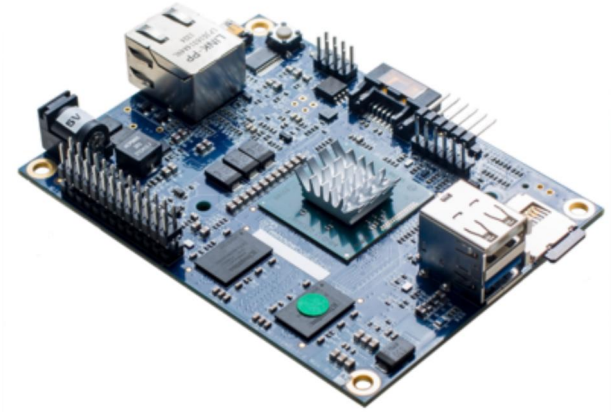
MinnowBoard MAX

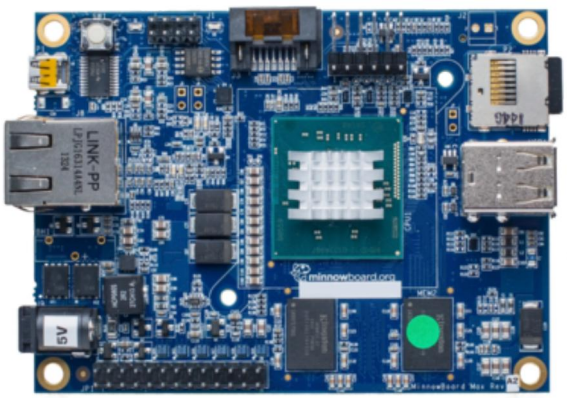
From MinnowBoard Wiki

MinnowBoard MAX is the second generation MinnowBoard (released in July 2014), updating and replacing the original MinnowBoard. The MinnowBoard MAX board has an upgraded 64-bit Intel®Atom™ E3800 (Bay Trail-I) processor with better graphics and revised I/O, shrinks the footprint by more than half, supports additional operating systems (Linux*, Android*, and Windows*) and significantly improves on the original board on price, performance, and energy consumption.



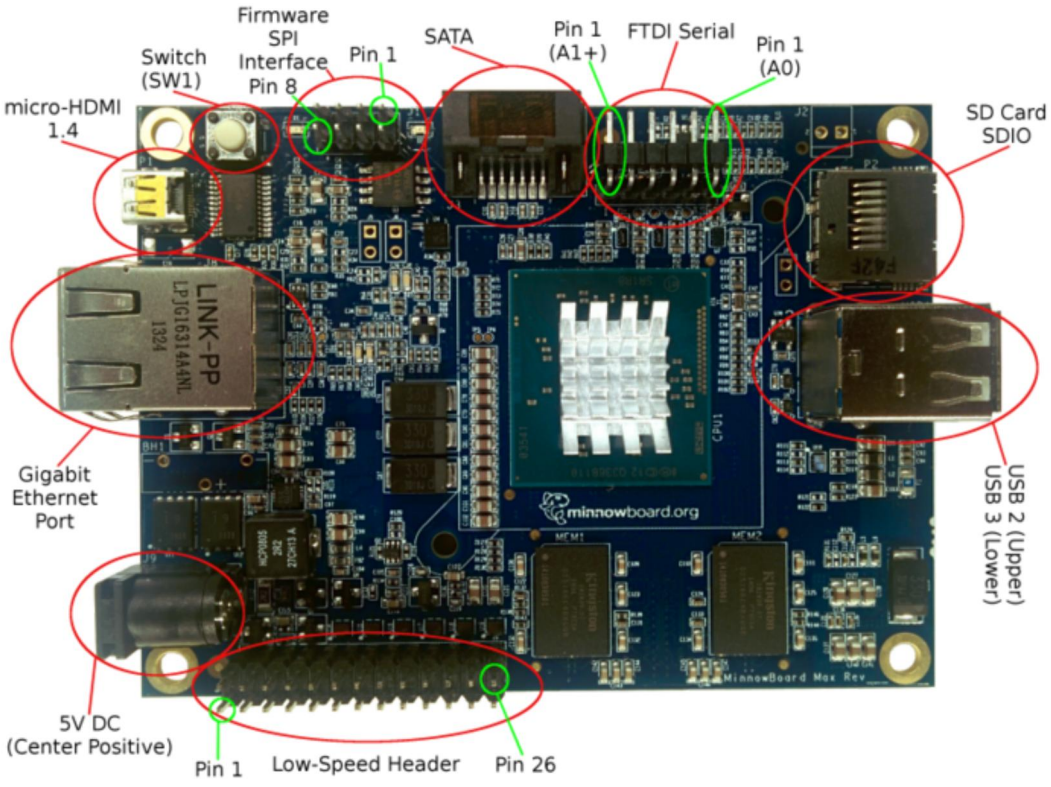
Category	Feature
Core Logic	▪ 64-bit Intel Atom E38xx Series SoC (Intel Atom E3800 Family overview (http://www.intel.com/content/www/us/en/intelligent-systems/bay-trail/atom-processor-e3800-family-overview.html)) ▪ $139 MSRP: E3825 (dual-core, 1.33 GHz) ▪ Integrated Intel HD Graphics with Open Source hardware-accelerated drivers for Linux OS
Memory	▪ DDR3 RAM System Memory ▪ $139 MSRP: 2 GB ▪ 8 MB SPI Flash System Firmware Memory
Video	▪ Intel HD Graphics (1920x1080 max resolution) ▪ HDMI 1.4a (micro HDMI connector)
Audio	▪ Digital via HDMI ▪ Analog available separately via MinnowBoard MAX Lure (sold separately)
I/O	▪ Micro SDSDIO ▪ SATA2 3Gb/sec (Port multipliers not supported via on-board SATA) ▪ USB 3.0 (host) ▪ USB 2.0 (host) ▪ Serial debug via FTDI cable (sold separately) ▪ 10/100/1000 Ethernet RJ-45 connector
Experimenter Features	▪ 8 x Buffered GPIO pins (2 pins support PWM) ▪ I2C & SPI bus ▪ 2 x 16550 HS UARTs, one with CTS/RTS ▪ System Firmware Flash Programming Header (compatible with Dediprog programmer)
Board Dimensions	▪ 99 x 74mm (2.9 x 3.9in)
Temperature Range	▪ 0 – 70 deg C (Contact CircuitCo (http://www.circuitco.com/index.php/contact-us%7C) for industrial temp range needs)
Power	▪ 5V (min 2.5A) DC (Sold separately)
Operating Systems	▪ Supported: ▪ Debian GNU, Ubuntu, Fedora, Linux Mint ▪ Yocto Project Compatible ▪ Android 4.4 (Kitkat) and 5.0 (Lollipop) System ▪ Microsoft Windows 8.1 and 10
System Boot Firmware	▪ UEFI Firmware ▪ Coreboot ▪ SageBIOS
Note: These features and specifications may be subject to change without notice.	

