Specifications

General Specifications

Embedded CPU + Chipset : ZFx86 Failsafe 586 32-bit CPU core operating at 133, 100, 66 and 33 MHz with 32-bit 33MHz PCI rev 2.1 compliant Northbridge and Southbridge FailSafe internal Boot ROM that allows execution of multiple instruction sets: DRAM clear, Flash erase, executable load and run, Provides permanent and fail-safe mechanism

External BIOS : Phoenix Embedded PC BIOS with RS-232 console redirection for headless BIOS access

DRAM Memory : 32 MB Synchronous DRAM on board

Bus Interfaces :
ISA bus - 8.3 MHz (PC/104)
PCI 32 bit 33MHz rev. 2.1 compliant (internal)

Enhanced IDE : supports two ports and up to four ATAPI devices with Ultra DMA (ATA-4) support two 44-pin IDE connector for 2.5" (laptop-size) HDD/Flash IDE drive including power

Watchdog Timer : Embedded application Dual Watchdog Timer (WDT) with SW and HW control of the WDT event 16 bit counter primary watch-dog connected to SW IRQ/NMI/SMI reset by Watch Dog Timer Input (WDI). Second 8 bit counter output connected to H/W reset line enabled by primary counter output

Real-time Clock : Built-in chipset with lithium battery backup for 10 years of data retention.

Digital I/O : 16-bit GPIO, 8 independent GPI and 8 independent GPO programamble by software.

Dual Network Controller

Chipset : Dual RTL8139C, 10/100 Mbps, autoswitching

Connector : two 10-pin onboard headers

High Speed Multi I/O

Serial Ports : three high speed RS-232C ports (COM1/3/4) and one jumper selectable RS-232C/422/485 (COM2) with 16C550 compatible UART and 16 byte FIFO, all provide jumper selecable +5V/+12V DC power

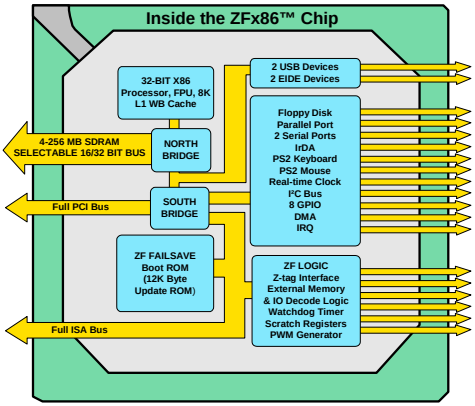
USB : 2 ports USB 1.1 and OpenHCL compl.

Floppy Disk Drive Interface : supports ome 3‰" floppy disk drive

Bi-directional Parallel Port : supports SPP, EPP and ECP mode.BIOS enabled/disabled

Keyboard and Mouse Connectors :
onboard 10-pin mini header for AT Keyboard and PS2 Mouse

Inside the ZFx86 Chip



Flash Disk DiskOnChipfi2000

Package : Single Chip Flash Disk in 32-pin DIP JEDEC

SSD Interface

SSD Type : One compact flash Socket supports Type I/II Compact flash Cards (CFC)

VGA Interface

Chipset : SMI SM712G4AA LynxEM4+ 33 MHz PCI bus with 4 MB memory on dye

Display Type : CRT, TFT, DSTN,
VGA, VGA, SVGA, XGA and SXGA

Environmental and Power

Power Requirements :
based on 32 MB DRAM and 8 MB Flash disk

33 Mhz	-> 5 V @ 0.9 A
66 Mhz	-> 5 V @ 0.95 A
100 Mhz	-> 5 V @ 1 A (default)
133 Mhz	-> 5 V @ 1.2 A (over-clocked)

Board Dimensions : 145 x 102 mm.

