Practical Session 2
Transformers and Mixers

Aim

To investigate the behaviour and frequency response of RF transformers and Double Balanced Mixers and to reinforce the theory of transformers and mixers, described in Chapter 3 "RF Transformers" and Chapter 5 "Mixers" of the RF Electronics Lecture notes by C. J. Kikkert and distributed through AWR Corp.

Procedure

1 For the transformer core given, calculate the Leakage and Magnetising Inductance of a trail winding on the transformer. Hence make two transformer cores suitable for use in a double balanced mixer, to have a 50 Ω impedance at 1 MHz.

2 Measure the frequency response of the transformer, when connected as 1:1 turns ratio isolation transformer.

3 Match 4 Shottky Barrier Diodes and construct the double balanced mixer.

Measure the useful frequency range of the mixer and at the low, mid and high frequency range:

Measure the local oscillator isolation.

Measure the unwanted frequency components.

Measure the conversion loss.

Plot the spectrum for the mixer used as a Double Sideband Modulator.

Investigate the spectra of the mixer at the harmonics of the local oscillator.

Equipment required

RF Transformer cores, like Neosid 28-512-31 cores 12.7mm dia x 6.4mm high torroid with F14 ferrite and a 6.4 mm dia hole. 2 cores per mixer.

4 matched shottky-barrier diodes, PCB with BNC connectors for mounting mixer. See Fig 34 of Chapter 5 "Mixers" for suitable example. Double sided PCB with 3 BNC connectors soldered to it can also be used.

RF Signal Generator (up to 100 MHz) >+7dBm output, Spectrum Analyser, Cathode Ray Oscilloscope, Low frequency (100Hz-1MHz) Sinewave generator (50 Ω output).

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