

RF Components and Basic Concepts

1.19 - Smith Chart

What is Smith Chart ?

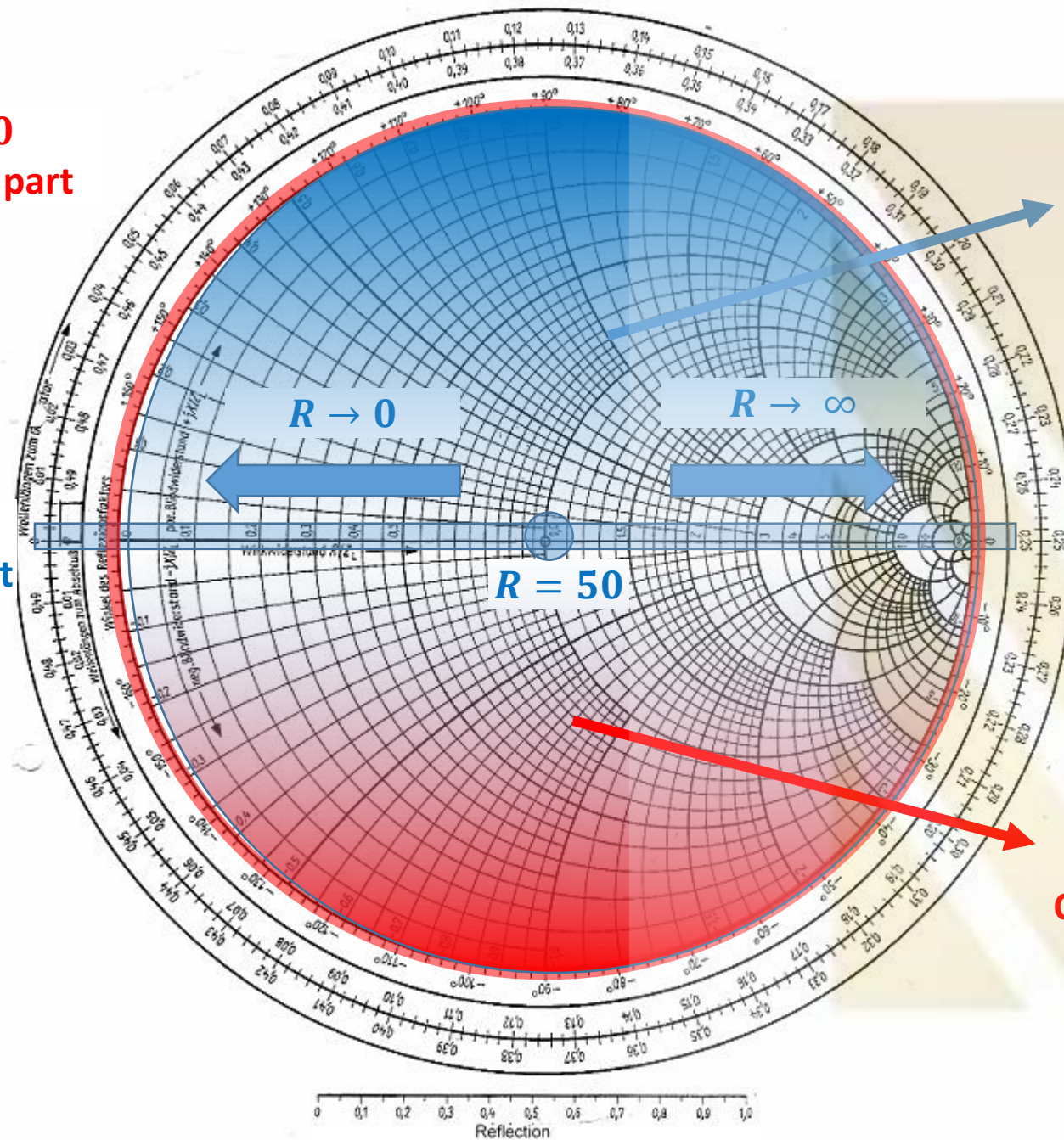
- The **Smith chart** is a graphical aid designed for radio frequency (RF) engineering to assist in solving problems with transmission lines and matching circuits.
- The Smith chart contains almost all possible impedances, real or imaginary, within one circle.

