Circuit Description

The equipment under test (EUT) is Embedded computing platform. Software version is V1.4, Hardware version is V10.

1. Key component function

In board:

1. Chip U7: RK3399 Dual-core Cortex-A72 up to 1.8GHz， Quad-core Cortex-A53 up to 1.4GHz with Mali-T860 GPU。
2. Chip U5:Power Management IC for U7.
3. Chip U8 U9 U10 U11:DRAM for U7.
4. Chip U4:eMMC for U7,Used to store code and data.
5. Crystal Y2:Support clock source for U7.
6. Crystal Y1:Support clock source for U5.
7. Modem M1: LTE module EP06ALA-512-SGAD is machine-to-machine (M2M) module witch is a highly integrated transceiver incorporating both baseband and RF transceiver to enable LTE smart application.
8. Chip U52:AP6356S is a Wi-Fi and Bluetooth module.The wireless module complies with IEEE 802.11 a/b/g/n/ac 2x2 MIMO standard and it can achieve up to a speed of 867Mbps with dual stream in 802.11ac to connect the wireless LAN.
9. Chip U41:Switch chip RTL8363NB-VB-CG.
10. Chip U20:USB HUB chip USB2514Bi-AEZG.

2. Operation

LTE:

The LTE module communicates with the CPU(RK3399) with USB.

In Tx procedure, CPU output data to LTE module M1(EP06ALA-512-SGAD), module EP06ALA-512-SGAD will modulate and send it to antenna.

In Rx procedure, modulate EP06ALA-512-SGAD receive the signal from antenna, then the data will be demodulated and transferred to CPU.

By the switching circuit, the device can support two SIM cards.

Wi-Fi：

The AP6356S(U52) communicates with the CPU(RK3399) through the SDIO.

In radio Tx procedure, chip U52 will directly output power of the RF signal via an antenna sent to the space.

In radio Rx procedure, the antenna will be sensitive to electromagnetic signals in the space ,sent to the chip U52 for processing, demodulation.

Wi-Fi interface can be used as a STA to connect to an AP, or as an AP to establish a wireless LAN for local STAs[smart phones or laptops with WIFI support] to connect.

At the same time, Wi-Fi interface can be bridged with Ethernet interface to extend LAN coverage: the device will relay Layer 2 packets between wired LAN[Ethernet interface] and wireless LAN[WIFI interface] to form an extended LAN. [quite the same as a home-router] packets sent or received via WIFI interface are encoded as

802.11 frames, and they will be transferred on certain frequency channel at related rate with MAC method CSMA/CA.

WAN/LAN:

The network function of the two network ports is realized by RTL8363NB-VB-CG chip of the switch.This is a three port switch chip.

The chip and CPU are connected through the RGMII interface.

USB HUB chip:

The device extends the USB port with a USB HUB chip USB2514Bi-AEZG.It offers up to four USB2.0 ports,We used two of them.

1. Product name: Edge Computer
2. Model name: ICG-200-NA
3. Input power rated: 12V/2A
4. Frequency band: 2.412-2.462GHz
5. Carrier frequency: 2.4GHz
6. Number of channel: 11
7. Channel bandwidth: 20MHz
8. Modulation type: OFDM/BPSK/QPSK/CCK/DQPSK/DBPSK
9. Bit rate of transmission: 300Mbps
10. Antenna type: WIFI/BT: Suction cup Antenna RP-SMA-K

    LTE: Suction cup Antenna SMA-K
11. Antenna gain: LTE: 0dBi

    WIFI/BT: 3.0dBi

Bluetooth & BLE

Modulation Technology	FHSS
Modulation Type	GFSK, 8DPSK, π/4 DQPSK
Operating Frequency	2402MHz~2480MHz
Number Of Channel	79

Modulation Technology	BLE
Modulation Type	GFSK
Operating Frequency	2402MHz~2480MHz
Number Of Channel	40

Support Function: WLAN MIMO

Antenna Manufactor: ShenZhen GuYou Technology Co.,Ltd. LTE/WCDMA Antenna Model Name: GY-XPL-BDL2-AJG30

WIFI /BT Antenna Model Name:GY-XPF-BCL2.5-GJG22