

# DHUR-AZ68 a/b/g/n/ac 2x2 Module User Manual

● **Revision History**

| Version | Change history  | Date       |
|---------|-----------------|------------|
| V1.0    | Initial version | 2017/11/02 |

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|      |                   |            |
|------|-------------------|------------|
| V1.1 | Modify pin define | 2017/11/09 |
|------|-------------------|------------|

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## Product Introduction

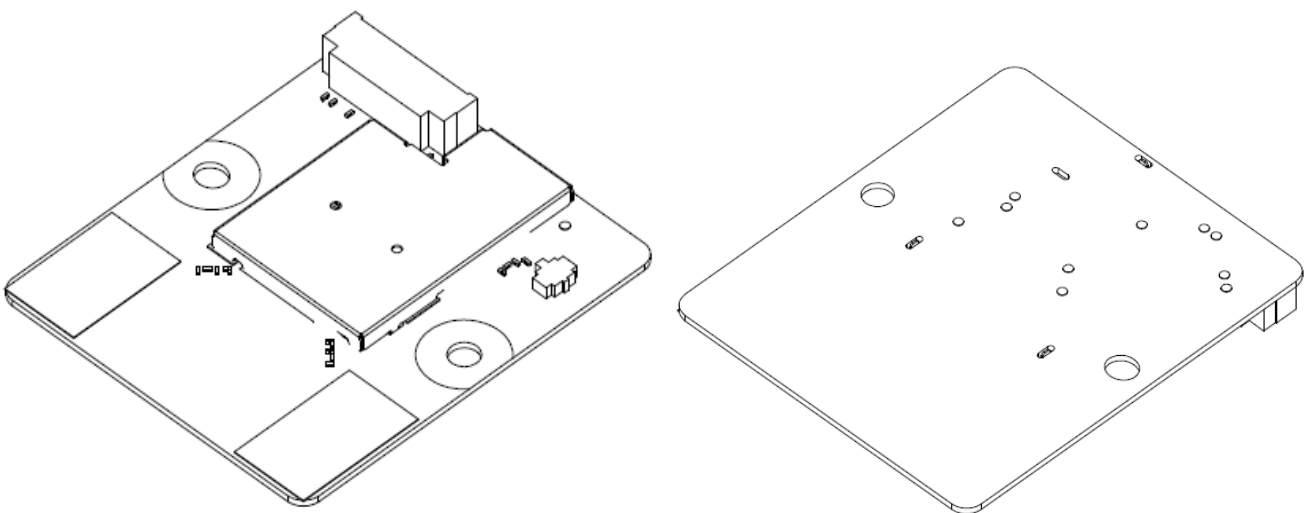
DHUR-AZ68 is an 802.11 a/b/g/n/ac WLAN/Bluetooth 5.0 combo module with USB interface based on MediaTek MT7668AUN chipset solution.

### 1-1. Features

- Dual band 2T2R support, IEEE 802.11a/b/g/n/ac + Bluetooth 5.0
- Support 20MHz, 40MHz and 80MHz bandwidth
- Support MU-MIMO RX, DBDC, STBC, LDPC, TX Beamformer, Rx Beamformee
- 2 on-board printed Wi-Fi antennas and 1 BT external antenna
- PCB 4 Layers with 46.5 x 40 x1.0 mm<sup>3</sup>

### 1-2. Interfaces and Power supply

- Power supply with VCC 5.0
- 10 pin wire to board
- USB 2.0 Interface



## 2 Product Photo

Top Side



Bottom Side



## 3. Product Specification

### 3-1. Electrical Specification

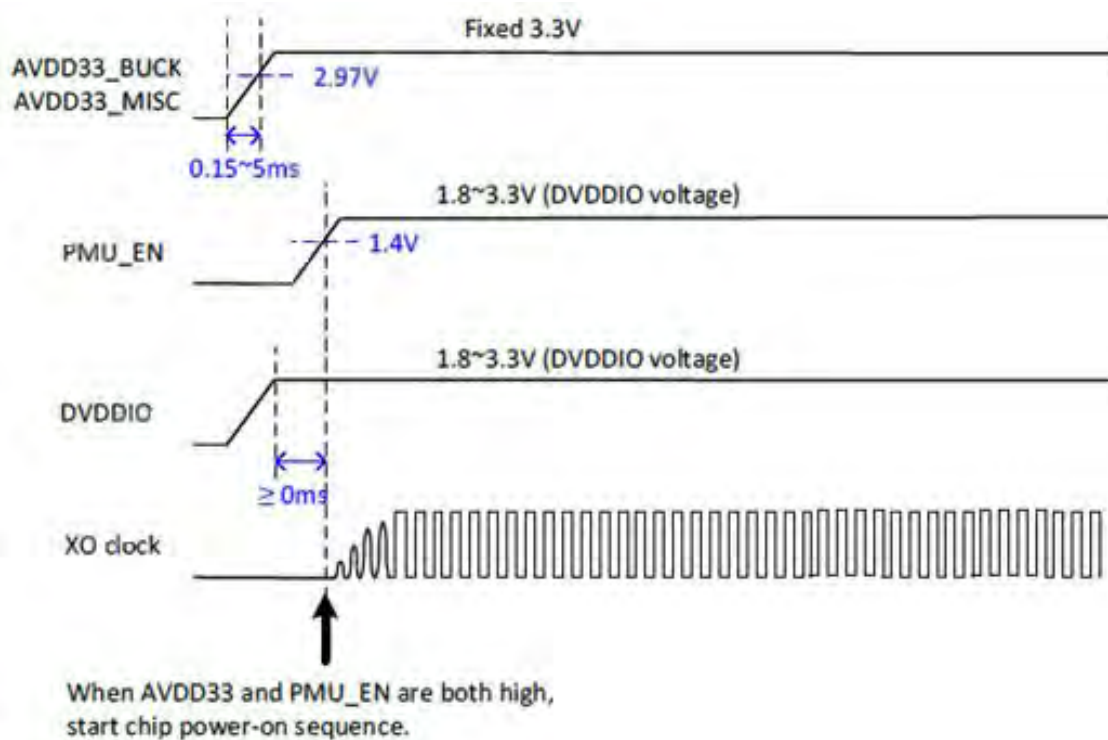
#### 3-1-1. Absolute Maximum Ratings

| Symbol<br>(Board level) | Description                           | Min. | Max. | Units |
|-------------------------|---------------------------------------|------|------|-------|
| 5V                      | 5V power supply                       | 0    | 6.0  | V     |
| RESET                   | Controlled by SOC, GPIO input         | -0.3 | 3.63 | V     |
| BT_WAKE_HOST            | BT wake up host, GPIO output          | -0.3 | 3.63 | V     |
| WoWLAN                  | Wake on Wireless LAN, GPIO output     | -0.3 | 3.63 | V     |
| BT_IR                   | BT_IR signal from MT7668, GPIO output | -0.3 | 3.63 | V     |
| GPIO_X                  | BT_IR signal select, GPIO output      | -0.3 | 3.63 | V     |
| H <sub>storage</sub>    | Storage humidity                      | 5    | 85   | %RH   |
| T <sub>storage</sub>    | Storage temperature                   | -40  | 85   | °C    |

