HDWF-82D
Product Specification

(V1.0)

Model Name: HDWF-82D (2x2)
Description: IEEE802.11 a/an/ac PCIe card

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V1.0	Initial Document	2014/05/05

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1. Hardware Block Diagram：

The HDWF-82D is a PCIe interface card and based on Qualcomm Atheros QCA9882, which is a highly integrated wireless local area network (WLAN) system-on-chip (SoC) for 5GHz 802.11a/an/ac WLAN applications. It enables high-performance 2x2 MIMO with two spatial streams for wireless applications demanding the highest robust link quality and maximum throughput and range. It supports 866Mbps for 802.11ac 80MHz channel operation.

2. Features：

- QCA9882 PCI-e 2x2 solution
- External FEM for Extreme Performance
- Single band support, IEEE 802.11a/an/ac
- Support 20MHz, 40MHz and 80MHz Channel Bandwidth
- Support 256 QAM Modulation
- Antenna Port Data rate up to 866Mbps
- PCI-e Interface
- 30x50.8mm size with the same mounting hole location as the standard full minicard.
- Operation temperature: -10~60 degrees C

3. Block Diagram：

The major internal components are illustrated in Figure 1-1.

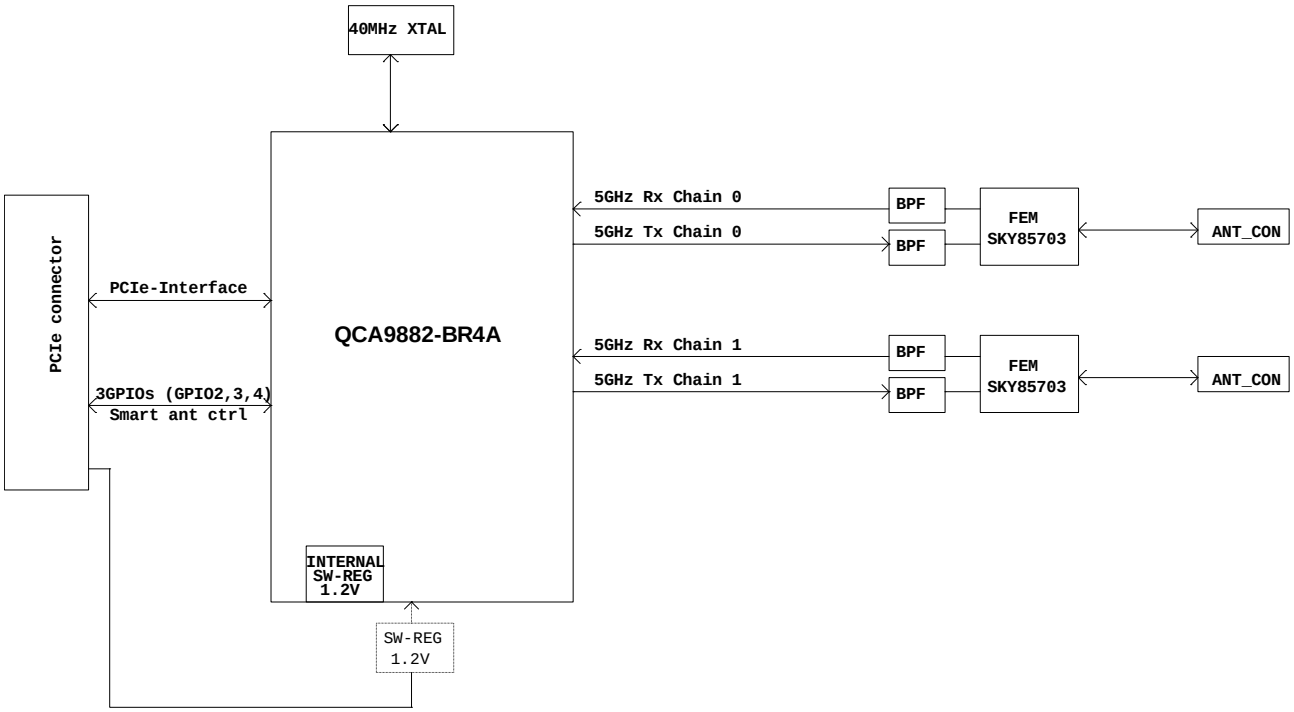

Figure 1-1 Major Component and System Interface

4. Pin Definition：

The pin definitions follow the PCIe interface standard.

