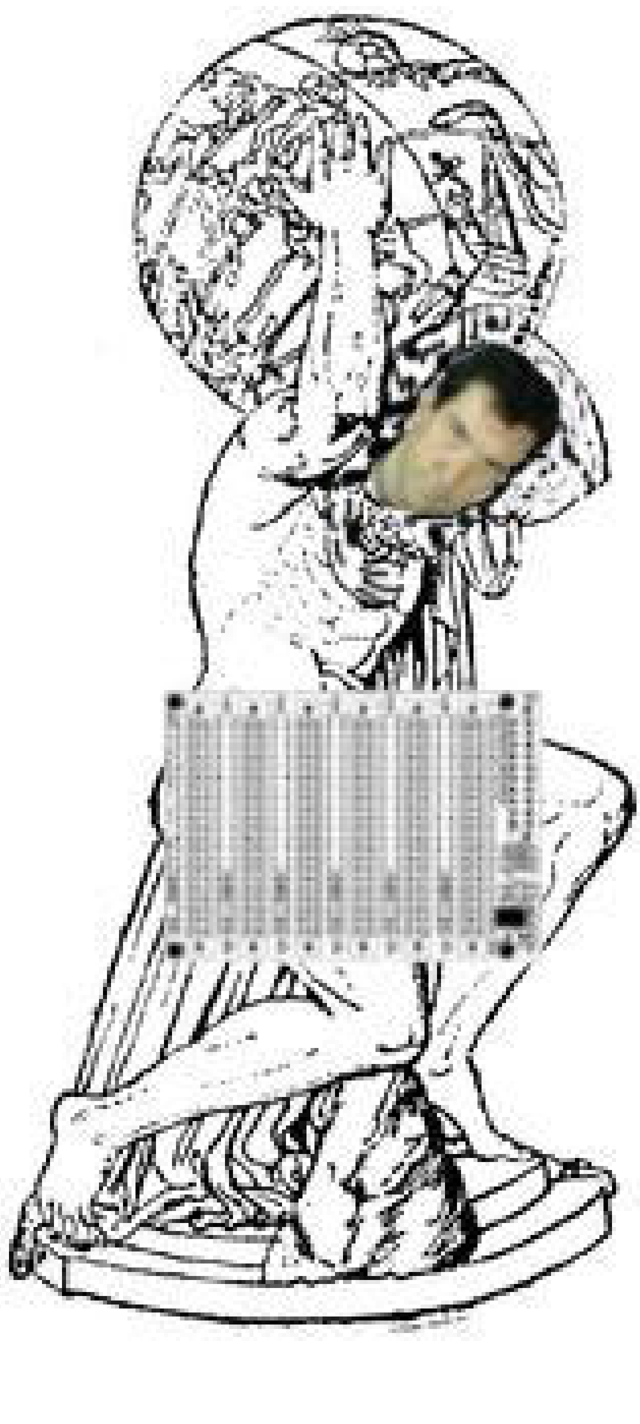
High Performance Software Defined Radio

Open Source (GNU type) Hardware and Software Project

Project Description: http://hpsdr.org



Hardware Project #1

ATLAS Board

Assembly Guide and Documentation

Board Design Philip Covington, N8VB

Text Christopher T.Day, AE6VK
Philip Covington, N8VB
Horst Gruchow, DL6KBF
Ray Anderson, WB6TPU

Graphics and Layout Horst Gruchow, DL6KBF

Project Coordinator Eric Ellison, AA4SW

Rev. 1.4 of June 10, 2006

Contents

Where to find everything

ATLAS - the Backplane

About the ATLAS Module

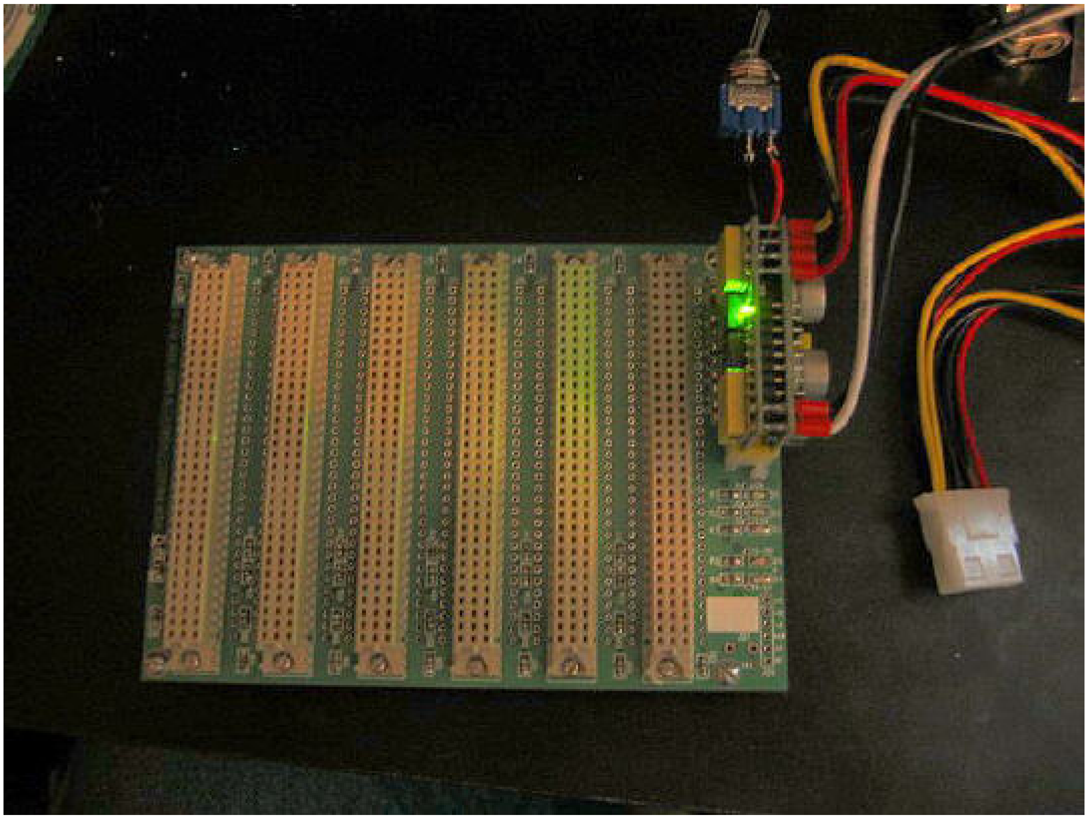
The ATLAS is a passive backplane that all other modules plug into.
The circuit board has provision for up to six DIN41612 connectors at 0.8 inch spacing.
An ATX 20 pin power connector is fitted to the board so that 12v, 5v, 3.3v etc. supplies from a standard PC power supply can be used to power the HPSDR. Since such power supplies are in plentiful supply, both new and surplus, this neatly solves the power supply requirements.

The various files for the ATLAS board can be found at

http://www.philcovington.com/HPSDR/ATLAS/ .

The DIN connector spacing and board size have been chosen such that the backplane can be fitted into a standard PC enclosure.

