Mixers

High IP3

Connectorized, 1-3500 MHz
Surface Mount, 1-3500 MHz

Double Balanced
DC Coupled I.F.

Connectorized, .01-4000 MHz
Surface Mount, 0.1-7000 MHz

Triple Balanced
AC Coupled I.F.

All Packages, .05-4200 MHz

High Frequency

Connectorized, 2.0-18.0 GHz
Surface Mount, 2.0-18.0 GHz

CIRCUITS

Double Balanced Mixer
A double balanced mixer (DBM) employs the use of a well matched quad-diode ring with two balanced transformers (fig. A). Because of this, a DBM enjoys the inherent advantage of high port to port isolation. The IF port in Pulsar's DBM design is DC coupled to the diodes.

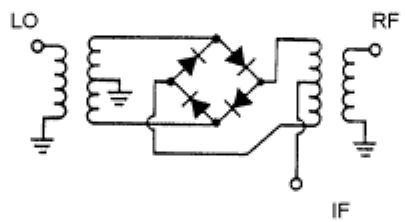


Figure A

Triple Balanced Mixer
A triple balanced mixer uses two well matched quad-diode rings (fig. B). Because of this, they offer wider LO/RF bandwidths than DBM designs. But more importantly, the TBM offers a higher dynamic range and lower distortion. Pulsar Microwave's line of High Intercept Point (IP^3) mixers, the recommended choice for use in wireless communications systems, are triple balanced mixers.

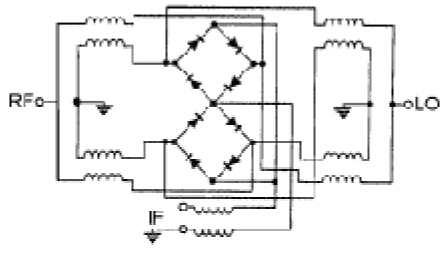


Figure B

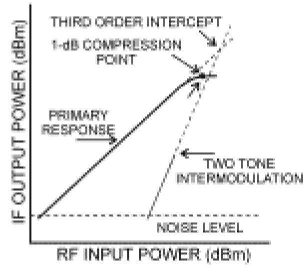
DEFINITIONS

The mixer is a fundamental building block in many RF/MW systems and is a standard component in wireless communications systems. In most cases, the mixer plays a big role in defining the overall performance of these systems. Therefore, understanding the mixer and its specifications is critical for selecting the proper model to best optimize system performance.

Third Order Intercept Point - IP^3

The third order intercept point is the most critical specification of a mixer when being used in wireless communications. It is a fictitious number used as a figure of merit to describe the level of performance of a mixer. IP^3 is defined as the point of intersection of the extrapolation of the linear primary response of the mixer and the two tone intermodulation response.

$(F_{LO} \pm (2F_{RF1} \pm F_{RF2}), (2F_{RF2} \pm F_{RF1}))$.



Dynamic Range

The dynamic range of a mixer defines the range of power over which it provides useful operation. The upper limit of the dynamic range is defined as the 1dB Compression Point of the mixer. The lower limit is defined as the Noise Figure of the mixer. Since Noise Figure is typically 1 dB above the conversion loss and the 1 dB Compression Point is controlled by the LO drive level, to obtain the greatest dynamic range you would need to use a high LO drive level mixer with very low conversion loss.

1 dB Compression Point

As the RF input power of a mixer increases, the IF output level also increases in a linear fashion. However, at a certain input power level the IF no longer follows its linear progression. At this point the IF starts to increase at a lower rate until the output power becomes fairly level. The RF level at which the IF deviates 1 dB from its linear progression is defined as the 1 dB Compression Point.

LO Drive Level

This is the level of power needed to be supplied to the mixer by the local oscillator to properly drive the mixer diodes. The LO drive level plays a critical role in determining the IP^3, 1 dB Compression Point and Dynamic Range of a mixer. For higher performance applications, Pulsar recommends as a minimum the use of a +17 dBm level mixer.

Conversion Loss

Conversion loss defines the loss of power between the input RF signal and the signal sideband output IF signal during the frequency translation. Since power loss is critical in most system designs, a low loss device is most desirable.

Isolation

Isolation defines the amount of power which is 'leaked' from one port to another. It is the level of attenuation of a signal injected into a specific port when measured at a different port. The higher the isolation specification, the less port to port 'feed thru' will occur.

DC Polarity

DC polarity defines the polarity of the IF voltage when a mixer is used as a phase detector.