Pin No.	Name	Direction	Description
4,9,15,18,21,26,27,29,34,35,40,50	**GND**	---	Ground
43	**RESERVED**	---	Ground
37	**RESERVED**	---	No connection
39,41	**RESERVED**	---	3.3V
49,51	**RESERVED**	I	Reserved for External Power Supply for FEM
3	**RESERVED**	I/O	No connection
47	**RESERVED**	I/O	No connection
45	**RESERVED**	I/O	No connection
5	**RESERVED**	I/O	No connection
8,10,12,14,16,17,19,	**NC**	---	No connection
33	**PETp0**	Analog input signal	Differential receive
31	**PETn0**	Analog input signal	Differential receive
25	**PERP0**	Analog output signal	Differential trnasmit
23	**PERN0**	Analog output signal	Differential trnasmit
13	**REFCLK+**	Analog input signal	Differential reference clock (100MHz)
11	**REFCLK-**	Analog input signal	Differential reference clock (100MHz)
20	**WLAN_DISABLE_L**	I/O	Reserved for QCA GPIO0
7	**CLKREQ_L**	A digital output signal with open drain	Reference clock request, open drain
22	**PERST_L**	Input siganls with weak internal pull-down, to prevent siganls from floating	PCI Express reset with weak pull down
1	**WAKE_L**	A digital output signal with open drain	Reserved for 3.3V or WAKE2_L (Request to service a fuction-initiated wake event, open drain).
32	**SMB_DATA**	---	No connection
30	**SMB_CLK**	---	No connection
46	**LED_WPAN_L**	O	No connection
44	**LED_WLAN_L**	O	Reserved for QCA GPIO1
42	**LED_WWAN_L**	---	No connection.
38	**USB_D+**	I/O	USB_D+
36	**USB_D-**	I/O	USB_D-
6,28,48	**1.5V**	---	No connection
2,52	**3.3V**	---	3.3V
24	**3.3VAUX**	---	Reserved for 3.3V

