

# **Winmate Inc.**

## **AntennaSpecification**

**Project :M700DQ8**  
**Version :20230111**  
**Issue Date : 2020/01/17**

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## **1. LTE Main Antenna Specification**

**Winmate Part Number: 90RF0100000P**

### **1.1. Electrical Characteristics**

Frequency(MHz): 700-960 / 1710-2170 / 2500-2690

SWR:  $\leq 3.0:1$  typ. (with Enclosure)

Peak Gain: 3dBi typ. (with Enclosure)

Average Gain: -6/-6 dBi typ. (with Enclosure)

Impedance: 50ohm

Polarization: Linear

### **1.2. Mechanical Characteristics**

Cable:  $50\Omega$   $\phi$  0.81 RF cable

Connector: MHF4

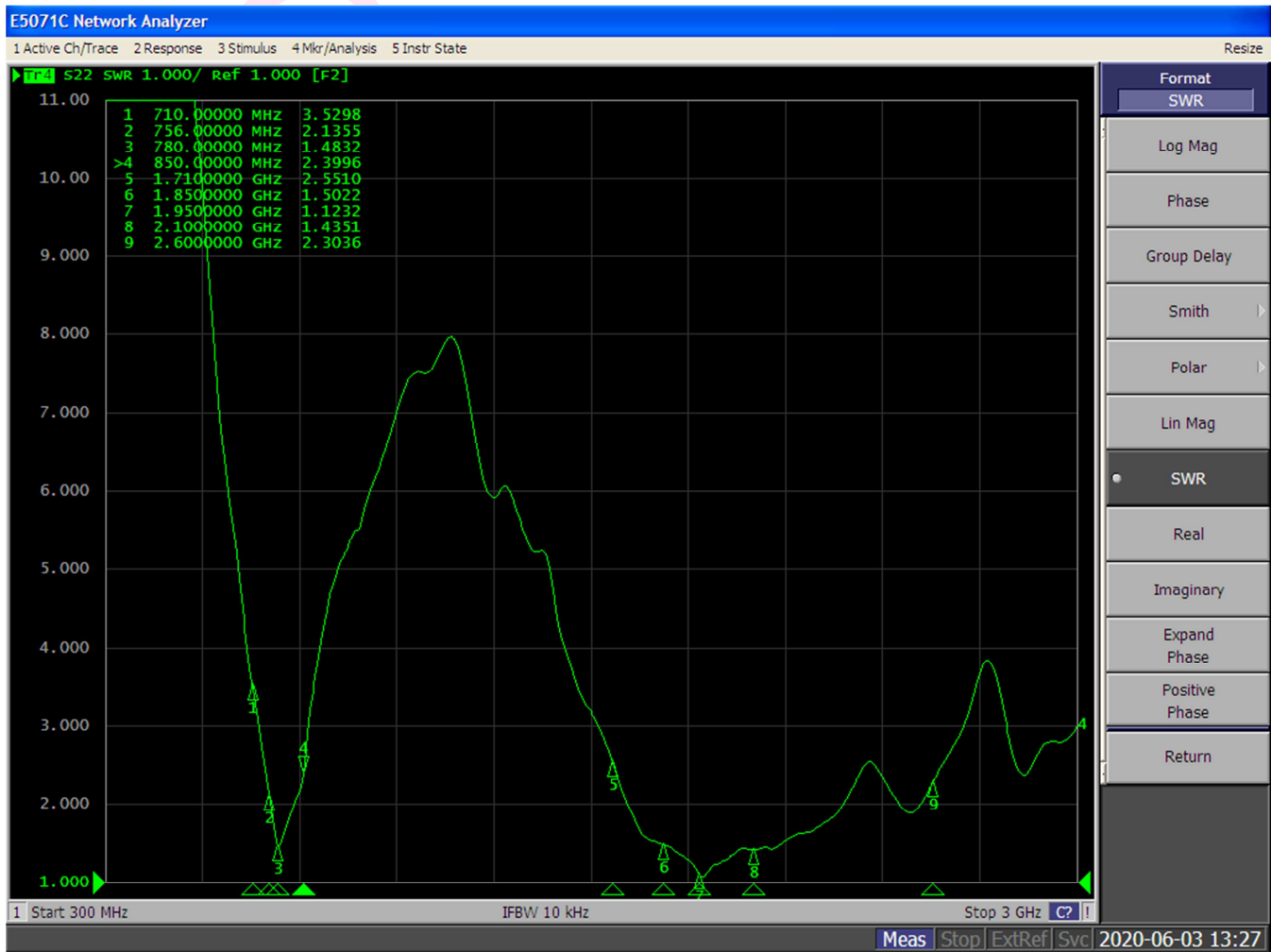
PCB:FPCB /Thickness 1.0mm

### **1.3. Environmental Characteristics**

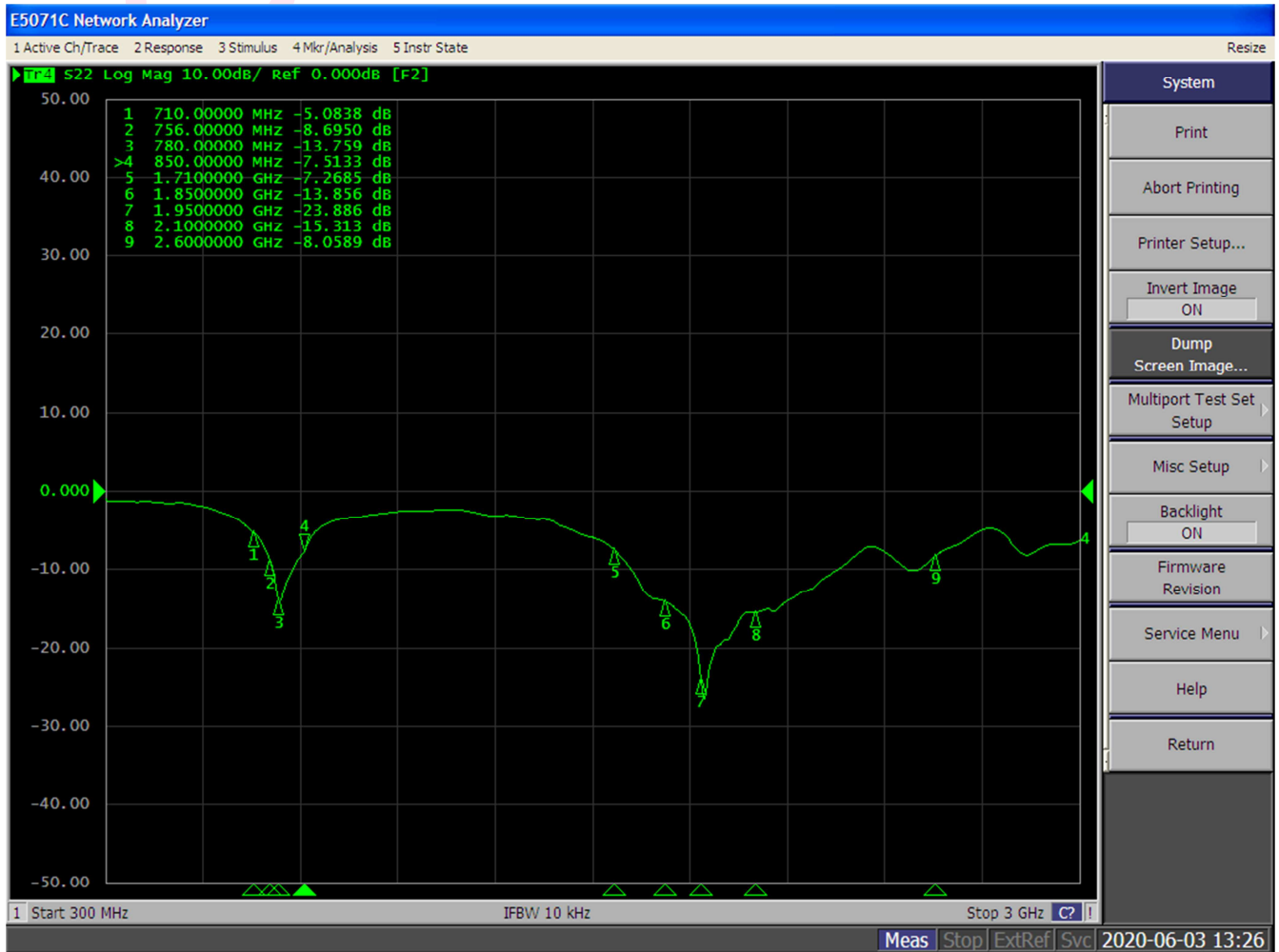