Contents

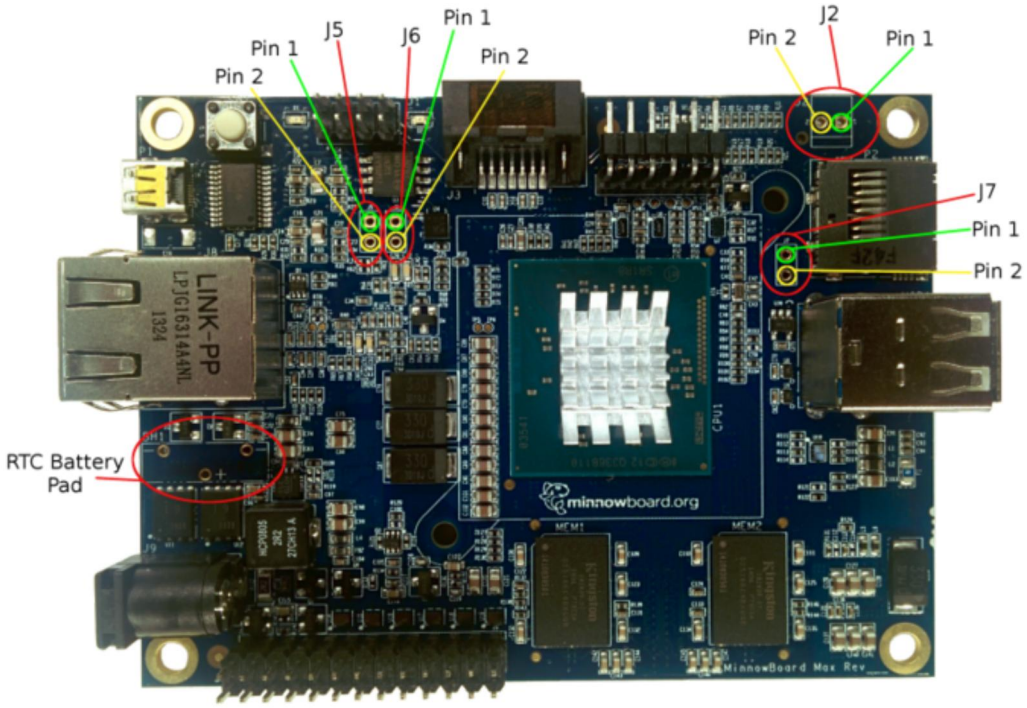


MinnowBoard MAX Board Layout

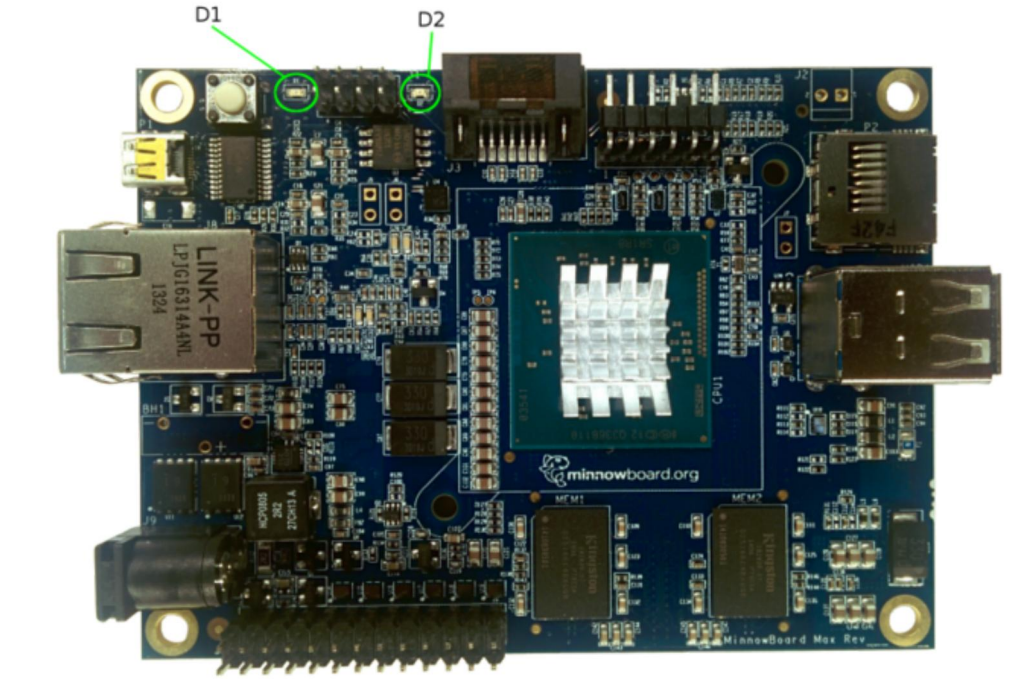
Here are photos showing the MinnowBoard MAX board layout identifying key hardware items; items are described later in this section.



NOTE: On Rev A1 boards and beyond, FTDI serial pin 1 is nearest the SATA connector, but on A0 boards pin 1 is furthest away. (A0 boards are rare, and are only being documented for completeness.)

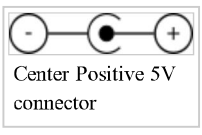


NOTE: Some items, such as the Real Time Clock battery pad are not populated when the boards are manufactured.



Power Plug

The Minnowboard Max uses a 5.5 x 2.1mm barrel 5V power plug (+/- .25V or 4.75 - 5.25V), Recommended minimum 2.5A power supply. It is a Center Positive power supply, indicating that the center (tip) of the output plug is positive (+), the outer barrel is negative (-).



Center Positive 5V connector

The 2.5A recommendation is just a simple calculation of:

```
500mA (USB2) + 900mA (USB3) + 500mA (core) + 500mA (other peripherals) = 2400mA
```

- Universal Power Supply from Digikey - 5V@3A - CUI EMSA050300-P5P-SZ (http://www.digikey.com/product-detail/en/EMSA050300-P5P-SZ/T1088-P5P-ND/2352082)
- Power Supply from Sparkfun - 5V@2A - TOL-12889 (https://www.sparkfun.com/products/12889)
- Power Supply from SeeedStudio - 5V@2A SKU: POW06182B (http://www.seeedstudio.com/depot/Wall-Adapter-Power-Supply-

5VDC-2A-p-1508.html?cPath=1_4)

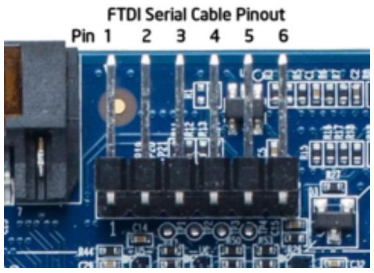
