IPC/COMPACTA1-1KE

DOC/COMPACTA1_1KE

Revision	Date	Author	Modification
1.0	02.04.2009	Patrick Brunner	Original
1.1	07.09.2009	Patrick Brunner	DIN Mounting Section updated

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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.
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Syslogic is grateful for any help referring to errors or suggestions for improvements.
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Windows CE	trademark of Microsoft Corporation
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1.2. Contents of this Documentation

This document addresses system integrators, programmers, and instructed installation and maintenance personnel.

This documentation provides all information concerning the assembly, cabling, installation, grounding and EMI-issues of the IPC/COMPACTA1-1KE.

1.3. Items delivered

1.3.1. IPC/COMPACTA1-1KE

- IPC/NETSBC-A1AE mounted into one-slot chrome steel enclosure
- Power connector (Weidmueller *BL3.5/2F*).

1.4. Additional Products and Literature

1.4.1. Hardware

Following items, which have to be ordered separately, complement the system:

- CompactFlash

1.4.2. Software

The following software products are used together with the IPC/COMPACTA1-1KE:

- IPC/WINCE-60A: Windows CE 6.0 Operating System with license.
- IPC/CRATER-10A: Embedded Linux Operating System.

1.4.3. Documents

Additional documents to the hardware and software described above:

Ordercode	Document	Manufacturer
IPC/CRATER-10A	User documentation of the ARM Linux Distribution	Syslogic AG

Tab. 1 Additional Documents

1.5. 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 11.1). 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.

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.

1.6. Life Cycle Information

1.6.1. 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.

1.6.2. 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.

1.6.3. 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 IPC/COMPACTA1-1KE is 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.

1.6.4. Maintenance and Repair

The IPC/COMPACTA1-1KE 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 returning the product (ESD and mechanical protection).

1.6.5. Disposal

At the end of the lifespan the IPC/COMPACTA1-1KE must be properly disposed. IPC/COMPACTA1-1KE contains a multitude of elements and must be disposed like computer parts. The system contains a battery which should be properly disposed.

1.7. Electromagnetic Interference Standards

The IPC/COMPACTA1-1KE complies to the following electromagnetic interference standards and are certified according to European Union "CE"-requirements:

- EN 55022 Information technology equipment-
  Radio disturbance characteristics-
  Limits and methods of measurement

- EN 55024 Information technology equipment-
  Immunity characteristics-
  Limits and methods of measurement

- EN61000-2-2 Generic standard - immunity Standard for industrial environments.

- EN61000-2-4 Generic standard - emissions standard for industrial environments.

2 System Overview

2.1. Introduction

The IPC/COMPACTA1-1KE is an industrial Single Board Computer from *Syslogic* based on the EP9315 processor from *Cirrus Logic*. It features an advanced 184MHz ARM920T (ARM9) processor core with high performance at low power consumption.

The IPC/COMPACTA1-1KE's processor board, the Syslogic IPC/NETSBC-A1AE, is very similar to the EDB9315A evaluation board from the processor supplier *Cirrus Logic*. Most of the binary operating system images from *Cirrus Logic* run without any modification on the IPC/COMPACTA1-1KE.

The IPC/COMPACTA1-1KE is a relative of the IPC/NETARM-1A CPU board from Syslogic. The main differences from the IPC/COMPACTA1-1KE to the IPC/NETARM-1A are:

Feature	IPC/COMPACTA1-1KE	IPC/NETARM-1A
Single Board Computer	●	
Digital TFT/Inverter/Touch-Screen Interface		●
Analog Montor (VGA) Interface		●
Second 10/100 MBit Ethernet Port	●	
PC/104 Bus		●
AC97 Audio Codec		●
PS/2 Interface		●
Selectable RS232/RS422/RS485 Serial Ports	●	
Real Time Clock Backup Energy Source	Supercap	Battery
RAM	32MB	64MB

Tab. 2 Board comparison

2.2. Board Features

High-Performance ARM920T Processor Core

- low power industrial processor eliminating the need for enforced cooling.
- high performance 32-bit 5-stage pipeline ARM9 based processor core (ARM920T) with Thumb Instruction Set.
- 184 MHz processor clock speed
- 16 kByte data and 16kByte instruction caches

MaverickCrunch Coprocessor for Fast Math Processing

- single and double-precision integer and floating point processing.
- single cycle integer multiply and accumulate (MAC).

Memory

- 32 MByte SDRAM (on board)

- 16 MByte (128Mbit) Firmware Flash memory for bootloader, operating system and file systems (easily updatable over serial port)

USB 2.0 Full Speed Host

- 2 ports on internal header
- up to 12 Mbps transfer rate, also low speed capable
- header provides mounting space for USB storage module

Serial Ports

- One DSUB-9 serial port, selectable as RS232/RS422/RS485.
- One RS232 serial port on header (no handshake signals).

Two 10/100baseT Ethernet interfaces

- on-chip auto negotiation, 10/100Mbit and Full/Half-Duplex.
- separate serial EEPROMs containing MAC addresses.

Real Time Clock

- backed by a SuperCap (or battery as an option).

Hardware Watchdog

- configurable timeout (100 ms or 1.6 s) with hardware reset activation.

Temperature Supervisor

- temperature supervisor for software controlled power management.

4x4 Keypad Interface (optional)

- on internal header
- for low cost user input.

2.3. Board Block Diagram

Due to the high level of peripheral integration of the EP9315 processor, the base board has a lot of peripheral connectors.

