



eMotion ST3:4

Product Specification

Rev. 008

Version: July 2016

This document might be changed without prior notice

Revisions of the document

| Rev. | Date | Author | Modifications |
|------|------------|------------|--|
| 000 | 19.05.2011 | O. Merfels | Requirement Specification(Initial Revision) |
| 001 | 20.12.2011 | M. Schmidt | Update of the Specification |
| 002 | 12.03.2012 | R. Muhler | Part-No. of X800, X1400 |
| 003 | 28.03.2012 | M. Schmidt | Default configuration for X11 set to DVI-I – Release Version |
| 004 | 16.04.2013 | R. Muhler | Change of serial input connectors |
| 005 | 03.07.2013 | R. Muhler | Pin numbers of X14, X800, X1400 added, chapter 6.3 updated, description of jumpers added |
| 006 | 22.08.2014 | R. Muhler | Changed X7, X37, X39 to flange type |
| 007 | 29.10.2014 | R. Muhler | Changed X39 to no flange type |
| 008 | 18.07.2016 | R. Muhler | Changed X7 to no flange type Adapted Environmental conditions (Chapter 5.1) |

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1. Preamble

1.1. Purpose of this document

The purpose of this document is the definition of the technical parameters, the electrical connections and the mechanical dimensions for the development of the eMotionST3:4.

1.2. Abbreviations

| | |
|------------------|---|
| UXGA | Ultra Extended Graphics Array |
| I ² C | Inter-IC |
| EMI | Electro Magnetic Interference |
| EMC | Electro Magnetic Compatibility |
| EN | European Norm |
| ESD | Electro Static Discharge |
| UL | Underwriter Lab |
| PCB | Printed Circuit Board |
| SMT | Surface Mount Technology |
| RoHS | Restriction for the use of Hazardous Substances |
| NC | Not Connected |
| t.b.d. | To be defined |
| TMDS | Transition Minimized Differential Signaling |
| DVI | Digital Video Interface |
| DP | Display Port |
| HDMI | High-Definition Multimedia Interface |
| VGA | Video Graphics Array |
| VESA | Video Electronics Standards Association |
| DMPS | Display Power Management Signaling |
| DDC/CI | Display Data Channel / Command Interface |
| USB | Universal Serial Bus |

1.3. Documentation Development process

The detailed documentation of the 4 phases of the development process (Feasibility Study, Concept Design, Design & Verification and Production Pre-Series) can be found in InLoox – Project CON0025B.

In this Design Specification only the results of the development are presented.

2. Product description

2.1. Functionally description of the product

The eMotionST3:4 represents a successor of the UXGA3-1 and AV6 interface boards for high resolution TFT-displays. Based on the latest design of highly integrated LCD controller ICs (STDP92xx/STDP93xx), the eMotionST3:4 is able to control panels from VGA up to 1920x1080(120Hz) / WQXGA (2560x1600) (depending on version).

The eMotionST3:4 is designed to be used for industrial applications, but it also can be used for digital-signage applications as well as for airport and transport applications. The internal connectors (for PSU, IR-board, etc.) are compatible to the existing AV6 interface board.

The interface board can display input signals from VGA, DVI-D, HDMI or DisplayPort interfaces as well as SD-Video signals (CVBS and YC).

The eMotionST3:4 can be controlled by a 5-key keyboard and by an IR-commander as well. The OSD menu allows the selection of six different languages (more languages on request).

The interface board is compatible with VESA DPMS, DDC2B, DDC/CI and can be controlled by RS232 and USB (optional). A software update can be done over serial interface using a standard PC (via RS232 and USB (option)).

2.2. Special features

- WQXGA (up to 2560 x 1600 input and output) OR FHD (1920 x 1080 120 Hz input and output) monitor scaler
- Integrated DisplayPort (DP) 1.2 compliant Rx and Tx with support for eDP, multistream and 3D video formats (option)
- Video processing supports full or partial capture of 4096x2160 format scaled to 2560x2160 output format
- Integrated HDMI 1.4 receiver (support 3D video)
- Integrated dual link DVI receiver
- 10-bit triple ADCs (sampling rate up to 205 MHz)
- High-speed quad LVDS Tx
- Advanced PIP / PBP for all input sources (option)
- Supports daisy chaining for monitors of up to four streams
- Panel backlight RGB uniformity compensation (option)
- Advanced Faroudja® video processing: MADi and DCDi
- 6-axis color control independent of ACC
- Advanced bit-mapped OSD controller
- 3D Frame Rate Conversion (FRC) and advanced overdrive to support 3D video
- 4Kx2K screen resolution support (option)
- Up/Down scaling of all input signals from VGA up to WQXGA
- 14bit gamma table
- Firmware update via RS232, Smart ISP (HDMI/DVI/DP cable) and USB (option)
- Auto image optimization
- Multilingual OSD with support of keypad and IR commander
- Very low power consumption in stand-by-mode
- Integrated special PD features (cPXS, cDPR, cSPM, cDPM, ...), option
- USB client interface (for remote control, color calibration and service), option

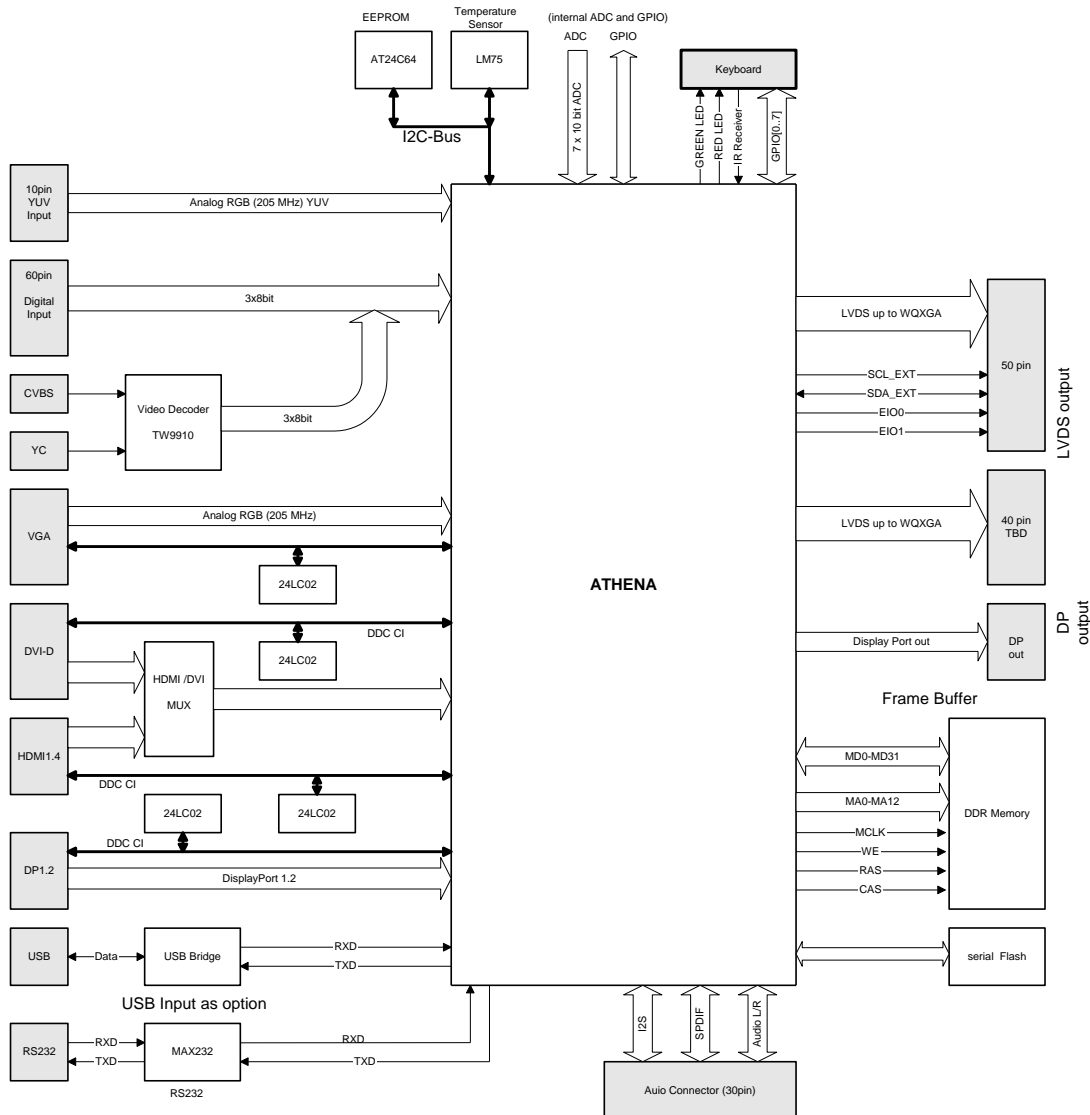
2.3. Versions of eMotionST3:4

Only one version is available, it covers to following features:

1. WQXGA Version for panels up to 2560 x 1600 pixel (60Hz)
2. 120Hz Version for panels up to 1920 x 1080 pixel

2.4. Block diagram of eMotionST3:4

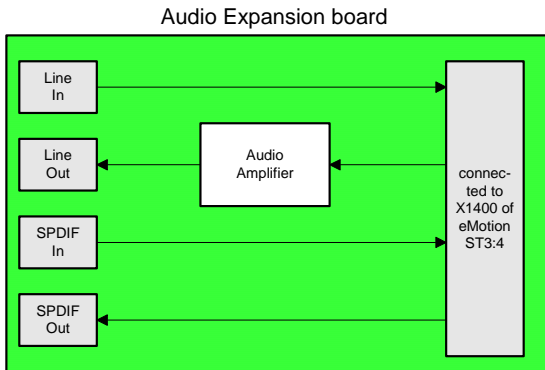
Block diagram of the eMotionST3:4



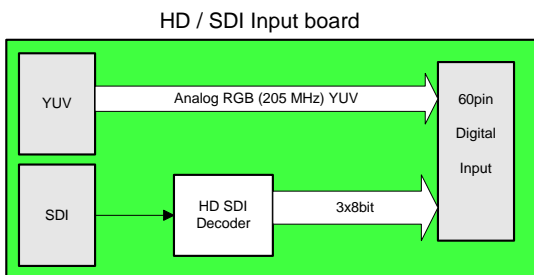
Standard mounting option for X11 is DVI-I. In this case no 15pin HD-Sub VGA connector is mounted.

