



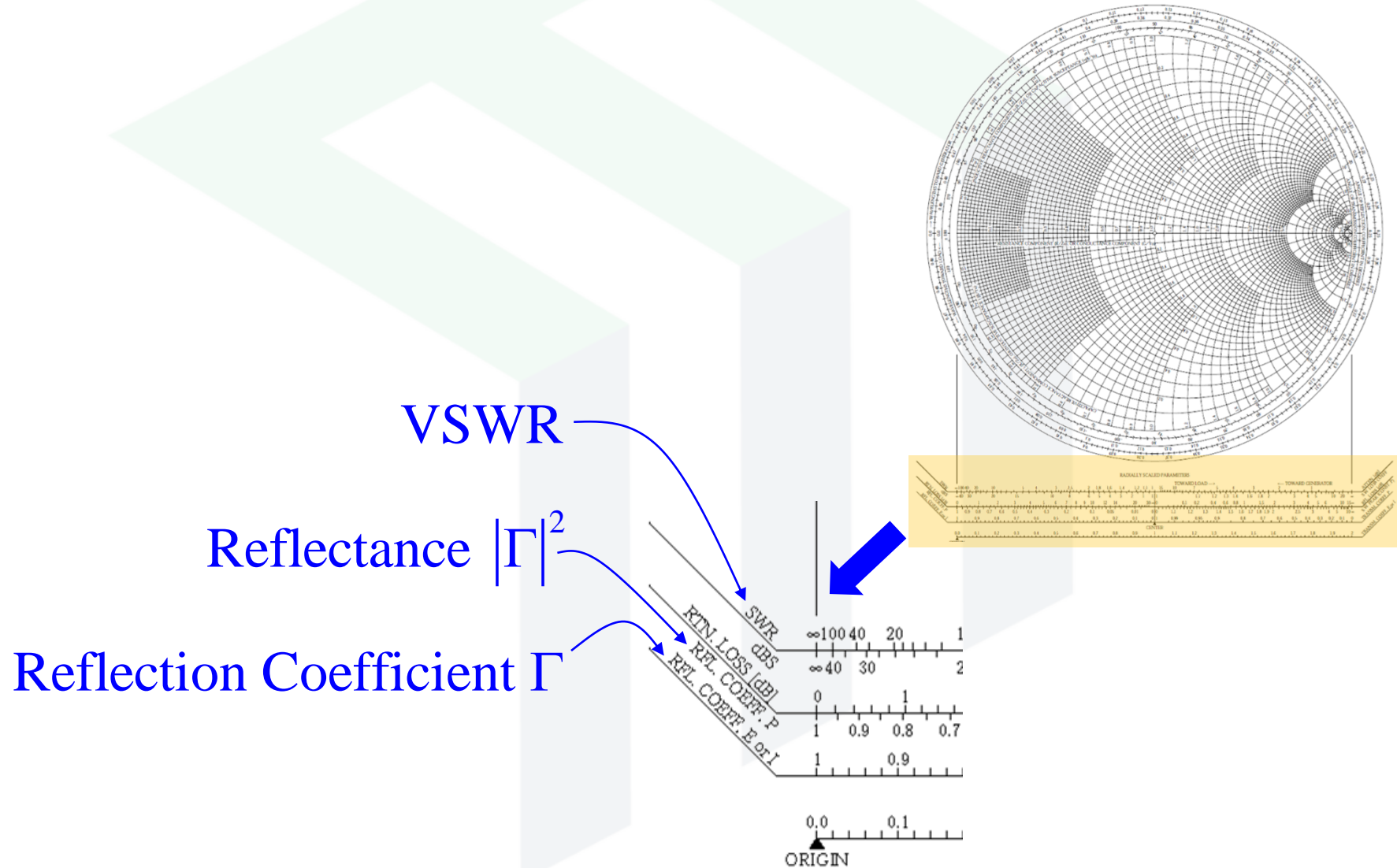
Electromagnetics:
Microwave Engineering

VSWR and Γ
on Smith Charts

Lecture Outline

- Determining the voltage standing wave ratio (VSWR)
- Determining the reflection coefficient Γ

