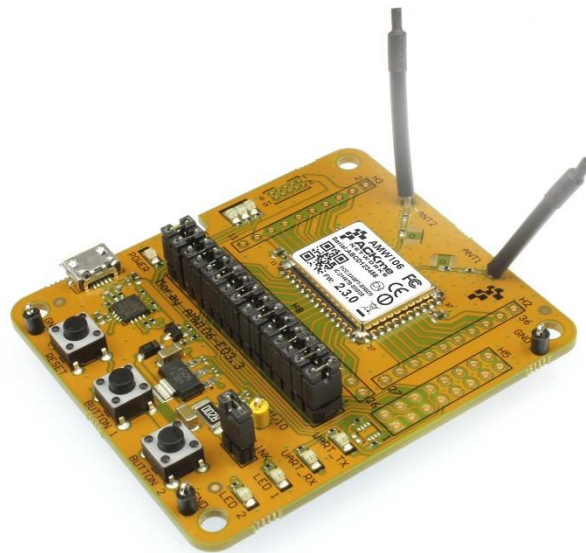




AMW106 Evaluation Guide



AMW106-E03
'Moray'

Disclaimer

While the information provided in this document is believed to be accurate, it is under development and ACKme Networks reserves the right to make changes without further notice to the product described herein to improve reliability, function, or design, and makes no guarantee or warranty concerning the accuracy of said information, nor shall it be responsible for any loss or damage of whatever nature resulting from the use of, or reliance upon, such information. ACKme Networks makes no warranties of any kind, whether express, implied or arising by custom or course of trade or performance, and specifically disclaims the implied warranties of title, non-infringement, merchantability, or fitness for a particular purpose.

No part of this document may be copied, reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photographic, or otherwise, or used as the basis for manufacture or sale of any items without the prior written consent of ACKme Networks.

Trademarks

ACKme Networks and the ACKme Networks logo are trademarks of ACKme Networks. WICED™ is a trademark of Broadcom® Corporation, Inc. Other trademarks in this document belong to their respective owners.

Copyright © 2014-2015 ACKme Networks, Inc.

All rights reserved.

Document Number: ARG-MW106E-101R

Release Date: September 1, 2015

Contact

<http://ack.me/contact>

About this User Guide

This guide provides information and basic usage instructions for the WiConnect serial Wi-Fi application and the AMW106 'Numbat' module available from ACKme Networks.

Evaluation boards covered by this guide include:

- AMW106-E03 'Moray' (Revision 3)

Further information about WiConnect is available in the WiConnect Reference manual online at:

<http://wiconnect.ack.me>

Organization

This document is organized into the following sections:

- [Introduction](#)
- [Feature Identification](#)
- [Using WiConnect](#)
- [Measuring Power Usage](#)
- [Ordering Information](#)
- [Revision History & Glossary](#)
- [Appendix A – Setting up a Terminal Emulator](#)
- [Appendix B – Evaluation Board Schematics](#)

Contents

1	Introduction	1
2	Feature Identification	2
2.1	AMW106-E03 ‘Moray’	2
3	Using WiConnect.....	4
3.1	Getting Help.....	4
3.2	System Indicator LEDs	5
3.3	Scanning for Wi-Fi Networks	5
3.4	Joining a Wi-Fi Network.....	5
3.4.1	Web Setup	5
3.4.2	Script Setup.....	6
3.4.1	Manual Setup.....	7
3.4.2	Wireless Protected Setup (WPS)	8
3.5	Filesystem	8
3.6	Saving Custom Configurations.....	9
3.7	UDP / TCP / TLS Clients.....	9
3.8	HTTP / HTTPS Clients	10
3.9	Using GPIOs	10
3.10	Factory Reset	11
3.11	Save & Reboot	11
3.12	Command vs. Stream Mode	12
3.12.1	Command Mode	12
3.12.2	Stream Mode	13
3.13	Want more?.....	13
4	Measuring Power Usage	13
4.1	Measuring Coarse Current Consumption	13
4.2	Measuring Sleep Current.....	13
5	Ordering Information.....	14
6	Revision History & Glossary	15
6.1	Revision History	15
6.2	Glossary	15

APPENDIX A – Configuring a Terminal Application

APPENDIX B – Evaluation Board Schematics

1 Introduction

The family of AMWx06 ‘Numbat’ modules are fully certified small form factor, low power Wi-Fi networking modules perfectly suited to deeply embedded applications requiring medium/high data throughput in medium to high volume.

The Sensors.com WiConnect Operating System is pre-installed on all AMWx06 modules. WiConnect provides products with an intuitive, reliable and secure Wi-Fi networking connection featuring an embedded TCP/IP networking stack that includes a webserver with REST & websockets, a fully customizable javascript-based web application and SSL/TLS security.

Evaluation of WiConnect and the AMWx06 module is available with the AMW106-E03 ‘Moray’ evaluation board. The evaluation board is shown in Figure 1 and its features are shown in Table 1.

This document describes how to use the Moray evaluation board populated with an AMW106 module, usage is however identical whether the board is populated with an AMW006 module or an AMW106 module.

Figure 1. AMW106 Moray Evaluation Board



AMW106-E03 ‘Moray’
(with AMW106 surface mount module)

