

User Manual

WCDMA\EDGE\GPRS\GSM module

Model;SIM5320A,SIM5320AD

Manufacture:Shanghai SIMCom Wireless Solutions Limited

Compliance Information

FCC Compliance 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. This device must accept any interference received, including interference that may cause undesired operation. Product that is a radio transmitter is labeled with FCC ID.

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 protectionagainst 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 thatinterference 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.

FCC Caution:

(1)Exposure to Radio Frequency Radiation. This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

(2) Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

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

(4) Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

(5) the modules FCC ID is not visible when installed in the host, or

(6) if the host is marketed so that end users do not have straight forward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: Contains Transmitter Module FCC ID: 2AJYU-180302008 or Contains FCC ID: 2AJYU-180302008 must be used.

1. SIM5320A Description

1.1. Summarize

Designed for global market, SIM5320A is a quad-band GSM/GPRS/EDGE and dual-band UMTS /HSDPA that works on frequencies of 850/900/1800/1900 MHz and WCDMA 1900/850MHz. The SIM5320A support HSDPA. User can choose the module based on the wireless network configuration.

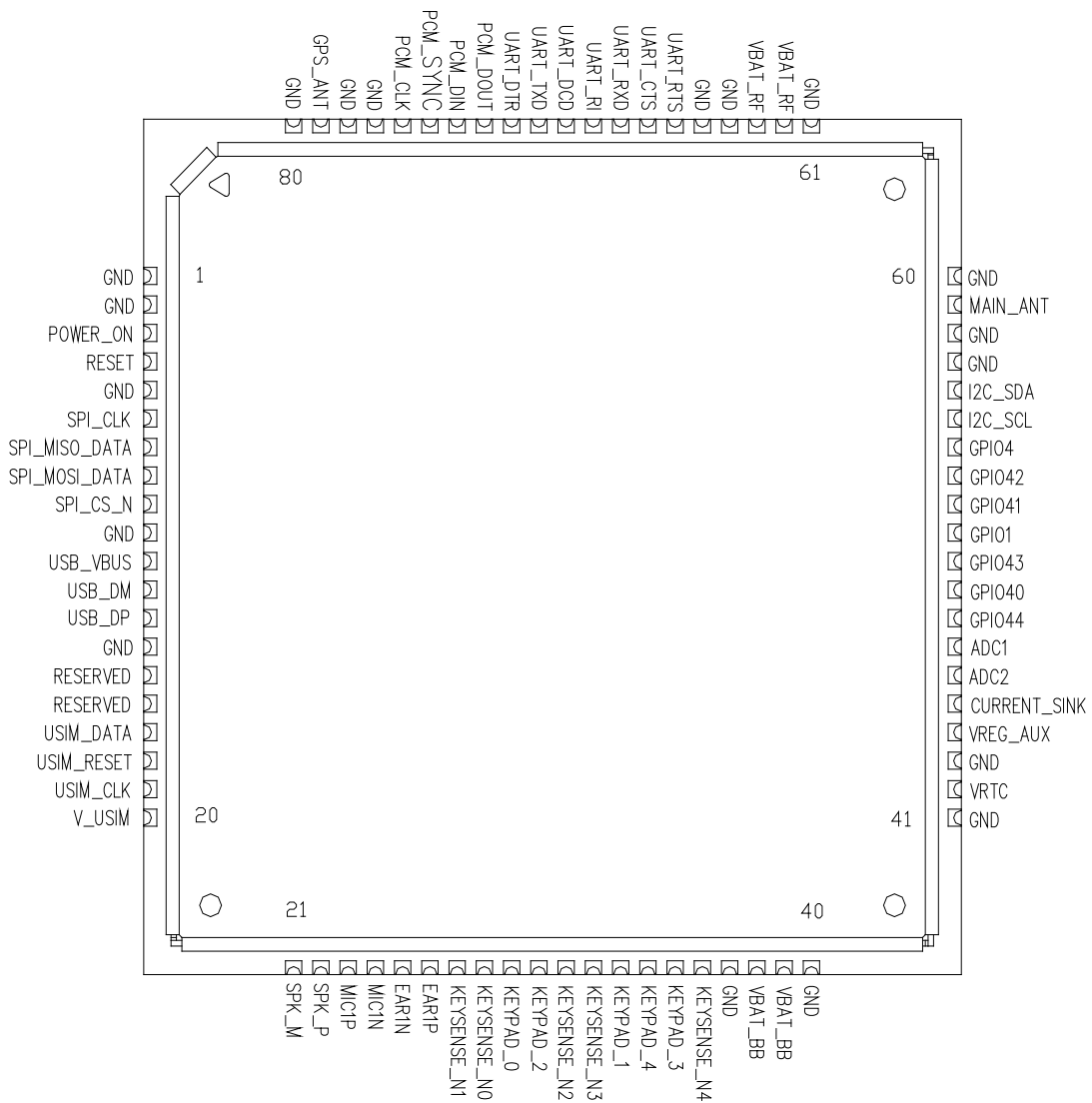
With a tiny configuration of 30*30*2.9 mm and integrated functions, SIM5320A can meet almost any space requirement in users' application, such as Smart phone, PDA phone, industrial handhelds, machine-to-machine, vehicle applications, etc..

