



Operation Description of WCT750M

1. Introduction

WCT750M is a Wi-Fi / Bluetooth Combo module compliant with IEEE802.11 a/b/g/n/ac/ax, MAC/baseband/radio and Bluetooth 5.0 optimized for low-power applications. The core chipset is from MediaTek part number MT7668AUN and MT7915DUN..

2. Hardware Architecture:

2.1 Main Chipset Information

Item	Vendor	Part Number
IEEE802.11 a/b/g/n/ac/ax MAC/baseband/radio Bluetooth 5.0	MediaTek	MT7668AUN
IEEE802.11 a/b/g/n/ac/ax MAC/baseband/radio	MediaTek	MT7915DUN/MT7975N



3. Operational Description

WCT750 is the 802.11a/b/g/n/ac/ax +Bluetooth 5.0 Combo Module that acts as a communication controller for users of a wireless device to connect to SMART TV

3.1 Wi-Fi MAC Features

- Support all data rates of 802.11a/g including 6, 9, 12, 18, 24, 36, 48, and 54Mbps
- Support short GI and all data rates of 802.11n including MCS0 to MCS7
- Support 802.11ac MCS0 to MCS9
- Support 802.11ax MCS0 to MCS11
- AMPDU/AMSDU RX (de-aggregation) and TX (aggregation) support
- TX beamformer and RX beamformee
- TX rate adaptation
- TX power control
- Management/control frame filtering
- Low power beacon filtering
- Supports BT/Wi-Fi coexistence.
- Adaptive frequency hopping (AFH) for reducing radio frequency interference

3.2 Wi-Fi Baseband Features

Wi-Fi baseband supports the following features:

- 20/40/80 MHz channels
- HE MCS0-11 BW20/40/80MHz with Nss=1~2
- Short Guard Interval
- Space-time block code (STBC)
- Low Density parity check (LDPC)
- Support digital pre-distortion to enhance PA performance
- Smoothing extension to MIMO case
- Support CDD MIMO tech



3.3 Bluetooth Features

WCT750M Bluetooth supports the following features:

- BLE 2Mbps
- BLE Long Range
- BLE Advertising Extension
- BLE high duty cycle non-connectable ADV
- Compatible Bluetooth 4.2
- Data length extension
- LE security connection
- Single-ended, RF port with integrated Balun and T/R switch
- Integrated high efficiency PA and TSSI
- Baseband and radio BDR and EDR packet type: 1Mbps, 2Mbps, 3Mbps
- Fully functional Bluetooth baseband AFH, FEC, CRC
- Standard pairing, authentication, link key, and encryption operation
- Standard power saving mechanism: sniff mode and sniff subrating

- Interlaced scan for faster connection setup
- Up to 7 simultaneous active ACL connections with background inquiry and page scan
- Up to 16 BLE links
- Scatternet support
- Channel quality driven data rate control
- WB RSSI support. Monitor environment air condition to select good channel for AFH.

- Time base of the RF frequency

For IF and RF frequency, 40MHz crystal is a clock reference.

- Synthesizer

Synthesizer inside Transceiver. Internal voltage controlled oscillator (VCO) provides the desired LO signal based on the phase-locked loop (PLL) with a relatively wide tuning range for this application. Internal fractional nPLL allows support for a wide range of reference clock frequencies

- Wi-Fi Transmission

Baseband data is modulated and upconverted to the 2.4GHz ISM and 5-GHz U-NII bands, respectively. Linear on-chip power amplifiers are included, which are capable of delivering high output powers while meeting IEEE802.11ac/ax and IEEE802.a/b/g/n specifications without the need for external PAs. When using the internal PAs, closed-loop output power control is completely integrated. Base-band Processing (BBP) IC has DSSS (BPSK/QPSK/CCK) and OFDM (BPSK/QPSK/16QAM/64QAM/256QAM) modulation function, it provides transmission data rates of 1, 2, 5.5, 11Mbps on DSSS and 6, 12, 18, 24, 36, 48, 54 Mbps on OFDM. Digital data signals will be converted to analog (TX IQ) signals through DAC in BBP IC, TX IQ pass through to low pass filter. TX I/Q signals use direct conversion (zero-IF) architecture converter to generate carrier frequency signal. Transceiver IC and internal PA magnify output power.



