# BAB V

# KESIMPULAN

Berdasarkan bahasan pada bab-bab sebelumnya dapat diambil kesimpulannya adalah sebagai berikut :

1. Dari hasil perhitungan C/N pada system modulasi QPSK diperoleh sebesar 78.79 dB, maka dari hasil tersebut lebih besar dari carrier-to-noise 13,6 dB yang bisa dilihat dari table performansi modulasi untuk BER $10^{-6}$ sehingga dapat disimpulkan data yang diperoleh lebih baik.
2. Dari hasil perhitungan Eb/No yaitu sebesar 60.73 dB maka kualitas EB/No sangat baik, maka untuk kualitas BER akan lebih kecil karena pada BER $10^{-6}$ besarnya Eb/No untuk standart modulasi QPSK adalah sebesar 10,6 dB.
3. Hasil dari perhitungan analisa throughput data didapat hasil sebesar 83.729,27872 bps dan memerlukan bit rate sebesar 22 Kbps, sedangkan bandwidth yang tersedia pada BNI Ciawi sebesar 256 Kbps. Jadi dari hasil analisa dan perbandingan, bandwidth yang tersedia pada BNI Ciawi kurang optimal karena throughput pada BNI Ciawi masih rendah dan masih bisa dimungkin kan untuk menambah throughput lagi.

## DAFTAR PUSTAKA


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6. ....., *"Palapa Satellite First and Main Player in The Asia Pasific Region", PT. Citra Sari Makmur,* 1995

# LAMPIRAN

# LAMPIRAN 1

**Data**

KOM
CSM

P.T. CITRA SARI MAKMUR
*Satellite & Terrestrial Network*

Plaza Chase 16th Floor, Jl. Jend. Sudirman Kav. 21, Jakarta 12910, Indonesia
☎ (021) 5700194, 5208311, Fax. 5704656

Kami selaku pembimbing tugas akhir di PT. CSM Cikarang memberikan pernyataan benar adanya bahwa:

1. BNI Ciawi memakai ; a. Frekuensi Up Link sebesar : 3.740 MHz
   b. Frekuensi Down Link sebesar: 5.965 MHz
   c. Inroute sebesar : 256 Kbps
   d. Outroute sebesar : 5,9 Mbps
2. Standard throughput minimum di BNI Ciawi sebesar 256 Kbps dipergunakkan untuk 30 remote.
3. Waktu delay ( *Delay Time*) yang diberikan pada BNI Ciawi yaitu sebesar 700 ms.
4. BNI Ciawi memakai satelit Telkom 1.

Demikian pernyataan ini dibuat agar dapat dipergunakkan dengan sebaik-baiknya.

# LAMPIRAN2

## Data Traffic

TELKOM

CSM

## Tabel Data Traffik BNI Ciawi

| | Port 1 on JKT CIAWI (172.31.236.180)<br>Bandwidth Traffic IN<br>kbyte |
|---|---|
| 6/1/2008 11:00 PM -11:05 PM | 54.337 |
| 6/2/2008 12:45 PM - 12:50 PM | 310.981 |
| 6/3/2008 12:05 PM- 12:10 PM | 410.229 |
| 6/4/2008 8:15 AM-8:20 AM | 317.679 |
| 6/5/2008 8:20 AM -8:25 AM | 368.379 |
| 6/6/2008 8:30 AM -8:35 AM | 286.011 |
| 6/7/2008 7:15 AM -7:20 AM | 135.268 |
| 6/8/2008 7:15 PM -7:20 PM | 52.731 |
| 6/9/2008 8:35 AM- 8:40 AM | 352.906 |
| 6/10/2008 8:15 AM- 8:20 AM | 297.218 |
| 6/11/2008 8:20 AM -8:25 AM | 311.096 |
| 6/12/2008 8:15 AM -8:20 AM | 317.276 |
| 6/13/2008 8:30 AM-8:35 AM | 438.249 |
| 6/14/2008 9:40 AM-9:45 AM | 137.384 |
| 6/15/2008 9:35 PM-9:40 PM | 124.078 |
| 6/16/2008 8:25 AM -8:30 AM | 394.131 |
| 6/17/2008 8:25 AM -8:30 AM | 337.958 |
| 6/18/2008 8:35 AM - 8:40 AM | 308.26 |
| 6/19/2008 8:25 AM - 8:30 AM | 350.623 |
| 6/20/2008 8:30 AM -8:35 AM | 322.792 |
| 6/21/2008 12:20 AM-12:25 AM | 123.073 |
| 6/22/2008 1:50 PM- 1:55 PM | 16.162 |
| 6/23/2008 2:00 PM-2:05 PM | 315.607 |
| 6/24/2008 11:55 AM- 12:00 PM | 354.153 |
| 6/25/2008 8:35 AM -8:40 AM | 352.441 |
| 6/26/2008 12:10 PM- 12:15 PM | 284.17 |
| 6/27/2008 8:40 AM -8:45 AM | 307.469 |
| 6/28/2008 11:50 AM- 11:55 AM | 225.046 |
| 6/29/2008 2:05 AM-2:10 AM | 58.919 |
| 6/30/2008 8:25 AM- 8:30 AM | 297.088 |
| 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM | 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM |
| Total Volume | 7,907.38 |
| Rata-rata per bulan (Total Volume/30 Hari) | 263.5792333 |

