

# MBS-SAM9G15/9G25 /9G35/9X25/9X35 User Manual

Release: V1.0 Date: 2012.04.17



## Revision history

Rev	Date	Description	by
1.0	20120417	Initial version	huangyin

## Note:

This user guide introduces the ARM embedded evaluation board produced by Embest , based on ATMEL ARM926-EJ-S-based processors as listed below:

- ✚ AT91SAM9G15
- ✚ AT91SAM9G25
- ✚ AT91SAM9G35
- ✚ AT91SAM9X25
- ✚ AT91SAM9X35

The user guide pertains to the following kit references:

- ✚ MBS-SAM9G15
- ✚ MBS-SAM9G25
- ✚ MBS-SAM9G35
- ✚ MBS-SAM9X25
- ✚ MBS-SAM9X35

The user guide gives design information on the kit and is made up of 4 sections:

- ✚ Section 1 includes a photo of the board, deliverables and applicable documents.
- ✚ Section 2 describes the hardware resource of the board.
- ✚ Section 3 describes the updating software list of the board.
- ✚ Section 4 provides the ways to contact us.

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In the passage , 9X5 serial general means 9G15,9G25,9G35,9X25,9X35.

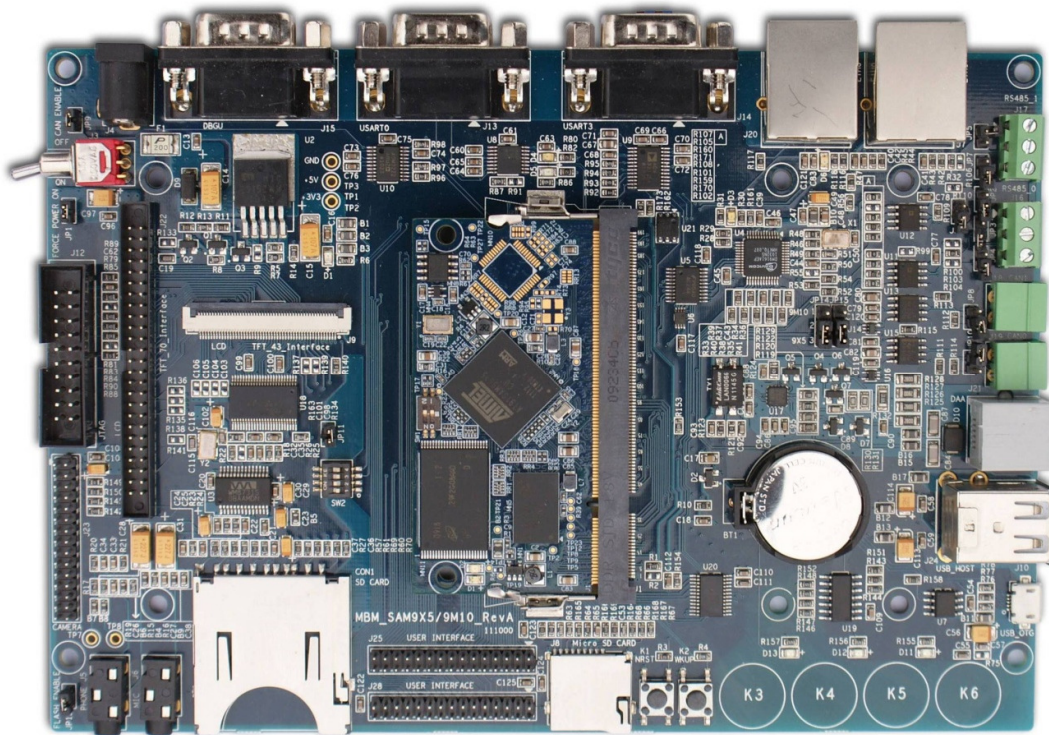
# Section 1\_Scope

## 1.1 Introduction

The MBS-SAM9X5 Series development board, which consists of two parts of the MBC-SAM9X5 core board and MBM-SAM9X5\_9M10 main board, is the Embest launched based on the development board the ATMEL AT91SAM9X5. The core board is the smallest-sized 9X5 core board to help you as much as possible to reduce the product space, you can take advantage of the core board to complete product development easily and improve time to hit the market. Using industrial-grade connectors can achieve seamless connection with the custom main board, greatly improving the stability of the product.

MBS-SAM9X5 SBC clocked up to 400MHz, the development board that supportsLinux-2.6.39 operating system debugging, angstrom, and the android-2.3.5\_r1 file system test. With 256MB NandFlash, 128MB of DDR II, 4MB serial dataflash, 64KBserial eeprom, and a rich feature set expansion: high-speed USB 2.0 (480MHz), audio input, audio output, 10/100Mbps network, the JTAG debug interface, DBGU serial Micro SD card slot, SD/MMC card interface, CMOS camera interface, support for video data acquisition.

## 1.2 Scope



### 1.3 Deliverables

NO	Items	Qty	Description	Inspection
1	MBS-SAM9X5 board	1	MBC + MBM	SC
2	Power Adapter (5V, 1.25A rating)	1	5V, 1.25A	SC
3	Micro USB Cable	1	Micro USB	SC
4	10/100 Ethernet Cable	1	Cross-over cable	SC
5	DB9-IDC10 Cable	1	Serial cable	SC
7	TFT LCD Panel	1	LCD with touch (4", 7")	SC

## Section 2\_Hardware

### 2.1 Available resource for 9x5

projects		9G15	9G25	9G35	9X25	9X35
<b>MPUs</b>		AT91SAM9G15/9G25/9G35/9X25/9X35(ARM926EJ-Score frequency 400MHz) <a href="#">learn more &lt;&lt;</a>				
<b>memory</b>		128MB SDRAM				
<b>Flash</b>		256MB nandflash; 4MB serial dataflash;				
<b>EEPROM</b>		64KB serial eeprom; 256B 1-wire eeprom *2 (MBC+MBM)				
<b>USB</b>	USB HOST	2	2	2	2	2
	USB OTG	1	1	1	1	1
<b>Audio</b>	Audio in	1	1	1	1	1
	Audio out	1	1	1	1	1
<b>NET</b>	ETH	0	1	1	2	1
<b>Camera</b>	Camera	0	1	0	0	0
<b>Uart</b>	UART interface	1	1	1	1	1
	USART interface	1	2	1	2	1
<b>JTAG</b>	JTAG	1	1	1	1	1
<b>RS485</b>	RS485	2	2	2	2	2
<b>CAN</b>	CAN	0	0	0	2	2
<b>SD card</b>	MicroSD	1	1	1	1	1
	SDCard	1	1	1	1	1
<b>telephone</b>	telephone	1	1	1	1	1
<b>LCD</b>	4.3,7.0inch LCD	1	0	1	0	1
<b>button</b>	User button*2; Q touch button*4	1	1	1	1	1
<b>RTC</b>	Back up battery	1	1	1	1	1
<b>Extended</b>	30*2pin interface	1	1	1	1	1

power	5V supply	1	1	1	1	1
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## 2.2 Core Board

