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# **WEM-TK**

# **USER MANUAL**

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Model: TL8715AQ

# DISCLAIMER

ARK Intelligence provides this document "as is", without warranty of any kind. ARK Intelligence may make improvements and/or changes in this document or in the product described in this document at any times. This document could include technical inaccuracies or typographical errors.

# REVISION HISTORY

Revision	Date	Remark
Version 1.0a	2020/10/22	Initialed version
Version 1.1a	2021/01/04	Content optimized

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# PRODUCT OVERVIEW

ARK WEM-TK is the highly integrated camera main board for video / audio processing application;

It provides all-in-one system on module design for customers to quickly and easily generate their product production with saving most cost on time and R&D resource.

# PRODUCT FEATURES

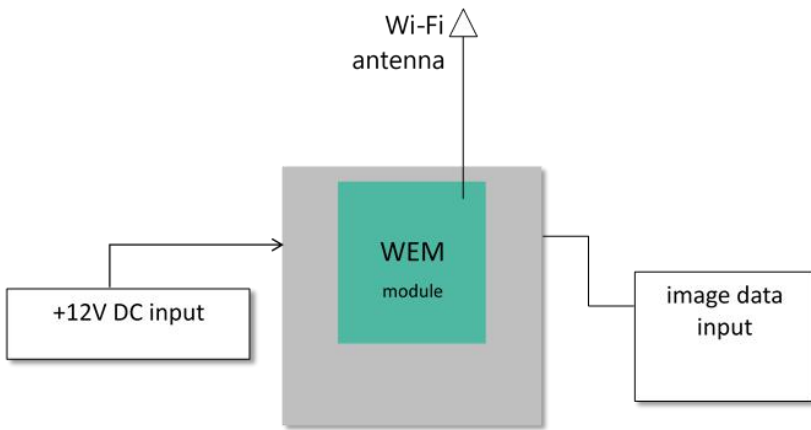
- WEM mini module based design
- Low power consumption, low heat temperature
- Integrate several main stream HD CIS for camera vision application
- Wi-Fi single-on-chip system platform, providing H.264 video compression, ISP image handling engine, audio codec and 802.11n Wi-Fi connectivity
- Maximum 1080p30 video capability
- RTOS (Real Time Operation System) ultra-fast system response, best solution for event driven system design
- Support high speed peripheral interface
- Well tested and calibrated before shipping

# PRODUCT DESCRIPTION

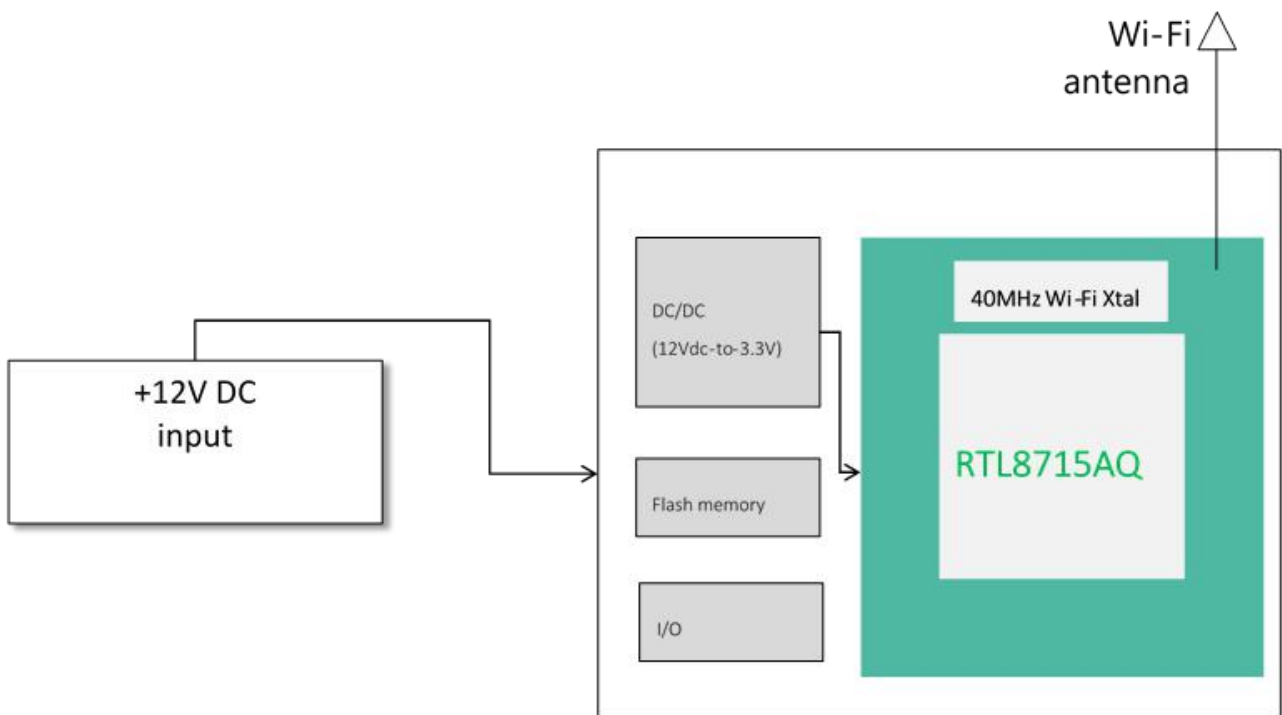
Diagram:

This system is mainly the main board carrying Wi-Fi module for data handling and transmit / receive via Wi-Fi connectivity

basic block diagram :



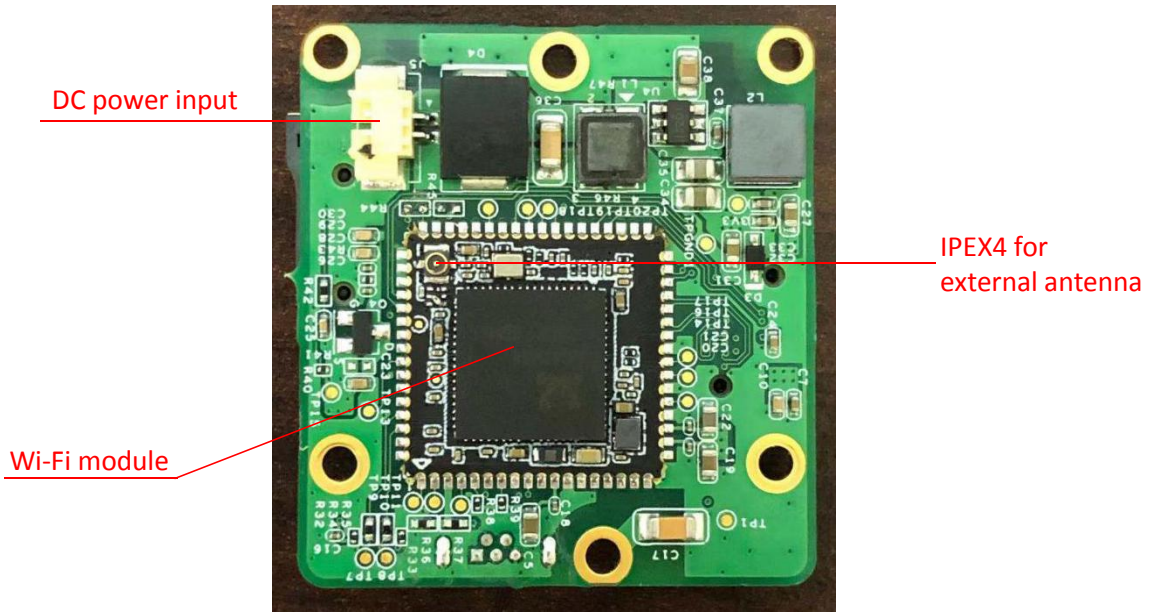
Circuit description:



System circuit consist

- Wi-Fi module, including RTL8715AQ SoC and 40MHz Wi-Fi Xtal performing main system features with 802.11n wireless connectivity
- The carrier board carries Wi-Fi module and own DC/DC conversion circuit to downgrade external +12Vdc to +3.3Vdc to supply Wi-Fi module

