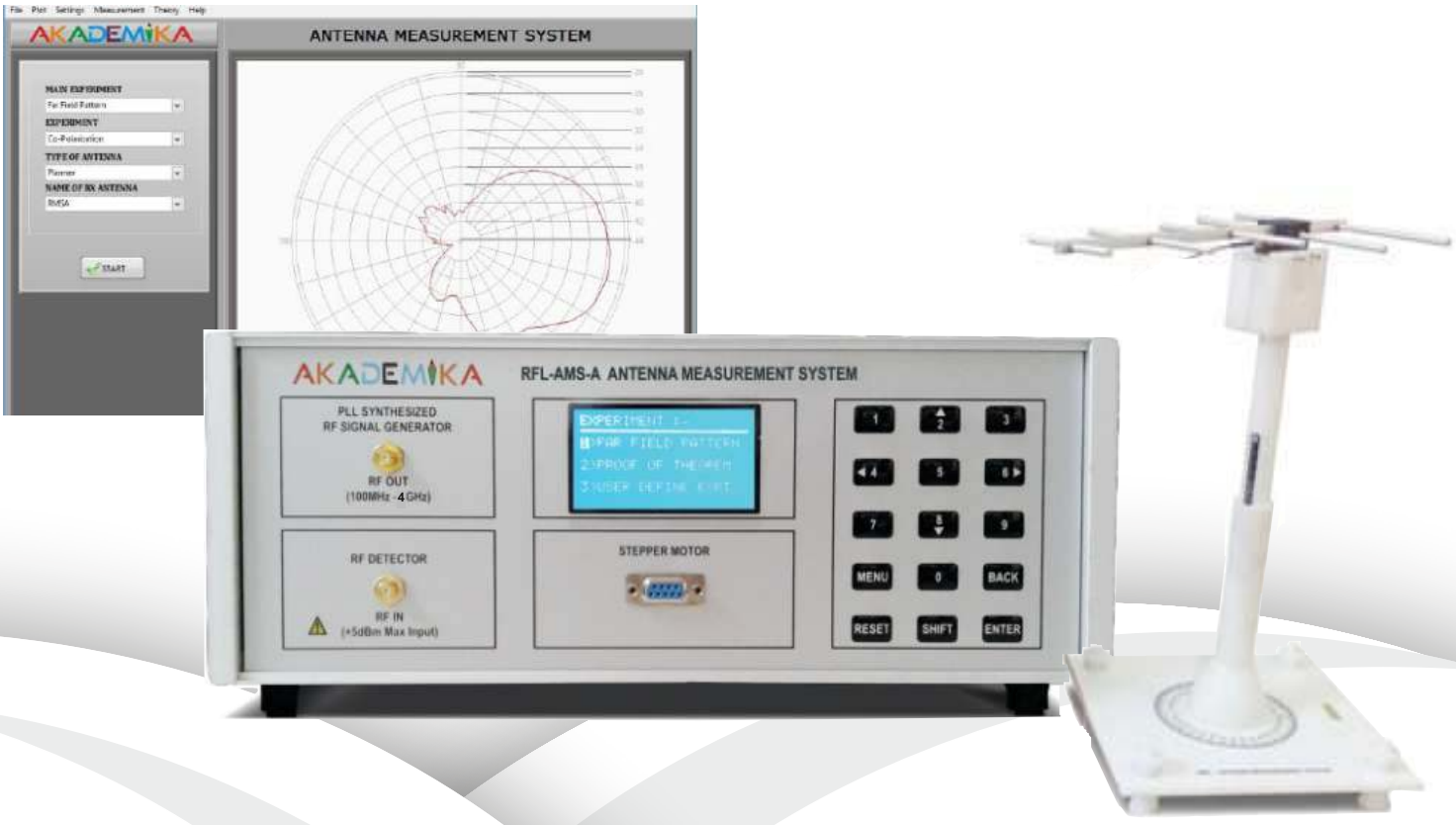
RFL-AMS-A

ADVANCED MOTORIZED ANTENNA TRAINER

- Single training system to teach all types of antenna measurement
- Covers UHF, L, S and ISM Bands
- Software controlled PLL Synthesized Source and Detector working up to 4GHz with high dynamic range of power transmission
- Graphical LCD Display with numeric keypad to monitor and navigate the experiments.
- Facility for testing user defined antenna.
- Customized selection of antenna from the list as per syllabus requirement
- Practical approach for Microstrip Antenna designs
- Non conductive and non magnetic Transmitter and Receiver stand
- Radiation pattern plotting software
- Stepper motor controlled receiver stand



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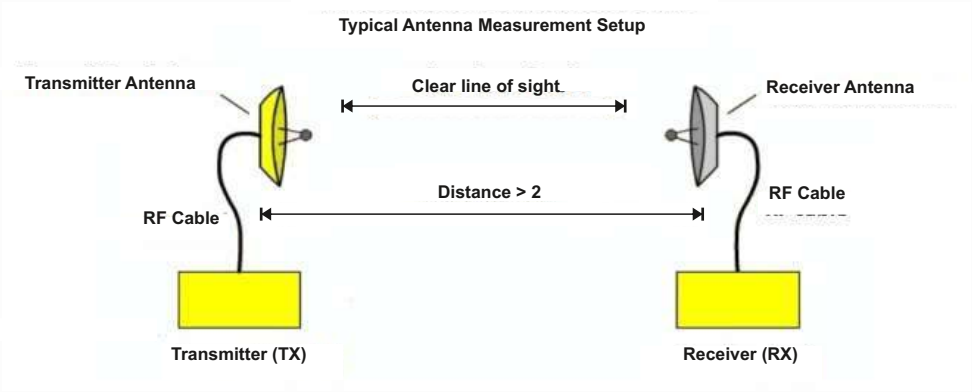
ADVANCED MOTORIZED ANTENNA TRAINER

AKADEMIKA'S Antenna Measurement System has been designed to Teach, Measure and Test various parameters of Antennas covering from UHF to ISM Band.. This system consists of a wide band PLL based source and detector module