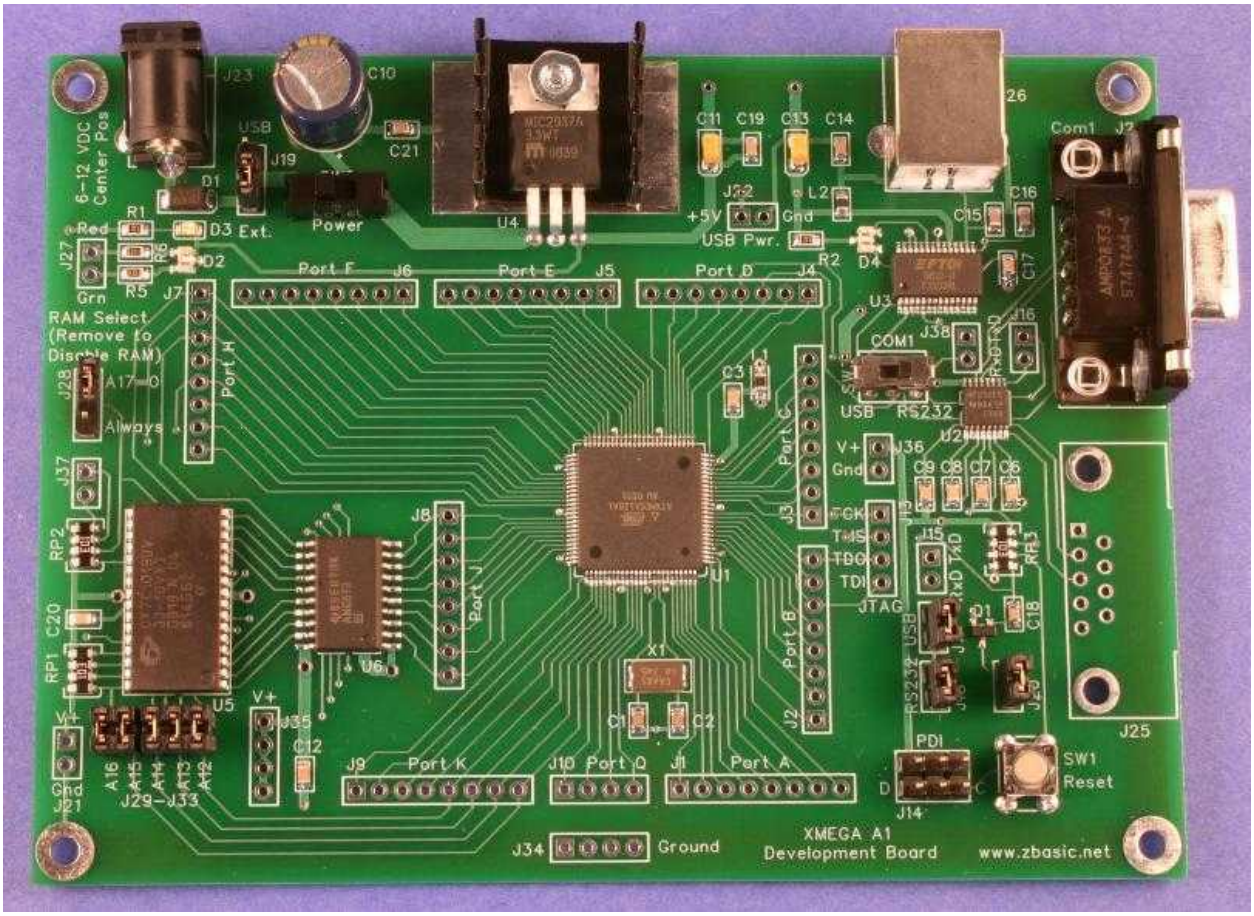
ZX-128A1 Development Board
Reference Manual



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ZX-128A1Development Board

Introduction

The ZX-128A1 Development Board (for brevity, Dev Board hereafter) is intended to be used to facilitate the construction and testing of a prototype ZX-128A1 application. There are several configuration options on the Dev Board. For example, the Dev Board can be powered from the USB hub or from an external supply via the on-board regulator. Also, the on-board expansion RAM may be enabled or disabled.