$R = 0$
Only Imag part

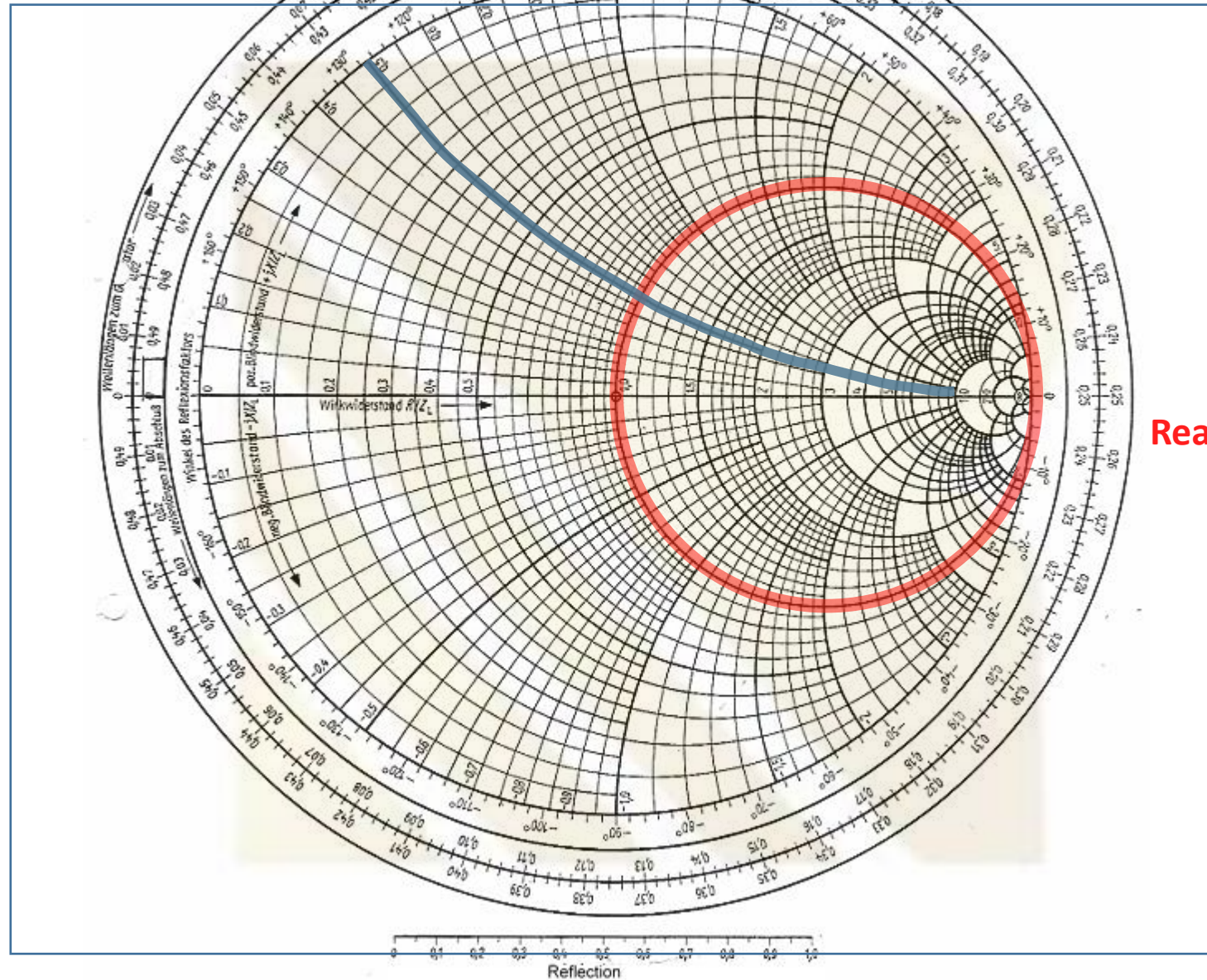
$X = 0$
Only real part

$X > 0$
Inductive

$X < 0$
Capacitive



$X = 0.5$
Imaginary Part Constant



$R = 50$
Real Part Constant

Purpose of use

- Impedance Matching (specifically for transmission lines).
- Designing a matching circuit
- ✓ Finding Transmission Line Length
- ✓ Finding Value of L or C used for matching
- ✓ Finding Reflection Coefficient at both load and source sides
- ✓ Finding Transmission line Type used in matching (open, short, ...)
- Converting impedance Z to admittance Y .
- Finding V_{\max} and V_{\min} positions in transmission line and standing wave ratio (SWR).
- Finding input impedance.