



Pixie Evaluation Board™

Evaluation board for Pixie and Pixie Lite modules

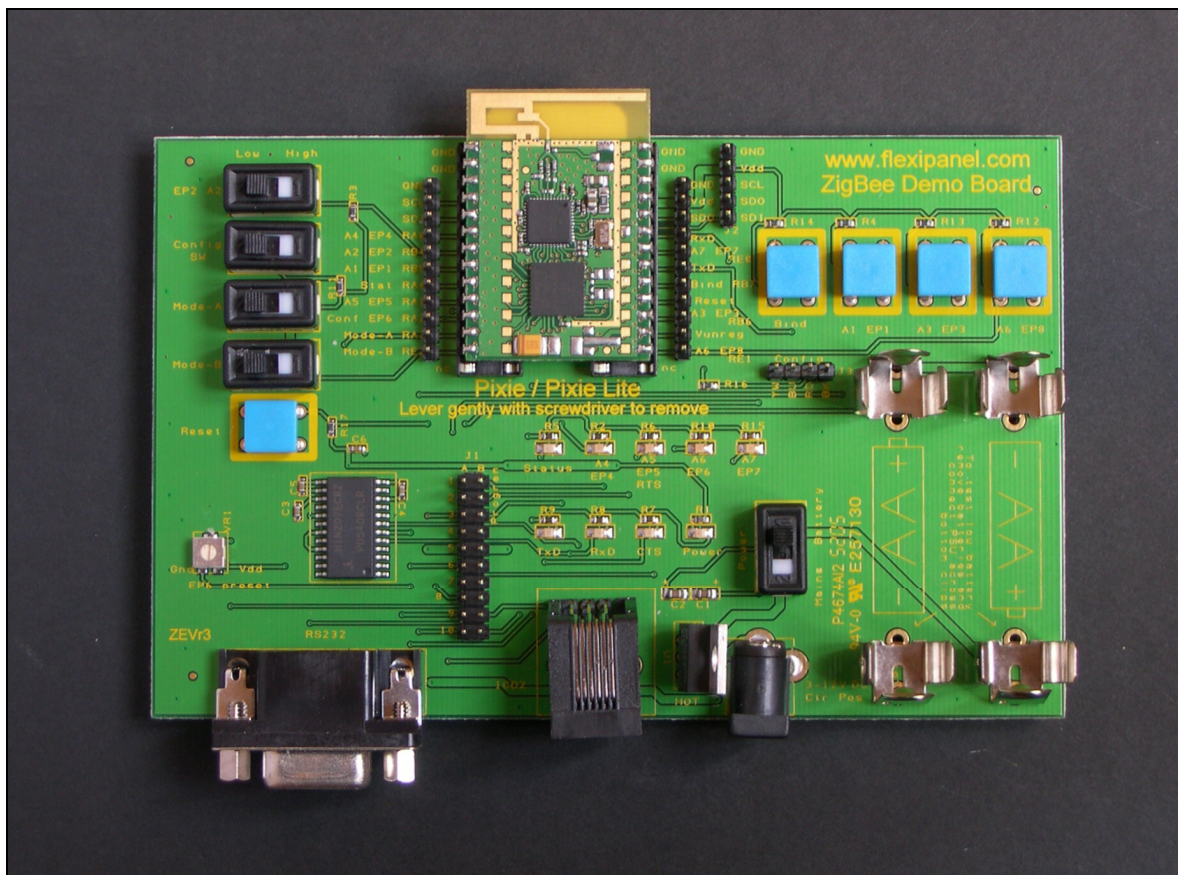
Summary

The Pixie Evaluation Board is designed for research and development with FlexiPanel Ltd's Pixie ZigBee modules. It is designed to be compatible with FlexiPanel's schedule of firmware solutions, including:

- Switcher HC-L profile (preloaded)
- Sniffer packet eavesdropping
- DataStream serial profile
- Trace asset tracking
- DARC data acquisition & remote control

Features

- 4 switch inputs
- 4 pushbutton inputs
- 8 LED outputs
- 1 trimmer input
- RS232 serial port and TTL to RS232 converter
- ICD2 programming socket
- Configuration tool socket
- Power regulator and battery clips.
- Solder pads for custom development



