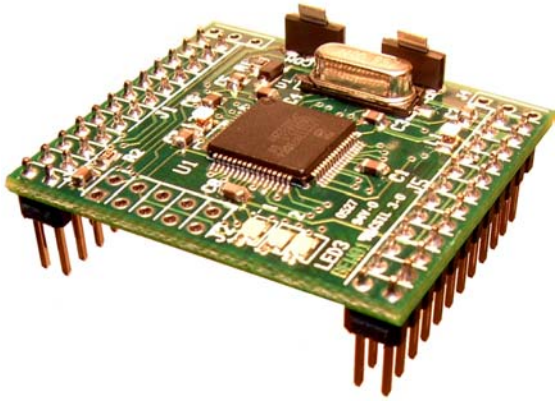
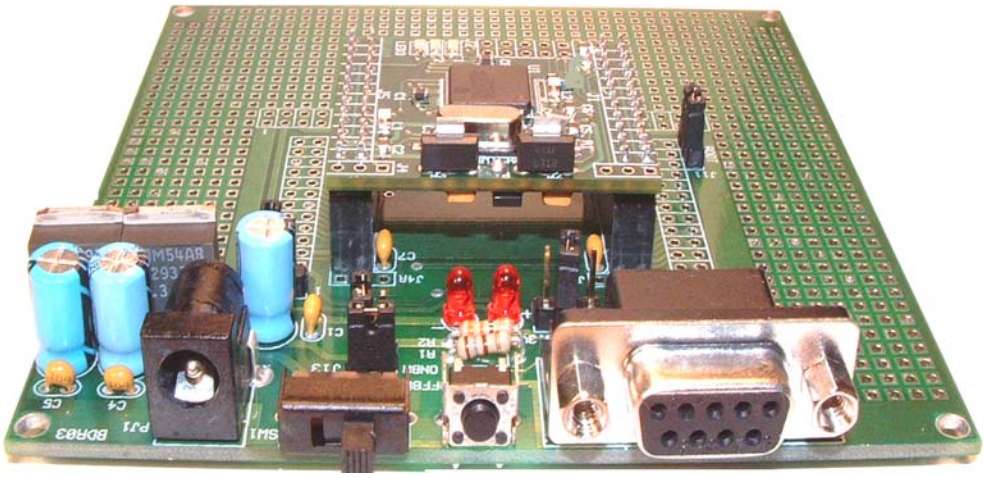
GETTING STARTED

Thank you for buying the Pluga2138. We hope you will find the Pluga2138 to be inexpensive, incredibly useful small controller board we intended it to be, and easy to use as possible.



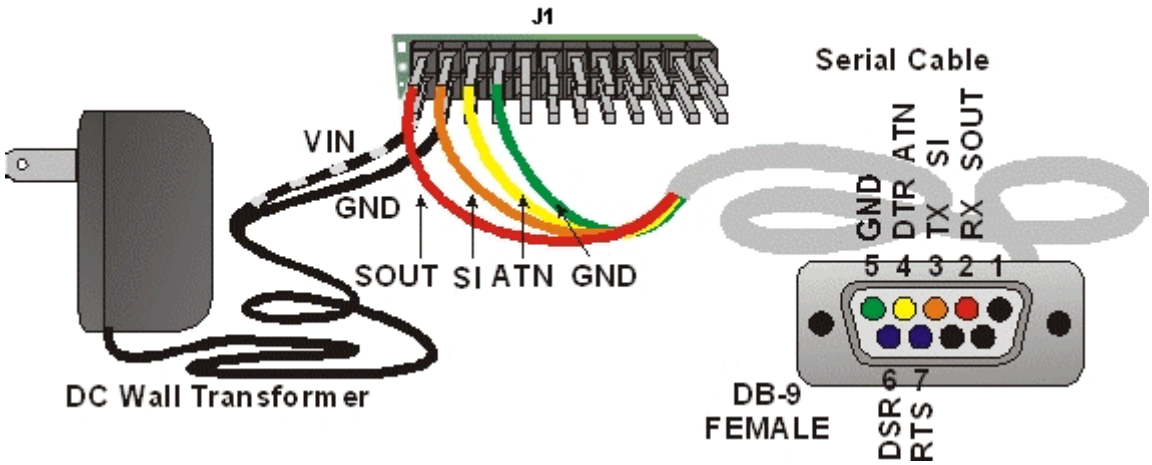
If you are new to the Pluga2138, we know you will be in a hurry to see it working. Once we've got communications, then we can make some lights blink and know for sure we're in business.

If you have the Pluga2138 Development Kit, which comes with the Pluga2138 Controller and the Interfacing board then you are probably ahead, because the wiring to the power connector, RS-232 connector, and the Serial Boot Loader jumper is done for you.

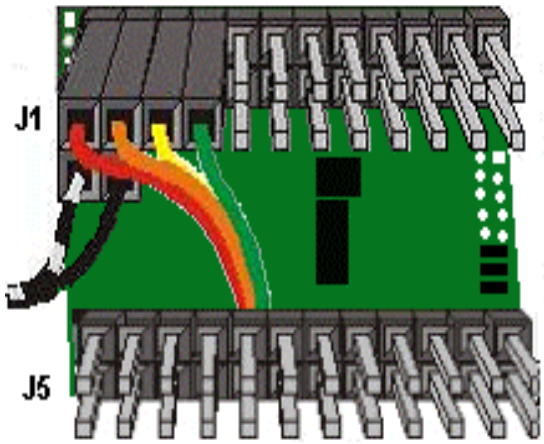


If you do not have a Development Kit, you can also order from us a custom made serial cable, and a wall transformer. This will save you lots of time. If not, you can build your own serial cable, and provide your own power supply, or transformer ranging from 6-12Vdc at 200mA or higher.

WIRING DIAGRAM



These connections are all made on a few pins of J1, which is a male .1" dual row connector. Generally, an intermediate double male header strip will be used to mate from J1 to the Wall transformer single row female connector, and to the Serial Cable single row female connector.



Bottom View

Your main concern now, is not hooking the serial cable or power cable up on the wrong connector; the wrong pins on the right connector; or backwards or rotated on the right connector. Pay close attention how the connectors go on. There is no protection to prevent plugging in on the .1" dual row headers the wrong way.

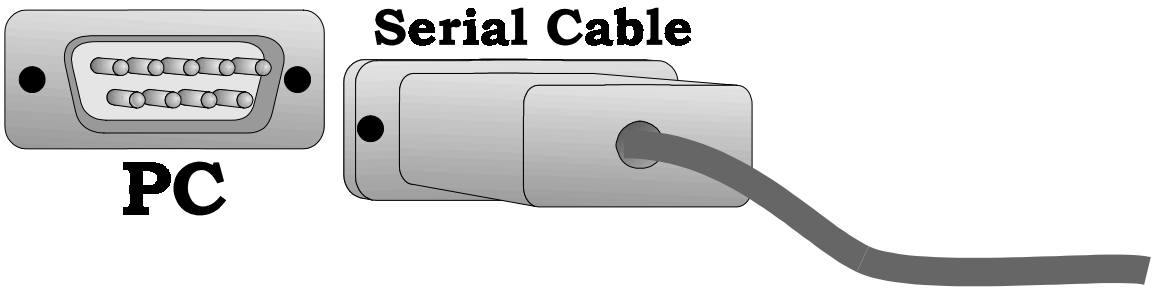
Once you have your serial cable and connectors, and wall transformer and connectors, ready, follow these steps.

