

# eMotion NT5:3

## Product Specification

This document might be changed without prior notice

12036010 – eMotion NT5:3 LCD-Controller board

Revision: 002  
Date: 2023-02-24

### Revision History

Rev.	Date	Author	Modifications
000	05.04.2019	R. Muhler	Initial revision
001	22.07.2020	R. Muhler	Chapter 5.2: EMI standards actualized
002	24.02.2023	R. Muhler	Chapter 4.1: Block diagram corrected

Change History (Optional)

## Table of contents

<b>1. Preamble</b> .....	<b>5</b>
1.1. <i>Purpose of this document</i> .....	5
1.2. <i>Abbreviations</i> .....	5
<b>2. Product description</b> .....	<b>6</b>
2.1. <i>Functionally description of the product</i> .....	6
2.2. <i>Special Features</i> .....	6
<b>3. PCB description</b> .....	<b>7</b>
3.1. <i>Dimensions of eMotionNT5:3</i> .....	7
3.2. <i>Connector Panel</i> .....	7
3.3. <i>Connector overview</i> .....	8
3.4. <i>Input voltage connector, X100</i> .....	9
3.5. <i>Backlight Supply Voltage and Control connector, X101</i> .....	9
3.6. <i>Input voltage connector, X102</i> .....	10
3.7. <i>HDMI input connector, X103</i> .....	10
3.8. <i>OSD-Keyboard-Connector, X105</i> .....	11
3.9. <i>LVDS-output connector, X106</i> .....	12
3.10. <i>GPIO connector, X107</i> .....	13
3.11. <i>VGA input connector, X108</i> .....	13
3.12. <i>RS232-connector, X109</i> .....	14
3.13. <i>Display-Port input connector, X110</i> .....	14
3.14. <i>BLT_VCC-Select, X201</i> .....	15
3.15. <i>I2S-Audio Connector, X700</i> .....	15
<b>4. Technical Details</b> .....	<b>16</b>
4.1. <i>Block diagram</i> .....	16
4.2. <i>Supply voltages and current consumption</i> .....	16
4.3. <i>Configuration Options on eMotionNT5:3</i> .....	17
4.4. <i>TCON-current capability of eMotionNT5:3</i> .....	17
4.5. <i>Backlight Inverter Supply</i> .....	18
4.6. <i>Backlight-current capability of eMotionNT5:3</i> .....	18
4.7. <i>Input and output signals</i> .....	19
4.7.1st DP input.....	19
4.7.2nd HDMI input.....	19
4.7.3rd VGA input.....	19
4.7.4th LVDS connector (output).....	19
4.8. <i>Serial Communication with eMotionNT5:3</i> .....	20
4.9. <i>Firmware Update on eMotionNT5:3</i> .....	20
<b>5. Qualification</b> .....	<b>21</b>
5.1. <i>Environmental conditions</i> .....	21

5.2. <i>EMI-Standards</i> .....	21
5.3. <i>Safety</i> .....	21
5.4. <i>Shock and Vibration</i> .....	22
5.5. <i>Reliability, MTBF</i> .....	22
<b>6. Warranty, Quality and Environmentalism .....</b>	<b>22</b>
6.1. <i>Warranty</i> .....	22
6.2. <i>Quality</i> .....	22
6.3. <i>Environmentalism</i> .....	22
<b>7. Label and package.....</b>	<b>23</b>
7.1. <i>Label and material number</i> .....	23

## 1. Preamble

### 1.1. *Purpose of this document*

In this document the technical parameters, the electrical connections and the mechanical dimensions of the DATA MODUL LCD-controller-board eMotionNT5:3 are described. The eMotionNT5:3 is especially designed for use in low height applications. The height of components incl. pcb is below 9mm. All necessary timings and voltages to support the connected display are generated on the eMotionNT5:3.

### 1.2. *Abbreviations*

<b>I<sup>2</sup>C</b>	<b>INTER-IC</b>
<b>I<sup>2</sup>S</b>	<b>INTER-IC-SOUND</b>
<b>EMI</b>	<b>ELECTRO MAGNETIC INTERFERENCE</b>
<b>EMC</b>	<b>ELECTRO MAGNETIC COMPATIBILITY</b>
<b>EN</b>	<b>EUROPEAN NORM</b>
<b>ESD</b>	<b>ELECTRO STATIC DISCHARGE</b>
<b>UL</b>	<b>UNDERWRITER LAB</b>
<b>PCB</b>	<b>PRINTED CIRCUIT BOARD</b>
<b>SMT</b>	<b>SURFACE MOUNT TECHNOLOGY</b>
<b>ROHS</b>	<b>RESTRICTION FOR THE USE OF HAZARDOUS SUBSTANCES</b>
<b>NC</b>	<b>NOT CONNECTED</b>
<b>T.B.D.</b>	<b>TO BE DEFINED</b>
<b>LVDS</b>	<b>LOW VOLTAGE DIFFERENTIAL SIGNALING</b>
<b>TMDS</b>	<b>TRANSITION MINIMIZED DIFFERENTIAL SIGNALING</b>
<b>DVI</b>	<b>DIGITAL VIDEO INTERFACE</b>
<b>DP</b>	<b>DISPLAY PORT</b>
<b>EDP</b>	<b>EMBEDDED DISPLAY PORT</b>
<b>OSD</b>	<b>ON SCREEN DISPLAY</b>
<b>DPMS</b>	<b>DISPLAY POWER MANAGEMENT SIGNALING</b>
<b>VESA</b>	<b>VIDEO ELECTRONICS STANDARDS ASSOCIATION</b>
<b>DDC / CI</b>	<b>DISPLAY DATA CHANNEL / COMMAND INTERFACE</b>
<b>VGA</b>	<b>VIDEO GRAPHICS ARRAY</b>
<b>UXGA</b>	<b>ULTRA EXTENDED GRAPHICS ARRAY</b>
<b>USB</b>	<b>UNIVERSAL SERIAL BUS</b>
<b>VBO / VX1</b>	<b>V-BY-ONE (VIDEO BY ONE)</b>

## 2. Product description

### 2.1. *Functionally description of the product*

Based on the latest design of highly integrated LCD controller NT68862, the eMotionNT5:3 board is able to control panels from VGA up to WUXGA. The eMotionNT5:3 can drive panels with LVDS.

