

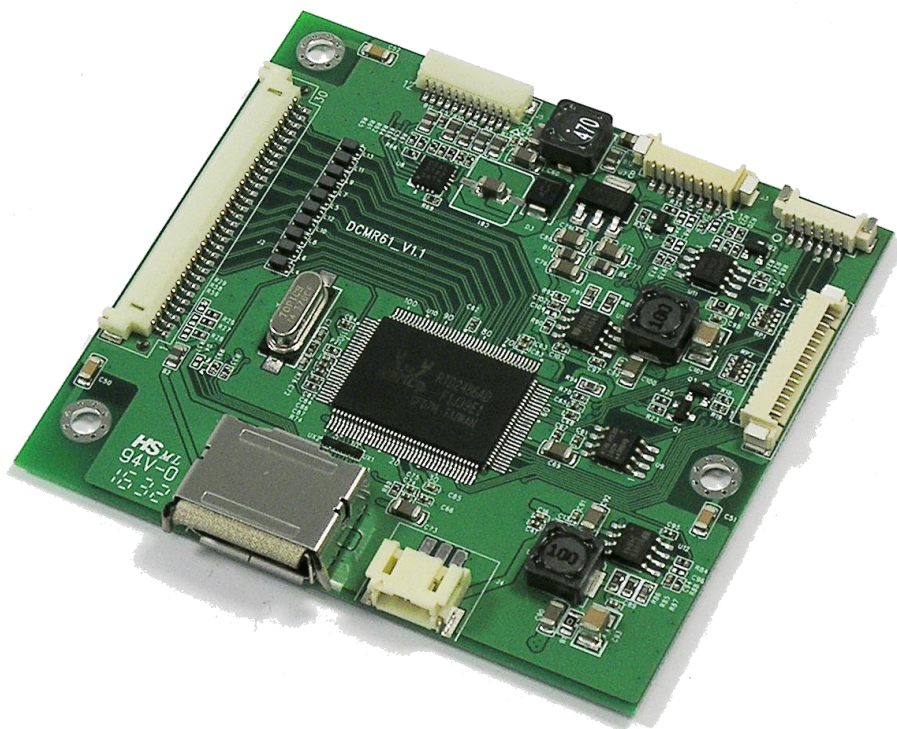
Specification for approval

(DisplayPort Interface Controller for TFT-LCD Interface)

Product Specification Status

- Preliminary
- Final

Model: DCMR-61



Customer

Approved by
(Name / Title)

Signature

Please return one of these to us immediately with your signature for approval.

This specification is subject to legal disclaimers.

1. Product Overview

This DisplayPort to LVDS converter board accepts standard DisplayPort 1.2 and all backward compatible signals. It generates all necessary control signals and panel data to drive TFT-LCDs with V_{DD} level 3.3V or 5V. This TFT-controller board supports resolutions up to 1920x1200 (WUXGA) at a vertical refresh rate up to 60Hz. The user interface includes brightness, contrast adjustment, etc. by on-screen programming. Some OSD functions can be managed via I²C interface.

2. Features

General

- Support up to 1920x1200 (WUXGA) resolution @ 60Hz
- Support displays with LVDS V_{DD} 3.3V / 5V
- DDC/CI support by embedded DDC
- I²C-bus Interface
- Power management support (DPMS - VESA compliant)

DisplayPort 1.2 Digital Input Interface

- High-Bandwidth Digital Content Protection (HDCP v1.3) support
- Support 4 lanes digital input, each lane's speed up to 1.62Gbps and 2.7Gbps
- Support 6-bit, 8-bit, 10-bit, and 12-bit color depth transport

Auto Detection / Calibration

- Input format detection
- Compatibility with standard VESA Mode
- Smart engine for color calibration

Audio

- I²S 8-channel support
- 5-band Equalizer
- AVC (Auto Volume Control)

Scaling

- Fully programmable zoom ratios
- Independent horizontal/vertical scaling
- Advanced zoom algorithm provides high image quality
- Sharpness/Smooth filter enhancement
- Support non-linear scaling from 4:3 to 16:9 or 16:9 to 4:3

Color Processor

- True 10-bit color processing engine
- sRGB compliance

Output Interface

- Dual-LVDS 24-bit output interface
- Spread-Spectrum DPLL to reduce EMI
- Support VESA and JEIDA Mapping

On Screen Display menu

- Backlight dimming
- Color adjustment (contrast, brightness, etc.)
- Several other settings

