

Contents

1	Introduction	5
1.1.	General Remarks	5
1.2.	Contents of this Documentation	5
1.2.1.	Hardware Products	5
1.2.2.	Software Products	5
1.2.3.	Documents	5
1.3.	Installation and Configuration	5
1.4.	Safety Recommendations and Warnings	6
1.5.	Life Cycle Information	6
1.5.1.	Transportation and Storage	6
1.5.2.	Assembly and Installation	6
1.5.3.	Operation	6
1.5.4.	Maintenance and Repair	6
1.5.5.	Disposal	6
2	Product Description	7
2.1.	Features	7
2.2.	Operating Modes	8
2.2.1.	Display-only mode vs. internal CPU mode	8
2.2.2.	Input Video Modes	8
3	Hardware description	10
3.1.	Power Supply	10
3.2.	Powerfail Detector Input (only TFT/GPHMI)	11
3.3.	OSD control board connector	12
3.4.	Temperature control switch and internal heating	12
3.5.	VGA input connector (only TFT/GPPAN & TFT/GPMON)	14
3.6.	TFT Inverter Connector	15
3.7.	Display bus configuration switch	16
3.8.	Display connectors	17
3.8.1.	TTL 6 bit connector	17
3.8.2.	LVDS 1 channel 8bit connector	19
3.8.3.	LVDS 2 channel 8bit connector	20
3.9.	PC/104 Bus Interface (only TFT/GPHMI)	21
3.10.	Touch Screen (only TFT/GPHMI & TFT/GPPAN)	22
3.10.1.	Driver	22
3.10.2.	Configuration	22
3.10.3.	Connector	23
3.11.	USB Connector (only TFT/GPHMI)	24
3.12.	PS/2 Mouse interface (only TFT/GPHMI & TFT/GPMON)	24
3.12.1.	PS/2 interface on TFT/GPHMI	25
3.12.2.	PS/2 interface on TFT/GPPAN	25

3.13.	Special Connectors / Future Enhancements	25
3.13.1.	Sensorboard connector	25
3.13.2.	External heating connector	26
3.13.3.	Battery & battery connector	26
3.14.	List of Connectors and Switches	27
3.14.1.	Factory Presets of Switches	28
4	Programming Information	29
4.1.1.	I/O Resources (only TFT/GPHMI)	29
4.1.2.	Status Register	30
4.1.3.	Control Register	30
4.1.4.	Function ID Register	30
4.1.5.	Option ID Register	31
4.1.6.	Revision ID Register	31
4.1.7.	I2C Register (for temperatur sensor control)	31
5	Technical Data	33
5.1.	General Electrical Data	33
5.2.	Fuse Replacement	34
6	Mechanical Data	35
6.1.	Screw Mounting Holes	35
6.2.	Dimensions	35
6.3.	Component Placement Top	36
6.4.	Component Placement Bottom	37
7	Product Revision History	38
7.1.	Hardware	38
7.2.	Firmware	38
8	Manufacturer Information	39
8.1.	Contact	39
8.2.	Warranty	39

List of Tables

Tab. 1	Power Supply Connector P403 (4 pin)	10
Tab. 2	Powerfail configuration switch	11
Tab. 3	OSD control board connector	12
Tab. 4	global thermostat configuration	13
Tab. 5	local thermostat configuration	13
Tab. 6	VGA Input Connector	14
Tab. 7	Power Supply Connector P403 (8 pin)	15
Tab. 8	Inverter Switch	15
Tab. 9	Power Supply Connector P403 (8 pin)	16

Tab. 10	Video data pin assignment on P702	17
Tab. 11	Video data pin assignment on P700	18
Tab. 12	Video data pin assignment on P703	19
Tab. 13	Video data pin assignment on P701	20
Tab. 14	PC/104 Bus Connectors P300..P304	21
Tab. 15	Touch panel controller configuration for 4- / 8- / 5- wire operation on S600	22
Tab. 16	8-Wire/5-wire/4-wire Touch Panel connector P600	23
Tab. 17	PS/2 configuration switch	24
Tab. 18	PS/2 configuration switch	24
Tab. 19	PS/2 configuration switch	25
Tab. 20	PS/2 configuration switch	25
Tab. 21	external battery connector layout	26
Tab. 22	List of connectors and headers	27
Tab. 23	switch configuration option matrix	28
Tab. 24	TFT/GPHMI System Registers	29
Tab. 25	General Absolute Maximum Ratings	33
Tab. 26	General Recommended Operating Conditions	34
Tab. 27	General Electrical Characteristics	34
Tab. 28	Mechanical outlines	35
Tab. 29	Hardware Revision State	38
Tab. 30	Firmware Revision State	38

List of Figures

Fig. 1	block schematic of TFT/GPHMI	7
Fig. 2	Powerfail Input Options	11
Fig. 3	6-pin female Mini-DIN (PS/2) socket (front view)	24
Fig. 4	mounting holes – top side view	35
Fig. 5	component placement top	36
Fig. 6	component placement bottom	37

1 Introduction

1.1. General Remarks

The content and presentation of this document has been carefully checked. No responsibility is accepted for any errors or omissions in the documentation.

Note that the documentation for the products is constantly revised and improved. The right to change this documentation at any time without notice is therefore reserved.

Syslogic is grateful for any help referring to errors or for suggestions for improvements.

The following registered trademarks are used:

IBM-PC, PC/AT, PS/2	trademarks of IBM Corporation
I ² C	trademark of Philips Corporation
NetiPC	trademarks of Syslogic Datentechnik AG
DDC	trademarks of VESA
EDID	trademarks of VESA

1.2. Contents of this Documentation

This document addresses to system integrators, programmers and instructed installation and maintenance personal working with the TFT/GPHMI system by Syslogic. It provides all information needed to configure, setup and program the TFT/GPHMI base board. For complete information also the documentation of the mounted CPU board and communications and I/O boards must be consulted. As the base board may be delivered in various versions with optional hardware blocks, the standard version (TFT/GPHMI-1A) is described here.

1.2.1. Hardware Products

The following hardware products are useful together with the TFT/GPHMI base board:

- PC-104 x86 based CPU boards: e.g. IPC/NETIPC-5A

1.2.2. Software Products

The following software products are useful together with the TFT/GPHMI base board:

- Firmware for NETIPC CPU boards: CUB/NETIPCFW-1A

1.2.3. Documents

The following documents are *required* for correct installation and operation of the TFT/GPHMI base board:

- DOC/TFT/GPHMI-E: This document.

1.3. Installation and Configuration

Upon your selected options in the order, all jumpers and plugs are already configured. For a specific configuration of the board, please consult the following chapters.

