Embedded Computing for
Business-Critical Continuity™

COMX-P1022 COM Express Module

Installation and Use

P/N: 6806800M04A

September 2011

EMERSON
Network Power

Trademarks

Notice

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About this Manual

Overview of Contents

This manual is divided into the following chapters and appendices.

- *Introduction* gives an overview of the features of the product, standard compliances, mechanical data, ordering information, and board identification.
- *Hardware Preparation and Installation* outlines the installation requirements, hardware accessories, switch settings, and installation procedures.
- *Controls, LEDs, and Connectors* describes external interfaces of the board. This includes connectors and LEDs.
- *Functional Description* includes a block diagram and functional description of major components of the product.
- *Firmware Upgrade* describes the procedures in upgrading the firmware.
- *Operating System and Driver Support* lists the drivers and operating systems supported by the product.
- *Related Documentation* provides a listing of related product documentation, manufacturer's documents, and industry standard specifications.
- *Safety Notes* summarizes the safety instructions in the manual.
- *Sicherheitshinweise* is a German translation of the Safety Notes chapter.

Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
A	Amps
BGA	Ball Grid Array
COM	Communications
COM-E	Computer-on-Module Express
COP	Common On-chip Processor
CPU	Central Processing Unit

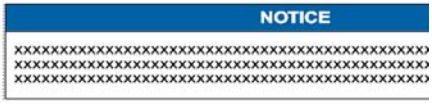
Abbreviation	Definition
CRC	Cyclic Redundancy Check
DDR	Double Data Rate
oC	Degrees Celsius
DRAM	Dynamic Random Access Memory
DUART	Dual Universal Asynchronous Receiver/Transmitter
ECC	Error Correction Code
EEPROM	Electrically Erasable Programmable Read-Only Memory
EPROM	Erasable Programmable Read-Only Memory
F/W	Firmware
GB	Giga Bytes
GbE	Gigabit Ethernet
Gbit	Gigabit
RGMII	Reduce Gigabit Media Independent Interface
H/W	Hardware
I/O	Input/Output
IEEE	Institute of Electrical and Electronics Engineers
I2C	Inter IC
JTAG	Joint Test Access Group
KB	Kilo Bytes
LED	Light Emitting Diode
MB	Mega Bytes
Mbit	Megabit
MBLT	Multiplexed Block Transfer
Mbps	Megabits Per Second
MHz	Megahertz
MTBF	Mean Time Between Failure
OS	Operating System
PCI-X	Peripheral Component Interconnect -X

Abbreviation	Definition
PIC	Programmable Interrupt Controller
PLL	Phase-Locked Loop
POR	Power-On Reset
PRD	Product Requirements Document
RAM	Random Access Memory
RGMII	Reduced Gigabit Media Independent Interface
ROM	Read-Only Memory
RTBI	Reduced Ten Bit Interface
RTC	Real-Time Clock
RTM	Rear Transition Module
SATA	Serial AT Attachment
SDRAM	Synchronous Dynamic Random Access Memory
SMT	Surface Mount Technology
SODIMM	Small-Outline Dual In-line Memory Module
S/W	Software
USB	Universal Serial Bus
V	Volts
W	Watts

Conventions

The following table describes the conventions used throughout this manual.

Notation	Description
0x00000000	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
0b0000	Same for binary numbers (digits are 0 and 1)
bold	Used to emphasize a word
`Screen`	Used for on-screen output and code related elements or commands in body text
`Courier + Bold`	Used to characterize user input and to separate it from system output
Reference	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a submenu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12
. . .	Omission of information from example/command that is not necessary at the time being
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
|	Logical OR

Notation	Description
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
	Indicates a property damage message
	No danger encountered. Pay attention to important information

Summary of Changes

The table below lists all the revisions implemented in this manual.

Part Number	Publication Date	Description
6806800M04A	September 2011	GA Version

1.1 Features

COMX-P1022 COM Express Module is a COM Express module based on the Freescale P1022 processor and derivative processors P1013. COM Express is an industry-standard embedded computer module defined by PICMG.

The following table summarizes the features of COMX-P1022.

Table 1-1 COMX-P1022 Features Summary

Function	Features
Processor	● Freescale Power PC – P1022: 1.066 GHz dual core – P1013: Single core
Memory	● Supports 2GB DDR3 667MT/s DDR3+ECC arranged in two ranks on one slot
SD Card	● 2 GB MicroSD Card on module ● SDHC signals routed to the COM-E connector ● Storage for bootloader and OS
UART	Two UARTs
Video	● Supports up to 1280x1024@60 HZ ● 24bpp display color depth ● Supports DVI and LVDS interfaces
Ethernet	Broadcom BCM5482 supports two 10/100/1000BASE-T ports.
USB	Four USB2.0 ports routed to the COM-E connector
PCI Express	Two x1 PCI-E 1.0 and one x2 PCI-E 1.0 (@2.5 GT/s) ports routed to the COM-E connectors.
Boot Loader	TBD
I2C	Four ports
RTC	M41ST85WMX6TR
JTAG	JTAG connector on module
Audio	I2S/SSI interface
SATA	Two SATA ports routed to the COM-E connectors

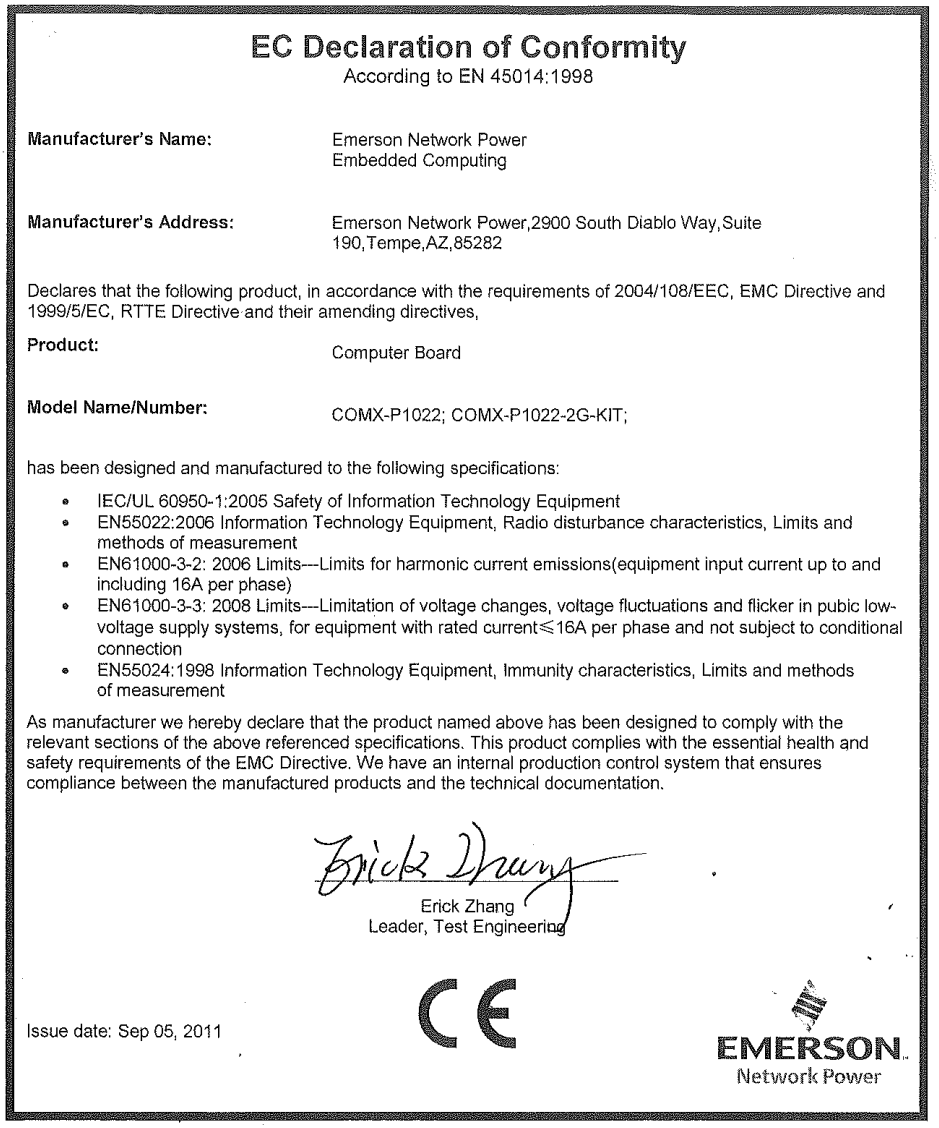
1.2 Standard Compliances

This product meets the following standards:

Table 1-2 Standard Compliances

Standard	Description
UL/CSA 60950-1 EN 60950-1 IEC 60950-1 CB Scheme	Legal safety requirements
FCC 47 CFR Part 15 Subpart B (US), Class A EN55022 Class A (EU) AS/NZS CISPR 22 Class A (Australia/New Zealand) VCCI Class A (Japan)	EMC requirements (legal) on system level (predefined Emerson system)

Figure 1-1 Declaration of Conformity



EC Declaration of Conformity

According to EN 45014:1998

Manufacturer's Name: Emerson Network Power
Embedded Computing

Manufacturer's Address: Emerson Network Power,2900 South Diablo Way,Suite 190,Tempe,AZ,85282

Declares that the following product, in accordance with the requirements of 2004/108/EEC, EMC Directive and 1999/5/EC, RTTE Directive and their amending directives,

Product: Computer Board

Model Name/Number: COMX-P1022; COMX-P1022-2G-KIT;

has been designed and manufactured to the following specifications:

- IEC/UL 60950-1:2005 Safety of Information Technology Equipment
- EN55022:2006 Information Technology Equipment, Radio disturbance characteristics, Limits and methods of measurement
- EN61000-3-2: 2006 Limits---Limits for harmonic current emissions(equipment input current up to and including 16A per phase)
- EN61000-3-3: 2008 Limits---Limitation of voltage changes, voltage fluctuations and flicker in pubic low-voltage supply systems, for equipment with rated current≤16A per phase and not subject to conditional connection
- EN55024:1998 Information Technology Equipment, Immunity characteristics, Limits and methods of measurement

As manufacturer we hereby declare that the product named above has been designed to comply with the relevant sections of the above referenced specifications. This product complies with the essential health and safety requirements of the EMC Directive. We have an internal production control system that ensures compliance between the manufactured products and the technical documentation.

