4x4 Wave-2 802.11ac/a/n Mini PCIe WiFi Module

Full size form factor with 80+80MHz bandwidth support

Model: WLE1216V5-20

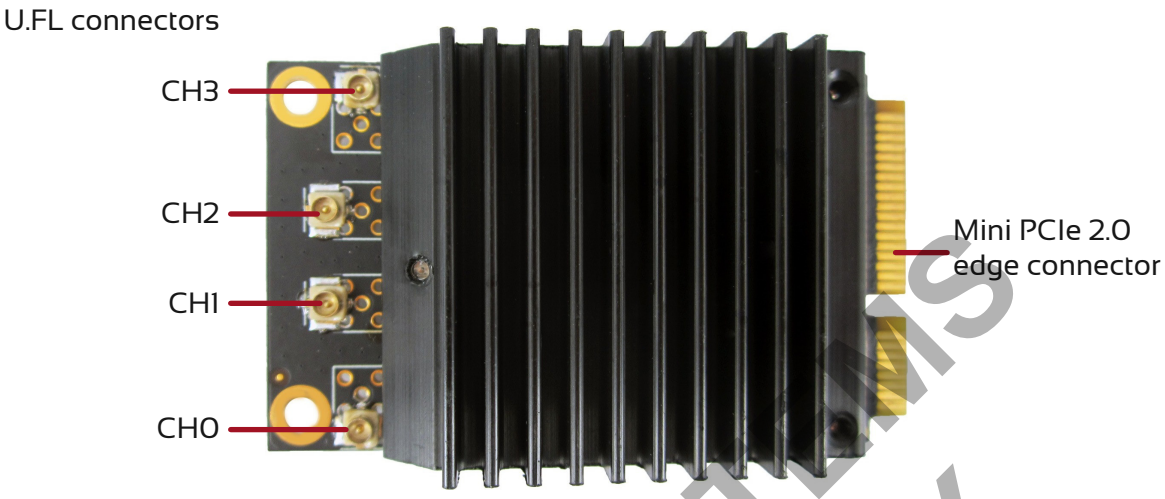
KEY FEATURES

- Heat sink allows free air operation
- IEEE 802.11ac compliant & backward compatible with 802.11a/n, up to 1733Mbps
- Multi-user MIMO (MU-MIMO)
- 4 spatial streams (4SS) at 80MHz
- 2 spatial streams (2SS) at 80+80MHz
- Mini PCI Express 2.0 interface
- Supports Spatial Multiplexing
  Low-Density Parity Check (LDPC) Codes
  Maximal Ratio Combining (MRC), Space Time Block Code (STBC)
- Supports IEEE 802.11d, e, h, i, j, k, r, u, v time stamp, w , and z standards
- Supports Dynamic Frequency Selection (DFS)
- Designed for High Bandwidth Enterprise Wireless Access Points

