u s e r   d o c u m e n t a t i o n

IPC/COMPACGP-1AE, -3AE
IPC/COMPACGP-1F, -1FE
IPC/COMPACGP-2EE, -2ESE
IPC/COMPACGP-3F, -3FE
IPC/COMPACGP-3EE

Document Ordercode: DOC/COMPACGP-1FE

Revision	Date	Author	Modification
1.0	29.03.2004	R. Newbould	Original
2.0	09.09.2004	R. Newbould	New products added
2.1	07.10.2004	R. Newbould	Minor corrections
2.2	30.06.2005	R. Newbould	New board revisions added, RoHS compl.
2.3	21.10.2005	R. Newbould	IPC/COMPACGP-1AE, -3AE added
2.4	05.08.2009	R. Newbould	Minor corrections

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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 suggestions for improvements.

The following registered trademarks are used:

IBM-PC, PC/AT, PS/2	trademarks of IBM Corporation
CompactFlash	trademark of SanDisk Corporation
STPC	trademark of ST Microelectronics
CAN	trademark of Robert Bosch GmbH

1.2. Contents of this Documentation

This document addresses to system integrators, programmers and instructed installation and maintenance personal working with the following base boards:

Order Code	Description
IPC/COMPACGP-1AE	USB, COM1, COM2, ext. temp. range, isol. Power supply, SuperCaps
IPC/COMPACGP-1F	CAN, USB, COM2
IPC/COMPACGP-1FE	CAN, USB, COM2, extended temperature range
IPC/COMPACGP-2EE	USB, COM1, COM2, extended temperature range, standard PC/104 connector
IPC/COMPACGP-2ESE	USB, COM1, COM2, extended temperature range, DIN41612 connector
IPC/COMPACGP-3AE	PS/2, COM1, COM2, ext. temp. range, isol. power supply, SuperCaps
IPC/COMPACGP-3EE	PS/2, COM1, COM2, extended temperature range
IPC/COMPACGP-3F	CAN, PS/2, COM2
IPC/COMPACGP-3FE	CAN, PS/2, COM2, extended temperature range

Tab. 1   Boards included in this documentation

It provides all information needed to configure, setup and program the base board. The detailed installation guidelines and further information can be found in the documentation DOC/COMPACT5-1FE.

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1.3.   Additional Documents

The following documents are *required* for correct installation and operation of the IPC/COMPACT5-1F(E), IPC/COMPACT5-2E(E), IPC/COMPACT3-1F(E), IPC/COMPACT3-3EE , IPC/COMPACT2-F and IPC/COMPACT2-1E systems:

Order Code	Description	Manufacturer
DOC/IPC_IOCOMSW-E	User documentation for porgramming examples and utilities	Syslogic AG
DOC/COMPACT5-1FE	User documentation of the system	Syslogic AG
DOC/IPC_NETIPC-E	User documentation of the IPC/NETIPC	Syslogic AG
DOC/NETIPCFW-E	User documentation of the firmware	Syslogic AG
SJA1000_3.pdf	Datasheet: SJA1000 CAN controller	Philips Semiconductor
AN97076.pdf	Application Note: SJA 1000 Stand-alone CAN controller	Philips Semiconductor

Tab. 2   Related Documents

1.4.   Safety Recommendations and Warnings

The products are intended for measurement, control and communications applications in industrial environments. 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 8). 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.

The products contain electronic components which will be damaged by electrostatic discharges. The recommendations for handling of sensitive electronic equipment must therefore be strictly followed in all phases of the mounting and installation of the products.

The products are "CE"-certified. The "CE"-conformity, i.e. the compliance to the required standards is only guaranteed if the corresponding mounting, installation, and cabling guidelines are strictly observed (see DOC/COMPACT5-1FE).

The products are operated with electrical power. Before manipulating the products, they must be disconnected from the power source and from the communication signals.

The products require set-up procedures before they can be operated. Before being used in an actual installation, they must be correctly configured. If the products are not or wrongly configured, they may malfunction in the intended application.

The products must be assembled and installed by specially trained people. The strict observation of the assembly and installation guidelines is mandatory.

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 guidelines in this document before unpacking the products. Make sure that you have all the necessary items ready (including all the small parts).

The installation procedures 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.

1.5.3.   Operation

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

The main functionality of the base board defined by the application programs running on the system. The application programs are not part of the delivery by Syslogic but are defined, developed and tested by the customer or a system-integrator for each specific application. Refer to the respective documentation for more information.

1.5.4.   Maintenance and Repair

The base board features error- and malfunction-detection circuitry. Diagnostic information gathered is transferred to the applications software where it can be used. In the rare 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 whenever possible the original packing for return of the product (ESD and mechanical protection).

1.5.5.   Disposal

At the end of the lifespan the base board must be properly disposed. It contains a multitude of elements and must be disposed like computer parts. The system contains a battery which should be properly disposed.