5. Specification ：

Main chipset	➢ QCA9882
TX/RX	➢ 2T2R (2x2 with 1NSS/2NSS MCS 0-9)
Frequency range	➢ USA: 5.15 ~ 5.35GHz, 5.47 ~ 5.725GHz, 5.725 ~ 5.85GHz ➢ Europe: 5.15 ~ 5.35GHz, 5.47 ~ 5.725GHz ➢ Japan: 5.15 ~ 5.35GHz, 5.47 ~ 5.725GHz ➢ China: 5.725 ~5.85GHz
Support Standard	➢ 802.11a/an/ac
Host interface	➢ PCI Express® Mini Card Electromechanical Specification Revision 1.2
Operation voltage	➢ 3.3V +/- 5%
Power consumption @25 ° C	(mA) 802.11a Avg: 802.11ac(20MHz) Avg: 802.11ac(40MHz) Avg: 802.11ac(80MHz) Avg ➢ 100% TX duty (3.3V): 880 / 840 / 760 / 760 ***This can be treated as the peak current consumption during operation.
Output power (only for maximum hardware capability, regardless the regulatory limit)	➢ Power tolerance 5.18GHz~5.825GHz +2/-2dB ➢ 802.11a (Typical) Test Frequencies / 6-24_Target / 36_Target / 48_Target / 54_Target 5180: 18 / 18 / 18 / 16 5500: 18 / 18 / 18 / 16 5825: 18 / 18 / 18 / 16 ➢ 802.11ac (Typical) Freq. Range: 5GHz/VHT20: @800GI(400GI) Test Freq / MCS 0 / MCS 1 / MCS 2 / MCS 3 / MCS 4 / MCS 5 / MCS 6 / MCS 7 / MCS 8 / MCS 9 5180: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 5500: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 5825: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 Freq. Range: 5GHz/VHT40: @800GI(400GI) Test Freq / MCS 0 / MCS 1 / MCS 2 / MCS 3 / MCS 4 / MCS 5 / MCS 6 / MCS 7 / MCS 8 / MCS 9 5190: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 5510: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 5795: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 Freq. Range: 5GHz/VHT80: @800GI(400GI) Test Freq / MCS 0 / MCS 1 / MCS 2 / MCS 3 / MCS 4 / MCS 5 / MCS 6 / MCS 7 / MCS 8 / MCS 9 5210: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 5530: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14 5775: 18 / 18 / 18 / 18 / 18 / 18 / 18 / 16 / 15 / 14
EVM	➢ 802.11a Modulation / Code Rate / Relative constellation error (dB) IEEE Spec (1Tx dB) / Relative constellation error (dB) Typical/Maximum (2Tx dB) (6M)BPSK: 1/2: -5: -15/-13 (9M)BPSK: 3/4: -8: -15/-13 (12M)QPSK: 1/2: -10: -16/-13 (18M)QPSK: 3/4: -13: -16/-15 (24M)16-QAM: 1/2: -16: -20/-16 (36M)16-QAM: 3/4: -19: -20/-19 (48M)64-QAM: 2/3: -22: -30/-22 (54M)64-QAM: 3/4: -25: -31/-25

	➢ 802.11ac Modulation Code Rate Relative constellation error (dB) IEEE Spec (1Tx dB) Relative constellation error (dB) Typical/Maximum (2Tx dB) ✧ VHT20 (MCS0) BPSK 1/2 -5 -15/-13 (MCS1) QPSK 1/2 -10 -15/-13 (MCS2) QPSK 3/4 -13 -16/-13 (MCS3) 16-QAM 1/2 -16 -22/-16 (MCS4) 16-QAM 3/4 -19 -22/-19 (MCS5) 64-QAM 2/3 -22 -30/-22 (MCS6) 64-QAM 3/4 -25 -31/-25 (MCS7) 64-QAM 5/6 -28 -32/-27 (MCS8) 256-QAM 3/4 -30 -33/-30 ✧ VHT40 (MCS0) BPSK 1/2 -5 -15/-13 (MCS1) QPSK 1/2 -10 -18/-13 (MCS2) QPSK 3/4 -13 -18/-13 (MCS3) 16-QAM 1/2 -16 -25/-16 (MCS4) 16-QAM 3/4 -19 -25/-19 (MCS5) 64-QAM 2/3 -22 -30/-22 (MCS6) 64-QAM 3/4 -25 -31/-25 (MCS7) 64-QAM 5/6 -28 -32/-27 (MCS8) 256-QAM 3/4 -30 -33/-30 (MCS9) 256-QAM 5/6 -32 -34/-32 ✧ VHT80 (MCS0) BPSK 1/2 -5 -15/-13 (MCS1) QPSK 1/2 -10 -18/-13 (MCS2) QPSK 3/4 -13 -18/-13 (MCS3) 16-QAM 1/2 -16 -25/-16 (MCS4) 16-QAM 3/4 -19 -25/-19 (MCS5) 64-QAM 2/3 -22 -30/-22 (MCS6) 64-QAM 3/4 -25 -31/-25 (MCS7) 64-QAM 5/6 -28 -32/-27 (MCS8) 256-QAM 3/4 -30 -33/-30 (MCS9) 256-QAM 5/6 -32 -34/-32
RX Sensitivity	➢ 802.11a Modulation Code Rate IEEE Spec (1Rx dBm) Typical/Maximum (2Rx dBm) (6M)BPSK 1/2 -82 -93/-88 (9M)BPSK 3/4 -81 -92/-88 (12M)QPSK 1/2 -79 -91/-87 (18M)QPSK 3/4 -77 -88/-84 (24M)16-QAM 1/2 -74 -86/-82 (36M)16-QAM 3/4 -70 -83/-79 (48M)64-QAM 2/3 -66 -76/-72 (54M)64-QAM 3/4 -65 -74/-70 ➢ 802.11ac Modulation Code Rate IEEE Spec (1Rx dBm) Typical/Maximum (2Rx dBm) ✧ VHT20 (MCS0) BPSK 1/2 -82 -92/-88 (MCS1) QPSK 1/2 -79 -90/-86 (MCS2) QPSK 3/4 -77 -88/-84 (MCS3) 16-QAM 1/2 -74 -84/-80 (MCS4) 16-QAM 3/4 -70 -81/-77

