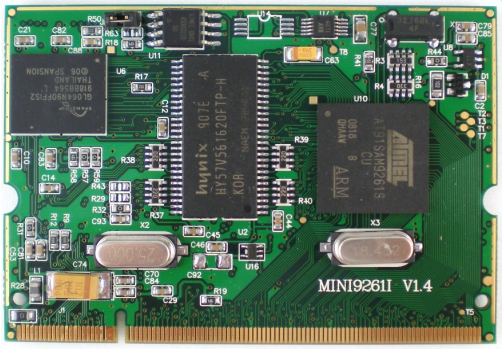
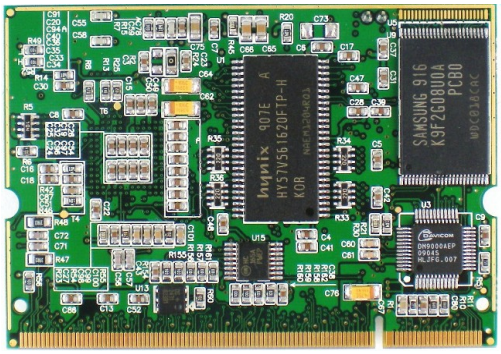
ChipworkX™ Module



Top View



Back View

ChipworkX™ is a combination of hardware (ARM9 Processor, Flash, RAM, Ethernet PHY...etc) on a small (67.6mm x47mm) OEM board MINI9261I with SO-DIMM200 slot that hosts Microsoft .NET Micro Framework with various PAL/HAL drivers. In addition to the benefits of .NET Micro Framework, ChipworkX includes exclusive software and hardware features.

ChipworkX Module is a vastly sophisticated piece of hardware. This complexity provides the end-user with a remarkably simple platform to implement in any hardware design. Looking at the ChipworkX Development System schematic shows just how simple it really is. All you need is 3.3 volts and some connections to bring the latest technologies to your products. With manageable features like USB host, database and WiFi, the possibilities are boundless.

What is Microsoft .NET Micro Framework?

Microsoft's .NET Micro Framework extends the advantages of .NET and Visual Studio to a class of smaller, less expensive, and more resource-constrained devices than the .NET Compact Framework or the standard .NET framework.

Extended Framework Features

ChipworkX™module supports a complete set of .NET Micro Framework features such as TCP/IP,SSL, FAT, USB device and many more. In addition, it supports many other exclusive GHI features, for example, full USB host stack (access thumb drives, mice, keyboards, printers and many other devices), PPP, GPRS, 3G...etc. Furthermore, ChipworkX™ supports SQLite database, allowing fast logging and retrieving of standard SQL queries.

Runtime Loadable Procedure (RLP)

A very useful and unique feature in ChipworkX is allowing users to load their own compiled native code (C or assembly) and run it directly through managed Micro Framework. Similar to the use of DLLs on PCs and usually used to implement high-processing and time-critical routines.

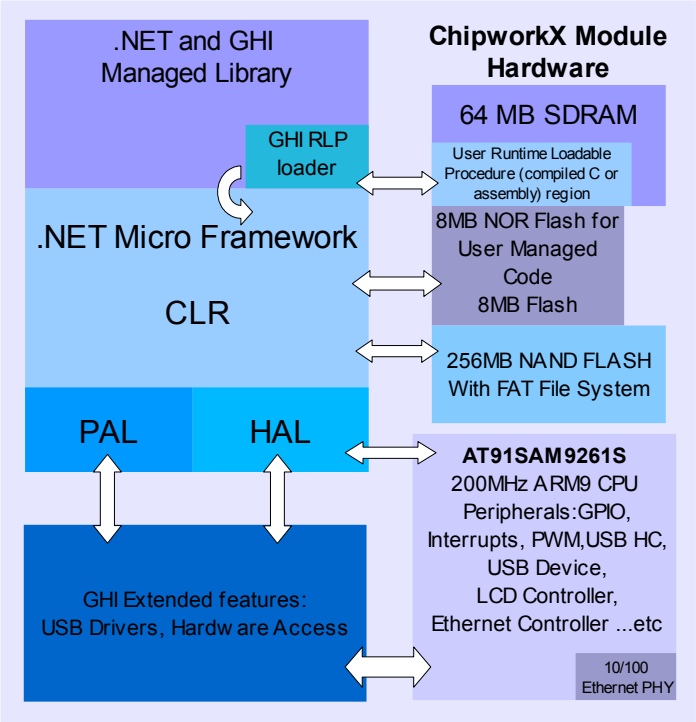
SideShow Support

ChipworkX module is ideal for SideShow devices.

