

MEC-WIFI-2052B-30

WLAN 802.11 a/b/g/n/ac/ax/be 2T2R BT 5.4

M.2 Type 2230 E key (Wi-Fi 7)

Product Datasheet



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Revision History

Date	Revision	Description
2025.12.18	1.0	First Released

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1. Product Overview

1.1 Introduction

MEC-WIFI-2052B-30 is a highly integrated triple-band WLAN + Bluetooth combo M.2 Card based on Realtek RTL8922AE Wi-Fi 7 chipset. It combines a 2T2R triple-band WLAN subsystem with a PCI Express interface controller and a Bluetooth v5.4 subsystem with a USB interface controller.

MEC-WIFI-2052B-30 is compatible with IEEE 802.11 a/b/g/n/ac/ax/be standards, delivering a maximum PHY rate of up to 2882Mbps. It supports Bluetooth dual mode and complies with v5.4/v4.2/v2.1 specifications.

MEC-WIFI-2052B-30 provides a complete solution for high-performance integrated wireless and Bluetooth connectivity in devices such as laptops, set-top boxes, and smart TVs.

1.2 Features

- M.2 Type 2230 E Key Card
- Support 2.4GHz, 5GHz, 6GHz frequency bands
- Support 2T2R mode operation on a single band
- Support dual-band concurrent operation (2.4GHz + 5GHz or 6GHz)
- Support Multi-Link Operation(MLO), subject to firmware and host support
- Channel bandwidth support : 20/40/80/160MHz
- Support 802.11be with OFDMA and MU/RU/SU decision path by firmware
- Dual-mode Bluetooth support : BR/EDR + LE
- Two external antenna connectors via MHF4/IPEX4

2. Specification

2.1 Hardware Specification

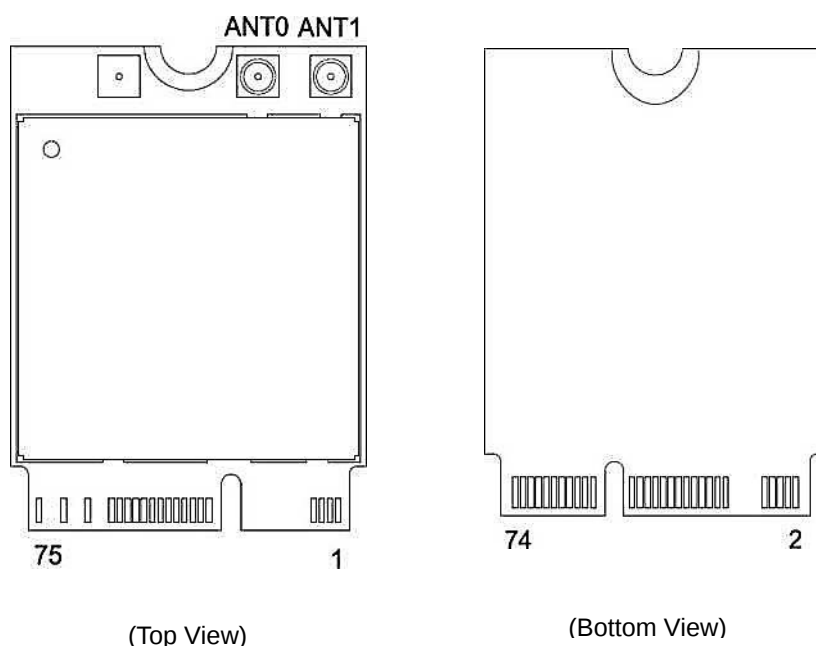
General Specification	
Chipset	Realtek RTL8922AE-CG
IEEE Networking Standard	IEEE 802.11 a/b/g/n/ac/ax/be
RF Frequency Range	2.4~2.4835GHz / 5.15~5.85GHz / 5.925-7.125GHz
BT Specification	Bluetooth Core Specification v5.4/4.2/2.1
Host Interface	PCI Express Gen2 1 Lane for WLAN & USB2.0 FS for Bluetooth
Antenna	Connect to the external antenna through MHF4/IPEX4 connectors
Dimension	M.2 Type 2230 E Key Add-in Card: 30.0*22.0*2.48mm (L*W*H)
Power Supply	DC 3.3V±0.2V@ 1.5A (Max)
Operating	Operating temperature: 0 to 70°C Relative Humidity : 10-95% (non-condensing)
Storage	Temperature: -40 to 85°C Relative Humidity : 10-95% (non-condensing)