	(MCS5) 64-QAM	2/3	-66	-76/-72
	(MCS6) 64-QAM	3/4	-65	-75/-71
	(MCS7) 64-QAM	5/6	-64	-74/-70
	(MCS8) 256-QAM	3/4	-59	-70/-66
	✧ VHT40			
	(MCS0) BPSK	1/2	-79	-90/-86
	(MCS1) QPSK	1/2	-76	-89/-85
	(MCS2) QPSK	3/4	-74	-88/-82
	(MCS3) 16-QAM	1/2	-71	-83/-79
	(MCS4) 16-QAM	3/4	-67	-80/-76
	(MCS5) 64-QAM	2/3	-63	-76/-72
	(MCS6) 64-QAM	3/4	-62	-75/-71
	(MCS7) 64-QAM	5/6	-61	-74/-69
	(MCS8) 256-QAM	3/4	-56	-69/-65
	(MCS9) 256-QAM	5/6	-54	-68/-64
	✧ VHT80			
	(MCS0) BPSK	1/2	-76	-88/-84
	(MCS1) QPSK	1/2	-73	-87/-83
	(MCS2) QPSK	3/4	-71	-85/-81
	(MCS3) 16-QAM	1/2	-68	-80/-76
	(MCS4) 16-QAM	3/4	-64	-77/-73
	(MCS5) 64-QAM	2/3	-60	-73/-69
	(MCS6) 64-QAM	3/4	-59	-72/-68
	(MCS7) 64-QAM	5/6	-58	-71/-66
	(MCS8) 256-QAM	3/4	-53	-66/-62
	(MCS9) 256-QAM	5/6	-51	-65/-61

Transmit spectrum mask	➢ Frequency mask is complying with IEEE 802.11spec.
Transmit center frequency tolerance	➢ Transmitted center frequency tolerance within ±20 ppm.
PCB dimension	➢ (50.8+/-0.2mm)x (29.85+/-0.2mm) x (1.0+/-0.1mm) with 4 PCB layer
Transfer data rate	➢ 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps ➢ 802.11ac: @800GI(400GI) ● 20MHz BW ▪ 1 Nss: 78(86.7) Mbps maximal ▪ 2 Nss: 156(173.3) Mbps maximal ● 40MHz BW ▪ 1 Nss: 180(200) Mbps maximal ▪ 2 Nss: 360(400) Mbps maximal ● 80MHz BW ▪ 1 Nss: 390(433.3) Mbps maximal ▪ 2 Nss: 780(866.7) Mbps maximal
Operation temperature	➢ -10° ~ 60° C (with thermal pad underneath assembled, see definition in mechanical drawing)
Storage temperature	➢ -20° ~ 80° C
RF connector	➢ 2 x SMT Ultra-miniature coaxial connectors (U.FL type, Foxconn : KK23011-32-7H)

6. Mechanical Drawing：