



EZYWIFI

802.11 b/g/n access point up to 11 Mbps (802.11b)

Rev. 01 — 01 February 2012

Product data sheet

1. General description

The EZYWIFI is a co-processor assisted carrier board for the Gainspan GS1011 Low Power WIFI Module Family.

EZYWIFI's main features are ease of use (with menu driven configuration) and low power with high level data translation between the microprocessor application and WIFI layer. The required tasks of initializing a communication channel, including security and encryption is fully managed on board.

The serial level TTL 3.3v interface @9600 Baud, N,8,1 and comprehensive user interface ensures a wide interfacing options for any engineering level.

2. Features

- 3.3v Low power operation with 5v tolerance on all I/O ports
- Built in WIFI antenna and C.FL connector
- Simple serial 3.3v TTL level interface
- Debug & managed data communication channels
- 8 user accessible general purpose digital I/O
- Onboard firmware upgradable

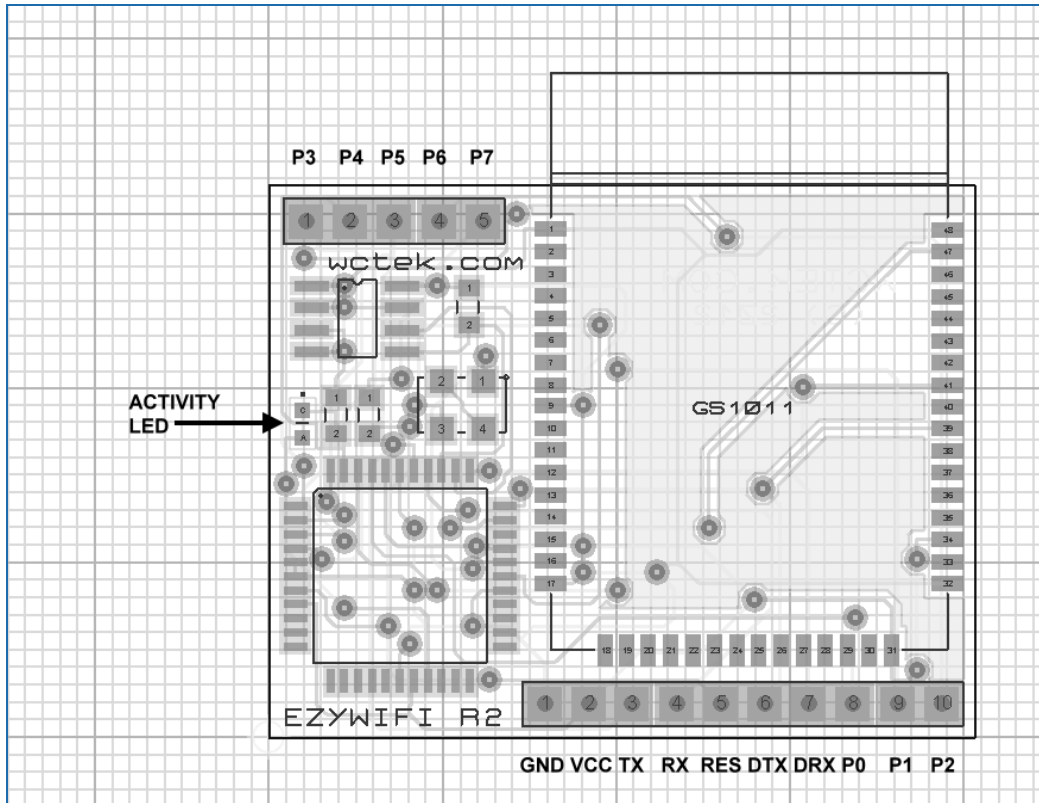
3. Quick reference data

Table 1: Quick reference data

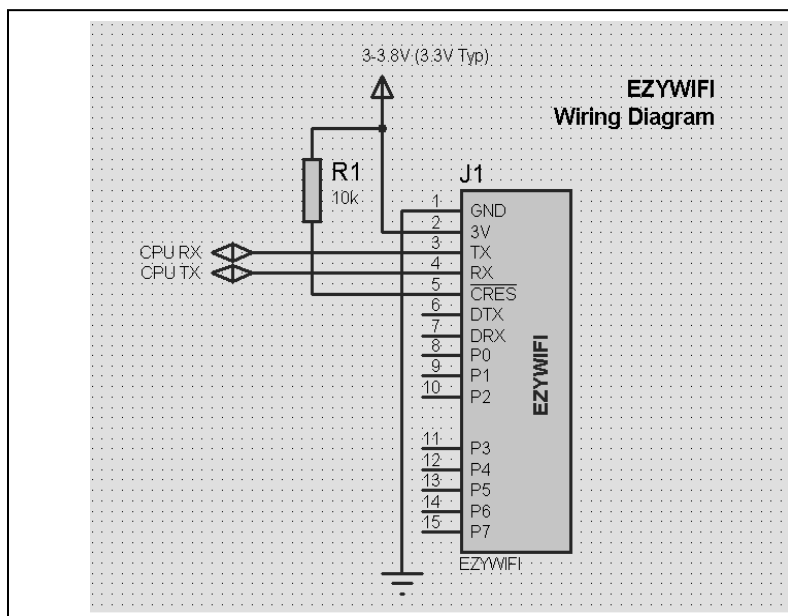
GND = 0 V; Tamb = 25 °C; tr = tf = 6 ns.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Type EZYWIFI 1011						
P0-P7	User accessible general purpose I/O	-	0	3	5	V
VCC	Supply Positive Voltage	-	3	3.3	3.8	V
GND	Supply Ground	-	-	0	-	V
TX	Transmit Data	-	3	3.3	5	V
RX	Receive Data	-	3	3.3	5	V
$\overline{\text{RES}}$	Co processor Reset	-	0	0	3.3	V
RTX	Debug Transmit	-	0	3.3	5	V
RRX	Debut Receive	-	0	3.3	5	V

4. Layout configuration & pinning



Pin height is .300", spacing is standard .001" gold plated. Overall board dimension is 1.600"W x 1.250"H with an additional .250" reserved for the Gainspan built-in antenna.



Connection to the EZYWIFI module from the host processor is achieved via TTL level RS232 signals. Only Pin 3 & 4 is required for communication (within a common ground design). An optional 10K resistor can be used to secure the CRES line, but it's not required under normal operation.