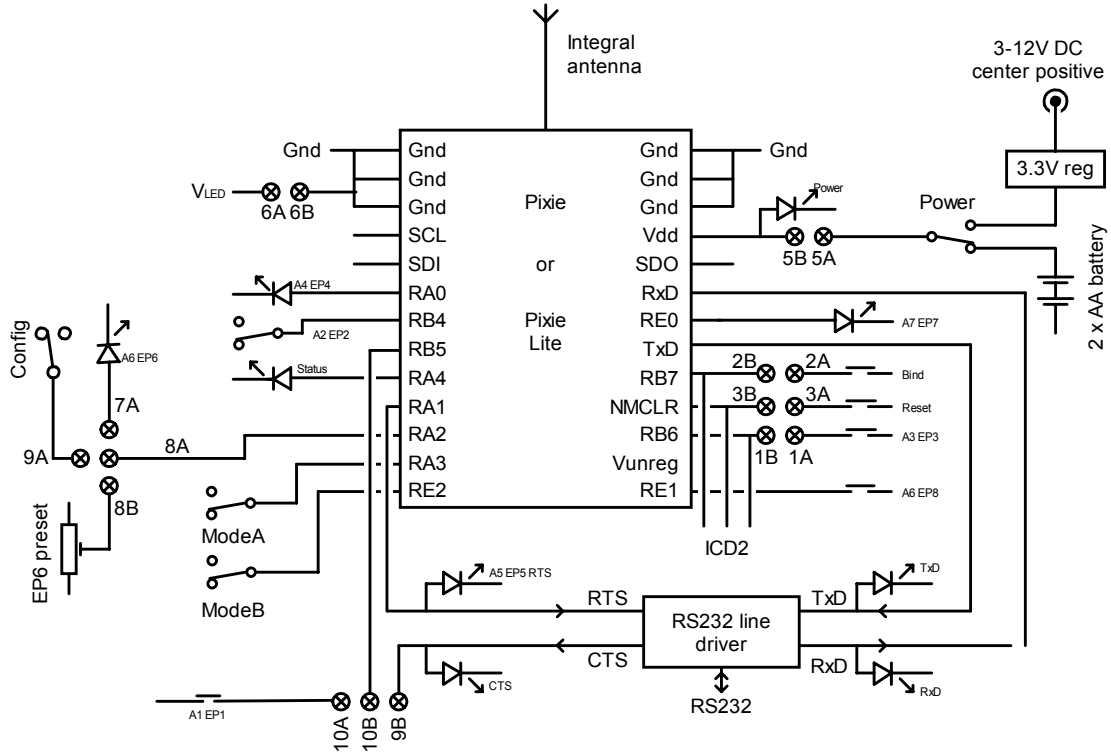
Ordering Information

Manufactured to ISO9001:2000



Part No	Description
PIXIE-EVAL	ZigBee Evaluation Board 2-pack, including 1 Pixie and 1 Pixie Lite

Schematic diagram



Firmware

The Pixie Evaluation boards are supplied in sets of two, one with a Pixie module mounted onboard, the other with a Pixie Lite module mounted on-board.

The modules are preloaded with Pixie Switcher firmware. This is simple switching firmware using the ZigBee HC-L profile for turning things on and off. A short tutorial is given on the next page. For detailed instructions, please read the Pixie Switcher data sheet. Contact us regarding the availability of other firmware.

Jumper switches

Connect 1A-1B, 2A-2B, 3A-3B during normal use. Remove them to program via the ICD2 connector.

4A-4B is not connected.

Connect 5A-5B during normal use. Connect an ammeter across these pins for current consumption measurement.

Connect 6A-6B during normal use. Remove to disconnect power from LEDs and trimmer for current measurements.

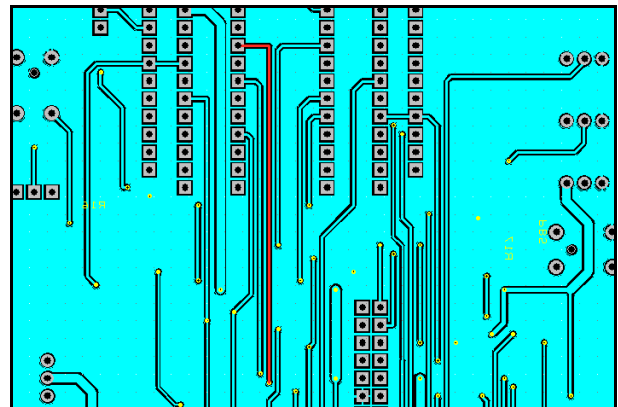
Connect 8A-7A for an LED on the RA2 pin, or 8A-8B for a trimmer, or 8A-9A for push switch.

Connect 10B-9B for RB5 to connect to CTS flow control input, or 10B-10A for push switch.

Revision ZEVr3 notes

(1) RS232 driver is not powered down by removing jumper 6A-6B.

(2) Config tool port will be TxD only unless the RxD input from the RS232 line driver and the LED is disconnected. To do this (irreversibly), use a sharp knife to cut the track on the board underside highlighted in red in the diagram below. Take care not to cut any other tracks, not to short the track to the ground plane, and not to damage the Pixie by leaning the board on it.



