

# RT5350 Module W502 Product Specification

| Version | Issue date | Changes   | Remark |
|---------|------------|---|--------|
| 0.1     | 2013/12/30 | Initial Version   |        |
| 0.2     | 2014/01/14 | Modify P2.1 pin definition, add mechanical application note |        |
| 0.3     | 2014/10/17 | Modify 1T1R operation and LAN port number                   |        |
| 0.4     | 2015/7/2   | Modify 802.11b/g/n mode output power                        |        |
| 0.5     | 2016/3/17  | Update operating/storage temperature range                  |        |

### IMPORTANT

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**Address :** 1F,No. 14, Aly. 32, Ln. 133, Zhongyang Rd., Xindian Dist., New Taipei City, Taiwan(R.O.C)  
[www.amazipoint.com](http://www.amazipoint.com)

Signature:

| Author:   | Reviewed by: | Approved by: | Remarks: |
|-----------|--------------|--------------|----------|
| Martin Ho |              |              |          |

# 1. Introduction

W502 module is designed for easy-design-in low cost Wifi application。 It has WAN, LAN, UART, I2C GPIO interfaces. Support 1T1R operation.

# 2. Technical specification

| Items                           |                    | Specification   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|---------------------------------|--------------------|---|-----------|--------------------|--|--|--|----------------|--|----------------|--|-------|-------|-------|-------|---|-----|-----|------|----|---|----|------|----|----|---|------|------|------|----|---|----|------|----|----|---|----|------|----|----|---|----|------|-----|-----|---|------|----|-------|-----|---|----|------|-----|-----|
| Supported Standard and Protocol |                    | IEEE 802.11n, IEEE 802.11g, IEEE 802.11b, IEEE 802.3, IEEE 802.3u, CSMA/CA, CSMA/CD,TCP/IP,DHCP, ICMP, NAT, PPPoE   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| Dimension                       |                    | 30*40 mm  |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| Power consumption               |                    | < 350mA   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| Operating Temperature Range     |                    | -10 ~ +50 deg. C ( Under well heat dissipation environment )  |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| Storage Temperature Range       |                    | -40 ~ 90 deg. C   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| Humidity                        |                    | < 90%, non condensing   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|                                 | WAN Port           | one 10/100M adaptive RJ45 port  |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|                                 | LAN Port           | one 10/100M adaptive RJ45 port  |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| RF Parameters                   | Frequency Range    | 2.4~2.4835GHz   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|                                 | Baud Rate          | <table border="1"> <thead> <tr> <th rowspan="3">MCS index</th> <th colspan="4">Data rate (Mbit/s)</th> </tr> <tr> <th colspan="2">20 MHz channel</th> <th colspan="2">40 MHz channel</th> </tr> <tr> <th>800ns</th> <th>400ns</th> <th>800ns</th> <th>400ns</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>6.5</td> <td>7.2</td> <td>13.5</td> <td>15</td> </tr> <tr> <td>1</td> <td>13</td> <td>14.4</td> <td>27</td> <td>30</td> </tr> <tr> <td>2</td> <td>19.5</td> <td>21.7</td> <td>40.5</td> <td>45</td> </tr> <tr> <td>3</td> <td>26</td> <td>28.9</td> <td>54</td> <td>60</td> </tr> <tr> <td>4</td> <td>39</td> <td>43.3</td> <td>81</td> <td>90</td> </tr> <tr> <td>5</td> <td>52</td> <td>57.8</td> <td>108</td> <td>120</td> </tr> <tr> <td>6</td> <td>58.5</td> <td>65</td> <td>121.5</td> <td>135</td> </tr> <tr> <td>7</td> <td>65</td> <td>72.2</td> <td>135</td> <td>150</td> </tr> </tbody> </table> | MCS index | Data rate (Mbit/s) |  |  |  | 20 MHz channel |  | 40 MHz channel |  | 800ns | 400ns | 800ns | 400ns | 0 | 6.5 | 7.2 | 13.5 | 15 | 1 | 13 | 14.4 | 27 | 30 | 2 | 19.5 | 21.7 | 40.5 | 45 | 3 | 26 | 28.9 | 54 | 60 | 4 | 39 | 43.3 | 81 | 90 | 5 | 52 | 57.8 | 108 | 120 | 6 | 58.5 | 65 | 121.5 | 135 | 7 | 65 | 72.2 | 135 | 150 |
| MCS index                       | Data rate (Mbit/s) |   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|                                 | 20 MHz channel     |   |           | 40 MHz channel     |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|                                 | 800ns              | 400ns   | 800ns     | 400ns              |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 0                               | 6.5                | 7.2   | 13.5      | 15                 |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 1                               | 13                 | 14.4  | 27        | 30                 |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 2                               | 19.5               | 21.7  | 40.5      | 45                 |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 3                               | 26                 | 28.9  | 54        | 60                 |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 4                               | 39                 | 43.3  | 81        | 90                 |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 5                               | 52                 | 57.8  | 108       | 120                |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 6                               | 58.5               | 65  | 121.5     | 135                |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
| 7                               | 65                 | 72.2  | 135       | 150                |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |
|                                 |                    | IEEE 802.11g : 54/48/36/24/18/12/9/6(adaptive )   |           |                    |  |  |  |                |  |                |  |       |       |       |       |   |     |     |      |    |   |    |      |    |    |   |      |      |      |    |   |    |      |    |    |   |    |      |    |    |   |    |      |     |     |   |      |    |       |     |   |    |      |     |     |

