

BAB V

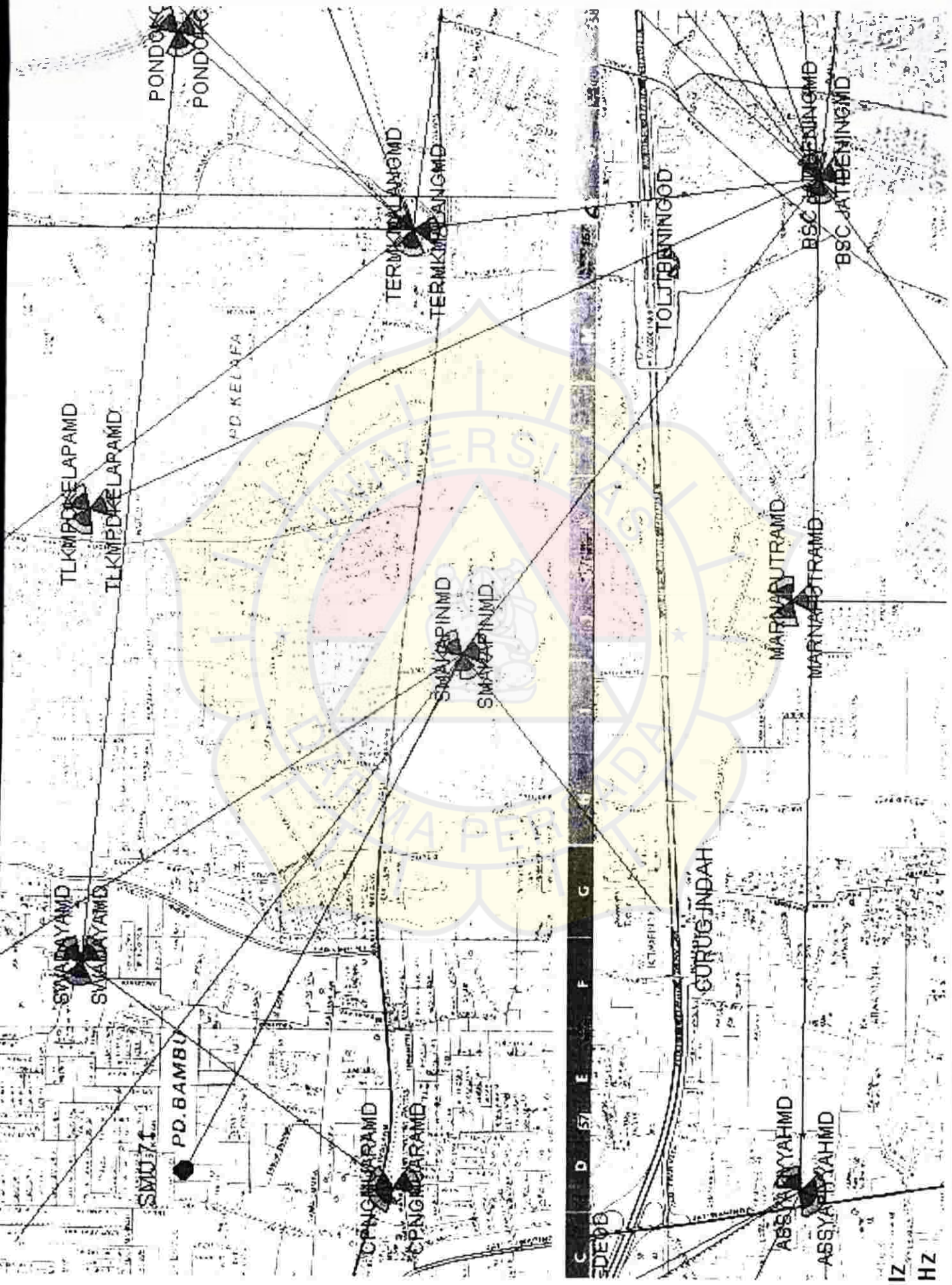
KESIMPULAN

1. Dari hasil rancangan ini untuk frekwensi 23 GHz dengan ketinggian antenna 25 meter pada SMUN 71 dan ketinggian antenna 30 meter di SMU Kapin menunjukkan tingkat LOS yang baik.
2. Dari hasil rancangan secara teoritis dengan antenna 0,3 meter, maka diperoleh RSL untuk uplink sebesar $-57,71$ dBm dan untuk Downlink sebesar $-57,94$ dBm. Bila ditinjau dari power threshold sebesar -86 dBm, maka untuk hasil RSL telah memenuhi syarat spesifikasi alat. Dan bila ditinjau dari Fade Marginya secara keseluruhan hasil rancangan cukup baik.
3. Dari hasil perhitungan EB/No untuk *Uplink* didapat sebesar $47,17$ dB dan untuk *Downlink* sebesar $46,94$ dB, maka dengan itu kualitas BERnya dapat dikatakan baik. Dikarenakan untuk BER 10^{-6} besarnya EB/No dalam standar QPSK adalah $10,6$ dB.

