

Mini Socket iWiFi™

# Mini Socket iWiFi™



## Data Sheet

Ver. 1.20

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## Revision History

### 11-4001-13

Version	Date	Description
1.0	April 2008	Initial preliminary version
1.1	May 2008	Added power consumption during transmission @12dbm
1.15	February 2009	Miscellaneous
1.16	June 2009	Removed "preliminary" label
1.20	July 2009	Update pin 10(-RES) description

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# 1 Introduction

## General Description

Mini Socket iWiFi™ is a secure serial-to-Wireless LAN device server module that also acts as a bridge to connect serial devices to 802.11b/g Wireless LANs. It includes the iChip™ CO2128 IP Communication Controller™ chip and Marvell 88W8686 WiFi chipset. It is packaged in RoHS-compliant ultra-slim form factor and uses an industry standard pin-out.

Mini Socket iWiFi offers much more than many other device servers on the market. It acts as a security gap between the application and the network; supports up to 10 simultaneous TCP/UDP sockets; two listening sockets; a web server with two websites; SMTP and POP3 clients; MIME attachments; FTP and TELNET clients, and SerialNET™ mode for serial-to-IP bridging.

Mini Socket iWiFi supports the SSL3/TLS1 protocol for secure sockets, HTTPS and FTPS, WEP, WPA and WPA2 WiFi encryption.

Mini Socket iWiFi minimizes the need to redesign the host device hardware. It easily inserts into headers on the host PCB and connects to an external antenna. Minimal or no software configuration is needed for Mini Socket iWiFi to access the Wireless LAN.

Connect One's high-level AT+i™ API eliminates the need to add WiFi drivers, security and networking protocols and tasks to the host application. The AT+i SerialNET operating mode offers a true plug-and-play mode that eliminates any changes to the host application.

Mini Socket iWiFi firmware – the IP stack and Internet configuration parameters – are stored in an external flash memory. The module is power-efficient: the core operates at 1.2V, while I/Os operate at 3.3V. Power Save mode further reduces power consumption.

The II-EVB-362MW evaluation board provides an easy environment for testing the Mini Socket iWiFi prior to designing it into your product.

## Hardware Description

- Size: 41.0x31.5x5.0mm
- Core CPU: 32-bit RISC ARM7TDMI, low-leakage, 0.13 micron, running at 48MHz
- Operating Voltage: +3.3V+/-10%
- Operating Humidity: 90% maximum (non-condensing)
- Operating Temperature Range: -20° to 75°C (-4° to 167°F)
- Power Consumption:
  - Transmit – 250mA @16dbm
  - 235mA @12dbm (typical)
  - Receive – 190mA (typical)
  - Power Save mode – 8mA
  - Power Down mode – 40uA (typical)
- RF Connector: SMA reverse polarity
- Header: 6x2 male
- Host Interface: TTL serial interface
- RoHS-compliant; lead-free

## Performance Specifications

- Host Data Rate: up to 3Mbps in serial mode
- Serial Data Format (AT+i mode): Asynchronous character; binary; 8 data bits; no parity; 1 stop bit
- SerialNET mode: Asynchronous character; binary; 7 or 8 data bits; odd, even, or no parity; 1 stop bit
- Flow Control: Hardware (-RTS, -CTS) and software flow control.

**Internet Protocols**

ARP, ICMP, IP, UDP, TCP, DHCP, DNS, NTP, SMTP, POP3, MIME, HTTP, FTP and TELNET

**Security Protocols**

SSL3/TLS1, HTTPS, FTPS, RSA, AES-128/256, 3DES, RC-4, SHA-1, MD-5, WEP, WPA and WPA2

**Protocols Accelerated in HW**

AES, 3DES and SHA

**Application Program Interface**

- Connect One's AT+i protocol
- SerialNET mode for transparent serial data-to-Internet bridging

**Wireless Specifications**

- Standards Supported: IEEE 802.11b, IEEE 802.11g
- Frequency:
  - Europe – 2.412-2.472GHz
  - USA – 2.412-2.462GHz
- Channels:
  - Europe – 13 channels
  - USA – 11 channels

**Recommended Antenna**

iW-ANT2-BL Antenna: 2.4GHz, 2.0dBi, 50Ω, omni-directional, 1/4 wavelength dipole configuration, VSWR≤2.0, height - 82.5mm, weight – 6.3 grams

**Warranty**

One year

**Certifications**

- FCC and CE pending

**Installation Requirements**

The Mini Socket iWiFi must be installed within a full-enclosure device that is safety certified.



