



Mini Pini is an 802.11ax Wi-Fi 6 radio module for ultra-high speed enterprise connectivity. Device comes out in three different versions:

Mini Pini 4x4 is based on Qualcomm QCN9074 chipset for 2.4/5GHz IEEE802.11ax/ac/n/g/b/a applications. New radio can perform access point and station functionality with 4x4 MIMO (4 spatial streams). It is a wireless LAN radio with native 160 MHz support. 4x4 version comes out in industrial (-40-85°C) temperature range, and also in commercial (0-60°C) temperature range.

Mini Pini 2x2 is based on Qualcomm QCN9072 chipset for 2.4/5GHz IEEE802.11ax/ac/n/g/b/a applications. This radio can perform access point and station functionality with 2x2 MIMO (2 spatial streams). It is a wireless LAN radio with native 160 MHz support. 2x2 version comes out in industrial (-40-85°C) temperature range.

Features

- 2x2/4x4 160MHz 802.11ax Wi-Fi 6 PCIe radio module
- Dual band: 2.4 GHz, 5 GHz full band support
- PCI Express 3.0 dual-lane interface
- 30x50.95x15.05mm size PCIe radio card
- Dual-synthesizer WLAN radio up to 160MHz bandwidth support
- Supports 5/10 MHz in 4.9 GHz (Public Safety band)
- Supports 20/40 MHz in 2.4 GHz
- Supports 20/40/80/160 MHz in 5 GHz
- Data rates of up to 4804 Mbps in 802.11ax 160 MHz 4x4 channels in 5GHz
- Data rates of up to 1147 Mbps in 802.11ax 40 MHz 4x4 channels in 2.4GHz mode
- Data rates of up to 2402 Mbps in 802.11ax 160 MHz 2x2 channels in 5GHz
- Data rates of up to 573.5 Mbps in 802.11ax 40 MHz 2x2 channels in 2.4GHz mode
- DL/UL MU-MIMO, up to 4 users per PPDU
- DL/UL MU-OFDMA, up to 37 users per PPDU
- TxBF, MU-MIMO, MU-OFDMA/TxBF, ML, STBC
- Dynamic frequency selection (DFS) and Agile DFS (dynamic switching between 4 and 3+1)
- PTA (3-wire) and WCI/MCI (2-wire) coexistence
- 802.11 ac/ax explicit transmit beamforming (TxBF)
- 802.11e-compatible bursting
- Supports monitor mode
- Supports IEEE 802.11d, h, i, j, k, r, u, v, w
- AES-CCMP/GCMP at 128/256 bits
- WEP, TKIP, WAPI-2 hardware encryption
- WPA/WPA2-Personal/WPA2-Enterprise and WPA3 Personal
- FIPS ECB

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1. Specification

Platform	
Chipset code	QCN-9074/QCN-9072
Interface	Mini-PCIe card
Linux Support	QSDK
Mainline Kernel	from 4.4.60 upward
Wi-Fi	
Standard	802.11 a/b/g/n/ac/ax
Band	2.4/5
MIMO	MU-MIMO 4x4, MIMO 2x2
Monitor Mode	yes
Power (Per Chain)	20 dBm
Receiver Sensitivity	-91 dB
Antenna Connector	U.FI
Module Spec	
Power Supply	3.3V
Power Consumption	Up to 10W
Temperature Range	0°C to 65°C or -40°C to 85°C
Dimension (mm)	30x50.95x15.05xmm
Reference Design	PN02.7
Certifications	TBD

You can find quick user guide and more documentation about Mini Pini at: <https://wiki.8devices.com/minipini>

