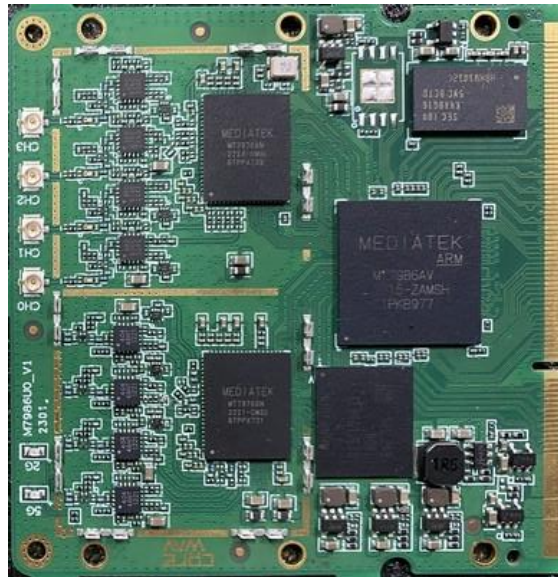




M7986U1 Datasheet

802.11ax 2.4/5GHz 4x4 SOM



The M7986U1 is an IEEE 802.11ax compliant radio module with Mediatek MT7986A SoC based SODIMM type SOM(System on Module). It can deliver up to 24dBm (2 streams) high output power, but still keep a very compact dimension of 67.5mm(Length) x 66mm(Width) x 3mm (Height), making it a perfect WiFi solution for WiFi & IOT(Internet Of Things) applications.

The M7986U1 provides multiple interfaces including PCIe gen3, USB3.0, USB2.0, SPI, I2C, HSGMII x 1, GbE PHY x 1, GPIOs, UART and etc. The SOM supports flexible memory combination, makes it easy to support various types of applications, including WiFi AP/Router, IOT, SDWAN, VPN and etc.

Features

Wi-Fi6/6E IEEE 802.11a/b/g/n/ac/ax 2.4/5GHz dual band dual concurrent applications

Supports MIMO 4x4(2.4GHz) and 4x4(5GHz) WiFi operations

Supports WiFi PHY rate of 1,376Mbps for 2.4Ghz(40MHz) and 4,804Mbps for 5GHz(160MHz)

SoC: MTK Fillogic830 MT7986A Quad Core A53 1.8Hz CPU

RF IC: MT7975GN + MT7975A, 802.11ax WiFi6 2.4/5GHz 4x4 radios

Memory: 8GB EMMC + 2GB DDR4 with optional NAND and NOR reserved and can be customized per request

Ethernet Interface : 2 x HSGMII

Interfaces: 1xPCIe3.0 1L, 1xUSB3.0, 1xUSB2.0, SPI,UART, I2C, GPIO and etc.

Connector: DDR3 SODIMM connector

Dimension: 67.5 x 66 mm



Specifications

Model	2.4GHz 4x4 40MHz+ 5GHz 4x4 160MHz 802.11ax Wi-Fi6 radio module
WLAN standard	IEEE 802.11 a/b/g/n/ac/ax
SoC/CPU	Mediatek MT7986A Quad ARM A53 1.8GHz SoC
Memory	• DDR3/4: 1GB (up to 4GB) • EMMC: up to 16GB • NOR: (reserved) • NAND: (reserved, EMMC and NAND flash share same SPI pinouts)
Radio mode	MIMO 4x4
Radio frequency band	2412 MHz ~2472MHz, 5180 MHz ~5825MHz
Transmit power	• 2.4GHz: Max. 21dBm/MCS0 • 5GHz: Max. 21dBm/MCS0
Receive sensitivity	Varying between -96 and -52 dBm depending on modulation
Channel size	20/40/80/160 MHz
Modulation	BPSK, QPSK, 64/256/1024 QAM
Data rates	2.4G Rate: HE0-HE11 (8 Mbps – 573.3 Mbps) 5G Rate : HE0-HE11 (8 Mbps – 1200 Mbps)
Power Consumption	20W typical (preliminary)
Operating Temperature	-20°C ~ +70°C
Storage Temperature	-40°C ~ +90°C
Operating Humidify	5%-95%(Non-condensing)
Dimension	67.5*66*3mm
Weight	<20g
Antenna	4 x IpeX connectors
Power Supply	+5V
Ethernet	2 x HSGMII
USB	1 x USB3.0 Host + 1 x USB2.0
GPIO	12 (partly shared with EMMC/SPI)
UART	X2 (shared with EMMC/SPI)
Pin Share Scheme	1xEMMC or 2xSPI or 1xUART + SPI NAND, or 1xUART + PTA or GPIO

