LX1250TI & LX1251TI
USER MANUAL

www.planar.com
Preface:
This manual is designed for use with the LX1250TI industrial display. Information in this document has been carefully checked for accuracy; however, no guarantee is given to the correctness of the contents. The information in this document is subject to change without notice.

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USAGE Notice

WARNING – Please do not open or disassemble the product as this may cause electric shock. Doing so will void the warranty.

Precautions
To maximize the life and safe use of your unit, always be sure to follow the warnings, precautions and maintenance recommendations in this user’s guide.

In a Vehicle:
The monitor should be visible to the driver only if it is used for navigation, system control or vehicle information. If the monitor will be used for other purposes, it should be installed in a way that it will only operate while the vehicle is not moving (such as when the parking brake is in use), or so that its display is not visible to the driver. Review all applicable state and local laws and regulations to make sure the monitor is used properly and safely. Avoid using the monitor for extended times while the vehicle is not running, or the monitor could drain the vehicle’s battery.

Cleaning the Monitor:
Always turn off the unit before cleaning. Use a soft cloth moistened with mild detergent, isopropyl alcohol, or window cleaners to clean the display housing. Never use abrasive cleaners, waxes or solvents to clean the unit.

Accessory Cables:
The LX1250TI (PN# 997-6186-00LF) requires a special interface cable. This manual contains information to design the interface cable OR an accessory interface cable can be purchased.

- PN#. 997-5886-00LF GlenAir to VGA, Power, USB & Audio

For remote control: Download USB to RS232 Driver from Planar website at [http://www.planar.com/support/](http://www.planar.com/support/)
Introduction
About Planar’s LX1250TI Rugged Touch Monitor
The LX1250TI is a high-performance, rugged touch monitor intended for demanding environments, such as those inside mining vehicles. The monitor features a 12.1-inch diagonal liquid crystal display with XGA resolution, bright enough to be read in full sunlight. The monitor also includes a buzzer for audio feedback and a sturdy cast aluminum enclosure that can withstand shock and vibration.

Product
This manual applies to product

<table>
<thead>
<tr>
<th>Planar Part Number</th>
<th>Planar Model Name</th>
<th>Description</th>
<th>UPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>997-6186-00LF</td>
<td>LX1250TI</td>
<td>IR touch 12.1” XGA LCD</td>
<td>8 10689 06186 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Market</td>
<td></td>
</tr>
<tr>
<td>997-6192-00LF</td>
<td>LX1251TI</td>
<td>IR Touch 12.1” XGA LCD</td>
<td>8 10689 06192 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Market –VGA IF</td>
<td></td>
</tr>
</tbody>
</table>
Reference Document # 076-0672-00 for detailed drawings.

Front View (Descriptions):
1. Backlight control +
2. Backlight Control –
3. LED:
   - Green When video present;
   - Amber when there is no video signal present and the monitor will go into standby mode.
   - LED remains Amber in Standby Mode
   - Off – no power to display.
All mounting & strain relief holes M4 x 8 mm
Product highlights

- Designed for demanding transportation environment
- Optimized for in cab sunlight viewability
- One button Display/CPU power on/off
- Control of backlight dimming and other OSD functions though 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 enclosure design
- Rugged Aluminum enclosure
- 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 Bezel buttons
- Fanless die cast aluminum chassis with an IP65 design
- 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 environmental impact (no mercury) and to minimize overall monitor depth and weight
- Hazardous materials compliant for international deployment

Features:

- **Brightness control** allows you to easily adjust the display to match ambient light, from full sunlight to night. Even while wearing gloves. The convenient buttons enable quick adjustments.
- The monitor’s **optically bonded** display reduces the effects of reflected light on the display, increasing contrast ratio and read-ability in high ambient lighting conditions.
- The monitor’s **autosync function** eliminates the need for adjusting the monitor for best image. The monitor automatically adjusts to the input signal.
- **HID Compliant IR Touch** screen provides a durable touch environment that allows for operation in all conditions including with gloved hands. HID compliance means no touch drivers required.
- The monitor supports **standard VGA input signals** – native 1024 x 768 (XGA) as well as 800 x 600 (SVGA) and 640x480 VGA.
- The **aluminum enclosure** has a waterproof front and is designed to withstand substantial shock and vibration.
Package Overview
The following items are shipped with the display:
- Monitor
- Quick Start Guide

NOTE: No cables ship with the monitor. Cables are purchased separately.