Erick Zhang
Leader, Test Engineering

CE

Issue date: Sep 05, 2011

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1.3 Mechanical Data

1.3.1 COMX-P1022 Mechanical Data

Figure 1-2 COMX-P1022 Mechanical Dimensions (Top and Side View)

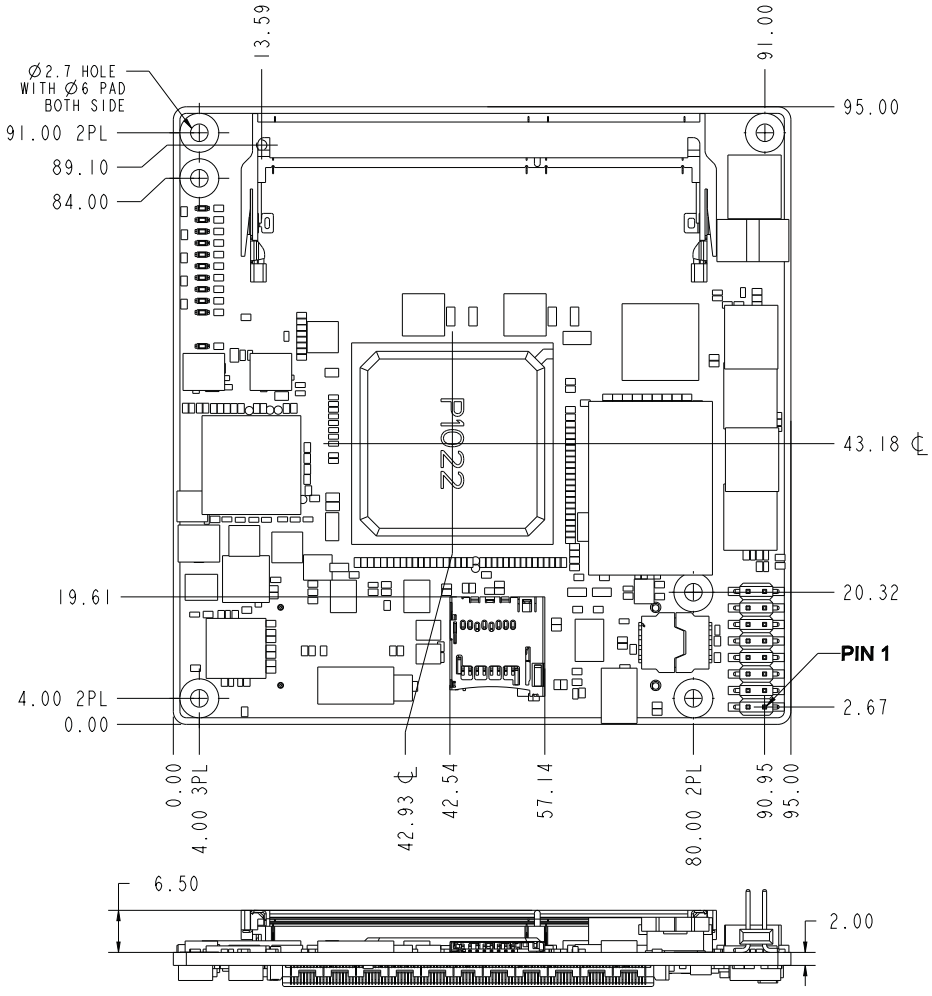
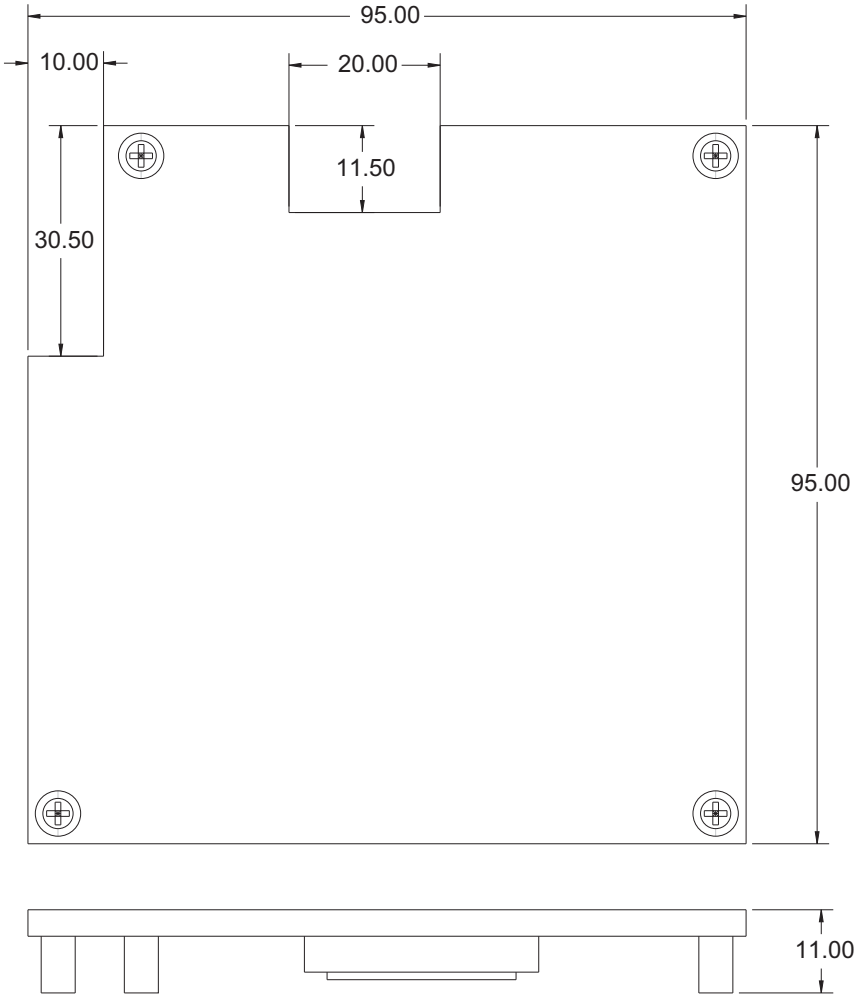


Table 1-3 Mechanical Data

Feature	Value
Dimensions	COM Express basic form factor: 95 mm x 95 mm
Weight	70.0 g

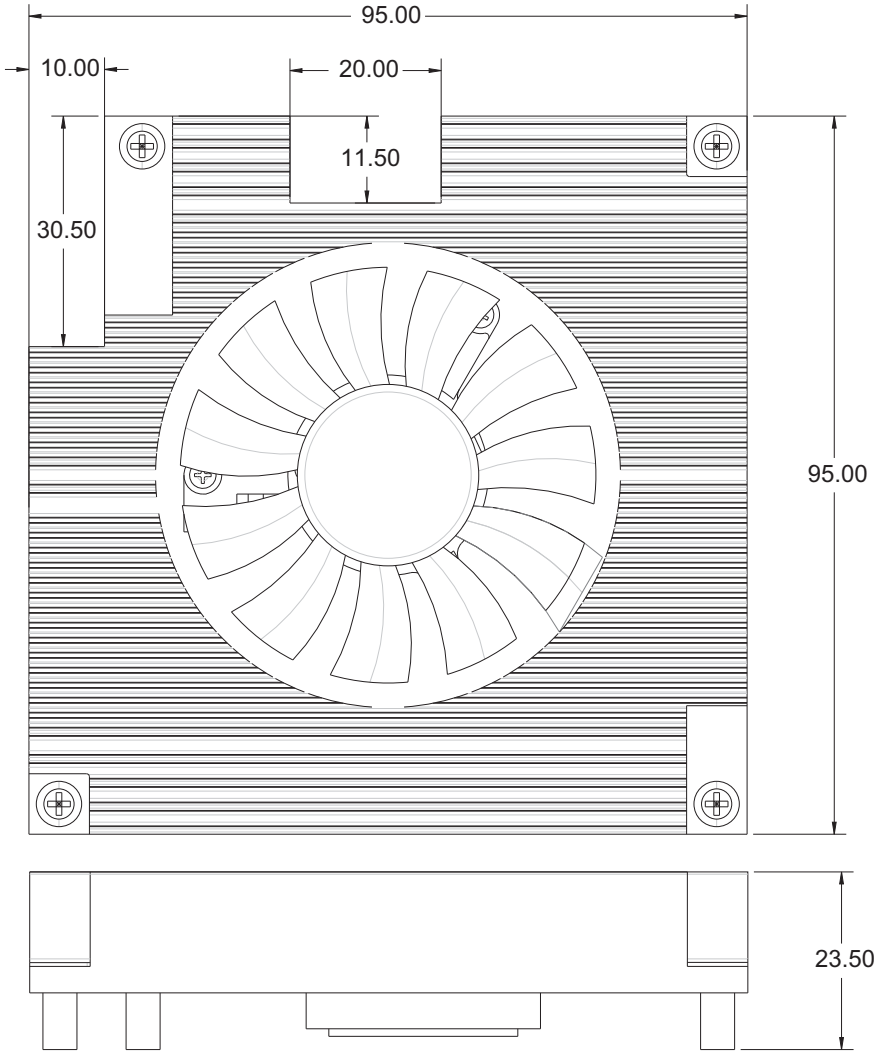
1.3.2 Heat Spreader Mechanical Data

Figure 1-3 Heat Spreader Mechanical Dimensions (Front and Side View)



1.3.3 Cooler Mechanical Data

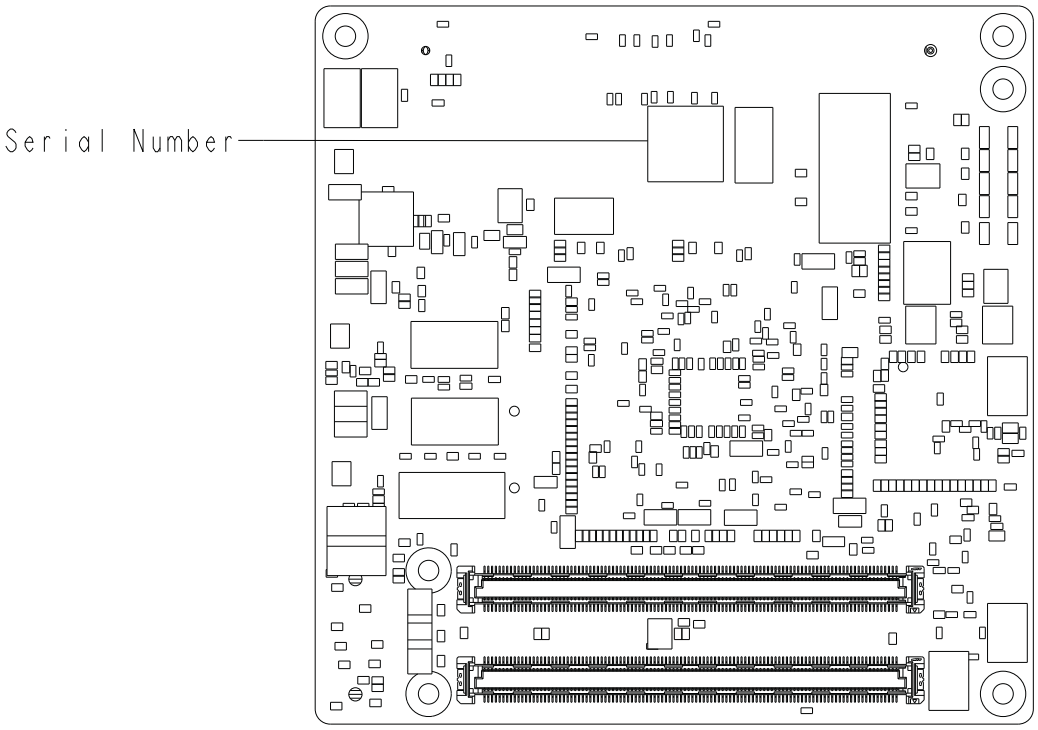
Figure 1-4 Cooler Mechanical Dimensions (Front and Side View)



1.4 Board Identification

This section shows the serial number and its location on the board.

Figure 1-5 Serial Number Location



1.5 Ordering Information

1.5.1 Supported Board Models

The following table lists the product variants that are available upon release of this publication.

Table 1-4 Available Board Variants

Order Number	Description
COMX-P1022	P1022 COM Module
COMX-P1022-2G-KIT	P1022 COM Module with 2 GB memory and heatsink

For availability of other variants, consult your local Emerson sales representative.

1.5.2 Board Accessories

The following table lists the board accessories that are available upon release of this publication.

Table 1-5 Available Board Accessories

Order Number	Description
COMX-P1022-HSP	Heat spreading plate
COMX-P1022-HTSNK	Heatsink

For availability of other board accessories, consult your local Emerson sales representative.