Environmental

- ✓RoHS
- ✓REACH

3. Functional Diagram

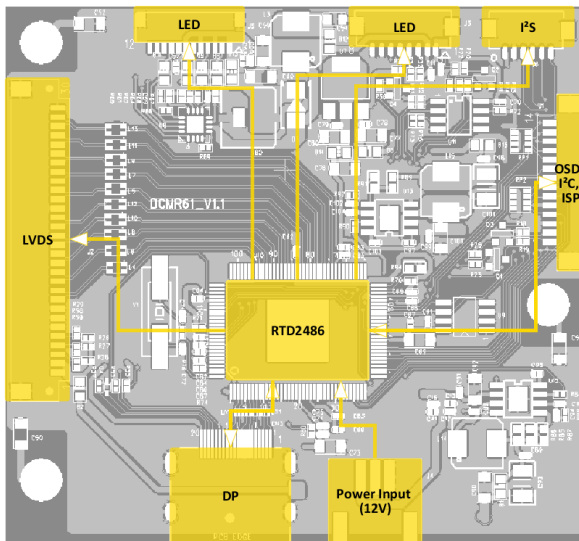


Fig 1. System Diagram

4. Typical Application

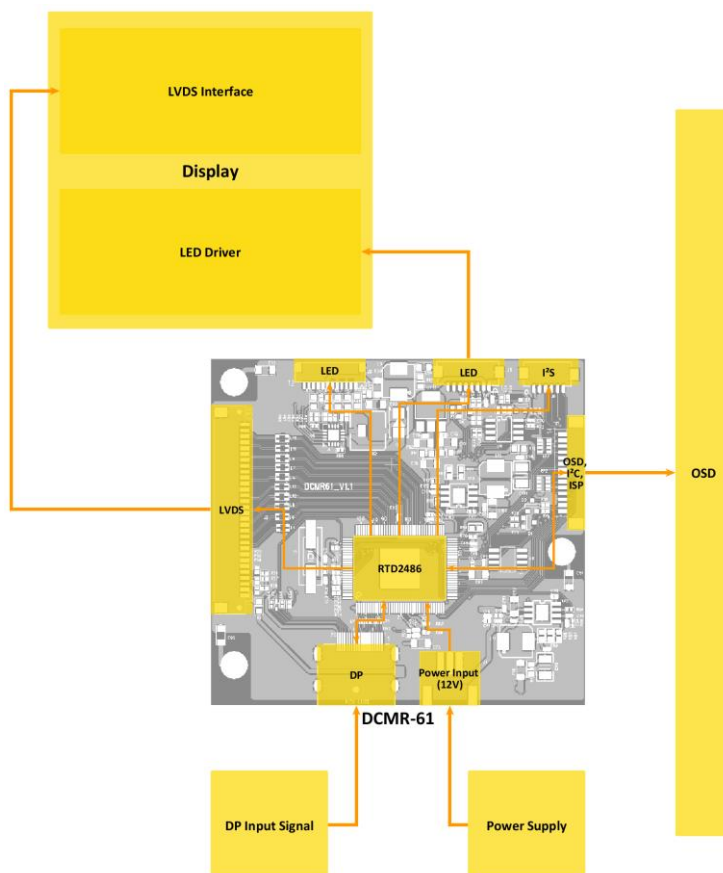


Fig 2. Application of DCMR-61

5. Electrical Characteristics

All ratings @ $V_{DD} = 12.0V$, $\vartheta = 25^{\circ}C$ unless otherwise noted.

5.1. Input

Table 1. Electrical Input Characteristics

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{DD}	Operating Supply Voltage	-	10.8	12.0	13.2	V DC
V_{DDmax}	Absolute Max. Rating ¹	-	-0.3	-	16	V DC
I_{DD}	Current Consumption ²	Board Only (active mode)	60	96	110	mA
		Board Only (sleep mode)	-	8	-	mA
		With WVGA Display ³	0.15	0.24	0.35	A
		With SXGA Display ⁴	0.22	0.70	1.21	A
		With FHD Display ⁵	0.31	0.72	1.32	A
P_C	Power Consumption	-	0.72	1.15	1.32	W

5.2. Output

Table 2. Electrical Output Characteristics

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{Panel}	Display Power Supply	3.3V configuration	3.0	3.3	3.6	V DC
		5V configuration	4.5	5	5.5	V DC
V_{BKL}	Backlight Power Supply	-	-	V_{DD}	-	V DC
V_{BKL_EN}	Backlight Enable Voltage	-	3.0	3.3	3.6	V DC
V_{BKL_ADJ}	Backlight Adjust Voltage	-	3.0	3.3	3.6	V DC
V_{LED}	LED String Forward Voltage per channel	-	-	24	36	V
P_{LED}	LED driver power output	-	-	1.2	6	W
I_{LED}	LED Channel current per pin	-	10	50	175	mA
ΔI_{LED}	LED Channel Matching	-	-5	± 1	5	%

¹ Consider ratings of connected parts

² Current consumption depends on the firmware used (resolution)

³ Test was performed with InnoLux G070Y2-L01 Rev. C6 (WVGA, 500cd/m²). Backlight PWM duty ratio min: 10%

⁴ Test was performed with CPT CLAA190EB01CW (SXGA, 450cd/m²). Backlight PWM duty ratio min: 5%

⁵ Test was performed with AUO G133HAN01.0 (FHD, 400cd/m²). Backlight PWM duty ratio min: 5%

Electrical Characteristics

V_{LED_FMAX}	LED string short-circuit voltage limit	-	-	18	-	V
V_{LED_FMAX}	LED string open-circuit voltage limit	-	-	30	-	V

6. OSD (On-Screen Display)

The user-friendly, intuitive controllable integrated OSD menu provides certain functions to change settings, adjust the image and others. It can be controlled by an OSD-keyboard. The status of the LCD controller can be checked by a LED which is integrated on the keyboard.

