

MSAX65-W1-M12-E2 Operational Description

FCC ID: LYHMSAX65V1

IC: 267AA-MSAX65V1

1 Product overview

The MSAX65-W1-M12-E2 (FCC ID LYHMSAX65V1) device is a wireless LAN access point / client for industrial applications supporting following WLAN modes and frequencies:

- 802.11 ax/ac/a/h/n Mode: 5.15~5.35 GHz and 5.47~5.85 GHz
- 802.11 ax/b/g/n Mode: 2400~2483.5 MHz

2 N connectors are available for usage with external antennas. 2x2 MIMO operation is possible in both bands. Simultaneous operation of the device in both frequency bands is supported. Module may be used either as Master or as Client WLAN device.



Figure 1 MSAX65-W1-M12-E2

The device supports 10/100/1000 Mbit/s Ethernet. Additionally, the device features one digital input and one digital output signalling line, a configuration/licensing plug and a sleep timer. Supply power is 24Vdc, also PoE on the ethernet interface is available.

2 Device structure

Please see attached block diagram for details on the device structure. The main components are:

1. Control Processor: Qualcomm IPQ6010, including WLAN base band processing
2. System Memory: DDR4 + SPI Flash + eMMC Flash
3. Power system for 24Vdc and PoE supply
4. WLAN PHY for 5 GHz operation: Qualcomm QCN5152
5. WLAN PHY for 2,4 GHz operation: Qualcomm QCN5122
6. Radio frontend including matching, amplifiers, filters and diplexers
7. 1x 10/100/1000 Mbit/s Ethernet PHY
8. Digital input / digital output signaling lines
9. Configuration / licensing plug
10. LEDs
11. M12 power, ethernet and digital input / digital output connectors on a separate PCB

3 Device clock tree

The following diagram summarizes main system frequencies:

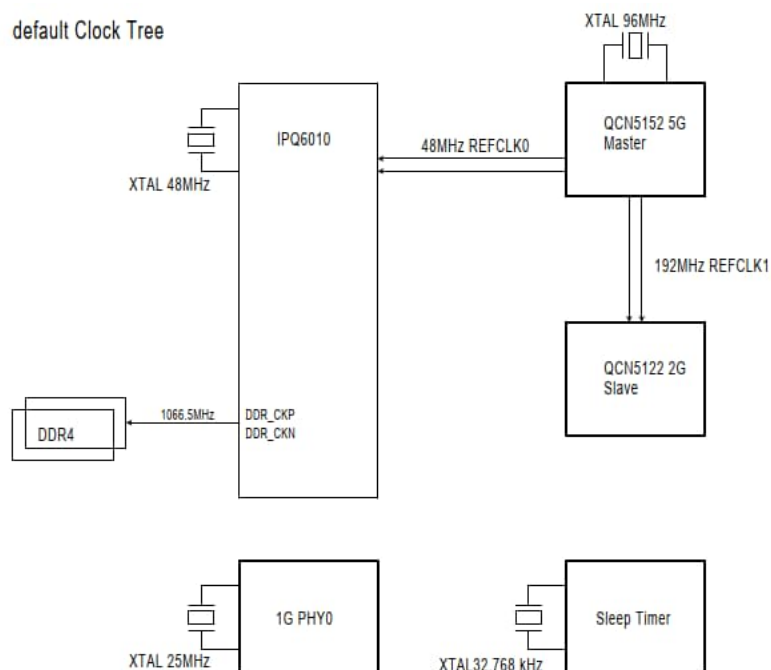


Figure 2 device clock tree

SIEMENS

4 RF System

Modulation Types:

DSSS (DBPSK, DQPSK, CCK),

OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM)

Data Rates:

802.11b/g/n 20 and 40 MHz Channel Bandwidth

- 11b: 11, 5.5, 2, 1 Mbps, auto-fallback,
- 11g: 54, 48, 36, 24, 18, 12, 9, 6Mbps, auto-fallback
- 11n: MCS0...MCS15 (up to 2 spatial streams)

802.11a/h/n 20 and 40 MHz Channel Bandwidth

- 11a/h: 54, 48, 36, 24, 18, 12, 9, 6Mbps, auto-fallback
- 11n: MCS0...MCS15 (up to 2 spatial streams)

802.11ac 20, 40, and 80 Channel Bandwidth

- 11ac: MCS0-MCS9 with up to 2 spatial streams

802.11ax 20, 40, and 80 Channel Bandwidth

- 11ax: MCS0-MCS11 with up to 2 spatial streams

In the current software version, no OFDMA modes are used.

5 Frequency usage

Country	Mode	CH	MHz	Use
USA, Canada	11g 11n	1	2412	Indoor + outdoor
		-	-	
		11	2462	
	11a 11ac 11ax 11n	36	5180	Indoor only
		-	-	
	11a 11ac 11ax 11n	48	5240	
		52	5260	Indoor + outdoor
	-	-		
	11a 11ac 11ax 11n	64	5320	
		100	5500	Indoor + outdoor
	-	-		
	11a 11ac 11ax 11n	144	5720	
149		5745	Indoor + outdoor	
-	-			
		165	5825	

6 Maximum conducted power

20 MHz operation

Band	Channel	Center Frequency (MHz)	Max. Conducted Output Power (dBm)	
			802.11 b/a/n/ac/ax (SISO)	802.11 n/ac/ax (MIMO 2Tx)
2.412-2.462 GHz	1	2412	17	20
	6	2437	17	20
	11	2462	17	20
5.180-5.240 GHz	36	5180	20 (US) / 13 (CA)	21 (US) / 13 (CA)
	40	5200	20 (US) / 13 (CA)	21 (US) / 13 (CA)
	44	5220	20 (US) / 13 (CA)	21 (US) / 13 (CA)
	48	5240	20 (US) / 13 (CA)	21 (US) / 13 (CA)
5.260-5.320 GHz	52-64	5260-5320	20	21
5.500-5.720 GHz	100-144	5500-5720	20	21
5.745-5.825 GHz	149	5745	20	23
	153	5765	20	23
	157	5785	20	23
	161	5805	20	23
	165	5825	20	23

40 MHz operation

Band	Channel	Center Frequency (MHz)	Max. Conducted Output Power (dBm)	
			802.11 b/a/n/ac/ax (SISO)	802.11 n/ac/ax (MIMO 2Tx)
2.412-2.462 GHz	3	2422	15	18
	6	2437	15	18
	9	2452	15	18
5.180-5.240 GHz	38	5190	20 (US) / 13 (CA)	22 (US) / 13 (CA)
	46	5230	20 (US) / 13 (CA)	22 (US) / 13 (CA)
5.260-5.320 GHz	54-62	5270-5310	20	21
5.500-5.720 GHz	102-142	5510-5710	20	21
5.745-5.825 GHz	151	5755	20	23
	159	5795	20	23

80 MHz operation

Band	Channel	Center Frequency (MHz)	Max. Conducted Output Power (dBm)	
			802.11 b/a/n/ac/ax (SISO)	802.11 n/ac/ax (MIMO 2Tx)
5.180-5.240 GHz	42	5210	18 (US) / 13 (CA)	21 (US) / 13 (CA)
5.745-5.825 GHz	155	5775	20	23