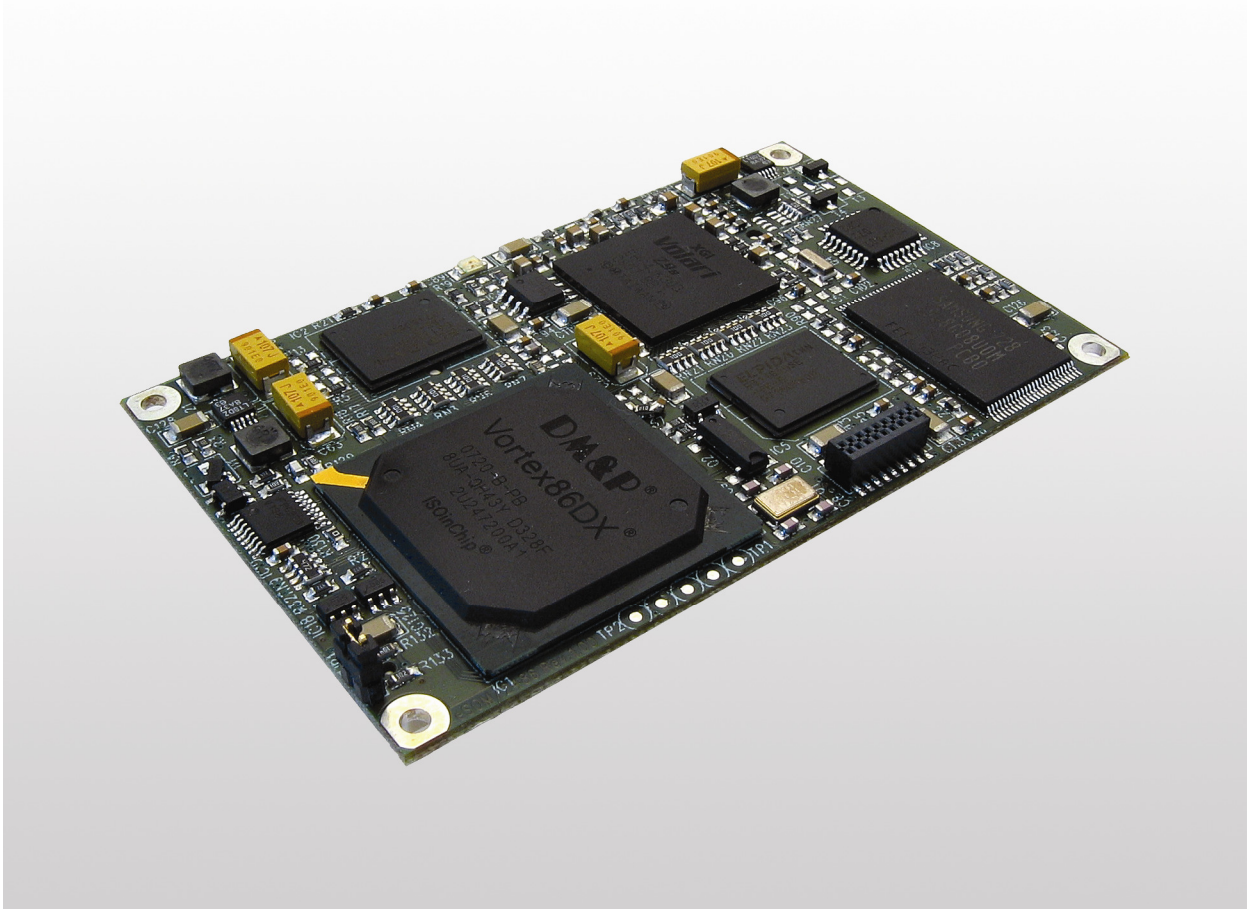
System-on-Module eSOM/2586-M

Board Revision 1.0

Hardware Reference



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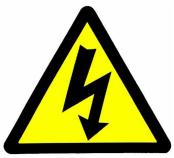
1 INTRODUCTION

This document describes the hardware components of the System-on-Module eSOM/2586-M. For further information about the individual components of this product you may follow the links from our website at `http://www.ssv-embedded.de`. Our website contains a lot of technical information, which will be updated in regular periods.

1.1 Safety Guidelines

Please read the following safety guidelines carefully! In case of property or personal damage by not paying attention to this document and/or by incorrect handling, we do not assume liability. In such cases any warranty claim expires.



ATTENTION: Observe precautions for handling – electrostatic sensitive device!

- Discharge yourself before you work with the device, e.g. by touching a heater of metal, to avoid damages.
- Stay grounded while working with the device to avoid damage through electrostatic discharge.