## 2 Features

### Security

- Acts as a security gap between the host application and the network
- One secure SSL3/TLS1 socket
- Provides WEP, WPA and WPA2 Wireless LAN security
- Supports multiple Certificate Authorities and both client-side and server-side authentication
- Secure FTP and HTTP clients (over SSL3)
- Includes a true hardware random number generator
- AES, 3DES and SHA accelerated in hardware

### Protocols

- Up to 10 simultaneous TCP/UDP sockets and two listening sockets
- HTTP client
- HTTP web server with two on-chip websites: configuration site and application site
- FTP and TELNET clients
- DHCP client and server
- Sending and receiving textual email and binary email with MIME attachments

### Additional Features

- Non-volatile, on-chip operational parameter database
- Supports infrastructure and ad-hoc Wireless LAN networks
- SerialNET mode for serial-to-IP bridging (port server mode)
- Local firmware update
- Remote configuration and firmware update over the Internet
- Retrieval of time data from a Network Time Server

**Note:** For a detailed description of all available features, see the *AT+i Programmer's Manual*.

## 3 Pin Description

The Mini Socket iWiFi module includes the iChip CO2128 IP Communication Controller and the Marvell 88W8686 802.11b/g WiFi chipset mounted on a socket form-factor module.

### 3.1 Pin Assignments

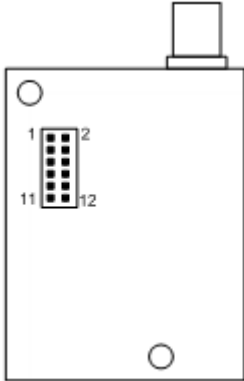


Figure 3-1: Pin-out for Mini Socket iWiFi

### 3.2 Pin Functional Description

Pin No.	Signal	Type	Description
1	VDD	POWER	3.3±0.3V power supply
2	GND	POWER	iChip ground
3	RXD	INPUT	Host Data Receive – Asynchronous serial data received from host.
4	TXD	OUTPUT	Host Data Send – Asynchronous serial data sent to host.
5	-RTS	OUTPUT	Request to Send Host – -RTS is active only when host hardware flow control is enabled. When -RTS is LOW, flow control is enabled for the host serial port, that is, the host can transmit to iChip. When -RTS is HIGH, iChip indicates that its receiver is busy and cannot receive data from host.  When not in use, this pin must be connected to -CTS.
6	-DTR	OUTPUT	Host Data Terminal Ready
7	-CTS	INPUT	Clear to Send Host – -CTS is active only when host

			<p>hardware flow control is enabled. When -CTS is LOW, flow control is enabled for the host serial port, that is, iChip can transmit to the host. When -CTS is HIGH, the iChip transmitter holds its data in the serial port transmit register. -CTS is sampled only at the beginning of a frame transmission. If -CTS is raised while a character frame is being transmitted, that frame will be completed.</p> <p>When not in use, connect this pin to -RTS.</p>
8	-CD	OUTPUT	Not in use
9	-DSR	INPUT	Host Data Set Ready
10	-RES/-PD	INPUT	<p>RESET/Power-Down: When -RES/-PD is LOW, The Mini shuts down all circuits and current consumption becomes minimal – typically 40uA.</p> <p>When -RES/-PD is High the Mini is in normal operation mode.</p> <p>To RESET properly: -RES/-PD must be held LOW for at least 1ms after power reaches 90%.</p>
11	MSEL	INPUT	Mode Select – If MSEL is held LOW for more than 5 seconds during runtime, iChip performs a software reset and restarts in Rescue mode. For more information, see the <i>AT+i Programmer's Manual</i> .
12	-RF_LED	OUTPUT with serial 330Ω resistor	<p>RF Status Indication – When this signal is asserted intermittently, iChip is scanning for APs.</p> <p>When asserted HIGH, this signal indicates that iChip is currently associated with an AP.</p>

