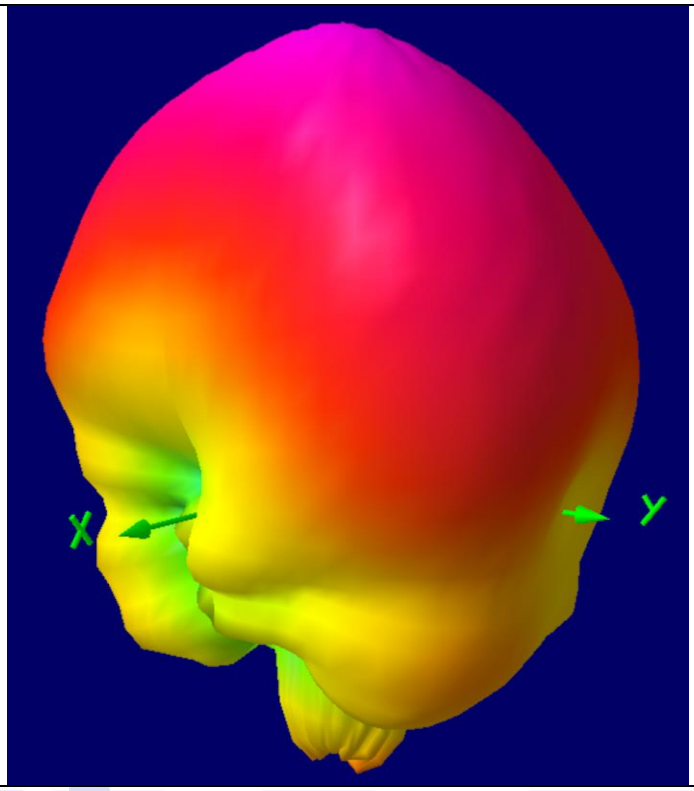
ANTENNA TRAINING LAB SAP10

ANTENNA COMMUNICATION TRAINING AND MEASUREMENT LAB

Features:

- **World's first 3D antenna measurement training system**
- **Only system complying to IEEE Standard 149-1979**
- **Antenna Gain Measurement**
- **EIRP and Total Radiated Power Measurement**
- **Vector Signal Generator and Vector Signal Analyzer**
- **Built-in Spectrum Analyzer with waterfall and Oscilloscope**
- **Test with LTE, Wi-Fi and other advanced waveforms**



Features:

- 30 MHz-20 GHz Antenna Communication Training & Measurement Lab with 30 antennas
- Fully Software controlled RF Transceiver with customizable frequency and power
- Software-controlled 3D positioner along 3D plotting and measurement software
- Transmit and receive any waveform, any modulation, any frequency, any protocol using any antenna
- Calibrated Signal Generator with precise power, frequency
- Calibrated Spectrum Analyser with precise power, frequency
- Directional Coupler & Coaxial Slotted line for Return loss, VSWR plotting
- -10dBm Transmit power & -100dBm Sensitivity Receiver
- All SMA connector antennas with RG316 cables
- Works seamlessly with Linux GNURadio, MATLAB, C++ and Python
- Open-licensing of experimentation and study material with No recurring cost!
- Latest generation of ASIC architecture with integrated LNA, PA, RX/TX Mixers, PLL, Synthesizers, RX/TX Filters, RX Gain control, TX power control
- Support for TDD and FDD configuration
- Highly stable +/- 250 ppb TCXO
- Modulation Bandwidth Programmable upto 30 MHz
- Supports both TDD &FDD Full Duplex upto 30MHz

Description:

ATS12 is the world's most advanced Antenna Communication Training and Measurement Lab. It is the world's first Complete 3D measurement training system providing True 3D pattern of an antenna. ATS12 complies with IEEE Std 149-1979, "Test Procedure for Antennas". The complete setup requires minimum space and can be used as a benchtop system.

The complete setup consists of:

- USB powered calibrated software-controlled Vector Signal Generator and a calibrated software-controlled Vector Signal Analyzer
- Software-controlled 3D positioner with very low RCS
- Linux based Data Visualization and Management Software
- More than 30 different antennas consisting of narrowband, broadband, directional, Omni-directional and different polarizations

Broadband calibrated reference antenna for gain measurement and broadband directional coupler for return loss measurement
The setup works as spectrum analyzer, vector signal source and vector signal analyzer. It Covers broadcast television, satellite TV communication. Future ready from simple FM to QPSK, QAM standard to whatever future may hold.

GIGABYTE NETWORKS PVT LTD

"GIGABYTE HOUSE"

6th floor, Surya Kiran-II, Sutlej Club Road, Ludhiana-141001, INDIA P: +91-161-2776677, 2776688,

