

BAB V

KESIMPULAN

1. Bentuk antena microstrip hasil dari rancang bangun dengan karakteristik polarisasi melingkar memperlihatkan bersifat antena kompak dengan ukuran minimalis. Target antena yang beroperasi pada frekuensi S band satelit mikro LAPAN TUBSAT terlihat dari hasil simulasi dan pengukuran terhadap parameter S11. Untuk target resonansi di daerah frekuensi *center* sekitar 2,35 GHz dari hasil simulasi dan pengukuran diperoleh penyimpangan atau pergeseran frekuensi resonansi sebesar 0.8%. Meskipun ada pergeseran, pergeseran tersebut tidak berpengaruh karena masih berada pada ring frekuensi yang ditetapkan.
2. Penempatan arah jalur saluran transmisi terhadap sisi *patch* peradiasi mempengaruhi arah polarisasi melingkar. Untuk *axial ratio* di bawah 3 dB dipengaruhi oleh letak jarak antara dua saluran keluaran terhadap sisi tepi *patch* bujur sangkar. Penambahan sebuah stub saluran transmisi pada saluran masukan berpengaruh untuk koefisien refleksi terhadap *return loss* di bawah -10 dB. Bandwidth hasil simulasi dan pengukuran yang diperoleh antena yang beroperasi pada frekuensi S-Band hanya sebesar 40,1 MHz dan 52,1 MHz (narrowband). Seperti yang terlihat pada lampiran 2, hasil simulasi tanpa stub target yang dihasilkan hanya *axial ratio* dibawah 3 dB yaitu 0,7764 dB, sedangkan untuk Return Loss dan VSWR tidak mencapai target, hasil simulasi tersebut belum

tercapai. Sedangkan hasil simulasi dengan menggunakan stub, target yang ditetapkan tercapai.



DAFTAR PUSTAKA

1. John D. Kraus, "Antennas", McGraw-Hill, 2nd ed, 1988.
2. JR James & PS Hall, "Handbook of Microstrip Antennas", Peter Peregrinus Ltd, Volume 1 dan Volume 2, 1993.
3. Kai Chang, Inder Bahl, Vijay Nair; "RF and Microwave Circuit and Component Design for Wireless System", John Wiley & Son, 2002.
4. M. Darsono, "Design of Circularly Polarisation Microstrip Antenna for LAPAN TUBSAT Micro Satellite Application", Jurnal Ilmiah Nasional Bidang Rekayasa Sains & Teknologi -GIGA, Vol. 12, No.2, Hal: 87-91, ISSN : 1410-8682, Juni 2009.
5. M. Darsono, Sapto Nugroho, "Rancang Bangun Antena Microstrip Polarisasi Melingkar Patch Bujur Sangkar Untuk Komunikasi Satelit", Jurnal Ilmiah Nasional Elektronika dan Telekomunikasi (Terakreditasi LIPI No: 276/AUI/P2MBI/05/2010), Volume 10, Nomor 1, ISSN: 1411-8289, Januari-Mei 2010.
6. Robert E. Collin; "Foundation For Microwave Engineering", McGraw-Hill, 2nd ed, 1992.
7. Suhata, "Pengembangan Model Feed Horn Antena S-band untuk Ground Station Satelit Mikro LAPAN TUBSAT", Buku: Pengembangan Teknologi Dirgantara Untuk Mendukung Program Satelit Mikro LAPAN, ISBN: 978-979-1458-16-0, LAPAN, 2008.
8. W.Hasbi, E.Nasser, A.Rahman, "Spacecraft Control Center Of Lapantubsat Micro Satellite" National Institute for Aeronautics and Space

(LAPAN)-Indonesia, http://www.aprsaf.org/feature/PAPERASC_2007-WHASBI-LAPAN-2.

9. Wong, K. L., *Compact and Broadband Microstrip Antenas*, (New York : John Willey & Son, 2002).



The logo of Universitas Darma Persada is a large, light yellow flower-like emblem with eight petals. Inside the emblem is a circular shield with a red and white background, featuring a central figure of a person carrying a bundle on their back. The text 'UNIVERSITAS' is written in a semi-circle above the shield, and 'DARMA PERSADA' is written in a semi-circle below it. Two small stars are positioned on either side of the shield.

