

# General Technical Description

**Model: ZTE 7540N**

**Date: 2022-01-27**

**Band:**

**GSM/CDMA/WCDMA/LTE/SUB6G/**

**WLAN**



More detailed Frequency information as following:

A、UMTS Band: B1/B8

GSM Band: B3/B8

B、Max. transmitter power:

UMTS 2100/900: Power Class 3 (+24dBm +1/-3dBm)

LTE: B1/B3/B7/B8/B20/B28/B38:+23dBm(Power Class 3)

C、WCDMA

WCDMA PS: UL 384kbps/DL 384kbps;

D、HSDPA/HSUPA/HSPA+

HSDPA: DL14.4Mb/s; HSUPA: UL 5.76Mb/s; HSPA+: DL21Mb/s; DC-HSPA+: DL 42Mb/s;

E、LTE: DL 1600Mb/s UL 200Mb/s

F、SUB6: n1/n3/n28/n78

### 3. Baseband

Baseband architecture is based on highly integrated solution and

comprise mainly 7 chips: MT6190M、RR88643-81、

RR98077-11、RR98028-21、MXD83K5A、HFQRXRKJB-512、RR88920-21.

Detailed function description of chips.

### **MT6190M:**

MT6190M is a multi-mode multi-band highly integrated transceiver in 12 nm FinFET CMOS.

### **Key Features:**

- Full multi-mode RF solution

(GGE/C2K/WCDMA/TD-SCDMA/LTE/NR SA/NR NSA)

Multi-band NR sub6G/LTE/WCDMA/TD-SCDMA/C2K/GGE

256 QAM UL/256 QAM DL (HSPA+/LTE)

C2K/2G/3G/4G/5G co-banding

Supports RxD

- Direct conversion transmitter (NR/LTE/3G/8-PSK) and DFM for 2G GMSK

Dedicated power detection circuits for power control over specific power range

2LB+2MHB+1MHB/CB TX0 output port

1LB+1MHB+2CB TX1\_MIMO0 output port

1MHB+2CB TX1\_MIMO1 output port

- Hybrid

direct-conversion(5G/4G/3G/C2K)/low-IF(GGE,DC-HS DPA)receiver

26 RX input ports

Digital output interface

- External LNA at RxP and RxD are required
- Supports 2G DRx and 3G/4G/5G TDD SAWless RX
- Low supply current and operation directly from DC-DC converters
- Supports RF calibration features for key RX and TX specifications (image rejection, LO feed-through, IIP2, DC offset, RC corner
- Temperature measurement sub-system
- LTE carrier aggregation
  - Supports 2UL+3DL inter-band CA
  - MAX.CCA BW up to 100MHz
- Supports RX 2\*2 MIMO for LB, 4\*4 for MHB/CB
- Supports TX 2\*2 MIMO for MHB/CB
- NR carrier aggregation
  - Supports 2UL+2DL inter-band CA
  - Max.CCA BW up to 200 MHz
- LTE+NR dual connectivity supports 2UL+3DL inter-band ENDC
- Supports NSA/SA+LTE DR-DSDS
- Supports Power Class 2 high-power UE (HPUE) in HB/CB

