

PART NUMBER: GA-043

1. SCOPE

This specification covers the dielectric antenna for LTE (US) 698~960MHz, 1710~2170 MHz application.

2. Name of the product

This product is named "Dielectric PIFA Antenna".

3. Electrical characteristics

3-1 Electrical characteristics of antenna

The antenna has the electrical characteristics given in Table 1 under the *Chinmore* standard installation conditions shown in the figure of Evaluation Board.

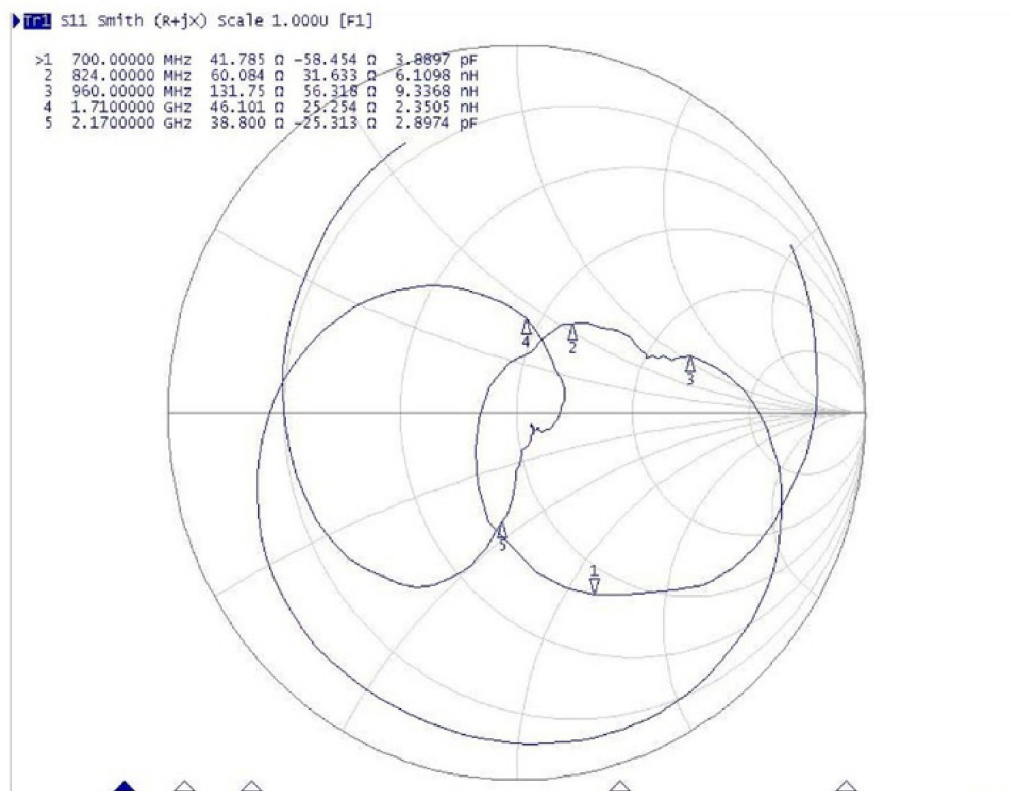
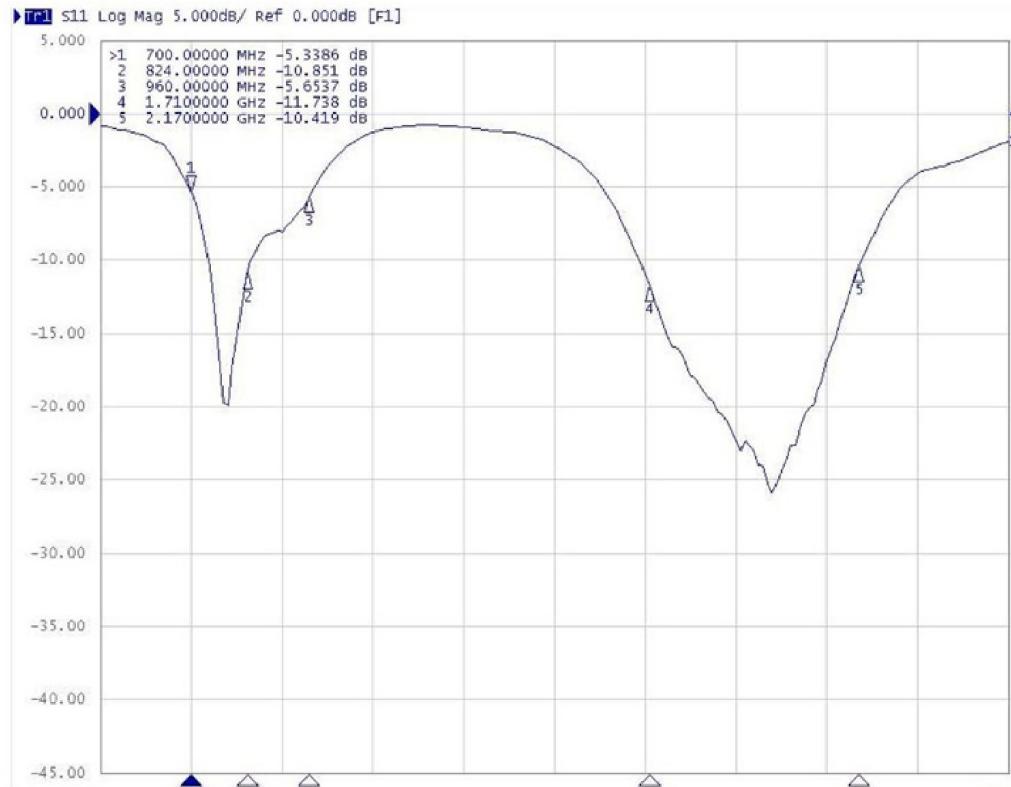
Table 1

