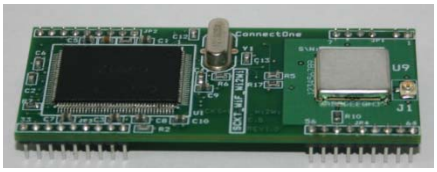
Secure Socket iWiFi™

# Secure Socket iWiFi™



# Data Sheet

Ver. 1.60


ConnectOne™

**International:**
Connect One Ltd.
20 Atir Yeda Street
Kfar Saba 44643, Israel
Phone: +972-9-766-0456
Fax: +972-9-766-0461
Email: sales@connectone.com
www.connectone.com

**USA:**
560 S. Winchester Blvd.
Suite 500
San Jose, CA 95128
Tel: (408) 572-5675
Fax: (408) 572-5601



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**WARNING:** THE SECURE SOCKET iWIFI IS AN RF MODULE INTENDED FOR EMBEDDING IN A HOST DEVICE. LOCAL RELEVANT RF REGULATIONS SUCH AS ALLOWED FREQUENCIES AND USAGE IN COMMERCIAL FLIGHTS MUST BE OBSERVED. SAFETY INSTRUCTIONS MUST BE INCLUDED IN THE MANUALS OF THE HOST DEVICE. CONNECT ONE ASSUMES NO LIABILITY FOR CUSTOMER FAILURE TO COMPLY WITH THESE PRECAUTIONS.

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# Revision History
# 11-6250-16

| Version | Date | Description |
|---|---|---|
| 1.0 | January 2008 | Initial preliminary version |
| 1.1 | January 2008 | Added certification details and some editing |
| 1.2 | February 2008 | Added antenna ordering information |
| 1.3 | March 2008 | Changed temperature range values |
| 1.4 | March 2008 | Minor edits |
| 1.5 | March 2008 | Updated power consumption values |
| 1.60 | February 2009 | Miscellaneous |



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# 1 Introduction

**General Description**

Secure 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 compact form factor and uses an industry standard pin-out.

Secure 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.

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

Secure 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 Secure 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.

Secure 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-361MW evaluation board provides an easy environment for testing the Secure Socket iWiFi prior to designing it into your product.

**Hardware Description**

- Size: 64.5x27.4x6.6mm (2.54x1.08x0.26")
- 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 – 260mA (typical)
  Receive – 190mA (typical)
  Power Save mode – 8mA
- Connector: U.FL ultra-miniature coax to antenna
- 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 (RTSH, CTSH) and software flow control.



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**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
  USA – 11 channels

**Recommended Antenna and Cable**

- 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
- iW-CAB-150 Pigtail Antenna Cable

**Warranty**

One year

**Certifications**

- CE, FCC
- Radio: FCC part 15, subpart C; EN 301 489 (EMC Directive 89/336/EEC)
- EMC: FCC part 15, subpart B; EN 300 328 (R&TTE Directive 1999/5/EC)
- Safety: EN 60950-1:2004

**Installation Requirements**

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



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# 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 infrasturcture 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*.



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# 3 Pin Description

The Secure 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

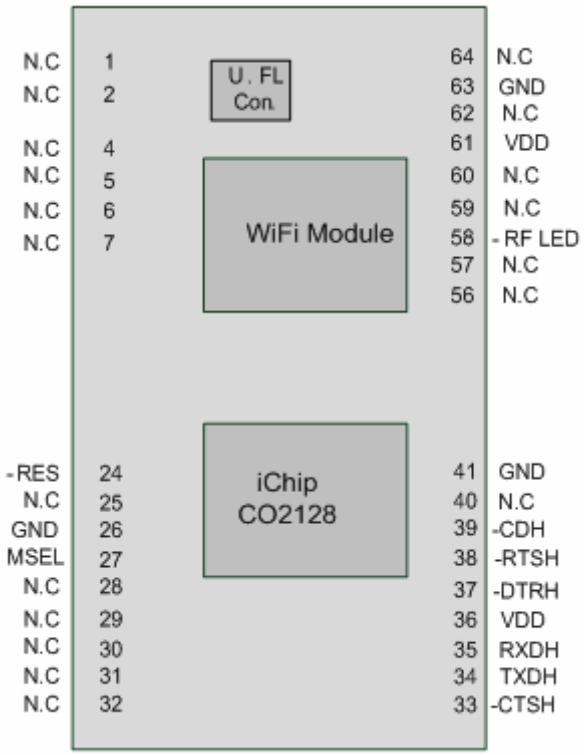


*Figure 3-1: Pin-out for Secure Socket iWiFi*



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# 3.2 Pin Functional Description

## 3.2.1 Miscellaneous Signals

| Signal | Type | Pin No. | Description |
|---|---|---|---|
| MSEL | Input with internal pull-up resistor | 27 | Mode Select: When this pin is held LOW during power-up for at least 3 seconds, the boot ROM application ignores the firmware that is burnt on the external flash memory and waits for an application to be loaded via one of the enabled interfaces. This mode is used for firmware update. |
| -RES | I | 24 | RESET: When -RES is LOW, Secure Socket iWiFi immediately terminates its present activity and clears its internal logic.<br>-RES must be held LOW for at least 1ms after power reaches 90%. |
| GND | P | 26, 41, 63 | Ground: iChip ground signal |
| VDD | P | 36, 61 | Power Supply: This pin supplies 3.3V+/-0.3V |
| NC | --- | 1, 2, 4-7, 25, 28-32, 40, 56, 57, 59, 60, 62 64 | NC (Not Connected) pins |

