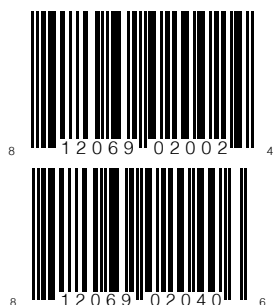


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MPN

**AEH-AR9485-NC**  
**AEH-AR9485-NX**

UPC



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SAMPLES

## 150Mbps one chain-two antenna, 802.11b/g/n WLAN with WiFi Direct® & Miracast® – Half Size MiniPCI Express Module

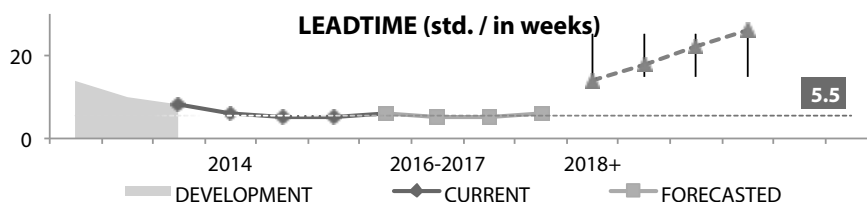
a.k.a. QUALCOMM Atheros Reference Design HB125 (QCA P/N AR5B125)

### DATASHEET



C	B	A	3	3	1 week
TECHPOINT	LIFESPOT	VAROD	VERTICALS	DCO	ELT

\* Page 2 for key legend. Commercial data refresh: January 2016



FOR FURTHER INFORMATION, DEVELOPMENT SAMPLES, CUSTOMIZATION AND VOLUME PRICING CONTACT US  
VIA AIRETOS.COM OR VIA THE VOXMICRO GROUP WHOLESALERS - FOR CONTACTS SEE [WWW.VOXMICRO.TEL](http://WWW.VOXMICRO.TEL)

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## Revision History

Releases	Date	Notes	Prepared	Approved
Version 1.0	2013/12/17	Standard Version Spec	Kuo	RChang
Version 1.1	2014/01/24	Update TX/RX data	Amos	LTu
Version 1.2	2014/06/20	Added Market Orientation Index	James	LTu
Version 1.3	2014/07/07	Added Configuration Option Updated Bluetooth & Miracast® Compliance	James	LTu
Version 1.4	2016/01/22	Default Variant ECN applied Added Extended Operating Temperature Variant X	Andy	LTu
Version 1.5	2016/03/07	Front and Back Product Labels refresh Disclaimer Notice revision	Andy	LTu

## \* Commercial Key Legend

Indicators that assess the specific product for its position in the technology curve and the supply chain responsiveness it enjoys. They combine an inner-outer view: both from outside factors and from internal corporate and production support.

<b>MOI [Market Orientation Index]</b>	A value calculated from the grading of the factors below. Used as a rule-of-thumb to aid design-in and procurement evaluation. MOI depicts the present product affinity to Innovation (I), Customer Empathy (C) and Price Focus (P).
<b>TECHPOINT</b>	The position of the product within the specific technology-innovation curve for its class. VALUES: Advanced (A), Barring (B), Common (C), Dissolving (D).
<b>LIFESPOT</b>	Estimated lifespan indicator. VALUES: Agonist (A), Bold (B), Current (C), Distressed (D); the earlier the letter the earlier the position in the specific product lifecycle.
<b>VAROD [Variants On-Demand]</b>	An indicator of the depth and difficulties On-Demand product variations can reach and encounter. VALUES: Auxiliary (A), Basic (B), Core (C), Deep (D).
<b>VERTICALS</b>	It is an index of the spread of product applications in different vertical markets. VALUES: 1 to 4; the more the target markets the higher the number, the less the product specificity to markets.
<b>DCO [Design Cost Orientation]</b>	Commodity index related to the cost point for the product's design conception. VALUES: 1 to 4; the higher the number the more cost aware is the core design.
<b>ELT [Effective Lead Time]</b>	Adjusted lead-time in weeks. This is a compound value based on the timeframe for the fulfillment of the 90% of unscheduled orders received accounting also for the industrial lead-time and internal inventory buffering. VALUE: number of ELT weeks.



