

RFID SysTech 2007

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New properties of RFID transponders on metal with microstrip antennas

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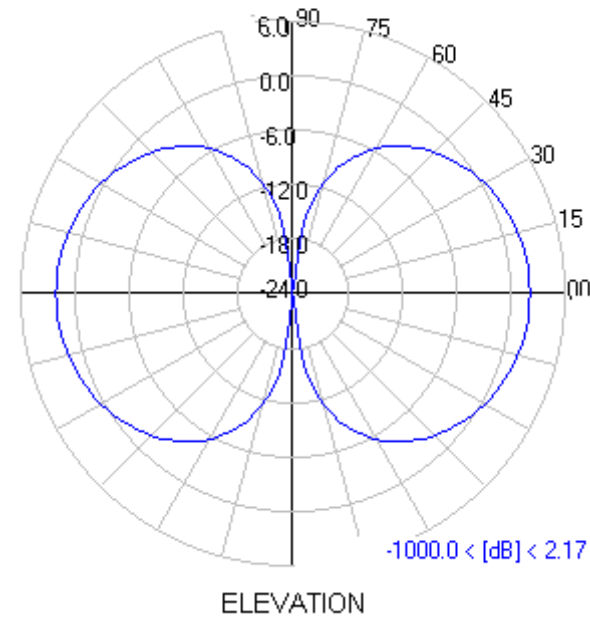
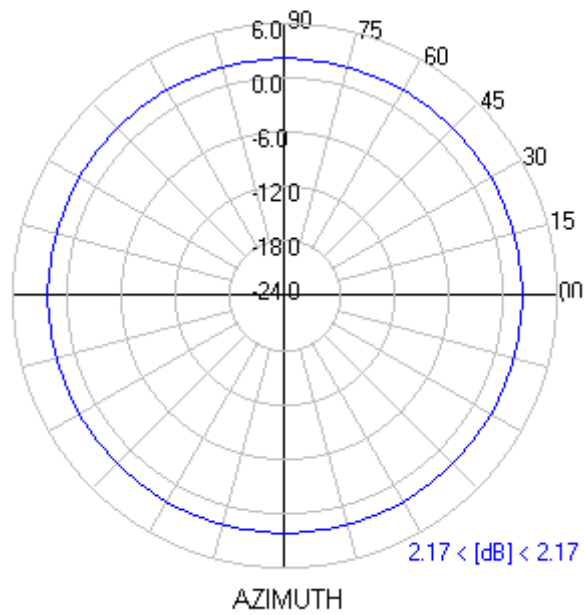
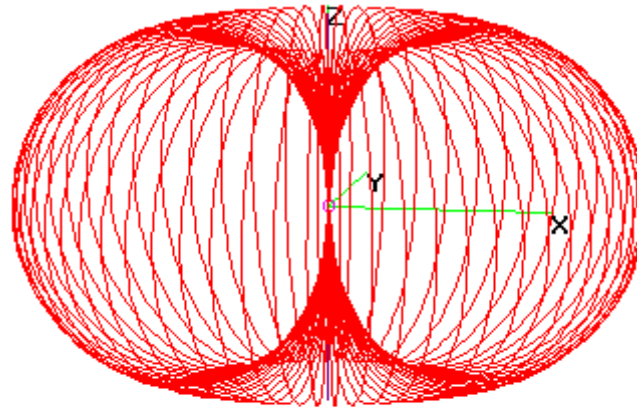
Returnable transport items