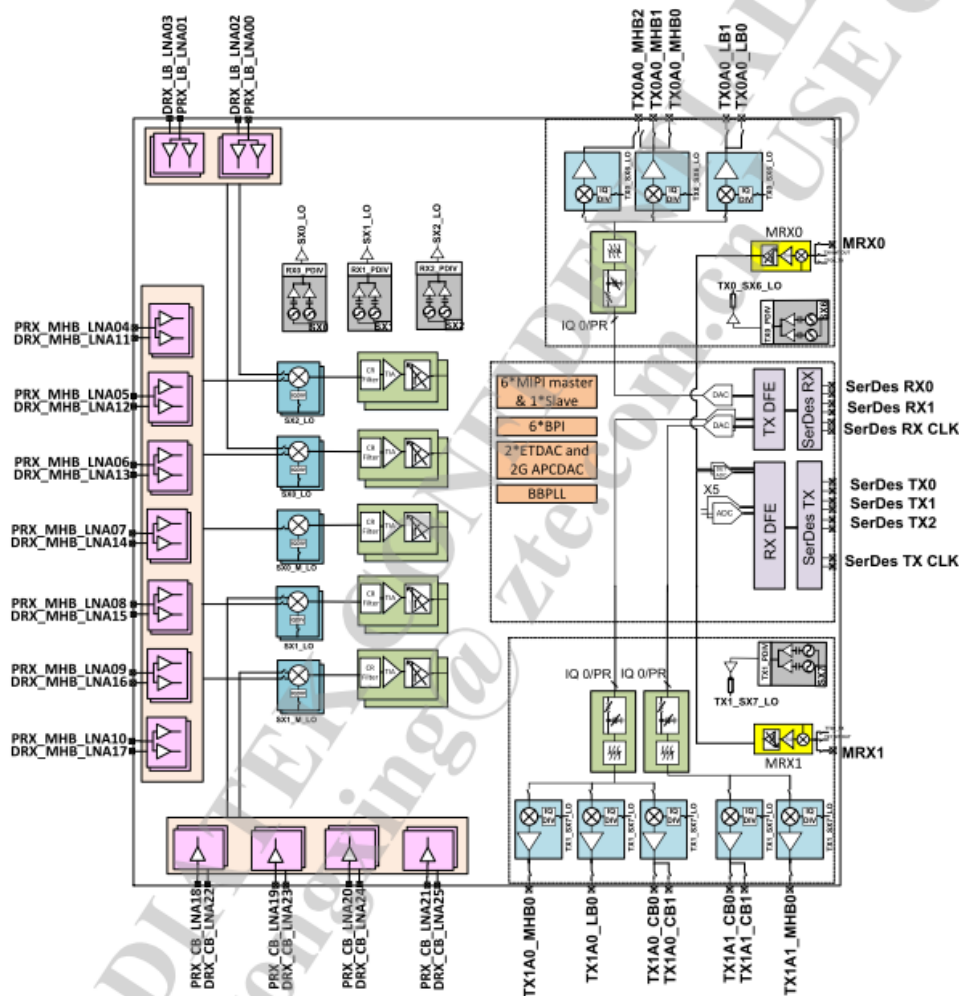


Fig. 2 MT6190M functional block diagram and example application

### RR88643-81:

RadRock RR88643-81 is a multimode multiband (MMMB) Power Amplifier Module (PAM) that supports 3G/4G/5G\_N41 handsets and operates efficiently in CDMA, WCDMA, TD-SCDMA, and LTE modes. The module is fully programmable through a Mobile Industry Processor Interface (MIPI®). The PAM consists of a WCDMA / LTE block for low, mid, and high bands, a Multi-Function Control

(MFC) block, and RF input/output ports internally matched to 50  $\Omega$  (reduces the number of external components). A CMOS integrated circuit provides the internal MFC interface and operation using standard MIPI controls. Varying the input power level provides output power control. VCC is adjusted using a DCDC converter to maximize efficiency for each power level and modulation type.

**Key features:**

- LTE Power Class 2 High Power User Equipment (HPUE)
- 5G N1/N3 Power Class 3 up to 30MHz Bandwidth with max 3.8V Vcc
- Two T/R (RX) ports and 14 outputs
- Industry-leading PAE for 3G/4G
- Dual Low Band RF inputs, supporting separate transceiver outputs
- Optimized for APT DCDC operation
- Support MIPI RFFE
- Compact Low Profile Package Dimension
  - 4.0 x 6.8 x 0.75 mm
  - 42-pad configuration