NOTE: If you try to power both a MinnowBoard MAX **AND** a hard drive (spinning or SSD) off of the same power supply, please use a minimum of 3A supply, preferably 4A. Failure to do so will likely result in odd behavior of the MAX as the whole system may be pushed into a brown-out situation.

Serial Console

On your host computer, configure your terminal emulation software with these settings:

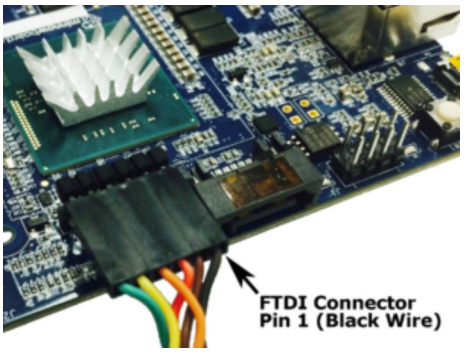
- /dev/ttyS0
- **Baud rate:** 115200
- **Hardware Flow Control:** No
- **Bits:** 8
- **Stop:** 1

The serial console port (UART0), located near the SATA connector at the top of the board, uses a 3.3v FTDI serial cable with a 6-pin connector. This is a reasonably common cable, also used on the Arduino Pro, Arduino Pro Mini and Arduino Lilypad. The cable connector typically has a triangle marking pin 1 (black wire).



Pins and signal names are referenced from the cable:

- **Pin 1:** Ground (GND) (Closest to SATA connector)
- **Pin 2:** CTS*
- **Pin 3:** VCC* (3.3V)
- **Pin 4:** TXD
- **Pin 5:** RXD
- **Pin 6:** RTS*



NOTE: CTS,VCC, and RTS are not used on the debug UART header. The pinouts and connections are listed to facilitate locating and connecting a compatible adapter.

NOTE: On Rev A1 boards and beyond, FTDI serial pin 1 is nearest the SATA connector, but on A0 boards pin 1 is furthest. (A0 boards are rare, and are only being documented for completeness.)

6-Wire Serial Console

In this case, plug the connector in exactly as it's described in the primary layout.

