Matrix Converter

In the last few years the need for variable frequency A.C supply has grown much in industries. This is due to the fact that in A.C machines the simplest way to control the speed is by changing the frequency.

This work deals with implementations of the Single-Phase Matrix Converter (SPMC) as a direct AC-AC converter subjected to passive load conditions without the need of intermediate dc link. It proposed to design the converter for 12.5, 25, 100 and 150 Hz output frequencies.

The implementation of this project is done with the use of Spartan 3E FPGA. This device is selected for the implementation of this work because of the flexible design tools form Xilinx. The ISE web Pack software is a free evaluation IDE form Xilinx which supports Code development, Simulation, Pin assignment and Constraint verification. The USB based programming is done using a third-party tool, the Digilent ADEPT 2.0.

The bi-direction switches of this project are created from common n-channel MOS switches numbered IRFZ44 in combination with four rectifier diodes. These MOSFET's can handle a forward current of up to 50 A. They have high current handling capacity and Low on state resistance, which ensures very low switching losses even at high frequencies. An optical isolation stage using PC817 IC is present in the circuit it helps to isolate the high power circuit for the low powered VLSI unit.