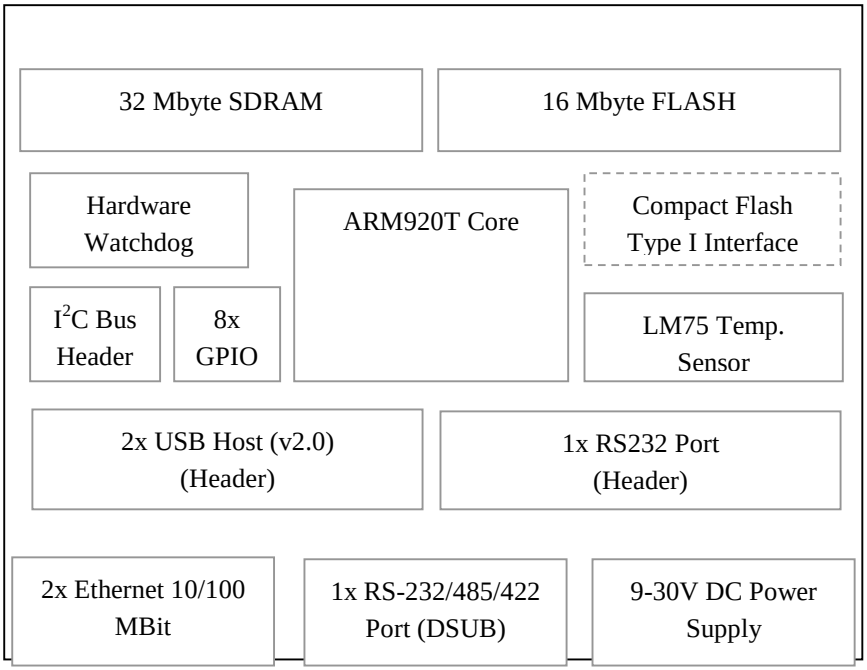


Fig. 1 Board block diagram

3 System Configuration

3.1. Connector and Jumper Positions

The NETSBC board hardware can be configured by jumpers and switches. The jumper and connector locations are shown in the board layout drawing.

Important Note

Always check the jumper configuration of a freshly received board to comply with your system requirements before applying power, otherwise the system may get damaged or may fail to operate.

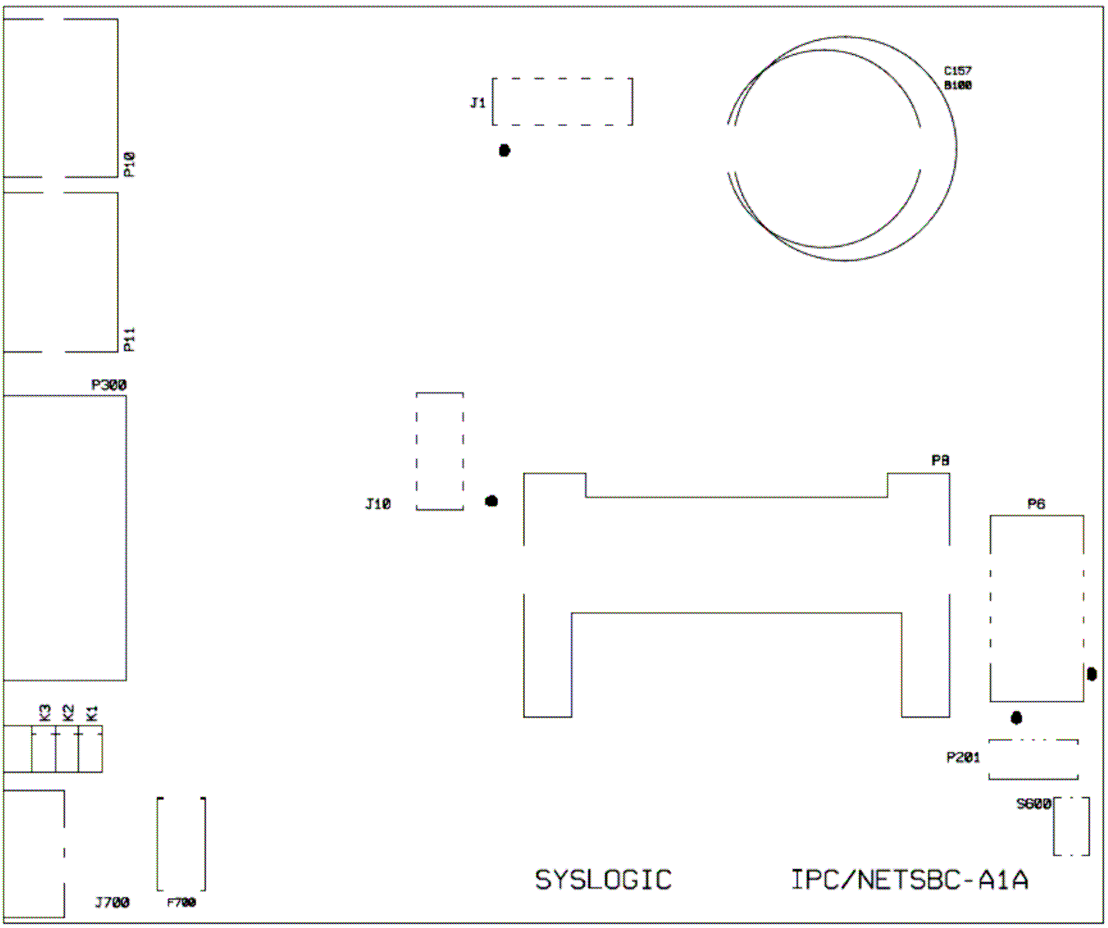


Fig. 2 Board layout

3.2. EP9315 Processor Details

The Cirrus EP9315 system-on-chip processor has a built in 32bit ARM920T core with a memory management unit and 16kB instruction cache and 16kB data cache. The processor can also work in 16Bit mode (ARM Thumb Instruction Set) to provide higher code density and lower program space requirements.

