

# Operational description

Model:

## 1. Scope:

This document shows and provides the more detail information about the platform we used. The basic description for the Baseband and RF section are also included

## 2. System Block Diagram

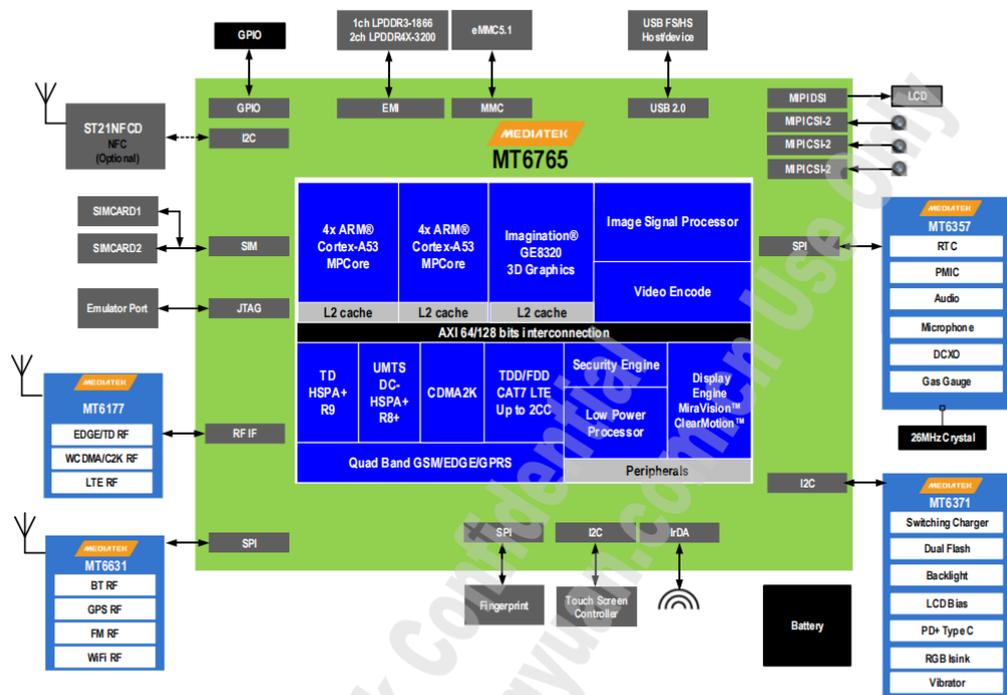


Figure 1-1. High-level MT6765X functional block diagram

Figure 1 System Overview (MT6765)

## 3. RF Module:

### **3.1 Transceiver(MT6177M)**

MT6177M is a highly integrated, single-die radio transceiver chip that supports 4G FDD-LTE, TDD-LTE, 3G WCDMA, HSDPA, HSUPA, GSM/EDGE as well as TD-SCDMA operation. Implemented in low cost bulk CMOS, it is optimized to meet the power efficient, high performance cellular handsets

#### **Features**

Fully integrated single chip multi-mode, multi-band transceiver in bulk CMOS

TD-LTE Band: 38,39,40,41

FDD-LTE Band: 1,2,3,4,5,7,8,12,13,17,20,28

TD-SCDMA Band: 34,39

WCDMA Band: 1,2,3,4,5,6,8,9,10

GSM/EDGE: GSM850, EGSM900, DCS1800, PCS 1900

Single-ended LNAs in all receive

Two SAWless Rx input port for GGE(B2/B3/B5/B8), TDSCDMA and TDD LTE(B34&B39).

Completely integrated frequency

synthesizer and VCO

All TX outputs are single-ended and

Analog and Digital IQ interface

C2K/2G/3G/4G CO-banding

Support SRLTE

Support external LNA at RXP and RxD.

Support LTE Power Class 2 high-power UE(HPUE) in band 41.