6.1. OSD-Keyboard

There are 5 buttons to control the OSD by the OSD-keyboard and one LED on it to show the board's status.

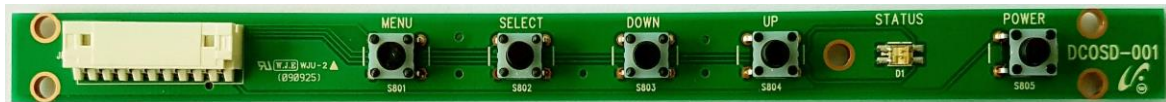


Fig 3. OSD-keyboard

Buttons

The function of each OSD key is shown in the following table.

Table 3. OSD keyboard functions

No.	Button	Switch Function	Hot-Key Function
1	Menu	1. Open / Close OSD Main Menu 2. Leave setting without change	-
2	Select	Select an item / leave setting and save	-
3	Down	1. Move to down / left in menu list 2. Decrease the value of selected item	Show Signal Info
4	Up	1. Move to upside / right in menu list 2. Increase the value of selected item	-
5	Power	Turn power on / off	-

LED

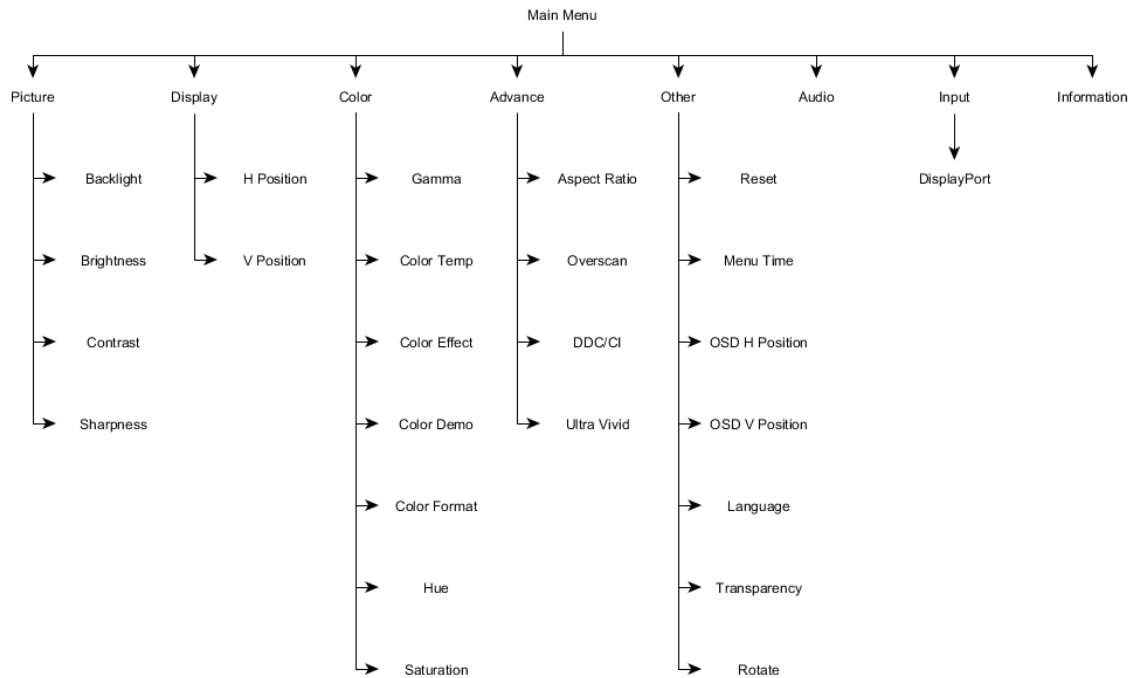
LED colors and their meanings are described in the table below.

Table 4. OSD-keyboard LED status lights

LED Color	Status	Meaning
Green	Constant	Normal state
Amber	Flashing	DPMS mode (can't find signal)
Red	Constant	Searching signal

6.2.OSD-menu

Menu Structure



Menu Items



Fig 4. Menu Items

Table 5. OSD Overview: Menu Items

Title	Function
Picture	Adjust and optimize the image
Display	Adjust H- & V-Position of the image
Color	Adjust and optimize the color
Advance	Advanced settings
Input	Input source selection
Other	Adjust the On-Screen-Display settings
Information	Information about current timing

Main-Menu: Picture



Fig 5. Main-Menu: Picture

Table 6. OSD Overview: Main-Menu Picture

Title	Function
Backlight	Adjust the backlight-intensity
Brightness	Adjust the brightness of the image
Contrast	Adjust the contrast of the image
Sharpness	Adjust the sharpness of the image

Main-Menu: Display



Fig 6. Main-Menu: Display

Table 7. OSD Overview: Main-Menu Display

Title	Function
Auto Adjustment	n/a
H Position	Adjust horizontal position of the image
V Position	Adjust vertical position of the image
Pixel Clock	n/a
Phase:	n/a

Main-Menu: Color



Fig 7. Main-Menu: Color

Table 8. OSD Overview: Sub-Menu Color

Title	Function
Gamma	Adjust gamma level of the image
Color Temp	Adjust the color temperature
Color Effect	Select a color effect
Color Demo	Select a mode to check hue and saturation settings
Color Format	Select a color space
Hue	Adjust the color balance
Saturation	Adjust the color intensity