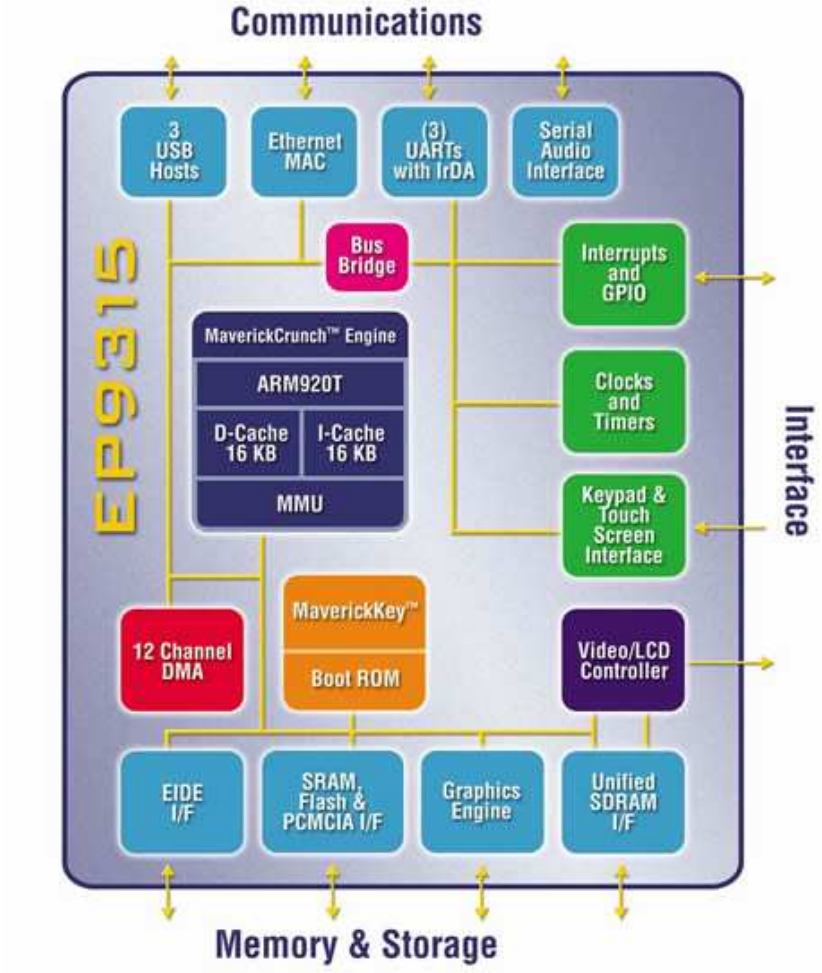


Fig. 3 CPU block diagram

The MaverickCrunch is a DSP engine that enhances the ARM920T core with fast floating point arithmetics.

3.3. Indicators

Three LEDs on the front side of the case provide information about the system's state:

LED color / position	Function	Remarks
Red (top)	(B) Boot (active during boot phase)	See Control register
Yellow (middle)	(L) Link activity ETH1	
Green (bottom)	(R) Ready (active when boot phase is finished)	See Setup register

Tab. 3 Front LED indicators

3.4. Board System Registers

The Board System Registers are mapped into the memory of the EP9315 processor. These registers must not be confused with the internal ARM CPU System Registers that configure the ARM CPU and its internal peripherals.

The Board System Registers can be used to access/configure various peripherals that are not integrated into the EP9315 processor chip.

Address	Device / Register	Remarks
0x2000'8200	Status Register	
0x2000'8201	Control Register	
0x2000'8202	Function ID Register	=0x59
0x2000'8203	Reserved	do not access
0x2000'8204	Option ID Register	=0xB1
0x2000'8205	Setup Register	
0x2000'8206	Revision ID Register	
0x2000'8207	Reserved	do not access
0x2000'8208	Reserved	do not access
0x2000'8209	Reserved	do not access
0x2000'820A	Boot Mode Input Register	
0x2000'820B	I2C Register	
0x2000'820C .. 0x2000'820F	Reserved	do not access

Tab. 4 Board system registers

Status Register

Reading I/O Register 0x2000_8200:

D7	D6	D5	D4	D3	D2	D1	D0
OVERTMP*	LOBAT*	1	WDG*	1	1	1	1

Description:

- WDG*: Watchdog Status Flag (persistent after board reset)
  0 = Watchdog has timed out
  1 = Watchdog running or disabled
  Reset by issuing a hardware reset (see register 8204H)
- LOBAT*: Battery Status Flag
  0 = Battery voltage low
  1 = Battery voltage ok
- OVERTMP*: Temperature Sensor Status Flag
  0 = Programmed temperature limit reached
  1 = Temperature below limit (ok)

Writing I/O Register 0x2000_8200:

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

Description:

- reserved: reserved, always write 0

Control Register

Reading I/O Register 0x2000_8201:

D7	D6	D5	D4	D3	D2	D1	D0
1	WDTRIG	0	STOP	0	1	0	1

Description:

- STOP: Boot LED State
  0 = Boot LED (red) inactive (off)
  1 = Boot LED (red) active (on)
- WDTRIG: Watchdog Trigger
  any state change triggers the watchdog (timeout reset)

Writing I/O Register 0x2000_8201:

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

Description:

- STOP: Boot LED State
  0 = deactivate Boot LED (red)
  1 = activate Boot LED (red)
- WDTRIG: Watchdog Trigger, state change triggers the watchdog

Function ID Register

Reading I/O Register 0x2000_8202:

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

Description:

- FID7..0: Function ID
  0101'1001 (59H) = general NETSBC board,
  subtype defined by Option ID Register

Writing I/O Register 0x2000_8202:

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 I/O Register 0x2000_8204:

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

Description:

- OPT7..0: Option ID
  1011'0001 (B1H) = IPC/NETSBC-A1AE version

Writing I/O Register 0x2000_8204:

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)

Setup Register

Reading I/O Register 0x2000_8205:

D7	D6	D5	D4	D3	D2	D1	D0
READY	WDEN	0	0	0	0	0	0

Description:

- WDEN: Watchdog Enable
  0 = Watchdog disabled
  1 = Watchdog enabled (running)
- READY: Ready LED State
  0 = Ready LED (green) inactive (off)
  1 = Ready LED (green) active (on)

Writing I/O Register 0x2000_8205:

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

Description:

