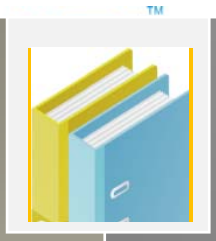


SAMICE by Embest

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

Release：V1.0 Date：2012.04.17

Embest Info&Tech Co.,LTD.

2000-2012@

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.

This document copyright belongs to embest technology Co., LTD. © 2012

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

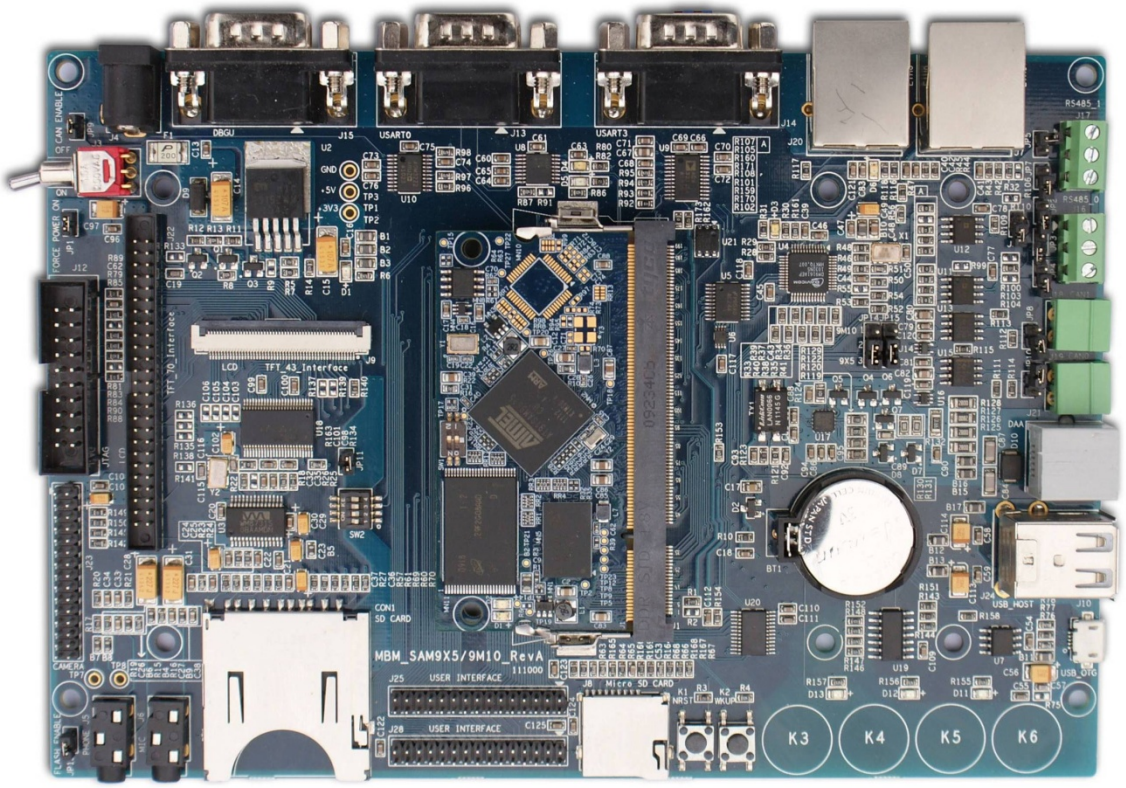
Section 1_Scope

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

power	5V supply	1	1	1	1	1

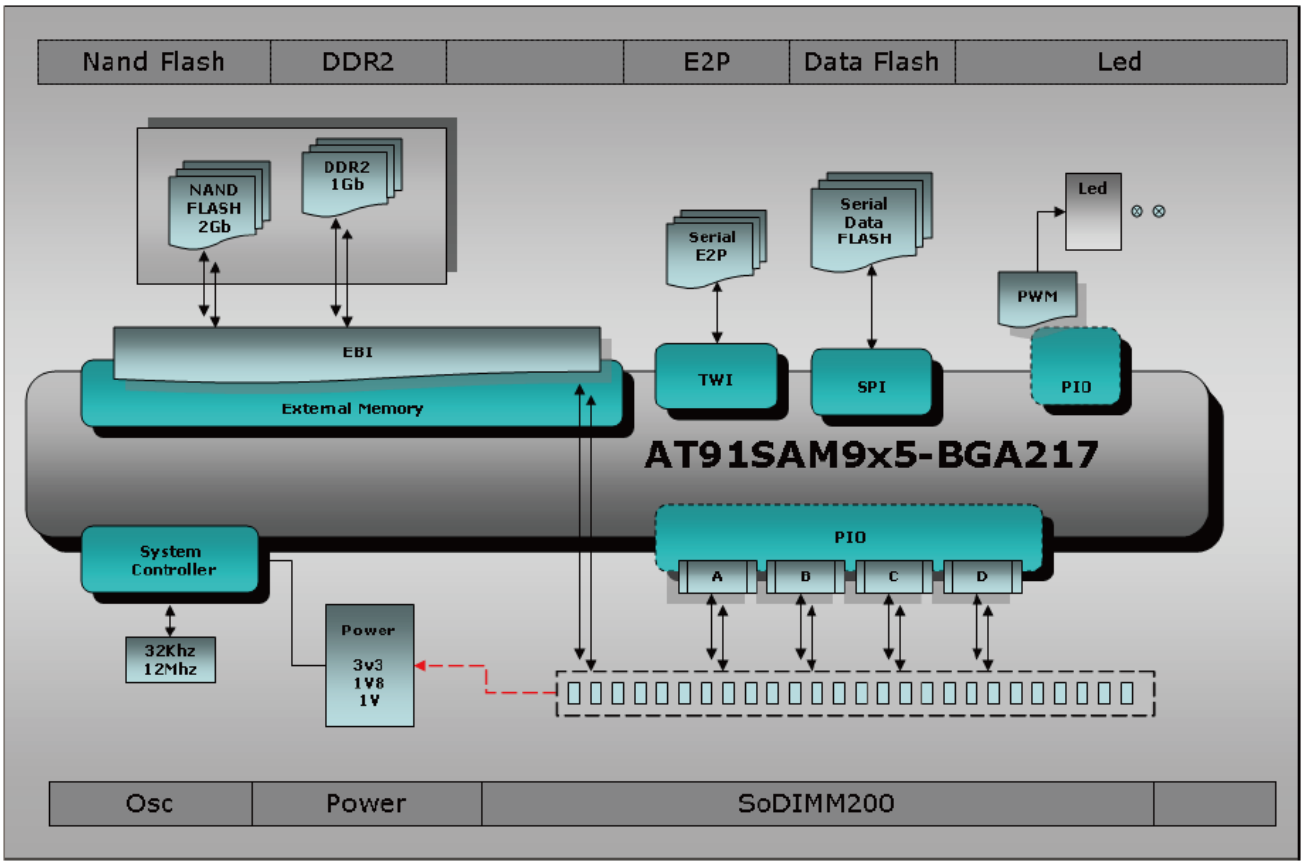
2.2 Core Board

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:)**

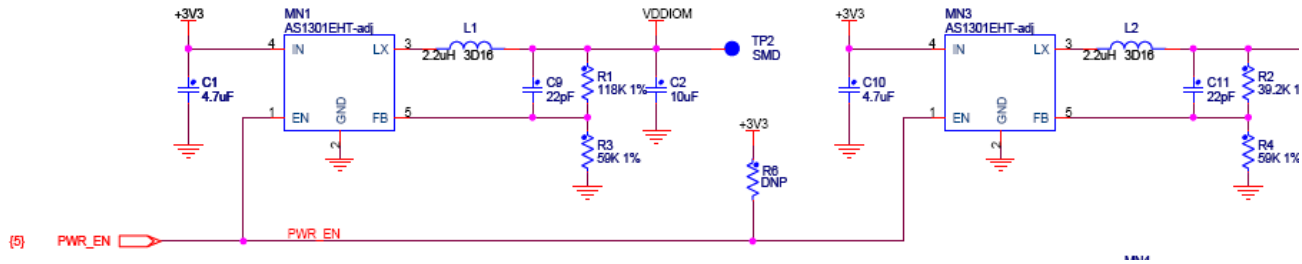
2.3.1 processor

SAM9G15---ARM926EJ-S™ 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

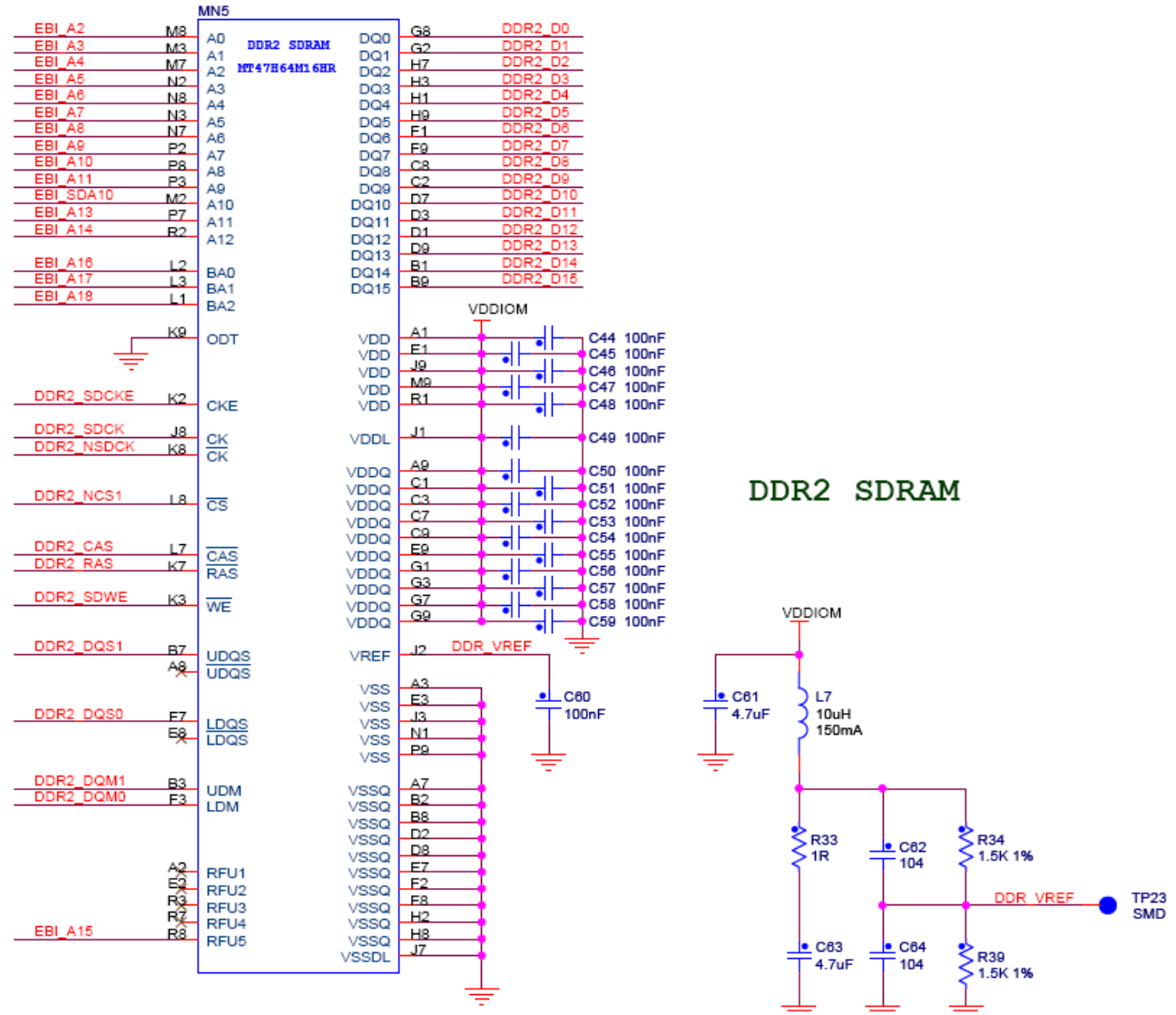
2.3.4 Power supplies

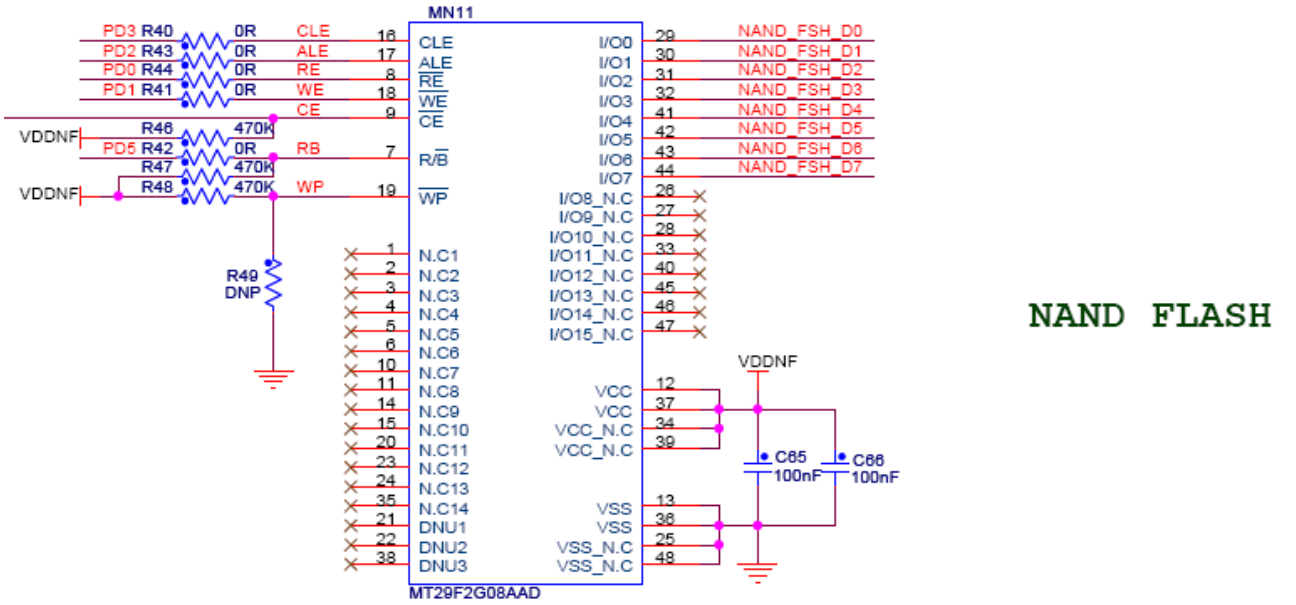


2.3.5 Memory

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:

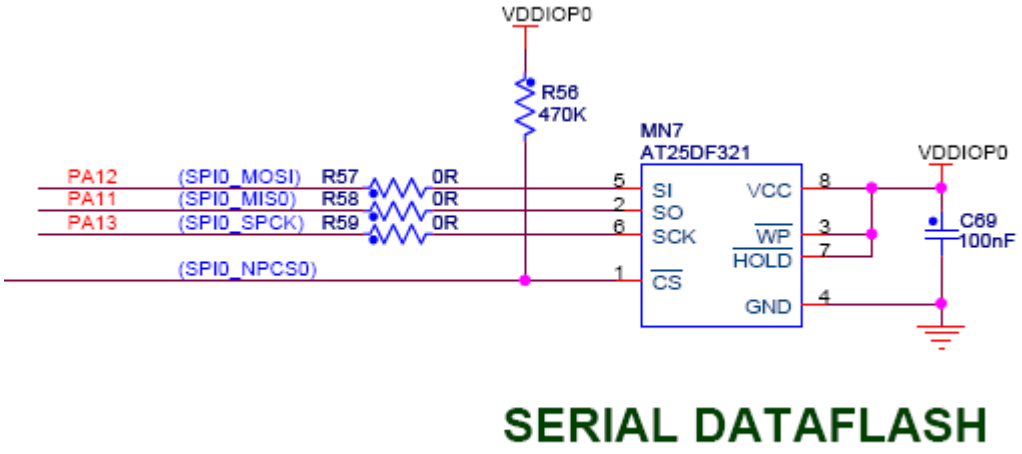
- 128MB DDR SDRAM
- 256MB nandflash


MN5
DDR2 SDRAM
MT47H64M16HR
EBI_A2
EBI_A3
EBI_A4
EBI_A5
EBI_A6
EBI_A7
EBI_A8
EBI_A9
EBI_A10
EBI_A11
EBI_SDA10
EBI_A13
EBI_A14
EBI_A16
EBI_A17
EBI_A18
ODT
DDR2_SDCKE
CKE
DDR2_SDCK
DDR2_NSDCK
CK
CK
DDR2_NCS1
CS
DDR2_CAS
DDR2_RAS
CAS
RAS
DDR2_SDWE
WE
DDR2_DQS1
UDQS
UDQS
DDR2_DQS0
LDQS
LDQS
DDR2_DQM1
DDR2_DQM0
UDM
LDM
RFU1
RFU2
RFU3
RFU4
RFU5
EBI_A15
DQ0
DQ1
DQ2
