

LCD Converter Board Specification

Model: SG95MW_2UBTPH_U001 Ver20.3(C1)

Function: HDMI+DP+TYPE-C+USB-B+2*USB

Supporting Panel: 4096*2160@60Hz and below

Security Level: Confidential



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Version

No	Ver.	Description	Date	Remark
1	R0.1	First Issue	20220617	

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1. Introduction

SG95MW_2UBTPH_U001 LCD controller board is a new LCD motherboard that integrates LED backlight driver and the most popular Type-C interface functions. The maximum output current that can be set by the hardware of the LED screen backlight drive current is 720mA (DC24V input). The output current below 720mA can be controlled by the software.

The LED screen backlight driving voltage will be automatically adjusted as the LED light string load changes. In addition, this board supports MPRT2 (dynamic picture response time) function (only built-in constant current backlight), which solves the problem of picture smear so that provides better picture details. The DC input voltage is 12V/24V, and the screen voltage is 5V/10V/12V. The board also supports headphone output and 2-way amplifier output within 15 watts (8Ω speaker).

The SG95MW_2UBTPH_U001 converter board can complete the conversion from the DP or HDMI or Type-C signal output from the PC to the signal that the LCD module can support. This solution is mainly used to connect to TFT LCD PANEL to realize the reproduction of the input signal with the highest resolution of 4096x2160@60Hz, and the color reproduction can support up to 12bit (1.07 billion colors). It has special functions such as color enhancement and color engine, which make the color reproduction more realistic, brighter and more vivid. Moreover, it supports HDCP (1.4) function, and has a beautiful OSD interface style and a variety of OSD languages to choose from.

Lighting rendering image output (High-Dynamic Range) provides more dynamic range and image details. Freesync/G-sync/Adaptive sync are also supported.