2 Product Description

2.1. General Information

IPC/COMPACGP-1AE with USB
The IPC/COMPACGP-1AE can be used with the following CPU:
IPC/NETIPC-5A(N)(E)

IPC/COMPACGP-1F(E) with USB
The IPC/COMPACGP-1F(E) can be used with the following CPU:
− IPC/NETIPC-5A(N)(E)

IPC/COMPACGP-2E(S)E with USB
The IPC/COMPACGP-2E(S)E can be used with the following CPU:
− IPC/NETIPC-5A(N)(E)

IPC/COMPACGP-3AE with PS/2
The IPC/COMPACGP-3AE can be used with the following CPUs:
− IPC/NETIPC-2A(N)
IPC/NETIPC-3A(N)E

IPC/COMPACGP-3EE with PS/2
The IPC/COMPACGP-3E(E) can be used with the following CPUs:
− IPC/NETIPC-2A(N)
− IPC/NETIPC-3A(N)E

IPC/COMPACGP-3F(E) with PS/2
The IPC/COMPACGP-3F(E) can be used with the following CPUs:
− IPC/NETIPC-2A(N)
− IPC/NETIPC-3A(N)E

2.2. Features
The base board comes in many different options.The IPC/COMPACTx-xF(E) and IPC/COMPACTx-xE(S)E systems provides all necessary support functions to build a standalone network and fieldbus capable industrial control system. Standard desktop PC functions are implemented according to the PC/AT reference platform.

There are several versions of the base board with differenz features which are listed below.

2.2.1.   IPC/COMPACGP-1AE

Power Supply
- isolated DC/DC converter
- input range: 19Vdc to 30Vdc, according to IEC1131-2
- protected against reverse connection of external power source
- protected against overload with replaceable fuse

PC/104 Bus Interface
- subset of standard PC/104 bus interface
- IPC/COMPACGP-2ESE: DIN41612 bus connector

Non Isolated Serial Ports
- 2 standard 16C550 compatible UART channels, implemented on the CPU board
- 16 byte receive and transmit FIFOs
- standard PC/AT address range
- standard 1.8432 base clock for baudrates up to 115.2kbaud standard non isolated protected RS232 signals on DSUB9 connector

USB
- two USB V1.1 ports (OHCI-Hostcontroller) on IPC/NETIPC-5A

Backup
- 2 SuperCaps (1F/5.5V) are soldered on the board instead of the battery

2.2.2.   IPC/COMPACGP-1F(E)

Power Supply
- non isolated switching regulator
- input range: 9Vdc to 30Vdc
- protected against reverse connection of external power source
- protected against overload with replaceable fuse
- optional: isolated converter from 24Vdc input to 5V logic supply (standard IEC1131-2 24Vdc input voltage range, has a different order code)

PC/104 Bus Interface
- subset of standard PC/104 bus interface
- DIN41612 bus connector

Non Isolated Serial Ports
- 1 standard 16C550 compatible UART channel (COM2), implemented on the CPU board
- COM1 is available on a 2x5pin header
- 16 byte receive and transmit FIFOs
- standard PC/AT COM3 and COM4 address range
- configurable for IRQ3, IRQ4, IRQ9, IRQ10, IRQ11 or IRQ15
- standard 1.8432 base clock for baudrates up to 115.2kbaud standard non isolated protected RS232 signals on DSUB9 connector

USB
- two USB V1.1 ports (OHCI-Hostcontroller) on IPC/NETIPC-5A

CAN Interface
- SJA1000 stand-alone CAN controller from Philips Semiconductor
- BasicCAN or PeliCAN architecture
- supports CAN 2.0A protocol in BasicCAN mode
- supports CAN 2.0B passive protocol in BasicCAN mode (29 bit identifier accepted)
- fully supports CAN 2.0B protocol in PeliCAN mode
- 16MHz clock frequency
- configurable addressing mode (I/O or Memory)
- configurable memory base address
- configurable for IRQ5, IRQ6, IRQ7, IRQ9, IRQ11 or IRQ15
- ISO 11898-24V compatible interface
- optical isolation (1000VDC)
- configurable termination resistor

Backup
- 3 – 3.6V Lithium Battery (Renata CR2450N or CR2477N)

2.2.3.   IPC/COMPACGP-2E(S)E

Power Supply
- non isolated switching regulator
- input range: 9Vdc to 30Vdc
- protected against reverse connection of external power source
- protected against overload with replaceable fuse
- optional: isolated converter from 24Vdc input to 5V logic supply (standard IEC1131-2 24Vdc input voltage range, has a different order code)

PC/104 Bus Interface
- subset of standard PC/104 bus interface
- IPC/COMPACGP-2EE: "standard" PC/104 bus connector
- IPC/COMPACGP-2ESE: DIN41612 bus connector

Non Isolated Serial Ports
- 2 standard 16C550 compatible UART channels, implemented on the CPU board
- 16 byte receive and transmit FIFOs
- standard PC/AT address range
- standard 1.8432 base clock for baudrates up to 115.2kbaud standard non isolated protected RS232 signals on DSUB9 connector

USB
- two USB V1.1 ports (OHCI-Hostcontroller) on IPC/NETIPC-5A

Backup
- 3 – 3.6V Lithium Battery (Renata CR2450N or CR2477N)

2.2.4.   IPC/COMPACGP-3AE

Power Supply
- isolated DC/DC converter
- input range: 19Vdc to 30Vdc, according to IEC1131-2
- protected against reverse connection of external power source
- protected against overload with replaceable fuse