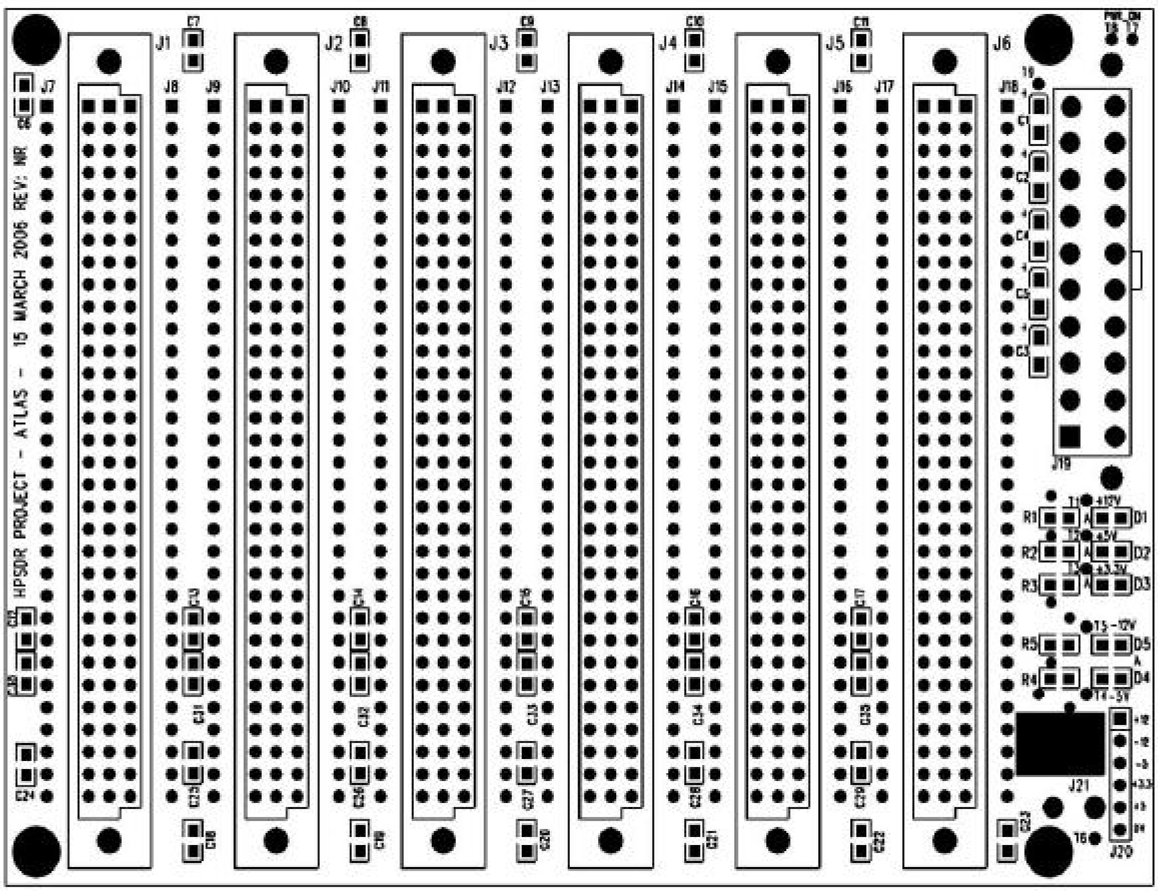
The project leader for ATLAS is Phil, N8VB.



Assembled ATLAS with a PicoPSU ATX power supply plugged in
(photo Christopher T. Day, AE6VK)

ATLAS - the Bus

ATLAS Bus Physical Description



Board: 4 Layer , 5.500" X 3.940"(139.7x100 mm^2)
J1-J6 slots spaced at 0.800"(20.3 mm)

Stackup:

Ground Plane (Top Layer)
YBUS
Power Planes
XBUS (Bottom Layer)

Power:

+12VDC, -12VDC, +5VDC, -5VDC, +3.3VDC

ATLAS Bus Physical Description

Standard Connectors:

- ❑ 96 pin DIN41612 (J1-J6) - BUS
- ❑ 20 pin ATX PS (J19) - POWER
- ❑ PS LOAD (J21) - LOAD
- ❑ 6 pin 0.100 SIP (J20) - POWER
- ❑ T1-T6 for external LEDs
- ❑ T7-T8 for remote ATX power on switch
- ❑ T9 for ATX_PWR_OK

Optional Connectors:

- ❑ 64 pin DIN41612 (using XBUS only)
- ❑ 32x2 0.100”(2.54 mm) Header (using XBUS only)

Misc. Features:

- ❑ Each pin of the slot connectors can be isolated from the bus and then jumpered to another bus pin or signal.
- ❑ J7-J18 are provided for optional 32 pin SIP headers or wire-wrap pins. This allows re-routing the bus as needed.
- ❑ The user can decide to use the XBUS only by populating J1-J6 with DIN41612 64 pin "Type B" connectors or 32 pin dual 0.100 headers.
- ❑ J21 allows for an optional load resistor to be placed on the +5V bus when using an ATX power supply. The load resistor should be mounted to a proper heatsink.
- ❑ D1-D5 are SMT LEDs connected to the power bus (+12V, -12V, +5V, -5V, +3.3V) through dropping resistors R1-R5.
- ❑ T1-T6 allow panel mounting of LEDs instead of SMT.
- ❑ All supplies bypassed.

ATLAS Bus Physical Description

Notes:

1. The buses are separated into the XBUS and YBUS, with 24 lines each.
2. The XBUS is routed on the bottom layer of the PCB.
3. The YBUS is routed between the top ground plane layer and the power plane layer.
4. The XBUS is divided into the subgroups XA0-XA7, XB0-XB7, XC0-XC7, XDC.
5. The YBUS is divided into the subgroups YA0-YA7, YB0-YB7, YC0-YC7, YDC.
6. XDC and YDC are daisy chained between slots (see schematic).
7. The XBUS and YBUS subgroup divisions are for physical naming purposes only.
8. Since the YBUS is sandwiched in between two plane layers, it should be used to route medium speed signals or clocks between boards. While not intended to be a LVDS bus, it should be adequate for clock speeds up to 20-25 MHz.
9. J7, J9, J11, J13, J15, J17 are connected to the XBUS.
   J8, J10, J12, J14, J16, J18 are connected to the YBUS.
   On the bottom side of the Atlas board, J7-J18 are then connected by traces to J1-J6. This allows you to isolate pins on the J1-J6 connectors by cutting the connecting trace.
   See 10 below.
10. If an application requires re-routing signals on the bus, a possible solution is to populate the related pin on connectors J7-J18 with wire wrap pins. The signal then can be routed on top of the Atlas board with wire wrap wire. Since the top of the board is ground plane, the wire wrap wire should lay directly on the board surface to minimize crosstalk/noise.
11. An alternative to wire wrap is to place jumper wires between the rerouted bus signals on the J7-J18 pads.
12. See physical bus pinout below.

