

Features

- * PLL synthesized source and receiver 5-2000MHz
- * High dynamic range of 110dB with -105dBm sensitivity of receiver and +3dBm source
- * S parameter measurement using directional coupler
- * Different microstrip modules provided
- * Windows software for graphical analysis
- * Gold plated SMA connectors
- * Power measurement resolution of 0.1dB on LCD
- * Teflon/Silver based RG316 SMA-SMA cables for unmatched repeatability
- * Close conformity to simulation/design data
- * Power measurement in dBm, dBuV, pW, dBr

PLL Synthesized Signal Source



Technical Specifications:

Frequency range	: 5-2000 MHz PLL synth. in 3 ranges
Step size	: 0.05, 0.1, 0.25, 0.5, 1, 10 & 100 MHz
Accuracy	: 0.01%
Display	: 16X2 Backlit LCD
Controls	: Menu, Enter, Escape, Up & Down
Memory	: 1000 individual frequencies be stored
RF Level	: +3dBm typical
Level Accuracy	: ± 2 dB
Attenuator	: 40dB (external SMA-SMA)
Output Z	: 50 ohms
Connector	: Gold plated SMA

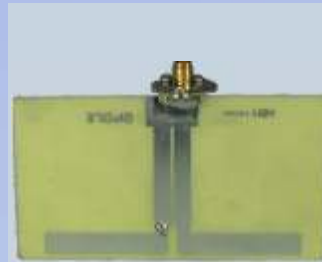
PLL Synthesized Receiver



Technical Specifications:

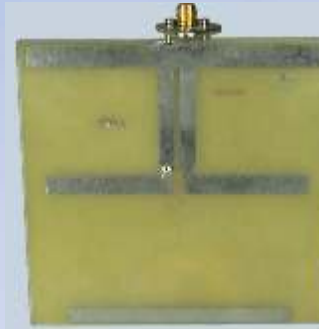
Frequency range	: 5-2000 MHz PLL synth. in 3 ranges
Step size	: 0.05, 0.1, 0.25, 0.5, 1, 10, 100MHz
Accuracy	: 0.01%
Display	: 16X2 Backlit LCD
Memory	: 1000 frequencies & levels be stored
Measurements	: RF level measurement in dBuV / dBm / pW / dBr with 0.1dB resolution
Sensitivity	: -105dBm
Dynamic range	: 110 dB (70dB log. + 40dB attenuator)
RS232 interface	: To PC for plotting software
Auto mode	: Interfacing with source
Input Z	: 50 ohm Gold plated SMA connector

1. Microstrip Antennas : Dipole - 2 Nos



Microstrip Dipole
 $F_c: 1.5 \pm 0.1$ GHz
 $S_{11}: 10 \pm 2$ dB
 Polarisation : Linear
 X Pol discrimination : 20dB
 Gain : 2dBi
 Feed: Microstrip balun
 Impedance : 50 Ohms
 Connector : SMA

2. Microstrip Antennas : Yagi



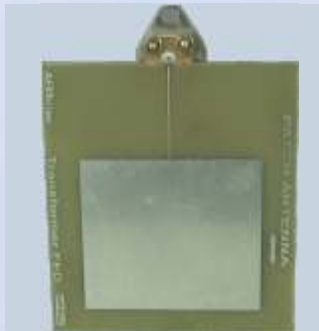
Microstrip Yagi
 $F_c: 1.5 \pm 0.1$ GHz
 $S_{11}: 10 \pm 2$ dB
 Polarisation : Linear
 Gain : 4dBi
 Feed : Microstrip balun
 Impedance : 50 Ohms
 Connector : SMA

3. Microstrip Antennas : Patch Inset Fed



Microstrip Patch Inset Fed
 $F_c: 1.5 \pm 0.1$ GHz
 $S_{11}: 10 \pm 2$ dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

4. Microstrip Antennas : Patch Transformer Fed



Microstrip Patch Transformer Fed
 $F_c: 1.5 \pm 0.1$ GHz
 $S_{11}: 10 \pm 2$ dB
 Polarisation : Linear
 Gain : 5dBi
 Impedance : 50 Ohms
 Connector : SMA

5. Microstrip Couplers : Directional Coupler



Microstrip Coupled line Directional coupler
 $F_c: 1.5 \pm 0.2$ GHz
 Insertion $S_{12}: 1.5 \pm 0.5$ dB
 Coupling $S_{13}: 15 \pm 2$ dB
 Isolation $S_{14}: 20 \pm 2$ dB
 Directivity $S_{23}: 12 \pm 2$ dB
 Impedance : 50 Ohms
 Connector : SMA

Mfd by: Amitec Electronics Ltd.

