SPECIFICATION

easyTOUCH DISPLAY - STARTER KIT

13.3” - FHD – eMotion ST1:3

Version: 1.0
Date: 08.06.2020

Note: This specification is subject to change without prior notice
Table of Contents

1. easyTOUCH Display P. 03
   1.1. 13.3”FHD Color TFT-LCD P. 05
   1.2. 13.3” PCAP Solution P. 29
   1.3. easyTOUCH mXT2952T2 2-Tail USB Controller P. 34

2. eMotion board P. 42

3. OSD board P. 58

4. DVI/HDMI cable P. 64

5. LVDS cable P. 65

6. LED cable P. 66

7. OSD cable P. 67

8. USB cable P. 68

9. +12V Power supply P. 70

10. Power cord (EU) P. 74

11. Power cord (US) P. 75
**easyTOUCH Display**

**ADVANCED LEVEL**

13.3 inch (33.8cm)  
Part-No. 12035525  
G133HAN01.0 incl. easyTOUCH eTD133W3202-AUA-A

### Display

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Type</td>
<td>AUO G133HAN01.0</td>
</tr>
<tr>
<td>Resolution (pixel / format)</td>
<td>1920 x 1080/wide</td>
</tr>
<tr>
<td>Brightness (typical)</td>
<td>400 cd/m²</td>
</tr>
<tr>
<td>Display Mode</td>
<td>VA, Normally black</td>
</tr>
<tr>
<td>Customer Interface Display</td>
<td>LVDS</td>
</tr>
<tr>
<td>Contrast ratio (typical)</td>
<td>800:1</td>
</tr>
<tr>
<td>Backlight</td>
<td>LED</td>
</tr>
</tbody>
</table>

### Glass and Touch

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover glass</td>
<td>2mm Glare Glass, chemically strengthened, no treatment</td>
</tr>
<tr>
<td></td>
<td>Printing RAL9005 organic</td>
</tr>
<tr>
<td></td>
<td>Dimensions according to outline drawing</td>
</tr>
<tr>
<td>Touch sensor type</td>
<td>13.3&quot; easyTOUCH</td>
</tr>
<tr>
<td>Active area touch sensor (W x H)</td>
<td>295.1 (H) x 166.7 (V)</td>
</tr>
<tr>
<td>Optical Specification</td>
<td>according to DATA MODUL Outgoing Specification 12005965</td>
</tr>
<tr>
<td>Touch Interface</td>
<td>USB mXT72952T2</td>
</tr>
</tbody>
</table>

### Assembling

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass to touch</td>
<td>Optically bonded</td>
</tr>
<tr>
<td>Glass/Touch assembly to display</td>
<td>AirGap-Bonding with 4 stripes industrial double-sided adhesive tape</td>
</tr>
<tr>
<td>Touch Controllerboard</td>
<td>mounted on rear side of TFT with metal bracket</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch Controller</td>
<td>easyTOUCHmXT72952T2Driverless USB</td>
</tr>
</tbody>
</table>

### Environmental conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (operating)</td>
<td>0° - 70 °C</td>
</tr>
</tbody>
</table>

### Mechanical dimensions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline dimensions (W x H x T)</td>
<td>328.4 (H) x 200.0 (V) x 13.7 (T)</td>
</tr>
<tr>
<td>Weight</td>
<td>Detailed dimensions according to outline drawing</td>
</tr>
<tr>
<td></td>
<td>approx. 1.1 kg</td>
</tr>
</tbody>
</table>

Technical specification subject to change without prior notice.  
For further information, please refer to detailed specification of individual component.
### Product Specification

**AU Optronics Corporation**

( ) Preliminary Specifications  
(V) Final Specifications

<table>
<thead>
<tr>
<th>Module</th>
<th>13.3”FHD Color TFT-LCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>G133HAN01.0</td>
</tr>
<tr>
<td>Note</td>
<td>LED backlight with driving circuit design</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checked &amp; Approved by</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Approved by</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sean Lin</td>
<td>2017/12/1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prepared by</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH Tsai</td>
<td>2017/12/1</td>
</tr>
</tbody>
</table>

Note: This Specification is subject to change without notice.

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GD BU Marketing Division  
AU Optronics Corporation
1. Handling Precautions

1) Since front polarizer is easily damaged, please be cautious and not to scratch it.
2) Be sure to turn off power supply when inserting or disconnecting from input connector.
3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
4) When the panel surface is soiled, wipe it with absorbent cotton or soft cloth.
5) Since the panel is made of glass, it may be broken or cracked if dropped or bumped on hard surface.
6) To avoid ESD (Electro Static Discharge) damage, be sure to ground yourself before handling TFT-LCD Module.
7) Do not open nor modify the module assembly.
8) Do not press the reflector sheet at the back of the module to any direction.
9) In case if a module has to be put back into the packing container slot after it was taken out from the container, do not press the center of the LED light bar edge. Instead, press at the far ends of the LED light bar edge softly. Otherwise the TFT Module may be damaged.
10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
11) TFT-LCD Module is not allowed to be twisted & bent even force is added on module in a very short time. Please design your display product well to avoid external force applying to module by end-user directly.
12) Small amount of materials without flammability grade are used in the TFT-LCD module. The TFT-LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950-1 or UL60950-1), or be applied exemption.
13) Severe temperature condition may result in different luminance, response time and lamp ignition voltage.
14) Continuous operating TFT-LCD display under low temperature environment may accelerate lamp exhaustion and reduce luminance dramatically.
15) The data on this specification sheet is applicable when LCD module is placed in landscape position.
16) Continuous displaying fixed pattern may induce image sticking. It’s recommended to use screen saver or shuffle content periodically if fixed pattern is displayed on the screen.
2. General Description

G133HAN01.0 is a Color Active Matrix Liquid Crystal Display composed of a TFT LCD panel, a driver circuit, and LED backlight system. The screen format is intended to support the 16:9 FHD, 1920(H) x1080(V) screen and 16.7M colors (RGB 8-bits data driver) with LED backlight driving circuit.

G133HAN01.0 is designed for a display unit of industrial machine.

2.1 General Specification

The following items are characteristics summary on the table at 25 °C condition:

<table>
<thead>
<tr>
<th>Items</th>
<th>Unit</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen Diagonal</td>
<td>[inch]</td>
<td>13.3”</td>
</tr>
<tr>
<td>Active Area</td>
<td>[mm]</td>
<td>293.472 (H) x 165.078 (V)</td>
</tr>
<tr>
<td>Pixels H x V</td>
<td></td>
<td>1920 x 3(RGB) x 1080</td>
</tr>
<tr>
<td>Pixel Pitch</td>
<td>[mm]</td>
<td>0.15285x 0.15285</td>
</tr>
<tr>
<td>Pixel Format</td>
<td></td>
<td>R.G.B. Vertical Stripe</td>
</tr>
<tr>
<td>Display Mode</td>
<td></td>
<td>AHVA</td>
</tr>
<tr>
<td>White Luminance ( Center )</td>
<td>[cd/m²]</td>
<td>400 Typ.</td>
</tr>
<tr>
<td>Luminance Uniformity</td>
<td></td>
<td>80% (5 points, Typ.)</td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td></td>
<td>800:1 (Typ.)</td>
</tr>
<tr>
<td>Response Time</td>
<td>[ms]</td>
<td>25 (Typ.)/ 35 (Max.)</td>
</tr>
<tr>
<td>Nominal Input Voltage VDD</td>
<td>[Volt]</td>
<td>+3.3 (Typ.)</td>
</tr>
<tr>
<td>LCD Power Consumption</td>
<td>[Watt]</td>
<td>1.8 W (Max. White Pattern)</td>
</tr>
<tr>
<td>LED Power Consumption</td>
<td>[Watt]</td>
<td>15W (Max.)</td>
</tr>
<tr>
<td>Weight</td>
<td>[Grams]</td>
<td>500 (Max.)</td>
</tr>
<tr>
<td>Physical Size</td>
<td>[mm]</td>
<td>309.7 x 184.1 x 9.6 (Typ.)</td>
</tr>
<tr>
<td>Electrical Interface</td>
<td></td>
<td>LVDS</td>
</tr>
<tr>
<td>Surface Treatment</td>
<td></td>
<td>Anti-glare</td>
</tr>
<tr>
<td>Support Color</td>
<td></td>
<td>16.7M Colors ( RGB 8-bits )</td>
</tr>
<tr>
<td>Temperature Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>[°C]</td>
<td>-20 to +70</td>
</tr>
<tr>
<td>Storage (Non-Operating)</td>
<td>[°C]</td>
<td>-20 to +70</td>
</tr>
</tbody>
</table>
# 2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Luminance</td>
<td>cd/m²</td>
<td></td>
<td>320</td>
<td>400</td>
<td>---</td>
<td>1, 3, 4</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal (Right)</td>
<td></td>
<td>CR = 10</td>
<td>75</td>
<td>89</td>
<td>---</td>
<td>3, 7</td>
</tr>
<tr>
<td>Vertical (Upper)</td>
<td></td>
<td>CR = 10</td>
<td>75</td>
<td>89</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Luminance Uniformity</td>
<td></td>
<td>5 Points</td>
<td>75</td>
<td>80</td>
<td>---</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td></td>
<td></td>
<td>600</td>
<td>800</td>
<td>-</td>
<td>3, 5</td>
</tr>
<tr>
<td>Response Time</td>
<td>msec</td>
<td>Rising + Falling</td>
<td>---</td>
<td>25</td>
<td>35</td>
<td>3, 6</td>
</tr>
<tr>
<td>Color / Chromaticity Coords</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red (CIE 1931)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Rx</td>
<td></td>
<td></td>
<td>0.625</td>
<td>0.675</td>
<td>0.725</td>
<td></td>
</tr>
<tr>
<td>Ry</td>
<td></td>
<td></td>
<td>0.266</td>
<td>0.316</td>
<td>0.366</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gx</td>
<td></td>
<td></td>
<td>0.235</td>
<td>0.285</td>
<td>0.335</td>
<td></td>
</tr>
<tr>
<td>Gy</td>
<td></td>
<td></td>
<td>0.605</td>
<td>0.655</td>
<td>0.705</td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bx</td>
<td></td>
<td></td>
<td>0.103</td>
<td>0.153</td>
<td>0.203</td>
<td></td>
</tr>
<tr>
<td>By</td>
<td></td>
<td></td>
<td>0.000</td>
<td>0.036</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wx</td>
<td></td>
<td></td>
<td>0.263</td>
<td>0.313</td>
<td>0.363</td>
<td></td>
</tr>
<tr>
<td>Wy</td>
<td></td>
<td></td>
<td>0.279</td>
<td>0.329</td>
<td>0.379</td>
<td></td>
</tr>
<tr>
<td>NTSC</td>
<td>%</td>
<td></td>
<td>-</td>
<td>90</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
**Note 1:** 5 points position (Ref: Active area)

![Diagram showing 5 points position within the Active area](image)

**Note 2:** The luminance uniformity of 5 points is defined by dividing the maximum luminance values by the minimum test point luminance

\[
\delta_{ws} = \frac{\text{Maximum Brightness of five points}}{\text{Minimum Brightness of five points}}
\]

**Note 3:** Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room, and it should be measured in the center of screen.
**Note 4:** Definition of Average Luminance of White ($Y_L$):

Measure the luminance of gray level 63 at 5 points. $Y_L = \frac{L(1) + L(2) + L(3) + L(4) + L(5)}{5}$

$L(x)$ is corresponding to the luminance of the point $X$ at Figure in Note (1).

**Note 5:** Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the “White” state}}{\text{Brightness on the “Black” state}}$$
Note 6: Definition of response time:

The output signals of BM-7 or equivalent are measured when the input signals are changed from “Black” to “White” (falling time) and from “White” to “Black” (rising time), respectively. The response time interval is between the 10% and 90% of amplitudes. Refer to figure as below.