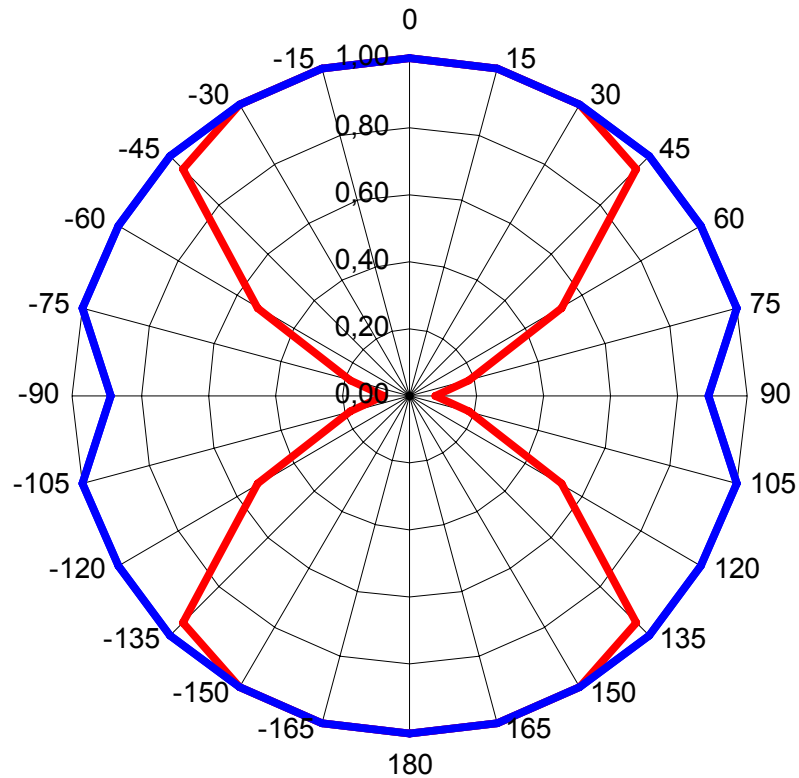
Metal-mount RFID tags

- Typical objects to be fastened
 - Returnable transport items (RTI)
 - Cars and other vehicles (*in the future*)
- Typical applications
 - Asset management
 - Supply chain management

