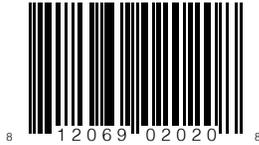


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MPN

AEX-QCA9890-NX

UPC



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PRODUCT PAGE

EVALUATION / RFQ



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SAMPLES



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Enterprise Grade 1.3 Gbps Three Chain, Dual Band 802.11ac/abgn WLAN – Extended Temperature Grade, Full Size MiniPCI Express Module

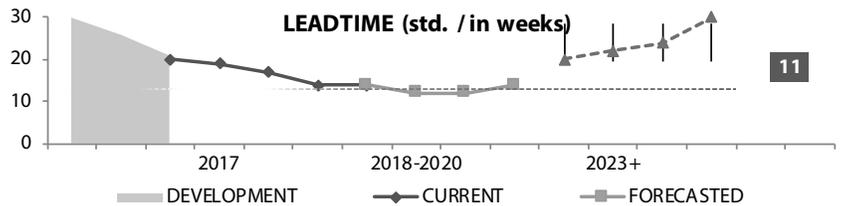
Based on QUALCOMM Atheros Reference Design XB140 Enterprise

DATASHEET



A	A	B	2	1	16 weeks
TECHPOINT	LIFESPOT	VAROD	VERTICALS	DCO	ELT

* Page 2 for key legend. Commercial data refresh: July 2018



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Revision History

Releases	Date	Notes	Prepared	Approved
Version 0.8	2015/01/30	Draft Version	James	LTu
Version 1.0	2015/05/21	Official Release Specifications	James	LTu
Version 1.1	2015/06/18	Spellings and typo corrections Updated Mechanical Drawing	James	LTu
Version 1.2	2018/07/05	Updated Pinout Definition	A Stamatis	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.

- MOI [Market Orientation Index]** 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).
- TECHPOINT** The position of the product within the specific technology-innovation curve for its class. VALUES: Advanced (A), Barring (B), Common (C), Dissolving (D).
- LIFESPOT** 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.
- VAROD [Variants On-Demand]** An indicator of the depth and difficulties On-Demand product variations can reach and encounter. VALUES: Auxiliary (A), Basic (B), Core (C), Deep (D).
- VERTICALS** 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.
- DCO [Design Cost Orientation]** 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.
- ELT [Effective Lead Time]** 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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ENTERPRISE GRADE 1.3 GBPS THREE CHAIN, DUAL BAND 802.11AC/ABGN WLAN – INDUSTRIAL TEMPERATURE GRADE, FULL SIZE MINIPCI EXPRESS MODULE	1
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1. Description

11AC Dual Band (DB): The AEX-AR9890-NX Series IEEE 802.11ac/abgn PCI-E WLAN is the first Enterprise Extended Grade Qualcomm-Atheros Dual Band modular design compliant with the IEEE 802.11AC standard.

New Performance Heights: With advanced QFN, On-chip CPU for Host Wi-Fi offload, 80MHz channel bandwidth, wider channel bandwidth (80 MHz) at 5Ghz, wider 256-QAM, 4 Gbit/s bus bandwidth, evolved QAM base band modulation technologies and 1.3 Gbps WLAN peak throughput the AEX-QCA9890-NI brings new standards to the Enterprise Market.

Enterprise Features: 4.9GHz frequency band support / narrow 5/10MHz channelization, Video QoS (VQos), Dynamic Frequency Selection (DFS), Spectral Analysis, Support for Smart Antenna, Transmission Beamforming (TxBF), loopback mode for FIPS security certification, Enhanced small packet performance, Spatial Multiplexing, cyclic-delay diversity (CDD), low-density parity check (LDPC), maximum ratio combining (MRC), space time block code (STBC).

Extended Grade: The AEX-QCA9890-NI module is built with top quality components. The industrial version fully sustains operating temperatures from -20° to +70° Celsius.