Board Weight : 0.24 Kg

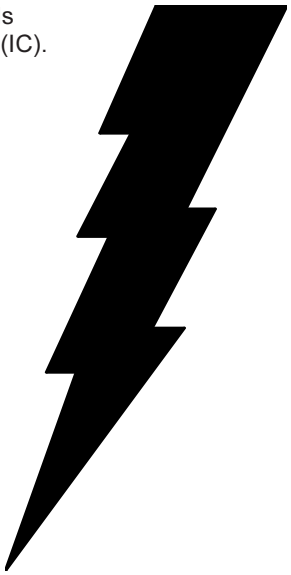
Operating Temperature : 0 to 60°C (32 to 140°F)

OS Compatibility : Linux, DOS, VxWorks, many RTOS, Windows CE, Windows 9x, and Windows NT

Warning

Single Board Computers and Miniboards contain very delicate Integrated Circuits (IC). To protect these components against damage from static electricity, always follow the following precautions when handling them :

1. Disconnect your board from the power source when you want to work on the inside
2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry
3. Use a grounded wrist strap when handling computer components.
4. Place the board on a grounded antistatic pad or on the bag that came with the it, whenever it is separated from the system.

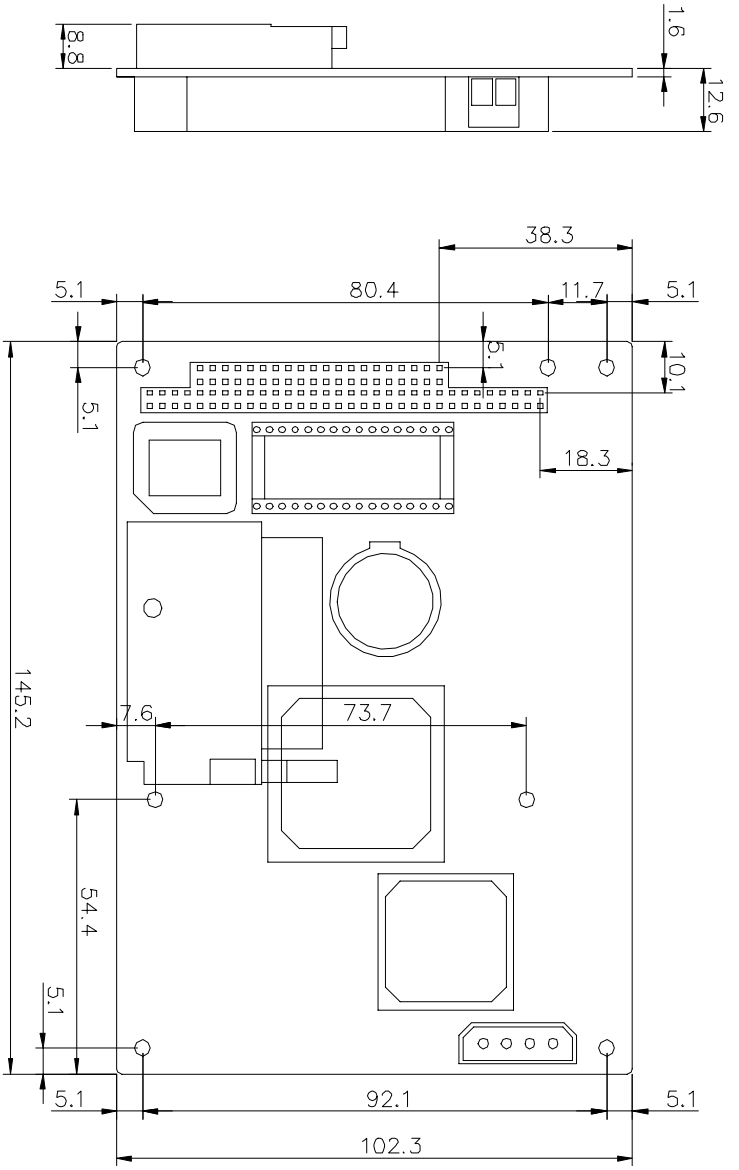


Ordering Codes

EmCORE-i411DVL2:
3‰" Embedded ZFx86 Miniboard with Flat Panel Display Controller, Dual Ethernet, DiskOnChip socket and CompactFlash socket (includes 32 MB onboard SDRAM)