Quick Start Guide

The firmware loaded on the evaluation boards is Pixie Switcher. This is simple switching firmware using the ZigBee HC-L profile for turning things on and off. Contact us regarding the availability of other firmware.

The Pixie Evaluation Board (26-pin DIL module, larger PIC) is loaded with ZigBee HC-L *coordinator* firmware. The Pixie Lite evaluation board (24-pin DIL module, smaller PIC) is loaded with ZigBee HC-L sleepy *end device* firmware. You might want to label them:

Pixie Board = Coordinator

Pixie Lite Board = Sleepy End Device

This tutorial will configure eight endpoints (I/O lines) for switching. Then you will bind the two boards together so that switches on one board light LEDs on the other and vice versa.

You will need a PC and at least one RS232 serial port, preferably two.

Configuring the boards

The purpose of configuring the board is to tell the firmware what hardware is connected to it. This would usually be done at the OEM's factory with the use of a serial port or configuration tool.

1. Connect the serial port to the DB9 socket on the Pixie Evaluation Board. If you have two serial ports, connect the other to the Pixie Lite Evaluation Board; if not, just swap over the connector as needed.
2. Set up HyperTerminal session(s) on the PC for the serial port(s) with 19200 baud, 8N1, no flow control.
3. Connect the on the Pixie Evaluation Board jumpers as follows: 1A-1B, 2A-2B, 3A-3B, 5A-5B, 6A-6B, 8A-8B, 10A-10B
4. Power up the Pixie Evaluation Board. Various LEDs may turn on and initialization messages will appear in the HyperTerminal window. The Status LED will extinguish when Pixie Switcher has initialized.
5. If you are repeating this tutorial and want to start from scratch, enter **F** to perform a factory reset now.
6. You will now specify the function of the input and output pins. When initialization is complete,

press type **E** into the HyperTerminal window, and when prompted, the following characters:

TLD00M0T

(That's three zeroes, not the letter O.) You have specified the following I/O:

Endpoint (EP)	Function
1	Toggle switch
2	Latching switch
3	Time delay input
4	Output, initially off
5	Output, initially off
6	Time delay setpoint input
7	Output, initially off
8	Toggle switch

7. Connect the on the Pixie Lite Evaluation Board jumpers as follows: 1A-1B, 2A-2B, 3A-3B, 5A-5B, 6A-6B, 7A-8A, 10A-10B. Note this is slightly different from the other board.
8. Power up the Pixie Evaluation Board. Various LEDs may turn on and initialization messages will appear in the HyperTerminal window. The sleepy end device is looking for a network to join. The Status LED will extinguish when Pixie Switcher has initialized.
9. If you are repeating this tutorial and want to start from scratch, enter **F** to perform a factory reset now. If the end device board keeps going into sleep mode, reset it without the other board powered up to stop it sleeping.
10. You will now specify the function of the input and output pins. When initialization is complete and the Status LED has extinguished, press type **E** into the HyperTerminal window, and when prompted, the following characters:

TLT01TUU

(That's zero-one.) You have specified the following I/O:

Endpoint (EP)	Function
1	Toggle switch
2	Latching switch
3	Toggle switch
4	Output, initially off
5	Output, initially on
6	Toggle switch
7	Unassigned
8	Unassigned

11. Enter **W** repeatedly until you get the message:

Wakeup mode: 04

You have specified that you want the device to sleep and wake up every 2 seconds to check for messages. If the Bind switch or any of EP1 – EP3 are pressed, it will wake immediately. Sleeping only takes effect once the device has joined the network.

Joining

The rest of the quick start guide does not require the serial connections, but you may wish to leave them connected to read the diagnostic messages out of interest. These steps are one-time only and would normally be done on-site at the time the equipment is installed by the customer or technician.

12. Power up and/or reset the Pixie Evaluation Board. The coordinator finds an unused frequency and starts a network on it.
13. Power up and/or reset the Pixie Lite Evaluation Board. The sleepy end device will look for a network to join. The Status LED will flash the letter **O** in Morse code (dash, dash, dash) indicating it is an orphan.
14. Press the Bind button on the coordinator (Pixie Evaluation Board) once. You are telling the coordinator to allow other devices to join the network. After a one-second delay, the Status LED will flash the letter **J** in Morse code (dot, dash, dash, dash) indicating it is permitting joining.
15. After a few seconds, both devices will flash the letter **Y** in Morse code (dash, dot, dash, dash) indicating that the join was successful. The end device (Pixie LITE Evaluation Board) is now a member of the coordinators network. You will see both Status LEDs flash every two seconds as the sleepy end device wakes up and checks for messages.
16. Press the Bind button on the end device once. The Status LED will flash a number to you as a series of 0-10 long pulses (tens) followed by series of 0-9 short pulses (units). This is the signal strength, an indication of the quality of the link between the end device and its parent.

