

	<b>ACA-107-T Ultra Wide Band Chip Antenna - (3.2 ~ 7.2GHz) Application Note</b>	
Date of Issue: April 9 <sup>th</sup> , 2015	<b>ACA-107-T</b>	 <b>ESD Sensitive</b>
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## 1.0 Introduction

The ACA-107-T product is a chip antenna with a broadband match covering 3200MHz to 7200MHz.

The antenna is constructed from a dielectric ceramic material with Ag patterns to form the antenna performance. Table (1) summarizes the operating frequencies, bandwidths and applications.

**Table (1.0) – Operating Frequencies, Bandwidths and Applications**

Frequency [MHz]	Bandwidth [MHz]	Description
5200	3200 ~ 7200	UWB

### 1.1 Matching and Performance of Evaluation Board




Ceramic Chip Antennas are sensitive to their application environment such as the size and location of ground planes, the dielectric constant and thickness of the PCB layers and the proximity to other objects. These parameters affect the actual centre frequency, gain and bandwidth of the antenna.

To overcome these influences and match to the ultra wide bandwidth the design utilizes a metalized matching stub on the PCB layout. The match to the antenna should be made in your final product environment to get the best performance. The performance characteristics shown in Table (2) are measured on Test Fixture and evaluation board in free space and make up the specification of the parts. These matching values may differ from those in the actual end product environment.

## 2.0 Electrical Characteristics

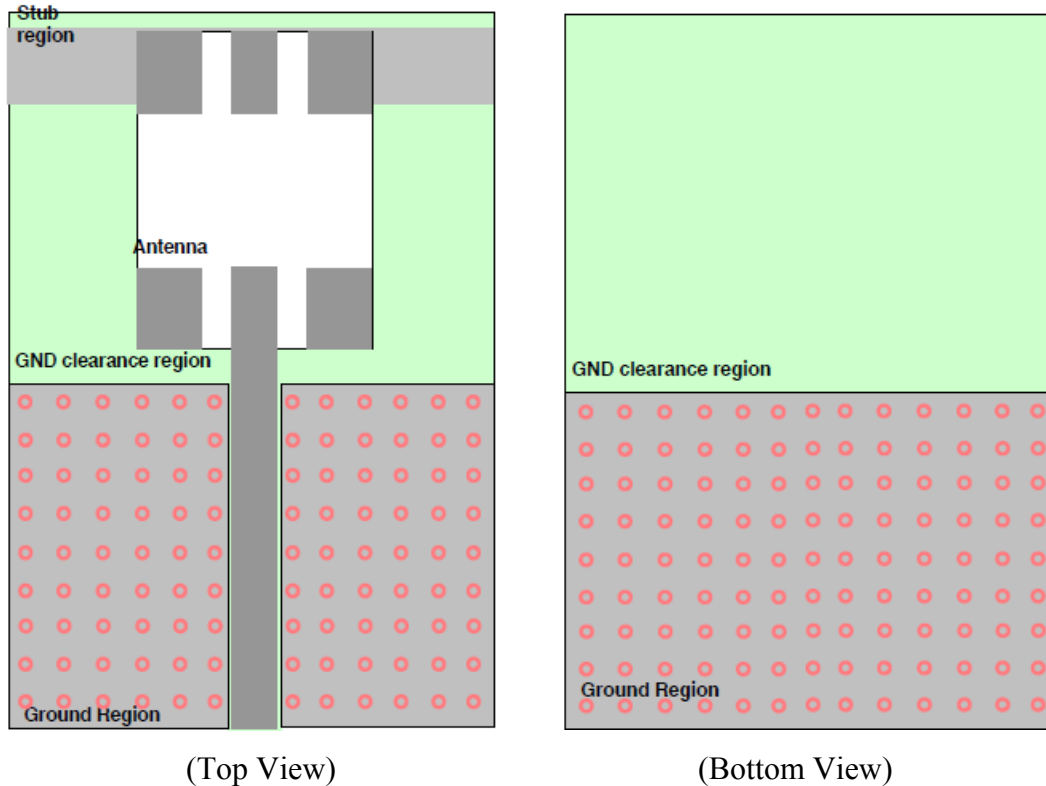
**Table (2.0) - 2D Electrical Characteristics ACA-107-T for UWB**