LAMPIRAN 1

SPEKIFIKASI SUBSTRAT



High Frequency Laminates: Standard Thickness, Tolerance and Panel Sizes

Grade	Dielectric Constant	Standard Dielectric Thickness	Standard Panel Sizes
RT/duroid® 5870 RT/duroid 5880	2.33 2.20	0.005" (0.127mm) ±0.0005" 0.010" (0.254mm) ±0.0007" 0.015" (0.381mm) ± 0.001" 0.020" (0.508mm) ±0.001" 0.031" (0.787mm) ± 0.001" 0.062" (1.570mm) ± 0.002" 0.125" (3.170mm) ± 0.004"	18" X 12" (457 X 305mm) 18" X 24" (457 X 305mm) 18" X 36" (457 X 914mm) 18" X 48" (457 X 1.219m)
RT/duroid 5880iZ	1.96	0.010" (0.256mm) ± 0.001 0.020" (0.508mm) ± 0.001 0.025" (0.625mm) ± 0.001 0.030" (0.762mm) ± 0.002 0.040" (1.026mm) ± 0.002 0.050" (1.270mm) ± 0.003 0.100" (2.540mm) ± 0.004 Other thicknesses available in 10 mil increments.	12" X 18" (305 X 457mm) 24" X 18" (610 X 457mm) 24" X 54" (610 X 1.37m)
RT/duroid 6002 *RT/duroid 6202	2.94 *2.90 (0.005") *2.98 (0.010") *3.00 (0.015") *2.90 (0.020/0.030)	0.005" (0.127mm) ± 0.0005" 0.010" (0.254mm) ± 0.0007" 0.020" (0.508mm) ± 0.001" 0.030" (0.762mm) ± 0.0015" 0.060" (1.524mm) ± 0.002" 0.120" (3.048mm) ± 0.004"	12" X 18" (305 X 457mm) 24" X 18" (610 X 457mm) 24" X 54" (610 X 1.37m)
RT/duroid 6006	6.15	0.010" (0.254mm) ±0.001"	10" X 10" (254 X 254mm)
RT/duroid 6010LM	10.2 10.5 10.8	0.025" (0.625mm) ± 0.001" 0.050" (1.270mm) ± 0.002" 0.075" (1.905mm) ±0.004" 0.100" (2.540mm) ±0.005"	10" X 20" (254 X 508mm) 20" X 20" (508 X 508mm) 18" X 12" (457.2 X 305mm) 18" X 24" (457 X 305mm)
RT/duroid material available claddings: 1/4 oz. (9µm), 1/2 oz (17µm), 1 oz (35µm), 2 oz (70µm) electrodeposited copper foil, 1/2 oz (17µm), 1 oz (35µm), 2 oz (70µm) rolled copper foil. Thick metal cladding on aluminum, brass and copper are available.			
TMM®3	3.27	0.015" (0.381mm) ± 0.0015" 0.020" (0.508mm) ± 0.0015"	18" X 12" (457 X 305mm) 18" X 24" (457 X 610mm)
TMM4	4.50	0.030" (0.762mm) ± 0.0015" 0.060" (1.524mm) ± 0.0015" 0.125" (3.175mm) ± 0.0015"	
TMM6	6.00	0.015" (0.381mm) ± 0.0015"	
TMM10	9.20	0.025" (0.635mm) ± 0.0015" 0.050" (1.270mm) ± 0.0015"	
TMM10i	9.80	0.075" (1.905mm) ± 0.0015"	
TMM13i	12.80	0.100" (2.540mm) ± 0.0015"	
TMM material available claddings: 1/4 oz. (9µm), 1/2 oz (17µm), 1 oz (35µm), 2 oz (70µm) electrodeposited copper foil. Thick metal cladding on aluminum and brass are available.			
ULTRALAM® 2000	2.40 2.45 2.48 2.50 2.55	0.004" (102mm) ± 0.0004 0.0101" (0.257mm) ± 0.009 0.0147" (0.373mm) ± 0.001 0.0190" (0.483mm) ± 0.001 0.0300" (0.762mm) ± 0.001	18" X 12" (457 X 305mm) 18" X 24" (457 X 610mm) 18" X 36" (457 X 915mm) 18" X 48" (457 X 1.219m)
ULTRALAM 2000 material available claddings: 1/4 oz. (9µm), 1/2 oz (17µm), 1 oz (35µm), 2 oz (70µm) electrodeposited copper foil, 1/2 oz, 1 oz and 2 oz rolled copper foil. Thick metal cladding on aluminum, brass and copper are available.			