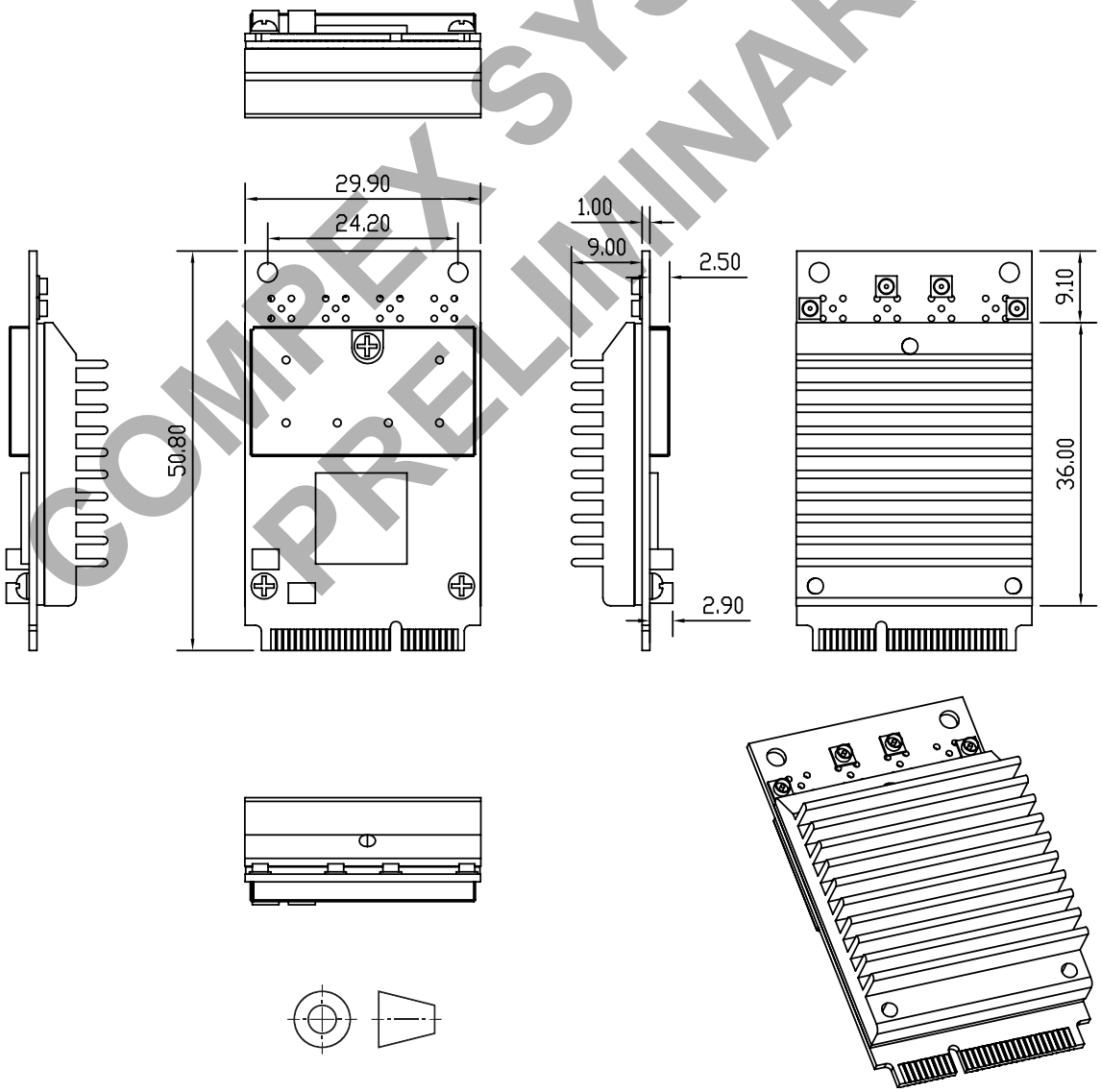
Specifications

System Memory	256Kbit serial I²C bus EEPROM
Host Interface	Mini PCI Express 2.0 Standard
Operating Voltage	3.3V
Antenna Connector	4x U.FL
Frequency Range	5.180 ~ 5.825 GHz
Power Consumption	8.5W (Max)
Modulation Techniques	OFDM: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
Supported Operating System	CompexWRT
Temperature Range	Operating: -20°C to 70°C Storage: -40°C to 90°C
Humidity	Operating: 5% to 95% (non-condensing) Storage: Max. 90% (non-condensing)
ESD Sensitivity	Class 1B
Dimensions (H x W x D)	50.8mm x 29.9mm x 12.9mm