ATLAS Bus Physical Description

DIN41612 Bus Pinout

XBUS					YBUS		
PIN	NAME	ALTERNATE	PIN	NAME	PIN	NAME	ALTERNATE
A1	**+12VDC**		**B1**	**+12VDC**	**C1**	**+12VDC**	
A2	X0A0		B2	GND	C2	Y0A0	
A3	X1A1		B3	GND	C3	Y1A1	
A4	X2A2		B4	GND	C4	Y2A2	
A5	X3A3		B5	GND	C5	Y3A3	
A6	X4A4		B6	GND	C6	Y4A4	
A7	X5A5		B7	GND	C7	Y5A5	
A8	X6A6		B8	GND	C8	Y6A6	
A9	X7A7		B9	GND	C9	Y7A7	
A10	X8B0		B10	GND	C10	Y8B0	
A11	X9B1		B11	GND	C11	Y9B1	
A12	X10B2		B12	GND	C12	Y10B2	
A13	X11B3		B13	GND	C13	Y11B3	
A14	X12B4		B14	GND	C14	Y12B4	
A15	X13B5		B15	GND	C15	Y13B5	
A16	X14B6		B16	GND	C16	Y14B6	
A17	X15B7		B17	GND	C17	Y15B7	
A18	X16C0	1-WIRE	B18	GND	C18	Y16C0	SPI - nCS4
A19	X17C1	nRST	B19	GND	C19	Y17C1	SPI - nCS3
A20	X18C2	I2C - SCL	B20	GND	C20	Y18C2	SPI - nCS2
A21	X19C3	I2C - SDA	B21	GND	C21	Y19C3	SPI - nCS1
A22	X20C4	JTAG - TRST	B22	GND	C22	Y20C4	SPI - nCS0
A23	X21C5	JTAG - TMS	B23	GND	C23	Y21C5	SPI - SCK
A24	X22C6	JTAG - TCK	B24	GND	C24	Y22C6	SPI - MISO
A25	X23C7	JTAG - SDO ret	B25	GND	C25	Y23C7	SPI - MOSI
A26	**-12VDC**		**B26**	**-12VDC**	**C26**	**-12VDC**	
A27	X24DC	JTAG - SDO	B27	GND	C27	Y24DC	SPI - MOSI ovfl out
A28	**-5VDC**		**B28**	**-5VDC**	**C28**	**-5VDC**	
A29	X25DC	JTAG - SDI	B29	GND	C29	Y25DC	SPI - MOSI ovfl in
A30	**+3.3VDC**		**B30**	**+3.3VDC**	**C30**	**+3.3VDC**	
A31	X26DC		B31	GND	C31	Y26DC	
A32	**+5VDC**		**B32**	**+5VDC**	**C32**	**+5VDC**	

ATLAS Bus Board Connections - XBUS

XBUS				
PIN	**NAME**	**JANUS U11**	**OZY U3**	**ALTERNATE**
A1	**+12VD**C			
A2	X0A0	PIN 97 IO	PIN 147 IO	
A3	X1A1	PIN 95 IO	PIN 146 IO	
A4	X2A2	PIN 91 IO	PIN 145 IO	
A5	X3A3	PIN 89 IO	PIN 144 IO	
A6	X4A4	PIN 87 IO	PIN 143 IO	
A7	X5A5	PIN 85 IO	PIN 142 IO	
A8	X6A6	PIN 83 IO	PIN 141 IO	
A9	X7A7	PIN 81 IO	PIN 139 IO	
A10	X8B0	PIN 77 IO	PIN 138 IO	
A11	X9B1	PIN 75 IO	PIN 137 IO	
A12	X10B2	PIN 73 IO	PIN 135 IO	
A13	X11B3	PIN 71 IO	PIN 134 IO	
A14	X12B4	PIN 69 IO	PIN 133 IO	
A15	X13B5	PIN 67 IO	PIN 128 IO	
A16	X14B6	PIN 64 IO/GCLK3	PIN 127 IO	
A17	X15B7	PIN 61 IO	PIN 120 IO	
A18	X16C0	PIN 57 IO / **U14 ID**	PIN 119 IO	1-WIRE
A19	X17C1	PIN 55 IO	PIN 118 IO	nRST **(1)**
A20	X18C2	PIN 53 I2CSCK	PIN 117 IO	I2C - SCL
A21	X19C3	PIN 51 I2CSDA	PIN 116 IO	I2C - SDA
A22	X20C4	PIN 49 IO	PIN 115 IO	JTAG - TRST
A23	X21C5	PIN 22 CTMS	PIN 114 IO	JTAG - TMS
A24	X22C6	PIN 24 CTCK	PIN 113 IO	JTAG - TCK
A25	X23C7	**JP 10** SDOBACK	PIN 112 IO	JTAG - SDO ret
A26	**-12VDC**			
A27	X24DC	PIN 25 CTDO	PIN 110 IO	JTAG - SDO
A28	**-5VDC**			
A29	X25DC	PIN 23 CTDI	PIN 106 IO	JTAG - SDI
A30	**+3.3VDC**			
A31	X26DC	PIN 40 IO	PIN 105 IO	
A32	**+5VDC**			

ATLAS Bus Board Connections - YBUS

YBUS				
PIN	**NAME**	**JANUS U11**	**OZY U3**	**ALTERNATE**
C1	**+12VDC**			
C2	Y0A0	PIN 98 IO	PIN 149 IO	
C3	Y1A1	PIN 96 IO	PIN 150 IO	
C4	Y2A2	PIN 92 IO	PIN 151 IO	
C5	Y3A3	PIN 90 IO	PIN 152 IO	
C6	Y4A4	PIN 88 IO	PIN 160 IO	
C7	Y5A5	PIN 86 IO	PIN 161 IO	
C8	Y6A6	PIN 84 IO	PIN 162 IO	
C9	Y7A7	PIN 82 IO	PIN 163 IO	
C10	Y8B0	PIN 78 IO	PIN 164 IO	
C11	Y9B1	PIN 76 IO	PIN 165 IO	
C12	Y10B2	PIN 74 IO	PIN 168 IO	
C13	Y11B3	PIN 72 IO	PIN 169 IO	
C14	Y12B4	PIN 70 IO	PIN 170 IO	
C15	Y13B5	PIN 68 IO	PIN 171 IO	
C16	Y14B6	PIN 66 IO	PIN 173 IO	
C17	Y15B7	PIN 62 IO/GCLK2	PIN 175 IO	
C18	Y16C0	PIN 58 IO	PIN 176 IO	SPI - nCS4
C19	Y17C1	PIN 56 IO	PIN 179 IO	SPI - nCS3
C20	Y18C2	PIN 54 IO	PIN 180 IO	SPI - nCS2
C21	Y19C3	PIN 52 IO	PIN 181 IO	SPI - nCS1
C22	Y20C4	PIN 50 IO	PIN 182 IO	SPI - nCS0
C23	Y21C5	PIN 48 IO	PIN 185 IO	SPI - SCK
C24	Y22C6	PIN 44 IO/DEV_CLRn	PIN 187 IO	SPI - MISO
C25	Y23C7	PIN 43 IO/DEV_OE	PIN 188 IO	SPI - MOSI
C26	**-12VDC**			
C27	Y24DC	PIN 42 IO	PIN 189 IO	SPI - MOSI ovfl out
C28	**-5VDC**			
C29	Y25DC	PIN 41 IO	PIN 191 IO	SPI - MOSI ovfl in
C30	**+3.3V**DC			
C31	Y26DC	PIN 39 IO	PIN 192 IO	
C32	**+5VDC**			