The eMotionNT5:3 graphic controller board can be connected to input signals coming from DP-, HDMI- and VGA-sources.

The board can be controlled by a 5-key OSD keyboard, by RS232 and IR-controller, it is compatible with VESA DPMS, DDC2B, DDC/ CI.

### 2.2. *Special Features*

- DP 1.2 compliant input (HBR)
- HDMI 1.4 (digital 165MHz)
- VGA (analoge 205MHz)
- Up to WUXGA with 170MHz to the panel (8bit)
- 10-bit color processing
- Single power supply +12V / +24V DC
- Built in power on/off sequencing controller for panel power as well as for backlight
- Support of 3.3V, 5.0V, 12.0V\* panel voltage and 12V/ 24V\* backlight voltage
- Built in DC/DC-regulator for up to 12V - 3A backlight current
- Analog & PWM dimming support for backlight
- Remote control by RS232 or DDC/CI or 5 button board
- Multilingual OSD
- Panel file in separate EEPROM (option)
- height of components incl. pcb is below 9mm
- onboard temperature sensor
- I2S-Audio out

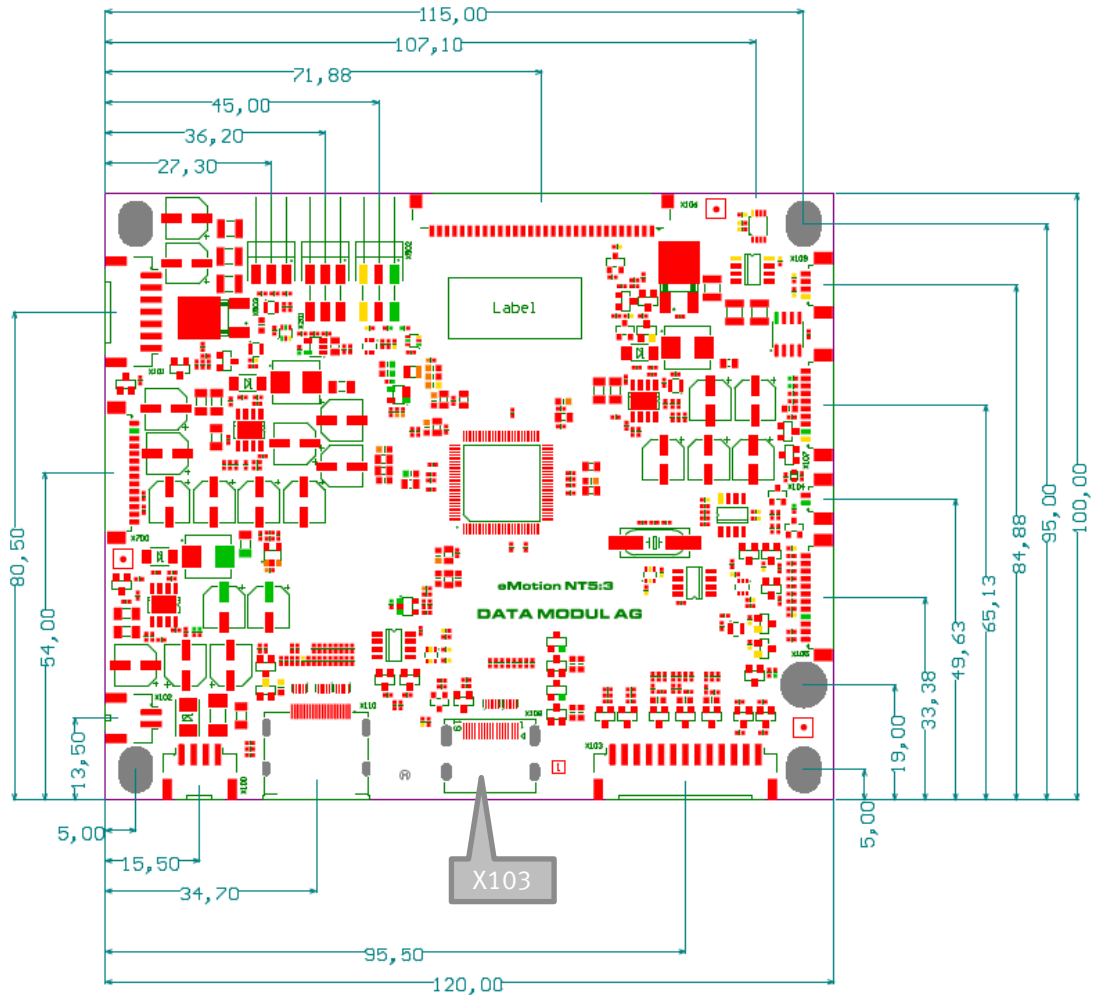
\*: 12V panel voltage and 24V backlight voltage are only available if input voltage is 24V!