2. Top Features



- IEEE 802.11ac Dual Band (backwards compatible with 802.11abgn)
- Extended operating temperature grade (-20°C ~ 70°C)
- Three antenna connectors, for MIMO 3Tx3R (3 Transmit & 3 Receive) technology
- Transmission Beamforming (TxBF) with enhanced Tx power accuracy and high aggregate power
- PCI-E 2.0 standard specification with up to 4 Gbit/s bandwidth (backwards compatible to 1.x)



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3. Specifications

SOLUTION DESIGN	Chipset	Qualcomm Atheros QCA9892 (Peregrine)
	Standard	IEEE 802.11 a/b/g/n/ac Wi-Fi
	Industrial Reference	Qualcomm Atheros reference design XB140 Enterprise Version 2
APPEARANCE	Communications Interface	Mini PCIE format, PCI Express Standard 2.0 host I/O
	Form Factor	Mini PCIE format, standard mPCIe dimensions – Full size card
ANTENNA	Configuration	Three Streams (3 chains), 3x3, 3 Connectors, MIMO
	Type	Three on board I-PEX U.FL antennas
WIRELESS PARAMETERS	Frequency Band	2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz 4.9425-4.985 GHz (optional band support for Japan and safety markets) 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada
	Data Transfer Rates	WLAN 2.4GHz: 11n: Up to 450Mbps (dynamic) 11g: Up to 54Mbps (dynamic) 11b: Up to 11Mbps (dynamic) WLAN 4.9GHz: 11n: Up to 450Mbps (dynamic) WLAN 5GHz: 11ac: Up to 1300Mbps (dynamic) 11n: Up to 450Mbps (dynamic) 11a: Up to 54Mbps (dynamic)
	Media Access Control	CSMA/CA with ACK
	Channel	2.4GHz: 1-13 (14 only for Japan) 4.9GHz: 7x20MHz (20-80), 2x10MHz (10, 90), 10x5MHz (5-95) 5GHz: 36-48, 149-165
	Channel Spacing	5MHz, 10MHz and 20 MHz selectable
	Spreading / Modulation	802.11ac/g/n: OFDM (BPSK,QPSK,16-QAM,64-QAM), MRC, STBC, LDPC, ML Demodulation 802.11b: CCK (11, 5.5Mbps), DQPSK (2Mbps), BPSK (1Mbps)

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	RF Output Power	<p>802.11a: Typical 13 dBm at 54M / 16dBm at 6M +- 2dBm 802.11b: Typical 18dBm +/- 2 dBm 802.11g: Typical 13 dBm at 54M / 18dBm at 6M +- 2dBm 802.11n 5G HT20 : Typical 21 dBm at MCS0 / 16dBm at MCS7 +/- 2dBm 802.11n 5G HT40 : Typical 21 dBm at MCS0 / 16dBm at MCS7 +/- 2dBm 802.11n 2.4G HT20 : Typical 22 dBm at MCS0 / 16dBm at MCS7 +/- 2dBm 802.11n 2.4G HT40 : Typical 22 dBm at MCS0 / 16dBm at MCS7 +/- 2dBm 802.11ac 5G VHT20 : Typical 21 dBm at MCS0 / 15dBm at MCS8 +/- 2dBm 802.11ac 5G VHT40 : Typical 21 dBm at MCS0 / 15dBm at MCS8 +/- 2dBm 802.11ac 5G VHT80 : Typical 21 dBm at MCS0 / 14dBm at MCS8 +/- 2dBm</p> <ul style="list-style-type: none"> • DBm values reflect single RF chain output power performance. • Three chain combined output power can be calculated as the single chain output power above plus 5dB (3Tx = 1Tx + 5dB).
	RF Receive Sensitivity (Typical)	<p>802.11a: 54M less than -70 dBm 802.11b: 11M less than -85 dBm 802.11g: 54M less than -70 dBm 802.11n 2.4G: HT20 MCS7 less than -72 dBm HT40 MCS7 less than -69 dBm 802.11a 4.9GHz: 54M less than -75 dBm 6M less than -85 dBm 802.11n 5G: HT20 MCS7 less than -72 dBm HT40 MCS7 less than -69 dBm 802.11ac 5G: VHT20 MCS8 less than -68 dBm VHT40 MCS8 less than -64 dBm VHT40 MCS8 less than -61 dBm</p>
	Operating Range	<p>Open Space: ~300 m; Indoor: ~100 m (Coverage varies according to environment, antenna and topography)</p>
	Wireless Security	<p>WEP 64-bit and 128-bit encryption WPA (Wi-Fi Protected Access) WPA2 (Wi-Fi Protected Access)</p>
WORKING MODES	<p>Infrastructure, Client, Bridge, Ad-hoc</p>	
SAFETY, EMISSION & REGULATORY	<p>Compliant with FCC, CE and IC. Compliant with RoHS.</p>	
PROTOCOLS	IEEE WLAN Network	<p>802.11ac, 802.11n , 802.11g, 802.11b, 802.11a, 802.11d, 802.11e, 802.11h, 802.11j and 802.11i</p>
	Other Standards	
	Industry Standards	
HOST SYSTEM REQUIREMENTS	Operating System	<p>Linux, Linux Open Source, Qualcomm-Atheros Embedded Platform (Windows on request)</p>
ENVIRONMENT	Operating Temperature	<p>-20° ~ +70° Celsius</p>