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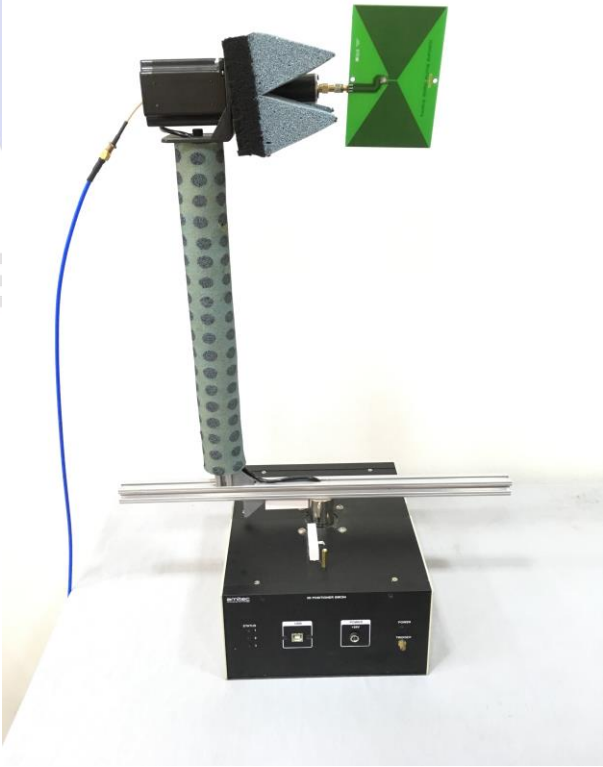
Hardware Technical Specifications:	
Transceiver Unit	
Transmitter Frequency Range	30 MHz to 20 GHz
Receiver Frequency Range	30 MHz to 20 GHz
Power	USB Powered
Bandwidth	100 kHz to 30 MHz
Frequency Resolution	< 30 Hz (Factory Calibrated)
Maximum Output Power	-10 dBm
Level Accuracy	< 3dB
Receiver Sensitivity	-100 dBm
Antenna Connectors	SMA
MIMO Capability	2X2, 2X1, 1X2, 1X1
Clock synchronization	External, GPS 1PPS
Wall-mounted Option	Should be supported
MTBF	Greater than 20 years
Ingress Protection level	IP40
Weight	Less than 500g
Frequency Band Upgradable	Upgradable to DC on lower Side and 60 GHz on upper side
Compatibility	Works with Linux GnuRadio, MATLAB, Simulink
Antenna configuration	SISO, MIMO
Mode	Full Duplex, TDD, FDD
Architecture	ASIC, FPGA, Zero IF
TX/RX SMA Impedance	50 Ohm
PLL Phase Noise	-125dBc/Hz at 1MHz
Spurious Output	-50dBc
PLL Settling time	<20us
RF Cable	RG316 SMA-SMA X 4
3D Positioner Specification	
Azimuth Start Angle	-360 to 360 degree
Azimuth Stop Angle	-360 to 360 degree
Azimuth Minimum Step Size	1 degree
Elevation Start Angle	-360 to 360 degree
Elevation Stop Angle	-360 to 360 degree
Elevation Minimum Step Size	1 degree
Power	12 V
Control	Software control
Connection to PC	Via USB cable
No of cycles of rotation	User Configurable
Return to Home	Yes
Loading Capacity	1 kg
Antennas	Included Below
Shipping List Deliverable	ATS12 Transceiver Unit, 3D Positioner, Antennas and Accessories



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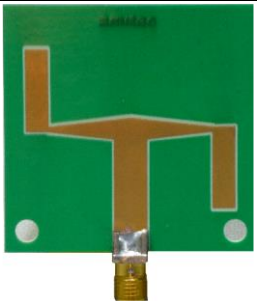
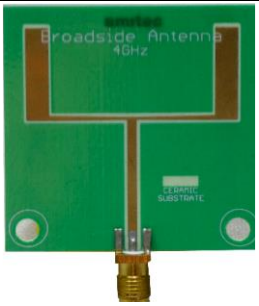
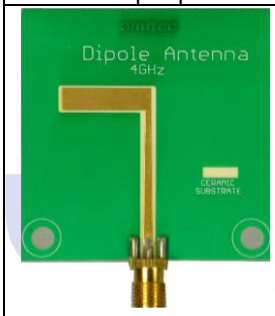
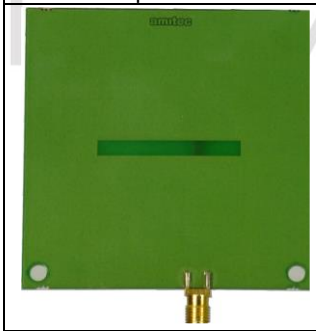
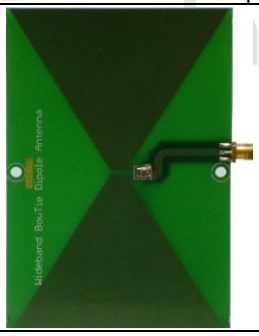
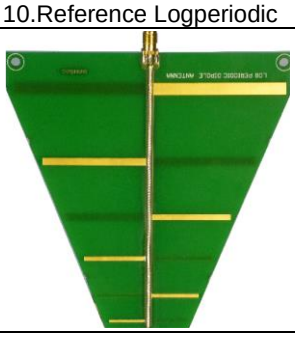
GIGABYTE NETWORKS

1. Microstrip Yagi		6. Endfire Phased array	
	Fc : 4 + 0.1 GHz S11 : 10 + 2dB Polarisation : Linear Gain : 3dBi Feed : Microstrip balun Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold		S11: >10dB Bandwidth: 4 + 0.1GHz Gain: 3dBi Beamwidth : E plane 60^0 Beamwidth : H Plane 120^0 Polarisation : Linear Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold
2. Folded Dipole		7. Broadside phased array	
	S11: >10dB Bandwidth: 4 + 0.2GHz Gain: 2dBi Beamwidth : E plane 70^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold		S11: >10dB Bandwidth: 4 + 0.1GHz Gain: 3dBi Beamwidth : E plane 60^0 Beamwidth : H Plane 120^0 Polarisation : Linear Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold
3. Microstrip Dipole		8. Coplanar waveguide CPW Bow tie slot Antenna	
	Fc : 4 + 0.1 GHz S11 : 10 + 2dB Polarisation : Linear X Pol discrimination : 20dB Gain : 2dBi Feed: Microstrip balun Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold		Fc : 4 + 0.1 GHz S11 : 10 + 2dB Polarisation : Linear Gain : 2dBi Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold
4. Microstrip Slot		9.Wideband Bow tie Dipole Antenna	
	Fc : 4 + 0.1 GHz S11: >10dB Gain: 2dBi Beamwidth : E plane 60^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold		Fc : 4 $\pm$ 2 GHz S11 : 10 + 2dB Polarisation : Linear Gain : 2dBi Impedance : 50 Ohms Connector : SMA Substrate: Glass Epoxy Masking: Selective Plating: Selective Gold
5. Loop		10.Reference Logperiodic	
	S11: >10dB Bandwidth: 4 + 0.1GHz Gain: 2dBi Beamwidth : E plane 70^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold		S11: >10dB Bandwidth: 1 to 6GHz Gain: 4dBi Beamwidth : E plane 60^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio: 10dB Connector : SMA

