

# DHA 90-4213-004

## Enhanced Sunlight Readable Display Head Assembly

### GENERAL SPECIFICATIONS

Display Diagonal Size	21.3" (541.02 mm)
Resolution	1600 x 1200 (UXGA)
Aspect Ratio	4:3
Refresh Rate	60 Hz
<b>Contrast Ratio</b>	<b>1250:1</b>
Weber Contrast	10.99:1
Display Colors	16.7M
Color Gamut	0% NTSC
LCD Technology	Si TFT Active Matrix
Response Time (R/F)	15 ms
Horizontal Viewing Angle	±89°
Vertical Viewing Angle	±89°

### ELECTRICAL SPECIFICATIONS

LCD Interface	LVDS
LCD Voltage	12 Vdc
LCD Maximum Power	5.04 W

### BACKLIGHT SPECIFICATIONS

<b>Maximum Brightness</b>	<b>1150 cd/m<sup>2</sup></b>
Maximum Power	25.2 W
Uniformity	78.1%
LED Driver	21-406 (recommended)

### ENVIRONMENTAL SPECIFICATIONS

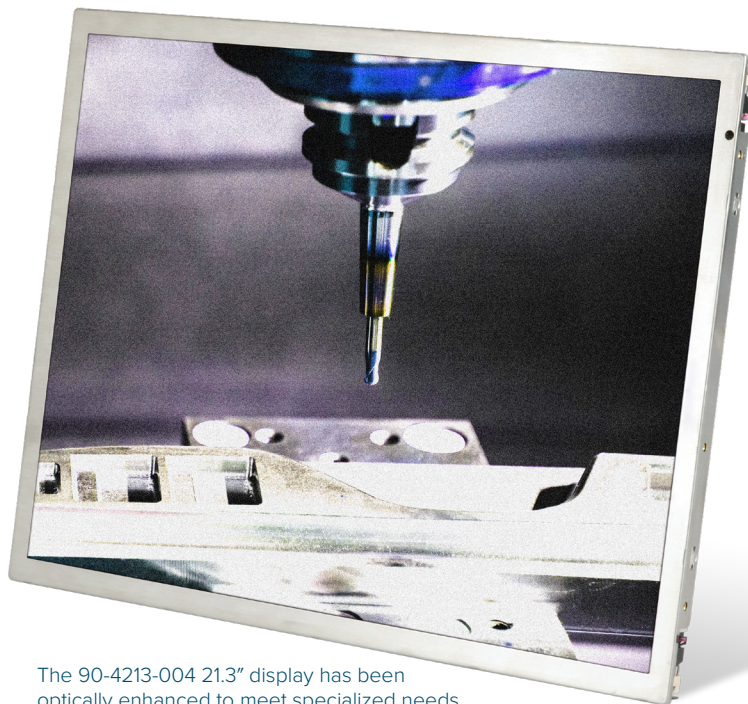
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 60°C

### RELIABILITY

Shock	50 G, 11 ms, ½ Sine Wave
Vibration	1.5 G (10–300 Hz)

### SPECIAL FEATURES

TYPE	DESCRIPTION
Industrial Grade	Superior production life compared to commercial-grade panels
	Superior optical performance



The 90-4213-004 21.3" display has been optically enhanced to meet specialized needs.