Built-in DCXO

Three sets of reference outputs

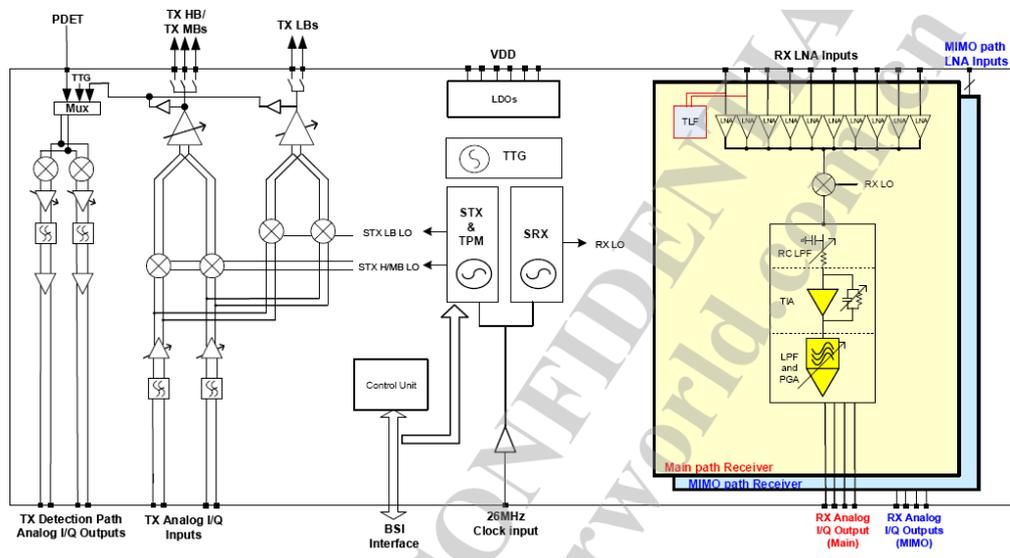
Single SPI operation

Body Size: 5.0 X4.6 X 0.9mm

Ball array: 12 X 11

RoHS Compliance

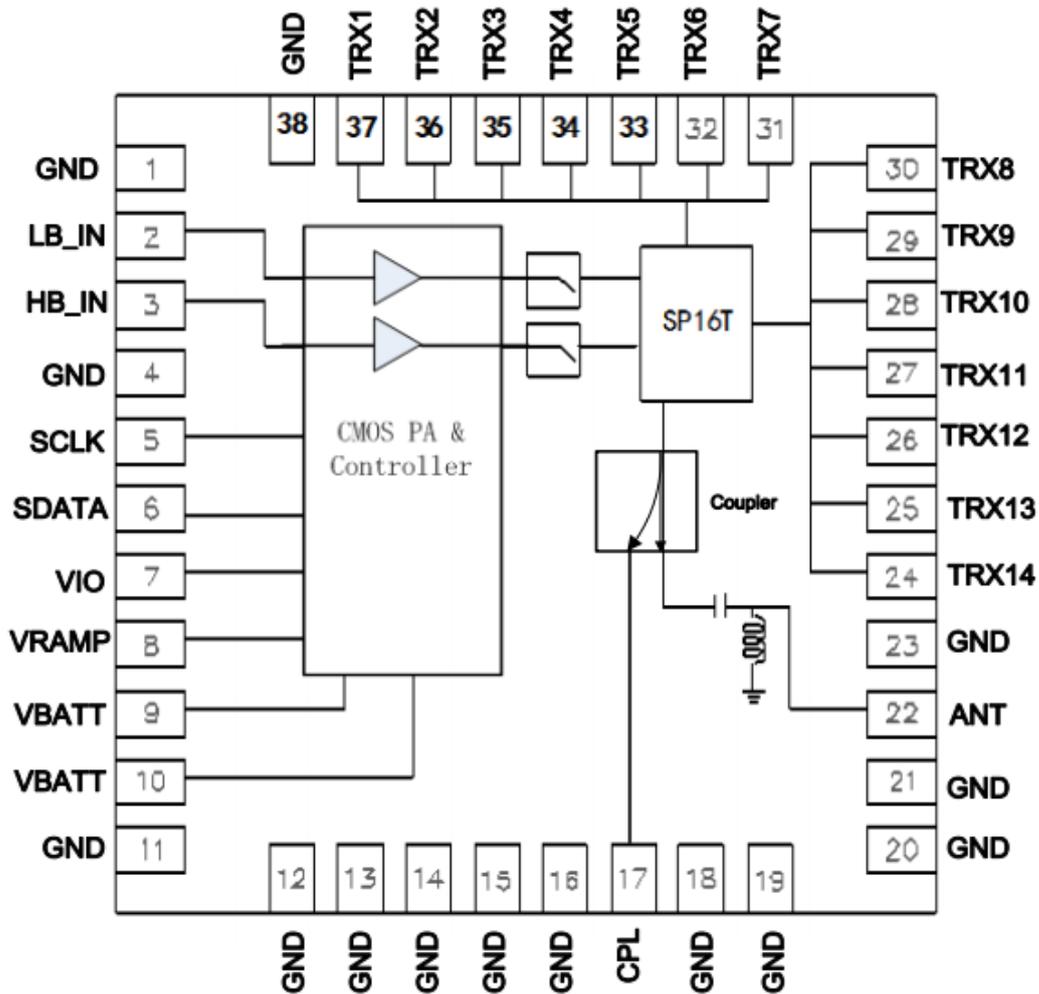
Halogen Free (HF) Compliance



RF system block diagram

### 3.2 RF ASM (OM8816-61)

The HS8816CM-31 is a high-power, high-efficiency Front-End CMOS Module for GSM850/900, DCS1800, PCS1900 operation. A high-power and high-efficiency CMOS-PA & Controller die and a SP16T RF switch are integrated in HS8816CM, supporting quad-band GSM/GPRS of GSM850/900/DCS1800/PCS1900. The HS8816CM provides complete features including PA over-voltage and over-current protection, 50 ohms matching for inputs/outputs, TRx high linearity/low loss switching and high off-state isolation, integrated directional coupler, esd protection for IEC ruggedness at antenna .output. The device is packaged in a small LGA package (5.5mm x 5.3mm x 0.82mm).



## Features

- LGA: 5.5 mm x 5.3 mm x 0.85 mm Max
- Fully programmable MIPI RFFE control
- Fourteen low-insertion-loss TRx ports (five ultra-low loss) with enhanced linearity, for state-of-the-art 4G performance and GPS / WiFi compatibility
- High Efficiency (inclusive of coupler)

- GSM850/ GSM900 39%

- DCS1800/PCS1900 32%

- Tx harmonics below -40 dBm
- Current limiting and over-voltage

protection for ruggedness and

extended battery life

- Power control circuitry built-in for improved

•Cellular

handsets encompassing Quad-Band

GSM/EDGE, Dual-Band TD-SCDMA

- Class 4 GSM850/900

- Class 1 DCS1800/PCS1900

- Class 12 GPRS multi-slot operation

- Linear EDGE operation

- TD-SCDMA Bands 34/39

### **3.3 RF PA (OM8443-20):**

#### **Product Description**

OM8443-20 is a hybrid multimode multiband (MMMB) Power Amplifier Module (PAM) that supports 3G/4G 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 3G/4G PA blocks for low, high, and mid-bands, and a Multi-Function Control (MFC) block, RF input/output ports internally matched to 50 ohm to reduce the number of external components. A CMOS integrated circuit uses standard MIPI controls to provide the internal MFC interface and operation. Extremely low leakage current maximizes handset standby time. The devices packaged in a small LGA package. (4.0 mm x 6.8 mm x 0.83 mm)

