

# M201 Wireless Android Module Datasheet

Version 1.0

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The document only for following list module:

M201

## Revision History

DocumentVersion	Date	Chapter	Descriptions
1.0	2019-11-15		Add packaging

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## 1 Product Application Overview

M201 is a Android inside All wireless mode module. Now it Integrate with LTE/HSPA+/HSDPA/HSUPA/WCDMA/GSM, Bluetooth, WIFI, GPS on board.

This document defines the M201 module and describes its air interface and hardware interface within your application.

This document can help you to quickly understand module interface specifications, electrical and mechanical details as well as other related information of M201 module. Associated with application notes and user guide, you can use M201 module to design and set up devices applications easily.

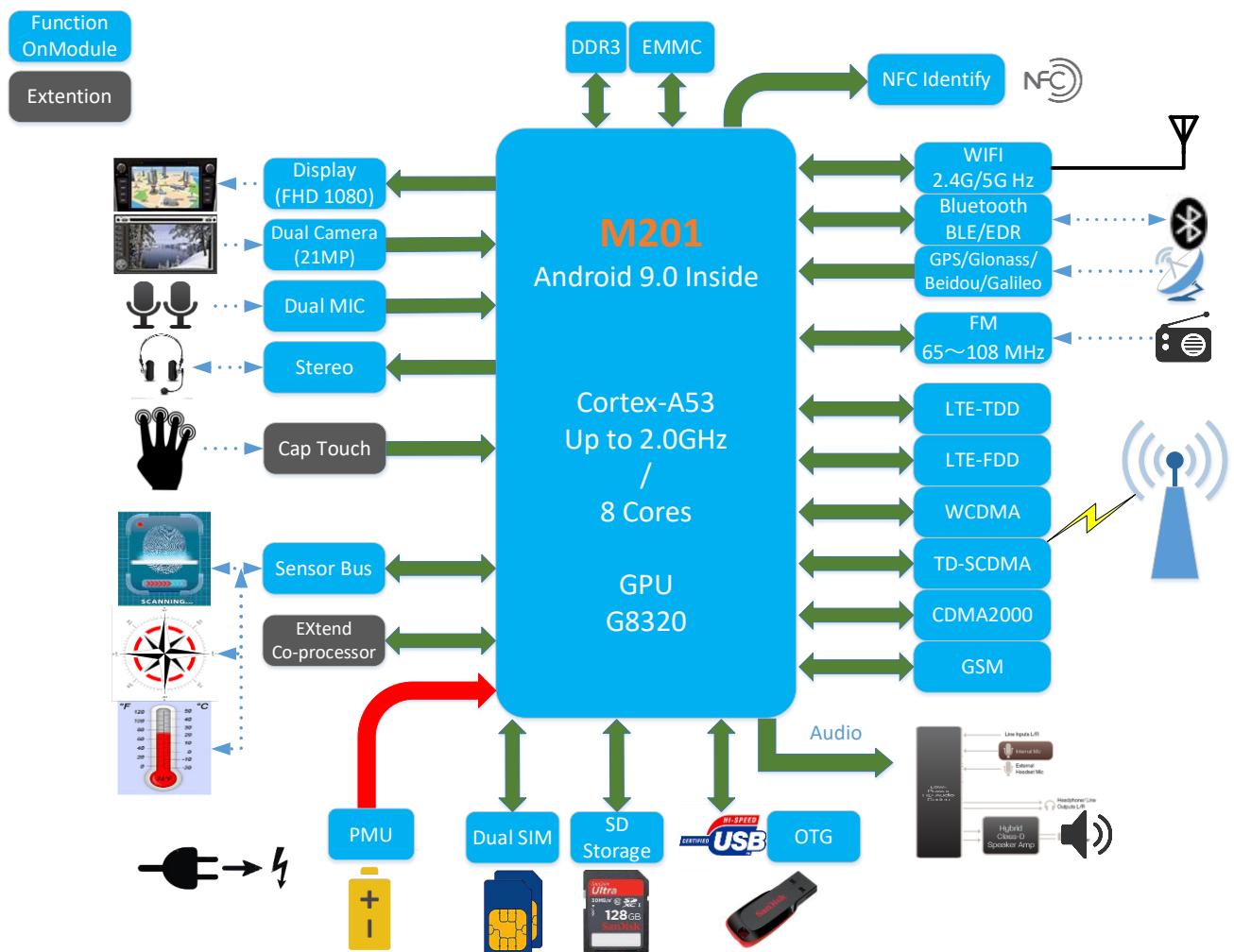


Figure: Framework of M201 Application

## 2 Brief description

### M201 Android world mode communication module

General Info	Description
<b>Features</b>	
<b>Dimension</b>	41x41x3.2mm
<b>Weight</b>	19g
<b>Total Pins</b>	142
<b>Processors</b>	8x 1.28Ghz Cortex-A53 32KB L1 I-cache and 32KB L1 D-cache 512KB unified L2 cache
<b>DRAM Memory Inside</b>	2GB LPDDR-3 Up to 933Mhz
<b>Flash Memory Inside</b>	16GB eMMC
<b>Graphics</b>	GE8300 OpenGL ES 1.1/2.0/3.0/3.1 OpenCL ES 1.1 full profile
<b>Mobile</b>	Dual SIM Dual Standby(DSDS)
<b>Power supply</b>	3.3 V to 4.2V (typical: 3.8V)
<b>Temperature range</b>	-40°C to 70°C
<b>Humidity</b>	5%~ 95%
<b>Drop Height</b>	1.5 meters, 6 free fall
<b>RF Support</b>	
<b>RF Band</b>	Bluetooth/BLE 2.4G WIFI/5G WIFI Band1/5GWIFI Band3 LTE FDD -B2/B4/B5/B7 LTE TDD -B41 WCDMA - B2/B5 GSM850/PCS1900

<b>Air Symbol Rate</b>	LTE FDD -Cat4 DL 150Mbps/UL 50Mbps LTE TDD -Cat4 DL 150Mbps/UL 50Mbps WCDMA -HSDPA,HSUPA,HSPA+,DC-HSPA+
<b>Multimedia</b>	<b>Description</b>
<b>Resolution</b>	Portrait panel resolution up to FHD (1,920*1,080)
<b>Displays</b>	MIPI DSI interface (4 data lanes) Extended support (HDMI/LVDS) by used external chip
<b>Primary Camera</b>	MIPI CSI interface (4 data lanes) 21MP@30fps
<b>Secondary Camera</b>	MIPI CSI interface (4 data lanes) 21MP@30fps
<b>Video</b>	Decoder: H.265 1080p@30fps/40Mbps H.264 BP/MP/HP-1080p@30fps/40Mbps MPEG-4 SP/ASP -1080p@30fps/40Mbps H.263 -1080p@30fps/40Mbps DivX 4x/5x/6x -1080p@30fps/40Mbps DivX HD/XVID -1080p@30fps/40Mbps Encoder: H.264 High profile 1080p @30fps
<b>Audio</b>	Audio content sampling rates supported:8kHz to 192kHz Audio content sample formats supported: 8-bit/16-bit/24-bit, Support Mono/Stereo output External CODEC I2S interface supports 16-bit/24-bit, Audio encoding: AMR-NB, AMR-WB, AAC, OGG, ADPCM Audio decoding: WAV, MP3, MP2, AAC,AMR-NB, AMR-

	WB, IDI, Vorbis, APE, AAC-plus v1, AAC-plus v2, FLAC, WMA, ADPCM
<b>Connectivity</b>	<b>Description</b>
<b>WLAN</b>	Dual-band (2.4GHz/5Ghz) 802.11 a/b/g/n 802.11 d/h/k compliant Security: WFA WPA/WPA2 personal, WPS2.0, WAPI (hardware) Max data Rates 802.11n 40Mhz/150Mbps
<b>Bluetooth</b>	Bluetooth v4.2 Low Energy (LE) Compatible 2.1+EDR/3.0+HS
<b>GPS</b>	GPS/Glonass/Beidou/Galileo dual-band reception concurrently Supports SBAS (Satellite-Based Augmentation Systems)- WAAS/MSAS/EGNOS/GAGAN
<b>NFC</b>	By add on another module to support
<b>FM</b>	65-108MHz with 50kHz step RDS/RBDS
<b>Other Input/Output</b>	<b>Description</b>
<b>Extensional I/O</b>	Low speed: I2C/SPI/SPI/SD/ UART/I2S/SIM/Keypad/GPIO High speed: MIPI LCD/MIPI Camera/USB Analog: MIC/Speaker/Receiver/Headset/ADC
<b>Other Input/Output</b>	<b>Description</b>
<b>Power down</b>	98uA
<b>Standby Without SIM</b>	3.2mA
<b>Standby with SIM</b>	5.7mA
<b>Mp3 play on back</b>	105 mA
<b>H. 264 play</b>	248mA
<b>LTE video play</b>	378mA

# 1 System Overview

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The M201 device (see [Figure 1-1](#)), with integrated Bluetooth, FM, WLAN and GPS modules, is a highly integrated baseband platform incorporating both modem and application processing subsystems to enable LTE/LTE-A smart device applications. 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 displays and MMC/SD cards.