No	Parameter	Specification
1	Working Frequency	698~960 MHz , 1710~2170 MHz
2	Dimension	40×6×5 mm
3	VSWR	4.0 max (depends on the special environment)
4	Polarization	Linear
5	Impedance	50 Ω
6	Operating Temperature	-40~85℃
7	Termination	Ag (Environmentally-Friendly Pb Free)

* Evaluation board size 120×45 mm.

* Actual Electrical value will depend on customer ground plane size.

S11 Response curve

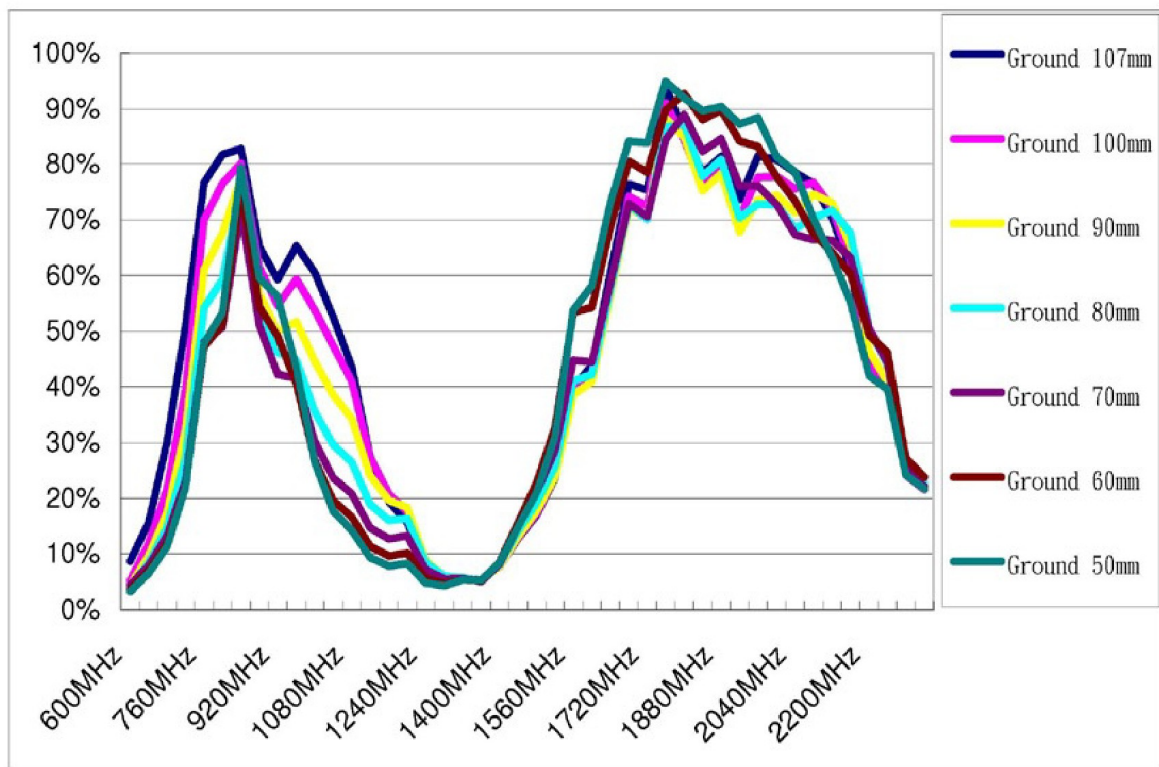


Gain and Efficiency

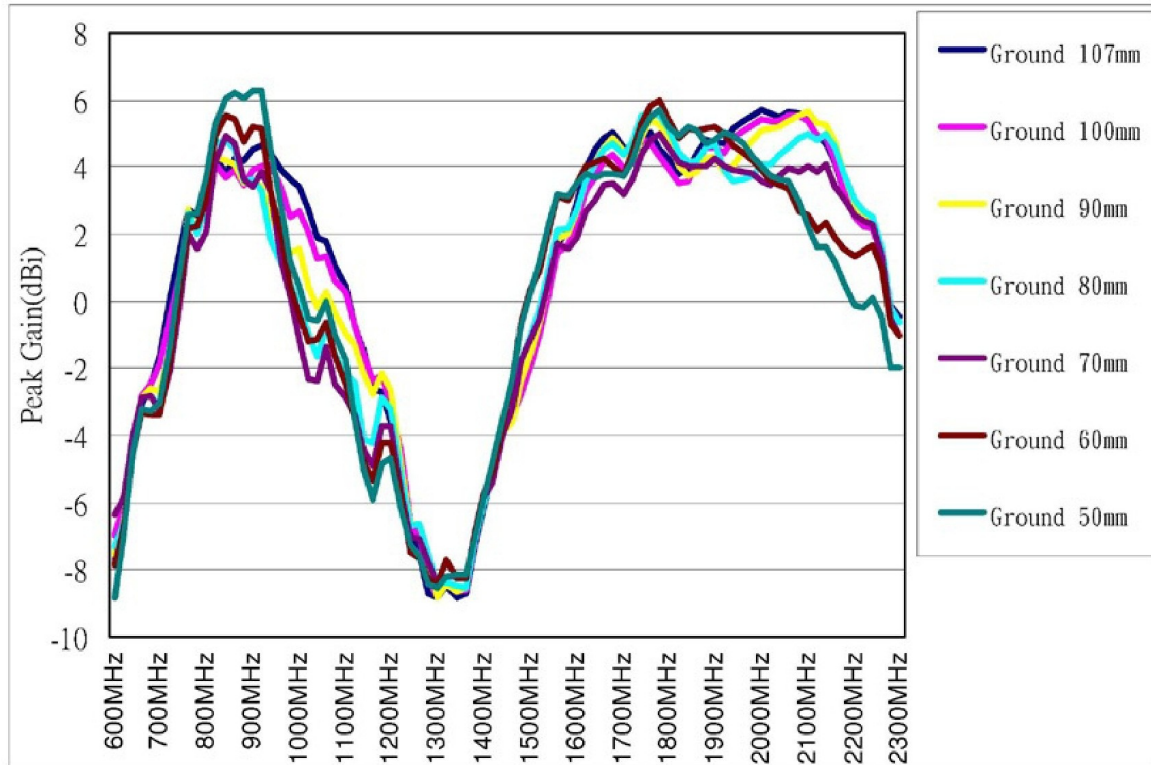
(Ground length: 107mm)

LTE Antenna Peak Gain parameter Summary											
Band	GSM (MHz)					DCS (MHz)		PCS (MHz)		WCDMA (MHz)	
