Hardware Documentation

7" LVDS LCD Display
LCD.7.LVDS.1

preliminary

Version 001
(2024-02-05)

About This Document

This document describes how to use the LCD.7.LVDS.1 display with mechanical and electrical information. The latest version of this document can be found at: http://www.fs-net.de.

ESD Requirements

All F&S hardware products are ESD (electrostatic sensitive devices). All products are handled and packaged according to ESD guidelines. Please do not handle or store ESD-sensitive material in ESD-unsafe environments. Negligent handling will harm the product and warranty claims become void.

History

Date	V	Platform	A,M,R	Chapter	Description	Au
08.02.24	001	All		-	Initial Version	SM

V	Version
A, M, R	Added, Modified, Removed
Au	Author

Table of Contents

1 Overview

The LCD.7.LVDS.1 is a display including an adapter for the LCD and backlight voltages and an I2C IO expander for control signals.
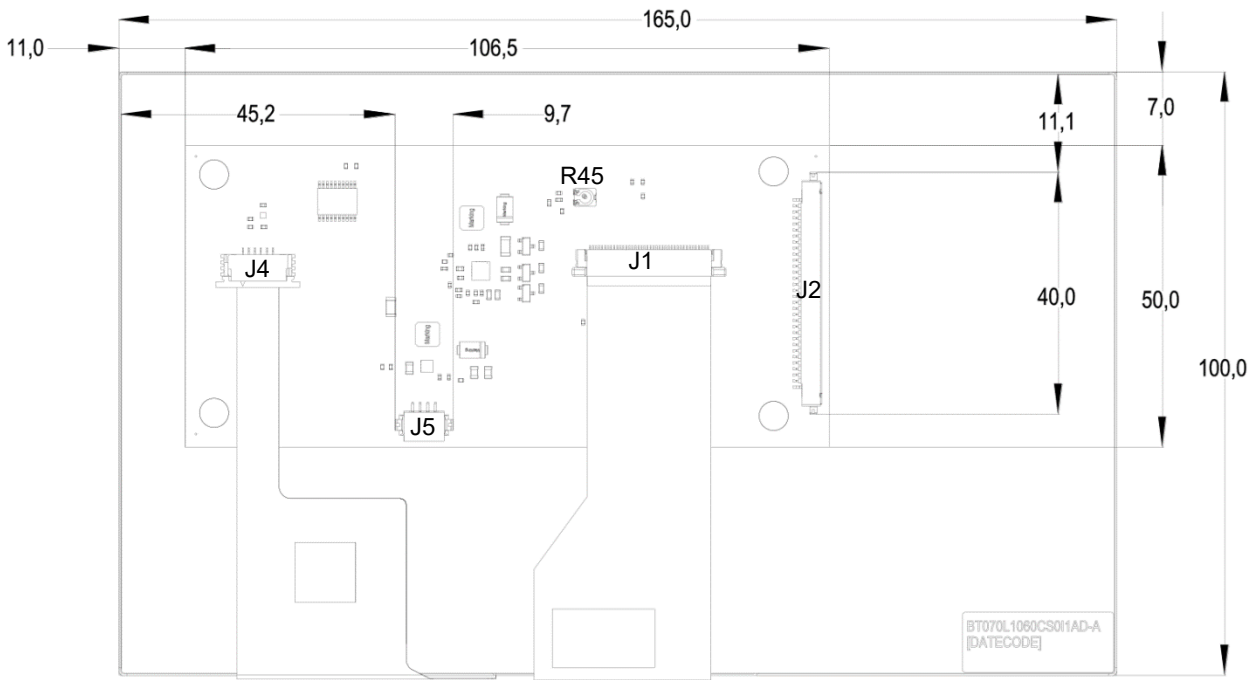
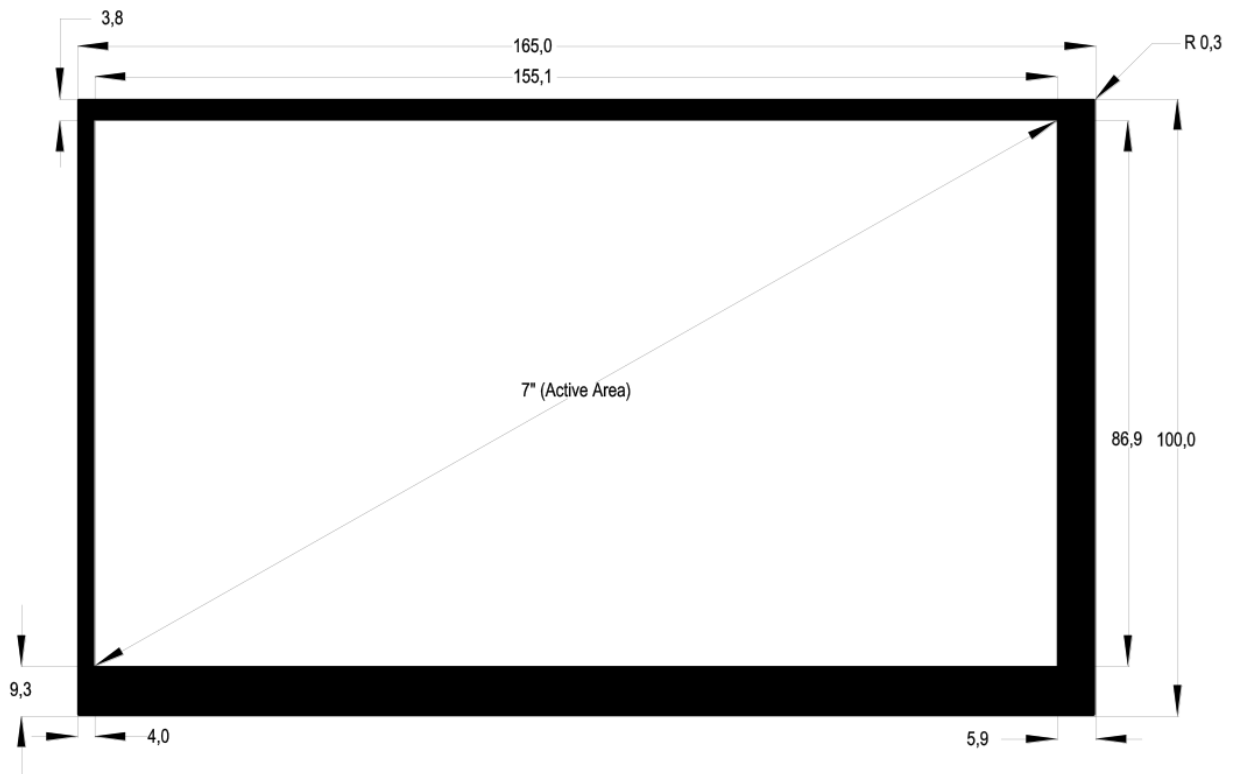## 1.1 Mechanic