Key Features

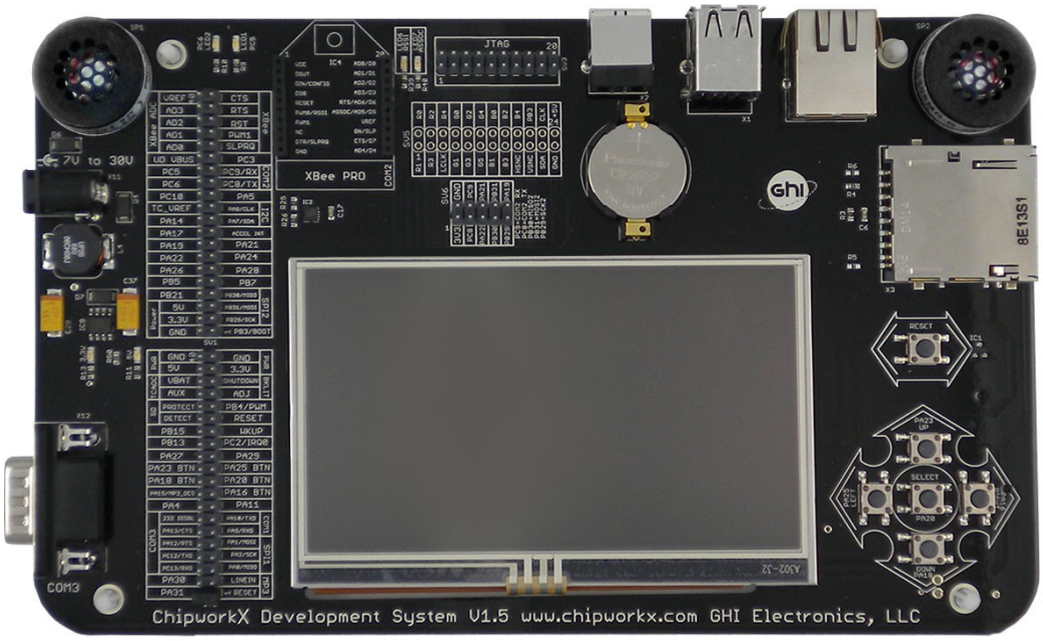
- Microsoft .NET Micro Framework.
- 200 MHz 32-bit ARM9 Processor AT91SAM9261S
- 64MB RAM
- 8MB NOR FLASH
- 256MB Internal NAND Flash with File System
- 4MB Serial DataFlash
- SQLite Database
- Runtime Loadable Procedure
- JTAG Access
- In field programmable
- LCD controller
- Ethernet with Full TCP/IP Stack
- SSL
- DPWS
- USB Device
- USB Host with 2 ports
- 80 GPIO Pins with interrupt capabilities
- Real Time Clock
- 2 SPI (8/16bit)
- I2C
- 3 UART
- 1 PWM
- One-wire interface
- WiFi Support
- 3.3V IOs voltage
- 0ºC to +70ºC Operational
- Easily attached with SO-DIMM200 slot.
- RoHS, Lead Free

Block Diagram



Getting Started with ChipworkX Modules

GHI Electronics offers a development system for ChipworkX Modules. The development system exposes all peripherals and includes 480x272 4.3" display with touch screen . We highly recommend starting up with the development system. With this option, you will have a running system out-of-the-box.



SODIMM200 Pin-out

Pins marked with `IOxx` are general purpose digital I/O. These pins might have other features.