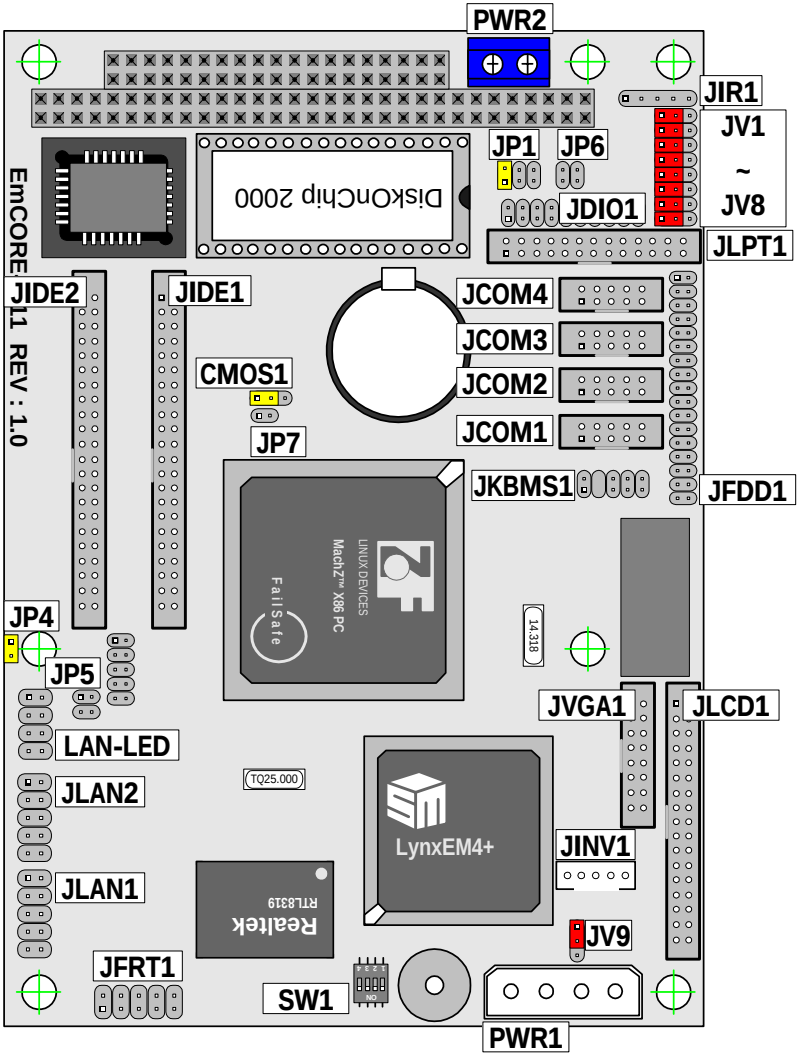
Product Image

Dimensions



EmCORE-i411 with passive cooling element

Board Layout Front



Jumper/Connector Quick Reference

Jumpers

JP6 CPU Clock select

1-2	3-4		
on	on	->	33 MHz
off	on	->	66 MHz
on	off	->	133 Mhz
off	off	->	100 MHz

JP7 CPU Core select

on	->	2.7
off	->	D8000h

CMOS1 RTC/CMOS Operation

1-2	->	Normal Operation
2-3	->	Clear CMOS

JP1 COM2 Mode Select

1-2	->	RS-232
2-3	->	RS-485
3-4	->	RS-422

JV8 COM1 Pin 1 Voltage

1-2	->	RS-232 signal DCD#
2-3	->	5 V

JV7 COM1 Pin 9 Voltage

1-2	->	RS-232 signal RI#
2-3	->	12 V

JV6 COM2 Pin 1 Voltage

1-2	->	RS-232 signal DCD#
2-3	->	5 V

JV5 COM2 Pin 9 Voltage

1-2	->	RS-232 signal RI#
2-3	->	12 V

JV4 COM1 Pin 1 Voltage

1-2	->	RS-232 signal DCD#
2-3	->	5 V

JV3 COM1 Pin 9 Voltage

1-2	->	RS-232 signal RI#
2-3	->	12 V

JV4 COM1 Pin 1 Voltage

1-2	->	RS-232 signal DCD#
2-3	->	5 V

JV3 COM1 Pin 9 Voltage

1-2	->	RS-232 signal RI#
2-3	->	12 V

JP4 CF Card Select

on	->	Master
off	->	Slave

JP5 LAN Enable/Disable

	on	off
1-2	LAN1 enabled	LAN1 disabled
2-3	LAN2 enabled	LAN1 disabled

JV9 LCD Voltage

1-2	->	5 V
2-3	->	3.3 V

Connectors

IDE1	Primary IDE (44-pin)
IDE2	Secondary IDE (44-pin)
JFDD1	FDD interface
JCOM1	COM 1 (RS-232)
JCOM2	COM 2 (RS-232)
JCOM3	COM 3 (RS-232)
JCOM4	COM 4 (RS-232)
JKBMS1	Keyboard/Mouse
JLPT1	Primary Parallel Port
JVGA1	CRT SVGA
JLCD1	LCD SVGA (34-pin)
JINV1	LCD Inverter Control
JLAN1	LAN1 10/100 Mbps
JLAN2	LAN2 10/100 Mbps
JDIO1	16-bit Digital I/O
JUSB1	Dual USB Port
JAUDIO1	Audio Port
PWR1	Power Connector
PWR2	Power Connector
