MATERIAL PROPERTIES FOR MOS CAP EM SIMULATION

Gold Metalization 100MicroInch: 2.44uohmCm
Si: 10uOhmCm

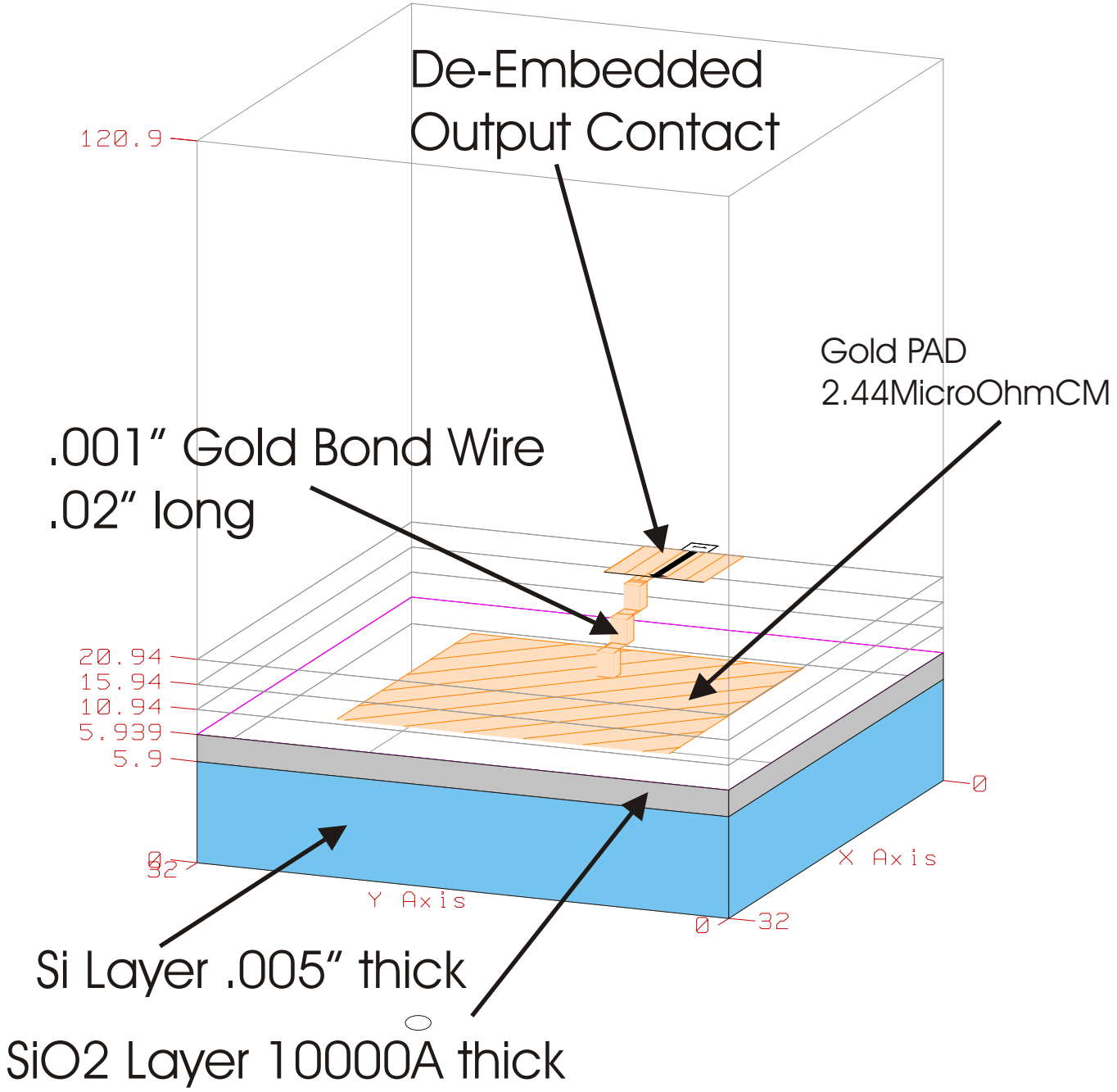
Silicon Electrical Properties

Density 2.33 gm/cc
Melting Point 1420 C
Thermal Conductivity 163.3 Wm-1K-1 at 273K
Thermal Expansion 4.15 x 10-6/ C
Hardness Knoop 1150
Specific Heat Capacity 703 J Kgm-1K-1
Dielectric Constant 13 at 10GHz
Youngs Modulus (E) 131 GPa
Shear Modulus (G) 79.9 GPa
Bulk Modulus (K) 102 GPa
Elastic Coefficient C11 = 167 C12 = 65 C44 = 80
Apparent Elastic Limit
Poisson Ratio 0.266

Silicon Dioxide Electrical Properties

Silicon Dioxide (SiO2)
Properties
Crystal structure: amorphous for most VLSI applications
Atomic Weight 60.08
Thermal Conductivity .014 W/cm-K
Thermal diffusivity .006 cm**2/s
Relative Dielectric Constant 3.9
Index of Refraction 1.46
Dielectric Constant 3.45e-11 F/m
Breakdown field 6e8 V/m
Atomic Density 2.27e22 molecules/cm**3
Density (dry oxide) 2.27 g/cm**3
Energy Gap ~ 9 eV
Specific Heat 1.0 J/g-K
Melting point ~1700 C
Cofficient of Thermal Expansion 5e-7 /K (lowest known material)
Electron affinity 1.0 eV

Construction of a .02"x.02" by .05"thick MOS cap



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Using EM Simulation To Model MOS-Caps