- reserved: reserved, always write 0
- WDEN: Watchdog Enable
  0 = Watchdog disabled (cannot be disabled while running)
  1 = enable Watchdog
- READY: Ready LED State
  0 = deactivate Ready LED (green)
  1 = activate Ready LED (green)

Revision ID Register

Reading I/O Register 0x2000_8206:

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 ID

Writing I/O Register 0x2000_8206:

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

Description:

- reserved: reserved, always write 0

Boot Mode Input Register

Reading I/O Register 0x2000_820A:

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	0	0	BM1	BM0

Description:

- BM1..0: Boot Mode Inputs
  0 = reserved (Factory Diagnostic Mode)
  1 = reserved
  2 = Boot Loader Mode
  3 = normal Operating Mode

Writing I/O Register 0x2000_820A:

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

Description:

- reserved: reserved, do not write

I2C Register (for temperature sensor control)

Reading I/O Register 0x2000_820B:

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 0x2000_820B:

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)

3.5. Startup modes

The IPC/COMPACTA1-1KE may startup either in “Normal” mode or in “Bootloader” mode. Bootloader mode is intended for updating the on-board firmware flash (not the Compact flash!).

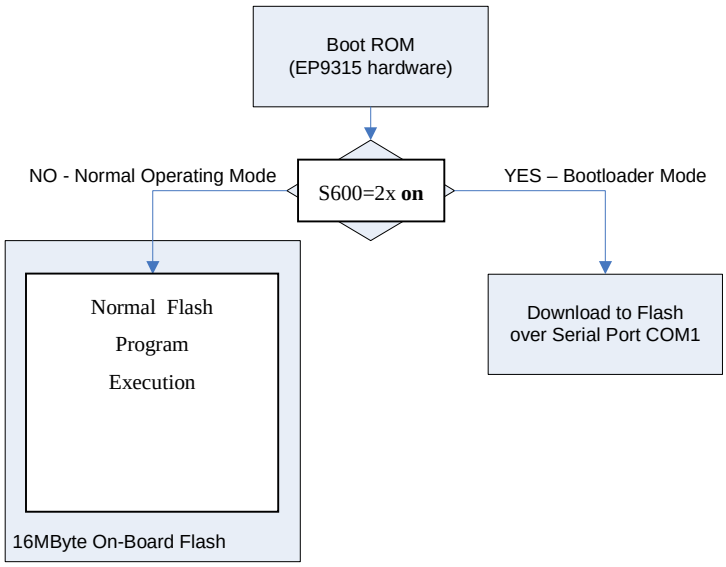


Fig. 4 Startup modes

3.5.1. Bootloader Mode

Boot Loader mode is invoked when setting switch **S600 Pins 1 & 2** to **ON** state. In Boot Loader mode the contents of the Onboard Flash may be updated over the serial port connection COM1 (RS232) from a Windows based host PC.

3.5.2. Normal Mode

Normal operating mode is invoked when S600 Pins 1-2 are in every other state than ON-ON. For normal operating mode with RS-232 protocol settings, S600 Pins 1-2 must be in the state OFF-OFF.

4 Peripheral Connectors

4.1. General Remarks

The EP9315 system-on-chip processor assembled on the IPC/COMPACTA1-1KE boards integrates most peripheral devices (e.g. serial ports, USB ports) that make up the system. Thus, the "EP9315 User's Guide" [1] is a valuable source of information for programming the IPC/COMPACTA1-1KE board peripherals. The following section addresses mainly the external peripherals added by the board manufacturer, which are not described in the "EP9315 User's Guide".

From the peripherals described below, only COM1, ETH1, and ETH2 are externally accessible. The other part is either available on internal connectors/headers (e.g. USB ports), or purely by software (e.g. temperature sensor).

4.2. Temperature Sensor

The Temperature Sensor is an LM75 compatible chip programmable through the I^2C board system register. This register hosts the I^2C data lines. The protocol of the I^2C bus specification must be programmed completely in software. Please ask the board manufacturer for sample code. For detailed programming information please refer to the National Semiconductor LM75 datasheet or similar documentation.

4.3. Watchdog

The watchdog is disabled by default at power-on and must be enabled by the application program (WDGEN bit).

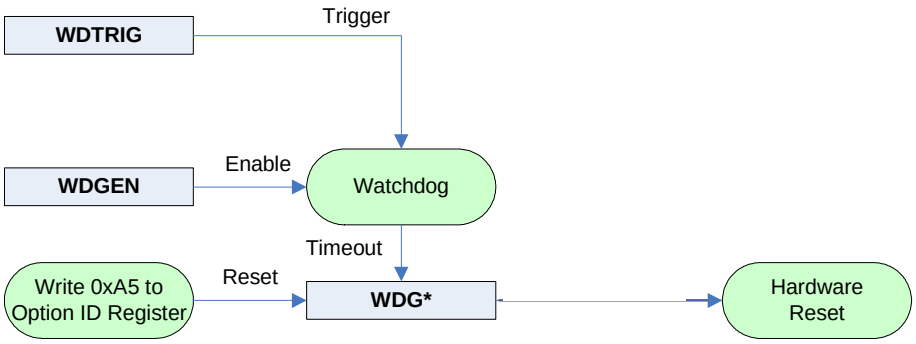


Fig. 5 Watchdog block diagram

The watchdog generates a hardware reset if it is not triggered within the configured timeout window by writing the WDTRIG bit in the Board System Control Register.

The application code must check the WDG* bit in the Board System Status Register upon starting up to identify the watchdog as the source of the reset, and it must issue a hardware

reset (by writing the value 0a5h to the Board System Option ID Register) to clear the WDG* flag. Otherwise the system resets again as soon as the watchdog is started.

Sample code showing the initialization and triggering of the watchdog is available from Syslogic.

The watchdog timer is configurable for 100 ms or 1.6 s timeout. Once enabled and timed-out, it activates the COMPACTA1-1KE's hardware reset.

