

User Instruction of WCD940M

1. Introduction

WCD940M is a highly integrated single chip which features a low power 2x2 11a/b/g/n/ac/ax dual band Wi-Fi subsystem and a Bluetooth v5.2 subsystem, offering feature-rich wireless connectivity at high standards, and delivering reliable, cost-effective throughput from an extended distance.

The core chipset is from MediaTek part number MT7921AUN.

2. Hardware Architecture:

2.1 Main Chipset Information

Item	Vendor	Part Number
IEEE802.11 a.b.g.n.ac.ax mac/baseband/radio Bluetooth 5.2	MediaTek	MT7921AUN

3. Operational Description

WCD940M is the 802.11a/b/g/n/ac/ax +Bluetooth 5.2 Combo Module that acts as a communication controller for users of a wireless device to connect to SMART TV

3.1 Features

- Technology and package

11.5x8.7 DRQFN 109 pins package

3.2 Power management and clock source

- Integrate high efficiency power management unit with single 3.3V power supply input.
- Support 40MHz crystal clock with low power operation in idle mode
- Buffered clock output for co-clock with other SOC chipset

- Platform

- 32-bit RISC MCU for Wi-Fi/Bluetooth protocols and Wi-Fi offload
- Embedded SRAM/ROM
- UART interface with hardware flow control
- Programmable and multiplexed GPIO pins
- MT7921AUN - USB device fully compliant to USB v3.0 specification

3.2 Operational temperature

The Operational temperature range is -20 deg to 50 deg C

Approval Statement

FCC approval

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 5.25-5.35GHz, 5.47-5.725GHz, 5.85-5.895GHz, and 5.925-7.125GHz bands in this Modular device will only associate and connect with a low-power indoor access point or subordinate device and never directly connect to other client devices.

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

This device can support Ad-hoc and Wi-Fi Direct for 2.4GHz, UNII 1, and UNII 3 bands.

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)

3. Operation of transmitters in the 5.25-5.35GHz, 5.47-5.725GHz, 5.85-5.895GHz, 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: A3LWCD940M

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.

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. The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet.

Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

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

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

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

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance with 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 conditions. 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.

This module is authorized for Low Power Indoor Client applications only; final host product must be for indoor operations only.

Further operation restrictions on the host product include:

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

This radio transmitter FCC ID: A3LWCD940M has been approved by Federal Communications Commission to operate with the integrated PCB 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.

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

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

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module except for operations within the 5.925~7.125GHz band.

Only the integrated antenna has been certified for use with this module and the specifications for the antenna are given in the tables below. Use of any other antenna requires coordination through Samsung for additional guidance.

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)
0	2402-2480	PCB	1.15
1	2402-2480	PCB	1.33

2.4G WIFI:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
0	2412-2472	PCB antenna	0.85
1	2412-2472	PCB antenna	0.07

5G WIFI:

Frequency Band	Antenna 0 Gain (dBi)	Antenna 1 Gain (dBi)	Antenna Type
UNII1	1.82	1.28	PCB Antenna
UNII2A	2.54	1.41	
UNII2C	1.73	0.42	
UNII3	-0.7	-1.39	

6G WIFI:

Frequency Band	Antenna 0 Gain (dBi)	Antenna 1 Gain (dBi)	Antenna Type
UNII5~UNII8	-2.06(Minimum) 1.12(Maximum)	-0.84(Minimum) -0.37(Maximum)	PCB Antenna

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: “Contains FCC ID: A3LWCD940M”. 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.

Modules: extended to host manufacturers by integration instructions.

IMPORTANT NOTE

This device complies with FCC & IC radiation exposure limits set forth for an uncontrolled environment. This device should be installed and must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is intended only for OEM integrators under the following conditions:

- 1) This module may not be co-located with any other transmitters or antennas.
- 2) The antenna must be installed such that 20cm is maintained between the antenna and users.