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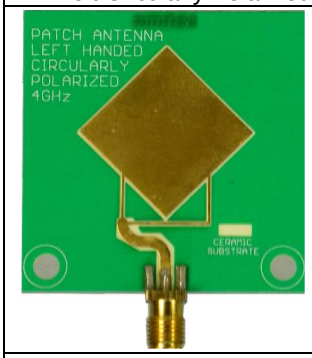
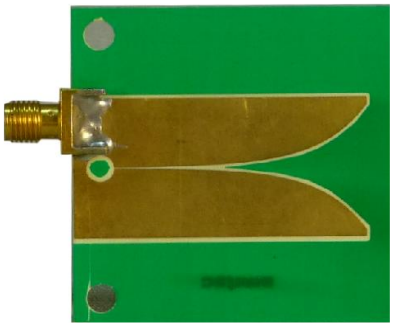
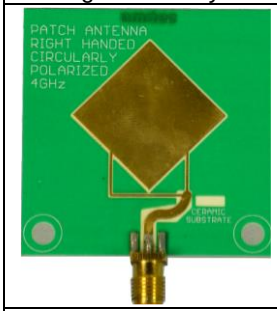
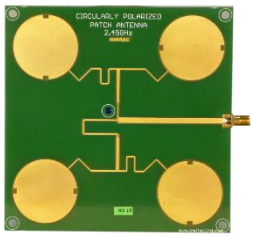
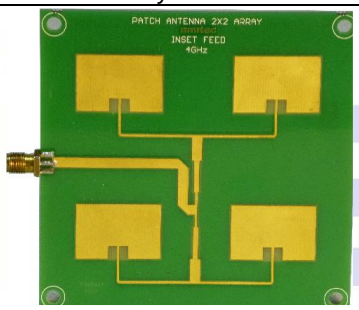
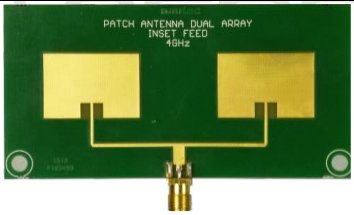
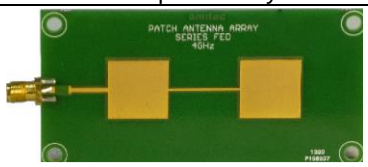
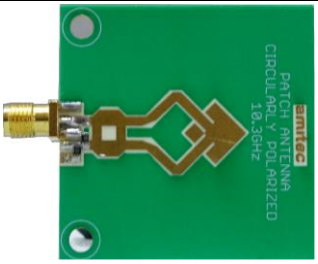
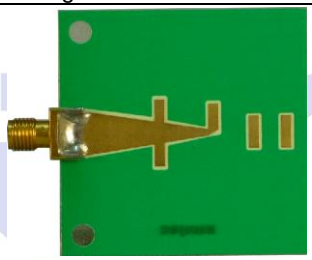
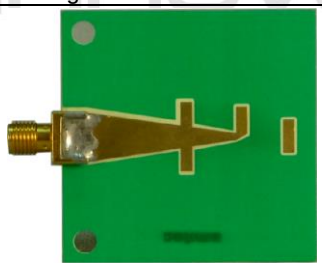
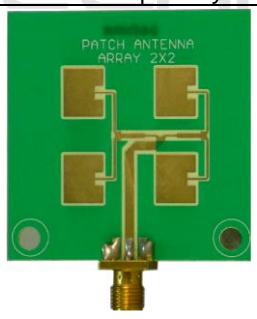
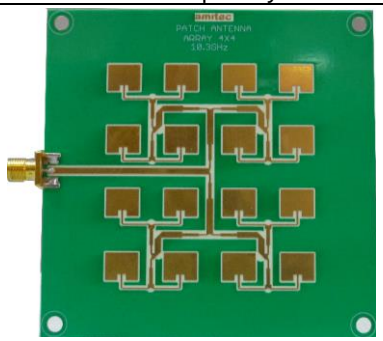
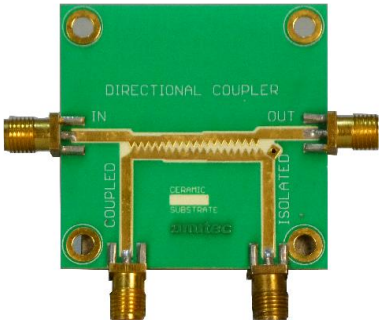
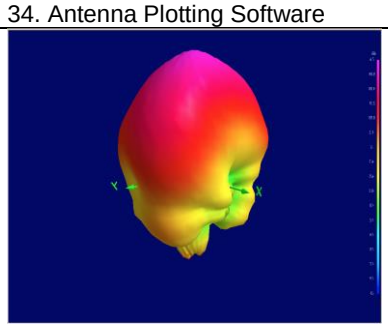
11. Left Circularly Polarized Patch		16. Vivaldi (Planar Horn: Aperture Antenna)	
	Fc : 4 + 0.1 GHz S11 : 10 + 2dB Polarisation : LHCP Gain : 3dBi Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold		S11 : >6dB Bandwidth : 3 ± 2 GHz Gain : 1dBi Beamwidth : E plane 80^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio : 0dB Connector : SMA
12. Right Circularly Polarized Patch		8. Microstrip Circular Patch Array 2 X 2	
	Fc : 4 + 0.1 GHz S11 : 10 + 2dB Polarisation : RHCP Gain : 3dBi Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold		Fc :2.4 + 0.1 GHz S11 : 10 + 2dB Polarisation : Circular Gain : 7dBi Impedance : 50 Ohms Connector : SMA
21. Spiral Slot		18. Patch Array 2X2	
	Fc : 4 + 1 GHz S11 : 10 + 2dB Polarisation : Linear Gain : 2dBi Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold		Fc : 2.4 + 0.1 GHz S11 : 10 + 2dB Polarisation : Linear Gain : 8dBi Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold
22. Log Spiral		19. Dual Rectangular Patch	
	Fc : 4 + 1 GHz S11: >10dB Gain: 2dBi Beamwidth : E plane 80^0 Beamwidth : H Plane 120^0 Polarisation : Circular Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold		Fc : 4 + 0.1 GHz S11 : 10 + 2dB Polarisation : Linear Gain : 5dBi Impedance : 50 Ohms Connector : SMA Masking: Selective Plating: Gold
15. Monopole		20. Series fed patch array	
	S11: >10dB Bandwidth: 4 + 0.2GHz Gain: 1dBi Beamwidth : E plane 70^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio: 0dB Connector : SMA Masking: Selective Plating: Gold		S11 : >6dB Bandwidth : 4 ± 0.3GHz Gain : 4dBi Beamwidth : E plane 40^0 Beamwidth : H Plane 40^0 Polarisation : Linear Front to Back Ratio : >8dB Connector : SMA