As an option the VGA and DVI-D input can be a stacked DVI / VGA connector.

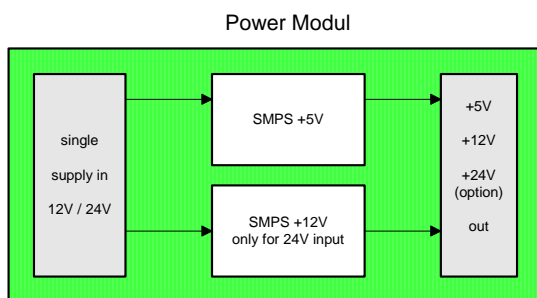
2.5. Input Boards (option)



ProAlpha part number: CU70370, 12007194



Conrac part number: tbd



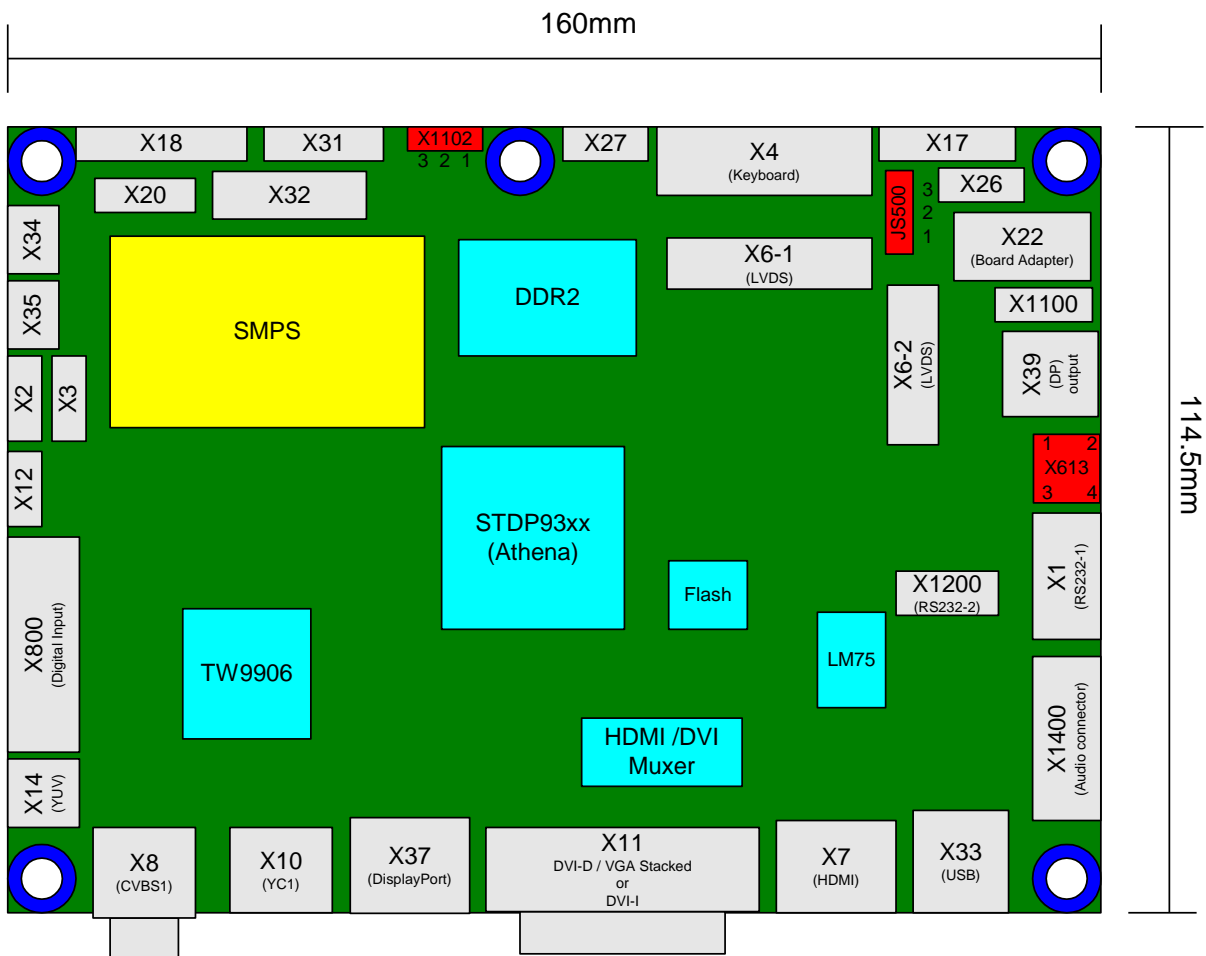
Conrac part number: tbd

3. Connector Terminals

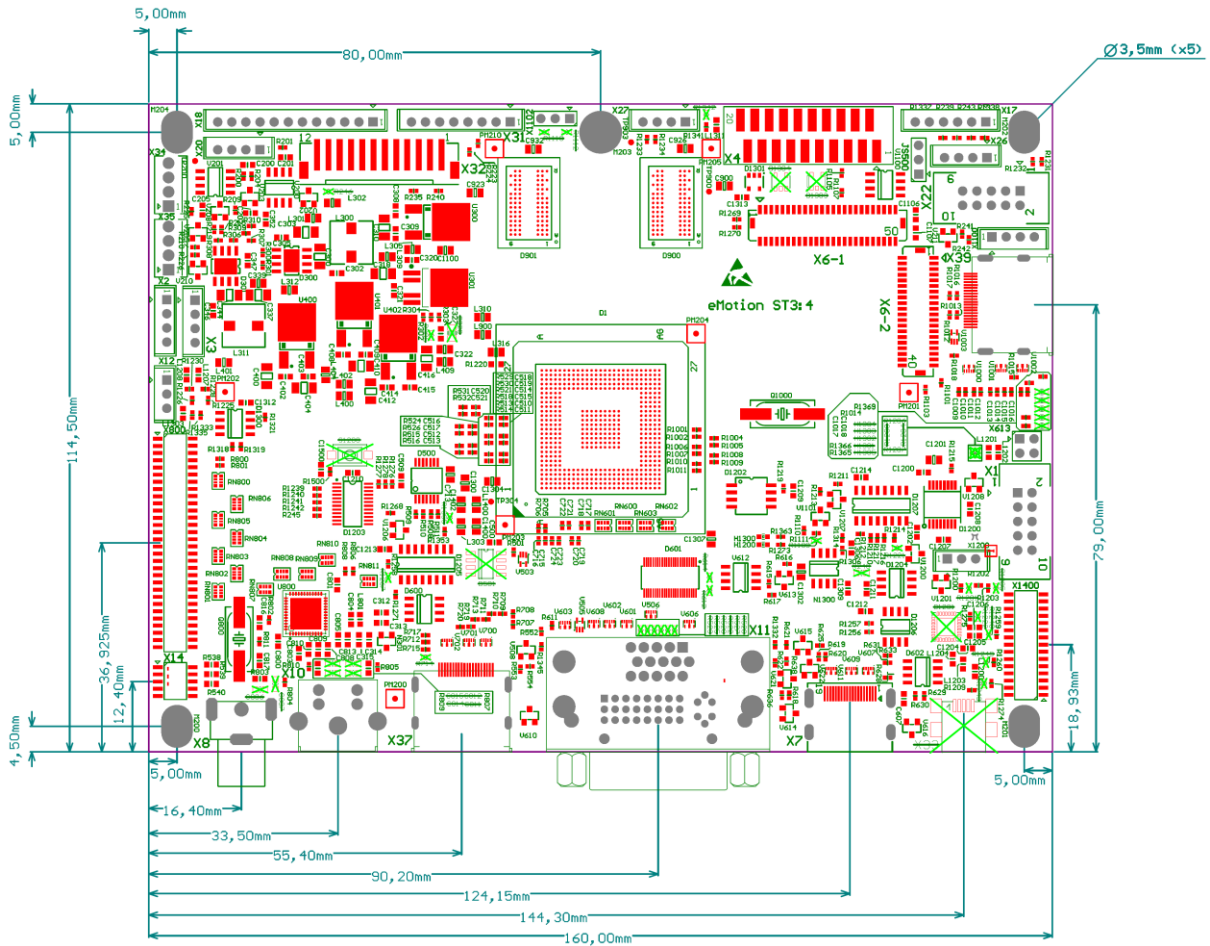
3.1. Drawing of PCB and dimensions

The dimensions of eMotionST3:4 are 160.0mm x 114.5mm.

Connector placement on eMotionST3:4:



Assembly-Drawing of eMotionST3:4: Top-Side; PCB-size: 114,5mm x 160mm:

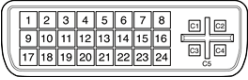


Five mounting holes (M100-M104) are used to fix the PCB in the chassis. Screw size is M3 (diameter of the plated area is 7mm).

