

RFL-MCT

3GHz Microstrip Component Training System

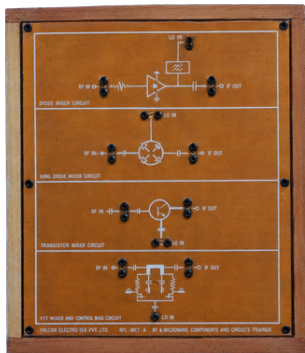


FEATURES

- The RFL-MCT-A-3G kit is designed to introduce the fundamentals of microstrip line technology with emphasis on Basic and Advance Microstrip Active and Passive Circuit design concepts. The design frequency range is up to 3GHz. The trainer kit contains Gold plated components in a accurate, robust and integrated board platform.

SPECIFICATIONS

ACTIVE COMPONENT BOARD 1 · SOURCE



MMIC Amplifier

- Frequency - 100 MHz to 3 GHz
- Noise Figure - 2.9 dB @ 3 GHz
- Reverse Isolation - 20 dB (typical)

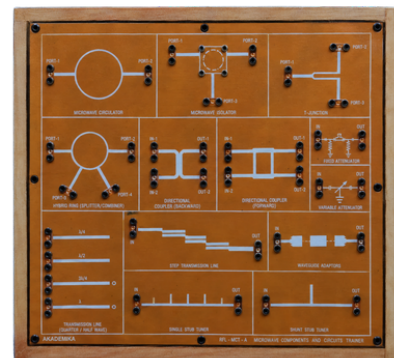
VCO

- Frequency - 1300 MHz – 3 GHz
- Power Output - 8 dBm (typical)
- Tuning Voltage - 0.5 V to 10 V

Frequency Mixer

- RF / LO Frequency - 1300 MHz to 3 GHz
- LO Power IN - +7 dBm
- IF Out - DC to 1000 MHz
- Conversion Loss - 6.3 dB (typical)
- Isolation - 20 dB (typical)

PASSIVE COMPONENT BOARD 2 · MICROSTRIP FILTERS



LPF

- Frequency Range - 100 MHz to 2 GHz (3 dB cut-off +/- 50 MHz)
- Insertion Loss - < 1.5 dB

HPF

- Frequency Range - 1.9 GHz (3 dB cut-off +/- 50 MHz)
- Insertion Loss - < 1.5 dB

BPF

- Center Frequency - 2 GHz (+/- 50 MHz)
- Bandwidth - ~ 300 MHz @ 3 dB · ~ 800 MHz @ 30 dB

BSF

- Center Frequency - 1.8 GHz (+/- 50 MHz)
- Bandwidth - ~ 850 MHz @ 3 dB · ~ 400 MHz @ 25 dB

Attenuators

- Tee Attenuator - 5 dB
- PI Attenuator - 10 dB

COUPLERS

Coupled Line Directional Coupler

- Center Frequency 2 GHz (+/- 50 MHz)
- Coupling 13 dB
- Isolation > 20 dB

Branchline Coupler

- Center Frequency 2.45 GHz (+/- 50 MHz)
- Isolation > 25 dB

Rat Race Coupler

- Center Frequency 2.45 GHz (+/- 50 MHz)
- Isolation > 25 dB

Ring Resonator

- Center Frequency 2.45 GHz (+/- 10 MHz)
- Bandwidth 60 MHz

Circulator

- Frequency 2.5 GHz

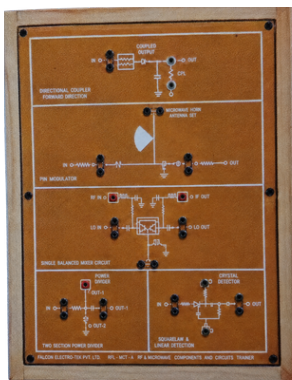
Power Divider

- Frequency 2 GHz to 2.5 GHz
- Isolation > 20 dB

TRANSMISSION LINE TERMINATIONS / LOADS

- OPEN Termination
- SHORT Termination
- MATCHED Load
- MISMATCHED Load

ACTIVE COMPONENT BOARD 3 · DETECTOR



Pin Diode Switch

- SPST Switch Freq - 300 MHz to 1 GHz
- SPDT Switch Freq - 1 GHz to 2 GHz
- Insertion loss - < 3 dB

Schottky Diode Detector

- Frequency 2.2 GHz to 2.5 GHz
- Input power -30 dBm to 10 dBm

Pin diode variable Attenuator

- Frequency - 1.5 GHz to 2.5 GHz
- Attenuation range - 7 dB to 17 dB
- Variable Voltage - 0V to +5V

EXPERIMENTS

Directional coupler

- Insertion loss of through port [SA ✓ · VNA ✓]
- Coupled & Isolation port magnitude [SA ✓ · VNA ✓]
- Return loss characteristics [SA X* · VNA ✓]
- Smith chart, impedance [SA X · VNA ✓]
- Phase characteristics of Through, Coupled & Isolation port [SA X · VNA ✓]

Circulator / isolator

- Transmission/insertion loss characteristics [SA ✓ · VNA ✓]
- Return loss characteristics [SA X* · VNA ✓]
- Phase characteristic [SA X · VNA ✓]

Ring resonator

- Transmission characteristics [SA ✓ · VNA ✓]
- Bandwidth and quality factor [SA ✓ · VNA ✓]

Microstrip 3dB power divider

- Power division characteristics [SA ✓ · VNA ✓]
- Isolation characteristics [SA ✓ · VNA ✓]
- Return loss characteristics [SA X* · VNA ✓]
- Amplitude balance [SA ✓ · VNA ✓]
- Phase balance [SA X · VNA ✓]

Microstrip filters

- Insertion loss characteristics, 3dB and 15dB bandwidth [SA ✓ · VNA ✓]
- Filter slope, roll-off, bandwidth [SA ✓ · VNA ✓]
- Return loss characteristics [SA X* · VNA ✓]
- Phase and group delay [SA X · VNA ✓]

Fixed attenuator

- Return loss characteristics [SA X · VNA ✓]
- Insertion loss/attenuation level characteristics [SA ✓ · VNA ✓]

MMIC amplifier

- Gain & Reverse Isolation [SA ✓ · VNA ✓]
- Input / output return loss [SA X · VNA ✓]
- 1 dB compression point [SA ✓** · VNA ✓**]
- Phase characteristics [SA X · VNA ✓]

Active phase shifter

- Return & Insertion loss characteristics [SA X · VNA ✓]
- Tuning voltage Vs Phase characteristics [SA X · VNA ✓]
- Total phase variance ($\Delta\phi$) [SA X · VNA ✓]

Frequency mixer

- Measurement of IF [SA ✓ · VNA X]
- Return loss BW [SA X · VNA X]
- IF conversion loss [SA ✓ · VNA X]
- IF power measurement [SA ✓ · VNA X]
- Power handling (P) [SA ✓ · VNA X]

VCO

- V tune Vs RF-out [SA ✓ · VNA X]
- V tune Vs power level [SA ✓ · VNA X]
- Load pulling [SA ✓ · VNA X]

PIN modulator

- Insertion loss [SA ✓ · VNA ✓]
- Return loss [SA X · VNA ✓]
- Isolation between carrier and modulating signal ports [SA ✓ · VNA X]
- Modulated signal power [SA ✓ · VNA —]

PIN diode switch

- Insertion loss of switch line [SA ✓ · VNA ✓]
- Isolation [SA ✓ · VNA ✓], Return loss [SA X · VNA ✓]

Schottky diode detector

- Measurement of Dynamic range, voltage sensitivity, signal sensitivity using DMM [SA — · VNA —]