Phase Noise Measurement in Crystal Oscillators

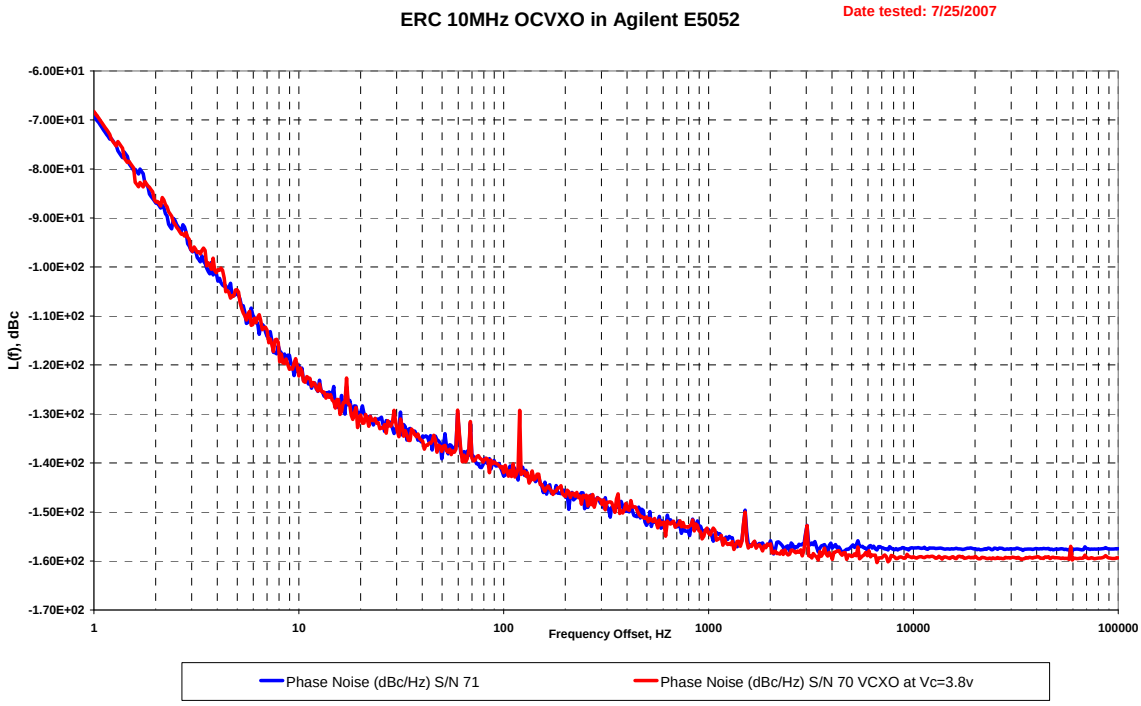
APPLICATION NOTES QTAN-107

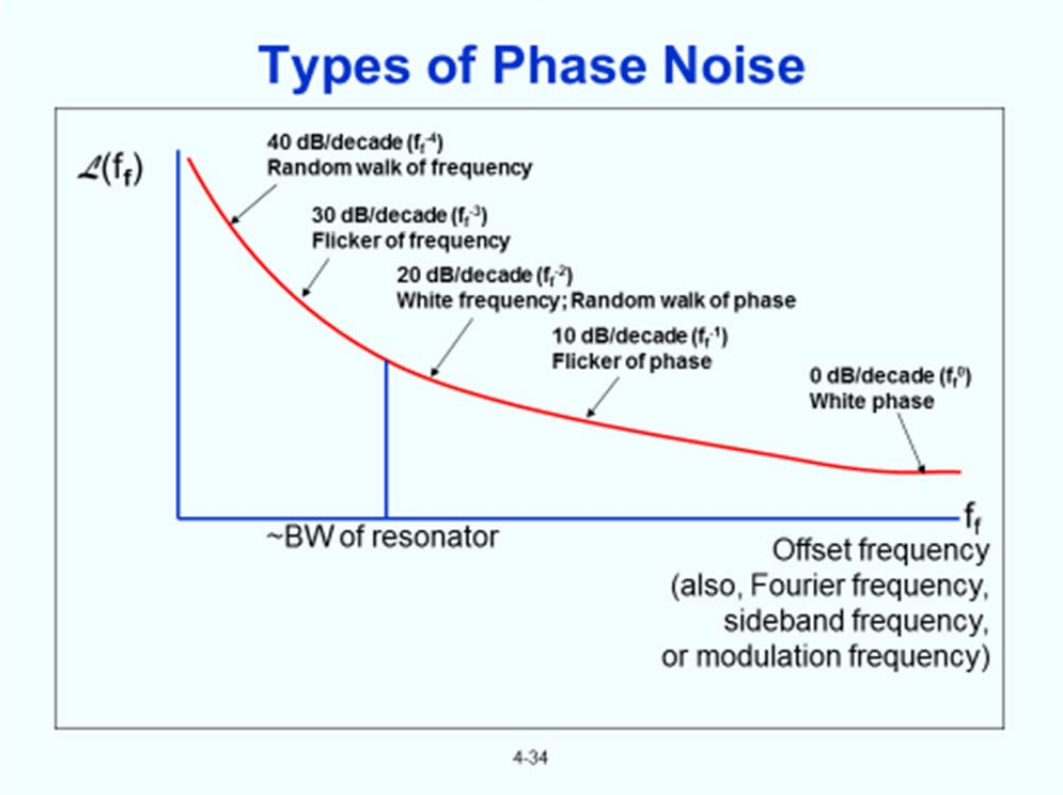
AGILENT E5052A Signal Source Analyzer
Application Notes

The E5052A employs a proprietary cross-correlation measurement method, using measurement channels with independent reference sources and performing analysis on the two-channel signals. If the two signals are correlated and vector summed, the vector (amplitude and phase) of the two signals will be emphasized. Cross-correlation can remove the limitation imposed by the noise floor of a reference source, allowing measurements of extremely low noise levels.