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6.'Instruction Manual Coaxial Cabel' ANDREW
7. "Instruction Manual Flexihopper Digital Radio Sistem" Nokia corp,





PONDOK
PONDOK

TLKMPDRELAPAMD
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PD. KELAPA

TERMIKUNINGMD
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SIMANGPINMD
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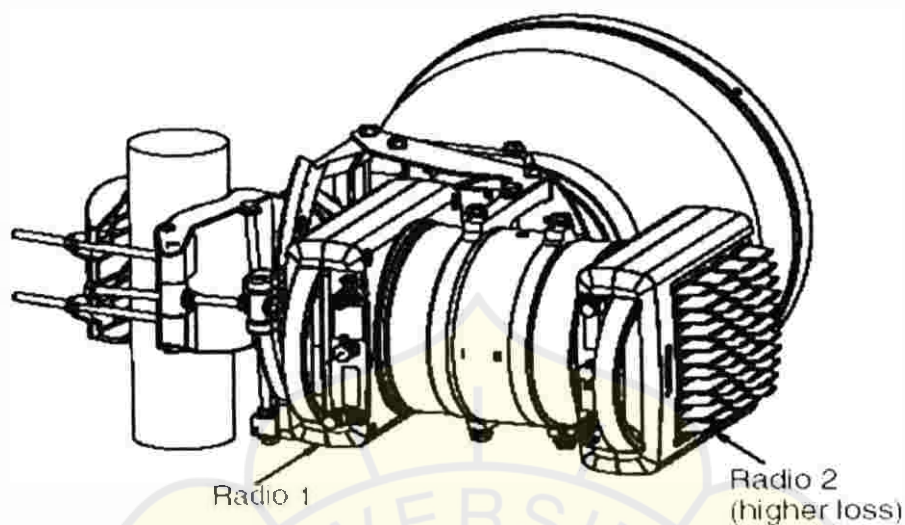


Figure 36. Nokia FlexiHopper 18, 23, or 26 in 1-antenna HSB operation

Table 95. Coupler dimensions

Dimensions of the 7, 8 GHz coupler	Height 380 mm Width 430 mm Depth 260 mm Weight 7.5 kg
Dimensions of the 13, 15 GHz coupler	Height 300 mm Width 430 mm Depth 260 mm Weight 6.8 kg
Dimensions of the 19 - 26 GHz coupler	Height 250 mm Width 280 mm Depth 300 mm Weight 5.0 kg
Dimensions of the 39 GHz coupler	Height 250 mm Width 240 mm Depth 300 mm Weight 4.8 kg

Electrical specifications for FlexiHop per 30 cm antenna at 23 GHz

Frequency/ Size	(23 GHz): 21200-23600 MHz/ 30 cm (1 ft)
Type, Item	Single T55075.01/ Dual T55075.51
Gain	Low 35.0 Middle 35.4 High 35.9 dBi (min 34.2 max 36.7 dBi)
Bandwidth	2.6 GHz
F/B	51 dB
XPD Isolation	30 dB (35 dB (Dual))
RL	17.7 dB
RFE ETSI EN 60820 V.4.1	R3 C3

Receiver threshold

Frequency band	Capacity (Mbit/s)	BER 10 ⁻³ threshold (dBm)		BER 10 ⁻⁶ threshold (dBm)	
		Typical	Guaranteed	Typical	Guaranteed
7, 9 GHz	2 x 2	-95	-92	-92	-89
	4 x 2	-92	-89	-89	-86
	8 x 2	-89	-86	-86	-83
	16 x 2	-86	-83	-83	-80
13, 15, 18, 28 GHz	2 x 2	-93	-89	-90	-86
	4 x 2	-90	-86	-87	-83
	8 x 2	-87	-83	-84	-80
	16 x 2	-84	-80	-81	-77
26 GHz	2 x 2	-92	-88	-89	-85
	4 x 2	-89	-85	-86	-82
	8 x 2	-86	-82	-83	-79
	16 x 2	-83	-79	-80	-76
38 GHz	2 x 2	-90	-86	-87	-83
	4 x 2	-89	-85	-86	-82
	8 x 2	-86	-82	-83	-79
	16 x 2	-83	-79	-80	-76