Configuration Options

Jumper	Configuration	Remarks
J1	Pin 4-6 open = 1.6 s Pin 4-6 closed = 100 ms	

Tab. 5 Watchdog Configuration Options

The programmable logic devices on the COMPACTA1-1KE base board are factory programmed using some pins of the internal header J1. These pins **must not** be connected by the user.

Pin Number	Signal	Remarks
1	TCK	do not use
3	TDO	do not use
5	TMS	do not use
7	TDI	do not use

Tab. 6 Factory Programming Header J1 (2x6 pin)

4.4. Serial Ports

4.4.1. General

Serial Port COM1 is a configurable RS-232/422/485 (RS-232 with handshake signals) port routed to the DSUB-9 connector P300. Serial port COM2 is a RS-232 port without handshake signals routed to the header P6.

The serial ports can be programmed by accessing the UART system registers in the "CPU Configuration Register" address space. See the EP9315 datasheet for details on programming the serial ports.

Depending on the mode selected by switch S600, UART1 or UART3 must be accessed in the EP9315 address space to communicate over the COM1 serial port.

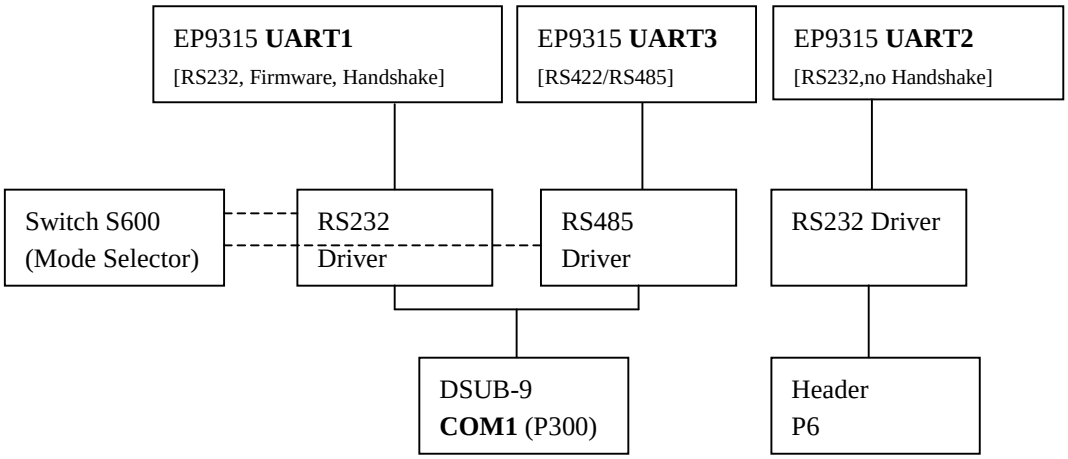


Fig. 6 Serial port mapping

Important Note

COM1 equals **UART1 (in RS-232 mode) or UART3 (in RS422/RS485 mode)**, **COM2** equals **UART2** in the EP9315 datasheet.

4.4.2. COM1

COM1 can be configured by the switch S600 for 4 different operating modes and connector layouts. When switch S600 Pins 1-2 are in state ON-ON, the IPC/COMPACTA1-1KE is in bootloader-mode. Bootloader mode is not listed in Tab. 7.

Fig. 7 DSUB9 male socket (front view)

Pin Number	Switch S600 Pins 1-2		
	OFF-OFF	OFF-ON	ON-OFF
	RS-232	RS-422 / RS485 4wire	RS-485 2wire
	UART1	UART3	UART3
1	DCD*	T-	-
2	RXD	T+	-
3	TXD	R+	Data+
4	DTR*	R-	Data-
5	GND	GND	GND
6	DSR*	-	-
7	RTS*	-	-
8	CTS*	-	-
9	RI*	-	-

Tab. 7 COM1 layout of DSUB9 connector (in function of S600 switch)

4.4.3. COM2

P6 Pin Number	signal	P6 Pin Number	signal
1	do not connect	2	do not connect
3	RX	4	do not connect
5	TX	6	do not connect
7	do not connect	8	do not connect
9	GND	10	+5V

Tab. 8 COM2 header P6 (2x5 pin)

4.5. Ethernet Interfaces

Both Ethernet interfaces (P10 and P11) feature two LED's (yellow and green) integrated into the RJ45 connector. The yellow LED on the front panel indicates Line Activity (flashing) and the green LED indicates Good Link (on).

Device Connection

The Ethernet interface uses the standard RJ45 connector P10 and P11 for 100Ω shielded or unshielded Twisted Pair cabling.

Pin Number	Signal	Remarks
1	TX+	
2	TX-	
3	RX+	
4-5	line termination	
6	RX-	
7-8	line termination	

Tab. 9 Ethernet RJ45 Connector P10/P11

4.6. Compact Flash Interface

The IDE interface will allow a standard connection to an Compact Flash card. The IDE interface provided on the EDB9315 supports the following operating modes:

- PIO Mode 4
- Ultra DMA Mode 2

The IDE interface provides the following jumper configuration options:

Configuration Options

Jumper	Configuration	Remarks
J1	Pin 2-4 open = on board CompactFlash is slave Pin 2-4 closed = on board CompactFlash is master	don't care if only external devices are connected.

Tab. 10 IDE Configuration Options

4.7. I²C Interface (optional)

The I²C Bus Interface is available on Connector P201. The clock (SCL) and data line (SDA) can be read or driven from the Board System Register "I2C Register" (see 3.3). Note that the LM75 system temperature sensor and the RTC (real time clock) are also connected to the I²C Bus.

The LM75 occupies the addresses 0x90h and 0x91h on the bus, the RTC reserves 0xD0h and 0xD1h.

Important Note

When using the I²C bus, always be aware of the fact that the I²C bus addresses 0x90h, 0x91h, 0xD0h and 0xD1h are reserved by the on-board temperature sensor and RTC.