2.2 Software Specification

Software Support	
Operating System	Windows 11 Linux (Kernel 6.1 LTS or later, driver support dependent on OS distribution)
EMI Test Report	FCC/CE/NCC

2.3 Electronic Specification

2.3.1 Pin Assignment



2.3.2 Pin Define

PIN	Definition	Remark	I/O Level	Card Pin Description
1	GND	P		Ground connections
2	VDD33	P		DC 3.3V power supply
3	USB_D+	A I/O		USB 2.0 Device Full Speed Interface differential pair for BT To connect the "USB D+" of USB Host
4	VDD33	P		DC 3.3V power supply
5	USB_D-	A I/O		USB 2.0 Device Full Speed Interface differential pair for BT. To connect the "USB D-" of USB Host
6	WL_LED	0	3.3V	GPIO8 used for WLAN LED Active Low Output. To connect the cathode of WLAN status indicator LED and the anode connect to VDD33, a series resistor for current limiting is required. If not use, can be left float
7	GND	P		Ground connections
8	I2S SCK	I/O	3.3V	GPIO3 used for I2S SCK
9	NC	-		No connection(floating)
10	I2S WS	I/O	3.3V	GPIO2 used for I2S WS
11	NC	-		No connection(floating)



12	I2S SD OUT	I/O	3.3V	GPIO1 used for I2S SD OUT
13	NC	—		No connection(floating)
14	I2S_SD_IN	I/O	3.3V	GPIO0 used for I2S SD IN
15	NC	-		No connection(floating)
16	BT_LED	0	3.3V	GPIO25 used for BT LED Active Low Output To connect the cathode of BT status indicator LED and the anode connect to VDD33, a series resistor for current limiting is required. If not use, can be left float
17	NC	—		No connection(floating)
18	VIO_CFG	P		I/O level configuration, an internal 0Ω pull low resistor (connected to Ground) used to set the 3.3V digital I/O level
19	NC	—		No connection(floating)
20	NC	-		No connection(floating)
21	NC	—		No connection(floating)
22	NC	—		No connection(floating)
23	NC	—		No connection(floating)
24	Connector Key	—		Connector Key
25	Connector Key	—		Connector Key
26	Connector Key	—		Connector Key
27	Connector Key	—		Connector Key
28	Connector Key	—		Connector Key
29	Connector Key	—		Connector Key
30	Connector Key	—		Connector Key
31	Connector Key	—		Connector Key
32	NC	—		No connection(floating)
33	GND	P		Ground connections
34	NC	—		No connection(floating)
35	PERp0	AI		PCI Express device receive differential pair for WLAN. To connect the "PETp0" of PCI Express Host
36	NC	-		No connection(floating)
37	PERn0	AI		PCI Express device receive differential pair for WLAN. To connect the "PETn0" of PCI Express Host
38	GPIO12	I/O	3.3V	General Purpose Input/Output Pin GPIO12



