MIMO ANTENNA

Problem Statement 1

To design a 2X2 MIMO antenna on a FR-4 substrate. The frequency is 2 GHz to 12 GHz and the thickness is 1.5 mm, dielectric constant = 4.3.
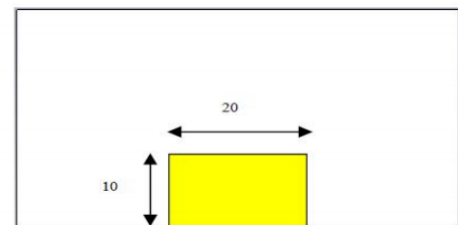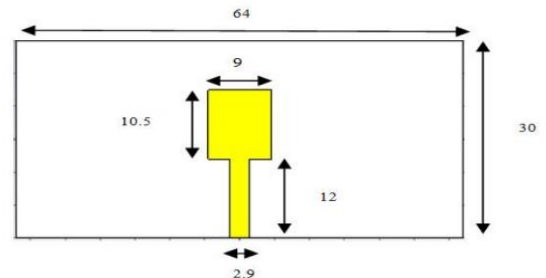
Also do performance analysis.

Parameter	Value(mm)	Parameter	Value(mm)
t	0.035	h	1.5

fl= 2 GHz fh =12 GHz

USAGE: WiMax [3.5 GHz]

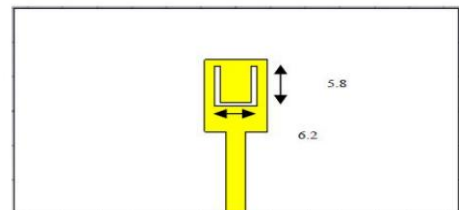Power Radar Applications [9-10 GHz]

Create Notch/Slot in UWB to reduce Interference.

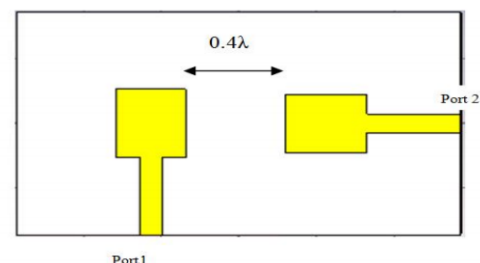The receiving bandwidth is notch UWB

(notch bandwidth 4.1-5.9GHz) are chosen

to reduce the interference at the receiver side.

Design a 2x2 MIMO System

- Mutual Coupling Reduction
- Orthogonal Polarization Diversity.
- The separation between the antennas is 12.8 mm Which is 0.4λ**.**

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STEP1 Modelling of Substrate Plane ➔ Brick ➔ Esc

Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
-32	32	-15	15	-h	0

Material: FR-4 (Lossy)

STEP2 Modelling of Patch Plane ➔ Brick ➔ Esc

Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
-4.5	4.5	-3	7.5	0	t

Material: Copper Annealed

STEP3 Modelling of Feed line ➔ Brick ➔ Esc

Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
-2.9/2	2.9/2	-3	-15	0	t

Material: Copper Annealed

ADD PATCH & FEEDLINE COMPONENT TO FORM PATCH PLANE

STEP4 Modelling of Ground Plane ➔ Brick ➔ Esc

Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
-10	10	-5	-15	-h-t	-h

Material: Copper Annealed

STEP5 Modelling of Slot Brick ➔ Esc   (optional)

S1

Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
0	1	0	5.8	0	t

S2

Xmin	Xmax	Ymin	Ymax	Zmin	Zmax
0	6.2	0	-1	0	t

Material: Copper Annealed

- o   Transform: Translate **S1 [X = 5.2]** to form S3.
- o   Add S1, S2 and S3 to form Slot
- o   Rename Component Slot
- o   Transform: Translate **Slot [X = -3.1]**
- o   Subtract Slot from Patch.

STEP6 Modeling of MIMO Antenna

- o   Select Patch and Ground.
- o   Transform: Rotate **[Z = 90]**
- o   Transform: Translate **[X = 24.8]**

STEP7 Modeling of MIMO Antenna

- o   Select Patch 1, Patch 2, Ground 1, Ground 2
- o   Transform: Translate **[X = -7.8]**

STEP8 Create Port1 and Port2.

STEP9 Simulate

Problem Statement 2

To design dual band T shaped Monopole MIMO antenna on a FR-4 substrate with Stub Resonator.

The frequency is 1 GHz to 6 GHz and the thickness is 1.5 mm, dielectric constant = 4.3.

Also Reduce Mutual Coupling with the help of Stub Resonator.

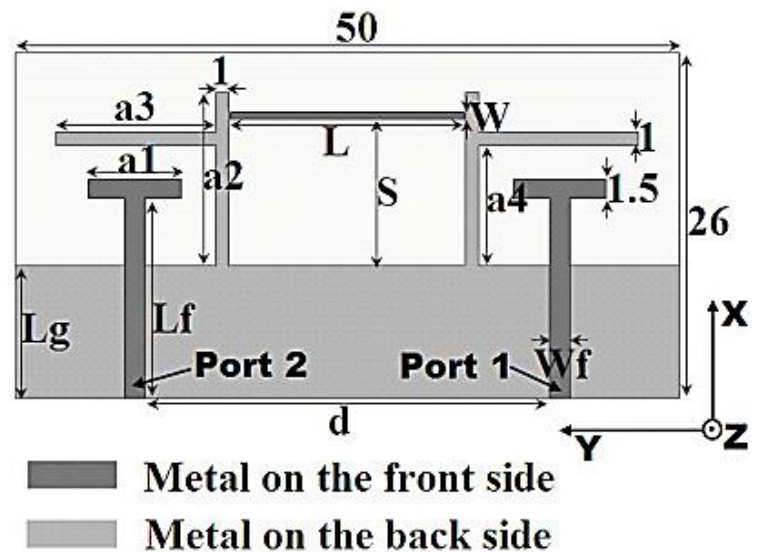| Parameter	Value(mm)
t	0.035
h	0.8

Fig. 1. Geometry of the dual-band MIMO antenna: $L_g = 10$, $L_f = 15$, $W_f = 1.5$, $a_1 = 7$, $a_2 = 13$, $a_3 = 12$, $a_4 = 9$, $d = 30.5$, $L = 17.6$, $S = 11$, and $W = 0.5$. (All dimensions are in millimeters).

USAGE : 2.4/5.2/5.8 GHz WLAN operating bands

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