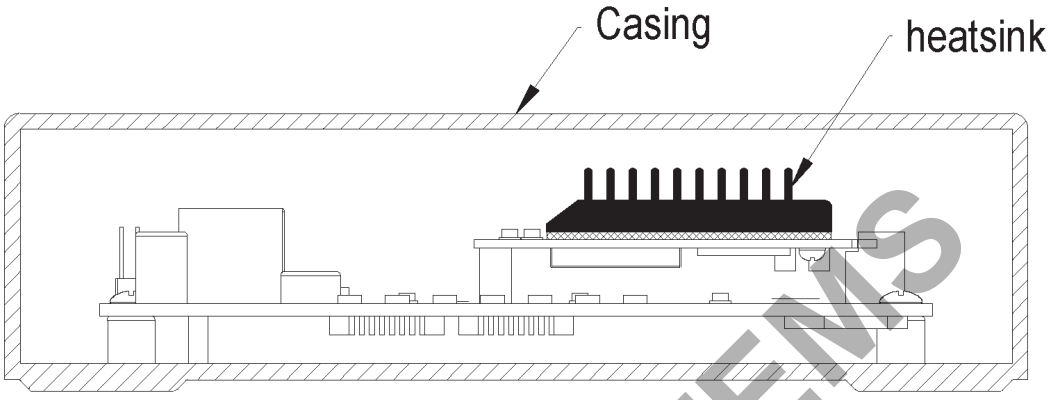
Feature Guide



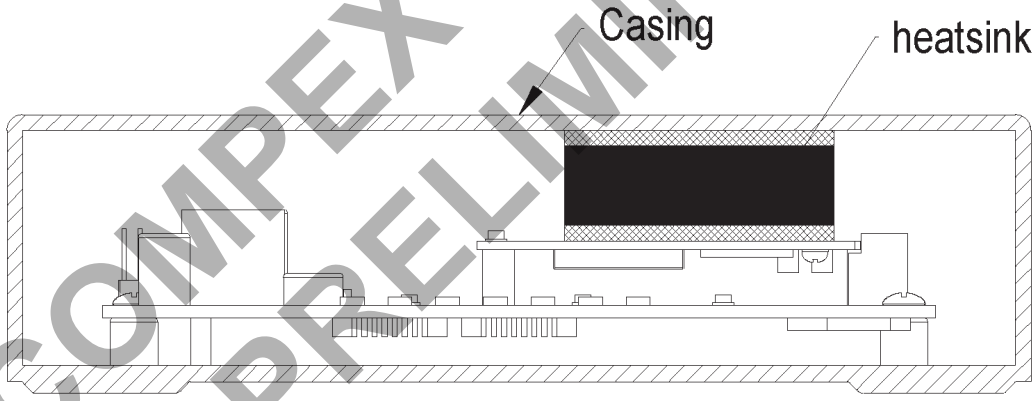
Mechanical Dimensions



Heat Dissipation Options



Using the pre-installed heatsink for heat dissipation



Using a custom design metal enclosure for heat dissipation

FCC Statement:

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.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

List of applicable FCC rules

This module has been tested and found to comply with part 15 requirements for Modular Approval.

Antenna Placement Within the Host Platform

The module is tested for standalone mobile RF exposure use condition.

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,

(2) The transmitter module may not be co-located with any other transmitter or antenna.

In the event that these conditions cannot 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 cannot 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.

Limited modular

This module will be restricted in the Host.

Manufacturer: Compex Systems Pte Ltd
Product Model Name: WPJXXX

Trace antenna designs

Not Applicable

RF exposure considerations

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.

Antenna Type and Gain

The following antennas have been certified for use with this module.
Only antennas of the same type with equal or lower gain may also be used with this module. Other types of antennas and/or higher gain antennas may require the additional authorization for operation.

Antenna Specification list below:

No	Antenna	Manufacturer	Frequency Band (MHz)	Max.Peak Gain (dBi)
Wi-Fi External Antenna List (5GHz 4*4 MIMO)				
1#	Omni Directiona	Exceltek Electronics Technology Co.,Ltd	2400~2500	3.0
			5150~5850	5.0
2#	Omni Directiona	Laird Smart Technology Co.,Ltd	2400~2500	2.2
			5150~5850	3.5
3#	Omni Directiona	Linx Technologies	2400~2500	2.5
			5150~5850	4.6
4#	Omni Directiona	Kenbotong Technology Co.,Ltd.	5150~5850	10.0
5#	Patch Array	Starry,Inc.	5150~5850	15.0

The modular has no RF shielding as required in §15.212(a) (1)(i) and it cannot be tested in a stand-alone configuration as required in §15.212(a)(1)(v), as required in KDB 996369 D01 V04 C2PC is required for every different specific host using the module.

