



Planar Engineering Specification

023-0498-00 Rev. C

12.1 Monitor for Extreme Environments; LX1250TI & LX1251TI

September 14, 2011

Table of Contents

DISPLAY DESIGN SUMMARY	4
PRODUCT HIGHLIGHTS	4
1 PRODUCT.....	5
1.1 PRODUCT VERSIONS	5
2 PRODUCT DESCRIPTION	5
3 PERFORMANCE CONDITIONS.....	6
3.1 CLEANING GUIDELINES	7
3.2 COOLING.....	7
4 FUNCTIONAL SPECIFICATIONS	7
4.1 MANUAL DIMMING CONTROL	7
4.2 USB DIMMING CONTROL	7
4.3 AUTO SYNC	7
4.4 VOLUME CONTROL.....	7
4.5 FUNCTION BUTTONS ON FRONT OF DISPLAY	7
4.5.1 Power interrupt button (All-in-one power button).....	7
4.5.2 (+) Button.....	7
4.5.3 (-) Button	7
4.6 STANDARD DTM OSD BUTTONS.....	8
4.7 LED STATUS LIGHT.....	8
4.7.1 LED green	8
4.7.2 LED amber	8
5 MODULE SPECIFICATIONS	8
5.1 AMLCD	8
5.2 TOUCHSCREEN	8
5.2.1 Touch surface	8
5.2.2 Touchscreen interface.....	8
5.2.3 Touchscreen resolution.....	8
5.2.4 Touchscreen driver.....	8
5.2.5 Touchscreen controller.....	8
5.3 VIDEO CONTROLLER BOARD.....	8
5.4 LED BACKLIGHT DRIVER.....	9
5.5 PEZIO FUNCTION – LX1250TI ONLY	9
5.6 MECHANICAL ENCLOSURE	9
5.6.1 Front Bezel.....	9
5.7 CONNECTORS AND I/O.....	9
5.7.1 I/O connector – LX1250TI.....	9
5.7.1 I/O Connectors –LX1251TI.....	10
6 PHYSICAL SPECIFICATIONS	11
6.1 OPTICAL REQUIREMENTS	11
6.1.1 Luminance through touchscreen.....	11
6.1.2 Maximum luminance at full dimming.....	11
6.1.3 Uniformity.....	11
6.1.4 Contrast.....	11
6.1.5 High ambient contrast	11
6.2 POWER REQUIREMENTS	11
6.2.1 Voltage Range	11
6.2.2 Voltage Transients.....	12
6.2.3 Reverse polarity protection.....	12
6.2.4 Maximum Power Consumption.....	12
6.2.5 Power consumption in standby Power (LED amber).....	12
6.3 MECHANICAL OUTLINE	12
6.4 PRELIMINARY DIMENSIONS.....	12
6.5 VESA MOUNT	13
6.6 WEIGHT	13
6.7 COLOR	13
6.7.1 Monitor Bezel and Back Chassis	13
6.7.2 Button color.....	13
6.8 PRODUCT GRAPHICS	13
6.8.1 Product Branding Graphics.....	13
6.8.2 Product Model Name.....	13
6.8.3 Button Graphics.....	13
6.8.4 Product Label Requirements.....	13
7 COSMETIC DEFECTS, VIEWING AREA OF DISPLAY SCREEN	14
8 COSMETIC DEFECTS, EXTERNAL SURFACES.....	14