- Wi-FiReceiver

The WCT750M has a wide dynamic range, direct conversion receiver that employs high-order on-chip channel filtering to ensure reliable operation in the noisy 2.4GHz ISM band or the entire 5GHz U-NII band. Control signals are available that can support the use of optional LNAs for each band, which can increase the receive sensitivity by several decibels. Reverse direction isolation of LNA inside Transceiver IC suppresses unwanted radiation. Then RF signal will be directly down to IF signal (RX IQ) and high frequency spurious emissions are suppressed by LPF. At last RX IQ signal will be demodulated digital data.

-Bluetooth Low Energy

The WCT750M supports the Bluetooth 4.2 LE and 5.0 BLE 2Mbps

- Link Control Layer

The link control layer is part of the Bluetooth link control functions that are implemented in dedicated logic in the link control unit (LCU).

Each task performs a different state in the Bluetooth Link Controller.

- Wideband speech

The WCT750M provides support for wideband speech (WBS) using on-chip SmartAudio technology.

The WCT750M can perform modified Sub Band Codec (mSBC) encoding and decoding of linear 16 bits at 16kHz (256kbps rate) transferred over USB interface.

- Adaptive Frequency Hopping

The WCT750M gathers link quality statistics on a channel by basis to facilitate channel assessment and Channel map selection. The link quality is determined using both RF and baseband signal processing to provide a more accurate frequency-hop map.

4. Product Details

-Data Modulation

DSSS: CCK, BPSK, QPSK for 802.11b

OFDM: BPSK, QPSK, 16QAM, 64QAM, 256QAM for 802.11a, g, n, ac

OFDMA: BPSK, QPSK, 16QAM, 64QAM, 256QAM/1024QAM for 802.11ax

FHSS: GFSK, OQPSK, 8DPSK, $\pi/4$ DPSK for Bluetooth

-Frequency Range

2400-2483.5MHz

5150-5350MHz

5470-5725MHz

5725-5825MHz

- IEEE 802.11nHT20

MCS Index	Modulation	R	$N_{BPSCS(i_{SS})}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI (see NOTE)
0	BPSK	1/2	1	52	4	52	26	6.5	7.2
1	QPSK	1/2	2	52	4	104	52	13.0	14.4
2	QPSK	3/4	2	52	4	104	78	19.5	21.7
3	16-QAM	1/2	4	52	4	208	104	26.0	28.9
4	16-QAM	3/4	4	52	4	208	156	39.0	43.3
5	64-QAM	2/3	6	52	4	312	208	52.0	57.8
6	64-QAM	3/4	6	52	4	312	234	58.5	65.0
7	64-QAM	5/6	6	52	4	312	260	65.0	72.2

- IEEE 802.11nHT40

MCS Index	Modulation	R	$N_{BPSCS(i_{SS})}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
8	BPSK	1/2	1	108	6	216	108	27.0	30.0
9	QPSK	1/2	2	108	6	432	216	54.0	60.0
10	QPSK	3/4	2	108	6	432	324	81.0	90.0
11	16-QAM	1/2	4	108	6	864	432	108.0	120.0
12	16-QAM	3/4	4	108	6	864	648	162.0	180.0
13	64-QAM	2/3	6	108	6	1296	864	216.0	240.0
14	64-QAM	3/4	6	108	6	1296	972	243.0	270.0
15	64-QAM	5/6	6	108	6	1296	1080	270.0	300.0

-IEEE 802.11ac

MCS	Modulation & Rate	20MHz 1x SS	20MHz 2x SS	40MHz 1x SS	40MHz 2x SS	80MHz 1x SS	80MHz 2x SS
0	BPSK 1/2	7.2	14.4	15.0	30.0	32.5	65.0
1	QPSK 1/2	14.4	28.9	30.0	60.0	65.0	130.0
2	QPSK 3/4	21.7	43.3	45.0	90.0	97.5	195.0
3	16-QAM 1/2	28.9	57.8	60.0	120.0	130.0	260.0
4	16-QAM 3/4	43.3	86.7	90.0	180.0	195.0	390.0
5	64-QAM 2/3	57.8	115.6	120.0	240.0	260.0	520.0
6	64-QAM 3/4	65.0	130.0	135.0	270.0	292.5	585.0
7	64 QAM 5/6	72.2	144.4	150.0	300.0	325.0	650.0
8	256 QAM 3/4	86.7	173.3	180.0	360.0	390.0	780.0
9	256-QAM 5/6	-	--	200.0	400.0	433.3	866.7

802.11ax channel puncturing is not implemented.