ELKOM

CSM

| Port 1 on JKT CIAWI (172.31.236.180)<br>Bandwidth Traffic IN<br>kbit/second | Port 1 on JKT CIAWI(17231.236.180)<br>Bandwidth Traffic OUT<br>kbyte |
|---|---|
| 1.484 | 48.446 |
| 8.492 | 193.099 |
| 11.202 | 601.809 |
| 8.675 | 293.653 |
| 10.059 | 331.763 |
| 7.81 | 788.07 |
| 3.694 | 2,007.32 |
| 1.44 | 48.004 |
| 9.637 | 816.274 |
| 8.116 | 258.596 |
| 8.495 | 707.086 |
| 8.664 | 336.226 |
| 11.967 | 1,158.19 |
| 3.751 | 488.297 |
| 3.388 | 472.05 |
| 10.762 | 417.699 |
| 9.229 | 774.858 |
| 8.418 | 1,035.92 |
| 9.574 | 962.764 |
| 8.815 | 437.254 |
| 3.361 | 99.771 |
| 0.441 | 14.861 |
| 8.618 | 612.083 |
| 9.671 | 944.033 |
| 9.624 | 539.845 |
| 7.76 | 781.927 |
| 8.396 | 745.15 |
| 6.145 | 73.408 |
| 1.609 | 49.705 |
| 8.113 | 279.508 |
| 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM | 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM |
| 215.926 | 16,269.22 |
| 7.197533333 | 542.3072667 |

ELKOM
CSM

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| Port 1 on JKT CIAWI (172.31.236.180) Bandwidth Traffic OUT kbit/second | Port 1 on JKT CIAWI (172.31.236.180) SUM kbyte |
|---|---|
| 1.323 | 102.783 |
| 5.273 | 504.08 |
| 16.433 | 1,012.04 |
| 8.019 | 611.332 |
| 9.059 | 700.142 |
| 21.52 | 1,074.08 |
| 54.813 | 2,142.59 |
| 1.311 | 100.735 |
| 22.29 | 1,169.18 |
| 7.061 | 555.813 |
| 19.309 | 1,018.18 |
| 9.181 | 653.502 |
| 31.626 | 1,596.44 |
| 13.334 | 625.681 |
| 12.891 | 596.128 |
| 11.406 | 811.83 |
| 21.16 | 1,112.82 |
| 28.287 | 1,344.18 |
| 26.29 | 1,313.39 |
| 11.94 | 760.046 |
| 2.725 | 222.845 |
| 0.406 | 31.023 |
| 16.714 | 927.69 |
| 25.779 | 1,298.19 |
| 14.741 | 892.286 |
| 21.353 | 1,066.10 |
| 20.348 | 1,052.62 |
| 2.005 | 298.454 |
| 1.357 | 108.624 |
| 7.632 | 576.596 |
| 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM | 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM |
| 444.263 | 24,176.60 |
| 14.80876667 | 805.8865333 |

