Planar Engineering Specification
023-0498-00 Rev. C

12.1 Monitor for Extreme Environments; LX1250TI & LX1251TI

September 14, 2011
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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

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

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 though 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 (wring 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 though 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:

<table>
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<th>Vertical refresh rate</th>
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<tr>
<td>1024*768</td>
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<td>800*600</td>
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<tr>
<td>640*480</td>
<td>60Hz</td>
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<tr>
<td></td>
<td>More available</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.
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
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<td>3</td>
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<td>DVI VGA SCL</td>
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<td>12 V power Backlight</td>
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**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
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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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-20°C to + 60°C (-4°F to 140°F)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20°C to + 85°C (-4°F to 185°F)</td>
</tr>
<tr>
<td>Operating Survival Temp Range</td>
<td>-40°C to + 70°C</td>
</tr>
</tbody>
</table>

12.2 Humidity

Operating: MIL-STD-810F (95% RH with 20°C 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 mounted 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
• EN61000-3-3: 1995+ A1:2001 Voltage Flicker

13.3 Immunity Characteristics
• 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 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

<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>
</tbody>
</table>

## 18 Revision History

<table>
<thead>
<tr>
<th>REV</th>
<th>ECO</th>
<th>DATE</th>
<th>SECTIONS</th>
<th>DESCRIPTION OF CHANGE</th>
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<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>6-18-09</td>
<td>1-6-18</td>
<td>Initial Distribution.</td>
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<tr>
<td>2</td>
<td>6</td>
<td>6-25-09</td>
<td>7-18</td>
<td>Updated compliance sections.</td>
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<tr>
<td>A</td>
<td>1000743</td>
<td>8-11-10</td>
<td>7-18</td>
<td>Initial Revision Release.</td>
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<tr>
<td>B</td>
<td>1002431</td>
<td>9-14-11</td>
<td>7-18</td>
<td>Added cables for LX1251TI</td>
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<tr>
<td>C</td>
<td>1003039</td>
<td>2-27-12</td>
<td>7-18</td>
<td>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</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Panel size</th>
<th>&lt; 9”</th>
<th>10” to 13”</th>
<th>14” to 18”</th>
<th>19” to 24”</th>
<th>25” to 29”</th>
<th>30” to 36”</th>
<th>&gt; 37”</th>
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</thead>
<tbody>
<tr>
<td>Opaque Defect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; .020”</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<td>.020” - .030”</td>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>&gt; .030”</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>Lint</td>
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<td>&lt;.002” x .1”</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>Disregard</td>
<td>Disregard</td>
<td>Disregard</td>
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<td>.002”-.003” x .15”</td>
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<td>2</td>
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<td>0</td>
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<td>1</td>
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<td>3</td>
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<tr>
<td>&gt; .004” x &gt; .04”</td>
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<tr>
<td>Bubble/Transluscent</td>
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<tr>
<td>&lt; .020”</td>
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<td>2</td>
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<td>Disregard</td>
<td>Disregard</td>
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<td>.020” - .035”</td>
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<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>&gt; .050”</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

19.4 Protective cover glass

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