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PropStick USB (#32210)
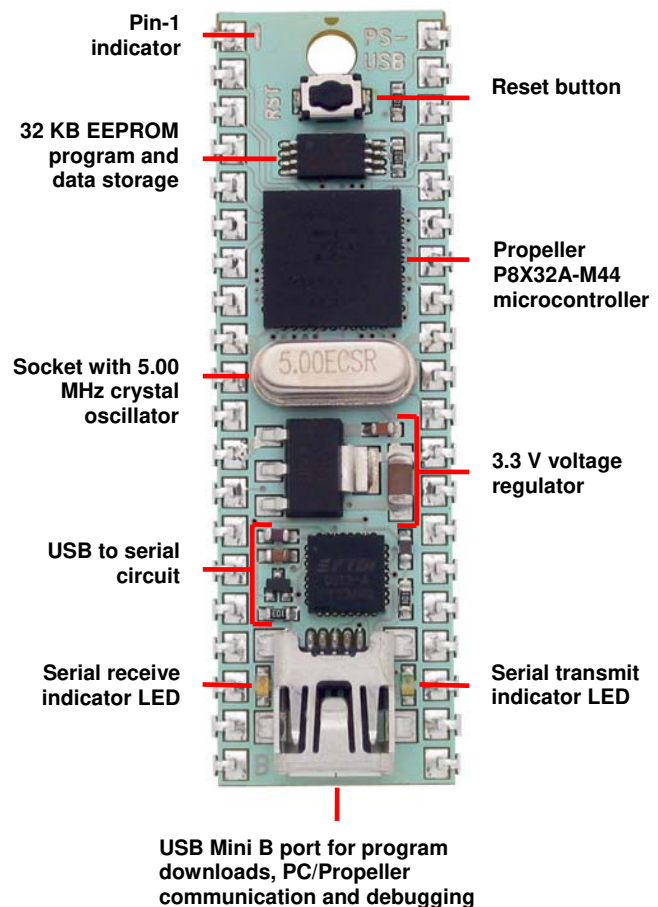## P8X32A Module with USB Programming Port

The PropStick USB is a complete Propeller development tool with a convenient built-in USB programming interface. The PropStick USB module comes fully assembled, with a USB A to Mini-B Retractable Cable (#805-00010).   The PropStick USB is suitable for all new Propeller-based designs. PropStick USB mounting possibilities include breadboard, perfboard with wire-wrap, or in a 600 mil 40-pin socket soldered to a PCB.

Features

- P8X32A-M44 8-cog multiprocessing microcontroller
- 32 KB EEPROM
- 3.3 V regulator with power and ground connections
- 5.00 MHz removable crystal oscillator
- Reset button
- FTDI 232R USB interface with red and blue LEDs for transmit/receive activity
- 600-mil wide 40-pin DIP package, modeled after the P8X32A-D40
- USB A to Mini-B Retractable Cable included

Key Specifications

- Power requirements: regulated 5-9 VDC. (See Current Consumption and Availability below)
- Communication: 232R USB interface to PC for programming and bidirectional communication
- Operating temp: 0 to 70 °C (32 to 158 °F)
- Dimensions: 2.0 x 0.6 x 0.45 in (51 x 16 x 12 mm)

Pin-1 indicator

Reset button

32 KB EEPROM program and data storage

Propeller P8X32A-M44 microcontroller

Socket with 5.00 MHz crystal oscillator

3.3 V voltage regulator

USB to serial circuit

Serial receive indicator LED

Serial transmit indicator LED

USB Mini B port for program downloads, PC/Propeller communication and debugging

USB VCP Drivers Required

The PropStick USB requires FTDI USB drivers. These drivers for Windows 2K/XP/Vista are installed automatically with the Propeller Tool Software available from the Downloads link at www.parallax.com/Propeller.   To install these drivers separately, click on the USB Drivers link at the bottom of the home page at www.parallax.com and follow the USB Driver installation steps as shown there. That page provides a link to troubleshooting instructions if needed.

Current Consumption and Availability

The PropStick USB contains an on-board 3.3 V voltage regulator. Depending on the voltage input into the PropStick USB and the ambient temperature, the maximum current available to power your Propeller chip and application circuits will vary. For example, assuming a room temperature of 80 °F (26.7 °C), your maximum available current with a 5 VDC supply is 280 mA. At 9 VDC, the available current drops to 84 mA. For information about the Propeller chip's current consumption under different operating scenarios, refer to the Propeller Datasheet (available from the Downloads link at www.parallax.com/propeller).

