

DHA 90-4156-002

Enhanced Sunlight Readable Display Head Assembly

GENERAL SPECIFICATIONS

Display Diagonal Size	15.6" (396.24 mm)
Resolution	1920 x 1080 (WUXGA)
Aspect Ratio	16:9
Refresh Rate	60 Hz
Contrast Ratio	650:1
Weber Contrast	10.25:1
Display Colors	16.7M
Color Gamut	74% NTSC
LCD Technology	Si TFT Active Matrix
Response Time (R/F)	16 ms
Horizontal Viewing Angle	±80°
Vertical Viewing Angle	±70°

ELECTRICAL SPECIFICATIONS

LCD Interface	LVDS
LCD Voltage	3.3 VDC
LCD Maximum Power	3.37 W

BACKLIGHT SPECIFICATIONS

Maximum Brightness	1350 cd/m²
Maximum Power	18.2 W
Uniformity	73%
LED Driver	21-500 (recommended)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-10°C to 70°C
Storage Temperature	-20°C to 70°C

RELIABILITY

Shock	50 G, 20 ms, ½ Sine Wave
Vibration	1.5 G (10–200 Hz)

SPECIAL FEATURES

TYPE	DESCRIPTION
Military Grade	10-year production: Ideal for aerospace and defense applications requiring long product life cycle and expensive certification/re-certification
	Superior resistance to shock and vibration
	Configuration control



The 90-4156-002 15.6" display has been optically enhanced to meet specialized needs.

Weber Contrast vs Power

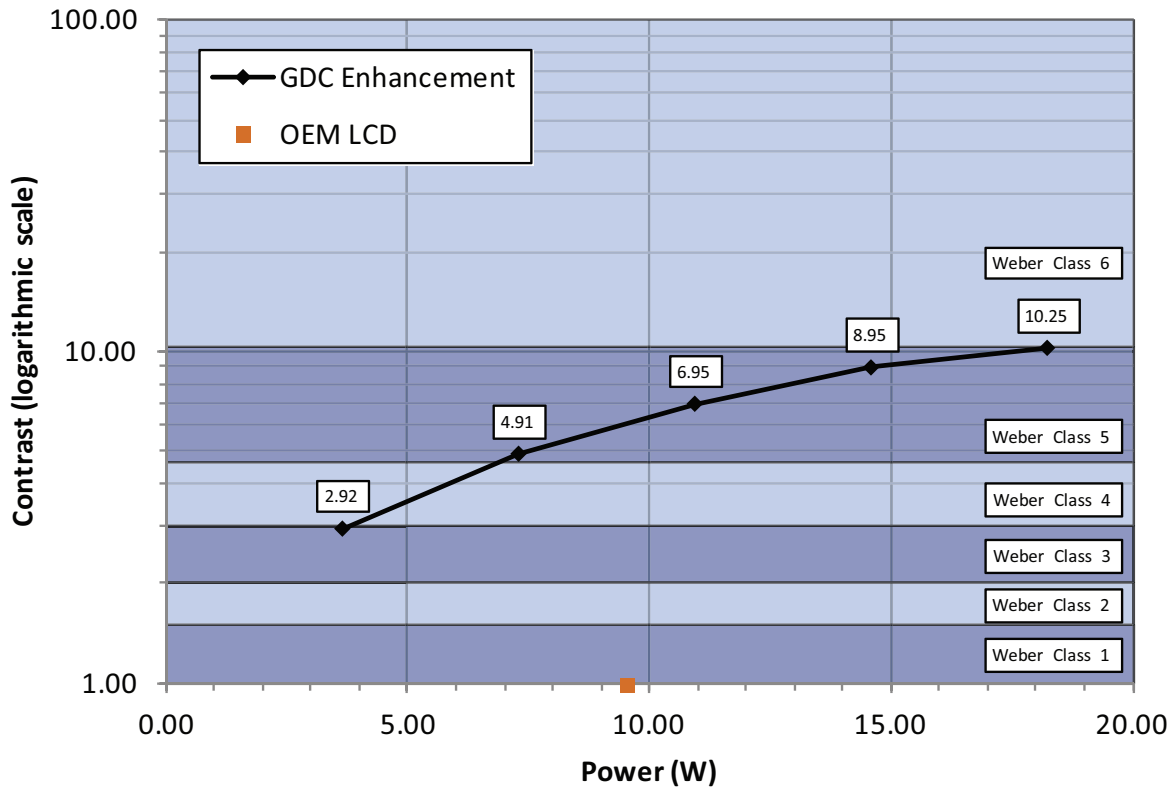


Figure 1: Weber Contrast vs Power (reference Notes 1, 3, 4 on page 3)

