

# Data Sheet

CUSTOMER: 虹堡

MODEL NAME: S1 mini LTE+WiFi EU+US

CUSTOMER P/N: 311600214000

AWAN P/N: ALF00-000012



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## 1. Description

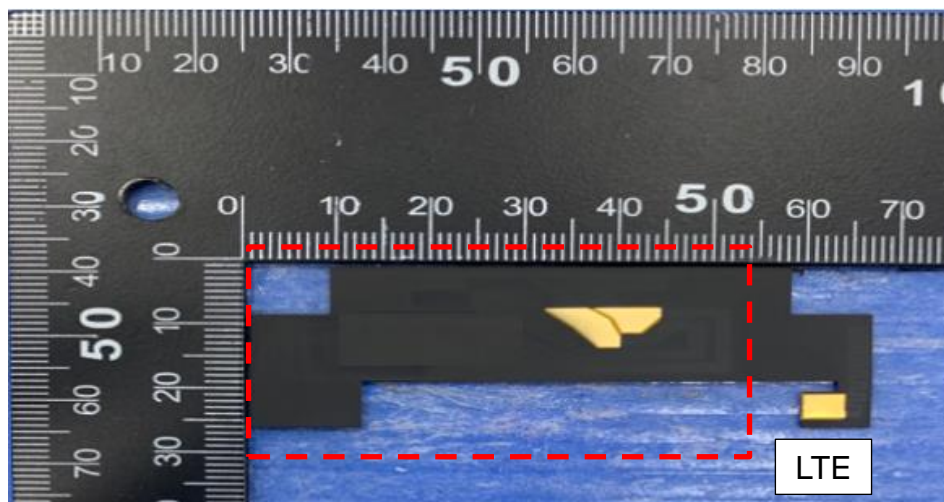
### 1.1 Specifications

Antennas Type	PIFA Antenna for LTE application	
Impedance	50Ω	
Polarization	Linear	
Radiation pattern	Omni-directional	
Frequency	LTE	699-960MHz, 1710-2170MHz 2200-2690MHz

Frequency range	699-960 MHz	1710-2170 MHz	2200-2690MHz
Peak gain	-7.18 ~ -16.74dBi	-3.27 ~ -8.32dBi	-6.11 ~ -9.93dBi
Efficiency (%)	2~19%	6~56%	10~24%
VSWR (in Device)	10.0 : 1 Max.	7 : 1 Max.	7 : 1 Max.
Polarization	Linear		
Power handling	1W (cw)		
Impedance	50 Ω		

### 1.2 Antenna Picture

LTE P/N: ALF00-000012



## 2. Electrical Specification

### 2.1 Test Equipment

Equipment Description	Manufacturer	Identification no.	Current Calibration date	Next calibration date
Universal Radio Communication tester	Anritsu	MT8820C	2022/07/29	2022/12/29
Network Analyzer	Agilent	E5071C	2022/07/29	2022/12/29
Sleeve Dipole	MVG	SD740	2022/07/12	2022/12/12
Dual Ridge Horn	MVG	SH800	2022/07/12	2022/12/12
Dipole antenna	MVG	3126-700	2022/07/12	2022/12/12
Stargate-16-L probe array	MVG	Stargate-16-L	2022/07/12	2022/12/12
Measurement software	MVG	Wave Studio 22.1	N/A	N/A
Wireless protocol tester	R&S	CMW500	2022/07/29	2022/12/29

#### 2.1.2 General Information

Description	Tester	Measured Date
Measured	William.lee	2023/01/30

## 2.2 Test Setup

### 2.2.1 Frequency Range

- A. LTE : 699~960 MHz  
1710~2170 MHz  
2200~2690 MHz

### 2.2.2 VSWR

Step 1: The antenna is arranged on the customer provided test fixture.

Step 2: The VSWR of the antenna is measured via Agilent 8720/8753 Network Analyzer (see figure. 1).



Figure.1

### 2.2.3 Radiation pattern and Gain

- A. The 3D chamber provides less than -40dB reflectivity from 699MHz to 3GHz and a 45cm diameter spherical quiet zone. The measurement results are calibrated using Stargate-16-L probe array (see figure. 2).
- B. The measured results of the radiation patterns and antenna gain are obtained from the control system and showed on the monitor (see figure. 3).
- C. The measured photo is shown in figure. 4