The application processor, an Octa-core ARM® Cortex-A53 MPCore™ equipped with NEON engine offers processing power necessary to support the latest OpenOS along with its demanding applications such as web browsing, email, GPS navigation and games. All are viewed on a high resolution touch screen display with graphics enhanced by the 2D and 3D graphics acceleration.

The multi-standard video accelerator and an advanced audio subsystem are also integrated to provide advanced multimedia applications and services such as streaming audio and video, a multitude of decoders and encoders.

Imagination MIPS32® InterAptive, DSP, and 2G and 3G coprocessors combined provide a powerful modem subsystem capable of supporting LTE Cat 4, Category 24 HSDPA downlink and Category 4 HSUPA uplink data rates, Category 14 TD-HSDPA downlink and Category 6 TD-HSUPA uplink, as well as Class 12 GPRS, EDGE.

M201 also embodies wireless communication device, including WLAN,

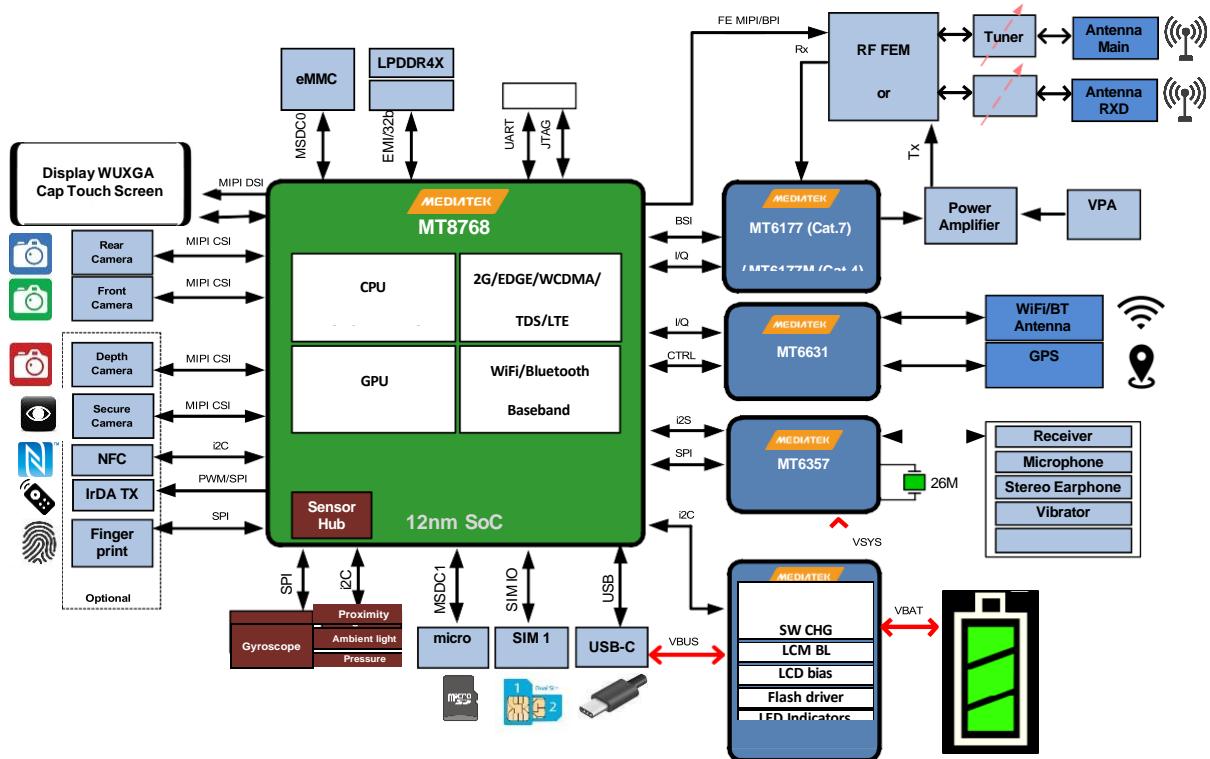
Bluetooth and GPS. With four advanced radio technologies integrated into one single chip, M201 provides the best and most convenient connectivity solution in the industry.

The enhanced overall quality is achieved for simultaneous voice, data and audio/video transmission on AIOT and Media Tablets. The small footprint with low-power consumption greatly reduces the PCB layout resource.

## 1.1 **Highlighted Features Integrated in M201**

- Quad-core high performance ARM® Cortex-A53 MPCore™ operating up to 2.0GHz, and the other quad-core low power ARM® Cortex-A53 MPCore™ operating at 1.5GHz
- LPDDR3 up to 4GB (single channel with 32-bit data bus width)
- LPDDR4X up to 6GB (dual channels with 16-bit data bus width)
- Memory clock up to LPDDR3-1866 or LPDDR4X-3200
- LTE Cat 7 (300Mps)
- Embedded connectivity system including WLAN/BT/FM/GPS
- Resolution up to WUXGA (1,900\*1,200)
- OpenGL ES 3.0 3D graphic accelerator
- ISP supports 21MP@30fps.
- HEVC 1080p @ 30fps decoder
- H.264 1080p @ 30fps encoder
- Speech codec (FR, HR, EFR, AMR FR, AMR HR, Wide-Band AMR, and EVS\_WB)

The following figure shows a block diagram of M201 and illustrates the major functional parts.



**Figure 1-1. High-level M201 functional block diagram**

## 1.2 Platform Features

- **General**

- AIOT/Tablet, two MCU subsystems architecture
- Supports eMMC boot
- Supports LPDDR3
- Supports LPDDR4X

- **AP MCU subsystem**

- Quad-core ARM® 2.0GHz Cortex-A53 MPCore™ and another quad-core ARM® 1.5GHz Cortex-A53 MPCore™
- NEON multimedia processing engine with SIMDv2/VFPv4 ISA support
- 32KB L1 I-cache and 32KB L1 D-cache for each cluster
- 512KB L2 cache for each cluster
- DVFS technology with adaptive operating voltage from 0.6V to 1.12V

- **MD MCU subsystem**

- Imagination MIPS32® InterAptive processor with max. 864MHz operation frequency
- High-performance multi-core and multi-thread processor architecture (two cores and two threads)
- 32KB L1 I-cache and 32KB L1 D-cache per core
- 384KB SPRAM (Scratchpad memory, Two-Core's ISPRAM and DSPRAM)
- 256KB L2 Cache (share L2 cache for two cores)
- High-performance AXI bus Interfaces
- General DMA engine and dedicated DMA channels for peripheral data transfer
- Power management for clock gating control

- **MD external interfaces**

- Dual SIM/USIM interface

- Interface pins with RF and radio-related peripherals (antenna tuner, PA, etc.)

- **Security**

- ARM® TrustZone® Security
- In-line engine for full-disk encryption (FDE) and file-based encryption (FBE)
- MediaTek CryptoCore

- **External memory interface**

- LPDDR3 up to 4GB (single channel with 32-bit data bus width)
- LPDDR4X up to 8GB (dual channels with 16-bit data bus width)
- Memory clock up to LPDDR3-1866 or LPDDR4X-3200
- Self-refresh/partial self-refresh mode
- Low-power operation
- Programmable slew rate for memory controller's IO pads
- Dual rank memory device
- Advanced bandwidth arbitration control

- **Peripherals**

- USB2.0 OTG mode
- eMMC5.1
- 2 UART for debugging and applications
- 6 SPI masters for external devices
- 7 I2C to control peripheral devices, e.g. CMOS image sensor, LCM or FM receiver module
- Max. 6 PWM channels (depending on system configuration/IO usage)
- GPIOs
- 1 set of memory card controllers supporting SD/SDHC

- **Operating conditions**

- Core voltage: 0.65V/0.7V/0.8V
- I/O voltage: 1.8V/2.8V/3.3V
- Memory: 1.1V/0.6V
- LCM interface: 1.8V

- Clock source: 26MHz, 32.768kHz

## 1.3 Modem Features

- **LTE**

- FDD/TDD Up to 300Mbps downlink, 150Mbps uplink
- Downlink carrier aggregation (CA) ability; 1.4 to 20MHz RF bandwidth per component carrier (CC) and up to 2 CCs
- Uplink intra-band carrier aggregation (CA) ability; 1.4 to 20MHz RF bandwidth per component carrier (CC) and up to 2 CCs
- Uplink 64QAM
- 4\*2 downlink SU-MIMO per component carrier
- Downlink MU-MIMO per component carrier
- Not support feICIC
- Supports MBMS
- Uplink CoMP ability
- Advanced Interference Cancellation
- Transmit Antenna Selection