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 only	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

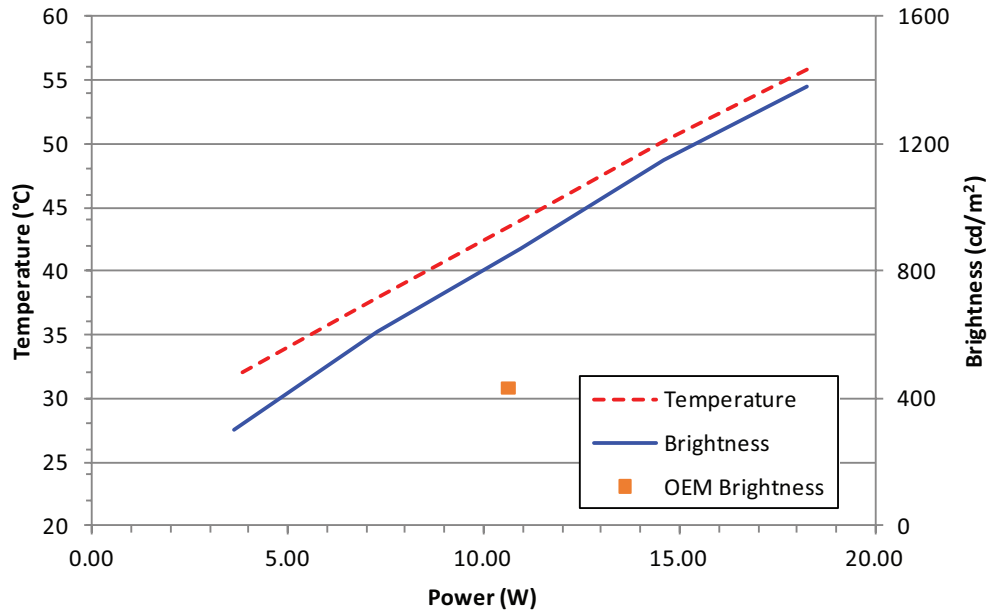


Figure 2: LCD Temperature and Brightness vs Backlight Power (reference Notes 1, 2)

CIE 1931 Color Space

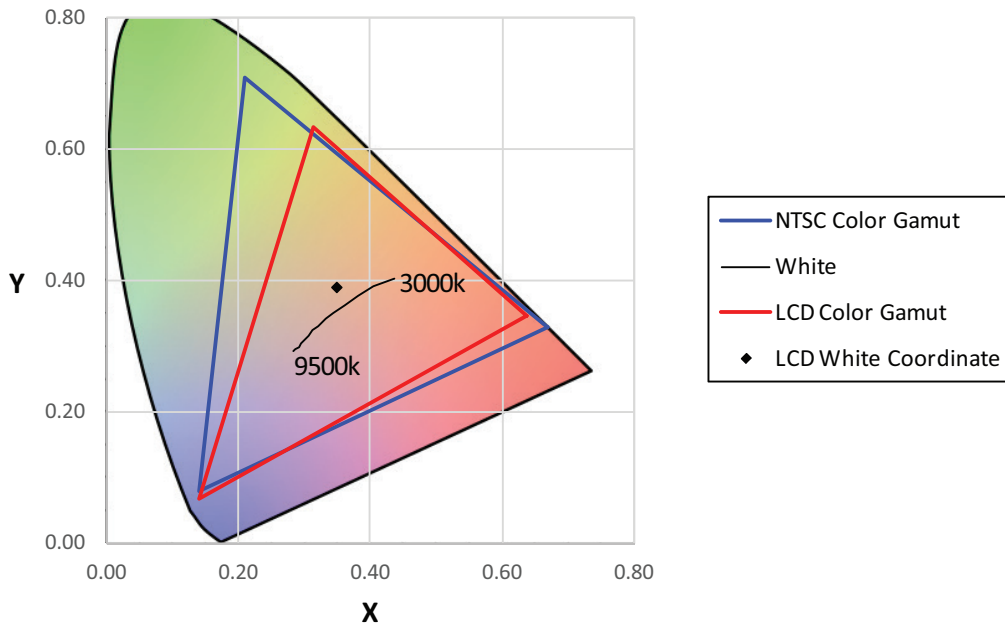


Figure 3: LCD RGB Color Coordinates Compared to NTSC Color Space (reference Notes 1, 3, 4)

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.