9	SHIPPING BOX	14
10	SHIPPING BOX LABEL	15
11	MAINTENANCE REQUIREMENTS/SERVICE SUPPORT	15
11.1	SERVICE REQUIREMENTS	15
11.2	SERVICE BOM	15
12	ENVIRONMENTAL SPECIFICATIONS	15
12.1	TEMPERATURE	15
12.2	HUMIDITY	15
12.3	ALTITUDE	15
12.4	VIBRATION	15
12.5	SHOCK	15
13	REGULATORY COMPLIANCE	15
13.1	ELECTROMAGNETIC COMPATIBILITY (EMC).....	15
13.2	EMISSIONS	15
13.3	IMMUNITY CHARACTERISTICS	16
13.4	SAFETY	16
13.5	RoHS COMPLIANCE.....	16
13.6	WEEE COMPLIANCE	16
13.7	RELIABILITY	16
14	INCLUDED IN THE SHIPPING BOX	16
15	SHIPPING CONFIGURATION (STATE OF MONITOR WHEN SHIPPED)	16
16	PRODUCT ACCESSORIES	16
17	PRODUCT SPECIFICATIONS OVERVIEW	18
18	REVISION HISTORY	18
19	APPENDIX A	20
19.1	AMLCD COSMETIC SPECIFICATION	20
19.2	OPTICAL BONDING COSMETIC SPECIFICATION	20
19.3	PLANAR DEFINED	20
19.4	PROTECTIVE COVER GLASS	20
19.5	MEETS 80-50 (SCRATCH – DIG) PER MIL-PRF-13830B.....	20

Display Design Summary

Utilize proven design and supplier

Cost optimized design

Long product life cycle

Designed for demanding transportation environment

Optimized for in cab sunlight viewability

Glass surface touchscreen for optimal performance in harsh environment

One button Display/CPU power on/off

Ultra wide dimming range

Control of backlight dimming and other OSD functions through USB interface

Wide Voltage input with transient protection

Low EMI

Wide operating temperature range without fans or ventilation

Vibration and Shock tested to rugged transportation specifications

Waterproof design

Rugged Aluminum enclosure

Product highlights

12.1" XGA high bright display for viewability in all environments

Infrared touchscreen with strengthened glass touch surface for the best optical clarity

Wide dimming range controlled via USB or Hard buttons

Wide input VGA scalar with OSD controls hidden from end user

Fanless die cast aluminum chassis with an IP65 rating with regards to water/dust penetration

Single integrated Mil-Std connector for all connections

Also available with separate VGA, Power, and USB connectors

LED backlight for increased ruggedness, lower power, better EMI performance, better environmentally (no mercury) and to minimize overall monitor depth and weight

Hazardous materials compliant for international deployment

1 Product

Planar will leverage past transportation and marine design and product development experience to offer a product that conforms to the following specification

1.1 Product Versions

All sellable product part numbers ending in LF will be built with RoHS complaint components

Planar Part Number	Planar Model Name	Description	UPC
997-6186-00LF	LX1250TI	IR touch 12.1" XGA LCD General Market	8 10689 06186 1
997-6192-00LF	LX1251TI	IR Touch 12.1" XGA LCD General Market –VGA IF	8 10689 06192 2

Figure 1 Rendering of the display



2 Product Description

The LX1250TI is intended for use in an in transportation environment. The initial use will be a dashboard mounted, touch enabled display for a remote computer. The display will consist of an AMLCD, touchscreen, user controls, and a rugged enclosure. The LX1250TI will be powered by 12 or 24 V DC from a vehicle.