The Dev Board, which includes a ZX-128A1 is provided completely assembled and ready to use. However, depending on the intended use, you may need to install the SIP sockets or solder jumper wires to one or more of the I/O ports.

Preparation for Use

The jumpers and switches are set at the factory assuming that the Dev Board will be powered via the on-board regulator and that a standard serial port will be used for communication with the ZX-128A1. If this is how you intend to operate it, simply connect an external supply to J23, connect your serial cable to J24 and activate the power switch. You should then see the output from the default “Hello, world” program, confirming that the ZX-128A1 is operating correctly and ready to accept your program. You will have to select the correct serial port in the IDE if you end up using a serial port other than Com 1. Select “Serial Port Options…” on the Options menu to make the change.

If you intend to use the USB interface, several additional steps will be required. Firstly, change the switch SW3 to the “USB” position. If you also intend to power the Dev Board from your USB hub, move jumper J19 to the “USB” position as well. Otherwise, connect an external power supply to J23. Connect a standard USB A-B cable between J26 of the Dev Board and your USB hub. When the power switch is activated, you should see several flashes on the Red/Green LED (D4, near the J26 connector). If you have previously installed compatible FTDI FT232R drivers, your OS should recognize the USB device on the Dev Board and automatically install drivers for it. Otherwise, you’ll need to download drivers from the FTDI site and install them manually. The FT232R drivers are available directly from FTDI at http://www.ftdichip.com/Drivers/VCP.htm. Note that the CDM driver is not available for all operating systems. Be sure to download the drivers for the FT232R device that match your OS.

Connections and Jumpers

J1-J10

The signals available on the connection points marked J1 through J10 are the corresponding bits of the I/O ports A through Q, respectively (note that there is no Port G, Port I nor Port L through Port P). Except for Port Q (J10), each connection comprises 8 connection points marked 0 through 7 corresponding to the bits of the port. Port Q comprises only 4 bits numbered 0 through 3.

J13, J12

These designators are not used.

J13

This 4-pole connection provides access to the processors JTAG signals. Connections for +V and Ground are also available nearby at J36. In normal use, these signals are not useful to end-users but they may be useful if the Dev Board is being used in an unconventional way.

J14

This Atmel-standard 6-pin header is used for programming the mega128A1 chip. In normal use, these signals are not useful to end-users but they may be useful if the Dev Board is being used in an unconventional way.

J15

This two-pin connection provides access to the transmit and receive signals of the USB port. This is most useful if the USB port is not being used as the primary serial interface for Com1. In order for the USB port to be completely isolated from Com1, jumper J17 must also be removed.

J16

This two-pin connection provides access to the logic-level transmit and receive signals for the J24 serial port connector. The transmit signal is applied to an RS-232 level converter whose output is connected to pin 2 of J24. Similarly, the RS-232 signal on pin 3 of J24 is applied to the level converter and the corresponding TTL output is available as the receive signal.

J17

This jumper, normally in place, connects the transmit data line from Com1 to the USB port. In order to completely isolate the USB port from Com1, the jumper must be removed.

J18

This jumper, normally in place, connects the transmit data line from Com1 to the RS-232 level converter. In order to completely isolate the RS-232 level converter from Com1, the jumper must be removed. If the jumper is removed, logic-level transmit and receive signals may be applied to J38.

J19

This jumper is used to select the power source for the Dev Board, deriving from the USB hub or the on-board regulator powered via J26.

J20

This jumper, normally in place, connects the reset signal derived from DTR transitions to the reset input of the processor. It can be removed if this connection is not desired.

J21

This 2-pole connection provides access to the +V (3.3V) and Ground signals. It may be useful for powering a logic probe or other testing fixtures. It may be useful to install square pins for this connection point.

J22

This 2-pole connection provides access to +5V and Ground. The +5V is available only if the USB connector J26 is connected to a USB hub.

J23

This coaxial connection may be used to provide unregulated or lightly regulated DC power to the Dev Board. The connector is compatible with a female coaxial connector that has an external barrel diameter of 5.5mm and an internal socket diameter of 2.1mm. Typically, power will be derived from an inexpensive “wall wart” type transformer with an output of 7.5V to 12V DC. The polarity of the supply should be center positive. The power is applied to the Dev Board through a diode so accidental reverse polarity will not harm the board.

