QUICK START GUIDE

SN171 Proto Board

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1. Introduction

This Quick Start guide attempts to point out the most important features of the Synapse SN171 Proto Board**.** This break-out/prototyping board has been created to make it easy to evaluate the Synapse RF Engine (RFE).

The SN171 Proto Board provides easy access to **all 19** General Purpose I/O (GPIO) pins of the RF Engine, including:

- 19 Digital Inputs or Outputs
- 8 Analog Inputs
- 2 UART ports

> **Note:** The analog input and serial port functionality share pins with the digital I/O - you can only have a **total** of 19 functions at one time. Please refer to the existing RF Engine Datasheet for more details.

On the SN171 Proto Board, none of the I/O pins are dedicated to a single function. At the same time, we wanted to make it easy to test drive "basic functionality" like blinking a LED, reading a push-button switch, and communicating over a serial port.

To accomplish this, various jumpers can be installed to connect different RF Engine General Purpose I/O (GPIO) pins to some on-board peripherals.

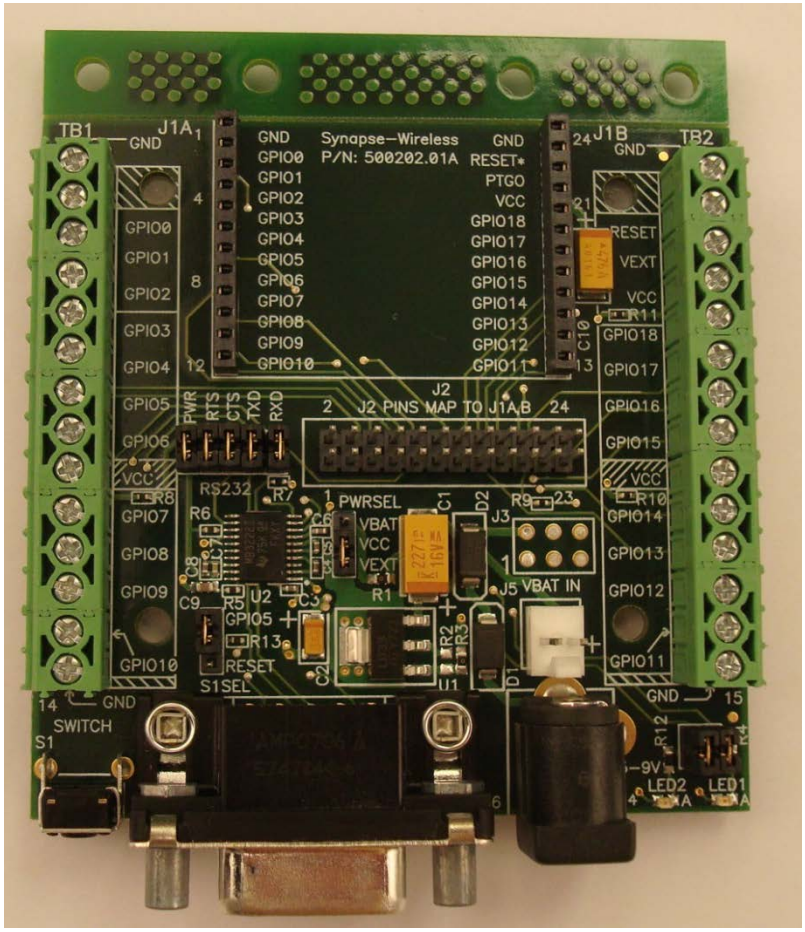

Figure 1 - Overhead view of SN171 Proto Board with no RF Engine installed

2. Using the SN 171

On-Board Peripherals List

From a hardware configuration (jumper setting) standpoint, there are *five* hardware sub-systems to be aware of:

- Voltage Regulator
- **LED1** – green
- **LED2** – yellow
- **S1** - push-button switch
- RS-232 port - DB9

Figure 2 - SN171 Proto Board with RF Engine Installed

Powering Options

The SN171 Proto Board can be powered (VCC) through any one of three different connectors:

- Barrel connector labeled **J4** (circled in red)
- The **VEXT** pin on terminal block **TB2** (circled in yellow)
- White two-pin header labeled **J5 VBAT IN** (circled in blue)