Power levels

Maximum transmit power

Frequency band	Transmit power (dBm), nominal
7-9 GHz	23
13-15 GHz	20

Frequency band	Transmit power (dBm), nominal
18-23 GHz	19
26 GHz	19
38 GHz	16

Antenna connector

Frequency band	Waveguide flange
7-9 GHz	UBR04
13 GHz	UBR120
15 GHz	UBR140
18-23, 26 GHz	UBR220
38 GHz	UBR320



Figure 3. The basic Nokia FlexiHopper node configuration, one indoor unit and one outdoor unit

Table 2. Antenna and alignment unit

Frequency band	Antenna size alternatives					
7 - 8 GHz		60 cm*	120 cm	180 cm	240 cm	300 cm
10 GHz	30 cm*	60 cm*	120 cm	180 cm		
15 GHz		90 cm*	60 cm*	120 cm	180 cm	
18 GHz		90 cm*	60 cm*	120 cm	180 cm	
23 GHz	20 cm*	30 cm*	60 cm*	120 cm	180 cm	
26 GHz	20 cm*	30 cm*	60 cm*	120 cm		
38 GHz	20 cm*	30 cm*	60 cm*			

* Available with the Nokia alignment unit

Capacities

Table 8. Capacity options (programmable)

Traffic capacity (Mbit/s)	Gross bit rate (Mbit/s, ±10 ppm)
2 x 2	4.715 127.5
4 x 2	9.430 255
8 x 2	18.860 510
16 x 2	37.721 020
Bit rate tolerances	
2 Mbit/s interface	±50 ppm