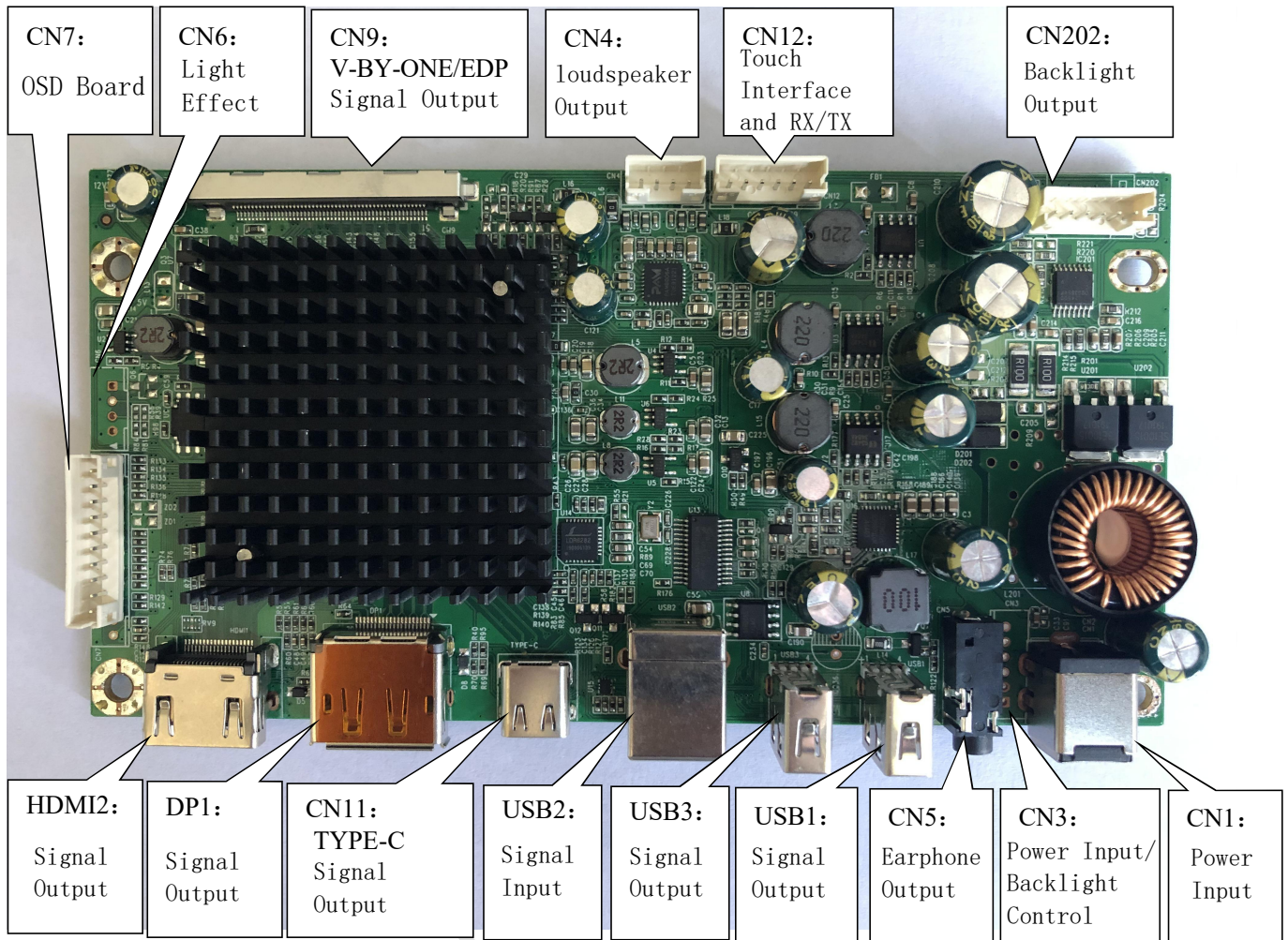
Type-C interface supports data transmission, external charging, and image display functions. USB-A bottom interface can realize the system operation of controlling the signal source of the TYPE-C device with the mouse, keyboard and touch screen. USB-B interface can also be used as the upper interface of the USB, and the upper interface can be used to control the system operation of the signal source through the two USB-A interfaces. The Type-C interface also supports PD protocol for external fast charging (only for devices that support fast charging), with a maximum of 20V/3A (DC input must be 24V, adopts 5A adapter), or a fixed 5V/3A. When the TYPE-C device is in standby or shut down, it can be set in the OSD menu to charge or not. The Type-C protocol also supports online updates to provide better compatibility.

The software on the board supports online updates, unless otherwise stated, the specifications that the product conforms to are described in this document.

2. Main Characteristics

Model	SG95MW_2UBTPH_U001 Ver20.3(C1)		
Interfaces	Input	DP	DP1.2
		HDMI	HDMI2.0
		2*USB-A	USB2.0
		USB-B	USB2.0
		Type-C	Data transfer, smart charging, image display
	Output	PANEL	8LANE EDP/8LANE VB1
		Amplifier Output	<15W*2 (8Ω)
		Earphone	JACK-3.5φPHONE
Power	Input	12V/24V DC Voltage (optional)	
	Drive-screen Voltage	5V/10V/12V (optional)	
	Constant Current	Max.720mA(DC24 input)	
	Standby Power Consumption	<0.5W	
	OSD Menu	Brightness, contrast, reset, etc.	
	Key	POWER、LEFT、RIGHT、AUTO、MENU、UP、DOWN (It can be changed to 5 keys or 6 keys through software according to customer requirements.)	