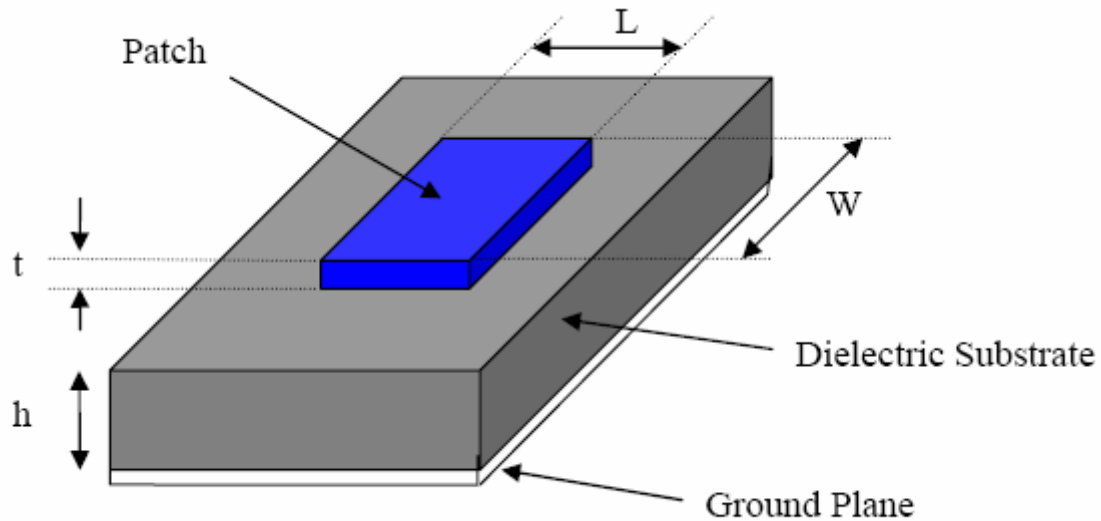
Dipole



Dipole-based rigid tag

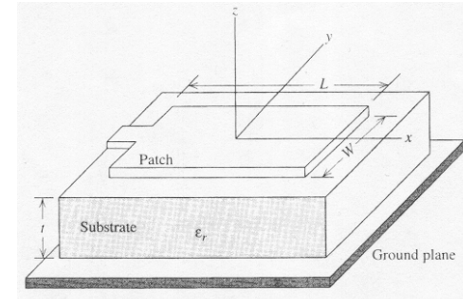


Microstrip

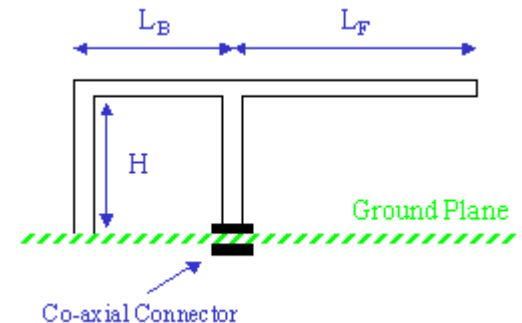


Typical microstrip antennas

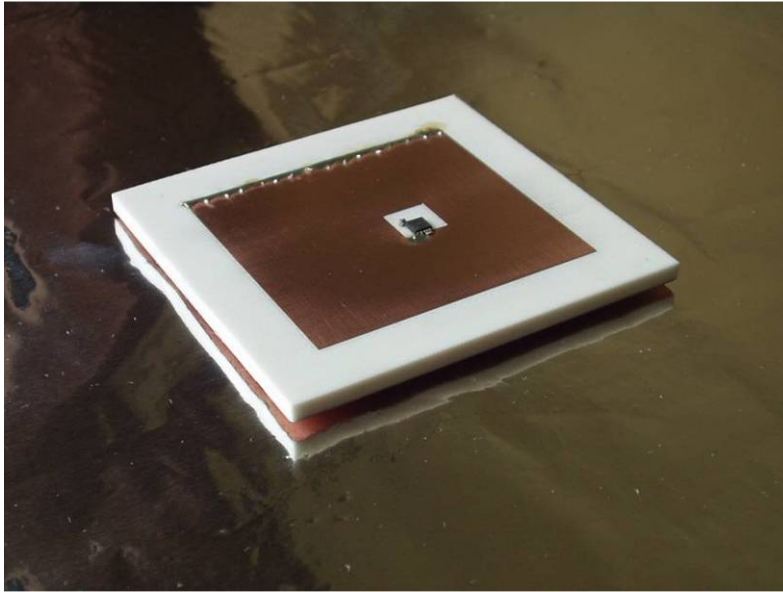
- Patch
 - RFID reader antennas
 - $\frac{1}{2}$ wave



- PIFA
 - Mobile phones
 - $\frac{1}{4}$ wave



PIFA prototype (2004)



