



## AFFORDABLE ANTENNA TECHNOLOGY AT WORK FOR YOU

ANTENNA DESIGN | FABRICATION | INTEGRATION | CONSULTING

### ASSISTING YOUR PROGRAMS WITH THE ANTENNA TECHNOLOGY RESOURCES YOU NEED

#### PACIFIC ANTENNA SYSTEMS (PAS)

PAS has over 40 years design experience and specializes in Affordable (Low Profile/Lightweight) Antenna Solutions (1 to 100GHz):

- Communications (Multi Element)— Electronic Scanning Arrays (ESA's) ; Digital Beamforming (Multibeam) Arrays
- Waveguide Arrays, Distributed Arrays
- Antenna Tracking Techniques –Monopulse, Single Channel Monopulse (SCM), Missile Seekers
- Communications (Communications & SATCOM) –Auto Tracking Antennas including integrated Monopulse comparators & simultaneous polarizations
- Radar—SAR & Tracking, Arrays, Airborne Sense and Collision Avoidance



#### CUSTOM SOLUTIONS FOR YOUR ADVANCED ANTENNA REQUIREMENTS!

- PAS provides a full range of antenna systems engineering, antenna system design, fabrication and manufacturing including systems integration of product line to fit customers needs
- Antenna theory, design, test and measurement
- Gimbal & positioner design, Radome design including structural analysis (FEA, CFD) expertise
- Extremely fast concept to working Antenna Prototype spiral development cycles
- Industry leaders, experienced PhD level engineers and management with a proven track record in solving the toughest projects on time and within budget



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PAS ENGINEERING STAFF HAS PROUDLY PARTICIPATED IN DEVELOPING & TRANSITIONING ANTENNA SYSTEMS FOR PROGRAMS INCLUDING:

Apache AH-64E • Gray Eagle MQ-1C • MK 15 Phalanx Close-In Weapons System (CIWS) • Fire Scout MQ-8 (B & C) • Triton MQ-4C (BAMS) • Fire Finder AN/TPQ- 36 & 37 • Standard Missile RIM—161 • Electronic Warfare Suite/Pod



#### PAS' CORE COMPETENCIES

- Experienced RF Systems Engineering
- Antenna theory, design, development and antenna test & measurement
- Control systems and gimbal design for Airborne and Ground Communications & Radar Antennas
- Microwave components, design and development
- Structural designs including Finite Element Analysis (FEA), thermodynamics and heat transfer analysis, and Computational Fluid Dynamics (CFD)



#### Pacific Antenna Systems Analysis Software Includes:

- CST Microwave Suite
- DSS Solidworks Premium
- MATLAB/Simulink

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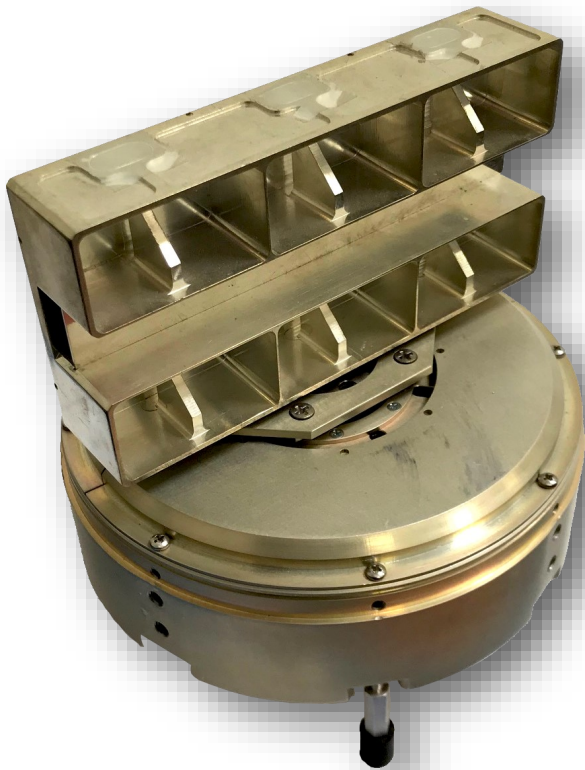
High Gain/Low Profile C Band Datalink Antenna

Model AD-100-C

The Pacific Antenna Systems (PAS) Model AD-100-C (4.4 – 5.85 GHz ) is a high performance lightweight (3.9 lbs.) low profile (6” total height) wide beam antenna terminal ideal for full duplex rotary/fixed wing aircraft communications and datalink applications. The AD-100-C provides 15.8 dBi constant antenna gain over wide angular coverage (Azimuth 20.5°; Elevation 37.0° [-3dB BW]) for vehicle roll compensation. The Azimuth drive is an efficient high performance, low power consumption (> 6 Watts @ 20°C) direct drive system. Azimuth drive is capable of high velocities (>90°/sec) and accelerations (>500°/sec²).