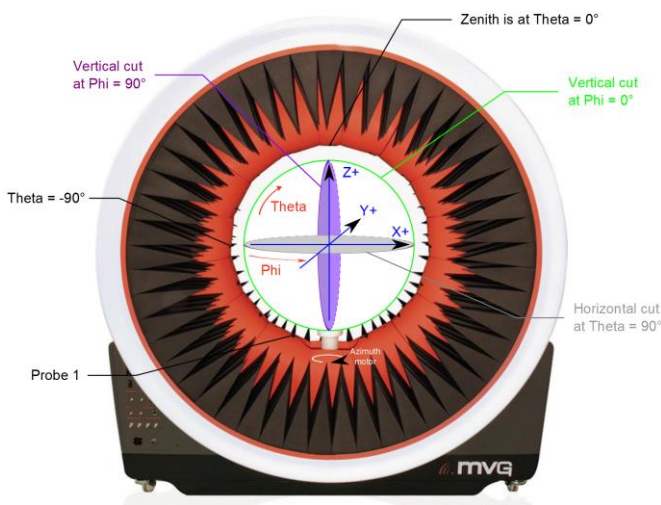


Figure.2

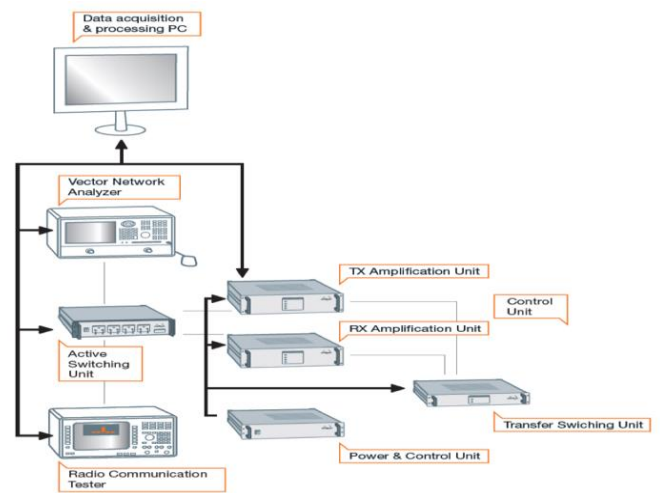


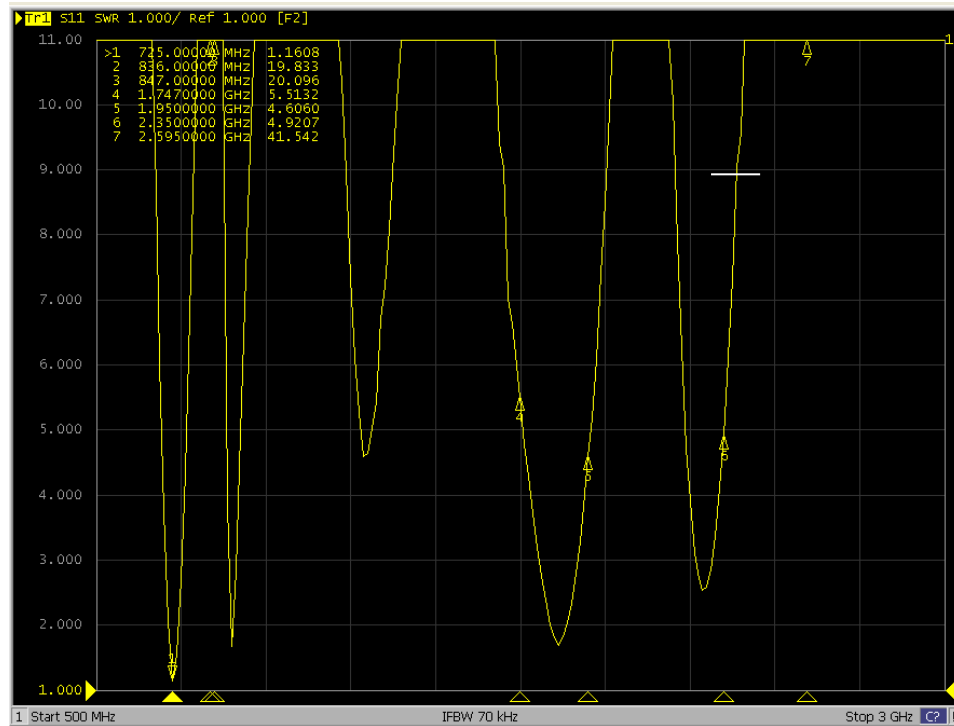
Figure.3



Figure.4

### 3. Performance Data

#### 3.1 VSWR



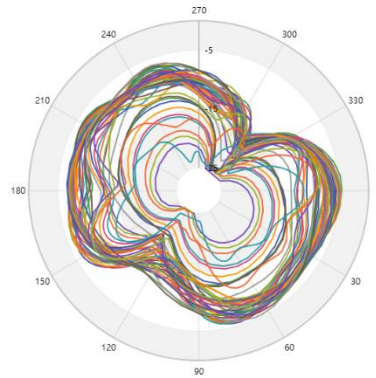
## 3.2 Radiation pattern & Gain

### 3.2.1 Antenna pattern

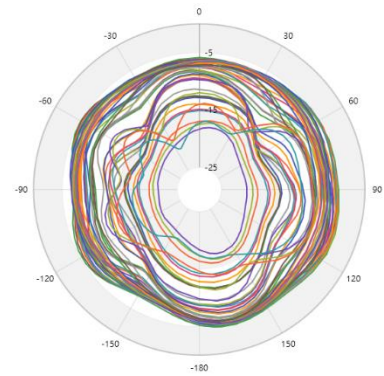
#### 699-960MHz

699.00 MHz	814.00 MHz
703.00 MHz	815.00 MHz
707.00 MHz	821.00 MHz
716.00 MHz	824.00 MHz
717.00 MHz	830.00 MHz
722.50 MHz	831.00 MHz
725.50 MHz	832.00 MHz
728.00 MHz	836.00 MHz
729.00 MHz	837.50 MHz
737.00 MHz	845.00 MHz
746.00 MHz	847.00 MHz
748.00 MHz	849.00 MHz
751.00 MHz	859.00 MHz
756.00 MHz	860.00 MHz
758.00 MHz	862.00 MHz
763.00 MHz	869.00 MHz
768.00 MHz	875.00 MHz
777.00 MHz	876.00 MHz
780.50 MHz	880.00 MHz
782.00 MHz	882.50 MHz
787.00 MHz	890.00 MHz
788.00 MHz	894.00 MHz
791.00 MHz	900.00 MHz
793.00 MHz	915.00 MHz
798.00 MHz	925.00 MHz
803.00 MHz	940.00 MHz
806.00 MHz	960.00 MHz