1.2 Conventions

Convention	Usage
bold	Important terms
italic	Filenames, user inputs and command lines
`monospace`	Pathnames, internet addresses and program code

Table 1: Conventions used in this Document

1.3 Block Diagram

The System-on-Module eSOM/2586-M comes with 1x 10/100 Mbps Ethernet LAN interface, 16-bit GPIO, 1x SPI, 3x UART, 1x 18-bit VGA CRT interface, 1x PS/2-compatible keyboard and mouse interface, 1x CompactFlash (CF) card slot and 2x USB 2.0 host port. The 16-bit expansion bus interface (available over the 2x 100-pin interface connector) supports the connection to external I/O chips and memory devices. The main application area of the eSOM/2586-M is the field of embedded IP-based HMI (Human Machine Interface) gateways for modern factory automation and laboratory environments.

The eSOM/2586-M drive space for the operating system and the user files are implemented with a NAND Flash controller and a NAND Flash chip. The eSOM/2586-M NAND Flash controller is connected to one of the USB 2.0 host controllers of the Vortex86DX 32-bit x86 SoC. This means the eSOM/2586-M is using an on-board USB boot device.

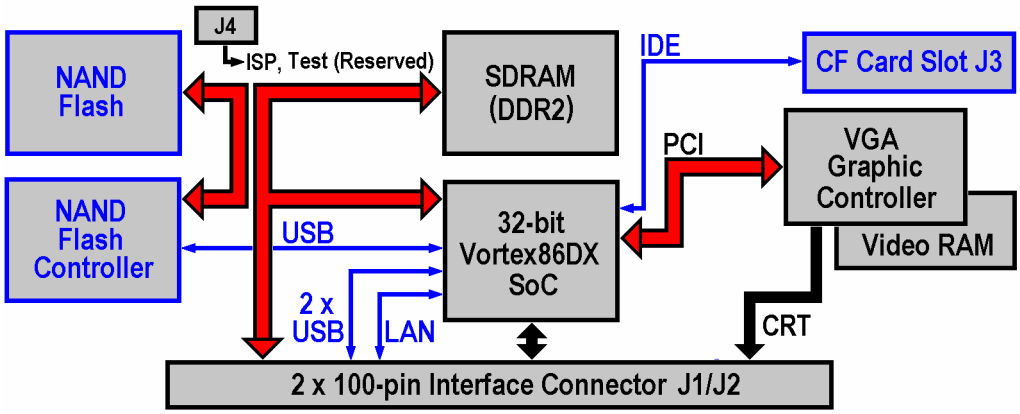


Figure 1: Block diagram of System-on-Module eSOM/2586-M

The main component of the eSOM/2586-M is the Vortex86DX 32-bit x86 SoC (System on Chip). The Vortex86DX is a high performance MCU, which is compatible with DOS, Linux and Microsoft Windows CE. It integrates 32 KB write through direct map L1 cache, PCI Rev. 2.1 32-bit bus interface at 33 MHz, DDR2 SDRAM controller, ROM controller, IPC (Internal Peripheral Controller) with DMA and interrupt timer/counter, Fast Ethernet MAC and PHY, 16C550/16C552-compatible FIFO UART, USB 2.0 host controller and many more. Please see the Vortex86DX user manuals for more details.

The eSOM/2586 VGA graphics controller is implemented with a XGI Volari Z9s GPU (Graphics Processing Unit) and 64 MB DDR2-based frame buffer RAM. The Z9s GPU device is using an on-board PCI bus interface to the Vortex86DX SoC.