JIR1	IrDA Header

CPU and CMOS Settings

CPU Speed and Voltage

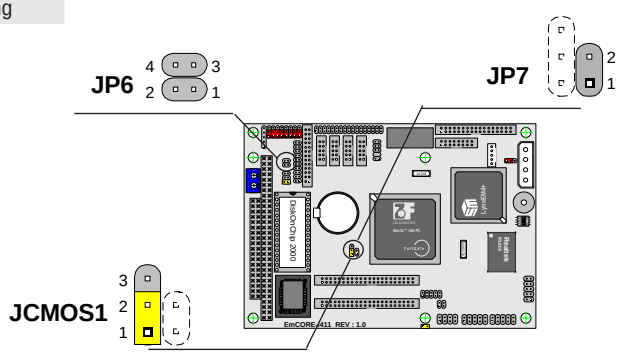
Onboard jumpers are provided to set the CPU's speed and adjust the CPU voltage fpr speed selection. Altough it is possible to let the CPU run at 133 MHz this is actually overclocking whereby additional cooling is needed !

Connector:JP6 (speed selection)
Type:onboard 4-pin header

Connector:JP7 (voltage selection)
Type:onboard 2-pin header

Mode	**JP6**	1-2	3-2	**JP7**	1-2	
33 Mhz		on	on		on	(2.28 V)
66 Mhz		off	on		on	(2.28 V)
100 Mhz		off	off		on	(2.28 V)
133 Mhz		on	off		off	(2.75 V)

default setting



CMOS Operation(CMOS1)

If the EmCORE-i411 refuses to boot due to inappropriate CMOS settings here is how to proceed to clear (reset) the CMOS to its default values

Connector:JCMOS1
Type:onboard 3-pin header

Mode	**JCMOS1**
Normal Operation	1-2
Clear CMOS	2-3

default setting

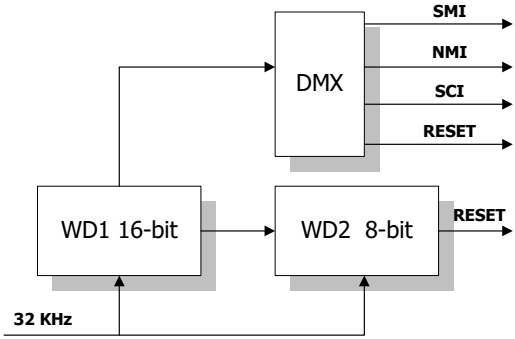
Dual Watchdog Timer

The watchdog timer checks against possible failures and bugs in the application program or operating system that make the system uncontrollable. Both watchdog timers generate events to notify the system of an error condition. These timers are individually initialized to a preset value.

After initialization, WD1 begins a countdown that is reset to the initial value by software writing into the watchdog control register (tickle function). If WD1 reaches zero, it indicates that the software has been unable to reset the timer in the allotted time and an event is generated to take corrective actions or to reset the device.