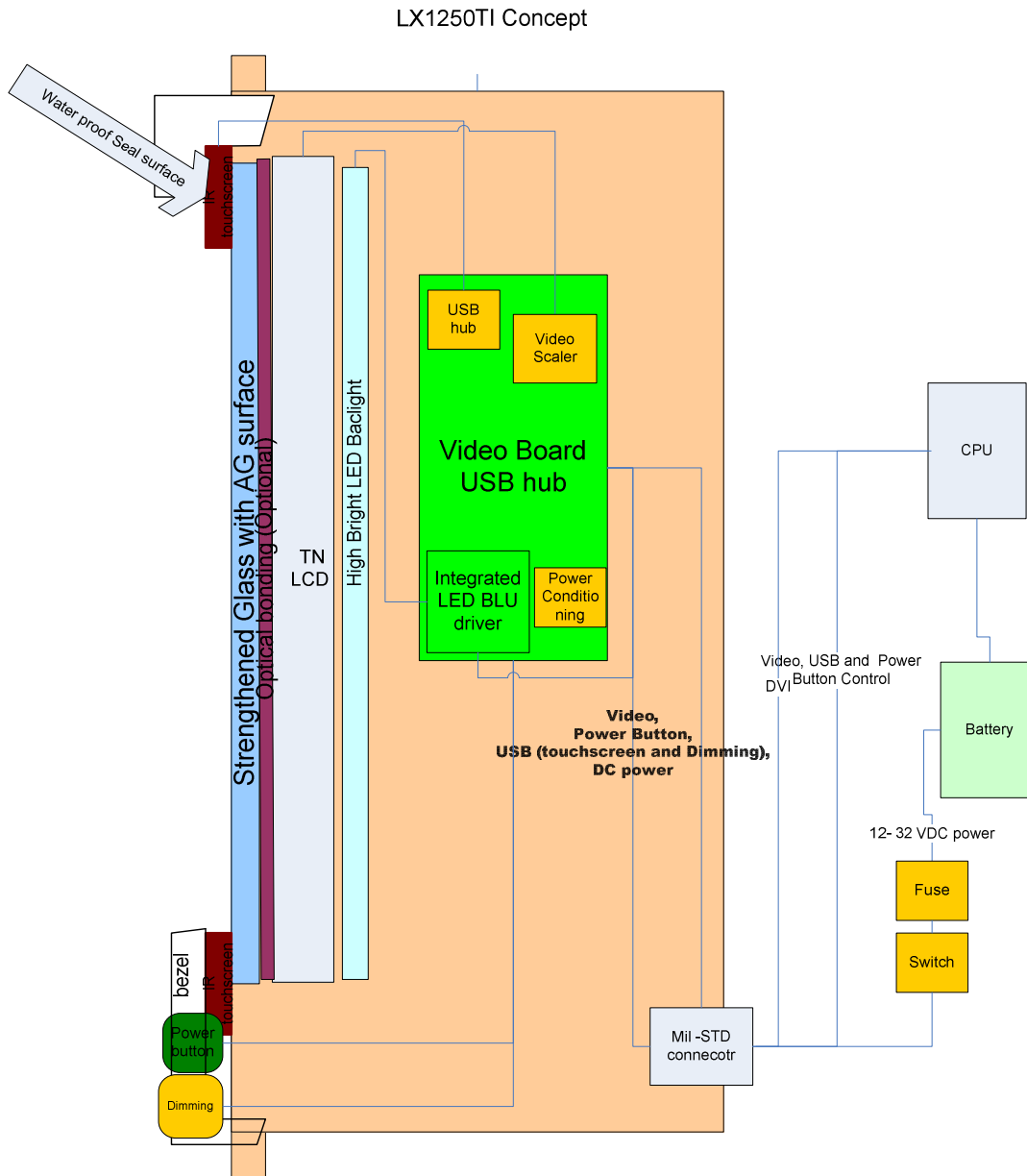
The primary application for this product requires a touch enabled display that is plug-and-play, and requires little training to use by the end user.

There are a few unique features to this product that are not on standard desktop monitors (DTM):

- No standard OSD buttons are open to the user: All 'standard' DTM OSD functionality will work as a hard button or be hidden to the user.
- All-in-One power button: A power button located on the front of the display functions as a pass through to turn on and off the remote computer. It functions very similar to a laptop computer docking station power button. When there is no video detected, the monitor will go into standby mode.
- No Base, mounting brackets, or stand is shipped with this device. It is a monitor head only.

- No cables or power supply are shipped with this monitor, they are available as accessories for order separately.
- Refer to the following block diagram for a general description of the product components:

LX1250TI Block Diagram. Connector only for LX1250TI, LX1251TI has VGA, Power & USB.



3 Performance Conditions

Performance characteristics are guaranteed over the environmental specification range.

This product will be in used in the following conditions:

- Dusty environments
- High ambient lighting, outdoors and in a vehicles

- Scratched and banged with other equipment in the vehicle
- Very high vibration and shock environment
- Vandalism and tamper proofing: This product may be in environments that are unattended and used by people that are hard on their equipment
- This product will be driven by remote computers that can be far away. Product testing and verification was done with cables of at least 15ft. USB cables require a hub or booster for testing at lengths over 15 ft.

3.1 Cleaning guidelines

The LX1250TI will continue to operate normally while being cleaned in a fashion normal for a transportation environment. This includes cleaning with a damp (wrung out), mild soapy cloth.

