

# Antenna Drawing For Envy

Regulatory Model Number: P01L

Regulatory Type: P01L001

# Antenna Regulatory Information

|   |                                |
|---|--------------------------------|
| • <b>Product type</b>                       | • <b>WWAN antenna</b>          |
| • <b>Model number</b>                       | • <b>Latitude Z600</b>         |
| • <b>Revision</b>                           | • <b>X01</b>                   |
| • <b>Manufacturer Part No. : Main / Aux</b> | • <b>2023685-1 / 2023684-1</b> |
| • <b>Dell Part No. : Main / Aux</b>         | •                              |



Template Revision 031808

# 1. Specifications

## Antenna Specifications

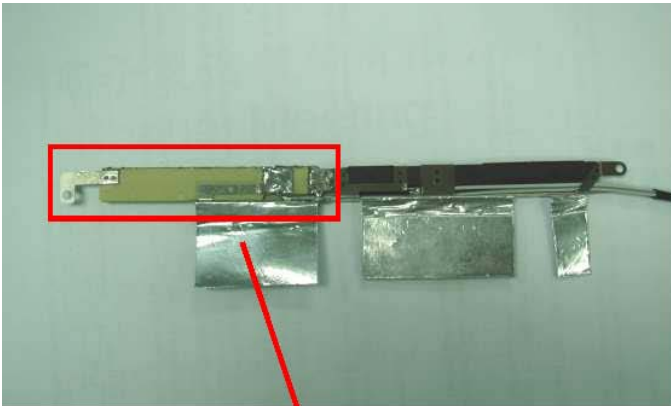
|  |                                       |
|--|---------------------------------------|
| <b>Antenna Type (Material, Technology)</b>     | PIFA                                  |
| <b>Antenna Model Number</b>                    | REDBULL                               |
| <b>Operating Frequency Range(s)</b>            | 824MHz ~ 960MHz and 1710MHz ~ 2170MHz |
| <b>Peak Gain (Low Band) (dBi)</b>              | Main -0.67 / Aux 0.85                 |
| <b>Peak Gain (High Band) (dBi)</b>             | Main 2.33 / Aux 1.23                  |
| <b>Radio Connector Type</b>                    | Technova 1.13/1.37 RF Connector.      |
| <b>Mid-Line Connector Type (If Applicable)</b> | N/A                                   |

**Remark:** Peak Gains include all system losses (connector, cable, etc)

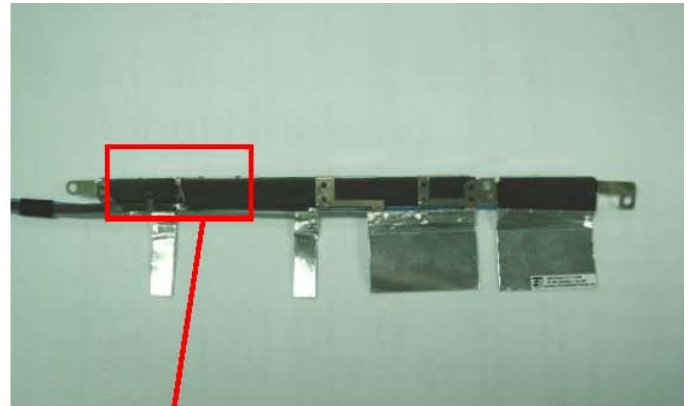
## Cable Specifications

| Cable Parameters                                       | Main  |           |                | Aux   |           |               |
|--|---|-----------|----------------|---|-----------|---------------|
|  | LCD Side  | Base Side | Total          | LCD Side  | Base Side | Total         |
| <b>Length (mm)</b>                                     | 360   | 258       | 618            | 301   | 518       | 819           |
| <b>Loss (Including Connectors) (dB, 0.9GHz / 2GHz)</b> |   |           | 0.89 /<br>2.48 |   |           | 1.18/<br>3.29 |
| <b>Description (Color, Diameter, Manufacturer)</b>     | Color: White/Gray<br>OD: 1.37 mm<br>Vendor: HLG or equivalent |           |                | Color: Black/Gray<br>OD: 1.13 mm<br>Vendor: HLG or equivalent |           |               |

## 2. Antenna Assembly



Main Antenna



Aux Antenna

## 3. Antenna Assembly Installed in The Notebook

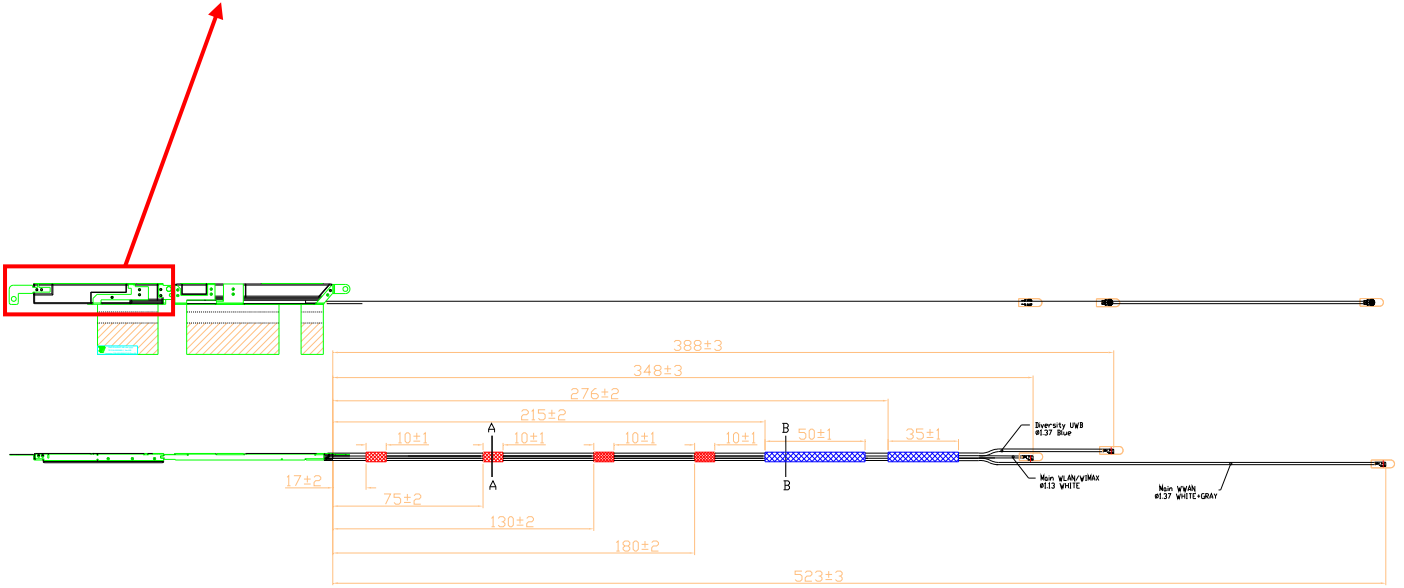


WWAN-Aux

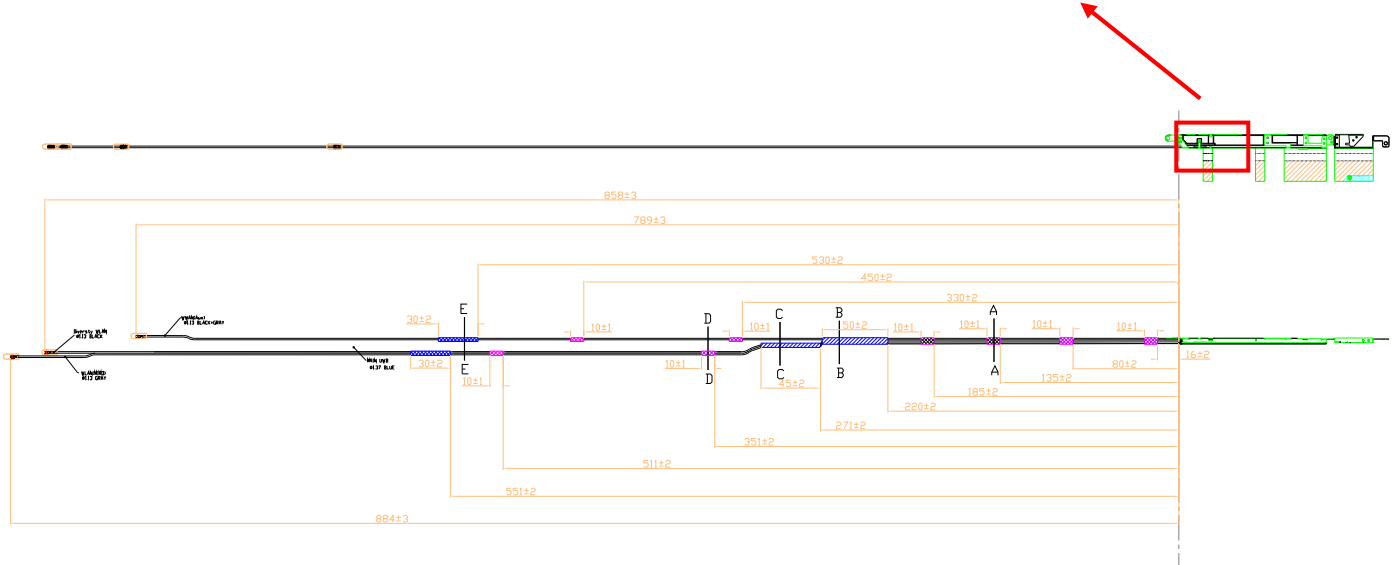
WWAN-Main

# 4. Mechanical Drawing of Antennas

WWAN- Main



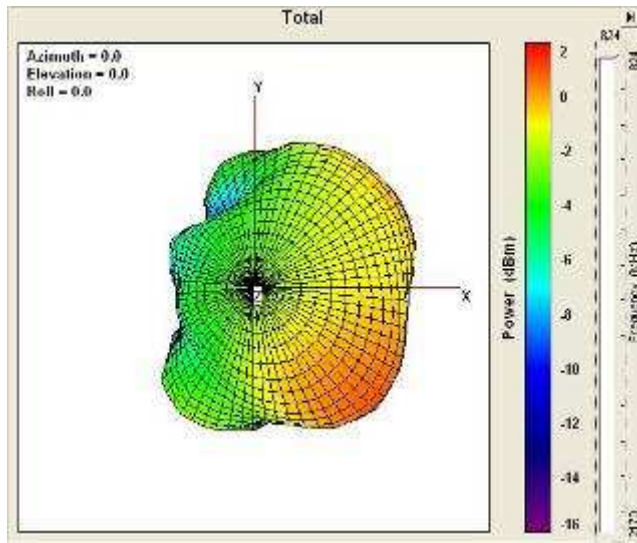
WWAN- Aux



# 5. Gain Patterns

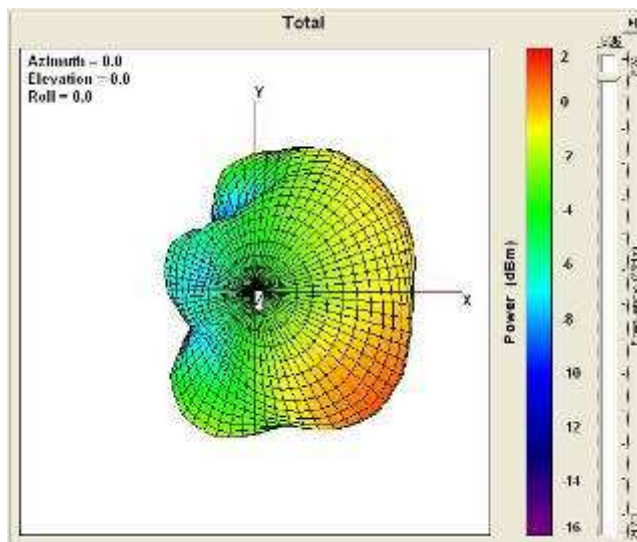
- Main Antenna

824 MHz



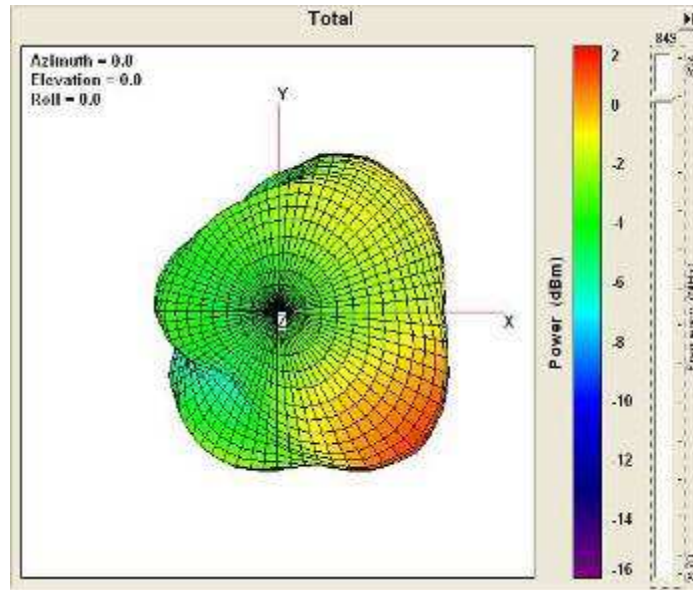
|                  |                |
|------------------|----------------|
| Center Frequency | <b>824 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.71</b>   |
| Efficiency(%)    | <b>43.33</b>   |

836 MHz



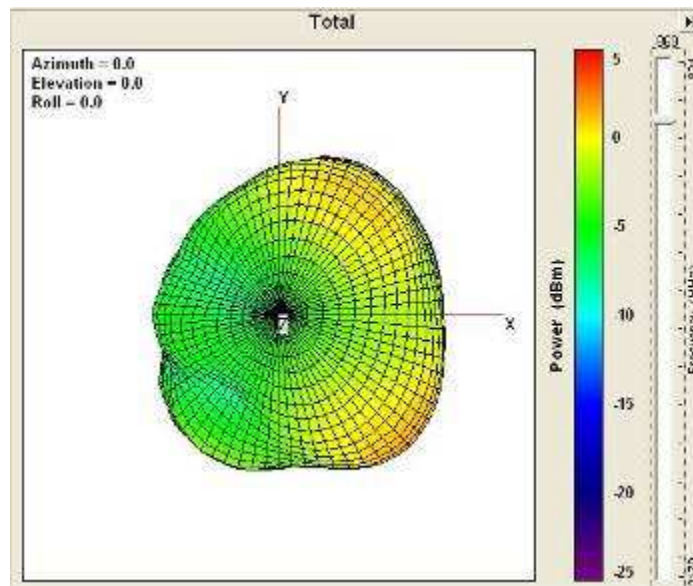
|                  |                |
|------------------|----------------|
| Center Frequency | <b>836 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.67</b>   |
| Efficiency(%)    | <b>46.78</b>   |

849 MHz



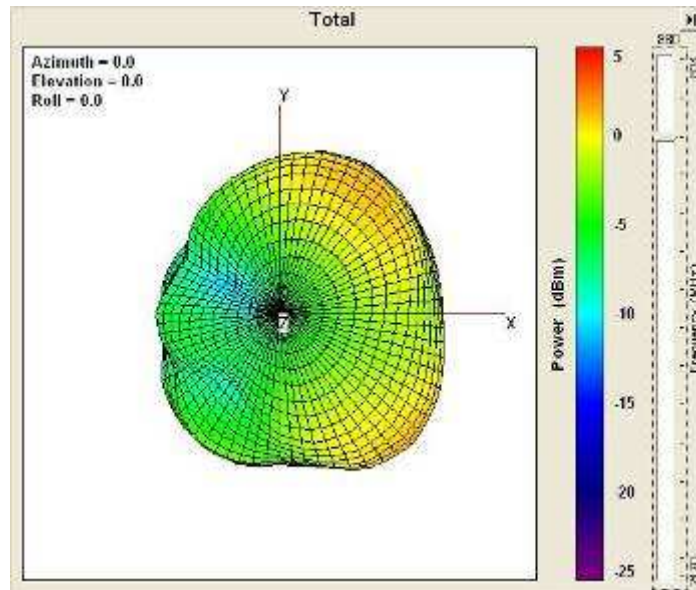
|                  |                |
|------------------|----------------|
| Center Frequency | <b>849 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.76</b>   |
| Efficiency(%)    | <b>46.52</b>   |

869 MHz



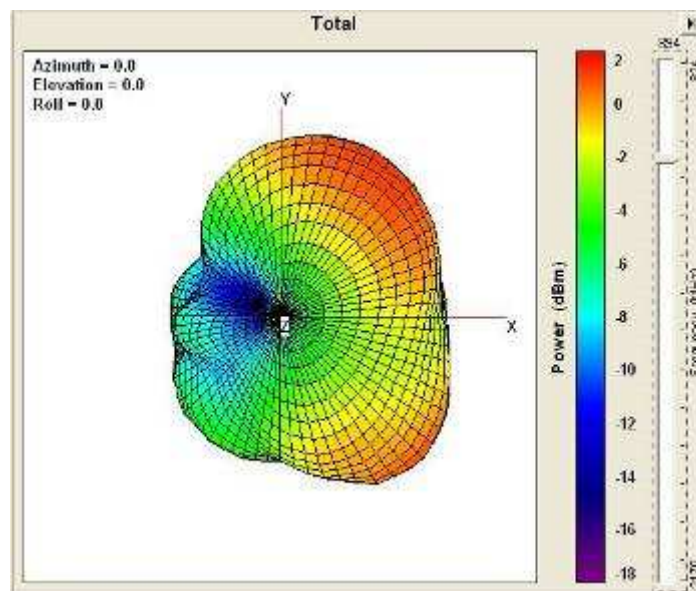
|                  |                |
|------------------|----------------|
| Center Frequency | <b>869 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.78</b>   |
| Efficiency(%)    | <b>46.57</b>   |

## 880 MHz



|                  |                |
|------------------|----------------|
| Center Frequency | <b>880 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.76</b>   |
| Efficiency(%)    | <b>44.91</b>   |