|                     |                   |  |
|---------------------|-------------------|--|
|                     |                   | IEEE 802.11b : 11/5.5/2/1M(adaptive )  |
|                     | Number of Channel | 13   |
|                     | Modulation Scheme | DBPSK 、DQPSK 、CCK and OFDM(BPSK/QPSK/16-QAM/64-QAM)  |
|                     | Sensitivity @ PER | 150M : -68dBm@10% PER ; 130M : -68dBm@10% PER ;<br>108M : -68dBm@10% PER ; 54M : -72dBm@10% PER<br>11M : -85dBm@8% PER ; 6M : -88dBm@10% PER<br>1M : -90dBm@8% PER ; |
|                     | Output Power      | 802.11b: 16.5dBm ± 1.5dBm@11Mbps<br>802.11g: 12.5dBm ± 1.5dBm@54Mbps<br>802.11gn HT20: 12.5 dBm ± 1.5dBm @MCS7<br>802.11gn HT40: 12.5 dBm ± 1.5dBm @MCS7             |
|                     | Antenna           | External antenna with Ipex I connector   |
| WIFI Operation Mode |                   | Client/AP  |
| System Service      |                   | Virtual Server : Internal web server for browser to access   |
| Device Management   |                   | Area setting<br>Restore to default factory setting<br>Software upgrade<br>Reboot<br>Change password  |
| WLAN Security Mode  |                   | OPENWEP<br>SHAREDWEP<br>WEPAUTO<br>WPA<br>WPA-PSK<br>WPA2<br>WPA2-PSK<br>WPAPSKWPA2PSK   |