The LX1250TI will withstand cleaning solutions used in transportation. Possible chemicals include:

- 70% isopropyl alcohol
- 1.6% aqueous ammonia
- Formula 409®
- Fantastic®

3.2 Cooling

Cooling will be provided solely by convection cooling (no fan).

4 Functional Specifications

All specifications apply to both LX1250TI & LX1251TI Unless specifically noted.

4.1 Manual Dimming Control

Dimming control shall be two buttons that are easy to access and use with gloved hands. Dimming range shall be from max bright to minimum brightness.

4.2 USB dimming control

It is possible to access OSD functions on the Pixelworks scaler via USB

4.3 Auto Sync

The display will Autosync to video if both '+' and '-' are pushed at the same time

4.4 Volume Control

None: through OS control only. Only available on LX1250TI, LX1251, does not have Audio.

4.5 Function Buttons on Front of display

The LX1250TI will have buttons and LEDs on the front of the display for user interaction. All buttons are silicon with positive feedback and backlight with white LEDs

4.5.1 Power interrupt button (All-in-one power button)

This button is not connected to the monitor power. The power interrupt button passes through to the rear IF connector. It shall be a SPST,N.O. momentary push button.

4.5.2 (+) Button

This button increases brightness of the backlight

4.5.3 (-) Button

This button decreases the brightness of the backlight

4.6 Standard DTM OSD Buttons

No OSD buttons or OSD are required on this product.

4.7 LED status light

The Monitor shall have a single LED for video status.

4.7.1 LED green

The LED Shall be green with there is video present

4.7.2 LED amber

The LED shall be amber when there is no video signal present and the monitor will go into standby mode.

5 Module Specifications

This section describes the internal components of this monitor.

(Refer to Block Diagram in the Product Description Section 1.4)

5.1 AMLCD

Industrial grade with high bright LED backlight

5.2 Touchscreen

Infrared type: sensors and controller located in bezel

5.2.1 Touch surface

3mm solid glass, chemically strengthened, Anti glare coating AG level 110.

The touchscreen will function even if the surface is scratched or broken.

5.2.2 Touchscreen interface

USB

5.2.3 Touchscreen resolution

4096 X 4096

5.2.4 Touchscreen driver

Windows XP, Linux kernel () support

5.2.5 Touchscreen controller

Built into touch screen frame

Externally accessible for firmware updates

5.3 Video Controller board

- Requires standard VGA (DVI input TBV)

Auto sync on power up and any video mode change. Video Modes supported:

Resolution	Vertical refresh rate
1024*768	60 Hz
800*600	60 Hz
640*480	60Hz
	More available

- When there is no VGA signal present, it will show "No Signal message" within 1 second and the LED over the power button (B1) will go amber.

5.4 LED Backlight Driver

Function: Powers the LED backlights throughout the input voltage range

- Low DC voltage output for a low EMI signature
- Provide a wide dimming range available in dim to off. Brightness and dimming range in Section
- LED Driver shall be integrated onto the Video board

5.5 Pezio function – LX1250TI only

Function: provides audio for PC applications

Specification:

Frequency range: 700Hz – 20kHz

Max SPL@1 m, 60 Vpp: 81dB

Input 0-1VPP

Location: Rear of display.

5.6 Mechanical enclosure

Function: provides support for internal components and EMI cage

- Rugged.
- Material: Aluminum
- Designed to pass IP67
- The enclosure will be powder coated

5.6.1 Front Bezel

Material Aluminum

Color: Black

5.7 Connectors and I/O

Connector Location: To be located on the back of the monitor facing the rear unless otherwise noted.

