

SBC-9263

Specification

Document Revision V1.0

Moscow 2008

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1 User information

1.1 About this manual

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MENTOR ELECTRONICS engineers are available for technical support. Before contacting technical support, please consult our web site for the latest product documentation, utilities, and drivers. If the information does not help solve the problem, please contact us by email or telephone.

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2 Introduction

2.1 SBC-9263 Architecture

System on module SBC-9263 is designed to be a low cost solution for embedded applications. It requires a few low cost components to be implemented in a custom design. The MPU AT91SAM9263 requires higher density circuit boards. The concept of this module is to separate the high-density circuit board of the SBC-9263 from the low density, often two-layer, application-specific baseboard.

For further reducing of system cost the module does not contain any unnecessary components that can be easily removed from the end system. The module contains only memories required for MPU functioning, Ethernet PHY to reduce external signals and a set of interfaces which are in common use by embedded system designers. This further decreases additional costs, while enabling a user to have more flexibility when selecting the interface driver (RS485, RS422, RS232, TTY etc.). Power consumption is reduced due to the integrated components.

SBC-9263 requires only the following components for integration:

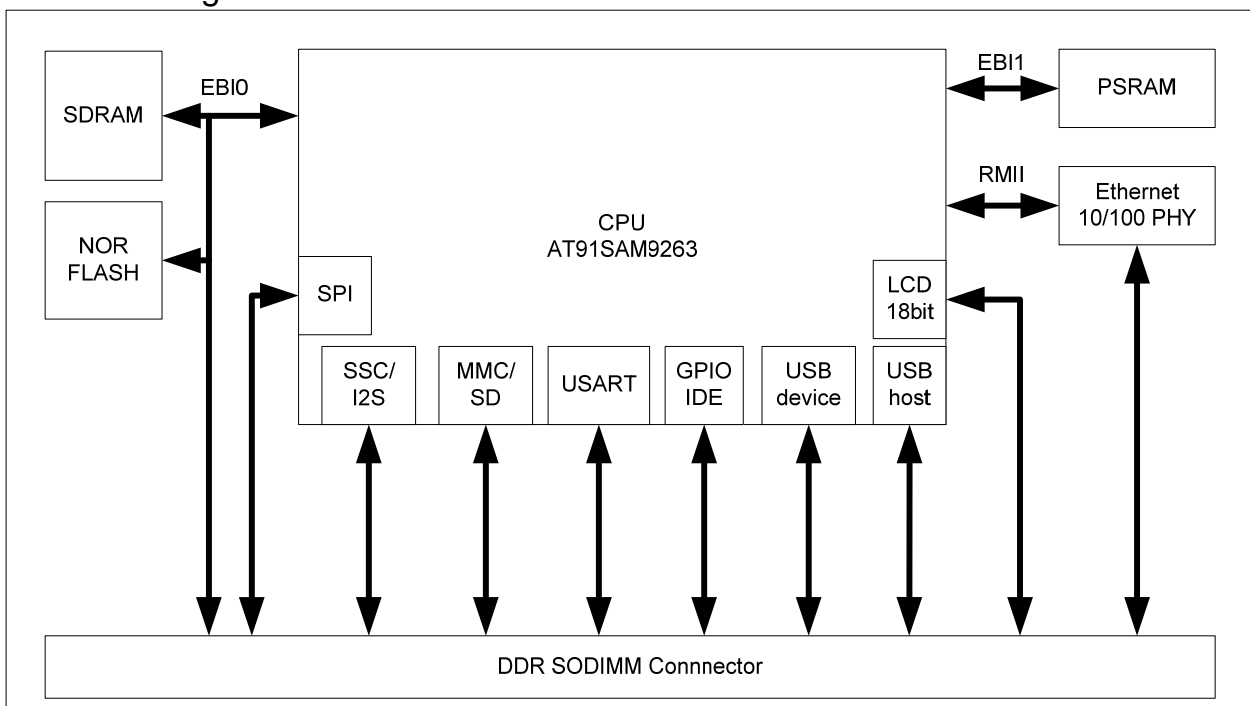
- DDR SODIMM 2.5V
- Power supply 3.3V

The module contains all required software for rapid software development: Linux kernel, rootfs and free disk space installed. With the SODIMM connector, the module can be exchanged for other CPU types, increasing the scalability and flexibility of the ultimate device. Also, one software framework can be used with different hardware platforms reducing a price of prototyping.

