# GETTING STARTED

Thank you for buying the Tini2131/38. We hope you will find the Tini2131/38 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 Tini2131/38, 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 Tini2131/38 Development Kit, which comes with the Tini2131/38 and the Controller Interfacing board then you are probably ahead, because the wiring to the power connector, RS-232 connector, and the Boot jumper is done for you.
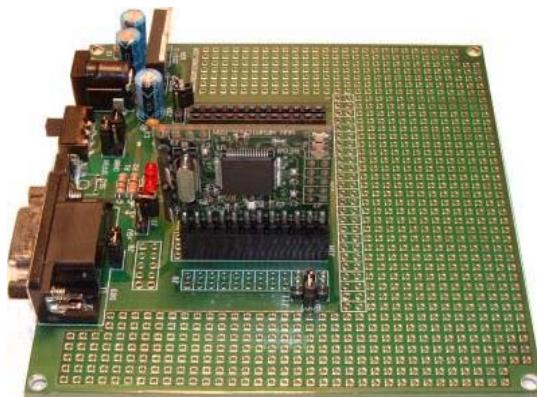

If you do not have a Development Kit, you can also order from us a custom made serial cable, and a wall transformer. This will save you lots of time. If not, you can build your own cable, and supply your own power supply. We'll need a serial cable to connect from the PC to the Tini2131/38, and a 6-12Vdc supply at 100mA or higher.   If we have those connections correct, we will be able to download the "Blinky", or "Hello" test program on the Tini2131/38 so we can tell if the board is communicating and operating properly.

WIRING DIAGRAM
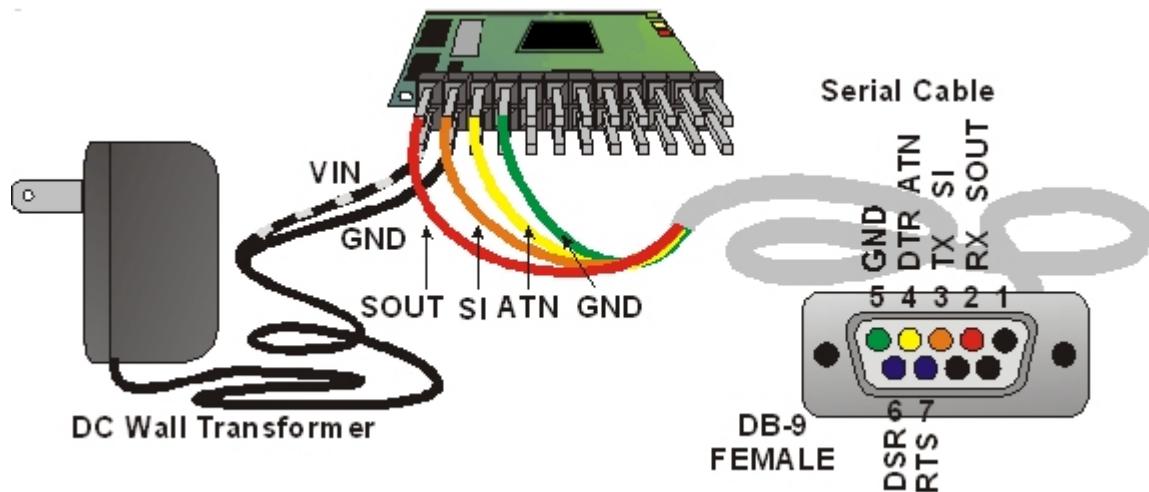
These connections are all made on a few pins of J1, which is a male .1" dual row connector. Generally, an intermediate double male header strip will be used to mate from J1 to the Wall transformer single row female connector, and to the Serial Cable single row female connector.
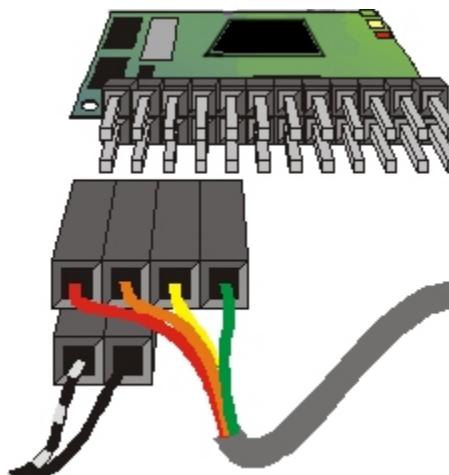
Your chief concern now, is not hooking the serial cable or power cable up on the wrong connector; the wrong pins on the right connector; or backwards or rotated on the right connector. Pay close attention how the connectors go on. There is no protection to prevent plugging in on the .1" dual row headers the wrong way.
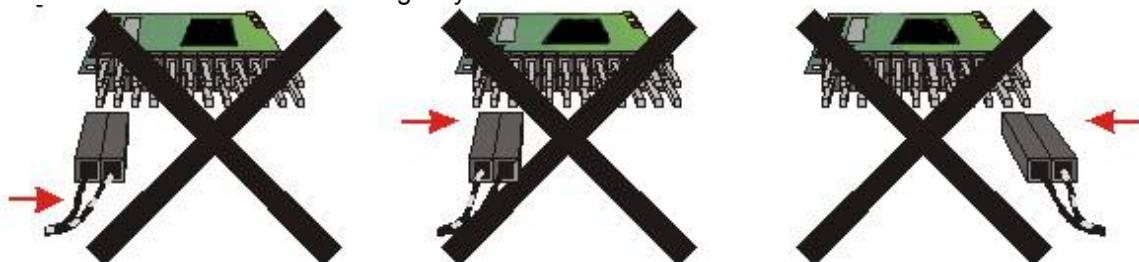
Once you have your serial cable and connectors, and wall transformer and connectors, ready, follow these steps.