PC/104 Bus Interface
- subset of standard PC/104 bus interface
- IPC/COMPACGP-2ESE: DIN41612 bus connector

Non Isolated Serial Ports
- 2 standard 16C550 compatible UART channels, implemented on the CPU board
- 16 byte receive and transmit FIFOs
- standard PC/AT address range

standard 1.8432 base clock for baudrates up to 115.2kbaud standard non isolated protected RS232 signals on DSUB9 connector

Mouse
- standard PS/2 connector (controller implemented on the CPU board)

Backup
- 2 SuperCaps (1F/5.5V) are soldered on the board instead of the battery

2.2.5.   IPC/COMPACGP-3EE

Power Supply
- non isolated switching regulator
- input range: 9Vdc to 30Vdc
- protected against reverse connection of external power source
- protected against overload with replaceable fuse

− optional: isolated converter from 24Vdc input to 5V logic supply (standard IEC1131-2 24Vdc input voltage range, has a different order code)

PC/104 Bus Interface
− subset of standard PC/104 bus interface
− DIN41612 bus connector

Non Isolated Serial Ports
− 2 standard 16C550 compatible UART channel (COM2), implemented on the CPU board
− 16 byte receive and transmit FIFOs
− standard PC/AT address range
− standard 1.8432 base clock for baudrates up to 115.2kbaud standard non isolated protected RS232 signals on DSUB9 connector

Mouse
− standard PS/2 connector (controller implemented on the CPU board)

Backup
− 3 – 3.6V Lithium Battery (Renata CR2450N or CR2477N)

2.2.6. IPC/COMPACGP-3F(E)

Power Supply
− non isolated switching regulator
− input range: 9Vdc to 30Vdc
− protected against reverse connection of external power source
− protected against overload with replaceable fuse
− optional: isolated converter from 24Vdc input to 5V logic supply (standard IEC1131-2 24Vdc input voltage range, has a different order code)

PC/104 Bus Interface
− subset of standard PC/104 bus interface
− DIN41612 bus connector

Non Isolated Serial Ports
- 1 standard 16C550 compatible UART channel (COM2), implemented on the CPU board
- COM1 is available on a 2x5pin header
- 16 byte receive and transmit FIFOs
- standard PC/AT address range
- standard 1.8432 base clock for baudrates up to 115.2kbaud standard non isolated protected RS232 signals on DSUB9 connector

Mouse
- standard PS/2 connector (controller implemented on the CPU board)

CAN Interface
- SJA1000 stand-alone CAN controller from Philips Semiconductor
- BasicCAN or PeliCAN architecture
- supports CAN 2.0A protocol in BasicCAN mode
- supports CAN 2.0B passive protocol in BasicCAN mode (29 bit identifier accepted)
- fully supports CAN 2.0B protocol in PeliCAN mode
- 16MHz clock frequency
- configurable addressing mode (I/O or Memory)
- configurable memory base address
- configurable for IRQ5, IRQ6, IRQ7, IRQ9, IRQ11 or IRQ15
- ISO 11898-24V compatible interface
- optical isolation (1000VDC)
- configurable termination resistor

Backup
- 3 – 3.6V Lithium Battery (Renata CR2450N or CR2477N)

2.3.   Block Diagram
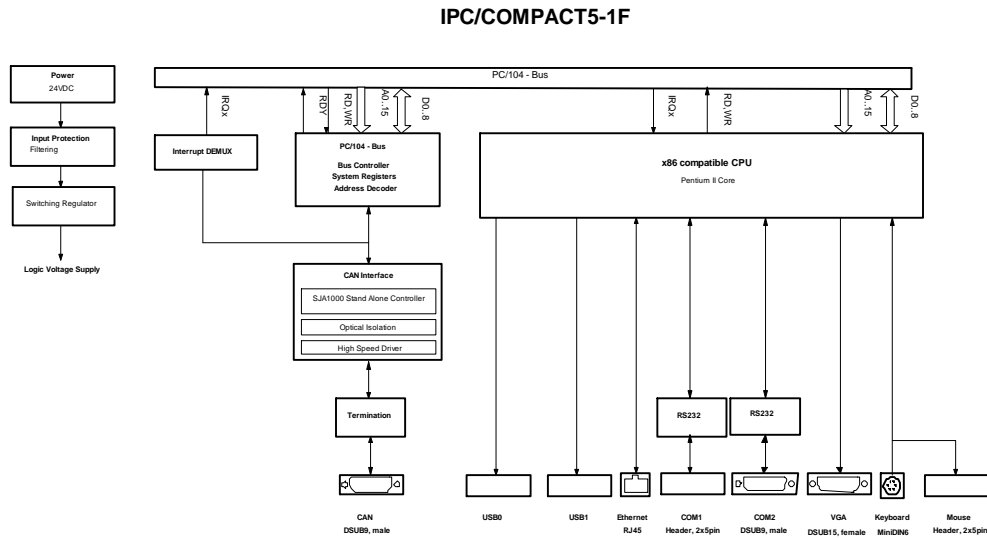
Fig. 1   Block Diagram (IPC/COMPACGP-1F)

2.4.   Operating Modes

The system regsiter are accessible through I/O registers. The CAN controller can be accessed either through memory or I/O mode.

