

EM104V1 PC/104 Single Board Computer

- ARM920T Single-board Computer based upon Samsung S3C2410A
- PC/104-compliant form factor
- ADC, PWM, LCD/TSP, UART, IIS, SPI, I2C, USB, Ethernet, SD/MMC, Jtag...
- Provided with Linux2.6.14 BSP

The EM104V1 is a standard PC/104-compliant industrial control board based on Samsung S3C2410A microcontroller. The board has a flexible design with a tiny CPU board mounted on a carrier board. The CPU board we called [Mini2410-III](#) has an ARM9 CPU, 64M SDRAM, 64M Nand Flash, 2M Nor Flash and 128K SRAM on it and implements the most functions of the EM104V1.

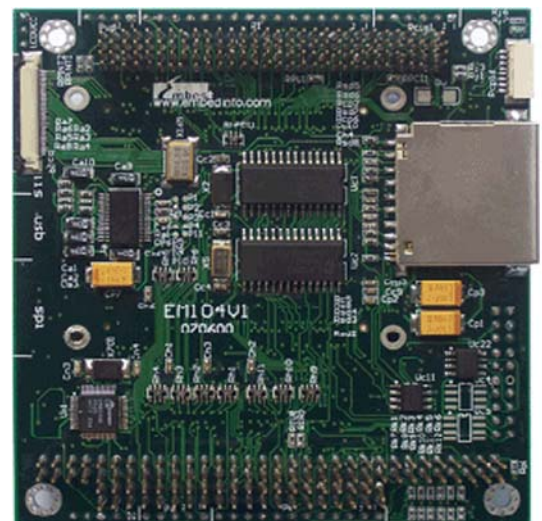
The carrier board offers features in addition to those provided by the CPU board including Ethernet, 4*8 matrix Keyboard and 2-channel CAN bus. Data transmission between the carrier board and the CPU board is through the 4mm height, 0.6mm space, 140-pin board-to-board connectors and a broad line of peripherals interfaces have been brought out including ADC, PWM, LCD/TSP, UART, IIS, SPI, Watchdog, I2C, USB, SD/MMC and JTAG. Up to 40 I/Os have been extended, 34 of which are derived from CPLD and other 6 are from the CPU board. The EM104V1 contains one PC/104 and one PC/104+ expansion connectors and make it available to connect with a wide range of standard peripheral cards.

Embest offers some accessories with this board including two Ethernet port expansion boards, one dual-ports USB cable and one serial cable.

Embest provides Linux 2.6.14 BSP for this board. The board is capable of supporting various file systems including ROM/CRAM/EXT2/FAT32/NFS/YAFFS and yaffs is the root file system. Also many drivers like Ethernet, USB Host, Serial ports, SD/MMC, Audio, I2C bus, SPI, ADC and PWM are available for customers.