The Horizontal Bar on Smith Charts





Determining the Voltage Standing Wave Ratio (VSWR)

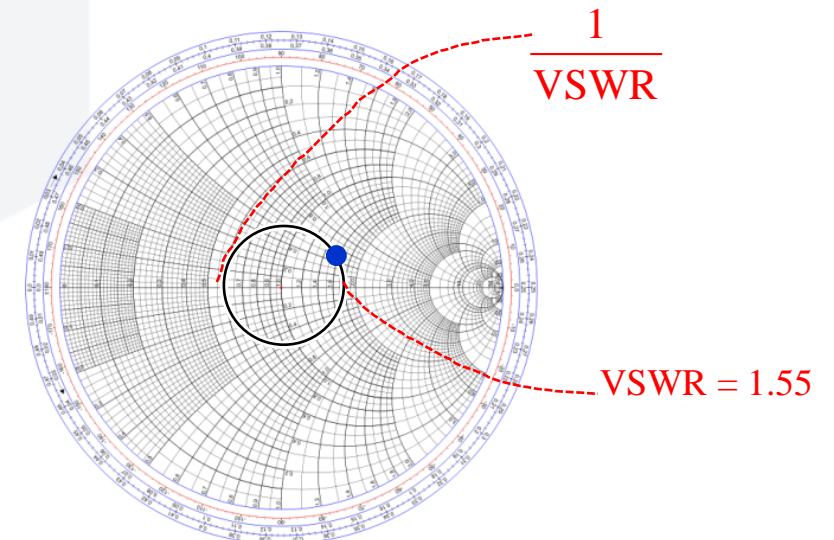
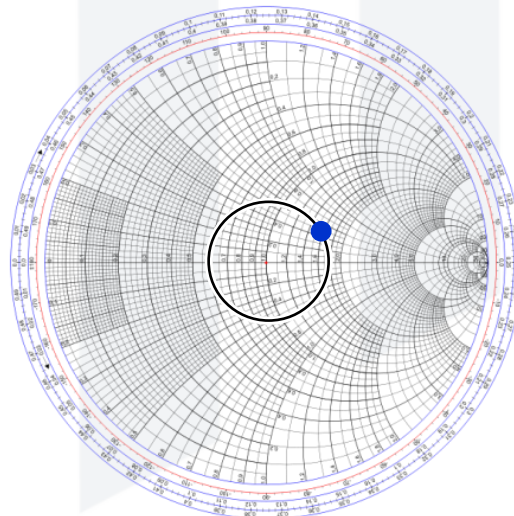
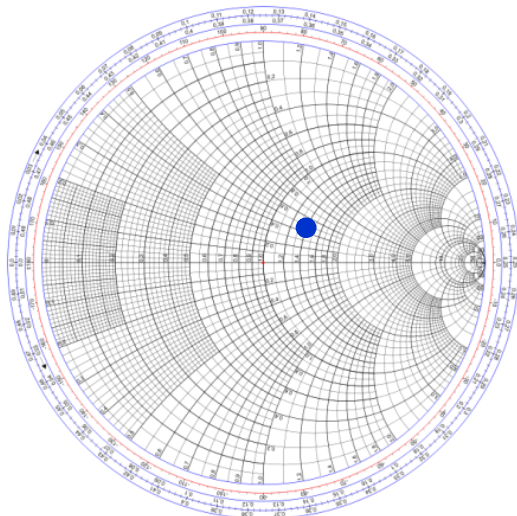
Determining VSWR

1. Plot the normalized load impedance on the Smith chart.
2. Draw a circle centered on the Smith chart that intersects this point.
3. The VSWR is read where the circle crosses the real axis on the right side.