2.5.   Other Products

See Tab. 1.

3 Hardware Description

3.1. Overview

Before operation the COMPACT base board must be configured with switches and jumpers.
The switch, jumper and connector locations are shown in the board layout drawing (Fig. 2).

SP1457A   25-III-2004

SPEEDESIGN GmbH CH-6064 KERNS   Bauteilplan Comp

IPC/COMPACGP-1F   G-2626-2

Fig. 2   Board Layout

3.2.   Memory and I/O Resources

3.2.1.   General Memory Layout and Configuration

The base board uses a maximum of 256 bytes in memory address space, located in the area below 1MB. Depending on how the base board is configured.

The general memory layout of the IPC system is described in the CPU's user documentation. For the detailed I/O layout and configuration of the peripheral devices integrated on the COMPACT base board refer to paragraph 3.2.2.

Board	Window size
IPC/COMPACGP-1F(E)	8 kByte, 256 Bytes used
IPC/COMPACGP-1AE	-
IPC/COMPACGP-2E(S)E	-
IPC/COMPACGP-3F(E)	8 kByte, 256 Bytes used
IPC/COMPACGP-3AE	-
IPC/COMPACGP-3EE	-

Tab. 3   Window sizes

The base address of the submodule can be configured between 0xC000:0 and 0xFFFF:F but only the range between 0xD000:0 and 0xDFFF:F is always free. The reserved memory space (BIOS and extensions) can be used depending on which CPU (BIOS size) you are using and wether or not a socket-memory is mounted. If so, the BIOS has to specially configured and is not recommended by the manufacturer. Please check the documentation of the appropriate CPU board for detailed information.

Address	Device / Register	Remarks
0xC000:0..0xCFFF:F	Reserved for BIOS extensions	
0xD000:0..0xDFFF:F	**Free memory space for submodules**	**Default: 0xD800:0**
0xE000:0..0xFFFF:FF	Reserved for BIOS	

Tab. 1   Memory Space Layout

Important Note

Placing the submodule inside the reserved memory spaces is not recommended.
Please check all base addresses for possible address conflicts.

For setting the base address of the module please refer to chapter 3.2.3.

3.2.2. General I/O Layout

Address	Device / Register	Remarks
0x02F8..0x02FF	COM2	CPU
0x03F8..0x03FF	COM1	CPU
0x7600..0x76FF	CAN interface	only if enabled
0x82E0..0x82FF	System Registers	IPC/COMPACGP-xF(E) only

Tab. 4   I/O Address Space Layout

Only peripherals which are implemented on the base board are listed in Tab. 4.

3.2.3. Memory Base Address Configuration

The memory base address is configured with SW301. To set up the switch SW301 proceed as followed:

SW301/ appropriate address line	8 I/O_MEM #	7 SA19	6 SA18	5 SA17	4 SA16	3 SA15	2 SA14	1 SA13	SA12 - SA0
Segment:Offset									
0xE800:0	off	off	off	off	on	off	on	on	X
0xE000:0	off	off	off	off	on	on	on	on	X
0xD800:0	off	off	of	on	off	off	on	on	X
0xD000:0	off	off	of	on	off	on	on	on	X
0xC800:0	off	off	off	on	on	off	on	on	X
0xC000:0	off	off	off	on	on	on	on	on	X

Tab. 5   Memory Base Address Configuration

Note: Switch off: log. 1
Switch on: log. 0

SW301 configures the segment address of the base address. Please make sure that the address range which you configure with SW301 is available on the bus. This can be done by checking (and changing) the BIOS configuration (refer to the documentation of the NETIPC Firmware).

Important Note

In standard PC-AT systems the address range 0xC000:0 .. 0xC7FF:F is reserved for the VGA BIOS. If the graphic controller on the CPU board is used then this address range can't be used.

3.2.4. I/O Base Address Configuration

The I/O base address cannot be configured. If the CAN controller is operated in I/O mode the base address is 0x7600 regardless how the switch is confiugred.

SW301/ appropriate address line	8 I/O_MEM#	7 SA19	6 SA18	5 SA17	4 SA16	3 SA15	2 SA14	1 SA13
Base address								
0x7600	on	X	X	X	X	X	X	Xn

Tab. 6   I/O Base Address Configuration

Note: Switch off: log. 1
                   Switch on: log. 0

Important Note

Some standard PC-AT peripherals are in the same I/O address range as the submodule. Please check your individual configuration for conflicts.

3.3.   Onboard Function Blocks

Please check which features are implemented on your base board.

3.3.1.   Power Supply

Logic power is converted from an external 24Vdc power supply to non isolated +5V. A 3.3V power supply is generated from the isolated 5V supply. The external 24V input is rectified to prevent any short circuit situation.

Power Supply Device Connection

The input for the external 24Vdc power supply is provided on male connector J101. The order code for the female part is: *Weidmüller BL 3.5/2F*.

The signal layout is compatible with standard PC power supply cabling.