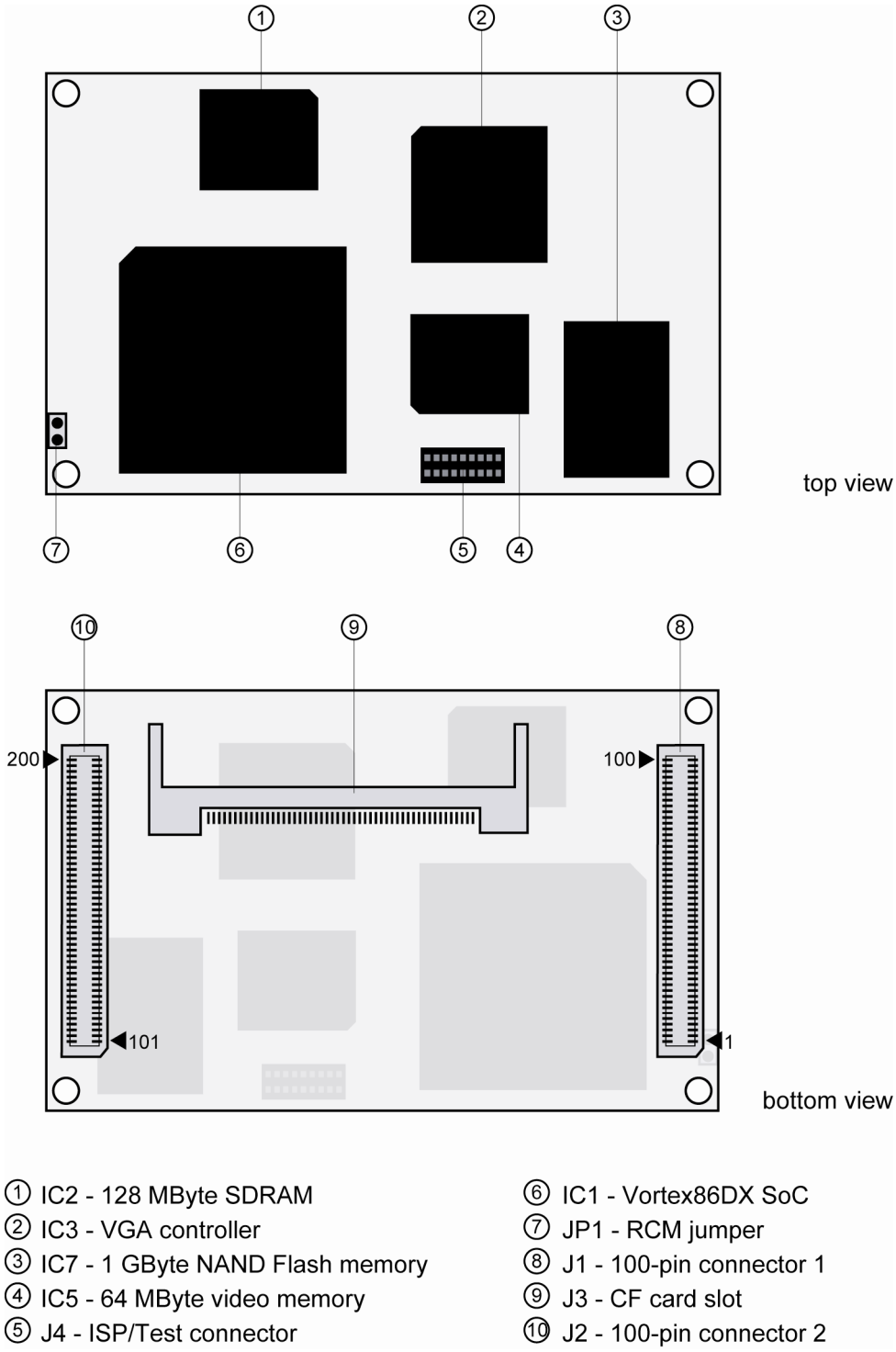
1.4 Features and Technical Data

- Vortex86DX 32-bit x86 SoC @ 600, 800, 1.000 MHz (please see note 1)
- PC-compatible AMI Basic I/O System (BIOS)
- 128 MB SDRAM with DDR2 interface @ 300 MHz Bus Speed
- 1 GB NAND Flash memory for O/S boot image and data files
- XGI GPU VGA controller with 64 MB frame buffer (DDR2 SDRAM)
- On-board PCI interface between Vortex86DX SoC and XGI GPU
- 1x VGA CRT interface
- 1x PS/2-compatible keyboard and mouse interface
- 1x CompactFlash (CF) card slot with IDE-based interface
- 1x LED for IDE (CF) access status
- 1x 10/100 Mbps Ethernet LAN interface
- 1x LED output signal for LAN status
- 2x USB 2.0 host interface with HS, FS and LS support
- 1x SPI (Serial Peripheral Interface) with one Chip Select Output (please see note 2)
- 3x 16C550/16C552-compatible UART-based serial ports (one with all handshakes)
- 16-bit General Purpose Parallel Input Output (GPIOs) (please see note 2)
- 16-bit Expansion Bus with 24 address lines
- 4x Interrupt Inputs, 4x Chip Select Outputs
- Programmable Watchdog timer
- In-System Programming features
- 2x 100-pin Hirose FX8C interface connector
- 3.3 Volt low power design, supply voltage 3.3 VDC (±5 %)
- Supply current 1.000 mA typ. @ 800 MHz (1.300 mA max.)
- 0 °C to +70 °C operating temperature (still air) without heat sink
- Size 80 mm x 50 mm
- Preinstalled Linux O/S with Kernel version 2.6.18 or ROM-DOS 6.22 O/S
- RoHS compliant

Note 1: The ex factory clock speed is 800 MHz. The other clock speeds are available over an on-board strap option.