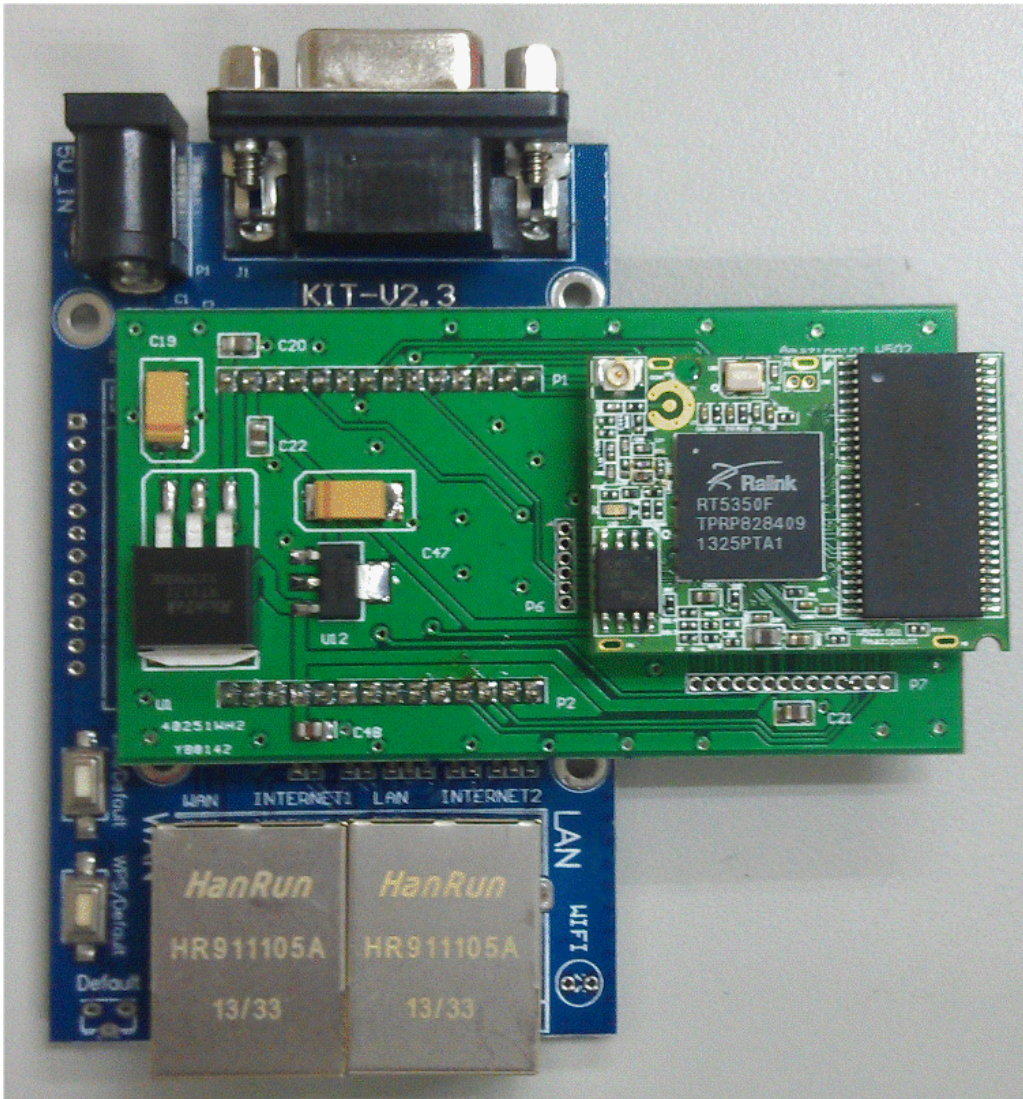
|  |  |
|--|--|
|  | WPA1WPA2(WPA and WPA2 hybrid mode)<br><br>802.1x |
|--|--|

