

Mini-Circuits®

Phase Detectors

Mini-Circuits high efficiency phase detectors are the only units in the world offering a figure-of-merit greater than 125.

The figure-of-merit M or efficiency of a phase detector can be defined as the ratio of maximum DC output voltage (in mV) divided by the RF power (in dBm). The maximum DC output from these units is 1000 mV with +7 dBm applied to the LO and RF ports. Thus, its figure-of-merit M is 143, which indicates a highly efficient phase detector. DC offset is typically 400 micro volts. For comparison, a double balanced mixer used as a phase detector offers 350 mV DC output with the same LO and RF inputs for a figure-of-merit M of 50. So when your system requires a high output phase detector, specify Mini-Circuits' phase detectors, available in a wide variety of package styles.

Modern Definition

phase detector

Provides a DC output voltage proportional to the difference in phase between two RF input signals. A double-balanced mixer can perform as a phase detector when the LO and RF signal inputs are at the same frequency.

dc offset

The small amount of voltage present at the output when there should actually be zero voltage, such as when only one input is present, or when the two RF input signals are 90° out of phase. This offset voltage is due to slight mismatches in the diodes and/or imperfect balance in the transformer windings.

maximum dc output

from a phase detector occurs when the RF and LO signals are in phase or 180 degrees out-of-phase.

figure-of-merit, M

A method for defining the efficiency of a phase detector. It is the ratio of maximum DC output voltage, in mV, divided by the RF power in dBm.

frequency range spec

Refers to the frequency range of operation of the phase detector, such that the figure of merit decreases to 75 percent of its mid-band value.

scale factor

The phase detector output measured in mV per degree in the approximate linear range of operation, 0 to 57.3° , or 1 radian.