21. Leaky wave antenna		26. Patch Microstrip circularly polarized	
	S11 : >6dB Bandwidth : 4 + 0.3GHz Gain : 2dBi Beamwidth : E plane 40^0 Beamwidth : H Plane 40^0 Polarisation : Linear Front to Back Ratio : >8dB Connector : SMA		S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 4dB Beamwidth : E plane 120^0 Beamwidth : H Plane 120^0 Polarisation : Circular Front to Back Ratio : >10dB Substrate : Ceramic based Connector : SMA
22. Dipole		27. Patch Microstrip	
	S11 : >6dB Bandwidth : 10.3 + 0.5GHz Gain : 1dB Beamwidth : E plane 800 Beamwidth : H Plane 1800 Polarisation : Linear Front to Back Ratio : 0dB Substrate : Ceramic based Connector : SMA		S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 6dB Beamwidth : E plane 1800 Beamwidth : H Plane 800 Polarisation : Linear Front to Back Ratio : >10dB Substrate : Ceramic based Connector : SMA
23. Yagi 4 element		28. Patch Microstrip Array 2x1	
	S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 6dB Beamwidth : E plane 60^0 Beamwidth : H Plane 80^0 Polarisation : Linear Front to Back Ratio : >10dB Substrate : Ceramic based Connector : SMA		S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 6dB Beamwidth : E plane 50^0 Beamwidth : H Plane 80^0 Polarisation : Linear Front to Back Ratio : >10dB Substrate : Ceramic based Connector : SMA
24. Yagi 3 element		29. Patch Microstrip Array 2x2	
	S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 5dB Beamwidth : E plane 80^0 Beamwidth : H Plane 100^0 Polarisation : Linear Front to Back Ratio : >10dB Substrate : Ceramic Connector : SMA		S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 10dB Beamwidth : E plane 50^0 Beamwidth : H Plane 40^0 Polarisation : Linear Front to Back Ratio : >10dB Substrate : Ceramic based Connector : SMA
25. Monopole		30. Patch Microstrip Array 4x4	
	S11 : >6dB Bandwidth : 10.3 + 0.5GHz Gain : 1dB Beamwidth : E plane 80^0 Beamwidth : H Plane 180^0 Polarisation : Linear Front to Back Ratio : 0dB Substrate : Ceramic based Connector : SMA		S11 : >10dB Bandwidth : 10.3 + 0.1GHz Gain : 11dB Beamwidth : E plane 25^0 Beamwidth : H Plane 20^0 Polarisation : Linear Front to Back Ratio : >10dB Substrate : Ceramic based Connector : SMA