### 3. Software features

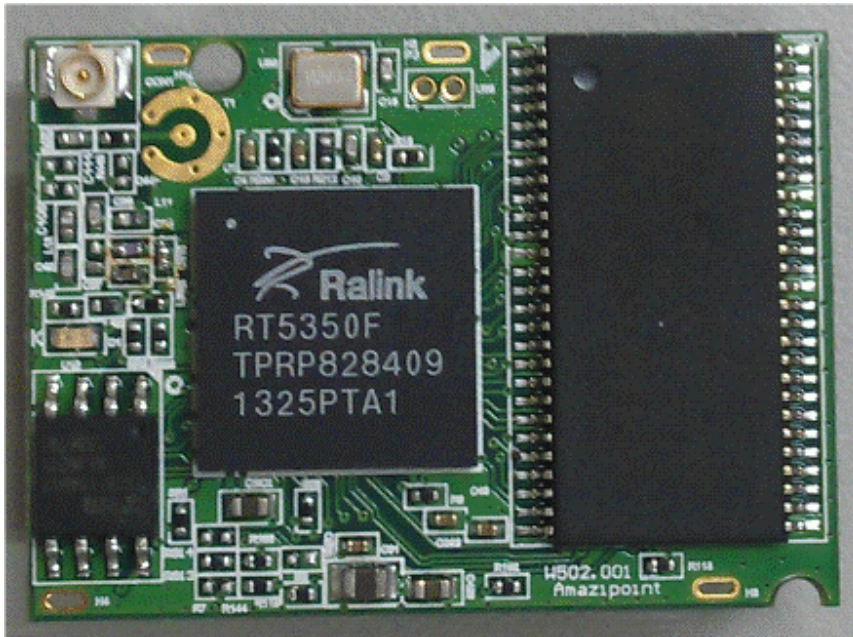
- Support WPS
- Support AP ( Access point ) 、 Client ( Wifi Station) mode
- **AP mode**
  - Default operation mode. In this mode, the module work as an Access Point, don't need any configuration.
  - User can use PC via RJ45 or smart phone via Wifi to login RT5350 AP moad and change the default configuration ( through browser).
- **Client mode**
  - In this mode, RT5350\_V3 module is a Wifi station.

### 4. Development tool :

We provide development tool for easy connection of power, RS-232, LAN, WAN, and USB port.