Operating Temperature: -30°C to 80°C

## 1.4. RF Performance Characteristics

### 1.4.1. SWR



## 1.4.2. Return Loss



### 1.4.3. Gain / Efficiency

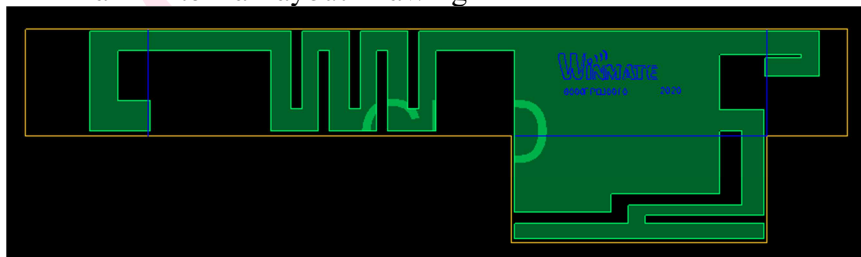
| Frequency         | 703   | 729   | 748   | 782   | 803   | 824   | 832   | 847   | 869   | 880   |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Directivity (dBi) | 4.10  | 3.97  | 3.67  | 3.98  | 3.52  | 3.52  | 3.43  | 3.41  | 3.32  | 3.27  |
| Efficiency (dB)   | -4.73 | -4.08 | -4.19 | -4.10 | -4.40 | -4.72 | -4.94 | 5.41  | -6.15 | -6.55 |
| Efficiency (%)    | 33.64 | 39.02 | 38.08 | 38.81 | 36.24 | 33.70 | 32.05 | 28.76 | 24.21 | 22.09 |
| Peak Gain (dBi)   | -0.63 | -0.10 | -0.51 | -0.12 | -0.87 | -1.19 | -1.50 | -1.99 | -2.83 | -3.27 |
| Average Gain (dB) | -4.73 | -4.08 | -4.19 | -4.10 | -4.40 | -4.72 | -4.94 | -5.41 | -6.15 | -6.55 |

| Frequency         | 894   | 915   | 960    | 1710  | 1755  | 1785  | 1805  | 1880  | 1910  | 1930  |
|-------------------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| Directivity (dBi) | 3.34  | 3.60  | 3.54   | 5.10  | 5.67  | 4.75  | 4.38  | 4.26  | 3.94  | 3.99  |
| Efficiency (dB)   | -7.15 | -8.33 | -10.35 | -3.93 | -3.81 | -3.64 | -3.50 | -2.74 | -2.60 | -2.51 |
| Efficiency (%)    | 19.25 | 14.68 | 9.21   | 40.41 | 41.54 | 46.17 | 44.63 | 53.14 | 54.94 | 56.00 |
| Peak Gain (dBi)   | -3.80 | -4.72 | -6.81  | 1.16  | 1.85  | 1.10  | 0.88  | 1.52  | 1.34  | 1.47  |
| Average Gain (dB) | -7.15 | -8.33 | -10.35 | -3.93 | -3.81 | -3.64 | -3.50 | -2.74 | -2.60 | -2.51 |