Pin Number	Signal	Remarks
1	GND	
2	+24V	

Tab. 2   Power Supply Connector J101 (2 pin)

3.3.2. Backup Voltage

There are two different ways for providing the backup voltage for the system:

−   Using a single battery
−   Using two GoldCaps

The backup time is dependent on the load which is connected to the backup device. If a SRAM is mounted on the CPU board the backup is largely decreased.

IPC/COMPACGP-1F(E), -2E(S)E, -3F(E), -3EE

These baseboards use a battery for backup. The following two types can used:

−   Renata: CR2450N, 3V/540mAh
−   Renata: CR2477N, 3V/950mAh

IPC/COMPACGP-1AE, -3AE

The baseboards mentioned above use two GoldCaps (1F/5.5V)for backup. With the following simplified equation the backup time can be calculated.

$$t = C \cdot \frac{V_0 - V_1}{I}$$

t: backup time

C: capacitance of Gold capacitor (F)

V_0: applied voltage (V)

V_1: minimum cut off voltage (V)

I: current during backup (A)

In the following two example calculations the IPC/NETIPC-5A CPU board is mounted onto the base board.

Component	Worst case value	Typical value
Total GoldCap capacitance C [F]	1.6	2.0
V0 [V]	4.75	5.0
V1 [V] (output LDO)	2.8	2.8
Vloss [V], voltage loss	1.1	0.8
Standby current SRAM [µA]	30.0	5.0
Standby current NETIPC [µA]	27.5	2.5
Standby COMPACGP [µA]	5.5	3

Tab. 3   Values for example calculation

typical without SRAM:

$$t = 2F \cdot \frac{5V - 0.8V - 2.8V}{3\mu A + 2.5\mu A} \approx 509'091s \approx 141h \approx 5.8d$$

typical with SRAM:

$$t = 2F \cdot \frac{5V - 0.8V - 2.8V}{3\mu A + 5\mu A + 2.5\mu A} \approx 266'667s \approx 74h \approx 3d$$

3.3.3. USB Interface

The IPC/NETIPC-5A features an OHCI compatible USB Hostcontroller having assigned the base address and IRQ at boot time by the PCI-BIOS.

Device Connection

The USB interface uses two 4pin headers for the two USB channels.

J504 Pin Number	USB channel 0 Signal	J506 Pin Number	USB channel 1 Signal
1	VBUS	1	VBUS
2	D-	2	D-
3	D+	3	D+
4	GND	4	GND

Tab. 7   USB Interface Headers J504/J506

P503 Pin Number	USB channel 0 Signal	P504 Pin Number	USB channel 1 Signal
1	VBUS	1	VBUS
2	D-	2	D-
3	D+	3	D+
4	GND	4	GND

Tab. 8   USB Interface Connector P503/P504

3.3.4.   Mouse

The additional wiring for use with keyboard and mouse is provided on the base board. The signals for the mouse are available on a standard PS/2 connector (P505).

Pin Number	Signal	Remarks
1	-	connected with Pin3, KBDATA
2	-	connected with Pin4, KBCLK
3	-	connected with Pin1, KBDATA
4	-	connected with Pin2, KBCLK
5	MDATA	
6	MCLK	
7	not used	
8	not used	
9	GND	not connected with GND on the base board
10	VCC	not connected with VCC on the base board

Tab. 9   Mouse Header J509 (2x5 pin)

Pin Number	Signal	Remarks
1	MDATA	
2	not used	
3	GND	not connected with GND on the base board
4	VCC	not connected with VCC on the base board
5	MCLK	
6	not used	
7	Shield	
8	Shield	
9	Shield	

Tab. 10 PS/2 Mouse Connector P505 (MiniDIN)

3.3.5.   Non isolated Serial Ports

Two serial ports are available on the base board. The serial ports have fixed base addresses of 0x03F8 (COM1) for channel A and 0x02F8 (COM2) for channel B. The UART is implemented on the CPU board.

Device Connection

The Serial Port A (COM1) of the UART is available on the standard PC/AT DSUB9 male connector P501 (only on IPC/COMPACGP-xE(E)).

The Serial Port B (COM2) of the UART is available on the standard PC/AT DSUB9 male connector P502 on every board version.

Pin Number	Signal	Remarks
1	DCD*	
2	RXD	
3	TXD	
4	DTR*	
5	GND	
6	DSR*	
7	RTS*	
8	CTS*	
9	RI*	

Tab. 4   Serial Port A and B Connectors P501, P502 (DSUB9)

Pin Number	Signal	Pin Number	Signal
1	DCD*	2	DSR*
3	RXD	4	RTS*
5	TXD	6	CTS*
7	DTR*	8	RI*
9	GND	10	+5V (not fused)

Tab. 11 Serial Port A Header J501 (2x5pin)

3.3.6.   Factory Programming Header (JTAG Interface)

Pin Number	Signal	Remarks
1	TCK	do not use
2	TDO	do not use
3	TMS	do not use
4	TDI	do not use

Tab. 12   Factory Programming Header J301 (1x4 pin)

Important Note

Do not use the factory pins.

3.3.7.   CAN Interface

For detailed information on the CAN interface please read the following chapters.

3.4. CAN Interface

3.4.1. General Information

There is no firmware running on the CAN module. All setup functions have to be programmed by the user or configured by a third-party device driver.