2.1 Environmental and Power Requirements

2.1.1 Environmental Requirements

The following table lists the environmental requirements that the board must meet when operated in your particular system configuration.

Operating temperatures refer to the temperature of the air circulating around the board and not to the component temperature.

NOTICE

Product Damage
High humidity and condensation on surfaces cause short circuits.
Do not operate the system outside the specified environmental limits. Make sure the product is completely dry and there is no moisture on any surface before applying power.

Table 2-1 Environmental Requirements

Requirement	Operating	Non-Operating
Temp Cycle Class	-40°C to 85°C:500 cycles	
Temperature	0°C to 60°C	-40°C to 85°C
Humidity	10% to90% (non-condensing)	
Vibration	0.01g2/Hz @ 5-500Hz (Random Vibration)	
Shock	20G peak 11ms (half sine)	
Altitude	-60 to 4000m ASL	

2.1.2 Thermal Requirements

Table 2-2 Critical Temperature Spots for COMX-P1022

Component Identifier	Heat Dissipation Power (W)	Maximum Allowable Temperature (°C)
CPU-P1022	6	Tjmax = 125
SODIMM		Tcmax = 85

Contact your Emerson sales representative for current information on the detailed thermal information including airflow and resistance of the module.

NOTICE

System Overheating
Cooling Vents
Improper cooling can lead to system damage and can void the manufacturer's warranty. To ensure proper cooling and undisturbed airflow through the system do not obstruct the ventilation openings of the system. Make sure that the fresh air supply is not mixed with hot exhaust from other devices.

⚠ CAUTION

Personal Injury
During operation, hot surfaces may be present on the heat sinks and the components of the product.
To prevent injury from hot surface do not touch any of the exposed components or heatsinks on the product when handing. Use the handle and face plate, where applicable, or the board edge when removing the product from the enclosure.

2.1.3 Power Requirements

Table 2-3 Board Power Supply Current Requirements

	0.75V	1.0V	1.2V	1.5V	1.8V	2.5V	3.3V
CPU(P1022)		6000		1000		100	200
DDR3	600			4400			
USB PHY(3315)							55
USB HUB(2514)							415
GE PHY BCM5482			260			88	
DS90C385							493
TFP410PAP							250
74LVCH32244A x2							120
Total 23.17W	0.45W	6W	3.12W	8.1W		0.5W	5W

2.2 Unpacking and Inspecting the Module

NOTICE

Damage of Circuits
Electrostatic discharge and incorrect installation and removal of the product can damage circuits or shorten its life.
Before touching the product make sure that you are working in an ESD-safe environment or wear an ESD wrist strap or ESD shoes. Hold the product by its edges and do not touch any components or circuits.

Shipment Inspection

1. Verify that you have received all items of your shipment:
   - Printed *Quick Start Guide* and *Safety Notes*
   - COMX-P1022 COM Express Module
2. Check for damage and report any damage or differences to customer service.
3. Remove the desiccant bag shipped together with the product.

NOTICE

Environmental Damage
Improperly disposing of used products may harm the environment.
Always dispose of used products according to your country's legislation and manufacturer's instructions.

2.3 Preparing the Installation Environment

Before you install or replace components, pay attention to the following:

- Wear an ESD-preventive wrist strap to prevent the static electricity from damaging the device.
- Keep the area where the components reside clean and keep the components away from heat-generating devices, such as radiator.
- Ensure that your sleeves are tightened or rolled up above the elbow. For safety purposes, it is not recommended to wear jewelry, watch, glasses with metal frame, or clothes with metal buttons.
- Do not exert too much force, or insert or remove the components forcibly. Avoid damage to the components or plug-ins.

- **Confirm the feasibility of the operation**
  There are available spare parts of the components to be installed or replaced in the equipment warehouse. When the available spare parts are lacking, contact Emerson Network Power for help in time. For details on how to get help from Emerson Network Power, visit http://www.emersonnetworkpower.com/embeddedcomputing.
  Make sure that the new components are in good condition, without defects such as oxidation, chemical corrosion, missing components, or transportation damage.
  By reading this document, you are familiar with how to install and replace the component and master the skills required by the operation.
- **Check the environment**
  Make sure that the power supply, temperature, and humidity meet the operating requirements for the board and its components. For details, refer to the respective system documentation.
- **Prepare the parts and the tools**
  Prepare the components to be installed or replaced.
  When you hold or transport the components, use the special antistatic package. Prepare the cross screwdriver, screws, plastic supports, cooling gel, and ESD-preventive wrist strap.
- **Confirm installation or changing position**
  Confirm the position where COMX-P1022 COM Express Module will be installed.
- If a serious problem occurs and cannot be solved when you install or replace the component, contact Emerson Network Power for technical support.

2.4 Installing and Removing the Memory Module

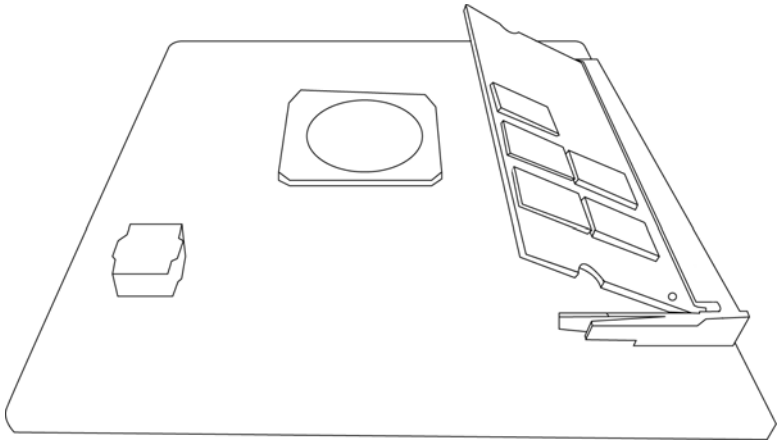
There is one 204-pin SODIMM slot on the COMX-P1022 COM Express Module.

NOTICE

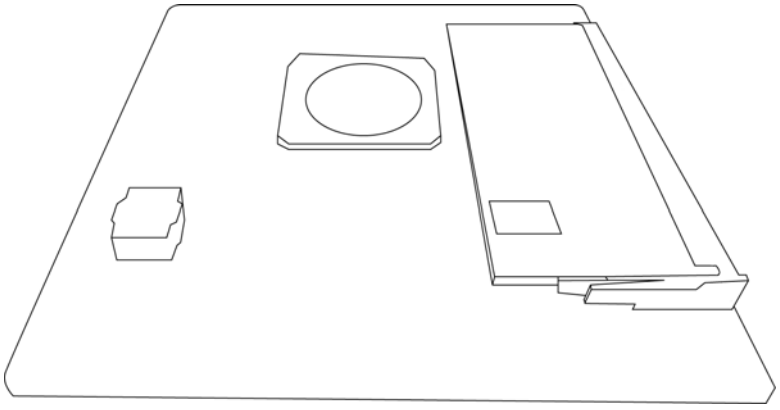
Pin Damage
Forcing the module into the system may damage connector pins.
If the module hangs during insertion, pull it out and insert it again.

Installing a Memory Module

1. Wear the ESD-preventive wrist strap.
2. Lay the COM-E module where the SODIMM is to be installed on the antistatic desktop.
3. Take the SODIMM out of the antistatic package, holding it by the edges.
4. Line up the notch located on the row of the metal pins at the bottom of the module with the key in the SODIMM slot on the COM-E module.
5. Insert the SODIMM in a slantwise position or at a 45-degree angle to slide the memory module into place.



6. Press down on the memory module against the COM-E module until you hear it snap into place. The module must be properly aligned before you press it down into its final position. You can remove the module from the socket and reinstall it if you cannot press it down into its final position.



Removing a Memory Module

1. Wear the ESD-preventive wrist strap.
2. Release the module from the slot by pushing the spring latches on either side of the module outward.
3. Lift the module from the COM-E Module.

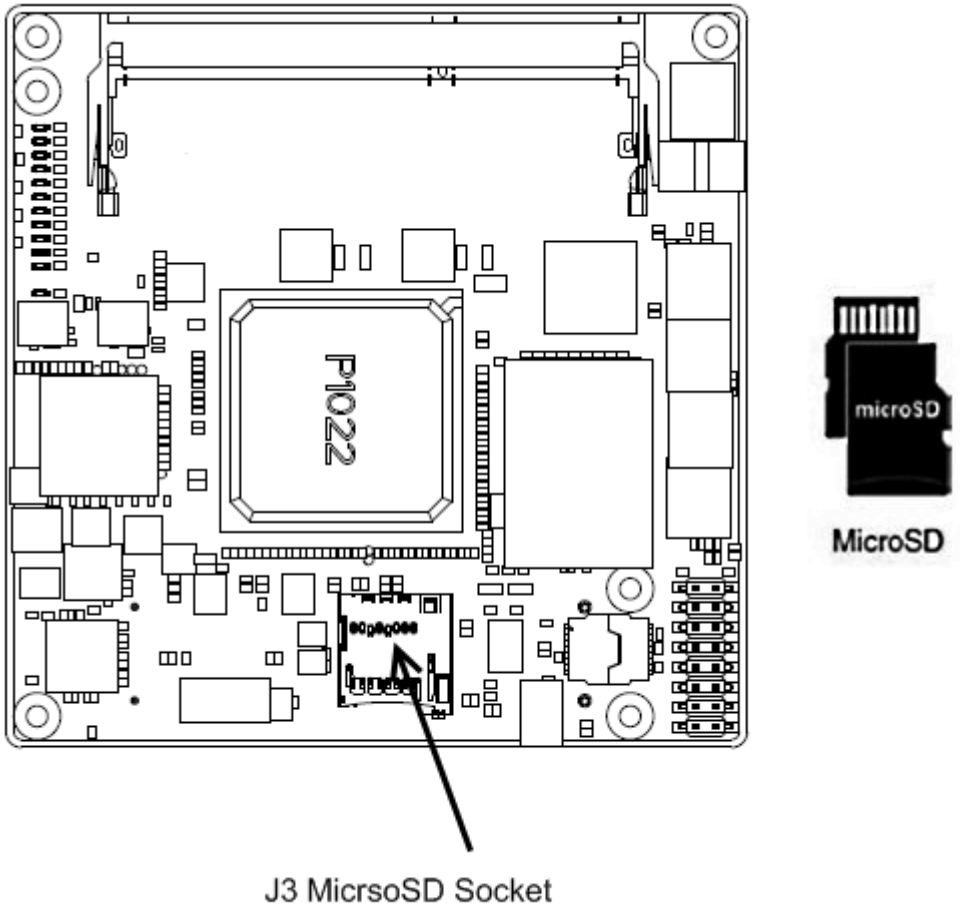
NOTICE

Damage of the Product and Additional Devices and Modules
Incorrect installation or removal of additional devices or modules damages the product or the additional devices or modules.
Before installing or removing additional devices or modules, read the respective documentation and use appropriate tools.

2.5 Installing the MicroSD Card

COMX-P1022 COM Express Module has an on-module MicroSD card slot with a 2 GB MicroSD card installed.

Figure 2-1 MicroSD Card Slot



Installing the MicroSD Card

1. Insert the MicroSD card to the MicroSD socket.
2. Make sure that the metallic contact point of the MicroSD card and the MicroSD socket are lined up correctly.

2.6 Installing and Removing the Heat Spreader/Cooler

Installing the Heat Spreader/Cooler

1. Check the thermal interface material pads on the heat spreader/cooler. Make sure the pads are aligned to their corresponding components on the COMX-P1022 COM Express module.
2. Align the standoffs of the heat spreader/cooler with the screw holes on the COMX-P1022 COM Express module.
3. Hold the heat spreader/cooler and COMX-P1022 COM Express module.
4. From the backside of COMX-P1022 COM Express module, use two screws to fasten the module to the heat spreader/cooler through two internal mounting holes.