Pin Number	Signal	Remarks
1	I²C DATA	(pulled-up 3.3V)
2	I²C CLOCK	(pulled-up 3.3V)
3	+3.3V (optional +5V available)	50mA max.
4	GND	

Tab. 11 I²C Connector P201 (Molex)

4.8. 4x4 Keypad/ GPIO Interface (optional)

A 4x4 keypad switch matrix with hardware de-bouncing capability is supported on the IPC/COMPACTA1-1KE (the EP9315 contains a 8x8 switch array capability). If the system does not use a keypad, the ROW and COL pins can be remapped to General Purpose Input/Output (GPIO) pins.

Pin Number	Signal	Remarks
1	ROW0	
2	ROW1	
3	ROW2	
4	ROW3	
5	COL0	
6	COL1	
7	COL2	
8	COL3	

Tab. 12 4x4 Keypad connector P200 (Molex)

4.9. USB Interface (optional)

The COMPACTA1-1KE features an OHCI compatible USB Hostcontroller with two channels, routed to an internal header:

Device Connection

J10 Pin Number	USB channel 1 Signals	J10 Pin Number	USB channel 0 Signals
1	VBUS1	2	VBUS0
3	D1-	4	D0-
5	D1+	6	D0+
7	GND	8	GND
9	n.c.	10	n.c.

Tab. 13 USB Interface Connector J10 (2x5 pin)

5 Basic Information and First Steps

5.1. Firmware

The IPC/COMPACTA1-1KE allows the user to select and load his own operating system (OS). Many well known OS's – e.g. Windows CE, Embedded Linux, etc. are supported either by Syslogic or by its respective manufacturer or distributor.

The default firmware installed on the IPC/COMPACTA1-1KE is

- RedBoot bootloader
- Embedded Linux Kernel Version 2.6.20.4

Programming of the bootloader and the OS is described in detail in the "ARM Linux User Documentation [4]".

A Windows CE 6.0 release is also available together with the necessary documentation [5].

6 Enclosure, Assembly and Mounting

6.1. Introduction

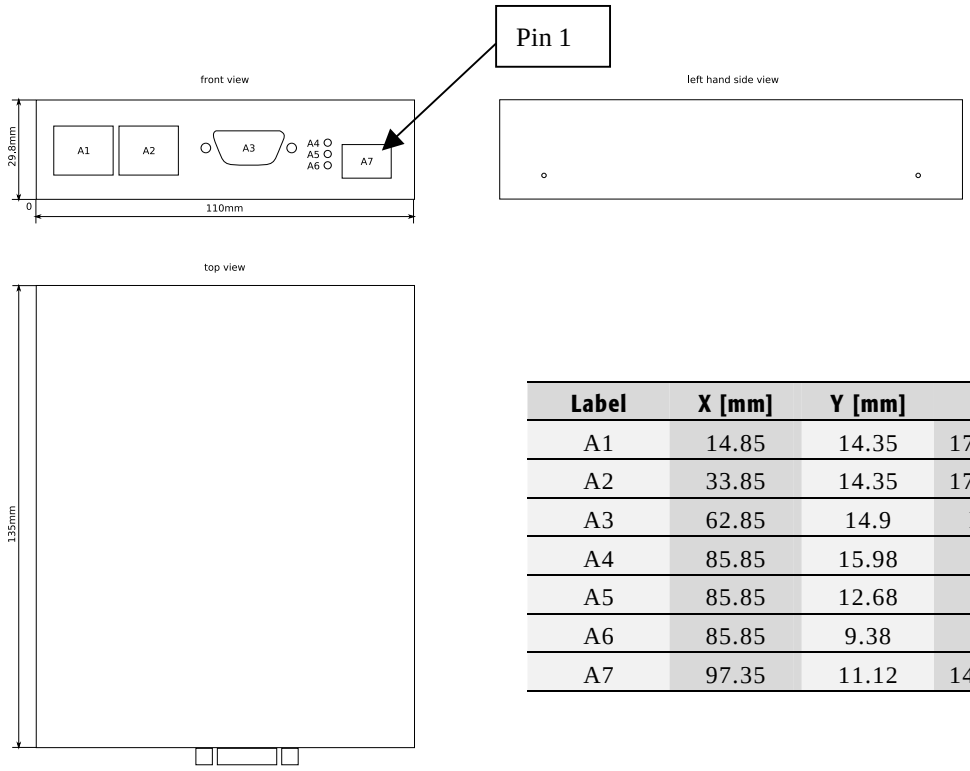
The enclosure can house a complete industrial control system with many basic functions. The enclosure with its internal electronic system meets EMI/RFI electromagnetic standards according to the European ”CE”- requirements (see paragraph 1.5).

Important Notes

Before assembling the whole enclosure with the electronic modules please read through the following paragraphs containing information about the assembling of the system.

6.2. Case dimensions

The IPC/COMPACTA1-1KE is housed in a Compact MS case (1-slot).



Label	X [mm]	Y [mm]	D [mm]
A1	14.85	14.35	17.5 x 14.5
A2	33.85	14.35	17.5 x 14.5
A3	62.85	14.9	DSUB9
A4	85.85	15.98	2.3
A5	85.85	12.68	2.3
A6	85.85	9.38	2.3
A7	97.35	11.12	14.5 x 10.0

Fig. 8 Three side view of the MS enclosure

6.3. Internal Cabling

No internal cabling has to be done.

6.4. Serviceable Parts inside IPC/COMPACTA1-1KE

Only one part inside IPC/COMPACTA1-1KE may be exchanged from time to time:

- Compact Flash memory module (to be ordered separately)

Important Notes

Handle the flash memory module with care. A small screwdriver can help to unlock the memory from its socket.

In order to exchange these part, execute the following steps:

1) Remove 4 screws on the side of the case with a Torx screwdriver.
2) Slide back the cover part of the case.
3) Exchange the Compact Flash card.

6.5. DIN-Rail Mounting of the Enclosure

The IPC/COMPACTA1-1KE comes with a DIN-Rail mounting kit installed and is supposed to be mounted in the cabinet as illustrated below.

Important Notes

Be sure to use the screws provided in the mounting kit; screws which are too long can damage the board.
Make sure to place the washer between the case and the clamp.