5. Communication User Interface

General Interface Concept

The EZYWIFI module has been designed with a very flexible user interface. For simplicity, EZIWIFY communicates with the host CPU via a serial TTL Level 3.3v RS232 interface. It accepts an ASCII command and returns a delimited, filtered response. EZYWIFI manages all required command translation, communication retries and connection parameters, freeing the host CPU from considerable overhead which is typically required when establishing a WIFI 802.11 connection.

Initialization Persistent Commands

COMMAND	Description	Response
1	Toggle DHCP Mode	\$DHCP ON or \$DHCP OFF
2	Authentication Mode (0=None, 1=Open, 2=Shared)	\$AUTH X (x=0,1 or 2)
3	Set Network SSID	\$SSID <network name>
4	Set WEP Encryption Key 1 (automatic 64/128bits)	\$WEP1 <encryption key>
5	Set WPAx-PSK Passphrase	\$WWPA <passphrase>
6	Set WPAx-PSK Calculation	(see text)
7	Set WPAx-PSK Hex Key	(see text)
8	Set Static IP <ip, mask, gateway>	\$SETIP <ip,mask,gw>
9	Set Static DNS <dns1,dns2>	\$SETDNS <dns1,dns2>

Operating Commands

COMMAND	Description	Response
A	List Available Networks	(see text)
B	Attach to Wireless Network	\$CONN <ssid> <ip,mask,gw>
D	Disconnect from WIFI	\$DISC OK
G	Get HTTP URL <addr/page>	\$HGET <addr> <page> size OK
L	DNS Lookup <domain name>	\$DNSL <domain> <IP addr>
N	Network Status	(see text)
P	Ping <ip address>	(see text)
Q	Show Page Data (buffer)	(see text)
R	Enter RAW Command Mode	(see text)
S	Save Default Profile	(see text)
T	Traceroute <ip address>	(see text)
V	View Setup Profiles	(see text)
X	Read from Digital Ports	\$PREAD 00000000
Y	Write to Digital Ports <01234567>	\$PWRITE 00000000
Z	Full Factory Reset	(see text)
!	Reboot Interpreter	(see text)

Note: In the event of an error during either initialization or operational commands, EZYWIFI will return the string **ERROR: <error type>** (see text for error description).