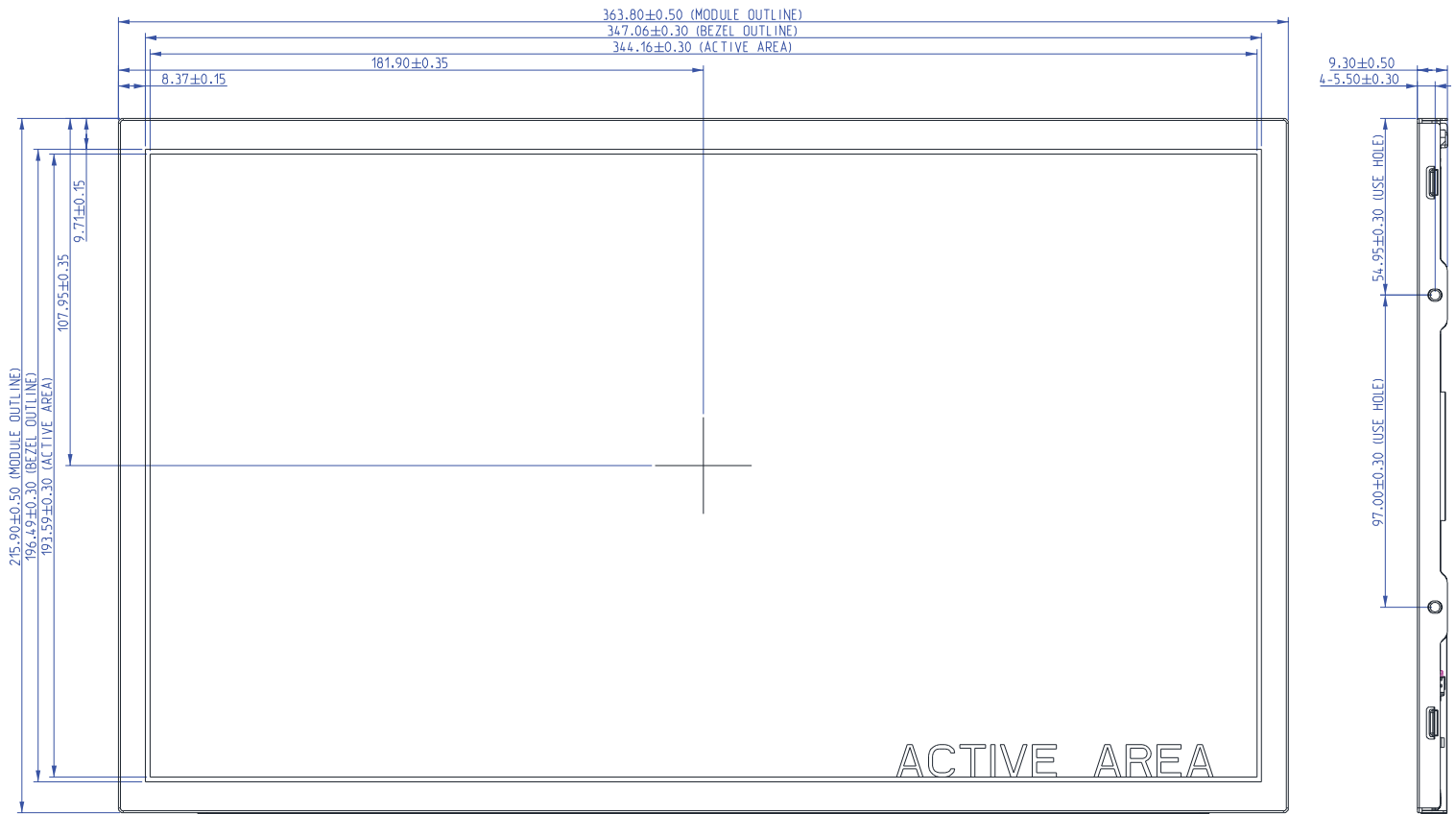


Figure 4: Display dimensions (unit of measure: mm; tolerance: as indicated)

MECHANICAL SPECIFICATIONS

Active Area	344.16 (W) x 193.59 (H) mm
Dimensional Outline	363.8 (W) x 215.9 (H) x 9.3 (D) mm
Weight	940 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	—	3 May 2018	Created document	JDG
1	—	5 May 2020	Updated layout; added Reliability specifications	JDG



60 Prestige Park Road
East Hartford, Connecticut 06108
Phone 860.282.2900 | Toll-Free 800.952.2535
E-mail gdc_info@generaldigital.com

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