	700	824	880	890	960	1710	1880	1850	1990	2110	2170
Peak Gain (dBi)	-1.65	4.31	4.18	4.35	3.88	4.35	4.82	4.15	5.61	5.13	3.67
Efficiency (%)	40.09	86.92	65.19	62.90	65.33	73.41	81.41	80.26	81.85	73.16	57.03
Average Gain(dBi)	-3.96	-0.60	-1.85	-2.01	-1.84	-1.35	-0.89	-0.95	-0.86	-1.35	-2.43

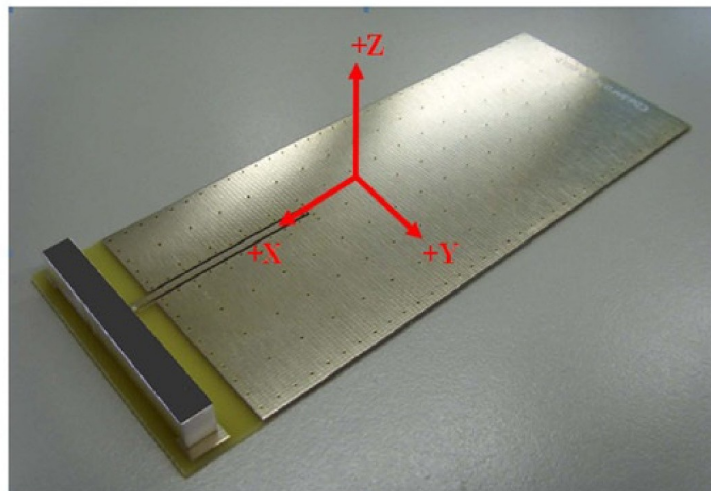
Reference efficiency data with different ground plane length:

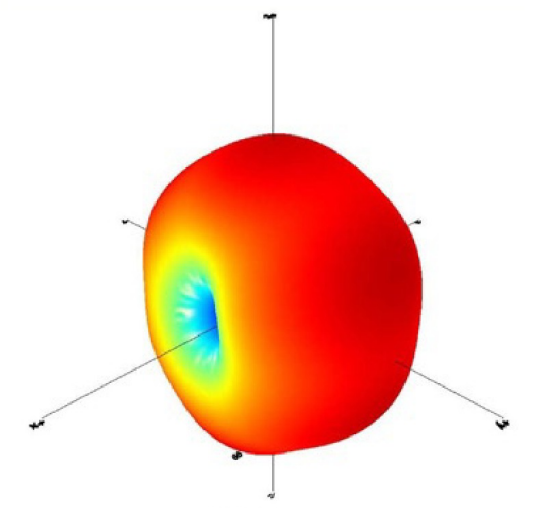


Reference Peak Gain data with different ground plane length:

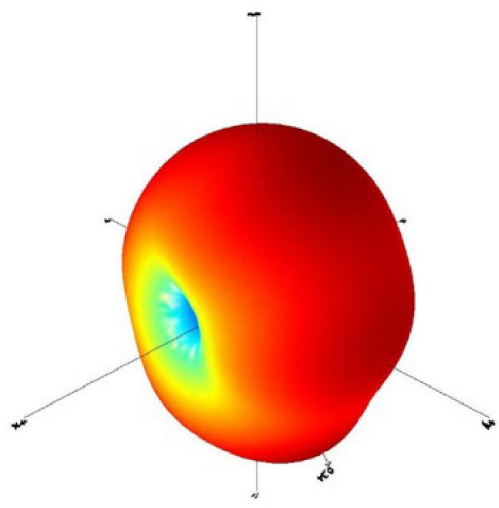


3D Radiation Pattern (measure on CHINMORE EVB)