### 3. PCB description

#### 3.1. Dimensions of eMotionNT5:3

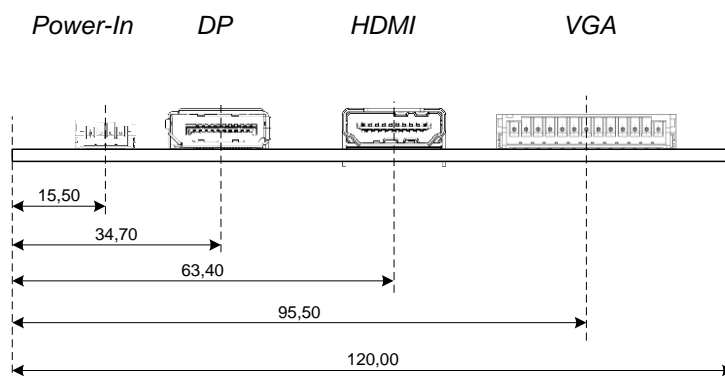
Dimensions: 120 mm (L) x 100 mm (W) x 9 mm (H). Mounting holes diameter: 5 x 3.5mm

(Remark: The dimensions of eMotionNT5:3 are the same as eMotionST5:3. Most of the connectors will have the same position as on the eMotionST5:3. Exception: X103 is now implemented as HDMI-connector)

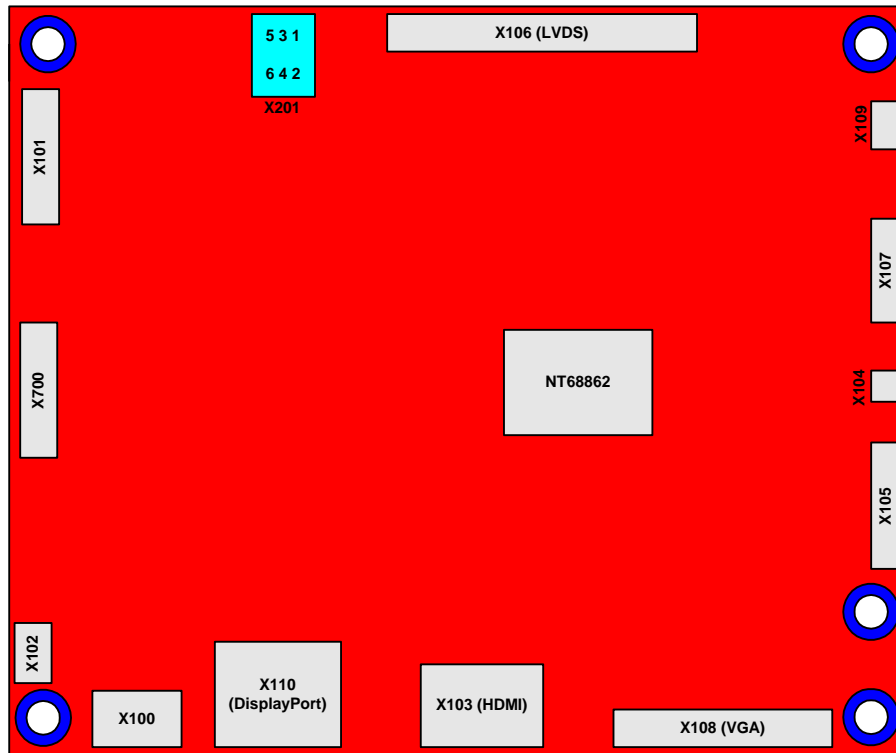


All dimensions can be found in DATA MODUL file-Nr.: 12036012\_Rev001\_PcbComposite.PDF

#### 3.2. Connector Panel



### 3.3. Connector overview



Item	Description	Remarks
X100	Power In	4pin, right angle
X101	Backlight connector	7pin, right angle
X102	Power In	2pin, right angle
X103	HDMI input	19pin HDMI-connector without flange, female
X105	OSD-keyboard connector	12pin, right angle, Molex 53015-1210
X106	LVDS Dual link output	Hirose DF14-30P-1.25H
X107	GPIO connector	10pin multi functions connector (53261-1071) (I <sup>2</sup> C lines, FAN-supply and -signals, GPIOs)
X108	VGA input	13 pin, right angle (No D-Sub!)
X109	RS232 connector	4pin, right angle, RS232 LVTTTL Signal (MOLEX 53261-0471)
X110	DP input	20pin DisplayPort connector without flange
X201	Jumper block for Backlight supply voltage	6pin double row connector, right angle Note: both jumper caps X800 and X801 must be set on same side of X201
X700	I2S-Audio Connector	14 pin connector, right angle, Molex 53261-1471, to digital audio board



### 3.4. Input voltage connector, X100

Type JST: S4B-PH-SM4-TB, SMT, Side entry type, RM 2.0mm; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
<p>Front-View</p> <p>Side-View</p>	1	GND	I/O	GND / 2A
	2	GND	I/O	GND / 2A
	3	+V_IN	I	+Vin: +12V/2A or +24V/2A
	4	+V_IN	I	+Vin: +12V/2A or +24V/2A

### 3.5. Backlight Supply Voltage and Control connector, X101

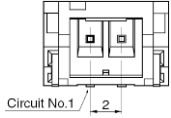
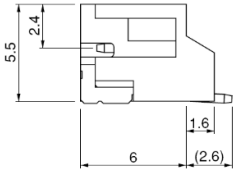
Type JST: S7B-PH-SM4-TB, SMT, Side entry type, RM 2.0mm; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
<p>Front-View</p> <p>Side View</p>	1	BLT.ADIM	O	Analog dimming voltage
	2	BLT.PWM	O	PWM diming output*
	3	BLT.EN	O	ON/OFF **
	4	BLT_VCC*	O	Operating voltage +12V / +24V
	5	BLT_VCC*	O	Operating voltage +12V / +24V
	6	GND	I/O	Ground
	7	GND	I/O	Ground

\* Note: BLT\_VCC is selectable with the jumpers on X201. For details see chapter 3.14 and 4.5!