Figure 1: Back view, all dimensions in mm

Figure 2: Top view, all dimensions in mm

Dimensions	Description
Display Thickness	7.5 mm (13.1 mm with Adapter)
Weight	215g
Tolerance	±0.2 mm
Operating Temperature	-20 … +70°C

Table 1: Mechanical dimensions

1.2   Connectors

Ref.	Description	Connector Type
J1	Display	FPC 40pol, Pitch: 0.50mm TE, 4-1734839-0
J2	LVDS & I²C In	FPC 30pol, Pitch: 1.00mm Hirose, MDF76GW-30S-1H(55)
J4	Touch	FPC 6pol, Pitch: 1.00mm Tyco, 84952-6
J5	Backlight Supply 5V	Header 4pol, Pitch: 1.25mm Hirose, DF13-4P-1.25H(20)

Table 2: Connector list

2 Electrical Characteristics

2.1 Recommended Operating Conditions

Parameter	Description		Min.	Typ.	Max.	Unit
V_{IN}	Input voltage for the display at J2		3.00	3.30	3.60	V
P_{IN}	Power consumption Display, Touch & I²C IO Expander at 3,3V			0,65		W
$V_{BL\ IN}$	Input voltage for the Backlight at J5		3.30[1]	5.0	10.20	V
$P_{BL\ IN}$	Power consumption Backlight at 5V and PWM frequency at:	20%		0.35		W
		50%		0.90		
		100%		1.80		
$V_{I2C\ LOW}$	I²C SDA/SCL LOW-level input voltage		-0-50		+0.30V_{IN}	V
$V_{I2C\ HIGH}$	I²C SDA/SCL HIGH-level input voltage		0-70V_{IN}	3.30	5.50	V

[1]For the full brightness a minimum of 5V is needed.