6. Initialization Sequence

The persistent EZYWIFI initialization allows repetitive connection parameters to be set at startup time and then preserved within EZYWIFI's internal non volatile memory. This allows the application developer to alleviate the lengthy task of configuring each of the network connection settings upon system restart.

*Example of a typical initialization sequence. For this purpose, a connection to a **WEP** encrypted open mode network called **My Network** will be simulated. The WEP key in this example is 64bit and it is set to **1234567890**.*

```
1 // Turn DHCP ON
21 // Set Auth to OPEN
3My Network ↵ // Set SSID to "My Network"
41234567890 ↵ // Set WEP Key 1 to "1234567890"
S // Save connection profile
```

Once the above commands are sent and no error is detected, the EZYWIFI system is ready to GET or POST URL pages from the Internet.

7. Accessing remotely hosted web pages

After power up (with a valid initialization sequence active) access to remotely store pages is achieved by using the command "G" (Get Page) . For example, to retrieve a web page the following command is used:

```
Gwww.mysite.com/index.html ↵
```

Alternatively a POST command can be executed with parameters need to the remote page using the standard URL POST syntax such as:

```
Gwww.mysite.com/myscript.php?par1=test&parameterX=abc ... &parameterY=def ↵
```

If successful, EZYWIFI will respond as follows:

```
$HGET|www.mysite.com|myscript.php|321|OK
```

To indicated that 321 bytes were successfully received as a response.

Should EZYWIFI encounter an error, it will alternatively respond with an error message as:

```
$HGET|www.mysite.com|ERROR: <error description>
```

EZYWIFI is extremely flexible and easy to use. See section 8 entitled *Command Examples* for a full set of command examples and responses.

8. Command Examples

Toggle DHCP Mode

1

Syntax: 1

Returns: Current active state

Example:

```
$READY
1
$DHCP|ON
1
$DHCP|OFF
$READY
```

Authorization Mode 0=None, 1=Open, 2=Shared

2

Syntax: 20 // set Authorization to NONE
21 // set Authorization to OPEN
22 // set Authorization to SHARED

Returns: Current active state

Example: *Setting Network Authorization mode to OPEN*

```
$READY
21
$AUTH|1
$READY
```

Set Network SSID

3

Syntax: 3<WIFI network name>

Returns: WIFI network name to be used in future connections

Example:

```
$READY
3linksys ↵
$SSID|linksys
$READY
```

4

Set WEP Encryption Key 1

Syntax: 4<wep key>

Returns: Wep key confirmation

Example:

```
$READY  
41234567890 ↵  
$WEP1|1234567890  
$READY
```

5

Set WPAx-PSK Passphrase

Syntax: 5<passphrase>

Returns: Passphrase confirmation

Example:

```
$READY  
5mysecret ↵  
$WWPA|mysecret  
$READY
```

6

Set WPAx-PSK Calc

Syntax: 6<SSID,Passphrase>

Returns: Passphrase confirmation

Example:

```
$READY  
6linksys,mysecret ↵  
$WWPP|linksys,mysecret  
$READY
```

Set WPAx-PSK Hex Key

Syntax: 6<hex key>

Returns: Hex Key confirmation

Example:

```
$READY
78FA732B6A1B9...BA83 ↵
$WWPP|8FA732B6A1B9...BA83
$READY
```

Set Static IP

Syntax: 8<ip,mask,gateway>

Returns: Connection confirmation

Example: *Setting IP address to 192.168.0.100, with a subnet mask of 255.255.255.0 and a gateway (router) address of 192.168.0.1*

```
$READY
8192.168.0.100,255.255.255.0,192.168.0.1 ↵
$SETIP|192.168.0.100,255.255.255.0,192.168.0.1
$READY
```