2D MEASUREMENTS								
Frequency Range [MHz]				3200 ~ 7200				
VSWR				(Typ 4:1) 5:1 Max				
Frequency [MHz]				3200	4200	5200	6200	7200
Gain	Azimuth	Theta	Peak	-0.88	2.73	2.51	4.16	1.31
			Average	-4.26	-1.22	-1.88	-1.10	-4.82
			Efficiency	37.50	75.50	64.86	77.62	32.96
		Phi	Peak	-3.84	-2.16	-1.91	-2.61	-5.20
			Average	-9.61	-8.20	-8.16	-9.96	-11.63
			Efficiency	10.96	15.13	15.27	10.09	6.87
	Elevation 1	Theta	Peak	-5.05	-2.32	-1.03	0.30	-0.68
			Average	-10.36	-8.84	-7.90	-6.99	-8.06
			Efficiency	9.20	13.06	16.21	19.99	15.63
		Phi	Peak	-2.99	1.98	1.81	2.92	0.20
			Average	-6.65	-3.30	-3.37	-3.04	-3.71
			Efficiency	21.62	46.77	46.02	49.65	42.55
	Elevation 2	Theta	Peak	-5.83	-3.38	-2.05	0.26	-3.56
			Average	-10.76	-9.16	-7.01	-5.74	-8.27
			Efficiency	8.39	12.13	19.90	26.66	14.89
		Phi	Peak	-0.52	2.32	1.52	1.39	1.12
			Average	-5.23	-3.30	3.30	-3.90	4.74
			Efficiency	29.99	46.77	43.05	40.73	33.57

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### 3.0 Application Test Circuit & PCB layout.

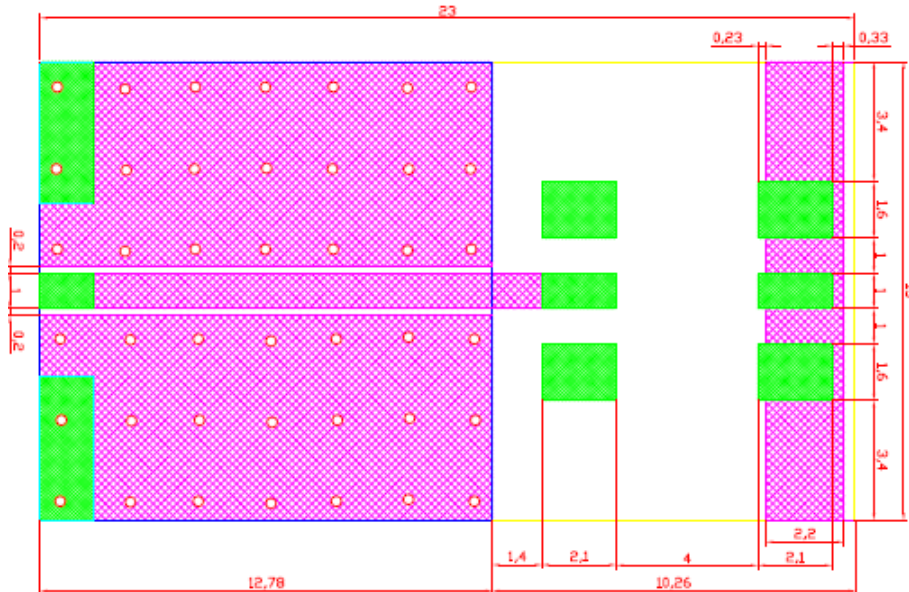
**Figure (1) - Default PCB Layout (Top & Bottom Views)**



The electrical performance of this antenna was gathered using a test board as shown in Figure (1). This has a “No-Ground area, dimensions (13 x 10.26mm) that is critical to using this type of antenna. The reference PCB is 23 x 13mm, with a “Ground area” of 12.78 x 13mm and a 12.78 x 1.0mm feed line to impedance match into the antenna. The pcb layout also has an extended metalized stub area 2.2mm wide extending across beyond the end of the antenna, the function of this is to provide matching for the wide bandwidth required for UWB.