The AD-100–C has several flexible and re-configurable control interfaces including EtherCAT, analog torque, analog velocity, serial position & velocity. The Azimuth RF interface is an SMA (F) and an integral RF rotary joint allows for continuous 360° rotation and high angular rates. Modular design allows quick repair, replacement of servo amps, antenna array, RF rotary joints as LRU’s

The AD-100–C is suitable for either airborne or portable ground datalink applications. Contact PAS for complete electrical and mechanical ICD documentation



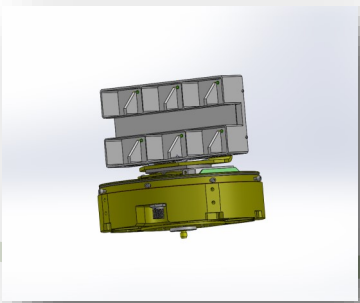
(Complete Antenna = 3.9lbs.)



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Antenna Parameter	Expected Performance
Antenna	Hybrid Array (Waveguide/Strip line)
Operating Frequency	4.40 – 5.85 GHz
Polarization	Linear Vertical
VSWR	2.0:1 maximum
RF Interface	SMA (F)
Power Handling	50 Watts C.W.
Antenna Gain (nominal)	
4.40 – 5.85 GHz	15.8 dBi
Antenna Beamwidth (-3 dB)	
Azimuth	20.5° (nominal)
Elevation	37.0° (nominal)
Azimuth Sidelobes (minimum)	
14.40 -15.35 GHz	< -11 dBc
Positioner	Expected Performance
Type	Azimuth (Continuous Rotation)
Velocity	> 90°/sec
Acceleration	> 500°/sec/sec
Travel	Azimuth 360° continuous electrical (rotary joint assembly)
Travel	Elevation N/A
Environmental & EMI/EMC (System designed to comply to the following MIL Standards)	MIL-STD-810F MIL-STD-461F
Primary Input Power	Nominal power consumption @ 20°C 5.6 Watts, 12 VDC (full operation); +12 VDC @ 84 Watts (Maximum Cold Start)
Weight (Maximum)	3.9 lbs. (1.72 KG)



Expected performance parameters are conservatively modeled and estimated. PAS reserves the right to change expected performance parameters at any time.



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High Gain/Low Profile Ku Band TCDL Antenna

MODEL—AD-100

The Pacific Antenna Systems (PAS) Model AD-100 Ku Band (14.40—15.35 GHz) is a high performance lightweight (3.85 lbs. not-including radome) low profile (5” total height) fan beam antenna terminal ideal for full duplex rotary/fixed wing aircraft applications. The AD-100 provides 18.5 dBi (minimum) constant antenna gain over wide Elevation angular coverage (> 55° [-3dB BW]) for vehicle roll compensation. The Azimuth drive is an efficient high performance, low power consumption (> 6 Watts @ 20°C) direct drive system. Azimuth drive is capable of high velocities (>90°/sec) and accelerations (>500°/sec²).

The AD-100 has several flexible and re-configurable control interfaces including EtherCAT, analog torque, analog velocity, serial position & velocity. The Azimuth RF interface is an SMA (F) and an integral RF rotary joint allows for continuous 360° rotation and high angular rates. Modular design allows quick repair, replacement of servo amps, antenna array, RF rotary joints as LRU’s

The AD-100 is ideal for airborne or portable ground TCDL (STANAG 7085) applications. Contact PAS for complete electrical and mechanical ICD documentation



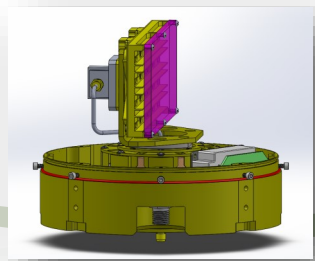
(Complete Antenna = 3.6lbs.)



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Antenna Parameter (AD-100)	Expected Performance
Antenna	Slotted Waveguide Array with Polarizer
Operating Frequency	14.40 – 15.85 GHz
Polarization	RHCP
VSWR	2.0:1 maximum
RF Interface	SMA (F)
Axial Ratio	2.0 dB max.
Power Handling	100 Watts C.W.
Antenna Gain (nominal)	
14.40 – 15.85 GHz	18.5 dBi
Antenna Beamwidth (-3 dB)	
Azimuth	6.9° (nominal)
Elevation	55° (nominal, shaped beam, constant gain profile)
Azimuth Sidelobes (minimum)	
14.40 -15.35 GHz	< -14 dBc
Positioner	Expected Performance
Type	Azimuth (Continuous Rotation)
Velocity	> 90°/sec
Acceleration	> 500°/sec²
Travel	Azimuth 360° continuous electrical (rotary joint assembly)
Travel	Elevation N/A
Environmental & EMI/EMC (System designed to comply to the following MIL Standards)	MIL-STD-810F MIL-STD-461F
Primary Input Power (+12-28 VDC)	Nominal power consumption @ 20°C 5.6 Watts, 12 VDC (full operation); +12 VDC @ 84 Watts (Maximum Cold Start)
Weight (Maximum Including Radome)	3.85 lbs. (1.75 KG)