Wisteq WTUG-132



- WTUG-132 / Core
- WTUG-132 / With fastening holes

Fig. 1

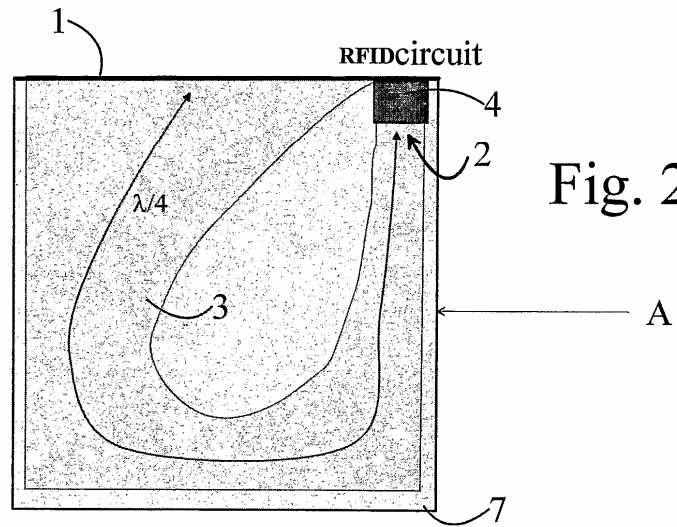


Fig. 2

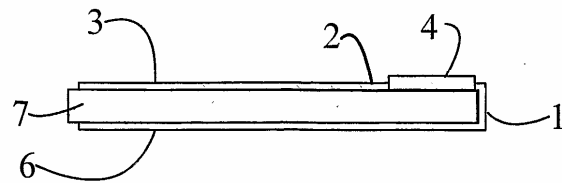
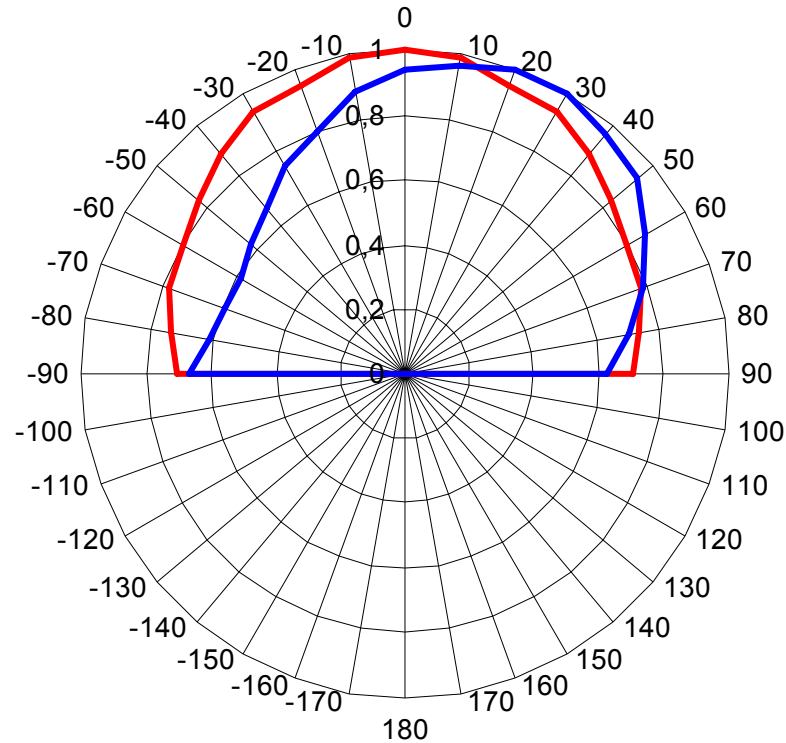


Fig. 3

Relative read distance (E/H-planes)