working up to 4GHz, a very study non magnetic Transmitter and Receiver stand, Universal Antenna Mount with plug and fit assembly and radiation pattern plotting software. Akademika provides options of more than 40 Antenna for the users to selects as per their syllabus requirement. These Antennas are classified as planar (Microstrip), Wired, Aperture, Reflector and Array.

Antenna Test Setup

Antenna measurement techniques refer to the testing of antennas to ensure that the antenna meets specifications or simply to characterize it. Typical parameters of antennas are gain, radiation pattern, beamwidth, polarization, and impedance.



Antenna Measurement Setup

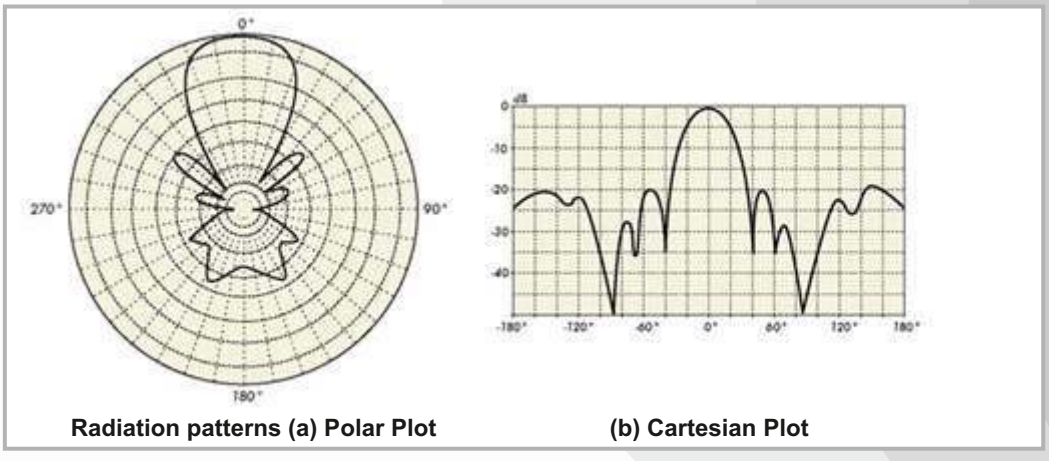
An individual antenna has the same electrical qualities whether it is transmitting or receiving. This principle is known as reciprocity and refers to impedance, bandwidth, gain, radiation pattern, resonant frequency and polarization. For reciprocity to apply, materials that comprise the antenna and transmission line must be linear as well as reciprocal.