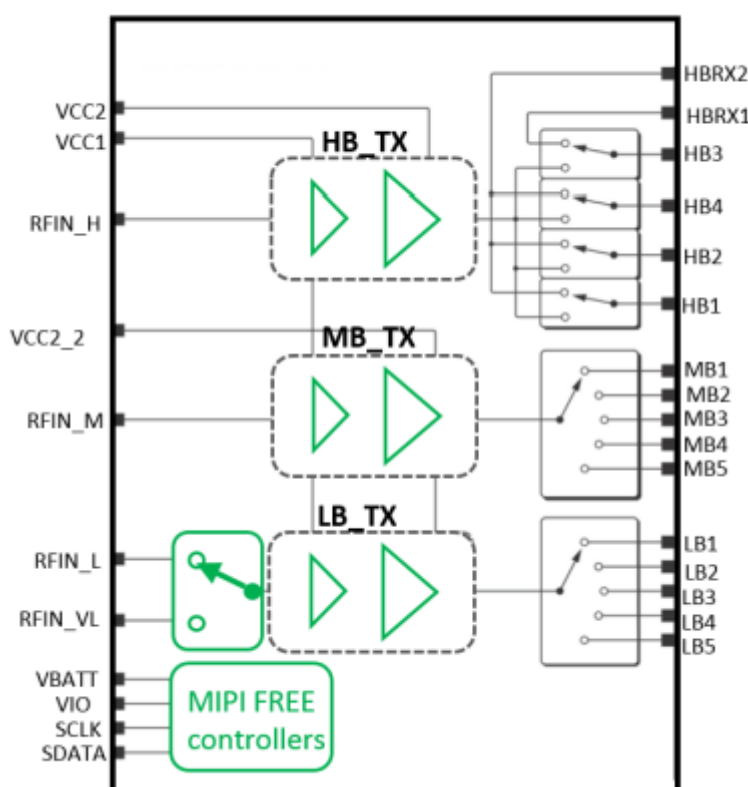


Fig. 3 RR88643-81 functional block diagram

### RR98077-11:

RadRock RR98077-11 is a highly integrated Sub-6GHz LPAMiD compliant to 5G-NR standards focused on Best-in-class 5G performance targeting advanced RF, including flagship/premium smartphones and data devices. The module consists of a N77 PA, N77 LNA, Filter, directional coupler and TRx Switch for TDD operation. The RR98077-11 supports Average Power Tracking (APT) Power Class 2 power targets at 3.4 Vcc.

### Key features:



- Fully Baseband Agnostic Design
- UHB S-PAD covering B42, B43, B48, n77, n78
- MIPI® v2.1 compliant 52 MHz RFFE bus
- Two LNA cores
- Support n77 receiving simultaneous in dual Rx path
- Support Fast SRS Hopping timing requirements
- ASM switch with two selectable ANT ports and 3 AUX ports for seamless SRS Hopping support
- Switchable LAA input
- Forward and Reverse Coupler
- Full Power APT support without DPD
  - LTE Power Class 2 High Power User Equipment (HPUE)
  - Optimized for APT DCDC operation, ET compatible with VCC Capacitor Switch
- MIPI v2.1 compliant 52 MHz RFFE bus
- Support DFT-S-OFDM/CP-OFDM waveform up to 100 MHz
- Support 2X2 UL-MIMO using two TX placements
- Support Fast SRS Hopping timing requirements
- Small, low profile package
  - 4.5 mm x 5.5 mm x 0.75 mm (Max.)
  - 42-pad configuration