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	Storage Temperature	-40° ~ +90° Celsius	
	Operating Humidity	10%~90% non-condensing	
	Storage Humidity	5%~90% non-condensing	
ELECTRICAL	I/O Voltage	3.3V +/-5%	
	Power Consumption	Transmit Packet Test HT 40*:	TBC mA max
		Receiver Packet Test HT 40*:	TBC mA max
MECHANICAL	Dimensions	50.95mm x 30mm x 3.15mm (with shielding)	
	Weight	6.1 g	
PACKAGING	Packing style	ESD Sleeves in Carton Bulk Package	
	Package Contents	AEX-QCA9890-N Series IEEE 802.11 ac/abgn mPCI-E modules	

4. Ratings / Characteristics

4-1. Absolute Maximum Ratings

Symbol	Parameter	Max. Rating	Unit
V _{dd33}	Maximum I/O supply voltage	3.63	V
R _{Fin}	Maximum RF input (reference to 50 Ω)	+10	dBm
T _{store}	Storage temperature	-40~+90	°C

4-2. Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V _{dd33}	I/O voltage	2.97~3.63	V

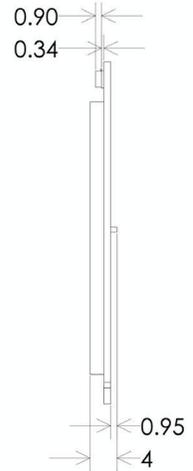
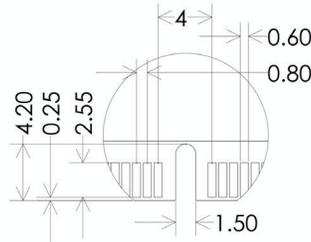
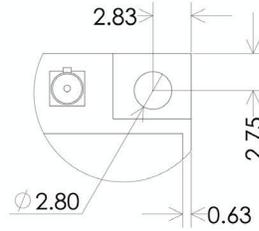
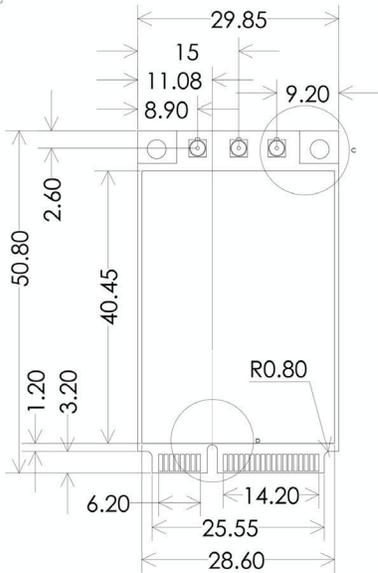
4-3. GPIO Interface Characteristics

Signal Name (To chip GPIO PIN)	Mini PCI-E PIN	Type	Driver	PU/PD Resistance
WLAN_LED	44	O	24 mA (Max)	1 KΩ PD
WLAN_DISABLE	20	I	_	10 KΩ PU



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5. Mechanical Drawing



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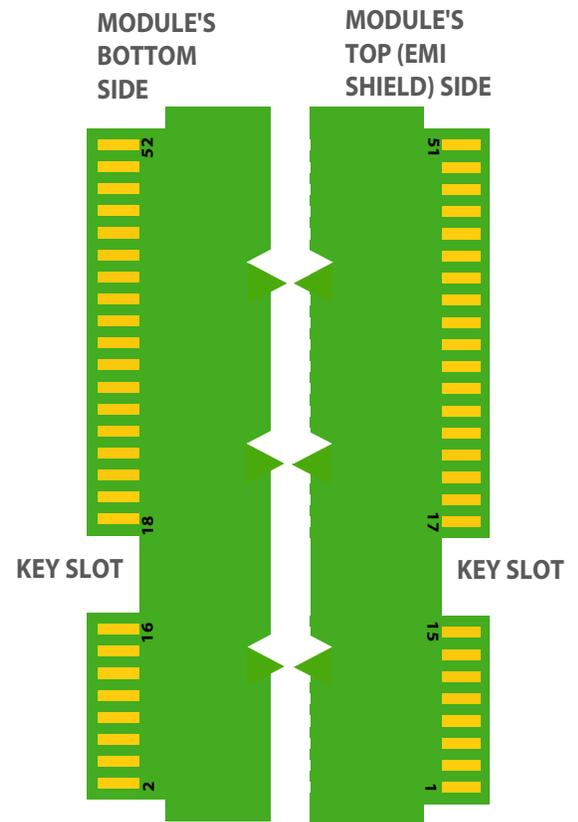
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6. Connector Pin-out Definitions