The mounting holes are not changed on eMotionST3:4 compared with UXGA3-1

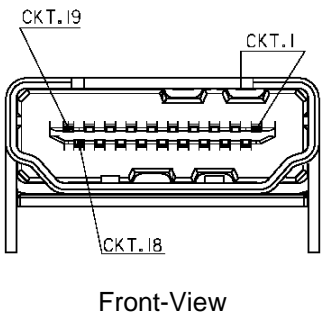
3.2. X11-1, DVI-I (Dual-Link)

Type: DVI-socket, stacked DVI/VGA connector or DVI-I

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|-------------------|------|------------------------|
|  <p>Front view</p> | 1 | DT2- | In | TMDS Data2- |
| | 2 | DT2+ | In | TMDS Data2+ |
| | 3 | TX2/4-SHLD | | TMDS Data2/4 Shield |
| | 4 | DT4- | | TMDS Data4- |
| | 5 | DT4+ | | TMDS Data4+ |
| | 6 | DDC-CLK | In | I2C-Clock, +5V level |
| | 7 | DDC-Data | I/O | I2C-Data, +5V level |
| | 8 | AVS | In | Analog V-Sync |
| | 9 | DT1- | In | TMDS Data1- |
| | 10 | DT1+ | In | TMDS Data1+ |
| | 11 | TX1/3-SHLD | | TMDS Data1/3 Shield |
| | 12 | DT3- | | TMDS Data3- |
| | 13 | DT3+ | | TMDS Data3+ |
| | 14 | +5V | In | +5V Power* |
| | 15 | Ground (for +5V) | | |
| | 16 | HP Detect | Out | Hot Plug Detect |
| | 17 | DT0- | In | TMDS Data0- |
| | 18 | DT0+ | In | TMDS Data0+ |
| | 19 | TX0/5-SHLD | | TMDS Data0/5 Shield |
| | 20 | DT5- | | TMDS Data5- |
| | 21 | DT5+ | | TMDS Data5+ |
| | 22 | TXC-SHLD | | TMDS Clock Shield |
| | 23 | CLK+ | In | TMDS Clock + |
| | 24 | CLK- | In | TMDS Clock - |
| | | C1 | ARED | In |
| | C2 | AGRN | In | Analog GREEN (option) |
| | C3 | ABLU | In | Analog BLUE (option) |
| | C4 | AHS | In | Analog H-Sync (option) |
| | C5 | Analog RGB Ground | | |

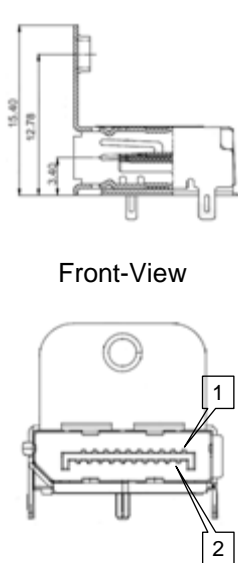
3.3. X7, HDMI Input without flange

Type: Nexus 3600HFR, Molex-Ref.-No. 47151-0001

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|---------|-----|------------------------|
|  <p>Front-View</p> | 1 | RX2+ | In | TMDS Data2+ |
| | 2 | GND | | TMDS Data2 Shield |
| | 3 | RX2- | In | TMDS Data2- |
| | 4 | RX1+ | In | TMDS Data1+ |
| | 5 | GND | | TMDS Data1 Shield |
| | 6 | RX1- | In | TMDS Data1- |
| | 7 | RX0+ | In | TMDS Data0+ |
| | 8 | GND | | TMDS Data0 Shield |
| | 9 | RX0- | In | TMDS Data0- |
| | 10 | RXC+ | In | TMDS Data-Clock+ |
| | 11 | GND | | TMDS Data-Clock Shield |
| | 12 | RXC- | In | TMDS Data-Clock- |
| | 13 | CEC | | CEC |
| | 14 | NC | | No internal Connection |
| | 15 | DSCL | In | I2C-Clock, +5V level |
| | 16 | DSDA | I/O | I2C-Data, +5V level |
| | 17 | GND | | DDC/CEC-GND |
| | 18 | HDMIHOT | In | +5V Power |
| | 19 | HOTPLUG | Out | Hot Plug Detect Signal |

3.4. X37, Display-Port input with flange

Type: Nexus 3662-FA-R

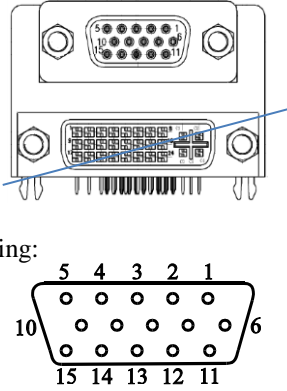
| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|----------|-----|---|
|  <p>Front-View</p> | 1 | ML_L3N | I | Lane 3 (negative) |
| | 2 | GND | | Ground |
| | 3 | ML_L3P | I | Lane 3 (positive) |
| | 4 | ML_L2N | I | Lane 2 (negative) |
| | 5 | GND | | Ground |
| | 6 | ML_L2P | I | Lane 2 (positive) |
| | 7 | ML_L1N | I | Lane 1 (negative) |
| | 8 | GND | | Ground |
| | 9 | ML_LN1P | I | Lane 1 (positive) |
| | 10 | ML_LN0N | I | Lane 0 (negative) |
| | 11 | GND | | Ground |
| | 12 | ML_LN0P | I | Lane 0 (positive) |
| | 13 | Config 1 | O | connected to Ground vs. 1M Ω ¹⁾ |
| | 14 | Config 2 | O | connected to Ground vs. 1M Ω ¹⁾ |
| | 15 | AUXP | I | Auxiliary Channel (positive) |
| | 16 | GND | | Ground |
| | 17 | AUXN | I | Auxiliary Channel (negative) |
| | 18 | HPD | I/O | Hot Plug Detect |
| | 19 | POR | | Return for Power |
| | 20 | PO | O | Power for connector (3.3V 500mA) Actually no internal connection |

1) Pin13 and Pin14 may either be directly connected to ground or connected to ground through a pulldown device.

3.5. X11-2 VGA input (as an option)

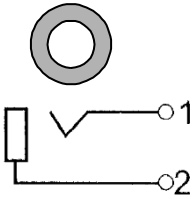
Type: 15pin, HD-Sub; Tyco Electronics 177-5075-1 (Stacked DVI-D / VGA 15pin HD-Sub)

Upper part of shown connector:

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|---------------|--------|-------------|
|  <p>Pinning:</p> | 1 | Analog Red1 | In | |
| | 2 | Analog Green1 | In | |
| | 3 | Analog Blue1 | In | |
| | 4 | GND | | |
| | 5 | GND | | |
| | 6 | GND | | |
| | 7 | GND | | |
| | 8 | GND | | |
| | 9 | +5V_DSUB1 | In | |
| | 10 | GND | | |
| | 11 | NC | | |
| | 12 | DDC SDA1 | In/Out | |
| | 13 | Analog HSYNC1 | In | |
| | 14 | Analog VSYNC1 | In | |
| | 15 | DDC SCL1 | In | |

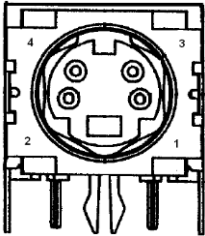
3.6. X8, CVBS

Type: 1xRCA-Jack; Conrac-No. 2175-0069-1010

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|---------------|
|  | 1 | CVBS1 | In | CVBS1 (FBAS1) |
| | 2 | Ground | | |

3.7. X10, YC1

Type: Mini DIN4; Conrac-No. 2175-0046-3040

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|-------------|
|  | 1 | Ground | | |
| | 2 | Ground | | |
| | 3 | Y1 | In | Luminance |
| | 4 | C1 | In | Chrominance |

3.8. X800, Digital input

Type: 60pin, double row, shrouded pin header, female, pitch 1.27 ,

W+P-Connector 7130-060-00-00-TR

| Pin arrangement | Pin | Signal | I/O | Description | |
|---|-----|-----------------|--------|-------------|--|
| <p>No slot at side of pin1 and pin2</p> | 1 | GND | | | |
| | 2 | +3V3 | Out | | |
| | 3 | GND | | | |
| | 4 | +5V | Out | | |
| | 5 | GND | | | |
| | 6 | +12V | Out | | |
| | 7 | GND | | | |
| | 8 | +24V | Out | | |
| | 9 | GND | | | |
| | 10 | GND | | | |
| | 11 | CLK0 | In | | |
| | 12 | CKL1 | In | | |
| | 13 | HS_CS | In | | HSync / CSync VSync Data Enable ODD / Even Signal |
| | 14 | VS | In | | |
| | 15 | DE | In | | |
| | 16 | HODD | In | | |
| | 17 | GND | | | |
| | 18 | GND | | | |
| | 19 | R0 | In | | RED0 |
| | 20 | R1 | In | | . |
| | 21 | R2 | In | | . |
| | 22 | R3 | In | | . |
| | 23 | R4 | In | | . |
| | 24 | R5 | In | | . |
| | 25 | R6 | In | | . |
| | 26 | R7 | In | | RED7 |
| | 27 | GND | | | |
| | 28 | GND | | | |
| | 29 | G0 | In | | GREEN0 |
| | 30 | G1 | In | | . |
| | 31 | G2 | In | | . |
| | 32 | G3 | In | | . |
| | 33 | G4 | In | | . |
| | 34 | G5 | In | | . |
| | 35 | G6 | In | | . |
| | 36 | G7 | In | | GREEN7 |
| | 37 | GND | | | |
| | 38 | GND | | | BLUE0 |
| | 39 | B0 | In | | . |
| | 40 | B1 | In | | . |
| | 41 | B2 | In | | . |
| | 42 | B3 | In | | . |
| | 43 | B4 | In | | . |
| | 44 | B5 | In | | . |
| | 45 | B6 | In | | . |
| | 46 | B7 | In | | BLUE7 |
| | 47 | GND | | | |
| | 48 | GND | | | |
| | 49 | SCL | Out | | SCL /+3V3 |
| | 50 | SDA | In/Out | | SDA / +3V3 |
| | 51 | RESET | Out | | RESET |
| | 52 | Power ON | Out | | Main Power On |
| | 53 | GND | | | |
| | 54 | GND | | | |
| | 55 | I2S_MCLK_OUT_IN | In/Out | | I2S Master Clock |
| | 56 | I2S_CLK_IN | In | | I2S Clock In |
| | 57 | I2S_WS_IN | In | | I2S Word Sync |
| | 58 | I2S_DIN | In | | I2S Data In |
| | 59 | GND | | | |
| | 60 | GND | | | |