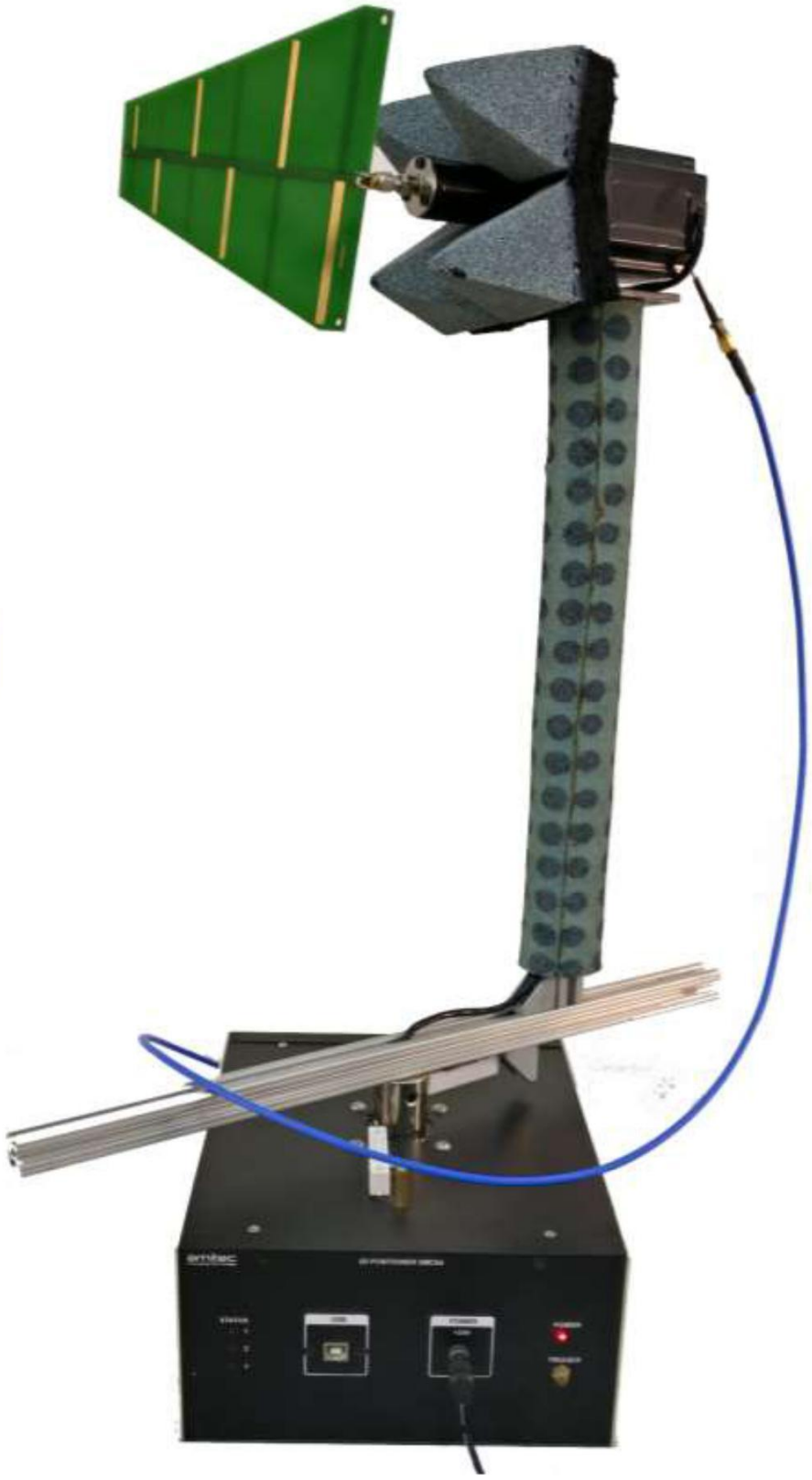
31. Directional Coupler		33. Coaxial Slotted Line & OSL	
	Bandwidth: 1 - 6 GHz Insertion S12 : 1.5 + 0.5 dB Coupling S13 : 20 + 2dB Isolation S14: 20 + 2dB Directivity S23: 15 + 3dB Impedance : 50 Ohms Connector : SMA Usage: Antenna forward & reverse power & VSWR measurements.		S11: >15dB, S12: <1.5dB Resolution: 0.05mm/ 0.15degree at 1.5GHz Coupling factor:-20dB Connector : SMA Residual VSWR : <1.2 Velocity propagation : 1.818X108m/s Wavelength/3600 phase : 121mm at 1.5GHz Total Length : 200mm 50Ohms, Short & Open
32. H & E probe		34. Antenna Plotting Software	
	H probe Type: Loop Rejection E/H: 40dB Frequency: upto 800MHz Sensitivity: High Diameter: 6cm E probe Type: Narrow Rejection H/E: 30dB Frequency: upto 3GHz Sensitivity: Low Size: 0.6cm		USB interface with 3D plotting software along with cartesian and polar plots, 3dB/10dB beam-width, Gain, Front to back, Side lobe level and position, Plot rotate, File- edit, save, get.

Scope of Experimentation

- Establishing a complete RF link with point-to-point connectivity
- RF Link budgeting and calculations
- 3D Antenna Radiation Pattern measurement with Data Visualization and Management Software
- Measurement of Antenna Gain parameter and other characteristics
- Experimentation with more than 20 different types of antennas
- Experiments covering practical impairments such as Doppler shift
- Simultaneous visualization in time and frequency domain of received signal for practical approach
- Custom waveform transmission with 28 MHz of instantaneous bandwidth for advanced experimentation and research such as LTE
- Completely configurable frequency range from 30 MHz to 20 GHz can be used for RF path loss and other practical measurements
- VSWR and Return Loss measurement of antennas with broadband directional coupler
- Vertical, Horizontal and Circularly polarized antenna
- Polarization discrimination of Linear and Circular antennas
- Resonant and non-resonant antenna
- Reciprocity of antenna
- Current distribution of an antennas and comparative study of antennas
- EM simulation results of all the antennas included for practical verification
- Practical Verification of antennas working in Quad-band GSM, 20 bands of 3G, 40 bands of LTE, GPS, GNSS, Wi-Fi, CDMA and applications such as IoT
- Can be upgraded and daisy-chained for MIMO antenna measurement