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<b>150MBPS ONE CHAIN-TWO ANTENNA, 802.11B/G/N WLAN WITH WIFI DIRECT® &amp; MIRACAST® – HALF SIZE MINIPCI EXPRESS MODULE</b>	<b>1</b>
<b>REVISION HISTORY</b>	<b>2</b>
<b>* COMMERCIAL KEY LEGEND</b>	<b>2</b>
<b>DESCRIPTION</b>	<b>4</b>
<b>TOP FEATURES</b>	<b>4</b>
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## 1. Description

**Value for Money:** The AEH-AR9485 IEEE 802.11 b/g/n PCI-E WLAN is a highly cost effective solution for consumer and applications. Connect one or two antenna, as per your design specifications.

**Compliance:** With World level Regulatory Compliance and full compatibility with the latest industry standards like Multi-Country Roaming support via IEEE 802.11d (Global Harmonization Standard) for regulatory adaptability, Dynamic Frequency Selection (DFS), Wi-Fi Protected Setup™ via PIN and Push-Button (PBC), Passpoint™ and Voice protocols, the AEH-AR9485 provides a modern solution at a optimal price point, targeting at the growing value computing products market segment.

**DirectConnect:** The AEH-AR9485 Series is WiFi Direct® & Miracast® Certified enabling easy direct connectivity and wireless display functionality with other compliant devices without the need of a wireless access point.

**Less Power - Longer Range:** A high level of integration and full implementation of power management functions specified in the AEH-AR9485 minimizes system power requirements. It conserves power with low power sleep modes, Power Save and low platform power, offering the industry's lowest power consumption – 30% to 50% lower than comparable solutions. The robust signal travels farther, maintaining wireless connections up to 3 times farther than standard 802.11g.

## 2. Top Features



- Two antenna connectors to support 1(Transmit) & 2(Receive) technology
- Optimal price point for the value computing market
- Lowest (best-in-class) power consumption
- Extended temperature grade version
- Support for DirectConnect / Wi-Fi CERTIFIED Direct® and Miracast®
- Modular World Regulatory Certification (50+ domains)



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### 3. Specifications

SOLUTION DESIGN	<b>Chipset</b>	Qualcomm Atheros AR9485-AL1A
	<b>Standard</b>	IEEE 802.11 b/g/n Wi-Fi
	<b>Industrial Reference</b>	Qualcomm Atheros reference design HB125 (QCA P/N AR5B125)
APPEARANCE	<b>Communications Interface</b>	PCI Express Standard 1.1 host I/O
	<b>Form Factor</b>	Mini PCIE format, Half Size (length) of the standard mPCle dimensions - Minicard
ANTENNA	<b>Configuration</b>	One Stream (1 chains), 1x2, 2 Connectors
	<b>Type</b>	Two on board I-PEX / U.FL connectors: MAIN : Rx/Tx – AUX: Rx
WIRELESS PARAMETERS	<b>Frequency Band</b>	2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz
	<b>Data Transfer Rates</b>	WiFi 2.4GHz:    11n: Up to 450Mbps(dynamic) 11g: Up to 54Mbps(dynamic) 11b: Up to 11Mbps(dynamic)
	<b>Media Access Control</b>	CSMA/CA with ACK
	<b>Channel</b>	2.4GHz: 1-13 (optionally 14 – including 2484 MHz only for Japan)
	<b>Channel Spacing</b>	5MHz
	<b>Spreading / Modulation</b>	802.11g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps)
	<b>RF Output Power</b>	802.11b: Typical 18dBm +/- 2 dBm 802.11g: Typical 13 dBm at 54M / 18dBm at 6M +/- 2dBm 802.11n 2.4G HT20 : Typical 11 dBm at MCS7 / 16dBm at MCS0 +/- 2dBm 802.11n 2.4G HT40 : Typical 12 dBm at MCS7 / 16dBm at MCS0 +/- 2dBm
	<b>RF Receive Sensitivity (Typical)</b>	802.11b: 11M less then 85 dBm 802.11g: 54M less then 74 dBm 802.11n 2.4G:    HT20 MCS7 less then 68 dBm HT40 MCS7 less then 71 dBm
	<b>Operating Range</b>	Open Space: ~300 m; Indoor: ~100 m (The transmission speed may vary according to the environment)
	<b>Wireless Security</b>	WEP 64-bit and 128-bit encryption WPA (Wi-Fi Protected Access) WPA2 (Wi-Fi Protected Access)
WORKING MODES	Infrastructure, Client, Bridge, Ad-hoc	
SAFETY, EMISSION & REGULATORY	Pre-scan/scan reports on request following Atheros HB125 (AR5B125) certifications. Almost 50 domain modular certification available, including FCC, CE, IC and TELEC (including optional MKK). Compliant with RoHS	