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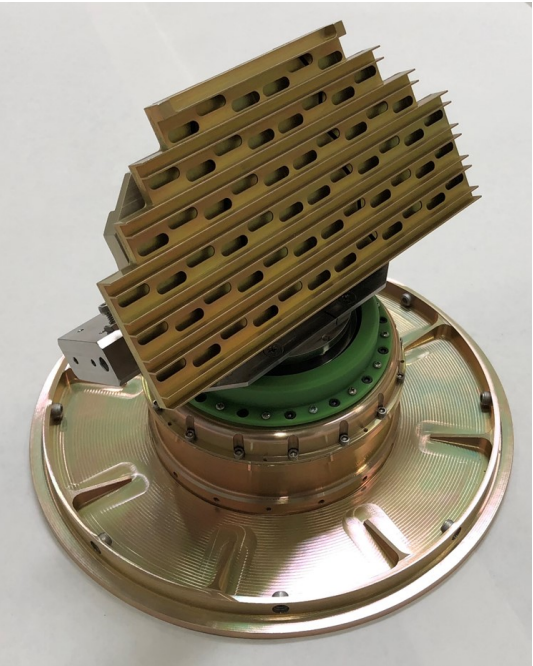
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High Gain/Low Profile Ku Band TCDL Antenna  
Model AD-200

The Pacific Antenna Systems (PAS) Model AD-200 Ku Band (14.40—15.35 GHz) is a high performance lightweight (4.8 lbs. not-including Radome) low profile (5.9” total height) high gain, antenna terminal ideal for full duplex rotary/fixed wing aircraft applications. The AD-200 provides 24.0 dBi (minimum) gain and is ideal for long range airborne and lightweight ground applications. The Azimuth & Elevation drives are both efficient high performance, low power consumption (> 13 Watts @ 20°C) direct drive system. Azimuth drive is capable of high velocities (>500sec) and accelerations (>1000°/sec²) and the Elevation drive is capable of high velocities (>100/sec) and accelerations (>200°/sec²).

The AD-200 has several flexible and re-configurable control interfaces including EtherCAT, analog torque, analog velocity, serial position & velocity. The Azimuth RF interface is an SMA (F) and an integral RF rotary joint allows for continuous 360° rotation and high angular rates. Modular design allows quick repair, replacement of servo amps, antenna array, RF rotary joints as LRU’s.

The AD-200 small mounting base (4.5” diameter) mates it ideal for pods and tight fuselage mounting applications. Contact PAS for complete electrical and mechanical ICD documentation.



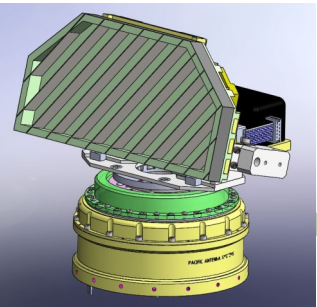
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Antenna Parameter (AD-200)	Expected Performance
Antenna	Slotted Waveguide Array with Polarizer
Operating Frequency	14.40 – 15.85 GHz
Polarization	RHCP
VSWR	2.0:1 maximum
RF Interface	SMA (F)
Axial Ratio	2.0 dB max.
Power Handling	100 Watts C.W.
Antenna Gain (nominal)	
14.40 – 15.85 GHz	24.0 dBi
Antenna Beamwidth (-3 dB)	
Azimuth	6.3° (nominal)
Elevation	12.7° (nominal)
Azimuth Sidelobes (minimum)	
14.40 -15.35 GHz	< -14 dBc
Positioner	Expected Performance
Type	Azimuth (360 Cont. Rotation) Elevation (Limited Travel)
Velocity	Az > 500°/sec El > 100°/sec
Acceleration	Az > 1000°/sec² El > 200°/sec²
Travel	Azimuth 360° continuous electrical (rotary joint assembly)
Travel	Elevation -10° to +85°
Environmental & EMI/EMC (System designed to comply to the following MIL Standards)	MIL-STD-810F MIL-STD-461F
Primary Input Power (+12-28 VDC)	Nominal power consumption @ 20°C 13 Watts, 12 VDC (full operation); +12 VDC @ 120 Watts (Maximum Cold Start)
Weight (Maximum Including Radome)	6.5 lbs. (2.95 KG)