Sub-Menu: Color Temp - User



Fig 8. Sub-Menu: Color Temp - User

Table 9. OSD Overview: Sub-Menu: Color Temp - User

Title	Function
R	Adjust red video gain
G	Adjust green video gain
B	Adjust blue video gain

Sub-Menu: Color Effect - User



Fig 9. Sub-Menu: Color Effect - User

Main-Menu: Advance



Fig 10. Main-Menu: Advance

Table 10. OSD Overview: Sub-Menu: Color Effect - User

Title	Function
Color	Select 6-axis color
Hue	Adjust hue of respective color
Saturation	Adjust saturation of respective color

Table 11. OSD Overview: Sub-Menu Advance

Title	Function
Aspect Ratio	Select aspect ratio or scaling factor of the image
Overscan	Enable / Disable overscan function
DDC/CI	Enable / Disable DDC/CI function
Ultra Vivid	Select grades of Ultra Vivid color mode

Main-Menu: Input



Fig 11. Main-Menu: Input

Table 12. OSD Overview: Main-Menu Input

Title	Function
DP	n/a

Main-Menu: Other



Fig 12. Main-Menu: Other

Table 13. OSD Overview: Main-Menu Other

Title	Function
Reset	Reset all OSD settings to factory mode
Menu Time	Set the OSD duration [s]
OSD H Position	Set the horizontal position of OSD menu
OSD V Position	Set the vertical position of OSD menu
Language	Select the OSD language (EN/DE)
Transparency	Adjust the transparency of the OSD menu
Rotate	Enable / Disable 90° OSD rotation

Main-Menu: Information



Fig 13. Main-Menu: Information

Table 14. OSD Overview: Main-Menu Information

Title	Function
Signal Source	DisplayPort
Current resolution	1920x1080@60.0Hz
H- & V-frequency	H: 67.5kHz V: 60.0Hz
Pixel clock frequency	PCLK: 148.4MHz
HDCP function state	HDCP Disabled
Firmware name and -version	DCMR-61H6S05 V1.22

7. Interfaces

7.1. LVDS Interface

At the LVDS-Interface, single- and dual-channel LVDS is supported. As the board is delivered pre-configured, no changes have to be made to the settings. Pixel clocks up to 186MHz and therefore a resolution up to WUXGA @ 60Hz are supported.

Settings

In order to achieve reliable communication when using longer cables, pre-emphasis may be applied to the LVDS signal lines. On the other hand the spread spectrum function can enhance the behavior in an EMI sensitive environment.

For further information please contact Beck GmbH & Co. Elektronik Bauelemente KG.

Mapping

6-bit and 8-bit per color (18-bit or 24-bit color depth) VESA- and JEIDA-mappings are supported at the LVDS-interface. The bit numbering of pixels is big endian, where the most significant bit has the largest bit number.

Table 15. LVDS Bit Number Mappings

VESA		JEIDA	
6-bit	8-bit	6-bit	8-bit
5	7	5	5
4	6	4	4
3	5	3	3
2	4	2	2
1	3	1	1
0	2	0	0
	1		7
	0		6

The following tables are identical for odd and even lines.

Table 16. VESA Data Packing

LVDS Data Line	Bit position						
	6	5	4	3	2	1	0
D 0	G0	R5	R4	R3	R2	R1	R0
D 1	B1	B0	G5	G4	G3	G2	G1
D 2	DE	VS	HS	B5	B4	B3	B2
D 3 (for 8-bit)	-	B7	B6	G7	G6	R7	R6

Table 17. JEIDA Data Packing

LVDS Data Line	Bit position						
	6	5	4	3	2	1	0
D 0	G2	R7	R6	R5	R4	R3	R2
D 1	B3	B2	G7	G6	G5	G4	G3
D 2	DE	VS	HS	B7	B6	B5	B4
D 3 (for 8-bit)	-	B1	B0	G1	G0	R1	R0

7.2. I²C Interface

DCMR-61 has an integrated I²C-bus interface. By sending 8-bit commands it is possible to change several settings that are stored on a serial EEPROM. Data will be polled by the master and the settings adjusted.

Commands

The following settings can be changed in the EEPROM:

Table 18. I²C Interface Commands

Name	Command	Type
Backlight	0x01	R/W
Contrast	0x02	R/W
Hardware version	0x10	RO
Firmware version	0x20	RO

Device Addressing

Table 19. I²C Interface Device Addressing

Operation	Control Code	Block Select	R/W
Read	1010	000	1
Write	1010	000	0

DC Characteristics

Table 20. I²C Interface DC Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
V _{CC}	I ² C-bus operating voltage (internal pull-up)	3.0	3.3	3.6	V
V _{IH}	High-level input voltage	0.7 V _{CC}	-	-	V
V _{IL}	Low-Level input voltage	-	-	0.3V _{CC}	V

AC Characteristics

Table 21. I²C Interface AC Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
f _{CLK}	Clock Frequency	-	100	400	kHz
t _{HIGH}	Clock high time	600	-	-	ns
t _{LOW}	Clock low time	1300	-	-	ns

Operations

In general the I²C-bus operations have to follow the I²C-bus standard. For further information about I²C usage, please contact your local sales partner.