Set Static DNS

Syntax: 9<dns1,dns2>

Returns: Connection confirmation

Example: *Setting DNS1 to 192.168.0.1 and DNS2 left unused.*

```
$READY
9192.168.0.1,0.0.0.0 ↵
$SETDNS|192.168.0.1,0.0.0.0
$READY
```

A

List Available Networks

Syntax: A

Returns: Available Wireless Networks

Example:

```
$READY
A
$LISTNET|
    BSSID      SSID          Channel Type  RSSI Security
e0:91:f5:87:3f:54, NETGEAR      , 01, INFRA , -72 , WPA2-PERSONAL
00:21:7c:4f:90:69, 2WIRE212    , 03, INFRA , -62 , WPA2-PERSONAL
No.Of AP Found:2

OK
$READY
```

B

Attach to Wireless Network

Syntax: B

Returns: Wireless Network, IP given, Mask and Gateway information

Example:

```
$READY
A
$CONN|linksys|192.168.0.111,255.255.255.0,192.168.0.1|OK
$READY
```

D

Disconnect from Wireless Network

Syntax: D

Returns: Status information

Example:

```
$READY
D
$DISC|OK
$READY
```


G

Get (post) HTTP URL

Syntax: G<addr/page>

Returns: URL, Page, Received Bytes & Status information

Example: *Retrieving index.html from www.yahoo.com*

```
$READY
Gwww.yahoo.com/index.html
$HGET|www.yahoo.com/index.html|200|OK
$READY
```

Example: *Posting par1 and par2 parameters to www.mysite.com using script called storedata.php*

```
$READY
Gwww.mysite.com/storedata.php?par1=hello&par2=world
$HGET|www.mysite.com/ storedata.php?par1=hello&par2=world |315|OK
$READY
```

DNS Lookup

L

Syntax: L<domain name>

Returns: domain, IP Address

Example:

```
$READY
Lyahoo.com
$DNSL|yahoo.com|98.139.127.6
$READY
```

Network Status

N

Syntax: N

Returns: Status, IP, SSID, Gateway, DNS, Security, Signal strength

Example:

```
$READY
N
$NET|CONNECTED|192.168.0.111|linksys|192.168.0.1|192.168.0.1|WEP (OPEN)|-57
$READY
```

Ping

Syntax: P<IP Address>

Returns: Ping Information

Example:

```

$READY
P192.168.0.1
Pinging for 192.168.0.1 with 56 bytes of data

OK
Reply from 192.168.0.1: bytes=56 time=95 ms TTL 30
Reply from 192.168.0.1: bytes=56 time=54 ms TTL 30
Reply from 192.168.0.1: bytes=56 time=44 ms TTL 30
Reply from 192.168.0.1: bytes=56 time=45 ms TTL 30
Ping Statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 percent
Approximate round trip times in milliseconds
    Minimum = 44ms, Maximum = 95ms, Average = 59ms $READY

```

Show Page Data

Syntax: Q

Returns: Last Retrieved Web Page Information

Example:

```

$READY
Q
←H00171301 Moved Permanently
The document has moved <A HREF="http://www.yahoo.com/">here</A>.<P><!-- w84.fp.mud.yahoo.com
uncompressed/chunked Sat Feb 25 05:24:31 PST 2012 -->
OK

DISCONNECT 0
$READY

```

Raw Command Mode

Syntax: R

Returns: Gainspan's "AT" prompt

Example: Use "R" to open a direct channel to the Gainspan WIFI module. This is useful to debug connections and to create custom connections which may not be covered under the EZYWIFI protocol. Enter "+++" to exist back to the EZYWIFI interface.

```
$READY
R
ENTERING DEBUG MODE
ATI
GainSpan
OK
+++ - EXITING DEBUG MODE
$READY
```

Save Default Profile

Syntax: S

Returns: Confirmation Message

Example:

```
$READY
S
$SAVE|OK
$READY
```

Traceroute

Syntax: T<IP Address>

Returns: Routing Path Information

Example:

```
$READY
T
Tracing Route to 192.168.0.1 over a max hops 30
1 186 ms 90 ms 89 ms 192.168.0.1
$READY
```