Top View



Bottom View

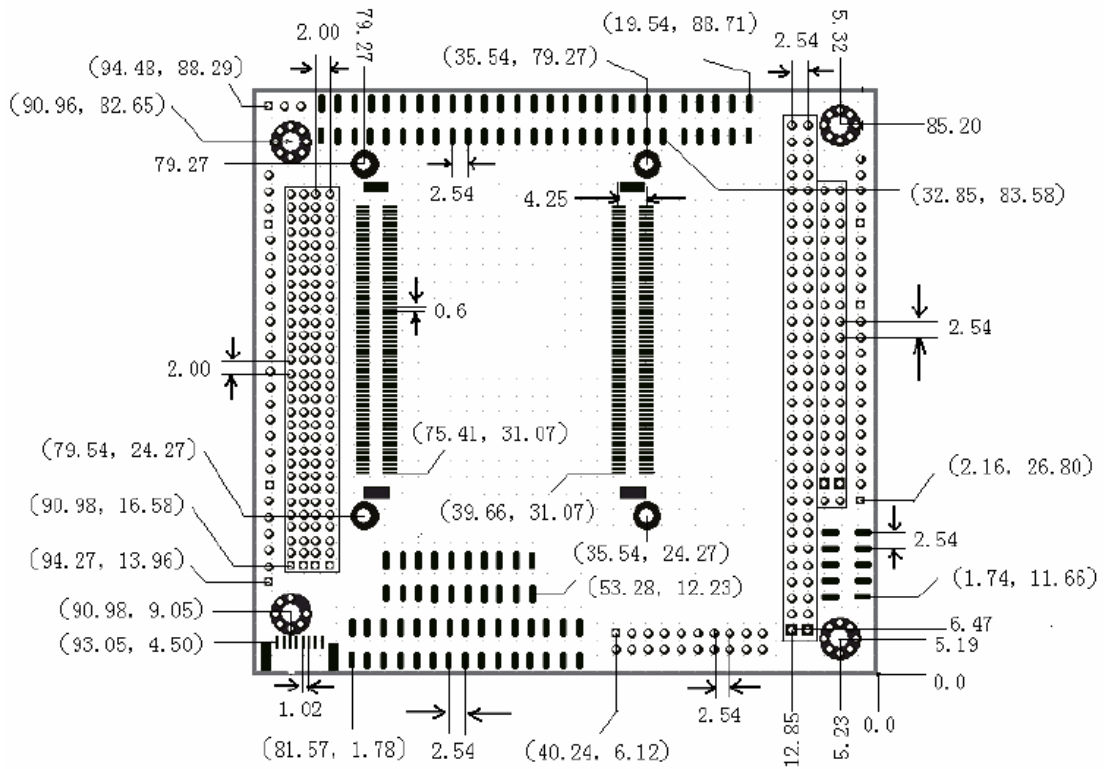
Hardware Description

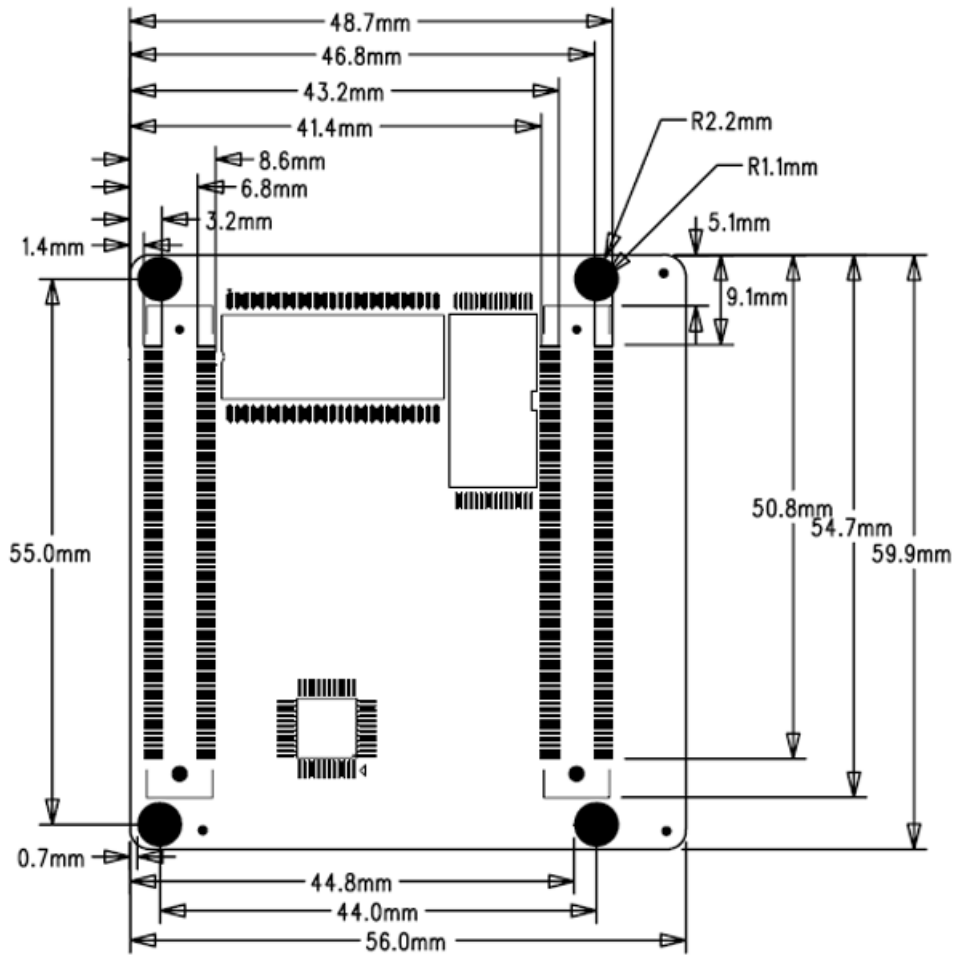
The S3C2410A processor consists of 16-/32-bit RISC (ARM920T) CPU core, separate 16KB instruction and 16KB data cache, MMU to handle virtual memory management, LCD controller (STN & TFT), NAND flash booting, System Manager (chip select logic and SDRAM controller), 3-ch UART, 4-ch DMA, 4-ch Timers with PWM, I/O ports, RTC, 8-ch 10-bit ADC and touch screen interface, IIC-BUS interface, IIS-BUS interface, USB host, USB device, SD host & multimedia card interface, 2-ch SPI and PLL for clock generation.