#### 4.0 AutoCAD Drawing of Reference PCB Design

**Figure (2) - AutoCAD layout drawing ACA-107-T**

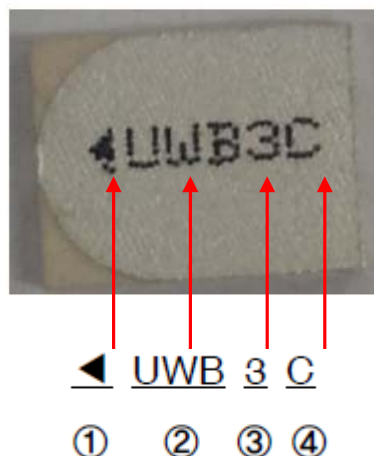


**Dimensions: mm / Board Thickness 1.0mm**

#### 4.1 Marking and Input Pin identification

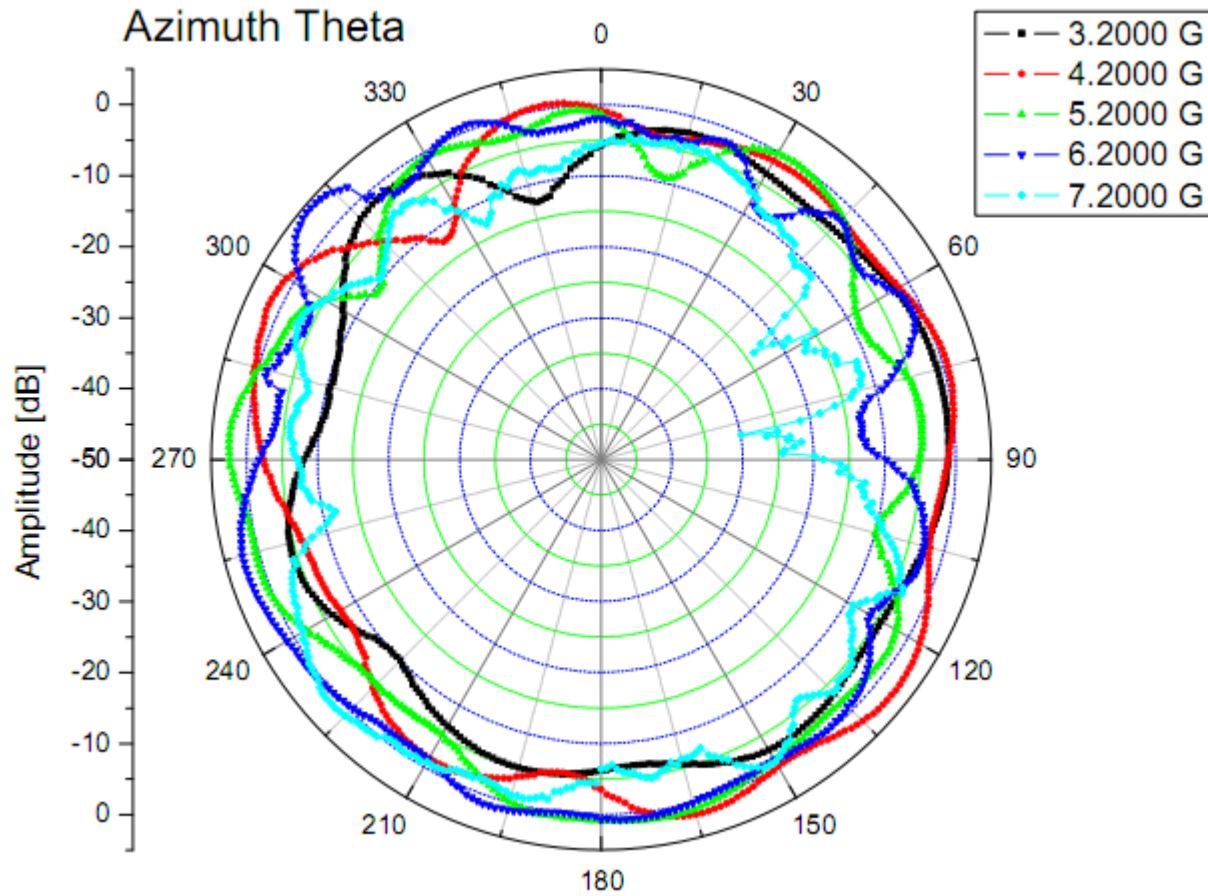
Figure (3) shows the marking of the ACA-107 and the arrow ◀ points to the input feed pad.