#### 3-1-2. Recommended Operating Conditions

| Symbol (Board level)   | Status          | Description              | Min. | Typ. | Max. | Units |
|------------------------|-----------------|--------------------------|------|------|------|-------|
| 5V                     | --              | 5V power supply          | 4.5  | 5.0  | 5.5  | V     |
| RESET                  | V <sub>IH</sub> | 3.3V Supply Voltage      | 2.97 | 3.3  | 3.63 | V     |
| WoWLAN                 | V <sub>OH</sub> | Wake on wireless LAN     | 2.97 | 3.3  | 3.63 | V     |
| BT_WAKE_HOST           | V <sub>IH</sub> | BT wake up host          | 2.97 | 3.3  | 3.63 | V     |
| BT_IR                  | V <sub>OH</sub> | BT_IR signal form MT7668 | 2.97 | 3.3  | 3.63 | V     |
| GPIO_X                 | V <sub>IH</sub> | BT_IR signal select      | 2.97 | 3.3  | 3.63 | V     |
| T <sub>operating</sub> | --              | Operating temperature    | -10  | --   | 60   | °C    |
| H <sub>operating</sub> | --              | Operating humidity       | 5    | --   | 95   | %RH   |

### 3-2. Chip Sequence



### 3-3. Wi-Fi Portion

| Item            | Key specifications                  |
|-----------------|-------------------------------------|
| Main chipset    | MT7668AUN                           |
| TX/RX           | 2T2R                                |
| Frequency range | 2.400 ~ 2.497GHz, 5.15GHz ~ 5.85GHz |

| Modulation technique      | <ul style="list-style-type: none"> <li>➤ <b>802.11 a/b/g</b><br/>DSSS (DBPSK, DQPSK, CCK)<br/>OFDM (BPSK, QPSK, 16-QAM, 64-QAM)<br/>DSSS (Direct Sequence Spread Spectrum) with<br/>DBPSK (Differential Binary Phase Shift Keying 1Mbps),<br/>DQPSK (Differential Quaternary Phase Shift Keying 2Mbps), and<br/>CCK (Complementary Code Keying 5.5&amp;11Mbps), and<br/>OFDM (Orthogonal Frequency Division Multiplexing with BPSK for 6,9Mbps 、 QPSK for 12,18Mbps 、<br/>16QAM for 24,36Mbps 、 64QAM for 48,54Mbps)</li> <li>➤ <b>802.11n a/g</b><br/>OFDM (BPSK, QPSK, 16-QAM, 64-QAM)</li> <li>➤ <b>802.11 ac</b><br/>OFDM (BPSK, QPSK, 16-QAM, 64-QAM,256-QAM)</li> </ul>  |      |            |          |      |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|---------------------------|--|------|------------|----------|------|-------|---------------------|----------|--|-----------|----------|--|-------|------|------|-------------------------|----|--|----|-----|-----|----|---------|------|-----|--------|-----|-----|----|-----|---------|-----|-----|-----|-----------|-----|-----|----|-----|---------|-----|-----|----|-----|-----------|-----|-----|------|------------|-----|-----|---------|------|-----|--------|----|-----|----|-----|---------|----|-----|-----|-----------|----|-----|----|-----|---------|-----|-----|----|-----|-----------|-----|-----|------|------------|-----|-----|
| Host interface            | ➤ USB2.0   |      |            |          |      |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
| Power consumption @25 ° C | <table border="1" data-bbox="288 658 1350 1357"> <thead> <tr> <th rowspan="2">Current consumption</th> <th colspan="2" rowspan="2">standard</th> <th rowspan="2">Data Rate</th> <th colspan="2">Average.</th> <th rowspan="2">Units</th> </tr> <tr> <th>Typ.</th> <th>Max.</th> </tr> </thead> <tbody> <tr> <td>Sleep mode<br/>Radio off</td> <td colspan="2">--</td> <td>--</td> <td>1.5</td> <td>2.0</td> <td>mA</td> </tr> <tr> <td rowspan="6">WLAN Tx</td> <td rowspan="3">2.4G</td> <td>11b</td> <td>CCK-1M</td> <td>250</td> <td>280</td> <td rowspan="3">mA</td> </tr> <tr> <td>11g</td> <td>OFDM-7M</td> <td>350</td> <td>400</td> </tr> <tr> <td>11n</td> <td>HT20_MCS0</td> <td>350</td> <td>390</td> </tr> <tr> <td rowspan="3">5G</td> <td>11a</td> <td>OFDM-6M</td> <td>510</td> <td>630</td> <td rowspan="3">mA</td> </tr> <tr> <td>11n</td> <td>HT20-MCS0</td> <td>490</td> <td>590</td> </tr> <tr> <td>11ac</td> <td>VHT20-MCS0</td> <td>490</td> <td>580</td> </tr> <tr> <td rowspan="6">WLAN Rx</td> <td rowspan="3">2.4G</td> <td>11b</td> <td>CCK-1M</td> <td>85</td> <td>158</td> <td rowspan="3">mA</td> </tr> <tr> <td>11g</td> <td>OFDM-7M</td> <td>93</td> <td>158</td> </tr> <tr> <td>11n</td> <td>HT20_MCS0</td> <td>93</td> <td>158</td> </tr> <tr> <td rowspan="3">5G</td> <td>11a</td> <td>OFDM-6M</td> <td>100</td> <td>165</td> <td rowspan="3">mA</td> </tr> <tr> <td>11n</td> <td>HT20-MCS0</td> <td>100</td> <td>165</td> </tr> <tr> <td>11ac</td> <td>VHT20-MCS0</td> <td>101</td> <td>165</td> </tr> </tbody> </table> |      |            |          |      |       | Current consumption | standard |  | Data Rate | Average. |  | Units | Typ. | Max. | Sleep mode<br>Radio off | -- |  | -- | 1.5 | 2.0 | mA | WLAN Tx | 2.4G | 11b | CCK-1M | 250 | 280 | mA | 11g | OFDM-7M | 350 | 400 | 11n | HT20_MCS0 | 350 | 390 | 5G | 11a | OFDM-6M | 510 | 630 | mA | 11n | HT20-MCS0 | 490 | 590 | 11ac | VHT20-MCS0 | 490 | 580 | WLAN Rx | 2.4G | 11b | CCK-1M | 85 | 158 | mA | 11g | OFDM-7M | 93 | 158 | 11n | HT20_MCS0 | 93 | 158 | 5G | 11a | OFDM-6M | 100 | 165 | mA | 11n | HT20-MCS0 | 100 | 165 | 11ac | VHT20-MCS0 | 101 | 165 |
| Current consumption       | standard   |      | Data Rate  | Average. |      | Units |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  |      |            | Typ.     | Max. |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
| Sleep mode<br>Radio off   | --   |      | --         | 1.5      | 2.0  | mA    |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
| WLAN Tx                   | 2.4G   | 11b  | CCK-1M     | 250      | 280  | mA    |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11g  | OFDM-7M    | 350      | 400  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11n  | HT20_MCS0  | 350      | 390  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           | 5G   | 11a  | OFDM-6M    | 510      | 630  | mA    |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11n  | HT20-MCS0  | 490      | 590  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11ac | VHT20-MCS0 | 490      | 580  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
| WLAN Rx                   | 2.4G   | 11b  | CCK-1M     | 85       | 158  | mA    |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11g  | OFDM-7M    | 93       | 158  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11n  | HT20_MCS0  | 93       | 158  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           | 5G   | 11a  | OFDM-6M    | 100      | 165  | mA    |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11n  | HT20-MCS0  | 100      | 165  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |
|                           |  | 11ac | VHT20-MCS0 | 101      | 165  |       |                     |          |  |           |          |  |       |      |      |                         |    |  |    |     |     |    |         |      |     |        |     |     |    |     |         |     |     |     |           |     |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |         |      |     |        |    |     |    |     |         |    |     |     |           |    |     |    |     |         |     |     |    |     |           |     |     |      |            |     |     |