3. A/D Picture



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4. Supporting Mode Table

Mode	Resolution	Horizontal Frequency (KHz)	Field Frequency (Hz)
UHD	3840*2160	135	60
QHD	2560*1440	213	144
QHD	2560*1080	180	144
FHD	1920*1080	162	144
WQXGA	2560*1600	98.7	60
WQXGA	2560*1440	88.8	60
WUXGA	1920*1080	137.8	120
WUXGA	1920*1080	67.5	60
UXGA	1680*1050	133.4	120
UXGA	1680*1050	59.8	60
WXGA+	1440*900	55.5	60
SXGA	1280*1024	63.5	60
		80.0	75
XGA	1024*768	48.4	60
		56.5	70
		60.0	75
SVGA	800*600	37.9	60
		47.2	72
		46.9	75
VGA	640*480	31.5	60
		37.9	72
		37.5	75
DOS	720*400	31.5	70

5. I/O Interface Definition

◆ DP1 (Horizontal DP connector): DP Input Interface

Note: This interface supports DP1.2 standard (Max. resolution supports 3840X2160@60Hz)

Foot Serial No.	Definition	Description
1	Lane3-	DP Differential Signal Input
2	GND	GROUP
3	Lane3+	DP Differential Signal Input
4	Lane2-	DP Differential Signal Input
5	GND	GROUP
6	Lane2+	DP Differential Signal Input
7	Lane1-	DP Differential Signal Input
8	GND	GROUP
9	Lane1+	DP Differential Signal Input
10	Lane0-	DP Differential Signal Input
11	GND	GROUP
12	Lane0+	DP Differential Signal Input
13	GND	GROUP
14	GND	GROUP
15	AUX+	DPRX AUX-CH / MCU GPIO
16	DP_DET	Input Detect
17	AUX-	DPRX AUX-CH / MCU GPIO
18	DP_HPD_1	Hot Plug Detect
19	DP_RETURN	Pull-down resistor to ground
20	NC	No Connection

◆ CN6 (PH2.0mm-4AL Vertical Connector): Light Effect Connector(1PIN-4PIN from top to bottom)

Foot Serial No.	Definition	Description
1	IIC_5V	Light Effect Power

2	IIC_SCL	Clock Signal
3	IIC_SDA	Data Signal
4	GND	Ground

◆ CN9 (0.5mm Spacing 51PIN): VByOne/eDP Signal Output Interface (1PIN-51PIN from left to right)

Foot Serial No.	Definition	Description
1	Vcc	PANEL VCC
2	Vcc	PANEL VCC
3	Vcc	PANEL VCC
4	Vcc	PANEL VCC
5	Vcc	PANEL VCC
6	Vcc	PANEL VCC
7	Vcc	PANEL VCC
8	Vcc	PANEL VCC
9	N.C.	No Connection
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	GND	Ground
15	NC	No Connection
16	NC	No Connection
17	NC	No Connection
18	SCL	VB1 I2C Clock signal
19	SDA	VB1 I2C Data signal
20	NC	No Connection
21	AUX_P_1	eDPTX_AUX / MCU GPIO
22	AUX_N_1	eDPTX_AUX / MCU GPIO
23	AUX_P_2	eDPTX_AUX / MCU GPIO I-
24	AUX_N_2	eDPTX_AUX / MCU GPIO

25	HPD1	eDP_HP1
26	HPD2	eDP_HP2
27	GND	Ground
28	VTX_TX0N EDDP_LANE0N	eDPTX / VbyOne (HBR/HBR2)
29	VTX_TX0P EDDP_LANE0P	eDPTX / VbyOne (HBR/HBR2)
30	GND	Ground
31	VTX_TX1N	eDPTX / VbyOne (HBR/HBR2)
	EDDP_LANE1N	
32	VTX_TX1P EDDP_LANE1P	eDPTX / VbyOne (HBR/HBR2)
33	GND	Ground
34	VTX_TX2N EDDP_LANE2N	eDPTX / VbyOne (HBR/HBR2)
35	VTX_TX2P EDDP_LANE2P	eDPTX / VbyOne (HBR/HBR2)
36	GND	Ground
37	VTX_TX3N EDDP_LANE3N	eDPTX / VbyOne (HBR/HBR2)
38	VTX_TX3P EDDP_LANE3P	eDPTX / VbyOne (HBR/HBR2)
39	GND	Ground
40	VTX_TX4N EDDP_LANE4N	eDPTX / VbyOne (HBR/HBR2)
41	VTX_TX4P EDDP_LANE4P	eDPTX / VbyOne (HBR/HBR2)
42	GND	Ground
43	VTX_TX5N EDDP_LANE5N	eDPTX / VbyOne (HBR/HBR2)
44	VTX_TX5P EDDP_LANE5P	eDPTX / VbyOne (HBR/HBR2)
45	GND	Ground