No.	Name			ChipworkX Pin Description	
	MINI9261I AT91SAM9261S H/W Name	ChipworkX IO	2nd Feature		
1	GND_BG			Connect to GroundConnect to Ground	
2	ENET_TX-			Ethernet transmit data minus.	Recommended Ethernet connector is J0026D21. Please refer to ChipworkX Development System schematic. Ethernet PHY is not needed since it is embedded in ChipworkX hardware.
3	ENET_2.5			Connect to Ethernet Connector Magnet TCT and RCT pins.	
4	ENET_TX+			Ethernet transmit data plus.	
5	GND			Connect to Ground	
6	ENET_RX-			Ethernet receive data minus.	
8	ENET_RX+			Ethernet receive data plus.	
11	ENET_LED1			Ethernet interface connection indicator LED	
12	ENET_LED2			Ethernet interface activity indicator LED	
13	GND3			Connect to Ground	
20	3.3V_0			Connect to 3.3 volt source.	
27	GND4			Connect to Ground	
32	3.3V_1			Connect to 3.3 volt source.	
40	GND16			Connect to Ground	
41	GND5			Connect to Ground	
46	3.3V_2			Connect to 3.3 volt source.	
51	GND6			Connect to Ground	
60	3.3V_3			Connect to 3.3 volt source.	
65	GND7			Connect to Ground	
72	3.3V_4			Connect to 3.3 volt source.	
79	GND8			Connect to Ground	
88	3.3V_5			Connect to 3.3 volt source.	
89	NAND_RE (PC0)*			Leave unconnected. Reserved for ChipworkX's NAND Flash use.	
90	NAND_WE (PC1)*			Leave unconnected. Reserved for ChipworkX's NAND Flash use.	
91	PC2 (IRQ0)	IO66	N/A	General purpose digital I/O	
92	PC3	IO67	N/A	General purpose digital I/O	
93	PC4	IO68	N/A	General purpose digital I/O	
94	PC5	IO69	N/A	General purpose digital I/O	
95	GND9			Connect to Ground	
96	PC6	IO70	N/A	General purpose digital I/O	
97	PC7	IO71	N/A	General purpose digital I/O	
98	PC8	IO72	COM2	Serial port (UART) TXD transmit signal (Out) for COM2.	
99	PC9	IO73		Serial port (UART) RXD receive signal (In) for COM2.	
100	PC10	IO74	N/A	General purpose digital I/O	
101	MAC_INT(PC11)*			Leave unconnected. Reserved for ChipworkX's Ethernet PHY use.	
102	PC12	IO76	COM3	Serial port (UART) TXD transmit signal (Out) for COM3.	
103	PC13	**IO77**		Serial port (UART) RXD receive signal (In) for COM3.	
104	NAND_CS(PC14)*			Leave unconnected. Reserved for ChipworkX's NAND Flash use.	
105	NAND_BSY(PC15)*			Leave unconnected. Reserved for ChipworkX's NAND Flash use.	
106	3.3V_6			Connect to 3.3 volt source.	
107	PA0	IO0	SPI1	SPI master bus interface MISO signal (Master In Slave Out) for SPI1.	SPI1 is shared with SD card driver, touch screen controller.
108	PA1	IO1		SPI master bus interface MOSI signal (Master Out Slave In) for SPI1.	