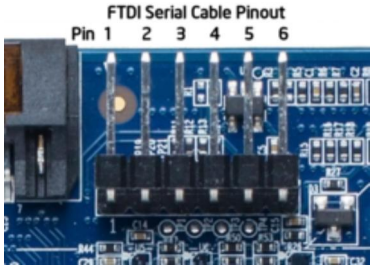
Places that carry 6-pin FTDI connector cables include:

- Mouser (http://www.mouser.com/ProductDetail/FTDI/TTL-232R-3V3/?qs=sGAEpiMZZMuGxYVy11yKKo9Jh1vSyHd5j3BYkuIZ9TA%3d)
- Digikey (http://www.digikey.com/product-detail/en/TTL-232R-3V3/768-1015-ND/1836393)
- Amazon (http://www.amazon.com/GearMo%C2%AE-3-3v-Header-like-TTL-232R-3V3/dp/B004LBXO2A/ref=sr_1_2?ie=UTF8&qid=1400890304&sr=8-2&keywords=ftdi+3.3v) ,or here (http://www.amazon.com/3-3V-Debug-Cable-BeagleBone-Black/dp/B00FA7LD0Y/ref=sr_1_4?ie=UTF8&qid=1400890356&sr=8-4&keywords=ftdi+3.3v)
- Sparkfun (https://www.sparkfun.com/products/9717)

Configure your terminal emulation software with the same settings listed above.

4-Wire Serial Console

The serial console port (UART0) can also be used with a 3.3v FTDI serial cable with a **4-pin connector**. This is a reasonably common cable, also used on the Arduino Pro, Arduino Pro Mini and Arduino Lilypad. If you are using one of the 4-wire adapters, here are the connections:



Pins and signal names are referenced from the cable:

- **Pin 1: BLACK** Ground (GND) (Closest to SATA connector)
- **Pin 3: RED** VCC (**Not connected**)
- **Pin 4: GREEN** TXD
- **Pin 5: WHITE** RXD

Note: The RED wire is for power and is not internally connected on the MinnowBoard MAX. CTS,VCC, and RTS are not used on the debug UART header. The pinouts and connections are listed to facilitate locating and connecting a compatible adapter.

Places that carry 4-pin FTDI connector cables include:

- Adafruit (http://www.adafruit.com/products/954)
- Watterott (http://www.watterott.com/de/Adafruit-USB-to-TTL-Serial-Cable)

Configure your terminal emulation software with the same settings listed above.

3-Wire Serial Console

The serial console port (UART0) can be used with a 3.3v FTDI serial cable with a 3-pin connector, for example Olimex USB-Serial-Cable-F. The same cable can used for debugging of a lot of other developer boards including HummingBoard, Raspberry Pi, Radxa Rock, Firefly-RK3288, and all of Olimex open source hardware boards OLinuXino. If you are using this cable, here are the connections:

- **Pin 1:BLUE** - Ground (GND) (Closest to the SATA connector)
- **Pin 4:RED** - TXD
- **Pin 5:GREEN** - RXD

NOTE: CTS,VCC, and RTS are not used on the debug UART header. The pinouts and connections are listed to facilitate locating and connecting a compatible adapter.

Places that carry the appropriate Cable:

- **Olimex** USB-Serial-Cable-F (https://www.olimex.com/Products/Components/Cables/USB-Serial-Cable/USB-Serial-Cable-F/)

Debugging MinnowBoard MAX with Olimex USB-Serial-Cable-F

High Speed UART1

Available on the Low Speed Expansion this Uart is 16550 compatible and appears as /dev/ttyS4

CTS/RTS signaling is available

High Speed UART2

Available on the Low Speed Expansion this Uart is 16550 compatible and appears as /dev/ttyS5

CTS/RTS signaling is **NOT** available

D1 (LED)

D1 is the power indicator LED; when lit, power is being provided to the board.

D2 (LED)

D2 is the On/Off status indicator LED; when lit the CPU itself has come up and is working, the system is running.

Note: On later revisions of the board (A4+), this LED defaults to being on, but is controllable via a GPIO.

HDMI

The MinnowBoard MAX uses a Type D micro-HDMI connector. This is a standard port; cables and adapters are readily available from most electronics stores.

HDMI CEC

While the MAX (from a hardware perspective) supports HDMI CEC, the signal is, unfortunately, not passed completely from the micro-hdmi connector to the CPU. This means we lack the ability to directly manipulate CEC from the A1 and A2 revisions of the hardware. It has been proposed that this be resolved in a later revision of the board, but it is unknown at which point (if it ever is) rectified.

Ethernet

The MinnowBoard MAX uses a Realtek RTL8111GS-CG PCIe based chipset to provide a 10/100/1000 Ethernet connection.

Low Speed Expansion Connector (Top)

The low speed expansion connector uses 0.1" (2.54 mm) male header pins in a 2 x 13 array, for a total of 26 pins. Pin 1 is in the row closest to the power connector, and closest to the board edge.

