

Application Note

Antennas of GPS Design

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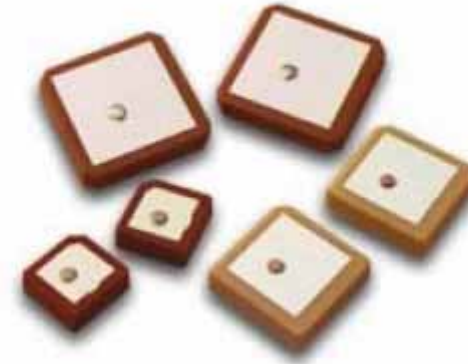
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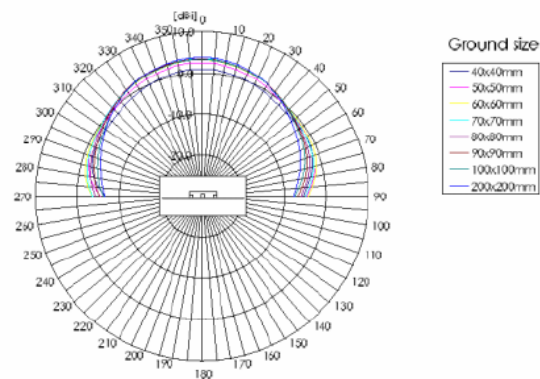
Antenna types

1. Patch antenna

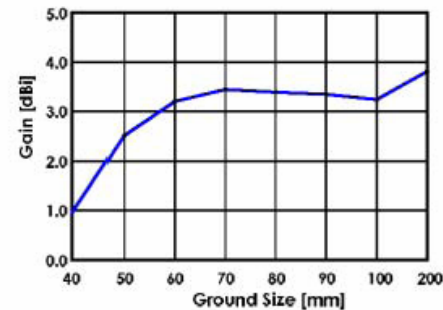
- Circular polarized
- Require ground plane for operation
- Rooftop applications
- 10 x 10 cm order typically
- Tradeoff between ground plane and gain/AR value
- Too small ground plane would receive reflected multi-path (unwanted) signals
- Large AR is to be similar to linear polarized antenna



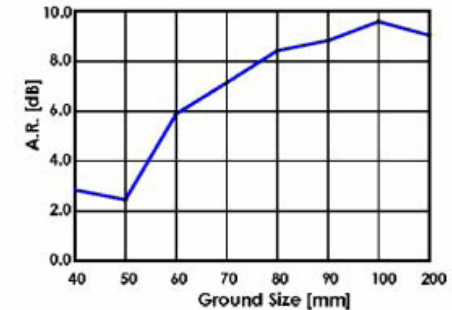
Directivity (YZ) - Ground plane size



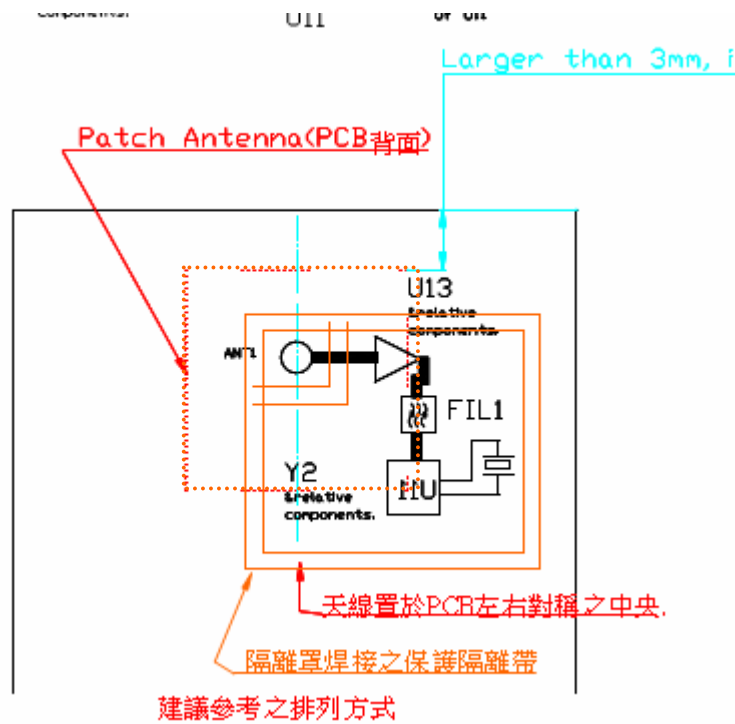
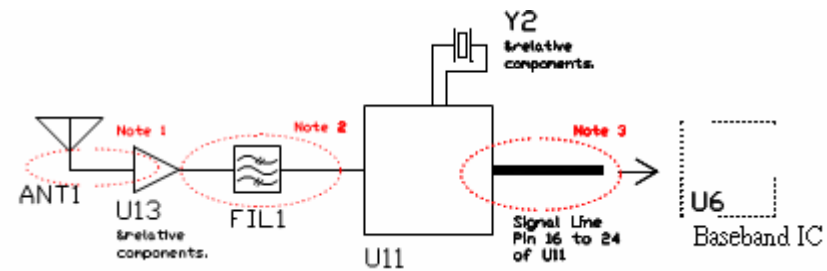
Gain - Ground Size



