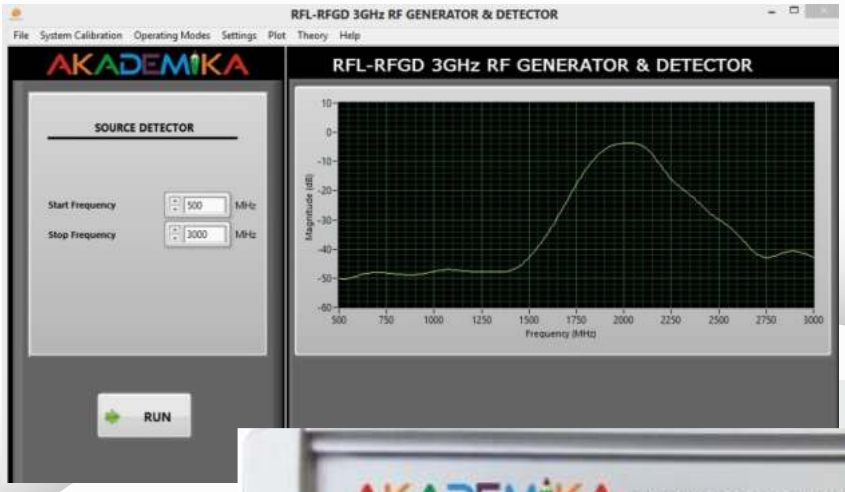
RFL- RFGD

RF Generator

Detector

AKADEMIKA

- 3GHz low-cost synthesised RF generator detector
- Internal and external frequency modulation
- High stability and low phase noise
- Wide Power range from -30dBm to +0dBm
- Dynamic Range –50dBm to +10dBm
- Frequency stepping 1MHz
- S-Parameters Measurement
- Analysis of Filters response
- Highly Reliable
- Both Standalone and PC interference



RFL- RFGD RF Generator Detector

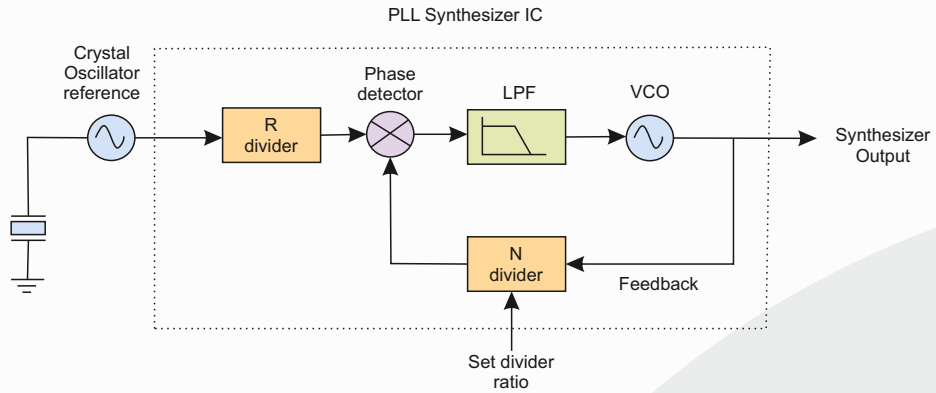
AKADEMIKA'S RFGD is specialized RF signal generator and detector covering frequency range from35MHz to 3GHz with reliable performance and multiple built like modulation capabilities (AM, FM, PSK).The architecture use highly accurate and stable Phase locked loop (PLL) synthesizer based frequency generator with double harmonics capability having with excellent phase noise. The RFGD system employs in built high dynamic log detector arrangement for forward and reflected power arrangement. A SMA connecter provide output for full span with adjustable output power form -30dBm to +0dBm into a 50 ohm load.A BNC type input available for modulating signal at the near end equipment. User friendly GUI supports monitoring, controlling and plotting the records.