Grade	Dielectric Constant	Standard Dielectric Thickness	Standard Panel Sizes
RO3003™	3.00	0.005" (0.13mm) ± 0.0005 0.010" (0.25mm) ± 0.0007 0.020" (0.50mm) ± 0.001	12" X 18" (305 X 457mm) 24" X 18" (610 X 457mm) 24" X 36" (610 X 915mm)
RO3035™	3.5	0.030" (0.75mm) ± 0.0015 0.060" (1.52mm) ± 0.003	
RO3006™	6.15	0.005" (0.13mm) ± 0.0005 0.010" (0.25mm) ± 0.0007	
RO3010™	10.2	0.025" (0.64mm) ± 0.001 0.050" (1.27mm) ± 0.002	
RO3203™	3.02	0.010" (0.25mm) ± 0.0007 0.020" (0.50mm) ± 0.001 0.030" (0.75mm) ± 0.0015 0.060" (1.52mm) ± 0.003	
RO3206™	6.15	0.025" (0.64mm) ± 0.001	
RO3210™	10.2	0.050" (1.27mm) ± 0.002	
RO3000 series material available claddings: 1/2 oz (17µm) (35µm) oz, 2 oz (70µm) electrodeposited copper foil.			
RO4003C™ RO4360™	3.38 6.15	0.008" (0.203mm) ± 0.0010 0.012" (0.305mm) ± 0.0010 0.016" (0.406mm) ± 0.0015 0.020" (0.508mm) ± 0.0015 0.032" (0.813mm) ± 0.0020 0.060" (1.524mm) ± 0.0040	12" X 18" (305 X 457mm) 24" X 18" (610 X 457mm) 24" X 36" (610 X 915mm) 48" X 36" (1,244mm X 915mm)
RO4350B™	3.48	0.0066" (0.168mm) ± 0.0007 0.010" (0.25mm) ± 0.0010 0.0133" (0.338mm) ± 0.0015 0.0166" (0.422mm) ± 0.0015 0.020" (0.51mm) ± 0.0015 0.030" (0.76mm) ± 0.0020 0.060" (1.52mm) ± 0.0040	
RO4450B PREPREG	3.30	0.0036" (0.091mm)	24" X 18" (610 X 457mm)
	3.54	0.004" (0.102mm)	
RO4450F PREPREG	3.52	0.004" (0.102mm)	24" X 18" (610 X 457mm)

Grade	Dielectric Constant	Standard Dielectric Thickness	Standard Panel Sizes
RO3730 Antenna Grade	3.00	0.030 (0.762mm) ± 0.0015 0.060 (1.524mm) ± 0.003	24" X 18" (601mm X 477 24 X 54" (610mm X 1.37m)
RO4730 Antenna Grade	3.00	0.0307 (0.780mm) ± 0.015 0.0407 (1.034mm) ± 0.002 0.0607 (1.542mm) ± 0.003	24 X 18 (610 X 457mm) 48 X 36" (1.224m X 0.915mm)