1.4. Safety Recommendations and Warnings

The products are intended for measurement, control and communications applications in industrial environments. The products must be assembled and installed by specially trained people. The strict observation of the assembly and installation guidelines is mandatory.

The use of the products in systems in which the life or health of persons is directly dependent (e.g. life support systems, patient monitoring systems, etc.) is not allowed.

The use of the products in potentially explosive atmospheres requires additional external protection circuitry which is not provided with the products.

In case of uncertainty or of believed errors in the documentation please immediately contact the manufacturer (address see chapter 0). Do not use or install the products if you are in doubt.

In any case of misuse of the products, the user is solely liable for the consequences.

1.5. Life Cycle Information

1.5.1. Transportation and Storage

During transportation and storage the products must be in their original packing. The original packing contains an antistatic bag and shock-absorbing material. It is recommended, to keep the original packing in case of return of the product to the factory for repair. Note that the packing is recyclable.

1.5.2. Assembly and Installation

Observe the EMI-precautions against static discharge. Carefully read the assembly and installation documentation (Document DOC/CUBINST) before unpacking the products. Make sure that you have all the necessary items ready (including all the small parts). Follow the assembly guidelines in DOC/CUBINST strictly.

The installation procedures (contained in document DOC/CUBINST) must be strictly observed. Note that deviations from the installation guidelines may result in degraded operational reliability or in unfavorable EM-radiation or EM-susceptibility.

The TFT/GPHMI was designed to cope with electrical discharges by human bodies (IEC 61010-4-4).

1.5.3. Operation

The operating environment must guarantee the environmental parameters (temperature, power supply, etc.) specified in the technical specification section of the manual.

1.5.4. Maintenance and Repair

In the case of a module hardware-failure or malfunction, the complete module should be exchanged. The faulty module must be returned to the factory for repair. Please use the original packing for return of the product (EMI and mechanical protection) whenever possible.

1.5.5. Disposal

At the end of the lifespan the TFTGPHMI product must be properly disposed. TFT/GPHMI products contain a multitude of elements and must be disposed like computer parts.

2 Product Description

2.1. Features

The TFT/GPHMI is a TFT Panel PC interface card with integrated touch screen controller especially designed for industrial applications. Various TFT panel and sub-board options make it a perfect fit for various applications in the industrial field.

The TFT/GPHMI is available in three main versions that differ in component placement and configuration:

- TFT/GPHMI-1A, -1AN includes PC/104 bus for CPU mounting.
Industrial PC option.
- TFT/GPPAN-1A no PC/104, includes internal touch controller for use with external PC.
- TFT/GPMON-1A no PC/104, no touch controller, only monitor application.

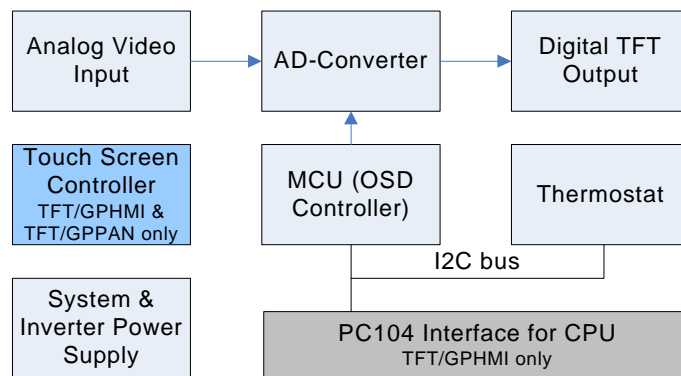


Fig. 1 block schematic of TFT/GPHMI

If not otherwise mentioned, this document refers to the TFT/GPHMI boards. The TFT/GPHMI offers the following main features:

Main Features

- analog input interface
- -20° to +70° ambient operating temperature
- frame locked analog to digital converter
- LVDS and TTL output interfaces matching most TFT panels
- Multiple output interface connectors
- On-Chip OSD (On Screen Display) Setup: 4 button user interface
- Resolutions from VGA up to WXGA/UXGA for panels from 6" up to 17" in size

- ESD protected
- Internal power supply unit
- Galvanic isolation (optional)
- PC104 interface connector with address decoder for local MCU.
- Internal temperature monitor shuts down the board/panel when temperature is out of specification bounds.
- Interface connectors for stacked mounting of IPC/NETIPC industrial PCs.
- VESA DDC (Data Display Channel) for Plug 'n Play capability
- EDID Revision 1.1

Touch Screen

- 8 wire/5 wire/4 wire industrial resistive touch screen controller
- resolution of 4096x4096 dots
- PS/2 output.
- Driver available for Microsoft Windows NT, WindowsCE, MS-DOS, Linux. Others upon request.

Power

- Industrial 24Vdc input range
- Powerfail detection input (polarity programmable)

Peripherals

- External sensorboard connector
- External heating connector with programmable thermostat function

2.2. Operating Modes

2.2.1. Display-only mode vs. internal CPU mode

To take full advantage of the small outline of the TFT/GPHMI, an IPC/NETIPC CPU board may be mounted, leveraging the display to a full featured Panel PC (e.g. TFT/HMI15-1A, -1AN). In this mode, video and touch screen signals are only provided to the internally mounted CPU.

But the TFT/GPHMI also can be operated (and ordered) in display-only mode without any internal CPU (TFT/GPPAN-1A, -1AN). In this configuration, video signals are routed through the analog input connector and processed by the dedicated TFT controller. The position information given by the touch screen is routed via the mouse connector with an absolute PS/2 protocol. All TFT panel and touch screen related functions (e.g. OSD) are fully functional in display-only mode.

2.2.2. Input Video Modes

The TFT/GPHMI currently supports the following analog video input modes:

Resolution	Frequency [Hz]	Standard
640 x 480	60	IBM VGA

	67	MAC II
	72	VESA
	75	VESA
	85	VESA
720 x 400	70	IBM VGA
800 x 600	56	VESA
	60	VESA
	72	VESA
	75	VESA
	85	VESA
832 x 624	75	MAC II
1024 x 768	43	IBM 8514A
	60	VESA
	70	VESA
	75	VESA
	85	VESA
1152 x 870	75	MAC II
1280 x 1024	60	VESA
	75	VESA
	85	VESA
1280 x 1280	68	VESA
1600 x 1200	60	VESA
	75	VESA

Supported video input synchronization:

- Separate
- Composite
- Sync on green

3 Hardware description

3.1. Power Supply

The external 24V input is protected by a diode from reverse polarity and by a fuse from short circuit damage. The input for the external 24Vdc power supply is provided on male connector P403. The signal layout is compatible with standard PC power supply cabling.