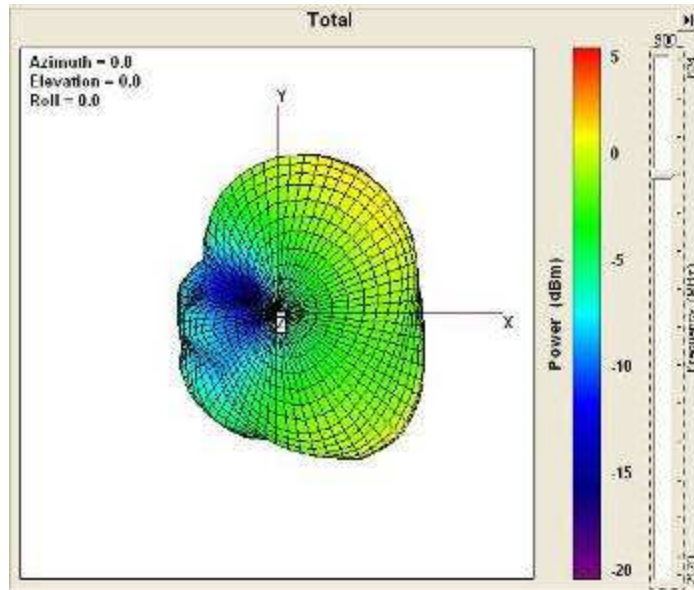
## 894 MHz



|                  |                |
|------------------|----------------|
| Center Frequency | <b>894 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.74</b>   |
| Efficiency(%)    | <b>40.08</b>   |

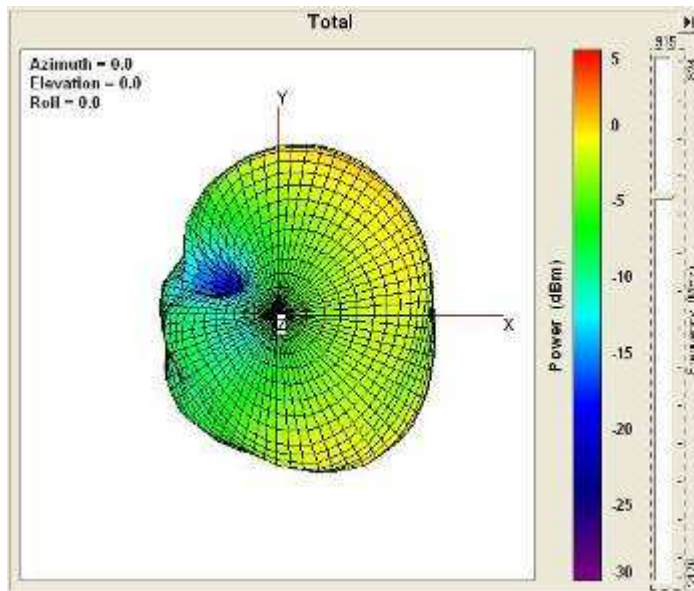


## 900 MHz



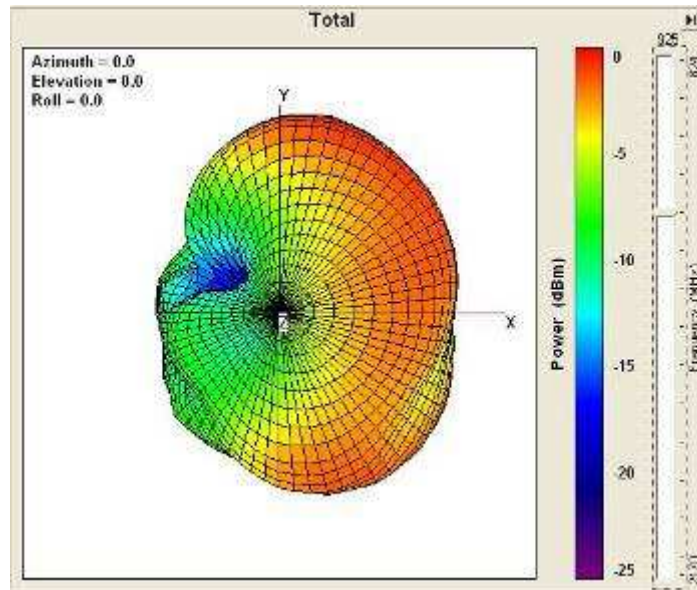
|                  |                |
|------------------|----------------|
| Center Frequency | <b>900 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.83</b>   |
| Efficiency(%)    | <b>38.02</b>   |

## 915 MHz



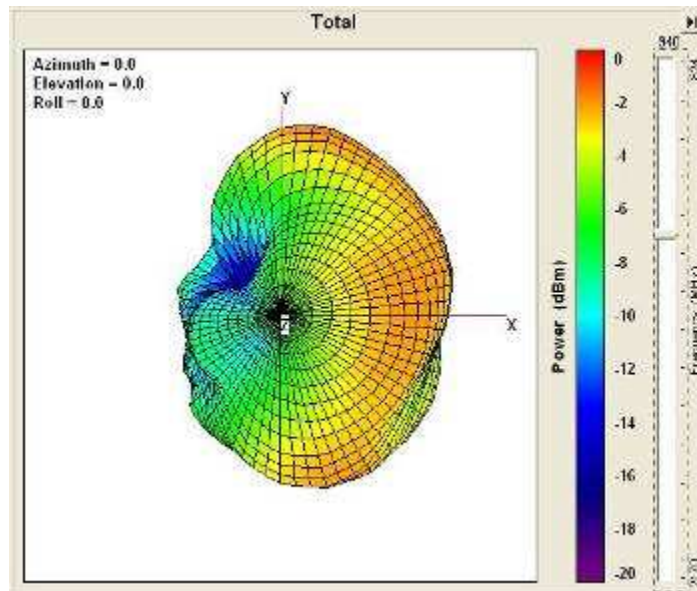
|                  |                |
|------------------|----------------|
| Center Frequency | <b>915 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.95</b>   |
| Efficiency(%)    | <b>35.27</b>   |

## 925 MHz



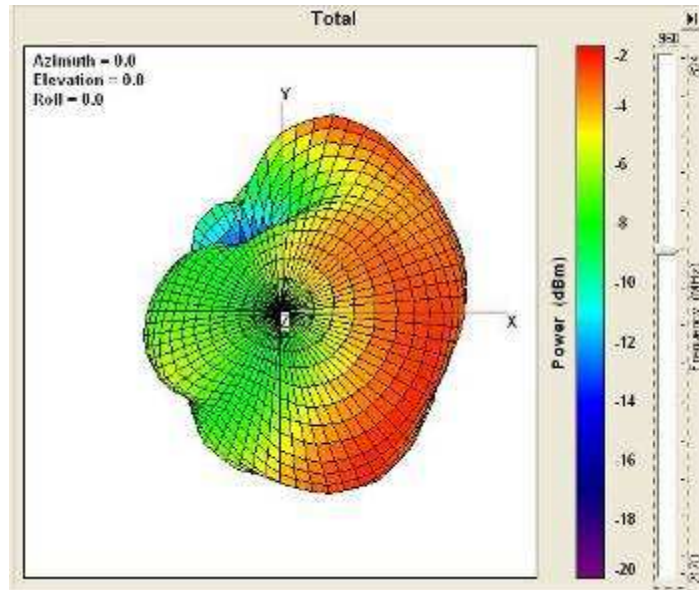
|                  |                |
|------------------|----------------|
| Center Frequency | <b>925 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.99</b>   |
| Efficiency(%)    | <b>32.97</b>   |

## 940 MHz



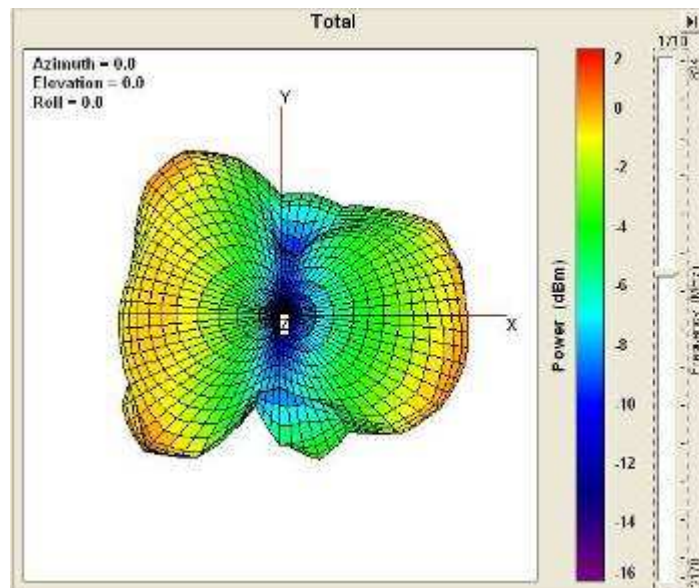
|                  |                |
|------------------|----------------|
| Center Frequency | <b>940 MHz</b> |
| Peak EIRP(dBm)   | <b>-1.91</b>   |
| Efficiency(%)    | <b>28.55</b>   |

**960 MHz**



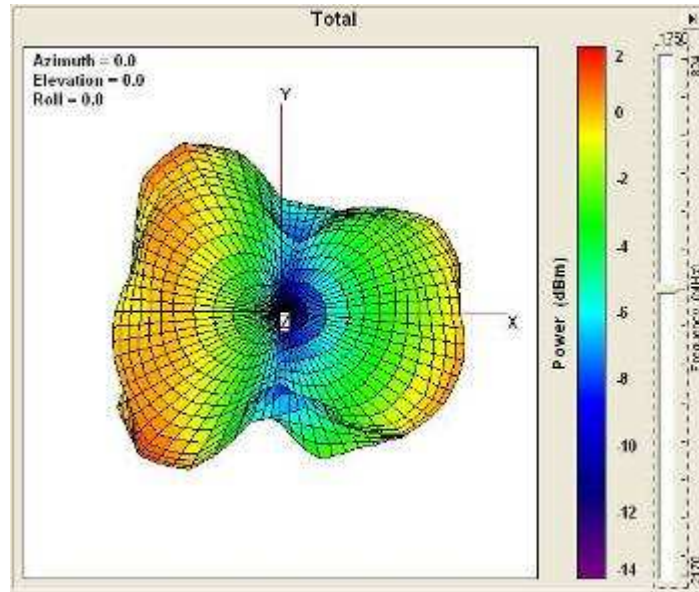
|                  |                |
|------------------|----------------|
| Center Frequency | <b>960 MHz</b> |
| Peak EIRP(dBm)   | <b>-2.28</b>   |
| Efficiency(%)    | <b>23.78</b>   |

**1710 MHz**



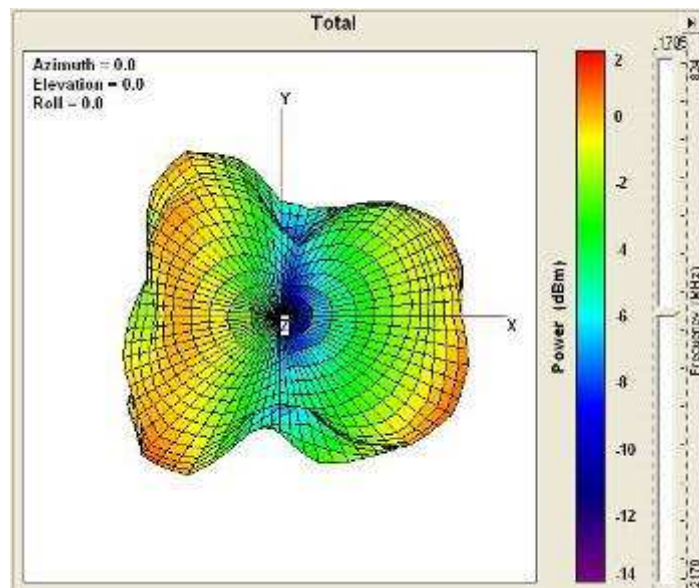
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1710 MHz</b> |
| Peak EIRP(dBm)   | <b>1.24</b>     |
| Efficiency(%)    | <b>48.48</b>    |

## 1750 MHz



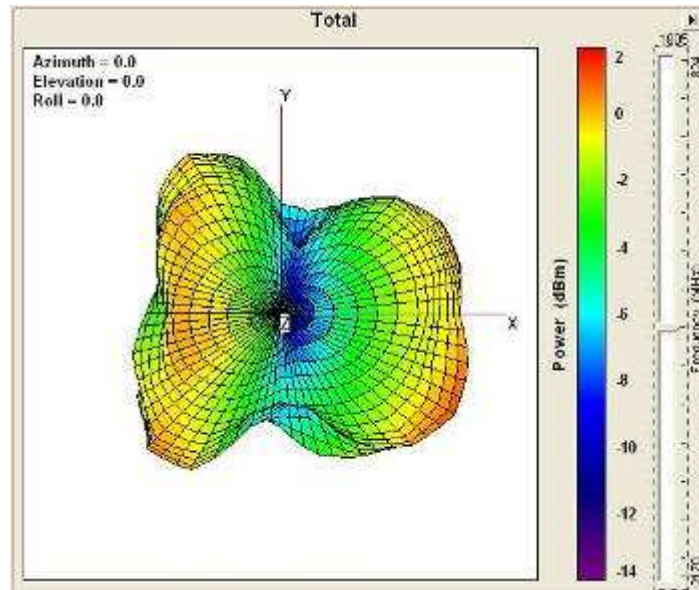
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1750 MHz</b> |
| Peak EIRP(dBm)   | <b>2.13</b>     |
| Efficiency(%)    | <b>50.45</b>    |

## 1785 MHz



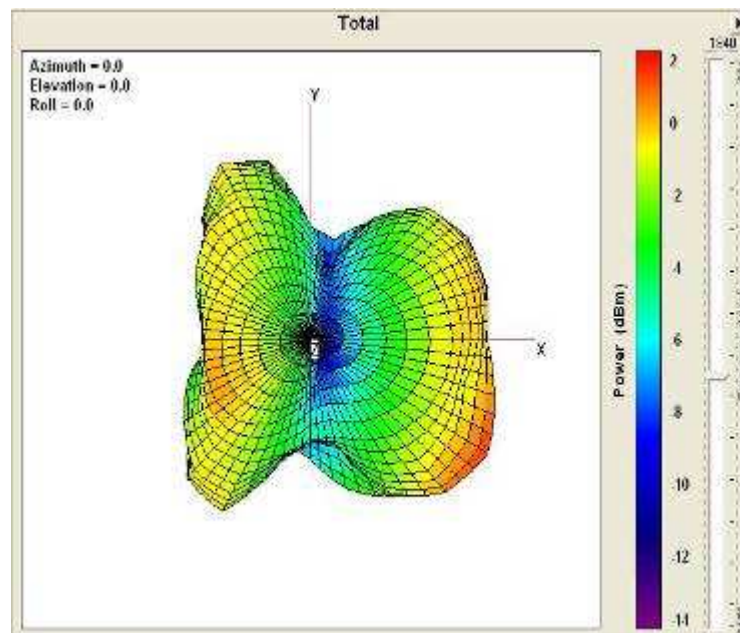
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1785 MHz</b> |
| Peak EIRP(dBm)   | <b>1.35</b>     |
| Efficiency(%)    | <b>42.27</b>    |

## 1805 MHz



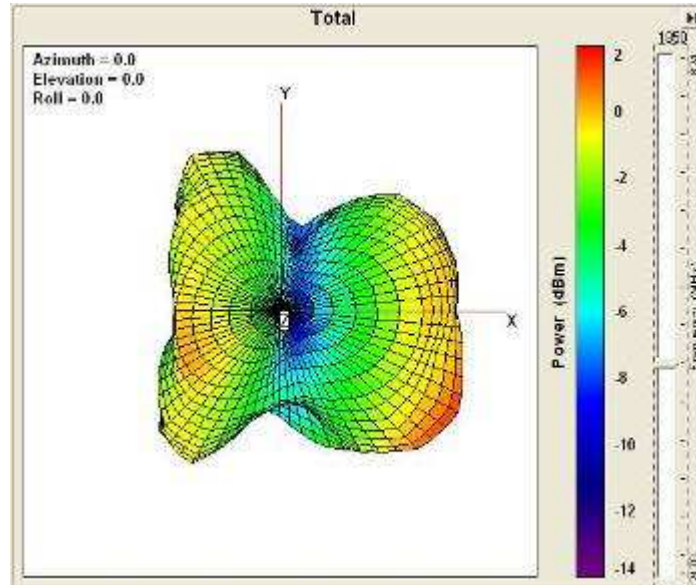
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1805 MHz</b> |
| Peak EIRP(dBm)   | <b>1.41</b>     |
| Efficiency(%)    | <b>45.72</b>    |

## 1840 MHz



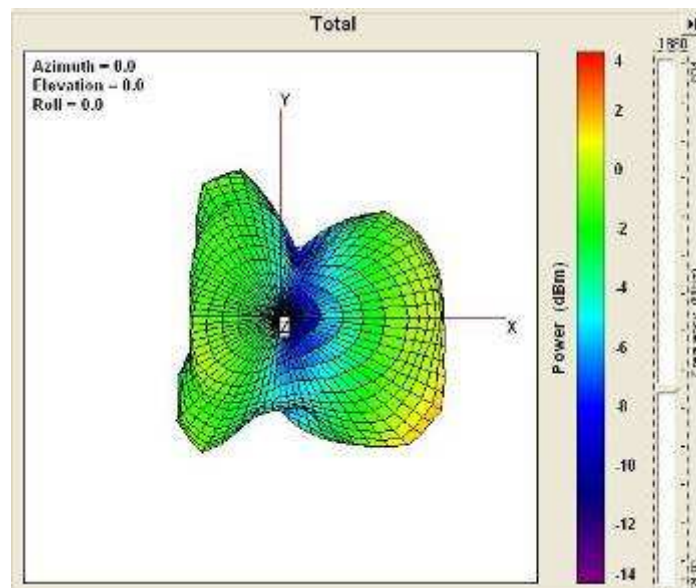
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1840 MHz</b> |
| Peak EIRP(dBm)   | <b>1.50</b>     |
| Efficiency(%)    | <b>51.95</b>    |

## 1850 MHz



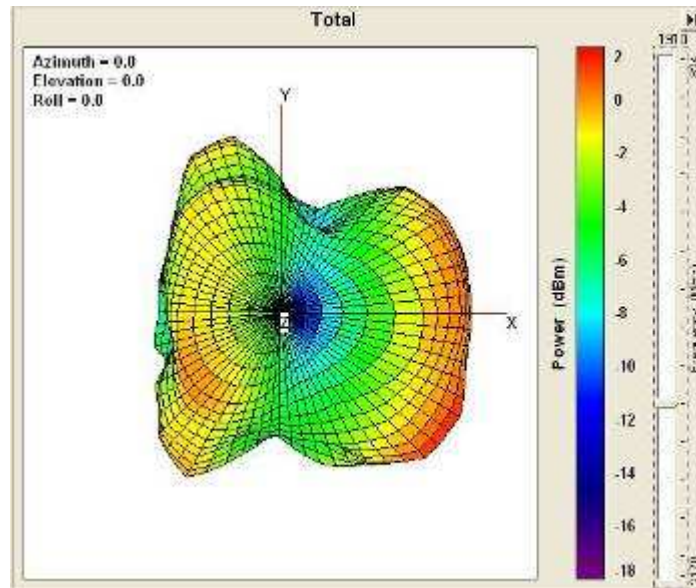
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1850 MHz</b> |
| Peak EIRP(dBm)   | 1.37            |
| Efficiency(%)    | 50.62           |