DQ3
DQ4
DQ5
DQ6
DQ7
DQ8
DQ9
DQ10
DQ11
DQ12
DQ13
DQ14
DQ15
DDR2_D0
DDR2_D1
DDR2_D2
DDR2_D3
DDR2_D4
DDR2_D5
DDR2_D6
DDR2_D7
DDR2_D8
DDR2_D9
DDR2_D10
DDR2_D11
DDR2_D12
DDR2_D13
DDR2_D14
DDR2_D15
VDDIOM
VDD
VDDL
VDDQ
VREF
DDR_VREF
C44 100nF
C45 100nF
C46 100nF
C47 100nF
C48 100nF
C49 100nF
C50 100nF
C51 100nF
C52 100nF
C53 100nF
C54 100nF
C55 100nF
C56 100nF
C57 100nF
C58 100nF
C59 100nF
C60 100nF
VSS
VSSQ
VSSDL
DDR2 SDRAM
VDDIOM
C61 4.7uF
L7 10uH 150mA
R33 1R
C62 104
R34 1.5K 1%
DDR_VREF
TP23 SMD
C63 4.7uF
C64 104
R39 1.5K 1%


MN11
PD3 R40 0R CLE
PD2 R43 0R ALE
PD0 R44 0R RE
PD1 R41 0R WE
CE
R46 470K
VDDNF
PD5 R42 0R RB
R47 470K
R48 470K WP
VDDNF
R49 DNP
CLE
ALE
RE
WE
CE
R/B
WP
N.C1
N.C2
N.C3
N.C4
N.C5
N.C6
N.C7
N.C8
N.C9
N.C10
N.C11
N.C12
N.C13
N.C14
DNU1
DNU2
DNU3
I/O0
I/O1
I/O2
I/O3
I/O4
I/O5
I/O6
I/O7
NAND_FSH_D0
NAND_FSH_D1
NAND_FSH_D2
NAND_FSH_D3
NAND_FSH_D4
NAND_FSH_D5
NAND_FSH_D6
NAND_FSH_D7
I/O8_N.C
I/O9_N.C
I/O10_N.C
I/O11_N.C
I/O12_N.C
I/O13_N.C
I/O14_N.C
I/O15_N.C
VCC
VCC_N.C
VSS
VSS_N.C
VDDNF
C65 100nF
C66 100nF
MT29F2G08AAD
NAND FLASH

2.3.6 Dataflash(SPI controller)

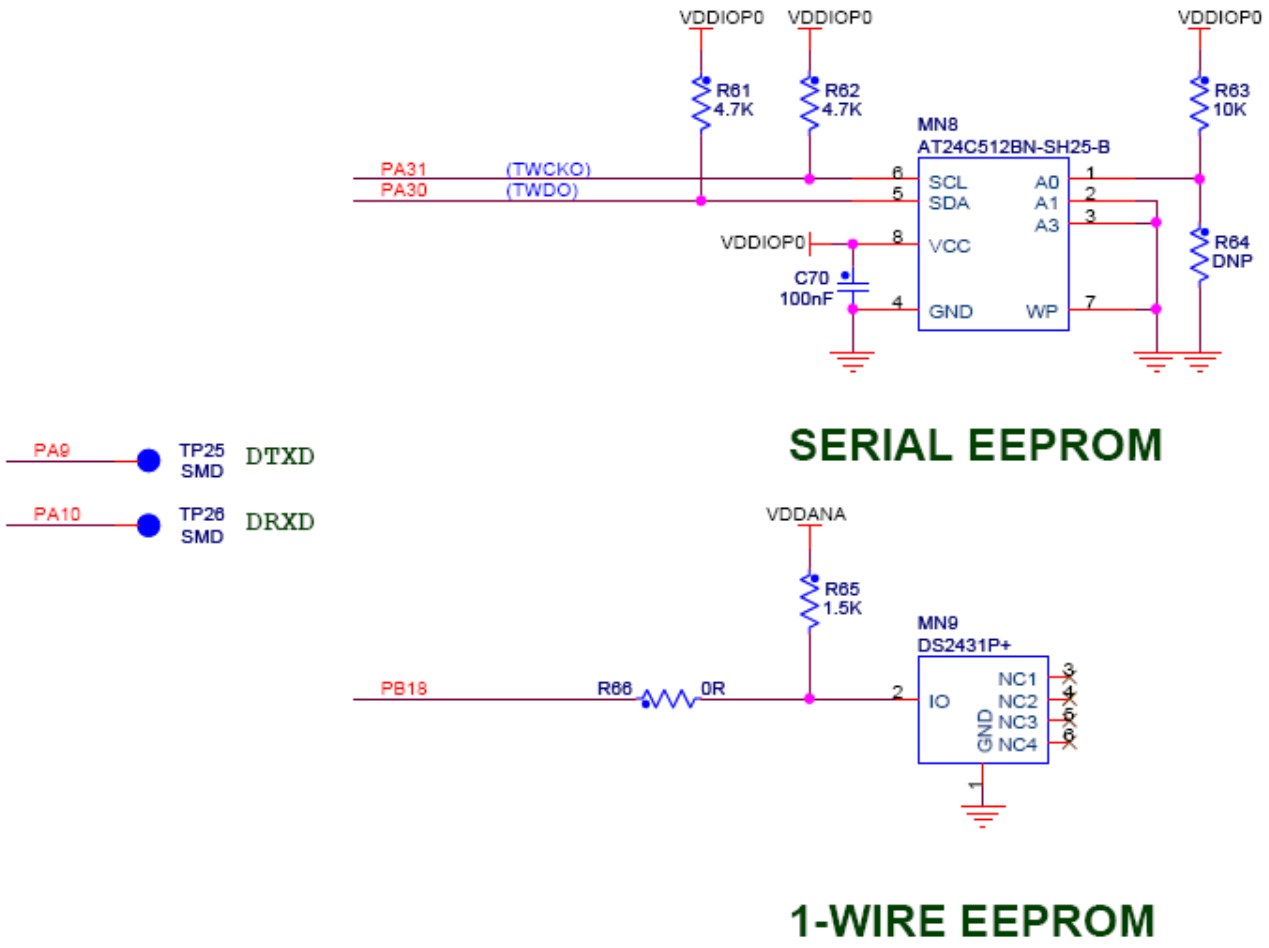
The serial processor provides two high-speed serial peripheral interface (SPI) controllers. One port is used to interface with the on-board serial Dataflash (4MB serial dateflash).



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.