### 2.2.1 Scope

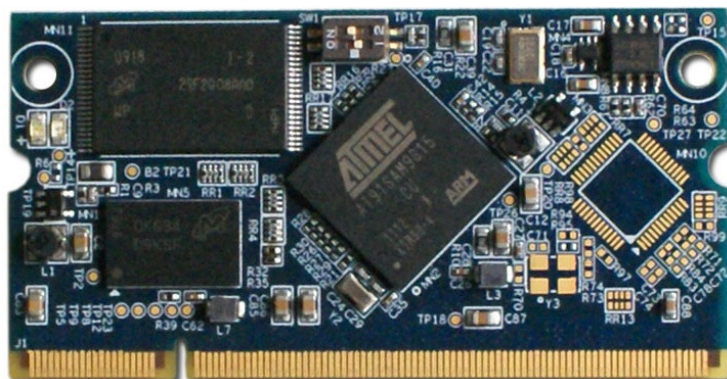


Figure 2-1 core board front

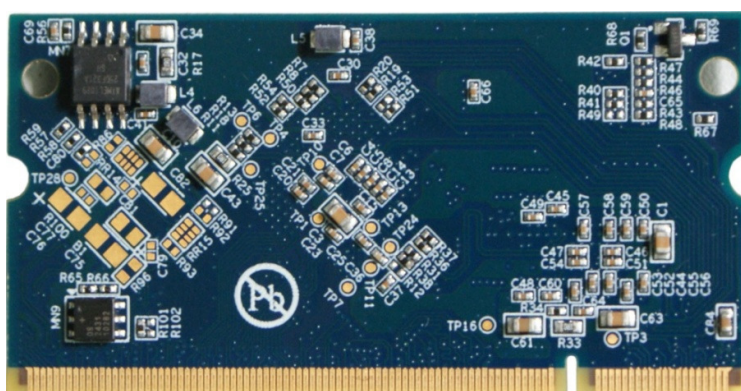
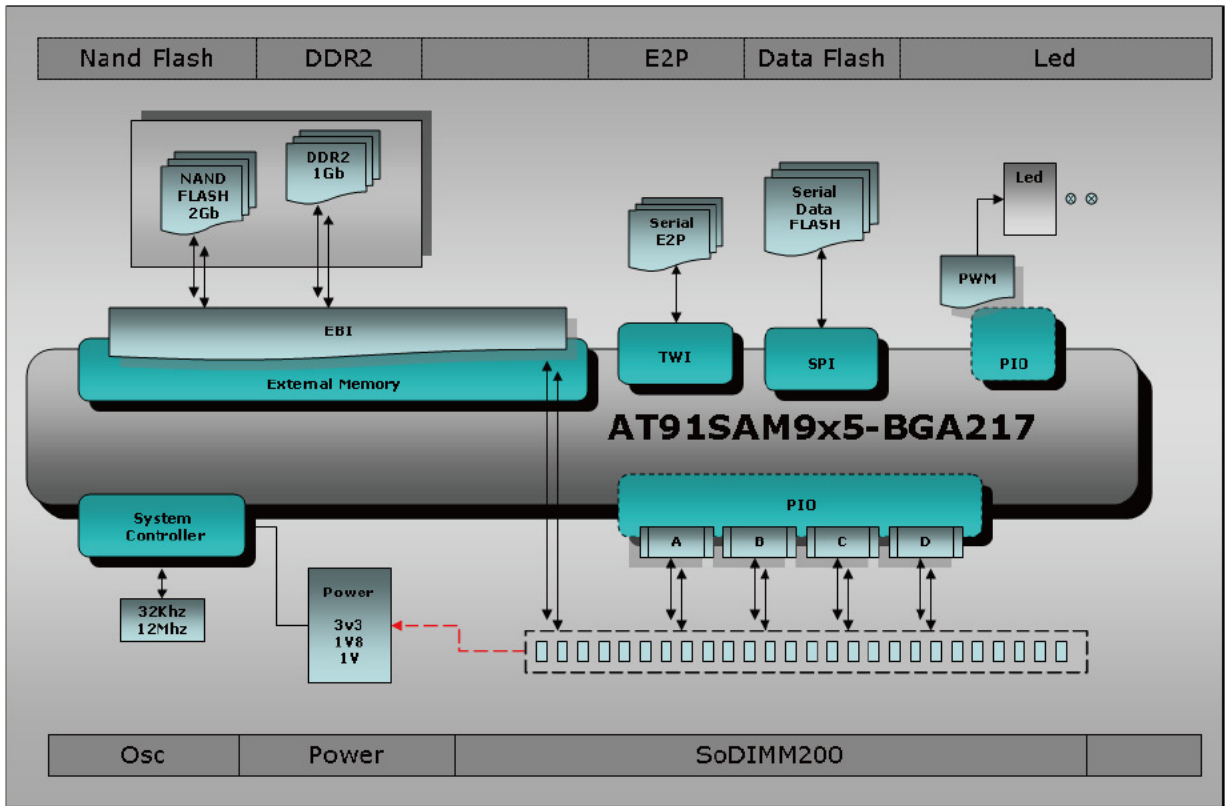


Figure 2-2 core board back

### 2.2.2 Structure



### 2.2.3 Core board resources

- ✚ Processor SAM9X5(SAM9G15/9G25/9G35/9X25/9X35)
- ✚ 12MHz
- ✚ 32.768MHz
- ✚ 128MB DDR2 memory
- ✚ 256MB nandflash memory with chip selection control switch
- ✚ 4MB SPI Serial dataflash with chip selection control switch
- ✚ 64KB EEPROM
- ✚ 256B 1-wire EEPROM
- ✚ On-board power regulation
- ✚ Two user LEDs
- ✚ Optional PHY
- ✚ SDIOIMM200 card edge interface

## 2.3 Function blocks for MBC-SAM9G15

Here we make description about function blocks of the board with some parts of the schematic. For the whole schematic please refer to [MBC-SAM9X5\\_REVB\(embest\).pdf](#) and [MBM\\_SAM9X5\\_9M10\\_RevA\(embest\).pdf](#) (direct:)



### 2.3.1 processor

SAM9G15---ARM926EJ-S<sup>TM</sup> ARM® Thumb® Processor running at up to 400 MHz, System running at up to 133 MHz

For more information about processor ATSAM9G15, please refer to **SAM9G15 Complete.pdf** or **SAM9G15**

**Summary.pdf** ()

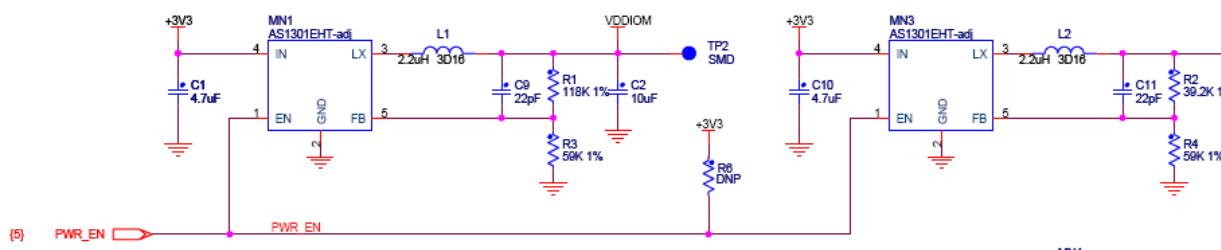
### 2.3.2 clock circuitry

Crystal for internal clock, 12MHz

Crystal for RTC clock, 32.768KHz

Crystal for Ethernet clock RMII,50MHz

### 2.3.4 Power supplies



### 2.3.5 Memory

The device serial processor features a DDR/SDR memory interface and an External Bus Interface to enable interfacing to a wide range of external memories and to almost any kind of parallel peripheral.

The EBI is connected to two kinds of memory device:

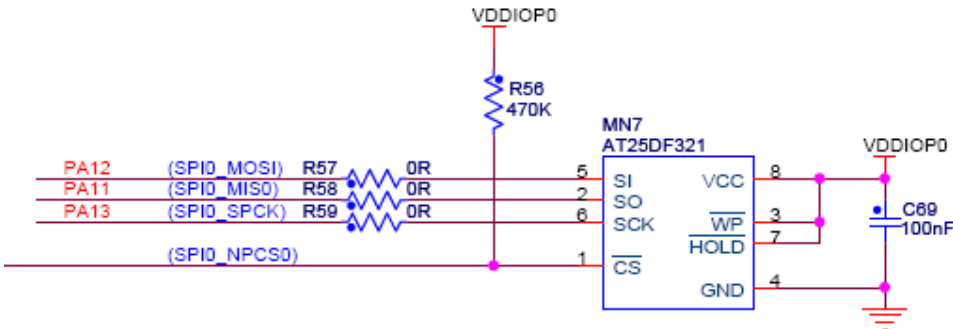
- ✚ 128MB DDR SDRAM
- ✚ 256MB nandflash





### 2.3.6 Dataflash(SPI controller)

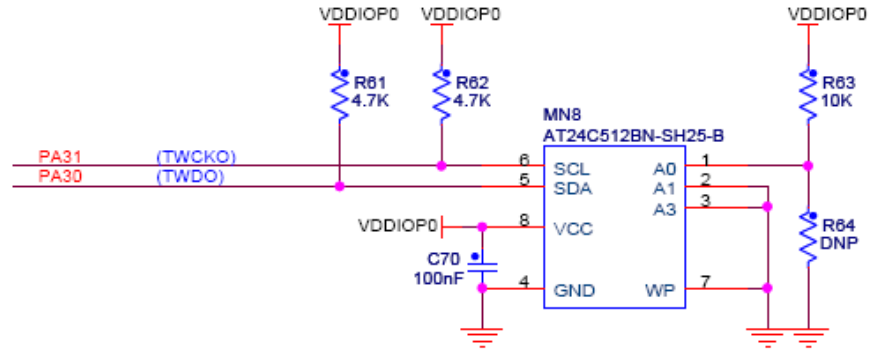
The serial processor provides two high-speed serial peripheral interface (SPI) controllers. One port is used to interface with the on-board serial Dataflash (4MB serial dataflash).



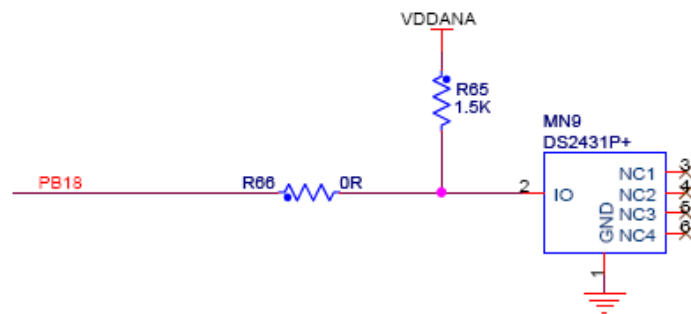
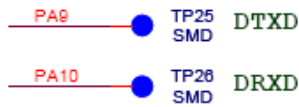
## SERIAL DATAFLASH

### 2.3.7 EEPROM(TWI controller)

The serial processor has a full speed(400KHz) master/slave TWI Serial Controller. The controller is mostly compatible with industry standard I2C and SMBus Interfaces. This port is used to interface with the on-board serial EEPROM,ISI, Qtouch device and audio codec interface.