The EM104V1 exposes many of these features to the user in support of developing specific solutions. This board is characterized as follows:

- Dimensions: 90mm x 96mm (carrier board), 56mm x 59.9mm (CPU board)
- Working temperature: 0~70 Celsius
- Power supply: +5V
- Samsung S3C2410A (ARM920T core with MMU capable of 203 MHz operation, normally CPU works at 200MHz)
- 64Mbyte SDRAM (32Mbyte for option)
- 64Mbyte Nand Flash (32Mbyte for option)
- 2Mbyte Nor Flash
- 128Kbyte SRAM
- LCD/TSP interface (supports STN or TFT LCD)
- 1 standard PC104 connector
- 1 standard PC104+ connector
- 3 RS232 serial ports
- Audio input and output
- 4-channel PWM signal output
- 4-channel ADC (precision up to 500KSPS/10bit)
- 2-channel CAN bus
- 2-channel SPI interface
- 2 10/100M Ethernet interface (DM9000AE)
(The two can work at the same time.)
- 2 USB Host
- SD/MMC card interface
- I2C/I2S bus
- 4*8 Keyboard interface
- 1 Reset button
- 2 1.0mm space 8-pin Jtag interface
(one on the CPU board, another one on the carrier board)
- 40 I/Os are extended
(34 of which are derived from CPLD and other 6 are from the CPU board.)

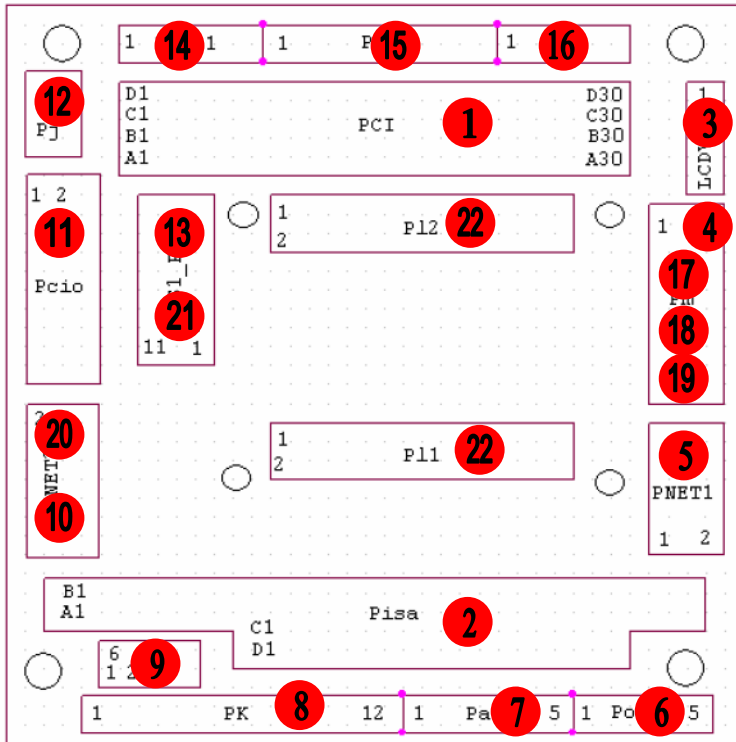
Dimension (including the carrier board and the CPU board)