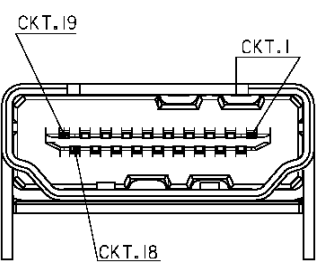
### 3.6. Input voltage connector, X102

Type JST: S2B-PH-SM4-TB, SMT, Side entry type, RM 2.0mm; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Front-View</p>	1	GND	I/O	GND / 2A
 <p>Side View</p>	2	+V_IN	I	+12V/2A or +24V/2A

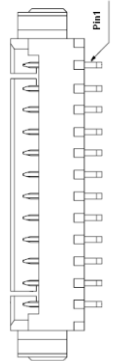
### 3.7. HDMI input connector, X103

Type Nexus 3600HFR; MOLEX: 47151-0001; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Front-View</p>	1	TX2_P	In	TMDS Data2+
	2	GND		TMDS Data2 Shield
	3	TX2_N	In	TMDS Data2-
	4	TX1_P	In	TMDS Data1+
	5	GND		TMDS Data1 Shield
	6	TX1_N	In	TMDS Data1-
	7	TX0_P	In	TMDS Data0+
	8	GND		TMDS Data0 Shield
	9	TX0_N	In	TMDS Data0-
	10	TXC_P	In	TMDS Data-Clock+
	11	DET	In	Detect pin for cable connection
	12	TXC_N	In	TMDS Data-Clock-
	13	NC		No internal Connection
	14	NC		No internal Connection
	15	DDC_SCL	In	I2C-Clock, +5V level
	16	DDC_SDA	I/O	I2C-Data, +5V level
	17	GND		DDC/CEC-GND
	18	HDMI_5V	In	+5V Power
	19	HPD	Out	Hot Plug Detect Signal

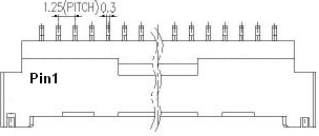
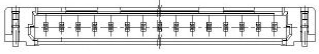
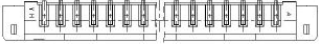
### 3.8. OSD-Keyboard-Connector, X105

Type MOLEX: 53261-1271, SMT Side entry type, 12pin, pitch 1.25mm; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Top-View</p>	1	OSD.LED1	O	LED Green
	2	OSD.LED2	O	LED RED
	3	OSD.IR	I	IR remote
	4	+5V	O	5V
	5	GND	I/O	Ground
	6	OSD.SW3	I	Button3 (UP)
	7	OSD.SW2	I	Button2 (DOWN)
	8	OSD.SW4	I	Button4 (SELECT)
	9	OSD.SW6	I	Button6 (POWER)
	10	OSD.SW1	I	Button1 (MENU)
	11	OSD.SW5	I	Button5 (SPECIAL)
	12	GND	I/O	Ground

### 3.9. LVDS-output connector, X106

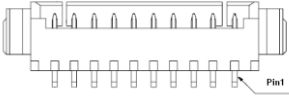
Type Hirose: DF14-30P-1.25H; YEONHO: 12507WR-30; SMT Side entry type, 30 pin, RM 1.25mm or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Top-View</p>  <p>Front-View</p>  <p>Rear-View</p>	1	Panel VCC	0	Panel VCC *
	2	Panel VCC	0	Panel VCC*
	3	Panel VCC	0	Panel VCC*
	4	Panel VCC	0	Panel VCC*
	5	GND	I/O	GROUND
	6	Reverse_Scan#	0	Digital out (3V3 or 0V), e.g. for LVDS-select
	7	GND	I/O	Ground
	8	LVDS.TXA3_P	0	TX3 even positive
	9	LVDS.TXA3_N	0	TX3 even negative
	10	LVDS.TCLKA_P	0	Clock even positive
	11	LVDS.TCLKA_N	0	Clock even negative
	12	LVDS.TXA2_P	0	TX2 even positive
	13	LVDS.TXA2_N	0	TX2 even negative
	14	GND	I/O	Ground
	15	LVDS.TXA1_P	0	TX1 even positive
	16	LVDS.TXA1_N	0	TX1 even negative
	17	LVDS.TXA0_P	0	TX0 even positive
	18	LVDS.TXA0_N	0	TX0 even negative
	19	GND	I/O	Ground
	20	LVDS.TXB3_P	0	TX3 odd positive
	21	LVDS.TXB3_N	0	TX3 odd negative
	22	LVDS.TCLKB_P	0	Clock odd positive
	23	LVDS.TCLKB_N	0	Clock odd negative
	24	LVDS.TXB2_P	0	TX2 odd positive
	25	LVDS.TXB2_N	0	TX2 odd negative
	26	GND	I/O	Ground
	27	LVDS.TXB1_P	0	TX1 odd positive
	28	LVDS.TXB1_N	0	TX1 odd negative
	29	LVDS.TXB0_P	0	TX0 odd positive
	30	LVDS.TXB0_N	0	TX0 odd negative