46	VTX_TX6N EDDP_LANE6N	eDPTX / VbyOne (HBR/HBR2)
47	VTX_TX6P EDDP_LANE6P	eDPTX / VbyOne (HBR/HBR2)
48	GND	Ground
49	VTX_TX7N EDDP_LANE7N	eDPTX / VbyOne (HBR/HBR2)
50	VTX_TX7P EDDP_LANE7P	eDPTX / VbyOne (HBR/HBR2)
51	GND	Ground

◆ CN5: Earphone Output Interface

CN5 (Black 5PIN P=3.6mm H=12mm PJ-3580 4-section function without screw head)

◆ CN202 (PH2.0mm-6AW Vertical Connector): LED Backlight Output Connector (1PIN-6PIN from left to right)

Foot Serial No.	Definition	Description
1	LED-	LED Backlight Output-
2	LED-	LED Backlight Output-
3	LED+	LED Backlight Output+
4	LED+	LED Backlight Output+
5	LED-	LED Backlight Output-
6	LED-	LED Backlight Output-

◆ CN7 (PH2.0mm Vertical Connector): OSD Board Connector (1PIN-12PINn from top to bottom)

Foot Serial No.	Definition	Description
K1	DOWN	Functions can be defined according to customer's requirements
K2	UP	Functions can be defined according to customer's requirements

K3	MENU	Functions can be defined according to customer's requirements
K4	AUTO	Functions can be defined according to customer's requirements
K5	RIGHT	Functions can be defined according to customer's requirements
K6	LEFT	Functions can be defined according to customer's requirements
K7	GND	GND
K8	LED-G	Green Indicator
K9	LEG-R	Red Indicator
K10	POWER	Functions can be defined according to customer's requirements
K11	5V	5V (Not connected by default)
K12	IR	Infrared receiving interface (default not connected)

◆ HDMI1(Horizontal HDMI Interface): HDMI Input

Note: It supports HDMI2.0 standard (the highest resolution supports 3840X2160@60Hz)

Foot Serial No.	Definition	Description
1	RX2P_2	TMDS Differential Signal Input
2	GND	Ground
3	RX2N_2	TMDS Differential Signal Input
4	RX1P_2	TMDS Differential Signal Input
5	GND	Ground
6	RX1N_2	TMDS Differential Signal Input
7	RX0P_2	TMDS Differential Signal Input
8	GND	Ground
9	RXON_2	TMDS Differential Signal Input
10	RXCP_2	TMDS Differential Signal Input
11	GND	Ground
12	RXCN_2-	TMDS Differential Signal Input

13	NC	No Connection
14	NC	No Connection
15	HDMI_SCL	DDC Clock
16	HDMI_SDA	DDC Data
17	GND	Ground
18	NC	No Connection
19	HDMI_HPD2	HPD Detection

◆ CN1 Core Diameter 2.0mm/2.5mm: Power Input Interface (Optional)

Note: When the input voltage required by the customer is 12V, the core diameter is 2.0mm DC Connector; when it is 24V, the core diameter is 2.5mm DC Connector.

◆ CN4 (PH2.0mm-4AW Horizontal Connector): Speaker Output Connector (Optional) (1PIN-4PIN from right to left)

Foot Serial No.	Definition	Description
1	R-	Right speaker channel-
2	R+	Right speaker channel+
3	L+	Left speaker channel+
4	L-	Left speaker channel-

◆ TYPE (MINI-Type-C Horizontal Interface): Type-C Input

Foot Serial No.	Definition	Description
1	DET	Input Detect
2	TX1+	Positive half of Second SuperSpeed TX differential pair
3	TX1-	Negative half of Second SuperSpeed TX differential pair
4	TYPEC 5V	Bus Power
5	CC1	Configuration Channel
6	TP_DP	D+
7	TP_DM	D-

