Glossary of Oscillator and Amplifier Terminology

AFC (Automatic Frequency Control) - Voltage tunability allows the user to provide an analog voltage input to the oscillator to provide “correction” tuning. This input may also be used with an external phase-locked circuit with digital inputs.

fixed tuning – This type of oscillator provides a single output frequency to agreed-upon specifications. In some models, a fine tune adjustment is provided for long-term readjustment due to aging characteristics and frequency drift. The fixed tuned oscillator gives the best performance with respect to temperature stability, microphonic induced FM noise, and overall efficiency.

frequency stability with temperature - The frequency drift of an oscillator with change in temperature (MHz/°C) is a measure of its frequency stability. Various frequency stabilization techniques are provided and relate to the absolute frequency required and tuning options selected. The frequency stability of a free-running oscillator is determined by the Q of the cavity and the temperature characteristics of the materials used in the design.

FM noise – A.) Residual FM Noise, B.) SSB Phase Noise or C.) Phase Jitter. FM noise requirement is expressed in terms of either a total signal-to-noise ratio measured in a given bandwidth centered at some offset from the signal frequency of a signal sideband or the phase-noise-to-signal ratio per Hz bandwidth specified over a wide range of offset frequencies. Typical free-running and phase-locked noise characteristics are shown in oscillator and amplifier product capability section.

harmonic suppression – The measured rejection of unwanted signals which are harmonically related to the output frequency. Measured in dBc (dB below carrier level). Harmonic band pass or low pass output filters may be added as options, if required.

load pulling – Frequency pulling is the amount of frequency change as a result of change in load VSWR or phase angle associated with the VSWR. It is a measure of stability of the oscillator with external load, and is determined by the Q of the oscillator. An isolator in front of the oscillator significantly reduces load pulling, and hence, enhanced the stability with load variation. Generally, all oscillators are designed to work into a load VSWR of up to 1.5:1 max., any phase. If load VSWR is greater, a load isolator should be specified.

mechanical tuning – Most of the oscillator types are available with some type of mechanical tuning. Tuning types available are: (1) micrometer tuning, (2) recessed screwdriver-tuning shaft, accessible from outside of unit. All mechanical tuning methods may degrade the frequency stability, noise and microphonic performance used in the tuning mechanism. The amount of degradation depends upon the type of tuner used, the precision of tolerance, and the level of mechanical vibration and/or shock.

modulation rate – The rate at which the output frequency can be modulated with an input modulation signal. The frequency tuning mechanism (voltage tuned oscillator, bias-tunable versus varactor-tunable) has a major impact on maximum modulation rate achievable.

phase-locked oscillator - The output signal stability is directly related to the stability of the reference signal. The reference signal may be external to the oscillator, or an internal crystal oscillator reference may be provided.

power stability vs. temperature – The output RF power of an oscillator can vary relative to input voltage, load VSWR, temperature changes, and as a result of tuning. The change in output power only due to temperature is generally expressed in dB/°C, and ranges between 0.01 to 0.05 dB/°C.

pushing – Frequency pushing is the amount of frequency change proportional to change in input voltage, usually expressed in (MHz/Volt).

spurious responses – Spurious frequencies are unwanted signals present at the oscillator output as the result of harmonics bias supply, phase-locked circuits, or undesirable internally generated frequencies. Spurious response is usually specified in terms of dBc (dB below output carrier).

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tuning resolution – The absolute instantaneous frequency to which an oscillator may be tuned or set.

tuning range – Oscillators can be tuned in a number of ways: (1) **fixed**, (2) **mechanica**l, (3) analog **voltage** (AFC), (4) digital (phase-locked types). See definitions on this page for individual tuning types.

voltage tuning – Several models of oscillators are provided with a voltage tuning option. The maximum amount of voltage tuning available depends on center frequency and output power. Tuning can be achieved either through a varactor or by varying the diode bias voltage. For AFC (Automatic Frequency Control) applications, the voltage tuning provided must be wider than the free-running temperature stability of the oscillator. The effect of varactor tuning on noise or the temperature stability varies proportionally to the frequency tuning range specified