The signal strength can be used to establish the effect of various obstacles during network installation. The value reported is the signal strength of the last packet of data received from the parent. Signal strength is on a scale of 0 (-110dBm) to 110 (0dBm).

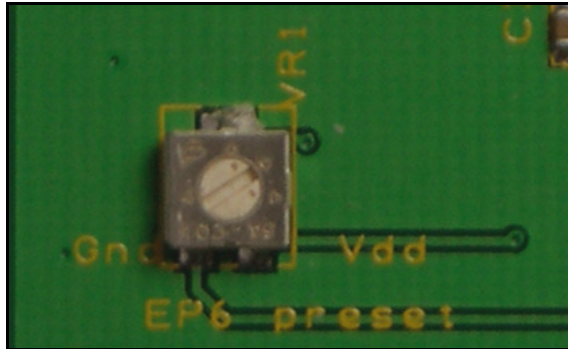
Binding and Switching

You will now bind individual endpoints together. This involves multiple presses of the Bind button on both devices. Note that the number of times the button is pressed is always the endpoint number plus one, e.g. to bind EP2, press the button 3 times.

17. Press the bind button on the coordinator twice in reasonably quick succession, then on the end device 6 times. After a few seconds, both devices will flash the letter **Y** in Morse code (dash, dot, dash, dash) indicating that the bind was successful.
18. You have now bound pushbutton EP1 on the coordinator to LED EP5 on the end device. Press the button EP1 on the coordinator and it will toggle the state of the EP5 LED on the end device. Note it can take up to two seconds to respond, because the end device spends much of its time sleeping.
19. Press the bind button on the coordinator 9 times, then on the end device 6 times. After a few seconds, both devices will flash the letter **Y** in Morse code (dash, dot, dash, dash) indicating that the bind was successful.
20. You have now also bound pushbutton EP8 on the coordinator to LED EP5 on the end device. Pressing either button EP1 or EP8 on the coordinator will toggle the state of the EP5 LED on the end device. This is how multiple inputs can control one output.
21. Press the bind button on the end device 3 times, then on the coordinator 5 times. After a few seconds, both devices will flash the letter **Y** in Morse code (dash, dot, dash, dash) indicating that the bind was successful.
22. You have now bound latching switch EP2 on the end device to LED EP4 on the coordinator. Throwing switch EP2 on the end device will set the state of the EP4 LED on the coordinator. Note the response is immediate, since the end device is woken by interrupt and sends the message immediately.
23. Press the bind button on the end device 3 times, then on the coordinator 6 times. After a few seconds, both devices will flash the letter **Y** in Morse code (dash, dot, dash, dash) indicating that the bind was successful.
24. You have now also bound latching switch EP2 on the end device to LED EP5 on the coordinator. Throwing switch EP2 on the end device and will set the state of both EP4 and EP5 LEDs on the coordinator. This is how one input can control

multiple outputs. You could, for example, have one pushbutton light switch turn off all the lights in a house.

25. Set the position of trimmer EP6 to the position shown, so the wiper is approximately 0.48V.



26. Press the bind button on the coordinator 4 times, then on the end device 5 times. After a few seconds, both devices will flash the letter **Y** in Morse code (dash, dot, dash, dash) indicating that the bind was successful.
27. You have now bound timer switch EP3 on the coordinator to LED EP5 on the end device. Pressing EP3 on the coordinator will light EP5 on the end device and then extinguish it after about 8 seconds. The time delay can be set from 1 second to 18 hours using the trimmer EP6.

Voltage range	Time delay
0.00V – 0.67V	From 1 sec to 10 sec in 1 sec steps
0.67V – 1.33V	Varies linearly from 10 sec to 60 sec
1.33V – 2.00V	Varies linearly from 1 min to 10 min
2.00V – 2.67V	Varies linearly from 10 min to 60 min
2.67V – 3.33V	Varies linearly from 1 hr to 18 hrs

28. Not all endpoints specified in steps 6 and 10 have been bound. So experiment with binding them. Also try un-binding, which is simply to repeat the binding process on an already bound pair of endpoints.

Failsafe Alarms

One significant feature not demonstrated here is the failsafe alarm. This is because it requires two Pixies, it is not implemented on Pixie Lite.

The failsafe alarm works as follows. An input endpoint wakes up regularly (every hour, say) to send a message saying “I’m still here”. If the output it is bound to does not hear from the input for a while (three hours, say), it raises an alarm. In this way the network is tested regularly.

Contact Details

Sales

FlexiPanel ZigBee products are manufactured and distributed by:



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