Once the first watchdog timer (WD1) expires, the software can attempt to gain control of the system using an interrupt handler routine triggered by any of the events connected to the WD1 output line. If the software is successful, the program can resume as normal.

The expired WD1 counter also enables the second watchdog counter (WD2). The second WDT is used to monitor the success of the software recovery mechanism initialized by WD1. If the second watchdog timer also expires it triggers a hardware system reset.



Operation of the Watchdog timer is desciribed in the :

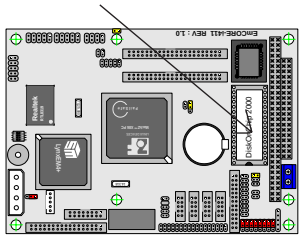
"ZF86 System-on-a-Chip Databook".
to be found on your support CDROM.

Note that the EmCORE-i411 design deviates from the generic watchdog timer function as specified in the Databook in that it does not support a hardware watchdog initialization pin. The EmCORE-i411 only (re)initialization by software. Further the watchdog hardware output line is not implemented.

DiskOnChip® 2000 Flash Disk

Installation Instructions

1. Make sure the EmCORE-i411 is powered OFF.
2. Plug the DOC (DiskOnChip 2000) device into its socket. Verify the direction is correct (pin 1 of the DiskOnChip 2000 is aligned with pin 1 of the socket)
3. Power up the system



4. Press F2 to Enter the Phoenix BIOS Setup

go to **Advanced**

Advanced Chipset Control

ISA Memory Chip Select Setup

In this window configure the second entry called :

Memory Window - mem_cs1

Base address options are D4000, D8000 or DC000 all with size of 8K (1000h)

Save the settings and continue booting.

5. During power up you may observe a message displayed by the DOC when its drivers are automatically loaded into system s memory
6. At this stage the DOC can be accessed as any disk in the system
7. If the DOC is the only disk in the system, it will appear as the first disk (drive C: in DOS)
8. If there are more disks besides the DOC, the DOC will appear by default as the last drive, unless it was programmed as first drive. (please refer to the DOC utilities user manual)
9. If you want the DOC to be bootable:
   a - copy the operating system files into the DOC by using the standard DOS command (for example: sys d:)
   b - The DOC should be the only disk in the systems or should be configured as the first disk in the system (c:) using the DUPDATE utility

For more information on DiskOnChip2000, visit M-Systems Web site at

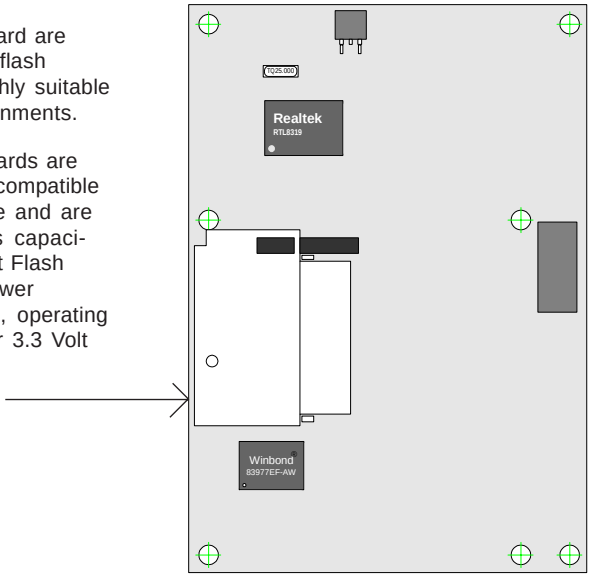
http:// www.m-sys.com

where you can find Utilities Manual, Data Sheets and Application Notes. In addition, you can find the latest DiskOnChip 2000 S/W Utilities

Compact Flash Slot

Compact Flash Card are small, removable flash memory card, highly suitable for rugged environments.

Compact Flash Cards are the smallest ATA compatible solutions available and are offered in various capacities. The Compact Flash Card is a low power consumption card, operating from a single 5 or 3.3 Volt power supply.