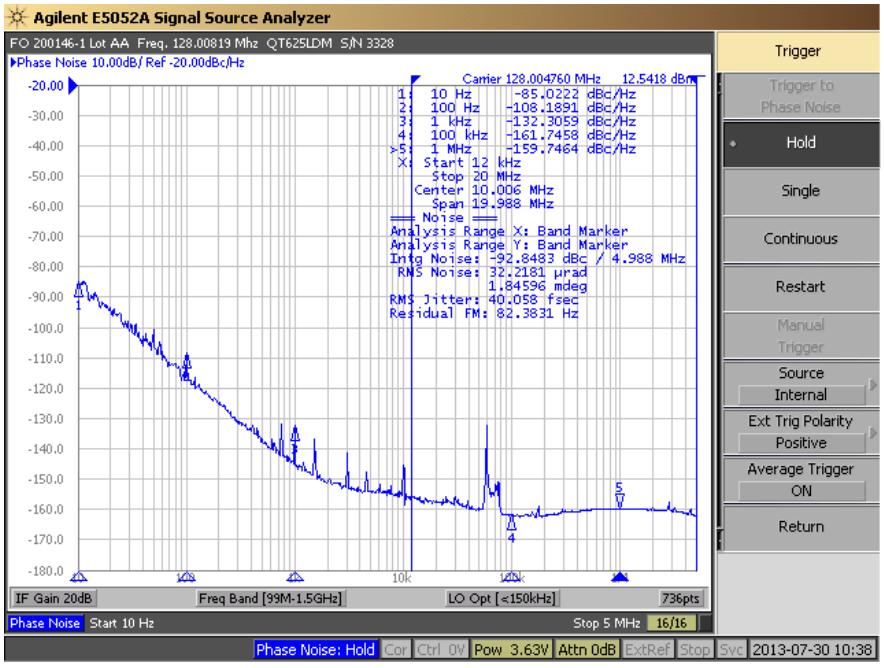
The E5052A performs from 1 to 10,000 correlations to lower the noise floor. The phase noise sensitivity improves with the number of correlations. For example 10 correlations yield a 5-dB improvement in the noise floor improvement, while 10,000 correlations provide a 20-dB improvement in the noise floor.
However, the larger the number of correlations required longer test time.
Currently, Q-Tech used **16** correlations in test.
The best noise sensitivity the E5052A can provide is -178dBc/Hz.