Write

A write operation looks the following way:

Start	Device Address	Write	Ack	Word Address	Ack	Data	Ack	Stop
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Read

A random read operation looks the following way:

Start	Device Address	Write	Ack	Word Address(n)	Ack	Start	Device Address	Read	Ack	Data(n)	No Ack	Stop
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7.3. I²S Interface

For further information about I²S usage, please contact your local sales partner.

7.4. DDC

This LCD controller provides a serial communications link between the video adapter and the controller, the DDC (Display Data Channel). Properties such as maximum resolution, color depth and supported video timing modes can be transmitted using DDC.

EDID

The DCMR-61 controller board supports the Extended Display Identification Data (EDID 1.4) standard.

EDID contains basic information about a monitor and its capabilities, including vendor information, maximum image size, color characteristics, factory pre-set timings, frequency range limits, a characters string for the monitor name and serial number. The video adapter uses this information for configuration purposes, so that the monitor and system can work together.

DDC/CI

The display controller complies with the MCCS 2.2 standard. It supports a standard set of MCCS VCP codes to adjust the displayed image or control the display. Read and write commands are available for the following categories:

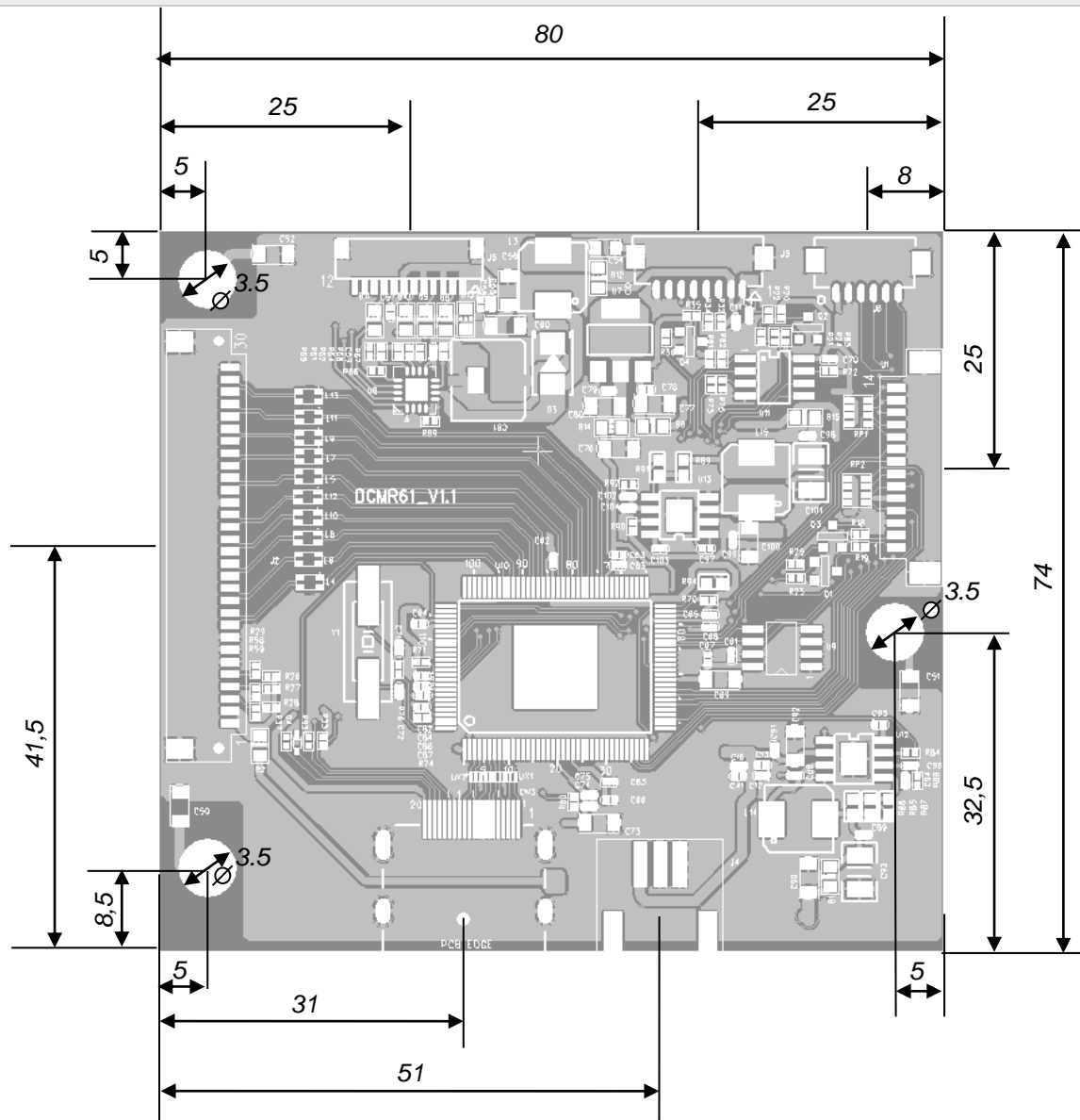
- Image Adjustments
- Color Adjustments
- Image Geometry Adjustments
- Audio Adjustments
- Window Operations
- DPVL Support

For detailed information about the supported MCCS VCP codes, please contact your local sales partner.

