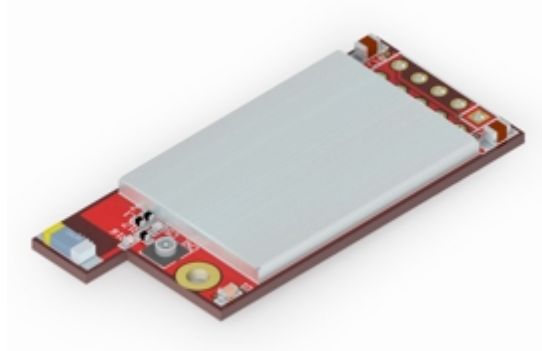# GA1000

Introduction

The GA1000 Wi-Fi add-on module further expands the scope of potential applications for Tibbo BASIC-programmable modules by adding 802.11b/g communications capability to the already powerful hardware mix. The GA1000 can be used with these Tibbo devices: EM1000, EM1202, EM1206, EM500.

The module utilizes an SPI interface and only requires five GPIOs to control. This can be reduced to four if two NAND gates are used to generate reset signal. On the EM500, the number is even down to three lines! For more information, see Connecting GA1000 to Tibbo Devices.
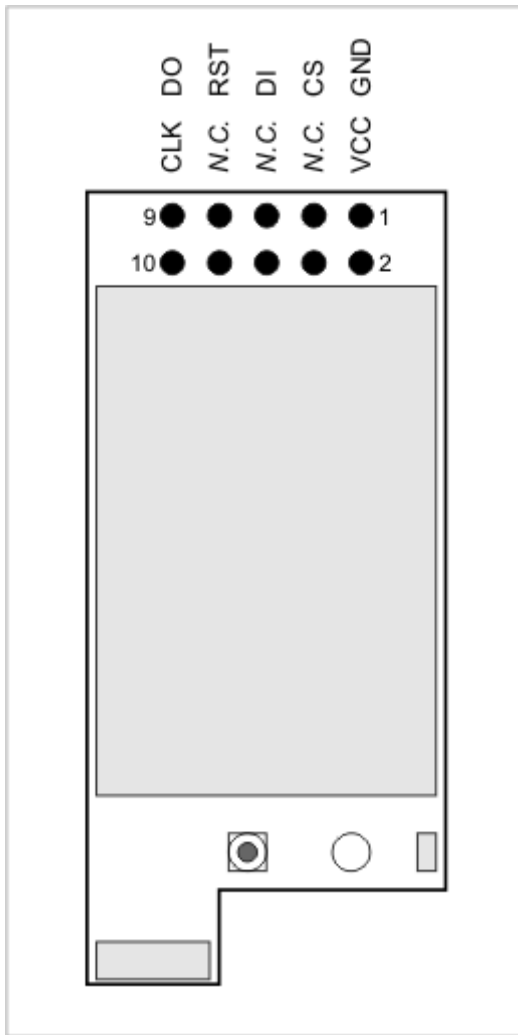
The GA1000 is fully supported by TIDE software (see "TIDE and Tibbo BASIC Manual", wln. object). For convenient testing and evaluation Tibbo offers EM1206EV, EM1000TEV and EM1000EV development systems.

Please note that the GA1000 is a slave device and cannot be used on its own. This add-on will only work together a BASIC-programmable Tibbo module.

Hardware features

• Superior upgrade to the now obsolete WA1000 module.

• Implements 802.11b/g Wi-Fi standard.

• Compatible with EM1000, EM1202, EM1206, and EM500 modules.

• Requires 3-5 GPIO lines to control.

• Chip antenna onboard, coaxial connector for external antenna.

• Red status LED for scan/link indication.

• Max. power: 280 mA (max) @ 3.3V.

• Dimensions: 42.0x19.0x6.7mm.

I/O Pin Assignment and Pin Functions

I/O pin assignment

Pin #	Function	Description
1	GND	System ground.
2	VCC	Positive power input, 3.3V nominal, +/- 5%.
3	CS	Chip select, active LOW (input*).
4	N.C.	*No connection.*
5	DI	SPI port, data in (input*, must be connected to DO of Tibbo module).
6	N.C.	*No connection.*
7	RST	Reset, active LOW (input*).
8	N.C.	*No connection.*
9	DO	SPI port, data out (output*, must be connected to DI of Tibbo module).
10	CLK	SPI port, clock (input*).

Connecting GA1000 to Tibbo Devices

GA1000 interface

The GA1000 communicates with Tibbo devices through an SPI interface. Your device will control the GA1000 through five GPIO lines:

- **CS** -- SPI bus, chip select (active low);

- **CLK** -- SPI bus, clock;

- **DI** -- SPI bus, data in (must be connected to the GA1000's DO);

- **DO** -- SPI bus, data out (must be connected to the GA1000's DI);

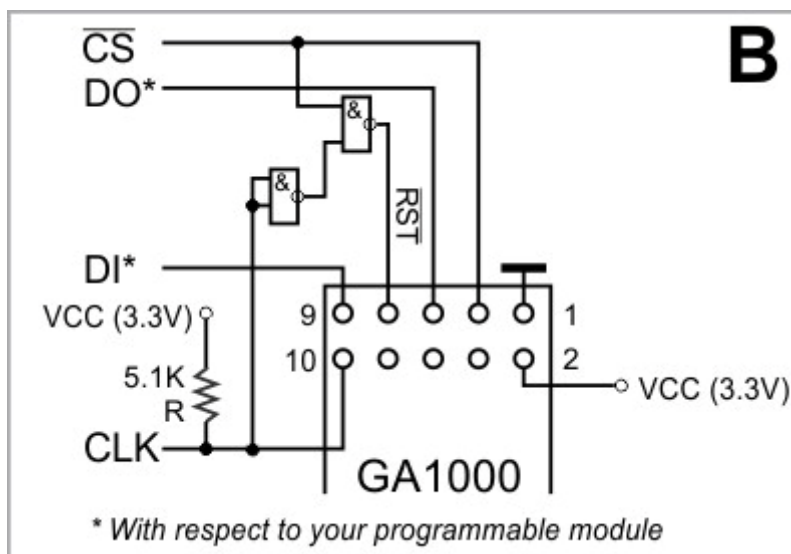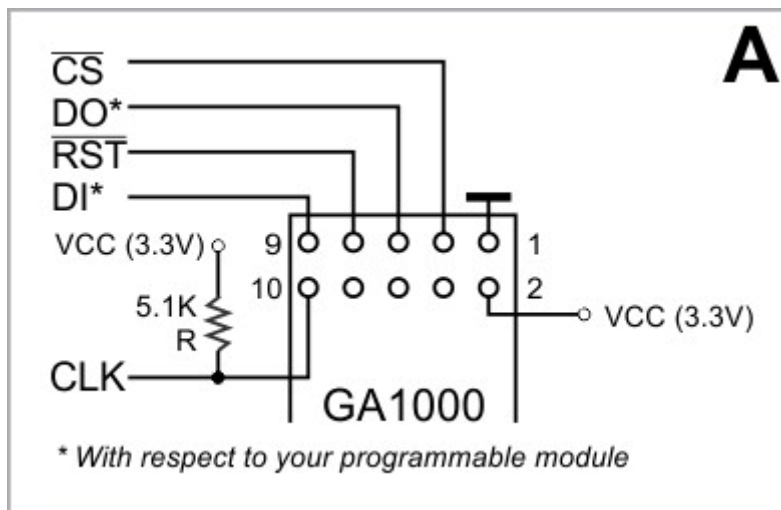- **RST** -- reset (active low). This line can be eliminated -- see below for details.

On the EM1000, EM1202, and EM1206, do not forget to configure CS, CLK, DO, and RST as outputs. DI must be configured as input. The wln. object won't do this automatically. GPIO configuration is not necessary on the EM500, whose lines are bidirectional.

Providing hardware reset

The wln. object directly controls CS, CLK, DI, and DO lines. Your application, however, must take care of the proper hardware reset for the GA1000. There are two methods for doing this:
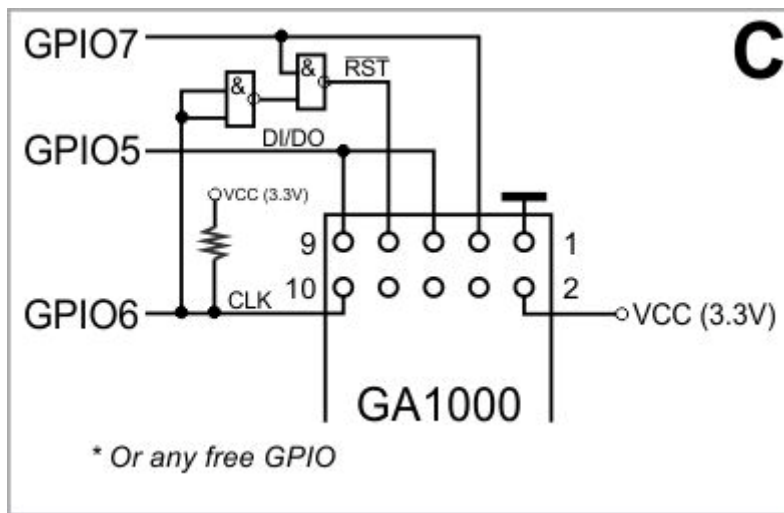
- Use a dedicated GPIO line to act as the RST line of the GA1000 interface (shown on diagram A below).

- Use 2 NAND gates to combine CS and CLK signals and produce the reset signal for the GA1000 (shown on diagram B). This approach takes advantage of the fact that during SPI communications, CLK line will never be LOW while the CS line is HIGH. Schematic diagram on figure B generates reset when CS=HIGH and CLK=LOW. This way you save one GPIO line of your programmable module.

A

B

Tibbo devices differ in whether the CS, CLK, DI, and DO lines are remappable. On the EM1000, EM1202, and EM1206, you can choose any set of GPIOs to control the GA1000. On the EM500 where remapping isn't provided, you just have to use "prescribed" GPIO lines.

Special case -- the EM500

Diagram C shows the recommended way of connecting the GA1000 to the EM500 module. GPIO lines are a precious commodity on the EM500 -- there are only eight of them available. As seen on the diagram C, you can get away with using only three lines to control the GA1000 (against the standard five lines). One line is saved by producing the reset out of CS and CLK lines. The second line is saved because EM500's bidirectional GPIOs allow interconnecting DI and DO. The EM500 does not allow remapping of GA1000 lines, so GPIO line assignment shown below cannot be changed.

Status LED

The GA1000 has a single red status LED:

•During scanning (see wln.scan*), the LED blinks.

•When the GA1000 is associated with an access point (see wln.associate*), the LED is ON.

•When the GA1000 is in ad-hoc mode and has another peer connected to it, the LED is ON as well.

•In all other cases, the LED is off.

*See "TIDE and Tibbo BASIC Manual", .wln object documentation.