Note 7: Definition of viewing angle

Viewing angle is the measurement of contrast ratio >10, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90° (θ) horizontal left and right and 90° (Φ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.
3. Functional Block Diagram

The following diagram shows the functional block of the 13.3 inch Color TFT-LCD Module:
4. Absolute Maximum Ratings

An absolute maximum rating of the module is as following:

4.1 Absolute Ratings of TFT LCD Module

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic/LCD Drive Voltage</td>
<td>VDD</td>
<td>-0.3</td>
<td>+4.0</td>
<td>Volt</td>
<td>Note 1,2</td>
</tr>
<tr>
<td>BL Input Voltage</td>
<td>VLED</td>
<td>-0.3</td>
<td>+34.0</td>
<td>Volt</td>
<td>Note 1,2</td>
</tr>
<tr>
<td>Signal Voltage</td>
<td>RinI-/+ , CklIN-/+</td>
<td>-0.3</td>
<td>VDD+0.3</td>
<td>Volt</td>
<td>Note 1, l=0,1,2,3</td>
</tr>
<tr>
<td>Signal Voltage</td>
<td>LED_EN , LED_PWM</td>
<td>-0.3</td>
<td>+5.5</td>
<td>Volt</td>
<td>Note 1,2</td>
</tr>
</tbody>
</table>

4.2 Absolute Ratings of Environment

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp.</td>
<td>TOP</td>
<td>-20</td>
<td>+70</td>
<td>°C</td>
<td>Note 4</td>
</tr>
<tr>
<td>Operation Humidity</td>
<td>HOP</td>
<td>8</td>
<td>90</td>
<td>[%RH]</td>
<td>Note 4</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>TST</td>
<td>-20</td>
<td>+70</td>
<td>°C</td>
<td>Note 4</td>
</tr>
<tr>
<td>Storage Humidity</td>
<td>HST</td>
<td>5</td>
<td>90</td>
<td>[%RH]</td>
<td>Note 4</td>
</tr>
</tbody>
</table>

Note 1: At Ta (25°C)
Note 2: Permanent damage to the device may occur if exceed maximum values
Note 3: LED specification refer to section 5.2
Note 4: For quality performance, please refer to AUO IIS (Incoming Inspection Standard)
5. Electrical Characteristics

5.1 TFT LCD Module

5.1.1 Power Specification

Input power specifications are as follows:
The power specification are measured under 25°C and frame frequency under 60Hz.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Unit</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDD</td>
<td>Logic/LCD Drive Voltage</td>
<td>Volt</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
</tr>
<tr>
<td>PDD</td>
<td>VDD Power</td>
<td>Watt</td>
<td>-</td>
<td>-</td>
<td>1.8</td>
</tr>
<tr>
<td>IDD</td>
<td>IDD Current</td>
<td>mA</td>
<td>-</td>
<td>-</td>
<td>500</td>
</tr>
<tr>
<td>IRush</td>
<td>Inrush Current</td>
<td>A</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>VDDrp</td>
<td>Allowable Logic/LCD Drive Ripple Voltage</td>
<td>mV</td>
<td>-</td>
<td>-</td>
<td>200</td>
</tr>
</tbody>
</table>

Note 1: Maximum Measurement Condition: White Pattern at 3.6V driving voltage ($P_{\text{max}} = V_{3.6} \times I_{\text{white}}$)

Note 2: Measurement Condition
5.1.2 Signal Electrical Characteristics

Input signals shall be low or High-impedance state when VDD is off.

Signal electrical characteristics are as follows:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{TH}$</td>
<td>Differential Input High Threshold</td>
<td>-</td>
<td>-</td>
<td>+100</td>
<td>[mV]</td>
<td>$V_{CM} = 1.2V$ Note 1</td>
</tr>
<tr>
<td>$V_{TL}$</td>
<td>Differential Input Low Threshold</td>
<td>-100</td>
<td>-</td>
<td>-</td>
<td>[mV]</td>
<td>$V_{CM} = 1.2V$ Note 1</td>
</tr>
<tr>
<td></td>
<td>$V_{ID}$</td>
<td>Input Differential Voltage</td>
<td>100</td>
<td>400</td>
<td>600</td>
<td>[mV]</td>
</tr>
<tr>
<td>$V_{CM}$</td>
<td>Differential Input Common Mode Voltage</td>
<td>+1.125</td>
<td>-</td>
<td>+1.375</td>
<td>[Volt]</td>
<td>$V_{TH}$-$V_{TL} = 200mV (max)$ Note 1</td>
</tr>
</tbody>
</table>

*Note 1: LVDS Signal Waveform*
# 5.2 Backlight Unit

## 5.2.1 LED characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backlight Power Consumption</td>
<td>PLED</td>
<td>-</td>
<td>-</td>
<td>15W</td>
<td>Watt</td>
<td>(Ta=25°C), Note 1</td>
</tr>
<tr>
<td>LED Life-Time</td>
<td>N/A</td>
<td>-</td>
<td>50,000</td>
<td>-</td>
<td>Hour</td>
<td>(Ta=25°C), Note 2</td>
</tr>
</tbody>
</table>

**Note 1:** Calculator value for reference $P_{LED} = V_F \times (Normal \ Distribution) \times I_F \times (Normal \ Distribution) / Efficiency$

**Note 2:** The LED life-time defines as the estimated time to 50% degradation of initial luminous.

## 5.2.2 Backlight input signal characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Power Supply</td>
<td>VLED</td>
<td>10.8</td>
<td>12.0</td>
<td>13.2</td>
<td>Volt</td>
<td></td>
</tr>
<tr>
<td>LED Input current</td>
<td>ILED</td>
<td>-</td>
<td>1.25</td>
<td>-</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>LED Enable Input High Level</td>
<td>LED_EN</td>
<td>2</td>
<td>-</td>
<td>5</td>
<td>Volt</td>
<td></td>
</tr>
<tr>
<td>LED Enable Input Low Level</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.8</td>
<td>Volt</td>
<td></td>
</tr>
<tr>
<td>PWM Logic Input High Level</td>
<td>LED_PWM</td>
<td>2</td>
<td>-</td>
<td>5</td>
<td>Volt</td>
<td>Define as Connector Interface (Ta=25°C)</td>
</tr>
<tr>
<td>PWM Logic Input Low Level</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.52</td>
<td>Volt</td>
<td></td>
</tr>
<tr>
<td>PWM Input Frequency</td>
<td>FPWM</td>
<td>500</td>
<td>-</td>
<td>10K</td>
<td>Hz</td>
<td></td>
</tr>
<tr>
<td>PWM Duty Ratio</td>
<td>Duty</td>
<td>5</td>
<td>-</td>
<td>100</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>LED Inrush Current</td>
<td>ILED_Rush</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>
6. Signal Interface Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.

<table>
<thead>
<tr>
<th></th>
<th>1st Line</th>
<th>1920 Line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Line</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>G</td>
<td>.</td>
<td>G</td>
</tr>
<tr>
<td>B</td>
<td>.</td>
<td>B</td>
</tr>
<tr>
<td></td>
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<td>.</td>
</tr>
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<td></td>
<td>.</td>
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</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1080th Line</th>
<th>1920 Line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1080th Line</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>G</td>
<td>.</td>
<td>G</td>
</tr>
<tr>
<td>B</td>
<td>.</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
6.2 The Input Data Format

<table>
<thead>
<tr>
<th>Interface</th>
<th>Type</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVDS</td>
<td>JEIDA</td>
<td>8 bit</td>
</tr>
</tbody>
</table>
### 6.3 Signal Description (CN1)

The module uses one LVDS receiver. LVDS is a differential signal technology for LCD interface and high speed data transfer device. The first LVDS port (RxOxxx) transmits odd pixels while the second LVDS port (RxExxx) transmits even pixels.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RxOIN0-</td>
<td>Negative LVDS differential data input (Odd data)</td>
</tr>
<tr>
<td>2</td>
<td>RxOIN0+</td>
<td>Positive LVDS differential data input (Odd data)</td>
</tr>
<tr>
<td>3</td>
<td>RxOIN1-</td>
<td>Negative LVDS differential data input (Odd data)</td>
</tr>
<tr>
<td>4</td>
<td>RxOIN1+</td>
<td>Positive LVDS differential data input (Odd data)</td>
</tr>
<tr>
<td>5</td>
<td>RxOIN2-</td>
<td>Negative LVDS differential data input (Odd data, DSPTMG)</td>
</tr>
<tr>
<td>6</td>
<td>RxOIN2+</td>
<td>Positive LVDS differential data input (Odd data, DSPTMG)</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Power Ground</td>
</tr>
<tr>
<td>8</td>
<td>RxOCLKIN-</td>
<td>Negative LVDS differential clock input (Odd clock)</td>
</tr>
<tr>
<td>9</td>
<td>RxOCLKIN+</td>
<td>Positive LVDS differential clock input (Odd clock)</td>
</tr>
<tr>
<td>10</td>
<td>RxOIN3-</td>
<td>Negative LVDS differential data input (Odd data)</td>
</tr>
<tr>
<td>11</td>
<td>RxOIN3+</td>
<td>Positive LVDS differential data input (Odd data)</td>
</tr>
<tr>
<td>12</td>
<td>RxEIN0-</td>
<td>Negative LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>13</td>
<td>RxEIN0+</td>
<td>Positive LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>14</td>
<td>GND</td>
<td>Power Ground</td>
</tr>
<tr>
<td>15</td>
<td>RxEIN1-</td>
<td>Positive LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>16</td>
<td>RxEIN1+</td>
<td>Negative LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Power Ground</td>
</tr>
<tr>
<td>18</td>
<td>RxEIN2-</td>
<td>Negative LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>19</td>
<td>RxEIN2+</td>
<td>Positive LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>20</td>
<td>RxECLKIN-</td>
<td>Negative LVDS differential clock input (Even clock)</td>
</tr>
<tr>
<td>21</td>
<td>RxECLKIN+</td>
<td>Positive LVDS differential clock input (Even clock)</td>
</tr>
<tr>
<td>22</td>
<td>RxEIN3-</td>
<td>Negative LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>23</td>
<td>RxEIN3+</td>
<td>Positive LVDS differential data input (Even data)</td>
</tr>
<tr>
<td>24</td>
<td>GND</td>
<td>Power Ground</td>
</tr>
<tr>
<td>25</td>
<td>AGBSEN</td>
<td>For AUO internal use</td>
</tr>
<tr>
<td>26</td>
<td>VDD</td>
<td>Power +3.3V</td>
</tr>
<tr>
<td>27</td>
<td>VDD</td>
<td>Power +3.3V</td>
</tr>
<tr>
<td>28</td>
<td>SCL</td>
<td>For AUO internal use</td>
</tr>
<tr>
<td>29</td>
<td>SDA</td>
<td>For AUO internal use</td>
</tr>
<tr>
<td>30</td>
<td>GND</td>
<td>Power Ground</td>
</tr>
</tbody>
</table>
6.4 Interface Timing (LVDS)

6.4.1 Timing Characteristics

Basically, interface timings should match the 1920x1080/60Hz manufacturing guide line timing.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame Rate</td>
<td>-</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>Hz</td>
</tr>
<tr>
<td>Clock frequency</td>
<td>1/ T&lt;sub&gt;clock&lt;/sub&gt;</td>
<td>67</td>
<td>70.6</td>
<td>74.5</td>
<td>MHz</td>
</tr>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>T&lt;sub&gt;H&lt;/sub&gt;</td>
<td>1023</td>
<td>1054</td>
<td>960+B</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>T&lt;sub&gt;HD&lt;/sub&gt;</td>
<td>960</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanking</td>
<td>T&lt;sub&gt;HB&lt;/sub&gt;</td>
<td>63</td>
<td>94</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>T&lt;sub&gt;V&lt;/sub&gt;</td>
<td>1092</td>
<td>1116</td>
<td>1080+A</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>T&lt;sub&gt;VD&lt;/sub&gt;</td>
<td>1080</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanking</td>
<td>T&lt;sub&gt;VB&lt;/sub&gt;</td>
<td>12</td>
<td>36</td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

**Note1:** The above is as optimized setting

**Note2:** The maximum clock frequency = [(960 + B)*(1080+A)*60] < 74.5MHz

**Note3:** Horizontal related parameters must be constant without variation (H_Sync_Width, H_Front_Porch and H_Back_Porch must be constant on each scanline).

**Note4:** On vertical blank area, H_Sync_Width and H_Total must be same as on the V_Active area.

**Note5:** Vertical related parameters must be constant without variation (V_Sync_Width, V_Front_Porch and V_Back_Porch must be constant on each video field).