## Weber Contrast vs Power

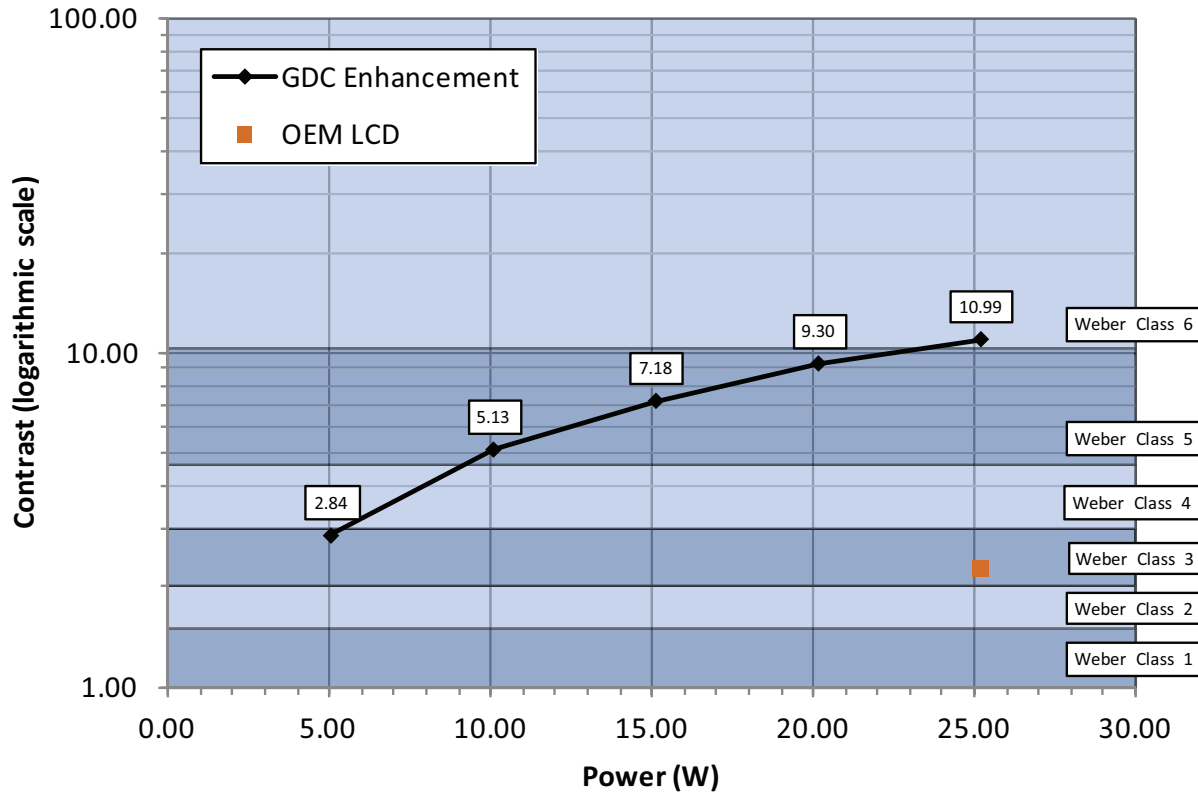


Figure 1: Weber Contrast vs Power (reference Notes 1, 3, 4 on page 3)

### WHAT IS WEBER CONTRAST?

Weber contrast is an important attribute to consider when selecting a display for use in high ambient brightness environments. Unlike the standard contrast value, which is measured in ideal conditions (dark room), the Weber contrast is measured under the simulated effects of direct sunlight (10,000 fc direct and 2,000 fL Lambertian light sources). General Digital determines and records the Weber contrast using the test procedure described in MIL-L-85762A. To simplify and quantify the engineering challenge of qualifying a panel for use in high ambient brightness conditions, we created our own unique metric (Weber Class), which is derived directly from Table II of MIL-L-85762A. This data establishes that the larger the Weber Class number, the better the display will perform in high ambient brightness conditions.

### WEBER CONTRAST LOOKUP CHART

DISPLAY CLASS	CONTRAST RANGE	SHORT DESCRIPTION	IDEAL APPLICATIONS
Class 1	0.00 to 1.49	Not sunlight readable	Not suitable for direct sunlight use
Class 2	1.50 to 1.99	Numeric <b>only</b>	Useful for numerics only in direct sunlight
Class 3	2.00 to 2.99	Alphanumeric	Useful for characters and numerical data
Class 4	3.00 to 4.659	Graphic symbols and alphanumerics	Useful for characters, numerical data and static images
Class 5	4.66 to 10.29	Acceptable video performance	Useful for characters, numerical data, static images and low quality video (6 $\sqrt{2}$ shades of gray with counting off as 1)
Class 6	10.3 and higher	Best case video performance	Useful for characters, numerical data, static images and high quality video (eight or more $\sqrt{2}$ shades of gray with counting off as 1)