DOWNLOADS

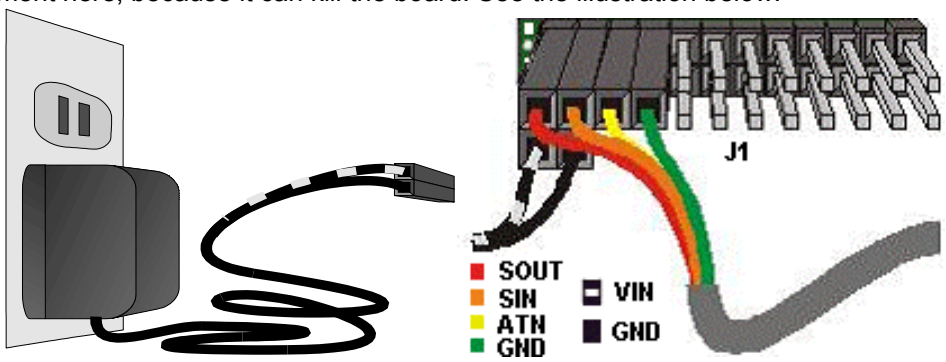
Download and install the Philips Flash utility program provides on Philips Web site,
http://www.semiconductors.philips.com/files/markets/microcontrollers/philips_flash_utility.zip

Also download and unzip the test programs provide on NMI Web site,
http://www.newmicros.com/download/appnotes/ARM/K_examples.zip

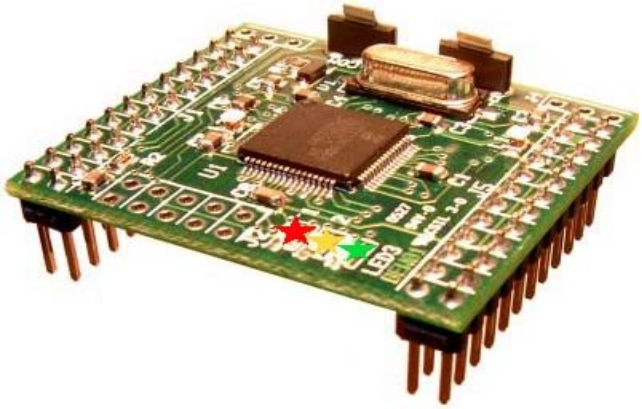
Now hook the computer end of the serial cable (usually a DB-9 connector, but may be a DB-25, or other, on older PC's) to the PC's.



While watching the LED's plug in the wall transformer connector to the power pins on the Pluga2138 board. For those who don't have the Development Kit, be *very* careful not to get a misalignment here, because it can kill the board. See the illustration below:

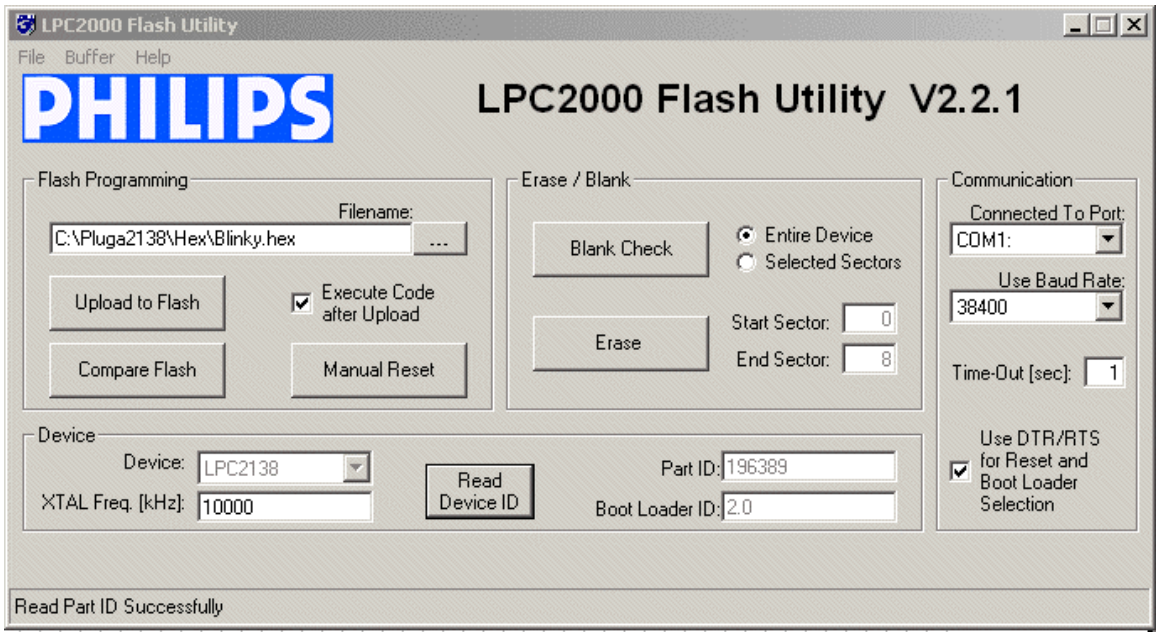


All three LED's should come on when the power is plugged in. If the LED's do not light, unplug the power to the Pluga2138 quickly and double check the power polarity, and make sure you are not misaligned the pins.

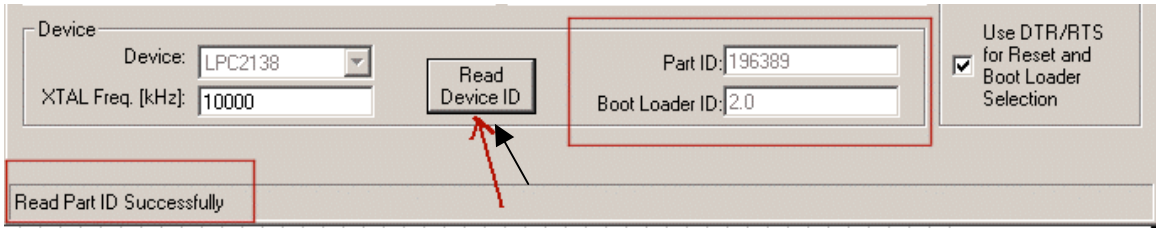


Run the Philips Flash Utility program, and configure the followings:

- Device: LPC2138
- XTAL: 10000
- Communication Port: Your available COM Port
- Baud Rate: 38400

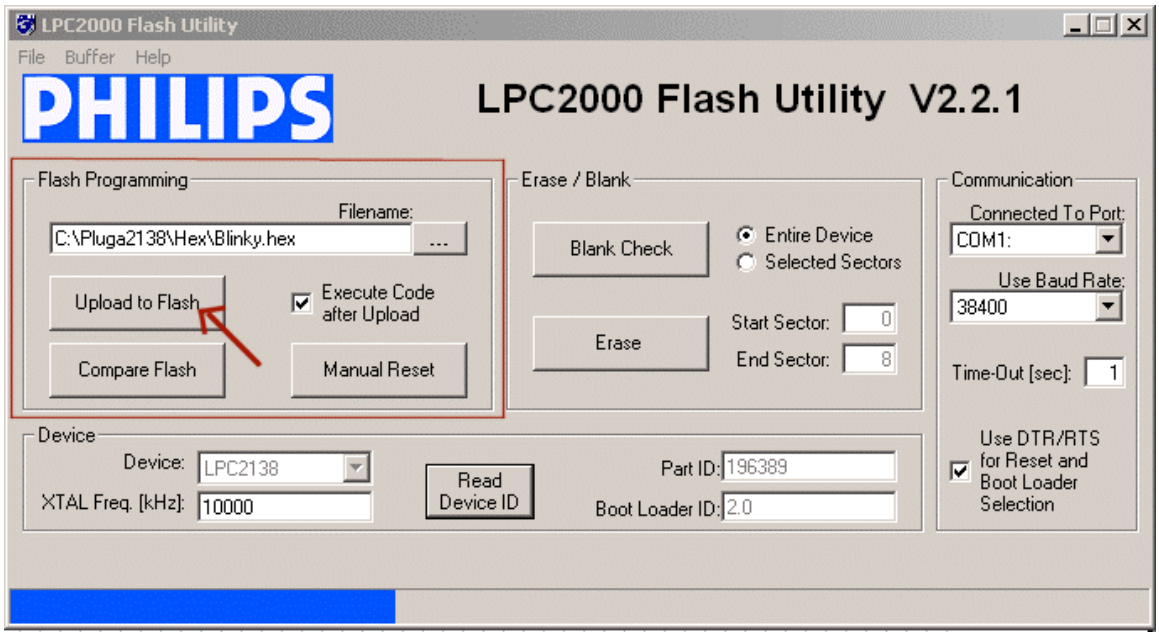


Now click on **Read Device ID** button, you will see the Part ID & Boot Loader ID numbers display as shown on the image below,