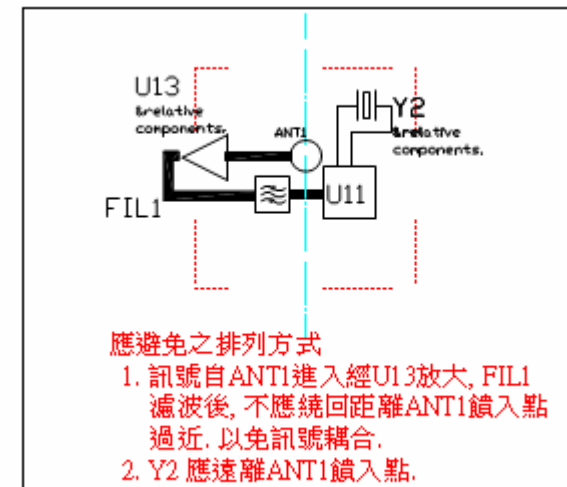
Axial Ratio - Ground Size



- Example Design

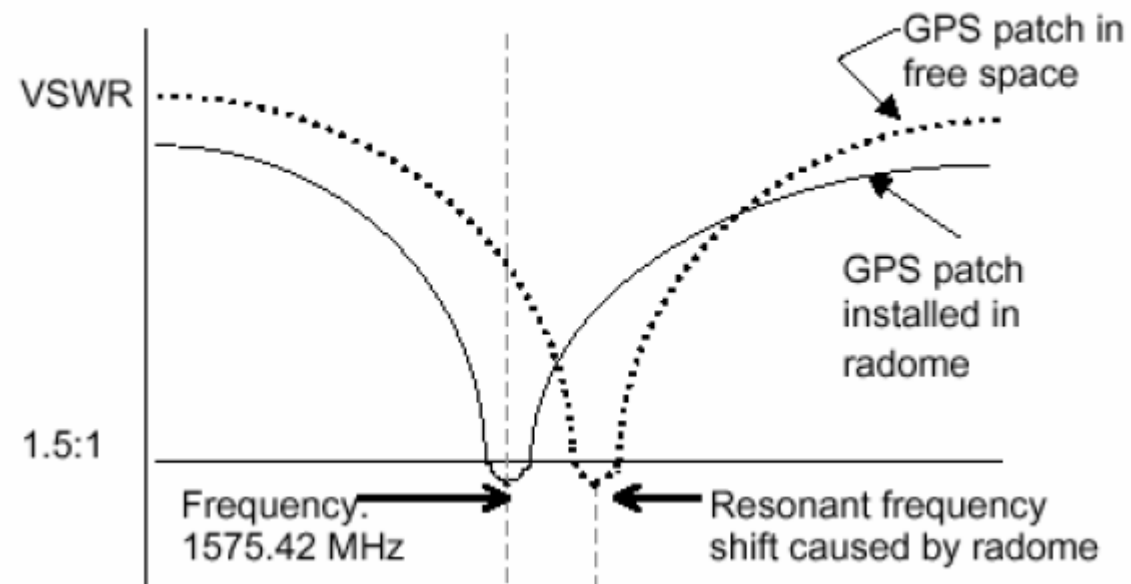


GOOD



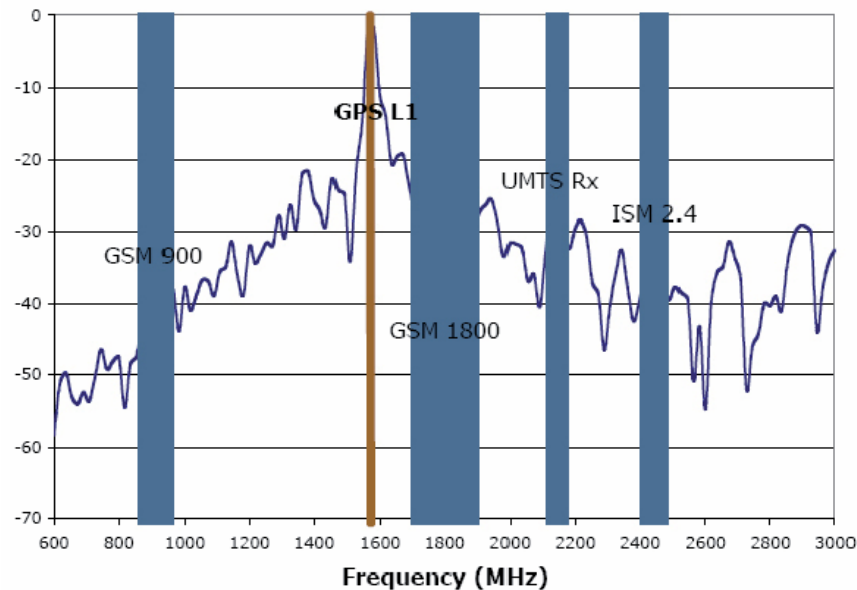
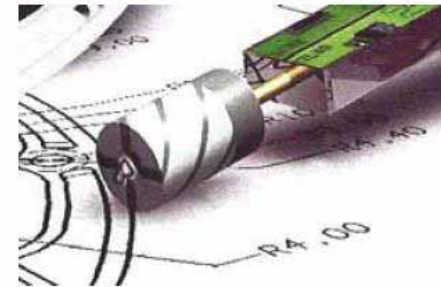
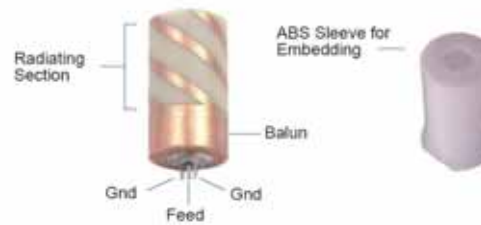
BAD

- Random effect

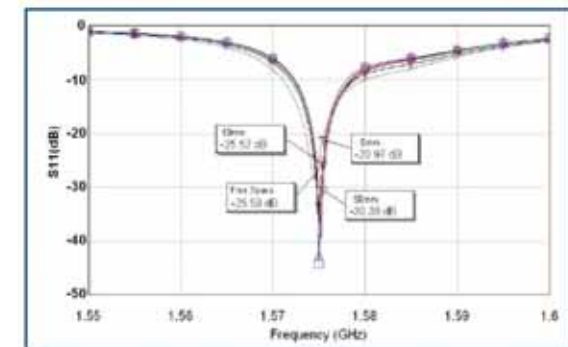
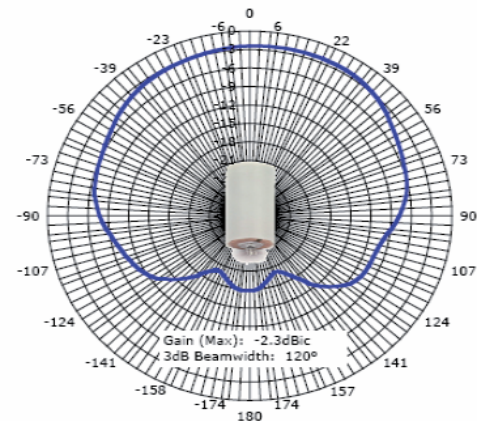


2. Helix antenna

- Without ground plane
 - Portable product applications
 - Natural user operation design result optimal antenna orientation