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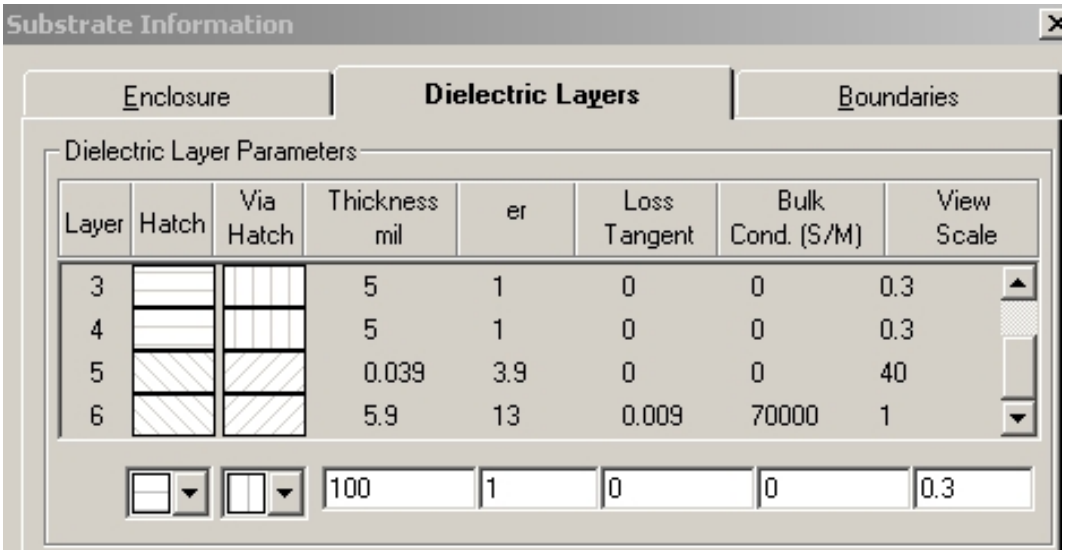
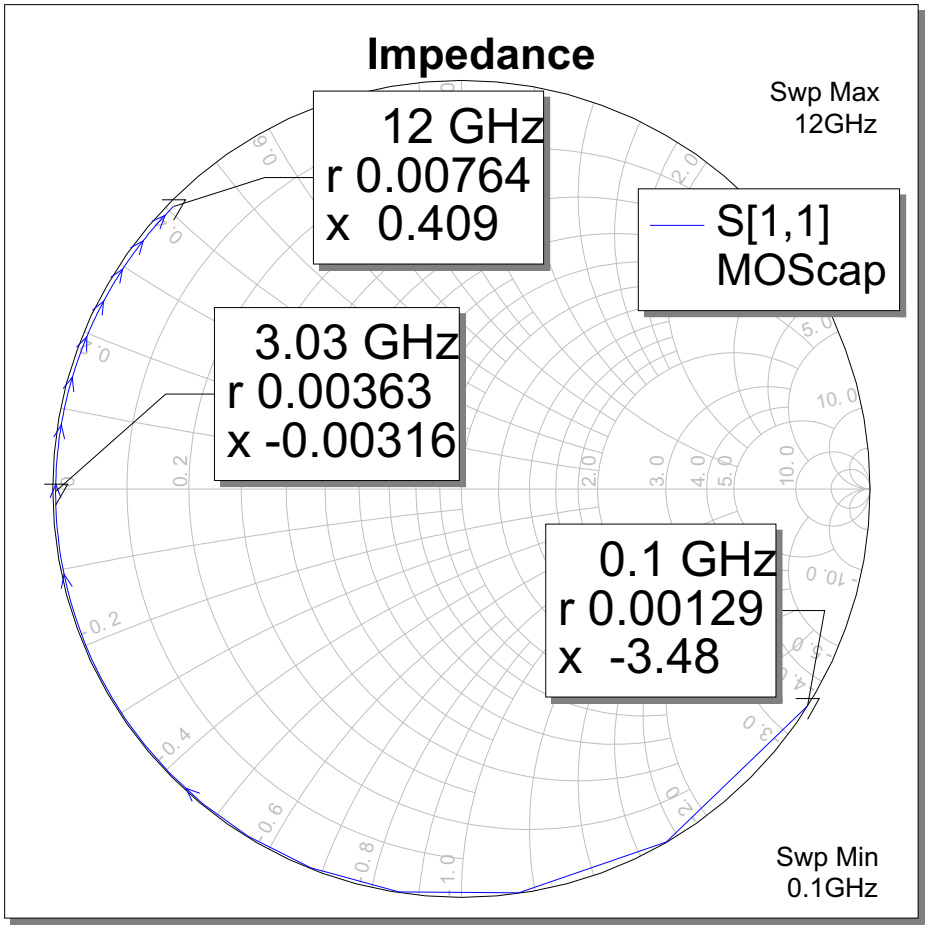