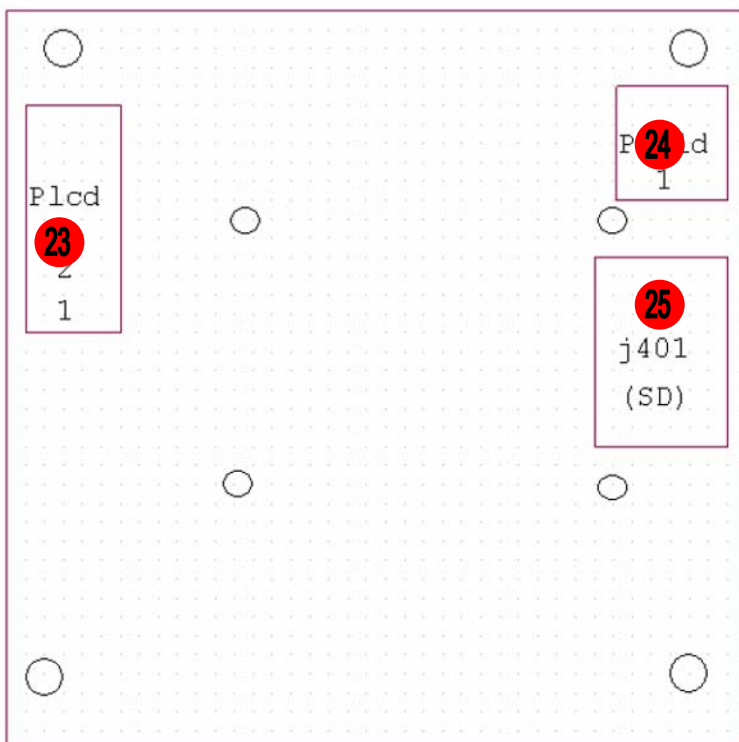
Layout of the Carrier Board (including top and bottom)

TOP



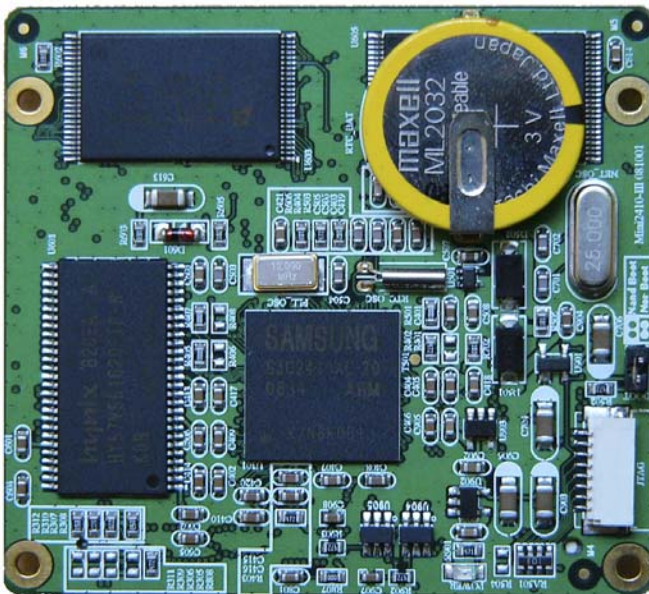
1	PC/104+ connector
2	PC/104 connector
3	LCD power (5V or 3.3V)
4	PWM
5	Ethernet interface 1
6	Power (5V or 3.3V)
7	ADC
8	4*8 Keyboard interface
9	UART (DB9, serial port 0)
10	CAN
11	I/Os
12	Jtag interface (CPU)
13	I/Os
14	I/Os
15	CPLD signals
16	USB Host
17	IIS
18	USB Host