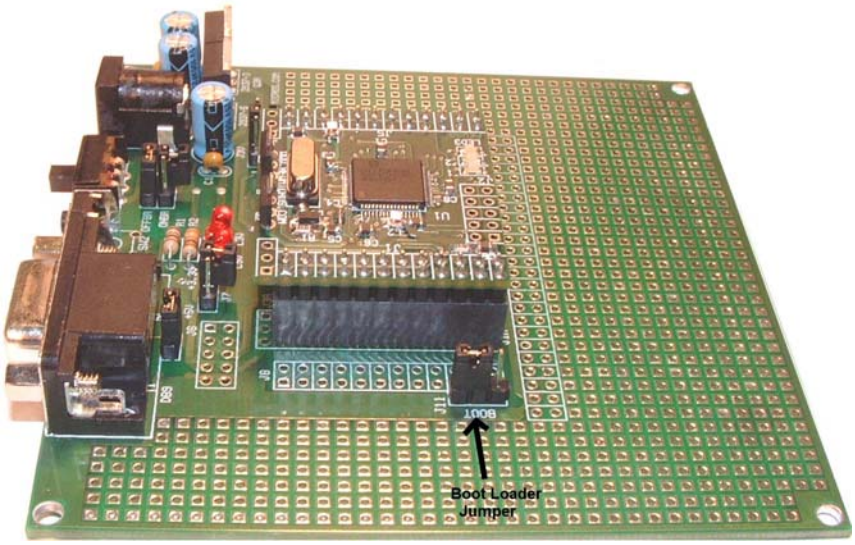
Seeing this means the Pluga2138 is communicating properly. Now it is time to load the blinky test file.

Open the Blinky.hex file in the Flash Programming box. Click on the **Upload to Flash** button. You will see a blue bar runs across the bottom of the screen. This indicates the program is loading.

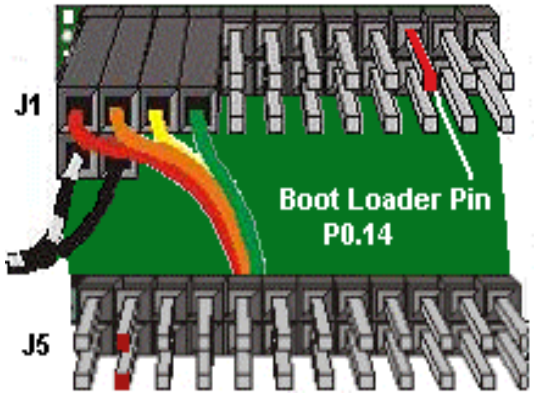


As soon as it's finish, you will see the LED's on the Pluga2138 start blinking back and forth. Seeing is believing! So, now you should have a good feeling because you can tell your Pluga2138 is working.

Boot Loader Jumper

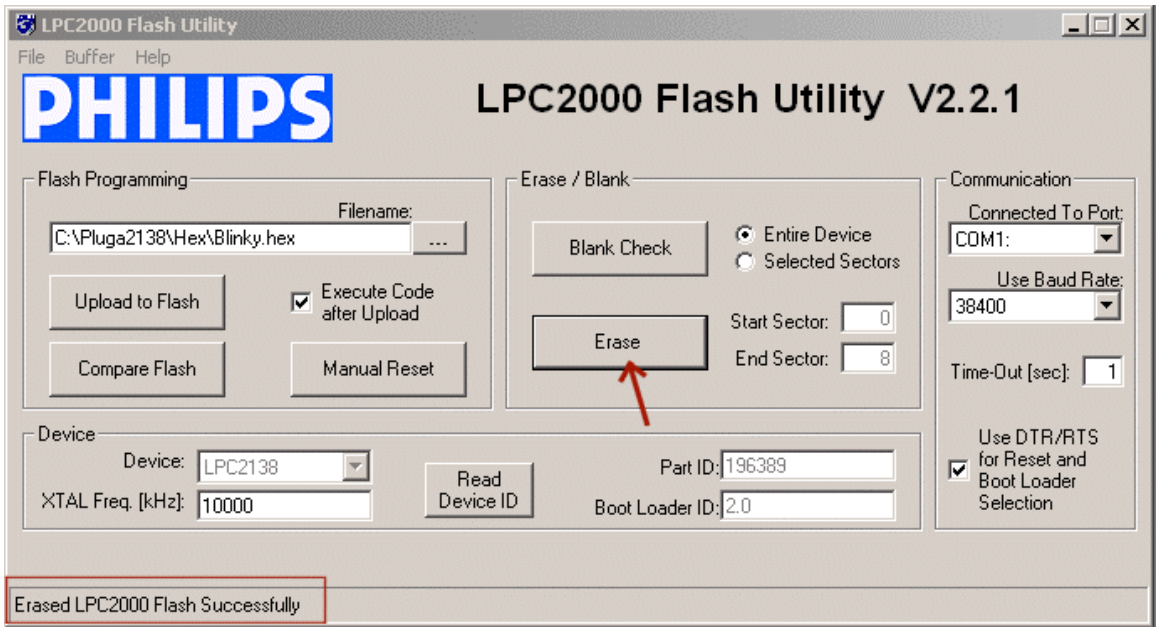


If the flash memory contains the user's program, you must erase the previous loaded program in order to load a new hex file . To do this, you must configure the Pluga2138 to Boot mode by jumper P0.14 pin to Ground. If you have a Pluga2138 Development Kit, simply connects the jumper on J11 from pin 1 & 2 on the interface board. See the picture above. This jumper will force the Pluga2138 to execute the serial boot loader on power up or reset. If you do not have the Interface board, you can connect a wire jumper from pin 19 (P0.14) of J1 to Ground. The Ground pins can be accessed on J5 pin 3, or 4. Or J2 pin 2.