Calculation of Maximum Current Draw

According to the National Semiconductor's LM2937 datasheet (available from www.national.com), the maximum allowable junction to ambient thermal resistance (θ_{JA}) for the SOT-223 package used on the PropStick USB is 174 °C/W. This quantity can be described in terms of the maximum allowable temperature rise ($T_{R(max)}$) and the power dissipated (P_D) as:

$$\theta_{JA} = \frac{T_{R(max)}}{P_D} \leq 174 \, ^\circ C \big/ W$$

...where $T_{R(max)}$ is the difference between the maximum junction temperature $T_{J(max)}$, which is fixed at 125 °C for the LM2937IMP-3.3, and the maximum ambient temperature $T_{A(max)}$, which varies depending on your local environment:

$$T_{R(max)} = T_{J(max)} - T_{A(max)} = 125^\circ C - T_{A(max)}$$

P_D is also related to the input voltage (V_{IN}), output voltage (V_{OUT}), load current (I_L), and quiescent current (I_G) by:
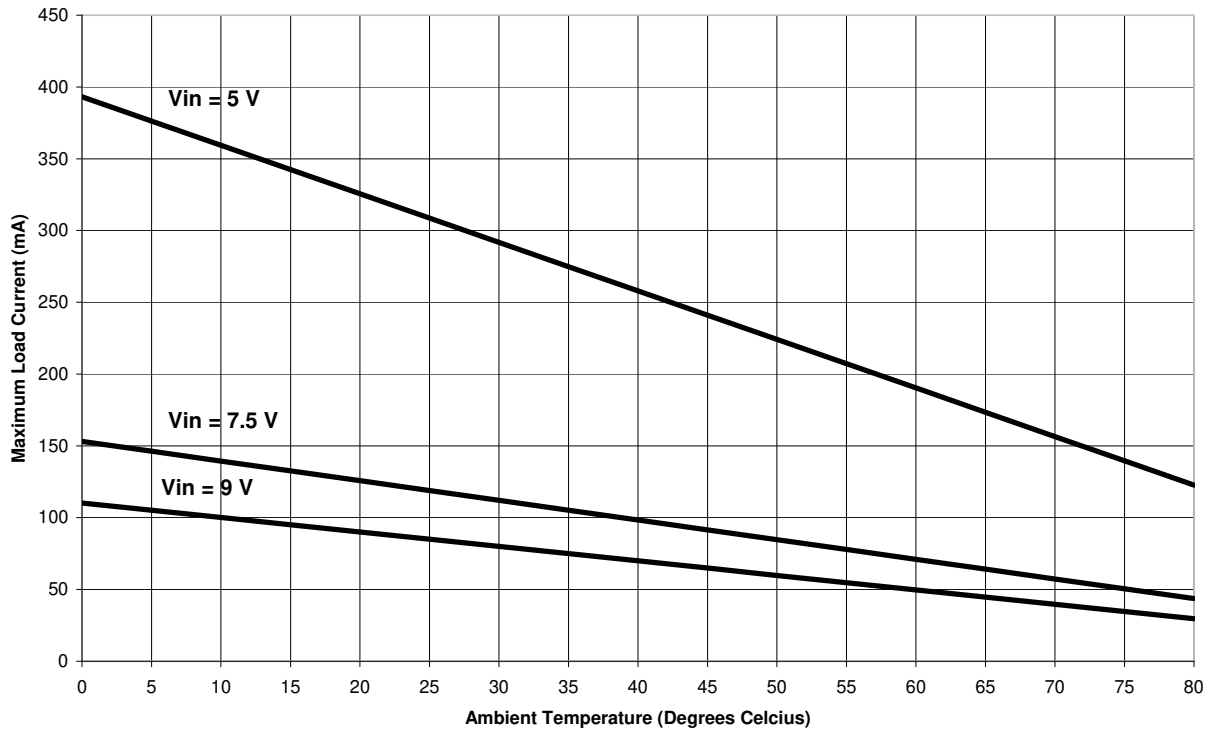
$$P_D = (V_{IN} - V_{OUT}) \bullet I_L + (V_{IN}) \bullet I_G$$

For the PropStick USB, V_{IN} = Your Input Voltage, V_{OUT} = 3.3 V, $T_{A(max)}$ = Operating Temperature (26.7°C for room temperature), and from the datasheet, I_G will not exceed 10 mA. You can solve for your load current in terms of the other variables and constants using the following formula:

$$I_L \leq \frac{\dfrac{T_{J(max)} - T_{A(max)}}{\theta_{JA}} - (V_{IN}) \bullet I_G}{V_{IN} - V_{OUT}}$$

The graph on the following page depicts how input voltage and ambient temperature affect the maximum load current of the PropStick USB.

Ambient Temperature vs. Maximum Load Current

Schematic and Pin Map

The PropStick USB was closely modeled after the P8X32A-D40, the DIP format Propeller chip. There are only three places where the PropStick USB varies from the P8X32A-D40 in pin assignments:

- Pin 10 (BOEn) is tied to VSS, permanently enabling the brown-out detector.
- Pin 12 (VIN) is the input to the onboard regulator and should be supplied with 5-9 VDC.
- Pin 32 (VDD) is the output of the regulator and provides up to 280 mA of 3.3 VDC to power the Propeller circuit and your projects (see Current Consumption and Availability above). Alternatively, the on-board regulator may be bypassed by connecting an externally regulated 3.3 VDC to VDD.

NOTE: The PropStick USB is **not** for use in 40-pin BASIC Stamp boards made by Parallax (as in the Professional Development Board or BS2p40 Demo Board).

Schematic (Rev D)