There are 80 pins on SIM5320A, which provide most application interfaces for customers' board.

1.2. Feature

- Dual-Band UMTS/HSDPA 850/1900MHz
- Quad-Band GSM/GPRS/EDGE 850/900/1800/1900MHz
- GPRS multi-slot class 12
- EDGE multi-slot class 12
- Output power
 - UMTS 850/1900: 0.25W
 - GSM850/900: 2W
 - DCS1800/1900: 1W
- Control Via AT Commands
- Supply voltage range: 3.4~ 4.2V
- Extended operation temperature: -40°C to +85°C
- Dimension: 30 * 30 * 2.9 mm
- Weight: 5.6g
- 80 LCC pads include
 - Interface to external SIM 3V/1.8V
 - USB 2.0
 - UART
 - I2C
 - Keypad
 - SPI
 - PCM
 - GPIO
 - ADC

1.3. Pin

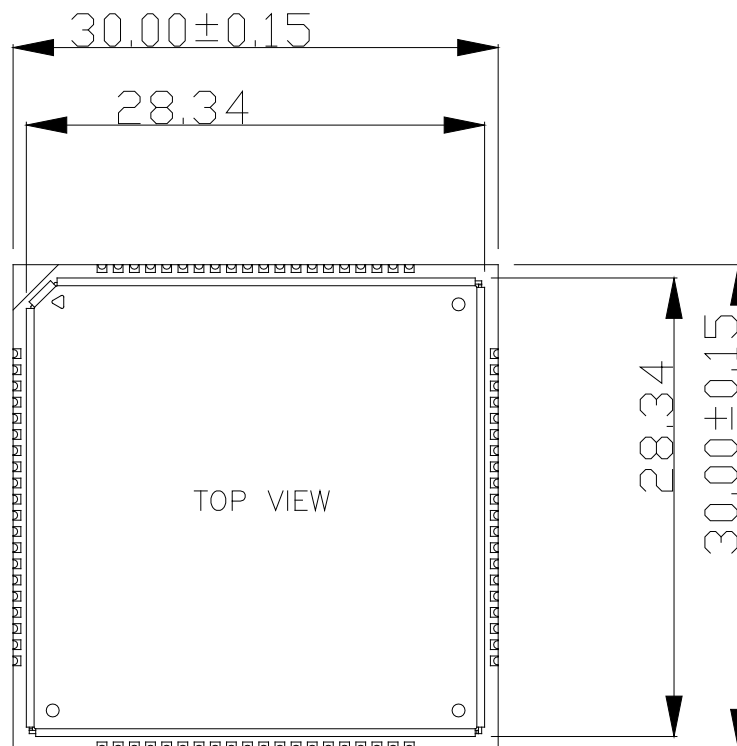


1.4. Picture



Figure 1: Top and Bottom view of SIM5320A

1.5. Dimension



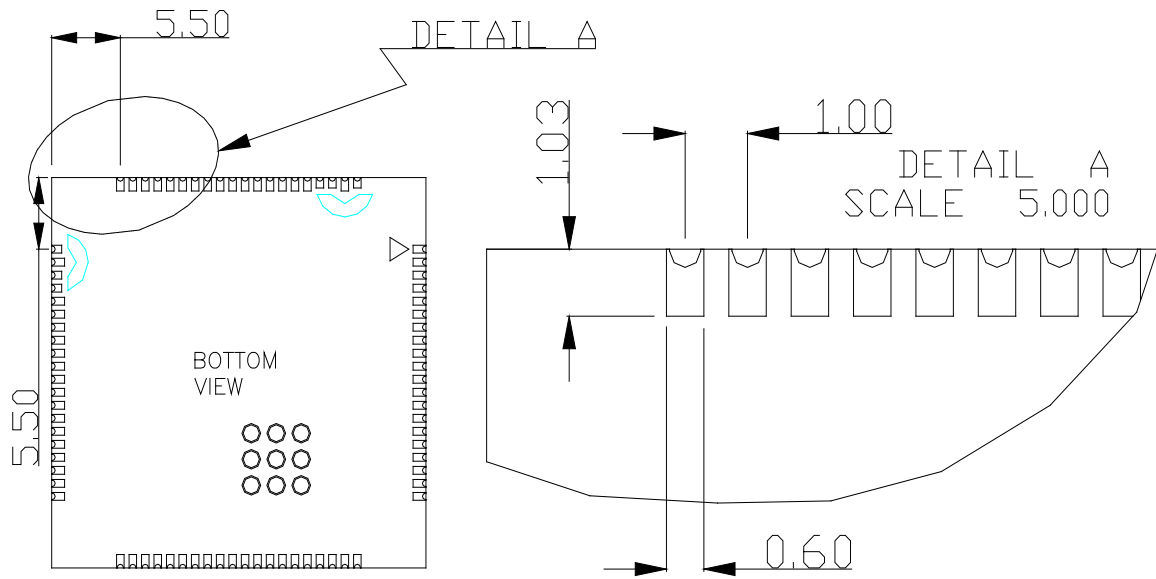


Figure 2: Dimention

2. Detail Block Diagram

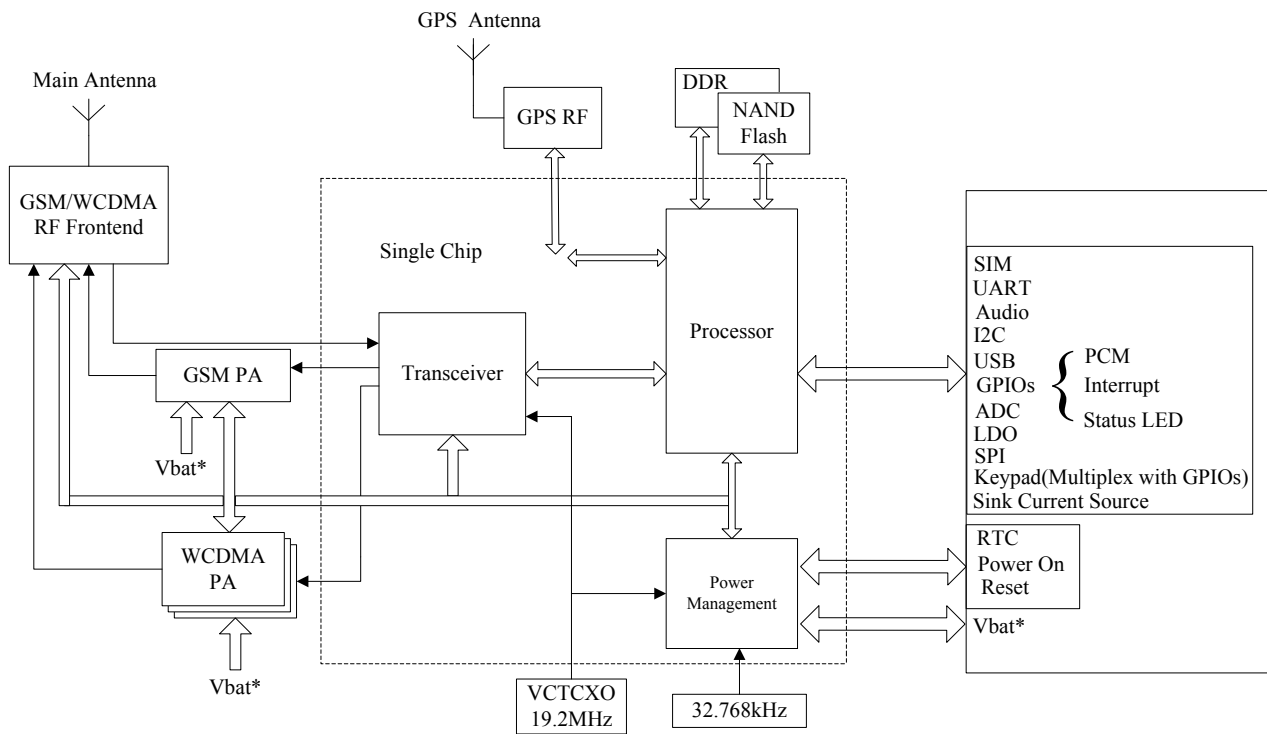


Figure 3: Block diagram of SIM5320A

3. Electrical and Reliability Characteristics

3.1. Absolute Maximum Ratings

The absolute maximum ratings stated in following table are stress ratings under non-operating conditions. Stresses beyond any of these limits will cause permanent damage to SIM5320A.

Table 1: Absolute maximum ratings

| Parameter | Min | Max | Unit |
|-------------------------------------|------|---------|------|
| Voltage at digital pins (1.8v mode) | -0.3 | 1.8+0.3 | V |
| Voltage at digital pins (2.6v mode) | -0.3 | 2.6+0.3 | V |
| Voltage at VBAT | -0.5 | 6.0 | V |
| Voltage at VRTC | 1.5 | 3.2 | V |
| Voltage at USB_VBUS | -0.5 | 6.0 | V |

3.2. USIM Card Interface Characteristics

Table 2: USIM card interface characteristics

3.3. SIM_VDD Characteristics

| Pin name | 3.0V mode | | | 1.8V mode | | |
|------------|-------------|------|--------|-------------|-----|--------|
| | Min | Typ | Max | Min | Typ | Max |
| V_USIM | 2.7 | 3.00 | 3.3 | 1.65 | 1.8 | 2.0 |
| USIM_RESET | 0.8* V_USIM | 3.00 | V_USIM | 0.8* V_USIM | 1.8 | V_USIM |
| USIM_CLK | 0.7* V_USIM | 3.00 | V_USIM | 0.8* V_USIM | 1.8 | V_USIM |
| USIM_DATA | 0.7* V_USIM | 3.00 | V_USIM | 0.8* V_USIM | 1.8 | V_USIM |

3.4. Current Consumption (VBAT = 3.8V)

Table 3: Current consumption

| GSM Sleep mode (without USB connection) | |
|---|--------------------|
| GSM850 | Sleep @DRX=2 4.5mA |
| | Sleep @DRX=5 2.7mA |
| | Sleep @DRX=9 2.3mA |
| GSM900 | Sleep @DRX=2 4.5mA |

| | |
|---|---|
| | Sleep @DRX=5 2.7mA Sleep @DRX=9 2.3mA |
| DCS1800 | Sleep @DRX=2 4.5mA Sleep @DRX=5 2.7mA Sleep @DRX=9 2.3mA |
| PCS1900 | Sleep @DRX=2 4.5mA Sleep @DRX=5 2.7mA Sleep @DRX=9 2.3mA |
| GSM Sleep Mode (with USB suspended) | |
| GSM850 | Sleep @DRX=2 4.6mA Sleep @DRX=5 2.8mA Sleep @DRX=9 2.5mA |
| GSM900 | Sleep @DRX=2 4.6mA Sleep @DRX=5 2.8mA Sleep @DRX=9 2.5mA |
| DCS1800 | Sleep @DRX=2 4.6mA Sleep @DRX=5 2.8mA Sleep @DRX=9 2.5mA |
| PCS1900 | Sleep @DRX=2 4.6mA Sleep @DRX=5 2.8mA Sleep @DRX=9 2.5mA |
| DATA mode, GPRS (1 Rx,4 Tx) CLASS 12 | |
| GSM 850 | @power level #5 <660mA, Typical 488mA |
| GSM 900 | @power level #5 <660mA, Typical 484mA |
| DCS1800 | @power level #0 <530mA, Typical 346mA |
| PCS1900 | @power level #0 <530mA, Typical 353mA |
| DATA mode, GPRS (3Rx, 2 Tx) CLASS 12 | |
| GSM 850 | @power level #5 <460mA, Typical 335mA |
| GSM 900 | @power level #5 <440mA, Typical 332mA |
| DCS1800 | @power level #0 <400mA, Typical 260mA |
| PCS1900 | @power level #0 <300mA, Typical 263mA |
| EDGE Data | |
| DATA mode, EDGE(1 Rx,4 Tx) CLASS 12 | |
| GSM 850 | @power level #8 <500mA, Typical 335mA |
| GSM 900 | @power level #8 <500mA, Typical 332mA |
| DCS1800 | @power level #2 <450mA, Typical 291mA |
| PCS1900 | @power level #2 <450mA, Typical 293mA |
| DATA mode, EDGE(3Rx, 2 Tx) CLASS 12 | |
| GSM 850 | @power level #8 <330mA, Typical 235mA |
| GSM 900 | @power level #8 <330mA, Typical 231mA |
| DCS1800 | @power level #2 <300mA, Typical 206mA |
| PCS1900 | @power level #2 <300mA, Typical 209mA |
| UMTS Sleep Mode (without USB connection) | |
| WCDMA 1900 | Sleep @DRX=9 2.2mA Sleep @DRX=8 2.7 mA Sleep @DRX=6 4.7mA |

| | |
|---|--|
| WCDMA 850 | Sleep @DRX=9 2.2mA Sleep @DRX=8 2.7 mA Sleep @DRX=6 4.7mA |
| UMTS Sleep Mode (with USB suspended) | |
| WCDMA 1900 | Sleep @DRX=9 2.4mA Sleep @DRX=8 2.8 mA Sleep @DRX=6 4.8mA |
| WCDMA 850 | Sleep @DRX=9 2.4mA Sleep @DRX=8 2.8 mA Sleep @DRX=6 4.8mA |
| HSDPA Data | |
| WCDMA 1900 | @Power 23dBm CQI=22 Typical 610mA @Power 21dBm CQI=5 Typical 540mA @Power -5dBm CQI=22 Typical 270mA |
| WCDMA 850 | @Power 23dBm CQI=22 Typical 550mA @Power 21dBm CQI=5 Typical 490mA @Power -5dBm CQI=22 Typical 220mA |

3.5. Electro-Static Discharge

SIM800H is an ESD sensitive component, so more attention should be paid to the procedure of handling and packaging. The ESD test results are shown in the following table.

Table 4: The ESD characteristics (Temperature: 25°C, Humidity: 45 %)

| Part | Contact discharge | Air discharge |
|--------------|-------------------|---------------|
| VBAT,GND | ±4KV | ±6KV |
| UART,USB | ±2KV | ±6KV |
| Antenna port | ±4KV | ±6KV |
| Other ports | ±2KV | ±2KV |

4. Radio Characteristics

4.1. Module RF Output Power

The following table shows the module conducted output power.

Table 5: SIM5320A conducted RF output power

| Frequency | Max | Min |
|-----------|------------|------------|
| GSM850 | 33dBm ±2dB | 5dBm ± 5dB |
| E-GSM900 | 33dBm ±2dB | 5dBm ± 5dB |
| DCS1800 | 30dBm ±2dB | 0dBm ± 5dB |

| | | |
|------------------|---------------|-------------|
| PCS1900 | 30dBm ±2dB | 0dBm ± 5dB |
| GSM850 (8-PSK) | 27dBm ±3dB | 5dBm ± 5dB |
| E-GSM900 (8-PSK) | 27dBm ±3dB | 5dBm ± 5dB |
| DCS1800 (8-PSK) | 26dBm +3/-4dB | 0dBm ±5dB |
| PCS1900(8-PSK) | 26dBm +3/-4dB | 0dBm ±5dB |
| WCDMA 1900 | 24dBm +1/-3dB | -56dBm ±5dB |
| WCDMA 850 | 24dBm +1/-3dB | -56dBm ±5dB |

4.2. Module RF Receive Sensitivity

The following table shows the module's conducted receive sensitivity, it is tested under static condition.

Table 6: SIM5320A conducted RF receive sensitivity

| Frequency | Receive sensitivity |
|------------|---------------------|
| GSM850 | < -106dBm |
| E-GSM900 | < -106dBm |
| DCS1800 | < -106dBm |
| PCS1900 | < -106dBm |
| WCDMA 1900 | < -108dBm |
| WCDMA 850 | < -106dBm |

4.3. Module Operating Frequencies

The following table shows the module's operating frequency range.

Table 7: SIM5320A operating frequencies

| Frequency | Receiving | Transmission |
|-----------|---------------|---------------|
| GSM850 | 869 ~894 MHz | 824 ~849 MHz |
| E-GSM900 | 925 ~960 MHz | 880 ~915 MHz |
| DCS1800 | 1805~1880 MHz | 1710~1785 MHz |
| PCS1900 | 1930~1990 MHz | 1850~1910 MHz |
| WCDMA1900 | 1930~1990 MHz | 1850~1910 MHz |
| WCDMA 850 | 869 ~894 MHz | 824 ~849 MHz |

5. Antenna interface

SIM5320A provides RF antenna interface. Customer's antenna should be located in the host board and connected to module's antenna pad through micro-strip line or other types of RF trace and the trace impedance must be controlled in 50Ω. The maximum gain of the GSM antenna gain should not exceed 3dBi considering the SAR radio. No antenna gain may be used that would exceed the 2W EIRP power limit in 1900MHz band.

SIMCom recommends that the total insertion loss between the antenna pad and antenna should meet the

following requirements:

- GSM850/GSM900<0.5dB
- DCS1800 /PCS1900<0.9dB
- WCDMA 1900<0.9dB
- WCDMA 850<0.5dB

To facilitate the antenna tuning and certification test, a RF connector and an antenna matching circuit should be added. The following figure is the recommended circuit.

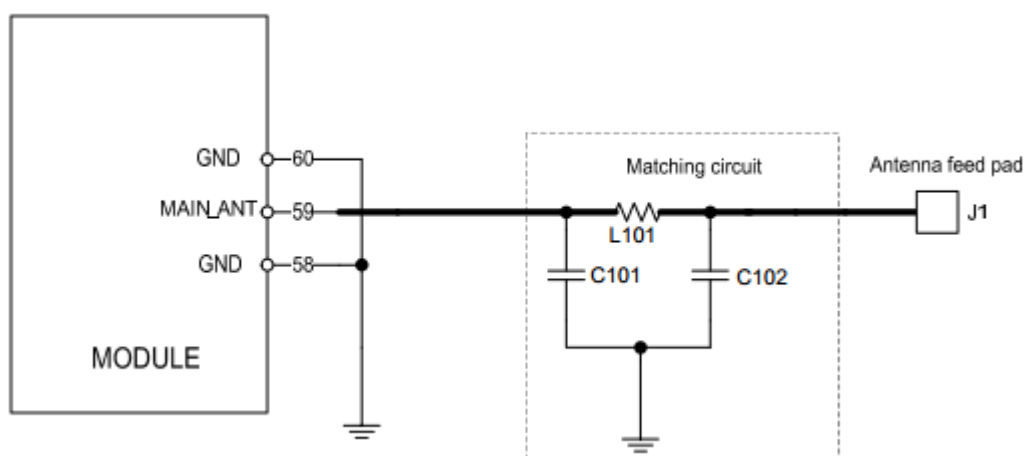


Figure1: antenna matching circuit

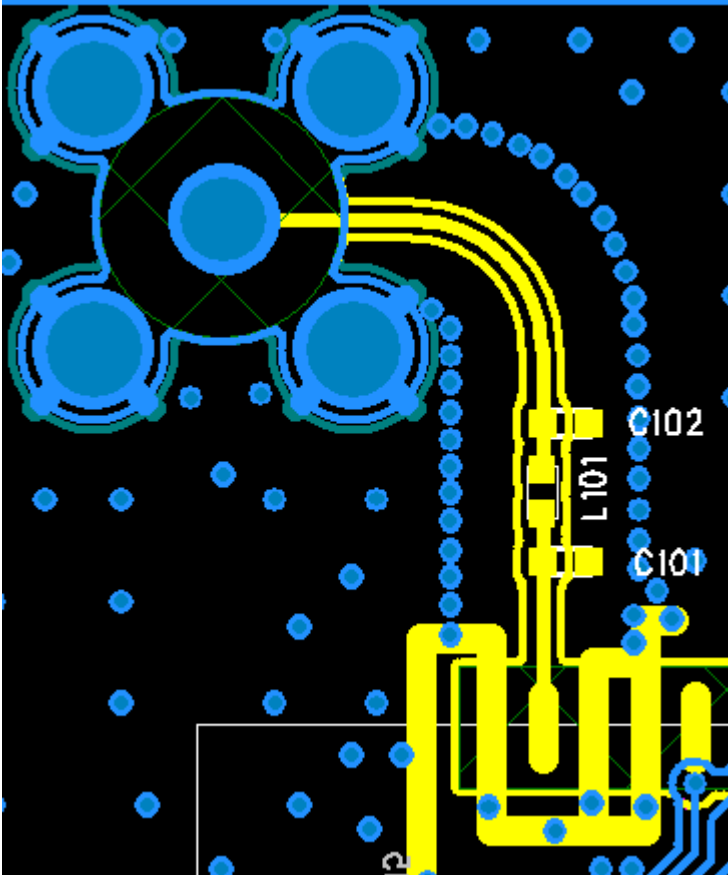
In this figure, the components L101,C101,C102 is used for antenna matching, the value of components can only be got after the antenna tuning, usually, they are provided by antenna vendor. By default, the L101 is 0 ohm resistors, and the C101, C102 are reserved for tuning.

The RF test connector in the figure is used for the conducted RF performance test, and should be placed as close as to the module's antenna pin. The traces impedance between components must be controlled in 50ohm.

5.1 Dipole Antenna Reference Design PCB

Mount these devices with brown mark facing up. Units: mm

Line width should be designed to provide 50 Ω impedance matching characteristics



5.2 Dipole Antenna Reference Design Schematic