- **3G UMTS FDD supported features**

- 3G modem supports most main features in 3GPP Release 7 and Release 8
- CPC (DTX in CELL\_DCH, UL DRX DL DRX), HS-SCCH-less [Not support], HS-DSCH
- Dual cell operation
- MAC-ehs
- 2 DRX (receiver diversity) schemes in URA\_PCH and CELL\_PCH
- Uplink Cat. 7 (16QAM), throughput up to 11.5Mbps
- Downlink Cat. 24 (64QAM, dual-cell HSDPA), throughput up to 42.2Mbps
- Fast dormancy
- ETWS
- Network selection enhancements
- Transmit Antenna Selection

- **Radio interface and baseband front- end**

- High dynamic range delta-sigma ADC converts the downlink analog I and Q signals to digital baseband.
- 10-bit D/A converter for Automatic Power Control (APC)
- Programmable radio Rx filter with adaptive gain control
- Dedicated Rx filter for FB acquisition
- Baseband Parallel Interface (BPI) with programmable driving strength
- Supports multi-band

- **GSM modem and voice CODEC**

- Dial tone generation
- Noise reduction
- Echo suppression
- Advanced side-tone oscillation reduction
- Digital side-tone generator with programmable gain
- 2 programmable acoustic compensation filters
- GSM quad vocoders for adaptive multi- rate (AMR), enhanced full rate (EFR), full rate (FR) and half rate (HR)
- GSM channel coding, equalization and A5/1, A5/2, A5/3, and A5/4 ciphering

- GPRS GEA1, GEA2, GEA3, and GEA4 ciphering
- Programmable GSM/GPRS/EDGE modem
- Packet switched data with CS1/CS2/CS3/CS4 coding schemes
- GSM circuit switch data
- GPRS/EDGE Class 12
- Supports SAIC (Single Antenna Interference Cancellation) technology
- VAMOS (Voice services over Adaptive Multi-user channels on One Slot) technology in R9 spec
- Transmit Antenna Selection

## 1.4 Connectivity Features

M201 includes four wireless connectivity functions:

- | 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, M8768/MT6631 is the best and most convenient connectivity solution in the industry, implementing advanced and sophisticated Radio Coexistence algorithms and hardware mechanisms. It supports single antenna sharing among 2.4GHz Bluetooth, 2.4GHz/5GHz WLAN and 1.575GHz for GPS. The enhanced overall quality is achieved for simultaneous voice, data and audio/video transmission on AIOT and Media Tablets. The small footprint with low- power consumption greatly reduces PCB layout resource.

- **Supports integrated Wi-Fi/Bluetooth/GPS**

- Single antenna for Bluetooth and WLAN/GPS/Bluetooth
- Self calibration
- Single TCXO and TMS for GPS, BT and WLAN
- Best-in-class current consumption performance
- Intelligent BT/WLAN coexistence scheme that goes beyond PTA signaling (e.g. transmit window and duration that take into account protocol exchange sequence, frequency, etc.)

- **Wi-Fi**

- Dual-band (2.4/5GHz) single stream 802.11 ac/a/b/g/n MAC/BB/RF SoC, 20/40/80MHz bandwidth, MCS0~9 (256-QAM)
- 802.11 d/e/h/i/j/k/r/v compliant
- Security: WFA WPA/WPA2 personal, AES-CCMP, WPI-SMS4, GCMP, WPS2.0, WAPI (hardware)
- QoS: WFA WMM, WMM PS
- 802.11n optional features: STBC, A-MPDU, Blk-Ack, RIFS, MCS Feedback, 20/40MHz coexistence (PCO), unscheduled PSMP
- Supports 802.11w protected managed frames
- Supports 802.11ac STBC TX/RX, 4T1R beamformee, MU-MIMO RX, WoWLAN
- Supports MediaTek proprietary low power Green AP mode for portable hotspot operation
- Auto rate control for optimizing the signal range and performance
- Supports Wi-Fi Direct (WFA P-2-P standard) and Wi-Fi Miracast (Wi-Fi Display)
- Supports Wi-Fi HotSpot 2.0
- Integrated 2.4GHz PA with max. 23dBm CCK output power and 5GHz PA with max. 18.5dBm OFDM 54Mbps output power
- RX sensitivity at 11n HT20 MCS7 mode and -62dBm 5GHz RX sensitivity at 11ac VHT80 MCS9 mode
- Supports 32 multicast address filters and TCP/UDP/IP checksum offload
- Per packet TX power control

- **Bluetooth**

- Supports Bluetooth 5 dual mode for 4x the range, 2x the speed and 8x the broadcasting message capacity

- Integrated PA with 9dBm (class 1) transmit power or 12dBm boost mode via WIFI PA.
- RX sensitivity: GFSK -95dBm, DQPSK -94.5dBm, 8-DPSK -88dBm, BLE -98dBm
- Supports BT/Wi-Fi/LTE coexistence
- Supports 7 BT links and 16 BLE links
- Supports Packet Loss Concealment (PLC) function for better voice quality
- Supports Wideband speech
- Supports mSBC and SBC including mono and stereo
- Supports secure connection with AES128 and ECC256
- Supports Adaptive Frequency Hopping with built-in channel assessment method

- **GPS**

- Supports GPS/Glonass/Beidou/Galileo/QZSS tri- band reception concurrently
  - GPS/Galileo only (GPS only)
  - GPS/Galileo - GLONASS (G+G)
  - GPS/Beidou (G+B)
  - GPS/GLONASS/Beidou (G+G+B)
  - GPS/Galileo/GLONASS (G+G+G)
  - GPS/Galileo/GLONASS/Beido (G+G+G+B)
- Supports SBAS (Satellite-Based Augmentation Systems): WAAS/MSAS/EGNOS/GAGAN
- Best-in-class sensitivity performance
  - -165 dBm tracking sensitivity
  - -163 dBm hot start sensitivity
  - -148 dBm cold start sensitivity
  - -151 dBm warm start sensitivity
- AGPS sensitivity is 8dB design margin over 3GPP
- Full A-GPS capability (E911/SUPL/EPO/HotStill)
- Active interference cancellation for up to 12 in-band tones

- Supports both TCXO and TMS (Thermister Crystal) clock source
- 5Hz update rate

- **FM**
  - 65-108MHz with 50kHz step
  - RDS/RBDS
  - Digital stereo demodulator
  - Simplified digital audio interface (I2S)
  - Stereo noise reduction
  - Audio sensitivity  $2\text{dB}\mu\text{Vemf}$  (SINAD=26dB)
  - Audio SINAD 60dB
  - Anti-jamming
  - Integrated short antenna

- **WBT IPD**
  - Integrated matching network, balance band-pass filter, GPS-WBT diplexer
  - Fully integrated in one IPD die
  - Single and dual antenna operation

- **GPS IPD**
  - Integrated high-pass type matching network and 5th-order ellipse low-pass filter
  - Fully integrated in one IPD die
  - Single and dual antenna operation

## 1.5 Multimedia Features

### • Display

- Portrait panel resolution up to WUXGA (1,920\*1,200)
- MIPI DSI interface (4 data lanes)
- MiraVision™ for picture quality enhancement
- Embedded LCD gamma correction
- True colors
- 8 overlay layers with per-pixel alpha channel and gamma table
- Spatial and temporal dithering
- Side-by-side format output to stereo 3D panel in both portrait and landscape modes
- Color enhancement
- Adaptive contrast enhancement
- Image/video/graphic sharpness enhancement
- Dynamic backlight scaling

### • Graphics

- OpenGL ES 3.1/3.0/2.0/1.1 3D graphic accelerator capable of 2,600M pixel/sec @ 650MHz
- OpenCL ES 1.1 full profile

### • Image

- Integrated image signal processor supports 21MP@30fps
- Electronic image stabilization
- Video stabilization
- Preference color adjustment
- Noise reduction
- Multiple frame noise reduction for image capture
- Temporal noise reduction for video recording
- Lens shading correction
- Auto sensor defect pixel correction
- Supports AE/AWB/AF

- Edge enhancement (sharpness)
- Face detection and visual tracking
- Video face beautification
- Zero shutter delay image capture
- Captures full size image when recording video (up to 24M sensors)
- 2 MIPI CSI-2 high-speed camera serial interfaces; both are 4 data lane
- Hardware JPEG encoder: Baseline encoding with 130M pixel/sec; Continuous shot with 220M pixel/sec
- Supports YUV422/YUV420 color format and EXIF/JFIF format

### • Video

- HEVC decoder 1080p @ 30fps/40Mbps
- H.264 decoder: Baseline 1080p @ 30fps/40Mbps
- H.264 decoder: Main/high profile 1080p @30fps/40Mbps
- H.263 decoder: 1080p @ 30fps/40Mbps
- MPEG-4 SP/ASP decoder: 1080p @ 30fps/40Mbps
- MPEG2 decoder 1080p @ 30fps/40Mbps
- MPEG-4 encoder: Simple profile D1 @ 30fps
- H.263 encoder: Simple profile D1 @ 30fps
- H.264 encoder: High profile 1080p @ 30fps