Notes and Glossary

TERM	*Explanation*
JANUS U11	Altera EPM240TQFP100 CPLD on JANUS Board
OZY U3	Altera EP2C5-208 FPGA on OZY Board
CPLD	Complex Logical Programmable Device
FPGA	Field Programmable Gate Array
1-WIRE	Board Identification (using MAXIM DS2431P with 64-bit ROM registration no. + 1024bit EEPROM) DALLAS 1-Wire Protocol
nRST	RESET
I2CSCK / I2C-SLC	Inter-Integrated Circuit (I^2C Bus) - Master Clock Line
I2CSDA	I^2C Bus - Serial Data Line
JTAG	Joint Test Action Group - Implementation of IEEE 1149.1 Standard Test Access Port and Boundary-Scan Architecture Programming Port for Altera Devices
JTAG-TRST	Test Reset
JTAG-TMS	Test Mode Select
JTAG-TCK	Test Clock
JTAG-SDO	Test Data Out
JTAG-SDOret	Test Data Out Return - Jumper JP12 on JANUS to be set if JANUS U11 programmed via OZY USB - J12 open for local JTAG program-
JTAG-SDI	Test Data In
GCLK2 /GCLK3	Clocks connected to Global Clock Network on JANUS U11
SPI-nCS4 to CS0	Serial Peripheral Interface - Chip(Slave) Select
SPI-SCK	SPI - Master Clock
SPI-MISO	SPI - Master In Slave Out Data / Serial Data In
SPI-MOSI	SPI - Master Out Slave In Data / Serial Data Out
SPI-MOSI ovfl out	SPI - Data Overflow Master
SPI-MOSI ovfl in	SPI - Data Overflow Slave
DEV_CLRn	Clear all Registers on Low - JANUS U11
DEV_OE	All I/O pins tristate on Low - JANUS U11

ATLAS - the Construction

How to get the ATLAS printed circuit board

Status as of June 2006
A batch of 400 beta boards has been produced by Eric Ellison, AA4SW, after the initial order count had gone up over the 300 mark. There still might be some boards available of this first run. Cost at this time will be 10 US$ plus shipping.
Please check the website http://www.hamsdr.com .
If not yet done you will have to register in order to be able to view the **Projects** tab where the currrent board ordering status of the **HPSDR** project is listed. So just click on **Log-In/Join** at the upper right, select **Join** from the menu and provide the appropriate information on the form, click on the **Save** button at the bottom of the form and you are all done. The website is secure and spam-free and you will have access to a wealth of information about Software Defined Radio.

You can always make your own board because the PCB files are Open Source and are available at http://www.philcovington.com/HPSDR/ATLAS/ in Gerber format.

Please also check
HPSDR mailing list
HpsdrWiki:Community Portal
for information regarding the current standing of the HPSDR project.

Effective as of June 7, 2006, the TAPR organization (TUCSON AMATEUR PACKET RADIO CORPORATION) has gone into cooperation with the HPSDR group and will distribute HPSDR boards and kits. The first available kit is a parts kit for ATLAS.
Please visit http://www.tapr.org/kits_atlas.html

Bill of materials (BOM)

As test orders have shown the parts for the ATLAS board should be readily available at good eletronics parts stores. The board uses standard SMT parts, mainly of the type 0805.
Special care should be taken to get the 5 tantalum capacitors C1 to C5 right. The only ones which will fit on the board are of the type 3216 or 3528 (A, B or S, T for low profile).
The Molex ATX header might present a little problem as well because it is not stocked everywhere as experience shows. Most probably a posting to the HPSDR mailing list will help.
The following tables represent two different parts sources. The US BOM uses part nos. and part designations from MOUSER ELECTRONICS. The EU BOM has been compiled from a german supplier SEGOR-electronics who ships europewide and accepts PayPal. They usually have all items in stock.

US BOM

Position	MOUSER Part No.	Description	Units	Price/Unit	Total
J1-J6	**571-5350905**	**AMP Eurocard Connectors** Type C Receptacle 96 Position	6	$ 3.360	$ 20.16
J19	**538-39-29-9202**	**Molex Mini-Fit Jr. Connectors** 20 CKT VERT HEADER	1	$ 2.570	$ 2.57
C6-C35	**80-C0805C104Z5V**	**Kemet 0805 SMD Ceramic Chip Capacitors** 0.1uF 50V Y5V	30	$ 0.070	$ 2.10
D1-D5	**859-LTST-C171GKT**	**Lite-On SMT LED** 0805 Green, Clear 569nm	5	$ 0.130	$ 0.65
R3	**260-1.0K-RC**	**Xicon 0805 SMD Chip Resistors** 1/10WATT 1KOHMS 5%	1	$ 0.080	$ 0.08
R2, R4	**260-1.8K-RC**	**Xicon 0805 SMD Chip Resistors** 1/10WATT 1.8KOHMS	2	$ 0.080	$ 0.16
R1, R5	**260-3.3K-RC**	**Xicon 0805 SMD Chip Resistors** 1/10WATT 3.3KOHMS	2	$ 0.080	$ 0.16
C1-C5	**74-293D106X9016A2TE3**	**Vishay/Sprague Solid Tanta-lum SMD Capacitors** 10uF 16volts 10% A case	5	$ 0.300	$ 1.50