**Figure (3) - ACA-107-Top Marking**



## 5.0 2D Radiation Pattern

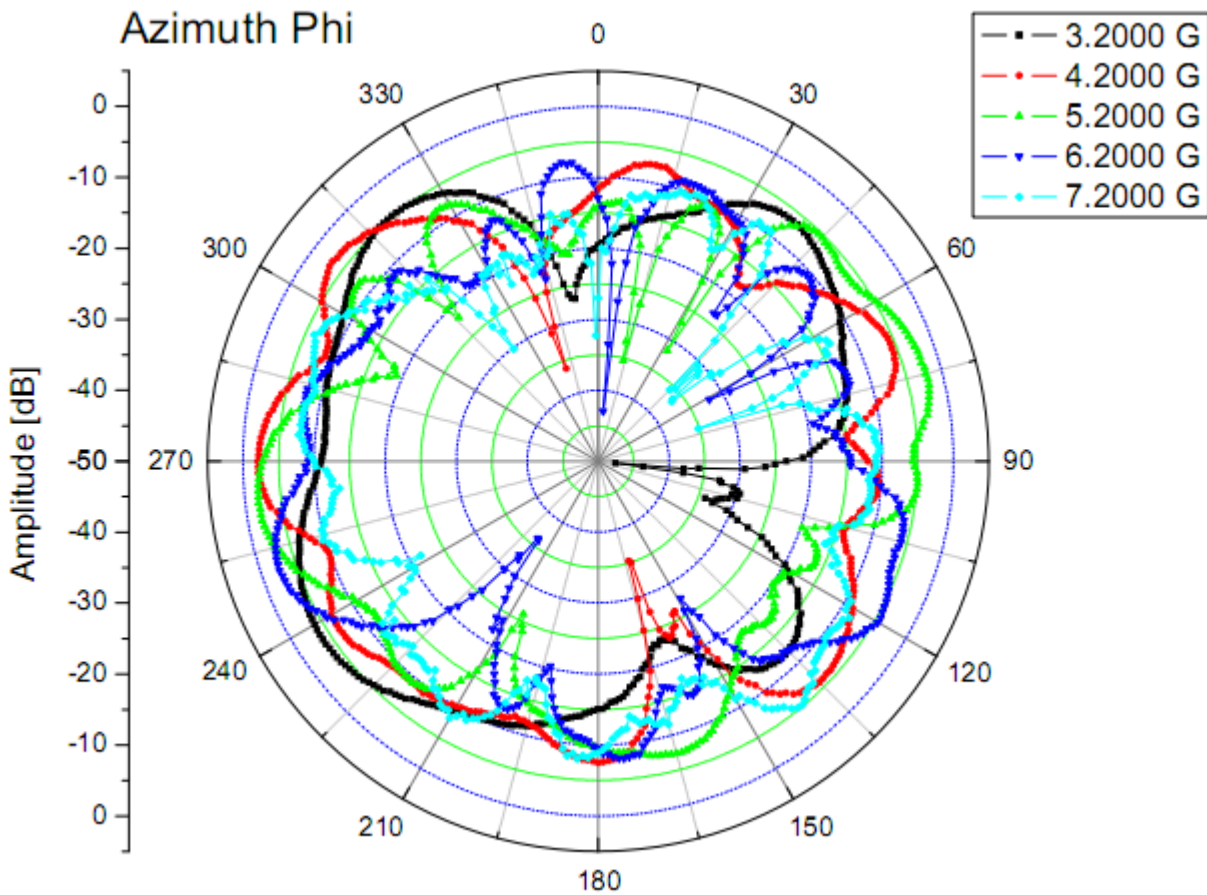
**Figure (4) - 2D Radiation Pattern - ACA-107-T Azimuth Theta**





