```
// VerilogA for inductors, modelopi, veriloga

`include "constants.vams"
`include "disciplines.vams"

module modelop(t1,t2);

inout t1,t2;
electrical t1,t2, p1, p2;
ground gnd;

// TECH FILE UMC130nm
real miur = 1;
real miu = 4*`M_PI *1e-7*miur;
real E0 = 8.854187817e-12;
real c = 299792458;

// Layer Oxide (Metal)
real t = 2.8e-6;
real Rsheet = 10*1e-3;
real Ro= Rsheet * t;
real toxide = 5.42e-6;
real t_M_underpass = 0.4e-6;
real toxide_Munderpass = toxide - t_M_underpass - 4.76e-6;
real Erox = 4;
real Eox =E0 * Erox;
real Ersub = 11.9;
real Esub = E0 * Ersub;
real Tsub = 700e-6;
real Sub_resistiv = 2800;

//Square Shape
parameter real nsides = 4;
parameter real k1 = 2.34;
parameter real k2 = 2.75;
parameter real f = 2.4e9;
parameter real s = 5e-6;
parameter real dout = 1.02336158e-3;
parameter real nturns = 1.5;
parameter real w = 1.005e-5;

//Calcs
real din = dout - 2*nturns*w - 2*(nturns-1)*s;
real davg = 0.5 * (din + dout);
real rox = (dout - din) / (dout + din);
real Ls = (nturns**2) * davg * k1 * miu / (1 + k2 * rox);

real delta = sqrt(rox/(`M_PI*f*miu));
real teff = 1 - exp(-t/delta);
real l = nsides * davg * nturns * tan(`M_PI/nsides);
real Rs = l * Ro / (w * delta * teff);

real cp = (nturns-1) * (w**2) * Eox / toxide_Munderpass;
real cox = 0.5 * l * w * Eox / toxide;
real csub = 0.5 * l * w * Esub / Tsub;
real rsub = 2 * Tsub * Sub_resistiv / (l * w);

//Connections
```

```
branch (t1, t2) bCp, bLR;

analog begin

        V(bLR) <+ I(bLR)*Rs;
        V(bLR) <+ Ls*ddt(I(bLR));
        I(bCp) <+ cp*ddt(V(bCp));

        I(t1, p1) <+ cox*ddt(V(t1, p1));
        I(p1, gnd) <+ V(p1, gnd)/rsub;
        I(p1, gnd) <+ csub*ddt(V(p1, gnd));

        I(t2, p2) <+ cox*ddt(V(t2, p2));
        I(p2, gnd) <+ V(p2, gnd)/rsub;
        I(p2, gnd) <+ csub*ddt(V(p2, gnd));

end

endmodule
```