2.2 Feature Summary

- ATMEL AT91SAM9263 CPU in BGA package with 240 MHz ARM926EJ-S core
- UBOOT GPL boot loader
- LINUX operating system
- 64 MB SDRAM memory (optional 128 MB)
- 32-bit SDRAM data bus
- 64 MB NOR Flash memory (optional 32 MB)
- 16-bit Flash data bus
- unbuffered external 23 bit address / 16 bit data bus
- 10 / 100Mbit Ethernet with on board physical layer and fast MII interface
- 2 serial interfaces
- USB 2.0 Full Speed (12 Mbits per second) Host Double Port
- USB 2.0 Full Speed (12 Mbits per second) Device Port
- 8 MB video memory for LCD (optional)
- 1 power LED (3.3V) for status display
- on board 1.2V power supply for processor core voltage
- on board 1.8V power supply for PSRAM video memory
- 200-pins DDR SODIMM card edge connector
- ultra small size (67mm x 46mm)

2.3 Block diagram



Picture 1. SBC-9263 block diagram

2.4 Functional Description

2.4.1 SO-DIMM connector

All external connections are accessible through the 200-pins SODIMM card edge connector. The following external functionality is available:

- 3.3V input for all internal power sources
- AVDDT analog transmit power output for Ethernet
- EBIO address bus with address lines A0 through A22
- EBIO data bus with data lines D0 through D15
- NANDCS output
- SPI0 CS0 and CS3 outputs
- SPI1 CS0-CS3 outputs
- RESET out/input signal
- Interrupt inputs
- Serial interfaces
- Timer inputs and outputs
- 1 USB device and 2 USB host interfaces
- JTAG interface
- 10/100Mbit Ethernet signals

All components at the module are low-voltage that means that they are only 3.3V compliant. A system designer must take care to protect internal module circuits from over voltage and electrostatic.

2.4.2 Power supply

2.4.2.1 External power supply

The SBC-9263 requires an external power supply with the parameters:

- Voltage: 3.3V \pm 10%
- Current: 0.3 A

When using an external power supply, it is strongly recommended to place a low ESR capacitor on the carrier board close to the 3V3 input to reduce interference.

2.4.2.2 On board power supply

The CPU core supply voltage for the AT91SAM9263 is generated on board and is not available at SODIMM connector.

The PSRAM core voltage is generated on board and is not available at SODIMM connector. As PSRAM is an option, the 1.8V DC/DC converter is installed only with PSRAM chip.

2.4.3 Clocking

A 16.0 MHz oscillator supplies the system clock to the processor. This oscillator enables 240 MHz core frequency to the processor with 15 multiply, and 200 MHz with 12.5 multiply.

A 32.768 Hz oscillator supplies the permanent Slow Clock SLCK to the system.

A 50 MHz generator provides the reference clock to the Ethernet PHY.

2.4.4 Memory Layout

The module is equipped with the following types of memory:

- Spansion MirrorBit™ NOR Flash Family S29GL512N (or S29GL256N)
- SDRAM 2 chips organized as 4M (or 8M) x 4Bank x16 I/O (133MHz, 166MHz)
- PSRAM Micron 64Mb: 4 Meg x 16 Async/Page CellularRAM 1.0
MT45W4MW16PCGA

2.4.4.1 NOR Flash

The flash memory is accessed 16 bits wide with EBI0_NCS0. The resulting address range for the two standard options are:

64 Mbyte: 0x1000 0000 – 0x13FF FFFF (S29GL512N)

32 Mbyte: 0x1000 0000 – 0x11FF FFFF (S29GL256N)

Flash Sector Architecture:

- S29GL512N: Five hundred twelve 64 Kword (128 Kbyte) sectors
- S29GL256N: Two hundred fifty-six 64 Kword (128 Kbyte) sectors

High Performance:

- 90 ns access time for S29GL256N
- 100 ns for S29GL512N
- 8-word/16-byte page read buffer
- 25 ns page read times
- 16-word/32-byte write buffer reduces overall programming time for multiple-word updates

Common Flash Interface is a standard feature. For further information, please refer to the CFI Specification and CFI Publication 100, available via the World Wide Web at <http://www.amd.com/flash/cfi>

For further information about the Spansion MirrorBit™ NOR Flash Family please refer to the latest datasheet available at www.spansion.com