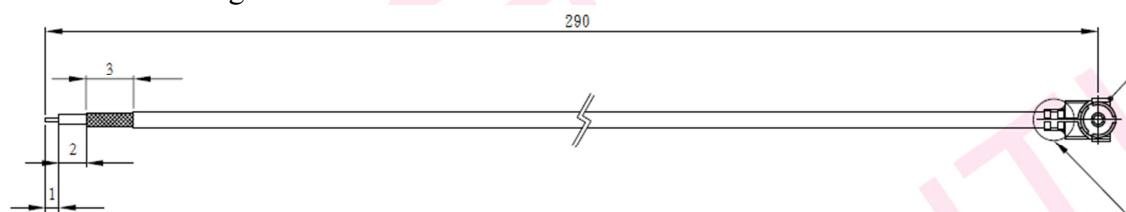
| Frequency         | 1980  | 1990  | 2110  | 2155  | 2170  | 2500  | 2690  |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| Directivity (dBi) | 5.50  | 5.73  | 5.41  | 5.18  | 4.65  | 6.13  | 4.35  |
| Efficiency (dB)   | -2.75 | -2.81 | -3.73 | -4.51 | -4.51 | -6.28 | -6.44 |
| Efficiency (%)    | 53.02 | 52.34 | 42.28 | 35.38 | 35.36 | 23.51 | 22.68 |
| Peak Gain (dBi)   | 2.74  | 2.92  | 1.67  | 0.67  | 0.13  | -0.14 | -2.08 |
| Average Gain (dB) | -2.75 | -2.81 | -3.73 | -4.51 | -4.51 | -6.28 | -6.44 |

## 1.5. Drawing

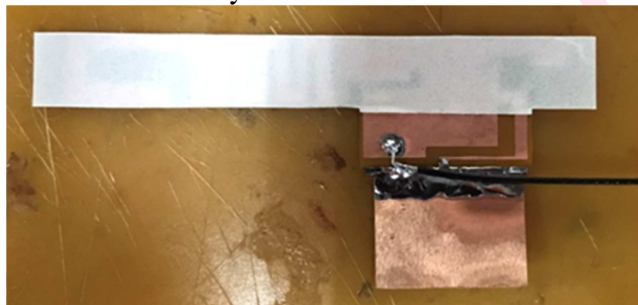
### LTE Main Antenna Layout Drawing



### RF Cable Drawing



### Antenna Assembly



Winmate Part Number: 90RF01000017

## **2. LTE Aux Antenna Specification**

**Winmate Part Number: 90RF0200000Q**

### **2.1. Electrical Characteristics**

Frequency(MHz): 700-960 / 1710-2170 / 2500-2690

SWR:  $\leq 5.5:1$  typ. (with Enclosure)

Peak Gain: 2dBi typ. (with Enclosure)

Average Gain: -4/-4 dBi typ. (with Enclosure)