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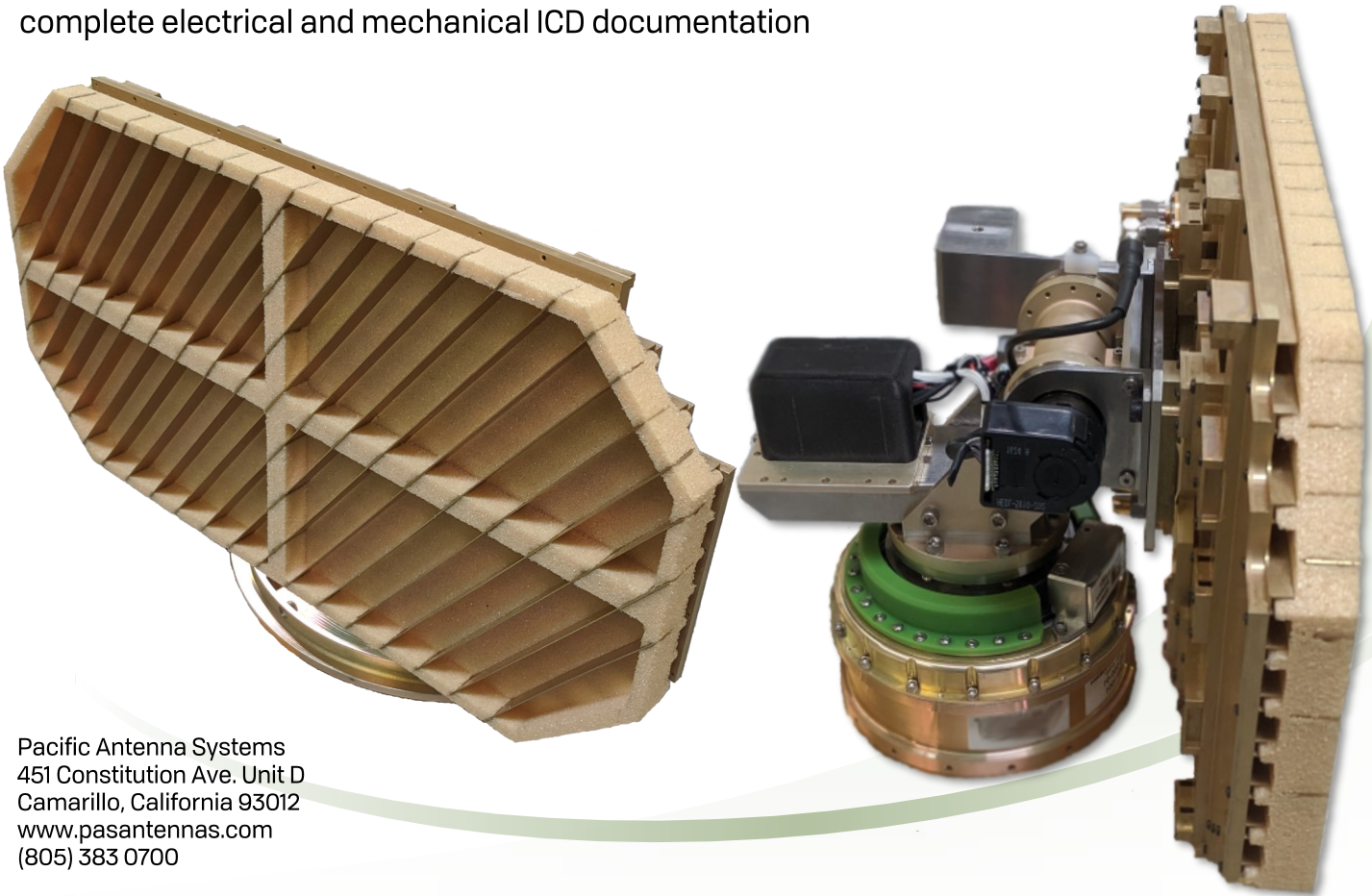
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## High Gain/Low Profile Ku Band TCDL Antenna with integrated Monopulse Comparator for Auto-tracking

### Model AD-300

The Pacific Antenna Systems (PAS) Model AD-300 Ku Band (14.40—15.35 GHz) is a high performance lightweight (10 lbs. not-including Radome) low profile (9.8” total height) high gain, antenna terminal ideal for full duplex portable ground, airborne, and shipboard applications. The AD-300 provides 30.0 dBi gain with integrated monopulse comparator for autotracking and stabilized high dynamic applications. The Azimuth & Elevation drives are both efficient high performance, low power consumption (> 13 Watts @ 20°C) direct drive system. Azimuth drive is capable of high velocities (>300/sec) and accelerations (>1000°/sec²) and the Elevation drive is capable of high velocities (>100/sec) and accelerations (>200°/sec²).The AD-300 has several flexible and re-configurable control interfaces including EtherCAT, analog torque, analog velocity, serial position & velocity.

The Azimuth RF interface is an SMA (F) for SUM, DELTA AZ, DELTA EL monopulse RF ports and an integral RF rotary joint allows for continuous 360° rotation and high angular rates. Modular design allows quick repair, replacement of servo amps, antenna array, RF rotary joints as LRU’s. The AD-300 small mounting base (4.5” diameter) mates it ideal for pods and tight fuselage mounting applications. Contact PAS for complete electrical and mechanical ICD documentation



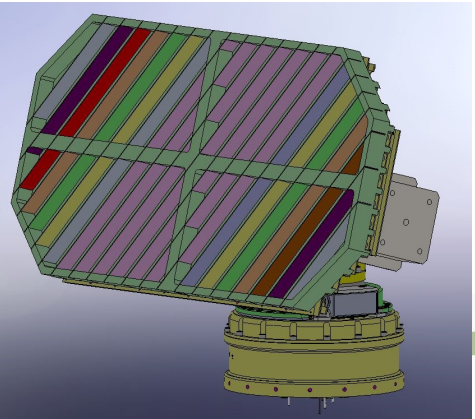
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Antenna Parameter (AD-300)	Expected Performance
Antenna	Slotted Waveguide Array with Polarizer
Operating Frequency	14.40 - 15.35 GHz
Polarization	RHCP
VSWR	2.0:1 maximum
RF Interface	SMA (F)
Axial Ratio	2.0 dB maximum
Power Handling	100 Watts C. W.
Antenna Gain (nominal)	30.0 dBi
Azimuth Beamwidth (-3 dB)	2.8° (nominal)
Elevation Beamwidth (-3 dB)	6.5° (nominal)
Azimuth Sidelobes (minimum)	< -14 dBc
Positioner	Expected Performance
Type	Azimuth (36 Continuous Rotation) over Elevation (Limited Travel)
Velocity	Azimuth > 300° /sec
	Elevation > 100° /sec
Acceleration	Azimuth > 1000° /sec²
	Elevation > 200° /sec²
Travel	Elevation -10° to +88°
Environmental & EMI/EMC (System designed to comply to the following MIL Standards	MIL-STD-810F MIL-STD-461F
Primary Input Power (+12-28 VDC)	Nominal power consumption @ 20°C 13 Watts, 12 VDC (full operation); +12 VDC @ 120 Watts (Maximum Cold Start)
Weight (Maximum Including Control Electronics and Heatsinks)	10 lbs. (4.55 kg)