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PROTOCOLS	<b>IEEE WLAN Network</b>	802.11n , 802.11g, 802.11b, 802.11e, and 802.11i
	<b>Other Standards</b>	
	<b>Industry Standards</b>	Wi-Fi CERTIFIED Direct®, Wi-Fi CERTIFIED Miracast®
HOST SYSTEM REQUIREMENTS	<b>Operating System</b>	Windows (32 & 64 bits) XP/Vista/7/8, OSX, Linux,
ENVIRONMENT	<b>Operating Temperature</b>	Variant X / 04 : -20° ~ +75° Celsius Other Variants: 0° ~ +50° Celsius
	<b>Storage Temperature</b>	-40° ~ +70° Celsius
	<b>Operating Humidity</b>	10%~90% non-condensing
	<b>Storage Humidity</b>	5%~90% non-condensing
ELECTRICAL	<b>I/O Voltage</b>	3.3V +/-10%
	<b>Power Consumption</b>	Transmit Packet Test HT40: 600 mA Receiver Packet Test HT40: 400 mA
MECHANICAL	<b>Dimensions</b>	50.95mm x 30mm x 3.15mm (with shielding)
	<b>Weight</b>	3.1 g
PACKAGING	<b>Packing style</b>	ESD Sleeves in Carton Box Package (optional: open plastic tray modality)
	<b>Package Contents</b>	AEH-AR9485 Series IEEE 802.11 b/g/n mPCI-E PCB modules

## 4. Ratings / Characteristics

### 4-1. Absolute Maximum Ratings

Symbol	Parameter	Max. Rating	Unit
V <sub>dd33</sub>	Maximum I/O supply voltage	3.63	V
R <sub>FIn</sub>	Maximum RF input (reference to 50 Ω)	+10	dBm
T <sub>store</sub>	Storage temperature	-40~+70	°C