## Product Features

- Two T/R (RX) ports and 14 outputs
- Dual Low Band RF inputs support separate transceiver outputs or interstage filtering
- Industry-leading PAE for 3G/4G
- Optimized for APT DCDC operation
- Fully programmable Mobile Industry Processor Interface (MIPI) control
- MIPI programmable bias modes optimize best efficiency / linearity trade-off for 3G and 4G; minimizes DG09 for 3G.
- Small package: 4.0 mm × 6.8 mm × 0.83 mm, LGA 42 pad configuration
- Ultra low harmonics leakage from LB TX ports to MB TX ports, suitable for downlink carrier aggregation

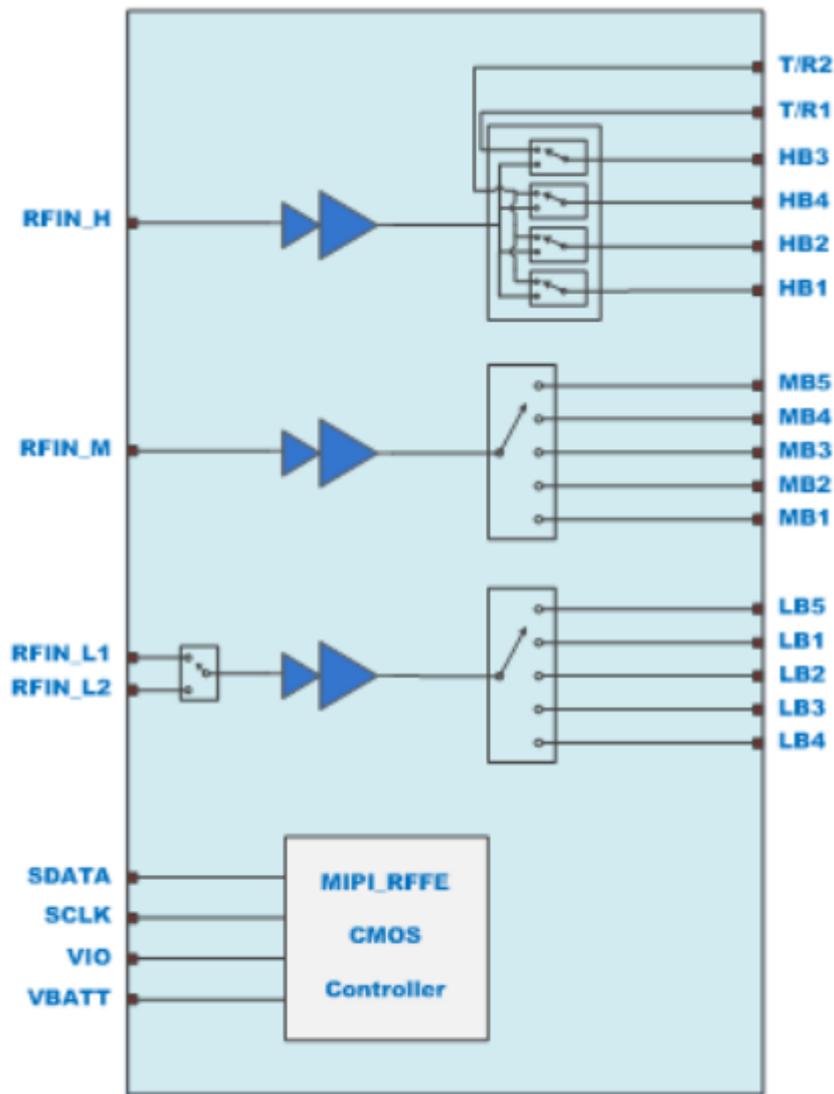
## Applications

- Multiband 3G / LTE handsets
- WCDMA Bands I, II, III, IV, V, VIII, IX
- TD-SCDMA Bands 34, 39
- FDD LTE Bands 1, 2, 3, 4, 5, 7, 8, 9, 12, 13, 17, 20, 25, 26, 28, 30, 71
- TDD LTE Bands 34, 38, 39, 40, 41
- CDMA2000 Bands BC0, BC1, BC4, BC6, BC010, BC015