Bottom View

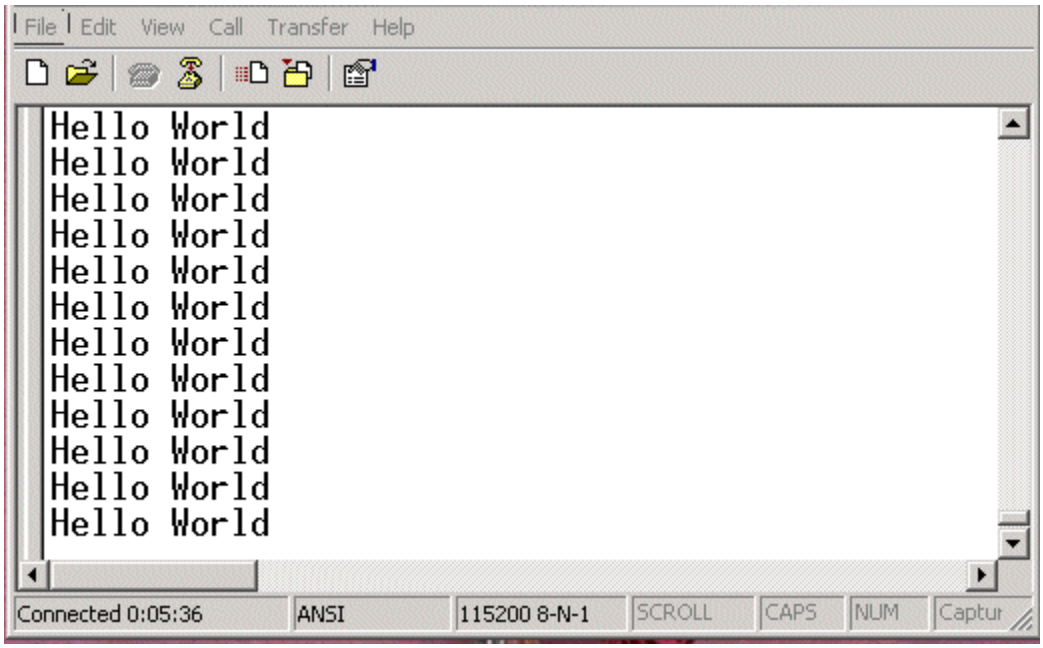
Next, recycle the power or reset the Pluga2138 and click on the **Erase** button. You will see Erased message displays as shown on the image below. If the user's flash memory is blank, regardless of P0.14 input condition, the Pluga2138 will always boot from the Serial Boot Loader. In this case, the boot jumper, or erasing the flash memory is not required.



More Testing…

On the Flash Programming box, open the *Hello.hex* file then click on the **Upload to Flash** button. When it's finish, close the LPC2000 Philips Flash Utility program completely so later on when you open the HyperTerminal Program, the comport won't be conflicted. Set the Hyper Terminal baud rate for 115,200. Be sure to remove the boot Jumper, P0.14 & Ground in order for the user's program to run on the next reset.

When the Hello program is running, you will see message: "Hello World" continuously display on the terminal as shown below.



Enough for the test. Now it's time for an overview of what your Pluga2138 has for features.

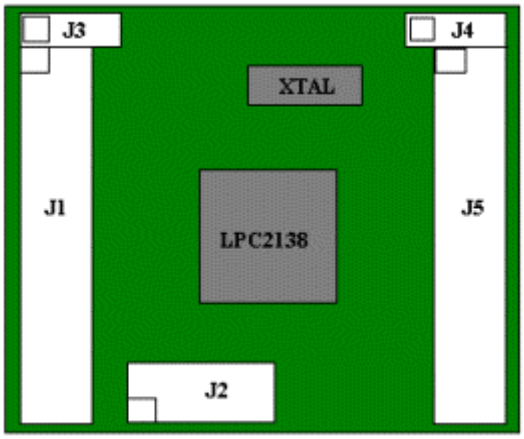
FEATURES

- 32/16-bit ARM7TDMI-S microprocessor
- CPU oprerating range up to 60Mhz
- On-chip Memory
    - 512KByte Program Flash provides minimum 10,000 erase/write cycles, and 10 yrs of data-retention
    - 32KByte Static Ram can be accessed as 8-bits, 16-bits, and 32-bits
- RS-232 Serial Communication Interface
- JTAG connection for flash programming/debugging, or GPIO’s access
- Up to 40 General Purpose Digital I/O lines share functions with,
    - 15 channels 10-bit A/D
        - Measurement range 0V to 3.3V
        - More than 400,000 10-bit samples per second
    - 1 channel 10-bit D/A
    - Two Serial Communication Interface
    - Two 4-wire SPI Interface
    - Two I2C bus Interface
    - Six PWM channels
    - Timers
        - 8 Input Capture
        - 8 Output Match
    - 4 external Interrupts
- Real Time Clock provides Seconds, Minutes, Hours, Month, Year, Day of Month, Day of Week, Day of Year
- Two low power modes, Idle and Power down
- WatchDog Timer
- Brown-out detector, 2.9V & 2.6V threadholds
- Onboard three user's leds
- Onboard 5.0V, and 3.3V LDO regulators
- Two 2x12 header pin for Power, Serial, and I/O's connection

I/O Connectors

Most of the CPU I/O's are brought out on J1-J5 connectors for easily accessible. The power connection, serial I/O's, and cpu controlled signals are described below.

Top View



Square on each connector indicates pin #1

J1

SOUT	1	2	VIN
SIN	3	4	GND
ATN'	5	6	RESET'
GND	7	8	+5V
P0.28	9	10	P0.27
P0.3 (*)	11	12	P0.29
P0.26	13	14	P0.25
P0.5	15	16	P0.4
P0.9	17	18	P0.7
P0.14	19	20	P0.11
P0.17	21	22	P0.19
P0.18	23	24	P0.20

J5

+3.3V	1	2	P0.3 (*)
GND	3	4	GND
VREF	5	6	P0.2 (*)
VDDA	7	8	VSSA
P0.8	9	10	P0.6
P0.12	11	12	P0.10
P0.15	13	14	P0.13
P0.22	15	16	P0.21
P1.17	17	18	P1.16
P1.19	19	20	P1.18
P1.21 (*)	21	22	P1.20
P0.23	23	24	P1.24

Signal Descriptions:

SOUT: Serial Output from Pluga2138, RS-232 level
SIN: Serial Input to Pluga2138, RS-232 level
ATN': Alternative reset signal connects to DTR signal from host
VIN: Power Input, 6-12Vdc
GND: Ground, power return signal
VREF: Tied to VDDA with an inductor in series for noise reduction
VDDA: Tied to VDD(+3.3V) with an inductor in series for noise reduction
VSSA: Analog Ground. Currently ties to GND
RESET': Target Reset signal
P0.xx : Port 0 GPIO pins
P1.xx : Port 1 GPIO pins
(*): Pin shared on other I/O connectors

J2, JTAG interface, or GPIO's

+3.3V	1	2	GND
TDI/P1.28	3	4	RTCK/P1.26
TDO/P1.27	5	6	TMS/P1.30
TCK/P1.29	7	8	No Connection
RESET'	9	10	TRST/P1.31

J3, Serial TTL signals, or GPIO's

1	RxD0/P0.1 (*)
2	GND
3	TxD0/P0.0 (*)

J4, I2C interface, or GPIO's

1	SDA0/P0.3 (*)
2	GND
3	SCL0/P0.2 (*)

A detail I/O pin description is available on Philips document. See the link below,

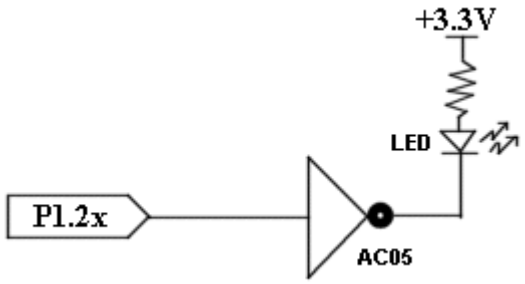
http://www.semiconductors.philips.com/acrobat_download/datasheets/LPC2131_32_34_36_38_2.pdf

LED's Controlled Ports:

There are three port pins being used to control the onboard LED's. Since each I/O pin can only source/sink 4mA which is not enough current to turn on a LED. A standard LED is normally required around 10-15mA. Therefore, the inverter chip, AC05 is used to drive the LED's.

