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Verdex UARTs

UARTs

Note! Current kernels use ttyS3 (HWUART) for bluetooth. This is available on the BTUART pins by setting GPIO42 and 43 to AF3 - and this is the default configuration. This can be very confusing if you want to use the HWUART for something else! To re-enable HWUART on ttyS3, make bluetooth use ttyS1 (see /etc/default/bluetooth) and then set GPIO42 to AF1 in and GPIO43 to AF2 out. You can then set GPIO48 to AF1 out (HWUART TXD) and GPIO49 to AF1 in (HWUART RXD).

FFUART

FF_CTS

FF_RTS

FF_TXD

FF_RXD

- Logic level (3.3V) signals
- Speeds to 230 kbps
- Normally mapped to ttyS0 in the kernel and Y0 in some schematics
- FFUART pins are located on the [60-pin Hirose](#) connector
- Schematic diagram for the FFUART

HWUART

HW_CTS

HW_RTS

HW_TXD

HW_RXD

- Logic level (3.3V) signals
- Speeds to 921 kbps
- Normally mapped to ttyS3 in the kernel and Y1 in some schematics
- HWUART pins are located on the [60-pin Hirose](#) (Connex and Basix only)
- Schematic diagram for the HWUART

STUART

- Logic level (3.3V) signals
- Speeds to 230 kbps
- Normally mapped to ttyS2
- Schematic diagram for the STUART

BTUART

BT_CTS

BT_RTS

BT_TXD

BT_RXD

BT_NRESET Bluetooth reset (output, active low)

CLK_32

32.768 kHz Clock output

- Logic level (3.3V) signals
- BTUART pins are located on the [60-pin Hirose](#) and [24-pin flex ribbon](#) (Verdex only) connectors.
- It is not an exposed interface; mapped to ttyS1 by the kernel and connected physically to the bluetooth module if one is present.
- BT_NRESET and CLK_32 are for an optional Bluetooth module IC ([24-pin flex ribbon](#) only)

Feature Overview

[GUMSTIX NOTE: Verdex \(not Pro\) product line is EOL, as posted here.](#)

Motherboard

>> **verdex XM4**



>> **verdex XM4-bt**



>> **verdex XL6P**



Processor (1)

Marvell® PXA270 with XScale™

Marvell® PXA270 with XScale™

Marvell® PXA270 with XScale™

Speed	400 MHz	400 MHz	600 MHz
Ram (2)	64 MB	64 MB	128 MB
Flash	16 MB	16 MB	32 MB
On-Board Memory	n/a	n/a	n/a
Connectors	60-pin Hirose connector 80-pin connector 24-pin flex connector	60-pin Hirose connector 80-pin connector 24-pin flex connector	60-pin Hirose connector 80-pin connector 24-pin flex connector
Configuration	Maximum: One 60-pin board (eg consoleLCD16-vx) plus One 80-pin board (eg netpro-vx) connected on opposite sides of Verdex Pro COM	Maximum: One 60-pin board (eg consoleLCD16-vx) plus One 80-pin board (eg netpro-vx) connected on opposite sides of Verdex Pro COM	Maximum: One 60-pin board (eg consoleLCD16-vx) plus One 80-pin board (eg netpro-vx) connected on opposite sides of Verdex Pro COM
Features	USB Full Speed (v1.1) host signals 10 data bits of CIF signals 3 logic level UARTs NSSP DMA access Up to 98 GPIO's Power Management (3) I ² C™ Bus JTAG	USB Full Speed (v1.1) host signals 10 data bits of CIF signals 3 logic level UARTs NSSP DMA access Up to 98 GPIO's Power Management (3) I ² C™ Bus JTAG Bluetooth®(4)	USB Full Speed (v1.1) host signals 10 data bits of CIF signals 3 logic level UARTs NSSP DMA access Up to 98 GPIO's Power Management (3) I ² C™ Bus JTAG