## 3G/4G Modulation Scheme

- WCDMA Voice Release 99
- HSDPA categories
- HSUPA

- HSPA+
- TD-SCDMA
- LTE 1.4, 3, 5, 10, 15, 20 MHz Channel BW
- TDD-LTE
- CDMA2000



**Functional Block Diagram**

#### **4. Baseband(MT6762):**

MT6762 device ,with integrated bluetooth ,FM,WLAN and GPS module,is a highly integrated baseband platform incorporating both moden and application processing subsystems to enable LTE /LET-A and C2k smart phone application,The chip integrates ARM Cortex-A53 operating up to 2.0GHZ, and powerful multi-standard video codec. In addition,an extensive set of interfaces and connectivity peripherals are included to interface to cameras, touch-screen displayd and MMC/SD cards. the application procesor ,an Octa-core ARM Cortex-A53 MPCore equipped with NEON engine offers processing power necessary to support the latest Open OS along with its demanding applications such as web browsing, email,GPS navigation and games. All are viewed in a high resolution touch screen display with graphics enhanced by the 2D and 3D graphics acceleration.

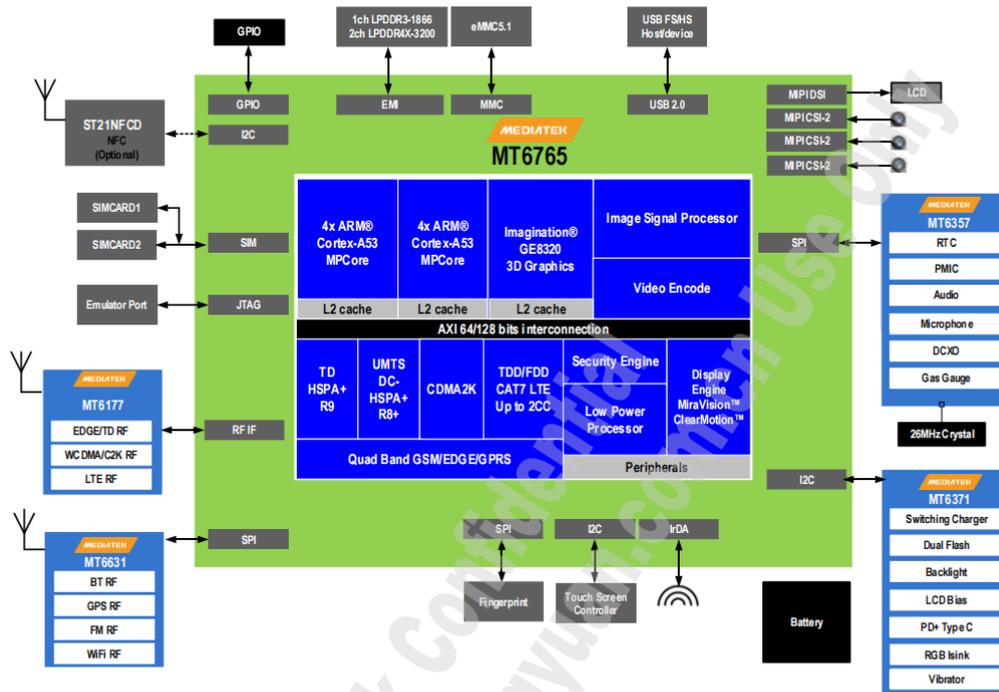


Figure 1-1. High-level MT6765X functional block diagram

### MT6765 characteristic:

Octa-core ARM Cortex -A53 MPCore operating at 2.0GHZ

LPDDR3 up to 4GB,

LTE CAT4(150Mbps)

CDMA2000 HRPD/1XEV-DO Revision O and A.