### 4-2. Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V <sub>dd33</sub>	I/O voltage	2.97~3.63	V



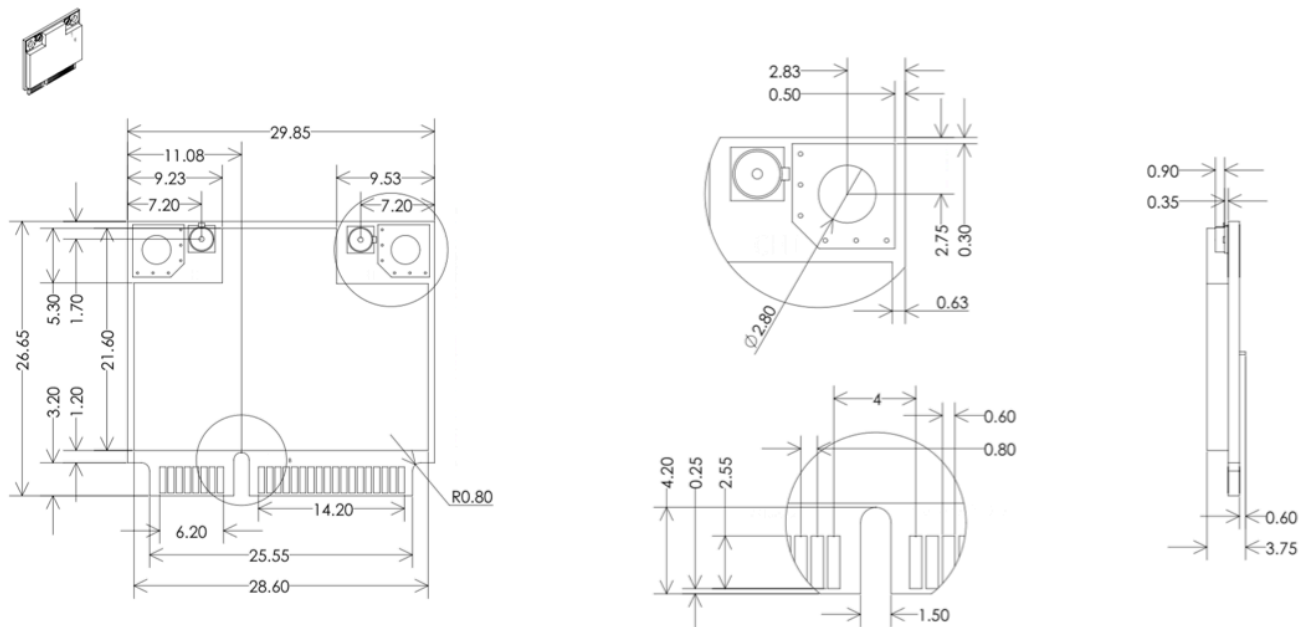


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### 4-3. GPIO Interface Characteristics

Signal Name (To chip GPIO PIN)	Mini PCI-E PIN	Type	Driver	PU/DP Resistance
WLAN_LED	44	O	24 mA (Max)	None-PU
WLAN_DISABLE	20	I	—	100 KΩ PU

## 5. Mechanical Drawing



\* Measures in millimeters (mm). Tolerance below 0.15mm unless otherwise specified.

## 6. Connector Pin-out Definitions

Pin No.	Definition	Basic Description	Type
1	WAKE_L	No connect. Should be left open.	NC
2	+3.3V	3.3V power supply	YES
3	Reserved	No connect. Should be left open.	NC
4	GND	Ground	YES
5	Reserved	No connect.	NC