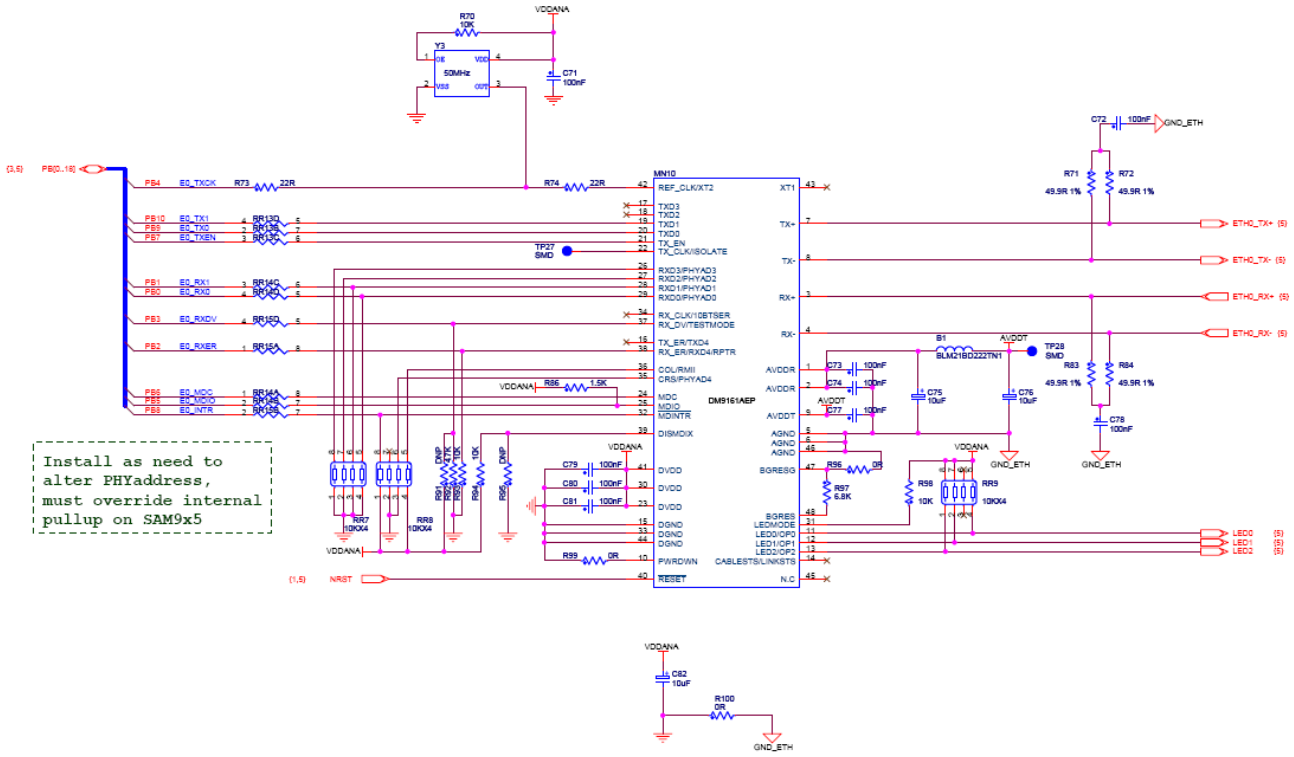


2.3.8 1-wire EEPROM

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

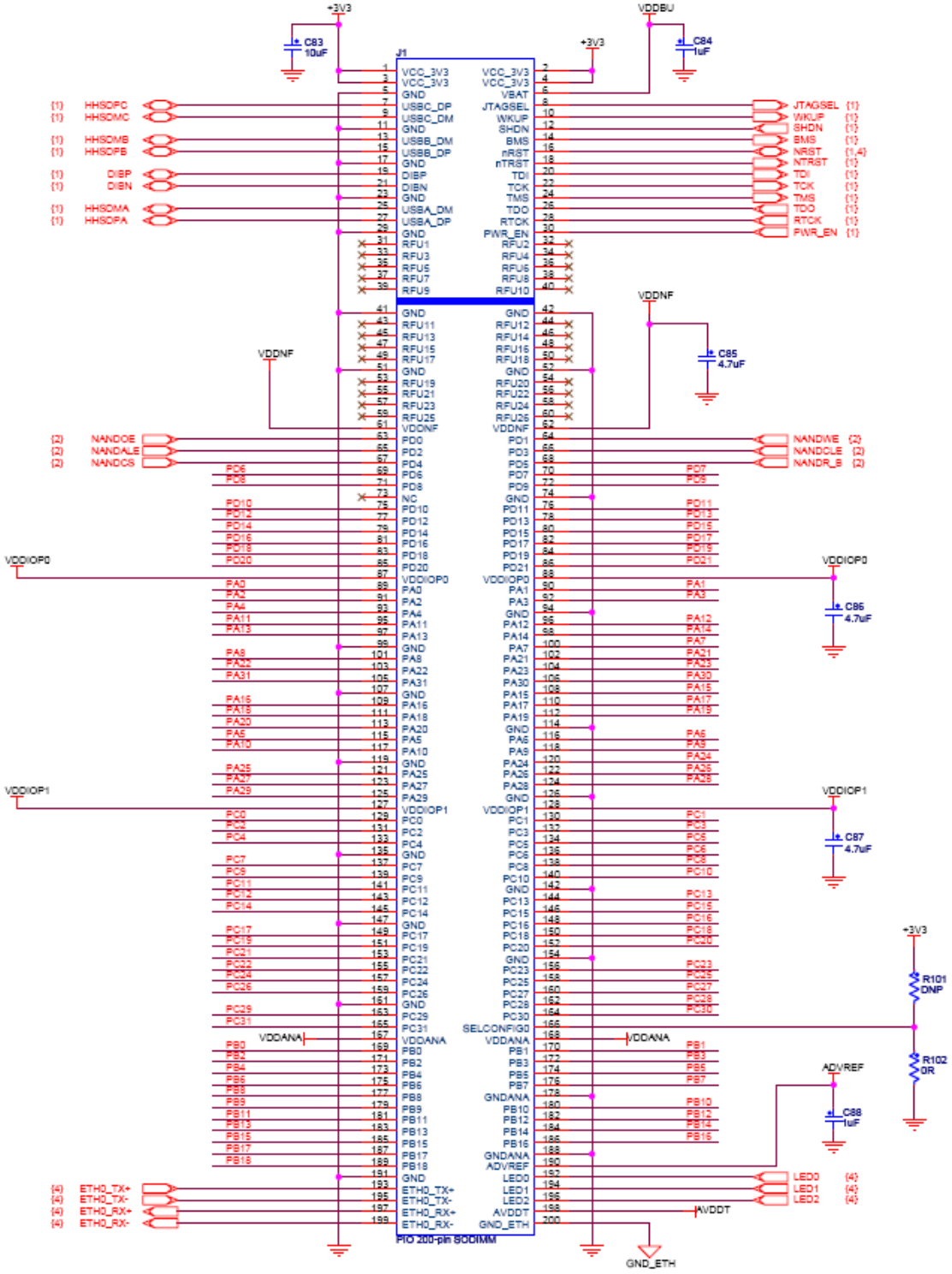
2.3.9 Optional PHY

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.


Install as need to alter PHYaddress, must override internal pullup on SAM9x5
DM9161AEP
MII10
VDDANA
GND_ETH
AVDDT
ETH0_TX+
ETH0_TX-
ETH0_RX+
ETH0_RX-
NRST
LED0
LED1
LED2

ETHERNET

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;

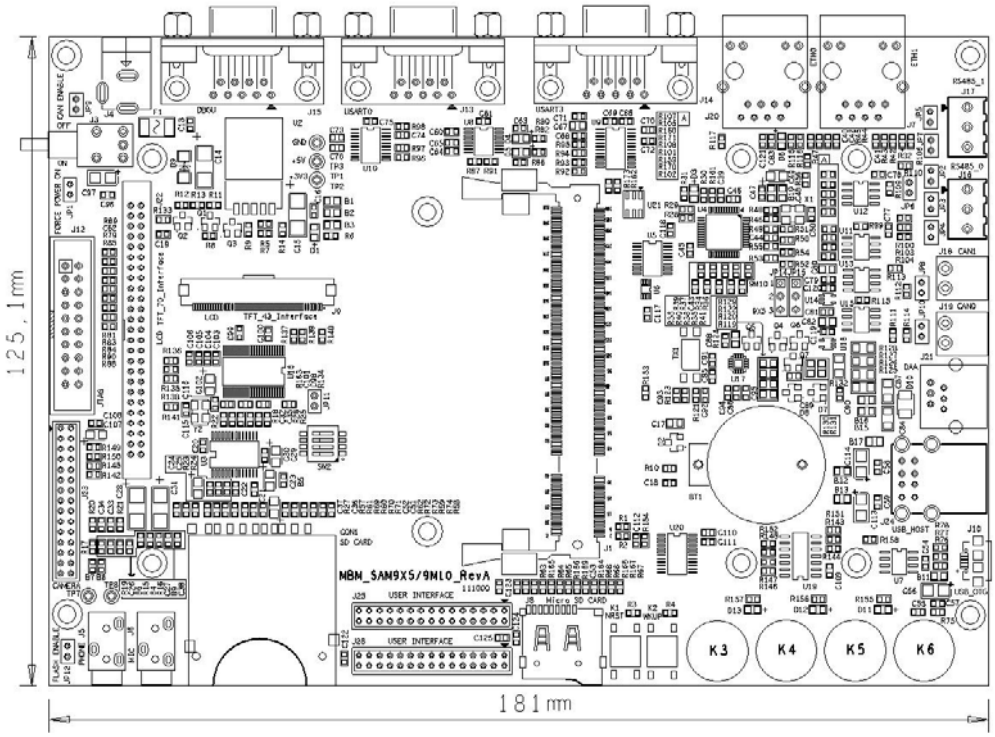
  Note: 9m10 1 (USB_A); 9x5 2 (USB_B & USB_C);
- 1 USB high speed USB2.0 OTG interface;

  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

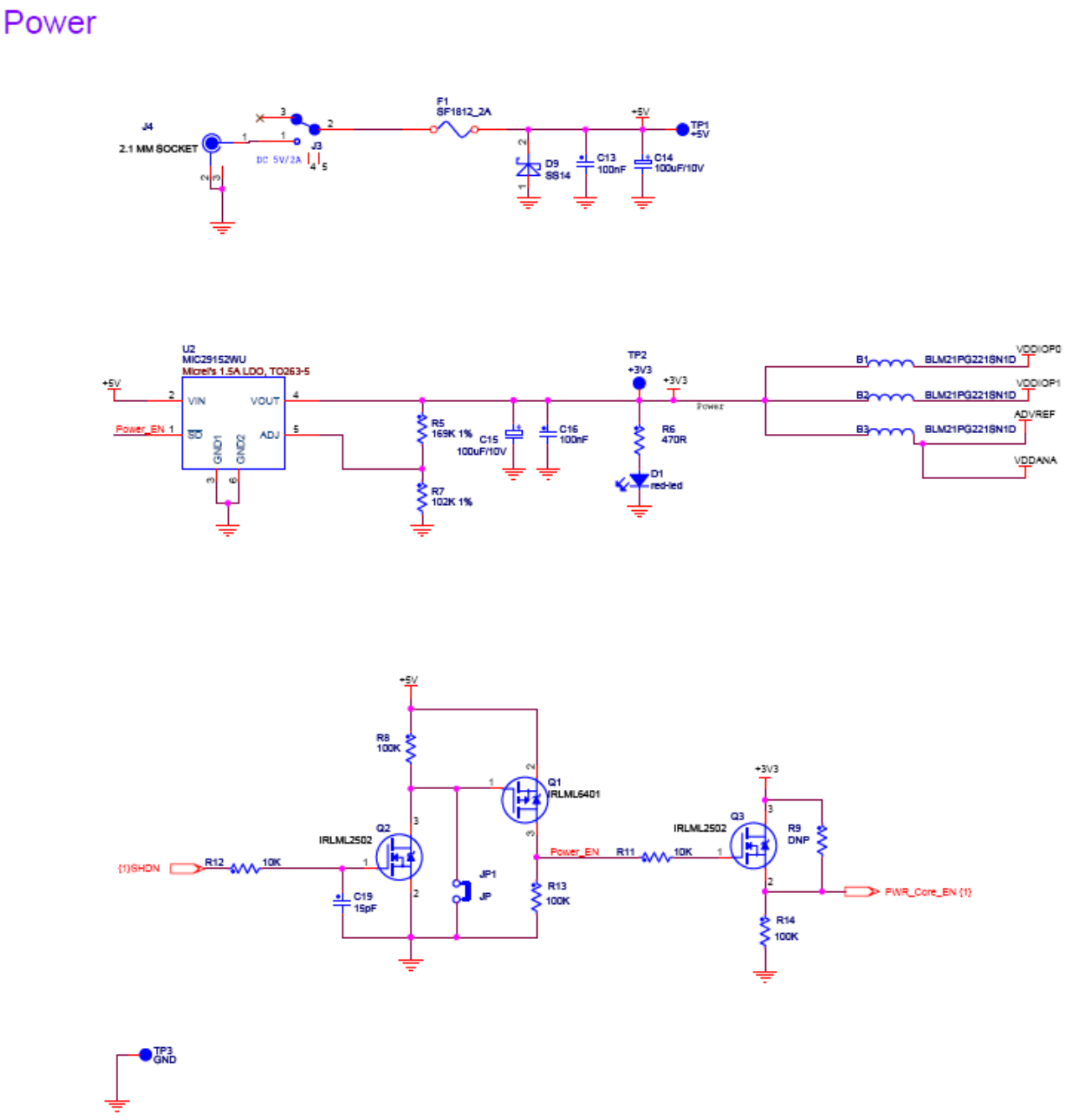
2.4.3 Mechanical and Physical Characteristics



