Phase Noise Performance Stabilization of PLL System under Dynamic Vibration Conditions for Airborne Applications

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Abstract

The purpose of this paper is to disclose the design techniques and experimental methodologies for the stabilization of X-band phase locked loop (PLL) phase noise performance during random vibration environment. Phase noise performance of PLL based unit under test (UUT) is very prone to disturbance occurred in random vibration profile frequency spectrum. UUT self-resonance plays vital role in occurrence of disturbance in random vibration profile. The stabilization of phase noise performance during dynamic (random vibration) condition is achieved by following methodologies, i.e. vibration-isolator compensation technique, purification tactic of crystal reference of PLL and spatial location analysis for mounting of crystal reference. Spatial analysis helps to filter out UUT self-resonance from frequency spectrum of random vibration profile which ultimately leads to reduction of frequency resonance pickups during random vibration testing.

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