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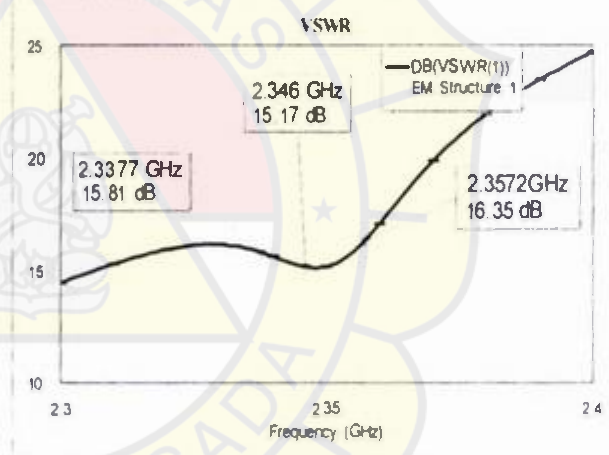
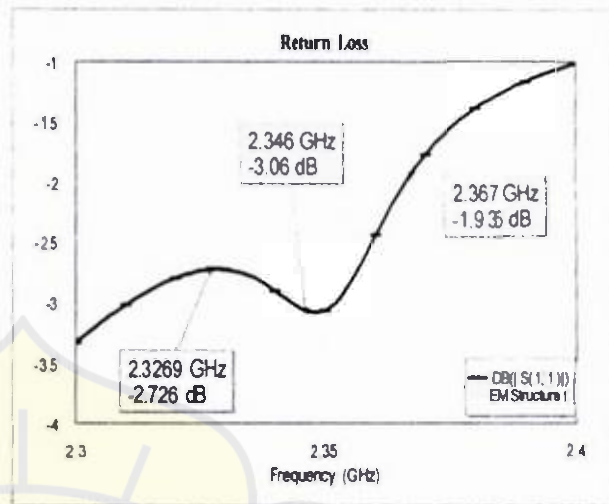
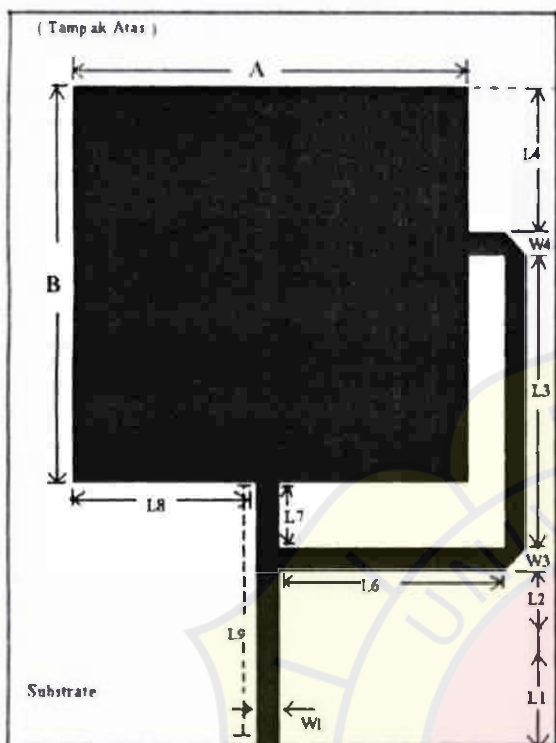
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The logo of Universitas Darma Persada is a large, light yellow, multi-petaled flower-like emblem. It features a central shield with a red and white design, flanked by two stars. The text 'UNIVERSITAS' is arched across the top, and 'DARMA PERSADA' is arched across the bottom. In the center of the shield is a figure holding a staff and a book.