Modulation and demodulation

Table 27. Modulation

Modulation method	$\pi/4$ -DQPS K
Demodulation method	Partially differential

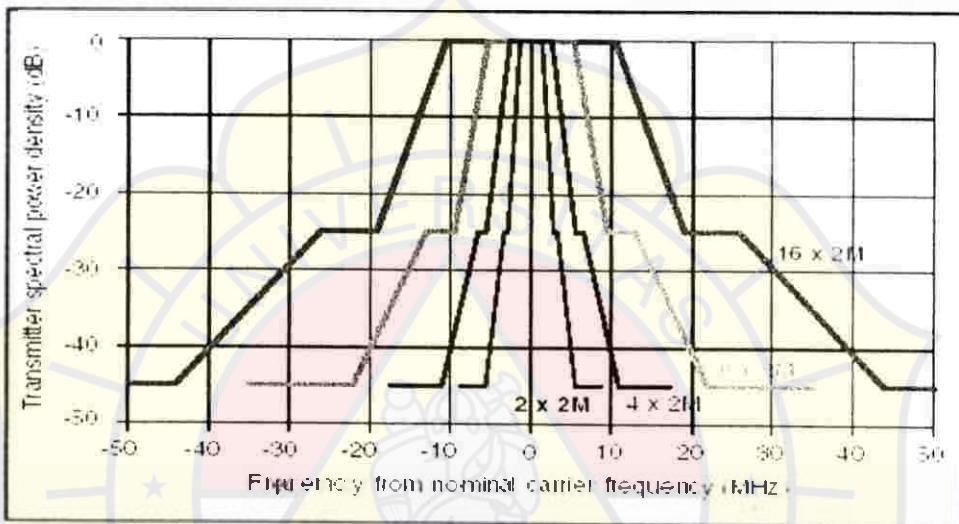
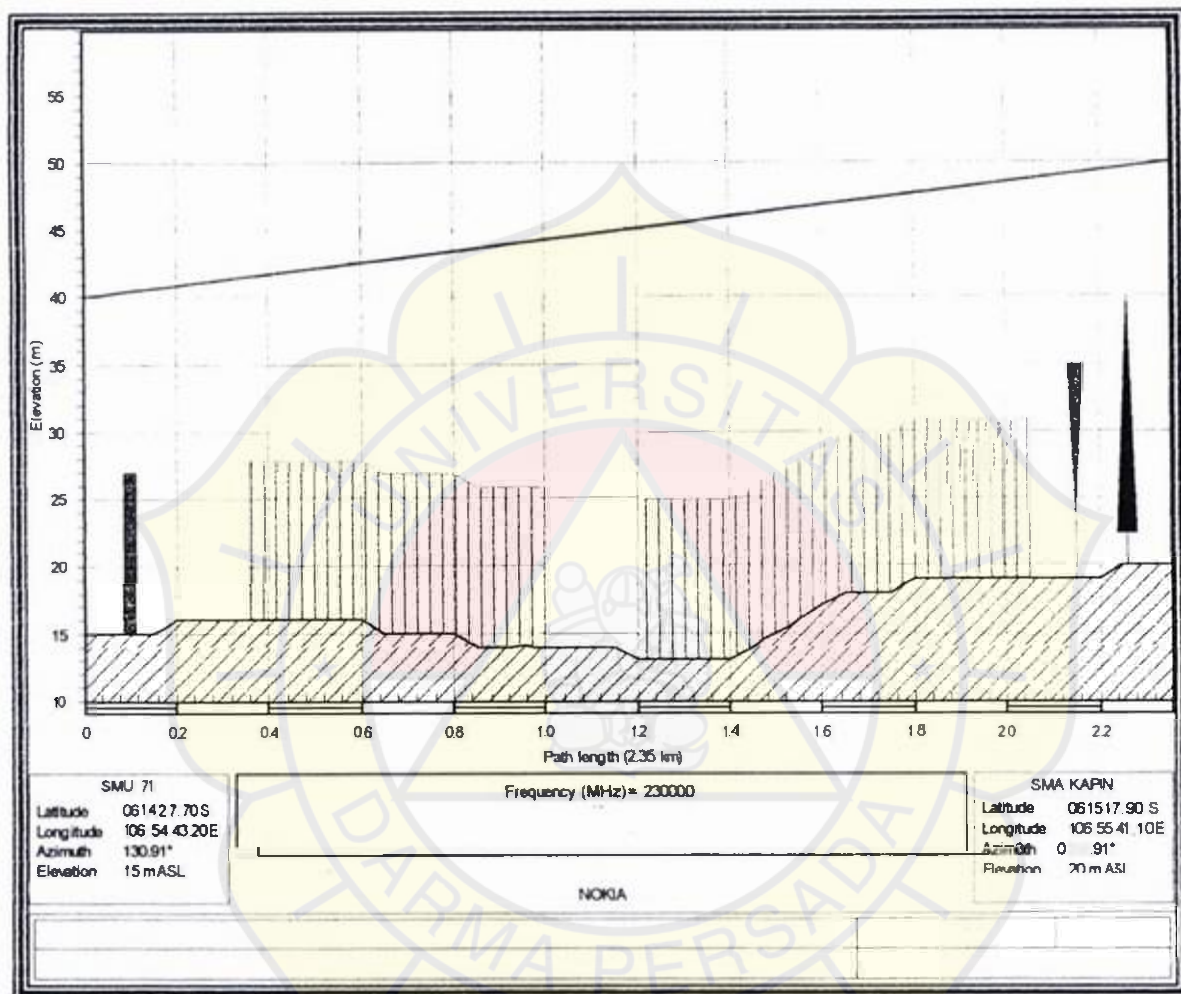


Figure 28. Spectrum mask

Table 38. Minimum transmit power

Frequency band	Capacity (Mbit/s)	Minimum transmit power (dBm), nominal
7, 8 GHz	All capacities	3
13, 15 GHz	All capacities	6
18, 23, 26, 38 GHz	2 x 2	-10
	4 x 2	-7
	8 x 2	-4
	16 x 2	-1



Terrain Data - SMU 71-SMA KAPIN.pl4

	SMU 71	SMA KAPIN
Latitude	06 14 27.70 S	06 15 17.90 S
Longitude	106 54 43.20 E	106 55 41.10 E
True azimuth (°)	130 54 27.31	310 54 21.01
Calculated Distance (km)	2.355	
Profile Distance (km)	2.355	
Datum	WGS 1984	
UTM zone	48S	48S
Easting (km)	711.544	713.318
Northing (km)	9309.768	9308.219
Elevation (m)	15.00	20.00