View Setup Profiles

Syntax: V

Returns: WIFI Setup Profiles

Example:

```
$READY
V
$VIEW|
ACTIVE PROFILE
C0 &Y0 E0 V1 B=9600,8,N,1 &K0 &R0
+NDHCP=1 +NSET=192.168.0.111,255.255.255.0,192.168.0.1
+DNS1=192.168.0.1, +DNS2=0.0.0.0
+WM=0 +WAUTO=0,"linksys",,
+WRETRY=5 +WP=0 +WRXPS=1 +WRXACTIVE=0
+NAUTO=0,1,192.168.1.1,8
+WAUTH=1 +WWPA="Serial2Wifi"+PSK-valid=0 +SSID=
+WWEP1=2812886031 +WWEP2=
+WWEP3= +WWEP4=
S0=01000 S1=00500 S2=00500 S3=00003 S4=00010 S5=00020
+BDATA=0 +WSEC=0

STORED PROFILE 0
E0 V1 B=9600,8,N,1 &K0 &R0
+NDHCP=1 +NSET=192.168.0.111,255.255.255.0,192.168.0.1
+DNS1=192.168.0.1, +DNS2=0.0.0.0
+WM=0 +WAUTO=0,"linksys",,
+WRETRY=5 +WP=0 +WRXPS=1 +WRXACTIVE=0
+NAUTO=0,1,192.168.1.1,8
+WAUTH=1 +WWPA="Serial2Wifi"+PSK-valid=0 +SSID=
+WWEP1=2812886031 +WWEP2=
+WWEP3= +WWEP4=
S0=01000 S1=00500 S2=00500 S3=00003 S4=00010 S5=00020
+BDATA=0 +WSEC=0

$READY
```

Read From Digital Ports

X

Syntax: X

Returns: Status of general purpose P0..P7 in bit format

Example:

```
$READY
X
$PREAD|00000000
$READY
```

Write to Digital Ports

Y

Syntax: Y<P0..P7>

Returns: Write to general purpose P0..P7 in bit format

Example: *Make port 0, port 1 and port 7 HIGH and remaining ports LOW*

```
$READY
Y11000010
$PWRITE|11000010
$READY
```

Full Factory Reset

Z

Syntax: Z

Returns: Status Information

Example: Resetting EZYWIFI to initial factory testing (does not destroy WIFI settings).

```
$READY
Z
Resetting ...
$EZYWIFI 1010
$READY
```



Help Menu

Syntax: ?