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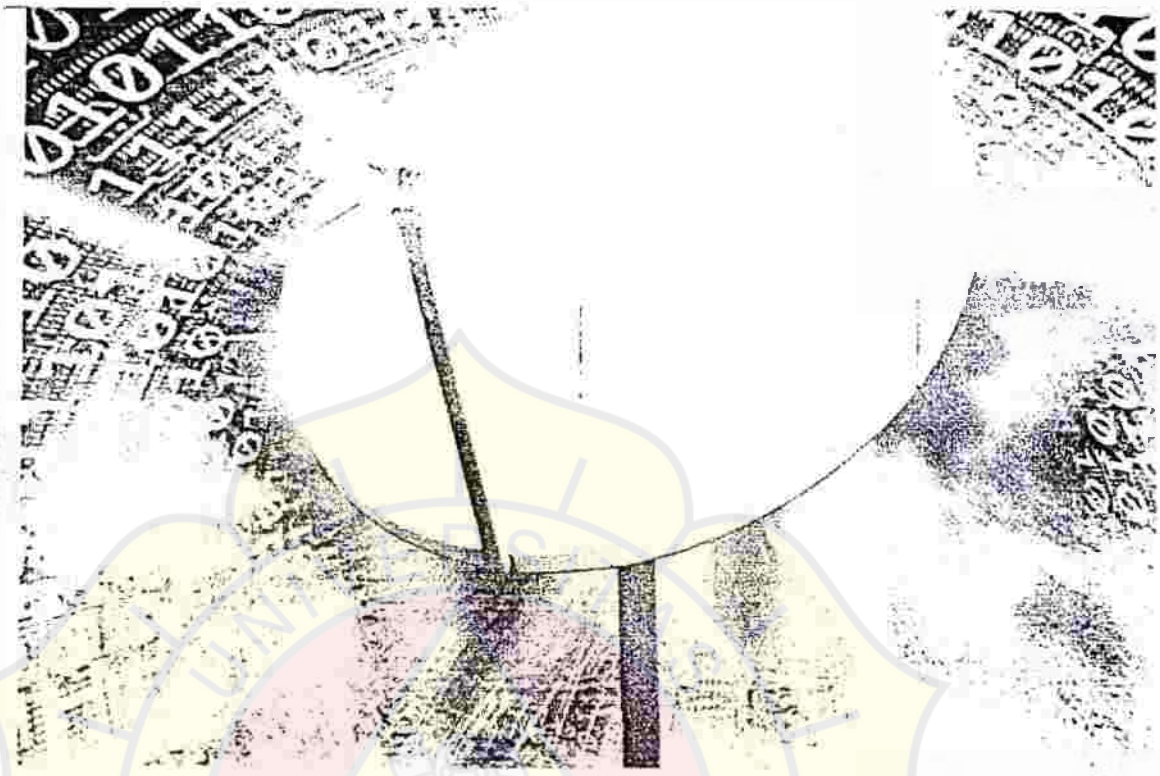
CSM

| Port 1 on JKT CIAWI (172.31.236.180) SUM kbit/second | Port 1 on JKT CIAWI (172.31.236.180) Coverage % |
|---|---|
| 2.807 | 100 |
| 13.765 | 100 |
| 27.635 | 100 |
| 16.694 | 100 |
| 19.119 | 100 |
| 29.33 | 100 |
| 58.507 | 100 |
| 2.751 | 100 |
| 31.927 | 100 |
| 15.178 | 100 |
| 27.804 | 100 |
| 17.845 | 100 |
| 43.593 | 100 |
| 17.085 | 100 |
| 16.279 | 100 |
| 22.169 | 100 |
| 30.388 | 100 |
| 36.705 | 100 |
| 35.864 | 100 |
| 20.755 | 100 |
| 6.085 | 100 |
| 0.847 | 100 |
| 25.332 | 100 |
| 35.45 | 100 |
| 24.366 | 100 |
| 29.112 | 100 |
| 28.744 | 100 |
| 8.15 | 100 |
| 2.966 | 100 |
| 15.745 | 100 |
| 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM | 6/1/2008 12:00 AM s/d 6/30/2008 12:00 AM |
| 660.19 | |
| 22.00633333 | |