|   |                   |             |            |           |           |           |           |          |          |
|---|-------------------|-------------|------------|-----------|-----------|-----------|-----------|----------|----------|
| Output power<br>(per chain;<br>2.4G<br>tolerance<br>+/-2.5 dB,<br>5G tolerance<br>+/-3,0dB) | ➤ 802.11a         |             |            |           |           |           |           |          |          |
|   | Test Frequencies  | 6-36_Target | 48_Target  | 54_Target |           |           |           |          |          |
|   | 5180              | 15.5        | 15.5       | 14.5      |           |           |           |          |          |
|   | 5320              | 15.5        | 15.5       | 14.5      |           |           |           |          |          |
|   | 5500              | 15.5        | 15.5       | 14.5      |           |           |           |          |          |
|   | 5600              | 15.5        | 15.5       | 14.5      |           |           |           |          |          |
|   | 5700              | 15.5        | 15.5       | 14.5      |           |           |           |          |          |
|   | 5825              | 15.5        | 15.5       | 14.5      |           |           |           |          |          |
|   | ➤ 802.11b         |             |            |           |           |           |           |          |          |
|   | Test Frequencies  | 1/2_Target  | 5.5_Target | 11_Target |           |           |           |          |          |
|   | 2412              | 18.5        | 18         | 18        |           |           |           |          |          |
|   | 2472              | 18.5        | 18         | 18        |           |           |           |          |          |
|   | 2484              | 18.5        | 18         | 18        |           |           |           |          |          |
|   | ➤ 802.11g         |             |            |           |           |           |           |          |          |
|   | Test Frequencies  | 6-12_Target | 18_Target  | 24_Target | 36_Target | 48_Target | 54_Target |          |          |
|   | 2412              | 16.5        | 16.5       | 16.5      | 16.5      | 15.5      | 15.5      |          |          |
|   | 2442              | 16.5        | 16.5       | 16.5      | 16.5      | 15.5      | 15.5      |          |          |
|   | 2472              | 16.5        | 16.5       | 16.5      | 16.5      | 15.5      | 15.5      |          |          |
|   | ➤ 802.11n         |             |            |           |           |           |           |          |          |
|   | Freq. Range: HT20 |             |            |           |           |           |           |          |          |
|   | Test Freq         | MCS 0/8     | MCS 1/9    | MCS 2/10  | MCS 3/11  | MCS 4/12  | MCS 5/13  | MCS 6/14 | MCS 7/15 |
|   | 5180              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
|   | 5240              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
|   | 5320              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
|   | 5500              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
|   | 5700              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
|   | 5745              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
|   | 5825              | 14.5        | 14.5       | 14.5      | 14.5      | 14.5      | 14.5      | 14.5     | 14.5     |
| Freq. Range: HT40   |                   |             |            |           |           |           |           |          |          |
| Test Freq   | MCS 0/8           | MCS 1/9     | MCS 2/10   | MCS 3/11  | MCS 4/12  | MCS 5/13  | MCS 6/14  | MCS 7/15 |          |
| 5190  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| 5230  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| 5270  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| 5510  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| 5670  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| 5755  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| 5795  | 14                | 14          | 14         | 14        | 14        | 14        | 14        | 14.5     |          |
| Freq. Range: HT20   |                   |             |            |           |           |           |           |          |          |
| Test Freq   | MCS 0/8           | MCS 1/9     | MCS 2/10   | MCS 3/11  | MCS 4/12  | MCS 5/13  | MCS 6/14  | MCS 7/15 |          |
| 2412  | 15.5              | 15.5        | 15.5       | 15.5      | 15.5      | 15.5      | 15.5      | 15.5     |          |
| 2437  | 15.5              | 15.5        | 15.5       | 15.5      | 15.5      | 15.5      | 15.5      | 15.5     |          |
| 2472  | 15.5              | 15.5        | 15.5       | 15.5      | 15.5      | 15.5      | 15.5      | 15.5     |          |
| Freq. Range: HT40   |                   |             |            |           |           |           |           |          |          |
| Test Freq   | MCS 0/8           | MCS 1/9     | MCS 2/10   | MCS 3/11  | MCS 4/12  | MCS 5/13  | MCS 6/14  | MCS 7/15 |          |
| 2412  | 15.5              | 15.5        | 15.5       | 15.5      | 15.5      | 15.5      | 15.5      | 15.5     |          |
| 2437  | 15.5              | 15.5        | 15.5       | 15.5      | 15.5      | 15.5      | 15.5      | 15.5     |          |
| 2472  | 15.5              | 15.5        | 15.5       | 15.5      | 15.5      | 15.5      | 15.5      | 15.5     |          |