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
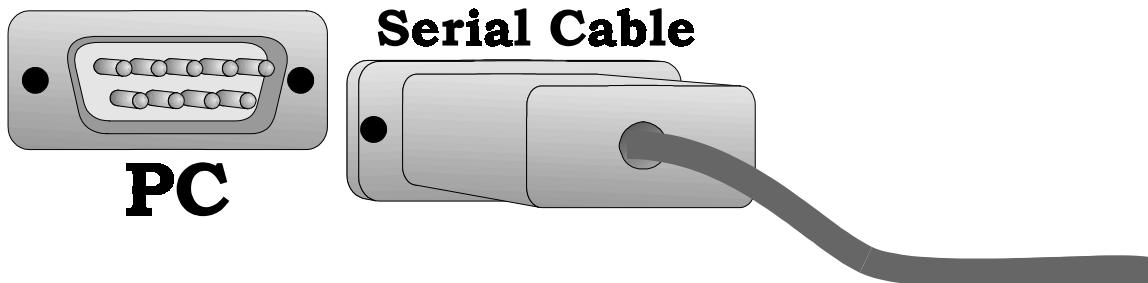
Now hook the Tini2131/38 end of the serial cable to the Tini2131/38 with connections as shown in the instructions. See the illustration here:
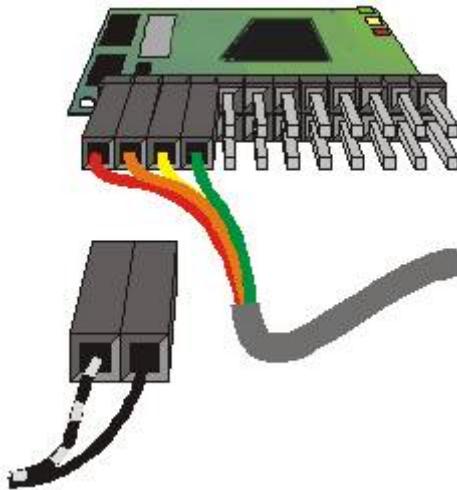
Plug the wall transformer into the wall, but do not plug it into the board yet.
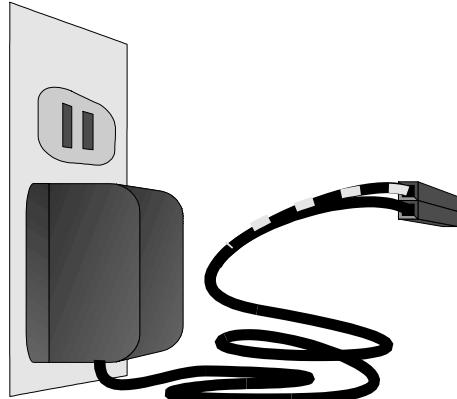
Now, while watching the LED's plug in the wall transformer connector to the power pins on the Tini2131/38 board. Be _very_ careful not to get a misalignment here, because it can kill the board. See the illustration here:
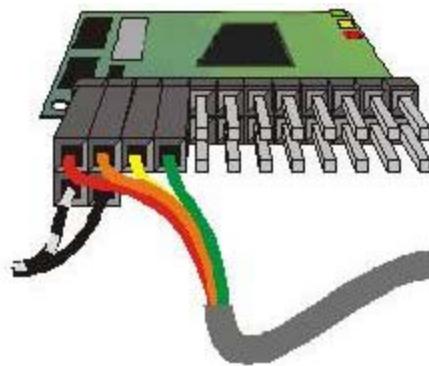
All three LED's should come on. If the LED's do not light, unplug the power to the Tini2131/38 quickly and double check the power polarity, and make sure you are not misaligned the pins.

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.

Run the Philips Flash Utility program as the image shown below. Select the Device: LPC2131 for Tini2131, or LPC2138 for Tini2138. Your PC, or laptop available COM Port, and the Path to the Blinky.hex file where you downloaded earlier.
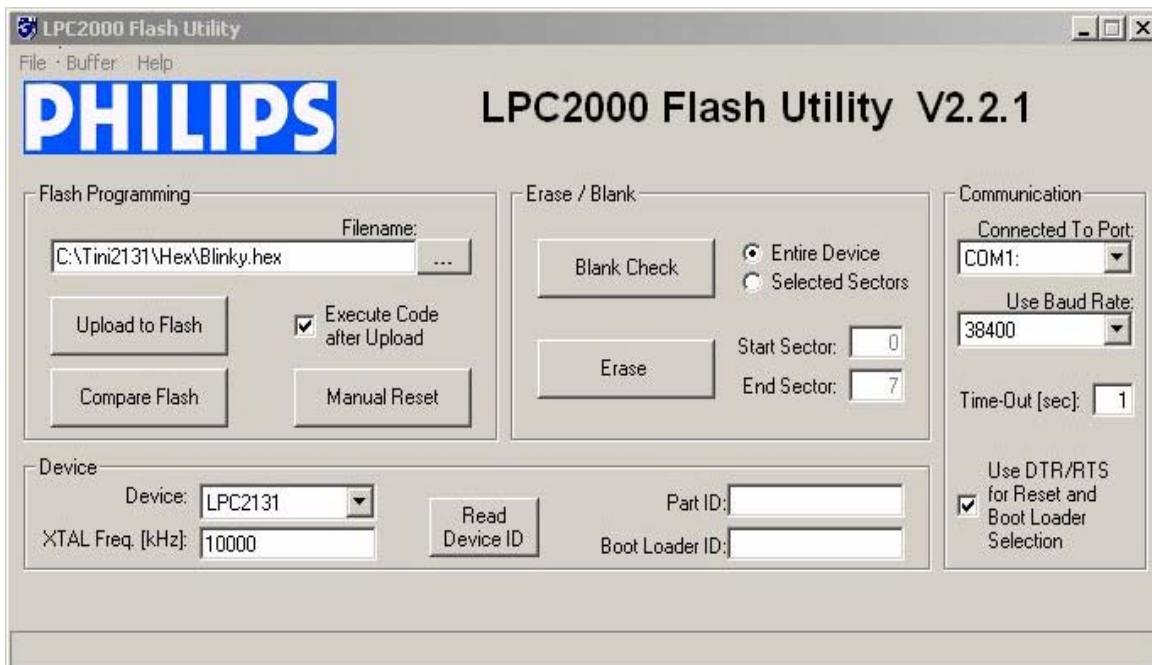
Download Hex File

Plug the wall transformer into the wall and click on **Read Device ID** button, you will see the Part ID & Boot Loader ID numbers display as shown on the image below,
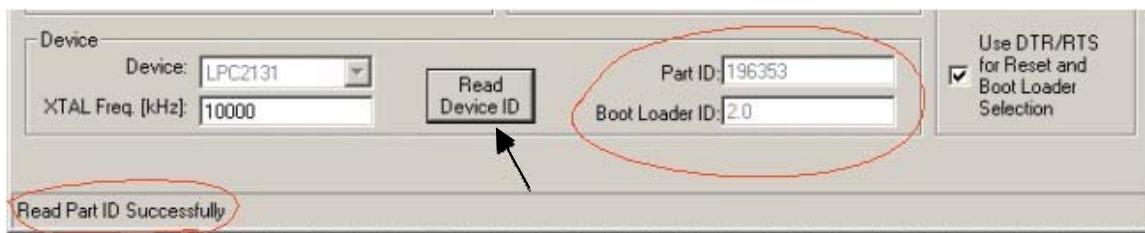
Seeing this means that the Tini2131/38 is communicating properly. Now it is time to load the Blinky.hex file. Simply click on the **Upload to Flash** button. You will see a blue bar runs across the bottom of the screen. This indicates the program is loading. As soon as it's finish, the LEDs on the Tini2131/38 start blinking back and forth.
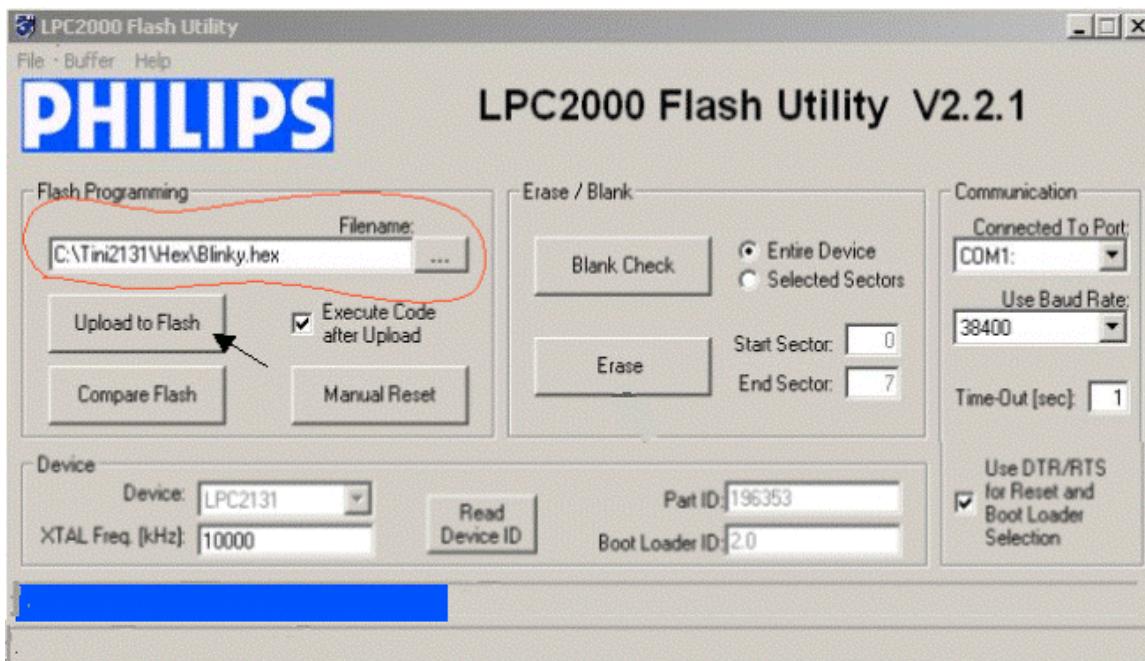
Boot Loader Jumper