\* Note: Pin1, 2, 3, 4: Output voltage 3.3V / 5.0V / 12.0V – selected by firmware

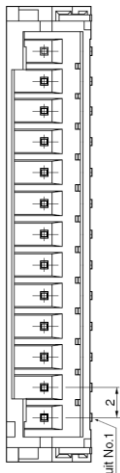
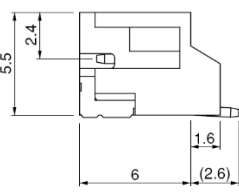
### 3.10. GPIO connector, X107

Type MOLEX: 53261-1071; YEONHO: 12505WR-10; SMT Side entry type, 10 pin, RM 1.25mm or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Top-View</p>	1	+3V3_DVDD	0	3.3V
	2	+5V	0	5V
	3	Fan_PWM	0	Fan speed control (5V-Level)
	4	GPIO3	I/O	GPIO (connected to I <sup>2</sup> C-I/O-Expander D905)
	5	Fan_Vcc	I/O	Fan operating voltage (= +V_IN)
	6	GPIO1	I/O	GPIO (connected to I <sup>2</sup> C-I/O-Expander D905)
	7	GPIO2	0	GPIO (connected to I <sup>2</sup> C-I/O-Expander D905)
	8	I2C_EXT.SCL	I/O	I <sup>2</sup> C SCL (5V-Level)
	9	I2C_EXT.SDA	I/O	I <sup>2</sup> C SDA (5V-Level)
	10	GND	I/O	Ground

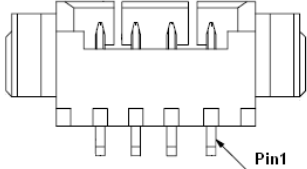
### 3.11. VGA input connector, X108

Type JST S13B-PH-SM4-TB, SMT, Side entry type, RM 2.0mm; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Front-View</p>  <p>Side-View</p>	1	VGA_IN.HSync	I	Horizontal Sync
	2	GND	I/O	Ground
	3	VGA_IN.VSync	I	Vertical Sync
	4	VGA_5V	I	+5V_DC
	5	VGA_IN.Blue	I	Blue analog input
	6	GND	I/O	GND
	7	VGA_IN.Green	I	Green analog input
	8	GND	I/O	GND
	9	VGA_IN.Red	I	Red analog input
	10	GND	I/O	GND
	11	VGA_I2C.SCL	I	DDC SCL
	12	VGA_I2C.SDA	I/O	DDC SDA
	13	VGA_IN.DET	I	Detect pin for cable connection

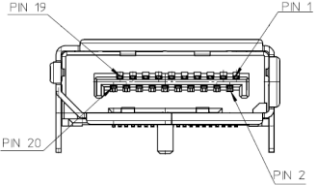
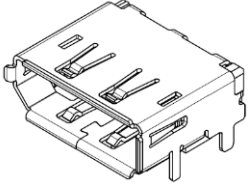
### 3.12. RS232-connector, X109

Type MOLEX: 53261-0471, SMT Side entry type, 4 pin, RM 1.25mm; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Top-View</p>	1	+3V3_DVDD	O	+3V3
	2	UART.TX	O	Transmit Data (LVTTTL)
	3	UART.RX	I	Receive Data (LVTTTL)
	4	GND	I/O	Ground

### 3.13. Display-Port input connector, X110

Type W+P: 8470-2-2-1-80-TR; MOLEX: 47272-0001; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
 <p>Front-View</p> 	1	DP_IN.L3_N	I	Main Link Ch. 3 Differential Input negative
	2	GND	I/O	Ground
	3	DP_IN.L3_P	I	Main Link Ch. 3 Differential Input positive
	4	DP_IN.L2_N	I	Main Link Ch. 2 Differential Input negative
	5	GND	I/O	Ground
	6	DP_IN.L2_P	I	Main Link Ch. 2 Differential Input positive
	7	DP_IN.L1_N	I	Main Link Ch. 1 Differential Input negative
	8	GND	I/O	Ground
	9	DP_IN.L1_P	I	Main Link Ch. 1 Differential Input positive
	10	DP_IN.L0_N	I	Main Link Ch. 0 Differential Input negative
	11	GND	I/O	Ground
	12	DP_IN.L0_P	I	Main Link Ch. 0 Differential Input positive
	13	DP_IN.CONFIG1	O	Config Pin1, connected to GND with 1M
	14	DP_IN.CONFIG2	O	Config Pin2, connected to GND with 1M
	15	DP_IN.AUX_P	I	Auxiliary Ch. Differential Input positive
	16	DP_IN.DET	I/O	Detect pin for cable connection
	17	DP_IN.AUX_N	I	Auxiliary Ch. Differential Input negative
	18	DP_IN.HPD	I/O	Hot Plug Detect
	19	DP_IN.RTN	I/O	Connected to Ground with OR
	20	N.C.		Not Connected to internal circuits

### 3.14. *BLT\_VCC-Select, X201*

Type W+P: 3131-13-006-50; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
<p>Side- and Front-View</p>	1	V_IN_Fused		Input-Voltage
	2	V_IN_Fused		Input-Voltage
	3	BLT_VCC		Voltage for BL-Inverter
	4	BLT_VCC		Voltage for BL-Inverter
	5	+12V_BLT_VCC		+12V from Regulator
	6	+12V_BLT_VCC		+12V from Regulator

\*Note: two jumper caps must be mounted on same side of X201, i.e. on 1-3 and 2-4 OR 3-5 and 4-6!

