

VCO Step Response Analysis Made Easy

Application Brief AN 1200-3

**HP 53310A Modulation
Domain Analyzer**



Complete VCO Step Response Analysis in a Single Pass

Situation

Voltage Controlled Oscillators (VCOs) are at the heart of many electronic systems such as phase-locked loops, radar, and communication systems. The overall performance of these systems is often limited by the VCO's performance. Optimizing system performance requires a complete understanding of the VCO's characteristics.

Problem

Most applications require that the VCO operate at one frequency, then be quickly switched to another frequency where it will stay for some time. The key VCO parameters here are frequency overshoot, settling time, and post-tuning drift. Depending on how often a VCO is switched, these parameters will change. Thus, to properly characterize a VCO, it must be tested in the same manner it will be used. Conventional test techniques are cumbersome and temperature sensitive, require repetitive signals or lack sufficient measurement resolution in single-shot modes.

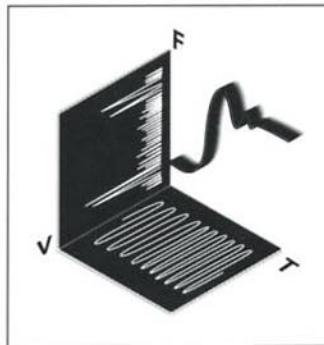
Solution

An easy to use, single pass technique for displaying the VCO's output frequency versus time is needed. This is exactly what the HP 53310A Modulation Domain Analyzer does. It makes rapid, high resolution frequency measurements in a back-to-back manner. This yields a full analysis of a VCO's step response in a single pass. For applications that require repetitive stepping of the VCO, the HP 53310A's real-time measurement processing and rapidly updated display clearly show the step-to-step variations.

The Modulation Domain Gives You a New Way to View Your Complex Signals

Better ways to analyze your complex signals don't come along often. Now Hewlett-Packard brings you the Modulation Domain - a way of looking at frequency or time interval measurements that directly and clearly reveals both intentional and unintentional modulation.

For frequency analysis, it's the missing piece of the puzzle. The Time Domain shows you amplitude (voltage) vs. time. The Frequency Domain gives you amplitude vs. frequency. The Modulation Domain plots frequency vs. time - an intuitive and insightful way of examining your signal's dynamic frequency modulation.



For timing measurements, the Modulation Domain's view of time interval vs. time allows you to both see and quantify timing jitter directly - taking you one step beyond the Time Domain's qualitative view.

Related Applications

- Switching characterization of frequency synthesizers and direct digital synthesis components
- Frequency agile radio and cellular phone carrier-switching analysis
- Turn on characterization of YIG oscillators
- Oscillator short and long term drift analysis
- Tuning linearity and modulation bandwidth on VCOs

For more information, call your local Hewlett-Packard Test and Measurement Sales Office listed in your telephone directory.

December 1990

© Copyright 1990
Hewlett-Packard Company
Printed in U.S.A.
5091-0387E