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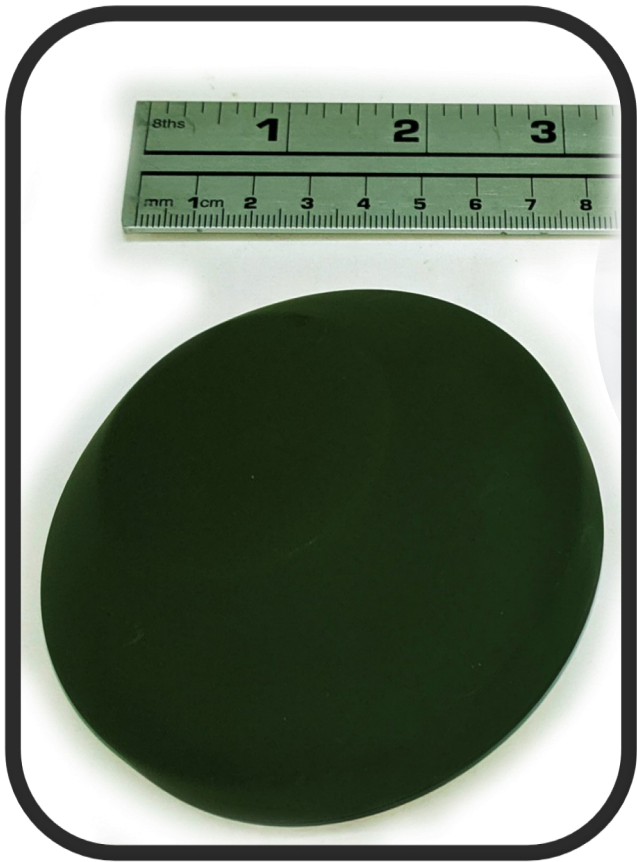
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Omni Directional Ku Band Antenna

Model AO-100-Ku

The Pacific Antenna Systems (PAS) Model AO-100-Ku Band (14.40—15.35 GHz) is a high performance lightweight (lbs) low profile (3.290” total height) Omnidirectional antenna terminal ideal for full duplex rotary/fixed wing aircraft applications. The AO-100-Ku provides +3 dBi (minimum) antenna gain over wide Elevation angular coverage ~70° [-3dB BW]) and 360° Azimuth. The AO-100-Ku is ideal for airborne or portable ground applications. Contact PAS for complete electrical and mechanical ICD documentation



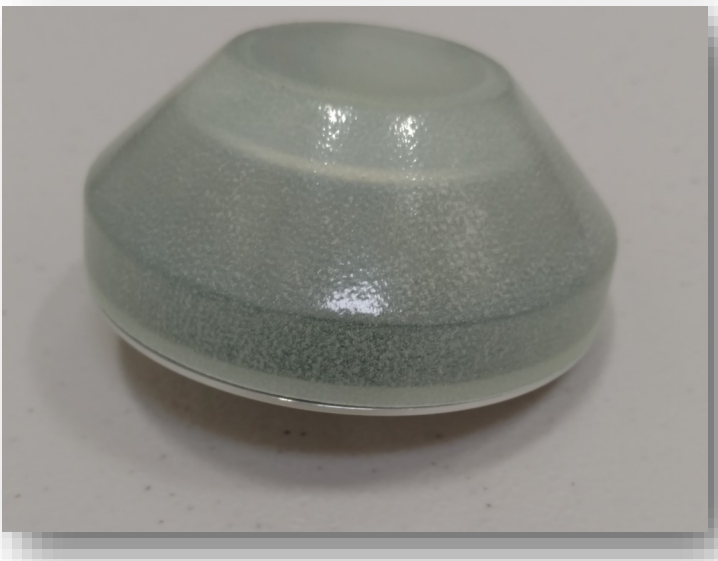
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Omnidirectional Antenna	Expected Performance
Antenna	Omnidirectional
Operating Frequency	14.40 – 15.85 GHz
Polarization	RHCP
VSWR	2.0:1 maximum
RF Interface	SMA (F)
Axial Ratio	2.0 dB max.
Power Handling	100 Watts C.W.
Antenna Gain (nominal)	
14.40 – 15.85 GHz	3.0 dBi
Antenna Beamwidth (-3 dB)	
Azimuth	360°( omnidirectional)
Elevation	Gentle roll off up to 70° elevation
Size	1.380 inches high
	3.290 inches diameter
Environmental	
Weight (Maximum Including Radome)	0.20 lbs.
Environmental	+50 to -40°C