# LAMPIRAN3

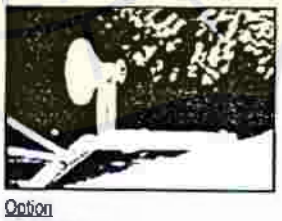
## *Spesifikasi* Alat

A TriPoint Global Company™



Prodelin Corporation is the world's largest manufacturer of Rx/Tx VSAT antennas. We have the broadest product line in the industry including Receive Only, Rx/Tx and Rural Telephony antenna systems. Prodelin offers nineteen antenna sizes, 47cm to 4.5M. Prodelin is the leader in obtaining type certifications and approvals for Intelsat, AsiaSat and Eutelsat. Prodelin antennas provide the best quality in the market due to the sophisticated, precision SMC compression molding process technology. Prodelin provides the best value antenna solution to the market with competitive prices, the highest quality products and superb engineering support. Prodelin is ISO registered, KEMA # 70022.01. *Prodelin - The Market Leader in VSAT Antennas.*

Back View
1.8M Rx/Tx



Option
Ku-Band Feed

## Key Features

- Precision compression molded offset reflector
- Intelsat approvals: C-Band # IA010C00 and Ku-Band # IA005A00
- Non penetrating roof mounts and king posts available
- Interface kits for all C & Ku-Band RF heads in stock
- Two axis tracking configuration available
- Reflector/Feed electrical anti-icing available
- Insat extended C-band available

| | | | | |
|---|---|---|---|---|
| Antenna Size | | 1.8M(71in.) | 1.8M(71i.n.) | 18M(71i.n.) |
| Operating Frequency | Receive | 3.625-4.2GHz | 3.625-4.2GHz | 10.95-12.75 GHz |
| | Transmit | 5.850-6.425 GHz | 5.850-6.425 GHz | 14.0-14.5 GHz |
| Midband Gain( ±.2dB) | Receive | 35.5dBi | 35.5dBi | 45.0dBi |
| | Transmit | 39.5dBi | 39.5dBi | 46.5dBi |
| Antenna Noise Temperature | | | | |
| 10° elevation | | 56K | 30K | 44K |
| 20° elevation | | 49K | 23K | 38K |
| 30° elevation | | 47K | 21K | 35K |
| 40° elevation | | 46K | 20K | 33K |
| Sidelobe Envelope, Co-Pol | | | | |
| Mainbeam $<\theta<7°$ | | 29-25Log θ dBi | 29-25 Log θ dBi | 29-25Log θ dBi |
| $7° < \theta < 9.2°$ | | +8 dBi | +8 dBi | +8 dBi |
| $9.2° < \theta < 48°$ | | 32-25Log θ dBi | 32-25 Log θ dBi | 32-25 Log θ dBi |
| $48° < \theta < 180°$ | | -10 dBi(averaged) | -10dBi(averaged) | -10dBi(averaged) |
| Cross-Polarization (Linear) | | >30 dB on axis | N/A | >30 dB on axis |
| Axial Ratio (Circular) | Receive | N/A | 2.2B | N/A |
| | Transmit | N/A | 1.60 | N/A |
| VSWR | | 1.3:1 Max. | 1.3:1 Max. | 1.3:1 Max. |
| Feed Interface | Recieve | CPR 229F | CPR 229F | Available in a variety of designs |
| | Transmit | CPR 137 or Type N | CPR 137 or Type N | Available in a variety of designs |

| | | |
|---|---|---|
| Reflector Material | Glass Fiber Reinforced Polyester SMC | |
| Antenna Optics | Prime Focus, One-Piece Offset Feed | |
| Mast Pipe Size | 3.5" SCH 40Pipe (4.00" OD) 10.16 cm. | |
| Elevation Adjustment Range | 5° to 90°, Continuous Fine Adjustment | |
| Azimuth Adjustment Range | ±45°Fine Adjustment, 360° Continuous | |
| Mount Type | Elevation over Azimuth | |
| Shipping Specifications | 225 lbs.(103 kg.) | 240 lbs.(109 kg.) |

| | | |
|---|---|---|
| Wind Loading | Operational | 50mph (80km/h) |
| | Survival | 125 mph(201km/h) |
| Temperature | Operational | -40° to 140° F (-40° to 60°C) |
| | Survival | -50° to 160° F (-46° to 71°C) |
| Rain | Operational | 1/2"/hr |
| | Survival | 2"/hr |
| Ice | Operational | —— |
| | Survival | 1/2" radial |
| Atmospheric Conditions | Salt, Pollutants and Contaminants as Encountered in Coastal and Industrial Areas | |
| Solar Radiation | 360BTU/h/ft² | |