HPUE

Embedded connectivity system including WLAN/BT/FM/GPS

Resolution up to HD+(1600 x720 60 fps)

OpenGL ES 3.0 3D graphic accelerator

ISP supports 13MP@30fps

H.264 1.80p@30fps encoder

Speech codec(FR,HR,EFR,AMR,FR,AMR,HR and Wide-band AMR ,EVS-WB)

Package: VFBGA 11.8X11.0 mm

**Modem Features:**

. TD-LTE/ LTE FDD baseband

FDD/TDD UP TO 150Mbps downlink, 50Mbps uplink

1.4 to 20MHz RF bandwidth

2\*2 downlink SU-MIMO, 4\*2 downlink SU-MIMO

IPV6,QOS

Inter-RAT capabilities with HSPA+, EDGE and applicable backward-compatible modes.

- supported band:

FDD\_LTE\_B1: 1920-1980MHz (TX), 2110-2170MHz (RX);

FDD\_LTE\_B3: 1710-1785MHz (TX),1805-1880MHz (RX)

FDD\_LTE\_B7: 2500-2570MHz (TX), 2620-2690MHz (RX)

FDD\_LTE\_B20: 832-862MHz (TX), 791-821MHz (RX)

.WCDMA baseband:

3G modem supports main features in 3GPP Release 7 and Release 8

CPC (DTX in CELL\_DCH,UL DRX DL DRX),HS-SCCH-LESS,HS-DSCH

DUAL CELL operation

2drx schemes in URA\_PCH and CELL\_PCH

Uplink cat 7(16qam) ,throughput up to 11.5Mbps

Downlink Cat.24(64QAM),throughput up to 42.2Mbps

- supported band

WCDMA2100: 1922-1977 MHz (TX), 2112-2167MHz (RX);

WCDMA900: 880-915MHZ (TX), 925-960MHZ (RX)

GSM/GPRS/EDGE baseband:

- Compatible with GSM/GPRS/EDGE Release 1999, GSM850, GSM900, DCS1800, and PCS1900 recommendations
- Complete in-phase and quadrature (I/Q) component interface between the Digital Signal Processor (DSP) and RF module
- EGPRS class12type B (MCS1-9 in downlink and MCS1-9 in uplink)
- Cryptographic Algorithms: A5/1 A5/2 A5/3, GEA1 GEA2 GEA3
- supported band

GSM850: 824-849 MHz (TX), 869-894 MHz (RX);

GSM900: 880-915 MHz (TX), 925-960 MHz (RX);

DCS1800: 1710-1785 MHz(TX), 1805MHz-1880 MHz(RX);

PCS1900: 1850-1910 MHz (TX), 1930-1990 MHz (RX);

### **Connectivity Features**

WLAN

Bluetooth

GPS

FM Receiver

The RF parts of those four blocks are placed on chip MT6631, With four advanced radio technologies integrated on one chip, It supports single antenna sharing among 2.4GHz Bluetooth, 2.4GHz WLAN and 1.575GHz for GPS.

-Single antenna for Bluetooth and WLAN/GPS

-.WiFi Features

- Single-band 2.4 GHz single stream IEEE 802.11b/g/n/a
- Support WIFI and Bluetooth TDD operation and single-antenna topology with integrated TR-switch

Wifi: 2412-2472 MHz (TX/RX)

#### .Bluetooth Features

- Bluetooth specification v2.1 + EDR,3.0+HS
- Bluetooth v4.1 Low Energy (LE)
- Bluetooth v2.1 and BLE dual mode concurrent
- Integrated on-chip PA for TX, maximum power >8dBm (class 1)

BT: 2402-2480MHz (TX/RX)

#### . GPS Features

- Support GPS , BEIDOU ,GALILEO,GLONASS and BEIDOU .

Built-in calibration for PVT variation.

Typical Rx tracking sensitivity of -163dbm.

Supports external LNA

Multi-mode filters for different GNSS receiver modes.

#### . FM Features

65-108MHZ with 50KHZ step

Supports RDS/RBDS

Digital stereo modulator/demodulator

Digital audio interface(FM 2-wire bus)

Fast seek time 30ms/channel

Stereo noise reduction

Audio sensitivity 3dbu Vemf (SINAD=26dbm)

Audio SIND>60dB

Anti-jamming

Supports short antenna