

User's Manual of WCF940M

1. Introduction

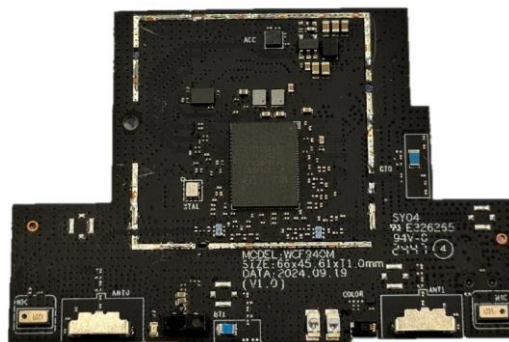
WCF940M is a Wi-Fi / Bluetooth Combo module compliant with IEEE802.11 a.b.g.n.ac.ax MAC/baseband/radio and Bluetooth 5.2 optimized for low-power applications.

The core chipset is from MediaTek part number MT7921AUN.

2. Product Photos

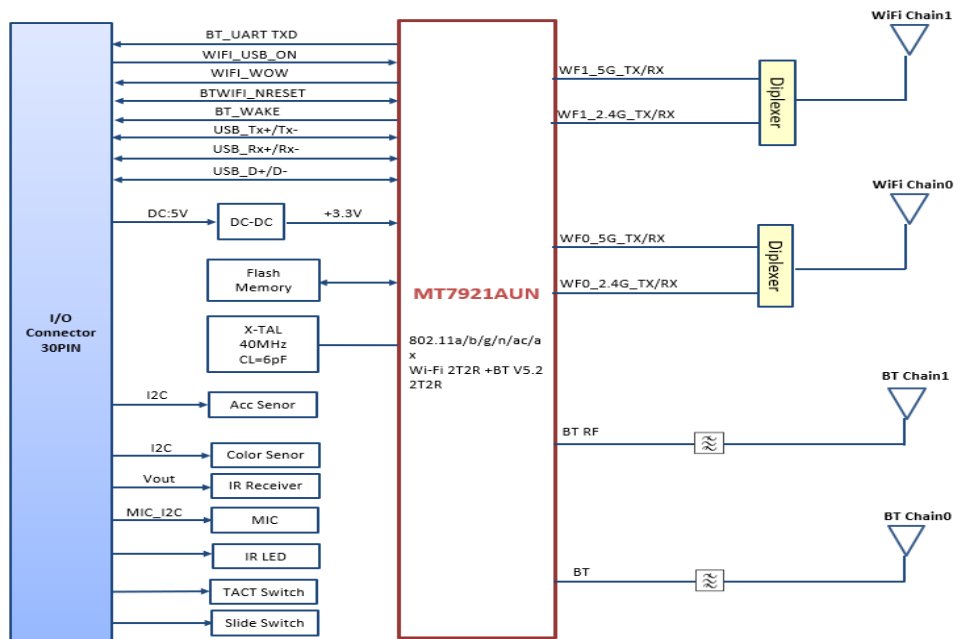


[TOP]



[BOTTOM]

3. Circuit Block Diagram



4. Recommended Operating Condition

Parameter	Min	Typ.	Max	Unit
Operating voltage	4.5	5	5.5	V
Operating temperature	-10	-	50	°C

5.Pin Definition

No.	Define	Description
1	IR_RX	IR Receiver
2	BT_UART_TXD	FW log output for debug
3	GND_3	Ground
4	WIFI_USB_ON	WiFi_USB_suspend
5	WIFI_WOW	WiFi wake host
6	BTWIFI_NRESET	WiFi reset
7	BT_WAKE	BT wakehost
8	GND	Ground
9	USB_Tx+	USB_Tx+
10	USB_Tx-	USB_Tx-
11	GND	Ground
12	USB_Rx-	USB_Rx-
13	USB_Rx+	USB_Rx+
14	GND	Ground
15	USB_D+	USB_D+
16	USB_D-	USB_D-
17	A5V_PW_WiFi_17	Supply voltage 5V
18	A5V_PW_WiFi_18	Supply voltage 5V
19	A5V_PW_WiFi_19	Supply voltage 5V
20	LED	Light emitting diode
21	I2C_SCL	I2C digital serial clock input
22	I2C_SDA	I2C digital serial data output
23	KEY1	Key
24	MIC_On/off	Power on/off for MIC
25	DMIC_CLK	MIC I2C digital serial clock input
26	DMIC_DATA	MIC I2C digital serial data output
27	MIC_GND	MIC Ground
28	IR_OUT1	IR LED1
29	IR_OUT2	IR LED2
30	A3.3V_PW_Sensor	Supply voltage 3.3V

Approval Statement

• FCC approval statement

RF Software restrictions

1. Contention-Based Protocol, as demonstrated in the FCC test report, is permanently embedded in the module and is not host-dependent and can't be changed by anyone.