## SERIAL EEPROM



## 1-WIRE EEPROM

### 2.3.8 1-wire EEPROM

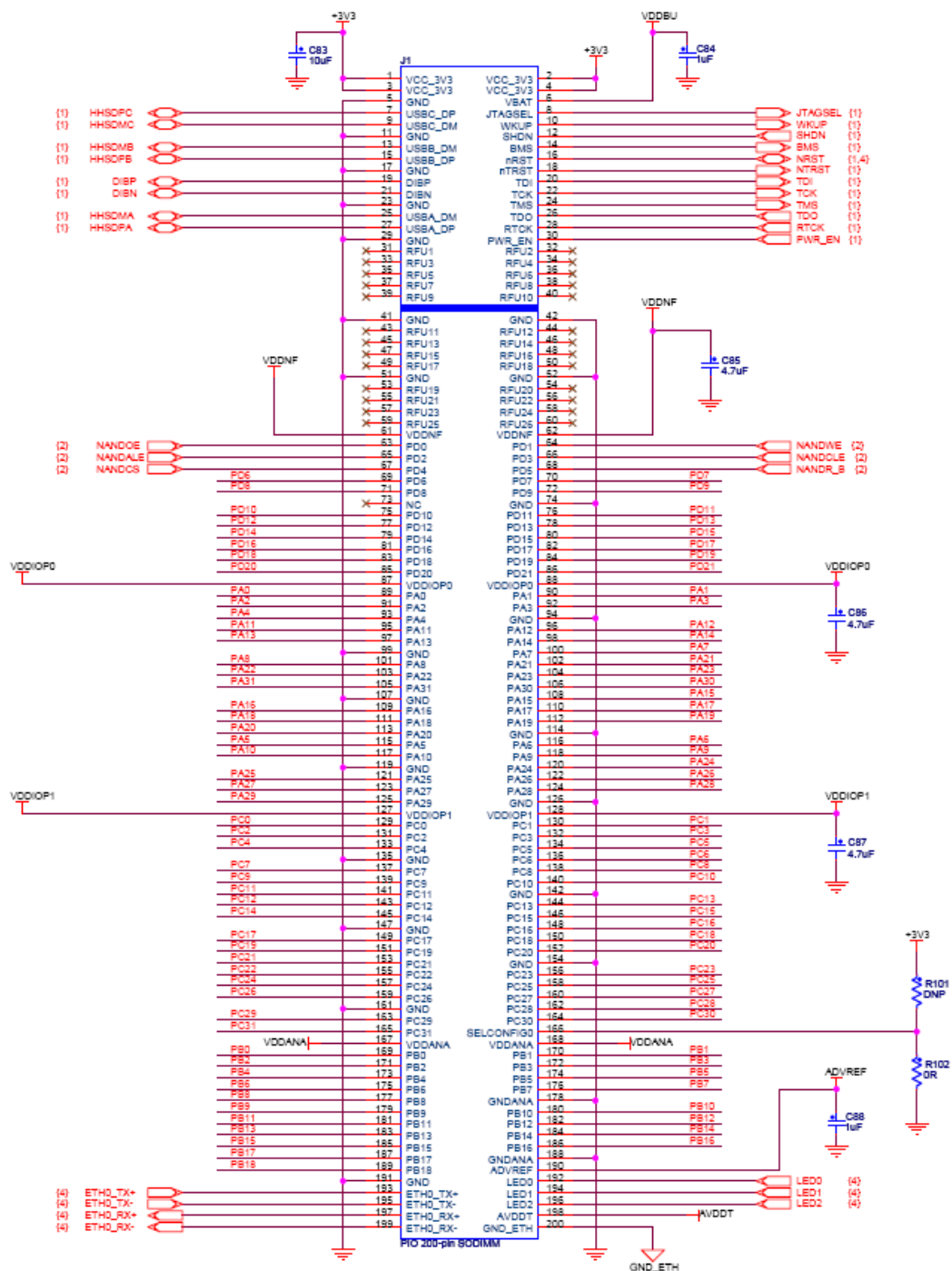
The board uses a 1-wire device as “firmware label” to store the information such as chip type, manufacturer’s name, production date etc.

### 2.3.9 Optional PHY

Some of the core boards (SAM9G15 not included) provide a location for a 10/100 Ethernet MAC/PHY interface. For more information about the Ethernet controller device, refer to the Dacvicom DM9161 controller manufacturer’s datasheet.



### 2.3.10 SODIMM200 interface



## 2.4 Main Board

The main board is compatible with both the the **9m10 core board** and **9x5 series core board**.

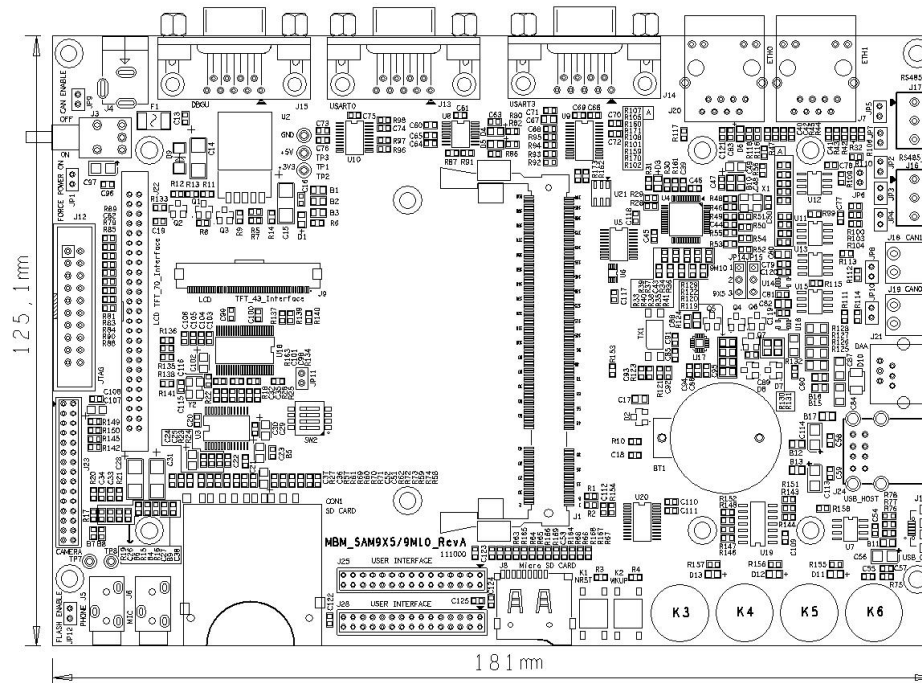
#### 2.4.1 resources

- ✚ ONE WIRE EPPROM(1024-bit);
- ✚ 1 JTAG DEBUG interface;
- ✚ 1 Camera interface(9m10 & 9G25);
- ✚ 2 24-bit LCD interfaces(with touch);
- ✚ 1 DBGU serial interface(3 wires);
- ✚ 2 communication serial interfaces(5-wire & 3-wire);
- ✚ 2 10/100Mb Ethernet interfaces;  
Note: 9m10 1; 9G15, 9G25, 9X35, 9G35 1; 9X25 2
- ✚ 2 RS485 interfaces;
- ✚ 2 CANinterfaces;
- ✚ 1 SmartDAA interface;
- ✚ 2 USB 2.0 Host interfaces;  
Note: 9m10 1 (USB\_A); 9x5 2 (USB\_B & USB\_C);
- ✚ 1 USB high speed USB2.0 OTG interface;  
Note: 9m10(USB\_B) and 9X5(USB\_A) OTG interface;
- ✚ 4 buttons (QTOUCH);
- ✚ 2 buttons (reset, wakeup);
- ✚ 1 Micro SD interface;
- ✚ 1 SD card interface;
- ✚ 3 LEDs;
- ✚ 1 audio input and output interface;
- ✚ 1 backup battery holder;
- ✚ User interface (50 GPIOs).