	Name			
No.	**MINI9261I AT91SAM9261S H/W Name**	**ChipworkX IO**	**2nd Feature**	**ChipworkX Pin Description**
109	PA2	IO2		SPI master bus interface SCK signal (Clock)for SPI1.
110	DataFlash_CS (PA3)*			Leave unconnected. Reserved for ChipworkX's DataFlash use.
111	PA4	IO4	N/A	General purpose digital I/O
112	PA5	IO5	N/A	General purpose digital I/O
113	GND10			Connect to Ground
114	PA6	IO6	SDCard_CS	Used as a Chip Select signal for SPI-based SD/MMC card communication.
115	PA7	IO7	I2C	**(open drain pin)** I2C Interface SDA
116	PA8	IO8		**(open drain pin)** I2C Interface SCL
117	PA9	IO9	COM1	Serial port (UART) RXD receive signal (In) for COM1.
118	PA10	IO10		Serial port (UART) TXD transmit signal (Out) for COM1.
119	PA11	IO11	N/A	General purpose digital I/O
120	PA12	IO12	COM3 HW HS	Serial port (UART) RTS hardware handshaking signal for COM3.
121	PA13	IO13		Serial port (UART) CTS hardware handshaking signal for COM3.
122	PA14	IO14	N/A	General purpose digital I/O
123	PA15	IO15	N/A	General purpose digital I/O
124	3.3V_7			Connect to 3.3 volt source.
125	PA16	IO16	N/A	General purpose digital I/O
126	PA17	IO17	N/A	General purpose digital I/O
127	PA18	IO18	Down Button	General purpose digital I/O and TinyBooter/Firmware **Down Button** (Check hardware design consideration).
128	PA19	IO19	N/A	General purpose digital I/O
129	PA20	IO20	Select Button	General purpose digital I/O and TinyBooter/Firmware **Select Button** (Check hardware design consideration).
130	PA21	IO21	N/A	General purpose digital I/O
131	GND11			Connect to Ground
132	PA22	IO22	N/A	General purpose digital I/O
133	PA23	IO23	Up Button	General purpose digital I/O and TinyBooter/Firmware **Up Button** (Check hardware design consideration).
134	PA24	IO24	N/A	General purpose digital I/O
135	PA25	IO25	N/A	General purpose digital I/O
136	PA26	IO26	N/A	General purpose digital I/O
137	PA27	IO27	N/A	General purpose digital I/O
138	PA28	IO28	N/A	General purpose digital I/O
139	PA29	IO29	N/A	General purpose digital I/O
140	PA30	IO30	N/A	General purpose digital I/O
141	PA31	IO31	N/A	General purpose digital I/O
142	3.3V_8			Connect to 3.3 volt source.
143	PB0	IO32	LCD V-Sync	TFT Display, Vertical sync.
144	PB1	IO33	LCD H-Sync	TFT Display, Horizontal sync.
145	PB2	IO34	LCD CLK	TFT Display, Clock.
146	PB3	IO35	BMS	General purpose digital I/O but this pin is multiplexed with BMS (Boot Mode Select)signal. Care should be taken during reset time. and it should not be set high on reset. For more information about BMS, check AT91SAM9261S user manual.
147	PB4	IO36	PWM	PWM feature is mainly utilized to control the LCD back light illumination.
148	PB5	IO37	N/A	General purpose digital I/O