Important Note

For detailed information and configuration options of the SJA1000 Stand Alone CAN Controller please refer to the appropriate documentation.

3.4.2. Base Address

The Memory base address of the CAN controller is set according to chapter 3.2.3. The I/O base address is 0x7600.

3.4.3. Interrupt/Addressing Mode Configuration

	Configuration						Rem.
SW301/	off = Memory Mode						see 3.2.3
	on = I/O Mode						0x7600
J302	11-12	9-10	7-8	5-6	3-4	1-2	IRQ
	Open	Open	Open	Open	Open	Closed	IRQ5
	Open	Open	Open	Open	Closed	Open	IRQ6
	Open	Open	Open	Closed	Open	Open	IRQ7
	Open	Open	Closed	Open	Open	Open	IRQ9
	Open	Closed	Open	Open	Open	Open	IRQ11
	Closed	Open	Open	Open	Open	Open	IRQ15

Tab. 13 Interrupt/Addressing Mode selection

Important Note

It is required that all IRQs have to be checked for conflicts.

3.4.4. CAN Communication Interface

CAN is connected to a DSUB9 male connector P501.

Pin	Signal Designation	Signal
1	-	not used
2	CAN_L	CAN_L
3	CAN_GND	signal ground
4	-	not used
5	-	not used
6	-	not used
7	CAN_H	CAN_
8	-	not used
9	-	not used

Tab. 14 Pin assignment of CAN interface at P501

A 120Ω termination resistor is implemented on the base board module.

Termination	J401
active	closed
not active	open

Tab. 15 Termination Resistor

3.4.5. PC/104 Bus Interface

The PC/104 bus interface of the NETIPC 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. 16.

Pin		Signal Name	Pin		Signal Name	Pin		Signal Name	Pin		Signal Name
										⊗	GND
P11			P12			A2	⊗	SD7	B2	⊗	RESETDRV
										⊗	+5V
2	⊗	no connection	2	⊗	+5V	A4	⊗	SD5	B4	⊗	IRQ9
3	⊗	no connection	3	⊗	TRIGGER*	A5	⊗	SD4	B5	⊗	-5V (not used)
4	⊗	Vbatt	4	⊗	STOP*	A6	⊗	SD3	B6	⊗	DRQ2
						A7	⊗	SD2	B7	⊗	-12V (not used)
						A8	⊗	SD1	B8	⊗	0WS#
	⊗			⊗	GND	A9	⊗	SD0	B9	⊗	+12V (not used)
D1	⊗	MEMCS16#	C1	⊗	SBHE#	A10	⊗	IOCHRDY	B10	⊗	(KEY)
D2	⊗	IOCS16#	C2	⊗	LA23	A11	⊗	AEN	B11	⊗	SMEMW#
D3	⊗	IRQ10	C3	⊗	LA22	A12	⊗	SA19	B12	⊗	SMEMR#
D4	⊗	IRQ11	C4	⊗	LA21	A13	⊗	SA18	B13	⊗	IOW#
D5	⊗	IRQ12	C5	⊗	LA20	A14	⊗	SA17	B14	⊗	IOR#
D6	⊗	IRQ15	C6	⊗	LA19	A15	⊗	SA16	B15	⊗	DACK3#
D7	⊗	IRQ14	C7	⊗	LA18	A16	⊗	SA15	B16	⊗	DRQ3
D8	⊗	DACK0#	C8	⊗	LA17	A17	⊗	SA14	B17	⊗	DACK1#
D9	⊗	DRQ0	C9	⊗	MEMR#	A18	⊗	SA13	B18	⊗	DRQ1
D10	⊗	DACK5#	C10	⊗	MEMW#	A19	⊗	SA12	B19	⊗	REFRESH#
D11	⊗	DRQ5	C11	⊗	SD8	A20	⊗	SA11	B20	⊗	SYSCLK
D12	⊗	DACK6#	C12	⊗	SD9	A21	⊗	SA10	B21	⊗	IRQ7
D13	⊗	DRQ6	C13	⊗	SD10	A22	⊗	SA9	B22	⊗	IRQ6
D14	⊗	DACK7#	C14	⊗	SD11	A23	⊗	SA8	B23	⊗	IRQ5
D15	⊗	DRQ7	C15	⊗	SD12	A24	⊗	SA7	B24	⊗	IRQ4
	⊗	+5V	C16	⊗	SD13	A25	⊗	SA6	B25	⊗	IRQ3
D17	⊗	MASTER#	C17	⊗	SD14	A26	⊗	SA5	B26	⊗	DACK2#
	⊗	GND	C18	⊗	SD15	A27	⊗	SA4	B27	⊗	TC
	⊗	GND	C19	⊗	(KEY)	A28	⊗	SA3	B28	⊗	BALE
										⊗	+5V
						A30	⊗	SA1	B30	⊗	OSC
										⊗	GND
							⊗			⊗	GND

Tab. 16 PC/104 Bus Connectors PA/PB, PC/PD

4 Programming Information

4.1. Overview

The programming of the IPC/COMPACTx-xXx base board is done with standard memory and I/O read and write operations. For detailed information refer to the IPC CPU board's user documentation, firmware documentation and other related documents as listed in paragraph 1.3.