RF Generator

Synthesized radio frequency signal generators: Virtually all radio frequency signal generators used today employ frequency synthesizer technology. Using this technique enables frequencies to be entered directly from a keypad, or via remote control and it also enables the output signal to be determined very accurately. The accuracy being dependent upon either an internal reference oscillator that can have a very high degree of accuracy, or the signal can be locked to an external frequency reference which can be exceedingly accurate.
Synthesized signal generators are available in many forms. High end RF signal generators can be contained in traditional bench cases as well as in modular forms like PXI. In addition to this, a number of much lower cost USB RF signal generators are coming onto the market. Using the power of a PC, these signal generators can be made much more cheaply that those in specialised cases with front panels, power supplies and the like.

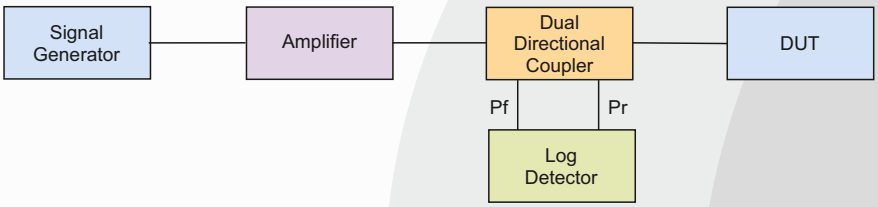
Generalized block diagram of a phase-locked-loop (PLL) frequency synthesizer.

Phase locked loop synthesizer: Phase locked loop synthesizers are used within most RF signal generators as they enable signals to be generated over a wide range of frequencies with a relatively low level of spurious signals. Phase locked loop synthesizer technology is well developed and enables high performance RF signal generators to be produced using them.



RF Detector

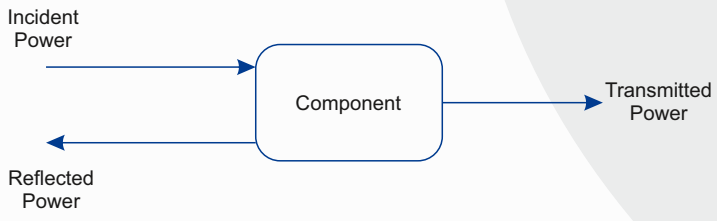
RF power detectors pick up radio frequency signals and generate an output corresponding to the strength of the signal. Subsequently, a processor correlates this output to real signal power. In applications requiring greater dynamic range, a new generation of instruments, such as logarithmic and RMS instruments, are replacing the traditional diode detection method. All classes of detection systems possess unique characteristics that make them suitable for particular uses.
Real signal power provides RF engineers with information essential to selecting the component size and establishing controls for optimal signal and data accuracy. The power is monitored closely over increasing distance to analyze circuit performance and reliability in communications application



Recently directional coupler and log detector used to measure the forward and reflected power in a RF system. The block diagram is shown as above

Insertion Loss Measurement

Insertion loss is the loss of signal when traveling in and out of a given circuit or traveling into a component and out of the component. If your signal is at 100% going into a component, and coming out there is a loss, its described as insertion loss and is measured in decibels (dB). 3 dB is described as the end point for any component and is equivalent to the signal strength being reduced by 50%



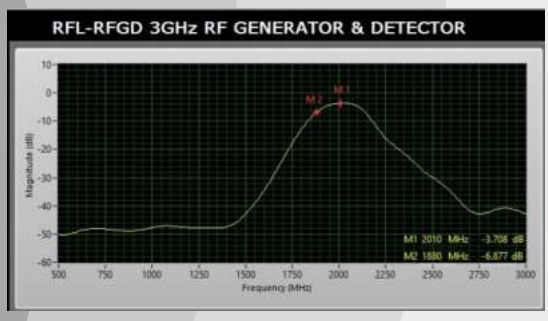
$$\text{Insertion Loss} = \frac{\text{Transmitted Power}}{\text{Incident Power}}$$

$$\text{Return Loss} = \frac{\text{Reflected Power}}{\text{Incident Power}}$$

RFL- RFGD

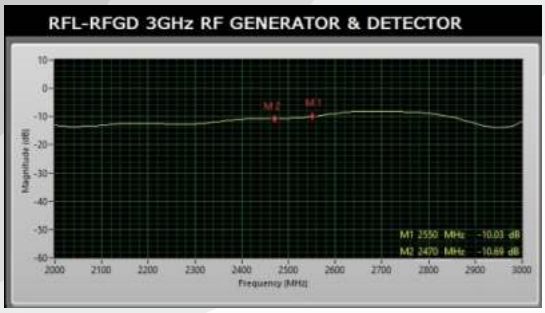
KEY RFGD PARAMETERS

1.Insertion Loss (S12)