Installation
Before Installing
Keep the following in mind while installing the monitor.
- The monitor should be visible to the driver only if it is used for navigation, system control or vehicle information. If the monitor will be used for other purposes, it should be installed in such a way that it will only operate while the vehicle is not moving (such as when the parking brake is in use). Review all applicable state and local laws and regulations to make sure the monitor is used properly and safely.
- The installed monitor must not interfere with the driver’s vision.

Installing the LX1250TI monitor consists of three steps:
1. Testing Touch Screen functionality with application software - see page 26.
2. Securely routing the interface cable
3. Mounting the monitor using one of the mounting options available on the back of the display enclosure. - see page 31.
4. Connecting the monitor to the computer and power source - see page 17

Note: The touch sensor is factory tested & calibrated, however different computing environments may require the touch screen to be recalibrated. Windows & Linux tools can be downloaded at:
For Linux Support: http://www.irtouch.com/shtml/2009129110904.shtml

No standard On Screen Display (OSD) buttons are available to the user: All ‘standard’ OSD functionality can be controlled via the remote interface.
The user controls are limited to Backlight +/- & Remote Power buttons.

The All-in-One power button: A power button located on the front of the display functions as a pass though to turn on and off a remote computer. It functions very similar to a laptop computer docking station power button. The button is a Normally Open, Single Pull Single Throw Switch. It is not designed for current carrying switching.
When there is no video detected, the monitor will go into standby mode. The LED will remain in Amber state in 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.

**Electrical & SW Installation:**

Prior to end unit installation verify display works with computing system.

1. Power up display:
   a. Display requires 9-32V DC with a maximum of 1.88A
2. Test touch functionality. Connect cable to display and apply power.
3. Connect Display to a computer.
4. Display should auto sync to source signal. Ensure source meets supported display resolutions (XGA, SVGA, VGA).
5. Connect USB touch screen to display.
   a. If Windows PC, PC should auto detect and configure touch sensor as HID compliant device.
6. Verify touch response and accuracy.
   a. If Touch alignment is reversed install Touch calibration tools

**NOTE:** Touch screen is calibrated at factory. Some computer interfaces may require recalibration at installation. Regular Calibration is not required.

7. Once monitor is verified working with PC proceed to mechanical installation.

**Mechanical Installation:**

Display may be mounted in several configurations.

a) Panel mounting
b) VESA 100 or 75mm
c) RAM 34.5mm x 40mm Triangle mount.

If Vibration is a concern, consider mounting display using vibration dampening mount.

1. Choose mounting option & Location
2. Refer to dimensions figure for mounting holes and locations.
3. Attach display to mounting hardware.
4. Rout cable.

**NOTE:** GlenAir cable should be mounted with strain relief to avoid excessive loading or torquing of the cable connectors. Improper cable installation will void warranty.
Using the display:
1. Once installed and cabled. The display is ready to use.
2. Apply system power.
3. Display & Touch screen are active

Using the Touchscreen
1. The LX1200TI touchscreen allows you to operate the computer by touching the screen with a finger or stylus, rather than using a mouse or keyboard.
2. Navigating the Touchscreen
   • To click an item, tap the item once.
   • To double-click an item, tap the item twice rapidly.
   • To drag an item, touch the item, and then drag it along the screen to the new location.
3. To move the cursor, touch the screen and move the cursor as needed.