## 1880 MHz



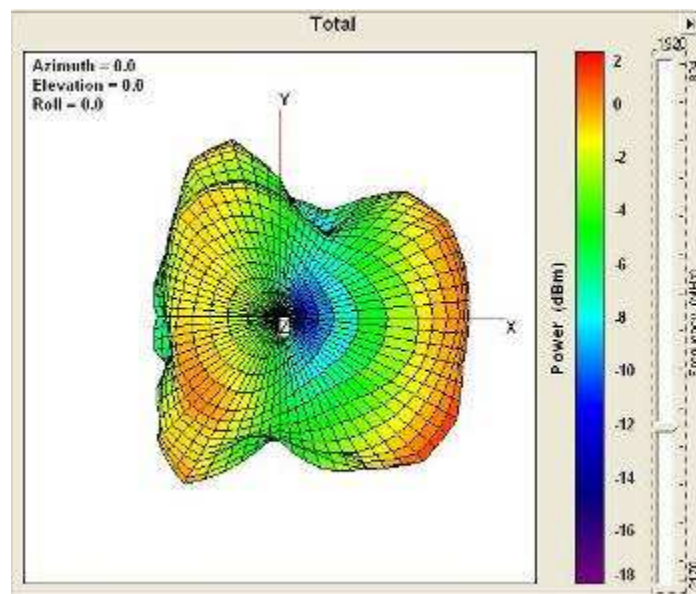
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1880 MHz</b> |
| Peak EIRP(dBm)   | 1.11            |
| Efficiency(%)    | 46.70           |

## 1910 MHz



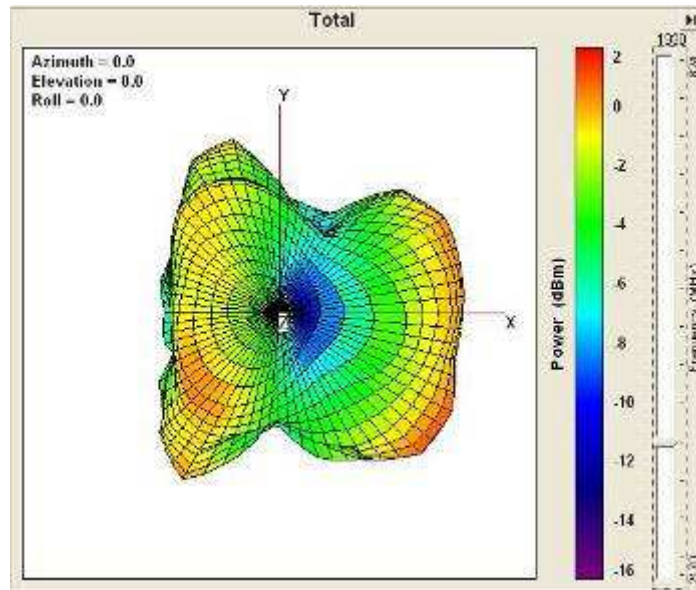
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1910 MHz</b> |
| Peak EIRP(dBm)   | <b>1.53</b>     |
| Efficiency(%)    | <b>51.11</b>    |

## 1920 MHz



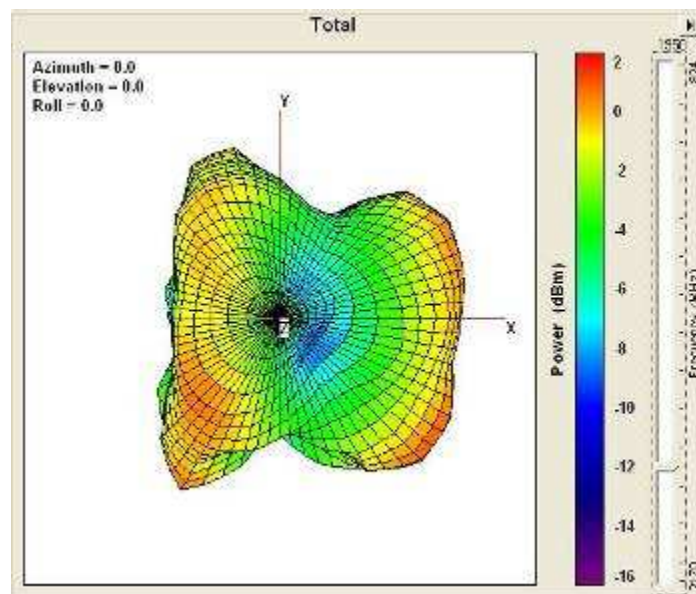
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1920 MHz</b> |
| Peak EIRP(dBm)   | <b>1.83</b>     |
| Efficiency(%)    | <b>52.87</b>    |

## 1930 MHz



|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1930 MHz</b> |
| Peak EIRP(dBm)   | <b>2.06</b>     |
| Efficiency(%)    | <b>53.31</b>    |

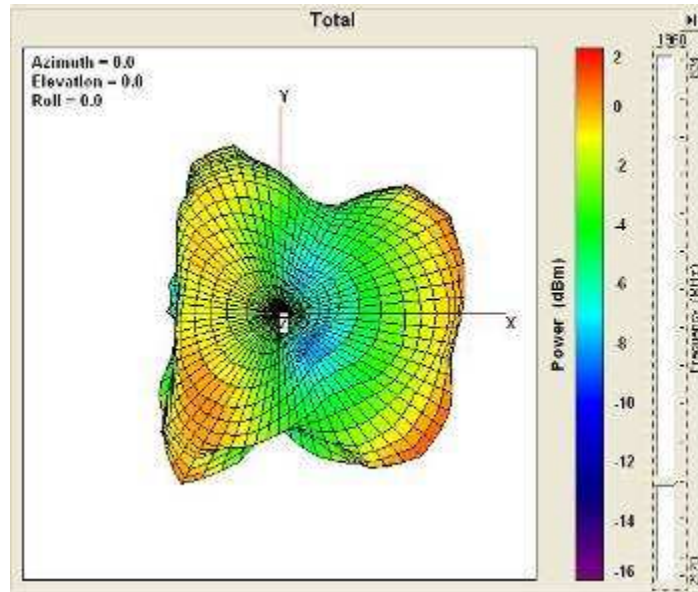
## 1950 MHz



|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1950 MHz</b> |
| Peak EIRP(dBm)   | <b>2.37</b>     |
| Efficiency(%)    | <b>53.69</b>    |

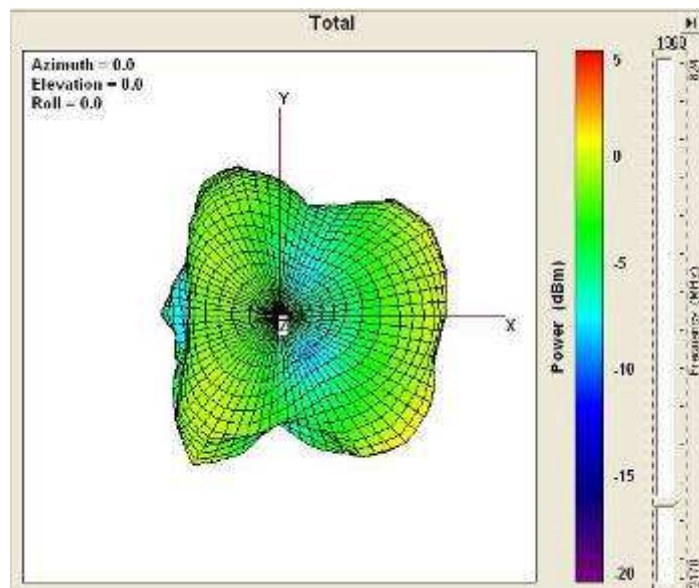


**1960 MHz**



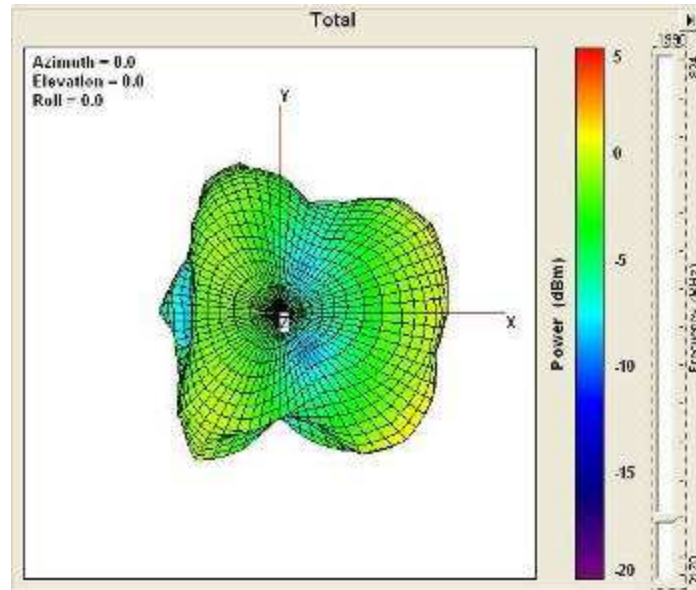
|                  |                |
|------------------|----------------|
| Center Frequency | <b>1960MHz</b> |
| Peak EIRP(dBm)   | <b>1.85</b>    |
| Efficiency(%)    | <b>53.44</b>   |

**1980 MHz**



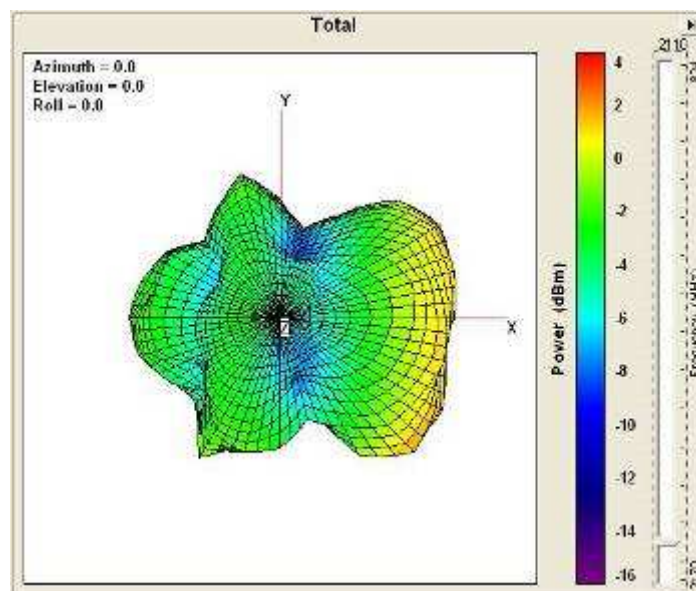
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1980 MHz</b> |
| Peak EIRP(dBm)   | <b>1.75</b>     |
| Efficiency(%)    | <b>51.14</b>    |

## 1990 MHz



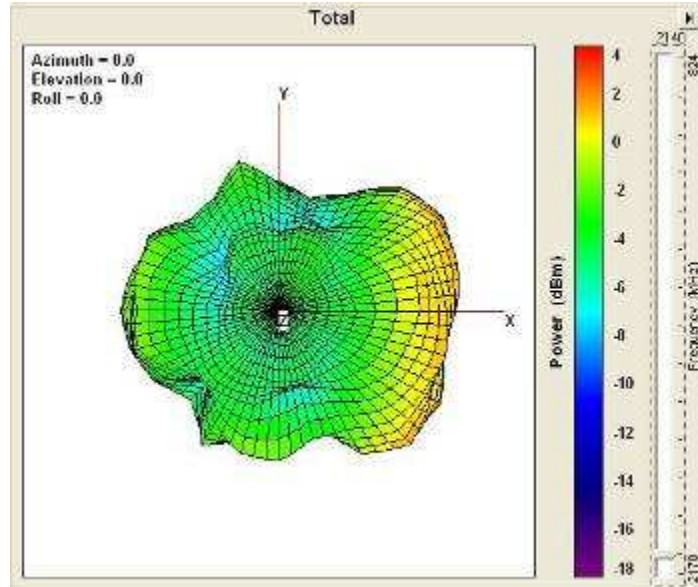
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1990 MHz</b> |
| Peak EIRP(dBm)   | <b>1.92</b>     |
| Efficiency(%)    | <b>52.72</b>    |

## 2110 MHz



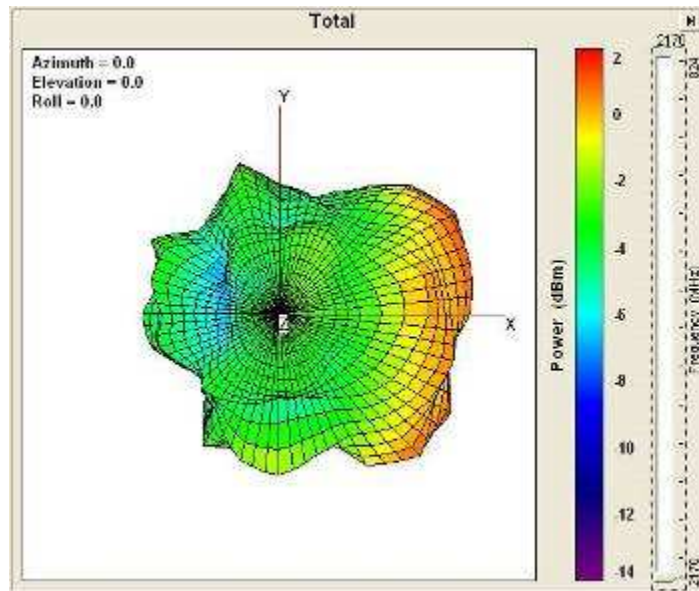
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>2110 MHz</b> |
| Peak EIRP(dBm)   | <b>0.80</b>     |
| Efficiency(%)    | <b>44.16</b>    |

**2140 MHz**



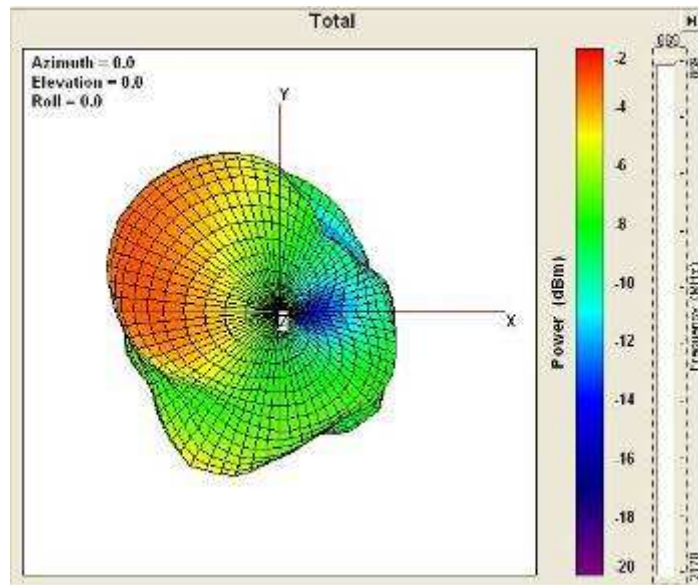
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>2140 MHz</b> |
| Peak EIRP(dBm)   | <b>0.15</b>     |
| Efficiency(%)    | <b>38.14</b>    |

**2170 MHz**



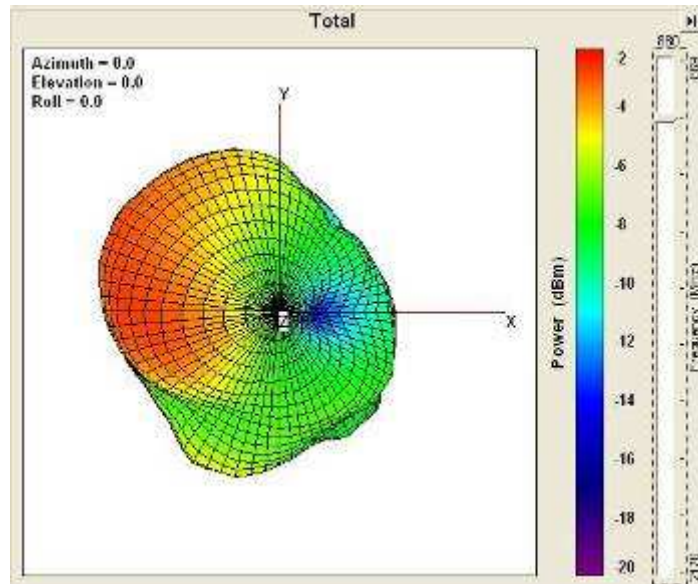
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>2170 MHz</b> |
| Peak EIRP(dBm)   | <b>0.28</b>     |
| Efficiency(%)    | <b>34.49</b>    |

**- Aux Antenna  
869 MHz**



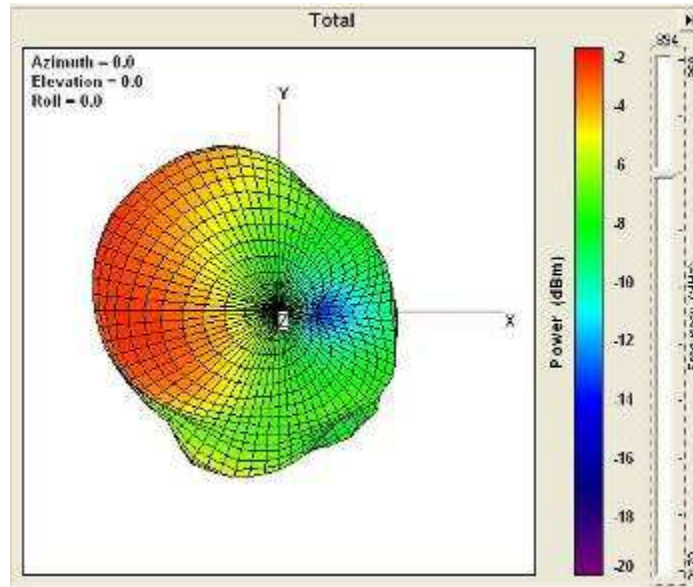
|                  |                |
|------------------|----------------|
| Center Frequency | <b>869 MHz</b> |
| Peak EIRP(dBm)   | <b>0.10</b>    |
| Efficiency(%)    | <b>23.23</b>   |