Impedance: 50ohm

Polarization: Linear

### **2.2. Mechanical Characteristics**

Cable:  $50\Omega$   $\varnothing$  0.81 RF cable

Connector: MHF4

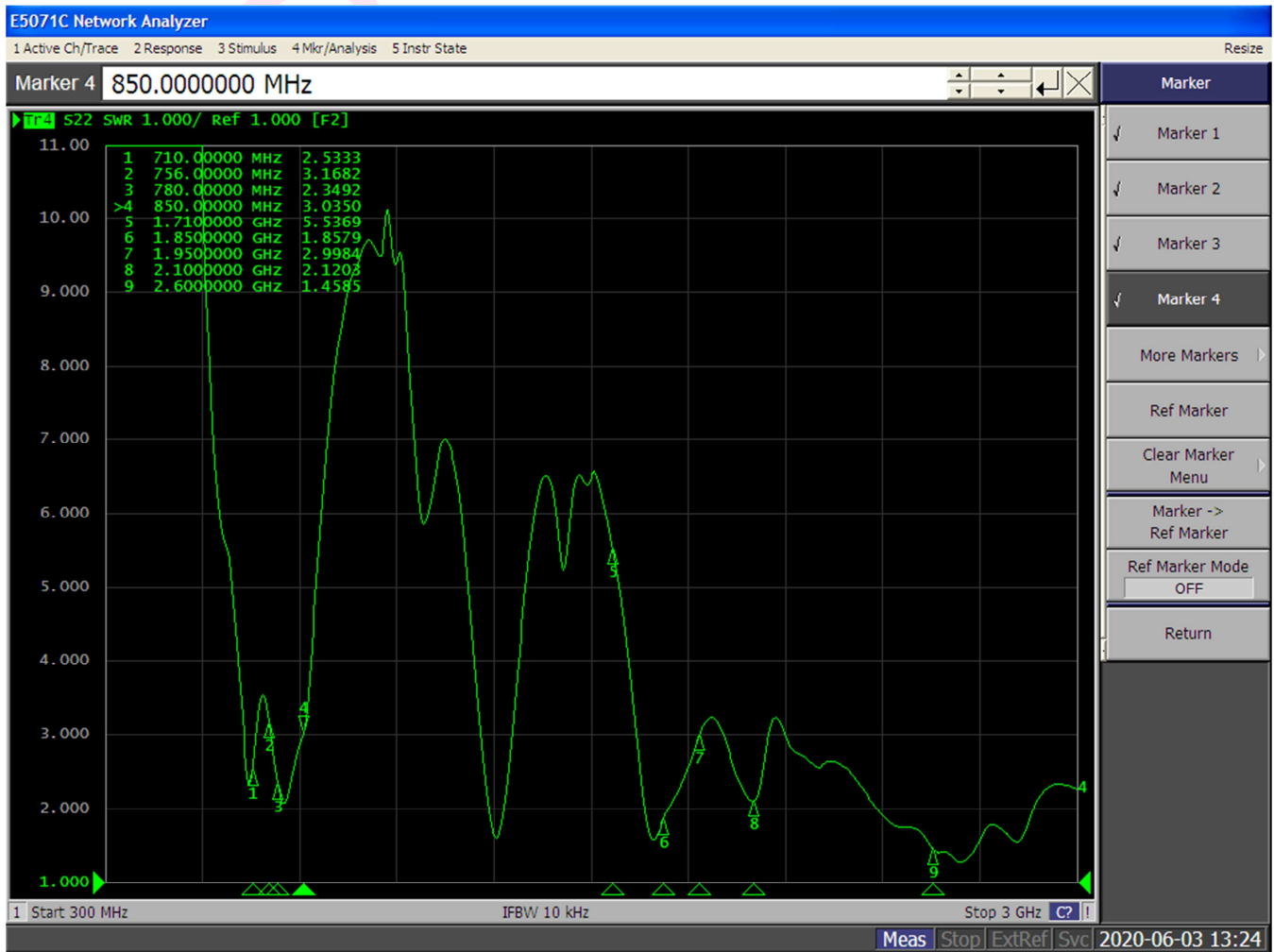
PCB: FR4 /Thickness 1.6mm

### **2.3. Environmental Characteristics**

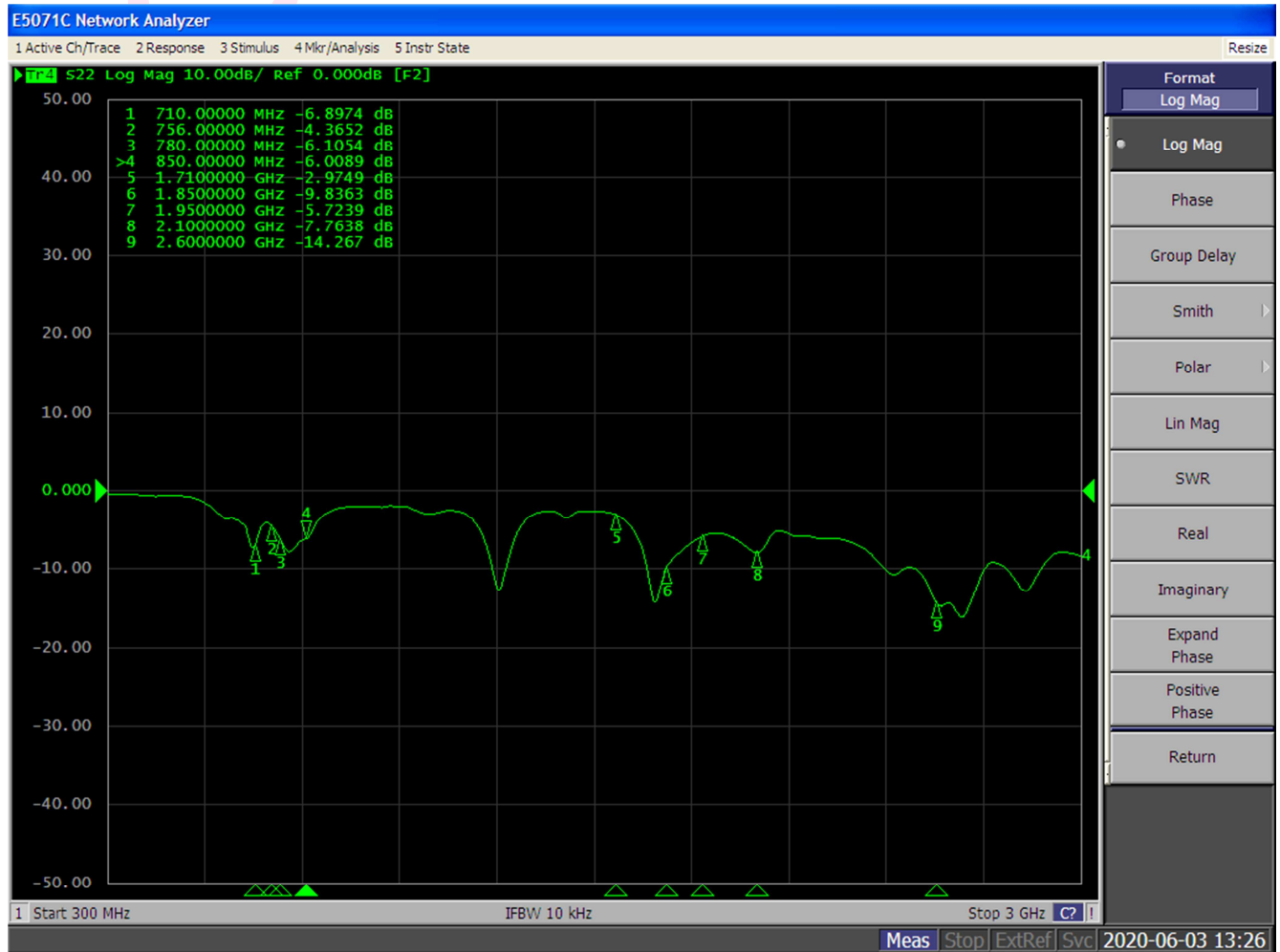
Operating Temperature: -30°C to 80°C

## 2.4. RF Performance Characteristics

### 2.4.1. SWR



## 2.4.2. Return Loss



### 2.4.3. Gain / Efficiency

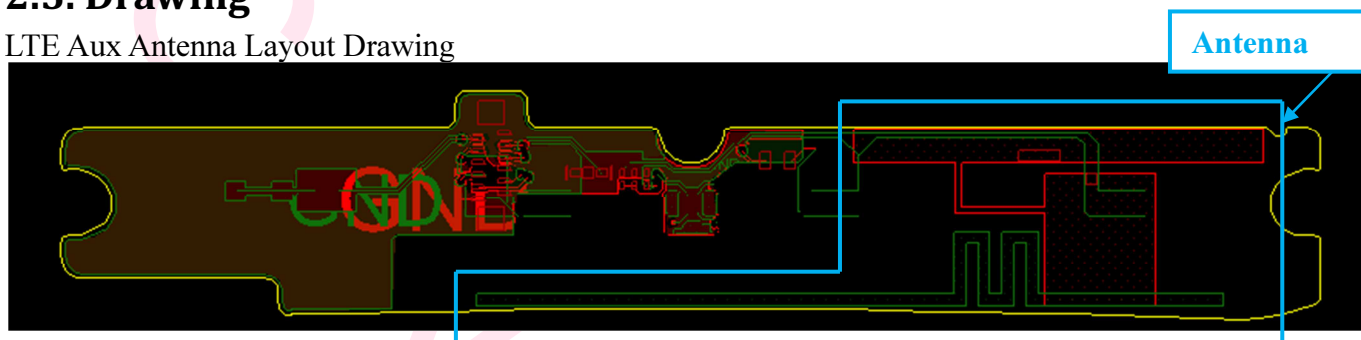
| Frequency         | 698   | 729   | 738   | 746   | 751   | 859   | 869   | 877   | 882   | 894   |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Directivity (dBi) | 3.93  | 4.51  | 4.62  | -4.66 | 4.69  | 5.19  | 5.27  | 5.27  | 5.21  | 5.14  |
| Efficiency (dB)   | -6.69 | -4.40 | -4.04 | -3.82 | 3.79  | -5.20 | -5.13 | -5.13 | -5.15 | -5.38 |
| Efficiency (%)    | 21.38 | 36.25 | 39.42 | 41.41 | 41.76 | 30.13 | 30.67 | 30.62 | 30.51 | 28.96 |
| Gain (dBi)        | -2.75 | 0.10  | 0.58  | 0.83  | 0.89  | -0.01 | 0.14  | 0.13  | 0.06  | -0.23 |
| Average Gain (dB) | -6.69 | -4.40 | -4.04 | -3.82 | -3.79 | -5.20 | -5.13 | -5.13 | -5.15 | -5.38 |

| Frequency         | 1930  | 1960  | 1963  | 1990  | 1995  | 2110  | 2133  | 2155  | 2350  | 2355  |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Directivity (dBi) | 4.65  | 5.18  | 5.22  | 5.20  | 5.26  | 5.48  | 6.19  | 6.19  | 5.41  | 5.39  |
| Efficiency (dB)   | -6.11 | -6.81 | -6.83 | -6.90 | -6.88 | -5.79 | -5.82 | -5.46 | -4.47 | -4.52 |
| Efficiency (%)    | 24.47 | 20.80 | 20.74 | 20.37 | 20.47 | 26.35 | 26.14 | 28.42 | 35.67 | 35.27 |
| Gain (dBi)        | -1.45 | -1.63 | -1.60 | -1.70 | -1.61 | -0.30 | 0.36  | 0.73  | 0.94  | 0.87  |
| Average Gain (dB) | -6.11 | -6.81 | -6.83 | -6.90 | -6.88 | -5.79 | -5.82 | -5.46 | -4.47 | -4.52 |