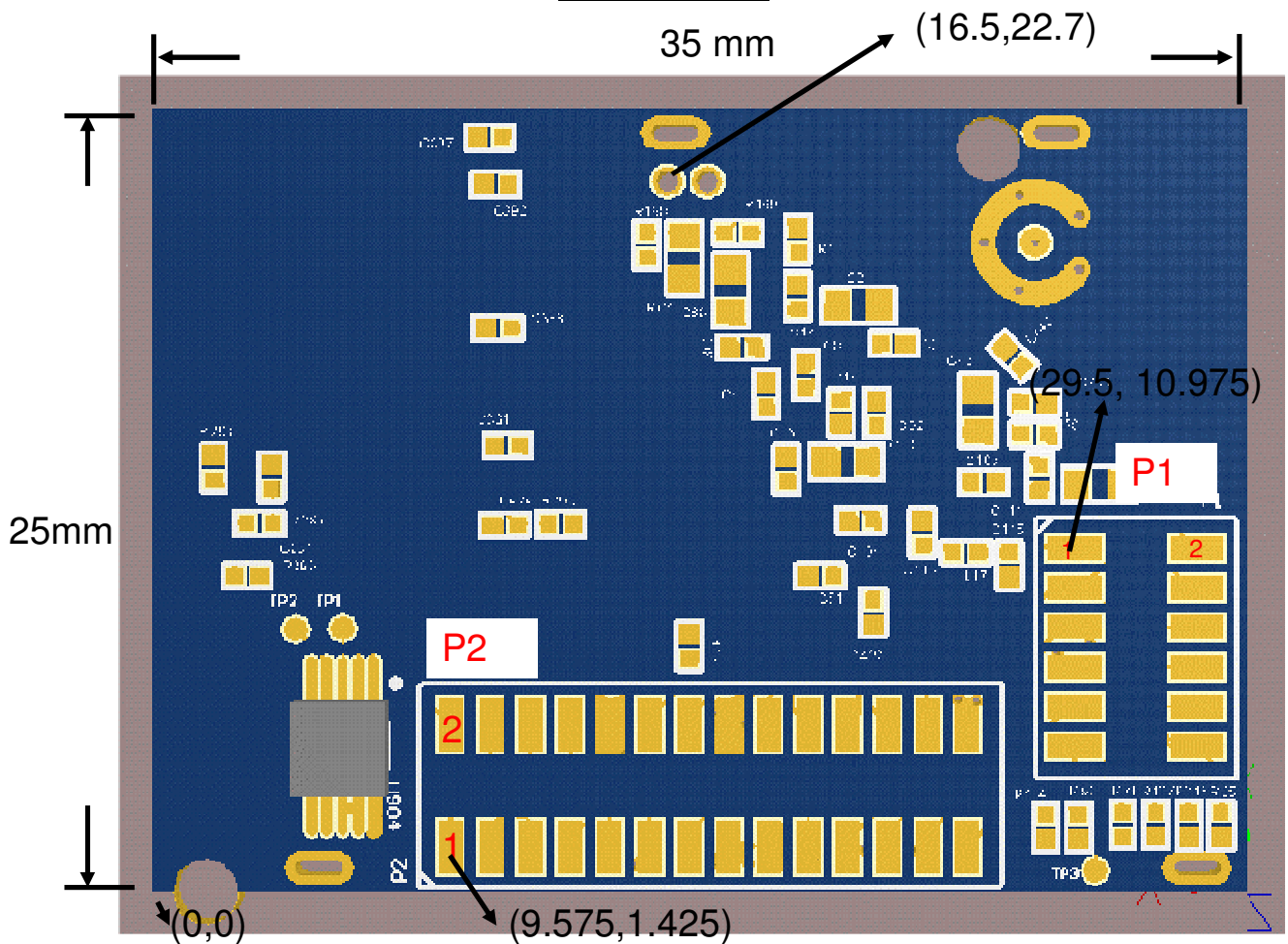


5. Module Dimension : 35\*25 mm



There are two 1.27mm pitch header on the bottom side of module P1 and P2.

Bottom View



## 6. Pin Assignment

P1 :

| Multi 1 | Multi 2 | GPIO    | Main    |           | Main      | GPIO     | Multi 2 | Multi 1 |
|---------|---------|---------|---------|-----------|-----------|----------|---------|---------|
|         |         | REFCLK0 | MCS1    | <b>1</b>  | <b>2</b>  | POR      |         |         |
|         |         | GPIO22  | LINK0   | <b>3</b>  | <b>4</b>  | GPIO0    |         |         |
|         |         | GPIO23  | LINK1   | <b>5</b>  | <b>6</b>  | SPI_MISO | GPIO6   |         |
|         |         | GPIO27  | SPI_CS1 | <b>7</b>  | <b>8</b>  | UART_TX  | GPIO15  |         |
|         |         | GPIO4   | SPI_CLK | <b>9</b>  | <b>10</b> | UART_RX  | GPIO16  |         |
|         |         | GPIO24  | LINK2   | <b>11</b> | <b>12</b> | SPI_MOSI | GPIO5   |         |

P2 :