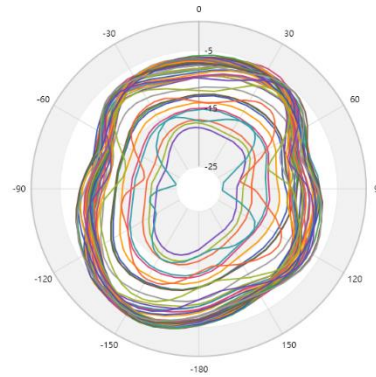
XY Plane



ZX Plane



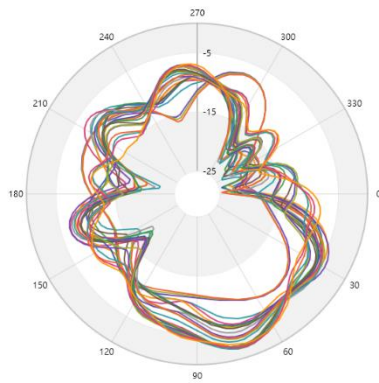
ZY Plane



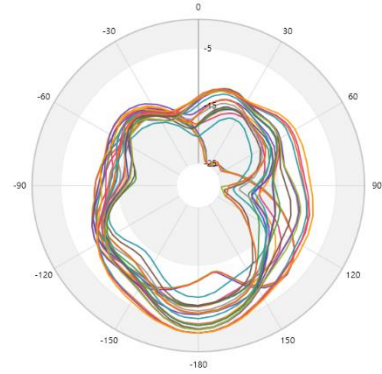
**1452-1920MHz**

- 1452.00 MHz
- 1463.00 MHz
- 1474.00 MHz
- 1710.00 MHz
- 1730.00 MHz
- 1745.00 MHz
- 1747.50 MHz
- 1749.90 MHz
- 1755.00 MHz
- 1767.40 MHz
- 1780.00 MHz
- 1784.90 MHz
- 1785.00 MHz
- 1805.00 MHz
- 1840.00 MHz
- 1842.50 MHz
- 1844.90 MHz
- 1850.00 MHz
- 1862.40 MHz
- 1879.90 MHz
- 1880.00 MHz
- 1883.00 MHz
- 1900.00 MHz
- 1910.00 MHz
- 1915.00 MHz
- 1920.00 MHz

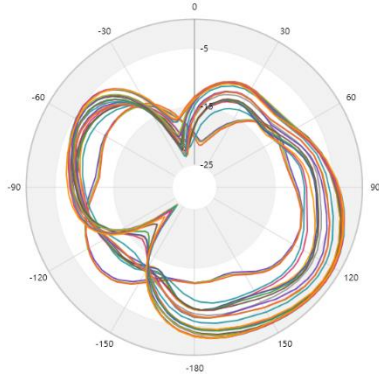
**XY Plane**



**XZ Plane**



**YZ Plane**

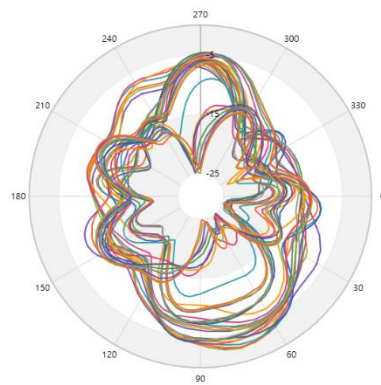




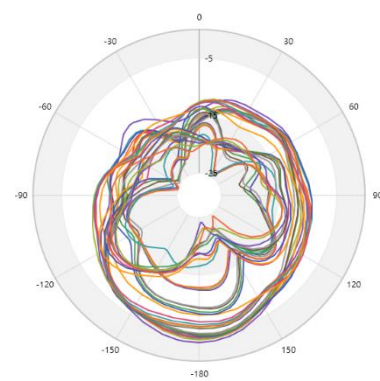
**1930-2690MHz**

- 1930.00 MHz
- 1950.00 MHz
- 1960.00 MHz
- 1963.00 MHz
- 1980.00 MHz
- 1990.00 MHz
- 1995.00 MHz
- 2010.00 MHz
- 2018.00 MHz
- 2025.00 MHz
- 2110.00 MHz
- 2130.00 MHz
- 2140.00 MHz
- 2155.00 MHz
- 2170.00 MHz
- 2200.00 MHz
- 2300.00 MHz
- 2305.00 MHz
- 2310.00 MHz
- 2315.00 MHz
- 2350.00 MHz
- 2355.00 MHz
- 2360.00 MHz
- 2400.00 MHz
- 2496.00 MHz
- 2500.00 MHz
- 2535.00 MHz
- 2570.00 MHz
- 2593.00 MHz
- 2595.00 MHz
- 2620.00 MHz
- 2655.00 MHz
- 2690.00 MHz