PRODELIN

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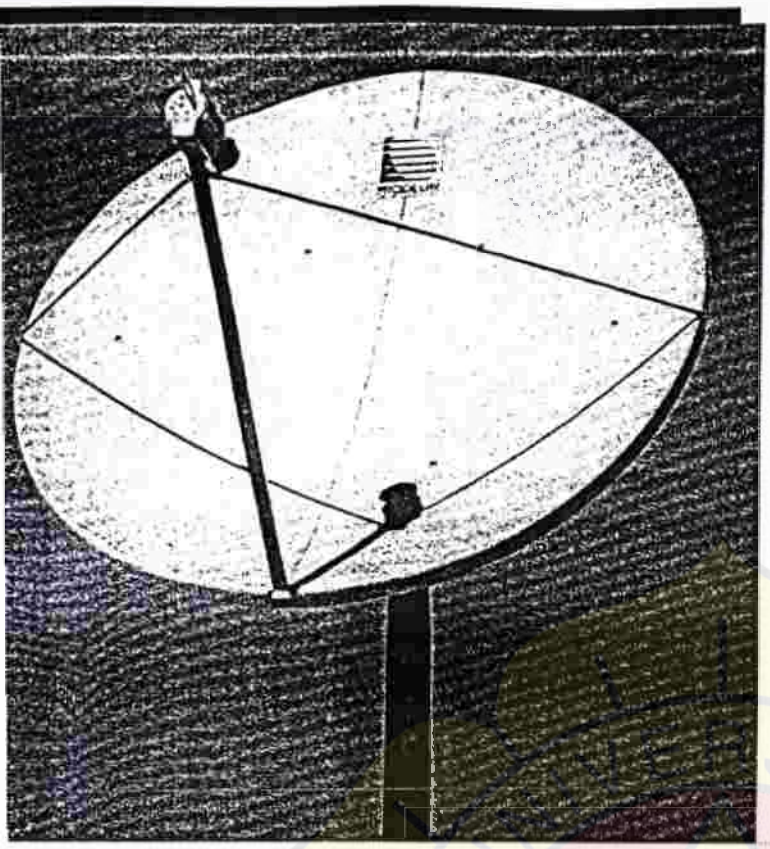
2000

# RODELIN

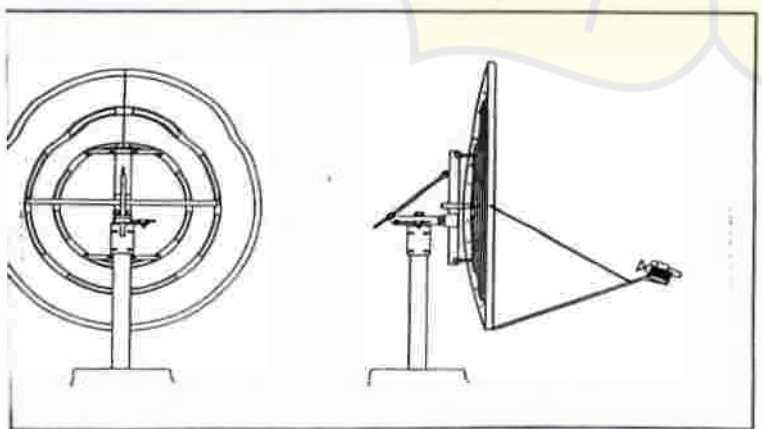


## 2.4 Meter C and Ku-Band Receive/Transmit Antenna System Series 1251

## ATURES

- Piece Compression Molded Offset Reflector
- Extended C-Band Available
- llation Time Reduced with Improved Mount Design
- Easily in Standard Air Freight Containers
- Penetrating Roof Mounts and King Post Available
- ace Kits For All C and Ku-Band RF Heads in Stock
- Axis Tracking Configuration Available
- tor/Feed Electrical Anti-Icing Available

Prodelin Corporation specializes in the design and manufacture of small aperture antennas. The Company has invested heavily in the manufacture of antenna products, especially for direct reception of signals by commercial customers. Prodelin is committed to the production of high quality, low cost and easily deployed antenna systems for operation at frequencies up to 30 GHz. Each system features a sturdy galvanized steel support structure and is available with a variety of feed, mount and pedestal configurations. The Company's products are marketed worldwide.