39	GND	P		Ground connections
40	GPIO13	I/O	3.3V	General Purpose Input/Output Pin GPIO13
41	PETp0	AO		PCI Express device transmit differential pair for WLAN. To connect the "PERp0" of PCI Express Host. (AC coupling capacitors are integrated on Card)
42	GPIO14	I/O	3.3V	General Purpose Input/Output Pin GPIO14
43	PETn0	AO		PCI Express device transmit differential pair for WLAN. To connect the "PERn0" of PCI Express Host. (AC coupling capacitors are integrated on Card)
44	NC	-		No connection(floating)
45	GND	P		Ground connections
46	NC	—		No connection(floating)
47	REFCLKp0	AI		PCI Express 100MHz differential reference clock input To connect the "REFCLKp0" of PCI Express Host
48	NC	—		No connection(floating)
49	REFCLKn0	AI		PCI Express 100MHz differential reference clock input. To connect the "REFCLKn0" of PCI Express Host
50	NC	—		No connection(floating)
51	GND	P		Ground connections
52	PERST#	I	3.3V	PCI Express Reset active low input. When the PERST# is asserted at power-on state, the card returns to a pre-defined reset state and is ready for initialization and configuration after the de-assertion of the PERST#
53	CLKREQ0#	I/O/D	3.3V	Reference Clock Request output signal. Also used by L1 PM substates. This signal is used by the card to request for the PCI Express reference clock
54	BT_DIS#	I	3.3V	GPIO11 used for BT Disable# input. It can externally shut down the card BT function when its pulled Low, and USB interface will be also disabled. When this function is not required, external pull up is not required.
55	PEWAKE0#	O/D	3.3V	Power Management Event active low open drain output signal. Used to reactivate the PCI Express device main power rails and reference clocks. This PEWAKE# can be shared with BT wake up host function via sideband signals



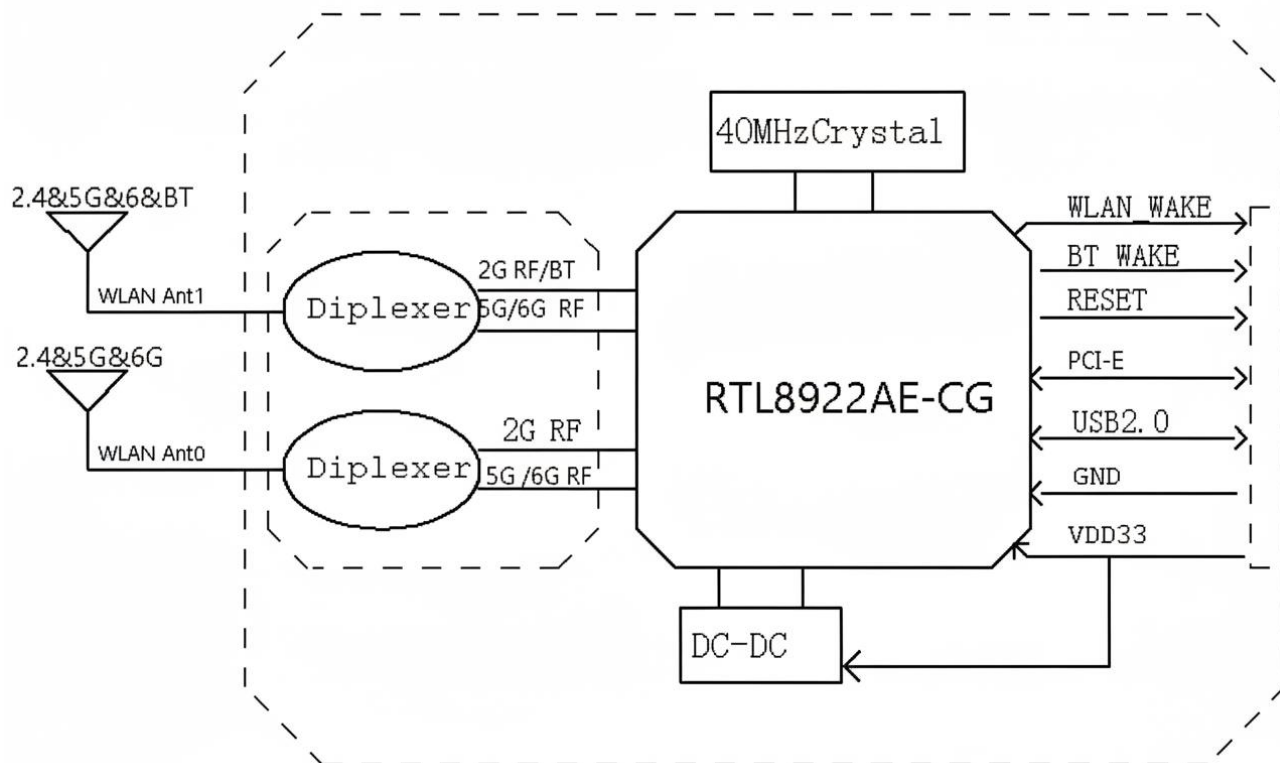
56	WL_DIS#	I	3.3V	GPIO9 used for WLAN Disable# input. It can be defined as the WLAN Radio-off function with host interface remaining connected. When this pin is pulled low, WLAN function will be Radio-off. When this function is not required, external pull up is not required.
57	GND	P		Ground connections
58	NC	—		No connection(floating)
59	NC	—		No connection(floating)
60	NC	—		No connection(floating)
61	NC	—		No connection(floating)
62	NC	—		No connection(floating)
63	GND	P		Ground connections
64	VDDIO18	P		No connection (floating, reserved for DC 3.3V/1.8V digital I/O power supply input)
65	NC	—		No connection(floating)
66	NC	—		No connection(floating)
67	NC	-		No connection(floating)
68	NC	—		No connection(floating)
69	GND	P		Ground connections
70	NC	—		No connection(floating)
71	NC	—		No connection(floating)
72	VDD33	P		DC 3.3V power supply
73	NC	—		No connection(floating)
74	VDD33	P		DC 3.3V power supply
75	GND	P		Ground connections
ANTI	ANTI RF	RF		MHF4/IPEX4 connector for 2.4G/5G/6G WLAN/2.4G BT RF to ANTI
ANT2	ANTO RF	RF		MHF4/IPEX4 connector for 2.4G/5G/6G WLAN RF to ANTO