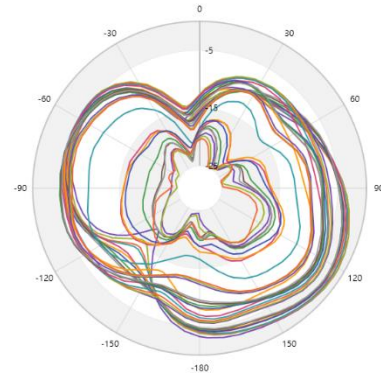
**XY Plane**



**XZ Plane**



**YZ Plane**



### Antenna Gain

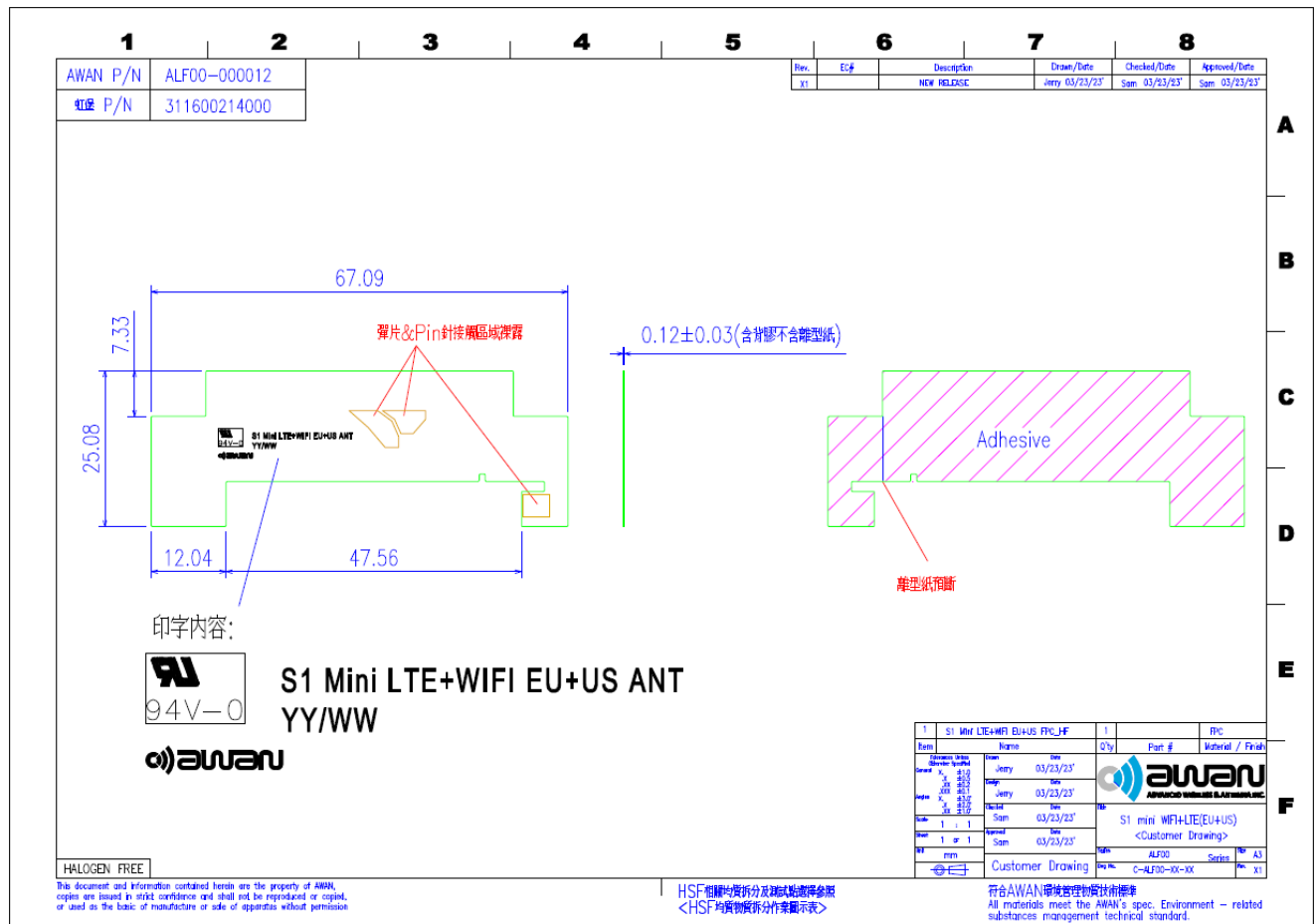
Frequency (MHz)	3D		
	Efficiency	Avg. Gain	Peak Gain
<b>699</b>	8.933	-10.49	-16.77
<b>703</b>	9.931	-10.03	-15.69
<b>707</b>	10.814	-9.66	-15.07
<b>716</b>	11.614	-9.35	-13.1
<b>717</b>	12.106	-9.17	-12.69
<b>722.5</b>	12.560	-9.01	-11.45
<b>725.5</b>	11.482	-9.4	-10.2
<b>728</b>	11.455	-9.41	-9.95
<b>729</b>	11.641	-9.34	-9.86
<b>737</b>	13.428	-8.72	-7.71
<b>746</b>	15.524	-8.09	-5.54
<b>748</b>	15.488	-8.1	-5.52
<b>751</b>	16.749	-7.76	-4.95
<b>756</b>	17.219	-7.64	-4.91
<b>758</b>	18.408	-7.35	-4.64
<b>763</b>	19.679	-7.06	-4.04
<b>768</b>	21.577	-6.66	-4.26
<b>777</b>	22.233	-6.53	-4.11
<b>780.5</b>	23.714	-6.25	-4.14
<b>782</b>	23.496	-6.29	-4.24
<b>787</b>	24.044	-6.19	-3.86
<b>788</b>	23.878	-6.22	-4.27
<b>791</b>	24.889	-6.04	-4.34
<b>793</b>	23.121	-6.36	-4.53
<b>798</b>	23.442	-6.3	-3.58
<b>803</b>	27.040	-5.68	-4.28
<b>806</b>	30.200	-5.2	-4.51
<b>814</b>	30.690	-5.13	-3.63
<b>815</b>	30.200	-5.2	-3.88
<b>821</b>	31.623	-5	-4.03
<b>824</b>	28.708	-5.42	-4.18
<b>830</b>	29.174	-5.35	-3.95
<b>831</b>	29.444	-5.31	-4.15
<b>832</b>	29.854	-5.25	-4.16
<b>836</b>	27.353	-5.63	-4.9
<b>837.5</b>	27.606	-5.59	-4.54
<b>845</b>	27.040	-5.68	-4.67
<b>847</b>	27.040	-5.68	-4.58
<b>849</b>	28.642	-5.43	-4.81
<b>859</b>	23.823	-6.23	-4.63
<b>860</b>	24.378	-6.13	-4.68
<b>862</b>	23.442	-6.3	-4.88
<b>869</b>	21.979	-6.58	-4.72
<b>875</b>	18.281	-7.38	-4.63
<b>876</b>	17.298	-7.62	-4.68