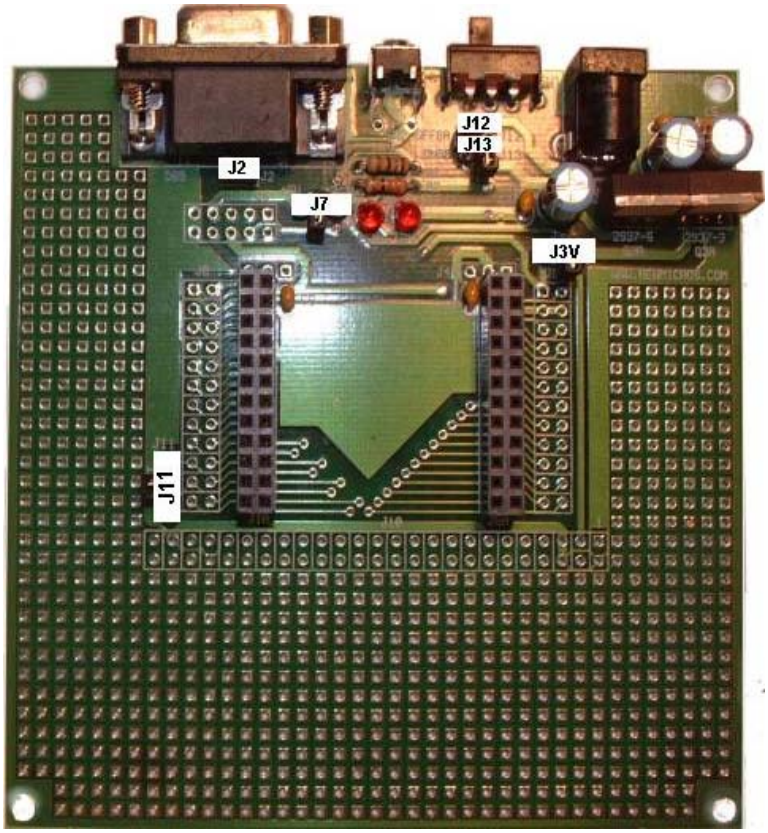
An output high signal from the port pin will turn the LED On, and a low signal will turn it Off. The following I/O ports are being used for this purpose

P1.21 => Red Led
P1.22 => Yellow Led
P1.23 => Green Led



Interface Board

The Interface Board, BDR03 is the current production of the Carrier Board for the Tini's or Pluga's controller module.



Jumper descriptions:

J2: DTR Enable/Disable jumper.

J3V: An option to provide external 3.3V power .

J7: An option to provide external 5.0V or 3.3V power.

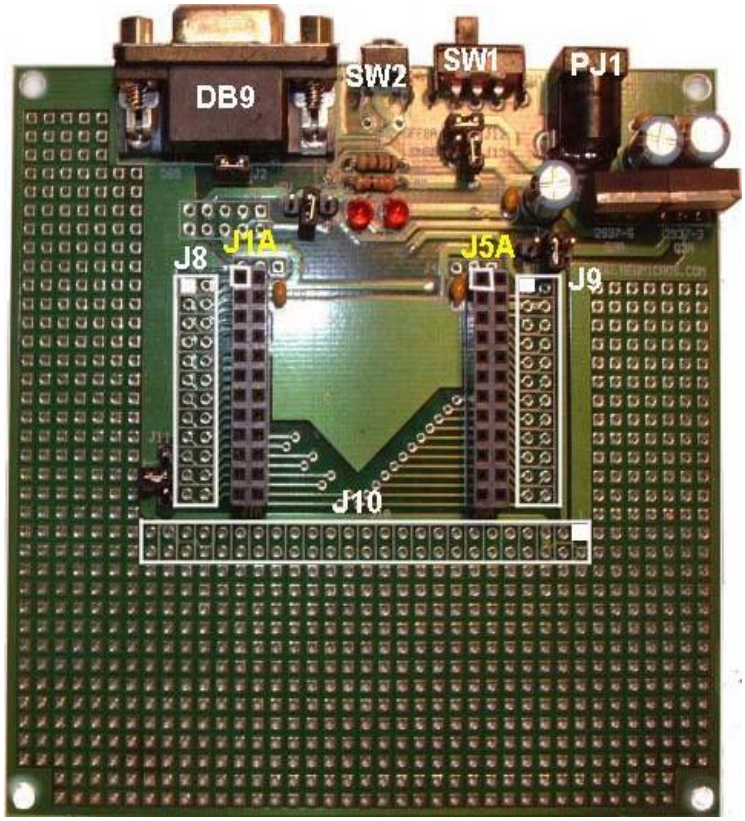
J11: Boot jumper

J12: Power input jumper for the on-board Tini's or pluga's regulators

J13: An option to provide power input for the external 5.0V & 3.3V regulators.

I/O Connections

The I/O's & power pins are brought out to J8, J9, and J10. Where J1A & J5A are the mating connectors for the Tini's & Pluga's controller module.



J8: I/O pins brought out from Tini's or Pluga's J1 connector.

J9: I/O pins brought out from Pluga's J5 connector.

J10: I/O pins brought out from Tini's or Pluga's J1 & J5 connectors.

