amitec

MICROWAVE INTEGRATED CIRCUITS LAB MIC20

Features

* 2-4 GHz source.
* 10 MHz-12.4 GHz Power meter.
* 2-4 GHz Directional Coupler with 15dB directivity.
* 1-4 GHz Slotted Line with low VSWR.
* 20 different MIC modules provided.
* Gold plated SMA connectors on low loss substrate.
* 0.1dB resolution LCD with bargraph.
* Wide power range +20dBm to -30dBm.
* High measure speed at all power levels.
* Measurement in dBm, mW, dBr, dBW, dBuW, dB relative.
* Shock/Drop resistant Sensor.
* Teflon cables are provided for low loss interconnects.

1. Microwave Signal Generator

Technical Specifications:

Microwave Source	:	2 GHz to 4GHz
Frequency Display	:	LCD
RF Level	:	+3 dBm typical
Level Accuracy	:	± 2 dB
Attenuator	:	20dB (external SMA-SMA)
Output Z	:	50 ohms
Connector	:	Gold plated SMA
Modulation	:	AM/FM/Sweep
Modulating Signal	:	1KHz Internal/External for AM/FM
Frequency Sweep	:	AC line synchronised Linear
Modulation Control	:	Depth/Deviation adjustable
Power Supply	:	100-240VAC, 47-63 Hz

2.Receiver / Power Meter with Sensor

Technical Specifications:

Frequency range	:	10MHz to 12.4 Ghz
Display	:	16X2 Backlit LCD with Bar graph
Power range	:	-30dBm to +20dBm
Resolution	:	0.1, 0.5 and 1dB
Measurement	:	dBm, dBr, mW, dBW, dBuW With Digital Display
Relative Offset	:	+20.0 to -30.0dBm for relative measurement

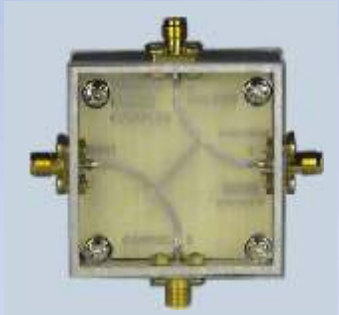
Power Sensor

Frequency Range	:	10 MHz to 12.4 GHz
Maximum input	:	+20dBm
Return Loss	:	15dB at 12.4GHz

3. Microstrip Couplers : Unfolded Lange Coupler

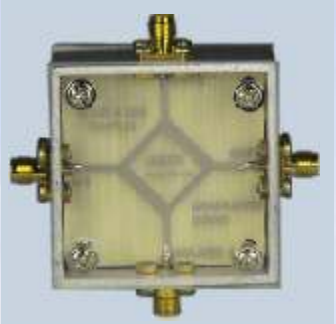
F_c: 3.0 ± 0.2 GHz
Insertion S_{12} : 1.5 ± 0.5 dB
Coupling S_{13}: 6 ± 2dB
Isolation S_{14}: 20 ± 2dB
Directivity S_{23}: 14 ± 2dB
Impedance : 50 Ohms
Connector : SMA

4. Microstrip Couplers : Folded Lange Coupler



F_c: 3.0 ± 0.2 GHz
Insertion S_{12} : 1.5 ± 0.5 dB
Coupling S_{13}: 6 ± 2dB
Isolation S_{14}: 20 ± 2dB
Directivity S_{23}: 14 ± 2dB
Impedance : 50 Ohms
Connector : SMA

5. Microstrip Couplers : Branch Line Quadrature Hybrid



F_c: 3.0 ± 0.2 GHz
Insertion $S_{12}S_{14}$: 3.5 dB
Isolation S_{13} : 15dB
Bandwidth : 150 MHz
Phase Shift S_{24}: 90^0
Impedance : 50 Ohms
Connector : SMA

6. Microstrip Couplers : Hybrid ring rat race

F_c:3.0 ± 0.2 GHz
Insertion $S_{12}S_{14}$: 3.5 dB
Isolation S_{13} : 15dB
Bandwidth : 150 MHz
Phase Shift S_{24}: 180^0
Impedance : 50 Ohms
Connector : SMA

7. Microstrip Couplers : Coupled Line Directional

F_c:3.0 ± 0.2 GHz
Insertion S_{12} : 1.5 ± 0.5 dB
Coupling S_{13}: 15 ± 2dB
Isolation S_{14}: 20 ± 2dB
Directivity S_{23}: 12 ± 2dB
Impedance : 50 Ohms
Connector : SMA

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8. Microstrip Bandpass Filter Tapped Hairpin

Order: 7
F_c : 3.0 ± 0.1 Ghz
Bandwidth : 100MHz
Insertion Loss S_{12} : 1.5dB
Return Loss S_{11} : 15 dB
Stop Band S_{12}: 20dB
Impedance : 50 Ohms
Connector : SMA

9. Microstrip Low Pass Filter Open Stub

Order: 7
F_c : 3.0 ± 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

10. Microstrip Filter : Low Pass Stepped Impedance

Type : Stepped Impedance
Order : 7
F_c : 3.0 ± 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