#### 2.4.2 Electrical Characteristics

- ✚ Power: 5V, 2A;
- ✚ Operating Temperature: 0~70C;
- ✚ Power Consumption: to be confirmed

## 2.4.3 Mechanical and Physical Characteristics



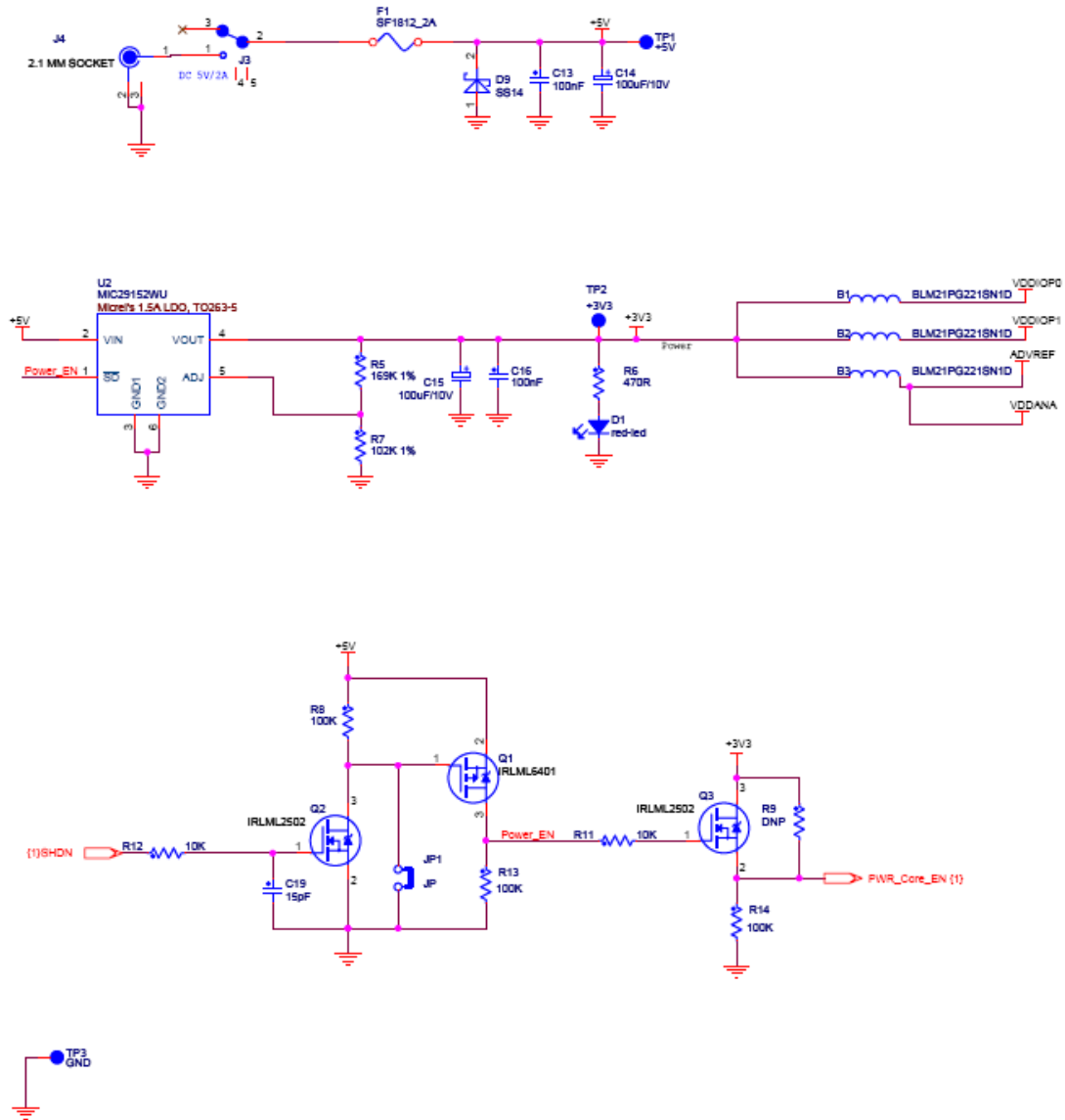
- ✚ Size: 181x125mm;
- ✚ Board layer: 4;
- ✚ Board thickness: 6mm;
- ✚ Interface type: DIMM 200 Pins



## 2.5 Function blocks for MBM-SAM9G15

### 2.5.1 Power supply

#### Power



### 2.5.2 AUDIO

The board includes a WM8731 CODEC for digital sound input and output. This interface includes audio jacks for line audio input and headphone line output.

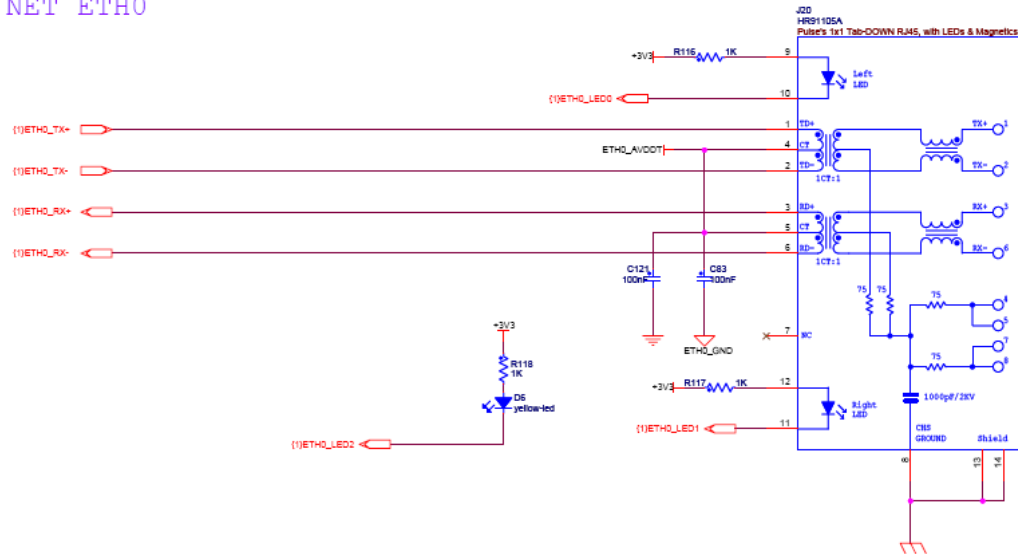
The SAM9 processor is configured in IIS slave mode to interface with the WM8731 Codec.



### 2.5.3 Ethernet 0 interface

Ethernet 0 is available for the core board which has a optional PHY.

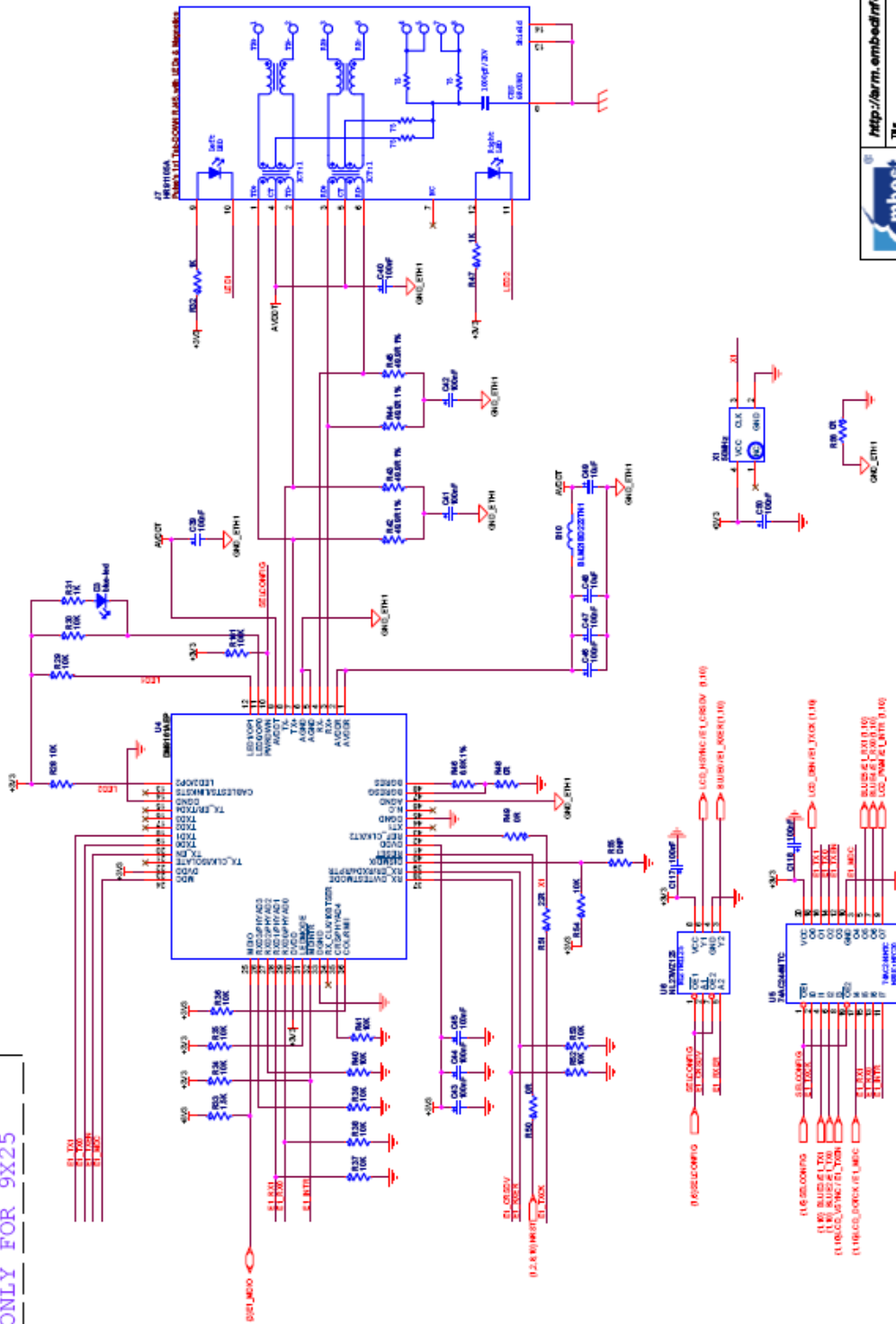
10M/ 100M NET ETH0



### 2.5.4 Ethernet1

Ethernet1 is only available for SAM9X25, The PHY on Ethernet 1 is enabled by the SELCONFIG signal from a pull-down resistor on the core board.