Using Remote OSD features:
This is an advanced feature and should only be attempted by qualified individuals.
The display allows for remote PC management. The display is controlled via the USB interface. The controlling PC requires a virtual COM port to operate the display. Drivers for the Display Virtual comport can be found here:
http://www.ftdichip.com/Drivers/VCP.htm
http://www.ftdichip.com/Drivers/D2XX.htm

Commands for control are as follows:

2.1 Display Control Serial Commands/Queries
The display must support the following commands and queries using a protocol compatible with the Pixel works PW Host protocol.
Support required for Phase II and beyond.
<table>
<thead>
<tr>
<th>Function</th>
<th>Function Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power On</td>
<td>Command</td>
<td>Turn on backlight and AMLCD (assuming video is present)</td>
</tr>
<tr>
<td>Power Off</td>
<td>Command</td>
<td>Turn off backlight and AMLCD</td>
</tr>
<tr>
<td>Set Image Scale</td>
<td>Command</td>
<td>Display changes to the desired image scale setting: One to One, Fill All, Fill to aspect Ratio, Fill to 16:9 Linear</td>
</tr>
<tr>
<td>Set Contrast</td>
<td>Command</td>
<td>Adjusts the contrast of the display</td>
</tr>
<tr>
<td>Set Brightness</td>
<td>Command</td>
<td>Adjusts the color brightness of the display (note: not an adjustment of the backlight brightness)</td>
</tr>
<tr>
<td>Set Color Temperature</td>
<td>Command</td>
<td>Display changes to the desired color temp setting: 5000C, 6500C, 7300C, or 9300C</td>
</tr>
<tr>
<td>Set Gamma</td>
<td>Command</td>
<td>Display changes to the desired gamma setting (adjusts gray scale separation): Linear or CRT</td>
</tr>
<tr>
<td>Restore Default Settings</td>
<td>Command</td>
<td>Display restores all adjustable parameters back to the factory settings (see table below for default values)</td>
</tr>
<tr>
<td>Get Power Status</td>
<td>Query</td>
<td>Display response indicates whether display is on, off, or on with no video present</td>
</tr>
<tr>
<td>Read ID</td>
<td>Query</td>
<td>Display responds by sending: Display model Serial number Date of manufacture (year, month, day) Firmware version</td>
</tr>
<tr>
<td>Get Image Scale</td>
<td>Query</td>
<td>Display sends the current image scale setting</td>
</tr>
<tr>
<td>Get Contrast Setting</td>
<td>Query</td>
<td>Display sends the current contrast setting</td>
</tr>
<tr>
<td>Get Brightness Setting</td>
<td>Query</td>
<td>Display sends the current color brightness setting</td>
</tr>
<tr>
<td>Get Color Temp Setting</td>
<td>Query</td>
<td>Display sends the current color temp setting</td>
</tr>
<tr>
<td>Get Gamma Setting</td>
<td>Query</td>
<td>Display sends the current gamma setting</td>
</tr>
<tr>
<td>Set Display ID</td>
<td>Command</td>
<td>Sets ID of display for use in multi-display installations.</td>
</tr>
<tr>
<td>Get Display ID</td>
<td>Command</td>
<td>Gets ID of display being communicated with</td>
</tr>
<tr>
<td>Set Backlight Brightness</td>
<td>Command</td>
<td>Sets backlight brightness (value 0-100, 25 Nit to Max LCD brightness)</td>
</tr>
<tr>
<td>Get Backlight Brightness</td>
<td>Query</td>
<td>Display Sends the current backlight brightness setting</td>
</tr>
</tbody>
</table>
2.1.1 Default Settings for Adjustable Parameters

- The following table defines the factory set values for the adjustable parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>On</td>
</tr>
<tr>
<td>Image Scale</td>
<td>Fill All</td>
</tr>
<tr>
<td>Contrast</td>
<td>150 (Range 0-255)</td>
</tr>
<tr>
<td>Brightness</td>
<td>150 (Range 0-255)</td>
</tr>
<tr>
<td>Color Temperature</td>
<td>7300C</td>
</tr>
<tr>
<td>Gamma</td>
<td>Linear</td>
</tr>
<tr>
<td>Backlight brightness*</td>
<td>255</td>
</tr>
</tbody>
</table>

*Backlight retains previous brightness settings.

Auto Power On

The display automatically turns on when power is restored after a power failure and maintains all operational settings. Note: “on/off” refers to the LCD panel and the backlight inverter.

Standby Mode

If no video is present, after 10 seconds, the display powers off (will power back on once video is detected.)

No Burn-in during Signal Loss

The AMLCD will not maintain any static self-generated images (such as a “no video” text box when video is not present), thus avoiding image burn in.