Note 2: The four SPI signals of the eSOM/2586-M can be also used as a 4-bit GPIO (GPIO – Parallel Port C).

2 BOARD LAYOUT



① IC2 - 128 MByte SDRAM
② IC3 - VGA controller
③ IC7 - 1 GByte NAND Flash memory
④ IC5 - 64 MByte video memory
⑤ J4 - ISP/Test connector
⑥ IC1 - Vortex86DX SoC
⑦ JP1 - RCM jumper
⑧ J1 - 100-pin connector 1
⑨ J3 - CF card slot
⑩ J2 - 100-pin connector 2

Figure 2: Board layout System-on-Module eSOM/2586-M

3 PINOUTS

3.1 2 x 100 Pin Connector – J1 (1. Part)

Pin	Name	Group	Function
1	VCC	PWR	3.3 Volt Power Input
2	VCC	PWR	3.3 Volt Power Input
3	PA0	GPIO	GPIO - Parallel Port A, Bit 0
4	PA4	GPIO	GPIO - Parallel Port A, Bit 4
5	PA1	GPIO	GPIO - Parallel Port A, Bit 1
6	PA5	GPIO	GPIO - Parallel Port A, Bit 5
7	PA2	GPIO	GPIO - Parallel Port A, Bit 2
8	PA6	GPIO	GPIO - Parallel Port A, Bit 6
9	PA3	GPIO	GPIO - Parallel Port A, Bit 3
10	PA7	GPIO	GPIO - Parallel Port A, Bit 7
11	GND	PWR	Ground
12	GND	PWR	Ground
13	---	---	Reserved. Do not use.
14	---	---	Reserved. Do not use.
15	---	---	Reserved. Do not use.
16	---	---	Reserved. Do not use.
17	---	---	Reserved. Do not use.
18	SPICS0	SIO	Serial I/O, SPI Interface Chip Select 0
19	---	---	Reserved. Do not use.
20	SPICLK	SIO	Serial I/O, SPI Interface Clock
21	---	---	Reserved. Do not use.
22	MOSI	SIO	Serial I/O, SPI Interface Master Out Slave In
23	---	---	Reserved. Do not use.
24	MISO	SIO	Serial I/O, SPI Interface Master In Slave Out
25	VCC	PWR	3.3 Volt Power Input
26	VCC	PWR	3.3 Volt Power Input
27	INT4	EXPBUS	Expansion Bus, Interrupt Input 4
28	CLKOUT	EXPBUS	Expansion Bus, Clock Output
29	INT3	EXPBUS	Expansion Bus, Interrupt Input 3
30	RDY	EXPBUS	Expansion Bus, External Ready Input
31	INT2	EXPBUS	Expansion Bus, Interrupt Input 2
32	WR	EXPBUS	Expansion Bus, Write Signal
33	INT1	EXPBUS	Expansion Bus, Interrupt Input 1
34	RD	EXPBUS	Expansion Bus, Read Signal
35	GND	PWR	Ground
36	GND	PWR	Ground
37	D0	EXPBUS	Expansion Bus, Data Bit 0
38	D8	EXPBUS	Expansion Bus, Data Bit 8
39	D1	EXPBUS	Expansion Bus, Data Bit 1
40	D9	EXPBUS	Expansion Bus, Data Bit 9

Table 2: Pinout 2 x 100 pin connector – pin 1 to 40

3.2 2 x 100 Pin Connector – J1 (2. Part)