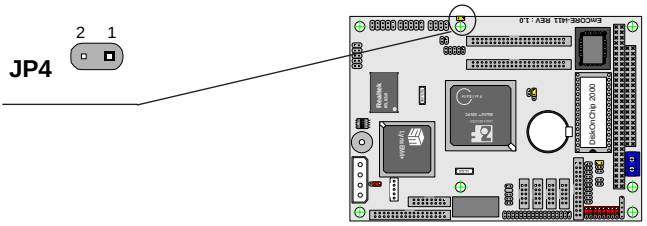


Backside of EmCORE-i411

Master / Slave Selection on IDE1 (JP4)

IDE Mode	JP4
Master	on
Slave	off

default setting

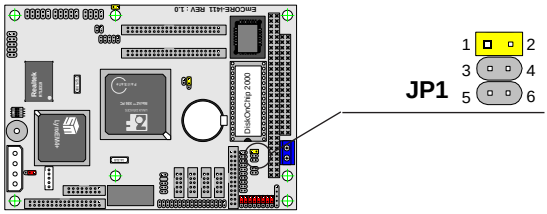


Serial Port Configuration

The first and second serial port are handled by the BIOS. The third and fourth port are not handled by the BIOS and can only be used after being initialized by a small program that should be exceuted during boot time.

RS-232/422/485 Mode on COM2 (JP1)

The onboard COM2 port can be configured to operate in RS-485 mode or in four different RS-422 modes. RS-422 modes differ in the way RX/TX is being handled. Jumper JCOM1 determines between RS-232 or RS-422/485 and assigns the different RS-422 modes.



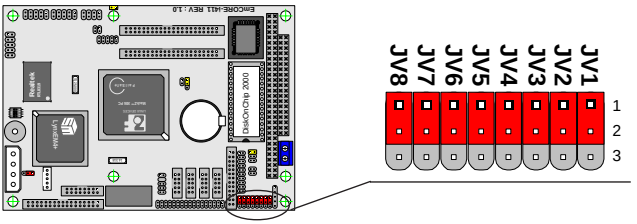
COM2 Mode Selection (JP1)	1-2	3-4	5-6
RS-232C	on	off	off
RS-485	off	on	off
RS-422	off	off	on

default setting

RS-232c Standard and POS Modes (JV2~JV9)

All onboard COM ports can be configured to operate in standard RS-232c mode or in POS (Point-of-Sale) RS-232c mode. POS devices normally need an additional power supply signal (5V or 12V) to be able to power the device (LCD, cash drawer or printer) without additional wiring.

There are three seperate POS modes :
- RS-232 with 5V on pin 1
- RS-232 with 12V on pin 9
- RS-232 with 5V on pin 1 and 12V on pin 9



COM1 RS-232 Mode	**JV2**	**JV3**
Standard	1-2	1-2
POS : 12 V on pin 9	1-2	2-3
POS : 5 V on pin 1	2-3	1-2
POS : 5 V on pin 1 and 12 V on pin 9	2-3	2-3

COM2 RS-232 Mode	**JV4**	**JV5**
Standard	1-2	1-2
POS : 12 V on pin 9	1-2	2-3
POS : 5 V on pin 1	2-3	1-2
POS : 5 V on pin 1 and 12 V on pin 9	2-3	2-3

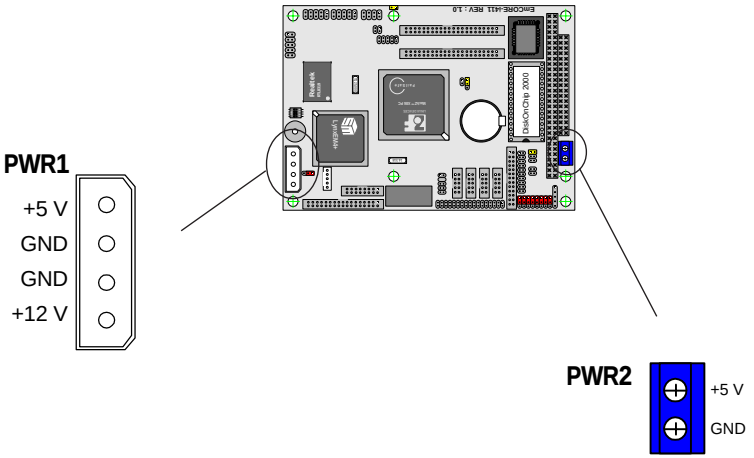
COM3 RS-232 Mode	**JV6**	**JV7**
Standard	1-2	1-2
POS : 12 V on pin 9	1-2	2-3
POS : 5 V on pin 1	2-3	1-2
POS : 5 V on pin 1 and 12 V on pin 9	2-3	2-3