The TFT/GPPAN and TFT/GPMON boards do not have a powerfail input.

Power Supply Connector P403 (Weidmüller BL 3.5/4F)		
Pin Number	Signal	Remarks
1	GND	
2	+24V	
3	POWERFAIL INPUT (only TFT/GPHMI)	Positive or negative logic depending on S400
4	EARTH	optional

Tab. 1 Power Supply Connector P403 (4 pin)

3.2. Powerfail Detector Input (only TFT/GPHMI)

The Powerfail Input (P403 Pin 3) can be configured ACTIVE HIGH or ACTIVE LOW as shown in figure 2. In the case of “ACTIVE HIGH” configuration (S400 switch 2 on, switch 1 off), the powerfail input is pulled low by an internal resistor of the TFT/GPHMI board. In the “ACTIVE LOW” configuration (S400 switch 2 off, switch 1 on), the powerfail input is pulled high to +5V by an internal resistor of the TFT/GPHMI.

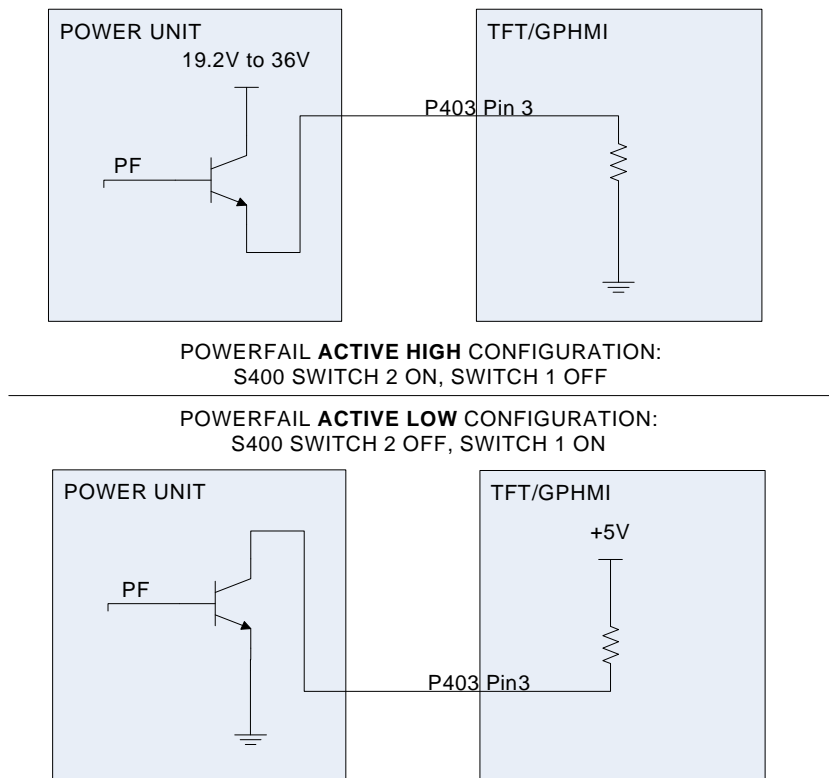


Fig. 2 Powerfail Input Options

Please note that the pullup/pulldown open drain transistors of the power unit must source/sink min. 10mA.

Power Fail Detector Configuration Switch S400			
Switch Nr.	Description		Remarks
1	ON: Powerfail Active Low	OFF: disable	
2	ON: Powerfail Active High	OFF: disable	

Tab. 2 Powerfail configuration switch

3.3. OSD control board connector

P105 hosts the required signals to directly interface six buttons to control the OSD (on screen display). The buttons (normally off) must be mounted in series between GND and each button terminal of P105. The two status LEDs can also be directly inserted if the provided internal resistors of 160 Ohms (@5V) meet the LEDs specifications.

OSD control board connector P105 (Molex 53261-0810)		
Pin Number	Signal	Remarks
1	GND	
2	DOWN	button terminal
3	UP	button terminal
4	SELECT	button terminal
5	FEATURE	button terminal
6	AUTOSETUP	button terminal
7	ON/OFF	button terminal
8	O-LED	status LED 1
9	G-LED	status LED 2
10	GND	

Tab. 3 OSD control board connector

3.4. Temperature control switch and internal heating

Most TFT panels have a limited temperature range and care must be taken not to exceed the specified operating values of the panel. The TFT/GPHMI has an internal thermostat that measures the ambient temperature and shuts down the panel and the inverter when the temperature is too low or too high.

The standard (factory preset) temperature hysteresis is the following:

Low temperature thermostat: < -15°C panel power off > -10°C panel power on

High temperature thermostat: > 65° panel power off < 60°panel power on

If you like to have other hysteresis settings, please contact the manufacturer of the board.

The thermostat shuts down the panel and inverter only. The devices stacked on the PC/104 bus (e.g. IPC/NETIPC-5A CPU) always keep powered on.

Some parts equipped on the TFT/GPHMI board are sensitive to very low ambient temperatures (e.g. devices containing FLASH memory). The TFT/GPHMI has a weak internal heating that heats these devices up to appropriate working temperature. S402 you can enable/disable the thermostat function and the internal heating. (S401 is for special applications only)

Thermostat configuration switch S401		
Switch Nr.	Description	Remarks
1	ON: global thermostat enabled OFF: disable	*
2	not connected	

Tab. 4 global thermostat configuration

* The global thermostat is only used in conjunction with an external heating. See 3.13.2 for details on using this feature

Thermostat configuration switch S402		
Switch Nr.	Description	Remarks
1	ON: local thermostat enabled OFF: disable	enables control of panel and inverter power
2	ON: local heating enabled	enables the internal heating to protect sensitive devices

Tab. 5 local thermostat configuration

3.5. VGA input connector (only TFT/GPPAN & TFT/GPMON)

The base board features a ADE3800 video controller that can process standard graphic analog input signals. Firmware running on a separate micro controller handles all video events and controls the OSD menu with the various setup options. Firmware updates may be downloaded through connector P101 with an appropriate programming tool.

The analog VGA input is available on P200 and has the following layout.

VGA input connector P200 (DSUB-15)		
Pin Number	Signal	Remarks
1	VGA-RED	
2	VGA-GREEN	
3	VGA-BLUE	
4/5	n.c.	
6/7/8	GND	
9/10/11	n.c.	
12	DDC-SDA	
13	HSYNC	
14	VSYNC	
15	DDC-SCL	0..5Vdc, Rout=500E

Tab. 6 VGA Input Connector

Note: only TFT/GPPAN and TFT/GPMON do have the VGA connector P200 equipped.