Operating System	Linux 2.6.21 or higher	Linux 2.6.21 or higher	Linux 2.6.21 or higher
Dimensions (5)	80mm x 20mm x 6.3mm (3.15 in. x 0.79 in. x 0.25 in.)	80mm x 20mm x 6.3mm (3.15 in. x 0.79 in. x 0.25 in.)	80mm x 20mm x 6.3mm (3.15 in. x 0.79 in. x 0.25 in.)
Weight	8g (1/4 oz)	8g (1/4 oz)	8g (1/4 oz)
Temperature Range	-25°C to 85°C	-25°C to 85°C	-25°C to 85°C
Supply Voltage	3.6V - 5.0V DC	3.6V - 5.0V DC	3.6V - 5.0V DC
Current Draw Idle			
Current Draw Max.			

(1) - 300 MHz, 400MHz, 500MHz, 600MHz available to OEM's.

(2) OEM's can place volume orders for verdex pro motherboards with reduced SDRAM

(3) [Power Management IC](#) (optional [[Supply#V_BACKUP_BATT|backup battery line]])

(4) [Infineon PBA31308](#) RoHS-compliant (Class 2 Bluetooth™) and [u.fl 2.4 GHz antenna](#) .

(5) Physical layout, mounting holes and connector locations are detailed in the [verdex pro physical layout chart](#).

(6) Approximate power requirements at 100% CPU usage and 100MHz bus speed w/o Bluetooth™

2D Layout and some 3D Models

Computers-on-Module Layout Files:

- [verdex pro series 3D CAD layout files - DXF, IGES, STEP and PDF formats](#)

Available under a Creative Commons license.

- The schematics may be viewed using Eagle software from CadSoft,

- Free version of Eagle: [available here.](#)
- Licensed version of Eagle: [available here.](#)

Version control and lot tracking

To determine the version of the bare PCB, bill of materials, and manufacturer work order used to build a specific Gumstix COM or expansion board, click [here](#)

3D Images for Physical Layouts

In the Spring of 2007, Gumstix provided physical layout and connector location information via SketchUp and the 3D warehouse visuals, as below. This work was done by a summer co-op student working at Gumstix for that summer only.

The eagle schematics and layout files (.dxf) linked below have the connector and mounting hole locations for the basix and connex motherboards.

As such, dimension numbers can be obtained via the Eagle files or by loading the sketchup files into CAD/CAM software.

Values for depth are said to be "buried in Sketchup" as sketchup has the heights programmed but a review of the details/properties of the sub-part (i.e.. the capacitor) is warranted.

For the expansion board layouts, go to the '.brd' files linked below.

Motherboards

- [--basix motherboards in 3D](#)
- [connex motherboards in 3D](#)
- [verdex motherboards in 3D](#)

Expansion boards

- [basix expansion boards in 3D](#)
- [connex expansion boards in 3D](#)
- [verdex expansion boards in 3D](#)

3D visualization of gumstix boards

This modeling environment for electronic product designers integrates popular design tools, 3D images, and software scripts to accelerate and simplify the design and visualization of new product enclosures and custom expansion boards by combining 3D gumstix product visuals with Google SketchUp, Google 3D Warehouse and Cadsoft's Eagle™ CAD software.

SketchUp is compatible with CAD products such as Graphisoft® Archicad 10, MicroStation® V8, Autodesk® AutoCAD® Revit® Series Systems Plus, VectorWorks® Architect, DataCAD, Nemetschek, Rhinoceros® and Softech.

Using pre-made gumstix Sketchup models

1. Download Google sketchup software.
2. Go to the Google 3D warehouse to find 3-D appliance model offerings that are planned to include basix, connex and verdex brands.
3. Search on "gumstix" 4. Select a file from the results posted and click "Download to Google SketchUp"

Converting Eagle layouts to Sketchup models Gumstix has published the scripts we use to convert Eagle layouts automatically into Sketchup models. This uses the ULP scripting features of the Eagle package along with the Ruby scripting features of Sketchup to automatically draw and place components on a circuit board within Sketchup. The generated model can then be edited/saved/exported as necessary. The System consists of two pieces:

Eagle ULP program which parses the layout and generates a ruby script encapsulating the components and their positions on the board * A set of Ruby libraries for Sketchup which the ULP-generated ruby script uses to actually draw the board within Sketchup. These scripts, along with further documentation, can be downloaded here (link to come).