2.1.2 Details of Command Implementation

All serial commands must be compatible with the Pixel works PW Host protocol defined in the Pixel works application note AN#77. Refer to AN #77 for protocol details.

The physical layer used for data exchange is RS232. No handshaking is used. Pin 3 of the DB-9 connector on the display is data transmitted from the host (Tx); pin 2 is data transmitted from the display and received by the host (Rx).
An explanation of the content transmitted to the display…

Tx: [line 1] BE EF 03 19 00 HH HH II JJ JJ CC CC FF FF FF
Tx: [line 2] KK 00 00 00 CC CC CC CC CC CC CC CC CC CC CC
BE EF – signifies the beginning of the transmission (always BE EF)
03 – indicates the packet type (typically 03 in this application)
19 00 – indicates the packet length (typically 19 00 in this application)
HH HH – gives the calculated CRC checksum for the transmission
II – gives the operation type
JJ JJ – gives the operation name (least significant byte is on the left)
KK – gives the operation value
All CC, FF, or 00 – not applicable… always CC, FF or 00 as indicated

An explanation of the content received from the display…

Rx: [line 1] 1E BE EF 03 19 00 00 00 XX XX XX XX 00 FF FF FF
Rx: [line 2] FF KK 00 00 00 CC CC CC CC CC CC CC CC CC CC CC
Rx: [line 3] CC
1E – is the acknowledgement indicating that the transmission has been successfully received
KK – gives the return value, if any, called for by the previous transmission
Everything else – “don’t care”

In the examples of data transmitted to the display and the responses from the display:
Operation names are shown in blue
Operation types are shown in green
Operation values, either transmitted or received, are shown in red

A. Power Command

Operation name: op_FORCE_DPMS_STATE

Operation types: SET or GET

Values:
dsON = LCD and inverter are powered on (inverter will power off if no video present)
dsSTANDBY = LCD and inverter off (state entered when no video Hsync is present)
dsSUSPEND = LCD and inverter off (state entered when no video Vsync is present)
dsOFF = if no video, LCD and inverter are powered off (will turn on when video returns)
dsSOFTPOWER = LCD and inverter are powered off regardless of video status

**Factory default value** dsON

**Typical uses:**
Use dsON and dsSOFTPOWER to turn the display on and off, respectively.

------------------------------------------Typical header file------------------------------------------

**op_FORCE_DPMS_STATE = 5125 // 5125 = x1405**

typedef enum {
    dsON = 0,
    dsSTANDBY = 1,
    dsSUSPEND = 2,
    dsOFF = 3,
    dsSOFTPOWER = 4,
} eDPMSSTATE;

----------------------------------------Examples of data streams----------------------------------------

**op_Force_DPMS_State: turn on display**
Tx: [0x000] BE EF 03 19 00 DD 91 01 05 14 CC CC FF FF FF
Tx: [0x010] 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 05 14 01 00 FF FF FF
Rx: [0x010] FF 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC
op_Force_DPMS_State: place display into Suspend state
Tx: [0x000] BE EF 03 19 00 4D 50 01 05 14 CC FF FF FF FF
Tx: [0x010] 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 05 14 01 00 FF FF FF
Rx: [0x010] FF 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

op_Force_DPMS_State: place display into Softpower state
Tx: [0x000] BE EF 03 19 00 1E 93 01 05 14 CC FF FF FF FF FF
Tx: [0x010] 04 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 05 14 01 00 FF FF FF
Rx: [0x010] FF 04 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

query op_Force_DPMS_State: result = display is in On state
Tx: [0x000] BE EF 03 19 00 96 6E 02 05 14 CC FF FF FF FF
Tx: [0x010] 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 02 05 14 01 00 FF FF FF
Rx: [0x010] FF 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

B. DPMS Enable Command

Operation name: op_DPMS_ENABLE
Operation types: SET
Values: enabled or not enabled
Factory default: enabled
Typical use: Typically not used; set to “not enabled” to force the display to stay powered on when video is not detected