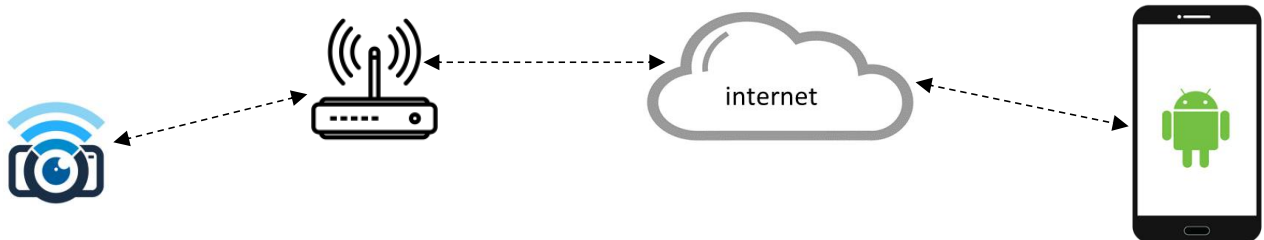
Wi-Fi RF path is directly driven from RTL8715 SoC and can connect standard Wi-Fi antenna



# INSTALLATION

- Power on system via external +12Vdc / 1A power source
- Long-press at least 5-sec to force system to enter RESET mode
- Using smartphone to search SSID "Vivo\_AP" to connect directly to complete system pairing
- Configure related parameters as desired
- Wi-Fi setting need to select target SSID (2.4GHz only) with correct WPA/WPA2 password for connection, system will automatically reboot when complete Wi-Fi setting
- Insert microSD card if needed (256GB capacity card support)

System diagram:



# SPECIFICATION

ITEM	SPEC. DESCRIPTION
Main Board	
Main Chip	Realtek RTL8715AQ
Kernel design	WEM-3 mini module (RTL8715 based 2.4GHz single band)
Wi-Fi RF XTal	40MHz crystal
Antenna	+2dBi omnidirectional antenna
Video compression	H264
Max. resolution/fps	HD1080p30
Multiple streaming	Support simultaneous dual streaming
Image compression	JPEG
Audio compression	AAC
2-way Audio / AEC	Supported / Built-in

Wireless connectivity	Built-in 802.11n 2.4GHz Wi-Fi
Night vision	Built-in IR LED for night vision illumination Built-in ICR auto-switching Day and Night modes
Event trigger	DingDong / Demolition / PIR Motion // BATTERY LOW
Event action	Melody / Siren / FFF / Push notification / Local recording
Edge recording	microSD slot (max. 256GB)
<b>CIS Board</b>	
CIS	SOI F37 1080p CMOS Image Sensor (optional)
Lens	MegaPixel f1.75mm / F2.0
Optical F.O.V.	D/H/V: 200° / 197.6° / 97.4°
ICR	Built-in IR Cut Removal
<b>I/O Board</b>	
Input / Output	microUSB: battery charging (+5Vdc) RESET button Power SW
<b>DingDong Board</b>	
Button	DingDong button
Indicator	LED sets indicator

List of applicable FCC rules: FCC Part15 Subpart C, Section 15.247

Information on test modes and additional testing requirements

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

**RADIATED EMISSION TEST (BELOW 1GHz):**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Test Channel	Modulation Tech.	Modulation Type	Data Rate (Mbps)
802.11n HT40	3 to 9	3, 6, 9	OFDM	BPSK	13.5

For the test results, only the worst case was shown in test report.

**RADIATED EMISSION TEST (ABOVE 1GHz):**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).



Additional testing Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional - radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

This is a copy of the page where the FCC statement is included:

## Regulatory Information

### Notice for the USA: FCC statement

Federal Communication Commission Statement (FCC, U.S.)

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.

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.

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.

#### IMPORTANT NOTES

FCC Radiation Exposure Statement:

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.

Co-location warning:

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Limited Channels fixed for use in the US:

IEEE 802.11b or 802.11g or 802.11n(HT20) operation of this product in the U.S. is firmware-limited to Channel 1 through 11. IEEE 802.11n(HT40)operation of this product in the U.S. is firmware-limited to Channel 3 through 9.

OEM integration instructions:

This device is intended only for OEM integrators under the following conditions: The antenna must be installed such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as 3 conditions above are met, further transmitter test 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 (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains Transmitter Module FCC ID:2AYHW-TL8715AQ".

Information that must be placed in the end user manual:

The OEM integrator has to 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.