Pin	Name	Group	Function
41	D2	EXPBUS	Expansion Bus, Data Bit 2
42	D10	EXPBUS	Expansion Bus, Data Bit 10
43	D3	EXPBUS	Expansion Bus, Data Bit 3
44	D11	EXPBUS	Expansion Bus, Data Bit 11
45	VCC	PWR	3.3 Volt Power Input
46	VCC	PWR	3.3 Volt Power Input
47	D4	EXPBUS	Expansion Bus, Data Bit 4
48	D12	EXPBUS	Expansion Bus, Data Bit 12
49	D5	EXPBUS	Expansion Bus, Data Bit 5
50	D13	EXPBUS	Expansion Bus, Data Bit 13
51	D6	EXPBUS	Expansion Bus, Data Bit 6
52	D14	EXPBUS	Expansion Bus, Data Bit 14
53	D7	EXPBUS	Expansion Bus, Data Bit 7
54	D15	EXPBUS	Expansion Bus, Data Bit 15
55	GND	PWR	Ground
56	GND	PWR	Ground
57	A0	EXPBUS	Expansion Bus, Address Bit 0
58	A1	EXPBUS	Expansion Bus, Address Bit 1
59	A2	EXPBUS	Expansion Bus, Address Bit 2
60	A3	EXPBUS	Expansion Bus, Address Bit 3
61	A4	EXPBUS	Expansion Bus, Address Bit 4
62	A5	EXPBUS	Expansion Bus, Address Bit 5
63	A6	EXPBUS	Expansion Bus, Address Bit 6
64	A7	EXPBUS	Expansion Bus, Address Bit 7
65	VCC	PWR	3.3 Volt Power Input
66	VCC	PWR	3.3 Volt Power Input
67	A8	EXPBUS	Expansion Bus, Address Bit 8
68	A9	EXPBUS	Expansion Bus, Address Bit 9
69	A10	EXPBUS	Expansion Bus, Address Bit 10
70	A11	EXPBUS	Expansion Bus, Address Bit 11
71	A12	EXPBUS	Expansion Bus, Address Bit 12
72	A13	EXPBUS	Expansion Bus, Address Bit 13
73	A14	EXPBUS	Expansion Bus, Address Bit 14
74	A15	EXPBUS	Expansion Bus, Address Bit 15
75	GND	PWR	Ground
76	GND	PWR	Ground
77	A16	EXPBUS	Expansion Bus, Address Bit 16
78	A17	EXPBUS	Expansion Bus, Address Bit 17
79	A18	EXPBUS	Expansion Bus, Address Bit 18
80	A19	EXPBUS	Expansion Bus, Address Bit 19

Table 3: Pinout 2 x 100 pin connector – pin 41 to 80

3.3 2 x 100 Pin Connector – J1 (3. Part)

Pin	Name	Group	Function
81	A20	EXPBUS	Expansion Bus, Address Bit 20
82	A21	EXPBUS	Expansion Bus, Address Bit 21
83	A22	EXPBUS	Expansion Bus, Address Bit 22
84	A23	EXPBUS	Expansion Bus, Address Bit 23
85	---	---	Reserved. Do not use.
86	---	---	Reserved. Do not use.
87	VCC	PWR	3.3 Volt Power Input
88	VCC	PWR	3.3 Volt Power Input
89	CS1	EXPBUS	Chip Select Output 1
90	CS3	EXPBUS	Chip Select Output 3
91	CS2	EXPBUS	Chip Select Output 2
92	CS4	EXPBUS	Chip Select Output 4
93	VBATP	PWR	3 Volt Real Time Clock Battery Plus Input
94	---	---	Reserved. Do not use.
95	---	---	Reserved. Do not use.
96	RESOUT	RESET	Reset Output Signal
97	---	---	Reserved. Do not use.
98	RESIN	RESET	Reset Input Signal
99	GND	PWR	Ground
100	GND	PWR	Ground

Table 4: Pinout 2 x 100 pin connector – pin 81 to 100

3.4 2 x 100 Pin Connector – J2 (1. Part)

Pin	Name	Group	Function
101	VCC	PWR	3.3 Volt Power Input
102	VCC	PWR	3.3 Volt Power Input
103	CTS1	SIO	Serial I/O, UART COM1 CTS Pin
104	---	---	Reserved. Do not use.
105	TXD1	SIO	Serial I/O, UART COM1 TXD Pin
106	---	---	Reserved. Do not use.
107	RXD1	SIO	Serial I/O, UART COM1 RXD Pin
108	---	---	Reserved. Do not use.
109	RTS1	SIO	Serial I/O, UART COM1 RTS Pin
110	---	---	Reserved. Do not use.
111	GND	PWR	Ground
112	GND	PWR	Ground
113	RI1	SIO	Serial I/O, UART COM1 RI Pin
114	---	---	Reserved. Do not use.
115	DTR1	SIO	Serial I/O, UART COM1 DTR Pin
116	LANLED1	LAN	10/100 Mbps Ethernet LAN Interface LAN1 LED Output
117	DSR1	SIO	Serial I/O, UART COM1 DSR Pin
118	---	---	Reserved. Do not use.
119	DCD1	SIO	Serial I/O, UART COM1 DCD Pin
120	---	---	Reserved. Do not use.
121	VCC	PWR	3.3 Volt Power Input
122	VCC	PWR	3.3 Volt Power Input
123	CTS2	SIO	Serial I/O, UART COM2 CTS Pin
124	---	---	Reserved. Do not use.
125	TXD2	SIO	Serial I/O, UART COM2 TXD Pin
126	---	---	Reserved. Do not use.
127	RXD2	SIO	Serial I/O, UART COM2 RXD Pin
128	---	---	Reserved. Do not use.
129	RTS2	SIO	Serial I/O, UART COM2 RTS Pin
130	---	---	Reserved. Do not use.
131	GND	PWR	Ground
132	GND	PWR	Ground
133	HDN1	SIO	Serial I/O, USB Host1 Port- Pin
134	LRXN1	LAN	10/100 Mbps Ethernet LAN Interface LAN1, RX- Pin
135	HDP1	SIO	Serial I/O, USB Host1 Port+ Pin
136	LRXP1	LAN	10/100 Mbps Ethernet LAN Interface LAN1, RX+ Pin
137	HDN2	SIO	Serial I/O, USB Host2 Port- Pin
138	LTXN1	LAN	10/100 Mbps Ethernet LAN Interface LAN1, TX- Pin
139	HDP2	SIO	Serial I/O, USB Host2 Port+ Pin
140	LTXP1	LAN	10/100 Mbps Ethernet LAN Interface LAN1, TX+ Pin