### • Audio

- Audio content sampling rates supported: 8kHz to 192kHz
- Audio content sample formats supported: 8-bit/16-bit/24-bit, Mono/Stereo
- Interfaces supported: I2S, PCM
- External CODEC I2S interface supports 16-bit/24-bit, Mono/Stereo, 8kHz to 192kHz.
- 4-band IIR compensation filter to enhance loudspeaker responses
- Proprietary audio post-processing technologies: BesLoudness(MB-DRC),

BesSurround, Android built-in post processing

- Audio encoding: AMR-NB, AMR-WB, AAC, OGG, ADPCM
- Audio decoding: WAV, MP3, MP2, AAC, AMR-NB, AMR-WB, MIDI, Vorbis, APE, AAC-plus v1, AAC-plus v2, FLAC, WMA, ADPCM

## •Speech

- Speech codec (FR, HR, EFR, AMR FR, AMR HR, Wide-Band AMR, and EVS\_WB)
- CTM
- Noise reduction
- Noise suppression
- Noise cancellation
- Dual-MIC noise cancellation
- Echo cancellation
- Echo suppression
- Dual-MIC voice tracking
- Dual-MIC sound recording w/o Wind Noise Rejection
- MagiLoudness (enhances the voice clarity based on near end environment noise)
- MagiClarity (maximizes loudness while controlling the maximum receiver output power; feed-forward receiver protection)

Compensation filter and digital gain for both uplink and downlink paths

### 3 Interface Overview

M201 Module show as the picture:

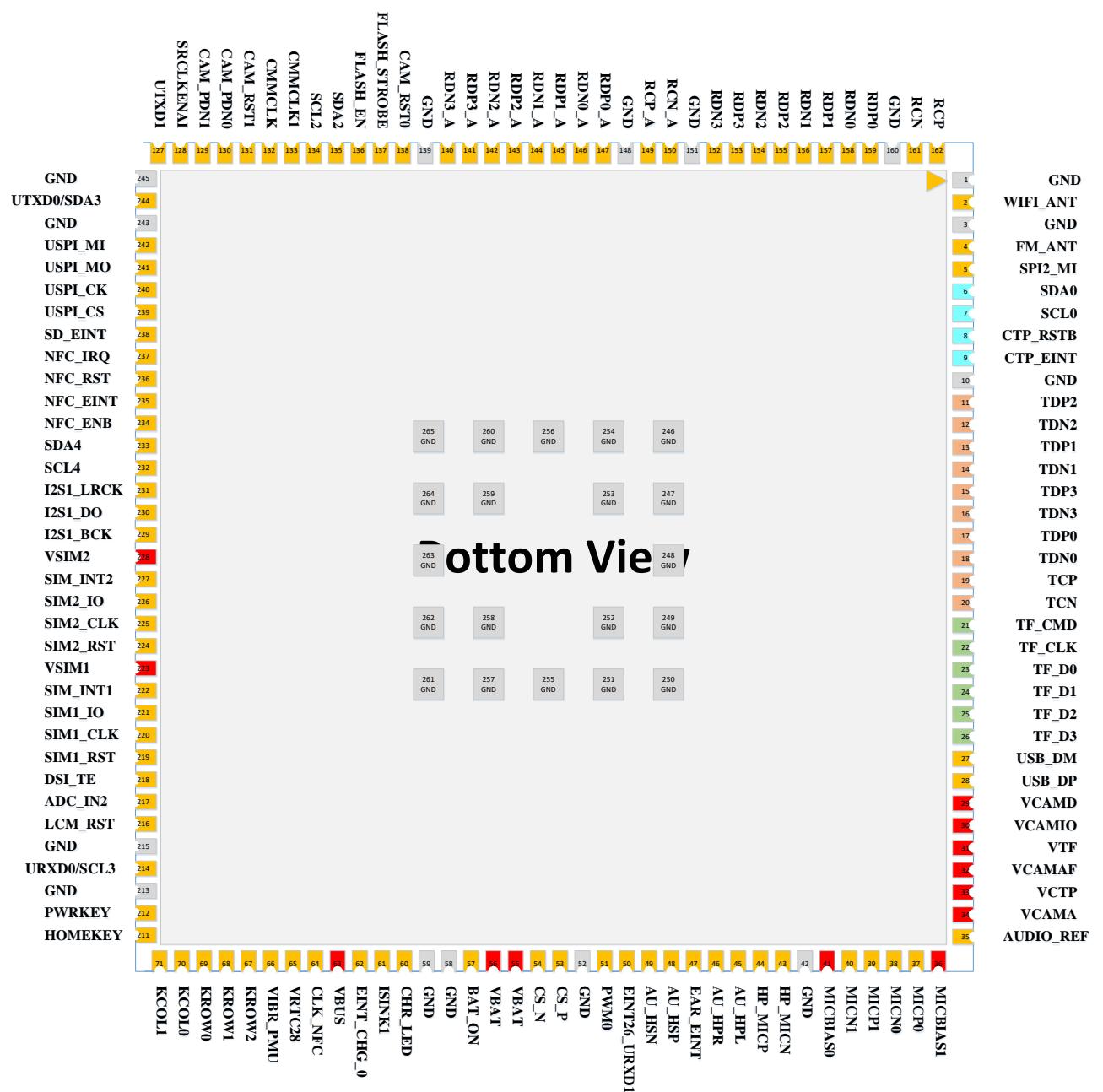


Figure: Pin Bottom view of M201 module

All Interface for user application detail show as following:

Table 1 : M201 hardware interface total view

◊ Storage		
<b>1</b>	<b>ROM (EMMC)</b>	<b>16GB</b>
<b>2</b>	<b>RAM (LPDDR3)</b>	<b>2GB</b>
◊ Wireless		
<b>1</b>	<b>Bluetooth</b>	<b>BT4.0 with A2DP / BLE</b>
<b>2</b>	<b>Wi-Fi</b>	<b>802.11</b>
<b>3</b>	<b>GPS</b>	<b>Global Position System</b>
<b>4</b>	<b>NFC</b>	<b>Support by external NFC module</b>
<b>5</b>	<b>FM</b>	<b>FM onboard</b>
◊ Interface		
<b>1</b>	<b>USB with OTG</b>	<b>USB high speed 2.0</b>
<b>2</b>	<b>Storage Card</b>	<b>UHS SD3.0</b>
<b>3</b>	<b>I2C</b>	<b>x4</b>
<b>4</b>	<b>UART</b>	<b>x3</b>
<b>5</b>	<b>I2S</b>	<b>x1</b>
<b>6</b>	<b>SPI</b>	<b>x1</b>
<b>7</b>	<b>DPI(RGB LCD)</b>	<b>x1</b>
<b>8</b>	<b>DSI(MIPI LCD)</b>	<b>x1</b>
<b>9</b>	<b>CSI(CAMERA)</b>	<b>x2</b>
<b>10</b>	<b>GPIO</b>	
<b>11</b>	<b>SIM</b>	<b>x2</b>
<b>12</b>	<b>MIC</b>	<b>x2</b>
<b>13</b>	<b>Headset</b>	<b>x1</b>
<b>14</b>	<b>Receiver</b>	<b>x1</b>
<b>15</b>	<b>Speaker</b>	<b>x1</b>
<b>16</b>	<b>Keypad</b>	<b>3x2x2</b>
<b>17</b>	<b>LED</b>	<b>x2</b>
<b>18</b>	<b>ADC</b>	<b>x1</b>
<b>19</b>	<b>RTC</b>	<b>x1</b>
<b>20</b>	<b>ANT</b>	<b>x3</b>
<b>21</b>	<b>FM ANT</b>	<b>x1</b>

## 4 Interface description

Table 1: I/O type description

◊	I/O TYPE	Description
1	IO	Digital input/output
2	DI	Digital input
3	DO	Digital output
4	PI	Power supply input
5	PO	Power supply output
6	AI	Analog input
7	AO	Analog output
8	OD	Open drain
9	VSS	Ground
10	ANT	Antenna
11	LVDS	Low Voltage Differential Signaling

Table 2: M201 pin description

Pin No.	Name	I/O Type	DC Feature	Description
1	GND	VSS		Ground
2	WIFI_ANT	ANT	50ΩRF	WIFI Antenna
3	GND	VSS		Ground
4	FM_ANT	ANT	50ΩRF	FM Antenna Positive
5	SPI2_MI	IO	1.8V Domain	GPIO
6	SDAO	OD	1.8V Domain	I2C0 data
7	SCL0	OD	1.8V Domain	I2C0 clock
8	CTP_RSTB	IO	1.8V Domain	GPIO
9	CTP_EINT	IO	1.8V Domain	GPIO
10	GND	VSS		Ground
11	TDP2	LVDS		Display MIPI Data out2+
12	TDN2	LVDS		Display MIPI Data out2-
13	TDP1	LVDS		Display MIPI Data out1+
14	TDN1	LVDS		Display MIPI Data out1-
15	TDP3	LVDS		Display MIPI Data out3+
16	TDN3	LVDS		Display MIPI Data out3-
17	TDP0	LVDS		Display MIPI Data out0+