5.7.1 I/O connector – LX1250TI

Manufacture: Glenair; Mighty Mouse

Part number: 801-011-07M13-37PA

Description 37 pin, round

Recommended Mating connector: 801-007-16M13-37SA

Pin	Description	Pin	Description	Pin	Description
4	Audio in	23	RX2-	17	Gnd Logic 4
3	Audio out	16	RX2+	20	H plug detect
2	H- sync VGA	25	DVI VGA SCL	19	+5 V DVI
1	V- sync VGA	24	DVI VGA SDA	34	12 V power Backlight
30	All-in-one	11	RX1-	35	12 V power Logic
31	All-in-one	10	RX1 +	36	GND Logic
26	USB - downstream	12	RX0+	29	GND Backlight
27	USB + downstream	13	RX0-	33	USB -
28	USB power downstream	9	RXC-	32	USB +
21	USB gnd downstream	15	RXC+	22	USB power
18	VGA blue	7	Gnd Logic 1	37	USB GND
6	VGA Green	5	Gnd Logic 2		
8	VGA red	14	Gnd Logic 3		

5.7.1 I/O Connectors –LX1251TI

Power

Manufacture: LTW

Part number: LTWCD-07MMS-LC7001 and mating LTWCD-07BFFA-LL7001

Description: 7 pin IP-68 rated, locking

VGA

Manufacture: LTW

Part number: LTWHDB-15PFFP-SA8001 and mating LTWHDB-15MMA-SL7001

Description: HD-SUB 15 pin, IT-68 rated

Pin	Description	Pin	Description	Pin	Description
	Power	5	GND		USB
1	Blue-8-30VDC To Inverter	6	Red GND	5	Shield
2	Orange-Ground To Inverter	7	Green GND	4	Black
3	Yellow-8-30VDC To Inverter	8	Blue GND	3	Green
4	Red-Bezel Switch Connector	9	+5 VDC	2	White
5	Brown-Bezel Switch Connection No 2	10	S GND	1	Red
6	Green-8-30VDC To Video Board	11	IDO		
7	White-Ground to Video Board VGA	12	SDA DDC		
	VGA	13	H Sync		
1	Red Video	14	V Sync		
2	Green Video	15	SCL DDC		
3	Blue Video				
4	RES				

USB

Manufacture: LTW

Part number: LTWUB-20PMFP-SC8002

Description: USB, B TYPE, Female, IP-68 rated

6 Physical Specifications

6.1 Optical requirements

6.1.1 Luminance through touchscreen:

650 cd/m2 (nits) typical screen center luminance

400 cd/m2 (nits) minimum screen center luminance

6.1.2 Maximum luminance at full dimming

Less than 5 (nits) screen center luminance

6.1.3 Uniformity

Per LCD spec at full brightness. Maximum/Minimum 1.5 typical

Measured: Non-uniformity for white screen is 32% defined as = $(1 - \min / \max)$

6.1.4 Contrast

Per LCD Spec and standard indoor brightness

Measured: 600:1 typical, min = 300:1 screen center

6.1.5 High ambient contrast

Per Mil-Std-85762A Greater than 7:1 at 8000 fc

Measured: CR = or > 11:1 with daylight (diffused) at 8,000 fc. CR = or > 3.5 for glare source of 2000 fL. (measured at 30° to normal)

6.2 Power requirements

The LX12 will be powered from a vehicle 12 or 24 volt system with wide voltage ranges and transient conditions.

6.2.1 Voltage Range

8 to 32 V, 12 V nominal.

6.2.2 Voltage Transients

Protected against voltage transients above +/-30V for 100ms

6.2.3 Reverse polarity protection

The display shall have reverse polarity protection as long as there is a slow blow fuse for power