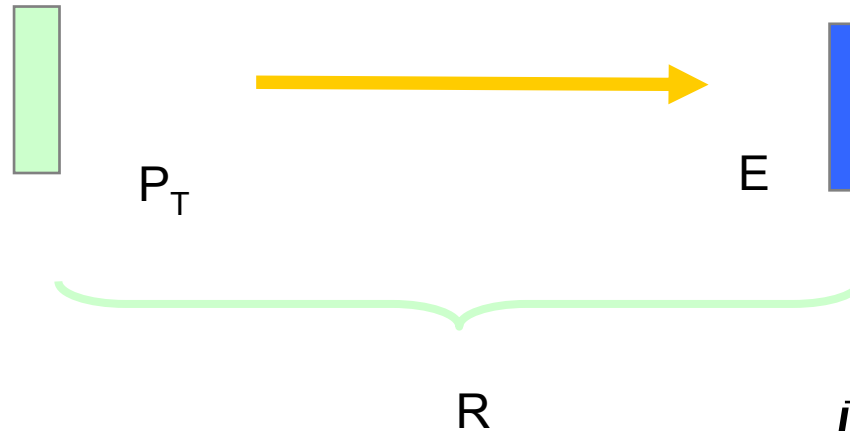


$r(\Phi)$ = blue $r(\Theta)$ = red

Forward channel

Reader antenna

RFID tag



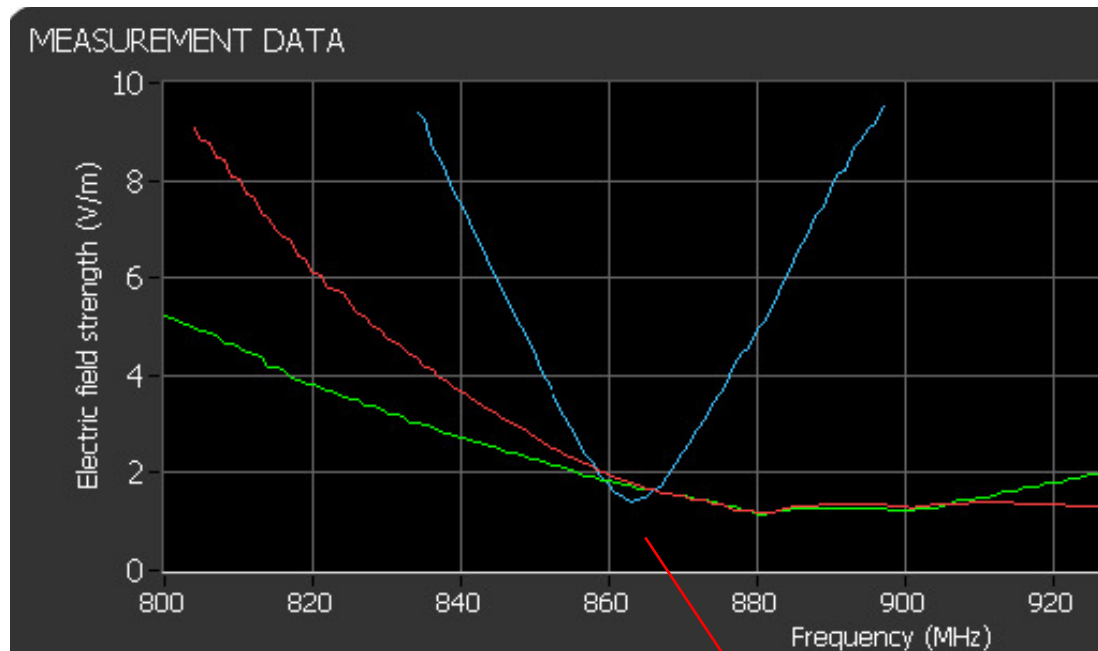
$$E = \sqrt{\frac{P_{EIRP} Z}{4\pi R^2}}$$