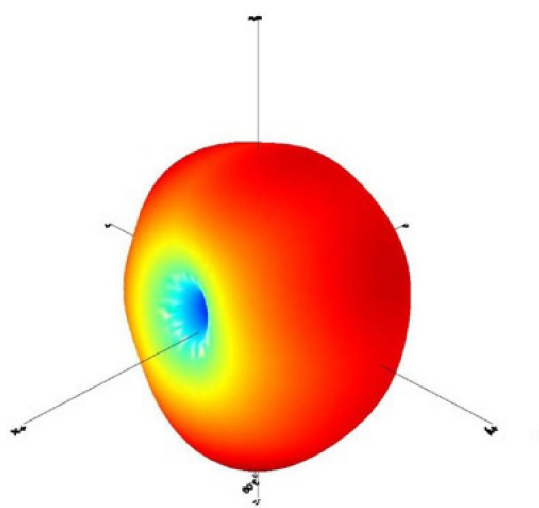




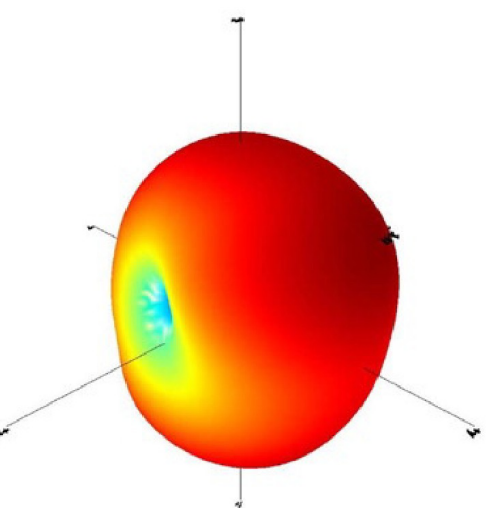
700MHz



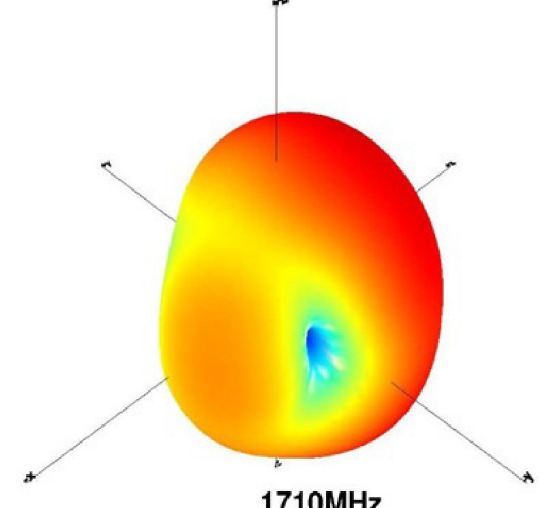
750MHz



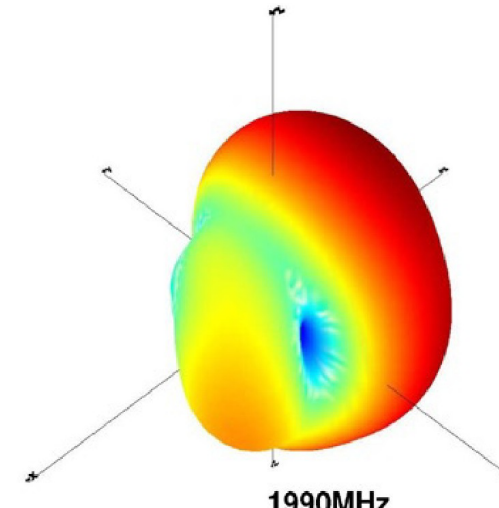
824MHz



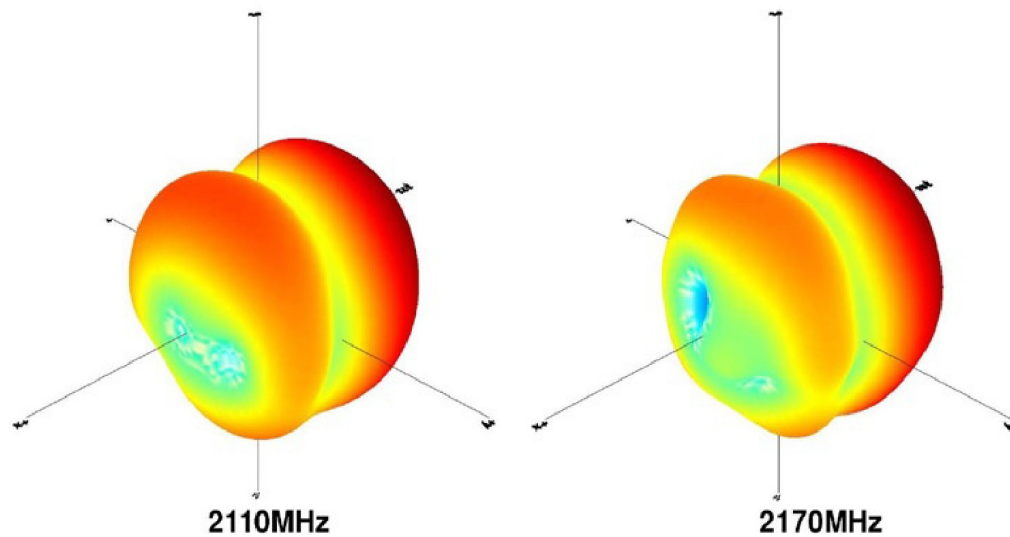
960MHz



1710MHz



1990MHz



4. Environmental conditions

4-1 Operating conditions

The antenna has the electrical characteristics given in Tables 1 in the temperature range of -30°C to $+85^{\circ}\text{C}$ and under the environmental conditions of $+40^{\circ}\text{C}$ and 0-95% r.h..

