

Wireless LAN PCI Express Mini Card Module  
SX-PCEAN User's Manual

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## 1. Introduction

This document describes about "SX-PCEAN".

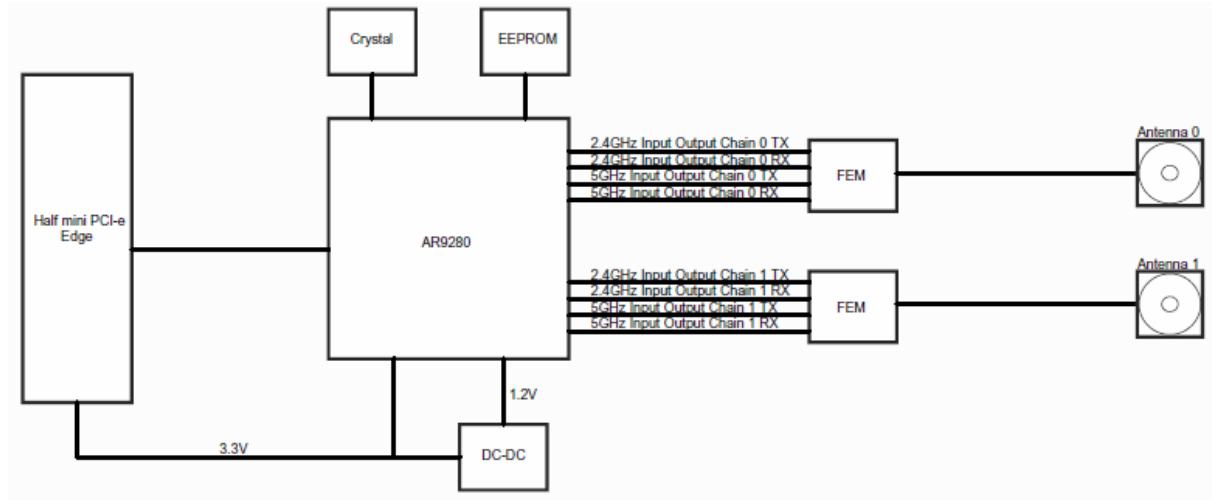
## 2. Overview

SX-PCEAN+ is Dual Band IEEE802.11abgn PCI Express Half Mini Card interface radio module. This module complies with EU RoHS Directive 2011/65/EC(Lead Free) and China RoHS with exemptions. This module has an MAC/BBP Chipset AR9280 (Atheros) and two RF front end modules which contains PA, LNA and RF switch internally. Also this module supports high speed two stream MIMO technology and 40MHz band width mode.

### Features:

- IEEE 802.11a/b/g/n conformity (2.4GHz & 5GHz)
  
- Two stream 2 x 2 MIMO technology and 40MHz band width mode. (Throughput up to 300Mbps)
  
- Data rates of 1 - 54 Mbps for 802.11b/g, 6 - 54 Mbps for 802.11a and MCS0-15 for 802.11n.
  
- Support IEEE802.11e, IEEE 802.11h and IEEE 802.11i.
  
- Support PCI Express Mini Card 1.2 (Signal definitions : PCI Express 1.1)
  
- Support "Short Guard Interval" mode.
  
- Support Tx/Rx selection Tx/Rx diversity at IEEE802.11a/b/g mode.

### 3. Block diagram



ANT Connectors :U.FL Alternative

## 4. Specifications

### 4-1. General specifications

Item	Specification	Unit	Note
Connector Type	PCI Express Mini Card edge	—	
Antenna connectors	U.FL Alternative connector x 2	—	
Device Interfaces	PCI Express Mini Card v1.2	—	Signal definitions : PCI Express v1.1
	IEEE802.11a/b/g/n/e/h/i	—	
Weight	4.5 +/- 1.0	g	
Dimensions	30.0 x 26.8 x 4.5	mm	