18	TDN0	LVDS		Display MIPI Data out0-
19	TCP	LVDS		Display MIPI clock out+
20	TCN	LVDS		Display MIPI clock out-
21	TF_CMD	IO	1.8/2.8V Auto	SD Card command
22	TF_CLK	IO	1.8/2.8V Auto	SD Card clock
23	TF_D0	IO	1.8/2.8V Auto	SD Card data0
24	TF_D1	IO	1.8/2.8V Auto	SD Card data1
25	TF_D2	IO	1.8/2.8V Auto	SD Card data2
26	TF_D3	IO	1.8/2.8V Auto	SD Card data3
27	USB_DM	LVDS	difference 90Ω	USB 2.0 D-
28	USB_DP	LVDS	difference 90Ω	USB 2.0 D+
29	VCAMD	PO	Vout = 0.9~1.5V Vdef = 1.3V Iomax = 500mA	Camera Digital Core Power
30	VCAMIO	PO	Vout = 1.2~1.8V Vdef = 1.8V Iomax = 200mA	Camera IO Power
31	VTF	PO	Vout = 2.9~3.3V Vdef = 2.9V Iomax = 800mA	SD Card Power
32	VCAMAF	PO	Vout = 1.2~3.3V Vdef = 2.8V Iomax = 200mA	Camera AF Motor Power
33	VTP	PO	Vout = 1.2~3.3V Vdef = 2.8V Iomax = 200mA	Touch Pannel IC Power
34	VCAMA	PO	Vout = 1.5~2.8V Vdef = 2.8V Iomax = 200mA	Camera Analog Power
35	AUDIO_REF	VSS	Connect to GND	Audio Referen Gnd
36	MICBIAS1	PO	Vout = 1.7~2.5V Vdef = 2.5V Iomax = 3mA	Headset MIC Power
37	MICP0	AI		MIC input 1+
38	MICN0	AI		MIC input 1-
39	MICP1	AI		MIC input 2+
40	MICN1	AI		MIC input 2-
41	MICBIAS0	PO		MIC Power
42	GND	VSS		Ground

43	HP_MICN	AI		Headset MIC input-
44	HP_MICP	AI		Headset MIC input+
45	AU_HPL	AO		Headset Line Out Left
46	AU_HPR	AO		Headset Line Out Right
47	EAR_EINT	IO	Default Hi	Headset Interrupt
48	AU_HSP	AO		Audio Receiver+
49	AU_HSN	AO		Audio Receiver-
50	EINT26_URXD1	IO	1.8V Domain	GPIO
51	PWM0	AO	1.8V Domain	GPIO
52	GND	VSS		Ground
53	CS_P	AI		Power meter input +
54	CS_N	AI		Power meter input -
55	VBAT	PI	Vmax = 4.4V Vmin = 3.5V	Battery Power input 3.5~4.2V
56	VBAT	PI	Vnorm = 4V	Battery Power input 3.5~4.2V
57	BAT_ON	AO	25°C Vdef = 0.68V	Battery temperature detect
58	GND	VSS		Ground
59	GND	VSS		Ground
60	CHR_LED	OD	0~24mA	Charge LED
61	ISINK1	OD	0~24mA	Status LED
62	EINT_CHG_0	IO	1.8V Domain	GPIO
63	VBUS	PI		USB VBUS
64	CLK_NFC	AO		26MHz Clock Output
65	VRTX	PIO	Vout = 2.2~3.0V Vdef = 2.8V Iomax = 2mA Imax = 100uA	Backup Battery input
66	VIBR	PO	Vout = 1.2~3.3V Vdef = 2.8V Iomax = 100mA	Vibration motor Power
67	KROW2	IO	1.8V Domain	Key Row2
68	KROW1	IO	1.8V Domain	Key Row1
69	KROW0	IO	1.8V Domain	Key Row0
70	KCOL0	IO	1.8V Domain No used as output	Key Col0
71	KCOL1	IO	1.8V Domain	Key Col1

			No used as output	
<b>82/211</b>	<b>HOMEKEY</b>	<b>DI</b>	1.8V Domain	Home Key
<b>83/212</b>	<b>PWRKEY</b>	<b>DI</b>	Internal weak pull-up to VBAT	Power Key
<b>84/213</b>	<b>GND</b>	<b>VSS</b>		Ground
<b>85/214</b>	<b>SCL3</b>	<b>IO</b>	1.8V Domain	I2C3 CLK
<b>86/215</b>	<b>GND</b>	<b>VSS</b>		
<b>87/216</b>	<b>LCM_RST</b>	<b>IO</b>	1.8V Domain	GPIO
<b>88/217</b>	<b>ADC_IN2</b>	<b>AI</b>	0~1.45V 12bit sample rate 1KHz	Analog ADC Input
<b>89/218</b>	<b>DSI_TE</b>	<b>IO</b>	1.8V Domain	GPIO
<b>90/219</b>	<b>SIM1_RST</b>	<b>IO</b>	1.8/2.8V Auto	SIM1 Card Reset
<b>91/220</b>	<b>SIM1_CLK</b>	<b>IO</b>	1.8/2.8V Auto	SIM1 Card Clock
<b>92/221</b>	<b>SIM1_IO</b>	<b>IO</b>	1.8/2.8V Auto	SIM1 Card IO
<b>93/222</b>	<b>SIM_INT1</b>	<b>IO</b>	1.8/2.8V Auto	SIM1 Card Detect
<b>94/223</b>	<b>VSIM1</b>	<b>PO</b>	Vout = 1.8~3.1V Vdef = 1.8V Iomax = 50mA	SIM1 Power
<b>95/224</b>	<b>SIM2_RST</b>	<b>IO</b>	1.8/2.8V Auto	SIM2 RST
<b>96/225</b>	<b>SIM2_CLK</b>	<b>IO</b>	1.8/2.8V Auto	SIM2 CLK
<b>97/226</b>	<b>SIM2_IO</b>	<b>IO</b>	1.8/2.8V Auto	SIM2 IO
<b>98/227</b>	<b>SIM_INT2</b>	<b>IO</b>	1.8/2.8V Auto	SIM2 Card Detect
<b>99/228</b>	<b>VSIM2</b>	<b>PO</b>	Vout = 1.8~3.1V Vdef = 1.8V Iomax = 50mA	SIM2 Power
<b>100/229</b>	<b>I2S1_BCK</b>	<b>IO</b>	1.8V Domain	GPIO
<b>101/230</b>	<b>I2S1_DO</b>	<b>IO</b>	1.8V Domain	GPIO
<b>102/231</b>	<b>I2S1_LRCK</b>	<b>IO</b>	1.8V Domain	GPIO
<b>103/232</b>	<b>SCL4</b>	<b>OD</b>	1.8V Domain	I2C4 CLK
<b>104/233</b>	<b>SDA4</b>	<b>OD</b>	1.8V Domain	I2C4 SDA
<b>105/234</b>	<b>NFC_ENB</b>	<b>IO</b>	1.8V Domain	GPIO
<b>106/235</b>	<b>NFC_EINT</b>	<b>IO</b>	1.8V Domain	GPIO
<b>107/236</b>	<b>NFC_RST</b>	<b>IO</b>	1.8V Domain	GPIO
<b>108/237</b>	<b>NFC_IRQ</b>	<b>IO</b>	1.8V Domain	GPIO
<b>109/238</b>	<b>SD_EINT</b>	<b>IO</b>	1.8V Domain	GPIO
<b>110/239</b>	<b>USPI_CS</b>	<b>IO</b>	1.8V Domain	GPIO