4-2 Storage temperature range

The storage temperature range of product is -40°C to $+85^{\circ}\text{C}$.

5. Reliability tests

5-1 Low-temperature test

Expose the specimen to -30°C for 500 hours and then to normal temperature/ humidity for 24 hours or more. After this test, examine its appearance and functions.

5-2 High-temperature test

Expose the specimen to $+85^{\circ}\text{C}$ for 500 hours and then to normal temperature/ humidity for 24 hours or more. After this test, examine its appearance and functions.

5-3 High-temperature/high-humidity test

Subject the object to the environmental conditions of $+85^{\circ}\text{C}$ and 90-95% r.h. for 96 hours, then expose to normal temperature/humidity for 24 hours or more. After this test, examine its appearance and functions.

5-4 Thermal shock test

Subject the object to cyclic temperature change (-30°C , 30 minutes \leftrightarrow $+85^{\circ}\text{C}$, 30 minutes) for 5 cycles, the expose to normal temperature/humidity for 24 hours or more.

5-5 Vibration test

5-5-1 Sinusoidal vibration test

Subject the object to vibrations of 5 to 200 to 5Hz swept in 10 minutes, 4.5G at maximum (2mm amplitude), in X and Y directions for two hours each and in Z direction for four hours. After this test, examine its appearance functions.

5-5-2 Vibration test in packaged condition

Subject the object, which is packaged as illustrated, to vibrations of 15 to 60 to 15Hz swept in 6 minutes, 4G at maximum (2mm amplitude at maximum), applied in X, Y and Z directions for two hours each, i.e. six hours in total. After this test, examine its appearance and functions.

5-6 Free fall test in packaged condition

Drop the object, which is packaged as illustrated, to a concrete surface from the height of 90 cm, on one corner, three edges and six faces once each, i.e. 10 times in total. After this test, examine its appearance and functions.

5-7 Soldering heat resistance test

After the lead pins of the unit are soaked in solder bath at $270 \pm 5^{\circ}\text{C}$ for 10 ± 0.5 seconds and then be left for more than 1 hour at $25 \pm 5^{\circ}\text{C}$ in less than 65% relative humidity.

5-8 Adhesion test

The device is subjected to be soldered on test PCB. Then apply 0.5Kg(5N) of force for 10 ± 1 seconds in the direction of parallel to the substrate. (the soldering should be done by reflow and be conducted with care so that the soldering is uniform and free of defect by stress such as heat shock) .

6. Inspection

As for the examination in the mass production, the receiving character of the ratio wave sent in a shield box from the standard antenna and VSWR are confirmed in the picking out examination.

7. Warranty

If any defect occurs form the product during proper use within a year after delivery, it will be repaired or replaced free of charge.

8. Other

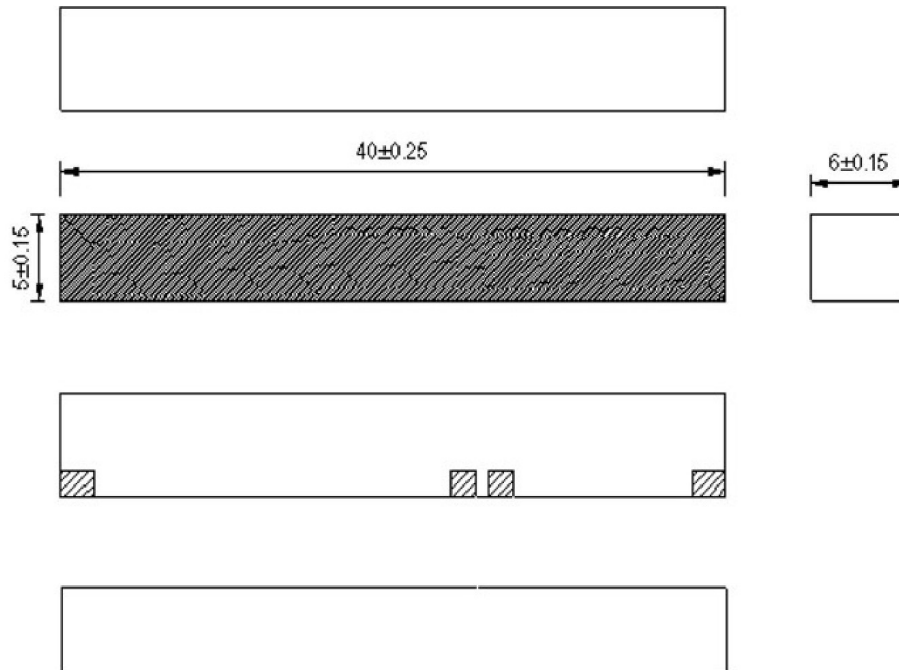
Any question arising from this specification manual shall be solved by arrangement made by both parties.