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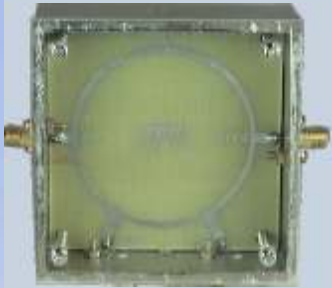
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6. Microstrip Couplers : Branch Line



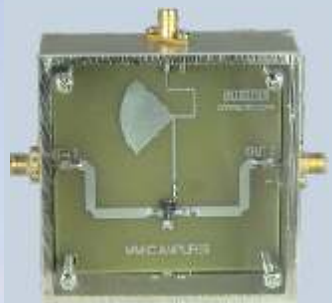
Branch Line Couplers
 $F_c: 1.5 \pm 0.2$ GHz
 Insertion S_{12}, S_{14} : 3.5 dB
 Isolation S_{13} : 15dB
 Bandwidth : 150 MHz
 Phase Shift S_{24} : 90°
 Impedance : 50 Ohms
 Connector SMA

7. Microstrip Couplers : Hybrid ring rat race



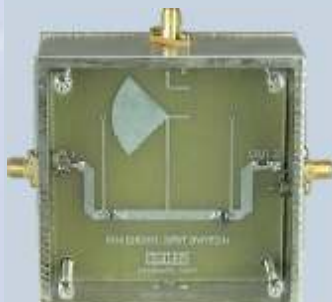
Hybrid Ring Rat race coupler
 $F_c: 1.5 \pm 0.2$ GHz
 Insertion S_{12}, S_{14} : 3.5 dB
 Isolation S_{13} : 15dB
 Bandwidth : 150 MHz
 Phase Shift S_{24} : 180°
 Impedance : 50 Ohms
 Connector SMA

8. Microstrip Amplifier : MMIC Amplifier



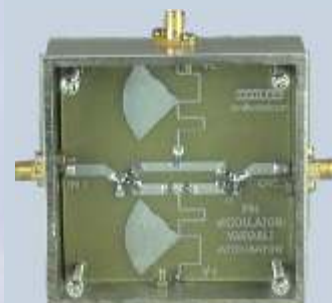
MMIC Amplifier
 $F_c: 1.5 \pm 1$ GHz
 Gain S_{12} : 18 dB
 Noise Floor : 3.5dB
 1dB Compression : 10dBm
 Bandwidth : 1 GHz
 Impedance : 50 Ohms
 Connector SMA

9. Microstrip Switch : PIN Diode Switch



SPST PIN diode switch
 $F_c = 1.5 \pm 0.5$ GHz
 Insertion Loss: 1.5 dB
 Return Loss = 20 dB
 Isolation : 20dB
 Impedance : 50 Ohms
 Connector : SMA

10. Microstrip Modulator : PIN Diode Modulator



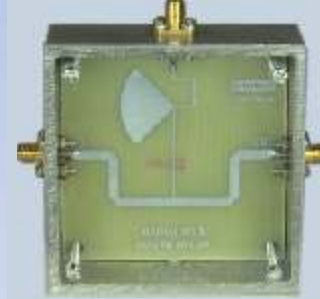
PIN Diode Modulator
 $F_c = 1.5 \pm 1$ GHz
 Insertion Loss: 1.5 dB
 Isolation: 10dB
 Return Loss = 10 dB
 Impedance : 50 Ohms
 Connector : SMA

11. Microstrip Power Divider : Wilkinson resistor



Wilkinson chip resistor type
 2 way
 $F_c = 1.5 \pm 0.2$ GHz
 Isolation = 15 ± 2 dB
 Insertion Loss = $3.5 \text{ dB} \pm 0.5 \text{ dB}$
 Connector : SMA

12. Microstrip Bias Network : Radial Stub (DC Injector)



Type : Radial stub
 $F_c = 1.5 \pm 0.5$ GHz
 Insertion Loss : 0.5dB
 Isolation : 30dB
 Impedance : 50 Ohms
 Connector : SMA

13. Microstrip Loads : Unmatched/matched loads



Matched & Unmatched Loads
 $F_c = 1.5 \pm 0.2$ GHz
 Return Loss = 20/6/0/0 dB
 Load : Quarter wave matched, VSWR 3, Open & Short Stubs
 Connector : SMA