EU BOM

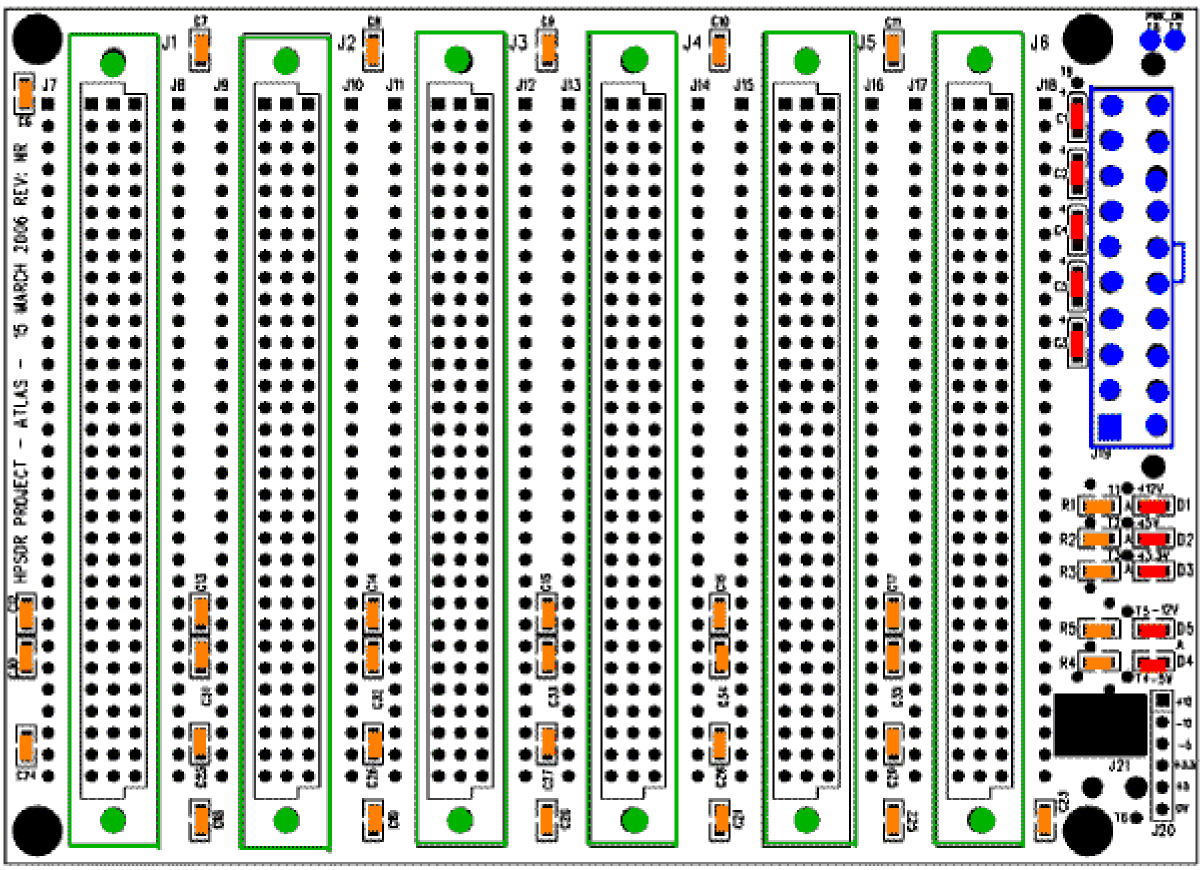
Position	SEGOR Part No.	Description	Units	Price/Unit	Total
J1-J6	**VG96F-ABC**	**VG-Buchse 96pol ABC**	6	€ 2.00	€ 12.00
J19	**MFJR20M-PR/Molex**	**20p.Stiftwanne 180'Print**	1	€ 2.00	€ 2.00
C6-C35	**u10-0805-X7R**	**100nF 63V X7R 10% 0805**	30	€ 0.075	€ 2.25
D1-D5	**LED 0805 gn-LC**	**SMD-LED grün 565nm 0805**	5	€ 0.15	€ 0.75
R3	**1k0-0805-5%**	**1,0k Ohm 5% SMD 0805** min. order 10	10	€ 0.038	€ 0.38
R2, R4	**1k8-0805-5%**	**1,8k Ohm 5% SMD 0805** min. order 10	10	€ 0.038	€ 0.38
R1, R5	**3k3-0805-1% !**	**3.3k Ohm1% SMD 0805** min. order 10	10	€ 0.038	€ 0.38
C1-C5	**TA10u-16A SMD**	**10uF-16V Tantal SMD A3216**	5	€ 0.20	€ 1.00

ATLAS Board Construction

Tools

As the components and pads are quite small, use a small soldering iron and small diameter solder. I used a 15W iron and 0.015 diameter (metric max. 0.5 mm) RadioShack Silver-Bearing Solder.
Some kind of magnifying glass is also helpful for soldering and checking. Use a good light source. If you are not too familiar with SMD soldering have a look at
http://www.amqrp.org/kits/micro908/smt_construction.pdf

Quick Installation



Step 1: Install orange parts first.

Step 2: Install red parts next. Observe polarity!

Step 3: Install green parts.

Step 4: Install blue parts.

Construction Notes

1) Start by installing the 0.1uF ceramic bypass capacitors, C6 through C36. Tack one end of each capacitor to its pad; you should not need any more solder than is already on the pad to hold the capacitor in place. Then solder the other end of the capacitor to its pad with a small amount of additional solder. Finally, go back and fully solder the tacked end of the capacitor by adding a small amount of solder.

2) Install the 1K resistor R3 with the same technique.

3) Install the 1.8K resistors R2 and R4.

4) Install the 3.3K resistors R1 and R5.

5) Using a similar tack-and-solder technique, install the 10uF tantalum capacitors C1 through C5. Be careful to observe the polarity of the tantalum capacitors - the marked end of the capacitor goes on the pad with the silk-screened "+" sign nearest to it. Do not linger with the soldering iron to avoid damaging the components.

6) Install LEDs D1 through D5. These are polarized and must be installed the right way around. The LED's cathodes are marked with a very small colored dot on the side of the lens nearer to one end. This end goes on the pad _away_ from the voltage marking, i.e., on the right-hand pad for the "+" voltages and the left-hand pad for the "-" voltages, looking at the board with the LED markings right-side up.

7) Check for short circuits. At least check that there are no shorts between any pair of pads at J20. If any are found, check all components for shorts or any other problems. You will not be able to easily access many of the components once the connectors are in place.

8) Install DIN 41612 connector J1. To keep the connector flush with the circuit board, use two 2-56 x 1/4" machine screws and hex nuts to at least temporarily fasten the connector to the board. Tighten the screws only enough to snug the connector evenly up against the circuit board. (Optionally, when you get to soldering the pins, be sure to hold the board firmly against the connector and the connector against a smooth tabletop.) Carefully check that the ears at the ends of the connectors match the extentions marked by the silk screen. This is to the left when the ATX connector is to the right. The DIN connectors will fit into the holes either way, but getting the connectors in wrong will mean the daughter boards will be upside down. Make certain you have this right before soldering any pins as it will be impossible to change later. Once the orientation is correct, at two diagaonally opposite corners of the connector solder one pin each to its pad on the bottom of the board. Check that the connector is flush against the board and correct the situation if needed. Then solder the remaining pins. It should take no more that about 2-3 seconds of contact between the pin and the pad to apply the solder. When all pins are soldered in place, check the whole connector carefully for solder bridges or missed pins.

9) Install DIN 41612 connectors J2 through J6 in the same way.

10) Snap the ATX 20-pin connector J19 into place and solder the pins to the pads on the bottom side of the board.

11) Install wires to an external SPST switch at T7 and T8. If you are not using a switch, then T7 and T8 must be jumpered together for the ATX power supply to turn on.