Radiation Pattern

The radiation pattern is a graphical depiction of the relative field strength transmitted from or received by the antenna, and shows sidelobes and backlobes. As antennas radiate in in space often several curves are necessary to describe the antenna. If the radiation of the antenna is symmetrical about an axis (as is the case in dipole, helical and som parabolic antennas) a unique graph is sufficient.

Each antenna supplier/user has different standards as well as plotting formats. Each format has its own advantages and disadvantages. Radiation pattern of an antenna can be defined as the locus of all points where the emitted power per unit surface is the same. The radiated power per unit surface is proportional to the squared electrical field of the electromagnetic wave. The radiation pattern is the locus of points with the same electrical field. In this representation, the reference is usually the best angle of emission. It is also possible to depict the directive gain of the antenna as a function of the direction. Often the gain is given in decibels

The graphs can be drawn using cartesian (rectangular) coordinates pr a polar plot. This last one is useful to measure the beamwidth, which is, by convention , the angle at the -3dB points around the max gain. The shape of curves can be very different in cartesian or polar coordinates and with the choice of the limits of the logarithmic scale. The two drawings below are the radiation patterns of a same horn antenna.



Radiation patterns (a) Polar Plot **(b) Cartesian Plot**

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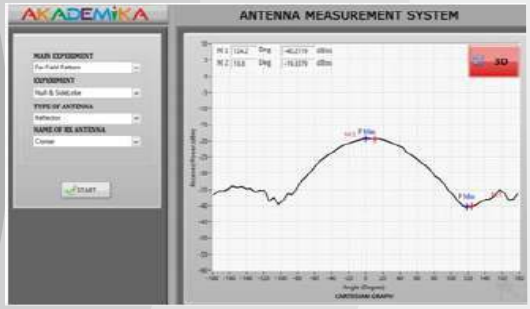
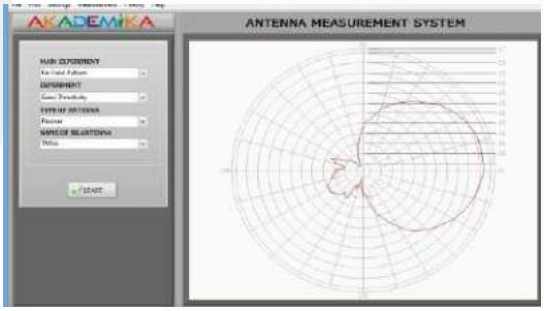
GRAPHS IN AMS-A

1.Cartesian Radiation pattern Plot



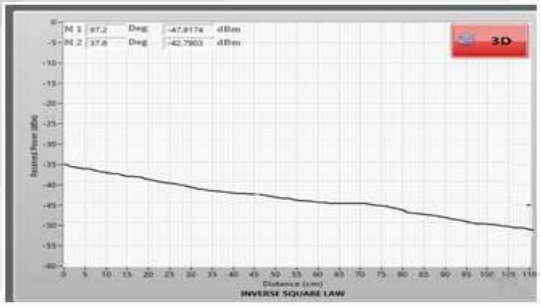
Linear representation of radiation pattern of microstrip patch antenna displaying power v/s angle