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

2.5 Function blocks for MBM-SAM9G15

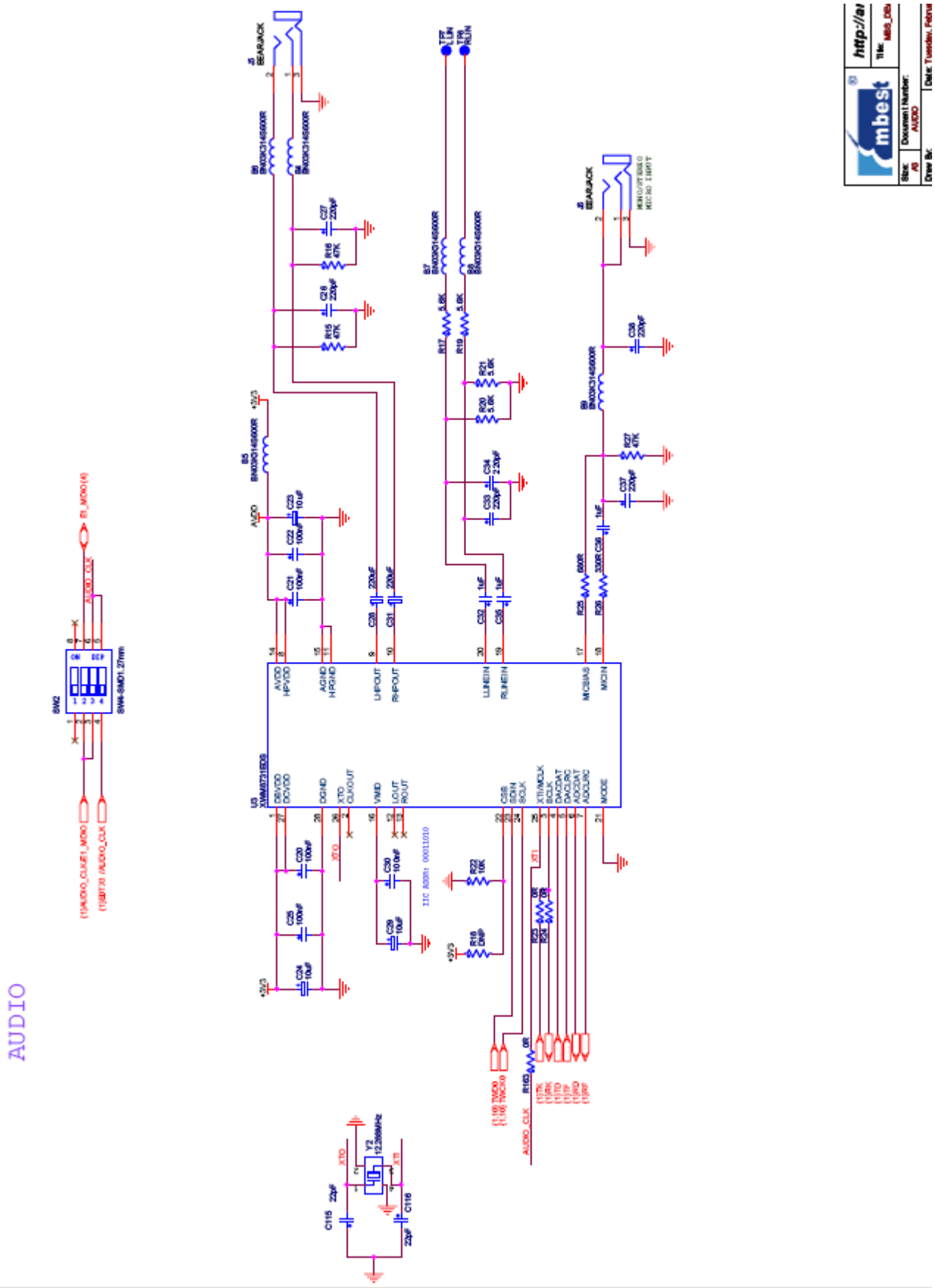
2.5.1 Power supply



2.5.2 AUDIO

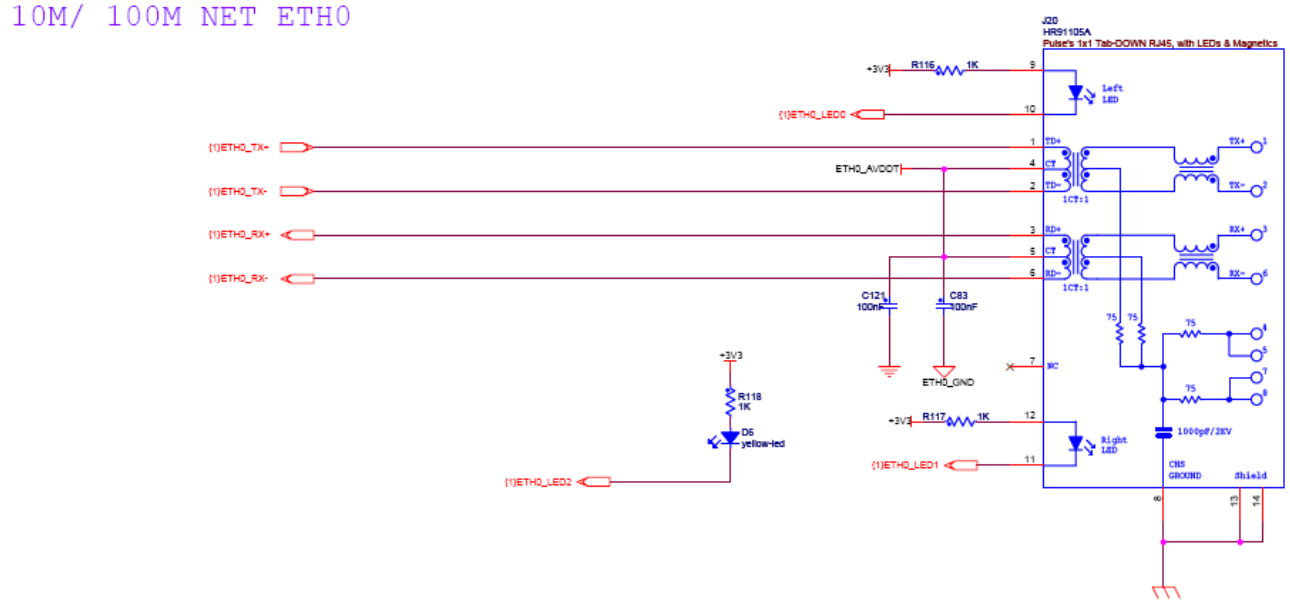
The board includes a WM8731 CODEC for digital sound input and output. This interface includes audio jacks for line audio input and headphone line output.