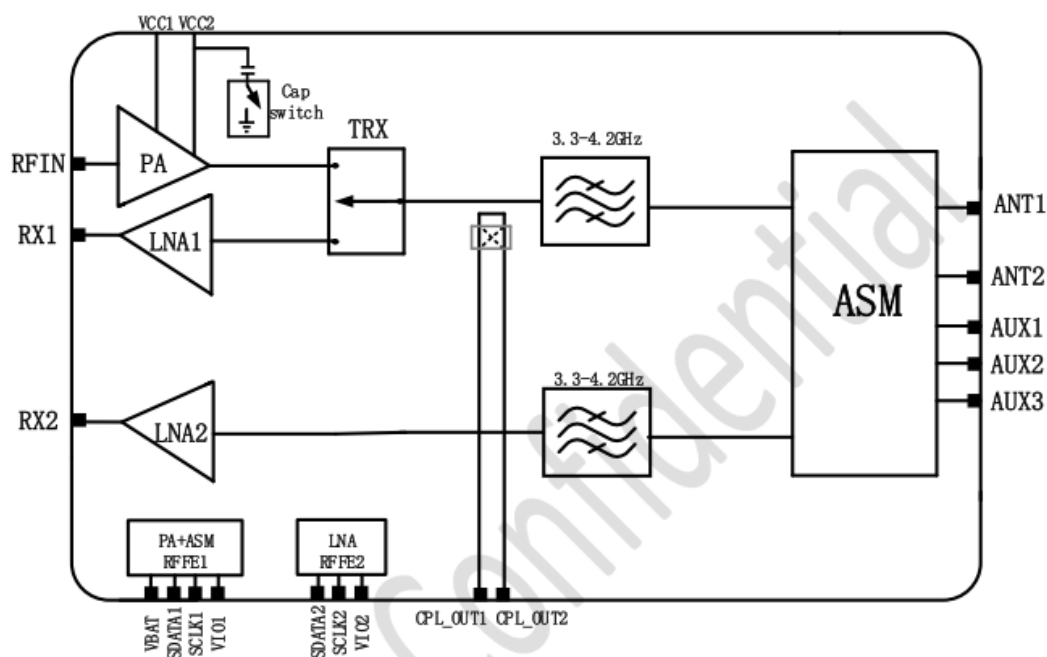


Fig. 4 RR98077-11 functional block diagram

## RR98028-21

The RR98028-21 is a highly integrated LNA filter module that enables users to support new 5G New Radio (NR) bands in the 3.3 to 4.2 GHz frequency range. It utilizes the latest advanced SOI process technologies to achieve leading high-bandwidth, low noise figure (NF) LNA performance in a small package footprint. It also integrates all the required filtering to attenuate unwanted out-of-band blockers in adjacent and far-out frequency bands while maintaining very low insertion loss (IL) performance in the pass-band frequencies.

The RR98028-21 is packaged in a small 2.8mm x 2.6mm x 0.85mm (max), 21-lead surface-mount package. No external DC blocking capacitors are required on the RF paths. The part can operate over the temperature range of -30 ° C to +85 ° C

**Key features:**

- Low insertion loss.
- High-performance variable gain LNAs.
- Integrated MIPI v3.0 interface.
- Small (2.8mm x 2.6mm x 0.8 mm) 21-lead MCM package.

(MSL3, 260 ° C per JEDEC J-STD-020)

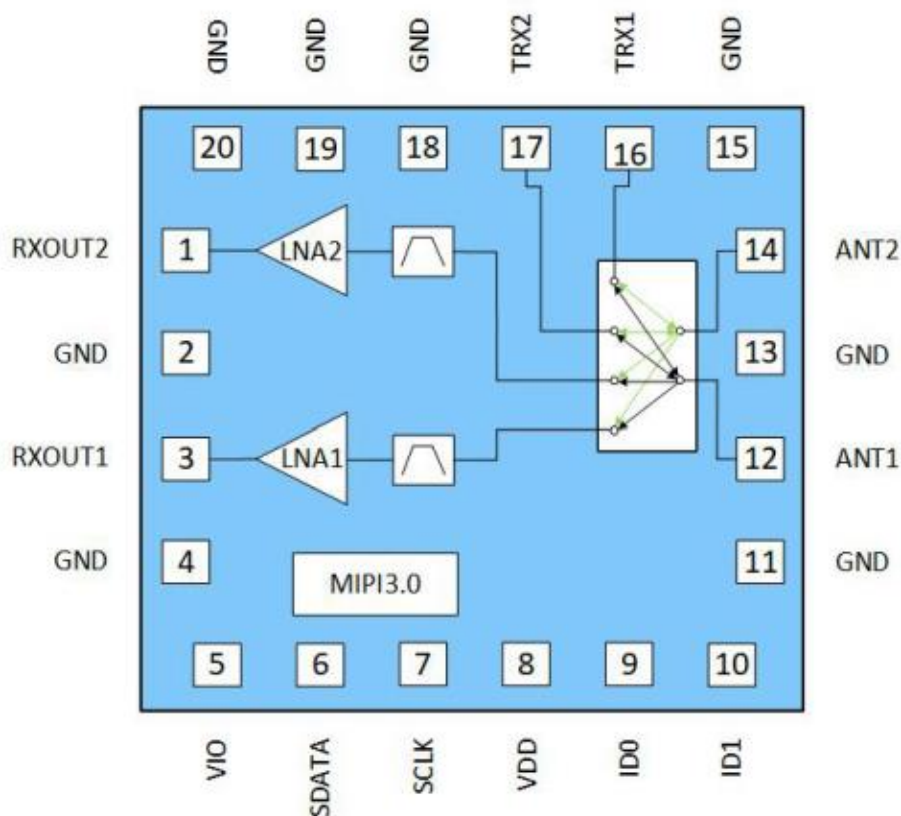


Fig. 5 RR98028-21 functional block diagram

### **MXD83K5A**

The MXD83K5A integrates five groups of switch and LNA combinations which can be utilized in multi-mode RF front-end modules for wireless applications.

The MXD83K5A is compatible with MIPI RFFE V3.0 control interface, which is a key requirement for many RFFE modules. This MXD83K5A is provided in a compact LGA 2.9mm x 2.9mm package.