For details of mounting see chapter 4.5

Jumper Type W+P: 165-101-10-00

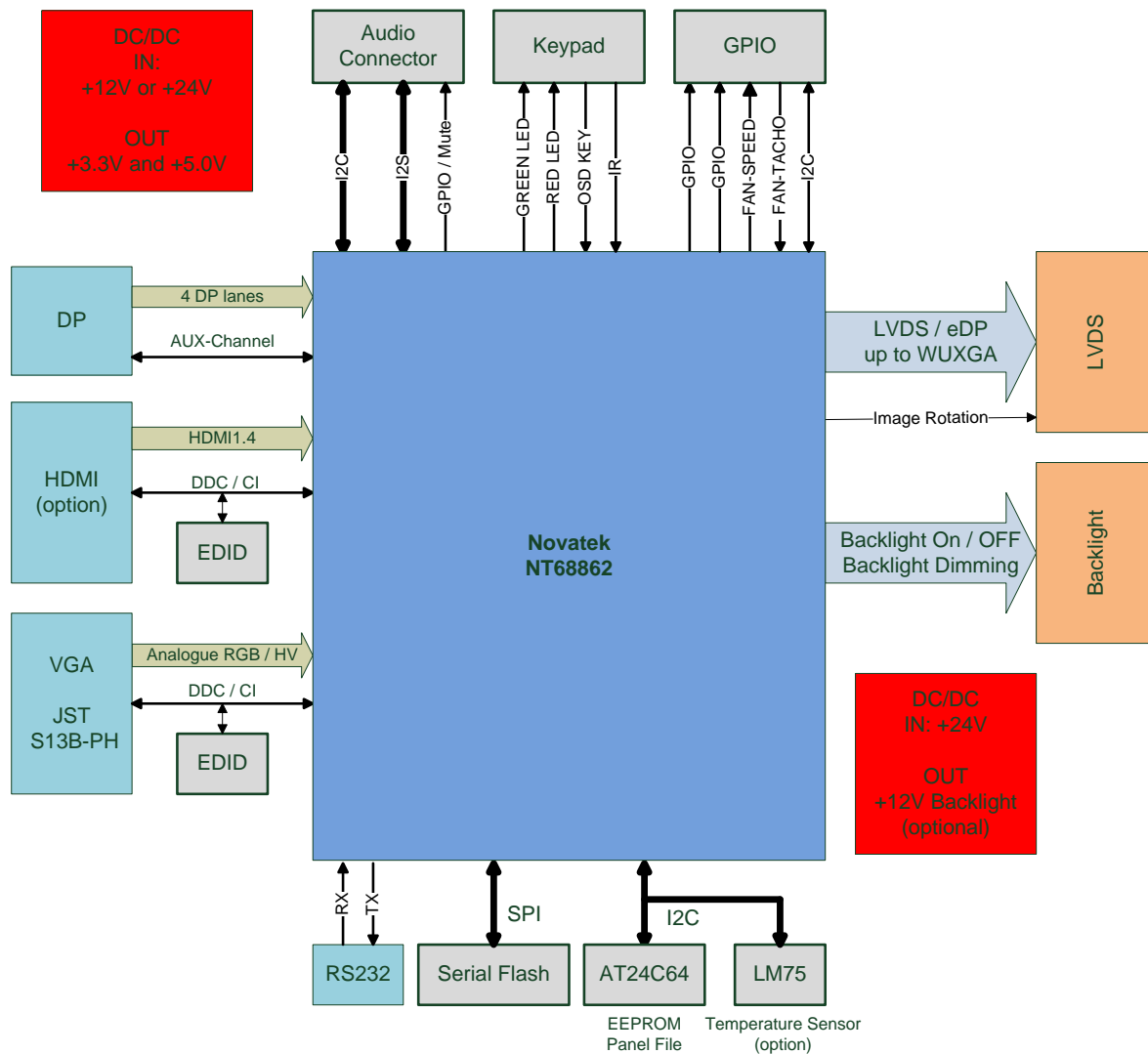
### 3.15. *I2S-Audio Connector, X700*

Type MOLEX: 53261-1471, SMT Side entry type, 14 pin, RM 1.25mm ; or equivalent

Pin arrangement	Pin	Signal	I/O	Description
<p>Top-View</p>	1	GND	I/O	Ground
	2	+5V	0	Power
	3	I2S_WS	0	I2S Word Select
	4	GND	I/O	Ground
	5	I2S_Data	0	I2S Data
	6	GND	I/O	Ground
	7	I2S_SCLK	0	I2S Clock
	8	GND	I/O	Ground
	9	I2S_MCLK	0	I2S MCLK
	10	GND	I/O	Ground
	11	AUDIO_MUTE	0	MUTE
	12	AUDIO_GPIO	I/O	GPIO
	13	I2C_EXT.SDA	I/O	I2C SDA (5V level)
	14	I2C_EXT.SCL	0	I2C SCL (5V level)

## 4. Technical Details

### 4.1. Block diagram



eMotionNT5:3 Block Diagram

### 4.2. Supply voltages and current consumption

The eMotionNT5:3 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 eMotionNT5:3.

Supply voltage	Nominal value	Regulation	Ripple & noise	Onboard current consumption
+12V	+12V	+/-10%	0.3V	200mA max.
+24V	+24V	+/-10%	0.3V	100mA max.