**880 MHz**



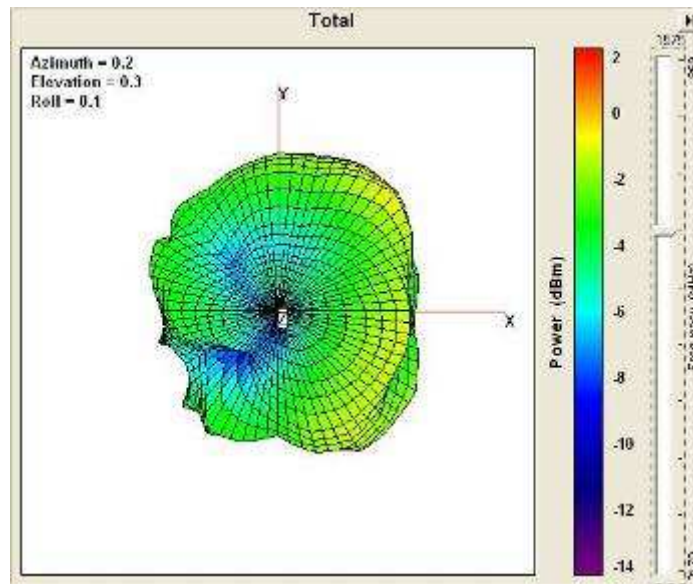
|                  |                |
|------------------|----------------|
| Center Frequency | <b>880 MHz</b> |
| Peak EIRP(dBm)   | <b>0.72</b>    |
| Efficiency(%)    | <b>24.97</b>   |

**894 MHz**



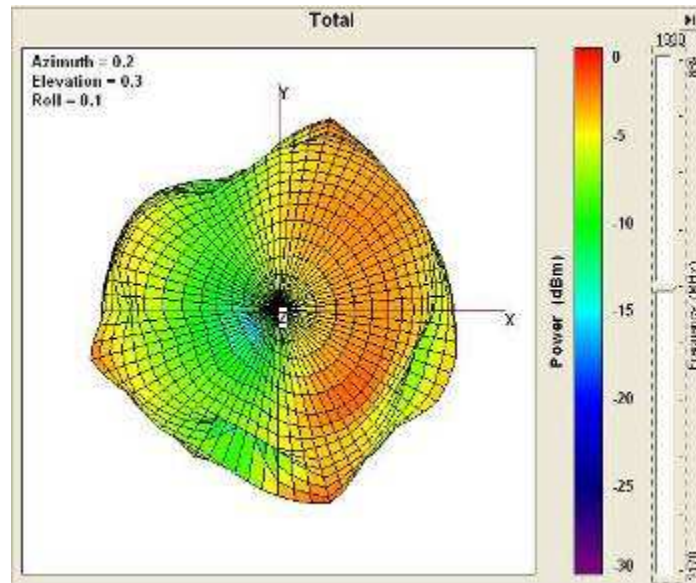
|                  |                |
|------------------|----------------|
| Center Frequency | <b>894 MHz</b> |
| Peak EIRP(dBm)   | 0.83           |
| Efficiency(%)    | 25.34          |

**1575 MHz**



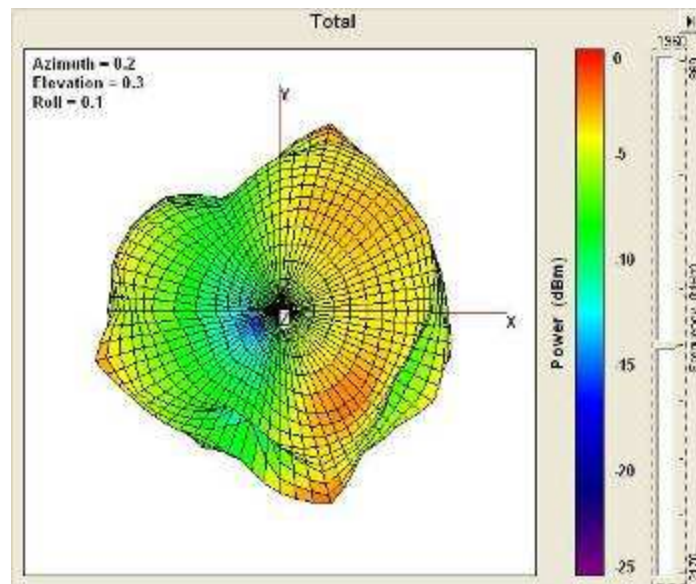
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1575 MHz</b> |
| Peak EIRP(dBm)   | 1.22            |
| Efficiency(%)    | 44.72           |

## 1930 MHz



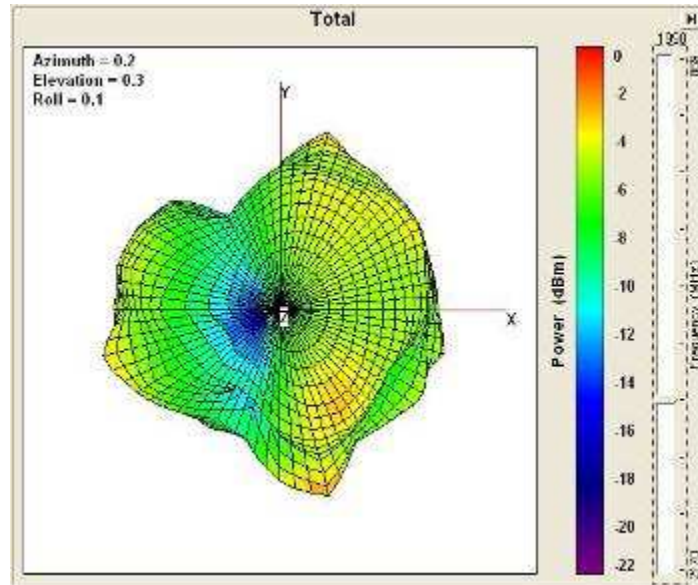
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1930 MHz</b> |
| Peak EIRP(dBm)   | <b>-0.10</b>    |
| Efficiency(%)    | <b>32.20</b>    |

## 1960 MHz



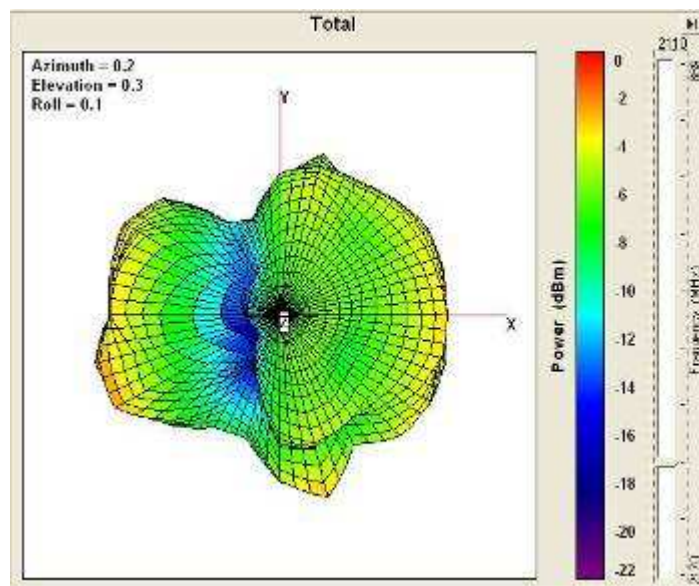
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1960 MHz</b> |
| Peak EIRP(dBm)   | <b>-1.16</b>    |
| Efficiency(%)    | <b>28.48</b>    |

**1990 MHz**



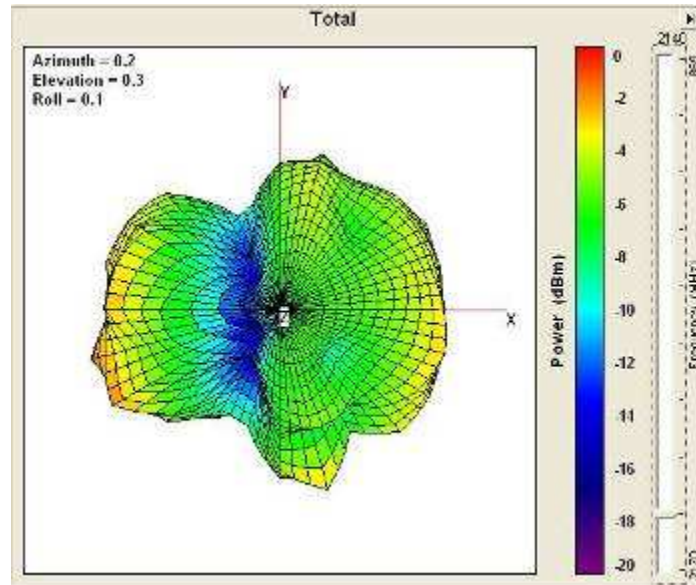
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>1990 MHz</b> |
| Peak EIRP(dBm)   | <b>-2.25</b>    |
| Efficiency(%)    | <b>24.94</b>    |

**2110 MHz**



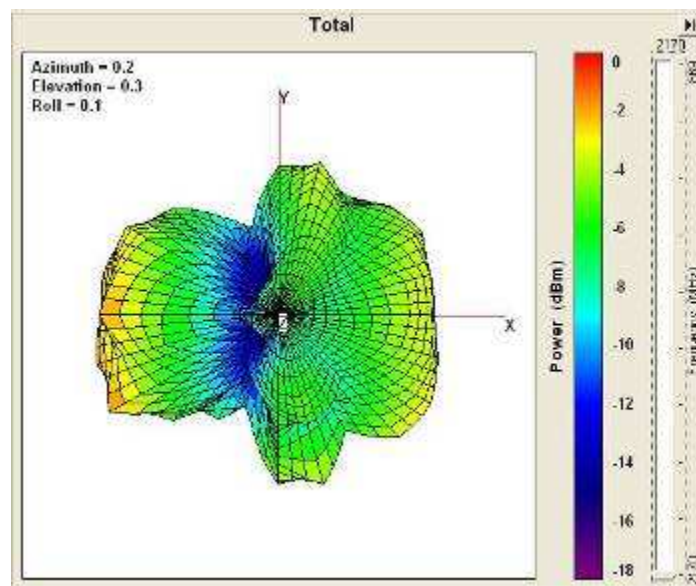
|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>2110 MHz</b> |
| Peak EIRP(dBm)   | <b>-3.58</b>    |
| Efficiency(%)    | <b>16.09</b>    |

## 2140 MHz



|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>2140 MHz</b> |
| Peak EIRP(dBm)   | <b>-2.53</b>    |
| Efficiency(%)    | <b>18.04</b>    |

## 2170MHz



|                  |                 |
|------------------|-----------------|
| Center Frequency | <b>2170 MHz</b> |
| Peak EIRP(dBm)   | <b>-3.22</b>    |
| Efficiency(%)    | <b>16.13</b>    |



# Antenna Regulatory Information

|  |   |
|--|---|
| • Product type   | • WWAN_Main/ WWAN_Aux<br>Antenna                    |
| • Model number   | • Latitude Z600                                     |
| • Revision   | • A00   |
| • Manufacturer Part No.  | (WWAN_Main) PE-080050-A<br>(WWAN_Aux) PE-080060-A   |
| • Inventec Part No.<br>R Antenna module:<br>WWAN Main/WWAN AUX | (WWAN_Main) 6036B0047101<br>(WWAN_Aux) 6036B0047102 |
| • Dell Part No. :  | •   |

## Smart Approach Co.,Ltd.

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FAX: +886-3-5830011

Template Revision 0 May 2008

# 1. Specifications

## Antenna Specifications

|  |  |
|--|--|
| <b>Antenna Type (Material, Technology)</b>     | Metal, Modified PIFA   |
| <b>Antenna Model Number</b>                    | (WWAN_Main) <b>PE-080050-A</b><br>(WWAN_Aux) <b>PE-080060-A</b>  |
| <b>Operating Frequency Range(s)</b>            | <b>WWAN_Main:</b> 824 MHz~960 MHz and 1710 MHz ~2170MHz<br><b>WWAN_Aux:</b> 869 MHz~894 MHz , 1930 MHz ~2170MHz                                      |
| <b>Peak Gain (dBi)</b>                         | <b>WWAN_Main :</b> 824 MHz~960 MHz: 2.17dBi<br>1710 MHz ~2170MHz:1.77dBi<br><b>WWAN_AUX :</b> 869 MHz~925 MHz:-0.09dBi<br>1930 MHz ~2170MHz:-1.78dBi |
| <b>Radio Connector Type</b>                    | Hirose U.FL-LP-88 or IPEX 20308-111R-32/ 20363-111R-37 or equivalent connector   |
| <b>Mid-Line Connector Type (If Applicable)</b> | N/A  |

**Remark:** Peak Gains include all system losses (connector, cable, etc)

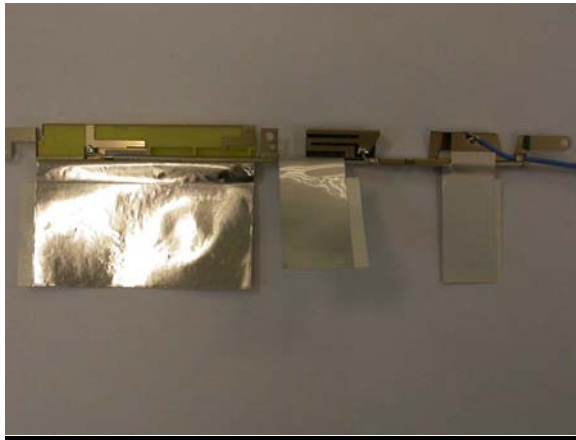
## Cable Specifications

| Cable Parameters                                   | WWAN_Main  |           |                                | WWAN_Aux   |           |                                 |          |           |       |
|--|--|-----------|--------------------------------|--|-----------|---------------------------------|----------|-----------|-------|
|  | LCD Side   | Base Side | Total                          | LCD Side   | Base Side | Total                           | LCD Side | Base Side | Total |
| <b>Length (mm)</b>                                 | N/A  | N/A       | 656                            | N/A  | N/A       | 807                             | N/A      | N/A       |       |
| <b>Loss (Including Connectors) (dB)</b>            |  |           | 1.1(890MHz) /<br>1.58(1940MHz) |  |           | 1.88(890MHz) /<br>1.95(1940MHz) |          |           |       |
| <b>Description (Color, Diameter, Manufacturer)</b> | Color: White/Gray<br>OD: 1.37 mm<br>GBE/Sumitomo |           |                                | Color: Black/Gray<br>OD: 1.13 mm<br>GBE/Sumitomo |           |                                 |          |           |       |

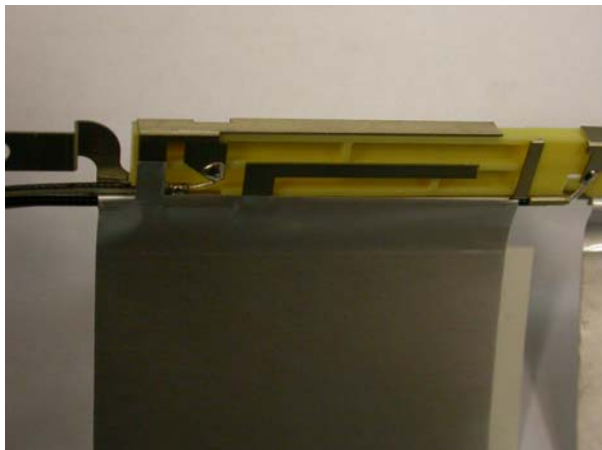
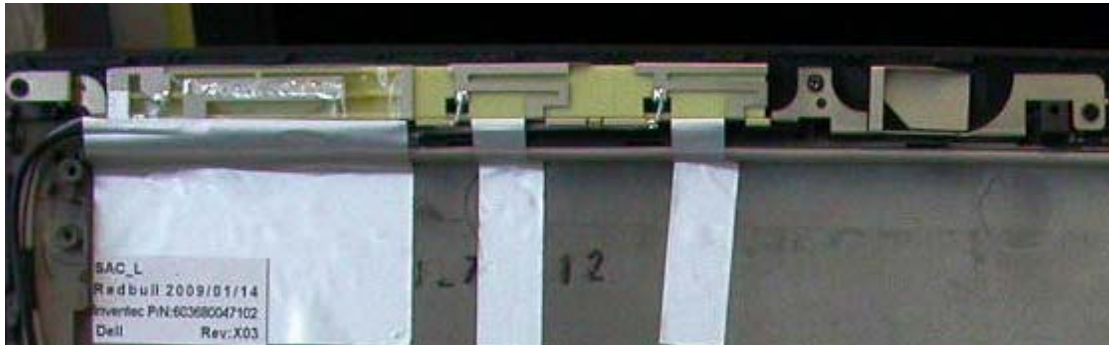
## 2. Antenna Assembly

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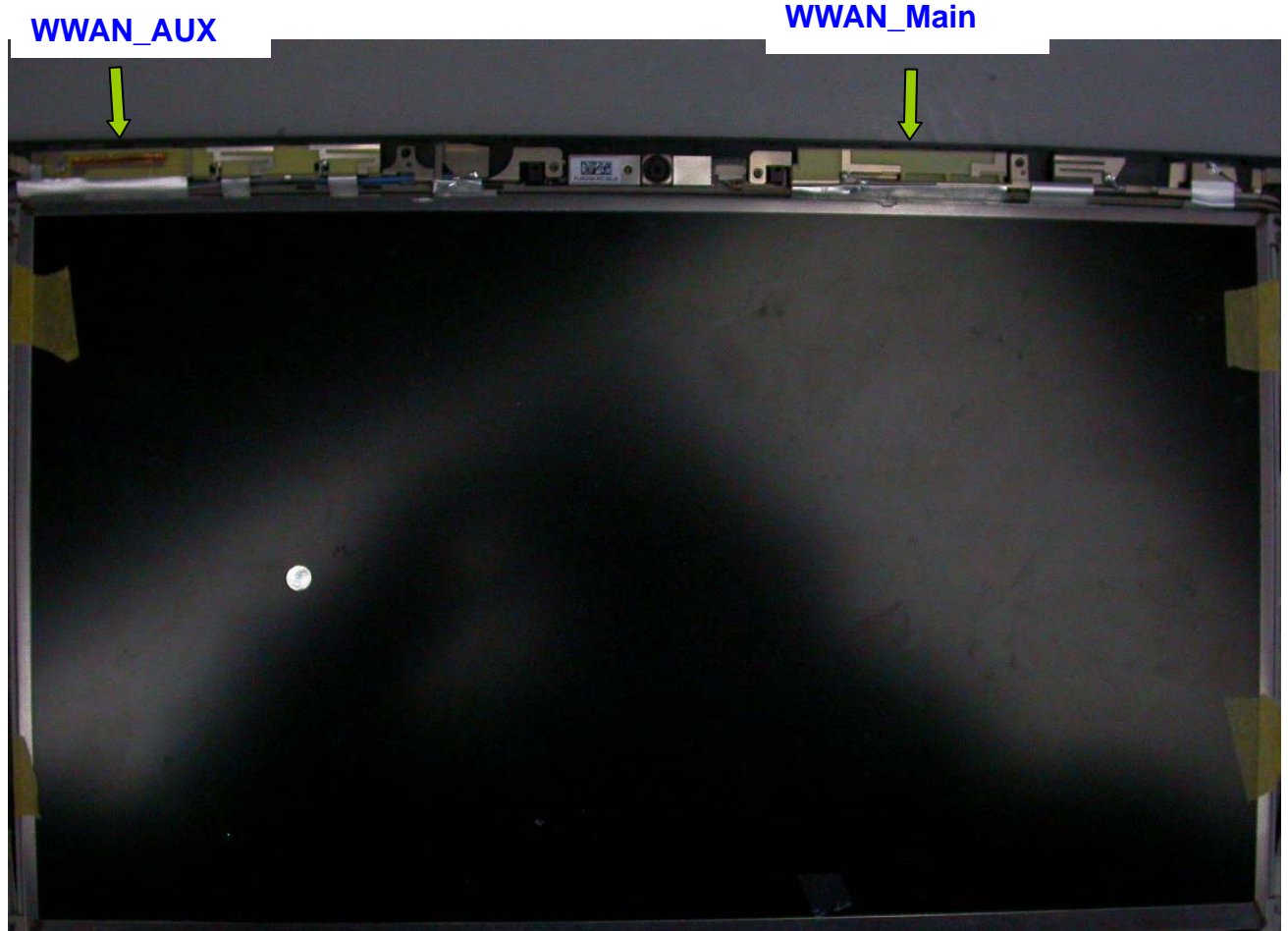
### 2.1 WWAN Main