Table 3: Recommended operation conditions

2.2 Absolute Maximum Ratings

Parameter	Description	Min.	Max.	Unit
V_{IN}	Input voltage for the Display at J2	-0-30	5.00	V
$V_{BL\ IN}$	Input voltage for the Backlight at J5	0.00	10.20	V

Table 4: Absolute maximum ratings

3 Detailed Description

3.1 LVDS & I²C In Connector

The display uses the common F&S connector for LVDS signals. It is suitable to the LVDS/MIPI Adapter Cable (Part No. B.MKAB.44).

Pin	Signal Name	Description
1	DATA0 -	LVDS Data 0
2	DATA0 +	
3	DATA1 -	LVDS Data 1
4	DATA1 +	
5	DATA2 -	LVDS Data 2
6	DATA2 +	
7	GND	Ground
8	CLK -	LVDS Clock
9	CLK +	
10	DATA3 -	LVDS Data 3
11	DATA3 +	
12	n.c.	
13	n.c.	
14	GND	Ground
15	n.c.	
16	n.c.	
17	GND	Ground
18	n.c.	
19	n.c.	
20	n.c.	
21	n.c.	
22	n.c.	
23	n.c.	
24	GND	Ground
25	I²C SDA	I²C for touch and control signals
26	Touch IRQ	Interrupt output for touch events
27	I²C SCL	I²C for touch and control signals
28	DISPLAY RESET	Optional external input for display reset
29	V_{IN}	Power Supply
30	V_{IN}	

Table 5: Connector Pinout J2

3.2 Backlight Supply

The display uses a LED Backlight with the following electrical characteristics.

Parameter	Description	Min.	Typ.	Max.	Unit
I_F	Forward current backlight LED		0.2		A
V_F	Forward voltage backlight LED	8.1		10.2	V
t_{DUR}	Durability until 50% of initial brightness		50000.0[1]		h

[1] If the backlight is driven under high current, high ambient temperature and humidity conditions, the lifetime will be reduced.

Table 6: Electrical characteristics of the backlight

Pin	Signal Name	Description
1	$V_{BL\ IN}$	Supply input for backlight
2		
3	GND	Ground
4		

Table 7: Connector Pinout J5

A suitable cable can be purchased by F&S under the Part No.: B.MKAB.35

Note: Optional the backlight can be supplied by the LVDS & I²C In connector with a voltage of 3,3V and a max current of 100mA. For this option hardware modifications are needed.

3.3 Control Signals

An I²C IO expander is used to generate control signals for display, touch sensor and backlight. The used expander is a NXP PCA9634PW. The I²C Adress of the expander is 0x61. All pins must be configured as open drain. The PWM signal for the backlight brightness uses the group duty cycle register 0x0A of the chip, because of the lower frequency. Please see the datasheet of the chip for further information.

Pin	Signal Name	Description
6	BL ON	Turns the backlight on and off.
7	BL PWM	Control signal for brightness.
9	DISPLAY RESET	Reset signal for the display.
12	TOUCH RESET	Reset signal for the touch sensor.