The output voltage for the backlight inverter (X101) can be set to the DC input voltage  $V_{IN}$  of the eMotionNT5:3 (X100 resp. X102) or to +12V when  $V_{IN}$  is +24V. For these setting see see chapter 3.14 *BLT\_VCC-Select* and 4.5 *Backlight Inverter Supply*.



#### 4.3. Configuration Options on eMotionNT5:3

eMotionNT5:3 can drive panels with different values for TCON-supply-voltage. Additionally backlight inverters with different values for backlight PWM-voltage / backlight enable-voltage and backlight logic-level can be driven.

Values for TCON-supply-voltage / backlight PWM-voltage and backlight enable voltage will be set by firmware on eMotionNT5:3! I.e. to ensure functionality of connected TFT it is necessary to program the correct firmware on eMotionNT5:3 first!

Backlight enable-logic-level is set by 0R-resistor (hardware mounting option)

Possible adjustments:

Value	Can be set to...		
TCON-supply-voltage	+3V3	+5V	+12V
Backlight PWM-voltage	+3V3	+5V	
Backlight enable voltage	+3V3	+5V	
Backlight enable-logic-level	Active high (default)	Active low (mounting option)	

#### 4.4. TCON-current capability of eMotionNT5:3

eMotionNT5:3 can deliver the following supply currents to a connected TCON-board

TCON Voltage	Nominal value	Max Current (total)	Ripple & noise
+3V3	3V3	3A	0.1V
+5V	5V	3A	0.1V
+12V	12V	3A	0.1V

TCON-voltage is supplied to TCON-board by pins with signal Panel VCC on X106

#### 4.5. Backlight Inverter Supply

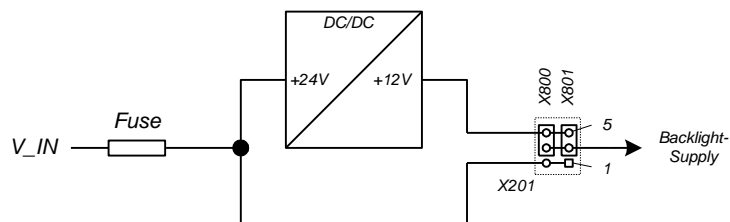
There are very many backlight inverters available for driving TFT backlights. Supply voltage for these inverters can be different.

Amongst others backlight inverters can operate with input voltages of +12V or +24V or have an input range from +12V to +24V. These inverters can be driven by eMotionNT5:3.

To handle the different backlight inverters the backlight supply voltage can be routed in 2 different ways on eMotionNT5:3:

- Input voltage (V\_IN) supplies DC/DC-regulator and output of this regulator ist backlight supply voltage
- Input voltage (V\_IN) is directly connect to backlight inverter supply input

The routing can be set by the user by setting jumper cabs X800, X801 on connector X201:



Depending on eMotionNT5:3 input voltage and required input voltage for the backlight inverter the jumpers on X201 have to be set in the following way:

V_IN	BLT_VCC	Jumper-Position on X201
+12V	+12V	1-3; 2-4
	+12V...+24V	1-3; 2-4
	+24V	Not possible
+24V	+12V	3-5; 4-6
	+12V...+24V	1-3; 2-4
	+24V	1-3; 2-4

#### 4.6. Backlight-current capability of eMotionNT5:3

Output current of eMotionNT5:3 for a connected backlight inverter depends on configuration of eMotionNT5:3:

- If jumper cabs X800, X801 are mounted to 3-5 and 4-6 on X201, i.e.  $V_{in}=+24V$  and  $V_{BL}=+12V$  (see chapter above), the output current is limited to 3A
- If onboard regulator for BLT\_VCC is not used, i.e.  $BLT\_VCC = V\_IN$ , the sum of output current for BLT\_VCC, the onboard current consumption and the TCON-board current consumption may not exceed the current capability of used input connector for V\_IN.

## 4.7. Input and output signals

### 4.7.1st DP input

PARAMETER	MIN	TYP	MAX	UNIT	Remark
Peak-to-peak input differential voltage	0.12		1.4	V <sub>p-p</sub>	
Rx DC Common Mode Voltage	0		V <sub>DD</sub>	V	
R <sub>T</sub> Termination Resistance	45	50	55	Ohm	

### 4.7.2nd HDMI input

PARAMETER	MIN	TYP	MAX	UNIT	Remark
Termination Supply Voltage AV <sub>CC</sub>	3,135	3.3	3,465	V	
Differential Input Voltage	150		1200	mV	
Input Common Mode Voltage	AV <sub>CC</sub> -300		AV <sub>CC</sub> -37	mV	
Input Clock frequency	20		165	MHz	

### 4.7.3rd VGA input

PARAMETER	MIN	TYP	MAX	UNIT	Remark
Conversion rate	10		205	MHz	
ADC resolution	8		10	bit	Up to 165MHz sample rate 10 bits per color are used, up to 205MHz sample rate 8 bits per color are used
Input levelrange	0,64	0,7	0,9	V <sub>pp</sub>	at 75R
Band width	9		290	MHz	
SOG level		0,3		V	at 75R

