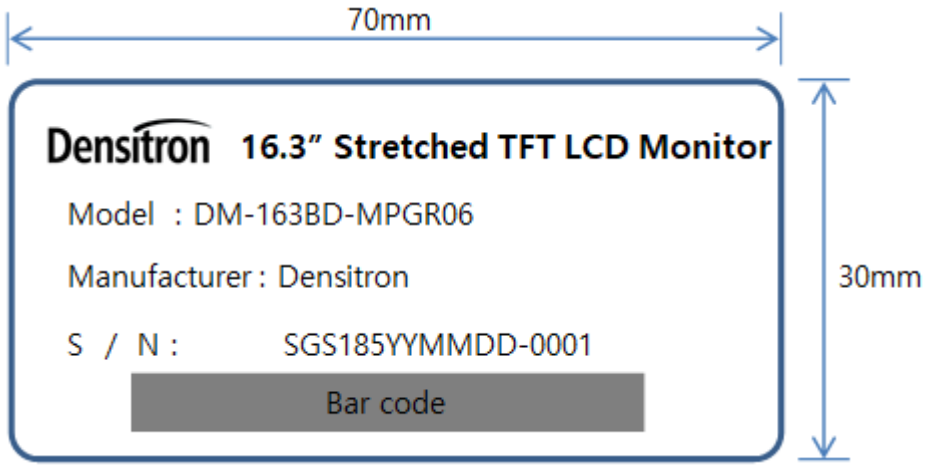
7.1 Optical Characteristics

Characteristics		Symbol	Conditions	Min	Typ	Max	Unit
Contrast Ratio		CR	-	-	1000:1	-	-
Response time		TR + TF		-	20	40	ms
Viewing Angle	Left/ Right	-	CR>10	-	178	-	deg
	Up/ Down	-		-	178	-	
Colour Chromaticity	Red	Rx	-	-0.05	0.640	+0.05	-
		Ry			0.330		
	Green	Gx			0.300		
		Gy			0.660		
	Blue	Bx			0.140		
		By			0.060		
	White	Wx			0.299		
		Wy			0.315		
Brightness		-	Default: 100 W/ Touch	540	700	-	cd/m^2

8. Packaging

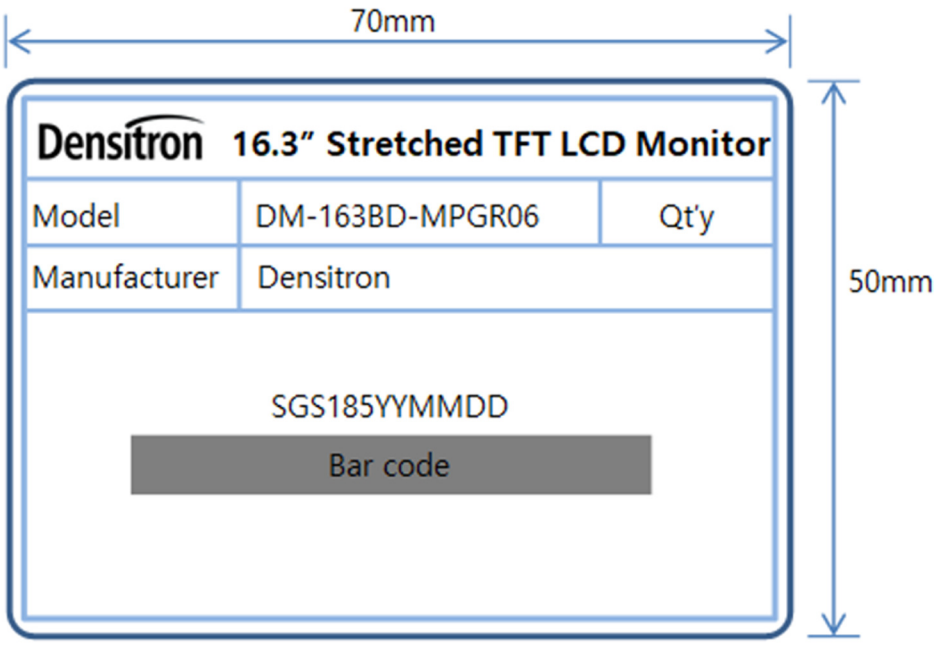
8.1 Labelling and Marking

8.1.1 Product Label



8.1.2 OSD Marking

8.1.3 Box Label



9. Environmental Specification

Items		Remark
LCD	Operating Temperature	-20°C ~ +70°C
	Storage Temperature	-20°C ~ +70°C
	Operating Humidity	5% ~ 90% RH
	Storage Humidity	5% ~ 90% RH
Touch Screen	Operating Temperature	-20°C ~ +70°C (45% ~ 85% RH)
	Storage Temperature	-20°C ~ +70°C (45% ~ 95% RH)