Table 8: Pin and signal list IO expander

3.4 Display Configurations

The display can be configured with pull up and down resistors. The resistors are placed below the display FPC connector.
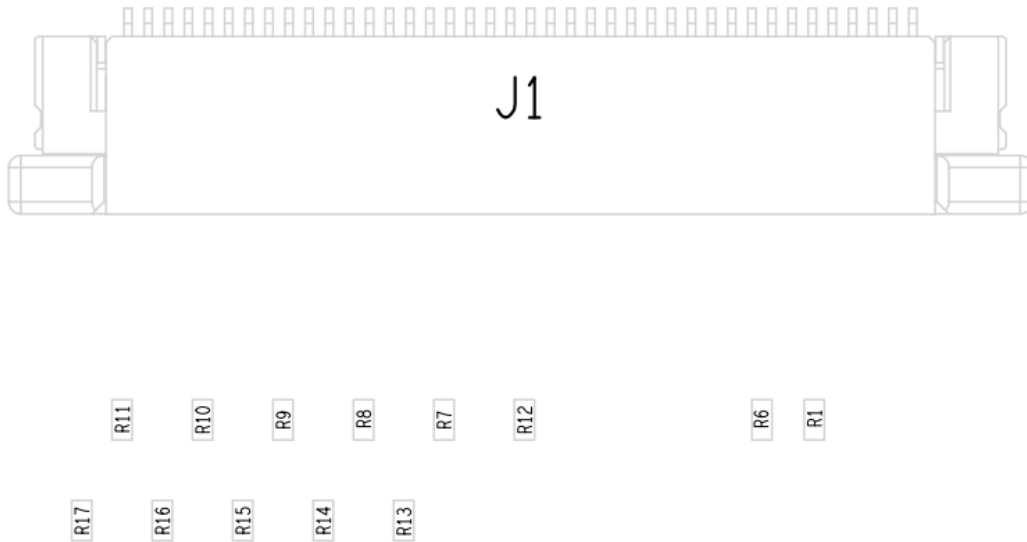

Figure 3: Config resistors position

Ref	Signal Name	Level	Description
R1	Standby Mode	HIGH	Normal operation
R6		LOW	Timing controller source driver will turn off, all outputs are HIGH-Z
R7	SELB	HIGH	6bit Mode
R13		LOW	8bit Mode
R8	Left/Right	HIGH	Left to right scan direction
R14		LOW	Right to left scan direction
R9	Up/Down	HIGH	Bottom to top scan direction
R15		LOW	Top to Bottom scan direction
R10	CABC_EN[1]	HIGH	CABC_EN = 00, CABC off (default) CABC_EN = 01, user interface image CABC_EN = 10, still picture CABC_EN = 11, moving image
R16		LOW	
R11	CABC_EN[0]	HIGH	
R17		LOW	

Table 9: Display configurations

3.5 VCOM

R45 is used to set the VCOM voltage (Pixel reference voltage). It can be adjusted from 2,8V to 3,5V.

3.6 Software

Drivers for the F&S boards with an LVDS Interface are provided.

4   ESD and EMI Implementation

The connectors do not have any protection. We highly recommend using the adapter board with wires as short as possible.
A helpful guide is available from TI; just search for slva680 at ti.com.

5   Second source rules

F&S qualifies their second sources for parts autonomously, as long as this does not touch the technical characteristics of the product. This is necessary to guarantee delivery times and product life. A setup of release samples with released second sources is not possible.
F&S does not use broker components without the consent of the customer.

6   Storage conditions

Maximum storage on room temperature with non-condensing humidity: 6 months
Maximum storage on controlled conditions 25 ±5 °C, max. 60% humidity: 1   2 months
For longer storage, we recommend vacuum dry packs.

7   ROHS and REACH statement

All F&S designs are created from lead-free components and are completely ROHS compliant.
The products we supply do not contain any substance on the latest candidate list published by the European Chemicals Agency according to Article 59(1,10) of Regulation (EC) 1907/2006 (REACH) in a concentration above 0.1 mass %.
Consequently, the obligations in No. 1 and 2 paragraphs in Annex are not relevant here.
Please understand that F&S is not performing any chemical analysis on its products to testify REACH compliance and is therefore not able to fill out any detailed inquiry forms.

8   Packaging

All F&S ESD-sensitive products will shipping either in trays or in bags.

9   Matrix Code Sticker

All F&S hardware will ship with a matrix code sticker including the serial number. Enter your serial number here https://www.fs-net.de/en/support/serial-number-info-and-rma/ to get information on shipping date and type of board.

Figure 2: Matrix Code Sticker

10 Appendix

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