PRODELIN
ISO 9002 registered
certificate no A2421

PRODELIN
CORPORATION

*"Quality is reflected in everything we do"*

# SPECIFICATIONS

Series 12

## ELECTRICAL

| | | C-Band Linear | C-Band Circular | Ku-Band |
|---|---|---|---|---|
| ntenna Size | | 2.4M(96in.) | 2.4M(96in.) | 2.4M(96in.) |
| perating Frequency | Receive | 3.625 -4.2 GHz | 3.625 -4.2 GHz | 10.95-12.75 GHz |
| | Transmit | 5.850-6.425 GHz | 5.850-6.425 GHz | 14.0-14.5 GHz |
| idband Gain (± .2dB) | Receive | 38 dBi | 38 dBi | 47.6 dBi |
| | Transmit | 42.0 dBi | 42.0 dBi | 49.2 dBi |
| ntenna Noise Temperature | | | | |
| 10° elevation | | 52°K | 30°K | 42° K |
| 20° elevation | | 46° K | 23°K | 32° K |
| 30° elevation | | 45° K | 20°K | 28° K |
| 40° elevation | | 44° K | 19°K | 27° K |
| ross-Pol Isolation (Linear) | | >30 dB (on axis) | N/A | >30 dB(on axis) |
| xial Ratio(Circular) | Receive | N/A | 2.28 | N/A |
| | Transmit | N/A | 1.94 | N/A |
| idelobe Envelope, Co-Pol | | | | |
| 100λ/D θ ≤ 20° | | 29-25 Log θ dBi | 29-25 Log θ dBi | 29-25 Log θ dBi |
| 20° < θ≤26.3° | | -3.5 dBi | -3.5 dBi | -3.5 dBi |
| 26.3° <θ≤48° | | 32-25 Logθ dBi | 32-25 Log θ dBi | 32-25 Log θ dBi |
| θ>48° | | -10 dBi(averaged) | -10 dBi(averaged) | -10 dBi(averaged) |
| SWR | | 1.3:1 Max. | 1.3:1 Max. | 1.3:1 Max. |
| eed Interface | Receive | CPR 229 F | CPR229F | WR 75 |
| | Transmit | CPR 137 or Type N | CPR 137 or Type N | WR75 or Direct Radio Mounting |

## MECHANICAL

| | |
|---|---|
| eflector Material | Glass Fiber Reinforced Polyester LPMC |
| ntenna Optics | Prime Focus, Offset Feed, Two-Piece Divided Along Major Axis |
| lount Type | Elevation over Azimuth |
| levation Adjustment Range | 5° to 90°, Continuous Fine Adjustment |
| zimuth Adjustment Range | 360 Continuous, ±45° Fine Adjustment |
| last Pipe Size | 6" SCH40 Pipe (6.63" OD) 16.83cm. |

## ENVIRONMENTAL PERFORMANCE

| | | |
|---|---|---|
| /ind Loading | Operational | 50 mph (80km/h) |
| | Survival | 125 mph (201km/h) |
| emperature | Operational | -40° to 140° F (-40° to 60° C) |
| | Survival | -50° to 160° F (-46° to 71° C) |
| ain | Operational | 1/2" /hr |
| | Survival | 2" /hr |
| e | Operational | ------ |
| | Survival | 1/2" radial |
| tmospheric Conditions | | Salt, Pollutants and Contaminants as Encountered in Coastal and Industrial Areas |
| olar Radiation | | 360 BTU/h/ft² |
| hipping Specifcations | | 385 lbs. (174 kg.) |

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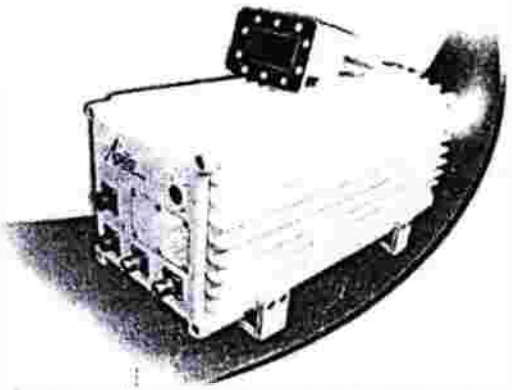
1700 NE Cable Drive
Conover NC 28613 USA
Phone 704/464-4141
Fax 704/466-0860
Home Page: http://www.prodelin.com

Agilis®
Connecting Globally

# AAV 813 Series C-Band VSAT Outdoor Transceiver



Agilis AAV 813 Series C-Band SPT (C-Band Single Package Transceiver) is a highly cost-effective RF ODU (OutDoor Unit) for satellite communication. It is designed for voice, data and broadband application, operating in different modulation formats including BPSK, QPSK, QAM and FM.