3.6. TFT Inverter Connector

The TFT/GPHMI base board interfaces to a majority of inverter boards for backlight control. It provides the necessary signals (power/brightness/enable) through P102.

TFT Inverter Connector P102 (Molex 53261-0890)		
Pin Number	Signal	Remarks
1	+12V	
2	+12V	
3	GND	
4	GND	
5	Inverter Enable (ON/OFF*)	0..5Vdc, Rout=500E
6	Brightness Control Voltage	0..5Vdc, Rout=500E
7	Switch terminal 1	See S100
8	Switch terminal 2	See S100

Tab. 7 Power Supply Connector P403 (8 pin)

TFT Inverter Switch		
switch number	description	Remarks
1	ON: P102 Pin 7 = GND OFF: P102 Pin7 = floating	
2	ON: P102 Pin 8 = GND OFF: P102 Pin8 = floating	

Tab. 8 Inverter Switch S100

3.7. Display bus configuration switch

With the switch S700 you can setup the LVDS/TTL bus. Configuration options are bus termination and vertical/horizontal display mode selector.

Display bus configuration switch S700	
Switch Number	Description
1-4	100 Ohms termination resistors
5	VMODE vertical mode logic (ON=+3.3V, OFF=GND, $R_s > 1k$ Ohms)
6	HMODE horizontal mode logic (ON=+3.3V, OFF=GND, $R_s > 1k$ Ohms)

Tab. 9 Power Supply Connector P403 (8 pin)

Note that when using the TTL connector, you must enable the 100 Ohm termination resistors on S700. When using LVDS interfaces, no termination resistors are required.

3.8. Display connectors

3.8.1. TTL 6 bit connector

TTL panel connector P702 (Hirose DF9)		
Pin	Signal	Remarks
1	GND	
2	DCLK	high frequency
3	HSYNC	
4	VSYNC	
5	GND	
6	R0	
7	R1	
8	R2	
9	R3	
10	R4	
11	R5	
12	GND	
13	G0	
14	G1	
15	G2	
16	G3	
17	G4	
18	G5	
19	GND	
20	B0	
21	B1	
22	B2	
23	B3	
24	B4	
25	B5	
26	GND	
27	ENAB	
28	+3.3V	
29	+3.3V	
30	HMODE	See S700
31	VMODE	See S700

Tab. 10 Video data pin assignment on P702

When using TTL interface connector, you must enable the 100 Ohms termination resistors on S700.

LVDS 1 channel 6bit connector

LVDS 1 channel 6bit connector P700 (JST FI-20)		
Pin	Signal	Remarks
1	+3.3V	
2	+3.3V	
3	GND	
4	GND	
5	LVDS0-	
6	LVDS0+	
7	GND	
8	LVDS1-	
9	LVDS1+	
10	GND	
11	LVDS2-	
12	LVDS2+	
13	GND	
14	LVDSCLK0-	
15	LVDSCLK0+	
16	GND	
17	VMODE	See S700
18	HMODE	See S700
19	GND	
20	GND	

Tab. 11 Video data pin assignment on P700

3.8.2. LVDS 1 channel 8bit connector

LVDS 1 channel 8bit connector P703 (Hirose DF-14)		
Pin	Signal	Remarks
1	+3.3V	
2	+3.3V	
3	GND	
4	GND	
5	LVDS0-	
6	LVDS0+	
7	GND	
8	LVDS1-	
9	LVDS1+	
10	GND	
11	LVDS2-	
12	LVDS2+	
13	GND	
14	LVDSCLK0-	
15	LVDSCLK0+	
16	GND	
17	LVDS3-	
18	LVDS3+	
19	GND	
20	HMODE	See S700

Tab. 12 Video data pin assignment on P703

3.8.3. LVDS 2 channel 8bit connector

LVDS 2 channel 8bit connector P701 (Hirose DF-19)		
Pin	Signal	Remarks
1	+3.3V	
2	+3.3V	
3	+3.3V	
4	n.c.	
5	HMODE	See S700
6	n.c.	
7	GND	
8	LVDS7+	
9	LVDS7-	
10	LVDSCLK1+	
11	LVDSCLK1-	
12	LVDS6+	
13	LVDS6-	
14	GND	
15	LVDS5+	
16	LVDS5-	
17	GND	
18	LVDS4+	
19	LVDS4-	
20	LVDS3+	
21	LVDS3-	
22	LVDSCLK0+	
23	LVDSCLK0-	
24	GND	
25	LVDS2+	
26	LVDS2-	
27	LVDS1+	
28	LVDS1-	
29	LVDS0+	
30	LVDS0-	

Tab. 13 Video data pin assignment on P701

3.9. PC/104 Bus Interface (only TFT/GPHMI)

The PC/104 bus interface of the TFT/GPHMI allows expansion with a wide range of I/O and communications boards. The bus interface is described in the IEEE 996 and 996.1 standards documentation. The bus connector pinout is shown in Tab. 14 (only signals used by TFT/GPHMI are shown in Tab.18).

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
				A1	IOCHCK#	B1	GND
				A2	SD7	B2	RESETDRV
1	GND			A3	SD6	B3	+5V
2	no connection			A4	SD5		
3	no connection			A5	SD4		
4	Vbatt			A6	SD3		
				A7	SD2		
				A8	SD1		
D0	GND	C0	GND	A9	SD0		
				A10	IOCHRDY		
				A11	AEN		
						B13	IOW#
						B14	IOR#
				A16	SA15		
				A17	SA14		
				A18	SA13		
				A19	SA12		
				A20	SA11		
				A21	SA10		
				A22	SA9		
				A23	SA8		
				A24	SA7		
D16	+5V			A25	SA6		
				A26	SA5		
D18	GND			A27	SA4		
D19	GND			A28	SA3		
				A29	SA2	B29	+5V
				A30	SA1	B30	OSC
				A31	SA0	B31	GND
				A32	GND	B32	GND

Tab. 14 PC/104 Bus Connectors P300..P304

Important Note

Do not connect bus drivers/receivers with integrated bushold circuit to the PC/104 signals. This may disturb proper operation of the TFT/GPHMI board or add-on boards.

3.10. Touch Screen (only TFT/GPHMI & TFT/GPPAN)

3.10.1. Driver

A 8-wire/5-wire/4-wire resistive touch screen interface is provided on connector P600_A to P600_D. The touch screen is controlled by a dedicated controller on the TFTMMI board, which computes the PS/2 datagram upon the touches sensed on the 8-wire/5wire/4-wire interface. The touch screen can be adjusted and calibrated by the software driver, which is Operating System dependent.