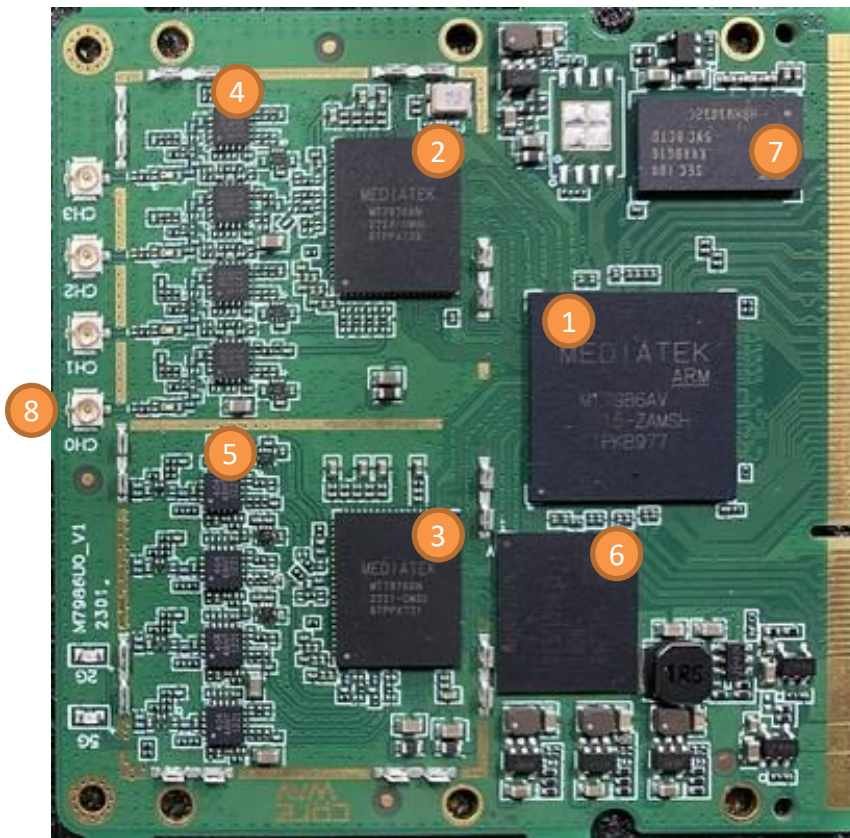


RF Characteristics

	2.4GHz		5GHz	
Rate	TX Power	RX Sensitivity	TX Power	RX Sensitivity
1Mbps	21	-96	NA	NA
11Mbps	19	-90	NA	NA
6Mbps	21	-94	21	-92
54Mbps	17	-78	17	-76
HT20/MCS0	21	-95	21	-91
HT20/MCS7	17	-76	17	-74
HT40/MCS0	21	-92	21	-91
HT40/MCS7	15	-73	16	-71
VHT20/MCS0	21	-92	21	-91
VHT20/MCS9	15	-73	16	-74
VHT40/MCS0	21	-89	21	-90
VHT40/MCS9	14	-61	16	-61
VHT80/MCS0	NA	NA	20	-85
VHT80/MCS9	NA	NA	15	-60
HE40/MCS0	21	-90	21	-86
HE40/MCS11	14	-62	15	-60
HE80/MCS0	NA	NA	21	-84
HE80/MCS11	NA	NA	14	-56
HE160/MCS0	NA	NA	20	-84
HE160/MCS11	NA	NA	15	-52