C2PC Test Plan:

This module supports 802.11a/n/ac, the modulation type is OFDM, and the bandwidth supports 20M/40M/80M/80+80M(non-continuous). Installing this module requires worse case testing on the host to meet the requirements of Part15.407. The worst-case assessment is as follows:

FCC Rule Parts	Test Item	Test Band	Test Mode (Data Rate)	Test Channel (Test Frequency)	Test Procedure
15.407 (a)(1)(iv), (2), (3)(i)	Output Power	5150 ~ 5250MHz	802.11ac-VHT80 (MCS0) (Ant 0+1+2+3)	CH42 (5210MHz)	KDB 789033D02 v02r01- Section II)E)
		5250 ~ 5350MHz	802.11ac-VHT80 (MCS0) (Ant 0+1+2+3)	CH58 (5290MHz)	
		5470 ~ 5725MHz	802.11ac-VHT80+80 (MCS0) (Ant 2+3)	CH122 (5610MHz)	
		5725 ~ 5850MHz	802.11ac-VHT20 (MCS0) (Ant 0+1+2+3)	CH149 (5745MHz)	
15.407 (a)(1)(iv), (2), (3)(i), (13)	Power Spectral Density	5150 ~ 5250MHz	802.11a (6Mbps) (Ant 0)	CH44 (5220MHz)	KDB 789033 D02v02r01- Section II)F)
		5250 ~ 5350MHz	802.11a (6Mbps) (Ant 1)	CH52 (5260MHz)	
		5470 ~ 5725MHz	802.11a (6Mbps) (Ant 2)	CH120 (5600MHz)	
		5725 ~ 5850MHz	802.11ac-VHT20 (MCS0) (Ant 0+1+2+3)	CH157 (5785MHz)	
15.407 (b)(1), (2), (3), (4)(i)	Radiated Spurious Emission	5150 ~ 5250MHz	802.11a (6Mbps) (Ant 2)	CH36 (5180MHz)	ANSI C63.10 -2013 - Section 6.3 & 6.4 & 6.5 & 6.6 & 12.7
		5250 ~ 5350MHz	802.11a (6Mbps) (Ant 1)	CH60 (5300MHz)	
		5470 ~ 5725MHz	802.11ac-VHT40 (MCS0) (Ant 0+1+2+3)	CH110 (5550MHz)	
		5725 ~ 5850MHz	802.11a (6Mbps) (Ant 0)	CH165 (5825MHz)	

FCC Rule Parts	Test Item	Test Band	Test Mode (Data Rate)	Test Channel (Test Frequency)	Test Procedure
15.205, 15.209 15.407 (b)(8), (9), (10)	Radiated Restricted Band Edge	5150 ~ 5250MHz	802.11a (6Mbps) (Ant 0)	CH36 (5180MHz)	ANSI C63.10 -2013 - Section 6.3 & 6.6 & 12.7
			802.11ac-VHT80+80 (MCS0) (Ant 0+1)	CH42 (5210MHz)	
		5250 ~ 5350MHz	802.11a (6Mbps) (Ant 0)	CH64 (5320MHz)	
			802.11ac-VHT80+80 (MCS0) (Ant 2+3)	CH58 (5290MHz)	
		5470 ~ 5725MHz	802.11a (6Mbps) (Ant 0)	CH140 (5700MHz)	
			802.11ac-VHT80+80 (MCS0) (Ant 0+1)	CH122 (5610MHz)	
		5725 ~ 5850MHz	802.11a (6Mbps) (Ant 0)	CH165 (5825MHz)	
			802.11ac-VHT80 (MCS0) (Ant 0+1+2+3)	CH155 (5775MHz)	

End Product Labeling

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: TK4WLE1216V520”. The FCC ID can be used only when all FCC compliance requirements are met.

The end product shall bear the following 15.19 statement: 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.

Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new certification.

Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all 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.

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 reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information to the End User

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 user's manual of the end product which integrates this module.

The host integrator must follow the integration instructions provided in this document and ensure that the composite-system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB 996369.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment