

BURIED MICROSTRIP TRANSMISSION LINES
(For comparison only! Preliminary Release.)

file: bmicrost.mcd

Credits:

1ST Equation Developed by: Martin Maritena ~1985
UMR and Motorola

Formulas included in this spreadsheet:

Martin's Buried Microstrip characteristic impedance	ZBMSTRIP()
UMR's Buried Microstrip characteristic impedance	ZBMSTRIP2()
Motorola's Buried Microstrip characteristic impedance	ZBMSTRIP3()
Both UMR and Motorola defined the "Internal ER" as	ER'()

Variables names used:

B	Overall dielectric thickness
H	Trace height above ground (inch)
W	Trace width (inch)
T	Trace thickness (inch)
ER	Relative permittivity of material between trace and ground plane (dimensionless)

Variables values used:

Overall dielectric thickness	B := .063
Height above ground (in.):	H := .05
Width of trace (in.):	W := .06
Thickness of trace (in.):	T := .00134
Relative electric permeability:	ER := 4.3

Martin's Calculation and Results:

$$ZBMSTRIP := \left[43.037 \cdot \ln\left(\frac{B}{W}\right) + 5.048 \left(\frac{T}{W}\right) + \frac{106.76}{1.09 \sqrt{ER}} \right]$$

ZBMSTRIP = 49.446

UMR's Calculation and Results:

$$ER' := ER \cdot \left(1 - e^{\frac{-1.55 \cdot B}{H}} \right)$$

$$ZBSTRIP2 := \frac{56}{\sqrt{ER'}} \cdot \ln \left[5.98 \frac{H}{.8 (W + T)} \right]$$

ZBSTRIP2 = 52.683

Motorola's Calculation and Results:

$$ZBSTRIP3 := \frac{87}{\sqrt{ER' + 1.41}} \cdot \ln \left[5.98 \frac{H}{.8 (W + T)} \right]$$

ZBSTRIP3 = 69.619