LAMPIRAN 2

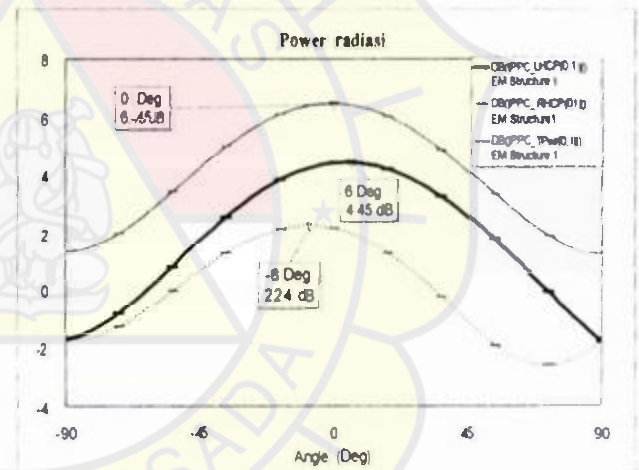
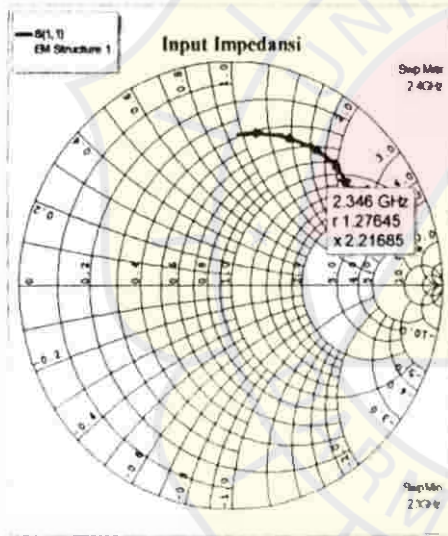
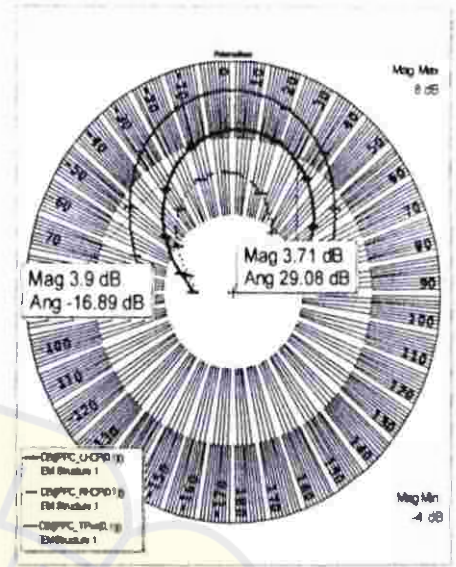
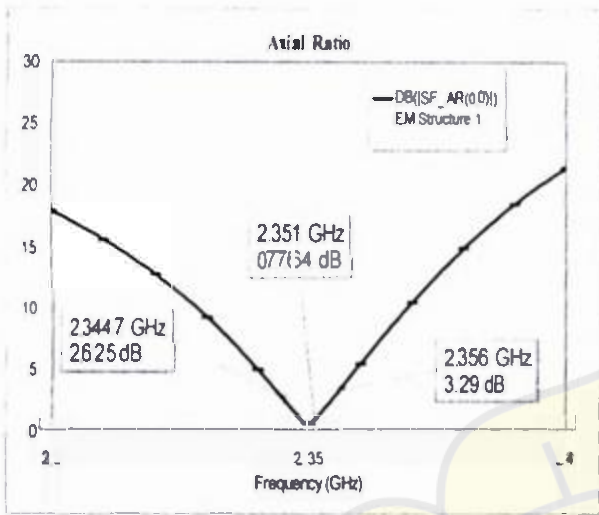
HASIL SIMULASI TANPA STUB

Hasil simulasi tanpa stub



Simbol	Ukuran (mm)
A	43,2
B	43,2
W1	2,4
W2	2,4
W3	2,4
W4	2,4
L1	10,4
L2	6,4
L3	32
L4	16
L5	-
L6	24,8
L7	7,2
L8	20
L9	28,8

Hasil simulasi tanpa stub



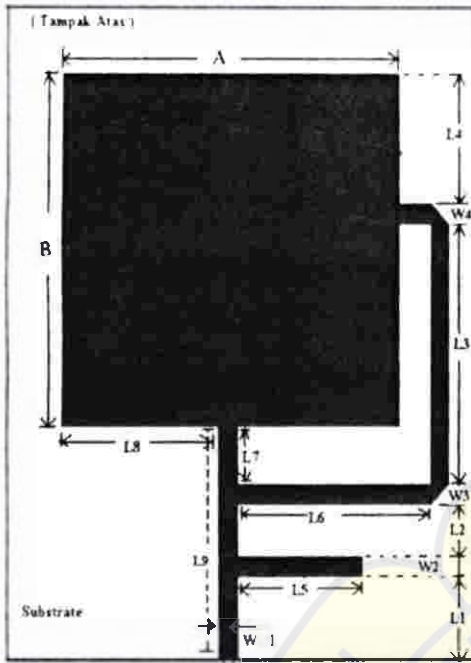
The logo of Universitas Darma Persada is a large, light yellow watermark in the background. It features a central shield with a red and white design, flanked by two stars. The shield is set within a circular frame with the text 'UNIVERSITAS' at the top and 'DARMA PERSADA' at the bottom. The entire logo is surrounded by a decorative, scalloped border.