# FCC RULES

The WEM-TK module is applicable to the FCC rules as following:

1. Basic RF characters
  - Working frequency
    - WEM3 series (2.4GHz single band):  
2.4GHz : 2.412 ~ 2.462 GHz
  - Wi-Fi standard
    - WEM3 series: IEEE 802.11b/g/n
  - Data transmission rate
    - 11b: 1, 2, 5.5, 11 Mbps
    - 11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
    - 11n HT20\_MCS7: 65 Mbps
    - 11n HT40\_MCS7: 135 Mbps
  - Antenna type
    - Onboard IPEX-4 connector for external antenna

2. Wi-Fi TX output power

MODULATION	typical PWR	UNIT
2.4GHz CCK 11M	17	dBm
2.4GHz OFDM 54M	15	dBm
2.4GHz MCS7-HT20	14	dBm
2.4GHz MCS7-HT40	14	dBm

3. Wi-Fi RX sensitivity

MODULATION	max SENSITIVITY	UNIT
2.4GHz CCK 1M	-91	dBm
2.4GHz OFDM 6M	-87	dBm
2.4GHz MCS7-HT20	-67	dBm

# LIMITED MODULE PROCEDURES

The WEM-TK module is "limited module", which is used with the installation requirement as described as above. Any other alternative method on using WEM-TK should get approval with

reviews of detailed test data or host designs, especially RF exposure evaluation part.

## RF EXPOSURE CONSIDERATIONS

### FCC Radio Frequency Exposure

WARNING: The WEMTK device radiates radio frequency energy at a level below the United States FCC radio frequency exposure limits. Nevertheless, this device should be used in such a manner that the potential for human contact during normal operation is minimized. For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions the handset a minimum of 20 cm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines. Details of the authorized configurations can be found at FCC website by entering the FCC ID number on the device. This Mobile device has been evaluated for and shown compliant with the FCC RF Exposure limits.

### FCC Compliance Statement

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the 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 of the device.

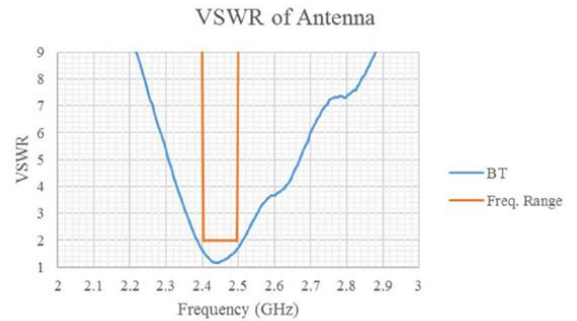
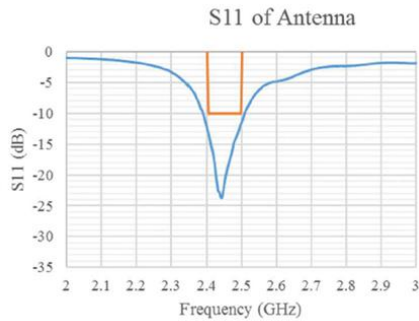
FCC Grant of Equipment Authorizations of this device and transmitters installed in this device can be found at FCC website by entering the FCC ID number on the device.

## ANTENNAS

Antenna spec.

- Condition: free space
- Antenna type: PIFA
- Frequency range: 2.4GHz
- Return lose: <-10dB

- Efficiency: >50%
- Polarization: linear
- Input impedance: 50 ohm
- Antenna size: 30.6 x 11.2 x 0.6 mm / cable length 90mm / cable type diameter 0.81
- Return loss S11(dB) / VSWR



V4.0		
Frequency (MHz)	S11	VSWR
2400	-12.6	1.6
2450	-21.6	1.2
2500	-11.3	1.7



V1.0			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Peak Gain (dBi)
2400 MHz	-2.55	55.65	3.08
2450 MHz	-1.97	63.57	3.69
2500 MHz	-2.41	57.45	2.90

### Trace antenna designs

- Condition: free space
- Antenna type: PIFA
- Frequency range: 2.4GHz
- Return lose: <-10dB
- Efficiency: >50%
- Polarization: linear
- Input impedance: 50 ohm
- Antenna size: 30.6 x 11.2 x 0.6 mm / cable length 90mm / cable type diameter 0.81
- Return loss S11(dB) / VSWR

# LABEL AND COMPLIANCE INFORMATION

We promise to continue compliance of WEM-TK module to the FCC rules; we keep to advise our clients' host product with a physical or e-label stating "Contain FCC ID" on their finished products.

## INFORMATION ON TEST MODES AND ADDITIONAL TESTING REQUIREMENTS

The user of WEM-TK module needs to follow installation and design guide; there is no extra information to users on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

## FCC PART 15 SUBPART B DISCLAIMER

### FCC Information to Users

This equipment has been tested and found to comply with the limits for a Class B digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in user's installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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.

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