2.Radiation Pattern Polar Plot



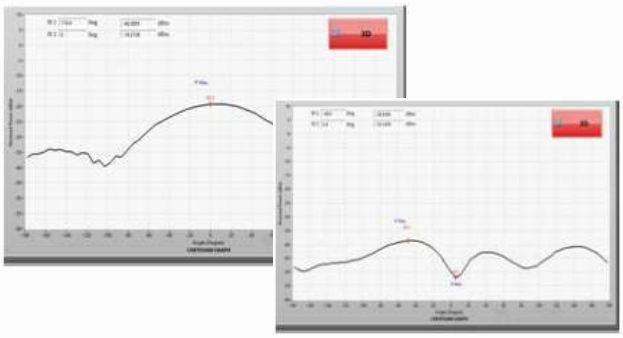
Graph show Radiation patter of triangular patch antenna. It shows maximum power received at o^0 angle

3.Inverse Square Law Plot



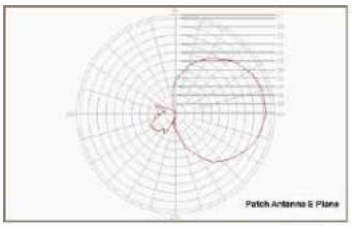
Graphs show Inverse square law graph of antenna and Its shows power is inversely proportional to distance

4.Co and Cross Polarization



Graphs show maximum received power in co-polarization at 0 degree and minimum receive power in cross polarization at 0 degree

5.Simulated V/S Measured Patch Antenna E-Plane Radiation Pattern

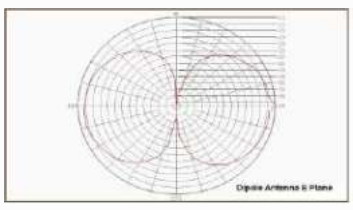


Measured

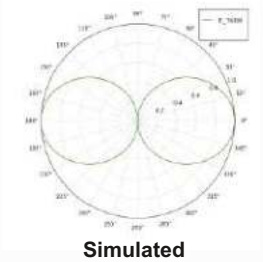
Simulated

Graphs show the Measured and Simulated Radiation pattern of Microstrip Patch antenna. The good agreement between simulated and measured radiation pattern except some slightly variation.

6.Simulated V/S Measured Dipole Antenna E-Plane Radiation Pattern



Measured



Simulated

Graphs show the Measured and Simulated Radiation pattern of Dipole antenna. The good agreement between simulated and measured radiation pattern except some slightly variation.

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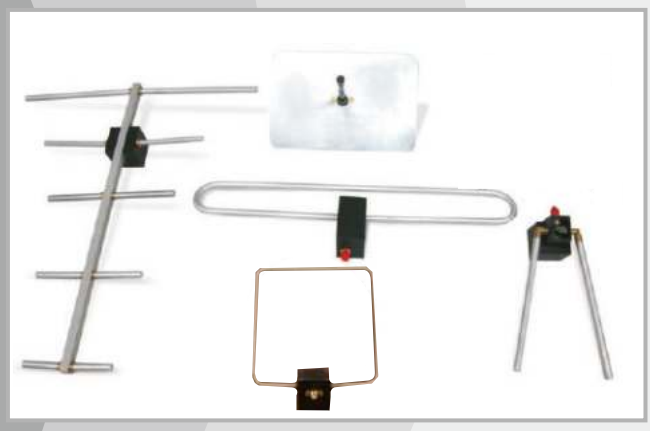
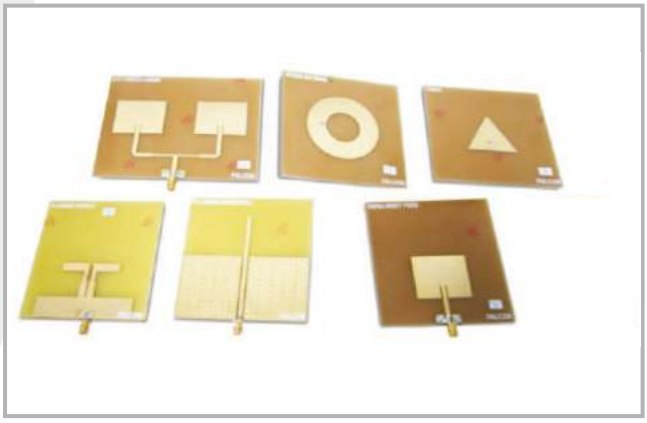