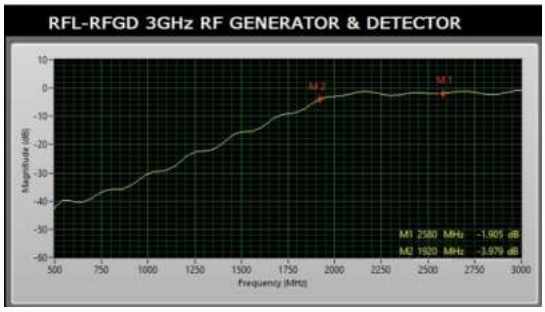
Insertion Loss of BPF
Graph shows insertion loss of passive Microstrip BPF filter. It shows 3dB bandwidth of Microstrip BPF is 260MHz

2.Isolation (S41)



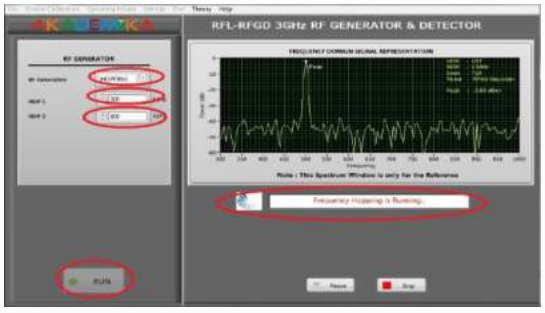
Isolation of Directional Coupler
Graph shows isolation of directional coupler. It shows -10.6dB isolation at 2470MHz.Directional coupler is 4 ports device. For S41 measurement remaining two ports will be terminated by 50 Ohm load.

3.S-Parameters (S21)



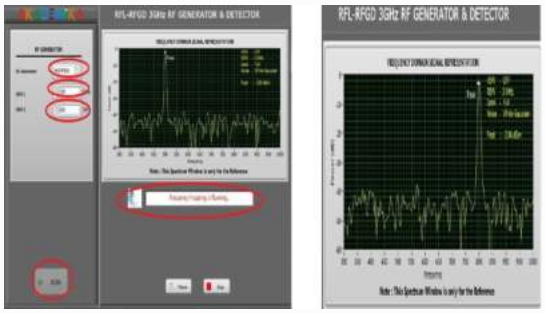
S21 of High Pass Filter(HPF)
Graph shows the S parameters of HPF and it show 3dB cut frequency of HPF is 1920MHz

4.Single tone frequency generation



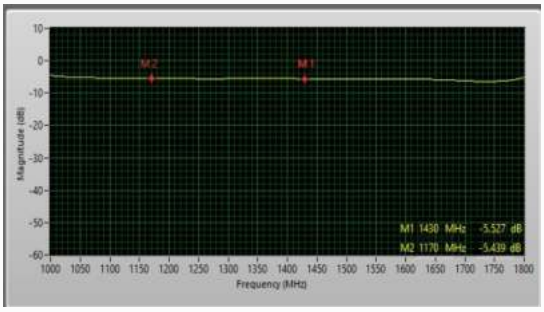
Frequency and Power generation
Graphs show this operating mode is to generate the single tone frequency at the selected power

5.Frequency Hopping



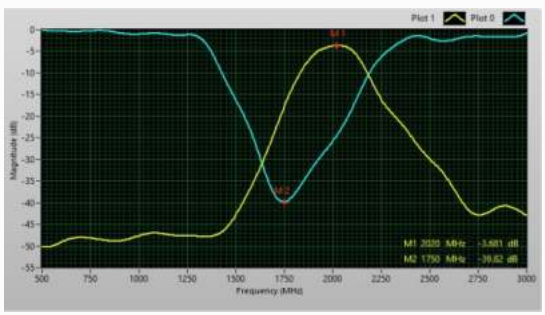
Frequency Hopping
Graphs shows operation mode will generate a continuous jumping of the selected HOP-1 and HOP-2 frequencies.