Table 3-1: Miscellaneous Signals

## 4 Electrical Specifications

### 4.1 Absolute Maximum Ratings

Parameter	Rating
Voltage at any pin with respect to ground	-0.3V to +3.6V
Operating temperature	-20°C to 75°C (-4°F to 167°F)
Storage temperature	-65°C to 125°C (-85°F to 257°F)

Table 4-1: Absolute Maximum Ratings

### 4.2 DC Operating Characteristics

Parameter	Min	Typical	Max	Units
VDD	3.0	3.3	3.6	Volts
High-level Input	2.0		VDD I/O+0.3	Volts
Low-level Input	-0.3		0.8	Volts
High-level Output @2mA	VDD I/O-0.4			Volts
High-level Output @0mA	VDD I/O-0.2			Volts
Low-level Output @2mA			0.4	Volts
Low-level Output @0mA			0.2	Volts
Input leakage current			10	µA
Power supply current from VDD (Transmit Mode)		260	280	mA
Power supply current from VDD (Receive Mode)		190	210	mA
Power supply current from VDD (Power Save Mode)		8*		mA
Power supply current from VDD (Power Down Mode)		40		uA
Input Capacitance			5.3	pF
Radio Frequency Range (subject to local regulation)	2.412		2.484	MHz

Table 4-2: DC Operating Characteristics

(\*) **Note:** Power supply current as measured in firmware version i2128d722B05.

## 4.3 Tx Specifications

Item	Condition	Min	Typ	Max	Unit	
Transmit Power Levels	11b		15		dBm	
	11g		15		dBm	
Transmit Spectrum Mask	11b	Fc+/-11MHz		40		dBc
		Fc+/-22MHz		60		dBc
	11g	Fc+/-11MHz		30		dBc
		Fc+/-20MHz		40		dBc
		Fc+/-30MHz		50		dBc
Transmit Center Frequency Tolerance	Temperature=25°C		±10		ppm	

Table 4-3: Tx Specifications

## 4.4 Rx Specifications

Item	Condition	Min	Typ	Max	Unit
Receiver Minimum Input Level Sensitivity	802.11b Data Rate=11Mbps, PER<8%		-88		dBm
	802.11g Data Rate=54Mbps, PER<10%		-74		dBm
Adjacent Channel Rejection Desired channel is 3dB above sensitivity	802.11b Data Rate=11Mbps, PER<8%		48		dBc
	802.11g Data Rate=54Mbps, PER<10%		15		dBc

Table 4-4: Rx Specifications

PER(%)=(Number of all packets – Number of received packets)/(Number of all packetsX100)

## 5 Mechanical Dimensions

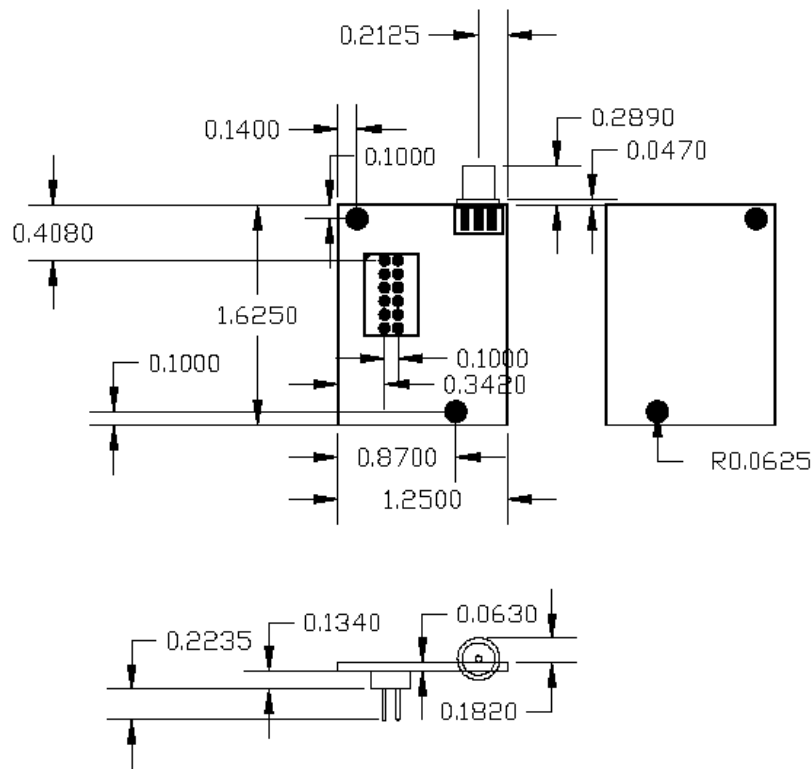


Figure 5-1: Mechanical Dimensions (all measures are in inches)

## 6 Evaluation Board

The II-EVB-362MW evaluation board enables you to evaluate the Mini Socket iWiFi without changing anything in your current development environment. Using a simple Windows-based application on a PC, you can issue AT+i commands to the iChip CO2128 and get responses.