 - Lower sensitivity
 - No reflected multi-path signals
 - 18 mm length x 10 mm diameter order
 - Negligible de-tuning
 - Up to 44dB of common cellular frequencies
 - With 3dB Bandwidth 20MHz, Beamwidth > 120 degree
- degree



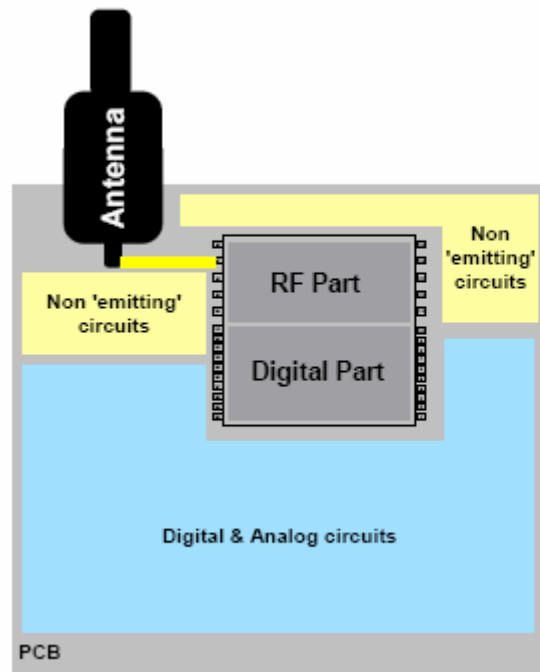
Frequency (MHz)		S_{12} (dB)
860	GSM	-46
970	900	-40
1575	GPS L1	-2
1700	GSM	-26
1800	1800	-36
1900	1800	-29
2110	3G Rx	-32
2170	3G Rx	-30
2400	ISM 2.4	-40
2480	ISM 2.4	-38