Boot Jumper
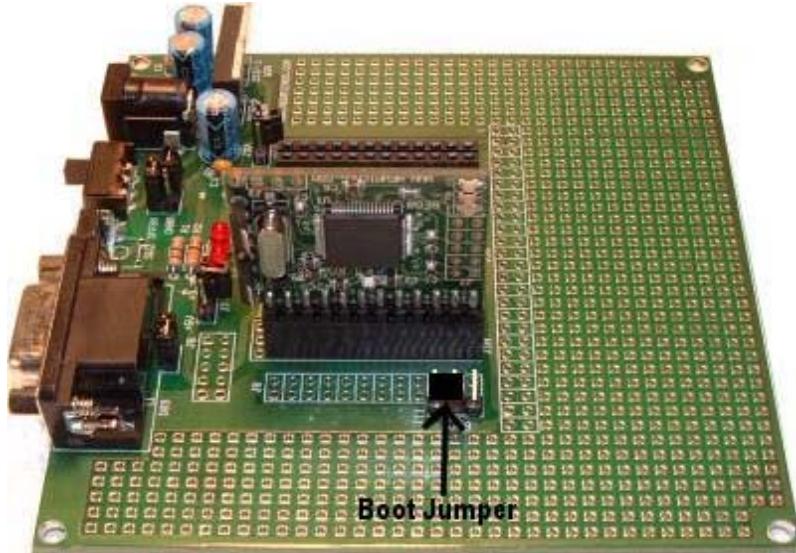
If the flash memory contains the user's program, to load a new hex file you must erase the previous loaded program. To do this, you must boot the Tini2131/38 from the serial boot loader by jumper P0.14 to Ground. If you have a Tini2131/38 Development Kit, simply connects the jumper on pin 1 & 2 of J11 on the interface board. This will force the Tini2131/38 runs the serial boot loader on power up or reset. If you do not have the Controller Interface board, you can connect a jumper wire from pin 19 (P0.14) of J1 to Pin 2 (Ground) of J2, as shown on the picture below.

Boot Wire Jumper
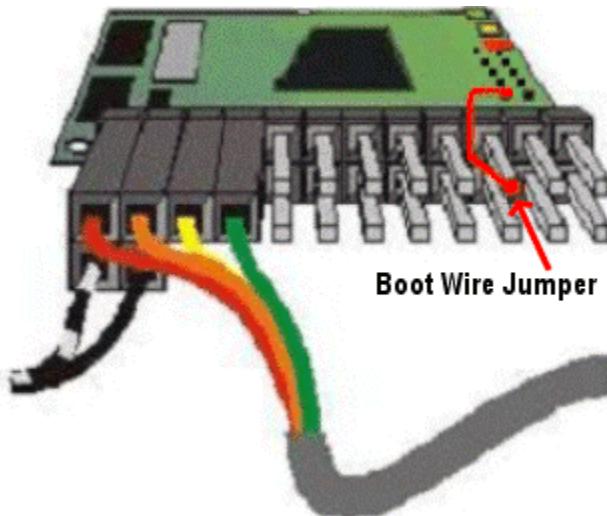
Next, recycle the power or reset the Tini2131/38 and click on the **Erase** button. You will see Erased message displays as shown on the image below. If the user's flash memory is blank, regardless of P0.14 input condition, the Tini2131/38 will always boot from the Serial Boot Loader. In this case, the boot jumper, or erasing the flash memory is not required.
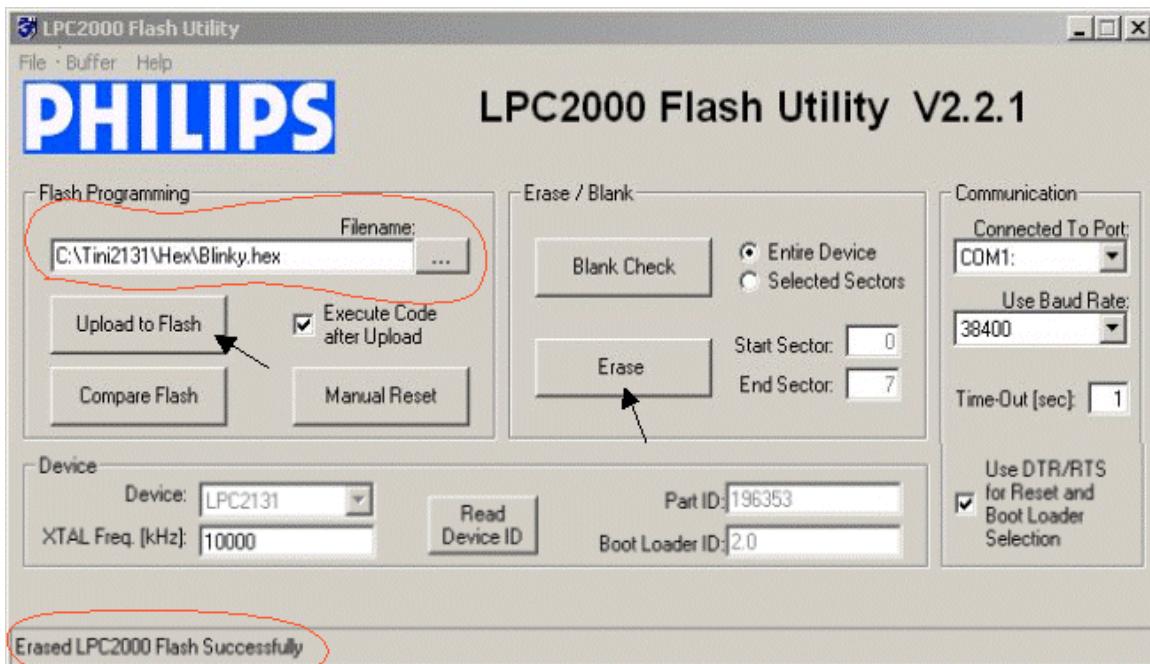
On the Flash Programming box, open the *Hello.hex* file then click on the **Upload to Flash** button. When it's finish, close the LPC2000 Philips Flash Utility program completely then open the HyperTerminal Program, set the baud rate for 115,200 bauds. Be sure to remove the boot Jumper, P0.14 & Ground in order for the user's program to run on the next reset. You will see message: "Hello World" continuously display on the terminal as shown below.
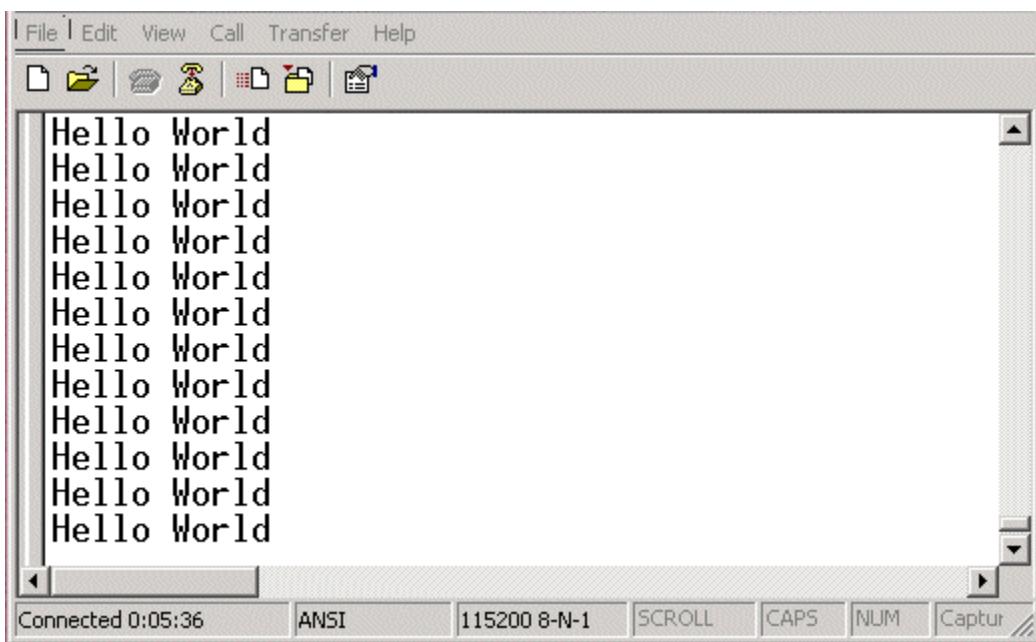
So, now you should have a good feeling because you can tell your Tini2131/38 is working. It's time for an overview of what your Tini2131/38 has for features.