Table 1. AMW106 Evaluation Board Features

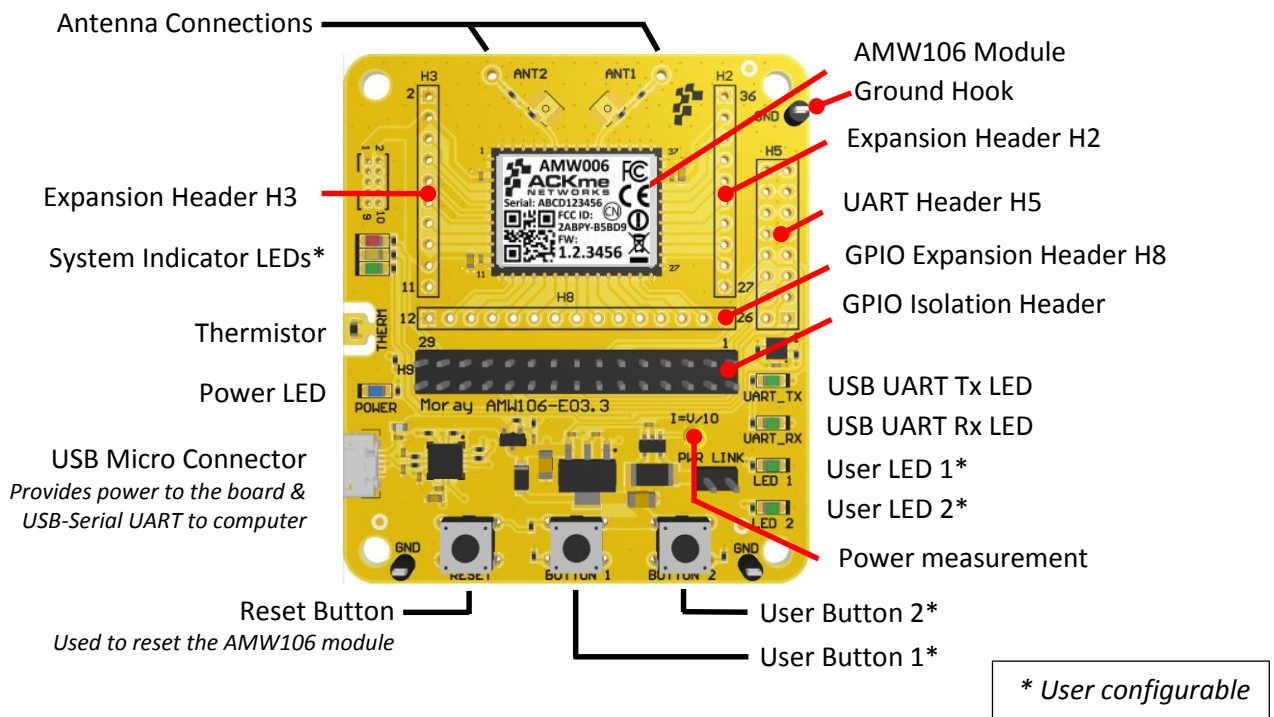
Feature	AMW106-E03 ‘Moray’
Product Number	AMW106-E03
Module style	Surface mount
Serial Interface	USB-UART
Power supply	from USB
User LEDs	2 + 3
User Buttons	2
Reset Button	Yes
GPIO Expansion Headers	35-pin
GPIO Isolation Header	2x15-pin

2 Feature Identification

2.1 AMW106-E03 'Moray'

The Moray evaluation board comes complete with a surface mount AMW106 'Numbat' module. Each pin on the Numbat module is connected to the expansion header. Schematics for the board are provided in Appendix B.

Figure 2. AMW106-E03 Features



* User configurable

Table 2. AMW106-E03 GPIO Expansion Header Connections

AMW106	H3
GND	2
VDD_DUT	3
GPIO 0	4
GPIO 1	5
GPIO 2	6
GPIO 3	7
GPIO 4	8
OSC_32K	9
VDD_DUT*	10
GND	11

AMW106	H8
GND	12
GPIO 5	13
GPIO 6	14
GPIO 7	15
GPIO 8	16
UART0_RTS	17
UART0_CTS	18
UART0_RX	19

AMW106	H8
UART0_TX	20
GPIO 13	21
GPIO 14	22
GPIO 15	23
GPIO 16	24
GPIO 17	25
GND	26

AMW106	H2
GND	27
GPIO 18	28
GPIO 19	29
GPIO 20	30
GPIO 21	31
GPIO 22	32
GPIO 23	33
RESET_N	34
VDD_DUT*	35
GND	36

*Note: You can safely draw up to 100mA from the VDD expansion header pins

Table 3. AMW106-E03 GPIO Isolation Header H9

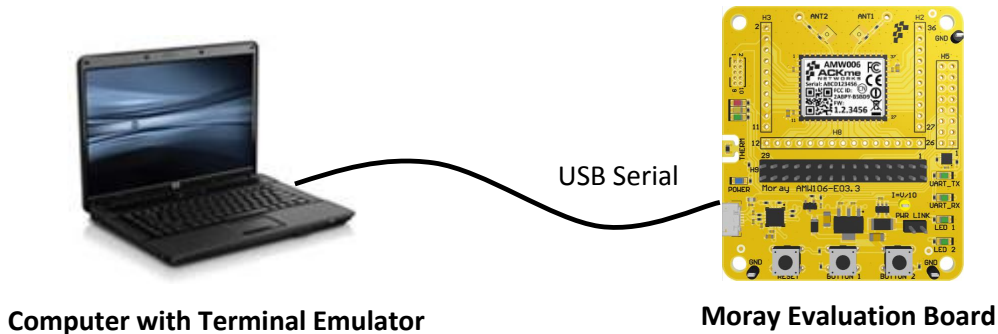
AMW106	H9	H9	AMW106
RESET_N	1	2	RESET_BTN
GPIO 23	3	4	LED_G
GPIO 22	5	6	BUTTON_2
GPIO 20	7	8	THERM
GPIO 18	9	10	LED_Y
GPIO 16	11	12	LED_1
GPIO 15	13	14	I2C_SDA
GPIO 14	15	16	I2C_SCL
GPIO 13	17	18	LED_2
GPIO 12	19	20	UART0_TX
GPIO 11	21	22	UART0_RX
GPIO 10	23	24	UART0_CTS
GPIO 9	25	26	UART0_RTS
GPIO 5	27	28	LED_R
GPIO 0	29	30	BUTTON_1

By removing all jumpers from the GPIO isolation header, all peripherals may be completely disconnected from module GPIOs. This provides several benefits including the option to connect custom peripherals without interference from on-board peripherals, and simplification of power consumption measurements described in the Measuring Power Usage section.

3 Using WiConnect

To get started with WiConnect, plug the AMW106 evaluation board into the USB port of the computer and open a terminal emulator as described in Appendix A. The USB cable provides the evaluation board with power and a serial UART connection to the computer.

With the board connected to the computer, verify the power LED is illuminated. If the power LED is NOT illuminated, try re-plugging the USB cable, or try a different USB cable.



Note! Be sure to use a quality USB cable. Inferior cables may result in reduced or intermittent operation of the evaluation board.

3.1 Getting Help

WiConnect provides extensive help for each command and variable. To obtain a list of help options, type the `help` command.

```
> help
The following help options are available ...
help all      -> Print a list of all Commands and Variables
help commands -> Print a list of Commands
help variables -> Print a list of Variables
help <command> -> Print help for a specific Command
help <variable> -> Print help for a specific Variable

Additional help is available online at http://wiconnect.ack.me
```

To obtain help for a particular command or variable, type `help <command>` or `help <variable>`.