<b>880</b>	15.311	-8.15	-4.58
<b>882.5</b>	13.932	-8.56	-4.75
<b>890</b>	13.772	-8.61	-4.43
<b>894</b>	11.912	-9.24	-4.17
<b>900</b>	10.423	-9.82	-4.1
<b>915</b>	9.120	-10.4	-4.95
<b>925</b>	6.998	-11.55	-6.29
<b>940</b>	3.289	-14.83	-8.09
<b>960</b>	1.400	-18.54	-10.47
<b>1452</b>	10.447	-9.81	-6.43
<b>1463</b>	11.912	-9.24	-6.5
<b>1474</b>	12.794	-8.93	-6.54
<b>1710</b>	30.549	-5.15	-5.39
<b>1730</b>	30.620	-5.14	-4.35
<b>1745</b>	29.648	-5.28	-4.44
<b>1747.5</b>	29.512	-5.3	-4.44
<b>1749.9</b>	29.854	-5.25	-4.33
<b>1755</b>	29.648	-5.28	-4.32
<b>1767.4</b>	29.580	-5.29	-3.46
<b>1780</b>	29.717	-5.27	-3.09
<b>1784.9</b>	30.269	-5.19	-3.17
<b>1785</b>	30.269	-5.19	-3.17
<b>1805</b>	29.444	-5.31	-2.53
<b>1840</b>	28.054	-5.52	-1.54
<b>1842.5</b>	27.797	-5.56	-1.55
<b>1844.9</b>	28.054	-5.52	-1.39
<b>1850</b>	27.290	-5.64	-1.4
<b>1862.4</b>	26.792	-5.72	-1.27
<b>1879.9</b>	26.669	-5.74	-1.04
<b>1880</b>	26.730	-5.73	-1.03
<b>1883</b>	26.546	-5.76	-1.01
<b>1900</b>	26.546	-5.76	-0.72
<b>1910</b>	27.227	-5.65	-0.72
<b>1915</b>	27.733	-5.57	-0.57
<b>1920</b>	27.669	-5.58	-0.61
<b>1930</b>	27.416	-5.62	-0.98
<b>1950</b>	29.107	-5.36	-0.86
<b>1960</b>	28.907	-5.39	-0.92
<b>1963</b>	28.774	-5.41	-0.91
<b>1980</b>	29.512	-5.3	-1.5
<b>1990</b>	29.444	-5.31	-1.62
<b>1995</b>	30.200	-5.2	-1.52
<b>2010</b>	30.974	-5.09	-1.97
<b>2018</b>	30.832	-5.11	-2.01
<b>2025</b>	30.690	-5.13	-2.11
<b>2110</b>	19.953	-7	-3.26
<b>2130</b>	16.866	-7.73	-3.2
<b>2140</b>	14.997	-8.24	-3.13
<b>2155</b>	12.560	-9.01	-2.89