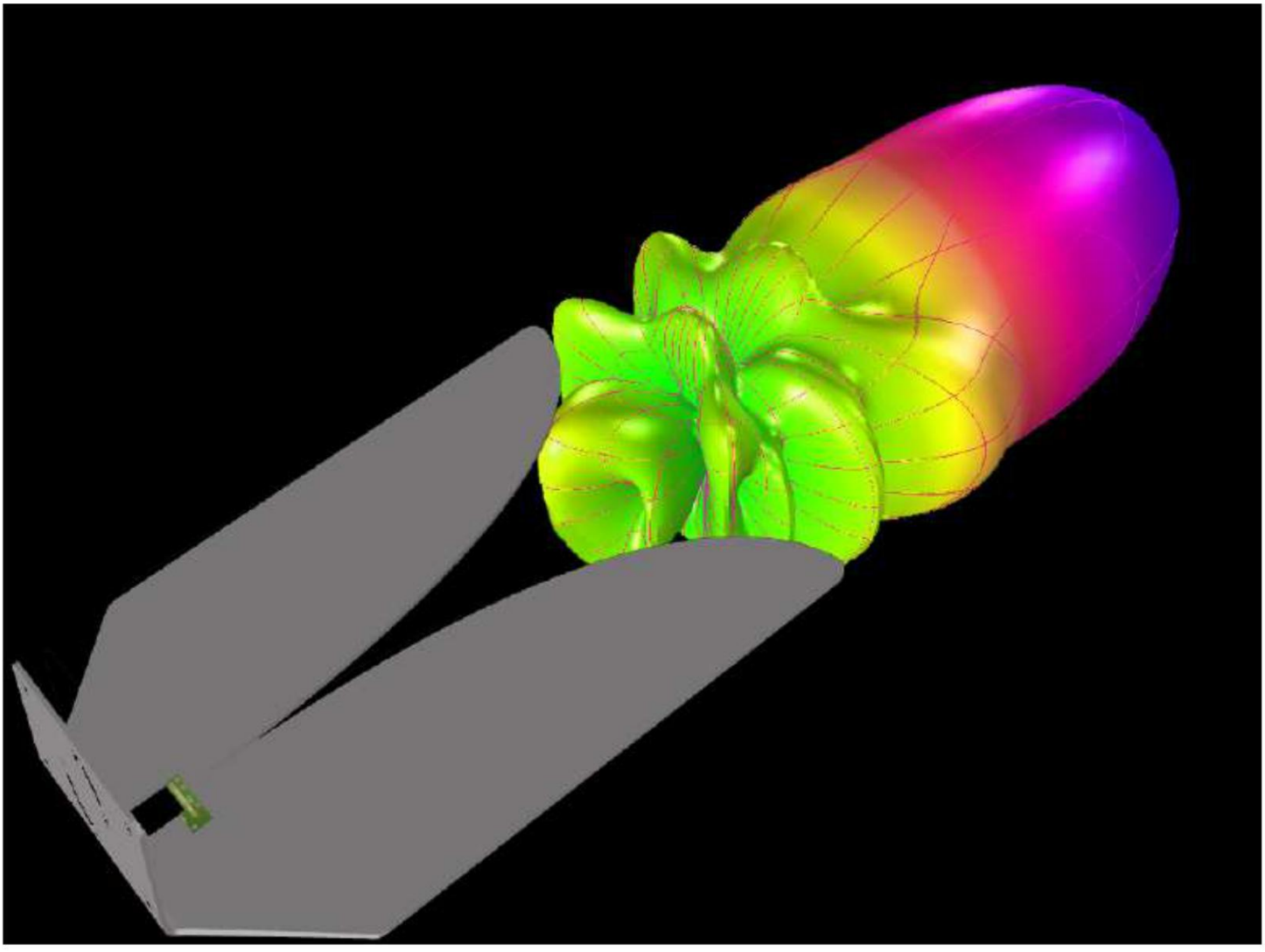
Innovating Technology

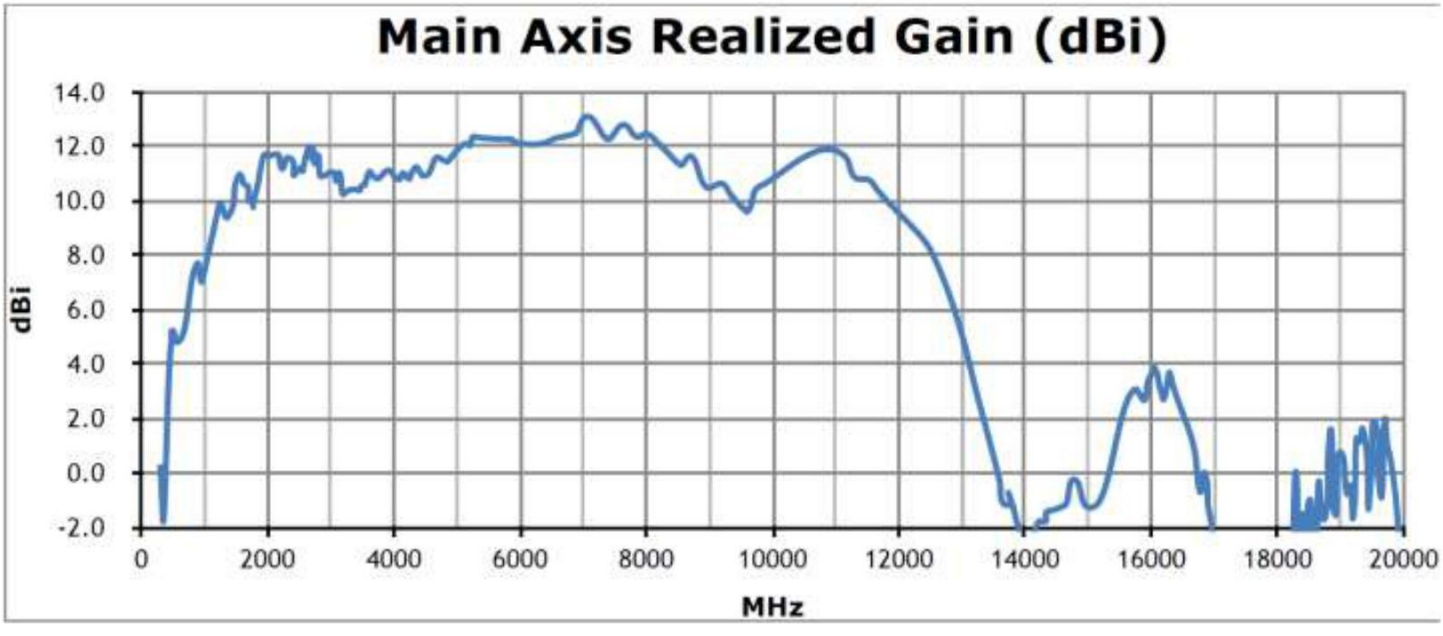
SAP10 complies with IEEE Std 149-1979, “Test Procedure for Antennas”.



Disclaimer: Images shown are Indicative only. Color or Model may differ from the picture shown (Features will remain same or More). Specifications are subject to change without notice.