To obtain help for the `wlan_scan` variable, type `help wlan_scan`.

```
> help wlan_scan
Usage : wlan_scan [-v] [<channel> [ssid]]
Shortcut: scan
Brief : Initiate a Wi-Fi scan and return results; optionally specify
a channel and AP SSID to scan for. For verbose scans, -v must be the first argument
```

3.2 System Indicator LEDs

The Moray evaluation board comes with three system indicator LEDs and two user LEDs. The LED functions are configurable, using the WiConnect peripheral commands and variables. See <http://wiconnect.ack.me> for more details., in particular the variables `system.indicator.gpio` and `system.indicator.state`.

By default the system indicator LEDs are configured as follows:

LED	Function	Behavior	
Red	Soft AP Indicator	Off	Soft AP off
		Fast blink	Soft AP error
		Medium blink	Soft AP active
		Slow blink	Client connected
Yellow	Network Indicator	Fast blink	No IP address
		Medium blink	DHCP in progress
		Slow blink	DHCP successful, IP address obtained
Green	WLAN indicator	Off	Wi-Fi off
		Fast blink	Error
		Medium blink	Connecting to AP
		Slow blink	Joined to AP

Blink rates are as follows: Fast blink: 4Hz, Medium blink: 1Hz, Slow blink: 0.5 Hz

3.3 Scanning for Wi-Fi Networks

To scan for Wi-Fi networks in range, use the `wlan_scan` command. Each AP in range is listed on a separate line.

```
> wlan_scan -v
!3 networks found
! # Ch RSSI MAC BSSID          Rate Security  Mode Len Network (SSID)
# 0 06 -27 84:1B:5E:29:9D:F7 450.0 WPA2-Mixed  Inf  17 YOUR_NETWORK_NAME
# 1 11 -73 2C:B0:5D:31:6F:6A 300.0 WPA2-AES   Inf   6 button
# 2 11 -73 EC:1A:59:36:5B:6C 144.4 WPA2-Mixed  Inf   5 ACKme
```

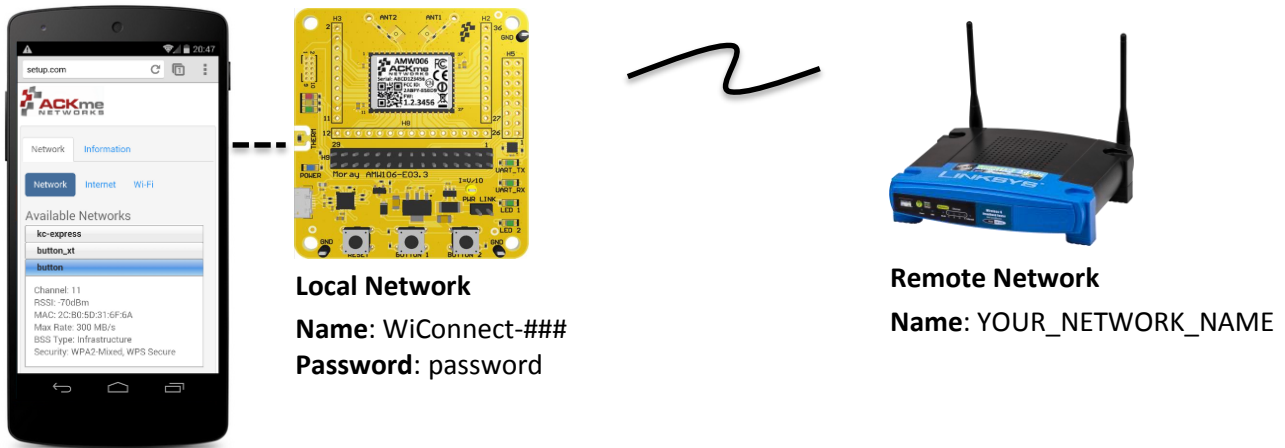
3.4 Joining a Wi-Fi Network

Several methods are available to configure and join the AMW106 module to a Wi-Fi network.

3.4.1 Web Setup

WiConnect provides the option to use a web browser running on a network client (such as a smartphone, tablet or computer) to select the remote Wi-Fi network the AMW106 module should join, and to enter a password for the remote network.

When web setup is used, it is helpful to think of the network client as the keyboard and display for the module as shown in Figure 3.

Figure 3. Web setup using a network client


To start web setup mode, enter the command `setup web`. WiConnect starts the local network and web server as indicated by the final message: `In progress`.

```
> setup web
[Disassociated]
IPv4 address: 10.10.10.1
Web setup started with the SSID: WiConnect-F1A
In progress
```

Open the Wi-Fi settings on your smartphone, tablet or computer and join the network called `WiConnect-###` (where `###` are the last 3 digits of the Wi-Fi module MAC address). The password for the network is simply: `password`. The local network name and password, and the web address may be customised to suit your needs, see the online [WiConnect Reference Manual](#) for further information.

After joining the local network, open a web browser on the network client and go to setup.com. The WiConnect web page appears (see Figure 3), and a scan begins for Wi-Fi access points in range. Select the remote network you wish to join, enter the network password then select **Save & Exit** and follow the prompts.

Once the settings are successfully saved, WiConnect prints `Web Setup Mode exited` to the terminal. Check that the settings were successfully saved using `get wlan.ssid` and `get wlan.passkey`.

```
Web Setup Mode exited
> get wlan.ssid
YOUR_NETWORK_NAME
> get wlan.passkey
YOUR_NETWORK_PASSWORD
```

3.4.2 Script Setup

If you prefer instead to enter configuration details for the Wi-Fi network, WiConnect provides a default setup script to step you through the process. The setup script is provided as a file called `default_setup.script` on the WiConnect file system. The setup script may be customised as required.

```
> setup cmd
> Enter Wi-Fi network name:
set wlan.ssid YOUR_NETWORK_NAME
Set OK
```

Using WiConnect, Section 3

```
> Enter Wi-Fi network password:
set wlan.passkey YOUR_NETWORK_PASSWORD
Set OK
>
set wlan.auto_join.enabled true
Set OK
> Saving settings
save
Saved
Success
>
network_up
[2014-05-17 | 11:48:31: Associating to YOUR_NETWORK_NAME]
In progress
> Security type from probe: WPA2-Mixed
Obtaining IPv4 address via DHCP
IPv4 address: 192.168.0.31
[2014-05-17 | 11:48:41: Associated]
> Exiting Cmd Setup Mode
```

