Agilent AN 1200-7
Simplified Analysis of Phase Locked Loop
Capture and Tracking Range
Application Note

Agilent Technologies 53310A
Modulation Domain Analyzer

Direct Analysis of Phase-Locked Loops

Situation
Phase-Locked Loops (PLLs) are common yet essential circuits in many electronic applications. They may be used as narrowband filters to recover signals embedded in noise, or for synchronizing digital transmissions in communication applications. Other traditional uses include frequency synthesizers, demodulators, multipliers, dividers, and many more.

Problem
The analysis of PLLs is challenging. Components can be assessed individually, but closed loop characterization is often difficult to obtain. Both transient and dynamic frequency response are of interest to the designer. Fast and direct analysis of parameters such as capture and tracking range are needed to improve characterization and shorten design cycles.
Solution
The Agilent Technologies 53310A Modulation Domain Analyzer’s ability to measure and display a signal’s continuous frequency over time makes dynamic frequency analysis of PLLs easy. A direct measure of the PLL’s capture and tracking range is obtained by monitoring the output frequency while the PLL is forced to go in and out of lock. A quick and simple view of the PLL’s capture and tracking range can now be displayed in one direct measurement.

Related Applications
- Carrier lock time and switching of cellular radios
- Switching characterization of PLLs, VCOs, and frequency synthesizers
- Frequency profile PLL output during acquisition
- Clock recovery circuit analysis
- Velocity profiles of motion control systems

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5966-4480E