3D ANTENNA POSITIONER SAP10





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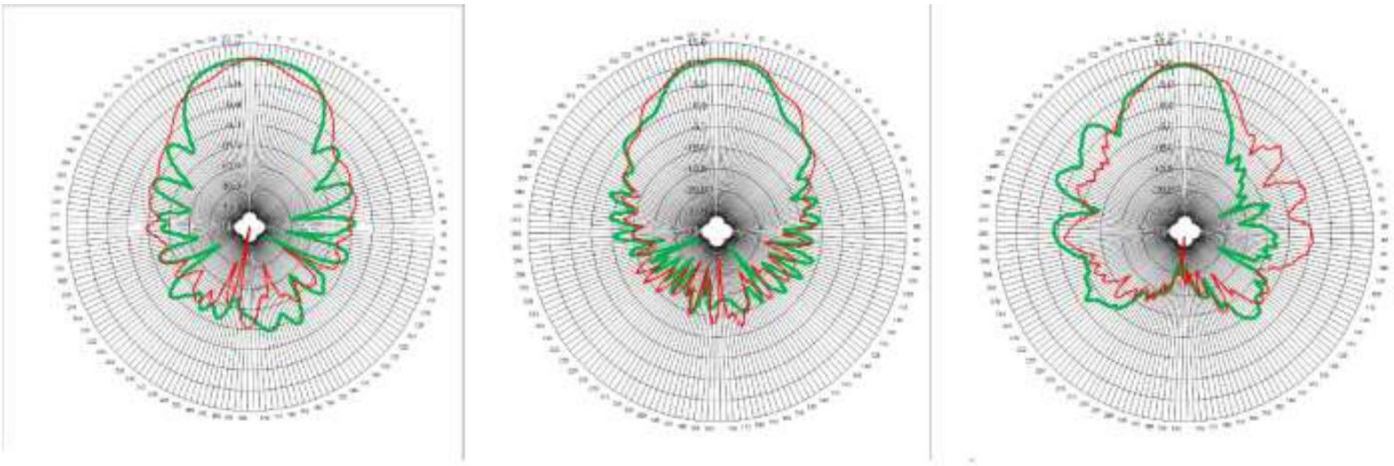
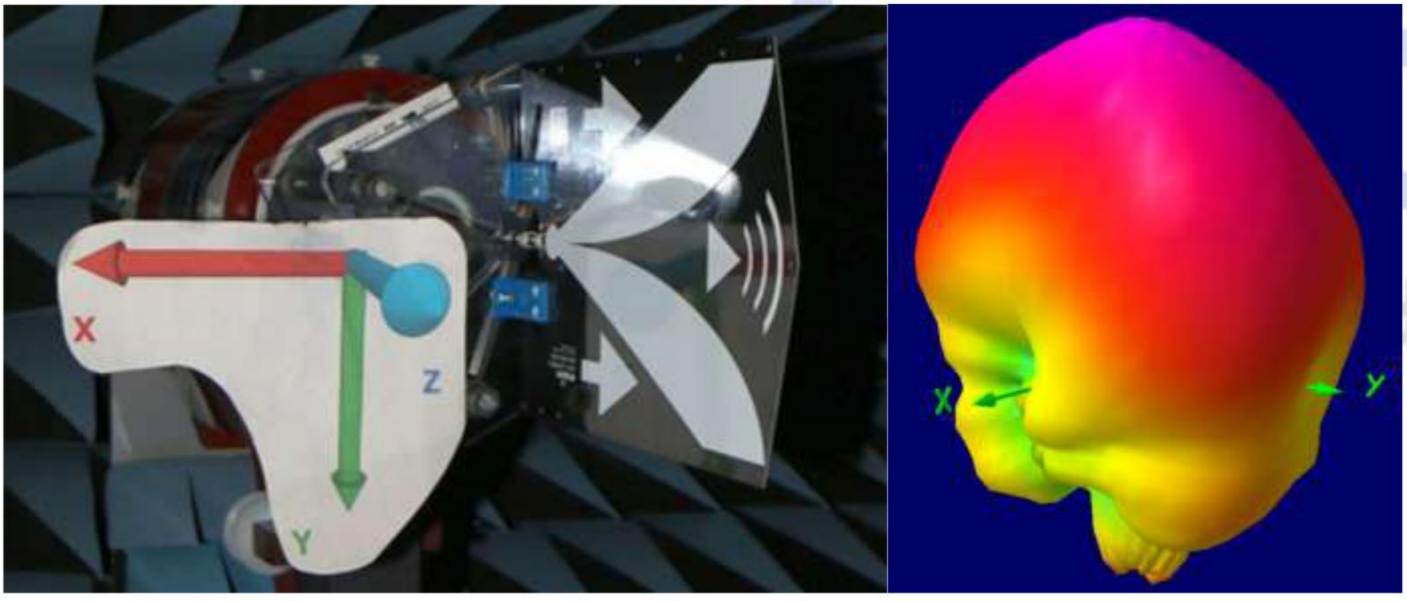
3D ANTENNA POSITIONER SAP10



Antenna patterns at 2.4 GHz, 4.0 GHz and 12 GHz



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3D ANTENNA POSITIONER SAP10

Features:

1. 3D Positioner (with VNA interfacing for Automatic Measurement of 3D pattern, gain measurement, S-parameter etc).
2. Maximum load: upto 0.5Kg.
3. Azimuth rotation: 360 degree.
4. Elevation Movement will be +90 degree.
5. 18GHz Ultra Low loss Testing cables.
6. Planar Horn: 0.9 GHz to 18 GHz- 2 Nos.
7. Connectors & adapters: SMA(F) to SMA(F) Adapter; N(F) to N(F) adapter.
8. 3D Visualization and Data Acquisition Software.
9. Frequency Support till 20GHz

Description:

Amitec Electronics Ltd is offering complete set of 3 D positioner & accessories required for antenna positioning for far-field pattern plotting. As against rotary tables which have been the common practice, we offer state of the art 3 D positioner for research and development & measurement in antennas. It provides freedom required for antenna pattern measurement. One is able to hold the antenna from the back lobe and rotate the antenna by 360 degree along horizontal plane for azimuthal measurements. Over 90 degree of rotation in vertical plane is used for elevation plane measurements. The stepper motor controlled rotator is controlled by PC using software provided. The data acquisition system software controls the axis motors and synchronizes the VNA to record the RF level corresponding to different angular locations. The data array is then used to synthesize the pattern in 3D for visualization as per IEEE norms. Low loss cables armored cables connect the Reference and test antennas to the VNA (provided by the customer). The system is able to interface to Keysight, R&S, Anritsu, Planar brands of VNA's. A pair of planar horn antennas with calibration charts complete the measurement setup for measuring the gain of the test antenna. Pyramidal absorbers are used to shroud the antenna rotator to reduce the radar cross section and reduce the induction in near field. This enables the antenna to be measured in near anechoic field and obviates the need for anechoic chamber for >50% of antenna measurements. For R&D a quick first pass of measurement is desired for faster iterations and emphasis is mostly on main lobe, gain, beamwidth, side lobe levels etc. Only when the need is to characterize these with a higher order of accuracy and <-20dB side lobe levels do we really would require an anechoic chamber.