BOTTOM

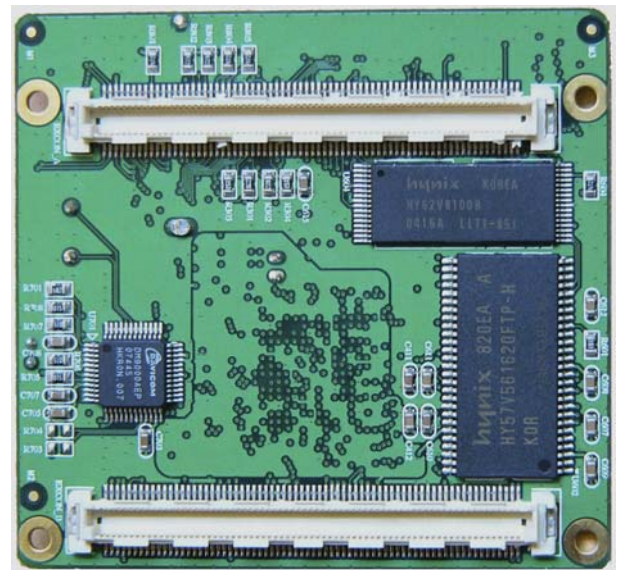


19	SPI
20	Ethernet interface 2
21	2 UARTs (serial ports 1, 2)
22	Board-to-board male connectors
23	LCD/TSP interface
24	Jtag interface (CPLD)
25	SD/MMC card socket

The CPU Board (Mini2410-III)



Top View



Back View

- ✓ Dimensions: 56mm x 59.9mm
- ✓ Temperature: 0 to +70 Celsius
- ✓ Samsung S3C2410A microcontroller based on an ARM920T CPU core with MMU
- ✓ 64Mbyte SDRAM (32Mbyte optional)
- ✓ 64Mbyte Nand Flash (32Mbyte optional)
- ✓ 2Mbyte Nor flash
- ✓ 128Kbyte SRAM
- ✓ On-chip MPLL generates the 12MHz OSC up to operate MCU at up to 203MHz
- ✓ 32768Hz RTC (Battery backed)
- ✓ 1.0mm space 8-pin JTAG interface
- ✓ LCD, AD, SPI, Uart, USB, SD/MMC Card, Ethernet (DM9000AE), IIS, I2C, RTC, PWM, GPIO, Local bus and all I/O CPU lines can be extended via two 4mm height 0.6mm space 140-pin board-to-board connectors.