3.9. X6-1, LVDS-output (first channel and second channel)

Type: DF20G-50DP-1 from Hirose (or equivalent), Conrac-No. 2170-0611-2500

(first pixel is the even pixel = pixel 0)

| Pin arrangement | Pin | Signal | I/O | Description |
|-----------------|-----|---------|--------|---|
| | 1 | FPPAR | In/Out | digital I/O with +3.3V level, out max. 10mA |
| | 2 | FPCTRL | In/Out | digital I/O with +3.3V level, out max. 10mA |
| | 3 | RxA0- | Out | LVDS Channel A Data0- |
| | 4 | RxB0- | Out | LVDS Channel B Data0- |
| | 5 | RxA0+ | Out | LVDS Channel A Data0+ |
| | 6 | RxB0+ | Out | LVDS Channel B Data0+ |
| | 7 | GND | | |
| | 8 | GND | | |
| | 9 | RxA1- | Out | LVDS Channel A Data1- |
| | 10 | RxB1- | Out | LVDS Channel B Data1- |
| | 11 | RxA1+ | Out | LVDS Channel A Data1+ |
| | 12 | RxB1+ | Out | LVDS Channel B Data1+ |
| | 13 | GND | | |
| | 14 | GND | | |
| | 15 | RxA2- | Out | LVDS Channel A Data2- |
| | 16 | RxB2- | Out | LVDS Channel B Data2- |
| | 17 | RxA2+ | Out | LVDS Channel A Data2+ |
| | 18 | RxB2+ | Out | LVDS Channel B Data2+ |
| | 19 | GND | | |
| | 20 | GND | | |
| | 21 | RxAC- | Out | LVDS Channel A Data-Clock- |
| | 22 | RxBC- | Out | LVDS Channel B Data-Clock- |
| | 23 | RxAC+ | Out | LVDS Channel A Data-Clock+ |
| | 24 | RxBC+ | Out | LVDS Channel B Data-Clock+ |
| | 25 | GND | | |
| | 26 | GND | Out | |
| | 27 | RxA3- | Out | LVDS Channel A Data3- |
| | 28 | RxB3- | Out | LVDS Channel B Data3- |
| | 29 | RxA3+ | Out | LVDS Channel A Data3+ |
| | 30 | RxB3+ | Out | LVDS Channel B Data3+ |
| | 31 | GND | | |
| | 32 | GND | | |
| | 33 | RxA4- | Out | LVDS Channel A Data4- |
| | 34 | RxB4- | Out | LVDS Channel B Data4- |
| | 35 | RxA4+ | Out | LVDS Channel A Data4+ |
| | 36 | RxB4+ | Out | LVDS Channel B Data4+ |
| | 37 | FPPAR | In/Out | Internally connected to pin1 of X6-1 |
| | 38 | FPCTRL | In/Out | Internally connected to pin2 of X6-1 |
| | 39 | GPIO4 | In/Out | digital I/O with +3.3V level, out max. 10mA |
| | 40 | SDA | In/Out | I2C-Data, +5V level |
| | 41 | +VPNL | Out | +5V / +3.3V (+/-5%, max. 3A total) |
| | 42 | SCL | Out | I2C-Clock, +5V level |
| | 43 | +VPNL | Out | +5V / +3.3V |
| | 44 | +12VPNL | Out | +12V (+/-5%, all +12V pins max. 3A total) |
| | 45 | +VPNL | Out | +5V / +3.3V |
| | 46 | +12VPNL | Out | +12V |
| | 47 | +VPNL | Out | +5V / +3.3V |
| | 48 | +12VPNL | Out | +12V |
| | 49 | +VPNL | Out | +5V / +3.3V |
| | 50 | +12VPNL | Out | +12V |

3.10. X6-2, LVDS-output (third channel and fourth channel)

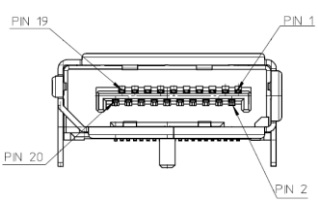
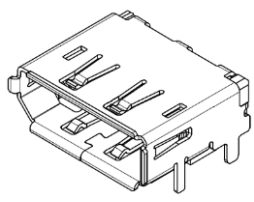
Type: DF20G-40DP-1 from Hirose (or equivalent), Conrac-No. 2170-0611-2400

(first pixel is the even pixel = pixel 0)

| Pin arrangement | Pin | Signal | I/O | Description |
|-----------------|-----|---------|--------|---|
| | 1 | FPPAR | In/Out | Internally connected to pin1 of X6-1 |
| | 2 | FPCTRL | In/Out | Internally connected to pin2 of X6-1 |
| | 3 | RxC0- | Out | LVDS Channel C Data0- |
| | 4 | RxD0- | Out | LVDS Channel D Data0- |
| | 5 | RxC0+ | Out | LVDS Channel C Data0+ |
| | 6 | RxD0+ | Out | LVDS Channel D Data0+ |
| | 7 | GND | | |
| | 8 | GND | | |
| | 9 | RxC1- | Out | LVDS Channel C Data1- |
| | 10 | RxD1- | Out | LVDS Channel D Data1- |
| | 11 | RxC1+ | Out | LVDS Channel C Data1+ |
| | 12 | RxD1+ | Out | LVDS Channel D Data1+ |
| | 13 | GND | | |
| | 14 | GND | | |
| | 15 | RxC2- | Out | LVDS Channel C Data2- |
| | 16 | RxD2- | Out | LVDS Channel D Data2- |
| | 17 | RxC2+ | Out | LVDS Channel C Data2+ |
| | 18 | RxD2+ | Out | LVDS Channel D Data2+ |
| | 19 | GND | | |
| | 20 | GND | | |
| | 21 | RxCC- | Out | LVDS Channel C Data-Clock- |
| | 22 | RxDC- | Out | LVDS Channel D Data-Clock- |
| | 23 | RxCC+ | Out | LVDS Channel C Data-Clock+ |
| | 24 | RxDC+ | Out | LVDS Channel D Data-Clock+ |
| | 25 | GND | | |
| | 26 | GND | | |
| | 27 | RxC3- | Out | LVDS Channel C Data3- |
| | 28 | RxD3- | Out | LVDS Channel D Data3- |
| | 29 | RxC3+ | Out | LVDS Channel C Data3+ |
| | 30 | RxD3+ | Out | LVDS Channel D Data3+ |
| | 31 | GND | | |
| | 32 | GND | | |
| | 33 | RxC4- | Out | LVDS Channel C Data4- |
| | 34 | RxD4- | Out | LVDS Channel D Data4- |
| | 35 | RxC4+ | Out | LVDS Channel C Data4+ |
| | 36 | RxD4+ | Out | LVDS Channel D Data4+ |
| | 37 | FPPAR2 | In/Out | digital I/O with +3.3V level, out max. 10mA |
| | 38 | FPCTRL2 | In/Out | digital I/O with +3.3V level, out max. 10mA |
| | 39 | SDA | In/Out | I2C-Data, +5V level |
| | 40 | SCL | Out | I2C-Clock, +5V level |

3.11. X39, Display Port output without flange

Type: Molex-Ref.-No. 47272-0001, Conrac No. 2171-0580-2200

| Pin arrangement | Pin | Signal | I/O | Description |
|--|-----|----------|--------|---|
|  <p>Front-View</p>  | 1 | ML_L3N | In | Lane 0 (positive) |
| | 2 | GND | | Ground |
| | 3 | ML_L3P | In | Lane 0 (negative) |
| | 4 | ML_L2N | In | Lane 1 (positive) |
| | 5 | GND | | Ground |
| | 6 | ML_L2P | In | Lane 1 (negative) |
| | 7 | ML_L1N | In | Lane 2 (positive) |
| | 8 | GND | | Ground |
| | 9 | ML_LN1P | In | Lane 2 (negative) |
| | 10 | ML_LN0N | In | Lane 3 (positive) |
| | 11 | GND | | Ground |
| | 12 | ML_LN0P | In | Lane 3 (negative) |
| | 13 | Config 1 | Out | connected to Ground vs. 1M Ω ¹⁾ |
| | 14 | Config 2 | Out | connected to Ground vs. 1M Ω ¹⁾ |
| | 15 | AUXP | In | Auxiliary Channel (positive) |
| | 16 | GND | | Ground |
| | 17 | AUXN | In | Auxiliary Channel (negative) |
| | 18 | HPD | In/Out | Hot Plug Detect |
| | 19 | POR | | Return for Power |
| | 20 | PO | Out | Power for connector (3.3V 500mA) |

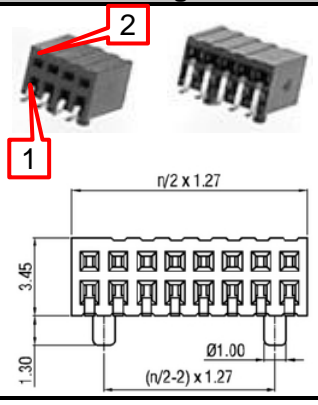
Pin13 and Pin14 may either be directly connected to ground or connected to ground through a pulldown device.

DisplayPort transmitter can receive data either from the Output Display Path (ODP) or from the DisplayPort1.2 compliant receiver which features a MST source.