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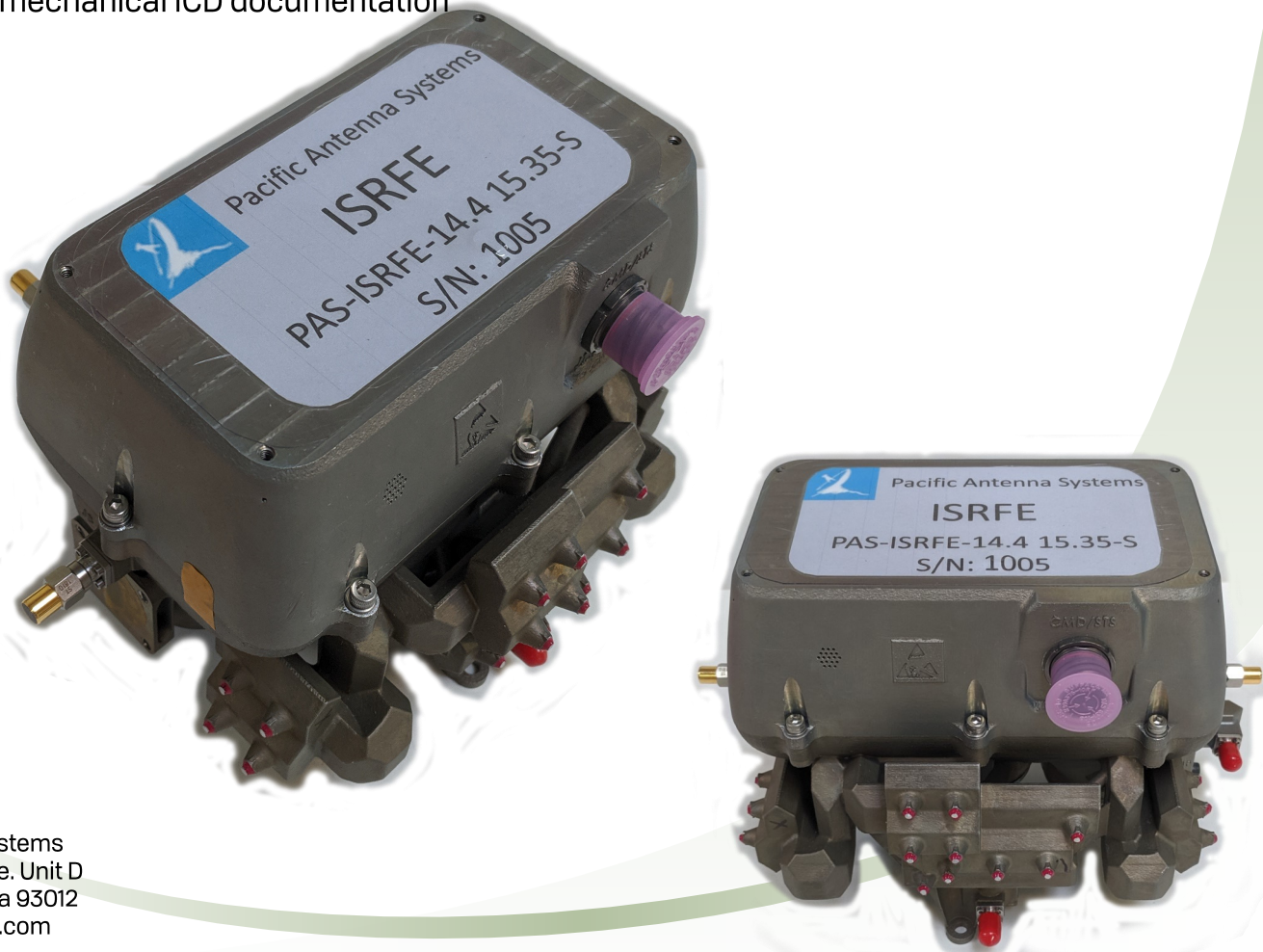
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Integrated Swappable Radio Frequency Equipment (ISRFE)

High Isolation, Integrated Ku Band Filter & Switch assembly for TCDL floppable applications

The Pacific Antenna Systems (PAS) ISRFE Ku Band (14.40—15.35 GHz) is an integrated microwave assembly that contains 5 high isolation waveguide switches, 4 custom tuned waveguide filters and 1 high isolation diplexer. The ISRFE is designed to solve the PCE/SCE frequency gender issue inherently created by Frequency Division Duplex (FDD) communication systems. In FDD, one terminal uses band b1 for Tx and b2 for Rx, the opposite terminal must use the complimentary band b2 for Tx and b1 for Rx for the system to operate. They are defined as Surface (SCE), and Perimeter (PCE) Communications Equipment. Normally, SCE and PCE require different RF baseband equipment. The PAS ISRFE allows one set of baseband equipment for both (SCE & PCE) and is easily floppable with 1 TTL line. The ISRFE is lightweight (<3lbs.) high isolation (> -120dB) and when coupled with PAS Antennas, SSPA and LNA one set of (affordable, small SWaP) gear can do all the jobs needed for TCDL applications and is dynamically re-configurable without changing or swapping any hardware or connectors. Contact PAS for complete electrical and mechanical ICD documentation