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


AUDIO

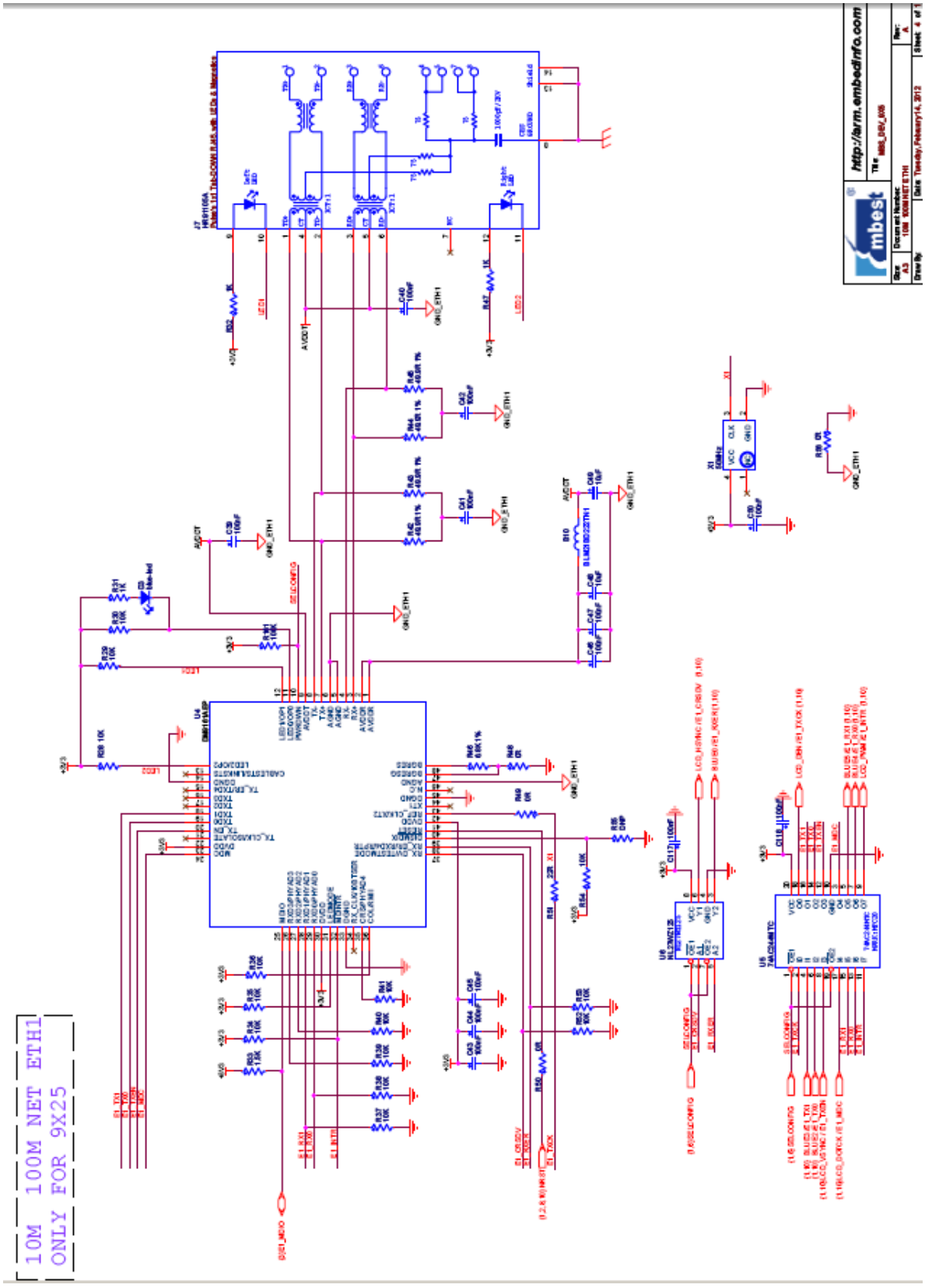
2.5.3 Ethernet 0 interface

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



2.5.4 Ethernet1

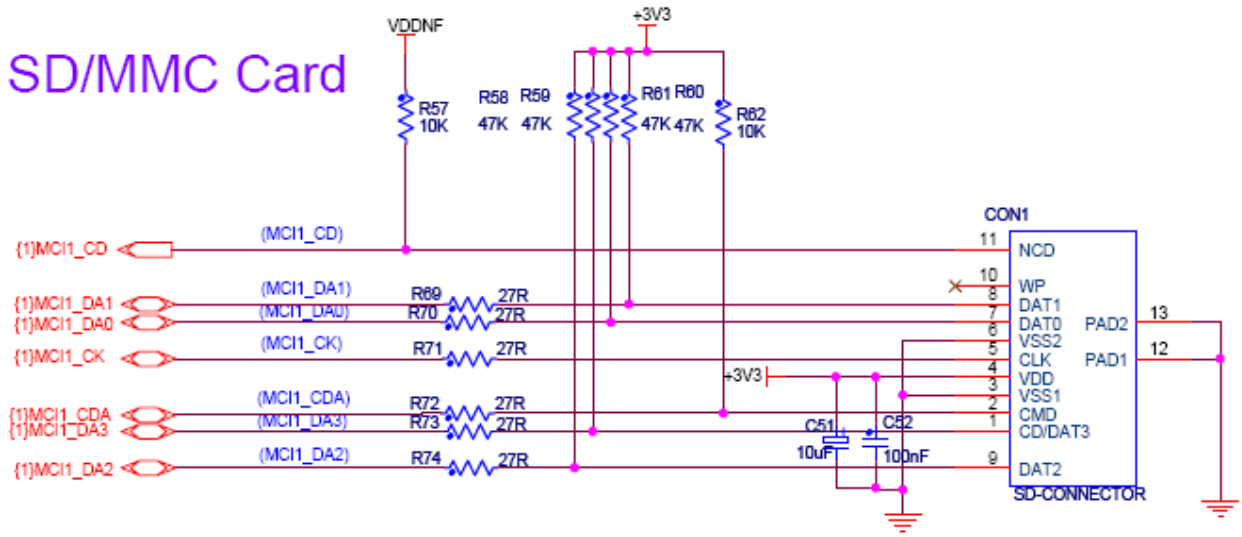
Etherne1 is only available for SAM9X25, The PHY on Ethernet 1 is enabled by the SELCONFIG signal from a pull-down resistor on the core board.

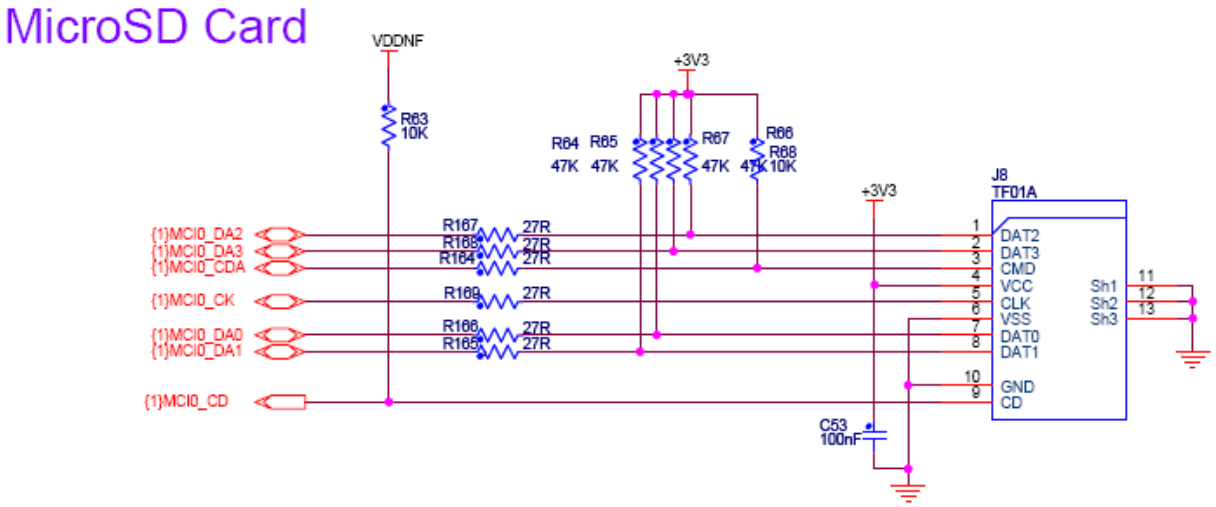


2.5.5 SD/MMC Card

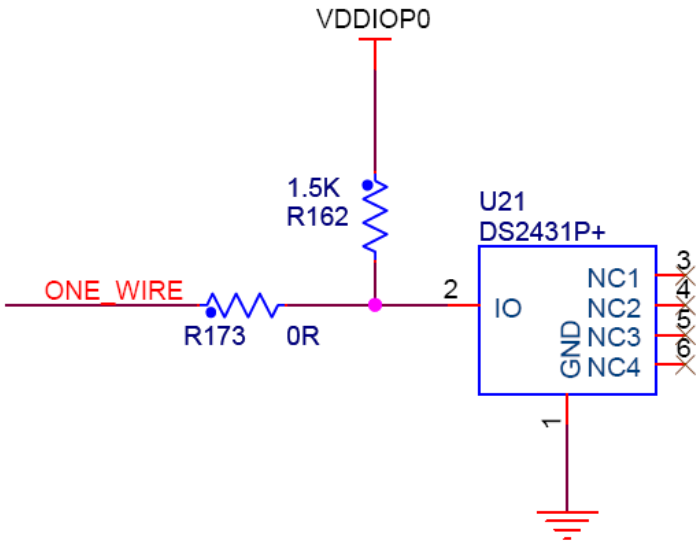
The board has **two** high-speed Multi Media Card Interface. The first interface is used as a 4-bit interface (MCI0), connected to a MicroSD card slot. The second interface is used as a 4-bit Interface (MCI1), connected to an SD/MMC

card slot.


SD/MMC Card
VDDNF
+3V3
R57 10K
R58 47K
R59 47K
R61 47K
R60 47K
R62 10K
CON1
{1}MCI1_CD
(MCI1_CD)
{1}MCI1_DA1
{1}MCI1_DA0
(MCI1_DA1)
(MCI1_DA0)
R69 27R
R70 27R
{1}MCI1_CK
(MCI1_CK)
R71 27R
{1}MCI1_CDA
{1}MCI1_DA3
(MCI1_CDA)
(MCI1_DA3)
R72 27R
R73 27R
{1}MCI1_DA2
(MCI1_DA2)
R74 27R
C51 10uF
C52 100nF
NCD
WP
DAT1
DAT0
VSS2
CLK
VDD
VSS1
CMD
CD/DAT3
DAT2
PAD2
PAD1
SD-CONNECTOR

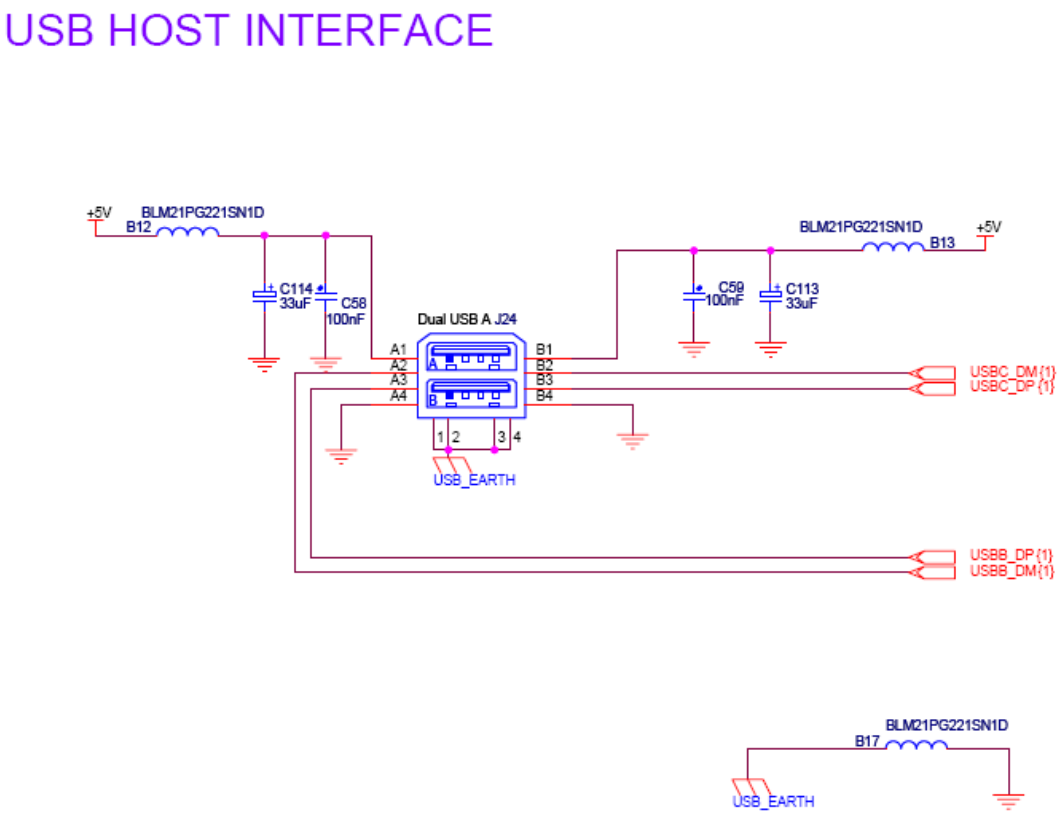

MicroSD Card
VDDNF
+3V3
R63 10K
R64 47K
R65 47K
R67 47K
R66 47K
R68 10K
J8
TF01A
{1}MCI0_DA2
{1}MCI0_DA3
{1}MCI0_CDA
{1}MCI0_CK
{1}MCI0_DA0
{1}MCI0_DA1
{1}MCI0_CD
R167 27R
R168 27R
R164 27R
R169 27R
R166 27R
R165 27R
C53 100nF
DAT2
DAT3
CMD
VCC
CLK
VSS
DAT0
DAT1
GND
CD
Sh1
Sh2
Sh3