3.12. X14, YUV-input (YUV input board / VGA over BNC)

Type: 10pin, double row, shrouded pin header, female, pitch 1.27,

W+P-Connector: 7130-010-00-00-TR

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|-------------|
|  | 1 | GND | | |
| | 2 | PR | In | PR / RED |
| | 3 | GND | | |
| | 4 | Y | In | Y / GREEN |
| | 5 | GND | | |
| | 6 | PB | In | PB / BLUE |
| | 7 | GND | | |
| | 8 | HSYNC2 | In | HSYNC / NC |
| | 9 | GND | | |
| | 10 | VSYNC2 | In | VSYNC / NC |

3.13. X1400, Audio connector

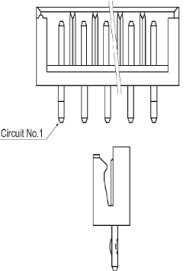
Type: 30pin, double row, shrouded pin header, female, pitch 1.27,

W+P-Connector: 7130-030-00-00-TR

| Pin arrangement | Pin | Signal | I/O | Description |
|-----------------|-----|-----------------|-----|------------------------|
| | 1 | GND | | |
| | 2 | +3V3 | Out | |
| | 3 | GND | | |
| | 4 | +5V | Out | |
| | 5 | GND | | |
| | 6 | +12V | Out | |
| | 7 | GND | | |
| | 8 | +24V | Out | |
| | 9 | I2S_MCLK_OUT_IN | Out | I2S Master Clock out |
| | 10 | MAIN_MUTE | Out | Mute |
| | 11 | I2S_WS_OUT | Out | I2S Word Sync |
| | 12 | I2S_CLK_OUT | Out | I2S Clock |
| | 13 | I2S_DOUT1 | Out | I2S Data out 1 |
| | 14 | I2S_DOUT2 | Out | I2S Data out 2 |
| | 15 | GND | | |
| | 16 | GND | | |
| | 17 | SPDIF_IN | In | SPDIF input |
| | 18 | SPDIF_OUT | Out | SPDIF output |
| | 19 | RESET# | Out | RESET |
| | 20 | MAIN_POWER_ON | Out | Main Power on signal |
| | 21 | GND | | |
| | 22 | GND | | |
| | 23 | AUDIO_L1_OUT | Out | Analog audio left out |
| | 24 | AUDIO_R1_OUT | Out | Analog audio right out |
| | 25 | HP_L_OUT | Out | Head phone left out |
| | 26 | HP_R_OUT | Out | Head phone right out |
| | 27 | AUDIO_L1_IN | In | Analog audio left in |
| | 28 | AUDIO_R1_IN | In | Analog audio right in |
| | 29 | GND | | |
| | 30 | GND | | |

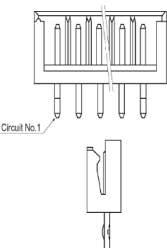
3.14. X18, Input voltage (main supply voltages)

Type: B12B-EH-A by JST, Conrac-No. 2170-0047-1121

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|--|
|  | 1 | +24V | In | +24V |
| | 2 | +24V | In | +24V |
| | 3 | +5V | In | +5VSTBY (+/- 5%), present all the time, (max. 1A per pin), in stand-by-mode < 15mA |
| | 4 | GND | | |
| | 5 | +5V | In | (same as pin 3, routed in parallel) |
| | 6 | GND | | |
| | 7 | +5V | In | (same as pin 3, routed in parallel) |
| | 8 | GND | | |
| | 9 | +12V | In | +12V (+/- 5%) applied by PSU in normal mode (max. 2A) |
| | 10 | PSON | Out | PSU-Control: 0V -> ext. PSU is off 3.3V -> PSU is on |
| | 11 | PSON | Out | PSU-Control: 0V -> ext. PSU is off 3.3V -> PSU is on |
| | 12 | +12V | In | +12V (+/- 5%) applied by PSU in normal mode (max. 2A) |

3.15. X20, Backlight Supply Voltage

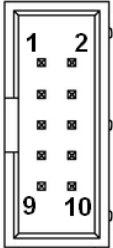
Type: B4B-EH-A by JST; Conrac-No. 2170-0047-1041

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|-----------------|
|  | 1 | GND | | |
| | 2 | GND | | |
| | 3 | +12V | Out | +/- 10% max. 1A |
| | 4 | +12V | Out | +/- 10% max. 1A |

3.16. X1, Application RS232

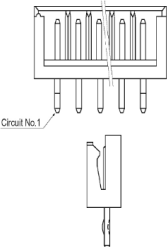
Type: 10pin, double row, shrouded pin header, male, pitch 2.54, Conrac-No. 2170-0043-1100

Application RS232-signal can be connected to all 3 RS232-Ports of ATHENA vs. Mux, s. Chapter 4.3

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|----------------------------|
|  | 1 | - | | Connected to pin 2 via 0R |
| | 2 | - | | Connected to pin 1 via 0R |
| | 3 | RxD0 | I | Receive Data |
| | 4 | - | | Connected to +12V via 100R |
| | 5 | TxD0 | O | Transmit Data |
| | 6 | N.C. | | |
| | 7 | - | | Connected to +5V via 0R |
| | 8 | NC | | |
| | 9 | GND | | |
| | 10 | NC | | |

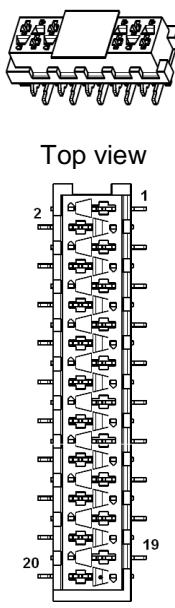
3.17. X1200, RS232, internally connected to second RS232-0 channel

Type: B3B-EH-A by JST; Conrac-No. 2170-0047-1031

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|--------------------------------|
|  | 1 | GND | | |
| | 2 | TxD0 | Out | Transmit Data (negative logic) |
| | 3 | RxD0 | In | Receive Data (negative logic) |

3.18. X4, Keyboard

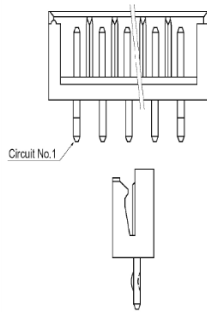
Type: 20pin, double row, Conrac-No. 2171-0559-0200 AMP Micromatch SMT 9-188275-0

| Pin arrangement | Pin | Signal | I/O | Description |
|--|-----|----------------|--------|-------------------------------|
|  <p>Top view</p> | 1 | GND | | |
| | 2 | ADC_REF / +12V | Out | ADC Ref / max. 100mA NC (1**) |
| | 3 | Red LED | Out | +5V, 10mA low / high |
| | 4 | Green LED | Out | +5V, 10mA low / high |
| | 5 | NC | | Internally not connected |
| | 6 | Orange LED | Out | +5V, 10mA (PWM) |
| | 7 | GND | | |
| | 8 | SDA5V | In/Out | I2C-Data, +5V level |
| | 9 | ALC | In | Analogue, 0V..+5V level |
| | 10 | SCL5V | Out | I2C-Clock, +5V level |
| | 11 | GND | | |
| | 12 | GND | | |
| | 13 | T5 | In | active low, ADC |
| | 14 | T4 | In | active low, ADC |
| | 15 | T3 | In | active low, ADC |
| | 16 | T2 | In | active low, ADC |
| | 17 | T1 | In | active low, ADC |
| | 18 | GND | | |
| | 19 | +5V | Out | +5V-StdBy (50mA for Keyboard) |
| | 20 | IR-Input | In | +5V level |

1**) Mounting option: Pin2 of X4 can be connected to ADC-Ref (actual state!) or to 12V (100mA) or can be left open by internal mounting options. It has to be decided by developer which mounting option is necessary.

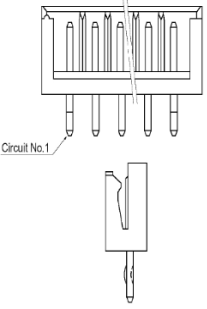
3.19. X2, Brightness Control

Type: B4B-EH-A by JST; Conrac-No. 2170-0047-1041

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|-----------------------------------|
|  <p>Circuit No.1</p> | 1 | ET0 | In | digital In, +3,3V level (Pull up) |
| | 2 | GND | | |
| | 3 | ET1 | In | digital In, +3,3V level (Pull up) |
| | 4 | GND | | |

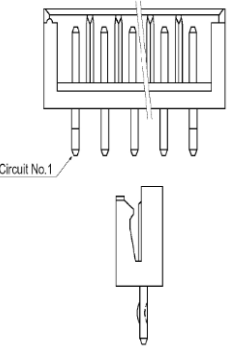
3.20. X12, GPIO1

Type: B3B-EH-A by JST; Conrac-No. 2170-0047-1031

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|--------|--|
|  | 1 | GND | | |
| | 2 | +5V | Out | |
| | 3 | ET2 | In/Out | digital in/out, +3,3V level (Pull up) |

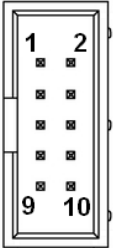
3.21. X17, GPIO2

Type: B6B-EH-A by JST; Conrac-No. 2170-0047-1061

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|--------|-----------------------------|
|  | 1 | GND | | |
| | 2 | ESCL | Out | I2C-Clock, +5V level |
| | 3 | ESDA | In/Out | I2C-Data, +5V level |
| | 4 | +5V | Out | max. 200mA |
| | 5 | PWM1 | Out | digital Out, +5V level |
| | 6 | GPIO2 | In/Out | digital In/Out, +3,3V level |

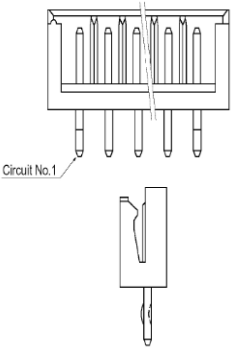
3.22. X22, Board Adapter

Type: 10pin, double row, shrouded pin header, male, pitch 2.54, Conrac-No. 2170-0043-1100

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|--------|----------------------------------|
|  | 1 | GND | | |
| | 2 | +5V | Out | max. 200mA |
| | 3 | +12V | Out | max. 200mA |
| | 4 | ESCL | Out | I2C Clock, +5V level |
| | 5 | ESDA | In/Out | I2C Data, +5V level |
| | 6 | PWM2 | Out | digital Out, +5V level |
| | 7 | GPIO3 | In/Out | digital In/Out, +3,3V level |
| | 8 | AIN5 | In | analog In, 2,5V max. |
| | 9 | VAREF | Out | Reference for analog Output, +2V |
| | 10 | GND | | |

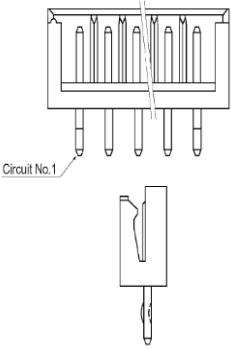
3.23. X3, Analog Input (Backlight Poti)

Type: B4B-EH-A by JST; Conrac-No. 2170-0047-1041

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|----------------------------------|
|  | 1 | GND | | |
| | 2 | AIN3 | In | analog In, +2,5V max., AIN3 |
| | 3 | AIN4 | In | analog In, +2,5V max., AIN4 |
| | 4 | VAREF | Out | Reference for analog Output, +2V |