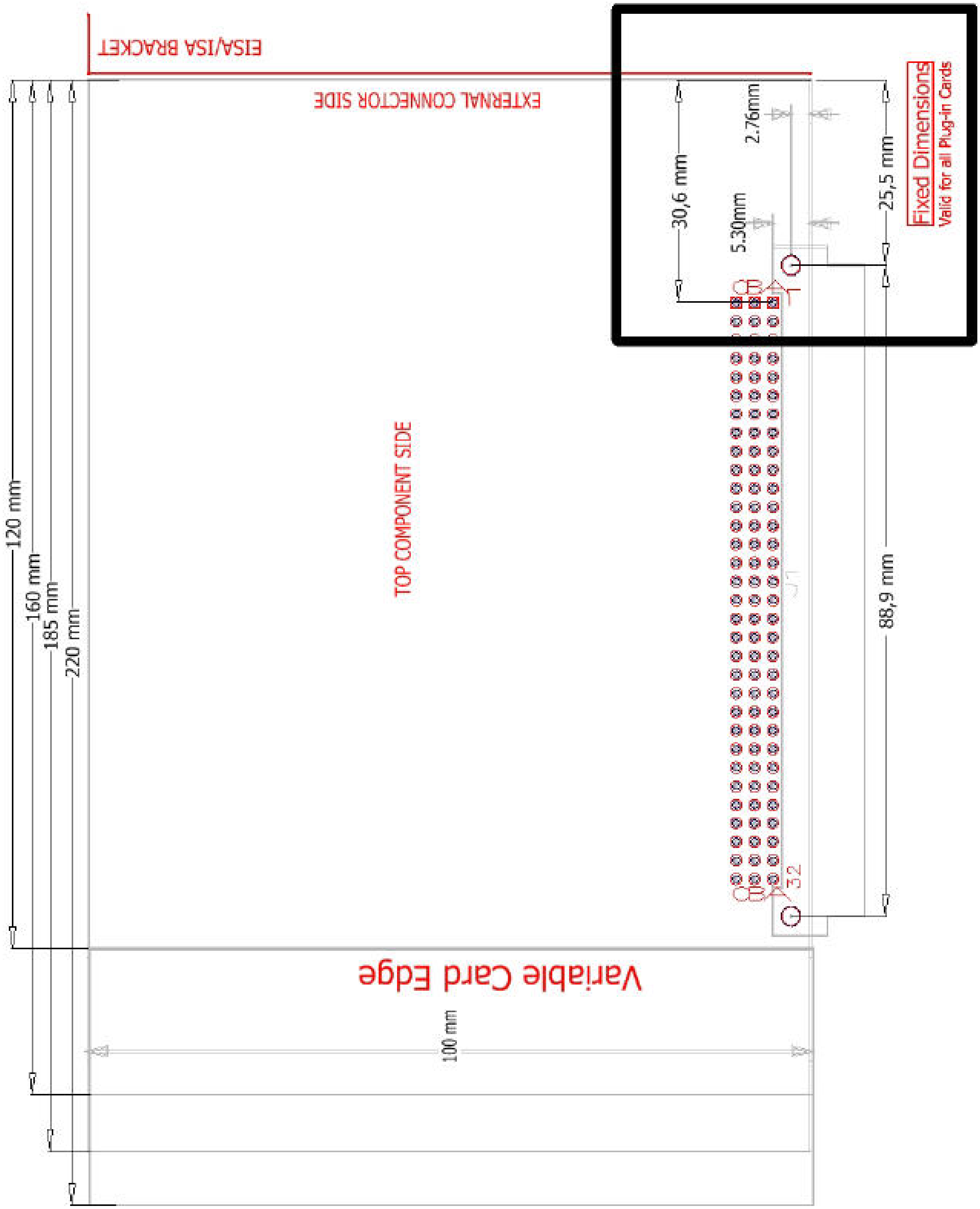
12) Make one last check of each connector for solder bridges or missed pins. Make one last check for shorts at J20.

If all is well, you should have a completed ATLAS board.

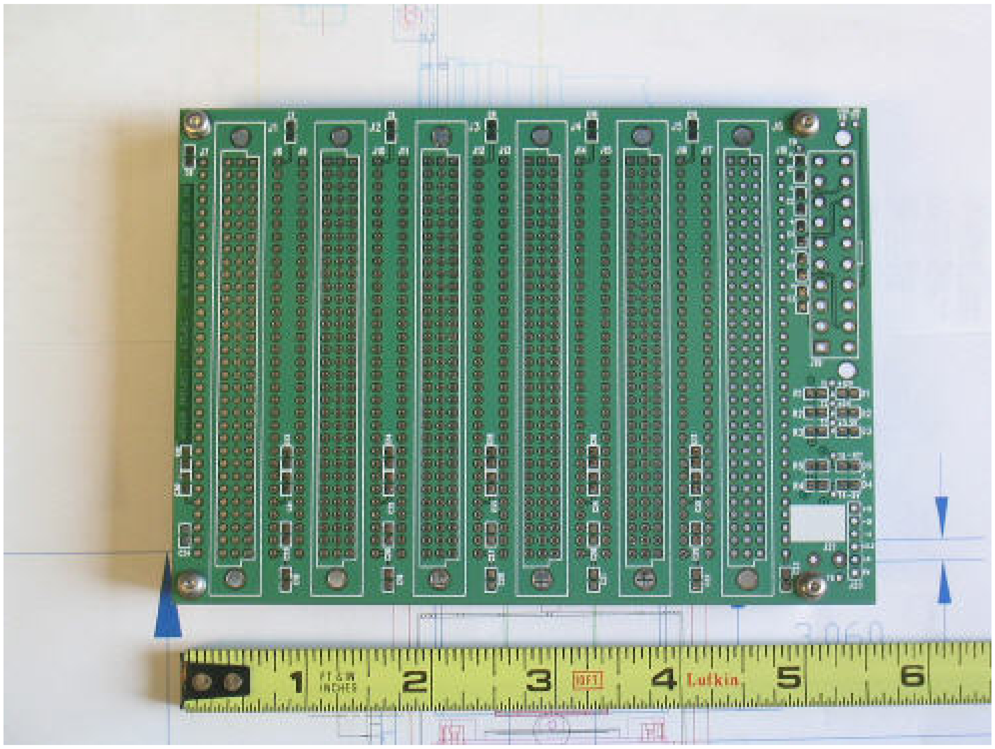
Congratulations!

