Constants

$\mu 0 := 4 \cdot \pi \cdot 10^{-7} \cdot \frac{H}{m}$ permeability of vacuum

$c := 3 \cdot 10^{8} \cdot \frac{m}{s}$ speed of light in vacuum

$\varepsilon 0 := \frac{1}{\mu 0 \cdot c^{2}}$ permittivity of vacuum $\varepsilon 0 = 8.842 \frac{pF}{m}$

Definition of PDN square

$W := 100 \cdot \mu m$ width

$d := 100 \cdot \mu m$ distance from ground

$t := 20 \cdot \mu m$ thickness

$\rho := 1.678 \cdot 10^{-8} \cdot \Omega \cdot m$ resistivity

$\varepsilon_r := 3.3$ relative permittivity of dielectric

$df := 0.018$ loss tangent of dielectric

Calculated Values

$C := \varepsilon 0 \cdot \varepsilon_r \cdot \frac{W^{2}}{d}$ capacitance $C = 2.917841\,fF$

$v := \frac{c}{\sqrt{\varepsilon_r}}$ propagation velocity $v = 1.651 \times 10^{8} \frac{m}{s}$

$Td := \frac{W}{v}$ propagation time $Td = 605.53\,fs$

$Td = \sqrt{L \cdot C}$ relationship between propagation time and L and C

$L := \frac{Td^{2}}{C}$ inductance $L = 125.664\,pH$

$\frac{L}{2} = 62.832\,pH$ half inductance per leg

$R := \frac{\rho}{W \cdot t} \cdot W$ resistance $R = 839\,\mu\Omega$

$\frac{R}{2} = 419.5\,\mu\Omega$ half resistance per leg