111/240	<b>USPI_CK</b>	<b>IO</b>	1. 8V Domain	GPIO
112/241	<b>USPI_MO</b>	<b>IO</b>	1. 8V Domain	GPIO
113/242	<b>USPI_MI</b>	<b>IO</b>	1. 8V Domain	GPIO
114/243	<b>GND</b>	<b>VSS</b>		Ground
115/244	<b>SDA3</b>	<b>IO</b>	1. 8V Domain	I2C3 SDA
116/245	<b>GND</b>	<b>VSS</b>		Ground
127	<b>UTXD1</b>	<b>IO</b>	1. 8V Domain	GPIO
128	<b>SRCLKENAI</b>	<b>IO</b>	1. 8V Domain	Clock Request
129	<b>CAM_PDN1</b>	<b>IO</b>	1. 8V Domain	Camera PowerDown Ctrl1
130	<b>CAM_PDN0</b>	<b>IO</b>	1. 8V Domain	Camera PowerDown Ctrl0
131	<b>CAM_RST1</b>	<b>IO</b>	1. 8V Domain	GPIO
132	<b>CMMCLK</b>	<b>IO</b>	1. 8V Domain	Cameral Clock
133	<b>CMMCLK1</b>	<b>IO</b>	1. 8V Domain	Camera2 Clock
134	<b>SCL2</b>	<b>OD</b>	1. 8V Domain	I2C2 CLK
135	<b>SDA2</b>	<b>OD</b>	1. 8V Domain	I2C2 SDA
136	<b>FLASH_EN</b>	<b>IO</b>	1. 8V Domain	GPIO
137	<b>FLASH_STROBE</b>	<b>IO</b>	1. 8V Domain	GPIO
138	<b>CAM_RST0</b>	<b>IO</b>	1. 8V Domain	GPIO
139	<b>GND</b>	<b>VSS</b>		Ground
140	<b>RDN3_A</b>	<b>LVDS</b>		Camera2 MIPI Data3-
141	<b>RDP3_A</b>	<b>LVDS</b>		Camera2 MIPI Data3+
142	<b>RDN2_A</b>	<b>LVDS</b>		Camera2 MIPI Data2-
143	<b>RDP2_A</b>	<b>LVDS</b>		Camera2 MIPI Data2+
144	<b>RDN1_A</b>	<b>LVDS</b>		Camera2 MIPI Data1-
145	<b>RDP1_A</b>	<b>LVDS</b>		Camera2 MIPI Data1+
146	<b>RDN0_A</b>	<b>LVDS</b>		Camera2 MIPI Data0-
147	<b>RDP0_A</b>	<b>LVDS</b>		Camera2 MIPI Data0+
148	<b>GND</b>	<b>VSS</b>		Ground
149	<b>RCP_A</b>	<b>LVDS</b>		Camera2 MIPI clock+
150	<b>RCN_A</b>	<b>LVDS</b>		Camera2 MIPI clock-
151	<b>GND</b>	<b>VSS</b>		Ground
152	<b>RDN3</b>	<b>LVDS</b>		Cameral MIPI Data3-
153	<b>RDP3</b>	<b>LVDS</b>		Cameral MIPI Data3+
154	<b>RDN2</b>	<b>LVDS</b>		Cameral MIPI Data2-
155	<b>RDP2</b>	<b>LVDS</b>		Cameral MIPI Data2+
156	<b>RDN1</b>	<b>LVDS</b>		Cameral MIPI Data1-
157	<b>RDP1</b>	<b>LVDS</b>		Cameral MIPI Data1+
158	<b>RDN0</b>	<b>LVDS</b>		Cameral MIPI Data0-

159	RDP0	LVDS		Cameral MIPI Data0+
160	GND	VSS		Ground
161	RCN	LVDS		Cameral MIPI Clock-
162	RCP	LVDS		Cameral MIPI Clock+
246~ 265	GND	VSS		Ground

## 4.1 Power Supply

M201 provides four VBAT pins dedicated to connection with the external power supply. VBAT pins (pin 55/56) are used for M201 power supply part. The power supply range of this module is 3.5V~4.3V, the suggestion value is 4 V.

## 4.2 Decrease Power Voltage Drop

The power design for the module is very important. Make sure the input voltage will never drop below 3.1V, even if the peak current reaches 2.5A. If the voltage drops below 3.1V, the module will be turned off automatically

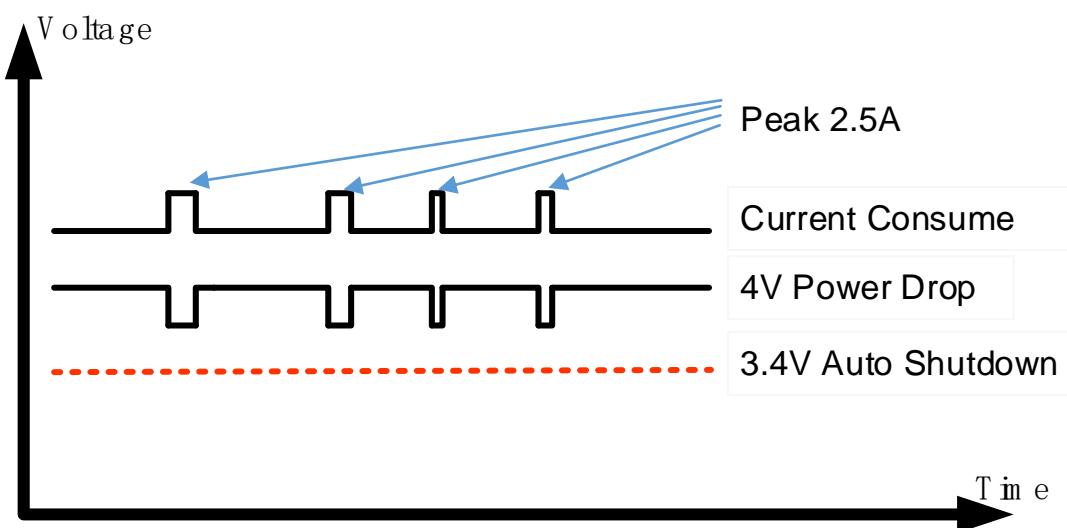


Figure: Voltage Drop on Peak Current diagram

To decrease voltage drop, a bypass capacitor of about  $100\mu\text{F}$  with low ESR should be added. Multi-layer ceramic chip (MLCC) capacitor is recommended to be used due to its ultra-low ESR. Two ceramic capacitors ( $100\text{nF}$ ,  $33\text{pF}$ ) are recommended to be applied to the VBAT pins. The main power supply from an external application has to be a single voltage source and can be expanded to two sub

paths with star structure. The width of VBAT BB trace should be no less than 1mm, and the width of VBAT RF trace should be no less than 2mm. In principle, the longer of the VBAT trace will be traced as width as possible. In addition, in order to get a stable power source, M201 is suggested to use a 0.5W zener diode and place it close to the VBAT pins. The following figure shows the star structure of the power supply.

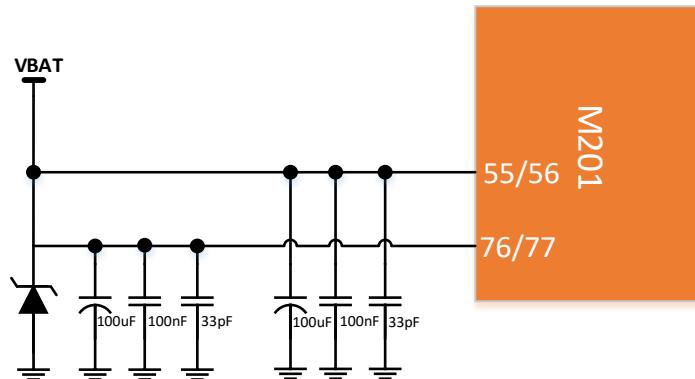


Figure : Star Structure of the Power Supply

### 4.3 Reference Design for Power Supply

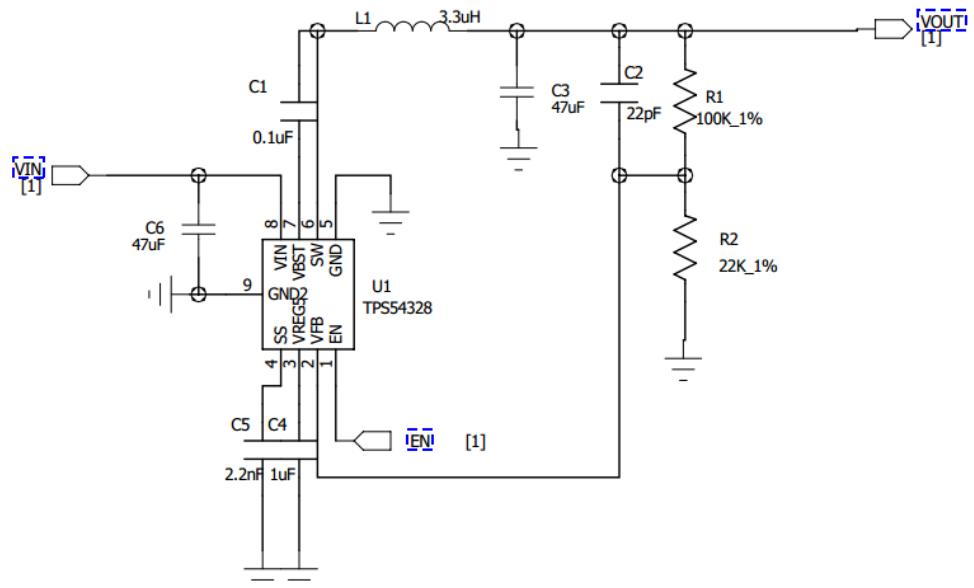


Figure: Power Supply Reference Circuit

### 4.4 M201 Mini System

The M201 extend mini system must be used minimum 13 pin as following pins.