2. Block diagram

FIGURE 3-1. BLOCK DIAGRAM MINI PINI 4X4

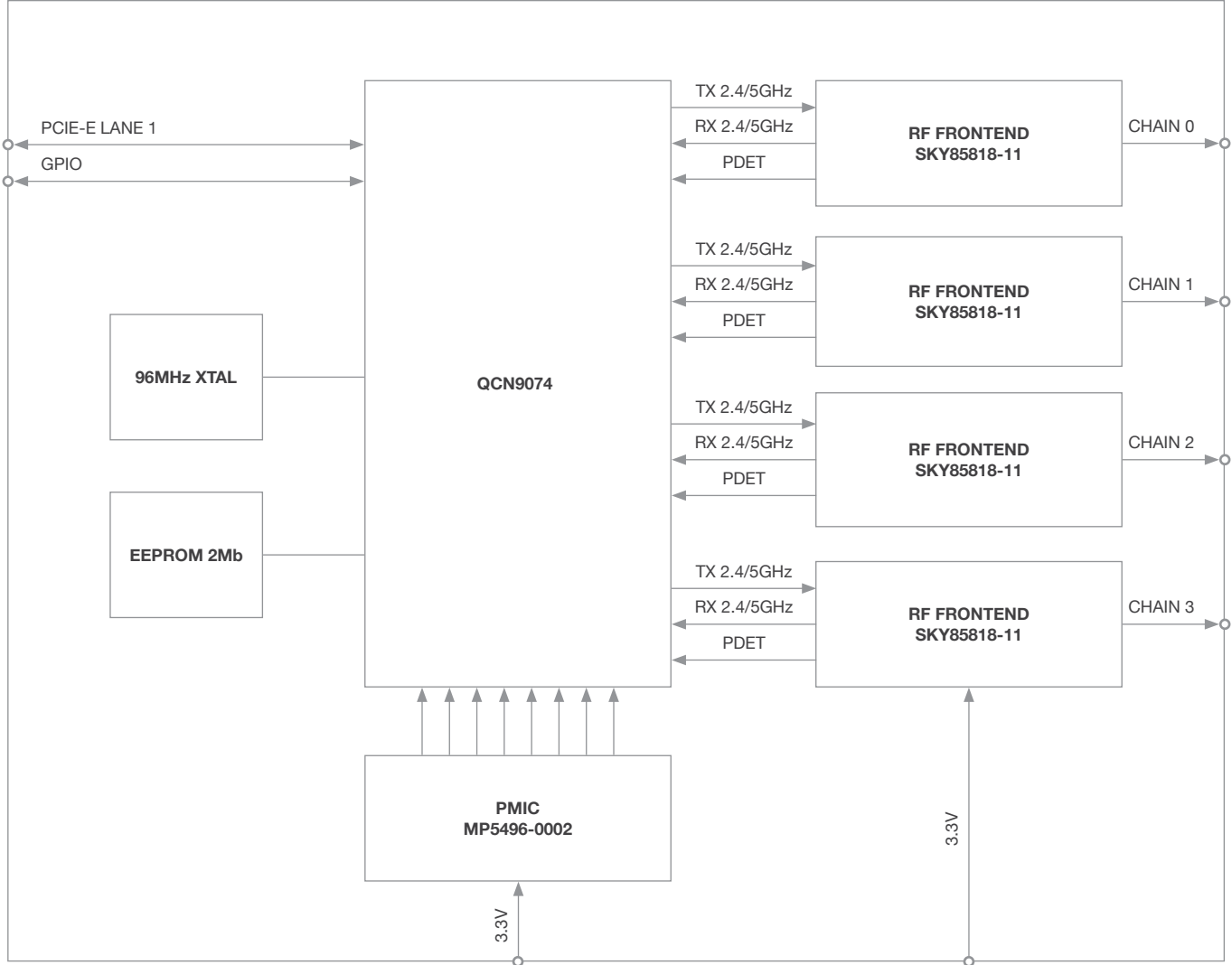
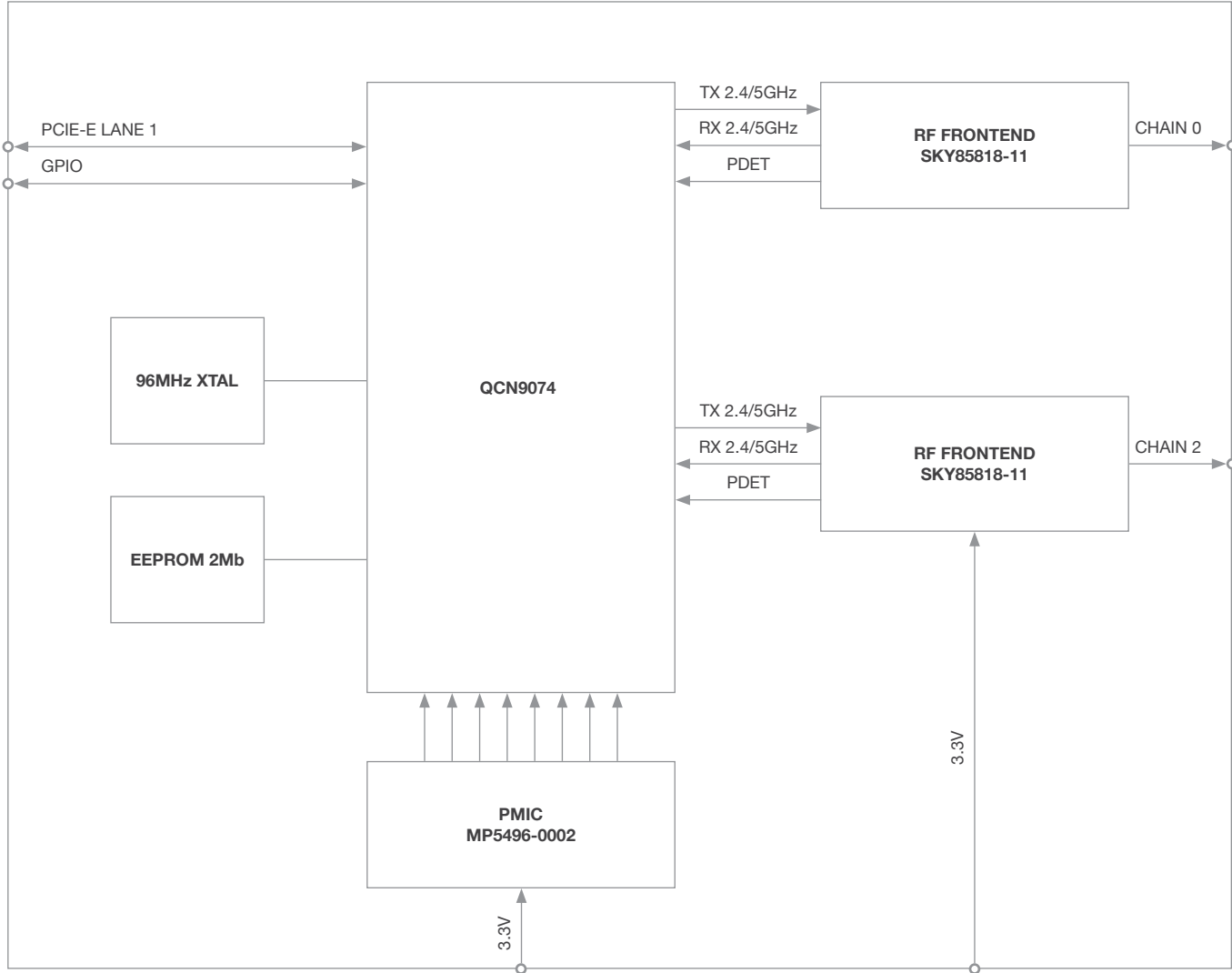


