

HK NATER TECH LIMITED

QCA9531+AR9582-ITM-AP20-M Specification

Customer: _____

Description: QCA9531+AR9582-ITM-AP20-M V4.0

Customer P/N: _____

Date: _____

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| Approve | Auditing | Admit |
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| Provider | | |
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QCA9531+AR9582 ITM-AP20-M

Product Specification

2.4G&5.8G WiFi AP Module

Version 4.0

| Document release | Date | Modification | Approved |
|------------------|------------|-----------------------|----------|
| Version 1.0 | 2013-12-30 | Initial release | |
| Version 3.0 | 2014-08-20 | Add the SPI interface | |
| Version 4.0 | 2015-03-20 | Add the pmos | |
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1. Product Overview

The module QCA9531+AR9582-ITM-AP20-M is a complete,small form factor 802.11a/b/g/n Wi-Fi Solution optimized for low power, low-cost, and highly integrated AP and consumer electronic devices, the module integrates all Wi-Fi functionality in a package friendly to low-cost PCB design, requiring only a few external 3.3V and 5V power supply and connection to antenna.

The module based on the single chip QCA9531 and AR9582 which integrates an 802.11n 2x2 MIMO MAC/BB/ radio with internal PA and LNA. It supports 802.11 a/n operations up to 150 Mbps for 20MHZ and 300 Mbps for 40MHZ,and 80211b/g data rates.

The module support AP mode and client mode at the same time and include mass service application software to reduce the research and design work of customer.

1.1 Regulation of Each Countries

The Product must be complied with the radio requirement of

-USA: FCC Part15C compatible

-EN 300328, EN301489 certified before marketing Europe.

-Japan TELEC certified before marketing Japan

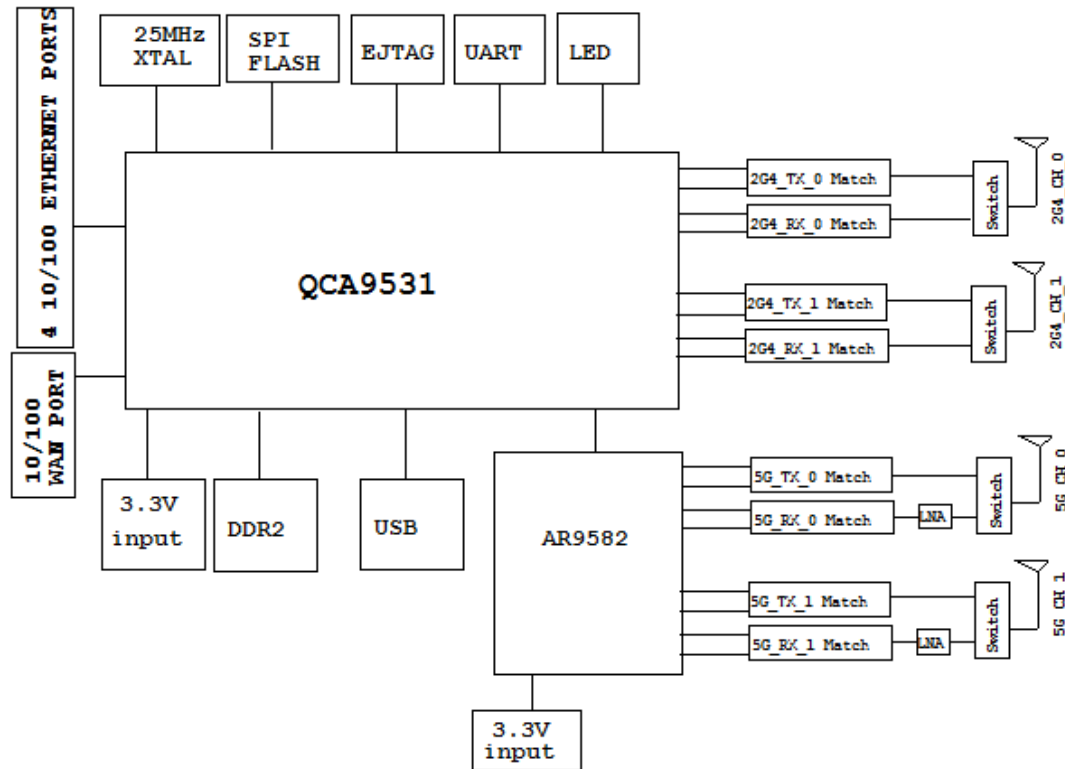
| Certification ID Number | | |
|-------------------------|--|---------|
| Country | Standard | ID/MARK |
| US | FCC P15C | TBD |
| CE | EN 300328 V1.7.1/ 301489-1and-17/60950-1 | TBD |
| JAPAN | ARIB-T66/T33 | TBD |

Note: Above regulations are representative examples. The module should get an approval by more countries.

2. Module Hardware Overview

2.1 Block Diagram

The general Hardware architecture is shown below Figure:



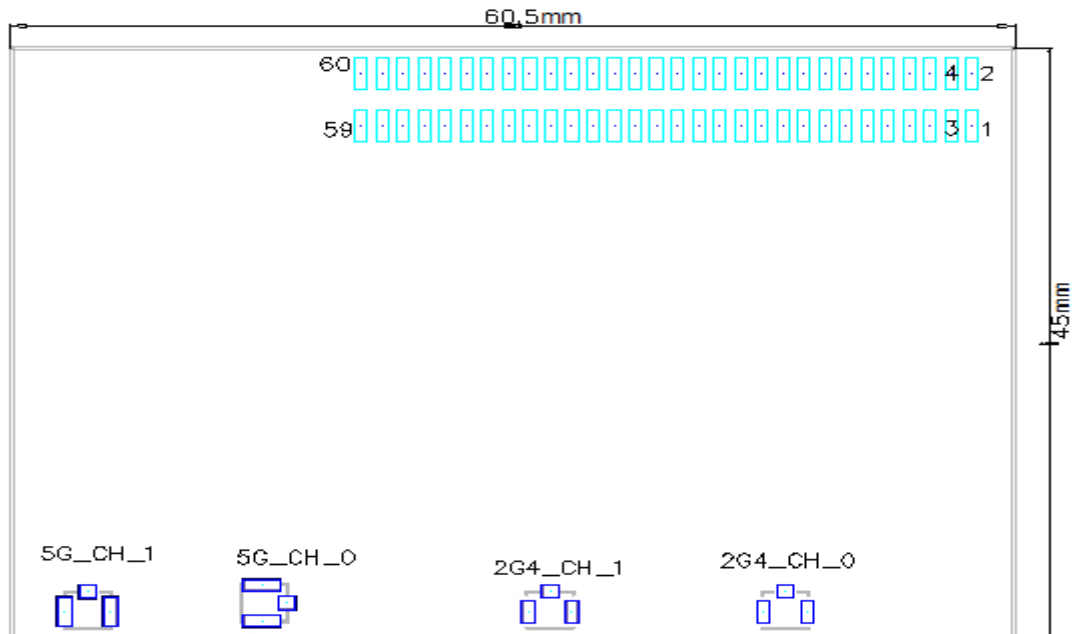
Module Block Diagram

2.2 Features

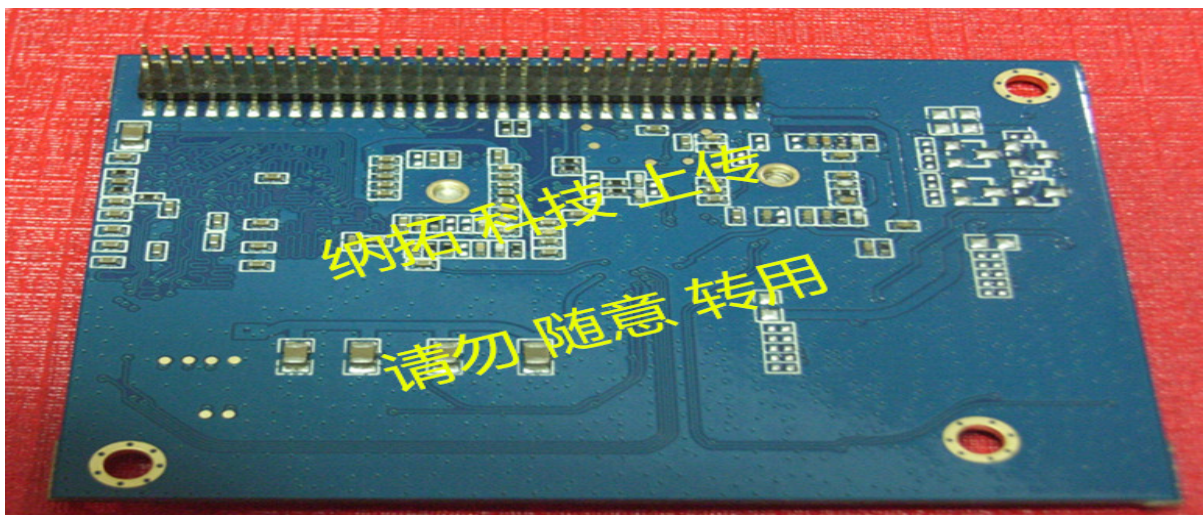
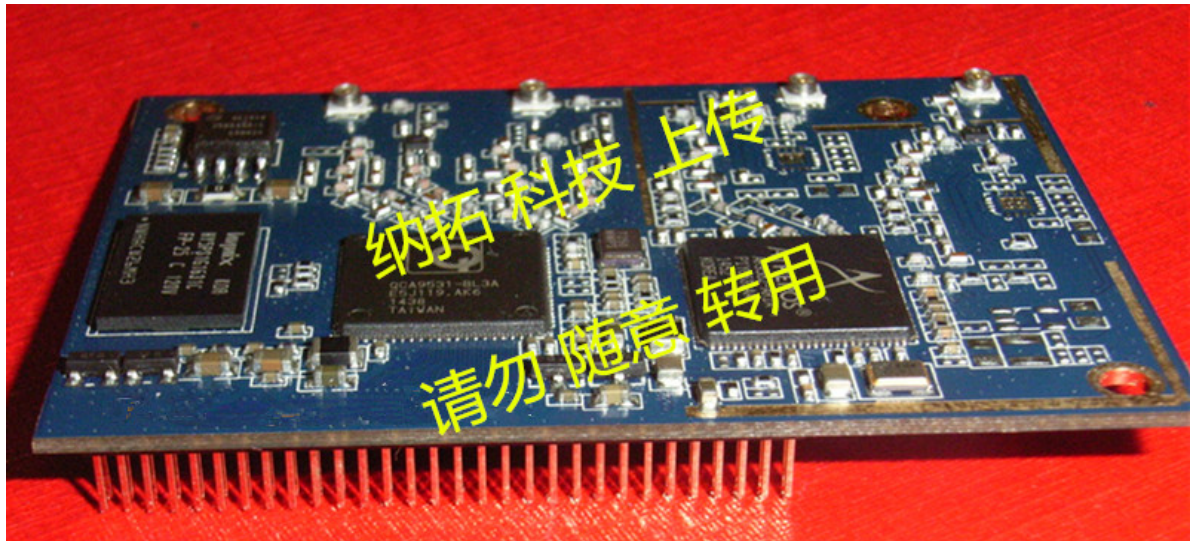
- ◆ The MIPS R24k supports 64KByte I-Cache and 32Kbyte D-Cache, targeted to operate at up to 550Mh.
- ◆ DD2 memory up to 1GB .
- ◆ SPI NOR Flash memory up to 64Mb.
- ◆ 4LAN ports and 1 WAN port .
- ◆ High-speed UART for console support.
- ◆ USB 2.0 host/device mode support.
- ◆ GPIO/LED support.

2.3 Interface

- ◆ Interface
 - 60pin DIP connector
 - Antenna: IPEX connector
- ◆ Pin definition



From Module TOP View



| Pin Number | Symbol Name | Status | Pin Description |
|------------|---------------------|--------|---|
| 1 | GND | P | GROUND |
| 2 | GND | P | GROUND |
| 3 | LED_LINK_4(GPIO_11) | I/O | LAN_PORT3_LED |
| 4 | LAN_PORT2_RX+ | IA | Ethernet port |
| 5 | LED_LINK_3(GPIO_14) | I/O | LAN_PORT2_LED |
| 6 | LAN_PORT2_RX- | IA | Ethernet port |
| 7 | LED_LINK_2(GPIO_15) | I/O | LAN_PORT1_LED |
| 8 | LAN_PORT2_TX+ | OA | Ethernet port |
| 9 | GND | P | GROUND |
| 10 | LAN_PORT2_TX- | OA | Ethernet port |
| 11 | LAN_PORT3_TX+ | OA | Ethernet port |
| 12 | GND | P | GROUND |
| 13 | LAN_PORT3_TX- | OA | Ethernet port |
| 14 | LAN_PORT1_TX+ | OA | Ethernet port |
| 15 | LAN_PORT3_RX+ | IA | Ethernet port |
| 16 | LAN_PORT1_TX- | OA | Ethernet port |
| 17 | LAN_PORT3_RX- | IA | Ethernet port |
| 18 | LAN_PORT1_RX+ | IA | Ethernet port |
| 19 | VDD_3.3V | P | 3.3V input 1000mA, recommended voltage 3.3V, Min2.97V, MAX 3.63V |
| 20 | LAN_PORT1_RX- | IA | Ethernet port |
| 21 | VDD_3.3V | P | 3.3V input 1000mA, recommended voltage 3.3V, Min2.97V, MAX 3.63V |
| 22 | GND | P | GROUND |
| 23 | GPIO_0 | I/O | GPIO |
| 24 | WAN_PORT_RX+ | IA | Ethernet port |
| 25 | GPIO_1 | I/O | GPIO |
| 26 | WAN_PORT_RX- | IA | Ethernet port |
| 27 | GPIO_2 | I/O | GPIO |
| 28 | WAN_PORT_TX+ | OA | Ethernet port |
| 29 | SPI_CLK | O | SPI_CLK |
| 30 | WAN_PORT_TX- | OA | Ethernet port |
| 31 | SPI_MO_SI | O | SPI data ouput |
| 32 | LAN_PORT0_RX+ | IA | Ethernet port |
| 33 | SPI_MI_SO | I | SPI data input |
| 34 | LAN_PORT0_RX- | IA | Ethernet port |
| 35 | USB + | IA/OA | USB signal, carries USB data to and from the USB 2.0 PHY |
| 36 | LAN_PORT0_TX+ | OA | Ethernet port |
| 37 | USB - | IA/OA | USB signal, carries USB data to and from the USB 2.0 PHY |
| 38 | LAN_PORT0_TX- | OA | Ethernet port |
| 39 | SYSTEM_LED(GPIO_13) | I/O | SYSTEM_LED |
| 40 | GND | P | GROUND |
| 41 | VDD_2.5V OUTPUT | O | I/O Voltage ouput |
| 42 | VDD_2.0V OUTPUT | P | Power supply output for peripheral network transformer |
| 43 | RESET | IH | external power on reset , it has an internal 10 K pull up resistance,the external pull low effective. |

| | | | |
|----|----------------------------|-----|---|
| 44 | VDD_2.0V OUTPUT | P | Power supply output for peripheral network transformer |
| 45 | JUMPSTART (GPIO_17) | I | KEY_INPUT start WPS function, it has an internal 10 K pull-up resistor, the external pull low effective |
| 46 | GND | P | GROUND |
| 47 | GND | P | GROUND |
| 48 | NC | P | NC |
| 49 | AC_3.3V | P | 3.3V input 1000mA, recommended voltage 3.3V,Min2.97V, MAX 3.63V |
| 50 | NC | P | NC |
| 51 | AC_3.3V | P | 3.3V input 1000mA, recommended voltage 3.3V,Min2.97V, MAX 3.63V |
| 52 | NC | NC | RESERVED |
| 53 | WAN_LED(GPIO_4) | I/O | WAN LED |
| 54 | LED_LINK_1(GPIO_16) | I/O | LAN_PORT0_LED |
| 55 | 5G_WLAN_LED(AR9582_GPIO_7) | O | 5G_wifi_LED |
| 56 | 2.4G_WLAN_LED(GPIO_12) | O | 2.4G_wifi_LED |
| 57 | UART_RX (GPIO_9) | I | Serial data in |
| 58 | UART_TX (GPIO_10) | O | Serial data out |
| 59 | GND | P | GROUND |
| 60 | GND | P | GROUND |

Note:

- ✧ I/O A digital bidirectional signal
- ✧ I A digital input signal
- ✧ O A digital output signal
- ✧ P A power or ground signal
- ✧ OA An analog output signal
- ✧ IA Analog input signal
- ✧ IH Input signals with weak internal pull-up,to prevent signals from floating when left open
- ✧ NC no connection should be made to this pin

3. Electrical Specification

3.1 Recommended operating rating

| Element | Symbol | Min | Typ | Max | Unit |
|-------------------|----------|-----|-----|-----|------|
| DC supply voltage | VDD_3.3V | 3.0 | 3.3 | 3.6 | (V) |
| DC supply voltage | AC_3.3V | 3.0 | 3.3 | 3.6 | (V) |
| DC supply voltage | nc | nc | nc | nc | (V) |

3.2 DC Characteristics

| Symbol | Parameter | Min | Typ | Max | Unit |
|----------|--|-----|-----|-----|------|
| | | | | | |
| | | | | | |
| | | | | | |
| VDD_3.3V | Continuous Tx Current 2.4GHz(Dual Chain) | -- | | 678 | (mA) |
| | Continuous Rx Current 2.4GHz(Dual Chain) | -- | | 540 | (mA) |
| AC_3.3V | Continuous Tx Current 5GHz(Dual Chain) | -- | | 514 | (mA) |
| | Continuous Rx Current 5GHz(Dual Chain) | -- | | 460 | (mA) |
| nc | Continuous Tx Current 5GHz(Dual Chain) | -- | | nc | (mA) |

3.3 Environment Storage Condition

| Environment condition | |
|-----------------------|--|
| Temperature | Operating Temperature: -10 deg.C ~70 deg.C |
| | Storage Temperature: -40 deg.C ~80 deg.C |
| Humidity | Operating Humidity: 5% ~95% (Non-condensing) |
| | Storage Humidity: 5% ~95% (Non-condensing) |

4. RF Specification

4.1 IEEE 802.11b

| Items | Contents | | | |
|--|----------------|------|------|------|
| Specification | IEEE 802.11b | | | |
| Modulation technique | DSSS/CCK | | | |
| Channel | CH1 ~ CH13 | | | |
| Data rate | 1,2,5.5,11Mbps | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels(SISO) | | | | |
| 1)Target Power@1Mbps | 15 | 17 | 19 | dBm |
| 2)Target Power@2Mbps | 15 | 17 | 19 | dBm |
| 3)Target Power@5.5Mbps | 15 | 17 | 19 | dBm |
| 4)Target Power@11Mbps | 15 | 17 | 19 | dBm |
| 2. Spectrum Mask@Target Power | | | | |
| 1) $f_c - 33\text{MHz} < f < f_c - 22\text{MHz}$ | - | - | -50 | dBr |
| 2) $f_c - 22\text{MHz} < f < f_c - 11\text{MHz}$ | - | - | -30 | dBr |
| 3) $f_c + 11\text{MHz} < f < f_c + 22\text{MHz}$ | - | - | -30 | dBr |
| 4) $f_c + 22\text{MHz} < f < f_c + 33\text{MHz}$ | - | - | -50 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) 1Mbps | - | | -10 | dB |
| 2) 2Mbps | - | | -10 | dB |
| 3) 5.5Mbps | - | | -10 | dB |
| 4) 11Mbps | - | | -10 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) 1Mbps(PER ≤ 8%) | - | -94 | -90 | dBm |
| 2) 2Mbps(PER ≤ 8%) | - | -94 | -90 | dBm |
| 3) 5.5Mbps(PER ≤ 8%) | - | -92 | -89 | dBm |
| 4) 11Mbps(PER ≤ 8%) | - | -88 | -76 | dBm |
| 6. Maximum Input Level (PER ≤ 8%) | -10 | - | - | dBm |

4.2 IEEE 802.11g

| Items | Contents | | | |
|--|---------------------------|------|------|------|
| Specification | IEEE 802.11g | | | |
| Modulation technique | OFDM | | | |
| Channel | CH1 ~ CH13 | | | |
| Data rate | 6,9,12,18,24,36,48,54Mbps | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels(SISO) | | | | |
| 1)Target Power@6Mbps | 15 | 17 | 19 | dBm |
| 2)Target Power@9Mbps | 15 | 17 | 19 | dBm |
| 3)Target Power@12Mbps | 15 | 17 | 19 | dBm |
| 4)Target Power@18Mbps | 15 | 17 | 19 | dBm |
| 5)Target Power@24Mbps | 15 | 17 | 19 | dBm |
| 6)Target Power@36Mbps | 14 | 16 | 18 | dBm |
| 7)Target Power@48Mbps | 13 | 15 | 17 | dBm |
| 8)Target Power@54Mbps | 12 | 14 | 16 | dBm |
| 2. Spectrum Mask@Target Power | | | | |
| 1) at $f_c \pm 11\text{MHz}$ | - | - | -20 | dBr |
| 2) at $f_c \pm 20\text{MHz}$ | - | - | -28 | dBr |
| 3) at $f_c > \pm 30\text{MHz}$ | - | - | -40 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) 6Mbps | - | | -5 | dB |
| 2) 9Mbps | - | | -8 | dB |
| 3) 12Mbps | - | | -10 | dB |
| 4) 18Mbps | - | | -13 | dB |
| 5) 24Mbps | - | | -16 | dB |
| 6) 36Mbps | - | | -19 | dB |
| 7) 48Mbps | - | | -22 | dB |
| 8) 54Mbps | - | -31 | -25 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) 6Mbps(PER < 10%) | - | -94 | -82 | dBm |
| 2) 9Mbps(PER < 10%) | - | -93 | -81 | dBm |
| 3) 12Mbps(PER < 10%) | - | -92 | -79 | dBm |
| 4) 18Mbps(PER < 10%) | - | -90 | -77 | dBm |
| 5) 24Mbps(PER < 10%) | - | -86 | -74 | dBm |
| 6) 36Mbps(PER < 10%) | - | -83 | -70 | dBm |
| 7) 48Mbps(PER < 10%) | - | -75 | -66 | dBm |
| 8) 54Mbps(PER < 10%) | - | -74 | -65 | dBm |
| 6. Maximum Input Level (PER < 10%) | -20 | - | - | dBm |

4.3 IEEE 802.11n HT20(2.4G)

| Items | Contents | | | |
|--|-------------------|------|------|------|
| Specification | IEEE 802.11n HT20 | | | |
| Modulation technique | OFDM | | | |
| Channel | CH1 ~ CH13 | | | |
| Data rate | MCS0 ~ MCS15 | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels | | | | |
| 1)Target Power@MCS0 | 15 | 17 | 19 | dBm |
| 2)Target Power@MCS1 | 15 | 17 | 19 | dBm |
| 3)Target Power@MCS2 | 15 | 17 | 19 | dBm |
| 4)Target Power@MCS3 | 15 | 17 | 19 | dBm |
| 5)Target Power@MCS4 | 14 | 16 | 18 | dBm |
| 6)Target Power@MCS5 | 13 | 15 | 17 | dBm |
| 7)Target Power@MCS6 | 12 | 14 | 16 | dBm |
| 8)Target Power@MCS7 | 11 | 13 | 15 | dBm |
| 2. Spectrum Mask@14dBm | | | | |
| 1) at $f_c \pm 11\text{MHz}$ | - | - | -20 | dBr |
| 2) at $f_c \pm 20\text{MHz}$ | - | - | -28 | dBr |
| 3) at $f_c > \pm 30\text{MHz}$ | - | - | -45 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) MCS0 | - | | -5 | dB |
| 2) MCS1 | - | | -10 | dB |
| 3) MCS2 | - | | -13 | dB |
| 4) MCS3 | - | | -16 | dB |
| 5) MCS4 | - | | -19 | dB |
| 6) MCS5 | - | | -22 | dB |
| 7) MCS6 | - | | -25 | dB |
| 8) MCS7 | - | -31 | -28 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) MCS0(PER < 10%) | - | -94 | -82 | dBm |
| 2) MCS1(PER < 10%) | - | -91 | -79 | dBm |
| 3) MCS2(PER < 10%) | - | -89 | -77 | dBm |
| 4) MCS3(PER < 10%) | - | -85 | -74 | dBm |
| 5) MCS4(PER < 10%) | - | -81 | -70 | dBm |
| 6) MCS5(PER < 10%) | - | -77 | -66 | dBm |
| 7) MCS6(PER < 10%) | - | -75 | -65 | dBm |
| 8) MCS7(PER < 10%) | - | -73 | -64 | dBm |
| 6. Maximum Input Level (PER < 10%) | -20 | - | - | dBm |

4. 4 IEEE 802.11n HT40(2.4G)

| Items | Contents | | | |
|--|-------------------|------|------|------|
| Specification | IEEE 802.11n HT40 | | | |
| Modulation technique | OFDM | | | |
| Channel | CH3 ~ CH11 | | | |
| Data rate | MCS0 ~ MCS15 | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels | | | | |
| 1)Target Power@MCS0 | 14 | 16 | 18 | dBm |
| 2)Target Power@MCS1 | 14 | 16 | 18 | dBm |
| 3)Target Power@MCS2 | 14 | 16 | 18 | dBm |
| 4)Target Power@MCS3 | 14 | 16 | 18 | dBm |
| 5)Target Power@MCS4 | 13 | 15 | 17 | dBm |
| 6)Target Power@MCS5 | 12 | 14 | 16 | dBm |
| 7)Target Power@MCS6 | 11 | 13 | 15 | dBm |
| 8)Target Power@MCS7 | 11 | 13 | 15 | dBm |
| 2. Spectrum Mask@14dBm | | | | |
| 1) at $f_c \pm 11\text{MHz}$ | - | - | -20 | dBr |
| 2) at $f_c \pm 20\text{MHz}$ | - | - | -28 | dBr |
| 3) at $f_c > \pm 30\text{MHz}$ | - | - | -45 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) MCS0 | - | | -5 | dB |
| 2) MCS1 | - | | -10 | dB |
| 3) MCS2 | - | | -13 | dB |
| 4) MCS3 | - | | -16 | dB |
| 5) MCS4 | - | | -19 | dB |
| 6) MCS5 | - | | -22 | dB |
| 7) MCS6 | - | | -25 | dB |
| 8) MCS7 | - | -32 | -28 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) MCS0(PER < 10%) | - | -91 | -79 | dBm |
| 2) MCS1(PER < 10%) | - | -88 | -76 | dBm |
| 3) MCS2(PER < 10%) | - | -86 | -74 | dBm |
| 4) MCS3(PER < 10%) | - | -82 | -71 | dBm |
| 5) MCS4(PER < 10%) | - | -79 | -67 | dBm |
| 6) MCS5(PER < 10%) | - | -74 | -63 | dBm |
| 7) MCS6(PER < 10%) | - | -72 | -62 | dBm |
| 8) MCS7(PER < 10%) | - | -70 | -61 | dBm |
| 6. Maximum Input Level (PER < 10%) | -20 | - | - | dBm |

4.5 IEEE 802.11a

| Items | Contents | | | |
|--|---------------------------|------|------|------|
| Specification | IEEE 802.11a | | | |
| Modulation technique | OFDM | | | |
| Channel | 5180 ~ 5825MHz | | | |
| Data rate | 6,9,12,18,24,36,48,54Mbps | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels(SISO) | | | | |
| 1)Target Power@6Mbps | 13 | 15 | 17 | dBm |
| 2)Target Power@9Mbps | 13 | 15 | 17 | dBm |
| 3)Target Power@12Mbps | 13 | 15 | 17 | dBm |
| 4)Target Power@18Mbps | 13 | 15 | 17 | dBm |
| 5)Target Power@24Mbps | 13 | 15 | 17 | dBm |
| 6)Target Power@36Mbps | 10 | 12 | 14 | dBm |
| 7)Target Power@48Mbps | 8 | 10 | 12 | dBm |
| 8)Target Power@54Mbps | 8 | 10 | 12 | dBm |
| 2. Spectrum Mask@Target Power | | | | |
| 1) at $f_c \pm 11\text{MHz}$ | - | - | -20 | dBr |
| 2) at $f_c \pm 20\text{MHz}$ | - | - | -28 | dBr |
| 3) at $f_c > \pm 30\text{MHz}$ | - | - | -40 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) 6Mbps | - | | -5 | dB |
| 2) 9Mbps | - | | -8 | dB |
| 3) 12Mbps | - | | -10 | dB |
| 4) 18Mbps | - | | -13 | dB |
| 5) 24Mbps | - | | -16 | dB |
| 6) 36Mbps | - | | -19 | dB |
| 7) 48Mbps | - | | -22 | dB |
| 8) 54Mbps | - | -29 | -25 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) 6Mbps(PER < 10%) | - | -94 | -82 | dBm |
| 2) 9Mbps(PER < 10%) | - | -93 | -81 | dBm |
| 3) 12Mbps(PER < 10%) | - | -92 | -79 | dBm |
| 4) 18Mbps(PER < 10%) | - | -89 | -77 | dBm |
| 5) 24Mbps(PER < 10%) | - | -86 | -74 | dBm |
| 6) 36Mbps(PER < 10%) | - | -82 | -70 | dBm |
| 7) 48Mbps(PER < 10%) | - | -78 | -66 | dBm |
| 8) 54Mbps(PER < 10%) | - | -77 | -65 | dBm |
| 6. Maximum Input Level (PER < 10%) | -30 | - | - | dBm |

4. 6 IEEE 802.11n HT20(5G)

| Items | Contents | | | |
|--|---------------------|------|------|------|
| Specification | IEEE 802.11a/n HT20 | | | |
| Modulation technique | OFDM | | | |
| Channel | 5180 ~ 5825MHz | | | |
| Data rate | MCS0 ~ MCS15 | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels | | | | |
| 1)Target Power@MCS0 | 13 | 15 | 17 | dBm |
| 2)Target Power@MCS1 | 13 | 15 | 17 | dBm |
| 3)Target Power@MCS2 | 12 | 14 | 15 | dBm |
| 4)Target Power@MCS3 | 11 | 13 | 15 | dBm |
| 5)Target Power@MCS4 | 11 | 13 | 15 | dBm |
| 6)Target Power@MCS5 | 11 | 13 | 15 | dBm |
| 7)Target Power@MCS6 | 9 | 11 | 13 | dBm |
| 8)Target Power@MCS7 | 8 | 10 | 12 | dBm |
| 2. Spectrum Mask@14dBm | | | | |
| 1) at $f_c \pm 11\text{MHz}$ | - | - | -20 | dBr |
| 2) at $f_c \pm 20\text{MHz}$ | - | - | -28 | dBr |
| 3) at $f_c > \pm 30\text{MHz}$ | - | - | -45 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) MCS0 | - | | -5 | dB |
| 2) MCS1 | - | | -10 | dB |
| 3) MCS2 | - | | -13 | dB |
| 4) MCS3 | - | | -16 | dB |
| 5) MCS4 | - | | -19 | dB |
| 6) MCS5 | - | | -22 | dB |
| 7) MCS6 | - | | -25 | dB |
| 8) MCS7 | - | -30 | -28 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) MCS0(PER < 10%) | - | -93 | -82 | dBm |
| 2) MCS1(PER < 10%) | - | -91 | -79 | dBm |
| 3) MCS2(PER < 10%) | - | -88 | -77 | dBm |
| 4) MCS3(PER < 10%) | - | -83 | -74 | dBm |
| 5) MCS4(PER < 10%) | - | -80 | -70 | dBm |
| 6) MCS5(PER < 10%) | - | -76 | -66 | dBm |
| 7) MCS6(PER < 10%) | - | -75 | -65 | dBm |
| 8) MCS7(PER < 10%) | - | -73 | -64 | dBm |
| 6. Maximum Input Level (PER < 10%) | -30 | - | - | dBm |

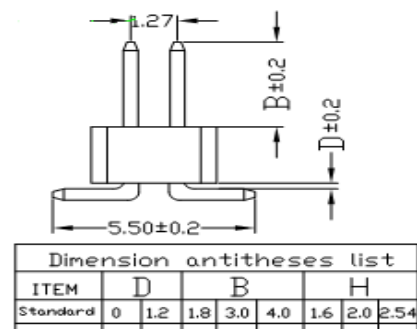
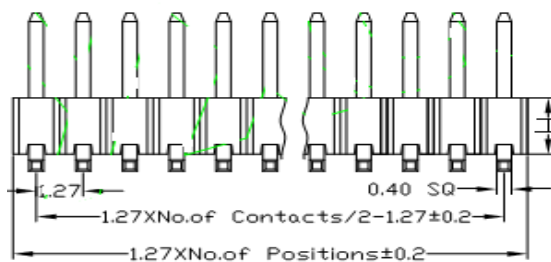
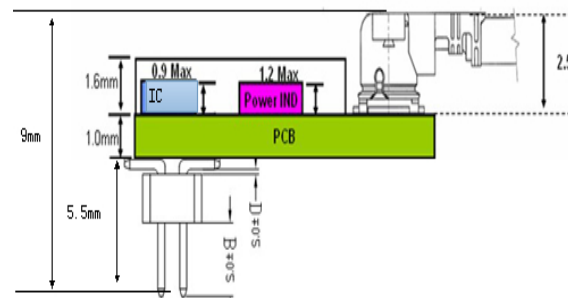
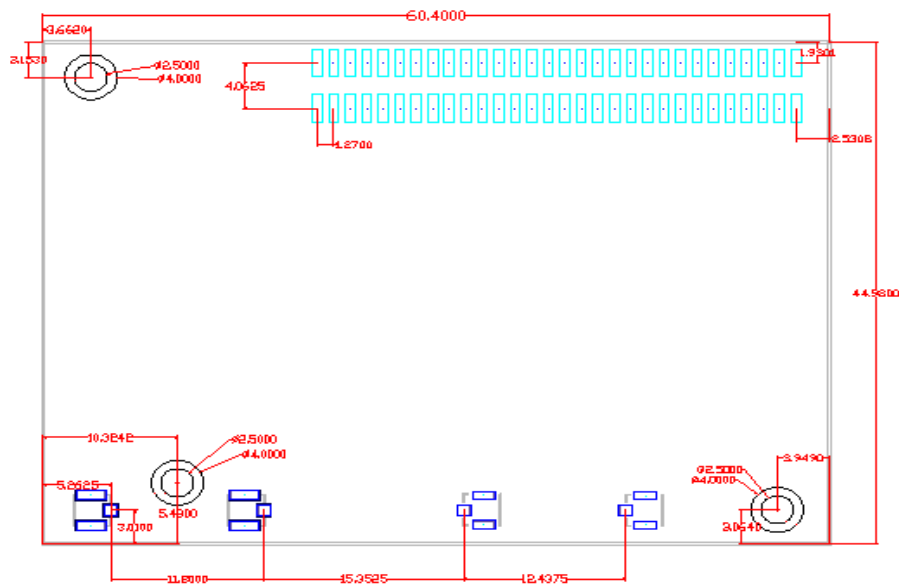
4. 7 IEEE 802.11n HT40(5G)

| Items | Contents | | | |
|--|---------------------|------|------|------|
| Specification | IEEE 802.11a/n HT40 | | | |
| Modulation technique | OFDM | | | |
| Channel | 5190 ~ 5815MHz | | | |
| Data rate | MCS0 ~ MCS15 | | | |
| TX Characteristics | Min. | Typ. | Max. | Unit |
| 1. Power Levels | | | | |
| 1)Target Power@MCS0 | 13 | 15 | 17 | dBm |
| 2)Target Power@MCS1 | 11 | 13 | 15 | dBm |
| 3)Target Power@MCS2 | 11 | 13 | 15 | dBm |
| 4)Target Power@MCS3 | 11 | 13 | 15 | dBm |
| 5)Target Power@MCS4 | 11 | 13 | 15 | dBm |
| 6)Target Power@MCS5 | 10 | 12 | 14 | dBm |
| 7)Target Power@MCS6 | 9 | 11 | 13 | dBm |
| 8)Target Power@MCS7 | 7 | 9 | 11 | dBm |
| 2. Spectrum Mask@14dBm | | | | |
| 1) at $f_c \pm 11\text{MHz}$ | - | - | -20 | dBr |
| 2) at $f_c \pm 20\text{MHz}$ | - | - | -28 | dBr |
| 3) at $f_c > \pm 30\text{MHz}$ | - | - | -45 | dBr |
| 3. Frequency Error | -20 | - | +20 | ppm |
| 4. Modulation Accuracy(EVM)@Target Power | | | | |
| 1) MCS0 | - | | -5 | dB |
| 2) MCS1 | - | | -10 | dB |
| 3) MCS2 | - | | -13 | dB |
| 4) MCS3 | - | | -16 | dB |
| 5) MCS4 | - | | -19 | dB |
| 6) MCS5 | - | | -22 | dB |
| 7) MCS6 | - | | -25 | dB |
| 8) MCS7 | - | -31 | -28 | dB |
| RX Characteristics | Min. | Typ. | Max. | Unit |
| 5. Minimum Input Level Sensitivity | | | | |
| 1) MCS0(PER < 10%) | - | -89 | -79 | dBm |
| 2) MCS1(PER < 10%) | - | -87 | -76 | dBm |
| 3) MCS2(PER < 10%) | - | -84 | -74 | dBm |
| 4) MCS3(PER < 10%) | - | -80 | -71 | dBm |
| 5) MCS4(PER < 10%) | - | -77 | -67 | dBm |
| 6) MCS5(PER < 10%) | - | -73 | -63 | dBm |
| 7) MCS6(PER < 10%) | - | -71 | -62 | dBm |
| 8) MCS7(PER < 10%) | - | -70 | -61 | dBm |
| 6. Maximum Input Level (PER < 10%) | -30 | - | - | dBm |

5. Mechanical Specifications

PCB Assembly Dimension:

- ◆ Dimension (W x L x H): 45mm x 60.5mmx9mm
- ◆ PCB: 4 layer High Tg-FR4 design



1.27mm connector