COM4 RS-232 Mode	**JV8**	**JV9**
Standard	1-2	1-2
POS : 12 V on pin 9	1-2	2-3
POS : 5 V on pin 1	2-3	1-2
POS : 5 V on pin 1 and 12 V on pin 9	2-3	2-3

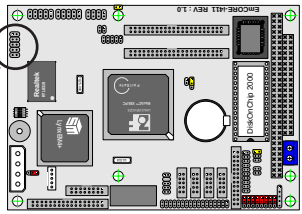
default setting

Power Connectors

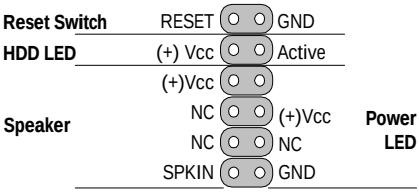
The EmCORE-i411 has to power connectors. Altough the board itself can run on a 5 Volt power source only the LCD power inverter supply source needs an addtional 12 Volt. When not using the inverter source a 5 Volt power source is sufficient !



Switches and Indicators

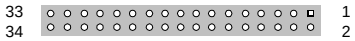


JFRT1



Interface Connectors HDD, FDD

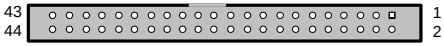
Floppy Disk Drive (JFDD1)



Connector : **JFDD1**
Type : Onboard 34-pin header

Pin	Description	Pin	Description
1	GND	2	DRIVE DENSITY SELECT 0
3	GND	4	DRIVE DENSITY SELECT 1
5	GND	6	N/C
7	GND	8	INDEX-
9	GND	10	MOTOR ENABLE A-
11	GND	12	DRIVER SELECT B-
13	GND	14	DRIVER SELECT A-
15	GND	16	MOTOR ENABLE B-
17	GND	18	DIRECTION-
19	GND	20	STEP-
21	GND	22	WRITE DATA-
23	GND	24	WRITE GATE-
25	GND	26	TRACK 0-
27	GND	28	WRITE PROTECT-
29	GND	30	READ DATA-
31	GND	32	HEAD SELECT-
33	GND	34	DISK CHANGE-

Enhanced IDE Connector (JIDE1 / JIDE2)



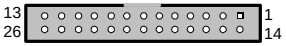
44-pin (2.0 pitch) box header for 2.5" (laptop-size) HDD/Flash IDE drive includinging power signals

Connectors : **JIDE1 / JIDE2**
Type : onboard 44-pin box header, secondary IDE

Pin	Description	Pin	Description
1	RESET	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	N/C
21	REQ	22	GND
23	IOW-/STOP	24	GND
25	IOR-/HDMARDY	26	GND
27	IORDY/DDMARDY	28	IDESEL
29	DACK-	30	GND
31	IRQ	32	N/C
33	A1	34	CBLID
35	A0	36	A2
37	CS0(MASTER CS)	38	CS1(SLAVE CS)
39	LED ACT-	40	GND
41	Vcc	42	Vcc
43	GND	44	GND

Peripheral Ports

Parallel Port (JLPT1)



Connector : **JLPT1**
Type : Onboard 26-pin header

	Pin	Description	Pin	Description
	1	STROBE-	14	AUTO FEED-
	2	DATA0	15	ERROR-
	3	DATA1	16	INITIALIZE-
	4	DATA2	17	SELECT INPUT-
	5	DATA3	18	GND
	6	DATA4	19	GND
	7	DATA5	20	GND
	8	DATA6	21	GND
	9	DATA7	22	GND
	10	ACKNOWLEDGE-	23	GND
	11	BUSY	24	GND
	12	PAPER EMPTY	25	GND
	13	SELECT+	26	N/C