An absolute position mode is supported by the driver. Drivers currently are available for the following operating systems:

- DOS
- Windows™ 3.1x, 95, 98, NT, 2000
- WindRiver
- Linux
- QNX

For detailed information upon the driver and the calibration process to be performed by the application, please refer to the Hampshire documentation for TSHARC-12.

3.10.2. Configuration

You can set the mode of the touch screen controller by configuration of S600. You can select between 8-wire/5-wire and 4-wire interface.

Touch Screen Configuration Switch S600	
Option	Switch configuration
8 wire interface	Switch 1: ON switch 2: ON
4 wire interface	Switch 1: ON switch 2: OFF
5 wire interface	Switch 1: OFF switch 2: OFF
Not valid	Switch 1: OFF switch 2: ON

Tab. 15 Touch panel controller configuration for 4- / 8- / 5- wire operation on S600

3.10.3. Connector

The connector is a standard 3x8 pin header (2.54mm pin spacing) on the circuit board. It has the following layout to support most of the resistive touch screen sensors from 3M:

Touch Screen Sensor Connectors P600A..P600D		
Top Row – P600_A		
Pin Number	Signal	Remarks
1	Y+ Bottom Excite	8 – wire
2	SY+ Bottom Sense	Layout 1
3	SY- Top Sense	
4	Y- Top Excite	
5	X+ Right Excite	
6	SX+ Right Sense	
7	SX- Left Sense	
8	X- Left Excite	
Middle Row – P600_B		
Pin Number	Signal	
1	X- Left Excite	8 - wire
2	SX- Left Sense	Layout 2
3	SX+ Right Sense	
4	X+ Right Excite	
5	Y+ Bottom Excite	
6	SY+ Bottom Sense	
7	SY- Top Sense	
8	Y- Top Excite	
Bottom Row – P600_C		
Pin Number	Signal	
1	Y+ Bottom Excite	4 – wire
2	Y- Top Excite	
3	X- Left Excite	
4	X+ Right Excite	
Bottom Row – P600_D		
Pin Number	Signal	
1	Y+ Bottom Excite	5 – wire
2	X- Left Excite	
3	SELB	
4	Y- Top Excite	
5	X+ Right Excite	

Tab. 16 8-Wire/5-wire/4-wire Touch Panel connector P600

3.11. USB Connector (only TFT/GPHMI)

The USB bus of the mounted CPU board is accessible through connector P202. This connector is not mounted for TFT/GPPAN or TFT/GPMON.

USB Connector P202 (USB Type B)		
Pin Number	Signal	Remarks
1	+5V	
2	DATA-	
3	DATA+	
4	GND	

Tab. 17 PS/2 configuration switch

3.12. PS/2 Mouse interface (only TFT/GPHMI & TFT/GPMON)

The TFT/GPHMI and TFT/GPPAN have a PS/2 connector P203 with the following layout. Note that the TFT/GPMON does not have the P203 connector equipped.

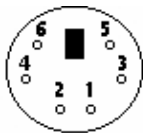


Fig. 3 6-pin female Mini-DIN (PS/2) socket (front view)

PS/2 Connector P203 (Mini-DIN)		
Pin Number	Signal	Remarks
1	PS/2 Data	
2	n.c.	
3	GND	
4	VCC	+5Vdc
5	P2/2 Clock	
6	n.c.	

Tab. 18 PS/2 configuration switch

3.12.1. PS/2 interface on TFT/GPHMI

The TFT/GPHMI can input an external PS/2 mouse on P203 for the mounted IPC/NETIC CPU board. Alternatively, the TFT/GPHMI can also route it's internal touch controller signals to the NETIPC CPU. The configuration is done with switch S200:

PS/2 Configuration Switch S200 for TFT/GPHMI			
switch number	description		Remarks
1	ON: disabled	OFF: ext. mouse (PS/2) to CPU	
2	ON: disabled	OFF: internal touch (PS/2) to CPU	

Tab. 19 PS/2 configuration switch

3.12.2. PS/2 interface on TFT/GPPAN

The TFT/GPPAN has an internal touch screen controller that can be connected to an external PC. The switch S200 must be configured according to the following table.

PS/2 Configuration Switch S200 for TFT/GPPAN			
switch number	description		Remarks
1	not used		
2	ON: disabled	OFF: internal touch (PS/2) to external CPU through P203	

Tab. 20 PS/2 configuration switch

3.13. Special Connectors / Future Enhancements

3.13.1. Sensorboard connector

The TFT/GPHMI can interface to an external sensorboard. P504 hosts the required I2C signals to enable such a link.

Sensorboard Connector P504 (Molex 53261-0690)		
Pin	Signal	Remarks
1	+5V	
2	SDA	I2C data
3	SCL	I2C clock
4	INT	I2C interrupt
5	INFRARED	
6	GND	

This connector will be used by Syslogic for future expansion. Please contact the manufacturer for details of using this feature.

3.13.2. External heating connector

With connector P502, one can attach an external heating for the TFT panel. The TFT/GPHMI has an internal programmable thermostat regulator to control such an external heating. Please contact the manufacturer for details of using this feature.

3.13.3. Battery & battery connector

The supporting battery for non volatile storage and Real Time Clock buffering is easily accessible for replacement from the outside.

Ext. battery connector P106 (header 2.54mm 1x2)		
Pin	Signal	Remarks
1	+3.0V	positive terminal
2	0V	negative terminal

Tab. 21 external battery connector layout

3.14. List of Connectors and Switches

For a detailed description of each header and its pins please refer to the corresponding functional description in this manual.

CONNECTORS		
Designator	Housing	Function
P102	MOLEX 1x8	Inverterboard connector
P105	MOLEX 1x10	OSD control board connector
P106	HEADER 1x2	Ext. battery connector
P200	DSUB-15	VGA input connector
P202	USB Type B	USB connector
P203	MINI-DIN	PS/2 mouse connector
P300..P304	PC104 Type	PC104 bus connector (GPHMI only)
P403	WEIDMÜLLER 1x4	Power connector
P502	MOLEX 1x6	External TFT heating connector
P504	MOLEX 1x6	Sensorboard connector
P600	HEADER 3x8	Touch screen connector
P601	MOLEX 1x4	Spare PS/2 touch input connector
P602	MOLEX 1x4	Spare USB touch input connector
P700	FI-20 20pin	LVDS 1 channel 6bit connector
P701	DF-19 30pin	LVDS 2 channel 8bit connector
P702	DF9 31pin	TTL 6bit panel connector
P703	DF-14 20pin	LVDS 1 channel 8bit connector
SWITCHES		
Designator	Housing	Function
S100	SWITCH-2	inverter configuration
S200	SWITCH-2	PS/2 configuration
S400	SWITCH-2	powerfail polarity switch
S401	SWITCH-2	global thermostat configuration
S402	SWITCH-2	local thermostat & heating configuration
S600	SWITCH-2	touch screen configuration
S700	SWITCH-6	display bus configuration switch

Tab. 22 List of connectors and headers

3.14.1. Factory Presets of Switches

The following table shows the factory defaults for the switches of HTF/GPHMI.