2.4.4.2 SDRAM

The SDRAM memory is accessed 32 bit data bus width with EBI0_NCS1. The resulting address range for the two standard options are:

64 Mbyte: 0x2000 0000 – 0x23FF FFFF (HY57V561620F)

128 Mbyte: 0x2000 0000 – 0x27FF FFFF (MT48LC32M16A2)

Features

- PC100- and PC133-compliant
- Standard SDRAM Protocol
- Internal 4bank operation
- 8,192 Refresh cycles / 64ms
- Programmable Burst Length and Burst Type
 - 1, 2, 4, 8 or full page for Sequential Burst
 - 1, 2, 4 or 8 for Interleave Burst

2.4.4.3 PSRAM as Video-memory

The MT45W4MW16PCGA is a 64Mb DRAM core device, organized as 4 Meg x 16 bits. The PSRAM memory is accessed 16 bit data bus width with EBI1_NCS0. The resulting address range is:

8 Mbyte: 0x7000 0000 – 0x707F FFFF (MT45W4MW16PCGA)

Features:

- Supports asynchronous and page operations
- Random access time: 70ns
- Page mode read access:
 - Sixteen-word page size
 - Interpage read access: 70ns
 - Intrapage read access: 20ns

Please note that currently the PSRAM is not supported in the Linux kernel. The frame buffer is located in SDRAM resulting in common lack of performance. For assistance in implementation of frame buffer in PSRAM – please contact sales department of Mentor Electronics Inc.

2.4.5 Ethernet Phy

A Davicom DM9161A is a physical layer, single-chip, and low power transceiver for 10/100BASE-TX operations. The whole Ethernet interface is formed with the fast Media Independent Interface (MII) and the Media Access Control Layer (MAC) of the Atmel AT91SAM9263 combined with the PHY Davicom DM9161A supplemented through an external RJ45-Modular Jack with integrated inductance.