### 2.1 WWAN Aux

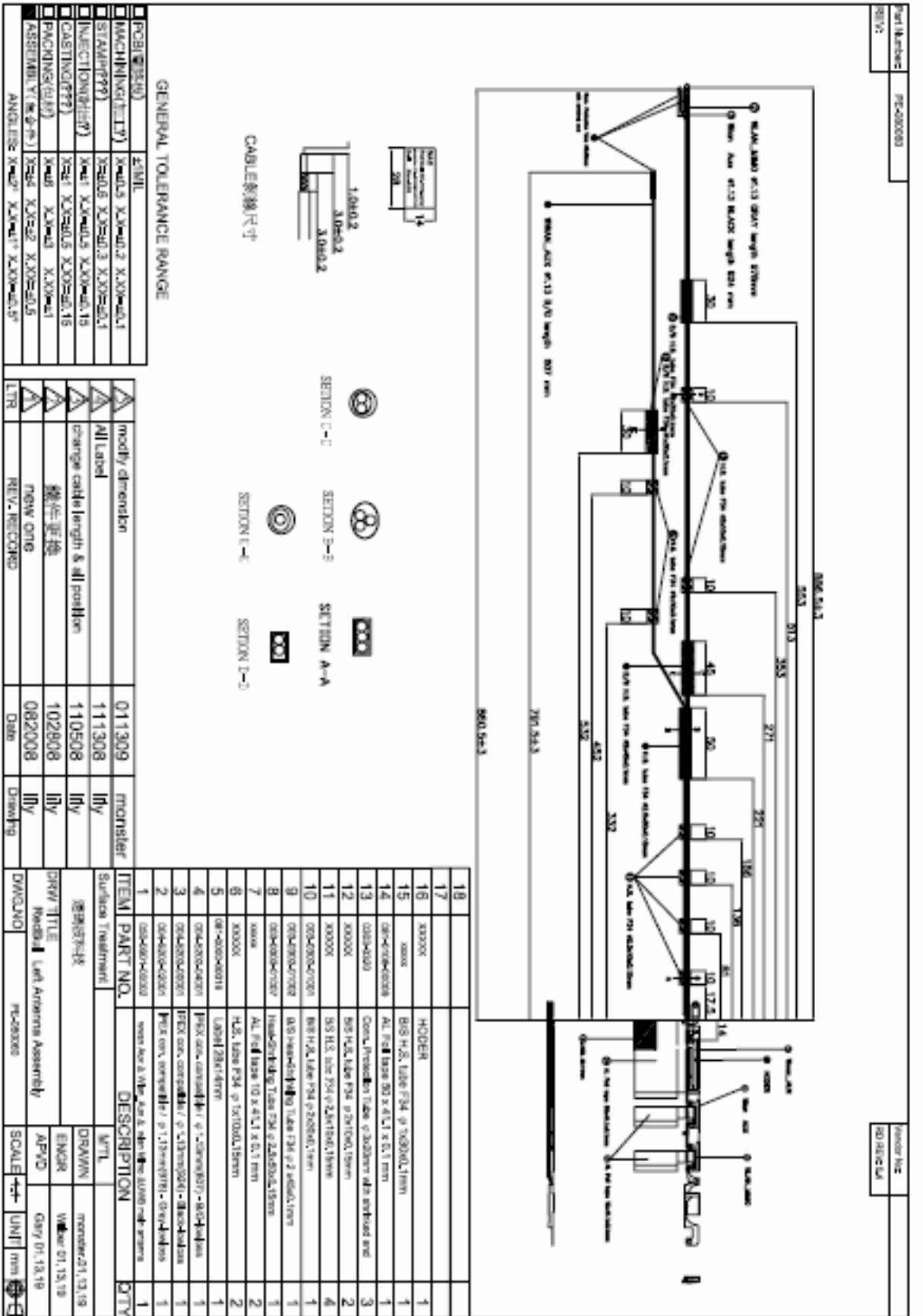


### 3. Antenna Assembly Installed in The Notebook





# 4.1 WWAN Aux antenna



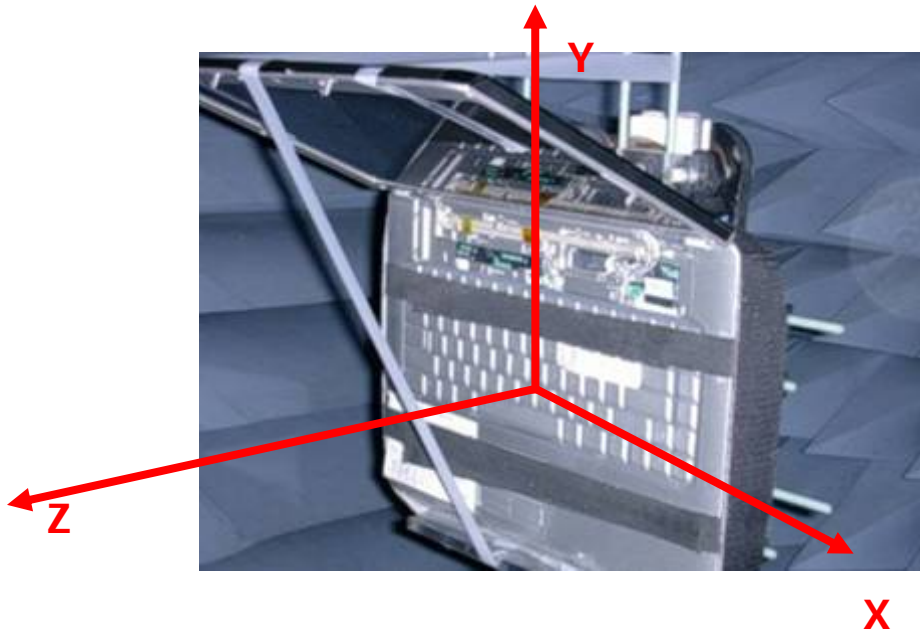
## 5. Gain Patterns

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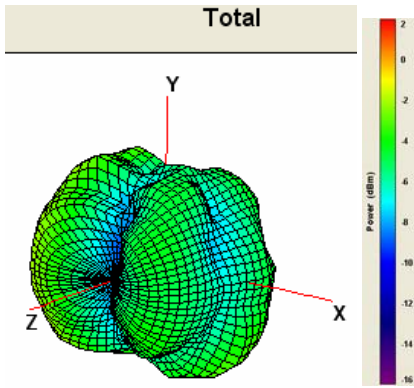
### 5.1 WWAN\_Main Gain test result

| Band   | Frequency (MHz) | Avg. Gain (dBi) |
|--------|-----------------|-----------------|
| 850-TX | 824             | -3.49           |
|        | 836             | -3.18           |
|        | 849             | -2.93           |
| 850-RX | 869             | -3.03           |
|        | 880             | -3.63           |
|        | 894             | -3.68           |
| 900-TX | 900             | -3.60           |
|        | 915             | -3.86           |
|        | 925             | -4.07           |
| 900-RX | 940             | -4.83           |
|        | 960             | -5.95           |

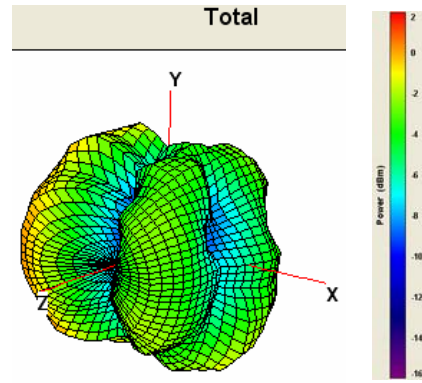
| Band    | Frequency (MHz) | Avg. Gain (dBi) |
|---------|-----------------|-----------------|
| 1800-TX | 1710            | -3.82           |
|         | 1750            | -3.55           |
|         | 1785            | -3.30           |
| 1800-RX | 1805            | -3.05           |
|         | 1840            | -2.17           |
|         | 1850            | -2.24           |
| 1900-TX | 1880            | -2.60           |
|         | 1910            | -2.44           |
|         | 1920            | -2.17           |
| 1900-RX | 1930            | -2.14           |
|         | 1950            | -2.29           |
|         | 1960            | -2.37           |
| 2100-TX | 1980            | -2.54           |
|         | 1990            | -2.43           |
|         | 2110            | -4.19           |
| 2100-RX | 2140            | -4.11           |
|         | 2170            | -4.17           |



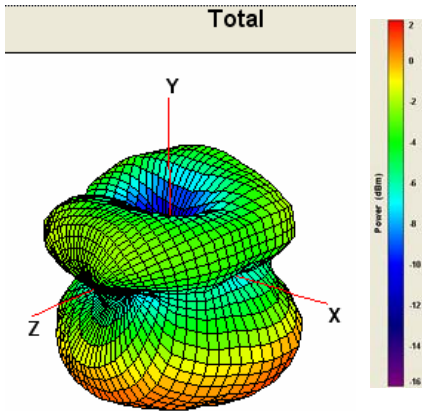




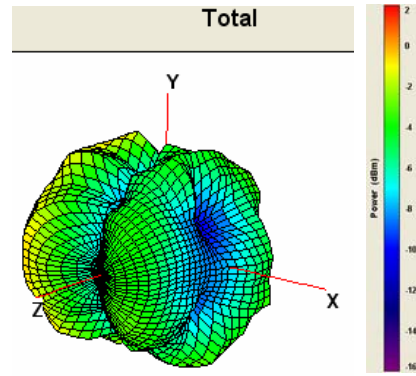
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>824 MHz</b> |
| Horizontal (dBi) peak | <b>-0.59</b>   |
| Vertical (dBi) peak   | <b>-0.4</b>    |



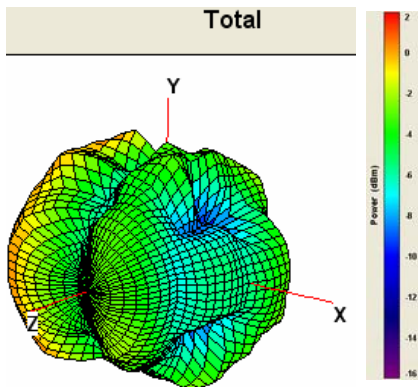
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>836 MHz</b> |
| Horizontal (dBi) peak | <b>-0.26</b>   |
| Vertical (dBi) peak   | <b>0.18</b>    |



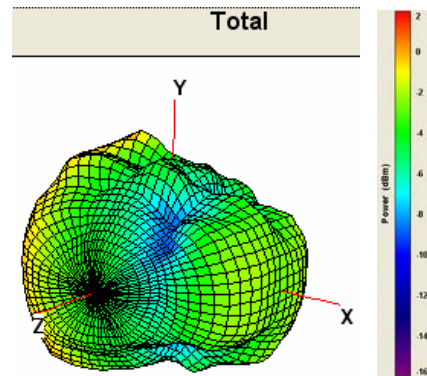
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>849 MHz</b> |
| Horizontal (dBi) peak | <b>0.31</b>    |
| Vertical (dBi) peak   | <b>0.98</b>    |



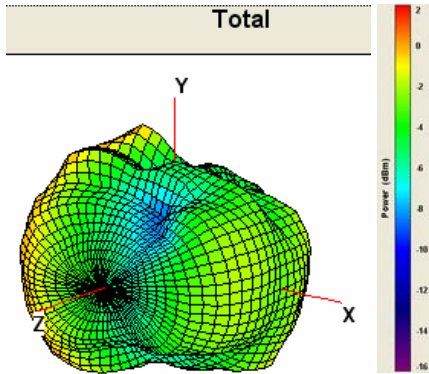
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>869 MHz</b> |
| Horizontal (dBi) peak | <b>1</b>       |
| Vertical (dBi) peak   | <b>1.01</b>    |



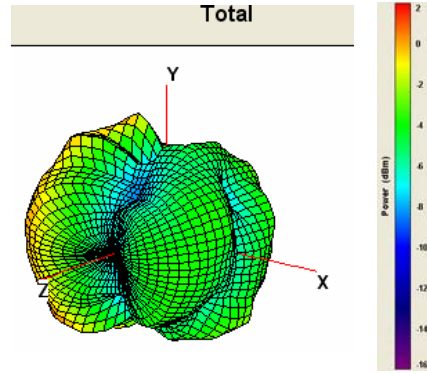
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>880 MHz</b> |
| Horizontal (dBi) peak | <b>0.59</b>    |
| Vertical (dBi) peak   | <b>0.68</b>    |



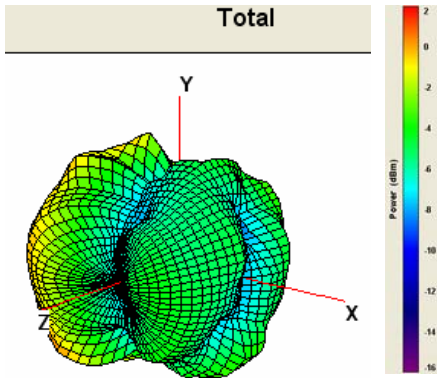
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>894 MHz</b> |
| Horizontal (dBi) peak | <b>0.21</b>    |
| Vertical (dBi) peak   | <b>-0.58</b>   |



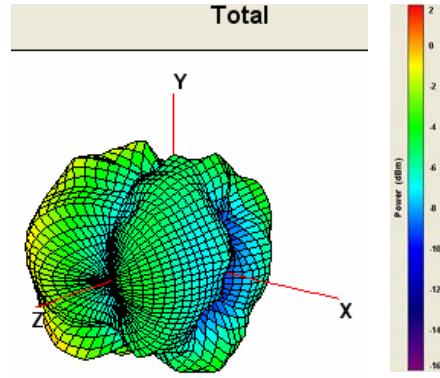
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>900 MHz</b> |
| Horizontal (dBi) peak | <b>0.41</b>    |
| Vertical (dBi) peak   | <b>-0.2</b>    |



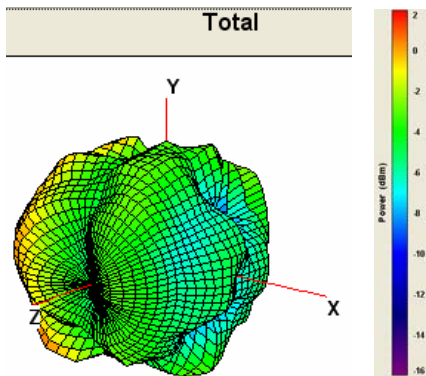
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>915 MHz</b> |
| Horizontal (dBi) peak | <b>0.1</b>     |
| Vertical (dBi) peak   | <b>0.21</b>    |



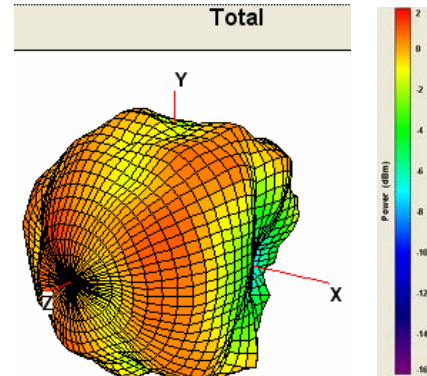
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>925 MHz</b> |
| Horizontal (dBi) peak | <b>-0.1</b>    |
| Vertical (dBi) peak   | <b>0.14</b>    |



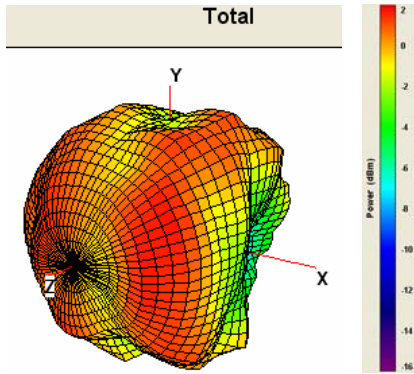
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>940 MHz</b> |
| Horizontal (dBi) peak | <b>-0.54</b>   |
| Vertical (dBi) peak   | <b>-0.48</b>   |



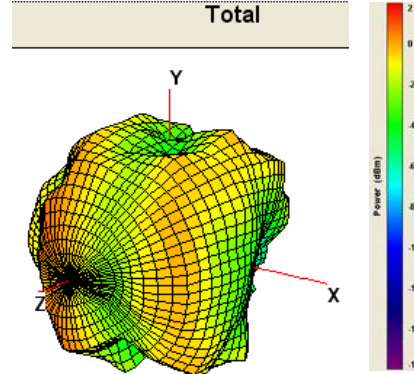
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>960 MHz</b> |
| Horizontal (dBi) peak | <b>-1.21</b>   |
| Vertical (dBi) peak   | <b>-1.9</b>    |



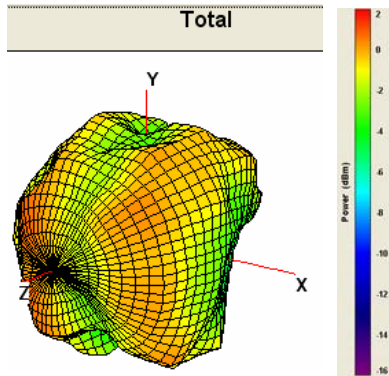
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1710 MHz</b> |
| Horizontal (dBi) peak | <b>-0.66</b>    |
| Vertical (dBi) peak   | <b>-1.43</b>    |