10M 100M NET ETH1  
ONLY FOR 9X25



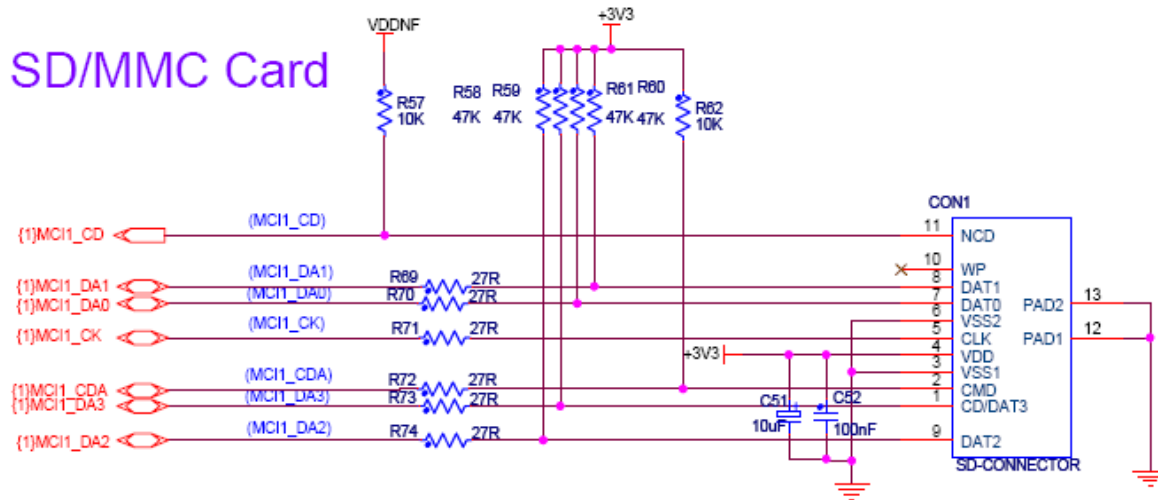
Document Number	9X25
Revision	1.0
File Name	9X25_ETH1
Release Date	2012/02/14
Page	4 of 4

## 2.5.5 SD/MMC Card

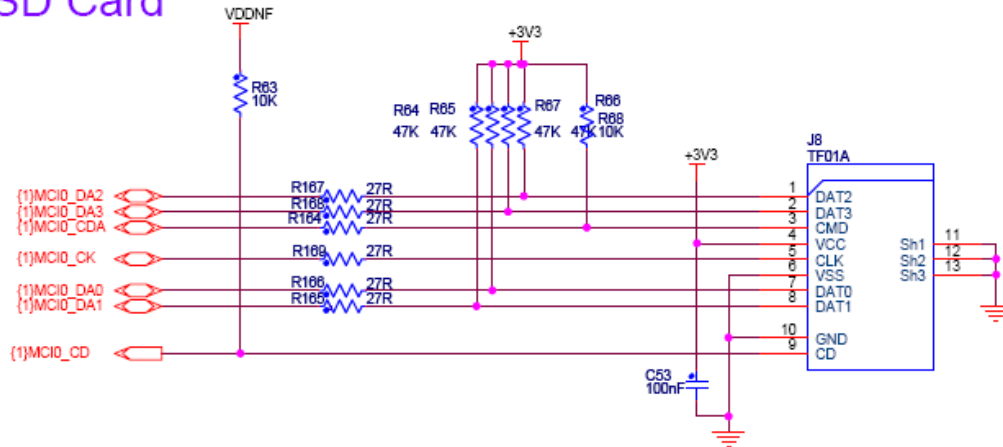
The board has **two** high-speed Multi Media Card Interface. The first interface is used as a 4-bit interface (MCI0), connected to a MicroSD card slot. The second interface is used as a 4-bit Interface (MCI1), connected to an SD/MMC

card slot.

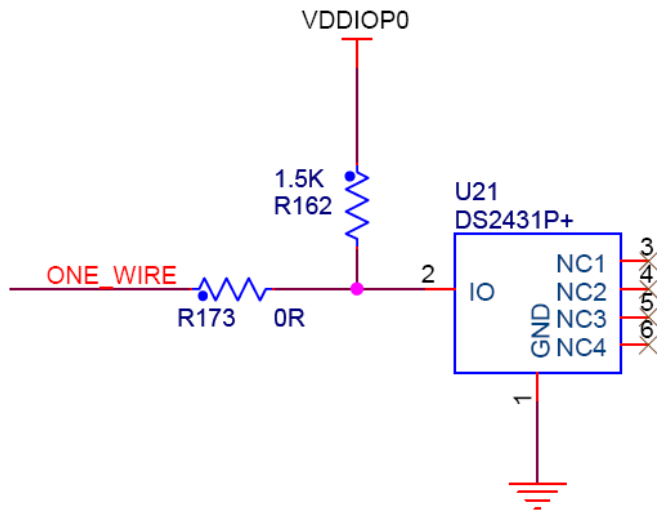
## SD/MMC Card



## MicroSD Card



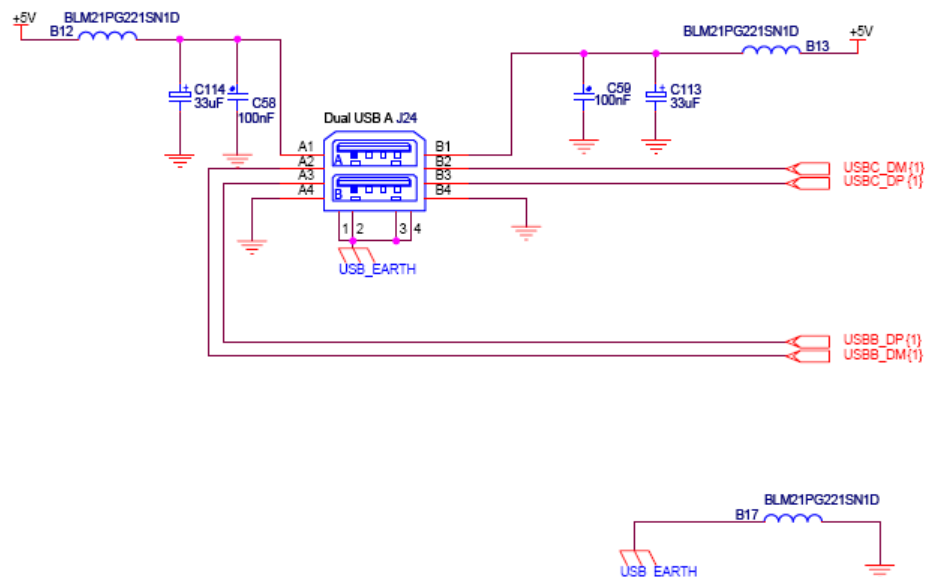
## 2.5.6 1-wire EEPROM



## 2.5.7 USB module

The board contains two USB HOST interfaces and an USB OTG interface.

### USB HOST INTERFACE

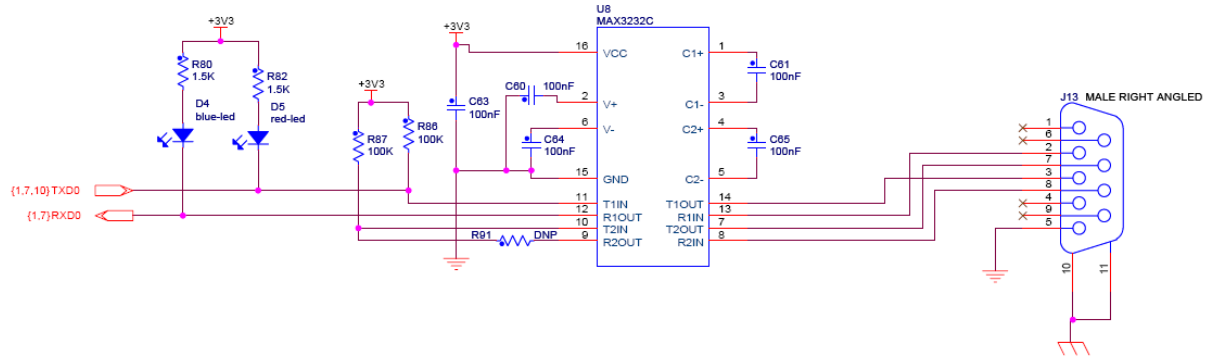


[illegible]