2.5 SBC-9263 module pinout

Pin	Interface	Signal	Dir	Pin	Interface	Signal	Dir
1	Address	EBI0_A0_NBS0	OUT	2	Power	+3,3V	IN
3	Address	EBI0_A1_NBS2_NWR2	OUT	4	Power	+3,3V	IN
5	Address	EBI0_A2	OUT	6	Power	Ground	
7	Address	EBI0_A3	OUT	8		None	
9	Address	EBI0_A4	OUT	10		None	
11	Address	EBI0_A5	OUT	12		None	
13	Address	EBI0_A6	OUT	14		None	
15	Address	EBI0_A7	OUT	16		None	
17	Address	EBI0_A8	OUT	18	LCD/IO	LCDD0/PortC4	I/O
19	Address	EBI0_A9	OUT	20	LCD/IO	LCDD1/PortC5	I/O
21	Address	EBI0_A10	OUT	22	LCD/IO	LCDD2/PortC6	I/O
23	Address	EBI0_A11	OUT	24	LCD/IO	LCDD3/PortC7	I/O
25	Address	EBI0_A12	OUT	26	LCD/IO	LCDD4/PortC8	I/O
27	Address	EBI0_A13	OUT	28	LCD/IO	LCDD5/PortC9	I/O
29	Address	EBI0_A14	OUT	30	LCD/IO	LCDD6/PortC10	I/O
31	Address	EBI0_A15	OUT	32	LCD/IO	LCDD7/PortC11	I/O
33	Address	EBI0_A16_BA0	OUT	34		None	
35	Address	EBI0_A17_BA1	OUT	36	MCI0/IO	MCI0_DB1/PortA18	I/O
37	Address	EBI0_A18	OUT	38	MCI0/IO	MCI0_DB2/PortA19	I/O
39	Address	EBI0_A19	OUT	40	CAN/IO	CANTX/PCK0/PortA13	I/O
41	Address	EBI0_A20	OUT	42	CAN/IO	CANRX/IRQ/PortA14	I/O
43	Address	EBI0_A21	OUT	44	DBGU/IO	DRXD/PortC30	I/O
45	Address	EBI0_A22	OUT	46	DBGU/IO	DTXD/PortC31	I/O
47	Data	EBI0_D15	I/O	48	UART0/IO	TXD0/PortA26	I/O
49	Data	EBI0_D14	I/O	50	UART0/IO	RXD0/PortA27	I/O
51	Data	EBI0_D13	I/O	52	UART0/IO	RTS0/PortA28	I/O
53	Data	EBI0_D12	I/O	54	UART0/IO	CTS0/PortA29	I/O
55	Data	EBI0_D11	I/O	56	MCI0/SPI0	MCI0_DA0/SPI0_MISO/PA0	I/O
57	Data	EBI0_D10	I/O	58	MCI0/SPI0	MCI0_CDA/SPI0_MOSI/PA1	I/O
59	Data	EBI0_D9	I/O	60	SPI0	SPI0_SPCK/PortA2	I/O
61	Data	EBI0_D8	I/O	62	IO	PortE20	I/O
63	Data	EBI0_D7	I/O	64	IO	PortE16	I/O
65	Data	EBI0_D6	I/O	66	IO	PortE17	I/O
67	Data	EBI0_D5	I/O	68	MCI0/SPI0	MCI0_DA1/SPI0_NPCS1/PA3	I/O
69	Data	EBI0_D4	I/O	70	MCI0/SPI0	MCI0_DA2/SPI0_NPCS2/PA4	I/O
71	Data	EBI0_D3	I/O	72	MCI0/SPI0	MCI0_DA3/SPI0_NPCS0/PA5	I/O
73	Data	EBI0_D2	I/O	74	MCI0/IO	MCI0_CK/PortA12	I/O
75	Data	EBI0_D1	I/O	76	IO	TIOB0/PortE19	I/O
77	Data	EBI0_D0	I/O	78	IO	TIOA0/PortE18	I/O
79		None	NC	80	MCI1/IO	MCI1_DA0/PortA8	I/O
81	ISI/IO	ISI_D8/PortE12	I/O	82	MCI1/IO	MCI1_DA1/PortA9	I/O
83	ISI/IO	ISI_D9/PortE13	I/O	84	MCI1/IO	MCI1_DA2/PortA10	I/O
85	ISI/IO	ISI_D10/PortE14	I/O	86	MCI1/IO	MCI1_DA3/PortA11	I/O
87	ISI/IO	ISI_D11/PortE15	I/O	88	MCI1/IO	MCI1_CDA/PortA7	I/O
89	MCI0/IO	MCI0_CDB/PortA16	I/O	90	MCI1/IO	MCI1_CK/PCK2/PortA6	I/O
91	MCI0/IO	MCI0_DB0/PortA17	I/O	92	AC97/SSI	AC97FS/TF0/PortB0	I/O
93	SPI1/IO	SPI1_MISO/PortB13	I/O	94	AC97/SSI	AC97CK/TK0/PortB1	I/O
95	SPI1/IO	SPI1_MOSI/PortB12	I/O	96	AC97/SSI	AC97TX/TD0/PortB2	I/O
97	SPI1/IO	SPI1_SPCK/PortB14	I/O	98	AC97/SSI	BMS/AC97RX/RD0/PortB3	I/O
99	SPI1/IO	SPI1_NPCS0/PortB15	I/O	100	IO	PCK1/PortB10	I/O