9. Precautions for use

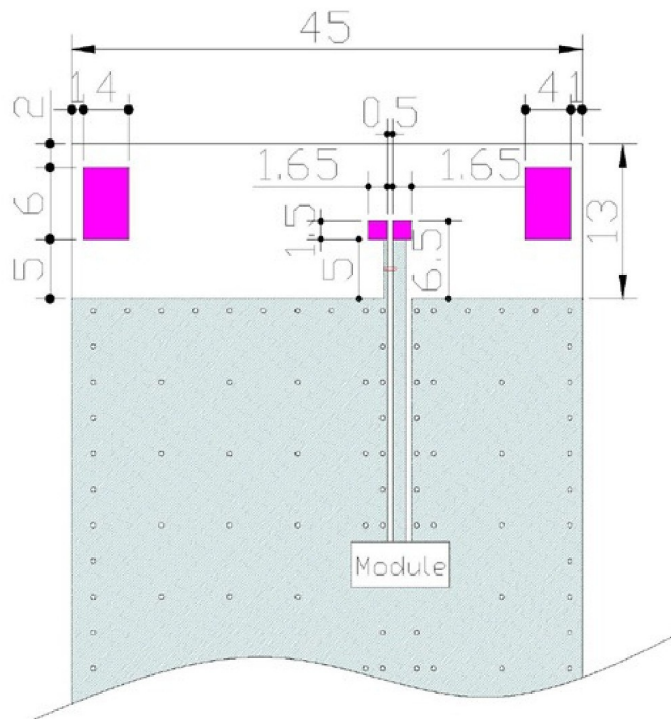
- Antenna pattern use a Ag electrode.
- Please don't use the corrosion gas (sulfur gas, chlorine gas) in the atmosphere.
 - Please don't direct solder onto the gold electrode of Antenna pattern.

