



# **Wireless Module User Manual**

Version 1.1  
February 2006

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## 1. Regulatory Notice

### 1.1 Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

**Caution:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

#### **FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

**This device is intended only for OEM integrators under the following conditions:**

- (1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- (2) The antenna should be integral if the end device is intended to be operated in 5.15 ~5.25GHz frequency range.

As long as the 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

**IMPORTANT NOTE:**

In the event that these conditions can not be met (for example, certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

**1.2 End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example: Access Point, Router). The final end product must be labeled in a visible area with the following: "Contains TX FCC ID: SPKCOPWRLAA"

**1.3 Manual Information That Must be Included**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the users manual of the end product which integrate this module.

The users manual for OEM integrators end users must include the following information in a prominent location:

"IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter".

If the end product integrating this module is going to be operated in 5.15 ~ 5.25GHz frequency range, the warning statement in the user manual of the end product should include the restriction of operating this device outdoor could void the user's authority to operate the equipment

## 2. Specifications

### 2.1 General

|                                        |                                                                                                                                                           |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio Data Rate<br>(Auto-rate capable) | 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 & 108Mbps turbo mode<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 & 108 Mbps turbo mode<br>802.11b: 1, 2, 5.5, 11Mbps   |
| Network Standards                      | WECA (Wi-Fi & Wi-Fi5 Compliant), IEEE802.11, IEEE802.11a, IEEE802.11g draft, IEEE802.11b, draft IEEE802.11e, f, h and i standards, IEEE802.11x (Optional) |
| Security                               | IEEE802.11x Support for LEAP (Optional)<br>WPA – Wi-Fi Protected Access (64, 128, 152-WEP with TKIP)                                                      |
| Network Architecture                   | Support ad-hoc, peer-to-peer networks and infrastructure communications to wired Ethernet networks via Access Point                                       |
| Drivers                                | Windows 98/ME/2000/XP                                                                                                                                     |
| Access Protocol                        | CSMA/CA with ACK                                                                                                                                          |
| Roaming                                | IEEE802.11b compliant                                                                                                                                     |
| Operating Voltage                      | 3.3V/5V                                                                                                                                                   |
| Regulation<br>Certifications           | FCC Part 15/UL, ETSI 300/328/CE                                                                                                                           |
| LED Indicator                          | RF Link activity                                                                                                                                          |

### 2.2 RF Information

|                          |                                                                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Band           | 802.11a: 5.15 to 5.25GHz<br>5.25 to 5.35GHz<br>5.725 to 5.825GHz<br>802.11b/g: 2.412 to 2.462GHz (United States)<br>2.412 to 2.484GHz<br>2.412 to 2.472GHz<br>2.457 to 2.462GHz<br>2.457 to 2.472GHz |
| Modulation<br>Technology | 802.11a/g: OFDM (64-QAM, 16-QAM, QPSK, BPSK)<br>802.11b: DSSS (DBSK, DQPSK, CCK)                                                                                                                     |

|                                  |             |                                                                                                                                                                    |
|----------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Receive Sensitivity<br>(Typical) | 802.11a:    | -86dBm@6Mbps, -80dBm@18Mbps, -70dBm@48Mbps, -84dBm@9Mbps, -77dBm@24Mbps, -68dBm@ 54Mbps, -82dBm@12Mbps, -73dBm@36Mbps                                              |
|                                  | 802.11b/g : | -91dBm@1Mbps, -85dBm@9Mbps, -77dBm@36Mbps, -89dBm@2Mbps, -82dBm@12Mbps, -76dBm@ 48Mbps, -87dBm@5.5Mbps, -80dBm@18Mbps, -73dBm@ 54Mbps, -86dBm@6Mbps, -78dBm@24Mbps |
| Transmit Output<br>Power         | 802.11a:    | Up to 18dBm                                                                                                                                                        |
|                                  | 802.11b/g:  | Up to 21dBm                                                                                                                                                        |

### 2.3 Environmental

|                              |                                                                                                                         |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Temperature Range            | -10 deg C to 60 deg C (14 deg F to 140 deg F ) – Operating<br>-40 deg C to 70 deg C (-40 deg F to 158 deg F ) - Storage |
| Humidity<br>(non-condensing) | 5% to 95% Typical                                                                                                       |

### 2.4 Physical Specifications

|            |                                                                           |
|------------|---------------------------------------------------------------------------|
| Interface  | Mini PCI TypeIII A                                                        |
| Antenna    | Two Antenna Connectors(U.FL)                                              |
| Dimensions | 50.9(L) mm x 59.6(W) mm x 4.8.(H) mm<br>2 (L) in x 2.3(W) in x 0.2.(H) in |

### **3. Installation**

#### **3.1 Module Installation**

The installation procedure for the wireless module may vary and fully depends upon the design of the particular networking device. Therefore, the OEM shall seek advice from Ambient for the proper installation procedure.

#### **3.2 Antenna Installation**

The Wireless Module must be used ONLY with one of the following antennas:

- portable rubber duck for indoor and outdoor applications (Nearson, Model: S181TR-2450R), or,
- omni-directional for outdoor applications (Netgate, Model:ANT-8-OMNI-RPNF)

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## 4. Software Configuration

To enable and configure WiFi, edit the following values in the File *ds2pl.conf* file:

```
# 802.11 WIFI configuration
```

```
# WIFI interface Enabled/Disabled
```

```
WIFI=no
```

**Set to YES to enable WiFi**

```
#Mode should be 802.11g or 802.11a or 802.11b
```

```
MODE_80211=802.11g
```

**Set to one of the listed values to set the card appropriately. That the supplied antenna must support the desired mode.**

```
#Access_point should be 'yes' to act like an access point and 'no' if not
```

```
ACCESS_POINT_80211=yes
```

**Should not be edited**

```
#ESSID sets the network name for the wireless network
```

```
ESSID_80211=Ambient
```

**The 802.11 name the node will advertise itself as**

```
#Specifies the channel to use - can be obtained using iwlist command
```

```
CHANNEL_80211=1
```

**The channel the node will service wireless clients on (values of 1 to 11 permitted)**

```
#Specifies the encryption key to use
```

```
ENCRYPTION_KEY_80211=6173320004
```

**Set this to the hex value for the WEP encryption key in hex digits XXXX-XXXX-XXXX-XXXX or XXXXXXXXXXXX. An ASCII string can be used by setting this value to "s:value"**

Consult Ambient for the procedure to edit this file.

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## 5. Technical Support

For technical support, contact:

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