### 4-2. Environmental specifications

Item	Specification	Unit	Note
Storage temperature	-20 to +85	°C	
Storage humidity	10 to 85	%RH	Non condensing
Operating Temperature	0 to +60	°C	Ambient
Operating humidity	20 to 80	%RH	Non condensing
Maximum temperature change	20	°C/H	

### 4-3. Electrical specifications

Item	Specification			Unit	Note
	Min.	Typ.	Max.		
Power supply voltage	-0.3	-	4.0	V	Absolute Maximum Ratings
	2.97	3.30	3.63	V	Recommended Operating Conditions

#### 4-4. Radio configuration and general specifications

Item	Specification		Unit	Note
Chipset	AR9280 (Atheros)		–	
Center frequency	11a	5180 – 5320 / 5745 – 5825	MHz	
	11na HT20	5180 – 5320 / 5745 – 5825		
	11na HT40	5190 – 5310 / 5755 – 5795		
	11b	2412 – 2462	MHz	
	11g	2412 – 2462		
	11ng HT20	2412 – 2462		
	11ng HT40	2422 – 2452	MHz	
Channel Spacing	11a/11naHT20	20	MHz	
	11b/11g/11ng HT20/11ng HT40	5		
	11na HT40	40		
Rate	11b	1, 2, 5.5L, 5.5S, 11L, 11S	Mbps	
	11a/g	6, 9, 12, 18, 24, 36, 48, 54		
Scheme code	11na/11ng 1Stream	MCS0, 1, 2, 3, 4, 5, 6, 7	–	
	11na/11ng 2Stream	MCS8, 9, 10, 11, 12, 13, 14, 15	–	
Modulation type	11a/11na	OFDM(64QAM,16QAM,QPSK,BPSK)	–	
	11b	DSSS(CCK,DQPSK,DBPSK)		
	11g/11ng	DSSS-OFDM (64QAM,16QAM,QPSK,BPSK)		