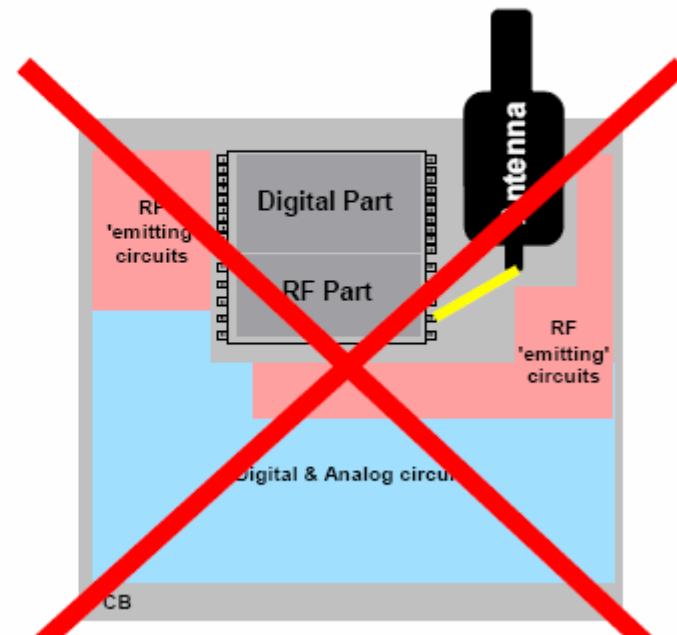
Antenna Placement

Locate antenna as far from interference sources as possible

- Example Design



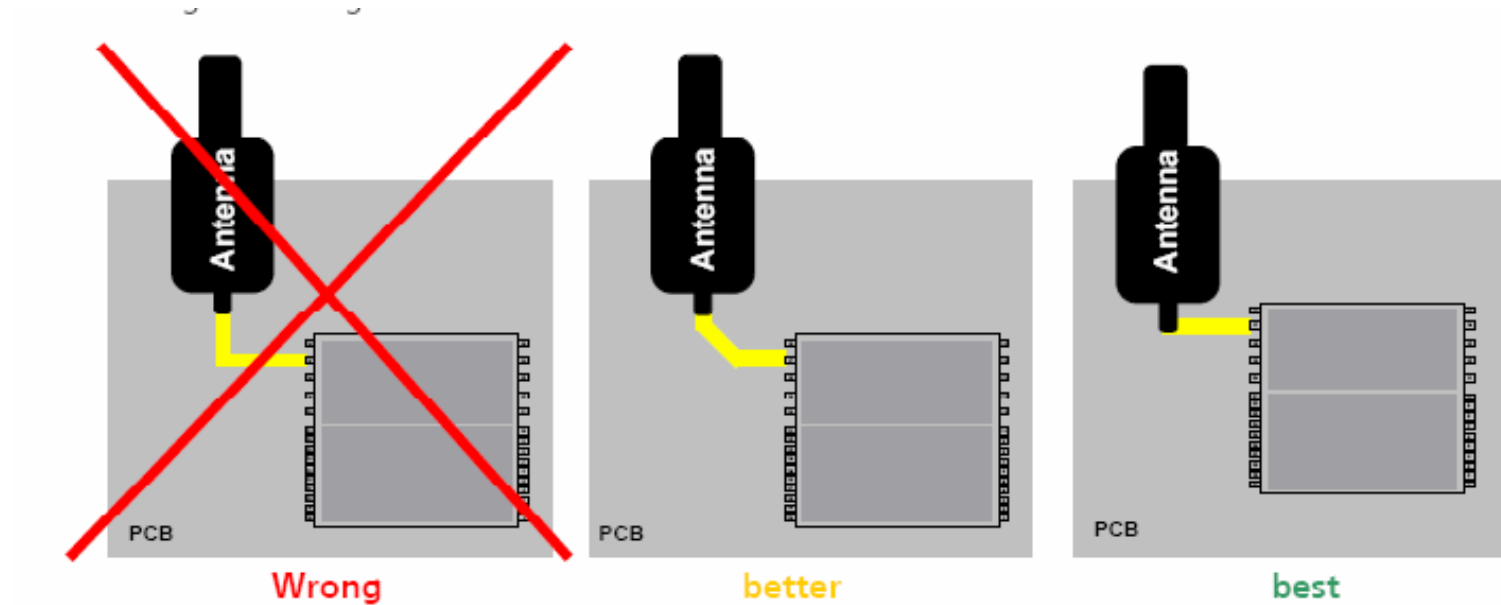
GOOD



BAD

Antenna Placement

- Example Design



Antenna Placement

- Example Design