| Multi 1 | Multi 2 | GPIO   | Main     |           | Main      | GPIO   | Multi 2 | Multi 1 |
|---------|---------|--------|----------|-----------|-----------|--------|---------|---------|
|         |         | GPIO2  | I2C_SCLK | <b>1</b>  | <b>2</b>  | I2C_SD | GPIO1   |         |
|         |         |        | TXO3_P   | <b>3</b>  | <b>4</b>  | RXI4_P |         |         |
|         |         |        | TXO3_N   | <b>5</b>  | <b>6</b>  | RXI4_N |         |         |
| RXD     | PCMDTX  | GPIO14 | RIN      | <b>7</b>  | <b>8</b>  | LINK4  | GPIO26  |         |
| RTS_N   | PCMFS   | GPIO11 | DTR_N    | <b>9</b>  | <b>10</b> | GND    |         |         |
|         | I2SSDI  | GPIO10 | RXD      | <b>11</b> | <b>12</b> | USB_P  |         |         |
|         | I2SCLK  | GPIO7  | RTS_N    | <b>13</b> | <b>14</b> | USB_N  |         |         |
|         |         |        | 3.3VD    | <b>15</b> | <b>16</b> | GND    |         |         |
|         |         |        | 3.3VD    | <b>17</b> | <b>18</b> | TXO4_P |         |         |
| TXD     | PCMCLK  | GPIO12 | DCD_N    | <b>19</b> | <b>20</b> | TXO4_N |         |         |
|         | I2SWS   | GPIO8  | TXD      | <b>21</b> | <b>22</b> | RXI3_N |         |         |
| CTS_N   | PCMDRX  | GPIO13 | DSR_N    | <b>23</b> | <b>24</b> | RXI3_P |         |         |
|         |         | GPIO25 | LINK3    | <b>25</b> | <b>26</b> | CTS_N  | GPIO9   | I2SSDO  |
|         |         |        | WLAN_LED | <b>27</b> | <b>28</b> | 1.8VD  |         |         |

P1 :

| Pin # | Function | Direction | Description                       |
|-------|----------|-----------|-----------------------------------|
| 1     | REFCLK0  | Out       | Can be configured as clock output |
| 2     | POR      | In        | Power on reset input, low active  |
| 3     | LINK0    | Out       | Link LED for port 0               |

|    |          |        |                          |
|----|----------|--------|--------------------------|
| 4  | GPIO0    | Out    | GPIO0 or WPS push button |
| 5  | LINK1    | In/Out | Link LED for port 1      |
| 6  | SPI_MISO | In     | SPI MISO signal          |
| 7  | SPI_CS1  | Out    | SPI chip select signal 1 |
| 8  | UART_TX  | A      | Console UART TXD signal  |
| 9  | SPI_CLK  | Out    | SPI clock output         |
| 10 | UART_RX  | A      | Console UART RXD signal  |
| 11 | LINK2    | Out    | Link LED for port 2      |
| 12 | SPI_MOSI | Out    | SPI MOSI signal          |

## P2 :

| Pin # | Function | Direction | Description            |
|-------|----------|-----------|------------------------|
| 1     | I2C_SCLK | In/Out    | I2C Clock signal       |
| 2     | I2C_SD   | In/Out    | I2C Data signal        |
| 3     | TXO3_P   | A         | Tx positive for port 3 |
| 4     | RXI4_P   | A         | Rx positive for port 4 |
| 5     | TXO3_N   | A         | Tx negative for port 3 |
| 6     | RXI4_N   | A         | Rx negative for port 4 |
| 7     | RIN      |           | Full UART RIN signal   |
| 8     | LINK4    | Out       | Link LED for port 4    |
| 9     | DTR_N    |           | Full UART DTR signal   |
| 10    | GND      |           | Power ground           |
| 11    | RXD      |           | Full UART RXD signal   |
| 12    | USB_P    | In/Out    | USB signal positive    |
| 13    | RTS_N    |           | Full UART RTS_N signal |
| 14    | USB_N    | In/Out    | USB signal negative    |
| 15    | 3.3VD    | Power In  | 3.3V input             |
| 16    | GND      |           | Power ground           |
| 17    | 3.3VD    | Power In  | 3.3V input             |
| 18    | TXO4_P   | A         | Tx positive for port 4 |
| 19    | DCD_N    |           | Full UART DCD_N signal |
| 20    | TXO4_N   | A         | Tx negative for port 4 |
| 21    | TXD      | Out       | Full UART TXD          |
| 22    | RXI3_N   | A         | Rx negative for port 3 |
| 23    | DSR_N    | In/Out    | Full UART DSR_N signal |



|    |          |             |                             |
|----|----------|-------------|-----------------------------|
| 24 | RXI3_P   | A           | Rx positive for port 3      |
| 25 | LINK3    | Out         | Link LED for port 3         |
| 26 | CTS_N    |             | Full UART CTS_N signal      |
| 27 | WLAN_LED | Out         | WLAN LED output, active low |
| 28 | 1.8VD    | Power input | 1.8V input                  |