--------------------------Typical header file--------------------------

op_DPMS_ENABLE = 5126,

typedef enum {
    enNotEnabled = 0,
    enEnable = 1,
} eENABLE;
---Examples of data streams---

op_DPMS_ENABLE: Enabled
Tx: [0x000] BE EF 03 19 00 B2 B4 01 06 14 CC CC FF FF FF
Tx: [0x010] 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 06 14 01 00 FF FF FF
Rx: [0x010] FF 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

op_DPMS_ENABLE: NotEnabled
Tx: [0x000] BE EF 03 19 00 22 75 01 06 14 CC CC FF FF FF FF
Tx: [0x010] 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 06 14 01 00 FF FF FF
Rx: [0x010] FF 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

C. Contrast Command

Operation name: op_CONTRAST
Operation types: SET, GET, INCREMENT, or DECREMENT
eTarget: always = 0 (wnWIN_MAIN)
Values: 64 to 192 (0x40 to 0xC0)
Factory default: 128

---Typical header file---

op_CONTRAST = 16388 // 16388 = x4004

typedef enum {
    wnWIN_MAIN = 0,
    wnWIN_PIP = 1,
    wnWINDOW_COUNT = 2,
    wnCURRENT_WINDOW = 3,
    wnINVALID_WINDOW = 4,
} eWINDOW;
set op_CONTRAST to 0x6F
Tx: [0x000] BE EF 03 19 00 A7 3F 01 04 40 CC CC 00 00 00 00
Tx: [0x010] 6F 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 04 40 01 00 00 00 00
Rx: [0x010] 00 6F 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

decrement op_CONTRAST
Tx: [0x000] BE EF 03 19 00 A6 16 04 04 40 CC CC 00 00 00 00
Tx: [0x010] CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 04 04 40 01 00 00 00 00
Rx: [0x010] 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

query op_CONTRAST: result = 0x6E
Tx: [0x000] BE EF 03 19 00 30 AD 02 04 40 CC CC 00 00 00 00
Tx: [0x010] 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 02 04 40 01 00 00 00 00
Rx: [0x010] 00 6E 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

D. Brightness Command (controls color intensity; not a backlight control)

Operation name: op_BRIGHTNESS
Operation types: SET, GET, INCREMENT, or DECREMENT
eTarget: always = 0 (wnWIN_MAIN)
Values: 0 to 255 valid
Factory default: 128

-------------Typical header file-------------------

op_BRIGHTNESS = 16387

typedef enum {
    wnWIN_MAIN = 0,

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wnWIN_PIP        =  1,
wnWINDOW_COUNT  =  2,
wnCURRENT_WINDOW =  3,
wnINVALID_WINDOW =  4,
} eWINDOW;

------------------------Examples of data streams------------------------

set op_BRIGHTNESS to 0xC8
Tx: [0x000] BE EF 03 19 00 C7 93 01 03 40 CC CC 00 00 00 00
Tx: [0x010] C8 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 03 40 01 00 00 00 00
Rx: [0x010] 00 C8 00 00 00 CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

increment op_BRIGHTNESS
Tx: [0x000] BE EF 03 19 00 E2 2A 03 03 40 CC CC 00 00 00 00
Tx: [0x010] CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC 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Typical header file

\begin{verbatim}
op_COLOR_TEMP = 17415

typedef enum {
   ct9300K  = 0,
   ct7300K  = 1,
   ct6500K  = 2,
   ct5000K  = 3,
   ctUSER1  = 4,
   ctLASTCOLORTEMP = 5,
} eCOLORTEMPLIST;
\end{verbatim}

Examples of data streams

\begin{verbatim}
set op_COLOR_TEMP = ct5000K
Tx: [0x000] BE EF 03 19 00 79 91 01 07 44 CC CC FF FF FF
Tx: [0x010] 03 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 07 44 01 00 FF FF FF
Rx: [0x010] FF 03 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

query op_COLOR_TEMP: result = ct5000K
Tx: [0x000] BE EF 03 19 00 C3 2E 02 07 44 CC CC FF FF FF FF
Tx: [0x010] 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 02 07 44 01 00 FF FF FF
Rx: [0x010] FF 03 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC
\end{verbatim}
F. Gamma Command