	Name			
No.	**MINI9261I AT91SAM9261S H/W Name**	**ChipworkX IO**	**2nd Feature**	**ChipworkX Pin Description**
149	PB6	IO38	TOUCH IRQ	If TSC2046 touch controller chip (similar to the one on the Development System) is used then wire this pin to PENIRQ at the controller's side (pin 11). Refer to ChipworkX Development System schematic. TSC2046's communication interface is SPI. (connect to SPI1 on ChipworkX)
150	PB7	IO39	N/A	General purpose digital I/O
151	GND12			Connect to Ground
152	PB8	IO40	LCD B0	TFT Display, Blue signal bit 0.
153	PB9	IO41	LCD B1	TFT Display, Blue signal bit 1.
154	PB10	IO42	LCD B2	TFT Display, Blue signal bit 2.
155	PB11	IO43	LCD B3	TFT Display, Blue signal bit 3.
156	PB12	IO44	LCD B4	TFT Display, Blue signal bit 4.
157	PB13	IO45	N/A	General purpose digital I/O
158	1WIRE_EEPROM (PB14)*			Leave unconnected. Reserved for ChipworkX's EEPROM use.
159	PB15	IO47	N/A	General purpose digital I/O
160	3.3V_9			Connect to 3.3 volt source.
161	PB16	IO48	LCD G0	TFT Display, Green signal bit 0.
162	PB17	IO49	LCD G1	TFT Display, Green signal bit 1.
163	PB18	IO50	LCD G2	TFT Display, Green signal bit 2.
164	PB19	IO51	LCD G3	TFT Display, Green signal bit 3.
165	PB20	IO52	LCD G4	TFT Display, Green signal bit 4.
166	PB21	IO53	N/A	General purpose digital I/O
167	PB22	IO54	TOUCH CS	If TSC2046 touch controller chip (similar to the one on the Development System) is used then wire this pin to CS at the controller's side (pin 15). Refer to ChipworkX Development System schematic. TSC2046's communication interface is SPI. (connect to SPI1 on ChipworkX)
168	PB23	IO55	LCD R4	TFT Display, Red signal bit 4.
169	GND13			Connect to Ground
170	PB24	IO56	LCD G5	TFT Display, Green signal bit 5.
171	PB25	IO57	LCD R0	TFT Display, Red signal bit 0.
172	PB26	IO58	LCD R1	TFT Display, Red signal bit 1.
173	PB27	IO59	LCD R2	TFT Display, Red signal bit 2.
174	PB28	IO60	LCD R3	TFT Display, Red signal bit 3.
175	PB29 (IRQ2)	IO61	SPI2	SPI master bus interface SCK signal (Clock)for SPI2.
176	PB30 (IRQ1)	IO62		SPI master bus interface MISO signal (Master In Slave Out) for SPI2.
177	WKUP			Wake Up (Input). Falling edge signal would wake up the processor and clear the Shut Down signal. If Sleep feature is not required, pull down this pin to ground.
178	PB31	IO63	SPI2	SPI master bus interface MOSI signal (Master Out Slave In) for SPI2.
179	SHDN			Shut Down (Output) can be wired to sleep circuit. Refer to ChipworkX Development System schematic. If Sleep feature is not required, leave this pin unconnected.
180	3.3V_10			Connect to 3.3 volt source.
181	EN_1.2V			ChipworkX's Internal power supply circuit enable. this pin can be wired to sleep circuit. Refer to ChipworkX Development System schematic. If Sleep feature is not required, pull down this pin to ground.
182	USBD+ Port B USB Host Feature			USB positive data line of the USB hosting feature, Port B.
183	VBAT			Connect to 3.3 volt backup battery to keep the real-time clock running.
184	USBD- Port B USB Host Feature			USB negative data line of the USB hosting feature, Port B.
185	GND14			Connect to Ground
186	GND17			Connect to Ground
187	JTAG NRST			JTAG NRST signal. Connect to TRST.

No.	Name			ChipworkX Pin Description
	MINI9261I AT91SAM9261S H/W Name	ChipworkX IO	2nd Feature	
188	USBD+ Port A USB Host Feature			USB positive data line of the USB hosting feature, Port A.
189	JTAG RTCK			JTAG RTCK signal.
190	USBD- Port A USB Host Feature			USB negative data line of the USB hosting feature, Port A.
191	JTAG TDO			JTAG TDO signal.
192	3.3V_11			Connect to 3.3 volt source.
193	NTRST			JTAG NTRST signal. Connect to TRST.
194	USBD+ USB client feature			USB positive data line of the USB debugging interface (access interface) and for the USB client feature.
195	JTAG TDI			JTAG TDI signal.
196	USBD- USB client feature			USB negative data line of the USB debugging interface (access interface) and for the USB client feature.
197	JTAG TCK			JTAG TCK signal.
198	GND18			Connect to Ground
199	JTAG TMS			JTAG TMS signal.
200	PIN200			Pull up with 10K resistor

N/A and * : Reserved pins, user should NOT connect or use.

For further Information:

Related Documents:

ChipworkX Development System Brochure and Pinout

ChipworkX User Manual

Weblinks:

http://www.chipworkx.com/

http://www.ghielectronics.com/

Customer Support:

http://www.ghielectronics.com/forum

35555 Garfield Rd. Suite #2
Clinton township, MI 48035
USA
PH: +1 586 693 2696
FAX: +1 586 693 3449
www.ghielectronics.com
www.chipworkx.com