FEATURES

- 32/16-bit ARM7TDMI-S microprocessor
- CPU oprerating range up to 60Mhz
- On-chip Memory
  - 32KByte Program Flash provides minimum 10,000 erase/write cycles, and 10 yrs of data-retention
  - 8KByte Static Ram can be accessed as 8-bits, 16-bits, and 32-bits
- RS-232 Serial Communication Interface
- Two I2C bus Interface (one shared on GPIO connector)
- JTAG connection for flash programming/debugging
- Two PWM channels (one shared on GPIO connector, one shared on JTAG connector)
- 16 General Purpose Digital I/O lines share functions with,
  - 8 channels 10-bit A/D
    - Measurement range 0V to 3.3V
    - More than 400,000 10-bit samples per second
  - Two 4-wire SPI Interface
  - I2C bus Interface
  - PWM channel
  - Timers
    - 10 Input Capture
    - or, 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
- 2x12 header pin for Power, Serial, and I/O's connection

I/O Connectors

Most of the CPU I/O's are brought out to J1, J2, and J3 Connectors.

J1

SOUT	1	2	VIN
SIN	3	4	GND
ATN'	5	6	RESET'
GND	7	8	+5V
P0.28	9	10	P0.27
P0.30	11	12	P0.29
P0.26	13	14	P0.25
P0.5	15	16	P0.4
P0.6	17	18	P0.7
P0.14	19	20	P0.11
P0.17	21	22	P0.19
P0.18	23	24	P0.20
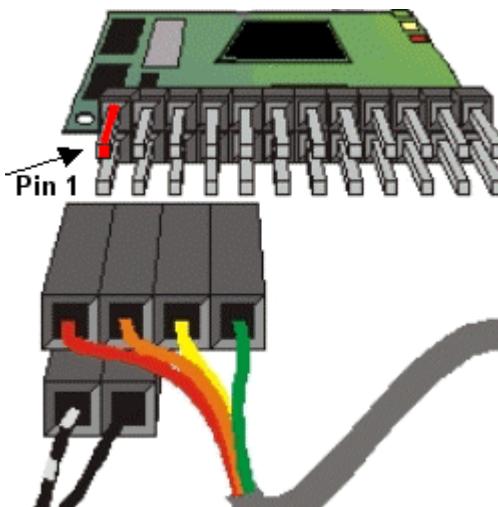
J1, Signal Descriptions:
SOUT: Serial Output from Tini2131/38, RS-232 level
SIN: Serial Input to Tini2131/38, RS-232 level
ATN': Alternative reset via DTR signal from host
VIN: Power Input Voltage, 6-12Vdc
GND: Ground, or power return
RESET': Target Reset signal
P0.xx : General Purpose I/O's

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	P0.8
RESET'	9	10	TRST/P1.31

J3, I2C interface or GPIO's

1	SDA0/P0.3
2	GND
3	SCL0/P0.2

Peripheral Controlled Ports:

LEDs are buffered by the AC05 inverter. A high signal on the port pin will turn the LED On, and low is Off. The following I/O ports are being used for this purpose,
P1.21 => Red Led
P1.22 => Yellow Led
P1.23 => Green Led

RS-232 Transceiver Enable/Disable
P0.16 controls the Receiver Input – A low signal on P0.16 will enable the RS-232 receiver, and high is disable.

P0.31 controls the Transmitter Output – A high signal on P0.31 will enable the RS-232 Transmitter, and low is disable.

By default, the RS-232 chip is configured for Normal Operation through the Pull-Down & Pull-Up resistors on Pin 1 & 16 respectively, since P0.16 & P0.31 are default to inputs after reset.