8. Mechanical Characteristics

Table 22. Mechanical Characteristics

Parameter	Value
Dimensions (H x V)	80mm x 74mm
Contour	Rectangular
Production technology	SMT & THT
Total height	9.5mm (1.0mm PCB + 7.5mm top side + 1.1mm bottom side)
Weight	27g



9. Connectors

Abbreviations used within this chapter are listed in the table below.

Table 23. Signal Assignment Abbreviations

Abbreviation	Description
GND	Ground
PWR	Power
I	Input
O	Output
I/O	Bi-directional

9.1. Connector Overview

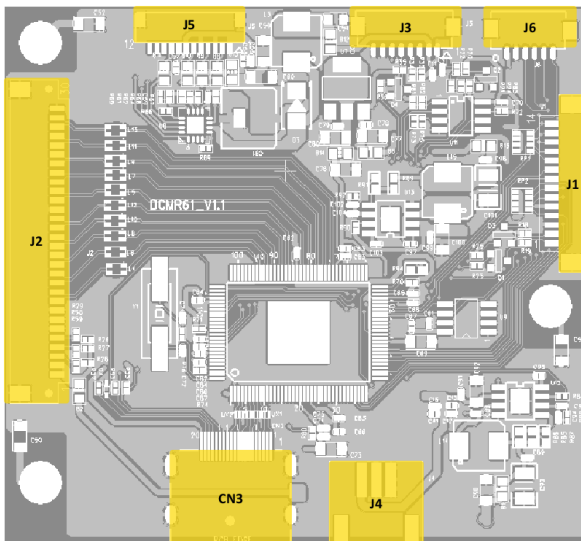


Fig 14. Connector Overview

9.2. Input Connectors

Power Connector (J4)

The Power Connector (J4) supplies the board with power. The connection is mandatory.

Table 24. Power Connector (J4)

Parameter	Value
Manufacturer: Connector model no.	JST: S3B-PH-K-S
Pin amount	3 pins (use Pin 1 as marked on connector)
Mating housing part	JST: PHR-3

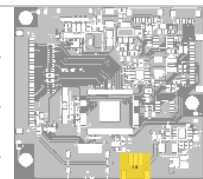




Fig 15. JST: S3B-PH-K-S

Table 25. Power Connector Pin Assignment

Pin	Signal	Description	Type
1	VIN	12V power input	PWR
2	GND	Ground	GND
3	GND	Ground	GND

DisplayPort Connector (CN3)

The DisplayPort Connector (CN3) delivers the video input-signal. The connection is mandatory.

Table 26. DisplayPort Connector (CN3)

Parameter	Value
Manufacturer: Connector model no.	Standard DisplayPort receptacle
Pin amount	20 pins (use Pin 1 as marked on connector)
Mating housing part	Standard DisplayPort plug

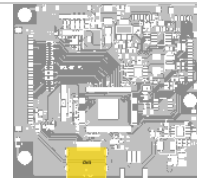


Fig 16. DisplayPort Connector

Table 27. Pin description

Pin	Signal	Description	Type
1	ML_Lane 0 (p)	Main-Link Lane 0+	I
2	GND	Ground	GND
3	ML_Lane 0 (n)	Main-Link Lane 0-	I
4	ML_Lane 1 (p)	Main-Link Lane 1+	I
5	GND	Ground	GND
6	ML_Lane 1 (n)	Main-Link Lane 1-	I
7	ML_Lane 2 (p)	Main-Link Lane 2+	I
8	GND	Ground	GND
9	ML_Lane 2 (n)	Main-Link Lane 2-	I
10	ML_Lane 3 (p)	Main-Link Lane 3+	I
11	GND	Ground	GND
12	ML_Lane 3 (n)	Main-Link Lane 3-	I
13	Config 1	-	-
14	Config 2	-	-
15	AUX CH (p)	AUX-CH+	I/O
16	GND	Ground	GND
17	AUX CH (n)	AUX-CH-	I/O
18	HPD	Hot-plug detect	O
19	PWR Return (GND)	Ground	GND
20	PWR (3,3V)	Power	PWR

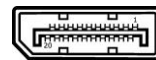


Fig 17. DisplayPort Connector Pin Config.

OSD, I²C, ISP Interface Connector (J1)

The OSD, I²C, ISP Interface Connector (J1) can be used for different purposes. An OSD-keyboard can be connected, the I²C-bus accessed or the board programmed by this interface. The connection is optional.