Signals routed to P11) and P12

P11		CONNECTER1		P12	
RX2-	2	ETH1_RDN	ETH1_TDP	1	TX2+
RX2+	4	ETH1_RDP	ETH1_TDN	3	TX2-
VDD25T	6	ETH1_LINK10#	ETH1_LINK100#	5	nLED1
GND	8	GND	VBAT	7	
nLED2	10	ETH1_ACT#	DACK1	9	DACK1
CAN2TX	12	CAN2_TX	DREQ1	11	DRQ1
GND	14	GND	DACK0	13	DACK0
CAN2RX	16	CAN2_RX	DREQ0	15	DRQ0
CTS1	18	COM1_CTS#	PME#	17	
RTS1	20	COM1_RTS#	SUSP_IN	19	
RXD1	22	COM1_RX	VCC3_3	21	VDD33
TXD1	24	COM1_TX	COM2_RX	23	RXD2
GND	26	GND	COM2_TX	25	TXD2
RXD3	28	COM3_RX	COM4_RX	27	RXD4
TXD3	30	COM3_TX	COM4_TX	29	TXD4
DCD3	32	COM3_DCD#	SD_WP	31	SD_WP
DTR3	34	COM3_DTR#	SD_CD	33	SD_CD
DSR3	36	COM3_DSR#	SDD0	35	SDD0
GND	38	GND	SDD1	37	SDD1
CTS3	40	COM3_CTS#	SDD2	39	SDD2
RTS3	42	COM3_RTS#	SDD3	41	SDD3
RI3	44	COM3_RI#	SDCMD	43	SDCMD
AIN0	46	AIN0	SDCLK	45	SDCLK
AIN1	48	AIN1	USB3_OVC	47	
GND	50	GND	USB3_P	49	UHD2+
AIN2	52	AIN2	USB3_N	51	UHD2-
GND	54	AGND	AIN3	53	AIN3
MCS1	56	SSP1_CS#	RESET_OUT#	55	nRESET
MFRM1	58	SSP1_FRM	RESET_IN#	57	RESETIN
MOSI1	60	SSP1_DOUT	SSP1_DIN	59	MISO1
GND	62	GND	SSP1_CLK	61	MCLK1
A0	64	LB_A0	LB_A1	63	A1
A2	66	LB_A2	LB_A3	65	A3
A4	68	LB_A4	VCC3_3	67	VDD33
A6	70	LB_A6	LB_A5	69	A5
A8	72	LB_A8	LB_A7	71	A7
GND	74	GND	LB_A9	73	A9
A10	76	LB_A10	LB_A11	75	A11
A12	78	LB_A12	LB_A13	77	A13
A14	80	LB_A14	LB_A15	79	A15
A16	82	LB_A16	LB_A17	81	A17
A18	84	LB_A18	LB_A19	83	A19
GND	86	GND	LB_A21	85	A21
A20	88	LB_A20	LB_A23	87	A23
A22	90	LB_A22	LB_A25	89	A25
A24	92	LB_A24	LB_CS0	91	CS0
D0	94	LB_D0	LB_CS1	93	CS1
D2	96	LB_D2	LB_D1	95	D1
GND	98	GND	LB_D3	97	D3
D4	100	LB_D4	LB_D5	99	D5
D6	102	LB_D6	LB_D7	101	D7
D8	104	LB_D8	VCC3_3	103	VDD33
D10	106	LB_D10	LB_D9	105	D9
D12	108	LB_D12	LB_D11	107	D11
GND	110	GND	LB_D13	109	D13
D14	112	LB_D14	LB_D15	111	D15
OE	114	PCM_IOCS16#	LB_IORDY	113	IORDY
WE	116	LB_RD#	GPIO_PCM_CD_B#	115	
GND	118	LB_WR#	PCM_MEMR_C#	117	
GND	120	PCM_MEMW_D#	PCM_IOR_E#	119	
GND	122	GND	PCM_IOW_F#	121	
GND	124	PCM_CE1#	PCM_WAIT#	123	
GND	126	GPIO_PCM_CD_A#	GPIO_PCM_RST#	125	
GND	128	GPIO_PCM_INT_RDY_#	GPIO_PCM_INT_RDY_B	127	
GND	130	PCM_WE#	PCM_REG#	129	
GND	132	PCM_SKTSEL	PCM_CE2#	131	
GND	134	GND	SSP2_SOUT	133	MOSI2
MISO2	136	SSP2_IN	SSP2_CS#	135	MCS2
MFRM2	138	SSP2_FRM	SSP2_CLK	137	MCLK2
VDD50	140	VCC5	VCC3_3	139	VDD33