## Features

Broadband frequency range:

- Low band(LB) supported from 600 to 960MHz
- Middle Band(MB) supported from 1800 to 2200MHz  
Middle High Band(MHB) supported from 1800 to 2700MHz
- High Band(HB) supported from 2300 to 2700MHz
- 5 LNA output groups with path selections and MHB output mux
- 1 LB group
- 2 MB groups
- 1 MHB group
- 1 HB group
- Designed for CA operation and LNA paths co-existence.
- MIPI RFFE V3.0 compatible
- Compact, LGA (49-pin, 2.9mm x 2.9mm) package, MSL3

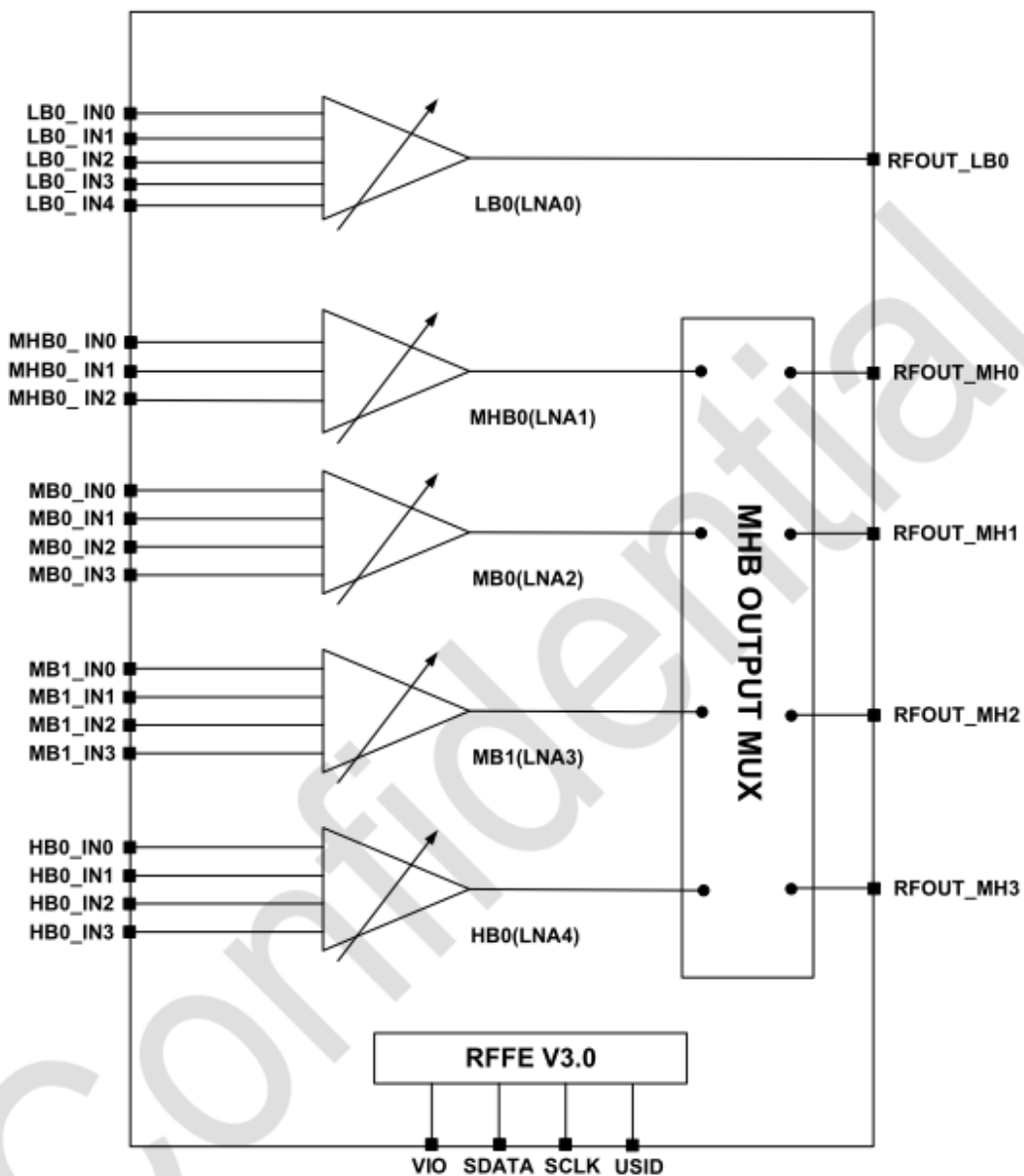


Fig. 6 MXD83K5A functional block diagram

## HFQRXRKJB-512

Low/Middle/High Band Front End Module (3.6x3.5mm)