$$Z = 377 \Omega$$

$$P_T \text{ (max)} = 2 \text{ W ERP} = 3.2 \text{ W EIRP}$$

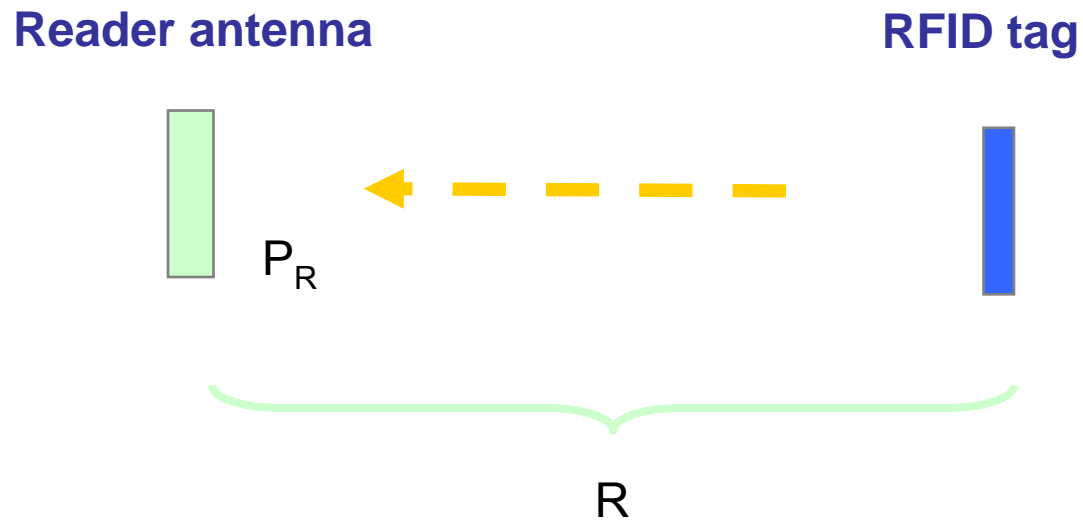
Tag sensitivity

- Minimum electric field to power up chip



$E = 1.7 \text{ V/m}$

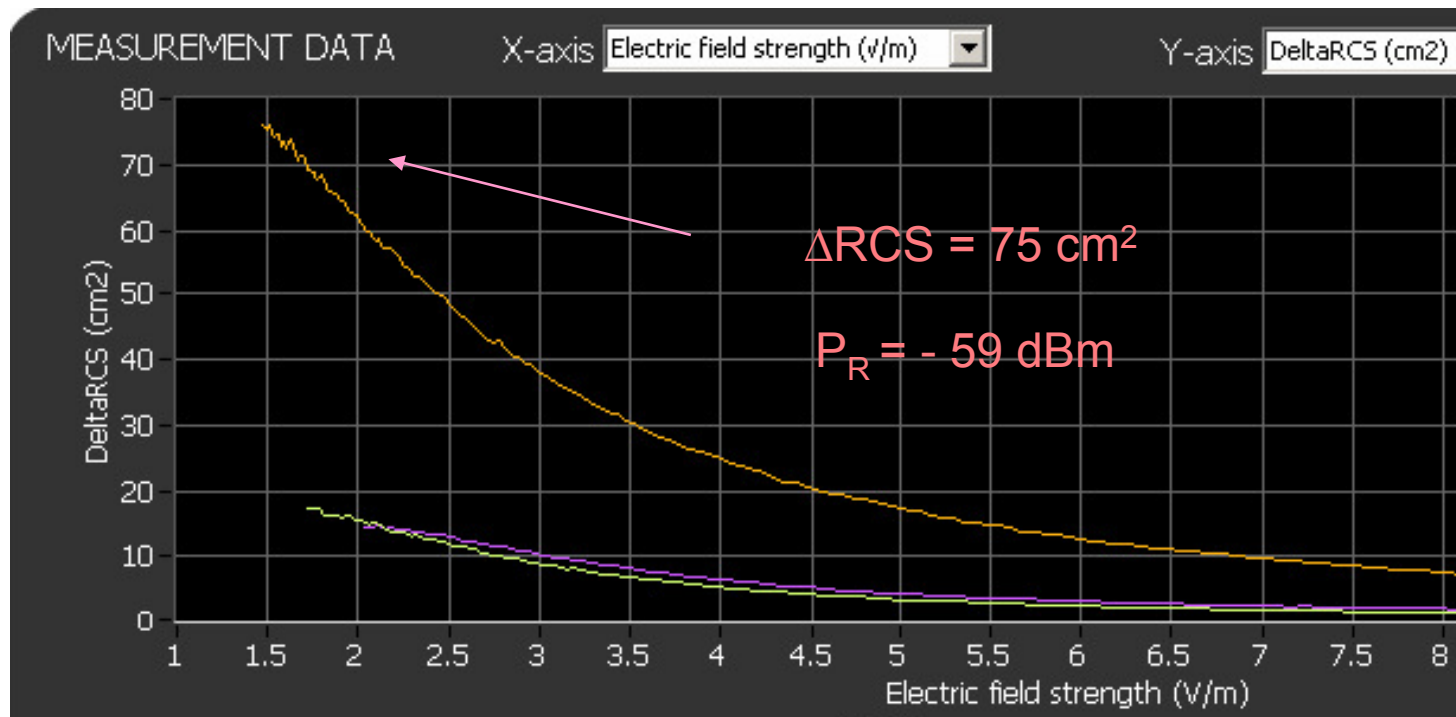
Reverse channel



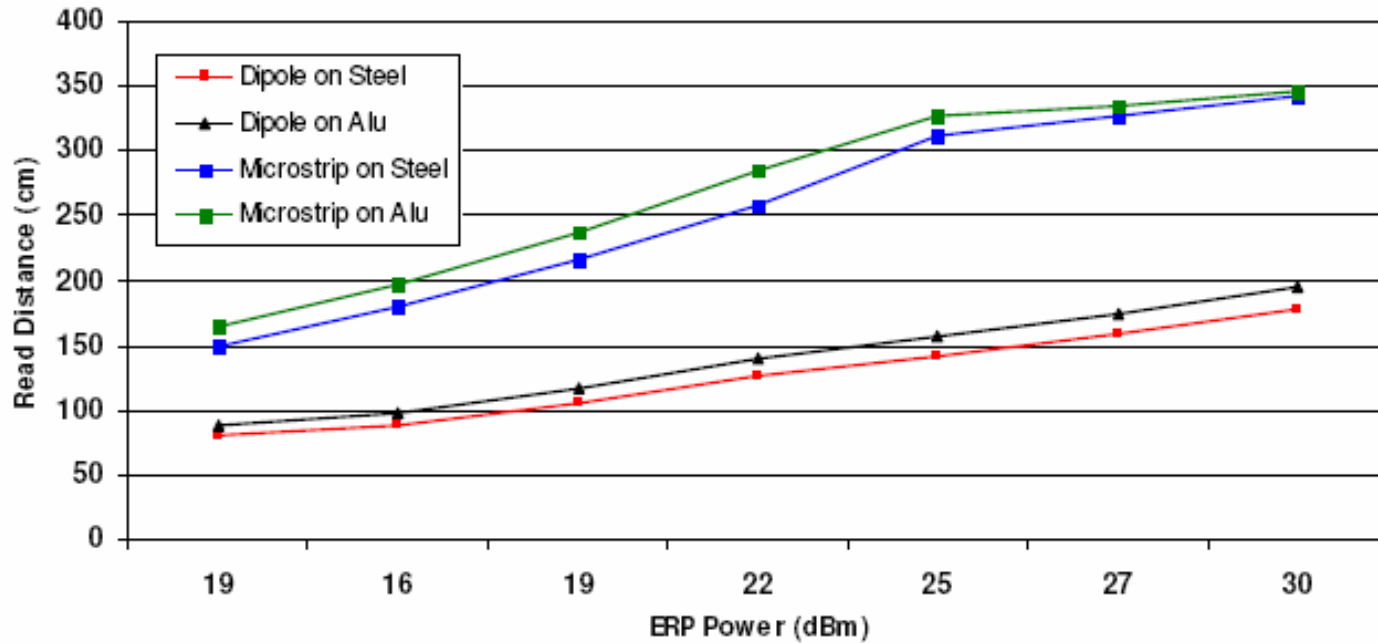
$$\Delta RCS = \frac{P_R (4\pi)^3 R^4}{P_{EIRP} G_R \lambda^2}$$

Δ RCS

- Change in radar cross section



Power levels



Measurement Diagram for typ 127 and Typ 132

Compare Δ RCS

70 cm²



17 cm²

PAFFA advantages

- Only $\frac{1}{4}$ wave basic unit (vs. $\frac{1}{2}$ wave)
- Insensitive to carrier material
- Ease of manufacturing
- Insensitivity to RF interference



Wisteq RFID tags

product range WTU (UHF)