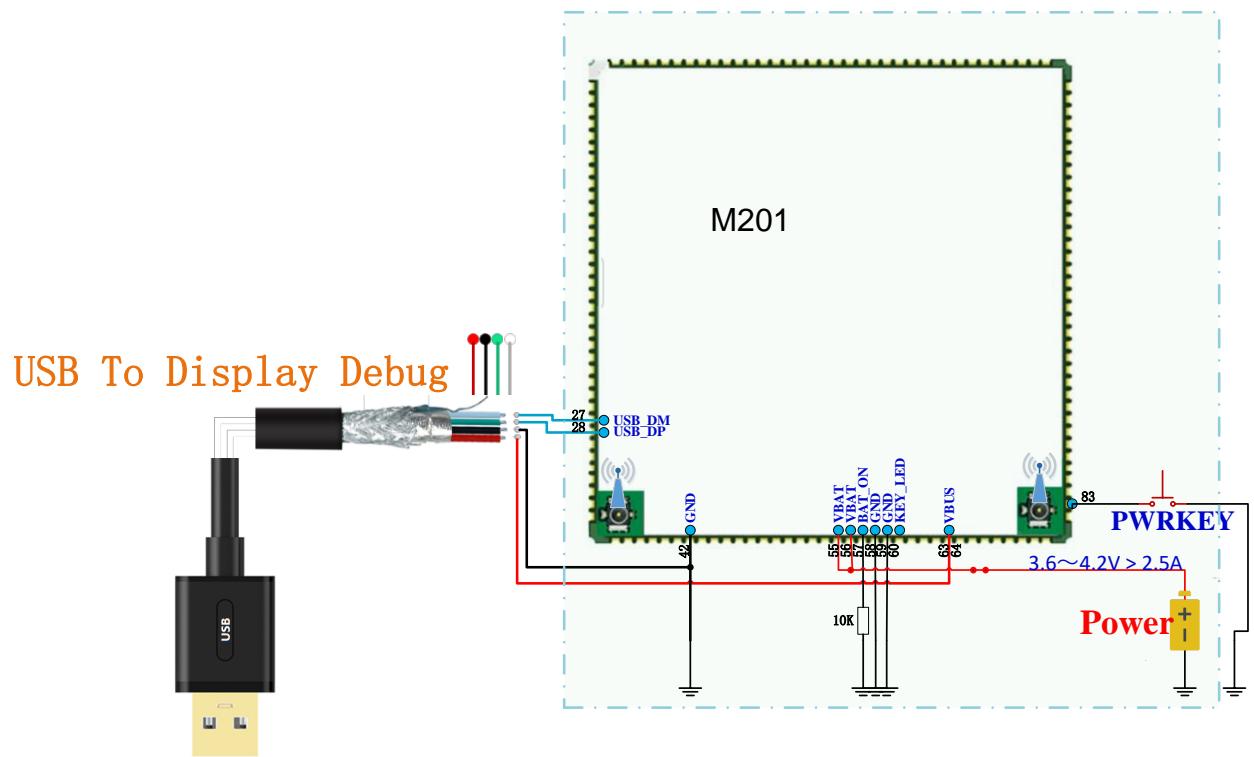


Figure :Mini System Application

## 5 Mechanical Dimensions

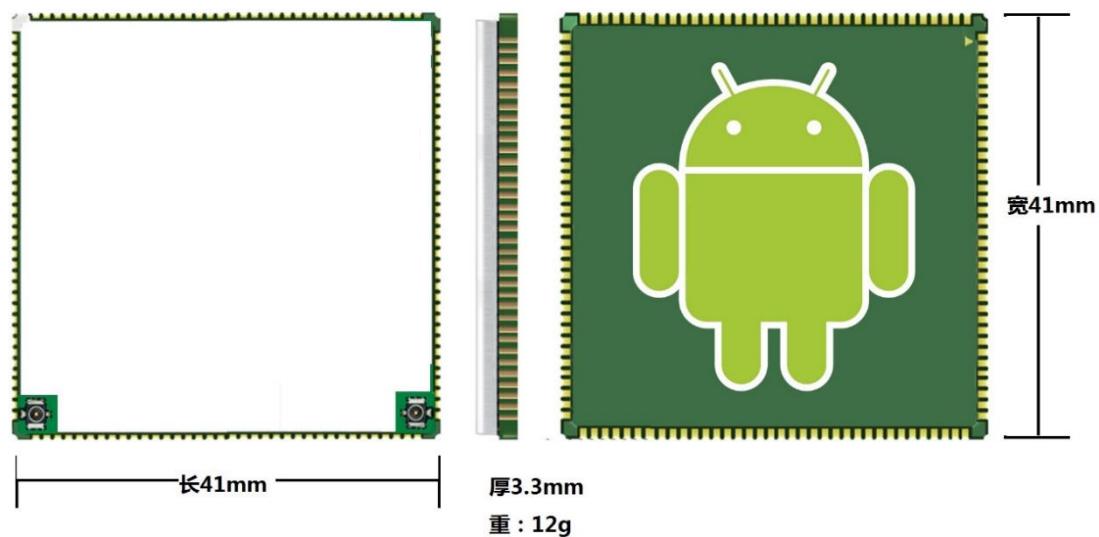


Figure :Module Top and Side Dimensions

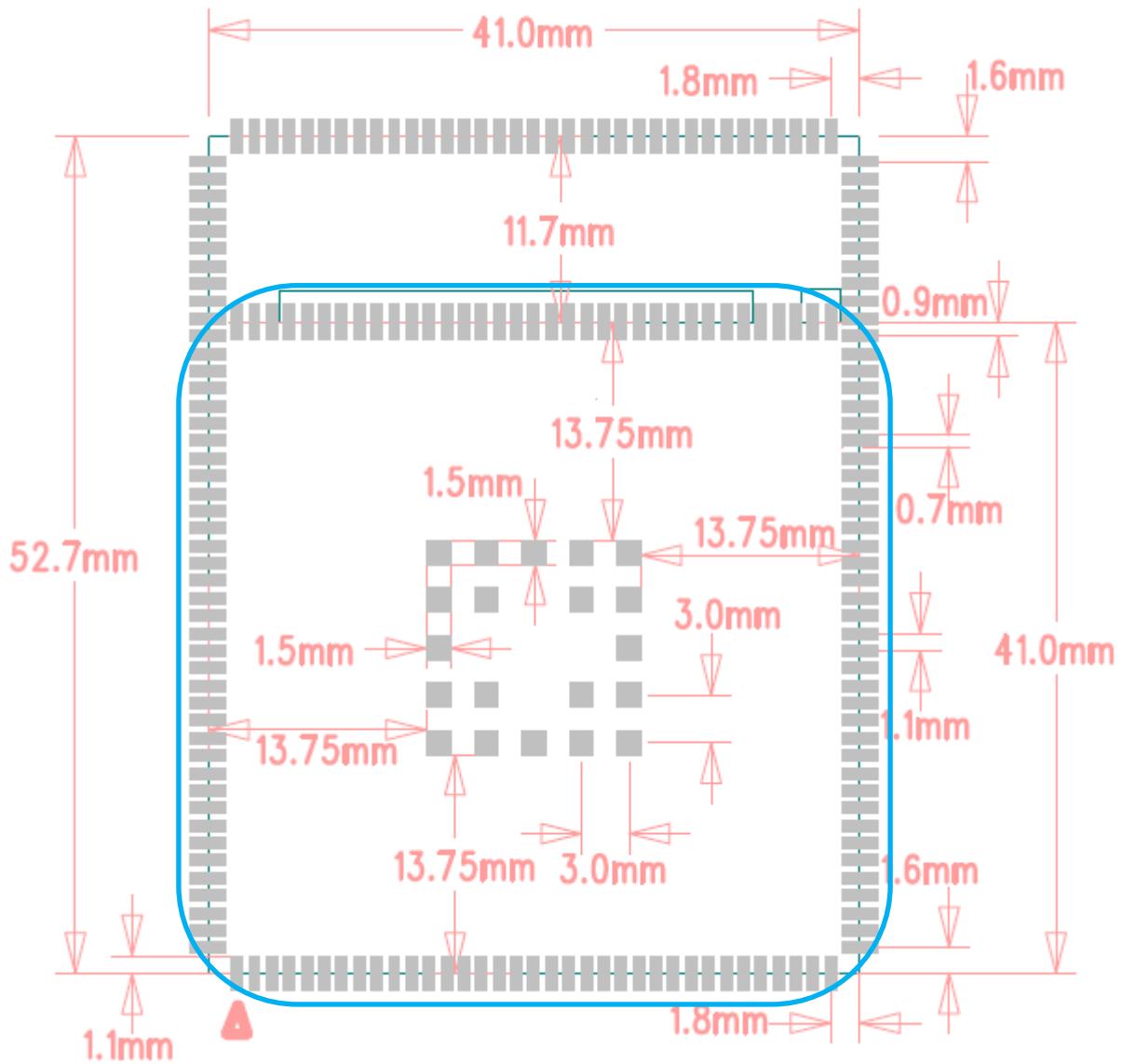


Figure : Layout PCB footprint example

Note:

M201 please refer to the Blue framework 41x41mm footprint

## 6 Packaging

M201 is packaged in the tray packing . One tray is 26cm length and 23cm width contains 20pcs modules.