Factory Preset Switch Configuration Matrix				
Part	Switch	ON	OFF	Remarks
S100	1	GND on P102-Pin7	P102-Pin7 floating	Inverter max. current
	2	GND on P102-Pin8	P102-Pin8 floating	
S200	1	Ext. PS/2 disabled	Ext. PS/2 enabled	Mouse
	2	Int. PS/2 disabled	Int. PS/2 enabled	Touch
S400	1	Powerfail Active Low	PF Active Low disabled	1 & 2 ON is not valid!
	2	Powerfail Active High	PF Active High disabled	
S401	1	global thermostat enabled	global thermostat disabled	
	2	-	-	not used
S402	1	local thermostat enabled	local thermostat disabled	
	2	local heating enabled	local heating disabled	
S600	1	8/4 wire	5 wire	touch sensor type
	2	8 wire	5/4 wire	
S700	1	LVDS0 termination on	LVDS0 termination off	100 Ohms
	2	LVDS1 termination on	LVDS0 termination off	100 Ohms
	3	LVDS2 termination on	LVDS0 termination off	100 Ohms
	4	LVDS_CK termination on	LVDS_CK termination off	100 Ohms
	5	VMODE high	VMODE low	
	6	HMODE high	HMODE low	
Note: shaded fields are factory preset configuration				

Tab. 23 switch configuration option matrix

4 Programming Information

The TFT/GPHMI can be accessed over the PC/104 bus from a mounted CPU board. The CPU can e.g. read out the firmware version of the TFT/GPHMI board.

The CPU can also access the internal I2C bus of the TFT/GPHMI board for communication with the TFT-Controller. This could enable the application on the CPU board to access the OSD parameters (e.g. to change brightness of the TFT). For details please contact the manufacturer.

Upon receiving a Powerfail input signal, the TFT/GPHMI can route this signal over the PC/104 bus (IOCHCK* line) to a CPU board. This can lead to an NMI (non maskable interrupt) within the CPU core. If you want to enable this NMI routing, clear the ERREN* bit in the Control Register (see below).

4.1.1 I/O Resources (only TFT/GPHMI)

This paragraph describes the TFT/GPHMI system registers and support functions that can be accessed through the PC104 bus.

Address	Device / Register	Remarks
82E0H	Status Register	
82E1H	Control Register	
82E2H	Function ID Register	
82E3H	reserved	do not write
82E4H	Option ID Register	
82E5H	Setup Register	
82E6H	Revision ID Register	
82E7..82EAH	reserved	do not write
82EBH	I2C Register	I2C bus
82EC..82EFH	reserved	

Tab. 24 TFT/GPHMI System Registers

4.1.2. Status Register

Reading I/O Register 82E0H:

D7	D6	D5	D4	D3	D2	D1	D0
1	1	1	1	ERRFLAG*	1	ERRINT*	1

Description:

- ERRINT*: Error Interrupt Status (masked by ERREN* bit)
 - 0 = Error Interrupt output active on PC/104 bus
 - 1 = no Error Interrupt output not active on this module
- ERRFLAG*: Error Status Flag for polled applications (not masked)
 - 0 = Powerfail input pending on the input of this module
 - 1 = no Powerfail input pending on the input of this module

Writing I/O Register 82E0H:

D7	D6	D5	D4	D3	D2	D1	D0
reserved	reserved	reserved	reserved	reserved	reserved	reserved	reserved

Description:

- reserved: reserved, always write 0

4.1.3. Control Register

Reading I/O Register 82E1H:

D7	D6	D5	D4	D3	D2	D1	D0
1	1	1	1	1	1	ERREN*	1

Description:

- ERREN*: Error Interrupt Enable (IOCHCK* routed to NMI)
 - 0 = Error interrupt on NMI enabled (always enabled)

Writing I/O Register 82E1H:

D7	D6	D5	D4	D3	D2	D1	D0
reserved	reserved	reserved	reserved	reserved	reserved	ERREN*	reserved

Description:

- ERREN*: Error Interrupt Enable (IOCHCK* routing to NMI)
 - 0 = enable Error interrupt on NMI (always enabled)

4.1.4. Function ID Register

Reading I/O Register 82E2H:

D7	D6	D5	D4	D3	D2	D1	D0
FID7	FID6	FID5	FID4	FID3	FID2	FID1	FID0

Description:

- FID7..0: Function ID
 - 0101'0001 (61H) = general TFT/GPHMI board,
 - subtype defined by Option ID Register

Writing I/O Register 82E2H:

D7	D6	D5	D4	D3	D2	D1	D0
reserved	reserved	reserved	reserved	reserved	reserved	reserved	reserved

Description:

- reserved: reserved, always write 0

4.1.5. Option ID Register

Reading I/O Register 82E4H:

D7	D6	D5	D4	D3	D2	D1	D0
OPT7	OPT6	OPT5	OPT4	OPT3	OPT2	OPT1	OPT0

Description:

- OPT7..0: Option ID
 23H = TFT/GPHMI-1A version

Writing I/O Register 82E4H:

D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	X	X	X	X	X

Description:

- xxxxxxxx: Writing data A5H invokes a complete hardware reset (also clearing the Watchdog timeout status bit)

4.1.6. Revision ID Register

Reading I/O Register 82E6H:

D7	D6	D5	D4	D3	D2	D1	D0
RID7	RID6	RID5	RID4	RID3	RID2	RID1	RID0

Description:

- RID7..0: Revision ID
 xxH = Logic Design revision

Writing I/O Register 82E6H:

D7	D6	D5	D4	D3	D2	D1	D0
reserved	reserved	reserved	reserved	reserved	reserved	reserved	reserved

Description:

- reserved: reserved, always write 0

4.1.7. I2C Register (for temperatur sensor control)

Reading I/O Register 82EBH:

D7	D6	D5	D4	D3	D2	D1	D0
SCLO	SDAO	SCL	SDA	1	1	1	1

Description:

- SDA: Data Port Pin State
 0 = Pin State = Low
 1 = Pin State = High
- SCL: Clock Port Pin State
 0 = Pin State = Low
 1 = Pin State = High

- SDAO: Data Port Output Latch State
 - 0 = Output Latch State = Low
 - 1 = Output Latch State = High (Open Collector)
- SCLO: Clock Port Output State
 - 0 = Output Latch State = Low
 - 1 = Output Latch State = High (Open Collector)

Writing I/O Register 82EBH:

D7	D6	D5	D4	D3	D2	D1	D0
SCLO	SDAO	X	X	X	X	X	X

Description:

- SDAO: Data Port Output Latch
 - 0 = Output Latch State = Low
 - 1 = Output Latch State = High (Open Collector)
- SCLO: Clock Port Output
 - 0 = Output Latch State = Low
 - 1 = Output Latch State = High (Open Collector)

5 Technical Data

5.1. General Electrical Data

Important Note

Do not operate the HTF/GPHMI outside of the recommended operating conditions. Otherwise lifetime and performance will degrade. Operating the board outside of the absolute maximum ratings may damage the hardware.