|             | <p>➤ <b>802.11ac</b><br/>Freq. Range: VHT20</p> <table border="1"> <thead> <tr> <th>Test Freq</th> <th>MCS 0</th> <th>MCS 1</th> <th>MCS 2</th> <th>MCS 3</th> <th>MCS 4</th> <th>MCS 5</th> <th>MCS 6</th> <th>MCS 7</th> <th>MCS 8</th> <th>MCS 9</th> </tr> </thead> <tbody> <tr><td>5180</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> <tr><td>5240</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> <tr><td>5320</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> <tr><td>5500</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> <tr><td>5700</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> <tr><td>5745</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> <tr><td>5825</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td><td>14.5</td></tr> </tbody> </table> <p>Freq. Range: VHT40</p> <table border="1"> <thead> <tr> <th>Test Freq</th> <th>MCS 0</th> <th>MCS 1</th> <th>MCS 2</th> <th>MCS 3</th> <th>MCS 4</th> <th>MCS 5</th> <th>MCS 6</th> <th>MCS 7</th> <th>MCS 8</th> <th>MCS 9</th> </tr> </thead> <tbody> <tr><td>5210</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5290</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5530</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5610</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5690</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5775</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> </tbody> </table> <p>Freq. Range: VHT80</p> <table border="1"> <thead> <tr> <th>Test Freq</th> <th>MCS 0</th> <th>MCS 1</th> <th>MCS 2</th> <th>MCS 3</th> <th>MCS 4</th> <th>MCS 5</th> <th>MCS 6</th> <th>MCS 7</th> <th>MCS 8</th> <th>MCS 9</th> </tr> </thead> <tbody> <tr><td>5210</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5290</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5530</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5610</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5690</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> <tr><td>5775</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td><td>13.5</td></tr> </tbody> </table> |           |                     |                   |       |       |       |       |       |       |       | Test Freq  | MCS 0     | MCS 1               | MCS 2             | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 | 5180 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5   | 14.5 | 5240 | 14.5 | 14.5   | 14.5 | 14.5 | 14.5 | 14.5   | 14.5 | 14.5 | 14.5 | 14.5   | 5320 | 14.5 | 14.5 | 14.5       | 14.5      | 14.5                | 14.5              | 14.5  | 14.5 | 14.5          | 14.5 | 5500  | 14.5 | 14.5          | 14.5 | 14.5  | 14.5 | 14.5          | 14.5 | 14.5  | 14.5 | 14.5          | 5700 | 14.5       | 14.5      | 14.5                | 14.5              | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 5745 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5   | 5825 | 14.5 | 14.5 | 14.5   | 14.5 | 14.5 | 14.5 | 14.5   | 14.5 | 14.5 | 14.5 | Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 | 5210 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5290 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5530 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5610 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5690 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5775 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | Test Freq | MCS 0 | MCS 1 | MCS 2 | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 | 5210 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5290 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5530 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5610 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5690 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 5775 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 |
|-------------|--|-----------|---------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|------------|-----------|---------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|--------|------|------|------|--------|------|------|------|--------|------|------|------|--------|------|------|------|------------|-----------|---------------------|-------------------|-------|------|---------------|------|-------|------|---------------|------|-------|------|---------------|------|-------|------|---------------|------|------------|-----------|---------------------|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|------|------|------|--------|------|------|------|--------|------|------|------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|             | Test Freq  | MCS 0     | MCS 1               | MCS 2             | MCS 3 | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 5180   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 5240   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5320        | 14.5   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5500        | 14.5   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5700        | 14.5   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5745        | 14.5   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5825        | 14.5   | 14.5      | 14.5                | 14.5              | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  | 14.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Test Freq   | MCS 0  | MCS 1     | MCS 2               | MCS 3             | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5210        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5290        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5530        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5610        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5690        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5775        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Test Freq   | MCS 0  | MCS 1     | MCS 2               | MCS 3             | MCS 4 | MCS 5 | MCS 6 | MCS 7 | MCS 8 | MCS 9 |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5210        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5290        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5530        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5610        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5690        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5775        | 13.5   | 13.5      | 13.5                | 13.5              | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  | 13.5  |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Sensitivity | <p>➤ <b>802.11a</b></p> <table border="1"> <thead> <tr> <th>Modulation</th> <th>Code Rate</th> <th>IEEE Spec (1Rx dBm)</th> <th>Typical (1Rx dBm)</th> </tr> </thead> <tbody> <tr><td>BPSK</td><td>1/2</td><td>-82</td><td>-89</td></tr> <tr><td>BPSK</td><td>3/4</td><td>-81</td><td>-88</td></tr> <tr><td>QPSK</td><td>1/2</td><td>-79</td><td>-87</td></tr> <tr><td>QPSK</td><td>3/4</td><td>-77</td><td>-85</td></tr> <tr><td>16-QAM</td><td>1/2</td><td>-74</td><td>-82</td></tr> <tr><td>16-QAM</td><td>3/4</td><td>-70</td><td>-78</td></tr> <tr><td>64-QAM</td><td>2/3</td><td>-66</td><td>-74</td></tr> <tr><td>64-QAM</td><td>3/4</td><td>-65</td><td>-67</td></tr> </tbody> </table> <p>➤ <b>802.11b</b></p> <table border="1"> <thead> <tr> <th>Modulation</th> <th>Code Rate</th> <th>IEEE Spec (1Rx dBm)</th> <th>Typical (1Rx dBm)</th> </tr> </thead> <tbody> <tr><td>DBPSK</td><td>-</td><td>not specified</td><td>-98</td></tr> <tr><td>DQPSK</td><td>-</td><td>not specified</td><td>-95</td></tr> <tr><td>DQPSK</td><td>CCK</td><td>not specified</td><td>-90</td></tr> <tr><td>DQPSK</td><td>CCK</td><td>not specified</td><td>-90</td></tr> </tbody> </table> <p>➤ <b>802.11g</b></p> <table border="1"> <thead> <tr> <th>Modulation</th> <th>Code Rate</th> <th>IEEE Spec (1Rx dBm)</th> <th>Typical (1Rx dBm)</th> </tr> </thead> <tbody> <tr><td>BPSK</td><td>1/2</td><td>-82</td><td>-89</td></tr> <tr><td>BPSK</td><td>3/4</td><td>-81</td><td>-88</td></tr> <tr><td>QPSK</td><td>1/2</td><td>-79</td><td>-86</td></tr> <tr><td>QPSK</td><td>3/4</td><td>-77</td><td>-84</td></tr> <tr><td>16-QAM</td><td>1/2</td><td>-74</td><td>-81</td></tr> <tr><td>16-QAM</td><td>3/4</td><td>-70</td><td>-78</td></tr> <tr><td>64-QAM</td><td>2/3</td><td>-66</td><td>-74</td></tr> <tr><td>64-QAM</td><td>3/4</td><td>-65</td><td>-73</td></tr> </tbody> </table>  |           |                     |                   |       |       |       |       |       |       |       | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) | BPSK  | 1/2   | -82   | -89   | BPSK  | 3/4   | -81   | -88  | QPSK | 1/2  | -79  | -87  | QPSK | 3/4  | -77  | -85  | 16-QAM | 1/2  | -74  | -82  | 16-QAM | 3/4  | -70  | -78  | 64-QAM | 2/3  | -66  | -74  | 64-QAM | 3/4  | -65  | -67  | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) | DBPSK | -    | not specified | -98  | DQPSK | -    | not specified | -95  | DQPSK | CCK  | not specified | -90  | DQPSK | CCK  | not specified | -90  | Modulation | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) | BPSK | 1/2  | -82  | -89  | BPSK | 3/4  | -81  | -88  | QPSK | 1/2  | -79  | -86  | QPSK | 3/4  | -77  | -84  | 16-QAM | 1/2  | -74  | -81  | 16-QAM | 3/4  | -70  | -78  | 64-QAM | 2/3  | -66  | -74  | 64-QAM    | 3/4   | -65   | -73   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | Modulation   | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | BPSK   | 1/2       | -82                 | -89               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | BPSK   | 3/4       | -81                 | -88               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | QPSK   | 1/2       | -79                 | -87               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | QPSK   | 3/4       | -77                 | -85               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 16-QAM   | 1/2       | -74                 | -82               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 16-QAM   | 3/4       | -70                 | -78               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 64-QAM   | 2/3       | -66                 | -74               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 64-QAM   | 3/4       | -65                 | -67               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | Modulation   | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | DBPSK  | -         | not specified       | -98               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | DQPSK  | -         | not specified       | -95               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | DQPSK  | CCK       | not specified       | -90               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | DQPSK  | CCK       | not specified       | -90               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | Modulation   | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | BPSK   | 1/2       | -82                 | -89               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | BPSK   | 3/4       | -81                 | -88               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | QPSK   | 1/2       | -79                 | -86               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | QPSK   | 3/4       | -77                 | -84               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 16-QAM   | 1/2       | -74                 | -81               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 16-QAM   | 3/4       | -70                 | -78               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 64-QAM   | 2/3       | -66                 | -74               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|             | 64-QAM   | 3/4       | -65                 | -73               |       |       |       |       |       |       |       |            |           |                     |                   |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |            |           |                     |                   |       |      |               |      |       |      |               |      |       |      |               |      |       |      |               |      |            |           |                     |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |      |      |      |        |      |      |      |        |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