P: Power or Ground; I/O: digital In/Output; O/D: Open Drain digital Output; A I/O: Analog In/Output;

RF: Analog RF Port or RF Ground



2.3.3 Block Diagram

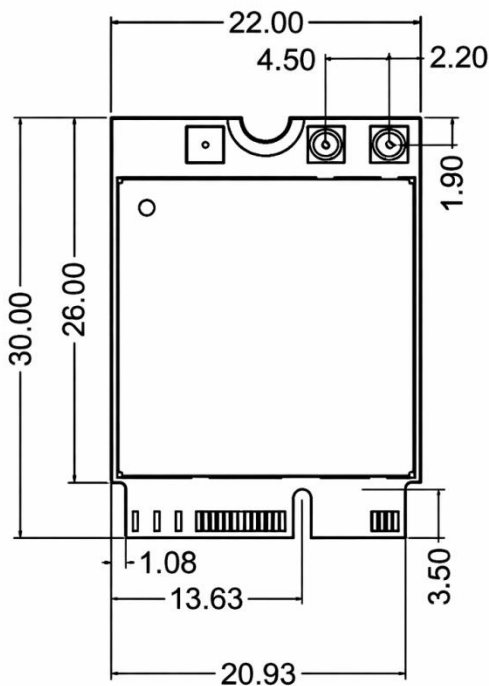




2.4 Mechanical Specification

Board Dimension			
Form factor	M.2 2230		
PCB Dimension	30L*22W mm		
PCB thickness	0.8mm (+/- 0.1mm)		
SMD	Single side		
Max. height of components (from PCB)	Top side	Shielding case	2.3mm (+/- 0.2mm)
	Bottom side	0mm	

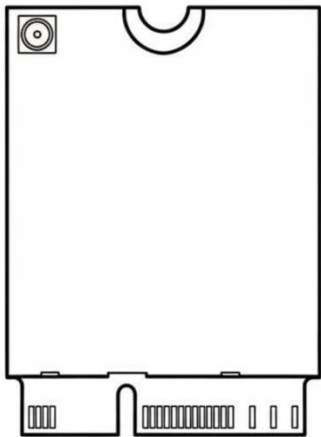
Mechanical Drawing



(Top View)



(Side View)



(Bottom View)

Card dimension: 30.0*22.0*2.48mm (L*W*H; Tolerance: ±0.3mm_L/W, ±0.2mm_H)
MHF4 / IPEX4 connector dimension: 2.0*2.0*0.6mm (L*W*H, Ø1,5mm)