3.4.1 Manual Setup

It is straightforward to manually enter the name and password for the network using the `wlan.ssid` and `wlan.passkey` variables too. Be sure to save afterwards, or the values will be lost when the module reboots. Any subsequent command requiring network access, such as an ICMP (Internet Control Message Protocol) ping, automatically results in the module attempting to join the network.

```
> set wlan.ssid YOUR_NETWORK_NAME
Set OK
> set wlan.passkey YOUR_NETWORK_PASSWORD
Set OK
> save
Saved
Success
> ping -g
[Associating to YOUR_NETWORK_NAME]
Security type from probe: WPA2-Mixed
Obtaining IPv4 address via DHCP
IPv4 address: 192.168.0.31
[Associated]
Ping reply in 25ms
```

The `network_up -s` command provides a shortcut to the process, by scanning for wireless Access Points, offering a choice of networks to join and automatically saving the `ssid` and `passkey`:

```
> network_up -s
Scanning for networks...
! 3 networks found
! # Ch RSSI MAC (BSSID) Network (SSID)
# 0 1 -40 4C:55:CC:10:2E:50 ABC
# 1 1 -32 9C:D6:43:28:50:A0 myAP
# 2 6 -77 30:85:A9:E7:9C:B0 DEF

Type the number # that matches your Network: 1
Type the password for your Network : secretpassword
```

```
[Associating to myAP]
> In progress
> Security type from probe: WPA2-AES
Obtaining IPv4 address via DHCP
IPv4 address: 10.5.6.94
[Associated]
```

3.4.2 Wireless Protected Setup (WPS)

WPS is a Wi-Fi provisioning method originally intended to simplify the process of connecting Wi-Fi clients to Wi-Fi Access Points. WPS offers both a push-button and PIN entry method for configuration. In reality, WPS push-button (as opposed to PIN) is the only method that has gained some level of adoption in the industry, however WPS naturally only works when the Wi-Fi AP supports WPS.

Many AP vendors choose not to test and certify APs with the Wi-Fi Alliance, and the lack of a standard WPS logo next to the WPS button on an AP often means many users are unaware that WPS is available. The potential for equipment incompatibility and added user confusion mean it is unwise to rely on WPS as the primary method of Wi-Fi provisioning in the real world.

Incompatibility and confusion aside, WiConnect provides full support for WPS1.0 & WPS2.0 and the underlying WPS engine has passed Wi-Fi certification. To use WPS in push-button mode, simply enter the `wps` command into WiConnect, then press the WPS button on your router (if the router supports WPS, and it is enabled, and you can find the button), and wait for the magic to happen.

3.5 Filesystem

ACKme Wi-Fi modules running WiConnect include a serial flash memory and a filesystem that provides users with the ability to read and write files. A quick example showing how to create, manipulate then delete a file is provided below.

```
> file_create hello.txt 13
my hello data
File created
Success
> ls
! #   Size   Version  Filename
# 0   1853    2.0.0   /favicon.ico.gz
# 1  18067   2.0.0   /setup/images.png
# 2  10525   2.0.0   /setup/index.css.gz
# 3  10143   2.0.0   /setup/index.html
# 4  39233   2.0.0   /setup/index.js.gz
# 5  32297   2.0.0   command_help.csv
# 6   135    2.0.0   default_setup.script
# 7   1236   2.0.0   geotrust_ca.pem
# 8   279    1.0.0   gpio_config_init.csv
# 9    13    1.0.0   hello.txt
# 10 212736  2.0.0   upgrade_app.exe
# 11 176920  2.0.0   wiconnect.exe
# 12 203261  5.26.230  wifi_fw.bin
> file_open hello.txt
[Opened: 0]
0
> stream_read 0 5
my he
```

```

> stream_read 0 50
llo data
[Closed: 0]
> file_delete hello.txt
File deleted
Success
  
```



Note! When reading the contents of a file using `stream_read`, the file is automatically closed if the end of file is reached.

3.6 Saving Custom Configurations

All available WiConnect variables may be saved to a file as a custom configuration. Saved configuration may then be loaded at a later date. This feature is particularly useful for saving configuration variables prior to an over-the-air (OTA) upgrade, and then restoring the configuration afterwards.

```

> save my_config.csv
Success
> load my_config.csv
Configuration successfully loaded
  
```

3.7 UDP / TCP / TLS Clients

To open a UDP, TCP or secure TLS connection to a remote server, use the `udp_client`, `tcp_client` or `tls_client` commands. WiConnect responds with a stream handle if the connection is opened successfully. For TLS connections, WiConnect provides a default TLS root certificate signed by GeoTrust (located on the WiConnect file system), however this certificate may not work with some TLS servers. A custom certificate may be provided as an option to the `tls_client` command if required.

```

> udp_client test.ack.me 50019
[Opening: test.ack.me:50019]
Resolving host: test.ack.me
Connecting: 107.170.222.80:50019
[2014-05-19 | 11:12:22: Opened: 0]
0
> tcp_client test.ack.me 50019
Resolving host: test.ack.me
[2014-05-19 | 11:12:38: Opening: test.ack.me:50019]
Connecting (TCP): 107.170.222.80:50019
[2014-05-19 | 11:12:39: Opened: 1]
1
> tls_client google.com 443
Resolving host: google.com
[2014-05-19 | 11:12:49: Opening: google.com:443]
Connecting (TLS): 74.125.237.174:443
[2014-05-19 | 11:12:50: Opened: 2]
2
  
```

Now try writing a character to the UDP or TCP stream that was opened in the examples above. The server at test.ack.me:50019 responds with a character pattern using the [Chargen](#) (Character Generator) protocol.

```
> stream_write 0 5
hello
Success
> stream_read 0 50
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO PQR
```



Note! WiConnect supports TCP, UDP and TLS server modes too!
For more information, please refer to the [WiConnect Reference Guide](#).