10. Accessary

12V power supplier * 1 / per one product
Power cord * 1 / per one product
HDMI to DVI cable
USB

Densitron

11. Quality Assurance Specification

11.1 Conformity

These inspection standards shall be applied to Stretched LCD Panel.

11.2 Environment Required

Customer's test & measurement are required to be conducted under the following conditions:
Ambient Temperature: 20 ~ 25 ◦ C
Humidity: 60 ~ 70% RH
Ambient Illumination: Fluorescent light (Day-Light type) display surface illumination to be 300~700Lux (standard 500Lux)
Viewing distance: 30 - 40cm from the surface of the monitor
Viewing Angle: 45 degree to the front surface of display panel.
Inspection resolution 1920 ×285
Finger glove (or finger cover) must be worn by the inspector.
Inspection table or jig must be anti-electrostatic.

11.3 Delivery Assurance

11.3.1 Criteria & Acceptable Quality Level (MIL-STD-105E, Level II)

Partition	AQL	Definition
Major	0.65	Defects in Pattern Check (Display On)
Minor	1.5	Defects in Cosmetic Check (Display Off)

11.3.2 Packing Inspection

No.	Items	Criteria	Inspection equipment
1	Carton Label	The character (Model, P/N, S/N etc…) can be discerned.	Visual
2	Box	No broken and dirty	

11.3.3 Appearance Inspection of Monitor

No.	Items	Criteria	Inspection equipment
1	Rear & Side	No crack, broken and distortion	* Visual * Calipers * Steel scale
2	Rear Label	The character (Model, P/N, S/N etc…) can be discerned.	
3	Dimension size	Tolerance: ± 1.0mm	

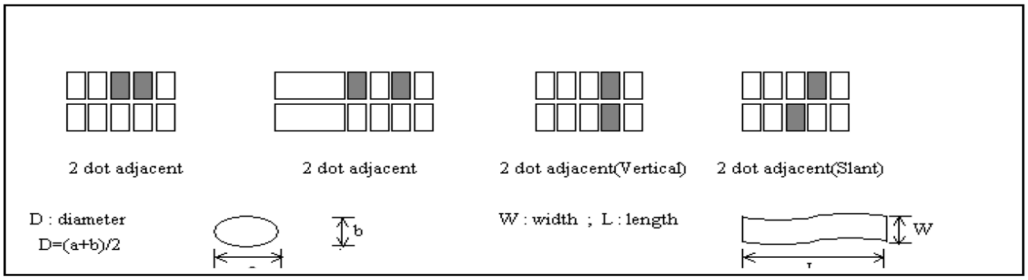
11.3.4 LCD Visual Inspection

Units: mm

Item		Standard		Inspection equipment
Dot (Bright)		Random	N≤2	* PC for inspection * Pattern generator * Lupe: ×10 * Test program
		2 adjacent	N≤ 1	
Dot (Dark)		Random	N≤ 3	
		2 adjacent	N≤ 1	
Total		N≤ 5		
Particles	Circular	0.15<D≤0.5mm, N≤4		
	Linear	0.07<W, 2.0<L, N=0		
Scratch/ Dent	Circular	0.15<D≤0.5mm, N≤4		
	Linear	0.07<W, 2.0<L, N=5		
Bubble	Circular	0.15<D≤0.5mm, N≤4		
Mura		Use 5% ND filter or judged by equivalent limit sample		
Line defect		Not allowed		

Note:
1) Diameter, W: Width, L: Length, N: Count
2) Distance between 2 Bright dots: ≥15mm
3) Distance between 2 Dark dots: ≥15mm
4) Distance between Bright and Dark dot: ≥15mm