3.24. X31, Backlight Control

Type: B8B-EH-A by JST; Conrac-No. 2170-0047-1081

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|---------|--------|--|
|  | 1 | GND | | |
| | 2 | BCKLGHT | Out | Analog dimming voltage (0 .. 3V) |
| | 3 | BCKPWM | Out | Backlight PWM-Signal (5V level, alternatively 3.3V*) |
| | 4 | BO1 | Out | Backlight ON/OFF (5V level, alternatively 3.3V**) |
| | 5 | V-Sync | Out | General I/Os, 3.3V, 10mA |
| | 6 | GPIO0 | In/Out | General I/Os, 3.3V, 10mA |
| | 7 | ESCL | Out | I2C-Clock, +5V level |
| | 8 | ESDA | In/Out | I2C-Data, +5V level |

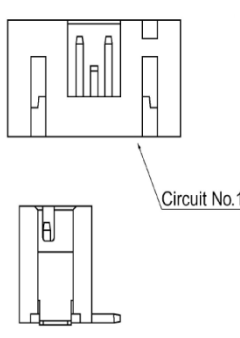
(For new backlight inverter with I2C control and V-sync link)

* for 3V3-level Backlight PWM-signal, a hardware-modification is necessary

** for 3V3-level Backlight ON/OFF-signal, a hardware-modification is necessary

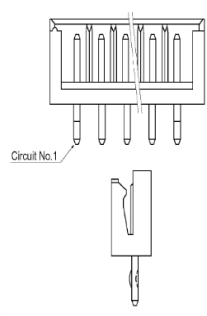
3.25. X32, Backlight Control (AV6 compatible)

Type : B12B-PH-SM3-TB by JST, Conrac-No. 2170-0122-1120

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|---------|--------|---|
|  | 1 | BCKPWM | Out | Backlight PWM-Signal (3V3 level), internally connected to X31-pin3 (same as pin 1, routed in parallel) |
| | 2 | BCKPWM | Out | |
| | 3 | GND | | |
| | 4 | BCKLGHT | Out | BL analogue-Signal (3V3 level), internally connected to X31-pin2 (same as pin 4, routed in parallel) |
| | 5 | BCKLGHT | Out | |
| | 6 | GND | | |
| | 7 | BO1 | Out | BL On/Off-Signal (5V level, alternatively 3V3 when 3V3-panel is used) (same as pin 7, routed in parallel) |
| | 8 | BO1 | Out | |
| | 9 | GPIO1 | In/Out | General I/Os, 3.3V, 10mA |
| | 10 | GPIO1 | In/Out | General I/Os, 3.3V, 10mA |
| | 11 | N.C. | | |
| | 12 | GND | | |

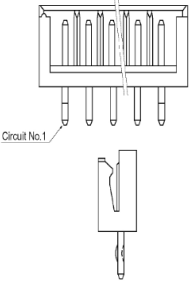
3.26. X26, Systembus1

Type: B4B-EH-A by JST; Conrac-No. 2170-0047-1041

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|--------|-------------------|
|  | 1 | GND | | |
| | 2 | ESCL | Out | I2C Bus +5V Level |
| | 3 | ESDA | In/Out | I2C Bus +5V Level |
| | 4 | +5V | | max .200mA |

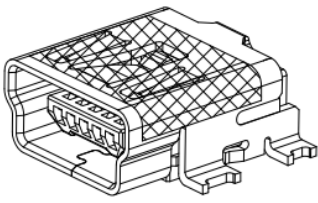
3.27. X27, Systembus2

Type: B4B-EH-A by JST; Conrac-No. 2170-0047-1041

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|--------|--------------------|
|  | 1 | GND | | |
| | 2 | ESCL | Out | I2C Bus +3V3 Level |
| | 3 | ESDA | In/Out | I2C Bus +3V3 Level |
| | 4 | +3V3 | | max .200mA |

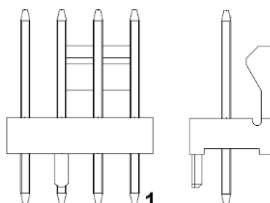
3.28. X33, USB (optional)

Type: Molex 0675031020 / Molex Type B 0670688011

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|--------|-------------|
|  | 1 | VCC | | |
| | 2 | D- | In/Out | |
| | 3 | D+ | In/Out | |
| | 4 | ID | | |
| | 5 | GND | | |

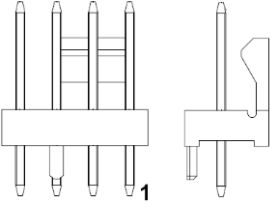
3.29. X34, Fan1-1 with tachometer signal

Type: Molex 4pin 47053-1000 / 2,54mm (2170-0136-1041)

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|---|
|  | 1 | GND | | |
| | 2 | FAN1 | Out | Fan1 supply voltage (+12V / max 400mA) |
| | 3 | TAC1 | In | tacho signal |
| | 4 | F1PWM | Out | PWM fan speed control |

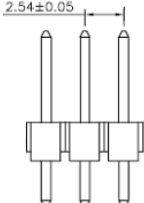
3.30. X35, Fan2-1 with tachometer signal

Type: Molex 4pin 47053-1000 / 2,54mm (2170-0136-1041)

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|---|
|  | 1 | GND | | |
| | 2 | FAN2 | Out | Fan2 supply voltage (+12V / max 400mA) |
| | 3 | TAC2 | In | tacho signal |
| | 4 | F2PWM | Out | PWM fan speed control |

3.31. JS500, Jumper for setting supply voltage for TFT-T-CON-Board

Type: SL 11/124-03G by Fischer-Elektronik or equivalent (2170-0004-2031)

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|-------------------------------|
|  | 1 | | | Connected to +5V_ON of ST3:4 |
| | 2 | | | Connected to T-CON-supply-In |
| | 3 | | | Connected to +3V3_SW of ST3:4 |

The supply voltage for TFT-T-CON-Boards is applied at X6-1 pins 41-50.

At pins 44, 46, 48, 50 there are +12V applied. At pins 41, 43, 45, 47, 49 there are either +3V3 or +5V applied. With JS500 the voltage at pins 41, 43, 45, 47, 49 of X6-1 can be set to one of this value.

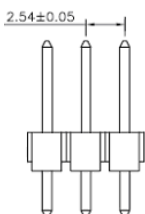
All voltages are switchable by eMotion ST3:4 through V1100.

T-CON-voltage vs. setting of JS500:

| Setting of JS500 | Voltage at pin 41, 43, 45, 47, 49 of X6-1 |
|------------------|---|
| 2-3 | +3V3 |
| 1-2 | +5V |

3.32. X1102, Jumper for setting polarity of Backlight-On-Signal

Type: SL 11/124-03G by Fischer-Elektronik or equivalent (2170-0004-2031)

| Pin arrangement | Pin | Signal | I/O | Description |
|---|-----|--------|-----|--|
|  | 1 | PBIAS | | Signal from ATHENA for driving BLON-signal |
| | 2 | /BLON | | Signal for driving the inverter-buffer for BLON-signal |
| | 3 | /PBIAS | | Inverted signal from pin1 |

The polarity of the BLON-signal at the pins X31-4 and X32-7, X32-8 can be set to active low or active high depending on setting of Jumper X1102.

The ATHENA chip itself has an output signal called PBIAS. The polarity of this signal can be kept by bypassing V1102 or inverted by using the signal pass through V1102. In the following the signal is inverted by V1103

Polarity of BLON-signal:

| Polarity of PBIAS | X1102 | Polarity of BLON |
|-------------------|-------|------------------|
| low | 1-2 | high |
| high | 1-2 | low |
| low | 2-3 | low |
| high | 2-3 | high |

The high level of BLON is +5V, low level is 0V. The value of high level can only be changed by hardware modification of eMotion ST3:4.

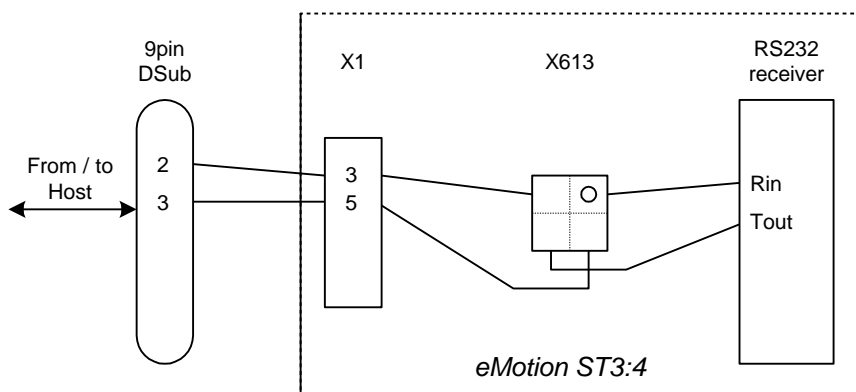
3.33. X613, Jumpers for selection of internal connection of RS232-input-signals

Type: SL 22/139-04Z by Fischer-Elektronik or equivalent; (2170-0041-1040)

| Pin arrangement | Pin | Signal | I/O | Description |
|-----------------|-----|--------|-----|---------------------------------------|
| | 1 | | | Connected RxD-input of RS232-receiver |
| | 2 | RxD0 | I | Connected to X1-3 |
| | 3 | TxD0 | O | Connected to X1-5 |
| | 4 | | | Connected TxD-input of RS232-receiver |

With jumpers on X613 the RS232-signals RxD and TxD from the 9pin DSub-connector can be connected in 2 different ways to the RS232-receiver on the eMotion ST3:4-board.