Absolute Maximum Ratings (over free-air temperature range)

Parameter	Symbol	min	nom	max	Unit
external supply voltage	Vcc	-0.5		36	Vdc
isolation external power supply to logic (AC, 60s, 500m a.s.l., Ta=25°C)		2000			Vrms
isolation external power supply to chassis (AC, 60s, 500m a.s.l., Ta=25°C)		1000			Vrms
isolation logic to chassis (AC, 60s, 500m a.s.l., Ta=25°C)		1000			Vrms
creepage distance external power supply to logic		2.5			mm
creepage distance external power supply to chassis		1.0			mm
creepage distance logic to chassis and PCB border		1.0			mm
storage temperature range	Tst	-40		125	°C
relative humidity ¹		10		90 ²	%

Tab. 25 General Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	min	nom	max	Unit
external logic supply voltage	Vdd	19.2	24	36	Vdc
operating free-air temperature range ³	Ta	-20		70	°C

¹ There shall be no dew condensation

² For ambient temperature > 40°C the humidity shall not exceed 80%

³ for ambient temperatures below 0°C, the internal chip heating is powered on

Tab. 26 General Recommended Operating Conditions

General Electrical Characteristics
 (over recommended operating range, unless otherwise noted)

Parameter	Symbol	min	typ	max	Unit
total available power on PC/104 bus (5V) (shared between panel and external submodules)	Pm_bus			11	W
total available current on PC/104 bus (5V) (shared between panel and external submodules)	Im_bus			2200	mA
available power on inverter connector (12V)	Pm_inv			24	W
available current on inverter connector (12V)	Im_inv			2000	mA
power dissipation	P		35	45	W

Tab. 27 General Electrical Characteristics

5.2. Fuse Replacement

If the TFT/GPHMI does not start up, please check the fuse F400 on the electronic base board.

Replacement information of fuse F400:

LittleFuse, Ordercode: 452 02.5, 63V/2.5 A slow

6 Mechanical Data

6.1. Screw Mounting Holes

- 4 outer mounting holes M2.5
- 3 inner mounting holes M3 (PC104)

6.2. Dimensions

Parameter	Symbol	Value
Board dimension (WxHxD)		140mm x 100mm x 1.6mm

Tab. 28 Mechanical outlines

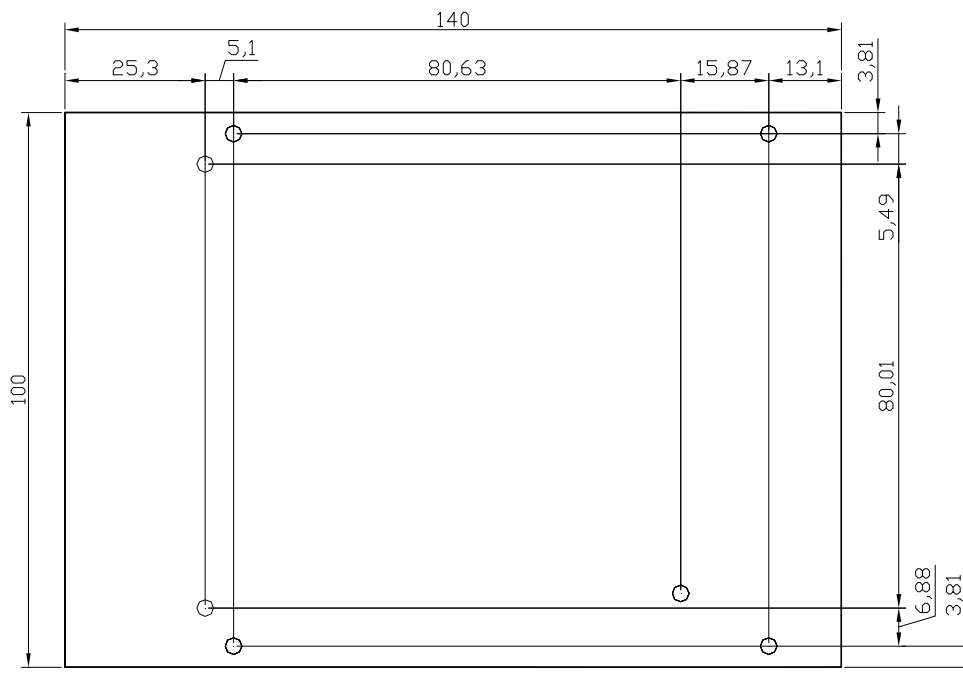
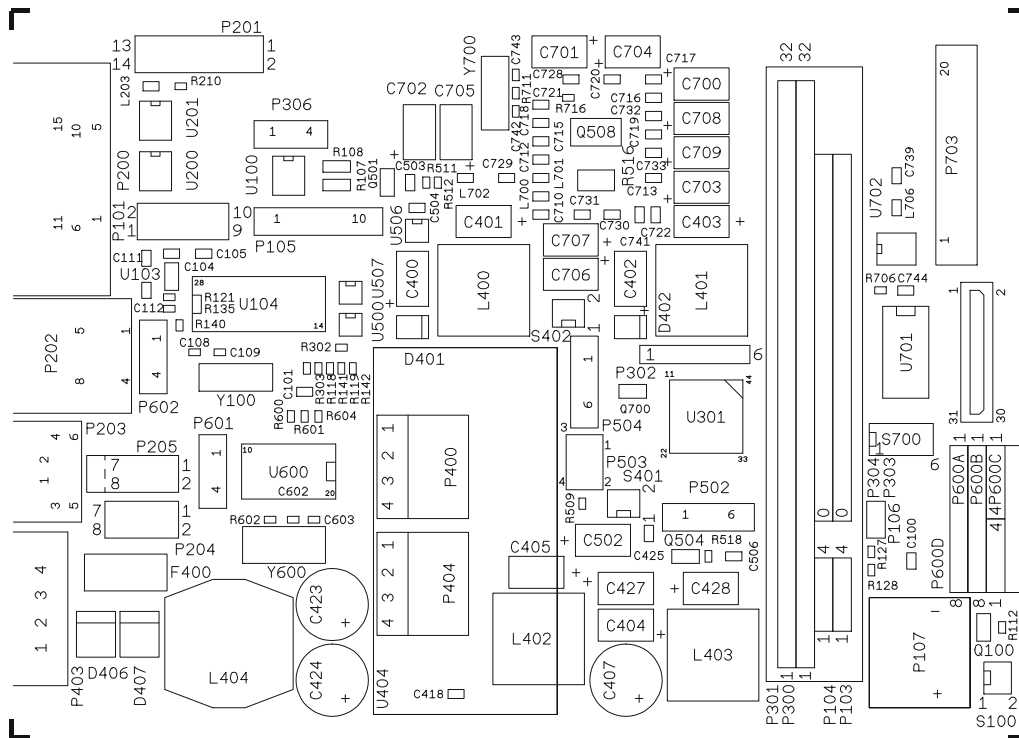