Pin No.	Definition	Basic Description	Type
1	PCIE_WAKE_L	PCIe Wake	Output
2	+3.3V aux	3.3V power supply	Power
4	GND	Ground	GND
7	CLKREQ_L	Reference clock request, open drain	Output
9	GND	Ground	GND
11	REFCLK-	Differential reference clock	Input
13	REFCLK+	Differential reference clock	Input
15	GND	Ground	GND
18	GND	Ground	GND
20	W_DISABLE_L	WLAN disable control. Low disables WLAN. Module P.U	Input
21	GND	Ground	GND
22	PERST_L	PCI express fundamental reset	Input
23	PERn0	Differential transmit (PCIE_TX_N)	Output
24	+3.3V aux	Designed	Power
25	PERp0	Differential transmit (PCIE_TX_P)	Output
26	GND	Ground	GND
27	GND	Ground	GND
29	GND	Ground	GND
31	PETn0	Differential receive (PCIE_RX_N)	Input
33	PETp0	Differential receive (PCIE_RX_P)	Input
34	GND	Ground	GND
35	GND	Ground	GND
37	GND	Designed	GND
39	+3.3V aux	3.3V power supply	Power
40	GND	Designed	GND
41	+3.3V aux	3.3V power supply	Power
43	GND	Ground	GND
44	LED_WLAN_L	Active low signal. The signal is used to provide WLAN LED indicate	Output
46	LED_WPAN_L	Active low signal. The signal is used to provide BT LED indicate	Output
50	GND	Ground	GND
52	+3.3V aux	3.3V power supply	Power

Interface type	Bus Signaling	Standard
NGFF Edge	PCIe	PCI-SIG v1.1

*Physical Layer Form Factor follows standard PCIe definitions. Graphic representation below.
 *Pin/Contact Numbers not appearing in the pinout table are either reserved or unused.