SP8T+SP5TwithBand1(66),2(25),3,5(26),7,8,34,39,40,41(38) DRx SAW, MHB-TRX x 1, LB-TRX x 3 HB-AUX x 2,

MB-AUX x 1, MHB-AUX x 1, LB-AUX x 3

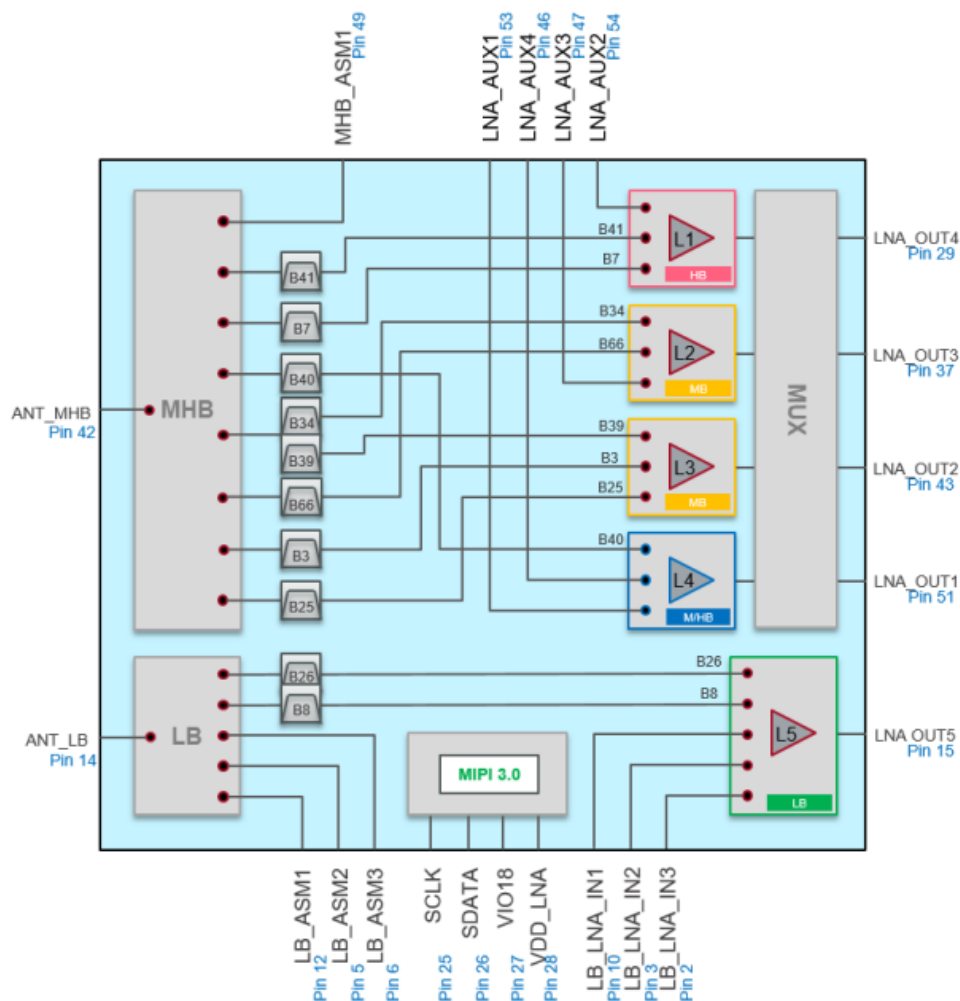


Fig. 7 HFQRXRKJB-512 functional block diagram

## RR88920-21

RR88920-21 is a Quad-band GSM/GPRS/EDGE, dual band TDD LTE B34/39 with 6 TRX ports of LB (617MHz ~ 960MHz) and 9 TRX ports of MHB (1400MHz~ 2690MHz). RR88920-21 integrates two high efficiency PA blocks, two antennas switch with high linearity/low insertion. In

addition, the built-in low pass filter to reject high order harmonics and eliminates the requirement of external low pass filter network. RR88920-21 is designed for support downlink inter-band Carrier Aggregation (CA) application, there are two independent switch block LB and MHB with direction coupler. Each switch block LB/MHB has its owned antenna port that provide simultaneous operation for downlink CA application.

RR88920-21 TX block supports both linear mode and Vramp-based mode (saturated mode) operation. User can configure through MIPI bus.