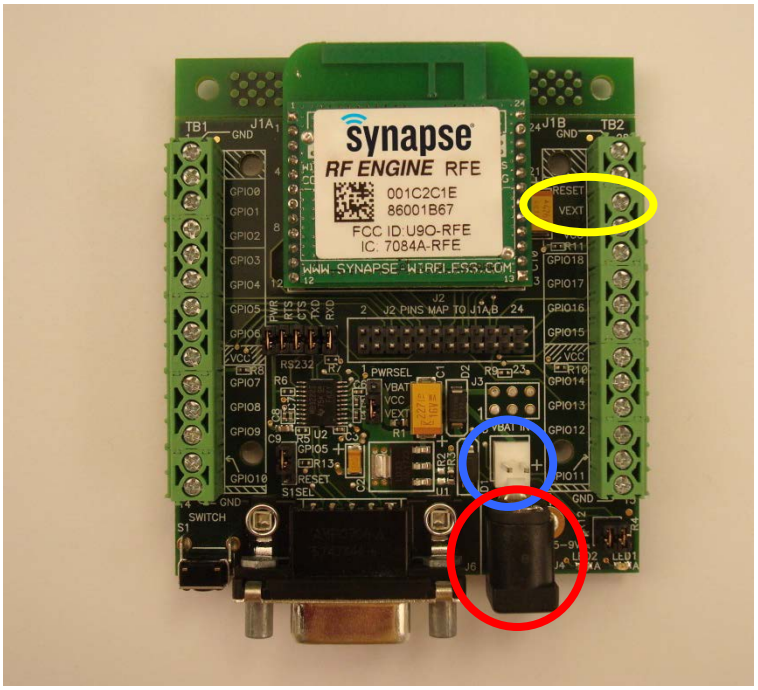

Figure 3 - Three places to apply power

The **J5 VBAT IN** connector accepts 2.7-3.4 volts DC.

The **VEXT** pin (on terminal block **TB2**) and connector **J4** both accept 5-9 volts DC.

The **PWRSEL** jumper, located near the center of the board, chooses between the **J5 VBAT IN** connector, or either of the **J4**/**VEXT** pin connectors. Pin 1 is marked on the silk-screen, plus the individual pins 1, 2, and 3 are labeled **VBAT**, **VCC**, and **VEXT**.

Jumper	**When Installed**
PWRSEL	Connect pins 1-2 (**VBAT** to **VCC**)to get VCC from **J5 VBAT IN**
PWRSEL	Connect pins 2-3 (**VCC** to **VEXT**)to get VCC from **VEXT** or **J4**

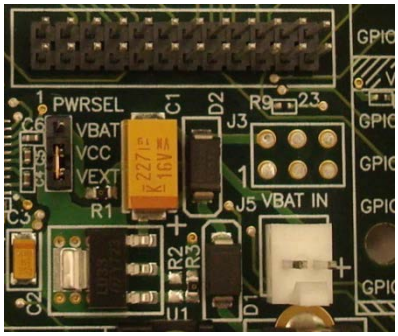

Figure 4 - SN171 jumpered for VCC = VEXT

On-board LEDs

Jumper	When Installed
JMP3	**LED1** (green) can be controlled via GPIO 1
JMP4	**LED2** (yellow) can be controlled via GPIO 2

Simply remove these jumpers to reclaim these pins for other purposes.

Figure 5 - LEDs enabled (both jumpers installed)

On-board Push-Button

Push-button switch **S1** is a normally open momentary contact switch that can be connected to *processor reset*, pin GPIO 5, or neither.

Figure 6 - S1SEL jumpered for S1 = RESET

Jumper	When Installed
S1SEL	Connecting pins 1-2 connects **S1** to **GPIO5**
S1SEL	Connecting pins 2-3 connects **S1** to **RESET**

You can also leave the jumper off entirely, and switch **S1** will do nothing.

RS-232 Port

The RF Engine's UART signals are 3.3 volt logic level, and so must go through a line interface chip before they can be directly used for RS-485, RS-232, etc.

The SN171 Proto Board includes a RS-232 line driver that can optionally be used with UART 1 (SCI 2). Note that this is the *second* serial port of the RF Engine. The first RF Engine serial port is always 3.3 volt logic level.

The RS-232 line driver is enabled and configured through a bank of five jumpers labeled **RS232**.