2. Operation of transmitters in the 5.15-5.25GHz, 5.725-5.850GHz and 5.925-7.125GHz bands in this Modular device will only associate and connect with a low-power indoor access point and never directly connect to other client devices.

This feature is included in its firmware and can't be changed by anyone.

3. Operation of transmitters in the 5.25-5.35GHz, 5.47-5.725GHz and 5.925-7.125GHz bands in this Modular device will always initiate transmission under the control of a low-power indoor AP or subordinate except for brief transmissions before joining a network. These short messages will only occur if the client has detected an indoor AP or subordinate operating on a channel. These brief messages will have a time-out mechanism such that if it does not receive a response from an AP it will not continually repeat the request.

4. That transmissions will be lower or equal to the power advertised by the indoor low-power access point or subordinate and never above the maximum output power allowed by the FCC grant for equipment class 6XD.

This device complies with Part 15 of the FCC's Rules. Operation is subject to the following two Conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesirable operation.

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end-product.

Contains Transmitter module FCC ID: A3LWCF940M

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential

installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.
- The OEM integrator is responsible for ensuring the end-user has no manual instruction to remove or install module.
- The module is limited to installation in mobile or fixed applications.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

-RF exposure considerations

The module has been certified for integration into products only by OEM integrators under the following condition:

- The antenna(s) must be installed such that a minimum separation distance of at least 20cm is maintained between the radiator(antenna) and all persons at all times.
- The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

The device operates strictly as a client in DFS channels (with passive scan). It does not support ad-hoc, Wi-Fi Direct Group Owner, Hotspot, or any other peer-to-peer modes that may initiate a network in DFS channels (UNII2-2A and UNII2-2C band)

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01r01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01r01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance with CFR 47 FCC Part 15 B, CFR 47 FCC Part 15 C (15.247, DTS and DSS) and CFR 47 FCC Part 15 E (NII). It is applicable to the modular transmitter

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) will need a separate reassessment through a class II permissive change application or new certification.

Further operation restrictions on the host product include:

*Prohibited for control of or Communications with unmanned aircraft systems.

This radio transmitter FCC ID: A3LWCF940M has been approved by Federal Communications Commission to operate with the integrated Metal antenna and Chip antenna. Use of any other antenna is strictly prohibited without filing an application for a new system-specific FCC ID.

2.4 Limited module procedures Not applicable for FCC, required for ISED Canada

The module complies with FCC Part 15.247 / Part 15.407 and applies for Single module approval.

Under ISED Canada rules as the module is approved under RSS-248 Issue 3 it is a limited modular approval and a C4PC submission is required for each host model.

2.5 Trace antenna designs Not applicable.

The antenna is integrated into the module and cannot be modified. See section 2.3.

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. A separate SAR/Power Density evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

Note 1: Use of other antenna types or the same type of antenna with higher gain than listed above must perform additional testing and appropriate permissive change approval.

Note 2: Additional testing/submission (C2PC) will be required if the device does not meet the antenna and RF exposure requirements.

Note 3: Contact Samsung for additional guidance, if choose to use different antenna types or higher/lower gain antennas in the end system.

IMPORTANT: The final host product must have an integral antenna that is not removable by the end user.

Antenna Type & Antenna Gain:

BT&BLE:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)	MIM Antenna Gain (dBi)
0	2402-2480	Chip Antenna	-1.46	-3.89
1	2402-2480	Chip Antenna	0.22	-1.19

Note: The antennas are permanently attached and can't be replaced.

2.4G WIFI:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)	MIM Antenna Gain (dBi)
0	2412 ~ 2472	Metal Antenna	-1.87	-2.58
1	2412 ~ 2472	Metal Antenna	-2.07	-3.09

Note: The antennas are permanently attached and can't be replaced.

5G WIFI:

Frequency Band	Antenna 0 Gain Max (dBi)	Antenna 0 Gain Min (dBi)	Antenna 1 Gain Max (dBi)	Antenna 1 Gain Min (dBi)	Antenna Type
UNII 1	-0.88	-1.18	0.53	0.16	Metal Antenna
UNII 2A	-0.88	-1.3	0.53	0.35	
UNII 2C	0.42	-0.61	1.17	0.26	
UNII 3	0.32	-0.33	0.26	-1.19	

Note: The antennas are permanently attached and can't be replaced.