Hardware Technical Specifications

Positioner Control Mode	:	Auto and Manual Mode
Auto Mode	:	Single button operation with predefined Theta, Phi and resolution for data acquisition with motor synchronization and 3D visualization of antenna.
Manual Mode	:	Custom Theta Start/Stop angle, and resolution Phi Start/Stop angle and resolution, with Auto stepping and Manual stepping.
THETA Start/ Stop Angle	:	0 to 360 degrees in
Resolution		0.1 degree
PHI Start/ Stop Angle		0 to 180 degrees in
Resolution	:	0.1 degree
Power		24 V
Positioner Control		Software control via USB Cable
Loading Capacity		0.5 kg
Material	:	Aluminum alloy
Finish	:	Low Radar cross section
Radar Cross Section	:	-30dBsm
Software	:	USB Interface for motion control, USB/LAN for VNA data acquisition and motor synchronization. 3D visualization of antenna pattern, polar plotting with log, linear cartesian and polar plots, Multiple pattern overlay,3dB beam width, Front to back, Side lobe level and position, Plot rotate, File- edit, save, get, Export to csv/xls format,
Compatibility	:	Keysight, Anritsu, R&S, Planar VNA
Planar Horn	:	0.9 GHz – 18 GHz- 2 Nos.
Polarisation	:	Linear
Beamwidth	:	60 degrees (Mid-Band Typ.)
VSWR	:	0.8 GHz - 0.15GHz <2.5:1 1.5GHz - 12.4GHz <2.0:1
Gain	:	5.5dBi @ 1GHz Typ. 8dBi @ 2.7GHz Typ. 5dBi @ 6GHz Typ.
Power Handling	:	10W
Aperture Width	:	165mm
Length	:	230mm
Microwave Cable	:	SMA-SMA cables 2m, 2-Nos
Insertion Loss	:	6dB 12-18 GHz
Absorber on Motor	:	EM Lossy PU Foam
Pyramidal Reflection	:	-25dB @ 10GHz
Equivalent RCS	:	-30dBsm 10-18GHz

Disclaimer: Images shown are Indicative only. Color or Model may differ from the picture shown (Features will remain same or More). Specifications are subject to change without notice.

Hardware Technical Specifications (SAP 10)

Antenna Spherical Mount 3D as per IEEE Std 149/1979

Positioner Control Mode	:	Auto and Manual Mode
Auto Mode	:	Single button operation with predefined Theta, Phi and resolution for data acquisition with motor synchronization and 3D visualization of antenna.
Manual Mode	:	Custom Theta Start/Stop angle, and resolution Phi Start/Stop angle and resolution with Auto stepping and Manual stepping.
Positioner Type	:	3-axis rotation
Frequency Support	:	Till 20 GHz
Theta Start/ Stop Angle	:	0 to 360 degrees
Resolution	:	0.1 degree
PHI Start/ Stop Angle	:	0 to 360 degrees
Resolution	:	0.1 degrees
Power	:	24 V
Positioner Control	:	Software control via USB Cable
Loading Capacity	:	0.5 kg
Material	:	Aluminum alloy
Finish	:	Low Radar cross section
Radar Cross Section	:	-30dBsm
Compatibility	:	Keysight, Anritsu, R&S, Planar VNA
Planar Horn	:	0.8 GHz - 18 GHz- 2 Nos.
Polarisation	:	Linear
Beamwidth	:	60 degrees (Mid-Band Typ.)
VSWR	:	0.9 GHz - 0.15GHz <2.5:1 1.5GHz - 12.4GHz <2.0:1
Gain	:	5.5dBi @ 1GHz Typ. 8dBi @ 2.7GHz Typ. 5dBi @ 6GHz Typ.
Power Handling	:	10W
Aperture Width	:	165mm
Length	:	230mm
Microwave Cable	:	SMA-SMA cables 2m, 2-Nos
Absorber on Motor	:	EM Lossy PU Foam Pyramidal Reflection
	:	-25dB @ 10GHz
Equivalent RCS	:	-30dBsm 10-20GHz

K to SMA adapter- 2Nos

Software:
USB Interface for Positioner control
USB/LAN support for VNA data acquisition and motor synchronization.
3D visualization of antenna pattern
3D-axis display over radiation pattern
3D radiation pattern heatmap colormap display
Configurable heatmap colormap position
Customizable heatmap colormap visualization
The mapping of level to color display should be configurable. The number of levels should be user-defined
Minimum and maximum of heatmap colormap should be configurable

3D Pattern Reset options: Reset to Original View, Reset to X-Y view, Reset to X-Z view, Reset to Y-Z view
Pattern Zoom In, Zoom Out, X Pan, Y Pan, Z Pan, XY Pan, YZ Pan, XZ Pan
Pattern Rotate in 3D
View multiple data points on radiation pattern
Save radiation pattern image as .jpg, and PDF
2D Polar plotting with log, linear, cartesian and polar plots
Multiple pattern overlay
3dB beam width calculation
Front to back calculation
Export to csv/xls format

Microstrip Antennas:

4GHz Antenna

Microstrip inset fed patch
Microstrip Dipole Antenna
Microstrip Endfire Antenna
Microstrip Broadside Antenna
Microstrip Log Periodic Antenna (LPDA)
Patch array 2X2 Antenna

10 GHz Antenna

Axial Mode Helix (RHCP)
Axial Mode Helix (LHCP)
Patch array 4X4 antenna
Patch array 2X2 antenna
Patch antenna
Patch antenna circularly polarized