Removing the Heat Spreader/Cooler

1. Loosen and remove the two pieces of screws that attach the heat spreader/cooler to the COMX-P1022 COM Express module.
2. While holding the edges, pull the heat spreader/cooler from the COMX-P1022 COM Express module.

2.7 Installing and Removing the Module on the Carrier Board

The assembled COM Express module with the attached heat spreader/ cooler is attached to a carrier board.

Installing the COM Express Module on the Carrier Board

1. Line up the board-to-board connector of the COMX-P1022 COM Express Module assembly with the board-to-board connector of the carrier board.
2. Make sure that the interconnectors are properly aligned and that the bottom surface of the COMX-P1022 COM Express Module have contact with the four standoffs on carrier board.
3. From the topside of the COMX-P1022 COM Express Module assembly, locate the screw holes on heat spreader/cooler.
4. Use the screws to fasten the COMX-P1022 COM Express Module assembly to the carrier board.

Removing the COM Express Module from the Carrier Board

1. From the topside of the COMX-P1022 COM Express Module assembly, locate the four screws that connect the COMX-P1022 COM Express Module assembly to the carrier board.
2. Loosen and remove the screws.
3. While holding the edges, pull the COMX-P1022 COM Express Module from the carrier board.

3.1 Board Layout

Figure 3-1 COMX-P1022 COM Express Module Components

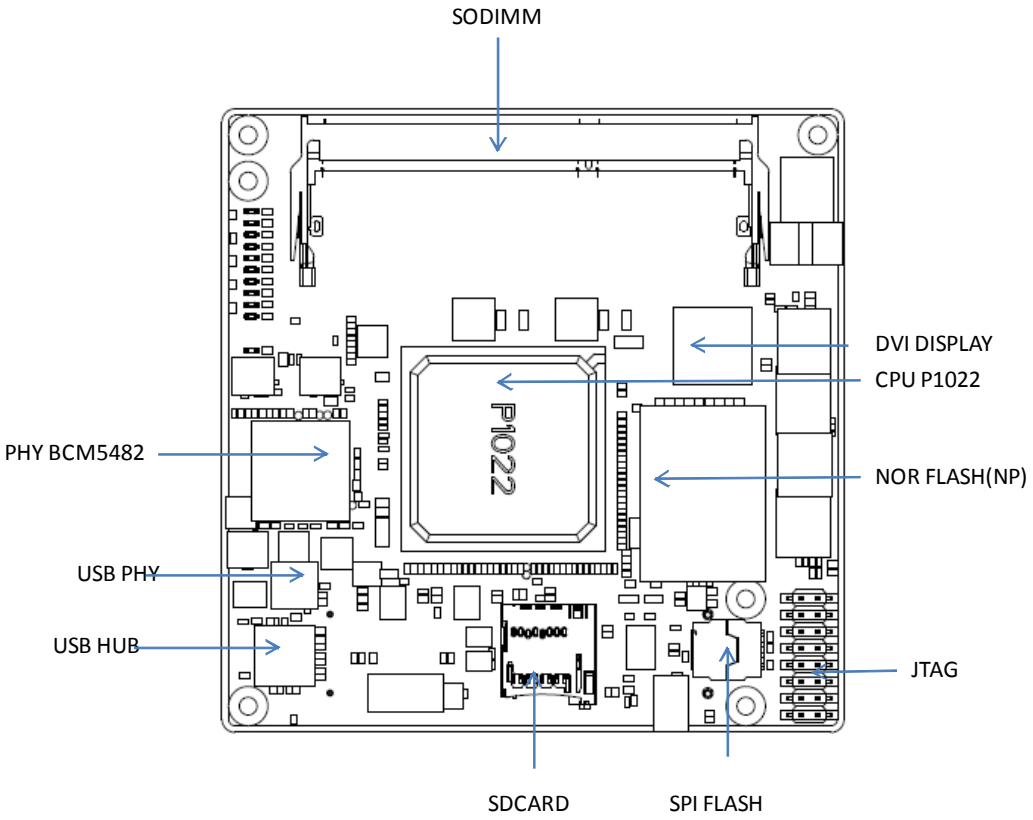
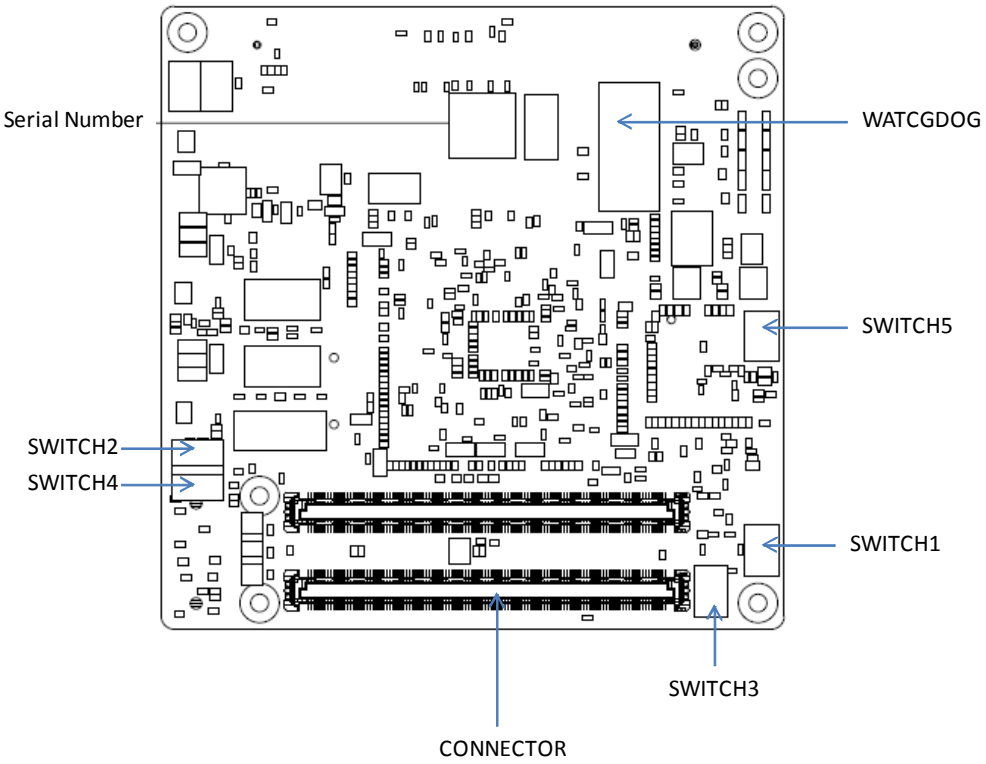


Figure 3-2 COMX-P1022 COM Express Module Components (Rear View)



3.2 Connectors and Switches

3.2.1 COM Express Connector

The following two tables provide the pin out for the Freescale type COM-E module.

The first column shows the default signal names while the succeeding columns show the differences in values.

Table 3-1 COM Express Connector Pinout

Row A		Row B		Row C		Row D	
A1	GND	B1	GND	C1	GND (FIXED)	D1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#	C2	GBE1_ACT#	D2	NC
A3	GBE0_MDI3+	B3	1588_CLK_OUT	C3	GBE1_MDI3-	D3	NC
A4	GBE0_LINK100#	B4	1588_PULSE_OUT1	C4	GBE1_MDI3+	D4	NC
A5	GBE0_LINK1000#	B5	1588_PULSE_OUT2	C5	GBE1_LINK100#	D5	NC
A6	GBE0_MDI2-	B6	1588_ALARM_OUT1	C6	GBE1_MDI2-	D6	NC
A7	GBE0_MDI2+	B7	1588_ALARM_OUT2	C7	GBE1_MDI2+	D7	NC
A8	GBE0_LINK#	B8	1588_TRIG_IN1	C8	GBE1_LINK1000#	D8	NC
A9	GBE0_MDI1-	B9	1588_TRIG_IN2	C9	GBE1_MDI1-	D9	NC
A10	GBE0_MDI1+	B10	1588_CLK_IN	C10	GBE1_MDI1+	D10	NC
A11	GND	B11	GND	C11	GND (FIXED)	D11	GND (FIXED)
A12	GBE0_MDI0-	B12	NC	C12	GBE1_MDI0-	D12	NC
A13	GBE0_MDI0+	B13	NC	C13	GBE1_MDI0+	D13	NC
A14	GBE0_CTREF	B14	NC	C14	GBE1_LINK#	D14	NC
A15	NC	B15	NC	C15	DDI1_PAIR6+/RSVD/User Display	D15	IRQ_OUT
A16	SATA0_TX+	B16	SATA1_TX+	C16	DDI1_PAIR6-/RSVD/User Display	D16	IRQ_IN0
A17	SATA0_TX-	B17	SATA1_TX-	C17	LGPL0	D17	LCLK0
A18	NC	B18	NC	C18	LGPL1	D18	LCLK1
A19	SATA0_RX+	B19	SATA1_RX+	C19	SERDES_RX6+	D19	SERDES_TX6+
A20	SATA0_RX-	B20	SATA1_RX-	C20	SERDES_RX6-	D20	SERDES_TX6-

Table 3-1 COM Express Connector Pinout

Row A		Row B		Row C		Row D	
A21	GND	B21	GND	C21	GND	D21	GND
A22	?NC	B22	NC	C22	SERDES_RX7+	D22	SERDES_TX7+
A23	?NC	B23	NC	C23	SERDES_RX7-	D23	SERDES_TX7-
A24	NC	B24	NC	C24	DDI1_HPD/RSVD/ User Display	D24	LCS0_B
A25	NC	B25	NC	C25	DDI1_PAIR4+/RSV D/User Display	D25	LCS1_B
A26	NC	B26	NC	C26	DDI1_PAIR4- /RSVD/User Display	D26	DDI1_PAIR0+/R SVD/User Display
A27	TBD	B27	WDT	C27	DDI1_AUX+/RSVD /User Display	D27	DDI1_PAIR0- /RSVD/User Display
A28	SATA_ACT#	B28	AC/HAD_SDIN2	C28	DDI1_AUX- /RSVD/User Display	D28	LAD00
A29	NC	B29	AC/HAD_SIN1	C29	DDI1_PAIR5+/RSV D/User Display	D29	DDI1_PAIR1+/R SVD/User Display
A30	NC	B30	AC/HAD_SIN0	C30	DDI1_PAIR5- /RSVD/User Display	D30	DDI1_PAIR1- /RSVD/User Display
A31	GND	B31	GND	C31	GND	D31	GND
A32	NC	B32	SPKR	C32	U0_TXD	D32	DDI1_PAIR2+/R SVD/User Display
A33	NC	B33	I2C1_CK	C33	U0_RXD	D33	DDI1_PAIR2- /RSVD/User Display
A34	BIOS_DIS0#	B34	I2C1_DAT	C34	U0_CTS	D34	LAD01
A35	NC	B35	NC	C35	U0_RTS	D35	LAD02

Table 3-1 COM Express Connector Pinout

Row A		Row B		Row C		Row D	
A36	NC	B36	NC	C36	U1_TXD	D36	DDI1_PAIR3+/RSVD/User Display
A37	NC	B37	NC	C37	U1_RXD	D37	DDI1_PAIR3-/RSVD/User Display
A38	NC	B38	NC	C38	N/A	D38	SSI_TCK/TDM_TCK
A39	NC	B39	NC	C39	N/A	D39	SSI_RCK/TDM_RCLK
A40	NC	B40	NC	C40	MDIO1	D40	SSI_TXD/TDM_TXD
A41	GND	B41	GND	C41	GND	D41	GND
A42	USB2-	B42	USB3-	C42	N/A	D42	SSI_RXD/TDM_RXD
A43	USB2+	B43	USB3+	C43	N/A	D43	SSI_TFS/TDM_TFS
A44	USB_2_3_OC#	B44	USB_0_1_OC#	C44	N/A	D44	SSI_RFS/TDM_RFS
A45	USB0-	B45	USB1-	C45	N/A	D45	LAD03
A46	USB0+	B46	USB1+	C46	N/A	D46	LAD04
A47	VCC_RTC	B47	NC	C47	N/A	D47	LAD05
A48	TBD	B48	NC	C48	N/A	D48	LAD06
A49	TBD	B49	SYS_RESET#	C49	N/A	D49	LAD07
A50	NC	B50	CB_RESET#	C50	MDC1	D50	LALE
A51	GND	B51	GND	C51	GND	D51	GND
A52	NC	B52	SERDES_RX5+	C52	SERDES_RX16+	D52	SERDES_TX16+
A53	NC	B53	SERDES_RX5-	C53	SERDES_RX16-	D53	SERDES_TX16-
A54	SD_DATA0	B54	SD_CMD	C54	TYPE0#	D54	TYPE3#
A55	SERDES_TX4+	B55	SERDES_RX4+	C55	SERDES_RX17+	D55	SERDES_TX17+

3.2.2 Default Switch Settings

Switches that are not mentioned should always be switched OFF.