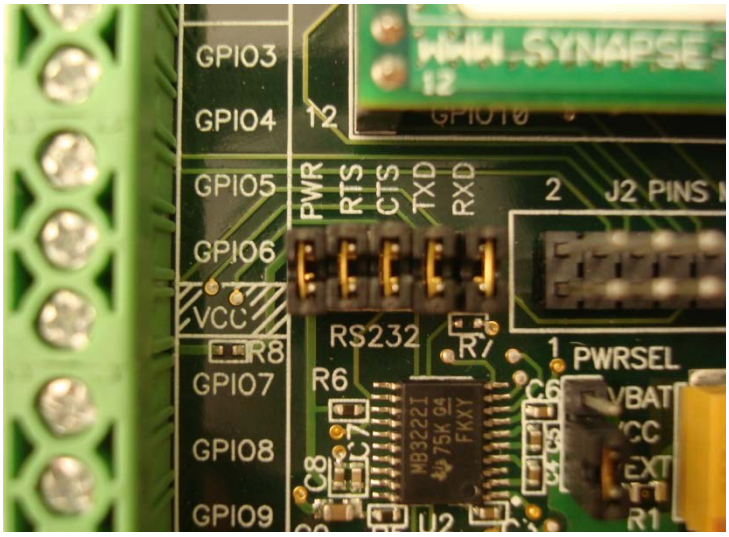

Figure 7 - The five RS232 jumpers

Jumper	When Installed
PWR	The RS-232 chip is powered up
RTS	UART 1 RTS is RS-232
CTS	UART 1 CTS is RS-232
TXD	UART 1 TXD is RS-232
RXD	UART 1 RXD is RS-232

Removing one of the **RTS**, **CTS**, **TXD**, or **RXD** jumpers disconnects the corresponding RS-232 signals from the DB-9 connector **J6**. The corresponding 3.3 volt logic level signals remain available at terminal block **TB1** and 24-pin header **J2**.

Remove all five jumpers (**PWR, RTS**, **CTS**, **TXD**, and **RXD)** to disable (power down) the entire RS-232 line driver chip.

NOTE: Removing the PWR jumper but leaving any of the other four jumpers connected can result in the unit being unable to start up.

Connectivity Options

Two terminal blocks (one on each side of the board) provide access to all of the GPIO pins, *plus* various POWER, GND, and RESET signals.

NOTE: That these terminal blocks DO NOT have the exact same pin-out as the two headers on the RF Engine!

The RF Engine headers have a total of 24 pins, the two terminal blocks have 28 pins total. The extra pins are

additional GND and POWER connections. Notice the power (**VCC**) pin between **GPIO6** and **GPIO7**. Also notice the power (**VCC**) pin between **GPIO14** and **GPIO15**, and also one next to **GPIO18**.