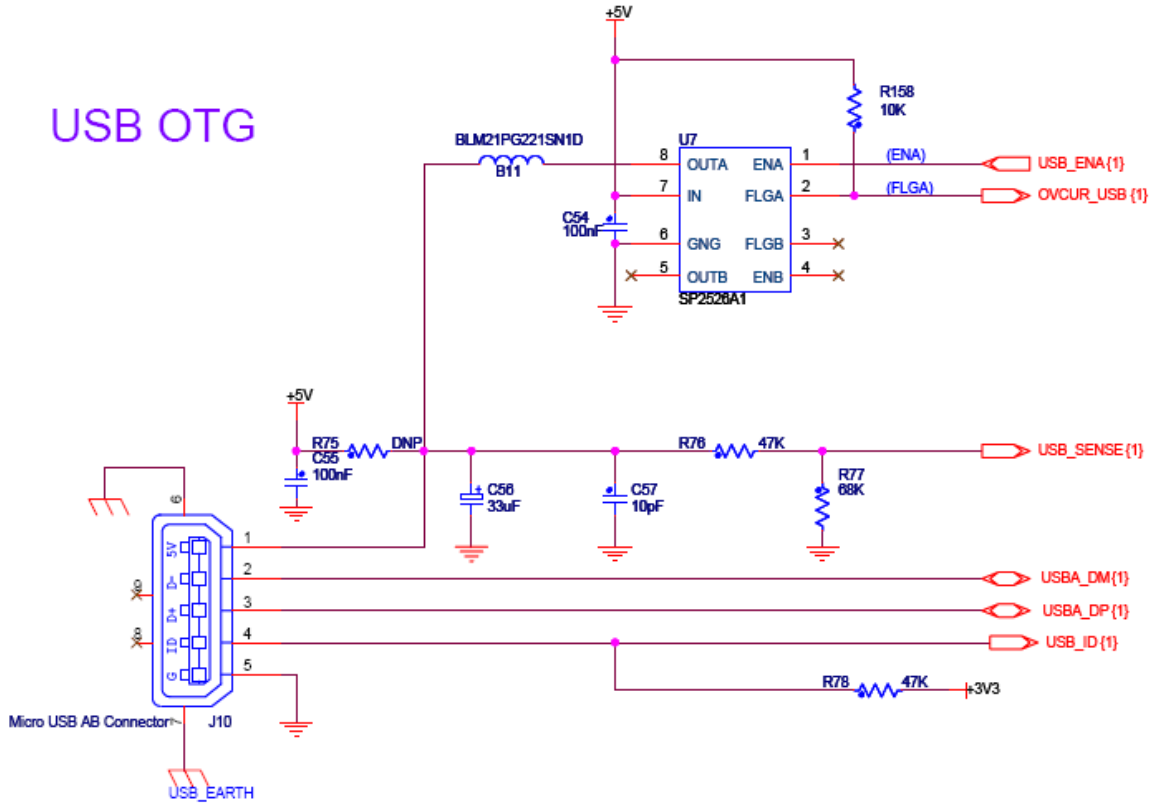
2.5.6 1-wire EEPROM



2.5.7 USB module

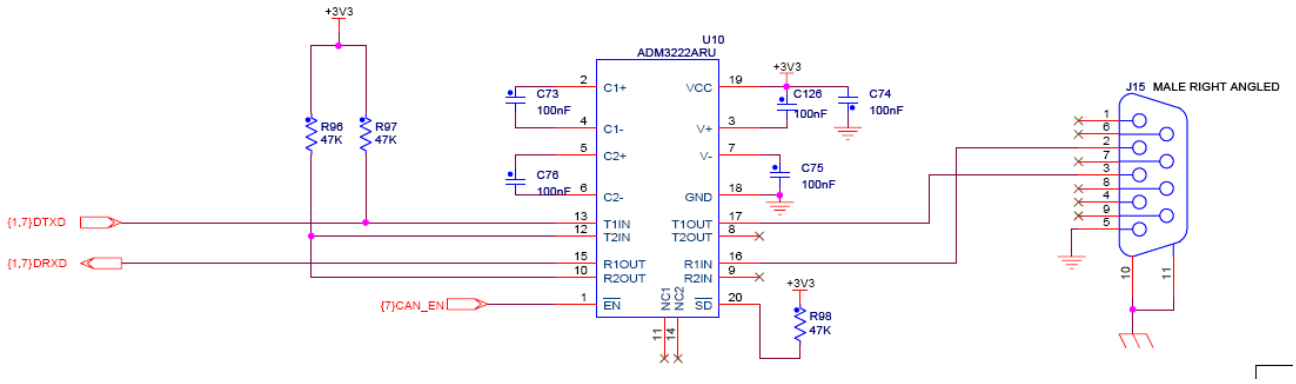
The board contains two USB HOST interfaces and an USB OTG interface.





2.5.8 DBGU

The DBGU is connected to the DB-9 male socket through an RS-232 Transceiver (TXD and RXD only).

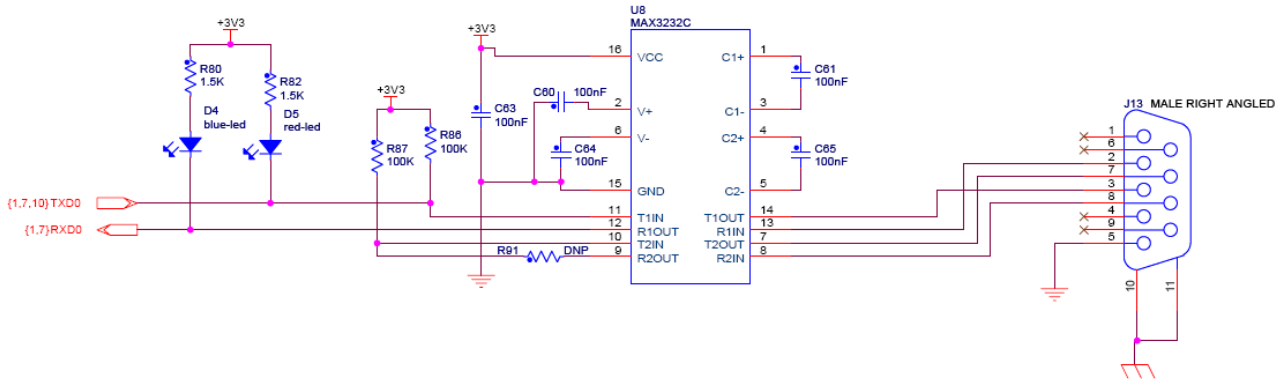


2.5.9 USARTs

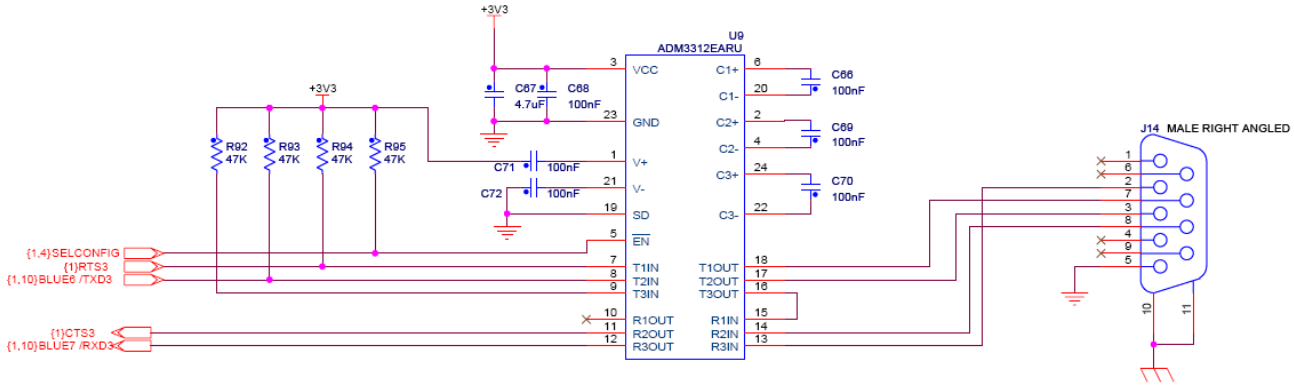
The USART0 and USART3 are used as serial communication ports. Both USARTs are buffered with an RS-232 Transceiver and connected to the DB-9 male socket. USART0 just own TXD and RXD signal, and USART3 equips addition handshake CTS/RTS control.

The USART3 is only supported by SAM9G25 and SAM9X25 processors.

USART0

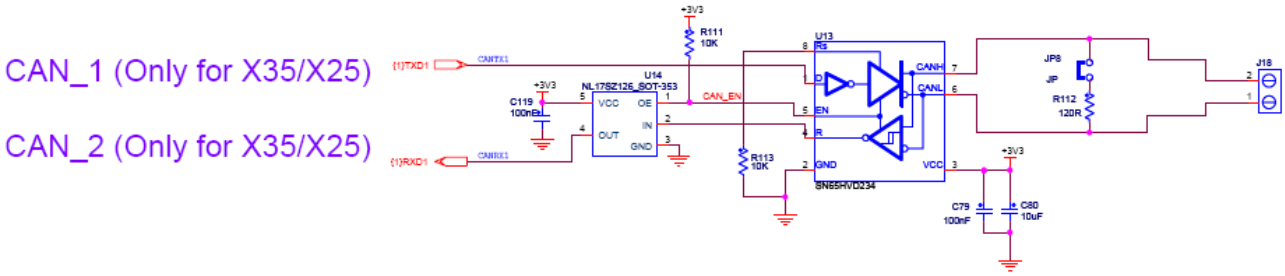


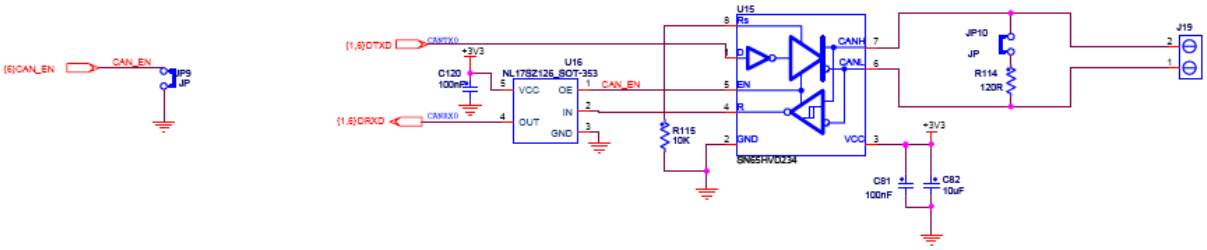
USART3



2.5.10 CAN

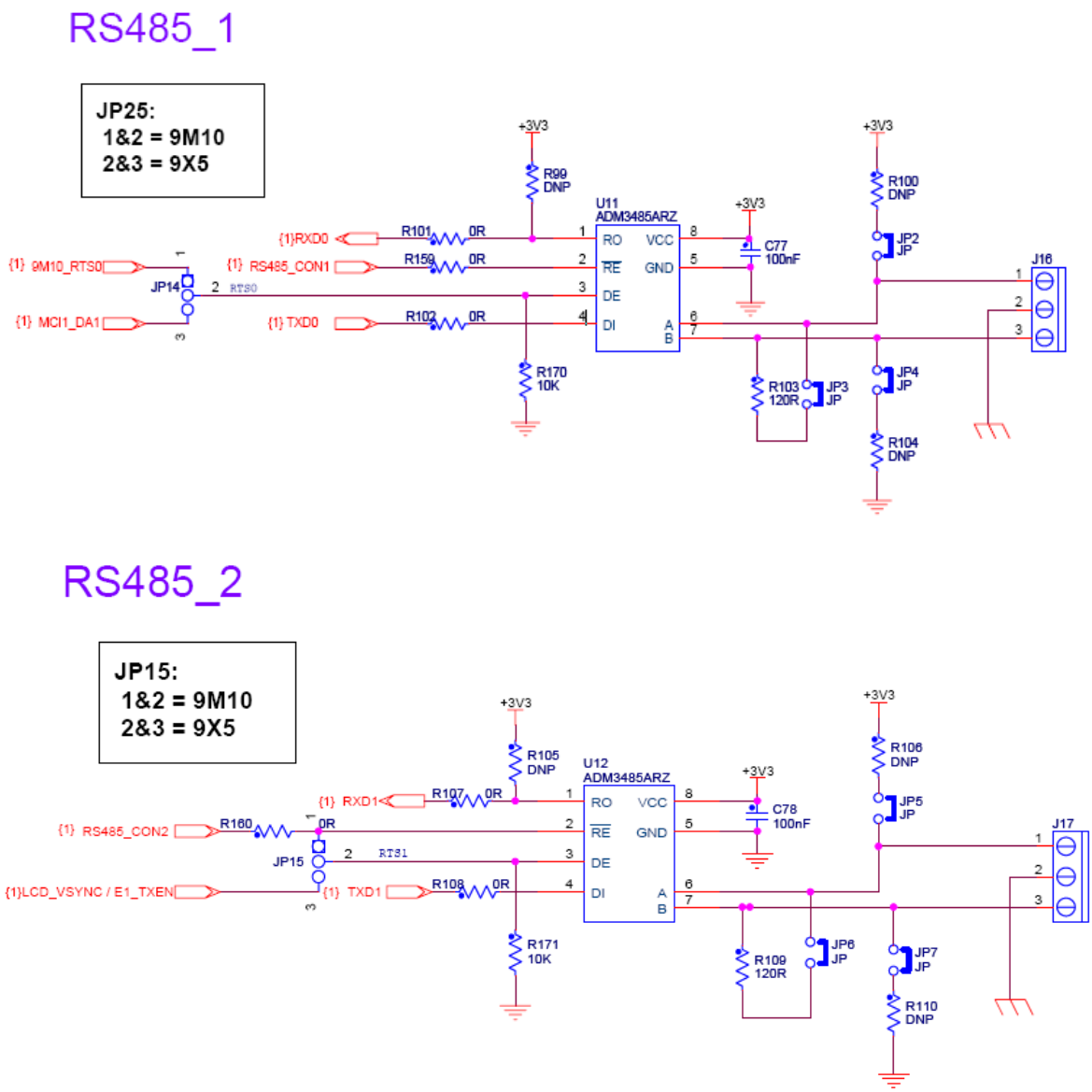
Two boards(MBS-SAM9X35 and MBS-SAM9X25), feature two controller area network (CAN) ports with transceiver.