Capacitance
= 10pf @.1GHz



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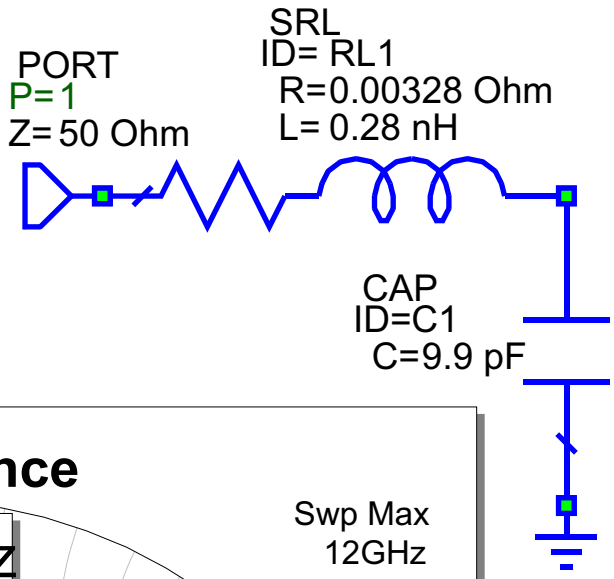
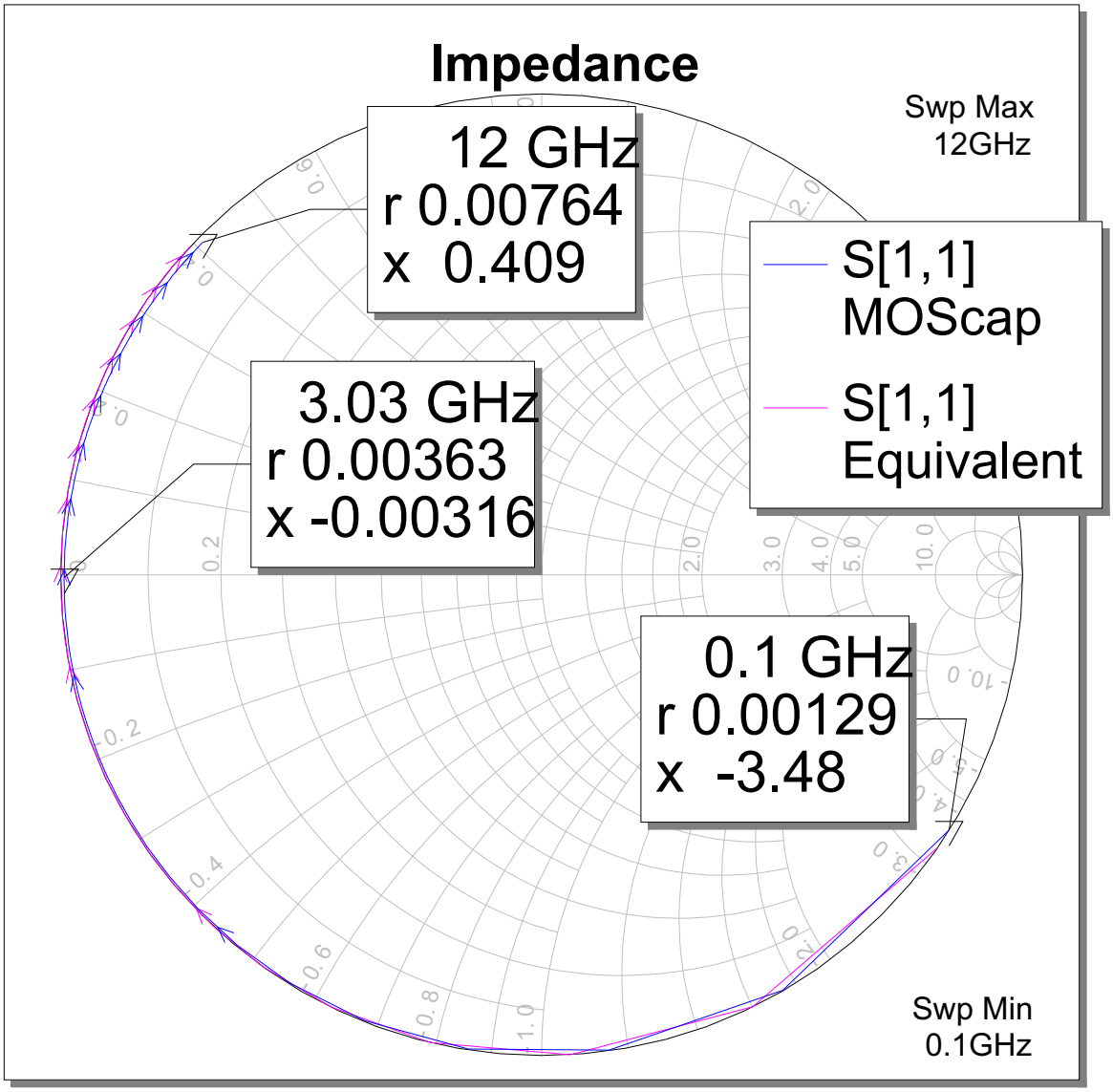
Electrical Equivalent Circuit For .02"x>02"x.005" MOScap with .001"x.015" BondWire





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