Table 28. OSD, I²C, ISP Interface (J1)

Parameter	Value
Manufacturer: Connector model no.	Molex: 53261-1471
Pin amount	14 pins (use Pin 1 as marked on connector)
Mating housing part	Molex: 51021-1400

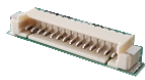
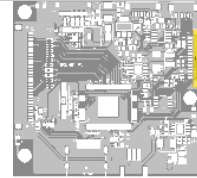


Fig 18. Molex: 53261-1471

Table 29. Pin description

Pin	Signal	Description	Type
1	LED_GN	LED Green	O
2	LED_RD	LED Red	O
3	GND OSD/ISP	Ground	GND
4	Power Key	OSD Key Power	I
5	3.3V	Power	O
6	Menu Key	OSD Key Menu	I
7	Down Key	OSD Key Down	I
8	ISP DATA	ISP-I ² C SDA	I/O
9	ISP CLK	ISP-I ² C SCL	I/O
10	Up Key	OSD Key Up	I
11	Sel Key	OSD Key Select	I
12	n.c.	-	-
13	I ² C SDA	EEPROM I ² C SDA	I/O
14	I ² C SCL	EEPROM I ² C SDA	I/O

9.3. Output Connectors

LVDS Interface (J2)

The LVDS Interface (J2) is the video output interface. The connection is mandatory.

Table 30. LVDS Interface (J2)

Parameter	Value
Manufacturer: Connector model no.	Hirose: DF14-30P1.25H
Pin amount	30 pins (use Pin 1 as marked on PCB)
Mating housing part	Hirose: DF14-30S-1.25C

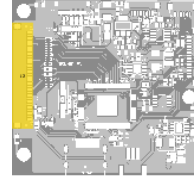


Fig 19. Hirose: DF14-30P1.25H

Table 31. Pin description

Pin	Signal	Description	Type
1	V_Panel	Panel Power	O
2	V_Panel	Panel Power	O
3	DSP	0Ω to VDD or GND; standard: 0Ω to VDD	O/GND
4	FRC	0Ω to VDD or GND; standard: 0Ω to VDD	O/GND
5	MSL	0Ω to VDD or GND; standard: 0Ω to VDD	O/GND
6	GND	Ground	GND
7	GND	Ground	GND
8	GND	Ground	GND
9	TXO0-	Negative LVDS differential data output – Line 0 (odd)	O
10	TXO0+	Positive LVDS differential data output – Line 0 (odd)	O
11	TXO1-	Negative LVDS differential data output – Line 1 (odd)	O
12	TXO1+	Positive LVDS differential data output – Line 1 (odd)	O
13	TXO2-	Negative LVDS differential data output – Line 2 (odd)	O
14	TXO2+	Positive LVDS differential data output – Line 2 (odd)	O
15	TXOCLK-	Negative LVDS differential clock output (odd)	O
16	TXOCLK+	Positive LVDS differential clock output (odd)	O
17	TXO3-	Negative LVDS differential data output – Line 3 (odd)	O
18	TXO3+	Positive LVDS differential data output – Line 3 (odd)	O
19	GND	Ground	GND
20	TXE0-	Negative LVDS differential data output – Line 0 (even)	O
21	TXE0+	Positive LVDS differential data output – Line 0 (even)	O
22	TXE1-	Negative LVDS differential data output – Line 1 (even)	O
23	TXE1+	Positive LVDS differential data output – Line 1 (even)	O
24	TXE2-	Negative LVDS differential data output – Line 2 (even)	O
25	TXE2+	Positive LVDS differential data output – Line 2 (even)	O
26	TXECLK-	Negative LVDS differential data output (even)	O
27	TXECLK+	Positive LVDS differential data output (even)	O

28	TXE3-	Negative LVDS differential data output – Line 3 (even)	O
29	TXE3+	Positive LVDS differential data output – Line 3 (even)	O
30	GND	Ground	GND

Backlight Power Connector (J3)

The Backlight Power Connector (J3) is one of two possible ways to power backlight units. When using an (in the display) integrated LED-driver, the connection is mandatory.

Table 32. Backlight Connector (J3)

Parameter	Value
Manufacturer: Connector model no.	Molex: 53261-0871
Pin amount	8 pins (use Pin 1 as marked on connector)
Mating housing part	Molex: 51021-0800

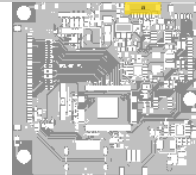


Fig 20. Molex: 53261-0871

Table 33. Pin description

Pin	Signal	Description	Type
1	12V (VIN)	Backlight Power	O
2	12V (VIN)	Backlight Power	O
3	n.c.	-	-
4	n.c.	0Ω to 12V or GND; standard: n. c.	-
5	BKL_EN	Backlight Enable	O
6	BKL_ADJ	Backlight Adjust	O
7	GND	Ground	GND
8	GND	Ground	GND

Backlight Power Connector (J5)

The Backlight Power Connector (J5) is one of two possible ways to power backlight units. It can be used to directly connect the on-board multi-channel LED-driver to the BLU of the display. The connection is optional.