### 5.1 2D Radiation Pattern

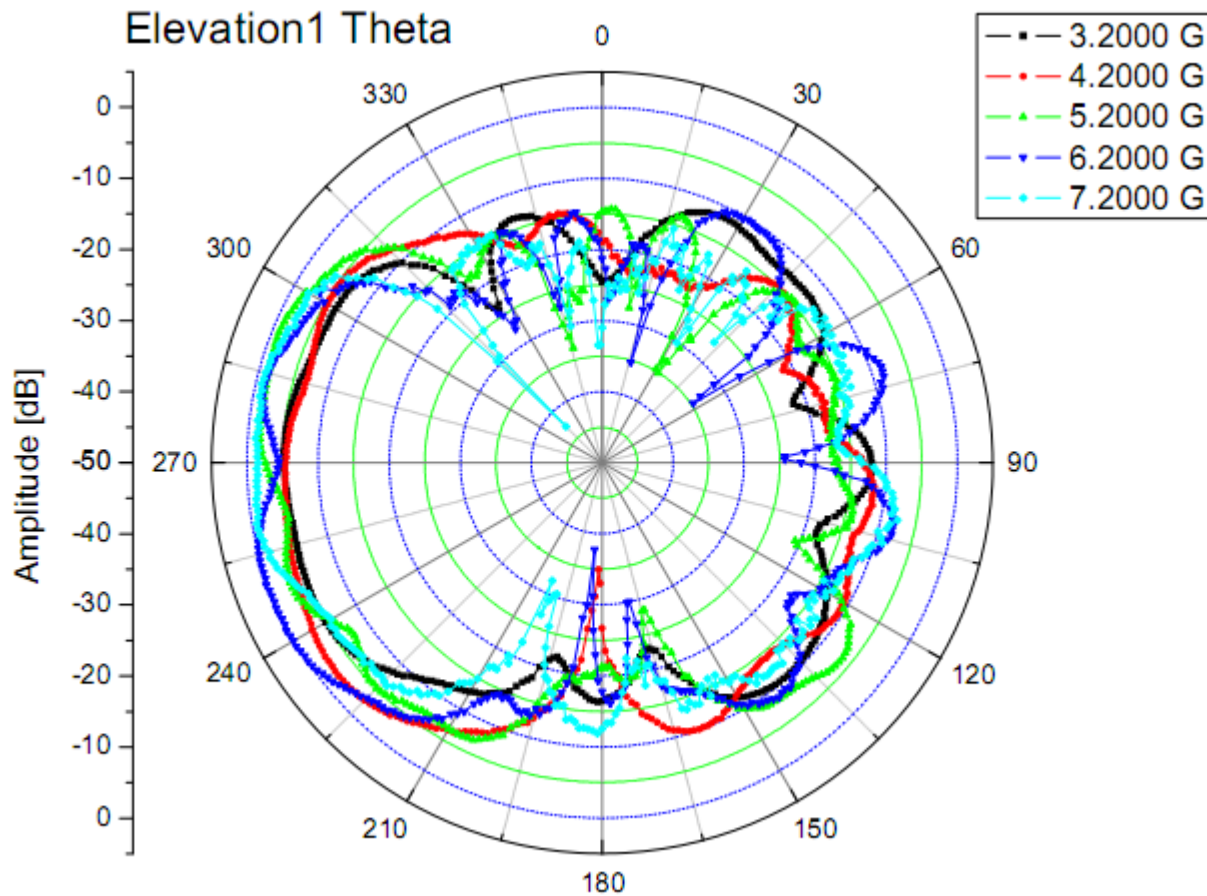
**Figure (5) - 2D Radiation Pattern - ACA-107-T Azimuth Phi**