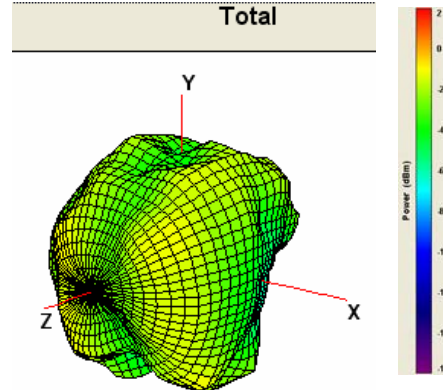
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1750 MHz</b> |
| Horizontal (dBi) peak | <b>-1.09</b>    |
| Vertical (dBi) peak   | <b>-0.25</b>    |



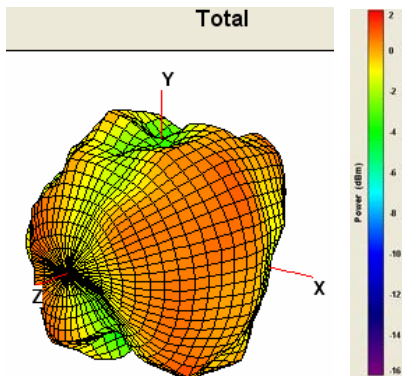
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1785 MHz</b> |
| Horizontal (dBi) peak | <b>0.38</b>     |
| Vertical (dBi) peak   | <b>-0.12</b>    |



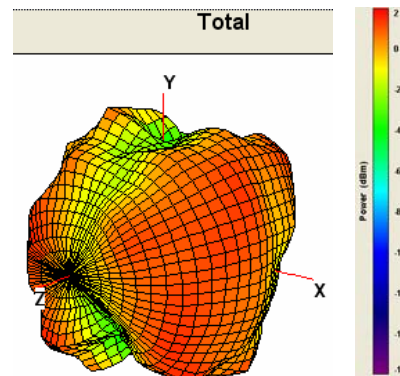
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1840 MHz</b> |
| Horizontal (dBi) peak | <b>0.45</b>     |
| Vertical (dBi) peak   | <b>-0.2</b>     |



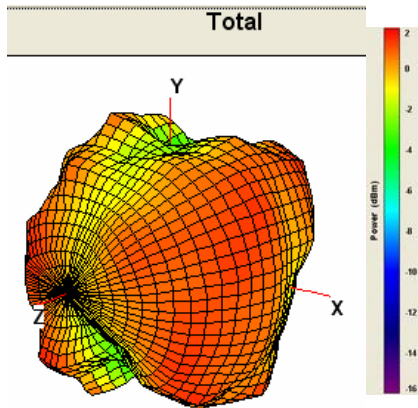
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1850 MHz</b> |
| Horizontal (dBi) peak | <b>0.52</b>     |
| Vertical (dBi) peak   | <b>0.22</b>     |



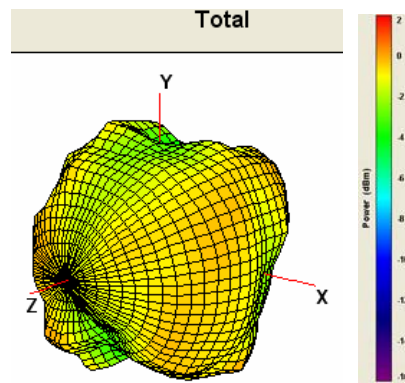
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1880 MHz</b> |
| Horizontal (dBi) peak | <b>0.86</b>     |
| Vertical (dBi) peak   | <b>0.73</b>     |



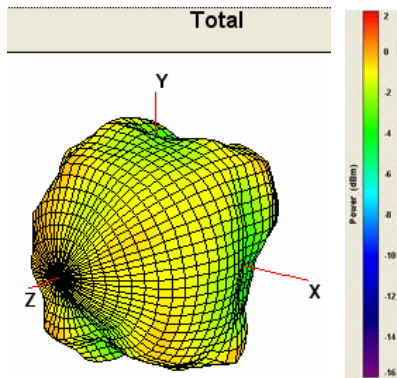
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1910 MHz</b> |
| Horizontal (dBi) peak | <b>1.41</b>     |
| Vertical (dBi) peak   | <b>1.39</b>     |



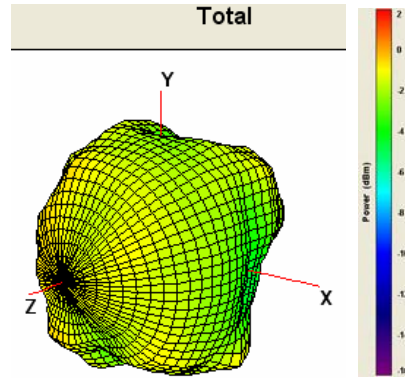
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1920 MHz</b> |
| Horizontal (dBi) peak | <b>1.49</b>     |
| Vertical (dBi) peak   | <b>1.37</b>     |



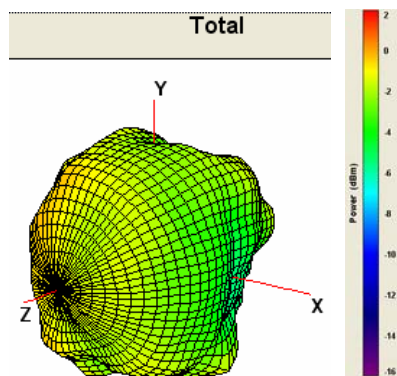
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1930 MHz</b> |
| Horizontal (dBi) peak | <b>1.5</b>      |
| Vertical (dBi) peak   | <b>1.35</b>     |



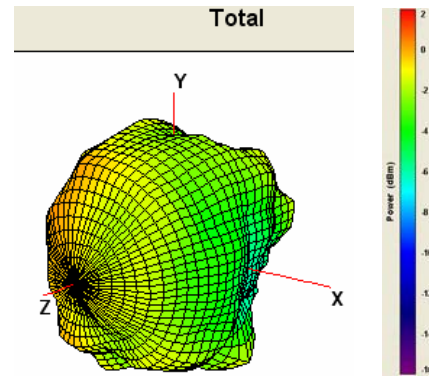
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1950 MHz</b> |
| Horizontal (dBi) peak | <b>1.55</b>     |
| Vertical (dBi) peak   | <b>1.21</b>     |



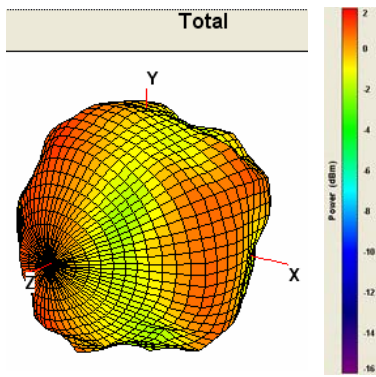
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1960 MHz</b> |
| Horizontal (dBi) peak | <b>1.54</b>     |
| Vertical (dBi) peak   | <b>1.25</b>     |



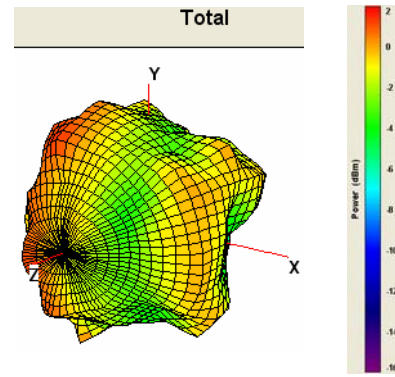
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1980 MHz</b> |
| Horizontal (dBi) peak | <b>1.72</b>     |
| Vertical (dBi) peak   | <b>1.24</b>     |



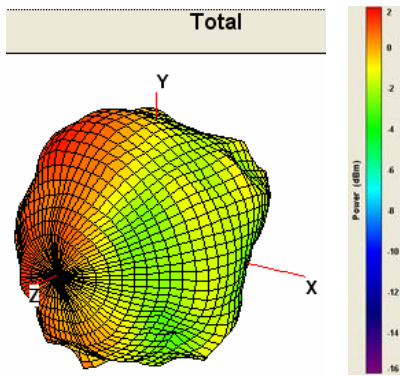
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1990 MHz</b> |
| Horizontal (dBi) peak | <b>1.58</b>     |
| Vertical (dBi) peak   | <b>1.09</b>     |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2110 MHz</b> |
| Horizontal (dBi) peak | <b>-0.73</b>    |
| Vertical (dBi) peak   | <b>-1.13</b>    |



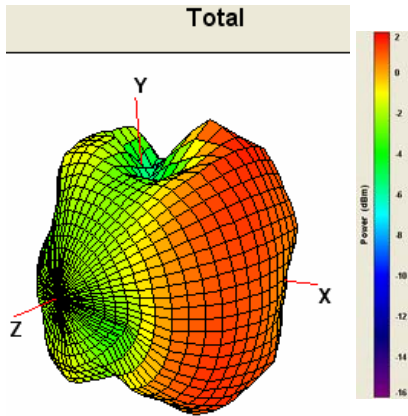
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2140 MHz</b> |
| Horizontal (dBi) peak | <b>-0.63</b>    |
| Vertical (dBi) peak   | <b>-0.75</b>    |



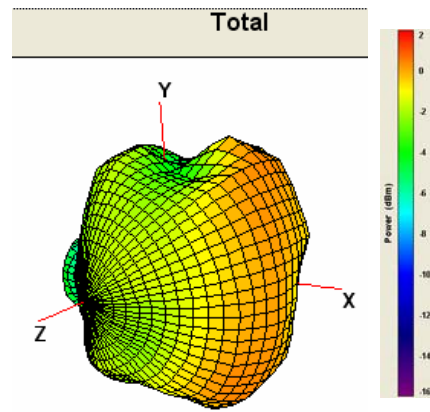
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2170 MHz</b> |
| Horizontal (dBi) peak | <b>-2.1</b>     |
| Vertical (dBi) peak   | <b>-2.55</b>    |

## 5.2 WWAN\_Aux Gain test result

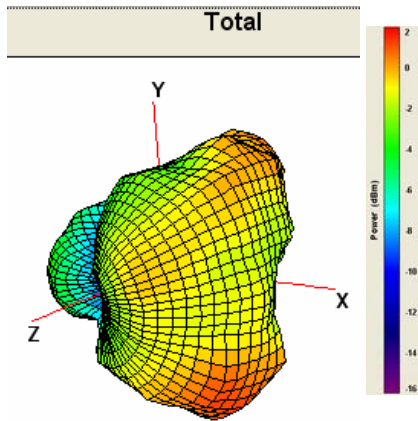
| Band               | Frequency (MHz) | Avg. Gain (dBi) |
|--------------------|-----------------|-----------------|
| 850-RX<br>900-TX   | 869             | -5.05           |
|                    | 880             | -4.70           |
|                    | 894             | -4.58           |
| GPS                | 1565            | -3.86           |
|                    | 1575            | -3.85           |
|                    | 1585            | -3.92           |
| 1900-RX<br>2100-TX | 1930            | -7.68           |
|                    | 1950            | -7.34           |
|                    | 1930            | -7.68           |
|                    | 1960            | -7.18           |
|                    | 1980            | -8.02           |
|                    | 1990            | -8.24           |
| 2100-RX            | 2110            | -6.65           |
|                    | 2140            | -5.82           |
|                    | 2170            | -7.19           |



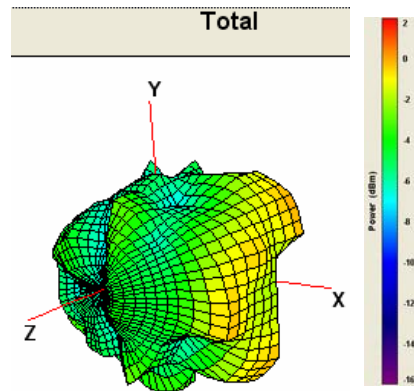
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>869 MHz</b> |
| Horizontal (dBi) peak | <b>-0.92</b>   |
| Vertical (dBi) peak   | <b>-0.69</b>   |



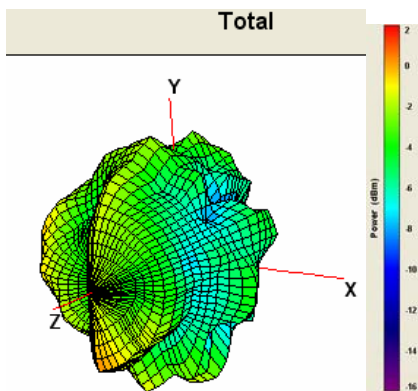
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>880 MHz</b> |
| Horizontal (dBi) peak | <b>-0.34</b>   |
| Vertical (dBi) peak   | <b>-0.18</b>   |



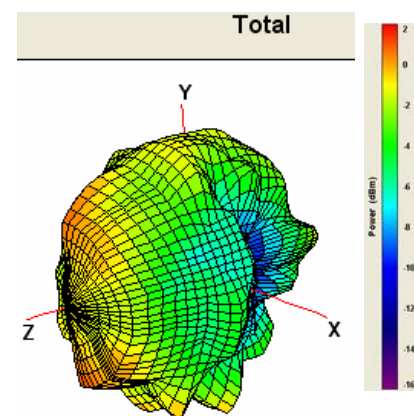
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>894 MHz</b> |
| Horizontal (dBi) peak | <b>0.38</b>    |
| Vertical (dBi) peak   | <b>-0.66</b>   |



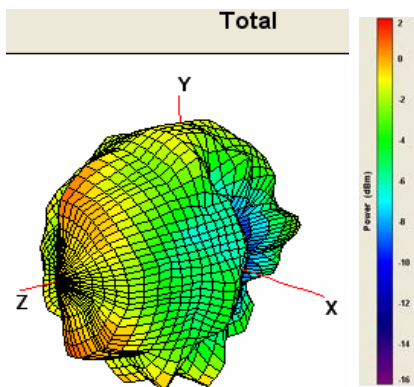
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1575 MHz</b> |
| Horizontal (dBi) peak | <b>0.23</b>     |
| Vertical (dBi) peak   | <b>-0.11</b>    |



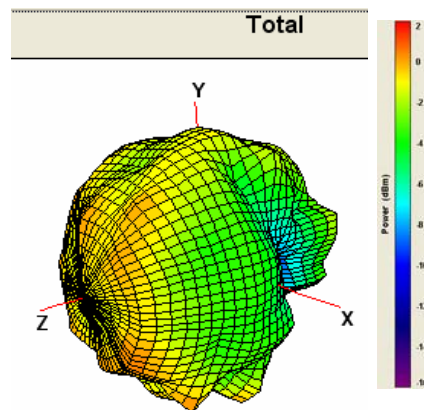
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1930 MHz</b> |
| Horizontal (dBi) peak | <b>-1.45</b>    |
| Vertical (dBi) peak   | <b>-2.51</b>    |



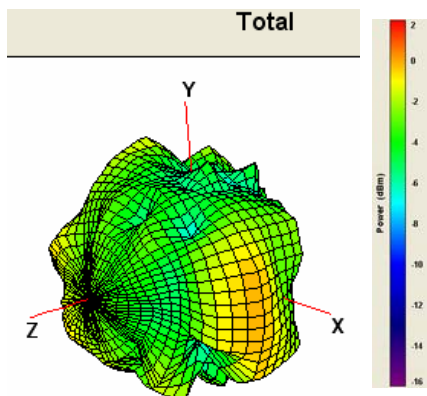
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1950 MHz</b> |
| Horizontal (dBi) peak | <b>-1.82</b>    |
| Vertical (dBi) peak   | <b>-3.13</b>    |



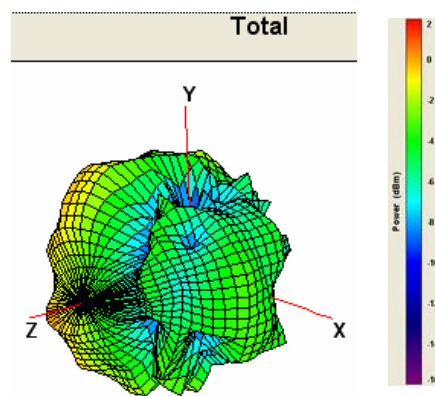
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1960 MHz</b> |
| Horizontal (dBi) peak | <b>-2.88</b>    |
| Vertical (dBi) peak   | <b>-4.47</b>    |



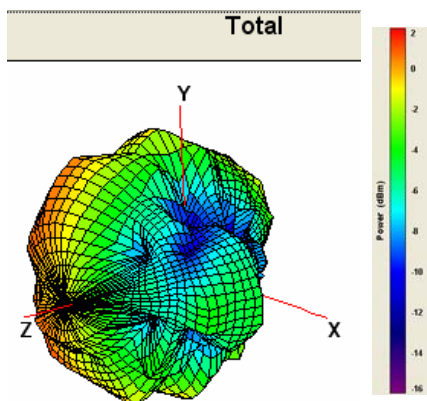
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1990 MHz</b> |
| Horizontal (dBi) peak | <b>-2.03</b>    |
| Vertical (dBi) peak   | <b>-1.71</b>    |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2110 MHz</b> |
| Horizontal (dBi) peak | <b>-4</b>       |
| Vertical (dBi) peak   | <b>-4.75</b>    |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2140 MHz</b> |
| Horizontal (dBi) peak | <b>-6.42</b>    |
| Vertical (dBi) peak   | <b>-6.86</b>    |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2170 MHz</b> |
| Horizontal (dBi) peak | <b>-7.55</b>    |
| Vertical (dBi) peak   | <b>-8.02</b>    |



# Antenna Regulatory Information

|  |   |
|--|---|
| • Product type   | • WWAN_Main/ WWAN_Aux<br>Antenna                    |
| • Model number   | • Latitude Z600                                     |
| • Revision   | • A00   |
| • Manufacturer Part No.  | (WWAN_Main) PE-080050-A<br>(WWAN_Aux) PE-080060-A   |
| • Inventec Part No.<br>R Antenna module:<br>WWAN Main/WWAN AUX | (WWAN_Main) 6036B0047101<br>(WWAN_Aux) 6036B0047102 |
| • Dell Part No. :  | •   |

## Smart Approach Co.,Ltd.

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FAX: +886-3-5830011

Template Revision 0 May 2008

# 1. Specifications

## Antenna Specifications

|  |   |
|--|---|
| <b>Antenna Type (Material, Technology)</b>     | Metal, Modified PIFA  |
| <b>Antenna Model Number</b>                    | (WWAN_Main) <b>PE-080050-A</b><br>(WWAN_Aux) <b>PE-080060-A</b>   |
| <b>Operating Frequency Range(s)</b>            | <b>WWAN_Main:</b> 824 MHz~960 MHz and 1710 MHz ~2170MHz<br><b>WWAN_Aux:</b> 869 MHz~894 MHz , 1930 MHz ~2170MHz                                     |
| <b>Peak Gain (dBi)</b>                         | <b>WWAN_Main :</b> 824 MHz~960 MHz: 1.39dBi<br>1710 MHz ~2170MHz:2.07dBi<br><b>WWAN_AUX :</b> 869 MHz~925 MHz:2.15dBi<br>1930 MHz ~2170MHz:-0.67dBi |
| <b>Radio Connector Type</b>                    | Hirose U.FL-LP-88 or IPEX 20308-111R-32/ 20363-111R-37 or equivalent connector  |
| <b>Mid-Line Connector Type (If Applicable)</b> | N/A   |