FIGURE 3-2. BLOCK DIAGRAM MINI PINI 2X2



3. Module pin out and Pin description

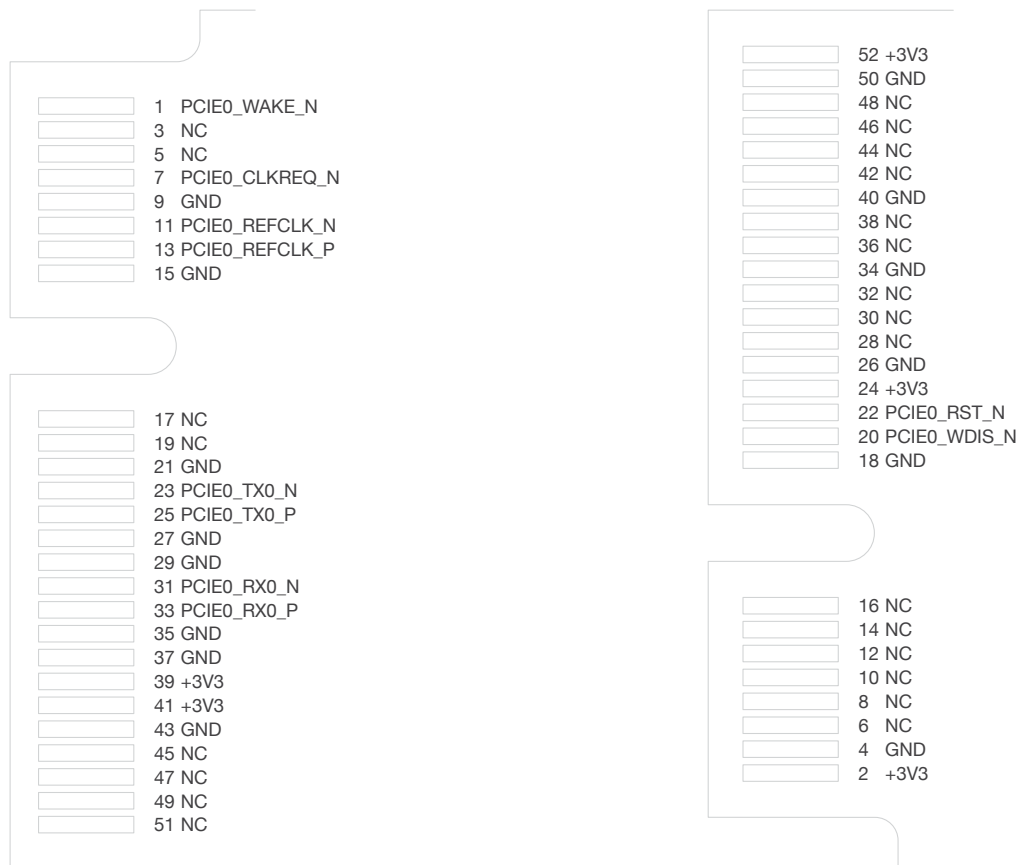


TABLE 3-1. I/O DESCRIPTION (PIN TYPE) PARAMETERS

Symbol	Description
GND	Ground
NC	Not connected
I	Digital input signal
O	Digital output signal
B	Digital bidirectional signal

TABLE 3-2. POWER, GROUND, NC

Pin ID	Pin name	Type	Description
2, 24, 39, 41, 52	+3V3	I	3.3V input voltage
4, 9, 15, 18, 21, 26, 27, 29, 34, 35, 37, 40, 43, 50	GND	GND	Ground
3, 5, 6, 8, 9, 10, 12, 14, 15, 16, 17, 19, 28, 30, 32, 36, 38, 42, 44, 45, 46, 47, 48, 49, 51, 20	NC	NC	NC

TABLE 3-3. PCIE GEN3

Pin ID	Pin name	Type	Description
7	PCIE0_CLKREQ_N	B	PCIe clock request
22	PCIE0_RST_N	I	PCIe reset
1	PCIE0_WAKE_N	B	PCIe wake
11	PCIE0_REFCLK_N	I	Reference clock
13	PCIE0_REFCLK_P	I	
23	PCIE0_TX0_N	O	PCIe transmitter differential signal
25	PCIE0_TX0_P	O	
33	PCIE0_RX0_P	I	PCIe receiver differential signal
31	PCIE0_RX0_N	I	

4. Electrical characteristics

TABLE 4-1. POWER SUPPLY DC CHARACTERISTICS

Symbol	Parameter	Minimum	Typical	Maximum	Units
+3V3	3.3 V Supply voltage	3	3.3	3.6	V
	3.3 V Supply current			3	A

TABLE 4-2. POWER CONSUMPTION MINI PINI 4X4

Scenario		Voltage V	Current, A	Total power W
TX	MCS0	3.3	2.4	7.92
	MCS11	3.3	1.74	5.76
RX	MCS0	3.3	0.8	2.64
	MCS11	3.3	0.76	2.52
Max throughput client side	MCS0	3.3	3.01	9.96
	MCS11	3.3	2.43	8.04

TABLE 4-3. POWER CONSUMPTION MINI PINI 2X2

Scenario		Voltage V	Current, A	Total power W
TX	MCS0	3.3	1.66	5.52
	MCS11	3.3	1.27	4.2
RX	MCS0	3.3	0.61	2.04
	MCS11	3.3	0.58	1.92
Max throughput client side	MCS0	3.3	2.21	7.32
	MCS11	3.3	1.7	5.64

TABLE 4-4. TEMPERATURE LIMIT RATINGS

Parameter	Minimum	Maximum	Units
Storage Temperature (Commercial)	0	+110	°C
Storage Temperature (Industrial)	-40	+110	°C
Commercial Operating Temperature	0	+65	°C
Industrial Operating Temperature	-40	+85	°C
Humidity	30	60	%RH
Storage humidity	15	70	%RH

5. Radio characteristics per chain

5.1. Mini Pini 4x4

TABLE 5-1. 2.4 GHZ 802.11AX 20 MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	34.4	68.8	103.2	137.6	206.5	275.3	309.7	344.1	412.9	458.8	516.2	573.5
TX power (dBm)	21	21	20	19	19	18	17	16	15	15	14	14
RX sensitivity (dB)	-91	-88	-86	-83	-79	-75	-74	-72	-70	-68	-65	-62