3.8 HTTP / HTTPS Clients

To open an HTTP or secure HTTPS connection to a remote server, read the first 300 bytes of the response then close the connection, use the `http_get`, `stream_read` and `stream_close` commands. WiConnect responds with a stream handle if the connection is opened successfully.

```
> http_get https://www.google.com
[2014-05-19 | 11:14:31: Opening: https://www.google.com]
Request GET /
Connecting (HTTP): www.google.com:443
Starting TLS
[2014-05-19 | 11:14:31: Opened: 0]
HTTP response: 302
Redirected to https://www.google.com.au/?gfe_rd=cr&ei=1-d5U9m2J6GN8QfexoHYCg
Request GET /?gfe_rd=cr&ei=1-d5U9m2J6GN8QfexoHYCg
Connecting (HTTP): www.google.com.au:443
Starting TLS
HTTP response: 200
Status: 200
0
> stream_read 0 300
<!doctype html><html itemscope="" itemtype="http://schema.org/WebPage" lang="en-AU"><head><meta content="/images/google_favicon_128.png"
itemprop="image"><title>Google</title><script>(function(){
window.google={kEI:"mOd5U4eZAYTVkAXF2oDwBA",getEI:function(a){for(var
b;a&&(!a.getAttribute)||!(b=a.getAt
> stream_close 0
[2014-05-19 | 11:14:47: Closed: 0]
Success
>
```

3.9 Using GPIOs

In WiConnect, a GPIO may have two functions: a standard IO function or an alternate function (such as a system indicator, status GPIO or control GPIO). When a GPIO is configured with an alternate function, the standard IO function is NOT available and the `gpio_dir`, `gpio_set`, and `gpio_get` commands are disabled for that GPIO.

Before a GPIO can be used, it is necessary to first check whether the GPIO is being used for an alternate function, or is already in use as a standard GPIO (for another purpose). If the GPIO is in use, it must first be freed up by setting the direction of the GPIO to none using the `gpio_dir` command (standard IO) or by disabling the alternate function.

The example below demonstrates how to control GPIO 23 on the AMW106 module. GPIO 23 is unassigned after factory reset.

```
> gpio_dir 23 out
Set OK
> get gpio.usage
! # Description
#13 - UART1 RX
#14 - UART1 TX
#17 - SPI CLK
#18 - SPI MOSI
#19 - SPI MISO
#21 - system.indicator.network
#22 - system.indicator.wlan
#23 - Standard I/O
> gpio_set 23 0
Set OK
> gpio_set 23 1
Set OK
> gpio_set 23 0
Set OK
```

3.10 Factory Reset

The AMW106 module may be factory reset using the `factory_reset` command or by holding the factory reset pin (GPIO 0 on all ACKme modules) high for more than 10 seconds through a hardware reset. After a successful factory reset, all variables are set to factory defaults and the module reboots. To avoid accidental factory reset, the Wi-Fi MAC address must be provided when calling the `factory_reset` command.

```
> get wlan.mac
4C:55:DC:15:02:5D
> factory_reset 4C:55:DC:15:02:5D
Reverting to factory default settings
Setting boot app to wiconnect.exe (0)
WiConnect-2.0.0.0, Built:2014-10-07 00:07:31 for AMW006.2, Board:AMW006-E03.1
[Ready]
>
```

3.11 Save & Reboot

When the value of a WiConnect variable is changed, the new value is only saved to RAM (not flash!). The value of unsaved variables is lost when the module is reset or rebooted. To save variables to non-volatile flash memory, use the `save` command. The following example demonstrates that failing to save the `wlan.ssid` prior to reboot results in the newly assigned value being lost.

```
> get wlan.ssid
> set wlan.ssid ssid_WONT_be_saved
Set OK
> reboot
[Disassociated]
Rebooting
WiConnect-2.0.0.0, Built:2014-10-07 00:07:31 for AMW006.2, Board:AMW006-E03.1
[Ready]
> get wlan.ssid
> set wlan.ssid ssid_WILL_be_saved
Set OK
> save
Saved
Success
```

```

> reboot
[Disassociated]
Rebooting
WiConnect-2.0.0.0, Built:2014-10-07 00:07:31 for AMW006.2, Board:AMW006-E03.1
[Ready]
> get wlan.ssid
ssid_WILL_be_saved
>
  
```



Note! WiConnect configures some services (such as GPIO initialization) only after reboot. It may be necessary to save and reboot the module before the new value of some variables takes effect.

3.12 Command vs. Stream Mode

The WiConnect serial interface may be used in either Command Mode or Stream Mode. A brief description of each of these modes is provided in the following text. For detailed information, please refer to the [WiConnect Reference Guide](#).

3.12.1 Command Mode

Command mode provides an asynchronous command interface that a host may use to send and receive control and data information. Command mode is typically used by a host to configure WiConnect, however it may also be used by simple hosts that need ultimate master/slave control over information sent to, and received from, the module. All preceding examples demonstrate usage of WiConnect in command mode.

There are two ways to interact with WiConnect in Command mode. When operating in human friendly command mode, WiConnect provides verbose asynchronous responses that are easy for humans to read. In machine friendly command mode, verbose prints and the command prompt are disabled and a well-defined response header is returned after each command.

Configuring Command Mode

Command mode can be configured using the convenience variable `system.cmd.mode`

Command	Description
<code>set system.cmd.mode human</code>	Enable human friendly command mode
<code>set system.cmd.mode machine</code>	Enable machine friendly command mode

Setting `system.cmd.mode` executes a macro that sets the value of the four variables used to switch between human and command mode. These variables, together with the human and machine mode setting, are listed in the following table.

Command	Human	/	Machine	Description
<code>set system.print_level</code>	all	/	0	Set debug & informational print level
<code>set system.cmd.header_enabled</code>	0	/	1	Disable/enable a response header
<code>set system.cmd.prompt_enabled</code>	1	/	0	Turn on/off the user prompt
<code>set system.cmd.echo</code>	on	/	off	Turn on/off character echo. In human mode, lets you see what you're typing

3.12.2 Stream Mode

Stream Mode provides a streaming interface that transparently connects a WiConnect serial interface with a network stream such as a UDP, TCP or TLS client or server. Stream mode provides a simple 1-1 connection between a physical serial interface and a network stream.

Bytes or characters sent from the host to a serial interface are transparently pushed by WiConnect to a network stream via a wireless interface. Conversely, bytes or characters received by a network stream (from a remote server) via a wireless interface are transparently pushed by WiConnect to a serial interface connected to the host. A wireless serial port is a typical application that uses stream mode.

3.13 Want more?

The WiConnect Reference Guide, available online at <http://wiconnect.ack.me>, provides detailed information about all WiConnect features, commands and variables, versions and release notes.

A number of simple and more sophisticated example applications are also provided to help you get the most out of WiConnect and the AMW106 module.