**➤ 802.11ng (HT20)**

| Modulation    | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---------------|-----------|---------------------|-------------------|
| (MCS0) BPSK   | 1/2       | -82                 | -90               |
| (MCS1) QPSK   | 1/2       | -79                 | -87               |
| (MCS2) QPSK   | 3/4       | -77                 | -85               |
| (MCS3) 16-QAM | 1/2       | -74                 | -82               |
| (MCS4) 16-QAM | 3/4       | -70                 | -80               |
| (MCS5) 64-QAM | 2/3       | -66                 | -75               |
| (MCS6) 64-QAM | 3/4       | -65                 | -74               |
| (MCS7) 64-QAM | 5/6       | -64                 | -67               |

**(HT40)**

| Modulation    | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---------------|-----------|---------------------|-------------------|
| (MCS0) BPSK   | 1/2       | -79                 | -88               |
| (MCS1) QPSK   | 1/2       | -76                 | -86               |
| (MCS2) QPSK   | 3/4       | -74                 | -84               |
| (MCS3) 16-QAM | 1/2       | -71                 | -81               |
| (MCS4) 16-QAM | 3/4       | -67                 | -78               |
| (MCS5) 64-QAM | 2/3       | -63                 | -74               |
| (MCS6) 64-QAM | 3/4       | -62                 | -69               |
| (MCS7) 64-QAM | 5/6       | -61                 | -65               |

**➤ 802.11na (HT20)**

| Modulation    | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---------------|-----------|---------------------|-------------------|
| (MCS0) BPSK   | 1/2       | -82                 | -89               |
| (MCS1) QPSK   | 1/2       | -79                 | -86               |
| (MCS2) QPSK   | 3/4       | -77                 | -84               |
| (MCS3) 16-QAM | 1/2       | -74                 | -82               |
| (MCS4) 16-QAM | 3/4       | -70                 | -79               |
| (MCS5) 64-QAM | 2/3       | -66                 | -74               |
| (MCS6) 64-QAM | 3/4       | -65                 | -73               |
| (MCS7) 64-QAM | 5/6       | -64                 | -66               |

**➤ (HT40)**

| Modulation    | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|---------------|-----------|---------------------|-------------------|
| (MCS0) BPSK   | 1/2       | -79                 | -86               |
| (MCS1) QPSK   | 1/2       | -76                 | -84               |
| (MCS2) QPSK   | 3/4       | -74                 | -82               |
| (MCS3) 16-QAM | 1/2       | -71                 | -80               |
| (MCS4) 16-QAM | 3/4       | -67                 | -80               |
| (MCS5) 64-QAM | 2/3       | -63                 | -78               |
| (MCS6) 64-QAM | 3/4       | -62                 | -76               |
| (MCS7) 64-QAM | 5/6       | -61                 | -73               |

**➤ 802.11ac (HT80)**

| Modulation     | Code Rate | IEEE Spec (1Rx dBm) | Typical (1Rx dBm) |
|----------------|-----------|---------------------|-------------------|
| (MCS0) BPSK    | 1/2       | -76                 | -88               |
| (MCS1) QPSK    | 1/2       | -73                 | -86               |
| (MCS2) QPSK    | 3/4       | -71                 | -83               |
| (MCS3) 16-QAM  | 1/2       | -68                 | -80               |
| (MCS4) 16-QAM  | 3/4       | -64                 | -78               |
| (MCS5) 64-QAM  | 2/3       | -60                 | -76               |
| (MCS6) 64-QAM  | 3/4       | -59                 | -73               |
| (MCS7) 64-QAM  | 5/6       | -58                 | -71               |
| (MCS8) 256-QAM | 3/4       | -53                 | -65               |
| (MCS9) 256-QAM | 5/6       | -51                 | -59               |

|   |   |
|---|---|
| Transmit spectrum mask                          | For transmitted spectral mask for 11b shall be less than -50dB for $22\text{MHz} < f < fc + 22\text{MHz}$ .<br>For transmitted spectral mask for 11g shall be less than -40dB for $fc - 30\text{MHz} < f < fc + 30\text{MHz}$ .<br>For transmitted spectral mask for 11n 20MHz shall be less than -45dB for $fc - 30\text{MHz} < f < fc + 30\text{MHz}$ .<br>For transmitted spectral mask for 11n 40MHz shall be less than -45dB for $fc - 60\text{MHz} < f < fc + 60\text{MHz}$ .   |
| Transmit spectrum flatness                      | For 802.11g the average energy of the constellations in each of spectral lines -16..-1 and +1..+16 will deviate no more than +/- 2dB from their average energy.<br>For 802.11n 40MHz mode, the average energy of the constellations in each of spectral lines -42..-2 and +2..+42 will deviate no more than +/- 2dB from their average energy.<br>The transmitted spectral flatness should be within +/- 4dB.   |
| Transmit center frequency tolerance             | The transmitted center frequency tolerance shall be $\pm 20$ ppm maximum.   |
| Carrier suppression                             | 802.11a:<br>The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.<br>802.11b:<br>The RF carrier suppression, measured at the channel center frequency, shall be at least 15 dB below the peak SIN(x)/x power spectrum.<br>802.11g:<br>The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.<br>802.11n:<br>For all 20 MHz modes of transmission<br>The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers.<br>For all 40 MHz modes of transmission<br>The center frequency leakage shall not exceed -18 dB relative to overall transmitted power, or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers. |
| Transmit power on ramp and power down ramp time | <ul style="list-style-type: none"> <li>➤ The transmitting power-on ramp for 10% to 90% of maximum power m shall be no greater than 2 <math>\mu</math>s.</li> <li>➤ The transmitting power-down ramp for 90% to 10% of maximum power shall be no greater than 2 <math>\mu</math>s.</li> </ul>  |
| Receiver maximum input level                    | <ul style="list-style-type: none"> <li>➤ 802.11a<br/>Modulation Code Rate IEEE Spec (1Rx dBm)<br/>&gt;-30</li> <li>➤ 802.11b<br/>Modulation Code Rate IEEE Spec (1Rx dBm)<br/>DBPSK &gt;-10<br/>DQPSK &gt;-10<br/>CCK &gt;-10</li> <li>➤ 802.11g<br/>Modulation Code Rate IEEE Spec (1Rx dBm)<br/>&gt;-20</li> <li>➤ 802.11na<br/>Modulation Code Rate IEEE Spec (1Rx dBm)<br/>&gt;-30</li> <li>➤ 802.11ng<br/>Modulation Code Rate IEEE Spec (1Rx dBm)<br/>&gt;-20</li> <li>➤ 802.11ac<br/>Modulation Code Rate IEEE Spec (1Rx dBm)<br/>&gt;-30</li> </ul>   |