## 5. PCI Express Mini Card Interface Specifications

### 5-1. PCI Express Mini Card edge pin assignments

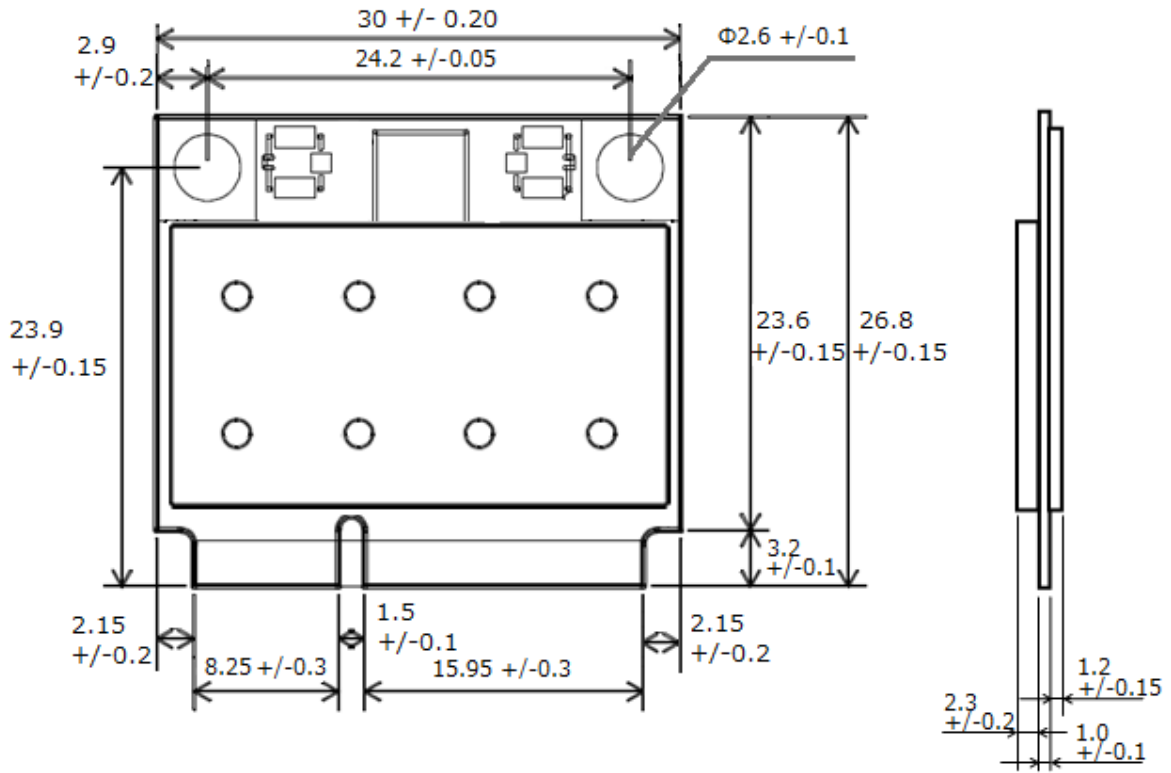
Pin Number	Pin Name	Type	Description
1	WAKE#	OD	PCI Express request to service function - initiated wake event, open drain
2	+3.3Vaux	PWR	
3	RESERVED	OD	Connected to GPIO. WLAN active signal
4	GND	GND	
5	RESERVED	OD	Connected to GPIO. Bluetooth active signal
6	+1.5V	NC	
7	CLKREQ#	OD	PCI Express reference clock request, open drain
8	UIM_PWR	NC	
9	GND	GND	
10	UIM_DATA	NC	
11	REFCLK-	IA	PCI Express differential reference clock (100MHz)
12	UIM_CLK	NC	
13	REFCLK+	IA	PCI Express differential reference clock (100MHz)
14	UIM_RESET	NC	
15	GND	GND	
16	UIM_VPP	NC	
			Mechanical key
17	RESERVED (UIM_C8)	NC	
18	GND	GND	
19	RESERVED (UIM_C4)	NC	
20	RESERVED	ID	Connected to GPIO. Disable wireless module. Pull-up(10kohm)
21	GND	GND	
22	PRESET#	IH	PCI Express reset. Weak pull-up
23	PERn0	OA	Module : Differential data transmit
24	+3.3Vaux	PWR	
25	PERp0	OA	Module : Differential data transmit

Pin Number	Pin Name	Type	Description
26	GND	GND	
27	GND	GND	
28	+1.5V	NC	
29	GND	GND	
30	SMB_CLK	NC	
31	PETn0	IA	Module : Differential data receive
32	SMB_DATA	NC	
33	PETp0	IA	Module : Differential data receive
34	GND	GND	
35	GND	GND	
36	USB_D-	NC	
37	RESERVED	NC	
38	USB_D+	NC	
39	RESERVED	NC	: Connected to pin 41 internally
40	GND	GND	
41	RESERVED	NC	: Connected to pin 39 internally
42	LED_WWAN#	NC	
43	RESERVED	GND	Connected to GND
44	LED_WLAN#	OD	LED control for WLAN module. Pull-up high (10kohm)
45	RESERVED	NC	
46	LED_WPAN#	NC	
47	RESERVED	NC	
48	+1.5V	NC	
49	RESERVED	NC	
50	GND	GND	
51	RESERVED	NC	
52	+3.3Vaux	PWR	

NC : No connection  
 IA : Analog input  
 ID : Digital input  
 IH : Digital output with weak pull-up  
 OA : Analog output  
 OD : Digital output  
 PWR : Power  
 GND : Ground



**6. Mechanical Specifications**



Thickness = 4.5mm  
Board thickness = 1.0mm

## 7. System Requirements

The system requirements below or compatible system are necessary to stably use this module.