Interface Board

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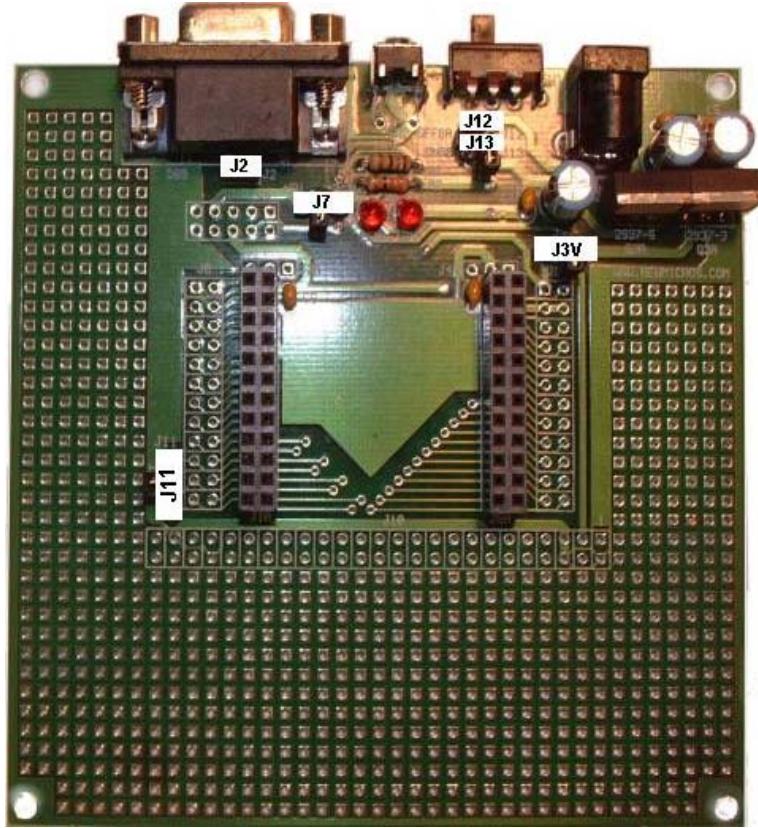
Jumper descriptions:

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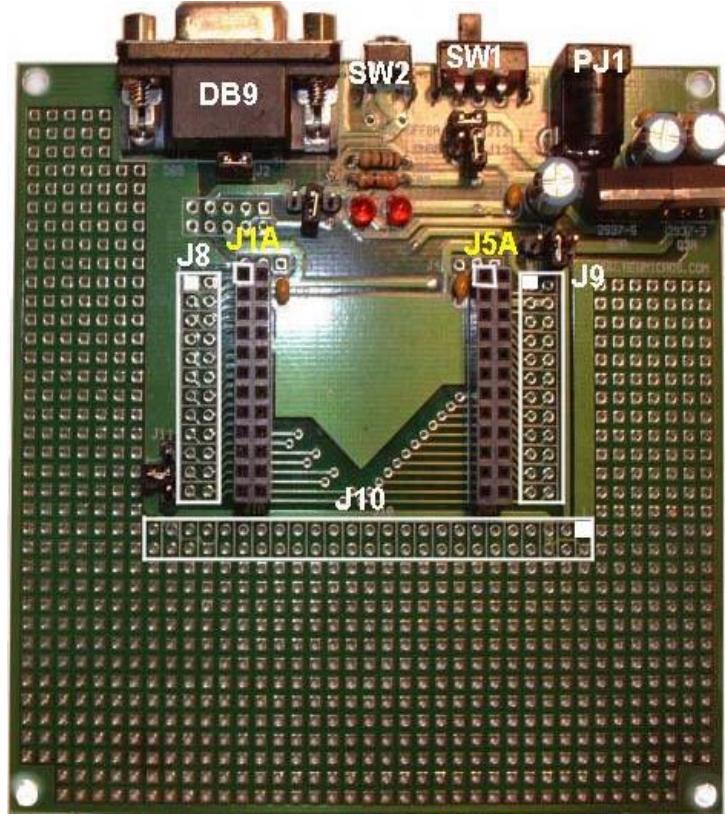
J8: I/O pins brought out from Tini's or Pluga's J1 connector.

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

Tini2131/38

(0.050,1.375)

0.250

0.100

(0,1.025)

(1.325,1.025)

(1.250,0.975)

J2

C1

C2

J1

C3 C4

R2

(0.050,0.750)

L1

(1.250,0.825)

Q2

RTX

D2

C5

C8

(1.250,0.400)

Q3

BEO01

+ − 1

+ 2

+ 3

C7

J9

U1

C6

(1.150,0.050)

(0,0)

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(1.250,0.050)