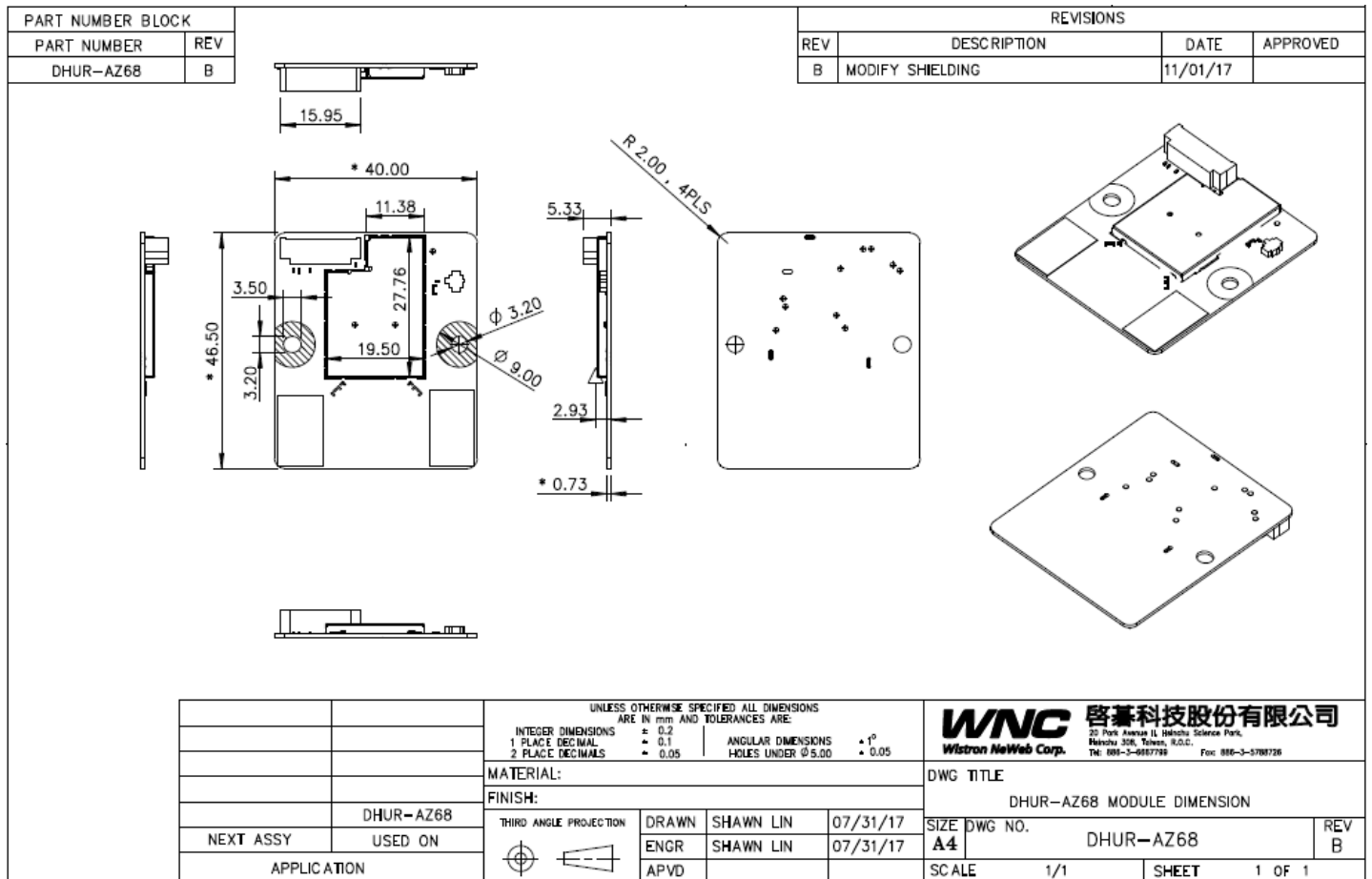
|                       |   |
|-----------------------|---|
| PCB dimension         | ➤ 46.0+/-0.1mm x 40.00+/-0.1mm x 1.0+/-0.1mm 4L FR4   |
| Transfer data rate    | <ul style="list-style-type: none"> <li>➤ 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps</li> <li>➤ 802.11b: 1, 2, 5.5, 11Mbps</li> <li>➤ 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps</li> <li>➤ 802.11n: @800GI(400GI) <ul style="list-style-type: none"> <li>● 20MHz BW <ul style="list-style-type: none"> <li>▪ 1 Nss: 65(72.2) Mbps maximal</li> <li>▪ 2 Nss: 130(144.444) Mbps maximal</li> </ul> </li> <li>● 40MHz BW <ul style="list-style-type: none"> <li>▪ 1 Nss: 135(150) Mbps maximal</li> <li>▪ 2 Nss: 270(300) Mbps maximal</li> </ul> </li> </ul> </li> <li>➤ 802.11ac: @800GI(400GI) <ul style="list-style-type: none"> <li>● 80MHz BW <ul style="list-style-type: none"> <li>▪ 1 Nss: 390(433.3) Mbps maximal</li> <li>▪ 2 Nss: 780(866.7) Mbps maximal</li> </ul> </li> </ul> </li> </ul> |
| Security              | WEP, WPA ,WPA2 ,AES, TKIP   |
| Operation temperature | -10° ~ 60° C  |
| Storage temperature   | - 45° ~ 85° C ,R.H:90% ( non-condensing )   |
| Antenna               | ➤ Wi-Fi on-board antenna.   |

### 3-4. BT Portion

| Item  | Key specifications                 |           |          |      |       |
|---|------------------------------------|-----------|----------|------|-------|
| Main chipset  | ➤ MT7668AUN                        |           |          |      |       |
| Compliance  | ➤ Bluetooth 5.0                    |           |          |      |       |
| Frequency range   | ➤ 2400 ~ 2483.5MHz                 |           |          |      |       |
| Initial carrier frequency tolerance   | ➤ +/- 40kHz (typical)              |           |          |      |       |
| Modulation technique  | ➤ Frequency hopping, 1600 hops/sec |           |          |      |       |
| Channel spacing   | ➤ 1MHz                             |           |          |      |       |
| Channels support  | ➤ 79 channels                      |           |          |      |       |
| Power consumption @25° C  | Current consumption                | Data Rate | Average. |      | Units |
|   |                                    |           | Typ.     | Max. |       |
|   | Sleep mode<br>Radio off            | --        | 1.5      | 2.0  | mA    |
|   | BT Tx                              | BDR       | 34       | 38   | mA    |
|   |                                    | EDR       | 34       | 38   | mA    |
|   |                                    | BLE       | 34       | 38   | mA    |
|   | BT Rx                              | BDR       | 23       | 26   | mA    |
|   |                                    | EDR       | 23       | 26   | mA    |
|   |                                    | BLE       | 23       | 26   | mA    |
|   | Note :                             |           |          |      |       |
| ※The maximum current consumption would be impacted by radiation environment and the driver mechanism. |                                    |           |          |      |       |

|                       |   |
|-----------------------|---|
| Output power (dBm)    | ➤ + 4 dBm ≤ Output Power ≤ +10dBm ( Class I Device )  |
| Sensitivity           | ➤ -80 dBm (typ.) for pi/4-DQPSK, 0.1%BER              |
| Operation temperature | ➤ -10° ~ 60° C  |
| Storage temperature   | ➤ -45° ~ 85° C , R.H. : 90% ( non-condensing )        |
| Antenna               | ➤ 1 U.FL connector on module for BT external antenna. |