14. Microstrip Filter : Low Pass Step Impedance



Low Pass Filter
 Type : Stepped Impedance
 Order: 7
 $F_c = 1.5 \pm 0.1$ GHz
 Insertion Loss S_{12} : 1.5dB
 Return Loss S_{11} : 15 dB
 Stop Band S_{12} : 20dB
 Impedance : 50 Ohms
 Connector : SMA

15. Microstrip Resonator : Ring resonator



Ring Resonator
 $F_c: 1.5 \pm 0.1$ GHz
 S_{11} : -2 ± 1 dB
 S_{12} : -20 ± 2 dB
 Q: 50 typical
 Connector : SMA

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Standard Accessories



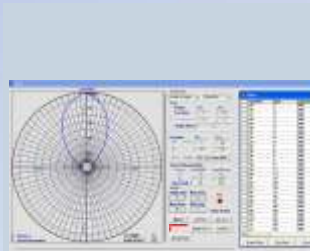
50 Ohms Matched Termination SMA(M) - 4 nos, Short termination SMA(M), Teflon based RG316 cables 4 nos SMA(M)-SMA(M), DC - Mains Power supply adapter, E-Manual / Installation Video for ease of Learning

Manual Antenna Rotator



Low RCS Transmitting tripod, Low RCS Receiving tripod, Connecting cables RG316 SMA - 1.5m - 2 Nos, Goniometer with 1 degree resolution

Antenna Plotting Software



RS232 interface for plotting with log, linear cartesian and polar plots, Vi, Vr & Return Loss plots, Multiple pattern overlay, Double cursor, Zoom, Colour editing, 1000 location editor, Absolute/Relative, 3dB/10dB band-width, Gain, Front to back, Plot rotate, File- edit, save,

Microstrip Design Software



RF Unit converter, Microstrip circuit layout drawing and analysis to display S-parameters at any frequency in smith chart or rectangular dB format, Frequency and time domain analysis, optimizer, dielectric and metal losses, Filter design, Antenna design

Coaxial Slotted Line



S11: >15dB
S12: <3dB
Resolution: 0.05mm using vernier
Coupling factor:-20dB
Connector : SMA
Residual VSWR : <1.2
Velocity propagation : 1.818×10^8 m/s
Wavelength/360° phase : 60.5mm at 3GHz
Total Length : 200mm

Scope of Experiments

- * Properties of Directional Coupler
 - i) Measurement of coupling factor.
 - ii) Measurement of Directivity.
 - iii) Measurement of return loss of a load.
 - iv) Main line insertion loss, isolation, VSWR of ports.
- * Measurement of S11, S12, S21, S22 parameters of microstrip components
- * To measure the ANTENNA PARAMETERS (directivity, gain, beam width (Half Power/10dB), front to back ratio, plane of polarization, cross polarization discrimination, side lobe level and its angular position from polar plot, VSWR/return loss) of Standard dipole (or printed dipole), microstrip inset fed patch antenna, microstrip transformer fed patch antenna and Yagi antenna(printed).
- * Properties of Branch Line Coupler
 - i) Measurement of coupling factor.
 - ii) Measurement of return loss of a load.
 - iii) Main line insertion loss, isolation, VSWR of ports.
- * Properties of Hybrid Ring Rat race Coupler
 - i) Measurement of Power division or Decoupling between Sum and Diff arms of a rat race coupler.
 - ii) Measurement of Insertion loss S21 & S41.
 - iii) Measurement of Return Loss/ impedance match at ports 1 & 4 - S11, S44.
 - iv) Measurement of Isolation between ports 1 & 3 - S13.
 - v) Measurement of Phase difference in output arms 2 & 4 as 180 Deg.
- * To measure gain, isolation, VSWR of ports of mmic amplifier.
- * To measure Insertion loss, isolation and VSWR of port microwave SPST PIN diode switch.
- * To measure Insertion loss, isolation and VSWR of port microwave SPST PIN diode Modulator. Operation of PIN diode modulator. Study of square wave modulation of PIN modulator.
- * Measurement of power division and isolation characteristic of a microstrip 3 dB power divider.
- * To measure isolation, VSWR of ports of Radial stub.
- * To measure attenuation, isolation, VSWR of ports of Attenuator.
- * To measure VSWR of ports of 50 ohms microstrip line, Matched load, open stub, Short Stub, mismatch.
- * Low pass filter characteristics insertion loss, pass band, port VSWR
- * Measurement of resonance characteristics of a microstrip ring resonator and determination of dielectric constant of the substrate.

Dimension: 56 X48 X 36, Weight: 20 Kg, Warranty: 3 yrs.

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