If the 2 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 with this module installed. In the event that these conditions cannot be met, then the FCC & IC authorizations are 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 this module and obtaining separate FCC & IC authorizations.

Contact info for above certified FCC:

Company Name: Samsung Electronics America, Inc

Contact Name: JENNI CHUN

Address: 19 Chapin Rd, Building D. Pine Brook, NJ 07058

Telephone No: 973-808-6375

Email: j1.chun@samsung.com

IC approval

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.

Devices shall not be used for control of or communications with unmanned aircraft systems.

Low-power indoor access points and indoor subordinate devices shall bear statements acknowledging both of the following restrictions in the user manual and, where feasible, in a conspicuous location on the device:

Operation shall be limited to indoor use only.

Operation on oil platforms, automobiles, trains, maritime vessels and aircraft shall be prohibited except for on large aircraft flying above 3,048 m (10,000 ft).

L'équipement ne doit pas être utilisé pour le contrôle ou la communication des systèmes d'aéronefs sans pilote.

Les points d'accès intérieurs de faible puissance et les accessoires intérieurs doivent indiquer les restrictions suivantes dans le manuel de l'utilisateur et, si possible, à un endroit bien en vue de l'appareil:

Le fonctionnement doit être limité à un usage intérieur.

Il est interdit de travailler sur les plates-formes pétrolières, les voitures, les trains, les navires maritimes et les aéronefs, à l'exception des gros aéronefs de plus de 3 048 mètres (10 000 pieds).

User Information

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: Toutechangéou modifications non expressémentapprouvéspar la partieresponsable de la conformitépourraientannulerl'utilisateur `autorité de faire fonctionnercetéquipement.

Antenna Type & Antenna Gain:

BT&BLE:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
0	2402-2480	PCB	1.15
1	2402-2480	PCB	1.33

2.4G WIFI:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
0	2412-2472	PCB antenna	0.85
1	2412-2472	PCB antenna	0.07

5G WIFI:

Frequency Band	Antenna 0 Gain (dBi)	Antenna 1 Gain (dBi)	Antenna Type
UNII1	1.82	1.28	PCB Antenna
UNII2A	2.54	1.41	
UNII2C	1.73	0.42	
UNII3	-0.7	-1.39	

6G WIFI:

Frequency Band	Antenna 0 Gain (dBi)	Antenna 1 Gain (dBi)	Antenna Type
UNII5~UNII8	-2.06(Minimum) 1.12(Maximum)	-0.84(Minimum) -0.37(Maximum)	PCB Antenna

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-WCD940M" 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-WCD940M» 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 2.5 of RSS 102 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 2.5 de RSS 102 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.

CE/UKCA approval

This device is restricted to indoor use only within the 5.15 ~ 5.35GHz Band and 5.945~6.425GHz Band.

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.

Frequency Range and Maximum Output Power (EIRP)

2402 MHz to 2480 MHz: Below 13.5 dBm for Bluetooth

2412 MHz to 2472 MHz: Below 20 dBm for b,g,n,ax

5150MHz to 5240 MHz: Below 20 dBm for a,n,ac,ax



5260 MHz to 5320 MHz Below 19 dBm for a,n,ac,ax

5500 MHz to 5700 MHz: Below 20 dBm for a,n,ac,ax

5745MHz to 5825 MHz: Below 14 dBm for a,n,ac,ax

5955MHz to 6415 MHz: Below 19 dBm for a, ax

Restricted countries:

	AT	BE	BG	CH	CY	CZ	DK	DE	EE	EL	ES	FI
	FR	HR	HU	IE	IS	IT	LI	LT	LU	LV	MT	NL
	NO	PL	PT	RO	SE	SI	SK	TR	UK(NI)			
	UK											

Manufacturer Name: Samsung Electronics Co., Ltd.

Address: 129 SAMSUNG-RO SUWON-SI, GYEONGGI-DO 16677 Republic of Korea