## 4. Mechanical Drawing



### 5. Shielding cover Information

|                   |     |           |             |          |          |
|-------------------|-----|-----------|-------------|----------|----------|
| PART NUMBER BLOCK |     | REVISIONS |             |          |          |
| PART NUMBER       | REV | REV       | DESCRIPTION | DATE     | APPROVED |
| 3SDAZ6801S1-111ST | A   | A         | NEW RELEASE | 17/10/20 |          |

NOTES:  
1. MATERIAL: 洋白銅  
2. THICKNESS: 0.2mm

|                        |         |   |                          |              |   |  |
|------------------------|---------|---|--------------------------|--------------|---|--|
|                        |         | UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN mm AND TOLERANCES ARE: |                          |              | <b>啓碁科技股份有限公司</b><br><small>20 Park Avenue II, Hsinchu Science Park, Hsinchu 300, Taiwan, R.O.C.<br/>                 TEL: 886-3-6587799 Fax: 886-3-5788726</small> |  |
|                        |         | INTEGER DIMENSIONS ± 0.2  | ANGULAR DIMENSIONS ± 1°  |              |   |  |
|                        |         | 1 PLACE DECIMAL ± 0.1   | HOLES UNDER Ø5.00 ± 0.05 |              |   |  |
|                        |         | MATERIAL: SEE NOTES   |                          |              | DWG TITLE   |  |
|                        |         | FINISH: SEE NOTES   |                          |              | SHIELDING, FRAME, ST, DHUR-AZ68   |  |
| THIRD ANGLE PROJECTION | DRAWN   | SHAWN LIN   | 10/20/17                 | SIZE DWG NO. | REV   |  |
|                        | ENGR    | SHAWN LIN   | 10/20/17                 | A4           | A   |  |
| NEXT ASSY              | USED ON | APVD  |                          | 3SDAZ6801S1  |   |  |
| APPLICATION            |         | SCALE   | 1/1                      | SHEET        | 1 OF 1  |  |

### 6. Connector Information

Material :  
 Insulation: High temperature plastic UL 94V-0,  
 Color Nature(Halogen-Free)  
 Contact : Phosphor Bronze  
 Fixed Tgb : Phosphor Bronze with Tin Plated

| Circuits | Dimension   |              |              |
|----------|-------------|--------------|--------------|
|          | A           | B            | C            |
| 2        | 1.25(.049)  | 9.75(.226)   | 3.85(.152)   |
| 3        | 2.50(.098)  | 7.00(.276)   | 5.10(.201)   |
| 4        | 3.75(.148)  | 8.25(.325)   | 6.35(.250)   |
| 5        | 5.00(.197)  | 9.50(.374)   | 7.60(.299)   |
| 6        | 6.25(.246)  | 10.75(.423)  | 8.85(.346)   |
| 7        | 7.50(.295)  | 12.00(.472)  | 10.10(.398)  |
| 8        | 8.75(.344)  | 13.25(.522)  | 11.35(.447)  |
| 9        | 10.00(.394) | 14.50(.571)  | 12.60(.496)  |
| 10       | 11.25(.443) | 15.75(.620)  | 13.85(.545)  |
| 11       | 12.50(.492) | 17.00(.669)  | 15.10(.594)  |
| 12       | 13.75(.541) | 18.25(.719)  | 16.35(.644)  |
| 13       | 15.00(.591) | 19.50(.768)  | 17.60(.693)  |
| 14       | 16.25(.640) | 20.75(.817)  | 18.85(.742)  |
| 15       | 17.50(.689) | 22.00(.866)  | 20.10(.791)  |
| 16       | 18.75(.737) | 23.25(.914)  | 21.35(.839)  |
| 17       | 20.00(.786) | 24.50(.963)  | 22.60(.888)  |
| 18       | 21.25(.835) | 25.75(1.012) | 23.85(.937)  |
| 19       | 22.50(.884) | 27.00(1.061) | 25.10(.986)  |
| 20       | 23.75(.933) | 28.25(1.110) | 26.35(1.035) |

**ORDERING CODE:**  
 C140 \*\* M \* H RO -NH  
 ① ② ③ ④ ⑤ ⑥ ⑦

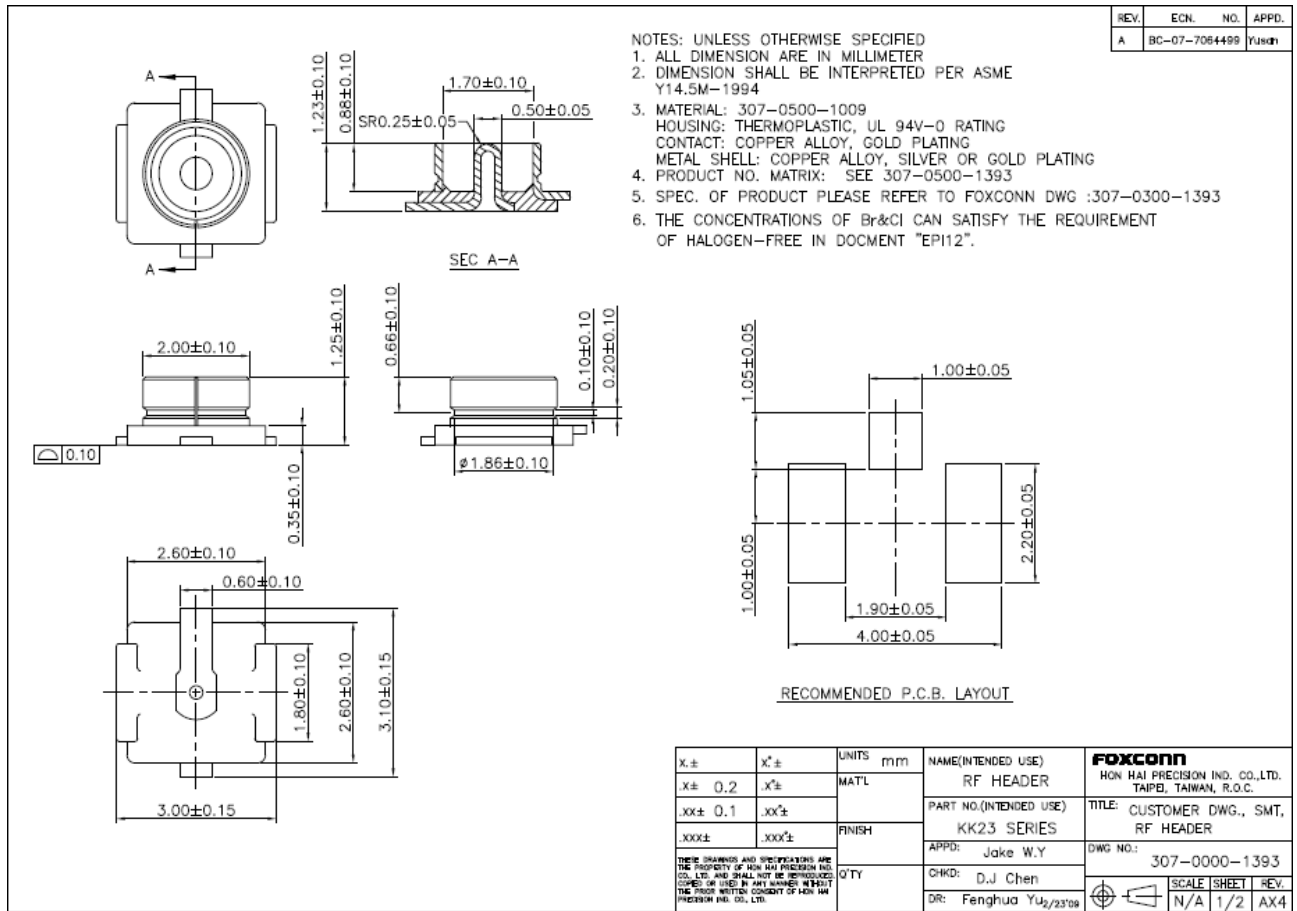
① SERIES NO.:  
 ② NO. OF CIRCUITS:  
 ③ CONTACTS TYPE: M= SMT  
 ④ PLATING OPTION:  
 1= TIN OVER NICKEL PLATED  
 2= GOLD FLASH PLATING OVER  
 1.27µm(50µ") NICKEL  
 ⑤ TAIL STYLE: H= RIGHT ANGLE  
 ⑥ OPTION: RO= TAPE & REEL PACKING  
 ⑦ -NH= FOR LEAD FREE IR PROCESSES  
 AND HALOGEN-FREE