*Table 3-1: Miscellaneous Signals*



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### 3.2.2 Host Serial Interface Signals

| Signal | Type | Pin No. | Description |
|---|---|---|---|
| TXDH | O | 34 | Transmit Data Host: This pin supplies asynchronous serial transmit data to the host. |
| RXDH | I | 35 | Receive Data Host: This pin supplies asynchronous serial receive data from the host.<br>When not used, this pin must be connected to VDD. |
| -CTSH | I | 33 | Clear-to-Send Host: -CTSH is active only when host hardware flow control is enabled. When -CTSH is LOW, flow control is enabled for the host serial port, i.e., iChip can transmit to the host. When -CTSH is HIGH, the iChip transmitter holds its data in the serial port transmit register. -CTSH is sampled only at the beginning of a frame transmission. If -CTSH is raised while a character frame is being transmitted, that frame will be completed. Connect -CTSH to -RTSH when not in use. |
| -RTSH | O | 38 | Ready-to-Send Host: -RTSH is active only when host hardware flow control is enabled. When -RTSH is LOW, flow control is enabled for the host serial port, i.e., the host can transmit to iChip. When -RTSH is HIGH, iChip indicates that its receiver is busy and cannot receive data from host. Connect -RTSH to -CTSH when not in use. |
| -DTRH | O | 37 | Undefined |
| -CDH | O | 39 | Undefined |

*Table 3-2: Host Serial Interface Signals*

### 3.2.3 LED Indicator and RF Connector

| Signal | Type | Pin No. | Description |
|---|---|---|---|
| -RF_LED | Output with serial 330Ω resistor | 58 | -RF_LED status<br>Blinking: AP scanning<br>ON (Low): Link |
| RF Connector | | --- | U.FL ultra-miniature coaxial antenna connectors for diversity receive at 2.4GHz. Use pigtail to connect to a standard antenna. |

*Table 3-3: LED Indicator and RF Connector*



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# 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 |
| 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.



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## 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 | Data Rate=11Mbps, PER<8% | | -88 | | dBm |
| | Data Rate=54Mbps, PER<10% | | -74 | | dBm |
| Adjacent Channel Rejection<br>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)



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# 5 Mechanical Dimensions

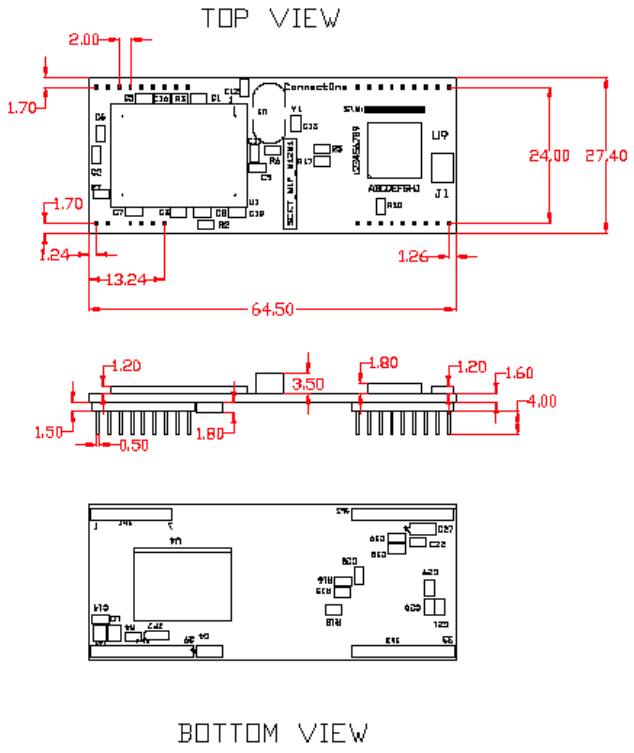


*Figure 5-1: Mechanical Dimensions*



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# 6 Evaluation Board

The II-EVB-361MW evaluation board enables you to evaluate the Secure 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.

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 Secure 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.



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# 7 Ordering Information

| Part Number | Description |
|---|---|
| iW-SM2128MW-US | Secure Socket iWiFi module, for USA |
| iW-SM2128MW-EU | Secure Socket iWiFi module, for Europe |
| iW-SM2128MW-JP | Secure Socket iWiFi module, for Japan |
| II-EVB-361MW-US-0<br>II-EVB-361MW-US-110 | Evaluation board for Secure Socket iWiFi module, for USA, without power supply/110V |
| II-EVB-361MW-EU-0<br>II-EVB-361MW-EU-0/220 | Evaluation board for Secure Socket iWiFi module, for Europe, without power supply/220V |
| II-EVB-361MW-JP-0<br>II-EVB-361MW-JP-110 | Evaluation board for Secure Socket iWiFi module, for Japan, without power supply/110V |
| 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 |
| iW-CAB-150 | Pigtail antenna cable |



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# 8 Internet Protocol Compliance

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

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

*Table 8-1: Internet Protocol Compliance*



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