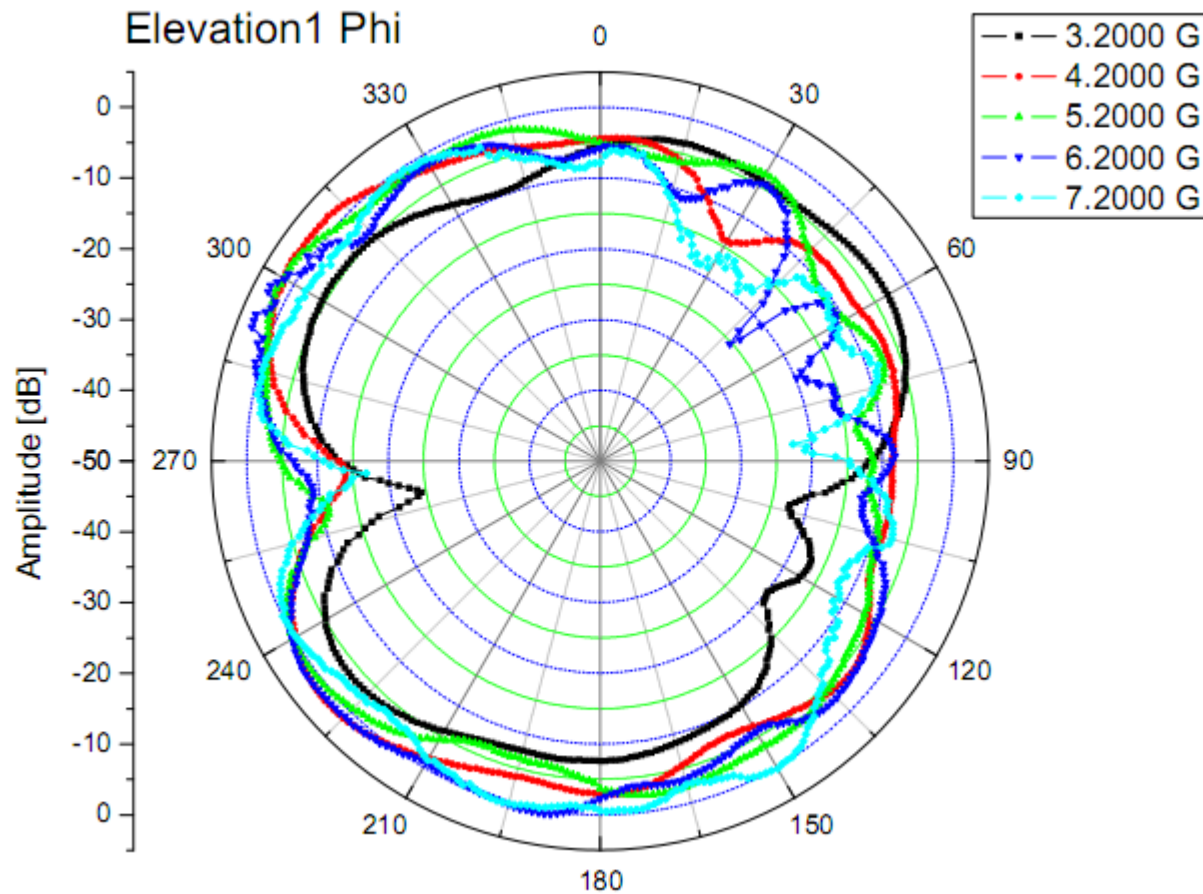
## 5.2 2D Radiation Pattern

**Figure (6) - 2D Radiation Pattern - ACA-107-T Elevation 1 Theta**



### 5.3 2D Radiation Pattern

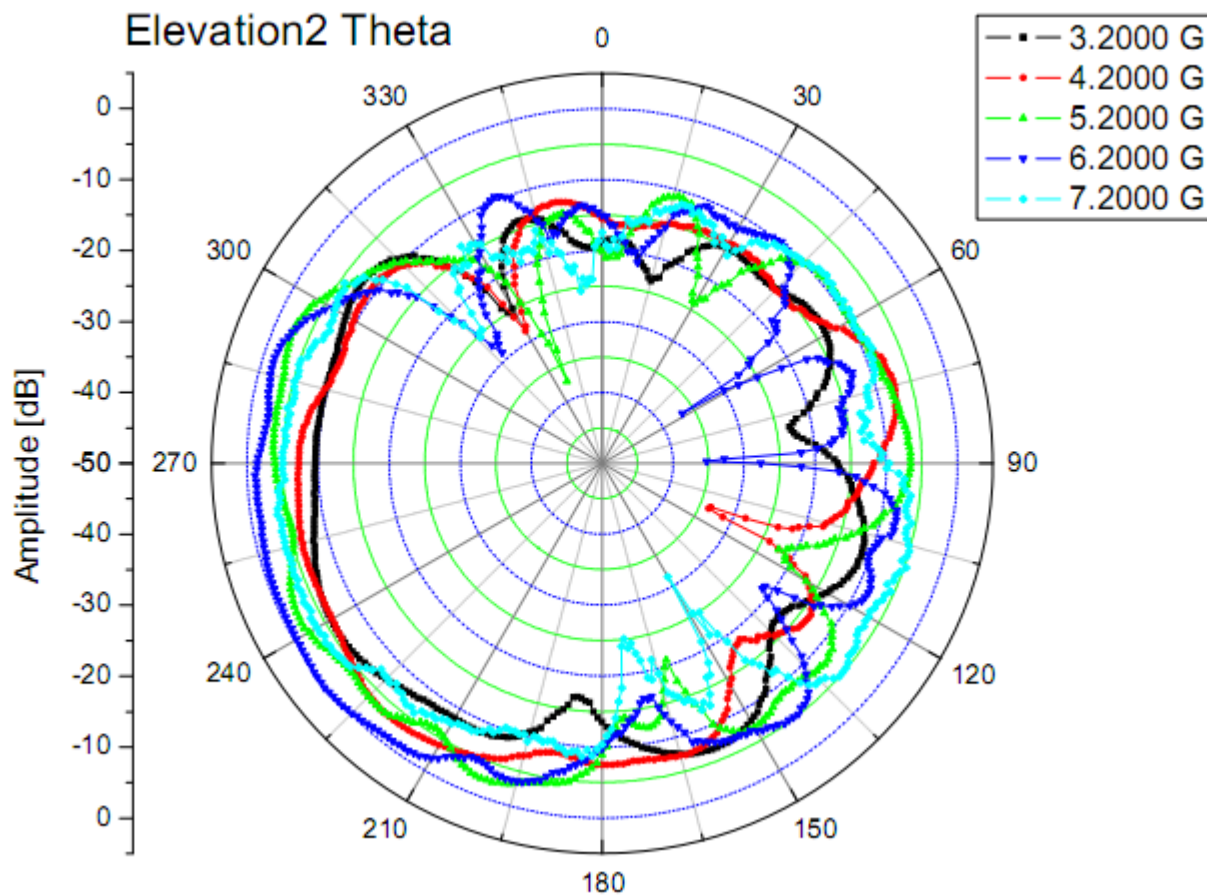
**Figure (7) - 2D Radiation Pattern - ACA-107-T Elevation 1 Phi**