LAMPIRAN 3

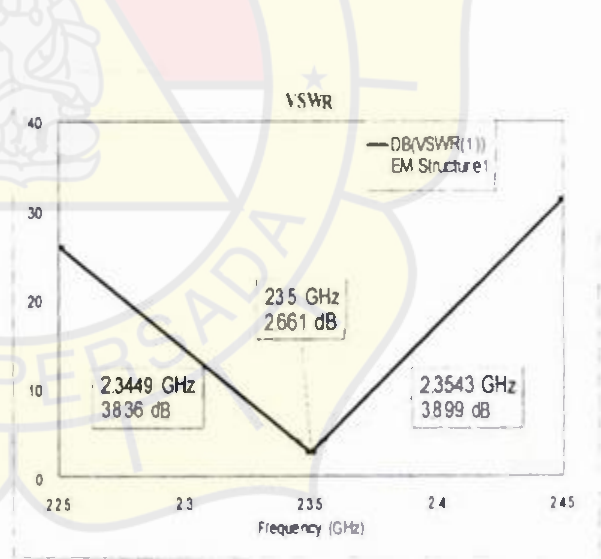
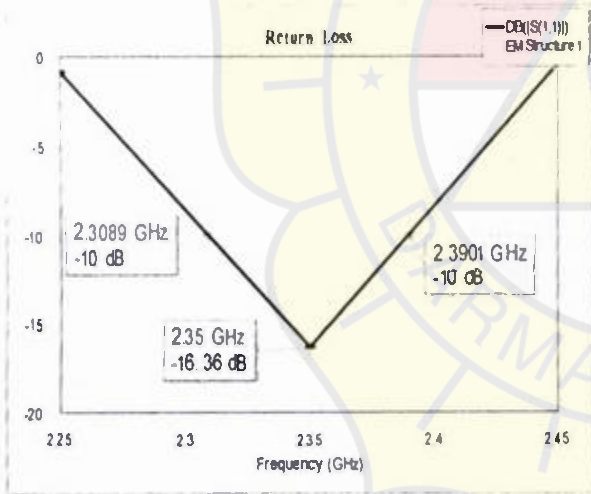
HASIL SIMULASI DENGAN PANJANG STUB

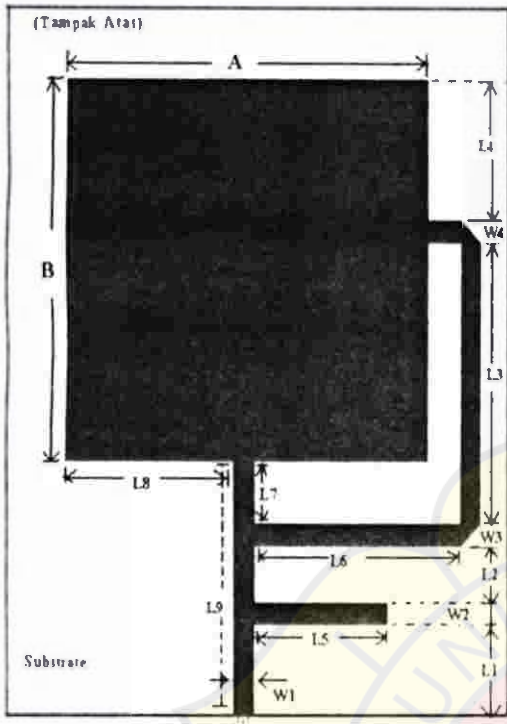
16,8 mm

Hasil simulasi dengan panjang stub 16,8 mm



Simbol	Ukuran (mm)
A	43,2
B	43,2
W1	2,4
W2	2,4
W3	2,4
W4	2,4
L1	10,4
L2	6,4
L3	32
L4	16
L5	16,8
L6	24,8
L7	7,2
L8	20
L9	28,8





Simbol	Ukuran (mm)
A	43,2
B	43,2
W1	2,4
W2	2,4
W3	2,4
W4	2,4
L1	10,4
L2	6,4
L3	32
L4	16
L5	16
L6	24,8
L7	7,2
L8	20
L9	28