Wire Antenna

Wire antennas are also known as linear or curved antennas. These antennas are very simple, cheap and are used in a wide range of UHF and VHF rangeapplications



Planer Antenna

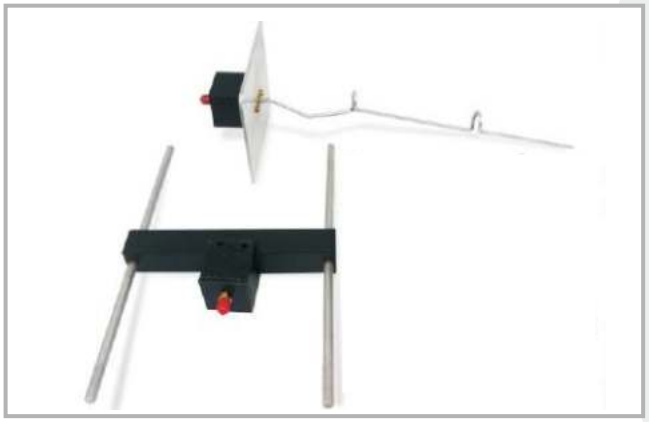
Planar antennas include microstrip antennas and printed circuit board antennas. The antenna “patches” may be square, triangular or circular. They can be very small, making them ideal for wireless applications.

Aperture Antenna

Aperture antennas are the main type of directional antennas used at microwave frequencies and above. We provide E plane horn antenna and rectangular Wave guide antennas.

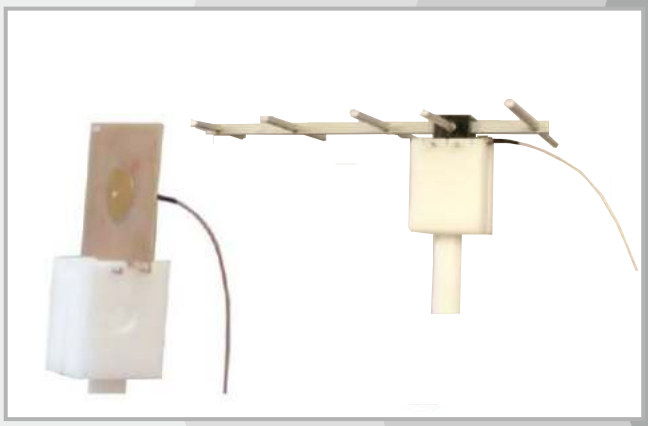
Reflector Antenna

The antenna that comprises one or more dipole elements placed in front of a corner reflector, is known as corner-reflector antenna.The directivity of any antenna can be increased by using reflectors.



Array Antenna

The array antenna is to provide directivity and gain by using two or more antenna elements in such a way that their fields combine and interact to focus the signal in one direction, or a limited number of directions.



Universal Antenna Mount

Universal plug and fix Antenna mounts are provided to hold the antenna assembly in vertical and horizontal orientation for co and cross polarization

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DELIVERABLES

Sr. No.	Discription	Quantity
1	Antenna Measurement System Module	1
2	SMA to SMA Male Adapter	1
3	Antenna Mounting Assembly	
	a. Height Adjuster Legs	8
	b. Base Plate for Transmitter	1
	c. Base Plate for Receiver with Stepper Motor & Conical Mount	1
	d. Conical Mount for Transmitter	1
	e. Hollow Rod	2
	f. Solid Rod With Scale	2
	g. Big Nut for Solid rod of Transmitter	1
	h. Universal Mount with Screws	1
	I. Screw Driver	1
	j. Allen Key	1
4	Standard 22 Antennas	1 Set
5	Power Cord	1
6	USB A Male To USB B Male Cable	1
7	SMA Male to SMA Male 2m Cable	1
8	SMA Male to SMA Male 1m Cable	1
9	9 pin D type Male to Female Cable	1
10	Experimental Manual	1
11	Software CD	1