**Note:** The evaluation board supports serial host data rates of up to 1Mbps only.

AT+i commands are used to configure parameter values into iChip's flash memory and activate Internet tasks such as email send, sockets, FTP sessions, configuration, and more.

A full description of AT+i commands can be found in the *AT+i Programmer's Manual* on Connect One's website at <http://www.connectone.com>.

To help you evaluate the Mini Socket iWiFi, Connect One supplies the iChip Config Utility. This is a Windows-based application that contains intuitive dialog boxes to fully configure iChip CO2128. It doesn't require any knowledge of AT+i commands. It also contains local firmware update functionality. The iChip Config Utility allows you to perform specific Internet communication tasks such as sending and receiving emails, activating iChip's websites, entering SerialNET mode, and more. The latest iChip Config Utility version and user manual can be found on Connect One's website under the Support section.

## 7 Ordering Information

Part Number	Description
iW-SM2128M1-US	Mini Socket iWiFi module, for USA
iW-SM2128M1-EU	Mini Socket iWiFi module, for Europe
II-EVB-362MW-US-110	Evaluation board for Mini Socket iWiFi module, for USA, with 110V power supply adaptor
II-EVB-362MW-EU-220	Evaluation board for Mini Socket iWiFi module, for Europe, with 220V power supply adaptor
iW-ANT2-BL	2.4GHz WiFi antenna, 2.0dBi, 50Ω, omni-directional, 1/4 wavelength dipole configuration, VSWR≤2.0, height – 82.5mm, weight – 6.3 grams



## 8 Internet Protocol Compliance

Mini Socket iWiFi complies with the Internet standards listed in the following table.

<b>RFC 768</b>	User datagram protocol (UDP)
<b>RFC 791</b>	Internet protocol (IP)
<b>RFC 792</b>	ICMP – Internet control message protocol
<b>RFC 793</b>	Transmission control protocol (TCP)
<b>RFC 821</b>	Simple mail transfer protocol (SMTP)
<b>RFC 822</b>	Standard for the format of ARPA Internet text messages
<b>RFC 826</b>	Ethernet address resolution protocol (ARP)
<b>RFC 959</b>	File transfer protocol (FTP)
<b>RFC 854</b>	TELNET protocol specification
<b>RFC 857</b>	Telnet ECHO option
<b>RFC 858</b>	Telnet suppress go-ahead option
<b>RFC 1034</b>	Domain names (DNS) - concepts and facilities
<b>RFC 1035</b>	Domain names (DNS) - implementation and specification
<b>RFC 1073</b>	Telnet window size option
<b>RFC 1091</b>	Telnet terminal type option
<b>RFC 1321</b>	MD5 message digest algorithm
<b>RFC 1939</b>	Post office protocol - version 3 (POP3)
<b>RFC 1957</b>	Some observations on the implementations of the post office protocol (POP3)
<b>RFC 2030</b>	Simple network time protocol (SNTP)
<b>RFC 2045</b>	Multipurpose Internet mail extensions (MIME) part one: internet message body format
<b>RFC 2046</b>	MIME part two: media types
<b>RFC 2047</b>	MIME part three: message header extensions for non-ASCII text
<b>RFC 2048</b>	MIME part four: registration procedures
<b>RFC 2049</b>	MIME part five: conformance criteria and examples
<b>RFC 2068</b>	Hypertext transfer protocol HTTP/1.1
<b>RFC 2131</b>	Dynamic host configuration protocol (DHCP)
<b>RFC 2132</b>	DHCP options (only relevant parts)
<b>RFC 2228</b>	FTP security extensions
<b>RFC 2246</b>	The TLS protocol version 1.0

*Table 8-1: Internet Protocol Compliance*