### Temperature & Brightness vs Power

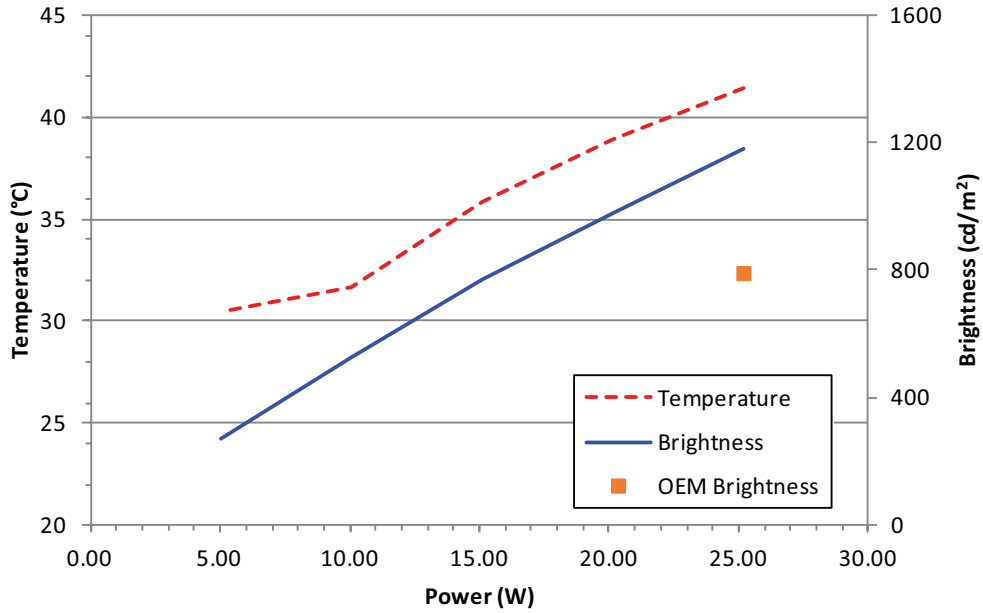


Figure 2: LCD Temperature and Brightness vs Backlight Power (reference Notes 1, 2)

### CIE 1931 Color Space

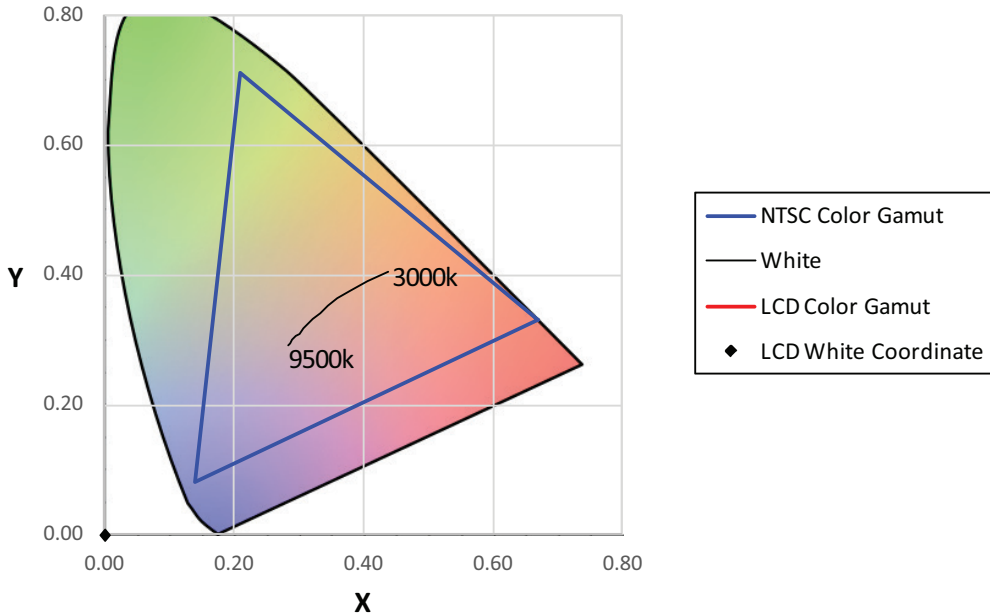


Figure 3: LCD RGB Color Coordinates Compared to NTSC Color Space (reference Notes 1, 3, 4)

**NOTES**

- 1) Data recorded at an ambient temperature of 25°C.
- 2) Temperature on rear panel on the center of the Day Mode LED Rail.
- 3) Weber Contrast calculated IAW MIL-L-85762A.
- 4) Measurements taken with antireflective film and ESR overlay.