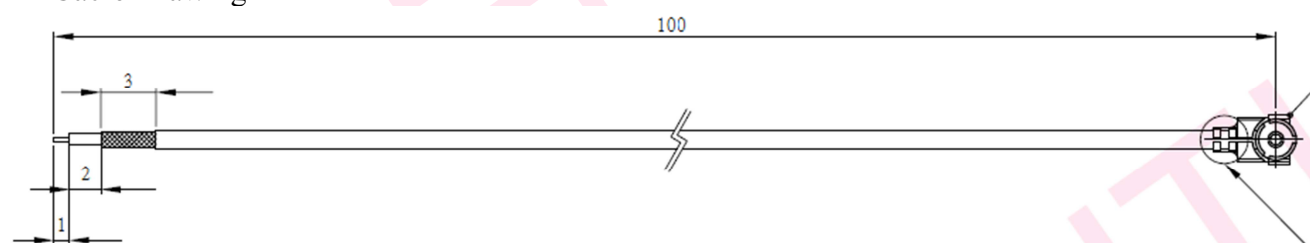
| Frequency         | 2360  | 2496  | 2500  | 2570  | 2620  |
|-------------------|-------|-------|-------|-------|-------|
| Directivity (dBi) | 5.69  | 7.10  | 6.88  | 6.38  | 5.88  |
| Efficiency (dB)   | -4.53 | -5.60 | -5.43 | -7.18 | -6.79 |
| Efficiency (%)    | 35.18 | 27.52 | 28.62 | 19.12 | 20.89 |
| Gain (dBi)        | 1.15  | 1.50  | 1.45  | -0.80 | -0.91 |
| Average Gain (dB) | -4.53 | -5.60 | -5.43 | -7.18 | -6.79 |

## 2.5. Drawing

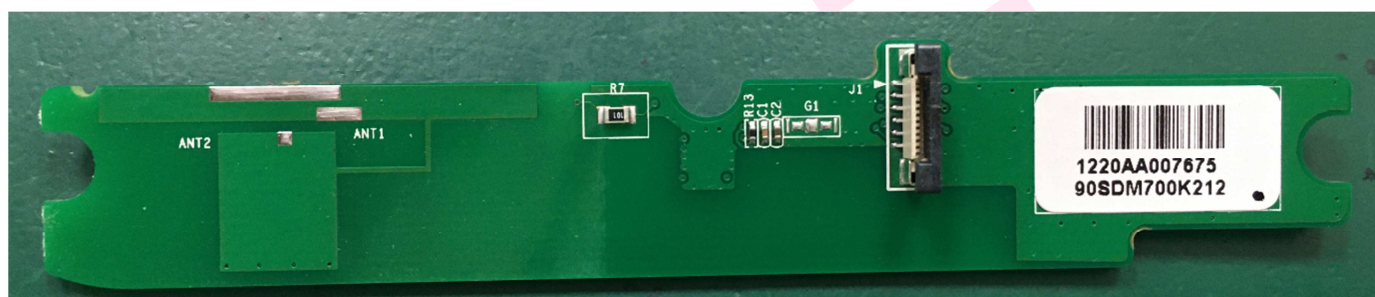
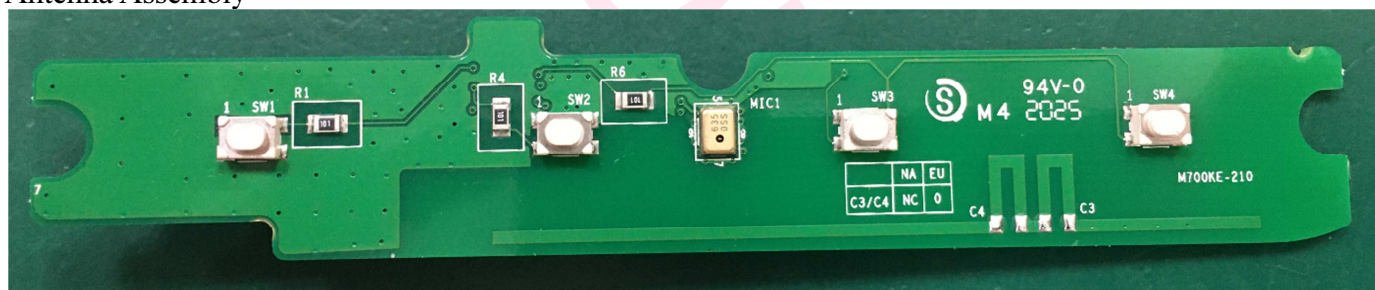
### LTE Aux Antenna Layout Drawing



### RF Cable Drawing



### Antenna Assembly



Winmate Part Number: 90SDM700K212