Operation name: op_GAMMA_DISCRETE
Operation types: SET or GET
Values: gtLINEAR, gtCRT
Factory default: gtLINEAR

------------------------------Typical header file-------------------------------

op_GAMMA_DISCRETE = 17416

typedef enum {
    gtLINEAR = 0,
    gtCRT    = 1,
} eGAMMATABLELIST;

------------------------------Examples of data streams-------------------------------

set op_GAMMA_DISCRETE = gtLINEAR
Tx: [0x000] BE EF 03 19 00 48 A0 01 08 44 CC CC FF FF FF
Tx: [0x010] 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 08 44 01 00 FF FF FF
Rx: [0x010] FF 00 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

set op_GAMMA_DISCRETE = gtCRT
Tx: [0x000] BE EF 03 19 00 D8 61 01 08 44 CC CC FF FF FF
Tx: [0x010] 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x000] 1E BE EF 03 19 00 00 00 01 08 44 01 00 FF FF FF
Rx: [0x010] FF 01 00 00 00 CC CC CC CC CC CC CC CC CC CC CC CC CC CC CC
Rx: [0x020] CC

G. Image Scale Command

Operation name: op_Scaler_mode

Operation types: SET or GET

Values:
smONE_TO_ONE = data is shown as received; if smaller than screen, image will be centered; if larger than screen, the image will be upper left justified and truncated as required

smFILL_ALL = data will be stretched/compressed as required to fill the entire screen

smFILL_TO_ASPECT_RATIO = data will be stretched/compressed as needed to fill as much of the screen as possible while maintaining original image aspect ratio; so a 16:9 input on a 4:3 screen would result in black bars at the top and bottom of the screen

smFILL_TO_16X9_LINEAR = stretch content to fill as much screen as possible while maintaining a 16x9 aspect ratio

Factory default: smFILL_ALL

-------------------------Typical header file-------------------------

op_SCALER_MODE = 17430

typedef enum {
    smONE_TO_ONE = 0,
    smFILL_ALL = 1,
    smFILL_TO_ASPECT_RATIO = 2,
    smFILL_TO_16X9_LINEAR = 3,
    smFILL_NL_LETTERBOXED = 4,
    sm4X3LB_TO_4X3 = 5,
    sm4X3LBST_TO_4X3 = 6,
    sm4X3A_TO_4X3 = 7,
    sm4X3_TO_16X9 = 8,
    sm4X3LB_TO_16X9 = 9,
    sm4X3LBST_TO_16X9 = 10,
    smNORMAL = 11,
    smWIDE = 12,
    smZOOM = 13,
    smANAMORPHIC = 14,
    smZOOM2 = 15,
} eSCALEMODE;

H. Display ID Commands
Troubleshooting the Monitor
If you are experiencing trouble with the LX1200TI monitor, refer to the following. If the problem persists, please contact your local dealer or our service center.

Problem: No image appears on screen
• Make sure the brightness is not turned all the way down.
• Make sure all data and power cables are properly connected to the monitor and to the computer and power supply - see page17 for details.
• Make sure the pins on the cables and connectors are not crooked or broken.
• Make sure the computer is functioning properly, and has not entered power-saving mode. (You may also want to disable the computer’s power-saving feature.)

Problem: Partial image or incorrectly displayed image
• Make sure the computer’s image resolution is set to one of these resolutions: 1024 x 768 (XGA), 800 x 600 (SVGA) or 640 x 480 (VGA).

Problem: Image is scrolling
• Check and make sure the VGA signal cable (or adapter) is securely connected at both ends.

Problem: No sound
• Make sure the volume is not turned completely down.
• Make sure the audio cable is securely connected at both ends.
• Make sure the computer’s audio is not muted.

Problem: The monitor does not appear to respond to the touchscreen
• Make sure the USB cable to the computer is securely connected at both ends.
**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.

**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®

**Cooling**

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

**Functional Specifications**

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

**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.

**USB dimming control**

It is possible to access OSD functions via USB interface. To control display remotely, install Virtual COM Port drivers.

http://www.ftdichip.com/Drivers/VCP.htm

http://www.ftdichip.com/Drivers/D2XX.htm

**Auto Sync**

The display will Autosync to video if both ‘+’ and ‘-‘ are pushed at the same time
**Volume Control**
None: through OS control only. Only available on LX1250TI, LX1251, does not have Audio.