Power Consumption

verdex

- consoleLCD16-vx board + verdex XL6P motherboard + netCF-vx board, no display attached: $5V \times 0.4A == 2W$
- console-vx board + verdex XM4-BT motherboard + netwifimicroSD board: wifi active == $5V \times 0.5A == 2.5W$; wifi not active == $5V \times 0.3A == 1.5W$

basix and connex

At 4.5V:

- 99MHz CPU, 50MHz bus, idle: 0.01-0.02A
- 200MHz CPU, 100MHz bus, idle: 0.03-0.04A
- 400MHz CPU, 100MHz bus, idle: 0.06A
- 200MHz CPU, 100MHz bus, 100% CPU usage: 0.12A
- 400MHz CPU, 100MHz bus, 100% CPU usage: 0.22A

These power requirements are approximate. Note also that the PXA bus to RAM can go up to 133MHz depending upon the components chosen, which might well increase things like FFT performance.

120-Pin Connector

The mating connector from MOLEX that belongs on the daughtercard side is [#54876-1274](#).

7/25/08: As Molex is phasing out this connector, Gumstix has secured a limited supply. As such, customers planning a verdex-based product should contact sales@gumstix.com to discuss alternatives.

Dimensions are [here as PDF](#).

Notes: (1) Schematic images and charts below are from the point of view of the gumstix verdex. Looking at the connector from the daughtercard's point of view, these signals are mirrored.

Pi n	GPIO	Signal	Signal	GPIO	Pin
1	GPIO(20)	NSDCS2	V_BATT	.	120
2	.	SDCLK2	V_BATT	.	119
3	.	SDCLK0	I2C_SDA	GPIO(118)	118
4	GPIO(21)	NSDCS3	GND	.	117
5	GPIO(2)	SYS_EN	MMCDAT0	GPIO(92)	116
6	GPIO(80)	NCS4	I2C_SCL	GPIO(117)	115
7	GPIO(55)	NPREG	MMCCMD	GPIO(112)	114
8	.	X_ADDR_0	MMCDAT2	GPIO(110)	113
9	GPIO(22)	SSPSCLK2	GND	.	112
10	GPIO(15)	NCS1	MMCDAT3	GPIO(111)	111
11	GPIO(79)	NCS3 / NPSKTSEL	MMCDAT1	GPIO(109)	110

12	GPIO(78)	NCS2	MMCCLK	GPIO(32)	109
13	.	DQM0	DQM1	.	108
14	.	RDNWR	CIF_DD00	GPIO(98)	107
15	GPIO(18)	RDY	CIF_FV	GPIO(84)	106
16	GPIO(99)	SDATA_IN1	MBREQ	GPIO(96)	105
17	GPIO(102)	NPCE1	CIF_DD02	GPIO(116)	104
18	GPIO(97)	MBGNT	CIF_DD01	GPIO(114)	103
19	GPIO(105)	NPCE2	NPWE	GPIO(49)	102
20	GPIO(104)	NPSKTSEL	CIF_DD03	GPIO(103)	101
21	GPIO(107)	CIF_DD08	CIF_DD07	GPIO(108)	100
22	GPIO(51)	NPIOW	CIF_MCLK	GPIO(53)	99
23	GPIO(106)	CIF_DD09	NPOE	GPIO(48)	98
24	.	DQM3	CIF_DD05	GPIO(82)	97
25	GPIO(57)	NIOIS16	NPIOR	GPIO(50)	96
26	GPIO(83)	CIF_DD04	CIF_PCLK	GPIO(54)	95
27	GPIO(93)	CIF_DD06	SDCKE	.	94
28	.	GND	X_DATA_29	.	93
29	.	X_DATA_24	X_DATA_25	.	92
30	.	X_DATA_26	X_DATA_27	.	91
31	.	X_DATA_28	X_DATA_31	.	90
32	.	GND	NPWAIT	GPIO(56)	89
33	.	X_DATA_30	NSDRAS	.	88