Draft of internal connection of RxD and TxD:

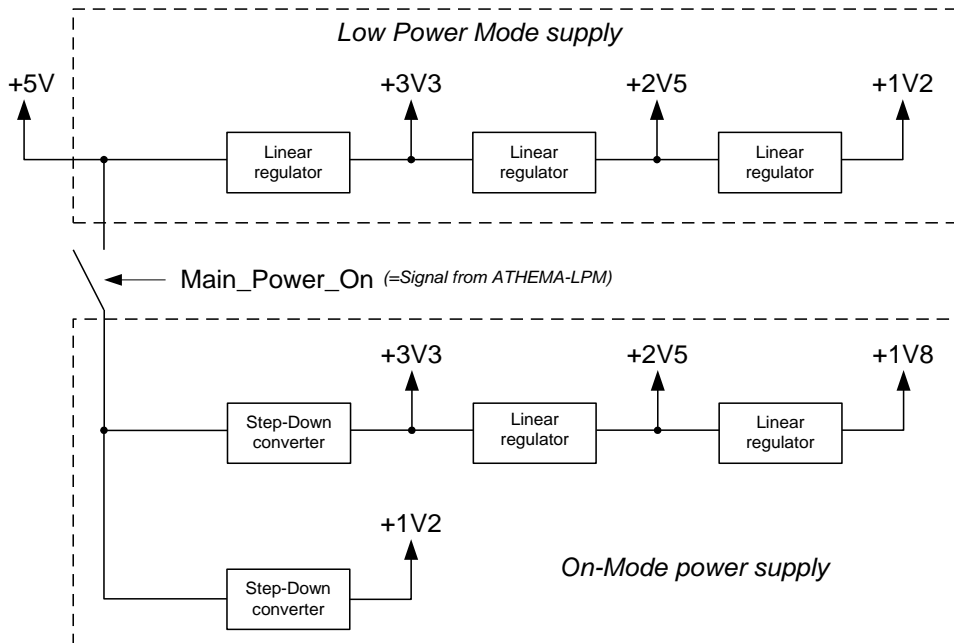


| Possible Jumper-settings | Input | Connected to |
|--|--------------------------------|---|
| Jumpers on X613 1-2 and X613 3-4 For use of Null-Modem cables (RxD, TxD crossed) from host to 9pin-DSub-connector | DSub – pin2 DSub – pin3 | Rin of RS232-receiver Tout of RS232-receiver |
| Jumpers on X613 1-3 and X613 2-4 For use of 1:1 cables from host to 9pin-DSub-connector | DSub – pin2 DSub – pin3 | Tout of RS232-receiver Rin of RS232-receiver |

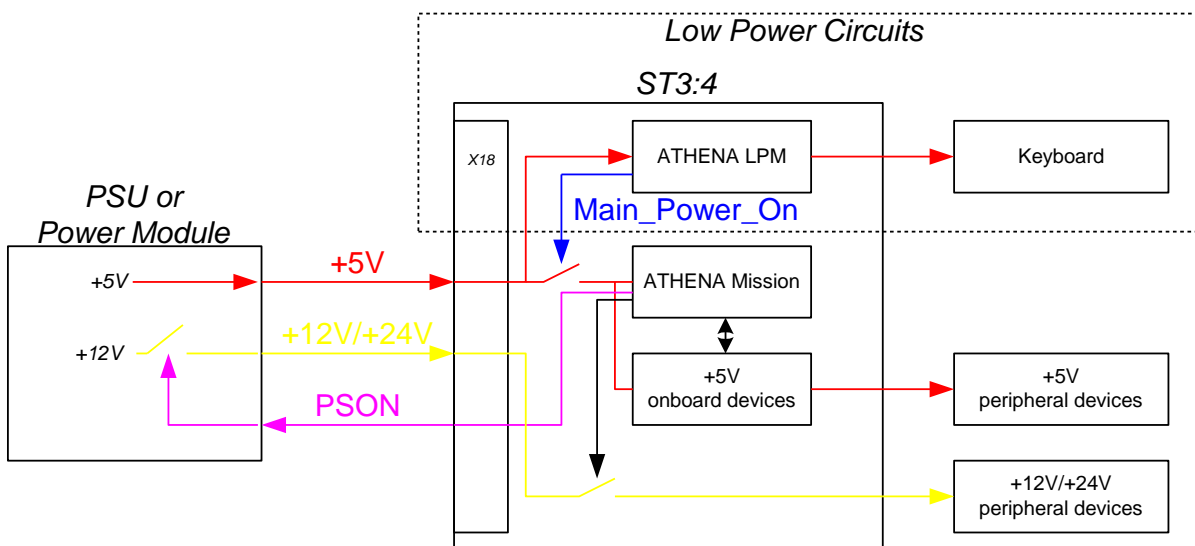
4. Technical Details

4.1 Power distribution overview (simplified block diagram)

In total seven voltages are needed on ST3:4 board. Three voltages are used for the Stand-By circuits and are always on. Four voltages are only present in On-Mode:



4.2 Block diagram of ST3:4 with peripheral components



The emotionST3 is divided into 2 sections: a low power section and a normal operating section. The low power section is operating in Stand-By mode and is waiting for start-up. When an ON-command is detected the lower power circuit enables the PSU or power module and switches the +5V to the complete eMotionST3.

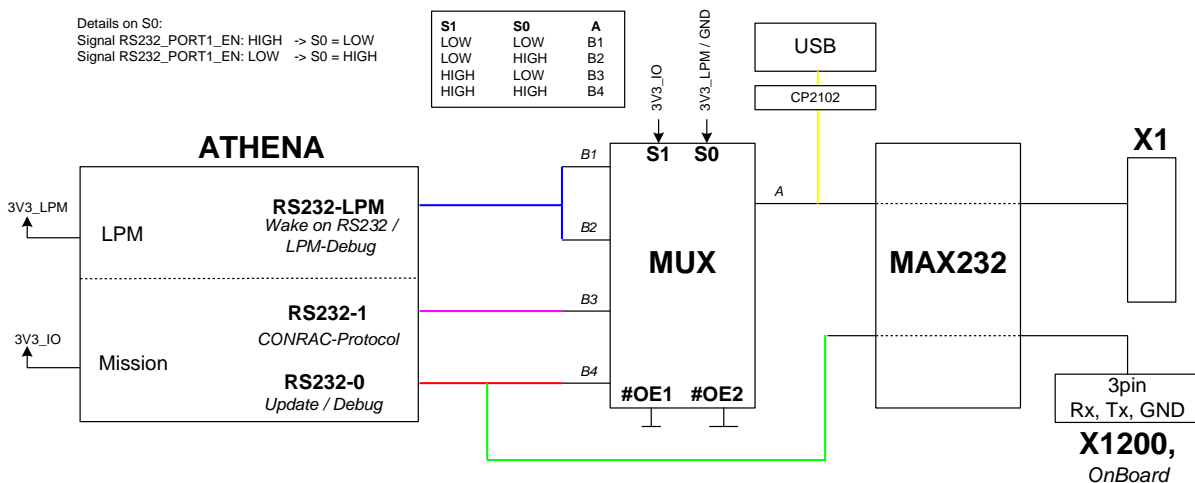
4.3 RS232 Connections

ATHENA main processor of ST3:4 has in total 3 RS232 ports for serial communication:

- RS232-LPM port
- RS232-1 port
- RS232-0 port

The user has only one connector from outside: X1, RS232-application connector. But it is possible to communicate with every RS232 of the ATHENA over a MUX.

Draft of RS232 connections:



It is also possible to establish a serial communication over a mini-USB connector (X33, option). This connector is in parallel to X1 but only optional!

For developers there is another connector (X1200) on the ST3:4. With this connector the RS232-1 port of the ATHENA-mission part can be used. The RS232-1 port is used for update and debugging.

In stand-by mode of ST3:4 the SET pins of the MUX are set in the way that only the RS232 of the LPM is connected to X1 (resp. USB).

When ST3:4 is in normal operation mode the firmware which is operating on ST3:4 sets the MUX in the way that RS232-1 is connected to X1. In this case serial command can be send between user an ST3:4 and adjustments can be made.

An update can now be done over X1200.

4.4 Supply voltages and current consumption

Please refer to chapter 4.2:

+5V (+/-10%), +12V(+/-10%) , +24V(+/-10%) from power supply or power module

+5V is used in Standby (low power mode) all other supply voltages are switched off in the low power mode. Therefore a special power supply or a power module has to be used.

The supply current of the +12V or +24V in On-Mode depends on the peripheral devices which are connected to the eMotionST3 (TFT-TCON-Board, Fans, Audio-Amplifier...). The eMotionST3 itself has no consumption on +12V or +24V.

Current Consumption on +5V / Power consumption in Stand-By mode:

| Supply Voltage | Regulation | Ripple&Noise | Current max. | Comment |
|----------------|------------|--------------|--------------|---|
| +5V | +/- 10% | 0.25V | 30 mA | No Keyboard connected / No LED lightning |
| | | | 40 mA | Keyboard connected / RED LED lightning |

Current Consumption on +5V / Power consumption in operation mode:

| Supply Voltage | Regulation | Ripple&Noise | Current max. | Comment |
|----------------|------------|--------------|--------------|-----------------------|
| +5V | +/- 10% | 0.25V | 600 mA | No Input Signal |
| | | | 750 mA | CVBS-Input / PAL |
| | | | 750 mA | YC-Input / PAL |
| | | | 1000 mA | VGA-Input: 1920x1200 |
| | | | 1050 mA | DVI-Input: 1920x1200 |
| | | | 950 mA | HDMI-Input: 1920x1200 |
| | | | 900 mA | DP-Input: 1920x1200 |

*Only the onboard power consumption is mentioned! Input current of ST3:4 may increase if peripheral devices are connected!