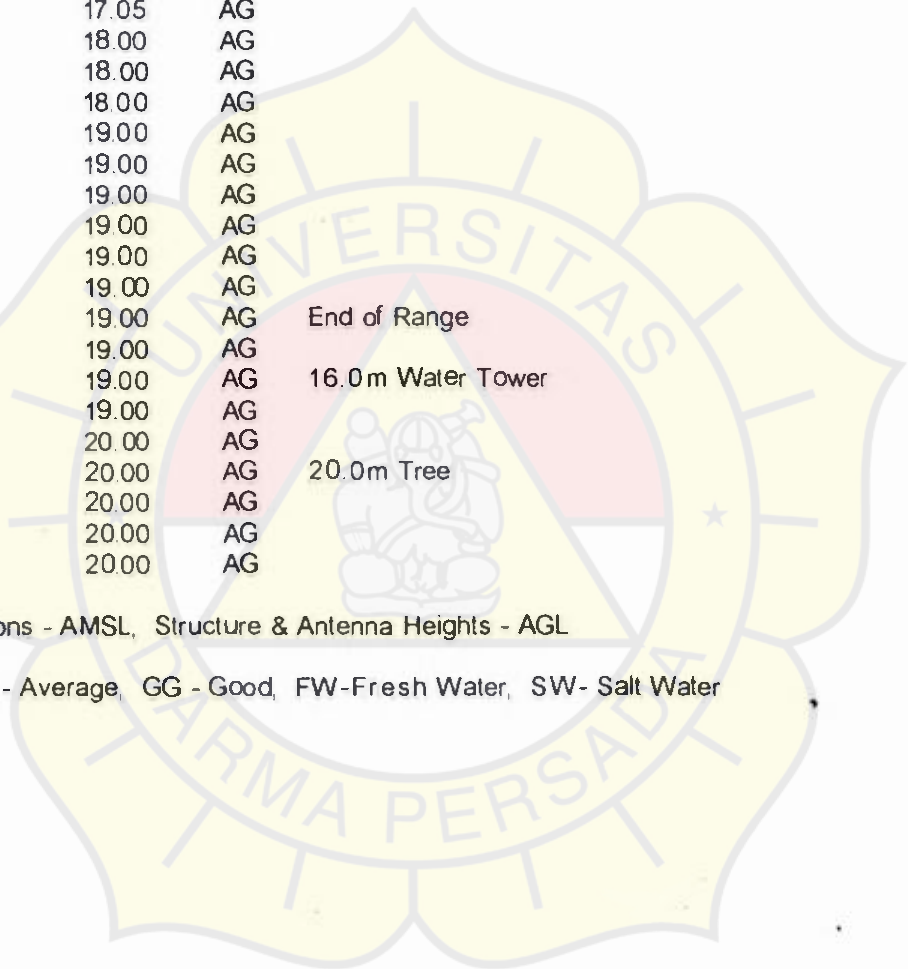
Distance (km)	Elevation (m)	Ground	Structure (m)
0.000	15.00	AG	
0.050	15.00	AG	
0.100	15.00	AG	12.0m Building
0.150	15.00	AG	
0.200	16.00	AG	
0.226	16.00	AG	
0.250	16.00	AG	
0.300	16.00	AG	
0.350	16.00	AG	
0.360	16.00	AG	12.0 m Building - Start of Range
0.400	16.00	AG	
0.450	16.00	AG	
0.470	16.00	AG	
0.500	16.00	AG	
0.550	16.00	AG	
0.600	16.00	AG	
0.650	15.00	AG	
0.700	15.00	AG	
0.750	15.00	AG	
0.800	15.00	AG	
0.850	14.00	AG	
0.900	14.00	AG	
0.950	14.01	AG	
1.000	14.00	AG	End of Range
1.050	14.00	AG	
1.083	14.00	AG	
1.100	14.00	AG	

1 150	14.00	AG	
1 200	13.00	AG	
1 220	13.00	AG	12.0m Building - Start of Range
1 250	13.00	AG	
1 300	13.00	AG	
1 350	13.00	AG	
1 400	13.00	AG	
1 450	14.00	AG	
1 500	15.00	AG	
1 550	16.00	AG	
1 600	17.05	AG	
1 650	18.00	AG	
1 700	18.00	AG	
1 750	18.00	AG	
1 800	19.00	AG	
1 850	19.00	AG	
1 900	19.00	AG	
1 950	19.00	AG	
2 000	19.00	AG	
2 030	19.00	AG	
2 050	19.00	AG	End of Range
2 100	19.00	AG	
2 150	19.00	AG	16.0m Water Tower
2 200	19.00	AG	
2 250	20.00	AG	
2 261	20.00	AG	20.0m Tree
2 280	20.00	AG	
2 300	20.00	AG	
2 355	20.00	AG	