**Note6:** The DE timings also must be constant without variation (H/V timing requirements are as same as previous. Blank timing must also be constant).

6.4.2 Timing Diagram
6.5 Power ON/OFF Sequence

VDD power and LED on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>0.1</td>
</tr>
<tr>
<td>T2</td>
<td>200</td>
</tr>
<tr>
<td>T3</td>
<td>50</td>
</tr>
<tr>
<td>T4</td>
<td>0.5</td>
</tr>
<tr>
<td>T5</td>
<td>10</td>
</tr>
<tr>
<td>T6</td>
<td>10</td>
</tr>
<tr>
<td>T7</td>
<td>10</td>
</tr>
<tr>
<td>T8</td>
<td>10</td>
</tr>
<tr>
<td>T9</td>
<td>0.5</td>
</tr>
<tr>
<td>T10</td>
<td>50</td>
</tr>
<tr>
<td>T11</td>
<td>10</td>
</tr>
<tr>
<td>T12</td>
<td>-</td>
</tr>
<tr>
<td>T13</td>
<td>1000</td>
</tr>
</tbody>
</table>

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.
6.5 Power ON/OFF Sequence

VDD power and LED on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>0.1 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T2</td>
<td>200 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T3</td>
<td>50 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T4</td>
<td>0.5 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T5</td>
<td>10 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T6</td>
<td>10 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T7</td>
<td>10 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T8</td>
<td>10 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T9</td>
<td>0.5 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T10</td>
<td>50 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T11</td>
<td>10 - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T12</td>
<td>- - 10</td>
<td>[ms]</td>
</tr>
<tr>
<td>T13</td>
<td>1000 - 10</td>
<td>[ms]</td>
</tr>
</tbody>
</table>

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.
7.2 Backlight Unit

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.2.1 Connector (CN2)

<table>
<thead>
<tr>
<th>Connector Name / Designation</th>
<th>LED Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Hirose</td>
</tr>
<tr>
<td>Type Part Number</td>
<td>DF19G-8P-1H(54)</td>
</tr>
<tr>
<td>Mating Housing Part Number</td>
<td>DF19G-8S-1C(05) DF19A-2830SCFA(41)</td>
</tr>
</tbody>
</table>
7.2.2 LED Driver Connector Pin Assignment (CN2)

<table>
<thead>
<tr>
<th>Pin#</th>
<th>Symbol</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LED_EN</td>
<td>LED enable pin</td>
</tr>
<tr>
<td>2</td>
<td>LED_PWM</td>
<td>System PWM Single Input</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
<td>No connect</td>
</tr>
<tr>
<td>4</td>
<td>VLED</td>
<td>+12V</td>
</tr>
<tr>
<td>5</td>
<td>VLED</td>
<td>+12V</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>No connect</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>
# 8. Panel Reliability Test

<table>
<thead>
<tr>
<th>Items</th>
<th>Required Condition</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Humidity Bias</td>
<td>$T_a = 40^\circ C$, 90%RH, 300h</td>
<td></td>
</tr>
<tr>
<td>High Temperature Operation</td>
<td>$T_a = 70^\circ C$, Dry, 300h</td>
<td></td>
</tr>
<tr>
<td>Low Temperature Operation</td>
<td>$T_a = -20^\circ C$, 300h</td>
<td></td>
</tr>
<tr>
<td>High Temperature Storage</td>
<td>$T_a = 70^\circ C$, Dry, 300h</td>
<td></td>
</tr>
<tr>
<td>Low Temperature Storage</td>
<td>$T_a = -20^\circ C$, 300h</td>
<td></td>
</tr>
<tr>
<td>Thermal Shock Test</td>
<td>$T_a = -20^\circ C$ to 60$^\circ C$, Duration at 30 min, 50 cycles</td>
<td>Note 1,2</td>
</tr>
<tr>
<td>Vibration test (non-operation)</td>
<td>1.5G, (10<del>200Hz</del>10, random), 30 mins/axis (X, Y, Z)</td>
<td>Note 1,2</td>
</tr>
<tr>
<td>Shock Test (non-operation)</td>
<td>50G, 20ms, Half-sine wave, ($\pm X$, $\pm Y$, $\pm Z$)</td>
<td>Note 1,2</td>
</tr>
<tr>
<td>ESD</td>
<td>Contact Discharge: $\pm 8$ KV, 150pF(330$\Omega$) 1sec, 8Points, 25times/point</td>
<td>Note 1</td>
</tr>
<tr>
<td></td>
<td>Air Discharge: $\pm 15$ KV, 150pF(330$\Omega$) 1sec, 8Points, 25times/point</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** According to EN 61000-4-2, ESD class B: Some performance degradation allowed.
- Self-recoverable. No data lost, No hardware failures.

**Note 2:**
- Water condensation is not allowed for each test items.
- Each test is done by new TFT-LCD module. Don’t use the same TFT-LCD module repeatedly for reliability test.
- The reliability test is performed only to examine the TFT-LCD module capability.
- To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.
- No function failure occurs. Mura shall be ignored after high temperature reliability test.
10. Mechanical Characteristics

10.1 LCM Outline Dimension (Front View)
Product Specification

AU OPTRONICS CORPORATION

10.2 LCM Outline Dimension (Rear View)
easy//TOUCH

13.3” PCAP Solution
12029459
Table of contents

1 Scope ........................................................................................................................................ 3

2 Touch Sensor and Cover Glass ............................................................................................... 3
   2.1 Technical Parameters ............................................................................................................ 3
   2.2 Reliability Tests ..................................................................................................................... 4

3 Recommended Touch Controller .............................................................................................. 4

4 Optical Inspection Criteria and Handling Recommendations ................................................. 4
   4.1 Optical Inspection Criteria .................................................................................................... 4
   4.2 Handling Recommendations .................................................................................................. 4

5 Appendix A: Technical Drawing .............................................................................................. 5

6 Revision History ....................................................................................................................... 6
1 Scope
DATA MODUL's PCAP solution 12029459 consists of a 13.3" capacitive touch screen. Please note that this is only a sub-assembly of the final product. The specification of the final end product might differ from this specification.

2 Touch Sensor and Cover Glass

2.1 Technical Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen size</td>
<td>13.3 inch /33 cm</td>
</tr>
<tr>
<td>Format</td>
<td>Wide</td>
</tr>
<tr>
<td>Composite</td>
<td>SITO with Tail</td>
</tr>
<tr>
<td>Outline dimensions</td>
<td>303.3 x 177.0 x 1.1 mm (WxHxT)</td>
</tr>
<tr>
<td>Active area</td>
<td>295.07 x 166.68 mm (WxH)</td>
</tr>
<tr>
<td>Bending radius of tail</td>
<td>R = 2 mm recommended</td>
</tr>
<tr>
<td>Transmissivity</td>
<td>86% (min.)</td>
</tr>
<tr>
<td>Operating temperature and humidity</td>
<td>-30 to +85</td>
</tr>
<tr>
<td>Storage temperature and humidity</td>
<td>-40 to +85</td>
</tr>
<tr>
<td>Tail connector</td>
<td>Hirose FH28H-80S-0.5SH, Hirose FH28H-50S-0.5SH</td>
</tr>
</tbody>
</table>
2.2 Reliability Tests

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Temperature Storage Test</td>
<td>-30 °C for 120 h, 1h recovery at room temperature</td>
</tr>
<tr>
<td>High Temperature Storage Test</td>
<td>70 °C for 120 h, 1h recovery at room temperature</td>
</tr>
<tr>
<td>High Temperature / High Humidity Test</td>
<td>60°C, 90% RH for 120h, 1h recovery at room temperature</td>
</tr>
<tr>
<td>Cycle test</td>
<td>-30°C / 80°C, 30 min / cycle, 100 cycles, 1 h recovery at room temperature</td>
</tr>
</tbody>
</table>

3 Recommended Touch Controller

The recommendation for this PCAP solution is a controller based on mXT2952T2. Please ask your local DATA MODUL sales representative for further details.

4 Optical Inspection Criteria and Handling Recommendations

4.1 Optical Inspection Criteria

For details on the optical inspection criteria, please refer to DATA MODULs Outgoing Spec or ask your local DATA MODUL sales representative.

4.2 Handling Recommendations

Precautions for operation
- Do not put a heavy, hard or sharp object on the product
- Do not bend the product in order to assure the reliability
- Do not put one product on the other. Otherwise, it may cause the product to be scratched
- Don’t use any organic solvent acid or alkali solution.

Precautions for mounting
- The panel should be mounted using a configuration that either holds the panel by all four corners or by all four sides
- The bezel edge must be positioned outside the active area. The bezel may cause false activation if the edge overlaps the active area
- Any mounting configuration should ensure that there is no twisting force applied to the panel
- 1mm distance between TFT screen and touch panel is recommended

Precautions for tail
- The flex tail in general can be bent with a min. radius of about 1mm
- In order to avoid damaging and malfunction of the sensor, please don’t bend the FPC area next to the panel
- Excess or repeated bending of the FPC connector should also be avoided
5 Appendix A: Technical Drawing

This assembly drawing is only a schematic representation of the structure. For separate parts, specifications and process instructions see part list.
easyTOUCH mXT2952T2 2-tail PCAP USB controller
## Table of contents

1  Introduction.................................................................................................................. 3

2  Controller specification ................................................................................................ 4
   2.1 Mechanical features ................................................................................................. 4
   2.2 Connection features ................................................................................................. 4
   2.3 Electrical features .................................................................................................. 4

3  Mechanical drawing ...................................................................................................... 5

4  Connectors and signals ................................................................................................ 6
   4.1 Connectors .............................................................................................................. 6
   4.2 X1 pin assignment .................................................................................................. 6

5  UL information .............................................................................................................. 7

7  Appendix: Frequently asked questions ....................................................................... 8
1 Introduction

The easyTouch mXT2952T2 Controller is designed as a part of the capacitive touch systems developed by Data Modul. It offers the possibility to connect a projective capacitive touch sensor to standard computers or embedded systems using USB.

The controller is based on the Atmel maXTouch 2952T2 which offers a very good touch performance and high noise resistance. To get the best touch performance with water and glove usage the mXT2952T2 has integrated self-capacitance technology. In combination with the mutual-capacitance entity the controller is applicable for single- and multi-touch. Together with outstanding filter technology the maXTouch ICs are suitable for industrial, medical and other applications.

For the communication with the OS the controller uses Data Modul’s Driverless firmware. The firmware connects as a Human Interface Device (HID) without an additional driver to the most popular operating systems like Windows XP, Windows 7 / 8, Windows CE5/6/7, OSX and Linux. For more information about the Data Modul Driverless firmware please refer to the Driverless Controller User Guide.
2 Controller specification

2.1 Mechanical features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>105x27x6 mm</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 to +85 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 to +85 °C</td>
</tr>
<tr>
<td>Temperature slew rate</td>
<td>10 °C /minute (max.)</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>95 % at 60 °C no condensation</td>
</tr>
<tr>
<td>RoHS compliant</td>
<td>Yes</td>
</tr>
</tbody>
</table>

2.2 Connection features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>HID mouse, HID digitizer</td>
</tr>
<tr>
<td>Multi touch</td>
<td>16 fingers (max.)</td>
</tr>
<tr>
<td>Single touch</td>
<td>HID mouse with right mouse button emulation</td>
</tr>
<tr>
<td>Resolution</td>
<td>4096 x 4096 (x/y)</td>
</tr>
<tr>
<td>Report rate</td>
<td>&gt;100 Hz for 15 touches, subject to configuration</td>
</tr>
<tr>
<td>USB connector</td>
<td>Mini USB or Molex 53261-0971</td>
</tr>
</tbody>
</table>

2.3 Electrical features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>5 V ± 5%</td>
</tr>
<tr>
<td>Vin ripple</td>
<td>±50 mV peak-peak (max.)</td>
</tr>
<tr>
<td>On board voltage</td>
<td>3.3 V and 8.5 V</td>
</tr>
<tr>
<td>Power consumption</td>
<td>500 mW (max. subject to configuration)</td>
</tr>
</tbody>
</table>
3 Mechanical drawing