Recommended P.C. Board layout

Halogen-Free | Lead Free Process | RoHS Compliant

|     |      |      |           |                    |          |                            |                             |                                |
|-----|------|------|-----------|--------------------|----------|----------------------------|-----------------------------|--------------------------------|
| △   |      |      |           |                    | DWG      | UNIT: mm / inch            | TITLE: 125MM (49")          | 瀚星股份有限公司<br>CviLux Corporation |
| △   |      |      |           | DRAWN BY: Clark    | 04/19-17 | TOLERANCE                  | RIGHT ANGLE SMT TYPE HEADER |                                |
| △   |      |      |           | ENGINEER: Clark    | 04/19-17 | UNLESS OTHERWISE SPECIFIED | INTERNAL:                   |                                |
| △   |      |      |           | CHECKED BY: David  | 04/19-17 | X ± 0.30/0.02 X' ± 3"      | FINISH:                     |                                |
| SYN | NAME | DATE | REVISIONS | APPROVED BY: David | 04/19-17 | .XX ± 0.25/0.00 X' ± 0.5"  |                             | DRAWING NO. C14001SA           |
|     |      |      |           |                    |          | .XXX ± 0.20/0.08 XX ±      |                             | PART NO. C140**M**HRO-NH       |
|     |      |      |           |                    |          |                            |                             | SCALE 5 / 1                    |
|     |      |      |           |                    |          |                            |                             | SHEET 1 OF 1                   |

**7. Coaxial IPEX Connector**





### **Federal Communication Commission Interference Statement**

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 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: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

**For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.**

This device is restricted for indoor use.

Professional installation is required

#### **IMPORTANT NOTE:**

#### **FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

#### **IMPORTANT NOTE:**

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

Additional testing and certification may be necessary when multiple modules are used.

#### **USERS MANUAL OF THE END PRODUCT:**

In the users manual of the end product, the end user has to be informed to keep at least **20cm** separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

If the labelling area is small than the palm of the hand, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

**LABEL OF THE END PRODUCT:**

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: NKR-DHURAZ68 ".

If the labelling area is larger than the palm of the hand, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

| Set | Ant. | Port | Brand | Model Name | Antenna Type    | Connector | Gain (dBi) |      |           |
|-----|------|------|-------|------------|-----------------|-----------|------------|------|-----------|
|     |      |      |       |            |                 |           | 2.4GHz     | 5GHz | Bluetooth |
| 1   | 1    | 1    | WNC   | -          | Printed Antenna | N/A       | 5.31       | 5.92 | -         |
|     | 2    | 2    | WNC   | -          | Printed Antenna | N/A       | 5.26       | 5.91 | -         |
| 2   | 3    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | 1.54       | 3.52 | -         |
|     | 4    | 2    | WNC   | -          | PIFA Antenna    | I-PEX     | 0.15       | 2.83 | -         |
| 3   | 5    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | 3.56       | 5.59 | -         |
|     | 6    | 2    | WNC   | -          | PIFA Antenna    | I-PEX     | 2.14       | 5.08 | -         |
| 4   | 7    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | -          | -    | 3.90      |
| 5   | 8    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | -          | -    | 1.18      |
| 6   | 9    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | -          | -    | 0.01      |

This device complies with Industry Canada’s licence-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

*Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

*Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.*

This radio transmitter (4441A-DHURAZ68) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

*Le présent émetteur radio (4441A-DHURAZ68) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.*

| Set | Ant. | Port | Brand | Model Name | Antenna Type    | Connector | Gain (dBi) |      |           |
|-----|------|------|-------|------------|-----------------|-----------|------------|------|-----------|
|     |      |      |       |            |                 |           | 2.4GHz     | 5GHz | Bluetooth |
| 1   | 1    | 1    | WNC   | -          | Printed Antenna | N/A       | 5.31       | 5.92 | -         |
|     | 2    | 2    | WNC   | -          | Printed Antenna | N/A       | 5.26       | 5.91 | -         |
| 2   | 3    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | 1.54       | 3.52 | -         |
|     | 4    | 2    | WNC   | -          | PIFA Antenna    | I-PEX     | 0.15       | 2.83 | -         |
| 3   | 5    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | 3.56       | 5.59 | -         |
|     | 6    | 2    | WNC   | -          | PIFA Antenna    | I-PEX     | 2.14       | 5.08 | -         |
| 4   | 7    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | -          | -    | 3.90      |
| 5   | 8    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | -          | -    | 1.18      |
| 6   | 9    | 1    | WNC   | -          | PIFA Antenna    | I-PEX     | -          | -    | 0.01      |

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

*les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.*

The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

*le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5850 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.*

**IMPORTANT NOTE:**

**IC Radiation Exposure Statement:**

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

**IMPORTANT NOTE:**

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

Additional testing and certification may be necessary when multiple modules are used.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

**USERS MANUAL OF THE END PRODUCT:**

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. 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.

**LABEL OF THE END PRODUCT:**

The final end product must be labeled in a visible area with the following " Contains IC: 4441A-DHURAZ68 ".

The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

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