Top View

0.400

Side View
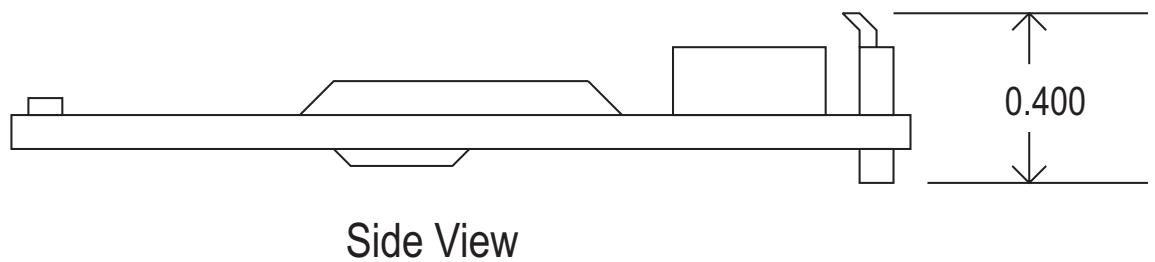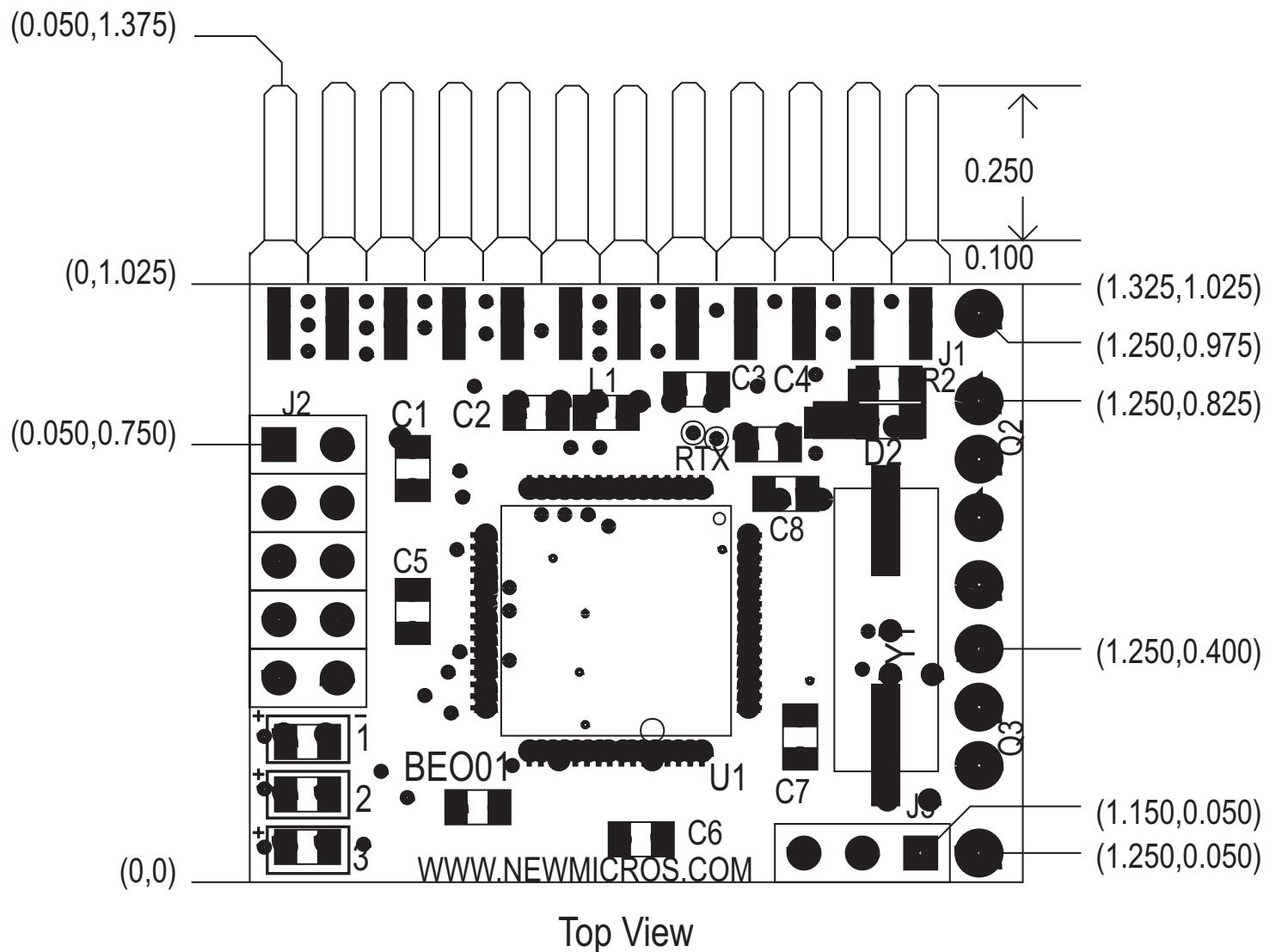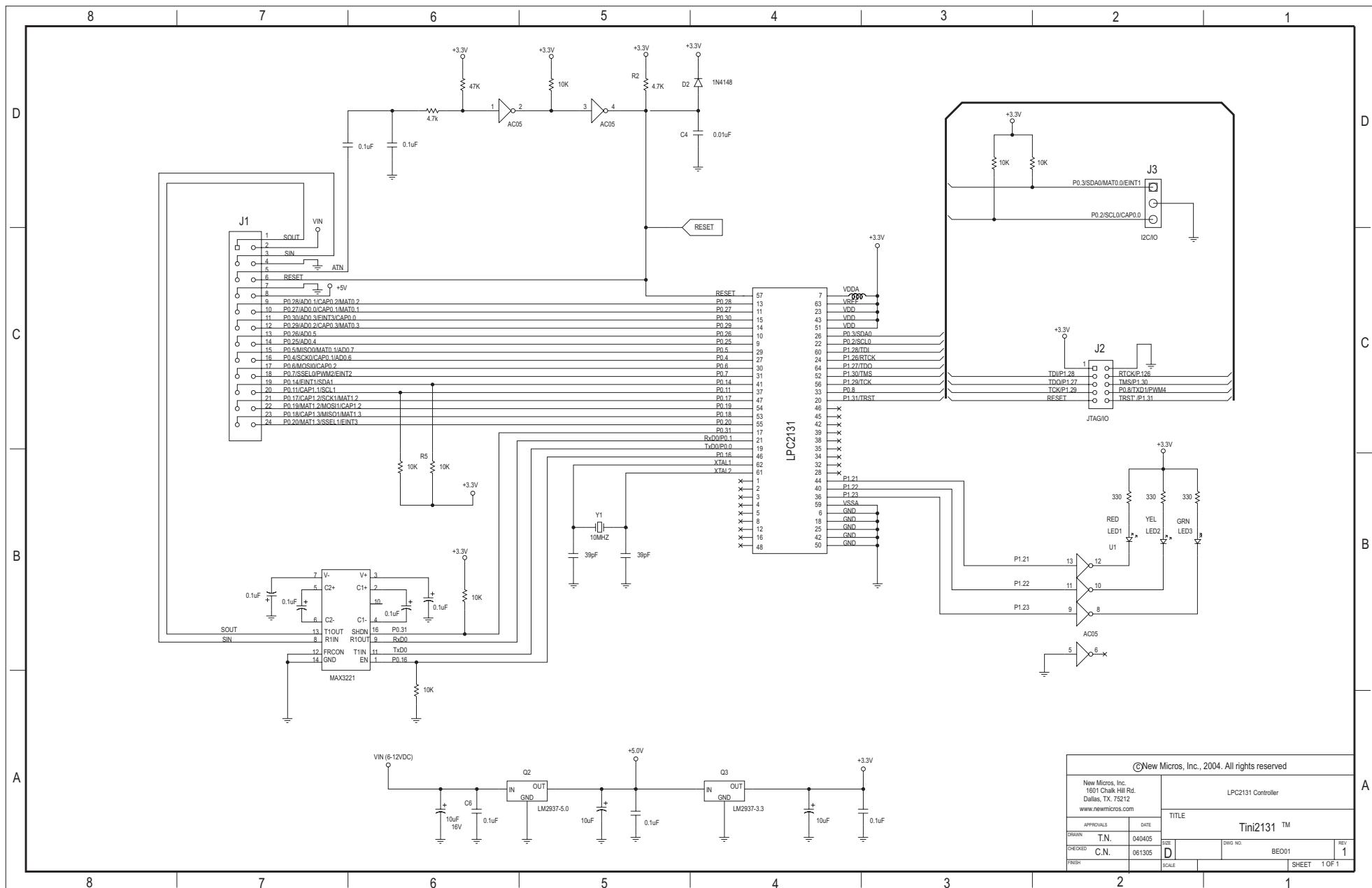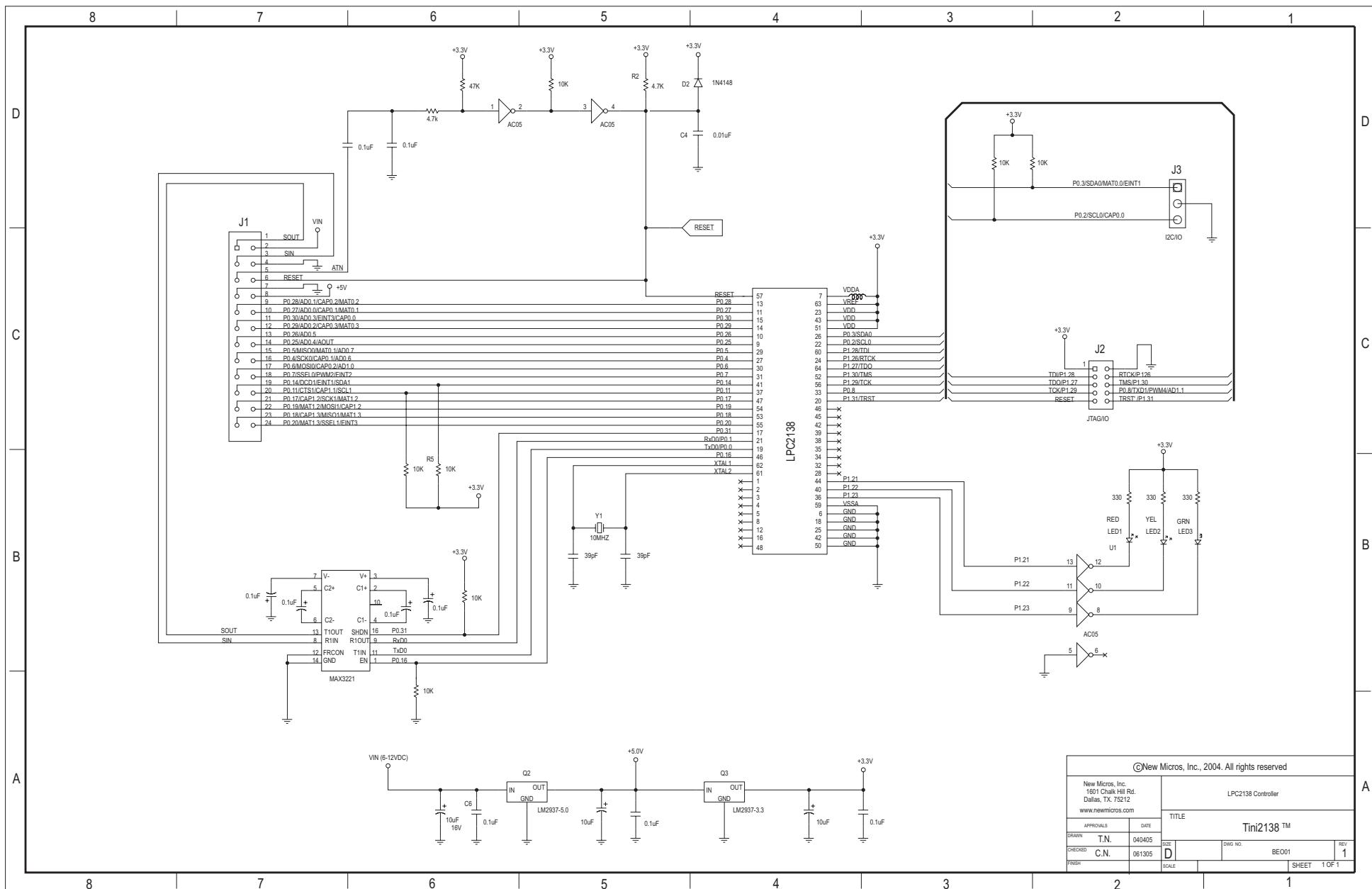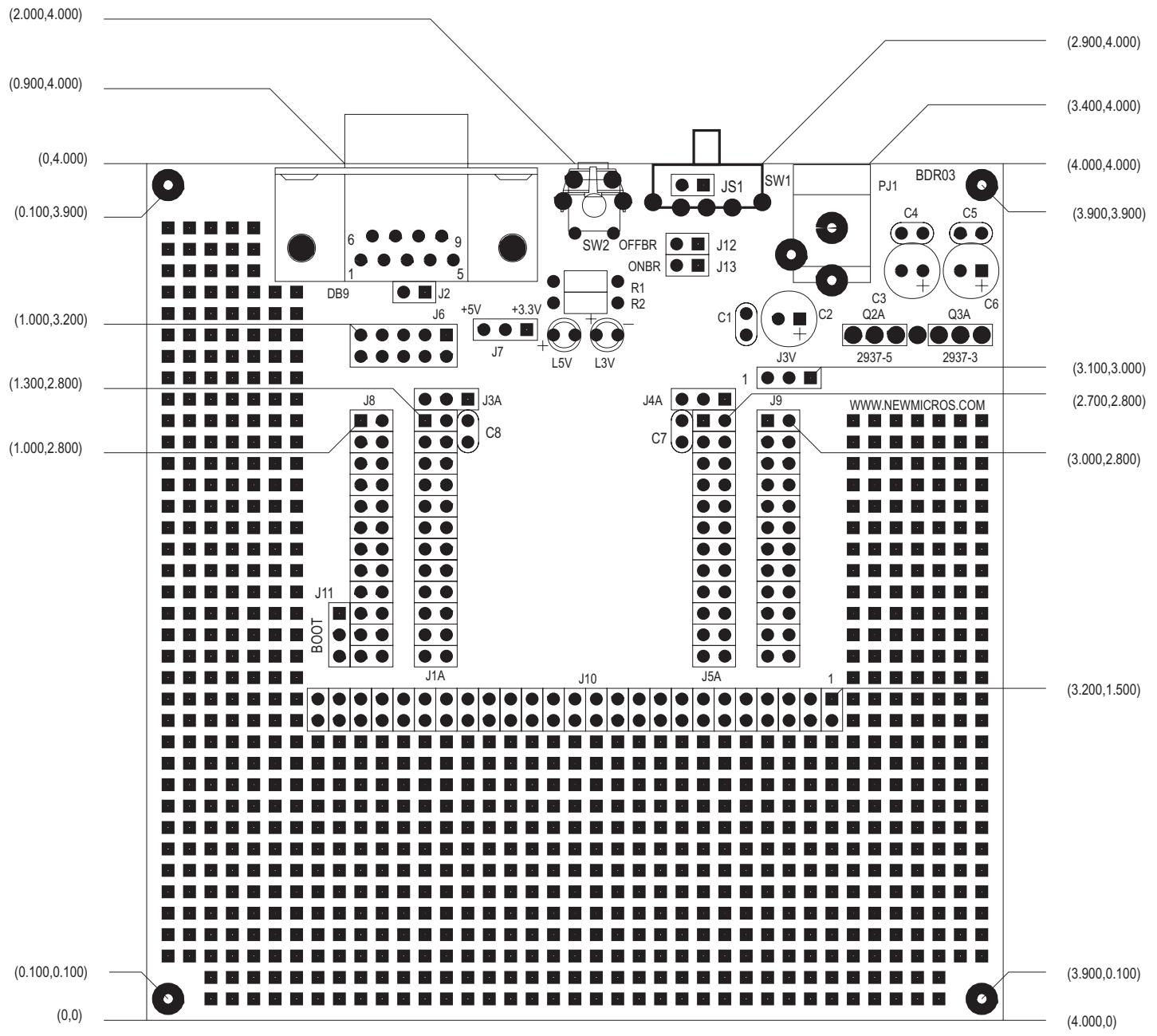
Dimensions in Inches