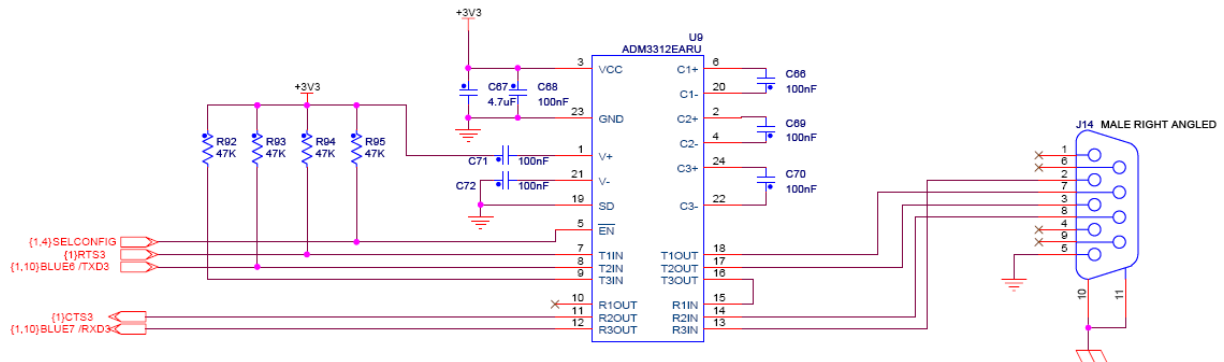
## 2.5.9 USARTs

USART0





## USART3

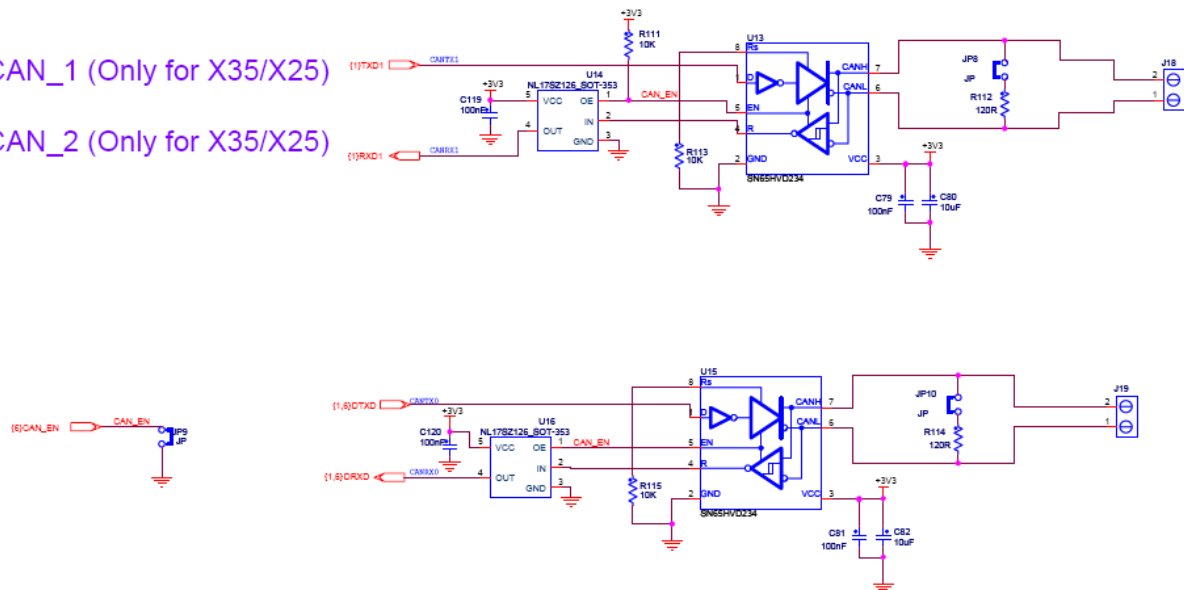


## 2.5.10 CAN

Two boards(MBS-SAM9X35 and MBS-SAM9X25), feature two controller area network (CAN) ports with transceiver.

CAN\_1 (Only for X35/X25)

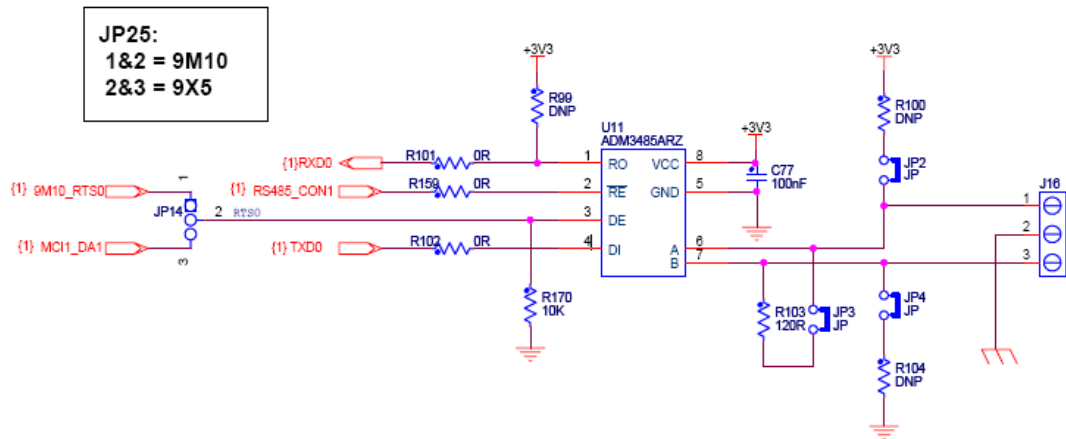
CAN\_2 (Only for X35/X25)



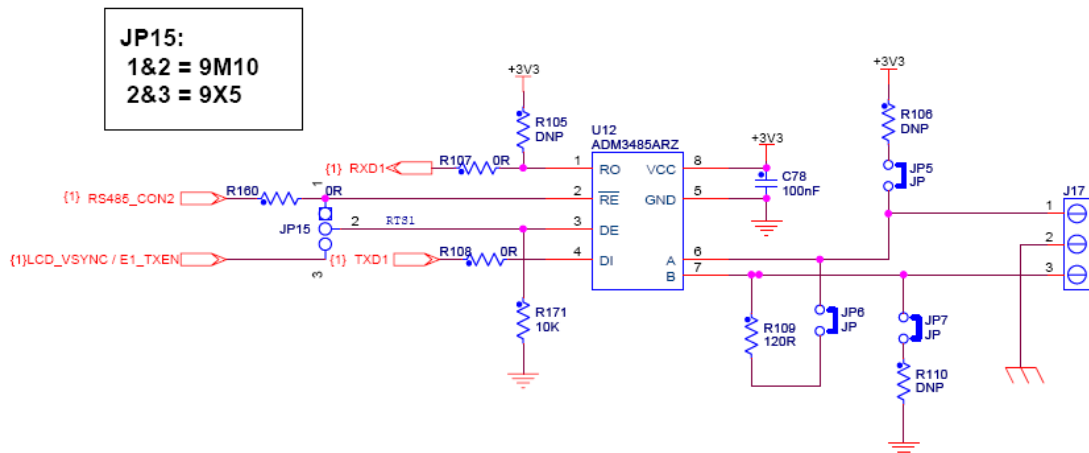
## 2.5.11 RS485

Two RS485 interfaces.

## RS485\_1



## RS485\_2



### 2.5.12 JTAG

Software debug is accessed by a standard 20-pin JTAG connection.