**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.

**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.

** (+) Button**
This button increases brightness of the backlight

** (-) Button**
This button decreases the brightness of the backlight

**LED status light**
The Monitor shall have a single LED for video status.

** LED green**
The LED Shall be green with there is video present

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

**Module Specifications**
This section describes the internal components of this monitor.
(Refer to Block Diagram in the Product Description Section 1.4)

** AMLCD**
Industrial grade with high bright LED backlight

**Touchscreen**
Infrared type: sensors and controller located in bezel

** 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.

**Touchscreen interface**
USB - HID

**Touchscreen resolution**
4096 X 4096

**Touchscreen driver**
Windows XP, Linux kernel (Fedore Code 4) support
**Touchscreen controller**
Built into touch screen frame
Externally accessible for firmware updates

**Video Controller board**
Requires standard VGA
Auto sync on power up and any video mode change. Video Modes supported:

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Vertical refresh rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1024*768</td>
<td>60 Hz</td>
</tr>
<tr>
<td>800*600</td>
<td>60 Hz</td>
</tr>
<tr>
<td>640*480</td>
<td>60 Hz</td>
</tr>
<tr>
<td>More available</td>
<td></td>
</tr>
</tbody>
</table>

- 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.

**Pezio function – LX1250TI only**
Function: provides audio warning signals
Location: Rear of display.
To use Buzzer:
Apply a 500hz-1khz, 500mv-1V sign wave to the Audio Input signals. Duration of the signal controls perceived volume (1ms minimum @1khz, 2ms minimum @500hz).

**Mechanical enclosure**
Function: provides support for internal components and EMI cage
- Rugged.
- Material: Aluminum
- Designed for IP67
- Powder coated enclosure

**Front Bezel**
Material Aluminum
Color: Black

**Connectors and I/O**
Connector Location: To be located on the back of the monitor facing the rear unless otherwise noted.

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

### 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  
Reference Planar mating cable PN#:  
Or LTW Mating cable PN#

**VGA**

Manufacture: LTW  
Part number: LTWHDB-15PFFP-SA8001 and mating LTWHDB-15MMA-SL7001  
Description: HD-SUB 15 pin, IT-68 rated
USB

Manufacture: LTW
Part number: LTWUB-20PMFP-SC8002
Description: USB, B TYPE, Female, IP-68 rated

**Physical Specifications**

**Optical requirements**

**Maximum luminance through touchscreen:**
650 cd/m² (nits) typical

**Maximum luminance at full dimming**
Less than 5 nits.

**Uniformity**
Per LCD spec at full brightness. Maximum/Minimum 1.25 T typical
Measured: Non-uniformity for white screen is 26% defined as $= (1 – \text{min} / \text{max})$

**Contrast**
Per LCD Spec and standard indoor brightness
Measured: 600 typical, min = 300

**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)

**Voltage Range**
8 to 32 V, 12 V nominal.

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<tr>
<th>Pin</th>
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<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
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<tbody>
<tr>
<td></td>
<td><strong>Power</strong></td>
<td>5</td>
<td>GND</td>
<td>6</td>
<td>Red GND</td>
</tr>
<tr>
<td>1</td>
<td>Blue-8-30VDC To Inverter</td>
<td>6</td>
<td>Red GND</td>
<td>5</td>
<td>Shield</td>
</tr>
<tr>
<td>2</td>
<td>Orange-Ground To Inverter</td>
<td>7</td>
<td>Green GND</td>
<td>4</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>Yellow-8-30VDC To Inverter</td>
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<td>Blue GND</td>
<td>3</td>
<td>Green</td>
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<td>Red-Bezel Switch Connector</td>
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<td>+5 VDC</td>
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<td>S GND</td>
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<td>6</td>
<td>Green-8-30VDC To Video Board</td>
<td>11</td>
<td>IDO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>White-Ground to Video Board VGA</td>
<td>12</td>
<td>SDA DDC</td>
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<td></td>
<td><strong>VGA</strong></td>
<td>13</td>
<td>H Sync</td>
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<tr>
<td>1</td>
<td>Red Video</td>
<td>14</td>
<td>V Sync</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Green Video</td>
<td>15</td>
<td>SCL DDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Blue Video</td>
<td>1</td>
<td>Red Video</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RES</td>
<td>2</td>
<td>Green Video</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LX1250TI User Manual
Voltage Transients
Protected against voltage transients above +/-30V for 100ms