Table 5: Pinout 2 x 100 pin connector – pin 101 to 140

3.5 2 x 100 Pin Connector – J2 (2. Part)

Pin	Name	Group	Function
141	GND	PWR	Ground
142	GND	PWR	Ground
143	---	---	Reserved. Do not use.
144	---	---	Reserved. Do not use.
145	---	---	Reserved. Do not use.
146	---	---	Reserved. Do not use.
147	---	---	Reserved. Do not use.
148	---	---	Reserved. Do not use.
149	---	---	Reserved. Do not use.
150	---	---	Reserved. Do not use.
151	VCC	PWR	3.3 Volt Power Input
152	VCC	PWR	3.3 Volt Power Input
153	---	---	Reserved. Do not use.
154	---	---	Reserved. Do not use.
155	---	---	Reserved. Do not use.
156	---	---	Reserved. Do not use.
157	---	---	Reserved. Do not use.
158	---	---	Reserved. Do not use.
159	---	---	Reserved. Do not use.
160	---	---	Reserved. Do not use.
161	GND	PWR	Ground
162	GND	PWR	Ground
163	GND_B	PWR	Ground Blue Signal
164	CRT_B	PSP	CRT Blue Signal
165	GND_G	PWR	Ground Green Signal
166	CRT_G	PSP	CRT Green Signal
167	GND_R	PWR	Ground Red Signal
168	CRT_R	PSP	CRT Red Signal
169	GND	PWR	Ground
170	GND	PWR	Ground
171	VCC	PWR	3.3 Volt Power Input
172	VCC	PWR	3.3 Volt Power Input
173	CRT_HS	PSP	CRT Interface, HSYNC Signal (Horizontal Sync Output)
174	CRT_VS	PSP	CRT Interface, VSYNC Signal (Vertical Sync Output)
175	GND	PWR	Ground
176	GND	PWR	Ground
177	CRT_SCL	PSP	CRT Interface Clock
178	CRT_SDA	PSP	CRT Interface Data
179	GND	PWR	Ground
180	GND	PWR	Ground

Table 6: Pinout 2 x 100 pin connector – pin 141 to 180

3.6 2 x 100 Pin Connector – J2 (3. Part)

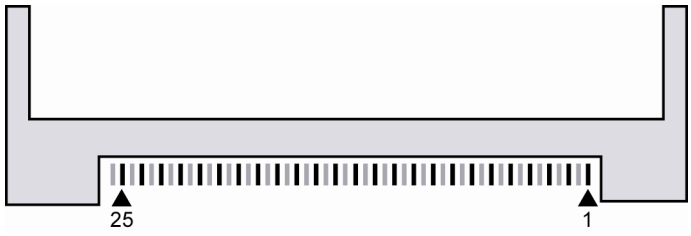
Pin	Name	Group	Function
181	PB4	GPIO	GPIO - Parallel Port B, Bit 4
182	PB0	GPIO	GPIO - Parallel Port B, Bit 0
183	PB5	GPIO	GPIO - Parallel Port B, Bit 5
184	PB1	GPIO	GPIO - Parallel Port B, Bit 1
185	PB6	GPIO	GPIO - Parallel Port B, Bit 6
186	PB2	GPIO	GPIO - Parallel Port B, Bit 2
187	PB7	GPIO	GPIO - Parallel Port B, Bit 7
188	PB3	GPIO	GPIO - Parallel Port B, Bit 3
189	VCC	PWR	3.3 Volt Power Input
190	VCC	PWR	3.3 Volt Power Input
191	MS_CLK	PSP	Mouse Clock
192	CTS3	SIO	Serial I/O, UART COM3 CTS Pin
193	MS_DAT	PSP	Mouse Data
194	TXD3	SIO	Serial I/O, UART COM3 TXD Pin
195	KB_CLK	PSP	Keyboard Clock
196	RXD3	SIO	Serial I/O, UART COM3 RXD Pin
197	KB_DAT	PSP	Keyboard Data
198	RTS3	SIO	Serial I/O, UART COM3 RTS Pin
199	GND	PWR	Ground
200	GND	PWR	Ground