Height: 6 mm (including components)
4 Connectors and signals

4.1 Connectors

<table>
<thead>
<tr>
<th>Connector</th>
<th>Type</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>1.25 mm Pitch 9 pin header Molex 53261-0971 compatible</td>
<td>USB</td>
</tr>
<tr>
<td>X3</td>
<td>Mini USB connector</td>
<td>USB</td>
</tr>
<tr>
<td>X4</td>
<td>0.5 mm pitch 50 pin header</td>
<td>Flextail to touch sensor</td>
</tr>
<tr>
<td>X5</td>
<td>0.5 mm pitch 80 pin header</td>
<td>Flextail to touch sensor</td>
</tr>
</tbody>
</table>

4.2 X1 pin assignment

<table>
<thead>
<tr>
<th>X1</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VDD_5V</td>
<td>USB power supply</td>
</tr>
<tr>
<td>2</td>
<td>USB DM</td>
<td>USB signal -</td>
</tr>
<tr>
<td>3</td>
<td>USB DP</td>
<td>USB signal +</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Do not use</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Do not use</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Do not use</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Do not use</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Do not use</td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Matching USB cable (length 2m): Article number TP72241
## 5 UL information

<table>
<thead>
<tr>
<th>Part</th>
<th>Type</th>
<th>UL number</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>1.25 mm pitch 9 pin header MOLEX 53261-0971 compatible</td>
<td>Molex 53261-xx71: E29179 or YeonHo 12505WRxx: E108706</td>
</tr>
<tr>
<td>X3</td>
<td>Mini USB connector</td>
<td>FCI 10033526-N3212LF or W+P 8233-2-05-60-FTR/SW: Thermoplastic UL94V-0</td>
</tr>
<tr>
<td>X4</td>
<td>0.5 mm pitch 50 pin header</td>
<td>Hirose FH28D-xxS-0.5SH(05): LCP resin (UL94V-0)/gray LCP resin (UL94V-0)/black</td>
</tr>
<tr>
<td>X5</td>
<td>0.5 mm pitch 80 pin header</td>
<td>Hirose FH28H-xxS-0.5SH(05): LCP resin (UL94V-0)/gray LCP resin (UL94V-0)/black</td>
</tr>
<tr>
<td>PCB</td>
<td></td>
<td>Fastprint: E204460</td>
</tr>
</tbody>
</table>
7 Appendix: Frequently asked questions

Touch coordinates are not stable and the cursor is “jumping around”?

In mains-operated systems this can happen if the touch controller is missing the systems ground reference. Another reason can be an extreme amount of noise present that exceeds the touch threshold set in the controller.

Please connect the system ground reference to one of the mounting holes. For best touch performance the touch controller needs a low impedance AC connection to the person that operates the system to achieve a good current loop back to the controller.

If the instability is caused by a noise source like a display, a switching regulator or a RF antenna your system may have an integration issue. With proper settings the controller can most likely suppress the noise. However, eliminating the noise source should be the first thing to check. If you have any difficulties to find the correct settings, please contact Data Modul.
Final Specification

Hardware Revision 05
This document might be changed without prior notice

<table>
<thead>
<tr>
<th>Revision</th>
<th>1.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>16.01.2015</td>
</tr>
<tr>
<td>Name</td>
<td>M. Schmidt</td>
</tr>
</tbody>
</table>
Table of contents

1. Revision History 4
2. General Description 5
3. Features 5
4. Electrical Specification of inputs and outputs 6
   4.1 Power Supply voltage 6
   4.2 Panel supply voltage 6
   4.3 LVDS 6
   4.4 Backlight 6
   4.5 DVI input 7
   4.6 DisplayPort Input 7
   4.7 VGA input 7
5. Qualifications 8
   5.1 Environmental conditions 8
   5.2 EMI Standards 8
   5.3 Safety 8
   5.4 Shock and Vibration 8
6. Outline dimensions 9
7. Overview of Connectors and Jumpers 10
   7.1 Power Input Connector 11
   7.2 VGA Input Connector 11
   7.3 DVI Input Connector 12
   7.4 Display Port Input Connector 12
   7.5 LVDS Output 13
   7.6 Inverter / Backlight 13
   7.7 OSD Connector 14
   7.8 GPIO Connector 14
   7.9 Systembus 14
   7.10 RS232 Connector 14
   7.11 Fan Connector 15
   7.12 Inverter Switch 15
8. Jumper settings and configuration 16
8.1. Panel supply voltage (CN200)  
8.2. Backlight Power Supply (CN202, CN203, CN204)  
8.3. Backlight Dimming (CN600)  
8.4. Backlight Enable Signal (CN601, CN602)  
8.5. Panel file configuration  

9. OSD (On Screen Display)  
9.1. Mechanical dimensions OSD board (CU70008, incl. input cable)  
9.2. Operation & buttons  
9.3. Hotkeys  
9.4. OSD Status LED  
9.5. OSD Structure  
9.5.1 Picture Menu  
9.5.2 VGA Settings Menu  
9.5.3 Setup Menu  
9.5.4 Color Menu  
9.5.5 User Color Menu  
9.5.6 Inputs Menu  
9.5.7 OSD Menu  
9.5.8 OSD Position Menu  
9.5.9 Info Menu  
9.5.10 Advanced Setup Menu  

10. Serial Control RS232  

11. DDC/CI Interface
# 1. Revision History

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Chapter</th>
<th>Description</th>
<th>by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>24.03.2012</td>
<td>All</td>
<td>First draft</td>
<td>MS</td>
</tr>
<tr>
<td>1.1</td>
<td>30.07.2012</td>
<td>All</td>
<td>Cosmetic changes</td>
<td>MS</td>
</tr>
<tr>
<td>1.2</td>
<td>04.04.2014</td>
<td>9.4 OSD Status LED</td>
<td>LED state power off changed</td>
<td>MS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.5 OSD Structure</td>
<td>Color menu changed</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>15.01.2015</td>
<td>7. Overview of connectors and jumpers</td>
<td>CN104 connector family corrected</td>
<td>MS</td>
</tr>
</tbody>
</table>
2. General Description

The eMotionST1:3 is an advanced TFT-LCD controller board to connect LCDs standard VGA, DVI, and DisplayPort sources. All necessary timings and voltages to support the connected display and backlight are generated on the eMotionST1:3.

3. Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaler</td>
<td>STMicroelectronics STDP6036</td>
</tr>
<tr>
<td>Input resolution</td>
<td>Up to WUXGA (1920x1200@60Hz)</td>
</tr>
<tr>
<td>Output resolution</td>
<td>VGA up to WUXGA</td>
</tr>
<tr>
<td>Colors</td>
<td>16.7M</td>
</tr>
<tr>
<td>Power Supply</td>
<td>Single power supply +12V / +24V DC</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 ...60 °C</td>
</tr>
<tr>
<td>Inputs</td>
<td>VGA, DVI, DisplayPort 1.1a</td>
</tr>
<tr>
<td>Panel voltage</td>
<td>3.3V, 5.0V, 12.0V (selectable with jumpers)</td>
</tr>
<tr>
<td>LVDS output</td>
<td>JEIDA or VESA mapping selectable by panel file</td>
</tr>
<tr>
<td>Backlight support</td>
<td>Analog &amp; PWM dimming</td>
</tr>
<tr>
<td>Power safe mode</td>
<td>VESA DPMS compatible</td>
</tr>
<tr>
<td>DDC CI</td>
<td>Support of DDC / CI</td>
</tr>
<tr>
<td>Remote Control</td>
<td>RS232 remote control</td>
</tr>
<tr>
<td>Software update</td>
<td>- RS232</td>
</tr>
<tr>
<td></td>
<td>- Smart ISP</td>
</tr>
<tr>
<td></td>
<td>- VGA-input using VGA to DDC adapter</td>
</tr>
</tbody>
</table>
4. Electrical Specification of inputs and outputs

4.1 Power Supply voltage

The eMotionST1:3 can handle 12V or 24V DC input voltage. The board is designed for a single power supply. All other supply voltages are generated on the eMotionST1:3. If the input supply voltage is used for backlight supply (jumper CN202, CN203, CN204 position 2-3) then the input voltage of the board must fit with the backlight supply voltage. An additional SMPS on the eMotionST1:3 is used to generate +12V supply voltage for the backlight inverter. Therefore the jumper CN202, CN203 and CN204 have to be placed in position 1-2. In this position the max. backlight current is limited to 3A.

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Nominal value</th>
<th>Regulation</th>
<th>Ripple &amp; noise</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>+12V</td>
<td>+12.0V</td>
<td>+/-10%</td>
<td>0.3V</td>
<td></td>
</tr>
<tr>
<td>+24V</td>
<td>+24.0V</td>
<td>+/-10%</td>
<td>0.3V</td>
<td></td>
</tr>
</tbody>
</table>

4.2 Panel supply voltage

The panel supply voltage is generated on the eMotionST1:3. The eMotionST1:3 can generate 3.3V, 5.0V or 12.0V panel supply voltage. The max current is limited to 3.0A. Select the panel supply voltage with jumper CN200. Note: 12.0V panel supply can only be used if the supply voltage of the board is 24V.

<table>
<thead>
<tr>
<th>Panel supply voltage</th>
<th>Nominal value</th>
<th>Regulation</th>
<th>max Current</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 3.3V</td>
<td>+3.3V</td>
<td>+/-5%</td>
<td>3.0 A</td>
<td>CN200 Pin 1-2 closed</td>
</tr>
<tr>
<td>+ 5.0V</td>
<td>+5.0V</td>
<td>+/-5%</td>
<td>3.0 A</td>
<td>CN200 PIN 3-4 closed</td>
</tr>
<tr>
<td>+12.0V</td>
<td>+12.0V</td>
<td>+/-5%</td>
<td>3.0 A</td>
<td>CN200 PIN 5-6 closed</td>
</tr>
</tbody>
</table>

4.3 LVDS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential Output Voltage</td>
<td>300</td>
<td>500</td>
<td>700</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Common Mode Voltage</td>
<td>1.25</td>
<td></td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Clock Frequency</td>
<td>100</td>
<td>90</td>
<td></td>
<td>MHz</td>
<td>Single Channel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dual Channel</td>
</tr>
<tr>
<td>Bits per Color</td>
<td>6</td>
<td>8</td>
<td></td>
<td>bit</td>
<td>6/8bit selectable in panel file</td>
</tr>
</tbody>
</table>

4.4 Backlight

The backlight supply voltage can be selected by the jumper CN202, CN203, CN204. All three jumpers must be set in the same position. In position 2-3 the backlight supply voltage is equal the input voltage of the board. The max. backlight current is limited to 6A. In position 1-2 the backlight supply voltage is generated by a 12V SMPS on the board (do only use it with 24V board supply voltage). Using this configuration, the max. backlight current is limited to 3A.