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

Maximum Power Consumption
Maximum: <10 W @ 12 or 24V
Typical power consumption: 7.7W @ 12 or 24V

Power consumption in standby Power (LED amber)
2.5 W @ 12 or 24V typical.

Mechanical Outline
Preliminary dimensions

Figure 2: Outline Drawing
**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.

**Weight**
Weight <5.5lbs.

**Shipping Box**
- Conforms to ISTA-2A (32 inch drop)

**Maintenance Requirements/Service Support**

**Service Requirements**
The LX1250TI requires no routine maintenance.

**Service BOM**
Service BOM provided on request.

**Environmental Specifications**

**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

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

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

**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

**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)
Regulatory Compliance

Electromagnetic Compatibility (EMC)
Must be verified to comply with the following:

Emissions
- 47 CFR. Part 15, Subpart B, Class A
- CE EMC Directive 2004/108/EC
- EN61000-3-2:2006 Harmonic Current Emissions

Immunity Characteristics
- IEC 61000-4-2: 2008 ESD, 6kV contact and 8 kV air discharge
- 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

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

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

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

Included in the Shipping Box
- LX01250TI touch monitor

Shipping Configuration (State of monitor when shipped)
The unit will be shipped in the ‘ON’ state
Brightness Control: Set to Maximum

Product accessories
- Upon customer request
## Product Specifications Overview

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Type</td>
<td>LCD Active Matrix Flat Panel Display (TFT)</td>
</tr>
<tr>
<td>Viewable Size</td>
<td>12.1 inch</td>
</tr>
<tr>
<td>Display Viewing Area</td>
<td>246 (W) x 184 (H) mm</td>
</tr>
<tr>
<td>Display Color</td>
<td>262 K (6 bit/color)</td>
</tr>
<tr>
<td>Touchscreen Type</td>
<td>IR touch</td>
</tr>
<tr>
<td>Touchscreen Interface</td>
<td>USB</td>
</tr>
<tr>
<td>Touchscreen surface</td>
<td>strengthened glass with AntiGlare</td>
</tr>
<tr>
<td>Contrast Ratio (Typical)</td>
<td>600:1</td>
</tr>
<tr>
<td>Viewing Angle (Typical) @contrast ratio &gt;10:1</td>
<td>70° -70 ° H /60 ° -60° V</td>
</tr>
<tr>
<td>Response Time (Typical)</td>
<td>25 ms</td>
</tr>
<tr>
<td>Brightness (Typical)</td>
<td>650 cd/m² Min</td>
</tr>
<tr>
<td>Display Resolution</td>
<td>XGA</td>
</tr>
<tr>
<td>Refresh Rate</td>
<td>60 to 68 Hz</td>
</tr>
<tr>
<td>Preliminary Dimensions</td>
<td>12.5” W x 10” H x 2.3” D (no connectors)</td>
</tr>
<tr>
<td>Preliminary Display Weight</td>
<td>&lt;5.5lbs, 2.5kg</td>
</tr>
<tr>
<td>Audio input</td>
<td>Mono 0-1VPP (LX1250TI only)</td>
</tr>
<tr>
<td>External Connections</td>
<td>37 pin Military connector</td>
</tr>
<tr>
<td>Power Supply</td>
<td>None provided</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>8-32 V DC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>&lt;8W typ @ 12V</td>
</tr>
<tr>
<td>VESA Compatible/Location</td>
<td>Built-in 75 and 100 mm VESA on monitor back</td>
</tr>
<tr>
<td>Protective cover glass</td>
<td>Meets 80-50 (scratch – dig) per MIL-PRF-13830B.</td>
</tr>
</tbody>
</table>