4.5 Input and output signals

4.5.1 Analog input (VGA)

| PARAMETER | MIN | TYP | MAX | UNIT | Remark |
|-------------------|------|-----|-----|------|--------|
| Conversion rate | 10 | | 205 | MHz | |
| ADC resolution | | 10 | | bit | |
| Input level range | 0,35 | 0,7 | 1.0 | Vpp | at 75Ω |
| SOG level | | 0,3 | | V | |
| Phase Steps | | 255 | | | |
| H-Frequency | 15 | | 150 | KHz | |
| V-Frequency | 50 | | 120 | Hz | |

Sync Options:

| | Sync On Green | Composite Sync | Separat H-/V-Sync |
|-------------------|---------------|----------------|-------------------|
| Polarity positive | - | o.k. | o.k. |
| Polarity negative | - | o.k. | o.k. |

4.5.2 DVI input (Dual Link)

- Support Dual DVI input for 3D Video up to 300MHz
- Max DVI Speed up to 165 MHz in single DVI Mode
- Max video resolution 2560x1600
- HDCP1.2 content protection with integrated key storage
- TMDS receiver compliant with DDWG DVI 1.0 specification

4.5.3 HDMI input

- Max HDMI speed up to 3 GHz
- Deep color and wide gamut support
- Max video resolution 2560x1600
- Max video stream pixel clock: 300 MHz
- Supports HBR audio format
- HDCP 1.4 content protection with integrated key storage

4.5.4 YC / CVBS

- 10bit ADC
- Input level range 0,35 – 1,4Vpp at 75Ω

| Video Standards | | | |
|-----------------|-----------|------|--------------------|
| | PAL 4,43 | 50Hz | B/G, D/K, I, L, L1 |
| | PAL 4,43 | 60Hz | B/G, I |
| | PAL 3,58 | 50Hz | N |
| | PAL 3,58 | 60Hz | M |
| | NTSC 3,58 | 60Hz | M |
| | NTSC 4,4 | 60Hz | B/G |
| | SECAM | 50Hz | B/G, D/K, L, L1 |

4.5.5 DP input

- DP 1.2 compliant
- 2- and 4-lane support
- Embedded DisplayPort (eDP) compliant
- Max video resolution 2560x1600, 10bit color video standard timings
- Max video stream pixel clock 300 MHz
- Supports 3D stereo video format
- HDCP1.2 with on-chip keys
- Supports repeater for multi-stream daisy-chain monitor

4.5.6 DP output

- DisplayPort 1.2, 5.4 GHz transmitter with multi-stream capability for daisy-chaining monitors
- Supports eDP1.2 for notebook monitor

4.5.7 LVDS connector

- Support of 10bit and 8bit panels (high quality dithering (10bit for 8bit panels))
- Single, dual or quad channel transmitter
- Max panel clock 300 MHz
- 12V and 5V/3V3 display power voltage
- Display power voltage of 12V and 5V are supplied from an external PSU
- Display power voltage of 3V3 are generated on board

4.6 MISC

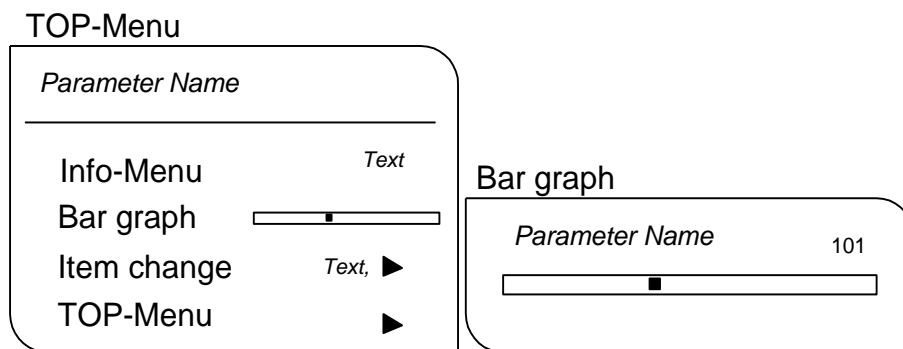
- Backlight Control (analog Dimming voltage and PWM signal)
- 5 key keypad
- IR support (standard is RECS80, other protocols available on request)
- Temperature sensor on board
- Possibility to control two fans and one heater
- Fan speed control (PWM)
- USB slave interface (for control and color adjustment, option)

4.7 OSD-Structure

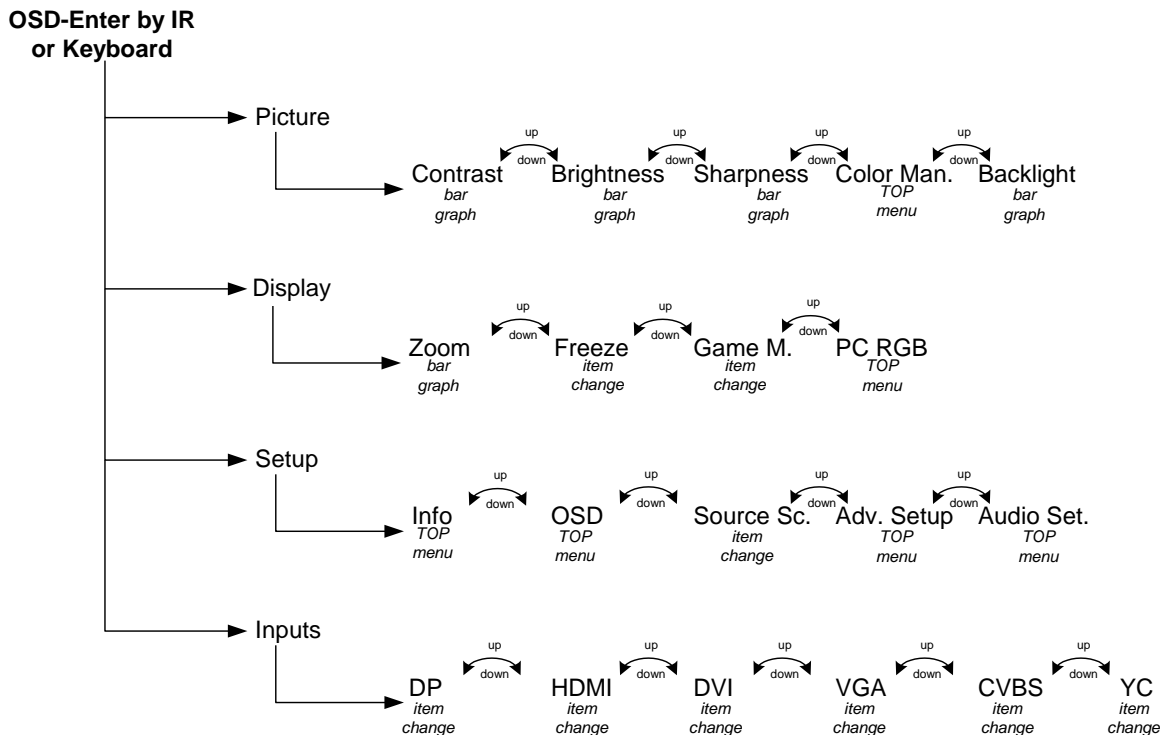
The OSD of ST3:4 can be configured customer specific. It can be controlled by an IR remote control (RECS80 is standard protocol) or a 5 key keypad.

In general OSD consists out of TOP-Menus, Info-Menus, Bar graphs to adjust parameters via a bar (e.g. contrast), or item changes to change the values of some parameters (e.g. Freeze On <-> Off)

Draft of OSD-Menus:



Possible OSD-structure:



4.8 PIP/PBP Combinations (option)

PIP is a customer specific feature, it can be implemented or omitted.

Matrix of possible PIP PBP combinations (combinations can be reduced by software of ST3:4):

| | DP | HDMI | DVI-D | VGA | Digital Input | YC | CVBS |
|---------------|----|------|-------|-----|---------------|----|------|
| DP | | X | X | X | X | X | X |
| HDMI | X | | no | X | X | X | X |
| DVI-D | X | no | | X | X | X | X |
| VGA | X | X | X | | X | X | X |
| Digital Input | X | X | X | X | | no | no |
| YC | X | X | X | X | no | | no |
| CVBS | X | X | X | X | no | no | |

X = combination possible, there may be restrictions regarding the input resolution (PIP source) depending on the panel resolution/pixelclock. For further details please consult Development department.

5 Qualification

5.1 Environmental conditions

| | |
|--------------------------|--|
| Temperature (operating): | max. +60°C min. -20°C only basic functions |
| Temperature (storage) : | -20°C ... +70°C |
| Relative humidity: | < 80% |
| Tolerable air-pressure: | >= 700 hPa, operating (approx. altitude 3000m) >= 500 hPa, transport (approx. altitude 5500m) |

5.2 EMI-Standards

| | | Criteria |
|--|--|----------|
| EMI/EMC: | EN55022-B (appendix A1:2007 from Oct., 1 st 2011 on), highest internal frequency on the board is below 400MHz (DDR data lines). | t.b.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

MECHANICAL STRESS

| | |
|------------|--------------------------------------|
| Shock: | 20G, 11ms, half sine (x/y direction) |
| | 15G, 11ms, half sine (z direction) |
| Vibration: | 1.2G, 10 – 55Hz, sinus |
| Sweep: | 1 minute/octave |
| Amplitude: | 0.35mmp-p (x-direction) |
| | 0.35mmp-p (y direction) |
| | 0.175mmp-p (z-direction) |
| Time : | 30 minutes |
| Standard: | Conform to EN60605 |

5.5 Reliability, MTBF

0-hour-failure

- Start of MP (0-6 months): 1,0%
- 6 months after start of MP: 0,25%

Failure within the first 6 month of operating

- Start of MP (0-6 months): 1,5%
- 6 months after start of MP: 1,0%
- Start of MP (0-6 months): 1,5%

MTBF

- min. 50000h at Ta = 40°C (SXGA Panel (110MHz), Input VGA analog (135MHz))

6 Warranty, Quality and Environmentalism

6.1 Warranty

- Manufacturer warranty: 24 month after delivery

6.2 Quality

The producing process of the board is aligned with the guideline according to the DIN ISO 9001 certification.

MIL-STD-105E single sampling plans for normal inspection, Level II. AQL 0.65% for function test; AQL 1.00% for cosmetic.

Workmanship standard: IPC-A-610D Class2

6.3 Environmentalism

The list of used materials is still under preparation based on the parts list.

The PCB is produced under lead free soldering conditions.

All components are produced according to European RoHS (RoHS-1 = 2002/95/EU, RoHS-2 = 2011/65/EU) and REACH (2006/1907/EU) regulations. The board is designed and manufactured to meet ISO 14001.

The packing complies to directive 1994/62/EU.

7 Label and package

7.1 Label and material number

The following points are visible on the label of the eMotionST3:4 board.

- Material number
- CONRAC Logo
- Serial- and Revision-number
- Manufacturing date
- UL-Sign on PCB

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