J24, J25

These DB-9 connections are for standard RS-232 serial connections. Only J22 is installed by default. You may install a connector for J25 like Digi-Key # A32117-ND or Mouser # 571-5747844-4. Unless the configuration jumpers/switches are set to use the USB port, J24 is connected to Com1 of the ZX-128A1. If J25 is installed, J38 is used to access the logic-level transmit and receive signals. SIP sockets installed in J38 may simplify such connections.

J26

The Dev Board can be connected to a USB hub via a standard USB cable (not included) that has a Type A connector on one end (plugs into the hub) and a Type B connector on the other end (plugs into the J26 jack on the Dev Board). Note that jumper J19 controls whether power for the Dev Board is derived from the on-board regulator or from the USB hub. Also, switch SW3 controls whether the USB port or the standard RS-232 serial port will be used for Com1. Jumper J17 must be in place in order to use the USB port as Com1 and jumper J18 must be in place to use the RS-232 port for Com1.

J27

This connection provides access to the cathodes of the auxillary dual-color LED. Applying a logic zero to pin 1 will illuminate the green LED while applying a logic zero to pin 2 will illuminate the red LED. Note that the Red/Green legends near J27 are in the wrong positions on the Rev 0 board.

J28

This jumper is used to determine the enabled status of the on-board expansion RAM. With the jumper connecting pins 1 and 2 of J28, the RAM chip will be selected when A17 is zero. With the jumper in connecting pins 2 and 3 of J28, the RAM chip will be selected for any address. The RAM chip can be disabled by removing the jumper completely thus allowing Ports H, J and K to be used for general I/O purposes.

J29-J33

These jumper blocks may be removed to restrict the effective size of the on-board external RAM chip. They are labeled on the board as A16 to A12. When the jumper blocks are removed, the corresponding pins of Port K become available for use as general I/O pins if the ZX-128A1 is also configured for reduced external RAM. The table below indicates the amount of RAM provided in various configurations.

Note, particularly, that the upper 64K of the external RAM chip is not directly accessible in ZBasic code because RAM addresses are limited to 16 bits. The upper 64K can be accessed using specially written C or assembly language code.

Jumpers Installed	External RAM	Total User RAM
A16, A15, A14, A13, A12	48K	56K
A15, A14, A13, A12	48K	56K
A14, A13, A12	16K	24K
A13, A12	0K	8K
A12	0K	8K
none	0K	8K

J34, J35, J36

These connections provide access to the +V (3.3V) and Ground.

J37

This connection provides access to two 10K pullup resistors, the other end of each of which is connected to +V.

Switches

SW1

This momentary contact pushbutton connects the reset line of the processor to ground when pressed.

SW2

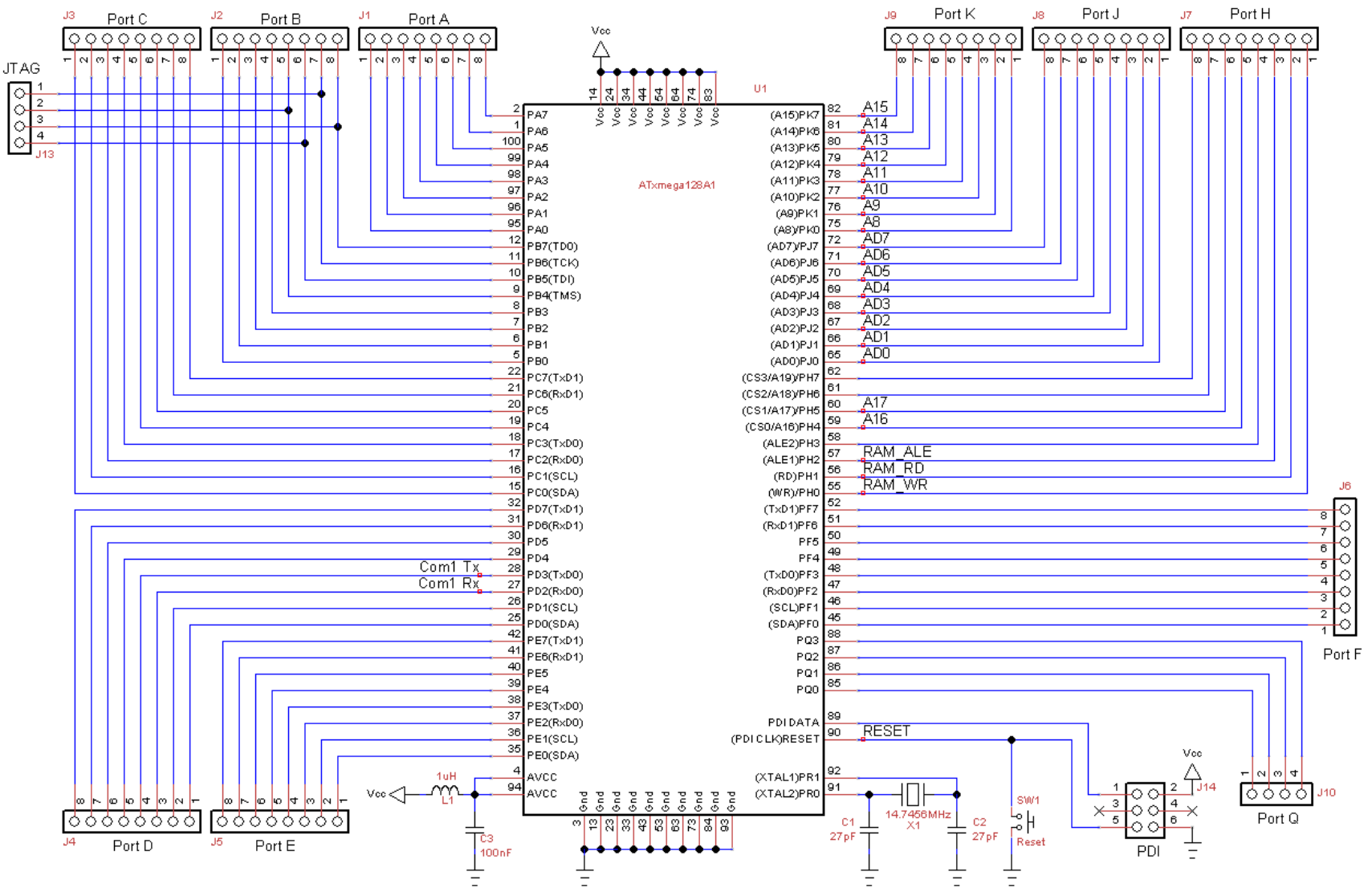
This is the power switch for the Dev Board. Note that it turns the power on and off whether the power source is the on-board regulator or the USB hub. When the board is under power, the red LED (D3, near the power switch) will be illuminated.

SW3

This switch controls whether the Com1 serial port will be connected to the USB port or RS-232 level converter.

Schematics

The schematics on the following pages document the circuitry on the Dev Board. They may be useful for gaining a better understanding of the effects of the various switch and jumper positions. They may also be useful for deriving ideas for your own ZX-128A1 project.



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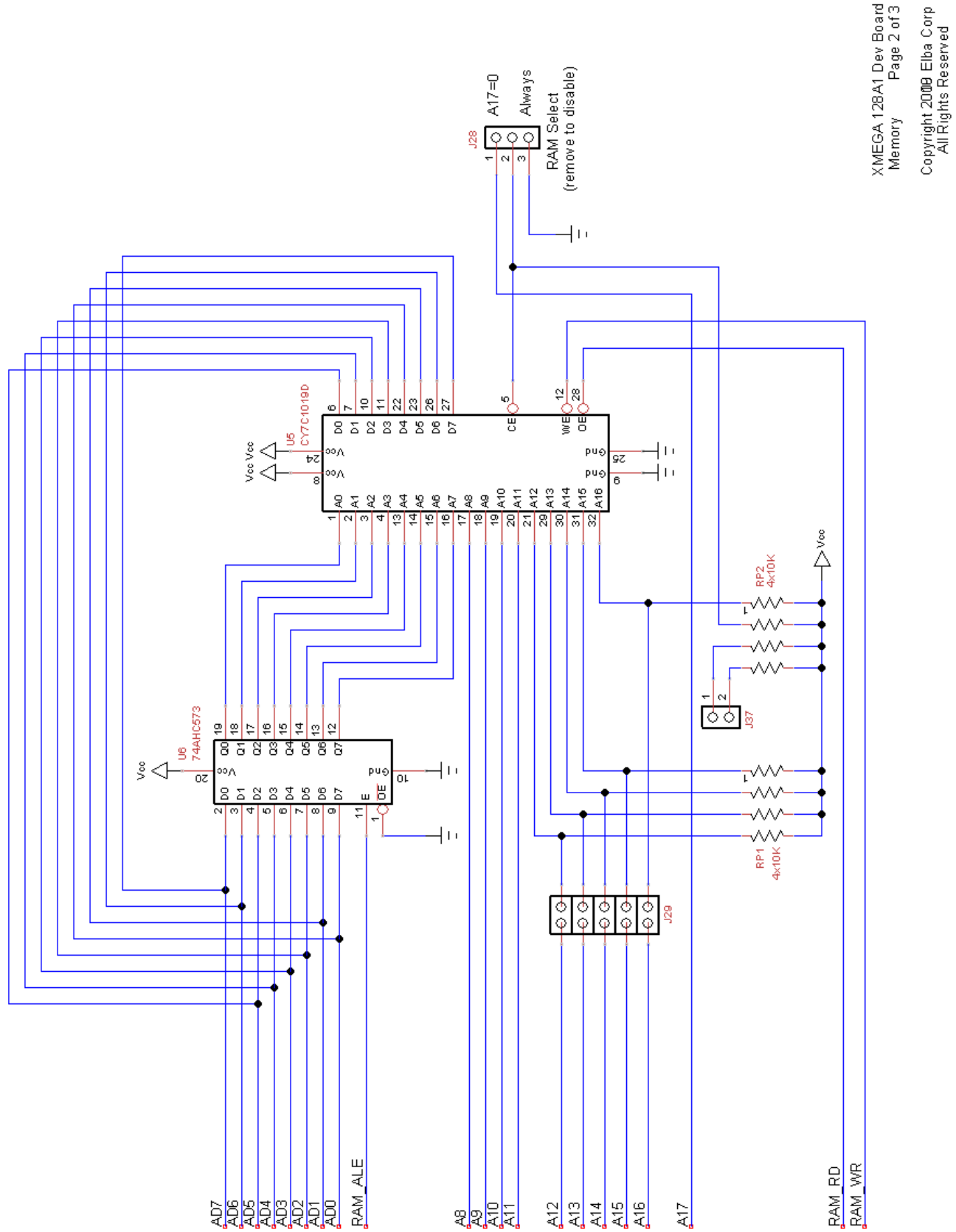
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Memory Page 2 of 3
Copyright 2008 Elba Corp
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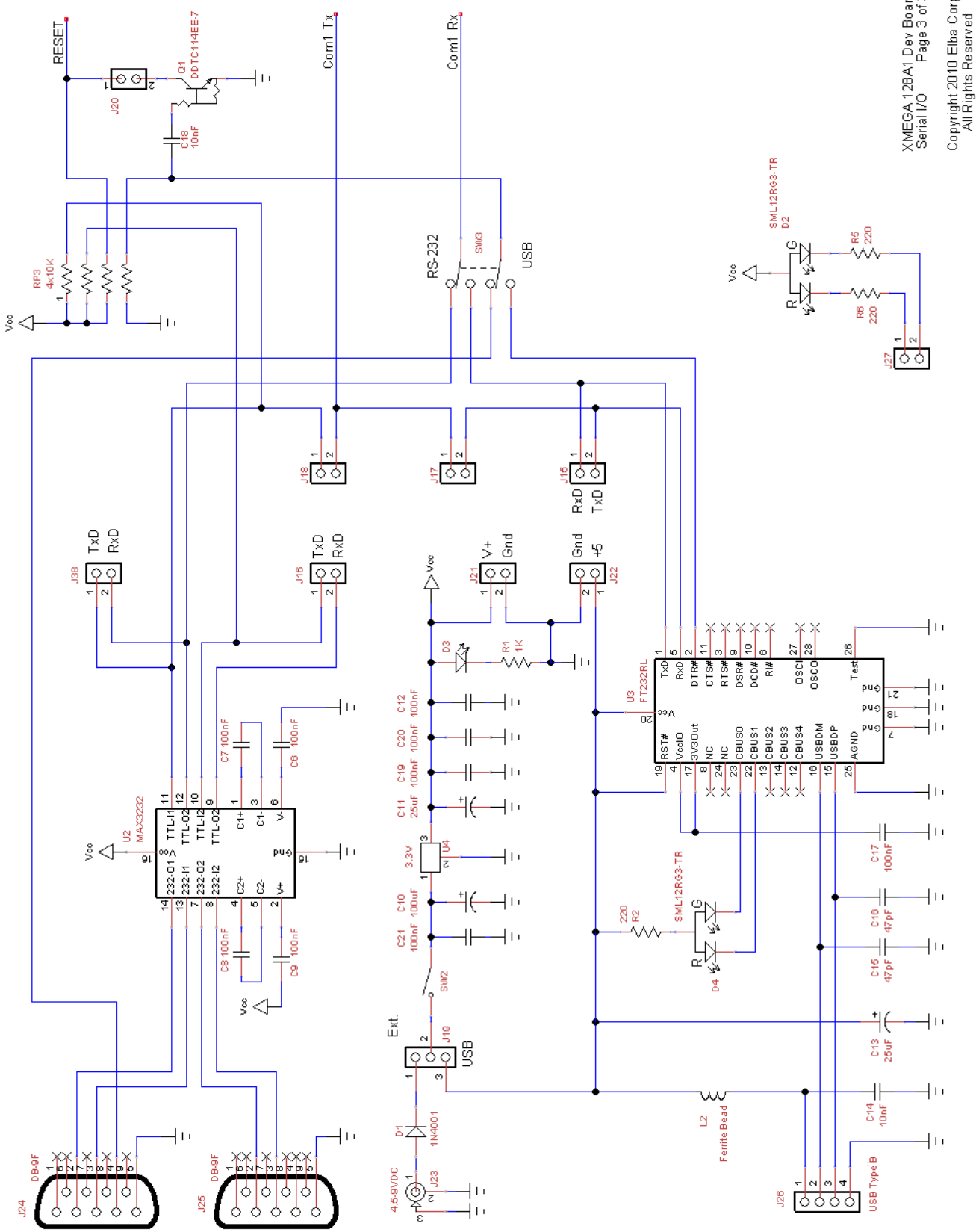
RAM Select
(remove to disable)
A17=0
Always
J28
U5
CY7C1019D
U6
74AHC573
RP1
4x10K
RP2
4x10K
J29
J37
Vcc
Gnd
AD7
AD6
AD5
AD4
AD3
AD2
AD1
AD0
RAM_ALE
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
RAM_RD
RAM_WR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Serial I/O Page 3 of 3
Copyright 2010 Elba Corp
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RESET
Com1 Tx
Com1 Rx
RS-232
USB
Vcc
RP3
4x10K
J20
Q1
DDTC114EE-7
C18
10nF
SW3
SML12RG3-TR
D2
R5
220
R6
220
J27
J18
J17
J15
RxD
TxD
J38
J16
J21
V+
Gnd
J22
+5
D3
R1
1K
U3
FT232RL
TxD
RxD
DTR#
CTS#
RTS#
DSR#
DCD#
RI#
OSCI
OSCO
Test
RST#
VccIO
3V3Out
NC
CBUS0
CBUS1
CBUS2
CBUS3
CBUS4
USBDM
USBDP
AGND
U2
MAX3232
TTL-I1
TTL-O2
TTL-I2
TTL-O2
232-O1
232-I1
232-O2
232-I2
C1+
C1-
V-
C2+
C2-
V+
Gnd
C7 100nF
C6 100nF
C8 100nF
C9 100nF
C12 100nF
C20 100nF
C19 100nF
C11 25uF
C10 100uF
C21 100nF
U4
3.3V
SW2
Ext.
USB
J19
D1
1N4001
J23
4.5-9VDC
J24
J25
DB-9F
R2
220
SML12RG3-TR
D4
C17 100nF
C16 47pF
C15 47pF
C13 25uF
C14 10nF
L2
Ferrite Bead
J26
USB Type-B