4 Measuring Power Usage

The AMW106 Moray evaluation board provides two features for measuring current (power) consumption. See Figure 2. AMW106-E03 Features. Measuring dynamic current consumption over a large dynamic range is quite difficult. Current consumed during the transmission of a Wi-Fi packet may be 400mA or more, and current consumed during sleep mode may be tens of microamperes or less. The dynamic range of the measurement covers nearly six orders of magnitude with microsecond switching times. Since this document is intended as a usage guide for the evaluation board, the measurement procedures provided below are described in broad terms only.

4.1 Measuring Coarse Current Consumption

Lots of useful information can be gained by observing the coarse current profile of the AMWx06 module during normal operation. The Moray evaluation board includes a current measurement circuit that is perfectly suited for current measurement in the milliamp range and above. To measure the dynamic current consumption, connect an oscilloscope probe between the **I=V/10** test hook and **GND** test hook. The current (in Amps) consumed by the AMWx06 module is calculated by dividing the measured voltage by a factor of ten. For example, if the voltage measured at the **I=V/10** test hook is 1.0V, the current consumed by the module is 1/10 = 100mA. Since the module is supplied by 3.3V, the power consumed is 3.3V x 100mA = 330mW.

4.2 Measuring Sleep Current

Measuring current in low power mode, in the μ A range, requires a different strategy. To avoid causing an excess voltage drop in the power supply, it is necessary to use a two-stage approach.

Connect an ammeter between the pins of the **PWR LINK** (H10) header and switch the ammeter to the μ A range. Now connect a cable between the leads of the ammeter to short out the ammeter.

Apply power to the module, then issue the WiConnect `sleep` command to put the module into low power mode.


See http://wiconnect.ack.me/apps/power_management.

Now, remove the cable shorting the ammeter and measure the sleep current.

5 Ordering Information

Table 3 provides ordering information for AMW106 evaluation boards.

Table 3. Ordering Information

Part Number	Picture	Description
AMW106-E03 'Moray'		WiConnect development and evaluation platform for the surface-mount AMW106 module. The surface mount AMW106 module is not removable.

6 Revision History & Glossary

6.1 Revision History

Table 4: Document Revision History

Revision	Date	Change Description
ARG-MW006E-100R	Oct 20, 2014	First release
ARG-MW106E-101R	Sep 1, 2015	Added system indicator LED section, updated for AMW106

6.2 Glossary

In most cases, acronyms and abbreviations are defined on first use. A comprehensive list of acronyms and other terms used in ACKme Networks documents are provided on the ACKme Networks website at <http://ack.me/FAQs/Glossary>.

APPENDIX A – Configuring a Terminal Application

The following instructions describe how to obtain and install a serial terminal application for use on computers running a Windows® or OS X operations system. ACKme recommends using Tera Term for Windows® systems and CoolTerm for OS X systems, however other equivalent applications may work equally well.

Plug the evaluation board into the computer using a USB cable before continuing.

Verify USB-Serial Driver Installation

The USB-Serial interface on WiConnect evaluation boards is based on an FTDI chip used widely in the industry. Most operating systems including Windows®, OS X, and Linux provide integrated FTDI driver support as part of the operating system. However on some older machines, or machines that do not pickup regular updates, the driver may not automatically install and it is necessary to manually install the driver.

On computers running Windows®, check if the driver is installed as follows:

- Display the System Control Panel (e.g. press the 'Windows' key + Pause key).
- In the left-hand column near the top of the panel, click **Device Manager**
- In the Device Manager dialog, expand the Ports (COM and LPT) branch
- FTDI drivers appear under the USB Serial Port items. If no items of this kind appear, the drivers may not be installed.
Note: The driver entry may not appear if the ACKme device is not connected to the USB port and powered on.
- Double click the USB Serial Port entry.
- Select the **General** tab in the USB Serial Port Properties dialog. Check the following:
 - Manufacturer: FTDI
 - Device status: This device is working properly
- Select the **Driver** tab in the USB Serial Port Properties dialog. Check the following:
 - Driver Provider: FTDI
 - Update drivers if necessary by clicking the **Update Driver...** button.
- In some cases, the FTDI driver may actually be correctly installed, but the driver may not enumerate as a Virtual Communications Port (VCP). If this is the case, find the device under the USB Serial Bus controllers section of the Device manager, open the device, check the VCP box, then click OK. It may be necessary to unplug/replug your evaluation board in order for the VCP driver to load correctly.

If the FTDI drivers do not appear to be installed, see the installation instructions on the FTDI official site:

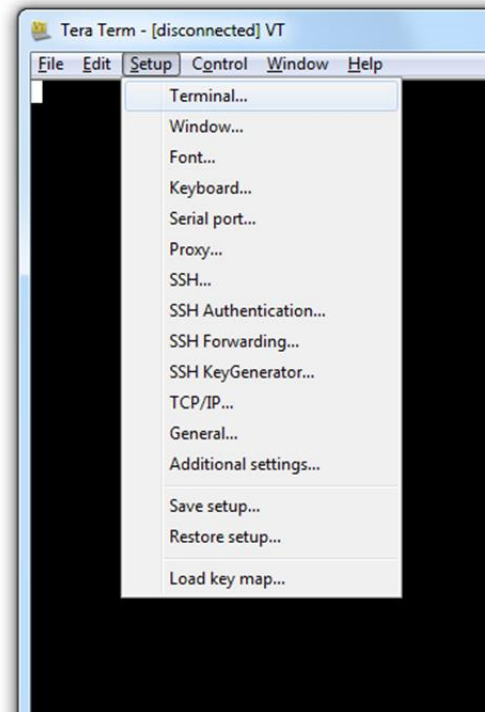
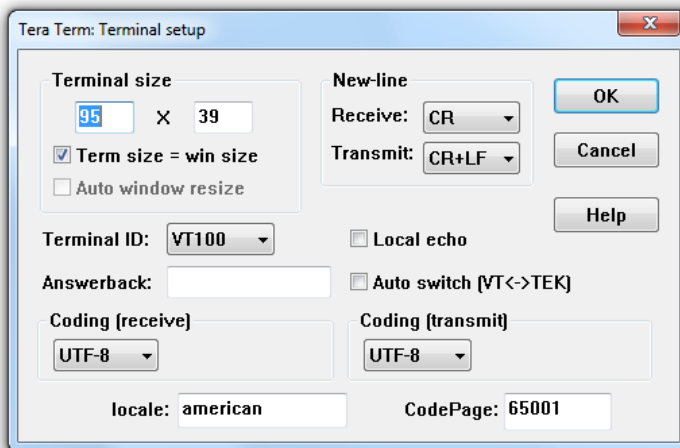
<http://www.ftdichip.com/Support/Documents/InstallGuides.htm>

Set Up Tera Term for Windows®

Tera Term is available as a free download from <http://tssh2.sourceforge.jp>. Download and install Tera Term now if you have not already done so. The following procedure describes how to establish a UART serial connection between Tera Term and the evaluation board.