This "Golden unit OCXO 10MHz measured on E5052A was used in set-up verifications.

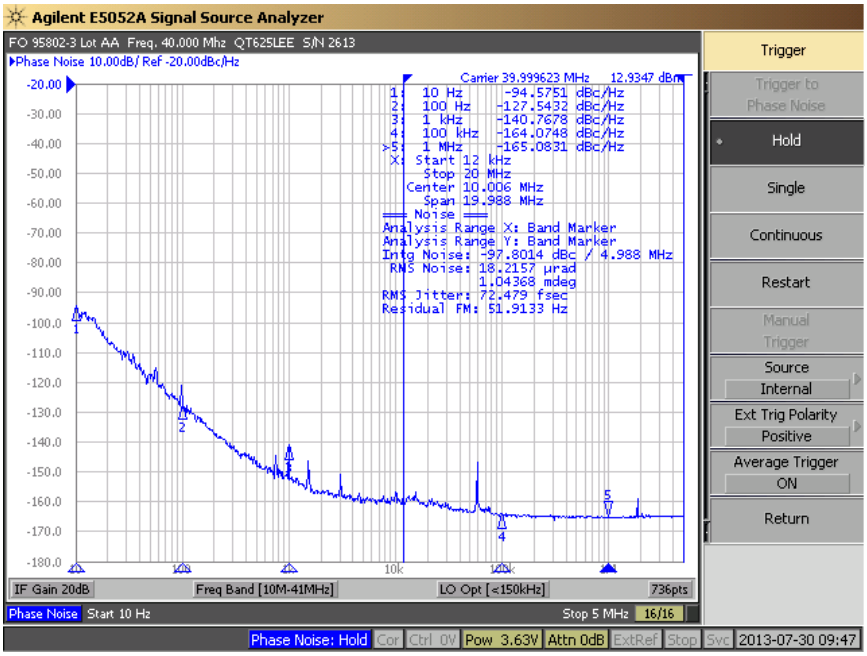




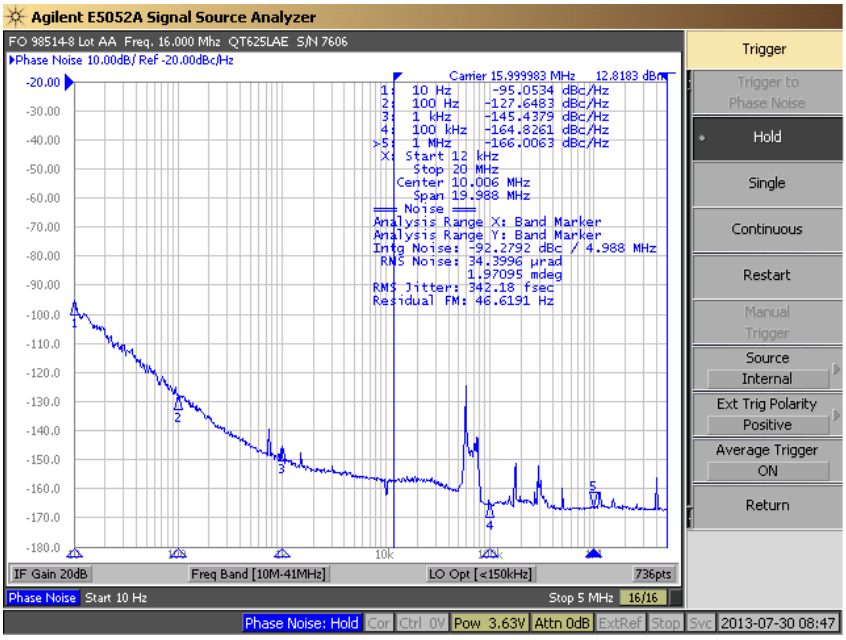
QT625LDM-128MHz Phase Noise



QT625LEE-40MHz Phase Noise



QT625LAE-16MHz Phase Noise



QT625CE2E-12MHz Phase Noise