TABLE 5-2. 2.4GHZ 802.11AX 40MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	68.8	137.6	206.5	275.3	412.9	550.6	619.4	688.2	825.9	917.6	1032.4	1147.1
TX power (dBm)	21	21	20	19	19	18	17	16	15	15	14	14
RX sensitivity (dB)	-88	-86	-84	-82	-78	-74	-73	-71	-67	-66	-62	-60

TABLE 5-3. 5GHZ 802.11AX 20MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	34.4	68.8	103.2	137.6	206.5	275.3	309.7	344.1	412.9	458.8	516.2	573.5
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-92	-88	-86	-83	-80	-75	-74	-72	-70	-68	-65	-62

TABLE 5-4. 5GHZ 802.11AX 40MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	68.8	137.6	206.5	275.3	412.9	550.6	619.4	688.2	825.9	917.6	1032.4	1147.1
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-87	-86	-85	-81	-78	-74	-73	-71	-67	-65	-62	-60

TABLE 5-5. 5GHZ 802.11AX 80MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	144.4	288.2	432.4	576.5	864.7	1152.9	1297.1	1441.2	1729.4	1921.6	2161.8	2402
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-83	-82	-81	-78	-75	-70	-69	-67	-64	-61	-58	-56

TABLE 5-6. 5GHZ 802.11AX 160MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	288.8	576.5	864.7	1152.9	1729.4	2305.9	2594.1	2882.4	3458.8	3843.1	4323.5	4803.9
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-82	-81	-79	-75	-73	-68	-67	-65	-62	-60	-56	-54

5.2. Mini Pini 2x2

TABLE 5-1. 2.4 GHZ 802.11AX 20 MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	17.2	34.4	51.6	68.8	103.2	137.6	154.9	172.1	206.5	229.4	258.1	286.8
TX power (dBm)	21	21	20	19	19	18	17	16	15	15	14	14
RX sensitivity (dB)	-91	-88	-86	-83	-79	-75	-74	-72	-70	-68	-65	-62

TABLE 5-2. 2.4GHZ 802.11AX 40MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	34.4	68.8	103.2	137.6	206.5	275.3	309.7	344.1	412.9	458.8	516.2	573.5
TX power (dBm)	21	21	20	19	19	18	17	16	15	15	14	14
RX sensitivity (dB)	-88	-86	-84	-82	-78	-74	-73	-71	-67	-66	-62	-60

TABLE 5-3. 5GHZ 802.11AX 20MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	17.2	34.4	51.6	68.8	103.2	137.6	154.9	172.1	206.5	229.4	258.1	286.8
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-92	-88	-86	-83	-80	-75	-74	-72	-70	-68	-65	-62

TABLE 5-4. 5GHZ 802.11AX 40MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	34.4	68.8	103.2	137.6	206.5	275.3	309.7	344.1	412.9	458.8	516.2	573.5
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-87	-86	-85	-81	-78	-74	-73	-71	-67	-65	-62	-60