3.2.2.1 DIP Switch Setting

Table 3-2 Configure I2CMUX

S1_23	Description
OFF	SPI ON MODULE
ON	SPI ON CARRIER

3.2.2.2 Boot Location Configuration

Table 3-3 Boot Location Configuration

S4_14	S4_23	S5_14	S5_23	Description
ON	ON	ON	ON	BOOT FROM PCIE 1
ON	ON	ON	OFF	BOOT FROM PCIE 2
ON	ON	OFF	ON	RESERVED
ON	ON	OFF	OFF	RESERVED
ON	OFF	ON	ON	BOOT FROM DDR
ON	OFF	ON	OFF	BOOT FROM PCIE 3
ON	OFF	OFF	ON	BOOT FROM SPI
ON	OFF	OFF	OFF	*BOOT FROM SDHC

Table 3-3 Boot Location Configuration (continued)

S4_14	S4_23	S5_14	S5_23	Description
OFF	ON	ON	ON	BOOT FROM 8BIT NANDFLASH SMALL PAGE
OFF	ON	ON	OFF	RESERVED
OFF	ON	OFF	ON	BOOT FROM 8BIT NANDFLASH LARGE PAGE
OFF	ON	OFF	OFF	RESERVED
OFF	OFF	ON	ON	BOOT FROM 16BIT NOR FLASH
OFF	OFF	ON	OFF	BOOT FROM 8BIT NOR FLASH
OFF	OFF	OFF	ON	BOOT FROM 16BIT NOR FLASH
OFF	OFF	OFF	OFF	BOOT FROM 16BIT NOR FLASH

3.2.2.3 SPI CS0 Configuration

Table 3-4 SPI CS0 Configuration

S1_23	Description
OFF	SPI ON MODULE
ON	SPI ON CARRIER

3.2.2.4 SDHC Write-protect

Table 3-5 SDHC Write-protect

S3_14	SDHC WP ON CARRIER	S3_23	SDHC WP ON MODULE
OFF	Write protect	OFF	Write protect
ON	Write	ON	Write

3.2.3 System Status LEDs

LEDs indicate the status of the power and the CPU before any software is run.

Table 3-6 System LED Status

Location	Status
D1	CPU Core Power OK(1.0V)
D2	DDR3 Power OK(1.5V)
D3	3.3V Power OK
D4	2.5V Power OK
D5	1.2V Power OK
D6	1.8V Power OK
D9	CPU in Sleep state
D10	1.0V_SW Power OK
D11	1.0V_SW_IO Power OK
D12	3.3V_SW Power OK
D13	2.5V_SW Power OK

3.2.4 JTAG

COMX-P1022 supports JTAG method for CPU and GE PHY debugging.

Table 3-7 CPU Debug (P1)

Pin	Signal	Pin	Signal
1	JTAG_TDO	2	NC
3	JTAG_TDI	4	COP_TRST#
5	COP_RUNSTOP	6	COP_VSENSE
7	JTAG_TCK	8	P_CKSTP_IN#
9	JTAG_TMS	10	NC
11	COP_SRST#	12	GND
13	COP_HRST#	14	NC
15	P_CKSTP_OUT#	16	GND

Table 3-8 GE PHY Debug (Test Point14-19)

Test Point	Signal
TP2	JTAG_GE_TDI
TP3	JTAG_GE_TDO
TP4	JTAG_GE_TCK
TP5	JTAG_GE_TMS
TP6	JTAG_GE_TRST#

3.2.5 GPIO

Table 3-9 GPIO Description

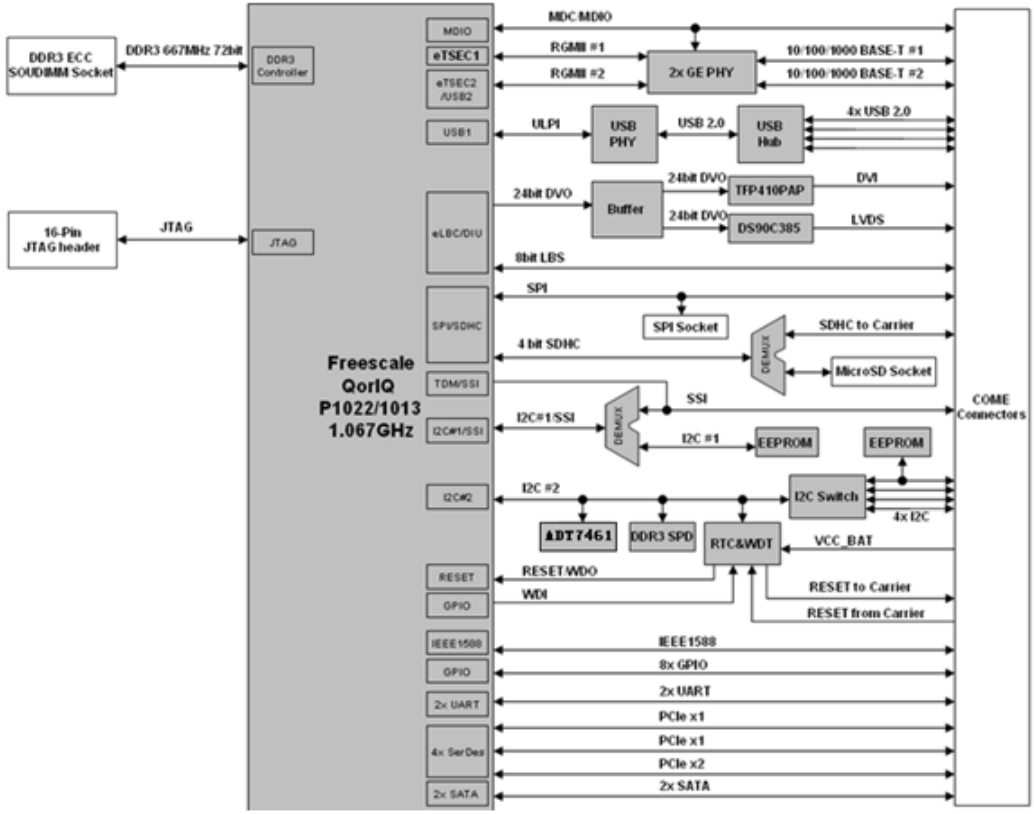
GPIO	FUNCTION
TRIG_OUT /GPIO3_21	SATA_ACT#

Table 3-9 GPIO Description (continued)

GPIO	FUNCTION
IRQ11/ GPIO3_13	WATCHDOG
TRIG_IN/GPIO3_20	LVDS_ENABLE
UDE1_B/GPIO3_17	LVDS_ENAVDD
POWER_OK/GPIO3_19	LVDS_PWM
IRQ6/GPIO2_31	MUX_I2C
IRQ7/ GPIO3_9	GPI0
IRQ8/ GPIO3_10	GPI1
IRQ9/ GPIO3_11	GPI2
IRQ10/ GPIO3_12	GPI3
MCP0_B/GPIO3_14	GPO0
MCP1_B/GPIO3_15	GPO1
UDE0_B/GPIO3_16	GPO2
READY_P1/GPIO3_22	GPO3

4.1 Block Diagram

Figure 4-1 Block Diagram



4.2 Processor

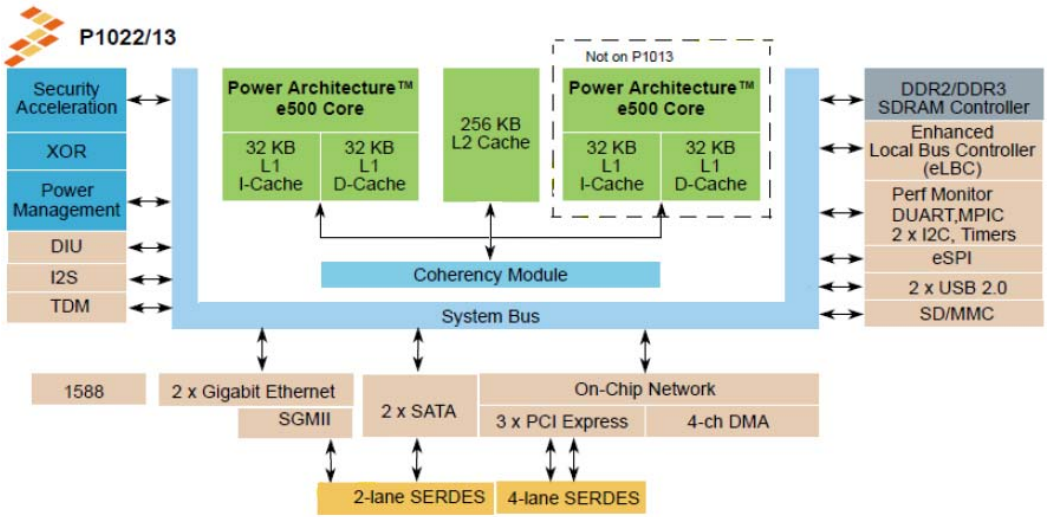
COMX-P1022 supports the Freescale P1022 processor and compatible with the P1013 processor. P1022 includes the following features:

- Dual e500v2 Core, 533MHz to 1.066 GHz clock frequency
- Power consumption of less than 6 W at 1.066 GHz

- 32 KB instruction and 32 KB data first-level cache (L1) for each core
- 256 KB second-level cache (L2) with ECC
- 64 bit DDR2/DDR3 controller with ECC supports data rate of up to 667 Mbps per pin
- 31x31 mm 689-pin wirebond power-BGA
- 45 nm SOI process technology

Each e500 core complex contains a separate 32-KB, eight-way set associative level 1 (L1) instruction and data caches to provide the execution units and registers rapid access to instructions and data. The 32 KB cache is divided into eight ways and 128 sets, so there is a total of 1024 blocks. The size of each block is eight words (32 bytes).

Figure 4-2 P1022 Processor Block Diagram



4.3 Memory

P1022 supports 64-bit DDR2/DDR3 SDRAM memory controller with ECC.

The COM-E module supports a 2GB dual-rank DDR3 with ECC SO-UDIMM memory modules which can be run at 667MHz.

4.3.1 SDRAM

COMX-P1022 only supports 2 GB DDR3 667 MT/s DDR3+ECC arranged in two ranks in one slot.

4.3.2 SD Card

COMX-P1022 has a microSD card slot on-module with a 2 GB SD card installed. The SD card stores the Bootloader and the Operating System.

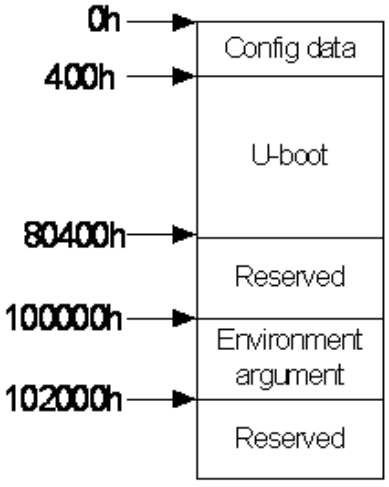
The eSDHC acts as a bridge, passing host bus transactions to SD/MMC cards by sending commands and performing data accesses to or from the cards. It handles the SD/MMC protocol at the transmission level.

4.3.3 SPI Flash

COMX-P1022 has an SPI socket on-module with a 4 MB SPI Flash installed. The U-Boot is installed in the SPI flash on module.

The flash was divided into 3 areas: configure data, U-boot, and Environment argument area.

Figure 4-3 SPI Area for U-boot



4.3.4 EEPROM

COMX-P1022 uses two 256x8(2 Kb) I2C EEPROM for boot up configuration.

4.4 Video

COMX-P1022 supports the following:

- DVI
- LVDS

4.5 Audio

COMX-P1022 supports an I2S/SSI interface to COM-Express.

4.6 I2C

4.6.1 I2C Bus

There are two I2C buses included in P1022 (I2C#1 and I2C#2).

I2C input clock is equal to platform frequency / 2, which is 266MHz. The desired I2C SCL frequency is 400KHz so the clock divisor is 667.

There is one device attached to I2C#1 and 5 devices attached to I2C#2. The following tables describe the I2C buses and devices:

Table 4-1 I2C#1 Address Distribution

IIC1	ADDRESS
EEPROM	0XA0

Table 4-2 I2C#2 Address Distribution

IIC2	ADDRESS
ADT7461	0X98
DDR3	0XA6 0X66 0x36
RTC	0XD0
IIC MUX	0XE0
TFP410	0X72

4.6.2 I2C EEPROM

The I2C EEPROM AT24C02B is located on I2C#1. It is used for board information storage (such as MAC Address, board ID etc) or for other purposes.

The EEPROM provides 2048 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 256 words of 8 bits each. The device address is 0xA0, it can be accessed only at I2C#1.

AT24C02 support SEQUENTIAL READ and page write.

Sequential reads are initiated by either a current address read or a random address read. After the microcontroller receives a data word, it responds with an acknowledge. As long as the EEPROM receives an acknowledge, it will continue to increment the data word address and serially clock out sequential data words. When the memory address limit is reached, the data word address will "roll over" and the sequential read will continue.

AT24C02's 32K EEPROM was internally organized with 32 pages of 8 bytes each. A page write is initiated the same as a byte write, but the microcontroller does not send a stop condition after the first data word is clocked in. Instead, after the EEPROM acknowledges receipt of the first data word, the microcontroller can transmit up to seven more data words.

4.6.3 I2C Device - Thermal Sensor

The thermal sensor ADT7461 is a dual-channel digital thermometer and under/over temperature alarm, intended for use in PCs and thermal management systems. It is located on I2C#2. The device address is 0x98. It is designed for monitoring P1022 processor temperature.

The ADT7461 can accurately measure the temperature of a remote thermal diode to ±1°C and the ambient temperature to ±3°C. The temperature measurement range defaults to 0°C to +127°C, but can be switched to a wider measurement range of?55°C to +150°C. The ADT7461 communicates over a 2-wire serial interface compatible with system management bus (SMBus) standards. An ALERT output signals when the on-chip or remote temperature is out of range. The THERM output is a comparator output that allows on/off control of a cooling fan. The ALERT output can be reconfigured as a second THERM output, if required.

By default, u-boot should mask THERM and ALERT output, set the temperature measurement range to 0°C to +127°C. And u-boot should provide u-boot commands for setting operation mode, and getting the monitoring temperature.

4.6.4 SODIMM SDP EEPROM

The SODIMM SDP EEPROM is connected to I2C#2. I2C address for SDP EEPROM of memory module is 0xA6 and 0x66.

Commonly the memory module information on SDP EEPROM can be used to configure the memory controller. But in this case, we use fix parameters to configure the memory controller, so the BSP won't read the SDP EEPROM.

4.6.5 RTC and Watchdog Timer

The RTC/WDT M41ST85W is located on I2C#2, and the device address is 0xD0.

The M41ST85W is a combination Serial Real-Time Clock, Microprocessor Supervisor, and NVRAM Supervisor. It is built in a low power CMOS SRAM process and has a 64-byte memory space with 44 bytes of NVRAM and 20 memory-mapped RTC registers. The RTC registers are configured in binary coded decimal (BCD) format. The M41ST85W has 512-bit, static CMOS SRAM organized as 64 words by 8 bits. A built-in 32.768 kHz oscillator and 8 bytes of the SRAM are used for the clock/calendar function and are configured in binary coded decimal (BCD) format. An additional 12 bytes of RAM provide status/control of Alarm, Watchdog and Square Wave functions. Addresses and data are transferred serially via a two line, bi-directional I2C interface. The built-in address register is incremented automatically after each WRITE or READ data byte. The M41ST85W can detect power failures and automatically switches to the battery supply when a power failure occurs. The energy needed to sustain the SRAM and clock operations can be supplied by a small lithium button-cell supply when a power failure occurs.

4.6.6 USB Hub

There is one USB2514 located on I2C#2, and the device address is 0x58.

USB2514 is a USB hub controller IC with 4 downstream ports for embedded USB solutions. The 4-port hub is fully compliant with the USB 2.0 Specification and will attach to an upstream port as a Full-Speed Hub or as a Full-/High-Speed Hub, and High Speed (if operating as a High-Speed Hub) downstream devices on all of the enabled downstream ports.

The SMSC Hub must be configured in order to correctly function when attached to a USB host controller. There are three principal ways to configure the hub: SMBus, EEPROM, or by internal default setting. In all cases, the configuration method will be determined by the CFG_SEL2, CFG_SEL1 and CFG_SEL0 pins immediately after RESET_N negation.

In SMBus case, the CFG_SEL1 and CFG_SEL0 pins must be 01, so the Hub can be configured as an SMBus slave for external download of user-defined descriptors.

The USB Hub can work well even without any configuration. So U-boot doesn't need to access the USB Hub registers through I2C bus unless special requirements are need.

4.6.7 PCA9545

The PCA9545 is a quad bi-directional translating switch controlled via the I2C bus. The SCL/SDA upstream pair fans out to four downstream pairs, or channels. Any individual SCx/SDx channel or combination of channels can be selected, determined by the contents of the programmable control register. Four interrupt inputs, INT0 to INT3, one for each of the downstream pairs, are provided, but in this case, they are not used.

PCA9545's i2c address is E0. There is only a control register in PCA9545 that can be read or written via I2C#1.

INT3	INT2	INT1	INT0	B3	B2	B1	B0

Table 4-3 PCA955 Register

Bit	Name	Description
0	BO	0: Channel 0 disable 1: Channel 0 enable
1	B1	0: Channel 1 disable 1: Channel 1 enable
2	B2	0: Channel 2 disable 1: Channel 2 enable
3	B3	0: Channel 3 disable 1: Channel 3 enable

4.6.8 TFP410

There is one TFP410 located on I2C#2, and the device address is 0x70.

The TFP410 is a DVI-compliant digital transmitter that is used in digital host monitor systems to T.M.D.S. encode and serialize RGB pixel data streams. TFP410 supports resolutions from VGA to UXGA and can be controlled in two ways: 1) configuration and state pins or 2) the programmable I2C serial interface.

The host in a digital display system, usually a PC or consumer electronics device, contains a DVI-compatible transmitter such as the TI TFP410 that receives 24-bit pixel data along with appropriate control signals. The TFP410 encodes the signals into a high speed, low voltage, differential serial bit stream optimized for transmission over a twisted-pair cable to a display device. The display device, usually a flat-panel monitor, requires a DVI compatible receiver like the TI TFP401 to decode the serial bit stream back to the same 24-bit pixel data and control signals that originated at the host. This decoded data can then be applied directly to the flat panel drive circuitry to produce an image on the display. Since the host and display can be separated by distances up to 5 meters or more, serial transmission of the pixel data is preferred

The TFP410 integrates a high-speed digital interface, a T.M.D.S. encoder, and three differential T.M.D.S. drivers. Data is driven to the TFP410 encoder across 12 or 24 data lines, along with differential clock pair and sync signals. The flexibility of the TFP410 allows for multiple clock and data formats that enhance system performance.

The TFP410 also has enhanced PLL noise immunity, an enhancement accomplished with on-chip regulators and bypass capacitors.

The TFP410 is versatile and highly programmable to provide maximum flexibility for the user. An I2C host interface is provided to allow enhanced configurations in addition to power-on default settings programmed by pin-strapping resistors.

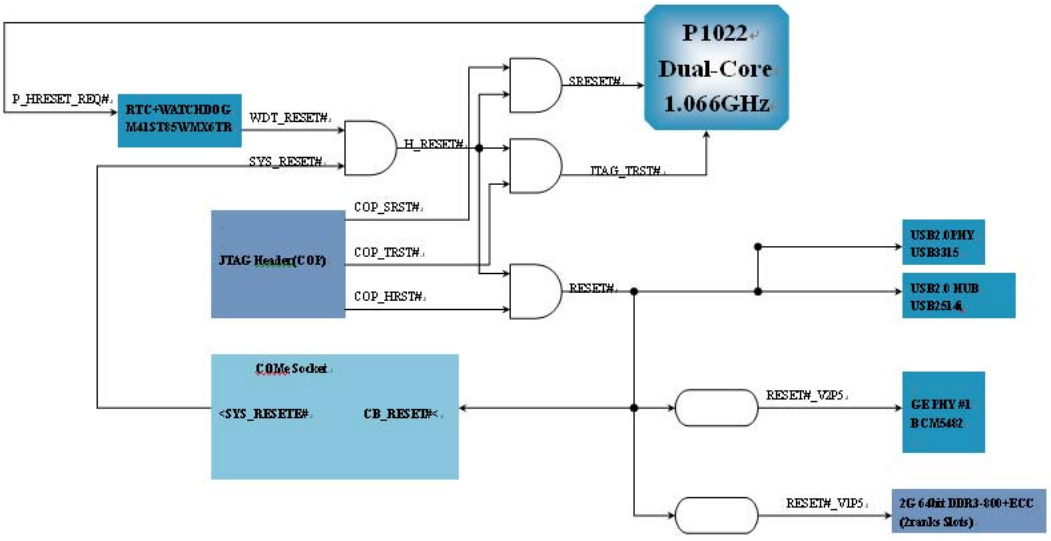
The TFP410 offers monitor detection through receiver detection or hot-plug detection when I2C is enabled. The monitor detection feature allows the user enhanced flexibility when attaching to digital displays or receivers.

4.7 Reset Logic

M41ST85WMX6TR will pull H_RESET# low when the VCC is below Vpfd=2.6V, thus realizing the power fail reset function and power-on reset.

M41ST85WMX6TR will pull WDT_RESET# low when VCC is below Vpfd=2.6V, thus realize the power fail reset function and power-on Reset.

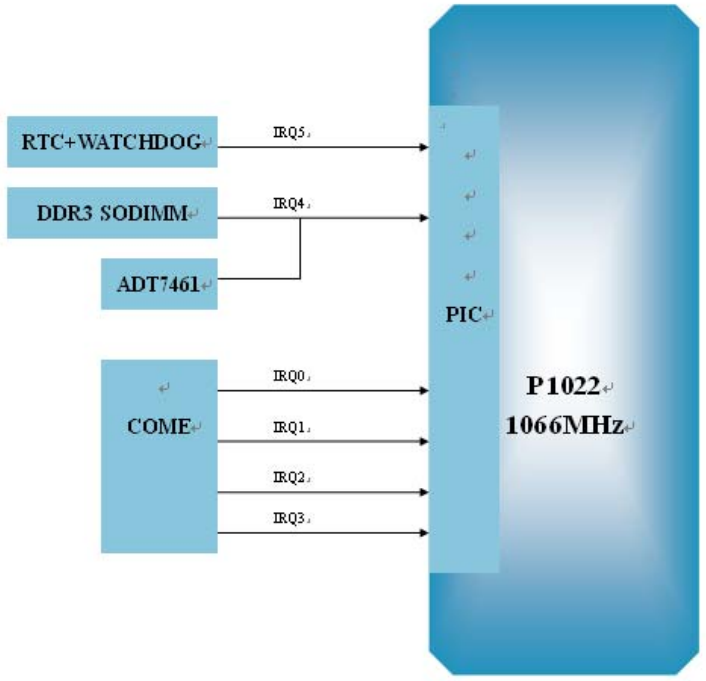
Figure 4-4 Reset Logic



4.8 Interrupt Logic

COMX-P1022 has a programmable interrupt controller, which conforms to OpenPIC architecture.

Figure 4-5 Interrupt Logic



4.9 JTAG

COMX-P1022 supports JTAG for CPU and GE PHY debugging. See *JTAG* on page 45 for the debug ports pinout.

4.10 GPIO

Table 4-4 GPIO Description

GPIO	Function
TRIG_OUT /GPIO3_21	SATA_ACT#
IRQ11/ GPIO3_13	WATCHDOG
TRIG_IN/GPIO3_20	LVDS_ENABLE
UDE1_B/GPIO3_17	LVDS_ENAVDD
POWER_OK/GPIO3_19	LVDS_PWM
IRQ6/GPIO2_31	MUX_I2C
IRQ7/ GPIO3_9	GPI0
IRQ8/ GPIO3_10	GPI1
IRQ9/ GPIO3_11	GPI2
IRQ10/ GPIO3_12	GPI3
MCP0_B/GPIO3_14	GPO0
MCP1_B/GPIO3_15	GPO1
UDE0_B/GPIO3_16	GPO2
READY_P1/GPIO3_22	GPO3

4.11 USB

The P1022 has two USB interfaces. USB1 is a host-only interface and USB2 may be a host or device interface.

P1022 uses USB2 as the only USB host controller. There is one USB PHY (USB3315) connected to USB2 host interface via ULPI interface and then one 4-ports USB hub (USB2514) connected to the USB PHY. Four USB 2.0 ports (USB4~USB7) are provided on the USB hub.

By default, the USB Hub can work well without any configuration, so we won't configure USB through I2Cbus for this board.

U-boot should provide commands to scan, read from or write to USB stick. FAT/FAT32/ext2 file system is supported.

4.12 PCI Express

There are three PCI Express on COMX-P1022 . The PCI Express are all routed to the carrier board.

4.13 Ethernet (eTSEC)

COMX-P1022 provides three enhanced three-speed Ethernet controllers (eTSECs) which interface to 10 Mbps, 100 Mbps, and 1 Gbps Ethernet/IEEE 802.3™ networks. The following POR Configurations mean that the eTESEC1, 2, 3 are working in RGMII Mode.

4.14 SATA

COMX-P1022 has two SATA controllers. The serial ATA controller is a high-performance SATA solution incorporating some of the latest SATA-IO extensions. The SATA may also be referred to as a host bus adapter (HBA). The SATA controller is designed to operate in a system that supports command queuing and, in particular, a switching scheme based on a frame information structure (FIS) using port multipliers.

FIS-based switching requires the SATA controller to maintain in hardware a context for each command it has queued at the devices that are attached to it. FIS-based switching also requires the SATA controller to maintain a queue per attached device ensuring that the command issue order for each device is maintained. It can be used in SATA controllers, as well as storage area network (SAN), network attached storage (NAS), and RAID (redundant array of independent/inexpensive disks) devices.

4.15 SSI (Synchronous Serial Interface)

The SSI is a full-duplex, serial port that allows the chip to communicate with a variety of serial devices. These serial devices can be standard CODer-DECoder (CODECs), digital signal processors (DSPs), microprocessors, peripherals, and popular industry audio CODECs that implement the inter-IC sound bus standard (I2S) and Intel AC97 standard.

There is a CODEC chip connects with the SSI, which lies on the testing bed.For the testing bed of Rev A and Rev B, the codec chip is wm8776; for the testing bed of Rev C, the codec chip is changed to ADAU1361.

For WM8776, it connects with the I2C#2 through the I2C_SWITCH#0, and its I2C address is 0x32(7-bit);

For ADAU1361, it connects with the I2C#2 through the I2C_SWITCH#0, and its I2C address is 0x38(7-bit).

U-boot won't provide the driver of SSI, However, the OS will provide the driver of SSI which working at Normal Mode.

4.16 DIU (Display Interface Unit)

The DIU is a display controller designed to handle TFT LCD display. Besides generating all the signals required to drive the display, the DIU handles real time blending of up to three planes onto the display.

4.17 UART

There are a total of two UARTS (Tx and Rx signals for each UART) routed to the COM-E connectors.

UART0 is the debug console. The working mode is 115200, 8, None, 1.

The Programming model is compatible with original PC16450 UART and PC16550D. Its input clock is platform clock / 2, that is, 533MHz / 2 = 266MHz. So the clock divisor for baud rate 115200 is 266M / 115200 / 16 = 144 = 90h

5.1 Memory Map

The U-boot uses a 32-bit effective address and a 32-bit physical address. The memory map is listed below:.

Table 5-1 Memory Map

Address#	Effective Address	Physical Address	Size	Description
1	0000 0000	0000 0000	2GB	DDR3 Memory
2	8000 0000	8000 0000	512MB	PCIE3 MEM
3	A000 0000	A000 0000	512MB	PCIE2 MEM
4	C000 0000	C000 0000	512MB	PCIE1 MEM
5	E800 0000	E800 0000	128MB	NOR Flash (Just for debug, it will be deleted after the release of FSL's Beta BSP Version)
6	FFC0 0000	FFC0 0000	64KB	PCIE3 I/O
7	FFC1 0000	FFC1 0000	64KB	PCIE2 I/O
8	FFC2 0000	FFC2 0000	64KB	PCIE1 I/O
9	FFD0 0000	FFD0 0000	16KB	L1 Data Cache (Only used before memory initialization)
10	FFE0 0000	FFE0 0000	1MB	CSSR

5.2 IRQ Distribution

Table 5-2 IRQ Distribution

IRQ#	Description
CPU_IRQ5	RTC + WATCHDOG
CPU_IRQ4	DDR3 SODIMM and ADT7461
CPU_IRQ3	To COM-E connectors
CPU_IRQ2	To COM-E connectors

Table 5-2 IRQ Distribution (continued)

IRQ#	Description
CPU_IRQ1	To COM-E-connectors
CPU_IRQ0	To COM-E connectors

5.3 Registers

Please see the respective datasheets of the devices for the registers.

6.1 Upgrade Procedure

6.1.1 Host Setup

Host setup is very critical in upgrading the firmware. The following instructions are generic, and have been tested at RHEL 4.6 and RHEL 5.3 - 32 bit. Your system may be different and the commands should be adjusted accordingly.

1. Turn off the firewall for *tftp* to work. Type **`iptables -F`** or **`setup`** at the command line.
2. All the operators on the host side should be ordinary users which have "sudo" privileges with NO password. To obtain "sudo" privilege, the operator should login as root, and run "**`visudo`**" and add the following line at the end.
   Example:
   `ec7987 ALL=(ALL)  NOPASSWD: ALL`
3. Setting up the *tftp* service:
   1. Create the /local/tftpboot/COMX-P1022/current directory at host, and copy the release file: COMX-P1022.bsp.tar.gz to the directory: /local/tftpboot/COMX-P1022/current

      ```
      [percy@localhost current]$ sudo chmod 777 /local/tftpboot/COMX-
      P1022/current
      [percy@localhost current]$ ls -al COMX-P1022.bsp.tar.gz
      -rwxr--r-- 1 percy percy 462501957 Dec  9 14:57 COMX-P1022.bsp.tar.gz
      [percy@localhost current]$
      ```

   2. Extract all the BSP targets from the COMX-P1022.bsp.tar.gz:

      ```
      [percy@localhost current]$ tar zxvf COMX-
      P1022.bsp.tar.gz
      ```

```
[percy@localhost current]$ ls -al
total 910224
drwxr-xr-x 2 percy percy      4096 Dec 10 09:37 .
drwxrwxr-x 8 percy percy      4096 Dec  9 18:07 ..
-rw-r--r-- 1 percy percy      9824 Dec  9 14:51 comx.dtb
-rwxr--r-- 1 percy percy 462501957 Dec  9 14:57 COMX-P1022.bsp.tar.gz
-r-xr-xr-x 1 percy percy      5771 Dec  9 12:57 make_sd.sh
-rw-r--r-- 1 percy percy 110443332 Dec  9 14:53 rootfs-dev.ext2.img
-rw-r--r-- 1 percy percy 107400408 Dec  9 14:54 rootfs-LRFS.tar.gz
-rw-r--r-- 1 percy percy 200253398 Dec  9 14:55 rootfs-nfs.tar.gz
-rwxr-xr-x 1 percy percy    524288 Dec  9 14:40 u-boot-sd.bin
-rw-r--r-- 1 percy percy    525312 Dec  9 14:39 u-boot-spi.bin
-rw-r--r-- 1 percy percy   3416506 Dec  9 14:51 uImage
 [percy@localhost current]$
```

3. Edit /etc/xinetd.d/tftp to enable *tftp*, here we set the *tftp* directory to /local/tftpboot:

```
service tftp
{
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /local/tftpboot
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
}
```

4. Start the tftp servers at the host:

```
[percy@localhost COMX-P1022]$sudo /sbin/service xinetd start
Stopping xinetd: [  OK  ]
Starting xinetd: [  OK  ]
```

6.1.2 Upgrade MicroSD Card

This device should be pre-programmed with a USB reader at Linux host.

1. Insert the MicroSD card to a USB reader.
2. Connect the USB reader to the host.
3. Check the device name for the USB reader. The following command shows that the device name for USB reader is /dev/sdb.

```
[percy@localhost current]$ ls -al /dev/sd*
brw-r----- 1 root disk 8,  0 Dec  2 17:16 /dev/sda
brw-r----- 1 root disk 8,  1 Dec  2 17:17 /dev/sda1
brw-r----- 1 root disk 8,  2 Dec  2 17:16 /dev/sda2
brw-r----- 1 root disk 8, 16 Dec  2 18:43 /dev/sdb
[percy@localhost current]$ sudo fdisk -l /dev/sdb

Disk /dev/sdb: 2002 MB, 2002780160 bytes
62 heads, 62 sectors/track, 1017 cylinders
Units = cylinders of 3844 * 512 = 1968128 bytes

   Device Boot      Start         End      Blocks   Id  System
```

4. Run the script make_sd.sh to program the SD card with the BSP targets as below:

```
[percy@localhost COMX-P1022]$ sudo ./make_sd.sh /dev/sdb
```

Normally, the program process will last for 3-5 minutes. If the SD card is upgraded successfully, the following information should be shown as below:

```
Program SD successfully, first partition size = 300 MByte,  cost time:
198 seconds
```

Otherwise, the SD card has failed to be programmed.