4.2. Memory and I/O Resources

4.2.1. General Memory Layout and Configuration

The IPC/COMPACTx-xXx base board does not contain any devices addressable in memory space. Therefore no configuration and programming may be done for memory layout.

4.2.2. General I/O Layout and Configuration

This paragraph describes the system registers which are available on the IPC/COMPACGP-xF(E) base boards. The IPC/COMPACGP-xE(E) don't have any systems registers.

I/O Address Space

Address	Device / Register	Remarks
0x82E0	Status Register	Not used, 0xFF
0x82E1	Control Register	Not used, 0xFF
0x82E2	Function ID Register	0x6A
0x82E3	reserved	Not used, 0xFF
0x82E4	Option ID Register	IO_MEM#
0x82E5	not used	Not used, 0xFF
0x82E6	Revision ID Register	
0x82E7	Configuration Register	Not used, 0xFF
0x82E8..0x82FF	not used	Not used, 0xFF

Tab. 17 I/O Address Space Layout

The base address for system registers is 0x82E0 and cannot be changed.

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Function ID Register

Reading Register 0x82E2:

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

Description:

- FID7..0: Function ID
  0110'1010 (0x6A) = IPC/COMPACT base board

Writing Register 0x82E2:

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

Description:

- reserved: reserved, always write 0

Option ID Register

Reading Register 0x82E4:

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

Description:

- OPT7..0: Option ID
  0000'0001 (0x01) = SJA1000, I/O mode
  0000'0101 (0x09) = SJA1000, Memory mode

Writing Register 0x82E4:

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

Description:

- reserved: reserved, always write 0

Revision ID Register

Reading Register 0x82E6:

D7	D6	D5	D4	D3	D2	D1	D0
LID7	LID6	LID5	LID4	LID3	LID2	LID1	LID0

Description:

-   LID7..0:   Revision ID

Writing Register 0x82E6:

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

Description:

-   reserved: reserved, always write 0

Important Note

Do not write to or read from register addresses not listed above as this could lead to unpredictable results.

5   Technical Data

5.1.   General Electrical Data

Important Note

Do not operate the IPC/COMPACTx-xXx base board 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
internal power supply voltage	Vcc	-0.5		5.5	Vdc
isolation external power supply to logic, note 1					
(AC, 60s, 500m a.s.l., Ta=25°C)		1000			Vrms
(DC, 60s, 500m a.s.l., Ta=25°C)		1500			Vdc
isolation logic to chassis		1000			Vrms
(AC, 60s, 500m a.s.l., Ta=25°C)					
isolation CAN to chassis, note 2		1000			Vrms
(AC, 60s, 500m a.s.l., Ta=25°C)					
isolation CAN to logic, note 2		1500			Vdc
(DC, 60s, 500m a.s.l., Ta=25°C)					
creepage distance external power supply to logic, note 1		2.5			mm
creepage distance logic to chassis and PCB border		1.0			mm
creepage distance CAN to chassis and PCB border, note 2		2.5			mm
creepage distance CAN to logic, note 2		1.6			mm
storage temperature range	Tst	-40		90	°C

Tab. 18   General Absolute Maximum Ratings

Note 1: IPC/COMPACGP-1GE and IPC/COMPACGP-3GE only
Note 2: IPC/COMPACGP-1F, IPC/COMPACGP-1FE, IPC/COMPACGP-2F and IPC/COMPACGP-3FE only

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Recommended Operating Conditions

Parameter	Symbol	min	nom	max	
external logic supply voltage, note 1	Vdd	19	24	30	Vdc
external logic supply voltage	Vdd	9	24	30	Vdc
internal logic supply voltage	Vcc	4.75	5.00	5.25	Vdc
operating free-air temperature range (-xX)	Ta	0		70	°C
operating free-air temperature range (-xXE)	Ta	-40		85	°C

Tab. 19   General Recommended Operating Conditions

Note 1: IPC/COMPACGP-1AE and IPC/COMPACGP-3AE only

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

Parameter	Symbol	min	typ	max	Unit
external supply current (Vdd=9V, approx. 2A load)	Idd		1.8		A
external supply current (Vdd=19.2V, approx. 2A load)	Idd		0.75		A
external supply current (Vdd=30V, approx. 2A load)	Idd		0.57		A
external supply current (Vdd=30V, approx. 2A load)	Idd		0.46		A
logic supply current (Vcc=5V, no additional modules)	Icc			3	A
supply current @ PS/2 (5VDC)	Ips2			500	mA
power dissipation (9V, approx. 2A load)	Pmax		16.2		W
power dissipation (19.2V, approx. 2A load)	Pmax		14.4		W
power dissipation (24V, approx. 2A load)	Pmax		13.68		W
power dissipation (30V, approx. 2A load)	Pmax		13.8		W
Internal logic supply current (Vdd = 9V), no load	Icc		310		mA
Internal logic supply current (Vdd = 30V), no load	Icc		330		mA
Backup time, note 1	tbu	10	172		h

Tab. 20   General Electrical Characteristics

Note 1: IPC/COMPACGP-1AE, -3AE only, with IPC/NETIPC-5A

Electrical Data of Peripheral Devices

5.1.1. Serial Ports

Absolute Maximum Ratings (over free-air temperature range)