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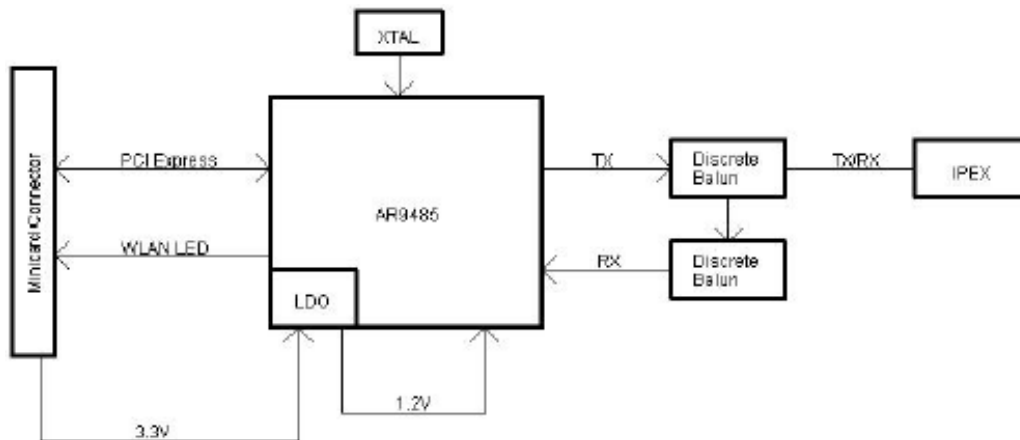
6	+1.5V	No connect. Should be left open.	YES
7	CLKREQ_L	Reference clock request.	YES
8	UIM_PWR	No connect. Should be left open.	NC
9	GND	Ground	YES
10	UIM_DATA	No connect. Should be left open.	NC
11	REFCLK-	Differential reference clock	YES
12	UIM_CLK	No connect. Should be left open.	NC
13	REFCLK+	Differential reference clock	YES
14	UIM_RESET	No connect. Should be left open.	NC
15	GND	Ground	YES
16	UIM_VPP	No connect. Should be left open.	NC
17	UIM_C8	No connect. Should be left open.	NC
18	GND	Ground	YES
19	UIM_C4	No connect. Should be left open.	NC
20	W_DISABLE_L	WLAN disable control. Low disable WIFI. Module P.U	YES
21	GND	Ground	YES
22	PERST_L	PCI express fundamental reset	NC
23	PERu0	Differential transmit	YES
24	+3.3Vaux	No connect. Should be left open.	YES
25	PERp0	Differential transmit	YES
26	GND	Ground	YES
27	GND	Ground	YES
28	+1.5V	No connect. Should be left open.	YES
29	GND	Ground	YES
30	SMB_CLK	No connect. Should be left open.	NC
31	PETn0	Differential receive	YES
32	SMB_DATA	No connect. Should be left open.	NC
33	PETp0	Differential receive	YES
34	GND	Ground	YES
35	GND	Ground	YES
36	USB_D-	USB Differential signal	NC
37	RESERVED	No connect. Should be left open.	YES
38	USB_D+	USB Differential signal	NC
39	RESERVED	No connect. Should be left open.	YES
40	GND	No connect. Should be left open.	NC
41	RESERVED	No connect. Should be left open.	YES
42	LED_WWAN_L	No connect. Should be left open.	NC
43	RESERVED	Ground	YES(GND)
44	LED_WLAN_L	Active low signal. The signal is used to provide WIFI	YES
45	RESERVED	Status indicators via LED.	NC
46	LED_WPAN_L	No connect. Should be left open.	NC
47	RESERVED	Active low signal. The signal is used to provide BT	NC
48	+1.5V	Status indicators via LED.	YES
49	RESERVED	No connect. Should be left open.	NC
50	GND	No connect. Should be left open.	YES
51	RESERVED	Active low signal. The signal is used to provide BT	NC
52	+3.3V	3.3V power supply	YES





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## 7. Block Diagram



## 8. Environmental Performance Qualification

Completed throughput evaluation at controlled conditions with 70dB attenuation for Variant X / 04:

- Assessment at independent laboratory, third-party performed product testing in thermal chamber.
- Conditions at extended operating temperatures of -40° ~ +85° Celsius and Cold-Start settings at -35° Celsius.

Technical reports and documentation can be made available on request.

## 9. Domain Code & Operating IDs

The Regulatory Domain pre-programmed as standard is 0x67 [wide open world mode].

Other regulatory domain codes can be pre-programmed on-request at production batch level.

Implemented as standard are identifiers following Qualcomm Atheros HB125 (p/n AR5B125) reference design:

	Vendor ID (VID)	Subsystem Vendor ID (SVID)	Device ID (DID)	Subsystem ID (SSID)
STANDARD WIFI	0x168C	0x168C	0x0032	0x3118

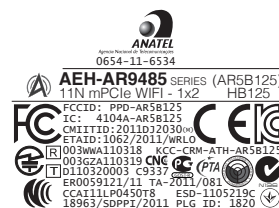


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## 10. Product Labels

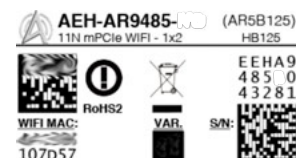
### 10-1. Front (Shield) Side Regulatory Label