Table 34. Backlight Connector (J5)

Parameter	Value
Manufacturer: Connector model no.	JST: SM12B-SRSS-TB
Pin amount	12 pins (use Pin 1 as marked on connector)
Mating housing part	JST: SHR-12V-S-B

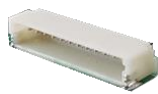
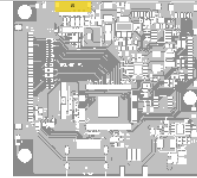


Fig 21. JST: SM12B-SRSS-TB

Table 35. Pin description

Pin	Signal	Description	Type
1	V _{LED_A1}	Anode 1	O
2	LED_C1	Cathode 1	I
3	V _{LED_A2}	Anode 2	O
4	LED_C2	Cathode 2	I
5	V _{LED_A3}	Anode 3	O
6	LED_C3	Cathode 3	I
7	V _{LED_A4}	Anode 4	O
8	LED_C4	Cathode 4	I
9	n.c.	-	-
10	n.c.	-	-
11	n.c.	-	-
12	n.c.	-	-

I²S Connector (J6)

The I²S Connector (J6) used for to access the Inter IC-Sound interface. The connection is optional.

Table 36. I²S Connector (J6)

Parameter	Value
Manufacturer: Connector model no.	Molex: 53261-0671
Pin amount	6 pins (use Pin 1 as marked on connector)
Mating housing part	Molex: 51021-0600

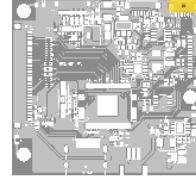


Fig 22. Molex: 53261-0671

Table 37. Pin description

Pin	Signal	Description	Type
1	3.3V	Power	O
2	GND	Ground	GND
3	MCK	Master Clock	I/O
4	SCK	Continuous Serial Clock	I/O
5	WS	Word Select	I/O
6	SD	Serial Data	O

10. Reliability

Table 38. Reliability test

Symbol	Test item	Min	Max	Unit
ϑ_{ST}	Storage temperature	-30	65	°C
ϑ_{OP}	Operating temperature	0	50	°C

11. Absolute Maximum Ratings

Table 39. Absolute maximum ratings

Symbol	Test item	Min	Max	Unit
ϑ_{ST}	Storage temperature	-30	65	°C
ϑ_{OP}	Operating temperature	0	50	°C

12. Application Information

12.1. Operating Precautions

- Be sure to ground yourself before handling the controller board.
- Turn off power supply before inserting or disconnecting any connector.
- Spike noise causes misoperation of circuits. It should be lower than following voltage: $\pm 200\text{mV}$ (over and under shoot voltage).
- This module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

12.2. General Cautions

- The responsibility for the applicability of customer specific products and use in a particular customer design is always within the authority of the customer.
- An important factor for each system integration is the thermal design. System designers might need to implement a passive or active cooling system in their specific design to keep the temperatures of all parts within the specification.
- Be careful for condensation at sudden temperature change. Condensation damages electrical contacted parts.
- When preparing a cable for a specific display, always refer to appropriate cable pin-out and display specification. Always check the signals before connecting the cable. Any incorrect pin connection may damage the display and the controller permanently.

- Take care of all the sensitive electronic components
- Do not modify the module assembly
- You must mount a module using its respective mounting holes and avoid any bend force during mounting.
- Be sure to do a reset in OSD if any problem occurs during operation
- Should you need any technical help, please contact Beck GmbH & Co. Elektronik Bauelemente KG

13. Packing / Labels

Serial number looks in general the following way:

ABCN.NN-YYMMDDXXXX

Table 40. S/N Encoding

Code	Meaning
ABC	Acronym for the SMT producer
N.NN	Firmware version VN.NN
YYMMDD	Manufacturing date (YY/MM/DD)
XXXX	Manufacturing sequence of product

14. Abbreviations

Table 41. Abbreviations

Abbr.	Description
BLU	Backlight Unit
BPC	Bits Per Color
BPP	Bits Per Pixel
DDC	Display Data Channel
DDC/CI	Display Data Channel Command Interface
DP	DisplayPort
DPMS	Display Power Management Service
EDID	Extended Display Identification Data
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMI	Electromagnetic Interference
GND	Ground
HDCP	High Digital Content Protection
I²C	Inter Integrated Circuit
I²S	Inter-IC Sound
ISP	In System Programming
JEIDA	Japan Electronic Industry Development Association
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LVDS	Low Voltage Different Signaling
MCCS	Monitor Command Control Set
OSD	On Screen Display
PCB	Printed Circuit Board
PCLK	Pixel Clock
PWM	Pulse Width Modulation
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
RoHS	Restriction of Hazardous Substances
SMT	Surface Mounted Technology
TFT	Thin-Film Transistor
THT	Through Hole Technology
VCP	Virtual Control Panel
VESA	Video Electronics Standards Association

15. Revision History

Table 42. Revision History

Rev.	Date	Section	Specification Status	Description
0.1	Jun 2, 2017	All	Preliminary	Initial release
1.0	Aug 16, 2018	All	Final	Initial release
1.1	Feb 8, 2019	All	Final	Changed product picture; Updated OSD structure; Improved several table's readability
1.2	Mar 4, 2019	9.2	Final	Changed J4 model no.

16. Legal Information

16.1. Disclaimers

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Limiting values

Stress above one or more limiting values (as defined in section Absolute maximum ratings) may cause permanent damage and irreversibly affect the quality and reliability of the device.

16.2. Trademarks

All referenced brands, product names, service names and trademarks are the property of their respective owners.

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Contact Information

For more information or technical support, please visit: <https://www.beck-elektronik.de>