8	SUB1	Reserved for Future Use(RFU)
9	TYPEC 5V	Bus Power
10	RX2-	Negative half of Third SuperSpeed RX differential pair
11	RX2+	Positive half of Third SuperSpeed RX differential pair
12	GND	Ground
13	GND	Ground
14	TX2+	Positive half of Third SuperSpeed TX differential pair
15	TX2-	Negative half of Third SuperSpeed TX differential pair
16	TYPEC 5V	Bus Power
17	CC2	Configuration Channel
18	TP_DP	Positive half of the USB2.0 differential pair
19	TP_DM	Negative half of the USB2.0 differential pair
20	SBU2	Reserved for Future Use(RFU)
21	TYPEC 5V	Bus Power
22	RX1-	Negative half of Second SuperSpeed RX differential pair
23	RX1+	Positive half of Second SuperSpeed RX differential pair
24	GND	Ground

◆ **CN8 (USB2.0 Horizontal Connector): USB Output (1PIN-4PIN from right to left)**

Foot Serial No.	Definition	Description
1	VBUS	USB 5V
2	D-	USB DATA-
3	D+	USB DATA+
4	GND	GND

◆ **CN10 (USB2.0 Horizontal Connector): USB Output (1PIN-4PIN from right to left)**

Foot Serial No.	Definition	Description
1	VBUS	USB 5V
2	D-	USB DATA-
3	D+	USB DATA+
4	GND	GND

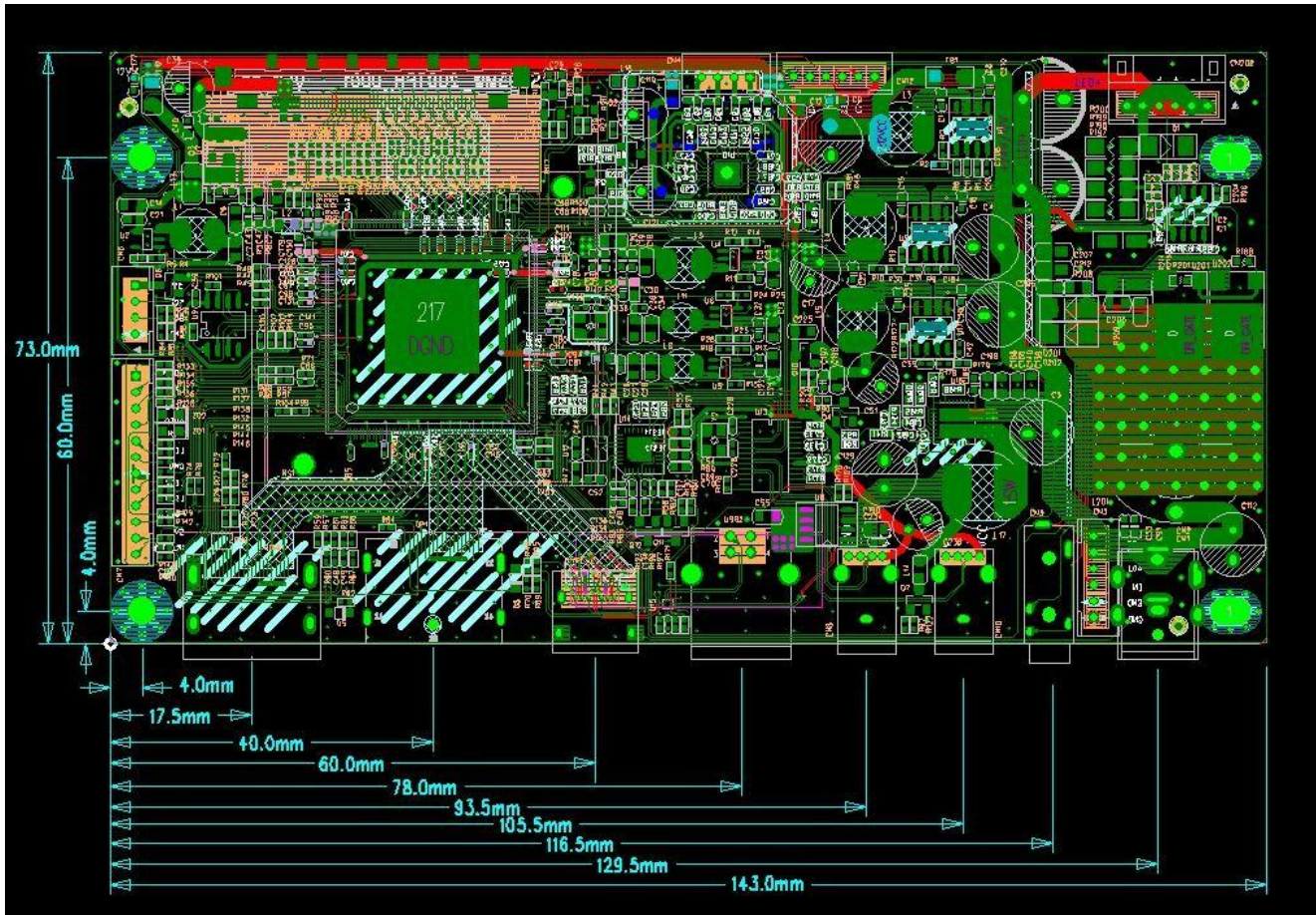
◆ **USB2 (USB2.0HorizontalConnector): USB-B Input (1PIN-4PIN from right to left)**