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

LPC2131 Controller

TITLE

Tini2131 ™

APPROVALS	DATE
DRAWN	
T.N.	040405
CHECKED	
C.N.	061305
FINISH	

SIZE D

DWG NO. BEO01

REV 1

SCALE

SHEET 1 OF 1

LPC2131

MAX3221

J1
SOUT
VIN
SIN
ATN
RESET
+5V

J2 JTAG/IO
TDI/P1.28   RTCK/P1.26
TDO/P1.27   TMS/P1.30
TCK/P1.29   P0.8/TXD1/PWM4
RESET   TRST'/P1.31

J3 I2C/IO
P0.3/SDA0/MAT0.0/EINT1
P0.2/SCL0/CAP0.0

VDDA
VREF
VDD
VDD
VDD

RESET

Y1 10MHZ
39pF   39pF

1N4148   D2
R2 4.7K
47K
10K
4.7k
AC05   AC05
0.1uF   0.1uF
C4 0.01uF

RED LED1
YEL LED2
GRN LED3
330 330 330
U1 AC05
P1.21
P1.22
P1.23

VIN (6-12VDC)
Q2 LM2937-5.0
Q3 LM2937-3.3
+5.0V
+3.3V
10uF 16V
C6
0.1uF
10uF
0.1uF
10uF
0.1uF