## Features

- Small, low profile package
  - 5.5 mm x 5.5 mm x 0.88 mm (Max)
  - 44-pad configuration
- MIPI® RFFE control with dual-standard support
  - User-selectable register mappings
  - Linear or VRAMP-based GMSK power control
- RF ports internally matched to 50  $\Omega$  w/ zero DC



offset.

- High GMSK Output Power
  - 34.0 dBm GSM850/GSM900
  - 31.0 dBm DCS1800/PCS1900
- Support 2xDLCA with TRX switch Multi-on Functional.
- 15 low loss / high linearity / high isolation TRx switch ports.
- RF input switching to external 3G/4G path.
- Integrated broadband directional coupler.
- Dual antenna downlink inter-band CA support with dedicated LB and M/HB antenna ports.
- Single antenna downlink inter-band CA support with external diplexer.
- Built-in IEC-compliant antenna ESD protection.
- High impedance control inputs and low standby current.

- Current limiting and overvoltage protection for ruggedness and extended battery life.

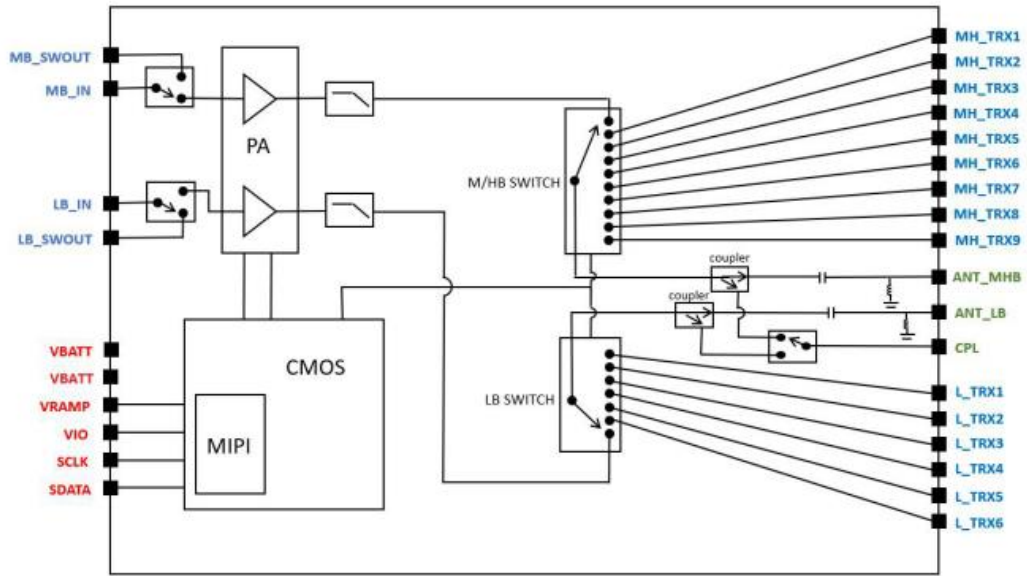


Fig. 8 RR88920-21 functional block diagram

## 4. WI-FI Operational Description

- **General**
  - MT6631 is a 4-in-1 connectivity RF chip which contains front-ends of a 2.4GHz Wi-Fi and Bluetooth transceiver, a 5GHz Wi-Fi transceiver, a GPS receiver and an FM receiver.
  - MT6631 supports integrated passive device to save footprint on PCB and cost due to Wi-Fi/Bluetooth/GPS external BoM (bill of materials) in a 40-pin QFN package.
- **Wi-Fi / BT**
  - Simultaneous operation (FDD) of WiFi-5GHz and Bluetooth.
- **Wi-Fi**
  - Dual-band (2.4GHz and 5GHz) single stream 802.11 a/ b/g/n/ac RF, 20/40/80MHz bandwidth
  - Supports worldwide Wi-Fi 5G channel including new band in US and China (5925MHz), and Bluetooth FDD operation
  - Integrated 2.4GHz PA with max. 20dBm CCK output power, 5GHz PA OFDM 54Mbps output power 17dBm and VHT80 MCS9 output power 15dBm.
  - Typical Rx sensitivity with companion chip modem: -76.5dBm at both 11g 54Mbps mode and 11a 54Mbps mode, -62dBm at 11ac VHT80 MCS9 mode
  - Integrated power detector to support per packet Tx power control
  - Supports external PA and LNA for WiFi-2.4GHz and WiFi-5GHz.
- **Bluetooth**
  - Bluetooth specification v2.1+EDR, 3.0+HS and v4.1+HS compliant
  - Integrated PA with 8dBm (class 1) transmit power
  - Typical Rx sensitivity with companion chip modem: GFSK -94dBm, DQPSK -93dBm, 8-DPSK -87.5dBm
- **ANT**
  - The wireless protocol standard for sport and fitness monitors
  - Supports different profiles for various applications: sport & fitness, health & wellness, recreational activity, transportation, and information management, etc.
- **FM**
  - 65 -108MHz with 50kHz step
  - Supports RDS/RBDS
  - Digital stereo modulator/demodulator
  - Digital audio interface
- **GPS**
  - RF supports GPS, Galileo, GLONASS, and Beidou.
  - Simultaneous reception of GPS + Galileo + GLONASS + Beidou for more accurate positioning. (note: MT6765 series platform)
  - Typical RX tracking sensitivity of -165dBm.
  - Support external LNA

