GENERAL DYNAMICS
SATCOM Technologies

Ka-Band Satcom Products
General Dynamics SATCOM Technologies offers a broad portfolio and expertise with emerging Ka-band applications. Our engineering teams are unmatched in experience with Ka-band products and solutions including large and small antennas, feeds, RF electronics, filters, and drive systems for these demanding applications.
Ka-Band Terminals and Earth Stations

EDGE TERMINALS

GATEWAY TERMINALS

TT&C TERMINALS
Electronics for Ka-band

SATCOM Technologies offers a broad line of Block Up / Down Converters, LNA’s, LNB’s, and redundant systems covering the full Ka band.

- State-of-the-art HEMT or GaAs FET technology
- High duty cycle of today’s emerging Ka broadband / SATCOM market
- Significant experience with Ka band SSPA’s with embedded BUC’s for custom solutions.
- All of our electronics can be packaged for outdoor installations in the hub for maximum gain.
Ka-Band RF Products

General Dynamics SATCOM Technologies is a leading supplier of antenna feed components for the various commercial and military markets.

- Multiport Circular or Linear Diplexers Power Combiners
- Monopulse Tracking Couplers
- Mode Components
- Transitions
- Filters
- Flexible Waveguide
- Waveguide Bends
- Twists & Runs,
- Other Ka components in frequencies from 17.0 to 31.0 GHz.
Antenna Controls

Controls and M&C

Antenna Control Units
• Antenna Pointing Units (for < 2m)
• StepTrack ACUs (for 2m to 8m)
• Monopulse ACUs (for >8m)

Monitor & Control Systems
• Fully Networked and Suitable for Geographic Diversity Operation
Many Ka-Band Products Delivered

Our experience:

General Dynamics SATCOM Technologies (GDST) is the preeminent provider of Ka-Band Antenna Systems and Earth Stations in the world. GDST has been involved in Ka-Band programs since 1991 beginning with the NASA ACTS antenna. We design and commission Ka-Band terminals from 65 cm to 22 meters in diameter having shipped over 357,000 Ka – band terminals including terminals for DirecTV and Echostar.

SATCOM Technologies Terminal Products

<table>
<thead>
<tr>
<th>Type</th>
<th>User Terminal</th>
<th>Gateway Terminal</th>
<th>Infrastructure Terminals</th>
<th>TT&amp;C Terminals</th>
<th>Scientific Terminals</th>
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<td>1.67M</td>
<td>15</td>
<td>120</td>
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<td>6</td>
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<tr>
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<td>28</td>
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<tr>
<td></td>
<td>6M</td>
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<td>Total 158</td>
<td>Total 61</td>
<td>Total 72</td>
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Transportable Ka-Band Terminals
Transportable Ka-Band Terminals

Trailer mounted SATCOM terminal
- Quad band operation including Ka-Band
- Self-contained earth station
  - Multi-band antenna
  - Multi-band RF equipment
  - Baseband equipment
  - Power generator and conditioner
- Auto-acquisition ACU
- Hundreds have been deployed
ARSTRAT and DISA Certified and Certifiable

GD Satcom has terminal certification experience and in providing antenna products to be certified to the following:

- ARSTRAT
- DSCS/DISA
- **MIL-STD-188-164A**
- FCC
- Intelsat
- Eutelsat

Flyaways  Mobiles  IOT  Gateway
Terminal Control Unit – Monitoring And Control System

- Displayed on Laptop or Handheld from Remote location via Ethernet
- Displays L-band TX/RX Spectrum
- Downloadable Configurations
GD SATCOM Ka-Band update

GD SATCOM continues to lead the world in Ka-band ground infrastructure

- Military and commercial Ka-Band
- Antennas from less than 1 Meter to 18 Meters in size
- Single and multi-carrier terminals

More satellites now on orbit

- Commercial Ka-Band service active many world regions
- Military Ka-Band coverage in many world regions
- WGS is upgrading GBS for U.S. DoD Ka-band coverage

Nilesat Ground Station
6 -Meter Ka-Band Terminals on Turning Head Pedestal (VA)
Ka-Band Antenna Products

VSAT antennas
Small Antenna Products
35 cm to 3.8 Meters in size

Gateway antennas
Large and Tactical Antenna Products
2.4 to > 18 Meters in size
30 to 70 cm Satcom-On-The-Move™
Most Ka-Band Antenna Experience in the World

Preeminent Ka-band system provider

- From the beginning
  - We built the ACTS TT&C Antenna
- To the present
  - More Ka-Band gateways than any other company

