

PropChar

Author: Felix Meier
Version: 1.0
Date: July 25, 2014
File: PropChar 20140717.docx

Copyright © 2014 Felix Meier GmbH. This is a proprietary document of Felix Meier GmbH. Its contents must not be disclosed, forwarded or made known in any other way to third parties.

Contents

1	Introduction	2
2	The Theory	2

Document Versions:

01.00	July 25, 2014	first draft

1 Introduction

PropChar is a tool for calculating the propagation parameters for media with specific electrical and magnetic properties.

2 The Theory

The phase velocity of an electromagnetic wave is given by

$$v_{ph} = \frac{1}{\sqrt{\mu_0 \cdot \mu_r \cdot \varepsilon_0 \left(\varepsilon_r - j \frac{\sigma}{\omega} \right)}}$$

The wavelength is

$$\lambda = \frac{v_{ph}}{f}$$

The wave number is

$$k = \frac{2\pi}{\lambda} = \frac{2\pi \cdot f}{v_{ph}} = \frac{\omega}{v_{ph}}$$

and the near field limit is simply the inverse of the wave number:

$$l_{NF} = \frac{v_{ph}}{\omega}$$

That's all !