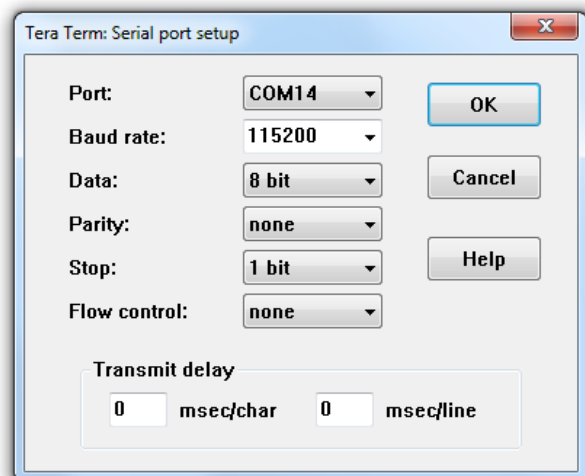
1. Start the Tera Term application and click on the **Setup** tab. A dropdown appears providing options to configure Tera Term as shown in the screen capture on the right. Select **Terminal**.
2. Terminal Setup. In the **New-line** section of the **Setup Terminal** dialog box (see the screen capture below), ensure that:
 - **Receive:** is set to **CR**
 - **Transmit:** is set to **CR+LF**

Close the **Terminal Setup** dialog box by selecting **OK**.



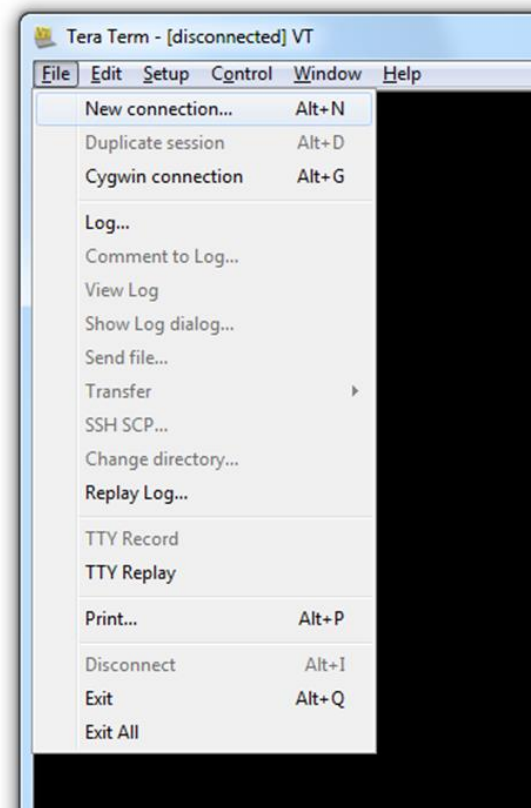
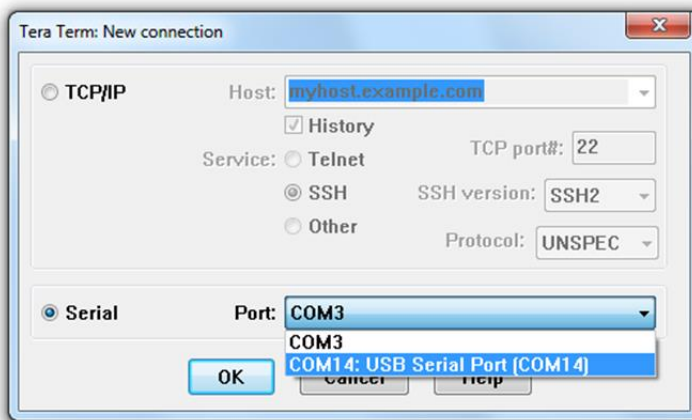
3. Serial Port Setup. Select the **Setup** tab again from the main window, then select **Serial port**. A **Setup serial port** dialog box appears. Ensure the settings in the dialog box match the settings shown in the following screen capture. The **COM Port** shown in the example (COM14) will almost certainly be different for your evaluation board, be sure to choose the COM port that matches your board.

When the serial port has been correctly setup, close the **Serial port** setup dialog box by selecting **OK**.

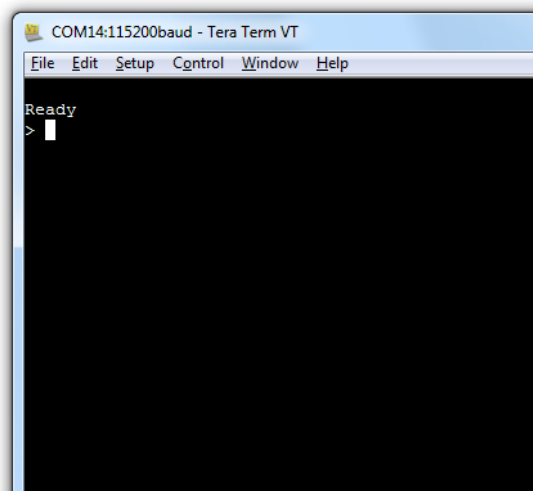


4. New Connection. From the Tera Term application menu, setup a new connection with the evaluation board by selecting **File | New connection** (or by pressing **Alt + N**) as shown in the screen capture on the right. A New connection dialog box appears as shown in the following screen capture. Check the **Serial** radio button, then click the **Port:** dropdown menu and select the COM port that matches your evaluation board. The COM port description for the evaluation board includes the text **COMxx: USB Serial Port (COMxx)**.

Once the correct COM port has been selected, close the **New connection** dialog box by selecting **OK**.



5. Testing the connection. If Tera Term was able to connect successfully, the text in the application title bar indicates which COM port is connected, and the baud rate of the connection. For the example documented above, Tera Term displays 'COM14:115200baud'. The Tera Term screen remains blank however until a character is sent to WiConnect. Try pressing the **Enter** key, WiConnect responds with `Ready` as shown in the following screen capture.