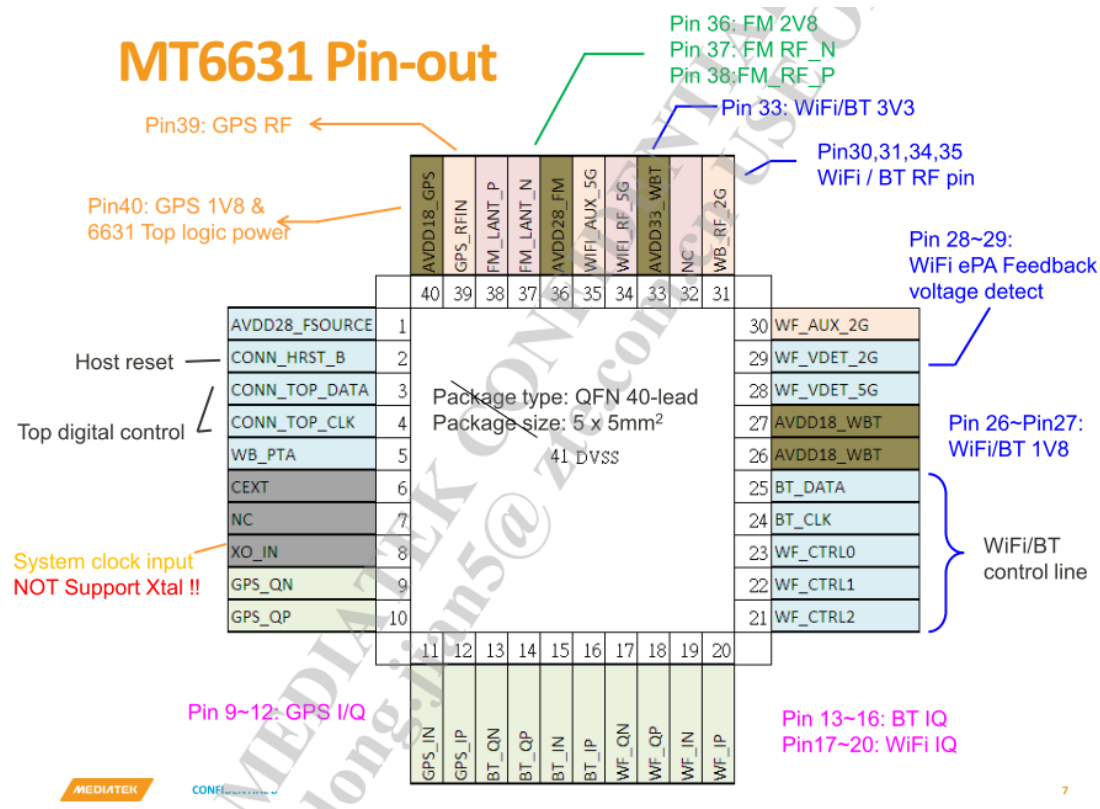


Fig.9 MT6631 functional block diagram

## 5. GPS

The GNSS integrated in MT6631 supports GNSS L1 and L5.

## 6. PA Operating Ranges

PA parameter	Specification		
	Min.	Type.	Max.
Power supply voltage (V)	0	\	4.4
Power supply current (mA)	0	\	420

## **7. Operational Environment**

Storage Temperature:  $-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$

Operation Temperature:  $-10^{\circ}\text{C} \sim +55^{\circ}\text{C}$