-Output Power tolerance

Output power - 2.5dBm/+0.4dBm



-Recommended Operating conditions

	Min	Typ.	Max	Unit
Operatingvoltage	4.5	5	5.5	V
Operatingtemperature(ambient)	-20	25	50	°C

-AS Information

Company Name:Samsung electronics CO.,LTD.

Fax:+82-10-2965-6788

Tel:+82-10-2965-6788

Add:129 Samsung-ro, Yeongtong-guSuwon-Si Gyeonggi-do 16677 Korea (Republic Of)

-Certification Information

1) Name(Model name): Wi-Fi/BT Transceiver

2) Certification ID: FCC ID: A3LWCT750M, IC: 649E-WCT750M

3) CompanyName: Samsung Electronics Co., Ltd.

4) Production date

5) Vendor:

-Antenna Information:

Chipset	Manufacture	Antenna Type	Antenna Part Number	Max Gain (Peak)	Min Gain (Peak)
MT7668AUN	INPAQ	Pattern	WA-P-LALBLB-12-001(WiFi 1)	2.4GHz: -3.06dBi 5GHz: 2.22dBi	DFS Band: -6.35dBi
			WA-P-LALBLB-12-001(WiFi 2)	2.4GHz: -9.74dBi 5GHz: 0.79dBi	DFS Band: -8.29dBi
			WA-P-LALBLB-12-001 (BT)	-3.57dBi	---

Chipset	Manufacture	Antenna Type	Antenna Part Number	Max Gain (Peak)	Min Gain (Peak)
MT7915DUN	INPAQ	Pattern	WA-P-LBLB-04-075 (WiFi 3)	2.4GHz: -2.86dBi 5GHz: -0.06dBi	DFS Band: -4.57dBi
			WA-P-LBLB-04-075(WiFi 4)	2.4GHz: -7.48dBi 5GHz: -3.44dBi	DFS Band: -8.03dBi



Figure 5-3 Pin Assignments

	Pin#	Pin Name	Description	Type
WiFi5	1	BT_WAKEUP	Wake up signal input	O
	2	UART_TX	UART Tx signal out	O
	3	SUSPEND	USB Suspend	I
	4	GND	Ground	G
	5	USB DP	WiFi5 USB Interface D+	I/O
	6	USB DM	WiFi5 USB Interface D-	I/O
	7	GND	Ground	G
	8	VCC	+5V DC power supply for DC-DC	V
	9	WIFI_WAKEUP	Wake up signal input	O
	10	Reset	Reset for Wi-Fi5	I
WiFi6	11	GND	Ground	G
	12	USB DP	WiFi6 USB Interface D+	I/O
	13	USB DM	WiFi6 USB Interface D-	I/O
	14	GND	Ground	GND
	15	VCC	+5V DC power supply for DC-DC	V
	16	Reset	Reset for Wi-Fi6	I



FCC Statement

Federal Communication Commission Interference Statement

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 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.

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 complies with Part 15 of the FCC 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 undesired operation.

Manufacturers integrating the Radio Module into other devices should note the following:

The device is compliant with part 15.247 and 15.407 of Title 47 of the FCC rules. If the Link Module is integrated into a new host product, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.



IC Statement

This Class B digital apparatus complies with Canadian ICES-003.

5150-5250MHz is limited to use indoor only

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux normes RSS exemptes de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas causer d'interférences et (2) cet appareil doit accepter toute interférence, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

-Label and Compliance Information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: A3LWCT750M", "contains IC: 649E-WCT750M". The grantee's FCC ID can be used only when all FCC/ IC compliance requirements are met.

-RF exposure

The module will install into mobile device such as TV.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

-Information on test modes and additional testing requirements

Output power check, EVM(Error Vector Magnitude) check, center frequency check, PER check, external inspection