<table>
<thead>
<tr>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V dimm A</td>
<td>Analog dimming voltage 0 to 5.0V / 0 to 3.3V selectable with jumper CN600</td>
</tr>
<tr>
<td>V dimm PWM</td>
<td>3.3V / 5.0V level selectable with jumper CN600</td>
</tr>
<tr>
<td>Enable</td>
<td>3.3V / 5.0V level selectable with jumper CN601, polarity selectable with jumper CN602</td>
</tr>
<tr>
<td>VDD</td>
<td>Operating voltage of the backlight. Jumper CN202-204 in position 2-3: The backlight voltage is the same as board supply</td>
</tr>
</tbody>
</table>
4.5 DVI input

TMDS receiver compliant with DDWG DVI 1.0 specification

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential Input Voltage</td>
<td>150</td>
<td>1200</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Input Common Mode Voltage</td>
<td>-300</td>
<td>-37</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Input Clockfrequency</td>
<td>20</td>
<td>165</td>
<td>MHz</td>
<td></td>
</tr>
</tbody>
</table>

4.6 DisplayPort Input

DisplayPort 1.1a compliant receiver. 4-lane DisplayPort input

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak-to-peak input differential voltage</td>
<td>0.12</td>
<td>1.4</td>
<td>Vpp</td>
<td>Vpp</td>
<td></td>
</tr>
<tr>
<td>Rx DC Common Mode Voltage</td>
<td>0</td>
<td>Vpp</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R, Termination Resistance</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>Ω</td>
<td></td>
</tr>
</tbody>
</table>

4.7 VGA input

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion rate</td>
<td>10</td>
<td>205</td>
<td>MHz</td>
<td></td>
<td>Up to 165MHz sample rate 10 bits per color are used, up to 205MHz sample rate 8 bits per color are used</td>
</tr>
<tr>
<td>ADC resolution</td>
<td>8</td>
<td>10</td>
<td>bit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input levelrange</td>
<td>0.64</td>
<td>0.7</td>
<td>0.9</td>
<td>Vpp</td>
<td>at 75R</td>
</tr>
<tr>
<td>Band width</td>
<td>9</td>
<td>290</td>
<td>MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOG level</td>
<td>0.3</td>
<td>0.3</td>
<td>V</td>
<td></td>
<td>at 75R</td>
</tr>
</tbody>
</table>
5. Qualifications

5.1 Environmental conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0°C</td>
<td>+60°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20°C</td>
<td>+80°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td></td>
<td>80%</td>
</tr>
<tr>
<td>Tolerable air-pressure</td>
<td>708 hPa (approx. Altitude 2000m)</td>
<td></td>
</tr>
</tbody>
</table>

5.2 EMI Standards

| EMI/EMC:                  | EN55022-B (appendix A1:2007 from Oct., 1st 2011 on), highest internal frequency on the board is below 400MHz (DDR data lines). | D |
| ESD:                     | EN61000-4-2 contact discharge 4kV, EN61000-4-2 air discharge 8kV | B |
| Radiated RF (80-1000MHz):| EN61000-4-3 (20V/m 80% modulation level from 80 – 1000MHz) | A |
| Conducted disturbances induced by RF fields: | EN61000-4-6 (10Veff, AM 80%, 1kHz from 150kHz – 80MHz) | A |
| Radiated RF:             | EN50204:1995; 900MHz, 20V/m, pulse 50% | A |

Note: To ensure that the board meets the standard mentioned above, an adequate shielding cover must be added. Alternatively the housing of the monitor must act as shielding cover (e.g. aluminium enclosure).

5.3 Safety

- EN60950-1: Latest edition
- Designed to meet UL60950-1

5.4 Shock and Vibration

<table>
<thead>
<tr>
<th>MECHANICAL STRESS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock:</td>
<td>20G, 11ms, half sine (x/y direction)</td>
</tr>
<tr>
<td></td>
<td>15G, 11ms, half sine (z direction)</td>
</tr>
<tr>
<td>Vibration:</td>
<td>1.2G, 10 – 55Hz, sinus</td>
</tr>
<tr>
<td>Sweep:</td>
<td>1 minute/octave</td>
</tr>
<tr>
<td>Amplitude:</td>
<td>0.35mmp-p (x-direction)</td>
</tr>
<tr>
<td></td>
<td>0.35mmp-p (y direction)</td>
</tr>
<tr>
<td></td>
<td>0.175mmp-p (z-direction)</td>
</tr>
<tr>
<td>Time:</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Standard:</td>
<td>Conform to EN60605</td>
</tr>
</tbody>
</table>
6. Outline dimensions

Dimensions: 150mm (L) x 110 mm (W) x 17mm (H)
7. Overview of Connectors and Jumpers

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN103</td>
<td>Power</td>
<td>DC-Jack 2.5mm</td>
</tr>
<tr>
<td>CN104</td>
<td>Power</td>
<td>Molex Series 5569</td>
</tr>
<tr>
<td>CN116</td>
<td>Power (internal)</td>
<td>JST S8B-EH</td>
</tr>
<tr>
<td>CN100</td>
<td>DVI input</td>
<td>24 pin DVI-D connector, female</td>
</tr>
<tr>
<td>CN101</td>
<td>VGA input</td>
<td>15 pin HD-Sub connector, female</td>
</tr>
<tr>
<td>CN102</td>
<td>DP input</td>
<td>DisplayPort connector</td>
</tr>
<tr>
<td>CN105</td>
<td>LVDS Dual link output</td>
<td>Hirose DF14-30P-1,25H</td>
</tr>
<tr>
<td>CN107</td>
<td>Backlight connector</td>
<td>JST S7B-EH</td>
</tr>
<tr>
<td>CN108</td>
<td>Backlight connector</td>
<td>JST S7B-EH</td>
</tr>
<tr>
<td>CN109</td>
<td>Inverter Switch</td>
<td>Inverter switch signal</td>
</tr>
<tr>
<td>CN110</td>
<td>GPIO connector</td>
<td>10pin multi functions connector</td>
</tr>
<tr>
<td>CN111</td>
<td>Systembus</td>
<td>JST S4B-EH</td>
</tr>
<tr>
<td>CN112</td>
<td>OSD</td>
<td>Molex 53015-1210</td>
</tr>
<tr>
<td>CN113</td>
<td>RS232</td>
<td>10 pin double row connector RS232 LVTTL Signal</td>
</tr>
<tr>
<td>CN114</td>
<td>FAN</td>
<td>Fan connector</td>
</tr>
<tr>
<td>CN115</td>
<td>RS232</td>
<td>RS232 LVTTL Signal (MOLEX 53261-0471)</td>
</tr>
<tr>
<td>CN200</td>
<td>Jumper Block for Panel VCC</td>
<td>6pin double row connector</td>
</tr>
<tr>
<td>CN202</td>
<td>Jumper block for Backlight supply voltage</td>
<td>6pin double row connector</td>
</tr>
<tr>
<td>CN203</td>
<td>Jumper block for Backlight supply voltage</td>
<td>Note: Same position must be set for all three jumpers.</td>
</tr>
<tr>
<td>CN204</td>
<td>Jumper block for Backlight supply voltage</td>
<td>6pin double row connector</td>
</tr>
<tr>
<td>CN600</td>
<td>Backlight PWM voltage select</td>
<td>3pin row connector</td>
</tr>
<tr>
<td>CN601</td>
<td>Backlight EN voltage select</td>
<td>3pin row connector</td>
</tr>
<tr>
<td>CN602</td>
<td>Backlight EN polarity</td>
<td>3pin row connector</td>
</tr>
</tbody>
</table>
7.1 Power Input Connector

Connector: CN104 - Molex 0039303045

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>+12V / +24V DC</td>
<td>VDD / max 4A per pin</td>
</tr>
<tr>
<td>4</td>
<td>+12V / +24V DC</td>
<td>VDD / max 4A per pin</td>
</tr>
</tbody>
</table>

Connector: J101 - 2.5mm DC Jack

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+12V / +24V DC</td>
<td>VDD / max 5A</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Connector: CN116 - JST S8B-EH

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>5</td>
<td>+12V / +24V DC</td>
<td>VDD / max 3A per pin</td>
</tr>
<tr>
<td>6</td>
<td>+12V / +24V DC</td>
<td>VDD / max 3A per pin</td>
</tr>
<tr>
<td>7</td>
<td>+12V / +24V DC</td>
<td>VDD / max 3A per pin</td>
</tr>
<tr>
<td>8</td>
<td>+12V / +24V DC</td>
<td>VDD / max 3A per pin</td>
</tr>
</tbody>
</table>

7.2 VGA Input Connector

Connector: CN101 - 15pin HD-Sub, female

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Red analog input</td>
</tr>
<tr>
<td>2</td>
<td>Green</td>
<td>Green analog input</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Blue analog input</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>Not connected (GND)</td>
</tr>
<tr>
<td>5</td>
<td>GND (Red)</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>GND (Green)</td>
<td>Ground</td>
</tr>
<tr>
<td>7</td>
<td>GND (Blue)</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>VGA 5V</td>
<td>+5V DC</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>11</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>12</td>
<td>SD</td>
<td>Serial Data Line for DDC</td>
</tr>
<tr>
<td>13</td>
<td>HSYNC</td>
<td>Horizontal Sync</td>
</tr>
<tr>
<td>14</td>
<td>VSYNC</td>
<td>Vertical Sync</td>
</tr>
<tr>
<td>15</td>
<td>SCL</td>
<td>Serial clock input for DDC</td>
</tr>
</tbody>
</table>
### 7.3 DVI Input Connector

Connector: CN100 - DVI-D24P

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TMDS DATA2-</td>
<td>TMDS DATA2 Differential negative signal</td>
</tr>
<tr>
<td>2</td>
<td>TMDS DATA2+</td>
<td>TMDS DATA2 Differential positive signal</td>
</tr>
<tr>
<td>3</td>
<td>TMDS DATA2 Shield</td>
<td>Shield for TMDS channel 2</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>6</td>
<td>DDC Clock</td>
<td>Clock DDC Interface</td>
</tr>
<tr>
<td>7</td>
<td>DDC Data</td>
<td>Data DDC Interface</td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>9</td>
<td>TMDS DATA1-</td>
<td>TMDS DATA1 Differential negative signal</td>
</tr>
<tr>
<td>10</td>
<td>TMDS DATA1+</td>
<td>TMDS DATA1 Differential positive signal</td>
</tr>
<tr>
<td>11</td>
<td>TMDS DATA1 Shield</td>
<td>Shield for TMDS channel 1</td>
</tr>
<tr>
<td>12</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>13</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>14</td>
<td>+5V Power</td>
<td>+5V for EDID (un-powered monitor)</td>
</tr>
<tr>
<td>15</td>
<td>GND (for +5V)</td>
<td>Ground</td>
</tr>
<tr>
<td>16</td>
<td>HPD</td>
<td>Hot Plug Detect</td>
</tr>
<tr>
<td>17</td>
<td>TMDS DATA0-</td>
<td>TMDS DATA0 Differential negative signal</td>
</tr>
<tr>
<td>18</td>
<td>TMDS DATA0+</td>
<td>TMDS DATA0 Differential positive signal</td>
</tr>
<tr>
<td>19</td>
<td>TMDS DATA0 Shield</td>
<td>Shield for TMDS channel 0</td>
</tr>
<tr>
<td>20</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>21</td>
<td>NC</td>
<td>Not connected</td>
</tr>
<tr>
<td>22</td>
<td>TMDS Clock Shield</td>
<td>Shield for TMDS clock</td>
</tr>
<tr>
<td>23</td>
<td>TMDS CLOCK+</td>
<td>TMDS Clock Differential positive signal</td>
</tr>
<tr>
<td>24</td>
<td>TMDS CLOCK-</td>
<td>TMDS Clock Differential negative signal</td>
</tr>
</tbody>
</table>

### 7.4 DisplayPort Input Connector

Connector: CN102 - W+P: 8470-2-2-1-80-TR

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ML_L3N</td>
<td>Main Link Ch. 3 Differential Input negative</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>ML_L3P</td>
<td>Main Link Ch. 3 Differential Input positive</td>
</tr>
<tr>
<td>4</td>
<td>ML_L2N</td>
<td>Main Link Ch. 2 Differential Input negative</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>ML_L2P</td>
<td>Main Link Ch. 2 Differential Input positive</td>
</tr>
<tr>
<td>7</td>
<td>ML_L1N</td>
<td>Main Link Ch. 1 Differential Input negative</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>ML_LN1P</td>
<td>Main Link Ch. 1 Differential Input positive</td>
</tr>
<tr>
<td>10</td>
<td>ML_LN0N</td>
<td>Main Link Ch. 0 Differential Input negative</td>
</tr>
<tr>
<td>11</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>12</td>
<td>ML_LN0P</td>
<td>Main Link Ch. 0 Differential Input positive</td>
</tr>
<tr>
<td>13</td>
<td>Config 1</td>
<td>Config Pin1, connect to GND with 1M</td>
</tr>
<tr>
<td>14</td>
<td>Config 2</td>
<td>Config Pin2, connect to GND with 1M</td>
</tr>
<tr>
<td>15</td>
<td>AUXP</td>
<td>Auxiliary Ch. Differential Input positive</td>
</tr>
<tr>
<td>16</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>17</td>
<td>AUXN</td>
<td>Auxiliary Ch. Differential Input negative</td>
</tr>
<tr>
<td>18</td>
<td>HPD</td>
<td>Hot Plug Detect</td>
</tr>
<tr>
<td>19</td>
<td>POR</td>
<td>Connected to Ground</td>
</tr>
<tr>
<td>20</td>
<td>PO</td>
<td>Not Connected to internal circuits</td>
</tr>
</tbody>
</table>
### 7.5 LVDS Output

