

PL Secure Car Access

UWB Antenna Design Considerations

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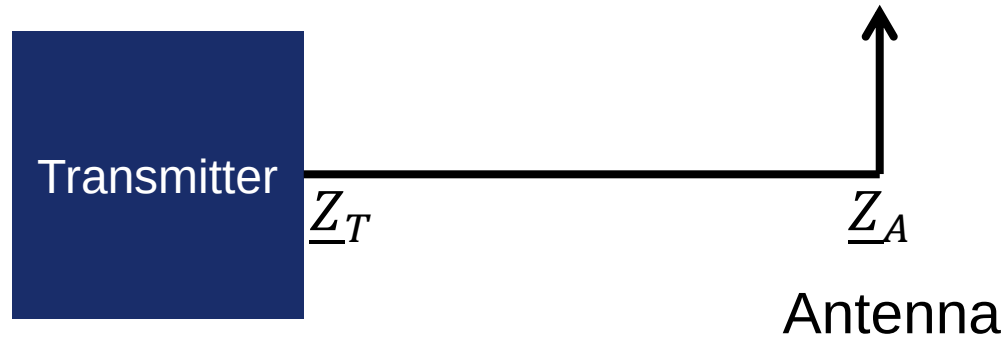
Content

- Antenna parameters
- Radiation pattern considerations
- Exemplary radiation patterns
- Simulation software

Antenna parameters

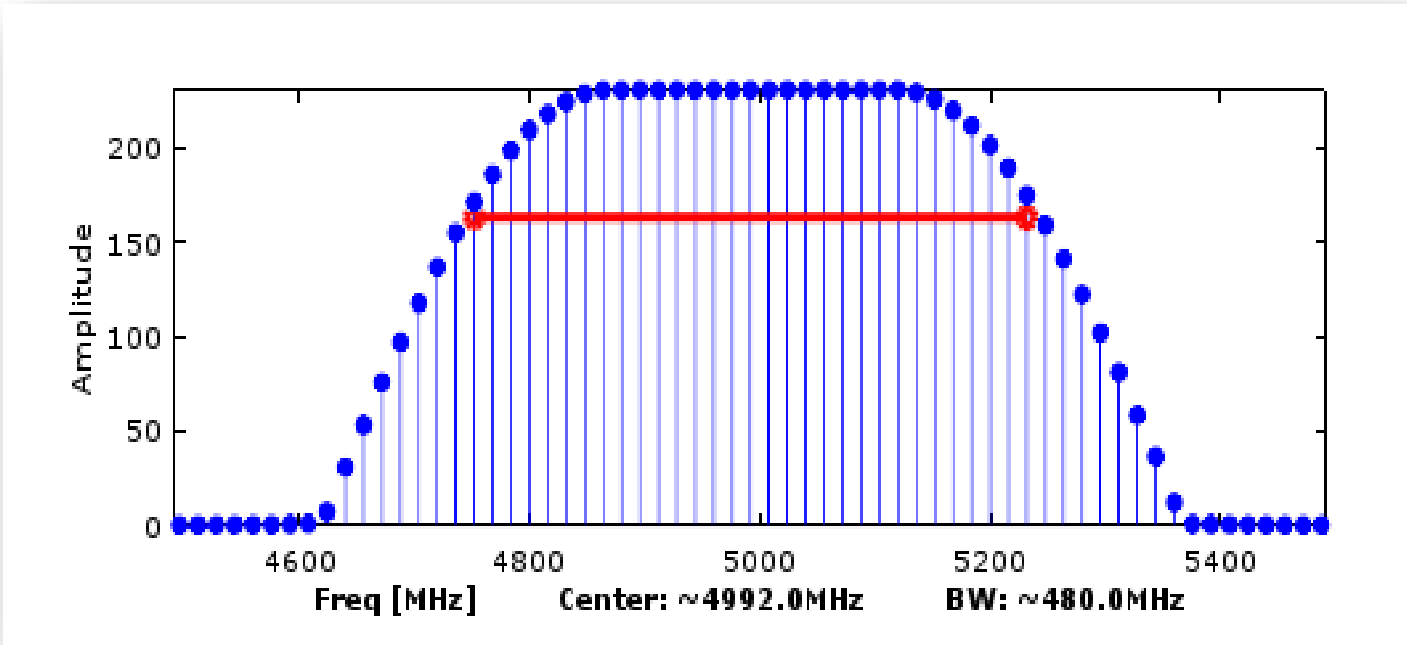
- Feedpoint impedance
- Bandwidth
- Antenna efficiency
- Gain, gain flatness
- Radiation pattern
- Size, automotive qualification
- Group delay flatness over angle and frequency