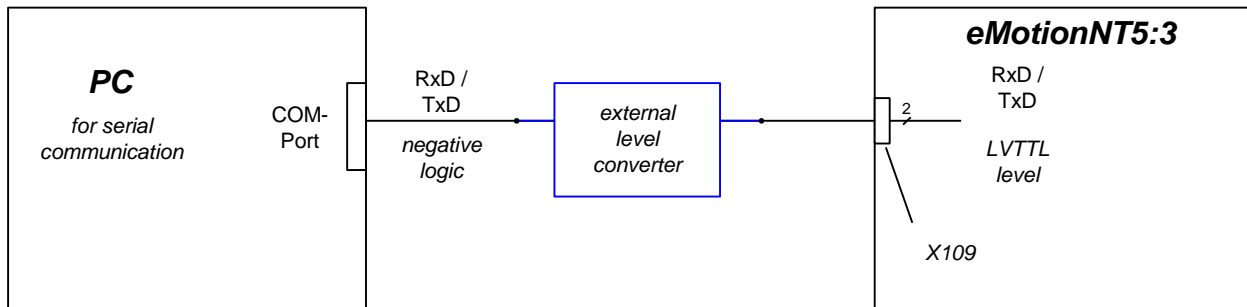
### 4.7.4th LVDS connector (output)

PARAMETER	MIN	TYP	MAX	UNIT	Remark
Differential Output Voltage	300	500	700	mV	
Common Mode Voltage		1.25		V	
Clock Frequency			100 90	MHz	Single Channel Dual Channel

#### 4.8. Serial Communication with eMotionNT5:3

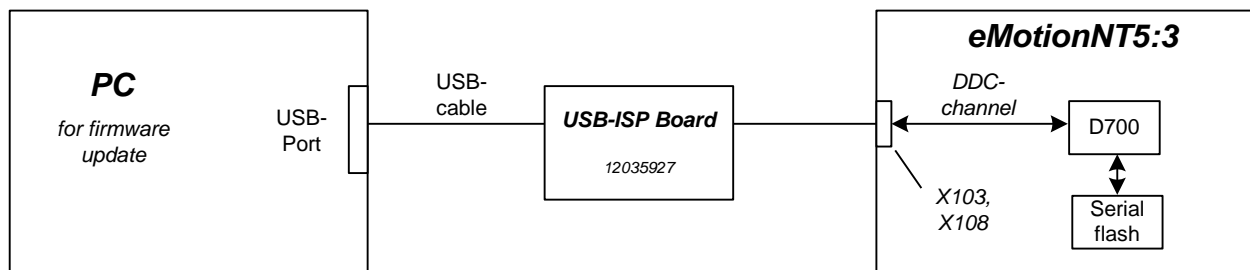
The eMotionNT5:3 can be controlled by RS232 commands which can be send by COM-port of PC e.g..  
RS232-signals RxD and TxD at X109 should have LVTTTL-level.

⇒ for communication an external level converter is needed!



#### 4.9. Firmware Update on eMotionNT5:3

Firmware update on eMotionNT5:3 is done over DDC-channel of video-inputs HDMI or VGA. An USB-ISP Board is necessary for this operation!  
This board is connected to PC with USB2.0 cable and to eMotionNT5:3 with videocable to input HDMI or VGA.



Details for firmware update on request.

## 5. Qualification

### 5.1. *Environmental conditions*

Parameter	Min	Max
Operating temperature	0°C	+60°C
Storage temperature	-20°C	+80°C
Relative humidity		80%
Tolerable air-pressure	708 hPa (approx. Altitude 3000m)	

### 5.2. *EMI-Standards*

Designed to meet EMC (Electro-Magnetic Compatibility): Emission standard for industrial environments, according to EN 61000-6-4 and Immunity for industrial environments, according to EN 61000-6-2:

Description	Requirements	Test parameter	Criteria
Electromagnetic compatibility of multimedia equipment - Emission Requirements	EN 55032		Class A
Electrostatic discharge immunity test	EN 61000-4-2	±4 kV contact discharge, ±8 kV air discharge	Criteria B
Radiated, radio frequency, electromagnetic field immunity test	EN 61000-4-3	80-1000 MHz 10 V/m, 1,4-2 GHz 3 V/m 2-6 GHz 1 V/m 80 % AM (1 kHz)	Criteria A
Electrical fast transient/burst immunity test	EN 61000-4-4	±1 kV on I/O lines	Criteria B
Immunity to conducted disturbance, induced by radio-frequency fields	EN 61000-4-6	0,15 – 80 MHz 10 V <sub>rms</sub> 80 % AM (1 kHz)	Criteria A
Immunity to magnetic field	EN 61000-4-8	30 A/m	Criteria 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. aluminum enclosure).

### 5.3. *Safety*

- Designed to meet: IEC 62368-1
- Designed to meet UL 62368-1

## 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*

- min. 500.000h at Ta = 40°C, determined according to Telcordia SR-332

## 6. Warranty, Quality and Environmentalism

### 6.1. *Warranty*

- Manufacturer warranty: 12 month after delivery

### 6.2. *Quality*

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

Workmanship standard: IPC-A-610D Class2

### 6.3. *Environmentalism*

The list of used materials is based on the parts list, which is available at DATA MODUL ERP-system

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 eMotionNT5:3 board respectively on the board itself:

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

**DATA MODUL Aktiengesellschaft**

Landsberger Str. 322  
80687 Munich, Germany  
Tel. +49-89-5 60 17-0  
Fax +49-89-5 60 17-119  
[www.data-modul.com](http://www.data-modul.com)

**Logistics, Production & Services:**

DATA MODUL Weikersheim GmbH  
Lindenstrasse 8  
DE-97990 Weikersheim - Germany  
Phone: +49-7934-101-0  
Fax: +49-7934-101-101

**DATA MODUL's worldwide offices**

can be found on our website:  
[www.data-modul.com/eu/contact-worldwide.html](http://www.data-modul.com/eu/contact-worldwide.html)