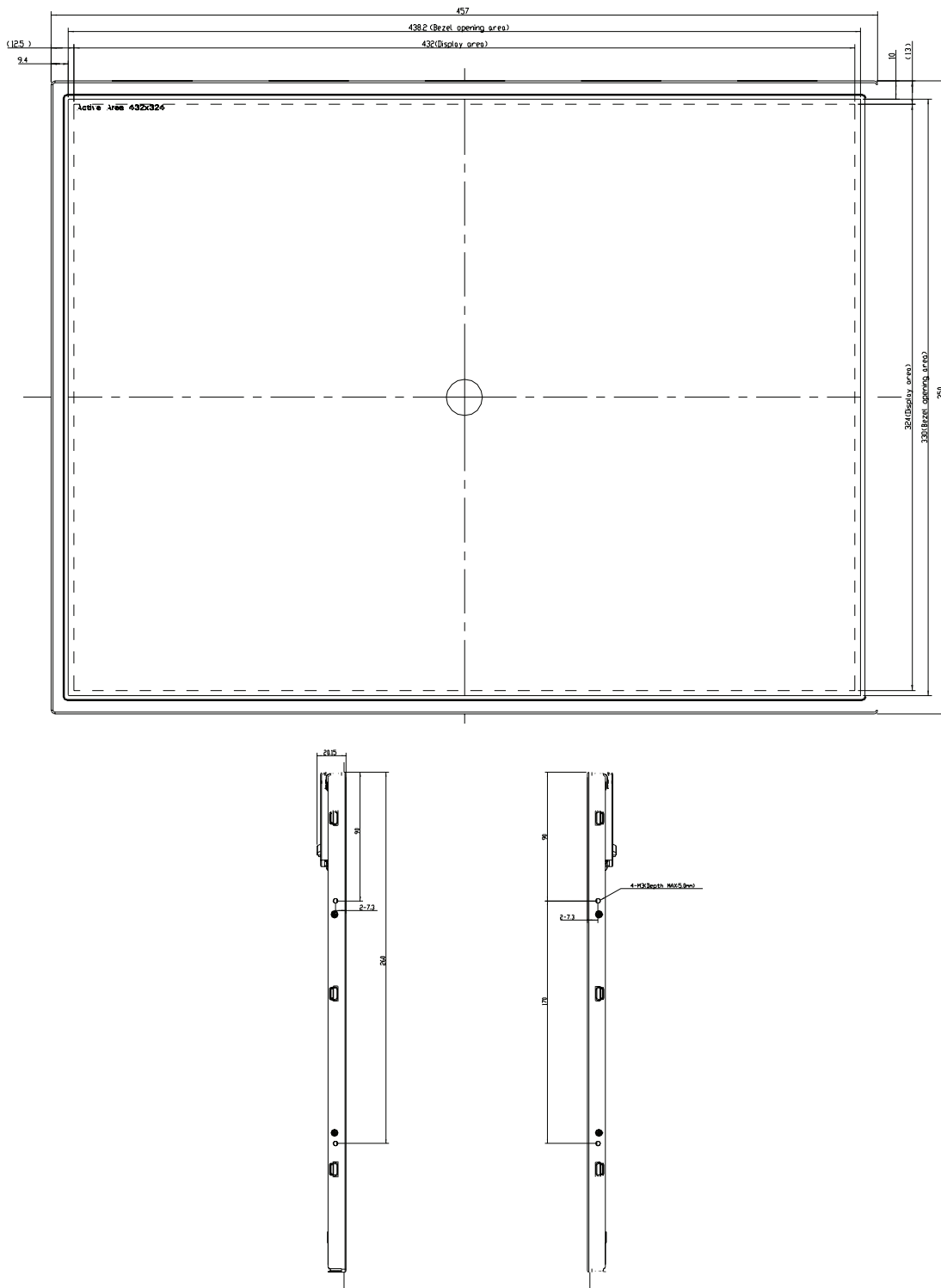


Figure 4: Display dimensions (unit of measure: mm; tolerance is  $\pm 0.50$  mm unless otherwise indicated)

**MECHANICAL SPECIFICATIONS**

Active Area	432 (W) x 324 (H) mm
Dimensional Outline	457 (W) x 350 (H) x 20.15 (D) mm
Weight	2,412 g

## VALUE-ADD OPTIONS (Partial listing—contact General Digital for additional selections)

TYPE	EXAMPLES
Overlays	Touch screens, EMI filters, heaters, vandal shields, more
Overlay Integration	Optical bonding or mechanical mount
Films	AR (antireflective), AG (antiglare), AR/AG, privacy, contrast, hydrophobic, more
Controllers	Video, LED backlight, heater, touch, OSD, custom, more
Integration	Can be integrated into most General Digital standard products, or designed into custom assemblies
Software	Software/firmware development and IV&V (Independent Validation & Verification) services available

## REVISION HISTORY

REV. NO.	ECN NO.	DATE	DESCRIPTION	INITIAL
0	—	24 May 2017	Created document	MV
1	—	6 May 2020	Updated layout; added Reliability specifications	JDG



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