Foot Serial No.	Definition	Description
1	NC	No Connection
2	D-	USB DATA-
3	D+	USB DATA+
4	GND	GND

◆ **CN12: TOUCH Connector (1PIN-6PIN from right to left)**

Foot Serial No.	Definition	Description
1	VBUS	USB 5V
2	D-	USB DATA-
3	D+	USB DATA+
4	GND	GND
5	RX	RX
6	TX	TX

6. Structure and dimension (Unit: mm)



PCB Dimensions:

PCB thickness + height of the highest part $\leq 16\text{mm}$

PCB Length=143.0mm

PCB Width=73.0mm

PCB Thickness=1.6mm

Screw Hole:

3.5mm diameter screw hole, hole size and coordinates see the structure drawing.

7. Transportation, storage, using requirements

In order to ensure the positive use of this product and prevent electric shock, fire and other accidents, please read and understand all the requirements and operating procedures before using this product. And please strictly comply with the following requirements:

1. The DC power supply required by this product is generated by the AC/DC power adapter, and the AC/DC power adapter should be far away from the heat source and placed in the good ventilation.
2. AC power socket and cord should be connected to ground well and can withstand sufficient current demand.
3. This product needs DC power input voltage is +12V, the error is not greater than $\pm 0.5V$, the electric current is based on the selected LED screen and the power of the machine.
4. Pay attention to good ventilation and heat dissipation, can not be placed in a closed shell or box without heat conduction; Do not allow direct sunlight or other heat sources.
5. Be careful to avoid too much moisture and dust, so as not to cause circuit corrosion.
6. During assembly, keep certain N/A interval to provide heat dissipation by N/A air convection on the surface, and prevent short circuit between the conductor and the components on the board.
7. When assembling, pay attention to prevent the drive board from deforming due to extra pressure.
8. During assembly, pay attention to the correct electrical connection of the drive board, LED screen, key board and other parts. Select right working voltage of LED (too low will show abnormally; too high may burn out the LED screen). Power can be turned on after checking.
9. The program on the driver board should be matched with the corresponding LED screen.
10. Attention should be paid to the electrostatic protection during the assembly of the board card to avoid short circuit and electrostatic damage.
11. All I/O ports should be operated under power failure (pull out and plug connector connectors).
12. This product is suitable for general commercial and household use with the ambient temperature from -10°C to 40°C and relative humidity less than or equal to 80%.
13. Please unplug the power when not in use for a long time