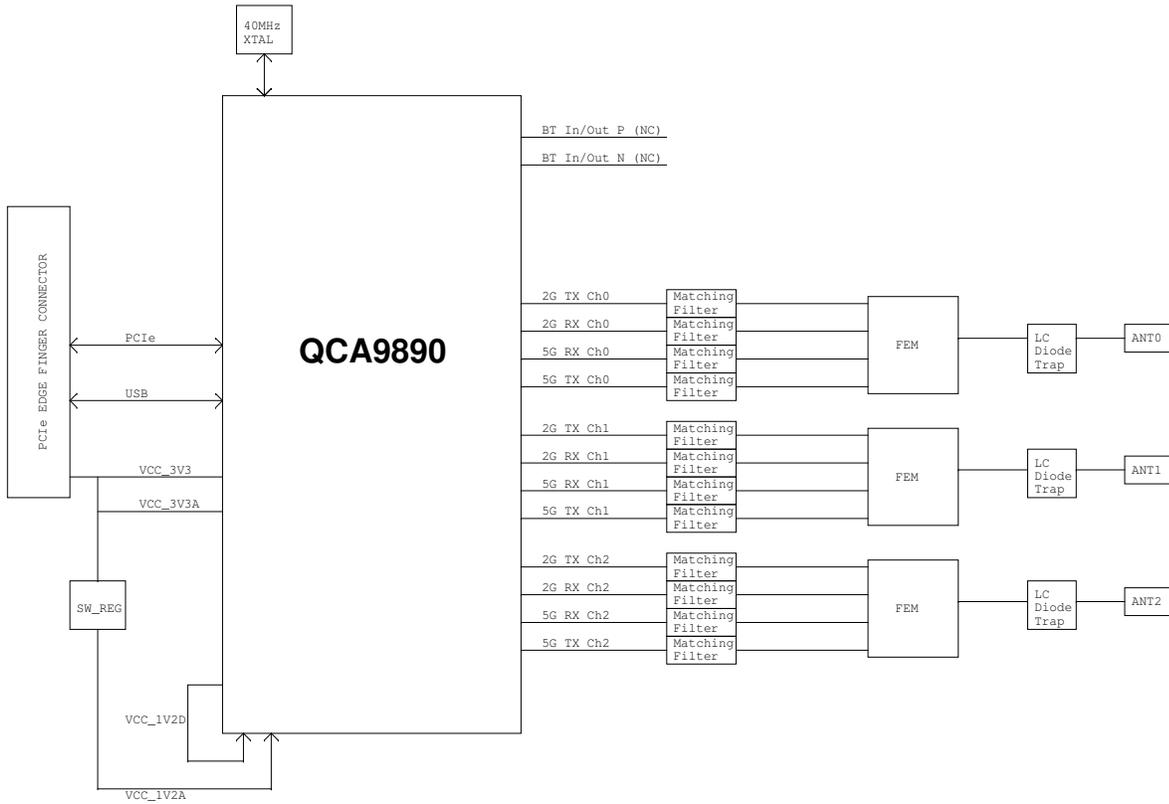


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7. Block Diagram



8. Environmental Performance Qualification

At the time of writing this document, throughput test at controlled thermal conditions are to be scheduled. Any related enquiries can be addressed to your sales / account manager.



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9. Standard Domain Code & Identification

The Regulatory Domains pre-programmed as standard as standard are 0x6c,0x1f.

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

Implemented as standard are identifiers following Qualcomm Atheros XB140 reference design:

	Vendor ID (VID)	Subsystem ID (SSID)
STANDARD WLAN	0x168C	0x3C

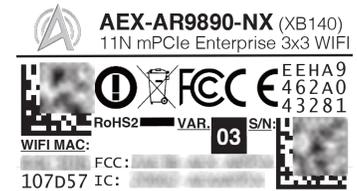
10. Product Label

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 (Europe), EU Safety & Environmental.

Wireless LAN NIC MAC ID label (human legible and barcode).

Serial Number label (human legible and barcode) plus Variant Number.



10-3. On-Demand Labeling

Labels can be tailored to report customer's part number and regulatory compliance following Qualcomm Atheros XB140 Enterprise Version 2 reference design certifications for any of the countries and domains required.

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 (K)	Master Carton (M)
CONTENT (UNITS)	1	60	960
INVENTORY SKU	AEX-QCA9890-NX or NI	AEX-QCA9890-NX (or NI) -K	AEX-QCA9890-NX (or NI) -M
OUTER DIMENSIONS	70 x 60 x 3.5 mm	204 x 165 x 65 mm	430 x 350 x 285 mm
GROSS WEIGHT	6.2 gr	430 gr	8000 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.

AEX-QCA9890-NX constitutes a sensitive electronic device and caution is required when handling it.

ESD handling, shipment and storage notices apply:

	<p>DO NOT OPEN OR HANDLE EXCEPT AT A STATIC-FREE WORKSTATION</p>		<p>DO NOT SHIP OR STORE NEAR STRONG ELECTROSTATIC, ELECTROMAGNETIC OR RADIOACTIVE FIELDS</p>
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13. NOTICES

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 (Cl₂, NH₃, SO₂, Nox, 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.

SHELVE 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 (Cl₂, NH₃, SO_x, NO_x) 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 AIRETOS 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 AIRETOS 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 AIRETOS deems necessary. Unless mandated by government requirements, AIRETOS 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.

DISCLAIMER: Please note that the only warranty that AIRETOS (DBA part of the VoxMicro LTD Group) provides regarding the products is its conformance to the specifications provided herein. Accordingly, AIRETOS 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.

AIRETOS 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 AIRETOS 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.

AIRETOS's liability under this warranty shall be limited to products that are returned during the warranty period to the address designated by AIRETOS and that are determined by AIRETOS not to conform to such warranty. If AIRETOS elects to repair or replace such products, AIRETOS 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, AIRETOS shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than AIRETOS including improper installation or testing, or for any products that have been altered or modified in any way by an entity other than AIRETOS. Moreover, AIRETOS shall not be liable for any defects that result from your or third party's design, specifications or instructions for such products.

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AIRETOS™ PROFILE

5 Locations – 80% Direct Market Coverage – Affiliate Support



Quality Functions at all Stages



Behind the Scenes

5%	10 YEARS				
OF REVENUE	HANDS-ON IN	DECADES OF	HUNDREDS OF	THOUSANDS OF	MILLIONS OF
• INVESTED IN INNOVATION R&D	• OEM/ODM WIRELESS MODULE MARKET	• CUMMILATIVE ENGINEERING EXPERIENCE	• ROUTINE INDUSTRIAL CUSTOMERS	• TUNING HOURS YEARLY	• INTERNAL AND EXTERNAL INVESTMENTS

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