## 7. Memory configuration

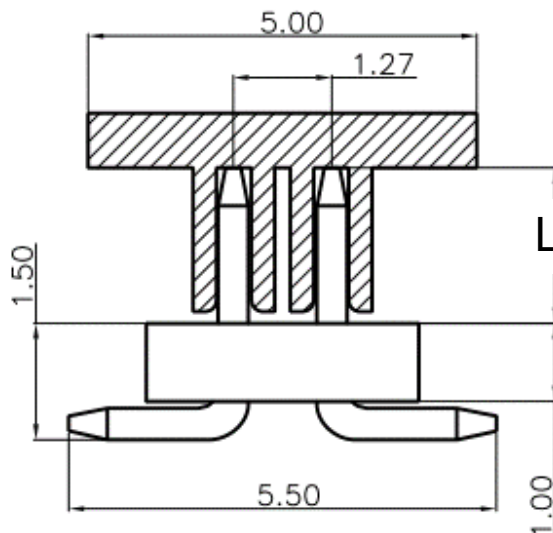
Depending on customer's request, the module can be shipped with following configuration :

Flash size : 2MB, 4MB, 8MB, 16MB

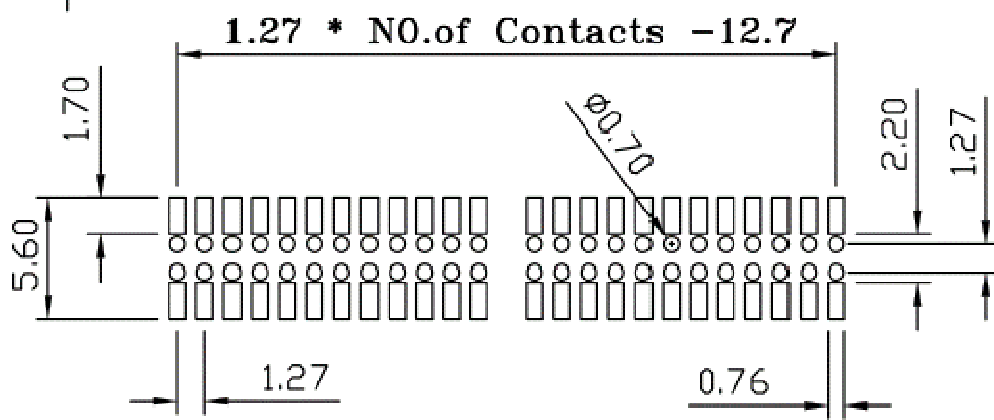
SDRAM size : 16MB, 32MB

## 8. Mechanical Application Notes

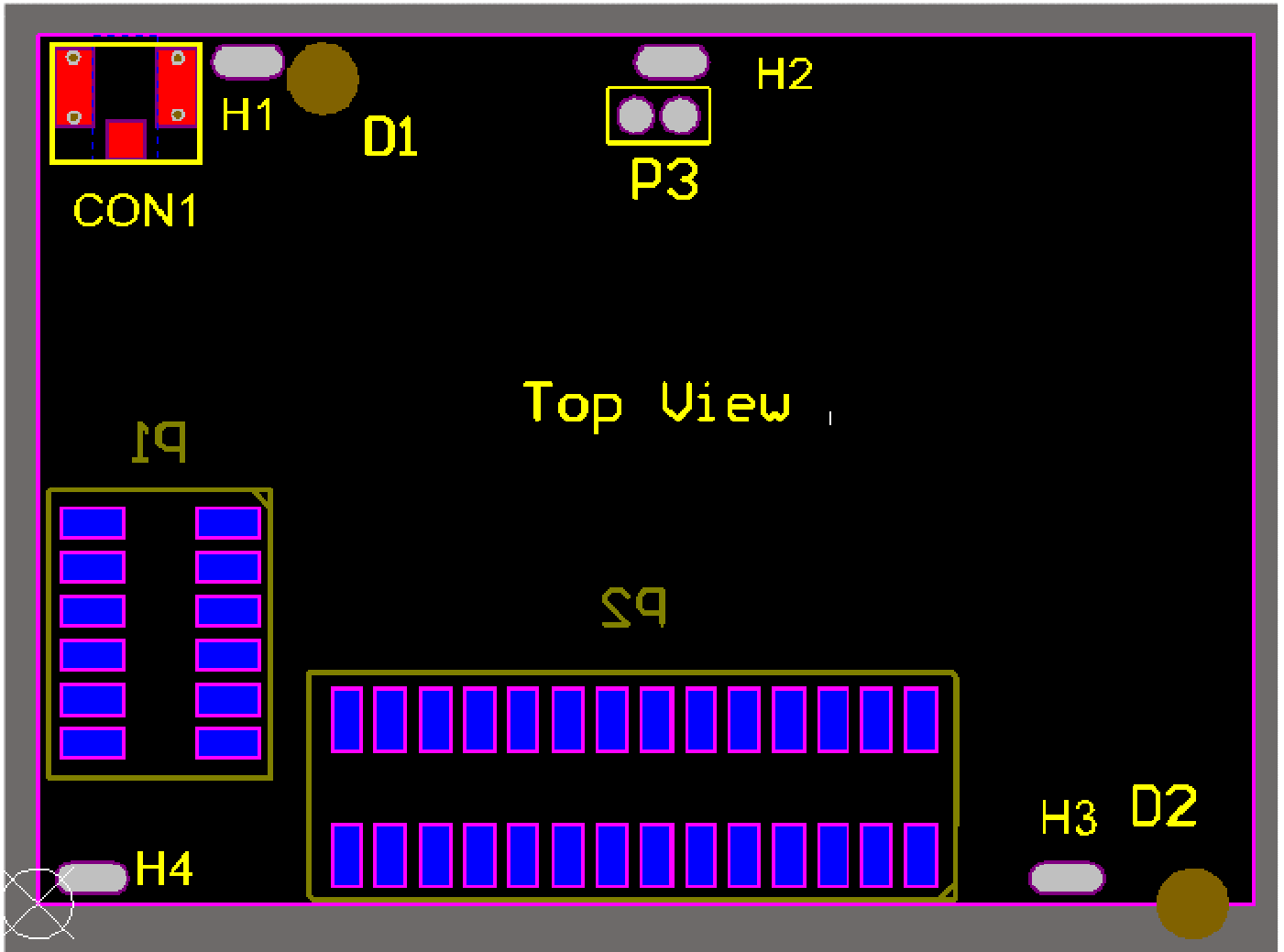
1. CON1 is IPEX1 connector on top side
2. P1 is 2\*6 pins 1.27mm male header on bottom side for signals
3. P2 is 2\*14 pins 1.27mm male header on bottom side for signals
4. The P1, P2 male header pin length L is 4 mm. ( 2mm, 3mm could be custom made under request ).



- Footprint of P1, P2 is as following, the coordinate of pin1 footprint center for P1 and P2 are (29.5, 10.975) and (9.575,1.425), Please note that this coordinate is the center of pad, not center of header pin.



- H1, H2, H3, H4 are slot holes used for install metal shielding cover if needed
- D1 is diameter 2.1mm hole for screw fixing
- D2 is diameter 2.1mm half hole for screw fixing
- P3 is a 2 pins dip type header holes with 1.27mm pitch. Since P1 and P2 are all located on lower side, this socket can be used optionally to mount module on base PCB for balancing the force of upper side.
- The following drawing in .dxf format is available under request.



1.