<b>2170</b>	10.116	-9.95	-2.76
<b>2200</b>	5.808	-12.36	-3.84
<b>2300</b>	28.054	-5.52	-3.8
<b>2305</b>	30.409	-5.17	-3.77
<b>2310</b>	32.509	-4.88	-3.89
<b>2315</b>	34.754	-4.59	-4
<b>2350</b>	44.055	-3.56	-4.81
<b>2355</b>	44.055	-3.56	-5.11
<b>2360</b>	45.394	-3.43	-5.17
<b>2400</b>	42.658	-3.7	-7.48
<b>2496</b>	43.251	-3.64	-9.32
<b>2500</b>	43.053	-3.66	-8.64
<b>2535</b>	38.282	-4.17	-8.37
<b>2570</b>	33.420	-4.76	-8.53
<b>2593</b>	30.409	-5.17	-8.54
<b>2595</b>	30.549	-5.15	-8.67
<b>2620</b>	29.309	-5.33	-8.71
<b>2655</b>	28.184	-5.5	-8.93
<b>2690</b>	26.853	-5.71	-8.81

## 4. Mechanical Specification

### 4.1 Assembly Drawing (LTE Antenna)



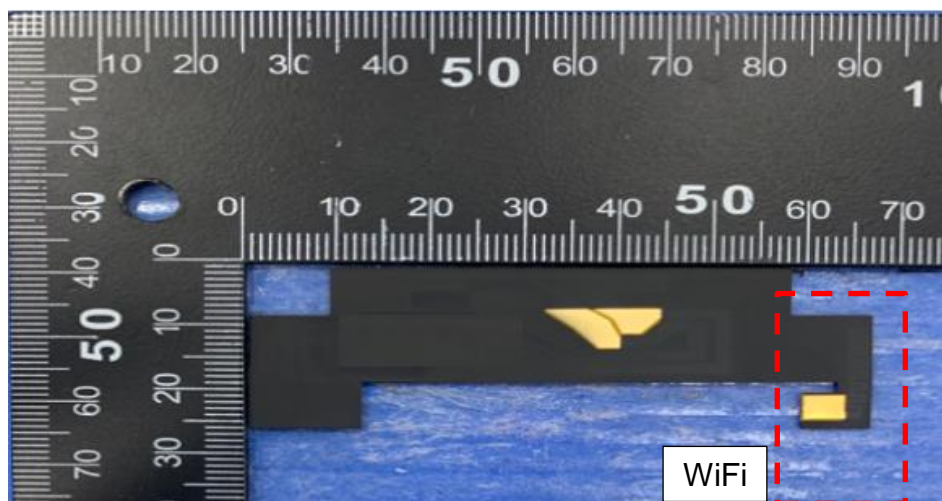
## 5. Description

### 5.1 Specifications

Antennas Type	PIFA Antenna for WIFI application	
Impedance	50Ω	
Polarization	Linear	
Radiation pattern	Omni-directional	
Frequency	WIFI	2.40~2.50 GHz, 5.15~5.85 GHz
VSWR	WIFI	2.40~2.50 GHz 3.5 Max 5.15~5.85 GHz 3.0 Max