### 5.4 2D Radiation Pattern

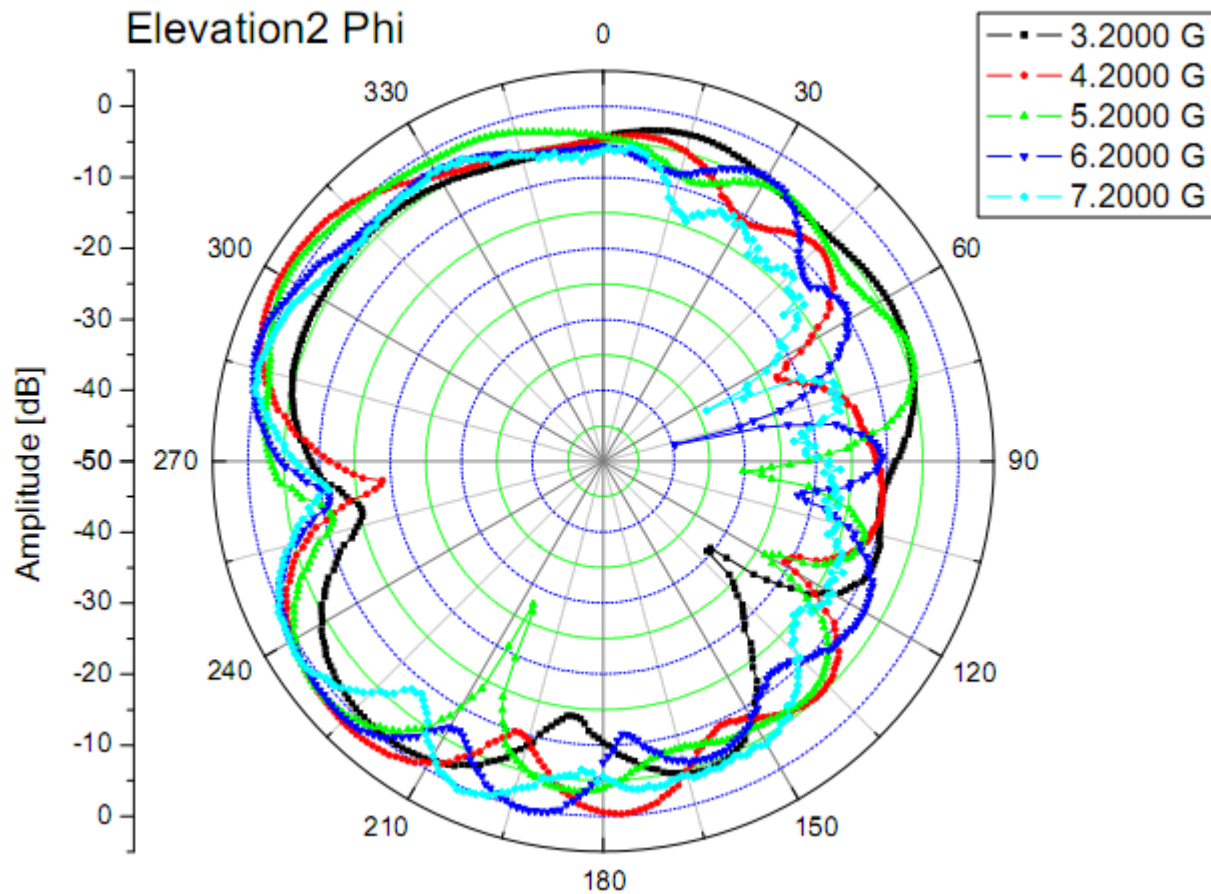
**Figure (8) - 2D Radiation Pattern - ACA-107-T Elevation 2 Theta**