6.Attenuation



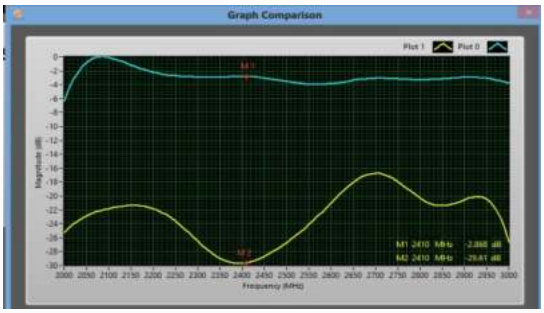
Graphs shows attenuation of pi attenuator. It shows -5.5dB attenuation over the entire frequency band from 1000MHZ-1800MHz

7. Transmission and Reflection coefficient



Graphs show transmission and reflection coefficient of filter. It can conclude that the transmitted power (S12) is -3dB and reflected power (S11) of filter is very less around -39.8dB.

8. Plot Comparison



Graphs show both Insertion loss (S31) and Mutual coupling (S41) of hybrid coupler. The yellow graph shows isolation of coupler is -29.6dB and Blue graph shows insertion loss of coupler is -2.8dB at 2410MHz

RFL-RFGD RF Generator Detector

TECHNICAL SPECIFICATION

1. Microstrip Transmission Line

Frequency	35MHz TO 3GHz
Frequency Resolution	1MHz
Modes	Freq sweep,Freq hopping, Power sweep
Freq Sweep for Full Span	≤ 3.8 sec
Frequency Offset	± 100 Hz
Sub Harmonics	50 dBc/Hz
Phase Noise	80 dBc/Hz @800MHz
Power Max	0dBm @ upto 1.5GHz , -10dBm @ upto 3GHz
Power Min	-30dBm
Power Resolution	0.5dB
Detector Dynamic Range	-50dBm to 10dBm
Modulation	AM,FM,PSK
AM Modulation Range	100MHz to 2.8GHz
FM Modulation Range	300MHz to 1GHz
LCD display	128x64 Graphics Display
Impedance	50 ohms
RF type Port	SMA type female
Measurement	Insertion Loss
User Interface	Standalone and PC based control
Software	compatible with Win XP Win 7,Win Vista

2. Directional Coupler

Frequency	20 to 3000 MHz
Number of Port	3
Measurement	Return Loss, VSWR Impedance
Min VSWR Detection	1.18:1
Impedance	50 ohm
Minimum Return Loss(S11)	-30dB
Power Handling	1W
Directivity	20dB

DELIVERABLES

- RFGD –Control Unit : 01nos
- SMA (M) to SMA (M) 50 ohm RG316 cable 50cm : 02nos
- BNC to BNC Cable : 01nos
- 9V Adapter : 01nos
- USB cable (Male A to Male B) : 01nos
- Power Cord : 01nos
- Software on CD : 01nos
- Manual : 01nos

TUTORIALS

- Determination of Power division characteristics (S21,S31)
- Measurement of Insertion Loss and Isolation for directional Coupler (S21,S41)
- Determination of 3dB Bandwidth of BPF filter
- Determination of 3dB cut off frequency of HPF and LPF filter
- Measurement of attenuation power for Pi attenuator
- Determination of insertion loss (S21) and harmonics for Microstrip Ring Resonator
- Measurement of transmission and isolation characteristics of Circulator
- Impedance and VSWR measurement of transmission using directional coupler.

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