Example #1: 50 Ω line connected to 75+j10 Ω load impedance.

$$z = \frac{Z_L}{Z_0} = \frac{75 + j10}{50} = 1.5 + j0.2$$

● impedance



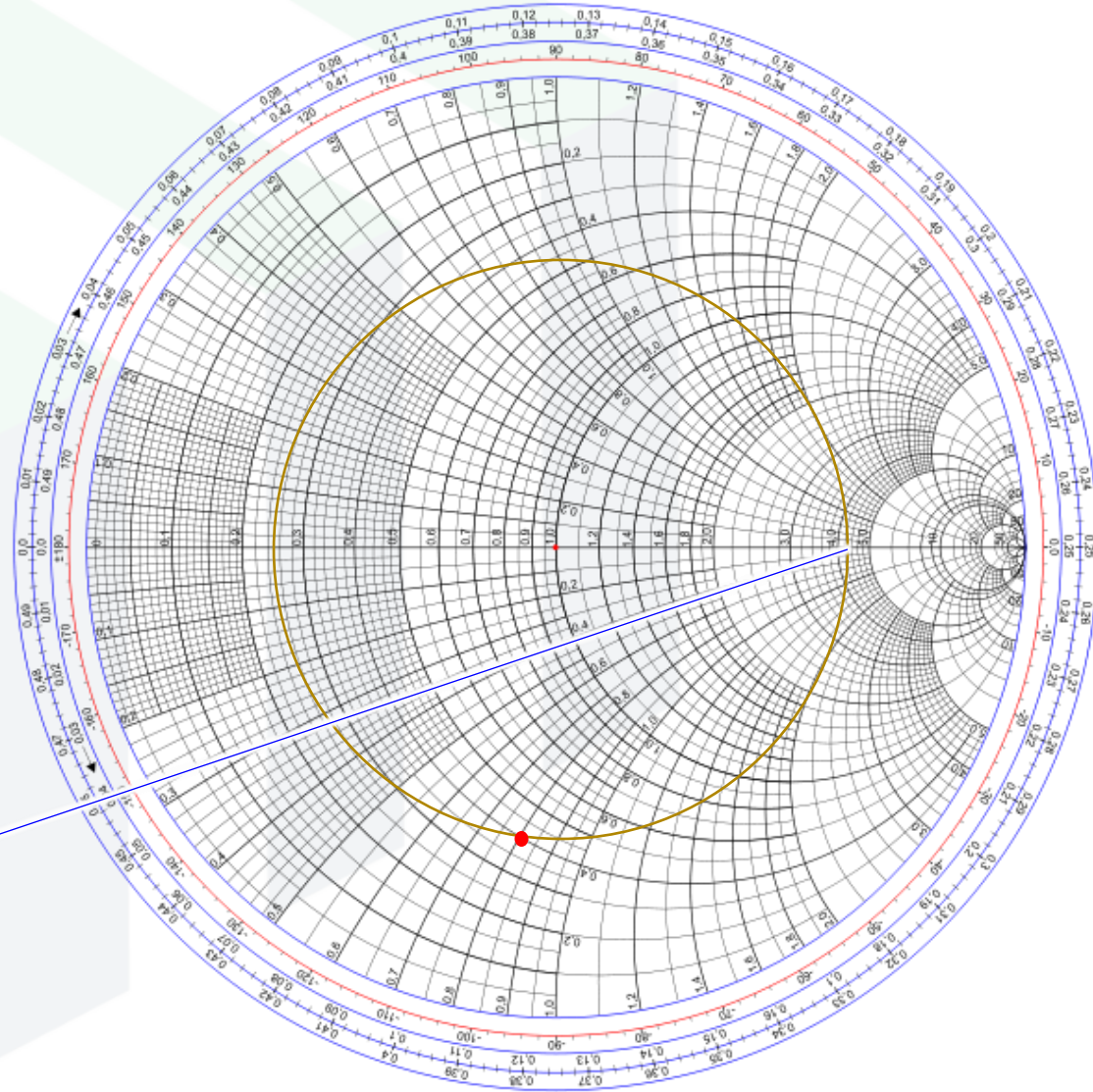
Example #2 – What is the VSWR?

A 50 Ω line is connected to 20-j40 Ω load impedance.

$$Z_{in} = 20 - j40 \Omega$$

$$z_{in} = \frac{Z_{in}}{Z_0} = \frac{20 - j40 \Omega}{50 \Omega} = 0.4 - j0.8$$

VSWR \approx 4.3



Example #2 – What is the reflection coefficient Γ ?