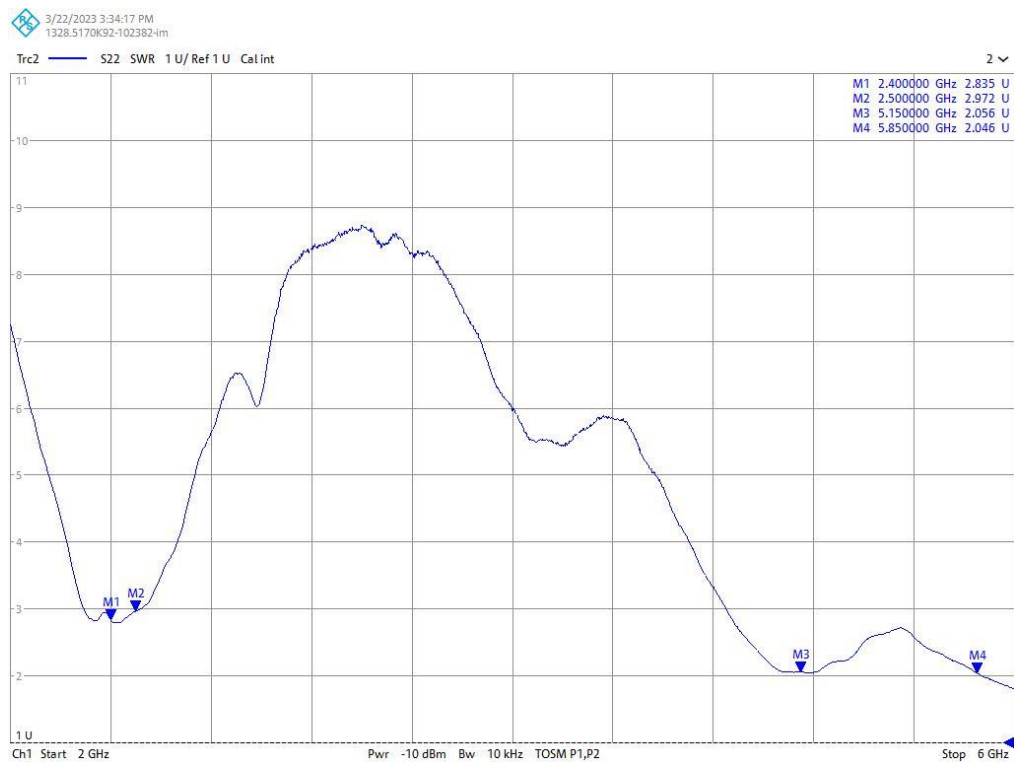
### 5.2 Antenna Picture

WIFI P/N: ALF00-000012



## 6. Performance Data

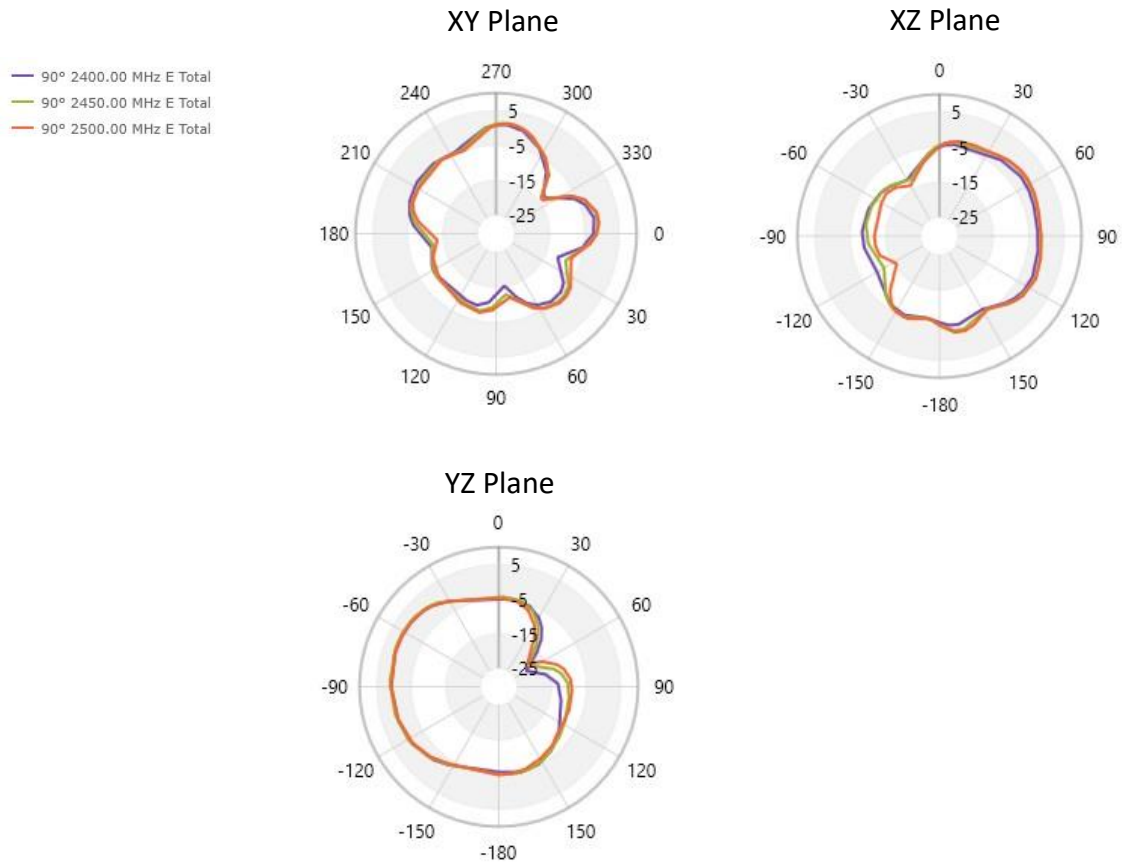
### 6.1 VSWR



## 6.2 Radiation pattern & Gain (WIFI Antenna)

### 6.2.1 Antenna pattern

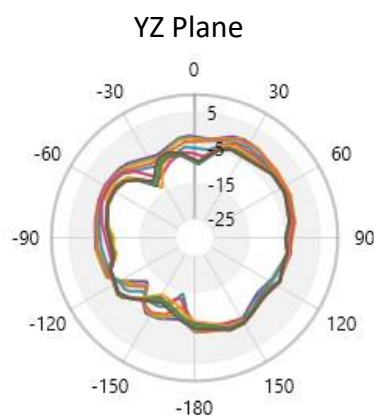
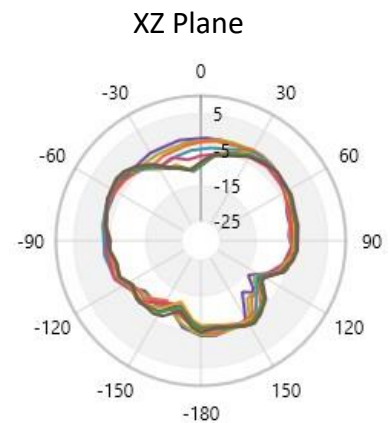
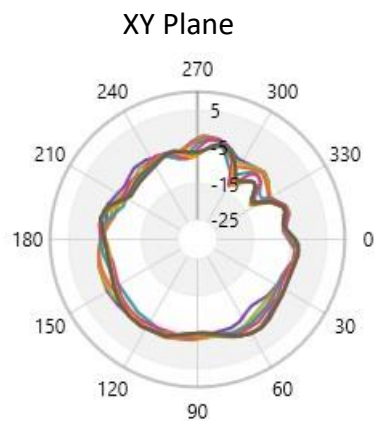
2400-2450MHz