5. The second parameter of the script: make_sd.sh can be used to change the size of first partition. To change the size of the first partition to 250M, you can run the script as below:

```
[percy@localhost COMX-P1022]$ sudo ./make_sd.sh /dev/sdb 250
……
Program SD successfully, first partition size = 250 MByte,  cost time:
171 seconds
```

The size of the first partition should be greater than 160M, and less than 2000M, or the script will show input parameter error.

The Bootloader is stored on the SD card. Do not delete partitions on the SD card.

6.1.3 Upgrade SPI Flash

1. Attach the board's first Ethernet port (eTSEC1) to the host using a network cable. Assuming that the IP address of the host is 192.168.0.197, and IP Address for the board is 192.168.0.253.
2. Attach the board's first serial port (UART0) to the host using a serial port cable. The serial port of the host can be set with the following parameters:

   Baud rate= 115200; Data bits = 8; Parity = None; Stop bits = 1; Flow Control = None

3. Power on the board. Normally, the following information can be seen at the terminal of the host:

```
U-Boot 2009.11-V100R00 (Sep 05 2011 - 17:47:19)

CPU0:  P1022E, Version: 1.1, (0x80ee0011)
Core:  E500, Version: 5.1, (0x80211151)
Clock Configuration:
       CPU0:1066.667 MHz, CPU1:1066.667 MHz,
       CCB:533.333 MHz,
     DDR:333.333 MHz (666.667 MT/s data rate) (Asynchronous), LBC:33.333
MHz
L1:    D-cache 32 kB enabled
       I-cache 32 kB enabled
Board: COMX-P1022
I2C:   ready
SPI:   ready
DRAM:  Initializing.... 2 GB
FLASH: None
L2:    256 KB enabled
MMC:  FSL_ESDHC: 0
EEPROM: NXID v0
EEPROM: COMX

    PCIE1 connected to Slot 1 as Root Complex (base addr ffe0a000)
    PCIE1 on bus 00 - 00


    PCIE2 connected to Slot 3 as Root Complex (base addr ffe09000)
    PCIE2 on bus 01 - 01

    PCIE3 connected to Slot 2 as Root Complex (base addr ffe0b000)
    PCIE3 on bus 02 - 02

In:    serial
Out:   serial
Err:   serial
Net:   eTSEC1, eTSEC2
RTC:  M41ST85W@68
Hit any key to stop autoboot:  0
=>
```

4. Set the u-Boot environment variables for the network settings through the terminal:

```
=> setenv ethaddr 00:01:af:12:23:01
=> setenv ipaddr 192.168.0.253
=> setenv netmask 255.255.255.0
=> setenv gatewayip 192.168.0.1
=> setenv serverip 192.168.0.197
=> setenv ethact eTSEC1
=> ping 192.168.0.197
Enet starting in 100BT/FD
Speed: 100, full duplex
Using eTSEC1 device
host 192.168.0.197 is alive
```

5. Set the U-Boot environment variables for upgrade files and upgrade the SPI Flash. This step may take up to 1 minute.

```
=> setenv tftppath COMX-P1022/current
=> setenv uboot_spi u-boot-spi.bin
=> run upgradespi
4096 KiB S25FL032A(P) at 0:0 is now current device
Enet starting in 100BT/FD
Speed: 100, full duplex
Using eTSEC1 device
TFTP from server 192.168.0.197; our IP address is 192.168.0.250
Filename 'COMX-P1022/current/u-boot-spi.bin'.
Load address: 0x1000000
Loading: #################################
done
Bytes transferred = 525312 (80400 hex)
=>
```

Operating System and Driver Support

7.1 Supported Operating Systems

This module supports the following operating systems:

- Linux (published by Emerson)
  Publicly available Linux with Emerson's patches. Includes the following:
  - U-boot (Based on public version: u-boot-2009.11 [Dec 15 2009])
  - Linux Kernel (Based on public version: 2.6.32)
  - File system

7.2 Supported Drivers

Table 7-1 Driver Controller Table

	Linux (published by Emerson)
Chipset	Yes
Graphic	Yes
LAN	Yes

Related Documentation

A.1 Emerson Network Power - Embedded Computing Documents

The publications listed below are referenced in this manual. You can obtain electronic copies of Emerson Network Power - Embedded Computing publications by contacting your local Emerson sales office. For released products, you can also visit our Web site for the latest copies of our product documentation.

1. Go to www.emersonnetworkpower.com/embeddedcomputing.
2. Under **Resources**, click **Technical Documentation**.
3. Enter the manual you are looking for in the search. Use either the publication number or the complete name of the product to search for available manuals.

Table A-1 Emerson Network Power - Embedded Computing Publications

Document Title	Publication Number
COMX-P1022 Quick Start Guide	6806800M05
COMX-P1022 Safety Notes	6806800M06

Safety Notes

This section provides warnings that precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed during all phases of operation, service, and repair of this equipment. You should also employ all other safety precautions necessary for the operation of the equipment in your operating environment. Failure to comply with these precautions or with specific warnings elsewhere in this manual could result in personal injury or damage to the equipment.

Emerson intends to provide all necessary information to install and handle the product in this manual. Because of the complexity of this product and its various uses, we do not guarantee that the given information is complete. If you need additional information, ask your Emerson representative.

The product has been designed to meet the standard industrial safety requirements. It must only be used in its specific area of office telecommunication industry, industrial control, and development. It must not be used in safety critical components, life supporting devices or on aircraft.

Only personnel trained by Emerson or persons qualified in electronics or electrical engineering are authorized to install, remove or maintain the product. The information given in this manual is meant to complete the knowledge of a specialist and must not be used as replacement for qualified personnel.

Keep away from live circuits inside the equipment. Operating personnel must not remove equipment covers. Only factory authorized service personnel or other qualified service personnel is allowed to remove equipment covers for internal subassembly or component replacement or any internal adjustment.

This product operates with dangerous voltages that can cause injury or death. Use extreme caution when handling, testing, and adjusting this equipment and its components.

Operation

Product Damage
High humidity and condensation on surfaces cause short circuits.
Do not operate the product outside the specified environmental limits. Make sure the product is completely dry and there is no moisture on any surface before applying power.

Installation

Damage of Circuits
Electrostatic discharge and incorrect installation and removal of the product can damage circuits or shorten their life.
Before touching the product make sure that your are working in an ESD-safe environment or wear an ESD wrist strap or ESD shoes. Hold the product by its edges and do not touch any components or circuits.

Damage of the Product and Additional Devices and Modules
Incorrect installation or removal of additional devices or modules damages the product or the additional devices or modules.
Before installing or removing additional devices or modules, read the respective documentation and use appropriate tools.

Pin Damage
Forcing the module into the system may damage the connector pins.
If the module hangs during insertion, pull it out and insert it again.

Environment

Environmental Damage
Improperly disposing of used products may harm the environment.
Always dispose of used products according to your country's legislation and manufacturer's instructions.

Sicherheitshinweise

This section provides a German translation of the Safety Notes.

Dieses Kapitel enthält Hinweise, die potentiell gefährlichen Prozeduren innerhalb dieses Handbuchs vorrangestellt sind. Beachten Sie unbedingt in allen Phasen des Betriebs, der Wartung und der Reparatur des Systems die Anweisungen, die diesen Hinweisen enthalten sind. Sie sollten außerdem alle anderen Vorsichtsmaßnahmen treffen, die für den Betrieb des Systems innerhalb Ihrer Betriebsumgebung notwendig sind. Wenn Sie diese Vorsichtsmaßnahmen oder Sicherheitshinweise, die an anderer Stelle diese Handbuchs enthalten sind, nicht beachten, kann das Verletzungen oder Schäden am System zur Folge haben.

Emerson ist darauf bedacht, alle notwendigen Informationen zum Einbau und zum Umgang mit dem System in diesem Handbuch bereit zu stellen. Da es sich jedoch bei dem System um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Sie weitere Informationen benötigen sollten, wenden Sie sich bitte an die für Sie zuständige Geschäftsstelle von Emerson.

Das Produkt erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschließlich für Anwendungen in der Telekommunikationsindustrie, im Zusammenhang mit Industriesteuerungen und in der Entwicklung verwendet werden. Es darf nicht in sicherheitskritischen Anwendungen, lebenserhaltenden Geräten oder in Flugzeugen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch Emerson ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschließlich dazu, das Wissen von Fachpersonal zu ergänzen, können dieses jedoch nicht ersetzen.

Halten Sie sich von stromführenden Leitungen innerhalb des Systems fern. Entfernen Sie auf keinen Fall die Systemabdeckung. Nur werksseitig zugelassenes Wartungspersonal oder anderweitig qualifiziertes Wartungspersonal darf die Systemabdeckung entfernen, um Systemkomponenten zu ersetzen oder andere Anpassungen vorzunehmen.

Installieren Sie keine Ersatzteile oder führen Sie keine unerlaubten Veränderungen am System durch, sonst verfällt die Garantie. Wenden Sie sich für Wartung oder Reparatur bitte an die für Sie zuständige Geschäftsstelle von Emerson. So stellen Sie sicher, dass alle sicherheitsrelevanten Aspekte beachtet werden.

Emerson und unsere Zulieferer unternehmen größte Anstrengungen um sicherzustellen, dass sich Pins und Stecker von Boards vor dem Verlassen der Produktionsstätte in einwandfreiem Zustand befinden. Verbogene Pins, verursacht durch fehlerhafte Installation oder durch Installation von Boards mit beschädigten Steckern kann die durch Emerson gewährte Garantie für Boards und Backplanes erlöschen lassen.

Dieses Produkt wird mit gefährlichen Spannungen betrieben, die zu Verletzungen und Tod führen können. Seien Sie im Umgang mit dem Produkt und beim Testen und Anpassen des Produktes und seiner Komponenten äußerst vorsichtig.

Betrieb

Beschädigung des Systems
Hohe Luftfeuchtigkeit und Kondensat auf den Oberflächen der Produkte kann zu Kurzschlüssen führen.
Betreiben Sie die Produkte nur innerhalb der angegebenen Grenzwerte für die relative Luftfeuchtigkeit und Temperatur und stellen Sie vor dem Einschalten des Stroms sicher, dass sich auf den Produkten kein Kondensat befindet.

System Installation

Beschädigung von Schaltkreisen
Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau des Produktes kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen.
Bevor Sie das Produkt oder elektronische Komponenten berühren, vergewissern Sie sich, daß Sie in einem ESD-geschützten Bereich arbeiten.

Beschädigung des Produktes und der Zusatzmodule
Fehlerhafter Ein- oder Ausbau von Zusatzmodulen führt zu Beschädigung des Produktes oder der Zusatzmodule.
Lesen Sie deshalb vor dem Ein- oder Ausbau von Zusatzmodulen die Dokumentation und benutzen Sie angemessenes Werkzeug.

Umweltschutz

Umweltverschmutzung
Falsche Entsorgung der Produkte schadet der Umwelt.
Entsorgen Sie alte Produkte gemäß der in Ihrem Land gültigen Gesetzgebung und den Empfehlungen des Herstellers.

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