

INTRODUCTION

Inkjet printing is a mature technique for ~~colourful~~ colorful graphic arts. It ~~exels~~ excels at customized, large-area, high-resolution, and small-volume production. With the developments in conductive, dielectric, and even semi-conducting inks, there ~~is~~ is potential for large area ~~ink jet-inkjet~~ inkjet electronics fabrication. Passive radio frequency devices s can benefit greatly from a printing process, seeing as the size of ~~those~~ these devices is defined by the frequency of operation. The large size of radio frequency passives means s that they either take up expensive space ~~“on chip”~~; or ~~they~~ are fabricated on a ~~seperate~~ separate lower cost ~~substrate-substrate~~ substrate and ~~some-how-somehow~~ somehow bonded to the chips. This has hindered cost-sensitive high volume Applications such as radio frequency identification tags. While ~~many-much~~ many work has been undertaken on inkjet-printed ~~conducters~~ conductors for passive ~~antennaes~~ antennas on microwave substrates and even paper, little work has been done on the printing of the dielectric materials aimed at radio frequency passives.

Both the conductor and dielectric needs s to be integrated to create a multilayer inkjet printing process that is capable of making quality passives ~~like-such as~~ like-such as capacitors and inductors. Three inkjet-printed dielectrics are investigate in this thesis: a ceramic (alumina), a thermal-cured polymer (poly 4 vinyl phenol), and a UV-cured polymer (acrylic based). Both a silver nanoparticle ink ~~as-well-as-and~~ as well as a custom in-house formulated particle-free silver ink ~~are-was~~ are explored for the conductor. The focus is ~~in-on~~ in passives, mainly capacitors and inductors. Comparing ing to low frequency electronics, radio frequency components have additional ly sensitivity with regard ing to skin depth of the conductor and; surface roughness, as well as dielectric constant and loss tangent ~~from-of~~ from the dielectric. ~~Those-These~~ These concerns are investigated with the aim ~~at~~ at of making the highest quality components possible and ~~to~~ to understanding ing the current limitations of inkjet-fabricated radio frequency devices.