**Connector:** CN105 - Hirose DF14-30P-1.25H

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VCC</td>
<td>Panel VCC *</td>
</tr>
<tr>
<td>2</td>
<td>VCC</td>
<td>Panel VCC*</td>
</tr>
<tr>
<td>3</td>
<td>VCC</td>
<td>Panel VCC*</td>
</tr>
<tr>
<td>4</td>
<td>VCC</td>
<td>Panel VCC*</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>3.3V</td>
<td>3.3V permanent for LVDS select</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>TX3+O</td>
<td>TX3 odd positive</td>
</tr>
<tr>
<td>9</td>
<td>TX3-O</td>
<td>TX3 odd negative</td>
</tr>
<tr>
<td>10</td>
<td>TXCLK+O</td>
<td>Clock odd positive</td>
</tr>
<tr>
<td>11</td>
<td>TXCLK-O</td>
<td>Clock odd negative</td>
</tr>
<tr>
<td>12</td>
<td>TX2+O</td>
<td>TX2 odd positive</td>
</tr>
<tr>
<td>13</td>
<td>TX2-O</td>
<td>TX2 odd negative</td>
</tr>
<tr>
<td>14</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>15</td>
<td>TX1+O</td>
<td>TX1 odd positive</td>
</tr>
<tr>
<td>16</td>
<td>TX1-O</td>
<td>TX1 odd negative</td>
</tr>
<tr>
<td>17</td>
<td>TX0+O</td>
<td>TX0 odd positive</td>
</tr>
<tr>
<td>18</td>
<td>TX0-O</td>
<td>TX0 odd negative</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>20</td>
<td>TX3+E</td>
<td>TX3 even positive</td>
</tr>
<tr>
<td>21</td>
<td>TX3-E</td>
<td>TX3 even negative</td>
</tr>
<tr>
<td>22</td>
<td>TXCLK+E</td>
<td>Clock even positive</td>
</tr>
<tr>
<td>23</td>
<td>TXCLK-E</td>
<td>Clock even negative</td>
</tr>
<tr>
<td>24</td>
<td>TX2+E</td>
<td>TX2 even positive</td>
</tr>
<tr>
<td>25</td>
<td>TX2-E</td>
<td>TX2 even negative</td>
</tr>
<tr>
<td>26</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>27</td>
<td>TX1+E</td>
<td>TX1 even positive</td>
</tr>
<tr>
<td>28</td>
<td>TX1-E</td>
<td>TX1 even negative</td>
</tr>
<tr>
<td>29</td>
<td>TX0+E</td>
<td>TX0 even positive</td>
</tr>
<tr>
<td>30</td>
<td>TX0-E</td>
<td>TX0 even negative</td>
</tr>
</tbody>
</table>

* Note: Pin 1, 2, 3, 4: Output voltage 3.3V / 5.0V / 12.0V - selectable with jumper CN200

### 7.6 Inverter / Backlight

**Connector:** CN107, CN108 – JST S7B-EH

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V dimm A</td>
<td>Analog dimming voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analog dimming range is selectable with jumper CN600</td>
</tr>
<tr>
<td>2</td>
<td>V dimm PWM</td>
<td>PWM dimming output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal level is selectable with jumper CN601</td>
</tr>
<tr>
<td>3</td>
<td>Enable</td>
<td>ON/OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polarity is selectable with jumper CN602</td>
</tr>
<tr>
<td>4</td>
<td>VDD</td>
<td>Operating voltage +12V / +24V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VDD is selectable with the jumpers CN202, CN203, CN204. All jumpers must be set in the same position!</td>
</tr>
<tr>
<td>5</td>
<td>VDD</td>
<td>Operating voltage +12V / +24V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VDD is selectable with the jumpers CN202, CN203, CN204. All jumpers must be set in the same position!</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>
### 7.7 OSD Connector

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LED1</td>
<td>LED Green</td>
</tr>
<tr>
<td>2</td>
<td>LED2</td>
<td>LED RED</td>
</tr>
<tr>
<td>3</td>
<td>IR / n.c.</td>
<td>IR remote / not connected</td>
</tr>
<tr>
<td>4</td>
<td>3.3V</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>SW3</td>
<td>Button3 (UP)</td>
</tr>
<tr>
<td>7</td>
<td>SW2</td>
<td>Button2 (DOWN)</td>
</tr>
<tr>
<td>8</td>
<td>SW4</td>
<td>Button4 (SELECT)</td>
</tr>
<tr>
<td>9</td>
<td>SW6</td>
<td>Button6 (POWER)</td>
</tr>
<tr>
<td>10</td>
<td>SW1</td>
<td>Button1 (MENU)</td>
</tr>
<tr>
<td>11</td>
<td>n.c.</td>
<td>Not connected</td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

### 7.8 GPIO Connector

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.3V</td>
<td>3.3V (max 200mA)</td>
</tr>
<tr>
<td>2</td>
<td>5.0V</td>
<td>5.0V (max 200mA)</td>
</tr>
<tr>
<td>3</td>
<td>FAN PWM</td>
<td>PWM signal for FAN speed</td>
</tr>
<tr>
<td>4</td>
<td>FAN Tacho</td>
<td>N.C</td>
</tr>
<tr>
<td>5</td>
<td>FAN VCC</td>
<td>GPIO from STD6036 (LVTTL)</td>
</tr>
<tr>
<td>6</td>
<td>GPIO34</td>
<td>GPIO from STD6036 (LVTTL)</td>
</tr>
<tr>
<td>7</td>
<td>GPIO45</td>
<td>GPIO from STD6036 (LVTTL)</td>
</tr>
<tr>
<td>8</td>
<td>SCL</td>
<td>I2C SCL (5V level)</td>
</tr>
<tr>
<td>9</td>
<td>SDA</td>
<td>I2C SDA (5V level)</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Signals on the GPIO connector are not used at the moment. Reserved for custom options.

### 7.9 Systembus

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>SCL</td>
<td>I2C SCL (5V level)</td>
</tr>
<tr>
<td>3</td>
<td>SDA</td>
<td>I2C SDA (5V level)</td>
</tr>
<tr>
<td>4</td>
<td>5V</td>
<td>5.0V (max 200mA)</td>
</tr>
</tbody>
</table>

### 7.10 RS232 Connector

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.3V</td>
<td>3.3V (max 200mA)</td>
</tr>
<tr>
<td>2</td>
<td>TxD</td>
<td>Transmit Data (LVTTL)</td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
<td>Receive Data (LVTTL)</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>
Connector: CN113 – 10pin double row

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
<td>Receive Data (LVTTL)</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>TxD</td>
<td>Transmit Data (LVTTL)</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>10</td>
<td>NC</td>
<td></td>
</tr>
</tbody>
</table>

7.11 Fan Connector

Connector: CN114 – MOLEX 47053-1000

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Fan VCC</td>
<td>Fan Supply (same as board supply voltage)</td>
</tr>
<tr>
<td>3</td>
<td>Fan Tacho</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>Fan PWM</td>
<td>PWM Signal for Fan speed</td>
</tr>
</tbody>
</table>

7.12 Inverter Switch

Connector: CN109 – MOLEX 53261-0271

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inverter Switch</td>
<td>Inverter ON / OFF</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>
8. Jumper settings and configuration

WARNING! Do not change the jumper settings and configuration of the board! Changing the jumpers and configuration may cause fatal damage to the board and to the connected display or cause malfunction.

8.1. Panel supply voltage (CN200)

The supply voltage of the panel can be selected with the Jumper CN200.
Note: Do only use one jumper cab at the same time. Combinations of jumper cables are not allowed.

<table>
<thead>
<tr>
<th>Panel Voltage</th>
<th>CN200 1-2</th>
<th>CN200 3-4</th>
<th>CN200 5-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3V</td>
<td>closed</td>
<td>open</td>
<td>open</td>
</tr>
<tr>
<td>5.0V</td>
<td>open</td>
<td>closed</td>
<td>open</td>
</tr>
<tr>
<td>12.0V</td>
<td>open</td>
<td>open</td>
<td>closed</td>
</tr>
</tbody>
</table>

Table 1: Panel power supply

8.2. Backlight Power Supply (CN202, CN203, CN204)

Select the backlight supply voltage with the jumper CN202 to CN204.

Note: All jumper cables of the jumper CN202-CN204 must be set in the same position!

<table>
<thead>
<tr>
<th>CN202 CN203 CN204</th>
<th>Backlight supply voltage (CN107 and CN108 Pin4 and Pin5)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>+12V / max 3A</td>
<td>Use this setting if the input voltage of the board does not match the backlight supply voltage.</td>
</tr>
<tr>
<td>2-3</td>
<td>Equal to board supply voltage / max 6A</td>
<td>This setting should be used if the input voltage of the board matches with the backlight supply voltage. The max backlight current is limited to 6A.</td>
</tr>
</tbody>
</table>

8.3. Backlight Dimming (CN600)

The range of the analog dimming voltage and the signal high level of the digital PWM dimming signal can be selected with the jumper CN600.

<table>
<thead>
<tr>
<th>CN600</th>
<th>Analog Dimming (CN107 und CN108 Pin1)</th>
<th>Digital Dimming (CN107 and CN108 Pin 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>0V – 5.0V</td>
<td>High level: 5.0V</td>
</tr>
<tr>
<td>2-3</td>
<td>0V – 3.3V</td>
<td>High level 3.3V</td>
</tr>
</tbody>
</table>

Note: Signal polarity can be changed in the panel file.

8.4. Backlight Enable Signal (CN601, CN602)

Select the level of the backlight enable signal (CN107 and CN108 Pin3) with the jumper CN601.

<table>
<thead>
<tr>
<th>CN601</th>
<th>Backlight enable signal (CN107 und CN108 Pin3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>High level 5.0V</td>
</tr>
<tr>
<td>2-3</td>
<td>High level 3.3V</td>
</tr>
</tbody>
</table>
Select the polarity of the enable signal with jumper CN602.

<table>
<thead>
<tr>
<th>CN602</th>
<th>Backlight enable signal (CN107 und CN108 Pin3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>High active</td>
</tr>
<tr>
<td>2-3</td>
<td>Low active</td>
</tr>
</tbody>
</table>

8.5. Panel file configuration

The panel timing is defined in a panel file. To modify the panel file you have to use the Data Modul BoardProgrammer.exe.
The board is shipped out with the correct panel and inverter configuration.

9. OSD (On Screen Display)

The eMotionST1:3 can operate with an external OSD board (optional item).
Generally the OSD offers the user various possibilities of customizing the appearance of the TFT display. By using the OSD board, brightness, contrast, input selection, OSD appearance and much more can be adjusted easily.
The eMotionST1:3 supports a 5 button OSD. Other customized OSDs (4button/6button) may be realized upon request.

9.1. Mechanical dimensions OSD board (CU70008, incl. input cable)

OSD connector CN112: Molex 53015-1210
### 9.2. Operation & buttons

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu</td>
<td>Enter OSD main menu</td>
</tr>
<tr>
<td></td>
<td>Leave sub menu</td>
</tr>
<tr>
<td></td>
<td>Leave OSD main menu</td>
</tr>
<tr>
<td>Select</td>
<td>Navigate down in menu</td>
</tr>
<tr>
<td>Down / Minus</td>
<td>Navigate left in main menu</td>
</tr>
<tr>
<td></td>
<td>Decrease value</td>
</tr>
<tr>
<td>Up / Plus</td>
<td>Navigate up in main menu</td>
</tr>
<tr>
<td></td>
<td>Increase value</td>
</tr>
<tr>
<td>Power</td>
<td>Turn power on/off</td>
</tr>
<tr>
<td>2 color LED</td>
<td>RED / GREEN</td>
</tr>
</tbody>
</table>

### 9.3. Hotkeys

The OSD offers hot key functions. To access these functions the user must not open the OSD via «Menu». The hotkey functions offer a direct access to the equivalent function.