TUTORIALS

- Measure the variation of field strength /inverse square law
- Prove the reciprocity theorem of antenna
- Plot Radiation pattern of all WIRED Antenna
- Plot Radiation pattern of all Aperture Antenna.
- Plot Radiation pattern of all Reflector Antenna.
- Plot Radiation pattern of all Array Antenna
- Plot Radiation pattern of all Planar (Microstrip) Antenna
- Measure co-polarization ,cross polarization
- Measurement circularly polarized antennas
- Measurement of Front to back(F/B) ratio of yagi-uda antenna
- Measurement of 3 dB beamwidth of horn antenna
- Side lobe level measurement
- Comparative study of different antenna type and its radiation pattern

Experiments Using Vector Network Analyser (VNA)

- Return Loss and VSWR measurement of antennas with broadband freq range.
- Bandwidth analysis of different antennas
- Comparative study of different antenna parameters like impedance, bandwidth and VSWR.
- Finding operating frequency of an antennas
- Phase measurement of antennas

Experiments Using Spectrum analyser

- Gain measurement of antennas
- Measured the variation of received power vs distance

TECHNICAL SPECIFICATION

Antenna Measurement System

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Advanced Motorized Antenna Traier

RF Source	
Source Types	PLL Synthesized with Integrated VCO
Frequency Range	100MHz to 4GHz
Transmitted Power Min	-50dBm
Transmitted Power Max	+5dBm
Impedance	50 Ω SMA Connecter
RF Detector	
Detector Type	Logarithmic Detector
Frequency Range	100MHz to 8GHz
Resolution	0.1dB
Dynamic Range	65dB (±3dB)
Noise Level	-90dbm
Impedance	50 Ω SMA Connecter
Representation of RF Level	dBm
Display	128x64 Graphic LCD Display with backlit
Keypad	15 Key Membrane Keypad for user entry
Stepper Motor Controller	1.8^0 and 5.4^0 Resolution

Antenna List

Note : Optional Antenna. Need to be order sperately *

WIRE ANTENNA		PLANER ANTENNA		APERTURE ANTENNA	
Monopole - Wire	: 705MHz	Dipole - Planer	: 2402 MHz	E-Horn	: 2400 MHz
Dipole - Wire	: 700MHz	Monopole - Planer	: 1598 MHz	Open Ended Waveguide Rectangular	: 2450 MHz
Yagi	: 716MHz	CMSA	: 2405 MHz		
Folded Dipole	: 700MHz	TMSA	: 2437 MHz	* H-Horn	: 2400 MHZ
Vee Dipole	: 715MHz	2X1 ARRAY	: 2400 MHz	* Dipole - SLOT	: 2400 MHz
Rectangular Loop	: 702MHz	Annular Ring	: 2445 MHz	**REFLECTOR ANTENNA**	
Helical	:1555 MHz	Chip Antenna	: 2420 MHz	Corner Reflector	: 1580 MHZ
* Cross Dipole	: 710MHz	RMSA	: 2438 MHz	Parabolic	: 2440 MHz
* Monopole with loading	: 700MHz	RMSA –Circular Polarized	: 2450 MHz	* DIPOLE - Plane Reflector	: 1580 MHz
* Logperodic	: 750MHz	* RMSA- Stub Loaded	: 2436 MHz		
* Circular Loop	: 705MHz	* Insert Feed	: 2440 MHz	**ARRAY ANTENNA**	
* 3/2 linear Dipole	: 700MHz	* RMSA- Shorting Plate	: 2430 MHz	Broadside	: 1580 MHz
* Monopole - Wire Base Ground	: 706MHz	* Yagi-Uda	: 2420 MHz	Collinear	: 1000 MHz
		* RMSA - Shorting pin	: 2438 MHz	* End Fire	: 1580 MHz

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