Designed and installed systems from 35cm to > 35 Meters

Satcom-On-The-Move™  Man Packs  DSA II 35-Meter X-Ka Band (VA)
Ka-Band Antenna Competitive Advantages

GDST is the premier supplier of high performance, large-dish antenna systems with distinctive advantages over our competition:

- Successful Ka-Band History
- TT&C Experience
- System Thermal Characteristics
- Anti-Icing Systems
- Structural Integrity
- Hub Integration Experience
- Experienced Field Installation and Test Teams
- Repeatable Results
- Self-contained, In house expertise

4.8 m AMOS-4 Ka Band (VA)
Ka-Band Medium Range Antenna Systems

Antenna Standard Diameter
- 4.8 / 6.3 / 8.1 / 9.0 / 11.1 / 13 M LMA, …

Frequency Ranges:
- 17.7-20.2 GHz RX
- 28.0-31.0 GHz TX
- Custom Bands

Representative Customers
- U.S. DBS Providers / DoD
- Eutelsat
- Telesat
- KoreaSat
- Avanti (UK)
- Intelsat (US, Australia, India)
- Astrium (YahSat TT&C Stations)
- Nilesat (Egypt)
- Spacecom (Israel)
4.8 m Ka-Band System Architecture (starter package)

4.8m KP Antenna Ka-Band
Coaxial
Waveguide
Hub
RH
ACU Servo
TCP / IP
20.2 – 21.2 GHz
30.0 – 31.0 GHz
DTR
Equipment building

Hub IFL

Option
HPA System
Located close to the HUB at the Pedestal
HPA / BUC

Test inject

IFL

Option

4.8m Ka-Band Station

Name:
E. Mellinghoff
approved:
G. Lagerweij
Drawing-Nr.
Date :
03.05.2012
VERTEX ANTENNENTECHNIK
4.8 m Ka-Band RF Components

Ka-Band Redundant TLNB System  
*TBRKA-1100*

Redundant LNB systems minimize system downtime due to LNB failure by providing a spare LNB and an automatic means of switching to the spare upon failure of the primary LNB. The system consists of an outdoor plate assembly which mounts at the antenna hub and an indoor control panel.

**Plate Assembly Features**
- TLNB20000X LN Bs
- High quality dual waveguide/coaxial switch
- Manual override
- Waveguide input flange

**Control Panel Features**
- Standard 19" rack panel, 3½" high
- Dual, redundant power supplies
- Worldwide universal AC input capability
- Manual or automatic operation
- Monitors LNB bias currents to detect faults
- Network interface

Ka-Band Low Noise Block Converter  
*TLNB20000X.0001*

**Introduction**
The TLNB20000X Ka-Band Low Noise Block Converter is specially designed for SATCOM applications. Utilizing state-of-the-art HEMT and GaAs FET technology, this block converter has been designed for both fixed and transportable applications. The TLNB 20000X has the quality, stability, and performance required for demanding receiver applications in today's SATCOM systems.

**Features**
- Low noise temperature
- High reliability HEMT design
- Phase-locked oscillator
- Excellent phase noise
- Reverse polarity protection
- Wide operating temperature range, -40 °C to +70 °C
4.8 m Ka-Band Integration example
9 m Antenna Systems

9.0 m TH Antenna (VA) for TTC
Hub Integrations

Hub Integration:
- HPAs (Up to 8 HPAs)
- BUCs & BDCs
- Diplexers
- VPC Phase Combine
- LNA Plate
Photogrammetric Measurements

Targets im Reflektor der 6,3 m Ka Band Antenne

Bild 7
Man erkennt deutlich die Verbesserung des RMS Wertes von 203 µm auf 165 µm.
Achtung (Ring 12) nicht mit in die Berechnung einbezogen und auch nicht im Bild dargestellt.
In Summary
The Industry’s Broadest Ka-Band Product Line

Ka-Band antenna products
- Standard antennas from 35 cm to 18 Meters
- Custom antennas of any aperture

Ka-band RF electronics
- LNAs, LNBs, frequency converters
- SSPAs, SSPBs, TWTAs, Millitrons, EIKs

Ka-Band tracking systems
- Simple fix-pointed to full monopulse

Network and terminal M&C Systems
- From single terminal to full networks

Most Ka-Band system integration experience
- Most Ka-Band terminals utilize antenna-mounted RF
- Since we build more of the hardware than other vendors, we can ensure maximum performance!
VERTEX ANTENNENTECHNIK GmbH