<table>
<thead>
<tr>
<th>Button</th>
<th>Direct access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up / Plus</td>
<td>Source select, switch to next input source</td>
</tr>
<tr>
<td>Down / Minus</td>
<td>Brightness</td>
</tr>
<tr>
<td>Select</td>
<td>Auto adjust</td>
</tr>
</tbody>
</table>

### 9.4. OSD Status LED

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amber flashing</td>
<td>Stand by (searching input)</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Searching display mode (source)</td>
</tr>
<tr>
<td>GreenON</td>
<td>OK (displaying signal)</td>
</tr>
<tr>
<td>Red ON</td>
<td>Power off</td>
</tr>
</tbody>
</table>
9.5. OSD Structure

- **Picture**
  - Contrast
  - Brightness
  - Sharpness
  - Color

- **Color**
  - Auto color
  - Theme mode
  - Color space
  - Color balance
  - User color

- **User color**
  - RED
  - GREEN
  - BLUE

- **VGA Settings**
  - Timing
  - Auto setup
  - H total
  - V position
  - H position
  - Phase

- **Inputs**
  - VGA
  - DVI
  - Display Port

- **Setup**
  - Inputs
  - OSD
  - Info
  - Reset to factory defaults
  - Source Scan
  - Advanced Setup

- **OSD**
  - Time out
  - Transparency
  - Language
  - Rotation
  - OSD Position
  - Show Logo

- **Info**
  - Temperature (°C)
  - Software
  - Revision
  - Timing
  - Mode ID

- **Reset to factory defaults**
  - Press right to confirm reset

- **Advanced Setup**
  - Smart ISP
  - CVT Mode

---

Page 19 of 23
### 9.5.1 Picture Menu

<table>
<thead>
<tr>
<th>Picture</th>
<th>Contrast</th>
<th>Brightness</th>
<th>Sharpness</th>
<th>Color</th>
</tr>
</thead>
</table>

### 9.5.2 VGA Settings Menu

<table>
<thead>
<tr>
<th>VGA Settings</th>
<th>Timing</th>
<th>Auto setup</th>
<th>H total</th>
<th>V position</th>
<th>H position</th>
<th>Phase</th>
</tr>
</thead>
</table>

### 9.5.3 Setup Menu

<table>
<thead>
<tr>
<th>Setup</th>
<th>Inputs</th>
<th>OSD</th>
<th>Info</th>
<th>Reset to factory defaults</th>
<th>Source scan</th>
<th>Advanced Setup</th>
</tr>
</thead>
</table>

### 9.5.4 Color Menu

<table>
<thead>
<tr>
<th>Color</th>
<th>Auto color</th>
<th>Theme mode</th>
<th>Gamma</th>
<th>Color balance</th>
<th>User color</th>
</tr>
</thead>
</table>

9.5.5 User Color Menu

<table>
<thead>
<tr>
<th>User color</th>
<th>RED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GREEN</td>
</tr>
<tr>
<td></td>
<td>BLUE</td>
</tr>
</tbody>
</table>

9.5.6 Inputs Menu

<table>
<thead>
<tr>
<th>Inputs</th>
<th>VGA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DVI</td>
</tr>
<tr>
<td></td>
<td>DisplayPort</td>
</tr>
</tbody>
</table>

9.5.7 OSD Menu

<table>
<thead>
<tr>
<th>OSD</th>
<th>Time out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transparency</td>
</tr>
<tr>
<td></td>
<td>Language</td>
</tr>
<tr>
<td></td>
<td>Rotation</td>
</tr>
<tr>
<td></td>
<td>OSD Position</td>
</tr>
<tr>
<td></td>
<td>Show logo</td>
</tr>
</tbody>
</table>

9.5.8 OSD Position Menu

<table>
<thead>
<tr>
<th>OSD Position</th>
<th>x Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>y Position</td>
</tr>
</tbody>
</table>
9.5.9 Info Menu

<table>
<thead>
<tr>
<th>Info</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td></td>
</tr>
<tr>
<td>Revision</td>
<td></td>
</tr>
<tr>
<td>Timing</td>
<td></td>
</tr>
<tr>
<td>Mode ID</td>
<td></td>
</tr>
</tbody>
</table>

9.5.10 Advanced Setup Menu

<table>
<thead>
<tr>
<th>Advanced Setup</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart ISP</td>
<td></td>
</tr>
<tr>
<td>CVT Mode</td>
<td></td>
</tr>
</tbody>
</table>

10. Serial Control RS232

The eMotionST3:1 can be controlled by a serial command set using the RS232. For using the RS232 a level converter from LVTTL to RS232 level must be used. Detailed information about the RS232 protocol are provided on request!

11. DDC/CI Interface

The eMotionST1:3 can be controlled by DDC/CI. Detailed information are provided on request!
Description: HDMI to DVI Cable, Black Line
- Connectors: HDMI Type A male to DVI-D (18+1) male, gold plated
- Cable: UL 20276 30AWG (7/0.1TC), 85% AL-Braid, OD: 5.5mm, PVC, black / red screws/SR: Pantone 2035C
- RoHS & Reach compliant, UL certified

Packaging: Lindy polybag and label as above

Alterations

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>BY</th>
<th>GB</th>
<th>DE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>23.05.17</td>
<td>ML</td>
<td>Al</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>08.08.17</td>
<td>ML</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>16.11.17</td>
<td>ML</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>01.12.17</td>
<td>ML</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All connectors viewed from front

The following tolerances apply to overall dimensions -0% +10%

Lindy polybag and label as above

Lindy Electronics Ltd., LINDY-Elektronik GmbH and LINDY group. All rights reserved.
PIN ASSIGNMENT

<table>
<thead>
<tr>
<th>COLOR</th>
<th>P1</th>
<th>P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>YELLOW</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>YELLOW</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>RED</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>RED</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>BLACK</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>BLACK</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

NOTE

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION</th>
<th>SUPPLIER</th>
<th>UL FILE NO</th>
<th>QTY</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>JST: EHR-7 PITCH 2.54mm 7P HOUSING</td>
<td>JST</td>
<td>E00369</td>
<td>1 PCS</td>
<td>JST</td>
</tr>
<tr>
<td>2</td>
<td>JST: SEH-001T-P0.6 terminal</td>
<td>JST</td>
<td>E00389</td>
<td>6 PCS</td>
<td>JST</td>
</tr>
<tr>
<td>3</td>
<td>HR P/N: A1007H-08P, PITCH 1.0mm 8P HOUSING</td>
<td>JOINT TECH</td>
<td>E170987</td>
<td>1 PCS</td>
<td>JOINT TECH</td>
</tr>
<tr>
<td>4</td>
<td>HR P/N: A1007-GPE, TERMINAL</td>
<td>JOINT TECH</td>
<td>E170987</td>
<td>6 PCS</td>
<td>JOINT TECH</td>
</tr>
<tr>
<td>5</td>
<td>CABLE: UL 30 AWG ID Ø0.55×0.06 CABLE</td>
<td>COPARTNER</td>
<td>E1199132</td>
<td>6 PCS</td>
<td>XIN YA</td>
</tr>
<tr>
<td>6</td>
<td>WHITE SHRINK TUBE WITH LABEL</td>
<td>WOER</td>
<td>E203699</td>
<td>1 PCS</td>
<td>YI JINGA</td>
</tr>
</tbody>
</table>

DRAWN: Song 02/18  
DAW NO: FT - C345 - 403  
TITLE: EHR-7 TO A1007H-8P  
L = 300 mm UL30 AWG CABLE  
PART NO: 12018499F  
DATE: 2016. 02. 18  
SHEET 1 OF 1
PIN ASSIGNMENT

<table>
<thead>
<tr>
<th>PIN</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RED</td>
</tr>
<tr>
<td>02</td>
<td>WHITE</td>
</tr>
<tr>
<td>03</td>
<td>GREEN</td>
</tr>
<tr>
<td>04</td>
<td>BLACK</td>
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</tbody>
</table>

PACKING:

150±20

ITEM

<table>
<thead>
<tr>
<th>ITEM</th>
</tr>
</thead>
</table>

28-Aug-18

工程部： KELLY

Copyright © 1996 Digi-Key Corporation

Customer: EU0137
Unit:mm

Date: APR/13/2018
3rd Angle Projection
<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>UNIT</th>
<th>#28AWGX1P+#28AWGX2C+AL/MYLAR+E-SPIRAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO OF PAIR</td>
<td>EACH</td>
<td>1</td>
</tr>
<tr>
<td>CONDUCTOR</td>
<td>MATERIAL</td>
<td>TINNED COPPER STRANDED</td>
</tr>
<tr>
<td>OC.</td>
<td>V V</td>
<td>0.38 (REF)</td>
</tr>
<tr>
<td>INSULATION</td>
<td>MATERIAL</td>
<td>HD-PE</td>
</tr>
<tr>
<td>THICKNESS</td>
<td>MM</td>
<td>0.23 (REF)</td>
</tr>
<tr>
<td>O.D.</td>
<td>MM</td>
<td>0.85±0.05</td>
</tr>
<tr>
<td>COLOR</td>
<td>WHITE&amp;GREEN</td>
<td></td>
</tr>
<tr>
<td>NO OF WIRE</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CONDUCTOR</td>
<td>MATERIAL</td>
<td>TINNED COPPER STRANDED</td>
</tr>
<tr>
<td>OD.</td>
<td>MM</td>
<td>0.38 (REF)</td>
</tr>
<tr>
<td>INSULATION</td>
<td>MATERIAL</td>
<td>SR-PVC</td>
</tr>
<tr>
<td>THICKNESS</td>
<td>MM</td>
<td>0.23 (REF)</td>
</tr>
<tr>
<td>O.D.</td>
<td>MM</td>
<td>0.85±0.05</td>
</tr>
<tr>
<td>COLOR</td>
<td>1.RED 2.BALCK</td>
<td></td>
</tr>
<tr>
<td>AL/MYLAR(AL. FACE OUTSIDE)</td>
<td>CCVERAGE</td>
<td>% 100</td>
</tr>
<tr>
<td>OVERLAP</td>
<td>%</td>
<td>25</td>
</tr>
<tr>
<td>DRAYN WIRE</td>
<td>28AWG 7/0.127±0.008 TINNED COPPER STRANDED</td>
<td></td>
</tr>
<tr>
<td>SPIRAL SHIELD</td>
<td>CONSTITUTION</td>
<td>40±3/0.12±0.008</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>TINNED COPPER WIRE</td>
<td></td>
</tr>
<tr>
<td>JACKET</td>
<td>MATERIAL</td>
<td>FR-PVC</td>
</tr>
<tr>
<td>THICKNESS</td>
<td>MM</td>
<td>0.45 (REF)</td>
</tr>
<tr>
<td>HARDNESS</td>
<td>HA</td>
<td>75±5</td>
</tr>
<tr>
<td>O.D.</td>
<td>MM</td>
<td>3.5±0.15</td>
</tr>
<tr>
<td>COLOR</td>
<td>BLACK (FREeway COLOR CODE 140C)</td>
<td></td>
</tr>
<tr>
<td>UL</td>
<td>2725</td>
<td></td>
</tr>
<tr>
<td>TEMPERATURE</td>
<td>°C</td>
<td>80</td>
</tr>
<tr>
<td>VOLTAGE RATING</td>
<td>V</td>
<td>30</td>
</tr>
<tr>
<td>DIELECTRIC STRENGTH</td>
<td>AC-500V/1 MIN</td>
<td></td>
</tr>
<tr>
<td>INSULATION RESISTANCE</td>
<td>SR-PVC 50 M OHM/KM MIN. AT 20°C</td>
<td></td>
</tr>
<tr>
<td>HD-PE 100 M OHM/KM MIN. AT 20°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONDUCTOR RESISTANCE</td>
<td>28AWG 237 OHM/KM MAX. AT 20°C</td>
<td></td>
</tr>
<tr>
<td>24AWG 93 OHM/KM MAX. AT 20°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPARK TEST</td>
<td>AC-2KV IN AIR</td>
<td></td>
</tr>
<tr>
<td>JACKET MARKING</td>
<td>% AWM E257034 FREeway STYLE 2725 80°C 3CV VW-1 28AWG/1P+28AWG/2C USB 2.0 CABLE</td>
<td></td>
</tr>
</tbody>
</table>