Parameter	Symbol	min	nom	max	Unit
see general electrical data					

Tab. 21   Serial Port absolute maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	min	nom	max
see ANSI RS232 specification				

Tab. 22   Serial Port recommended operating conditions

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

Parameter	Symbol	min	typ	max	Unit
see ANSI RS232 specification					

Tab. 23   Serial / Parallel Port electrical characteristics

Switching Characteristics (nominal conditions)

Parameter	Symbol	min	nom	max	
UART base clock	fclk		1.8432		MHz
baude rate				115.2	kbaud

Tab. 24   Serial Port switching characteristics

5.1.2. CAN Interface

Absolute Maximum Ratings (over free-air temperature range)

Parameter	Symbol	min	nom	max	
see general electrical data					

Tab. 25   CAN Interface absolute maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	min	nom	max	
see general specification					

Tab. 26   CAN Interface recommended operating conditions

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

Parameter	Symbol	min	typ	max	Unit
see general specification					

Tab. 27   Submodule electrical characteristics

Switching Characteristics (nominal conditions)

Parameter	Interface	min	nom	max	
CAN baud rate	ISO11989-24V			1.0	Mbaud

Tab. 28   Submodule switching characteristics

5.2.   Mechanical Data

Mechanical data depends on the enclosure used for the IPC/COMPACTx-xx system. Please refer to the appropriate documentation or contact the manufacturer for details.

6   Firmware

6.1.   Software Structure

The x86 CPU board based IPC system is based on the following software structure:

BIOS (Basic Input/Output System)
−   Power On Self Test (POST)
−   Initialization of standard peripheral devices
−   Boot procedure for the Operating System
   Note : Refer to the BIOS documentation for detailed information

OS (Operating System)
−   Initialization of additional peripheral devices
−   Start procedure for the Application Programs
   Note : Refer to the OS documentation for detailed information

Application Programs
−   Initialization of IPC/COMPACTx-xXx system, communications and external
   devices
−   Start procedure for the Control Tasks
   Note : Refer to the Application Programs documentation for detailed information

6.2.   Firmware Functions

The base board of the COMPACT System does not contain any firmware. Some standard PC/AT peripheral devices (e.g. Serial and Parallel Ports) are directly supported by most BIOS and Operating Systems. Some peripheral devices (e.g. NE2000-Ethernet) are directly supported by standard communication software (e.g. TCP/IP stacks, TCP packet drivers) others need special programming according to the freely available sample software IPC/IOCOMSW-1A (e.g. CAN). Please refer to the appropriate documentation for detailed information.

6.3.   Application Programming Interface (API)

The base board does not contain any special API. Refer to the BIOS and Operating System documentation for API specifications.

7   Product Revision History

7.1.   Hardware

This paragraph lists the different hardware revisions of the IPC/COMPACTx-xXx base boards delivered beginning with the first production lot. Note that prototyping boards are not included and must be returned to factory for upgrade or replacement. 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.

Please contact the manufacturers technical support for upgrade options.

Board Identification (see product label)	Product Revision	Revision ID Register	Remarks
IPC/COMPACGP-1F #1	1	0x10	Original Release
IPC/COMPACGP-1F #6	6	0x10	RoHS compliant
IPC/COMPACGP-1FE #1	1	0x10	Original Release
IPC/COMPACGP-1FE #6	6	0x10	RoHS compliant
IPC/COMPACGP-1AE #1	1	-	Original Release
IPC/COMPACGP-1AE #6	6		RoHS compliant
HIP/COMPACGP-2EE #1	1	-	Original Release
HIP/COMPACGP-2EE #6	6	-	RoHS compliant
IPC/COMPACGP-2EE #1	1	-	Original Release
IPC/COMPACGP-2EE #6	6	-	RoHS compliant
IPC/COMPACGP-2ESE #1	1	-	Original Release
IPC/COMPACGP-2ESE #6	6	-	RoHS compliant
IPC/COMPACGP-3F #1	1	0x10	Original Release
IPC/COMPACGP-3F #6	6	0x10	RoHS compliant
IPC/COMPACGP-3FE #1	1	0x10	Original Release
IPC/COMPACGP-3FE #6	6	0x10	RoHS compliant
IPC/COMPACGP-3AE #1	1		Original Release
IPC/COMPACGP-3AE #6	6		RoHS compliant
IPC/COMPACGP-3EE #1	1	-	Original Release
IPC/COMPACGP-3EE #6	6	-	RoHS compliant

Tab. 29 Hardware Revision State

7.2.   Firmware

The COMPACT base board does not contain any firmware. Please refer to the appropriate firmware documentation of the IPC/NETIPC for detailed information.

7.3.   Software Products

The following software products are useful together with the IPC/COMPACTx-xXx base board and the optional submodules:

Order Code	Description	Manufacturer
IPC/IOCOMSW-1A	Examples & utilities	Syslogic AG

Tab. 30 Software Products

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 website:

Syslogic Datentechnik AG
Bruggerstr. 69
CH-5400 Baden / Switzerland

Email: info@syslogic.ch
www: http://www.syslogic.ch
Fax: +41 56 200 90 50

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.