34	GPIO(85)	CIF_LV	DQM2	.	87
35	.	NSDCAS	X_DATA_19	.	86
36	.	X_DATA_23	X_DATA_17	.	85
37	.	X_DATA_21	NOE	.	84
38	.	X_DATA_22	X_DATA_16	.	83
39	.	X_DATA_20	X_DATA_02	.	82
40	.	X_DATA_18	X_ADDR_23	.	81
41	.	X_ADDR_24	X_DATA_11	.	80
42	.	NWE	X_DATA_10	.	79
43	.	X_ADDR_21	X_DATA_00	.	78
44	.	X_ADDR_22	X_DATA_03	.	77
45	.	X_ADDR_18	X_ADDR_15	.	76
46	.	X_ADDR_19	X_ADDR_12	.	75
47	.	X_ADDR_20	X_ADDR_08	.	74
48	.	X_ADDR_25	X_ADDR_09	.	73
49	.	X_ADDR_16	X_ADDR_07	.	72
50	.	X_ADDR_17	X_ADDR_10	.	71
51	.	X_DATA_04	X_ADDR_06	.	70
52	.	X_DATA_15	X_ADDR_11	.	69
53	.	X_DATA_12	X_ADDR_05	.	68
54	.	X_ADDR_13	X_ADDR_03	.	67
55	.	X_ADDR_14	X_ADDR_02	.	66

56	·	X_DATA_05	X_ADDR_01	·	65
57	·	X_DATA_06	X_ADDR_04	·	64
58	·	X_DATA_14	X_DATA_08	·	63
59	·	X_DATA_07	X_DATA_09	·	62
60	·	X_DATA_13	X_DATA_01	·	61

Basix & connex Interface Design

basix & connex Interface Design

Gumstix maintains a repository of [schematics](#) for the interfaces of our expansion boards.

Gumstix basix motherboards have one 60-pin Hirose connector while the connex motherboards have both a 60-pin Hirose connector and a 92-pin bus header.

Since March, 2006, Gumstix has been shipping:

Note: schematic images and charts below are from the point of view of the gumstix looking at the connector from the daughtercard's point of view, these signals are mirrored

Motherboard	Revision #	60-pin Hirose	92-pin/120-pin bus header	24-pin flex connector
basix 200	gumstix #0.6	Old 60pin connector chart schematic		

.	gumstix #11	New 60pin chart schematic connector		
basix 200 bt	gumstix #11	New 60pin chart schematic connector		
basix 400 bt	gumstix #11	New 60pin chart schematic connector		
connex 200	gumstix #0.9	New 60pin chart schematic connector	92pin chart schematic connector	
.	gumstix #10	New 60pin chart schematic connector	92pin chart schematic connector	
.	gumstix #R687	New 60pin chart schematic connector	92pin chart schematic connector	
connex 200 xm	gumstix #0.9			

		New 60pin connector chart schematic	92pin connector chart schematic	
.	gumstix #10	New 60pin connector chart schematic	92pin connector chart schematic	
.	gumstix #R687	New 60pin connector chart schematic	92pin connector chart schematic	
connex 400	gumstix #0.8	Old 60pin connector chart schematic	92pin connector chart schematic	
connex 400 xm	gumstix #0.9	New 60pin connector chart schematic	92pin connector chart schematic	
.	gumstix #10	New 60pin connector chart schematic	92pin connector chart schematic	
.	gumstix #R687	New 60pin connector chart schematic	92pin connector chart schematic	

connex 400 xm bt	gumstix #0.9	New 60pin connector chart schematic	92pin connector chart schematic	
.	gumstix #10	New 60pin connector chart schematic	92pin connector chart schematic	
.	gumstix #R687	New 60pin connector chart schematic	92pin connector chart schematic	