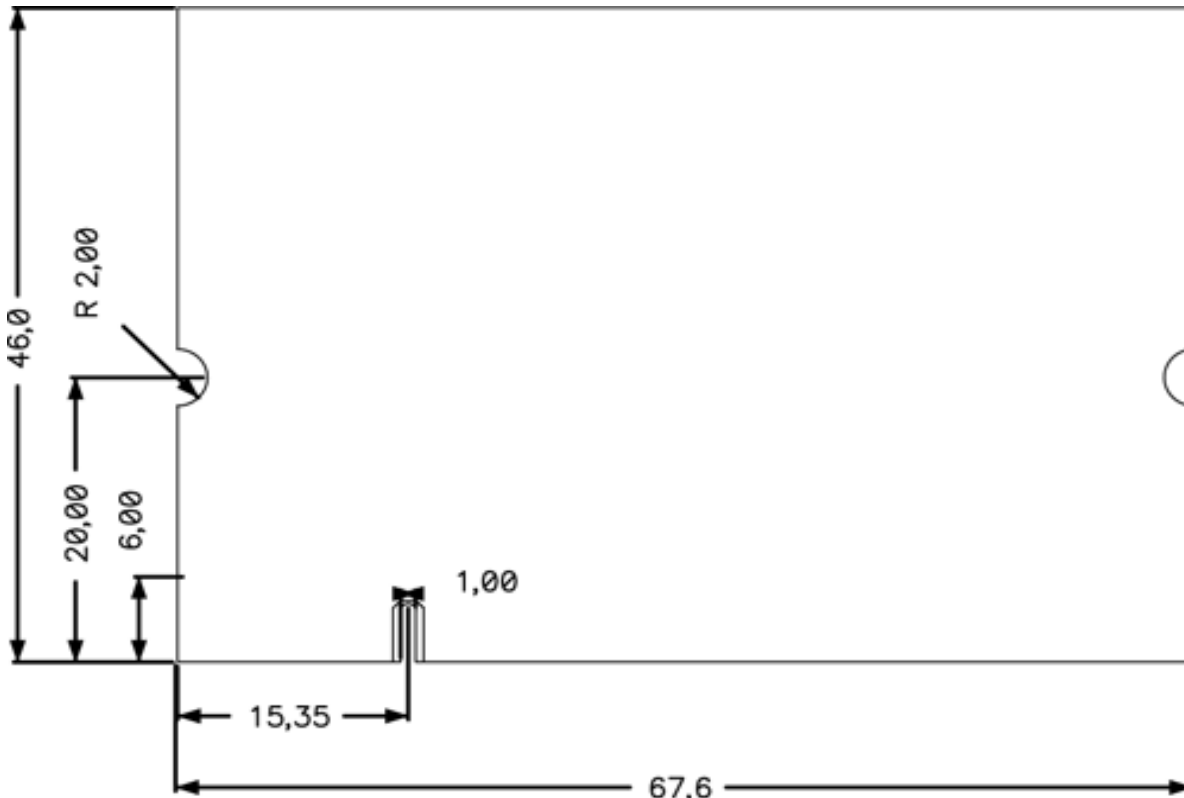
SBC-9263 module pinout (continue)

Pin	Interface	Signal	Dir	Pin	Interface	Signal	Dir
101	Control	EBI0_NANDOE	OUT	102	TW/SSI/IO	TWD/RK0/PortB4	I/O
103	Control	EBI0_NANDWE	OUT	104	TW/SSI/IO	TWCK/RF0/PortB5	I/O
105	MC11/IO	MC11_DB0/PortA22	I/O	106		None	
107	Control/IO	EBI0_NCS3/NANDCS/PD15	I/O	108		None	
109	Control	EBI0_NBS1_NWR1	OUT	110		None	
111	Control	EBI0_NBS3_NWR3	OUT	112		None	
113	Control/IO	EBI0_CFCE1/PortD8	I/O	114		None	
115	Control/IO	EBI0_CFCE2/PortD9	I/O	116		None	
117	ISI/IO	ISI_D0/PortE0	I/O	118		None	
119	ISI/IO	ISI_D1/PortE1	I/O	120		None	
121	ISI/IO	ISI_D2/PortE2	I/O	122		None	
123	ISI/IO	ISI_D3/PortE3	I/O	124		None	
125	ISI/IO	ISI_D4/PortE4	I/O	126	LCD/IO	LCDD10/PortC14	I/O
127	ISI/IO	ISI_D5/PortE5	I/O	128	LCD/IO	LCDD11/PortC15	I/O
129	ISI/IO	ISI_D6/PortE6	I/O	130	LCD/IO	LCDD12/PortC16	I/O
131	ISI/IO	ISI_D7/PortE7	I/O	132	LCD/IO	LCDD13/PortC12	I/O
133	ISI/IO	ISI_PCK/TIOA1/PortE8	I/O	134	LCD/IO	LCDD14/PortC18	I/O
135	ISI/IO	ISI_HSYNC/TIOB1/PortE9	I/O	136	LCD/IO	LCDD15/PortC19	I/O
137	ISI/IO	ISI_VSYNC/PWM3/PortE10	I/O	138		None	
139	ISI/IO	ISI_MCK/PCK3/PortE11	I/O	140		None	
141	SPI1/IO	SPI1_NPCS1/PCK1/PB16	I/O	142	LCD/IO	LCDD18/PortC22	I/O
143	SPI1/IO	SPI1_NPCS2/TIOA2/PB17	I/O	144	LCD/IO	LCDD19/PortC23	I/O
145	SPI1/IO	SPI1_NPCS3/TIOB2/PB18	I/O	146	LCD/IO	LCDD20/PortC24	I/O
147	IO	PWM0/PortC28	I/O	148	LCD/IO	LCDD21/PortC17	I/O
149	IO	PWM2/PortB27	I/O	150	LCD/IO	LCDD22/PortC26	I/O
151	IO	PWM3/PortB29	I/O	152	LCD/IO	LCDD23/PortC27	I/O
153	IO	Ethernet PHY LED Mode	IN	154	LCD/IO	LCDHSYNC/PortC1	I/O
155	IO	Ethernet PHY LED0	OUT	156	LCD/IO	LCDDOTCK/PortC2	I/O
157	IO	Ethernet PHY LED1	OUT	158	LCD/IO	LCDDEN/PWM1/PortC3	I/O
159	IO	Ethernet PHY LED2	OUT	160	IO	SCK0/PortA30	I/O
161	Power	Ground		162	IO	DMARQ0/PortA31	I/O
163	IO	Ethernet TX+	OUT	164	LCD/IO	LCDC/PortB9	I/O
165	IO	Ethernet TX-	OUT	166	LCD/IO	LCDVSYNC/PortC0	I/O
167	Power	Ground		168	USBH	HDPA	I/O
169	IO	Ethernet RX+	IN	170	USBH	HDMA	I/O
171	IO	Ethernet RX-	IN	172	Power	Ground	
173	Power	Ground		174	USBH	HDPB	I/O
175	UART2/IO	TXD2/SPI1_NPCS2/PortD2	I/O	176	USBH	HDMB	I/O
177	UART2/IO	RXD2/SPI1_NPCS3/PortD3	I/O	178	Power	Ground	
179	Control	NRST	I/O	180	USB D	DDM	I/O
181	JTAG	RTCK		182	USB D	DDP	I/O
183	JTAG	TMS		184	Power	Ground	
185	JTAG	TDO		186	MC11/IO	MC11_DB1/PortA23	I/O
187	JTAG	TDI		188	MC10/IO	MC10_DB3/PortA20	I/O
189	JTAG	TCK		190	MC11/IO	MC11_DB2/PortA24	I/O
191	JTAG	NTRST		192	MC11/IO	MC11_CDB/PortA21	I/O
193	Control/IO	IRQ1/PortA15	I/O	194	MC11/IO	MC11_DB3/PortA25	I/O
195	SPI1/IO	SPI0_NPCS3/PortB11	I/O	196		None	
197		None		198	Power	Ethernet PHY AVDDT	OUT
199		None		200	Power	Ethernet PHY AVDDT	OUT