### 5150-5850MHz

- 90° 5150.00 MHz E Total
- 90° 5250.00 MHz E Total
- 90° 5350.00 MHz E Total
- 90° 5470.00 MHz E Total
- 90° 5600.00 MHz E Total
- 90° 5725.00 MHz E Total
- 90° 5785.00 MHz E Total
- 90° 5800.00 MHz E Total
- 90° 5850.00 MHz E Total

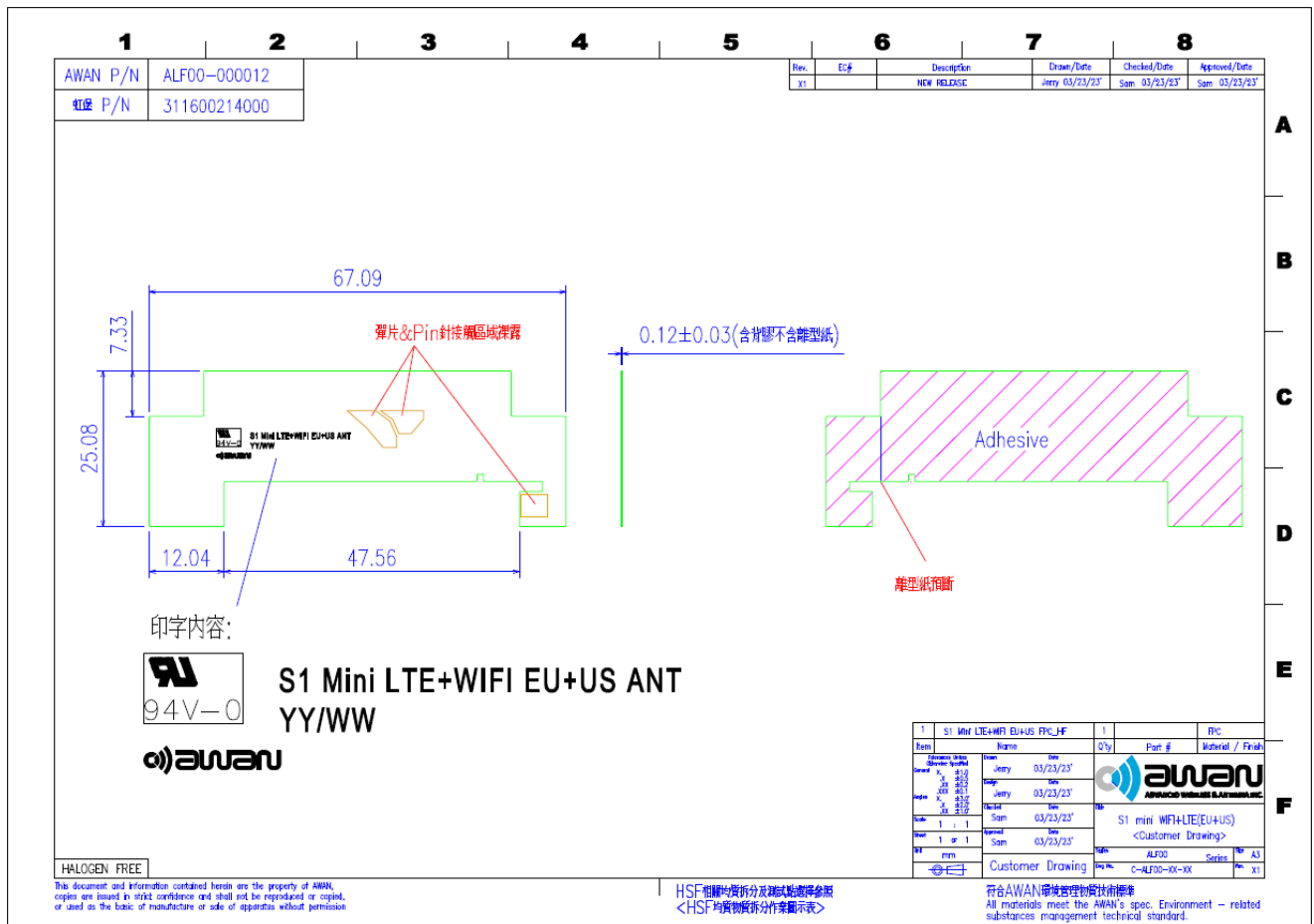


## Antenna Gain/Efficiency (WIFI Antenna)

Frequency (MHz)	3D		
	Efficiency	Avg. Gain	Peak Gain
2400	35.318	-4.52	1.56
2450	38.371	-4.16	1.96
2500	37.757	-4.23	1.82
5150	45.920	-3.38	1.11
5250	45.082	-3.46	1.09
5350	42.073	-3.76	0.76
5470	42.756	-3.69	0.77
5600	41.210	-3.85	0.4
5725	41.879	-3.78	1.21
5785	40.644	-3.91	1.31
5800	40.926	-3.88	1.33
5850	41.400	-3.83	1.49

## 7. Mechanical Specification

### 7.1 Assembly Drawing (WIFI Antenna)



## Revision

Revision	Date	Change Notification	Notes
Rev.1	2023-03-23		