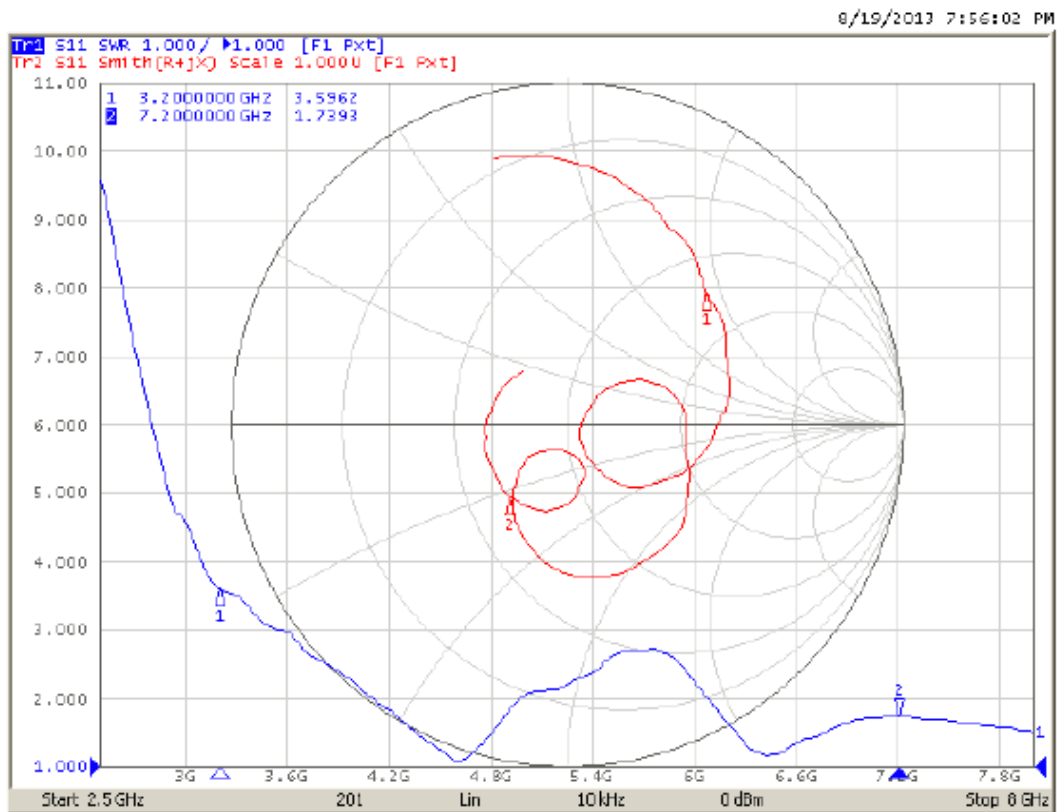


### 5.5 2D Radiation Pattern




**Figure (9) - 2D Radiation Pattern - ACA-107-T Elevation 2 Phi**



## 6.0 Antenna Response - VSWR / Smith Chart

**Figure (10) – SWR and Smith Chart Plots for ACA-107-T**




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## 7.0 Notes

- i) The parts are manufactured in accordance with this specification. If other conditions and specifications which are required for this specification, please contact ABRACON for more information.
- ii) ABRACON will supply the parts in accordance with this specification unless we receive a written request to modify prior to an order placement.
- iii) In no case shall ABRACON be liable for any product failure from in appropriate handling or operation of the item beyond the scope of this specification.
- iv) When changing your production process, please notify ABRACON immediately.
- v) ABRACON's products are COTS – Commercial-Off-The-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. ABRACON's products are not specifically designed for Military, Aviation, Aerospace, Life-dependant Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from ABRACON is required. Please contact ABRACON for more information.
- vi) All specifications and Marking will be subject to change without notice.

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