3 Mechanical Dimensions

3.1 Module dimensions

All units are millimeters.



3.2 SODIMM Connector

The SBC-9263 uses standard DDR1 & DDR2 SO-DIMM 2V5 version memory sockets for connection to the carrier board.

Attention:

The SBC-9263 module is NOT compatible with memory sockets. Insertion into a socket with wrong pinout may damage the SBC-9263 and the carrier board!

The following table is a short list of possible SODIMM connectors which can be used with the SBC-9263:

Manufacturer	Order
JAE	MM50-200B1-1E
TYCO	AMP-1473005-1

4 Technical Specifications

Microcontroller

Type: Atmel AT91SAM9263-CU
Speed: 200 (240) MHz

Memory

SDRAM: 64 Mbyte, optional 128 Mbyte, 32-bit data bus
Flash: 64 Mbyte, NOR, 16-bit data bus

External interfaces

Data bus 23-bit unbuffered address bus
16-bit unbuffered data bus
3.3V tolerant
Can be used for booting

SPI
MCI
SSI
USB-host
USB-device
Ethernet 10/100

External power supply

Input: 3.3 V \pm 5 %, 200 mA max.
Input connection: DDR SODIMM bus pins 3V3 and GND

On board power supply

Type: Low drop out linear voltage regulator
Output 1: 1.2 V, 100 mA max. (CPU core)
Output 2: 1.8 V, 150 mA max. (PSRAM core)

General information

Connector: DDR SODIMM 2V5 card edge, 200 pins
Power consumption: 3.3V 200 mA max.
PCB type: 6 layer FR-4 lead free
Operating temperature: -40 +85 °C
Storage temperature: -40 +85 °C
Humidity: 10 – 90%, non condensing
Dimensions (h x w): 46 x 67.6 mm
Weight: 30 g.

5 Document Revision History

Version	Date	Description
0.1	06 Apr 2008	Initial Draft
0.2	21 Apr 2008	Added pinout description
1.0	25 Apr 2008	Added mechanical and technical specification