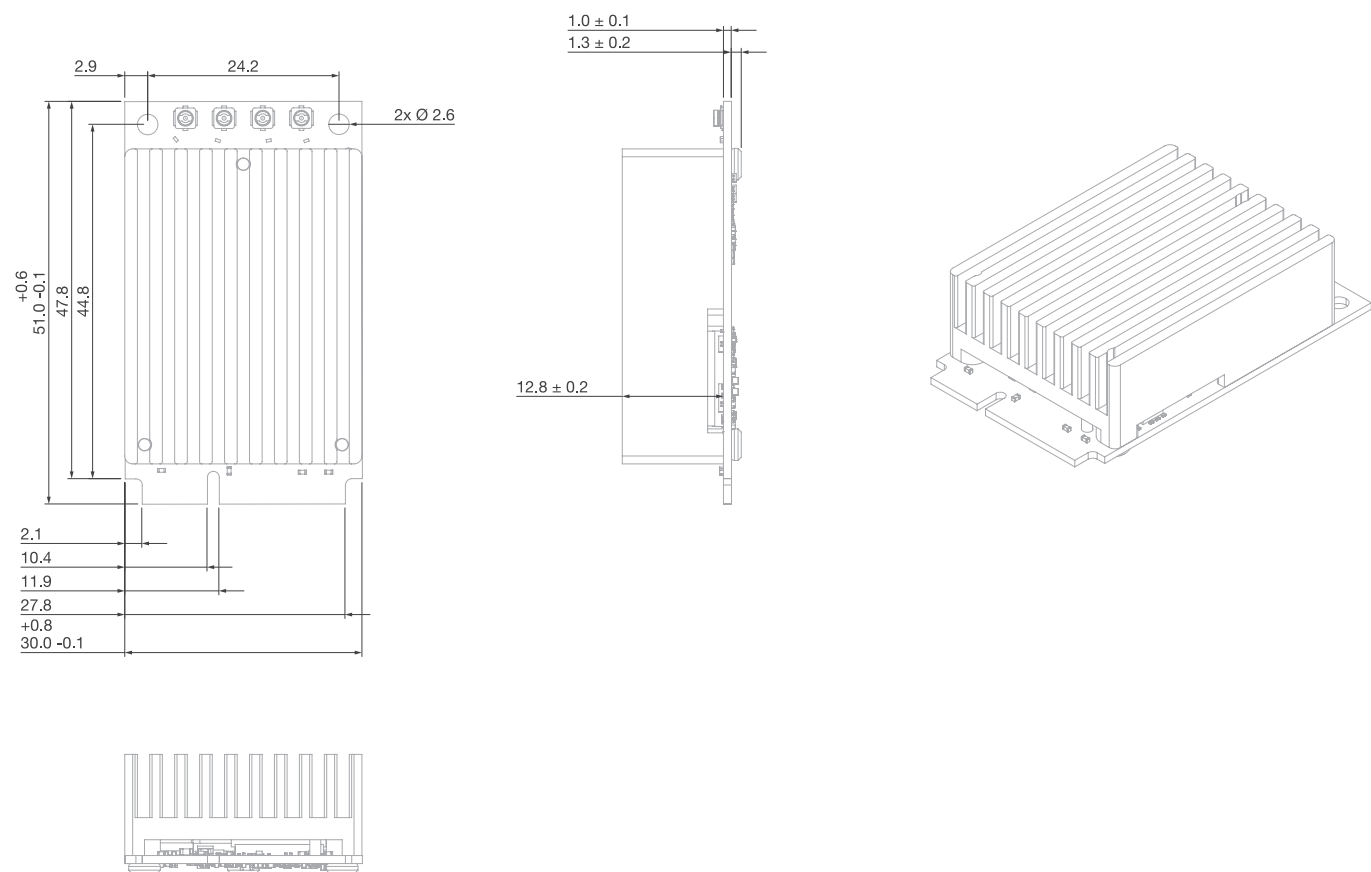
TABLE 5-5. 5GHZ 802.11AX 80MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	72.1	144.1	216.2	288.2	432.4	576.5	648.5	720.6	864.7	960.8	1080.9	1201
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-83	-82	-81	-78	-75	-70	-69	-67	-64	-61	-58	-56

TABLE 5-6. 5GHZ 802.11AX 160MHZ

	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
Data rate (Mbps)	144.1	288.2	432.4	576.5	864.7	1152.9	1297.1	1441.2	1729.4	1921.6	2161.8	2402
TX power (dBm)	19	19	18	17	17	16	16	15	14	14	13	13
RX sensitivity (dB)	-82	-81	-79	-75	-73	-68	-67	-65	-62	-60	-56	-54

6. Mechanical characteristics



7. Ordering information

TABLE. 7-1. MINI PINI RADIO CARD ORDER NUMBERS AND DESCRIPTIONS

Order Number	Description
MiniPini25 4x4	Mini-PCle 4x4 radio card, commercial temperature grade, 0-60°C
MiniPini25-I 4x4	Mini-PCle 4x4 radio card, industrial temperature grade, -40+85°C
MiniPini25 2x2	Mini-PCle 2x2 radio card, commercial temperature grade, 0-60°C
MiniPini25-I 2x2	Mini-PCle 2x2 radio card, industrial temperature grade, -40+85°C

8. Document Revision History

Revision	Revision Date	Description
v1.0	2023-05-30	Initial release
v1.1	2023-12-18	Updated 4/5. Tables, 6 mechanical characteristics
v1.2	2024-01-12	Updated Table 4-2
v1.3	2024-01-23	Added Mini Pini 2x2 information about radio performance and power consumption