Miscellaneous

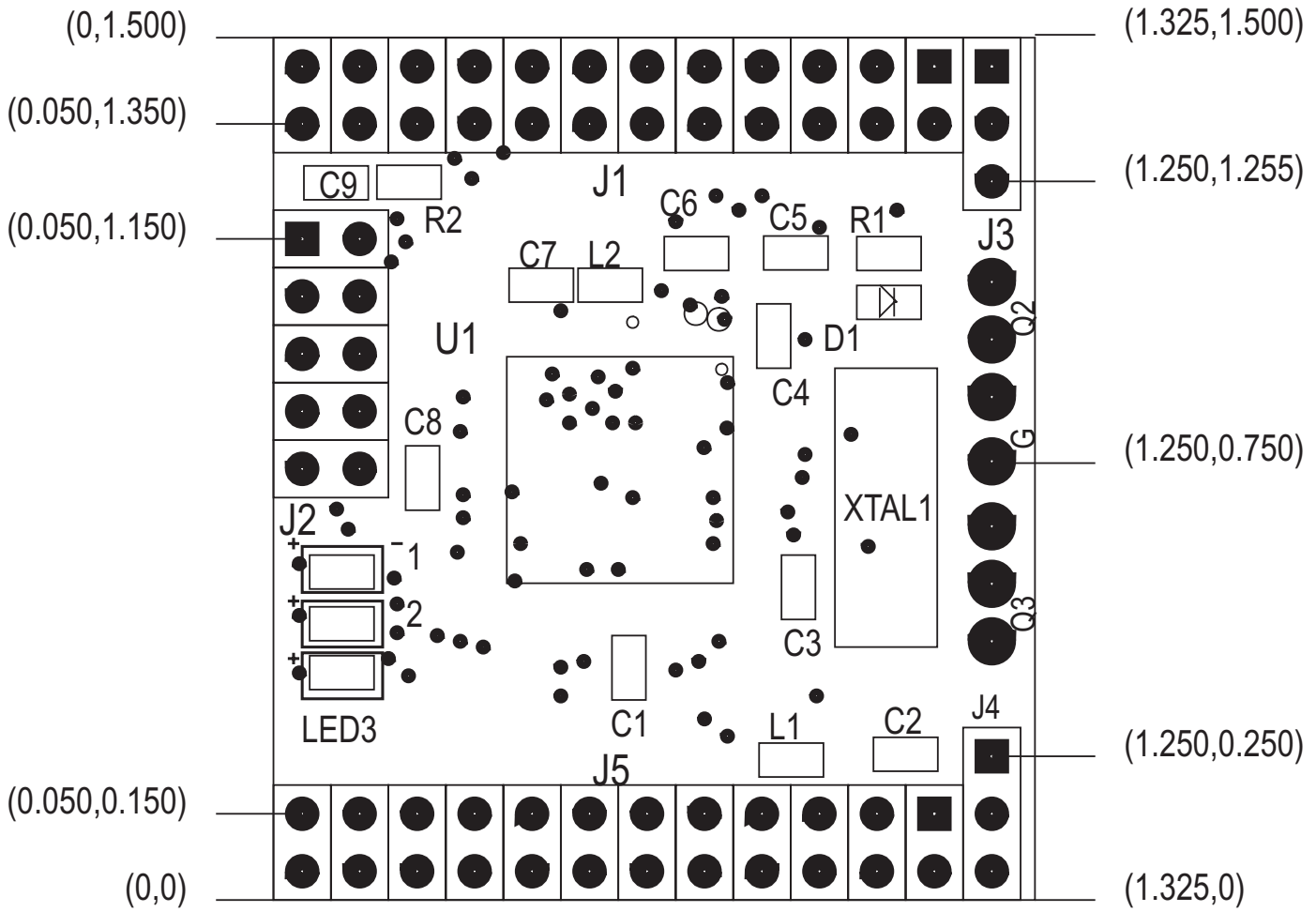
PJ1: Power Jack

SW1: Power On/Off switch

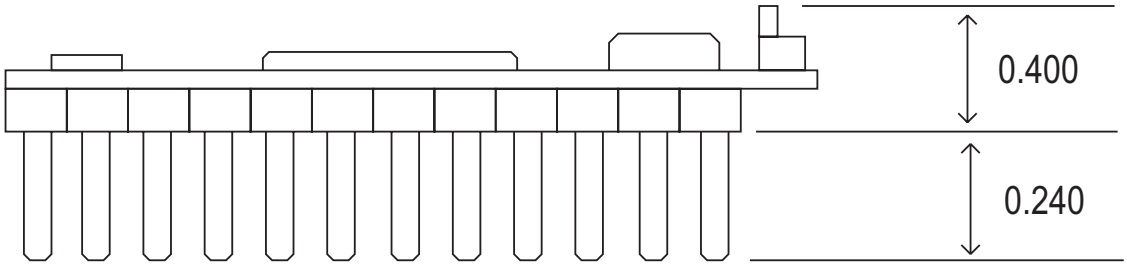
SW2: Reset switch

DB9: Serial RS-232 DB9F connector

PLUGA2138
Mechanical Drawing

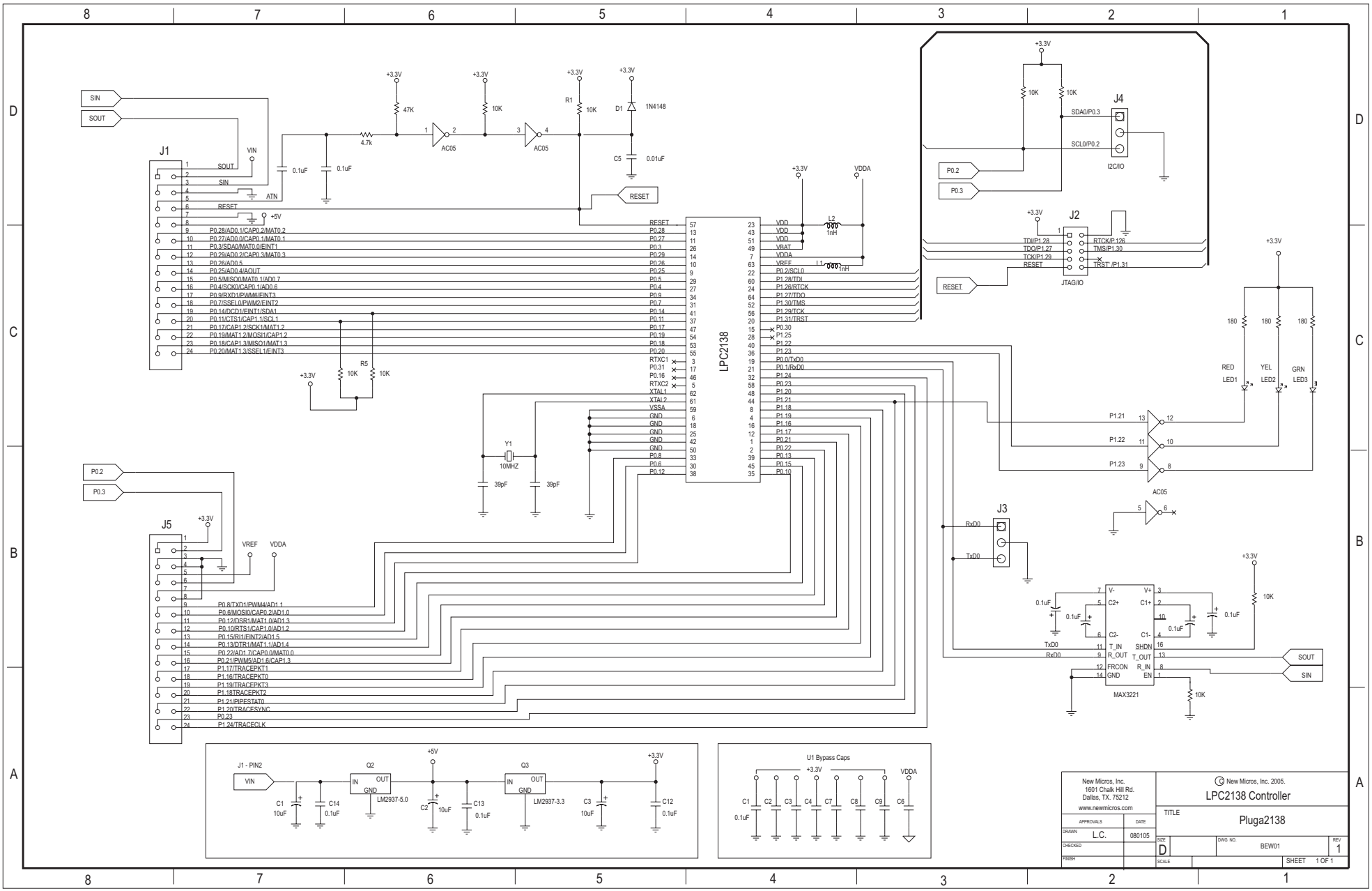


Top View



Side View

Dimension Units are Inches


SIN
SOUT
J1
VIN
ATN
RESET
+5V
0.1uF
4.7k
47K
10K
AC05
R1
D1
1N4148
C5
0.01uF
P0.28/AD0.1/CAP0.2/MAT0.2
P0.27/AD0.0/CAP0.1/MAT0.1
P0.3/SDA0/MAT0.0/EINT1
P0.29/AD0.2/CAP0.3/MAT0.3
P0.26/AD0.5
P0.25/AD0.4/AOUT
P0.5/MISO0/MAT0.1/AD0.7
P0.4/SCK0/CAP0.1/AD0.6
P0.9/RXD1/PWM6/EINT3
P0.7/SSEL0/PWM2/EINT2
P0.14/DCD1/EINT1/SDA1
P0.11/CTS1/CAP1.1/SCL1
P0.17/CAP1.2/SCK1/MAT1.2
P0.19/MAT1.2/MOSI1/CAP1.2
P0.18/CAP1.3/MISO1/MAT1.3
P0.20/MAT1.3/SSEL1/EINT3
R5
10K
LPC2138
VDD
VDDA
VREF
VBAT
L1
L2
1nH
RESET
P0.2/SCL0
P1.28/TDI
P1.26/RTCK
P1.27/TDO
P1.30/TMS
P1.29/TCK
P1.31/TRST
P0.30
P1.25
P1.22
P1.23
P0.0/TxD0
P0.1/RxD0
P1.24
P0.23
P1.20
P1.21
P1.18
P1.19
P1.16
P1.17
P0.21
P0.22
P0.13
P0.15
P0.10
RTXC1
P0.31
P0.16
RTXC2
XTAL1
XTAL2
VSSA