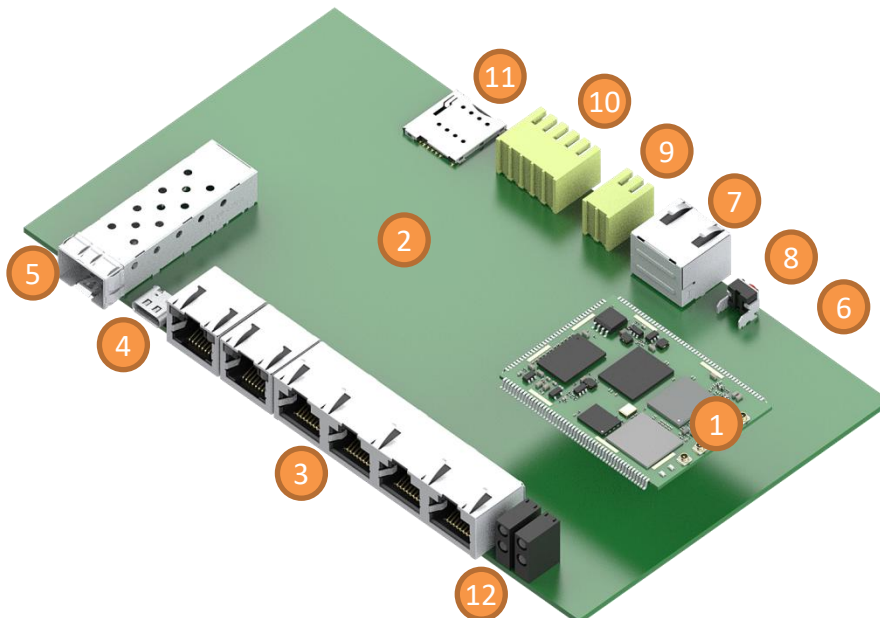


SOM



1	MT7986A SoC
2	MT7975GN 2.4GHz 11ax 4x4 RF
3	MT7975A 5GHz 11ax 4x4 RF
4	4 x 2.4GHz FEM
5	4 x 5GHz FEM
6	EMMC
7	DDR4
8	4 x iPex (U.FL)
9	U.FL connectors
10	DDR3 SODIMM
11	NAND Flash (reserved)
12	DDR3 SODIMM connector

EVK (Evaluation Kit)



1	MT7986U1 SOM
2	M.2 Slot key B
3	GbE Ethernet x 6
4	USB3.0 Type C
5	SFP
6	Reset button
7	Console/RJ45
8	DC Jack
9	DC in Terminal Block
10	RS232/422/485 Terminal Block
11	Micro SIM x2
12	LED x 6



Pinouts

Pin	Definition	I/O	Description	Pin	Definition	I/O	Description
1	+5V	PI	General power supply	2	GND	PI	Ground
3	+5V	PI	General power supply	4	GND	PI	Ground
5	+5V	PI	General power supply	6	GND	PI	Ground
7	+5V	PI	General power supply	8	GND	PI	Ground
9	+5V	PI	General power supply	10	GND	PI	Ground
11	+5V	PI	General power supply	12	GND	PI	Ground
13	+5V	PI	General power supply	14	GND	PI	Ground
15	+5V	PI	General power supply	16	GND	PI	Ground
17	+5V_2G	PI	RF power supply	18	GND	PI	Ground
19	+5V_2G	PI	RF power supply	20	GND	PI	Ground
21	+5V_2G	PI	RF power supply	22	GND	PI	Ground
23	+5V_2G	PI	RF power supply	24	GND	PI	Ground
25	GND	PI	Ground	26	GND	PI	Ground
27	GND	PI	Ground	28	GND	PI	Ground
29	GND	PI	Ground	30	GND	PI	Ground
31	GND	PI	Ground	32	PWM0	I/O	
33	GND	PI	Ground	34	SPI1_CS_N	DO	
35	GND	PI	Ground	36	SPI1_MISO	I/O	
37	GND	PI	Ground	38	SPI1_CLK	I/O	
39	GND	PI	Ground	40	SPI1_MOSI	I/O	
41	GND	PI	Ground	42	GND	PI	Ground
43	PCIE_LO_RXP	I/O	PCIE RX +	44	GND	PI	Ground
45	PCIE_LO_RXN	I/O	PCIE RX -	46	GND	PI	Ground
47	GND	PI	Ground	48	GND	PI	Ground
49	PCIE_LO_TXP	I/O	PCIE TX +	50	GND	PI	Ground
51	PCIE_LO_TXN	I/O	PCIE TX -	52	GND	PI	Ground
53	GND	PI	Ground	54	GND	PI	Ground
55	PCIE_CLK_P	I/O	PCIE clock +	56	GND	PI	Ground
57	PCIE_CLK_N	I/O	PCIE clock -	58	GND	PI	Ground
59	GND	PI	Ground	60	GND	PI	Ground
61	PCIE_L1_RXP	I/O	PCIE RX +	62	GND	PI	Ground
63	PCIE_L1_TXN	I/O	PCIE RX -	64	GND	PI	Ground
65	GND	PI	Ground	66	GND	PI	Ground
67	PCIE_L1_TXP	I/O	PCIE TX +	68	GND	PI	Ground
69	PCIE_L1_RXP	I/O	PCIE RX +	70	GND	PI	Ground
71	GND	PI	Ground	72	GND	PI	Ground
73	GND	PI	Ground	74	GND	PI	Ground
75	GPIO9	I/O	General GPIO	76	SPIO_MISO	DO	
77	GPIO7	I/O	General GPIO	78	SPIO_CS_N	I/O	
79	UART1_CTS	I/O	UART clear to send	80	SPIO_WP	I/O	
81	UART1_RXD	I/O	UART Rx Data	82	SPIO_MOSI	I/O	
83	GPIO6	I/O	General GPIO	84	SPIO_HOLD	PI	
85	GPIO13	I/O	General GPIO	86	PWMI	PI	
87	GPIO10	I/O	General GPIO	88	SPIO_CLK	PI	
89	GPIO8	I/O	General GPIO	90	SYS_DOG	PI	
91	GPIO14	I/O	General GPIO	92	ETH_RST_N	PI	
93	GPIO12	I/O	General GPIO	94	GPIO0	PI	
95	UART0_TXD	I/O	UART Tx Data	96	GPIO11	PI	
97	UART0_RXD	I/O	UART Rx Data	98	UART1_RTS	PI	
99	SYS_RST_N	I/O	System reset	100	UART1_TXD	PI	
101	PCM_CLK			102	UART1_RXD	PI	