Table 7: Pinout 2 x 100 pin connector – pin 181 to 200

3.7 CompactFlash Card Slot – J3 (1. Part)

Pin	Name	Function
1	GND	Ground
2	D3	Data Bit 3
3	D4	Data Bit 4
4	D5	Data Bit 5
5	D6	Data Bit 6
6	D7	Data Bit 7
7	CS0#	Chip Select 0
8	A10	Not Connected
9	ATASEL#	Ground
10	A9	Not Connected
11	A8	Not Connected
12	A7	Not Connected
13	VCC	3.3 VDC Power
14	A6	Not Connected
15	A5	Not Connected
16	A4	Not Connected
17	A3	Not Connected
18	A2	Address Bit 2
19	A1	Address Bit 1
20	A0	Address Bit 0
21	D0	Data Bit 0
22	D1	Data Bit 1
23	D2	Data Bit 2
24	IOCS16#	Not Connected
25	CD2#	Connected to Ground

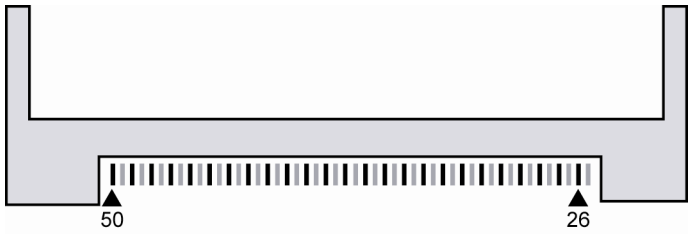
Table 8: Pinout CompactFlash card slot – pin 1 to 25



3.8 CompactFlash Card Slot – J3 (2. Part)

Pin	Name	Function
26	CD1	Connected to Ground
27	D11	Data Bit 11
28	D12	Data Bit 12
29	D13	Data Bit 13
30	D14	Data Bit 14
31	D15	Data Bit 15
32	CS1#	Chip Select 1
33	VS1#	Connected to Ground
34	IOR#	Read Strobe
35	IOW#	Write Strobe
36	WE#	Not Connected
37	INTRQ	Interrupt Request
38	VCC	3.3 VDC Power
39	CSEL#	Cable Select (Jumpered as Master)
40	VS2#	Not Connected
41	RESET#	Reset Pin
42	IORDY	I/O Ready
43	DMARQ	DMA Request
44	DMACK#	DMA Acknowledge
45	DASP#	Device Active or Slave Present (CF LED)
46	PDIAG#	Passed Diagnostics
47	D8	Data Bit 8
48	D9	Data Bit 9
49	D10	Data Bit 10
50	GND	Ground

Table 9: Pinout CompactFlash card slot – pin 26 to 50



3.9 ISP/Test Connector – J4

Pin	Name	Function
1	VCC	3.3 VDC
2	GND	Ground
3	---	Reserved
4	FS1	Reserved for Factory Setup
5	FS2	Reserved for Factory Setup
6	---	Reserved
7	FS3	Reserved for Factory Setup
8	FS4	Reserved for Factory Setup
9	---	Reserved
10	FS5	Reserved for Factory Setup
11	FS6	Reserved for Factory Setup
12	---	Reserved
13	FS7	Reserved for Factory Setup
14	---	Reserved
15	---	Reserved
16	---	Reserved
17	FS8	Reserved for Factory Setup
18	VCC	3.3 VDC

Table 10: Pinout ISP/Test connector

3.10 RCM Jumper – JP1

The **RCM (Remote Console Mode)** offers the possibility to control the eSOM/2586-M via a terminal emulation program over the UART-based serial port COM1 (serial-based CLI = Command Line Interface).

Please note: The default setting of the RCM jumper is set (Enable Remote Console Mode). This mode is checked by the AMI Basic I/O System (BIOS). With RCM jumper set, it is possible to control a DOS O/S over COM1. DOS I/O goes direct over the AMI BIOS I/O functions.