10. Drawings

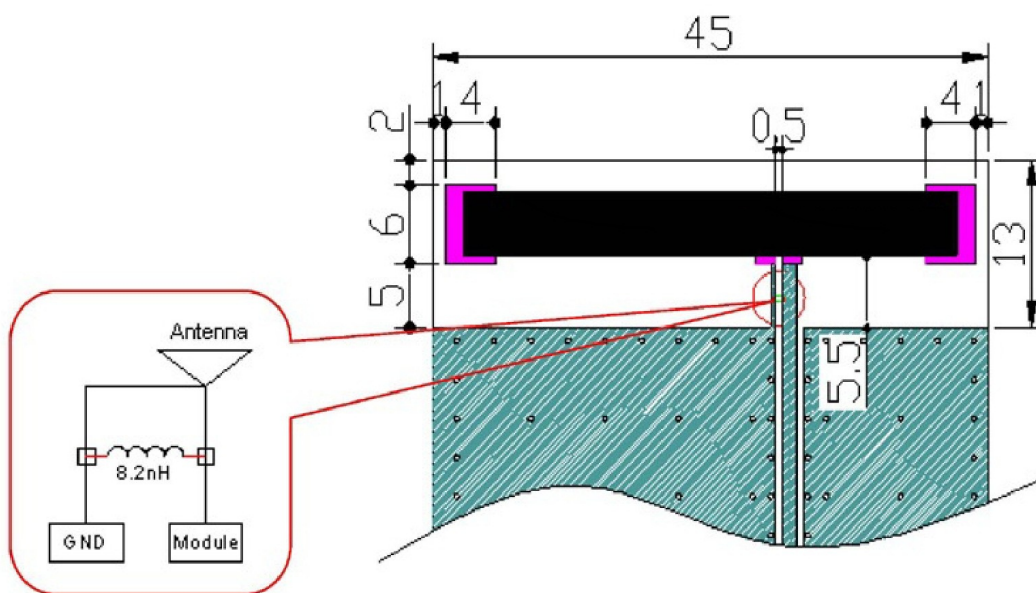
Shape and Dimension

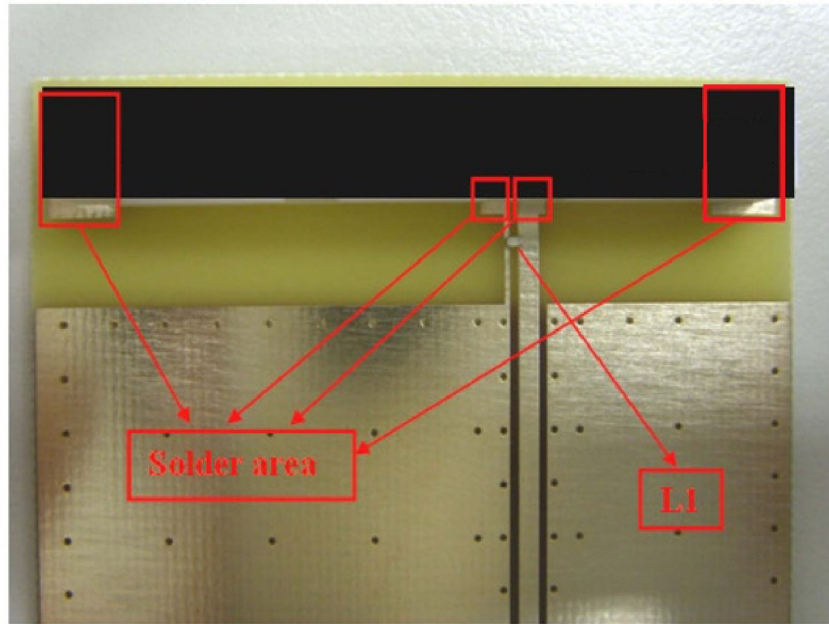


Customer's Requirement Layout Dimension



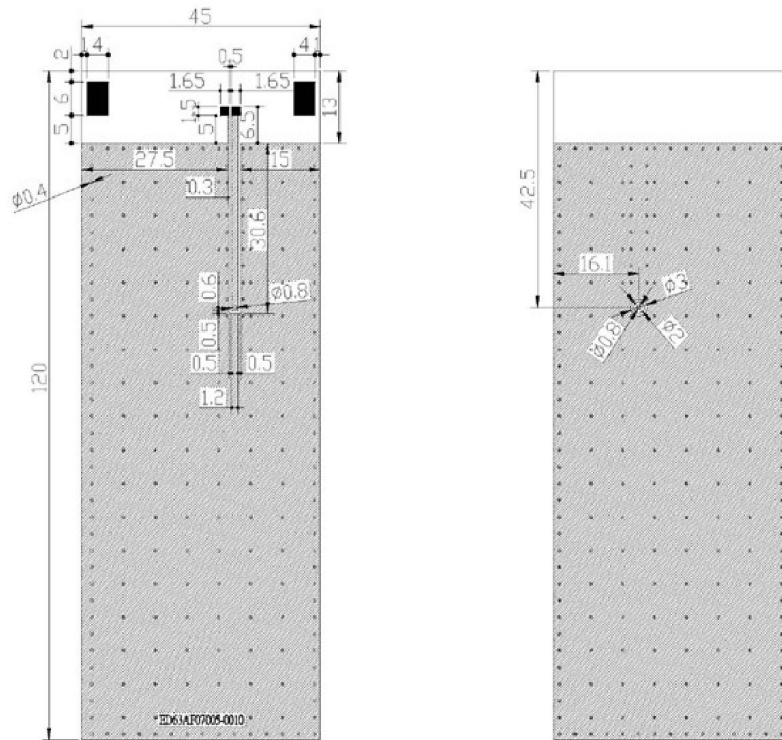
Antenna Measurement on Demo Board Matching Circuit





Circuit Symbol	Size	Description
L1	0402	8.2nH Inductor (MLK1005S8N2D)

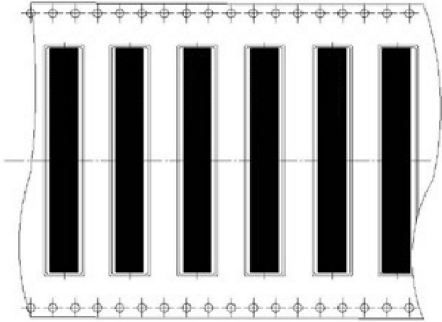
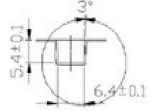
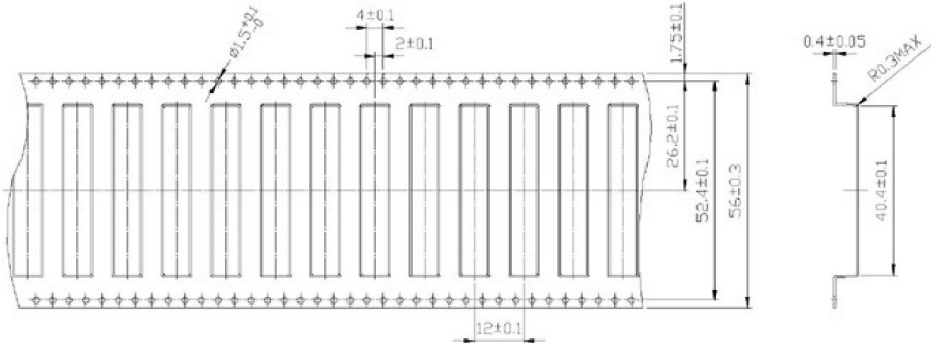
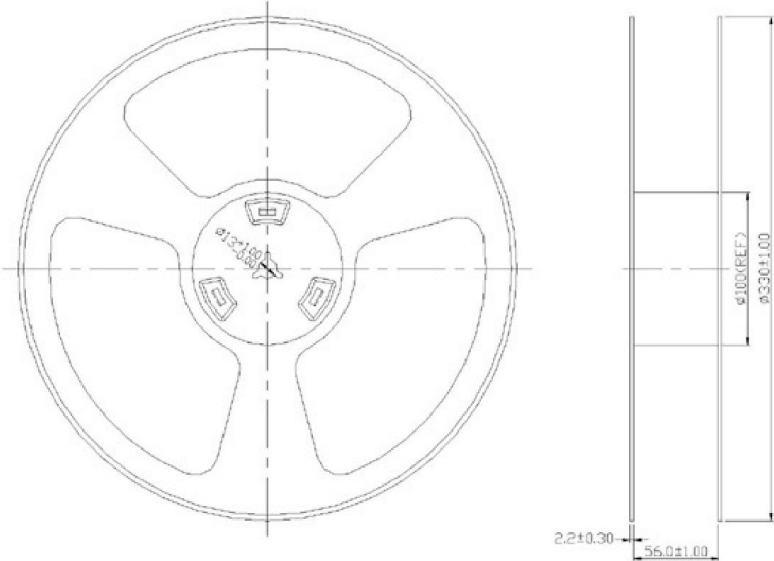
Test board dimensions