6G WIFI:

Frequency Band	Antenna 0 Gain Max (dBi)	Antenna 0 Gain Min (dBi)	Antenna 1 Gain Max (dBi)	Antenna 1 Gain Min (dBi)	Antenna Type
UNII 5	-0.32	-1.24	0.08	-0.72	Metal Antenna
UNII 6	-0.46	-0.59	-0.69	-0.96	
UNII 7	-0.14	-1.15	-0.78	-1.13	
UNII 8	-0.14	-1.32	-0.78	-1.68	

Note: The antennas are permanently attached and can't be replaced.

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: A3LWCF940M". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitters need class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance with this portion of rule requirements if applicable.

If all conditions above are met, further transmitter tests will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

2.11 Note EMI Considerations

The host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

Manual Information to the End User

The OEM integrator must be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module.

The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter

module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

This module cannot be installed in a weatherized enclosure and cannot operate from a battery but only power sources.

The host device must be connected to a power source as it has no battery.

- FCC regulations restrict the operation of this device to indoor use only.
- This device is prohibited from operating on oil platforms, cars, trains, boats, and aircraft, except it can be operated in the 5.925–6.425 GHz bands in large aircraft while flying above 10,000 feet.
- Transmitters in the 5.925-7.125 GHz band are prohibited from operating to control or communicate with unmanned aircraft systems.

The user manual complies with 996369 D04 Module Integration Guide v02.

This module cannot be installed in a weatherized enclosure and cannot operate from a battery but only power sources.

The host device must be connected to a power source as it has no battery.

IMPORTANT: The final host product must have an integral antenna that is not removable by the end user.

• Canada IC approval statement

IC approval

Under ISED Canada rules as the module is approved under RSS-248 Issue 3 it is a limited modular approval and every host device that uses the module needs to submit a C4PC before it is considered approved for use in Canada

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) L'appareil ne doit pas produire de brouillage;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Attention: Toute change ou modifications non expressément approuvées par la partie responsable de la conformité pourraient annuler l'autorité de faire fonctionner cet équipement.

Please notice that if the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 649E-WCF940M" any similar wording that expresses the same meaning may be used.

L'appareil hôte doit porter une étiquette donnant le numéro de certification du module d'Industrie Canada, précédé des mots (Contient un module d'émission, du mot IC: 649E- WCF940M) ou d'une formulation similaire exprimant le même sens, comme suit

The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

User should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Les utilisateurs doivent également être informés que les radars de haute puissance sont affectés aux bandes 5250 - 5350 MHz et 5650 - 5850 MHz en tant qu'utilisateurs principaux (c. - à - D. utilisateurs prioritaires) et que ces radars peuvent causer des interférences et / ou des dommages à l'équipement le - lan.

The device meets the exemption from the routine evaluation limits in section 6.6 of RSS 102 Issue 6 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 6.6 de RSS 102 Issue 6 et la conformité à l'exposition de RSS-102 RF, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de RF.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

IMPORTANT: The final host product must have an integral antenna that is not removable by the end user.

- Devices shall not be used for control of or communications with unmanned aircraft systems.
 - Devices shall not be used on oil platforms.
 - Devices shall not be used on aircraft, except for the low-power indoor access points, indoor subordinate devices, low-power client devices, and very low-power devices operating in the 5925-6425 MHz band, that may be used on large aircraft as defined in the [Canadian Aviation Regulations](#), while flying above 3,048 metres (10,000 feet).
 - Devices shall not be used on automobiles.
 - Devices shall not be used on trains.
 - Devices shall not be used on maritime vessels.
 - Operation shall be limited to indoor use only.
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- Les dispositifs ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.
 - Les dispositifs ne doivent pas être utilisés sur des plateformes pétrolières.
 - Les appareils ne doivent pas être utilisés sur les aéronefs, à l'exception des points d'accès intérieurs à faible puissance, des appareils intérieurs subordonnés, des appareils clients à faible puissance et des appareils à très faible puissance fonctionnant dans la bande 5925-6425 MHz, qui peuvent être utilisés sur les grands aéronefs tels que définis dans le Règlement de l'aviation canadien, au-dessus de 3 048 mètres (10 000 pieds).
 - l'appareil ne doit pas être utilisé dans la voiture.
 - l'équipement ne doit pas être utilisé à bord du train.
 - l'équipement ne doit pas être utilisé à bord des navires en mer.
 - Le fonctionnement doit être limité à une utilisation intérieure seulement.