12 V use fuse 2A

24 V use fuse 1A

6.2.4 Maximum Power Consumption

Maximum: <10 W @ 12 or 24V

Typical power consumption: 7.7W @ 12 or 24V

6.2.5 Power consumption in standby Power (LED amber)

2.5 W @ 12 or 24V typical.

3.5 W @ 12 or 24V with USB

6.3 Mechanical Outline

6.4 Preliminary dimensions

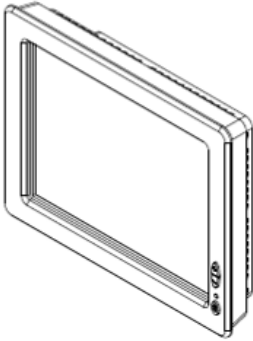
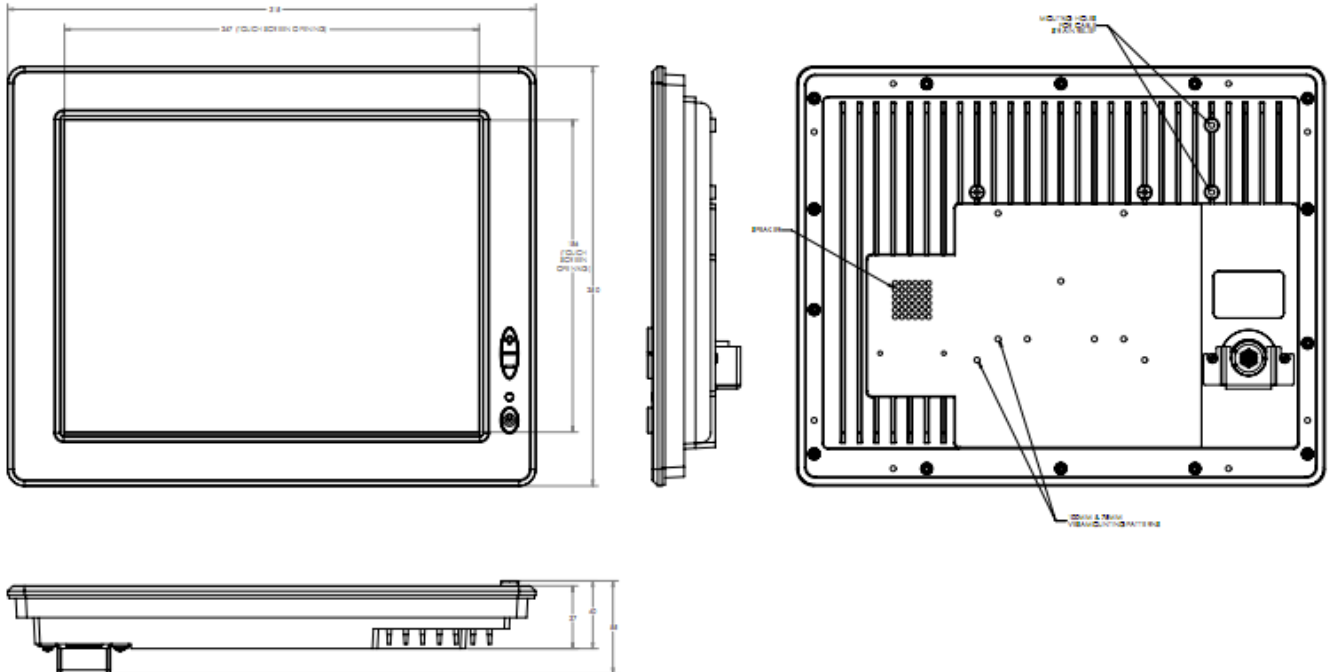


Figure 2: Outline Drawing



6.5 VESA Mount

A VESA mount feature must be included on the LX1250TI, located on the back cover.

Standard 100 and 75 mm VESA mount M4 x .7 threaded hole pattern. The holes shall be blind.

Additional M4 threaded mounting or cable management locations on rear of display also included to support vertical cable routing.

See Figure 2: Outline Drawing.

6.6 Weight

Weight target <5.5lbs.

6.7 Color

6.7.1 Monitor Bezel and Back Chassis

Powder coated Black

6.7.2 Button color

Background BLACK Pantone 426C

6.8 Product Graphics

6.8.1 Product Branding Graphics

Location: None, except 997-5853-00LF

Size: Customer defined

Will add special graphics for set up fee and minimum order QTY's.

6.8.2 Product Model Name

Will add special product names for setup fee & minimum order QTY's

Location: Customer defined

Size: Customer defined

6.8.3 Button Graphics

Power Button



Brightness Up

"+"