**Remark:** Peak Gains include all system losses (connector, cable, etc)

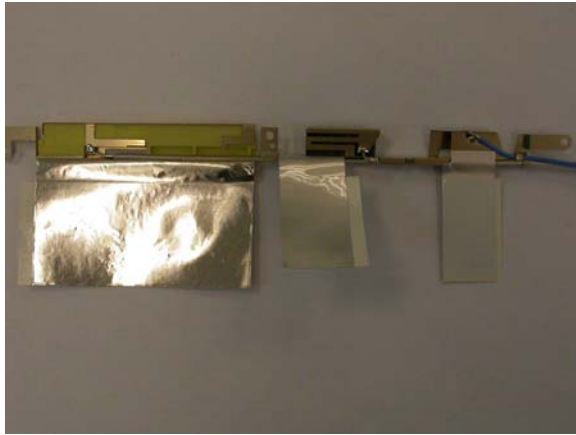
## Cable Specifications

| Cable Parameters                                   | WWAN_Main  |           |                                | WWAN_Aux   |           |                                 |          |           |       |
|--|--|-----------|--------------------------------|--|-----------|---------------------------------|----------|-----------|-------|
|  | LCD Side   | Base Side | Total                          | LCD Side   | Base Side | Total                           | LCD Side | Base Side | Total |
| <b>Length (mm)</b>                                 | N/A  | N/A       | 656                            | N/A  | N/A       | 807                             | N/A      | N/A       |       |
| <b>Loss (Including Connectors) (dB)</b>            |  |           | 1.1(890MHz) /<br>1.58(1940MHz) |  |           | 1.88(890MHz) /<br>1.95(1940MHz) |          |           |       |
| <b>Description (Color, Diameter, Manufacturer)</b> | Color: White/Gray<br>OD: 1.37 mm<br>GBE/Sumitomo |           |                                | Color: Black/Gray<br>OD: 1.13 mm<br>GBE/Sumitomo |           |                                 |          |           |       |

## 2. Antenna Assembly

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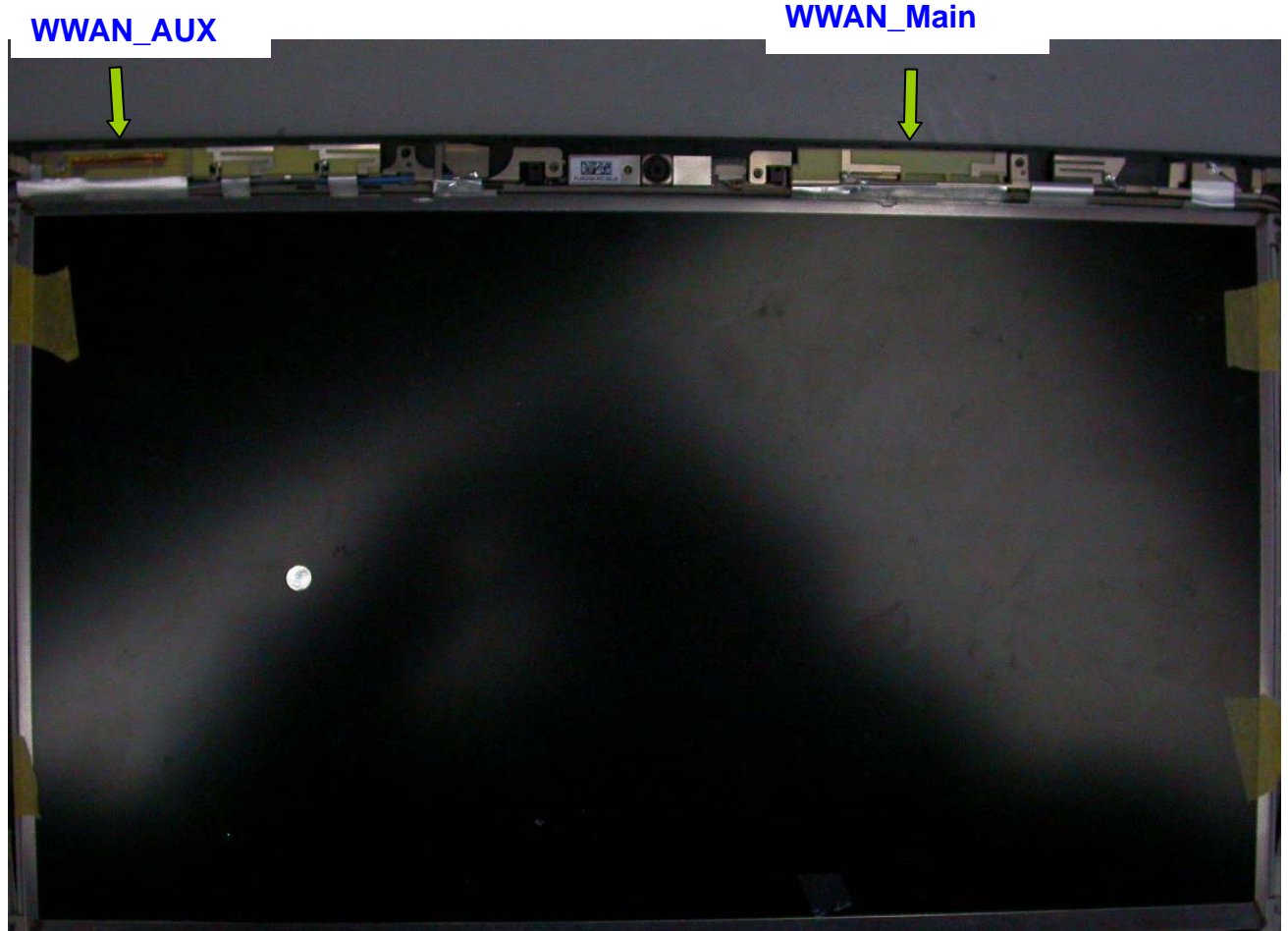
### 2.1 WWAN Main



### 2.1 WWAN Aux



### 3. Antenna Assembly Installed in The Notebook







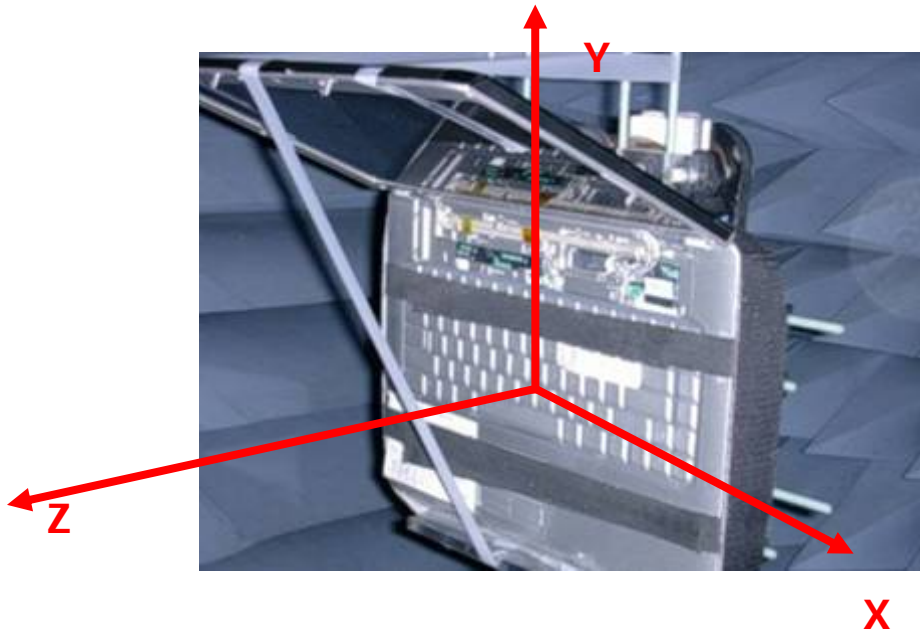
## 5. Gain Patterns

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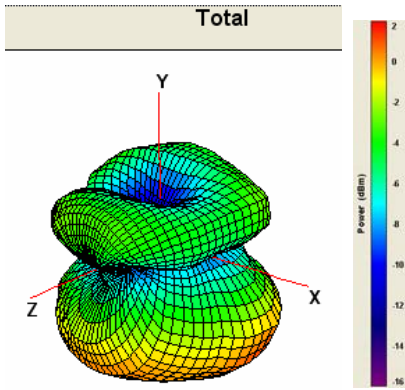
### 5.1 WWAN\_Main Gain test result

| Band   | Frequency (MHz) | Avg. Gain (dBi) |
|--------|-----------------|-----------------|
| 850-TX | 824             | -3.34           |
|        | 836             | -3.18           |
|        | 849             | -2.9            |
| 850-RX | 869             | -3.17           |
|        | 880             | -3.73           |
| 900-TX | 894             | -4.57           |
|        | 900             | -4.38           |
|        | 915             | -4.50           |
| 900-RX | 925             | -4.50           |
|        | 940             | -5.16           |
|        | 960             | -6.34           |

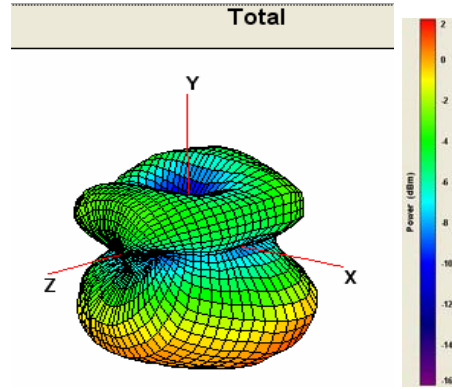
| Band    | Frequency (MHz) | Avg. Gain (dBi) |
|---------|-----------------|-----------------|
| 1800-TX | 1710            | -3.76           |
|         | 1750            | -3.33           |
|         | 1785            | -3.23           |
| 1800-RX | 1805            | -3.00           |
|         | 1840            | -2.23           |
| 1900-TX | 1850            | -2.30           |
|         | 1880            | -2.57           |
|         | 1910            | -2.40           |
| 1900-RX | 1920            | -2.31           |
|         | 1930            | -2.39           |
|         | 1950            | -2.43           |
| 2100-TX | 1960            | -2.49           |
|         | 1980            | -2.70           |
|         | 1990            | -2.60           |
| 2100-RX | 2110            | -4.01           |
|         | 2140            | -4.73           |
|         | 2170            | -4.47           |



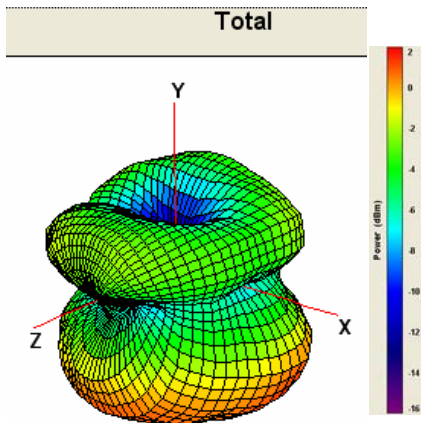




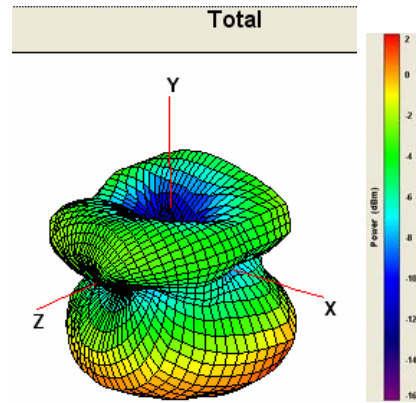
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>824 MHz</b> |
| Horizontal (dBi) peak | <b>-0.5</b>    |
| Vertical (dBi) peak   | <b>-0.35</b>   |



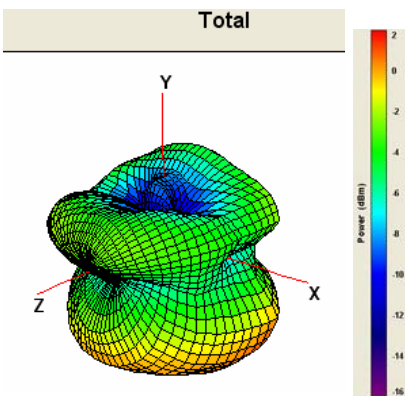
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>836 MHz</b> |
| Horizontal (dBi) peak | <b>-0.28</b>   |
| Vertical (dBi) peak   | <b>-0.02</b>   |



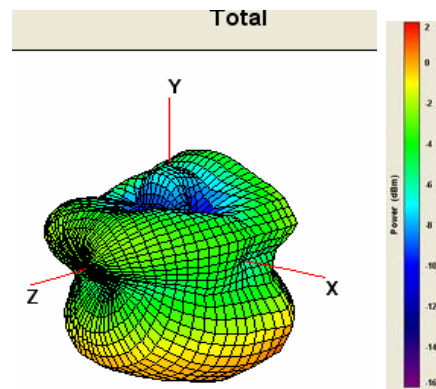
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>849 MHz</b> |
| Horizontal (dBi) peak | <b>0.03</b>    |
| Vertical (dBi) peak   | <b>0.45</b>    |



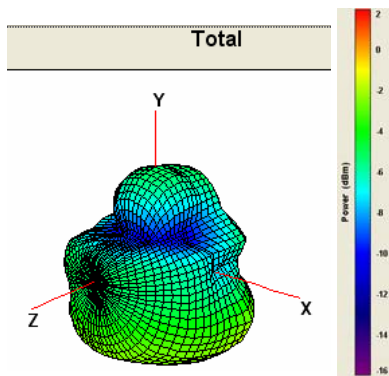
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>869 MHz</b> |
| Horizontal (dBi) peak | <b>0.11</b>    |
| Vertical (dBi) peak   | <b>0.73</b>    |



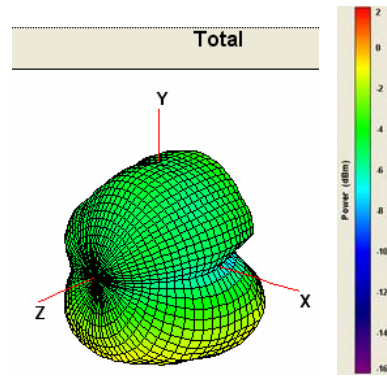
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>880 MHz</b> |
| Horizontal (dBi) peak | <b>-0.33</b>   |
| Vertical (dBi) peak   | <b>0.22</b>    |



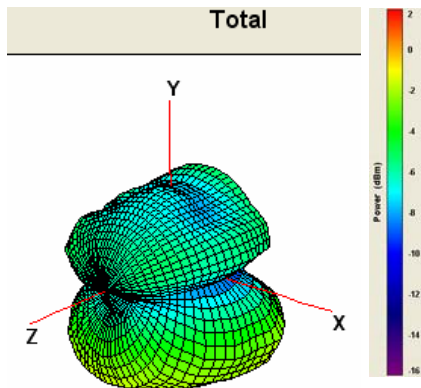
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>894 MHz</b> |
| Horizontal (dBi) peak | <b>-0.25</b>   |
| Vertical (dBi) peak   | <b>-0.55</b>   |



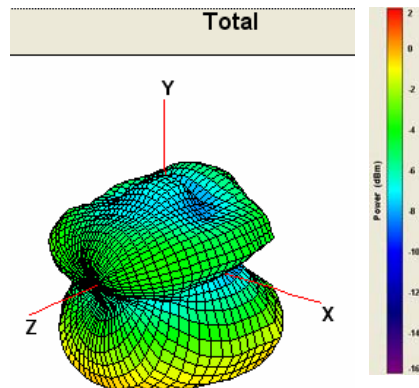
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>900 MHz</b> |
| Horizontal (dBi) peak | <b>-0.16</b>   |
| Vertical (dBi) peak   | <b>-0.23</b>   |



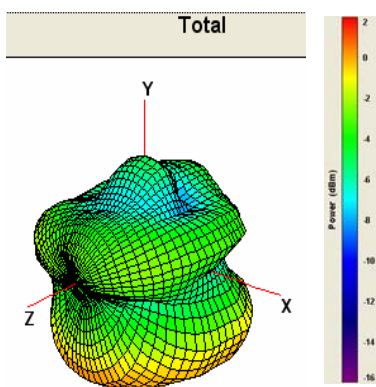
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>915 MHz</b> |
| Horizontal (dBi) peak | <b>-0.26</b>   |
| Vertical (dBi) peak   | <b>-0.24</b>   |



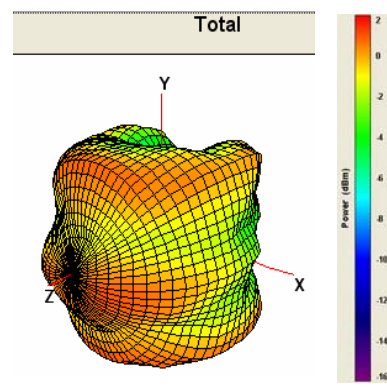
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>925 MHz</b> |
| Horizontal (dBi) peak | <b>-0.42</b>   |
| Vertical (dBi) peak   | <b>-0.39</b>   |



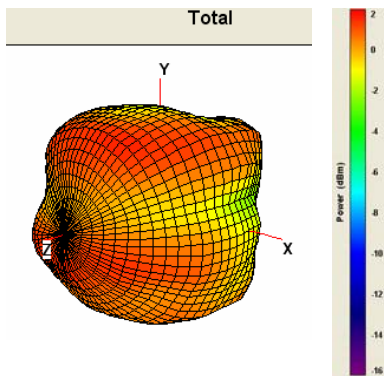
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>940 MHz</b> |
| Horizontal (dBi) peak | <b>-1.15</b>   |
| Vertical (dBi) peak   | <b>-0.84</b>   |



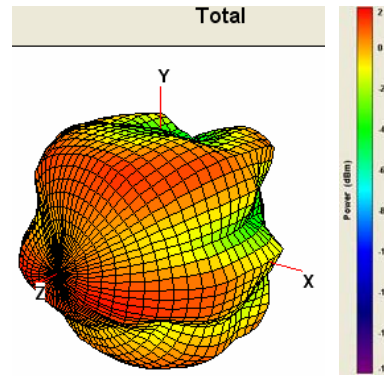
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>960 MHz</b> |
| Horizontal (dBi) peak | <b>-2.42</b>   |
| Vertical (dBi) peak   | <b>-1.62</b>   |