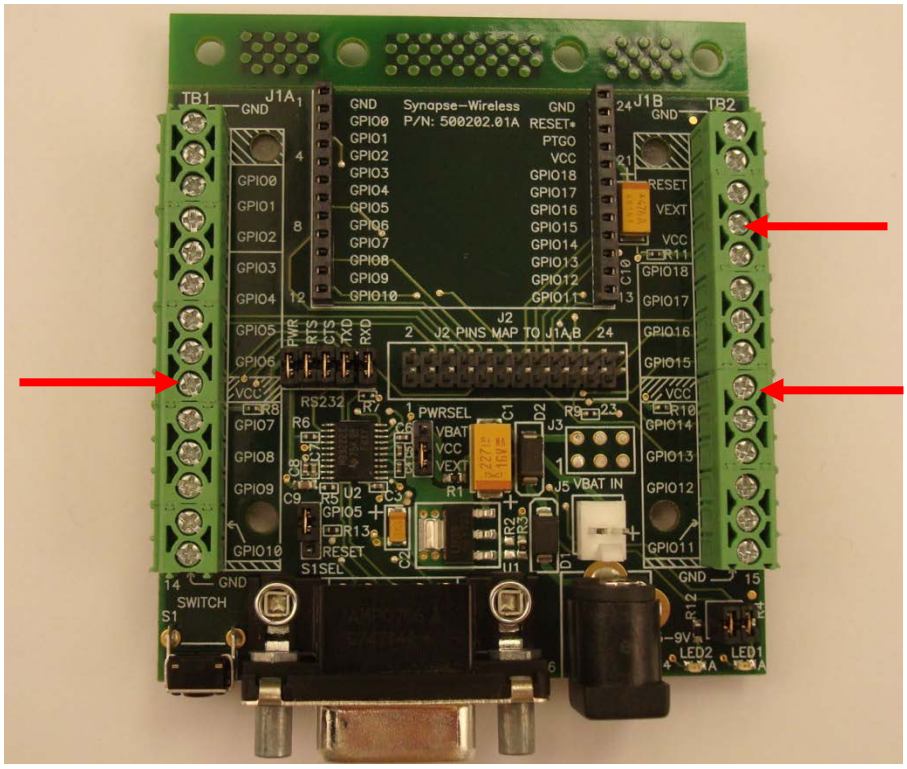

Figure 8 - Terminal Blocks on each side of the board

In addition to the two terminal blocks, the RF Engine signals are also available at connector **J2** (when loaded).

Note that connector **J2** has only 24 pins, and maps to connectors **J1A** and **J1B**, not terminal blocks **TB1** and **TB2**.

Connector Table

Connector	Description
J1A	12 pin header, one of two that connect to the Synapse RF Engine
J1B	12 pin header, the second of two that connect to the RF Engine
TB1	14 position terminal block that provides all **J1A** signals, ***plus*** *some additional power and ground pins*
TB2	14 position terminal block that provides all **J1B** signals, ***plus*** *some additional power and ground signals*
J2	A 24 pin connector that provides alternate connection points to the RF Engine signals Note that pins 1-12 of J2 map to connector J1A (not TB1) and pins 13-24 of J2 map to connector J1B (not TB2)
J3	This is a standard *Background Debug Mode* (BDM) interface to the RF Engine's microprocessor. This connector is usually not installed.
J4	Barrel connector for external DC power (5 - 9 volt range)
J5	Connector for external “Battery" power (2.7 - 3.4 volt range)
J6	This is the DB9 connector for the RS-232 line interface

Mounting Options

When a Synapse RF engine with SMA connector is used, it is recommended that the mounting holes provided on the engine (either side of the SMA connector) be used with the included mounting hardware to hard mount the module to the SN171 proto board. The mounting hardware consists of two plastic standoffs. This allows the unit to handle the mechanical stresses that can occur when an external antenna is screwed into the SMA. Figure 9 shows the RF Engine with SMA connector mounted to the Proto Board.

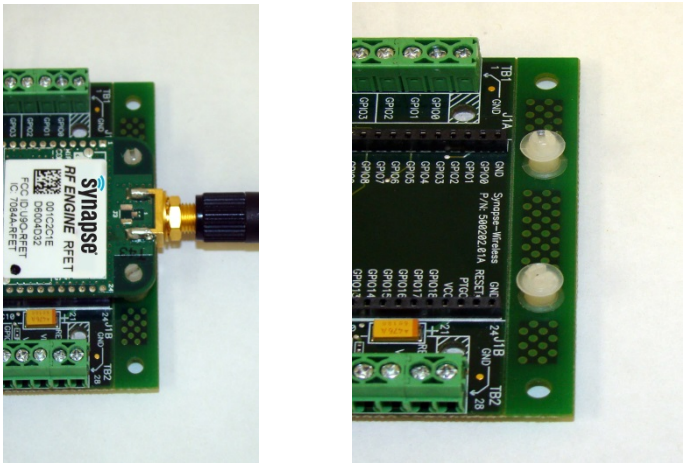

Figure 9 – SN171 Board with RF Engine Mounted and Mounting Hardware

When using a Synapse RF engine with integrated F-antenna, in order to maximize RF range in the direction behind the module, it is recommended that no components and no metal be placed in the area that lies underneath the engine directly below the internal antenna. It is also recommended that users remove the PCB mounting tab located directly below the F-antenna.

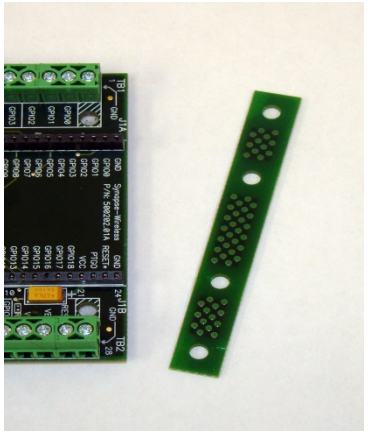

Figure 10 – SN171 with Mounting Tab Removed