

Declaration

I hereby declare that the work presented in this Thesis titled "*Study and Realization of Microwave & Millimeter-wave Circuits using Substrate Integrated Coaxial Line Technology (SICL)*" submitted to the Indian Institute of Technology Jodhpur in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy, is a bonafide record of the research work carried out under the supervision of *Dr. Soumava Mukherjee*. The contents of this Thesis in full or in parts, have not been submitted to, and will not be submitted by me to, any other Institute or University in India or abroad for the award of any degree or diploma.

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Certificate

This is to certify that the Thesis titled "*Study and Realization of Microwave & Millimeter-wave Circuits using Substrate Integrated Coaxial Line Technology (SICL)*", submitted by *Idury Satya Krishna (P17EE003)* to the Indian Institute of Technology Jodhpur for the award of the degree of *Doctor of Philosophy*, is a bonafide record of the research work done by him under my supervision. To the best of my knowledge, the contents of this report, in full or in parts, have not been submitted to any other Institute or University for the award of any degree or diploma.

Dr. Soumava Mukherjee
Ph.D. Thesis Supervisor

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List of Symbols

Symbol	Description
E	Electric Field Intensity
H	Magnetic Field Intensity
k	Wave Number
λ	Number of temporal frames used for bit-requirement estimation
c	Speed of Light in Free Space
α	Attenuation Constant
β	Propagation Constant
ϵ_r	Relative Permittivity of the Dielectric
$\tan\delta$	Loss Tangent of the Dielectric
σ	Electrical Conductivity

List of Abbreviation

Abbreviation	Full form
<i>SICL</i>	Substrate Integrated Coaxial Line
<i>SIW</i>	Substrate Integrated Waveguide
<i>TE</i>	Transverse Electric
<i>TM</i>	Transverse Magnetic
<i>Quasi – TEM</i>	Quasi -Transverse Electromagnetic
<i>PCB</i>	Printed Circuit Board
<i>PEC</i>	Perfect Electric Conductor
<i>SNR</i>	Signal to NoiseRatio
<i>FCC</i>	Federal Communications Commission
<i>HPBW</i>	Half-power Beam Width
<i>Q</i>	Quality Factor
<i>RF</i>	Radio Frequency
<i>CPW</i>	Coplanar Waveguide
<i>GCPW</i>	Grounded Coplanar Waveguide
<i>GSM</i>	Bits per second
<i>WCDMA</i>	Cumulative Distribution Function
<i>LTCC</i>	Low Temperature Co-fired Ceramic
<i>WLAN</i>	Wireless Local Area Network
<i>5G</i>	5 th Generation
<i>WBAN</i>	Wireless Body Area Network
<i>WPC</i>	Wireless Planning Commission
<i>HMSIW</i>	Dynamic Indexing
<i>HMSICL</i>	Half-Mode Substrate Integrated Waveguide
<i>QMSICL</i>	Quarter-Mode Substrate Integrated Waveguide
<i>IoT</i>	Internet of Things
<i>SMA</i>	Sub-miniature Version A
<i>FR</i>	Frequency Ratio
<i>VNA</i>	Vector Network Analyzer
<i>NR</i>	New Radio
<i>HFSS</i>	High Frequency Structural Simullator
<i>DGS</i>	Defected Ground Structure
<i>FBW</i>	Fractional Bandwidth
<i>UC</i>	Unit Cell
<i>WiMAX</i>	Worldwide Interoperability for Microwave Access
<i>PCS</i>	Personal Communication Service
<i>WiBro</i>	Wireless Broadband
<i>PTH</i>	Plated Through Hole
<i>FEM</i>	Finite Element Method
<i>UMTS</i>	Universal Mobile Telecommunication System
<i>LNA</i>	Low Noise Amplifier
<i>PA</i>	Power Amplifier Photographic Experts Group
<i>SMD</i>	Surface Mount Device

Abbreviation	Full form
<i>LPF</i>	Low Pass Filter
<i>BLC</i>	Branch Line Coupler
<i>LTE</i>	Long-Term Evolution