GND
P0.8
P0.6
P0.12
Y1
10MHZ
39pF
J4
SDA0/P0.3
SCL0/P0.2
I2C/IO
P0.2
P0.3
J2
TDI/P1.28
TDO/P1.27
TCK/P1.29
RESET
RTCK/P.126
TMS/P1.30
TRST /P1.31
JTAG/IO
180
RED
YEL
GRN
LED1
LED2
LED3
P1.21
P1.22
P1.23
J3
RxD0
TxD0
AC05
MAX3221
V-
V+
C2+
C1+
C2-
C1-
T_IN
R_OUT
T_OUT
R_IN
FRCON
GND
SHDN
EN
SOUT
SIN
J5
P0.8/TXD1/PWM4/AD1.1
P0.6/MOSI0/CAP0.2/AD1.0
P0.12/DSR1/MAT1.0/AD1.3
P0.10/RTS1/CAP1.0/AD1.2
P0.15/RI1/EINT2/AD1.5
P0.13/DTR1/MAT1.1/AD1.4
P0.22/AD1.7/CAP0.0/MAT0.0
P0.21/PWM5/AD1.6/CAP1.3
P1.17/TRACEPKT1
P1.16/TRACEPKT0
P1.19/TRACEPKT3
P1.18TRACEPKT2
P1.21/PIPESTAT0
P1.20/TRACFSYNC
P0.23
P1.24/TRACECLK
J1 - PIN2
Q2
Q3
LM2937-5.0
LM2937-3.3
C1
C2
C3
C4
C7
C8
C9
C6
C12
C13
C14
10uF
0.1uF
U1 Bypass Caps
New Micros, Inc.
1601 Chalk Hill Rd.
Dallas, TX. 75212
www.newmicros.com
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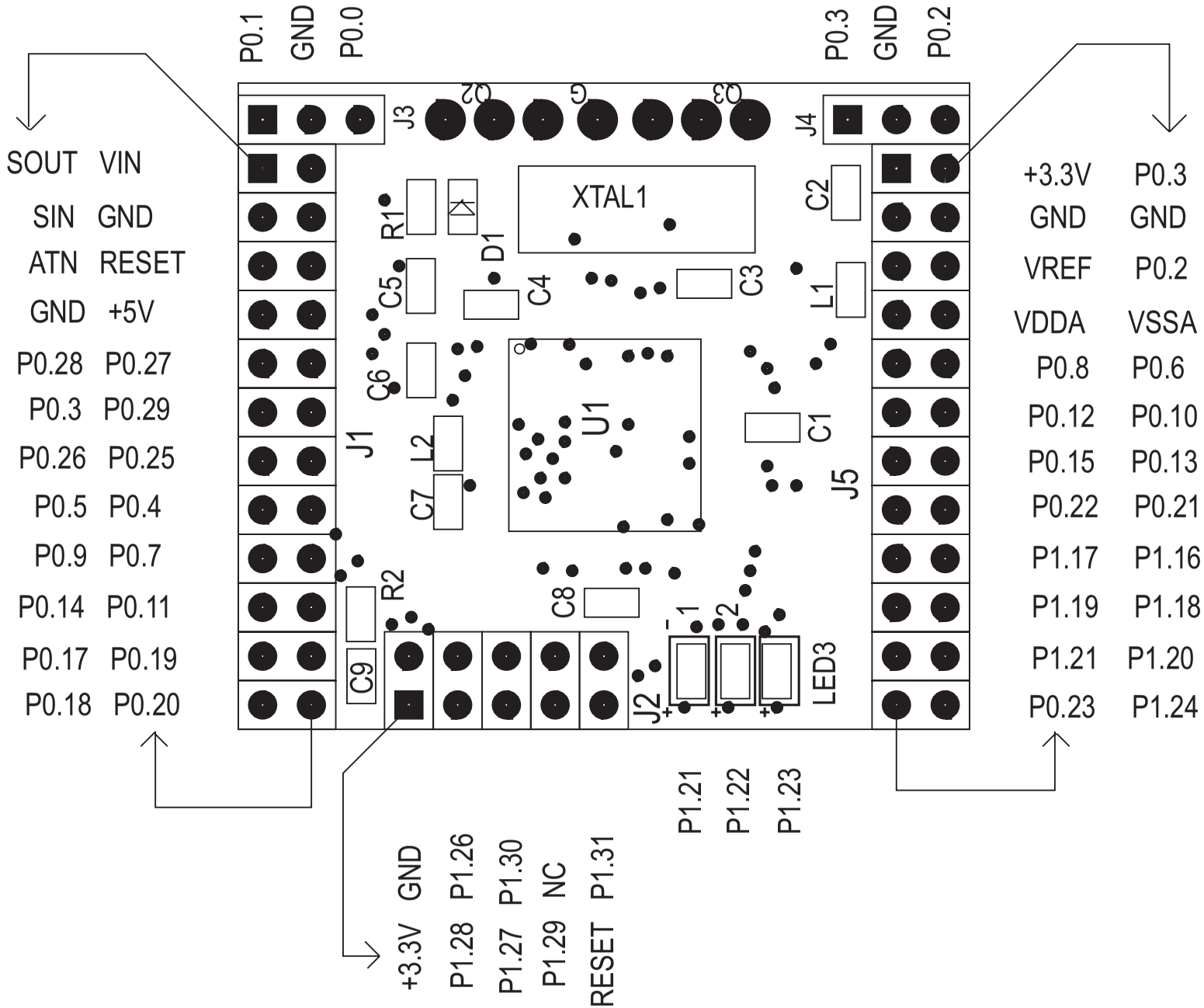
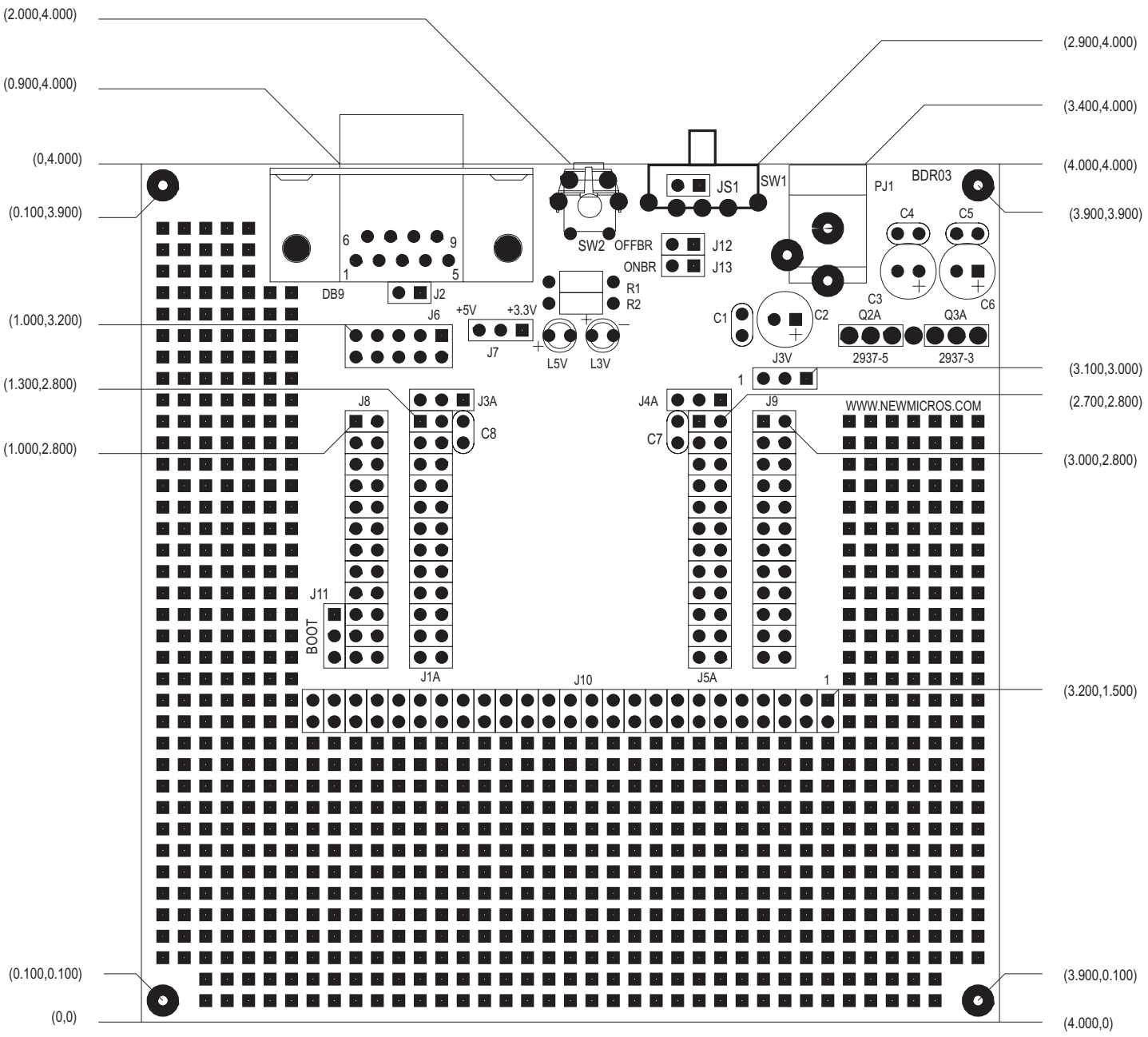
LPC2138 Controller
TITLE
Pluga2138
APPROVALS
DATE
DRAWN
L.C.
080105
CHECKED
FINISH
SIZE
D
DWG NO.
BEW01
REV
1
SCALE
SHEET 1 OF 1