To disable RCM remove the jumper cap of the RCM jumper. This frees UART based serial port COM1 for application usage.

RCM jumper	Function
Not set	Disable Remote Console Mode
Set (default)	Enable Remote Console Mode

Table 11: RCM jumper settings

4 MEMORY MAP

4.1 System Memory Map

Physical Address Range	Description	Access Format	Type
0x0000.0000 - 0x000F.FFFF	1 MByte DOS/BIOS Area	16-bit MEM R/W	MEM
0x0010.0000 - 0x03FF.FFFF	63 MByte Main Memory	16-bit MEM R/W	MEM
0xF800.0000 - 0xFBFF.FFFF	64 MByte Frame Buffer	16-bit MEM R/W	MEM

Table 12: System memory map of System-on-Module eSOM/2586-M

4.2 System I/O Map

Physical Address Range	Description	Access Format	Type
0x000 - 0x3FF	IO Address Space	*	*
0x078	GPIO Port A Data Register	8-bit IO R/W	*
0x079	GPIO Port B Data Register	8-bit IO R/W	*
0x07B	GPIO Port C Data Register	8-bit IO R/W	*
0x098	GPIO Port A Direction Register	8-bit IO R/W	*
0x099	GPIO Port B Direction Register	8-bit IO R/W	*
0x09B	GPIO Port C Direction Register	8-bit IO R/W	*
0x100 - 0x10F	Chip Select Signal CS1#	8-bit IO R/W	GPCS1
0x110 - 0x11F	Chip Select Signal CS2#	8-bit IO R/W	GPCS1
0x120 - 0x12F	Chip Select Signal CS3#	8-bit IO R/W	GPCS1
0xC8000 – 0xC8FFF	Chip Select Signal CS4#	8-bit MEM R/W	GPCS0

Table 13: External I/O map of System-on-Module eSOM/2586-M

* Refer to Vortex86DX manual.

5 MECHANICAL DIMENSIONS

All length dimensions have a tolerance of 0.5 mm. The drillings are suitable for M2 screws.

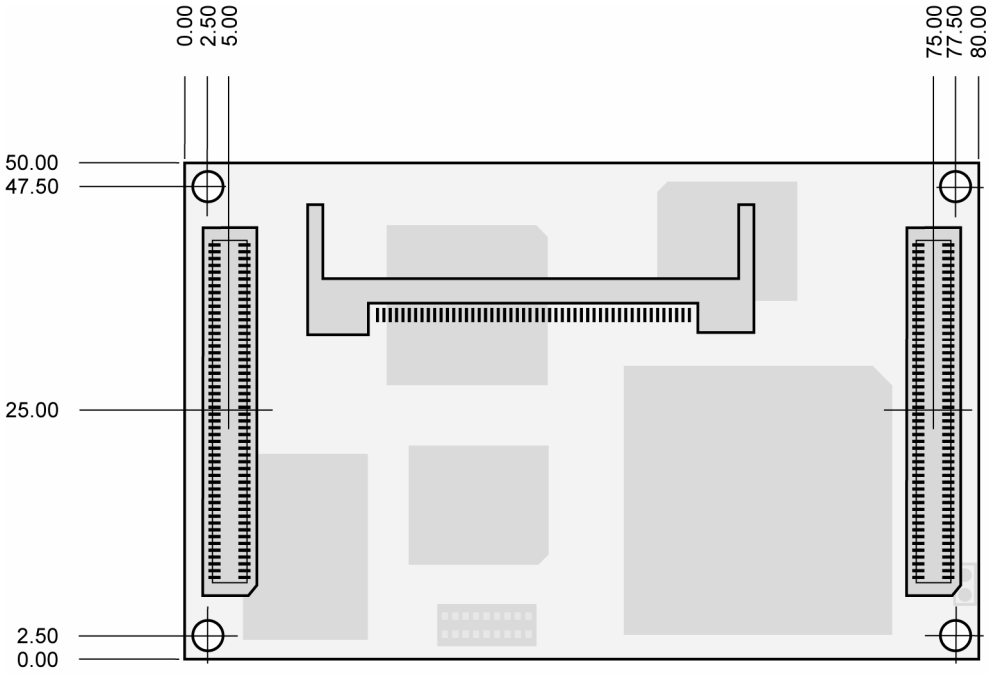


Figure 3: Mechanical dimensions of System-on-Module eSOM/2586-M

6 HELPFUL LITERATURE

- Vortex86DX documents: http://www.vortex86dx.com
- BB6/eSOM hardware reference

CONTACT

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Support: www.ssv-comm.de/forum

DOCUMENT HISTORY

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