Agilis AAV880 SPT is a highly integrated ODU that comprises of Power Supply, Upconverter, SSPA (Solid State Power Amplifier), Downconverter and low phase noise synthesizers. It has a built-in M&C for remote and local monitor and control. In addition, a wide range of SSPA booster options are available for higher power applications.

Agilis AAV 880 SPT is suitable for SCPC (Single Channel Per Carrier), MCPC (Multi-Channel Per Carrier), DAMA (Demand Assigned Multiple Access) or TDMA (Time Division Multiple Access) applications.

## Features

- Available for all C-Band frequencies
- Broadband data transmission
- Easy installation& configuration
- Built-in monitoring& control
- Higher power options
- Built-in image rejection filter
- Very stable OCXO reference oscillator
- Output power monitoring
- Electronically tuneable synthesizer
- 2.5 MHz frequency step size
- Redundancy ready
- Surge protection
- 70 or 140 MHz IF interface

## Applications

- Hub and VSAT terminals
- Video conferencing
- Broadcast
- Rural telephony
- Emergency link restoration
- Point-of-sales

## Enhanced Monitoring and Control

Agilis AAV 880 C-SPT offers M&C via RS232/485. It features full remote M&C through Windows using PC or WinCE PDA.
These include:

- Tx/Rx level monitoring
- Temperature monitoring
- RF output ON/OFF
- Frequencies selection
- Gain control
- Automatic fault identification & alarm

## Reliability

Field proven under harsh environmental conditions. Agilis ODUs can withstand temperature ranging from -20°C to +60°C with up to 100% humidity.

## Quality Assurance

All Agilis ODUs go through 72 hours burn-in at +60°C with performance being monitored. In addition, all units undergo 100% waterproof test equivalent to IP65 to ensure operation in tropical, cold and harsh environment.

Agilis Communication Technologies Pte Ltd
*(Registration No.:199103901W)*
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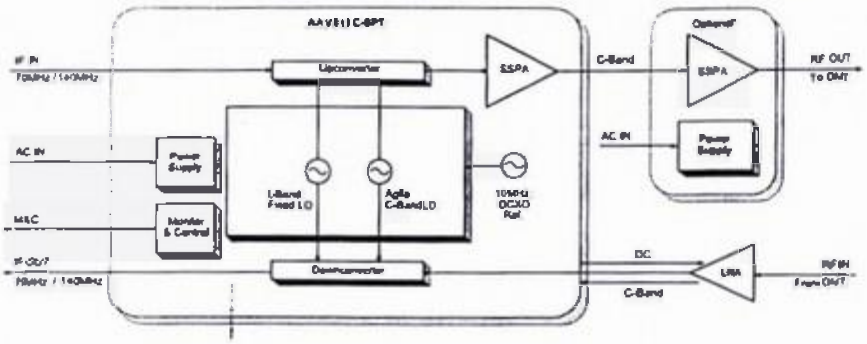
## TECHNICAL SPECIFICATIONS




### C-Band Frequency Band (GHz)

| Frequency | Transmit | Receive |
|---|---|---|
| Intelsat | 5.850 – 6.425 | 3.625 – 4.200 |
| Gorizont | 5.725 – 6.275 | 3.400 – 3.950 |
| Insat | 6.725 – 7.025 | 4.500 – 4.800 |
| ST-1/Palapa C | 6.425 – 6.725 | 3.400 – 3.700 |