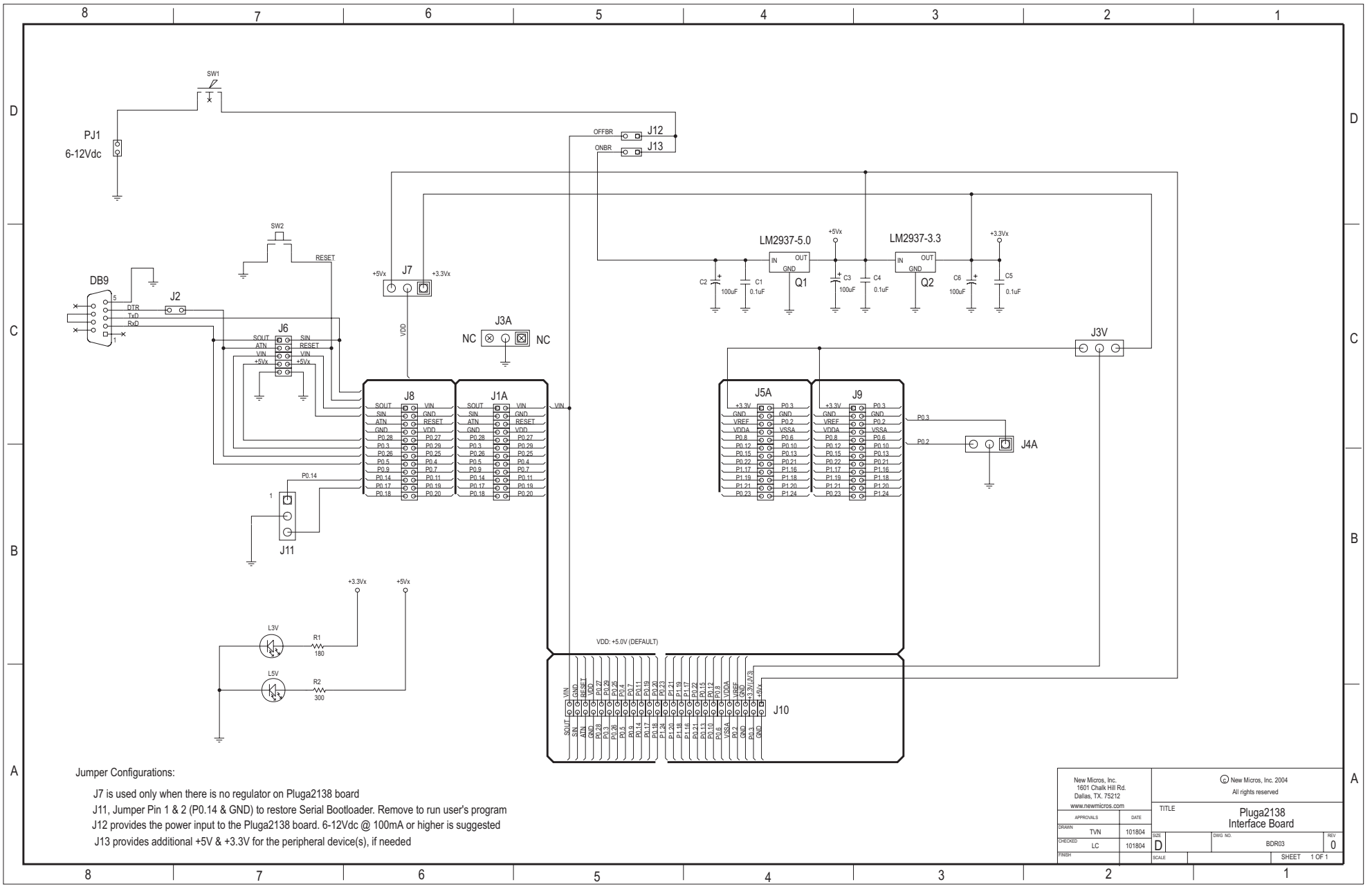
PLUGA2138
Pinouts



Controller Interface Board



Units measure in Inches



Jumper Configurations:

J7 is used only when there is no regulator on Pluga2138 board

J11, Jumper Pin 1 & 2 (P0.14 & GND) to restore Serial Bootloader. Remove to run user's program

J12 provides the power input to the Pluga2138 board. 6-12Vdc @ 100mA or higher is suggested

J13 provides additional +5V & +3.3V for the peripheral device(s), if needed

New Micros, Inc.
1601 Chalk Hill Rd.
Dallas, TX. 75212
www.newmicros.com

APPROVALS	DATE
DRAWN TVN	101804
CHECKED LC	101804
FINISH	

TITLE: Pluga2138 Interface Board

SIZE: D | DWG NO.: BDR03 | REV: 0

SCALE: | SHEET 1 OF 1