11. Microstrip Switch : PIN Diode SPST Switch

F_c = 3.0 ± 0.5 GHz
Insertion Loss: 1.5 dB
Return Loss : 20 dB
Isolation : 20dB
Impedance : 50 Ohms
Connector : SMA

12. Microstrip Modulator : PIN Diode Variable Attenuator

F_c = 3.0 ± 1 GHz
Insertion Loss : 1.5 dB
Isolation : 10dB
Return Loss : 10 dB
Attenuaton : 0-20dB
Control Voltage : 0-15V
Impedance : 50 Ohms
Connector : SMA

13. Microstrip PIN Diode Switchable Attenuator

F_c : 3.0 ± 1 GHz
Insertion Loss : 1.5dB
Isolation : 20dB
Attenuation : 20dB
Impedance : 50 Ohms
Connector : SMA
Operating Current : 35mA
Operating Voltage : 15V DC

14. Microstrip Amplifier : MMIC Amplifier

F_c : 3.0 ± 1 GHz
Gain : >15dB
1dB Compression : 10dBm
Noise Figure : 3.5dB
Impedance : 50 Ohms
Connector : SMA
Operating Current : 35mA
Operating Voltage : 15V DC

15. Microstrip Wilkinson Equal Power Divider

F_c : 3.0 ± 0.2 GHz
Isolation : 15 ± 2dB
Insertion Loss : 3.5 dB ± 0.5dB
Amplitude Unbalance : 0.5dB
Phase Unbalance : <5 degrees
Connector : SMA

16. Microstrip Wilkinson Unequal Power Divider

F_c = 3.0 ± 0.2 GHz
Isolation = 15 ± 2dB
Insertion Loss = 3.5 dB ± 0.5dB
Amplitude Unbalance: 3dB
Phase Unbalance : <10 degrees
Connector : SMA

17. Microstrip Patch Antenna

F_c : 2.4 ± 0.1 GHz
S_{11} : 10 ± 2dB
Polarisation : Linear
Gain : 9dBi
Array : 2X2
Impedance : 50 Ohms
Connector : SMA

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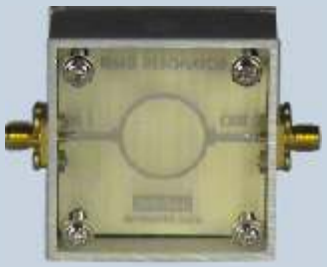
18. Microstrip Resonator : Ring resonator



Ring Resonator
F_c : 3.0 ± 0.1 GHz
S_{11} : -4 ± 1dB
S_{12} : -4 ± 2dB
Q : 50 typical
Connector : SMA

19. Microstrip Half Wave Resonator

F_c :3.0 ± 0.1 GHz
S_{11} : -2 ± 1dB
S_{12} : -20 ± 2dB
Q : 50 typical
Connector : SMA

20. Microstrip Tapered Line Transformer

F_c : 3.0 ± 0.5 GHz
Return Loss : 10 dB
Load : 150 Ohms
Connector : SMA

21. Microstrip Loads : Unmatched/matched loads

F_c : 3.0 ± 0.2 GHz
Return Loss : 20/6/0/0 dB
Load : Quarter wave matched, VSWR 3, Open & Short Stubs
Connector : SMA

22. Coaxial Slotted Line

S11: >15dB
S12: <2dB
Resolution: 0.05mm using vernier
Coupling : -20dB typical
Connector : SMA
Residual VSWR : <1.2
Velocity propagation : $1.818X10^8$m/s
Wavelength/360^0 phase : 60.5mm at 3GHz
Total Length : 200mm

23. Dual Directional Coupler

F_c : 3.0 ± 1 GHz
Insertion S_{12} : 1.5 ± 0.5 dB
Coupling S_{13} : 20 ± 2dB
Isolation S_{14} : 20 ± 2dB
Directivity S_{23} : 15 ± 3dB
Impedance : 50 Ohms
Connector : SMA

24. Standard Accessories

50 Ohms Matched Termination SMA(M) - 4 Nos, Short termination SMA(M), Teflon based RG316 cables 4 nos SMA(M)-SMA(M), SMA(F)-SMA(F), Software- RF Unit converter, AppCAD, E-Manual / Installation Video for ease of Learning

Scope of Experiments

* Properties of Directional Coupler: Measurement of coupling factor, Directivity, return loss of a load, main line insertion loss, isolation, VSWR of ports.
* Measurement of S11, S12, S21, S22 parameters of microstrip components
* To measure the VSWR/return loss) of microstrip inset fed patch antenna.
* Properties of Branch Line Coupler: Measurement of coupling factor, return loss of a load, main line insertion loss, isolation, VSWR of ports.
* Properties of Hybrid Ring Rat race Coupler: Measurement of Power division or Decoupling between Sum and Diff arms of a rat race coupler,Measurement of Insertion loss S21 & S41, Measurement of Return Loss/ impedance match at ports 1 & 4 - S11, S44, measurement of Isolation between ports 1 & 3 - S13, Mesurement of Phase difference in output arms 2&4 as 180Deg.
* 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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