Pinouts

Pin	Definition	I/O	Description	Pin	Definition	I/O	Description
103	PCM_DTX			104	UART1_RTS	PI	
105	pcm_DRX			106	UART1_CTS	PI	
107	PCM_FS			108	PCIE_RST_N	PI	
109	GPIO15	I/O	General GPIO	110	UART2_TXD	PI	
111	I2C_SCL			112	GND	PI	Ground
113	I2C_SDA			114	GND	PI	Ground
115	CPU_RSTO_N			116	GND	PI	Ground
117	ETH_INT_N			118	GND	PI	Ground
119	ETH_MDIO			120	GND	PI	Ground
121	ETH_MDC			122	GND	PI	Ground
123	GND	PI	Ground	124	GND	PI	Ground
125	USB_1_DN			126	GND	PI	Ground
127	USB_1_DP			128	GND	PI	Ground
129	GND	PI	Ground	130	GND	PI	Ground
131	USB_0_DP			132	GND	PI	Ground
133	USB_0_DN			134	GND	PI	Ground
135	GND	PI	Ground	136	GND	PI	Ground
137	USB_1_TXP			138	GND	PI	Ground
139	USB_1_TXN			140	GND	PI	Ground
141	GND	PI	Ground	142	GND	PI	Ground
143	USB_1_RXP			144	GND	PI	Ground
145	USB_1_RXN			146	GND	PI	Ground
147	GND	PI	Ground	148	GND	PI	Ground
149	SG1_RXN			150	GND	PI	Ground
151	SG1_RXN			152	GND	PI	Ground
153	GND	PI	Ground	154	GND	PI	Ground
155	SG1_TXN			156	GND	PI	Ground
157	SG1_TXP			158	GND	PI	Ground
159	GND	PI	Ground	160	GND	PI	Ground
161	SG0_TXN			162	GND	PI	Ground
163	SG0_TXP			164	GND	PI	Ground
165	GND	PI	Ground	166	GND	PI	Ground
167	SG0_RXP			168	GND	PI	Ground
169	SG0_RXN			170	GND	PI	Ground
171	GND	PI	Ground	172	GND	PI	Ground
173	GND	PI	Ground	174	GND	PI	Ground
175	GND	PI	Ground	176	GND	PI	Ground
177	GND	PI	Ground	178	GND	PI	Ground
179	GND	PI	Ground	180	GND	PI	Ground
181	GND	PI	Ground	182	GND	PI	Ground
183	GND	PI	Ground	184	GND	PI	Ground
185	GND	PI	Ground	186	GND	PI	Ground
187	GND	PI	Ground	188	GND	PI	Ground
189	GND	PI	Ground	190	GPIO2	PI	
191	GND	PI	Ground	192	GPIO3	PI	
193	GND	PI	Ground	194	GPIO5	PI	
195	GND	PI	Ground	196	GPIO4	PI	
197	+5V_5G	PI	RF power supply	198	5G_LED	PI	
199	+5V_5G	PI	RF power supply	200	2G_LED	PI	
201	+5V_5G	PI	RF power supply	202	GND	PI	Ground
203	+5V_5G	PI	RF power supply	204	GND	PI	Ground
S1				S2	GND	PI	Ground