Abstracts

Wideband Varactor Harmonic Multipliers

The basic circuit criteria for designing efficient narrowband harmonic multipliers are well established. For the case of the shunt-connected diode, ideal falters are usually specified that pass desired harmonics, reject others by having an infinite input impedance, and provide zero impedance paths for idler harmonics. As the bandwidth of allowable input frequencies is increased, it is desirable to maintain these ideal conditions. The stopband input impedance of most filters is entirely reactive and must change continuously with frequency. Since the ideal filter conditions call for the input impedance to be either infinite or zero, the optimum conditions can be obtained only at discrete frequencies. As in any practical situation, the ideal conditions can be approximated but, in general, bandwidths in excess of 10 percent become difficult to achieve. A common procedure for obtaining wider bandwidths is to use bandpass filters that have sharp cutoff characteristics. This guarantees that the real part of the stopband input impedance is small, but does not provide the ideal input conditions required. In fact, for most designs, interaction between the filter input impedances results in undesirable loading of the varactor and is a bandwidth-limiting factor.

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