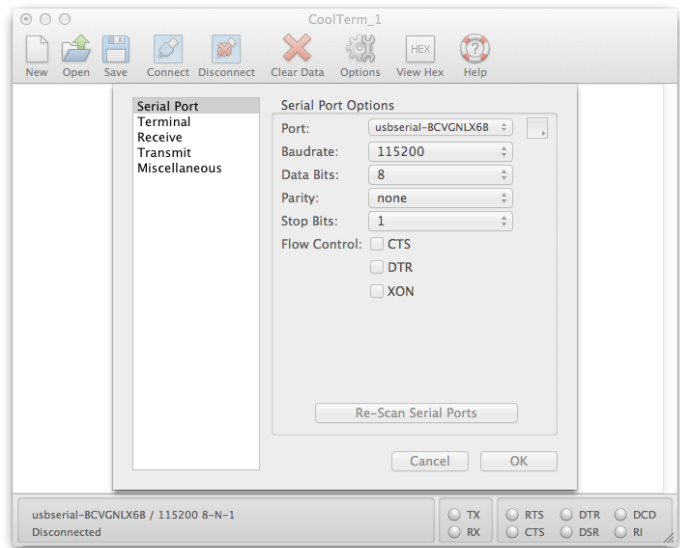


Set Up CoolTerm for OS X

CoolTerm is available as a free download from <http://freeware.the-meiers.org/CoolTermMac.zip>. Download and install CoolTerm now if you have not already done so.

The following procedure describes how to establish a UART serial interface between CoolTerm and the evaluation board.

1. Start the CoolTerm application and click the **Options** menu icon. The CoolTerm Configuration window opens. Set the Serial Port configuration options as follows:
 - Port: **usbserial-XXXXXXXX**
 - Baudrate: **115200**
 - Data bits: **8**
 - Parity: **none**
 - Stop bits: **1**
 - Flow control : Deselect all options
2. Click **OK**.
3. Click the **Connect** menu icon. The CoolTerm application connects to the evaluation board.

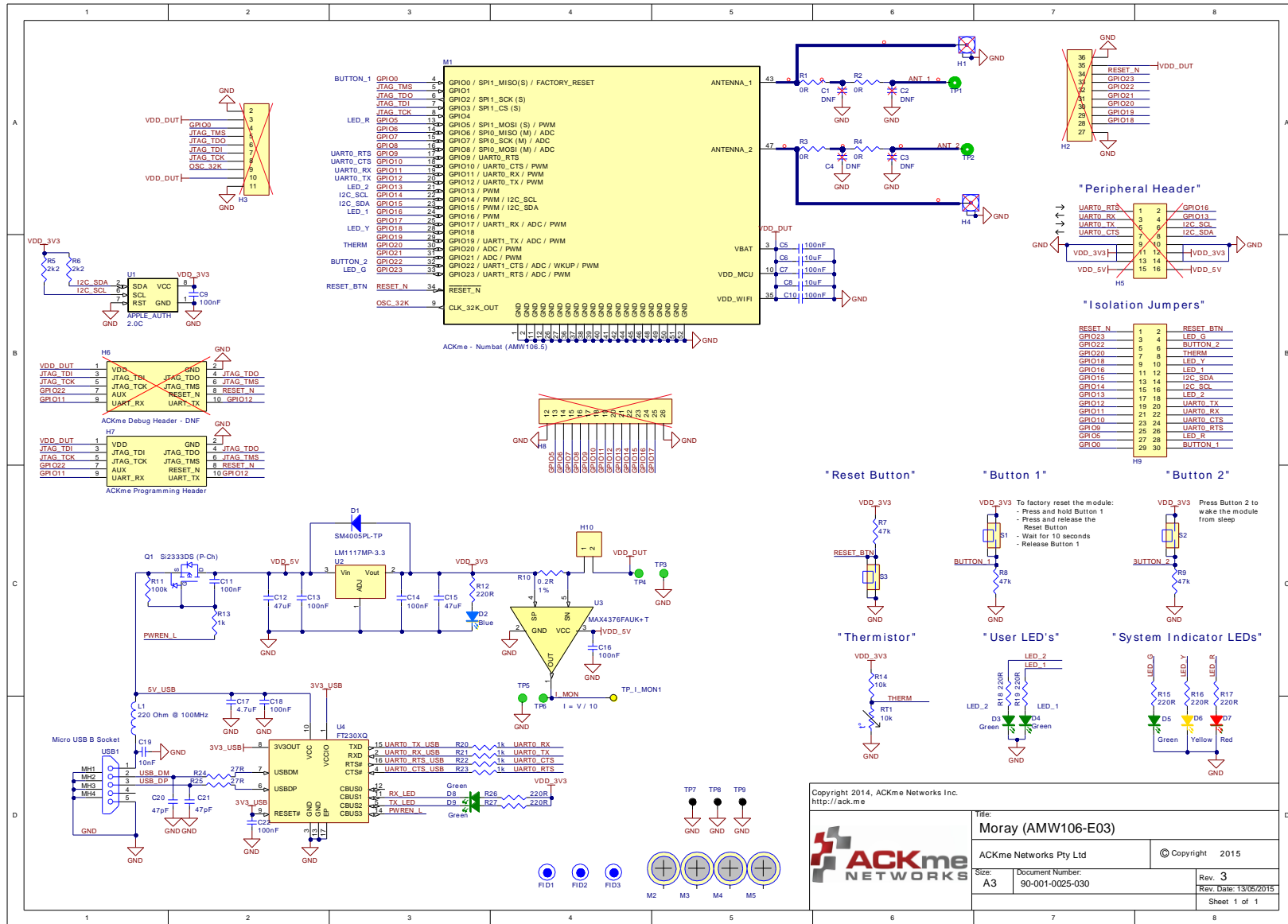


Try pressing the **Enter** key, if CoolTerm is successfully connected to the evaluation board, WiConnect responds with

```
Ready
>
```

Appendix B – Evaluation Board Schematics & Mechanical Dimensions

The schematic on this page is for Moray version 3 – AMW106-E03.3. Schematics for other board revisions are available at <http://ack.me/resources/show>



ACKme reserves the right to make changes without further notice to any products or data herein to improve reliability, function, or design. Information furnished by ACKme is believed to be accurate and reliable. However, ACKme does not assume any liability arising out of the application or use of this information, nor the application or use of any product described herein, neither does it convey any license under its patent rights nor the rights of others.

ACKme Networks

US Headquarters

20 North Santa Cruz Ave
Los Gatos CA 95030

©2014-2015 ACKme Networks . All Rights Reserved.

ARG-MW106E-101R • AMW106 Evaluation Guide
September 1, 2015

Contact Information

+1 (408) 402 8160

<http://ack.me/contact>