Standard label is shown here. It includes the required marking for the following regulatory areas: FCC (USA), ETSI R&TTE (Europe), KCC (South Korea), TELEC (Japan), NCC (Taiwan), Industry Canada (IC), China MIIT, ANATEL (Brazil), CNC (Argentina), C-TICK (Australia & New Zealand), ETA (India), SDPPI (Indonesia), South Africa (ISACA), Pakistan (PTA), NTC (Philippines), GOST-R (Russia), TKC (Ukraine), TRA (UAE).



### 10-2. Back (Flat) Side Label

It includes VoxMicro AIRETOS® part number and product short description, Qualcomm-Atheros Reference Design and model, Serial Number label (human legible and two-dimensional datamatrix barcode), EU Safety & Environmental, Variant Number (inside the black box) and Wireless LAN MAC NIC ID label (human legible and two-dimensional datamatrix barcode).



### 10-3. On-Demand Labeling

Labels can be tailored to report customer's part number and regulatory compliance following Qualcomm-Atheros HB125 (p/n AR5B125) reference design certifications for any of the countries and domains required.

The full regulatory domain country list is available on request.

Regulatory documentation aimed at OEMs and Equipment Integrators is available on request.

## 11. ESD Processes

See Notices appended.



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## 12. Standard Packaging, Storage & Shipping

ESD Sleeve, Inner Box & Outer Carton level standard packing schematic \*:



	Module in ESD Sleeve	Inner Box Kit	Master Carton
CONTENT (UNITS)	1	60	960
INVENTORY SKU	AEH-AR9485-NC AEH-AR9485-NC1 AEH-AR9485-NX	AEH-AR9485-NC-K AEH-AR9485-NC1-K AEH-AR9485-NX-K	AEH-AR9485-NC-M AEH-AR9485-NC1-M AEH-AR9485-NX-M
OUTER DIMENSIONS	70 x 60 x 3.5 mm	204 x 165 x 65 mm	430 x 350 x 285 mm
GROSS WEIGHT	3.2 gr	350 gr	6000 gr
PICK & PACK METHOD	Padded envelope or carton box depending on quantity. Padded & separated.	In outer carton packaging.	As-is.
PACKAGING COMPLIANCE **	ANSI/ESD S20.20, IEC 61340-5-1, RoHS2	RoHS2	RoHS2
HTS CODE (HS)	8517.62	8517.62	8517.62
NAFTA / ECCN	On request	On request	On request

\* Packaging modality and artwork can be designed as per customer's requirements.

\*\* The Packaging modality and the selection of its materials is made with environmental responsibility and commitment to resource preservation. Please reuse and recycle where possible.

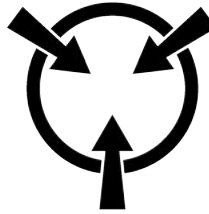
The AEH-AR9485 constitutes a sensitive electronic device and caution is required when handling it. ESD handling, shipment and storage notices apply:



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**DO NOT OPEN OR  
HANDLE EXCEPT AT A  
STATIC-FREE  
WORKSTATION**



**DO NOT SHIP OR STORE NEAR  
STRONG ELECTROSTATIC,  
ELECTROMAGNETIC OR  
RADIOACTIVE FIELDS**

## 13. Ordering Information

Public variants, their differential characteristics and ordering information:

	Ordering P/N	Variant IDs	Description
STANDARD PRODUCT	AEH-AR9485-NC	-/R/02	- Standard product - Standard packaging
Single Antenna VARIANT	AEH-AR9485-NC1	C/03	- Same as standard product but without AUX antenna connector - Standard packaging
Extended Temperature	AEH-AR9485-NX	X/04	- Standard product layout - Standard packaging - Extended Temperature Grade Materials



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## 14. NOTICES

**DISCLAIMER:** AIRETOS® and OxfordTEC® are registered trademarks VoxMicro LTD. All other registered and unregistered trademarks are the property of VoxMicro LTD Group or of their respective owners. Please note that the only warranty that VoxMicro provides regarding the products is its conformance to the specifications provided herein. Accordingly, VoxMicro shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this specification.