Dual USB Port (JUSB1)

Connector: **JUSB1**
Type:onboard 10-pin header for two USB ports

Pin	**Description**	**Pin**	**Description**
1	VCC	2	VCC
3	DATA0-	4	DATA1-
5	DATA0+	6	DATA1+
7	GND	8	GND
9	GND	10	GND

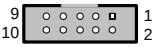
IrDA (JIR1)

Connector : **JIR1**
Type : onboard 5-pin header

	Pin	Description	Pin	Description
	1	Vcc	3	IRRX
	2	NC	5	IRTX
	4	GND		

Onboard RS-232 Serial Ports (JCOM1/2/3/4)

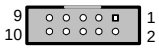
Connector : **JCOM1, JCOM2, JCOM3, JCOM4**
Type : onboard 10-pin boxheaders



COM1	Pin	Description	Pin	Description
	1	DCD (or +5 V)	2	RXD
	3	TXD	4	DTR
	5	GND	6	DSR
	7	RTS	8	CTS
	9	RI (or +12 V)	10	N/C
COM2				
	1	DCD (or +5 V)	2	RXD
	3	TXD	4	DTR
	5	GND	6	DSR
	7	RTS	8	CTS
	9	RI (or +12 V)	10	N/C
COM3				
	1	DCD (or +5 V)	2	RXD
	3	TXD	4	DTR
	5	GND	6	DSR
	7	RTS	8	CTS
	9	RI (or +12 V)	10	N/C
COM4				
	1	DCD (or +5 V)	2	RXD
	3	TXD	4	DTR
	5	GND	6	DSR
	7	RTS	8	CTS
	9	RI (or +12 V)	10	N/C

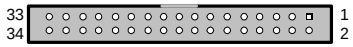
JCOM2 Port in RS-422/485 mode (set by JP1 !)

Connector : **JCOM2**
Type : onboard 10-pin header (COM2)



COM2	Pin	RS-422 mode	RS-485 mode
	1	TXD+	RTXD+
	2	TXD-	RTXD-
	3	RXD+	RTXD+
	4	RXD-	RTXD-
all other pins are not connected			

Flat Panel VGA (JLCD1)



Connector : **JLCD1**
Type : Onboard 34-pin box header

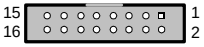
Pin	Description	Pin	Description
1	GND	2	GND
3	GND	4	Vcc (3.3 V or 5 V)
5	FPD0	6	FPD1
7	FPD2	8	FPD3
9	FPD4	10	FPD5
11	FPD6	12	FPD7
13	FPD8	14	FPD9
15	FPD10	16	FPD11
17	FPD12	18	FPD13
19	FPD14	20	FPD15
21	FPD16	22	FPD17
23	FPD18	24	FPD19
25	FPD20	26	FPD21
27	FPD22	28	FPD23
29	FPEN	30	M
31	FSCLK	32	FLM
33	GND	34	NP

Inverter Connector (JINV1)

Connector : **JINV1**
Type : Onboard 5-pin mini boxheader

Pin	**Description**	**Pin**	**Description**
1	+12 V	2	GND
3	on/off	4	brightness control
5	GND		

CRT SVGA (JVGA1)



Connector : **JVGA1**
Type : onboard 16-pin header

	Pin	Description	Pin	Description
	1	RED	2	GREEN
	3	BLUE	4	N/C
	5	GROUND	6	GROUND
	7	GROUND	8	GROUND
	9	N/C	10	GROUND
	11	N/C	12	VDDAT
	13	HSYNC	14	VSYNC
	15	VDCCLK	16	N/C

Keyboard (JKBMS1)

Connector : **JKBMS1**
Type : Onboard 10-pin header

Pin	**Description**	**Pin**	**Description**
1	KB-DATA	2	MS-DATA
3	N/C	4	NC
5	GND	6	GND
7	Vcc	8	Vcc
9	KB-CLK	10	MS-CLK

16-bit General Purpose I/O (JDIO1)

Connector : JDIO1
Type : Onboard 20-pin header