The figure below shows the package details, measured in mm:

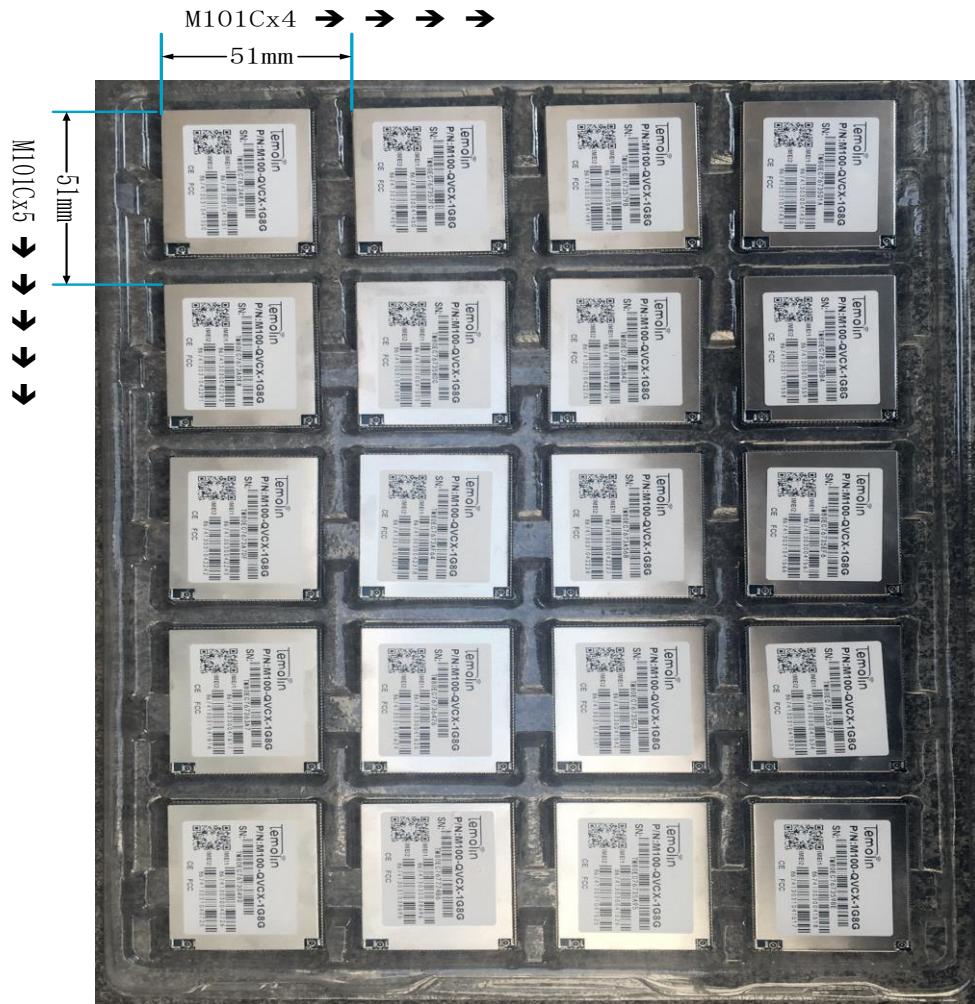


Figure: Deliver packaging example

## 7 Ordering information

M201 module are available in different configurations and densities.

For part number description as following:

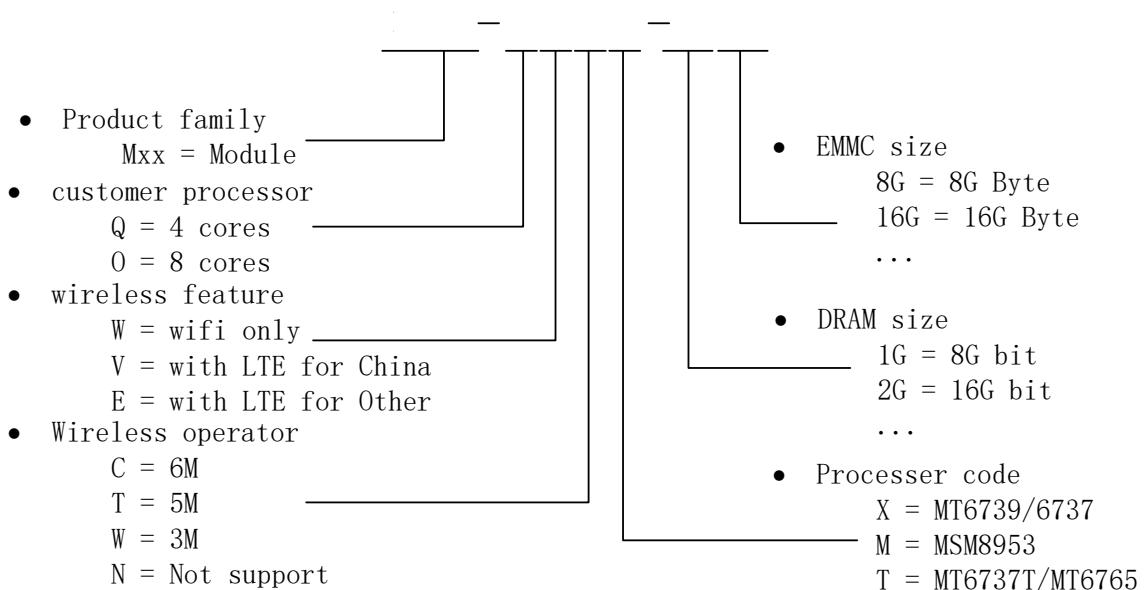


Figure: Part number description

For ordering list of module as following:

订货代码	主频	DDR3	eMMC	WIFI/BT	定位	通信制式	最大分辨率
M201-QVCX-1G8G	A53 4x1.28G	1G	8G	2.4/5G	北斗+GPS	全网通	1280x800
M201-QVCX-2G16G	A53 4x1.28G	2G	16G	2.4/5G	北斗+GPS	全网通	1280x800
M201-QVCT-1G8G	A53 4x1.28G	1G	8G	2.4/5G	北斗+GPS	全网通	1920x1080
M201-QVCT-2G16G	A53 4x1.28G	2G	16G	2.4/5G	北斗+GPS	全网通	1920x1080
M201-QECX-1G8G	A53 4x1.28G	1G	8G	2.4/5G	GPS+GLO	全球通	1280x800
M201-QECX-2G16G	A53 4x1.28G	2G	16G	2.4/5G	GPS+GLO	全球通	1280x800
M201-QECT-1G8G	A53 4x1.28G	1G	8G	2.4/5G	GPS+GLO	全球通	1920x1080
M201-QECT-2G16G	A53 4x1.28G	2G	16G	2.4/5G	GPS+GLO	全球通	1920x1080
M201-QVWX-1G8G	A53 4x1.28G	1G	8G	2.4/5G	北斗+GPS	移动/联通	1280x800
M201-QVWX-2G16G	A53 4x1.28G	2G	16G	2.4/5G	北斗+GPS	移动/联通	1280x800
M201-QVTX-1G8G	A53 4x1.28G	1G	8G	2.4/5G	北斗+GPS	移动	1280x800
M201-QVTX-2G16G	A53 4x1.28G	2G	16G	2.4/5G	北斗+GPS	移动	1280x800
M201-QWNX-1G8G	A53 4x1.28G	1G	8G	2.4/5G	北斗+GPS	-	1280x800
M201-QWNX-2G16G	A53 4x1.28G	2G	16G	2.4/5G	北斗+GPS	-	1280x800

**Integration instructions for host product manufacturers according to KDB  
996369 D03 OEM Manual v01**

**2.2 List of applicable FCC rules**

FCC Part 15.247&47 CFR FCC Part 15 Subpart E 15.407 &FCC CFR Title 47 Part 2, Part 22H &FCC CFR Title 47 Part 2, Part 24E&FCC CFR Title 47 Part 2, Part 27

**2.3 Specific operational use conditions**

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

**2.4 Limited module procedures**

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

**2.5 Trace antenna designs**

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstriptrace antenna etc.

**2.6 RF exposure considerations**

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

**2.7 Antennas**

This radio transmitter **2BOIX-M201** has been approved by Federal Communications Commission to operate with the

antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a

gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Model name	Antenna type	Antenna gain
M201	PIFA Antenna	3.0 dBi

**2.8 Label and compliance information**

The final end product must be labeled in a visible area with the following" Contains FCC ID: 2BOIX-M201".

**2.9 Information on test modes and additional testing requirements**

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

## **2.10 Additional testing, Part 15 Subpart B disclaimer**

The modular transmitter is only FCC authorized for FCC Part 15.247&47 CFR FCC Part 15 Subpart E 15.407 &FCC CFR Title 47 Part 2, Part 22H&FCC CFR Title 47 Part 2, Part 24E&FCC CFR Title 47 Part 2, Part 27 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.

**Federal Communications Commission (FCC) Statement**

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.

Note: 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 or more 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.

Warning: Changes or modifications made to this device not expressly approved by **Shanghai Mijia Electronics Technology Co., Ltd.** may void the FCC authorization to operate this device.

Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

**RF exposure statement:**

The transmitter must not be colocated or operated in conjunction with any other antenna or transmitter. This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a Minimum distance of 20cm between the radiator and any part of your body.