VoxMicro HEREBY DISCLAIMS ALL OTHER WARRANTIES REGARDING THE PRODUCTS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THAT THEY ARE DEFECT-FREE, OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. YOU AGREE TO INDEMNIFY AND DEFEND VoxMicro AND ITS AFFILIATES AGAINST ALL CLAIMS, DAMAGES, COSTS, AND EXPENSES THAT MAY BE INCURRED, INCLUDING WITHOUT LIMITATION, ATTORNEY FEES AND COSTS, DUE TO THE USE OF PRODUCTS.

VoxMicro's liability under this warranty shall be limited to products that are returned during the warranty period to the address designated by VoxMicro and that are determined by VoxMicro not to conform to such warranty. If VoxMicro elects to repair or replace such products, VoxMicro shall have reasonable time to repair such products or provide replacements. Repaired products shall be warranted for the remainder of the original warranty period. Replaced products shall be warranted for a new full warranty period.

For avoidance of doubt, VoxMicro shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than VoxMicro including improper installation or testing, or for any products that have been altered or modified in any way by an entity other than VoxMicro. Moreover, VoxMicro shall not be liable for any defects that result from your or third party's design, specifications or instructions for such products.

**STORAGE:** The product shall be stored without opening the packing according to storage environmental conditions noted within this datasheet. - The product shall be stored in non corrosive gas (Cl<sub>2</sub>, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub>, etc.). - Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp object and dropping the product, shall not be applied in order not to damage the packing materials.

**SHELF LIFE:** Product left more than two years after reception needs to be confirmed to its specifications before use.

**HANDLING:** Be careful in handling or transporting products because excessive stress or mechanical shock may break products. - Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change. Do not touch products with bare hands as such may result in electrostatic damage. - Since the application of static electricity or overvoltage may cause defect in the product or deterioration of its reliability, caution must be taken against exposure to any static electricity generated by electrified items such as workbenches, soldering irons, tools, carrying containers, etc.

**LAND PATTERN & DIMENSIONS:** All the ground terminals should be connected to the ground patterns. Furthermore, the ground pattern should be provided between IN and OUT terminals. Please refer to the specifications for the standard land dimensions.

**MECHANICAL PLACEMENT:** When mounting products connected to other components, products may be stressed and broken by uneven forces. To prevent products from damages, be sure to follow the specifications for the tools and interfaces being used.

**CLEANING:** Since this Product is Moisture Sensitive, any cleaning is not permitted.

**OPERATIONAL ENVIRONMENTAL CONDITIONS:** Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). If products are used under the following circumstances, it may damage products and leakage of electricity and abnormal temperature may occur:

- In an atmosphere containing corrosive gasses (Cl<sub>2</sub>, NH<sub>3</sub>, SO<sub>x</sub>, NO<sub>x</sub>) or combustible and volatile gases - Dusty place - Direct sunlight place - Water splashing place - Humid place where water condenses - Freezing place - etc.

If there are possibilities for products to be used under the preceding clause, consult with VoxMicro before actual use. As it might be a cause of degradation or destruction to apply static electricity to products, do not apply static electricity or excessive voltage while assembling and measuring.

**INPUT POWER CAPACITY:** Products shall be used in the input power capacity as specified in this specification. Discuss with VoxMicro beforehand, in need that the components are used beyond such input power capacity range.

**LIMITATION OF APPLICATIONS:** The product is designed and manufactured for consumer application only and is not available for any application listed below which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property.