Fig. 4 mounting holes – top side view

6.3. Component Placement Top



SP1543A

17-VI-2005

SPEEDESIGN GmbH CH-6064 KERNS

Bauteilplan Comp

TFT/GPHMI-1A

G2630-2

Fig. 5 component placement top

6.4. Component Placement Bottom

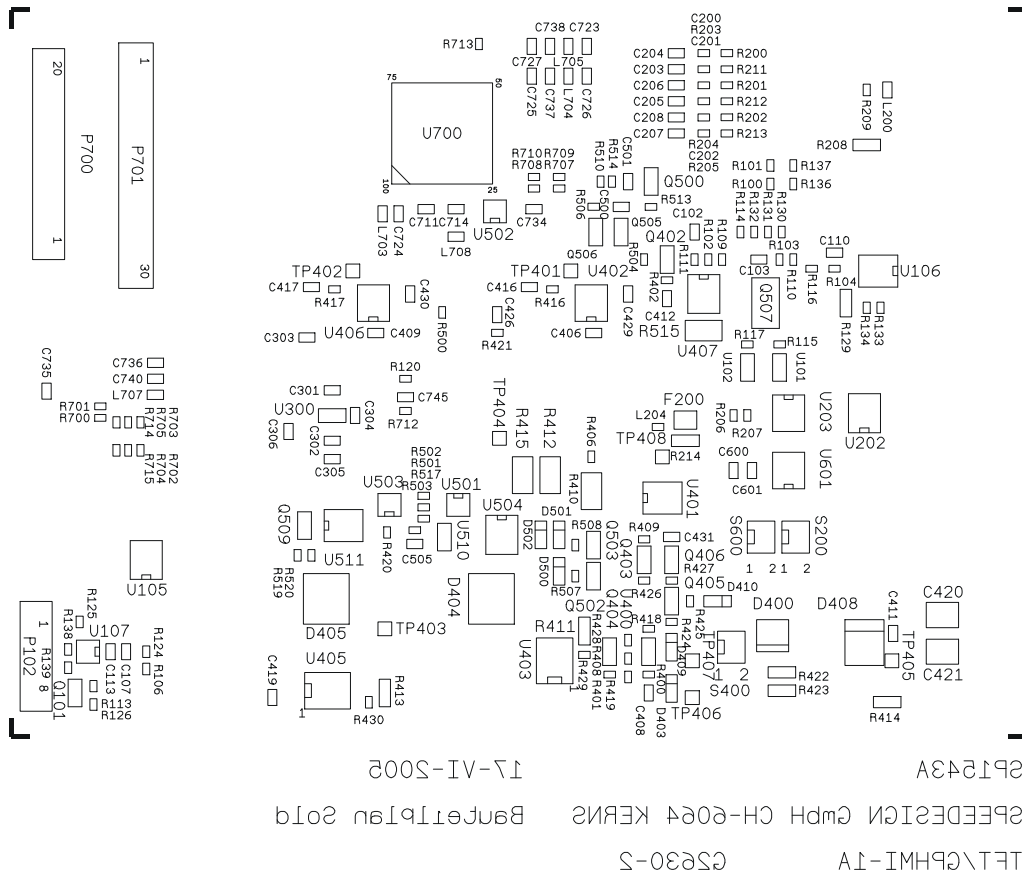


Fig. 6 component placement bottom

7 Product Revision History

7.1. Hardware

This paragraph lists the different hardware revisions of the TFTHMI delivered beginning with the first production lot. All information listed in this document relies on definitive state hardware. Therefore this information may be incompatible with the prototyping board hardware.

Important Note

This document always covers the newest product revision listed in Tab. 29
Hardware Revision State

Please contact the manufacturer technical support for upgrade options.

7.2. Logic Design (see I/O registers)

Board Identification (see product label)	Product Revision	Revision ID Register	Remarks
TFT/GPHMI-1A, 1AN	#1	00h	Release
TFT/GPPAN-1A	#1	-	Release
TFT/GPMON-1A	#1	-	Release

Tab. 29 Hardware Revision State

7.3. Firmware (see OSD Menu – Advanced – Information)

Board Identification (see product label)	Firmware Revision		Remarks
TFT/GPHMI-1A, 1AN	#1	A130B18P35O01	Release
TFT/GPPAN-1A	#1	A130B18P35O01	Release
TFT/GPMON-1A	#1	A130B18P35O01	Release

Tab. 30 Firmware Revision State

8 Manufacturer Information

8.1. Contact

Our distributors and system integrators will gladly give you any information about our products and their use. If you want to contact the manufacturer directly, please send a fax or email message containing a short description of your application and your request to the following address or use one of the information or technical support request forms on our internet homepage:

Syslogic Datentechnik AG
Bruggerstrasse 69
CH-5400 Baden / Switzerland

Email: info@syslogic.ch
www: <http://www.syslogic.ch>
Fax: +41 56 2009050
Tel: +41 56 2009040

Technical support:
support@syslogic.ch

8.2. Warranty

Our products are covered by a world-wide manufacturers warranty. The warranty period starts at the delivery time from our official distributor to the customer. The duration of the warranty period is specified in the respective product catalogs and the offers. All products carry a date code and a job number for identification. The manufacturing data and deliveries are registered in a high level Quality Management System.

The warranty covers material and manufacturing defects. All products must be returned via the official distributor to the factory for repair or replacement. The warranty expires immediately if the products are damaged of operation outside of the specified recommended operating conditions. The warranty also expires if the date code or job number listed on the product is altered or rendered unintelligible. The warranty does not include damage due to errors in firmware or software delivered with the products.