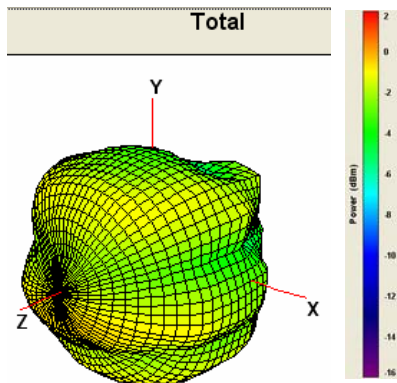
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1710 MHz</b> |
| Horizontal (dBi) peak | <b>0.44</b>     |
| Vertical (dBi) peak   | <b>0.11</b>     |



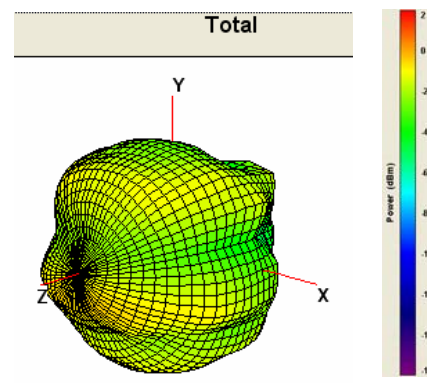
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1750 MHz</b> |
| Horizontal (dBi) peak | <b>-0.13</b>    |
| Vertical (dBi) peak   | <b>0.4</b>      |



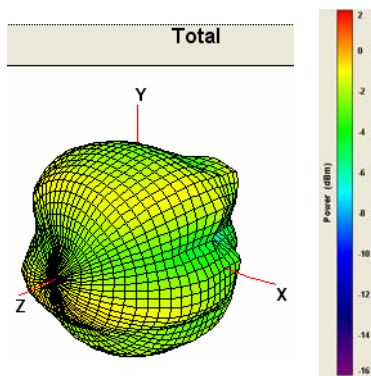
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1785 MHz</b> |
| Horizontal (dBi) peak | <b>0.32</b>     |
| Vertical (dBi) peak   | <b>-0.06</b>    |



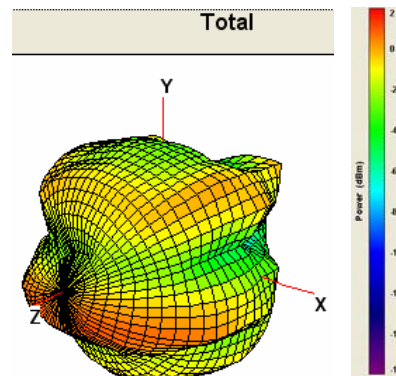
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1840 MHz</b> |
| Horizontal (dBi) peak | <b>0.4</b>      |
| Vertical (dBi) peak   | <b>0.61</b>     |



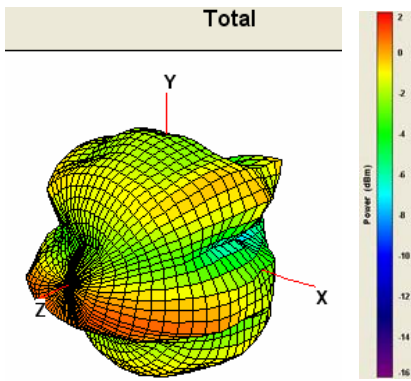
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1850 MHz</b> |
| Horizontal (dBi) peak | <b>0.39</b>     |
| Vertical (dBi) peak   | <b>0.51</b>     |



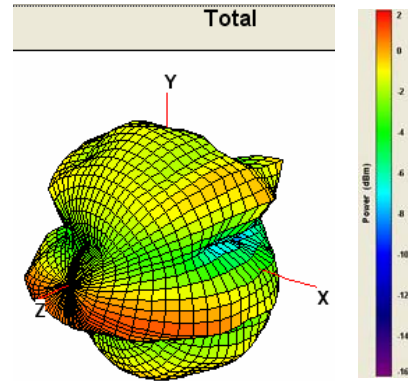
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1880 MHz</b> |
| Horizontal (dBi) peak | <b>0.19</b>     |
| Vertical (dBi) peak   | <b>0.1</b>      |



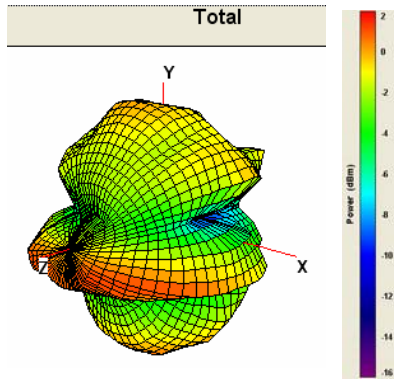
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1910 MHz</b> |
| Horizontal (dBi) peak | <b>0.61</b>     |
| Vertical (dBi) peak   | <b>0.2</b>      |



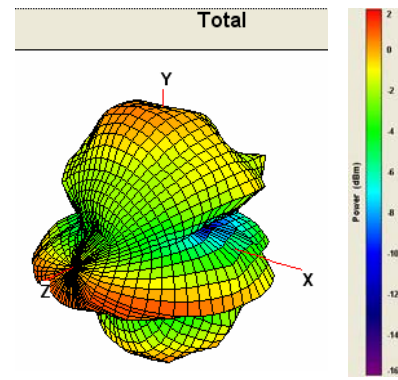
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1920 MHz</b> |
| Horizontal (dBi) peak | <b>0.8</b>      |
| Vertical (dBi) peak   | <b>0.3</b>      |



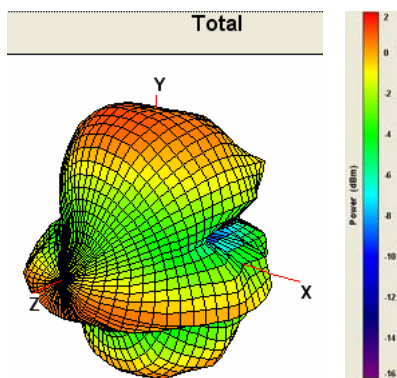
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1930 MHz</b> |
| Horizontal (dBi) peak | <b>0.96</b>     |
| Vertical (dBi) peak   | <b>0.42</b>     |



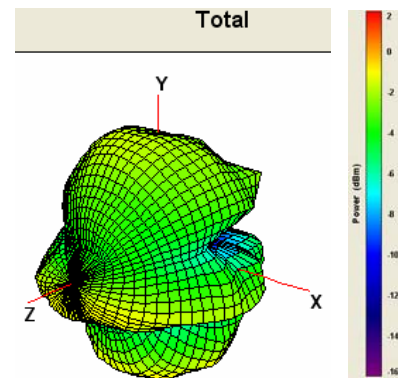
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1950 MHz</b> |
| Horizontal (dBi) peak | <b>1.17</b>     |
| Vertical (dBi) peak   | <b>0.51</b>     |



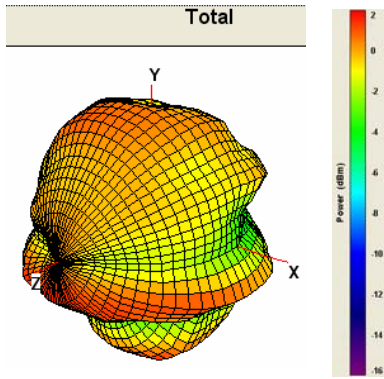
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1960 MHz</b> |
| Horizontal (dBi) peak | <b>1.25</b>     |
| Vertical (dBi) peak   | <b>0.96</b>     |



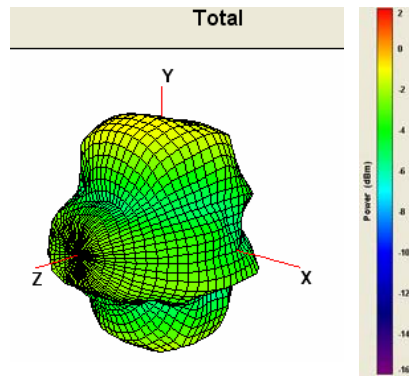
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1980 MHz</b> |
| Horizontal (dBi) peak | <b>0.63</b>     |
| Vertical (dBi) peak   | <b>0.93</b>     |



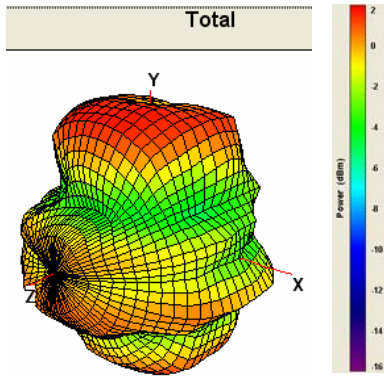
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1990 MHz</b> |
| Horizontal (dBi) peak | <b>0.79</b>     |
| Vertical (dBi) peak   | <b>1.23</b>     |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2110 MHz</b> |
| Horizontal (dBi) peak | <b>-0.78</b>    |
| Vertical (dBi) peak   | <b>-1.01</b>    |



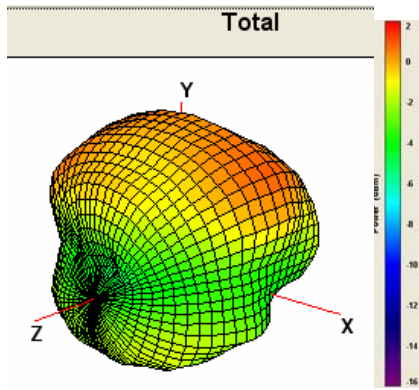
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2140 MHz</b> |
| Horizontal (dBi) peak | <b>-1.94</b>    |
| Vertical (dBi) peak   | <b>-0.45</b>    |



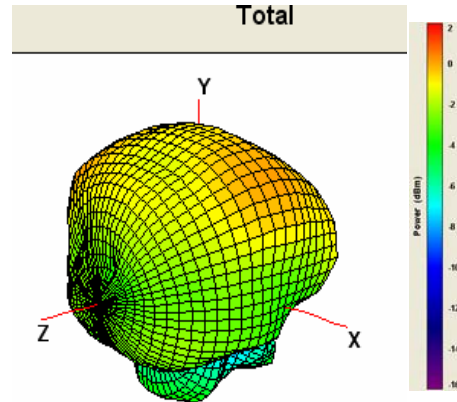
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2170 MHz</b> |
| Horizontal (dBi) peak | <b>-2.06</b>    |
| Vertical (dBi) peak   | <b>-0.76</b>    |

## 5.2 WWAN\_Aux Gain test result

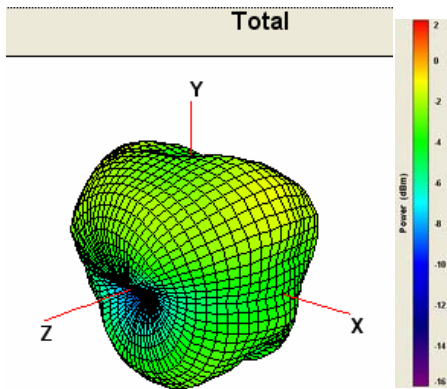
| Band               | Frequency (MHz) | Avg. Gain (dBi) |
|--------------------|-----------------|-----------------|
| 850-RX<br>900-TX   | 869             | -4.96           |
|                    | 880             | -4.83           |
|                    | 894             | -5.37           |
| GPS                | 1565            | -3.86           |
|                    | 1575            | -3.85           |
|                    | 1585            | -3.92           |
| 1900-RX<br>2100-TX | 1930            | -8.67           |
|                    | 1950            | -8.23           |
|                    | 1930            | -8.67           |
|                    | 1960            | -7.52           |
|                    | 1980            | -7.43           |
|                    | 1990            | -7.54           |
| 2100-RX            | 2110            | -6.19           |
|                    | 2140            | -6.2            |
|                    | 2170            | -6.88           |



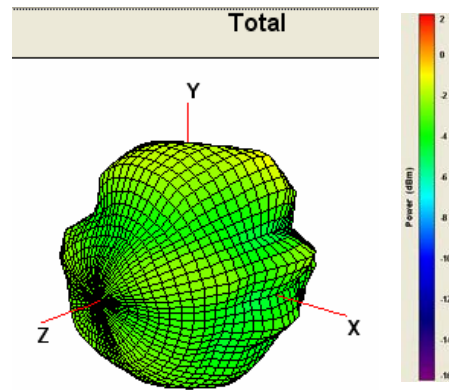
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>869 MHz</b> |
| Horizontal (dBi) peak | <b>-3.2</b>    |
| Vertical (dBi) peak   | <b>-3.69</b>   |



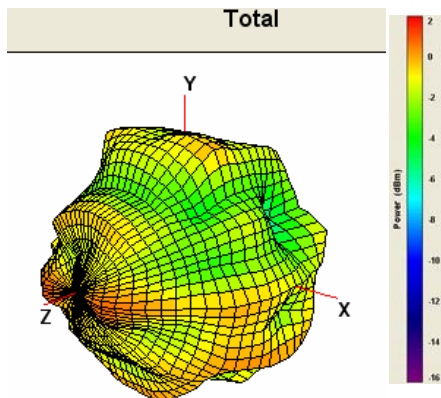
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>880 MHz</b> |
| Horizontal (dBi) peak | <b>-1.54</b>   |
| Vertical (dBi) peak   | <b>-3.32</b>   |



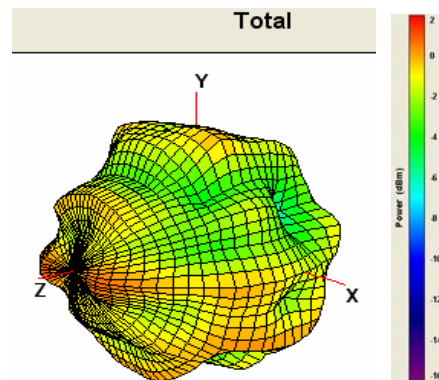
|                       |                |
|-----------------------|----------------|
| Center Frequency      | <b>894 MHz</b> |
| Horizontal (dBi) peak | <b>0.77</b>    |
| Vertical (dBi) peak   | <b>-1.69</b>   |



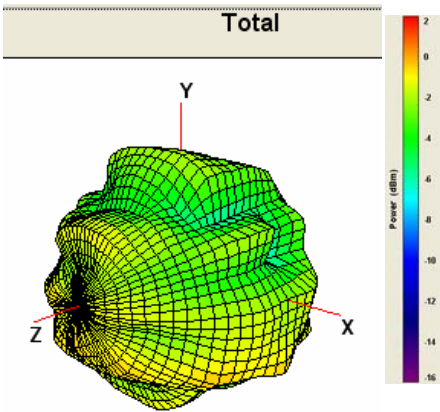
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1575 MHz</b> |
| Horizontal (dBi) peak | <b>0.04</b>     |
| Vertical (dBi) peak   | <b>-1.24</b>    |



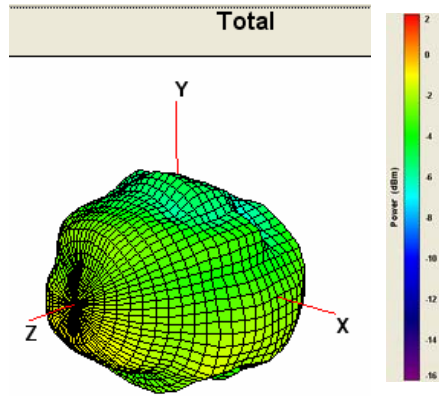
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1930 MHz</b> |
| Horizontal (dBi) peak | <b>-5</b>       |
| Vertical (dBi) peak   | <b>-5.67</b>    |



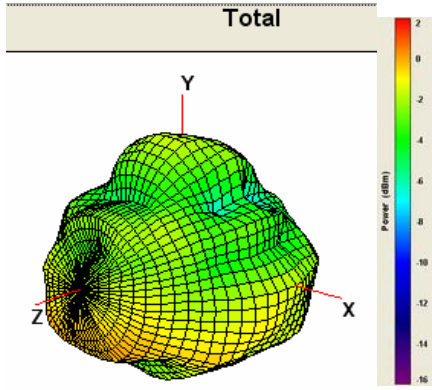
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1950 MHz</b> |
| Horizontal (dBi) peak | <b>-5.1</b>     |
| Vertical (dBi) peak   | <b>-5.13</b>    |



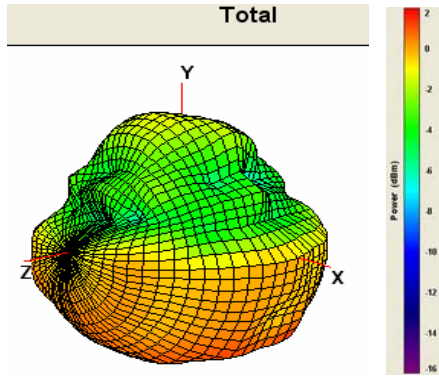
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1960 MHz</b> |
| Horizontal (dBi) peak | <b>-5.13</b>    |
| Vertical (dBi) peak   | <b>-4.94</b>    |



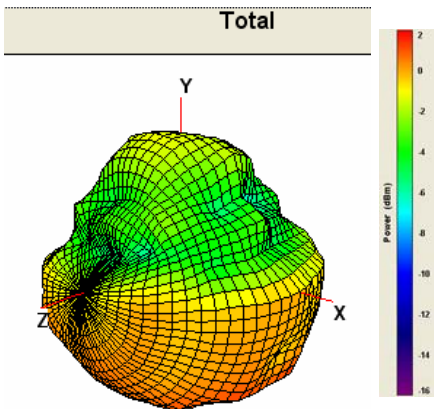
|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>1990 MHz</b> |
| Horizontal (dBi) peak | <b>-5.88</b>    |
| Vertical (dBi) peak   | <b>-4.45</b>    |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2110 MHz</b> |
| Horizontal (dBi) peak | <b>-4.83</b>    |
| Vertical (dBi) peak   | <b>-3.57</b>    |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2140 MHz</b> |
| Horizontal (dBi) peak | <b>-2.92</b>    |
| Vertical (dBi) peak   | <b>-2.26</b>    |



|                       |                 |
|-----------------------|-----------------|
| Center Frequency      | <b>2170 MHz</b> |
| Horizontal (dBi) peak | <b>-1.86</b>    |
| Vertical (dBi) peak   | <b>-1.99</b>    |



# Antenna to User Distance



# Antenna to Antenna Distance

WWAN AUX &  
WLAN AUX  
WLAN MIMO

UWB Main

WWAN Main

WLAN Main & UWB Div