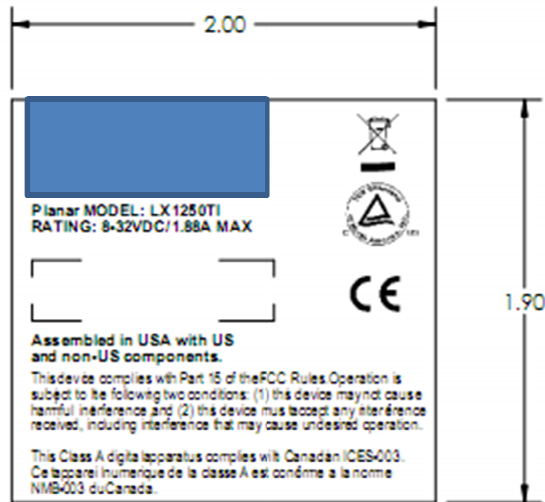
Brightness Down

"_"

6.8.4 Product Label Requirements

Location: Rear

Sample rating label from 997-5853-00LF product.



Replace box with information for Planar or OEM .

Rating Label: Below is the minimum Content:

Model Number: LX1250TI or LX1251TI (depending on PN#)

Serial Number: Format DDDYYXXXX

Barcode of Serial Number

Power Requirements

Regulatory Marks: CE, FCC,

Assembled in USA with US & Non-US components.

Manufacturing date code – in serial number

Planar Part Number and Revision level (e.g., 997-5853-00LF)

WEEE Trash bin

Color: Silver lettering on black label

Size: 14 point

Durability: Label will be tamper resistant and be difficult to remove

Serial #, Barcode & PN# Labels are must be at least 6 point font, black text on white label.

NOTES: No mercury (Hg) labeling required due to LED back lighting.

7 Cosmetic Defects, Viewing Area of Display Screen

The Cosmetic specification for the LX1250TI will follow the Touchscreen glass and AMLCD cosmetic specifications.

No foreign articles are allowed within the optical bond.

See Appendix A

8 Cosmetic Defects, External Surfaces

The monitor chassis shall follow Planar document 002-0112-00.

All labels must be attached squarely in their designated locations.

9 Shipping Box

- Product must not test to levels beyond 50G during ISTA 2A tests.
- Conform to ISTA-2A (32 inch drop)
- Planar labeling on box
- Package will be designed to fit maximum units per container.

10 Shipping box label

- Planar part number
- Planar model number
- Planar Serial number.

11 Maintenance Requirements/Service Support

11.1 Service Requirements

The LX1250TI requires no routine maintenance.

11.2 Service BOM

Service BOM provided on request.

12 Environmental Specifications

12.1 Temperature

Operating Temperature	-20° C to + 60° C (-4° to 140° F)
Storage Temperature	-20° C to + 85° C (-4° to 185° F)
Operating Survival Temp Range	-40° C to + 70° C

12.2 Humidity

Operating: MIL-STD-810F (95% RH with 20° to 60° C temperature cycle for 11 days)

12.3 Altitude

Operating: 15K ft (IEC 60068 PT2-13, 4hr)
 Non-operating: 30K ft (IEC 60068 PT2-13, 4 hr)

12.4 Vibration

Note: Tests performed with assemblies mounted in a rigid retaining fixture.

Operating (Random):	10-500 Hz, 3.0G rms acceleration, 3 hours per axis
Vibration, Endurance Sine Sweep	100-1100 Hz, 4 Gs rms, 1hr/axis

12.5 Shock

Note: Tests performed with monitor mounded in a rigid retaining assembly.

Operating/Non-operating: 50 g, 11 ms duration, ½ sine, 3 shocks per axis (IEC 60068 PT2-27)

13 Regulatory Compliance

13.1 Electromagnetic Compatibility (EMC)

Must be verified to comply with the following:

13.2 Emissions

- 47 CFR. Part 15, Subpart B, Class A

- CE EMC Directive 2004/108/EC
- EN55022:2006, A1:2000, Class A
- EN61000-3-2:2006 Harmonic Current Emissions
- EN610003-3-3: 1995+ A1:2001 Voltage Flicker
- EN61000-3-3:1995+A1:2001+A2:2005

13.3 Immunity Characteristics

- EN55024: 1998 + A1:2001 + A2:2003
- IEC 61000-4-2: 2008 ESD , 6kV contact and 8 kV air discharge
- IEC 61000-4-3: 2006+A1:2007 Radiated Field Immunity
- IEC 61000-4-4: 2004 - Electrical Fast Transient/Burst Immunity Test
- IEC 61000-4-5: 2005 - Surge immunity test
- IEC 61000-4-6:2008 - Immunity to conducted disturbances, induced by radio-frequency fields
- IEC 61000-4-8:2001 - Power frequency magnetic field immunity test
- IEC 61000-4-11:2004 Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