RoHS compliant

FREeway ELECTRONIC CABLE (DONGGUAN) CO., LTD
65 Watts

- Energy Efficiency Level VI
- CoC Tier 2
- Limited Power Source Approved
- <0.15 W Standby Power
- Optional Inlet Connector
- China Compulsory Certification (CCC) Qualified
- 0 °C to 60 °C Operation
- High Power Density
- Low Cost

Dimensions:
VEC65:
4.58 x 2.06 x 1.23" (116.3 x 52.4 x 31.3 mm)

Models & Ratings

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>Total Regulation</th>
<th>Efficiency(1)</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 W</td>
<td>12.0 V</td>
<td>5.41 A</td>
<td>±5%</td>
<td>89%</td>
<td>VEC65US12</td>
</tr>
<tr>
<td></td>
<td>19.0 V</td>
<td>3.42 A</td>
<td></td>
<td>89%</td>
<td>VEC65US19</td>
</tr>
<tr>
<td></td>
<td>24.0 V</td>
<td>2.71 A</td>
<td></td>
<td>89%</td>
<td>VEC65US24</td>
</tr>
</tbody>
</table>

Notes

1. Typical average of efficiencies measured at 25%, 50%, 75% and 100% load and 230 VAC input.

Mechanical Details

- Power Cord for C14 inlet, Order Part:
  - UK - UK-MAINS-IEC
  - European - EU-MAINS-IEC
  - US - US-MAINS-IEC

- Power Cord for C6 inlet, Order Part:
  - UK - UK-MAINS-5
  - European - EU-MAINS-5

Notes

1. All dimensions are shown in inches (mm); Tolerance is 0.04" (±1.0) max except output lead.
2. Weight: 0.6 lbs (270 g) approx.
3. Output connector is barrel type with 11 mm length, 5.5 mm dia. outer, 2.5 mm dia. inner with center + and outer shell - polarity.
**Input**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
<th>Units</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>90</td>
<td>264</td>
<td>VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Frequency</td>
<td>47</td>
<td>63</td>
<td>Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Current</td>
<td>1.3/0.9</td>
<td></td>
<td>A</td>
<td></td>
<td>Measured at 115/230 VAC</td>
</tr>
<tr>
<td>Inrush Current</td>
<td>70</td>
<td></td>
<td>A</td>
<td></td>
<td>230 VAC, cold start at 25 °C</td>
</tr>
<tr>
<td>Power Factor</td>
<td></td>
<td>0/3</td>
<td>%</td>
<td></td>
<td>EN61000-3-2 Class A</td>
</tr>
<tr>
<td>Earth Leakage Current</td>
<td>0.7</td>
<td></td>
<td>mA</td>
<td></td>
<td>204 VAC, 60 Hz</td>
</tr>
<tr>
<td>No Load Input Power</td>
<td>0.15</td>
<td></td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Protection</td>
<td>T3.15A/250 VAC internal fuse in line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Output**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Voltage</td>
<td>12</td>
<td>24</td>
<td>VDC</td>
<td></td>
<td>See Models and Ratings table</td>
</tr>
<tr>
<td>Minimum Load</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No minimum load required</td>
</tr>
<tr>
<td>Start Up Delay</td>
<td>3</td>
<td></td>
<td>s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Up Rise Time</td>
<td>8</td>
<td></td>
<td>ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold Up Time</td>
<td>8</td>
<td></td>
<td>ms</td>
<td></td>
<td>Full load and 115 VAC</td>
</tr>
<tr>
<td>Line Regulation</td>
<td>±0.5</td>
<td></td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Regulation</td>
<td>±5</td>
<td></td>
<td>%</td>
<td></td>
<td>Including initial set accuracy</td>
</tr>
<tr>
<td>Transient Response</td>
<td>4</td>
<td></td>
<td>%</td>
<td></td>
<td>Maximum deviation, recovering to less than 1% within 500 μs for 25% step load</td>
</tr>
<tr>
<td>Ripple and Noise</td>
<td>240</td>
<td></td>
<td>mV pk-pk</td>
<td></td>
<td>Measured with 20 MHz Bandwidth and 22 μF electrolytic in parallel with 0.1 μF ceramic capacitor.</td>
</tr>
<tr>
<td>Overload Protection</td>
<td>110</td>
<td>170</td>
<td>%</td>
<td></td>
<td>At turn on / turn off</td>
</tr>
<tr>
<td>Overvoltage Protection</td>
<td>150</td>
<td></td>
<td>%</td>
<td></td>
<td>Recycle mains to reset</td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>trip and restart (hiccup), auto resetting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>±0.04</td>
<td></td>
<td>%/°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Environmental**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
<th>Units</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>0</td>
<td>+60</td>
<td>°C</td>
<td></td>
<td>Derate from 100% load at 40 °C to 50% load at 60 °C</td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Natural convection</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>5</td>
<td>90</td>
<td>%RH</td>
<td></td>
<td>Non-condensing</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20</td>
<td>+85</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Altitude</td>
<td></td>
<td>5000</td>
<td>m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>IEC68-2-27, 30 g, 11 ms half sine, 3 times in each of 6 axes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC68-2-6, 10-500 Hz, 2 g 10 mins/sweep, 60 mins for each of 3 axes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Derating Curve**

![Derating Curve Graph]
## General

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
<th>Units</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>90</td>
<td></td>
<td></td>
<td>%</td>
<td>See Models and Ratings table and curves.</td>
</tr>
<tr>
<td>Isolation: Input to Output Input to Ground</td>
<td>3000</td>
<td></td>
<td></td>
<td>VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td></td>
<td></td>
<td>VAC</td>
<td></td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>65</td>
<td></td>
<td></td>
<td>kHz</td>
<td>±10 kHz</td>
</tr>
<tr>
<td>Power Density</td>
<td>5.6</td>
<td></td>
<td></td>
<td>W/in²</td>
<td></td>
</tr>
<tr>
<td>Mean Time Between Failure</td>
<td>&gt;200</td>
<td></td>
<td></td>
<td>kHrs</td>
<td>MIL-HDBK-217F at 25 °C GB</td>
</tr>
<tr>
<td>Weight</td>
<td>0.6 (270)</td>
<td></td>
<td></td>
<td>lb (g)</td>
<td></td>
</tr>
</tbody>
</table>

### Efficiency Curves

**VEC65US12**

![Efficiency Plot](image)

**VEC65US24**

![Efficiency Plot](image)

### EMC: Emissions

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Standard</th>
<th>Test Level</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions</td>
<td>EN55022</td>
<td>Level B</td>
<td>Conducted &amp; Radiated</td>
</tr>
<tr>
<td>Harmonic Current</td>
<td>EN61000-3-2</td>
<td>Class A</td>
<td></td>
</tr>
<tr>
<td>Voltage Flicker</td>
<td>EN61000-3-3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**EMC: Immunity**

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Standard</th>
<th>Test Level</th>
<th>Criteria</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD</td>
<td>EN61000-4-2</td>
<td>±8 kV Air, ±4 kV contact</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Radiated</td>
<td>EN61000-4-3</td>
<td>3 V/m</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>EFT/Burst</td>
<td>EN61000-4-4</td>
<td>3</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Surge</td>
<td>EN61000-4-5</td>
<td>Installation Class 3</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Conducted</td>
<td>EN61000-4-6</td>
<td>3 V</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Magnetic Fields</td>
<td>EN61000-4-8</td>
<td>3 A/m</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Dips and Interruptions</td>
<td>EN61000-4-11</td>
<td>Dip: 30% 500 ms A/B</td>
<td>High Line/Low Line</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dip: 60% 200 ms A/B</td>
<td>High Line/Low Line</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Int: 100% 5000 ms B</td>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

**Safety Approvals**

<table>
<thead>
<tr>
<th>Safety Agency</th>
<th>Safety Standard</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL/CSA</td>
<td>cUL60950-1</td>
<td>Approved at Limited Power Source (LPS)</td>
</tr>
<tr>
<td>TUV</td>
<td>EN60950-1</td>
<td></td>
</tr>
<tr>
<td>CB</td>
<td>IEC60950-1</td>
<td></td>
</tr>
<tr>
<td>CCC</td>
<td>China Compulsory Certification (CCC)</td>
<td></td>
</tr>
</tbody>
</table>

**Mechanical Details**

1. All dimensions are shown in inches (mm), Tolerance is 0.04” (±1.0) max except output lead.
2. Weight: 0.6 lbs (270 g) approx.
3. Output connector is barrel type with 11 mm length, 5.5 mm dia. outer, 2.5 mm dia. inner with center + and outer shell - polarity.

**Notes**

- Power Cord for C14 inlet, Order Part:
  - UK - UK-MAINS-IEC
  - European - EU-MAINS-IEC
  - US - US-MAINS-IEC

- Power Cord for C6 inlet, Order Part:
  - UK - UK-MAINS-5
  - European - EU-MAINS-5
### Power Cord

<table>
<thead>
<tr>
<th>Description</th>
<th>Power Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer / Type</td>
<td>Taiwan Line Tek Electronic Co., Ltd.</td>
</tr>
<tr>
<td>Supplier / Type</td>
<td>Elektroisol GmbH / DK06214 NK-01.8</td>
</tr>
<tr>
<td>Ratings</td>
<td>10A / 250VAC</td>
</tr>
<tr>
<td>Length / Colour</td>
<td>1.8m / black</td>
</tr>
</tbody>
</table>

**Plug**

| Kind of construction | LP-33 (DIN 49441-R2) |
| Manufacturer / Type | Longwell Company |
| Ratings | 10A / 250VAC |

**Appliance Connector**

| Kind of construction | LS-13 (IEC 60320 C13) |
| Manufacturer / Type | Longwell Company |
| Ratings | 10A / 250VAC |

**Cable**

| Kind of construction | H05VV-F 3G 0.75mm² |
| Manufacturer / Type | Longwell Company |
| Ratings | 10A, 250VAC |

**Required approval marks / certificates**

- Europe
- Germany
- Norway
- Sweden
- Denmark
- Finland
- Belgium
- Russia
- U.S.A
- Canada
- United Kingdom
- British Stand
- Swiss
- Austria
- France
- Italy
- Netherl.
- Japan
- China
- South Africa

---

**Drawing Information**

- Date: 01.06.2011
- Drafter: Dietrich
- Checker: Dietrich
- New: New
- Rev: 00

---

**CONTRAC High Performance Displays**

**DRAWING NUMBER**

2215-11A0-1800

**SIZE ISO A 4**

**SHEET 1 OF 1**

---

**Vorlage_Spec AC Power Cord_Rev00**

2215-11A0-1800.doc
<table>
<thead>
<tr>
<th>Description</th>
<th>Power cord set, North America type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer / Type</td>
<td>Feller 498G-SJT3X18AWG-C13</td>
</tr>
<tr>
<td>Supplier / Type</td>
<td></td>
</tr>
<tr>
<td>Ratings</td>
<td>10 A, 125 Vac,</td>
</tr>
<tr>
<td>Length / Colour</td>
<td>2.50m / black</td>
</tr>
</tbody>
</table>

**Plug**

| Kind of construction         | PVC 3-pole, 180 degree, NEMA 5-15 |
| Manufacturer / Type          | Feller / 498G                      |
| Ratings                      | 15A / 125 Vac                      |

**Appliance Connector**

| Kind of construction         | PVC 2-pole with earthing contact, 180 degrees, IEC 60320 / C13, UL 817 |
| Manufacturer / Type          | Feller / C13                      |
| Ratings                      | 12 A/250 Vac (USA, Canada), 7 A/125 Vac (Japan), 10 A/250 Vac            |

**Cable**

| Kind of construction         | SJT3X18AWG                        |
| Manufacturer / Type          | Feller                            |
| Ratings                      |                                   |

**Required approval marks / certificates**

- Europe
- Germany
- Norway
- Sweden
- Denmark
- Finland
- Belgium
- Russia
- U.S.A
- Canada
- United Kingdom
- British Stand
- Switzerland
- Austria
- France
- Italy
- Netherlands
- Japan
- China
- South Africa

**DRGW. TITLE**

Power Cord Set
North America Type

---

CONRAC
High Performance Displays

**DRAWING NUMBER**

2215-1140-2500

**SIZE ISO A4**

**SHEET 1 OF 1**

---

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ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.

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Landsberger Straße 322 DE-80687 Munich
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Lindenstraße 8
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Phone: +49-7934-101-0

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