### Transmit

| Power | Output @P1dB (dBm) min | Min Gain (dB) | MaxAC power consumption (VA) |
|---|---|---|---|
| 1mW | 0 | 28 - 33 | 30 |
| 2W | 33 | 58 - 63 | 50 |
| 5W | 37 | 62 - 67 | 70 |
| 10W | 40 | 65 - 70 | 120 |
| 20W* | 43 | 68 - 73 | 200 |
| 50W* | 47 | 72 - 77 | 400 |
| 80W* | 49 | 73 - 78 | 700 |
| 100W* | 50 | 75 - 80 | 800 |
| 125W* | 51 | 76 - 81 | 1000 |
| 150W* | 51.8 | 77 - 82 | 1200 |
| 200W* | 53 | 78 - 83 | 1400 |

| | |
|---|---|
| Input Frequency | 70/140±18 MHz (Optional)<br>140±36 MHz (Optional ) |
| Output Frequency | C-Band |
| Frequency Step Size | 2.5 MHz |
| IF Input Power for Output P1dB | -30 dBm min |
| Gain Flatness for Full BW | ±2.0 dB max |
| for 36 MHz BW | ±1.25 dB max |
| Gain Stability (-20°C to +60°C) | ±2.0 dB max |
| Gain Adjustment | 31 dB @ 1 dB steps |
| Intermodulation Product (with 2 carriers at 3 dB OPBO composite power) | -30 dBc max |
| Spurious (36 MHz BW) | -55 dBc max |
| Phase Noise @ 100Hz offset | -60 dBc/Hz max |
| @ 1kHz offset | -70 dBc/Hz max |
| @ 10kHz offset | -80 dBc/Hz max |
| @ 100kHz offset | -90 dBc/Hz max |
| IF Input Interface | 50Ω N-type Female |
| RF Output Interface | 50Ω N-type Female |

### Environmental

| | |
|---|---|
| Operating Temperature | -20°C to +60°C |
| Relative Humidity | up to 100% |

### Low Noise Amplifier

| | |
|---|---|
| Input Frequency | C-Band |
| Noise Temperature at 25°C | 35°K |
| Gain | 55 dB typ |
| Gain Flatness (36 MHz BW) | ±0.25 dB |
| RF Input Interface | WR229/ G |
| RF Output Interface | 50Ω N-type Female |

### Receive (exclude LNA)

| | |
|---|---|
| Input Frequency | C-Band |
| Output Frequency | 70/140± 18 MHz<br>140±36 MHz (Optional) |
| Frequency Step Size | 2.5 MHz |
| Gain | 40 dB min |
| Gain Adjustment | 31 dB @ 1 dB steps |
| Gain Flatness (36 MHz BW) | ±1.25 dB max |
| Gain Stability (-20°C to +60°C) | ±3 dB max |
| 3rd Order ICP 26 dBm min | |
| Spurious (36 MHz BW) | -55 dBc max |
| Phase Noise @ 100Hz offset | -60 dBc/Hz max |
| @ 1kHz offset | -70 dBc/Hz max |
| @ 10kHz offset | -80 dBc/Hz max |
| @ 100kHz offset | -90 dBc/Hz max |
| RF Input Interface / IF Output Interface | 50Ω N-type Female |

### Monitor And Control

| | |
|---|---|
| Interface | RS 232/485 |
| Form 'C' Relay Contacts | Optional |

### Power Supply

| | |
|---|---|
| Input Voltage (Factory Preset) | 220Vac, 110Vac or 48Vdc |
| DC output Voltage to LNA | +13Vdc at RF IN Connector |

### Mechanical

| | | | | |
|---|---|---|---|---|
| Dimensions | 440L | x 220W | x 220H mm | (1mW, 2W, 5W, 10W SPT) |
| | 410L | x 175W | x 275H mm | (20W Booster) |
| | 342L | x 278W | x 173H mm | (50W Booster) |
| | 420L | x 290W | x 290H mm | (80W, 100W, 125W, 150W, 200W Booster) |
| Weight | 12.5 kg | | | (1mW, 2W, 5W, 10W SPT) |
| | 13.0 kg | | | (20W, 50W Booster) |
| | 23.5 kg | | | (80W, 100W, 125W, 150W, 200W Booster) |

* Booster with 1mW driver

*Note: All specifications are subject to changes without notice*

# DATA PRIBADI PENULIS

NAMA : **ROWNAND R BTS**

NIM : 00210001

TTL : Jakarta, 26 September 1981

Jenis Kelamin :Laki-laki

Agama : KRISTEN

Warga Negara : Indonesia

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- SMPN Harapan Bunda– Jakarta Timur {1994 – 1997}
- SMK Budaya 1–Jakarta Timur {1997 – 2000}
- Universitas Darma Persada, Pondok Kelapa – Jakarta Timur {2000 – 2009}