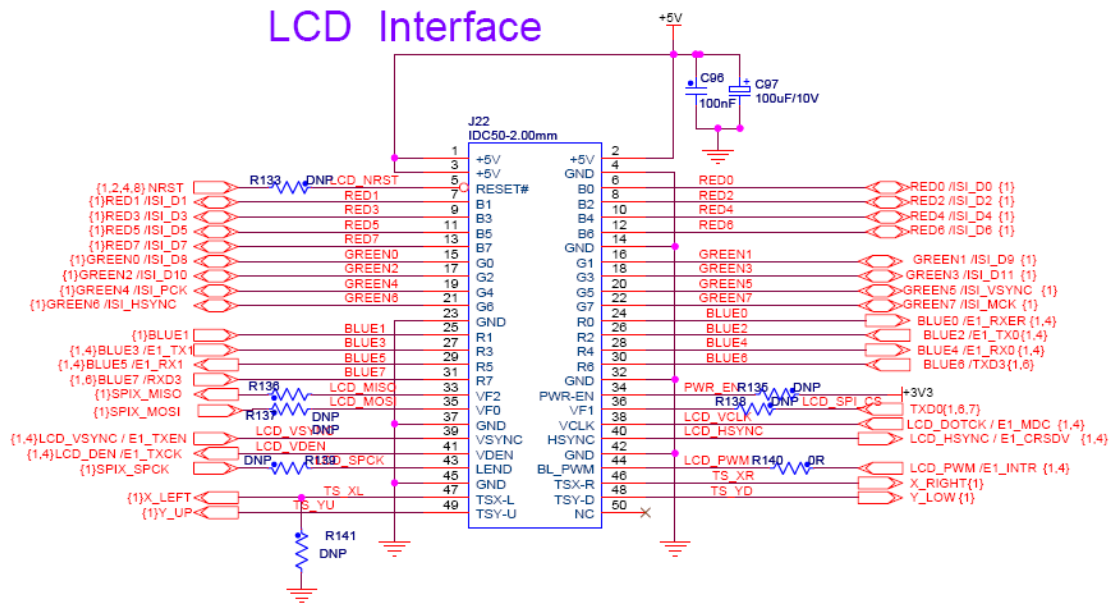


### 2.5.13 Qtouch

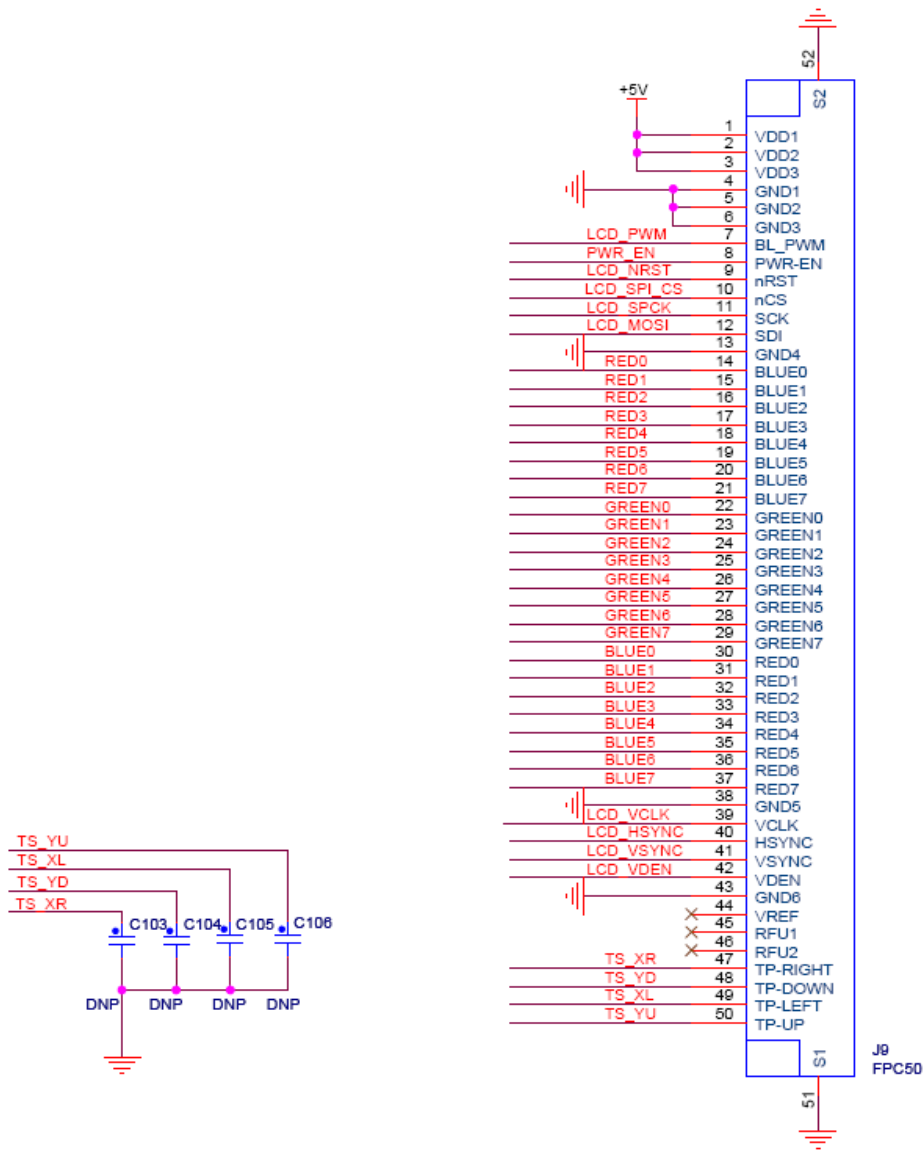


### 2.5.13 LCD interface

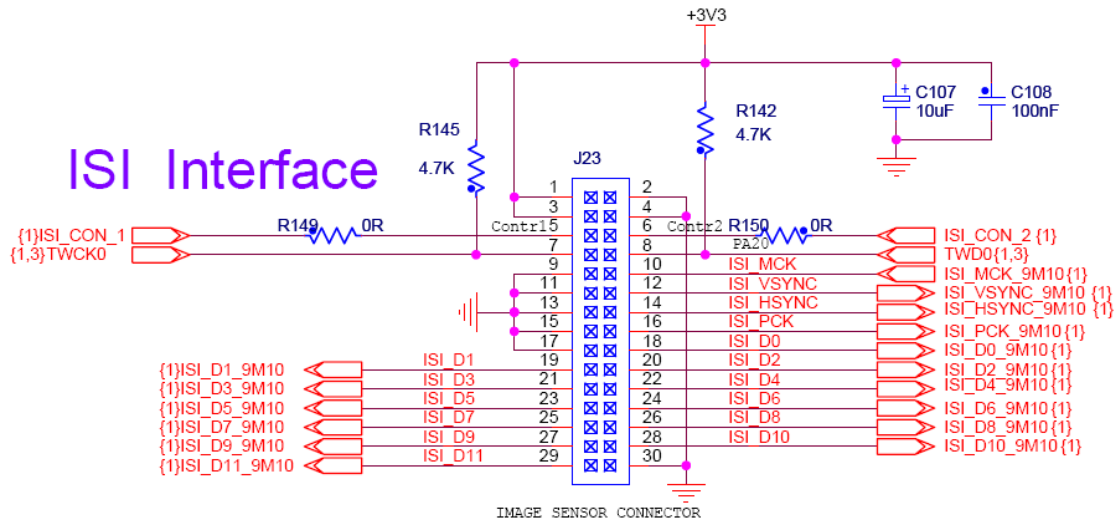
### 4.3 inch LCD interface



7.0 inch LCD interface



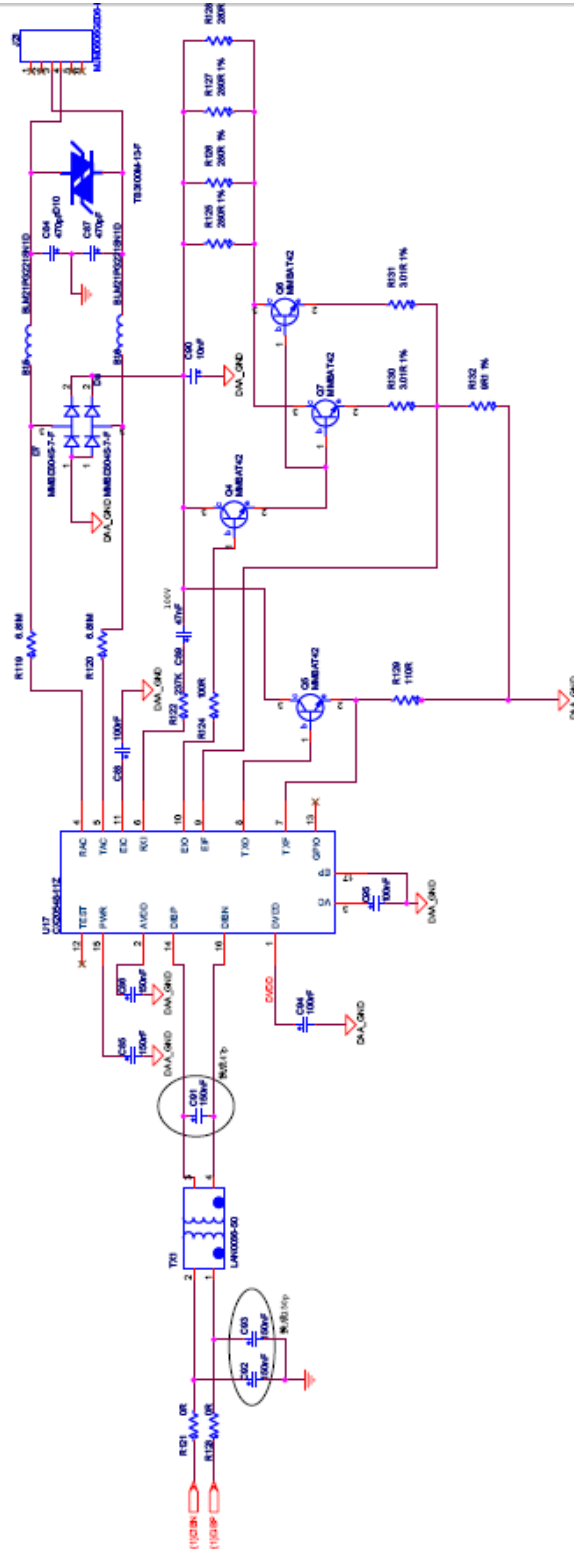
## 2.5.14 ISI Interface



## 2.5.15 Telephone interface

The board features a smart DAA(DATA Access Arrangement) chip to drive an analog telephone line.