ATLAS - the Mechanics

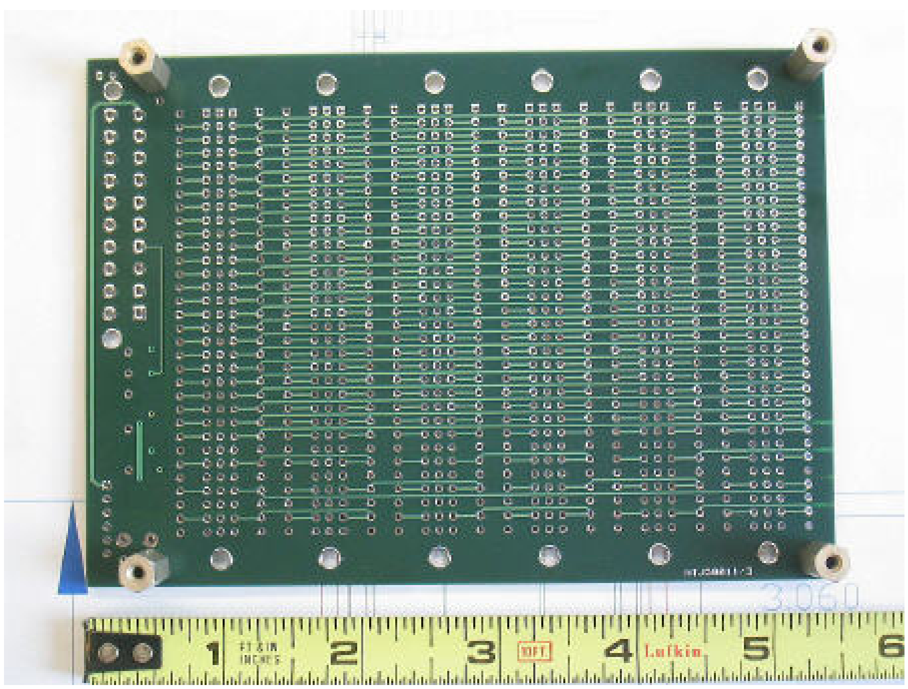
Plug-in Card Dimensions



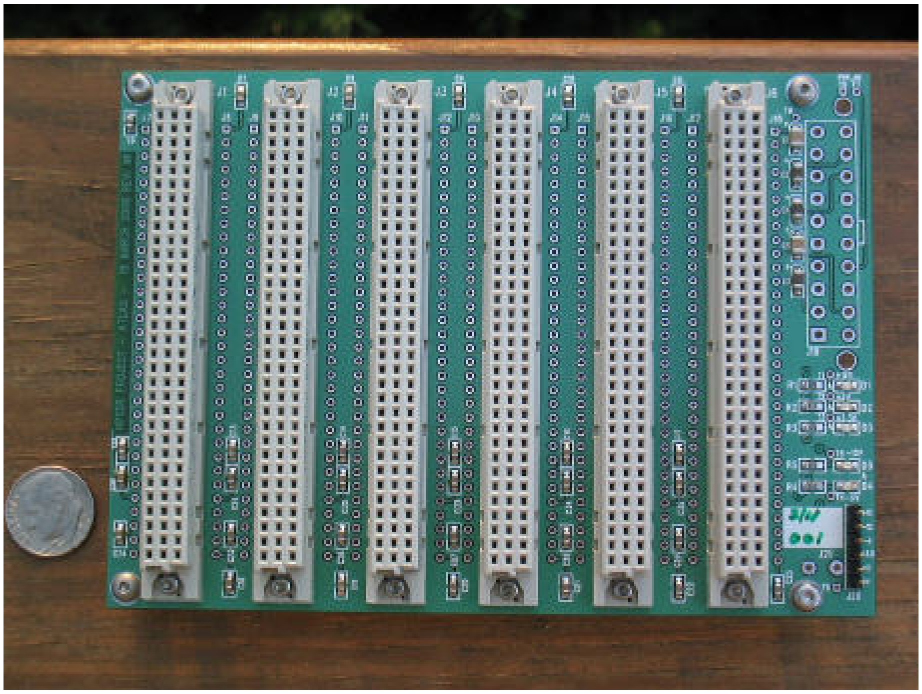
Some ATLAS Board Pictures



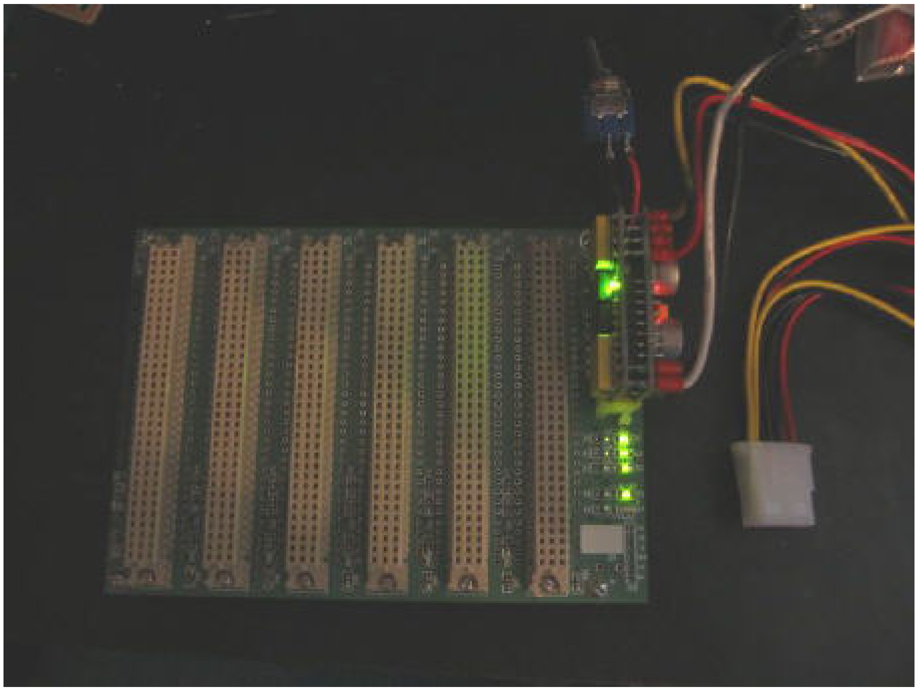
Bare board top side (photo Phil Covington, N8VB; scale shows **Inches**)



Bare board bottom side (photo Phil Covington, N8VB; scale shows **Inches**)



Assembled board with serial no. 001 (photo Phil Covington, N8VB)
Please note that the ATX connector is not in place yet



First light (photo Christopher T. Day, AE6VK)

ATLAS - the Performance

Ray Anderson, WB6TPU, on ATLAS performance

*'...I did manage to go hide out in the lab for an
hour or so and do some VNA and TDR tests on the ATLAS board.
No problems detected. Everything looked about how I was expecting it to look except my earlier impedance predictions by way of field solver were off a bit from the measured impedance values apparently due to some wrong assumptions that were made in setting up the extractor problem.
I plan on posting some plots to the web site later today or tomorrow, however here is the bottom line:*

I performed TDR and VNA measurements on all [0:24] lines in both the X and Y bus. All bus lines in each bus looked similar.

TDR Measurements:
X bus:
Measured impedance : 40 ohms average (predicted 78.5)

Y bus
Measured impedance : 46.2 ohms average (predicted 58)

The above measured impedances should be just fine for most applications and probably workable for LVDS signal if the need should arise.

VNA Measurements:
X bus:
Measured from DIN connector 1 to 6
Ripple 6 dB p-p from DC to 1.5 GHz

Major Resonances begin occurring at 1.5 GHz (-50dB @ 2.1 GHz)

Y bus:
Measured from DIN connector 1 to 6
Monotonic rolloff down to about -8db DC to 1GHz
Ripple 6dB p-p 1GHz to 1.5 GHz

Major Resonances begin occurring at 1.5 GHz (-47dB at 2.1 GHz)

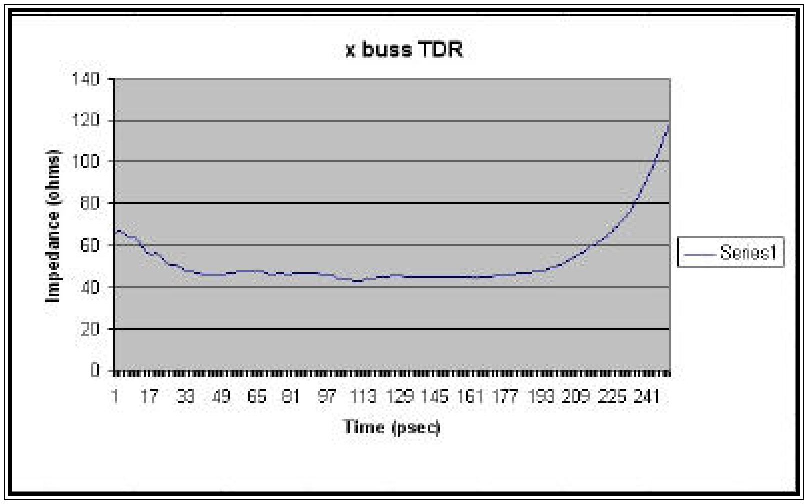
73, Ray WB6TPU
...'