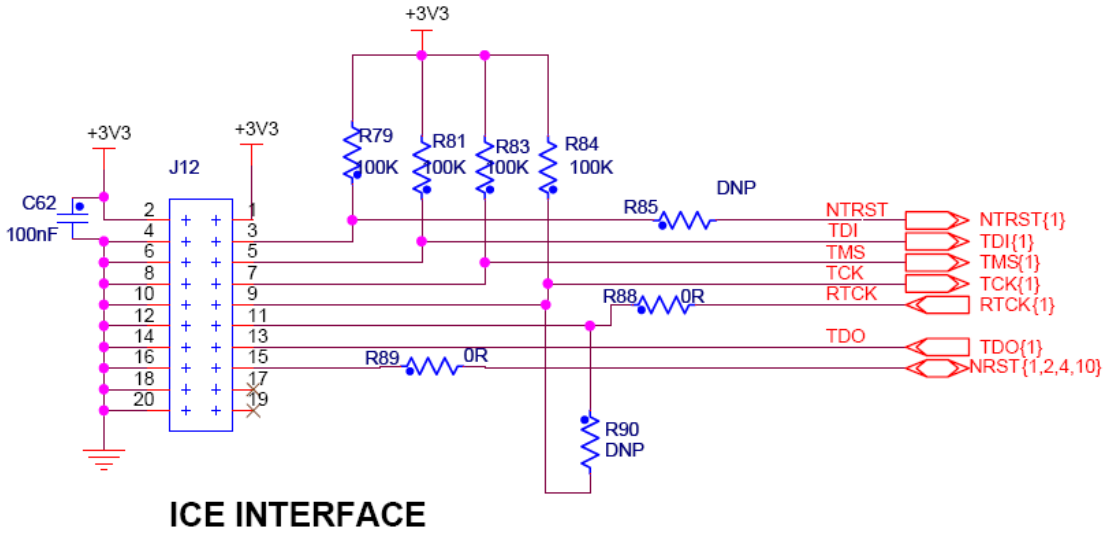
2.5.11 RS485

Two RS485 interfaces.