Returns: Available Options

Example: *When connected to the EZYWIFI via the RX and TX signals and with a serial terminal program, the engineer can invoke the built-in Help menu for guidance on available options.*

```
$READY

-----

1 - Toggle DHCP Mode           : ON
2 - Auth Mode 0=None,1=Open,2=Shared : 1
3 - Network SSID                : linksys
4 - Set WEP Encryption Key 1    : 4934902134
5 - Set WPAX-PSK Passphrase     : Serial2Wifi
6 - Set WPAX-PSK Calc <ssid,pass> :
7 - Set WPAX-PSK Hex Key       :
8 - Set Static IP <ip,mask,gateway> : 192.168.0.111,255.255.255.0,192.168.0.1
9 - Set Static DNS <dns1,dns2>   : 192.168.0.1,0.0.0.0

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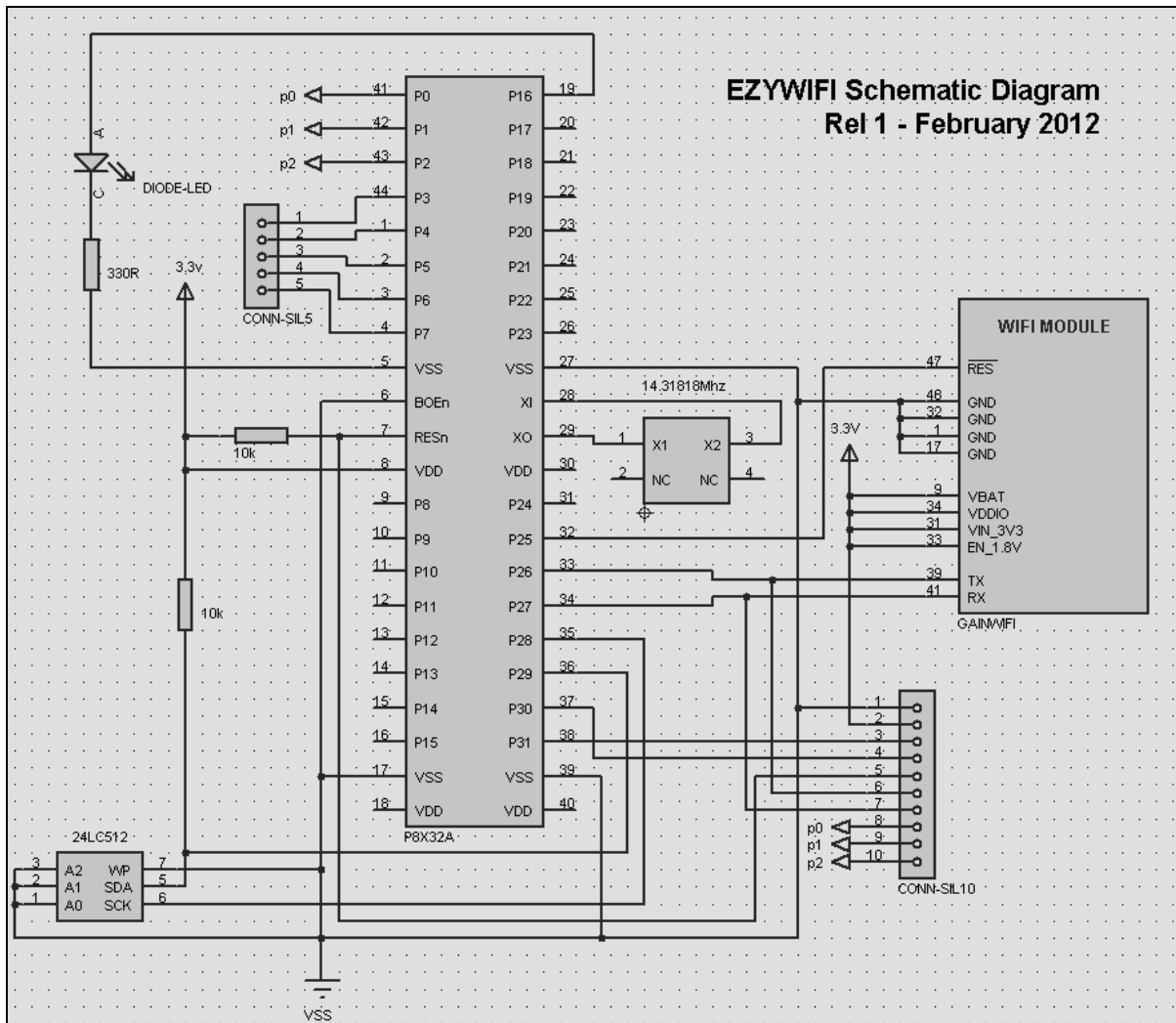
Available Options
-----

A - List Available Networks
B - Attach to Wireless Network
D - Disconnect from WIFI
G - Get HTTP URL <addr/page>
L - DNS Lookup <domain name>
N - Network Status
P - Ping <ip address>
Q - Show Page Data (0 bytes)
R - Raw Command Mode
S - Save Default Profile
T - Traceroute <ip address>
V - View Setup Profiles
X - Read from Digital Ports
Y - Write to Digital Ports <01234567>
Z - Full Factory Reset
! - Reboot Interpreter

$READY
```

9. Technical Information

EZYWIFI uses a Parallax P8X32A processor in order to provide the interface layer between the user application and the Gainspan WIFI module. The P8X32A is overclocked with a 14.31818 Mhz crystal and internally with a PLL multiplier x8 (pll8). This allows the internal translation process to execute at approximately 114.5 Mhz. The schematic diagram is provided in this documentation for reference only. Duplication of the hardware or firmware in a commercial environment is not permitted under the initial licencing agreement as outlined in section 10 of this document. Please contact World Class Technologies LLC (www.wctek.com) if you're interested in distributing or manufacturing this product for local or export markets.



EZYWIFI Schematic Diagram © 2012 World Class Technologies LLC

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