NOTE: All I/O on the Low Speed Expansion Connector is at 3.3V levels. **THE PINS ARE NOT 5v TOLERANT**

LSE Layout

The Linux GPIO base address changed (by adding 256) from Linux kernel versions 3.17 to 3.18, so you'll need to know which kernel version you're using to select the correct GPIO numbers. This table lists the GPIO number for both the 3.17 and earlier kernels, and 3.18 and later kernels, for each pin on the connector:

Description	Name	Pin	Linux GPIO# (≤3.17)	Linux GPIO# (≥3.18)	Linux GPIO# (≥3.18)	Linux GPIO# (≤3.17)	Pin	Name	Description
Ground	Gnd	1					2	Gnd	Ground
+5V Power	VCC	3					4	+3V3	+ 3.3V Power
SPI Chip Select 1	GPIO_SPI_CS#	5	220	476	481	225	6	GPIO_UART1_TXD	UART Transmit
Master In / Slave Out	GPIO_SPI_MISO	7	221	477	480	224	8	GPIO_UART1_RXD	UART Receive
Master Out / Slave In	GPIO_SPI_MOSI	9	222	478	483	227	10	GPIO_UART1_CTS	CTS / GPIO
SPI Clock	GPIO_SPI_CLK	11	223	479	482	226	12	GPIO_UART1_RTS	RTS / GPIO
Clock / GPIO	GPIO_I2C_SCL (I2C #5)	13	243	499	472	216	14	GPIO_I2S_CLK	Clock / GPIO
Data / GPIO	GPIO_I2C_SDA (I2C #5)	15	242	498	473	217	16	GPIO_I2S_FRM (* **Note issue**)	Frame / GPIO
UART Transmit / GPIO	GPIO_UART2_TXD	17	229	485	475	219	18	GPIO_I2S_DO	Data Out / GPIO
UART Receive / GPIO	GPIO_UART2_RXD	19	228	484	474	218	20	GPIO_I2S_DI	Data In / GPIO
GPIO / Wakeup	GPIO_S5_0	21	82	338	504	248	22	GPIO_PWM0	PWM / GPIO
GPIO / Wakeup	GPIO_S5_1	23	83	339	505	249	24	GPIO_PWM1	PWM / GPIO
GPIO / Wakeup	GPIO_S5_2	25	84	340	464	208	26	GPIO_IBL_8254 (*Notice)	Timer / GPIO

NOTE: Pins 5-26 are shown above with their primary configuration, any pin may be switched to being a generic GPIO as well. This would give a total of 22 GPIOs, with two being PWM capable.

☐ Denotes Pins that have issues with firmware prior to 0.71 (8/13/2014 build)
☐ Denotes Pins that have been tested and work as expected. Remember to drive the pin to ground.

High Speed Expansion Connector (Bottom)

The High speed expansion connector uses a TE Connectivity-compatible 60-pin header. We recommend using the 3-5177986-2 or the 60POS .8MM FH 8H GOLD part that rises 7.85mm. This permits using 3/8" standoffs at the corners for attaching a lure to the MinnowBoard MAX.

Link to connector used: http://www.digikey.com/product-detail/en/5177985-2/A99190CT-ND/1894007. mating connectors are listed at the bottom but include:

- **A99196DKR-ND** - CONN PLUG 60POS .8MM FH 5H GOLD
- **A115336-ND** - CONN PLUG 60POS DL BRD/BRD VERT
- **5179030-2-ND** - CONN PLUG 60POS FH .8MM BRD-BRD
- **5177984-2-ND** - CONN PLUG 60POS VERT FH .8MM
- **A99215CT-ND (http://www.digikey.com/product-detail/en/3-5177986-2/A99215CT-ND/1894032)** - CONN PLUG 60POS .8MM FH 8H GOLD **<— Recommended connector**
- **A99209CT-ND** - CONN PLUG 60POS .8MM FH 7H GOLD
- **A99203CT-ND** - CONN PLUG 60POS .8MM FH 6H GOLD
- **A99196CT-ND** - CONN PLUG 60POS .8MM FH 5H GOLD
- **A99215TR-ND** - CONN PLUG 60POS .8MM FH 8H GOLD
- **A99209TR-ND** - CONN PLUG 60POS .8MM FH 7H GOLD

HSE Layout

Description	Pin	Pin	Description
Ground	1	2	Ground
mSATA_TX_P	3	4	mSATA_RX_P
mSATA_TX_N	5	6	mSATA_RX_N
+5V SB	7	8	+5V SB
mPCIE_REFCLK_P	9	10	USB_HOST_DP
mPCIE_REFCLK_N	11	12	USB_HOST_DN
Ground	13	14	Ground
mPCIE_TX_P	15	16	mPCIE_RX_P
mPCIE_TX_N	17	18	mPCIE_RX_N
+5V SB	19	20	+5V SB
EXP_I2C_SCL (I2C #6)	21	22	mPCIE_WAKEB
EXP_I2C_SDA (I2C #6)	23	24	mPCIe_CLKREQ3_B
Ground	25	26	Ground
EXP_GPIO1	27	28	EXP_GPIO3
EXP_GPIO2	29	30	EXP_GPIO4
+5V SB	31	32	+5V SB
EXP_GPIO6 (XDP_H_OBSDATA_A1)	33	34	EXP_GPIO5 (XDP_H_OBSDATA_A0)
EXP_GPIO7 (XDP_H_OBSDATA_A2)	35	36	EXP_GPIO8 (XDP_H_OBSDATA_A3)
Ground	37	38	Ground
XDP_H_PRDYB	39	40	XDP_H_PREQB_PB
PMC_RSMRST	41	42	FP_PWRBTN
+5V SB	43	44	+5V SB
PMC_CORE_PWROK	45	46	PMC_RSTBTN
PMC_PLTRST_R_V1P8	47	48	ILB_RTC_TESTB
Ground	49	50	Ground
XDP Power Rail Status (3.3v ~250mA)	51	52	XDP_H_TRSTB
XDP Power Rail Status (1.8v ~250mA)	53	54	XDP_H_TCK
+V1P8A	55	56	XDP_H_TMS
+V1P8A	57	58	XDP_H_TDI
Ground	59	60	Ground