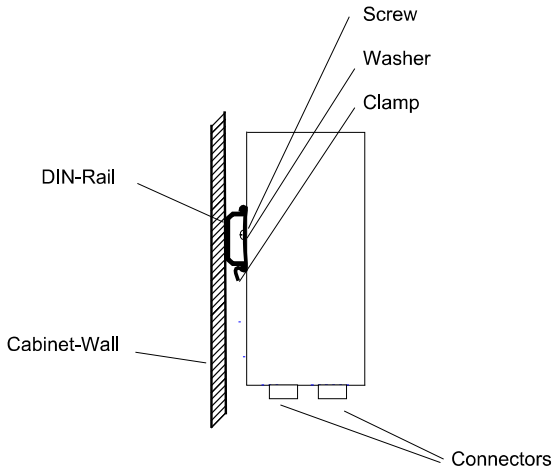


Fig. 9 Recommended way of mounting the IPC/COMPACTA1-1KE onto the DIN-Rail

7 Installation and Cabling

7.1. Introduction

Installation and cabling of the IPC/COMPACTA1-1KE system has to be done with great care; the correct cabling is essential for high operational reliability and the correct grounding is necessary for protection. To meet the requirements of "CE"-certification all cables have to be shielded. The enclosure has to be connected to ground via the DIN-rail.

Important Notes

To meet the requirements of RFI "CE"-certification, correct mounting, installation and cabling of the IPC/COMPACTA1-1KE system according to these guidelines is absolutely necessary.

Important Note

Please make sure that the **ambient temperature does not exceed the recommended range**. Otherwise overheating of the electronic devices inside the enclosure may occur.

7.2. Powering the IPC/COMPACTA1-1KE System

The "logic voltage", i.e. the power driving the electronic circuits (CPU and base board) is applied from an external 24VDC power supply (see Tab. 16 for recommended supply voltage range). The internal power supply converts the input voltage into the logic voltage. The input voltage is applied with a 2-pin Weidmüller connector (Pin 1 orientation is shown in Fig. 8).

Pin	Description
1	Ground
2	VDC

Tab. 14 Power connector J700

The connector can be ordered directly at your Weidmüller distributor (order code: *BL3.5/2F*).

Important Notes

Please make sure that the **input voltage does not exceed the recommended range**. Otherwise the base board could get damaged.

7.3. Grounding

In some cases it is recommended to connect the shields of the cables to chassis potential at the entry point into the housing cabinet as shown in Fig. 10. If the cables enter a hermetically closed cabinet, use special 360 degree metal clamps (RFI protected types which contact to the cable shield).

Important Notes

Grounding of the cables shields using "pig-tail wires" are not recommended because of their high impedance at high frequencies. It is better to clamp the shields onto a grounded copper rail.

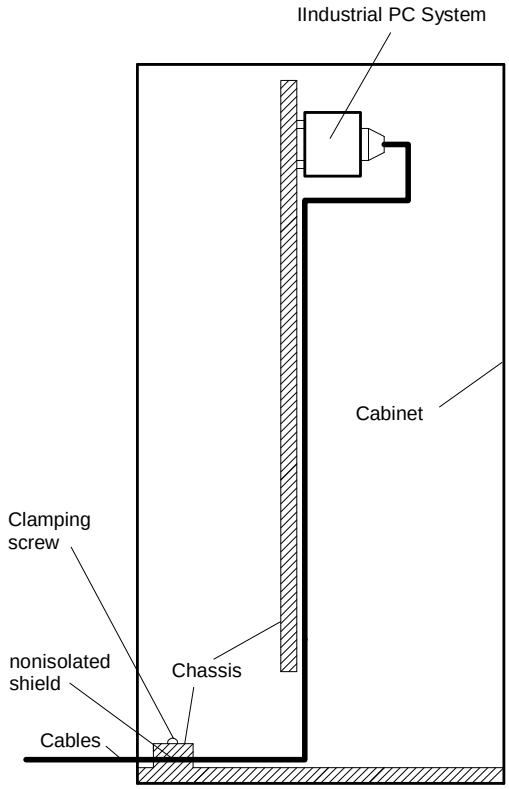


Fig. 10 Additional grounding of the cable shields at the entry point of a cabinet.

7.4. Cabling of Communication Links

If the communication ports are non-insulated ports, cable shields have to be connected to chassis potential on both sides of the interconnection cable. If the cable is very long, a thick copper wire (10 mm^2) for potential adjustment is highly recommended. shows an non isolated system with common chassis ground.

Some of the communication ports are galvanically isolated ports (for more information please refer to the documentation of the base board and the CPU board): in such cases the shield of the interconnection cable must be wired to chassis potential only on one side of the cable. shows an isolated system with independent grounds.

Important Notes

Grounding of cable shields using "pig-tails wires" are not recommended because of their high impedance at high frequencies. It is recommended to clamp the shields onto a grounded copper-rail.