Ground Elevations - AMSL, Structure & Antenna Heights - AGL

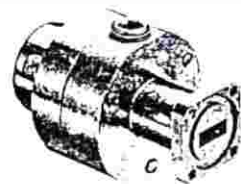
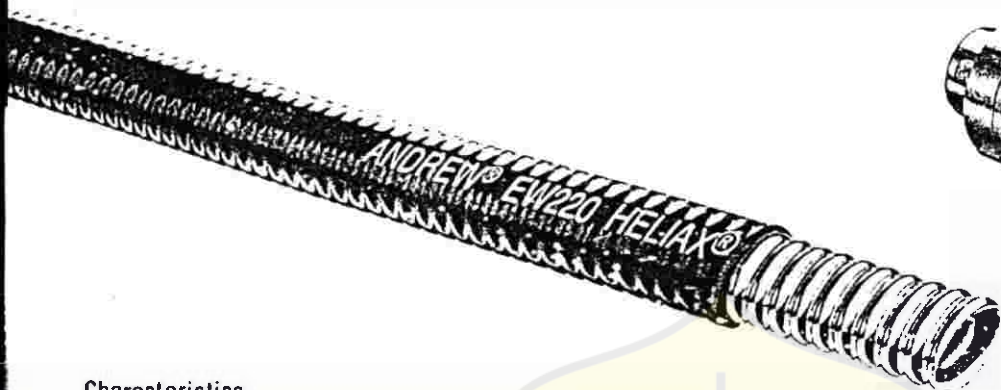
Ground Type

PG -Poor, AG- Average, GG - Good, FW-Fresh Water, SW- Salt Water



Elliptical Waveguide


Type EW220

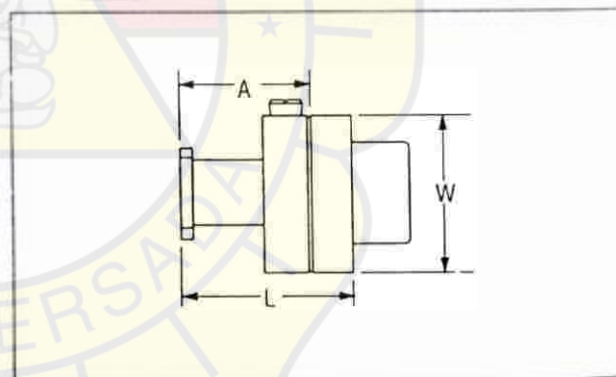


Characteristics

Type Numbers	
Standard Waveguide	EW220
Standard Waveguide Type CATVP	222040-2
Electrical	
Max. Frequency Range, GHz*	17.0-23.6
eTE ₁₁ Mode Cutoff Frequency, GHz	1334
Group Delay at 22.4 GHz, ns/100 ft (ns/100 m)	127 (415)
Peak Power Rating at 22.4 GHz, kW	8.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.67 x 0.41 (17.0 x 10.4)
Weight, pounds per foot (kg/m)	0.12 (0.18)

Connectors - Flange dimensions on pages 216-217

Type No. 1220ASC, 1220ASCW	L	W	A	Weight
	in (mm)	in (mm)	in (mm)	lb (kg)
	2.4 (61)	1.57 (40)	1.3 (33)	0.7 (0.3)



Connector Material: Brass

* Actual usable range is limited by the connecting rectangular waveguide.

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation, %
21	8.86 (29.08)	0.38	77.2
21.2	8.82 (28.93)	0.39	77.7
21.4	8.78 (28.80)	0.39	78.2
21.6	8.74 (28.67)	0.39	78.6
21.8	8.70 (28.54)	0.39	79.1
22.0	8.66 (28.43)	0.39	79.5
22.2	8.63 (28.32)	0.39	79.9
22.4	8.60 (28.22)	0.40	80.3
22.6	8.57 (28.13)	0.40	80.7
22.8	8.55 (28.03)	0.40	81.1
23.0	8.52 (27.95)	0.40	81.5
23.2	8.50 (27.87)	0.40	81.8
23.4	8.47 (27.80)	0.40	82.2
23.6	8.45 (27.73)	0.40	82.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature (use over 40°C (104°F) ambient).

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