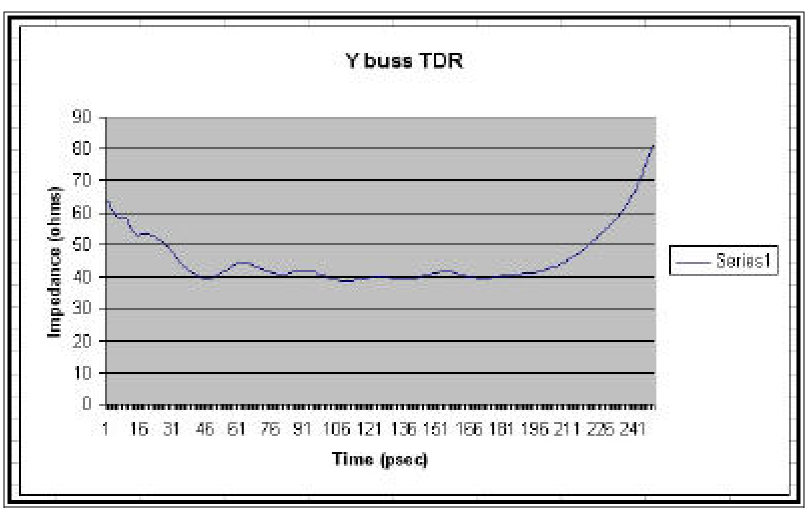
ATLAS TDR and VNA Plots

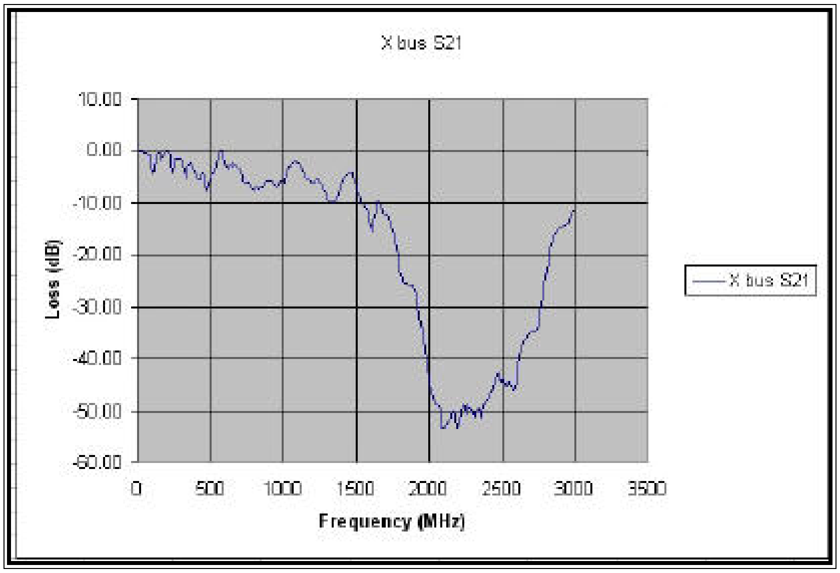
TDR (Time Domain Reflectometry) measurements were made with a Tektronix TDS8000B Digital Sampling Scope and a 80E04 Sampling Head (20 psec rise-time)

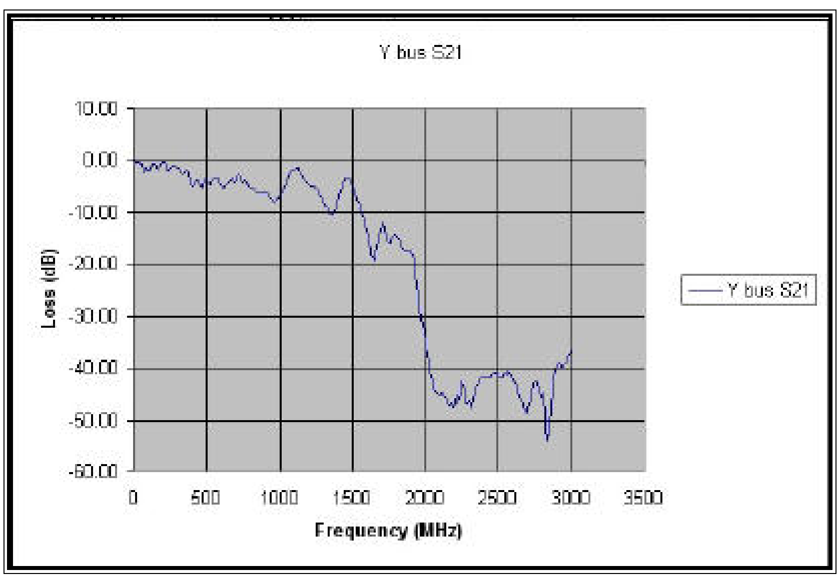
VNA (Vector Network Analyzer) measurements were made with an Agilent N5230A VNA

Measurements were made on all bus signal nets [0:24] . these plots represent a typical measurement. (They all appear about the same)






X bus S21
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00
Loss (dB)
0
500
1000
1500
2000
2500
3000
3500
Frequency (MHz)
X bus S21


Y bus S21
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00
Loss (dB)
0
500
1000
1500
2000
2500
3000
3500
Frequency (MHz)
Y bus S21

ATLAS - the Information

Useful Information and Links

Project Description and Information

http://hpsdr.org
http://hpsdr.org/wiki/index.php?title=HpsdrWiki:Community_Portal
http://www.hamsdr.com (requires registration for full information access)
http://www.philcovington.com

Discussion List / Reflector

The HPSDR Discussion List (also known as a "reflector") is the major method of intercommunication between all interested persons of this project.
At times the number of messages can get large -- other times it may go a day or two without a message. Anyone can view the message traffic in the list archive online. It can be found at
http://lists.hpsdr.org/pipermail/hpsdr-hpsdr.org/

Parts Kits and Boards

The TAPR Corporation is distributing parts kits as well as printed circuit boards for the HPSDR project.

TAPR Corporation http://www.tapr.org

ATLAS parts kit http://www.tapr.org/kits_atlas.html

Revision History

Revision	Date	Changes	Initiator
1.4	June 10, 2006	Page 11 modified Page 22 modified	DL6KBF
1.3	June 4, 2006	Page 11 modified: How to get the ATLAS printed circuit board	DL6KBF
1.2	May 29, 2006	Pages 8, 9, 10 added: Bus signal description Page 16 added: Plug-in Card Dimensions	DL6KBF
1.1	May 05, 2006	Page 7: Pinout table updated	N8VB
		Page 19 added: Revision History	DL6KBF
1.0	April 30, 2006	Initial publication	DL6KBF