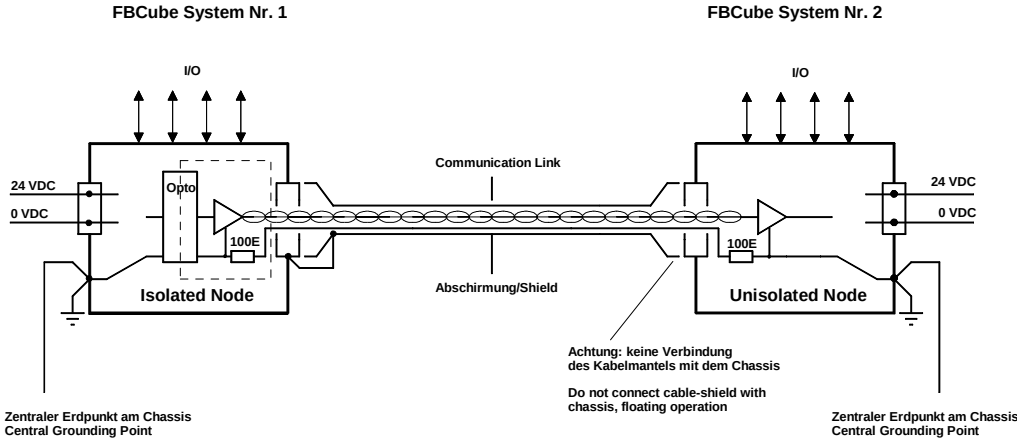


Fig. 11 Non isolated communication link with common chassis potential

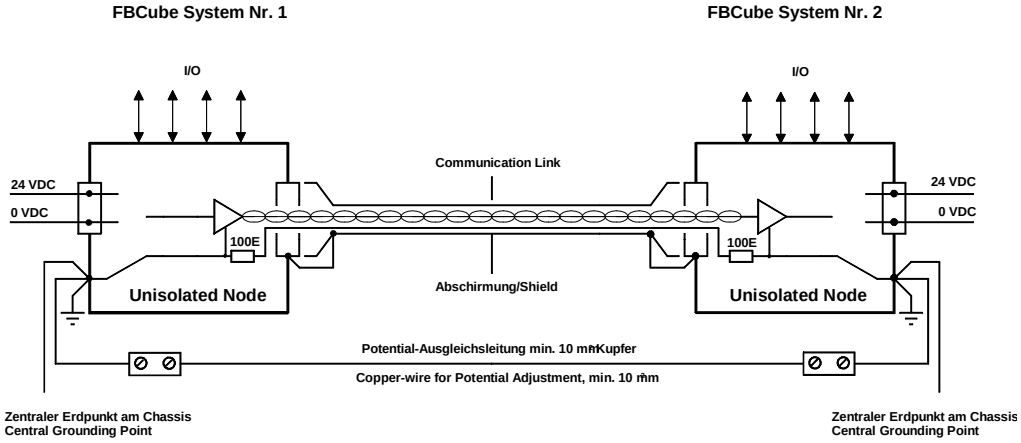


Fig. 12 Isolated communication link

8 Electrical Characteristics

Important Note

Do not operate the IPC/COMPACTA1-1KE outside of the recommended operating conditions. Otherwise lifetime and performance will degrade. Operating the device outside of the absolute maximum ratings may damage the hardware.

Absolute Maximum Ratings (over operating free air temperature range)

Parameter	Symbol	min.	nom.	max.	unit
external supply voltage	Vext	-0.5		32	VDC
internal logic supply voltage	Vcc	-0.5		5.5	VDC
Isolation:					
- logic and pwr. supply to chassis (AC, 60s, 500m a.s.l, Ta=25 °C)		500			Vrms
- RJ45 to logic and pwr supply (AC, 60s, 500m a.s.l., Ta=25 °C)		1500			Vrms
- RJ45 to chassis (AC, 60s, 500m a.s.l., Ta=25 °C)		1000			Vrms
creepage distance:					
- logic and pwr. supply to chassis and PCB border		1.0			mm
- RJ45 to logic and pwr. Supply		1.5			mm
- RJ45 to chassis and PCB border		1.5			mm
storage temperature range	Tst	-40		90	°C

Tab. 15 Absolute maximum ratings

Recommended Operating Conditions

Parameter	Symbol	min.	nom.	max.	unit
external supply voltage	Vext	9	24	30	VDC
operating free air ambient temperature	Ta	-40	25	65	°C

Tab. 16 Recommended operating conditions

Electrical Characteristics (over recommended temperature range)

Parameter	Symbol	min.	nom.	max.	unit
supply current	Iext	80	-	900	mA

Parameter	Symbol	min.	nom.	max.	unit
(over full recommended Supply Voltage Range)					
supply current @ 24V (no USB load attached)	Iext	-	110	-	mA
power dissipation	Pd	-	2.65	8.1	W

Tab. 17 Electrical characteristics

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

Parameter	Symbol	min	nom	max	
processor core clock	Fclk	-	-	184	MHz
COM1/2 baud rate		-	-	115.2	kbaud
Watchdog timeout (short period)	Tw	70	100	140	ms
Watchdog timeout (long period)	Tw	1.0	1.6	2.25	s
Real Time Clock base clock	Frtc_clk	-	32.768	-	kHz
Real Time Clock accuracy (25°C)		-	-	±20	ppm
Real Time Clock temperature coefficient		-	-	-0.04	ppm/(°C)
Real Time Clock aging		-	-	±3	ppm/year

Tab. 18 Switching characteristics

9 Product Revision History

9.1. Hardware

This paragraph lists the different hardware revisions of the IPC/COMPACTA1-1KE systems 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 hardware state. Therefore this information may be incompatible with the prototyping board hardware.

Important Note

This document always covers the newest product revision listed in Tab. 19.
Please contact the manufacturers technical support for upgrade options.

Board Identification (see product label)	Product Revision	Remarks
IPC/COMPACTA1-1KE	#1	Original release

Tab. 19 Hardware Revision State

9.2. Firmware

Please refer to the appropriate firmware documentation of the IPC/NETARM-1AN(E) for detailed information.

10 References

[1] EP9315 User's Guide
http://www.cirrus.com/en/pubs/manual/EP9315_Users_Guide.pdf

[2] EP9315 Datasheet
http://www.cirrus.com/en/pubs/proDatasheet/EP9315_PP4.pdf

[3] IPC/NETARM-1A User Documentation
Syslogic order code DOC/IPC_NETARM-1A

[4] ARM Linux User Documentation
Syslogic order code IPC/CRATER-10A

[5] Windows CE 6.0 User Documentation
Syslogic order code IPC/WINCE-60A

11 Manufacturer Information

11.1. 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
Täfernstrasse 28
CH-5405 Baden-Dättwil / Switzerland

Email: info@syslogic.ch
www: http://www.syslogic.ch
Tel: +41 (0)56 200 90 40
Fax: +41 (0)56 200 90 50

Technical support:
support@syslogic.ch

11.2. 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.