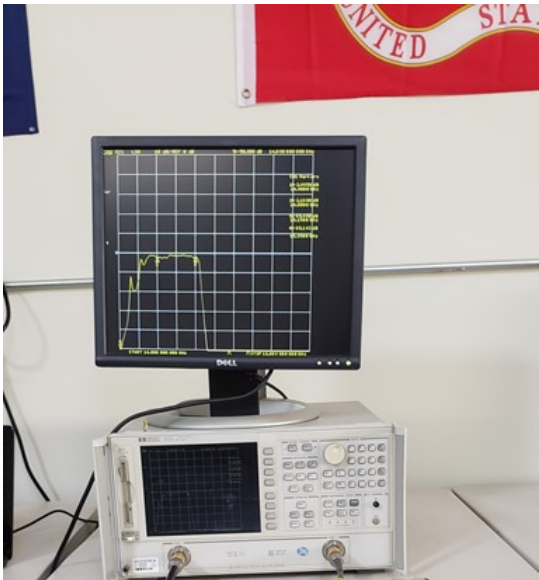
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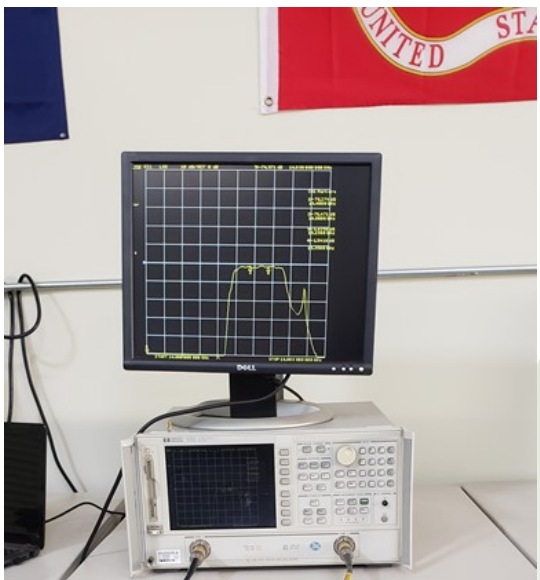
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ISRFE Integrated Filter & Switch Parameter	Expected Performance
Tx Frequencies	15.15-15.35GHz
Rx Frequencies	14.4-14.8 GHz
Filter Rejection (out-of-band)	> -60dB
Filter Insertion Loss (in-band)	0.25dB
Diplexer Rejection (out-of-band)	60dB
Diplexer Insertion Loss (in-band)	0.5dB
Line Loss	0.08dB
Switch Rejection	> -60dB
Switch Loss	0.15dB
Switch Level	GPIO +5/0 VDC
Status 1 & 2	GPIO +5/0 VDC
Channel to Channel isolation	> -120dB
Tx RF Path Loss Maximum (in-band)	1.6dB (maximum)
Rx RF Path Loss Maximum (in-band)	1.6dB (maximum)
Weight	3lb.



ISRFE Switched to PCE Low Band Tx  
Tx 14.40-14.80 GHz  
Rx 15.15-15.35



ISRFE Switched to SCE High Band Tx  
Tx 15.15-15.35 GHz  
Rx 14.40—14.80



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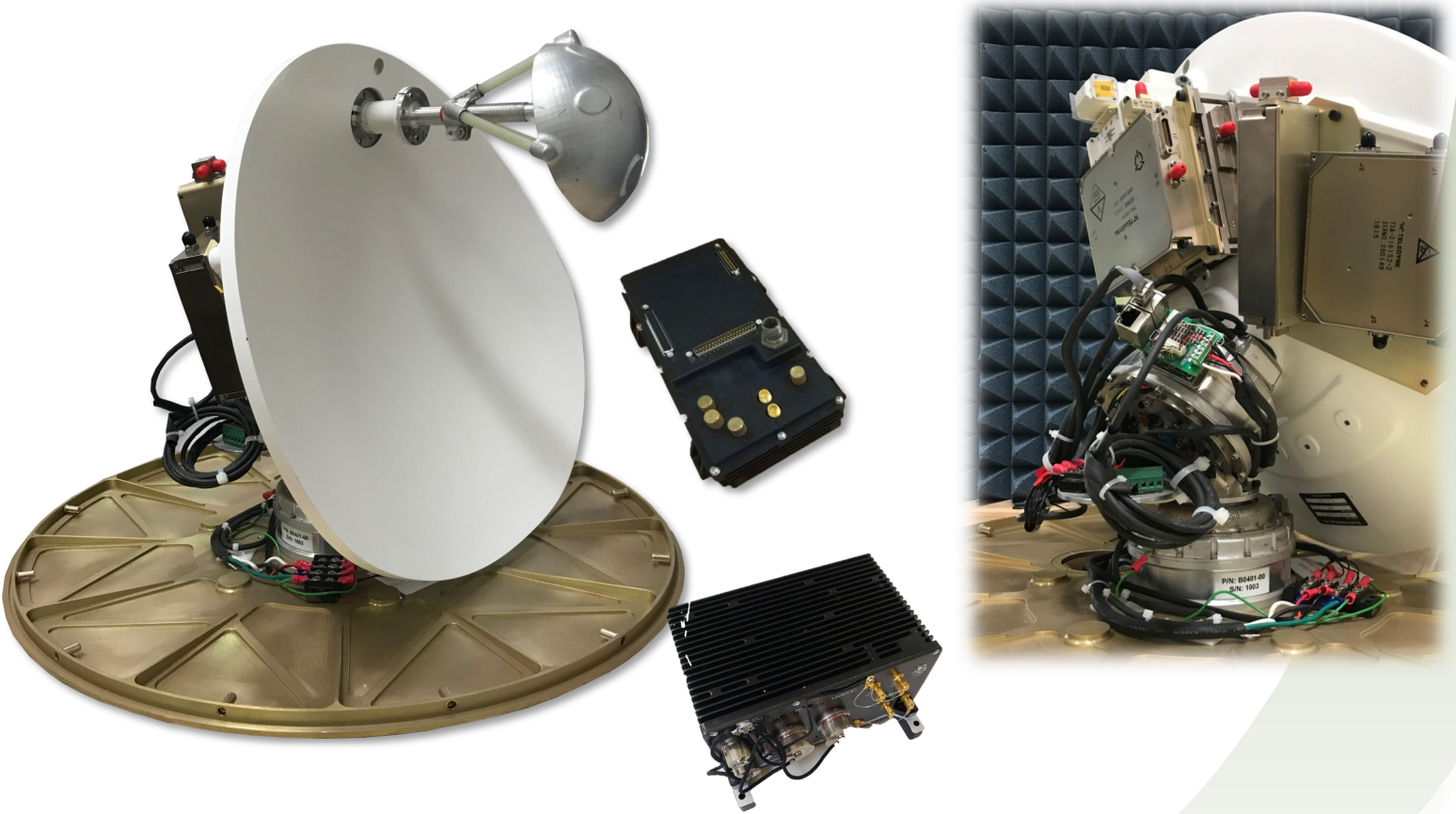
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Airborne 17" Ka Band SATCOM Antenna