GPIO Mapping

The Linux GPIO base address changed (by adding 256) from Linux kernel versions 3.17 to 3.18, so you'll need to know which kernel version you're using to select the correct GPIO numbers. This table lists the GPIO number for both the 3.17 and earlier kernels, and 3.18 and later kernels, for each pin on the connector:

Name	Pin	Linux GPIO# (≤3.17)	Linux GPIO# (≥3.18)	Linux GPIO# (≥3.18)	Linux GPIO# (≤3.17)	Pin	Name
EXP_I2C_SCL (I2C #6)	21	245	501				
EXP_I2C_SDA (I2C #6)	23	244	500				
	[...]						
EXP_GPIO1	27	109	365	367	111	28	EXP_GPIO3
EXP_GPIO2	29	110	366	368	112	30	EXP_GPIO4
	[...]						
EXP_GPIO6	33	105	361	362	106	34	EXP_GPIO5
EXP_GPIO7	35	107	363	364	108	36	EXP_GPIO8

NOTE: The I2C pins have the same property as the pins in the Low Speed Expansion Header, in that their primary purpose is I2C, but can be switched to GPIO in the firmware. In firmware this is the I2C #6.

☐ Denotes Pins that have issues with firmware prior to 0.71 (8/13/2014 build)
☐ Denotes Pins that have been tested and work as expected. Remember to drive the pin to ground.

SPI Header to Firmware flashing J1

This is a pinned out port for external flashing of the boot SPI. Dediprog and Flyswatter devices have been tested and verified to work.

J1 Layout

Description	Pin	Pin	Description
DDP_1V8	1	2	Ground
DDP_SPI_CS	3	4	DDP_SPI_CLK
DDP_SPI_MISO	5	6	DDP_SPI_MOSI
	7	8	DDP_IO3L

Power Connection J2 (SIP2_FAN)

This is a 5V 2-pin pin out originally intended for a CPU fan. The single core (E3815) and the dual core (E3825) use passive heat sinks and do not, under normal circumstances, need a fan. While it's theoretically possible to pull upwards of 1A through this port, you should refer to the released schematics to verify this before attempting to use these power pins.

The pins have a 2.54mm pitch and Screw Terminals 2.54mm Pitch (https://www.sparkfun.com/products/10571) are an example of a compatible component.

NOTE: This is not populated on the Single, or Dual core boards as shipped.

J2 Layout

Description	Pin	Pin	Description
+5VSB	1	2	Ground

NOTE: If you are using an A0 board, *the pinout is reversed*. Always verify pin output, preferably with a multimeter, before using J2.

Switch Jumper J5

These pins are intended for power toggling via a remote switch or relay, fundamentally no different than pressing SW1.

NOTE: This is not populated, by default.

J5 Layout

Description	Pin	Pin	Description
+5VSB	1	2	Ground

SATA LED J6

J6 header allows an external LED to be connected to the SATA interface's activity signal, causing it to blink based on the amount of SATA read/write activity.

NOTE: This is not populated, by default.

J6 Layout

Description	Pin	Pin	Description
	1	2	+V1P8S

SD Card Write Protect J7

This is a jumper point, intended for debugging, that enables SD card write-protect explicitly. This is not populated on shipping boards.

RTC Battery Holder

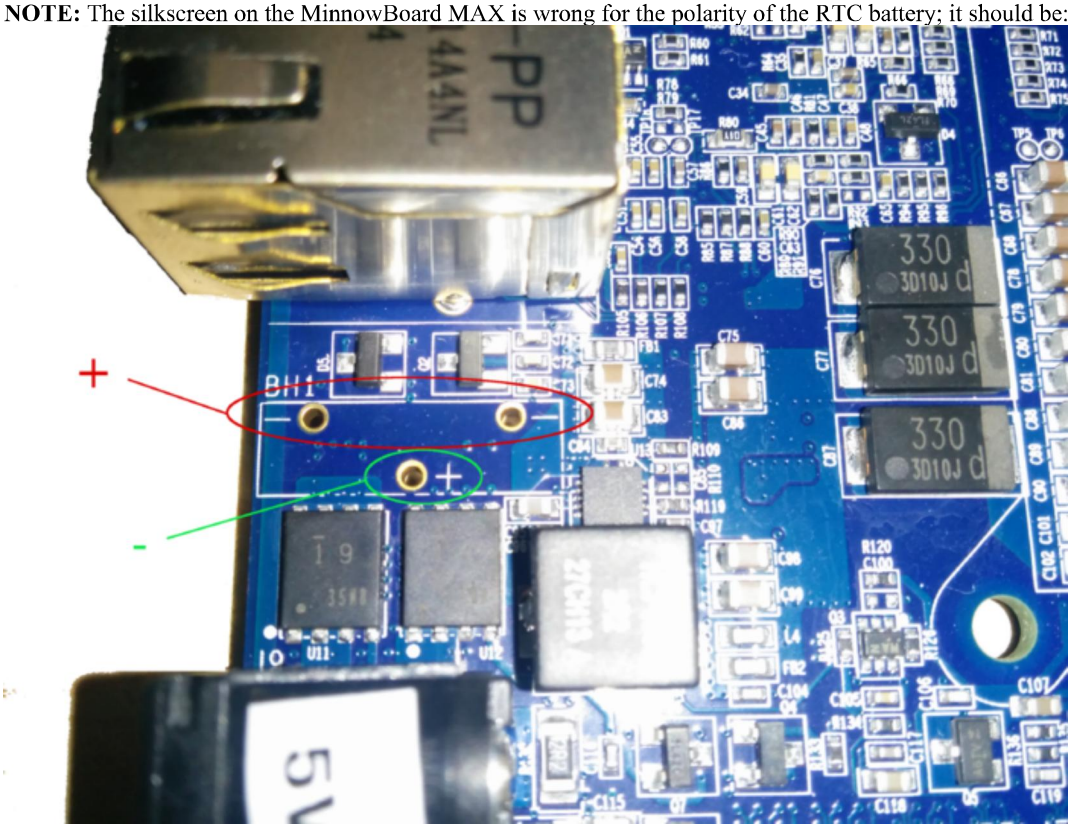
The Real-Time Clock Battery Holder is not populated on shipping boards, however you can add one using this part:

Known Compatible parts:

Part number	Part Data Sheet	Where to purchase from
BS-1225-PC	Data Sheet (http://www.memoryprotectiondevices.com/datasheets/BS-1225-PC-datasheet.pdf)	http://www.digikey.com/product-detail/en/BS-1225-PC/BS-1225-PC-ND/3029215

NOTE: The battery holder is not populated by default, and a resistor needed for the correct option may also be missing. Check MinnowBoard MAX RTC Hardware Known Issues

NOTE: The silkscreen on the MinnowBoard MAX is wrong for the polarity of the RTC battery; it should be:



GPIO for 1GB vs 2GB

This is for firmware development, but there is a specific GPIO set at manufacture time that determines 1GB or 2GB (or more) memory sizes.

GPIO_S5_5 is the GPIO that will determine the memory configuration:

- 0 - 1GB configuration
- 1 - 2/4GB configuration

The 2GB and 4GB configurations are the same since the 4GB configuration is a double die of the 2GB. In firmware, you only need to initialize enough memory for Linux to boot and program the I2C EEPROM.

Here's how firmware should initialize the board's memory given the above:

1. Read the SPD; if valid, use that and *DO NOT* do anything with the GPIO_S5_5 pin
2. If the SPD is invalid or empty, read GPIO_S5_5
    - If GPIO_S5_5 is 0 - use a hard coded 1GB configuration
    - If GPIO_S5_5 is 1 - use a hard coded 2GB configuration (even if the board has 4GB of memory)

Board Design Files

NOTE: All design files are released under Creative Commons CC-BY-SA (http://creativecommons.org/)

The MinnowBoard MAX is intended to comply with all requirements and guidelines set forth by the Open Source Hardware Association (http://www.oshwa.org/)

MinnowBoard MAX Rev A2

- A2 Schematic (PDF)
- A2 Schematic (Orcad DSN)
- A2 Board Layout (Allegro BRD)
- A2 Gerbers
- A2 Bill of Materials

MinnowBoard MAX Rev A1

- A1 Schematic (PDF)
- A1 Schematic (Orcad DSN)
- A1 Board Layout (Allegro BRD)
- A1 Gerbers
- A1 Bill of Materials

Cases

For Sale

- Full Case
  -  Netgate - MinnowBoard MAX Blue Enclosure (http://store.netgate.com/MBX/Case.aspx)

3D Printable

- Half cases
  -  John 'Warthog9' Hawley's
    - https://github.com/warthog9/minnowboardmax-case
    - http://www.thingiverse.com/thing:389100
    - http://www.shapeways.com/model/2205839/minnowboard-max-half-case.html?li=search-results&materialId=99
    - https://www.youtube.com/watch?v=WKLuHodiSfc
  -   Rom Hartmann's
    - http://www.thingiverse.com/thing:877434

Accessories (Lures)

Lures are accessory boards that attach to the MinnowBoard-MAX and provide additional functionality. Lures are owned and supported by their respective owners and manufacturers. Information on Lures can be found on the MinnowBoard MAX Lure wiki page.

Known Issues

MinnowBoard-MAX Open Bugs (Bugzilla)

- Bugzilla:
  We currently use the YoctoProject Bugzilla instance at http://bugzilla.yoctoproject.org
- Bug Triage link can be found at: https://wiki.yoctoproject.org/wiki/Minnow_Bug_Triage

Weak HDMI signal causing some monitors to not work

The MinnowBoard MAX was found to be missing a level shifter on a differential pair for the HDMI signal. This causes our HDMI signal to be marginal. For many monitors this isn't an issue and many folks don't see this issue. However this does mean several things **WILL NOT** work currently:

- Non-passive adapters (un-powered VGA adapters being the big one)
- Some HDMI Monitors

If you require a monitor to work, but it's not there is a work around that seems to resolve the issue for most folks. Specifically placing a **POWERED** HDMI switch between the MinnowBoard MAX and the display offsets the missing level shifter, as most powered HDMI switches do their own level shifting.