Feedpoint impedance

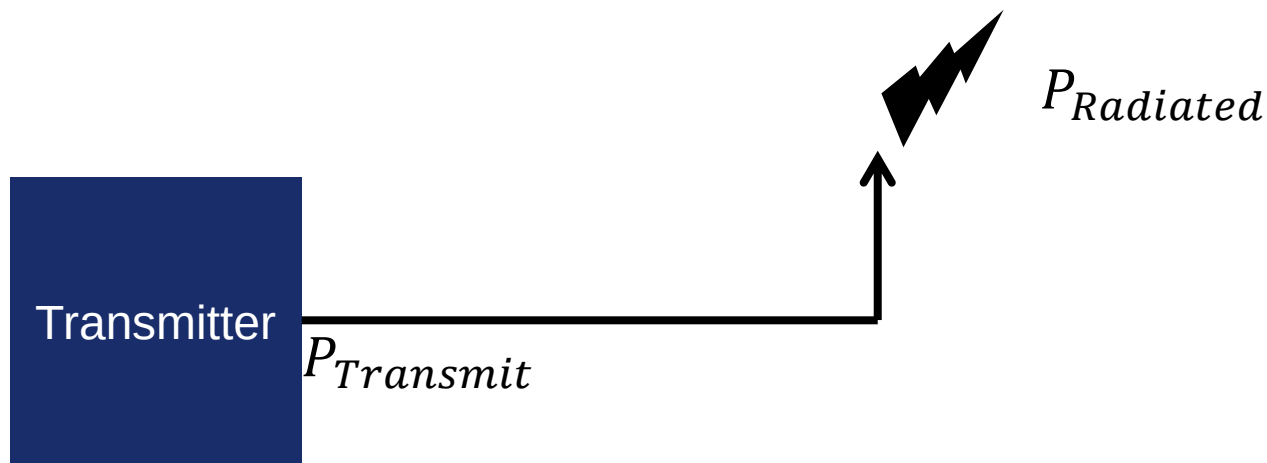


Optimal power transfer → Matching
 $\underline{Z}_T = \underline{Z}_A$

Bandwidth

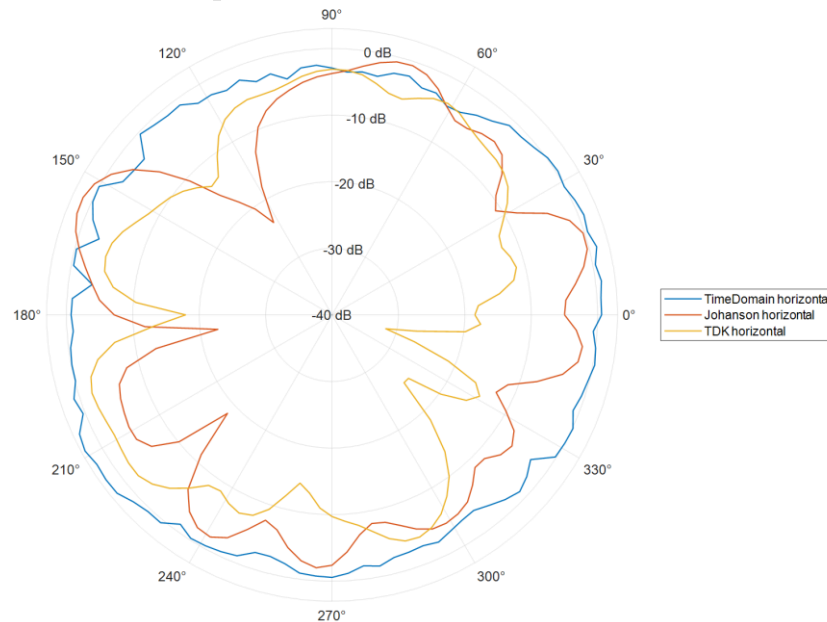


Antenna efficiency



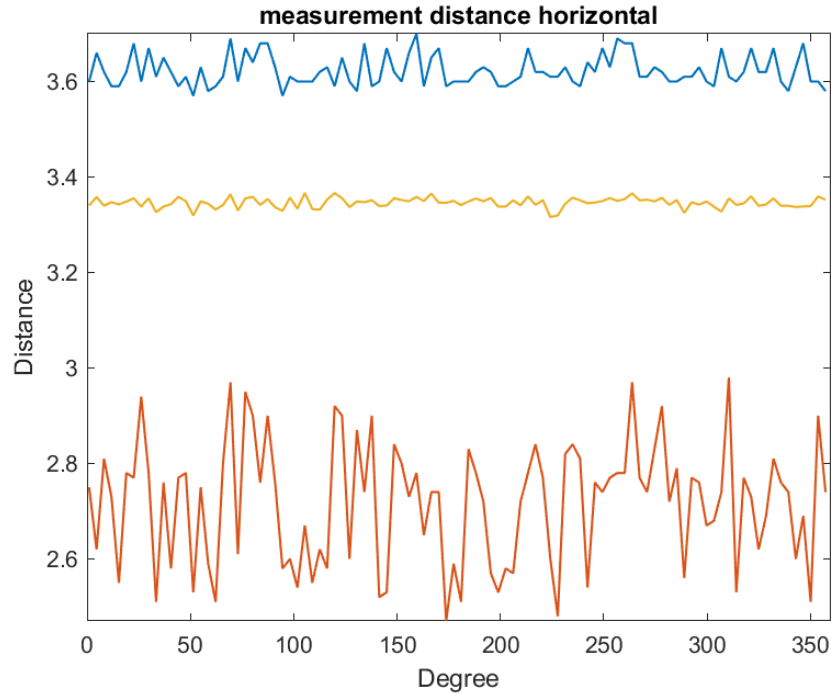
$$\text{Antenna efficiency in \%} = \frac{P_{Radiated}}{P_{Transmit}} \cdot 100$$

Antenna gain, radiation pattern



Radiation pattern depends on use case.
Keyfob: omnidirectional
Anchor: minimum towards car structure

Group delay flatness



Ideally group delay should not be angle dependent.

Simulation software

- CST Microwave Studio
- Keysight Advanced Design Studio (ADS)
- ...

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