- Aircraft equipment - Aerospace equipment - Undersea equipment - Power plant control equipment - Medical equipment - Transportation equipment (vehicles, trains, ships, etc.) - Traffic signal equipment - Disaster prevention / crime prevention equipment - Data-processing equipment - Application of similar complexity and/or reliability requirements to the applications listed in the above.

In case the product is to be used in equipment or electric circuit that requires high safety or reliability function or performances, sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage. Please provide and appropriate fail-safe function on your product to prevent any damages that may be caused by the abnormal function or the failure of our product.

**QUALITY CONTROL:** Testing and other quality control techniques are used to the extent VoxMicro deems necessary. Unless mandated by government requirements, VoxMicro does not necessarily test all parameters of each product.

**LIFECYCLE:** Please note that we may discontinue the manufacture of products, due to reasons such as end of supply of materials and/or components from our suppliers.

**CONFORMITY:** Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product. Please conduct validation and verification of the products in actual condition of mounting and operating environment before commercial shipment of the equipment. All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement. We consider it not appropriate to include other terms and conditions for transaction warranty in product specifications, drawings or other technical documents. Therefore, even if your original part of this product specification includes such terms and conditions as warranty clause, product liability clause, or intellectual property infringement liability clause, we are not able to accept such terms and conditions in this product specification unless they are based on the governmental regulation or what we have agreed otherwise in a separate contact. We would like to suggest that you propose to discuss them under negotiation of contract.





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## AIRETOS® PROFILE

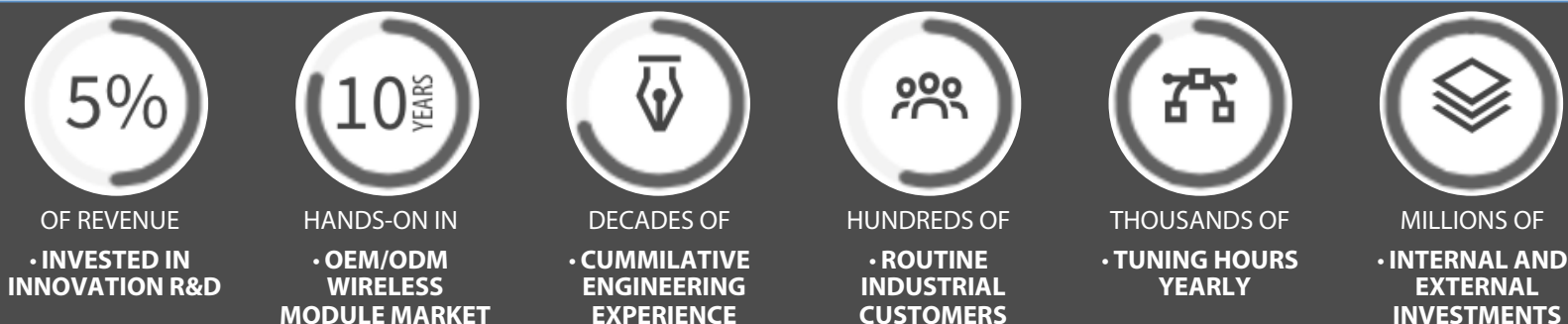
5 Locations – 80% Direct Market Coverage – Affiliate Support



## Quality Functions at all Stages



## Behind the Scenes



## World Distribution & Samples via OxfordTEC®



FREE SHIPPING

\*on orders above \$100



CARD, CHECK OR P.O.

NET Terms for trade & government



30-DAY RETURNS

peace of mind on all items



WORLD SHIPPING

\*also via your courier for account customers

FOR FURTHER INFORMATION, DEVELOPMENT SAMPLES, CUSTOMIZATION AND VOLUME PRICING CONTACT US VIA [AIRETOS.COM](http://AIRETOS.COM) OR VIA THE VoxMICRO GROUP WHOLESALERS - FOR CONTACTS SEE [WWW.VOXMICRO.TEL](http://WWW.VOXMICRO.TEL)

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