Bugzilla #7027 (https://bugzilla.yoctoproject.org/show_bug.cgi?id=7027) has more specific technical details about the issue

CPU Strapping issues

Some of the pins on the LSE and HSE, specifically those when switched into GPIO mode, can alter the way the CPU attempts to boot. In some cases the changes can prevent the system from successfully booting.

- LSE - Pin 16 - GPIO_I2S_FRM
  - If set as GPIO (not native function) and pin is held low, de-selects SPI boot flash and firmware is not actually read from the on-board SPI flash

When using these pins, particularly on Lures, please be aware of the limitations.

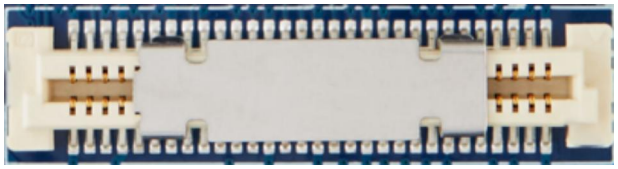
LSE Pin 26 Change notification

Pin 26 on the Low Speed Expansion connector was intended to provide a good MCLK (Master Clock) for I2S functionality, however the pin that was chosen originally does not actually meet this need. In a later revision of the board (A4 onwards) this signal will be replaced with one that will provide a good MCLK. If you make use of pin 26, software and hardware may need to be updated once the A4, or later, designs are available. (There is currently no ETA for the A4 boards, and this is being mentioned just so people are aware of the impending change.)

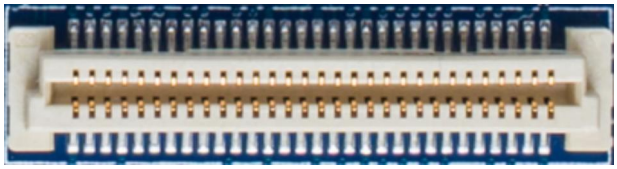
Plate over High Speed Expansion Headers

There is an issue for some boards manufactured in early 2015: a protective metal plate (used during the manufacturing process for the pick-in-place machine) may have been left covering the High Speed Expansion Headers (HSE) on the bottom of the board. You should remove the metal plate if it's still there.

Here's the HSE connector with the manufacturing cover that should be removed:



and here's what the connector should look like without the manufacturing connector:



Firmware

See the bug list, linked above.

NVRam issue

There are some reports of the UEFI firmware getting corrupted for firmware releases before 0.71. Symptoms include boot failure with no HDMI display output and both board LEDs are on. This problem has been fixed in firmware release 0.71 and above. Please update your firmware (http://uefidk.com/content/minnowboard-max) to the latest release.

Monitors

There is an issue with regards to some monitors not being able to display from the MinnowBoard MAX. Most monitors seem to be fine, but some will either completely not show a display (even at firmware boot-up) or may only show a display after the operating system is booting. This turns out to be an issue with HDMI vs. DVI detection and initialization. Firmware release 0.71 fixed this problem.

There have been additional reports saying some monitors may still not be working in the Firmware (UEFI shell), but are working once the OS (Linux) comes up. If you have a monitor that is having a problem please file a bug on our Bugzilla database and be sure to include the make, model, native resolution and the exact cabling used to connect the monitor to the MinnowBoard MAX

RTC

The Real-Time clock may not function correctly (when a battery is added) because resistor R278 (back side of the board) may be missing. Adding a 1K or 2K resistor should resolve this.

USB

There is a potential issue when using a powered USB hub that (erroneously) provides power over the USB 3 or USB 2 input connector. This is in violation of the USB spec. If such a powered USB hub is used, the MinnowBoard MAX will use that as power; this will be rectified in a future revision of the MinnowBoard MAX.

Hubs known to cause this:

- iXCC 7 Port USB 3.0 Hub
  - Amazon Link (http://www.amazon.com/iXCC-Firmware-backwards-compatibility-External/dp/B00GLJIPK6/ref=sr_1_2?ie=UTF8&qid=1403830109&sr=8-2&keywords=ixcc+usb3+powered+hub)
  - iXCC Website (http://ixcc.com/)

We recommend you check your powered USB hub to confirm that it does not provide power back to the board, as described. If you have a hub that is doing this, please report it here and either stop using it, or use it with its external power turned off.

NOTE: This is not an indication that hubs do not work, or that USB does not work. This is merely an indication that some powered hubs violate the USB spec, and there is a flaw (a diode should be added) in the MinnowBoard MAX design.

Another issue might appear if a wireless USB dongle operating at 2.4 GHz (e.g., a wireless receiver for input devices) is connected to the USB2.0 port together with an USB3.0 device attached to the USB3.0 host connector. In this case the device connected to the USB dongle can become unresponsive due to radio frequency interference form the USB3.0 connection. A solution is to use an extension cable or hub to move the the dongle further away from the board **NOTE:** This interference problem seems to be a general USB3.0 issue. Information on this can be found at Intel.com (http://www.intel.com/content/www/us/en/io/universal-serial-bus/usb3-frequency-interference-paper.html)

Export Information

MinnowBoard MAX Dual Core (E3825) w/ 2GB RAM

- **Export Control Classification Number (ECCN)** = 5A002.a.1
- **CCATS number** = G143235
- ENC is **Unrestricted**

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