10K

+3.3V +3.3V +3.3V +3.3V

47K 10K R2 4.7K D2 1N4148

4.7k AC05 AC05 C4 0.01uF

0.1uF 0.1uF

+3.3V

10K 10K

P0.3/SDA0/MAT0.0/EINT1

P0.2/SCL0/CAP0.0

J3
I2C/IO

RESET

+3.3V

+3.3V

J2

J1

SOUT VIN
SIN
ATN
RESET
+5V

1 RESET 57
2 P0.28 13
3 P0.28/AD0.1/CAP0.2/MAT0.2 P0.27 63
4 P0.27/AD0.0/CAP0.1/MAT0.1 P0.30 23
5 P0.30/AD0.3/EINT3/CAP0.0 P0.29 43
6 P0.29/AD0.2/CAP0.3/MAT0.3 P0.26 51
7 P0.26/AD0.5 P0.25 14
8 P0.25/AD0.4/AOUT P0.5 10
9 P0.5/MISO0/MAT0.1/AD0.7 P0.4 26
10 P0.4/SCK0/CAP0.1/AD0.6 P0.6 9
11 P0.6/MOSI0/CAP0.2/AD1.0 P0.7 29
12 P0.7/SSEL0/PWM2/EINT2 P0.14 27
13 P0.14/DCD1/EINT1/SDA1 P0.11 30
14 P0.11/CTS1/CAP1.1/SCL1 P0.17 37
15 P0.17/CAP1.2/SCK1/MAT1.2 P0.19 31
16 P0.19/MAT1.2/MOSI1/CAP1.2 P0.18 47
17 P0.18/CAP1.3/MISO1/MAT1.3 P0.20 54
18 P0.20/MAT1.3/SSEL1/EINT3 P0.31 53
RxD0/P0.1 55
TxD0/P0.0 17
P0.16 21
XTAL1 19
XTAL2 46

VDDA 7
VREF 63
VDD 43
VDD 51
VDD

P0.3/SDA0 22
P0.2/SCL0 60
P1.28/TDI 64
P1.26/RTCK 56
P1.27/TDO 33
P1.30/TMS
P1.29/TCK
P0.8
P1.31/TRST

TDI/P1.28
TDO/P1.27
TCK/P1.29
RESET

RTCK/P1.26
TMS/P1.30
P0.8/TXD1/PWM4/AD1.1
TRST./P1.31

JTAG/IO

LPC2138

P1.21 44
P1.22 40
P1.23 36
VSSA 59
GND 6
GND 18
GND 25
GND 42
GND 50

R5 10K 10K +3.3V

+3.3V

Y1 10MHZ

39pF 39pF

+3.3V

10K

+3.3V

330 330 330

RED LED1 YEL LED2 GRN LED3

U1

P1.21 13 12
P1.22 11 10
P1.23 9 8

AC05

5 6

V- C2+ V+ C1+
0.1uF C2- C1-
T1OUT SHDN P0.31
R1IN R1OUT RxD0
FRCON T1IN TxD0
GND EN P0.16

SOUT
SIN

0.1uF 0.1uF 0.1uF

MAX3221

10K

VIN (6-12VDC) +5.0V +3.3V

Q2 Q3

IN OUT IN OUT
GND GND

C6 0.1uF LM2937-5.0 10uF 0.1uF LM2937-3.3 10uF 0.1uF

10uF 16V

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www.newmicros.com

LPC2138 Controller

TITLE
Tini2138 ™

APPROVALS		DATE
DRAWN	T.N.	040405
CHECKED	C.N.	061305
FINISH		

SIZE D

DWG NO. BEO01

REV 1

SCALE   SHEET 1 OF 1

Controller Interface Board

(2.000,4.000)

(0.900,4.000)

(0,4.000)

(0.100,3.900)

(2.900,4.000)

(3.400,4.000)

(4.000,4.000)

(3.900,3.900)

JS1 SW1 PJ1 BDR03

SW2 OFFBR J12 C4 C5

ONBR J13 C3 C6

DB9 6 9 1 5

J2 R1 R2 C1 C2 Q2A Q3A

J6 +5V +3.3V 2937-5 2937-3

J7 L5V L3V J3V

(1.000,3.200)

(1.300,2.800)

(1.000,2.800)

J8 J3A C8

J4A J9 C7

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(3.100,3.000)

(2.700,2.800)

(3.000,2.800)

J11 BOOT

J1A J10 J5A

1

(3.200,1.500)

(0.100,0.100)

(0,0)

(3.900,0.100)

(4.000,0)

Units measure in Inches

SW1

PJ1
6-12Vdc

OFFBR — J12
ONBR — J13

LM2937-5.0   +5V   LM2937-3.3   +3.3V
             IN OUT   IN OUT
             GND   GND
C2 + C1   C3 C4   C6 + C5
100uF 0.1uF Q1   100uF 0.1uF Q2   100uF 0.1uF

SW2

RESET   +5V J7 +3.3V

DB9   J2
  5   DTR
             TxD
  1   RxD

J6
SOUT   SIN
ATN   RESET
VIN   VIN
+5V   +5V

VDD

J3A
NC ⊗ ▣ NC

J3V

J8   J1A
SOUT   VIN   SOUT   VIN
SIN   GND   SIN   GND
ATN   RESET   ATN   RESET
GND   VDD   GND   VDD
P0.28 P0.27   P0.28 P0.27
P0.30 P0.29   P0.30 P0.29
P0.26 P0.25   P0.26 P0.25
P0.5   P0.4   P0.5   P0.4
P0.6   P0.7   P0.6   P0.7
P0.14 P0.11   P0.14 P0.11
P0.17 P0.19   P0.17 P0.19
P0.18 P0.20   P0.18 P0.20

VIN

Tini2131/38

P0.14

1
J11

J5A   J9
+3.3V   +3.3V
GND   GND   GND   GND
VREF   VREF
VDDA   VSSA   VDDA   VSSA

J4A

Future
Plug-a-2131/38

+3.3V   +5V

L3V   R1
      180

L5V   R2
      300

Future
Plug-a-2131/38

J10
VIN
GND
RESET
VDD
P0.27
P0.29
P0.25
P0.4
P0.7
P0.11
P0.19
P0.20
VDDA
VREF
GND
+3.3V
+5V
SOUT
SIN
ATN
GND
P0.28
P0.30
P0.26
P0.5
P0.6
P0.14
P0.17
P0.18
VSSA
GND
GND

Tini2131/38

Jumper Configurations:
    J7 is used only when there is no regulator on Tini2131/38 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 Tini2131/38 board. 6-12Vdc @ 100mA or higher is suggested
    J13 provides additional +5V & +3.3V for the peripheral devices, if required

APPROVALS	DATE		TITLE	Tini213/38 Controller
DRAWN TVN	101804			Interface Board
CHECKED LC	101804	SIZE D	DWG. NO. BDR03	REV 0
FINISH		SCALE		SHEET 1 OF 1