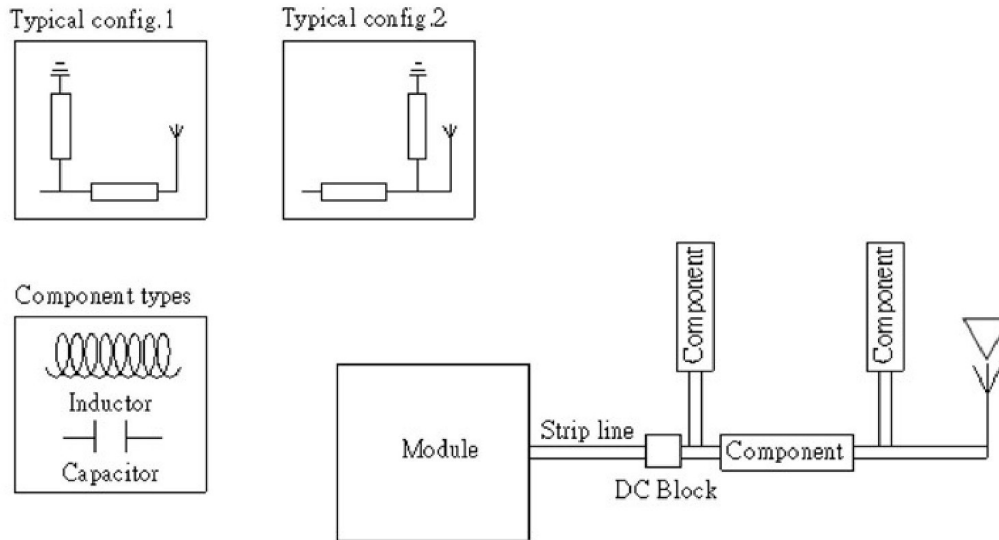
The test board is designed for evaluation purposes

Delivery mode

- 1 Blister tape to IEC 286-3 , polyester •**
- 2 Pieces/tape : 450**



Transmission line and matching



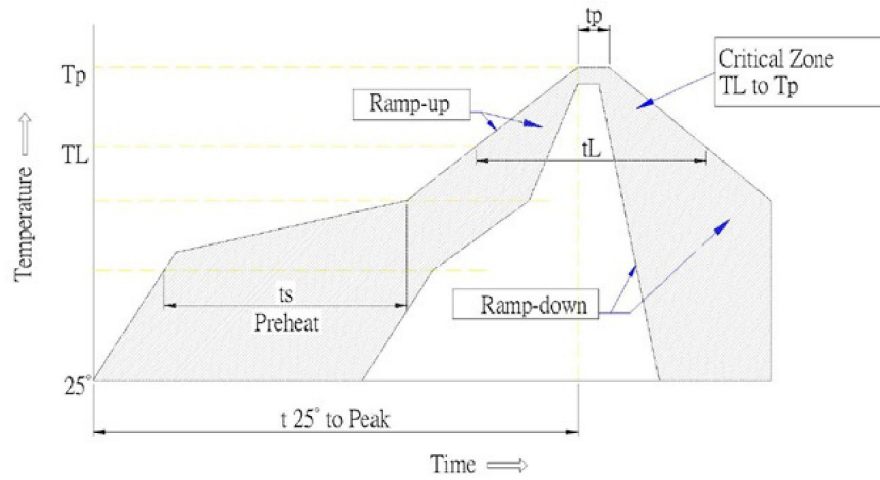
The matching network has to be individually designed using one, two or three components.

11. Recommended Reflow Temperature Profile

Chinmore GA-043 Planer Inverted-F antenna can be assembled following either Sn-Pb or Pb-free assembly. According to the Standard **IPC/JEDEC J-STD-020C**, the temperature profile suggested is as follow:

Phase	Profile features	Sn-Pb Assembly	Pb-Free Assembly (SnAgCu)
RAMP-UP	Avg. Ramp-up Rate (T _{smax} to TP)	3°C/second (max)	3°C/second(max)
PREHEAT	-Temperature Min(T _{Smin}) -Temperature Max(T _{Smin}) -Time(t _{smin} to t _{smax})	100°C 150°C 60-120 seconds	100°C 150°C 60-120 seconds
REFLOW	-Temperature(T _L) -Total Time above T _L (t _L)	183°C 60-150 seconds	217°C 60-150 seconds
PEAK	-Temperature(T _P) -Time(t _p)	235°C 10-30 second	260°C 20-40 second
RAMP-DOWN	Rate	6°C / second max.	6°C / second max.
Time from 25°C to Peak Temperature		6 minutes max.	8 minutes max.

Next graphic shows temperature profile(gray zone)for the antenna assembly process in reflow ovens.



Temperatures profile