Model AS-400-Ka

The Pacific Antenna Systems (PAS) Model AS-1000-Ka Band is a motion stabilized, high performance, lightweight (27 lbs.) low profile (15.5" total height) antenna terminal ideal for full duplex SACOM aircraft applications. The AS-400-Ka 17.5" equivalent antenna aperture provides very high Ka Band composite G/T and transmit EIRP as RF path losses are minimized with the unique antenna geometry allowing RF components to be close to the radiating elements. The AS-400-Ka's unique Oblique Scanning (OBSCAN) positioner provides efficient , high acceleration/torque and the antenna's controller can be co-located or easily remoted. Contact PAS for complete electrical and mechanical ICD documentation.



AHRS/IMU Motion Stabilized • Monopulse RF Tracking (Optional) • For use on WGS Satellites • Switchable RHCP/LHCP • Motion Stabilized • L-Band (IF) • RF Monopulse Autotrack

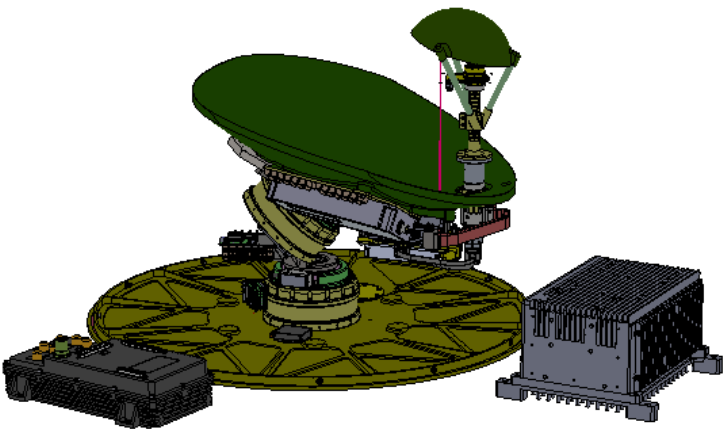
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Expected Performance	Parameter
SPECIFICATIONS (Radome Not Included) Ka Band	
Frequency - Receive	20.2 to 21.2 GHz
Frequency - Transmit	30.0 to 31.0 GHz
Model Number	AS-1000
RF Aperture Size	17 inches
Pedestal 2 Axis Obscan	2 Axis (Azimuth/Cross)
SSPA (P1dB)	14 Watts
G/T Typ at Midband (30° El, 25°C)	13.1 dB/K
EIRP Typ Midband and P1 dB	51 dBW
Beamwidth, 3 dB, (Rx/Tx)	2.4°/1.6°
Sidelobes, Tx	MIL-STD-188-164A
Polarization	Circular, RH/LH or LH/RH, Selectable
Axial Ratio within Tracking Accuracy, Rx/Tx	1.5/1.0
Azimuth Travel	360 deg
Elevation Travel	0° (horizon) to +90°
Tracking Performance	< 0.20°
Satellite Acquisition Time	< 3 min (cold)
Height	16.00 inches
Diameter	22 inches
Weight	< 35 lbs (depending on plate configuration)
Operating Temperature -65°C to +65°C	-40°C to +65°C
L Band IF Tx/Rx	1000 to 2000 MHz
Supply Voltage	28 VDC per MIL-STD-1275B and MIL-STD-704F
Power	220Watts Continuous (including SSPA)



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