Note (1) Two dot adjacent



11.3.5 Function Inspection

11.3.5.1 LCD Luminance and colour chromaticity

1) Measure point: Center of screen
2) Colure: White pattern
3) Stability time: 30 minutes

Item	Standard	Inspection equipment
Luminance	Typ. 700cd/㎡ Min. 560cd/㎡	* Colour analyser: CA-310 * PC * A/D Board
Colure	White x: 0.299 +/- 0.05 White y: 0.315 +/- 0.05	

11.3.5.2 Display inspection

Item	Standard	Inspection equipment
Colure	No strange colure displaying	* PC * A/D Board
Flicker	No flicker	

9.3.5.3 Touch Visual Inspection

Units: mm

Item	Standard	Inspection equipment
Particles	D≤0.2mm, 5mm≤distance, Ignored 0.2<D≤0.4mm, 20mm≤distance, N≤4 0.4<D≤0.5mm, 20mm≤distance, N≤2	-
Scratch	W≤0.2mm, L<20mm, 20mm≤distance N≤5 W≤0.1mm, L<8mm, 20mm≤distance N≤2 W>0.2mm, L>10mm, NG	
Bubble	D<0.1mm, Ignored W≤1/2X, L≤1mm, Ignored D>0.2mm, NG	
Linear defect	W<0.1mm, L≤10mm, Ignored W<0.2mm, L≤10mm, N≤10 W>0.2mm, L>10mm, NG	

12. Dealing with Customer Complaint

12.1 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.

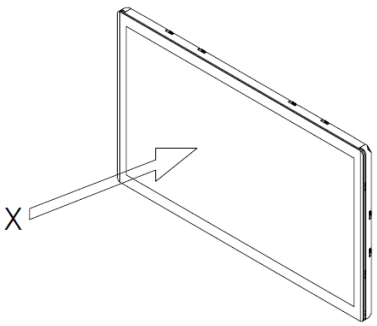
12.2 Handling of Non-conforming Displays

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.

13. Handling Precautions

13.1 Handling Precautions

1) Since the display panel is made of glass, do not apply mechanical impacts such us dropping from a high position.
2) If the display panel is broken by 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, care must me used not to apply pressure to these sections.
5) Applicable only for non-touch screen products: The polarizer covering the surface of the display module is soft and easily scratched. Please be careful when handling the display module.
6) 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 excessively bend the film with electrode pattern layouts. These stresses will influence the display performance. Also, ensure sufficient rigidity for the outer cases.



7) Do not apply stress to the LSI chips and the surrounding moulded sections.
8) Do not disassemble nor modify the display module.
9) Do not apply input signals while the logic power is off.
10) Pay sufficient attention to the working environments when handing display modules to prevent breakage of element through static electricity. Use electrostatic prevention.
    a. Human body to be grounded 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 module, this may create static electricity when pealing off the protective film.
11) 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).
12) If electric current is applied when the display module has condensation or when it is placed under high humidity environments, the electrodes may be corroded. Be careful to avoid the Condensation.

13.2 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.

13.3 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. Exceeding maximum ratings will void Warrantee.
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 install excess current preventive unit (fuses, etc.) to the power circuit (VDD). (Recommend value: 0.5A)
4) Pay sufficient attention to avoid occurrence of crosstalk noise interference with the neighbouring devices.
5) As for EMI, take preventative measures on the equipment side.
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.

13.4 Operation Precautions

1) It is essential to drive the display within the specified voltage limit since excessive voltage shortens its life.
2) Direct current causes an electrochemical reaction with rapid 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 design the 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. Refer to recommended operating manual.

13.5 Other Precautions

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

Warning
Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.

"CAUTION: Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions."

CAUTION:
- Lithium Battery Caution: Danger of explosion if battery is incorrectly replaced. Replace only with same or an equivalent type. Dispose batteries according to manufacturer's instructions.
- Disposal of a BATTERY into fire or a hot oven, or mechanically crushing or cutting of a BATTERY, that can result in an EXPLOSION
- Leaving a BATTERY in an extremely high temperature surrounding environment that can result in an EXPLOSION or the leakage of flammable liquid or gas
- A BATTERY subjected to extremely low air pressure that
may result in an EXPLOSION or the leakage of flammable liquid or gas.