Recommended system :

Items	Descriptions	Notes
OS	Linux/Windows/other	
CPU	1GHz	
Memory	1GByte	
Peripheral IF	PCI Express	x1 Slot

It uses Driver and a utility of Atheros Communications. (Atheros client utility)

It completes installation according to setup Wizard

## 8. Notifications

FCC ID : N6C-SXPCEAN  
IC : 4908B-SXPCEAN

### **NOTICE**

#### **Federal Communication Interference Statement (United States only)**

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 or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to 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 and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

#### **Canadian Department of Communications Industry Canada Notice (Canada only)**

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

#### **FCC Rules, Part 15/ Industry Canada**

This device complies with Part 15 of FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference, including interference that may cause undesired operation of this device.

Le présent appareil est conforme aux la partie 15 des règles de la FCC et CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- l'appareil ne doit pas produire de brouillage, et
- l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65 and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body (excluding extremities: hands, wrists, feet and ankles).

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles des radioélectriques (RF) de la FCC lignes directrices d'exposition dans le Supplément C à OET65 et d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le dispositif rayonnant et le corps (à l'exception des extrémités : mains, poignets, pieds et chevilles).

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter 4908B-SXPCEAN has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio 4908B-SXPCEAN a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device is going to be operated in 5.15~5.35GHz frequency range, it is restricted in indoor environment only.

Antenna information:

Sleeve Antenna: 1.5dBi (2.4GHz), 2.1dBi (5GHz) [for USA & Canada]

Mimo Antenna: Mitac E208GSTV0046, 2.0dBi (2.4GHz), 3.0dBi (5GHz) [USA only]

Mimo Antenna: Mitac E208GSTV0047, 2.0dBi (2.4GHz), 3.0dBi (5GHz) [USA only]

Omnidirectional Antenna: L-COM HG5808U, 8.0dBi (5745-5825 MHz) [USA only]

Directional Antenna: Laird SR49120DA, 11.0dBi (5745-5825 MHz) [USA only]

NOTE: the directional antenna must be used with an antenna cable that has a minimum loss of 0.39 dB to ensure the 36 dBm EIRP limit is not exceeded. Only professionally trained installers may install the Omnidirectional and Directional high-gain antennas for commercial/industrial applications.

The Maximum Permissible Exposure (MPE) calculation for maximum power (25.39-0.39db cable loss + 11dbi = 36dbm) is 0.792009 mW/cm<sup>2</sup>. The limit is 1.0 mW/cm<sup>2</sup> for a minimum separation distance of 20cm.

Data transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, and finally to the RF chip. Several special packets are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which then turns off at the end of the packet. Therefore, the transmitter will be on only while one of the aforementioned packets is being transmitted. In other words, this device automatically discontinues transmission in case of either absence of information to transmit or operational failure.

Frequency Tolerance : +/-20ppm

**WARNING :**

The FCC / The Industry Canada regulations provide that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Manual and Product Labeling information To The End User**

The end user manual shall include all required regulatory information/warning as show in this manual. And when this module is installed in the host product, you must include "Contains FCC ID : N6C-SXPCEAN" and a "Contains IC: 4908B-SXPCEAN" in the label of the host product.

This module is designed for embedded purpose into the general electric devices, and is not designed for high reliability demands like aircraft instruments, nuclear control instruments, high reliability medical instruments(Class III, IV), high reliability security instruments or any other devices required extremely high reliability and quality. **In the case embedded into the medical instrument, please ask to silex despite the medical class.**

- As this module communicates by radio wave, it is strongly recommended to use some security system to prevent unexpected information leakage to others.
- This module is a radio module for embedded purpose. Please understand functions and features of this module, and evaluate as the final product which has this module embedded. Also, as evaluation of EMC conformity of this module has not been performed, EMC conformity evaluation and application must be performed with the final product which this module is embedded.
- This module will effect to some other device or be affected by the some other device using the same frequency band. Please investigate the environment to use this module beforehand.
- Disassembling or modifying the radio module leads to punishment based on radio law.
- This module is the embedded module that has the exposed connectors or some devices. Please be careful for electro static, condensing, and other dusts.