pl2

GND	2	GND	1	PREQ0
EINT0	4	GND	3	PGNT0
EINT1	6	GPIO1	5	PGNT1
GPIO3	8	GPIO2	7	VDD33
GPIO4	10	GPIO3	9	GPIO6
GPIO5	12	GPIO4	11	TDO
GND	14	GPIO5	13	TDI
PCLK0	16	GND	15	TCK
PREQ1	18	PCI_CLK0	17	nTRST
AD0	20	PCI_REQ#1	19	TMS
AD1	22	PCI_AD0	21	AD2
AD3	24	PCI_AD1	23	AD4
GND	26	PCI_AD3	25	AD5
AD6	28	GND	27	AD7
PCBE0	30	PCI_AD6	29	AD8
AD9	32	PCI_CBE#0	31	PINTA
AD10	34	PCI_AD9	33	PINTB
AD12	36	PCI_AD10	35	AD11
GND	38	PCI_AD12	37	AD13
AD15	40	GND	39	AD14
PFAR	42	PCI_AD15	41	PCBE1
PFERR	44	PCI_FAR	43	VDD33
PSTOP	46	PCI_PERR#	45	PSERR
PTRDY	48	PCI_STOP#	47	PDEVESEL
GND	50	PCI_TRDY#	49	PIRDY
PCBE2	52	GND	51	PFRAME
AD17	54	PCI_CBE#2	53	AD16
AD19	56	PCI_AD17	55	AD18
AD20	58	PCI_AD19	57	AD21
AD22	60	PCI_AD20	59	AD23
GND	62	PCI_AD22	61	PCBE3
AD24	64	GND	63	AD25
AD26	66	PCI_AD24	65	AD27
AD28	68	PCI_AD26	67	VDD33
AD29	70	PCI_AD28	69	AD30
AD31	72	PCI_AD29	71	TSMX
GND	74	PCI_AD31	73	TSYM
SPECL1	76	GND	75	TSXP
SPECL2	78	SPECIAL1	77	TSYP
SPECL3	80	SPECIAL2	79	SPECL10
SPECL4	82	SPECIAL3	81	SPECL11
SPECL5	84	SPECIAL4	83	SPECL12
GND	86	SPECIAL5	85	SPECL13
SPECL6	88	GND	87	SPECL14
SPECL7	90	SPECIAL6	89	STN0
SPECL8	92	SPECIAL7	91	STN1
SPECL9	94	SPECIAL8	93	STN2
LCDLP	96	SPECIAL9	95	LCDB1
GND	98	LCD_LP	97	LCDB2
LCDB3	100	GND	99	LCDB4
LCDB5	102	LCD_B3	101	LCDG0
LCDG1	104	LCD_B5	103	LCDG3
LCDG2	106	LCD_G1	105	LCDG5
LCDG4	108	LCD_G2	107	LCDR1
GND	110	LCD_G4	109	LCDFRM
LCDSCK	112	GND	111	LCDR2
LCDDDEM	114	LCD_SCK	113	LCDR5
LCDR3	116	LCD_DE_M	115	PWM2
LCDR4	118	LCD_R3	117	PWM3
PWM1	120	LCD_R4	119	PWM4
GND	122	PWM1	121	GPIO7
GPIO9	124	GND	123	GPIO8
SCK	126	GPIO9	125	CAN1TX
SDA	128	SCK	127	CAN1RX
IISDO	130	SDA	129	CDCLK
IISCLK	132	AC97_SDOUT_IN_R	131	IISDI
GND	134	AC97_BITCLK_IN_L_MIC	133	
IISLRCLK	136	AC97_SYNC_OUT_R	135	VDD33
UHD1+	138	GND	137	nUDD+
UHD1-	140	USB1_P	139	nUDD-
		USB1_N		

CONNECTER2

Software

Embest provides Linux 2.6.14 BSP for this PC/104 single board computer. Many drivers are available for this board. Please see below table.

Kernel	Linux 2.6.14
BIOS	ViVi
Supporting file system	ROM/CRAM/EXT2/FAT32/NFS/YAFFS (yaffs is the root file system)
Driver	Two Ethernets (DM9000AE)
	USB Host
	LCD (only can provide driver for Sharp 8" TFT LCD at present)
	Serial ports
	SD/MMC card
	Audio
	CAN
	I/O
	Keyboard
	IIC bus
	SPI
	PWM
ADC	

Order Information

Order No.	SAM2410T1
Item	Embest EM104V1 PC/104 Single Board Computer
Price	Please contact us for detailed information.
CD-ROM	<ul style="list-style-type: none">● Linux 2.6.14 BSP● User manual● Circuit schematic drawing● Parts datasheet
Accessories	<ul style="list-style-type: none">● 2 Ethernet expansion boards● 1 dual-ports USB cable● 1 serial cable with standard DB9 connector● 5V power adapter

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