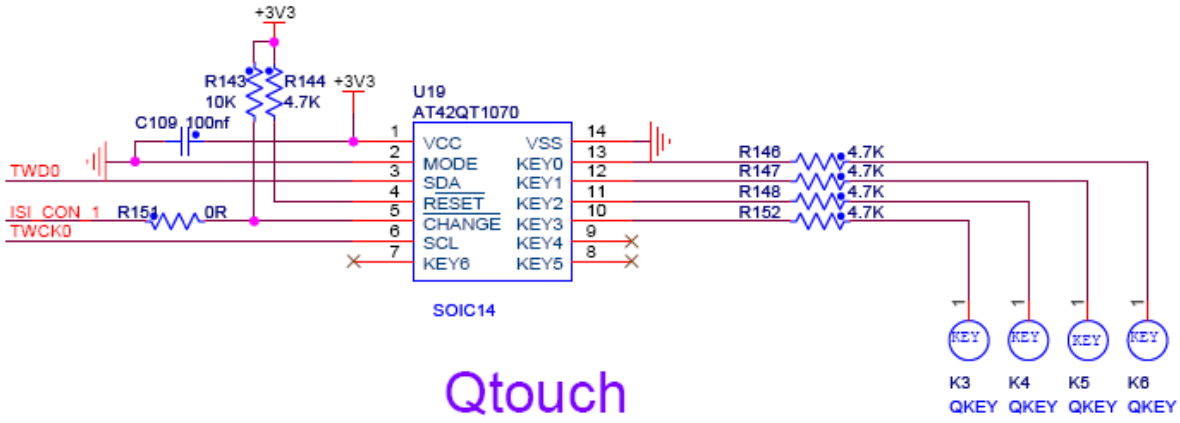


2.5.12 JTAG

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

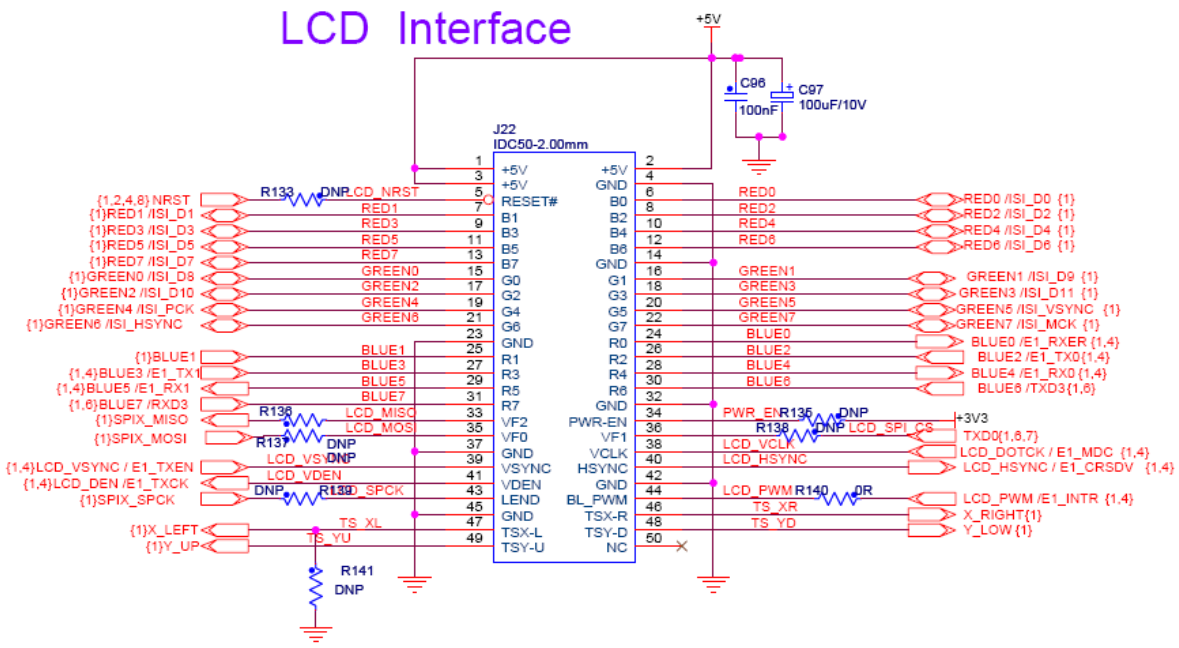


2.5.13 Qtouch

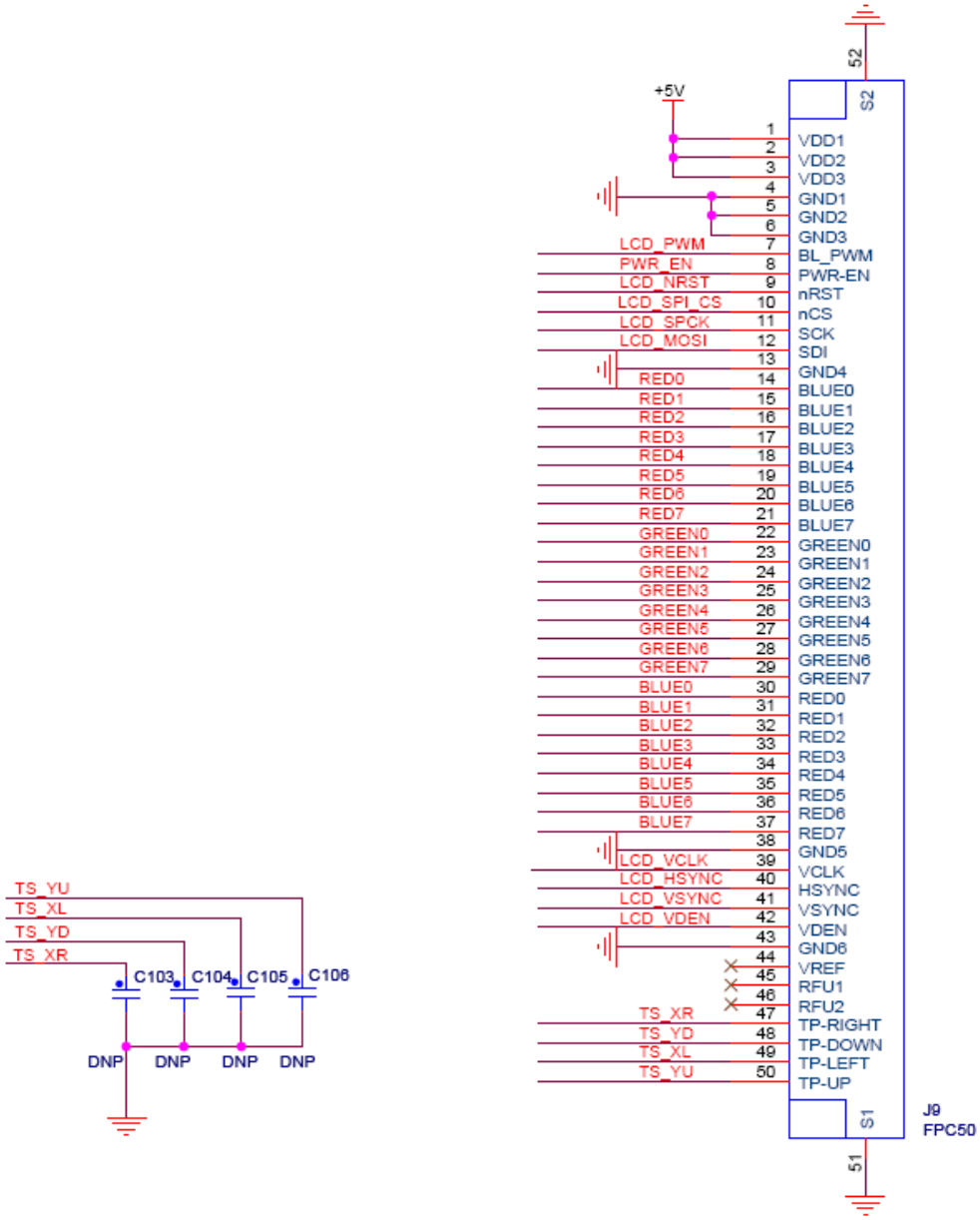


2.5.13 LCD interface

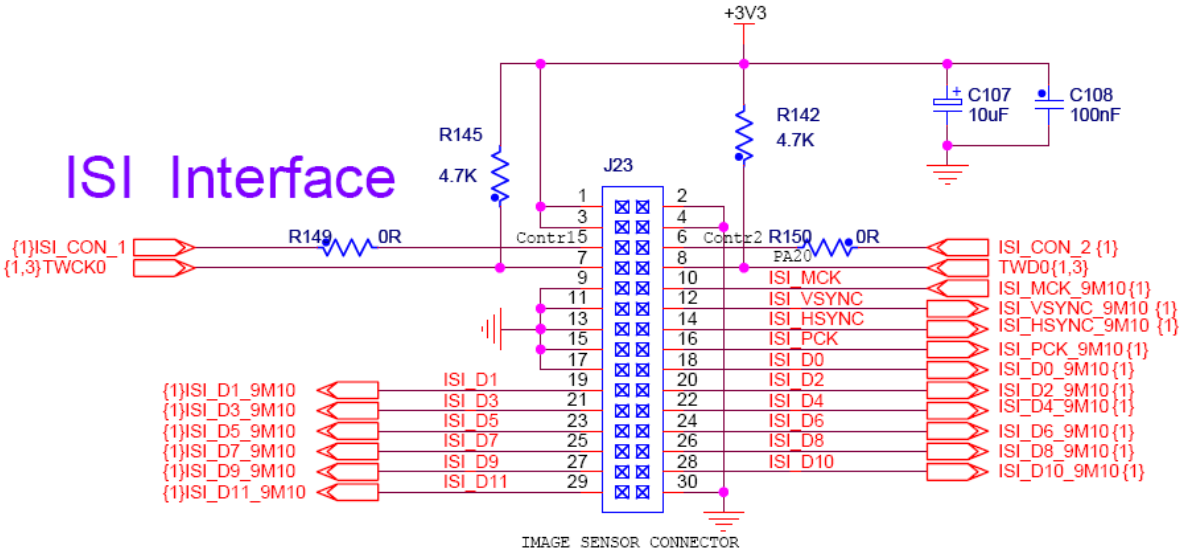
4.3 inch LCD interface



7.0 inch LCD interface

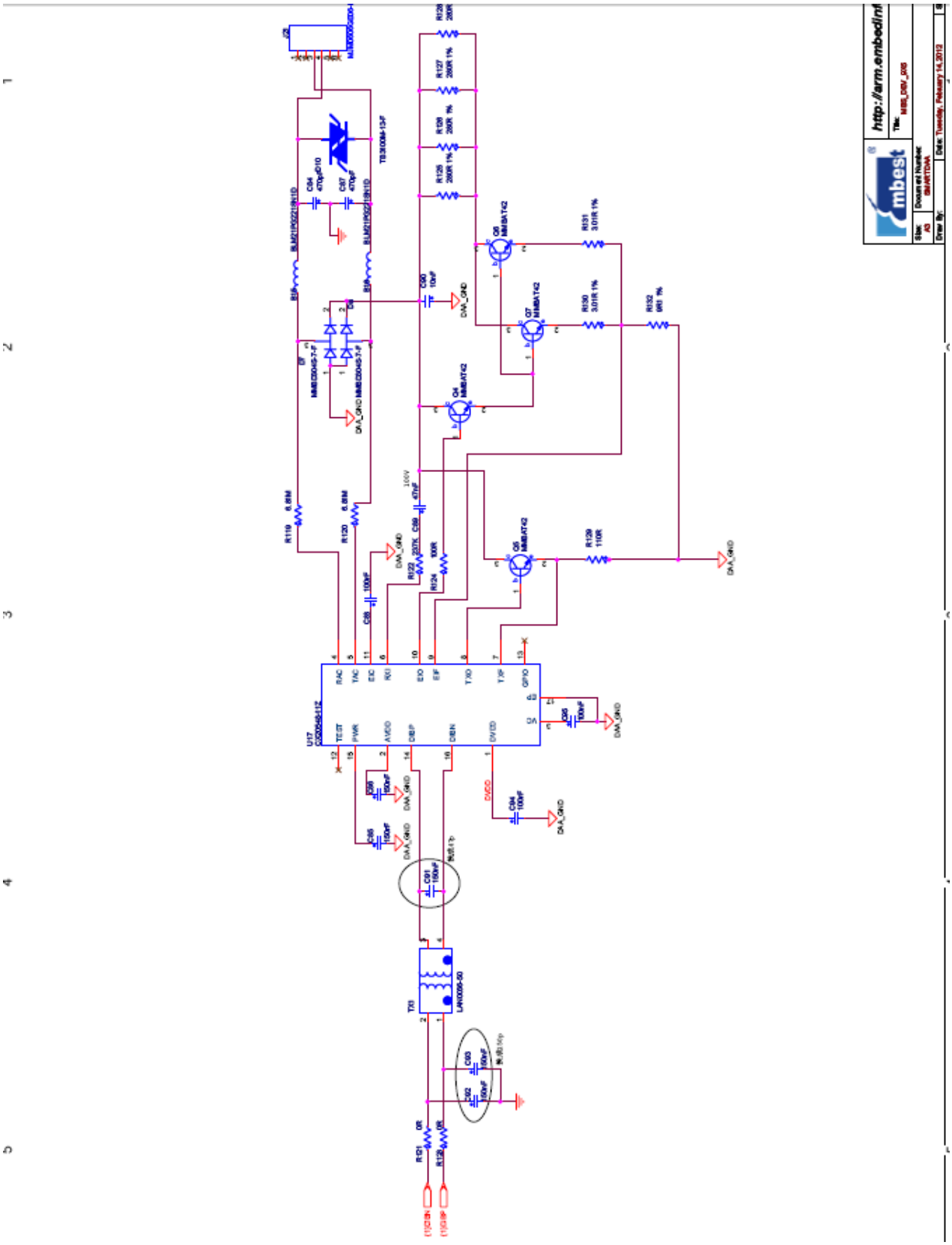

+5V
S2
S1
J9
FPC50
1 VDD1
2 VDD2
3 VDD3
4 GND1
5 GND2
6 GND3
7 LCD_PWM BL_PWM
8 PWR_EN PWR-EN
9 LCD_NRST nRST
10 LCD_SPI_CS nCS
11 LCD_SPCK SCK
12 LCD_MOSI SDI
13
14 RED0 GND4
15 RED1 BLUE0
16 RED2 BLUE1
17 RED3 BLUE2
18 RED4 BLUE3
19 RED5 BLUE4
20 RED6 BLUE5
21 RED7 BLUE6
22 GREEN0 BLUE7
23 GREEN1 GREEN0
24 GREEN2 GREEN1
25 GREEN3 GREEN2
26 GREEN4 GREEN3
27 GREEN5 GREEN4
28 GREEN6 GREEN5
29 GREEN7 GREEN6
30 BLUE0 GREEN7
31 BLUE1 RED0
32 BLUE2 RED1
33 BLUE3 RED2
34 BLUE4 RED3
35 BLUE5 RED4
36 BLUE6 RED5
37 BLUE7 RED6
38 RED7
39 LCD_VCLK GND5
40 LCD_HSYNC VCLK
41 LCD_VSYNC HSYNC
42 LCD_VDEN VSYNC
43 VDEN
44 GND6
45 VREF
46 RFU1
47 TS_XR RFU2
48 TS_YD TP-RIGHT
49 TS_XL TP-DOWN
50 TS_YU TP-LEFT
TP-UP
TS_YU
TS_XL
TS_YD
TS_XR
C103 C104 C105 C106
DNP DNP DNP DNP

2.5.14 ISI Interface

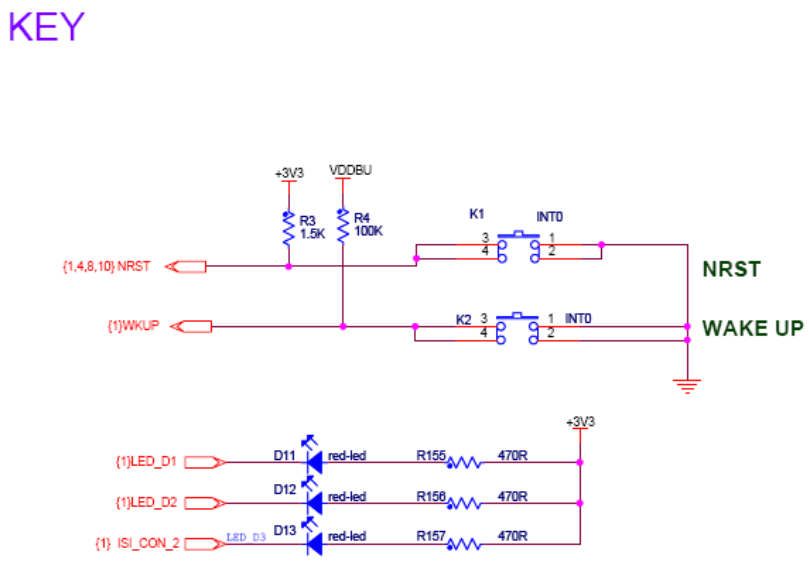


2.5.15 Telephone interface

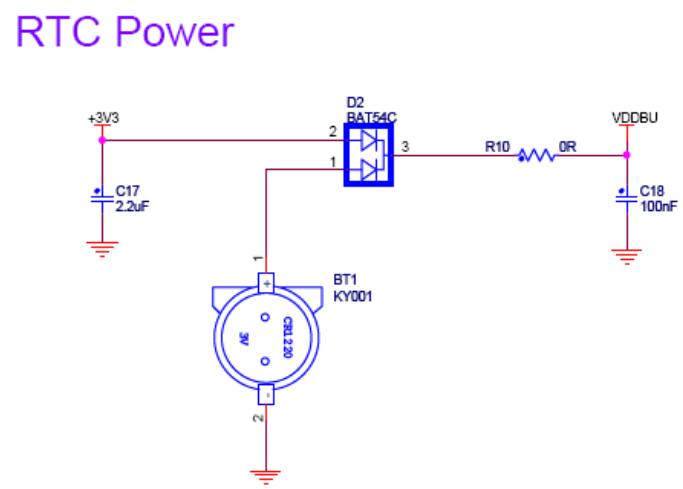
The board features a smart DAA(DATA Access Arrangement) chip to drive an analog telephone line.



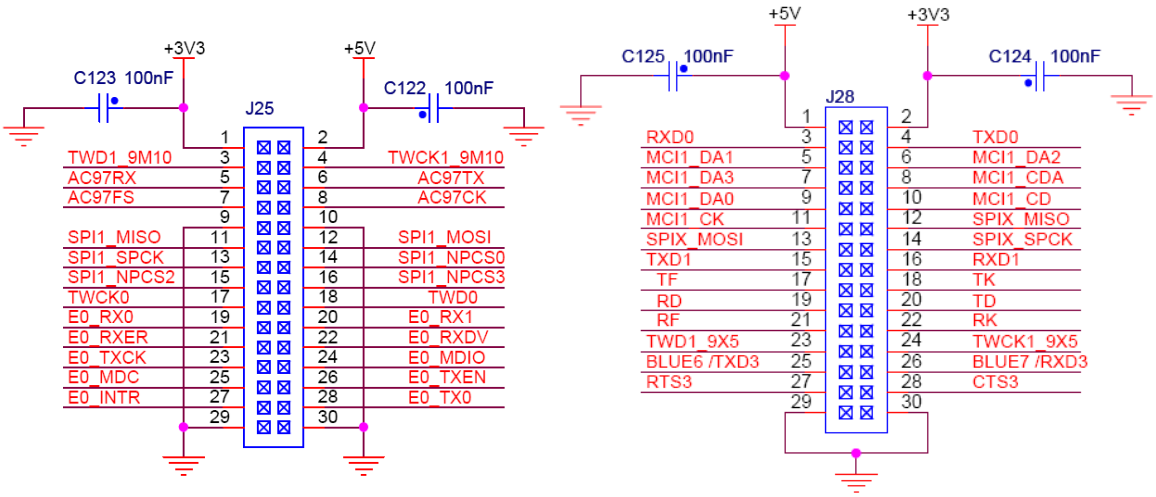
2.5.16 Key



2.5.17 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	√	√	√	√	√
eeprom	√	√	√	√	√
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

For Technical Support: support.en@embedinfo.com

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