1  
2  
3  
4  
5

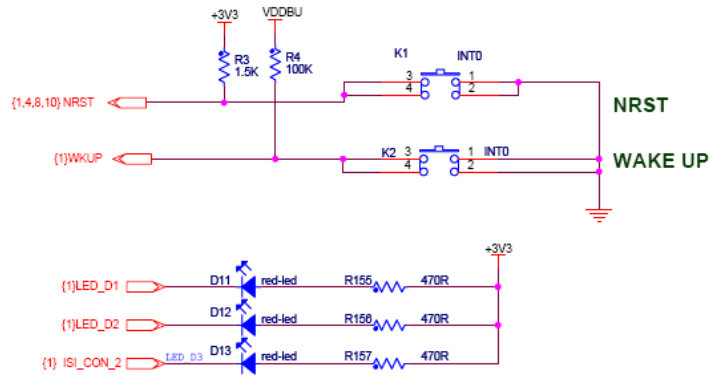


<b>embest</b>		<a href="http://arm.embedinfo.com">http://arm.embedinfo.com</a>
Title: SAMICC_J00		
Drawn by: AS	Checked by: SAMANTHA	
Drawn by: AS	Checked by: SAMANTHA	
Date: Tuesday, February 14, 2012		



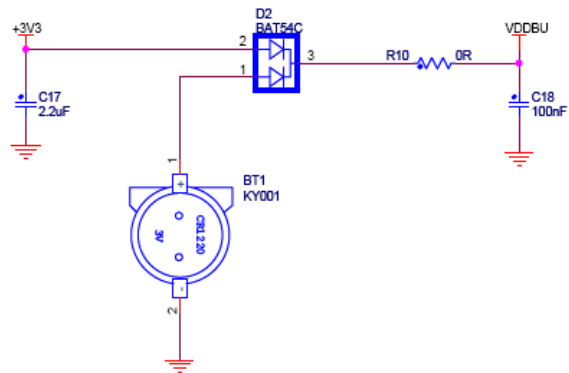
## 2.5.16 Key

### KEY

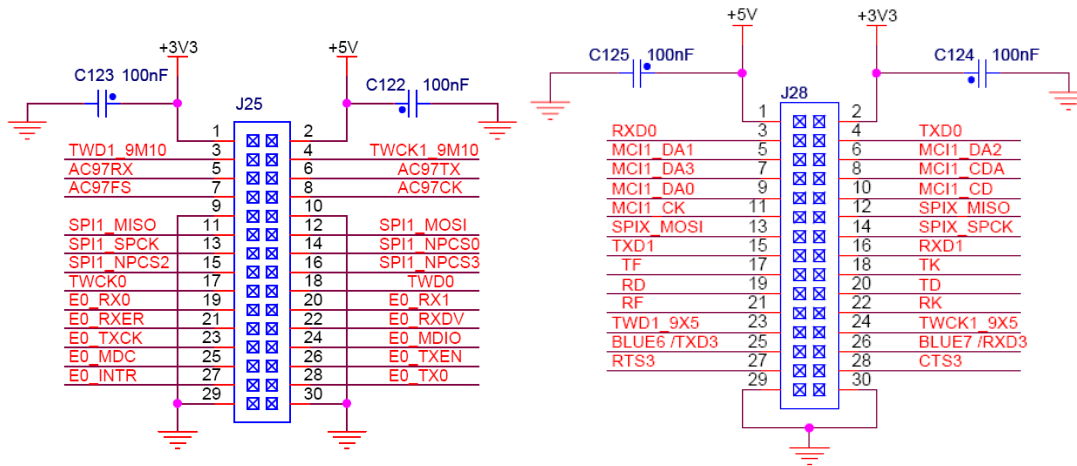


## 2.5.17 RTC Power

### RTC Power



## 2.5.18 user interface



## 2.6 Jumpers

### 2.6.1 SW1 settings

NO.	Setting
1	Nandflash enable
2	Dataflash enable

### 2.6.2 SW2 settings

It's used for matching Audio Lord the clock signal of the 9x5 core board

NO.	Settings
1	Do not care
2	Close
3	Open
4	Close

### 2.6.3 JP jumpers

NO.	settings	default
JP1	close: force power	close
JP2,JP3,JP4,JP5,JP6,JP7,	close: enable RS485 terminal resistance	open
JP8,JP10	close: enable CAN terminal resistance	open
JP9	close: DBGU available open: CAN available Note: if you download image to the board through USB, you must close the jumper	close
JP11	close: enable camera interface (for 9G25)	open

JP12	Open: disable external flash Close: enable external flash	close
JP14,JP15	1-2: RS485 for 9M10 core 2-3: RS485 for 9x5 core	

## Section 3\_Software (updating)

### 3.1 MDK resources

projects	ARM9 products				
	9G15	9G25	9G35	9x25	9x35
adc	√	√	√	√	√
can	×	×	×	√	√
dma	√	√	√	√	√
eeeprom	√	√	√	√	√
Emac(eth1)	×	×	×	√	×
getting-started	√	√	√	√	√
Hsmci_multimedia_card	√	√	√	√	√
Hsmci_sdcard	√	√	√	√	√
Hsmci_sdio	√	√	√	√	√
LCD_4.3	√	×	√	×	√
LCD_7.0	√	×	√	×	√
LCD_10.2	√	×	√	×	√
periph_protect	√	√	√	√	√
pmc_clock_switching	√	√	√	√	√
pwm	√	√	√	√	√
qtouch	√	√	√	√	√
Rs485_loopback	√	√	√	√	√
Rs485_twoport	√	√	√	√	√
Smc_nandflash	√	√	√	√	√
Spi_serialflash	√	√	√	√	√
Ssc_dma_audio	√	√	√	√	√
sysc	√	√	√	√	√
tc_capture_waveform	√	√	√	√	√

Touchscreen_4.3	√	×	√	×	√
Touchscreen_7.0	√	×	√	×	√
twi	√	√	√	√	√
Usart_serial_COM0	√	√	√	√	√
Usart_serial_COM3	×	√	×	√	×
Usart_hw_handshaking_COM3	×	√	×	√	×
usb_audio_looprec	√	√	√	√	√
usb_cdc_serial	√	√	√	√	√
usb_core	√	√	√	√	√
usb_hid_keyboard	√	√	√	√	√
usb_hid_mouse	√	√	√	√	√
usb_hid_msd	√	√	√	√	√
usb_hid_transfer	√	√	√	√	√
usb_iad_cdc_cdc	√	√	√	√	√
usb_iad_cdc_hid	√	√	√	√	√
usb_iad_cdc_msd	√	√	√	√	√
usb_masstorage	√	√	√	√	√

## 3.2 Linux resources

note:

(1) “√”--included, “×”-- not included;

(2) Free and open

Categories	Drivers		9G15	9G25	9G35	9X25	9X35	9x5
Bootloader	AT91Bootstrap		Lead Uboot					tested, free&open
	Uboot		1. NandFlash erasing ,reading and writing 2.support network download images 3. Support the establishment, save the environment variable 4. Support the memory contents display, contrast, and modification 5. Support bootm、bootargs settings					tested, free&open
kernel	net	ETH0	×	√	√	√	√	tested, free&open
		ETH1	×	×	×	√	×	tested, free&open
	serial	USART0	√	√	√	√	√	tested, free&open
		USART3	×	√	×	√	×	tested, free&open
		DBGU	√	√	√	√	√	tested, free&open
	CAN	CAN0	×	×	×	√	√	untested, provide codes
		CAN1	×	×	×	√	√	untested, provide codes
	USB	USB_HOST*2	√	√	√	√	√	tested, free&open
		USB_OTG	√	√	√	√	√	tested, free&open
	SMD驱动		√	√	√	√	√	provide hardware interface only
	SDcard	MicroSD	√	√	√	√	√	tested, free&open
		SDCard	√	√	√	√	√	tested, free&open
	camera (ISI)		×	√	×	×	×	untested, provide codes
	LCD+touch		√	×	√	×	√	tested, free&open
	Zigbee		√	√	√	√	√	provide hardware interface only
	SPI		√	√	√	√	√	reuse, unregistered equipment

	TWI	√	√	√	√	√	tested, free&open
	Qtouch	√	√	√	√	√	tested, free&open
	DMA	√	√	√	√	√	tested, free&open
	GPIO	√	√	√	√	√	tested, free&open
File system	Angstrom	√	√	√	√	√	provide file system
	Android	√	×	√	×	√	provide file system



## Section 4\_Purchase and service

If you are interested in the board ,you may connect:

Sales and marketing: [sales.en@embedinfo.com](mailto:sales.en@embedinfo.com)

For Technical Support: [support.en@embedinfo.com](mailto:support.en@embedinfo.com)

URL: <http://www.embedinfo.com/en/>