13.4 Safety

Must be certified to comply with the following:

- IEC/EN 60950-1:2005 Second Edition with country deviations for the US (UL60950-1) and Canada (CAN/CSA-C22.2 No. 60950-1)
- Designed to but not certified for Class 1 Div 2
- Designed and tested to IP67

13.5 RoHS Compliance

Planar guarantees RoHS compliance with on all part numbers ending in LF.

13.6 WEEE compliance

Will comply

13.7 Reliability

The MTBF of the LX1250TI shall be 30,000 hours at 25°C demonstrated by test or calculation, excluding brightness degradation.

14 Included in the Shipping Box

- LX01250TI touch monitor
 - Plastic bag
- For LX1251 (997-6192-00LF) Also included in the box:
- 903-1090-00 (USB)
 - 903-1151-01 (VGA)
 - 903-1152-01 (DC)

15 Shipping Configuration (State of monitor when shipped)

The unit will be shipped in the 'ON' state

Brightness Control: Set to Maximum

16 Product accessories

- Upon customer request

17 Product Specifications Overview

1

Display Type	LCD Active Matrix Flat Panel Display (TFT)
Viewable Size	12.1 inch
Display Viewing Area	246 (W) x 184 (H) mm
Display Color	262 K (6 bit/color)
Touchscreen Type	IR touch
Touchscreen Interface	USB
Touchscreen surface	strengthened glass with AntiGlare
Contrast Ratio (Typical)	600:1
Viewing Angle (Typical) @contrast ratio >10:1	70° -70 ° H /60 ° -60° V
Response Time (Typical)	25 ms
Brightness (Typical)	650 cd/m ² Min
Display Resolution	XGA
Refresh Rate	60 to 68 Hz
Preliminary Dimensions	12.5" W x 10" H x 2.3" D (no connectors)
Preliminary Display Weight	<5.5lbs, 2.5kg
Audio input	Mono 0-1VPP (LX1250TI only)
External Connections	37 pin Military connector
Power Supply	None provided
Power Requirements	8-32 V DC
Power Consumption	<8W typ @ 12V
VESA Compatible/Location	Built-in 75 and 100 mm VESA on monitor back

18 Revision History

REV	ECO	DATE	SECTIONS	DESCRIPTION OF CHANGE
1	-	6-18-09		Initial Distribution.
2		6-25-09		Updated compliance sections.
A	1000743	8-11-10		Initial Revision Release.
B	1002431	9-14-11		Added cables for LX1251TI
C	1003039	2-27-12		Lowered luminance uniformity from(.80 to .68 aka an increase from 1.25 to 1.5) Added minimum luminance spec. of 400 (nits) center screen

19 Appendix A

19.1 AMLCD cosmetic specification

- Planar part number 926-0037-xx references vendor supplied specification.

19.2 Optical bonding cosmetic specification

19.3 Planar defined.

Panel size	< 9"	10" to 13"	14"to 18"	19" to 24"	25" to 29"	30" to 36"	> 37"
Opaque Defect							
< .020"	0	0	1	1	2	2	3
.020" - .030"	0	0	0	0	1	1	1
> .030"	0	0	0	0	0	0	0
Lint							
<.002" x .1"	0	1	2	3	Disregard	Disregard	Disregard
.002"- .003" x .15"	0	0	1	1	2	2	3
.003"- .004" x .1"	0	0	0	1	1	2	3
> .004" x > .04"	0	0	0	0	0	0	0
Bubble/Translucent							
< .020"	1	2	3	3	Disregard	Disregard	Disregard
.020" - .035"	0	0	1	2	2	3	3
.035" - .050"	0	0	0	0	0	1	1
> .050"	0	0	0	0	0	0	0

19.4 Protective cover glass

19.5 Meets 80-50 (scratch – dig) per MIL-PRF-13830B.